HOW TO USE THIS MANUAL

IN00U-90

GENERAL INFORMATION

1. INDEX

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

2. GENERAL DESCRIPTION

At the beginning of each section, a General Description is given that pertains to all repair operations contained in that section.

Read these precautions before starting any repair task.

3. TROUBLESHOOTING

TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The fundamentals of how to proceed with troubleshooting are described on page IN-22.

Be sure to read this before performing troubleshooting.

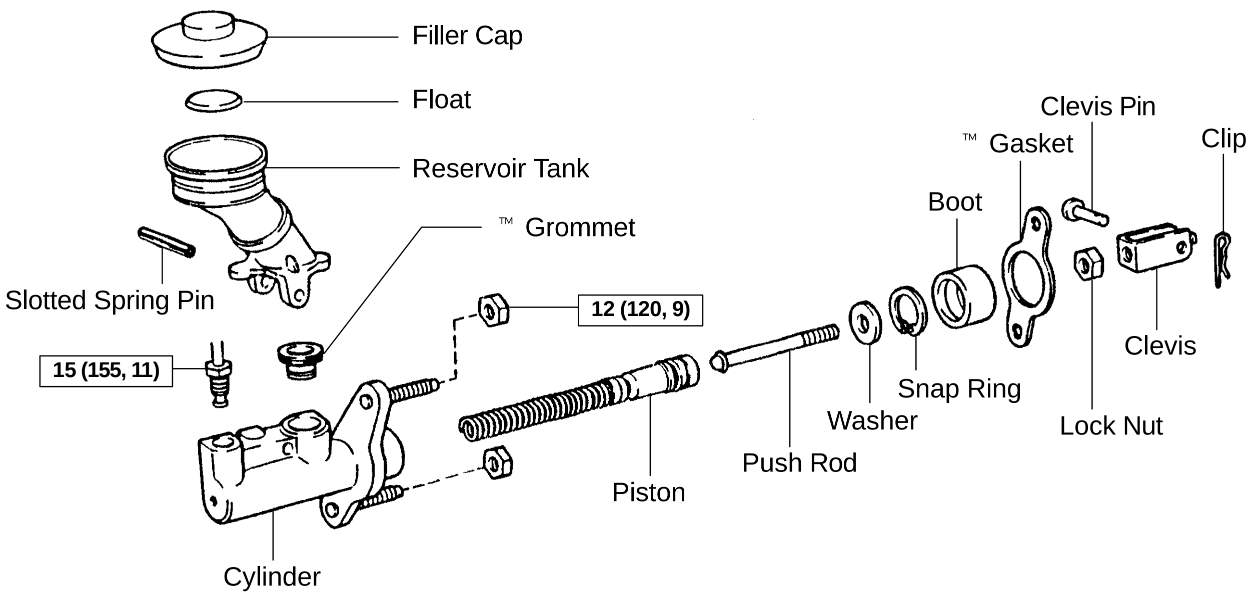
4. PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

5. REPAIR PROCEDURES

Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.

Example:



N·m (kgf·cm, ft·lbf) : Specified torque

™ Non-reusable part

N17080

The procedures are presented in a step-by-step format:

- The illustration shows what to do and where to do it.
- The task heading tells what to do.
- The detailed text tells how to perform the task and gives other information such as specifications and warnings.

Example:

Task heading : what to do

Illustration:
what to do and where

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the illustration.

SST 09350-30020 (09350-06120)

Set part No. *Component part No.*

Detailed text : how to do task

(b) Measure the stroke applying and releasing the compressed air (392 — 785 kPa, 4 — 8 kgf/cm^2 or 57 — 114 psi) as shown in the illustration.

Piston stroke: 1.40 — 1.70 mm (0.0551 — 0.0669 in.)

Specification

This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

6. REFERENCES

References have been kept to a minimum. However, when they are required you are given the page to refer to.

7. SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found in Service Specifications section for quick reference.

8. CAUTIONS, NOTICES, HINTS:

- CAUTIONS are presented presented in bold type, and indicate there is a possibility of injury to you or other people.
- NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- HINTS are separated from the text but do not appear in bold. They provide additional information to help you perform the repair efficiently.

9. SI UNIT

The UNITS given in this manual are primarily expressed according to the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the English System.

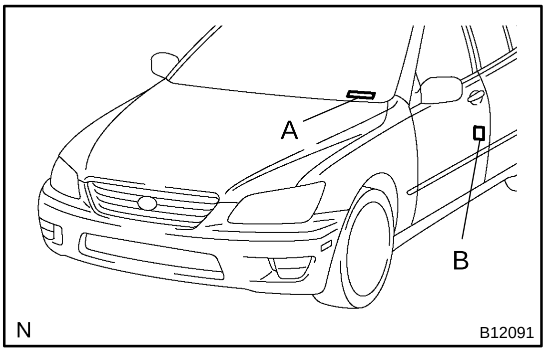
Example:

Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

IDENTIFICATION INFORMATION

IN04P-27

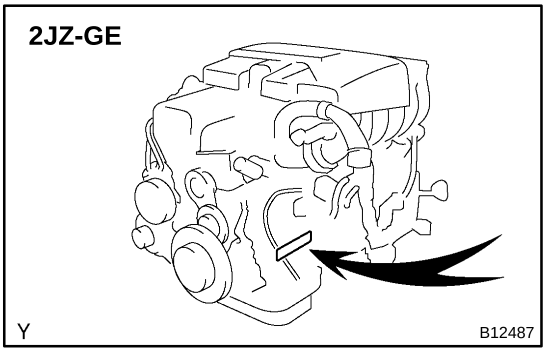
VEHICLE IDENTIFICATION AND ENGINE SERIAL NUMBER



1. VEHICLE IDENTIFICATION NUMBER

The vehicle identification number is stamped on the vehicle identification number plate and the certification label, as shown in the illustration.

A: Vehicle Identification Number Plate
B: Certification Label



2. ENGINE SERIAL NUMBER

The engine serial number is stamped on the engine block, as shown in the illustration.

REPAIR INSTRUCTIONS

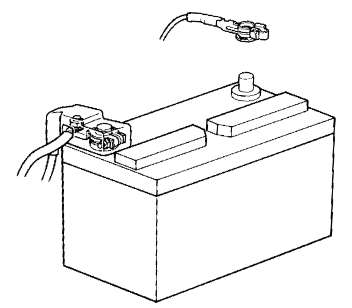
IN0DC-15

GENERAL INFORMATION

BASIC REPAIR HINT

(a) Prevent damage and maintain vehicle cleanliness by protective covering on the fender, seat and floor.

(b) During disassembly, line up parts in the order they were removed to facilitate reassembly.



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(c) Installation and removal of battery terminal:

(1) Before performing electrical work, disconnect the negative (-) terminal cable from the battery.

(2) If it is necessary to disconnect the battery for inspection or repair, first disconnect the negative (-) terminal cable.

(3) To prevent damage to the battery terminal when disconnecting the terminal cable, loosen the cable nut and raise the cable straight up. Do not twist or pry the cable off.

(4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.

(5) Install the cable ends to the battery terminals after loosening the nut, and tighten the nut after installation. Do not use a hammer to tap the cable ends onto the terminals.

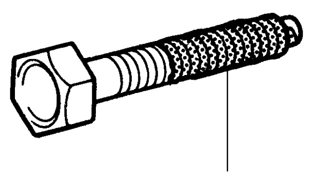
(6) Be sure the cover for the positive (+) terminal is properly in place.

(d) Check hose and wiring connectors to make sure that they are connected securely and correctly.

(e) Non-reusable parts:

(1) Always replace cotter pins, gaskets, O-rings, oil seals, etc. with new ones.

(2) Non-reusable parts are indicated in component illustrations by the " " symbols.



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(f) Precoated parts

Precoated parts are bolts, nuts, etc. that are coated with a seal lock adhesive at the factory.

(1) If a precoated part is retightened, loosened or move caused to in any way, it must be recoated with the specified adhesive.

(2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply new seal lock adhesive to the bolt, nut or threads.

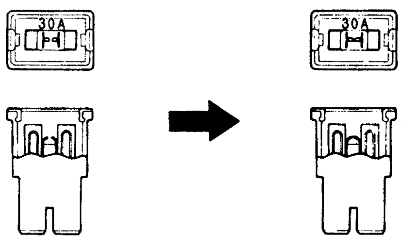
(3) Precoated parts are indicated in component illustrations by the ”” symbols.

(g) When necessary, use a sealer on gaskets to prevent leaks.

(h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.

(i) Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found in the Preparation section in this manual.

Medium Current Fuse and High Current Fuse Equal Amperage Rating



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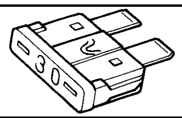
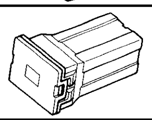
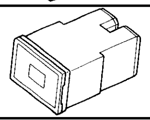
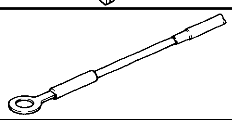
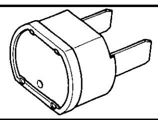
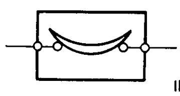
(j) When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.

Illustration	Symbol	Part Name	Abbreviation
 BE5594	 IN0365	FUSE	FUSE
 BE5595	 IN0366	MEDIUM CURRENT FUSE	M-FUSE
 BE5596	 IN0367	HIGH CURRENT FUSE	H-FUSE
 BE5597	 IN0367	FUSIBLE LINK	FL
 BE5598	 IN0368	CIRCUIT BREAKER	CB

V00076

(k) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (see page IN-8).

™ Release the parking brake on a level surface and shift to in Neutral or N range.

™ When jacking up the front wheels of the vehicle, at first place chocks behind the rear wheels.

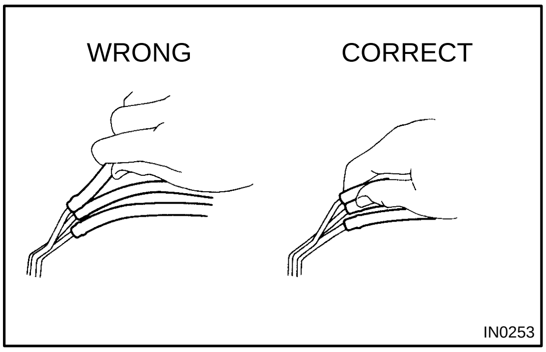
™ When jacking up the rear wheels of the vehicle, place chocks in front of the front wheels.

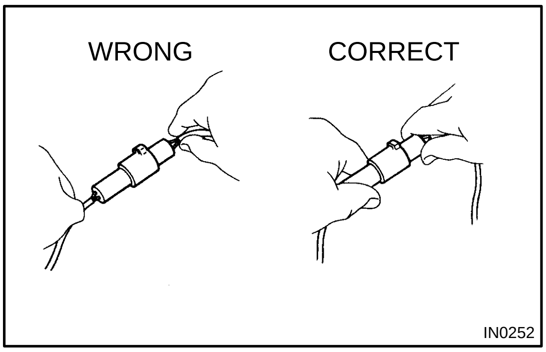
™ When jacking up only the front or rear wheels, set rigid racks and place chocks on front and behind the wheels in contact with the ground.

™ After the vehicle is jacked up, be sure to support it on rigid racks. It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.

(l) Observe the following precautions to avoid damage to the following parts:

(1) Do not open the cover or case of the ECU unless absolutely necessary. (Static electricity transmitted through human touch may destroy the IC.)





(2) To disconnect vacuum hoses, pull off the end of the hose, not the middle.

(3) To pull apart electrical connectors, pull on the connector itself, not the wires.

(4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.

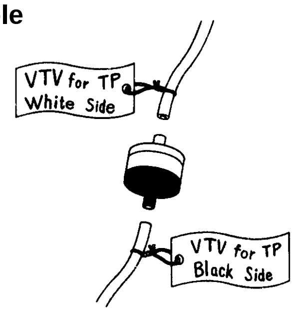
(5) When steam cleaning an engine, protect the electronic components, air filter and emission-related components from water.

(6) Never use an impact wrench to remove or install temperature switches or temperature sensors.

(7) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.

(8) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter for adjustment. Once the hose has been stretched, it may leak air.

Example



IN0002

(m) Installation and removal of vacuum hose:

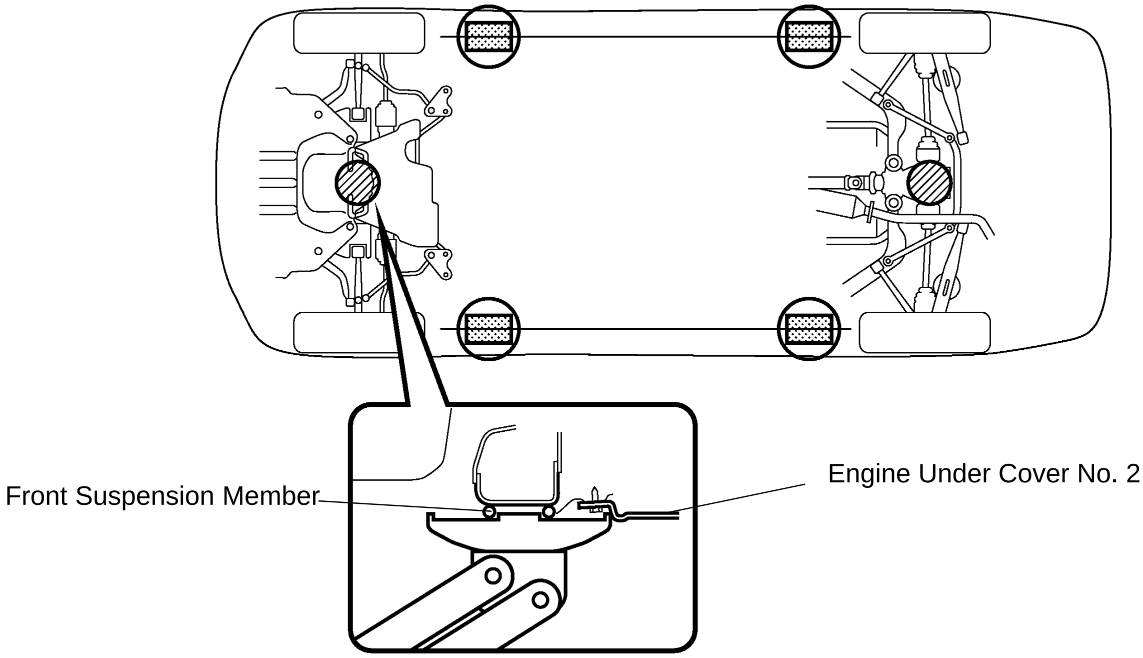
(1) When disconnecting vacuum hoses, use tags to identify where they should be reconnected to.

(2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

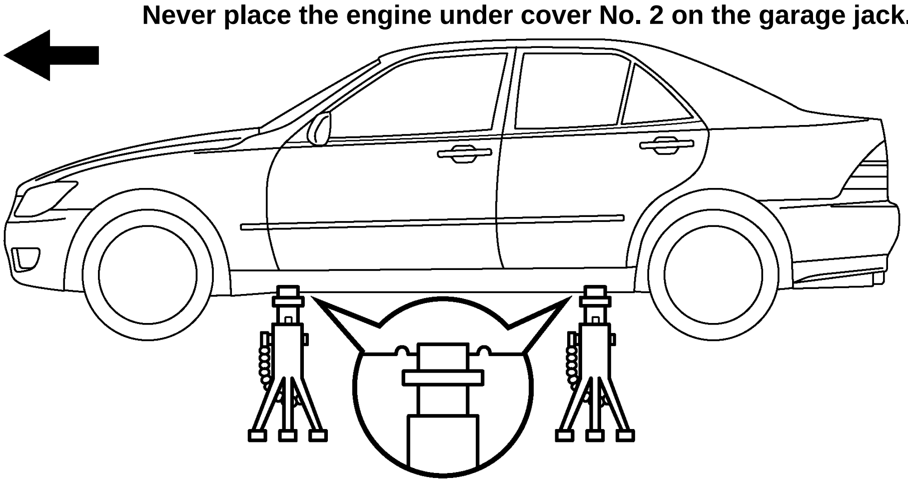
(n) Unless otherwise stated, all resistance should be measured at an ambient temperature of 20°C (68°F). Measurement should be made after the engine has cooled down. If measured at high temperatures immediately after the vehicle has been running, resistance may be outside specifications.

IN04O-16

VEHICLE LIFT AND SUPPORT LOCATIONS



NOTICE:
Never place the engine under cover No. 2 on the garage jack.



JACK POSITION

Front - - - - - - - - - Front suspension member
Rear - - - - - - - - - Differential carrier

CAUTION : **When jacking-up the front and rear, make sure the vehicle is not carrying any extra weight.**

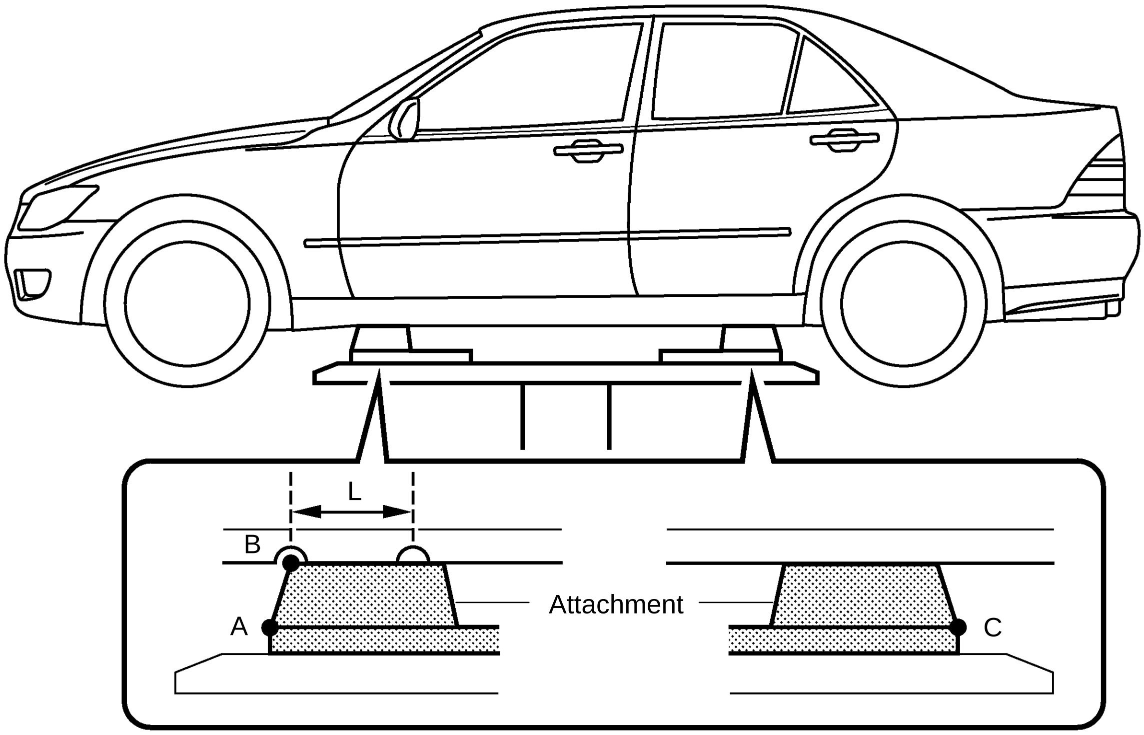
PANTOGRAPH JACK POSITION

SUPPORT POSITION

Safety stand and swing arm type lift -

I19098

Plate type lift



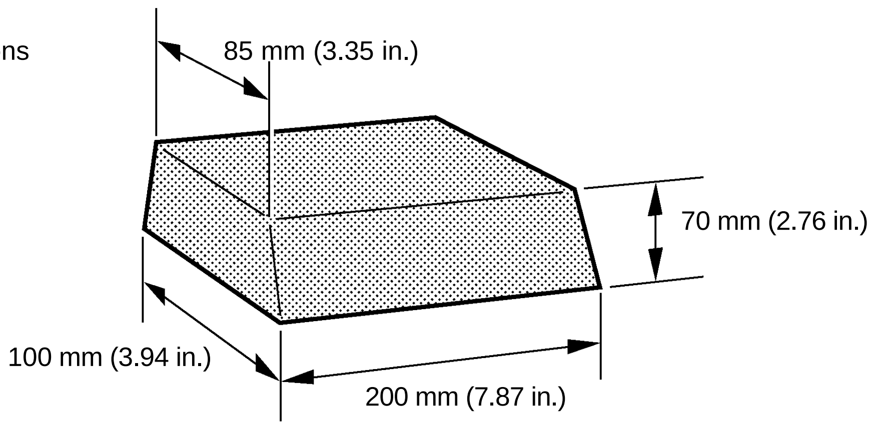
HINT :

Right and left set position	Place the vehicle over the center of the lift.
Front and rear set position	✓When using attachments, place the one for front side vertically and the one for rear side horizontally to the vehicle. ✓Align the cushion gum ends of the plate with the attachment lower ends (A, C). ✓Align the attachment upper end (B) with the rocker flange front side notch.

NOTICE :

Check the interference of the attachment with the front floor cover when placing the attachment on the plate.

Attachment dimensions



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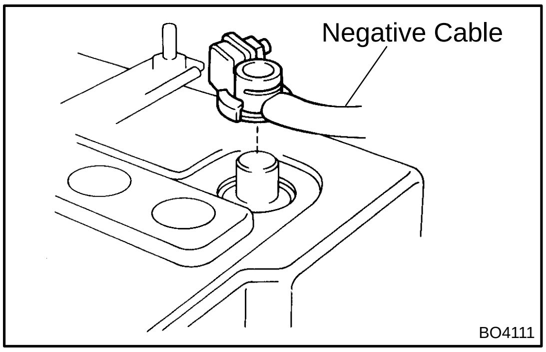
FOR ALL OF VEHICLES

IN0KE-01

PRECAUTION

1. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

(a) The LEXUS IS300 is equipped with an Supplemental Restraint System (SRS), such as the driver airbag, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly and seat belt pretensioners.
Failure to carry out service operations in the correct sequence could cause the supplemental restraint system to unexpectedly deploy during servicing, possibly leading to a serious accident.
Further, if a mistake is made in servicing the supplemental restraint system, it is possible the SRS may fail to operate when required. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedure described in this manual.



(b) GENERAL NOTICE

(1) Malfunction symptoms of the SRS are difficult to confirm, so the diagnostic trouble codes become the most important source of information when troubleshooting. When troubleshooting the supplemental restraint system, always check the diagnostic trouble codes before disconnecting the battery (see page DI-597).

(2) Work must be started after 90 seconds from the time the ignition switch is turned to the LOCK position and the negative (-) terminal cable is disconnected from the battery.
(The supplemental restraint system is equipped with a back-up power source so that if work is started within 90 seconds of disconnecting the negative (-) terminal cable from the battery, the SRS may deploy.)
When the negative (-) terminal cable is disconnected from the battery, memory of the clock and audio systems will be cancelled. So before starting work, make a record of the contents memorized by the each memory system. Then when work is finished, reset the clock and audio systems as before. To avoid erasing the memory of each memory system, never use a back-up power supply from another battery.

(3) Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad (see page RS- 17), front passenger airbag assembly (see page RS- 31), side airbag assembly (see page RS-44), curtain shield airbag assembly (see page RS-58), front airbag sensor (see page RS-74), side and curtain shield airbag sensor assembly (see page RS-79) and seat belt pretensioner (see page BO-220) should be inspected.

(4) Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.

(5) Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.

(6) Never disassemble and repair the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, front airbag sensor, side and curtain shied airbag sensor assembly or seat belt pretensioner.

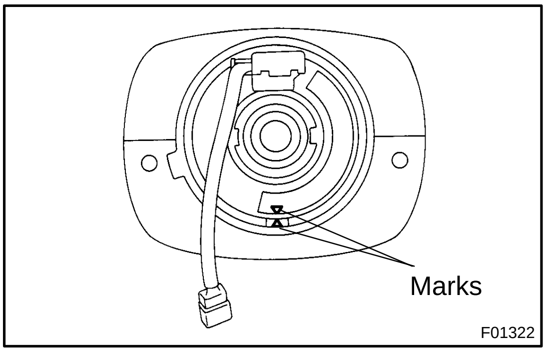
(7) Replace if the airbag sensor, steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, front airbag sensor assembly or seat belt pretensioner if it has been dropped, or if there are cracks, dents or other defects in its case, bracket or connector.

(8) Do not directly expose the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, front airbag sensor, side and curtain shied airbag sensor assembly or seat belt pretensioner to hot air or flames.

(9) Use a voltmeter/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting of the electrical circuit.

(10) Information labels are attached to the periphery of the SRS components. Follow the instructions on the labels.

(11) After work on the SRS is completed, check the SRS warning light (see page DI-597).



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(c) SPIRAL CABLE (in Combination Switch)
The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may result. Refer to SR-25 of this manual concerning correct steering wheel installation.

(d) STEERING WHEEL PAD (with Airbag)

(1) When removing the steering wheel pad or handling a new steering wheel pad, it should be placed with the pad top surface facing up see illustration below. Storing the pad with its metallic surface facing upward may lead to a serious accident if the airbag inflates. In addition, do not store a steering wheel pad on top of one another.

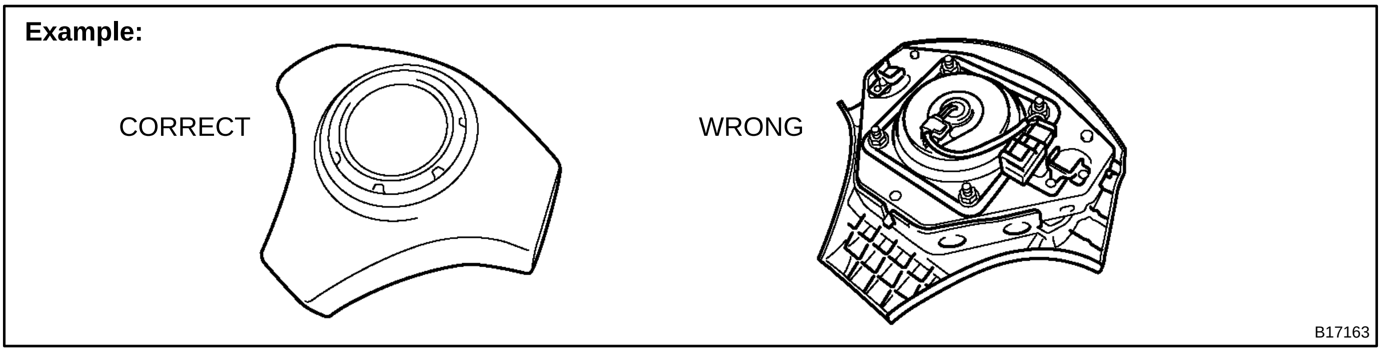
(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which is could cause serious injury.

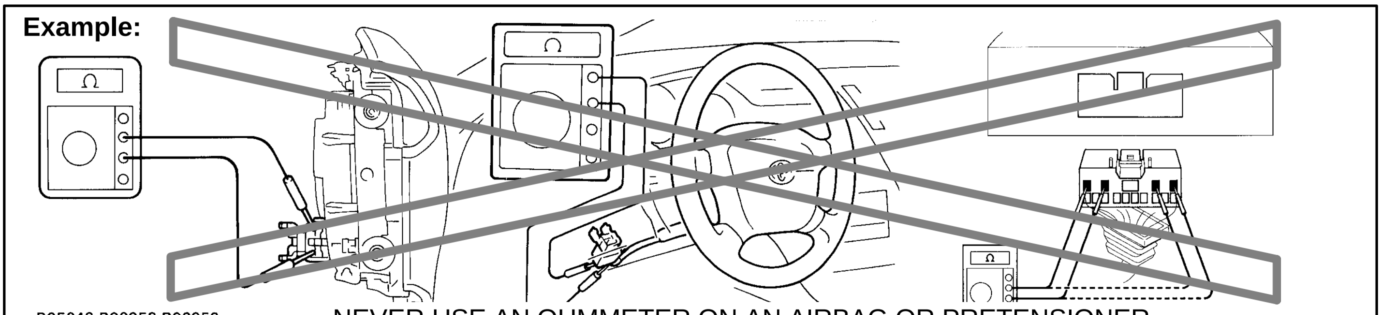
(3) Grease or detergents of any kind should not be applied to the steering wheel pad.

(4) Store the steering wheel pad where the ambient temperature remains below 93˚C (200˚F), has low humidity and is away from electrical noise.

(5) Before using an electric welder, first disconnect the airbag connector (the connector is yellow and has 4 pins) under the steering column near the combination switch connector.

(6) As a safety measure, always deploy airbags using an SST before disposal (see page RS-17). Deploy airbags in a safe place away from electrical noise.





NEVER USE AN OHMMETER ON AN AIRBAG OR PRETENSIONER

(e) FRONT PASSENGER AIRBAG ASSEMBLY

(1) Always store a removed or new front passenger airbag assembly with the airbag deployment direction facing up.
Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag inflate.

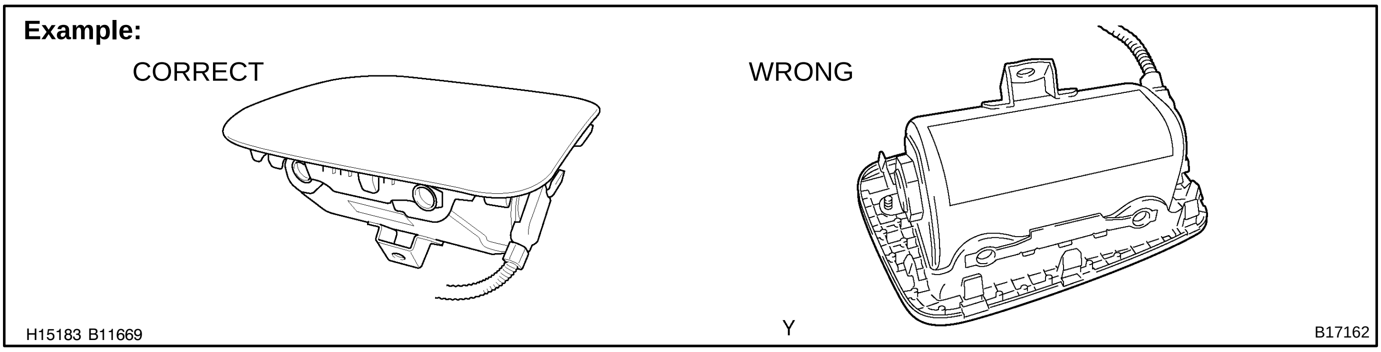
(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which is could cause serious injury.

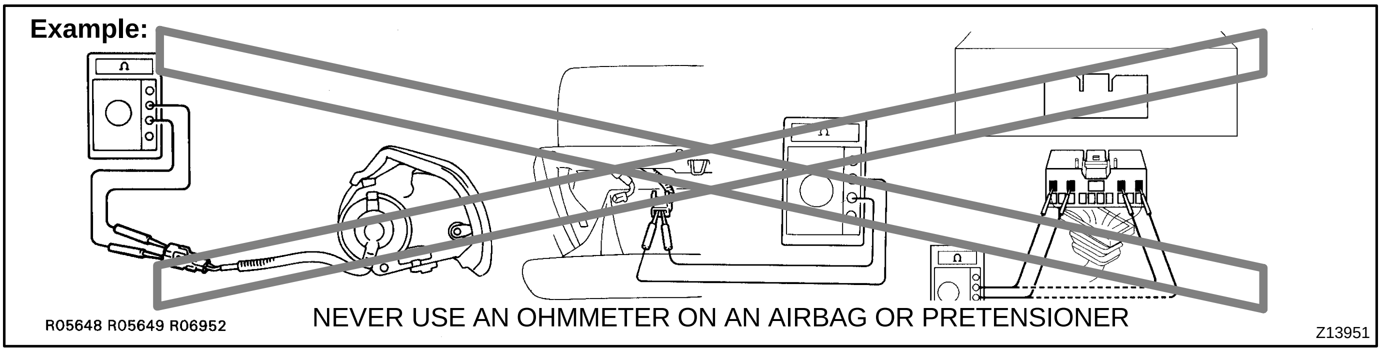
(3) Grease or detergents of any kind should not be applied to the steering wheel pad.

(4) Store the steering wheel pad where the ambient temperature remains below 93°C (200°F), has low humidity and is away from electrical noise.

(5) Before using an electric welder, first disconnect the airbag connector (the connector is yellow and has 4 pins) under the steering column near the combination switch connector.

(6) As a safety measure, always deploy airbags using an SST before disposal (see page RS-31).
Deploy airbags in a safe place away from electrical noise.





(f) SIDE AIRBAG ASSEMBLY

(1) Always store a removed or new side airbag assembly with the airbag deployment direction facing up. Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag inflates.

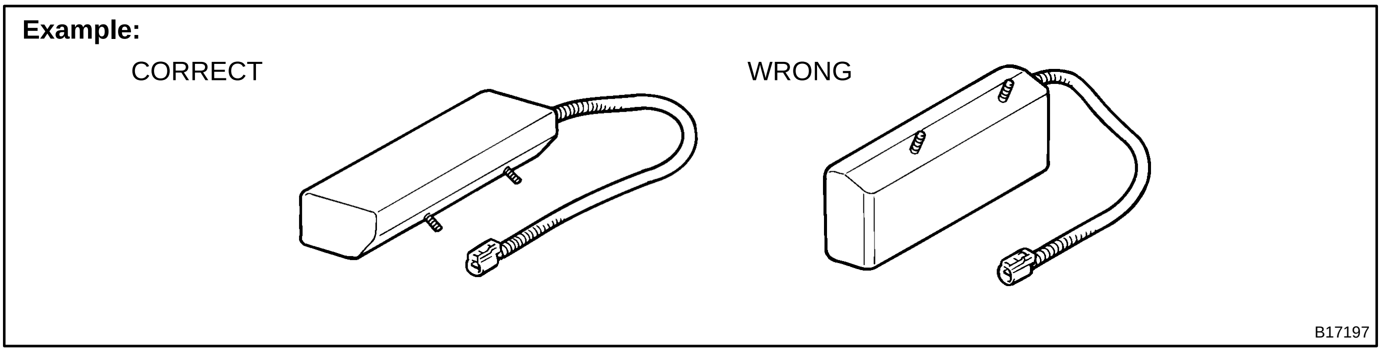
(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.

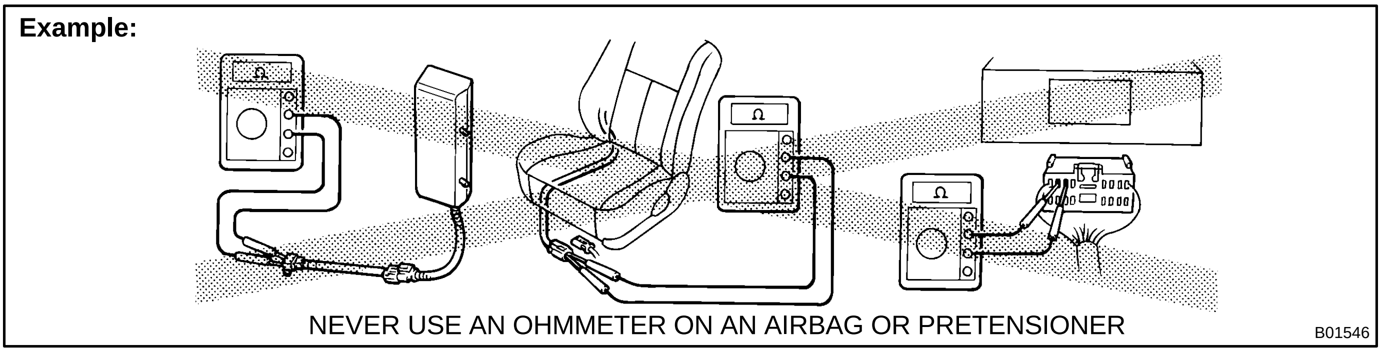
(3) Grease or detergents of any kind should not be applied to the steering wheel pad.

(4) Store the steering wheel pad where the ambient temperature remains below 93˚C (200˚F), has low humidity and is away from electrical noise.

(5) Before using an electric welder, first disconnect the airbag connector (the connector is yellow and has 2 pins) under the steering column near the combination switch connector.

(6) As a safety measure, always deploy airbags using an SST before disposal (see page RS-44). Deploy airbags in safe place away from electrical noise.





(g) CURTAIN SHIELD AIRBAG ASSEMBLY

(1) Always store a removed or new side airbag assembly with the airbag deployment direction facing up. Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag inflates.

NOTICE:

Plastic bag is not re-useable.

CAUTION:

Never disassemble the curtain shield airbag assembly.

(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.

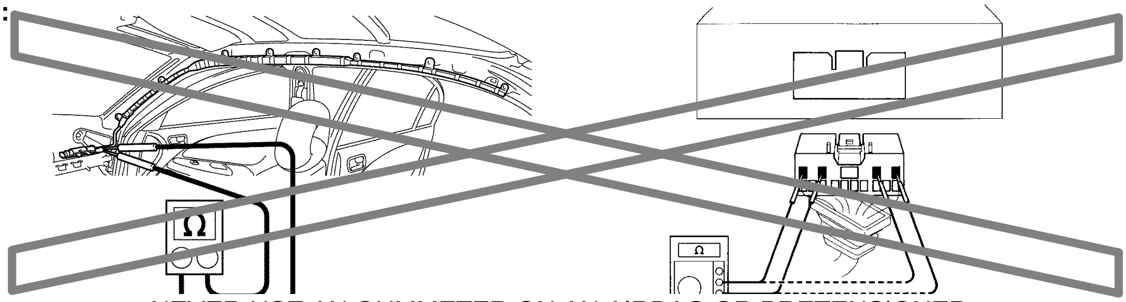
(3) Grease or detergents of any kind should not be applied to the curtain shield airbag assembly.

(4) Store the steering wheel pad where the ambient temperature remains below 93˚C (200˚F), has low humidity and is away from electrical noise.

(5) Before using an electric welder, first disconnect the airbag connector (the connector is yellow and has 2 pins) under the steering column near the combination switch connector.

(6) As a safety measure, always deploy airbags using an SST before disposal (see page RS-59). Deploy airbags in a safe place away from electrical noise.

Example:



NEVER USE AN OHMMETER ON AN AIRBAG OR PRETENSIONER

(h) SEAT BELT PRETENSIONER

(1) Never measure the resistance of the seat belt pretensioner. This may cause the seat belt pretensioner to activate, which could cause serious injury.

(2) Never disassemble the seat belt pretensioner.

(3) Never install the seat belt pretensioner in another vehicle.

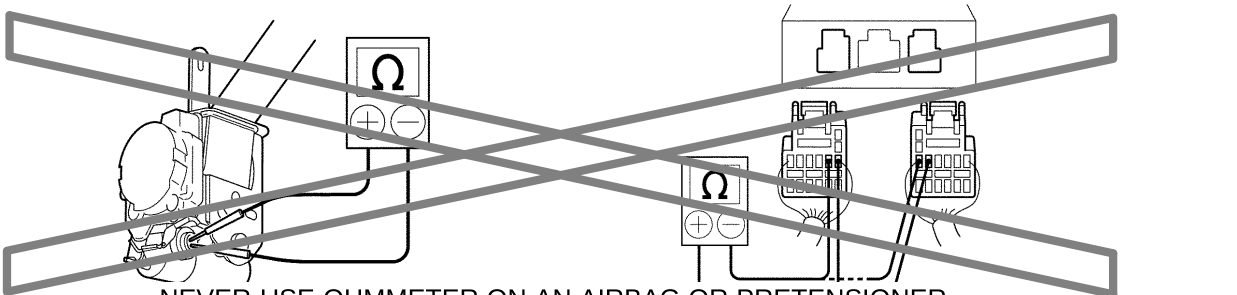
(4) Store the seat belt pretensioner where the ambient temperature remains below 80˚C (176˚F), has low humidity and is away from electrical noise.

(5) Before using an electric welder, first disconnect the connector (the connector is yellow and has 2 pins).

(6) As a safety measure, always activate the seat belt pretensioner before disposal (see page BO-220). Activate the pretensioner in safe place away from electrical noise.

(7) The seat belt pretensioner becomes hot after activation. Allow it to cool before disposing. Never use water to cool seat belt pretensioner.

Example:



NEVER USE OHMMETER ON AN AIRBAG OR PRETENSIONER

(i) AIRBAG SENSOR ASSEMBLY

(1) If an airbag sensor assembly has been involved in a collision where its SRS has deployed, do not re-use it.

(2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor mounted on the floor. Failure to do so could cause undesired deployment of the SRS.

(3) To avoid serious injury, servicing the SRS must be started 90 seconds after:

- The ignition switch is turned to the LOCK position.
- The negative (-) terminal cable is disconnected from the battery.

Even if only loosening the set bolts of the airbag sensor assembly, you must follow the above guidelines.

(j) WIRE HARNESS AND CONNECTOR

The SRS wire harness is integrated with the instrument panel wire harness assembly. All the connectors in the system are a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken, etc., repair or replace it as shown on page RS-82 .

2. FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

CAUTION:

If large amount of unburned gasoline flows into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.

(a) Use only unleaded gasoline.

(b) Avoid prolonged idling.
Avoid running the engine at idle speed for more than 20 minutes.

(c) Avoid spark jump test.
  (1) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
  (2) While testing, never race the engine.

(d) Avoid prolonged engine compression measurement.
Engine compression tests must be done as rapidly as possible.

(e) Do not run engine when fuel tank is nearly empty.
This may cause the engine to misfire and create an extra load on the converter.

(f) Avoid coasting with ignition turned off.

(g) Do not dispose of used catalyst along with parts contaminated with gasoline or oil.

3. IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

For vehicles with mobile communication systems such as two-way radios and cellular telephones, observe the following precautions.

  (1) Install the antenna as far as possible away from the ECU and sensors of the vehicle's electronic system.
  (2) Install the antenna feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle's electronic systems. For details about ECU and sensors locations, refer to the section on the applicable component.
  (3) Avoid winding the antenna feeder together with other wiring as much as possible, and also avoid running the antenna feeder parallel with other wire harnesses.
  (4) Check that the antenna and feeder are correctly adjusted.
  (5) Do not install powerful mobile communications system.

4. FOR USING OBD II SCAN TOOL OR HAND-HELD TESTER

CAUTION:

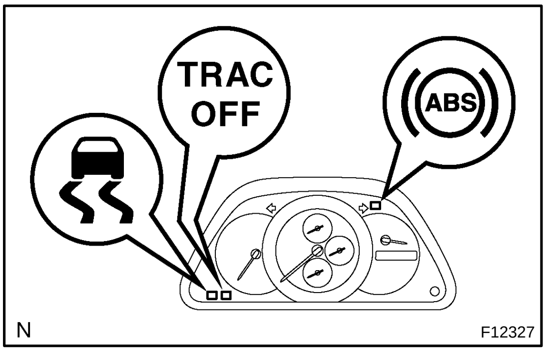
Observe the following items for safety reasons:

- **Before using the OBD II scan tool or hand-held tester, the OBD II scan tool's instruction book or hand-held tester's operator manual should be read thoroughly.**
- **Be sure to route all cables securely when driving with the OBD II scan tool or hand-held tester connected to the vehicle. (i.e. Keep cables away from feet, pedals, steering wheel and shift lever.)**
- **Two persons are required when test driving with the OBD II scan tool or hand-held tester, one person to drive the vehicle and the other person to operate the OBD II scan tool or hand-held tester.**

5. FOR VEHICLES EQUIPPED WITH TRACTION CONTROL (TRAC) SYSTEM

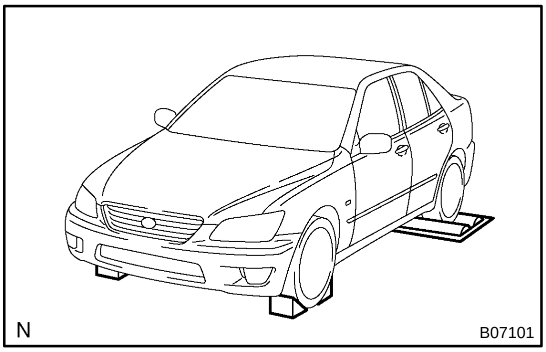
NOTICE:

When using a 2-wheel drum tester such as a speedometer tester or chassis dynamometer, etc., or jacking up the rear wheels and driving the wheels, always push in the TRAC cut switch and turn the TRAC system OFF.



(a) Press the TRAC cut switch.
(b) Check that the TRAC system is turned OFF by the TRAC cut switch.

HINT:
The SLIP indicator light should be always ON immediately after the engine is restarted.

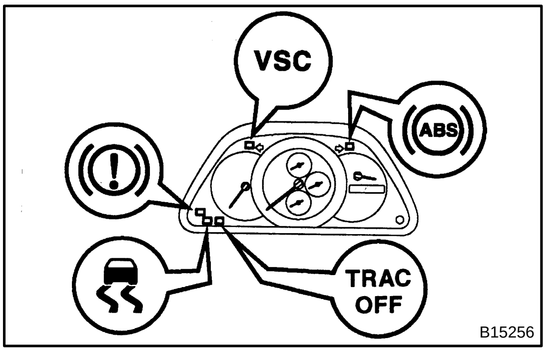


(c) Begin measurements.
(d) Press the TRAC cut switch to turn the TRAC to the operative mode and check that the TRAC OFF indicator light goes off.

HINT:
The SLIP indicator light blinks when the TRAC system is operational.

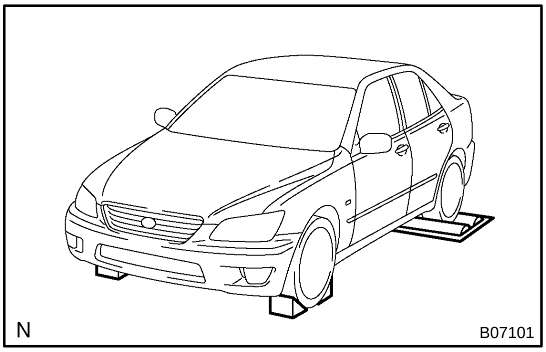
6. FOR VEHICLES EQUIPPED WITH VEHICLE SKID CONTROL (VSC) SYSTEM

NOTICE:
When using 2-wheel drum tester such as a speedometer tester or chassis dynamometer, etc., or jacking up the front wheels and driving the wheels, always push in the VSC OFF switch to turn the VSC system OFF.



(a) Press the VSC OFF switch.
(b) Check that the VSC OFF indicator light comes ON.

HINT:
The VSC OFF indicator light should be always OFF when the engine is restarted.



(c) Begin measurements.
(d) Press the VSC OFF switch again to change the VSC system to operational condition and check that the VSC OFF indicator light goes off.

HINT:
The SLIP indicator light blinks and the VSC buzzer sounds when the VSC system is operational.

B07102

7. FOR VEHICLES EQUIPPED WITH LIMITED SLIP DIFFERENTIAL

(a) Never apply driving force when RH or LH rear wheel only is touching the ground.

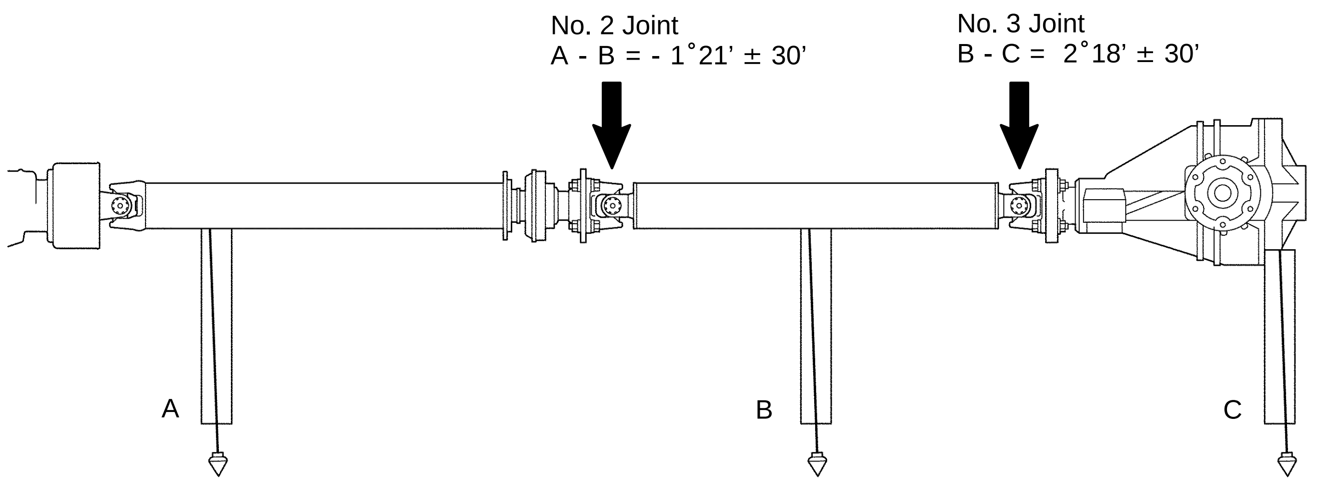
(b) During service/rectification work never spin (race) the RH or LH rear wheel only such as with ON-The-Car type wheel balancer, both rear wheels must be off the ground.

HINT:

- In case of the above, due to the construction of the LSD the driving force is transmitted to the opposite wheel and therefore it is possible for the vehicle to start suddenly if only one rear wheel is off the ground. Furthermore it could result in component damage to the LSD due to the loads acting on it.
- Always raise both rear wheels off the ground and support the vehicle on suitable safety stand.

8. INSPECTION AND ADJUSTMENT OF JOINT ANGLE DURING REMOVAL AND INSTALLATION OF PROPELLER SHAFT

When performing operations which involve the removal and installation of the propeller shaft, always check the joint angle. Make adjustments if necessary (see page PR-11).



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HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

IN04S-45

GENERAL INFORMATION

A large number of ECU controlled systems are used in the LEXUS IS300. In general, ECU controlled systems are considered to be a very intricate, requiring a high level of technical knowledge to troubleshoot. However, following the problem checking procedures of the ECU controlled system's circuits carefully is not complex. If you have an adequate understanding of the system and a basic knowledge of electricity, accurate diagnosis and necessary repair can be performed.
This manual emphasizes the above standpoint to help service technicians perform accurate and effective troubleshooting. Detailed information on major ECU controlled systems in this vehicle are outlined below:

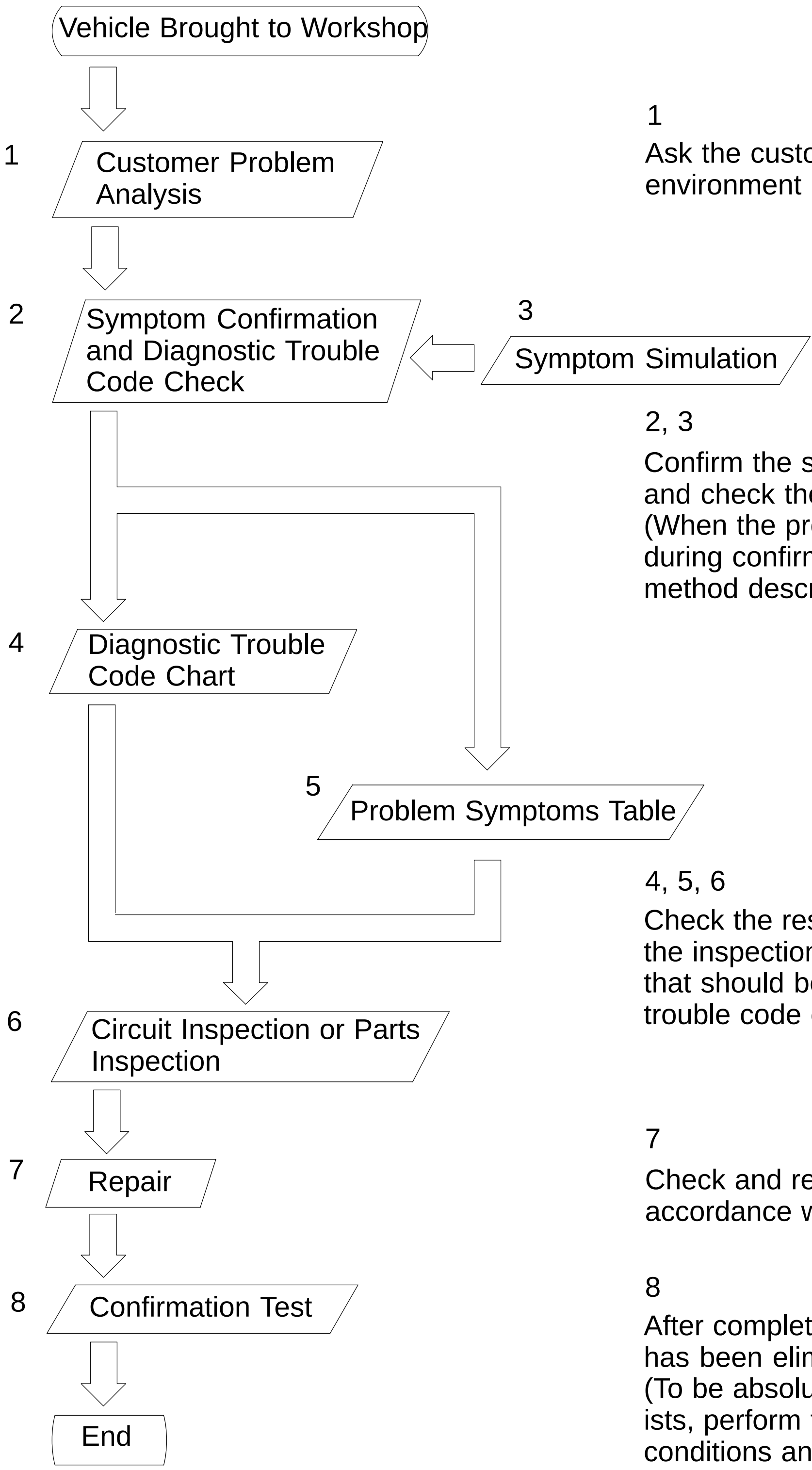
FOR USING OBDII SCAN TOOL OR HAND-HELD TESTER

- Before using the scan tool or tester, the scan tool's instruction book or tester's operator manual should be read thoroughly.
- If the scan tool or tester cannot communicate with ECU controlled systems when you have connected the cable of the scan tool or tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.
  (1) If communication is normal when the tool is connected to another vehicle, inspect the diagnosis data link line (Bus ± line) or ECU power circuit of the vehicle.
  (2) If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so perform the Self Test procedures outlined in the Tester Operator's Manual.

IN04T-22

HOW TO PROCEED WITH TROUBLESHOOTING

Carry out troubleshooting in accordance with the procedure below. Only a basic procedure is shown. Details in the Diagnostics section show the most effective methods for each circuit. Confirm troubleshooting procedures first for the relevant circuit before beginning troubleshooting of that circuit.



1
Ask the customer about the conditions and the environment in which the problem occurred.

2, 3
Confirm the symptoms and the problem conditions, and check the diagnostic trouble codes.
(When the problem symptoms do not appear during confirmation, use the symptom simulation method described later on.)

4, 5, 6
Check the results obtained in Step 2. Confirm the inspection procedure for the system or the part that should be checked using the diagnostic trouble code chart or the problem symptoms table.

7
Check and repair the affected system or part in accordance with the instructions in Step 6.

8
After completing repairs, confirm that the problem has been eliminated.
(To be absolutely sure the problem no longer exists, perform the confirmation test under the same conditions and environment as when it occurred the first time.)

1. CUSTOMER PROBLEM ANALYSIS

™ The 5 items in the table below are important points in the problem analysis:

™ In troubleshooting, the problem symptoms must be confirmed accurately. Preconceptions should be discarded in order to give an accurate judgement. To ascertain what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time it occurred.

Important Points in the Customer Problem Analysis

- What ----- Vehicle model, system name
- When ----- Date, time, occurrence frequency
- Where ----- Road conditions
- Under what conditions? ----- Running conditions, driving conditions, weather conditions
- How did it happen? ----- Problem symptoms

(Sample) Supplemental restraint system check sheet.

CUSTOMER PROBLEM ANALYSIS CHECK

SUPPLEMENTAL RESTRAINT SYSTEM Check Sheet

Inspector's Name

Customer's Name		VIN	
		Production Date	/ /
		Licence No.	
Date Vehicle Brought In	/ /	Odometer Reading	km miles

Date Problem First Occurred	/ /
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other
Temperature	Approx.

Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]

2. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE CHECK

The diagnostic system in the LEXUS IS300 fulfills various functions.

™ The first function is the Diagnostic Trouble Code (DTC) Check. In a DTC Check,a previous malfunction's DTC can be checked by a technician during troubleshooting. (A DTC is a code stored in the ECU memory whenever a malfunction in the signal circuits to the ECU occurs.)

™ Another function is the Input Signal Check, which checks if the signals from various switches are sent to the ECU correctly. By using these check functions, the problem areas can be narrowed down and troubleshooting is more effective. Diagnostic functions are incorporated in the following systems in the LEXUS IS300.

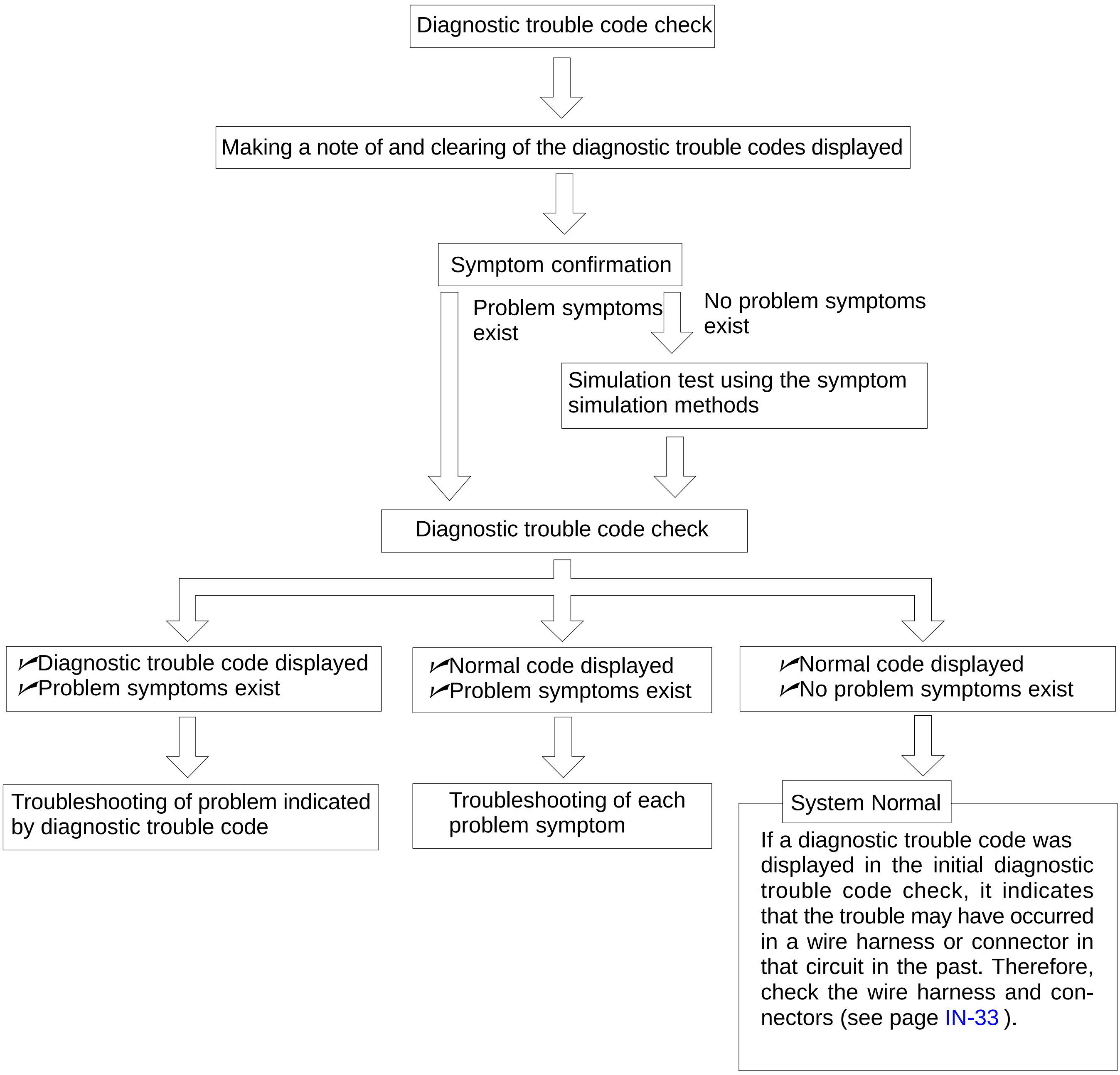
System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Diagnostic Test Mode (Active Test)
Engine	¿ (with Check Mode)	¿	¿
Automatic Transmission	¿ (with Check Mode)	¿	
ABS with EBD & BA & TRAC System	¿	¿	¿
ABS with EBD & BA & TRAC & VSC System	¿	¿	¿
Supplemental Restraint System	¿		
Theft Deterent System			¿
Cruise Control System	¿	¿	
Engine Immobiliser System	¿		
Combination Meter System			¿
Body Control System			¿
Multiplex Communication System	¿		¿
LEXUS Navigation System			¿
Air Conditioning System	¿		¿

In diagnostic trouble code check, it is very important to determine whether the problem indicated by the diagnostic trouble code is still occurring or occurred in the past but returned to normal at present. In addition, it must be checked in the problem symptom check whether the malfunction indicated by the diagnostic trouble code is directly related to the problem symptom or not. For this reason, the diagnostic trouble codes should be checked before and after the symptom confirmation to determine the current conditions, as shown in the table below. If this is not done, it may, depending on the case, result in unnecessary troubleshooting for normally operating systems, thus making it more difficult to locate the problem, or in repairs not pertinent to the problem. Therefore, always follow the procedure in correct order and perform the diagnostic trouble code check.

DIAGNOSTIC TROUBLE CODE CHECK PROCEDURE

Diagnostic Trouble Code Check (Make a note of and then clear)	**Confirmation of Symptoms**	**Diagnostic Trouble Code Check**	**Problem Condition**
Diagnostic Trouble Code Display	Problem symptoms exist	Same diagnostic trouble code is displayed	Problem is still occurring in the diagnostic circuit
		Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit (The diagnostic trouble code displayed first is either for a past problem or it is a secondary problem)
	No problem symptoms exist		The problem occurred in the diagnostic circuit in the past
Normal Code Display	Problem symptoms exist	Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit
	No problem symptoms exist	Normal code is displayed	The problem occurred in a place other than in the diagnostic circuit in the past

Taking into account the points on the previous page, a flow chart showing how to proceed with troubleshooting using the diagnostic trouble code check is shown below. This flow chart shows how to utilize the diagnostic trouble code check effectively, then by carefully checking the results, indicates how to proceed either to diagnostic trouble code troubleshooting or to troubleshooting of problem symptoms table.



3. SYMPTOM SIMULATION

The most difficult case in troubleshooting is when no problem symptoms occurring. In such cases, a thorough customer problem analysis must be carried out. Then simulate a simulation of the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be carried out. No matter how much skill or experience a technician has, troubleshooting without confirming the problem symptoms will lead to something important in the repair operation being overlooked and lead to mistakes or delays in repairs.

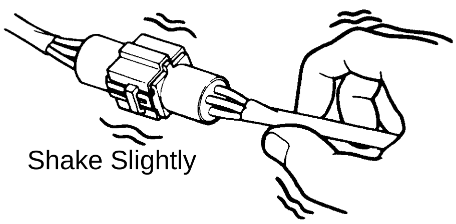
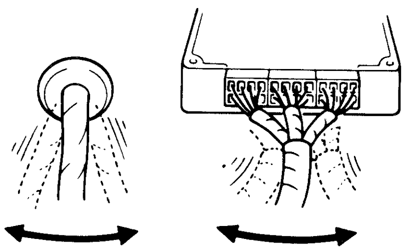
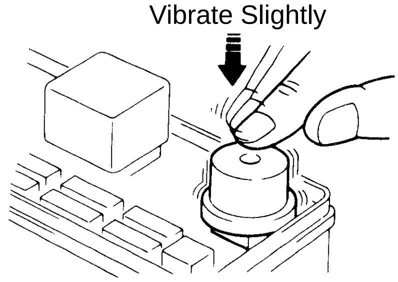
For example:

With a problem that only occurs when the engine is cold, or occurs as result of vibration caused by road during driving, the problem can never be determined as long as the symptoms are being checked on stationary vehicle or a vehicle with a warmed-up engine.

Vibration, heat or water penetration (moisture) is difficult to reproduce. The symptom simulation tests below are effected substitutes for the conditions and can be applied on a stationary vehicle.

Important Points in the Symptom Simulation Test:

In the symptom simulation test, the problem symptoms as well as problem area or parts must be confirmed. First, narrow down the possible problem circuits according to the symptoms. Then, connect the tester and carry out the symptom simulation test, judging whether the circuit being tested is defective or normal, and also confirming the problem symptoms at the same time. Refer to the problem symptoms table for each system to narrow down the possible causes of the symptom.

1	**VIBRATION METHOD: When vibration seems to be the major cause.**
CONNECTORS Slightly shake the connector vertically and horizontally. **WIRE HARNESS** Slightly shake the wire harness vertically and horizontally. The connector joint, fulcrum of the vibration, and body through portion are the major areas that should be checked thoroughly.	  FI2331 FI2332
PARTS AND SENSOR Apply slight vibration with a finger to the part of the sensor considered to be the cause of the problem and check whether or not the malfunction occurs. HINT: Applying strong vibration to relays may result in open relays.	 FI2330

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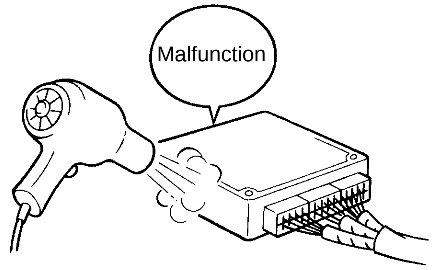
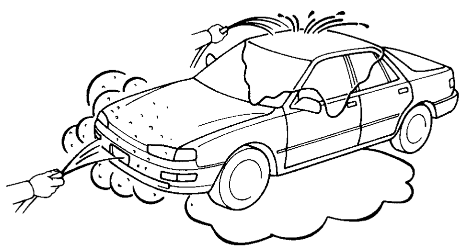
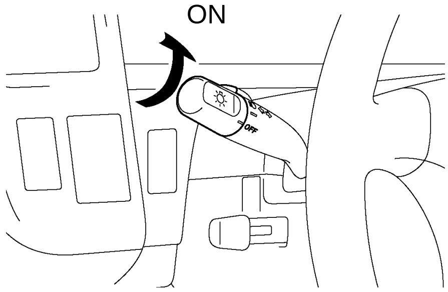
2	**HEAT METHOD: When the problem seems to occur when the suspect area is heated.**
Heat the component that is the likely cause of the malfunction with a hair dryer or similar device. Check whether or not if the malfunction occurs. **NOTICE:** **(1) Do not heat to more than 60˚C (140˚F). (Exceeding this temperature may damage components.)** **(2) Do not apply heat directly to parts in the ECU.**	 FI2334
3	**WATER SPRINKLING METHOD: When the malfunction seems to occur on a rainy day or in a high-humidity condition.**
Sprinkle water onto the vehicle and check whether or not if the malfunction occurs. **NOTICE:** **(1) Never sprinkle water directly into the engine compartment. Indirectly change the temperature and humidity by applying water spray onto the front of the radiator.** **(2) Never apply water directly onto electronic components.** HINT: If a vehicle is subject to water leakage, the leaked water may damage the ECU. When testing a vehicle with a water leakage problem, special caution must be taken.	 FI6649
4	**OTHER: When a malfunction seems to occur when electrical load is excessive.**
Turn on all electrical loads including the heater blower, head lights, rear window defogger, etc. and check to see if the malfunction occurs.	 B02389

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4. DIAGNOSTIC TROUBLE CODE CHART

Use Diagnostic Trouble Codes (DTCs) (from the DTC checks) in the table below to determine the trouble area and proper inspection procedure. The engine diagnostic trouble code chart is shown below as an example.

- DTC No.
  Indicates the diagnostic trouble code.
- Page or Instructions
  Indicates the page where the inspection procedure for each circuit is to be found, or gives instructions for checking and repairs.

- Trouble Area
  Indicates the suspect area of the problem.

- Detection Item
  Indicates the system of the problem or contents of the problem.

DTC CHART (SAE Controlled)

HINT:
Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check mode, check the circuit for that code listed in the table below. For details of each code, refer to the "See page" under the "DTC No." in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area	MIL*	Memory
P0100 (DI-24)	Mass Air Flow Circuit Malfunction	- Open or short in mass air flow meter circuit - Mass air flow meter - ECM	○	○
P0101 (DI-28)	Mass Air Flow Circuit Range/ Performance Problem	- Mass air flow meter	○	○
P0110 (DI-29)	Intake Air Temp. Circuit Malfunction	- Open or short in intake air temp. sensor circuit - Intake air temp. sensor - ECM	○	○
P0115 (DI-33)	Engine Coolant Temp. Circuit Malfunction	- Open or short in engine coolant temp. sensor circuit - Engine coolant temp. sensor - ECM	○	○
P0116 (DI-37)	Engine Coolant Temp. Circuit Range/ Performance Problem	- Engine coolant temp. sensor - Cooling system	○	○
	... / Pedal Position Sensor/Switch ...nction	- Open or short in throttle position sensor circuit - Throttle position sensor - ECM		
	...osition Sensor/ Switch ...erformance Prob-	- Throttle position sensor		

5. PROBLEM SYMPTOMS TABLE

The suspected circuits or parts for each problem symptom are shown in the table below. Use this table to troubleshoot when, during a DTC check, a "Normal" code is displayed in the diagnostic trouble code check but the problem is still occurring. Numbers in the table show the inspection order in which the circuits or parts should be checked.

HINT:

In some cases, a problem is not detected by the diagnostic system even though a problem symptom is present. It is possible that the problem is occurring outside the detection range of the diagnostic system, or that the problem is occurring in a completely different system.

Page
Indicates the page where the flow chart for each circuit is located.

Circuit Inspection, Inspection Order
Indicates the circuit which needs to be checked for a problem symptom.

Problem Symptom

Circuit or Part Name
Indicates the circuit or part which needs to be checked.

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	ST-2 ST-17
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI-147 DI-151 IN-29
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-151
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-144 DI-151 EM-3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-144 DI-151
Hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI-144 DI-151
...idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	AC-88
...ing)	1. A/C signal circuit 2. Fuel pump control circuit	
	1. Compression 2. Fuel pump control circuit	

6. CIRCUIT INSPECTION

How to read and use each page is shown below.

✓Diagnostic Trouble Code No. and Detection Item

✓Circuit Description
The major role and operation of the circuit and its component parts are explained.

DTC	P0325	Knock Sensor 1 Circuit Malfunction

CIRCUIT DESCRIPTION

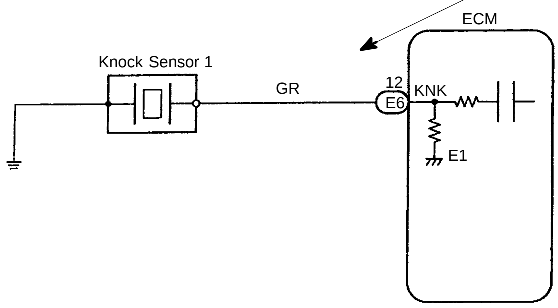
Knock sensor is fitted to the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed, 1,200 rpm or more.	✓Open or short in knock sensor1 circuit ✓Knock sensor 1 (looseness) ✓ECM

If the ECM detects the above diagnosis conditions, it operates the fall safe function in which the corrective retard angle value is set to the maximum value.

✓Indicates the diagnostic trouble code (DTC), (DTC) set parameter and suspect area of the problem.

WIRING DIAGRAM



✓Wiring Diagram
This is a wiring diagram of the circuit.
Use this diagram together with an ELECTRICAL WIRING DIAGRAM to thoroughly understand the circuit.
Wire colors are indicated by an alphabetical code:
B = Black; L = Blue; R = Red; BR = Brown;
LG = Light Green; V = Violet; G = Green;
O = Orange; W = White; GR = Gray; P = Pink;
Y = Yellow; SB = Sky Blue.
The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

V08423

Indicates the position of the ignition switch during the check.

LOCK Ignition Switch LOCK (OFF)

ON Ignition Switch ON

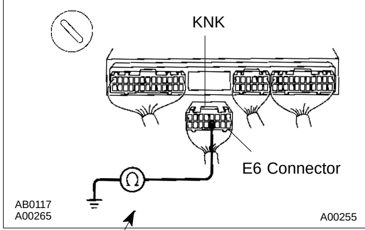
START Ignition Switch START

ACC Ignition Switch ACC

Inspection Procedure
Use the inspection procedure to determine if the circuit is normal or abnormal. If it is abnormal, use it to determine whether the problem is located in the sensors, actuators, wire harness or ECU.

INSPECTION PROCEDURE

1	**Check continuity between terminal KNK of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF-68).
(b) Disconnect the E6 connector of ECM.

CHECK:

Measure resistance between terminal KNK of ECM connector and body ground.

OK:

Resistance: 1 MΩ or higher

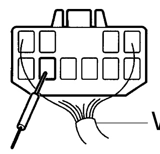
OK → **Go to step 3.**

NG

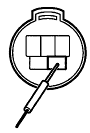
2	**Check knock sensor (See page SF-61).**

OK → **Replace knock sensor.**

Indicates the place to check the voltage or resistance.
Indicates the connector position to checked (from the front or back side).

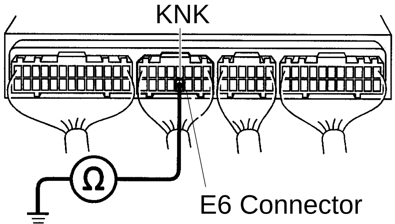


Check from the connector back side (with harness).

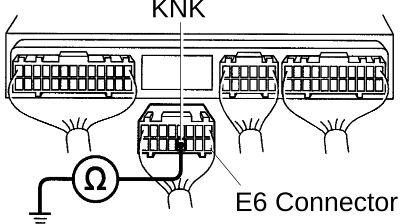


Check from the connector front side (without harness).
In this case, care must be taken not to bend the terminals.

Indicates the condition of the connector of ECU during the check.



Connector being checked is connected.



Connector being checked is disconnected.

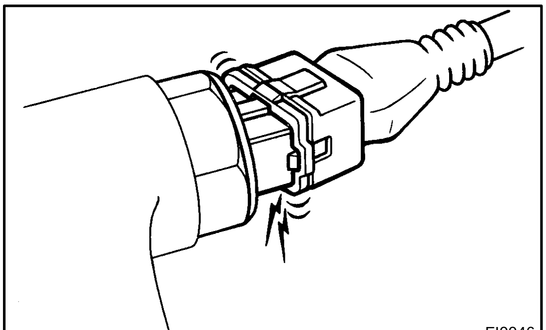
V08425

IN011-56

HOW TO USE THE DIAGNOSTIC CHART AND INSPECTION PROCEDURE

1. CONNECTOR CONNECTION AND TERMINAL INSPECTION

- For troubleshooting, diagnostic trouble code (DTC) charts or problem symptom table are provided for each circuit with detailed inspection procedures in this manual.
- When component parts, wire harnesses and connectors of each circuit are found to be normal in troubleshooting, the problem is most likely in the ECU. Accordingly, if diagnosis is performed without the problem symptoms occurring, refer to Step 8 to replace the ECU. Always confirm that the problem symptoms are occurring, or proceed with inspection while using the symptom simulation method.
- The instructions "Check wire harness and connector" and "Check and replace ECU" which appear in the inspection procedure are common and applicable to all DTCs. Follow the procedure outlined below whenever these instructions appear.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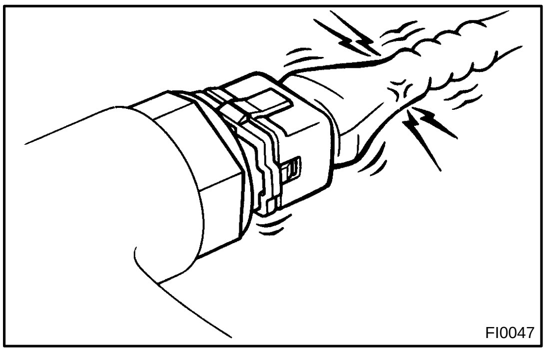
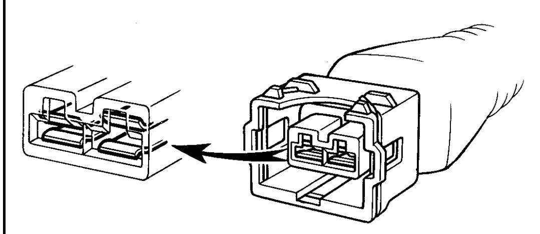

FI0047


FI0048

OPEN CIRCUIT:

An open circuit the result of a disconnected wire harness, a faulty contact in the connector, a connector terminal pulled out, etc.

HINT:

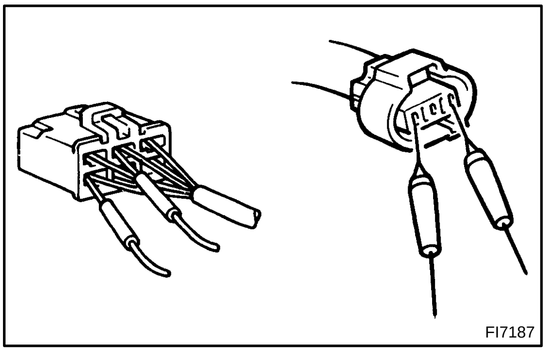
- A wire is rarely broken in its middle. Most problem occur at the wire ends. Carefully check the connectors of sensors and actuators.
- Faulty contacts could be due to the rusting, contamination, and/or deformation of connector terminals. In some cases: 1) simply disconnecting and reconnecting the connectors will fix the problem, or 2) even though no abnormality is found in the wire harness or connector, the problem disappears after the check (meaning the cause was most likely in the wire harness or connectors).

SHORT CIRCUIT:

A short circuit could be the result of contact between the wire harness and the body ground or a short circuiting switch.

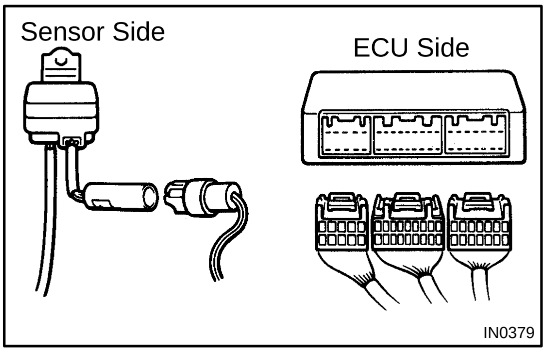
HINT:

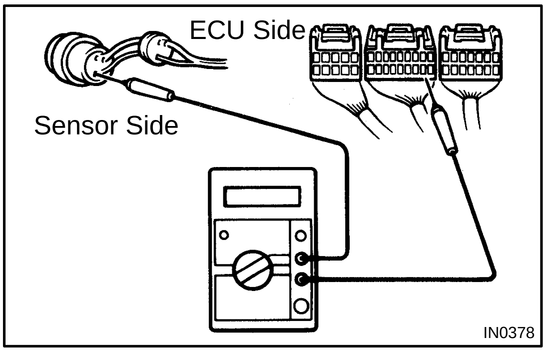
When there is a short circuit between the wire harness and body ground, check thoroughly it wire harness is caught in the body or is clamped properly.



2. CONNECTOR HANDLING

When inserting tester probes into a connector, insert them from the rear of the connector. When necessary, use mini test leads. For water resistant connectors which cannot be accessed from behind, take good care not to deform the connector terminals.





3. CONTINUITY CHECK (OPEN CIRCUIT CHECK)

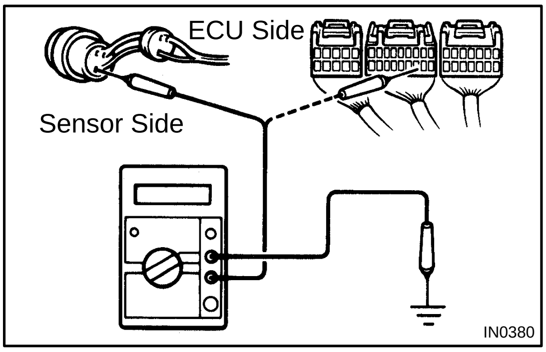
(a) Disconnect the connectors at both ECU and sensor sides.

(b) Measure the resistance between the applicable terminals of the connectors.

Resistance: Below 1 Ω

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.



4. RESISTANCE CHECK (SHORT CIRCUIT CHECK)

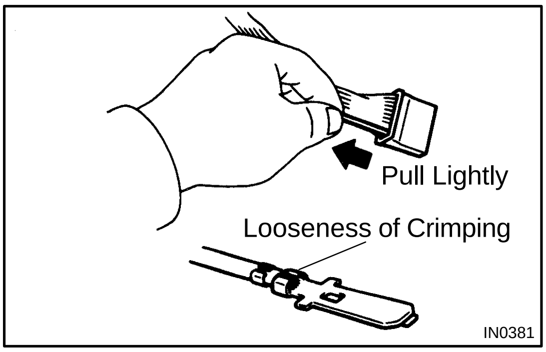
(a) Disconnect the connectors on both ends.

(b) Measure the resistance between the applicable terminals of the connectors and body ground. Be sure to carry out this check on the connectors on both ends.

Resistance: 10 kΩ or higher

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.



5. VISUAL CHECK AND CONTACT PRESSURE CHECK

(a) Disconnect the connectors at both ends.

(b) Check for rust or foreign material, etc. in the terminals of the connectors.

(c) Check crimped portions for looseness or damage and check that the terminals are secured in the lock portion.

HINT:

The terminals should not come out when pulled lightly from the back.

(d) Prepare a test male terminal and insert it in the female terminal, then pull it out.

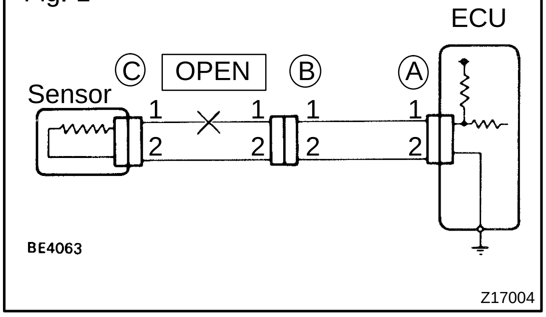
NOTICE:

When testing a gold-plated female terminal, always use a gold-plated male terminal.

HINT:

If a test terminal is easier to pulled out than others, there may be poor contact in that section.

Fig. 1



6. CHECK OPEN CIRCUIT

For the open circuit in the wire harness in Fig. 1, perform a continuity check (step (a) below) or a voltage check (step (b) below).

Fig. 2

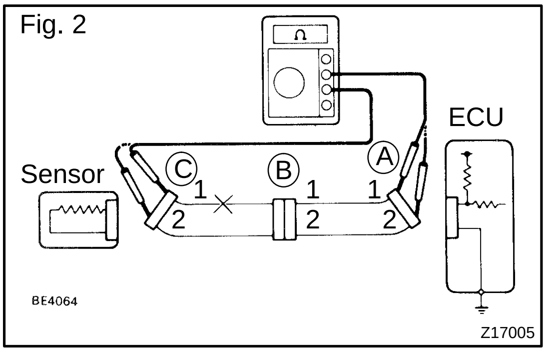
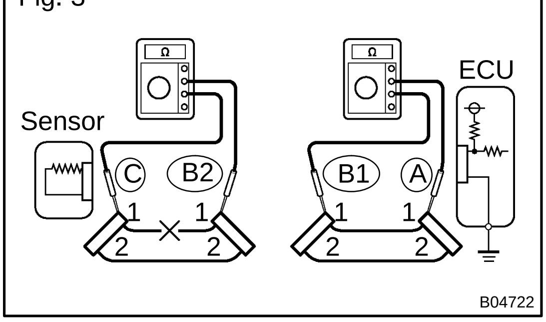


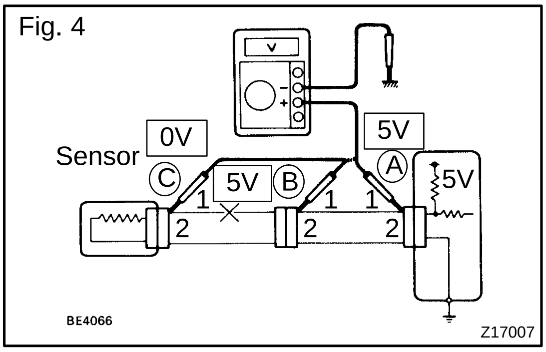
Fig. 3



(a) Check the continuity.

(1) Disconnect connectors A and C and measure the resistance between them.
In the case of Fig. 2:
Between terminal 1 of connector A and terminal 1 of connector C → 10 kΩ or higher (open)
Between terminal 2 of connector A and terminal 2 of connector C → Below 1 Ω
An open circuit exists in the wire harness between terminal 1 of A and terminal 1 of C.

(2) Disconnect connector B and measure the resistance between the connectors.
In the case of Fig. 3:
Between terminal 1 of connector A and terminal 1 of connector B1 → Below 1 Ω
Between terminal 1 of connector B2 and terminal 1 of connector C → 10 kΩ or higher (open)
An open circuit exists in the wire harness between terminal 1 of B2 and terminal 1 of C.



(b) Check the voltage.

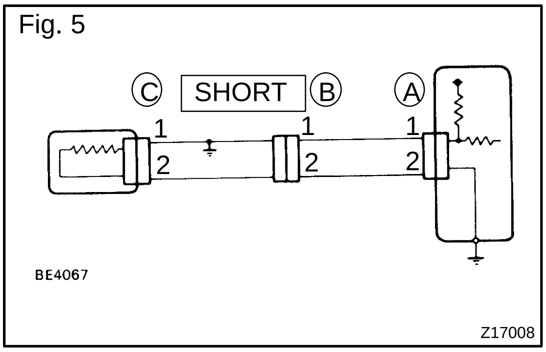
In a circuit in which voltage is applied to the ECU connector terminal, an open circuit can be checked for by conducting a voltage check.

As shown in Fig. 4, with each connector still connected, measure the voltage between body ground and terminal 1 of connector A at the ECU 5V output terminal, terminal 1 of connector B, and terminal 1 of connector C (in that order).

Example results:

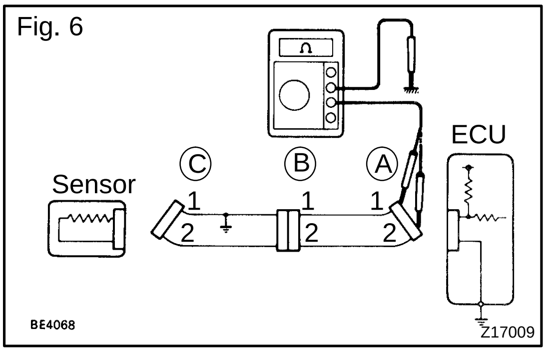
5V: Between Terminal 1 of connector A and Body Ground
5V: Between Terminal 1 of connector B and Body Ground
0V: Between Terminal 1 of connector C and Body Ground

In the above example, an open circuit is in the wire harness between terminal 1 of B and terminal 1 of C.



7. CHECK SHORT CIRCUIT

If the wire harness is ground shorted (Fig. 5), locate the section by conducting a resistance check with ground below.



Check the resistance with ground.

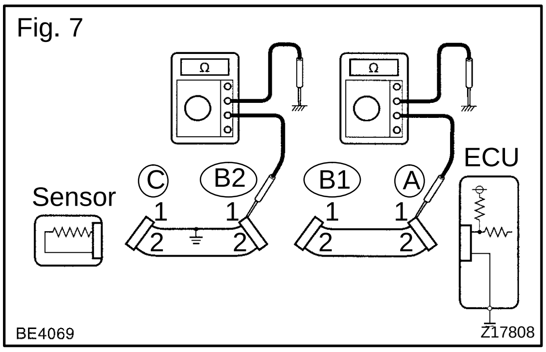
(1) Disconnect connectors A and C and measure the resistance between terminal 1 and 2 of connector A and body ground.

In the case of Fig. 6:

Between terminal 1 of connector A and body ground → Below 1 Ω (short)

Between terminal 2 of connector A and body ground → 10 kΩ or higher

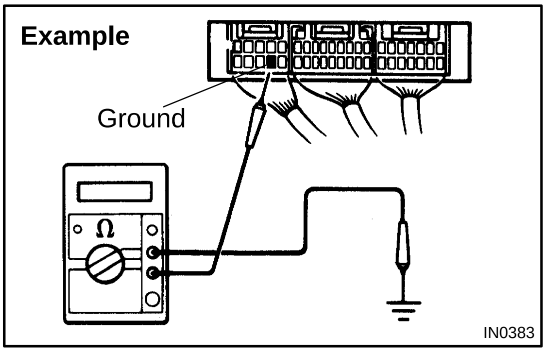
A short circuit is between terminal 1 of connector A and terminal 1 of connector C.



(2) Disconnect connector B and measure the resistance between terminal 1 of connector A and body ground, and terminal 1 of connector B2 and body ground.
In the case of Fig. 7:
Between terminal 1 of connector A and body ground → 10 kΩ or higher
Between terminal 1 of connector B2 and body ground → Below 1 Ω (short)
A short circuit is between terminal 1 of connector B2 and terminal 1 of connector C.

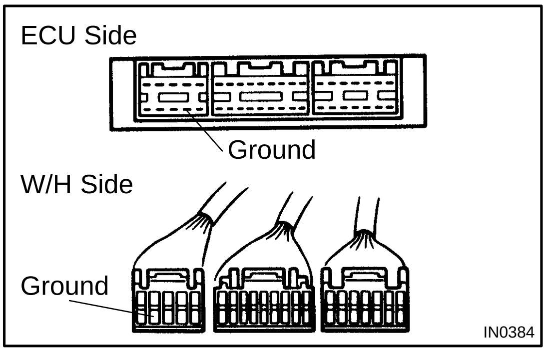
8. CHECK AND REPLACE ECU

First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty. Replace the ECU with a and check if the symptoms appear.



(1) Measure the resistance between the ECU ground terminal and the body ground.

Resistance: Below 1 Ω



(2) Disconnect the ECU connector. Check for bent ground terminals (on the ECU side and the wire harness side). Lastly, check the contact pressure.

TERMS

ABBREVIATIONS USED IN THIS MANUAL

IN04Q-24

Abbreviations	Meaning
ABS	Anti-Lock Brake System
AC	Alternating Current
ACC	Accessory
ACIS	Acoustic Control Induction System
ACSD	Automatic Cold Start Device
A.D.D.	Automatic Disconnecting Differential
A/F	Air-Fuel Ratio
AHC	Active Height Control Suspension
ALR	Automatic Locking Retractor
ALT	Alternator
AMP	Amplifier
ANT	Antenna
APPROX.	Approximately
A/T	Automatic Transmission (Transaxle)
ATDC	After Top Dead Center
ATF	Automatic Transmission Fluid
AUTO	Automatic
AUX	Auxiliary
AVG	Average
AVS	Adaptive Variable Suspension
BA	Brake Assist
BACS	Boost Altitude Compensation System
BAT	Battery
BDC	Bottom Dead Center
B/L	Bi-Level
B/S	Bore-Stroke Ratio
BTDC	Before Top Dead Center
BVSV	Bimetallic Vacuum Switching Valve
Calif.	California
CB	Circuit Breaker
CCo	Catalytic Converter For Oxidation
CD	Compact Disc
CF	Cornering Force
CG	Center Of Gravity
CH	Channel
COMB.	Combination
CPE	Coupe
CPS	Combustion Pressure Sensor
CPU	Central Processing Unit
CRS	Child Restraint System
CTR	Center
C/V	Check Valve

CV	Control Valve
CW	Curb Weight
DC	Direct Current
DEF	Defogger
DFL	Deflector
DIFF.	Differential
DIFF. LOCK	Differential Lock
D/INJ	Direct Injection
DLI	Distributorless Ignition
DOHC	Double Overhead Camshaft
DP	Dash Pot
DS	Dead Soak
DSP	Digital Signal Processor
ECAM	Engine Control And Measurement System
ECD	Electronic Controlled Diesel
ECDY	Eddy Current Dynamometer
ECU	Electronic Control Unit
ED	Electro-Deposited Coating
EDU	Electronic Driving Unit
EDIC	Electric Diesel Injection Control
EFI	Electronic Fuel Injection
E/G	Engine
EGR-VM	EGR-Vacuum Modulator
ELR	Emergency Locking Retractor
ENG	Engine
ESA	Electronic Spark Advance
ETCS	Electronic Throttle Control System
EVAP	Evaporator
E-VRV	Electric Vacuum Regulating Valve
EXH	Exhaust
FE	Fuel Economy
FF	Front-Engine Front-Wheel-Drive
F/G	Fuel Gauge
FIPG	Formed In Place Gasket
FL	Fusible Link
F/P	Fuel Pump
FPU	Fuel Pressure Up
Fr	Front
FR	Front-Engine Rear-Wheel-Drive
F/W	Flywheel
FW/D	Flywheel Damper
FWD	Front-Wheel-Drive
GAS	Gasoline
GND	Ground
HAC	High Altitude Compensator
H/B	Hatchback

H-FUSE	High Current Fuse
HI	High
HID	High Intensity Discharge (Head Lamp)
HSG	Housing
HT	Hard Top
HWS	Heated Windshield System
IAC	Idle Air Control
IC	Integrated circuit
IDI	Indirect Diesel Injection
IFS	Independent Front Suspension
IG	Ignition
IIA	Integrated Ignition Assembly
IN	Intake (Manifold, Valve)
INT	Intermittent
I/P	Instrument Panel
IRS	Independent Rear Suspension
J/B	Junction Block
J/C	Junction Connector
KD	Kick-Down
LAN	Local Area Network
LB	Liftback
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LH	Left-Hand
LHD	Left-Hand Drive
L/H/W	Length, Height, Width
LLC	Long-Life Coolant
LNG	Liquified Natural Gas
LO	Low
LPG	Liquified Petroleum Gas
LSD	Limited Slip Differential
LSP & PV	Load Sensing Proportioning And Bypass Valve
LSPV	Load Sensing Proportioning Valve
MAX.	Maximum
MIC	Microphone
MIL	Malfunction Indicator Lamp
MIN.	Minimum
MP	Multipurpose
MPX	Multiplex Communication System
M/T	Manual Transmission (Transaxle)
MT	Mount
MTG	Mounting
N	Neutral
NA	Natural Aspiration
No.	Number
O/D	Overdrive

OEM	Original Equipment Manufacturing
OHC	Overhead Camshaft
OHV	Overhead Valve
OPT	Option
O/S	Oversize
P & BV	Proportioning And Bypass Valve
PCS	Power Control System
PCV	Positive Crankcase Ventilation
PKB	Parking Brake
PPS	Progressive Power Steering
PS	Power Steering
PTO	Power Take-Off
R & P	Rack And Pinion
R/B	Relay Block
RBS	Recirculating Ball Type Steering
R/F	Reinforcement
RFS	Rigid Front Suspension
RRS	Rigid Rear Suspension
RH	Right-Hand
RHD	Right-Hand Drive
RLY	Relay
ROM	Read Only Memory
Rr	Rear
RR	Rear-Engine Rear-Wheel Drive
RWD	Rear-Wheel Drive
SDN	Sedan
SEN	Sensor
SICS	Starting Injection Control System
SOC	State Of Charge
SOHC	Single Overhead Camshaft
SPEC	Specification
SPI	Single Point Injection
SRS	Supplemental Restraint System
SSM	Special Service Materials
SST	Special Service Tools
STD	Standard
STJ	Cold-Start Fuel Injection
SW	Switch
SYS	System
T/A	Transaxle
TACH	Tachometer
TBI	Throttle Body Electronic Fuel Injection
TC	Turbocharger
TCCS	TOYOTA Computer-Controlled System
TCV	Timing Control Valve
TDC	Top Dead Center

TEMP.	Temperature
TEMS	TOYOTA Electronic Modulated Suspension
TIS	Total Information System For Vehicle Development
T/M	Transmission
TMC	TOYOTA Motor Corporation
TMMK	TOYOTA Motor Manufacturing Kentucky, Inc.
TRAC	Traction Control System
TURBO	Turbocharger
U/D	Underdrive
U/S	Undersize
VCV	Vacuum Control Valve
VENT	Ventilator
VIN	Vehicle Identification Number
VPS	Variable Power Steering
VSC	Vehicle Skid Control
VSV	Vacuum Switching Valve
VTV	Vacuum Transmitting Valve
w/	With
WGN	Wagon
W/H	Wire Harness
w/o	Without
1st	First
2nd	Second
2WD	Two Wheel Drive Vehicle (4x2)
4WD	Four Wheel Drive Vehicle (4x4)

IN03Q-04

GLOSSARY OF SAE AND LEXUS TERMS

This glossary lists all SAE-J1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their LEXUS equivalents.

SAE ABBREVIATIONS	SAE TERMS	LEXUS TERMS ( )--ABBREVIATIONS
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner, A/CL
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	-
B+	Battery Positive Voltage	+B, Battery Voltage
BARO	Barometric Pressure	HAC
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	-
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	-
CTOX	Continuous Trap Oxidizer	-
CTP	Closed Throttle Position	LL ON, Idle ON
DFI	Direct Fuel Injection	Direct Injection (DI)
DI	Distributor Ignition	-
DLC1 DLC2 DLC3	Data Link Connector 1 Data Link Connector 2 Data Link Connector 3	1: Check Connector 2: Total Diagnosis Comunication Link (TDCL) 3: OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Code
DTM	Diagnostic Test Mode	-
ECL	Engine Coolant Level	-
ECM	Engine Control Module	Engine ECU (Electronic Control Unit)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM), Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	TOYOTA Distributor-less Ignition (TDI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	-
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	-
FEPROM	Flash Erasable Programmable Read Only Memory	-
FF	Flexible Fuel	-
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)

HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO_2S)
IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	-
IFI	Indirect Fuel Injection	Indirect Injection (IDL)
IFS	Inertia Fuel-Shutoff	-
ISC	Idle Speed Control	-
KS	Knock Sensor	Knock Sensor
MAF	Mass Airflow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	-
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Lamp	Check Engine Lamp
MST	Manifold Surface Temperature	-
MVZ	Manifold Vacuum Zone	-
NVRAM	Non-Volatile Random Access Memory	-
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On-Board Diagnostic	On-Board Diagnostic System (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalyst Convert (OC), CCo
OL	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	-
PNP	Park/Neutral Position	-
PROM	Programmable Read Only Memory	-
PSP	Power Steering Pressure	-
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	-
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	E-ABV
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	-
SRI	Service Reminder Indicator	-
SRT	System Readiness Test	-
ST	Scan Tool	-
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter

TCM	Transmission Control Module	Transmission ECU, ECT ECU
TP	Throttle Position	Throttle Position
TR	Transmission Range	-
TVV	Thermal Vacuum Valve	Bimetallic Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)
TWC	Three-Way Catalytic Converter	Three-Way Catalytic (TWC) Manifold Converter CC_{RO}
TWC+OC	Three-Way + Oxidation Catalytic Converter	CC_R + CCo
VAF	Volume Airflow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor
WOT	Wide Open Throttle	Full Throttle
WU-OC	Warm Up Oxidation Catalytic Converter	-
WU-TWC	Warm Up Three-Way Catalytic Converter	-
3GR	Third Gear	-
4GR	Fourth Gear	-

OUTSIDE VEHICLE

MA001-34

GENERAL MAINTENANCE

Performing these maintenance checks on the vehicle in the owner's responsibility. The owner may perform the maintenance or take the vehicle to a service center.
Check the parts of the vehicle described below on a daily basis. In most cases, special tool are not required. It i recommended that the owner perform these check.
The procedures for general maintenance are as follows.

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Following the maintenance schedule is mandatory.
- Determine the appropriate time to service the vehicle using either miles driven or time (month) elapsed, whichever reaches the specification first.
- Maintain similar intervals between periodic maintenance unless noted.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. TIRES

(a) Check the tire pressure with a gauge. Make adjustment if necessary.
(b) Check the surfaces of tires for cuts, damage or excessive wear.

3. WHEEL NUTS

Check for nuts that are loose or missing. Tighten them if necessary.

4. TIRE ROTATION

Check the maintenance schedule in the owner's manual supplement.

5. WINDSHIELD WIPER BLADES

Check the blades for wear or cracks whenever they are unable to wipe the windshield clean. Replace them if necessary.

6. FLUID LEAKS

(a) Check under the vehicle for leaking fuel, oil, water and other fluid.
(b) If you smell gasoline fumes or notice any leak, locate the cause found and correct it.

7. DOORS AND ENGINE HOOD

(a) Check that all of the doors and the trunk lid operate smoothly, and that all the latches lock securely.
(b) When the primary latch is released, check that the engine hood secondary latch prevents the hood from opening.

INSIDE VEHICLE

MA002-43

GENERAL MAINTENANCE

Performing these maintenance checks on the vehicle in the owner's responsibility. The owner may perform the maintenance or take the vehicle to a service center.

Check the parts of the vehicle described below on a daily basis. In most cases, special tool are not required. It i recommended that the owner perform these check.

The procedures for general maintenance are as follows.

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
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- Determine the appropriate time to service the vehicle using either miles driven or time (month) elapsed, whichever reaches the specification first.
- Maintain similar intervals between periodic maintenance unless noted.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. LIGHTS

(a) Check that the headlights, stop lights, taillights, turn signal lights, and other lights are all working.

(b) Check that the headlights are aimed properly.

3. WARNING LIGHTS AND BUZZERS

Check that all the warning lights and buzzers are working.

4. HORN

Check that the horn is working.

5. WINDSHIELD GLASS

Check for scratches, pits or abrasions.

6. WINDSHIELD WIPER AND WASHER

(a) Check if the wind washers are aimed properly. Also, check if the washer fluid hits the center of the operating range of each wiper on the windshield.

(b) Check that the wipers do not streak.

7. WINDSHIELD DEFROSTER

When the heater or air conditioner is on the defroster setting, check that air comes out of the defroster outlet.

8. REAR VIEW MIRROR

Check that the rear view mirror is securely mounted.

9. SUN VISORS

Check that the sun visors move freely and are securely mounted.

10. STEERING WHEEL

Check that the steering wheel has the proper freeplay. Also check for steering difficulty, freeplay in the steering wheel and unusual noises.

11. SEATS

(a) Check that the seat adjusters operate smoothly.

(b) Check that all the latches lock securely in all positions.

(c) Check that the head restraints move up and down smoothly and that the locks hold securely in all latched positions.

(d) When the rear seatbacks are folded down, check if the latches lock securely.

12. SEAT BELTS

(a) Check that the seat belt system such as the buckles, retractors and anchors operate properly and smoothly.

(b) Check that the belt webbing is not cut, frayed, worn or damaged.

13. ACCELERATOR PEDAL

Check the pedal for smooth operation and uneven pedal effort and catching.

14. BRAKE PEDAL (See page BR-6)

(a) Check the pedal for smooth operation.
(b) Check that the pedal has the proper reserve distance and freeplay.
(c) Check the brake booster function.

15. BRAKES

In a safe place, check that the vehicle remains straight when applying the brakes.

16. PARKING BRAKE (See page BR-9)

(a) Check that the parking brake pedal has the proper range of motion.
(b) On a low incline, check that the parking brake alone can stabilize the vehicle.

17. AUTOMATIC TRANSMISSION ”PARK” MECHANISM

(a) Check the lock release mechanism of the selector lever for proper and smooth operation.
(b) When the selector lever is in the ”P” position and all brakes are released on a low incline, check that the vehicle is stabilized.

UNDER HOOD

MA003-42

GENERAL MAINTENANCE

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Following the maintenance schedule is mandatory.
- Determine the appropriate time to service the vehicle using either miles driven or time (month) elapsed, whichever reaches the specification first.
- Maintain similar intervals between periodic maintenance unless noted.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. WINDSHIELD WASHER FLUID

Check that there is sufficient fluid in the tank.

3. ENGINE COOLANT LEVEL

Check that the coolant level is between the "FULL" and "LOW" lines on the see-through reservoir.

4. RADIATOR AND HOSES

(a) Check that the front of the radiator is clean and free of leaves, dirt and bugs.
(see page CO-14)

(b) Check the hoses for cracks, kinks, rotting and loose connections.

5. BATTERY ELECTROLYTE LEVEL

Check that the electrolyte level of all the battery cells is between the upper and lower lines on the case.

6. BRAKE FLUID LEVEL

Check that the brake fluid levels are near the upper level line on the see-through reservoirs.

7. ENGINE DRIVE BELT

Check the drive belt for fraying, cracks, wear or oiliness.

8. ENGINE OIL LEVEL

Check if the level of engine oil is between "F" and "L" on the dipstick with the engine turned off.

9. POWER STEERING FLUID LEVEL

- Check the level on the dipstick.
- The level should be in the "HOT" or "COLD"range depending on the fluid temperature.

10. AUTOMATIC TRANSMISSION FLUID LEVEL

(a) Park the vehicle on a level surface.

(b) With the engine idling and the parking brake applied, shift the selector into all the positions from "P" to "L". Then shift the "P" position.

(c) Pull out the dipstick and wipe off the fluid with a clean shop rag. Re-insert the dipstick and check that the fluid level is in the "HOT" range.

(d) Perform this check with the fluid at the normal driving temperature: 70 to 80°C (158 to 176°F).

HINT:
After extended driving under harsh conditions (high speeds, hot weather, heavy traffic or pulling a trailer), let the engine cool own for approximately 30 minutes before checking the fluid level.

11. EXHAUST SYSTEM

Check for unusual exhaust sounds or abnormal exhaust fumes. Locate the cause and correct it.

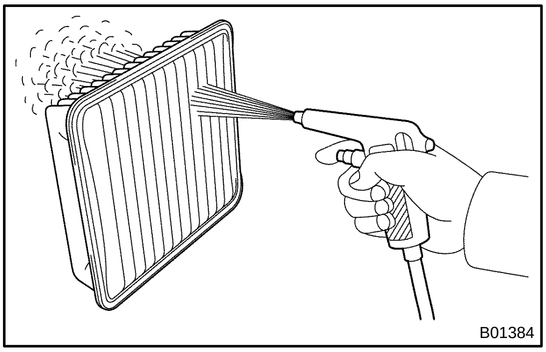
ENGINE

MA004-16

INSPECTION

HINT:
Inspect these items on a cooled down engine.

1. **REPLACE TIMING BELT**
   (See page EM-17)
2. **INSPECT DRIVE BELT**
   (See page CH-1)
3. **REPLACE SPARK PLUGS**
   (See page IG-1)


B01384

4. **INSPECT AIR FILTER**

(a) Remove the air filter.
(b) Visually check that the air filter is not excessively damaged or oily.

If necessary, replace the air filter.

(c) Clean the filter with compressed air.
First blow from the inside of the filter thoroughly then repeat from the outside.
(d) Reinstall the air filter.

5. **REPLACE AIR FILTER**

Replace the air filter with a new one.

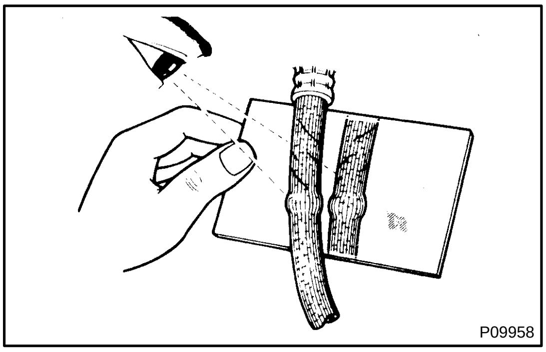
6. **REPLACE ENGINE OIL AND OIL FILTER**
   (See page LU-2)
7. **REPLACE ENGINE COOLANT**
   (See page CO-2)
8. **INSPECT GASKET IN FUEL TANK CAP**
   (See page EC-7)
9. **INSPECT FUEL LINES AND CONNECTIONS, FUEL TANK VAPOR VENT SYSTEM HOSES AND FUEL TANK BAND**

Visually check the fuel lines for cracks, leakage, loose connections, deformation or tank band looseness.

10. **INSPECT EXHAUST PIPES AND MOUNTINGS**

Visually check the pipes, hangers and connections for severe corrosion, leaks or damage.

11. **INSPECT VALVE CLEARANCE**
    (See page EM-5)



BRAKE

MA01R-11

INSPECTION

1. INSPECT BRAKE LINE PIPES AND HOSES

HINT:
Work in a well-lighted area. Check the entire circumference and length of the brake hoses using a mirror if neccessary. Turn the front wheels fully to the right or left before beginning.

(a) Check all brake lines and hoses for.
- Damage
- Wear
- Deformation
- Cracks
- Corrosion
- Leaks
- Bends
- Twists

(b) Check all the clamps for tightness and connections for leakage.

(c) Check that the hoses and lines are not near sharp edges, moving parts and the exhaust system.

(d) Check that the lines are installed pass through the center of the grommets.

2. INSPECT FRONT AND REAR BRAKE PADS AND DISCS

(FRONT PADS: See page BR-24)
(REAR PADS: See page BR-33)
(FRONT DISCS: See page BR-29)
(REAR DISCS: See page BR-38)

3. INSPECT OR CHANGE BRAKE FLUID

(See page BR-4)

Fluid: SAE J1703 or FMVSS No.116 DOT3

CHASSIS

MA01S-05

INSPECTION

1. **INSPECT STEERING LINKAGE**

(a) Check the steering wheel freeplay.
(see page SR-8)

(b) Check the steering linkage for looseness or damage.
Check that:

- Check that the tie rod ends do not have excessive play.
- Check that the dust seals and boots are not damaged.
- Check that the boot clamps are not loose.

2. **INSPECT STEERING GEAR HOUSING OIL**

Check the steering gear housing for oil leakage.

3. **INSPECT DRIVE SHAFT BOOTS**

Check the drive shaft boots for loose clamps, leakage or damage.

4. **INSPECT LOWER BALL JOINTS AND DUST COVERS**

(a) Jack up the front of the vehicle and support it with stands.
(b) Make sure the front wheels are in a straight-ahead position, and depress the brake pedal.
(c) Jack up the lower suspension arm until there is about half a load on the front coil spring.
(d) Inspect the dust cover for damage.

5. **CHECK AUTOMATIC TRANSMISSION AND DIFFERENTIAL**

Visually check the automatic transmission and differential for oil leakage.

6. **CHECK MANUAL TRANSMISSION AND DIFFERENTIAL**

Visually check the manual transmission and differential for oil leakage.
If leakage is found, check for the cause and repair it.

7. **LSD torque sensing type:**
REPLACE DIFFERENTIAL OIL (See page SA-73)

8. **Except wagon model:**
ROTATE TIRES (See page SA-3)

BODY

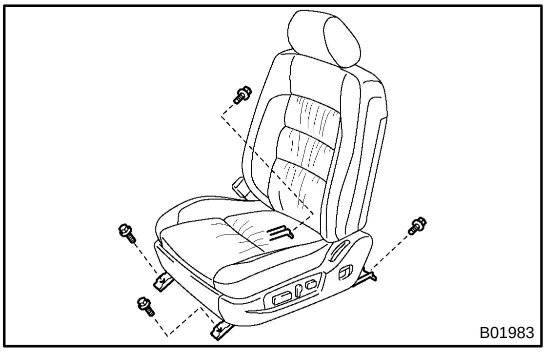
MA01T-05

INSPECTION

**1. CANADA:
TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY**

(a) Where necessary, tighten all parts of the chassis.

- Front axle and suspension
- Rear axle and suspension
- Drive train
- Brake system
- Engine mounting, etc.

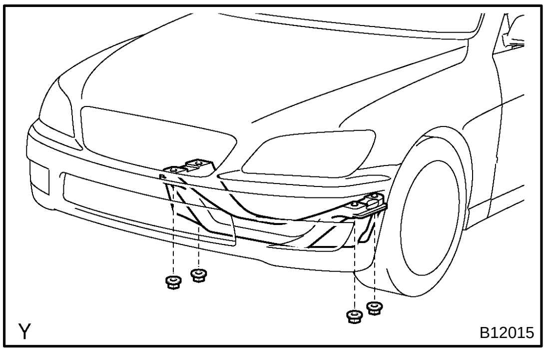


(b) Where necessary, tighten all parts of the body.

- Front seat mount bolts

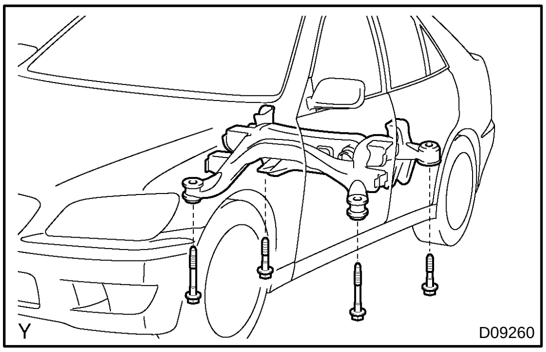
Torque: 37 N·m (375 kgf·cm, 27 ft·lbf)

- Seat belt system
- Doors and hood
- Body mountings
- Fuel tank
- Exhaust pipe system, etc.



- Front suspension member-to-body mounting bolts

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)



- Rear axle beam assembly-to-body mounting nuts

Torque: 127 N·m (1,300 kgf·cm, 94 ft·lbf)

2. REPLACE AIR REFINER FILTER (See page AC-93)

3. BODY INSPECTION

(a) Check the body exterior for dents, scratches and rust.

(b) Check the underbody for rust and damage.

If necessary, replace or repair.

4. ROAD TEST

(a) Check the engine and chassis for abnormal noises.
(b) Check that the vehicle does not wander or pull to one side.
(c) Check that the brakes work properly and do not drag.
(d) Do setting of the parking brake shoes and drum.

MAINTENANCE

PP0Q1-05

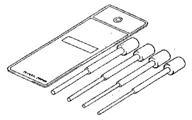
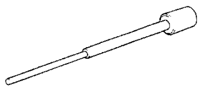
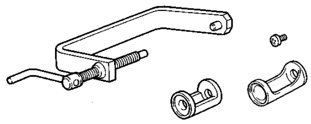
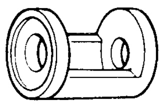
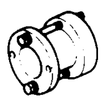
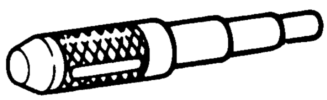
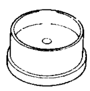
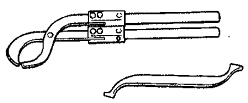
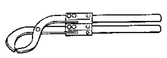
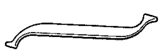
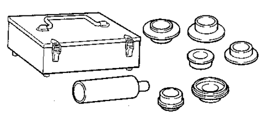
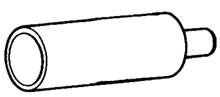
EQUIPMENT

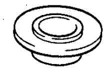
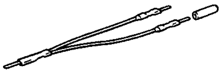
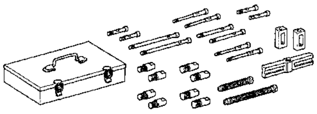
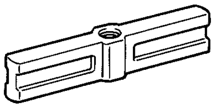
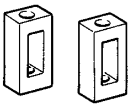
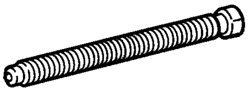
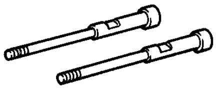
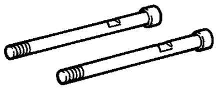
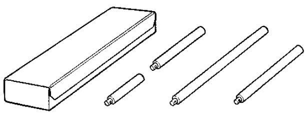
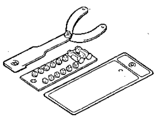
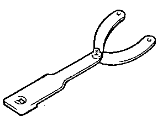
Mirror	Brake hose
Torque wrench	

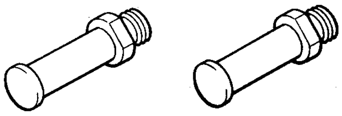
ENGINE MECHANICAL

SST (Special Service Tools)

PP3R8-01

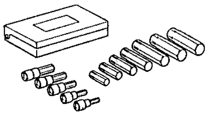
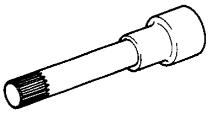
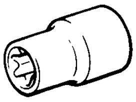
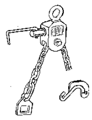
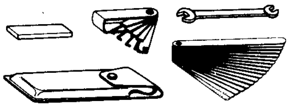
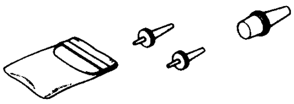
	09201-10000	Valve Guide Bushing Remover & Replacer Set	
	(09201-01060)	Valve Guide Bushing Remover & Replacer 6	
	09202-70020	Valve Spring Compressor	
	(09202-00010)	Attachment	
	09213-7001 1	Crankshaft Pully Holding Tool	
	09222-30010	Connecting Rod Bushing Remover & Replacer	
	09223-15030	Oil Seal & Bearing Replacer	Crankshaft rear oil seal
	09248-55040	Valve Clearance Adjust Tool Set	
	(09248-05410)	Valve Lifter Press	
	(09248-05420)	Valve Lifter Stopper	
	09316-6001 1	Transmission & Transfer Bearing Replacer	
	(09316-0001 1)	Replacer Pipe	Crankshaft front oil seal Camshaft oil seal

	(09316-00051)	Replacer "D"	Camshaft oil seal
	09330-00021	Companion Flange Holding Tool	Crankshaft pulley
	09843-18040	Diagnosis Check Wire No.2	
	09950-50013	Puller C Set	
	(09951-05010)	Hanger 150	Crankshaft pulley Crankshaft timing pulley
	(09952-05010)	Slide Arm	Crankshaft pulley Crankshaft timing pulley
	(09953-05020)	Center Bolt 150	Crankshaft pulley Crankshaft timing pulley
	(09954-0501 1)	Claw No.1	Crankshaft timing pulley
	(09954-05031)	Claw No.3	Crankshaft pulley
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	Valve guide bushing Crankshaft rear oil seal
	09960-10010	Variable Pin Wrench Set	
	(09962-01000)	Variable Pin Wrench Arm Assy	Camshaft timing pulley

	(09963-01000) Pin 10	Camshaft timing pulley

PP0TE-05

RECOMMENDED TOOLS

	09040-0001 1	Hexagon Wrench Set .	
	09043-50100	Bi-hexagon Wrench 10 mm .	Cylinder head bolt
	09044-00020	Torx Socket E10 .	A/C compressor stud bolt
	09090-04020	Engine Sling Device	For suspending engine
	09200-00010	Engine Adjust Kit .	
	09258-00030	Hose Plug Set .	

PP0TF-01

EQUIPMENT

Abrasive compound	Valve
Bolt (Part No. 90105-10345)	For suspending engine
Bolt (Part No. 90119-18001)	Crankshaft pulley Crankshaft timing pulley
Caliper gauge	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune-up tester	
Heater	
Magnetic finger	
Micrometer	
Mirror	
No. 1 engine hanger (Part No. 12281-46050)	For suspending engine
OBD II scan tool	
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Press	
Ridge reamer	Cylinder
Soft brash	
Solvent	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
Valve seat cutter	
Vernier calipers	
V-block	
Wire brush	

PP1XM-01

SSM (Special Service Materials)

	08826-00080	Seal Packing Black or equivalent (FIPG)	No. 1 camshaft bearing cap No. 3 camshaft bearing cap Cylinder head cover Rear oil seal retainer
	08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	Drive plate bolt Heater union Torque converter clutch bolt
	08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Idler pulley pivot bolt

EMISSION CONTROL

EQUIPMENT

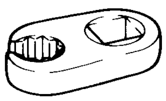
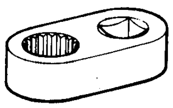
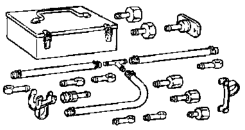
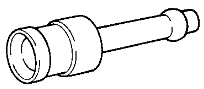
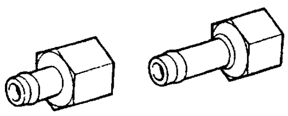
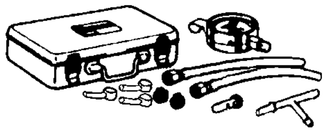
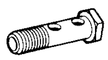
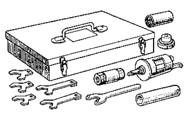
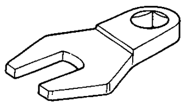
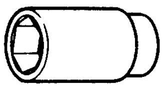
PP109-02

Hose clipper	
MITYVAC (Hand-held vacuum pump)	
Torque wrench	

SFI

PP0UD-03

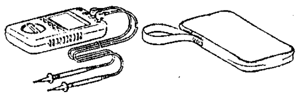
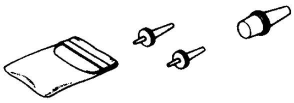
SST (Special Service Tools)

	09023-12700	Union Nut Wrench 17mm	Fuel line fare nut
	09205-76030	Cylinder Head Setting Bolt Tightening Adaptor	ECT sensor
	09268-41047	Injection Measuring Tool Set	
	(09268-41 110)	Adaptor	
	(09268-41300)	Clamp	
	(09268-5201 1)	Injection Measuring Attachment	
	09268-45014	EFI Fuel Pressure Gauge	
	(09268-41 190)	Adaptor	
	(90405-06167)	I Union	
	09612-24014	Steering Gear Housing Overhaul Tool Set	
	(09617-2401 1)	Steering Rack Wrench	Fuel pressure pulsation damper
	09816-30010	Oil Pressure Switch Socket	Knock sensor

	09842-30070 Wiring "F" EFI Inspection	

PP0TI-05

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09258-00030	Hose Plug Set .	

PP0TJ-07

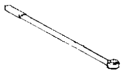
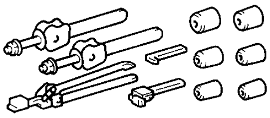
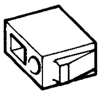
EQUIPMENT

Graduated cylinder	Injector
Heater	ECT sensor
OBD II scan tool	
Sound scope	Injector
Thermometer	ECT sensor
Torque wrench	
Vacuum gauge	

COOLING

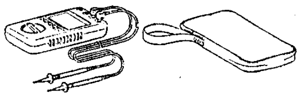
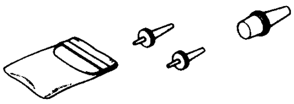
SST (Special Service Tools)

PP3C9-01

	09216-00041	V-Ribbed Belt Tensioner Wrench	
	09230-01010	Radiator Service Tool Set	
	09231-14010	Punch	

PP3CA-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09258-00030	Hose Plug Set .	

PP0TM-08

EQUIPMENT

Heater	Thermostat ECT switch
Radiator cap tester	
Rubber hose (Inside diameter 6 - 8 mm)	
Thermometer	Thermostat ECT switch
Torque wrench	
Vernier calipers	

PP1IA-04

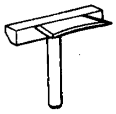
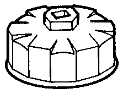
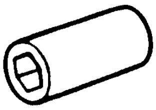
COOLANT

Item	Capacity	Classification
Engine coolant (w/ Heater)	7.5 liters (7.9 US qts, 6.6 Imp. qts)	”TOYOTA Long Life Coolant” or equivalent

LUBRICATION

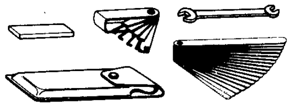
SST (Special Service Tools)

PP3CB-02

	09032-00100	Oil Pan Seal Cutter	No. 2 oil pan
	09228-07501	Oil Filter Wrench	
	09268-46021	Nozzle Holder Retaining Nut Wrench	Oil pressure switch

PP23F-02

RECOMMENDED TOOLS

	09200-00010	Engine Adjust Kit .	

PP1IE-03

EQUIPMENT

Oil pressure gauge	
Precision straight edge	Oil pump
Torque wrench	

PP1IF-05

LUBRICANT

Item		Capacity	Classification
Engine oil			
Drain and refill	w/ Oil filter change	5.4 liters (5.7 US qts, 4.8 Imp. qts)	API grade SL Energy-Conserving or ILSAC multigrade engine oil.
	w/o Oil filter change	5.1 liters (5.4 US qts, 4.5 Imp. qts)	
Dry fill		6.5 liters (6.9 US qts, 5.7 Imp. qts)	

PP1IG-03

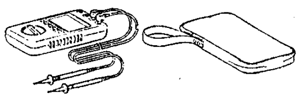
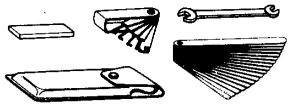
SSM (Special Service Materials)

	08826-00080	Seal Packing Black or equivalent (FIPG)	Oil pump No. 1 oil pan No. 2 oil pan
	08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Oil pressure switch

IGNITION

RECOMMENDED TOOLS

PP3CC-01

	09082-00040	TOYOTA Electrical Tester.	
	09200-00010	Engine Adjust Kit .	

PP0TU-09

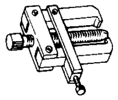
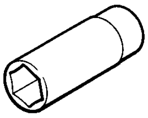
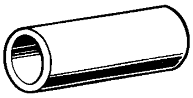
EQUIPMENT

Megger insulation resistance meter	Spark plug
Spark plug cleaner	
Torque wrench	

STARTING

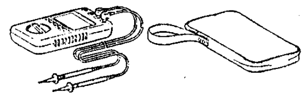
SST (Special Service Tools)

PP3CD-02

	09286-4601 1	Injection Pump Spline Shaft Puller	Armature bearing
	09810-38140	Starter Magnet Switch Nut Wrench 14	Terminal nut
	09820-00031	Alternator Rear Bearing Replacer	Armature front bearing

PP3CE-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	

PP0TX-09

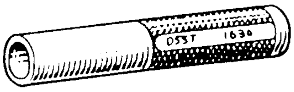
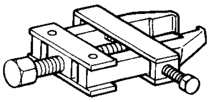
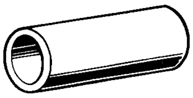
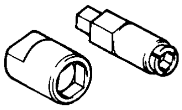
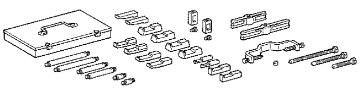
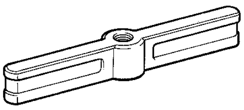
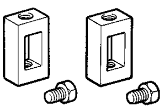
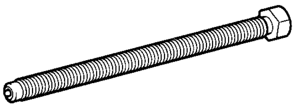
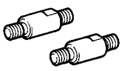
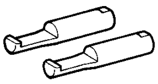
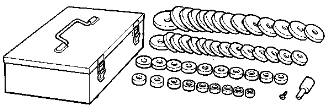
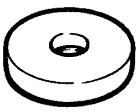
EQUIPMENT

Dial indicator	Commutator runout
Magnetic finger	Steel ball
Press	Magnetic switch terminal kit
Pull scale	Brush spring
Sandpaper	Commutator
Torque wrench	
V-block	Commutator
Vernier calipers	Commutator Brush

CHARGING

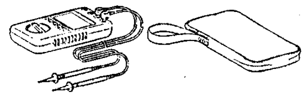
PP3CF-02

SST (Special Service Tools)

	09285-76010	Injection Pump Camshaft Bearing Cone Replacer	Rotor rear bearing cover
	09820-00021	Alternator Rear Bearing Puller	
	09820-00031	Alternator Rear Bearing Replacer	
	09820-63011	Alternator Pulley Set Nut Wrench Set	
	09950-40011	Puller B Set	
	(09951-04020)	Hanger 200	Rectifier end frame
	(09952-04010)	Slide Arm	Rectifier end frame
	(09953-04030)	Center Bolt 200	Rectifier end frame
	(09954-04010)	Arm 25	Rectifier end frame
	(09955-04041)	Claw No.4	Rectifier end frame
	09950-60010	Replacer Set	
	(09951-00500)	Replacer 50	Rotor front bearing

PP0TZ-05

RECOMMENDED TOOLS

 09082-00040	TOYOTA Electrical Tester.	

PP0U0-07

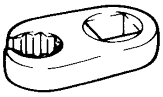
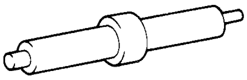
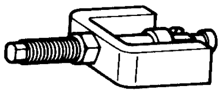
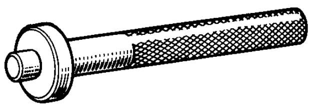
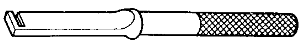
EQUIPMENT

Battery specific gravity gauge	Except maintenance-free battery
Battery tension gauge	
Torque wrench	
Vernier calipers	Rotor (Slip ring) Brush

CLUTCH

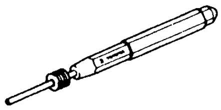
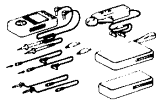
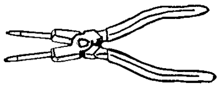
PP3RA-01

SST (Special Service Tools)

	09023-00100	Union Nut Wrench 10 mm	Clutch line
	09301-001 10	Clutch Guide Tool	
	09303-3501 1	Input Shaft Front Bearing Puller	
	09304-12012	Input Shaft Front Bearing Replacer	
	09333-00013	Clutch Diaphragm Spring Aligner	

PP3RB-01

RECOMMENDED TOOLS

	09031-00030	Pin Punch .	Reservoir tank
	09082-00050	TOYOTA Electrical Tester Set.	
	09905-00013	Snap Ring Pliers .	

PP3RC-01

EQUIPMENT

Vernier calipers	
Torque wrench	
Dial indicator with magnetic base	

PP3RD-01

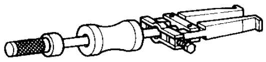
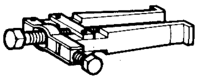
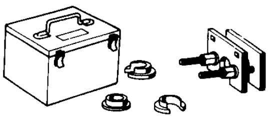
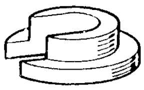
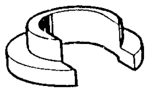
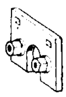
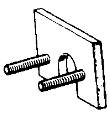
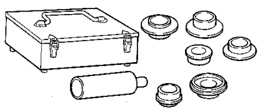
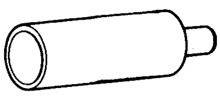
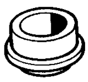
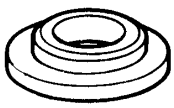
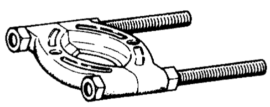
LUBRICANT

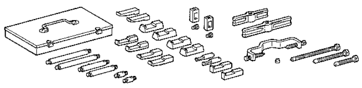
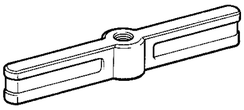
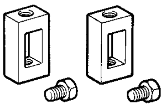
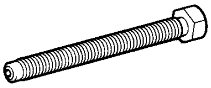
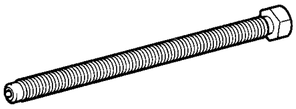
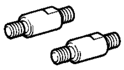
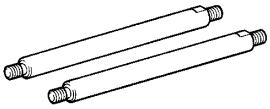
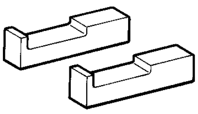
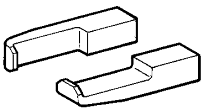
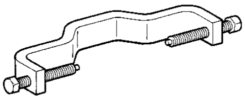
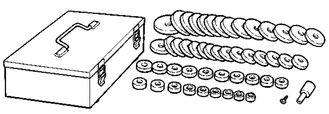
Item	Capacity	Classification
Brake fluid	-	SAEJ1703 or FMVSS No.116, DOT 3

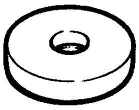
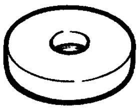
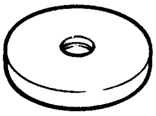
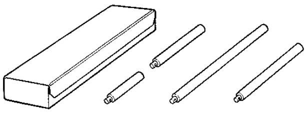
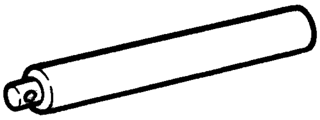
MANUAL TRANSMISSION

SST (Special Service Tools)

PP3R9-02

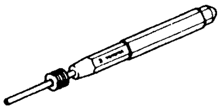
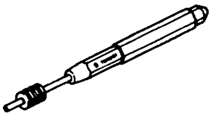
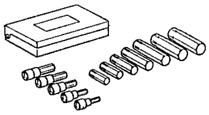
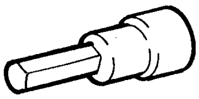
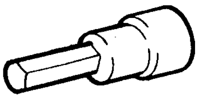
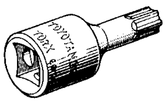
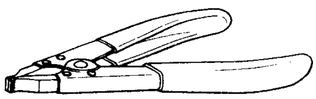
	09308-00010	Oil Seal Puller	Output shaft rear bearing outer race
	09308-10010	Oil Seal Puller	Extension housing oil seal
	09312-20011	Transmission Gear Remover & Replacer	5th gear Output shaft rear bearing Reverse gear
	(09313-00010)	Reverse Gear Remover	
	(09313-00030)	Rear Bearing Replacer	
	(09313-00040)	Plate "A"	
	(09313-00050)	Plate "B"	
	09316-60011	Transmission & Transfer Bearing Replacer	No. 3 clutch hob Counter gear center bearing outer race
	(09316-00011)	Replacer Pipe	
	(09316-00071)	Replacer "F"	
	09506-35010	Differential Drive Pinion Rear Bearing Replacer	Input shaft bearing Outer shaft center bearing
	09950-00020	Bearing Remover	Counter gear front bearing

	09950-4001 1	Puller B Set	Rear bearing, counter 5th gear rear bearing No. 3 clutch hub Reverse gear
	(09951-04020)	Hanger 200	
	(09952-04010)	Slide Arm	
	(09953-04020)	Center Bolt 150	
	(09953-04030)	Center Bolt 200	
	(09954-04010)	Arm 25	
	(09954-04040)	Arm 200	
	(09955-04051)	Claw No.5	
	(09955-04071)	Claw No.7	
	(09957-04010)	Attachment	
	(09958-0401 1)	Holder	
	09950-60010	Replacer Set	
	(09951-00200)	Replacer 20	No. 3 clutch hub

	(09951-00440)	Replacer 44	Front bearing retainer oil seal
	(09951-00510)	Replacer 51	Counter gear center bearing outer race
	(09951-00560)	Replacer 56	Output shaft rear bearing outer race Extension housing oil seal
	09950-70010	Handle Set	
	(09951-07150)	Handle 150	

PP3RE-01

RECOMMENDED TOOLS

	09031-00030	Pin Punch .	
	09031-00040	Pin Punch .	
	09040-0001 1	Hexagon Wrench Set .	
	(09043-20060)	Socket Hexagon Wrench 6.	
	(09043-20100)	Socket Hexagon Wrench 10.	
	09042-00020	Torx Socket T40 .	
	09905-00012	Snap Ring No.1 Expander	

PP3RF-01

EQUIPMENT

Dial indicator with magnetic base	
Feeler gauge	
Micrometer	
Torque wrench	
Calipers	
Magnetic finger	

PP3RG-01

LUBRICANT

Item	Capacity	Classification
Manual transmission oil	2.6 liters (2.7 US qts, 2.3 Imp. qts)	API GL-4 or GL-5 SAE 75W-90

PP3RH-01

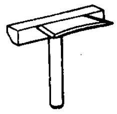
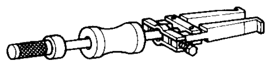
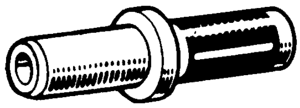
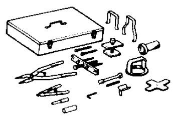
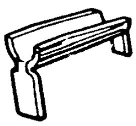
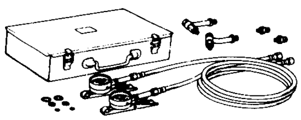
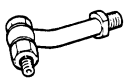
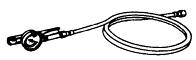
SSM (Special Service Materials)

08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	

AUTOMATIC TRANSMISSION

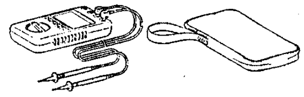
PP3BP-01

SST (Special Service Tools)

	09032-00100	Oil Pan Seal Cutter	Oil pan
	09308-00010	Oil Seal Puller	Extension housing rear oil seal
	09325-20010	Transmission Oil Plug	Extension housing rear oil seal
	09350-30020	TOYOTA Automatic Transmission Tool Set	
	(09351-32020)	Stator Stopper	
	09992-00095	Automatic Transmission Oil Pressure Gauge Set	
	(09992-00231)	Adaptor C	
	(09992-00271)	Gauge Assy	

PP3BQ-01

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	

PP0N6-08

EQUIPMENT

OBD II scan tool	
Dial indicator or dial indicator with magnetic base	
Straight edge	
Torque wrench	

PP0N7-10

LUBRICANT

Item	Capacity	Classification
Automatic transmission fluid Dry fill Drain and refill	 8.0 liters (8.5 US qts, 7.0 Imp. qts) 2.4 liters (2.5 US qts, 2.1 Imp. qts)	ATF TYPE T-IV

PP3BR-01

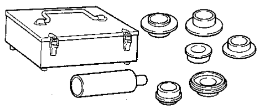
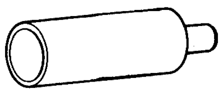
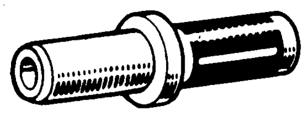
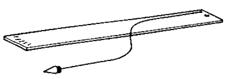
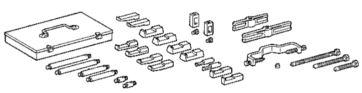
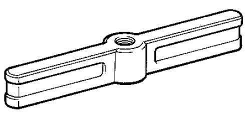
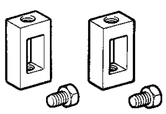
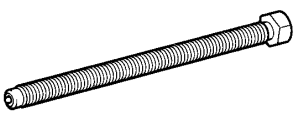
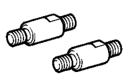
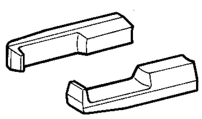
SSM (Special Service Materials)

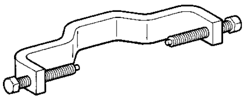
	08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	Transmission case x Oil pan
	08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	Extension housing set bolt
	08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Transmission case x Extension housing

PROPELLER SHAFT

PP23J-01

SST (Special Service Tools)

	09316-60011	Transmission & Transfer Bearing Replacer	
	(09316-00011)	Replacer Pipe	Dust cover
	09325-20010	Transmission Oil Plug	Oil leakage prevention
	09330-00021	Companion Flange Holding Tool	Universal joint flange
	09370-50010	Drive Line Angle Gauge	Joint angle
	09950-40011	Puller B Set	
	(09951-04020)	Hanger 200	Universal joint flange
	(09952-04010)	Slide Arm	Universal joint flange
	(09953-04030)	Center Bolt 200	Universal joint flange
	(09954-04010)	Arm 25	Universal joint flange
	(09955-04061)	Claw No.6	Universal joint flange
	(09957-04010)	Attachment	Universal joint flange

 (09958-0401 1)	Holder	Universal joint flange

PP23K-01

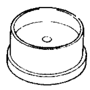
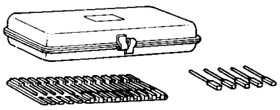
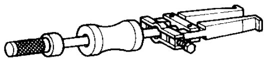
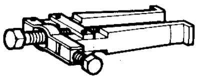
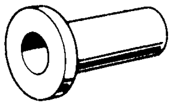
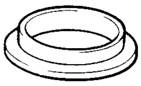
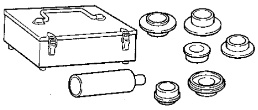
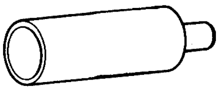
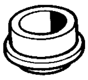
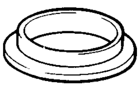
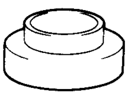
EQUIPMENT

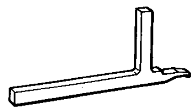
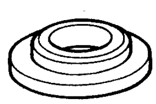
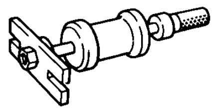
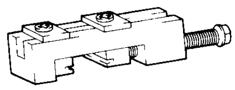
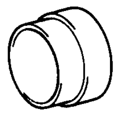
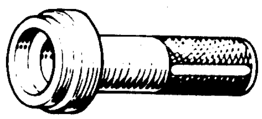
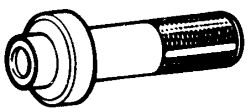
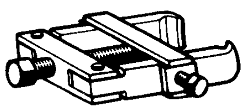
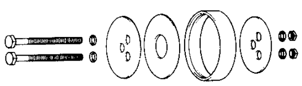
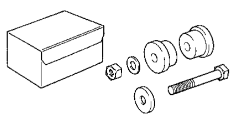
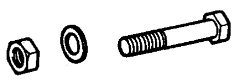
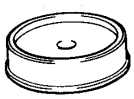
Torque wrench	
Dial indicator	

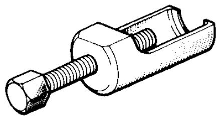
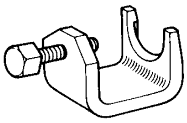
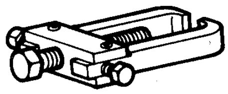
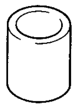
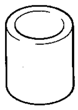
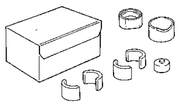
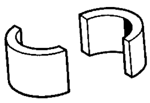
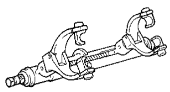
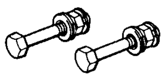
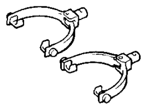
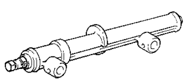
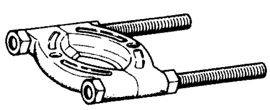
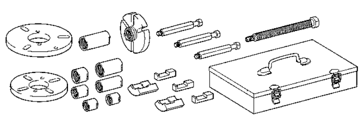
SUSPENSION AND AXLE

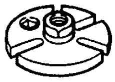
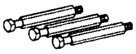
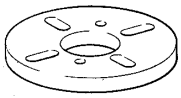
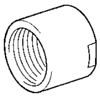
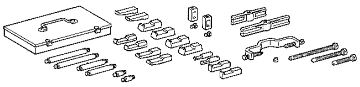
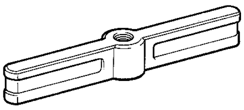
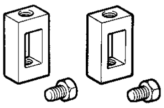
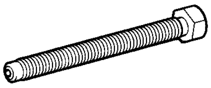
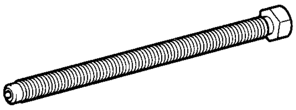
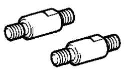
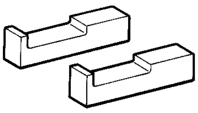
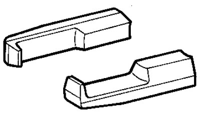
PP3C2-02

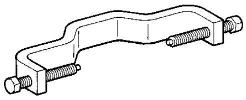
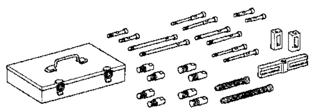
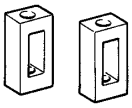
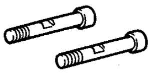
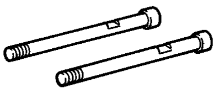
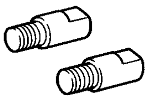
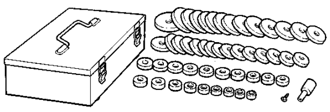
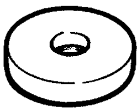
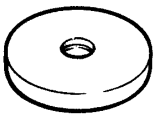
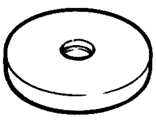
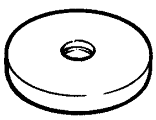
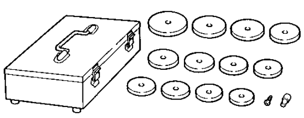
SST (Special Service Tools)

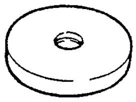
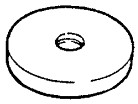
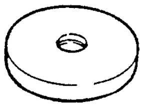
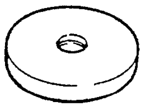
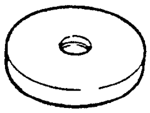
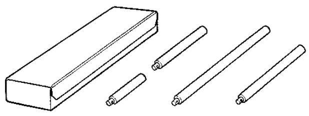
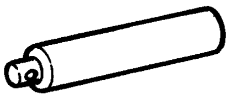
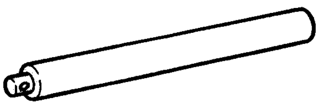
	09223-15020	Oil Seal & Bearing Replacer	Rear axle
	09240-00020	Wire Gauge Set	Rear drive shaft
	09308-00010	Oil Seal Puller	Front axle Rear differential
	09308-10010	Oil Seal Puller	Rear differential
	09309-36010	Transmission Rear Bearing Replacer	Rear drive shaft
	09316-12010	Transfer Bearing Replacer	Rear differential
	09316-6001 1	Transmission & Transfer Bearing Replacer	Front axle
	(09316-0001 1)	Replacer Pipe	
	(09316-00071)	Replacer "F"	
	09330-00021	Companion Flange Holding Tool	Rear differential
	09502-12010	Differential Bearing Replacer	Rear drive shaft
	09502-24010	Bearing Replacer	Front axle Rear differential

	09504-22012	Differential Side Bearing Replacer	Rear differential
	09506-30012	Differential Drive Pinion Rear Bearing Cone Replacer	Rear differential
	09520-24010	Differential Side Gear Shaft Puller	Rear differential
	09521-24010	Drive Shaft Boot Clamping Tool	Rear drive shaft
	09527-17011	Rear Axle Shaft Bearing Remover	Rear axle
	09554-22010	Differential Oil Seal Replacer	Rear differential
	09554-30011	Differential Oil Seal Replacer	Rear differential
	09556-22010	Drive Pinion Front Bearing Remover	Rear differential
	09570-24010	Differential Mounting Cushion Remover & Replacer	Rear differential
	09608-16042	Front Hub Bearing Adjusting Tool	Rear drive shaft
	(09608-02021)	Bolt & Nut	
	(09608-02041)	Retainer	
	09608-32010	Steering Knuckle Oil Seal Replacer	Front axle

	09610-20012	Pitman Arm Puller	Front axle Front suspension Rear axle Rear suspension
	09628-10011	Ball Joint Puller	Front axle Rear axle
	09628-62011	Ball Joint Puller	Front suspension Rear axle Rear suspension
	09710-04061	Base	Rear differential
	09710-04081	Base	Rear differential
	09726-12023	Lower Suspension Arm Bushing Remover & Replacer	Rear drive shaft
	(09726-01031)	Spacer	
	09727-30021	Coil Spring Compressor	Front suspension Rear suspension
	(09727-00010)	Bolt Set	
	(09727-00021)	Arm Set	
	(09727-00031)	Compressor	
	09950-00020	Bearing Remover	Front axle Rear axle Rear differential
	09950-30012	Puller A Set	Rear differential

	(09951-03010)	Upper Plate	
	(09953-03010)	Center Bolt	
	(09954-03010)	Arm	
	(09955-03030)	Lower Plate 130	
	(09956-03020)	Adapter 18	
	09950-4001 1	Puller B Set	
	(09951-04020)	Hanger 200	Front axle Rear axle Rear differential
	(09952-04010)	Slide Arm	Front axle Rear axle Rear differential
	(09953-04020)	Center Bolt 150	Front axle
	(09953-04030)	Center Bolt 200	Front axle Rear axle Rear differential
	(09954-04010)	Arm 25	Front axle Rear axle Rear differential
	(09955-04051)	Claw No.5	Front axle Rear axle
	(09955-04061)	Claw No.6	Rear differential

	(09957-04010)	Attachment	Front axle Rear axle Rear differential
	(09958-04011)	Holder	Front axle Rear axle Rear differential
	09950-50013	Puller C Set	
	(09952-05010)	Slide Arm	Front axle Rear axle Rear differential
	(09954-05021)	Claw No.2	Rear axle
	(09954-05031)	Claw No.3	Front axle Rear differential
	(09955-05040)	Adapter No.4	Front axle Rear axle Rear differential
	09950-60010	Replacer Set	
	(09951-00480)	Replacer 48	Rear axle Rear differential
	(09951-00560)	Replacer 56	Front axle
	(09951-00600)	Replacer 60	Rear differential
	(09951-00650)	Replacer 65	Rear axle
	09950-60020	Replacer Set No.2	

	(09951-00710)	Replacer 71	Front axle Rear differential
	(09951-00750)	Replacer 75	Rear axle
	(09951-00780)	Replacer 78	Rear differential
	(09951-00790)	Replacer 79	Rear differential
	(09951-01030)	Replacer 103	Rear axle
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	Rear axle Rear differential
	(09951-07150)	Handle 150	Front axle Rear differential
	(09951-07200)	Handle 200	Rear differential

PP0T3-05

EQUIPMENT

Dial indicator with magnetic base	
Micrometer	
Torque wrench	
Vernier caliper	

PP0T4-07

LUBRICANT

REAR DRIVE SHAFT		
Item	Capacity	Classification
Outboard joint grease	170 - 180 g (0.37 - 0.40 lb, 6.0 - 6.3 oz.)	
Inboard joint grease	144 - 154 g (0.32 - 0.34 lb, 5.1 - 5.4 oz.)	
REAR DIFFERENTIAL		
Item	Capacity	Classification
Differential oil	-	Hypoid gear oil API GL-5 Above -18°C (0°F) SAE 90 Below -18°C (0°F) SAE 80W-90 or 80W

PP241-03

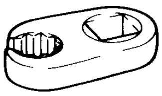
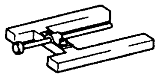
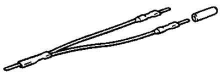
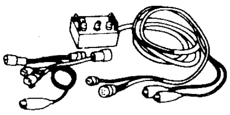
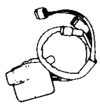
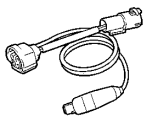
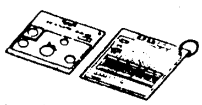
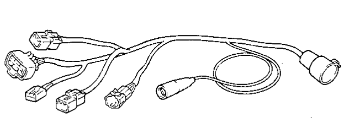
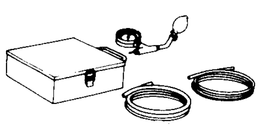
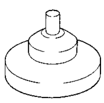
SSM (Special Service Materials)

	08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	

BRAKE

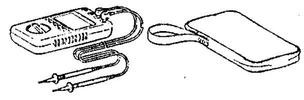
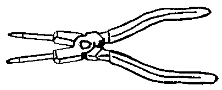
PP3C1-02

SST (Special Service Tools)

	09023-00100	Union Nut Wrench 10 mm	
	09737-00011	Brake Booster Push Rod Gauge	
	09843-18020	Diagnosis Check Wire	
	09843-18040	Diagnosis Check Wire No.2	
	09990-00150	ABS Actuator Checker and Sub-harness	
	09990-00250	ABS Actuator Checker Sub-harness ”G”	
	09990-00360	ABS Actuator Checker Sub-harness ”L”	
	09990-00410	ABS Actuator Checker Sheet ”N”	
	09990-00450	ABS Actuator Checker Sub-harness ”P”	
	09992-00242	Turbocharger Pressure Gauge	
	09992-00350	Brake Reservoir Pressure Adapter	

PP0P2-08

RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09905-00013	Snap Ring Pliers .	

PP0P3-03

EQUIPMENT

Torque wrench	
Micrometer	Brake disc
Dial indicator	Brake disc
Brake drum gauge	Brake disc

PP0P4-02

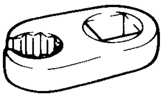
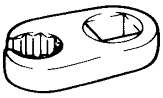
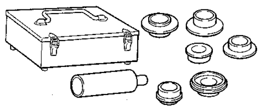
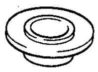
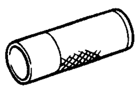
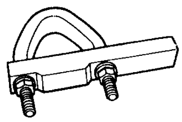
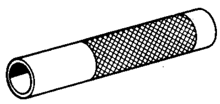
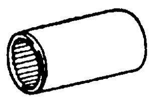
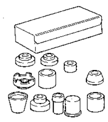
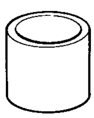
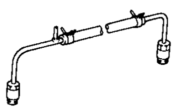
LUBRICANT

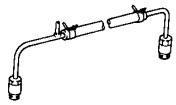
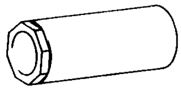
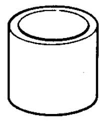
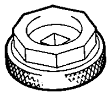
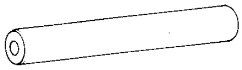
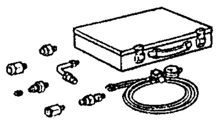
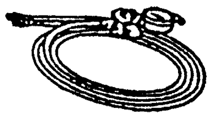
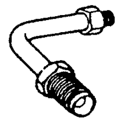
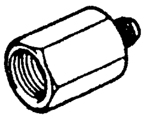
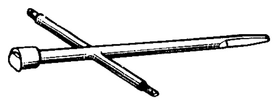
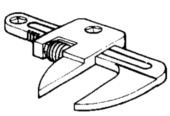
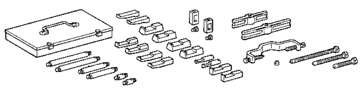
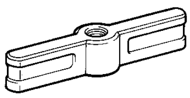
Item	Capacity	Classification
Brake fluid	-	SAE J1703 or FMVSS No. 116, DOT 3

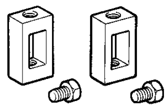
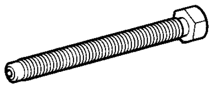
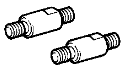
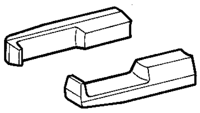
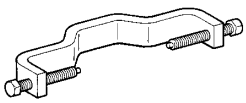
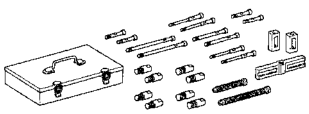
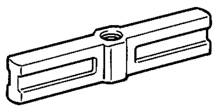
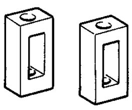
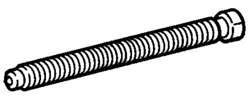
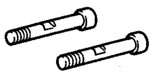
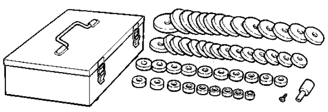
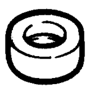
STEERING

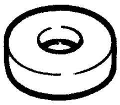
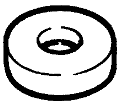
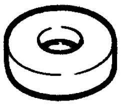
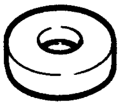
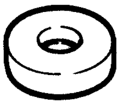
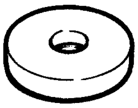
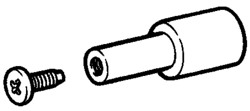
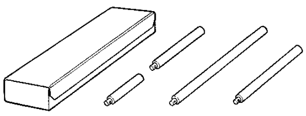
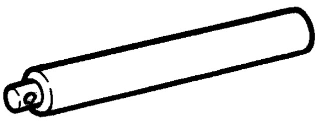
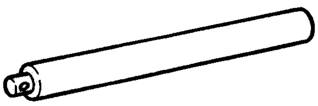
SST (Special Service Tools)

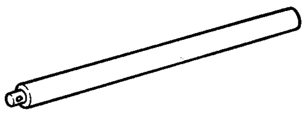
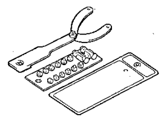
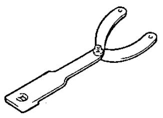
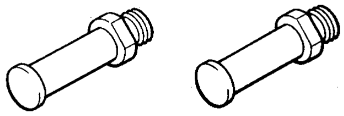
PP3R7-01

	09023-38200	Union Nut Wrench 12mm	PS gear
	09023-38400	Union Nut Wrench 14mm	PS gear
	09216-00041	V-Ribbed Belt Tensioner Wrench	PS vane pump
	09316-60011	Transmission & Transfer Bearing Replacer	Tilt steering column
	(09316-00051)	Replacer "D"	
	09608-04031	Front Hub Inner Bearing Cone Replacer	PS vane pump
	09612-00012	Rack & Pinion Steering Rack Housing Stand	PS gear
	09612-22011	Tilt Handle Bearing Replacer	Tilt steering column
	09616-00011	Steering Worm Bearing Adjusting Socket	PS gear
	09630-24014	Steering Rack Oil Seal Tool Set	PS gear
	(09620-24051)	Seal Ring Tool	
	09631-12071	Steering Rack Oil Seal Test Tool	PS nane pump

	09631-12071	Steering Rack Oil Seal Test Tool	PS gear
	09631-20060	Bearing Guide Nut Wrench	PS gear
	09631-20081	Seal Ring Tool	PS gear
	09631-20090	Cylinder End Stopper Nut Wrench	PS gear
	09631-33010	Steering Rack Cover "I"	PS gear
	09640-10010	Power Steering Pressure Gauge Set	Power steering fluid
	(09641-01010)	Gauge Assy	
	(09641-01030)	Attachment B	
	(09641-01060)	Attachment E	
	09703-30010	Brake Shoe Return Spring Tool	Tilt steering column
	09922-10010	Variable Open Wrench	PS gear
	09950-40011	Puller B Set	Tilt steering column
	(09951-04010)	Hanger 150	

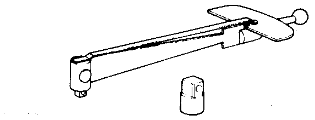
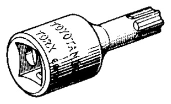
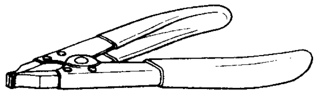
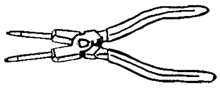
	(09952-04010)	Slide Arm	
	(09953-04020)	Center Bolt 150	
	(09954-04010)	Arm 25	
	(09955-04061)	Claw No.6	
	(09958-0401 1)	Holder	
	09950-50013	Puller C Set	Tilt steering column
	(09951-05010)	Hanger 150	
	(09952-05010)	Slide Arm	
	(09953-05020)	Center Bolt 150	
	(09954-05021)	Claw No.2	
	09950-60010	Replacer Set	
	(09951-00180)	Replacer 18	PS gear
	(09951-00240)	Replacer 24	PS gear

	(09951-00250)	Replacer 25	PS gear
	(09951-00280)	Replacer 28	PS gear
	(09951-00310)	Replacer 31	PS gear
	(09951-00320)	Replacer 32	PS vane pump PS gear
	(09951-00330)	Replacer 33	
	(09951-00340)	Replacer 34	PS gear
	(09951-00360)	Replacer 36	PS gear
	(09951-00430)	Replacer 43	PS gear
	(09952-06010)	Adapter	PS gear
	09950-70010	Handle Set	
	(09951-07100)	Handle 100	PS vane pump PS gear
	(09951-07150)	Handle 150	PS gear
	(09951-07200)	Handle 200	PS gear

	(09951-07360)	Handle 360	PS gear
	09960-10010	Variable Pin Wrench Set	PS vane pump
	(09962-01000)	Variable Pin Wrench Arm Assy	
	(09963-01000)	Pin 10	

PP23U-01

RECOMMENDED TOOLS

	09025-00010	Torque Wrench (30 kgf-cm)	PS vane pump PS gear
	09042-00010	Torx Socket T30 .	Tilt steering column
	09905-00012	Snap Ring No.1 Expander .	
	09905-00013	Snap Ring Pliers .	

PP18L-05

EQUIPMENT

Belt tension gauge	Drive belt
Caliper gauge	PS vane pump
Vernier calipers	PS vane pump
Dial indicator	PS gear
Feeler gauge	PS vane pump
Micrometer	PS vane pump
Torque wrench	

PP18M-04

LUBRICANT

Item	Capacity	Classification
Power steering fluid (Total)	0.9 liters (1.0 US qts, 0.8 Imp.qts)	ATF DEXRON® II or III

PP18N-04

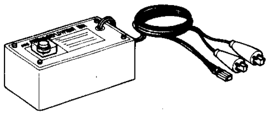
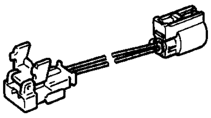
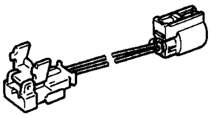
SSM (Special Service Materials)

08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	PS gear

SUPPLEMENTAL RESTRAINT SYSTEM

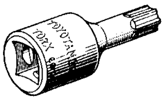
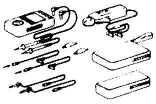
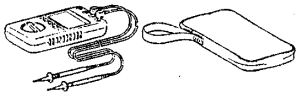
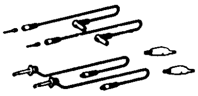
SST (Special Service Tools)

PP0MQ-10

	09082-00700	SRS Airbag Deployment Tool	
	09082-00750	Airbag Deployment Wire Sub-harness No.3	
	09082-00760	Airbag Deployment Wire Sub-harness No.4	
	09843-18040	Diagnosis Check Wire No.2	

PP1XL-06

RECOMMENDED TOOLS

	09042-00020	Torx Socket T40 .	Airbag sensor assembly
	09082-00050	TOYOTA Electrical Tester Set.	
	(09082-00040)	TOYOTA Electrical Tester.	
	(09083-00150)	Test Lead Set	Seat belt pretensioner connector

EQUIPMENT

Bolt Length: 35.0 mm (1.387 in.) Pitch: 1.0 mm (0.039 in.) Diam.: 6.0 mm (0.236 in.)	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposal
Torque wrench	
Vinyl bag	Airbag disposal

BODY ELECTRICAL

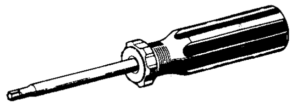
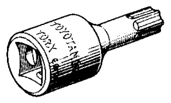
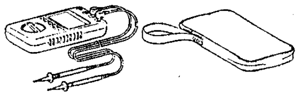
SST (Special Service Tools)

PP0O0-15

	09843-18040 Diagnosis Check Wire No.2	

PP0O1-11

RECOMMENDED TOOLS

	09041-00030	Torx Driver T30 .	For removing and installing steering wheel pad
	09042-00010	Torx Socket T30 .	For removing and installing steering wheel pad
	09082-00040	TOYOTA Electrical Tester.	

PP0O2-10

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Engine oil level warning switch, Seat heater
Syphon	Brake fluid level warning switch
Oil bath	Engine oil level warning switch
Dry cell battery	Fuel sender gauge
Heat light	Seat heater
Hexagon wrench (6 mm)	Power seat
Torque wrench	
Clip remover	For removing cowl louver
Masking tape	Rear window defogger wire
Tin foil	Rear window defogger wire

PP0T6-08

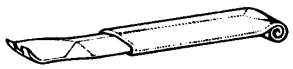
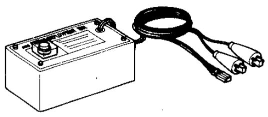
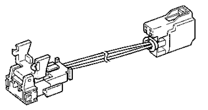
SSM (Special Service Materials)

08888-88888	DuPont Paste No. 4817 or equivalent	Rear window defogger

BODY

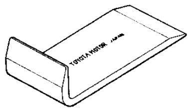
PP0T8-08

SST (Special Service Tools)

	09812-00010	Door Hinge Set Bolt Wrench	
	09806-30010	Windshield Moulding Remover	
	09082-00700	SRS Airbag Deployment Tool	
	09082-00730	Airbag Deployment Wire Sub-Harness No.1	

PP1EI-05

RECOMMENDED TOOLS

 09070-20010 Moulding Remover .		

PP0TA-02

EQUIPMENT

Clip remover	
Torque wrench	
Torx driver	
Hog ring pliers	
Hand riveter	
Tape	To avoid surface damage
Adhesive tape	To avoid surface damage
Double-stick tape	
Adhesive	
Cleaner	
Shop rag	
Knife	
Sealer gun	
Brush	
Putty spatula	
Wooden block or similar object	For tying both piano wire ends
Plastic sheet	To avoid surface damage
Rope (no projections, difficult to break)	Seat belt pretensioner disposal
Tire Width: 185 mm (7.28 in.) Inner diam: 360 mm (14.17 in.)	Seat belt pretensioner disposal
Tire with disc wheel Width: 185mm (7.28 in.) Inner diam 360 mm (14.17 in.)	Seat belt pretensioner disposal
Vinyl bag	Seat belt pretensioner disposal

PP0TB-01

LUBRICANT

Item	Capacity	Classification
MP grease	-	-

PP0TC-09

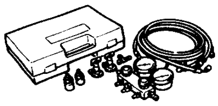
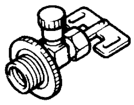
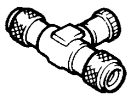
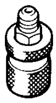
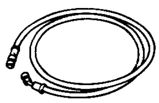
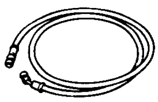
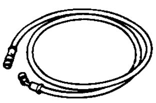
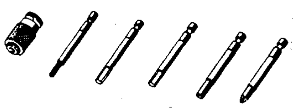
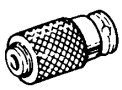
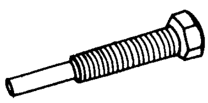
SSM (Special Service Materials)

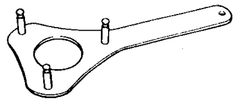
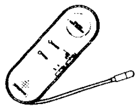
	08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	
	08833-00030	Three cement black or equivalent	
	08850-00801	Windshield Glass Adhesive Set or equivalent	

AIR CONDITIONING

PP3BY-01

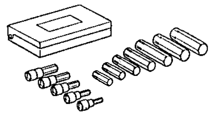
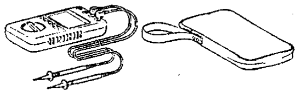
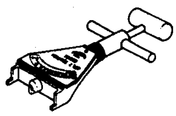
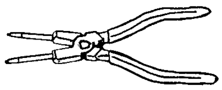
SST (Special Service Tools)

	07110-58060	Air Conditioner Service Tool Set	
	(07117-58060)	Refrigerant Drain Service Valve	
	(07117-58070)	T-Joint	
	(07117-58080)	Quick Disconnect Adapter	High pressure side
	(07117-58090)	Quick Disconnect Adapter	Low pressure side
	(07117-88060)	Refrigerant Charging Hose	High pressure side (Color: Red)
	(07117-88070)	Refrigerant Charging Hose	Low pressure side (Color: Blue)
	(07117-88080)	Refrigerant Charging Hose	Utility (Color: Green)
	07110-61050	Wrench Set	Expansion valve
	(07111-21020)	Holder	
	(07111-32020)	Hexagon Wrench	5 mm (0.20 in.)
	07112-66040	Magnetic Clutch Remover	

	07112-76060	Magnetic Clutch Stopper	
	07116-38360	Gas Leak Detector Assembly	
	09216-00041	V-Ribbed Belt Tensioner Wrench	

PP3BZ-01

RECOMMENDED TOOLS

	09040-0001 1	Hexagon Wrench Set .	
	09082-00040	TOYOTA Electrical Tester.	
	09216-00021	Belt Tension Gauge .	
	09905-00013	Snap Ring Pliers .	

PP0SP-01

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Sernsor
Torque wrench	
Dial indicator	Magnetic clutch
Plastic hammer	Magnetic clutch

PP0SQ-01

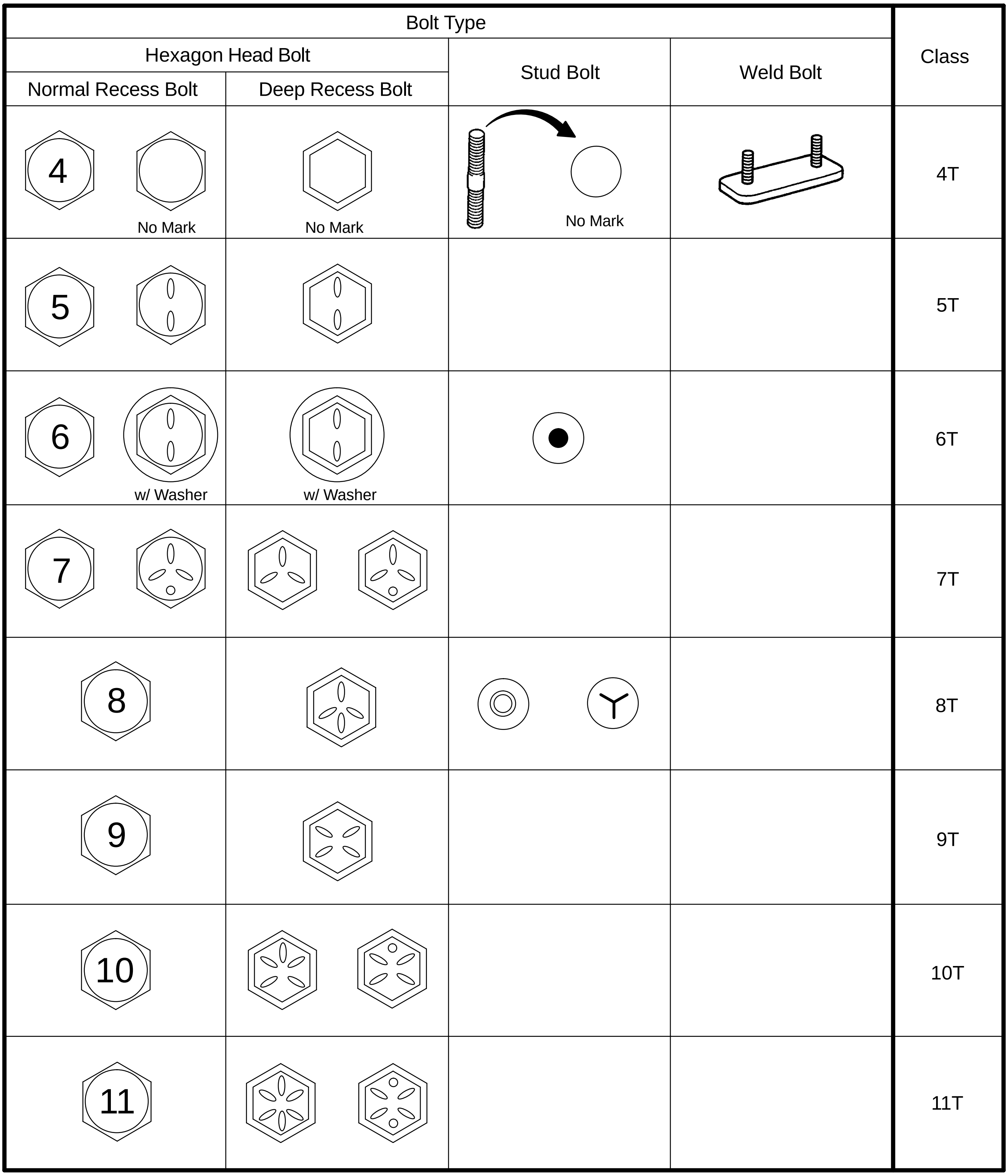
LUBRICANT

Item	Capacity	Classification
Compressor oil	-	ND-OIL 8 or equivalent
When replacing condenser	40 cc (1.4 fl. oz.)	
When replacing evaporator	40 cc (1.4 fl. oz.)	

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

SS0ZS-01



B06431

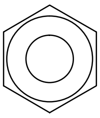
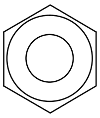
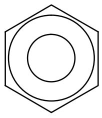
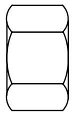
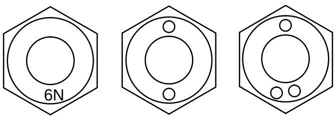
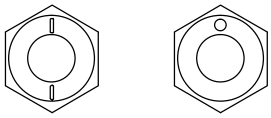
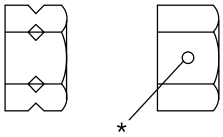
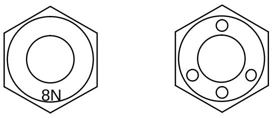
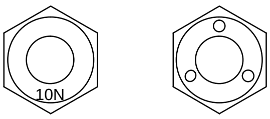
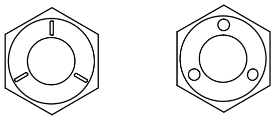
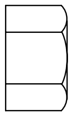
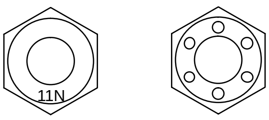
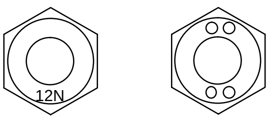
SS0ZT-01

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N·m	kgf·cm	ft·lbf	N·m	kgf·cm	ft·lbf
4T	6	1	5	55	48 in.·lbf	6	60	52 in.·lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	-	-	-
5T	6	1	6.5	65	56 in.·lbf	7.5	75	65 in.·lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	-	-	-
6T	6	1	8	80	69 in.·lbf	9	90	78 in.·lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	-	-	-
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	-	-	-
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

SS0ZU-01

HOW TO DETERMINE NUT STRENGTH

Nut Type			Class
Present Standard Hexagon Nut	Old Standard Hexagon Nut		
	Cold Forging Nut	Cutting Processed Nut	
 No Mark			4N
 No Mark (w/ Washer)	 No Mark (w/ Washer)	 No Mark	5N (4T)
			6N
			7N (5T)
			8N
		 No Mark	10N (7T)
			11N
			12N

*: Nut with 1 or more marks on one side surface of the nut.

B06432

HINT:
Use the nut with the same number of the nut strength classification or the greater than the bolt strength classification number when tightening parts with a bolt and nut.
Example: Bolt = 4T
Nut = 4N or more

MAINTENANCE

SS1JW-02

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Front seat mount bolts	37	375	27
Front suspension member x Body	98	1,000	72
Rear suspension member x Body	127	1,300	94

ENGINE MECHANICAL

SERVICE DATA

SS0FH-11

Compression pressure	at 250 rpm STD	1,324 kPa (13.5 kgf/cm^2, 192 psi) or more
	Minimum	1,079 kPa (11.0 kgf/cm^2, 156 psi)
	Difference of pressure between each cylinder	98 kPa (1.0 kgf/cm^2, 14 psi) or less
Valve clearance	at cold Intake	0.15 - 0.25 mm (0.006 - 0.010 in.)
	Exhaust	0.25 - 0.35 mm (0.010 - 0.014 in.)
	Adjusting shim (for repair part) Mark 2.500	2.500 mm (0.0984 in.)
	2.550	2.550 mm (0.1004 in.)
	2.600	2.600 mm (0.1024 in.)
	2.650	2.650 mm (0.1043 in.)
	2.700	2.700 mm (0.1063 in.)
	2.750	2.750 mm (0.1083 in.)
	2.800	2.800 mm (0.1102 in.)
	2.850	2.850 mm (0.1122 in.)
	2.900	2.900 mm (0.1142 in.)
	2.950	2.950 mm (0.1161 in.)
	3.000	3.000 mm (0.1181 in.)
	3.050	3.050 mm (0.1201 in.)
	3.100	3.100 mm (0.1220 in.)
	3.150	3.150 mm (0.1240 in.)
	3.200	3.200 mm (0.1260 in.)
	3.250	3.250 mm (0.1280 in.)
	3.300	3.300 mm (0.1299 in.)
Ignition timing	w/ Terminals TE and E1 connected of DLC1	10° ± 2° BTDC @ idle
Idle speed	-	700 ± 50 rpm
Timing belt tensioner	Protrusion (from housing side)	8.0 - 8.8 mm (0.315 - 0.346 in.)
Cylinder head	Warpage	
	Cylinder block side Maximum	0.10 mm (0.0039 in.)
	Intake manifold side Maximum	0.10 mm (0.0039 in.)
	Exhaust manifold side Maximum	0.10 mm (0.0039 in.)
	Valve guide bore diameter STD	10.985 - 11.006 mm (0.4325 - 0.4333 in.)
	O/S 0.05	11.035 - 11.056 mm (0.4344 - 0.4353 in.)
	Valve seat	
	Refacing angle	15°, 45°, 75°
	Contacting angle	45°
	Contacting width Intake	1.0 - 1.4 mm (0.039 - 0.055 in.)
	Exhaust	1.2 - 1.6 mm (0.047 - 0.063 in.)
	Cylinder head bolt diameter STD	10.8 - 11.0 mm (0.425 - 0.433 in.)
	Minimum	10.7 mm (0.421 in.)
Valve guide bushing	Inside diameter	6.010 - 6.030 mm (0.2366 - 0.2374 in.)
	Outside diameter (for repair part) STD	11.033 - 11.044 mm (0.4344 - 0.4348 in.)
	O/S 0.05	11.083 - 11.094 mm (0.4363 - 0.4368 in.)
Valve	Valve overall length STD Intake	98.29 - 98.79 mm (3.8697 - 3.8894 in.)
	Exhaust	98.84 - 99.34 mm (3.8913 - 3.9110 in.)
	Minimum Intake	98.19 mm (3.8657 in.)
	Exhaust	98.74 mm (3.8874 in.)
	Valve face angle	44.5°
	Stem diameter Intake	5.970 - 5.985 mm (0.2350 - 0.2356 in.)
	Exhaust	5.965 - 5.980 mm (0.2348 - 0.2354 in.)

Valve (cont'd)	Stem oil clearance	STD Intake	0.025 - 0.060 mm (0.0010 - 0.0024 in.)
		Exhaust	0.030 - 0.065 mm (0.0012 - 0.0026 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD	0.8 - 1.2 mm (0.031 - 0.047 in.)
		Minimum	0.5 mm (0.020 in.)
Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Free length	Pink painted mark	43.71 mm (1.7209 in.)
		Yellow painted mark	44.10 mm (1.7362 in.)
	Installed tension at 34.5 mm (1.358 in.)		186.2 - 205.8 N (19.0 - 21.0 kgf, 41.9 - 46.3 lbf)
Valve lifter	Lifter diameter		30.966 - 30.976 mm (1.2191 - 1.2195 in.)
	Lifter bore diameter		31.000 - 31.016 mm (1.2205 - 1.2211 in.)
	Oil clearance	STD	0.024 - 0.050 mm (0.0009 - 0.0020 in.)
		Maximum	0.07 mm (0.0028 in.)
Camshaft	Thrust clearance	STD	0.080 - 0.190 mm (0.0031 - 0.0075 in.)
		Maximum	0.30 mm (0.0118 in.)
	Cam lobe height	STD Intake	44.310 - 44.360 mm (1.7445 - 1.7465 in.)
		Exhaust	44.250 - 44.350 mm (1.7421 - 1.7461 in.)
		Maximum Intake	44.16 mm (1.7386 in.)
		Exhaust	44.10 mm (1.7362 in.)
	Journal diameter		28.949 - 28.965 mm (1.1397 - 1.1404 in.)
	Journal oil clearance	STD	0.035 - 0.072 mm (0.0014 - 0.0028 in.)
		Maximum	0.10 mm (0.0039 in.)
	Circle runout	Maximum	0.08 mm (0.0031 in.)
Air intake chamber	Warpage	Maximum	0.15 mm (0.0059 in.)
Manifold	Warpage	Maximum Intake	0.15 mm (0.0059 in.)
		Exhaust	0.50 mm (0.0196 in.)
Cylinder block	Cylinder head surface warpage	Maximum	0.07 mm (0.0028 in.)
	Cylinder bore diameter	STD	86.000 - 86.013 mm (3.3858 - 3.3863 in.)
		Maximum	86.02 mm (3.3866 in.)
	Main bearing bolt diameter	STD	9.96 - 9.97 mm (0.3921 - 0.3925 in.)
		Minimum	9.7 mm (0.382 in.)
Connecting rod	Thrust clearance	STD	0.250 - 0.402 mm (0.0098 - 0.0158 in.)
		Maximum	0.50 mm (0.0197 in.)
	Connecting bolt diameter	STD	8.1 - 8.3 mm (0.319 - 0.327 in.)
		Minimum	8.0 mm (0.315 in.)
	Connecting rod oil clearance	STD STD	0.023 - 0.041 mm (0.0009 - 0.0016 in.)
		U/S 0.25	0.028 - 0.066 mm (0.0011 - 0.0026 in.)
		Maximum STD	0.07 mm (0.0027 in.)
		U/S 0.25	0.08 mm (0.0031 in.)
	Connecting rod bearing center wall thickness (Reference)		
		STD Mark 1	1.498 - 1.501 mm (0.0590 - 0.0591 in.)
		2	1.501 - 1.504 mm (0.0591 - 0.0592 in.)
		3	1.504 - 1.507 mm (0.0592 - 0.0593 in.)
		4	1.507 - 1.510 mm (0.0593 - 0.0594 in.)
		5	1.510 - 1.513 mm (0.0594 - 0.0596 in.)
	Bushing inside diameter		22.005 - 22.014 mm (0.8663 - 0.8667 in.)
	Piston pin diameter		21.997 - 22.006 mm (0.8660 - 0.8664 in.)
	Piston pin oil clearance	STD	0.005 - 0.011 mm (0.0002 - 0.0004 in.)
		Maximum	0.05 mm (0.0020 in.)
	Rod out-of alignment	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)

Piston and Piston ring	Piston diameter		85.935 - 85.945 mm (3.3833 - 3.3837 in.)
	Piston oil clearance	STD	0.055 - 0.078 mm (0.0022 - 0.0031 in.)
		Maximum	0.10 mm (0.0039 in.)
	Piston ring groove clearance	No. 1	0.011 - 0.070 mm (0.0004 - 0.0028 in.)
		No. 2	0.030 - 0.070 mm (0.0012 - 0.0028 in.)
	Piston ring end gap	STD No. 1	0.300 - 0.470 mm (0.0118 - 0.0185 in.)
		No. 2	0.350 - 0.520 mm (0.0138 - 0.0205 in.)
		Oil	0.130 - 0.450 mm (0.0051 - 0.0177 in.)
		Maximum No. 1	1.07 mm (0.0421 in.)
		No. 2	1.12 mm (0.0441 in.)
		Oil	1.05 mm (0.0413 in.)
Crankshaft	Thrust clearance	STD	0.020 - 0.220 mm (0.0008 - 0.0087 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness	STD	1.940 - 1.990 mm (0.0764 - 0.0783 in.)
	Main journal oil clearance	STD STD	0.026 - 0.040 mm (0.0010 - 0.0016 in.)
		U/S 0.25	0.025 - 0.061 mm (0.0010 - 0.0024 in.)
		Maximum STD	0.06 mm (0.0024 in.)
		U/S 0.25	0.08 mm (0.0031 in.)
	Main journal diameter	STD	61.984 - 62.000 mm (2.4403 - 2.4409 in.)
		U/S 0.25	61.745 - 61.755 mm (2.4309 - 2.4313 in.)
	Main bearing center wall thickness (Reference)	Mark 1	1.994 - 1.997 mm (0.0785 - 0.0786 in.)
		2	1.997 - 2.000 mm (0.0786 - 0.0787 in.)
		3	2.000 - 2.003 mm (0.0787 - 0.0789 in.)
		4	2.003 - 2.006 mm (0.0789 - 0.0790 in.)
		5	2.006 - 2.009 mm (0.0790 - 0.0791 in.)
	Crank pin diameter	STD	51.982 - 52.000 mm (2.0465 - 2.0472 in.)
		U/S 0.25	51.745 - 51.755 mm (2.0372 - 2.0376 in.)
	Circle runout	Maximum	0.06 mm (0.0024 in.)
	Main journal taper and out-of-round	Maximum	0.02 mm (0.0008 in.)
	Crank pin taper and out-of-round	Maximum	0.02 mm (0.0008 in.)

ENGINE MECHANICAL

SS0FH-11

SERVICE DATA

Compression pressure		at 250 rpm STD	1,324 kPa (13.5 kgf/cm^2, 192 psi) or more
		Minimum	1,079 kPa (11.0 kgf/cm^2, 156 psi)
		Difference of pressure between each cylinder	98 kPa (1.0 kgf/cm^2, 14 psi) or less
Valve clearance		at cold Intake	0.15 - 0.25 mm (0.006 - 0.010 in.)
		Exhaust	0.25 - 0.35 mm (0.010 - 0.014 in.)
	Adjusting shim (for repair part)	Mark 2.500	2.500 mm (0.0984 in.)
		2.550	2.550 mm (0.1004 in.)
		2.600	2.600 mm (0.1024 in.)
		2.650	2.650 mm (0.1043 in.)
		2.700	2.700 mm (0.1063 in.)
		2.750	2.750 mm (0.1083 in.)
		2.800	2.800 mm (0.1102 in.)
		2.850	2.850 mm (0.1122 in.)
		2.900	2.900 mm (0.1142 in.)
		2.950	2.950 mm (0.1161 in.)
		3.000	3.000 mm (0.1181 in.)
		3.050	3.050 mm (0.1201 in.)
		3.100	3.100 mm (0.1220 in.)
		3.150	3.150 mm (0.1240 in.)
		3.200	3.200 mm (0.1260 in.)
		3.250	3.250 mm (0.1280 in.)
		3.300	3.300 mm (0.1299 in.)
Ignition timing		w/ Terminals TE and E1 connected of DLC1	10° ± 2° BTDC @ idle
Idle speed	-		700 ± 50 rpm
Timing belt tensioner	Protrusion (from housing side)		8.0 - 8.8 mm (0.315 - 0.346 in.)
Cylinder head	Warpage		
	Cylinder block side	Maximum	0.10 mm (0.0039 in.)
	Intake manifold side	Maximum	0.10 mm (0.0039 in.)
	Exhaust manifold side	Maximum	0.10 mm (0.0039 in.)
	Valve guide bore diameter	STD	10.985 - 11.006 mm (0.4325 - 0.4333 in.)
		O/S 0.05	11.035 - 11.056 mm (0.4344 - 0.4353 in.)
	Valve seat		
	Refacing angle		15°, 45°, 75°
	Contacting angle		45°
	Contacting width	Intake	1.0 - 1.4 mm (0.039 - 0.055 in.)
		Exhaust	1.2 - 1.6 mm (0.047 - 0.063 in.)
	Cylinder head bolt diameter	STD	10.8 - 11.0 mm (0.425 - 0.433 in.)
		Minimum	10.7 mm (0.421 in.)
Valve guide bushing	Inside diameter		6.010 - 6.030 mm (0.2366 - 0.2374 in.)
	Outside diameter (for repair part)	STD	11.033 - 11.044 mm (0.4344 - 0.4348 in.)
		O/S 0.05	11.083 - 11.094 mm (0.4363 - 0.4368 in.)
Valve	Valve overall length	STD Intake	98.29 - 98.79 mm (3.8697 - 3.8894 in.)
		Exhaust	98.84 - 99.34 mm (3.8913 - 3.9110 in.)
		Minimum Intake	98.19 mm (3.8657 in.)
		Exhaust	98.74 mm (3.8874 in.)
	Valve face angle		44.5°
	Stem diameter	Intake	5.970 - 5.985 mm (0.2350 - 0.2356 in.)
		Exhaust	5.965 - 5.980 mm (0.2348 - 0.2354 in.)

Valve (cont'd)	Stem oil clearance	STD Intake	0.025 - 0.060 mm (0.0010 - 0.0024 in.)
		Exhaust	0.030 - 0.065 mm (0.0012 - 0.0026 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD	0.8 - 1.2 mm (0.031 - 0.047 in.)
		Minimum	0.5 mm (0.020 in.)
Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Free length	Pink painted mark	43.71 mm (1.7209 in.)
		Yellow painted mark	44.10 mm (1.7362 in.)
	Installed tension at 34.5 mm (1.358 in.)		186.2 - 205.8 N (19.0 - 21.0 kgf, 41.9 - 46.3 lbf)
Valve lifter	Lifter diameter		30.966 - 30.976 mm (1.2191 - 1.2195 in.)
	Lifter bore diameter		31.000 - 31.016 mm (1.2205 - 1.2211 in.)
	Oil clearance	STD	0.024 - 0.050 mm (0.0009 - 0.0020 in.)
		Maximum	0.07 mm (0.0028 in.)
Camshaft	Thrust clearance	STD	0.080 - 0.190 mm (0.0031 - 0.0075 in.)
		Maximum	0.30 mm (0.0118 in.)
	Cam lobe height	STD Intake	44.310 - 44.360 mm (1.7445 - 1.7465 in.)
		Exhaust	44.250 - 44.350 mm (1.7421 - 1.7461 in.)
		Maximum Intake	44.16 mm (1.7386 in.)
		Exhaust	44.10 mm (1.7362 in.)
	Journal diameter		28.949 - 28.965 mm (1.1397 - 1.1404 in.)
	Journal oil clearance	STD	0.035 - 0.072 mm (0.0014 - 0.0028 in.)
		Maximum	0.10 mm (0.0039 in.)
	Circle runout	Maximum	0.08 mm (0.0031 in.)
Air intake chamber	Warpage	Maximum	0.15 mm (0.0059 in.)
Manifold	Warpage	Maximum Intake	0.15 mm (0.0059 in.)
		Exhaust	0.50 mm (0.0196 in.)
Cylinder block	Cylinder head surface warpage	Maximum	0.07 mm (0.0028 in.)
	Cylinder bore diameter	STD	86.000 - 86.013 mm (3.3858 - 3.3863 in.)
		Maximum	86.02 mm (3.3866 in.)
	Main bearing bolt diameter	STD	9.96 - 9.97 mm (0.3921 - 0.3925 in.)
		Minimum	9.7 mm (0.382 in.)
Connecting rod	Thrust clearance	STD	0.250 - 0.402 mm (0.0098 - 0.0158 in.)
		Maximum	0.50 mm (0.0197 in.)
	Connecting bolt diameter	STD	8.1 - 8.3 mm (0.319 - 0.327 in.)
		Minimum	8.0 mm (0.315 in.)
	Connecting rod oil clearance	STD STD	0.023 - 0.041 mm (0.0009 - 0.0016 in.)
		U/S 0.25	0.028 - 0.066 mm (0.0011 - 0.0026 in.)
		Maximum STD	0.07 mm (0.0027 in.)
		U/S 0.25	0.08 mm (0.0031 in.)
	Connecting rod bearing center wall thickness (Reference)		
		STD Mark 1	1.498 - 1.501 mm (0.0590 - 0.0591 in.)
		2	1.501 - 1.504 mm (0.0591 - 0.0592 in.)
		3	1.504 - 1.507 mm (0.0592 - 0.0593 in.)
		4	1.507 - 1.510 mm (0.0593 - 0.0594 in.)
		5	1.510 - 1.513 mm (0.0594 - 0.0596 in.)
	Bushing inside diameter		22.005 - 22.014 mm (0.8663 - 0.8667 in.)
	Piston pin diameter		21.997 - 22.006 mm (0.8660 - 0.8664 in.)
	Piston pin oil clearance	STD	0.005 - 0.011 mm (0.0002 - 0.0004 in.)
		Maximum	0.05 mm (0.0020 in.)
	Rod out-of alignment	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)

Piston and Piston ring	Piston diameter		85.935 - 85.945 mm (3.3833 - 3.3837 in.)
	Piston oil clearance	STD	0.055 - 0.078 mm (0.0022 - 0.0031 in.)
		Maximum	0.10 mm (0.0039 in.)
	Piston ring groove clearance	No. 1	0.011 - 0.070 mm (0.0004 - 0.0028 in.)
		No. 2	0.030 - 0.070 mm (0.0012 - 0.0028 in.)
	Piston ring end gap	STD No. 1	0.300 - 0.470 mm (0.0118 - 0.0185 in.)
		No. 2	0.350 - 0.520 mm (0.0138 - 0.0205 in.)
		Oil	0.130 - 0.450 mm (0.0051 - 0.0177 in.)
		Maximum No. 1	1.07 mm (0.0421 in.)
		No. 2	1.12 mm (0.0441 in.)
		Oil	1.05 mm (0.0413 in.)
Crankshaft	Thrust clearance	STD	0.020 - 0.220 mm (0.0008 - 0.0087 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness	STD	1.940 - 1.990 mm (0.0764 - 0.0783 in.)
	Main journal oil clearance	STD STD	0.026 - 0.040 mm (0.0010 - 0.0016 in.)
		U/S 0.25	0.025 - 0.061 mm (0.0010 - 0.0024 in.)
		Maximum STD	0.06 mm (0.0024 in.)
		U/S 0.25	0.08 mm (0.0031 in.)
	Main journal diameter	STD	61.984 - 62.000 mm (2.4403 - 2.4409 in.)
		U/S 0.25	61.745 - 61.755 mm (2.4309 - 2.4313 in.)
	Main bearing center wall thickness (Reference)	Mark 1	1.994 - 1.997 mm (0.0785 - 0.0786 in.)
		2	1.997 - 2.000 mm (0.0786 - 0.0787 in.)
		3	2.000 - 2.003 mm (0.0787 - 0.0789 in.)
		4	2.003 - 2.006 mm (0.0789 - 0.0790 in.)
		5	2.006 - 2.009 mm (0.0790 - 0.0791 in.)
	Crank pin diameter	STD	51.982 - 52.000 mm (2.0465 - 2.0472 in.)
		U/S 0.25	51.745 - 51.755 mm (2.0372 - 2.0376 in.)
	Circle runout	Maximum	0.06 mm (0.0024 in.)
	Main journal taper and out-of-round	Maximum	0.02 mm (0.0008 in.)
	Crank pin taper and out-of-round	Maximum	0.02 mm (0.0008 in.)

SS0FI-11

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Timing belt plate x Oil pump		8.0	80	71 in.·lbf
Idler pulley x Oil pump		35	350	26
No. 1 timing belt cover x Oil pump		8.0	80	71 in.·lbf
Camshaft timing pulley x Camshaft		81	810	60
Straight screw plug x Camshaft timing pulley		15	150	11
No. 1 oil pipe x No. 3 camshaft bearing cap		55	550	41
Cylinder head cover x Cylinder head		8.5	85	75 in.·lbf
High-tension cord x Cylinder head cover		8.0	80	71 in.·lbf
Timing belt tensioner x Oil pump		27	270	20
Crankshaft pulley x Crankshaft		330	3,300	243
Drive belt tensioner x Cylinder head		21	210	15
No. 2 timing belt cover x Cylinder head		8.0	80	71 in.·lbf
No. 3 timing belt cover x Cylinder head		8.0	80	71 in.·lbf
PS pump front bracket x PS vane pump		58	590	43
PS pump front bracket x Cylinder block		52	530	38
Drive belt tensioner absorber x Drive belt tensioner arm		20	200	14
Drive belt tensioner absorber x Drive belt tensioner bracket		20	200	14
Drive belt tensioner Arm x Drive belt tensioner		21	210	15
Drive belt tensioner bracket x Oil pump		28	280	21
ECT sensor x Cylinder head		19.6	200	14
Engine hanger x Cylinder head		40	400	30
Water outlet x Cylinder head		28	280	21
Cylinder head x Cylinder head	1st	35	350	26
	2nd	Turn 90°	Turn 90°	Turn 90°
	3rd	Turn 90°	Turn 90°	Turn 90°
Camshaft bearing cap x Cylinder head		20	200	14
No. 3 camshaft bearing cap x Cylinder head	Hexagon bolt	5.0	50	44 in.·lbf
No. 4 timing belt cover x Cylinder head		8.0	80	71 in.·lbf
Intake manifold x Cylinder head		28	280	21
Manifold stay x Intake manifold		40	400	30
Manifold stay x Cylinder block		40	400	30
Vacuum control valve set x Intake manifold		21	210	15
Exhaust manifold x Cylinder head		40	410	30
Front exhaust pipe x Exhaust manifold		43	438	32
PS vane pump x Cylinder block		58	590	43
PS vane pump x A/C compressor		58	590	43
PS pump rear stay x PS pump bracket		39.2	400	29
PS pump rear stay x Manifold stay		39.2	400	29
Drive plate x Torque converter clutch		48	490	35
Engine hanger x Cylinder head		40	400	30
Rear support member x Body		25.5	260	19
Drive plate x Crankshaft		83	850	61
Transmission x Cylinder block		72	730	53
Starter x Transmission		37	380	27

No. 1 oil pan x Transmission		37	380	27
Torque converter clutch x Drive plate		48	490	35
Suspension member x Body		70	714	52
Engine rear mounting member x Transmission		13.5	135	10
Engine rear mounting member x Body		25.5	260	19
Lower arm x Steering knuckle		245	2,500	181
Shock absorber x Steering knuckle		64	650	47
Stabilizer bar x Body	Bolt Nut	18 49	180 500	13 30
Sliding yoke x Steering intermediate shaft		35	360	26
Transmission control rod x Shift lever		13	130	9
Transmission control rod x Transmission		13	130	9
A/C compressor x Cylinder block	Stud bolt Bolt and nut	26 52	265 530	19 38
Fuel inlet hose x Fuel pipe support		29	300	22
Front suspension member brace x Front suspension member		119	1,120	88
Front suspension member brace x Body		58	590	43
Main bearing cap x Cylinder block	1st 2nd	45 Turn 90°	450 Turn 90°	33 Turn 90°
Connecting rod cap x Connecting rod	1st 2nd	30 Turn 90°	300 Turn 90°	22 Turn 90°
Rear oil seal retainer x Cylinder block		6.0	60	53
Engine mounting bracket x Cylinder block		59	590	44
Fuel inlet pipe x Cylinder block		29	290	21
No. 1 oil pipe x Cylinder block		55	550	41
Oil filter bracket x Cylinder block		90	900	66
No. 2 water bypass pipe x Water pump		21	210	15
No. 2 water bypass pipe x Cylinder block		21	210	15
Generator x Water pump		40	400	30
Generator x Cylinder block		40	400	30
Front exhaust pipe x Exhaust manifold		43	438	32
Front exhaust pipe x Center exhaust pipe		43	438	32
Center exhaust pipe x Tailpipe		43	438	32
Tailpipe bracket x Body		13	133	10

EMISSION CONTROL

SS0FJ-12

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Protector for charcoal canister x Body	5.5	56	49 in.·lbf
Charcoal canister x Protector	5.0	51	44 in.·lbf
RH rear drive shaft x Differential	83	850	61
Heated oxygen sensor x Exhaust manifold	45	450	33
Exhaust manifold x Cylinder head	40	408	30
Front exhaust pipe (with rear TWC) x Exhaust manifold	44	440	32
Front exhaust pipe (with rear TWC) x Center exhaust pipe	44	440	32
Pipe support bracket x Transmission	44	440	32

SFI

SS0FK-14

SERVICE DATA

Fuel pump	Resistance	at 20°C (68°F)	0.2 - 3.0 Ω
Fuel pressure regulator	Fuel pressure		304 - 343 kPa (3.1 - 3.5 kgf/cm^2, 44 - 50 psi)
Injector	Resistance Injection volume Difference between each cylinder Fuel leakage	at 20°C (68°F)	13.4 - 14.2 Ω 60 - 73 cm^3 (3.7 - 4.5 cu in.) per 15 sec. 13 cm^3 (0.8 cu in.) or less 1 drop or less per 12 min.
MAF meter	Resistance (THA - E2)	at -20°C (-4°F) at 20°C (68°F) at 60°C (140°F)	13.6 - 18.4kΩ 2.21 - 2.69 kΩ 0.493 - 0.667 kΩ
Throttle body	Throttle body fully closed angle		3.5°
Throttle control motor	Motor (M+ - M-) Clutch (CL+ - CL-)	at 20°C (68°F) at 20°C (68°F)	0.3 - 100 Ω 4.2 - 5.2 Ω
Throttle position sensor	Resistance (VC - E2) Throttle valve opening percentage	at 20°C (68°F) STD	1.2 - 3.2 kΩ 14.8 ± 0.8 %
Accelerator pedal position sensor	Resistance (VC - E2) Accelerator pedal position voltage	at 20°C (68°F) STD	1.2 - 3.2 kΩ 0.3 - 0.9 V
Camshaft timing oil control valve	Resistance	at 20°C (68°F)	5.5 - 12 Ω
Fuel pump resister	Resistance	at 20°C (68°F)	0.30 - 0.35 Ω
VSV for EVAP	Resistance	at 20°C (68°F)	27 - 33 Ω
VSV for ACIS	Resistance	at 20°C (68°F)	38.5 - 44.5 Ω
VSV for CCV	Resistance	at 20°C (68°F)	24 - 30 Ω
VSV for pressure switching valve	Resistance	at 20°C (68°F) at 120°C (248°F)	37 - 44 Ω 51 - 62 Ω
ECT sensor	Resistance	at -20°C (-4°F) 0°C (32°F) 20°C (68°F) 40°C (104°F) 60°C (140°F) 80°C (176°F)	10 - 20 kΩ 4 - 7 kΩ 2 - 3 kΩ 0.9 - 1.3 kΩ 0.4 - 0.7 kΩ 0.2 - 0.4 kΩ
Vapor pressure sensor	Power sorce voltage		4.5 - 5.5 V
Heated oxygen sensor	Heater coil resistance	at 20°C (68°F) at 800°C (1,472°F)	11 - 16 Ω 23 - 32 Ω
Fuel cut rpm		Fuel return rpm	1,000 rpm

SS0FL-12

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Fuel line	Union bolt	29	300	22
	Flare nut for use with SST	30	310	22
	for use without SST	38	387	28
Fuel tank vent tube set plate x Fuel tank		3.5	36	31 in.·lbf
Fuel inlet hose x Body		9.0	90	80 in.·lbf
Delivery pipe x Intake manifold		21	210	15
Fuel pressure pulsation damper x Fuel pipe support		32.5	325	24
Fuel inlet pipe x Intake manifold		9.0	90	80 in.·lbf
No. 2 vacuum pipe x Intake manifold		21	210	15
Fuel sender gauge x Fuel tank		1.5	15	13 in.·lbf
Fuel tank band x Body		39	400	29
MAF meter x Air cleaner		10.7	109	8
Throttle body bracket x Throttle body		21	210	15
Throttle body bracket x Cylinder head		21	210	15
Throttle position sensor x Throttle body		1.7	17.5	15 in.·lbf
Throttle control motor x Throttle body		3.7	37.5	33 in.·lbf
Throttle control motor cover x Throttle body		1.7	17.5	15 in.·lbf
Accelerator pedal position sensor x Throttle body		3.7	37.5	33 in.·lbf
Camshaft timing oil control valve x No. 3 camshaft bearing cap		8.0	80	71 in.·lbf
No. 3 timing belt cover x Cylinder head cover		8.0	80	71 in.·lbf
Intake air connector x Air intake chamber		28	280	21
Air intake chamber x Intake manifold		28	280	21
Vacuum control valve set x Intake manifold		21	210	15
ECT sensor x Cylinder head		19.6	200	14
Knock sensor x Cylinder block		44	450	33
PS pump rear stay x Manifold stay		39.2	400	29
PS pump rear stay x PS pump bracket		39.2	400	29
Heated oxygen sensor x Exhaust manifold		45	450	33
Heated oxygen sensor x Front exhaust pipe		45	450	33

COOLING

SS0SD-03

SERVICE DATA

Thermostat	Valve opening temperature		80 - 84°C (176 - 183°F)
	Valve lift	at 95°C (203°F)	8.5 mm (0.335 in.) or more
Radiator cap	Relief valve opening pressure	STD	93 - 123 kPa (0.95 - 1.25 kgf/cm^2, 13.5 - 17.8 psi)
		Minimum	78 kPa (0.8 kgf/cm^2, 11.4 psi)
Electric cooling fan	Rotating amperage	at 20°C (68°F)	8.5 - 11.5 A

SS0SE-04

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Engine drain plug x Cylinder block	30	300	22
Water pump x Cylinder block	21	210	15
Water pump x No. 2 water bypass pipe	21	210	15
Generator x Water pump	40	400	30
Generator x Cylinder block	40	400	30
Water bypass outlet x Cylinder head	9.0	90	80 in.·lbf
Water pump pulley x Water pump	14	140	10
Drive belt tensioner absorber x Drive belt tensioner arm	20	200	14
Drive belt tensioner absorber x Drive belt tensioner bracket	20	200	14
Water inlet x Water pump	9.0	90	80 in.·lbf
Oil cooler x Radiator lower tank	8.3	85	74 in.·lbf
Oil cooler x Oil cooler pipe	14.7	150	11
Electric cooling fan x Radiator	5.0	50	44 in.·lbf
Upper radiator support x Body	13.5	135	10

LUBRICATION

SERVICE DATA

SS0SF-03

Oil pressure		at idle speed	49 kPa (0.5 kgf/cm^2, 7.3 psi) or more
		at 3,000 rpm	324 kPa (3.3 kgf/cm^2, 47 psi) or more
Oil pump	Tip clearance	STD	0.060 - 0.240 mm (0.0024 - 0.0094 in.)
		Maximum	0.30 mm (0.0118 in.)
	Body clearance	STD	0.100 - 0.175 mm (0.0039 - 0.0069 in.)
		Maximum	0.20 mm (0.0079 in.)
	Side clearance	STD	0.030 - 0.090 mm (0.0012 - 0.0035 in.)
		Maximum	0.12 mm (0.0047 in.)

SS0SG-03

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Union bolt x Cylinder block		90	900	66
Oil pressure switch x Union bolt		15	150	11
Oil drain plug x No. 2 oil pan		38	380	28
Oil pump body cover x Oil pump body		10	105	8
Plug x Oil pump body		49	500	36
Oil pump x Cylinder block		21	210	15
No. 1 oil pan x Cylinder block	12 mm head	21	210	15
	14 mm head	40	400	30
Oil pan baffle plate x No. 1 oil pan		9.0	90	80 in.·lbf
Oil strainer x No. 1 oil pan		9.0	90	80 in.·lbf
No. 2 oil pan x No. 1 oil pan		9.0	90	80 in.·lbf
Oil level sensor x No. 1 oil pan		5.4	55	48 in.·lbf
Crankshaft position sensor x Oil pump		9.0	90	80 in.·lbf

IGNITION

SS0IM-03

SERVICE DATA

High-tension cord	Resistance	Maximum	25 kΩ per cord
Spark plug	Recommended spark plug Correct electrode gap for new plug Maximum electrode gap for used plug	DENSO made	SK16R-P11 1.1 mm (0.043 in.) 1.2 mm (0.047 in.)
Ignition coil	Primary coil resistance Secondary coil resistance	at cold at hot at cold at hot	0.33 - 0.52 Ω 0.42 - 0.61 Ω 8.5 - 14.7 kΩ 10.8 - 17.2 kΩ
Camshaft position sensor	Resistance	at cold at hot	835 - 1,400 Ω 1,060 - 1,645 Ω
Crankshaft position sensor	Resistance	at cold at hot	1,630 - 2,740 Ω 2,065 - 3,225 Ω

SS0IN-03

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	18	180	13
Throttle body x Intake air connector	21	210	15
Throttle body bracket x Cylinder head	21	210	15
Throttle body bracket x Throttle body	21	210	15
Throttle body gasket x Intake air connector	21	210	15
Ignition coils and high-tension cord set assembly x Cylinder head	8.0	80	71 in.·lbf
PS pump rear stay x Manifold stay	39.2	400	29
PS pump rear stay x PS pump bracket	39.2	400	29
Camshaft position sensor x Cylinder head	9.0	90	80 in.·lbf
Crankshaft position sensor x Oil pump	9.0	90	80 in.·lbf

STARTING

SS0FQ-11

SERVICE DATA

Starter	Rated voltage and output power		12 V 1.4 kW
	No-load characteristics	Current	90 A or less at 11.5 V
		rpm	3,000 rpm or more
	Brush length	STD	15.5 mm (0.610 in.)
		Minimum	10.0 mm (0.394 in.)
	Spring installed load	STD	17.6 - 23.5 N (1.8 - 2.4 kgf, 3.9 - 5.3 lbf)
		Minimum	11.8 N (1.2 kgf, 2.6 lbf)
	Commutator		
	Diameter	STD	30.0 mm (1.181 in.)
		Minimum	29.0 mm (1.412 in.)
	Undercut depth	STD	0.6 mm (0.024 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)

SS0FR-11

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Starter x Transmission	37	380	27
Lead wire x Terminal C of starter	5.9	60	52 in.·lbf
Field frame x Armature assembly	5.9	60	52 in.·lbf
Starter housing x Magnetic switch	5.9	60	52 in.·lbf
End cover x Field frame	1.5	15	13 in.·lbf
Terminal nut x Terminal 30 of starter	17	173	13
Terminal nut x Terminal C of starter	17	173	13
Magnetic switch end cover x Magnetic switch	2.5	26	22 in.·lbf

CHARGING

SERVICE DATA

SS0E6-10

Battery	Voltage (Maintenance-free battery)	at 20˚C (68˚F)	12.5 - 12.9 V
	Specific gravity (Except maintenance-free battery)	at 20˚C (68˚F)	1.25 - 1.29
Alternator	Rated output		12 V 80 A
	Rotor coil resistance	at 20˚C (68˚C)	2.1 - 2.5 Ω
	Slip ring diameter	STD	14.2 - 14.4 mm (0.559 - 0.567 in.)
		Minimum	12.8 mm (0.504 in.)
	Brush exposed length	STD	9.5 -11.5 mm (0.374 -0.453 in.)
		Minimum	1.5 mm (0.059 in.)
Voltage regulator	Regulating voltage		13.2 - 14.8 V

SS0E7-14

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Drive belt tensioner absorber x Drive belt tensioner arm	20	200	14
Drive belt tensioner absorber x Drive belt tensioner bracket	20	200	14
Generator x Water pump	40	400	30
Generator x Cylinder block	40	400	30
Bearing retainer x Drive end frame	3.0	31	27 in.·lbf
Rectifier end frame x Drive end frame	4.5	46	40 in.·lbf
Rectifier end frame with wire clip x Rectifier end frame	5.4	55	48 in.·lbf
Generator pully x Rotor	110.5	1,125	81
Rectifier holder x Coil lesd on rectifier end frame	2.9	30	26 in.·lbf
Voltage regulator x Rectifier end frame	2.0	20	18 in.·lbf
Voltage regulator x Rectifier holder	2.0	20	18 in.·lbf
Brush holder x Rectifier holder	2.0	20	18 in.·lbf
Brush holder x Voltage regulator	2.0	20	18 in.·lbf
Rear end cover x Rectifier holder	4.4	45	39 in.·lbf
Plate terminal x Rectifier holder Nut	4.4	45	39 in.·lbf
Plate terminal x Rectifier holder Bolt	3.9	40	35 in.·lbf
Terminal insulator x Rectifier holder	6.5	67	58 in.·lbf

CLUTCH

SS1JS-01

SERVICE DATA

Pedal height from asphalt sheet		162 - 172 mm (6.38 - 6.77 in.)
Pedal free play		5.0 - 15.0 mm (0.197 - 0.591 in.)
Push rod play at pedal top		1.0 - 5.0 mm (0.039 - 0.197 in.)
Full pedal stroke		142.0 - 147.5 mm (5.591 - 5.807 in.) or more
Clutch release point from pedal full stroke end position		25 mm (0.98 in.) or more
Clutch start switch ON-OFF Stroke		8.0 ± 0.5 mm (0.315 ± 0.020 in.)
Slotted spring pin protrusion		1.5 - 3.5 mm (0.059 - 0.138 in.)
Disc rivet head depth	Minimum	0.3 mm (0.012 in.)
Disc runout	Maximum	0.8 mm (0.031 in.)
Flywheel runout	Maximum	0.1 mm (0.004 in.)
Diaphragm spring finger wear	Maximum depth	0.6 mm (0.024 in.)
Diaphragm spring finger wear	Maximum width	5.0 mm (0.197 in.)
Diaphragm spring tip non-alignment	Maximum	0.5 mm (0.020 in.)

SS1JT-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Pedal hight lock nut	15.7	160	12
Push rod lock nut	12	120	9
Clutch line union	15.2	155	11
Master cylinder installation nut	12	120	9
Release cylinder installation bolt	12	120	9
Bleeder plug	10.7	109	8
Clutch cover x Flywheel	19.1	195	14
Release fork suppor	39.2	400	29

MANUAL TRANSMISSION

SS1JU-01

SERVICE DATA

Output shaft 2nd gear journal diameter	Minimum	42.975 mm (1.6919 in.)
Output shaft 3rd gear journal diameter	Minimum	31.969 mm (1.2586 in.)
Output shaft flange thickness	Minimum	5.70 mm (0.2244 in.)
Output shaft runout	Maximum	0.03 mm (0.0012 in.)
1st gear inner race flange thickness	Minimum	4.78 mm (0.1881 in.)
1st gear inner race outer diameter	Minimum	42.975 mm (1.6919 in.)
Counter gear bearing journal diameter	Minimum	29.950 mm (1.1791 in.)
Counter 5th gear journal diameter	Minimum	26.975 mm (1.0620 in.)
1st, 2nd and 3rd gear thrust clearance	Standard Maximum	0.10 - 0.25 mm (0.0039 - 0.0098 in.) 0.25 mm (0.0098 in.)
Counter 5th gear thrust clearance	Standard Maximum	0.10 - 0.41 mm (0.0039 - 0.0161 in.) 0.41 mm (0.0161 in.)
1st, 2nd and counter 5th gear radial clearance	Standard Maximum	0.009 - 0.060 mm (0.0004 - 0.0024 in.) 0.060 mm (0.0024 in.)
3rd gear radial clearance	Standard Maximum	0.015 - 0.066 mm (0.0006 - 0.0026 in.) 0.066 mm (0.0026 in.)
Reverse idler gear radial clearance	Standard Maximum	0.041 - 0.074 mm (0.0016 - 0.0029 in.) 0.074 mm (0.0029 in.)
No. 1 and No. 2 shift fork to hub sleeve clearance	Maximum	0.5 mm (0.020 in.)
No. 3 shift fork to hub sleeve clearance	Maximum	0.84 mm (0.0331 in.)
Synchronizer ring to 1st, 3rd and 4th gear clearance	Minimum	0.70 mm (0.0276 in.)
Synchronizer ring to 2nd and 3rd gear clearance	Minimum	0.74 mm (0.0291 in.)
Input shaft snap ring thickness	Mark 1 Mark 2 Mark 3 Mark 4 Mark 5 Mark 11 Mark 12	2.05 - 2.10 mm (0.0807 - 0.0827 in.) 2.10 - 2.15 mm (0.0827 - 0.0846 in.) 2.15 - 2.20 mm (0.0846 - 0.0866 in.) 2.20 - 2.25 mm (0.0866 - 0.0886 in.) 2.25 - 2.30 mm (0.0886 - 0.0906 in.) 2.30 - 2.35 mm (0.0906 - 0.0925 in.) 2.35 - 2.40 mm (0.0925 - 0.0945 in.)
Output shaft snap ring thickness No.2 clutch hub	Mark C-1 Mark D Mark 11 Mark 12 Mark 13 Mark 14 Mark 15	1.75 - 1.80 mm (0.0689 - 0.0709 in.) 1.80 - 1.85 mm (0.0709 - 0.0728 in.) 1.86 - 1.91 mm (0.0732 - 0.0752 in.) 1.92 - 1.97 mm (0.0756 - 0.0776 in.) 1.98 - 2.03 mm (0.0780 - 0.0799 in.) 2.04 - 2.09 mm (0.0803 - 0.0823 in.) 2.10 - 2.15 mm (0.0827 - 0.0846 in.)
Output shaft snap ring thickness Rear bearing	Mark 8 Mark 9 Mark 10 Mark 11 Mark 12 Mark 13 Mark 14 Mark 15	2.31 - 2.36 mm (0.0909 - 0.0929 in.) 2.37 - 2.42 mm (0.0933 - 0.0953 in.) 2.43 - 2.48 mm (0.0957 - 0.0976 in.) 2.49 - 2.54 mm (0.0980 - 0.1000 in.) 2.55 - 2.60 mm (0.1004 - 0.1024 in.) 2.61 - 2.66 mm (0.1028 - 0.1047 in.) 2.68 - 2.73 mm (0.1055 - 0.1075 in.) 2.74 - 2.79 mm (0.1079 - 0.1098 in.)

Output shaft snap ring thickness		
Reverse gear	Mark 5	2.25 - 2.30 mm (0.0886 - 0.0906 in.)
	Mark 11	2.30 - 2.35 mm (0.0906 - 0.0925 in.)
	Mark 12	2.35 - 2.40 mm (0.0925 - 0.0945 in.)
	Mark 13	2.40 - 2.45 mm (0.0945 - 0.0965 in.)
	Mark 14	2.45 - 2.50 mm (0.0965 - 0.0984 in.)
	Mark 15	2.50 - 2.55 mm (0.0984 - 0.1004 in.)
	Mark 16	2.55 - 2.60 mm (0.1004 - 0.1024 in.)
	Mark 17	2.61 - 2.66 mm (0.1028 - 0.1047 in.)
	Mark 18	2.67 - 2.72 mm (0.1051 - 0.1071 in.)
	Mark 19	2.73 - 2.78 mm (0.1075 - 0.1094 in.)
	Mark 20	2.79 - 2.84 mm (0.1098 - 0.1118 in.)
	Mark 21	2.85 - 2.90 mm (0.1122 - 0.1142 in.)
	Mark 22	2.91 - 2.96 mm (0.1146 - 0.1165 in.)
	Mark 23	2.97 - 3.02 mm (0.1169 - 0.1189 in.)
Coutner gear snap ring thickness		
Front bearing	Mark A	2.05 - 2.10 mm (0.0807 - 0.0827 in.)
	Mark B	2.10 - 2.15 mm (0.0827 - 0.0846 in.)
	Mark C	2.15 - 2.20 mm (0.0846 - 0.0866 in.)
	Mark D	2.20 - 2.25 mm (0.0866 - 0.0886 in.)
	Mark E	2.25 - 2.30 mm (0.0886 - 0.0906 in.)
	Mark F	2.30 - 2.35 mm (0.0906 - 0.0925 in.)
Counter gear snap ring thickness		
No.3 clutch hub	Mark 2	2.06 - 2.11 mm (0.0811 - 0.0831 in.)
	Mark 3	2.12 - 2.17 mm (0.0835 - 0.0854 in.)
	Mark 4	2.18 - 2.23 mm (0.0858 - 0.0878 in.)
	Mark 5	2.24 - 2.29 mm (0.0882 - 0.0902 in.)
Counter gear snap ring thickness		
Rear bearing	Mark 1	1.90 - 1.95 mm (0.0748 - 0.0768 in.)
	Mark 2	1.96 - 2.01 mm (0.0772 - 0.0791 in.)
	Mark 3	2.02 - 2.07 mm (0.0795 - 0.0815 in.)
	Mark 4	2.08 - 2.13 mm (0.0819 - 0.0839 in.)
	Mark 5	2.14 - 2.19 mm (0.0843 - 0.0862 in.)
	Mark 6	2.20 - 2.25 mm (0.0866 - 0.0886 in.)
	Mark 7	2.26 - 2.31 mm (0.0890 - 0.0909 in.)
Oil seal drive in depth		
Front bearing retainer (from retainer end)		12.2 ± 0.5 mm (0.480 ± 0.020 in.)
Extension housing		0 ± 0.5 mm (0 ± 0.020 in.)
Reverse restrict pin drive in depth		16 - 17 mm (0.63 - 0.67 in.)

SS1JV-02

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Transmission x Engine	12 mm bolt	71.6	730	53
	10 mm bolt	37.3	380	27
Engine rear mounting x Transmission		25.5	260	19
Rear engine mounting member	Nut	13.5	138	10
	Bolt	25	255	18
Transmission x Starter		37.3	380	28
Starter wire set nut		9.8	10	7
Clutch release cylinder set bolt		11.7	119	9
Propeller shaft x Differential		74	750	54
Propeller shaft center bearing		49	500	36
Exhaust manifold x Front exhaust pipe		62	630	46
Front exhaust pipe x Pipe support bracket		43	438	32
Center exhaust pipe x Tailpipe		43	438	32
Drain and filler plugs		38	387	28
Exhaust manifold x Engine		40	408	29
Engine cover No. 1 set nut		5.0	51	44 in.·lbf
Shift lever x Control shift lever arm		8.0	82	71 in.·lbf
Back-up light switch clamp set bolt		5.8	59	51 in.·lbf
Back-up light switch		41	410	30
Vehicle speed sensor drain gear set bolt		13	130	9
Clutch housing x Transmission case		38	387	28
Control shift lever retainer x Extension housing		18.5	189	14
Straight screw plug x Control shift lever retainer		24.5	250	18
Restrict pin		41	418	30
Inner lever x Shift and select lever		33	337	24
Extension housing x Intermediate plate		38	387	28
Front bearing retainer x Transmission case		25	255	18
Oil separator x Intermediate plate		18.5	189	14
Straight screw plug x Intermediate plate		25	255	18
No. 1 and No. 2 shift fork set bolt		20	203	15
Reverse idler gear shaft stopper set bolt		25	255	18
Straight screw plug x Reverse shift head		25	255	18
Rear bearing retainer x Intermediate plate		18.5	189	14
Straight screw plug x Extension housing		25	25.5	18

AUTOMATIC TRANSMISSION

SS0C5-13

SERVICE DATA

Line pressure (Wheel locked)		
	Idling	
	D position	390 - 460 kPa (4.0 - 4.7 kgf·cm^2, 57 - 67 psi)
	R position	0
	Stall	
	D position	1,200 - 1,360 kPa (12.2 - 13.8 kgf·cm^2, 174 - 196 psi)
	R position	1,640 - 1,960 kPa (16.7 - 19.8 kgf·cm^2, 238 - 282 psi)
Engine stall revolution (D position)		2,700 ± 150 rpm
Time lag	N → D position	Less than 1.2 seconds
	N → R position	Less than 1.5 seconds
Engine idle speed (N position and A/C OFF)		700 ± 50 rpm
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter clutch sleeve runout	Max.	0.30 mm (0.0118 in.)
Torque converter clutch installation (Correct distance)		More than 0.1 mm (0.004 in.)
Shift schedule (NORM and PWR mode)		
Differential gear ratio 3.909		
D, 4 position		
(Throttle valve fully opened)	1 → 2	47 - 59 km/h (29 - 37 mph)
	2 → 3	77 - 88 km/h (48 - 55 mph)
	3 → 4	118 - 133 km/h (73 - 83 mph)
	4 → 5	168 - 185 km/h (104 - 115 mph)
	5 → 4	163 - 176 km/h (101 - 109 mph)
	4 → 3	107 - 118 km/h (66 - 73 mph)
	3 → 2	60 - 66 km/h (37 - 41 mph)
	2 → 1	32 - 38 km/h (20 - 24 mph)
(Throttle valve fully closed)	4 → 5	37 - 43 km/h (23 - 27 mph)
	5 → 4	21 - 26 km/h (13 - 16 mph)
3 position		
(Throttle valve fully opened)	1 → 2	47 - 59 km/h (29 - 37 mph)
	2 → 3	77 - 87 km/h (48 - 54 mph)
	4 → 3	123 - 134 km/h (76 - 83 mph)
	3 → 2	60 - 66 km/h (37 - 41 mph)
	2 → 1	32 - 38 km/h (20 - 24 mph)
2 position		
(Throttle valve fully opened)	1 → 2	47 - 59 km/h (29 - 37 mph)
	3 → 2	82 - 90 km/h (51 - 56 mph)
	2 → 1	32 - 38 km/h (20 - 24 mph)
L position		
(Throttle valve fully opened)	2 → 1	17 - 22 km/h (11 - 14 mph)

Shift schedule (SNOW mode)		
Differential gear ratio 3.916		
D, 4 position		
(Throttle valve fully opened)	1 → 2	35 - 49 km/h (22 - 30 mph)
	2 → 3	55 - 73 km/h (34 - 45 mph)
	3 → 4	84 - 109 km/h (52 - 68 mph)
	4 → 5	121 - 151 km/h (75 - 94 mph)
	5 → 4	64 - 88 km/h (40 - 55 mph)
	4 → 3	38 - 54 km/h (24 - 34 mph)
	3 → 2	17 - 31 km/h (11- 19 mph)
(Throttle valve fully closed)	4 → 5	37 - 43 km/h (23 - 27 mph)
	5 → 4	21 - 26 km/h (13 - 16 mph)
3 position		
(Throttle valve fully opened)	1 → 2	35 - 49 km/h (22 - 30 mph)
	2 → 3	55 - 73 km/h (34 - 45 mph)
	4 → 3	123 - 134 km/h (76 - 83 mph)
	3 → 2	17 - 31 km/h (11 - 19 mph)
2 position		
(Throttle valve fully opened)	1 → 2	47 - 59 km/h (29 - 37 mph)
	3 → 2	82 - 90 km/h (51 - 56 mph)
L position		
(Throttle valve fully opened)	2 → 1	17 - 22 km/h (11 - 14 mph)
Lock-up point	(Throttle valve opening 5 %)	
5th gear (D position)	Lock-up ON	53 - 59 km/h (33 - 37 mph)
	Lock-up OFF	52 - 58 km/h (32 - 36 mph)
4th gear (4 position)	Lock-up ON	53 - 59 km/h (33 - 37 mph)
	Lock-up OFF	52 - 58 km/h (32 - 36 mph)
Flex lock-up point		
(Throttle valve opening 3 %)		
D position (When accelerating)		
5th gear	Lock-up ON	37 - 43 km/h (23 - 27 mph)
	Lock-up OFF	36 - 41 km/h (22 - 25 mph)
4th gear	Lock-up ON	28 - 33 km/h (17 - 32 mph)
	Lock-up OFF	27 - 32 km/h (18 - 20 mph)

SS139-04

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Extension housing x Transmission case	34	345	25
Transmission mounting bracket x Extension housing	12	120	9
Engine rear support member x Frame	25	260	19
Engine rear support member x Transmission mounting bracket	12	120	9
Vehicle speed sensor set bolt	5.4	55	48 in.·lbf
O/D direct clutch speed sensor set bolt	5.4	55	48 in.·lbf
AFT temperature sensor connector set bolt	5.4	55	48 in.·lbf
Drain plug	20	205	15
Shift solenoid valve SLU and SLT set bolt	6.4	65	56 in.·lbf
Shift solenoid valve SLN and No. 4 set bolt	10	100	7
Shift solenoid valve clamp set bolt	6.4	65	56 in.·lbf
Shift solenoid valve No. 1 and No. 3	6.4	65	56
Shift solenoid valve No. 2	10	100	7
Shift control rod set nut	13	130	9
Valve body x Transmission case	10	100	7
Oil pan x Transmission case	7.4	75	65 in.·lbf
Oil strainer x Valve body	10	100	7
Parking lock pawl bracket x Transmission case	7.4	75	65 in.·lbf
Control shaft lever set nut	13	130	9
Shift lever guide housing assembly x Shift lever plate	4.9	50	43 in.·lbf
Floor shift lever assembly set bolt	8.3	85	73 in.·lbf
Oil cooler pipe clamp bolt	5.4	55	48 in.·lbf
Oil cooler pipe union nut	44	450	33
Transmission x Engine 14 mm head	37	380	27
Transmission x Engine 17 mm head	72	730	53
Starter x Transmission	37	380	27
Exhaust pipe assembly x Exhaust manifold	62	632	46
Exhaust manifold with TWC x Engine	39	400	29
Pipe support bracket x Transmission	43	438	32
Torque converter clutch x Drive plate	48	490	35
Propeller shaft x Differential	74	750	54
Propeller shaft x Body	49	500	36
Drive plate x Crankshaft	83	850	61

PROPELLER SHAFT

SS132-01

SERVICE DATA

Shaft runout	Max.	0.8 mm (0.031 in.)
Joint angle (No. 2 joint)		- 1° 21’ ± 30’
Joint angle (No. 3 joint)		2° 18’ ± 30’
Center support bearing adjusting washer thickness		2.0 mm (0.079 in.) 4.5 mm (0.177 in.) 6.5 mm (0.256 in.) 9.0 mm (0.354 in.) 11.0 mm (0.433 in.) 13.5 mm (0.531 in.)

SS133-03

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Propeller shaft x Differential		74	750	54
Propeller shaft x Intermediate shaft		74	750	54
Intermediate shaft x Center support bearing x Universal joint flange	1st	181	1,850	134
	2nd	Loosen nut		
	3rd	69	700	51
Center support bearing x Body		49	500	36
Exhaust pipe assembly x Exhaust manifold		62	632	46
Heated oxygen sensor x Exhaust pipe assembly		44	450	33
Pipe support bracket x Transmission		43	438	32

SUSPENSION AND AXLE

SERVICE DATA

SS0FD-11

Cold tire inflation pressure (SEDAN)	Tire size: 215/45ZR17 or P205/55R16 89V		
		Front*1	230 kPa (2.3 kgf/cm^2, 33 psi)
		Rear*1	230 kPa (2.3 kgf/cm^2, 33 psi)
		Front*2	300 kPa (3.0 kgf/cm^2, 44 psi)
		Rear*2	300 kPa (3.0 kgf/cm^2, 44 psi)
Cold tire inflation pressure (WAGON)	Tire size: 215/45ZR17		
		Front*1	230 kPa (2.3 kgf/cm^2, 33 psi)
		Front*2	300 kPa (3.0 kgf/cm^2, 44 psi)
	Tire size: 225/45ZR17		
		Rear*1	240 kPa (2.4 kgf/cm^2, 35 psi)
		Rear*2	310 kPa (3.1 kgf/cm^2, 45 psi)
	Tire size: P205/55R16 89V		
		Front*1	230 kPa (2.3 kgf/cm^2, 33 psi)
		Rear*1	230 kPa (2.3 kgf/cm^2, 33 psi)
		Front*2	300 kPa (3.0 kgf/cm^2, 44 psi)
		Rear*2	320 kPa (3.2 kgf/cm^2, 46 psi)
Front wheel alignment (SEDAN, Canada)	Vehicle height	Front: B*4 - A*3	66 mm (2.60 in.)
		Rear: C*5 - D*6	66 mm (2.60 in.)
	Camber		-0 °21' ± 30' (-0.35° ± 0.5°)
		Right-left error	30' (0.5°) or less
	Caster		5°46' ± 30' (5.77° ± 0.5°)
		Right-left error	30' (0.5°) or less
	Steering axis inclination		9°16' ± 30' (9.27° ± 0.5°)
		Right-left error	30' (0.5°) or less
	Toe-in (total)		0°06' ± 12' (0.1° ± 0.2°, 1 ± 2 mm, 0.04 ± 0.08 in.)
		Rack end length difference	1.5 mm (0.059 in.) or less
	Wheel angle	Inside wheel	41°02' (39°02' – 42°02') 41.03° (39.03° – 42.03°)
		Outside wheel: Reference	33°30' 33.5°
Front wheel alignment (SEDAN, Except Canada)	Vehicle height	Front: B*4 - A*3	72 mm (2.83 in.)
		Rear: C*5 - D*6	85 mm (3.35 in.)
	Camber		-0 °30' ± 30' (-0.5° ± 0.5°)
		Right-left error	30' (0.5°) or less
	Caster		6°07' ± 30' (6.12° ± 0.5°)
		Right-left error	30' (0.5°) or less
	Steering axis inclination		9°25' ± 30' (9.42° ± 0.5°)
		Right-left error	30' (0.5°) or less
	Toe-in (total)		0°06' ± 12' (0.1° ± 0.2°, 1 ± 2 mm, 0.04 ± 0.08 in.)
		Rack end length difference	1.5 mm (0.059 in.) or less
	Wheel angle	Inside wheel	41°01' (39°01' – 42°01') 41.02° (39.02° – 42.02°)
		Outside wheel: Reference	33°23' 33.38°

Front wheel alignment (WAGON, Canada)	Vehicle height	Front: B*4 - A*3 Rear: C*5 - D*6	56 mm (2.20 in.) 58 mm (2.28 in.)
	Camber	Right-left error	-0 °05' ± 30' (-0.08° ± 0.5°) 30' (0.5°) or less
	Caster	Right-left error	5°31' ± 30' (5.52° ± 0.5°) 30' (0.5°) or less
	Steering axis inclination	Right-left error	8°59' ± 30' (8.98° ± 0.5°) 30' (0.5°) or less
	Toe-in (total)	Rack end length difference	0°06' ± 12' (0.1° ± 0.2°, 1 ± 2 mm, 0.04 ± 0.08 in.) 1.5 mm (0.059 in.) or less
	Wheel angle	Inside wheel Outside wheel: Reference	41°03' (39°03' – 42°03') 41.05° (39.05° – 42.05°) 33°40' 33.6°
Front wheel alignment (WAGON, Except Canada)	Vehicle height	Front: B*4 - A*3 Rear: C*5 - D*6	66 mm (2.60 in.) 66 mm (2.60 in.)
	Camber	Right-left error	-0 °21' ± 30' (-0.35° ± 0.5°) 30' (0.5°) or less
	Caster	Right-left error	5°46' ± 30' (5.77° ± 0.5°) 30' (0.5°) or less
	Steering axis inclination	Right-left error	9°16' ± 30' (9.27° ± 0.5°) 30' (0.5°) or less
	Toe-in (total)	Rack end length difference	0°06' ± 12' (0.1° ± 0.2°, 1 ± 2 mm, 0.04 ± 0.08 in.) 1.5 mm (0.059 in.) or less
	Wheel angle	Inside wheel Outside wheel: Reference	41°02' (39°02' – 42°02') 41.03° (39.03° – 42.03°) 33°30' 33.5°
Rear wheel alignment (SEDAN, Canada)	Camber	Right-left error	-0 °23' ± 30' (-0.38° ± 0.5°) 30' (0.5°) or less
	Toe-in (total)	Right and left length difference	0°12' ± 12' (0.2° ± 0.2°, 2 ± 2 mm, 0.08 ± 0.08 in.) 4.0 mm (0.157 in.) or less
Rear wheel alignment (SEDAN, Except Canada)	Camber	Right-left error	-0 °55' ± 30' (-0.92° ± 0.5°) 30' (0.5°) or less
	Toe-in (total)	Right and left length difference	0°12' ± 12' (0.2° ± 0.2°, 2 ± 2 mm, 0.08 ± 0.08 in.) 4.0 mm (0.157 in.) or less
Rear wheel alignment (WAGON, Canada)	Camber	Right-left error	-0 °04' ± 30' (-0.07° ± 0.5°) 30' (0.5°) or less
	Toe-in (total)	Right and left length difference	0°12' ± 12' (0.2° ± 0.2°, 2 ± 2 mm, 0.08 ± 0.08 in.) 4.0 mm (0.157 in.) or less
Rear wheel alignment (WAGON, Except Canada)	Camber	Right-left error	-0 °23' ± 30' (-0.38° ± 0.5°) 30' (0.5°) or less
	Toe-in (total)	Right and left length difference	0°12' ± 12' (0.2° ± 0.2°, 2 ± 2 mm, 0.08 ± 0.08 in.) 4.0 mm (0.157 in.) or less

*1: For driving under 160 km/h (100 mph)
*2: For driving at 160 km/h (100 mph) or over
*3: Ground clearance of the front No .1 lower suspension arm mounting bolt center.
*4: Ground clearance of the front wheel center.
*5: Ground clearance of the rear wheel center.
*6: Ground clearance of the No. 2 lower suspension arm mounting bolt (Suspension member side) tail center.

Front axle	Wheel bearing backlash	Maximum	0.05 mm (0.0020 in.)
	Axle hub deviation	Maximum	0.05 mm (0.0020 in.)
Front suspension	Upper ball joint turning torque		1.0 - 3.4 N·m (10 - 35 kgf·cm, 9 - 30 in.·lbf)
	Lower ball joint excessive play	Maximum	0.9 mm (0.035 in.)
	Lower ball joint turning torque		0.5 - 3.0 N·m (5 - 30 kgf·cm, 0.4 - 26 in.·lbf)
	Stabilizer bar link ball joint turning torque		0.05 - 1.9 N·m (0.5 - 20 kgf·cm, 0.4 - 16 in.·lbf)
Rear axle	Wheel bearing backlash	Maximum	0.05 mm (0.0020 in.)
	Axle hub deviation	Maximum	0.07 mm (0.0028 in.)
Rear drive shaft	Drive shaft standard length		RH: 585.4 ± 5.0 mm (23.047 ± 0.197 in.) LH: 539.8 ± 5.0 mm (21.252 ± 0.197 in.)
Rear suspension	Upper ball joint turning torque		1.0 - 2.9 N·m (10 - 30 kgf·cm, 9 - 26 in.·lbf)
	Toe control link ball joint turning torque		1.0 - 2.5 N·m (10 - 25 kgf·cm, 9 - 22 in.·lbf)
	Stabilizer bar link ball joint turning torque		0.05 - 1.0 N·m (0.5 - 10 kgf·cm, 0.4 - 9.0 in.·lbf)
Rear differential	Companion flange vertical runout	Maximum	0.09 mm (0.0035 in.)
	Companion flange lateral runout	Maximum	0.09 mm (0.0035 in.)
	Ring gear runout	Maximum	0.07 mm (0.0028 in.)
	Ring gear backlash	Maximum	0.13 - 0.18 mm (0.0051 - 0.0071 in.)
	Drive pinion bearing (at starting)	New bearing Reused bearing	0.98 - 1.57 N·m (10 - 16 kgf·cm, 8.7 - 13.9 in.·lbf) 0.49 - 0.78 N·m (5 - 8 kgf·cm, 4.3 - 6.9 in.·lbf)
	Total preload (at starting)		Drive pinion preload plus 0.39 - 0.59 N·m (4 - 6 kgf·cm, 3.5 - 5.2 in.·lbf)
	Side gear backlash (2 pinion differential)		0.05 - 0.20 mm (0.0020 - 0.0079 in.)
	Differential case runout	Maximum	0.07 mm (0.0028 in.)
	Side gear shaft oil seal drive in depth		0 ± 0.50 mm (0 ± 0.0197 in.)
	Front oil seal drive in depth		2.00 ± 0.45 mm (0.0787 ± 0.0177 in.)
	Right and left side gear shafts standard distance		279.7 mm (11.012 in.) or less
	Pinion gear backlash adjusting thrust washer		1.6 mm (0.062 in.) 1.7 mm (0.067 in.) 1.8 mm (0.071 in.)
Rear differential	Drive pinion bearing adjusting washer thickness		1.70 mm (0.0669 in.) 1.73 mm (0.0681 in.) 1.76 mm (0.0693 in.) 1.79 mm (0.0704 in.) 1.82 mm (0.0717 in.) 1.85 mm (0.0729 in.) 1.88 mm (0.0740 in.) 1.91 mm (0.0752 in.) 1.94 mm (0.0764 in.) 1.97 mm (0.0776 in.) 2.00 mm (0.0787 in.) 2.03 mm (0.0799 in.) 2.06 mm (0.0811 in.) 2.09 mm (0.0822 in.) 2.12 mm (0.0835 in.) 2.15 mm (0.0847 in.) 2.18 mm (0.0858 in.) 2.21 mm (0.0870 in.) 2.24 mm (0.0882 in.) 2.27 mm (0.0894 in.) 2.30 mm (0.0906 in.) 2.33 mm (0.0918 in.)

Rear differential	Side bearing adjusting washer thickness	2.58 mm (0.1016 in.) 2.60 mm (0.1024 in.) 2.62 mm (0.1031 in.) 2.64 mm (0.1039 in.) 2.66 mm (0.1047 in.) 2.68 mm (0.1055 in.) 2.70 mm (0.1063 in.) 2.72 mm (0.1071 in.) 2.74 mm (0.1079 in.) 2.76 mm (0.1087 in.) 2.78 mm (0.1094 in.) 2.80 mm (0.1102 in.) 2.82 mm (0.1110 in.) 2.84 mm (0.1118 in.) 2.86 mm (0.1126 in.) 2.88 mm (0.1134 in.) 2.90 mm (0.1142 in.) 2.92 mm (0.1150 in.) 2.94 mm (0.1157 in.) 2.96 mm (0.1165 in.) 2.98 mm (0.1173 in.) 3.00 mm (0.1181 in.) 3.02 mm (0.1189 in.) 3.04 mm (0.1197 in.) 3.06 mm (0.1205 in.) 3.08 mm (0.1213 in.) 3.10 mm (0.1220 in.) 3.12 mm (0.1228 in.) 3.14 mm (0.1236 in.) 3.16 mm (0.1244 in.) 3.18 mm (0.1252 in.) 3.20 mm (0.1260 in.) 3.22 mm (0.1268 in.) 3.24 mm (0.1276 in.) 3.26 mm (0.1283 in.) 3.28 mm (0.1291 in.) 3.30 mm (0.1299 in.) 3.32 mm (0.1307 in.) 3.34 mm (0.1315 in.) 3.36 mm (0.1323 in.) 3.38 mm (0.1331 in.) 3.40 mm (0.1339 in.) 3.42 mm (0.1346 in.) 3.44 mm (0.1354 in.) 3.46 mm (0.1362 in.) 3.48 mm (0.1370 in.)

SS0FE-12

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
FRONT AXLE			
Hub nut	103	1,050	76
Brake caliper x Steering knuckle	118	1,200	87
ABS speed sensor x Steering knuckle	8.0	82	71 in.·lbf
Steering knuckle x Upper suspension arm	65	660	50
Steering knuckle x Lower ball joint	113	1,150	83
Brake dust cover x Steering knuckle	8.3	85	74 in.·lbf
Tie rod end lock nut	56	570	41
Axle hub lock nut	147	1,500	108
FRONT SUSPENSION			
Height control sensor link x Lower arm bracket	5.4	55	48 in.·lbf
ABS speed sensor wire harness x Shock absorber	5.0	51	44 in.·lbf
Stabilizer bar x Stabilizer bar link	74	755	55
Shock absorber x Shock absorber bracket	64	650	47
Piston rod x Suspension support	34	350	25
Suspension support x Body	35	360	26
Upper suspension arm x Body	59	600	44
No. 1 lower suspension arm x Front suspension member	184	1,880	136
Steering gear housing bracket x Front suspension member	74	755	55
Front suspension member brace x No. 2 lower suspension arm x Body	119	1,210	88
Front suspension member brace x Body	58	590	43
Front suspension member brace x Front suspension member	58	590	43
Stabilizer bar link x Shock absorber bracket	95	970	70
No. 1 lower suspension arm x No. 2 lower suspension arm	245	2,500	180
No. 1 lower suspension arm x Lower ball joint	123	1,250	91
Shock absorber bracket x No. 1 lower suspension arm	25	250	18
Tie rod end x Lower ball joint	54	550	40
Stabilizer bar bracket x Body	23	235	17
REAR AXLE			
Hub nut	103	1,050	76
Brake caliper x Axle carrier	104	1,065	77
Axle carrier x Upper suspension arm	108	1,100	80
Backing plate x Axle carrier	59	600	43
No.2 lower suspension arm x Axle carrier	110	1,120	81
No.1 lower suspension arm x Axle carrier	75	765	55
Toe control link x Axle carrier	49	500	36
ABS speed sensor x Axle carrier	8.0	82	71 in.·lbf
Parking brake cable x Backing plate	7.8	80	69 in.·lbf
REAR DRIVE SHAFT			
Drive shaft x Axle hub	289	2,950	213
Drive shaft x Differential side gear shaft	68	695	50
REAR DIFFERENTIAL			
Differential drain plug	49	500	36

Differential filler plug		49	500	36
Differential mounting bolt	Front Rear	95 142	970 1,450	71 105
Ring gear set bolt		97	985	71
Companion flange lock nut		See page SA-88		
Differential carrier cover set bolt		47	475	34
Breather plug		21	210	15
Rear suspension member brace set bolt		50	510	37
Center exhaust pipe x Tailpipe		43	440	32
Front exhaust pipe x Exhaust pipe assembly		62	632	46
Heated oxygen sensor		44	450	33
Propeller shaft center support bearing set bolt		49	500	36
Propeller shaft assembly x Rear differential		74	750	54
Differential carrier x Bearing cap		85	870	63
Oil deflector x Differential carrier cover		8.0	82	71 in.·lbf
Rear suspension member x Body		127	1,300	94
Rear suspension member stopper x Body		19	195	14
Rear suspension member lower brace x Body		19	195	14
Parking brake cable x Body		7.8	80	69 in.·lbf
REAR SUSPENSION				
Height control sensor link x Lower arm bracket		5.4	55	48 in.·lbf
Rear seat belt assembly outer x Body		42	430	31
Rear seatback assembly x Body		18	185	13
Suspension support x Body	Upper side Lower side	64 18	650 185	47 13
Piston rod x Suspension support		18	185	13
Upper suspension arm x Body	Front side Rear side	88 74	900 755	65 55
No. 1 lower suspension arm x Body		75	765	55
No. 2 lower suspension arm x Stabilizer bar link		30	305	22
No. 2 lower suspension arm x Shock absorber		110	1,120	81
No. 2 lower suspension arm x Rear suspension member		110	1,120	81
ABS speed sensor wire harness x Toe control link		5.0	51	44 in.·lbf
Toe control link x Rear suspension member		49	500	36
Stabilizer bar x Stabilizer bar link		65	663	48
Stabilizer bar bracket x Suspension member		18	185	13

BRAKE

SS062-22

SERVICE DATA

Brake pedal height (from asphalt sheet)		154.0 - 164.0 mm (6.063 - 6.457 in.)
Brake pedal freeplay		1.0 - 6.0 mm (0.04 - 0.24 in.)
Stop light switch crearance		1.5 - 2.5 mm (0.059 - 0.098 in.)
Brake pedal reserve distance at 490 N (50 kgf, 110.2 lbf)		More than 99 mm (3.90 in.)
Brake booster push rod to piston clearance (w/ SST)		0 mm (0 in.)
Front brake pad thickness	STD	11.0 mm (0.433 in.)
Front brake pad thickness	Minimum	1.0 mm (0.039 in.)
Front brake disc thickness	STD	32.0 mm (1.260 in.)
Front brake disc thickness	Minimum	30.0 mm (1.181 in.)
Front brake disc runout	Maximum	0.05 mm (0.0020 in.)
Rear brake pad thickness	STD	10.5 mm (0.413 in.)
Rear brake pad thickness	Minimum	1.0 mm (0.039 in.)
Rear brake disc thickness	STD	12.0 mm (0.472 in.)
Rear brake disc thickness	Minimum	10.5 mm (0.413 in.)
Rear brake disc runout	Maximum	0.05 mm (0.0020 in.)
Rear brake disc inside diameter	STD	190 mm (7.48 in.)
Rear brake disc inside diameter	Maximum	191 mm (7.52 in.)
Parking brake shoe lining thickness for rear disc brake	STD	2.5 mm (0.098 in.)
Parking brake shoe lining thickness for rear disc brake	Minimum	1.0 mm (0.039 in.)
Parking brake pedal lever at 196 N (20 kgf, 44.1 lbf)		5 - 8 clicks
Parking brake clearance between rear shoe and lever		Less than 0.35 mm (0.0138 in.)
Parking brake adjusting shim thickness for rear disc brake		0.3 mm (0.012 in.) 0.6 mm (0.024 in.) 0.9 mm (0.035 in.)

SS063-24

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Master cylinder x Brake booster		13	130	9
Master cylinder x Piston stopper bolt		10	102	7
Brake line union nut		15	155	11
Brake booster clevis lock nut		25	260	19
Brake booster x Pedal bracket		13	130	9
Bleeder plug	(Brake caliper)	11	110	8
Bleeder plug	(ABS & TRAC / VSC actuator)	8.3	85	74 in.·lbf
Brake pedal x pedal bracket		37	377	27
Reservoir set screw		1.8	18	16 in.·lbf
Front brake caliper installation bolt		34	350	25
Front disc brake caliper x Flexible hose		30	310	22
Front disc brake torque plate x Steering knuckle		118	1,200	87
Rear disc brake caliper x Flexible hose		30	310	22
Rear disc brake caliper x Rear axle carrier		104	1,065	77
ABS & TRC Actuator x Actuator Bracket		5.4	55	48 in.·lbf
ABS & TRC Actuator Assembly x Body		19	195	14
Front speed sensor installation bolt		8.0	82	71 in.·lbf
Front speed sensor harness clamp bolt		5.0	51	44 in.·lbf
Rear speed sensor installation bolt		8.0	82	71 in.·lbf
Rear speed sensor harness x Body		5.0	51	44 in.·lbf
Rear speed sensor harness x Toe control link		5.0	51	44 in.·lbf

STEERING

SERVICE DATA

SS0MY-18

POWER STEERING FLUID		
Fluid level rise	Maximum	5 mm (0.20 in.)
Fluid pressure at idle speed with valve closed	Minimum	6,900 kPa (70 kgf/cm^2, 996 psi)
STEERING WHEEL		
Steering wheel freeplay	Maximum	30 mm (1.18 in.)
Steering effort at idle speed		4.2 - 5.4 N·m (43 - 55 kgf·cm, 37 - 48 in.lbf)
POWER STEERING VANE PUMP		
Vane pump rotating torque		0.25 N·m (2.5 kgf·cm, 2.2 in.·lbf) or less
Vane pump shaft and front housing bushing oil clearance	STD Maximum	0.03 - 0.05 mm (0.0012 - 0.0020 in.) 0.07 mm (0.0028 in.)
Vane plate height	Minimum	8.6 mm (0.339 in.)
Vane plate thickness	Minimum	1.40 mm (0.0551 in.)
Vane plate length	Minimum	14.99 mm (0.5902 in.)
Vane plate and vane pump rotor groove clearance	Maximum	0.033 mm (0.0013 in.)
Vane plate length	Pump rotor and cam ring mark	
	None	14.999 - 15.001 mm (0.59051 - 0.59059 in.)
	1	14.997 - 14.999 mm (0.59043 - 0.59051 in.)
	2	14.995 - 14.997 mm (0.59035 - 0.59043 in.)
	3	14.993 - 14.995 mm (0.59027 - 0.59035 in.)
	4	14.991 - 14.993 mm (0.59020 - 0.59027 in.)
Spring free length	Minimum	33.2 mm (1.307 in.)
POWER STEERING GEAR		
Steering rack runout	Maximum	0.15 mm (0.0059 in.)
Total preload	Turning	1.2 - 1.7 N·m (12.2 - 17.3 kgf·cm, 10.6 - 15.0 in.·lbf)

SS136-04

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
TILT STEERING COLUMN				
Tilt steering shaft		20	210	15
Turn signal bracket set bolt		2.9	30	26 in.·lbf
Column protector set bolt		6.1	60	52 in.·lbf
Column tube support x Column tube		15	150	11
No. 2 intermediate shaft assembly x Main shaft assembly		35	360	26
Steering column assembly set nut		26	270	19
Sliding yoke x No. 2 intermediate shaft assembly		35	360	26
Sliding yoke x Control valve shaft		35	360	26
Steering wheel set nut		50	510	37
Steering wheel pad set screw (Torx screw)		8.8	90	78 in.·lbf
POWER STEERING VANE PUMP				
Rear housing		24	240	17
Pressure port union		83	850	61
Oil reservoir	Front side	13	130	9
	Rear side	24	240	17
Vane pump pulley set nut		44	450	33
Vane pump assembly set bolt		58	590	43
Pressure feed tube x PS vane pump assembly		49	500	36
POWER STEERING GEAR				
Cylinder end stopper		59	600	44
Bearing guide nut		25	250	18
Control valve housing x Rack housing		18	180	13
Rack guide spring cap lock nut		50 (69)	510 (700)	37 (51)
Rack x Rack end		76 (103)	780 (1,050)	56 (76)
Tie rod end lock nut		56	570	41
Turn pressure tube union nut		22 (25)	220 (250)	16 (18)
PS gear assembly set bolt		74	750	54
Return tube x PS gear assembly		40 (44)	410 (450)	30 (33)
Pressure feed tube x PS gear assembly		42	430	31
Front suspension member brace	Bolt A	119	1,210	88
	Bolt B	58	590	43
Sliding yoke x Control valve shaft		35	360	26
Tie rod end x Steering knuckle		54	550	40
Front brake caliper x Steering knuckle		118	1,200	87
Steering wheel set nut		50	510	37

( ): For use without SST

SUPPLEMENTAL RESTRAINT SYSTEM

SS061-63

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Steering wheel	50	510	37
Steering wheel pad	8.8	90	78 in.·lbf
Front passenger airbag assembly x Instrument panel	5.4	55	48 in.·lbf
Front passenger airbag assembly x Instrument panel reinforcement	20	205	15
Front seat installation bolt	37	375	27
Seatback assembly x Seat cushion assembly	43	440	32
Front seat airbag door x Seat back assembly	4.7	48	42 in.·lbf
Airbag sensor assembly	20	205	15
Front airbag sensor	8.5	86.7	75 in.·lbf
Side and curtain shield airbag sensor assembly	20	205	15
Curtain shield airbag assembly x Body	9.8	100	86 in.·lbf

BODY ELECTRICAL

SS0CN-27

SERVICE DATA

AUTOMATIC LIGHT CONTROL SENSOR	
1 - Ground (Ignition switch LOCK or ACC)	No voltage
1 - Ground (Ignition switch ON)	9.5 V or more
SPEEDOMETER (ON-VEHICLE)	
Standard indication (mph) USA Models	Allowable range (mph)
20	18.5 - 21.5
40	38 - 41.5
60	58 - 62
80	77.5 - 82
100	97 - 102
120	116.5 - 122
140	136 - 142
Standard indication (km/h) CANADA Models	Allowable range (km/h)
20	18 - 23
40	40 - 44
60	60 - 64.5
80	80 - 85
100	100 - 105
120	120 - 125.5
140	140 - 146
160	160 - 169
180	180 - 188
200	200 - 209
220	220 - 230
240	240 - 251
Speedometer	Resistance (Ω)
A - B	160 Ω
C - D	160 Ω
TACHOMETER (ON-VEHICLE)/ DC 13.5 V 25 °C at (77 °F)	
Standard indication	Allowable range
700	630 - 770
1,000	900 - 1,100
2,000	1,850 - 2,150
3,000	2,800 - 3,200
4,000	3,800 - 4,200
5,000	4,800 - 5,200
6,000	5,750 - 6,250
7,000	6,700 - 7,300
8,000	7,700 - 8,300
Tachometer	Resistance (Ω)
A - B	160 Ω
C - D	160 Ω

FUEL RECEIVER GAUGE	Resistance (Ω)
A - B	160 Ω
C - D	160 Ω
FUEL MAIN SENDER GAUGE	
Float position mm (in.)	Resistance (Ω)
F: Approx. 22.9 (0.90) ± 3 (0.12)	Approx. 2.0 ± 1.0
1/2: Approx. 58.3 (2.30) ± 3 (0.12)	Approx. 30.3 ± 3.0
E: Approx. 133.6 (5.26) ± 3 (0.12)	Approx. 55.0 ± 1.0
FUEL SUB SENDER GAUGE	
Float position mm (in.)	Resistance (Ω)
F: Approx. 29.1 (1.15) ± 3 (0.12)	Approx. 2.0 ± 1.0
1/2: Approx. 65.8 (2.59) ± 3 (0.12)	Approx. 29.7 ± 3.0
E: Approx. 169.5 (6.67) ± 3 (0.12)	Approx. 55 ± 1.0
ENGINE COOLANT TEMPERATURE RECEIVER GAUGE (Resistance)	Resistance (Ω)
A - B	160 Ω
C - D	160 Ω
VOLTAGE GAUGE (Resistance)	Resistance (Ω)
A - B	160
C - D	160
SPECIFIC FUEL CONSUMPTION GAUGE (Resistance)	Resistance (Ω)
A - B	160
C - D	160

BODY

SS137-07

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
FRONT BUMPER				
Front bumper cover x Front fender panel		5.4	55	48 in.·lbf
REAR BUMPER (Sedan)				
Rear bumper cover x Side mounting bracket		5.4	55	48 in.·lbf
Rear bumper cover x Rear fender panel		5.4	55	48 in.·lbf
Rear bumper cover x Body	Nut	8.3	85	74 in.·lbf
Rear bumper reinforcement x Body		6.0	61	53 in.·lbf
HOOD				
Hood x Hood hinge		13	133	10
Hood lock x Body		8.0	82	71 in.·lbf
FRONT DOOR				
Outside handle x Key cylinder		5.5	56	49 in.·lbf
Outside handle x Door panel		5.5	56	49 in.·lbf
Door lock x Door panel		5.5	56	49 in.·lbf
Window regulator x Door panel		8.0	82	71 in.·lbf
Door glass x Window regulator		5.5	56	49 in.·lbf
Outside rear view mirror x Door panel		8.0	82	71 in.·lbf
Front No.2 speaker x Body		8.0	82	71 in.·lbf
Door hinge x Body		30	306	22
Door hinge x Door panel		30	306	22
Door check x Door panel		5.5	56	49 in.·lbf
Door lock striker x Body		23	235	17
REAR DOOR				
Outside handle x Door panel		5.5	56	49 in.·lbf
Door lock x Door panel		5.5	56	49 in.·lbf
Window regulator x Door panel		8.0	82	71 in.·lbf
Door hinge x Body		21	214	15
Door hinge x Door panel		30	306	22
Door check x Door panel		5.5	56	49 in.·lbf
Door lock striker x Body		23	235	17
BACK DOOR				
Back door lock x Body		12.5	128	9
Door hinge x Door panel		8.0	82	71 in.·lbf
Door hinge x Body		11.5	117	8
Door lock striker x Body		23	235	17
Back door outside handle x Back door outside garnish		4.0	40	35 in.·lbf
BACK DOOR STAY				
Back door stay x Door panel		22	224	16
Back door stay x Body		19.5	199	14
LUGGAGE COMPARTMENT DOOR AND HINGE				
Door lock striker x Body		5.5	56	49 in.·lbf
Luggage compartment door x Hinge		8.0	82	71 in.·lbf

Luggage compartment door lock x Body	5.5	56	49 in.·lbf
Luggage compartment door hinge x Body	5.5	56	49 in.·lbf
FRONT WIPER AND WASHER			
Wiper motor x Wiper link	5.4	55	48 in.·lbf
Wiper link assembly x Body	5.5	56	49 in.·lbf
Wiper arm x Wiper link assembly	26	265	19
REAR WIPER AND WASHER (Wagon)			
Wiper arm x Rear wiper motor	5.5	56	49 in.·lbf
Nut x Rear wiper motor	12	122	9
Rear wiper motor x Rear wiper motor	5.5	56	49 in.·lbf
SLIDING ROOF			
Sliding roof housing x Body	5.5	56	49 in.·lbf
Sliding roof bracket x Body	8.0	82	71 in.·lbf
Sliding roof bracket x Sliding roof housing	5.5	56	49 in.·lbf
INSTRUMENT PANEL			
Front passenger airbag assembly x Reinforcement	20	205	15
Front passenger airbag assembly x Instrument panel	5.5	56	49 in.·lbf
ROOF HEADLINING			
Inner rear view mirror x Body	5.5	56	49 in.·lbf
FRONT SEAT			
Seatback assembly x Seat track	43	440	32
Seat cushion assembly x Seat track	21	210	15
Seat track x Body	38	387	28
REAR SEAT (Sedan)			
Seatback assembly x Body	7.8	80	69 in.·lbf
REAR SEAT (Wagon)			
Seatback x Body	21	214	15
SEAT BELT			
Front seat outer belt:			
Shoulder anchor x Adjuster anchor	41	420	30
Floor anchor x Body	41	420	30
Retractor x Body Upper bolt	7.8	80	69 in.·lbf
Adjustable anchor x Body	41	420	30
Inner belt x Seat track	41	420	30
Rear seat belt (Sedan):			
Shoulder anchor x Body	41	420	30
Floor anchor x Body	41	420	30
Inner belt x Body	41	420	30
Shoulder anchor x Body	41	420	30
Floor anchor x Body	41	420	30
CRS anchor set bolt	21	210	15
Rear Seat Belt (Wagon):			
Floor anchor x Body	42	428	31
Inner belt x Body	42	428	31

Retractor x Body — Floor side: Roof Side:	42	428	31
CRS anchor set bolt	13.2	135	10

AIR CONDITIONING

SS0F5-05

SERVICE DATA

Refrigerant volume		600 ± 50 g (21.16 ± 1.76 oz.)
Idle Speed	Magnetic clutch not engaged	600 ± 50 rpm
	Magnetic clutch engaged	650 ± 50 rpm
Magnetic clutch clearance		0.5 ± 0.15 mm (0.020 ± 0.0059 in.)

SS0F6-04

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
REFRIGERANT LINE			
Condenser x Discharge hose	10	100	7
Condenser x Liquid tube	10	100	7
Compressor x Discharge hose	10	100	7
Compressor x Suction hose	10	100	7
Suction line (Block joint)	10	100	7
A/C unit x Liquid and suction tubes	10	100	7
AIR CONDITIONER UNIT			
Tube connector x Expansion valve x Tube and accessory	4.1	42	36 in.·lbf
Tube and accessory x Evaporator	4.1	42	36 in.·lbf
COMPRESSOR AND MAGNETIC CLUTCH			
Compressor x Engine (Bolt)	52	530	38
Compressor x Engine (Nut)	52	530	38
Compressor x Engine (Stud bolt)	26	265	19
PS pump bracket x Compressor x Engine	52	530	38
PS pump bracket x Compressor bracket Engine	58	590	43
Compressor bracket x Engine	39	400	29
Pump stay x Compressor bracket	39	400	29
Compressor bracket x Compressor	58	590	43
Pressure plate x Compressor	13.2	135	9
CONDENSER			
Cap x Condenser	12.3	125	9
CONDENSER FAN			
Radiator x Cooling fan assembly	5	50	44 in.·lbf
PRESSURE SWITCH			
Pressure switch x Liquid tube	10	100	7
ENGINE COOLANT TEMPERATURE (ECT) SWITCH			
Engine coolant temperature (ECT) switch x Radiator	7.4	75	65 in.·lbf

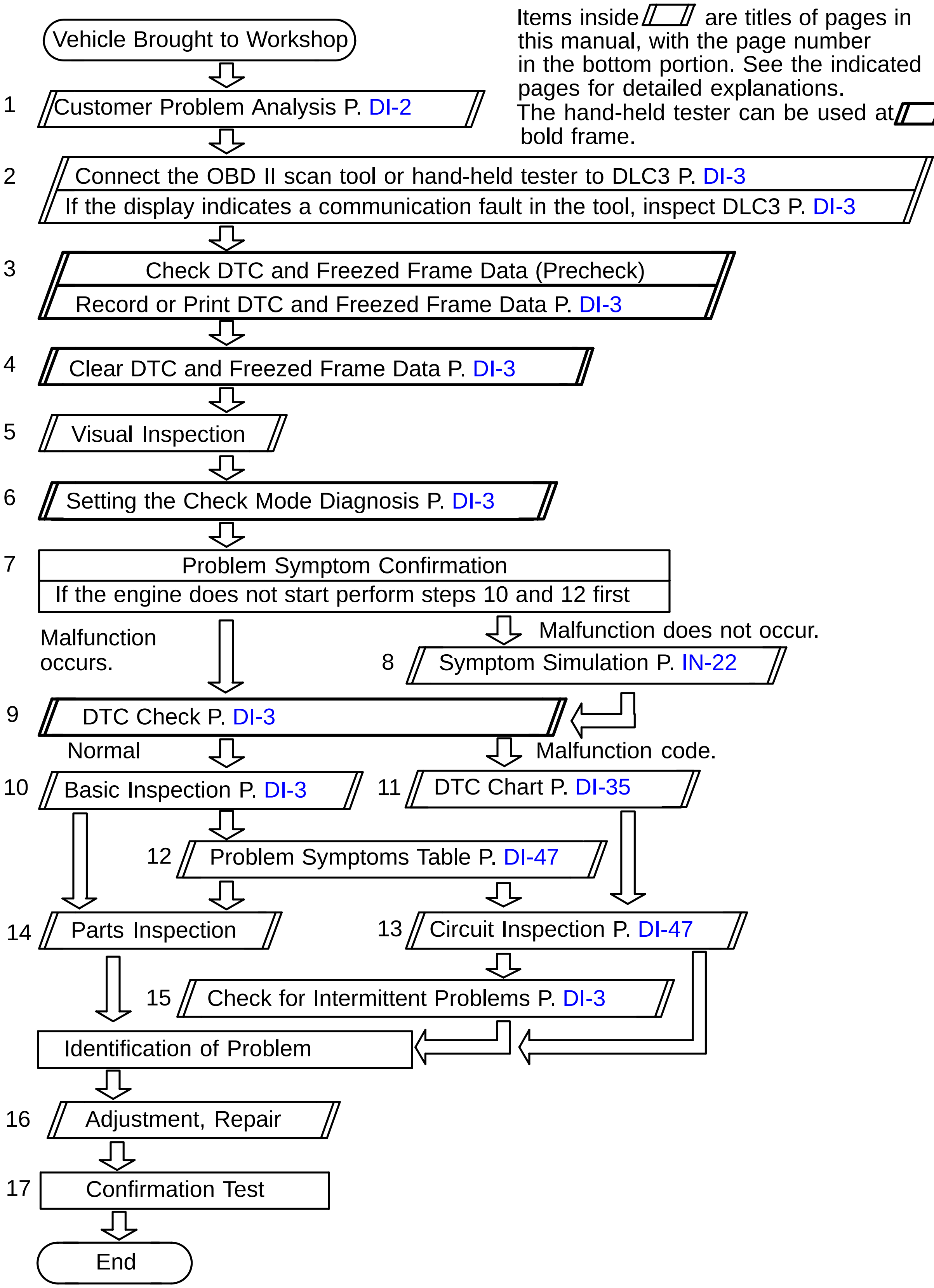
ENGINE

DI2DE-11

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.

Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the indicated pages for detailed explanations.
The hand-held tester can be used at ▱ bold frame.



DI2DF-07

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name ______________________

Customer's Name		VIN	
Driver's Name		Production Date	
Data Vehicle Brought in		Licence Plate No.	
Engine model		Odometer Reading	km miles

Problem Symptoms	☐ Engine does not Start	☐ Engine does not crank ☐ No initial combustion ☐ No complete combustion
	☐ Difficult to Start	☐ Engine cranks slowly ☐ Other ______
	☐ Poor Idling	☐ Incorrect first idle ☐ Idling rpm is abnormal ☐ High (rpm) ☐ Low (rpm) ☐ Rough idling ☐ Other ______
	☐ Poor Driveability	☐ Hesitation ☐ Back fire ☐ Muffler explosion (after-fire) ☐ Surging ☐ Knocking ☐ Other ______
	☐ Engine Stall	☐ Soon after starting ☐ After accelerator pedal depressed ☐ After accelerator pedal released ☐ During A/C operation ☐ Shifting from N to D ☐ Other ______
	☐ Others	

Dates Problem Occurred		
Problem Frequency		☐ Constant ☐ Sometimes (times per day/month) ☐ Once only ☐ Other ______
Condition When Problem Occurs	Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Other ______
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (approx. ____˚C/____˚F)
	Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other ______
	Engine Temp.	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temp. ☐ Other ______
	Engine Operation	☐ Starting ☐ Just after starting (min.) ☐ Idling ☐ Racing ☐ Driving ☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ A/C switch ON/OFF ☐ Other ______

Condition of malfunction indicator light (MIL)		☐ Remains on ☐ Sometimes light up ☐ Does not light up	
DTC Inspection	Normal Mode (Pre-check)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )
	Check Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )

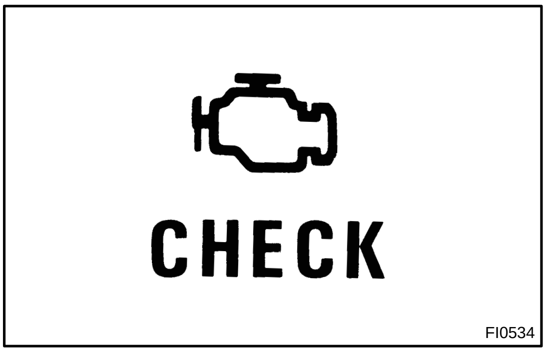
DIC3Z-01

PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Description

- When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (in compliance with SAE J1978) or the hand-held tester. Various data output from the vehicle's ECM can then be read.



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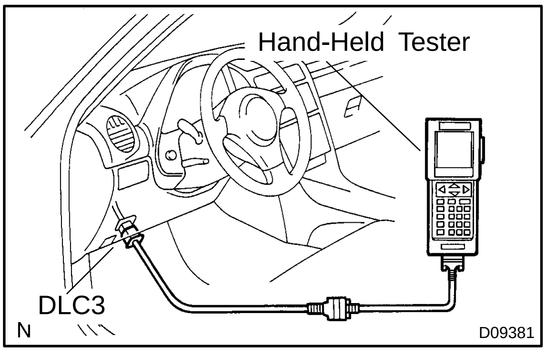
- OBD II regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator Light (MIL) on the instrument panel when the computer detects a malfunction in: 1) the emission control system/components, or 2) the powertrain control components (which affect vehicle emissions), or 3) The computer. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (See page DI-35).

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.



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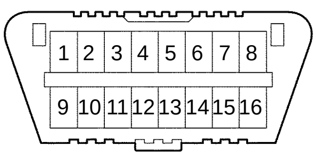
- To check the DTC, connect the hand-held tester or OBD II scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The hand-held tester or OBD II scan tool also enables you to erase the DTC and check the freeze frame data and various forms of engine data (See the instruction manual for the OBD II scan tool or the hand-held tester). The DTC includes SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set according to the SAE, while manufacturer controlled codes can be set by a manufacturer with certain restrictions (See the DTC chart on page DI-35).
- The diagnosis system operates in "normal mode" during normal vehicle use. In "normal mode", 2 trip detection logic* is used to ensure accurate detection of malfunctions. A "check mode" is also available to technicians as an option. In "check mode", 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions (hand-held tester only) (See step 3).

- *2 trip detection logic:
  When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. This is known as 1st trip detection. If the ignition switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate. This is known as 2nd trip detection.
- Freeze frame data:
  The freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when a malfunction is detected. When troubleshooting, freeze frame data can help determining if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Priorities for troubleshooting:
When multiple DTCs occur, find out the order in which the DTCs should be inspected by checking the component's DTC chart. If no instructions are written in the DTC chart, check DTCs in the following order of priority:

(1) DTCs other than fuel trim malfunction DTCs (P0171 and P0172) and misfire DTCs (P0300 to P0306).
(2) Fuel trim malfunction DTCs (P0171 and P0172).
(3) Misfire DTCs (P0300 to P0306).



DLC3

A04550

(b) Check the DLC3.
The vehicle's ECM uses the ISO 9141-2 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Tester Connection	Condition	Specified Condition
7 (Bus + line) - 5 (Signal ground)	During communication	pulse generation
4 (Chassis ground) - Body ground	Constant	Below 1 Ω
5 (Signal ground) - Body ground	Constant	
16 (B+) - Body ground	Constant	9 to 14 V

HINT:
Connect the cable of the hand-held tester to the DLC3, turn the ignition switch ON and attempt to use the hand-held tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

- If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

(c) Inspect the battery voltage.
Battery Voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

(d) Check the MIL.
(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

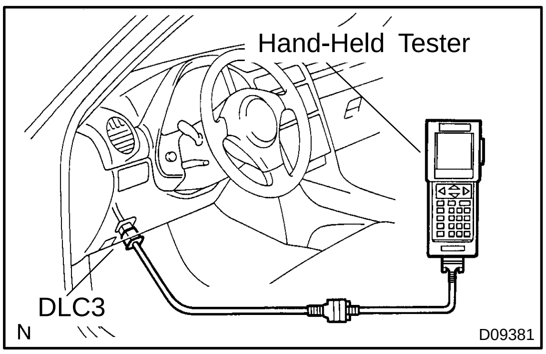
HINT:
If the MIL is not illuminated, troubleshoot the MIL circuit (See page DI-320).

(2) When the engine is started, the MIL should not illuminate. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

2. DTC CHECK (Normal Mode)

NOTICE:

- **If no DTC appears in normal mode:**
On the OBD II scan tool or the hand-held tester check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979).
- **When the diagnosis system is changed from normal mode to check mode or vice-versa, all DTCs and freeze frame data recorded in normal mode will be erased. Before changing modes, always check and make a note of DTCs and freeze frame data.**



(a) Checking DTCs using the OBD II scan tool or hand-held tester.
(1) Connect the OBD II scan tool or the hand-held tester to DLC3.
(2) Turn the ignition switch ON.

(3) Use the OBD II scan tool or the hand-held tester to check the DTCs and freeze frame data and then write them down.
For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES. For the OBD II scan tool, see its instruction manual.

(4) See page DI-35 to confirm the details of the DTCs.

NOTICE:
When simulating a symptom with the OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For DTCs chart subject to "2 trip detection logic", perform either of the following actions.

- **Check the pending fault code:**
  For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
- **Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL come on and the DTCs are recorded in the ECM.**
- **Check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool.**

(b) Clearing the DTCs using the OBD II scan tool or the hand-held tester.

(1) Connect the OBD II scan tool or the hand-held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester.
For the hand-held tester:
1) enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES.
For the OBD II scan tool, see its instruction manual.

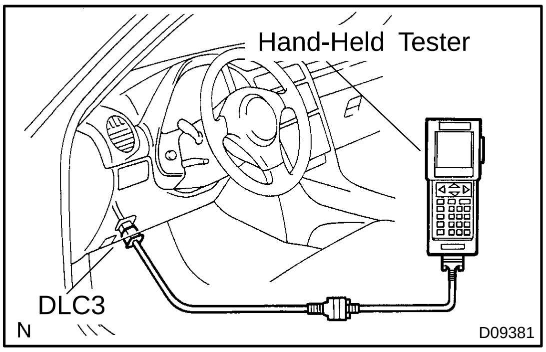
(c) Clearing the DTCs not using the OBD II scan tool or the hand-held tester.
Remove the EFI and ETCS fuses from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
After disconnecting the battery terminal, perform the "INITIALIZE" procedure (See page DI-328).

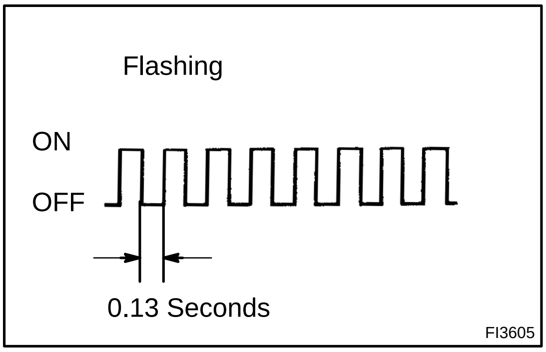
3. DTC CHECK (Check Mode)

HINT:

Hand-held tester only:

Check mode has a higher sensitivity to detect malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect.





(a) Follow these steps when preparing to use the hand-held tester check mode.
  (1) Make sure that the items below are true:
    - Battery positive voltage 11 V or more
    - Throttle valve fully closed
    - Transmission in the P or N position
    - A/C switched OFF
  (2) Turn the ignition switch OFF.
  (3) Connect the hand-held tester to the DLC3.
  (4) Turn the ignition switch ON.
  (5) Change the ECM to check mode with the hand-held tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / CHECK MODE. Make sure the MIL flashes as shown in the illustration.

NOTICE:
All DTCs and freeze frame data recorded will be erased if: 1) the hand-held tester is used to change the ECM from normal mode to check mode or vice-versa; or 2) during check mode, the ignition switch is turned from ON to ACC or OFF.

  (6) Start the engine. The MIL should turn off after the engine starts.
  (7) Simulate the conditions of the malfunction described by the customer.
  (8) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTC, freeze frame data and other data.
  (9) After checking the DTC, inspect the applicable circuit.

(b) Clearing DTCs using the OBD II scan tool or the hand-held tester.
  (1) Connect the OBD II scan tool or the hand-held tester to the DLC3.
  (2) Turn the ignition switch ON.

(3) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester.
For the hand-held tester:
1) enter the following menus: DIAGNOSIS ENHANCED OBD II / DTC INFO / CLEAR CODES;
and 2) press YES.
For the OBD II scan tool, see its instruction manual.

(c) Clearing the DTCs without using the OBD II scan tool or the hand-held tester.
Remove the EFI and ETCS fuse from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
After disconnecting the battery terminal, perform the ”INITIALIZE” procedure (See page DI-328).

4. FAIL-SAFE CHART

If any of the following codes is recorded, the ECM enters into the fail-safe mode.

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0100	Ignition timing is fixed at 5° BTDC	Returned to normal condition
P0110	Intake air temperature is fixed at 20°C (68°F)	Returned to normal condition
P0115	Engine coolant temperature is fixed at 80°C (176°F)	Returned to normal condition
P0031 P0032 P0037 P0038 P0051 P0052 P0057 P0058	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0325 P0330	Max. ignition timing retardation	Ignition switch OFF
P0351	Fuel cut	Returned to normal condition

5. CHECK FOR INTERMITTENT PROBLEMS

Hand-held tester only:
Inspect the vehicle’s ECM using check mode. Intermittent problems are easier to detect when the ECM is in check mode with hand-held tester. In check mode, the ECM uses 1 trip detection logic, which has a higher sensitivity to malfunctions than normal mode (default), which uses 2 trip detection logic.

(a) Clear the DTCs. (See step 2)
(b) Set the check mode. (See step 3)
(c) Perform a simulation test (See page IN-22).
(d) Check the connector and terminal (See page IN-33).
(e) Wiggle the harness and connector (See page IN-33).

6. BASIC INSPECTION

When the malfunction is not confirmed in the DTC check, troubleshooting should be carried out in all the possible circuits considered as causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location causing the problem can be found quickly and efficiently. Therefore, using this check is essential in the engine troubleshooting.

1	**Is battery positive voltage 11 V or more when engine is stopped?**

NO → **Charge or replace battery.**

YES

2	**Is engine cranked?**

NO → **Proceed to pages ST-15 and ST-17 , and continue to troubleshoot.**

YES

3	**Does engine start?**

NO → **Go to step 7.**

YES

4	**Check air filter.**

PREPARATION:

Remove the air filter.

CHECK:

Visual check that the air filter is not excessively dirty or oily.

NG → **Repair or replace.**

OK

5	**Check idle speed.**

PREPARATION:
(a) Warm up the engine to normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Shift transmission into the N position.
(e) Connect the OBD II scan tool or the hand-held tester to the DLC3 on the vehicle.

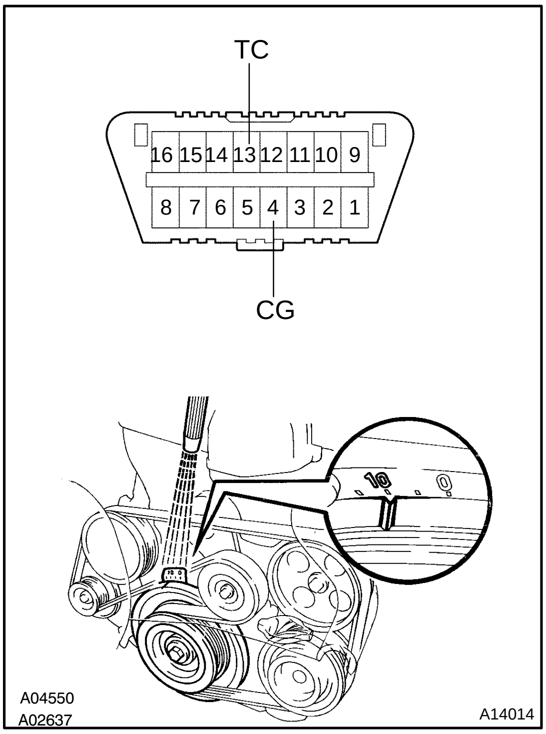
CHECK:
Use the CURRENT DATA to check the idle speed.

OK:
Idle speed: 650 to 750 rpm

NG → **Proceed to problem symptoms table on page DI-47.**

OK

6	**Check ignition timing.**



PREPARATION:
(a) Warm up the engine to normal operating temperature.
(b) Shift the transmission into the N position.
(c) Keep the engine speed at idle.
(d) Using SST, connect terminals TC and E1 of the DLC3.
SST 09843-18020
(e) Using a timing light, connect the tester to the No.1 high-tension cord.

CHECK:
Check the ignition timing.

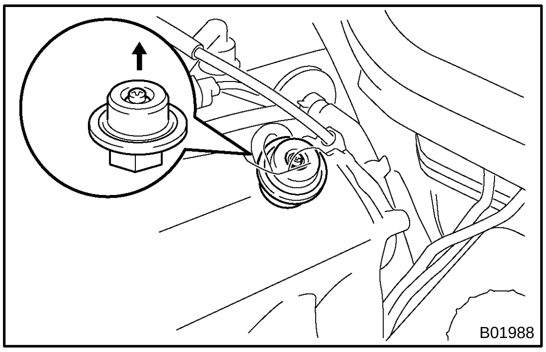
OK:
Ignition timing: 6 - 16° BTDC at idle

NG → **Proceed to page IG-1, and continue to troubleshoot.**

OK

Proceed to problem symptoms table on page DI-47 .

7	Check fuel pressure.



PREPARATION:

(a) Be sure that the enough fuel is in the tank.
(b) Remove the cover from the pulsation damper.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch ON and push the hand-held tester main switch ON.
(e) Use the ACTIVE TEST mode to operate the fuel pump.
(f) Please refer to the hand-held tester operator's manual for further details.
(g) If you have no hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page SF-6).

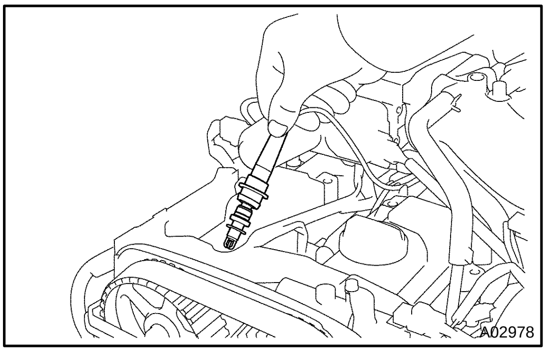
CHECK:

Check that the pulsation damper screw rises up when the fuel pump operates.
HINT:
At this time, you will hear a fuel flowing noise.

NG → **Proceed to page SF-6 , and continue to troubleshoot.**

OK

8	Check for spark.



PREPARATION:

(a) Remove the ignition coil from the spark plug.
(b) Remove the spark plug.
(c) Install the spark plug to the ignition coil.
(d) Disconnect the injector connector.
(e) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 - 10 seconds at a time.

NG	Proceed to page IG-1 , and continue to troubleshoot.

OK

Proceed to problem symptoms table on page DI-47 .

7. DATA LIST

HINT:
Using the hand-held tester DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to shorten labor time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of the hand-held tester.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) According to the display on tester, read the "DATA LIST".

hand-held tester display	Measurement Item	Normal Condition*	Diagnostic Note
INJECTOR	Injection period of the No.1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	Idling: 2.0 - 2.8 ms	—
IGN ADVANCE	Ignition timing advance for No.1 cylinder/ Min.: -64 deg., Max.: 63.5 deg.	Idling: BTDC 6 - 16 deg.	—
CALC LOAD	Calculated load by ECM/ Min.: 0%, Max.: 100%	• Idling: 15.6 - 22.2 % • Racing without load (2,500 rpm): 16.6 - 23.9 %	—
MAF	Air flow rate from MAF sensor/ Min.: 0 gm/s, Max.: 655 gm/s	• Idling: 3.5 - 5.0 gm/sec. • Racing without load (2,500 rpm): 12.5 - 17.9 gm/sec.	If value is approximately 0.0 gm/s: • Mass air flow meter power source circuit open • VG circuit open or short If value is 160.0 gm/s or more: • E2G circuit open
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 16,383 rpm	Idling: 650 - 750 rpm	—
COOLANT TEMP	Coolant temperature/ Min.: -40°C, Max.: 140°C	After warming up: 80 - 95°C (176 - 203°F)	• If value is -40°C (-40°F): sensor circuit is open. • If value is 140°C (284°F) or more: sensor circuit is shorted.
INTAKE AIR	Intake air temperature/ Min.: -40 °C, Max.: 140 °C	Equivalent to ambient temp.	
THROTTLE POS	Absolute throttle position sensor/ Min.: 0%, Max.: 100%	• Throttle fully closed: 8 -20 % • Throttle fully open: 64 - 96 %	Read value with the ignition switch ON (Do not start engine).
SPD (SP2)	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Vehicle stopped: 0 km/h (0 mph)	Speed indicated from speed sensor (SP2) signal
O2S B1 S1	Oxygen sensor output voltage of the bank 1 sensor 1/ Min.: 0 V, Max.: 1.275 V	Idling: 0.1 - 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
O2S B1 S2	Oxygen sensor output voltage of the bank 1 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving 50 km/h (31 mph): 0.1 - 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
O2S B2 S1	Oxygen sensor output voltage of the bank 2 sensor 1/ Min.: 0 V, Max.: 1.275 V	Idling: 0.1 - 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.

O2S B2 S2	Oxygen sensor output voltage of the bank 2 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving 50 km/h (31 mph): 0.1 - 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
VAPOR PRESS	Vapor pressure Min: -4.125 kPa Max:: 2.25 kPa	Fuel tank cap removed: 0 kpa	Pressure inside of fuel tank as read by the vapor pressure sensor
SHORT FT #1	Short term fuel trim of bank 1/ Min.: -100%, Max.: 100%	0 ± 20%	This item is short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long term fuel trim of bank 1/ Min.: -100%, Max.: 100%	0 ± 20%	This item is overall, long-term fuel compensation that helps to maintain air-fuel ratio at stoichiometric air-fuel ratio (steadies long term deviations of short-term fuel trim from central value)
TOTAL FT #1	Total fuel trim of bank 1/ Min.: 0.5, Max.: 1.496	Idling: 0.5 - 1.4	—
SHORT FT #2	Short term fuel trim of bank 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
LONG FT #2	Long term fuel trim of bank 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as LONG FT #1
TOTAL FT #2	Total fuel trim of bank 2/ Min.: 0.5, Max.: 1.496	Idling: 0.5 - 1.4	—
O2FT B1 S1	Short term fuel trim associated with the bank 1, sensor 1/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
O2FT B1 S2	Short term fuel trim associated with the bank 1, sensor 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #2
O2FT B2 S1	Short term fuel trim associated with the bank 2, sensor 1/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
O2FT B2 S2	Short term fuel trim associated with the bank 2, sensor 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #2
O2 LR B1 S1	Response time of the O2 sensor lean to rich (bank 1, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 - 1,000 ms	—
O2 LR B2 S1	Response time of the O2 sensor lean to rich (bank 2, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 - 1,000 ms	—
O2 RL B1 S1	Response time of the O2 sensor rich to lean (bank 1, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 - 1,000 ms	—
O2 RL B2 S1	Response time of the O2 sensor rich to lean (bank 2, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms		—
IGNITION	Ignition counter/ Min.: 0, Max.: 400	0 - 400	—
CYL #1 - CYL #6	Misfire ratio of the cylinder/ Min.: 0%, Max.: 50%	0%	This item is displayed in only idling
CTP SW	Closed throttle position switch/ ON or OFF	↗Throttle fully closed: ON ↗Throttle open: OFF	—

FUEL SYS #1	Fuel system status (Bank1)/ OL or CL or OLDRIVE or OL-FAULT or CLFAULT	Idling after warming up: CL	• OL: Open Loop-has not yet satisfied conditions to go closed loop. • CL: Closed Loop-using oxygen sensor (s) as feed back for fuel control. • OL DRIVE: Open loop due to driving conditions (Power enrichment, deceleration enlargement). • OL FAULT: Open loop due to detected system fault. • CL FAULT: Closed loop, but fault with at least one oxygen sensor may be using single oxygen sensor for fuel control.
FUEL SYS #2	Fuel system status (Bank2)/ OL or CL or OLDRIVE or OL-FAULT or CLFAULT		
FC IDL	Idle fuel cut/ ON or OFF	Fuel cut operation: ON	FC IDL = "ON" when throttle valve fully closed and engine speed is over 1,500 rpm.
MIL	MIL status/ ON or OFF	MIL ON: ON	—
STARTER SIG	Starter signal/ ON or OFF	Cranking: ON	—
A/C SIG	A/C signal/ ON or OFF	A/C ON: ON	—
PNP SW [NSW]	Park/neutral position switch signal/ ON or OFF	P or N range: ON	—
ELECT LOAD SIG	Electrical load signal/ ON or OFF	Defogger switch ON: ON	—
STOP LIGHT SW	Stop light switch/ ON or OFF	• Brake pedal depressed: ON • Brake pedal released: OFF	—
PS OIL PRESS SW	Power steering signal/ ON or OFF	Steering position is; center: OFF Except center: ON	—
PS SIGNAL	Power steering signal/ ON or OFF	• After ingine start: OFF • After steer the steering: ON	—
INTAKE CTL VSV1	VSV status for intake control (Bank 1)/ On or OFF	VSV operating: ON	—
FUEL PUMP SP CTL	Fuel pump speed control status/ ON or OFF	Idling: ON	—
FUEL PUMP/SPD	Fuel pump/speed status/ ON/H or OFF/M, L	Idling: ON	—
A/C MAG CLUTCH	A/C magnet clutch status/ ON or OFF	A/C magnet clutch ON: ON	—
EVAP VSV	VSV status for EVAP control/ ON or OFF	VSV operating: ON	VSV for EVAP is controlled by the ECM (ground side duty control)
VVT CTRL B1	VVT control status (Bank 1)/ ON or OFF	VVT system operation: ON	—

*:If no conditions are specifically stated for "Idling", it means the shift lever is at N or P range, the A/C switch is OFF and all accessory switches are OFF.

8. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester or the OBD II scan tool allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of the hand-held tester or the OBD II scan tool.
(f) Enter the following menus: DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST.
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
INJ VOL	[Test Details] Control the injection volume. Min.: -12.5%, Max.: 24.8% [Vehicle Condition] Engine speed: 3,000 rpm or less.	✓All injectors are tested at once. ✓Injection volume is gradually changed between -12.5 and 25%
FUEL PMP SP CTL	[Test Details] Activate the fuel pump speed control. ON or OFF	—
INTAKE CTL VSV1	[Test Details] Activate the VSV for intake control. ON or OFF	—
CAN CTRL VSV	[Test Details] Activate the VSV for canister control. ON or OFF	—
TANK BYPASS VSV	[Test Details] Activate the VSV for tank bypass. ON or OFF	—
EVAP VSV (ALONE)	[Test Details] Activate the VSV for EVAP control. ON or OFF	—
A/C MAG CLUTCH	[Test Details] Control the A/C magnet clutch. ON or OFF	—
FUEL PUMP / SPD	[Test Details] Control the fuel pump speed. ON or OFF	—
VVT CTRL B1	[Test Details] Activate the VVT system (Bank 1). ON or OFF	✓ON: Rough idle or engine stall ✓OFF: Normal engine speed
TC/TE1	[Test Details] Connect the TC and TE1. ON or OFF	Switch to the same state as the connection between terminal TC and TE1.
FC IDL PROHBT	[Test Details] Control the idle fuel cut prohibit. ON or OFF	—

9. DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. While another sensor is being monitored, the next sensor or component will not be monitored until the previous monitoring has concluded.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. ”Once per driving cycle” means that the ECM detects malfunction only one time during a single driving cycle. ”Continuous” means that the ECM detects malfunction every time when enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the ”typical enabling conditions” are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. ”Immediately” means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. ”2 driving cycle” means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.

10. TOYOTA/LEXUS PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydro-carbon Adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve, OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor ”A”	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit
Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve

Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobilizer system, Immobilizer system	Vehicle anti-theft system

11. The monitor will run whenever the following DTCs are not present (Monitor disablement List)

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the ”X” mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor detected malfunction			Monitor disablement (X - disabled)																									
Fault code			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
	Fault code		P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
		Component/ system	VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0010,P0020	P0010,P0020	VVT VSV1,2																				X					X	
P0011	P0011	VVT System1 - Advance				X		X														X					X	
P0012	P0012	VVT System1 - Retard				X		X														X					X	
P0016,P0018	P0016,P0018	VVT System - Misalignment																										
P0021	P0021	VVT System2 - Advance			X	X																X					X	
P0022	P0022	VVT System2 - Retard			X																	X					X	
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																				X	X	X	X	X	X	
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																				X			X	X	X	
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																							X	X		
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																								X		
P0100,P0101	P0100-P0103	MAF sensor		X	X		X	X											X		X	X	X	X	X	X	X	X
P0105,P0106	P0105-P0108	MAP sensor		X	X		X	X											X		X	X	X	X	X	X	X	X
P0110	P0110-P0113	IAT sensor																			X	X	X	X	X	X		X
P0115,P0116	P0115-P0118	ECT sensor		X	X	X	X	X						X		X					X	X	X	X	X	X	X	X
P0120,P0121	P0120-P0223,P2135	TP sensor												X		X							X	X	X	X	X	X
P0125	P0125	Insufficient ECT for Closed Loop		X	X		X	X						X		X						X	X	X	X	X	X	X
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																				X		X	X	X		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1								X												X	X		X	X	X	
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																										
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																										
P0171,P0172	P0171,P0172	Fuel system																				X	X	X	X	X		
P0300-P0308	P0300-P0308	Misfire							X													X	X	X	X	X		
P0325,P0330	P0325-P0333	Knock sensor																										X
P0335	P0335	CKP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X
P0340, P0341	P0340, P0341	CMP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X
P0340-P0346	P0340-P0346	VVT sensor1,2																				X						
P0351-P0358	P0351-P0358	Ignitor		X	X		X	X														X						
P0385	P0385	CKP sensor 2												X		X						X	X	X	X	X	X	X
P0401	P0401	EGR system (closed)																				X					X	
P0402	P0402	EGR system (open)																				X	X	X	X	X	X	
P0405,P0409	P0405-P0409	Lift sensor																									X	
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system																					X	X	X	X		
P0450,P0451	P0450-P0453	EVAP press sensor																										

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Monitor disablement (X - disabled)

Monitor detected malfunction

Fault code			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
	Fault code		P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
		Component/ system	VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0500	P0500	VSS																				X	X	X	X	X	X	X
P0511	P0511	IAC valve																					X					
P0510	P0510	Idle switch												X		X						X	X		X	X	X	X
P0560	P0560	System Voltage																										
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0799	Trans solenoid (range)																										
P0850	P0850	PNP switch																										X
P1010,P1020	P1010,P1020	VVTL																				X					X	
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X					X	
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor																										
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				X			X	X		
P2226	P2226	BARO sensor																					X		X	X		
P2237,P2240	P2237,P2240	A/F sensor (open)																				X			X	X		
P2423,24	P2423,24	HC Adsorption Catalyst																										
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
P2431	P2431	AIR Pressure Sensor(Rationality)																										
P2440	P2440	AIR control valve stuck open																					X	X	X	X	X	
P2441	P2441	AIR control valve stuck close																					X	X	X	X	X	
P2444	P2444	AIP stuck On																					X	X	X	X	X	
P2445	P2445	AIP stuck Off																					X	X	X	X	X	
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																				X			X	X		

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Monitor disablement (X - disabled)

Fault code			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
	Fault code		P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
Monitor detected malfunction		Component/ system	Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
P0010,P0020	P0010,P0020	VVT VSV1,2																										X
P0011	P0011	VVT System1 - Advance							X	X			X	X					X									
P0012	P0012	VVT System1 - Retard							X	X			X	X					X									
P0016,P0018	P0016,P0018	VVT System - Misalignment																										
P0021	P0021	VVT System2 - Advance							X	X			X	X					X									
P0022	P0022	VVT System2 - Retard							X	X			X	X					X									
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1							X	X			X						X									X
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1							X	X			X						X									
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2											X															
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																										
P0100,P0101	P0100-P0103	MAF sensor							X	X			X	X				X	X									X
P0105,P0106	P0105-P0108	MAP sensor							X	X			X	X				X	X									X
P0110	P0110-P0113	IAT sensor							X	X				X														X
P0115,P0116	P0115-P0118	ECT sensor							X	X		X	X	X				X	X									X
P0120,P0121	P0120-P0223,P2135	TP sensor							X	X			X	X			X		X									X
P0125	P0125	Insufficient ECT for Closed Loop							X	X		X	X	X				X	X									X
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1							X	X			X	X					X									X
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1							X	X			X						X									X
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2											X															
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																										
P0171,P0172	P0171,P0172	Fuel system							X	X			X	X					X									X
P0300-P0308	P0300-P0308	Misfire											X	X					X									X
P0325,P0330	P0325-P0333	Knock sensor							X	X																		X
P0335	P0335	CKP sensor							X	X			X	X					X									X
P0340, P0341	P0340, P0341	CMP sensor							X	X			X	X					X									X
P0340-P0346	P0340-P0346	VVT sensor1,2																										
P0351-P0358	P0351-P0358	Ignitor							X	X			X	X					X									X
P0385	P0385	CKP sensor 2							X	X			X	X					X									
P0401	P0401	EGR system (closed)											X															X
P0402	P0402	EGR system (open)											X	X					X									X
P0405,P0409	P0405-P0409	Lift sensor																										
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system																	X									
P0450,P0451	P0450-P0453	EVAP press sensor												X														

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Note *1: Without input speed sensor

Monitor detected malfunction: Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																									
Fault code			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
	Fault code		P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
		Component/ system	Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
P0500	P0500	VSS							×	×			×	×					×						×	×		×
P0511	P0511	IAC valve																										
P0510	P0510	Idle switch								×			×	×					×									×
P0560	P0560	System Voltage																										
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										×
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0799	Trans solenoid (range)																							×	×		×
P0850	P0850	PNP switch																	×									×
P1010,P1020	P1010,P1020	VVTL																										
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							×	×			×	×					×									
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor												×	×													
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)							×	×			×						×									×
P2226	P2226	BARO sensor																										×
P2237,P2240	P2237,P2240	A/F sensor (open)							×	×			×						×									×
P2423,24	P2423,24	HC Adsorption Catalyst																										
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
P2431	P2431	AIR Pressure Sensor(Rationality)																										
P2440	P2440	AIR control valve stuck open							×	×			×															
P2441	P2441	AIR control valve stuck close							×	×			×															
P2444	P2444	AIP stuck On							×	×			×															
P2445	P2445	AIP stuck Off							×	×			×															
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										×
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							×	×			×						×									×

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Note *1: Without input speed sensor

Monitor detected malfunction: Fault code	Fault code	Component/ system	P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
		Monitor disablement (X - disabled)																									
	Fault code		P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
		Component/ system	Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
P0010,P0020	P0010,P0020	VVT VSV1,2																				×	×	×	×		
P0011	P0011	VVT System1 - Advance																				×	×	×	×		
P0012	P0012	VVT System1 - Retard																				×	×	×	×		
P0016,P0018	P0016,P0018	VVT System - Misalignment																				×	×	×	×		
P0021	P0021	VVT System2 - Advance																				×	×	×	×		
P0022	P0022	VVT System2 - Retard																				×	×	×	×		
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																	×			×	×	×	×		
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1														×		×	×			×	×	×	×		×
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2														×			×								
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																	×								
P0100,P0101	P0100-P0103	MAF sensor				×	×									×		×	×			×	×	×	×		×
P0105,P0106	P0105-P0108	MAP sensor				×	×									×		×	×			×	×	×	×		×
P0110	P0110-P0113	IAT sensor									×					×		×				×	×	×	×		×
P0115,P0116	P0115-P0118	ECT sensor	×			×	×				×					×		×	×			×	×	×	×		×
P0120,P0121	P0120-P0223,P2135	TP sensor														×		×	×			×	×	×	×		×
P0125	P0125	Insufficient ECT for Closed Loop	×			×										×		×	×			×	×	×	×		×
P0128	P0128	Thermostat																									
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																	×			×	×	×	×		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1														×		×	×			×	×	×	×		×
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2														×			×								
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																	×								
P0171,P0172	P0171,P0172	Fuel system														×		×	×			×	×	×	×		×
P0300-P0308	P0300-P0308	Misfire														×		×	×			×	×	×	×		×
P0325,P0330	P0325-P0333	Knock sensor																				×	×	×	×		
P0335	P0335	CKP sensor				×	×									×		×	×			×	×	×	×		×
P0340, P0341	P0340, P0341	CMP sensor				×	×									×		×	×			×	×	×	×		×
P0340-P0346	P0340-P0346	VVT sensor1,2																				×	×	×	×		
P0351-P0358	P0351-P0358	Ignitor																	×			×	×	×	×		
P0385	P0385	CKP sensor 2				×	×									×		×	×			×	×	×	×		×
P0401	P0401	EGR system (closed)																	×								
P0402	P0402	EGR system (open)														×		×	×			×	×	×	×		×
P0405,P0409	P0405-P0409	Lift sensor																									
P0420,P0430	P0420,P0430	Catalyst																									
P0442-P0456	P0442-P0456	EVAP system														×		×				×	×	×	×		×
P0450,P0451	P0450-P0453	EVAP press sensor																				×	×	×	×		

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Note *2: With input speed sensor

Monitor disablement (X - disabled)

Monitor detected malfunction: Fault code	Fault code	Component/ system	P0741-P0796 P0741-P0796 Trans solenoid (function)*2	P0748-P0798 P0748-P0999 Trans solenoid (range)	P0850 P0850 PNP switch	P1010,P1020 P1010,P1020 VVTL	P1011,12(,21,22) P1011,12(,21,22) VVTL system1(,2)	P1126 P1126 Electronic magnet clutch	P1129 P1129 Electronic throttle system	P1430 P1430 HC adsorber ACT press sensor	P2004,P2006 P2004,6 Intake Manifold Runner Control	P2009,P2010 P2009,10 Intake Manifold Runner Control Circuit	P2014,16,17 P2014,16,17 Intake Manifold Runner Position Sensor	P2102,P2103 P2102,P2103 Throttle motor	P2120-P2138 P2120-P2138 Accel position sensor	P2196,P2198 P2196,P2198 A/F Sensor(Rationality) - Sensor1	P2226 P2226 BARO sensor	P2237,P2240 P2237,P2240 A/F Sensor(Open) - Sensor1	P2423,24 P2423,24 HC Adsorption Catalyst	P2430,2,3 P2430,2,3 AIR Pressure Sensor(Low/High)	P2431 P2431 AIR Pressure Sensor(Rationality)	P2440 P2440 AIR control valve stuck open	P2441 P2441 AIR control valve stuck close	P2444 P2444 AIP stuck On	P2445 P2445 AIP stuck Off	P2714-P2759 P2714-P2759 Trans solenoid(SLU-SLD)	P2A00,P2A03 P2A00,P2A03 A/F Sensor (Slow response) - Sensor1
P0500	P0500	VSS	X													X		X	X			X	X	X	X		X
P0511	P0511	IAC valve														X		X									X
P0510	P0510	Idle switch														X		X	X								X
P0560	P0560	System Voltage																									
P0617	P0617	Starter signal																									
P0705	P0705	Shift lever position switch																									
P0710	P0710-P0713	Trans fluid temp sensor																									
P0720-P0793	P0720-P0793	Output speed sensor																									
P0715-P0717	P0715-P0717	Input speed sensor																									
P0724	P0724	Stop lamp switch																									
P0741-P0796	P0741-P0796	Trans solenoid (function)																									
P0748-P0798	P0748-P0799	Trans solenoid (range)	X																								
P0850	P0850	PNP switch																									
P1010,P1020	P1010,P1020	VVTL																				X	X	X	X		
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X	X	X	X		X
P1126	P1126	Electronic magnet clutch																									
P1129	P1129	Electronic throttle system																									
P1430	P1430	HC adsorber ACT press sensor																									
P2004,6	P2004,6	Intake Manifold Runner Control																									
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																									
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																									
P2102,P2103	P2102,P2103	Throttle motor																									
P2120-P2138	P2120-P2138	Accel position sensor																									
P2196,P2198	P2196,P2198	A/F sensor (rationality)																	X			X	X	X	X		X
P2226	P2226	BARO sensor														X		X				X	X	X	X		X
P2237,P2240	P2237,P2240	A/F sensor (open)																	X			X	X	X	X		X
P2423,24	P2423,24	HC Adsorption Catalyst																									
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																			X	X	X	X	X		
P2431	P2431	AIR Pressure Sensor(Rationality)																				X	X	X	X		
P2440	P2440	AIR control valve stuck open														X		X	X								X
P2441	P2441	AIR control valve stuck close														X		X	X								X
P2444	P2444	AIP stuck On														X		X	X								X
P2445	P2445	AIP stuck Off														X		X	X								X
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																									
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																	X			X	X	X	X		

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Note *2: With input speed sensor

12. O2S TEST RESULT

INTRODUCTION

The O2S TEST RESULT refers to the results of the engine control module (ECM) when it monitors the oxygen sensor (O2S), and it can be read using the hand-held tester or the generic OBDII scantool. Based on this, you can find the O2S's conditions.
The ECM monitors the O2S in the various items. You can read the monitor result (TEST DATA) of each monitor item using the O2S TEST RESULT. However, the output value of the TEST DATA is the latest "snapshot" value that is it taken after monitoring and therefore it is not dynamic.
In this repair manual, the description of the O2S TEST RESULT (for O2S related DTCs) are written in a table.
This table consists of 5 items:

(1) TEST ID (a code applied to each TEST DATA)
(2) Description of TEST DATA
(3) Conversion Factor (When Conversion Factor has a value written in the table, multiply the TEST DATA value appearing on the scantool by the Conversion Factor value. The result will be the required value.)
(4) Unit
(5) Standard Value

If the TEST DATA value appearing on the scantool is out of the standard value, the O2S is malfunctioning. If it is within the standard value, the O2S is functioning normally. However, if the value is on the borderline of the standard value, the O2S may malfunction very soon.

HOW TO READ O2S TEST RESULT USING HAND-HELD TESTER

(a) Connect the hand-held tester to the DLC3.

O2S TEST RESULT Screen

O2 SENSOR TEST

01 BANK 1 - SENSOR 1
02 BANK 1 - SENSOR 2
03 BANK 2 - SENSOR 1
04 BANK 2 - SENSOR 2

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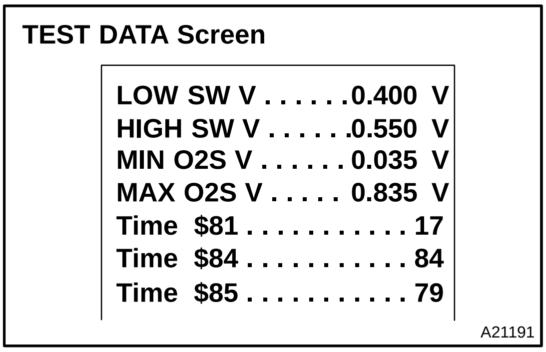
(b) On the tester screen, select the following menus: DIAGNOSIS/CARB OBDII/O2S TEST RESULT. A list of the O2S equipped on the vehicle will be displayed.



(c) Select the desired O2S and press ENTER. The following screen will appear.

(d) Press HELP and ¿ simultaneously. More information will appear.

(e) Example:

(1) The hand-held tester displays ”17” as a value of the ”TIME $81” (see the illustration on the left).

(2) Find the Conversion Factor value of ”TIME $81” in the O2S TEST RESULT chart below. 0.3906 is specified for $81 in this chart.

(3) Multiply ”17” in step (1) by 0.3906 (Conversion Factor) in the step (2).
17 x 0.3906 = 6.6 %

(4) If the answer is within the standard value, the ”TIME $81” can be confirmed to be normal.

O2S TEST RESULT Chart

TEST ID	Description of TEST DATA	Conversion Factor	Unit	Standard Value
$81	Percentage of monitoring time when the HO2S voltage is less than 0.05V	Multiply 0.3906	%	Within 60 %

13. CHECKING MONITOR STATUS

NOTICE:

The Monitor Status is not applicable to the heated oxygen sensor (HO2S). The HO2S status can be checked with O2S TEST RESULT.

(a) INTRODUCTION

The purpose of the monitor result (mode 6) is to allow access to the results for on-board diagnostic monitoring tests of specific components/systems that are not continuously monitored. Examples are catalyst, EVAP and thermostat.

The monitor result allows the OBD scan tool to display the monitor status, test value and test limit. The monitor status indicates whether the component is functioning normally or not (PASS or FAIL). The test value is the value that was used to determine the monitor status. When the test value is inside the test limit, the ECM determines the component is functioning normally (PASS). If the test value is outside the test limit, the ECM determines the component is malfunctioning (FAIL).

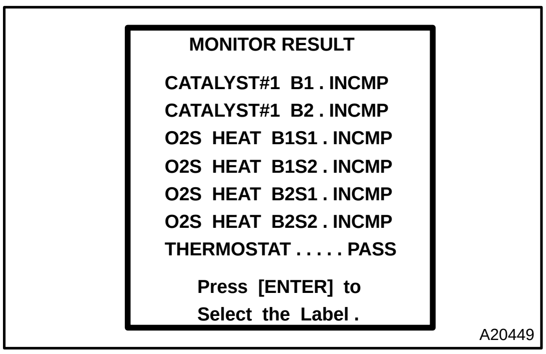
A problem in these components/systems can be found by comparing the test value and test limit. The monitor result information is included under “MONITOR RESULT” in the DTC sections.

(b) PROCEDURE

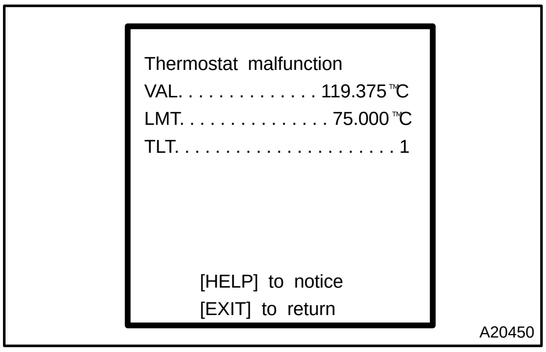
NOTICE:

The monitor result and test value are cleared when the ignition switch is turned OFF.

(1) Connect the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Clear the DTCs.
(4) Run the vehicle in accordance with the applicable drive pattern described in READINESS MONITOR DRIVE PATTERN (see page DI-29).



(5) Select from the tester menus: DIAGNOSIS, ENHANCED OBD II, MONITOR INFO and MONITOR RESULT. The monitor result appears after the component name.
INCMP: The component has not been monitored yet.
PASS: The component is functioning normally.
FAIL: The component is malfunctioning.
(6) Confirm that the component is set to either PASS or FAIL.



(7) Select the component (Label) and press ENTER. The accuracy test value appears when the monitor result is either PASS or FAIL.
VAL The test value
LMT: The test limit
TLT: The test limit type. Either 0 or 1 is displayed.

(8) If TLT is 0, the component is malfunctioning when the test value is higher than the test limit. If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.

(9) Compare the test value with the test limit. The test value is usually significantly higher or lower than the test limit. If the test value is on the borderline of the test limit, there is a potential malfunction in the component.

HINT:
The monitor result might on rare occasions be PASS even if the MIL is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.

DIC40-01

READINESS MONITOR DRIVE PATTERN

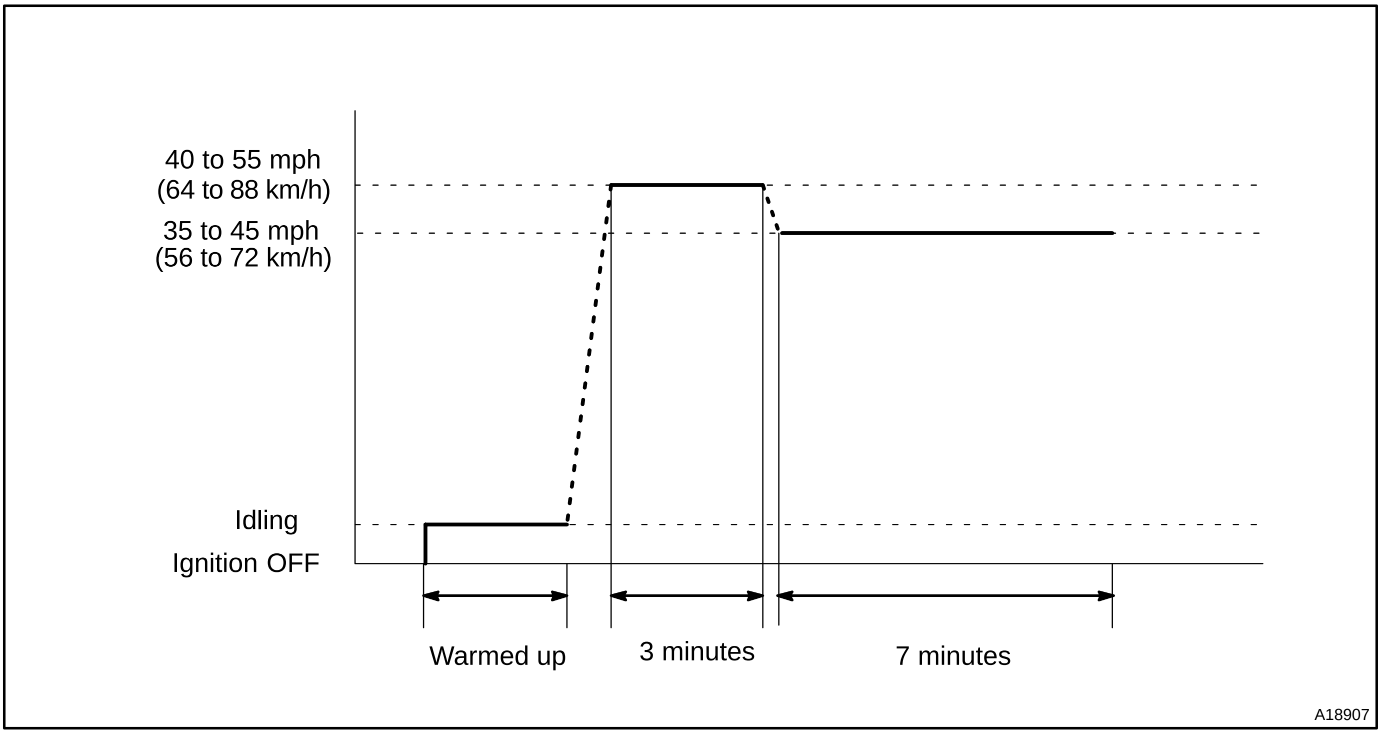
1. PURPOSE OF THE READINESS TESTS

- The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission-related components and report any detected abnormalities in the form of Diagnostic Trouble Codes (DTCs). Since the various components need to be monitored during different driving conditions, the OBD II system is designed to run separate monitoring programs called Readiness Monitors. Many state Inspection and Maintenance (I/M) programs require that vehicles complete their Readiness Monitors prior to beginning an emissions test.
- The current status of the Readiness Monitors can be seen by using the hand-held tester with version 9.0 software (or newer), or a generic OBD II Scan tool.
- To view the Readiness Monitor status using the hand-held tester, select ”Monitor Status” from the Enhanced OBD II Menu.
- A status of ”complete” indicates that the necessary conditions have been met to run the performance tests for the related Readiness Monitor.
- The Readiness Monitor will be reset to ”incomplete” if:
  - ECM has lost power (battery or fuse).
  - DTCs have been cleared.
  - The conditions for running the Readiness Monitor have not been met.
- In the event that any Readiness Monitor shows ”incomplete,” follow the appropriate Readiness Monitor Drive Pattern to active the monitor and change the readiness status to ”complete.”

CAUTION:
Strictly observe of posted speed limits, traffic laws, and road conditions when performing these drive patterns.

NOTICE:
These drive patterns represent the fastest method to satisfy all necessary conditions which allow the specific readiness monitor to complete.
In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors) the drive pattern can be resumed, and in most cases, the readiness monitor will still set to ”complete”.
To ensure rapid completion of readiness monitors, avoid sudden changes in vehicle load and speed (driving up and down hills and/or sudden acceleration).

2. CATALYST MONITOR (O2S TYPE)



(a) Preconditions

The monitor will not run unless:

- MIL is OFF.
- Engine Coolant Temperature (ECT) is 75°C (167°F) or greater.
- Intake Air Temperature (IAT) is -10°C (14°F) or greater.

NOTICE:

The readiness test can be completed in cold ambient conditions (less than -10°C / 14°F), if the drive pattern is repeated a second time after cycling the ignition off.

(b) Drive Pattern

(1) Connect the OBD II scan tool to the DLC3 to check monitor status and preconditions.

(2) Drive the vehicle at 40 to 55 mph (64 to 88 km/h) for approximately for 3 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden acceleration.

If IAT is less than 10°C (50°F) when engine was started, drive the vehicle at 40 to 55 mph (64 to 88 km/h) for additional 4 minutes.

(3) Drive the vehicle at 35 to 45 mph (56 to 72 km/h) for approximately 7 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden deceleration as much as possible with the throttle fully closed.

(4) If readiness status dose not switch to complete, make sure that the preconditions are met and the ignition switch is turned OFF and then repeat steps (2) and (3).

(5) Release pressure in the fuel tank by removing and then reinstalling the fuel tank cap.

(6) Start the engine and immediately begin driving as directed.

3. EVAP MONITOR (VACUUM PRESSURE MONITOR)

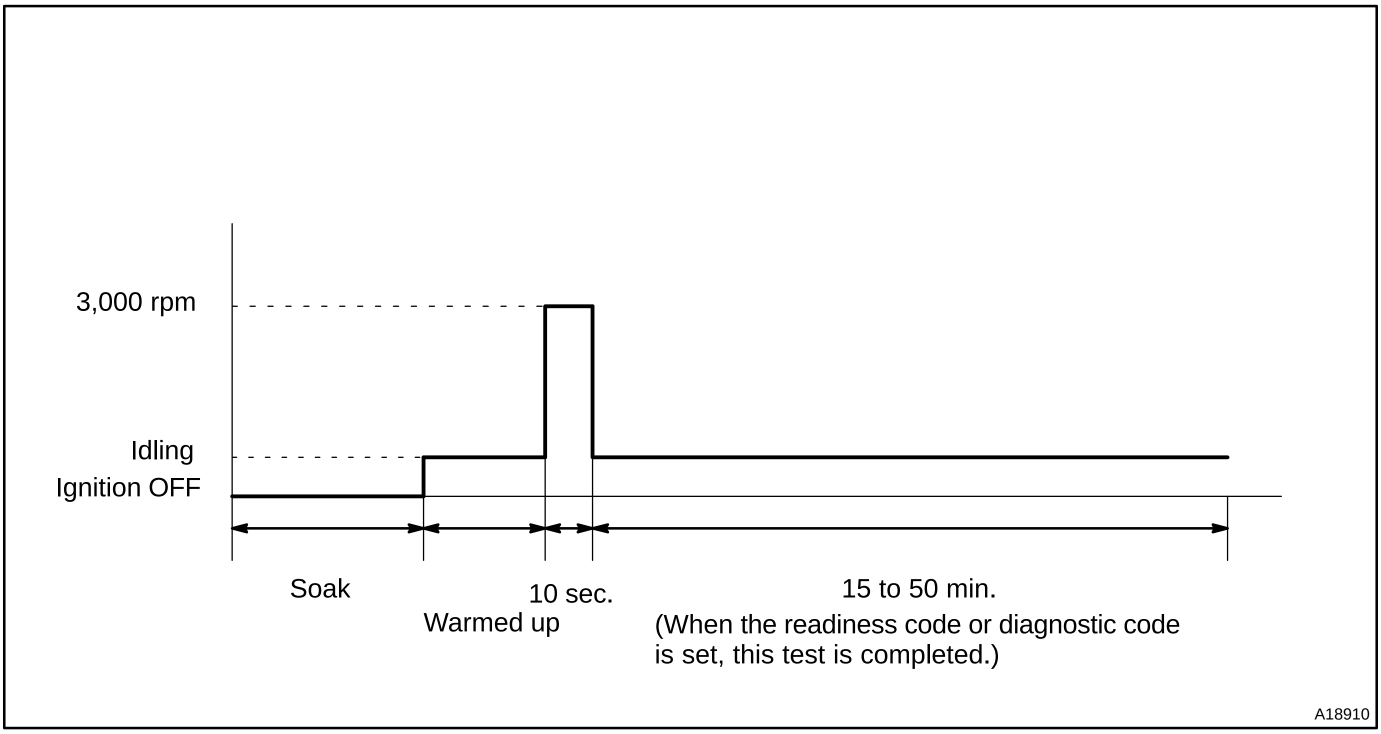
NOTICE:
A cold soak must be performed prior to conducting the drive pattern to complete the Internal Pressure Readiness Monitor.

(a) Cold Soak Preconditions
The monitor will not run unless:
- MIL is OFF
- Fuel level is approximately 1/2 to 3/4
- Altitude is 7,800 feet (2,400 m) or less

(b) Cold Soak Procedure
Let the vehicle cold soak for 8 hours or until the difference between IAT and ECT becomes less than 7°C (13°F)

HINT:
Examples:
- Scenario 1
  ECT = 24°C (75°F)
  IAT = 16°C (60°F)
  Difference between ECT and IAT is 8°C (15°F)
  → The monitor will not run because difference between ECT and IAT is greater than 7°C (13°F)
- Scenario 2
  ECT = 21°C (70°F)
  IAT = 20°C (68°F)
  Difference between ECT and IAT is 1°C (2°F)
  → The monitor will run because difference between ECT and IAT is less than 7°C (13°F)

4. EVAP MONITOR (VACUUM PRESSURE MONITOR) (CONTINUED)



(a) Preconditions

The monitor will not run unless:

- MIL is OFF
- Fuel level is approximately 1/2 to 3/4
- Altitude is 7,800 feet (2,400 m) or less
- Engine Coolant Temperature (ECT) is between 4.4°C and 35°C (40°F and 95°F)
- Intake Air Temperature (IAT) is between 4.4°C and 35°C (40°F and 95 °F)
- Cold Soak Procedure has been completed
- Before starting the engine, the difference between ECT and IAT must be less than 7°C (13°F)

HINT:

Examples:

- Scenario 1

  ECT = 24°C (75°F)

  IAT = 16°C (60°F)

  Difference between ECT and IAT is 8°C (15°F)

  → The monitor will not run because difference between ECT and IAT is higher than 7°C (13°F)
- Scenario 2

  ECT = 21°C (70°F)

  IAT = 20°C (68°F)

  Difference between ECT and IAT is 1°C (2°F)

  → The monitor will run because difference between ECT and IAT is less than 7°C (13°F)

The readiness test can be completed in cold ambient conditions (less than 40°F / 4.4°C) and/or at high altitudes (more than 7,800 feet / 2,400 m) if the drive pattern is repeated a second time after cycling the ignition off.

(b) Drive Pattern

(1) Connect the OBDII scan tool to DLC3 to check monitor status and preconditions (refer to ”a”).

(2) Release pressure in fuel tank by removing the fuel tank cap and then reinstalling it.

(3) Start the engine and allow it to idle until ECT becomes 75°C (167°F) or higher.

(4) Run the engine at 3,000 rpm for about 10 seconds.

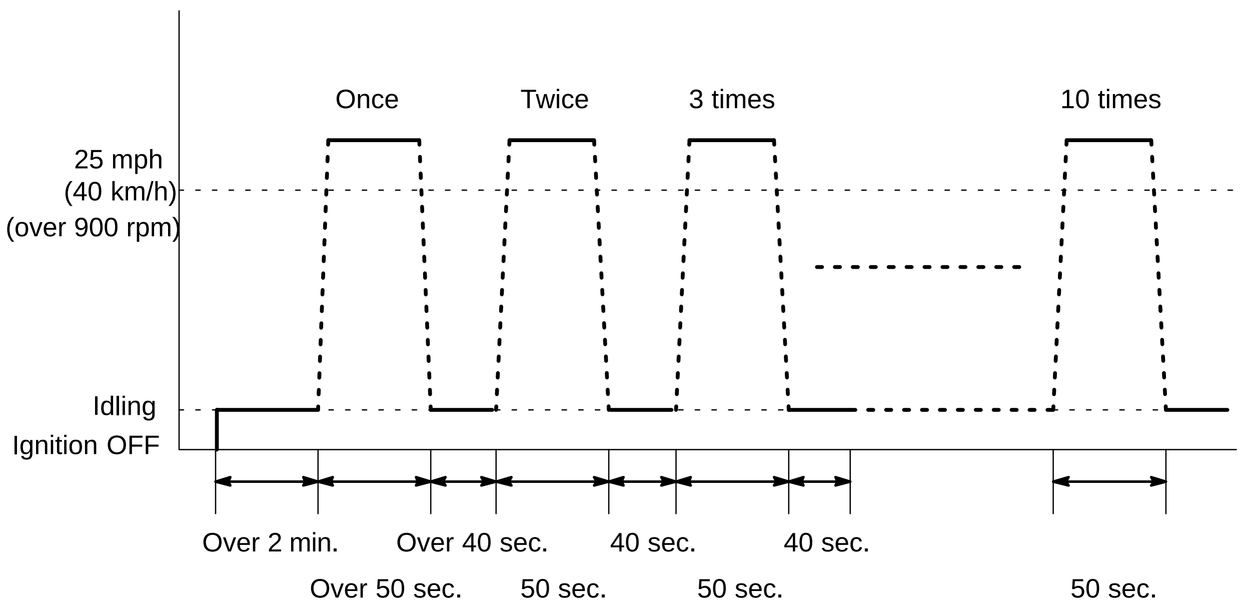
(5) Allow the engine to idle with the A/C ON (to create slight load) for 15 to 50 minutes.

NOTICE:

If the vehicle is not equipped with A/C put a slight load on the engine by doing the following :

- **Securely set the parking brake.**
- **Block the drive wheels with wheel chocks.**
- **Allow the vehicle to idle in drive for 15 to 50 minutes.**

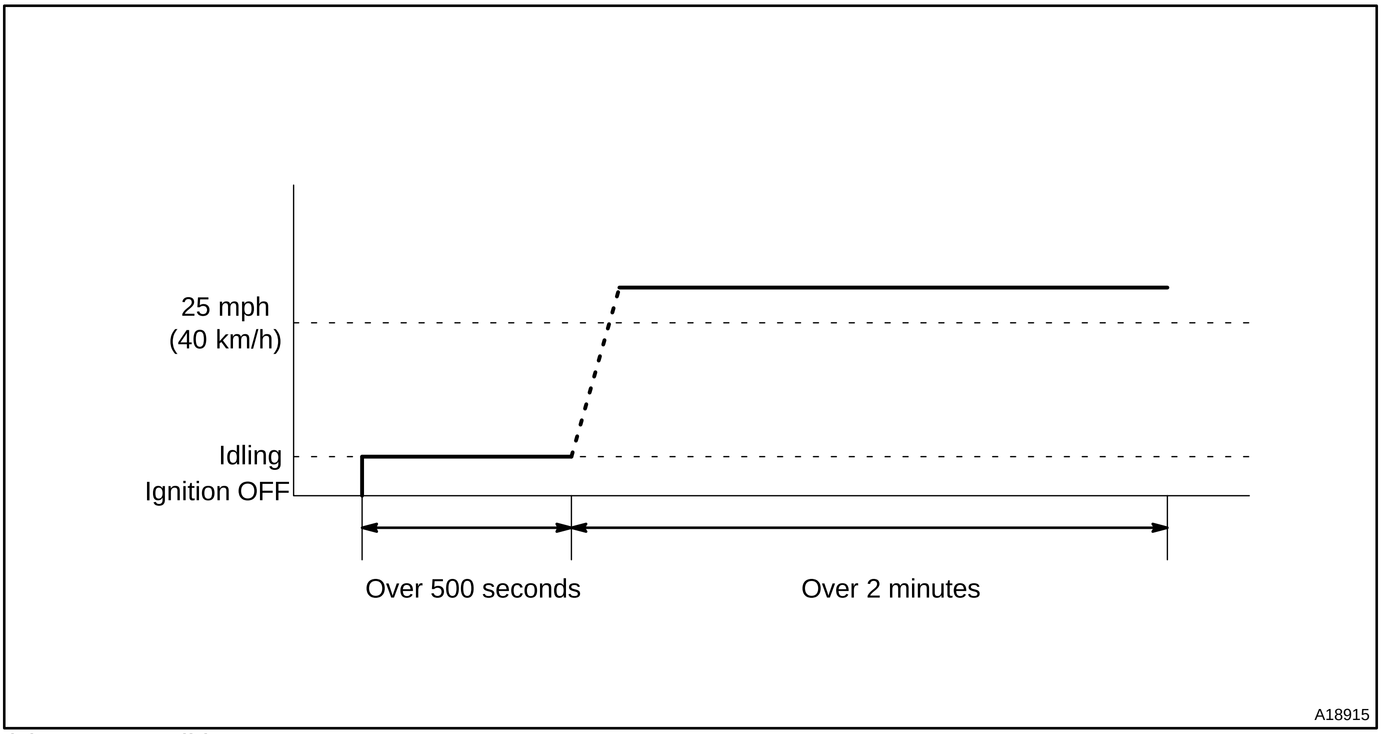
5. OXYGEN SENSOR MONITOR (FRONT AND REAR O2S SYSTEM)



(a) Preconditions
The monitor will not run unless:
- MIL is OFF

(b) Drive Pattern
(1) Connect the OBDII scan tool to DLC3 to check monitor status and preconditions (refer to step ”a”).
(2) Start the engine and allow it to idle for 2 minutes or more.
(3) Drive the vehicle at 25 mph (40 km/h) or more for at least 50 seconds.
(4) Stop the vehicle and allow the engine to idle for 40 seconds or more.
(5) Perform steps (3) and (4) ten times.
(6) Check the status of the readiness monitor on the scan tool display. If readiness status did not switch to complete, ensure preconditions are met, turn the ignition off and then repeat steps (1) and (5).

6. OXYGEN SENSOR HEATER MONITOR



(a) Preconditions

The monitor will not run unless:

- MIL is OFF

(b) Drive Pattern

(1) Connect the OBDII scan tool to the DLC3 to check monitor status and preconditions (refer to step ”a”).

(2) Start the engine and allow it to idle for 500 seconds or more.

(3) Drive the vehicle at 25 mph (40 km/h) or more at least 2 minutes.

(4) Check the status of the readiness monitor on the scan tool display. If readiness status did not switch to complete, ensure the preconditions are met, turn the ignition off and then repeat steps (2) and (3).

DI2DH-13

DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in check mode, check the circuit for the codes listed in the table below. For details of each code, turn to the page referred to under the "See page" for the respective "DTC No." in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area	MIL*1	Memory
P0010 (DI-48)	Camshaft Position "A" Actuator Circuit (Bank 1)	• Open or short in OCV circuit • OCV • ECM	™	™
P0011 (DI-53)	Camshaft Position "A" -Timing Over- Advanced or System Performance (Bank 1)	• Valve timing • OCV • VVT controller assembly • ECM	™	™
P0012 (DI-53)	Camshaft Position "A" -Timing Over- Retarded (Bank 1)	• Valve timing • OCV • VVT controller assembly • ECM	™	™
P0016 (DI-63)	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)	• Mechanical system (Jumping teeth of timing belt, belt stretched) • ECM	™	™
P0031 (DI-65)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	• Open in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • ECM	™	™
P0032 (DI-65)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 1)	• Short in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • ECM	™	™
P0037 (DI-65)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	• Open in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • EFI relay • ECM	™	™
P0038 (DI-65)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	• Short in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • EFI relay • ECM	™	™
P0051 (DI-65)	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 1)	• Open in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • ECM	™	™
P0052 (DI-65)	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 1)	• Short in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • ECM	™	™
P0057 (DI-65)	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)	• Open in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • ECM	™	™
P0058 (DI-65)	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)	• Short in heater circuit of heated oxygen sensor • Heated oxygen sensor heater • ECM	™	™
P0100 (DI-70)	Mass or Volume Air Flow Circuit	• Open or short in mass air flow meter circuit • Mass air flow meter • ECM	™	™

P0101 (DI-76)	Mass or Volume Air Flow Circuit Range/Performance Problem	• Mass air flow meter	™	™
P0102 (DI-70)	Mass or Volume Air Flow Circuit Low Input	• Open in mass air flow meter circuit • Mass air flow meter • ECM	™	™
P0103 (DI-70)	Mass or Volume Air Flow Circuit High Input	• Short in mass air flow meter circuit • Mass air flow meter • ECM	™	™
P0110 (DI-79)	Intake Air Temperature Circuit	• Open or short in intake air temp. sensor circuit • Intake air temp. sensor (built in mass air flow meter) • ECM	™	™
P0112 (DI-79)	Intake Air Temperature Circuit Low Input	• Short in intake air temp. sensor circuit • Intake air temp. sensor (built in mass air flow meter) • ECM	™	™
P0113 (DI-79)	Intake Air Temperature Circuit High Input	• Open in intake air temp. sensor circuit • Intake air temp. sensor (built in mass air flow meter) • ECM	™	™
P0115 (DI-86)	Engine Coolant Temperature Circuit	• Open or short in engine coolant temp. sensor circuit • Engine coolant temp. sensor • ECM	™	™
P0116 (DI-93)	Engine Coolant Temperature Circuit Range/Performance Problem	• Cooling system • Engine coolant temp. sensor	™	™
P0117 (DI-86)	Engine Coolant Temperature Circuit Low Input	• Short in engine coolant temp. sensor circuit • Engine coolant temp. sensor • ECM	™	™
P0118 (DI-86)	Engine Coolant Temperature Circuit High Input	• Open in engine coolant temp. sensor circuit • Engine coolant temp. sensor • ECM	™	™
P0120 (DI-95)	Throttle Pedal Position Sensor/ Switch "A" Circuit	• Open or short in throttle position sensor circuit • Throttle position sensor • ECM	™	™
P0121 (DI-101)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Range/Performance Problem	• Throttle position sensor	™	™
P0122 (DI-95)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Low Input	• Open in throttle position sensor circuit • Throttle position sensor • ECM	™	™
P0123 (DI-95)	Throttle/Pedal Position Sensor/ Switch "A" Circuit High Input	• Short in throttle position sensor circuit • Throttle position sensor • ECM	™	™
P0125 (DI-93)	Insufficient Coolant Temperature for Closed Loop Fuel Control	• Cooling system • Engine coolant temp. sensor	™	™
P0128 (DI-106)	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	• Thermostat • Cooling system • Engine coolant temp. sensor • ECM	¿	¿
P0130 (DI-110)	Oxygen Sensor Circuit (Bank 1 Sensor 1)	• Open or short in heated oxygen sensor circuit (Bank 1 Sensor 1) • Heated oxygen sensor (Bank 1 Sensor 1) • Air induction system • Fuel pressure • Injector • ECM	™	™

P0133 (DI-122)	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	Open or short in heated oxygen sensor circuit (Bank 1 Sensor 1) Heated oxygen sensor (Bank 1 Sensor 1) Air induction system Fuel pressure Injector ECM	™	™
P0134 (DI-131)	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	Open or short in heated oxygen sensor circuit (Bank 1 Sensor 1) Heated oxygen sensor (Bank 1 Sensor 1) Air induction system Fuel pressure Injector Gas leakage on exhaust system PCV pipng ECM	™	™
P0136 (DI-139)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	Open or short in heated oxygen sensor circuit (Bank 1 Sensor 2) Heated oxygen sensor (Bank 1 Sensor 2) Air induction system Fuel pressure Injector ECM	™	™
P0150 (DI-110)	Oxygen Sensor Circuit (Bank 2 Sensor 1)	Open or short in heated oxygen sensor circuit (Bank 2 Sensor 1) Heated oxygen sensor (Bank 2 Sensor 1) Air induction system Fuel pressure Injector ECM	™	™
P0153 (DI-122)	Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)	Open or short in heated oxygen sensor circuit (Bank 2 Sensor 1) Heated oxygen sensor (Bank 2 Sensor 1) Air induction system Fuel pressure Injector ECM	™	™
P0154 (DI-131)	Oxygen Sensor Circuit No Activity Detected	Open or short in heated oxygen sensor circuit (Bank 2 Sensor 1) Heated oxygen sensor (Bank 2 Sensor 1) Air induction system Fuel pressure Injector Gas leakage on exhaust system PCV pipng ECM	™	™
P0156 (DI-139)	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)	Open or short in heated oxygen sensor circuit (Bank 2 Sensor 2) Heated oxygen sensor (Bank 2 Sensor 2) Air induction system Fuel pressure Injector ECM	™	™

P0171 (DI-148)	System too Lean (Bank 1)	• Air induction system • Injector blockage • Mass air flow meter • Engine coolant temp. sensor • Fuel pressure • Gas leakage on exhaust system • Open or short in heated oxygen sensor (Bank 1 sensor 1) circuit • Heated oxygen sensor (Bank 1 sensor 1) • PCV pipng • ECM	™	™
P0172 (DI-148)	System too Rich (Bank 1)	• Injector leak, blockage • Mass air flow meter • Engine coolant temp. sensor • Ignition system • Fuel pressure • Gas leakage in exhaust system • Open or short in heated oxygen sensor (Bank 1 sensor 1) circuit • Heated oxygen sensor (Bank 1 sensor 1) • ECM	™	™
P0174 (DI-148)	System too Lean (Bank 2)	• Air induction system • Injector blockage • Mass air flow meter • Engine coolant temp. sensor • Fuel pressure • Gas leakage on exhaust system • Open or short in heated oxygen sensor (Bank 2 sensor 1) circuit • Heated oxygen sensor (Bank 2 sensor 1) • PCV pipng • ECM	™	™
P0175 (DI-148)	System too Rich (Bank 2)	• Injector leak, blockage • Mass air flow meter • Engine coolant temp. sensor • Ignition system • Fuel pressure • Gas leakage in exhaust system • Open or short in heated oxygen sensor (Bank 2 sensor 1) circuit • Heated oxygen sensor (Bank 2 sensor 1) • ECM	™	™
P0230 (DI-161)	Fuel Pump Praimary Circuit	• Open or short in fuel pump relay circuit • Fuel pump relay • ECM	™	™

P0300 (DI-164)	Random/Multiple Cylinder Misfire Detected	✓Open or short in engine wire ✓Connector connection ✓Vacuum hose connection ✓Ignition system ✓Injector ✓Fuel pressure ✓Mass air flow meter ✓Engine coolant temp. sensor ✓Compression pressure ✓Valve clearance ✓Valve timing ✓PCV piping ✓ECM	™ *2	™
P0301 (DI-164)	Cylinder 1 Misfire Detected		™ *2	™
P0302 (DI-164)	Cylinder 2 Misfire Detected		™ *2	™
P0303 (DI-164)	Cylinder 3 Misfire Detected		™ *2	™
P0304 (DI-164)	Cylinder 4 Misfire Detected		™ *2	™
P0305 (DI-164)	Cylinder 5 Misfire Detected		™ *2	™
P0306 (DI-164)	Cylinder 6 Misfire Detected		™ *2	™
P0325 (DI-179)	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)	✓Open or short in knock sensor 1 circuit ✓Knock sensor 1 (looseness) ✓ECM	™	™
P0330 (DI-179)	Knock Sensor 2 Circuit (Bank 2)	✓Open or short in knock sensor 2 circuit ✓Knock sensor 2 (looseness) ✓ECM	™	™
P0335 (DI-184)	Crankshaft Position Sensor "A" Circuit	✓Open or short in crankshaft position sensor circuit ✓Crankshaft position sensor ✓Signal plate ✓ECM	™	™
P0339 (DI-184)	Crankshaft Position Sensor "A" Circuit Intermittent	✓Open or short in crankshaft position sensor circuit ✓Crankshaft position sensor ✓Signal plate ✓ECM	-	™
P0340 (DI-189)	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	✓Open or short in camshaft position sensor circuit ✓Camshaft position sensor ✓LH camshaft timing pulley ✓ECM	™	™
P0341 (DI-189)	Camshaft Position Sensor "A" Circuit Range/Performance (Bank 1 or Single Sensor)		™	™
P0351 (DI-193)	Ignition Coil "A" Primary/Secondary Circuit	✓Open or short in IGF and IGT1 circuit from No. 1 ignition coil with igniter to ECM ✓No. 1 ignition coil with igniter ✓Ignition system ✓ECM	™	™
P0420 (DI-200)	Catalyst System Efficiency Below Threshold (Bank 1)	✓Gas leakage on exhaust system ✓Heated oxygen sensor (bank 1 sensor 1, 2) ✓Three-way catalystic converter	™	™
P0430 (DI-200)	Catalyst System Efficiency Below Threshold (Bank 2)	✓Gas leakage on exhaust system ✓Heated oxygen sensor (bank 2 sensor 1, 2) ✓Three-way catalystic converter	™	™

P0441 (DI-207)	Evaporative Emission Control System Incorrect Purge Flow	Vacuum hose cracks, holed, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8), (9), (10) and (11) in Fig. 1) Fuel tank cap incorrectly installed Fuel tank cap cracked or damaged Open or short in vapor pressure sensor circuit Vapor pressure sensor Open or short in VSV circuit for EVAP VSV for EVAP Open or short in VSV circuit for CCV VSV for CCV Open or short in VSV circuit for pressure switching valve VSV for pressure switching valve Fuel tank cracked, holed or damaged Charcoal canister cracked, holed or damaged Fuel tank over fill check valve cracked or damaged ECM	™	™
P0442 (DI-230)	Evaporative Emission Control System Leak Detected (Small Leak)	Hose or tube cracked, holed, damaged or loose seal ((3) or (9) in Fig. 1) Fuel tank cap incorrectly installed Fuel tank cap cracked or damaged Vacuum hose cracked, holed, blocked, damaged or disconnected ((1), (2), (4), (5), (6), (7), (8), (10) and (11) in Fig. 1) Fuel tank cracked, holed or damaged Charcoal canister cracked, holed or damaged Open or short in vapor pressure sensor circuit Vapor pressure sensor Fuel tank over fill check valve cracked or damaged ECM	™	™
P0446 (DI-207)	Evaporative Emission Control System Vent Control Circuit	Same as DTC No. P0441	™	™
P0451 (DI-251)	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance	Open or short in vapor pressure sensor circuit Vapor pressure sensor ECM	™	™
P0452 (DI-251)	Evaporative Emission Control System Pressure Sensor/Switch Low Input	Short in vapor pressure sensor circuit Vapor pressure sensor ECM	™	™
P0453 (DI-251)	Evaporative Emission Control System Pressure Sensor/Switch High Input	OpenShort in vapor pressure sensor circuit Vapor pressure sensor ECM	™	™
P0456 (DI-230)	Evaporative Emission Control System Leak Detected (Very Small Leak)	Same as DTC No. P0442	™	™
P0500 (DI-256)	Vehicle Speed Sensor "A"	Combination meter Open or short in vehicle speed sensor circuit Vehicle speed sensor ECM	™	™
P0503 (DI-256)	Vehicle Speed Sensor "A" Intermittent/Erratic/High	Combination meter Open or short in vehicle speed sensor circuit Vehicle speed sensor ECM	-	™
P0505 (DI-261)	Idle Air Control System	Air induction system Electric throttle control system Electric throttle control system circuit PCV piping ECM	™	™

P0550 (DI-265)	Power Steering Pressure Sensor/Switch Circuit Low Input	Open or short in power steering pressure sensor circuit Power steering oil pressure sensor ECM	™	™
P0552 (DI-265)	Power Steering Pressure Sensor/Switch Circuit High Input	Short in power steering pressure sensor circuit Power steering oil pressure sensor ECM	™	™
P0553 (DI-265)	Power Steering Pressure Sensor/Switch Circuit Intermittent	Open in power steering pressure sensor circuit Power steering oil pressure sensor ECM	™	™
P0560 (DI-267)	System Voltage	Back-up power source circuit EFI fuse ECM	™	™
P0604 (DI-270)	Internal Control Module Randam Access Memory (RAM) Error	ECM	™	™
P0606 (DI-270)	ECM/PCM Processor	ECM	™	™
P0607 (DI-270)	Control Module Performance	ECM	™	™
P0617 (DI-272)	Staerter Relay Circuit High	Park/neutral position switch Starter relay circuit Ignition switch ECM	™	™
P0657 (DI-270)	Actuator Supply Voltage Circuit / Open	ECM	™	™
P1126 (DI-278)	Magnetic Clutch Circuit	Open or short in magnetic clutch circuit Magnetic clutch ECM	™	™
P2102 (DI-283)	Throttle Actuator Control Motor Circuit Low	Open in throttle control motor circuit Throttle control motor ECM	™	™
P2103 (DI-283)	Throttle Actuator Control Motor Circuit High	Short in throttle control motor circuit Throttle control motor ECM	™	™
P2111 (DI-287)	Throttle Actuator Control System - Stuck Open	Throttle control motor Throttle body	™	™
P2112 (DI-287)	Throttle Actuator Control System - Stuck Closed	Throttle control motor Throttle body	™	™
P2118 (DI-290)	Throttle Actuator Control Motor Current Range/Performance	Open in ETCS power source circuit ECM	™	™
P2119 (DI-294)	Throttle Actuator Control Throttle Body Range/Performance	Electric throttle control system ECM	™	™
P2120 (DI-297)	Throttle/Pedal Position Sensor/Switch "D" Circuit	Open or short in accelerator pedal position sensor circuit Accelerator pedal position sensor ECM	™	™
P2121 (DI-305)	Throttle/Pedal Position Sensor/Switch "D" Circuit Range/Performance	Accelerator pedal position sensor	™	™
P2122 (DI-297)	Trottle/Pedal Position Sensor/Switch "D" Circuit Low Input	Open in accelerator pedal position sensor circuit Accelerator pedal position sensor ECM	™	™
P2123 (DI-297)	Trottle/Pedal Position Sensor/Switch "D" Circuit High Input	Short in accelerator pedal position sensor circuit Accelerator pedal position sensor ECM	™	™

P2195 (DI-110)	Oxygen Sensor Signal Stauk Lean (Bank 1 Sensor 1)	✓Open or short in heated oxygen sensor circuit (Bank 1, 2 Sensor 1) ✓Heated oxygen sensor (Bank 1, 2 Sensor 1) ✓Air induction system ✓Fuel pressure ✓Injector ✓ECM	™	™
P2196 (DI-110)	Oxygen Sensor Signal Stauk Rich (Bank 1 Sensor 1)		™	™
P2197 (DI-110)	Oxygen Sensor Signal Stauk Lean (Bank 2 Sensor 1)		™	™
P2198 (DI-110)	Oxygen Sensor Signal Stauk Rich (Bank 2 Sensor 1)		™	™

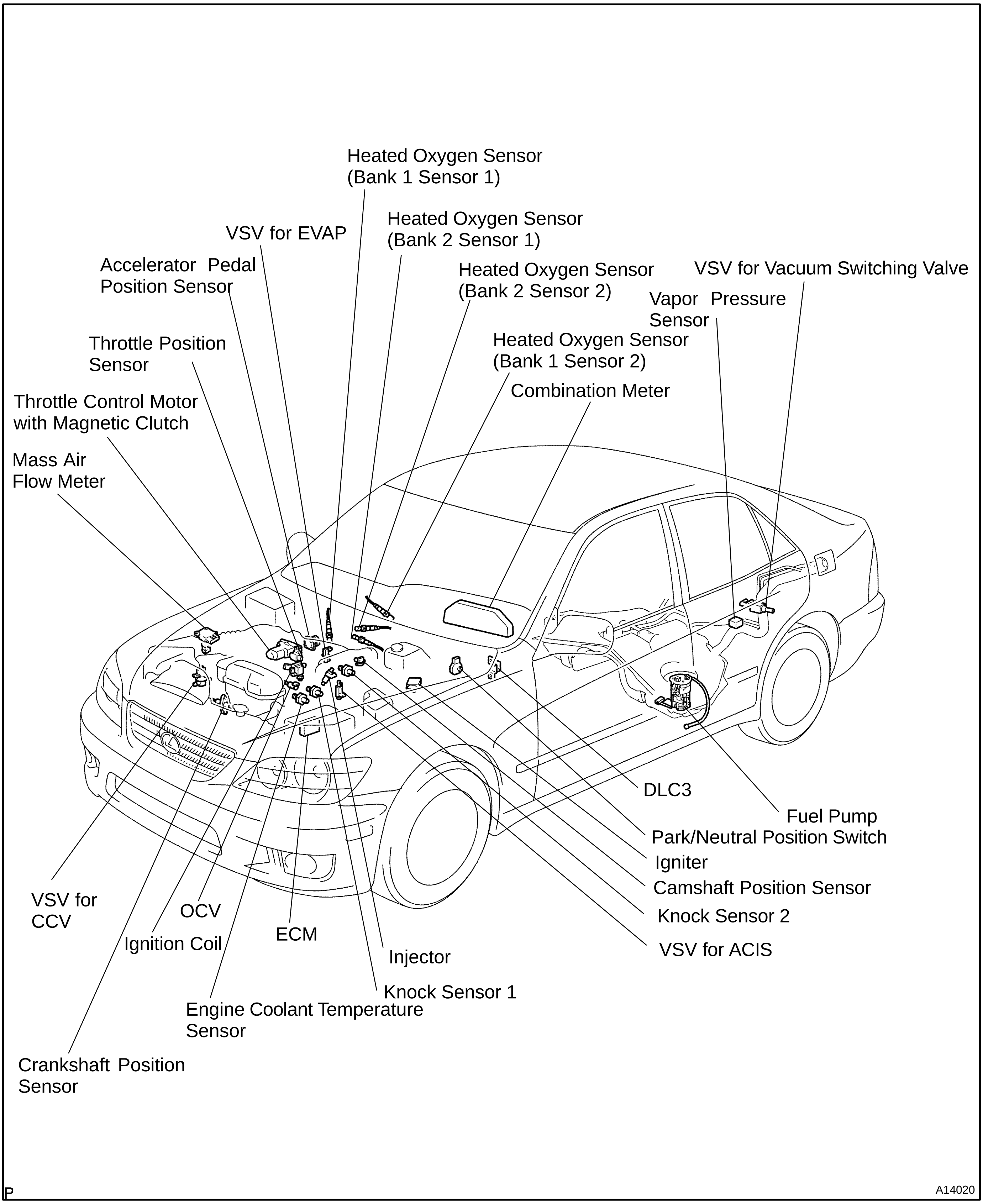
*1: MIL lights up.

*2: MIL lights up or blinks.

*: - .... MIL does not light up, ™ .... MIL lights up

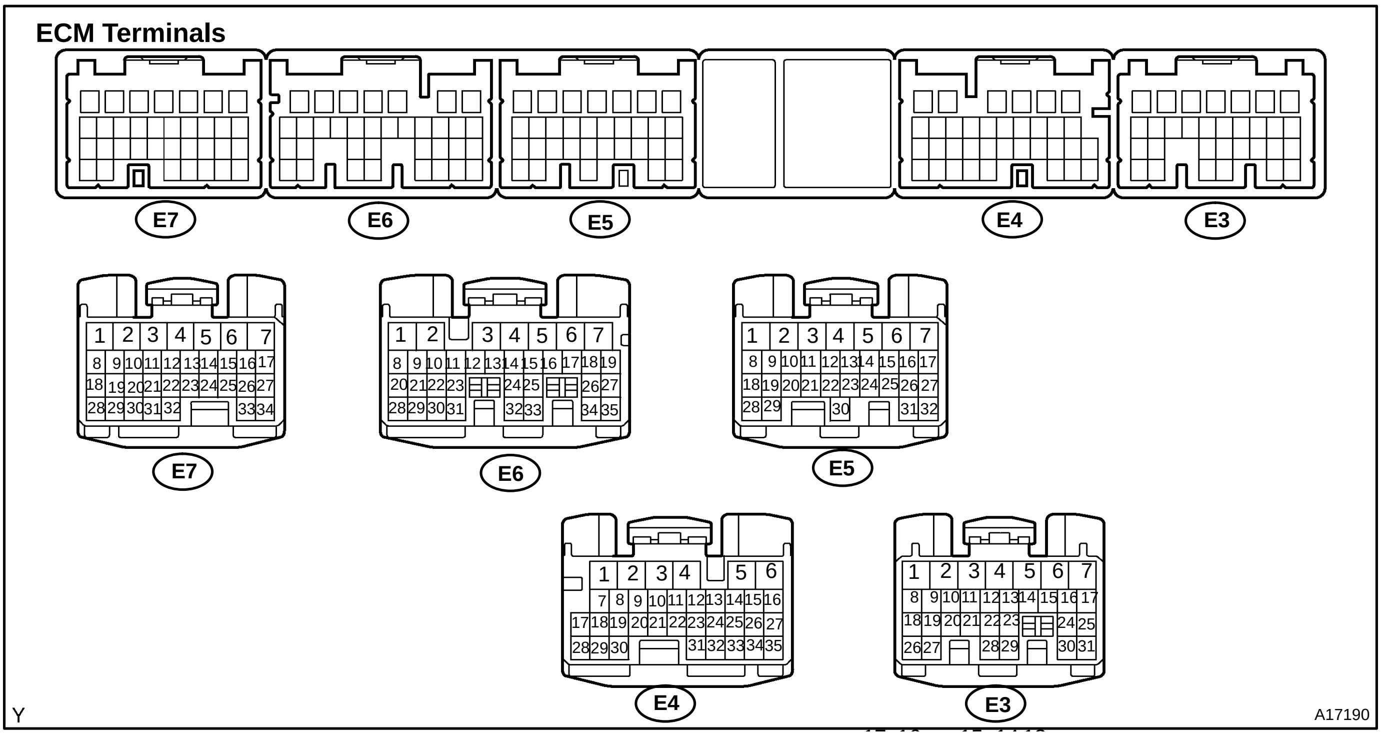
DI2DI-14

PARTS LOCATION



DI2DJ-13

TERMINALS OF ECM



Each ECM terminals standard normal voltage is shown in the table below. In the table, first follow the information under "Condition".
Look under "Symbols (Terminals No.)" for the terminals to be inspected.
The standard normal voltage between the terminals is shown under "STD Voltage".
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage
BATT (E3-4) - E1 (E6-7)	B-Y ↔ BR	Always	9 - 14 V
+BM (E3-7) - E1 (E6-7)	L-W ↔ BR		
IGSW (E3-17) - E1 (E6-7)	B -O ↔ BR	IG switch ON	9 - 14 V
+B (E3-6) - E1 (E6-7)	B-R ↔ BR		
+B2 (E3-5) - E1 (E6-7)	B-R ↔ BR		
VC (E4-35) - E2 (E4-34)	L-Y ↔ BR	IG switch ON	4.5 - 5.5 V
VTA (E7-25) - E2 (E4-34)	W-R ↔ BR	IG switch ON, Accelerator pedal released	0.4 - 1.0 V
		IG switch ON, Accelerator pedal depressed	3.2 - 4.8 V
VTA2 (E7-24) - E2 (E4-34)	G-Y ↔ BR	IG switch ON, Accelerator pedal released	2.0 - 2.9 V
		IG switch ON, Accelerator pedal depressed	4.6 - 5.1 V
VPA (E4-33) - E2 (E4-34)	P-L ↔ BR	IG switch ON, Accelerator pedal released	0.3 - 0.9 V
		IG switch ON, Accelerator pedal depressed	3.2 - 4.8 V
VPA2 (E4-32) - E2 (E4-34)	L-W ↔ BR	IG switch ON, Accelerator pedal released	1.8 - 2.7 V
		IG switch ON, Accelerator pedal depressed	4.7 - 5.1 V
VG (E5-27) - EVG (E5-26)	G-B ↔ L-W	Idling, P or N position, A/C switch OFF	1.1 - 1.5 V
THA (E5-32) - E2 (E4-34)	L-B ↔ BR	Idling, Intake air temp. 20°C (68°F)	0.5 - 3.4 V
THW (E5-24) - E2 (E4-34)	R ↔ BR	Idling, Engine coolant temp. 80°C (176°F)	0.2 - 1.0 V
STA (E3-12) - E1 (E6-7)	B ↔ BR	Shift lever position P or N position, ignition switch START	9 - 14 V

#10 (E7-15) - E01 (E5-2) #20 (E5-17) - E01 (E5-2) #30 (E7-14) - E01 (E5-2) #40 (E5-16) - E01 (E5-2) #50 (E7-13) - E01 (E5-2) #60 (E5-15) - E01 (E5-2)	R ↔ W-B L ↔ W-B V ↔ W-B R-W ↔ W-B L-R ↔ W-B B-W ↔ W-B	IG switch ON	9 - 14 V
		Idling	Pulse generation
IGT (E5-13) - E1 (E6-7) IGT2 (E7-27) - E1 (E6-7) IGT3 (E7-26) - E1 (E6-7)	GR-B ↔ BR B-R ↔ BR B-Y ↔ BR	Idling	Pulse generation (See page DI-193)
IGF (E5-7) - E1 (E6-7)	B-L ↔ BR	IG switch ON	4.5 - 5.5 V
		Idling	Pulse generation (See page DI-193)
G2 (E7-29) - NE- (E7-32)	G ↔ L	Idling	Pulse generation (See page DI-184)
NE (E7-31) - NE- (E7-32)	B-W ↔ L		
MREL (E3-13) - E1 (E6-7)	B-O ↔ BR	IG switch ON	9 - 14 V
FC (E3-14) - E1 (E6-7)	G-Y ↔ BR	IG switch ON	Below 1.5 V
		Idling	Pulse generation (0 and 4.5 - 5.5)
FPR (E3-15) - E1 (E6-7)	G-R ↔ BR	Idling	Below 1.5 V
STP (E4-4) - E1 (E6-7)	G-W ↔ BR	Brake pedal is depressed	7.5 - 14 V
		Brake pedal is released	Below 1.5 V
PRG (E7-11) - E01 (E5-2)	W-G ↔ W-B	IG switch ON	9 - 14 V
TBP (E4-10) - E01 (E5-2)	P ↔ W-B	IG switch ON	9 - 14 V
CCV (E5-22) - E01 (E5-2)	Y-R ↔ W-B	IG switch ON	9 - 14 V
PTNK (E4-25) - E2 (E4-34)	L-W ↔ BR	Ignition switch ON	2.9 - 3.7 V
		Apply vacuum 4.0 kPa (30 mmHg, 1.1 in.Hg)	Below 0.5 V
OX1A (E6-28) - E2 (E4-34) OX2A (E5-28) - E2 (E4-34)	W ↔ BR B ↔ BR	Maintain engine speed at 2,500 rpm for 90 sec. after warming up	Pulse generation
OX1B (E4-28) - E2 (E4-34) OX2B (E4-17) - E2 (E4-34)	W ↔ BR W ↔ BR	Maintain engine speed at 2,500 rpm for 3 min. after warming up	Pulse generation
HT1A (E6-9) - E01 (E5-2) HT2A (E5-30) - E01 (E5-2) HT1B (E4-7) - E01 (E5-2) HT2B (E4-8) - E01 (E5-2)	LG ↔ W-B P ↔ W-B G-B ↔ W-B R-W ↔ W-B	Idling	Below 3.0 V
		IG switch ON	9 - 14 V
KNK1 (E6-1) - E1 (E6-7)	B ↔ BR	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See page DI-179)
KNK2 (E6-2) - E1 (E6-7)	W ↔ BR		
TC (E4-3) - E1 (E6-7)	R-W ↔ BR	IG switch ON	9 - 14 V
W (E4-2) - E01 (E5-2)	R-L ↔ W-B	Idling	9 - 14 V
		IG switch ON	Below 3.0 V
ACMG (E3-16) - E01 (E5-2)	L-W ↔ W-B	A/C switch ON (at idling)	Below 3.0 V
		A/C switch OFF	9 - 14 V
OCV+ (E7-6) - OCV- (E7-5)	R-Y ↔ Y-B	IG switch ON	Pulse generation (See page DI-48)
ACIS (E5-21) - E01 (E5-2)	Y-G ↔ W-B	IG switch ON	9 - 14 V
		Engine speed between 2,500 and 4,000 rpm	Below 3.0 V
CL+ (E7-10) - CL- (E7-9)	R-W ↔ Y	Idling	Pulse generation (See page)
M+ (E7-3) - E1 (E6-7) M- (E7-2) - E1 (E6-7)	W ↔ BR R ↔ BR	Idling	Pulse generation (See page DI-283)

SIL (E3-26) - E1 (E6-7)	W ↔ BR	IG switch ON	9 - 14
SP2+ (E6-23) - SP2- (E6-22)	L-Y ↔ R-L	Vehicle is driving	Pulse generation (See page DI-256)

DI2DK-11

PROBLEM SYMPTOMS TABLE

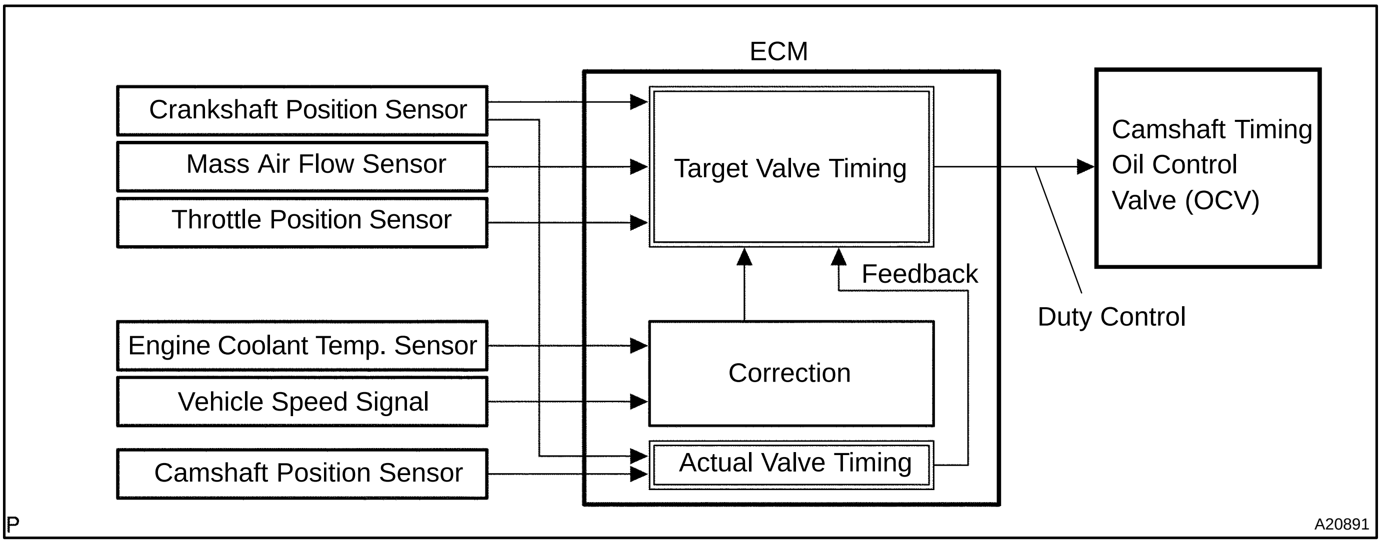
Symptom	Suspect Area	See page
Engine does not crank (Does not start)	14.Starter 15.Starter relay	ST-15 ST-17
No initial combustion (Does not start)	1. Engine immobiliser system 2. ECM power source circuit 3. Fuel pump control circuit	DI-847 DI-311 DI-161
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-161
Under normal condition (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-272 DI-161 EM-3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-272 DI-161
Hot engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-272 DI-161
High engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	- DI-311
Low engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. Fuel pump control circuit	- DI-161
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM-3 DI-161
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI-311 DI-161
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI-161 DI-356
Surging (Poor driveability)	1. Fuel pump control circuit	DI-161
Soon after starting (Engine stall)	1. Engine immobiliser system 2. Fuel pump control circuit	DI-847 DI-161
During A/C operation (Engine stall)	1. A/C signal circuit (Compressor circuit) 2. ECM	- IN-22

DIC41-01

DTC	P0010	Camshaft Position ”A” Actuator circuit (Bank 1)

CIRCUIT DESCRIPTION

The Variable Valve Timing (VVT) system includes the ECM, the Oil Control Valve (OCV) and the VVT controller. The ECM sends a target ”duty-cycle” control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. Camshaft timing control is performed based on engine operation conditions such as intake air volume, throttle position and engine coolant temperature.
The ECM controls the OCV, based on the signals output from the sensors. The VVT controller regulates the intake camshaft angle using oil pressure through the OCV. As a result, the relative position between the camshaft and the crankshaft is optimized, and the engine torque improves, fuel economy improves, and exhaust emissions decrease under overall driving conditions. Also, the ECM detects the actual valve timing using signals from the camshaft position sensor and the crankshaft position sensor, and performs feedback control. This is how target valve timing is verified by the ECM.



DTC No.	DTC Detecting Condition	Trouble Area
P0010	Open or short in OCV circuit (1 trip detection logic)	✓Open or short in OCV circuit ✓OCV ✓ECM

MONITOR DESCRIPTION

After the ECM sends the ”target” duty-cycle signal to the OCV (Oil Control Valve), the ECM monitors the OCV current to establish an ”actual” duty-cycle. When the actual duty-cycle ratio varies from the target duty-cycle, the ECM sets a DTC.

MONITOR STRATEGY

Related DTCs	P0010	VVT oil control valve bank 1 range check
Required sensors/components	OCV	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	13 V
Target duty ratio	-	70%
Starter	OFF	
Current cut status	Not cut	

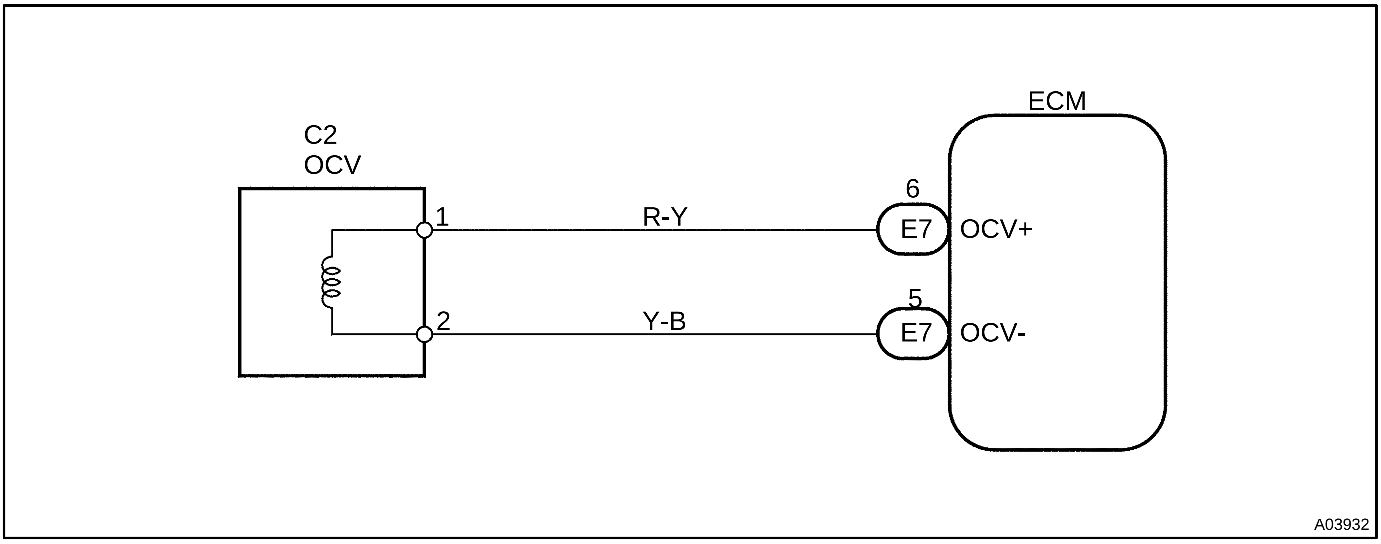
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Either of the following conditions is met:	A or B
A. Output signal duty for OCV	Output duty ratio is 100% (always ON) but target duty ratio is less than 70%
B. Output signal duty for OCV	Output duty is 3% or less despite the ECM supplying current to the OCV

COMPONENT OPERATING RANGE

Parameter	Standard Value
Output signal duty for OCV	"More than 3%" and "less than 100%"

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	**Check OCV circuit.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch On and push the hand-held tester main switch ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.

CHECK:
Check the engine speed when operate the OCV by the hand-held tester.

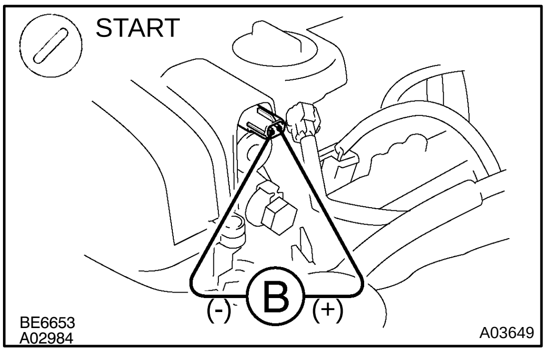
OK:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

OK → **Check for intermittent problems (See page DI-3).**

NG

2	**Check operation of OCV.**



PREPARATION:
(a) Start the engine and warm it up.
(b) Disconnect the OCV connector.
(c) Apply battery positive voltage between the terminals of the OCV.

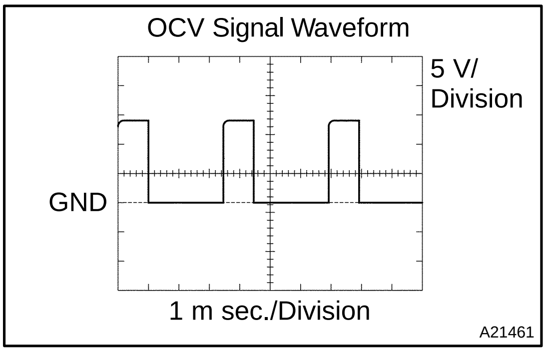
CHECK:
Check the engine speed.

OK:
Rough idle or engine stalled.

NG → **Replace OCV.**

OK

3	**Check voltage between terminals OCV+ and OCV- of ECM connector.**



Reference: INSPECTION USING OSCILLOSCOPE
Turn the ignition switch ON, and check waveform between terminals OCV+ and OCV- of the ECM connector.
HINT:
The correct waveform is as shown.

NG → **Replace ECM (See page SF-74).**

OK

4	**Check for open and short in harness and connector between OCV and ECM (See page IN-33).**

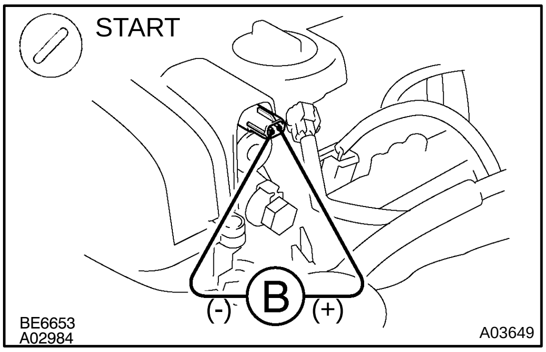
NG → **Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI-3).

OBD II scan tool (excluding hand-held tester):

1	**Check operation of OCV.**



PREPARATION:
(a) Start the engine and warm it up.
(b) Disconnect the OCV connector.
(c) Apply battery positive voltage between the terminals of the OCV.

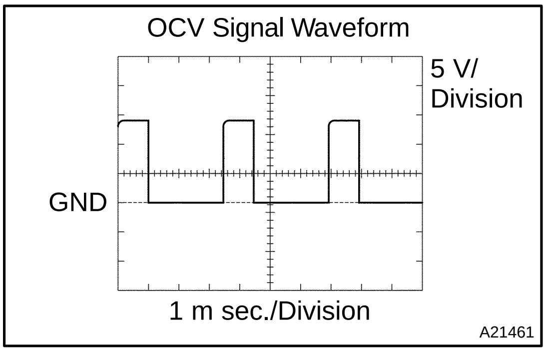
CHECK:
Check the engine speed.

OK:
Rough idle or engine stalled.

NG	**Replace OCV.**

OK

2	**Check voltage between terminals OCV+ and OCV- of ECM connector.**



Reference: INSPECTION USING OSCILLOSCOPE
Turn the ignition switch ON, and check the waveform between terminals OCV+ and OCV- of the ECM connector.
HINT:
The correct waveform is as shown in the illustration.

NG	**Replace ECM (See page SF-74).**

OK

3	**Check for open and short in harness and connector between OCV and ECM (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI-3).

DIAKI-02

DTC	P0011	Camshaft Position ”A” -Timing Over-Actuator or System Performance (Bank 1)

DTC	P0012	Camshaft Position ”A” -Timing Over-Retarded (Bank 1)

CIRCUIT DESCRIPTION

Refer to DTCs P0010 on page DI-48 .

DTC No.	DTC Detecting Condition	Trouble Area
P0011	Advanced cam timing: After engine is warmed up and engine speed is at 500 to 4,000 rpm condition (a) or (b) continues. (1 trip detection logic) (a) Valve timing does not change from current valve timing	Valve timing OCV Camshaft timing gear assy ECM
P0012	Retarded cam timing: After engine is warmed up and engine speed is at 500 to 4,000 rpm condition (a) or (b) continues. (2 trip detection logic) (a) Valve timing does not change from current valve timing	

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT (Variable Valve Timing) system to control the intake valve camshaft. The VVT system includes the ECM, the OCV (Oil Control Valve) and the VVT controller. The ECM sends a target ”duty-cycle” control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft.

Example:

A DTC will set if: 1) the difference between the target and actual valve timing is more than 5 degrees of the crankshaft angle (CA) and the condition continues for more than 4.5 sec.; or 2) the OCV is forcibly activated 63 times or more.

Advanced cam DTCs are subject to ”1 trip” detection logic.

Retarded cam DTCs are subject to ”2 trip” detection logic.

MONITOR STRATEGY

Related DTCs	P0011	VVT system advance (Bank 1)
	P0012	VVT system retard (Bank 1)
Required sensors/components	Main sensors/components	Camshaft position sensor
	Related sensors/components	Engine coolant temperature sensor, Crankshaft position sensor
Frequency of operation	Once per drive cycle	
Duration	10 sec.	
MIL operation	P0011: Immediate P0012: 2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	-
Engine speed	500 rpm	4,000 rpm
Engine coolant temperature	75 °C (167 °F)	100 °C (212 °F)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Duration time of the following condition; A and B are met	4.5 sec. or more
A. Following conditions are met:	(a) and (b)
(a) VVT control status	Feedback
(b) Deviation of valve timing (Target valve timing - Actual valve timing)	More than 5 °CA
B. Response of valve timing	1 sec./°CA or more

WIRING DIAGRAM

Refer to DTCs P0010 on page DI-48 .

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand-held tester or the OBD II scan tool. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

Hand-held tester:

1	**Check valve timing (Check for loose and jumped tooth of timing chain) (See page EM-24).**

NG → **Adjust valve timing.**

OK

2	**Check operation of OCV.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Start the engine and warm it up.
(c) Turn the ignition switch ON and push the hand-held tester main switch ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / VVT CTRL B1.

CHECK:
Check the engine speed when operating the OCV by the hand-held tester.

OK:

Tester Operation	Specified Condition
OCV is OFF	Normal engine speed
OCV is ON	Rough idle or engine stall

NG → **Go to step 4.**

OK

3	**Check if DTC output reoccurs.**

PREPARATION:
(a) Clear the DTCs.
  (1) Operating the hand-held tester to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.
(b) Start and warm up the engine.
(c) Drive the vehicle around for 10 minutes or more.

CHECK:
Read output DTCs using the hand-held tester.

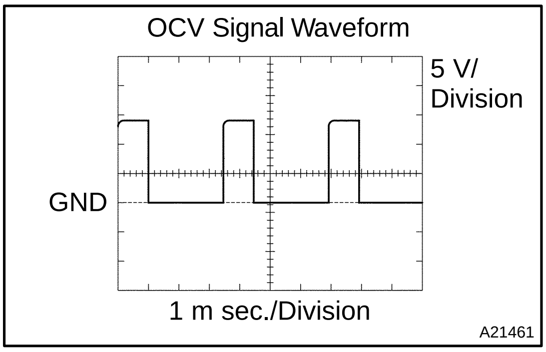
OK:
No DTC output.

OK → **VVT system is OK.***

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

4	Check voltage between terminals OCV+ and OCV- of ECM connector.



Reference: INSPECTION USING OSCILLOSCOPE
Turn the ignition switch ON, check the waveform between terminals OCV+ and OCV- of the ECM connector.
HINT:
The correct waveform is as shown.

NG → **Replace ECM (See page SF-74).**

OK

5	Check oil control valve filter.

NG → **Replace oil control valve filter.**

OK

6	Check oil control valve (See page SF-43).

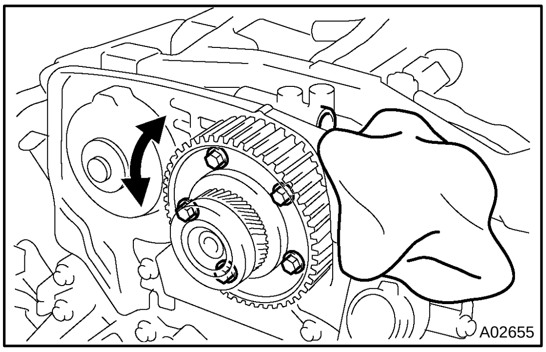
OK → **Go to step 8.**

NG

7	Replace oil control valve.

Go

8	**Check VVT controller assembly.**



PREPARATION:
(a) Remove the timing belt cover.
(b) Remove the ECM hood (See page SF-74).
(c) Remove the OCV.
(d) Drain the oil in the VVT controller assembly (See page EM-17).

CHECK:
Check whether the oil into the VVT controller assembly is drained or not.

OK:
Oil in VVT controller assembly is drained.

OK	**Go to step 10.**

NG

9	**Replace VVT controller assembly (See page EM-49).**

Go

10	**Check blockage of OCV, oil check valve and oil pipe No.1.**

NG	**Repair or replace.**

OK

11	**Check whether or not DTC P0011 or P0012 is stored.**

PREPARATION:

(a) Clear the DTCs.
Operate the hand-held tester to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.

(b) Start and warm up the engine.

(c) Drive the vehicle around for 10 minutes or more.

CHECK:

Read output DTC using the hand-held tester.

OK:

No DTC output.

OK → **VVT system is OK.***

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

Replace ECM (See page SF-74).

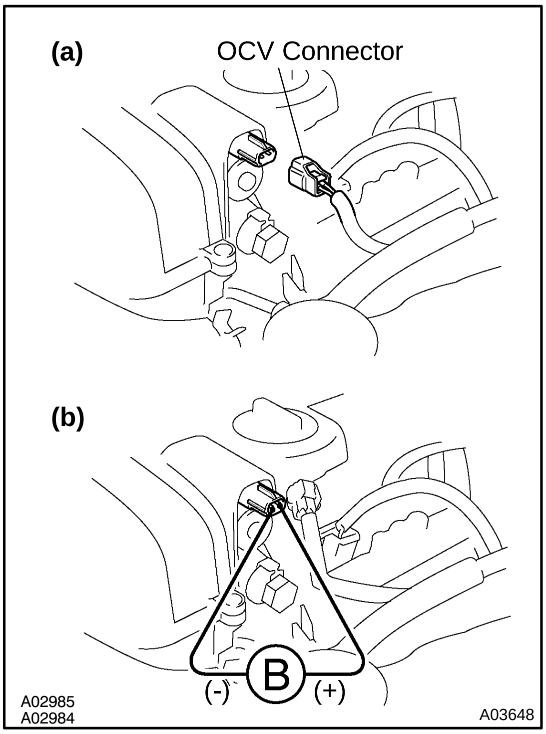
OBD II scan tool (excluding hand-held tester):

1	Check valve timing (Check for loose and jumped tooth of timing chain) (See page EM-24).

NG → **Adjust valve timing.**

OK

2	Check operation of OCV.



PREPARATION:
Start the engine.

CHECK:
(a) Check the engine speed when disconnecting the OCV connector.
(b) Check the engine speed when applying battery positive voltage between the terminals of the OCV.

RESULT:

Result	Check (a)	Check (b)
1	Normal engine speed	Rough idle or engine stall
2	Except 1	

2 → **Go to step 4.**

1

3	**Check if DTC output reoccurs.**

PREPARATION:

(a) Clear the DTCs.
Operate the OBD II scan tool to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.

(b) Start and warm up the engine.

(c) Drive the vehicle around for 10 minutes or more.

CHECK:

Read output DTCs using the OBD II scan tool.

OK:

No DTC output.

OK → **VVT system OK***

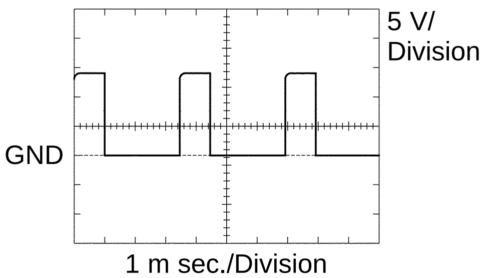
*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

Replace ECM (See page SF-74).

4	**Check voltage between terminals OCV+ and OCV- of ECM connector.**

OCV Signal Waveform



Reference: INSPECTION USING OSCILLOSCOPE

Turn the ignition switch ON, and check waveform between terminals OCV+ and OCV- of the ECM connector.

HINT:

The correct waveform is as shown.

NG → **Replace ECM (See page SF-74).**

OK

5	**Check oil control valve filter.**

NG → **Replace oil control valve filter.**

OK

6	**Check OCV (See page SF-43).**

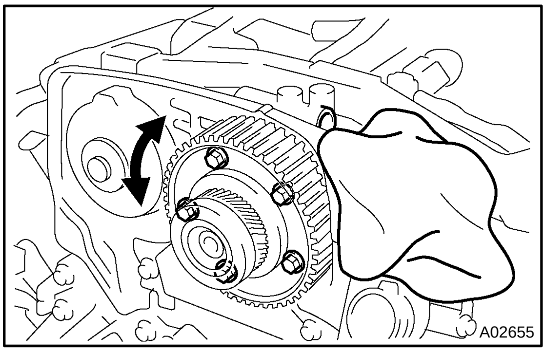
OK → **Go to step 8.**

OK

7	**Replace OCV.**

Go

8	**Check VVT controller assembly.**



PREPARATION:

(a) Remove the timing belt cover.

(b) Remove the ECM hood (See page SF-74).

(c) Remove the OCV.

(d) Drain the oil in the VVT controller assembly (See page EM-17).

CHECK:

Check whether the oil in the VVT controller assembly is drained or not.

OK:

Oil in VVT controller assembly is drained.

OK → **Go to step 10.**

OK

9	**Replace VVT controller assembly**

Go

10	**Check blockage of OCV, oil check valve and oil pipe No.1.**

NG → **Repair or replace.**

OK

11	**Check whether or not DTC P0011 or P0012 is stored.**

PREPARATION:

(a) Clear the DTCs.
Operate the OBD II scan tool to erase the codes, or disconnect the battery terminal or remove the EFI fuse for more than 60 seconds.

(b) Start and warm up the engine.

(c) Drive the vehicle around for 10 minutes or more.

CHECK:

Read output DTC using the OBD II scan tool.

OK:

No DTC output.

OK → **VVT system is OK.***

*: DTCs P0011 and P0012 are output when a foreign object in the engine oil enters the system. These codes will stay even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

NG

Replace ECM (See page SF-74).

DIC42-01

DTC	P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)

CIRCUIT DESCRIPTION

Refer to DTC P0335 on page DI-184 .

DTC No.	DTC Detecting Condition	Trouble Area
P0016	Deviation in crankshaft position sensor signal and camshaft position sensor signal (2 trip detection logic)	Mechanical system (Jumping teeth of timing belt, belt stretched) ECM

MONITOR DESCRIPTION

The ECM optimizes the valve timing using the VVT (Variable Valve Timing) system to control the intake valve camshaft. The VVT system includes the ECM, the OCV (Oil Control Valve) and the VVT controller. The ECM sends a target duty-cycle control signal to the OCV. This control signal, applied to the OCV, regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake valve camshaft. The ECM calibrates the valve timing of the VVT system by setting the camshaft to the maximum retard angle when the engine speed is idling. The ECM closes the OCV to retard the cam. The ECM stores this value as VVT learned value (When the difference between the target valve timing and the actual valve timing is 5 degrees or less, the ECM stores this in its memory.).
If the learned value meets both of the following conditions ((a) and (b)), the ECM interprets this as a defect in the VVT system and set a DTC.
(a) VVT learning value is less than 22°CA (Crankshaft Angle) or more than 47°CA.
(b) Above condition continues for more than 18 sec.

MONITOR STRATEGY

Related DTCs	P0016	Deviation in crankshaft position sensor signal and camshaft position sensor signal (Bank 1)
Required sensors/components	Crankshaft position sensor, Camshaft position sensor	
Frequency of operation	Once per drive cycle	
Duration	60 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
VVT feedback mode	ON	
Engine speed	500 rpm	1,400 rpm

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Either of the following conditions is met for 18 sec.:	A or B
A. "VVT learned" value	Less than 22 °CA
B. "VVT learned" value	More than 47 °CA

WIRING DIAGRAM

Refer to DTC P0335 on page DI-184 .

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check valve timing (Check for loose and jumping teeth of timing belt).**

NG → **Adjust valve timing (Repair or replace timing belt).**

OK

Replace ECM (See page SF-74).

DIC43-01

DTC	P0031	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 1)

DTC	P0032	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 1)

DTC	P0037	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)

DTC	P0038	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)

DTC	P0051	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 1)

DTC	P0052	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 1)

DTC	P0057	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)

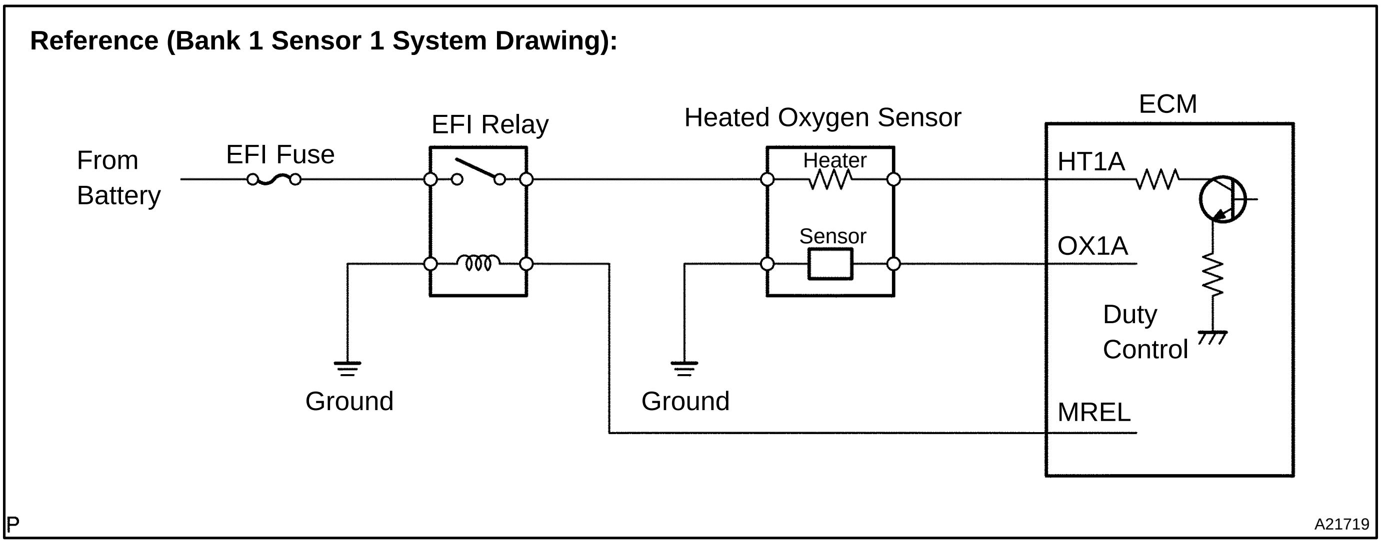
DTC	P0058	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0130 on page DI-1 10.

HINT:

The ECM provides a pulse width modulated control circuit to adjust current through the heater. The heated oxygen sensor heater circuit uses a relay on the B+ side of the circuit.



DTC No.	DTC Detecting Condition	Trouble Area
P0031 P0037 P0051 P0058	Heater current of 0.2 A or less when heater operates with +B > 10.5 V and < 11.5 V (1 trip detection logic) Heater current of 0.25 A or less when heater operates with +B ± 11.5 V (1 trip detection logic)	Open in heater circuit of heated oxygen sensor Heated oxygen sensor heater EFI relay ECM
P0032 P0038 P0052 P0058	When heater operates, heater current exceeds 2 A (1 trip detection logic)	Short in heater circuit of heated oxygen sensor Heated oxygen sensor heater EFI relay ECM

HINT:

- Bank 1 refers to bank that includes cylinder No.1.
- Bank 2 refers to bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closer to the engine body.
- Sensor 2 refers to the sensor farther away from the engine body.

MONITOR DESCRIPTION

The sensing portion of the heated oxygen sensor has a zirconia element which is used to detect oxygen concentration in the exhaust. If the zirconia element is at the proper temperature and difference of the oxygen concentration between the inside and outside surface of sensor is large, the zirconia element will generate voltage signals. In order to increase the oxygen concentration detecting capacity in the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor. When current in the sensor is out of the standard operating range, the ECM interprets this as a fault in the heated oxygen sensor and sets a DTC.

Example:

The ECM will set a high current DTC if the current in the sensor is more than 2 A when the heater is OFF. Similarly, the ECM will set a low current DTC if the current is less than 0.25 A when the heater is ON.

MONITOR STRATEGY

Related DTCs	P0031	Heated oxygen sensor heater current bank 1 sensor 1 (Low current)
	P0032	Heated oxygen sensor heater current bank 1 sensor 1 (High current)
	P0037	Heated oxygen sensor heater current bank 1 sensor 2 (Low current)
	P0038	Heated oxygen sensor heater current bank 1 sensor 2 (High current)
	P0051	Heated oxygen sensor heater current bank 2 sensor 1 (Low current)
	P0052	Heated oxygen sensor heater current bank 2 sensor 1 (High current)
	P0057	Heated oxygen sensor heater current bank 2 sensor 2 (Low current)
	P0058	Heated oxygen sensor heater current bank 2 sensor 2 (High current)
Required sensors/components	Main sensors/components	Heated oxygen sensor
	Related sensors/components	Vehicle speed sensor
Frequency of operation	Continuous	
Duration	0.3 sec.	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P0031, P0037, P0051, P0057 (Low current):		
Either of the following conditions is met:	A or B	
A. Following conditions are met:	1, 2, 3, 4 and 5	
1. Time after engine start	250 sec.	500 sec.
2. Battery voltage	10.5 V	-
3. Vehicle speed	-	90 km/h (56 mph)
4. Misfire	Not detected	
5. Pass/Fail detection in this driving cycle	Not detected	
B. Following conditions are met:	1, 2, 3, 4 and 5	
1. Time after engine start	500 sec.	-
2. Battery voltage	10.5 V	-
3. Vehicle speed	40 km/h (25 mph)	-
4. Misfire	Not detected	
5. Pass/Fail detection in this driving cycle	Not detected	
P0032, P0038, P0052, P0058 (High current):		
Intrusive heating is OFF		

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0031, P0037, P0051, P0057 (Low current):	
Heated oxygen sensor heater current	Less than 0.25 A (at 0.2 sec. after heater "ON")
P0032, P0038, P0052, P0058 (High current):	
Heated oxygen sensor heater current	More than 2 A (while intrusive heating is OFF)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor heater current under the following conditions: A. Engine has been warmed up B. Engine is idling C. Battery voltage is 11 to 14 V	0.4 to 1.0 A

MONITOR RESULT

The detailed information is described in "CHECKING MONITOR STATUS" (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $04: HO2S Heater

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 1 sensor 1)	Malfunction criterion
1	$02	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 1 sensor 2)	Malfunction criterion
1	$10	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 2 sensor 1)	Malfunction criterion
1	$20	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 2 sensor 2)	Malfunction criterion

WIRING DIAGRAM

Refer to DTC P0130 on page DI-1 10.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check resistance of heated oxygen sensor heater (See page SF-73).**

NG → **Replace heated oxygen sensor.**

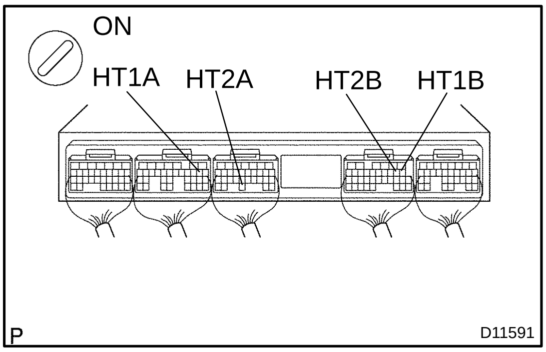
OK

2	Check EFI relay (See page SF-50).

NG → **Replace EFI relay.**

OK

3	Check voltage between terminals HT1A, HT1B, HT2A, HT2B of ECM connectors and body ground.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals HT1A, HT1B, HT2A, HT2B and the body ground.

HINT:

- Connect terminal HT2A to bank 2 sensor 1.
- Connect terminal HT2B to bank 2 sensor 2.
- Connect terminal HT1A to bank 1 sensor 1.
- Connect terminal HT1B to bank 1 sensor 2.

OK:

Voltage: 9 to 14 V

OK → **Replace ECM (See page SF-74).**

NG

4	Check for open and short in harness or connector between EFI main relay (Marking: EFI) and heated oxygen sensor, and heated oxygen sensor and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

DIAKL-02

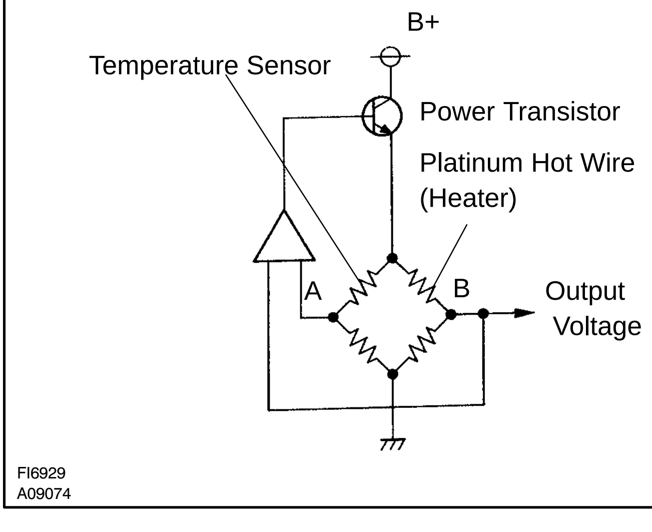
DTC	P0100	Mass or Volume Air Flow Circuit

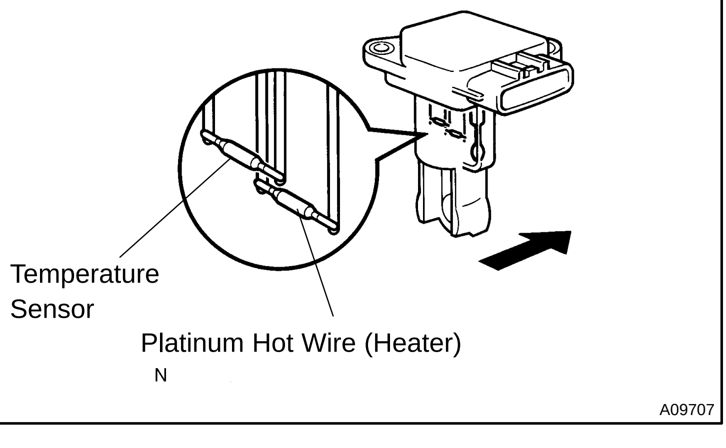
DTC	P0102	Mass or Volume Air Flow Circuit Low Input

DTC	P0103	Mass or Volume Air Flow Circuit High Input

CIRCUIT DESCRIPTION

The MAF (Mass Air Flow) meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air-fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air.
By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, changing their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the airflow through the sensor and the ECM interprets this voltage as the intake air amount.
The circuit is constructed so that the platinum hot wire and the temperature sensor provides a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.





DTC No.	DTC Detection Condition	Trouble Area
P0100	When the mass air flow meter circuit has an open or short for more than 3 seconds	✓Open or short in mass air flow meter circuit ✓Mass air flow meter ✓ECM
P0102	When the mass air flow meter circuit has an open for more than 3 seconds	
P0103	When the mass air flow meter circuit has a short for more than 3 seconds	

HINT:
After confirming DTC P0100, P0102 or P0103, confirm the mass air flow ratio in the "DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL" using the hand-held tester or the OBD II scan tool.

Mass Air Flow Value (gm/sec.)	Malfunction
Approx. 0.0	⋅Mass air flow meter power source circuit open ⋅VG circuit open or short
271.0 or more	⋅EVG circuit open

MONITOR DESCRIPTION

If there is a defect in the MAF (Mass Air Flow) meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.

Example:

When the MAF meter voltage output is less than 0.2 V, or more than 4.9 V, and if either the condition continues for more than 3 sec.

MONITOR STRATEGY

Related DTCs	P0100	Mass air flow meter circuit range check (Fluttering)
	P0102	Mass air flow meter circuit range check (Low voltage)
	P0103	Mass air flow meter circuit range check (High voltage)
Required sensors/components	Mass air flow meter	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (When engine speed is at less than 4,000 rpm) 2 driving cycles (When engine speed is at 4,000 rpm or more)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

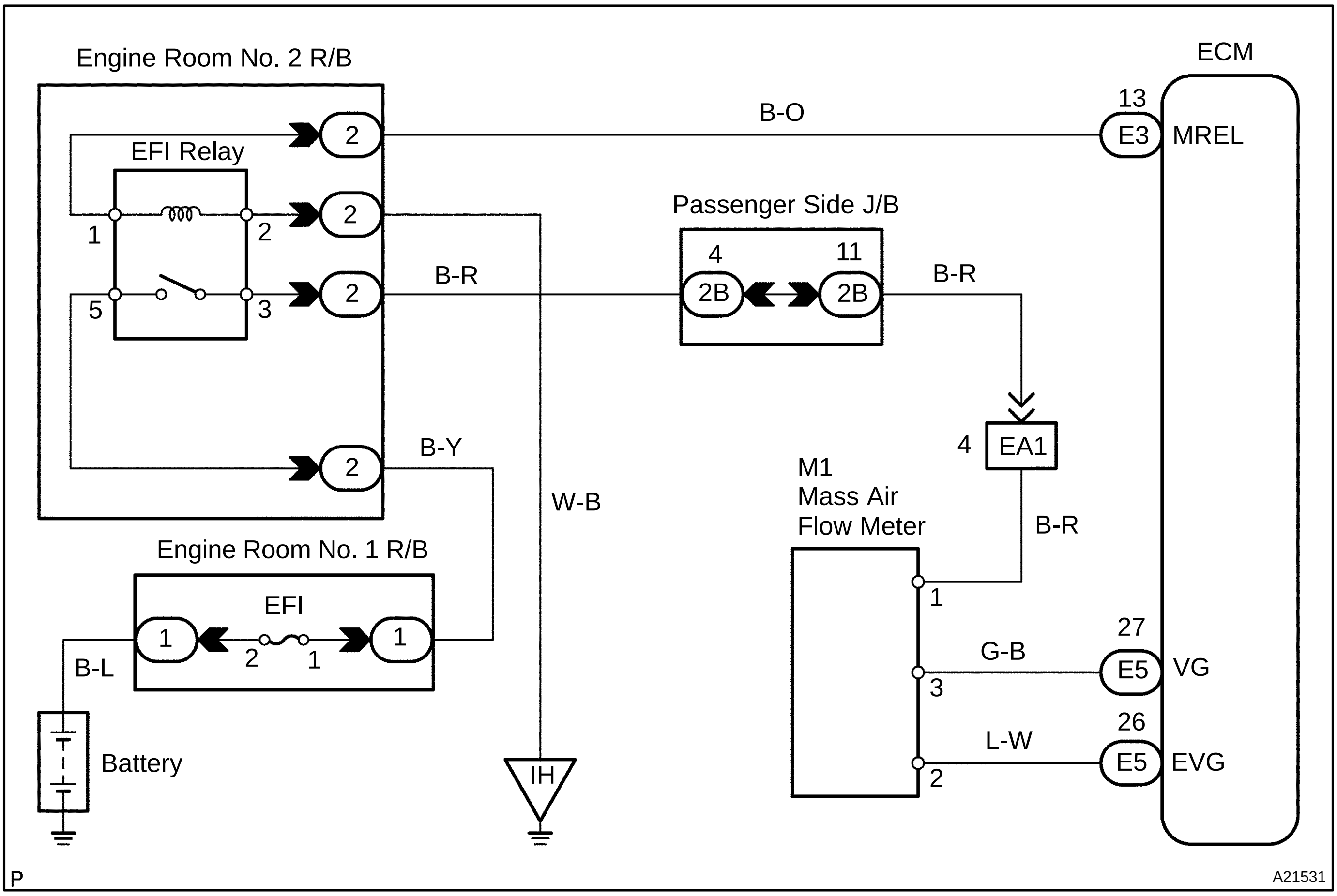
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0100:	
Mass air flow meter voltage	Less than 0.2 V or more than 4.9 V
P0102:	
Mass air flow meter voltage	Less than 0.2 V
P0103:	
Mass air flow meter voltage	More than 4.9 V

COMPONENT OPERATING RANGE

Parameter	Standard Value
Mass air flow meter voltage	0.4 to 2.2 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	Connect OBD II scan tool or hand-held tester, and read value of mass air flow rate.

PREPARATION:
(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(c) Start the engine.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF.

CHECK:
Read the mass air flow rate on the OBD II scan tool or the hand-held tester.

RESULT:

Air Flow Rate (gm/s)	Proceed to
0.0	A
271.0 or more	B
Between 1.0 and 270.0 (*1)	C

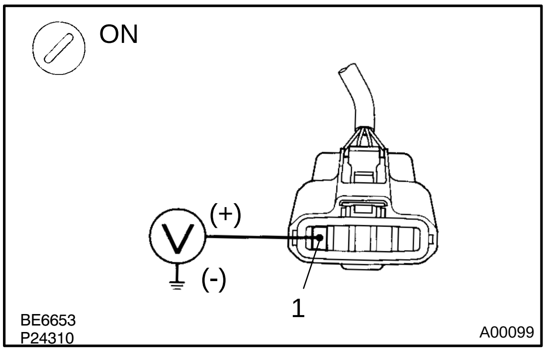
*1: The value must be changed when the throttle valve is opened or closed.

B	Go to step 6.

C	Check for intermittent problems (See page DI-3).

A

2	Check voltage of mass air flow meter power source.



PREPARATION:
(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.

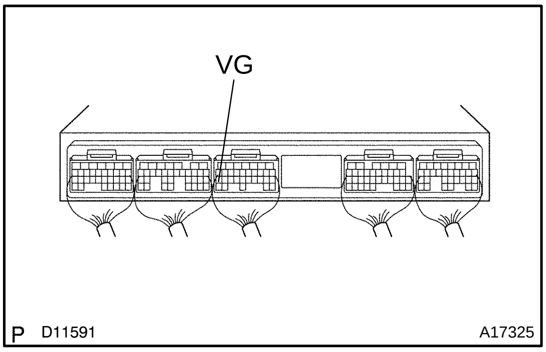
CHECK:
Measure the voltage between terminal 3 of the mass air flow meter connector and body ground.

OK:
Voltage: 9 to 14 V

NG	Go to step 5.

OK

3	**Check voltage between terminal VG of ECM connector and body ground.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Start the engine.

CHECK:

Measure the voltage between terminal VG of the ECM connector and body ground while the engine is idling.

OK:

Voltage:
1.1 to 1.5 V (P or N position and A/C switch OFF)

OK → **Replace ECM (See page SF-74).**

NG ↓

4	**Check for open and short in harness and connector between mass air flow meter and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK ↓

Replace mass air flow meter.

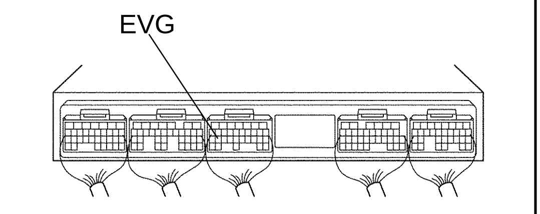
5	**Check for open in harness and connector between mass air flow meter and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK ↓

Check ECM power source circuit (See page DI-31 1).

6	**Check continuity between terminal EVG of ECM connector and body ground.**



PREPARATION:
Remove the ECM hood (See page SF-74).
CHECK:
Check the continuity between terminal EVG of the ECM connector and body ground.
OK:
Continuity (1 Ω or less)

NG → **Replace ECM (See page SF-74).**

OK

7	**Check for open in harness and connector between mass air flow meter and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace mass air flow meter.

DIAKM-02

DTC	P0101	Mass or Volume Air Flow Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100 on page DI-70 .

DTC No.	DTC Detecting Condition	Trouble Area
P0101	After engine is warmed up, conditions (a) and (b) continue for more than 10 seconds with engine speed less than 900 rpm: (2 trip detection logic) (a) Throttle valve fully closed (b) Mass air flow meter output ⊖ 2.2 V	Mass air flow meter
	Conditions (a) and (b) continue for more than 6 seconds with engine speed 0 rpm or more: (2 trip detection logic) (a) VTA 0.1 V (b) Mass air flow meter output ± 0.4 V	
	Conditions (a) and (b) continue for more than 6 seconds with engine speed 1,500 rpm or more: (2 trip detection logic) (a) VTA 0.63 V (b) Mass air flow meter output ± 1.0 V	

MONITOR DESCRIPTION

The MAF (Mass Air Flow) meter helps the ECM calculate the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air. By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to these components in the MAF meter. The voltage level is proportional to the air flow through the MAF meter. The ECM interprets this voltage as the intake air amount. If there is a defect in the MAF meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.

Example:

If the voltage is more than 2.2 V at idle or less than 0.4 V at idle OFF, the ECM interprets this as a defect in the MAF meter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0101	Mass air flow meter rationality
Required sensors/components	Main sensors/components	Mass air flow meter
	Related sensors/components	Engine speed sensor, Engine coolant temperature sensor, Throttle position sensor
Frequency of operation	Continuous	
Duration	10 sec. (High voltage) 6 sec. (Low voltage)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
High voltage:		
Engine speed	-	900 rpm
Idle	ON	
Engine coolant temperature	70 °C (158 °F)	-
Low voltage (Case 1):		
Engine speed	0 rpm	-
Throttle position	0.1 V	-
Low voltage (Case 2):		
Engine speed	1,500 rpm	-
Throttle position	0.63 V	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Mass air flow meter voltage (High voltage)	More than 2.2 V
Mass air flow meter voltage (Low voltage, Case 1)	Less than 0.4 V
Mass air flow meter voltage (Low voltage, Case 2)	Less than 1.0 V

WIRING DIAGRAM

Refer to DTC P0100 on page DI-70 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Are there any other codes (besides DTC P0101) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.

(c) When using hand-held tester, Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTCs.

RESULT:

Display (DTC output)	Proceed to
P0101 and other DTCs	A
Only P0101	B

HINT:

If any other codes besides P0101 are output, perform the troubleshooting for those DTCs first.

A → **Replace mass air flow meter.**

B

Go to relevant DTC chart (See page DI-35).

DIAKN-02

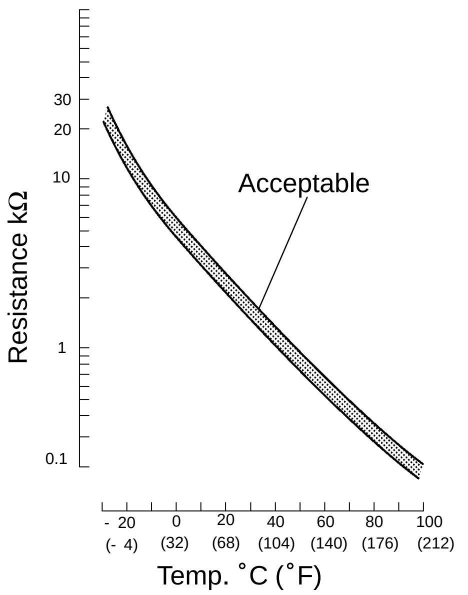
DTC	P0110	Intake Air Temperature Circuit

DTC	P0112	Intake Air Temperature Circuit Low Input

DTC	P0113	Intake Air Temperature Circuit High Input

CIRCUIT DESCRIPTION

Fig. 1



Y A15475

The intake air temperature (IAT) sensor, mounted on the mass air flow (MAF) meter, monitors the intake air temperature. The IAT sensor has a thermistor that varies its resistance depending on the temperature of the intake air. When the air temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected as voltage changes to the ECM terminal. (See Fig. 1).

The intake air temperature sensor is connected to the ECM. The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from terminal THA (THAR) via resistor R.

That is, the resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature sensor changes in accordance with changes in the intake air temperature, the potential at terminal THA (THAR) also changes. Based on this signal, the ECM increases the fuel injection volume to improve the driveability during cold engine operation.

DTC No.	Procced to	DTC Detection Condition	Trouble Area
P0110	Step 1	Open or short in intake air temperature sensor circuit for 0.5 sec.	• Open or short in intake air temperature sensor circuit • Intake air temperature sensor (built in mass air flow meter) • ECM
P0112	Step 4	Short in intake air temperature sensor circuit for 0.5 sec.	
P0113	Step 2	Open in intake air temperature sensor circuit for 0.5 sec.	

HINT:
After confirming DTC P0110, use the OBD II scan tool or hand-held tester to confirm the intake air temperature from the CURRENT DATA.

Displayed Temperature	Malfunction
-40˚C (-40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the intake air temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the IAT (Intake Air Temperature) sensor and sets a DTC.
Example:
When the sensor voltage output equal to -40°C (-40°F), or more than 140°C (284°F).

MONITOR STRATEGY

Related DTCs	P0110	Intake air temperature sensor range check (Fluttering)
	P0112	Intake air temperature sensor range check (Low resistance)
	P0113	Intake air temperature sensor range check (High resistance)
Required sensors/components	Intake air temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

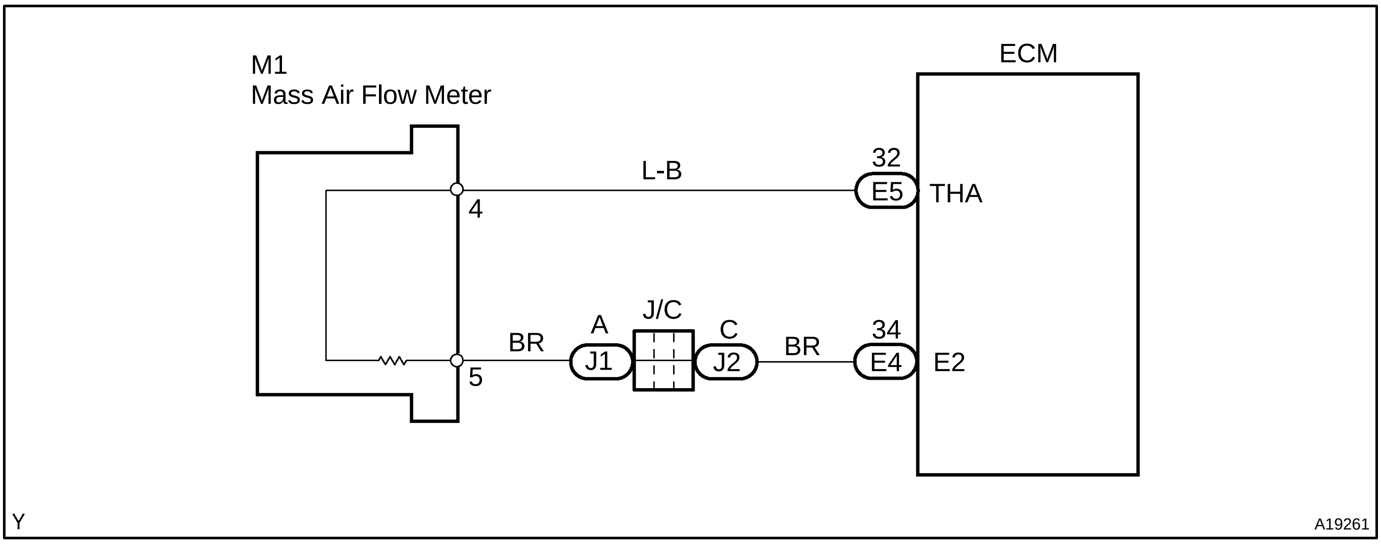
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0110:	
Intake air temperature sensor resistance (Intake air temperature)	Less than 98.5 Ω, or more than 156 kΩ (More than 140°C (284°F), or less than -40°C (-40°F)
P0112:	
Intake air temperature sensor resistance (Intake air temperature)	Less than 98.5 Ω (More than 140°C (284°F))
P0113:	
Intake air temperature sensor resistance (Intake air temperature)	More than 156 kΩ (Less than -40°C (-40°F))

COMPONENT OPERATING RANGE

Parameter	Standard Value
Intake air temperature sensor resistance	98.5 Ω (140°C (281°F)) to 156 kΩ (-40 °C (-40°F))

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Connect OBD II scan tool or hand-held tester, and read value of intake air temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL DADA / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

Same as actual intake air temperature.

RESULT:

Temperature Displayed	Proceed to
-40 °C (-40°F)	A
140°C (284°F) or more	B
OK (Same as air temperature near to the intake)	C

HINT:

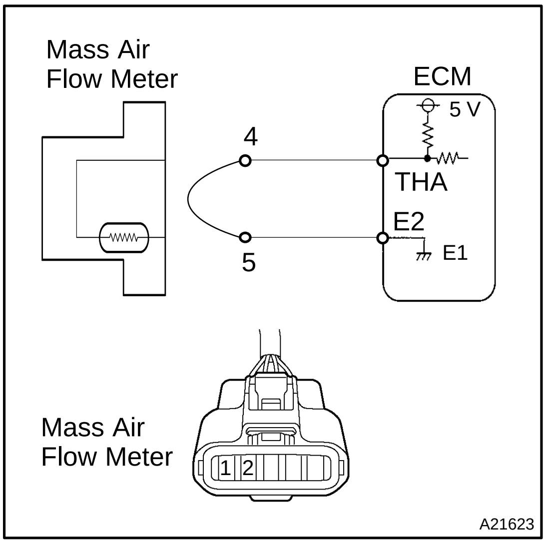
- If there is open circuit, the OBD II scan tool or the hand-held tester indicates -40°C (-40 °F).
- If there is short circuit, the OBD II scan tool or the hand-held tester indicates 140°C (284°F) or more.

B	**Go to step 4.**

C	**Check for intermittent problems (See page DI-3).**

A

2	**Check for open in harness or ECM.**



PREPARATION:

(a) Disconnect the mass air flow meter connector.
(b) Connect the sensor and wire harness terminals together.
(c) Turn the ignition switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

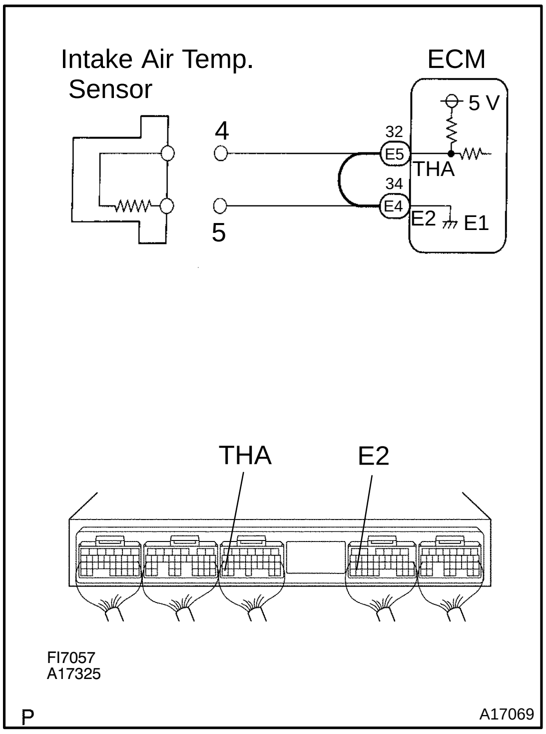
OK:

Temperature value: 140°C (284°F) or more

OK	**Confirm good connection at sensor. If OK, replace mass air flow meter.**

NG

3	**Check for open in harness or ECM.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).
(b) Connect terminals THA and E2 of the ECM connector together.

HINT:

The mass air flow meter connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page IN-33).

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

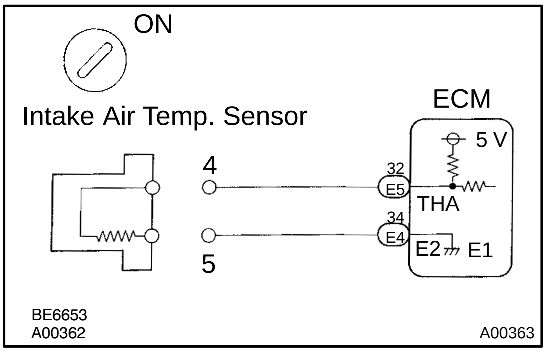
Temperature value: 140°C (284°F) or more

OK	**Open in harness between terminal E2 or THA, repair or replace harness.**

NG

Confirm good connection at ECM. If OK, replace ECM (See page SF-74).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

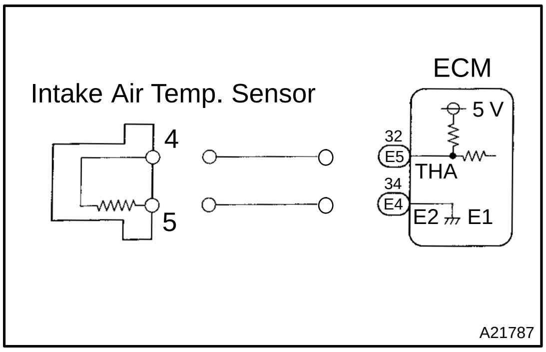
OK:

Temperature value: -40°C (-40°F)

OK	Replace mass air flow meter.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).
(b) Disconnect the E4 and E5 connectors from the ECM.
HINT:
The mass air flow meter connector is disconnected.
(c) Turn the ignition switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

Temperature value: -40°C (-40°F)

OK	Repair or replace harness or connector.

NG

Replace ECM (See page SF-74).

DIAKO-02

DTC	**P0115**	**Engine Coolant Temperature Circuit**

DTC	**P0117**	**Engine Coolant Temperature Circuit Low Input**

DTC	**P0118**	**Engine Coolant Temperature Circuit High Input**

CIRCUIT DESCRIPTION

A thermistor is built into the engine coolant temperature sensor and changes the resistance value according to the engine coolant temperature. The structure of the sensor and connection to the ECM is the same as those of intake air temperature sensor.

HINT:

If the ECM detects the DTC P0115, P0117 or P0118, it operates the fail-safe functions in which the engine coolant temperature is assumed to be 80™C (176™F).

DTC No.	Procced to	DTC Detection Condition	Trouble Area
P0115	Step 1	Open or short in engine coolant temperature sensor circuit for 0.5 sec.	✓Open or short in engine coolant temperature sensor circuit ✓Engine coolant temperature sensor ✓ECM
P0117	Step 4	Short in engine coolant temperature sensor circuit for 0.5 sec.	
P0118	Step 2	Open in engine coolant temperature sensor circuit for 0.5 sec.	

HINT:

After confirming DTC P0115, P0117 or P0118, confirm the engine coolant temperature in the "DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL" using the hand-held tester or the OBD II scan tool.

Temperature Displayed	Malfunction
-40 °C (-40°F)	Open circuit
140C° (284°F) or more	Short circuit

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor.

The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.

Example:

When the ECM calculates that the ECT is less than -40™C (-40™F), or more than 140™C (284™F), and if either condition continues for 0.5 sec. or more, the ECM will set a DTC.

MONITOR STRATEGY

Related DTCs	P0115	Engine coolant temperature sensor range check (Fluttering)
	P0117	Engine coolant temperature sensor range check (Low resistance)
	P0118	Engine coolant temperature sensor range check (High resistance)
Required sensors/components	Engine coolant temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

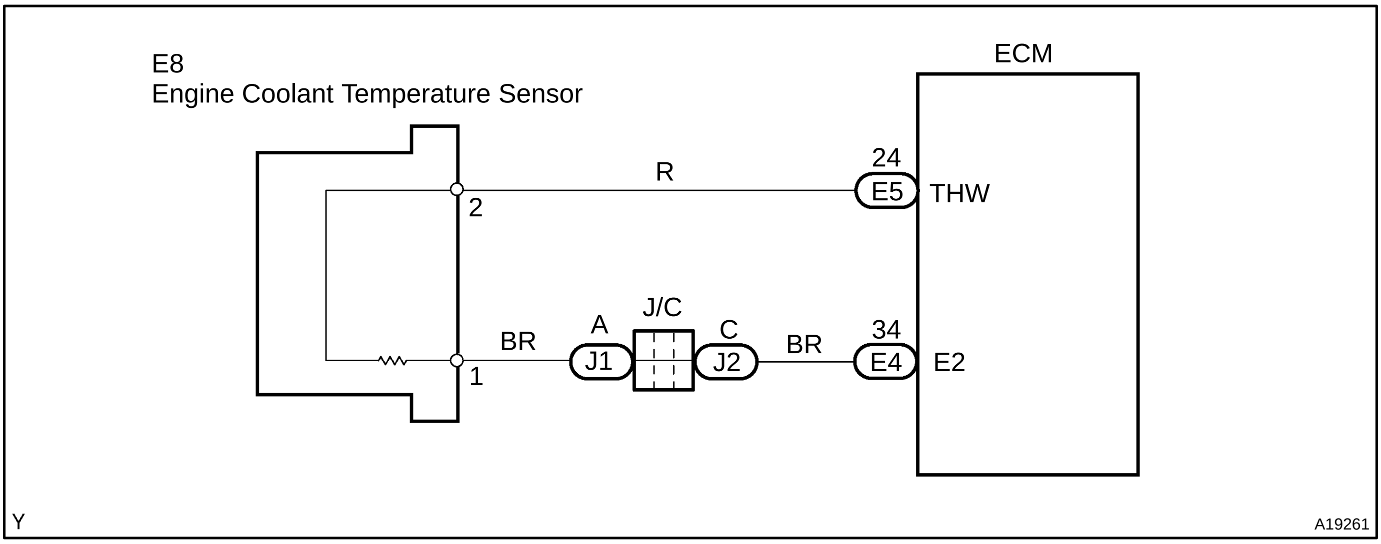
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0115:	
Engine coolant temperature sensor resistance (Coolant temperature)	Less than 79 Ω or more than 156 kΩ (More than 140 ℃ (284 ℉) or less than -40 ℃ (-40 ℉))
P0117:	
Engine coolant temperature sensor resistance (Coolant temperature)	Less than 79 Ω (More than 140 ℃ (284 ℉))
P0118:	
Engine coolant temperature sensor resistance (Coolant temperature)	More than 156 kΩ (Less than -40 ℃ (-40 ℉))

COMPONENT OPERATING RANGE

Parameter	Standard Value
Engine coolant temperature sensor resistance	79 Ω (140 ℃ (281 ℉)) to 156 kΩ (-40 ℃ (-40 ℉))

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If different DTCs that are related to different systems are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using hand-held tester or OBD II scan tool. Because freeze frame records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Connect OBD II scan tool or hand-held tester, and read value of engine coolant temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL DATA / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

Same as actual engine coolant temperature.

RESULT:

Temperature Displayed	Proceed to
-40 °C (-40°F)	A
140°C (284°F) or more	B
OK (Same as air temperature near to the intake)	C

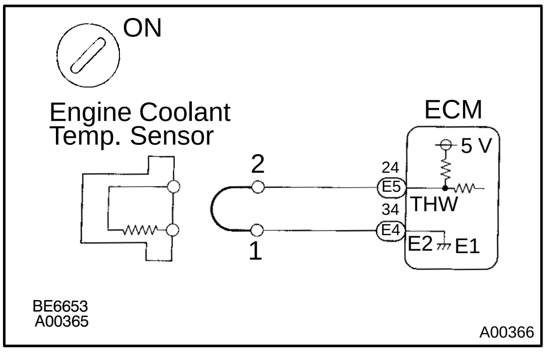
HINT:

- If there is open circuit, the OBD II scan tool or the hand-held tester indicates -40°C (-40°F).
- If there is short circuit, the OBD II scan tool or the hand-held tester indicates 140°C (284°F) or more.

B	**Go to step 4.**
C	**Check for intermittent problems (See page DI-3).**

A

2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the engine coolant temperature sensor connector.
(b) Connect the sensor wire harness terminals together.
(c) Turn the ignition switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

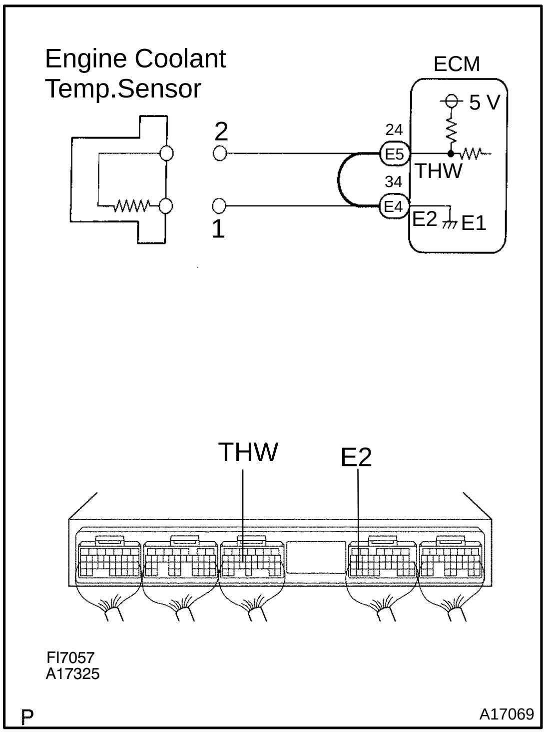
OK:

Temperature value: 140°C (284°F) or more

OK	Confirm good connection at sensor. If OK, replace engine coolant temperature sensor.

NG

3	**Check for open in harness or ECM.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Connect terminals THW and E2 of the ECM connector.

HINT:

The engine coolant temperature sensor connector is disconnected. Before checking, do a visual and contact pressure check for the ECM connector (See page IN-33).

(c) Turn the ignition switch ON.

(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

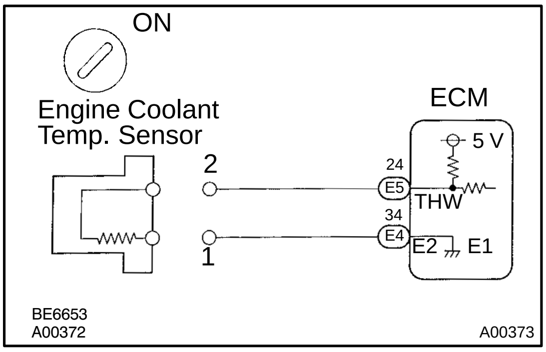
Temperature value: 140°C (284°F) or more

OK → **Open in harness between terminal E2 or THW, repair or replace harness.**

NG

Confirm good connection at ECM. If OK, replace ECM (See page SF-74).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the engine coolant temperature sensor connector.
(b) Turn the ignition switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

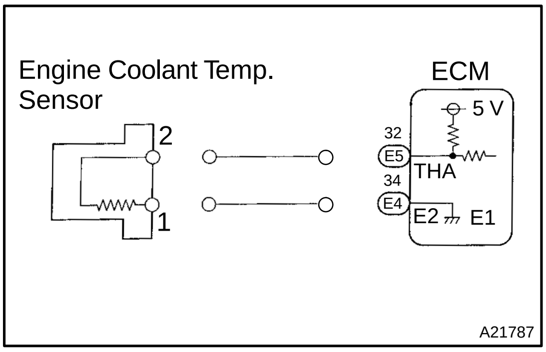
OK:

Temperature value: -40°C (-40°F)

OK	Replace engine coolant temperature sensor.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).
(b) Disconnect the E4 and E5 connectors from the ECM.

HINT:

The engine coolant temperature sensor connector is disconnected.

(c) Turn the ignition switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or hand-held tester.

OK:

Temperature value: -40°C (-40°F)

OK	Repair or replace harness or connector.

NG

Replace ECM (See page SF-74).

DIC44-01

DTC	P0116	Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A)

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI–86.

DTC No.	DTC Detection Condition	Trouble Area
P0116	When THW ≧ 35°C (95°F) and less than 60°C (140°F), and THA ≧ -6.7°C (20°F) when starting engine, conditions (a) and (b) continue: (2 trip detection logic) (a) Vehicle has accelerated and decelerated (b) Water temp. change is lower than 3°C (5.4°F) from water temp. since when starting engine	✓Engine coolant temp. sensor
	In case that reading value of water temp. sensor will not change more than 1°C (1.8°F) even after repeating 6 trips (detection logic) of adjusting speed pattern with THW more than 60°C (140°F) when starting engine	

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on the temperature of the engine coolant. When the coolant temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected in the voltage output from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the ECT sensor and sets a DTC.
Examples:
(1) Upon starting the engine, the ECT is between 35°C (95°F) and 60°C (140°F). If after driving for 250 sec., the ECT still remains within 3°C (5.4°F) of the starting temperature, a DTC will be set (2 trip detection logic).
(2) Upon starting the engine, the ECT is over 60°C (140°F). If after driving for 250 sec., the ECT still remains within 1°C (1.8°F) of the starting temperature, a DTC will be set (6 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0116	Engine coolant temperature sensor range check (Stuck)
Required sensors/components	Main sensors/components	Engine coolant temperature sensor
	Related sensors/components	Intake air temperature sensor, Crankshaft position sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	250 sec.	
MIL operation	2 driving cycles (When temperature is fixed between 35°C (95°F) and 60°C (140°F)) 6 driving cycles (When temperature is fixed at 60°C (140°F) or more)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1 (When temperature is fixed between 35 °C (95 °F) and 60 °C (140 °F)):		
Cumulative idle off period	250 sec.	-
Speed increase 30 km/h (19 mph) or more	10 times	-
Engine coolant temperature	35 °C (95 °F)	60 °C (140 °F)
Intake air temperature	-6.7 °C (20 °F)	-
Case 2 (When temperature is fixed at 60 °C (140 °F) or more):		
Engine coolant temperature	60 °C (140 °F)	-
Intake air temperature	-6.7 °C (20 °F)	-
Stop and go	Stop for 20 sec. or more and accelerate to more than 70 km/h (43 mph)	
70 km/h (43 mph) in less than 40 sec.	Decrease from 65 km/h (40 mph) to 3 km/h (2 mph) in 35 sec. and stop for 10 sec.	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case1 (When temperature is fixed between 35 °C (95 °F) and 60 °C (140 °F)):	
Change of engine coolant temperature value	Less than 3 °C (5.4 °F)
Case2 (When temperature is fixed at 60 °C (140 °F) or more):	
Change of engine coolant temperature value	1 °C (1.8 °F) or less

COMPONENT OPERATING RANGE

Standard Value
Engine coolant temperature changes with the actual engine coolant temperature

INSPECTION PROCEDURE

HINT:

- If DTCs P0115, P0116, P0117, P0118 and P0125 are output simultaneously, the engine coolant temperature sensor circuit may be open or short. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Replace engine coolant temperature sensor.

DIC45-01

DTC	**P0120**	**Throttle Pedal Position Sensor/Switch "A" Circuit**

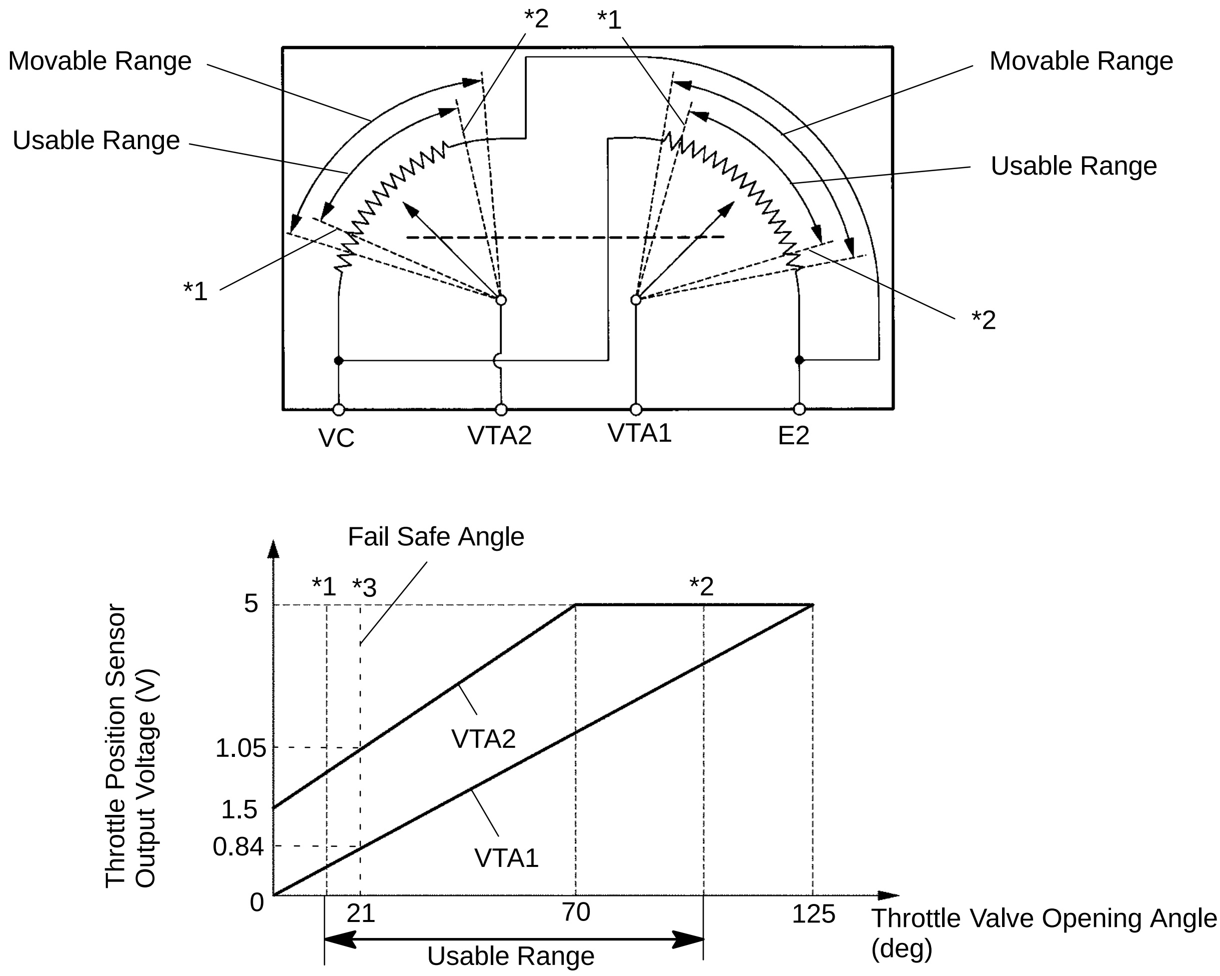
DTC	**P0122**	**Throttle Pedal Position Sensor/Switch "A" Circuit Low Input**

DTC	**P0123**	**Throttle Pedal Position Sensor/Switch "A" Circuit High Input**

HINT:
There are the purpose for the "throttle position sensor".

CIRCUIT DESCRIPTION

The throttle position sensor is mounted on the throttle body and it has 2 sensors to detect the throttle opening angle and a malfunction of the throttle position sensor.
The voltage applied to the terminals VTA1 and VTA2 of the ECM changes between 0 V to 5 V in proportion to the opening angle of the throttle valve. The VTA1 is a signal to indicate the actual throttle valve opening angle which is used for the engine control, and the VTA2 is a signal to indicate the information about the opening angle which is used for detecting a malfunction.
The ECM judges the current opening angle of the throttle valve from these signals input from terminals VTA1 and VTA2, and the ECM controls the throttle motor to make the throttle valve angle properly in response to the driving condition.
When a malfunction is detected, the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the ignition switch is turned OFF.



*1: Throttle Valve Fully Closed 15°
(Throttle Position Opening Position Expressed as Percentage (VAT1) 0 %)

*2: Throttle Valve Fully Opend 104°
(Throttle Position Opening Position Expressed as Percentage (VAT1) about 100 %)

*3: Fail Safe Angle 21°
(Throttle Position Opening Position Expressed as Percentage (VAT1) 8 %)

A02395 A02396 A19653

DTC No.	DTC Detection Condition	Trouble Area
Condition (a) of DTC P0120, P0122, P0123, P0220, P0222 or P0223 continues for 10 sec. when idle is ON, but for 2 seconds when idle is OFF		- Open or short in throttle position sensor circuit - Throttle position sensor - ECM
P0120	Detection conditions for DTCs P0122 and P0123 are not satisfied but condition (a) is satisfied (a) VTA1 ± 0.2 V or VTA1 ⊖ 4.8 V	
P0122	(a) VTA1 ± 0.2 V	
P0123	(a) VTA1 ⊖ 4.8 V	

HINT:

DTC No.	Main Trouble Area
P0122	- Throttle position sensor - VTA1 circuit open - VC circuit open (when the VC circuit is open, DTCs P0222 and P2135 are also output simultaneously)
P0123	- Throttle position sensor - E2 circuit open

NOTICE:
When a malfunction is detected, the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the ignition switch is turned OFF.

HINT:
- After confirming DTCs, use the hand-held tester or the OBD II scan tool to confirm the throttle valve opening percentage and closed throttle position switch condition.
- The THROTTLE POS means VTA1 signal as well as the THROTTLE POS #2 for the VTA2 signal.
  Refference (Normal condition):

Tester display	Accelerator pedal released	Accelerator pedal depressed
THROTTLE POS	8 to 20 %	64 to 96 %
THROTTLE POS #2	2.0 to 2.9 V	4.5 to 5.5 V

MONITOR DESCRIPTION

The ECM uses throttle position sensor to monitor the throttle valve opening angle.

(a) There is a specific voltage difference expected between VTA1 and VTA2 for each throttle opening angle.
- If the difference between VTA1 and VTA2 is incorrect, the ECM interprets this as a fault and will set a DTC.

(b) VTA1 and VTA2 each have a specific voltage operating range.
- If VTA1 or VTA2 is out of the normal operating range, the ECM interprets this as a fault and will set a DTC.

(c) VTA1 and VTA2 should never be close to the same voltage levels.
- If VTA1 is within 0.02 V of VTA2, the ECM interprets this as a short circuit in the throttle position sensor system and will set a DTC.

MONITOR STRATEGY

Related DTCs	P0120	Throttle position sensor (sensor 1) range check (Fluttering)
	P0122	Throttle position sensor (sensor 1) range check (Low voltage)
	P0123	Throttle position sensor (sensor 1) range check (High voltage)
Required sensors/components	Throttle position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
Throttle control motor power	ON

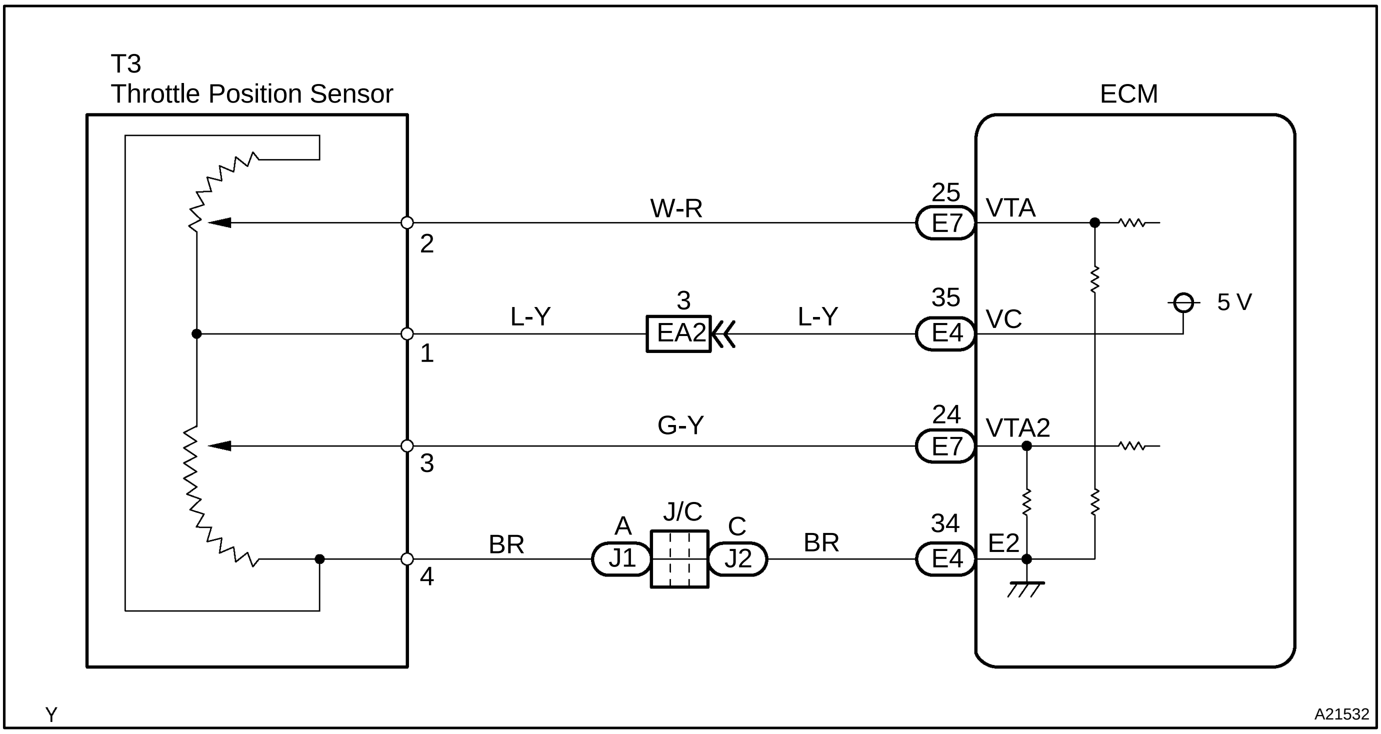
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0120:	
VTA1 voltage	0.2 V or less or 4.8 V or more (2 sec. or more)
P0122:	
VTA1 voltage	0.2 V or less (2 sec. or more)
P0123:	
VTA1 voltage	4.8 V or more (2 sec. or more)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle position sensor VTA1 voltage	0.6 to 3.96 V
Throttle position sensor VTA2 voltage	2.25 to 5.0 V

WIRING DIAGRAM

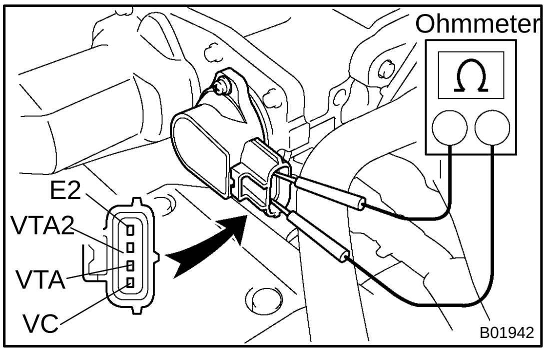


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check throttle position sensor.**



PREPARATION:

Disconnect the throttle position sensor connector.

CHECK:

(a) Measure the resistance between terminals VC and E2 of the throttle position sensor.

(b) Measure the resistance between terminals VTA and E2 of the throttle position sensor.

(c) Measure the resistance between terminals VTA2 and E2 of the throttle position sensor.

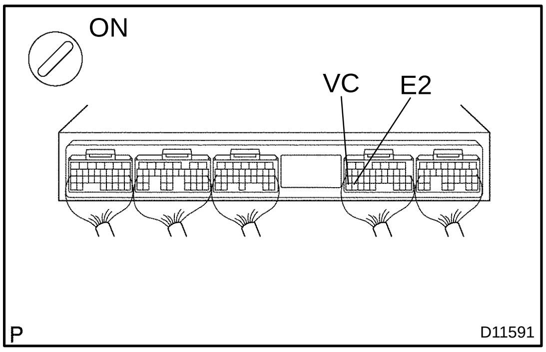
OK:

Throttle position sensor terminal	Resistance
VC (1) - E2 (4)	1.2 to 3.2 Ω at 20˚C (68˚F)
VTA (2) - E2 (4)	1.8 to 10.5 Ω at 20˚C (68˚F)
VTA2 (3) - E2 (4)	

NG	**Replace throttle position sensor.**

OK

2	Check voltage between terminals VC and E2 of ECM connector.



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.
OK:
Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK

3	Check for open and short in harness and connector between throttle position sensor and ECM (See page SF-74).

NG → **Repair or replace harness or connector.**

OK

Replace throttle position sensor.

DIAKR-02

DTC	P0121	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance Problem

HINT:
This is the procedure of "throttle position sensor".

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page DI–95.

DTC No.	DTC Detecting Condition	Trouble Area
P0121	Condition (a) continues for 10 sec. when idle is ON, but for 2 sec. when idle is OFF : (a) Difference between VTA and VTA2 is out of threshold	Throttle position sensor

MONITOR DESCRIPTION

The ECM uses throttle position sensor to monitor the throttle valve opening angle.
This sensor including two signals, VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. There are several checks that the ECM performs confirm proper operation of the throttle position sensor and VTA1.
(a) There is a specific voltage difference expected between VTA1 and VTA2 for each throttle opening angle.
(b) VTA1 and VTA2 each have a specific voltage operating range.
(c) VTA1 and VTA2 should never be close to the same voltage levels.
If the difference between VTA1 and VTA2 is incorrect (a), the ECM interprets this as a fault and will set a DTC.
If VTA1 or VTA2 is out of the normal operating range (b), the ECM interprets this as a fault and will set a DTC.
If VTA1 is within 0.02 V of VTA2 (c), the ECM interprets this as a short circuit in the throttle position sensor system and will set a DTC.
DTC P0121 relates to condition (a) above.
If the voltage output difference of the VTA1 and VTA2 deviates from the normal operating range, the ECM interprets this as a malfunction of the throttle position sensor. The ECM will turn on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0121	Throttle position sensor rationality
Required sensors/components	Throttle position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
VTA2 voltage	-	4.6 V

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Different between VTA1 and VTA2 |VTA1 - (VTA2 × 0.8 to 1.2)|* * Corrected by learning value	Less than 0.1 V and more than 0.4 V

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Replace throttle position sensor (See page SF-37).

DIC46-01

DTC	P0125	Insufficient coolant temperature for closed loop fuel control

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI-86 .

DTC No.	DTC Detection Condition	Trouble area
P0125	If THW or THA is less than -6.6°C (20°F) at engine start, 20 minutes or more after starting engine, ECT sensor value is less than ”closed-loop enable temperature” (2 trip detection logic)	✓Cooling system ✓Engine coolant temperature sensor ✓Thermostat
	If THW and THA is between -6.6°C (20°F) and 10°C (50°F) at engine start; 5 minutes or more after starting engine, ECT sensor value is less than ”closed-loop enable temperature” (2 trip detection logic)	
	If THW and THA greater than 10°C (50°F) at engine start; 2 minutes or more after starting engine, ECT sensor value is less than ”closed-loop enable temperature” (2 trip detection logic)	

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the temperature of the engine coolant. The resistance of the sensor varies with the actual coolant temperature. The ECM applies a voltage to the sensor and the varying resistance of the sensor causes the signal voltage to vary. The ECM monitors the ECT signal voltage after engine start-up. If, after sufficient time has passed, the sensor still reports that the engine is not warmed up enough for closed-loop fuel control after sufficient time has passed, the ECM interprets this as a fault in the sensor or cooling system and sets a DTC.
Example:
The engine coolant temperature was 0 ™C (32 ™F) at engine start. After 5 min. running time, the ECT sensor still indicates that the engine is not warmed up enough to begin air fuel ratio feedback control of the air-fuel ratio. The ECM interprets this as a fault in the sensor or cooling system and will set a DTC.

MONITOR STRATEGY

Related DTCs	P0125	Insufficient coolant temperature for closed loop fuel control
Required sensors/components	Main sensors/components	Engine coolant temperature sensor, Cooling system, Thermostat
	Related sensors/components	Mass air flow meter
Frequency of operation	Continuous	
Duration	2 min. (at engine start, engine coolant or intake air temperature of 10°C (50°F) or more) 5 min. (at engine start, engine coolant or intake air temperature of -6.6°C (20°F) to 10°C (50°F)) 20 min. (at engine start, engine coolant or intake air temperature of less than -6.6°C (20°F))	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of Disable a Monitor" table (on page DI-3)	
Fuel cut	OFF	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Time until "engine coolant temperature" detection temperature reaches feedback start temperature	
When the temperature at the time of engine starting is 10°C (50°F) or more	Engine coolant temperature is less than "closed-loop enable temperature" when 2 min. or more after engine start
When the temperature at the time of engine starting is "-6.6 °C (20°F)" to "10°C (50°F)"	Engine coolant temperature is less than "closed-loop enable temperature" when 5 min. or more after engine start
When the temperature at the time of engine starting is -6.6 °C (20°F) or less	Engine coolant temperature is less than "closed-loop enable temperature" when 20 min. or more after engine start

INSPECTION PROCEDURE

HINT:

- If DTCs P0115, P0116, P0117, P0118 and P0125 are output simultaneously, the engine coolant temperature sensor circuit may be open or short. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	Are there any other codes (besides DTC P0125) being output?

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0125	A
"P0125" and other DTCs	B

HINT:
If any other codes besides "P0125" is output, perform the troubleshooting for those codes first.

B Go to relevant DTC chart (See page DI-35).

A

2	Check thermostat (See page CO-12).

NG — Replace thermostat (See page CO-1 1).

OK

3	Check cooling system.

CHECK:

Check that there is defect cooling system which causes overcool, such as abnormal radiator fan operation, modified cooling system and so on.

NG — Repair or replace cooling system.

OK

Replace engine coolant temperature sensor.

DIC47-01

DTC	P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

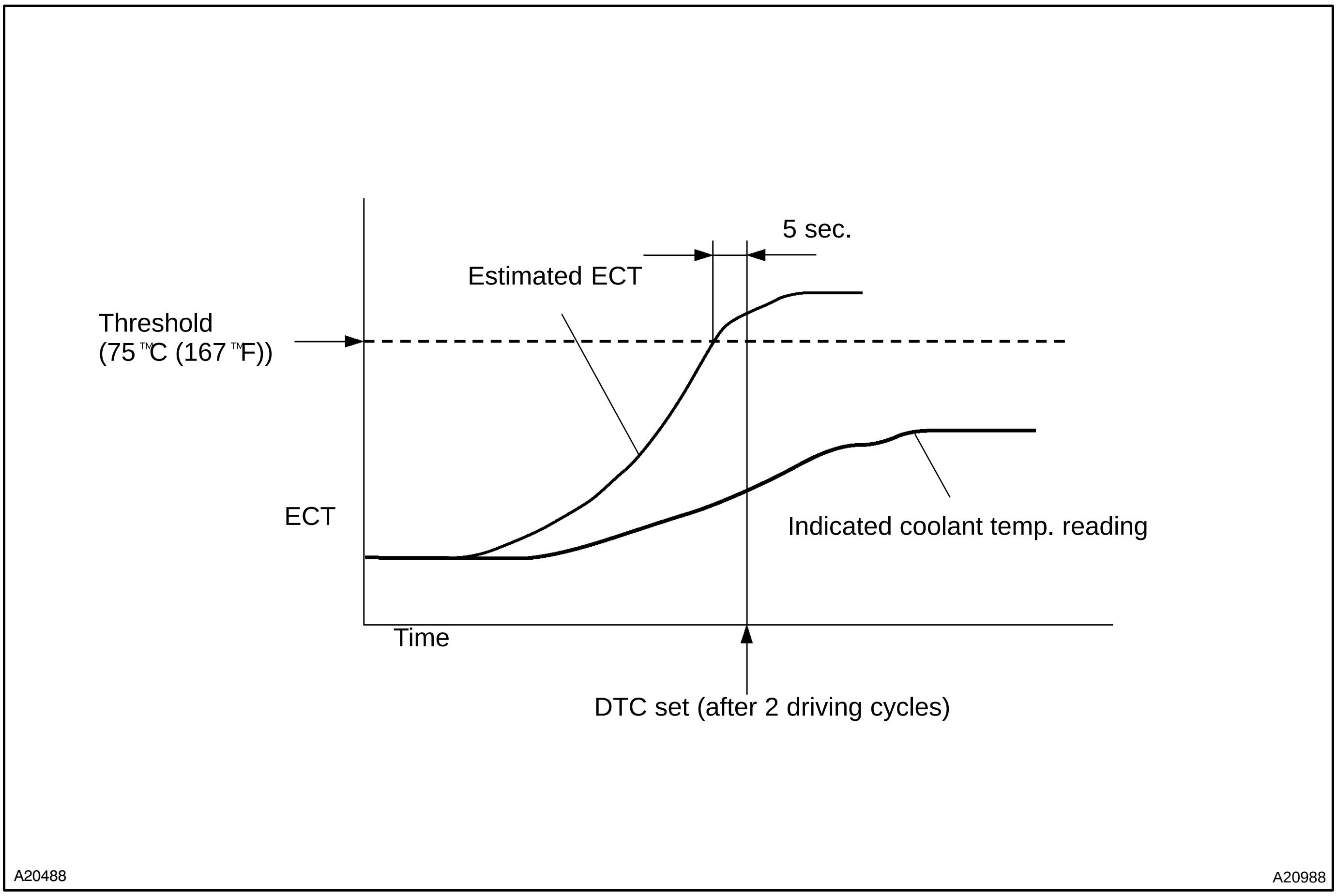
HINT:
This is the procedure of ”thermostat” malfunction detection.

CIRCUIT DESCRIPTION

If the engine coolant temperature (ECT) does not reach 75˚C (167˚F) despite sufficient warm - up time has elapsed.

DTC No.	DTC Detecting Condition	Trouble Area
P0128	Condition 1, 2 and 3: 1. Cold start 2. After engine is warmed up 3. THW<75 ˚C (167 ˚F)	✓Thermostat ✓Cooling system ✓Engine coolant temperature sensor ✓ECM

MONITOR DESCRIPTION



The ECM estimates the coolant temperature based on starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT (Engine Coolant Temperature). When the estimated coolant temperature reaches 75™C (167™F), the ECM checks the actual ECT. If the actual ECT is less than 75™C (167™F), the ECM will interpret this as a fault in the thermostat or engine cooling system and set a DTC.

MONITOR STRATEGY

Related DTCs	P0128	Thermostat
Required sensors/components	Main sensors/components	Engine coolant temperature sensor, Engine cooling system, Thermostat
	Related sensors/components	Intake air temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	15 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11.0 V	-
Intake air temperature (at engine start)	-10 °C (14 °F)	35 °C (95 °F)
Engine coolant temperature (at engine start)	-10 °C (14 °F)	35 °C (95 °F)
Difference between engine coolant temperature and intake air temperature (at engine start)	-15 °C (-27 °F)	7 °C (12.6 °F)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Duration period of both A and B	5 sec. or more
A. Estimated engine coolant temperature	75 °C (167 °F) or more
B. Engine coolant temperature sensor output value	Less than 75 °C (167 °F)

MONITOR RESULT

The detailed information is described in "CHECKING MONITOR STATUS" (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $08: Thermostat

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.625 and subtract 40 (°C)	ECT sensor output when estimated ECT reaches malfunction criterion	Malfunction criterion

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	Are there any other codes (besides DTC P0128) being output?

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTCs.

RESULT:

Display (DTC output)	Proceed to
P0128	A
”P0128” and other DTCs	B

HINT:
If any other codes besides P0128 is output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI–35).**

A ↓

2	Check cooling system.

CHECK:
Check that there is defect cooling system which causes overcool, such as abnormal radiator fan operation, modified cooling system and so on.

NG → **Repair or replace cooling system.**

OK ↓

3	Inspect thermostat (See page CO-12).

NG — Replace thermostat (See page CO-1 1).

OK

Replace ECM (See page SF-74).

DICDD-01

DTC	**P0130**	**Oxygen Sensor Circuit (Bank 1 Sensor 1)**

DTC	**P0150**	**Oxygen Sensor Circuit (Bank 2 Sensor 1)**

DTC	**P2195**	**Oxygen Sensor Signal Stauk Lean (Bank 1 Sensor 1)**

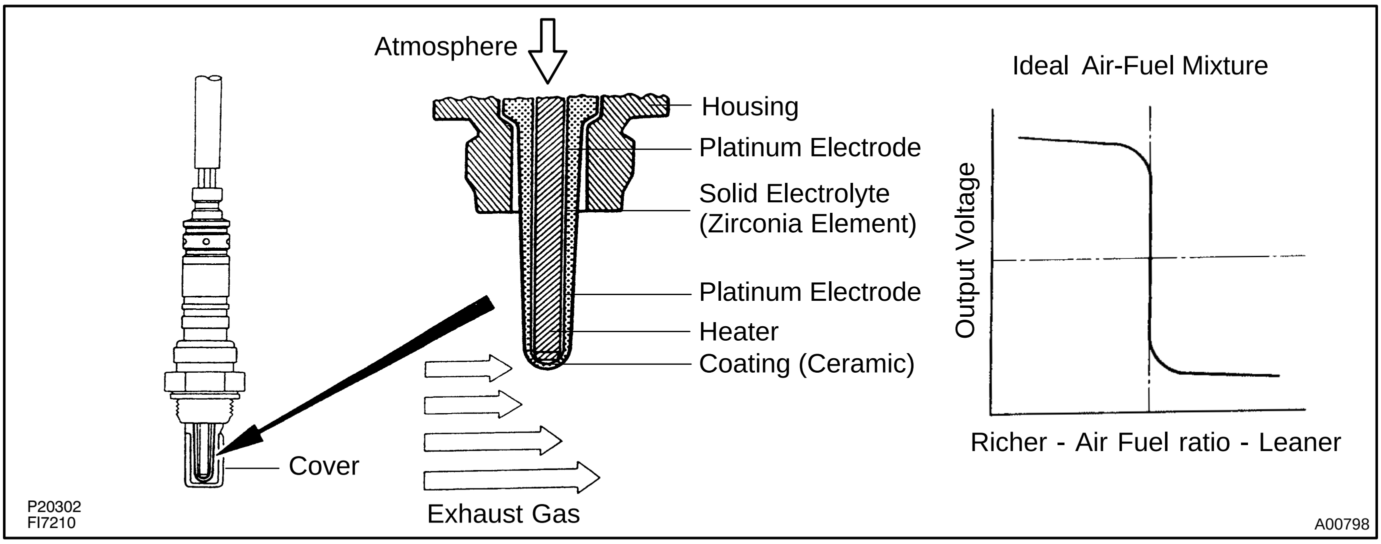
DTC	**P2196**	**Oxygen Sensor Signal Stauk Rich (Bank 1 Sensor 1)**

DTC	**P2197**	**Oxygen Sensor Signal Stauk Lean (Bank 2 Sensor 1)**

DTC	**P2198**	**Oxygen Sensor Signal Stauk Rich (Bank 2 Sensor 1)**

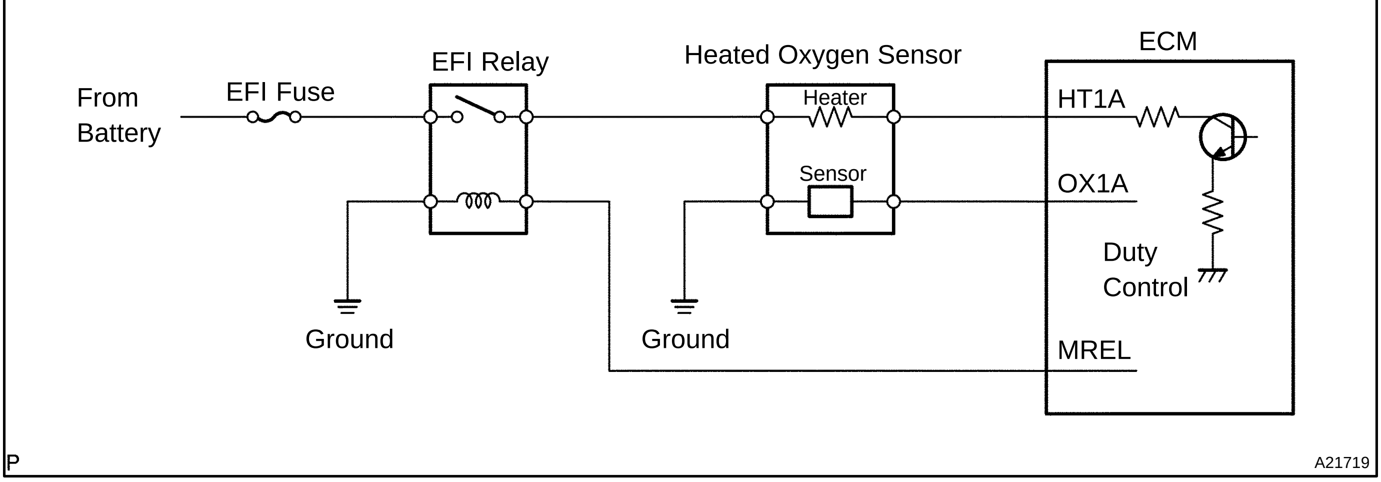
CIRCUIT DESCRIPTION

To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three-way catalytic converter is used, but for the most efficient use of the three-way catalytic converter, the air-fuel ratio must be precisely controlled so that it is always close to the stoichiometric air-fuel ratio.
The heated oxygen sensor has the characteristic which its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide the ECM with feedback to control the air-fuel ratio.
When the air-fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the heated oxygen sensor informs the ECM of the LEAN condition (low voltage, i.e. less than 0.45 V).
When the air-fuel ratio is RICHER than the stoichiometric air-fuel ratio, the oxygen concentration in the exhaust gas is reduced and the heated oxygen sensor informs the ECM of the RICH condition (high voltage, i.e. more than 0.45 V). The ECM judges by the voltage output from the heated oxygen sensor whether the air-fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the heated oxygen sensor causes output of abnormal voltage, this disables the ECM for performing an accurate air-fuel ratio control. The heated oxygen sensors include a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.



HINT:
The ECM provides a pulse width modulated control circuit to adjust current through the heater. The heated oxygen sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (Bank 1 Sensor 1 System Drawing):

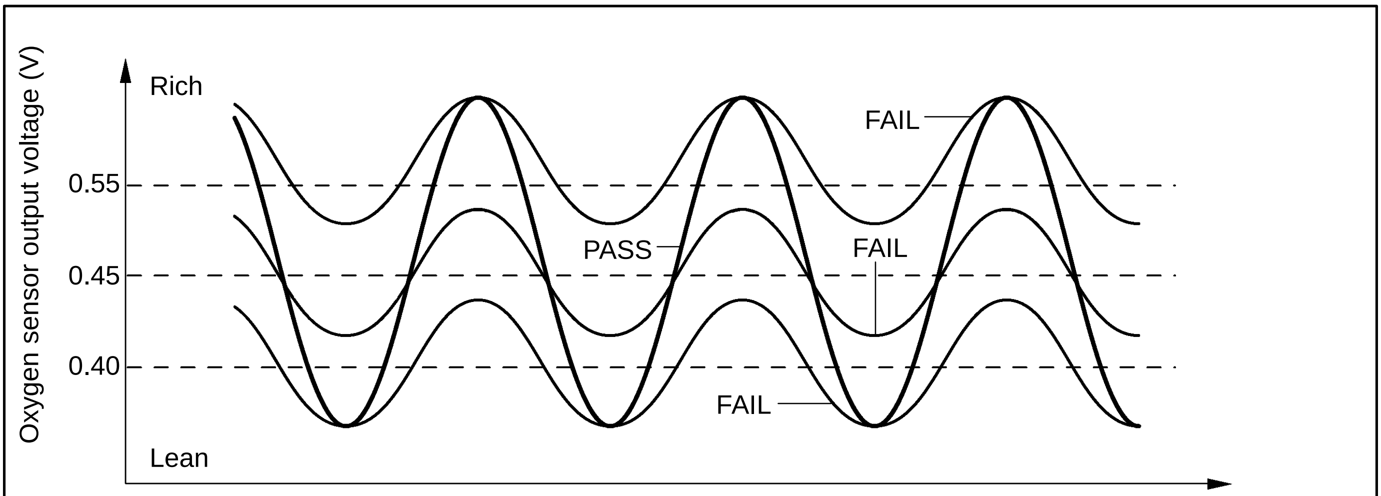


DTC No.	Detection Item	Trouble Area
P0130 P0150	Output voltage of heated oxygen sensor remains at 0.4 V or more, or 0.5 V or less, during idling after engine is warmed up (2 trip detection logic)	✓Open or short in heated oxygen sensor circuit ✓Heated oxygen sensor ✓EFI relay ✓Air induction system ✓Fuel pressure ✓Injector ✓ECM
P2195 P2197	Output voltage of heated oxygen sensor remains at 0.5 V or less, during idling after engine is warmed up (2 trip detection logic)	
P2196 P2198	Output voltage of heated oxygen sensor remains at 0.4 V or more, during idling after engine is warmed up (2 trip detection logic)	

HINT:

- Bank 1 refers to bank that includes cylinder No.1.
- Bank 2 refers to bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closer to the engine body.
- The heated oxygen sensor's output voltage and the short−term fuel trim value can be read using the OBD II scan tool or hand−held tester.

MONITOR DESCRIPTION



Pass / Fail definition of voltage malfunction

The ECM uses the heated oxygen sensor information to regulate the air-fuel ratio close to a stoichiometric ratio. This maximizes the catalytic converter's ability to purify the exhaust gas. The sensor detects oxygen levels in the exhaust gas and sends this signal to the ECM.

The inner surface of the sensor element is exposed to outside air. The outer surface of the sensor element is exposed to exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The heated oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. The heated oxygen sensor generates output voltage between 0 V and 1.0 V in response to the oxygen concentration in exhaust gas. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air-fuel ratio is RICH. When it is 0.4 V or less, the ECM judges that the air-fuel ratio is LEAN.

Under normal condition, the output voltage from the heated oxygen sensor alternates RICH and LEAN sides periodically. If the heated oxygen sensor outputs RICH signal (or LEAN signal) constantly, or if the heated oxygen sensor cannot output enough voltage to reach the minimum specification, the ECM interprets this as a malfunction in the heated oxygen sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0130	Front heated oxygen sensor voltage is constant at lean side or rich side (Bank 1)
	P0150	Front heated oxygen sensor voltage is constant at lean side or rich side (Bank 2)
	P2195	Front heated oxygen sensor voltage is constant at lean side (Bank 1)
	P2196	Front heated oxygen sensor voltage is constant at rich side (Bank 1)
	P2197	Front heated oxygen sensor voltage is constant at lean side (Bank 2)
	P2198	Front heated oxygen sensor voltage is constant at rich side (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen senor
	Related sensors/components	Crank position sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	20 to 36 sec. x (3 times)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Time after engine start	120 sec.	-
Idle	ON	
Fuel system status	Closed loop	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0130, P0150:	
Either of the following conditions A or B is met:	3 times or more
A. Front oxygen sensor voltage is 0.55 V or less	For 18 sec. or more
B. Front oxygen sensor voltage is 0.4 V or more	For 18 sec. or more
P2195, P2197:	
Front heated oxygen sensor voltage	Constant 0.55 V or less
P2196, P2198:	
Front heated oxygen sensor voltage	Constant 0.4 V or more

COMPONENT OPERATING RANGE

Parameter	Standard value
In the normal condition, the heated oxygen sensor voltage	0 to 1 V

O2S TEST RESULT

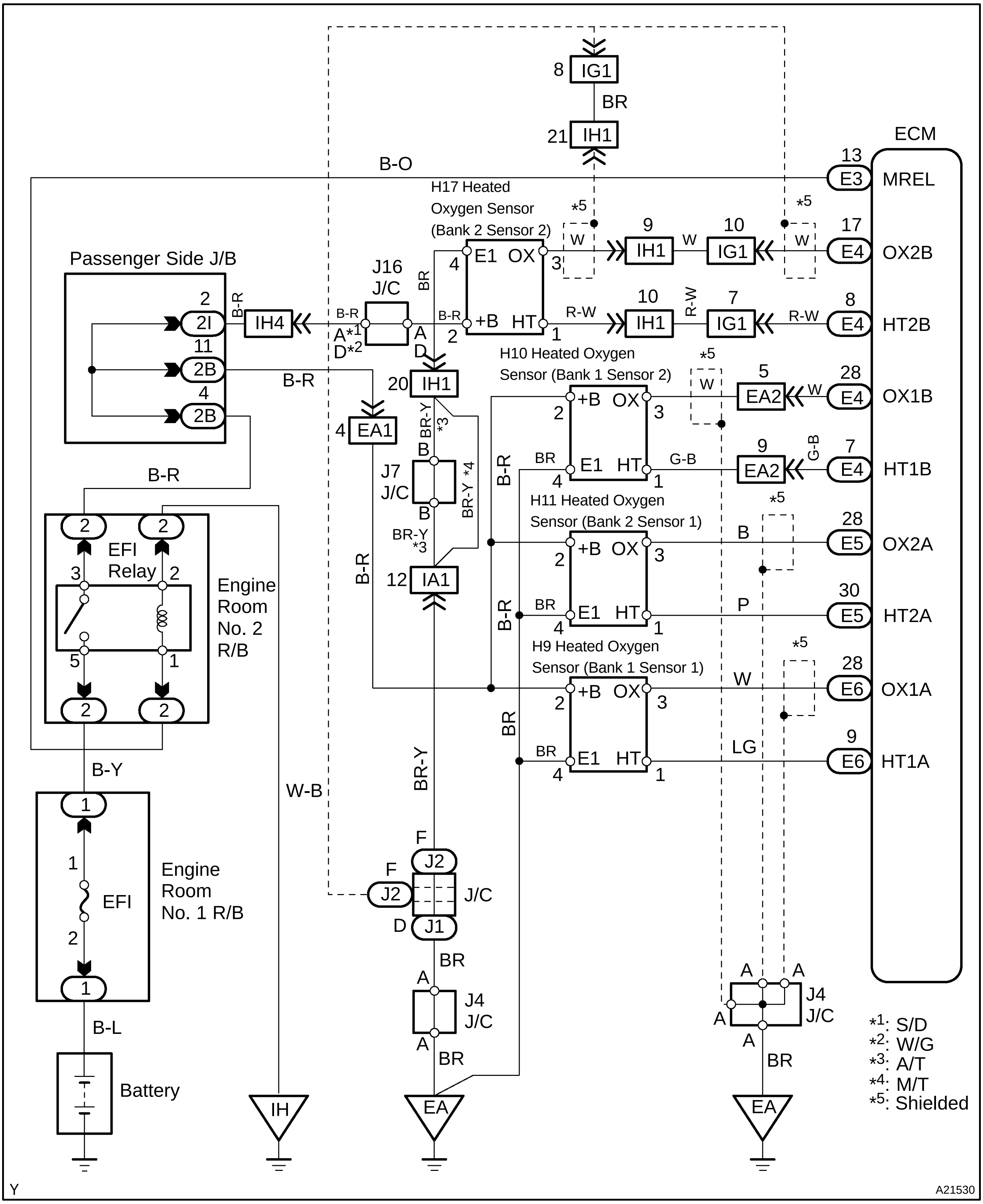
Refer to page DI-3 for detailed information.

Front HO2S voltage monitor

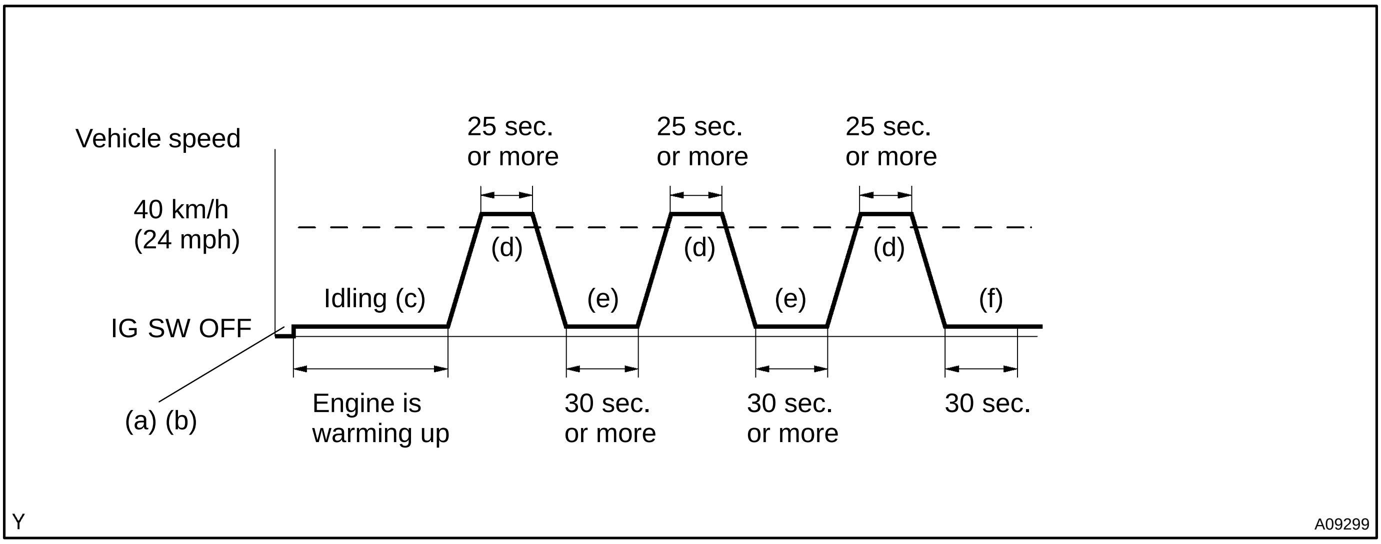
If the HO2S voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$07	Minimum front HO2S voltage	N/A	V
$08	Maximum front HO2S voltage	N/A	V

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN



(a) Connect the hand-held tester to the DLC3.
(b) Switch the hand-held tester from "normal mode" to "check mode" (See page DI-3).
(c) Start the engine and let the engine idle for warming up (Engine coolant Temp. is 75°C (167°F) or greater).
(d) Drive the vehicle at 40 km/h (24 mph) or more for 25 sec. or more.
(e) Let the engine idle for 25 sec. or more.
(f) Let the engine idle for 30 sec.

HINT:
If a malfunction exists, the MIL will light up during step (f).

NOTICE:
If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (c) to (f), then perform steps (c) to (f) again.

INSPECTION PROCEDURE

HINT:
Hand-held tester only:
The narrowing down the trouble area is possible by performing ACTIVE TEST of the following "A/F CONTROL" (Heated oxygen sensor or another can be distinguished).
(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).
HINT:
"A/F CONTROL" is an ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.
- (1) Connect the hand-held tester to the DLC3 on the vehicle.
- (2) Turn the ignition switch ON.
- (3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
- (4) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL".
- (5) Perform "A/F CONTROL" with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25% → rich output: More than 0.5 V
-12.5% → lean output: Less than 0.4 V

NOTICE:
However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter "ACTIVE TEST / A/F CONTROL/USER DATA" then select "O2S B1S1 and O2S B1S2" by pressing "YES" button and push "ENTER" button before pressing "F4" button.
NOTICE:
If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and heated oxygen sensor DTCs will be recorded, and the MIL then comes on.
HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	**Are there any other codes (besides DTC P0130, P0150, P2195, P2196, P2197 or P2198) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0130, P0150, P2195, P2196, P2197 and/or P2198”	A
”P0130, P0150 P2195, P2196, P2197 or P2198” and other DTCs	B

HINT:

If any other codes besides ”P0130, P0150, P2195, P2196, P2197 and/or P2198” are output, perform the troubleshooting for those DTCs first.

B	**Go to relevant DTC chart (See page DI-35).**

A

2	Check output voltage of heated oxygen sensor during idling.

PREPARATION:

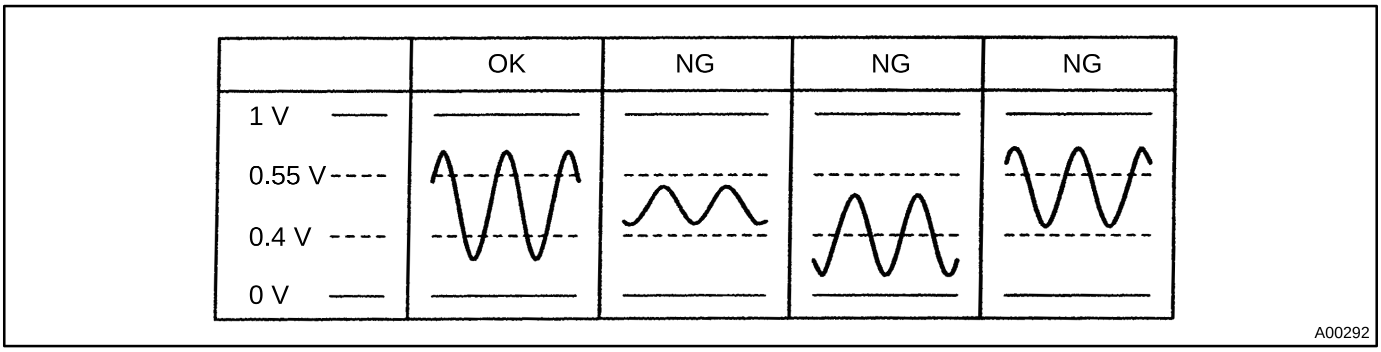
(a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
(b) Connect the hand-held tester or OBD II scan tool to the DLC3.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Use the OBD II scan tool or hand-held tester to read an output voltage of the heated oxygen sensor during idling.

OK:

Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



OK → **Go to step 9.**

NG ↓

3	Check resistance of heated oxygen sensor heater (See page SF-73).

NG → **Replace heated oxygen sensor.**

OK ↓

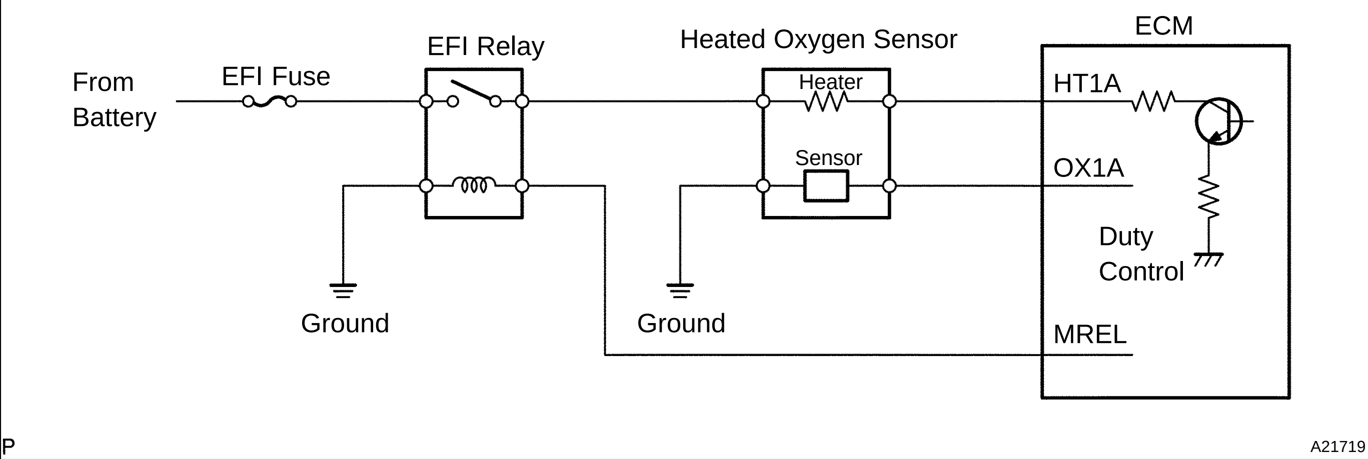
4	Check EFI relay (See page SF-50).

NG → **Replace EFI relay.**

OK ↓

5	Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN-33).

Reference (Bank 1 Sensor 1 System Drawing):



NG	Repair or replace harness or connector.

OK

6	Check air induction system (See page SF-1).

CHECK:
Check the air induction system for vacuum leaks.

NG	Repair or replace air induction system.

OK

7	Check fuel pressure (See page SF-6).

CHECK:
Check the fuel pressure (high or low pressure).

NG	Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).

OK

8	**Check injector injection (See page SF-22).**

NG → **Replace injector.**

OK

Replace heated oxygen sensor.

9	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

10	**Is there DTC P0130, P0150, P2195, P2196, P2197 or P2198 being output again?**

NO → **Check for intermittent problems (See page DI-427).**

YES

Replace heated oxygen sensor.

DIC49-01

DTC	P0133	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)

DTC	P0153	Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

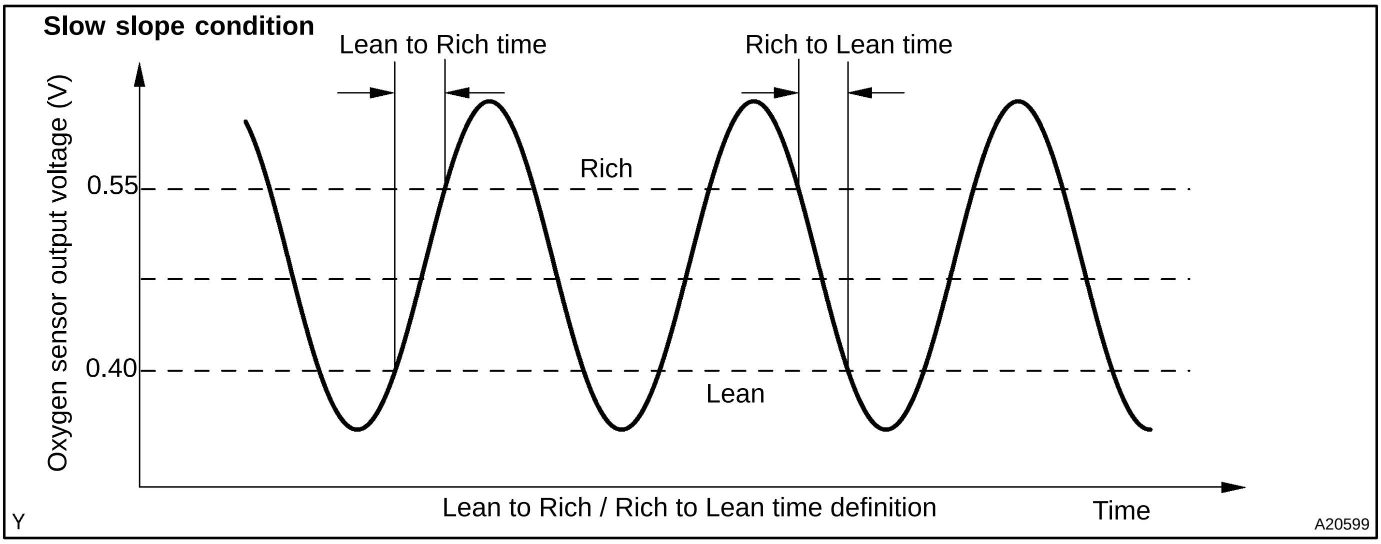
Refer to DTC P0130 on page DI-1 10.

DTC No.	DTC Detecting Condition	Trouble Area
P0133 P0153	After engine has been warmed up, if response time that heated oxygen sensor's output voltage reaches from RICH to LEAN. or from LEAN to RICH, is 0.6 second or more during idling. (2 trip detection logic) If response time of heated oxygen sensor's output voltage in one RICH-LEAN cycle is 6 seconds or more during idling. (2 trip detection logic)	Open or short in heated oxygen sensor circuit Heated oxygen sensor Air induction system Fuel pressure Injector ECM

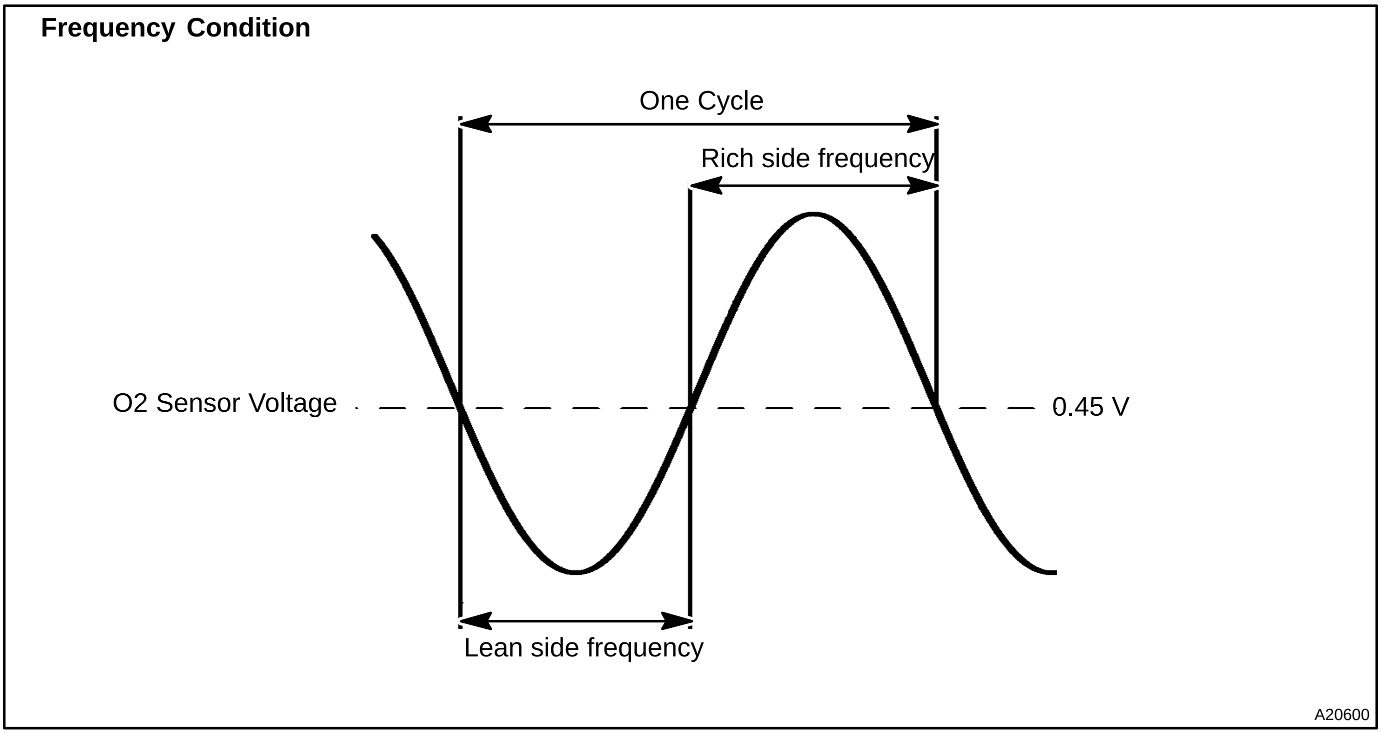
HINT:

- Bank 1 refers to bank that includes cylinder No.1.
- Bank 2 refers to bank that does not include cylinder No.1.
- Sensor 1 refers to the sensor closer to the engine body.

MONITOR DESCRIPTION



The ECM uses the heated oxygen sensor information to regulate the air-fuel ratio close to a stoichiometric ratio. This maximizes the catalytic converter's ability to purify the exhaust gas. The sensor detects oxygen levels in the exhaust gas and sends this signal to the ECM.
The inner surface of the sensor element is exposed to outside air. The outer surface of the sensor element is exposed to exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The heated oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. The heated oxygen sensor generates waveforms of a voltage between 0 V and 1 V in response to the oxygen concentration in exhaust gas. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air-fuel ratio is RICH. When it is 0.40 V or less, the ECM judges that the air-fuel ratio is LEAN.
The ECM monitors the response feature of the heated oxygen sensor. If the response time of the heated oxygen sensor output status change from RICH to LEAN or vice versa becomes longer, the ECM interprets this as a malfunction in the heated oxygen sensor and sets a DTC.



MONITOR STRATEGY

Related DTCs	P0133	Front heated oxygen sensor response monitor (Bank 1)
	P0153	Front heated oxygen sensor response monitor (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen sensor
	Related sensors/components	Crank position sensor, Vehicle speed sensor, Mass air flow meter
Frequency of operation	Once per drive cycle	
Duration	Within 60 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Frequency idle condition:		
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Idle	ON	
Vehicle speed	-	5 km/h (3 mph)
Fuel system status	Closed loop	
Time after engine start	120 sec.	-
Engine coolant temperature	75°C (167°F)	-
Frequency cruise condition:		
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Intake air amount	3 g/sec.	13 g/sec.
Time after engine start	120 sec.	-
Idle	OFF	
Fuel system status	Closed loop	
Engine speed	1,000 rpm	3,500 rpm
Engine coolant temperature	70°C (158°F)	-
Slow slope condition:		
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Time after engine start	120 sec.	-
Idle	ON	
Vehicle speed	-	5 km/h (3 mph)

Fuel system status	Closed loop	
Engine coolant temperature	40°C (104°F)	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Frequency idle condition	
Time required by the sensor's output voltage to change in one RICH-LEAN cycle	P0133 (Bank 1): 6.9 sec. or more P0153 (Bank 2): 7.4 sec. or more
Frequency cruise condition	
Time required by the sensor's output voltage to change in one RICH-LEAN cycle	a specific time or more
Slow slope condition	
Time that sensor's output voltage changes from 0.4 V to 0.55 V, or from 0.55 V to 0.4 V	0.9 sec. or more

COMPONENT OPERATING RANGE

Parameter	Standard value
Voltage output from heated oxygen sensor	Quickly fluctuates between 0.4 V and 0.55 V

O2S TEST RESULT

Refer to page DI-3 for detailed information.

Front HO2S slow slope monitor

If the HO2S sensor voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$03	Low sensor voltage for response time calculation	N/A	V
$04	High sensor voltage for response time calculation	N/A	V

If the time required to change is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$31	Time to change from Lean (±0.4 V) to Rich (⊖0.55 V)	N/A	sec.
$32	Time to change from Rich (⊖0.55 V) to Lean (±0.4 V)	N/A	sec.

Front HO2S frequency monitor (idling)

If the $38 is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$38	Average of switching frequency at idle	N/A	sec.

Front HO2S frequency monitor (cruse)

If the $90 is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$90	Remained value of that average of switching frequency is subtracted from average of switching frequency threshold	Multiply by 0.04096 plus 5.2	sec.

WIRING DIAGRAM

Refer to DTC P0130 on page DI-1 10.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

<u>**RESULT:**</u>

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few second delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter "ACTIVE TEST / A/F CONTROL / USER DATA" then select "O2S B1S1 and O2S B1S2" by pressing "YES" button and push "ENTER" button before pressing "F4" button.

NOTICE:

If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and DTCs P0133 and/or P0153 will be recorded, and the MIL then comes on.

- If different DTCs related to different systems while terminal E2 as ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1 Are there any other codes (besides DTC P0133 or P0153) being output?

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
"P0133 and/or P0153"	A
"P0133 or P0153" and other DTCs	B

HINT:
If any other codes besides "P0133 and/or P0153" are output, perform the troubleshooting for those DTCs first.

B **Go to relevant DTC chart (See page DI-35).**

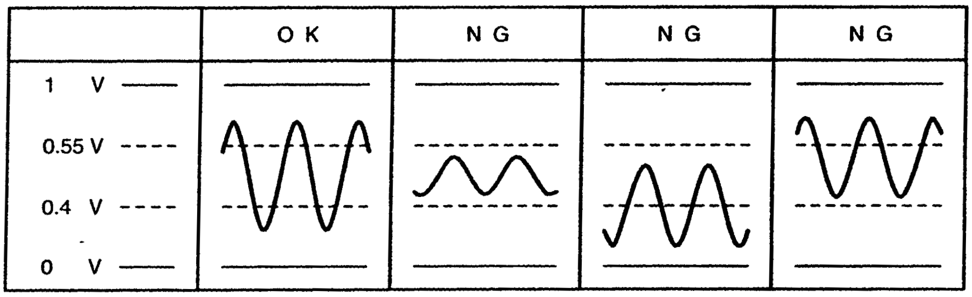
A

2	Check output voltage of heated oxygen sensor during idling.

PREPARATION:
(a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
(b) Connect the hand-held tester or OBD II scan tool to the DLC3.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:
Use the OBD II scan tool or hand-held tester to read the output voltage of the heated oxygen sensor during idling.

OK:
Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK → Go to step 9

NG ↓

3	Check resistance of heated oxygen sensor heater (See page SF-73).

NG → Replace heated oxygen sensor.

OK ↓

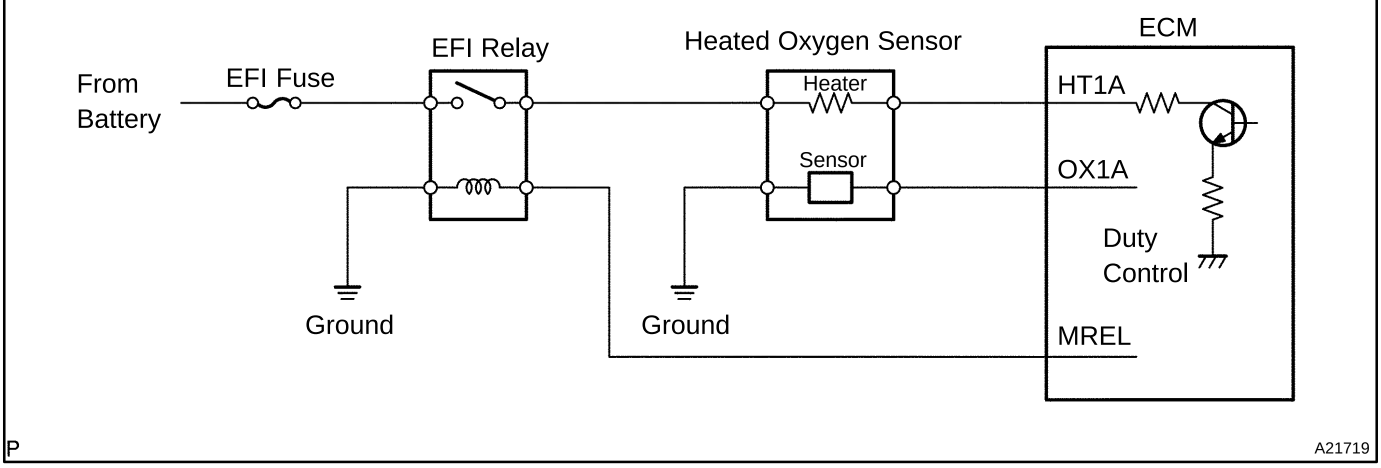
4	Check EFI relay (see page SF-50).

NG → Replace EFI relay.

OK ↓

5	**Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN-33)**

Reference (Bank 1 Sensor 1 System Drawing):



NG **Repair or replace harness or connector.**

OK

6	**Check air induction system (See page SF-1).**

CHECK:
Check the air induction system for vacuum leaks.

NG **Repair or replace air induction system.**

OK

7	**Check fuel pressure (See page SF-6).**

CHECK:
Check the fuel pressure (high or low pressure).

NG **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

8	Check injector injection (See page SF-22).

NG → Replace injector.

OK ↓

Replace heated oxygen sensor.

9	Perform confirmation driving pattern (See page DI-1 10).

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO ↓

10	Is there DTC P0133 or P0153 being output again?

NO → Check for intermittent problems (See page DI-3).

YES ↓

Replace heated oxygen sensor.

DIC4A-01

DTC	P0134	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)

DTC	P0154	Oxygen Sensor Circuit No Activity Detected (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0130 on page DI-1 10.

DTC No.	DTC Detecting Condition	Trouble Area
P0134 P0154	After engine is warmed up, heated oxygen sensor (bank 1, 2 sensor 1) output does not indicate RICH ($\geq$0.45 V) even once when conditions (a), (b), (c) and (d) continue for at least 65 sec.: (a) Engine speed: 1,400 rpm or more (b) Vehicle speed: 40 km/h (25 mph) or more (c) Throttle valve does not fully closed (d) 180 sec. or more after starting engine	• Open or short in heated oxygen sensor (bank 1, 2 sensor 1) circuit • Heated oxygen sensor (bank 1, 2 sensor 1) • Air induction system • Fuel pressure • Injector • Gas leakage on exhaust system • ECM • PCV piping

HINT:

- Bank 1 refers to bank that includes cylinder No. 1.
- Bank 2 refers to bank that does not includes cylinder No. 1.
- Sensor 1 refers to the sensor closer to the engine assembly.
- After confirming DTC P0134 and P0154, check the output voltage of the heated oxygen sensor in the "DIAGNOSIS / ENHANCE OBD II / DATA LIST / ALL" using the OBD II scan tool or the hand–held tester. If output voltage of the heated oxygen sensor is always less than 0.1 V, heated oxygen sensor circuit may be open or short.

MONITOR DESCRIPTION

The ECM uses the heated oxygen sensor to optimize the air-fuel mixture in closed-loop fuel control. This control helps decrease exhaust emissions by providing the catalyst with a nearly stoichiometric mixture. The sensor detects the oxygen level in the exhaust gas and the ECM uses this data to control the air-fuel ratio. The sensor output voltage ranges from 0 V to 1 V. If the signal voltage is less than 0.4 V, the air-fuel ratio is LEAN. If the signal voltage is more than 0.55 V, the air-fuel ratio is RICH. If the conditions for the closed-loop fuel control are met and after a specified time-period, the sensor's output signal never indicates RICH, the ECM will conclude that the closed-loop fuel control is malfunctioning. The ECM will illuminate the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0134	Excessive time to enter closed loop (Bank 1)
	P0154	Excessive time to enter closed loop (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen sensor
	Related sensors/components	Crank position sensor, Engine coolant temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	65 sec.	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Time after following conditions met:	50 sec.	-
Engine coolant temperature	40°C (104°F)	-
Engine speed	1,400 rpm	-
Vehicle speed	40 km/h (25 mph)	-
Idle	OFF	
Time after engine start	180 sec.	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Front heated oxygen sensor voltage	Less than 0.45 V

COMPONENT OPERATING RANGE

Parameter	Standard value
In the normal condition, the front heated oxygen sensor voltage	0 to 1 V

WIRING DIAGRAM

Refer to DTC P0130 on page DI-110.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

<u>**RESULT:**</u>

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.
HINT:

- If different DTCs related to different systems terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	**Are there any other codes (besides DTC P0134 and P0154) being output?**

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0134 and/or P0154”	A
”P0134 or P0154” and other DTCs	B

HINT:
If any other codes besides P0134 and/or P0154 are output, perform the troubleshooting for those codes first.

A	**Go to relevant DTC chart (See page DI-35).**

B

2	**Connect the OBD II scan tool or hand-held tester, and read value for voltage output of heated oxygen sensors (bank 1, 2 sensor 1).**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Warm up the engine to normal operating temperature (above 75°C (169°F)).
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Read the voltage output of the heated oxygen sensors when the engine is suddenly raced.

HINT:

Perform quick racing to 4,000 rpm 3 times using the accelerator pedal.

OK:

Heated oxygen sensor output a RICH signal (0.45 V or more) at least once.

OK → **Go to step 12.**

NG ↓

3	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

OK ↓

4	**Check resistance of heated oxygen sensor heater (See page SF-73).**

NG → **Replace heated oxygen sensor.**

OK ↓

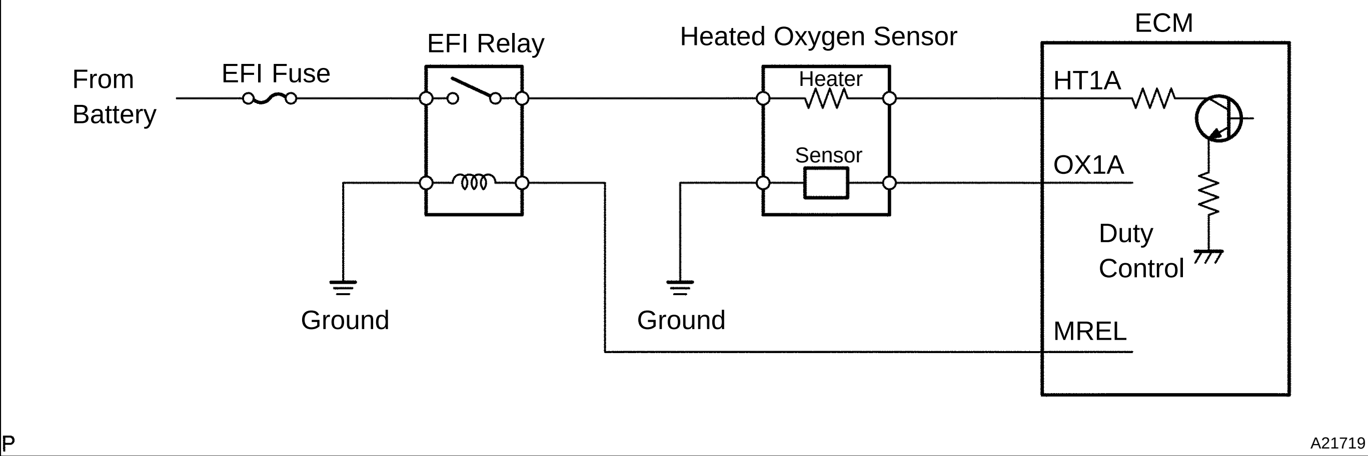
5	**Check EFI relay (See page SF-50).**

NG → **Replace EFI relay.**

OK ↓

6	**Check for open and short in harness and connector between ECM and heated oxygen sensors (bank 1, 2 sensor 1) (See page IN-33).**

Reference (Bank 1 Sensor 1 System Drawing):



NG → **Repair or replace harness or connector.**

OK

7	**Check whether misfire is occurred or not by monitoring DTC and data list.**

NG → **Perform troubleshooting for misfire (See page DI-164).**

OK

8	**Check air induction system (See page SF-1).**

CHECK:
Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK

9	**Check fuel pressure (See page SF-6).**

CHECK:
Check the fuel pressure (high or low pressure).

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

10	**Check injector injection (See page SF-22).**

NG → **Replace injector.**

OK

11	**Check gas leakage on exhaust system.**

NG → **Repair or replace exhaust gas leakage point.**

OK

Replace heated oxygen sensor (bank 1, 2 sensor 1).

12	**Perform confirmation driving pattern (See page DI-1 10).**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

GO

13	Is there DTC P0134 and P0154 being output again?

YES → Replace ECM (See page SF-74).

NO

14	Did vehicle runs out of fuel in past?

NO → Check for intermittent problems
(See page DI-3).

YES

DTCs P0134 and P0154 are caused by running out of fuel.

DIC4B-01

DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0156	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0130 on page DI-1 10.

DTC No.	Detection Item	Trouble Area
P0136 P0156	Voltage output of heated oxygen sensor remains at 0.4 V or more or 0.5 V or less after engine is warmed up (2 trip detection logic)	™Open or short in heated oxygen sensor circuit ™Heated oxygen sensor ™Air induction system ™Fuel pressure ™Injector ™ECM

HINT:

- ™ Bank 1 refers to bank that includes cylinder No.1.
- ™ Bank 2 refers to bank that does not include cylinder No.1.
- ™ Sensor 2 refers to the farther sensor away from the engine body.

MONITOR DESCRIPTION

The ECM monitors the rear heated oxygen sensor in the following 3 items:

(1) If the rear heated oxygen sensor voltage changes between Rich and Lean while the vehicle is running (repeating acceleration and deceleration). If not, the ECM interprets this as a malfunction, illuminates the MIL, and then sets DTC.

(2) If the rear heated oxygen sensor voltage does not remain at less than 0.05 V for a long time while the vehicle is running. If not, the ECM interprets this as a malfunction, illuminates the MIL, and then sets DTC.

(3) If the sensor's voltage drops to below 0.2 V (extremely Lean status) immediately when the vehicle decelerates and the fuel cut is working. if not, the ECM interprets this to mean the sensor's response feature has deteriorated, illuminates the MIL, and then sets DTC.

MONITOR STRATEGY

Related DTCs	P0136	Heated rear oxygen sensor output voltage (Crack) (Bank 1)
		Heated rear oxygen sensor output voltage (Bank 1)
		Heated rear oxygen sensor slow response (Bank 1)
	P0156	Heated rear oxygen sensor output voltage (Crack) (Bank 2)
		Heated rear oxygen sensor output voltage (Bank 2)
		Heated rear oxygen sensor slow response (Bank 2)
Required sensors/components	Main sensors/components	Heated rear oxygen sensor
	Related sensors/components	Mass air flow meter, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	300 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1 (Output voltage (Crack)):		
Vehicle speed	3 km/h (2 mph)	-
Idle	OFF	
Fuel cut	OFF	
Time after fuel cut ON to OFF	14.5 sec.	-
Intake air amount per revolution	™AT: 0.38 g/rev ™MT: 0.32 g/rev	-
Case 2 (Output voltage):		
All of the following conditions are met:	A, B, C and D	
A. Pass/fail detection in this driving cycle	Not detected	
B. Engine	Running	
C. Time after engine start	0 sec.	-
D. Either of the following conditions is met:	(a) or (b)	
(a) Cumulative time while heated oxygen sensor hearter is ON	22 sec.	-
(b) At once more heated oxygen sensor voltage	0.2 V	-
Case 3 (Slow response):		
Rear oxygen sensor voltage before the fuel cut	0.2 V	-
Catalyst condition	Warmed up	

Engine coolant temperature	75°C (167°F)	-
Fuel cut	Continues	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1 (Output voltage (Crack)):	
Following conditions are met:	1, 2 and 3
1. Cumulative heated oxygen sensor monitor time	™AT: 230 sec. or more ™MT: 200 sec.
2. Time while heated oxygen sensor voltage is less than 0.05V	™AT: 138 sec. or more ™MT: 120
3. Maximum heated oxygen sensor rich time (0.45V or more)	Less than 20 sec.
Case 2 (Output voltage):	
Number of heated oxygen sensor voltage "switching"	0 times or less
"Switching" is counted when the sensor signal crosses the minimum or maximum voltage	
Minimum voltage	0.4 V or less
Maximum voltage	0.5 V or more
Case 3 (Slow response):	
Time until the rear oxygen sensor voltage drops to 0.2 V after fuel cut starts operating	™AT: 6 sec. or more ™MT: 10 sec. or more

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor voltage	0 to 1 V

O2S TEST RESULT

Refer to page DI-3 for detailed information.

Rear HO2S voltage monitor

If the HO2S sensor voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$07	Minimum rear HO2S voltage	N/A	V
$08	Maximum rear HO2S voltage	N/A	V

If the time required to change is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$31	Time to change from Lean (<0.4 V) to Rich (±0.5 V)	N/A	sec.
$32	Time to change from Rich (±0.5 V) to Lean (<0.4 V)	N/A	sec.

Rear HO2S slow response monitor

If the elapsed time is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$37	Until rear HO2S voltage drops to 0.2 V after fuel-cut starting	N/A	sec.

Rear HO2S element monitor

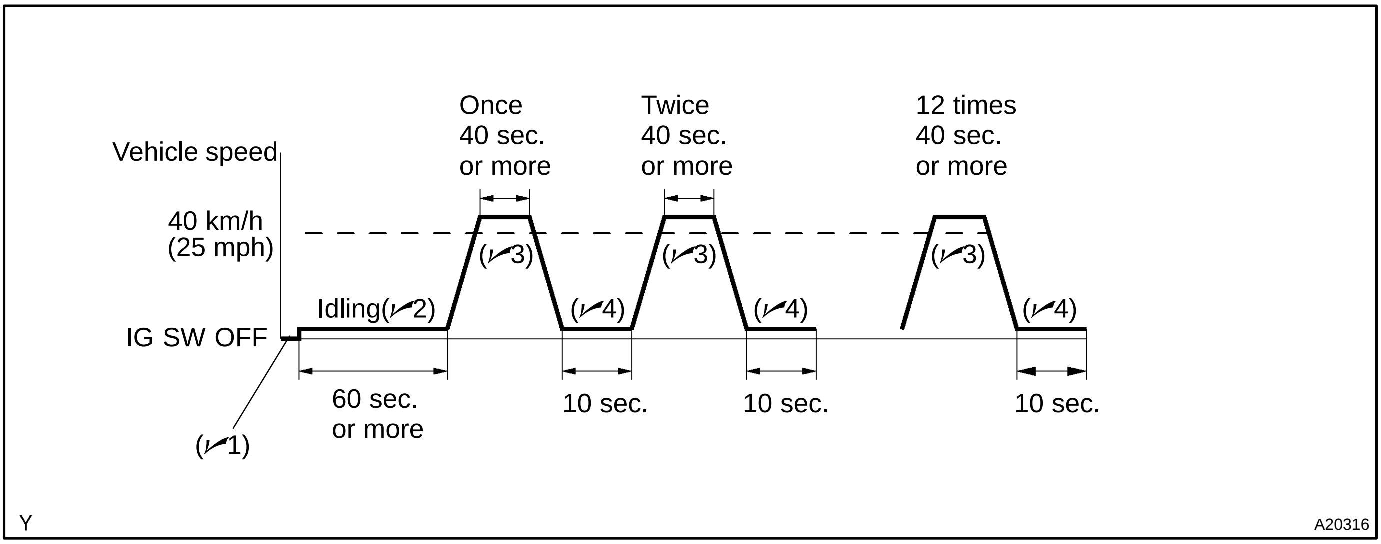
If all the values ($81, $84, $85 and $87) are out of the standard values, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$81	Percentage of monitoring time when the HO2S voltage is less than 0.05 V	Multiply 0.3906	%
$84	Percentage of monitoring time when the HO2S voltage is more than 0.7 V	Multiply 0.3906	%
$85	Time when the HO2S voltage is 0.45 V or more	Multiply 0.2621	sec.
$87	Percentage of monitoring time when the HO2S voltage is more than 0.45 V	Multiply 0.3906	%

WIRING DIAGRAM

Refer to DTC P0130 on page DI-110.

CONFIRMATION DRIVING PATTERN



1. **Connect the hand-held tester to the DLC3. (✓1)**
2. **Switch the hand-held tester from the normal mode to the check mode (See page DI-3). (✓1)**
3. **Start the engine and let the engine idle for 60 seconds or more. (✓2)**
4. **Drive the vehicle at 40 km/h (25 mph) or more for 40 seconds or more. (✓3)**
5. **Let the engine idle for 10 seconds or more. (✓4)**
6. **Perform steps 4. and 5. for 12 times.**

HINT:
If a malfunction exists, the MIL will light up on the multi-information display during step 6.

NOTICE:
If the conditions in this test are not strictly followed, a malfunction detection will not occur. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps from 3 to 6, then perform steps from 3 to 6 again.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:
However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors.
For displaying the graph indication, first enter ”ACTIVE TEST / A/F CONTROL / USER DATA,” then select ”02S B1S1and O2S B1S2” by pressing ”YES” button, and push ”ENTER” button before pressing ”F4” button.
HINT:

- If different DTCs that are related to different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0136 or P0156) being output?**

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0136 or P0156	A
”P0136 or P0156” and other DTCs	B

HINT:
If any other codes besides P0136 or P0156 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check output voltage of heated oxygen sensor.**

PREPARATION:
(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) After warming up the engine, race the engine speed at 2,500 rpm for 3 minntes.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S2 or B2 S2.

CHECK:
Read the output voltage of the heated oxygen sensor when the engine is suddenly raced.
HINT:
Perform a quick racing to 4,000 rpm 3 minntes. using the accelerator pedal.

OK:
Heated oxygen sensor output voltage: Alternates from 0.4 V or less to 0.5 V or more

OK → **Go to step 6.**

NG

3	Check resistance of heated oxygen sensor heater (See page SF-73).

NG → **Replace heated oxygen sensor.**

OK

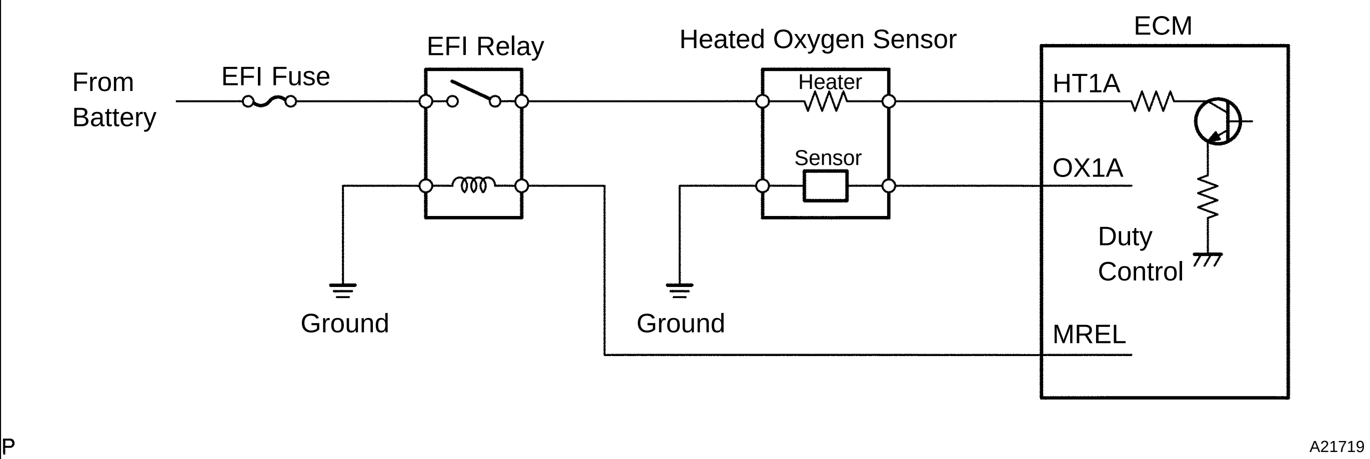
4	Check EFI relay (See page SF-50).

NG → **Replace EFI relay.**

OK

5	Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN-33).

Reference (Bank 1 Sensor 2 System Drawing):



NG → **Repair or replace harness or connector.**

OK

Replace heated oxygen sensor.

6	**Perform confirmation driving pattern (See page DI-148).**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

Go

7	**Is the DTC P0136 or P0156 being output again?**

NO → **Check for intermittent problems (See page DI-3).**

YES

Replace heated oxygen sensor.

DIC4C-01

DTC	P0171	System too Lean (Bank 1)

DTC	P0172	System too Rich (Bank 1)

DTC	P0174	System too Lean (Bank 2)

DTC	P0175	System too Rich (Bank 2)

CIRCUIT DESCRIPTION

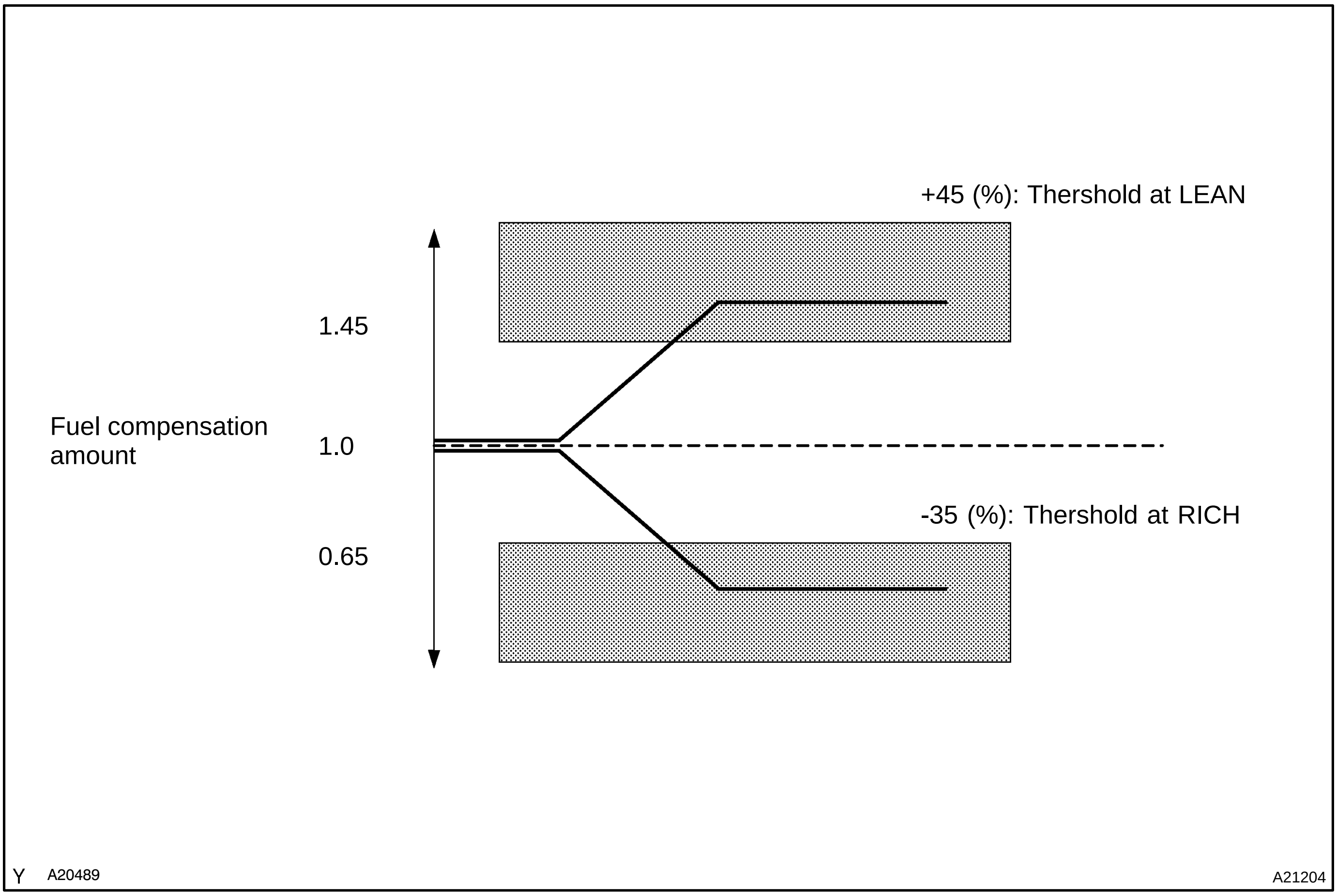
The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim includes the short-term fuel trim and the long-term fuel trim.
The short-term fuel trim is the short-term fuel compensation used to maintain the air-fuel ratio at stoichiometric air-fuel ratio. The signal from the heated oxygen sensor indicates whether the air-fuel ratio is RICH or LEAN compared to the stoichiometric air-fuel ratio. This variance triggers a reduction in the fuel volume if the air-fuel ratio is RICH, and an increase in the fuel volume if it is LEAN.
The long-term fuel trim is the overall fuel compensation carried out in long-term to compensate for a continual deviation of the short-term fuel trim from the central value, due to individual engine differences, wear overtime and changes in the operating environment.
If both the short-term fuel trim and the long-term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the MIL is illuminated and a DTC is set.

DTC No.	DTC Detecting Condition	Trouble Area
P0171 P0174	When air fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on LEAN side (2 trip detection logic)	™Air induction system ™Injector blockage ™Mass air flow meter ™Engine coolant temp. sensor ™Fuel pressure ™Gas leakage on exhaust system ™Open or short in heated oxygen sensor circuit (bank 1, 2 sensor 1) ™Heated oxygen sensor (bank 1, 2 sensor 1) ™ECM ™PCV piping
P0172 P0175	When air fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on RICH side (2 trip detection logic)	™Injector leak, blockage ™Mass air flow meter ™Engine coolant temp. sensor ™Ignition system ™Fuel pressure ™Gas leakage on exhaust system ™Open or short in heated oxygen sensor circuit (bank 1, 2 sensor 1) ™Heated oxygen sensor (bank 1, 2 sensor 1) ™ECM

HINT:

- When DTC P0171 or P0174 is recorded, the actual air-fuel ratio is on the LEAN side. When DTC P0172 or P0175 is recorded, the actual air-fuel ratio is on the RICH side.
- If the vehicle runs out of fuel, the air-fuel ratio is LEAN and DTC P0171 or P0174 may be recorded. The MIL then comes on.
- If the total of the short-term fuel trim value and long-term fuel trim value is within ± 35 % (engine coolant temperature is more than 75 C (167 F)), the system is functioning normally.

MONITOR DESCRIPTION



Under closed-loop fuel control, fuel injection amounts that deviate from the ECM's estimated fuel amount will cause a change in the long-term fuel trim compensation value. This long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim values. And the deviation from a simulated fuel injection amount by the ECM affects a smoothed fuel trim learning value. The smoothed fuel trim learning value is the combination of smoothed short term fuel trim (fuel feedback compensation value) and smoothed long term fuel trim (learning value of the air-fuel ratio). When the smoothed fuel trim learning value exceeds the DTC threshold, the ECM interprets this as a fault in the fuel system and sets a DTC.

Example:

If the smoothed fuel trim leaning value is more than +45% or less than -35%. The ECM interprets this as a malfunction in the fuel system.

MONITOR STRATEGY

Related DTCs	P0171	Fuel system lean (Bank 1)
	P0172	Fuel system rich (Bank 1)
	P0174	Fuel system lean (Bank 2)
	P0175	Fuel system rich (Bank 2)
Required sensors/components	Main sensors/components	Front oxygen sensor
	Related sensors/components	Engine coolant temperature sensor, Mass air flow meter, Crankshaft position sensor
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	-
Fuel system: Closed loop	13 sec.	-
One of the following conditions is met:	A or B	
A. Engine speed	-	1,100 rpm
B. Intake air amount per revolution	0.22 g/sec.	-
Warm up condition to enable air fuel ratio learning control	Condition are met	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Either following condition continues for 3 sec.	A or B
A. Smoothed fuel trim learning value (Lean)	45% or more
B. Smoothed fuel trim learning value (Rich)	-35% or less

WIRING DIAGRAM

Refer to DTC P0130 on page DI-1 10.

INSPECTION PROCEDURE

HINT:
Hand-held tester only:
The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).
(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).
HINT:
”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

<u>**RESULT:**</u>

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:
However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V OK	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V OK	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction NG	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V OK	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V OK	Injection volume +25 % -12.5 % Output voltage Almost no reaction NG	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction NG	Injection volume +25 % -12.5 % Output voltage Almost no reaction NG	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter "ACTIVE TEST / A/F CONTROL / USER DATA" then select "O2S B1S1 and O2S B1S2" by pressing "YES" button and push "ENTER" button before pressing "F4" button.
HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

1	**Check air induction system (See page SF-1).**

CHECK:
Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK

2	**Check connection of PCV piping.**

NG → **Repair or replace PCV valve and hose.**

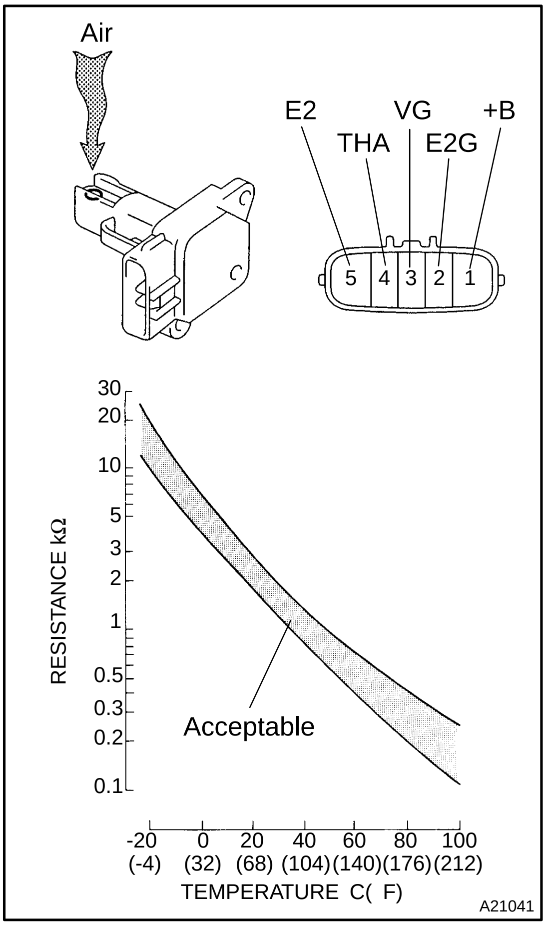
OK

3	**Check injector injection (See page SF-22).**

NG → **Replace injector.**

OK

4	Check mass air flow sensor.



PREPARATION:

Remove the mass air flow meter.

CHECK:

(a) Inspect output voltage.

(1) Apply battery voltage across terminals +B and E2G.

(2) Connect the positive (+) tester prove to terminal VG, and negative (-) tester prove to terminal E2G.

(3) Blow air into the mass air flow sensor, and check that the voltage fluctuates.

(b) Inspect resistance.

(1) Measure the resistance between terminals of the intake air temperature sensor.

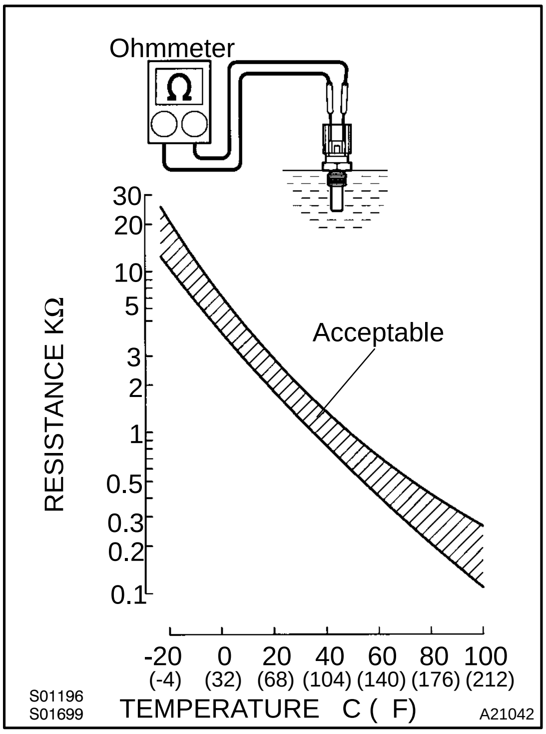
Resistance:

Tester Connection	Temperature	Specified Condition
THA (4) - E2 (5)	-20 C (-4 F)	13.6 to 18.4 kΩ
	20 C (68 F)	2.21 to 2.69 kΩ
	60 C (140 F)	0.49 to 0.67 kΩ

NG	Repair or replace mass air flow meter.

OK

5	Check engine coolant temperature sensor.



PREPARATION:
Remove the engine coolant temperature sensor.
CHECK:
(a) Measure the resistance between the terminals of the engine coolant temperature sensor.
Resistance:

Tester Connection	Specified Condition
1 - 2	2.32 to 2.59 kΩ (20 C (68 F))
	0.310 to 0.326 kΩ (80 C (176 F))

NOTICE:
In case of checking the engine coolant temperature sensor in the water, be careful not to allow water to go into the terminals. After checking, dry the sensor.
HINT:
Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.
(b) Reinstall the engine coolant temperature sensor.

NG	Repair or replace engine coolant temperature sensor.

OK

6	Check for spark and ignition (See page IG-1).

NG	Repair or replace.

OK

7	**Check fuel pressure (See page SF-6).**

CHECK:

Check the fuel pressure (high or low pressure).

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

8	**Check gas leakage on exhaust system.**

NG → **Repair or replace exhaust gas leakage point.**

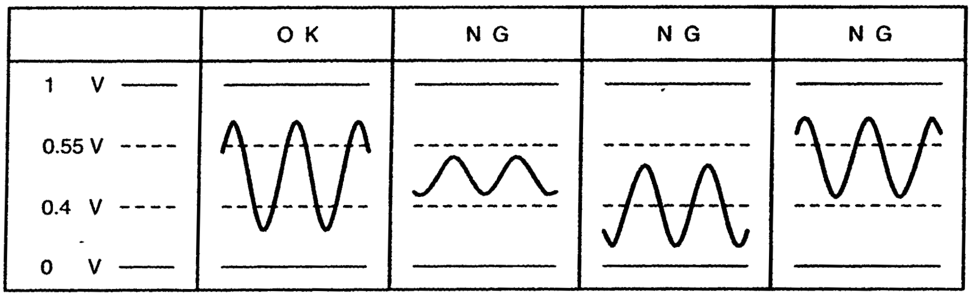
OK

9	Check output voltage of heated oxygen sensor (bank 1, 2 sensor 1) during idling.

PREPARATION:
(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Warm up the engine to normal operating temperature (above 75°C (169°F)).
(c) Enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:
Use the OBD II scan tool or hand-held tester to read an output voltage of the heated oxygen sensor during idling.

OK:
Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.55 V (See the following table).



P18349

OK → **Go to step 17.**

NG ↓

10	Check resistance of heated oxygen sensor heater (See page SF-73).

NG → **Replace heated oxygen sensor.**

OK ↓

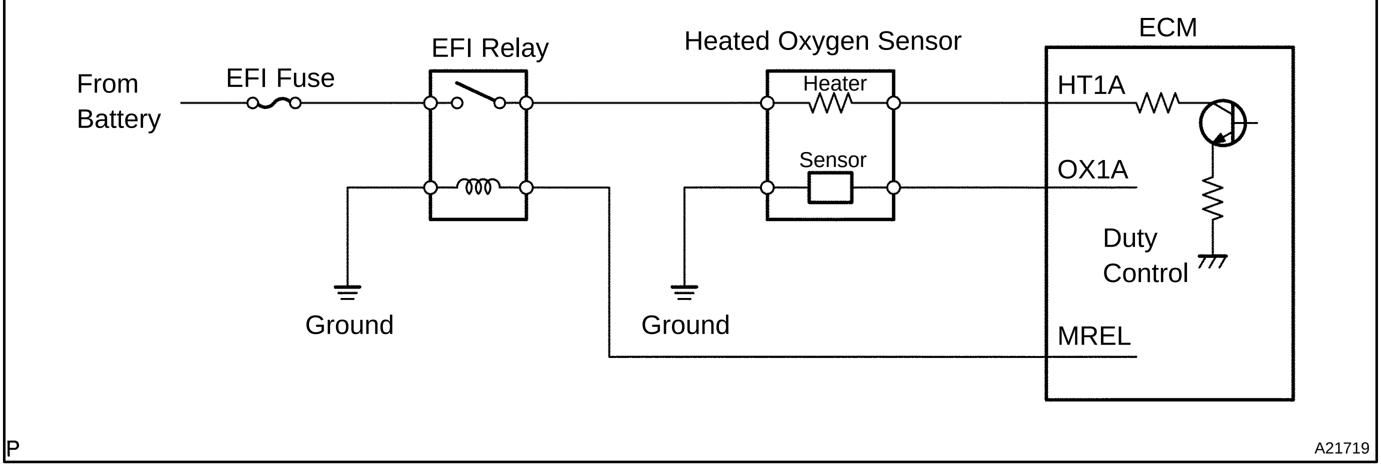
11	Check EFI relay (See page SF-50).

NG → **Replace EFI relay.**

OK ↓

12	Check for open and short in harness and connector between ECM and heated oxygen sensor (bank 1, 2 sensor 1) (See page IN-33).

Reference (Bank 1 Sensor 1 System Drawing):



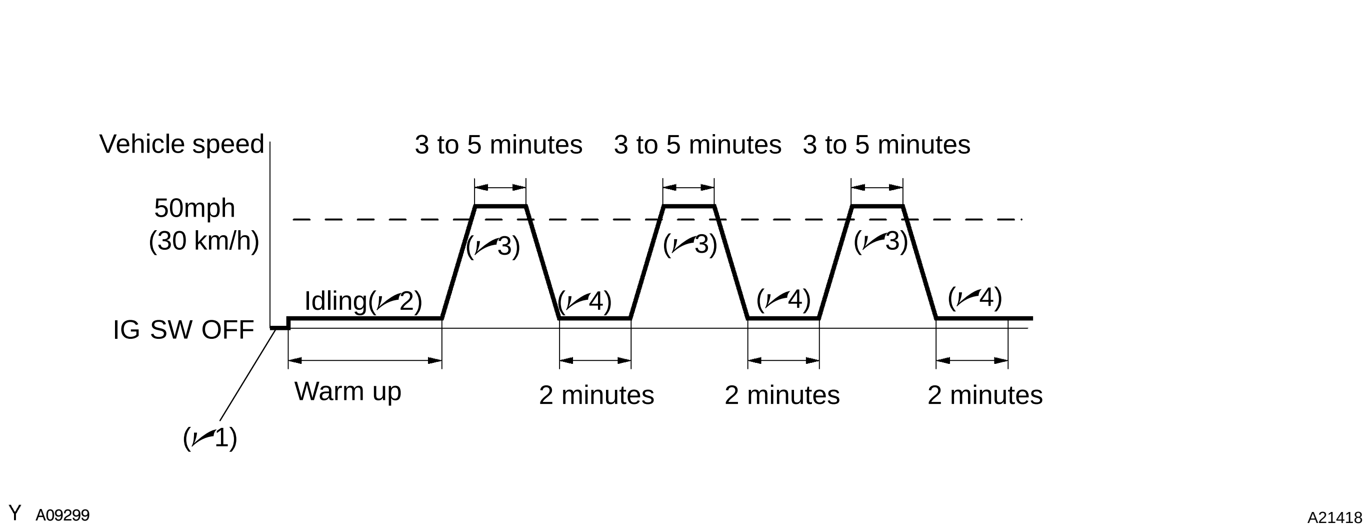
NG — **Repair or replace harness or connector.**

OK

13	Replace heated oxygen sensor.

Go

14	**Preform confirmation driving pattern.**



(a) Disconnect the battery terminal and wait for a minute (clear learning value of the air fuel ratio). (✓1)
(b) Connect the hand-held tester to the DLC3. (✓1)
(c) Switch the hand-held tester from the normal mode to the check mode (See page DI-3). (✓1)
(d) Start the engine and let it idle until engine coolant temperature is 75 °C (167 °F) or more. (✓2)
(e) Drive the vehicle at 50 mph (30 km/h) or more for 3 minutes or more. (✓3)
(f) Let the engine idle for approx. 2 minutes. (✓4)
(g) Perform steps (e) and (g) at least 3 times.

HINT:
If a malfunction exists, the MIL will be illuminated during step (f).

NOTICE:
If the conditions in this test are not strictly followed, detecting a malfunction may be difficult. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (e) to (f), and then do step (f) again.

GO

15	**Is there DTC P0171, P0172, P0174 or P0175 being output again?**

YES → **Replace ECM (see page SF-74) and perform confirmation driving pattern (Refer to step 14).**

NO

16	**Did vehicle run out of fuel in past?**

NO → **Check for intermittent problems (See page DI-3).**

YES

DTC P0171, P0172, P0174 or P0175 is caused by running out of fuel.

17	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (Refer to step 14).

Go

18	**Is there DTC P0171, P0172 P0174 and/or P0175 being output again?**

NO → **Go to step 22.**

YES

19	**Replace heated oxygen sensor.**

Go

20	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (Refer to step 14).

Go

21	Is the DTC P0171, P0172, P0174 and/or P0175 being output again?

YES → Replace ECM (see page SF-74) and perform confirmation driving pattern (Refer to step 14).

No

22	Confirm if vehicle has run out of fuel in past.

NO → Check for intermittent problems. (See page DI-3).

YES

DTC is caused by running out of fuel
(DTCs P0171, P0172 P0174 and/or P0175).

DI5YL-06

DTC	P0230	Fuel Pump Primary Circuit

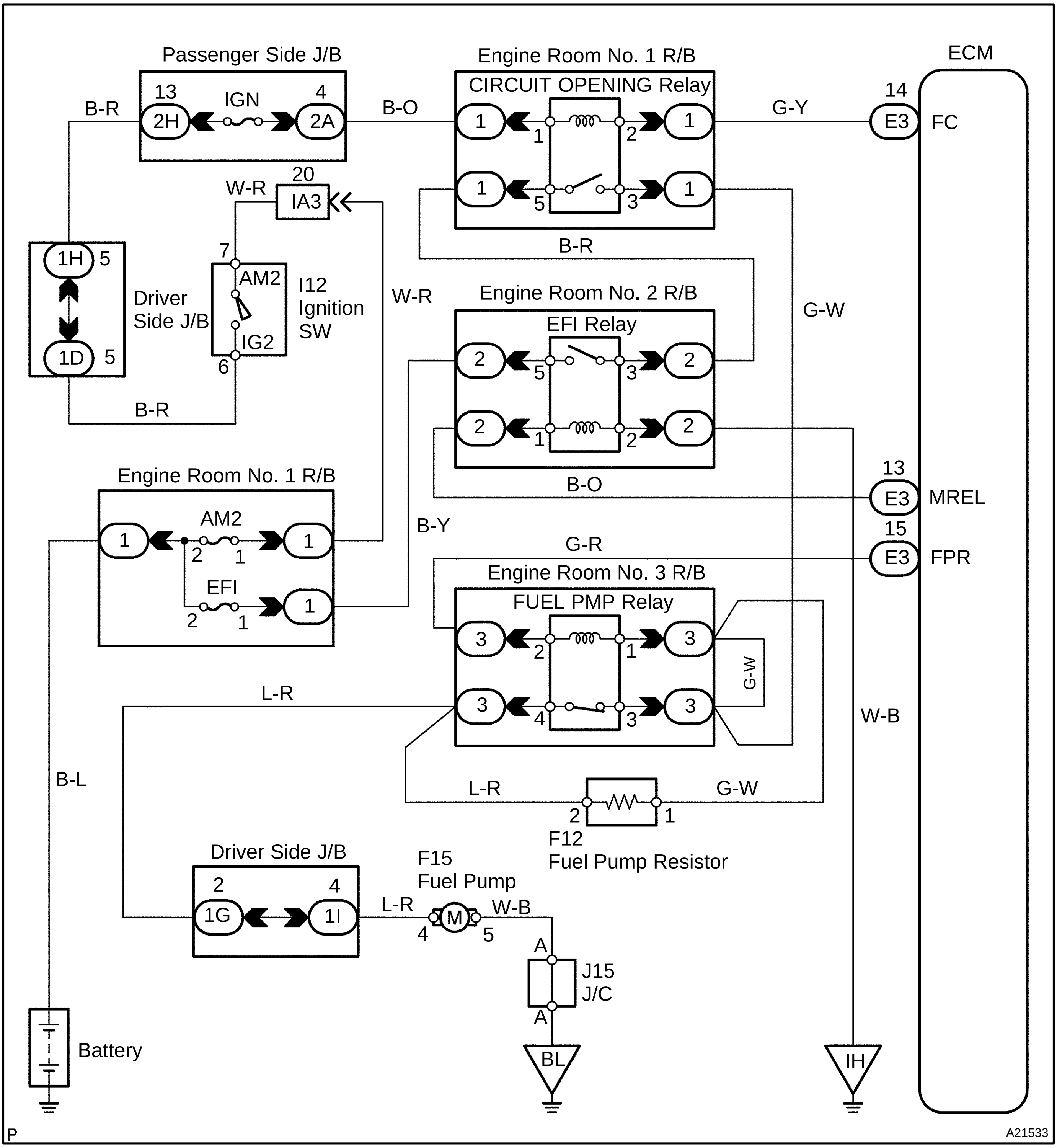
CIRCUIT DESCRIPTION

The fuel pump speed is controlled at 2 steps (high speed, low speed) according to the condition of the engine (starting, light load, heavy load).
When the engine starts, the ECM turns the fuel pump relay OFF to operate the fuel pump at high speed. After the engine has started, during idling or when the load is light, the ECM turns the fuel pump relay ON to operate the fuel pump at low speed. When the intake air increases (heavy load), the ECM turns the fuel pump relay OFF to operate the fuel pump at high speed. There are two fuel pumps. The ECM switches from main to sub or sub to main every time the ignition switch is turned ON and OFF.

DTC No.	DTC Detecting Condition	Trouble Area
P0230	When open or short is detected in the fuel pump relay circuit for 0.5 sec. or more during cranking.	✓Open or short in fuel pump relay circuit ✓Fuel pump relay ✓ECM

HINT:
This diagnostic chart is based on premise that engine is started. If the engine is not started, proceed to problem symptoms table on DI-47 .

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using hand-held tester. Because freeze frame records the engine conditions when the malfunction is detected, when troubleshooting it is useful for determining whether the vehicle was running or stopped, the engine warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

1	**Check fuel pump relay (See page SF-52).**

NG → **Replace fuel pump relay.**

OK

2	**Check fuel pump resister (See page SF-54).**

NG → **Replace fuel pump resister.**

OK

3	**Check for open and short in harness and connector between terminal FPR ECM and fuel pump relay (See page IN-33).**

NG → **Repair or replace harness and connector.**

OK

Check and replace ECM
(See page SF-74).

DIC4D-01

DTC	P0300	Random/Multiple Cylinder Misfire Detected

DTC	P0301	Cylinder 1 Misfire Detected

DTC	P0302	Cylinder 2 Misfire Detected

DTC	P0303	Cylinder 3 Misfire Detected

DTC	P0304	Cylinder 4 Misfire Detected

DTC	P0305	Cylinder 5 Misfire Detected

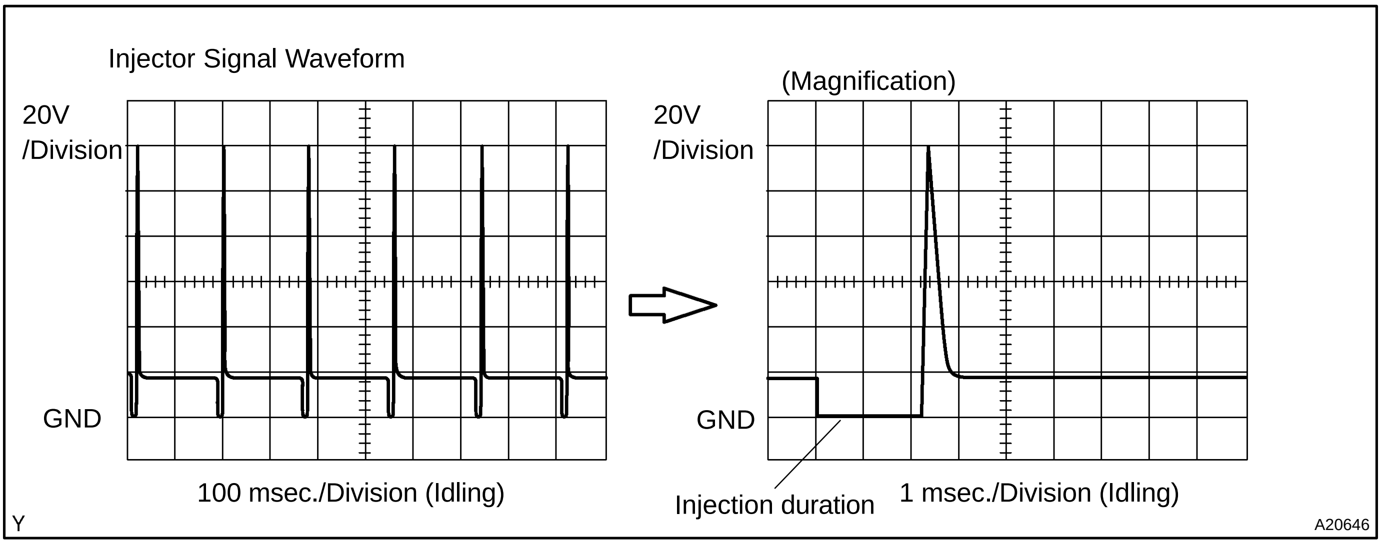
DTC	P0306	Cylinder 6 Misfire Detected

CIRCUIT DESCRIPTION

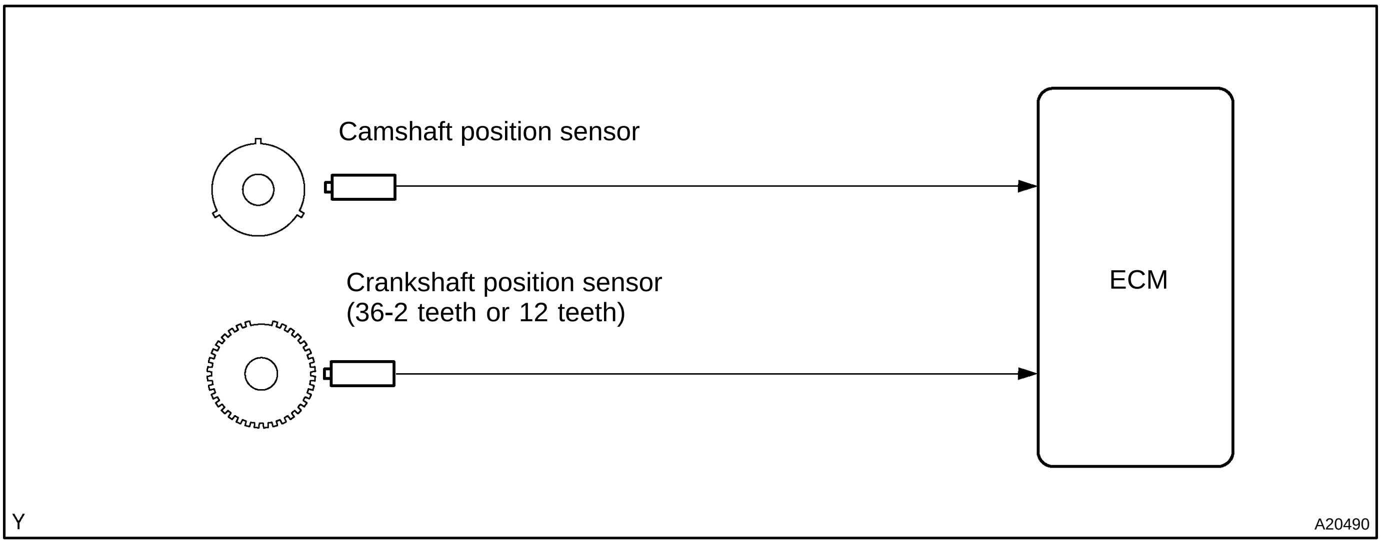
When a misfire occurs in the engine, hydrocarbons (HC) enter the exhaust in high concentrations. If this HC concentration is high enough, there could be an increase in exhaust emissions levels. High concentrations of HC can also cause to temperature of the catalyst to increase, possibly damaging the catalyst. To prevent this increase in emissions and limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the catalyst reaches a point of thermal degradation, the ECM will blink the MIL. For monitoring misfire, the ECM uses both the camshaft position sensor and the crankshaft position sensor. The camshaft position sensor is used to identify misfiring cylinders and the crankshaft position sensor is used to measure variations in the crankshaft rotation speed. The misfire counter increments when crankshaft rotation speed variations exceed threshold values.
If the misfiring rate exceeds the threshold value and could cause emissions deterioration, the ECM illuminates the MIL.

DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfiring of random cylinders is detected	✓Open or short in engine wire ✓Connector connection ✓Vacuum hose connection ✓Ignition system ✓Injector ✓Fuel pressure ✓Mass air flow meter ✓Engine coolant temperature sensor ✓Compression pressure ✓Valve clearance ✓Valve timing ✓PCV piping ✓ECM
P0301 P0302 P0303 P0304 P0305 P0306	Misfiring of each cylinder is detected	

HINT:
When several codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, it indicates that the misfires have been detected and recorded at different times.
Reference: Inspection using the oscilloscope.
With the engine idling, check the waveform between terminals #10 to #60 and E01 of the ECM connectors.
HINT:
The correct waveform is as shown.



MONITOR DESCRIPTION



The ECM illuminates the MIL (2 trip detection logic) if:
The ECM will illuminate the MIL when the percent misfire exceeds the specified limit per 1,000 engine revolutions. One occurrence of excessive misfire during engine start will set the MIL. Four occurrences are required to set the MIL 1,000 revolutions after engine start.
The ECM blinks the MIL (MIL blinks immediately) if:

- Within 200 engine revolutions at a high rpm, the threshold for "percent of misfire causing catalyst damage" is reached 1 time.
- Within 200 engine revolutions at a normal rpm, the threshold for "percent of misfire causing catalyst damage" is reached 3 times.

MONITOR STRATEGY

Related DTCs	P0300	Random/Multiple cylinder misfire detected
	P0301	Cylinder 1 misfire detected
	P0302	Cylinder 2 misfire detected
	P0303	Cylinder 3 misfire detected
	P0304	Cylinder 4 misfire detected
	P0305	Cylinder 5 misfire detected
	P0306	Cylinder 6 misfire detected
Required sensors/components	Main sensors/components	Camshaft position sensor, Crankshaft position sensor
	Related sensors/components	Engine coolant temperature sensor, Intake air temperature sensor, Throttle position sensor
Frequency of operation	Continuous	
Duration	Every 1,000 revolutions (soon after engine is started: 1 time, other 4 times) (emission related misfire) Every 200 revolutions (1 or 3 times) (catalyst deteriorating misfire)	
MIL operation	2 driving cycles MIL ON Immediate MIL blinking (Catalyst deteriorating misfire)	
Sequence of operation	None	

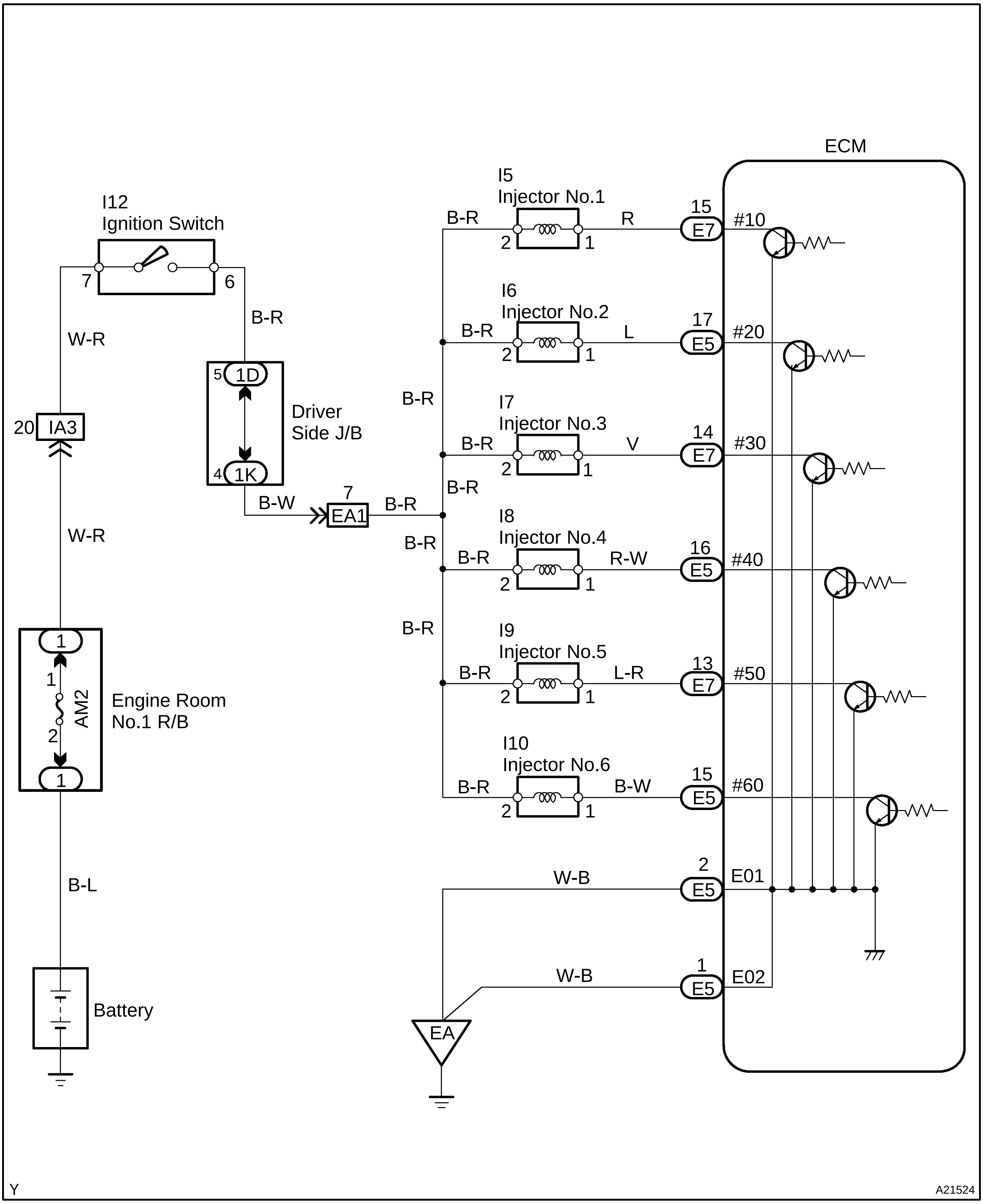
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	8 V	-
VVT	Normal operation (i. e. not under scan-tool control)	
Engine speed fluctuation	Engine speed should not have changed rapidly	
Engine speed (Two full revolutions (2 rev.) after engine has started)	450 rpm	6,400 rpm
All of the following conditions are met:	A, B and C	
A. Engine coolant temperature	-10 °C (14 °F)	-
B. Either of the following conditions is met:	(a) and (b)	
(a) Intake air temperature	-10 °C (14 °F)	-
(b) Engine coolant temperature	75 °C (167 °F)	-
C. Either of the following conditions is met:	(a) and (b)	
(a) Engine coolant temperature at engine start	-7 °C (19 °F)	-
(b) Engine coolant temperature	20 °C (68 °F)	-
Intake air amount per revolution (varies with engine speed)	✓AT: 0.23 g/rev ✓MT: 0.25 g/rev	-
Throttle position learning	Completed	
Throttle position	Rapid throttle opening or closing operation has not occurred	
	-	Changing value of throttle position Less than 3° per 0.008 sec.
Transient spark retard (The spark timing delay control in a short time for preventing surge at the time of a sudden acceleration.)	Not commanded	
Rough road counter	-	20 times/1,000 revolutions (Not running on rough road)
For paired cylinder misfire (6 cylinders):		
All of the following conditions are met:	A, B and C	
A. Engine speed	-	1,050 rpm
B. Vehicle speed	-	5 km/h (3 mph)
C. Idle	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Emission related misfire rate: 1. During the first 1,000 revolutions after engine start (MIL is set when misfire is detected 1 time) 2. After the first 1,000 revolutions have occurred (MIL is set when misfire is detected 4 times)	1.0%/1,000 revolutions
Catalyst damage misfire count: 1. Low engine rpm area (ex. less than 3,000 rpm): 200 revolutions (MIL is set when misfire is detected 3 times) 2. High engine rpm area: Every 200 revolutions	85 count/200 revolutions (Threshold varies with engine speed and intake air amount per revolution)
For paired cylinder misfire (6 cylinders):	
Paired cylinders out per 170 rev. (MIL blink)	50 times or more

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

(a) Connect the hand-held tester to the DLC3.
(b) Record DTC and the freeze frame data.
(c) Use the hand-held tester to set to the check mode (See page DI-3).
(d) Read the value on the misfire counter for each cylinder when idling. If the value is displayed on the misfire counter, skip the following procedure of confirmation driving.
(e) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the DATA LIST.

If you have no hand-held tester, turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again.

HINT:

In order to memorize the DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the DATA LIST for the following period of time. Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check mode to normal mode. So all DTCs, etc., are erased.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more
2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(f) Check if there is misfire and DTC and the freeze frame data. Record the DTC's, freeze frame date and misfire counter date.
(g) Turn the ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If DTCs besides misfire DTCs are memorized simultaneously, troubleshoot the non-misfire DTCs first.
- If the misfire does not occur when the vehicle is brought to the workshop, the misfire can be confirmed by reproducing the condition of the freeze frame data. Also, after finishing the repair, confirm that there is no misfire (See confirmation driving pattern).
- On 6 and 8 cylinder engines, misfiring cylinder identification is disabled at high engine speed and only a general misfire fault code P0300 is stored instead of a cylinder specific misfire fault code (P0301 to P0308).
  If the misfire starts in a high engine speed area or the misfire occurs only in a high engine speed area, only code P0300 may be stored.
  When only a general misfire fault code like P0300 is stored:
- Erase the general misfire fault code from the hand-held tester or OBD II scan tool.
- Start the engine and drive the confirmation patten (See confirmation driving pattern).
- Read the value of the misfire ratio for each cylinder. Or read the DTC.
- Perform repairs on the cylinder that has a high misfire ratio. Or repair the cylinder indicated by the DTC.
- After finishing repairs, drive the confirmation pattern again and confirm that no misfire occurs.
- When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is over the range of ±20 %, there is a possibility that the air-fuel ratio is becoming RICH (-20 % or less) or LEAN (+20 % or more).
- When COOLANT TEMP in the freeze frame data is less than 80°C (176°F), there is a possibility of misfire only during engine warm-up.
- If the misfire cannot be reproduced, the following reasons may apply: 1) the vehicle has low fuel, 2) improper fuel is being used, and 3) the ignition plug is contaminated.
- Be sure to check the value on the misfire counter after the repair.

1	**Are there any other codes (besides DTC P0300, P0301, P0302, P0303, P0304, P0305 or P0306) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0300, P0301, P0302, P0303, P0304, P0305 and/or P0306”	A
”P0300, P0301, P0302, P0303, P0304, P0305 and/or P0306” and other DTCs	B

HINT:
If any other codes besides ”P0300, P0301, P0302, P0303, P0304, P0305 or P0306” are output, perform the troubleshooting for those DTC.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check wire harness, connector and vacuum hose in engine room.**

CHECK:

(a) Check the connection conditions of wire harness and connector.
(b) Check the disconnection, piping and break of vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See confirmation driving pattern).**

OK

3	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

OK

4	Connect hand-held tester, and read the number of misfire.

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Start the engine.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / CYL#1 to CYL#6.

CHECK:

Read the number of misfire on the hand-held tester or the OBD II scan tool.

HINT:

When a misfire is not reproduced, be sure to branch below based on the stored DTC.

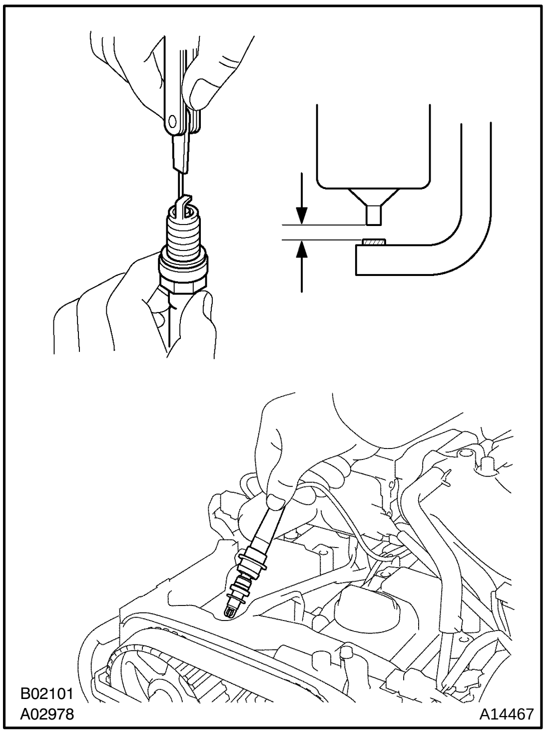
RESULT:

High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B	Go to step 15.

A

5	**Check spark plug and spark of misfiring cylinder.**

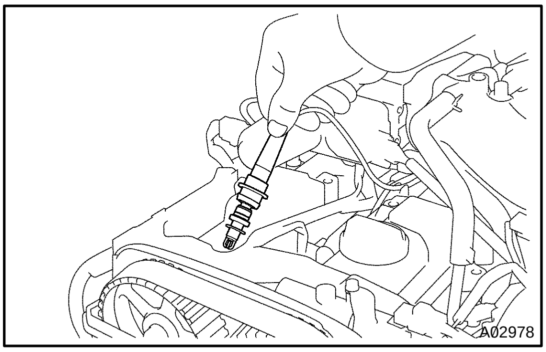


PREPARATION:
Remove the spark plug.
CHECK:
(a) Check the spark plug type (See page IG-1).
(b) Check the electrade for carbon deposits.
(c) Check the electrode gap.
OK:
(a) Twin ground electrodes type
Recommended spark plug:
DENSO made SK16R-P11
(b) No large carbon deposit present
Not wet with gasoline or oil
(c) Electrode gap: 1.0 to 1.2 mm (0.039 to 0.047 in.)
NOTICE:
If adjusting the gap of a new spark plug, bend only "the base / ground" electrode. Do not touch the tip. Never attempt to adjust the gap on a used plug.
PREPARATION:
(a) Install the spark plug to the high-tension cord or ignition coil.
(b) Disconnect the injector connector.
(c) Ground the spark plug.
CHECK:
Check if spark occurs while the engine is being cranked.
CAUTION:
Always disconnect each injector connector.
NOTICE:
Do not crank the engine for more than 2 seconds.
OK:
Spark jumps across electrode gap.

OK	Go to step 8.

NG

6	Change normal spark plug and check spark of misfiring cylinder.



PREPARATION:

(a) Change to the normal spark plug.

(1) Remove the spark plug that may be faulty from the ignition coil assembly.

(2) Install the spark plug to the high-tension cord or ignition coil.

(b) Disconnect the injector connector.

(c) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

CAUTION:

Always disconnect each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

OK:

Spark jumps across electrode gap.

OK → **Replace spark plug.**

NG ↓

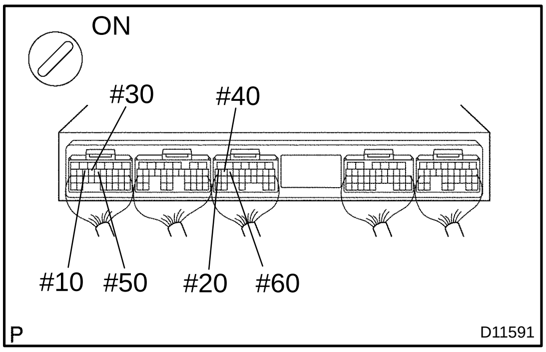
7	Check for open and short in harness and connector between igniter and ECM (See page IN-33).

OK → **Replace igniter, then confirm that there is no misfire.**

NG ↓

Repair or replace harness or connector.

8	**Check voltage of ECM terminals for injector of failed cylinder.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between applicable terminals #10 - #60 of the ECM connectors and body ground.

OK:

Voltage: 9 to 14 V

OK	**Go to step 11**

NG

9	**Check resistance of injector of misfiring cylinder (See page SF-19).**

NG	**Replace injector.**

OK

10	**Check for open and short in harness and connector between ignition switch and injector, injector and ECM of misfiring cylinder (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

11	**Check injector injection of misfiring cylinder (See page SF-22).**

NG	**Replace injector.**

OK

12	**Check compression pressure of misfiring cylinder (See page EM-3).**

NG → **Repair or replace.**

OK

13	**Check valve clearance of misfiring cylinder (See page EM-5).**

NG → **Adjust valve clearance.**

OK

14	**Check result of step 4 switch step by number of misfire cylinder.**

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Check for intermittent problems (See page DI-3).**

A

15	**Check valve timing (Check for looseness or a jumped tooth of timing belt) (See page EM-22).**

NG → **Adjust valve timing (Repair or replace timing belt).**

OK

16	**Check fuel pressure (See page SF-6).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK ↓

17	**Check mass air flow meter.**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

Check the intake air temperature.

(1) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

(2) Read its value displayed on the hand-held tester or the OBD II scan tool.

OK:

Equivalent to ambient temperature

CHECK:

Check the air flow rate.

(1) When using hand-held tester, enter the following menus: DIAGNOSIS/ENHANCED OBD II/ DATA LIST/ALL/MAF.

(2) Read its value displayed on the hand-held tester or the OBD II scan tool.

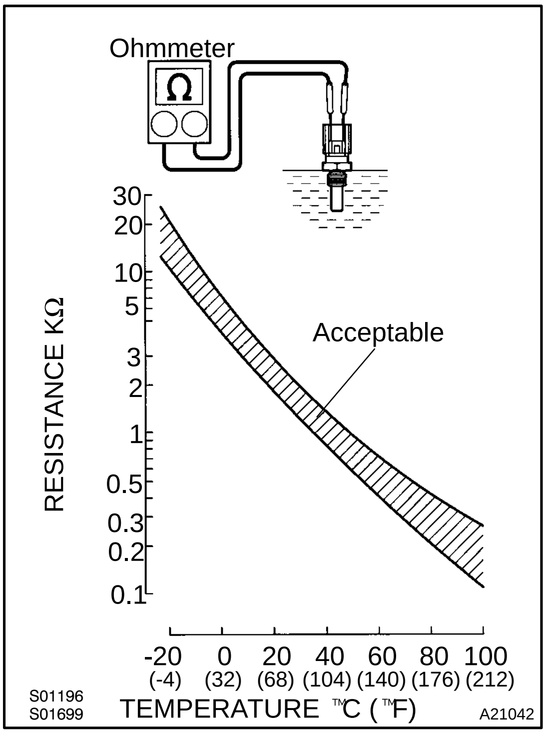
OK:

Condition	Air Flow Rate (gm/s)
Ignition switch ON (do not start engine)	0
Idling	4 to 6
Running without load (2,500 rpm)	13 to 20
Idling to quickly accelerating	Air flow rate fluctuates

NG → **Repair mass air flow meter.**

OK ↓

18	Check engine coolant temp. sensor (See page SF-65).



PREPARATION:
Remove the engine coolant temperature sensor.
CHECK:
Measure the resistance between the terminals of the engine coolant temperature sensor.

Resistance:

Tester Connection	Specified Condition
1 - 2	2.32 to 2.59 kΩ (20℃ (68℉))
	0.310 to 0.326 kΩ (80℃ (176℉))

NOTICE:
In case of checking the engine coolant temperature sensor in the water, be careful not to allow water to go into the terminals. After checking, dry the sensor.

HINT:
Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

NG → **Replace engine coolant temperature sensor**

OK

19	Switch step by number of misfire cylinder (Refer result of step 4).

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 5.**

A

Check intermittent problems (See page DI-3).

DIAKZ-02

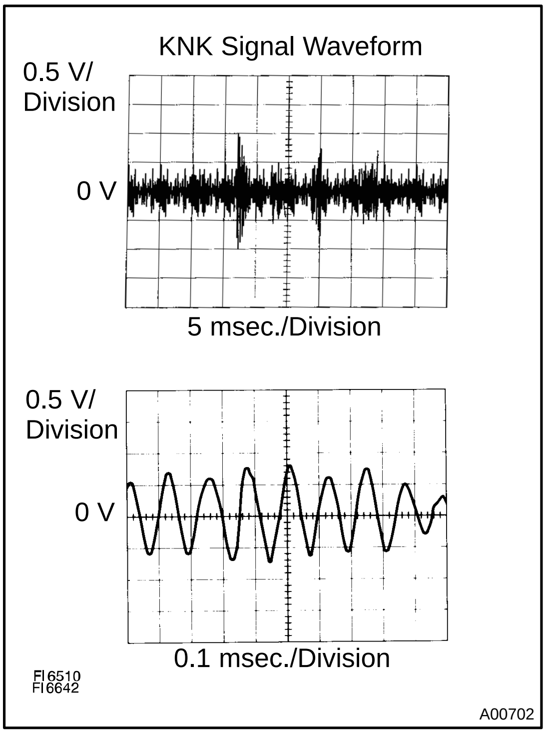
DTC	P0325	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)

DTC	P0330	Knock Sensor 2 Circuit Malfunction (Bank 2)

CIRCUIT DESCRIPTION

Each knock sensor is fitted to the right bank and left bank of the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed. The piezoelectric element sends a signal to the ECM, when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed between 1,600 rpm and 5,200 rpm	✓Open or short in knock sensor 1 circuit ✓Knock sensor 1 (looseness) ✓ECM
P0330	No knock sensor 2 signal to ECM with engine speed between 1,600 rpm and 5,200 rpm	✓Open or short in knock sensor 2 circuit ✓Knock sensor 2 (looseness) ✓ECM



Reference: INSPECTION USING OSCILLOSCOPE

- ✓ With the engine racing (4,000 rpm), check the waveform between terminals KNK1, KNK2 of the ECM connector and the body ground.

HINT:
The correct waveform is as shown in the illustration.

- ✓ Spread the time on the horizontal axis, and confirm that a period of the wave is 0.141 msec. (Normal mode vibration frequency of knock sensor: 7.1 kHz).

HINT:
If the normal mode vibration frequency is not 7.1 kHz, the sensor is malfunctioning.

MONITOR DESCRIPTION

The knock sensor located on the cylinder block, detects spark knock.
When spark knock occurs the sensor pick-up vibrates in a specific frequency range. When the ECM detects the voltage in this frequency range, it retards the ignition timing to suppress the spark knock.
The ECM also senses background engine noise with the knock sensor and uses this noise to check for faults in the sensor. If the knock sensor signal level is too low for more than 10 sec., and if the knock sensor output voltage is out of normal range,the ECM interprets this as a fault in the knock sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0325	Knock sensor (Bank 1) range check or rationality
	P0330	Knock sensor (Bank 2) range check or rationality
Required sensors/components	Main sensors/components	Knock sensor
	Related sensors/components	Crankshaft position sensor, Camshaft position sensor, Engine coolant temperature sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	Immediate	
Sequence of operation	None	

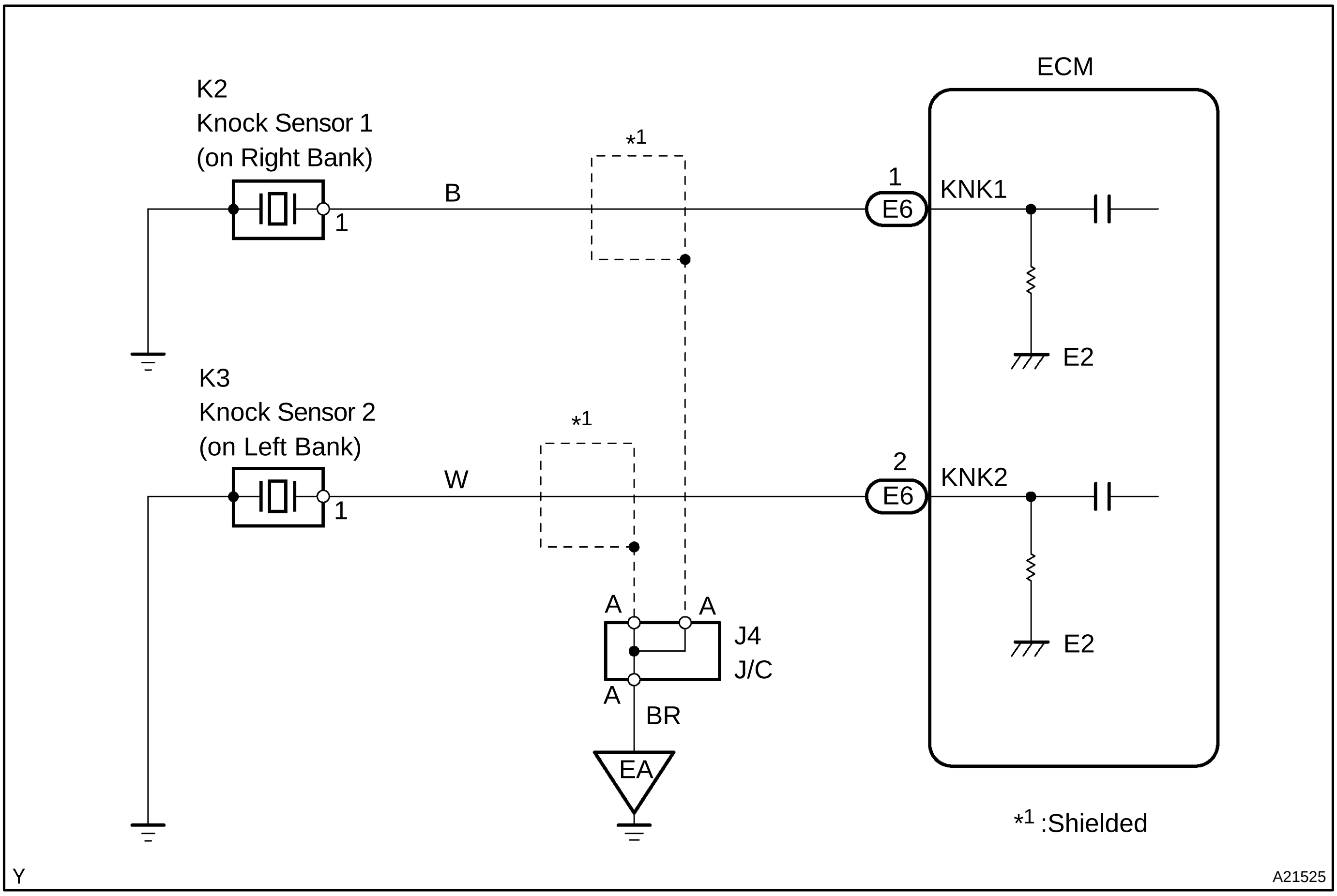
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	10 V	-
Idle	OFF	
Time after engine start	5 sec.	-
Engine coolant temperature	60°C (140°F)	-
Intake air amount per revolution	1 g/rev	-
Engine speed	1,600 rpm	5,200 rpm

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Sensor failure is indicated when the knock sensor output level is below the specific threshold for:	10 sec.

WIRING DIAGRAM

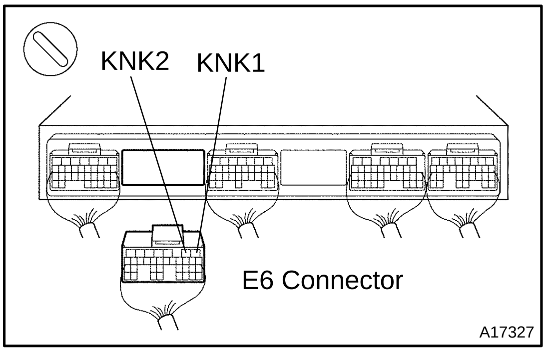


INSPECTION PROCEDURE

HINT:

- DTC P0325 is for the front side knock sensor circuit.
- DTC P0330 is for the rear side knock sensor circuit.
- Read freeze frame data using hand-held tester or OBD II scan tool. Because freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Check continuity between terminals KNK1, KNK2 of ECM connector and body ground.**



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Disconnect the E2 connector from the ECM.

CHECK:
Measure the resistance between terminals KNK1, KNK2 of the ECM connector and the body ground.
HINT:
- Connect terminal KNK1 to the knock sensor 1.
- Connect terminal KNK2 to the knock sensor 2.

OK:
Resistance: 1 MΩ or higher

OK	**Go to step 3.**

NG

2	**Check knock sensor (See page SF-69).**

NG	**Replace knock sensor.**

OK

3	**Check for open and short in harness and connector between ECM and knock sensor (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

4	Does malfunction disappear when normal knock sensor is installed?

YES → **Replace knock sensor.**

NO

Replace ECM (See page SF-74).

DIC4E-01

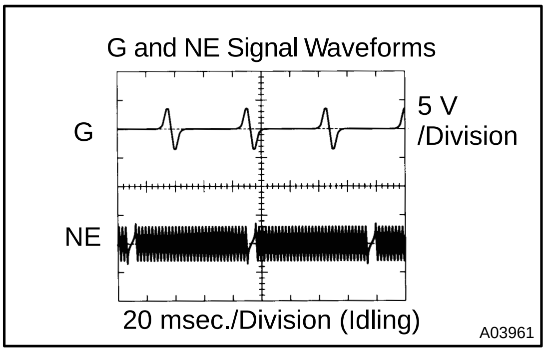
DTC	P0335	Crankshaft Position Sensor ”A” Circuit

DTC	P0339	Crankshaft Position Sensor ”A” Circuit Intermittent

CIRCUIT DESCRIPTION

The crankshaft position sensor system consists of a crankshaft position sensor plate and a pick-up coil. The sensor plate has 34 teeth and is installed on the crankshaft. The pick-up coil is made of an iron core and magnet. The sensor plate rotates and as each tooth passes through the pick-up coil, a pulse signal is created. The pick-up coil generates 34 signals for each engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine RPM. Using these calculations, the fuel injection time and ignition timing are controlled.

DTC No.	DTC Detecting Condition	Trouble Area
P0335	No crankshaft position sensor signal to ECM during cranking (2 trip detection logic)	✓Open or short in crankshaft position sensor circuit ✓Crankshaft position sensor ✓Signal plate ✓ECM
	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	
P0339	No crankshaft position sensor signal to ECM with engine speed 1,000 rpm or more	



Reference: INSPECTION USING OSCILLOSCOPE
During cranking or idling, check the waveforms between terminals G2 and NE-, and NE and NE- of the ECM connector.
HINT:
The correct waveforms are as shown in the illustration.

MONITOR DESCRIPTION

If there is no signal from the crankshaft sensor even though the engine is revolving, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0335	Crankshaft position sensor range check or rationality
Required sensors/components	Main sensors/components	Crankshaft position sensor
	Related sensors/components	Engine speed sensor
Frequency of operation	Continuous	
Duration	Case 1: 4.7 sec. Case 2: 0.5 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

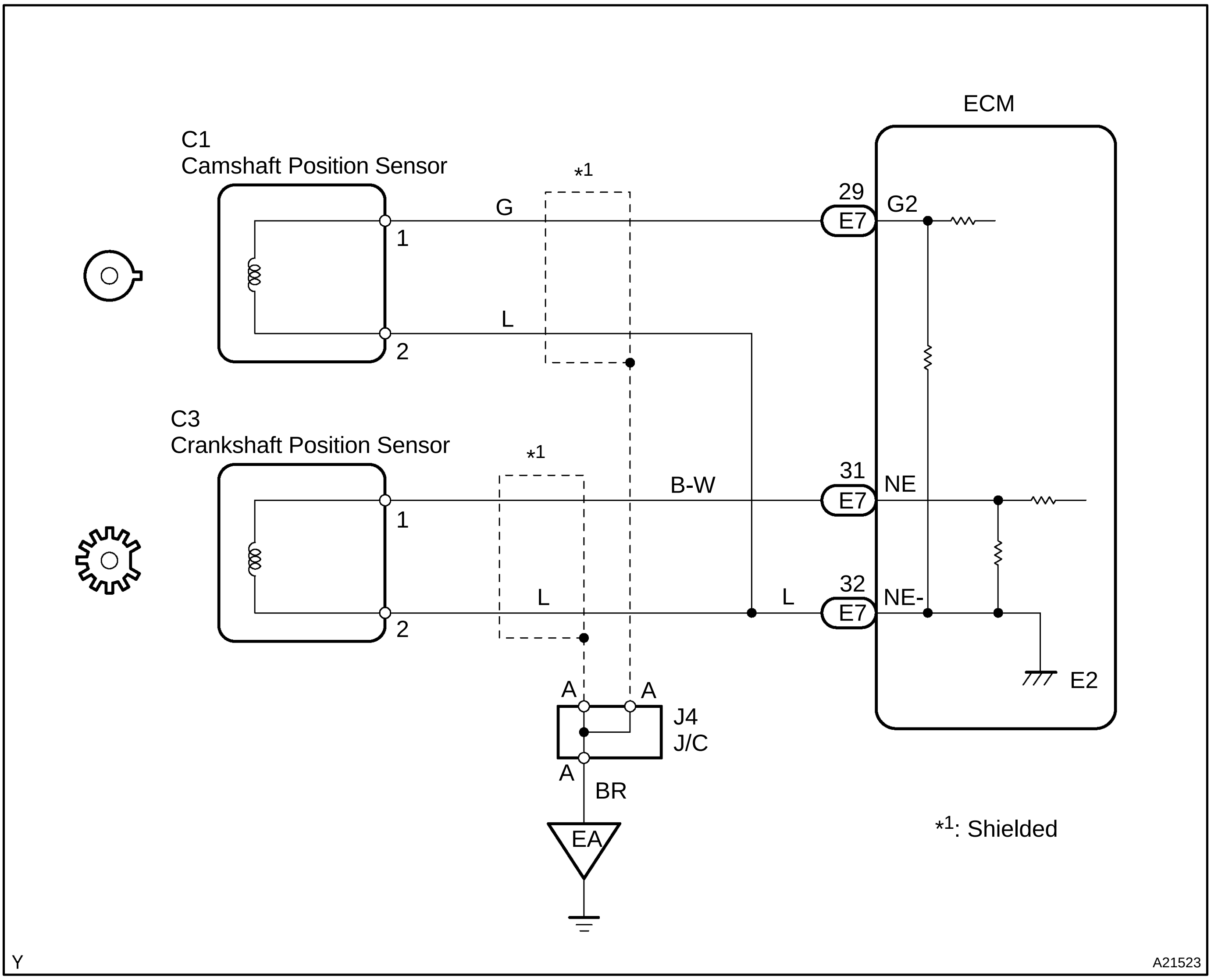
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1:		
Starter	ON	
Minimum battery voltage while starter ON	-	11 V
Case 2:		
Engine speed	600 rpm	-
Starter	OFF	
Time after starter ON to OFF	3 sec.	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1:	
Engine speed signal	No signal for 4.7 sec.
Case 2:	
Engine speed signal	No signal for 0.5 sec.

WIRING DIAGRAM



INSPECTION PROCEDURE

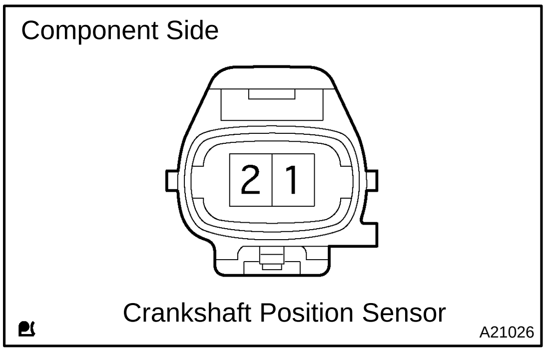
HINT:

- Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame records the engine conditions when a malfunction is detected. When troubleshooting it is useful for determining whether the vehicle was running or stopped. the engine was warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.
- READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Start the engine and push the hand-held tester or the OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ENGINE SPD.

- The engine speed can be confirmed in DATA LIST using the hand-held tester or OBD II scan tool. If there is no NE signals from the crankshaft position sensor despite the engine revolving, the engine speed will be indicated as zero. If voltage output of the crankshaft position sensor is insufficient, the engine speed will be indicated as lower PRM (than the actual RPM).

1	**Check resistance of crankshaft position sensor.**



PREPARATION:
Disconnect the crankshaft position sensor connector.
CHECK:
Measure the resistance between terminals 1 and 2.
OK:

Tester Connection	Specified Condition
1 - 2	1,630 to 2,740 Ω at cold
	2,065 to 3,225 Ω at hot

NOTICE:
" Cold" and "Hot" shown above mean the temperature of the coils themselves. "Cold" is form -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

NG	**Replace crankshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and crankshaft position sensor (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

3	**Check sensor installation (crankshaft position sensor).**

CHECK:
Check the crankshaft position sensor installation.

NG	**Tighten sensor.**

OK

4	Inspect teeth of sensor plate.

PREPARATION:

Remove the crankshaft angle sensor plate (See page EM-17).

CHECK:

Check the teeth of sensor plate.

NG → **Replace sensor plate.**

OK

Replace ECM (See page SF-74).

DIC4F-01

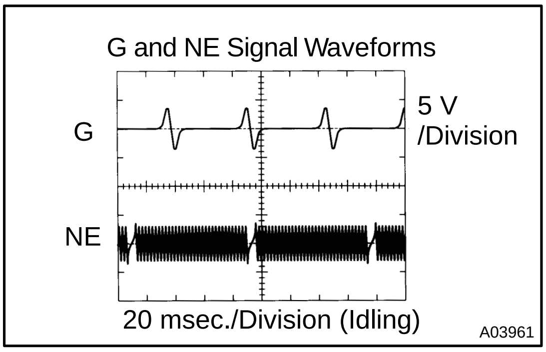
DTC	P0340	Camshaft Position Sensor ”A” Circuit (Bank 1 or Single Sensor)

DTC	P0341	Camshaft Position Sensor ”A” Circuit Range/Performance (Single Sensor)

CIRCUIT DESCRIPTION

The camshaft position sensor (G2 signal) consists of a magnet iron core and pickup coil.
The G signal plate has 3 teeth on its outer circumference and is installed on the camshaft timing pulley.
When the camshafts rotate, protrusion on the signal plate and air gap on the pickup coil change, causing fluctuations in the magnetic field and generating a voltage in the pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the crankshaft angle and the engine revolution based on the NE+ signals, and the cylinder and the angle of the VVT based on the combination of the G2 and NE signals.

DTC No.	DTC Detecting Condition	Trouble Area
P0340 P0341	No camshaft position sensor signal to ECM during cranking (2 trip detection logic) No camshaft position sensor signal to ECM with engine speed 600 rpm or more	• Open or short in camshaft position sensor circuit • Camshaft position sensor • Camshaft timing pulley • Jumping teeth of timing belt • ECM



Reference: INSPECTION USING OSCILLOSCOPE
During cranking or idling, check the waveforms between terminals G2 and NE-, and NE and NE- of the ECM connector.
HINT:
The correct waveforms are as shown in the illustration.

MONITOR DESCRIPTION

If there is no signal from the camshaft position sensor even though the engine is turning, or if the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0340	Camshaft position sensor (Bank 1) range check or rationality
	P0341	Camshaft position sensor (Bank 1) range check or rationality
Required sensors/components	Main sensors/components	Camshaft position sensor
	Related sensors/components	Crankshaft position sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	P0340 case 1 (no signal): 2 driving cycles P0340 case 2 (mis-aligned), P0341: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P0340 Case 1 (No signal):		
Starter	ON	
Minimum battery voltage while starter ON	-	11 V
P0340 Case 2 (Mis-aligned):		
Engine speed	600 rpm	-
Starter	OFF	
P0341:		
Starter	After OFF to ON timing	
Engine revolution angle	720°CA	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0340 Case 1 (No signal):	
Camshaft position sensor signal	No signal
P0340 Case 2 (Mis-aligned):	
Crankshaft/camshaft alignment is mis-aligned (judged by comparing the crankshaft position to the camshaft position)	
Camshaft position sensor signal: No input in appropriate timing.	
P0341:	
Crankshaft/Camshaft alignment	Mis-aligned
Camshaft position sensor count	12 or more / 720°CA (= Engine 2 revolutions)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Camshaft position sensor signal input during every 720°CA	3

WIRING DIAGRAM

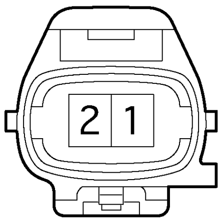
Refer to DTC P0335 on page DI-184 .

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check resistance of camshaft position sensor.**

Component Side



Camshaft Position Sensor
A21026

PREPARATION:
Disconnect the camshaft position sensor connector.
CHECK:
Measure the resistance between terminals 1 and 2.
OK:

Tester Connection	Specified Condition
1 - 2	835 to 1,400 Ω at cold
	1,060 to 1,645 Ω at hot

NOTICE:
” Cold” and ”Hot” shown above mean the temperature of the coils themselves. ”Cold” is from -10°C (14°F) to 50°C (122°F) and ”Hot” is form 50°C (122°F) to 100°C (212°F).

NG	**Replace camshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and camshaft position sensor (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

3	**Check sensor installation (Camshaft position sensor).**

CHECK:
Check the camshaft position sensor installation.

NG	**Tighten sensor.**

OK

4	**Inspect teeth of camshaft timing belt pulley.**

PREPARATION:
Remove the camshaft timing belt pulley (See page EM-17).
CHECK:
Check the camshaft timing belt pulley.

NG → **Replace camshaft timing pulley.**

OK

Replace ECM (See page SF-74).

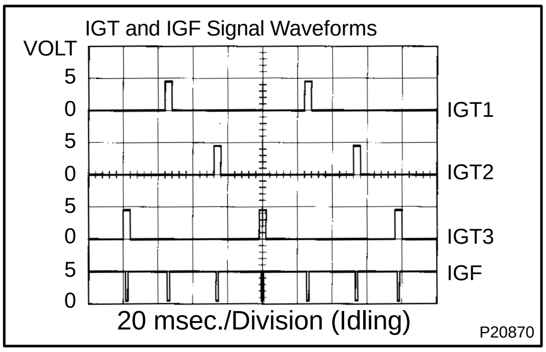
DIC4G-01

DTC	P0351	Igniter Coil ”A” Primary/Secondary Circuit

CIRCUIT DESCRIPTION

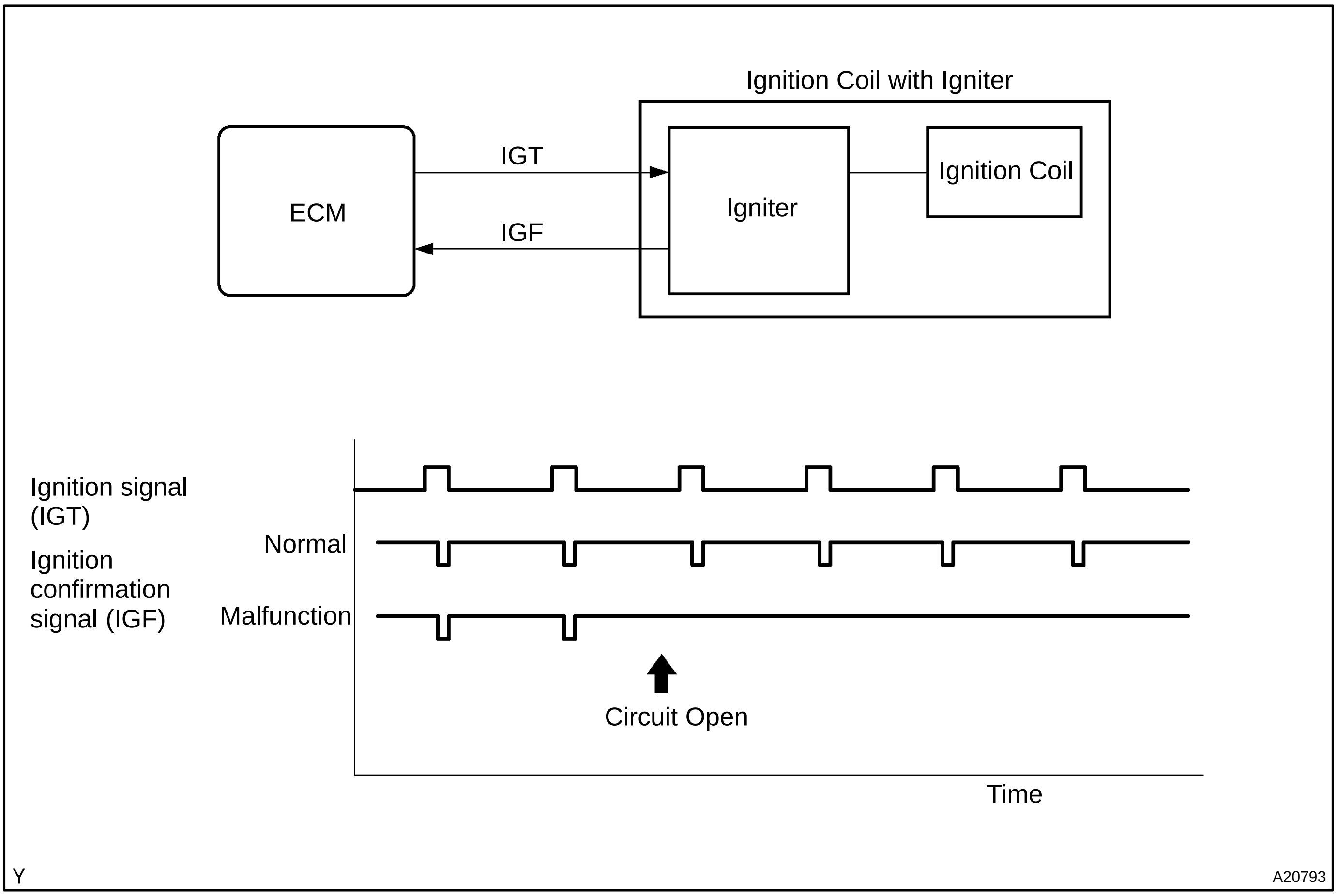
A Direct Ignition System (DIS) has been adopted. The DIS improves the ignition timing accuracy, reduces high-voltage loss, and enhances the overall reliability of the ignition system by eliminating the distributor. The DIS is a 2-cylinder simultaneous ignition system which ignites 2 cylinders simultaneously with 1 ignition coil. In the 2-cylinder simultaneous ignition system, each of the 2 spark plugs is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plugs. The sparks generated by the 2 spark plugs pass simultaneously from the center electrode to the ground electrode.
The ECM determines ignition timing and outputs the ignition signals (IGT) for each cylinder. Based on IGT signals, the igniter controls the primary ignition signals (IGC) for all ignition coils. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail-safe measure to the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0351	No IGF signal to ECM while engine is running (1trip detection logic)	✓Open or short in IGF and IGT1 - IGT3 circuit from igniter to ECM ✓Igniter ✓Ignition system ✓ECM



Reference: INSPECTION USING OSCILLOSCOPE
During idling, check the waveform between terminals IGT and E1, IGT2 and E1, IGT3 and E1, and IGF and E1 of the ECM connectors.
HINT:
The correct waveforms are as shown in the illustration.

MONITOR DESCRIPTION



If the ECM does not receive the IGF after sending the IGT it interprets this as a fault in the igniter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0351	Ignition coil with igniter circuit malfunction
Required sensors/components	Igniter	
Frequency of operation	Continuous	
Duration	0.256 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Following conditions is met:	A or B	
A. Following conditions are met:	(a) and (b)	
(a) Engine speed	-	500 rpm
(b) Battery voltage	6 V	-
B. Following conditions are met:	(a) and (b)	
(a) Engine speed	500 rpm	-
(b) Battery voltage	10 V	-

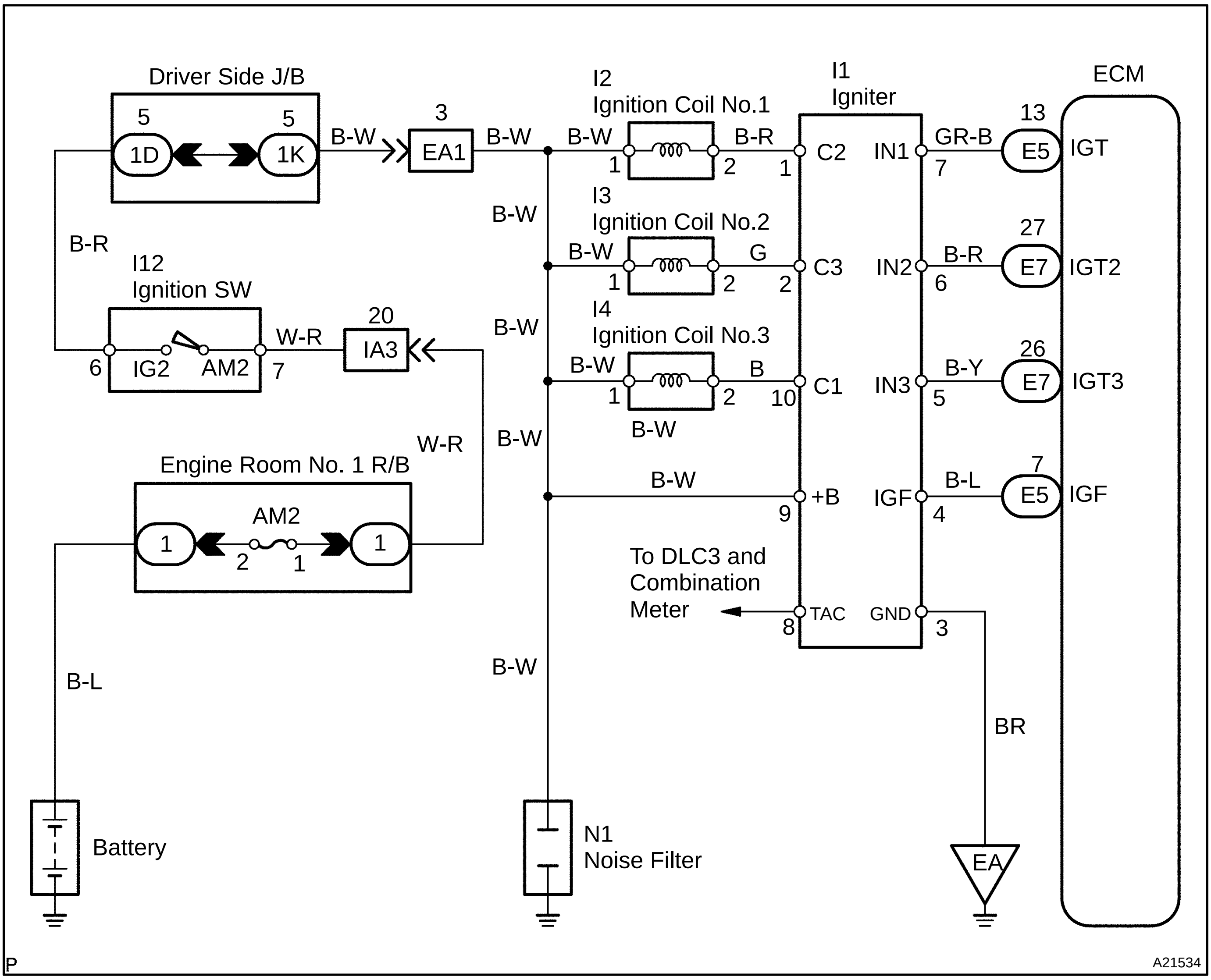
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
"Ignition signal fail count"	More than 2
"Ignition signal fail count" is as follows:	When IGF should have returned despite sending IGT.

COMPONENT OPERATING RANGE

Standard Value
Confirmed signal number = ignition signal number

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check spark plug and spark (See page IG-1).**

NG → **Go to step 4.**

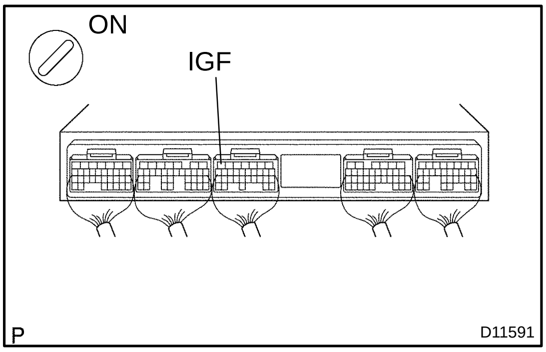
OK

2	**Check for open and short in harness and connector in IGF signal circuit between ECM and igniter (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

3	**Disconnect igniter connector, and check voltage between terminal IGF of ECM connector and body ground.**



PREPARATION:
(a) Disconnect the igniter connector.
(b) Remove the ECM hood (See page SF-74).
(c) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminal IGF of the ECM connector and the body ground.

OK:
Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK

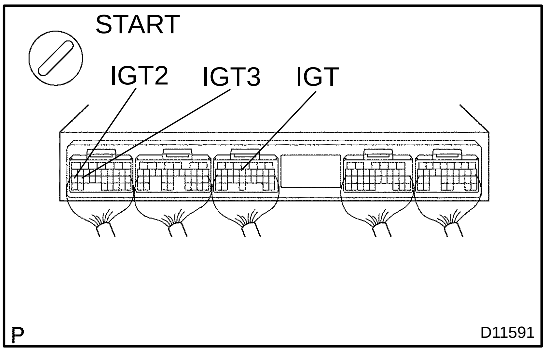
Replace igniter.

4	Check for open and short in harness and connector in IGT signal circuit between ECM and igniter (See page IN-33).

NG	Repair or replace harness or connector.

OK

5	Check voltage between terminals IGT, IGT2, IGT3 of ECM connector and body ground.



PREPARATION:

Remove the ECM hood (See page SF-74).

CHECK:

Measure the voltage between terminals IGT, IGT2, IGT3 of the ECM connector and the body ground when the engine is cranked.

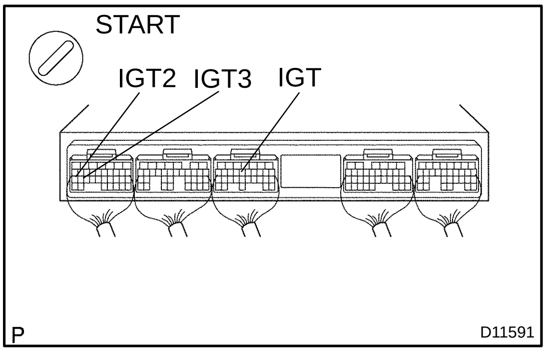
OK:

Voltage: More than 0.1 V and less than 4.5 V

NG	Replace ECM (See page SF-74).

OK

6	Disconnect igniter connector, and check voltage between terminals IGT, IGT2, IGT3 of ECM connector and body ground.



PREPARATION:

(a) Disconnect the igniter connector.

(b) Remove the ECM hood (See page SF-74).

CHECK:

Measure the voltage between terminals IGT, IGT2, IGT3 of the ECM connector and the body ground when the engine is cranked.

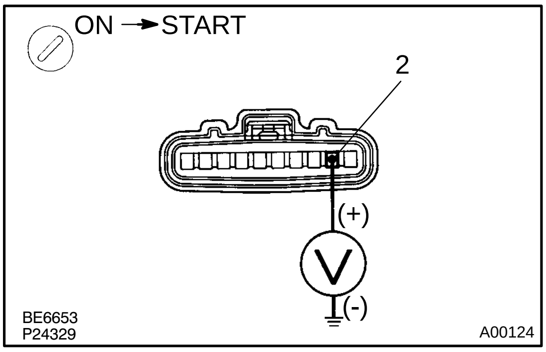
OK:

Voltage: 4.5 V or more

NG	Replace ECM (See page SF-74).

OK

7	Check voltage between terminal 2 of igniter connector and body ground.



PREPARATION:
Disconnect the igniter connector.
CHECK:
Measure the voltage between terminal 2 of the igniter connector and the body ground when the ignition switch is turned to ON and START positions.
OK:
Voltage: 9 to 14 V

OK → **Repair igniter.**

OK

8	Check for open and short in harness and connector between ignition switch and ignition coil, and ignition coil and igniter (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

9	Check ignition coil (See page IG-1).

NG → **Replace ignition coil.**

OK

Replace igniter.

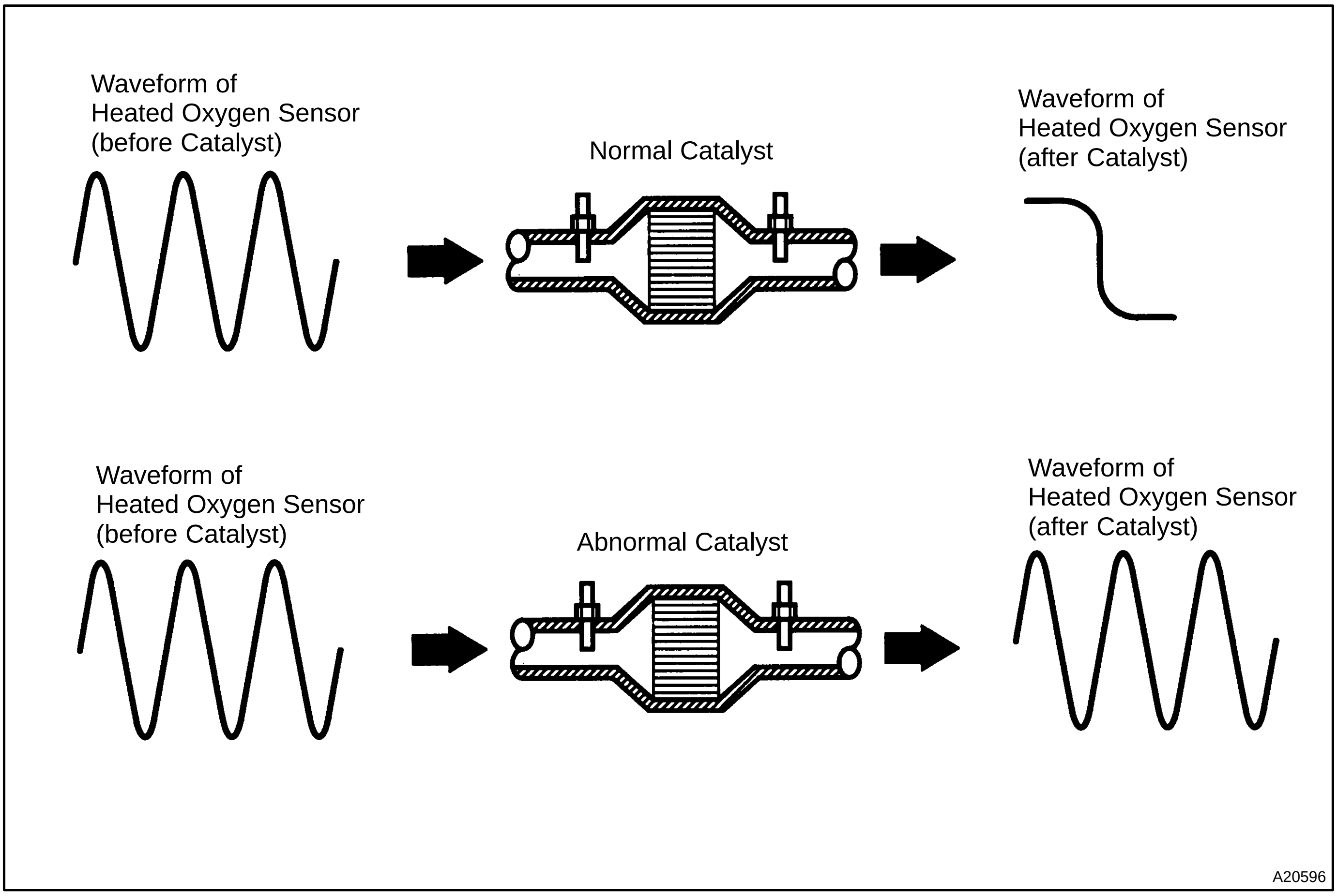
DIC4H-01

DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

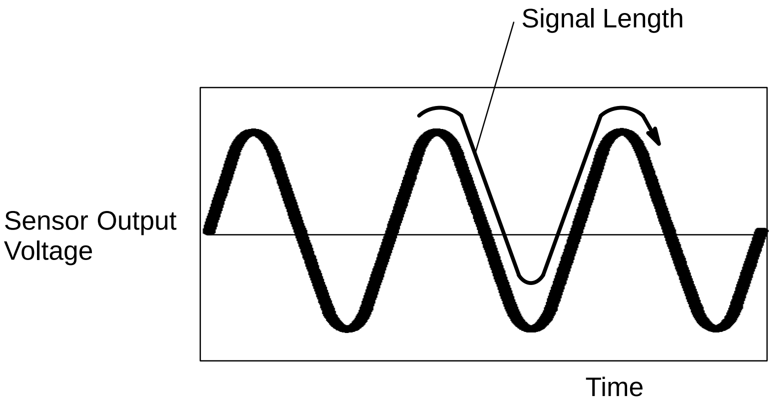
DTC	P0430	Catalyst System Efficiency Below Threshold (Bank 2)

MONITOR DESCRIPTION

The vehicle is equipped with two heated oxygen sensors. One is mounted upstream from the TWC (Three-Way Catalytic) converter (Front Oxygen Sensor, "sensor 1"), the second is mounted downstream (Rear Oxygen Sensor "sensor 2"). The catalyst efficiency monitor compares the sensor 1 and sensor 2 signals in order to calculate TWC ability to store the oxygen.
During normal operation, the TWC stores and releases oxygen as needed. This results in low oxygen variations in the post TWC exhaust stream as shown below.



Heated Oxygen Sensor Signal Length



A20598

DTC No.	DTC Detecting Condition	Trouble Area
P0420 P0430	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveform of heated oxygen sensors have same amplitude (2 trip detection logic)	• Gas leakage on exhaust system • Heated oxygen sensor • Three-way catalytic converter

MONITOR STRATEGY

Related DTCs	P0420	Bank 1 catalyst is deteriorated
	P0430	Bank 2 catalyst is deteriorated
Required sensors/components	Main sensors/components	Front and rear heated oxygen sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor, Engine speed sensor, Intake air temperature sensor
Frequency of operation	Once per driving cycle	
Duration	90 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	-
Intake air temperature	-10 °C (14 °F)	-
Idle	OFF	
Intake air amount	8 g/sec.	25 g/sec.
Engine speed	-	3,000 rpm
Engine coolant temperature	75°C (167°F)	
Estimated catalyst temperature conditions are met:	A and B	
A. Estimated temperature of up stream catalyst	450°C (842°F)	800°C (1,472°F)
B. Estimated temperature of down stream catalyst	450°C (842°F)	800°C (1,472°F)
Fuel system status	Closed loop	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Catalyst deterioration level (Heated oxygen sensor locus length ratio)	P0420 (Bank 1): 0.5 or more P0430 (Bank 2): 0.4 or more
Number of times detection	8 times

MONITOR RESULT

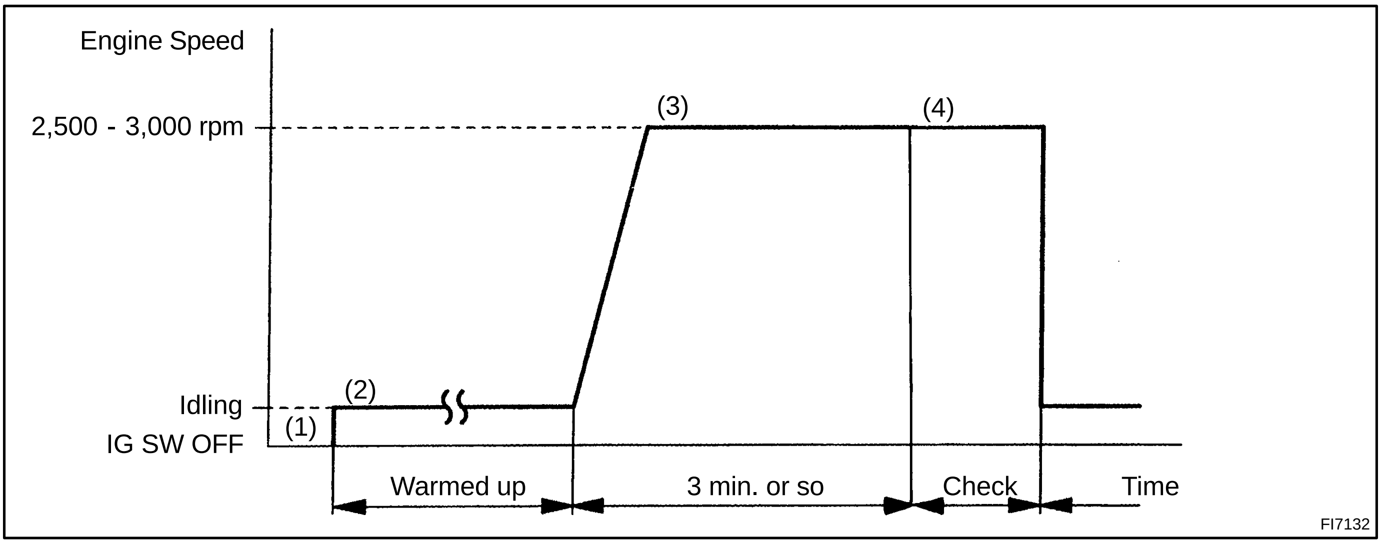
The detailed information is described in "CHECKING MONITOR STATUS" (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

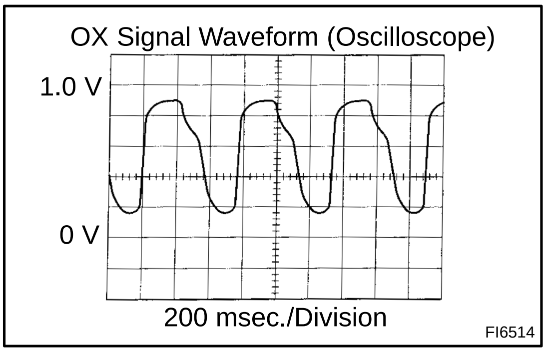
TID $01: Catalyst- Using Front HO2S and Rear HO2S

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
0	$01	Multiply by 0.0078 (no dimension)	Catalyst deterioration level bank 1: Determined by waveform of front HO2S and rear HO2S	Malfunction criterion
0	$02	Multiply by 0.0078 (no dimension)	Catalyst deterioration level bank 2: Determined by waveform of front HO2S and rear HO2S	Malfunction criterion

CONFIRMATION ENGINE RACING PATTERN



(1) Connect the hand-held tester to the DLC3, or connect the probe of the oscilloscope between terminals OX1A, OX1B, OX2A, OX2B and E1 of ECM connectors.
(2) Start the engine and warm it up with all the accessories switched OFF until engine coolant temperature is stable.
(3) Race the engine at 2,500 - 3,000 rpm for about 3 min.
(4) After confirming that the waveform of the heated oxygen sensor (bank 1, 2 sensor 1 (OX1A, OX2A)), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OX1B, OX2B)).



HINT:
If there is a malfunction in the system, the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OX1B, OX2B)) is almost the same as that of the heated oxygen sensor (bank 1, 2 sensor 1 (OX1A, OX2A)) on the left.
There are some cases where, even though a malfunction exists, the MIL may either light up or not light up.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Are there any other codes (besides DTC P0420 or P0430) being output?**

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0420 and/or P0430”	A
”P0420 or P0430” and other DTCs	B

HINT:
If any other codes besides ”P0420 and/or P0430” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check gas leakage on exhaust system.**

NG → **Repair or replace exhaust gas leakage point.**

OK

3	**Check heated oxygen sensor (bank 1, 2 sensor 1) (See page SF-73).**

HINT:
Reter to the hint following the end of this flowchart.

NG → **Replace heated oxygen sensor.**

OK

4	**Check heated oxygen sensor (bank 1, 2 sensor 2) (See page SF-73).**

HINT:
Reter to the hint following the end of this flowchart.

NG → **Replace heated oxygen sensor.**

OK

Replace front and rear three-way catalytic converter.

HINT:
Hand-held tester only:
The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).
(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).
HINT:
”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:
However, there is a few second delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 % Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 % Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter "ACTIVE TEST / A/F CONTROL / USER DATA" then select "O2S B1S1 and O2S B1S2" by pressing "YES" button and push "ENTER" button before pressing "F4" button.
NOTICE:
If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and DTCs P0133 and/or P0153 will be recorded, and the MIL then comes on.

- If different DTCs related to different systems while terminal E2 as ground terminal are output simultaneously, terminal E2 may be open.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 V or more) could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A low heated oxygen sensor (sensor 1) voltage (0.4 V or less) could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

DIC4I-01

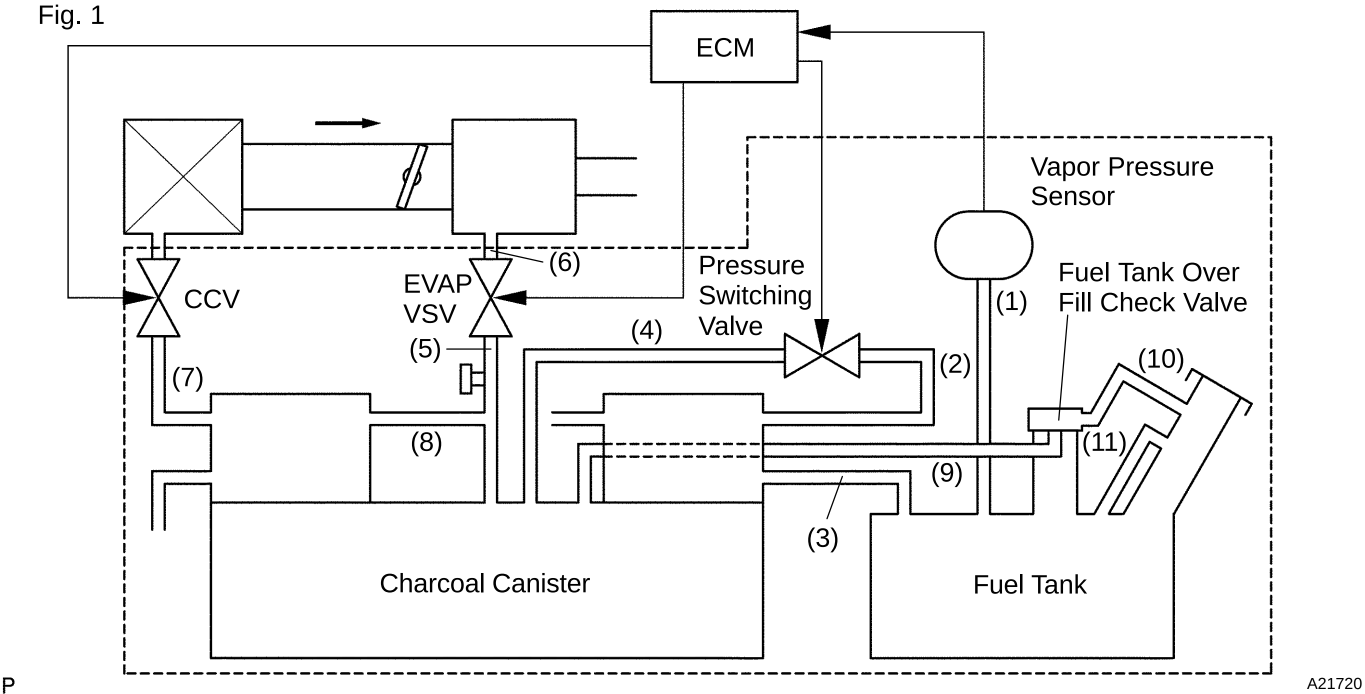
DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

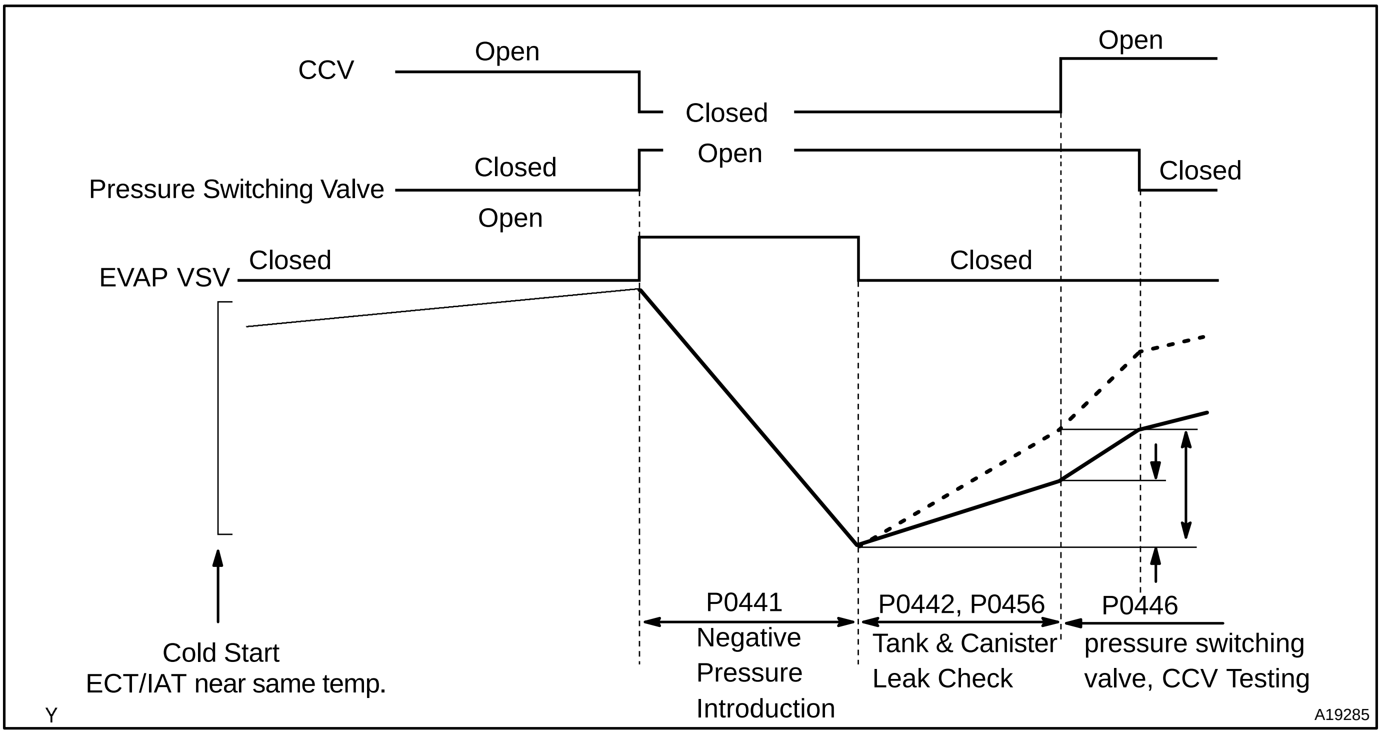
DTC	P0446	Evaporative Emission Control System Vent Control Circuit

CIRCUIT DESCRIPTION

The vapor pressure sensor, canister closed valve (CCV), pressure switching valve are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTCs P0441 and P0446 are recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when there is a malfunction in either the EVAP VSV, the pressure switching valve, or in the vapor pressure sensor itself.

Fig. 1





DTC No.	DTC Detecting Condition	Trouble Area
P0441	Pressure in charcoal canister and fuel tank does not drop during purge control (2 trip detection logic)	✓Vacuum hose cracks, holed, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8), (9), (10) and (11) in Fig. 1) ✓Fuel tank cap incorrectly installed ✓Fuel tank cap cracked or damaged ✓Open or short in vapor pressure sensor circuit ✓Vapor pressure sensor ✓Open or short in circuit for EVAP VSV ✓EVAP VSV ✓Open or short in circuit for CCV ✓CCV ✓Open or short in circuit for pressure switching valve ✓Pressure switching valve ✓Fuel tank cracked, holed or damaged ✓Charcoal canister cracked, holed or damaged ✓Fuel tank over fill check valve cracked damaged ✓ECM
	During purge cut-off, negative pressure incoming in the charcoal canister and fuel tank will not stop. (2 trip detection logic)	
P0446	No rising the fuel tank pressure when commanding the CCV open after an EVAP leak test	
	No changing the fuel tank pressure when commanding the pressure switching valve for the check after the EVAP leak test	
	A high negative pressure (vacuum) does not occurs in the system when commanding the EVAP VSV open with the CCV closed	

HINT:
Typical DTC output of each trouble part

Trouble part		Typical DTC output (*1)
Small Leak		”P0442” and/or ”P0456” (*2)
Medium Leak (ex: Vacuum hose loose)		P0442
Large Leak (ex: Fuel tank cap loose)		P0442 and P0441 and P0446
EVAP VSV	Open Malfunction	P0441
	Close Malfunction	P0442 and P0441 and P0446
CCV	Open Malfunction	P0442 and P0441 and P0446
	Close Malfunction	P0446
Pressure Switching Valve	Open Malfunction	P0446
	Close Malfunction	P0442 and P0441 and P0446

*1: ECM may output some other DTC combination.

MONITOR DESCRIPTION

P0441

The ECM checks for a stuck closed malfunction in the EVAP VSV by commanding it to open with the CCV closed. If a high negative pressure does not develop in the fuel tank, the ECM determines that the VSV for EVAP remains closed. The ECM turns on the MIL and a DTC is set.

The ECM checks for EVAP VSV ”stuck open” fault by commanding both valves (EVAP VSV and CCV) to close at a time when the fuel tank is at atmospheric pressure. If the fuel tank develops a high negative pressure at this early stage of the test, the ECM determines that the EVAP VSV is stuck OPEN.

The ECM will turn on the MIL and a DTC is set.

P0446

If there is a malfunction detected in the evaporative emission (EVAP) VSV, the canister closed valve (CCV) and the VSV for bypass valve; the ECM will illuminate the MIL and set a DTC.

This portion of the EVAP diagnosis checks the following EVAP system functions:

(a) CCV stuck closed.
The ECM checks for a CCV ”stuck closed” malfunction by commanding the CCV to open after an EVAP leak test. If the fuel tank pressure does not rise (lose vacuum), the ECM determines that the CCV is stuck closed. The ECM will turn on the MIL and a DTC is set.

(b) Pressure switching valve stuck closed.
The ECM checks for a pressure switching valve ”stuck closed” malfunction by commanding the pressure switching valve to close after an EVAP leak test. If the fuel tank pressure does not change, the ECM determines that the pressure switching valve is malfunctioning. The ECM will turn on the MIL and a DTC is set.

(c) EVAP VSV (Purge line to intake manifold) stuck closed.
The ECM checks for a stuck closed malfunction in the EVAP VSV by commanding it to open with the CCV closed. If a high negative pressure does not develop in the fuel tank, the ECM determines that the EVAP VSV remains closed. The ECM turns on the MIL and a DTC is set.

MONITOR STRATEGY

DTCs	P0441	VSV for EVAP malfunction
	P0446	Canister close valve stuck closed Pressure switching valve malfunction EVAP VSV malfunction
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Engine coolant temperature sensor, Intake air temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	P0441 : 90 sec. P0446 : 10 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Criteria	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
The same as that for DTC P0442		

TYPICAL MALFUNCTION THRESHOLDS

P0441

Detection Criteria	Threshold
Either of the following condition is met:	A or B
A. Following conditions are met:	(a) and (b)
(a) Fuel tank pressure at the vacuum introduction start	-1.6 kPa (-12 mmHg, -0.47 in.Hg) or more
(b) Difference between the fuel tank pressure at the vacuum introduction start and completion	Less than 0.9 kPa (7 mmHg, 2.7 in.Hg)
B. Following conditions are met:	(a) and (b)
(a) Difference between "minimum" fuel tank pressure before the leak check and the fuel tank pressure at 14 sec. after the leak check	0.5 kPa or more (3.5 mmHg, 0.15 in.Hg)
(b) Fuel tank pressure at 14 sec. after the leak check	Less than -3.7 kPa (-28 mmHg, -1.1 in.Hg)

P0446

Detection Criteria	Threshold
Case 1: CCV stuck closed	
Fuel tank pressure when the CCV is opened after an EVAP leak check	Not changing
Case 2: Pressure switching valve malfunction	
Fuel tank pressure when the pressure switching valve is closed after an EVAP leak check	Not changing
Case 3: EVAP VSV stuck closed	
Fuel tank pressure after the EVAP VSV is opened and manifold vacuum is introduced to the fuel tank	Not changing

MONITOR RESULT

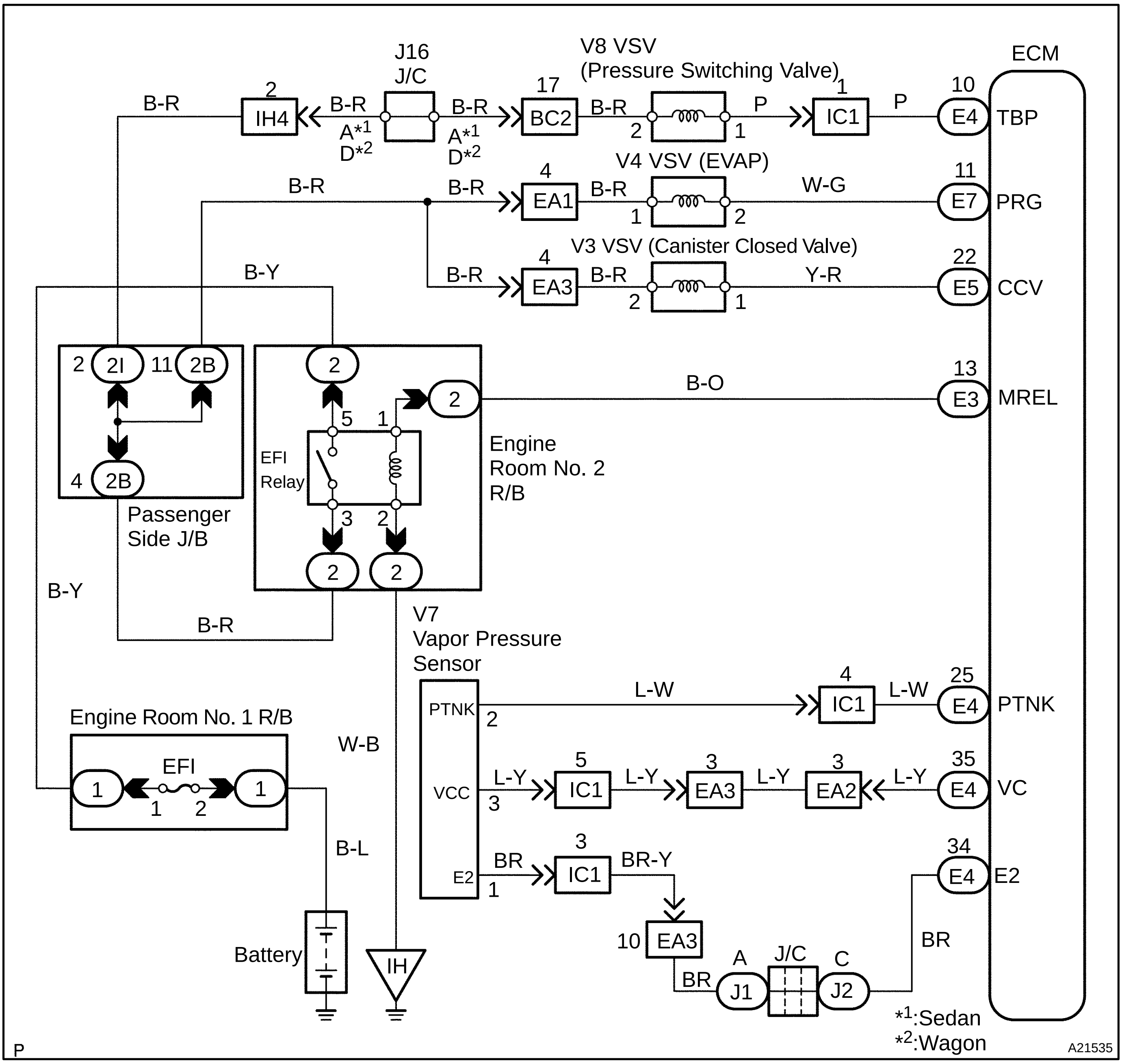
The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $02: EVAP - Vacuum Monitor

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.0916 (mmHg)	Test value of EVAP VSV: Determined by fuel tank pressure change during vacuum introduction	Malfunction criterion
1	$02	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of bypass VSV (pressure switching valve) and CCV: Determined by fuel tank pressure change at switching over bypass VSV and CCV	Malfunction criterion
0	$03	Multiply by 0.0458 (mmHg)	Test value of 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criterion
0	$04	Multiply by 0.0458 (mmHg)	Test value of 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criterion

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P0441 (Purge Flow), P0446 (CCV) or pressure switching valve or P0451 (Evaporative Pressure Sensor) is output with DTC P0442, P0455 or P0456, first troubleshoot DTC P0441, P0446 or P0451. If no malfunction is detected, troubleshoot DTC P0442, P0455 or P0456 next.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the vapor pressure sensor.

Hand-held tester:

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK

2	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

3	**Check fuel tank cap (See page EC-7).**

NG → **Replace fuel tank cap.**

OK

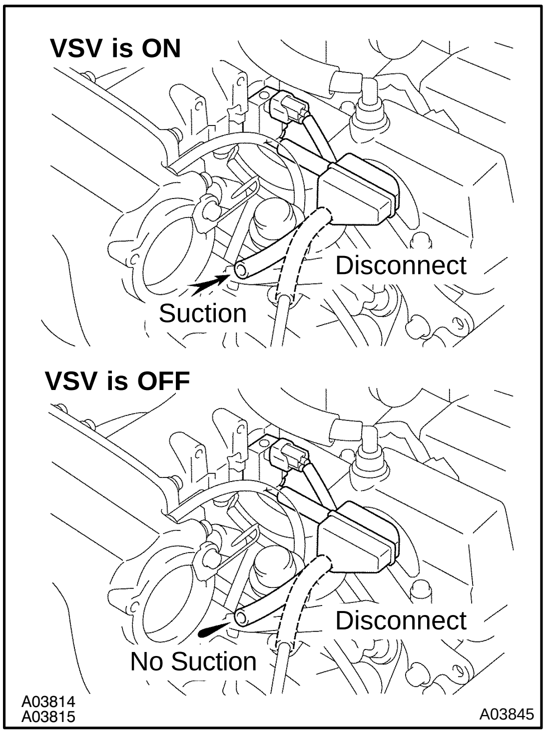
4	Check filler neck for damage.

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG	Replace filler pipe.

OK

5	Check purge flow.



PREPARATION:
(a) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(b) Disconnect the vacuum hose for the EVAP VSV from the charcoal canister.
(c) Start the engine.
(d) Select the item "EVAP VSV (ALON) / ALL" in the ACTIVE TEST and operate EVAP VSV (Press the right or left button).

CHECK:
When the EVAP VSV is operated by the hand-held tester, check whether the disconnected hose applies suction to your finger.

OK:
VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK	Go to step 9.

NG

6	**Check vacuum hose between intake manifold and EVAP VSV, and EVAP VSV and charcoal canister.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace vacuum hose.**

OK

7	**Check operation of EVAP VSV (See page SF-56).**

NG → **Replace EVAP VSV.**

OK

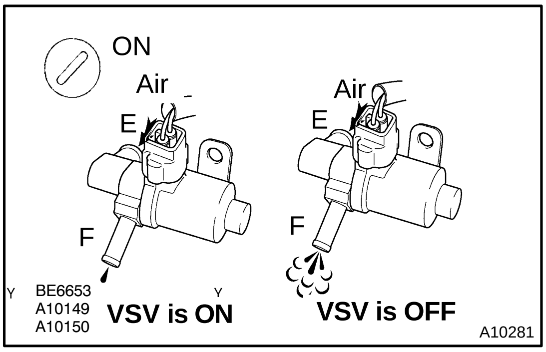
8	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and EVAP VSV, and EVAP VSV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

9	**Check CCV.**



PREPARATION:

(a) Disconnect the vacuum hose for the VSV for the CCV from the charcoal canister.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST” mode on the hand-held tester.

(d) Select the item ”CAN CTRL VSV / ALL” in the ACTIVE TEST and operate CAN CTRL VSV (Press the right or left button).

CHECK:

Check the CCV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK	**Go to step 13.**

NG

10	**Check vacuum hose between CCV and charcoal canister.**

CHECK:

(a) Check that the vacuum hose is connected correctly.

(b) Check the vacuum hose for looseness and disconnection.

(c) Check the vacuum hose for cracks, hole damage and blockage.

NG	**Repair or replace vacuum hose.**

OK

11	Check operation of CCV (See page SF-61).

NG → **Replace CCV.**

OK

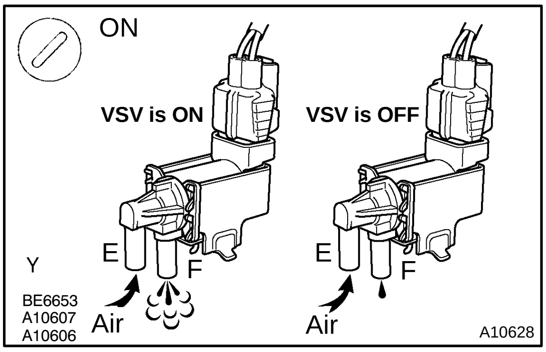
12	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and CCV, and CCV and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

13	Check pressure switching valve.



PREPARATION:

(a) Turn the ignition switch ON and push the hand-held tester main switch ON.

(b) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.

(c) Select the item "TANK BYPASS VSV / ALL" in the ACTIVE TEST and operate TANK BYPASS VSV (Press the right or left button).

CHECK:

Check the pressure switching valve operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 16.**

NG

14	Check operation of pressure switching valve (See page SF-63).

NG → Replace pressure switching valve.

OK

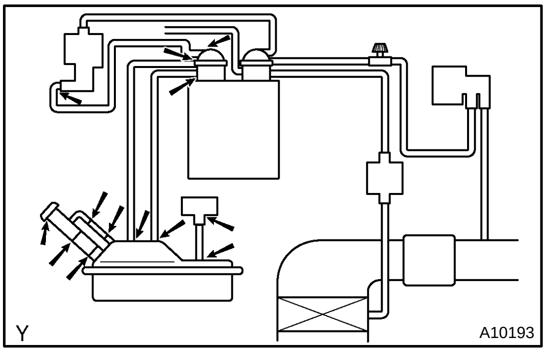
15	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and pressure switching valve, and pressure switching valve and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-74).

16	Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank.



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Fuel tank filler pipe
- Hoses and tubes around fuel tank

NG → Repair or replace evaporative emission leak part.

OK

17	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose.**

OK

18	**Check hose and tube between fuel tank and charcoal canister.**

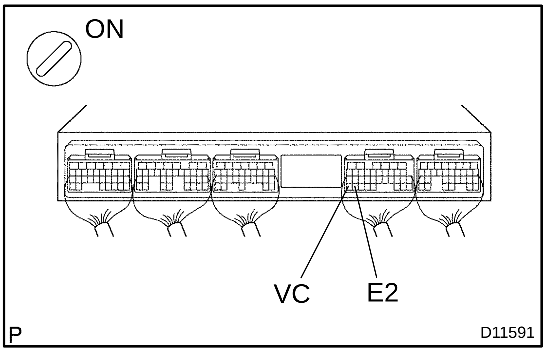
CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-7), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

19	**Check voltage between terminals VC and E2 of ECM connector.**



CHECK:

(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

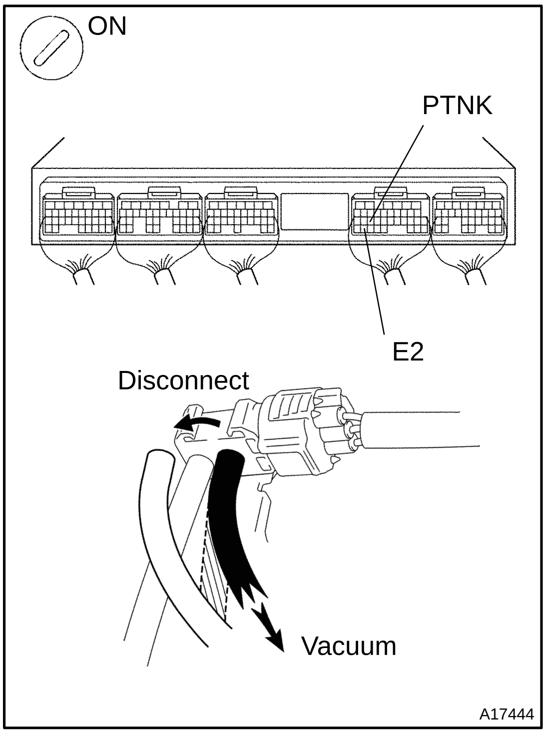
OK:

Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK

20	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK → **Go to step 22.**

NG

21	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

22	Check fuel tank over fill check valve.

NG → **Replace fuel tank over fill check valve.**

OK

23	Check fuel tank.

NG → **Replace fuel tank.**

OK

24	Check charcoal canister for cranks, hole and damage.

NG → **Replace charcoal canister.**

OK

Replace ECM (See page SF-74).

OBD II scan tool (excluding hand-held tester):

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK

2	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

3	**Check fuel tank cap (See page EC-7).**

NG → **Replace fuel tank cap.**

OK

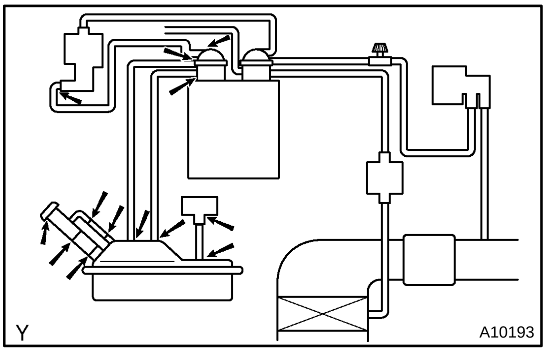
4	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

5	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace evaporative emissions leak part.**

OK

6	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-7), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

8	Check vacuum hoses ((8) and (9) in Fig. 1 in circuit description).

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage, and blockage.

NG → **Repair or replace vacuum hose.**

OK

9	Check VSV connector for EVAP, VSV connector for CCV, VSV connector for pressure switching valve and vapor pressure sensor connector for looseness and disconnection.

NG → **Repair or connect VSV or sensor connector.**

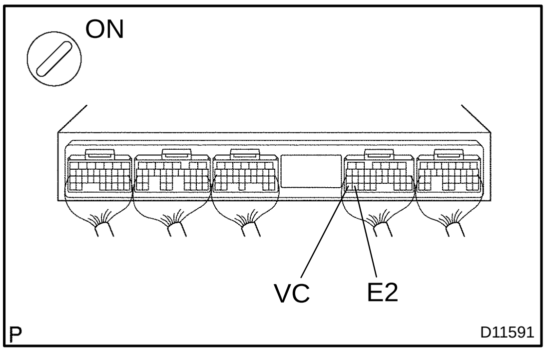
OK

10	Check charcoal canister for cracks, hole and damage.

NG → **Replace charcoal canister.**

OK

11	Check voltage between terminals VC and E2 of ECM connector.



CHECK:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

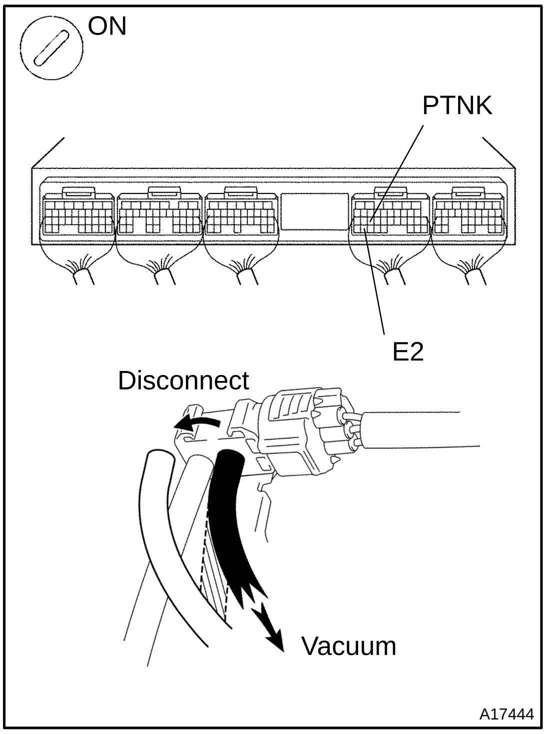
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.

OK:
Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK

12	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).
(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:
Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:
Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK → **Go to step 14.**

NG

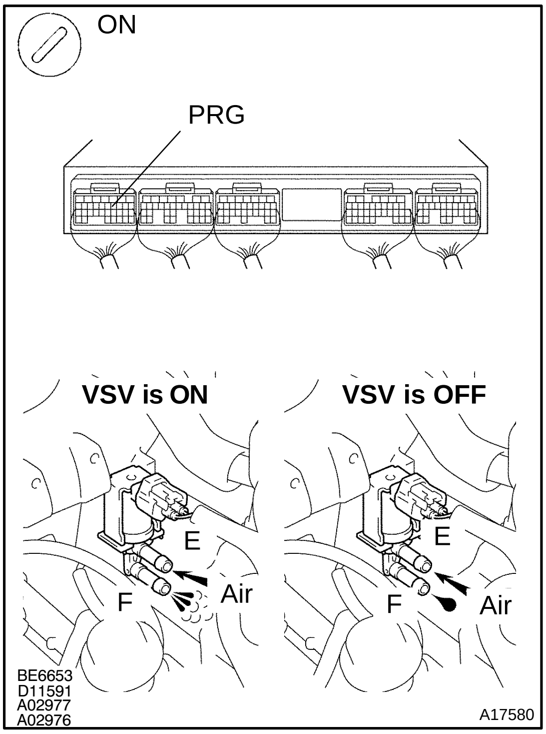
13	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).**

NG — **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

14	**Check EVAP VSV.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal PRG of the ECM connector and body ground (ON).

(2) Disconnect between terminal PRG of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E frows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK — **Go to step 17.**

NG

15	**Check operation of EVAP VSV (See page SF-56).**

NG — **Replace EVAP VSV.**

OK

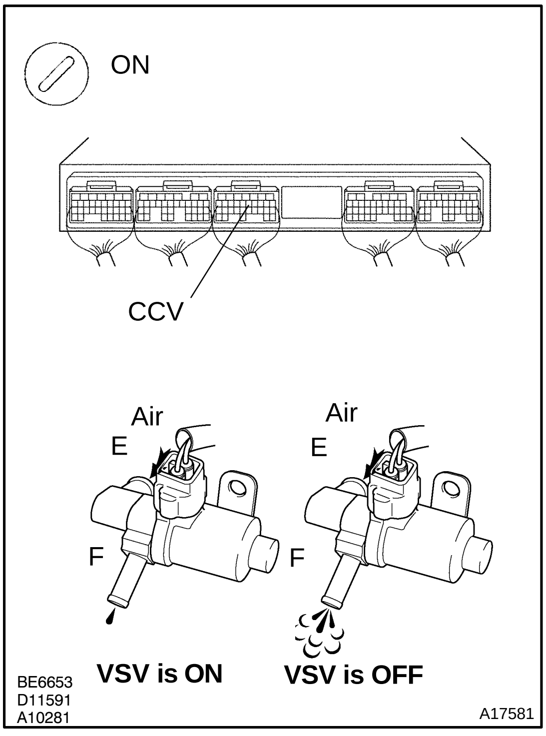
16	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and EVAP VSV, and EVAP VSV and ECM (See page IN-33)

NG — **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

17	Check CCV.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal CCV of the ECM connector and body ground (ON).

(2) Disconnect between terminal CCV of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air does not flow from port E to port F.
(2) VSV is OFF:
Air from port E flows out through port F.

OK — **Go to step 20.**

NG

18	Check operation of CCV (See page SF-61).

NG — **Replace CCV.**

OK

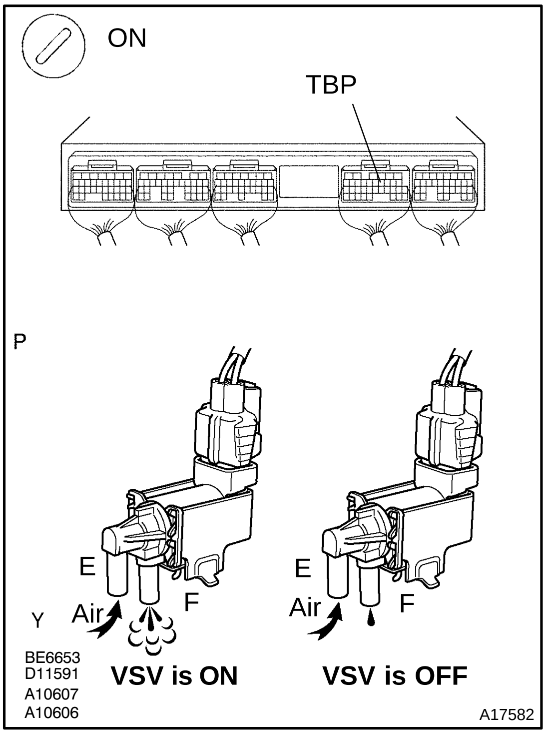
19	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and CCV, and CCV and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

20	Check pressure switching valve.



PREPARATION:

(a) Remove the ECM cover (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal TBP of the ECM connector and body ground (ON).

(2) Disconnect between terminal TBP of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 23**

NG

21	Check operation of pressure switching valve (See page SF-63).

NG → **Replace pressure switching valve.**

OK

22	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and pressure switching valve, and pressure switching valve and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK ↓

Replace ECM (See page SF-74).

23	Check fuel tank over fill check valve.

NG → Replace fuel tank over fill check valve.

OK ↓

24	Check fuel tank.

NG → Replace fuel tank.

OK ↓

It is likely that vehicle user did not properly close fuel tank cap.

DIC4J-01

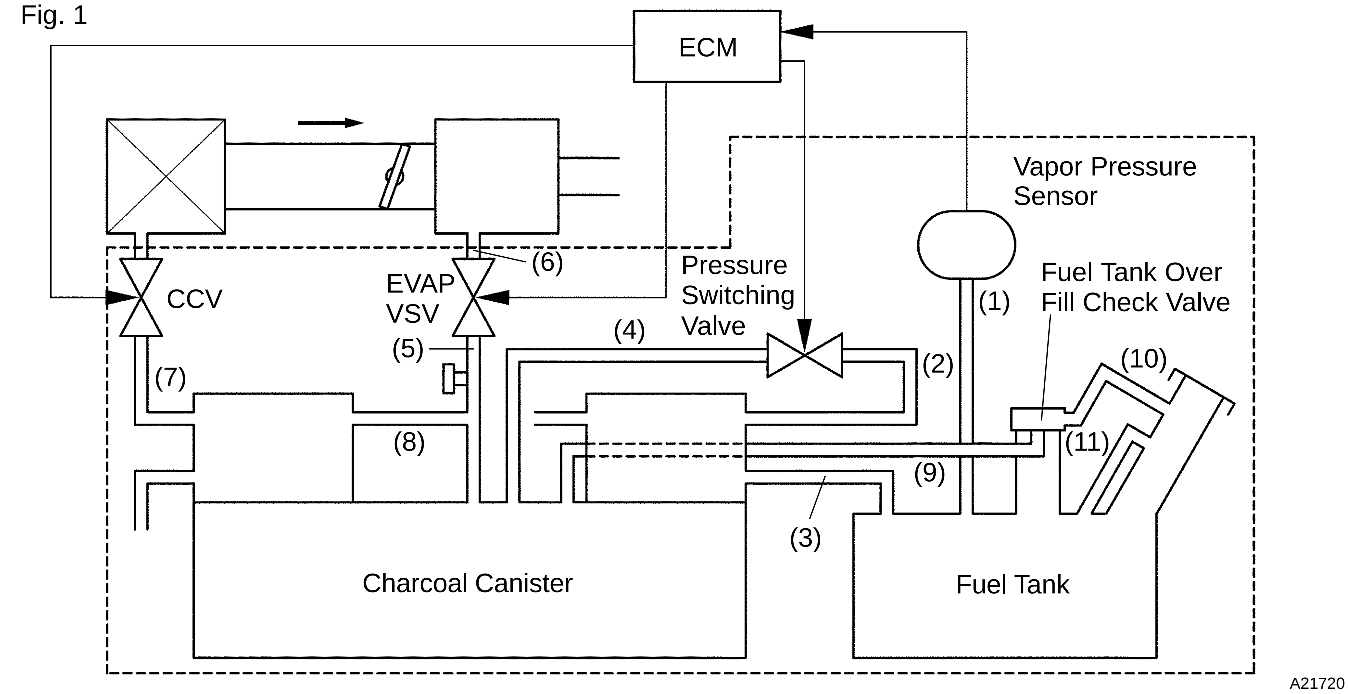
DTC	P0442	Evaporative Emission Control System Leak Detected (Small Leak)

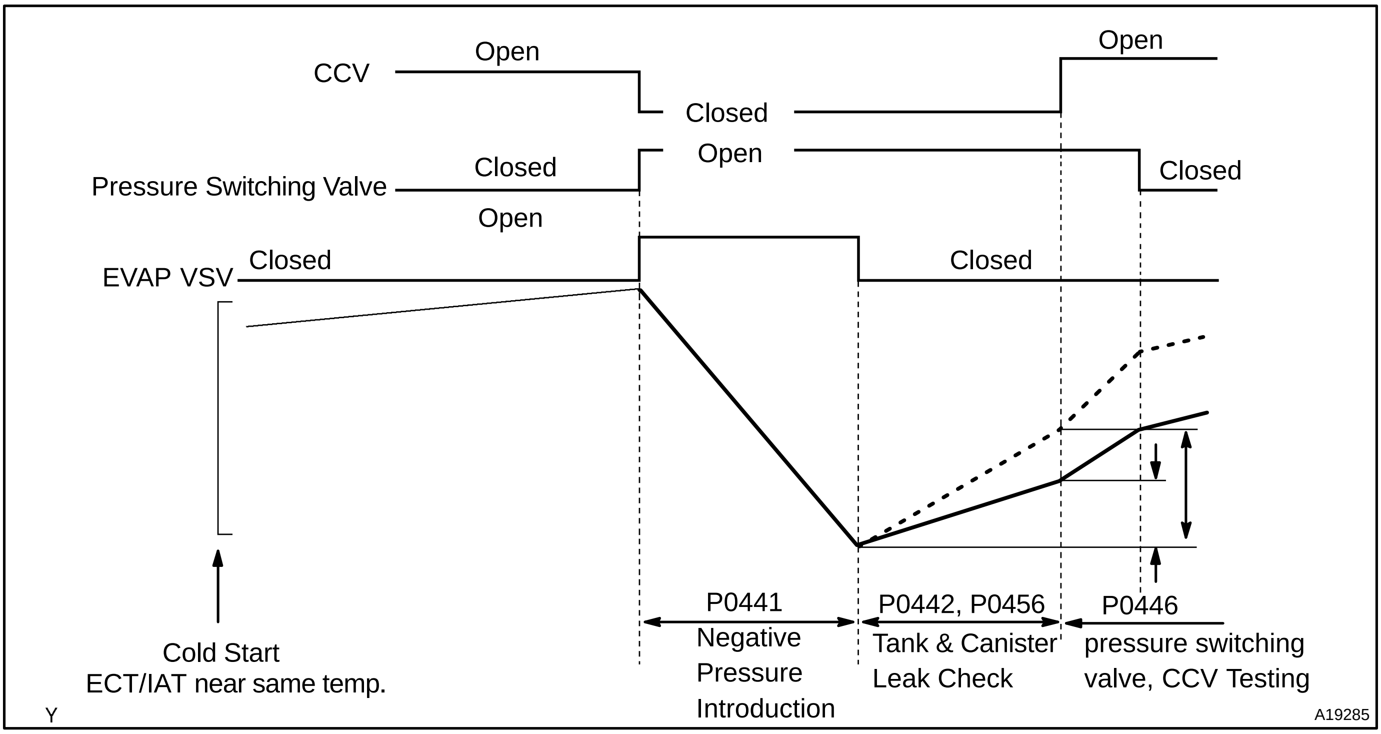
DTC	P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0440 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when the vapor pressure sensor malfunctions.

Fig. 1





DTC No.	DTC Detecting Condition	Trouble Area
P0442 P0456	After a cold engine start. After EVAP VSV operation, the EVAP VSV is turned off, Sealing the vacuum in the system and the ECM begins to monitor the pressure increase. Some increase is expected and will not set a DTC. (2 trip detection logic) • A rapid, sharp increase in pressure indicates a leak in the EVAP system and DTC P0442 sets. • An increase in pressure (above the expected amount) indicates a very small leak in the EVAP system and DTC P0456 sets.	• Hose or tube cracked, holed, damaged or loose seal ((3) in Fig. 1) • Fuel tank cap incorrectly installed • Fuel tank cap cracked or damaged • Vacuum hose cracked, holed, blocked, damaged or disconnected ((1), (2), (4), (5), (6), (7), (8) and (9) in Fig. 1) • Fuel tank cracked, holed or damaged • Charcoal canister cracked, holed or damaged • Open or short in vapor pressure sensor circuit • Vapor pressure sensor • ECM

HINT:
Typical DTC output of each trouble part

Trouble part		Typical DTC output (*1)
Small Leak		"P0442" or "P0456" or "P0442 and P0456"
Medium Leak (ex: Vacuum hose loose)		P0442
Large Leak (ex: Fuel tank cap loose)		P0442 and P0441 and P0446
EVAP VSV	Open Malfunction	P0441
	Close Malfunction	P0442 and P0441 and P0446
CCV	Open Malfunction	P0442 and P0441 and P0446
	Close Malfunction	P0446
Pressure Switching Valve	Open Malfunction	P0446
	Close Malfunction	P0442 and P0441 and P0446

*1: ECM may output some other DTC combination.

MONITOR DESCRIPTION

The evaporative emission system consists of the vapor pressure sensor, the CCV (Canister Close Valve), the pressure switching valve and the EVAP VSV (Purge VSV), those are used to detect malfunction in the system by ECM.
This test will run once per driving cycle when the ECM detects stable vapor pressure in the fuel tank. While the vehicle is being driven on rough or winding roads, the movement of the fuel in the tank will cause unstable fuel tank vapor pressure and the diagnostic test will not executed.
The ECM perform the following steps:

(a) The CCV is closed. (shuts the system)
(b) Checks the stability of the fuel tank pressure. If the variation in the pressure is greater than the specified value, disables the diagnosis.
(c) Opens the EVAP VSV to introduce a negative pressure (vacuum) from the intake manifold into the fuel tank.
(d) Closes the EVAP VSV to seal the fuel tank for storing the negative pressure.
(e) Monitors the negative pressure in the fuel tank for:
    (1) Rapid decrease, i.e. a large leak, 0.040 inch or more
    (2) Decrease greater than the normal value

    If the ECM detects either of above conditions, the ECM interprets this as a leak in the EVAP system. The ECM will illuminate the MIL (2-trip detection logic) and set a DTC.

MONITOR STRATEGY

DTCs	P0442	Small leak (0.040 inch or more large hole) is detected
	P0456	Vary small leak (0.020 inch hole) is detected
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow sensor, Engine coolant temperature sensor EVAP VSV (purge VSV), CCV
Frequency of operation	Once per drive cycles	
Duration	60 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Criteria	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Common pre-conditions for 0.020 and 0.040 inch:		
Altitude	-	2,400 m (7,872 ft.)
Throttle position learning	Completed	
Vapor pressure sensor	No malfunction	
Difference between intake air temperature and engine coolant temperature at engine start	-7 °C (-13 °F)	11.1 °C (20 °F)
Vehicle speed condition	A or B	
A. Time after vehicle stopped (Less than 10 km/h (6 mph))	90 sec.	-

B. Time after vehicle started (7 km/h (4 mph) or more)	20 sec.	-
0.020 inch malfunction detection:		
Engine coolant temperature at engine start	10°C (50°F)	32°C (89.6°F)
Intake air temperature at engine start	10°C (50°F)	32°C (89.6°F)
Intake air temperature	10°C (50°F)	-
Fuel level condition in fuel tank during leak check	Fuel slosh is small (must not drive on road in bad conditions)	
Time after engine start	-	50 min.
Fuel tank pressure condition before leak check (Fuel tank condition before closed negative pressure introduction)	Tank inside pressure change is small before negative pressure introduction. (Reference: If fuel in tank is high temperature, vapor volume increase and tank inside pressure changes also increase)	
Vehicle speed and intake air amount condition before and after negative pressure introduction	Steady speed and not change greatly of intake air amount	
Fuel level	-	90%
0.020 inch leak detection	Not completed	
0.040 inch leak detection	Not detected	
CCV malfunction, bypass VSV malfunction	Not detected	
Vehicle speed	-	130 km/h (81 mph)
EVAP VSV (Evap purge VSV) malfunction	Not detected	
0.040 inch malfunction:		
Engine coolant temperature at engine start	10°C (50°F)	35°C (95°F)
Intake air temperature at engine start	10°C (50°F)	35°C (95°F)
Intake air temperature	10°C (50°F)	-
Fuel level condition in fuel tank during leak check	Fuel slosh is small (must not drive on road in bad conditions)	
Time after engine start	-	50 min.
Fuel tank pressure condition before leak check (Fuel tank condition before closed negative pressure introduction)	Tank inside pressure change is small before negative pressure introduction. (Reference: If fuel in tank is high temperature, vapor volume increase and tank inside pressure changes also increase)	
Vehicle speed and intake air amount condition before and after negative pressure introduction	Steady speed and not change greatly of intake air amount	
Fuel level	-	90%
0.040 inch leak detection	Not completed	
Fuel tank pressure at vacuum introduction completed	-2.4 kPa (-18 mmHg, -0.71 in.Hg)	-
P0446 VSV check	Not executed	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
0.020 inch malfunction detection:	
Fuel tank pressure changing value for 5 sec. from -2.0 kPa (-15 mmHg, -0.59 in.Hg) point	Increase more than 0.067 kPa (0.5 mmHg, 0.02 in.Hg)
Fuel tank pressure changing value for 5 sec. from -2.7 kPa (-20 mmHg, -0.79 in.Hg) point	Increase more than 0.067 kPa (0.5 mmHg, 0.02 in.Hg)
0.040 inch malfunction detection:	
Fuel tank pressure changing value for 5 sec. from -2.0 kPa (-15 mmHg, -0.59 in.Hg) point	Increase more than 0.2 kPa (1.5 mmHg, 0.06 in.Hg)
Fuel tank pressure changing value for 5 sec. from -2.7 kPa (-20 mmHg, -0.79 in Hg) point	Increase more than 0.2 kPa (1.5 mmHg, 0.06 in.Hg)

MONITOR RESULT

The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $02: EVAP - Vacuum Monitor

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.0916 (mmHg)	Test value of EVAP VSV: Determined by fuel tank pressure change during vacuum introduction	Malfunction criterion
1	$02	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of bypass VSV (pressure switching valve) and CCV: Determined by fuel tank pressure change at switching over bypass VSV and CCV	Malfunction criterion
0	$03	Multiply by 0.0458 (mmHg)	Test value of 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criterion
0	$04	Multiply by 0.0458 (mmHg)	Test value of 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criterion

WIRING DIAGRAM

Refer to DTC P0441 on page DI-207 .

INSPECTION PROCEDURE

Hand-held tester:

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK ↓

2	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK ↓

3	**Check fuel tank cap (See page EC-7).**

NG → **Replace fuel tank cap.**

OK ↓

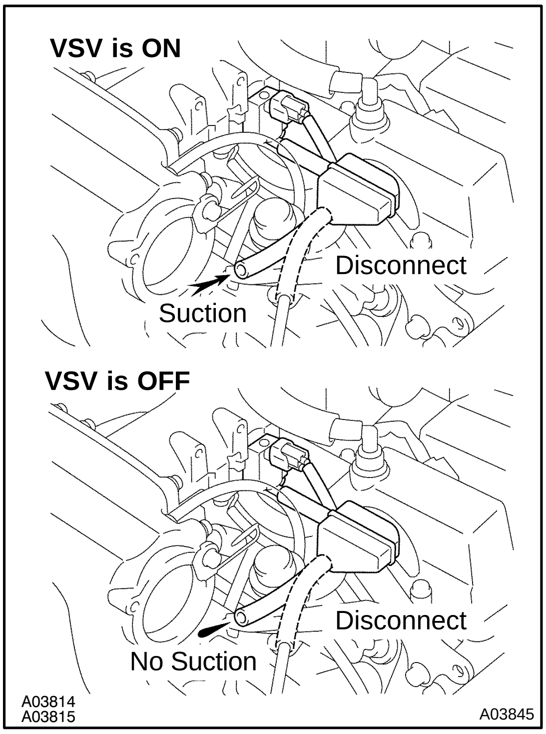
4	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK ↓

5	Check purge flow.



PREPARATION:

(a) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST” mode on the hand-held tester.

(b) Disconnect the vacuum hose for the EVAP VSV from the charcoal canister.

(c) Start the engine.

(d) Select the item ”EVAP VSV (ALON) / ALL” in the ACTIVE TEST and operate EVAP VSV (Press the right or left button).

CHECK:

When the EVAP VSV is operated by the hand-held tester, check whether the disconnected hose applies suction to your finger.

OK:

VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK	Go to step 9.

NG

6	Check vacuum hose between intake manifold and EVAP VSV, and EVAP VSV and charcoal canister.

CHECK:

(a) Check that the vacuum hose is connected correctly.

(b) Check the vacuum hose for looseness and disconnection.

(c) Check the vacuum hose for cracks, hole and damage.

NG	Repair or replace vacuum hose.

OK

7	Check operation of EVAP VSV (See page SF-55).

NG → **Replace EVAP VSV.**

OK

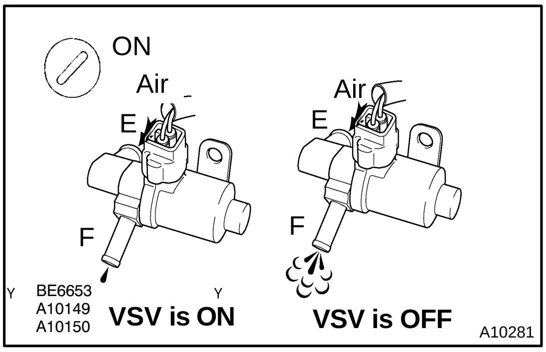
8	Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

9	Check CCV.



PREPARATION:

(a) Disconnect the vacuum hose for the CCV from the charcoal canister.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the item "DIAGNOSIS / ENHANCED OBD II/ACTIVE TEST" mode on the hand-held tester.

(d) Select the item "CAN CTRL VSV / ALL" in the ACTIVE TEST and operate CAN CTRL VSV (Press the right or left button).

CHECK:

Check the CCV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK → **Go to step 13.**

NG

10	**Check vacuum hose between CCV and charcoal canister.**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage and blockage.

NG → **Repair or replace vacuum hose.**

OK

11	**Check operation of CCV (See page SF-61).**

NG → **Replace CCV.**

OK

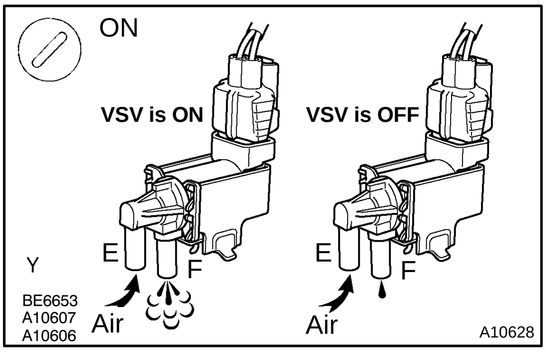
12	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and CCV, and CCV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

13	Check pressure switching valve.



PREPARATION:

(a) Turn the ignition switch ON and push the hand-held tester main switch ON.

(b) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.

(c) Select the item "TANK BYPASS VSV / ALL" in the ACTIVE TEST and operate TANK BYPASS VSV (Press the right or left button).

CHECK:

Check the pressure switching valve operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 16.**

NG ↓

14	Check operation of pressure switching valve (See page SF-63).

NG → **Replace pressure switching valve.**

OK ↓

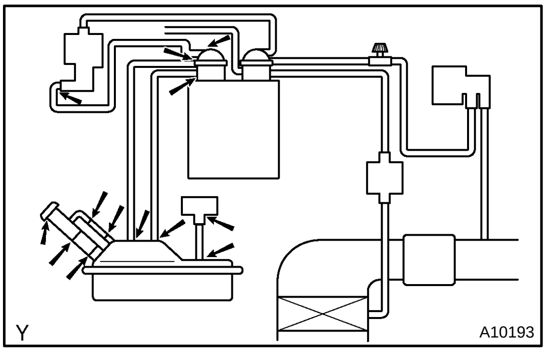
15	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and pressure switching valve, and pressure switching valve and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK ↓

Replace ECM (See page SF-74).

16	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Fuel tank filler pipe
- Hoses and tubes around fuel tan

NG → **Repair or replace evaporative emissions leak part.**

OK

17	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose and tube.**

OK

18	**Check hose and tube between fuel tank and charcoal canister.**

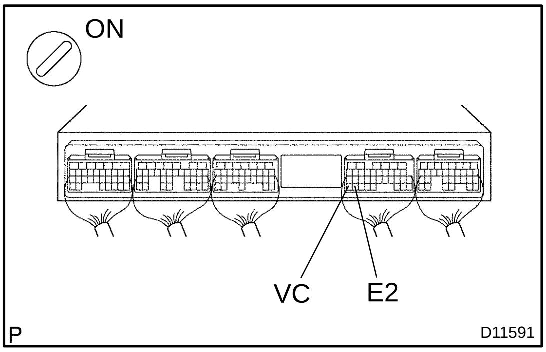
CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-7), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

19	Check voltage between terminals VC and E2 of ECM connector.



CHECK:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

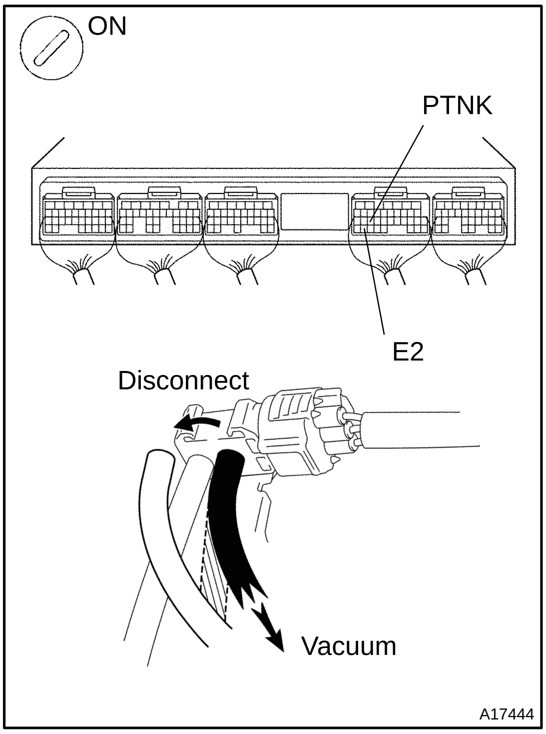
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.

OK:
Voltage: 4.5 to 5.5 V

NG	Replace ECM (See page SF-74).

OK

20	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).
(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:
Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:
Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK	Go to step 22.

NG

21	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-74).

22	Check fuel tank over fill check valve.

NG → Replace fuel tank over fill check valve.

OK

23	Check fuel tank.

NG → Replace fuel tank.

OK

24	Check charcoal canister for cranks, hole and damage.

NG → Replace charcoal canister.

OK

Replace ECM (See page SF-74).

OBD II scan tool (excluding hand-held tester):

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK

2	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

3	**Check fuel tank cap (See page EC-7).**

NG → **Replace fuel tank cap.**

OK

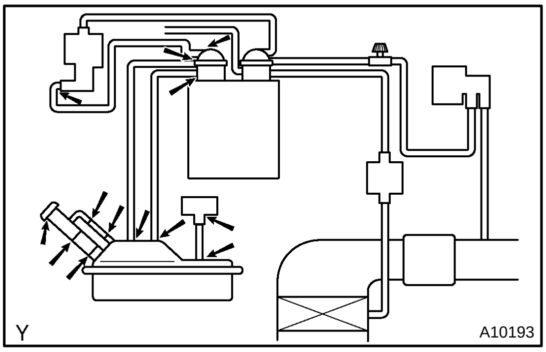
4	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

5	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:
Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace evaporative emission leak part.**

OK

6	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve, and pressure switching valve and charcoal canister.**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:
(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-7), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

8	**Check vacuum hoses ((5), (6), (7), (8) and (9) in Fig. 1 in circuit description).**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage, and blockage.

NG → **Repair or replace vacuum hose.**

OK

9	**Check VSV connector for EVAP, VSV connector for CCV, VSV connector for pressure switching valve and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

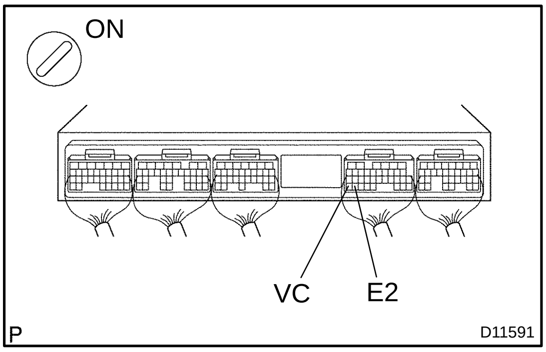
OK

10	**Check charcoal canister for cracks, hole and damage.**

NG → **Replace charcoal canister.**

OK

11 Check voltage between terminals VC and E2 of ECM connector.



CHECK:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

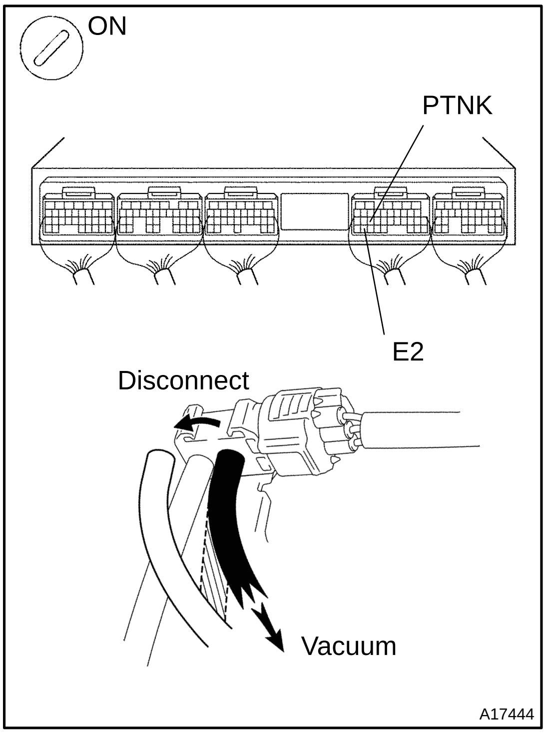
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.

OK:
Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK

12 Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).
(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:
Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:
Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK → **Go to step 14.**

NG

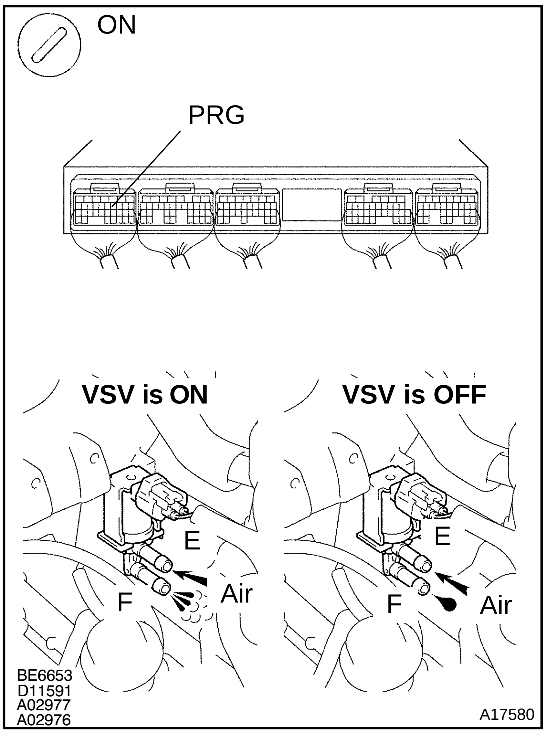
13	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).**

NG — **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

14	**Check EVAP VSV.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal PRG of the ECM connector and body ground (ON).

(2) Disconnect between terminal PRG of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E frows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK — **Go to step 17.**

NG

15	**Check operation of EVAP VSV (See page SF-56).**

NG — **Replace EVAP VSV.**

OK

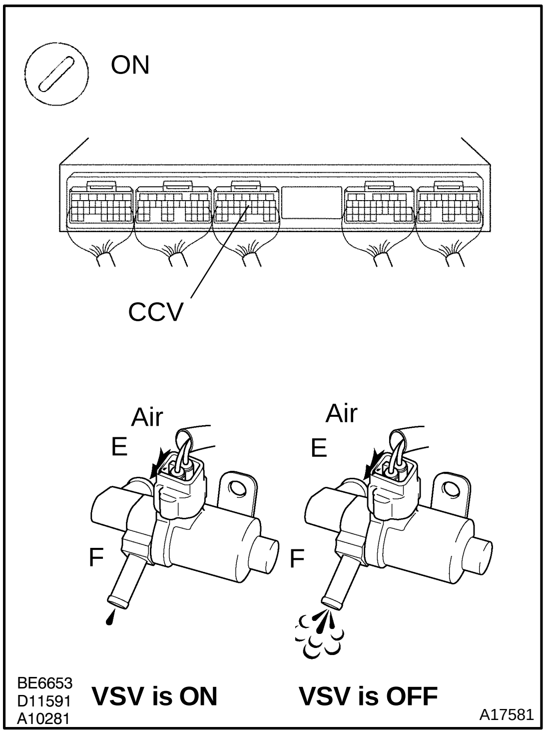
16	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and EVAP VSV, and EVAP VSV and ECM (See page IN-33)

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

17	Check CCV.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal CCV of the ECM connector and body ground (ON).

(2) Disconnect between terminal CCV of the ECM connector and body ground (OFF).

OK:

VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK → **Go to step 20.**

NG

18	Check operation of CCV (See page SF-61).

NG → **Replace CCV.**

OK

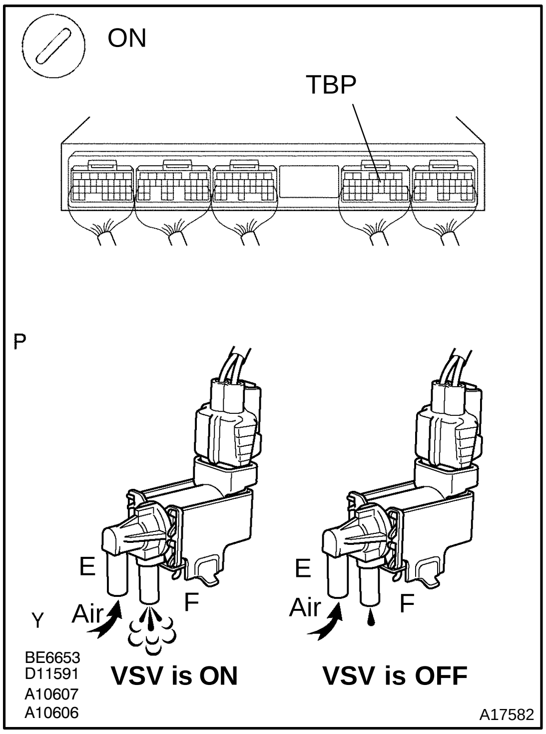
19	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and CCV, and CCV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

20	**Check pressure switching valve.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal TBP of the ECM connector and body ground (ON).

(2) Disconnect between terminal TBP of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 23.**

NG

21	Check operation of pressure switching valve (See page SF-63).

NG → Replace pressure switching valve.

OK ↓

22	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and pressure switching valve, and pressure switching valve and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK ↓

Replace ECM (See page SF-74).

23	Check fuel tank over fill check valve.

NG → Replace fuel tank over fill check valve.

OK ↓

24	Check fuel tank.

NG → Replace fuel tank.

OK ↓

It is likely that vehicle user did not properly close fuel tank cap.

DIC4J-01

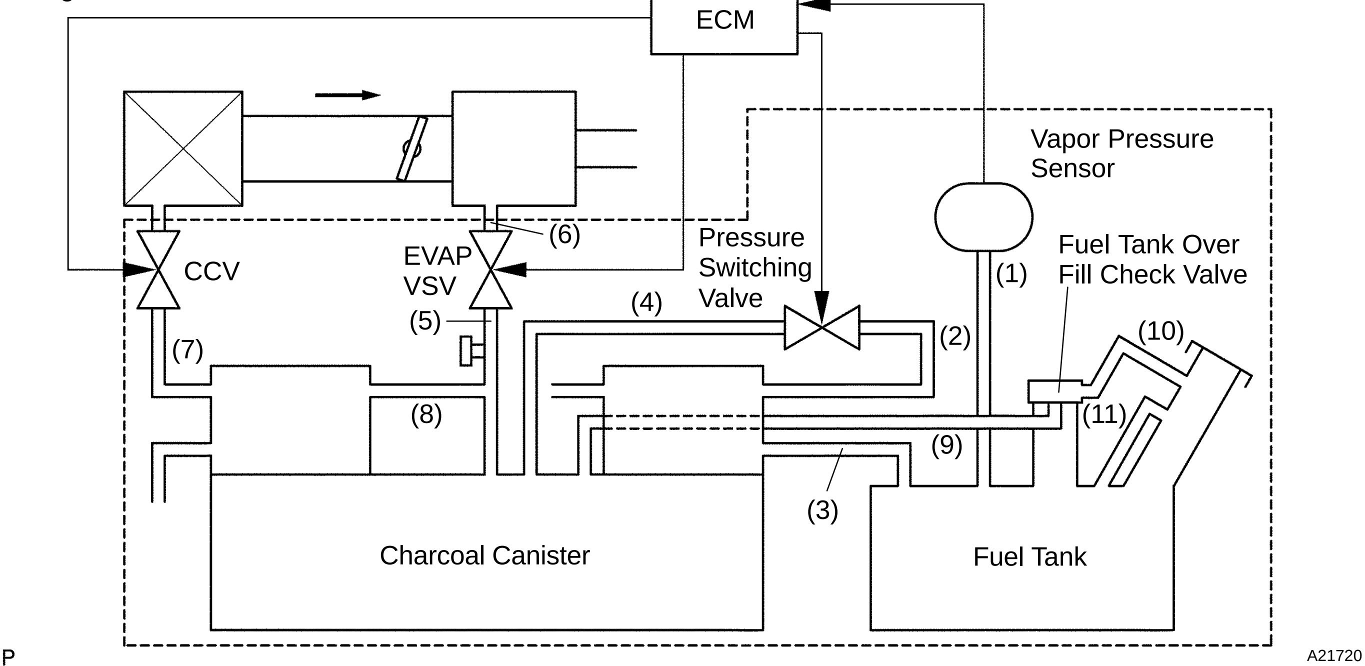
DTC	P0442	Evaporative Emission Control System Leak Detected (Small Leak)

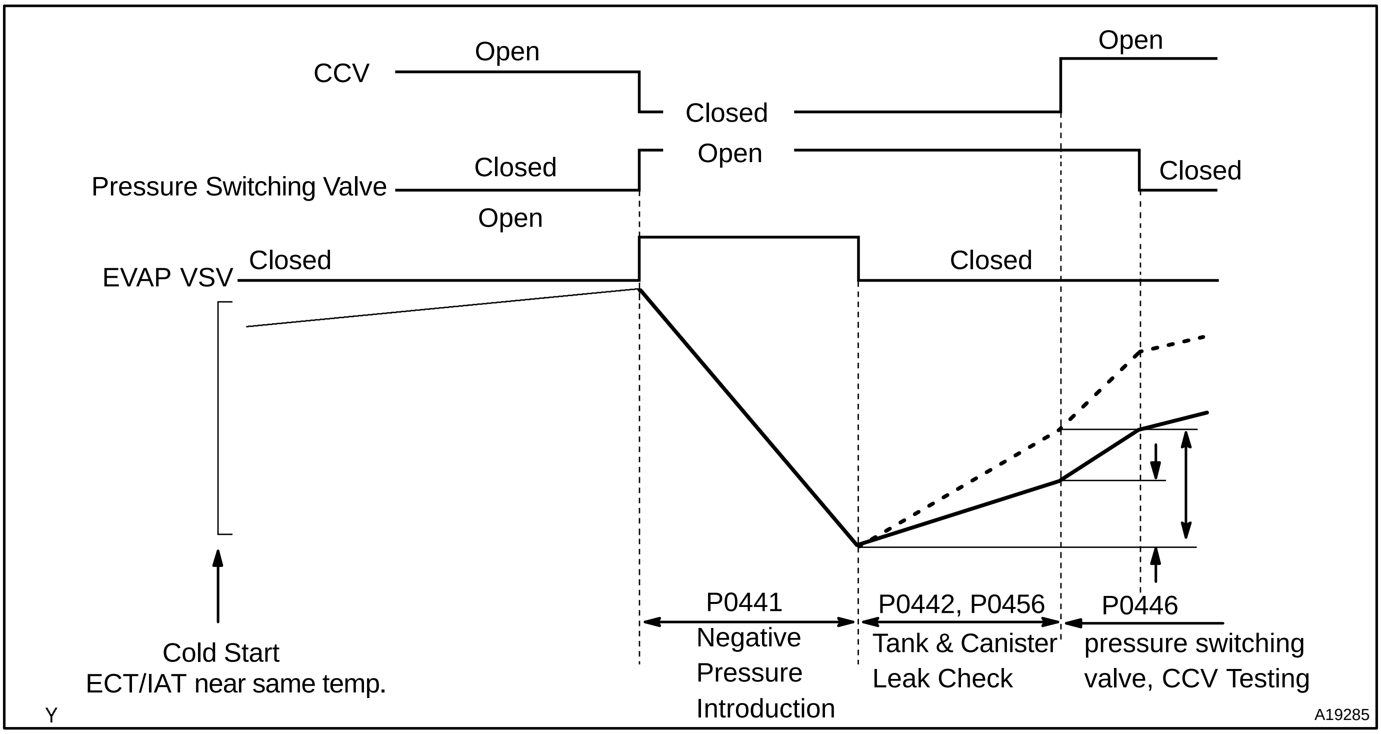
DTC	P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)

CIRCUIT DESCRIPTION

The vapor pressure sensor and VSV for vapor pressure sensor are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.
DTC P0440 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when the vapor pressure sensor malfunctions.

Fig. 1





DTC No.	DTC Detecting Condition	Trouble Area
P0442 P0456	After a cold engine start. After EVAP VSV operation, the EVAP VSV is turned off, Sealing the vacuum in the system and the ECM begins to monitor the pressure increase. Some increase is expected and will not set a DTC. (2 trip detection logic) • A rapid, sharp increase in pressure indicates a leak in the EVAP system and DTC P0442 sets. • An increase in pressure (above the expected amount) indicates a very small leak in the EVAP system and DTC P0456 sets.	• Hose or tube cracked, holed, damaged or loose seal ((3) in Fig. 1) • Fuel tank cap incorrectly installed • Fuel tank cap cracked or damaged • Vacuum hose cracked, holed, blocked, damaged or disconnected ((1), (2), (4), (5), (6), (7), (8) and (9) in Fig. 1) • Fuel tank cracked, holed or damaged • Charcoal canister cracked, holed or damaged • Open or short in vapor pressure sensor circuit • Vapor pressure sensor • ECM

HINT:
Typical DTC output of each trouble part

Trouble part		Typical DTC output (*1)
Small Leak		”P0442” or ”P0456” or ”P0442 and P0456”
Medium Leak (ex: Vacuum hose loose)		P0442
Large Leak (ex: Fuel tank cap loose)		P0442 and P0441 and P0446
EVAP VSV	Open Malfunction	P0441
	Close Malfunction	P0442 and P0441 and P0446
CCV	Open Malfunction	P0442 and P0441 and P0446
	Close Malfunction	P0446
Pressure Switching Valve	Open Malfunction	P0446
	Close Malfunction	P0442 and P0441 and P0446

*1: ECM may output some other DTC combination.

MONITOR DESCRIPTION

The evaporative emission system consists of the vapor pressure sensor, the CCV (Canister Close Valve), the pressure switching valve and the EVAP VSV (Purge VSV), those are used to detect malfunction in the system by ECM.
This test will run once per driving cycle when the ECM detects stable vapor pressure in the fuel tank. While the vehicle is being driven on rough or winding roads, the movement of the fuel in the tank will cause unstable fuel tank vapor pressure and the diagnostic test will not executed.
The ECM perform the following steps:

(a) The CCV is closed. (shuts the system)
(b) Checks the stability of the fuel tank pressure. If the variation in the pressure is greater than the specified value, disables the diagnosis.
(c) Opens the EVAP VSV to introduce a negative pressure (vacuum) from the intake manifold into the fuel tank.
(d) Closes the EVAP VSV to seal the fuel tank for storing the negative pressure.
(e) Monitors the negative pressure in the fuel tank for:
  (1) Rapid decrease, i.e. a large leak, 0.040 inch or more
  (2) Decrease greater than the normal value
  If the ECM detects either of above conditions, the ECM interprets this as a leak in the EVAP system. The ECM will illuminate the MIL (2-trip detection logic) and set a DTC.

MONITOR STRATEGY

DTCs	P0442	Small leak (0.040 inch or more large hole) is detected
	P0456	Vary small leak (0.020 inch hole) is detected
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow sensor, Engine coolant temperature sensor EVAP VSV (purge VSV), CCV
Frequency of operation	Once per drive cycles	
Duration	60 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Criteria	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Common pre-conditions for 0.020 and 0.040 inch:		
Altitude	-	2,400 m (7,872 ft.)
Throttle position learning	Completed	
Vapor pressure sensor	No malfunction	
Difference between intake air temperature and engine coolant temperature at engine start	-7 °C (-13 °F)	11.1 °C (20 °F)
Vehicle speed condition	A or B	
A. Time after vehicle stopped (Less than 10 km/h (6 mph))	90 sec.	-

B. Time after vehicle started (7 km/h (4 mph) or more)	20 sec.	-
0.020 inch malfunction detection:		
Engine coolant temperature at engine start	10°C (50°F)	32°C (89.6°F)
Intake air temperature at engine start	10°C (50°F)	32°C (89.6°F)
Intake air temperature	10°C (50°F)	-
Fuel level condition in fuel tank during leak check	Fuel slosh is small (must not drive on road in bad conditions)	
Time after engine start	-	50 min.
Fuel tank pressure condition before leak check (Fuel tank condition before closed negative pressure introduction)	Tank inside pressure change is small before negative pressure introduction. (Reference: If fuel in tank is high temperature, vapor volume increase and tank inside pressure changes also increase)	
Vehicle speed and intake air amount condition before and after negative pressure introduction	Steady speed and not change greatly of intake air amount	
Fuel level	-	90%
0.020 inch leak detection	Not completed	
0.040 inch leak detection	Not detected	
CCV malfunction, bypass VSV malfunction	Not detected	
Vehicle speed	-	130 km/h (81 mph)
EVAP VSV (Evap purge VSV) malfunction	Not detected	
0.040 inch malfunction:		
Engine coolant temperature at engine start	10°C (50°F)	35°C (95°F)
Intake air temperature at engine start	10°C (50°F)	35°C (95°F)
Intake air temperature	10°C (50°F)	-
Fuel level condition in fuel tank during leak check	Fuel slosh is small (must not drive on road in bad conditions)	
Time after engine start	-	50 min.
Fuel tank pressure condition before leak check (Fuel tank condition before closed negative pressure introduction)	Tank inside pressure change is small before negative pressure introduction. (Reference: If fuel in tank is high temperature, vapor volume increase and tank inside pressure changes also increase)	
Vehicle speed and intake air amount condition before and after negative pressure introduction	Steady speed and not change greatly of intake air amount	
Fuel level	-	90%
0.040 inch leak detection	Not completed	
Fuel tank pressure at vacuum introduction completed	-2.4 kPa (-18 mmHg, -0.71 in.Hg)	-
P0446 VSV check	Not executed	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
0.020 inch malfunction detection:	
Fuel tank pressure changing value for 5 sec. from -2.0 kPa (-15 mmHg, -0.59 in.Hg) point	Increase more than 0.067 kPa (0.5 mmHg, 0.02 in.Hg)
Fuel tank pressure changing value for 5 sec. from -2.7 kPa (-20 mmHg, -0.79 in.Hg) point	Increase more than 0.067 kPa (0.5 mmHg, 0.02 in.Hg)
0.040 inch malfunction detection:	
Fuel tank pressure changing value for 5 sec. from -2.0 kPa (-15 mmHg, -0.59 in.Hg) point	Increase more than 0.2 kPa (1.5 mmHg, 0.06 in.Hg)
Fuel tank pressure changing value for 5 sec. from -2.7 kPa (-20 mmHg, -0.79 in Hg) point	Increase more than 0.2 kPa (1.5 mmHg, 0.06 in.Hg)

MONITOR RESULT

The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

- TID (Test Identification) is assigned to each emission-related component.
- TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $02: EVAP - Vacuum Monitor

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.0916 (mmHg)	Test value of EVAP VSV: Determined by fuel tank pressure change during vacuum introduction	Malfunction criterion
1	$02	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of bypass VSV (pressure switching valve) and CCV: Determined by fuel tank pressure change at switching over bypass VSV and CCV	Malfunction criterion
0	$03	Multiply by 0.0458 (mmHg)	Test value of 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criterion
0	$04	Multiply by 0.0458 (mmHg)	Test value of 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criterion

WIRING DIAGRAM

Refer to DTC P0441 on page DI-207 .

INSPECTION PROCEDURE

Hand-held tester:

1	Check that fuel tank cap meets OEM specifications.

NG → Replace with a cap that meets OEM specifications.

OK

2	Check that fuel tank cap is correctly installed.

NG → Correctly install fuel tank cap.

OK

3	Check fuel tank cap (See page EC-7).

NG → Replace fuel tank cap.

OK

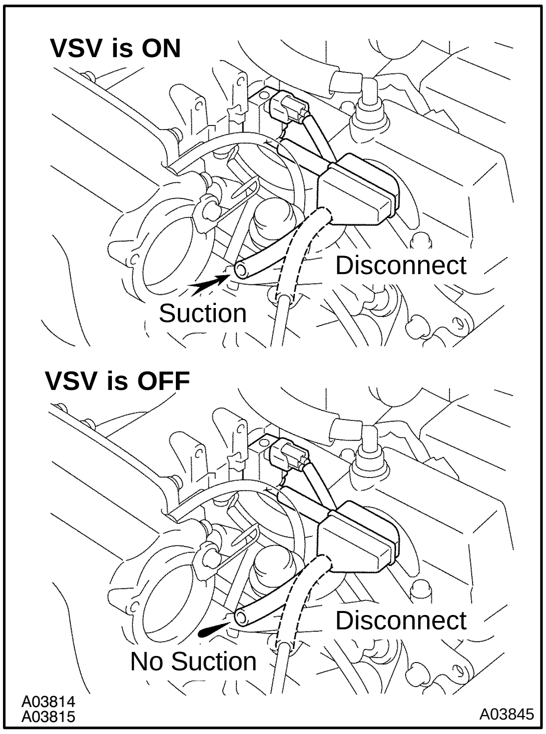
4	Check filler neck for damage.

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → Replace filler pipe.

OK

5	**Check purge flow.**



PREPARATION:
(a) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(b) Disconnect the vacuum hose for the EVAP VSV from the charcoal canister.
(c) Start the engine.
(d) Select the item "EVAP VSV (ALON) / ALL" in the ACTIVE TEST and operate EVAP VSV (Press the right or left button).

CHECK:
When the EVAP VSV is operated by the hand-held tester, check whether the disconnected hose applies suction to your finger.

OK:
VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK	**Go to step 9.**

NG

6	**Check vacuum hose between intake manifold and EVAP VSV, and EVAP VSV and charcoal canister.**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG	**Repair or replace vacuum hose.**

OK

7	Check operation of EVAP VSV (See page SF-55).

NG → Replace EVAP VSV.

OK

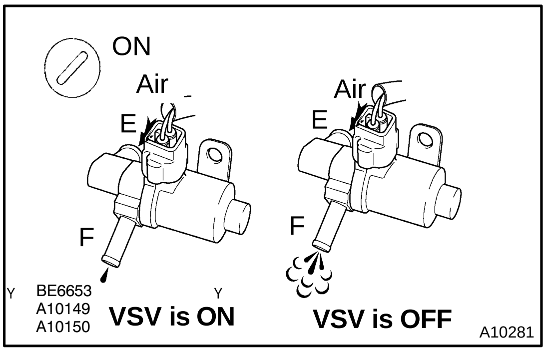
8	Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-74).

9	Check CCV.



PREPARATION:

(a) Disconnect the vacuum hose for the CCV from the charcoal canister.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the item "DIAGNOSIS / ENHANCED OBD II/ACTIVE TEST" mode on the hand-held tester.

(d) Select the item "CAN CTRL VSV / ALL" in the ACTIVE TEST and operate CAN CTRL VSV (Press the right or left button).

CHECK:

Check the CCV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK → Go to step 13.

NG

10	**Check vacuum hose between CCV and charcoal canister.**

CHECK:
(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage and blockage.

NG → **Repair or replace vacuum hose.**

OK

11	**Check operation of CCV (See page SF-61).**

NG → **Replace CCV.**

OK

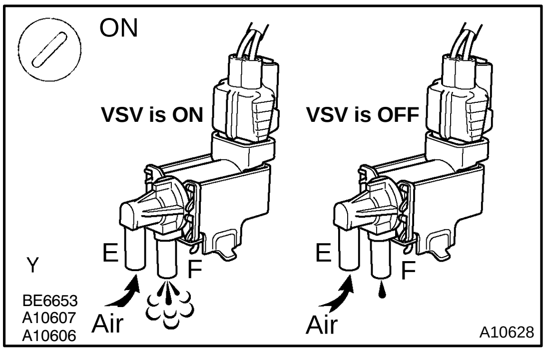
12	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and CCV, and CCV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

13	Check pressure switching valve.



PREPARATION:

(a) Turn the ignition switch ON and push the hand-held tester main switch ON.

(b) Select the item "DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.

(c) Select the item "TANK BYPASS VSV / ALL" in the ACTIVE TEST and operate TANK BYPASS VSV (Press the right or left button).

CHECK:

Check the pressure switching valve operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 16.**

NG

14	Check operation of pressure switching valve (See page SF-63).

NG → **Replace pressure switching valve.**

OK

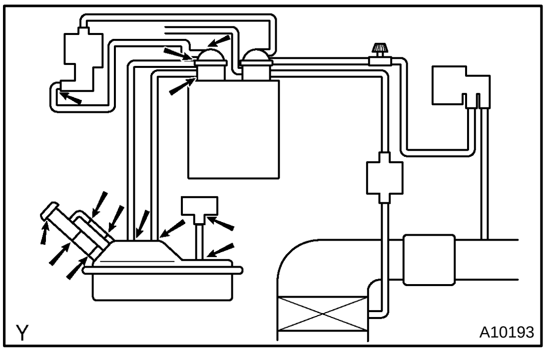
15	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and pressure switching valve, and pressure switching valve and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

16	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Fuel tank filler pipe
- Hoses and tubes around fuel tan

NG	**Repair or replace evaporative emissions leak part.**

OK

17	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG	**Repair or replace vacuum hose and tube.**

OK

18	**Check hose and tube between fuel tank and charcoal canister.**

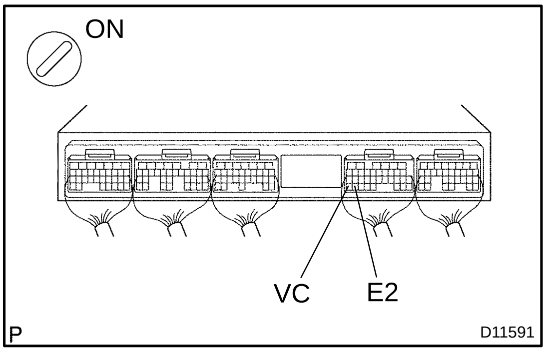
CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-7), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG	**Repair or replace hose and tube.**

OK

19	Check voltage between terminals VC and E2 of ECM connector.



CHECK:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

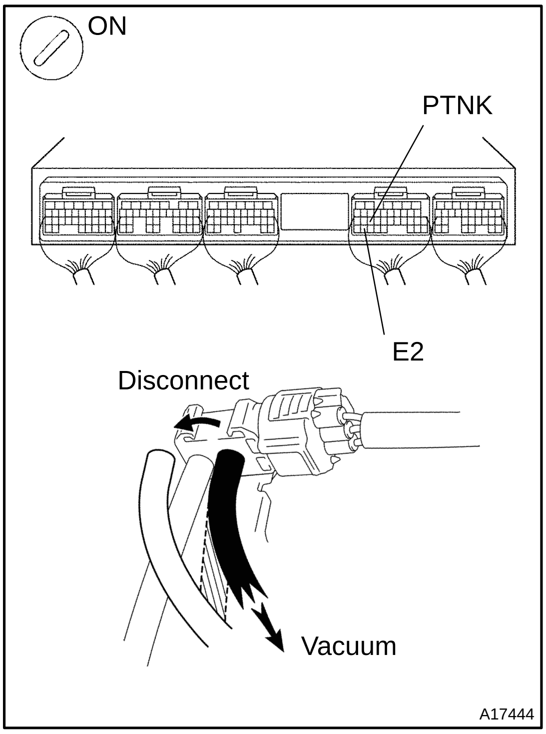
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.

OK:
Voltage: 4.5 to 5.5 V

NG	Replace ECM (See page SF-74).

OK

20	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).
(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:
Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:
Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK	Go to step 22.

NG

21	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-74).

22	Check fuel tank over fill check valve.

NG → Replace fuel tank over fill check valve.

OK

23	Check fuel tank.

NG → Replace fuel tank.

OK

24	Check charcoal canister for cranks, hole and damage.

NG → Replace charcoal canister.

OK

Replace ECM (See page SF-74).

OBD II scan tool (excluding hand-held tester):

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK

2	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

3	**Check fuel tank cap (See page EC-7).**

NG → **Replace fuel tank cap.**

OK

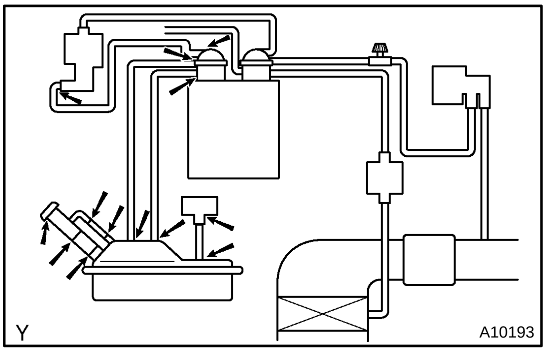
4	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

5	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- Fuel tank
- Charcoal canister
- Fuel tank filler pipe
- Hoses and tubes around fuel tank and charcoal canister

NG	**Repair or replace evaporative emission leak part.**

OK

6	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve, and pressure switching valve and charcoal canister.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG	**Repair or replace vacuum hose.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-7), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG	**Repair or replace hose and tube.**

OK

8	Check vacuum hoses ((5), (6), (7), (8) and (9) in Fig. 1 in circuit description).

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage, and blockage.

NG → **Repair or replace vacuum hose.**

OK

9	Check VSV connector for EVAP, VSV connector for CCV, VSV connector for pressure switching valve and vapor pressure sensor connector for looseness and disconnection.

NG → **Repair or connect VSV or sensor connector.**

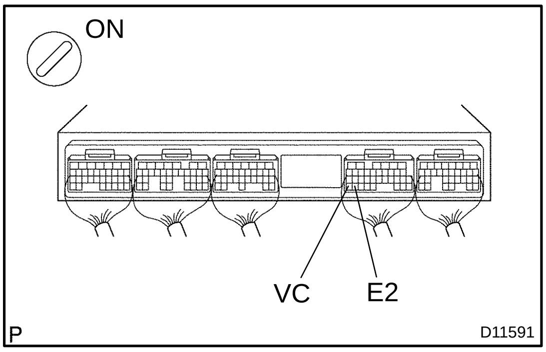
OK

10	Check charcoal canister for cracks, hole and damage.

NG → **Replace charcoal canister.**

OK

11	Check voltage between terminals VC and E2 of ECM connector.

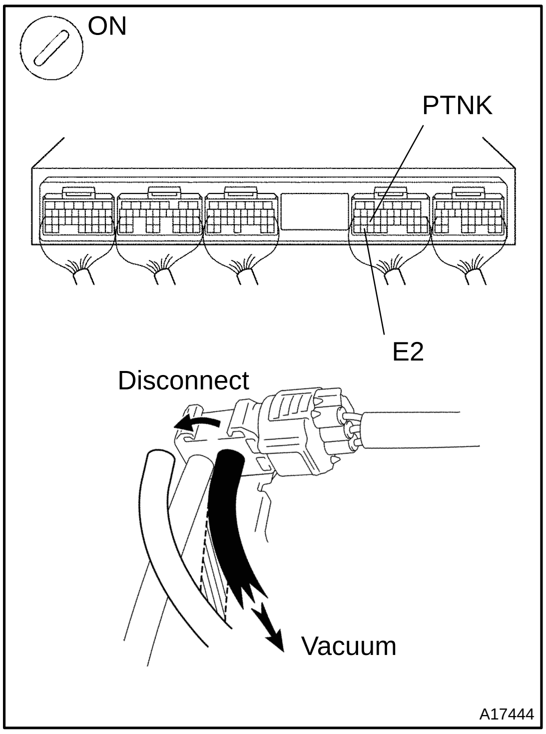


CHECK:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.
OK:
Voltage: 4.5 to 5.5 V

NG	Replace ECM (See page SF-74).

OK

12	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).
(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.
NOTICE:
Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).
OK:
Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK	Go to step 14.

NG

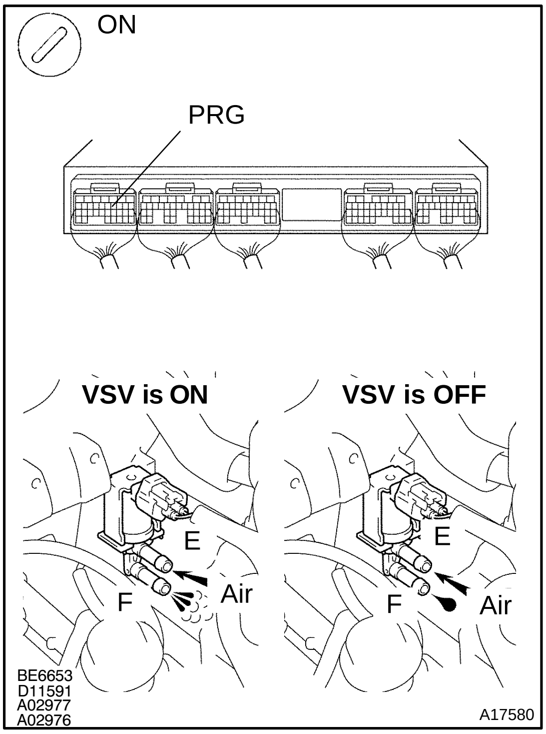
13	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

14	**Check EVAP VSV.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal PRG of the ECM connector and body ground (ON).

(2) Disconnect between terminal PRG of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E frows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 17.**

NG

15	**Check operation of EVAP VSV (See page SF-56).**

NG → **Replace EVAP VSV.**

OK

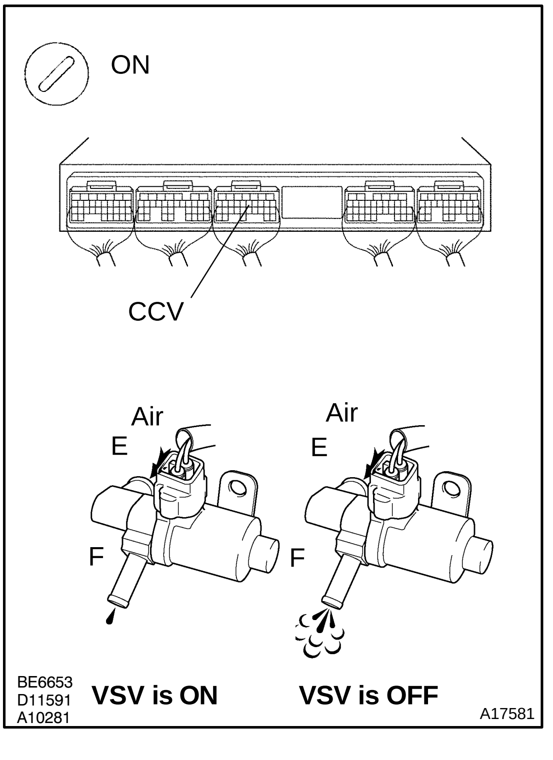
16	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and EVAP VSV, and EVAP VSV and ECM (See page IN-33)**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

17	**Check CCV.**



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:
Check the VSV function.
(1) Connect between terminal CCV of the ECM connector and body ground (ON).
(2) Disconnect between terminal CCV of the ECM connector and body ground (OFF).

OK:
VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK → **Go to step 20.**

NG

18	**Check operation of CCV (See page SF-61).**

NG → **Replace CCV.**

OK

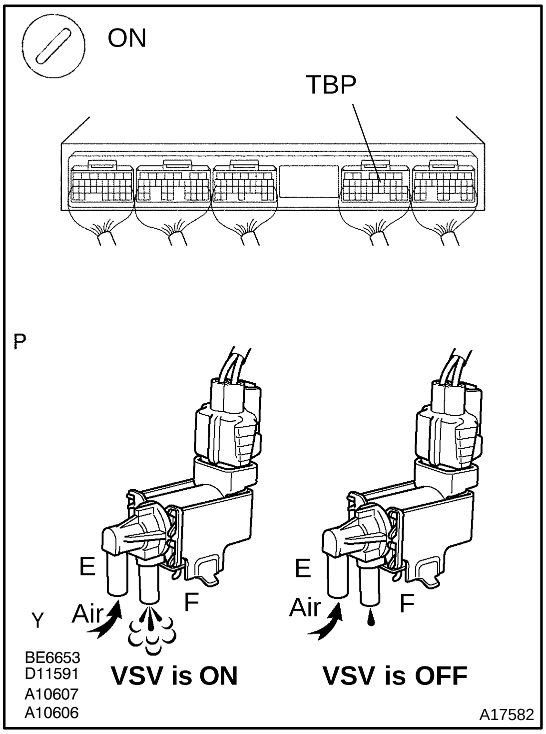
19	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and CCV, and CCV and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-74).

20	**Check pressure switching valve.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal TBP of the ECM connector and body ground (ON).
(2) Disconnect between terminal TBP of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 23.**

NG

21	Check operation of pressure switching valve (See page SF-63).

NG → Replace pressure switching valve.

OK

22	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and pressure switching valve, and pressure switching valve and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-74).

23	Check fuel tank over fill check valve.

NG → Replace fuel tank over fill check valve.

OK

24	Check fuel tank.

NG → Replace fuel tank.

OK

It is likely that vehicle user did not properly close fuel tank cap.

DIC4K-01

DTC	P0451	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance

DTC	P0452	Evaporative Emission Control System Pressure Sensor/Switch Low Input

DTC	P0453	Evaporative Emission Control System Pressure Sensor/Switch High Input

MONITOR DESCRIPTION

DTC ”P0451, P0452 or P0453” is recorded by the ECM when the vapor pressure sensor malfunctions.

DTC No.	DTC Detecting Condition	Trouble Area
P0451	Vapor pressure sensor output extremely changes under conditions of (a) and (b): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0mph), Engine speed: Idling and VSV for pressure switching valve is OFF (b) Vapor pressure sensor value ⊖ opening pressure valve of charcoal canister	• Open or short in vapor pressure sensor circuit • Vapor pressure sensor • ECM
P0452	10 seconds or less after engine starting condition vapor pressure sensor fixed value continues for fixed value or less: (2 trip detection logic)	
P0453	10 seconds or less after engine starting condition vapor pressure sensor fixed value continues for fixed value or more: (2 trip detection logic)	

P0451

The ECM sensor pressure in the fuel tank using the vapor pressure sensor. The ECM supplies the sensor with a regulated 5 V reference voltage and the sensor returns a signal voltage between 0.5 V and 4.5 V according to the pressure level in the fuel tank.
When the pressure in the fuel tank is low, the output voltage of the vapor pressure sensor is low. When it is high, the output voltage is high.
For this DTC P0451, the ECM checks for a ”noisy” sensor or a ”stuck” sensor.
The ECM checks for a ”noisy” sensor by monitoring the fuel tank pressures when the vehicle is stationary and there should be little variation in the tank pressure. If the indicated pressure varies beyond specified limits, the ECM will illuminate the MIL (2-trip detection logic) and a DTC is set.
The ECM checks for a ”stuck” sensor by monitoring the fuel tank pressure for an extended time period. If the indicated pressure does not change over this period, the ECM will conclude that the fuel tank pressure sensor is malfunctioning, The ECM will illuminate the MIL and a DTC is set.

P0452 and P0453

The ECM sensor pressure in the fuel tank using the vapor pressure sensor. The ECM supplies the sensor with a regulated 5 V reference voltage and the sensor returns a signal voltage between 0.5 V and 4.5 V according to the pressure level in the fuel tank.
If the output voltage of the vapor pressure sensor is out of normal range, the ECM will determine that there is a malfunction in the sensor or sensor circuit.
When pressure indicated by the vapor pressure sensor deviates below -3.999 kpa (-30 mmHg, -1.18 in.Hg) or above 1.999 kpa (15 mmHg, 0.59 in.Hg), the ECM interprets this as a malfunction in the vapor pressure sensor. The ECM will turn on the MIL and a DTC will be set.

MONITOR STRATEGY

P0451

Related DTCs	P0451	Evaporative emission control system pressure sensor range/performance
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor
Frequency of operation	Once per driving cycle	
Duration	Signal fluctuation (noise) monitoring: 10 sec. No signal change (stuck) monitoring: 20 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

P0452 and P0453

Related DTCs	P0452	Evaporative emission control system pressure sensor/switch low input
	P0453	Evaporative emission control system pressure sensor/switch high input
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor
Frequency of operation	Once per driving cycle	
Duration	17 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P0451

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Signal fluctuation (noise) monitoring:		
Altitude	-	2,400 m (7,872 ft)

Difference between intake air temperature and engine coolant temperature at engine start	-7 °C (-13 °F)	11.1 °C (20 °F)
Engine coolant temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Intake temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Vehicle stop and idling	5 sec.	15 sec.
Stuck monitoring:		
Altitude	-	2,400 m (7,872 ft)
Vapor pressure sensor	No malfunction	
Difference between intake air temperature and engine coolant temperature at engine start	-7 °C (-13 °F)	11.1 °C (20 °F)
Engine coolant temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Intake air temperature at engine start	4.4 °C (40 °F)	35 °C (95 °F)
Time after engine start	5 sec.	-

P0452 and P0453

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Difference between intake air temperature and engine coolant temperature at engine start	-	12 °C (21.6 °F)
Engine coolant temperature at engine start	10 °C (50 °F)	35 °C (95 °F)
Intake air temperature at engine start	10 °C (50 °F)	35 °C (95 °F)
Engine	Running	

TYPICAL MALFUNCTION THRESHOLDS

P0451

Detection Criteria	Threshold
Signal fluctuation (noise) monitoring:	
The number of times the output changed ±0.667 kpa (±5 mmHg, ±0.02 in.Hg) or more during 5 to 15 sec. after idling and vehicle stop	7 times or more
No signal change (stuck) monitoring:	
Fuel tank pressure "no change" time (less than 0.18 kpa (1.35 mmHg, 0.05 in.Hg) change since engine start)	20 min. or more

P0452 and P0453

Detection Criteria	Threshold
P0452:	
Fuel tank pressure	Less than -3.999 kPa (-30 mmHg, -1.18 in.Hg) / when engine running

P0453:	
Fuel tank pressure	1.999 kPa (15 mmHg, 0.59 in.Hg) or more / when engine running

WIRING DIAGRAM

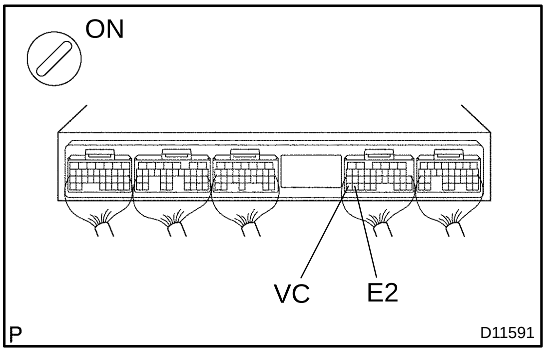
Refer to DTC P0441 on page DI-207 .

INSPECTION PROCEDURE

HINT:

- If different DTCs related to differemt system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- If DTC P0441 (Purge Flow), P0446 (VSV for CCV), P0451, P0452 or P0453 (Evaporative Pressure Sensor) is output with DTC P0442 or P0456, troubleshoot DTC P0441, P0446, P0451, P0452 or P0453 first. If no malfunction is detected, troubleshoot DTC P0442 or P0456 next.
- Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the vapor pressure sensor.

1	**Check voltage between terminals VC and E2 of ECM connector.**



CHECK:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

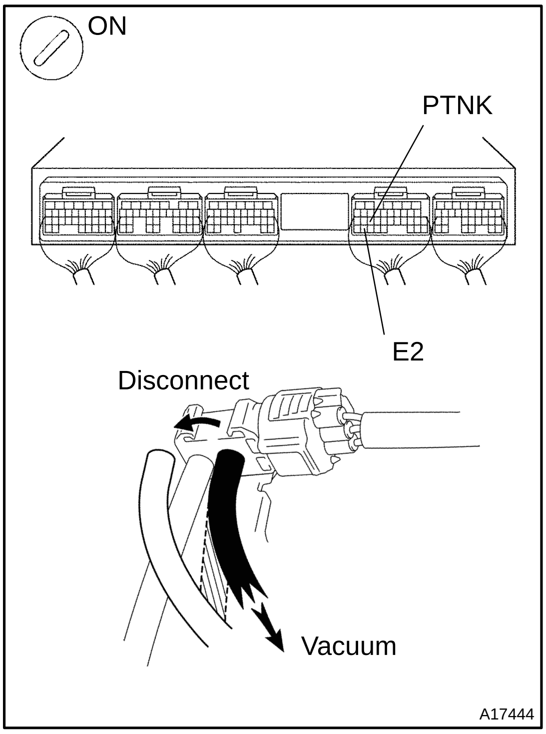
OK:

Voltage: 4.5 to 5.5 V

NG	**Replace ECM (See page SF-74).**

OK

2	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

Vacuum applied to vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK → **Replace ECM (See page SF-74).**

NG

3	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

Replace vapor pressure sensor.

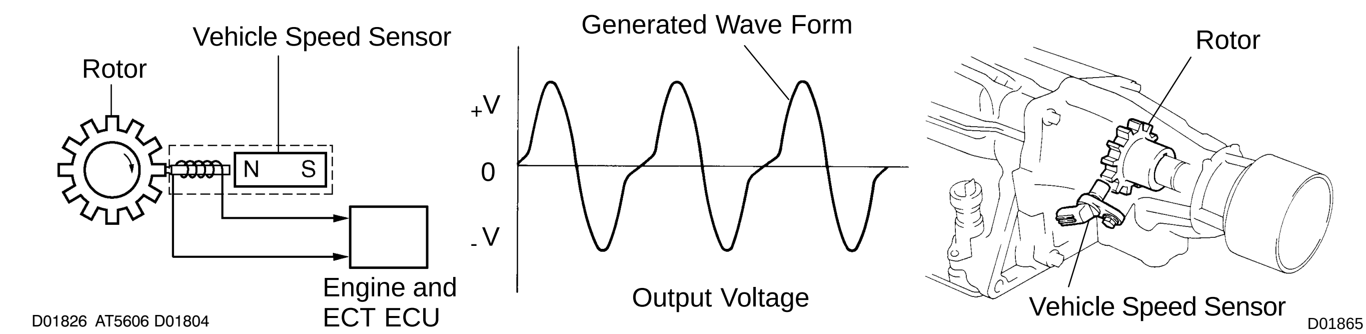
DIC4L-01

DTC	P0500	Vehicle Speed Sensor ”A”

DTC	P0503	Vehicle Speed Sensor ”A” Intermittent/ Erratic/High

CIRCUIT DESCRIPTION

The vehicle speed sensor detects the rotation speed of the transmission output shaft and sends signals to the ECM. The ECM determines the vehicle speed based on these signals. An AC voltage is generated in the vehicle speed sensor coil when the rotor mounted on the output shaft rotates, and then this voltage is sent to the ECM.



DTC No.	Procced to	DTC Detection Condition	Trouble Area
P0500	Step 1	No vehicle speed sensor signal to ECM under following conditions (a) and (b): (1 trip detection logic) (a) Park/neutral position switch is OFF (b) Vehicle is being driven	✓Open or short in vehicle speed sensor circuit ✓Vehicle speed sensor ✓ECM
P0503	DI-3	Intermittent problem in the vehicle speed sensor circuit	

MONITOR DESCRIPTION

The ECM assumes that the vehicle is driven when the RPM of the transmission counter gear indicates more than 300 rpm and it has been over 30 sec. since the park/neutral position switch was turned OFF. If there is no signal from the vehicle speed sensor with these conditions satisfied, the ECM concludes that there is a fault in the vehicle speed sensor. The ECM will turn on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0500	Vehicle speed sensor "A" pulse input error
Required sensors/components	Main sensors/components	Vehicle speed sensor
	Related sensors/components	Park/Neutral position switch, Engine coolant temperature sensor, Combination meter
Frequency of operation	Continuous	
Duration	8 sec.	
MIL operation	Case 1: 2 driving cycles Case 2: Immediate	
Sequence of operation	None	

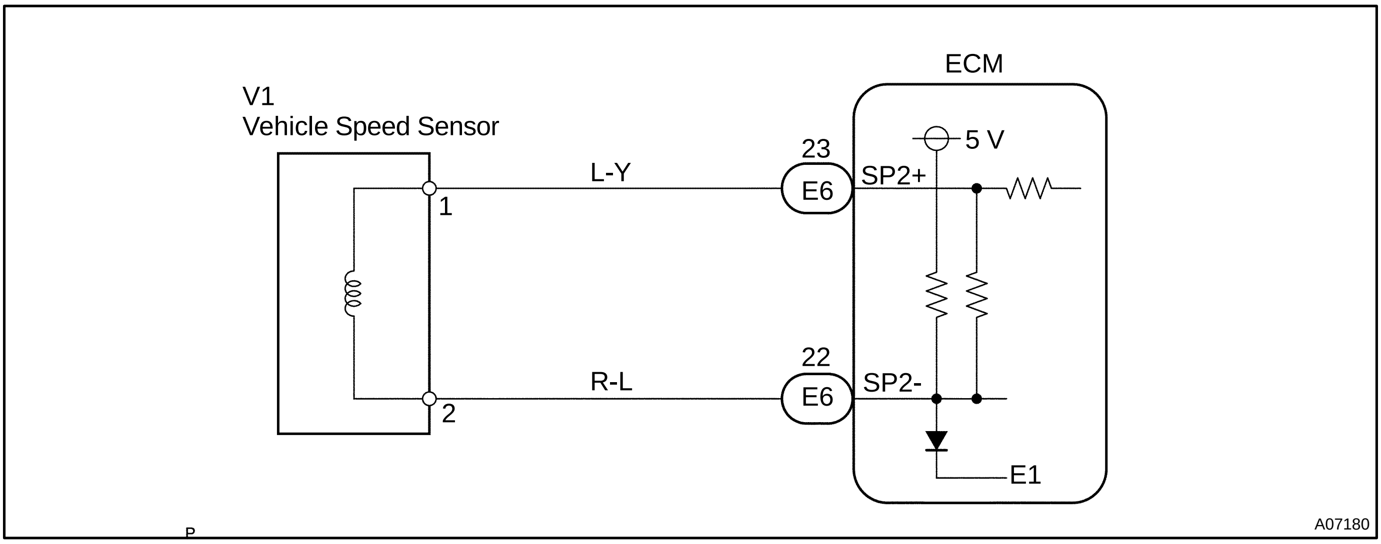
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1:		
Engine coolant temperature	70°C (158°F)	-
Engine speed	2,000 rpm	5,000 rpm
Calculated load	33%	-
Fuel cut at high engine speed	Not executing	
Case 2:		
Either the following conditions is met:	A or B	
A. Following conditions are met:	1 and 2	
1. Time after park/neutral position switch ON to OFF	10 sec.	-
2. Engine coolant temperature	20°C (68°F)	-
B. Following conditions are met:	1 and 2	
1. Time after park/neutral position switch ON to OFF	30 sec.	-
2. Engine coolant temperature	-	20°C (68°F)
Engine speed	Vary with throttle opening angle	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Sensor signal	No pulse input

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Connect OBD II scan tool or hand-held tester, and read value of vehicle speed.**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester.
(b) Start the engine.
(c) Turn the iginition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / SPD (SP2).

CHECK:

Drive the vehicle and read the vehicle speed SPD (SP2) on the OBD II scan tool or hand-held tester.

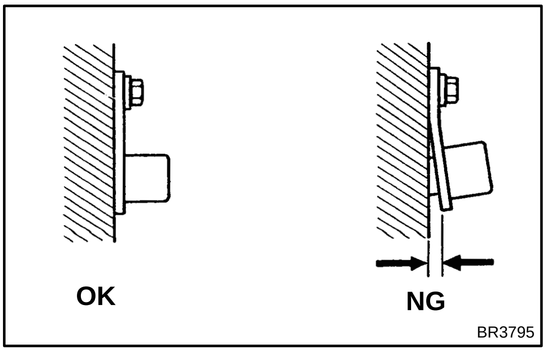
OK:

The actual vehicle speed should be almost equal to the vehicle speed displayed on the tester.

NG → **Check for intermittent problems (See page DI-3).**

OK

2	**Check vehicle speed sensor installation.**

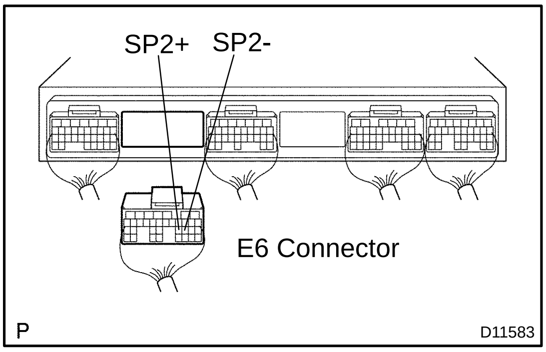


CHECK:
Check the speed sensor installation.
OK:
Sensor is installation properly. There is no clearance between the sensor and transmission.

NG → **Properly install the vehicle speed sensor.**

OK ↓

3	**Check resistance between terminals SP2+ and SP2- of ECM connector.**

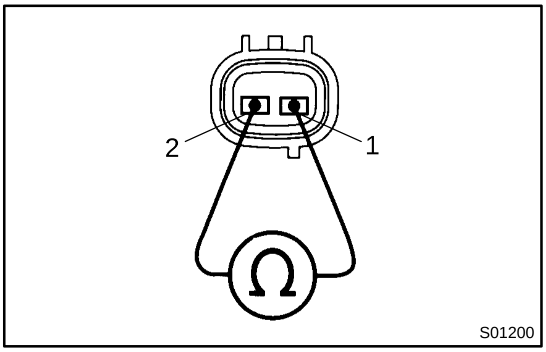


PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Disconnect the E6 connector from the ECM.
CHECK:
Check the resistance between terminals SP2+ and SP2- of the ECM connector.
OK:
Resistance: 560 to 680 Ω

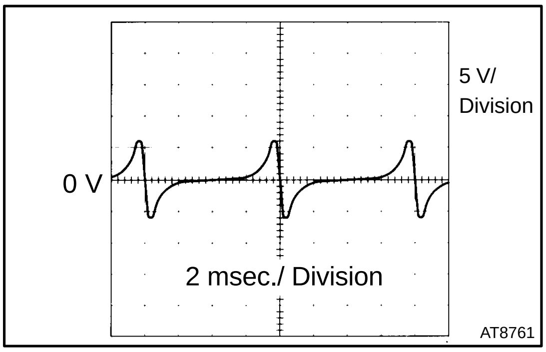
OK → **Replace ECM (See page SF-74).**

NG ↓

4	Check vehicle speed sensor.



PREPARATION:
Remove the vehicle speed sensor from the transmission.
CHECK:
Measure the resistance between terminals 1 and 2 of the speed sensor.
OK:
Resistance: 560 to 680 Ω



Reference: INSPECTION USING OSCILLOSCOPE
Check the waveform between terminals SP2+ and SP2- when the vehicle speed is approximately. 60 km/h (37 mph).

NG → **Replace vehicle speed sensor.**

OK ↓

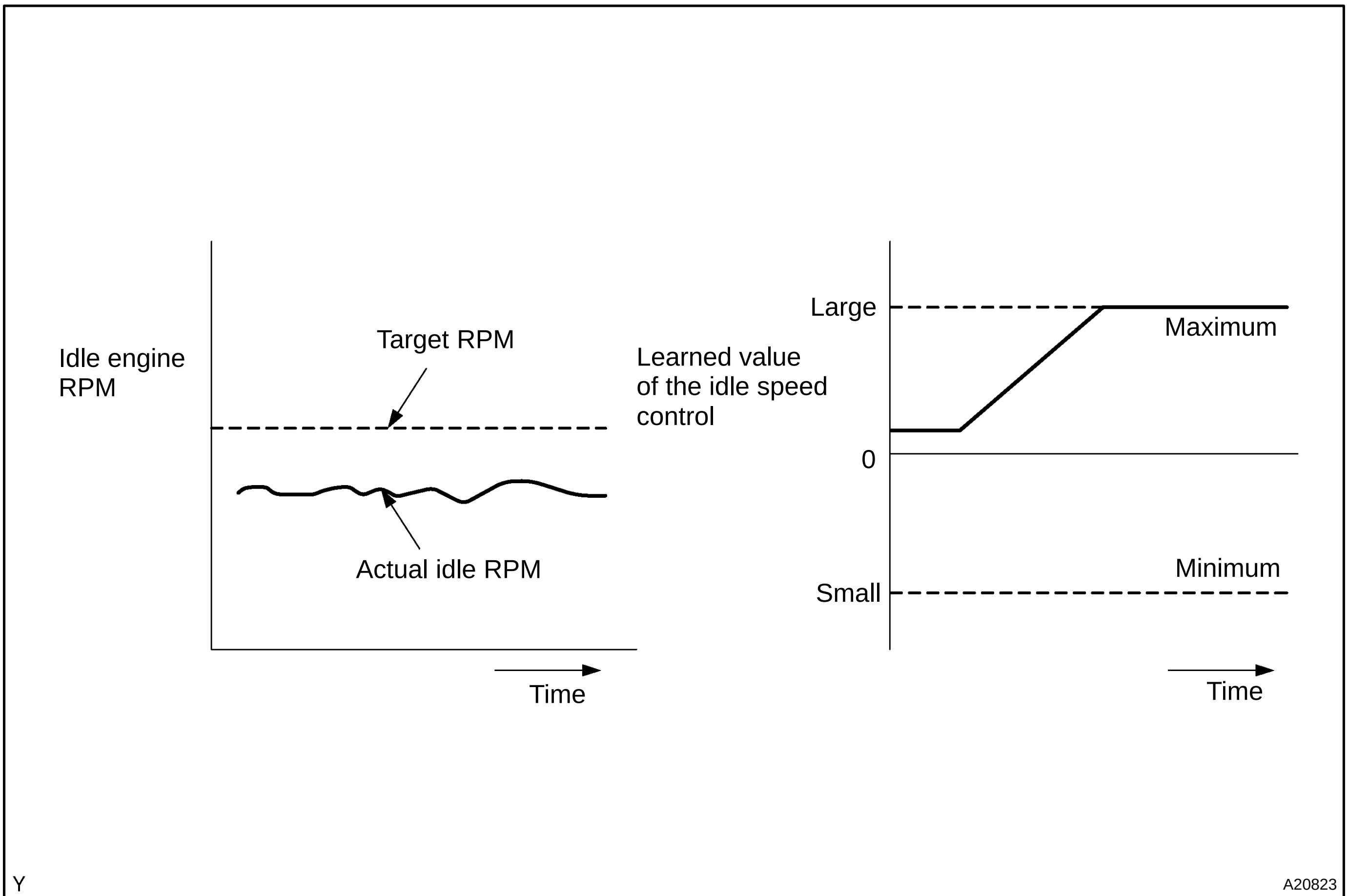
Check and repair harness and connector between ECM and vehicle speed sensor (See page IN-33).

DIC4M-01

DTC	P0505	Idle Air Control System

MONITOR DESCRIPTION

The idle speed is controlled by the ETCS (Electronic Throttle Control System).
The ETCS is composed of the throttle motor which operates the throttle valve, and the throttle position sensor, which detects the opening angle of the throttle valve.
The ECM controls the throttle motor to provide the proper throttle valve opening angle to obtain the target idle speed.
The ECM regulates the idle speed by opening and closing the throttle valve using the ETCS. The ECM concludes that the idle speed control ECM function is malfunctioning if: 1) the actual idle RPM varies more than the specified amount, or 2) a learned value of the idle speed control remains at the maximum or minimum five times or more during a drive cycle. The ECM will turn on the MIL and set a DTC.
Example:
If the actual idle RPM varies from the target idle RPM by more than 200 (*1) rpm five times during a drive cycle, or if the learned value angle of the IAC remains at its maximum or minimum angle for 5 sec., the ECM will turn on the MIL and a DTC is set.
HINT:
*1: RPM threshold varies with engine load.



DTC No.	DTC Detecting Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (2 trip detection logic)	• Air induction system • PCV piping • ECM

MONITOR STRATEGY

Related DTCs	P0505	Idle air control malfunction
Required sensors/components	Main sensors/components	Crankshaft position sensor
	Related sensors/components	Vehicle speed sensor, Engine coolant temperature sensor
Frequency of operation	Functional check: Once per trip Range check: Continuous	
Duration	Functional check: 10 min. Range check: 10 sec.	
MIL operation	Functional check: 2 driving cycles Range check: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Functional check:		
Precondition is met when both of the following are met	A and B	
A. Intake air flow rate learnings is enabled	3 sec.	-
B. Engine	Running (400 rpm or more)	
Range check:		
Output signal duty	10%	90%
Battery voltage	10 V	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Functional check:	
Case 1:	
All of the following conditions are met:	A, B and C
A. Engine RPM - target engine RPM (History that vehicle had run for 10 km/h (6 mph) or more)	Less than -100 rpm or more than 200 rpm (A/C ON or park/neutral position switch ON) or Less than -100 rpm or more than 150 rpm (A/C OFF and park/neutral position switch OFF)
B. Number of fallowing conditions is met	5 times or more
C. IAC flow rate learning value	Value when fail is judged first + 1.55 L/sec. or more Value when fail is judged first - 1.55 L/sec. or less
Case 2:	
Both or the following condition is met:	A and B
A. Engine RPM - target engine RPM (History that vehicle had run for 10 km/h (6 mph) or more)	Less than -100 rpm or more than 200 rpm (A/C ON or park/neutral position switch ON) or Less than -100 rpm or more than 150 rpm (A/C OFF and park/neutral position switch OFF)
B. IAC flow rate learning value	5.8 L/sec. or more or 1.49 L/sec. or less

Range check:
Missing output duty change

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	Are there any other codes (besides P0505) being output?

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0505	A
"P0505" and other DTCs	B

HINT:
If any other codes besides P0505 are output, perform the troubleshooting for those DTCs first.

YES → **Go to relevant DTC chart (See page DI-35).**

NO

2	Check connection of PCV piping.

NG → **Repair or replace PCV piping.**

OK

3	**Check air induction system (See page SF-1).**

CHECK:
Check for vacuum leaks in air induction system.

NG → **Repair or replace air induction system.**

OK

Check electric throttle control system (See page SF-32).

DIC4N-01

DTC	P0550	Power Steering Pressure Sensor/Switch Circuit

DTC	P0552	Power Steering Pressure Sensor/Switch Circuit Low Input

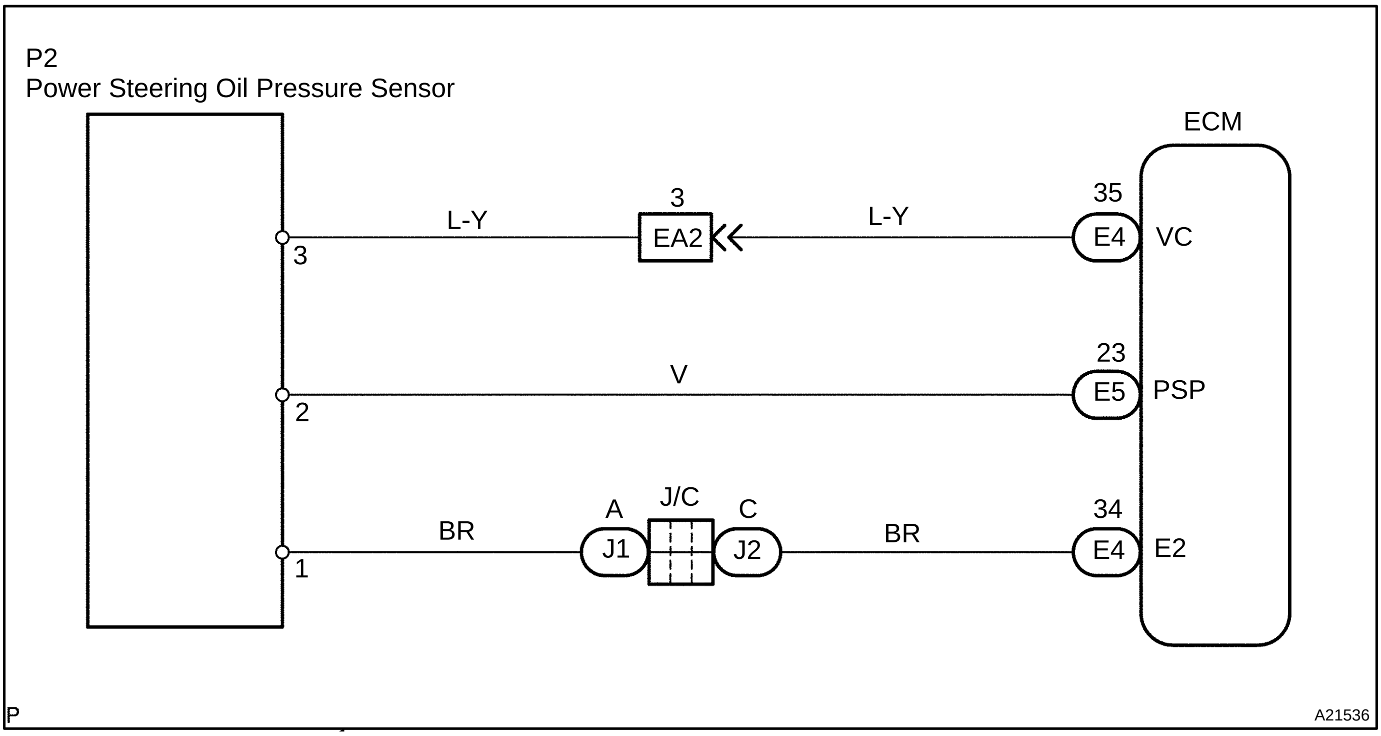
DTC	P0553	Power Steering Pressure Sensor/Switch Circuit High Input

CIRCUIT DESCRIPTION

ECM controls idle speed most appropriately according to a signal from the power steering pressure sensor.

DTC No.	DTC Detecting Condition	Trouble Area
P0550 P0552 P0553	Condition (a) or (b) continues with more than 0.5 secs.: (a) PNP < 0.28 V (b) PNP > 4.9 V	• Open or short in power steering pressure sensor circuit • Power steering oil pressure sensor • ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check power steering oil pressure sensor.**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Start the engine.
(c) Push the hand-held tester or the OBD II scan tool main switch ON.
(d) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / PS SIGNAL.

CHECK:

Read signal displayed on the hand-held tester or the OBD II scan tool.

RESULT:

Condition	Power steering oil pressure sensor
Turning the steering wheel until it is locked	ON
In an idle	OFF

OK → **Check for intermittent problems (See page DI-3).**

NG

2	**Check for open in harness and connector between engine ECU and power steering oil pressure sensor (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace power steering oil pressure sensor (See page SR-29).

DIALB-02

DTC	P0560	System Voltage

MONITOR DESCRIPTION

The battery supplies electricity to the ECM even when the ignition switch is OFF. This electricity allows the ECM store data such as DTC history, freeze frame data, fuel time values, and other data.
If the battery voltage falls below a minimum level, the ECM will conclude that there is a fault in the power supply circuit. The next engine starts, the ECM will turn on the MIL and a DTC will be set.

DTC No.	DTC Detecting Condition	Trouble Area
P0560	Open in back up power source circuit	⋅ Back-up power source circuit ⋅ EFI No.1 fuse ⋅ Engine room No. 1 R/B ⋅ ECM

HINT:
If DTC P0560 present, the ECM will not store another DTC.

MONITOR STRATEGY

Related DTCs	P0560	System voltage malfunction
Required sensors/components	ECM	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (*1)	
Sequence of operation	None	

*1: The DTC is set immediate. The MIL will be illuminated after the next engine start.

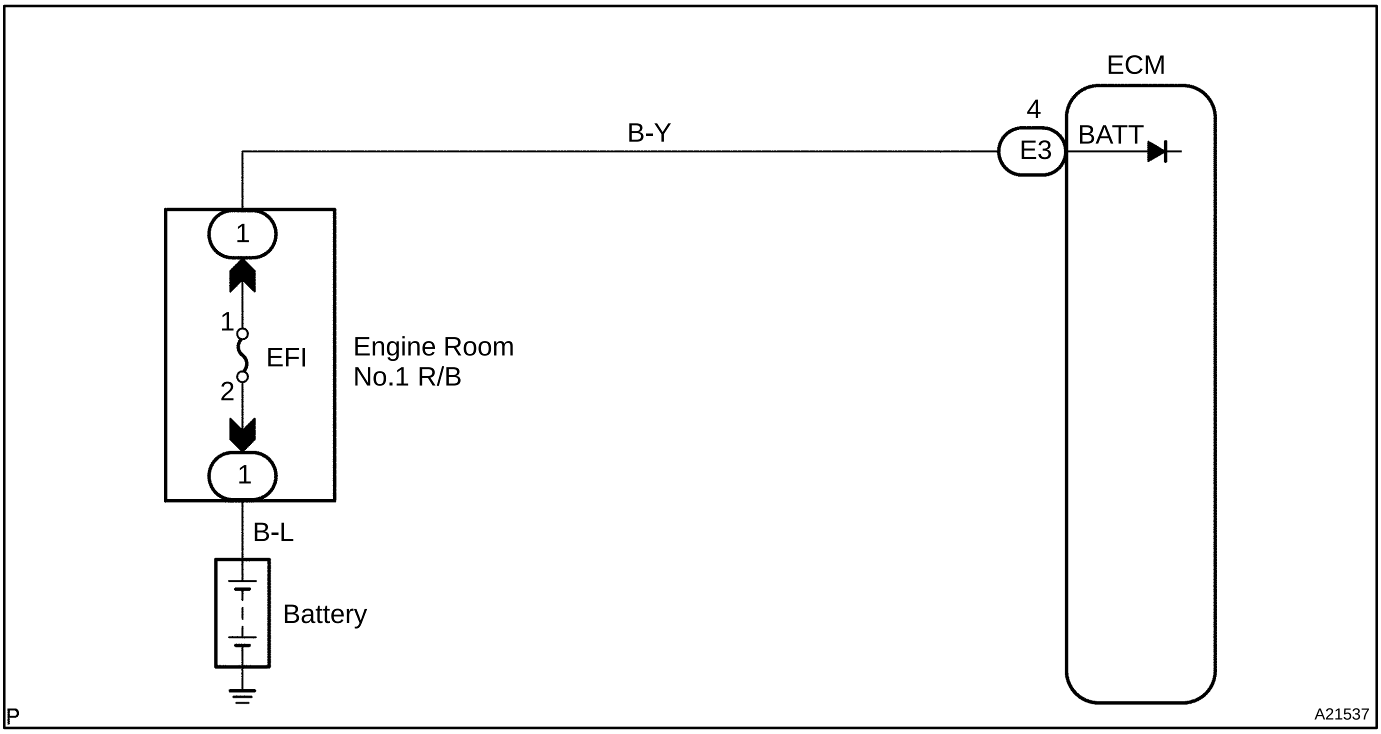
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Stand-by RAM	Initialized	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Battery voltage	Less than 3.5 V

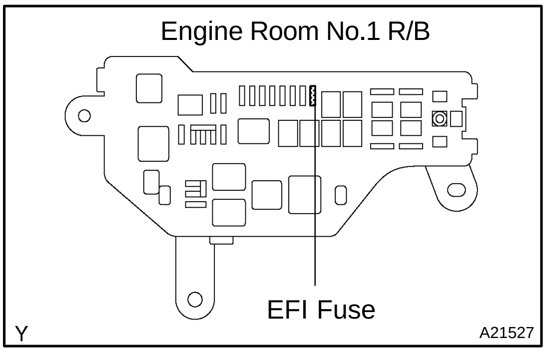
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check EFI fuse of engine rooom No.1 R/B.**

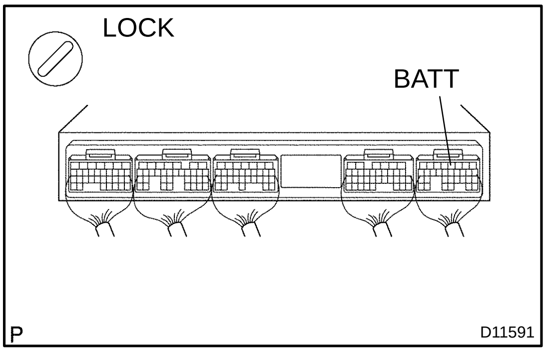


PREPARATION:
Remove the EFI fuse from the engine room No.1 R/B.
CHECK:
Check the continuity of the EFI fuse.
OK:
Continuity

NG → **Check for short in all harness and components connected to EFI fuse.**

OK

2	Check voltage between terminal BATT of ECM connector and body ground.



PREPARATION:
Remove the ECM hood (See page SF-74).
CHECK:
Measure the voltage between terminal BATT of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

OK	Check for intermitten problems (See page DI-3).

NG

3	Check for open and short in harness and connector between ECM and EFI fuse, EFI fuse and battery.

NG	Repair or replace harness or connector.

OK

Check and replace engine room No.1 R/B.

DIALC-02

DTC	P0604	Internal Control Module Random Access Memory (RAM) Error

DTC	P0606	ECM/PCM Processor

DTC	P0607	Control Module Performance

DTC	P0657	Actuator Supply Voltage Circuit / Open

MONITOR DESCRIPTION

The ECM continuously monitors it's internal memory status, internal circuits, and output signals to the throttle actuator. This self-check insures that the ECM is functioning properly. If any malfunction is detected, the ECM will set the appropriate DTC and illuminate the MIL.
The ECM memory status is diagnosed by internal "mirroring" of the main CPU and the sub CPU to detect RAM (Random Access Memory) errors. The two CPUs also perform continuous mutual monitoring.
The ECM sets a DTC if: 1) outputs from the 2 CPUs are different and deviate from the standards, 2) the signals to the throttle actuator deviate from the standards, 3) a malfunction is found in the throttle actuator supply voltage, and 4) any other ECM malfunction is found.

DTC No.	DTC Detecting Condition	Trouble Area
P0604 P0606 P0607 P0657	ECM malfunction	ECM

MONITOR STRATEGY

Related DTCs	P0604	Random access memory (RAM) error range check
	P0606	ECM range check/description
	P0657	Actuator supply voltage circuit range check
Required sensors/components	ECM	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0604:	
RAM mirror check failure	
P0606:	
Either of the following condition is met	(a) and (b)
(a) Difference between TP of main CPU and TP of sub CPU	0.3 V or more
(b) Difference between APP of main CPU and APP of sub CPU	0.3 V or more
P0657:	
ETCS power supply when electronic throttle actuator power OFF	4 V or more

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Replace ECM (See page SF-74).

DIC4Q-01

DTC	P0617	Starter Relay Circuit High

MONITOR DESCRIPTION

While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM.
If the vehicle is being driven and the ECM detects the starter control signal (STA), the ECM concludes that the starter control circuit is malfunction. The ECM will turn on the MIL and a DTC is set.

DTC No.	DTC Detection Condition	Trouble Area
P0617	When all conditions (a), (b) and (c) are satisfied for 20 seconds with battery (+B) voltage 10.5 V or more (a) Vehicle speed ± 20 km/h (b) Engine revolution ± 1,000 rpm (c) STA signal ON	✓Park/neutral position switch ✓Starter relay circuit ✓Ignition switch ✓ECM

MONITOR STRATEGY

Related DTCs	P0617	Starter signal error
Required sensors/components	Main sensors/components	Starter signal
	Related sensors/components	Vehicle speed sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	20 sec.	
MIL operation	Immediate	
Sequence of operation	None	

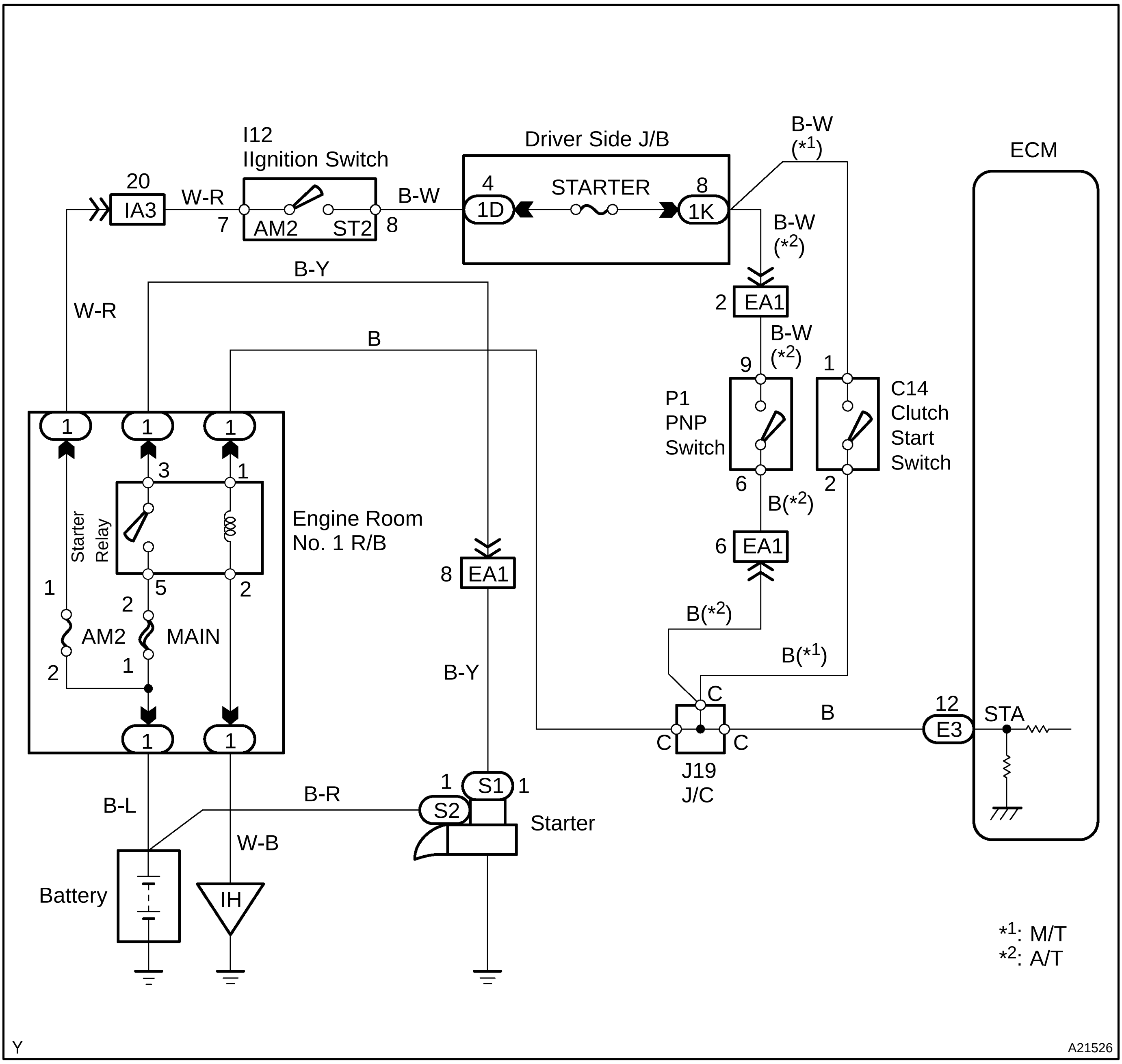
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	10.5 V	-
Vehicle speed	20 km/h (12.4 mph)	-
Engine speed	1,000 rpm	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Starter signal	ON (at "more than 20 km/h (12.4 mph) and more than 1,000 rpm")

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	Connect hand-held tester, and check STA signal.

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:

Read the STA signal on the hand-held tester while the starter is operating.

OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

OK → **Go to step 5.**

NG ↓

2	Check park/neutral position switch (See page DI-361).

NG → **Replace park/neutral position switch. Go to next step 3 after the replacement.**

OK ↓

3	Check ignition switch (See page BE-21).

NG → **Replace ignition switch. Go to next step 5 after the replacement.**

OK ↓

4	Connect hand-held tester, and check STA signal.

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:
Read the STA signal on the hand-held tester while the starter is operating.

OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

NG → **Repair or replace harness and connector.**

OK

5	Check DTC reoccur

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Clear DTC (See page DI-3)
Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODE and press YES.
(d) Drive the vehicle more than 40 km/h (25 mph) for 20 seconds or more.

CHECK:
Check DTC reoccur.

RESULT:

Display (DTC Output)	Proceed to
P0617	A
No DTC output	B

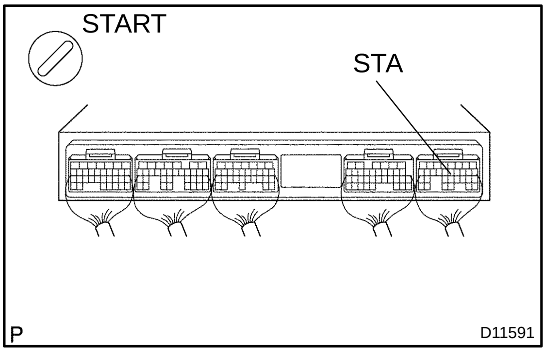
A → **Replace ECM (See page SF-74).**

B

Check for intermittent problems
(See page DI-3).

OBD II scan tool (excluding hand-held tester):

1	**Check voltage between terminal STA of ECM connector and body ground.**



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminal STA of the ECM connector and body ground, during the engine cranking.

OK:
Voltage:
6 V or more (ignition switch START position)
0 V (ignition switch ON position)

OK	**Go to step 5.**

NG

2	**Check park/neutral position switch (See page DI-361).**

NG	**Replace park/neutral position switch. And go to next step 4 after the replacement.**

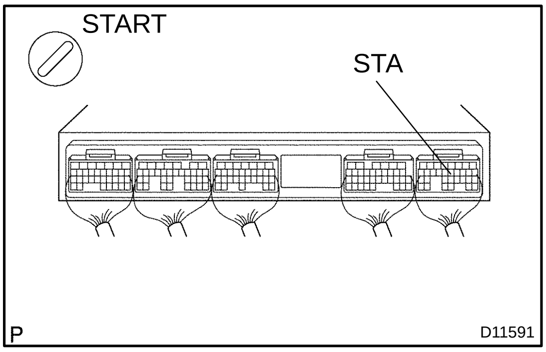
OK

3	**Check ignition switch (See page BE-21).**

NG	**Replace ignition switch. And go to step 4 after the replacement.**

OK

4	**Check voltage between terminal STA of ECM connector and body ground.**



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminal STA of the ECM connector and body ground, during the engine cranking.

OK:
Voltage:
6 V or more (ignition switch START position)
0 V (ignition switch ON position)

NG — **Repair or replace harness or connector.**

OK

5	**Check DTC reoccur**

PREPARATION:
(a) Connect the OBD II scan tool.
(b) Turn the ignition switch ON and OBD II scan tool main switch ON.
(c) Clear DTC (See page DI-3)
(d) Drive the vehicle more than 40 km/h (25 mph) for 20 seconds or more.

CHECK:
Check DTC reoccur.

RESULT:

Display (DTC Output)	Proceed to
P0617	A
No DTC output	B

A — **Replace ECM (See page SF-74).**

B

Check for intermittent problems (See page DI-3).

DIC4R-01

DTC P1126 Magnetic Clutch Circuit

CIRCUIT DESCRIPTION

Magnetic clutch is mounted between the throttle motor and the valve, and it connects the throttle motor with the throttle valve.Therefore, the throttle motor opens and closes the throttle valve through the magnetic clutch.
If the electric throttle control system has a malfunction, the magnetic clutch separates the throttle motor from the throttle valve so that the throttle valve cannot be operated by the throttle motor.
If this DTC is stored, the ECM shuts down the power for the throttle motor and the magnetic clutch, and the throttle valve is fully closed by the return spring.
However, the opening angle of the throttle valve can be controlled by the accelerator pedal through the throttle cable.

DTC No.	DTC Detecting Condition	Trouble Area
P1126	Condition (a) continues for 0.8 seconds: (a) Magnetic clutch current ⊖ 1.4 A or ± 0.4 A	✓Open or short in magnetic clutch cirucit ✓Magnetic clutch ✓ECM
	Condition (a) continues for 1.5 seconds: (a) Magnetic clutch current ⊖ 1.0 A or ± 0.8 A	

MONITOR DESCRIPTION

The ECM monitors both the magnetic clutch current and the throttle position sensor to confirm proper operation of the throttle motor and magnetic clutch. If the clutch current is out of range, the ECM will interpret this as malfunction of the magnetic clutch. If the throttle position sensor value does not change when the throttle motor is operated, the ECM will conclude that the magnetic clutch is "stuck".
If the ECM detects a malfunction in the magnetic clutch, it will:

- Illuminate the MIL and set a DTC.
- Disconnect the electrical supply to the throttle motor.
- Disengage the magnetic clutch (With the magnetic clutch disengaged, the throttle motor is disconnected from the throttle valve).

MONITOR STRATEGY

Related DTCs	P1126	Magnetic clutch range check
Required sensors/components	Main sensors/components	Magnetic clutch
	Related sensor/components	Accelerator pedal position sensor
Frequency of operation	Continuous	
Duration	Within 1.5 sec.	
MIL operation	1 drive cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 3: Magnetic clutch circuit range check		
When following conditions are met for 0.5 sec., start judgment for temporary fail and start intrusive throttle operation	A, B and C	
A. Ignition switch	ON to OFF	
B. Magnetic clutch	ON to OFF	
C. Actuator power	ON	
Stop the judgment if following conditions are met:	A, B, C and D	
A. Ignition switch	ON	
B. Pedal position	20°	-
C. Throttle control system down	Requested	
D. Engine coolant temperature	-	0°C (0°F)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1: Magnetic clutch circuit range check	
Clutch current when engagement motor clutch is ON	Less than 0.4 A (for 0.8 sec. or more)
	More than 1.4 A (for 0.8 sec. or more)
	Less than 0.8 A (for 1.5 sec. or more)
	More than 1.0 A (for 1.5 sec. or more)
Case 2: Magnetic clutch fail count (Magnetic clutch circuit is open/shorted)	25 times (x 0.004 sec.) or more
Case 3: Magnetic clutch circuit range check	
Throttle sensor valtage change	0.05 V or more

WIRING DIAGRAM

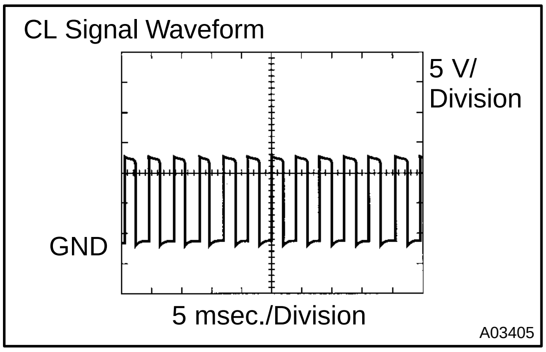
Refer to DTC P2102 on page DI-283 .

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check magnetic clutch circuit.**

When using hand-held tester:
PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
CHECK:
Read the magnetic clutch current value on the hand-held tester.
OK:
Current: 0.8 to 1.0 A

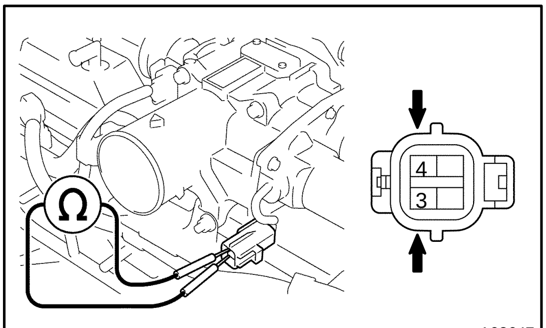


When not using hand-held tester:
PREPARATION:
(a) Connect an oscilloscope between terminals CL+ and CL- of the ECM connector.
(b) Start the engine.
CHECK:
Check the waveform between terminals CL+ and CL- of the ECM connector while the engine is idling.
OK:
The correct waveform is as shown.

NG	**Go to step 4.**

OK

2	Check magnetic clutch.



A02982 A02394 A03647

PREPARATION:
Disconnect the throttle control motor together with the magnetic clutch connector.

CHECK:
Measure the resistance between terminals 3 and 4 of the throttle control motor with the magnetic clutch.

OK:

Resistance: 4.2 to 5.2 Ω at 20°C (68°F)

NG	Replace throttle control motor with magnetic clutch (See page SF-37).

OK

3	Check for open and short in harness and connector between magnetic clutch and ECM (See page IN-33).

NG	Repair or replace harness or connector.

OK

4	Check operation of magnetic clutch.

CHECK:

(a) Clear the DTC.
(b) Perform the following steps and check the DTC.
  (1) Turn the ignition switch ON.
  (2) Start the engine.
  (3) Turn the ignition switch OFF and wait 3 seconds.
  (4) Turn the ignition switch ON.

OK:

DTC P1126 is not stored.

NG → **Replace throttle control motor with magnetic clutch (See page SF-37).**

OK ↓

Replace ECM (See page SF-74).

DIALE-02

DTC	P2102	Throttle Actuator Control Motor Circuit Low

DTC	P2103	Throttle Actuator Control Motor Circuit High

CIRCUIT DESCRIPTION

Throttle motor is operated by the ECM and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body and it provides feedback to the ECM to control the throttle motor in order to the throttle valve opening angle properly in response to driving condition.
If this DTC is stored, the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the ignition switch is turned OFF.

DTC No.	DTC Detection Condition	Trouble Area
P2102 P2103	Conditions (a) and (b) continue for 2 sec.: (a) Throttle control motor output duty ± 80 % (b) Throttle control motor current < 0.5 A	• Open or short in throttle control motor circuit • Throttle control motor • ECM

MONITOR DESCRIPTION

The ECM monitors the current flows through the electronic throttle motor and detects malfunctions or an open circuit in the throttle motor based on the current value. When the current deviates from standard range, the ECM concludes that there is a fault in the throttle motor ECM turns on MIL and a DTC is set.
Example:
The current is less than 0.5 A when the motor driving duty ratio is exceeding 80%. The ECM concludes that the current is out of range, turns on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P2102	Throttle actuator control motor current (Low current)
	P2103	Throttle actuator control motor current (High current)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	P2102: Immediate P2103: 1 driving cycle	
Sequence of operation	None	

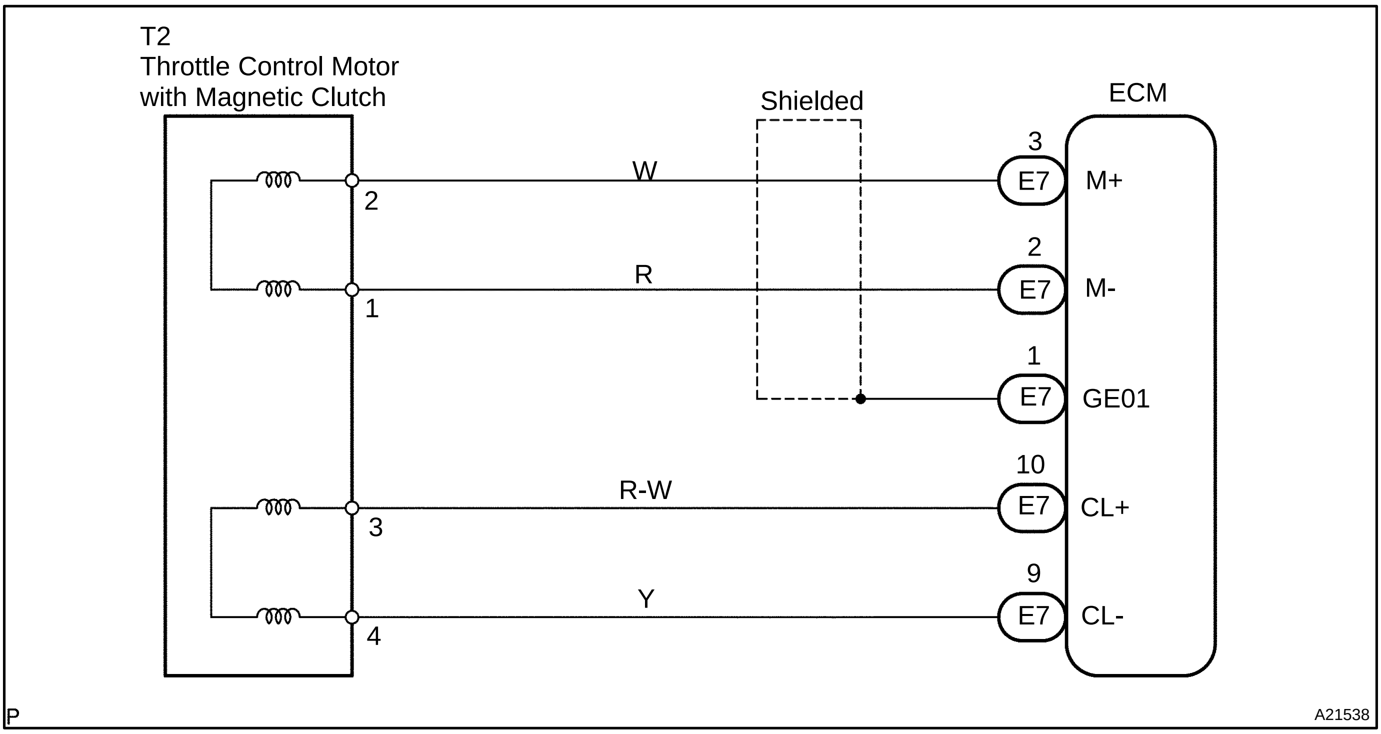
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P2102:		
Throttle control motor	ON	
Duty-cycle ratio to open throttle actuator	80%	-
Throttle actuator power supply	8 V	-
Current motor current - Motor current at 0.016 sec. before	-	0.2 A
Actuator power supply voltage	8 V	-
P2103:		
Throttle control motor	ON	
Either of the following conditions is met:	A or B	
A. Throttle actuator power supply	8 V	-
B. Throttle actuator power	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2102:	
Throttle control motor current	Less than 0.5 A (when motor drive duty 80% or more)
P2103:	
Hybrid IC	Fail

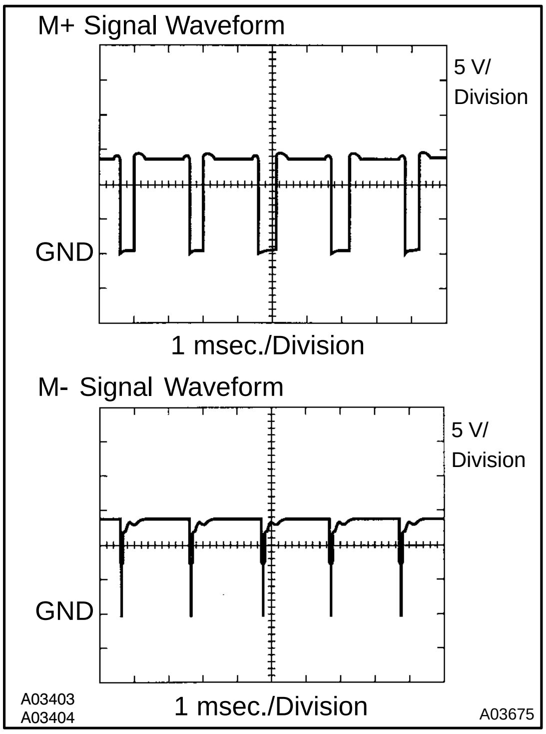
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	Check throttle control motor circuit.



PREPARATION:
(a) Connect an oscilloscope between terminals M+ or M- and E1 of the ECM connectors.
(b) Start the engine.

CHECK:
Check the waveform between terminals M+ or M- and E1 of the ECM connectors when the engine is idling.

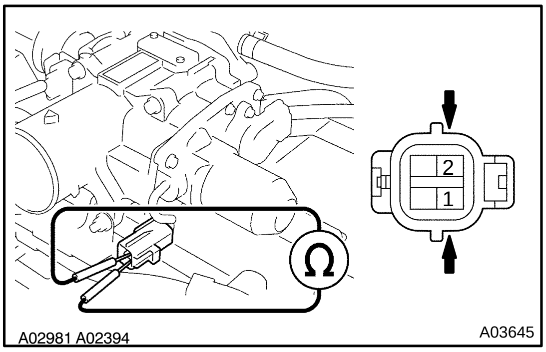
OK:
Correct waveforms are as shown.

HINT:
The waveform frequency varies depending on the throttle opening.

OK → **Replace ECM (See page SF-74).**

NG

2	Check throttle control motor.



PREPARATION:
Disconnect the throttle control motor with the magnetic clutch connector.

CHECK:
Measure the resistance between terminals 1 and 2 of the throttle control motor with the magnetic clutch.

OK:
Resistance: 0.3 to 100 Ω at 20°C (68°F)

NG → **Replace throttle control motor with magnetic clutch (See page SF-37).**

OK ↓

3	Check for open and short in harness and connector between throttle control motor and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK ↓

4	Visually check throttle valve.

CHECK:
Check between the throttle valve and the housing for foreign objects.
Also, check if the valve can open and close smoothly.

NG → **Remove foreign object and clean throttle body.**

OK ↓

Replace ECM (See page SF-74).

DIALF-02

DTC	P2111	Throttle Actuator Control System -Stuck Open

DTC	P2112	Throttle Actuator Control System -Stuck Closed

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM and it opens and closes the throttle valve. The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. And, it provides feedback to the ECM to control the throttle motor in order to make the throttle valve opening angle properly in response to the driving condition. If this malfunction is detected, the ECM shuts down the power for the throttle motor, and the throttle valve is fully closed by the return spring. And the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the ignition switch is turned OFF.

DTC No.	DTC Detection Condition	Trouble Area
P2111 P2112	Lock throttle control motor during control of throttle control motor	Throttle control motor Throttle body

MONITOR DESCRIPTION

The ECM concludes that there is a malfunction of the ETCS (Electronic Throttle Control System) when the throttle valve remains at a fixed angle despite high drive current from the ECM. The ECM will turn on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P2111	Throttle motor actuator lock (Open)
	P2112	Throttle motor actuator lock (Closed)
Required sensors/components	Main sensors/components	Throttle actuator motor
	Related sensors/components	Throttle position sensor
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P2111:		
Throttle motor current	2 A	-
Throttle motor duty to close side	80%	-
P2112:		
Throttle motor current	2 A	-
Throttle motor duty to open side	80%	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
|Current throttle position sensor voltage at this time - throttle position sensor voltage 0.016 sec. earlier|	Less than 0.1 V when throttle motor open (or close) duty 80% or more

WIRING DIAGRAM

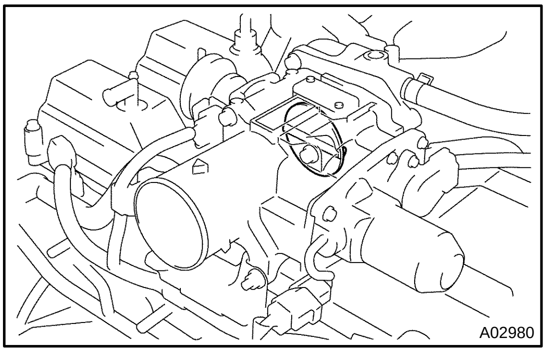
Refer to DTC P2102 DI-283 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Visually check throttle valve.**



PREPARATION:

Remove the intake air resonator.

CHECK:

Check whether or not a foreign body exists between the throttle valve and housing. Also, check if the valve can open and close smoothly.

NG → **Remove foreign body and clean throttle body.**

OK

2	Check throttle control motor (See page SF-32).

NG → Replace throttle control motor with magnetic clutch (See page SF-37).

OK

3	Check for open and short in harness and connector between ECM and throttle control motor (See page IN-33).

NG → Repair or replace harness or connector.

OK

Check for intermittent problems
(See page DI-3).

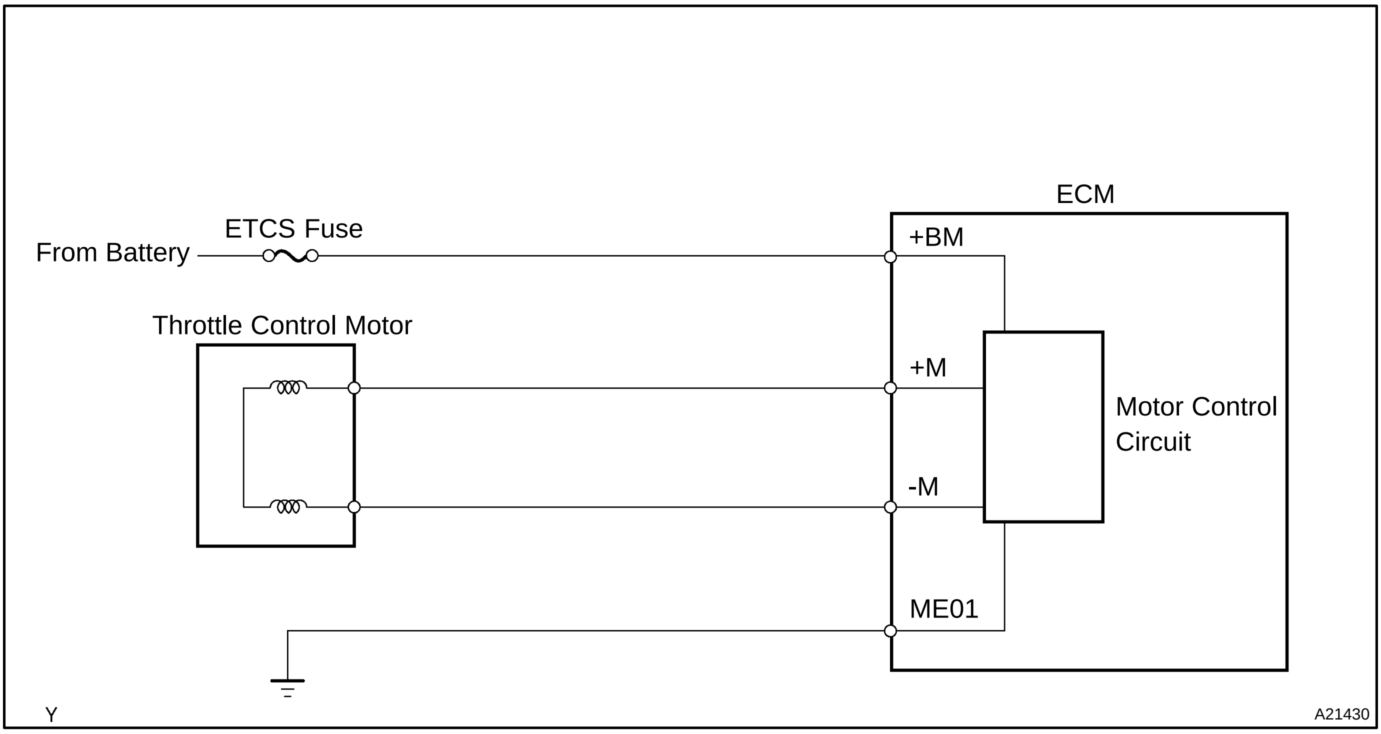
DIC4O-01

DTC	P2118	Throttle Actuator Control Motor Current Range/Performance

CIRCUIT DESCRIPTION

The Electronic Throttle Control System (ETCS) has a dedicated power supply circuit. The voltage (+BM) is monitored and when the voltage is low (less than 4V), the ECM concludes that the ETCS has a fault and current to the throttle control motor is cut.

When the voltage becomes unstable, the ETCS itself becomes unstable. For this reason, when the voltage is low, the current to the motor is cut. If repairs are made and the system has returned to normal, turn the ignition switch to OFF. The ECM then allows current to flow to the motor and the motor can be restarted.



DTC No.	DTC Detecting Condition	Trouble Area
P2118	Open in ETCS power source circuit	✓Open in ETCS power source circuit ✓ETCS fuse ✓ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the electronic throttle motor. When the power supply voltage drops below the threshold, the ECM concludes that the power supply has an open circuit. A DTC is set and the MIL is turned on.

MONITOR STRATEGY

Related DTCs	P2118	Throttle actuator motor power supply line range check (Low voltage)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	0.8 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Actuator power	ON	
Battery voltage	8 V	-

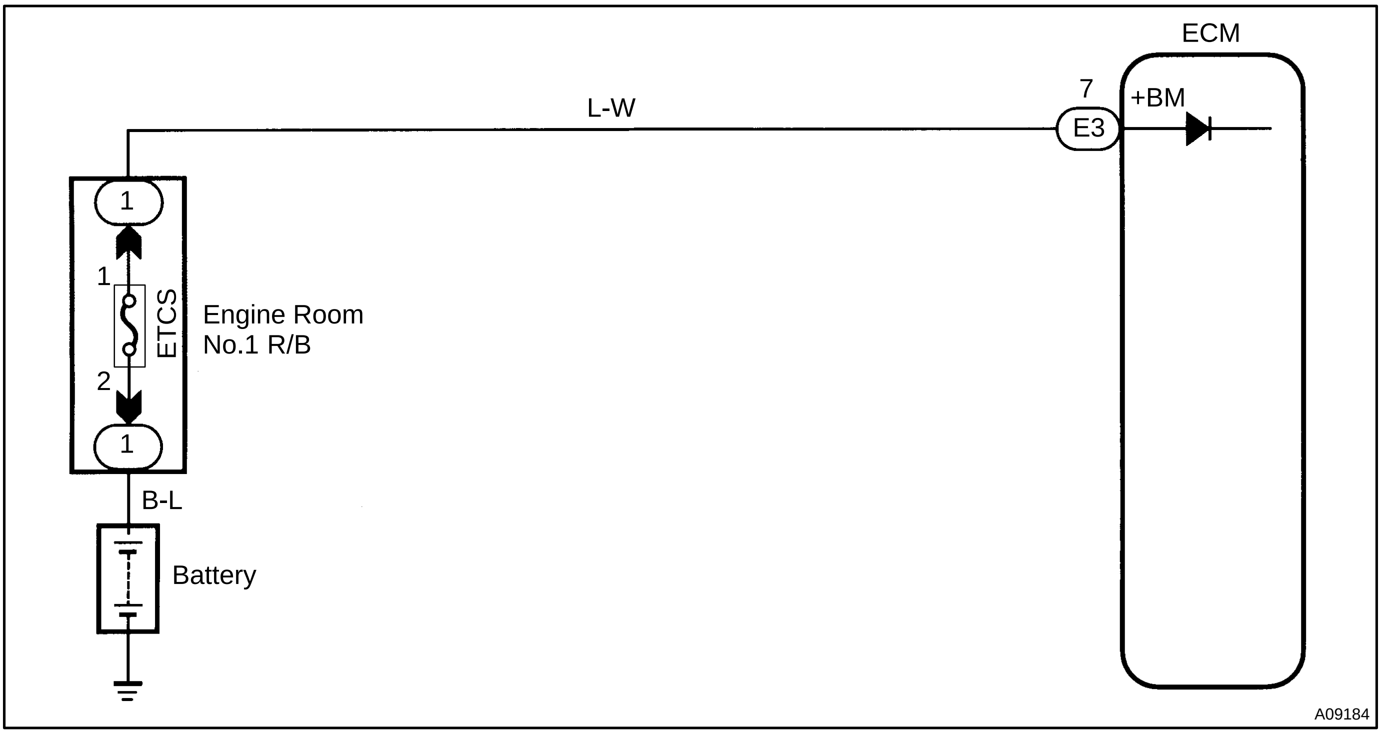
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Throttle actuator motor power supply voltage	Less than 4 V

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle actuator motor power supply voltage	9 to 14 V

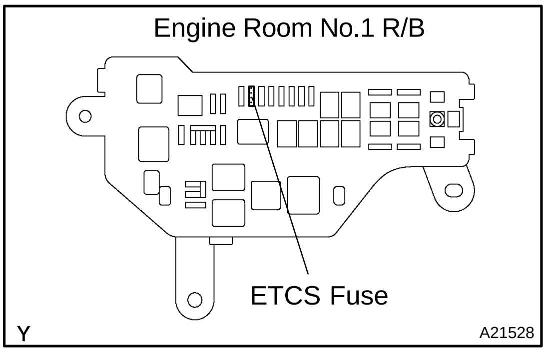
WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Check ETCS fuse of engine room No.1 R/B.**

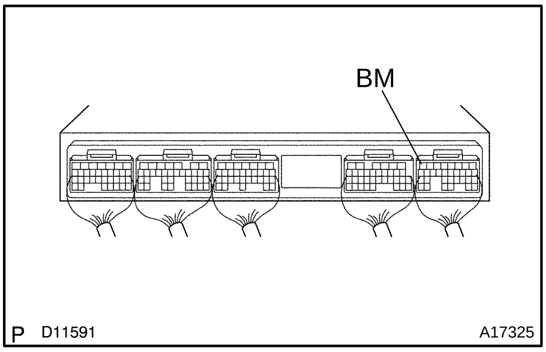


PREPARATION:
Remove the ETCS fuse from the engine room No.1 R/B.
CHECK:
Check the countinuity of the ETCS fuse.
OK:
Continuity

NG	**Check for short in all harness and components connected to ETCS fuse.**

OK

2	Check voltage between terminal BM of ECM connector and body ground.



PREPARATION:

Remove the ECM hood (See page SF-74).

CHECK:

Measure the voltage between terminal BM of the ECM connector and the body ground.

OK:

Voltage: 9 to 14 V

OK → **Check for intermittent problems (See page DI-3).**

NG ↓

3	Check for open or short in harness or connector between battery and ETCS fuse, ETCS fuse and ECM.

NG → **Repair or replace harness or connector.**

OK ↓

Check engine room No.1 R/B.

DIALH-02

DTC	P2119	Throttle Actuator Control Throttle Body Range/Performance

CIRCUIT DESCRIPTION

The Electric Throttle Control System (ETCS) is composed of the throttle motor to operate the throttle valve, the throttle position sensor to detect the opening angle of the throttle valve, the accelerator pedal position sensor to detect the accelerator pedal position, the ECM to control the ETCS, and the one valve type throttle body.
The ECM controls the throttle motor to make the throttle valve opening angle properly in response to the driving condition.
The throttle position sensor which is mounted on the throttle body detects the opening angle of the throttle valve, and it provides feedback to the ECM to control the throttle motor.
If the ETCS has a malfunction, the throttle valve is locket at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled until the system returns to normal and the ignition switch is turned OFF.

DTC No.	DTC Detecting Condition	Trouble Area
P2119	Throttle opening angle continues to vary greatly from target throttle opening angle	✓Electric throttle control system ✓ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the electronic throttle motor. When the power supply voltage drops below the threshold, the ECM concludes that the power supply has an open circuit. A DTC is set and the MIL is turned on.

MONITOR STRATEGY

Related DTCs	P2118	Throttle actuator motor power supply line range check (Low voltage)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Actuator power supply voltage	4 V	-
Throttle motor	ON	
Electric system down operation	Not executing	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Difference between ”target throttle position” and ”actual throttle position”	0.3 V or more

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle actuator motor power supply voltage	9 to 14 V

WIRING DIAGRAM

Refer to DTC P2102 on page DI-283 .

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

1	**Are there any other codes (besides DTC P2119) being output?**

PREPARATION:
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.
CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.
RESULT:

Display (DTC Output)	Proceed to
P2119	A
”P2119” and other DTC	B

HINT:
If any other codes besides P2119 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-35).**

A

2	**Check throttle control motor (See page SF-32).**

NG → **Replace throttle control motor with magnetic clutch (See page SF-37).**

OK ↓

3	**Replace ECM and clear DTC (Check if DTC outputs reoccur).**

PREPARATION:

(a) Replace ECM.
(b) Clear the DTC (See page DI-3).
(c) Start and warm up the engine.
(d) Run the engine at idle for 15 seconds or more.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool (See page DI-3).

OK:

No DTC output.

OK → **System is normal.**

NG ↓

Replace throttle body.

DIALI-02

DTC	P2120	Throttle/Pedal Position Sensor/Switch ”D” Circuit

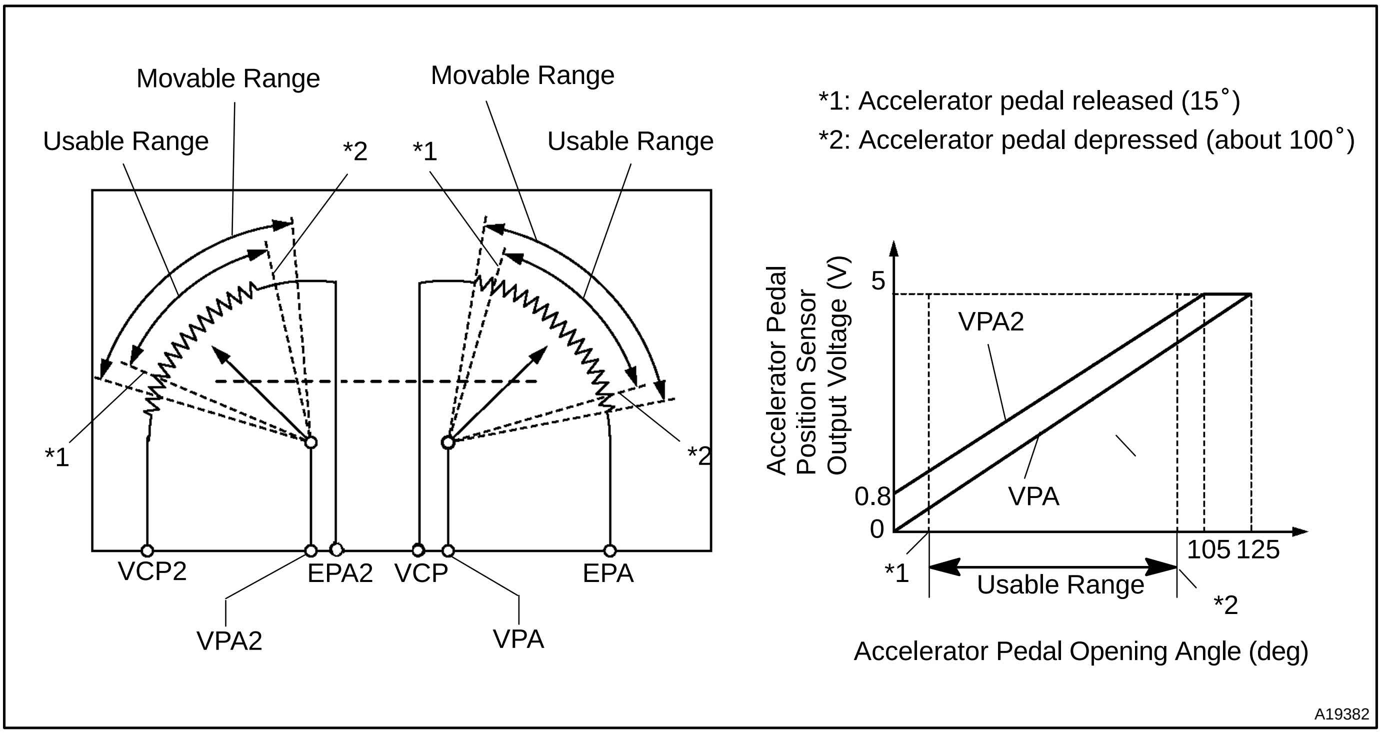
DTC	P2122	Throttle/Pedal Position Sensor/Switch ”D” Circuit Low Input

DTC	P2123	Throttle/Pedal Position Sensor/Switch ”D” Circuit High Input

HINT:
There are the repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket and it has the 2 sensors to detect the accelerator position and a malfunction of the accelerator position sensor.
In the accelerator pedal position sensor, the voltage applied to the pedal terminals VPA and VPA2 of the ECM changes between 0 V to 5 V, in proportion to the opening angle of the accelerator pedal. The VPA is a signal to indicate the actual accelerator pedal opening angle which is used for the engine control, and the VPA2 is a signal to indicate the information about the opening angle which is used for detecting a malfunciton.
The ECM judges the current opening angle of the accelerator pedal from these signals input from terminals VPA and VPA2 and, the ECM controls the throttle motor based on these signals.
If this DTCs is stored, the throttle valve is locked at a certain opening angle. Also, the whole electronically controlled throttle operation is cancelled untill the system returns to normal and the ignition switch is turned OFF.



DTC No.	Detection Item	Trouble Area
P2120	Condition (a) continues for 0.5 sec. or more: (a) VPA1 ± 0.2 V and VPA2 ⊖ 0.97 deg, or VPA1 ⊖ 4.7 V	✓Open or short in accelerator pedal position sensor circuit ✓Accelerator pedal position sensor ✓ECM
P2122	Condition (a) and (b) continues for 0.5 sec. or more: (a) VPA1 ± 0.2 V (b) VPA2 ⊖ 0.97 deg	
P2123	Condition (a) continues for 2.0 sec. or more: (a) VPA1 ⊖ 4.7 V	

HINT:
After confirming DTC P2120, P2122, P2123, P2125, P2127, P2128 and P2138 use the OBD II scan tool or the hand-held tester to confirm the throttle valve opening percentage.

Trouble area	Accelerator pedal position expressed as voltage			
	Accelerator pedal released		Accelerator pedal depressed	
	ACCEL POS #1	ACCEL POS #2	ACCEL POS #1	ACCEL POS #2
VC circuit open	0 V	0 V	0 V	0 V
VPA circuit open or ground short	0 V	0.9 to 2.3 V	0 V	3.4 to 5.0 V
VPA2 circuit open or ground short	0.5 to 1.1 V	0 V	3.0 to 4.6 V	0 V
E2 circuit open	5 V	5 V	5 V	5 V

MONITOR DESCRIPTION

When either voltage output VPA or VPA2, deviates from the standard ranges, or difference between the voltage outputs of the two sensors is less than threshold, the ECM concludes that there is a defect in the accelerator pedal position sensor. The ECM turns on the MIL and a DTC is set.
Example:
When the voltage output of the VPA below 0.2 V or exceeds 4.7 V.

MONITOR STRATEGY

Related DTCs	P2120	Accelerator position sensor 1 (VPA) range check (Fluttering)
	P2122	Accelerator position sensor 1 (VPA) range check (Low voltage)
	P2123	Accelerator position sensor 1 (VPA) range check (High voltage)
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
Throttle control motor power	ON

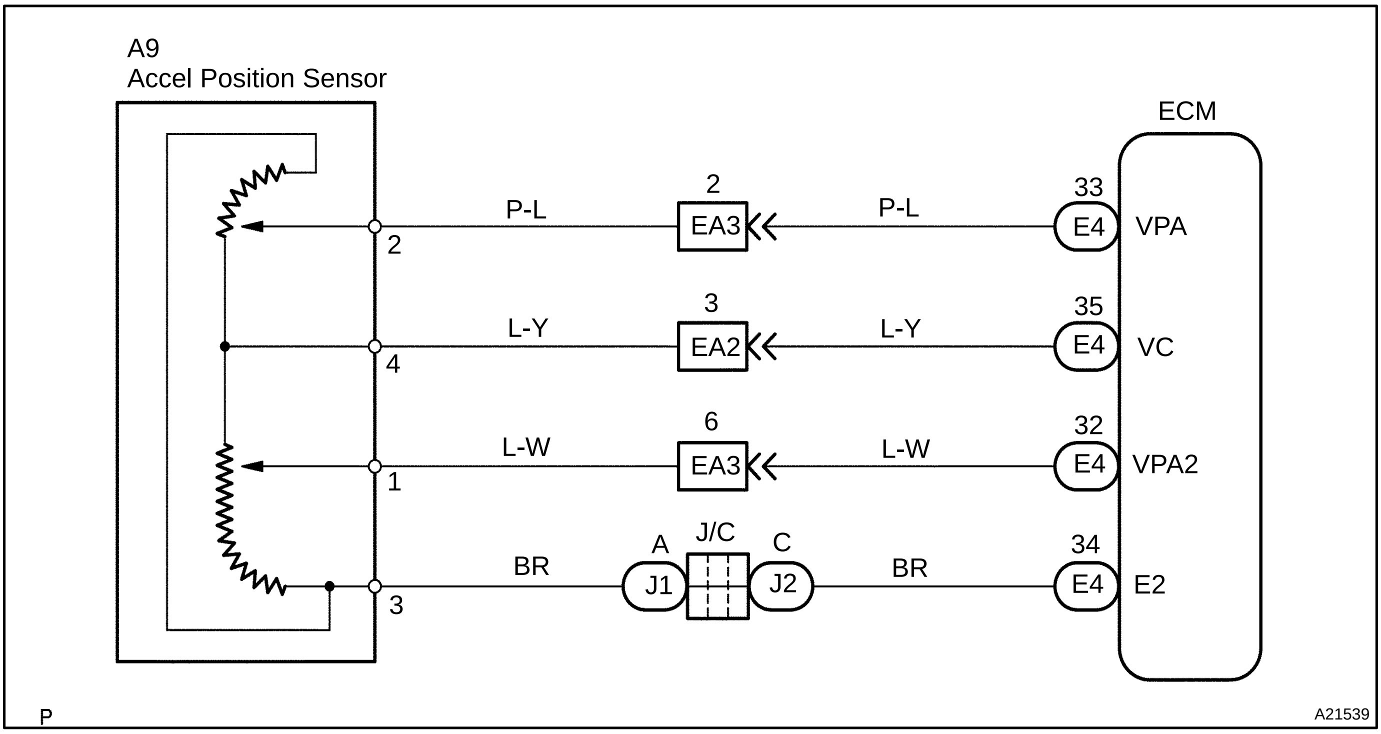
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2120:	
VPA voltage	0.2 V or less or 4.7 V or more fluttering
P2122:	
VPA voltage	0.2 V or less (When VPA2 angle 1 deg or more)
P2123:	
VPA voltage	4.7 V or more

COMPONENT OPERATING RANGE

Parameter	Standard Value
VPA voltage	More than 0.2 V and less than 4.7 V
VPA2 voltage	More than 0.5 V and Less than 4.97 V
Difference between VPA and VPA2 voltages	More than 0.02 V

WIRING DIAGRAM



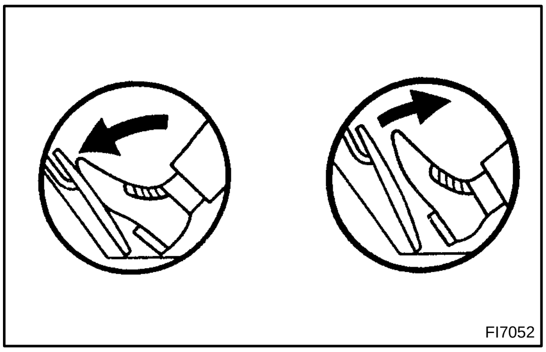
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	Connect hand-held tester, and read voltage for accelerator pedal position sensor data.


FI7052

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
CHECK:
Read the voltage for the accelerator pedal position sensor data.
OK:

Accelerator pedal	VPA	VPA2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK → **Go to step 6.**

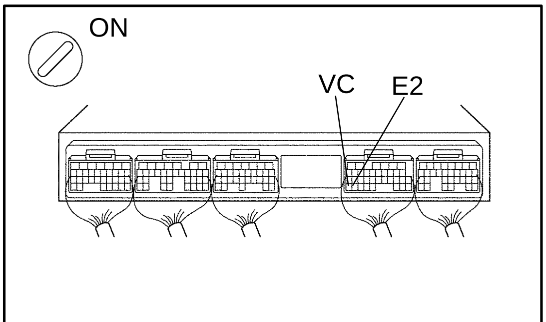
NG

2	Check accelerator pedal position sensor (See page SF-32).

NG → **Replace accelerator pedal position sensor.**

NG

3	Check voltage between terminals VC and E2 of ECM connector.



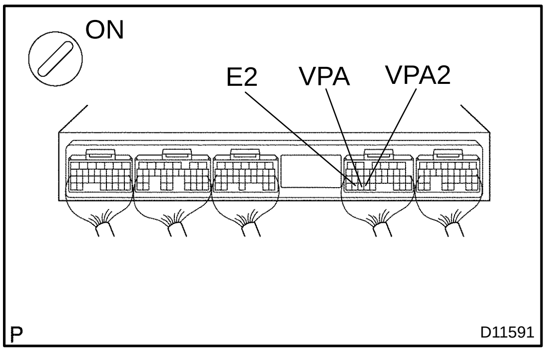
D11591

PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.
OK:
Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK

4	**Check voltage between terminals VPA and E2, and VPA2 and E2 of ECM connector.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VPA and E2, and VPA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VPA - E2	VPA2 - E2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK → **Replace ECM (See page SF-74).**

NG

5	**Check for open and short in harness and connector between accelerator pedal position sensor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

6	Is the DTC P2120, P2122 or P2123 being output again?

PREPARATION:
(a) Clear the DTC (See page DI-3).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.

CHECK:
(a) Read the DTC (See page DI-3).

Result:

Display (DTC Output)	Proceed to
P2120, P2122 and/or P2123 are output again	A
No DTC output	B

B → **System OK**

A

Replace ECM (See page SF-74).

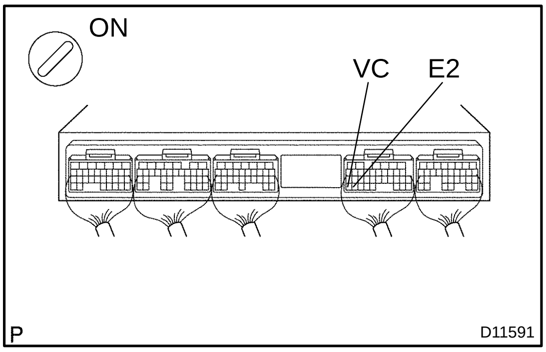
OBD II scan tool (excluding hand-held tester):

1	Check accelerator pedal position sensor (See page SF-32).

NG → **Replace accelerator pedal position sensor (See page SF-37).**

OK

2 Check voltage between terminals VC and E2 of ECM connector.



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

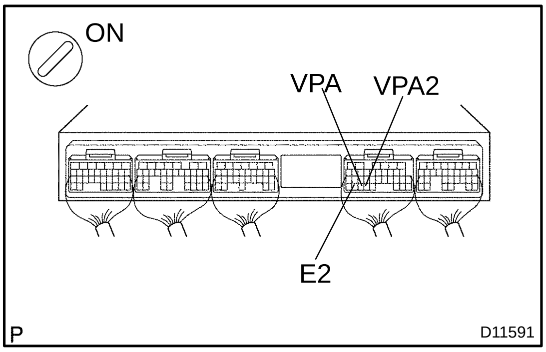
CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.

OK:
Voltage: 4.5 to 5.5 V

NG → **Replace ECM (See page SF-74).**

OK ↓

3 Check voltage between terminals VPA and E2, and VPA2 and E2 of ECM connector.



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals VPA and E2, and VPA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VPA - E2	VPA2 - E2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK → **Replace ECM (See page SF-74).**

NG ↓

4 Check for open and short in harness and connector between accelerator pedal position sensor and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK ↓

5	**Is the DTC P2120, P2122 or P2123 being output again?**

PREPARATION:
(a) Clear the DTC (See page DI-3).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.
CHECK:
(a) Read the DTC (See page DI-3).
Result:

Display (DTC Output)	Proceed to
P2120, P2122 and/or P2123 are output again	A
No DTC output	B

B → **System OK**

A

Replace ECM (See page SF-74).

DIC4P-01

DTC	P2121	Throttle/Pedal Position Sensor/Switch "D" Circuit Range/Performance

CIRCUIT DESCRIPTION

Refer to DTC P2120 on page DI-297 .

DTC No.	DTC Detecting Condition	Trouble Area
P2121	Condition (a) continues for 0.5 seconds: (a) Difference between VPA and VPA2 is out of threshold	Accelerator pedal position sensor

MONITOR DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket and consists of two sensors VPA and VPA2. The VPA is used to detect accelerator pedal position, and the VPA2 is used to monitor the VPA and detect faults in the sensor itself. When difference between voltage outputs, of the VPA or VPA2 deviates from the standard range, the ECM concludes that there is a defect in the accelerator pedal position sensor. The ECM turns on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P2121	Accelerator position sensor (rationality)
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Ignition switch	ON	
Throttle control motor power	ON	
System is not under limp home mode due to accelerator pedal position sensor malfunction		

TYPICAL MALFUNCTION THRESHOLDS

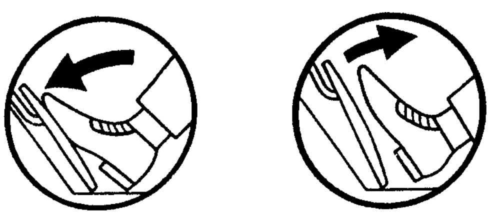
Detection Criteria	Threshold
|VPA - (VPA2 - 0.8)|* *Corrected by learning value	More than 0.4 V

INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand–held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, freeze frame data can help determine if the vehicle was running or stopped, if the engine was warmed up or not, if the air-fuel ratio was lean or rich, and other data from the time the malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and read voltage for accelerator pedal position sensor data.**


FI7052

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

CHECK:
Read the voltage for the accelerator pedal position sensor data.

OK:

Accelerator pedal	VPA	VPA2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK → **Go to step 5.**

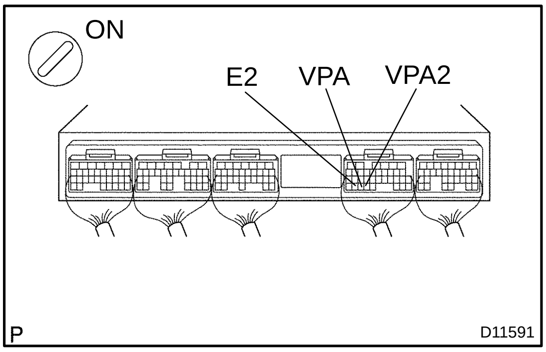
NG

2	**Check accelerator pedal position sensor (See page SF-32).**

NG → **Replace accelerator pedal position sensor.**

OK

3	**Check voltage between terminals VPA and E2, and VPA2 and E2 of ECM connector.**



PREPARATION:

(a) Remove the ECM hood (See page SF-74).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VPA and E2, and VPA2 and E2 of the ECM connector.

OK:

Accelerator pedal	Voltage	
	VPA - E2	VPA2 - E2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK → **Go to step 5.**

NG

4	**Check for open and short in harness and connector between accelerator pedal position sensor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace accelerator pedal position sensor (See page SF-37).

5	**Is the DTC P2121 being output again?**

PREPARATION:
(a) Clear the DTC (See page DI-3).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.
CHECK:
(a) Read the DTC (See page DI-3).
Result:

Display (DTC Output)	Proceed to
P2121 is output again	A
No DTC output	B

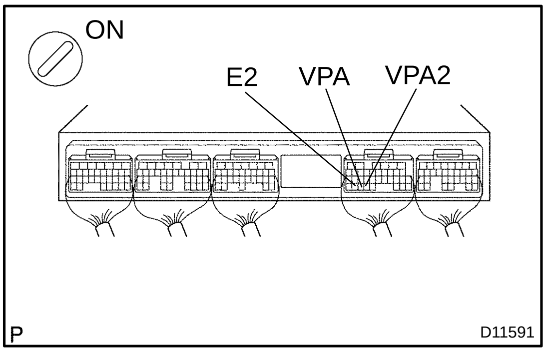
B → **System OK**

A

Replace ECM (See page SF-74).

OBD II scan tool (excluding hand-held tester):

1	**Check voltage between terminals VPA and E2, and VPA2 and E2 of ECM connector.**



PREPARATION:
(a) Remove the ECM hood (See page SF-74).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals VPA and E2, and VPA2 and E2 of the ECM connector.
OK:

Accelerator pedal	Voltage	
	VPA - E2	VPA2 - E2
Released	0.3 to 0.9 V	1.8 to 2.7 V
Depressed	3.2 to 4.8 V	4.7 to 5.1 V

OK → **Go to step 3.**

NG

2	**Check for open and short in harness and connector between accelerator pedal position sensor and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Replace accelerator pedal position sensor (See page SF-37).

3	**Is the DTC P2121 being output again?**

PREPARATION:

(a) Clear the DTC (See page DI-3).
(b) Start the engine.
(c) Run the engine at idle for 15 seconds or more.

CHECK:

(a) Read the DTC (See page DI-3).

Result:

Display (DTC Output)	Proceed to
P2121 is output again	A
No DTC output	B

B → **System OK**

A

Replace ECM (See page SF-74).

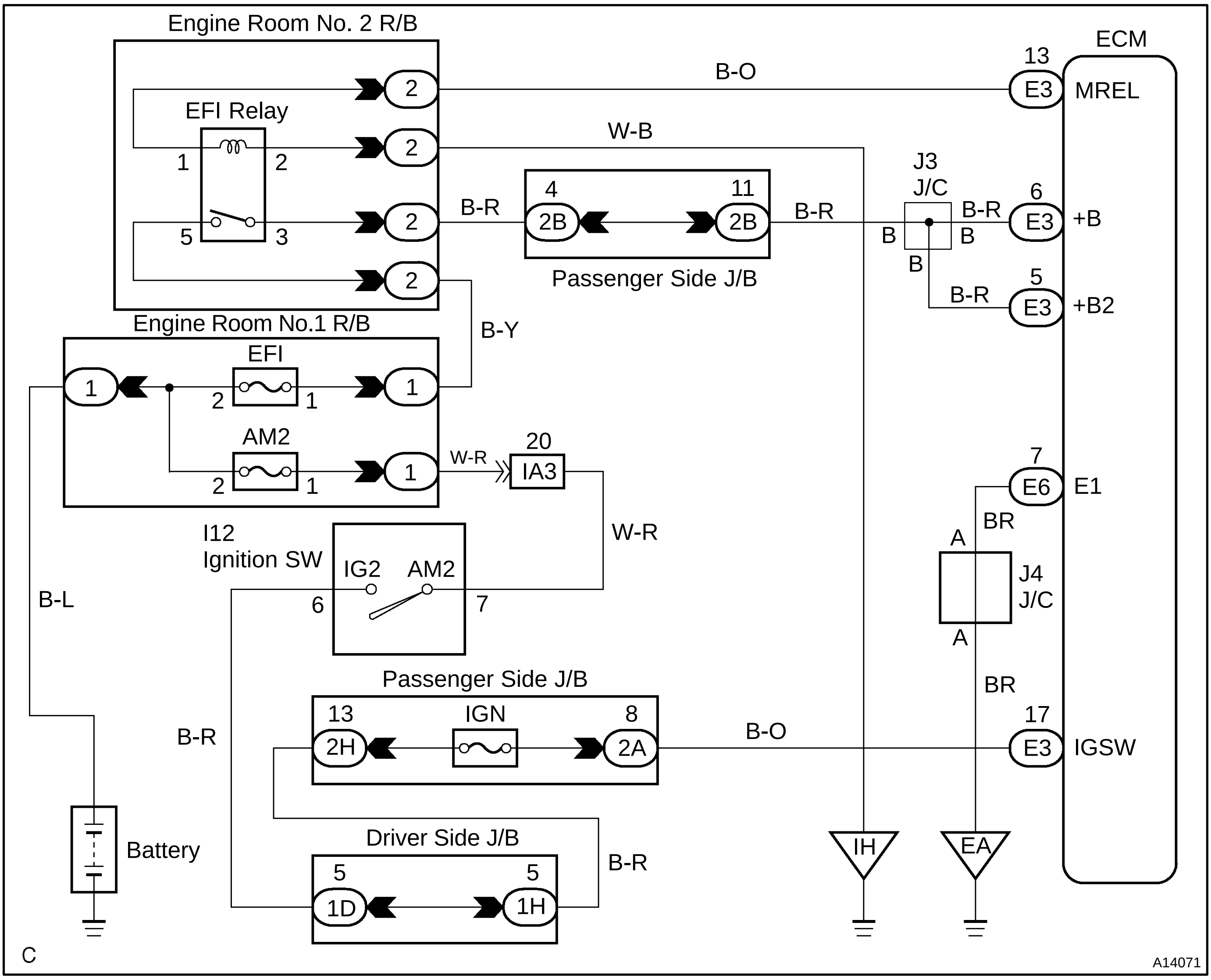
DI2EP-12

ECM Power Source Circuit

CIRCUIT DESCRIPTION

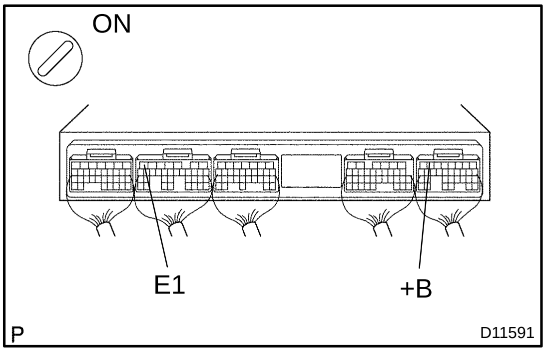
When the ignition switch is turned ON, battery positive voltage is applied to terminal IGSW of the ECM and the EFI main relay (Marking: EFI) control circuit in the ECM sends a signal to terminal MREL of the ECM, switching on the EFI main relay.
This signal causes current to flow to the coil, closing the contacts of the EFI main relay and supplying power to terminals +B and B2 of the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals + B and E1 of ECM connectors.



PREPARATION:
(a) Remove the ECM cover (See page SF-74).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals +B and E1 of the ECM connectors.

OK:
Voltage: 9 to 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI-47).**

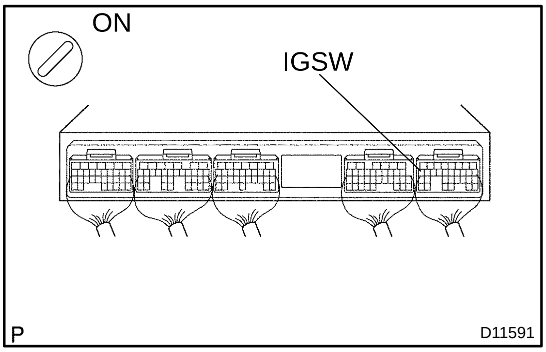
NG

2	Check for open in harness and connector between terminal E1 of ECM connector and body ground (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

3	Check voltage between terminal IGSW of ECM connector and body ground.



PREPARATION:
(a) Remove the ECM cover (See page SF-74).
(b) Turn the ignition switch ON.

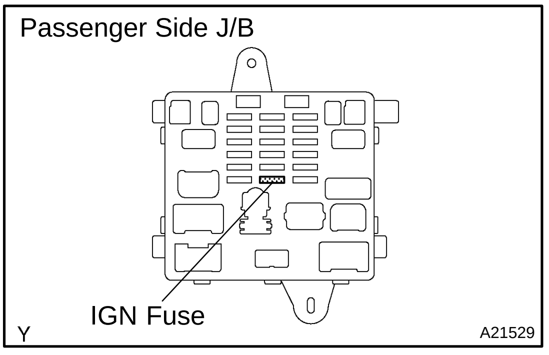
CHECK:
Measure the voltage between terminal IGSW of the ECM connector and the body ground.

OK:
Voltage: 9 to 14 V

OK → **Go to step 6.**

NG

4	**Check IGN fuse.**



PREPARATION:
Remove the IGN fuse from the passenger side J/B.
CHECK:
Check the continuity of the IGN fuse.
OK:
Continuity

NG → **Check for short in all harness and components connected to IGN fuse.**

OK

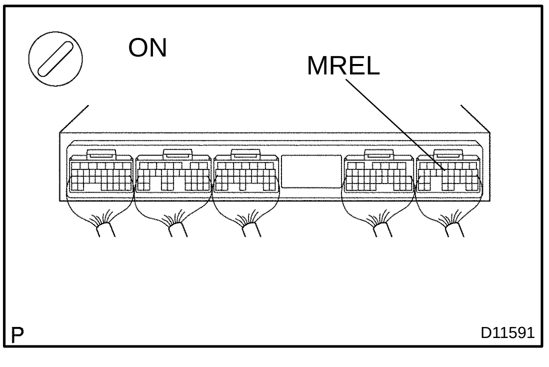
5	**Check ignition switch (See page BE-21).**

NG → **Replace ignition switch.**

OK

Check and repair harness and connector between battery and ignition switch, and ignition switch and ECM.

6	**Check voltage between terminal MREL of ECM connector and body ground.**



PREPARATION:
(a) Remove the ECM cover (See page SF-74).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal MREL of the ECM connector and the body ground.
OK:
Voltage: 9 to 14 V

NG → **Replace ECM (See page SF-74).**

OK

7	Check EFI fuse.

NG → Check for short in all harness and components connected to EFI fuse.

OK

8	Check EFI main relay (Marking: EFI) (See page SF-50).

NG → Replace EFI main relay.

OK

9	Check for open and short in harness and connector between terminal MREL of ECM and body ground (See page IN-33).

NG → Repair and replace harness or connector.

OK

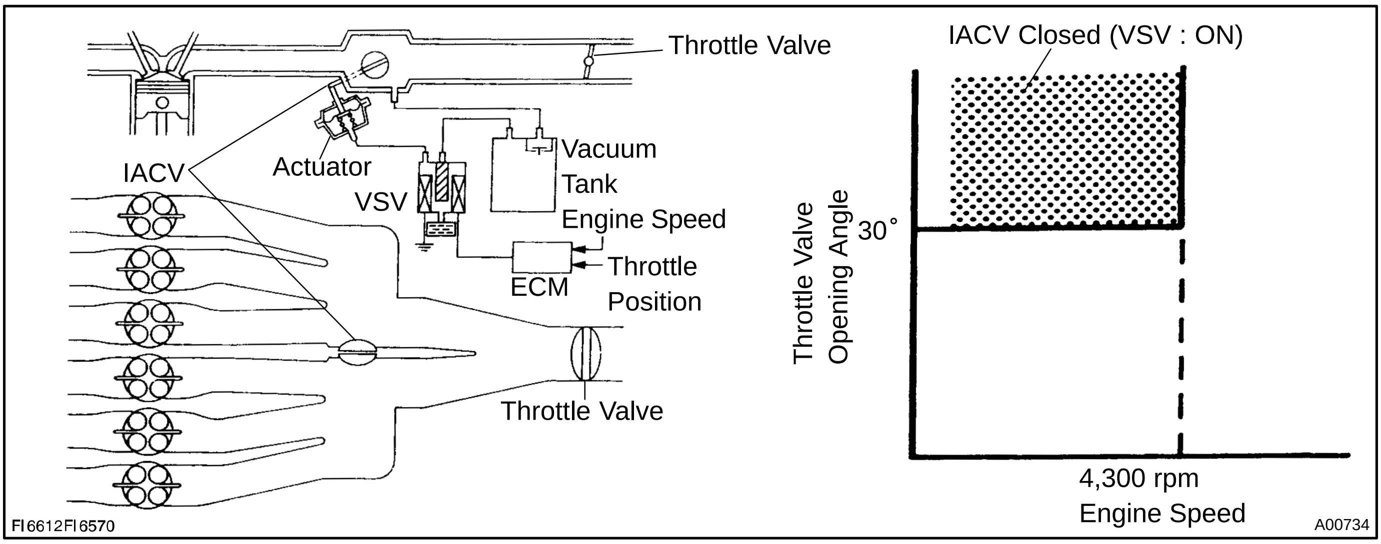
Check and repair harness or connector between EFI fuse and battery.

DI2ER-13

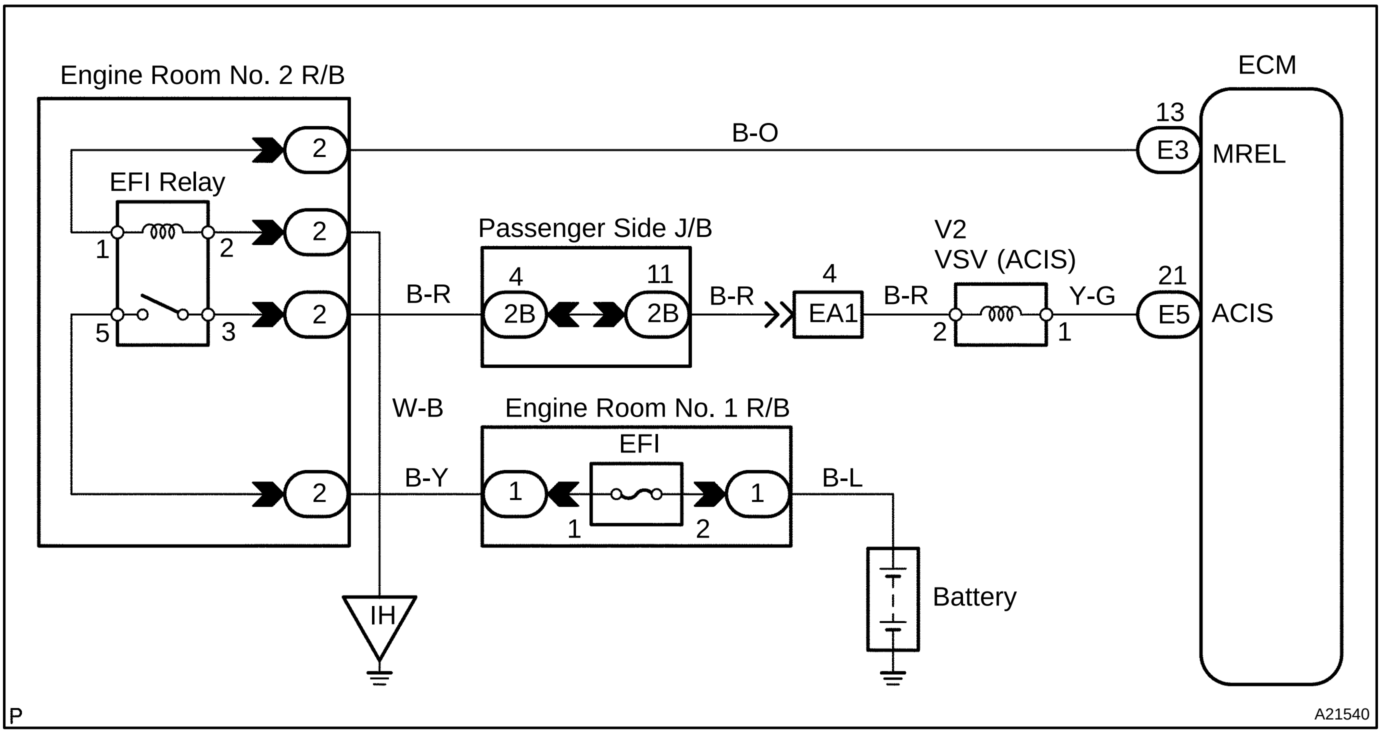
IACV Control Circuit

CIRCUIT DESCRIPTION

This circuit opens and closes the Intake Air Control Valve (IACV) in response to the engine load in order to increase the intake efficiency.
When the engine speed is 4,300 rpm or less and the throttle valve opening angle is 30° or more, the ECM turns the VSV ON and closes the IACV. At all other times, the VSV is OFF, so the IACV is open.
HINT:
IACV stands for "Acoustic Control Induction System".



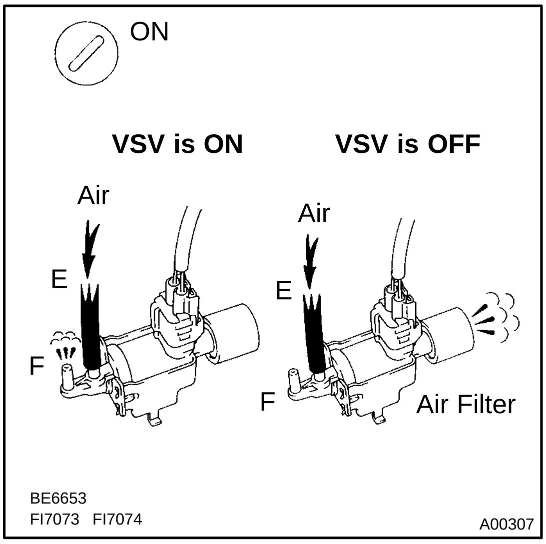
WIRING DIAGRAM



INSPECTION PROCEDURE

Hand-held tester:

1	Connect hand-held tester, and check operation of VSV for ACIS.



PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check the operation of the the VSV when the VSV is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air from port E flows out through air filter.

OK → Check for vacuum tank (See page SF-48).

NG ↓

2	Check VSV for ACIS (See page SF-58).

NG → Replace VSV for ACIS.

OK ↓

3	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and ECM (See page IN-33).

NG → Repair or replace harness or connector.

OK ↓

4	**Check vacuum hose.**

CHECK:

(a) Check that the vacuum hoses are connected correctly.
(b) Check that the vacuum hoses are not loose or disconnected.
(c) Check the vacuum hoses for cracks, holes or damage.

NG → **Repair or replace vacuum hose.**

OK

5	**Check intake air control valve (See page SF-44).**

NG → **Replace intake air control system.**

OK

Replace ECM (See page SF-74).

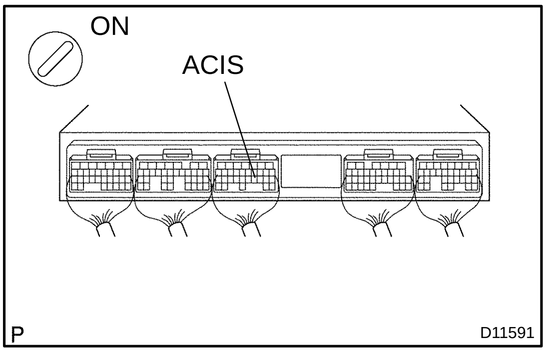
OBD II scan tool (excluding hand-held tester):

1	**Check VSV for ACIS (See page SF-58).**

NG → **Replace VSV for ACIS.**

OK

2	**Check voltage between terminal ACIS of ECM connector and body ground.**



PREPARATION:
(a) Remove the engine room ECM cover.
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminal ACIS of the ECM connector and body ground.

OK:
Voltage: 9 to 14 V

NG → **Go to step 4.**

OK

3	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and ECM (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

4	**Check vacuum hose.**

CHECK:
(a) Check that the vacuum hoses are connected correctly.
(b) Check that the vacuum hoses are not loose or disconnected.
(c) Check the vacuum hoses for cracks, holes or damage.

NG → **Repair or replace vacuum hose.**

OK

5	**Check intake air control valve (See page SF-44).**

NG → **Replace intake air control system.**

OK

Replace ECM (See page SF-74).

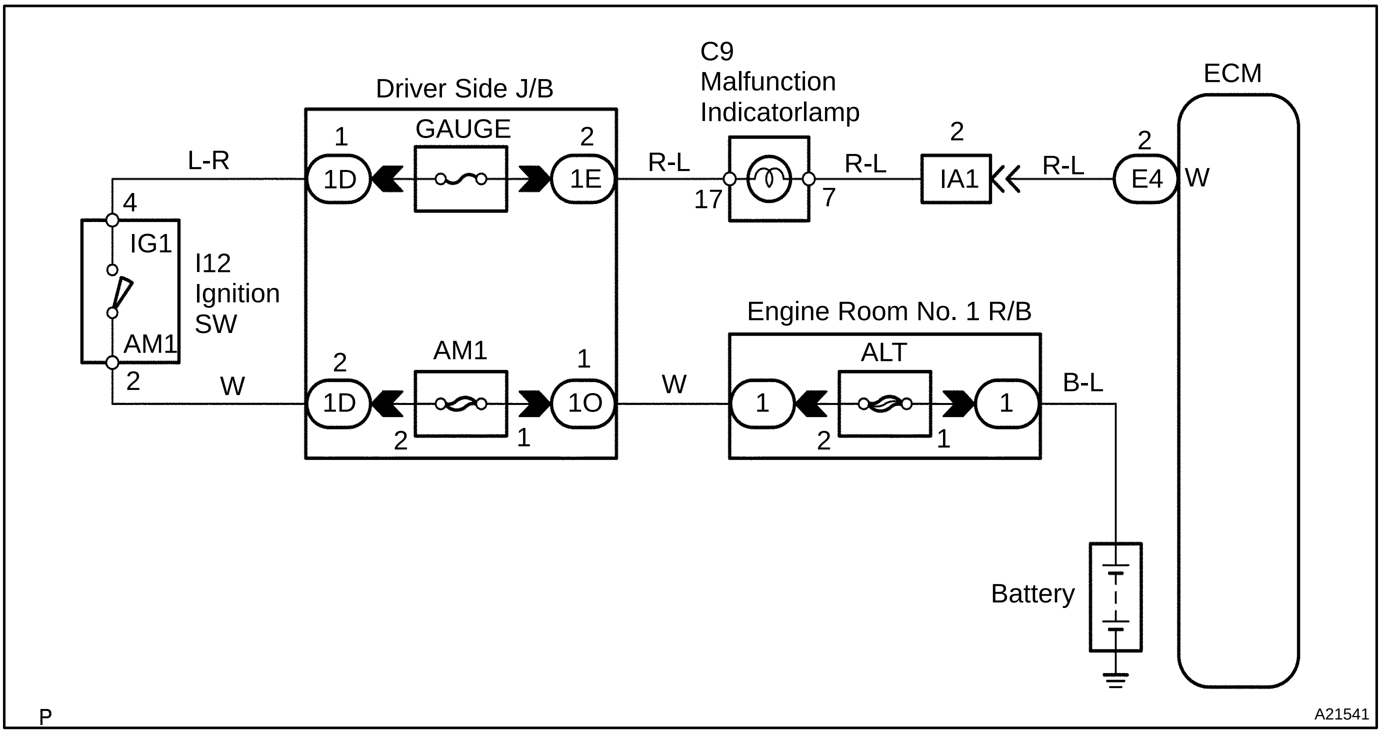
DI6MN-25

MIL Circuit Malfunction

CIRCUIT DESCRIPTION

If the ECM detects a trouble, the MIL lights up. At this time, the ECM records a DTC in the memory.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Troubleshoot in accordance with the chart below for each trouble symptom.

MIL does not light up	Start inspection from step 1 with hand-held tester and start from step 2 without hand-held tester
MIL remains on	After inspection of step 3, start inspection from step 4 with hand-held tester and start from step 5 without hand-held tester

1	**Inspect diagnosis (normal mode, check mode) (See page DI-3).**

OK → **Check and replace ECM (See page SF-74).**

NG ↓

2	**Check MIL.**

See the combination meter troubleshooting on page BE-2 .

NG → **Repair or replace bulb or combination meter assembly.**

OK ↓

3	**Check that ECM connectors are securely connected to ECM.**

NO → **Connect connector to ECM.**

YES ↓

Check for open circuit in harness and connector between combination meter and ECM (See page IN-33).

4	**Check operation of MIL (See step 1).**

OK → **Check and replace ECM (See page SF-74).**

NG ↓

5	Is any DTC output?

Check DTC on page DI-35 .

YES → **Repair circuit indicated by output code.**

NO

6	Check IG1 relay (Marking: IG1) (See page BE-20).

NG → **Replace IG1 relay.**

OK

Check for short circuit in harness and connector between DLC3 and ECM (See page IN-33).

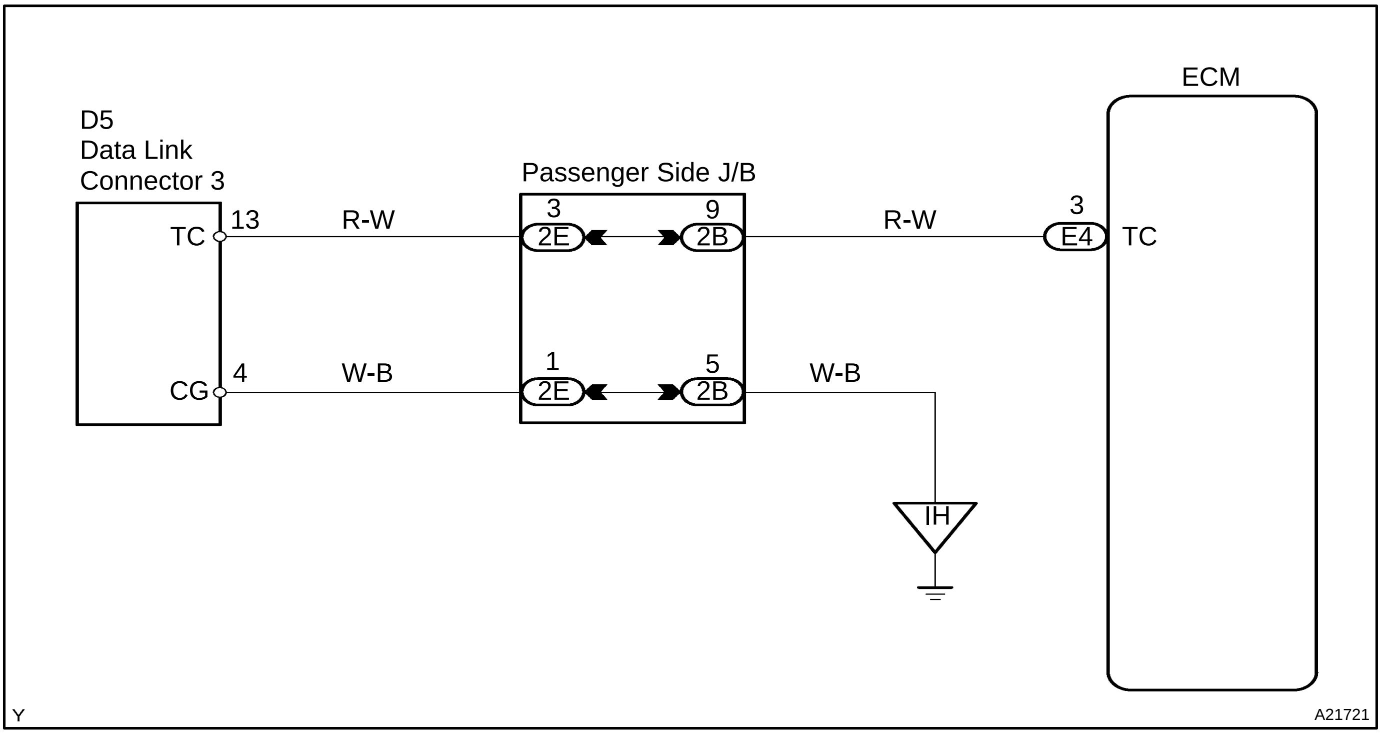
DI7DL-18

TC Terminal Circuit

CIRCUIT DESCRIPTION

Terminal TC and CG are located in the DLC3. When connecting these terminals, DTCs in the normal mode or the test mode can be read through the MIL flashing in the combination meter.

WIRING DIAGRAM

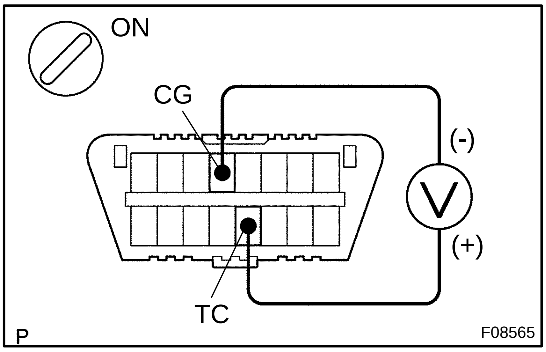


INSPECTION PROCEDURE

HINT:

- Even though terminal TC is not connected with terminal CG, the MIL blinks.
- For the above phenomenon,an open or short in the wire harness, or a malfunction inside the ECM is a likely cause.

1	Check voltage between terminals TC and CG of DLC3.



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals TC and CG of the DLC3.
OK:
Voltage: 9 - 14 V

OK → **Check and replace ECM (See page SF-74).**

NG

2	Check continuity between terminal CG of DLC3 and body ground.

NG → **Repair or replace harness or connector.**

OK

3	Check for open and short circuit in harness and connector between ECM and DLC3, and DLC3 and body ground (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

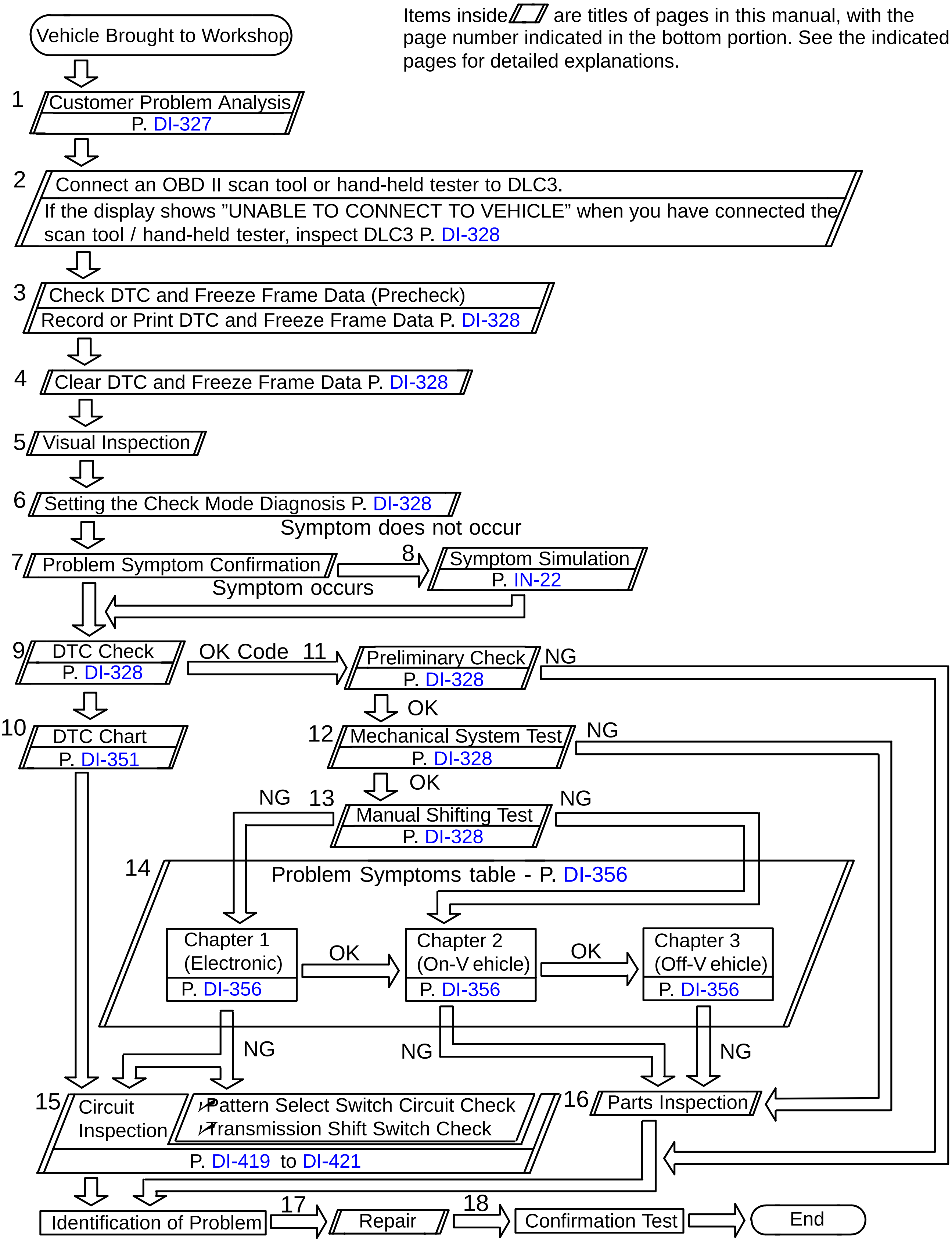
Check and replace ECM (See page SF-74).

AUTOMATIC TRANSMISSION

DI25G-05

HOW TO PROCEED WITH TROUBLESHOOTING

Items inside ▱ are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



DIBZW-02

PRECAUTION

NOTICE:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assy, engine assy or the ECM (See page DI-328).

HINT:

Initialization can not be completed by only disconnecting the battery terminal.

DI25H-04

CUSTOMER PROBLEM ANALYSIS CHECK

Automatic Transmission System Check Sheet

Inspector's Name :

Customer's Name		VIN	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

Date Problem Occurred	/ /
How Often Does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move (☐ Any position ☐ particular position)
	☐ No up-shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → 4th ☐ 4th → 5th)
	☐ No down-shift (☐ 5th → 4th ☐ 4th → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)
	☐ Lock-up malfunction
	☐ Shift point too high or too low
	☐ Harsh engagement (☐ N → D ☐ Lock-up ☐ Any drive position)
	☐ Slip or shudder
	☐ No kick-down
	☐ Others ( )

Check Item	Check Engine Warning Light	☐ Normal ☐ Remains ON

DTC Check	1st Time	☐ Normal code ☐ Malfunction code (DTC)
	2nd Time	☐ Normal code ☐ Malfunction code (DTC)

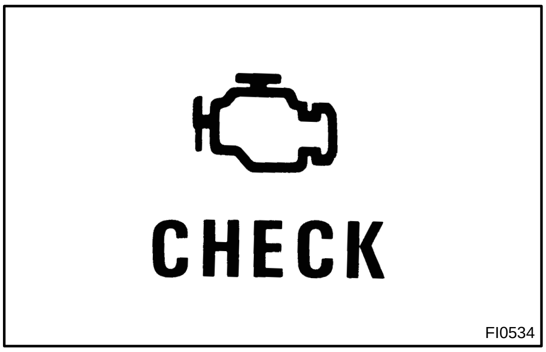
DIC66-01

PRE-CHECK

1. DIAGNOSIS SYSTEM

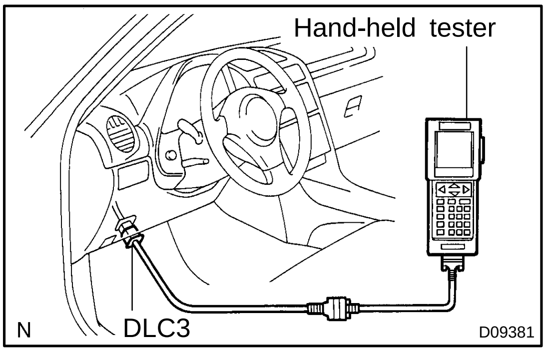
(a) Description

- When troubleshooting vehicles with OBD II, the only difference from the usual troubleshooting procedure is that you connect an OBD II scan tool complying with SAE J1987 or hand-held tester to the vehicle, and read off various data output from the vehicle's ECM.



FI0534

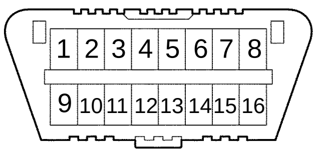
- OBD II regulations require that the vehicle's on-board computer lights up the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the computer itself or in drive system components which affect vehicle emissions. In addition to the MIL lighting up when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page DI-47).
  If the malfunction does not occur in 3 consecutive trips, the MIL goes off but the DTCs remain recorded in the ECM memory.



D09381

- To check the DTCs, connect an OBD II scan tool or hand-held tester to DLC3 on the vehicle. The OBD II scan tool or hand-held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For operating instructions, see the instruction book).
- DTCs include SAE controlled codes and Manufacturer controlled codes.
  SAE controlled codes must be set as the codes prescribed by the SAE, while Manufacturer controlled codes can be set freely by the manufacturer within the prescribed limits (See DTC chart on page DI-351).

- The diagnosis system operates in normal mode during normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2-trip detection logic (*) to prevent erroneous detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up for a malfunction that is only detected once or momentarily.
  (Hand-held tester) (See page DI-328)
- *2-trip detection logic:
  When a logic malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the 2nd test drive, this 2nd detection causes the MIL to light up. The 2-trip repeats the same mode 2nd time (However, the IG switch must be turned OFF between the 1st trip and 2nd trip.).



DLC3

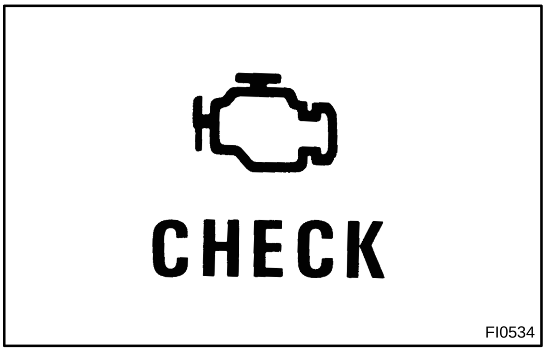
A04550

(b) Inspect the DLC3.
The vehicle's ECM uses the ISO 9141-2 communication protocol. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Terminal No.	Connection / Voltage or Resistance	Condition
7	Bus ± Line / Pulse generation	During communication
4	Chassis Ground ↔ Body / 1 Ω or less	Always
5	Signal Ground ↔ Body / 1 Ω or less	Always
16	Battery Positive ↔ Body / 9 to 14 V	Always

HINT:
If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of OBD II scan tool or hand-held tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

- If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



2. INSPECT DIAGNOSIS (NORMAL MODE)

(a) Check the MIL.

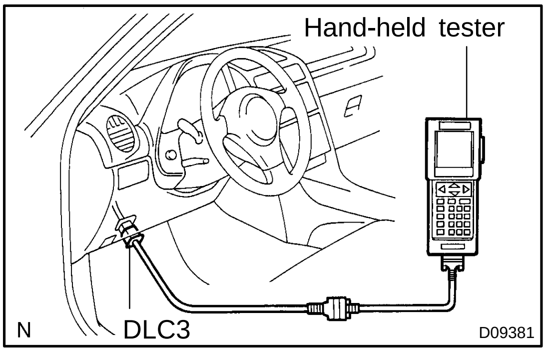
(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

HINT:
If the MIL does not light up, troubleshoot the combination meter (See page BE-2).

(2) When the engine is started, the MIL should go off. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

(b) Check the DTC.

NOTICE:
Hand-held tester only: When the diagnostic system is switched from normal mode to check mode, it erases all DTCs and freeze frame data recorded in normal mode. So before switching modes, always check the DTCs and freeze frame data, and note them down.



(1) Prepare an OBD II scan tool (complying with SAE J1978) or hand-held tester.

(2) Connect the OBD II scan tool or hand-held tester to DLC3 at the lower of the instrument panel.

(3) Turn the ignition switch ON and turn the OBD II scan tool or hand-held tester switch ON.

(4) Use the OBD II scan tool or hand-held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book).

(5) See page DI-351 to confirm the details of the DTCs.

NOTICE:
When simulating symptoms with an OBD II scan tool (excluding hand-held tester) to check the DTCs, use normal mode. For codes on the DTCs chart subject to "2-trip detection logic", turn the ignition switch off after the symptoms have been simulated the 1st time. Then repeat the simulation process again. When the problem has been simulated twice, the MIL comes on on the instrument panel and the DTCs are recorded in the ECM.

(c) When using the OBD II scan tool or hand-held tester: Clearing the DTCs.
  (1) Connect the OBD II scan tool or hand-held tester to the DLC3.
  (2) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch on.
  (3) When you use hand-held tester: Select the item "DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CLEAR CODES [YES] button".

HINT:
When operating the OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool's instruction book for operating instructions.)

(d) When not using the OBD II scan tool or hand-held tester: Clearing the DTCs.
Disconnect the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more. But if you disconnect the battery terminal, you should do the "INITIALIZE" procedure.

3. INSPECT DIAGNOSIS (CHECK MODE)

HINT:

Hand-held tester only: Compared to the normal mode, the check mode has high sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in Normal mode can also be detected in Check mode.

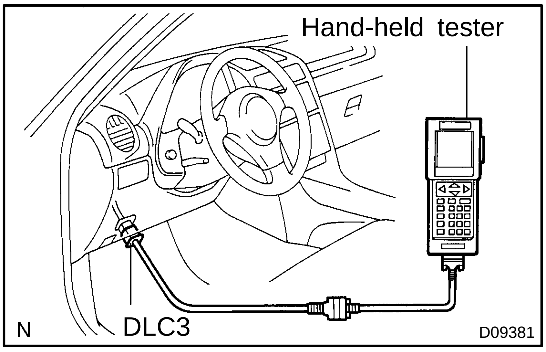
(a) Check the DTC.

(1) Check the initial conditions.

- Battery voltage 11 V or more
- Throttle valve fully closed
- Transmission in P position
- Air conditioning switched off

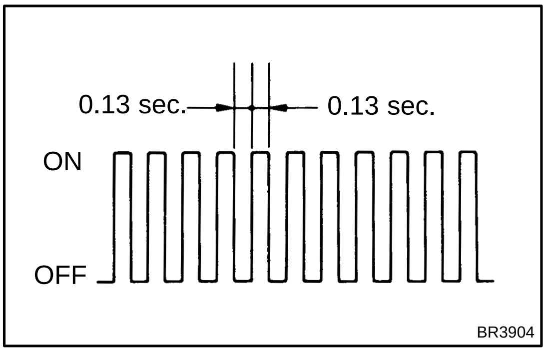
(2) Turn the ignition switch off.

(3) Prepare a hand-held tester.



(4) Connect the hand-held tester to DLC3 at the lower side of the instrument panel.

(5) Turn the ignition switch ON and switch the hand-held tester ON.



(6) Switch the hand-held tester from Normal mode to Check mode (Check that the MIL flashes).

(7) Start the engine (MIL goes out after the engine starts).

(8) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch ON until you have checked the DTCs, etc.

(9) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTCs and freeze frame data, etc.

HINT:

Be sure not to turn the ignition switch off as turning it off switches the diagnosis system from Check mode to Normal mode, which erases all DTCs, etc.

(10) After checking the DTC, inspect the applicable circuit.

(b) When using the OBD II scan tool or hand-held tester: Clearing the DTCs.
  (1) Connect the OBD II scan tool or hand-held tester to the DLC3.
  (2) Turn the ignition switch to the ON position and push the OBD II scan tool or the hand-held tester main switch on.
  (3) When you use hand-held tester:
  Select the item ”DIAGNOSIS/ENHANCED OBD II/ DTC INFO/CLEAR CODES [YES] button”.

HINT:
When operating the OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool's instruction book for operating instructions.)

(c) When not using the OBD II scan tool or hand-held tester: Clearing the DTCs.
Disconnect the battery terminal or remove the EFI and ETCS fuses from the engine room J/B for 60 seconds or more. But if you disconnect the battery terminal, you should do the ”INITIALIZE” procedure.

4. DATA LIST

HINT:
According to the DATA LIST displayed by the OBD II scan tool or hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as the first step of troubleshooting is one of the methods to shorten the labor time.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand-held tester.
(f) Select the item ”DIAGNOSIS/ENHANCED OBD II/DATA LIST”.
(g) According to the display on tester, read the ”DATA LIST”.

Item	Measurement Item/ Range (display)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light SW Status/ ON or OFF	• Brake Pedal is depressed: ON • Brake Pedal is released: OFF	-
SHIFT	Actual Gear Position/ 1st, 2nd, 3rd, 4th, 5th	Shift Lever Position is; • L: 1st • 2: 1st or 2nd • 3: 1st, 2nd or 3rd • 4: 1st, 2nd, 3rd or 4th • D: 1st, 2nd, 3rd, 4th or 5th	-
LOCK UP SOL	Lock Up Solenoid Status/ ON or OFF	• Lock Up: ON • Except Lock Up: OFF	-
PATTERN SW (M)	Pattern Switch Status/ ON or OFF	Pattern Select Switch is; POWER: ON Except POWER: OFF	-
SNOW SW	Snow Switch Status/ ON or OFF	Pattern Select Switch is; SNOW: ON Except SNOW: OFF	-

PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P or N: ON Except P or N: OFF	When the shift lever position displayed on the hand-held tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page DI-361 .
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	
DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D: ON Except D: OFF	
3RD	PNP SW Status/ ON or OFF	Shift lever position is; 2: ON Except 2: OFF	
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2: ON Except 2: OFF	
LOW	PNP SW Status/ ON or OFF	Shift lever position is; L: ON Except L: OFF	
SOLENOID (SLT)	Shift Solenoid SLT Status/ ON or OFF	• Accelerator pedal is depressed: OFF • Accelerator pedal is released: ON	-
SOLENOID (SLU)	Shift Solenoid SLU Status/ ON or OFF	• Lock Up: ON • Except Lock Up: OFF	-
SOLENOID (SLN)	Shift Solenoid SLN Status/ ON or OFF	Gear is changed: OFF → ON → OFF	-
AT FLUID TEMP	ATF Temp. Sensor Value/ min.: -40 ℃ (-40 ℉) max.: 225 ℃ (437 ℉)	Approx. 80 ℃ (176 ℉) (After Stall Test)	If the value is "-40 ℃ (-40 ℉)" or "225 ℃ (437 ℉)", ATF temp. sensor circuit is opened or shorted.

5. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as the first step of troubleshooting is one of the methods to shorten the labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the the hand-held tester.
(f) Select the item "DIAGNOSIS/ENHANCED OBD II/ACTIVE TEST".
(g) According to the display on tester, perform the "ACTIVE TEST".

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] • Press → button: Shift up • Press ← button: Shift down	Possible to check the operation of the shift solenoid valves.

LOCK UP	[Test Details] Control the shift solenoid DSL to set the ATM to the lock-up condition. [Vehicle Condition] Vehicle Speed: 58 km/h (36 mph) or more	Possible to check the DSL operation.
LINE PRESS UP	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] ✓Vehicle Stopped. ✓IDL: ON [Others] ON: Line pressure up. OFF: No action (normal operation)	-

6. DEFINITION OF TERMS

Term	Definition
Monitor description	Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details).
Related DTCs	Diagnostic code
Typical enabling condition	Preconditions that allow the ECM to detect malfunctions. With all preconditions satisfied, the ECM sets the DTC when the monitored value(s) exceeds the malfunction threshold(s).
Sequence of operation	The priority order that is applied to monitoring, if multiple sensors and components are used to detect the malfunction. When a sensor is being monitored, the next sensor or component will not be monitored until the sensor monitoring is finished.
Required sensor/components	The sensors and components that are used by the ECM to detect malfunctions.
Frequency of operation	The number of times that the ECM checks for malfunctions per driving cycle. "Once per driving cycle" means that the ECM detects the malfunction only one time during a single driving cycle. "Continuous" means that the ECM detects malfunction every time an enabling condition is met.
Duration	The minimum time that the ECM must sense a continuous deviation in the monitored value(s) before setting a DTC. This timing begins after the "typical enabling conditions" are met.
Malfunction thresholds	Beyond this value, the ECM will conclude that there is a malfunction and set a DTC.
MIL operation	MIL illumination timing after a defect is detected. "Immediately" means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. "2 driving cycle" means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.

7. TOYOTA/LEXUS PART AND SYSTEM NAME LIST

This reference list indicates the part names used in this manual along with their definitions.

TOYOTA/LEXUS name	Definition
Toyota HCAC system, Hydro-carbon Adsorptive Catalyst (HCAC) system, HC adsorptive three-way catalyst	HC adsorptive three-way catalytic converter
Variable Valve Timing sensor, VVT sensor	Camshaft position sensor
Variable valve timing system, VVT system	Camshaft timing control system
Camshaft timing oil control valve, Oil control valve, OCV, VVT, VSV	Camshaft timing oil control valve
Variable timing and lift, VVTL	Camshaft timing and lift control
Crankshaft position sensor "A"	Crankshaft position sensor
Engine speed sensor	Crankshaft position sensor
THA	Intake air temperature
Knock control module	Engine knock control module
Knock sensor	Engine knock sensor
Mass or volume air flow circuit	Mass air flow sensor circuit

Vacuum sensor	Manifold air pressure sensor
Internal control module, Control module, Engine control ECU, PCM	Power train control module
FC idle	Deceleration fuel cut
Idle air control valve	Idle speed control
VSV for CCV, Canister close valve VSV for canister control	Evaporative emissions canister vent valve
VSV for EVAP, Vacuum switching valve assembly No. 1, EVAP VSV, Purge VSV	Evaporative emissions canister purge valve
VSV for pressure switching valve, Bypass VSV	Evaporative emission pressure switching valve
Vapor pressure sensor, EVAP pressure sensor, Evaporative emission control system pressure sensor	Fuel tank pressure sensor
Charcoal canister	Evaporative emissions canister
ORVR system	On-board refueling vapor recovery system
Intake manifold runner control	Intake manifold tuning system
Intake manifold runner valve, IMRV, IACV (runner valve)	Intake manifold tuning valve
Intake control VSV	Intake manifold tuning solenoid valve
AFS	Air fuel ratio sensor
O2 sensor	Heater oxygen sensor
Oxygen sensor pumping current circuit	Oxygen sensor output signal
Oxygen sensor reference ground circuit	Oxygen sensor signal ground
Accel position sensor	Accelerator pedal position sensor
Throttle actuator control motor, Actuator control motor, Electronic throttle motor, Throttle control motor	Electronic throttle actuator
Electronic throttle control system, Throttle actuator control system	Electronic throttle control system
Throttle/pedal position sensor, Throttle/pedal position switch, Throttle position sensor/switch	Throttle position sensor
Turbo press sensor	Turbocharger pressure sensor
Turbo VSV	Turbocharger pressure control solenoid valve
P/S pressure switch	Power-steering pressure switch
VSV for ACM	Active control engine mount
Speed sensor, Vehicle speed sensor ”A”, Speed sensor for skid control ECU	Vehicle speed sensor
ATF temperature sensor, Trans. fluid temp. sensor, ATF temperature sensor ”A”	Transmission fluid temperature sensor
Electronic controlled automatic transmission, ECT	Electronically controlled automatic
Intermediate shaft speed sensor ”A”	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor
Input speed sensor, Input turbine speed sensor ”A”, Speed sensor (NT), Turbine speed sensor	Input turbine speed sensor
PNP switch, NSW	Park/neutral position switch
Pressure control solenoid	Transmission pressure control solenoid
Shift solenoid	Transmission shift solenoid valve
Transmission control switch, Shift lock control unit	Shift lock control module
Engine immobiliser system, Immobiliser system	Vehicle anti-theft system

8. The monitor will run whenever the following DTCs are not present (Monitor disablement List)

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the "X" mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor detected malfunction: Fault code	Fault code	Component/ system	P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
	Fault code		P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
		Component/ system	VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0010,P0020	P0010,P0020	VVT VSV1,2																				X					X	
P0011	P0011	VVT System1 - Advance				X		X														X					X	
P0012	P0012	VVT System1 - Retard				X		X														X					X	
P0016,P0018	P0016,P0018	VVT System - Misalignment																										
P0021	P0021	VVT System2 - Advance			X	X																X					X	
P0022	P0022	VVT System2 - Retard			X																	X					X	
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																				X	X	X	X	X	X	
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																				X			X	X	X	
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																							X	X		
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																								X		
P0100,P0101	P0100-P0103	MAF sensor		X	X		X	X											X		X	X	X	X	X	X	X	X
P0105,P0106	P0105-P0108	MAP sensor		X	X		X	X											X		X	X	X	X	X	X	X	X
P0110	P0110-P0113	IAT sensor																			X	X	X	X	X	X		X
P0115,P0116	P0115-P0118	ECT sensor		X	X	X	X	X						X		X					X	X	X	X	X	X	X	X
P0120,P0121	P0120-P0223,P2135	TP sensor												X		X							X	X	X	X	X	X
P0125	P0125	Insufficient ECT for Closed Loop		X	X		X	X						X		X						X	X	X	X	X	X	X
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																				X		X	X	X		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1								X												X	X		X	X	X	
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																										
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																										
P0171,P0172	P0171,P0172	Fuel system																				X	X	X	X	X		
P0300-P0308	P0300-P0308	Misfire							X													X	X	X	X	X		
P0325,P0330	P0325-P0333	Knock sensor																										X
P0335	P0335	CKP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X
P0340, P0341	P0340, P0341	CMP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X
P0340-P0346	P0340-P0346	VVT sensor1,2																				X						
P0351-P0358	P0351-P0358	Ignitor		X	X		X	X														X						
P0385	P0385	CKP sensor 2												X		X						X	X	X	X	X	X	X
P0401	P0401	EGR system (closed)																				X					X	
P0402	P0402	EGR system (open)																				X	X	X	X	X	X	
P0405,P0409	P0405-P0409	Lift sensor																									X	
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system																					X	X	X	X		
P0450,P0451	P0450-P0453	EVAP press sensor																										

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Monitor detected malfunction			Monitor disablement (X - disabled)																									
Fault code			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
	Fault code		P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
		Component/ system	VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire
P0500	P0500	VSS																				×	×	×	×	×	×	×
P0511	P0511	IAC valve																					×					
P0510	P0510	Idle switch												×		×						×	×		×	×	×	×
P0560	P0560	System Voltage																										
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0799	Trans solenoid (range)																										
P0850	P0850	PNP switch																										×
P1010,P1020	P1010,P1020	VVTL																				×					×	
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				×					×	
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor																										
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				×			×	×		
P2226	P2226	BARO sensor																					×		×	×		
P2237,P2240	P2237,P2240	A/F sensor (open)																				×			×	×		
P2423,24	P2423,24	HC Adsorption Catalyst																										
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
P2431	P2431	AIR Pressure Sensor(Rationality)																										
P2440	P2440	AIR control valve stuck open																					×	×	×	×	×	
P2441	P2441	AIR control valve stuck close																					×	×	×	×	×	
P2444	P2444	AIP stuck On																					×	×	×	×	×	
P2445	P2445	AIP stuck Off																					×	×	×	×	×	
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																				×			×	×		

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A21571

Monitor detected malfunction

			Monitor disablement (X - disabled)																									
Fault code			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
	Fault code		P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
		Component/ system	Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
P0010,P0020	P0010,P0020	VVT VSV1,2																										X
P0011	P0011	VVT System1 - Advance							X	X			X	X					X									
P0012	P0012	VVT System1 - Retard							X	X			X	X					X									
P0016,P0018	P0016,P0018	VVT System - Misalignment																										
P0021	P0021	VVT System2 - Advance							X	X			X	X					X									
P0022	P0022	VVT System2 - Retard							X	X			X	X					X									
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1							X	X			X						X									X
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1							X	X			X						X									
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2											X															
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																										
P0100,P0101	P0100-P0103	MAF sensor							X	X			X	X				X	X									X
P0105,P0106	P0105-P0108	MAP sensor							X	X			X	X				X	X									X
P0110	P0110-P0113	IAT sensor							X	X				X														X
P0115,P0116	P0115-P0118	ECT sensor							X	X		X	X	X				X	X									X
P0120,P0121	P0120-P0223,P2135	TP sensor							X	X			X	X			X		X									X
P0125	P0125	Insufficient ECT for Closed Loop							X	X		X	X	X				X	X									X
P0128	P0128	Thermostat																										
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1							X	X			X	X					X									X
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1							X	X			X						X									X
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2											X															
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																										
P0171,P0172	P0171,P0172	Fuel system							X	X			X	X					X									X
P0300-P0308	P0300-P0308	Misfire											X	X					X									X
P0325,P0330	P0325-P0333	Knock sensor							X	X																		X
P0335	P0335	CKP sensor							X	X			X	X					X									X
P0340, P0341	P0340, P0341	CMP sensor							X	X			X	X					X									X
P0340-P0346	P0340-P0346	VVT sensor1,2																										
P0351-P0358	P0351-P0358	Ignitor							X	X			X	X					X									X
P0385	P0385	CKP sensor 2							X	X			X	X					X									
P0401	P0401	EGR system (closed)											X															X
P0402	P0402	EGR system (open)											X	X					X									X
P0405,P0409	P0405-P0409	Lift sensor																										
P0420,P0430	P0420,P0430	Catalyst																										
P0442-P0456	P0442-P0456	EVAP system																	X									
P0450,P0451	P0450-P0453	EVAP press sensor												X														

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Monitor disablement (X - disabled)

Monitor detected malfunction

Fault code			P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
	Fault code		P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450-P0453	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710-P0713	P0720-P0793	P0715-P0717	P0724	P0741-P0796
		Component/ system	Knock sensor	CKP sensor	CMP sensor	VVT sensor1,2	Ignitor	CKP sensor 2	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor	VSS(ECT2sensor)	VSS(ECT1sensor, non-ECT)	VSS(M/T)	IAC valve	Idle switch	System Voltage	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function)*1
P0500	P0500	VSS							X	X			X	X					X						X	X		X
P0511	P0511	IAC valve																										
P0510	P0510	Idle switch								X			X	X					X									X
P0560	P0560	System Voltage																										
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										X
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0799	Trans solenoid (range)																							X	X		X
P0850	P0850	PNP switch																	X									X
P1010,P1020	P1010,P1020	VVTL																										
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							X	X			X	X					X									
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor												X	X													
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)							X	X			X						X									X
P2226	P2226	BARO sensor																										X
P2237,P2240	P2237,P2240	A/F sensor (open)							X	X			X						X									X
P2423,24	P2423,24	HC Adsorption Catalyst																										
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
P2431	P2431	AIR Pressure Sensor(Rationality)																										
P2440	P2440	AIR control valve stuck open							X	X			X															
P2441	P2441	AIR control valve stuck close							X	X			X															
P2444	P2444	AIP stuck On							X	X			X															
P2445	P2445	AIP stuck Off							X	X			X															
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										X
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							X	X			X						X									X

C

A21573

Monitor disablement (X - disabled)

Monitor detected malfunction

Fault code			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009.P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
	Fault code		P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
		Component/ system	Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
P0010,P0020	P0010,P0020	VVT VSV1,2																				X	X	X	X		
P0011	P0011	VVT System1 - Advance																				X	X	X	X		
P0012	P0012	VVT System1 - Retard																				X	X	X	X		
P0016,P0018	P0016,P0018	VVT System - Misalignment																				X	X	X	X		
P0021	P0021	VVT System2 - Advance																				X	X	X	X		
P0022	P0022	VVT System2 - Retard																				X	X	X	X		
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																	X			X	X	X	X		
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1														X		X	X			X	X	X	X		X
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2														X			X								
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																	X								
P0100,P0101	P0100-P0103	MAF sensor				X	X									X		X	X			X	X	X	X		X
P0105,P0106	P0105-P0108	MAP sensor				X	X									X		X	X			X	X	X	X		X
P0110	P0110-P0113	IAT sensor									X					X		X				X	X	X	X		X
P0115,P0116	P0115-P0118	ECT sensor	X			X	X				X					X		X	X			X	X	X	X		X
P0120,P0121	P0120-P0223,P2135	TP sensor														X		X	X			X	X	X	X		X
P0125	P0125	Insufficient ECT for Closed Loop	X			X										X		X	X			X	X	X	X		X
P0128	P0128	Thermostat																									
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																	X			X	X	X	X		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1														X		X	X			X	X	X	X		X
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2														X			X								
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																	X								
P0171,P0172	P0171,P0172	Fuel system														X		X	X			X	X	X	X		X
P0300-P0308	P0300-P0308	Misfire														X		X	X			X	X	X	X		X
P0325,P0330	P0325-P0333	Knock sensor																				X	X	X	X		
P0335	P0335	CKP sensor				X	X									X		X	X			X	X	X	X		X
P0340, P0341	P0340, P0341	CMP sensor				X	X									X		X	X			X	X	X	X		X
P0340-P0346	P0340-P0346	VVT sensor1,2																				X	X	X	X		
P0351-P0358	P0351-P0358	Ignitor																	X			X	X	X	X		
P0385	P0385	CKP sensor 2				X	X									X		X	X			X	X	X	X		X
P0401	P0401	EGR system (closed)																	X								
P0402	P0402	EGR system (open)														X		X	X			X	X	X	X		X
P0405,P0409	P0405-P0409	Lift sensor																									
P0420,P0430	P0420,P0430	Catalyst																									
P0442-P0456	P0442-P0456	EVAP system														X		X				X	X	X	X		X
P0450,P0451	P0450-P0453	EVAP press sensor																				X	X	X	X		

C

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Monitor detected malfunction

			Monitor disablement (X - disabled)																								
Fault code			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009.P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
	Fault code		P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
		Component/ system	Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
P0500	P0500	VSS	X													X		X	X			X	X	X	X		X
P0511	P0511	IAC valve														X		X									X
P0510	P0510	Idle switch														X		X	X								X
P0560	P0560	System Voltage																									
P0617	P0617	Starter signal																									
P0705	P0705	Shift lever position switch																									
P0710	P0710-P0713	Trans fluid temp sensor																									
P0720-P0793	P0720-P0793	Output speed sensor																									
P0715-P0717	P0715-P0717	Input speed sensor																									
P0724	P0724	Stop lamp switch																									
P0741-P0796	P0741-P0796	Trans solenoid (function)																									
P0748-P0798	P0748-P0799	Trans solenoid (range)	X																								
P0850	P0850	PNP switch																									
P1010,P1020	P1010,P1020	VVTL																				X	X	X	X		
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X	X	X	X		X
P1126	P1126	Electronic magnet clutch																									
P1129	P1129	Electronic throttle system																									
P1430	P1430	HC adsorber ACT press sensor																									
P2004,6	P2004,6	Intake Manifold Runner Control																									
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																									
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																									
P2102,P2103	P2102,P2103	Throttle motor																									
P2120-P2138	P2120-P2138	Accel position sensor																									
P2196,P2198	P2196,P2198	A/F sensor (rationality)																	X			X	X	X	X		X
P2226	P2226	BARO sensor														X		X				X	X	X	X		X
P2237,P2240	P2237,P2240	A/F sensor (open)																	X			X	X	X	X		X
P2423,24	P2423,24	HC Adsorption Catalyst																									
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																			X	X	X	X	X		
P2431	P2431	AIR Pressure Sensor(Rationality)																				X	X	X	X		
P2440	P2440	AIR control valve stuck open														X		X	X								X
P2441	P2441	AIR control valve stuck close														X		X	X								X
P2444	P2444	AIP stuck On														X		X	X								X
P2445	P2445	AIP stuck Off														X		X	X								X
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																									
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																	X			X	X	X	X		

C

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9. PROBLEM SYMPTOM CONFIRMATION

Taking into consideration the results of the customer problem analysis, try to reproduce the symptoms of the trouble. If the problem is that the transaxle does not up-shift, down-shift, or the shift point is too high or too low, conduct the following road test to confirm the automatic shift schedule and simulate the problem symptoms.

10. ROAD TEST

NOTICE:

Perform the test at normal operating ATF temperature 50 to 80 °C (122 to 176 °F).

(a) D position test (NORM and PWR pattern):
Shift into the D position and fully depress the accelerator pedal and check the following points.
  (1) Check up-shift operation.
  Check that 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts take place, and that the shift points conform to the automatic shift schedule (See page SS-28).

HINT:

- 5th Gear Up-shift Prohibition Control (1. Coolant temp. is 60 °C (140 °F) or less. 2. If there is a 10 km/h (6 mph) difference between the set cruise control speed and vehicle speed.)
- 5th Gear Lock-up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 60 °C (140 °F) or less.)

  (2) Check for shift shock and slip.
  Check for shock and slip at the 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts.
  (3) Check for abnormal noises and vibration.
  Drive in the D position lock-up or 5th gear and check for abnormal noises and vibration.

HINT:

The check for the cause of abnormal noises and vibration must be done very thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

  (4) Check kick-down operation.
  While driving in the D position, 2nd, 3rd, 4th and 5th gears, check that the possible kick-down vehicle speed limits for 2 → 1, 3 → 2, 4 → 3 and 5 → 4th kick-downs conform to those indicated on the automatic shift schedule (See page SS-28).
  (5) Check abnormal shock and slip at kick-down.
  (6) Check the lock-up mechanism.
    - Drive in D position 5th gear, at a steady speed (lock-up ON) of about 70 km/h (43 mph).
    - Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, there is no lock-up.

(b) 4 position test:
With the shift lever in "M", press the shift down switch once and check that the gear position indicator show "4". Fully depress the accelerator pedal and check the following points.
  (1) Check up-shift operation.
  Check that the 1 → 4 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-28).

HINT:

There is no 5th up-shift in the 4 position.

  (2) Check engine braking.
  While driving in the 4 position and 4th gear, release the accelerator pedal and check the engine braking effect.
  (3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(c) 3 position test:
Shift into the 3 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.
Check that the 1 → 3 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-28).
(2) Check engine braking.
While driving in the 3 position and 3rd gear, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(d) 2 position test:
Shift into the 2 position and fully depress the accelerator pedal and check the following points.
(1) Check up-shift operation.
Check that the 1 → 2 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-28).
(2) Check engine braking.
While driving in the 2 position and 2nd gear, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration, and for shock at up-shift and down-shift.

(e) L position test:
Shift into the L position and fully depress the accelerator pedal and check the following points.
(1) Check no up-shift.
While driving in the L position, check that there is no up-shift to 2nd gear.
(2) Check engine braking.
While driving in the L position, release the accelerator pedal and check the engine braking effect.
(3) Check for abnormal noises during acceleration and deceleration.

(f) R position test
Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.

CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

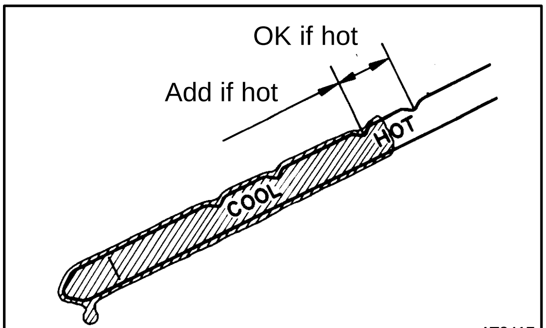
(g) P position test:
Stop the vehicle on a grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

11. BASIC INSPECTION

(a) Check the fluid level.

HINT:

- Drive the vehicle so that the engine and transmission are at normal operating temperature.
  Fluid temp.: 70 to 80 °C (158 to 176 °F)
- Only use the COOL range on the dipstick as a rough reference when the fluid is changed or the engine does not run.



AT3417

(1) Park the vehicle on a level surface and set the parking brake.
(2) With the engine idling and the brake pedal depressed, shift the shift lever into all positions from P to L position and return to P position.
(3) Pull out the dipstick and wipe it clean.
(4) Push it back fully into the pipe.
(5) Pull it out and check that the fluid level is in the HOT range.

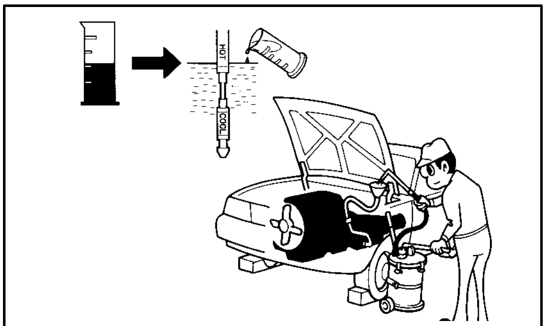
If the level is not within the range, add new fluid.

Fluid type: ATF T-IV

NOTICE:
Do not overfill.

(b) Check the fluid condition.

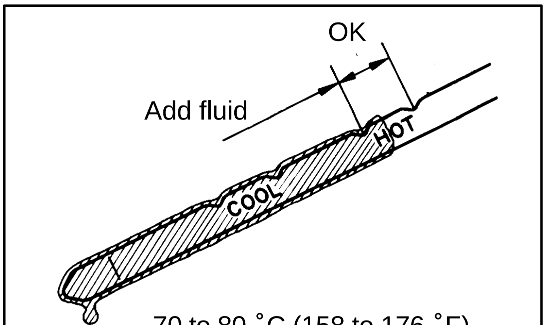
If the fluid smells burnt or is black, change it.


AT5143

(c) Replace the ATF.
(1) Remove the drain plug and drain the fluid.
(2) Reinstall the drain plug securely.
(3) With the engine OFF add new fluid through the oil filler pipe.

Fluid type: ATF T-IV
Capacity:
2.0 liters (2.1 US qts, 1.8 Imp. qts)

(4) Start the engine and shift the shift lever into all positions from P to L position and then shift into P position.
(5) With the engine idling, check the fluid level. Add fluid up to the COOL level on the dipstick.



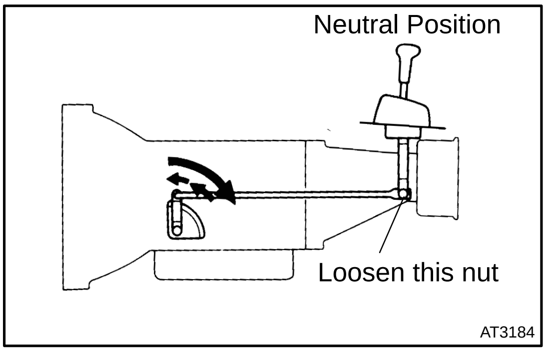
AT3417

(6) Check the fluid level is at the normal operating temperature, 70 to 80 ˚C (158 to 176 ˚F), and add as necessary.

NOTICE:
Do not overfill.

(d) Check the fluid leaks.
Check for leaks in the transmission.

If there are leaks, it is necessary to repair or replace O-rings, FIPGs, oil seals, plugs or other parts.



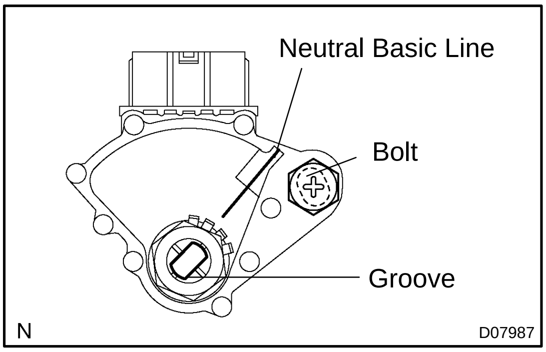
(e) Inspect and adjust the shift lever position.
When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator is aligned with the correct position.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.

- Loosen the nut on the shift lever.
- Push the control shaft fully rearward.
- Return the control shaft lever 2 notches to N position.
- Set the shift lever to N position.
- While holding the shift lever lightly toward the R position side, tighten the shift lever nut.

Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

- Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to D position and reverses when shifting it to the R position.



(f) Inspect and adjust the park/neutral position switch.

- Check that the engine can be started with the shift lever only in the N or P position, but not in other positions.

If it is not as stated above, carry out the following adjustment procedures.

- Loosen the park/neutral position switch bolt and set the shift lever to the N position.
- Align the groove and neutral basic line.
- Hold the switch in position and tighten the bolt.

Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

- For continuity inspection of the park/neutral position switch, see page DI-361 .

(g) Check the idle speed.
Idle speed (In N position and air conditioner OFF):
700 ± 50 rpm

12. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transmission and engine by measuring the stall speeds in the D position.

NOTICE:

- **Do the test at normal operating fluid temperature 50 to 80 °C (122 to 176 °F).**
- **Do not continuously run this test for longer than 5 seconds.**
- **To ensure safety, conduct this test in a wide, clear level area which provides good traction.**
- **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**
  - Chock the 4 wheels.
  - Connect an OBD II scan tool or hand-held tester to DLC3.
  - Fully apply the parking brake.
  - Keep your left foot depressing firmly on the brake pedal.
  - Start the engine.
  - Shift into the D position. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

Stall speed:

2,700 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall engine speed is low in D position	Engine output may be insufficient Stator one-way clutch is operating properly HINT: If the value is larger or smaller than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall engine speed is high in D position	Line pressure too low Forward clutch slipping No. 2 one-way clutch not operating properly O/D one-way clutch not operating properly

(b) Measure the time lag.

When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the O/D direct clutch, forward clutch, and 1st & reverse brake.

NOTICE:

- **Do the test at normal operating fluid temperature 50 to 80 °C (122 to 176 °F).**
- **Be sure to allow 1 minute interval between tests.**
- **Take 3 measurements and take the average value.**
  - Fully apply the parking brake.
  - Start the engine and check idle speed.

Idle speed (In N position and air conditioner OFF):

700 ± 50 rpm

- Shift the shift lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag: N → D Less than 1.2 seconds

- In the same manner, measure the time lag for N → R.

Time lag: N → R Less than 1.5 seconds

Evaluation (If N → D or N → R time lag is longer than the specified):

Problem	Possible cause
N → D time lag is longer	Line pressure too low Forward clutch worn O/D one-way clutch not operating properly
N → R time lag is longer	Line pressure too low Direct clutch worn 1st & reverse brake worn O/D one-way clutch not operating properly

13. HYDRAULIC TEST

Measure the line pressure.

NOTICE:

- **Do the test at normal operation fluid temperature 50 to 80 °C (122 to 176 °F).**
- **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**
- **Be careful to prevent SST's hose from interfering with the exhaust pipe.**

(1) Warm up the ATF.

(2) Remove the test plug on the front left side of the transmission case and connect SST (See page AT-29 for the location to connect SST).

SST 09992-00095 (09992-00231, 09992-00271)

(3) Fully apply the parking brake and chock the 4 wheels.

(4) Start the engine and check idling speed.

(5) Keep your left foot pressing firmly on the brake pedal and shift into D position.

(6) Measure the line pressure when the engine is idling.

(7) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

(8) In the same manner, do the test in R position.

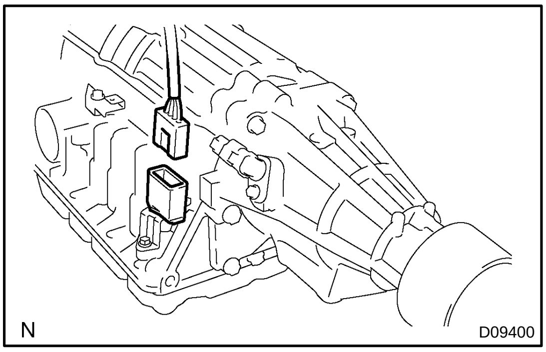
Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)	R position kPa (kgf/cm^2, psi)
Idling	390 to 460 (4.0 to 4.7, 57 to 67)	0
Stall	1,200 to 1,360 (12.2 to 13.8, 174 to 196)	1,640 to 1,960 (16.7 to 19.8, 238 to 282)

If the measured pressures are not up to the specified values, recheck the throttle cable adjustment and re-test.

Evaluation

Problem	Possible cause
If the measured values at all positions are higher	Shift solenoid valve SLT defective Regulator valve defective
If the measured values at all positions are lower	Shift solenoid valve SLT defective Regulator valve defective Oil pump defective O/D direct clutch defective
If pressure is low in the D position only	D position circuit fluid leakage Forward clutch defective
If pressure is low in the R position only	R position circuit fluid leakage Direct clutch defective 1st & reverse brake defective



14. MANUAL SHIFTING TEST

HINT:

By this test, it can be determined whether the trouble is within the electrical circuit or is a mechanical problem in the transmission.

(a) Disconnect the solenoid wire.

(b) Inspect the manual driving operation.
Check that the shift and gear positions correspond to the table below.
While driving, shift through the L, 2, 3, M and D positions.
Check that the gear change corresponds to the shift position.

Shift Position	Gear Position
D	5th
M	5th
3	4th
2	3rd
L	3rd
R	Reverse
P	Pawl Lock

HINT:

If the gear positions of the L, 2, 3, M and D are difficult to distinguish, do the road test.

If any abnormality is found in the above manual shifting test, the problem is in the transmission itself.

(c) Connect the solenoid wire.

(d) Clear out the DTC.

15. RESET MEMORY

CAUTION:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transaxle assy, engine assy or the ECM.

NOTICE:

Hand-held tester only

HINT:

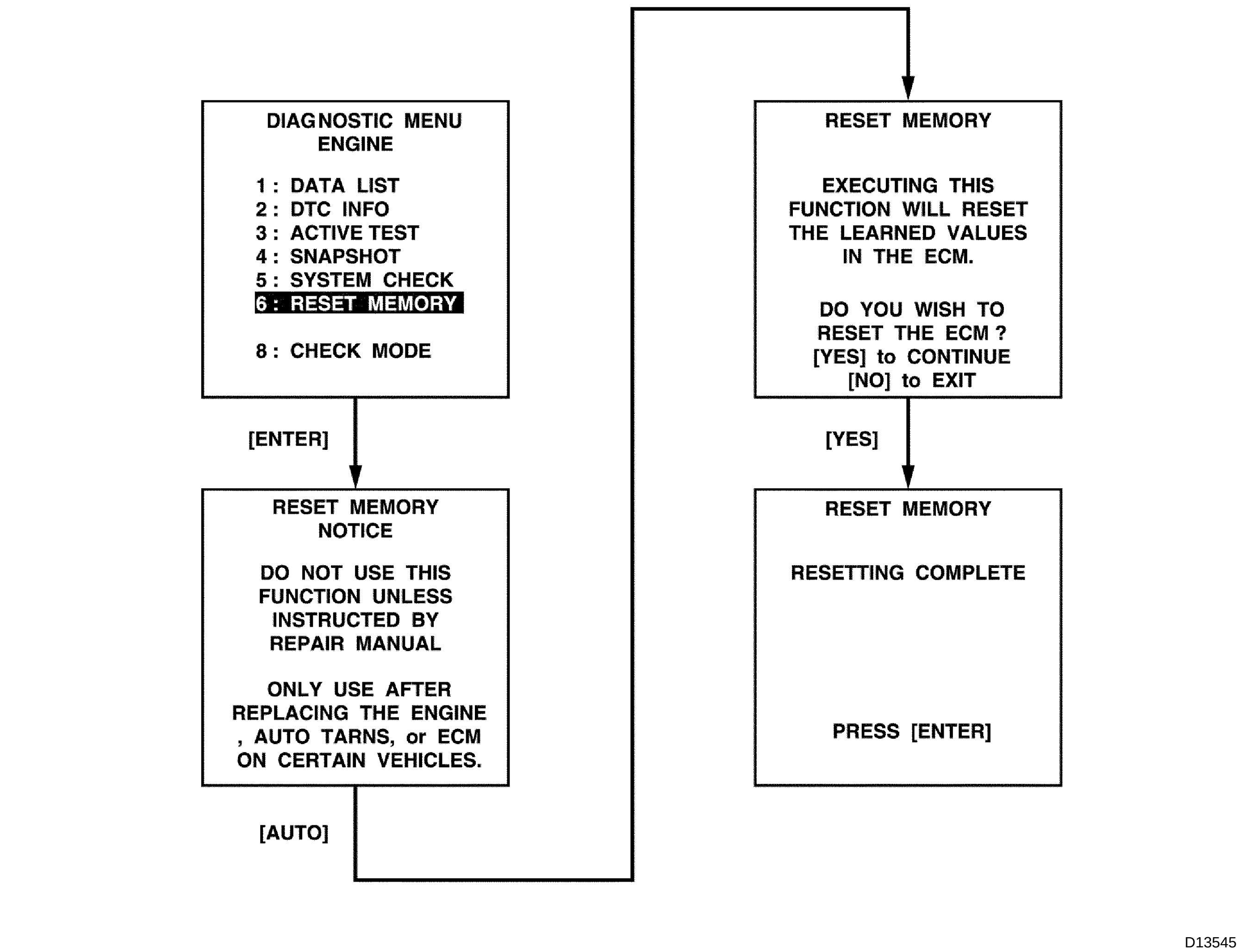
The ECM memorizes the condition that the ECT controls the automatic transaxle assy and engine assy according to those characteristics. Therefore, when the automatic transaxle assy, engine assy, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information. Reset procedure is as follows.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(d) Select the item "DIAGNOSIS/ENHANCED OBD II".
(e) Perform the reset memory procedure from the ENGINE menu.

CAUTION:

After performing the RESET MEMORY, be sure to perform the ROAD TEST described earlier.

Tester menu flow:



DI25J-08

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the circuit listed in the table below and proceed to the page given.

* : ✓...MIL lights up

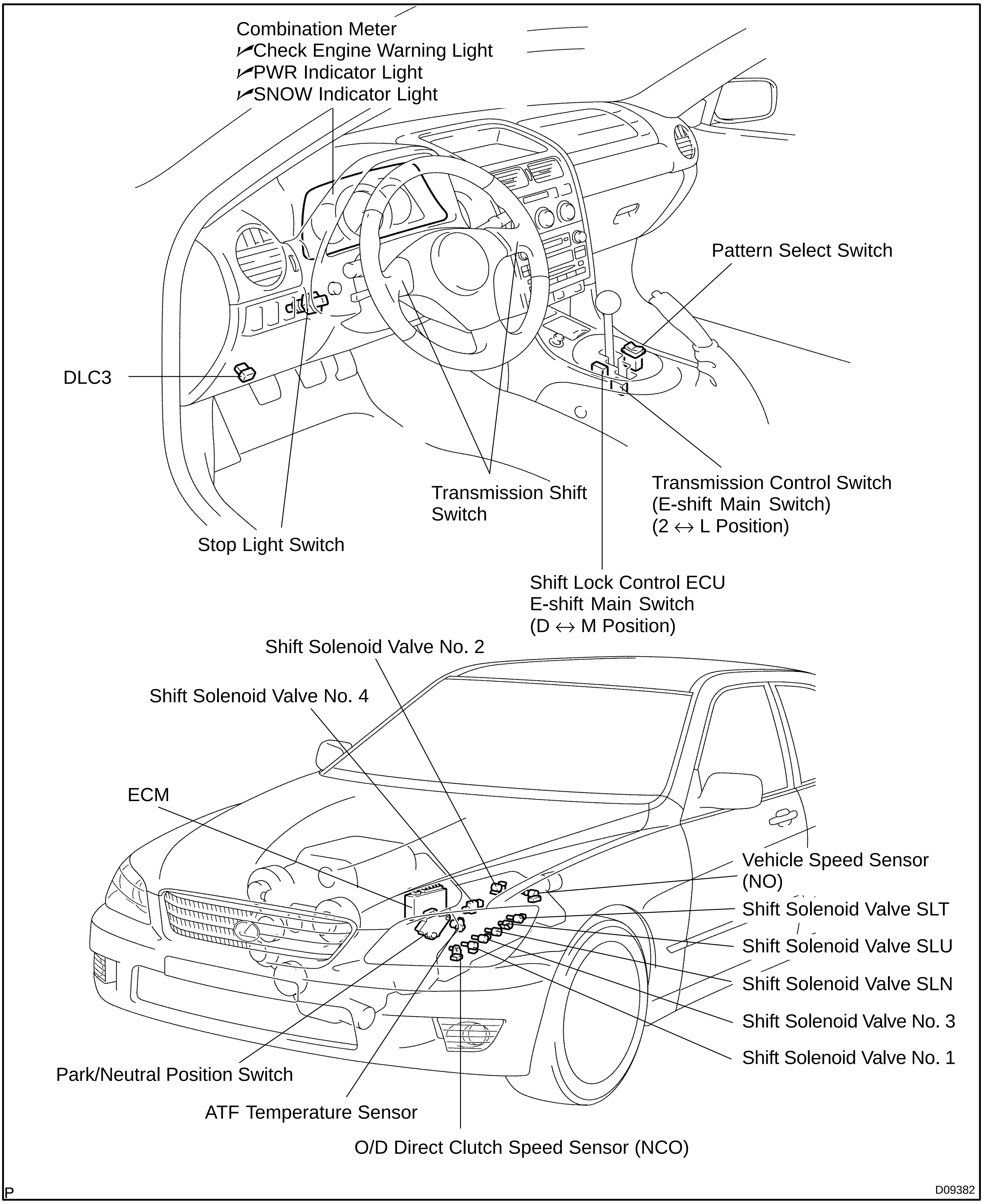
DTC No. (See Page)	Detection Item	Trouble Area	MIL*	Memory
P0500 (DI-256)	Vehicle Speed Sensor "A"	™Open or short in vehicle speed sensor circuit ™Speed sensor (SP2) ™ECM ™Automatic transmission assembly	✓	
P0705 (DI-361)	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	™Short in park/neutral position switch circuit ™Park/neutral position switch ™ECM	✓	
P0710 (DI-367)	Transmission Fluid Temperature Sensor "A" Circuit	™Open or short in ATF temperature sensor circuit ™ATF temperature sensor ™ECM	✓	
P0711 (DI-371)	Transmission Fluid Temperature Sensor "A" Performance	™Transmission fluid level ™ATF temperature sensor	✓	
P0712 (DI-367)	Transmission Fluid Temperature Sensor "A" Circuit Low Input	™Open or short in ATF temperature sensor circuit ™ATF temperature sensor ™ECM	✓	
P0713 (DI-367)	Transmission Fluid Temperature Sensor "A" Circuit High Input		✓	
P0717 (DI-374)	Input Speed Sensor Circuit No Signal	™Open or short in O/D direct clutch speed sensor circuit ™O/D direct clutch speed sensor ™ECM ™Automatic transmission assembly	✓	
P0724 (DI-378)	Brake Switch "B" Circuit High	™Open or short in stop light switch signal circuit ™Stop light switch ™ECM	✓	
P0751 (DI-380)	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	™Shift solenoid valve No. 1 is stuck open or closed ™Valve body is blocked up or stuck ™Automatic transmission assembly	✓	
P0756 (DI-380)	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	™Shift solenoid valve No. 2 is stuck open or closed ™Valve body is blocked up or stuck ™Automatic transmission assembly	✓	
P0761 (DI-380)	Shift Solenoid "C" Performance (Shift Solenoid Valve S3)	™Shift solenoid valve No. 3 is stuck open or closed ™Valve body is blocked up or stuck ™Automatic transmission assembly	✓	
P0973 (DI-390)	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	™Open or short in shift solenoid valve No. 1 circuit ™Shift solenoid valve No. 1 ™ECM	✓	
P0974 (DI-390)	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)		✓	
P0976 (DI-390)	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	™Open or short in shift solenoid valve No. 2 circuit ™Shift solenoid valve No. 2 ™ECM	✓	
P0977 (DI-390)	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)		✓	
P0979 (DI-390)	Shift Solenoid "C" Control Circuit Low (Shift Solenoid Valve S3)	™Open or short in shift solenoid valve No. 3 circuit ™Shift solenoid valve No. 3 ™ECM	✓	
P0980 (DI-390)	Shift Solenoid "C" Control Circuit High (Shift Solenoid Valve S3)		✓	

P0982 (DI-397)	Shift Solenoid "D" Control Circuit Low (Shift Solenoid Valve S4)	™Open or short in shift solenoid valve No. 4 circuit ™Shift solenoid valve No. 4 ™ECM	✓	
P0983 (DI-397)	Shift Solenoid "D" Control Circuit High (Shift Solenoid Valve S4)		✓	
P2716 (DI-401)	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	™Open or short in shift solenoid valve SLT circuit ™Shift solenoid valve SLT ™ECM	✓	
P2725 (DI-406)	Pressure Control Solenoid "E" Electrical (Shift Solenoid Valve SLN)	™Open or short in shift solenoid valve SLN circuit ™Shift solenoid valve SLN ™ECM	✓	
P2757 (DI-411)	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	™Shift solenoid valve SLU is stuck open or closed ™Valve body is blocked up or stuck ™Lock-up clutch ™Automatic transmission assembly	✓	
P2759 (DI-415)	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	™Open or short in shift solenoid valve SLU circuit ™Shift solenoid valve SLU ™ECM	✓	

HINT:
This DTC may be output when the clutch, brake and gear components etc. inside the automatic transmission are damaged.

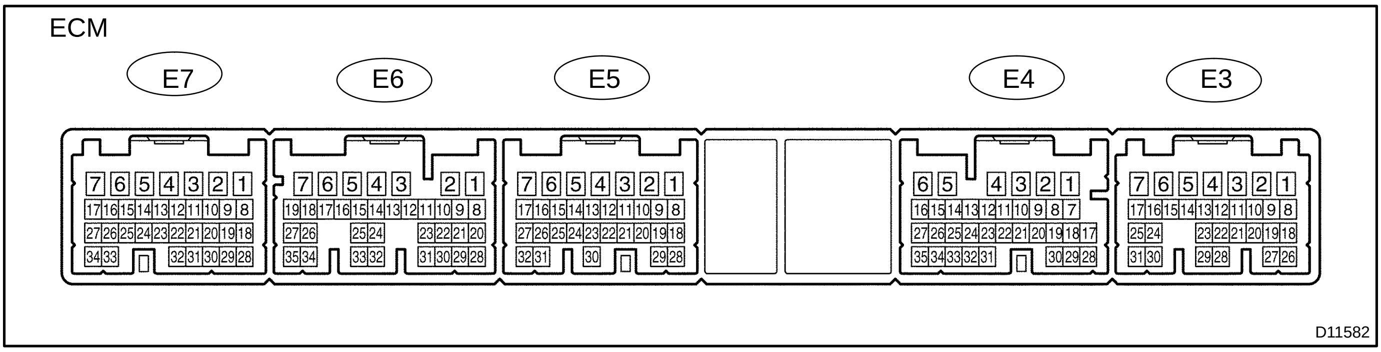
DI25K-06

PARTS LOCATION



DI260-06

TERMINALS OF ECM



Each ECM terminals standard normal voltage is shown in the table below. In the table, first follow the information under "Condition".
Look under "Symbols (Terminals No.)" for the terminals to be inspected.
The standard normal voltage between the terminals is shown under "STD Voltage".
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage
STP ↔ E1 (E4-4 ↔ E6-7)	G-W ↔ BR	IG ON and brake pedal depressed	7.5 to 14 V
		IG ON and brake pedal released	Below 1.5 V
SFTD ↔ E1 (E4-5 ↔ E6-7)	GR-R ↔ BR	IG ON and "Down" transmission shift switch pressed	Below 3 V
		IG ON and "Down" transmission shift switch released	7 to 12 V
SFTU ↔ E1 (E4-6 ↔ E6-7)	GR-G ↔ BR	IG ON and "Up" transmission shift switch pressed	Below 3 V
		IG ON and "Up" transmission shift switch released	7 to 12 V
2 ↔ E1 (E4-12 ↔ E6-7)	Y-G ↔ BR	IG ON and shift lever 2 or L position	7.5 to 14 V
		IG ON and shift lever other than 2 and L position	Below 1.5 V
D ↔ E1 (E4-13 ↔ E6-7)	GR-B ↔ BR	IG ON and shift lever D or M position	7.5 to 14 V
		IG ON and shift lever other than D and M position	Below 1.5 V
4 ↔ E1 (E4-14 ↔ E6-7)	LG-B ↔ BR	IG ON and shift lever M position	7.5 to 14 V
		IG ON and shift lever other than M position	Below 1.5 V
L ↔ E1 (E4-15 ↔ E6-7)	G-Y ↔ BR	IG ON and shift lever L position	7.5 to 14 V
		IG ON and shift lever other than L position	Below 1.5 V
N ↔ E1 (E6-3 ↔ E6-7)	G-R ↔ BR	IG ON and shift lever N position	7.5 to 14 V
		IG ON and shift lever other than N position	Below 1.5 V
3 ↔ E1 (E6-4 ↔ E6-7)	G-W ↔ BR	IG ON and shift lever 3 position	7.5 to 14 V
		IG ON and shift lever other than 3 position	Below 1.5 V
R ↔ E1 (E6-5 ↔ E6-7)	R-B ↔ BR	IG ON and shift lever R position	7.5 to 14 V
		IG ON and shift lever other than R position	Below 1.5 V
P ↔ E1 (E6-6 ↔ E6-7)	G ↔ BR	IG ON and shift lever P position	7.5 to 14 V
		IG ON and shift lever other than P position	Below 1.5 V
SLU^+ ↔ SLU^- (E6-11 ↔ E6-10)	G-W ↔ LG-B	IG ON	Below 3 V
		Engine is idling	Pulse signal is output below 1.5 V ↔ 9 to 14 V
SLN^+ ↔ SLN^- (E6-13 ↔ E6-12)	Y-R ↔ R-W	IG ON	Below 3 V
		Engine is idling	Pulse signal is output below 1.5 V ↔ 9 to 14 V

S4 ↔ E1 (E6-16 ↔ E6-7)	B-R ↔ BR	IG ON	Below 1.5 V
		1st, 2nd, 3rd or 4th gear	Below 1.5 V
		5th gear	9 to 14 V
S3 ↔ E1 (E6-17 ↔ E6-7)	W-L ↔ BR	IG ON	Below 1.5 V
		1st, 2nd, 3rd or 5th gear	Below 1.5 V
		4th gear	9 to 14 V
S2 ↔ E1 (E6-18 ↔ E6-7)	G-Y ↔ BR	IG ON	Below 1.5 V
		1st, 4th or 5th gear	Below 1.5 V
		2nd or 3rd gear	9 to 14 V
S1 ↔ E1 (E6-19 ↔ E6-7)	Y ↔ BR	IG ON	Below 1.5 V
		3rd, 4th or 5th gear	Below 1.5 V
		1st or 2nd gear	9 to 14 V
NCO+ ↔ NCO$^-$ (E6-21 ↔ E6-20)	R ↔ G	Engine is idling	Pulse signal is output below 1.5 V ↔ 4 to 6 V
SP2$^+$ ↔ SP2$^-$ (E6-23 ↔ E6-22)	L-Y ↔ R-L	Engine is idling	Pulse signal is output below 1.5 V ↔ 4 to 6 V
OIL ↔ E2 (E6-27 ↔ E4-34)	GR ↔ BR	IG ON and ATF temperature 110 ˚C (176 ˚F)	Below 1 V
SLT$^+$ ↔ SLT$^-$ (E6-35 ↔ E6-34)	B-Y ↔ R-B	IG ON	Below 3 V
		Engine is idling	Pulse signal is output below 1.5 V ↔ 9 to 14 V

DI25L-05

PROBLEM SYMPTOMS TABLE

HINT:

If a normal code is displayed during the DTC check but the trouble still occurs, check the circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for trouble-shooting.

The Matrix Chart is divided into 3 chapters.

- If the instruction ”Proceed to next circuit inspection shown on matrix chart” is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- If the trouble still occurs even though there are no abnormalities in any of the other circuits, then check and replace the ECM.

1. CHAPTER 1: ELECTRONIC CIRCUIT MATRIX CHART

Symptom	Suspected Area	See page
No up-shift (A particular gear, from 1st to 4th gear, is not up-shifted)	ECM	IN-33
No up-shift (4th → 5th)	1. E-shift main switch circuit 2. ECM	DI-361 IN-33
No down-shift (5th → 4th)	1. E-shift main switch circuit 2. ECM	DI-361 IN-33
No down-shift (A particular gear, from 1st to 4th gear, is not up-shifted)	ECM	IN-33
No lock-up	ECM	IN-33
No lock-up off	ECM	IN-33
Shift point too high or too low	1. Pattern select switch circuit 2. ECM	DI-419 IN-33
Up-shift to 5th from 4th while shift lever is M position	1. E-shift main switch circuit 2. ECM	DI-361 IN-33
Up-shift to 5th from 4th while engine is cold	ECM	IN-33
No pattern select	1. Pattern select switch circuit 2. ECM	DI-419 IN-33
Engine stalls when starting off or stopping	ECM	IN-33
No 2nd start	1. Pattern select switch circuit 2. ECM	DI-419 IN-33
No E-shift system	1. E-shift main switch circuit. 2. Transmission shift switch circuit 3. Pattern select switch circuit 4. ECM	DI-361 DI-421 DI-419 IN-33

2. CHAPTER 2: ON-VEHICLE REPAIR
(✓: A650E AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM780U)

Symptom	Suspected Area	See page
Vehicle does not move in any forward positions and reverse position	1. Transmission control rod 2. Manual valve 3. Parking lock pawl 4. Off-vehicle repair matrix chart	DI-328 ✓ ✓ -
Vehicle does not move in R position	1. Reverse control valve 2. Off-vehicle repair matrix chart	✓ -
Vehicle does not move in particular position or positions (except R position)	Off-vehicle repair matrix chart	-
No up-shift (1st → 2nd)	1. 1-2 shift valve 2. Off-vehicle repair matrix chart	✓ -
No up-shift (2nd → 3rd)	1. 2-3 shift valve 2. Off-vehicle repair matrix chart	✓ -
No up-shift (3rd → 4th)	1. 3-4 shift valve 2. Off-vehicle repair matrix chart	✓ -
No up-shift (4th → 5th)	1. 4-5 shift valve 2. Off-vehicle repair matrix chart	✓ -
No down-shift (5th → 4th)	1. 4-5 shift valve 2. Off-vehicle repair matrix chart	✓ -
No down-shift (4th → 3rd)	1. 3-4 shift valve 2. Off-vehicle repair matrix chart	✓ -
No down-shift (3rd → 2nd)	1. 2-3 shift valve 2. Off-vehicle repair matrix chart	✓ -
No down-shift (2nd → 1st)	1. 1-2 shift valve 2. Off-vehicle repair matrix chart	✓ -
No lock-up or No lock-up off	1. Lock-up control valve 2. Lock-up relay valve 3. Off-vehicle repair matrix chart	✓ ✓ -
Harsh engagement (N → D)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_1 accumulator 4. Orifice control valve 5. Off-vehicle repair matrix chart	✓ ✓ ✓ ✓ -
Harsh engagement (Lock-up)	1. Lock-up control valve 2. Lock-up relay valve 3. Solenoid relay valve 4. Off-vehicle repair matrix chart	✓ ✓ ✓ -
Harsh engagement (N → R)	1. Accumulator control valve 2. C_2 accumulator 3. Solenoid modulator valve 4. Off-vehicle repair matrix chart	✓ ✓ ✓ -
Harsh engagement (2 → L)	Coast brake control valve	✓
Harsh engagement (2nd → 3rd → 4th → 5th)	1. Accumulator control valve 2. Solenoid modulator valve	✓ ✓
Harsh engagement (1st → 2nd)	1. Solenoid modulator valve 2. B_3 control valve 3. B_2 release control valve 4. Solenoid relay valve 5. Off-vehicle repair matrix chart	✓ ✓ ✓ ✓ -

Harsh engagement (2nd → 3rd)	1. Accumulator control valve 2. Solenoid modulator valve 3. B_2 accumulator 4. B_3 control valve 5. B_2 release control valve 6. Solenoid relay valve 7. Off-vehicle repair matrix chart	✓ ✓ ✓ ✓ ✓ ✓ -
Harsh engagement (3rd → 4th)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_2 accumulator 4. Off-vehicle repair matrix chart	✓ ✓ ✓ -
Harsh engagement (4th → 5th)	1. Accumulator control valve 2. Solenoid modulator valve 3. B_0 accumulator 4. Off-vehicle repair matrix chart	✓ ✓ ✓ -
Harsh engagement (5th → 4th)	1. Accumulator control valve 2. Solenoid modulator valve 3. C_0 accumulator 4. Off-vehicle repair matrix chart	✓ ✓ ✓ -
Slip or shudder (Forward and reverse)	1. Transmission control rod 2. Oil strainer 3. Pressure relief valve 4. Off-vehicle repair matrix chart	DI-328 ✓ ✓ -
Slip or shudder (Particular position)	1. Transmission control rod 2. Off-vehicle repair matrix chart	DI-328 -
No engine braking (1st: L position)	1. Coast brake control valve 2. Off-vehicle repair matrix chart	✓ -
No engine braking (2nd: 2 position)	1. Coast brake control valve 2. Off-vehicle repair matrix chart	✓ -

3. CHAPTER 3: OFF-VEHICLE REPAIR (✓: A650E AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM780U)

Symptom	Suspected Area	See page
Vehicle does not move in any forward positions and reverse position	1. O/D one-way clutch (F_0) 2. O/D direct clutch (C_0) 3. O/D planetary gear unit 4. Torque converter clutch	✓ ✓ ✓ AT-35
Vehicle does not move in R position	1. Center and rear planetary gear unit 2. Direct clutch (C_2) 3. 1st & reverse brake (B_4) 4. O/D brake (B_0)	✓ ✓ ✓ ✓
No up-shift (1st → 2nd)	2nd brake (B_3)	✓
No up-shift (2nd → 3rd)	1. 3rd brake (B_2) 2. One-way clutch No.1 (F_1)	✓ ✓
No up-shift (3rd → 4th)	Direct clutch	✓
No up-shift (4th → 5th)	O/D brake (B_0)	✓
No lock-up or No lock-up off	Torque converter clutch	AT-35
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. O/D one-way clutch (F_0) 3. One-way clutch No.2 (F_2)	✓ ✓ ✓
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. O/D brake (B_0) 3. 1st & reverse brake (B_4)	✓ ✓ ✓
Harsh engagement (1st → 2nd)	2nd brake (B_3)	✓
Harsh engagement (2nd → 3rd)	1. 3rd brake (B_2) 2. 2nd brake (B_3) 3. One-way clutch No.1 (F_1)	✓ ✓ ✓
Harsh engagement (3rd → 4th)	Direct clutch (C_2)	✓
Harsh engagement (4th → 5th)	1. O/D brake (B_0) 2. O/D direct clutch (C_0)	✓ ✓
Harsh engagement (Lock-up)	Torque converter clutch	AT-35
Slip or shudder (Forward and reverse: After warm-up)	1. O/D one-way clutch (F_0) 2. O/D direct clutch (C_0) 3. Torque converter clutch	✓ ✓ AT-35
Slip or shudder (Particular position: Just after engine starts)	Torque converter clutch	AT-35
Slip or shudder (R position)	1. Direct clutch (C_2) 2. O/D brake (B_0) 2. 1st & reverse brake (B_4)	✓ ✓ ✓
Slip or shudder (1st)	1. Forward clutch (C_1) 2. No. 2 one-way clutch (F_2)	✓ ✓
Slip or shudder (2nd)	2nd brake (B_3)	✓
Slip or shudder (3rd)	1. 3rd coast brake (B_1) 2. 3rd brake (B_2) 3. One-way clutch No.1 (F_1)	✓ ✓ ✓
Slip or shudder (4th)	Direct clutch	✓
Slip or shudder (5th)	O/D brake (B_0)	✓
No engine braking (1st ~ 4th: D position)	O/D direct clutch (C_0)	✓
No engine braking (1st: L position)	1st & reverse brake (B_4)	✓
No engine braking (2nd: 2 position)	2nd brake (B_3)	✓
No engine braking (3rd: 3 position)	3rd coast brake (B_1)	✓

Poor acceleration (All positions)	Torque converter clutch	AT-35
Poor acceleration (5th)	1. O/D brake (B_0) 2. O/D planetary gear unit	✓ ✓
Engine stalls when starting off or stopping	Torque converter clutch	AT-35

DIALK-02

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.
The ECM receives signals (P, R, N, D, 4, 3, 2 and L) from the park/neutral position switch. When the signal is not sent to the ECM from the park/neutral position switch, the ECM judges that the shift lever is in D position.
When the shift lever is in the M position (with E-shift main switch for D and M pressed), ”M” in the shift position indicator light will come on and when the shift lever is in the D position (with E-shift main switch for D and M released), ”D” in the shift position indicator light will come on.
When the shift lever is in the L position (with E-shift main switch for 2 and L pressed), ”L” in the shift position indicator light will come on and when the shift lever is in the 2 position (with E-shift main switch for 2 and L released), ”2” in the shift position indicator light will come on.
When the shift lever is in M position, the ECM prohibits shifting to 5th.

DTC No.	DTC Detection Condition	Trouble Area
P0705	(2-trip detection logic) ✓All switches are OFF simultaneously for P, R, N, D, 3 and 2 positions. ✓2 or more switches are ON simultaneously for P, R, N, D, 3 and 2 positions.	✓Open or short in park/neutral position switch circuit ✓Park/neutral position switch ✓ECM

MONITOR DESCRIPTION

The park/neutral position switch detects the shift lever position and sends a signal to the ECM.
For security, the park/neutral position switch detects the shift lever position so that engine can be started only when the vehicle is in P or N shift position.
When the park/neutral position switch sends more than one signal at a time from switch positions P, R, N or D, the ECM interprets this as a fault in the switch. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0705	Park/neutral position switch/Verify switch input
Required sensors/Components	Park/neutral position switch	
Frequency of operation	Continuous	
Duration	Condition (A)	0.5 sec.
	Condition (B)	60 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
The typical enabling condition is not available.	-	

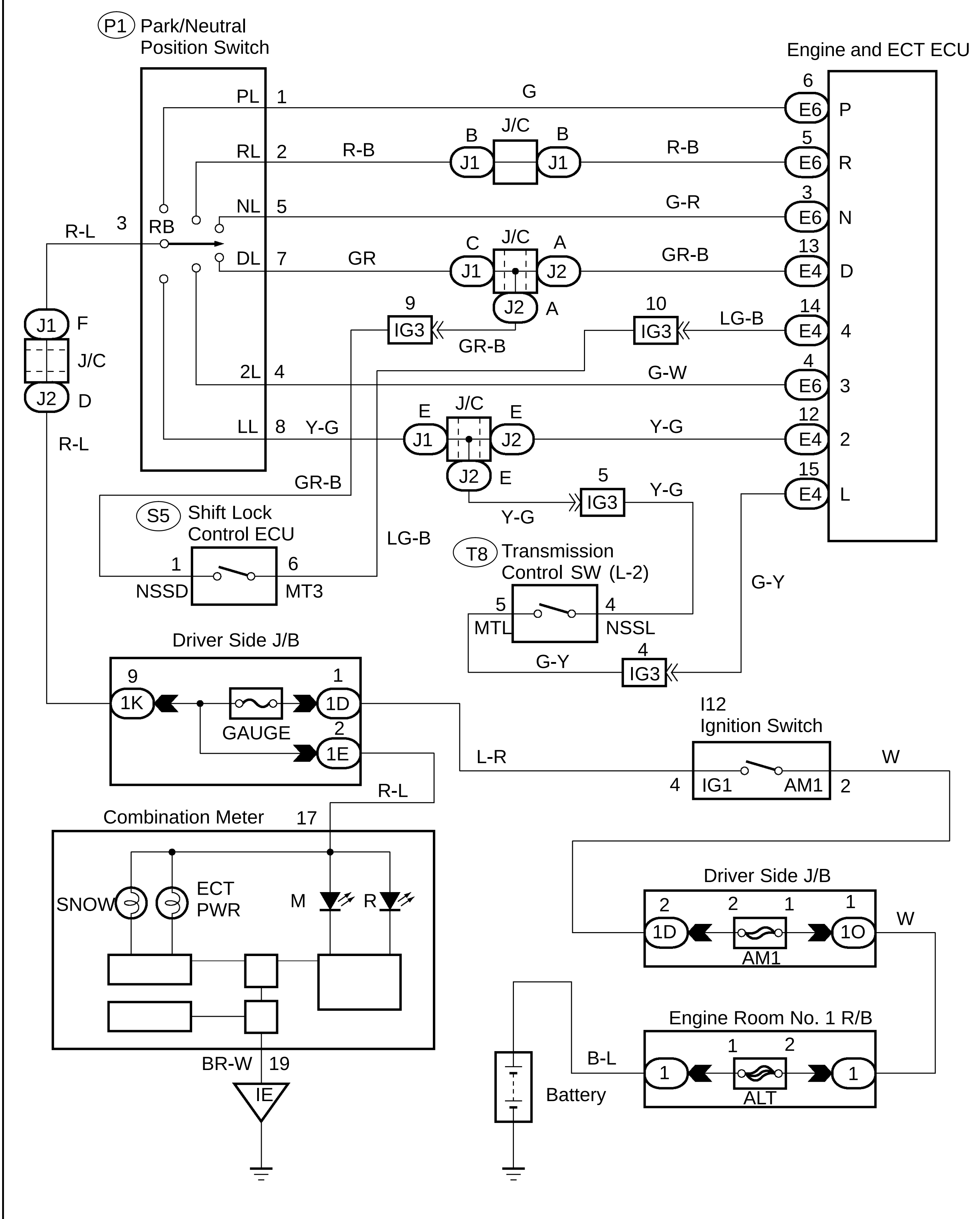
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Either of the following conditions is met: Condition (A) or (B)	
Condition (A)	
Number of the following signal input at the same time.	2 or more
P switch	ON
R switch	
N switch	
D switch	
3 switch	
2 switch	
Condition (B)	
All of the followings are met	
P switch	OFF
R switch	
N switch	
D switch	
3 switch	
2 switch	

COMPONENT OPERATING RANGE

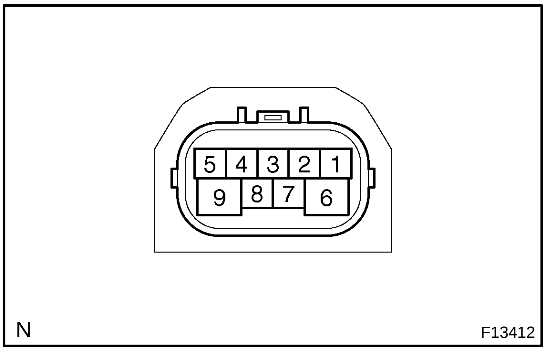
Parameter	Standard value
Park/neutral position switch	The park/neutral position switch sends only one signal to the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check park/neutral position switch.



PREPARATION:

(a) Jack up the vehicle.

(b) Disconnect the park/neutral position switch connector.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved to each position.

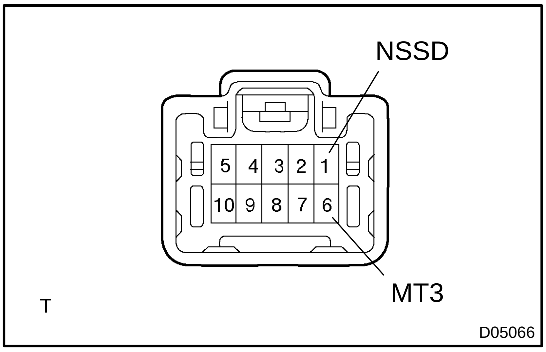
OK:

Shift position	Terminal No. to continuity	Terminal No. to continuity
P	1 - 3	6 - 9
R	2 - 3	-
N	3 - 5	6 - 9
D, M	3 - 7	-
3	3 - 4	-
2, L	3 - 8	-

NG → **Replace the park/neutral position switch.**

OK

2	Check shift lock control ECU (E-shift main switch).



PREPARATION:

(a) Connect the park/neutral position switch connector.

(b) Disconnect the shift lock control ECU connector.

CHECK:

Check continuity between each terminal of shift lock control ECU connector.

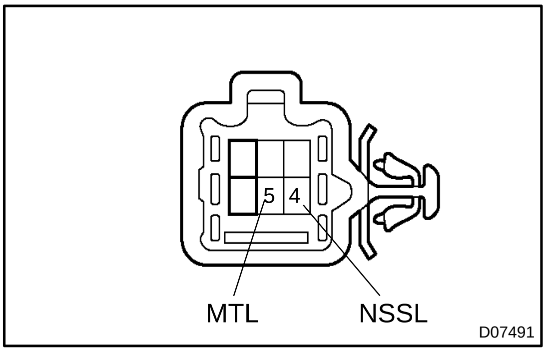
OK:

Shift position	Tester connection	Specified valve
D	1 - 6 (NSSD - MT3)	No continuity
M		Continuity

NG → **Replace the shift lock control ECU (E-shift main switch) (See page AT-20).**

OK

3	**Check transmission control switch (E-shift main switch).**



PREPARATION:

(a) Connect the shift lock control ECU connector.

(b) Disconnect the transmission control switch connector.

CHECK:

Check continuity between each terminal of transmission control switch connector.

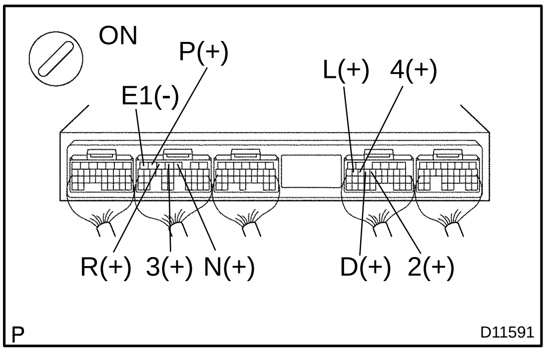
OK:

Shift position	Tester connection	Specified valve
2	4 - 5 (NSSL - MTL)	No continuity
L		Continuity

NG → **Replace the transmission control switch (E-shift main switch) (See page AT-20).**

OK

4	**Measure voltage between each terminal of P, R, N, D, 4, 3, 2, L and E1 of ECM.**



PREPARATION:

(a) Connect the shift lock control computer connector and E-shift main switch connector.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between each terminal of P, R, N, D, 4, 3, 2 and L, and E1 of ECM when the shift lever is shifted to the following positions.

OK:

Tester connection	Condition	Specified condition
P- E1	Shift lever position: P	Battery voltage
R - E1	Shift lever position: R	Battery voltage*
N - E1	Shift lever position: N	Battery voltage
D - E1	Shift lever position: D and M	Battery voltage
4 - E1	Shift lever position: M	Battery voltage
3 - E1	Shift lever position: 3	Battery voltage
2 - E1	Shift lever position: 2 and L	Battery voltage
L - E1	Shift lever position: L	Battery voltage

HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM (See page IN-33).

DIALL-02

DTC	P0710	Transmission Fluid Temperature Sensor ”A” Circuit

DTC	P0712	Transmission Fluid Temperature Sensor ”A” Circuit Low Input

DTC	P0713	Transmission Fluid Temperature Sensor ”A” Circuit High Input

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0710	(a) and (b) is detected momentarily within 0.5 sec. when neither P0712 or P0713 is not detected (1-trip detection logic) (a) ATF temperature sensor resistance is less than 79 Ω. (b) ATF temperature sensor resistance is more than 156 kΩ. HINT: Within 0.5 sec. the malfunction switches from (a) to (b) or from (b) to (a)	✓Open or short in ATF temperature sensor circuit ✓ATF temperature sensor ✓ECM
P0712	ATF temperature sensor resistance is less than 79 Ω for 0.5 sec. or more (1-trip detection logic).	
P0713	DTC is detected for 0.5 sec. or more (1-trip detection logic). ATF temperature sensor resistance is more than 156 kΩ after started engine for 15 minutes or more.	

MONITOR DESCRIPTION

The automatic transmission fluid (ATF) temperature sensor converts ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature, and the ECM detects an opens or shorts in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω*1 or more than 156 kΩ*2, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

*1: 150°C (302°F) or more is indicated regardless of the actual ATF temperature.

*2: -40°C (-40°F) is indicated regardless of the actual ATF temperature.

HINT:

The ATF temperature can be checked on the OBD II scan tool or hand-held tester display.

MONITOR STRATEGY

Related DTCs	P0710	ATF temperature sensor/Range check (Chattering)
	P0712	ATF temperature sensor/Range check (Low resistance)
	P0713	ATF temperature sensor/Range check (High resistance)
Required sensors/Components	ATF temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Range check (Fluttering, Low resistance)		
The typical enabling condition is not available.	-	
Range check (High resistance)		
Time after engine start	15 min. or more	-

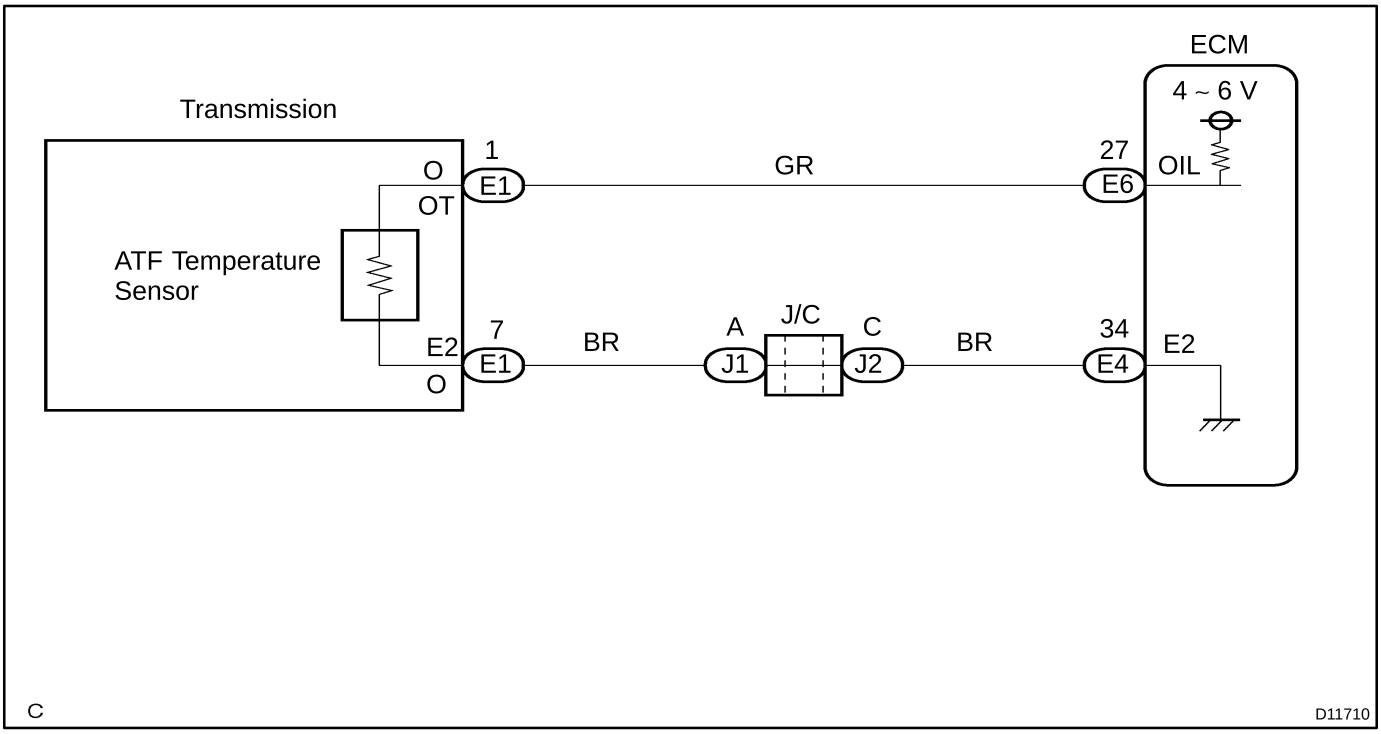
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Fluttering)	
ATF temperature sensor resistance	Less than 79 Ω or More than 156 kΩ
Range check (Low resistance)	
ATF temperature sensor resistance	Less than 79 Ω
Range check (High resistance)	
ATF temperature sensor resistance	More than 156 kΩ

COMPONENT OPERATING RANGE

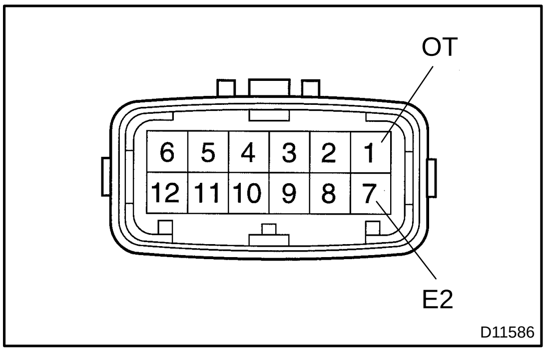
Parameter	Standard value
ATF temperature sensor	Atmospheric temperature to approx. 130˚C (266˚F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check ATF temperature sensor.



PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between terminals 1 and 7of transmission wire connector.
OK:
79 Ω to 156 kΩ
CHECK:
Measure resistance between terminals 1 and 7 of the transmission wire connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG	Replace the ATF temperature sensor (transmission wire) (See page AT-9).

OK

2	**Check harness and connector between ATF temperature sensor and ECM (See page IN-33).**

NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM
(See page IN-33).

DIC67-01

DTC	P0711	Transmission Fluid Temperature Sensor ”A” Performance

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0711	Both (a) and (b) are detected: (2-trip detection logic) (a) After 12 sec. of engine start, temp. of atmosphere and that of engine coolant is more than -10°C (14°F) (b) After normal driving for over 18 min. and 20 sec. and 9 km (6 miles), ATF temp. is less than -4°C (25°F)	✓Transmission fluid level ✓ATF temperature sensor

MONITOR DESCRIPTION

The ATF temperature sensor converts the ATF temperature to an electrical resistance value. Based on the resistance, the ECM determines the ATF temperature and detects an opens or shorts in the ATF temperature circuit or a fault of the ATF temperature sensor.

After running the vehicle for a certain period, the ATF temperature should increase. If the ATF temperature is below -4™C (25™F) after running the vehicle for a certain period, the ECM interprets this as a fault, and turns on the MIL.

When the ATF temperature is 110™C (230™F) or more after 18 minutes of engine cold start, the ECM also determines this as a fault, turns on the MIL, and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0711	ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
ATF temperature sensor ”A” circuit	There is no malfunction in the circuit shown on the left.	
ECT (Engine coolant temperature) sensor circuit		
IAT (Intake air temperature) sensor circuit		
Duration time from engine start	18 min. and 20 sec. or more	-
Driving distance after engine start	9 km (6 mile) or more	-
IAT (12 sec after engine start)	-10°C or more	-
ECT (12 sec after engine start)	-10°C or more	-

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
ATF temperature	Less than -4°C

COMPONENT OPERATING RANGE

Parameter	Standard value
ATF temperature sensor	Atmospheric temperature to approx. 130°C (266°F)

WIRING DIAGRAM

See page DI-367 .

INSPECTION PROCEDURE

1	**Check other DTCs output (in addition to DTC P0711)**

PREPARATION:

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the "ON" button of the OBD II scan tool or the hand-held tester.
(f) Select the item "DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES".

CHECK:

Read the DTCs using the OBD II scan tool or the hand-held tester.

RESULT:

Display (DTC output)	Proceed to
Only "P0711" is output	A
"P0711" and other DTCs	B

HINT:
If any other codes besides "P0711" is output, perform the troubleshooting for those DTCs first.

B	**Go to relevant DTC chart (See page DI-328).**

A

2	Check transaxle fluid level (See page DI-328).

NG → Add fluid (See page DI-328).

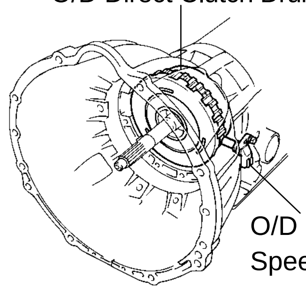
OK

Replace the transmission wire (ATF temperature sensor) (See page AT-9).

DIC68-01

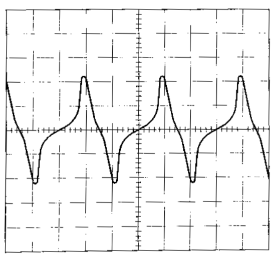
DTC	P0717	Input Speed Sensor Circuit No Signal

CIRCUIT DESCRIPTION



This sensor detects the rotation speed of the O/D input shaft from the rotation of the O/D direct clutch drum.
Its mechanism is the same as that of the vehicle speed sensor (See page DI-256).
By comparing the O/D direct clutch speed signal with vehicle speed sensor signal, the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus doing smooth gear shift.

DTC No.	DTC Detection Condition	Trouble Area
P0717	All conditions below are detected for 5 secs. or more (1-trip detection logic) (a) Gear change not being performed (b) Gear position: 1st, 2nd, 3rd or 4th (c) T/M input shaft rpm: 300 rpm or less (d) T/M output shaft rpm: 500 rpm or more (e) Park/neutral position switch: OFF (f) R switch: OFF (g) Shift solenoid valves, park/neutral position switch and vehicle speed sensor are in normal operation	• Open or short in O/D direct clutch speed sensor circuit • O/D direct clutch speed sensor • ECM • Automatic transmission assembly



Refer to the chart for the waveform between terminals $NC0^+$ and $NC0^-$ during engine idling.

MONITOR DESCRIPTION

The NT terminal of the ECM detects the revolving signal from speed sensor (NCO) (input RPM). The ECM outputs a gearshift signal comparing the speed sensor (NCO) with the speed sensor (NO).
While the vehicle is operating in the 2nd, 3rd, 4th or 5th gear position in the shift position of D, if the input shaft revolution is less than 300 rpm*1 although the output shaft revolution is more than 1,000 rpm*2, the ECM detects the trouble, illuminates the MIL and stores the DTC.
*1: Pulse is not output or is irregularly output.
*2: The vehicle speed is 50 km/h (31 mph) or more.

MONITOR STRATEGY

Related DTCs	P0717	Speed sensor (NT)/Verify pulse input
Required sensors/Components	Speed sensor (NCO), Speed sensor (NO)	
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Output shaft revolution	500 rpm or more	-
ECM selected gear	1st, 2nd, 3rd and 4th	
NSW switch	OFF	
R switch	OFF	
Engine	Running	

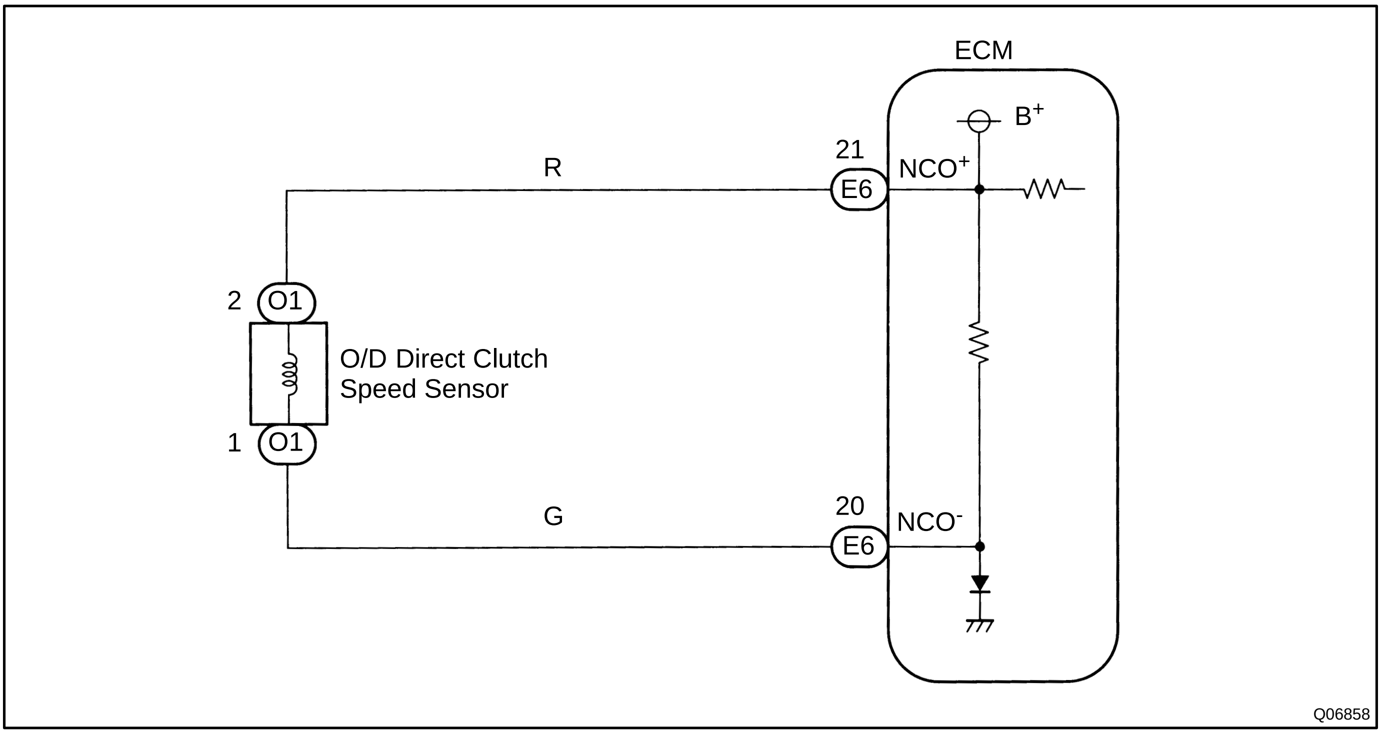
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

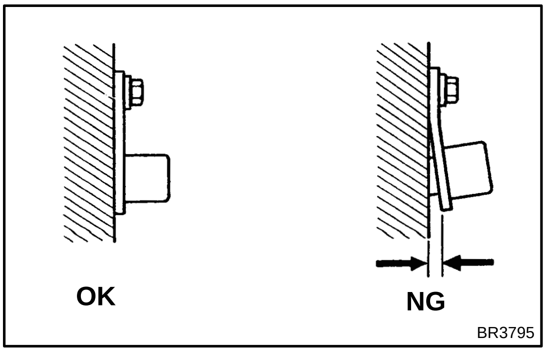
Parameter	Standard value
Speed sensor (NT)	Input speed is equal to engine speed when lock-up is ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check O/D direct clutch speed sensor (NCO) installation.



BR3795

CHECK:

Check the speed sensor installation.

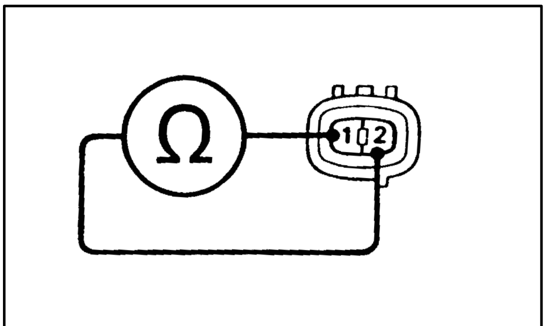
OK:

The installation bolt is tightened properly and there is no clearance between the sensor and transaxle case.

NG → **Tighten the speed sensor (NCO) properly.**

OK ↓

2	Check O/D direct clutch speed sensor (NCO) .



D13642

PREPARATION:

Remove the speed sensor (NCO) from transaxle.

CHECK:

Measure resistance between terminals 1 and 2 of speed sensor.

OK:

Resistance: 620 ± 60 Ω at 20 ˚C (68 ˚F)

NG → **Replace the O/D direct clutch speed sensor (See page AT-8).**

OK ↓

3	Check harness and connector between ECM and O/D direct clutch speed sensor (See page IN-33).

NG → **Repair or replace harness and connector.**

OK ↓

Check and replace the ECM (See page IN-33).

DI25S-07

DTC	P0724	Brake Switch ”B” Circuit High

CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling, while driving in lock-up condition, when brakes are suddenly applied.
When the brake pedal is depressed, this switch sends a signal to ECM. Then the ECM cancels operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P0724	The stop light switch does not turn off even once the vehicle is driven. (2-trip detection logic)	Short in stop light switch signal circuit Stop light switch ECM

MONITOR DESCRIPTION

When the stop light switch remains ON during ”stop and go” driving, the ECM interprets this as a fault in the stop light switch and the MIL comes on and the ECM stores the DTC. The vehicle must stop and go (3 km/h (2 mph) to 30 km/h (19 mph)) ten times for two driving cycles in order to detect malfunction.

MONITOR STRATEGY

Related DTCs	P0724	Stop light switch/Range check/Rationality
Required sensors/Components	Stop light switch, Vehicle speed sensor	
Frequency of operation	Continuous	
Duration	GO and STOP 10 times	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
The stop light switch remains on during GO and STOP 10 times. GO and STOP is defined as follows:		
GO: Vehicle speed	30 km/h (19 mph) or more	-
STOP: Vehicle speed	-	Less than 3 km/h (2 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Brake switch status	ON stuck

WIRING DIAGRAM

See page DI-821 .

INSPECTION PROCEDURE

1	**Check stop light switch (See page BE-68).**

NG → **Replace stop light switch.**

OK ↓

2	**Check harness and connector between ECM and stop light switch (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace ECM (See page IN-33).

DI25O-07

DTC	P0751	Shift Solenoid ”A” Performance (Shift Solenoid Valve S1)

DTC	P0756	Shift Solenoid ”B” Performance (Shift Solenoid Valve S2)

DTC	P0761	Shift Solenoid ”C” Performance (Shift Solenoid Valve S3)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor and input turbine speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th gear). The ECM then compares the actual gear with the shift schedule in the ECM memory to detect mechanical trouble of the shift solenoid valves, valve body and automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0751	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	✓Shift solenoid valve No.1 is stuck open or closed ✓Valve body is blocked up or stuck ✓Automatic transmission (clutch, brake or gear etc.)
P0756		✓Shift solenoid valve No.2 is stuck open or closed ✓Valve body is blocked up or stuck ✓Automatic transmission (clutch, brake or gear etc.)
P0756		✓Shift solenoid valve No.3 is stuck open or closed ✓Valve body is blocked up or stuck ✓Automatic transmission (clutch, brake or gear etc.)

MONITOR DESCRIPTION

P0751, P0756

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution, intermediate (counter) shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th, 5th, or 6th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL.

P0761

The ECM commands transmission gearshifts by turning the shift-solenoid valve ”ON/OFF”. Using the signals from the Input Speed sensor (Input shaft speed) and the Output Speed sensor (Output shaft speed or Counter shaft speed), the ECM calculates the actual gear position (1st, 2nd, 3rd, 4th, 5th, or 6th gear position). When the gear position indicated by the ECM and the actual gear position are not the same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

P0751

Related DTCs	P0751	Shift solenoid valve S1/Rationality check
		Shift solenoid valve S1/OFF malfunction
		Shift solenoid valve S1/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S1
Required sensors/Components	Sub	ECT sensor, Vehicle speed sensor (NO), MAF meter, Throttle position sensor, Input speed sensor (NCO)
Frequency of operation	Continuous	
Duration	0.4 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

P0756

Related DTCs	P0756	Shift solenoid valve S2/OFF malfunction
		Shift solenoid valve S2/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S2
Required sensors/Components	Sub	ECT sensor, Vehicle speed sensor (NO), MAF meter, Throttle position sensor, Input speed sensor (NCO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A), (B), (C) and (D) 0.4 sec. OFF malfunction (E) and (F) 1.2 sec. ON malfunction (A), (B) and (C) 0.4 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

P0761

Related DTCs	P0761	Shift solenoid valve S3/OFF malfunction
		Shift solenoid valve S3/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S3
Required sensors/Components	Sub	ECT sensor, Vehicle speed sensor (NO), MAF meter, Throttle position sensor, Input speed sensor (NCO)
Frequency of operation	Continuous	
Duration	0.4 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P0751

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
The following items are common to all conditions below		
Transmission shift position	"D"	
Spark advance from Max. retard timing by KCS control	0° CA or more	-
ECT (Engine Coolant Temperature)	40°C (104°F) or more	-
Neutral start switch circuit Shift solenoid "A" (S1) circuit Shift solenoid "B" (S2) circuit Shift solenoid "C" (S3) circuit Shift solenoid "D" (S4) circuit ECT sensor circuit	There is no malfunction in the circuits shown on the left.	
OFF malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	8% or more and 6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
OFF malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Continuous time for ECM selecting 4th gear	2 sec. or more	-
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
ON malfunction (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-

P0756

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
The following items are common to all conditions below		
Transmission shift position	"D"	
ECT (Engine Coolant Temperature)	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Neutral Start Switch circuit Shift Solenoid "A" (S1) circuit Shift Solenoid "B" (S2) circuit Shift Solenoid "C" (S3) circuit Shift Solenoid "D" (S4) circuit ECT Sensor circuit	There is no malfunction in the circuits shown on the left.	
OFF malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
OFF malfunction (B)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Continuous time for ECM selecting 4th gear	2 sec. or more	-
OFF malfunction (D)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
OFF malfunction (E)		
Torque converter clutch pressure control solenoid circuit	There is no malfunction in the circuits shown on the left.	
ECM selected gear	4th or 5th	
Vehicle speed	25 km/h (16 mph) or more	Less than 100 km/h (62 mph)
Input speed/Output speed (NC0/NO)	0.93 or more	Less than 1.07
ECM lock-up command	ON (SLU pressure: 513 kPa or more)	
Throttle valve opening angle	10% or more	-
OFF malfunction (F)		
Torque converter clutch pressure control solenoid circuit	There is no malfunction in the circuits shown on the left.	
ECM selected gear	4th or 5th	
Vehicle speed	25 km/h (16 mph) or more	Less than 100 km/h (62 mph)

Input speed/Output speed (NC0/NO)	0.00 or more	Less than 0.20
ECM lock-up command	ON (SLU pressure: 513 kPa or more)	
Throttle valve opening angle	10% or more	-
ON malfunction (A)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
ON malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	-
ON malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	

P0761

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
The following items are common to all conditions below		
Transmission shift position	"D"	
ECT (Engine Coolant Temperature)	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control.	0° CA or more	-
Neutral start switch circuit Shift solenoid "A" (S1) circuit Shift solenoid "B" (S2) circuit Shift solenoid "C" (S3) circuit Shift solenoid "D" (S4) circuit ECT sensor circuit	There is no malfunction in the circuits shown on the left.	
OFF malfunction (A)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
OFF malfunction (B)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-

Continuous time for ECM selecting 4th gear	2 sec. or more	-
OFF malfunction (D)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction (A)		
ECM selected gear	5th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at engine speed 2,000 rpm (condition varies with engine speed)	-
ON malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Continuous time for ECM selecting 4th gear	2 sec. or more	-
ON malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	

TYPICAL MALFUNCTION THRESHOLDS

P0751

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: OFF malfunction (A), (B) and (C)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
OFF malfunction (A)	
Input speed/Output speed (NC0/NO)	0.00 or more and 0.20 or less
OFF malfunction (B)	
Input speed/Output speed (NC0/NO)	0.00 or more and 0.20 or less
OFF malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
Both of the following conditions are met: ON malfunction (A) and (B)	
ON malfunction (A)	
Input speed/Output speed (NC0/NO)	3.14 or more and 7.34 or less
ON malfunction (B)	
Input speed/Output speed (NC0/NO)	3.14 or more and 7.34 or less

P0756

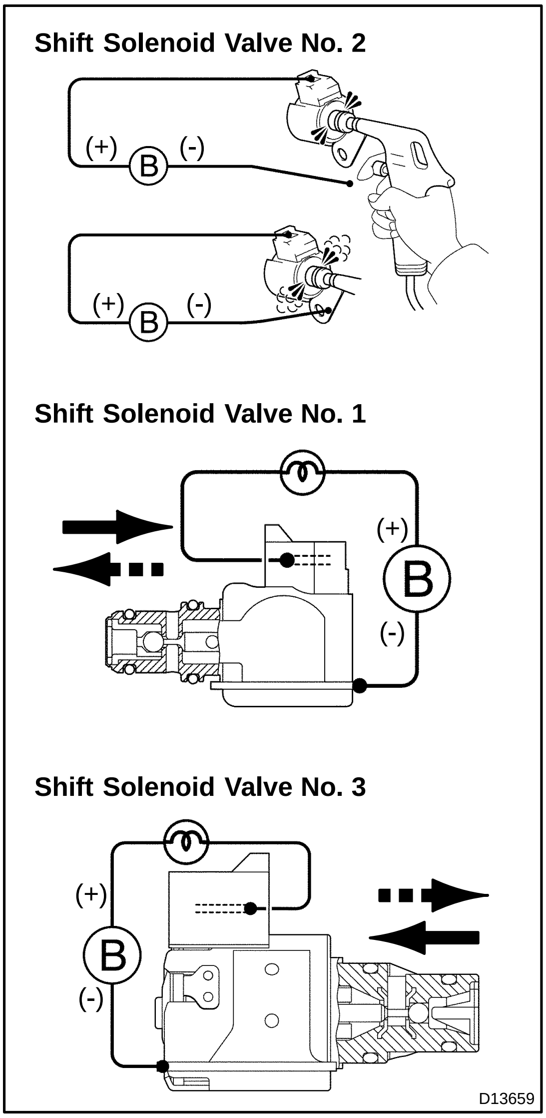
Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: OFF malfunction (A), (B), (C), (D), (E) and (F)	
OFF malfunction (A)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Input speed/Output speed (NC0/NO)	3.14 or more and 7.34 or less
OFF malfunction (B)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Input speed/Output speed (NC0/NO)	3.14 or more and 7.34 or less
OFF malfunction (C)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Input speed/Output speed (NC0/NO)	0.00 or more and 0.20 or less
OFF malfunction (D)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Output record from ECM for 4th → 5th upshifting	Recorded
OFF malfunction (E)	
|Engine speed - Input speed| (|NE - NC0|)	Less than 35 rpm
OFF malfunction (F)	
|Engine speed - Output speed x 5th gear ratio| (|NE - NO x 5th gear ratio|)	Less than 35 rpm
[ON malfunction]	
All of the following conditions are met: ON malfunction (A), (B), (C) and (D)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
ON malfunction (A)	
Input speed/Output speed (NC0/NO)	1.30 or more and 1.55 or less
ON malfunction (B)	
Input speed/Output speed (NC0/NO)	Not change as follows 0.93 or more and 1.07 or less ↓ 0.00 or more and 0.20 or less
ON malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded

P0761

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: OFF malfunction (A), (B), (C) and (D)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
OFF malfunction (A)	
Input speed/Output speed (NC0/NO)	0.00 or more and 0.20 or less
OFF malfunction (B)	
Input speed/Output speed (NC0/NO)	3.14 or more and 7.34 or less
OFF malfunction (C)	
Input speed/Output speed (NC0/NO)	Not change as follows 0.93 or more and 1.07 or less ↓ 0.00 or more and 0.20 or less
OFF malfunction (D)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
All of the following conditions are met: ON malfunction (A), (B) and (C)	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
ON malfunction (A)	
Input speed/Output speed (NC0/NO)	0.93 or more and 1.07 or less
ON malfunction (B)	
Input speed/Output speed (NC0/NO)	Not change as follows 0.93 or more and 1.07 or less ↓ 0.00 or more and 0.20 or less
ON malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded

INSPECTION PROCEDURE

1	Check shift solenoid valve No. 1, No. 2 or No. 3 operation.



PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve No. 1, No. 2 or No. 3 (See page AT-13).

CHECK:

Shift solenoid valve No. 2:

(a) Applying 490 kPa (5 kgf/cm^2, 71 psi) of compressed air, check that the solenoid valves do not leak air.

(b) When battery voltage is supplied to the shift solenoid valves, check that the solenoid valves are open.

Shift solenoid valve No. 1 and No. 3:

Connect the positive (+) lead with 8 to 10 W bulb to terminal 2 and the negative (-) lead to terminal 1, then check the movement of the valve.

OK:

When B$^+$ is applied.	Valve moves in ← direction in illustration on the left.
When B$^+$ is cut off.	Valve moves in ■■→ direction in illustration on the left.

NG	Replace the shift solenoid valve No. 1, No. 2 or No. 3 (See page AT-13).

OK

2	Check valve body (See page DI-356).

NG — Repair or replace the valve body (See page AT-13).

OK

Replace the transmission (See page AT-31).

DI25P-05

DTC	P0973	Shift Solenoid ”A” Control Circuit Low (Shift Solenoid Valve S1)

DTC	P0974	Shift Solenoid ”A” Control Circuit High (Shift Solenoid Valve S1)

DTC	P0976	Shift Solenoid ”B” Control Circuit Low (Shift Solenoid Valve S2)

DTC	P0977	Shift Solenoid ”B” Control Circuit High (Shift Solenoid Valve S2)

DTC	P0979	Shift Solenoid ”C” Control Circuit Low (Shift Solenoid Valve S3)

DTC	P0980	Shift Solenoid ”C” Control Circuit High (Shift Solenoid Valve S3)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ON and OFF of the shift solenoid valves No. 1, No. 2 and No. 3 controlled by ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

HINT:

Check the shift solenoid valve No. 1 when DTCs P0973 and P0974 are output, check the shift solenoid valve No. 2 when DTCs P0976 and P0977 are output and check the shift solenoid valve No. 3 when DTCs P0979 and P0980 are output.

DTC No.	DTC Detection Condition	Trouble Area
P0973	ECM detects short in solenoid valve No. 1 circuit 2 times when solenoid valve No. 1 is operated (1-trip detection logic)	✓Short in shift solenoid valve No. 1 circuit ✓Shift solenoid valve No. 1 ✓ECM
P0974	ECM detects open in solenoid valve No. 1 circuit 2 times when solenoid valve No. 1 is not operated (1-trip detection logic)	✓Open in shift solenoid valve No. 1 circuit ✓Shift solenoid valve No. 1 ✓ECM
P0976	ECM detects short in solenoid valve No. 2 circuit 2 times when solenoid valve No. 2 is operated (1-trip detection logic)	✓Short in shift solenoid valve No. 2 circuit ✓Shift solenoid valve No. 2 ✓ECM
P0977	ECM detects open in solenoid valve No. 2 circuit 2 times when solenoid valve No. 2 is not operated (1-trip detection logic)	✓Open in shift solenoid valve No. 2 circuit ✓Shift solenoid valve No. 2 ✓ECM
P0979	ECM detects short in solenoid valve No. 3 circuit 2 times when solenoid valve No. 3 is operated (1-trip detection logic)	✓Short in shift solenoid valve No. 3 circuit ✓Shift solenoid valve No. 3 ✓ECM
P0980	ECM detects open in solenoid valve No. 3 circuit 2 times when solenoid valve No. 3 is not operated (1-trip detection logic)	✓Open in shift solenoid valve No. 3 circuit ✓Shift solenoid valve No. 3 ✓ECM

Fail Safe Function:
If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid ON and OFF to shift to the gear positions shown in the table below. The ECM also turns the shift solenoid valve SL OFF at the same time. If both solenoids are malfunctioning, hydraulic control cannot be performed electronically and must be done manually.
Manual shifting as shown in the following table must be done (In the case of a short circuit, the ECM stops sending current to the short circuited solenoid).

Position	Normal				Shift Solenoid No. 1 Malfunction				Shift Solenoid No. 2 Malfunction				Shift Solenoid No. 3 Malfunction			
	Shift Solenoid No. 1	Shift Solenoid No. 2	Shift Solenoid No. 3	Gear	Shift Solenoid No. 1	Shift Solenoid No. 2	Shift Solenoid No. 3	Gear	Shift Solenoid No. 1	Shift Solenoid No. 2	Shift Solenoid No. 3	Gear	Shift Solenoid No. 1	Shift Solenoid No. 2	Shift Solenoid No. 3	Gear
D	ON	OFF	OFF	1	X	OFF→ON	OFF	5→3	ON	X	OFF	1	ON	OFF	X	1
	OFF	ON	OFF	3	X	ON	OFF	3	OFF	X	OFF→ON	5→4	OFF	ON	X	3
	OFF	OFF	ON	4	X	OFF	ON	4	OFF	X	ON	4	OFF	OFF	X	5
	OFF	OFF	OFF	5	X	OFF	OFF	5	OFF	X	OFF	5	OFF	OFF	X	5
4	ON	OFF	OFF	1	X	OFF→ON	OFF	5→3	ON	X	OFF	1	ON	OFF	X	1
	OFF	ON	OFF	3	X	ON	OFF	3	OFF	X	OFF→ON	5→4	OFF	ON	X	3
	OFF	OFF	ON	4	X	OFF	ON	4	OFF	X	ON	4	OFF	OFF	X	5
3	ON	OFF	OFF	1	X	OFF→ON	OFF→ON	4→3	ON	X	OFF	1	ON	OFF	X	1
	OFF	ON	ON	3	X	ON	ON	3	OFF	X	ON	4	OFF	ON	X	3
	OFF	OFF	ON	4	X	OFF	ON	4	OFF	X	ON	4	OFF	OFF	X	4
2	ON	OFF	ON	1	X	OFF→ON	ON	3	ON	X	ON	1	ON	OFF	X	1
	OFF	ON	ON	3	X	ON	ON	3	OFF	X	ON	3	OFF	ON	X	3
L	ON	OFF	OFF	1	X	OFF→ON	OFF→ON	3	ON	X	OFF	1	ON	OFF	X	1

Position	Shift Solenoid No. 1 and No. 2 Malfunction				Shift Solenoid No. 1 and No. 3 Malfunction				Shift Solenoid No. 2 and No. 3 Malfunction				Shift Solenoid No. 1, No. 2 and No. 3 Malfunction			
	Shift Solenoid No. 1	Shift Solenoid No. 2	Shift Solenoid No. 3	Gear	Shift Solenoid No. 1	Shift Solenoid No. 2	Shift Solenoid No. 3	Gear	Shift Solenoid No. 1	Shift Solenoid No. 2	Shift Solenoid No. 3	Gear	Shift Solenoid No. 1	Shift Solenoid No. 2	Shift Solenoid No. 3	Gear
D	X	X	OFF→ON	5→4	X	OFF→ON	X	5→3	ON	X	X	1	X	X	X	5
	X	X	OFF→ON	5→4	X	ON	X	3	OFF	X	X	5	X	X	X	5
	X	X	ON	4	X	OFF	X	5	OFF	X	X	5	X	X	X	5
	X	X	OFF	5	X	OFF	X	5	OFF	X	X	5	X	X	X	5
4	X	X	OFF→ON	5→4	X	OFF→ON	X	5→3	ON	X	X	1	X	X	X	5
	X	X	OFF→ON	5→4	X	ON	X	3	OFF	X	X	5	X	X	X	5
	X	X	ON	4	X	OFF	X	5	OFF	X	X	5	X	X	X	5
3	X	X	OFF→ON	4	X	OFF→ON	X	4 → 3	ON	X	X	1	X	X	X	4
	X	X	ON	4	X	ON	X	3	OFF	X	X	4	X	X	X	4
	X	X	ON	4	X	OFF	X	4	OFF	X	X	4	X	X	X	4
2	X	X	OFF→ON	3	X	OFF→ON	X	3	ON	X	X	1	X	X	X	3
	X	X	ON	3	X	ON	X	3	OFF	X	X	3	X	X	X	3
L	X	X	OFF→ON	3	X	OFF→ON	X	3	ON	X	X	1	X	X	X	3

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves ”ON/OFF.”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF.” (In case of an open or short circuit, the ECM stops sending current to the circuit.)

MONITOR STRATEGY

Related DTCs	P0973	Shift solenoid valve S1/Range check (Low resistance)
	P0974	Shift solenoid valve S1/Range check (High resistance)
	P0976	Shift solenoid valve S2/Range check (Low resistance)
	P0977	Shift solenoid valve S2/Range check (High resistance)
	P0979	Shift solenoid valve S3/Range check (Low resistance)
	P0980	Shift solenoid valve S3/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S1 (P0973/P0974), Shift solenoid valve S2 (P0976/P0977), Shift solenoid valve S3 (P0979/P0980)	
Frequency of operation	Continuous	
Duration	0.1 sec. x 2 (times) or more	
MIL operation	1 driving cycle	
Sequence of operation	None	

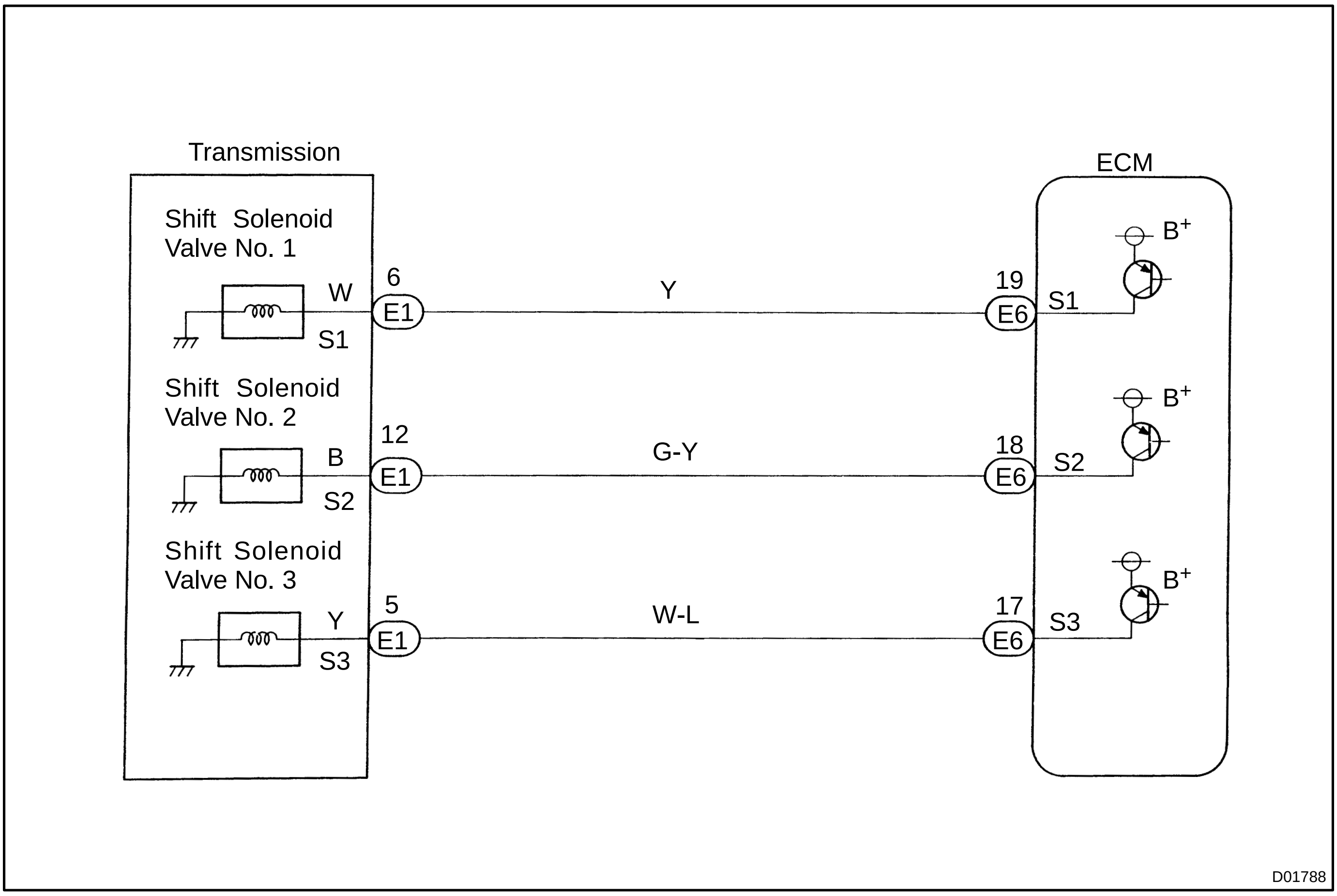
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Range check (Low resistance)		
Solenoid	ON	
Range check (High resistance)		
Solenoid	OFF	

TYPICAL MALFUNCTION THRESHOLDS

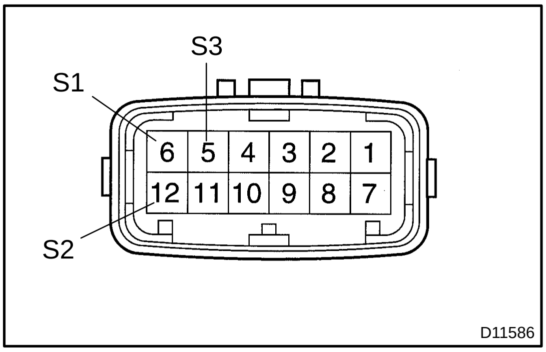
Detection criteria	Threshold
Range check (Low resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is operating	Fail at solenoid resistance: 8 Ω or less
Range check (High resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is not operating	Fail at solenoid resistance: 100 kΩ or more

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.



PREPARATION:
Disconnect the transmission wire connector.

CHECK:
Measure resistance between S1, S2 or S 3 of transmission wire and body ground.

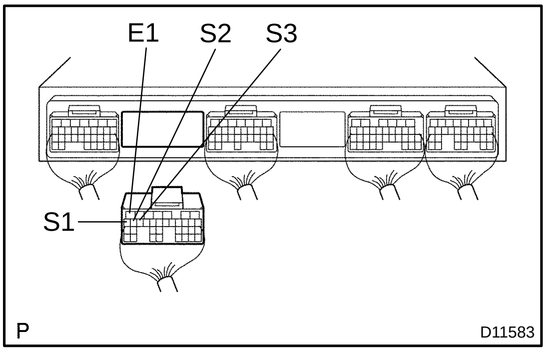
OK:

Resistance: 11 to 15 Ω at 20 °C (68 °F)

NG → **Go to step 3.**

OK

2	Measure resistance between terminal S1, S2 or S 3 of ECM and body ground.



PREPARATION:
(a) Connect the transmission wire connector.
(b) Remove the ECM hood.
(c) Disconnect the connector from ECM.

CHECK:
Measure resistance between terminal S1, S2 or S 3 and E1 of ECM.

OK:

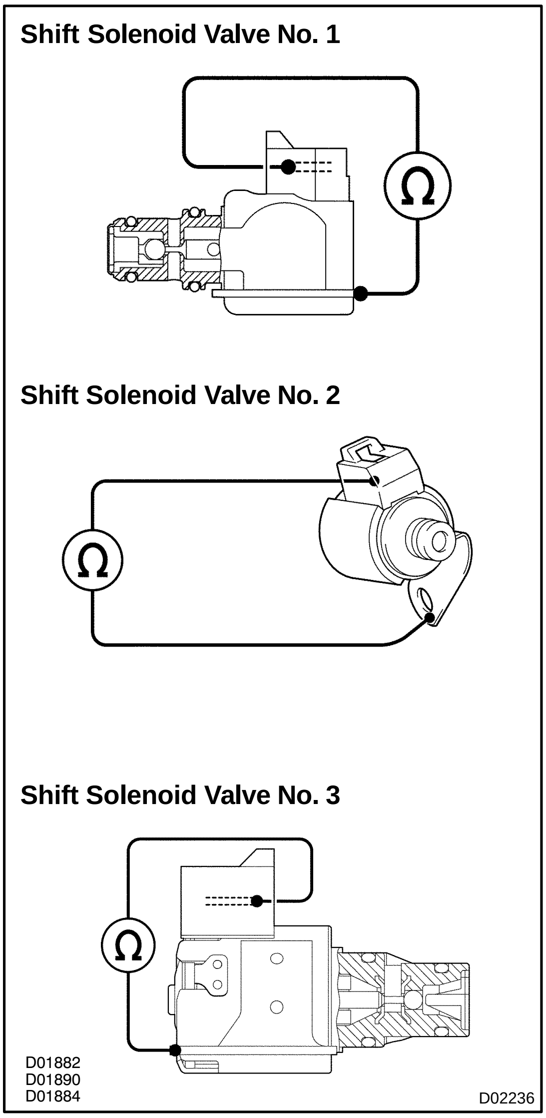
Resistance: 11 to 15 Ω at 20 °C (68 °F)

OK → **Check and replace the ECM (See page IN-33).**

NG

Repair or replace the harness or connector (See page IN-33).

3	Check shift solenoid valve No. 1, No. 2 or No. 3.



PREPARATION:

Remove the shift solenoid valve No. 1, No. 2 or No. 3 (See page AT-13).

CHECK:

(a) Measure resistance between solenoid connector and body ground.

(b) Connect positive ⊕ lead to terminal of solenoid connector, negative ⊖ lead to solenoid body.

OK:

(a) Resistance: 11 to 15 Ω at 20 °C (68 °F)

(b) The solenoid makes an operating noise.

NG → **Replace the shift solenoid valve (See page AT-13).**

OK

Repair or replace the transmission wire (See page AT-9).

DI25Q-05

DTC	P0982	Shift Solenoid ”D” Control Circuit Low (Shift Solenoid Valve S4)

DTC	P0983	Shift Solenoid ”D” Control Circuit High (Shift Solenoid Valve S4)

CIRCUIT DESCRIPTION

Shift solenoid valve No. 4 is controlled by ECM and it switches ON and OFF of the O/D direct switch.

DTC No.	DTC Detection Condition	Trouble Area
P0982	ECM detects short in solenoid valve S4 circuit 2 times when solenoid valve SR is operated (1-trip detection logic)	✓Short in shift solenoid valve S4 circuit ✓Shift solenoid valve S4 ✓ECM
P0983	ECM detects open in solenoid valve S4 circuit 2 times when solenoid valve SR is not operated (1-trip detection logic)	✓Open in shift solenoid valve S4 circuit ✓Shift solenoid valve S4 ✓ECM

MONITOR DESCRIPTION

The ECM commands gearshift by turning the shift solenoid valves ”ON/OFF”. When there is an open or short circuit in any shift solenoid valve circuit, the ECM detects the problem and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.).

MONITOR STRATEGY

Related DTCs	P0982	Shift solenoid valve S4/Range check (Low resistance)
	P0983	Shift solenoid valve S4/Range check (High resistance)
Required sensors/Components	Shift solenoid valve S4	
Frequency of operation	Continuous	
Duration	0.1 sec x 2 (times) or more	
MIL operation	1 driving cycle	
Sequence of operation	None	

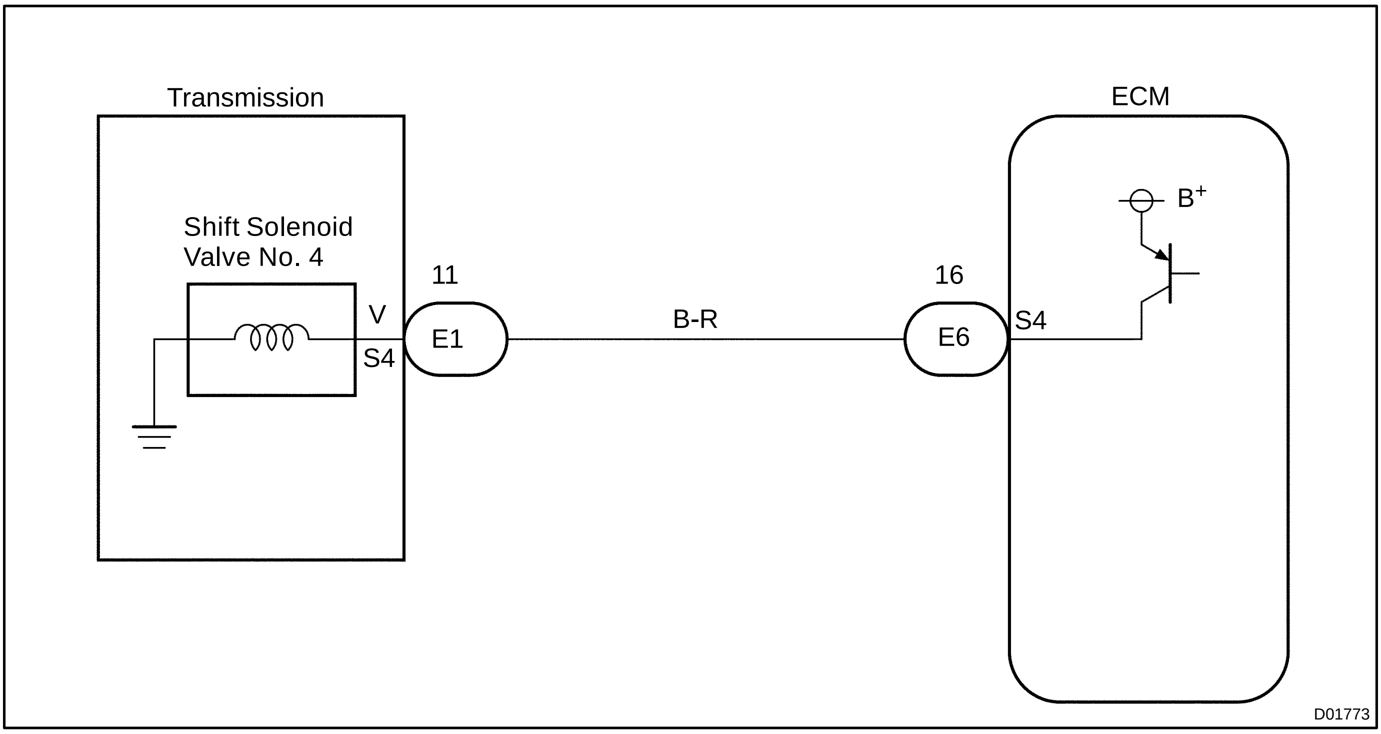
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Low resistance		
Solenoid	ON	
High resistance		
Solenoid	OFF	

TYPICAL MALFUNCTION THRESHOLDS

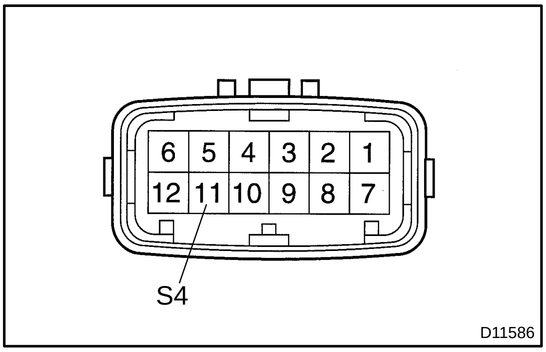
Detection criteria	Threshold
Range check (Low resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is operating.	Fail at solenoid resistance: 8 Ω or less
Range check (High resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is not operating.	Fail at solenoid resistance: 100 kΩ or more

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

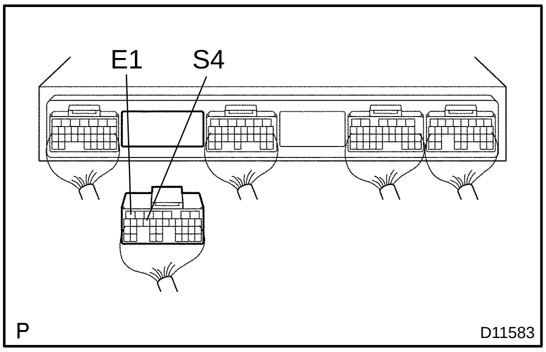


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between S4 of transmission wire and body ground.
OK:
Resistance: 11 to 15 Ω at 20 °C (68 °F)

NG	Go to step 3.

OK

2	Measure resistance between terminals S4 of ECM and body ground.



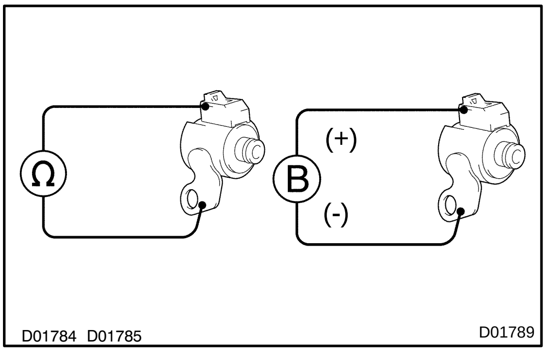
PREPARATION:
(a) Connect the transmission wire connector.
(b) Remove the ECM hood.
(c) Disconnect the connector from ECM.
CHECK:
Measure resistance between terminals S4 and E1 of ECM.
OK:
Resistance: 11 to 15 Ω at 20 °C (68 °F)

NG	Repair or replace the harness or connector (See page IN-33).

OK

Check and replace the ECM (See page IN-33).

3	**Check shift solenoid valve No. 4.**



PREPARATION:

Remove the shift solenoid valve No. 4 (See page AT-13).

CHECK:

(a) Measure resistance between terminal and solenoid body.

(b) Connect positive (+) lead to terminal of solenoid connector and negative (-) lead to solenoid body.

OK:

(a) Resistance: 11 to 15 Ω at 20 °C (68 °F)

(b) The solenoid makes an operating noise.

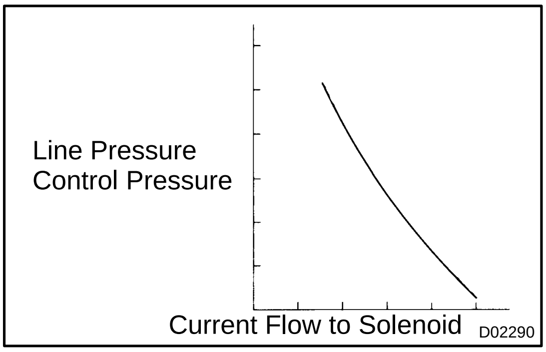
NG → **Replace the shift solenoid valve No. 4 (See page AT-13).**

OK

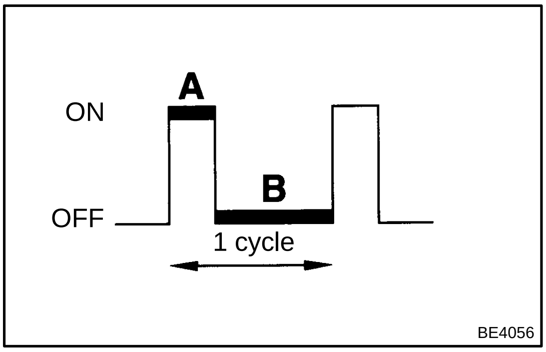
Repair or replace the transmission wire (See page AT-9).

DI9IZ-03

DTC	P2716	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)



D02290



BE4056

CIRCUIT DESCRIPTION

The throttle pressure that is applied to the primary regulator valve (which modulates line pressure) causes the solenoid valve SLT, under electronic control, to precisely and minutely modulate and generate line pressure according to the accelerator pedal effort, or engine power output detected.

This controls the line pressure and provides smooth shifting characteristics.

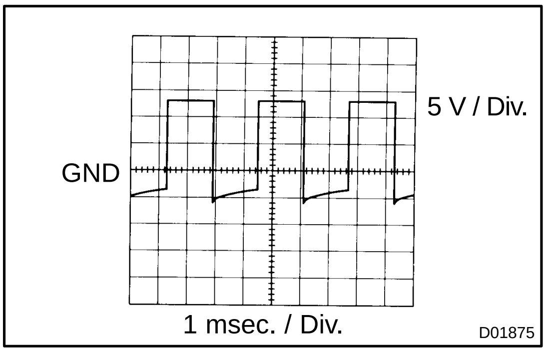
Upon receiving the throttle valve opening angle signal, ECM controls the line pressure by sending a predetermined (*) duty ratio to the solenoid valve, modulating the line pressure, and generating throttle pressure.

(*) Duty Ratio:

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

DTC No.	DTC Detection Condition	Trouble Area
P2716	ECM detects solenoid SLT circuit malfunction for 1 sec. or more (1-trip detection logic)	✓Open or short in shift solenoid valve SLT circuit ✓Shift solenoid valve SLT ✓ECM



D01875

Reference:

Refer to the chart for the waveform between terminals SLT^+ and SLT^- during engine idling.

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the ECM interprets this as a fault. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2716	Shift solenoid valve SLT/Range check
Required sensors/Components	Shift solenoid valve SLT	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Solenoid current cut status	Not cut	
Battery voltage	11 V or more	-
Target current	0.1 A or more	-

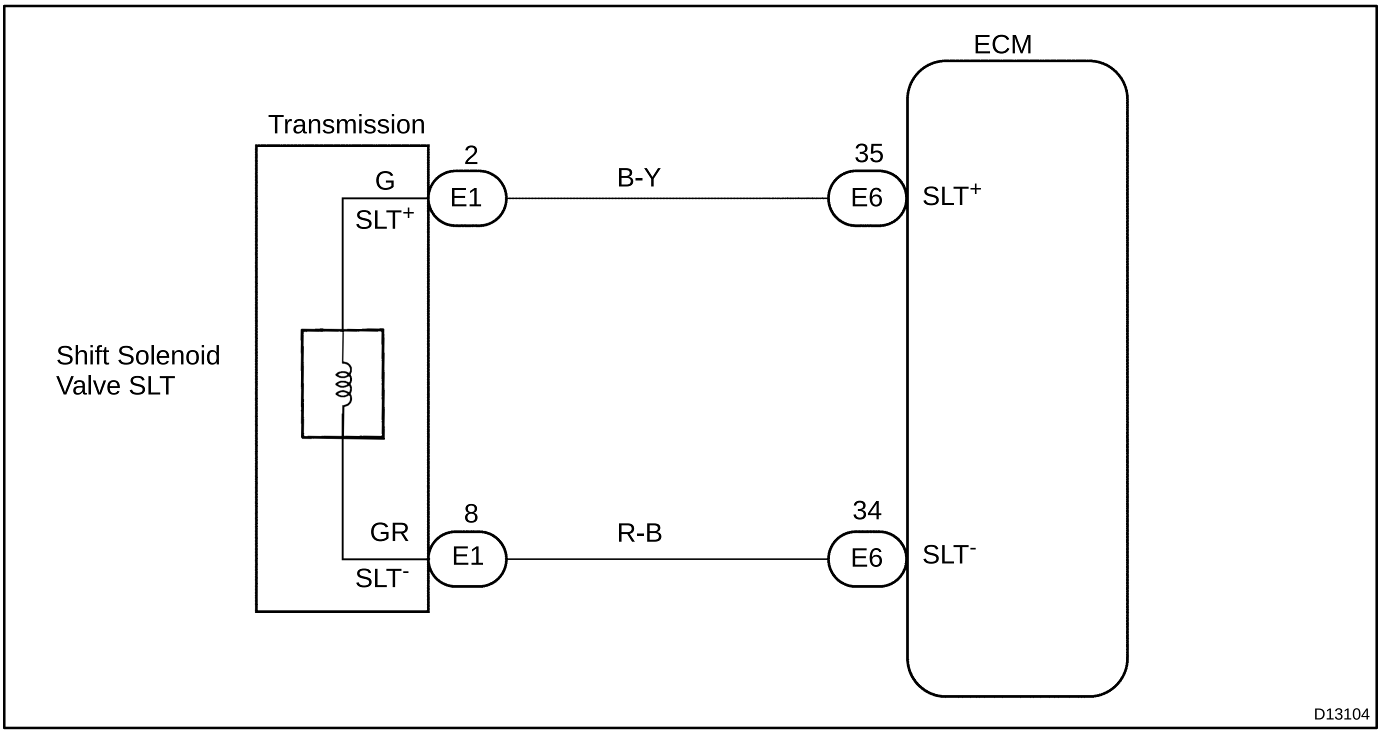
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

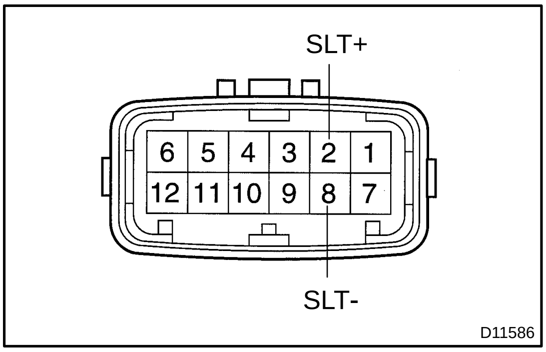
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

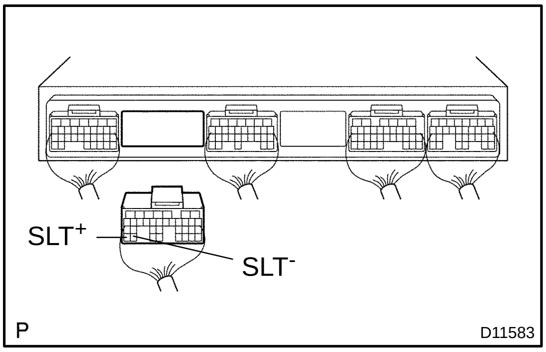


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between SLT+ and SLT- of transmission wire.
OK:
Resistance: 5.0 to 5.6 Ω at 20 °C (68°F)
CHECK:
Measure resistance between terminals SLT^{+} and SLT^{-} of the transmission wire connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG	Go to step 3.

OK

2	Measure resistance between terminals SLT^{+} and SLT^{-} of ECM connector.



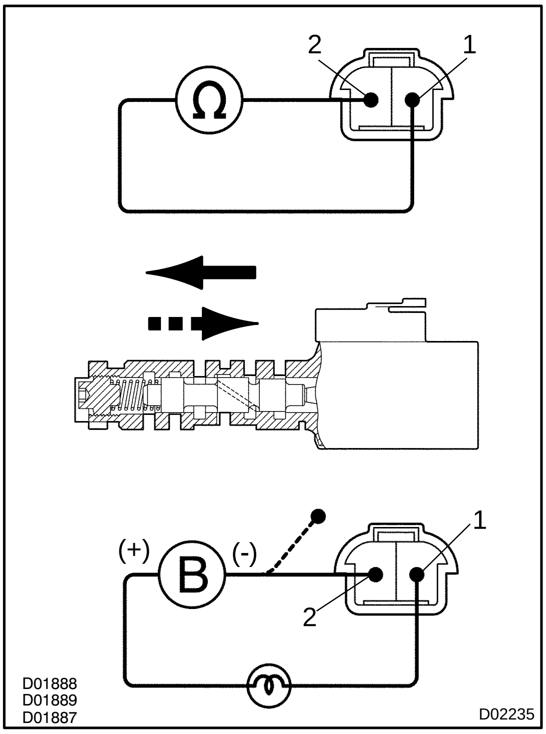
PREPARATION:
(a) Connect the transmission wire connector.
(b) Remove the ECM hood.
(c) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals SLT^{+} and SLT^{-} of ECM connector.
OK:
Resistance: 5.0 to 5.6 Ω at 20 °C (68°F)
Measure resistance between terminals SLT^{+} and SLT^{-} of the ECM connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG	Repair or replace the harness or connector (See page IN-33).

OK

Check and replace the ECM (See page IN-33).

3	**Check shift solenoid valve SLT.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Disconnect the solenoid connector.

Check solenoid resistance:

CHECK:

Measure resistance between terminals 1 and 2 of solenoid connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20 °C (68°F)

Check solenoid operation:

CHECK:

Connect positive (+) lead with an 8 to 10 W bulb to terminal 1 of solenoid connector and negative (-) lead to terminal 2, then check the movement of the valve.

OK:

When battery positive voltage is applied.	Valve moves in direction in the illustration on the left.
When battery positive voltage is cut off.	Valve moves in direction in the illustration on the left.

NG → **Replace the shift solenoid valve SLT (See page AT-13).**

OK

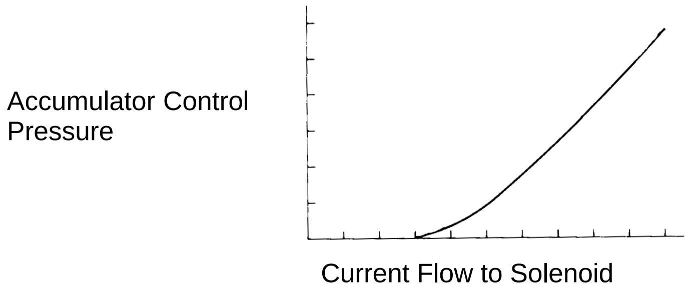
Repair or replace the transmission wire (See page AT-9).

DI9J0-03

DTC	P2725	Pressure Control Solenoid "E" Electrical (Shift Solenoid Valve SLN)

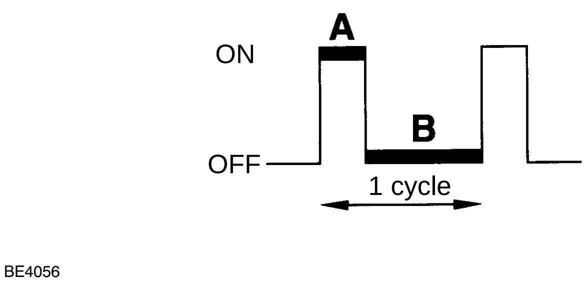
CIRCUIT DESCRIPTION

The shift solenoid valve SLN controls the hydraulic pressure acting on the accumulator control valve when gears are shifted and performs smooth gear shifting. The ECM determines optimum operating pressure according to the signals from the throttle position sensor, vehicle speed sensor and direct clutch speed sensor and controls the volume of current flow to the solenoid valve. The amount of current to the solenoid is controlled by the (*) duty ratio of ECM output signals, causing a momentary charge to the hydraulic pressure acting on the clutches during gear shifting .
When the duty ratio is high, the hydraulic pressure acting on the clutches is low.



D02291

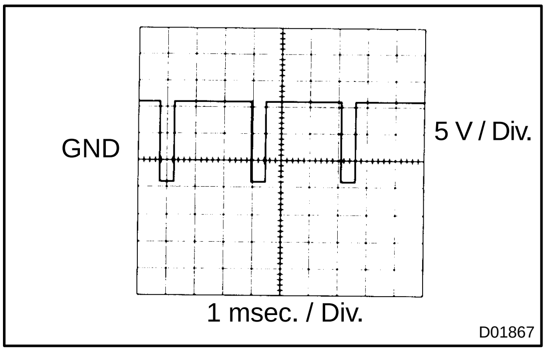
(*) Duty Ratio
The duty ratio is the ratio of the period of continuity in one cycle.
For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then



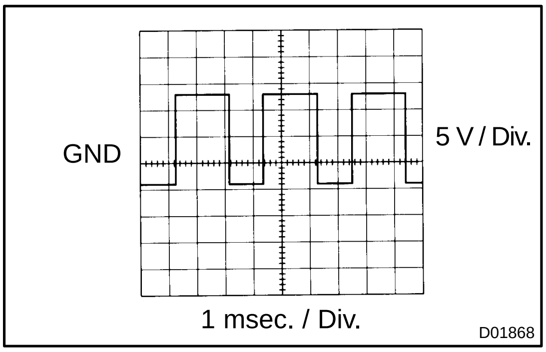
$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

D02292

DTC No	DTC Detecting Condition	Trouble Area
P2725	ECM detects solenoid valve SLU circuit malfunction for 1 sec. or more	• Open or short in shift solenoid valve SLN circuit • Shift solenoid valve SLN • ECM



Reference:
Refer to the chart for the waveform between terminals SLN- and E1 when engine is idling.



Refer to the chart for the waveform between terminals SLN- and E1 during shift change.

MONITOR DESCRIPTION

The shift solenoid valve SLN controls the oil pressure to the accumulator control valve to reduce transmission gearshift shock.
The ECM judges the appropriate oil pressure based on the signals from the throttle position sensor, the output speed sensor and the input speed sensor, and adjusts the oil pressure by sending a duty-ratio signal to the shift solenoid valve SLN.
The ECM illuminates the MIL and stores the DTC when it detects an open or a short circuit malfunction in the shift solenoid valve SLN.

MONITOR STRATEGY

Related DTCs	P2725	Shift solenoid valve SLN/Range check
Required sensors/Components	Shift solenoid valve SLN	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Solenoid current cut status	Not cut	
Battery voltage	11 V or more	-
Target current	0.1 A or more	-

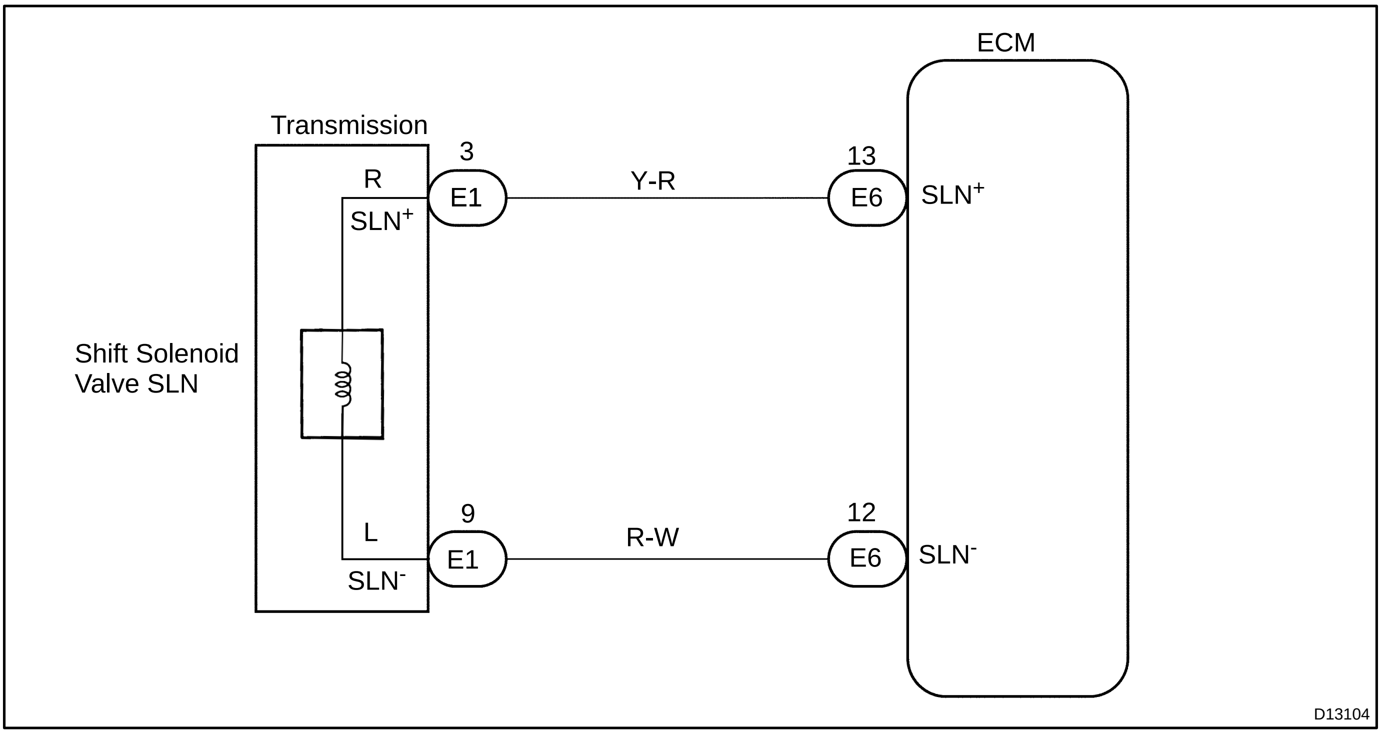
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

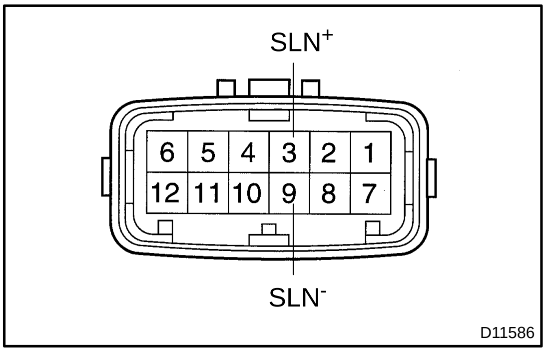
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transmission wire.**



PREPARATION:

Disconnect the transmission wire connector.

CHECK:

Measure resistance between SLN+ and SLN- of transmission wire.

OK:

Resistance: 5.0 to 5.6 Ω at 20 °C (68°F)

CHECK:

Measure resistance between terminals SLN^+ and SLN^- of the transmission wire connector and body ground.

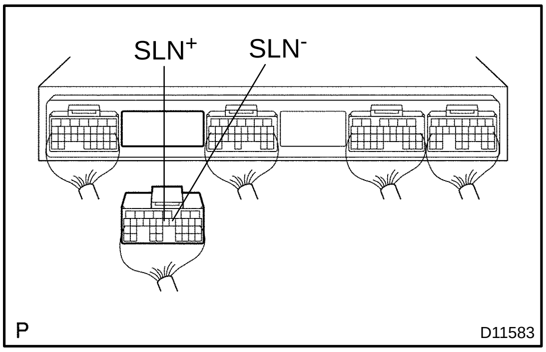
OK:

Resistance: 1 MΩ or higher

NG	**Go to step 3.**

OK

2	**Measure resistance between terminals SLN^+ and SLN^- of ECM connector.**



PREPARATION:

(a) Connect the transmission wire connector.
(b) Remove the ECM hood.
(c) Disconnect the connector of the ECM.

CHECK:

Measure resistance between terminals SLN^+ and SLN^- of ECM connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20 °C (68°F)

CHECK:

Measure resistance between terminals SLN^+ and SLN^- of the ECM connector and body ground.

OK:

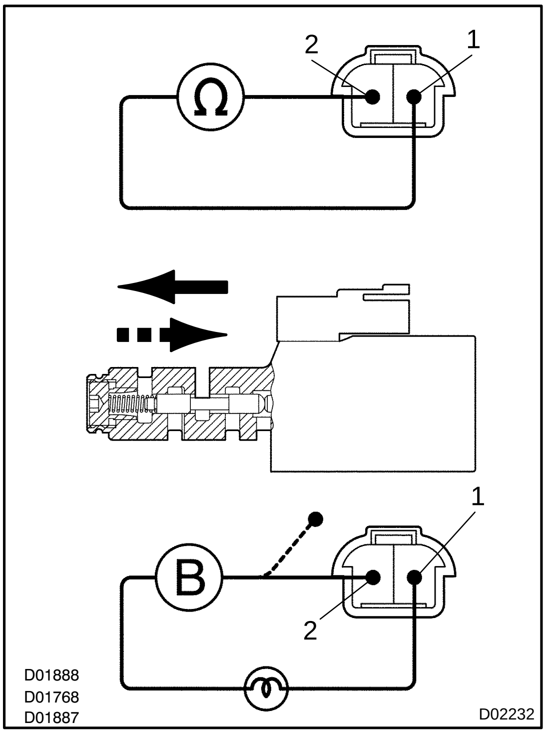
Resistance: 1 MΩ or higher

NG	**Repair or replace the harness or connector (See page IN-33).**

OK

Check and replace the ECM (See page IN-33).

3	Check shift solenoid valve SLN.



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the oil pan.

(c) Disconnect the solenoid connector.

Check solenoid resistance:

CHECK:

Measure resistance between terminals 1 and 2 of solenoid connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20 °C (68 °F)

Check solenoid operation:

CHECK:

Connect positive (+) lead with an 8 to 10 W bulb to terminal 1 of solenoid connector and negative (-) lead to terminal 2, then check the movement of the valve.

OK:

When battery positive voltage is applied.	Valve moves in direction in the illustration on the left.
When battery positive voltage is cut off.	Valve moves in direction in the illustration on the left.

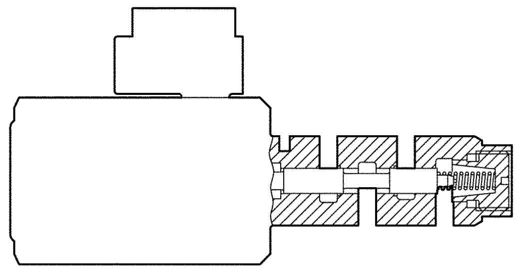
NG	**Replace the shift solenoid valve SLN (See page AT-13).**

OK

Repair or replace the transmission wire (See page AT-9).

DI9IX-03

DTC	P2757	Torque Converter Clutch Pressure Control Solenoid Performance(Shift Solenoid Valve SLU)


D01769

SYSTEM DESCRIPTION

The ECM uses the signals from the Throttle Position Sensor and Air-flow Meter to monitor the engagement condition of the lock-up clutch.
Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect mechanical trouble of the shift solenoid valve SLU, valve body, torque converter clutch and automatic transmission assembly (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P2757	Lock-up does not occur when driving in the lock-up range (normal driving at 80 km/h [50 mph]), or lock-up remains ON in the lock-up OFF range. (2-trip detection logic)	✓Shift solenoid valve SLU is stuck open or closed ✓Valve body blocked up or stuck ✓Lock-up clutch ✓Automatic transmission assembly

MONITOR DESCRIPTION

The ECM controls the oil pressure to the lock-up clutch based on engine-load information from the throttle position sensor, crankshaft position sensor, input speed sensor, and the oil pressure sensor for shift-solenoid SLU. The ECM commands the shift-solenoid SLU using a duty-cycle control signal. In turn, the shift solenoid operates the lock-up control valve and causes lock-up or flexible lock-up of the torque converter clutch.
To monitor the condition of the lock up clutch, the ECM monitors the signals from the input speed sensor, crank position sensor, the throttle position sensor, and air flow meter. The ECM uses this information to determine when the vehicle's torque converter clutch should be locked-up. The ECM can detect many mechanical problems in the shift solenoids, valve body, and the transmission clutches, brakes, and gears. If the ECM detects that the torque converter clutch locked below the minimum lock-up speed, it will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2757	Shift solenoid valve SLU/OFF malfunction
		Shift solenoid valve SLU/OFF malfunction
Require sensors/Components	Main	Shift solenoid valve SLU, valve body
Require sensors/Components	Sub	ECT sensor, MAF meter, Vehicle speed sensor (NO), Throttle position sensor, Input speed sensor (NCO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A)	2 sec.
	OFF malfunction (B)	0.5 sec.
	ON malfunction	1.8 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following items are common to all conditions below:		
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Transmission shift position	"D"	
ECT (Engine coolant temperature)	40°C or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Neutral Start Switch circuit	There is no malfunction in the circuit shown on the left.	
Shift Solenoid "A" (S1) circuit		
Shift Solenoid "B" (S2) circuit		
Shift Solenoid "C" (S3) circuit		
Shift Solenoid "D" (S4) circuit		
ECT Sensor circuit		
Torque Converter Clutch Pressure Control Solenoid circuit		
ECM selected gear	4th or 5th	
Vehicle speed	25 km/h (16 mph) or more	-
OFF malfunction (A)		
ECM lock-up command	ON (SLU duty: 90% or more)	
Intake air amount per revolution	0.4 g/rev or more (A/C OFF) 0.6 g/rev or more (A/C ON)	-
Vehicle speed	-	Less than 100 km/h (62 mph)
OFF malfunction (B)		
ECM selected gear	3rd	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions varies with engine speed)	-
Intake air amount per revolution	0.2 g/rev or more	-
ON malfunction		

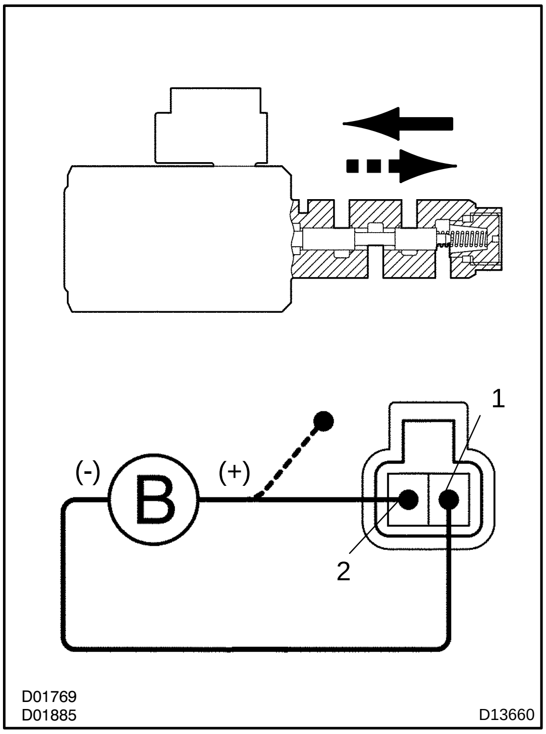
ECM lock-up command	OFF (SLU duty: Less than 10%)	
Throttle valve opening angle	8% or more	-
Vehicle speed	-	Less than 60 km/h (37 mph)
Intake air amount per revolution	0.4 g/rev or more (A/C OFF) 0.6 g/rev or more (A/C ON)	-

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
[OFF malfunction]	
Both of the following conditions are met: OFF malfunction (A) and (B)	
OFF malfunction (A)	
Engine speed - Output speed x 5th gear ratio (NE-NO x 5th gear ratio)	150 rpm or more
OFF malfunction (B)	
Input speed/Output speed (NC0/NO)	not 3.14 or more and 7.34 or less
[ON malfunction]	
2 detections are necessary per driving cycle: 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Vehicle speed must be under 10 km/h (6 mph) once before 2nd detection	
|Engine speed - Input speed| (|NE-NC0|)	Less than 35 rpm

INSPECTION PROCEDURE

1	**Check shift solenoid valve SLU operation.**



PREPARATION:

(a) Remove the oil pan.

(b) Remove the shift solenoid valve SLU.

CHECK:

Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1.

OK:

When B^+ is applied.	Valve moves in direction in illustration on the left.
When B^+ is cut off.	Valve moves in direction in illustration on the left.

NG → **Replace the shift solenoid valve SLU (See page AT-13).**

OK

2	**Check valve body (See page DI-356).**

NG → **Replace the valve body (See page AT-13).**

OK

3	**Check torque converter clutch (See page AT-35).**

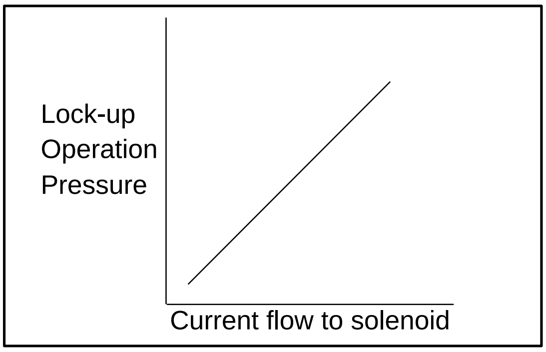
OK → **Repair or replace transmission (See page AT-31).**

NG

Replace the torque converter clutch.

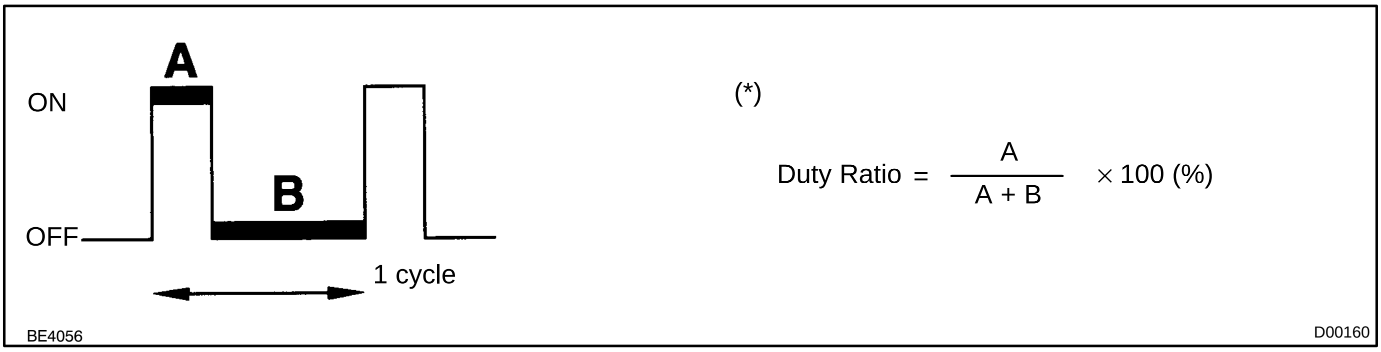
DI9IY-03

DTC	P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical(Shift Solenoid Valve SLU)



CIRCUIT DESCRIPTION

The amount of current flow to the solenoid is controlled by the (*) duty ratio of the ECM output signal. The higher the duty ratio becomes, the higher the lock-up hydraulic pressure becomes during the lock-up operation.
(*) Duty Ratio
The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then



DTC No.	DTC detection condition	Trouble Area
P2759	ECM detects solenoid valve SLU circuit malfunction for 1 sec. or more	Open or short in shift solenoid valve SLU circuit Shift solenoid valve SLU ECM

MONITOR DESCRIPTION

The ECM controls the oil pressure to the lock-up clutch based on engine-load information from the throttle position sensor, crankshaft position sensor, input speed sensor, and the oil pressure sensor for shift-solenoid SLU. The ECM commands the shift-solenoid SLU using a duty-cycle control signal. In turn, the shift solenoid operates the lock-up control valve and cause lock-up or flexible lock-up of the torque converter clutch. The ECM illuminates the MIL and stores the DTC when ECM detects an open or a short circuit malfunction in the shift solenoid valve SLU.

MONITOR STRATEGY

Related DTCs	P2759	Shift solenoid valve SLU/Range check
Required sensors/Components	Shift solenoid valve SLU	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-328	
Solenoid current cut status	Not cut	
Battery voltage	11 V or more	-
Target current	0.1 A or more	-

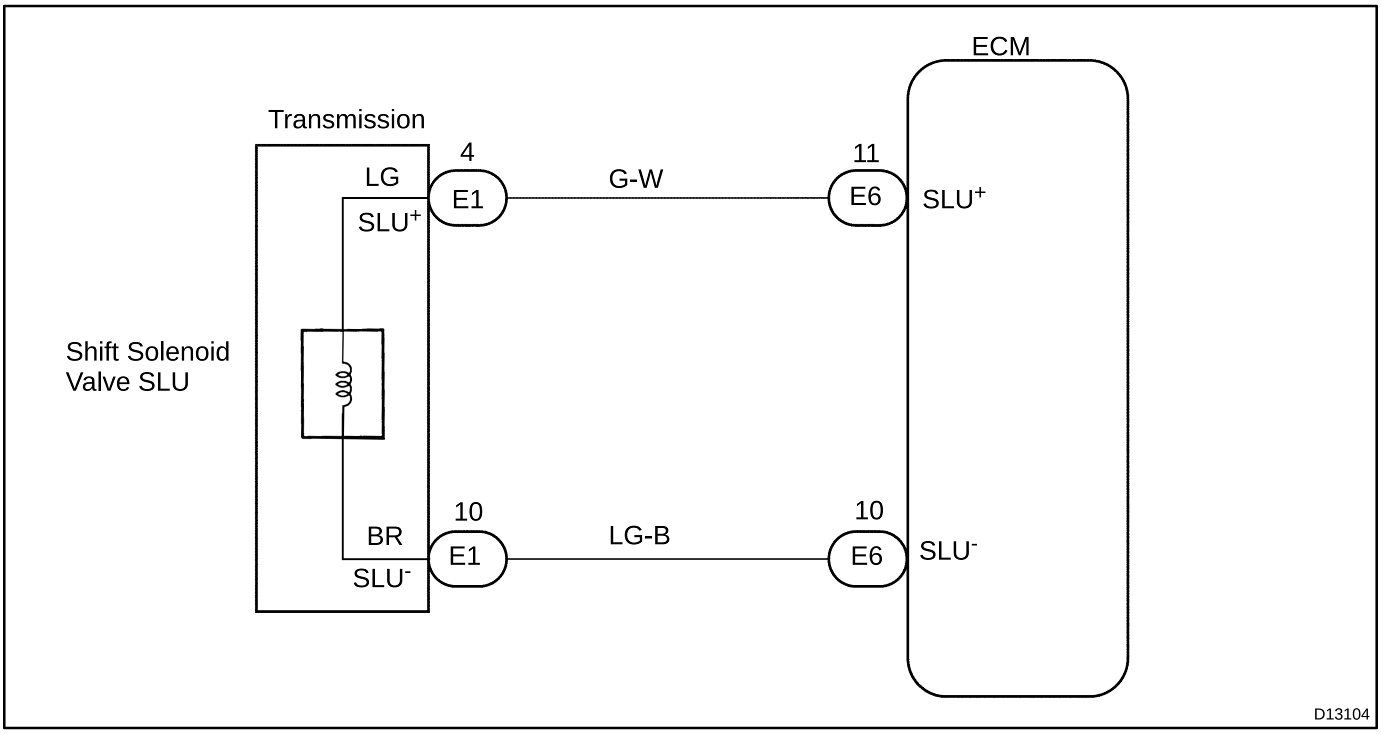
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

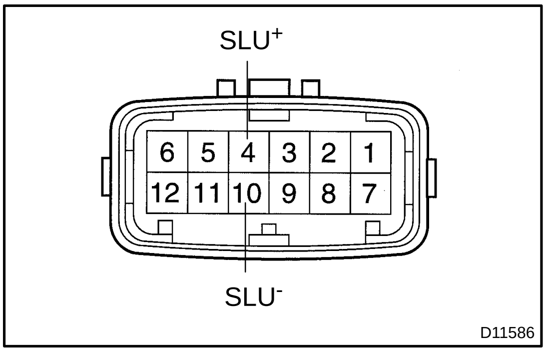
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.



PREPARATION:
Disconnect the transmission wire connector.

CHECK:
Measure resistance between SLU^+ and SLU^- of transmission wire.

OK:
Resistance: 5.0 to 5.6 Ω at 20 °C (68 °F)

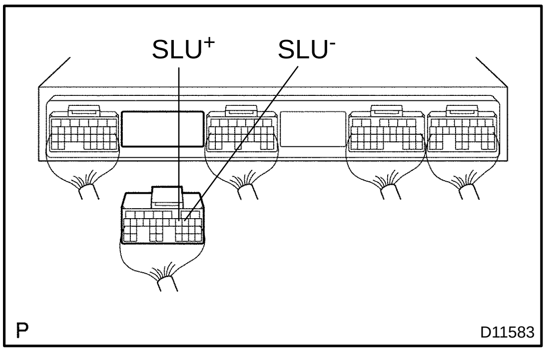
CHECK:
Measure resistance between terminals SLU^+ and SLU^- of the transmission wire connector and body ground.

OK:
Resistance: 1 MΩ or higher

NG	Go to step 3.

OK

2	Measure resistance between terminal SLU+ and SLU- of ECM connector.



PREPARATION:

(a) Connect the transmission wire connector.
(b) Remove the ECM hood.
(c) Disconnect the connector of the ECM.

CHECK:

Measure resistance between terminals SLU+ and SLU- of ECM connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20 °C (68 °F)

CHECK:

Measure resistance between terminals SLU+ and SLU- of the ECM connector and body ground.

OK:

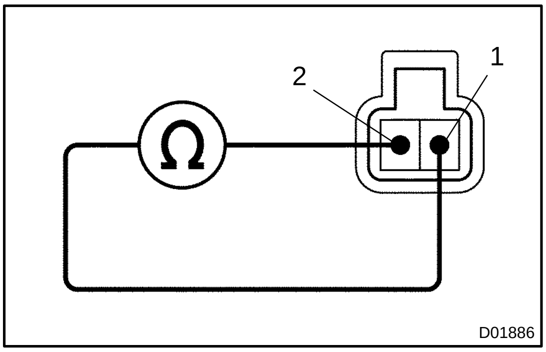
Resistance: 1 MΩ or higher

NG → **Repair or replace the harness or connector (See page IN-33).**

OK ↓

Check and replace the ECM (See page IN-33).

3	Check shift solenoid valve SLU.



PREPARATION:

(a) Remove the oil pan.
(b) Disconnect the solenoid valve connector.

CHECK:

Measure the resistance between terminals 1 and 2.

OK:

Resistance: 5.0 to 5.6 Ω at 20 °C (68 °F)

NG → **Replace the shift solenoid valve SLU (See page AT-13).**

OK ↓

Repair or replace the transmission wire (See page AT-9).

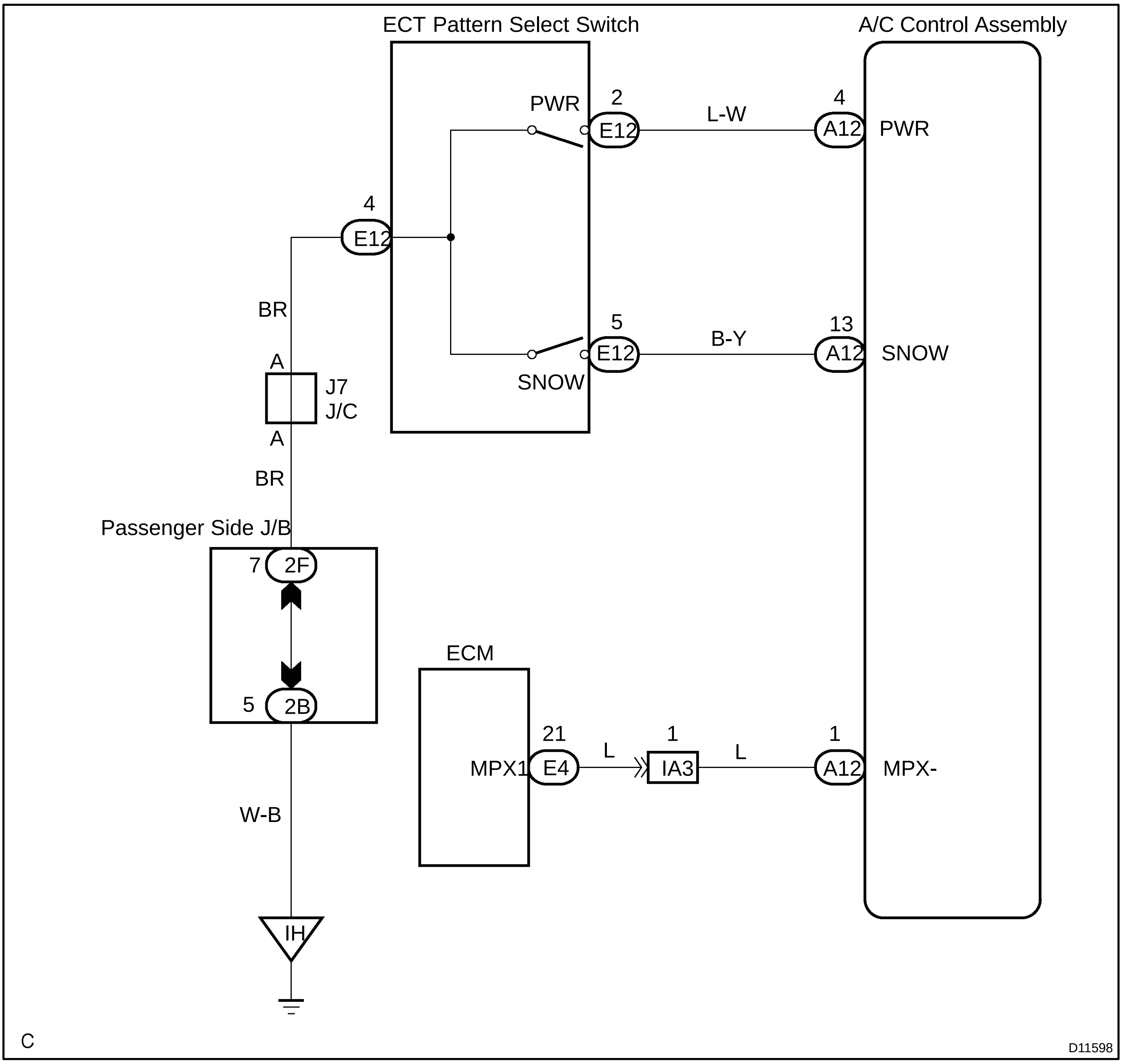
DI7W1-04

Pattern Select Switch Circuit

CIRCUIT DESCRIPTION

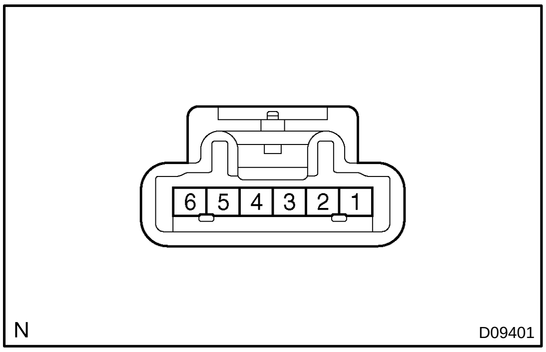
The ECM memory contains the shift programs for the NORMAL, POWER and SNOW patterns, 2 position, L position and the lock-up patterns. By following the programs corresponding to the signals from the pattern select switch, the park/neutral position and other various sensors, the ECM switches the solenoid valves ON and OFF, and controls the transmission gear change and the lock-up clutch operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check pattern select switch.



PREPARATION:

Disconnect the pattern select switch connector.

CHECK:

Check continuity between each terminal of pattern select switch connector when the select switch is set to PWR, NORM and SNOW positions.

OK:

Switch condition	Tester connection	Specified condition
PWR	2 - 4	Continuity
NORM	2 - 4, 4 - 5	No continuity
SNOW	4 - 5	Continuity

NG → **Replace pattern select switch.**

OK ↓

2	Check harness and connector between A/C control assembly and pattern select switch, pattern select switch and body ground (See page IN-33).

NG → **Repair or replace the harness or connector.**

OK ↓

Proceed to next circuit inspection shown on problem symptoms table (See page DI-356).

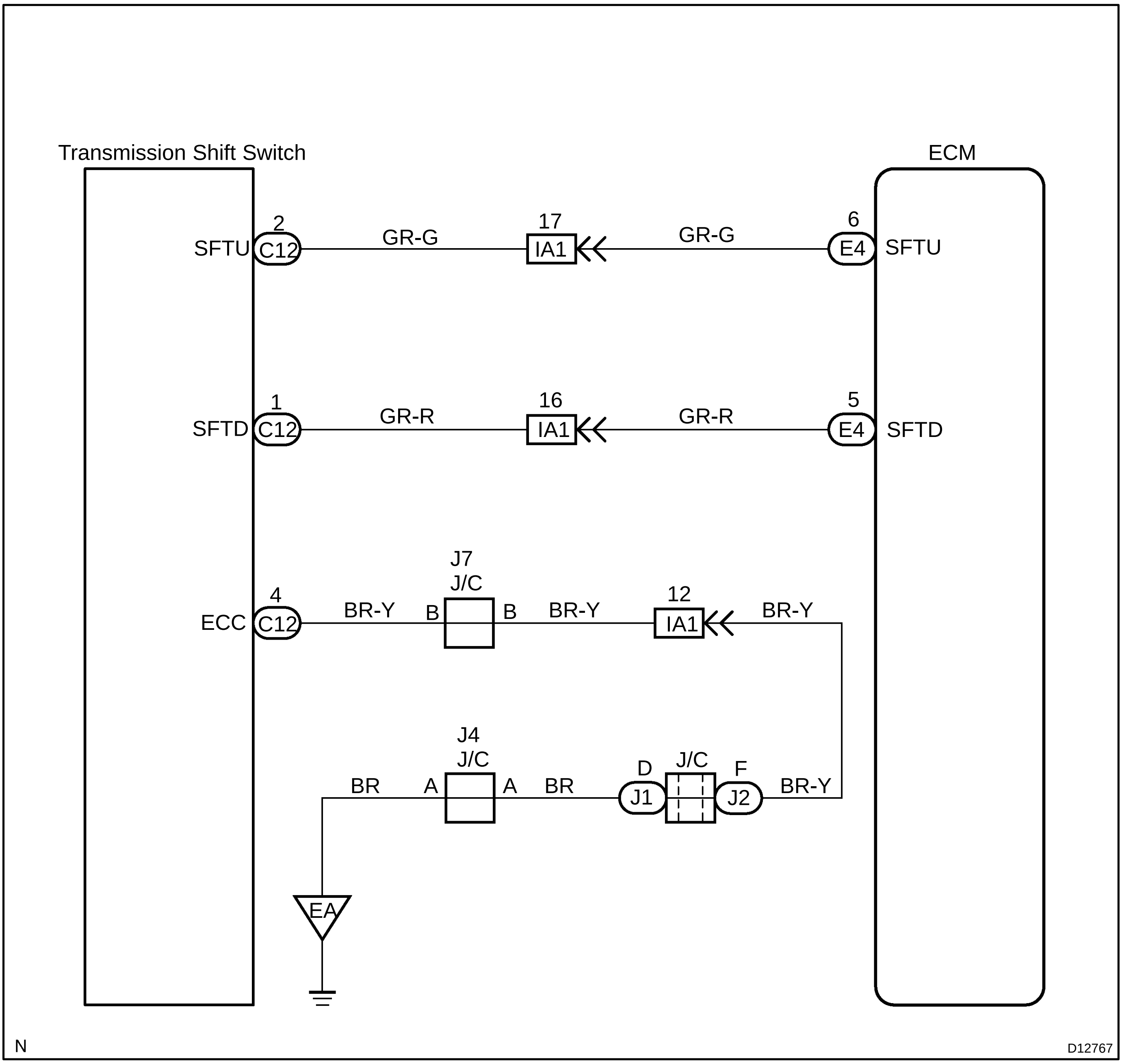
DI25Z-11

Transmission Shift Switch Circuit

CIRCUIT DESCRIPTION

When shifting the shift lever to the M position, using the transmission shift switch, it is possible to shift to the 2 to 5 positions.
Pressing "Up switch" once shifts up 1 position, and pressing "Down switch" once shifts down 1 position respectively.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check shift lock control ECU (E-shift main switch) (See page DI-361).

NG → **Replace the shift lock control ECU (E-shift main switch) (See page AT-20).**

OK

2	Check operation of transmission shift switch.

PREPARATION:

(a) Turn the ignition switch ON.

(b) Shift the shift lever into the M position.

CHECK:

Check the odo trip display panel when the transmission shift switch is pressed.

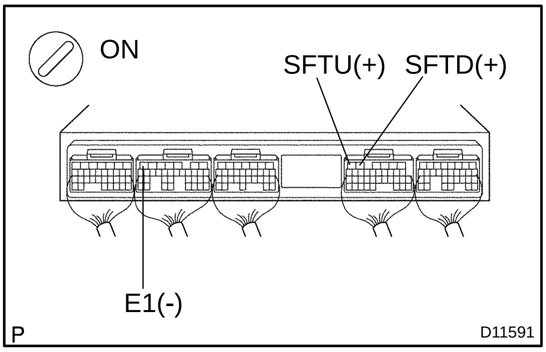
OK:

Switch condition	Odo trip display panel
”Up” switch press	Shift up
”Down” switch press	Shift down

OK → **Check and replace the ECM (See page IN-33).**

NG

3	**Check voltage between each of terminals SFTU, SFTD and E1 of ECM.**



PREPARATION:

(a) Turn ignition switch ON.

(b) Remove the ECM with connectors still connected.

CHECK:

Check voltage between each terminal of SFTU or SFTD and E1 of ECM.

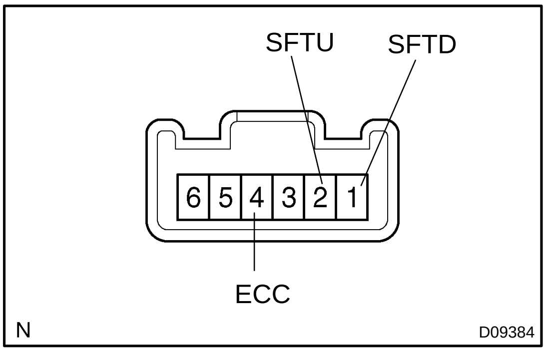
OK:

Switch condition	Tester connection	Specified condition
”Up” switch held pressed	SFTU - E1	7 to 14 V
”Up” switch released		Below 1.5 V
”Down” switch held pressed	SFTD - E1	7 to 14 V
”Down” switch released		Below 1.5 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI-356).**

NG

4 Check transmission shift switch.



PREPARATION:

(a) Remove the steering wheel pad.

(b) Disconnect the transmission shift switch connector.

CHECK:

Check continuity between each terminal of transmission shift switch connector.

OK:

Switch condition	Tester connection	Specified value
"Up" switch pressed	4 - 2	No continuity
"Up" switch released		Continuity
"Down" switch pressed	4 - 1	No continuity
"Down" switch released		Continuity

NG — **Replace the steering wheel (See page SR-1 1).**

OK

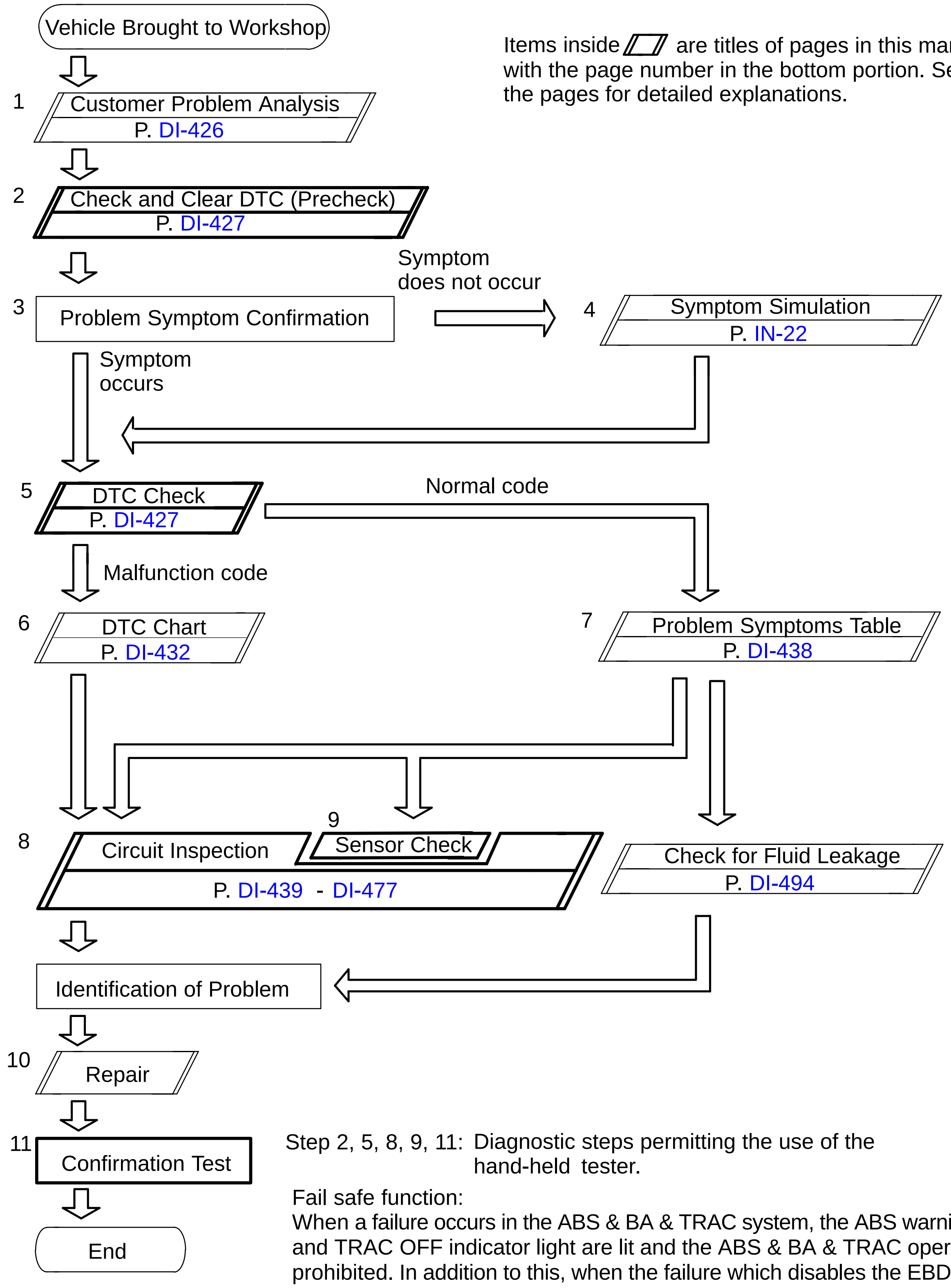
Repair or replace harness or connector (See page IN-33).

ABS WITH EBD & BA & TRAC SYSTEM

DI7UD-03

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.



Step 2, 5, 8, 9, 11: Diagnostic steps permitting the use of the hand-held tester.

Fail safe function:
When a failure occurs in the ABS & BA & TRAC system, the ABS warning light and TRAC OFF indicator light are lit and the ABS & BA & TRAC operation is prohibited. In addition to this, when the failure which disables the EBD operation occurs, the brake warning light is lit as well and the EBD operation is prohibited.

DI7UE-01

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & TRAC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency the Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ TRAC does not operate. (Wheels spin when starting rapidly.)	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	TRAC OFF Indicator Light Abnormal	☐ Remains ON ☐ Blinks ☐ Does not Light Up
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up
	BRAKE Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

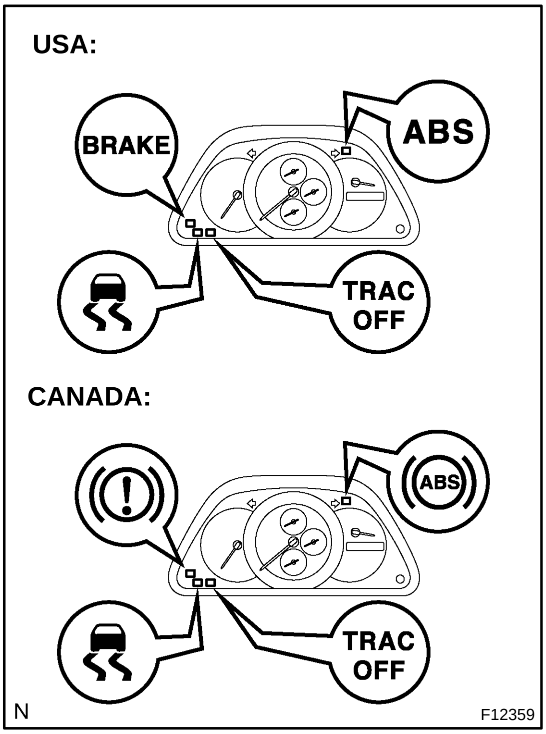
Check Item	**ABS Warning Light**	☐ Normal ☐ Malfunction Code (Code)
	Malfunction Indicator Light	☐ Normal ☐ Malfunction Code (Code)

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI9J7-01

PRE-CHECK

1. DIAGNOSIS SYSTEM



(a) Release the parking brake lever.

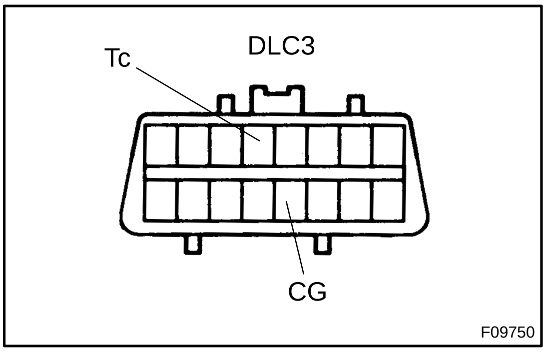
(b) Check the indicator.

When the ignition switch is turned ON, check that the ABS warning light, BRAKE warning light, TRAC OFF indicator light and SLIP indicator light go on for 3 seconds.

HINT:

- When the parking brake is applied or the lever of the brake fluid is low, the BRAKE warning light is lit.
- If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, BRAKE warning light circuit, TRAC OFF indicator light circuit and SLIP indicator light circuit.

Trouble Area	See page
ABS warning light circuit	DI-482
BRAKE warning light circuit	DI-490
TRAC OFF indicator light circuit	DI-485
SLIP indicator light circuit	DI-488



(c) In case of not using hand-held tester:

Check the DTC.

(1) Using SST, connect terminals Tc and CG of DLC3.

SST 09843-18040

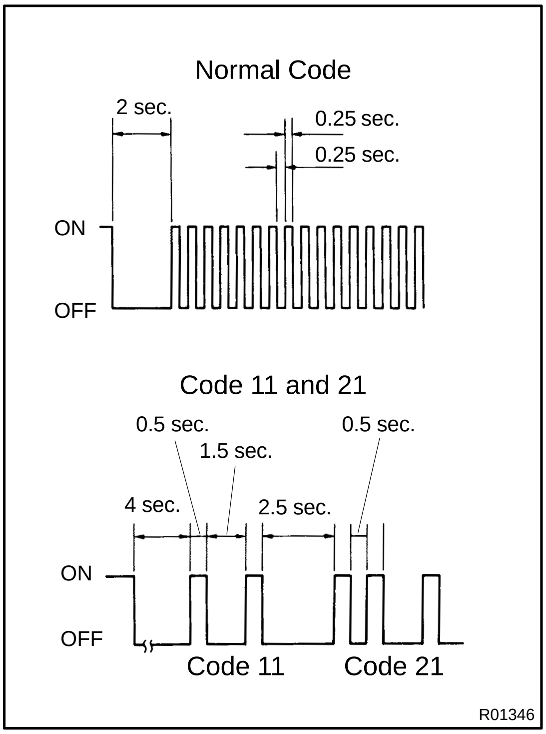
(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light and TRAC OFF indicator light on the combination meter.

HINT:

- If no code appears, inspect the ABS warning light circuit or TRAC OFF indicator light circuit.

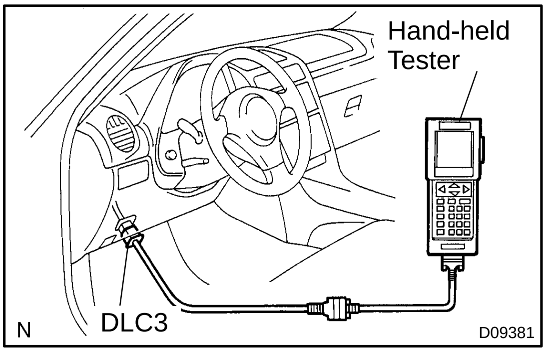
Trouble Area	See page
ABS warning light circuit	DI-482
TRAC OFF indicator light circuit	DI-485



- As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

(4) Codes are explained in the code table on page DI-432 .

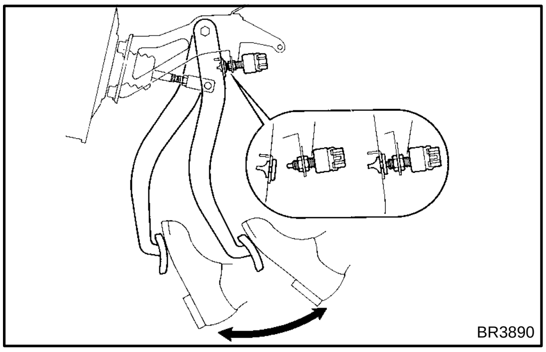
(5) After completing the check, disconnect terminals Tc and CG of DLC3 and turn off the display.
If 2 or more malfunctions are indicated at the same time the lowest numbered DTC will be displayed 1st.



(d) In case of using hand-held tester:
Check the DTC.

(1) Hook up the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Read the DTC by following the prompts on the tester screen.

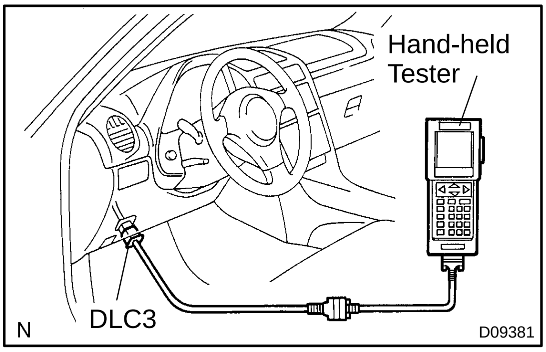
HINT:
Please refer to the hand-held tester operator's manual for further details.



(e) In case of not using hand-held tester:
Clear the DTC.

(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in ECU by depressing the brake pedal 8 or more times within 5 seconds.
(4) Check that the warning light shows the normal code.
(5) Remove the SST from the terminals of DLC3.
SST 09843-18040

HINT:
The DTC stored in the ECU will be erased when the battery terminal is disconnected for the troubleshooting.



(f) In case of using hand-held tester:
Clear the DTC.
(1) Hook up the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the hand-held tester to erase the codes. (See hand-held tester operator's manual.)

2. FREEZE FRAME DATA

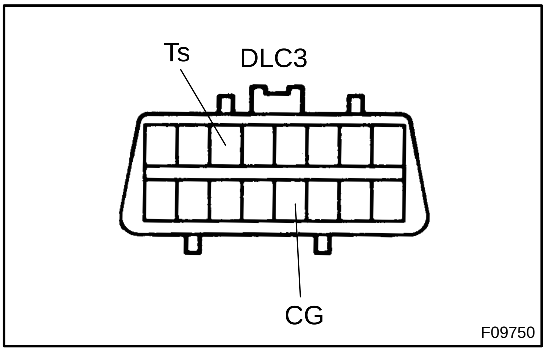
(a) The vehicle (sensor) status at the occurrence of abnormality of the diagnosis code and during the ABS operating can be memorized and displayed using the hand-held tester.
(b) Only one record of freeze frame data is stored, however, freeze frame data during the ABS operating is always up-dated. After the storage of freeze frame data, up to 31 ignition "ON" operations are stored and displayed.

HINT:
If the ignition switch "ON" operation exceeds 31 times, "31" appears on the display.

(c) If the diagnosis code abnormality occurs, the freeze frame data at the occurrence of the abnormality is stored but the ABS actuation data is deleted.

Hand-held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Vehicle speed	Speed indication of a meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Numbers of operations of ignition switch ON after memorizing freeze frame data	0 - 31
MAS CYL PRESS	Master cylinder pressure sensor output voltage	Release brake pedal: 0.3 - 0.9 V Depress brake pedal: 3.2 - 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor changing declivity	-30 - 200 MPa/s
SYSTEM	Operate system	ABS operate: ABS BA operate: BA
YAW RATE	Yaw rate angle sensor output value	-70 - 70
STEERING ANG	Steering angle sensor output value	Left turn: Increase Right turn: Drop
G (RIGHT & LEFT)	Right and left G	-1.5 - 1.5
G (BACK & FORTH)	Back and forth G	-1.5 - 1.5
VSC / TRC OFF SW	TRAC OFF switch signal	TRAC OFF SW ON: ON OFF: OFF
SHIFT POSITION	Shift lever position	P: P R: R N: N D: D 2: 2 L: L

If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.



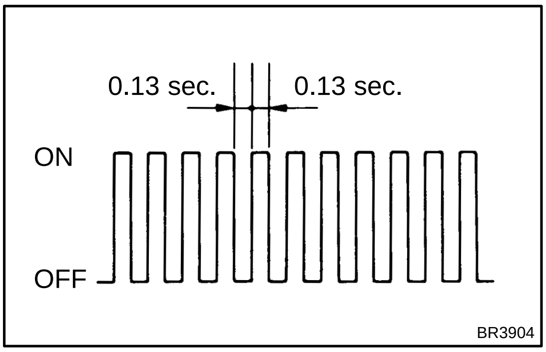
3. SPEED SENSOR SIGNAL CHECK

(a) In case of not using hand-held tester:
Check the speed sensor signal.

(1) Turn the ignition switch OFF.

(2) Using SST, connect terminals Ts and CG of DLC3.
SST 09843-18040

(3) Start the engine.



(4) Check that the ABS warning light blinks.

HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit (See page DI-482).

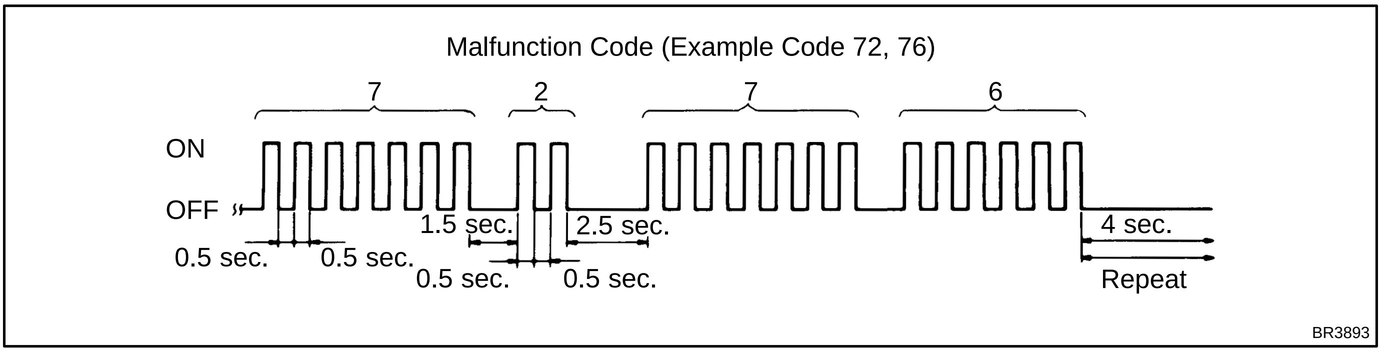
(5) Drive vehicle straight forward.
Drive vehicle faster than 45 km/h (28 mph) for several seconds.

(6) Stop the vehicle.

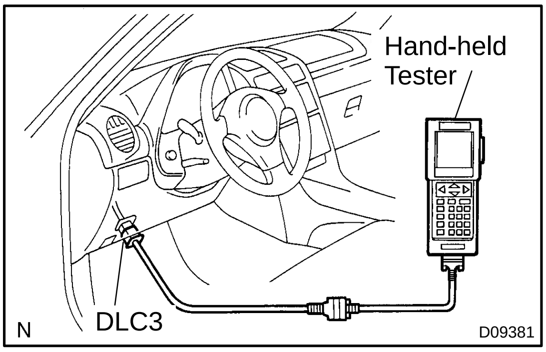
(7) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040

(8) Read the number of blinks of the ABS warning light.

HINT:
- See the list of DTC shown on the next page.
- If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.



(9) After doing the check, disconnect the SST from terminals Ts and CG, Tc and CG of DLC3, and turn ignition switch OFF.
SST 09843-18040



(b) In case of using hand-held tester:
Check the speed sensor signal.
(1) Hook up the hand-held tester to the DLC3.
(2) Do step (3) to (6) on the previous page and this page.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.

DTC of speed sensor check function:

Code No.	Diagnosis	Trouble Area
C1271/71	Low output voltage of right front speed sensor	⋅Right front speed sensor ⋅Sensor installation ⋅Right front speed sensor rotor ⋅Right front speed sensor circuit
C1272/72	Low output voltage of left front speed sensor	⋅Left front speed sensor ⋅Sensor installation ⋅Left front speed sensor rotor ⋅Left front speed sensor circuit
C1273/73	Low output voltage of right rear speed sensor	⋅Right rear speed sensor ⋅Sensor installation ⋅Right rear speed sensor rotor ⋅Right rear speed sensor circuit
C1274/74	Low output voltage of left rear speed sensor	⋅Left rear speed sensor ⋅Sensor installation ⋅Left rear speed sensor rotor ⋅Left rear speed sensor circuit
C1275/75	Abnormal change in output voltage of right front speed sensor	⋅Right front speed sensor rotor ⋅Right front speed sensor
C1276/76	Abnormal change in output voltage of left front speed sensor	⋅Left front speed sensor rotor ⋅Left front speed sensor
C1277/77	Abnormal change in output voltage of right rear speed sensor	⋅Right rear speed sensor rotor ⋅Right rear speed sensor
C1278/78	Abnormal change in output voltage of left rear speed sensor	⋅Left rear speed sensor rotor ⋅Left rear speed sensor
C1281/81	⋅Master cylinder pressure sensor output signal is faulty ⋅The problem symptoms in the brake cannot be confirmed	⋅Master cylinder pressure sensor ⋅Brake booster

DI7UG-03

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- Using SST 09843-18040, connect the terminals Tc and CG of DLC3.
- If any abnormality is not found when inspecting parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit listed for the code. For details of each code, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.

DTC chart of anti-lock brake system:

DTC No. (See Page)	Detection Item	Trouble Area
C0278/11 (DI-451)	Open circuit of ABS solenoid relay circuit	✓ABS solenoid relay ✓ABS solenoid relay circuit
C0279/12 (DI-451)	Short circuit of ABS solenoid relay circuit	
C0273/13*1 (DI-447)	Open circuit of ABS motor relay circuit	✓ABS motor relay ✓ABS motor relay circuit
C0274/14 (DI-447)	Short circuit of ABS motor relay circuit	
C0226/21 (DI-445)	Open or short circuit of right front solenoid circuit	✓Brake actuator ✓SFRR or SFRH circuit
C0236/22 (DI-445)	Open or short circuit of left front solenoid circuit	✓Brake actuator ✓SFLR or SFLH circuit
C0246/23 (DI-445)	Open or short circuit of right rear solenoid circuit	✓Brake actuator ✓SRRR or SRRH circuit
C0256/24 (DI-445)	Open or short circuit of left rear solenoid circuit	✓Brake actuator ✓SRLR or SRLH circuit
C1225/25 (DI-463)	Open or short circuit of SM circuit	✓Brake actuator ✓SM1 or SM2 circuit
C1226/26 (DI-463)	Open or short circuit of SRM circuit	✓Brake actuator ✓SRM1 or SRM2 circuit
C1227/27 (DI-463)	Open or short circuit of SRC circuit	✓Brake actuator ✓SRC1 or SRC2 circuit
C0200/31*1 (DI-439)	Right front wheel speed sensor signal malfunction	✓Right front, left front, right rear, left rear speed sensor ✓Each speed sensor circuit ✓Speed sensor rotor
C0205/32*1 (DI-439)	Left front wheel speed sensor signal malfunction	
C0210/33*1 (DI-439)	Right rear wheel speed sensor signal malfunction	
C0215/34*1 (DI-439)	Left rear wheel speed sensor signal malfunction	
C1235/35 (DI-439)	Foreign matter is attached on the tip of the right front sensor	✓Right front, left front, right rear, left rear speed sensor ✓Speed sensor rotor
C1236/36 (DI-439)	Foreign matter is attached on the tip of the left front sensor	
C1238/38 (DI-439)	Foreign matter is attached on the tip of the right rear sensor	
C1239/39 (DI-439)	Foreign matter is attached on the tip of the left rear sensor	

C1241/41 (DI-465)	Low battery positive voltage	⋅Battery ⋅Charging system ⋅Power source circuit
C1249/49*3 (DI-472)	Open circuit of stop light switch circuit	⋅Stop light switch ⋅Stop light switch circuit
C1246/46*2 (DI-469)	Malfunction in master ccylinder pressure sensor	⋅Master cylinder pressure sensor ⋅Master cylinder pressure sensor circuit
C1251/51*1 (DI-475)	Pump motor is locked	⋅ABS & TRAC Actuator ⋅ABS & TRAC Actuator circuit
C1267/67*4 (DI-477)	Malfunction in brake pedal load sensing switch	⋅Brake pedal load sensing switch ⋅Brake pedal load sensing switch circuit
Always ON (DI-480)	Malfunction in ECU	⋅Combination meter ⋅Combination meter circuit ⋅Battery ⋅ABS & TRAC ECU

*1, *2, *3, *4:

Even after the troubled areas are repaired, ABS warning light will not go OFF unless the following operations are performed.

- *1:
  (1) Drive the vehicle at 20 km/h (12 mph) for 30 seconds or more and check that the ABS warning light goes off.
  (2) Clear the DTC (See page DI-427).
- *2:
  (1) Keep the vehicle in the stationary condition for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  (2) Drive the vehicle at the vehicle speed 50 km/h (31 mph) and keep depressing the brake pedal strongly for about 3 seconds.
  (3) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  (4) Clear the DTC (See page DI-427).
- *3: Depress the brake pedal for 1 sec.
- *4: Depress the brake pedal strongly for 1 sec., then release the brake pedal for 1 sec.

HINT:

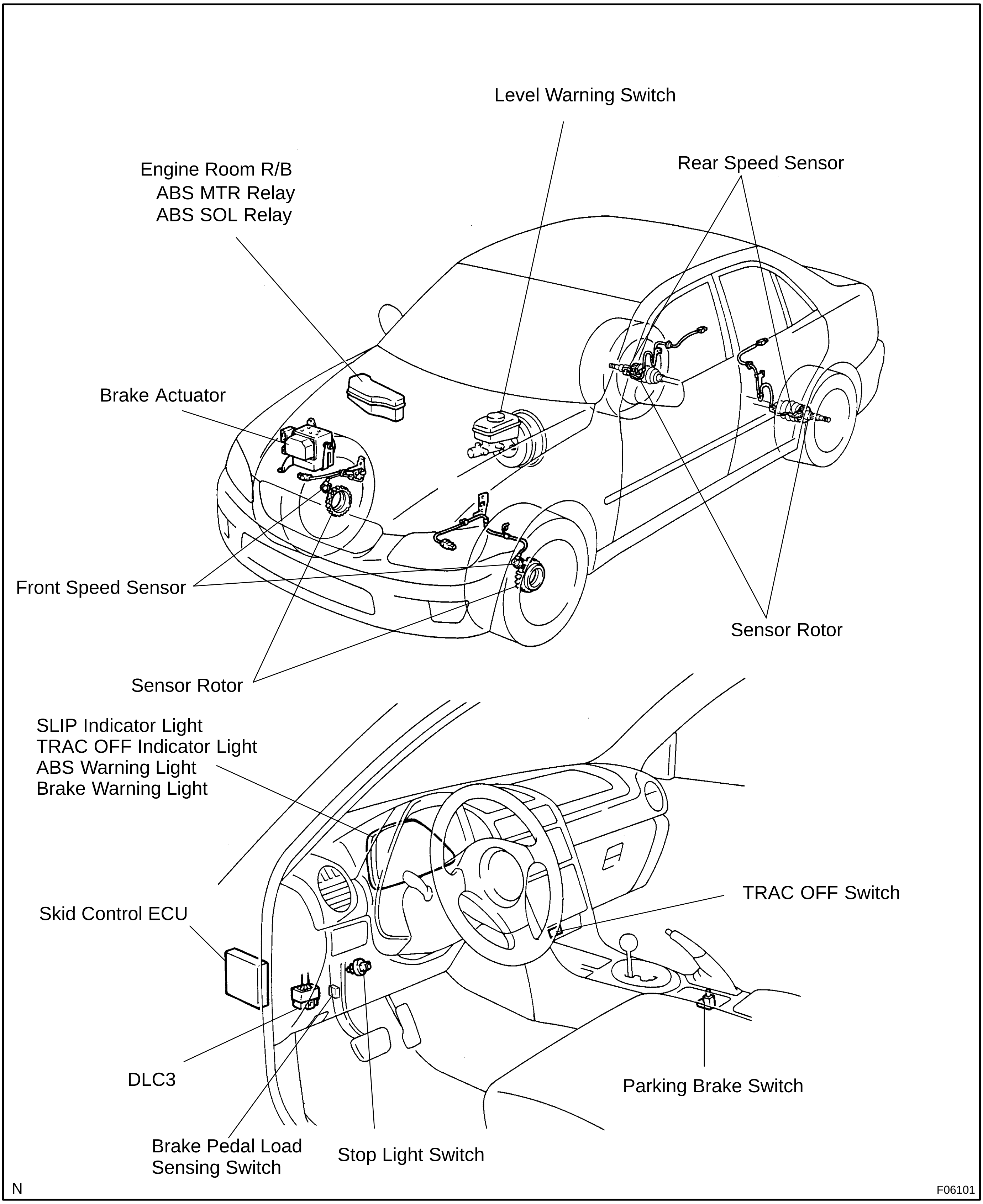
There is a case that hand-held tester cannot be used when ABS warning light is always on.

DTC chart of traction control system:

DTC No. (See Page)	Detection Item	Trouble Area
C1223/43 (DI-460)	Malfunction in ABS control system	ABS control system
C1224/44 (DI-461)	Open or short circuit of NE signal circuit	⋅NEO circuit ⋅ECM
C1201/51 (DI-455)	Malfunction in engine control system	Engine control system
C1202/52 (DI-456)	Brake fluid level low Open circuit in brake fluid level warning switch circuit	⋅Brake fluid level ⋅Brake fluid warning switch ⋅Brake fluid level warning switch circuit
C1203/53 (DI-458)	Malfunction in ECM communication circuit	⋅TRC+ or TRC - circuit ⋅ENG+ or ENG- circuit ⋅ECM

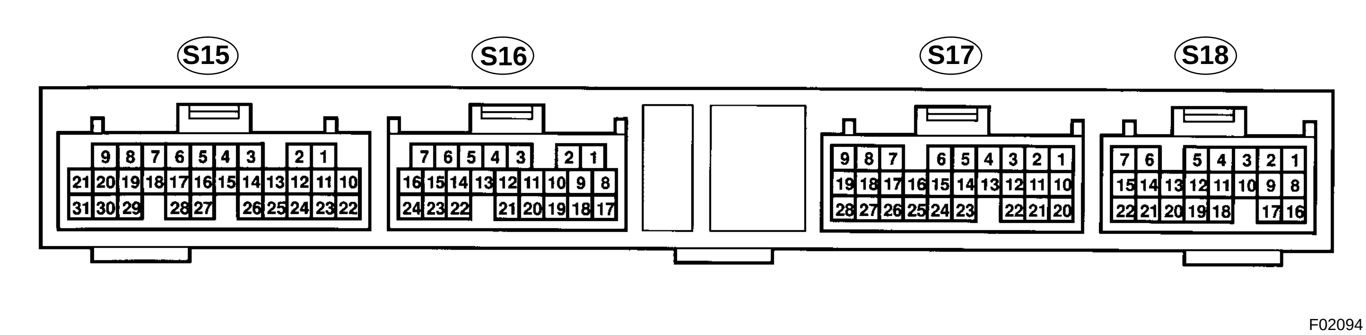
DI7UH-03

PARTS LOCATION



DI7UI-03

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
SRLR (S18 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	B ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SM1- (S18 - 2) - GND (S18 - 15, 22, S15 - 2, 3)	B-L ↔ W-B	IG switch OFF	Continuity
SM1+ (S18 - 3) - GND (S18 - 15, 22, S15 - 2, 3)	B-R ↔ W-B	IG switch ON, ABS warning light OFF	Below 1.0
SM2- (S18 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	L-B ↔ W-B	IG switch OFF	Continuity
SM2+ (S18 - 5) - GND (S18 - 15, 22, S15 - 2, 3)	G-B ↔ W-B	IG switch ON, ABS warning light OFF	Below 1.0
AST (S18 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRLH (S18 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	G-W ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFRR (S18 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
E3 (S18 - 12) - GND (S18 - 15, 22, S15 - 2, 3)	Y ↔ W-B	IG switch OFF	Continuity
FSS (S18 - 13) - GND (S18 - 15, 22, S15 - 2, 3)	Shielded ↔ W-B	IG switch OFF	Continuity
MT (S18 - 14) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON (Motor relay is OFF)	Below 1.5
SFRH (S18 - 16) - GND (S18 - 15, 22, S15 - 2, 3)	B-W ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
PMC2 (S18 - 18) - E3 (S18 - 12)	L ↔ Y	IG switch ON, stop light switch OFF	0.3 - 0.8
VCM2 (S18 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	IG switch ON	4.5 - 5.5
CSW (S17 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	LG-R ↔ W-B	IG switch ON, CSW is OFF	10 - 14
FSW+ (S17 - 5) - FSW- (S17 - 4)	W-G ↔ R-B	IG switch ON, ABS warning light OFF	10 - 14
NEO (S17 - 26) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	Engine idling	Pulse generation
D/G (S17 - 28) - GND (S18 - 15, 22, S15 - 2, 3)	W-R ↔ W-B	IG switch ON	10 - 14
WA (S16 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON, ABS warning light ON	10 - 14
		IG switch ON, ABS warning light OFF	Below 2.0

SP1 (S16 - 2) - GND (S18 - 15, 22, S15 - 2, 3)	R-Y ↔ W-B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation
STP (S16 - 3) - GND (S18 - 15, 22, S15 - 2, 3)	G-R ↔ W-B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 - 14
WT (S16 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	LG ↔ W-B	IG switch ON, TRC OFF indicator light ON	Below 2.0
		IG switch ON, TRC OFF indicator light OFF	10 - 14
IND (S16 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON, SLIP indicator light ON	Below 2.0
		IG switch ON, SLIP indicator light OFF	10 - 14
IG1 (S16 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	B-R ↔ W-B	IG switch ON	10 - 14
BRL (S16 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	Y-G ↔ W-B	IG switch ON, fluid in master cylinder reservoir above MIN level and parking brake switch is OFF (Brake warning light is OFF)	Below 2.0
		IG switch ON, fluid in master cylinder reservoir below MIN level or parking brake switch is ON (Brake warning light ON)	10 - 14
ENG+ (S16 - 9) - ENG- (S16 - 18)	L-B ↔ P	IG switch ON	Pulse generation
Ts (S16 - 10) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON	10 - 14
TRC+ (S16 - 11) - TRC- (S16 - 20)	R-Y ↔ W-G	IG switch ON, ABS warning light OFF	Pulse generation
FRO (S16 - 13) - GND (S18 - 15, 22, S15 - 2, 3)	W-R ↔ W-B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation
RR+ (S16 - 16) - RR- (S16 - 15)	GR ↔ B	IG switch ON, slowly turn right rear wheel	Pulse generation
PKB (S16 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IG switch ON, parking brake switch ON	Below 1.5
		IG switch ON, parking brake switch OFF	10 - 14
RL+ (S16 - 22) - RL- (S16 - 23)	R ↔ L	IG switch ON, slowly turn left rear wheel	Pulse generation
R+ (S15 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	L-B ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRM1 (S15 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	B-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRC2 (S15 - 5) - GND (S18 - 15, 22, S15 - 2, 3)	G-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFLH (S15 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	L-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFLR (S15 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRRH (S15 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	L-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRRR (S15 - 9) - GND (S18 - 15, 22, S15 - 2, 3)	G-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 -14
SR (S15 - 10) - R+ (S15 - 1)	L-R ↔ L-B	IG switch ON, ABS warning light OFF	10 - 14
FR+ (S15 - 13) - FR- (S15 - 12)	O ↔ B	IG switch ON, slowly turn right front wheel	Pulse generation
SRM2 (S15 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	B-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
MR (S15 - 23) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON, ABS motor stops	10 - 14

MRF (S15 - 24) - GND (S18 - 15, 22, S15 - 2, 3)	R-Y ↔ W-B	IG switch ON, ABS warning light OFF	Below 2.0
LBL (S15 - 25) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IG switch ON, fluid in master cylinder reservoir above MIN level	4 - 10
FL+ (S15 - 28) - FL- (S15 - 27)	LG ↔ V	IG switch ON, slowly turn left front wheel	Pulse generation
SRC1 (S15 - 31) - GND (S18 - 15, 22, S15 - 2, 3)	G-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14

DI7UJ-03

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

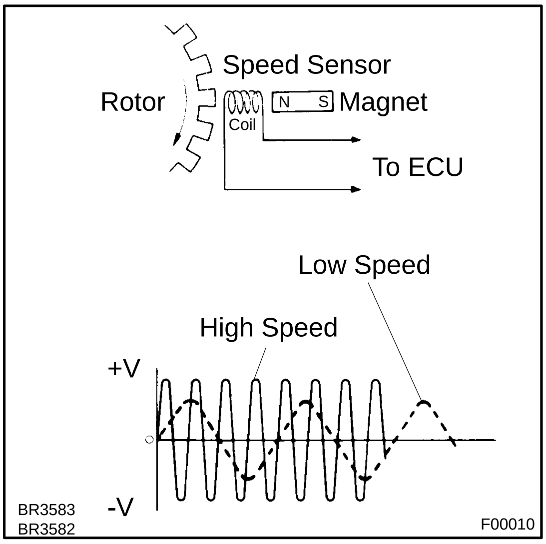
Symptom	Suspect Area	See page
ABS does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 3. Check the DTC reconfirming that the normal code is output. 4. IG power source circuit 5. Speed sensor circuit 6. Check the brake actuator with a hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-494).	 DI-427 DI-465 DI-439
ABS does not operate efficiently	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC reconfirming that the normal code is output 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the brake actuator with a hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-494).	 DI-427 DI-439 DI-472
ABS warning light abnormal	1. ABS warning light circuit 2. Skid control ECU	 IN-33
BRAKE warning light abnormal	1. BRAKE warning light circuit 2. Skid control ECU	 IN-33
DTC check cannot be done	Only when 1. and 2. are all normal and the problem is still occurring, replace the skid control ECU. 1. ABS warning light circuit 2. TRAC OFF indicator light circuit	 DI-482 DI-485
Speed sensor signal check cannot be done	1. Ts terminal circuit 2. Skid control ECU	DI-492 IN-33
TRAC does not operate	Only when inspection circuits for each problem symptom are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit	 DI-427 DI-465 DI-494 DI-439
SLIP indicator light abnormal	SLIP indicator light circuit	
TRAC OFF indicator light abnormal	Only when inspection circuits for each problem symptom are all normal and the problem is still occurring, replace the skid control ECU. 1. TRAC OFF indicator light circuit 2. TRAC cut switch circuit	 DI-485 DI-485

DI9J8-01

CIRCUIT INSPECTION

DTC	C0200 / 31 - C1239 / 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION



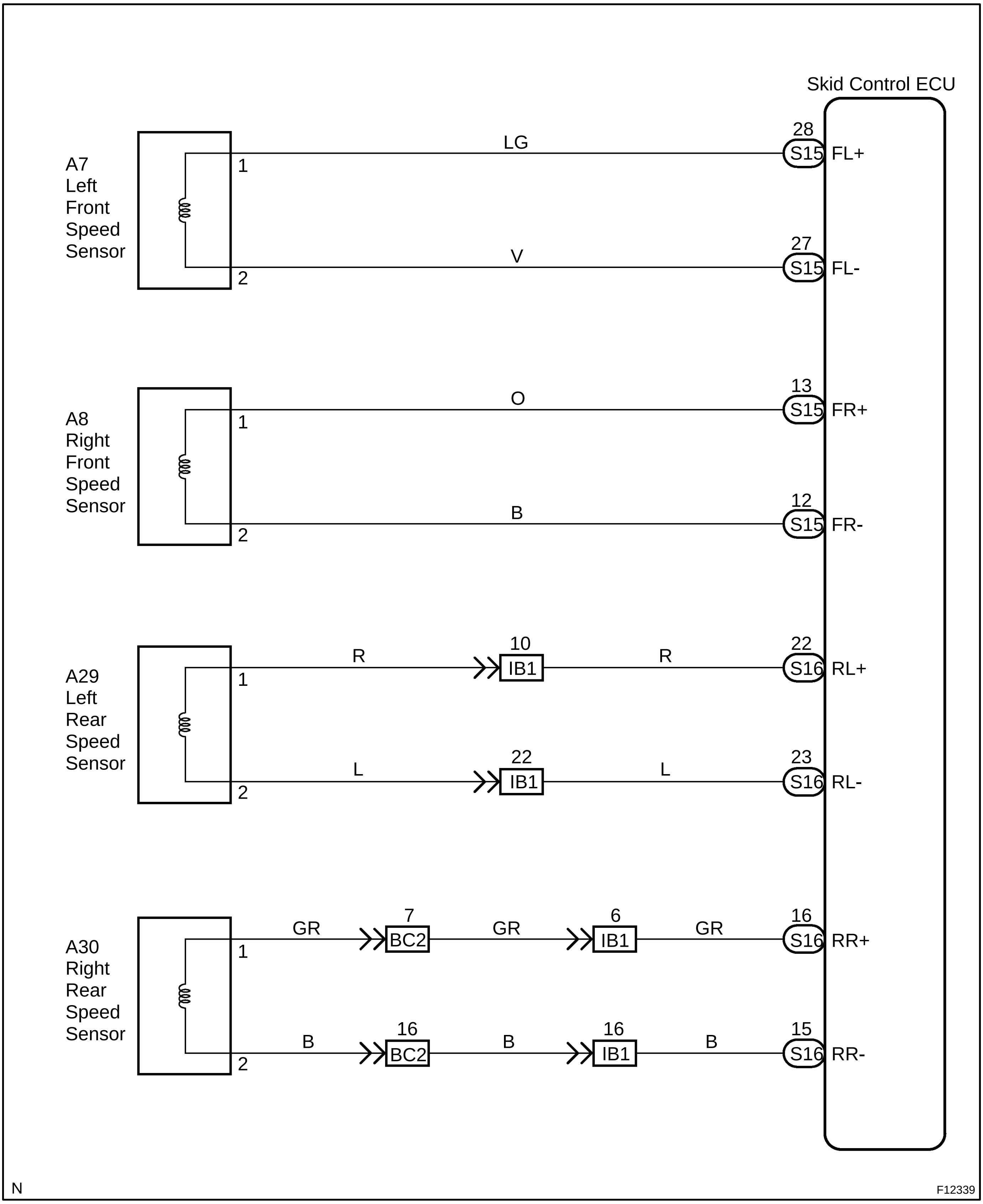
The speed sensor measures wheel speed and sends the corresponding signals to the ECU. These signals are used for control of both the ABS & TRAC control system. Both the front and rear rotors have 48 serrations.

When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to measure the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	Detection of any of conditions 1. through 3.: 1. At vehicle speed of 10 km/h (6 mph) or more, open or short circuit of the speed sensor signal circuit continues for 15 sec. 2. Momentary interruption of the speed sensor signal occurs 7 times or more. 3. Open circuit of the speed sensor signal circuit continues for 0.5 sec. or more.	Right front, left front, right rear, left rear speed sensor Each speed sensor circuit Sensor rotor
C1235 / 35 C1236 / 36 C1238 / 38 C1239 / 39	At the vehicle speed of 20 km/h (12mph) or more, the condition that noise is included in the speed sensor signal continues for 5 sec. or more.	Right front, left front, right rear, left rear speed sensor Sensor rotor

HINT:
- DTC No. C0200 / 31 and C1235 / 35 are for the right front speed sensor.
- DTC No. C0205 / 32 and C1236 / 36 are for the left front speed sensor.
- DTC No. C0210 / 33 and C1238 / 38 are for the right rear speed sensor.
- DTC No. C0215 / 34 and C1239 / 39 are for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of speed sensor.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.

(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that there is no difference between the speed value output from the speed sensor observed in the hand-held tester and the speed value displayed by the speedometer when the vehicle is in motion.

OK:

There is almost no difference in the displayed speed values.

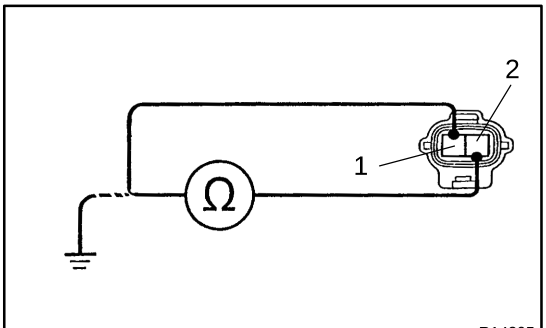
HINT:

There is tolerance of ± 10 % in the speedometer indication.

OK → **Go to step 4.**

NG

2	**Check speed sensor.**



R14205

Front:

PREPARATION:

(a) Make sure that the speed sensor connector and the wire harness side connector are securely connected.

(b) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:

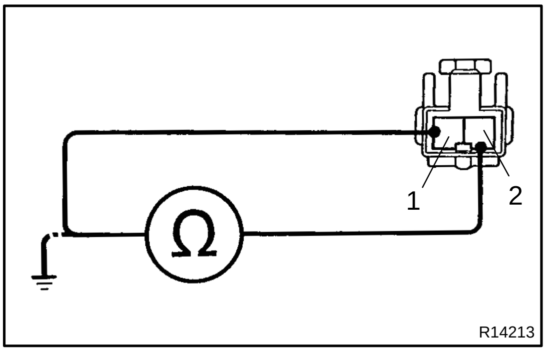
Resistance: 1.4 - 1.8 kΩ at 20°C

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the rear seat cushion and the seatback.

(b) Make sure that the speed sensor connector and the wire harness side connector are securely connected.

(c) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:

Resistance: 0.9 - 1.3 kΩ at 25 ± 5°C

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	Replace speed sensor.

NOTICE:

Check the speed sensor signal last (See page DI-427).

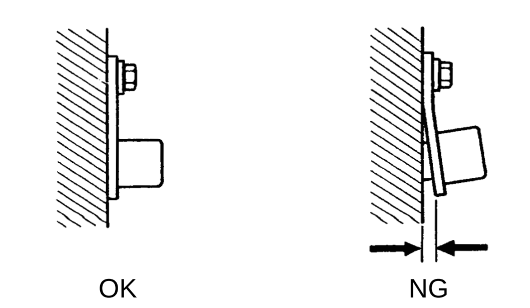
OK

3	Check for open and short circuit in harness and connector between each speed sensor and skid control ECU (See page IN-33).

NG	Repair or replace harness or connector.

OK

4	**Check sensor installation.**



BR3795

CHECK:
Check the speed sensor installation.

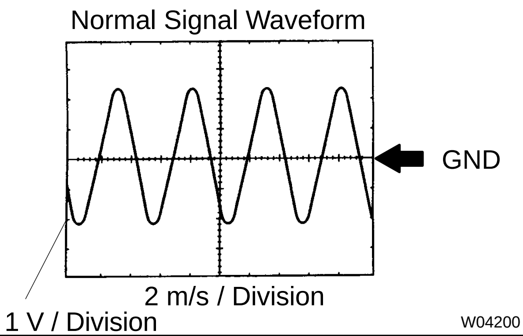
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and front steering knuckle or rear axle carrier.

NG → **Replace speed sensor.**

NOTICE:
Check the speed sensor signal last (See page DI-427).

OK

5	**Check speed sensor and sensor rotor serrations.**



W04200

(REFERENCE) INSPECTION USING OSCILLOSCOPE

PREPARATION:
(a) Remove the skid control ECU with the connector still connected.
(b) Connect the oscilloscope to the terminals FR+ - FR-, FL+ - FL-, RR+ - RR- and RL+ - RL- of the skid control ECU.

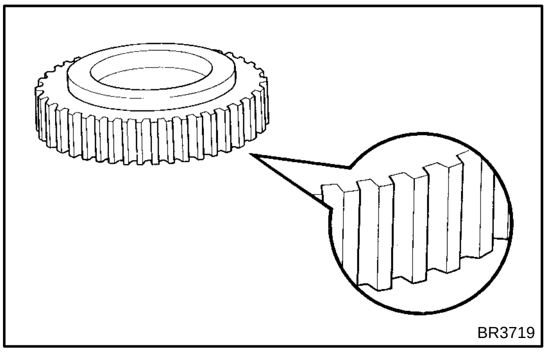
CHECK:
Drive the vehicle at the speed of about 20 km/h (12 mph), and check the signal waveform.

HINT:
- As the vehicle speed (rpm of the wheels) increases, a cycle of the waveform becomes shorter and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter deposited on it.

OK → **Check and replace skid control ECU (See page IN-33).**

NG

6	Check sensor rotor and sensor tip.


BR3719

Front:

PREPARATION:

Remove the front axle hub and the speed sensor (See page BR-51).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects on the sensor rotor.

CHECK:

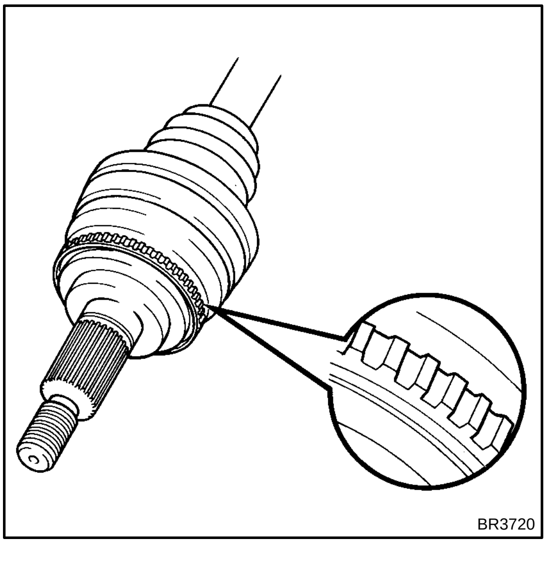
Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.


BR3720

Rear:

PREPARATION:

Remove the drive shaft (See page SA-57).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR-54).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.

NG	Replace speed sensor or rotor.

NOTICE:

Check the speed sensor signal last (See page DI-427).

OK

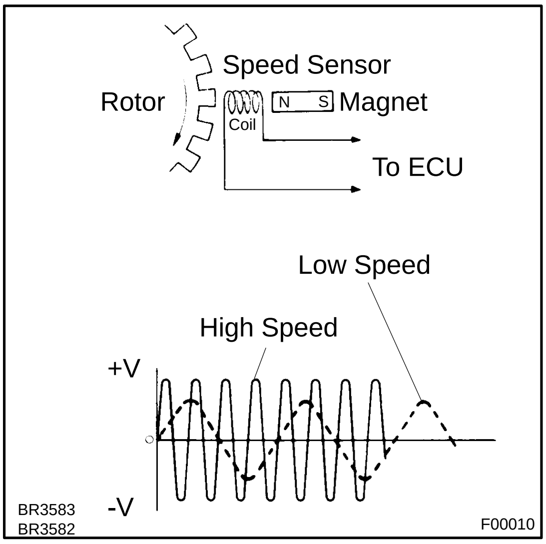
Check and replace skid control ECU (See page IN-33).

DI9J8-01

CIRCUIT INSPECTION

DTC	C0200 / 31 - C1239 / 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION

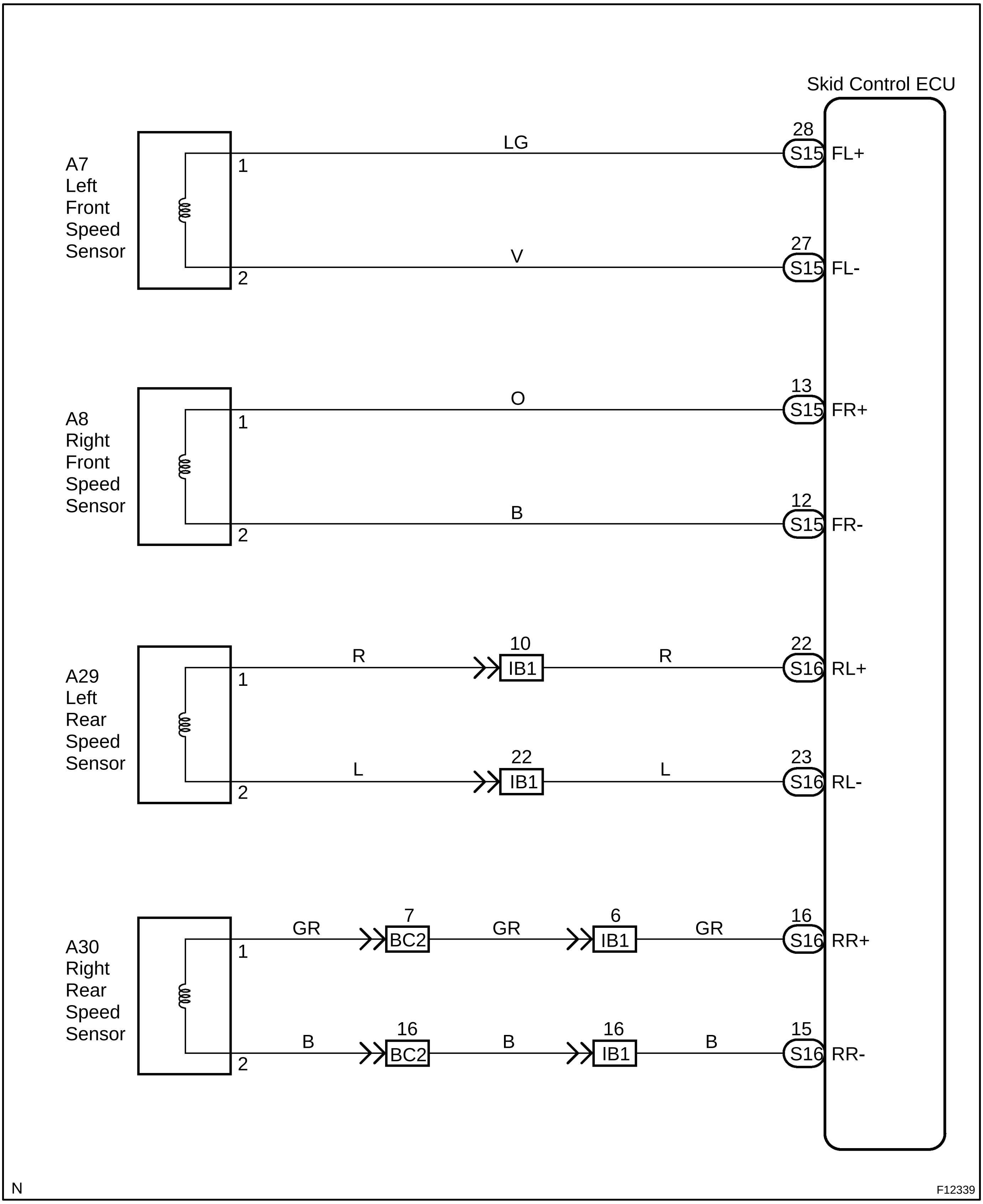


The speed sensor measures wheel speed and sends the corresponding signals to the ECU. These signals are used for control of both the ABS & TRAC control system. Both the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to measure the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	Detection of any of conditions 1. through 3.: 1. At vehicle speed of 10 km/h (6 mph) or more, open or short circuit of the speed sensor signal circuit continues for 15 sec. 2. Momentary interruption of the speed sensor signal occurs 7 times or more. 3. Open circuit of the speed sensor signal circuit continues for 0.5 sec. or more.	✓Right front, left front, right rear, left rear speed sensor ✓Each speed sensor circuit ✓Sensor rotor
C1235 / 35 C1236 / 36 C1238 / 38 C1239 / 39	At the vehicle speed of 20 km/h (12mph) or more, the condition that noise is included in the speed sensor signal continues for 5 sec. or more.	✓Right front, left front, right rear, left rear speed sensor ✓Sensor rotor

HINT:
- DTC No. C0200 / 31 and C1235 / 35 are for the right front speed sensor.
- DTC No. C0205 / 32 and C1236 / 36 are for the left front speed sensor.
- DTC No. C0210 / 33 and C1238 / 38 are for the right rear speed sensor.
- DTC No. C0215 / 34 and C1239 / 39 are for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	Check output value of speed sensor.

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:
Check that there is no difference between the speed value output from the speed sensor observed in the hand-held tester and the speed value displayed by the speedometer when the vehicle is in motion.

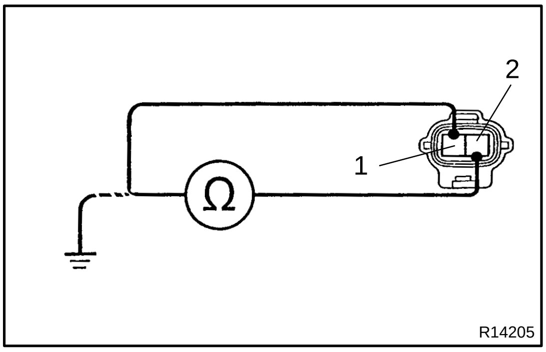
OK:
There is almost no difference in the displayed speed values.

HINT:
There is tolerance of ± 10 % in the speedometer indication.

OK → **Go to step 4.**

NG

2	Check speed sensor.



R14205

Front:

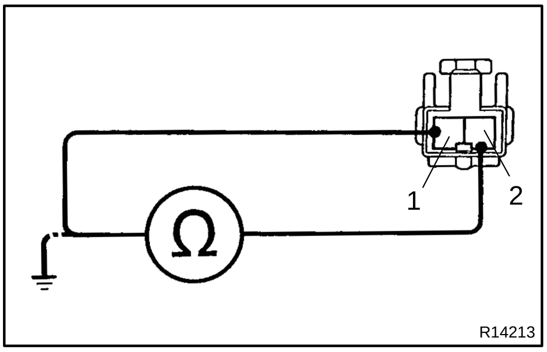
PREPARATION:
(a) Make sure that the speed sensor connector and the wire harness side connector are securely connected.
(b) Disconnect the speed sensor connector.

CHECK:
Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:
Resistance: 1.4 - 1.8 kΩ at 20°C

CHECK:
Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:
Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the rear seat cushion and the seatback.

(b) Make sure that the speed sensor connector and the wire harness side connector are securely connected.

(c) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:

Resistance: 0.9 - 1.3 kΩ at 25 ± 5°C

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	Replace speed sensor.

NOTICE:

Check the speed sensor signal last (See page DI-427).

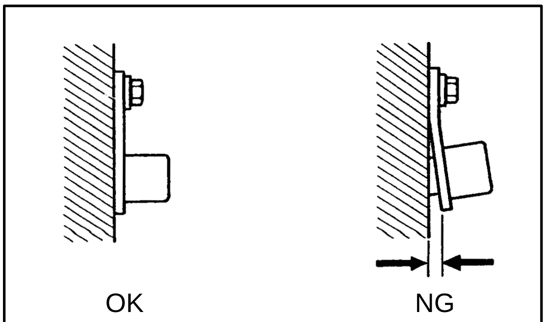
OK

3	Check for open and short circuit in harness and connector between each speed sensor and skid control ECU (See page IN-33).

NG	Repair or replace harness or connector.

OK

4	Check sensor installation.



BR3795

CHECK:

Check the speed sensor installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and front steering knuckle or rear axle carrier.

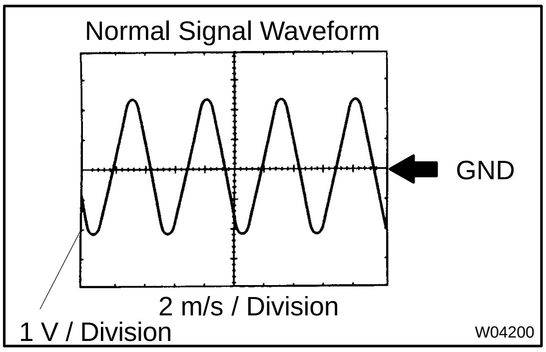
NG → **Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI-427).

OK

5	Check speed sensor and sensor rotor serrations.



W04200

(REFERENCE) INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Remove the skid control ECU with the connector still connected.

(b) Connect the oscilloscope to the terminals FR+ - FR-, FL+ - FL-, RR+ - RR- and RL+ - RL- of the skid control ECU.

CHECK:

Drive the vehicle at the speed of about 20 km/h (12 mph), and check the signal waveform.

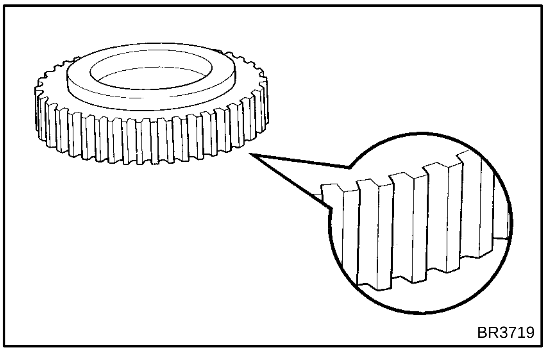
HINT:

- As the vehicle speed (rpm of the wheels) increases, a cycle of the waveform becomes shorter and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter deposited on it.

OK → **Check and replace skid control ECU (See page IN-33).**

NG

6	Check sensor rotor and sensor tip.


BR3719

Front:

PREPARATION:

Remove the front axle hub and the speed sensor (See page BR-51).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects on the sensor rotor.

CHECK:

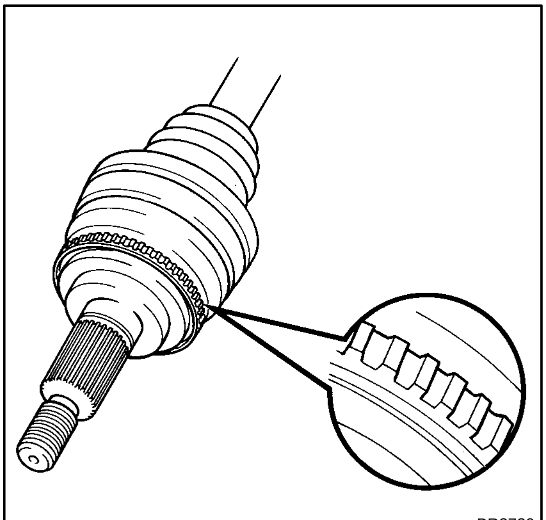
Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.


BR3720

Rear:

PREPARATION:

Remove the drive shaft (See page SA-57).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR-54).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.

NG	Replace speed sensor or rotor.

NOTICE:

Check the speed sensor signal last (See page DI-427).

OK

Check and replace skid control ECU (See page IN-33).

DI1GI-11

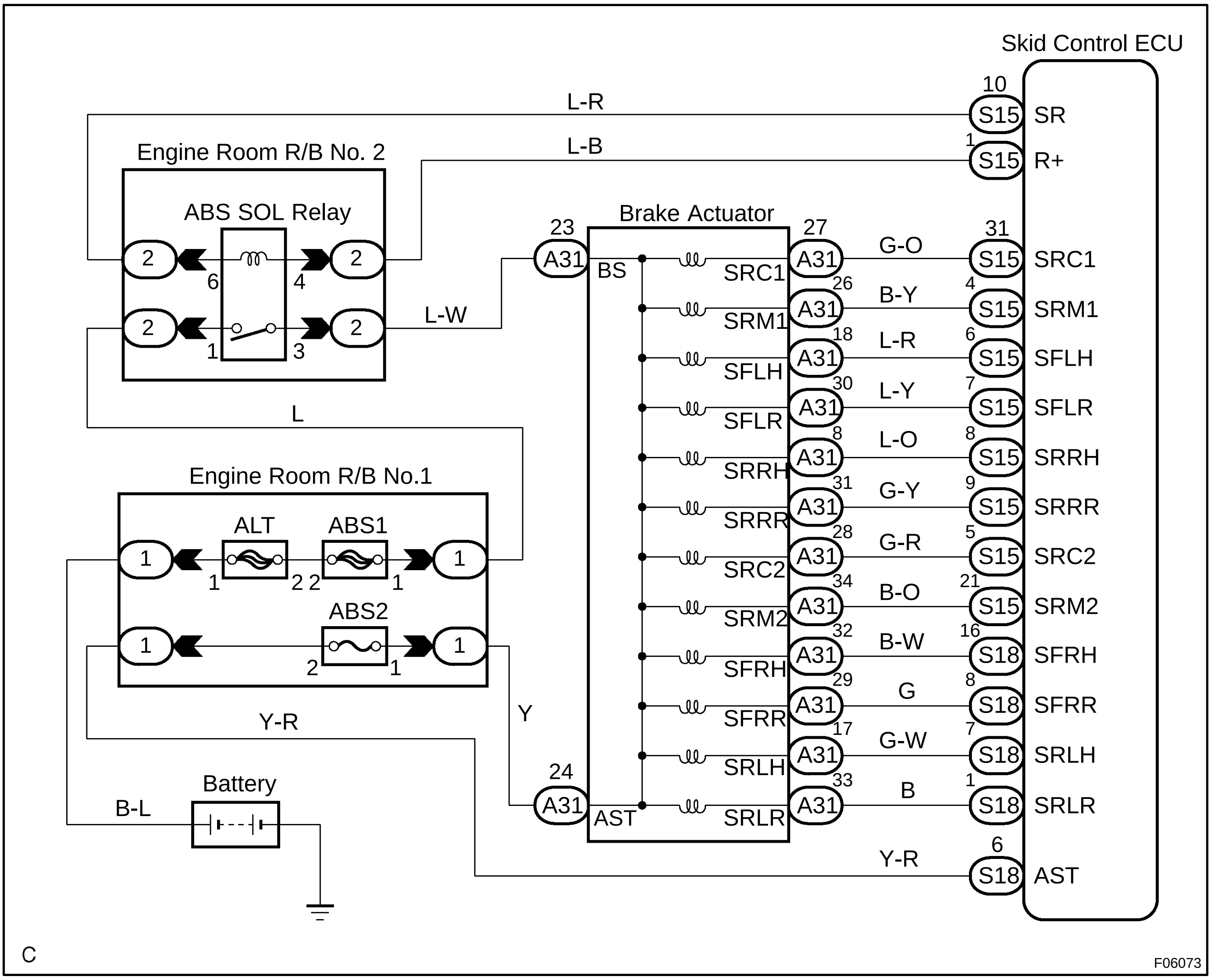
DTC	C0226 / 21 - C0256 / 24	ABS-Related Solenoid Circuits

CIRCUIT DESCRIPTION

ABS-related solenoids operate when signals are received from the ECU, and control the pressure acting on the wheel cylinders thus controlling the braking force.

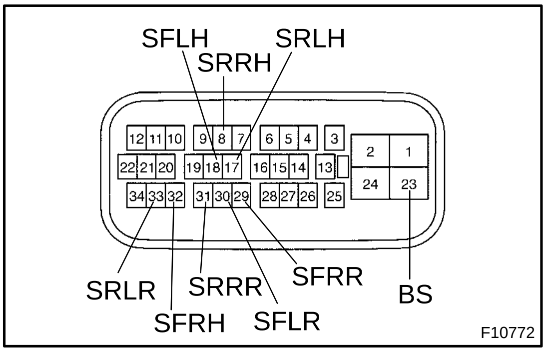
DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Open or short circuit for SFRH or SFRR circuit continues for 0.05 sec. or more.	• Brake actuator • SFRH or SFRR circuit
C0236 / 22	Open or short circuit for SFLH or SFLR circuit continues for 0.05 sec. or more.	• Brake actuator • SFLH or SFLR circuit
C0246 / 23	Open or short circuit for SRRH or SRRR circuit continues for 0.05 sec. or more.	• Brake actuator • SRRH or SRRR circuit
C0256 / 24	Open or short circuit for SRLH or SRLR circuit continues for 0.05 sec. or more.	• Brake actuator • SRLH or SRLR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake actuator solenoid.**



PREPARATION:
Disconnect the brake actuator connector.

CHECK:
Check continuity between terminal BS and terminals SFRH, SFLH, SRRH, SRLH, SFRR, SFLR, SRRR and SRLR of brake actuator.

OK:
Continuity

HINT:
Resistance of each solenoid at 25°C
SFRH, SFLH, SRRH, SRLH: 8.1 - 9.1 Ω
SFRR, SFLR, SRRR, SRLR: 4.0 - 4.6 Ω

NG → **Replace brake actuator.**

OK

2	**Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7UM-02

DTC	C0273/13, C0274/14	ABS Motor Relay Circuit

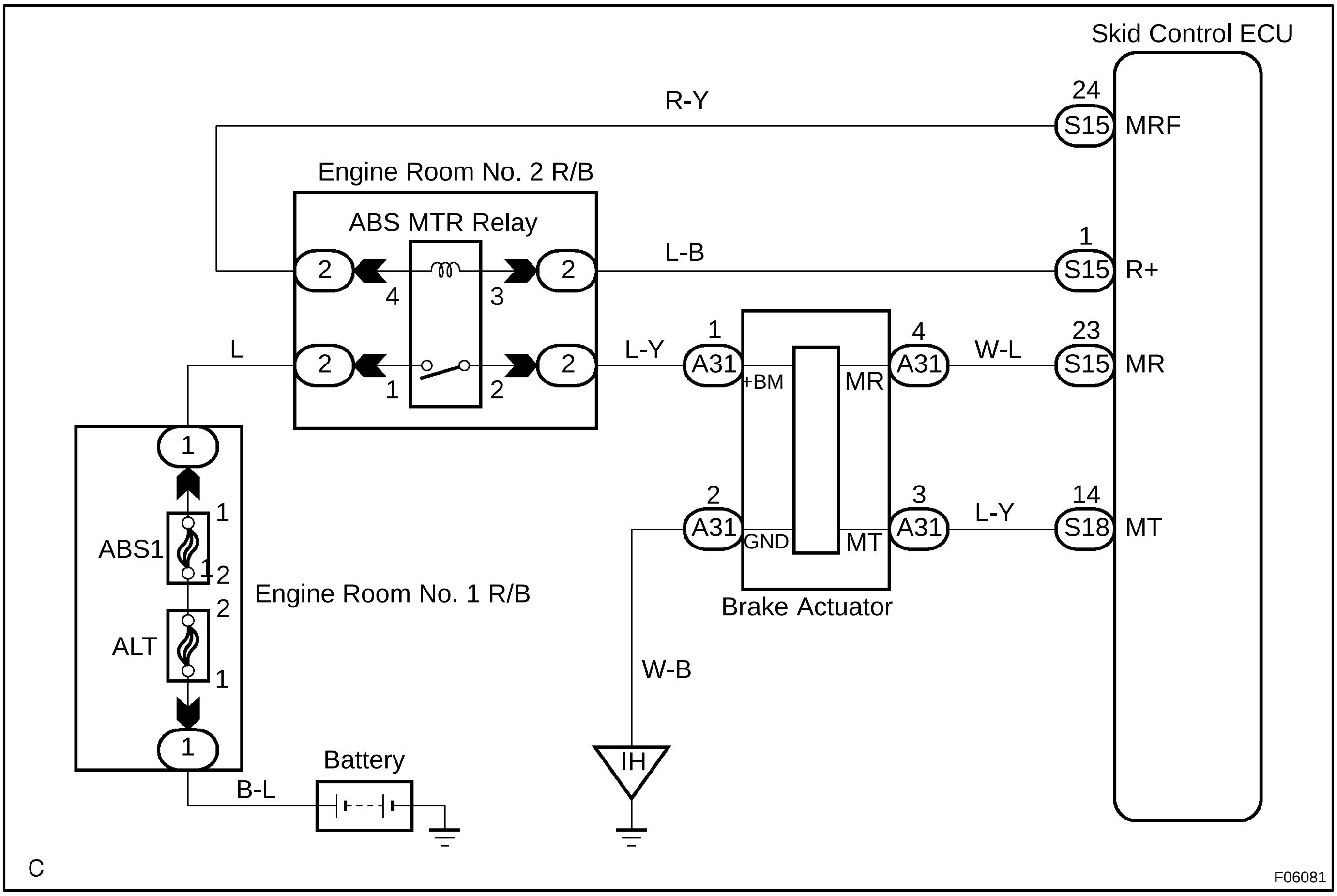
CIRCUIT DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS & TRAC are activated, the ECU switches the motor relay ON and operates the ABS pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C0273/13	Condition 1. or 2. continues for 0.2 sec. or more: 1. Skid control ECU terminal IG1 voltage is 9.5 V to 18.5 V, and when motor relay is ON in the midst of initial check or in operation of ABS control.*1 2. Motor relay is ON driving in the midst of initial check or in operation of ABS control, skid control ECU terminal IG1 voltage becomes 9.5 V or less.*2	• ABS motor relay • ABS motor relay circuit
C0274/14	Condition below continues for 4 sec. or more: When the motor relay is OFF, there is open circuit in MT terminal of skid control ECU.	

*1 Relay contact OFF condition: MT terminal voltage is below 3.6 V.
*2 Relay contact ON condition: MT terminal voltage is 3.6 V or above.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using hand-held tester.

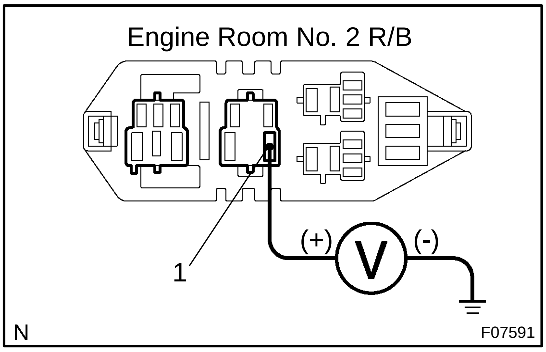
1	**Check ABS motor relay operation.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.
CHECK:
Check the operation sound of the ABS motor relay when operating it with the hand-held tester.
OK:
The operation sound of the ABS motor relay should be heard.

OK	**Go to step 4.**

NG

2	**Check voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.**

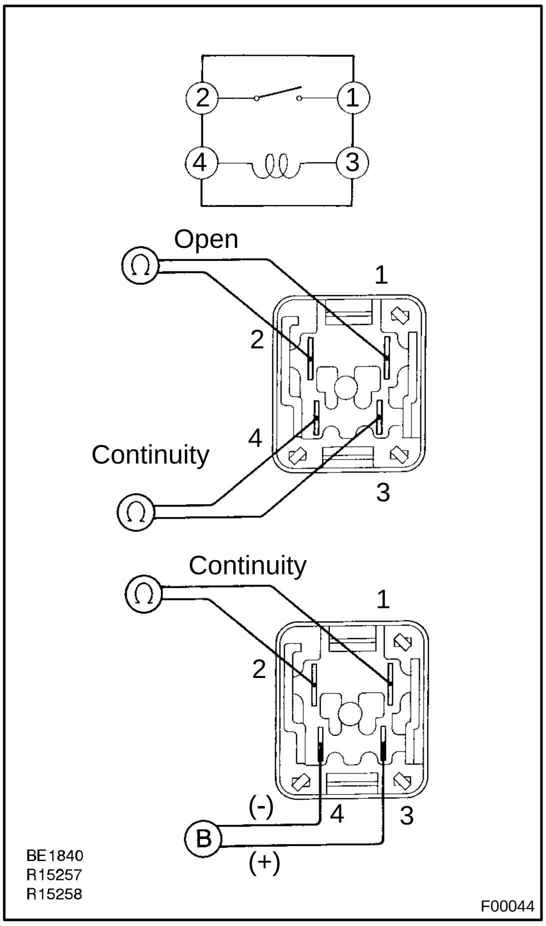


PREPARATION:
Remove the ABS motor relay from the engine room No. 2 R/B.
CHECK:
Measure voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.
OK:
Voltage: 10 - 14 V

NG	**Check and repair harness or connector.**

OK

3	**Check ABS motor relay.**



CHECK:

Check continuity between each pair of terminal of motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

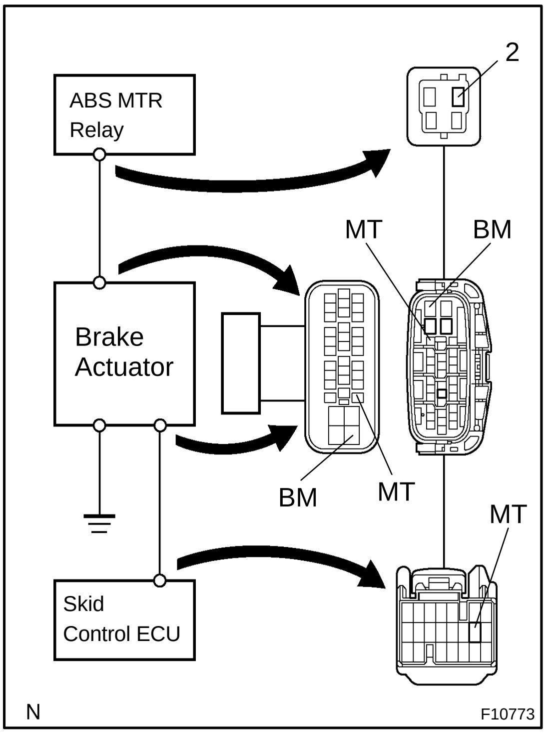
OK:

Terminals 1 and 2	Continuity

NG	**Replace ABS motor relay.**

OK

4	**Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU.**



PREPARATION:

(a) Remove the ABS motor relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU harness side connector.

OK:

Continuity

HINT:

There is a no continuity between terminals BM and MT of brake actuator.

NG → **Repair or replace harness or brake actuator.**

OK

5	**Check for open and short circuit in harness and connector between ABS motor relay and skid control ECU (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DTC	C0278/11, C0279/12	ABS Solenoid Relay Circuit

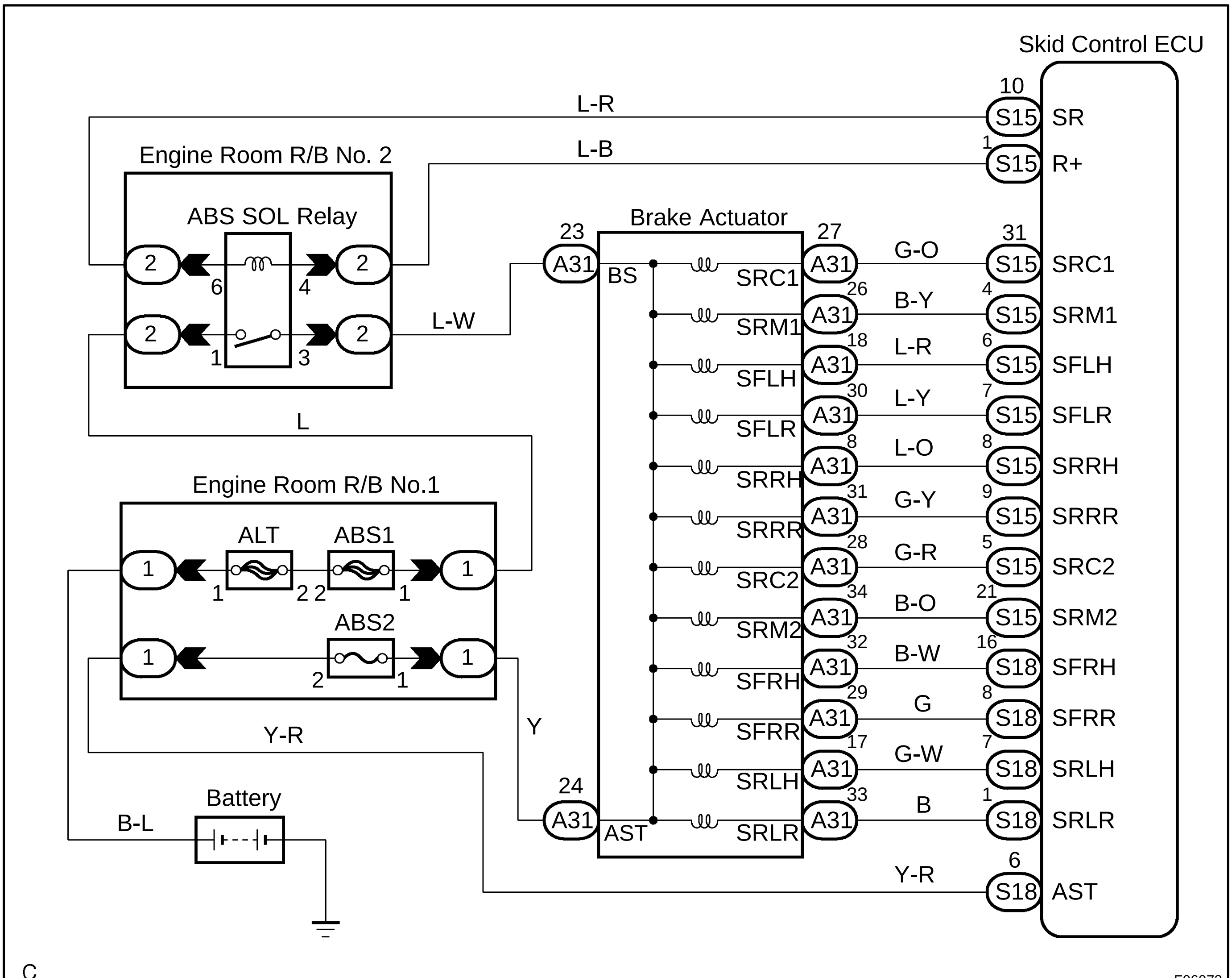
CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278/11	Condition 1. or 2. continues for 0.2 sec. or more: 1. IG1 terminal voltage of skid control ECU is 9.5 - 18.5 V, and when the solenoid relay is ON.*1 2. With solenoid relay ON driving, when IG1 terminal of skid control ECU is less than 9.5 V.*1	• ABS solenoid relay • ABS solenoid relay circuit
C0279/12	Immediately after IG switch has been turned ON, when the solenoid relay is OFF.*2	

*1 Solenoid relay contact OFF condition:
All of solenoid terminal voltage is half of IG1 terminal voltage or less than.
*2 Solenoid relay contact ON condition:
All of solenoid terminal voltage is half of IG 1 terminal voltage or more.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	Check ABS solenoid relay operation.

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

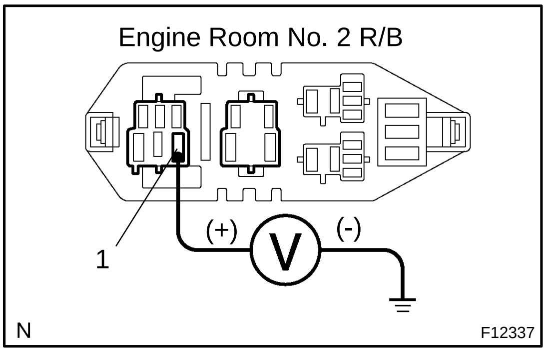
CHECK:
Check the operation sound of the ABS solenoid relay when operating it with the hand-held tester.

OK:
The operation sound of the ABS solenoid relay should be heard.

OK → **Go to step 4.**

NG

2	Check voltage between terminals 1 of engine room No. 2 R/B (for ABS solenoid relay) and body ground.



PREPARATION:
Remove the ABS solenoid relay from the engine room No. 2 R/B.

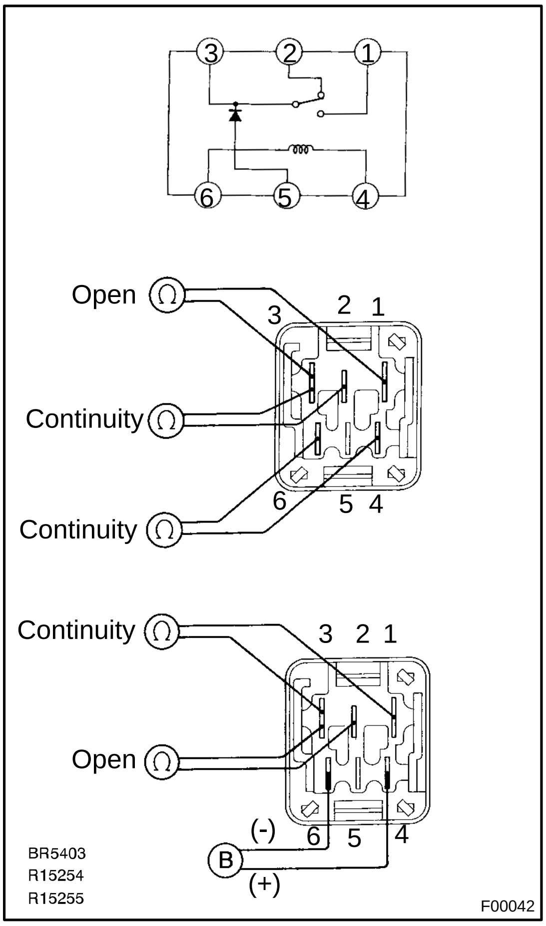
CHECK:
Measure the voltage between terminals 1 of engine room No. 2 R/B (for ABS solenoid relay) and body ground.

OK:
Voltage: 10 - 14 V

NG → **Check and repair harness or connector.**

OK

3	**Check ABS solenoid relay.**



CHECK:

Check continuity between each terminal of ABS solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery positive voltage between terminals 4 and 6.

(b) Check continuity between each terminal of ABS solenoid relay.

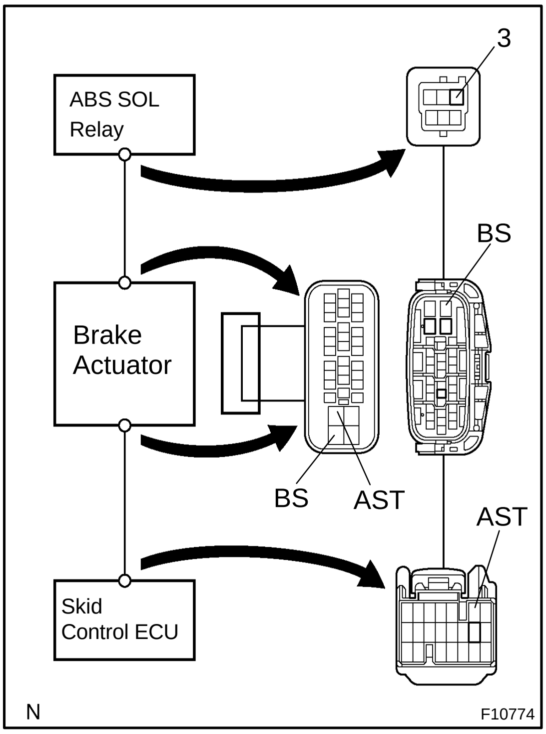
OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG → **Replace ABS solenoid relay.**

OK

4	**Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU.**



PREPARATION:

(a) Remove the ABS solenoid relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU harness side connector.

OK:

Continuity

NG	**Repair or replace harness or brake actuator.**

OK

5	**Check for open and short circuit in harness and connector between ABS solenoid relay and skid control ECU (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DTC	C1201/51	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If any trouble occurs in the engine control system, the ECU prohibits TRAC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201/51	Low fluid level condition in the brake master cylinder reservoir tank continues for 10 sec. or more	Engine control system

INSPECTION PROCEDURE

1	Check the DTC for the engine (See page DI-3).

*1 → **Repair engine control system according to the code output.**

*2

Check for ECM connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DI7UP-02

DTC	C1202/52	Brake Fluid Warning Switch Circuit

CIRCUIT DESCRIPTION

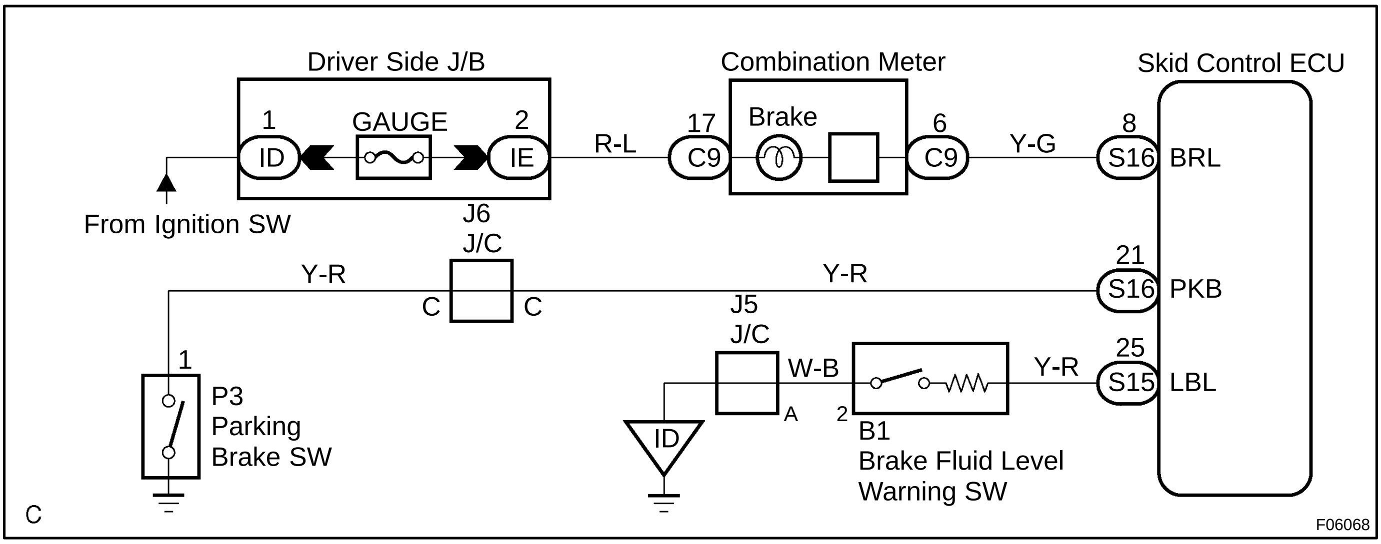
The brake fluid level warning switch sends the appropriate signal to the ECU when the brake fluid level drops.

HINT:

Pull the parking brake lever also turns on the brake warning light but does not diagnose DTC No. C1202 / 52.

DTC No.	DTC Detecting Condition	Trouble Area
C1202/52	Low master reservoir fluid level condition continues for 30 sec. or more when vehicle stops, or for 60 sec. or more when driving.	✓Brake fluid level ✓Brake fluid level warning switch ✓Brake fluid level warning switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check brake fluid level.

CHECK:

Check the amount of fluid in the brake reservoir.

NG → **Check and repair brake fluid leakage and add fluid.**

OK

2	Check brake fluid level warning switch (See page BE-89).

NG → Replace brake fluid level warning switch.

OK

3	Check for open circuit in all the harness and components connected to BRAKE fluid level warning light (See page IN-33).

NG → Repair or replace harness or connector.

OK

Check and replace skid control ECU
(See page IN-33).

DI7UQ-02

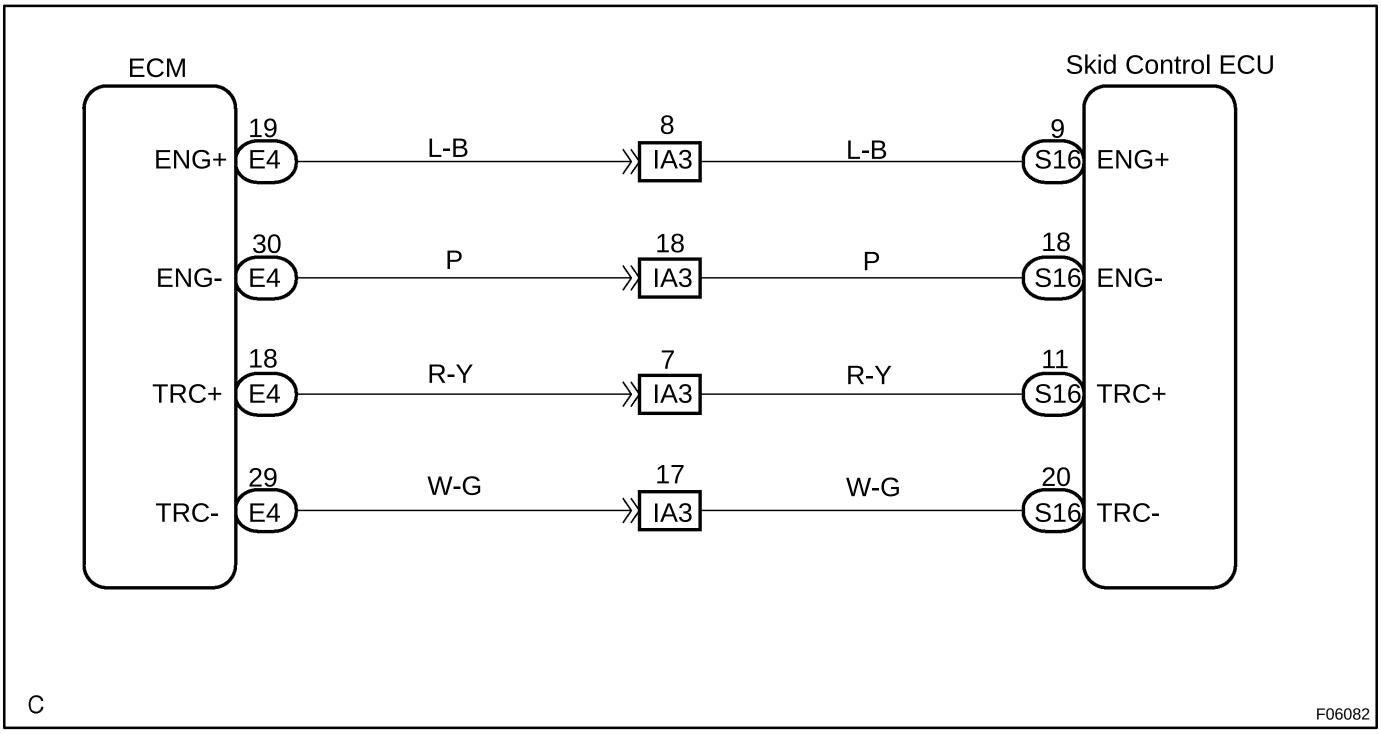
DTC	C1203/53	ECM Communication Circuit Malfunction

CIRCUIT DESCRIPTION

The circuit is used to send TRAC control information from the skid control ECU to the ECM (TRC+, TRC-), and engine control information from the ECM to the skid control ECU (ENG+, ENG-).

DTC No.	DTC Detecting Condition	Trouble Area
C1203/53	Either of the following 1., 2. or 3. continues for 5 sec.: 1. When ECU terminal IG1 voltage is 9.5 V or more, the condition that the data is not transmitted to ECM continues for more than 5 sec. 2. When ECU terminal IG1 voltage is 9.5 V or more, engine speed is 500 rpm or more and data receipt from ECM is impossible. 3. The condition that the data sent from ECM becomes repeatedly normal and abnormal occurs 10 times or more for 60 sec.	✓TRC+ or TRC- circuit ✓ENG+ or ENG- circuit ✓ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between terminals ENG+, ENG-, TRC+, TRC- of skid control ECU and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM or skid control ECU (See page IN-33).

DI7UR-02

DTC	C1223/43	ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1223/43	ABS control system is abnormal.	ABS control system

INSPECTION PROCEDURE

1	Check the DTC for the ABS (See page DI-427).

*1 → **Repair ABS control system according to the code output.**

*2 ↓

Check for ECU connected to malfunction indicator lamp.

*1: Output NG code
*2: Malfunction indicator lamp remains ON

DI7US-02

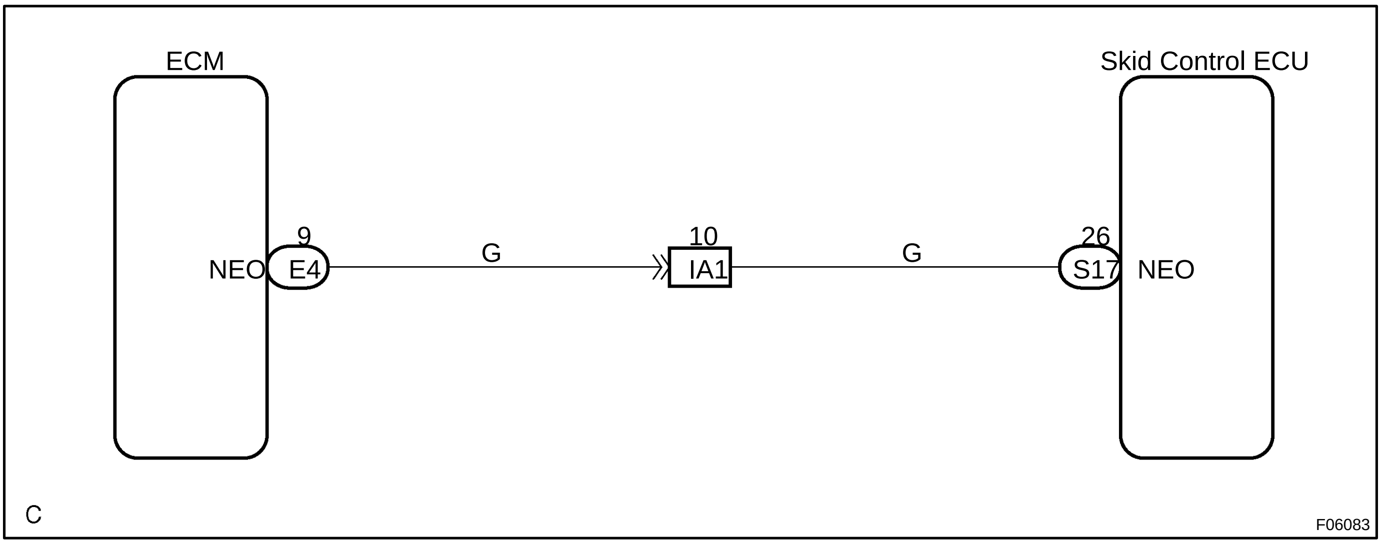
DTC	C1224/44	NE Signal Circuit

CIRCUIT DESCRIPTION

The skid control ECU receives engine revolution speed signals (NE signals) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
C1224/44	When any of the following 1. through 2. is detected: 1. At vehicle speed of 30 km/h (19 mph) or more, and when data receiving from the ECM is in normal condition, and open or short circuit for engine revolution signal circuit continues for 10 sec. or more. 2. While TRAC is operating and when open or short circuit for engine revolution signal circuit continues for 0.24 sec. or more.	• NEO circuit • ECM

WIRING DIAGRAM



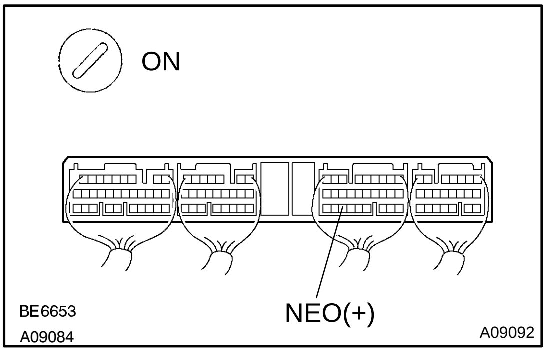
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminals NEO of skid control ECU and terminal NEO of ECM (See page IN-33).**

NG — **Repair or replace harness and connector.**

OK

2	**Check voltage between terminals NEO of skid control ECU and body ground.**



PREPARATION:

(a) Remove the skid control ECU with connectors still connected.

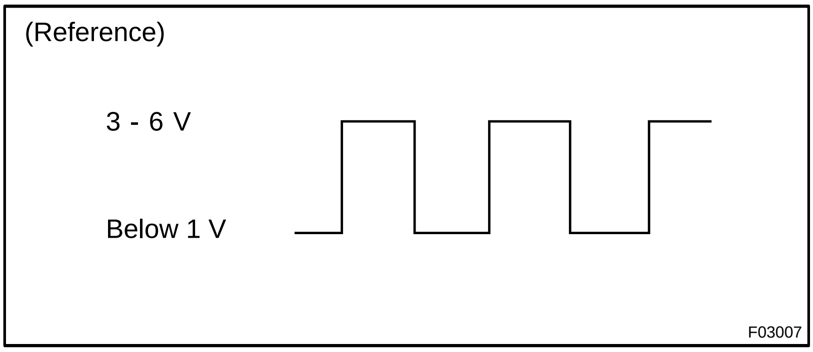
(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal NEO of skid control ECU and body ground for the engine conditions below.

OK:

Engine condition	Voltage
OFF (IG ON)	3 - 6 V or below 1 V
ON (Idling)	3 - 6 V ↔ below 1 V (Pulse)



NG → **Check and replace skid control ECU or ECM (See page IN-33).**

OK

If the same codes is still output after the DTC is deleted, check the contact condition of each connection.

DI9J9-01

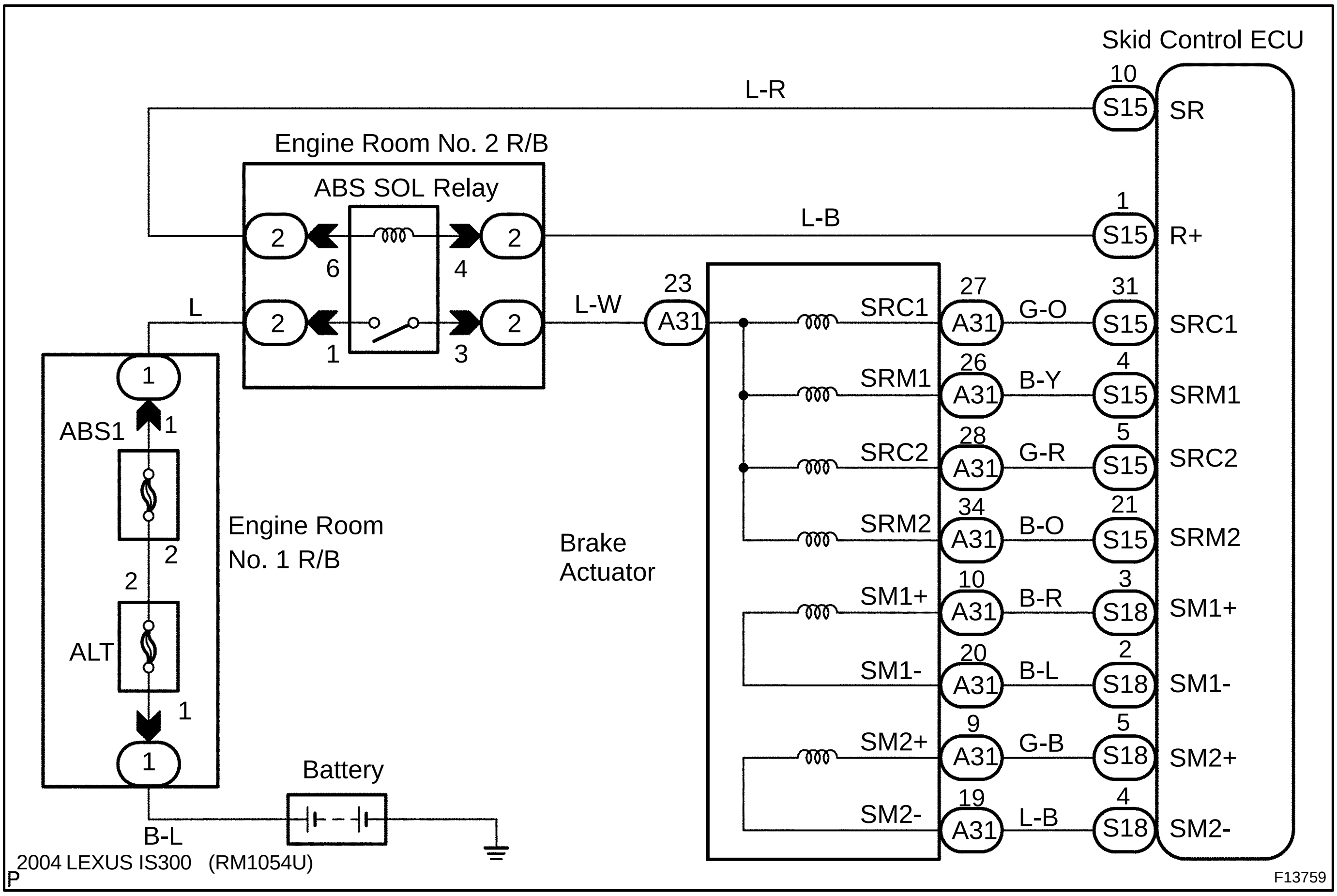
DTC	C1225 / 25 - C1227 / 27	TRAC & VSC-Related Solenoid Circuits

CIRCUIT DESCRIPTION

The TRAC & VSC solenoids operate in accordance with signals from the ECU and raise the fluid pressure in and release it from the brake cylinders.

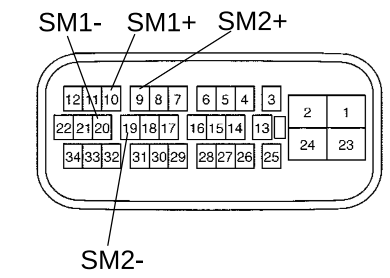
DTC No.	DTC Detecting Condition	Trouble Area
C1225 / 25	Detection of any of conditions 1. through 6.: 1. When SMF or SMR is ON, excessive electric current on SMF or SMR continues for 0.05 sec. or more. 2. When SMF or SMR is OFF, open circuit of SMF or SMR continues for 0.05 sec. or more. 3. When SMF or SMR is ON, open circuit of SMF or SMR continues for 0.1 sec. or more. 4. When SMF or SMR is OFF, electric current application on SMF or SMR continues for 0.1 sec. or more. 5. GND short circuit if SMF or SMR continues for 0.1 sec. or more. 6. Short circuit of SMF or SMR continues for 0.1 sec. or more.	• Brake actuator • SMF or SMR circuit
C1226 / 26	Open or short circuit of SRMF or SRMR continues for 0.05 sec. or more.	• Brake actuator • SRMF or SRMR circuit
C1227 / 27	Open or short circuit of SRCF or SRCR continues for 0.05 sec. or more.	• Brake actuator • SRCF or SRCR circuit

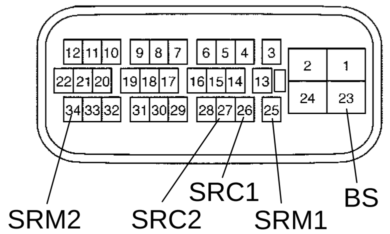
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake actuator solenoid.**





PREPARATION:
Disconnect the brake actuator connector.

CHECK:
Check continuity between terminals SM1+ - SM1-, and terminals SM2+ - SM2- of brake actuator.

OK:
Continuity

HINT:
Resistance of each solenoid: 8.1 - 9.1 Ω at 25 °C

CHECK:
Check continuity between terminal BS and terminals SRC1, SRC2, SRM1 and SRM2 of brake actuator.

OK:
Continuity

HINT:
Resistance of each solenoid at 25 °C
SRC1, SRC2: 8.1 - 9.1 Ω
SRM1, SRM2: 4.9 - 5.5 Ω

NG → **Replace brake actuator.**

OK

2	**Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

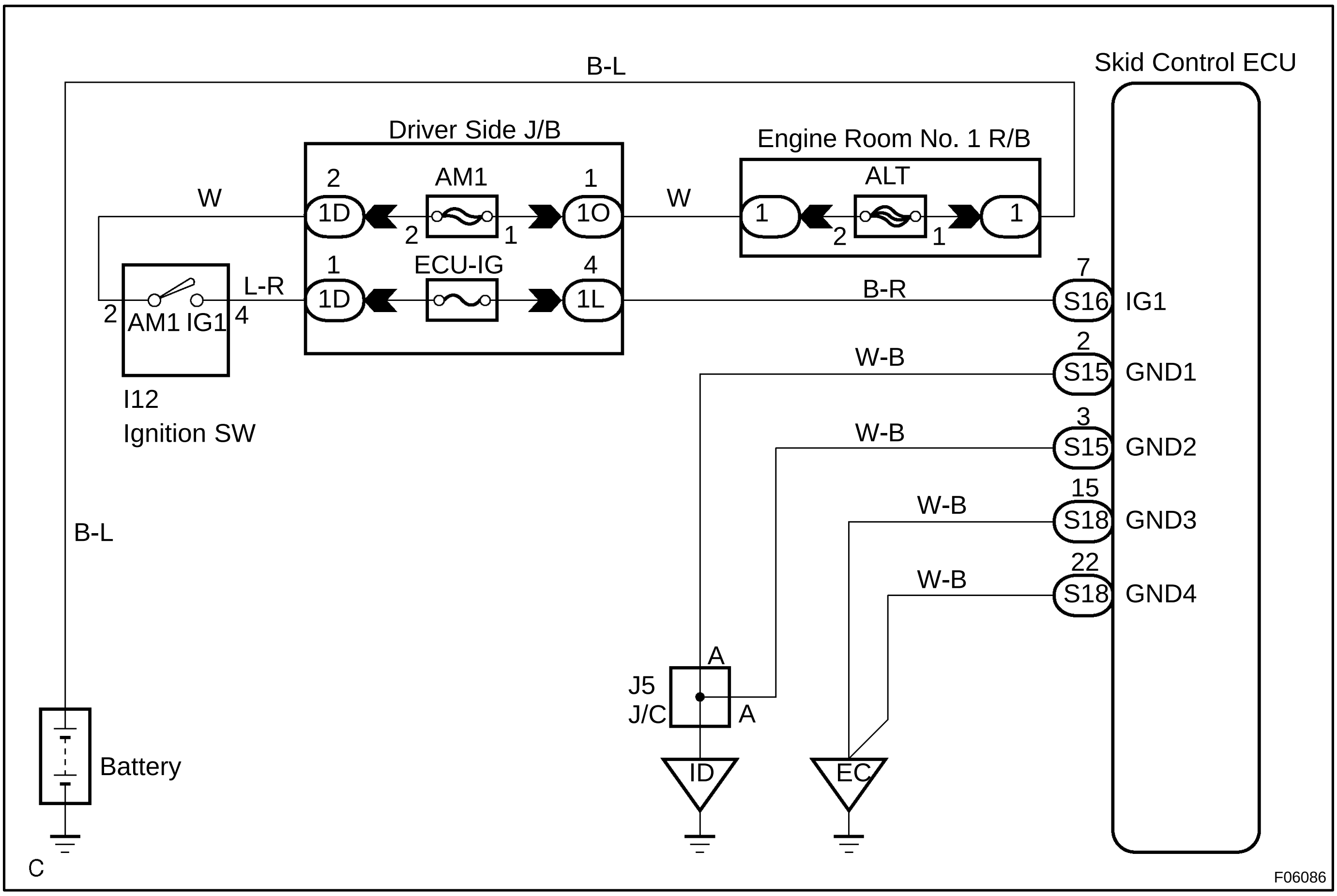
DI7UT-02

DTC	C1241/41	IG Power Source Circuit

CIRCUIT DESCRIPTION

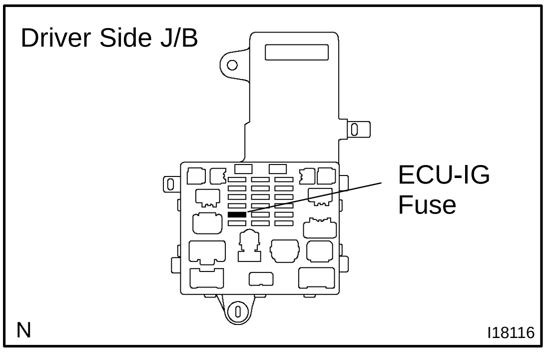
DTC No.	DTC Detecting Condition	Trouble Area
C1241/41	Condition 1. or 2. is detected: 1. Vehicle speed is at 3 km/h (1.9 mph) or more and ECU terminal IG1 voltage is 9.5 V or less , which continues for 10 sec. or more. 2. When IG1 terminal voltage is less than 9.5 V, there is open circuit in the motor relay or in the solenoid relay, or the solenoid circuit malfunction.	Battery Charging system Power source circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check ECU-IG fuse.



PREPARATION:
Remove ECU-IG fuse from driver side J/B.
CHECK:
Check continuity of ECU-IG fuse.
OK:
Continuity

NG → **Check for short circuit in all the harness and components connected to ECU-IG fuse (See attached wiring diagram).**

OK

2	Check battery positive voltage.

OK:
Voltage: 10 - 14 V

NG → **Check and repair the charging system (See page CH-1).**

OK

3	**Check voltage of the ECU IG power souce.**

In case of using the hand-held tester.

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

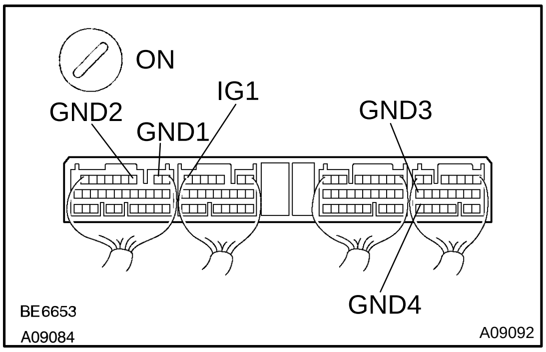
CHECK:

Check the voltage condition output from the ECU displayed by the hand-held tester.

OK:

"Normal" is displayed.

In case of not using the hand-held tester.



PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of skid control ECU.

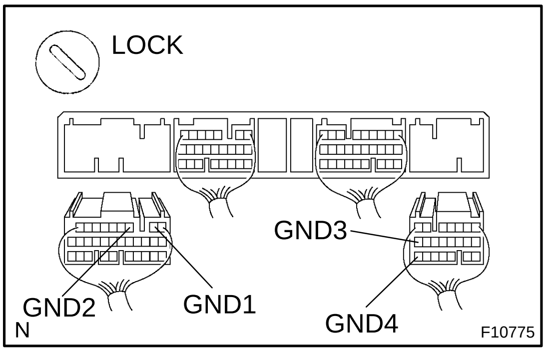
OK:

Voltage: 10 - 14 V

OK	**Ignition switch OFF, check and replace skid control ECU.**

NG

4	**Check continuity between terminal GND of skid control ECU connector and body ground.**



CHECK:

(a) Disconnect the 2 connector from the skid control ECU.

(b) Measure resistance between terminal GND of skid control ECU connector and body ground.

OK:

Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

Check for open circuit in harness and connector between skid control ECU and battery (See page IN-33).

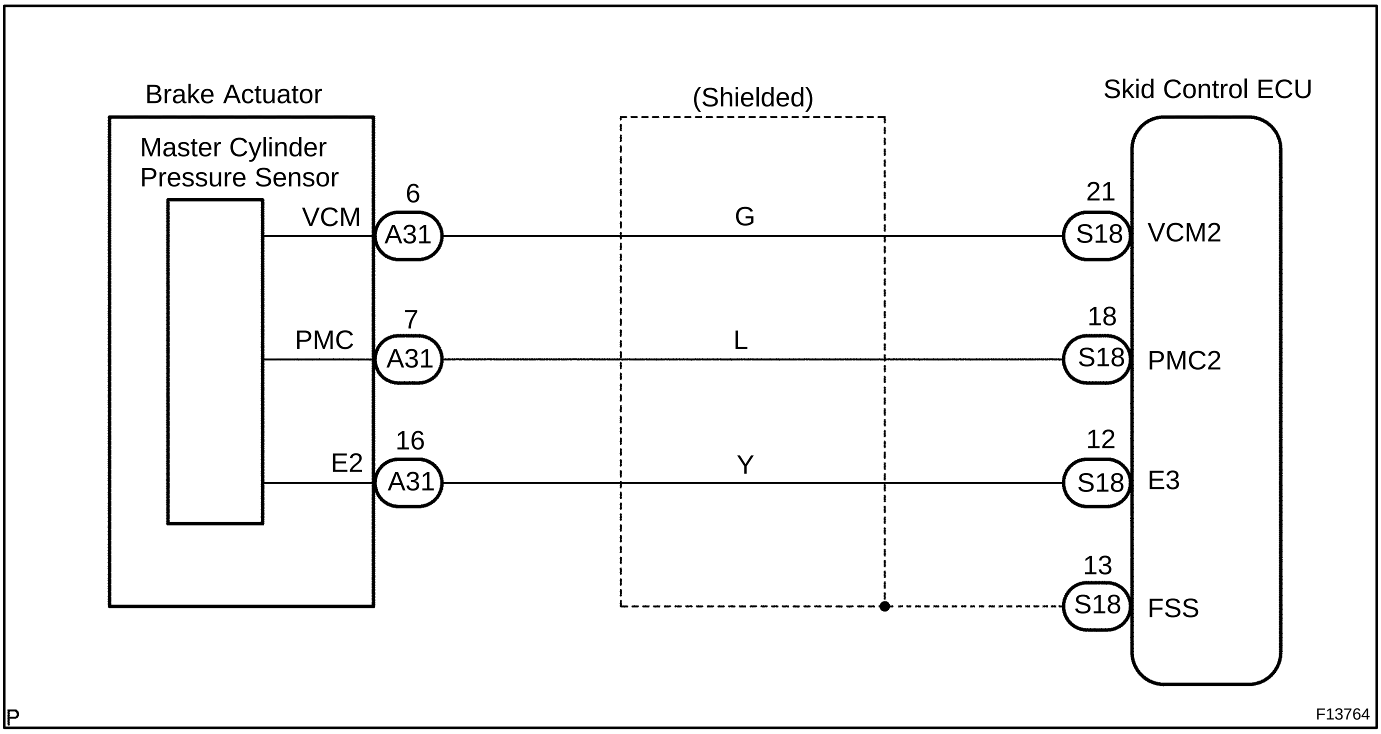
DI1GN-13

DTC	C1246 / 46	Master Cylinder Pressure Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1246 / 46	Detection of any of conditions 1. through 5.: 1. When the vehicle speed is 7 km/h (4 mph) or more and ECU PMC terminal voltage exceeds 0.86 V, the condition that the voltage does not change 0.005 V or more continues for 30 sec. 2. Noise in ECU PMC terminal occurs 7 times or more in 5 sec. 3. When the ECU STP terminal is OFF, the condition that ECU PMC terminal voltage is 0.86 V or more, or less than 0.3 V continues for 5 sec. or more. 4. When IG1 terminal voltage is 9.5 to 17.2 V, the condition that ECU VCM terminal voltage is out of the range from 4.4 to 5.6 V continues for 1.2 sec. or more. 5. When ECU VCM terminal voltage is 4.4 to 5.6 V, the condition that the ECU PMC terminal voltage is out of the range from 0.14 to 4.85 V continues for 1.2 sec. or more.	Master cylinder pressure sensor Master cylinder pressure sensor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	Check output value of the master cylinder pressure sensor.

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

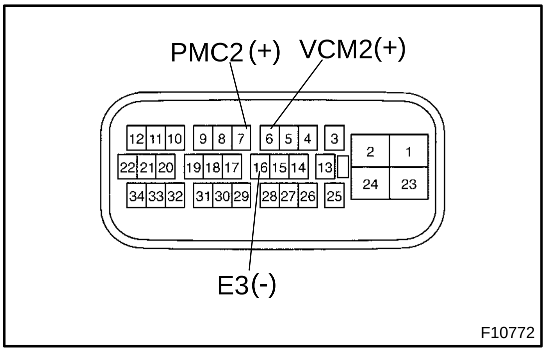
CHECK:
Check that the brake fluid pressure value of the master cylinder pressure sensor observed in the hand-held tester is changing when the brake pedal is being depressed.

OK:
Brake fluid pressure value must be changing.

OK → **Go to step 4.**

NG

2	Check master cylinder pressure sensor.



PREPARATION:
Install LSPV gauge to the front caliper bleeder plug portion, and bleed air from LSPV gauge.
SST 09709-29018

CHECK:
Start the engine and depress the brake pedal, then check how the fluid pressure affects voltage of PMC2 and E3 terminals of the master cylinder pressure sensor with the connector still connected to it.

OK:

Front brake caliper fluid pressure	Voltage
0 kPa (0 kgf/cm^2, 0 psi)	0.37 - 0.63 V
5,883 kPa (60 kgf/cm^2, 853 psi)	1.57 - 1.83 V
11,768 kPa (120 kgf/cm^2, 1,706 psi)	2.77 - 3.03 V

HINT:
Voltage of between terminals VCM2 and E3: 4.7 - 5.3 V

NG → **Replace brake actuator.**

OK

3	Check for open and short circuit in harness and connector between master cylinder pressure sensor and skid control ECU (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

4	Check whether or not the ECU terminal STP input voltage is changes when the stop light switch is turned on and off.

NO → **Check stop light switch circuit (See page BE-2).**

YES

Check and replace skid control ECU (See page IN-33).

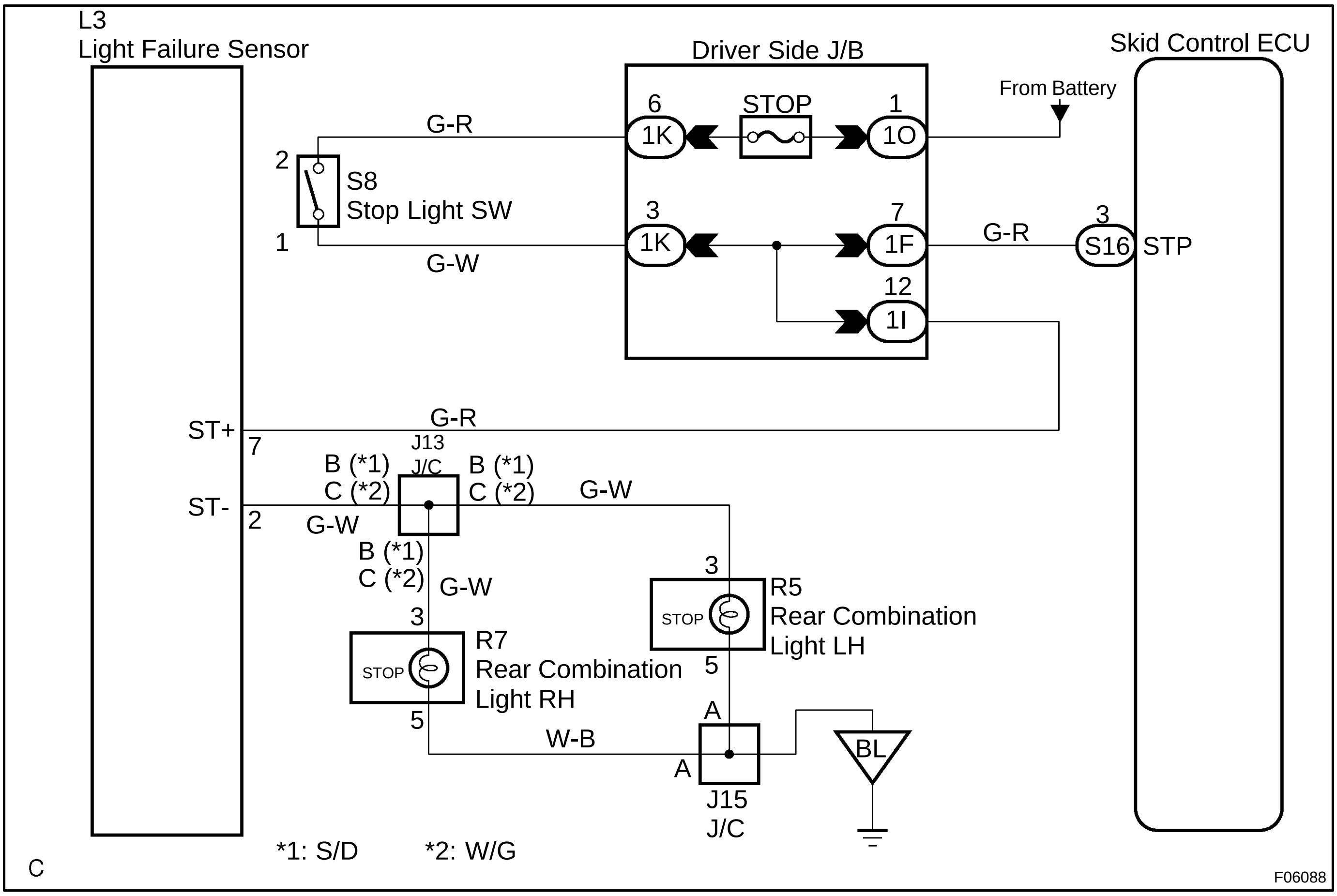
DI7UU-02

DTC	C1249/49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1249/49	1. ECU terminal IG1 voltage is 9.5 to 17.2 V and ABS is in non-operation, the open circuit of stop light switch circuit continues for 0.3 sec. or more. 2. When the following (a) to (d) continue for 2 sec. or more: (a) Brake pedal load sensing switch is ON. (b) Master cylinder pressure is 2 MPa or more. (c) The presumed gravity on the vehicle is 0.2 G or more. (d) Stop light switch is OFF.	✓Stop light switch ✓Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of the stop light switch.**

CHECK:
Check that the stop light lights up when brake pedal is depressed and turns off when the brake pedal is released.

OK → **Go to step 3.**

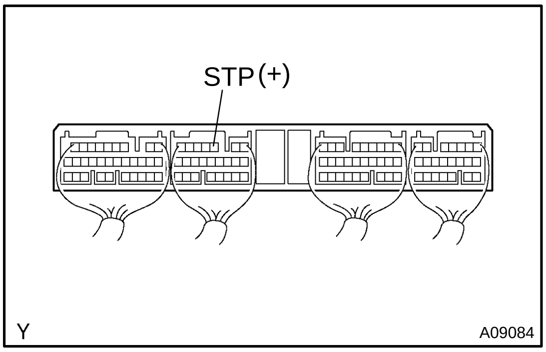
NG

2	**Check stop light circuit (See page BE-68).**

NG → **Repair or replace stop light circuit.**

OK

3	**Check voltage between terminal STP of skid control ECU and body ground.**



PREPARATION:
Remove skid control ECU with connectors still connected.
CHECK:
Measure voltage between terminal STP of skid control ECU and body ground when brake pedal is depressed.
OK:
Voltage: 10 - 14 V

OK → **Check and replace skid control ECU (See page IN-33).**

NG

4	Check for open circuit in harness and connector between skid control ECU and stop light switch (See page IN-33).

NG → Repair or replace harness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-438).

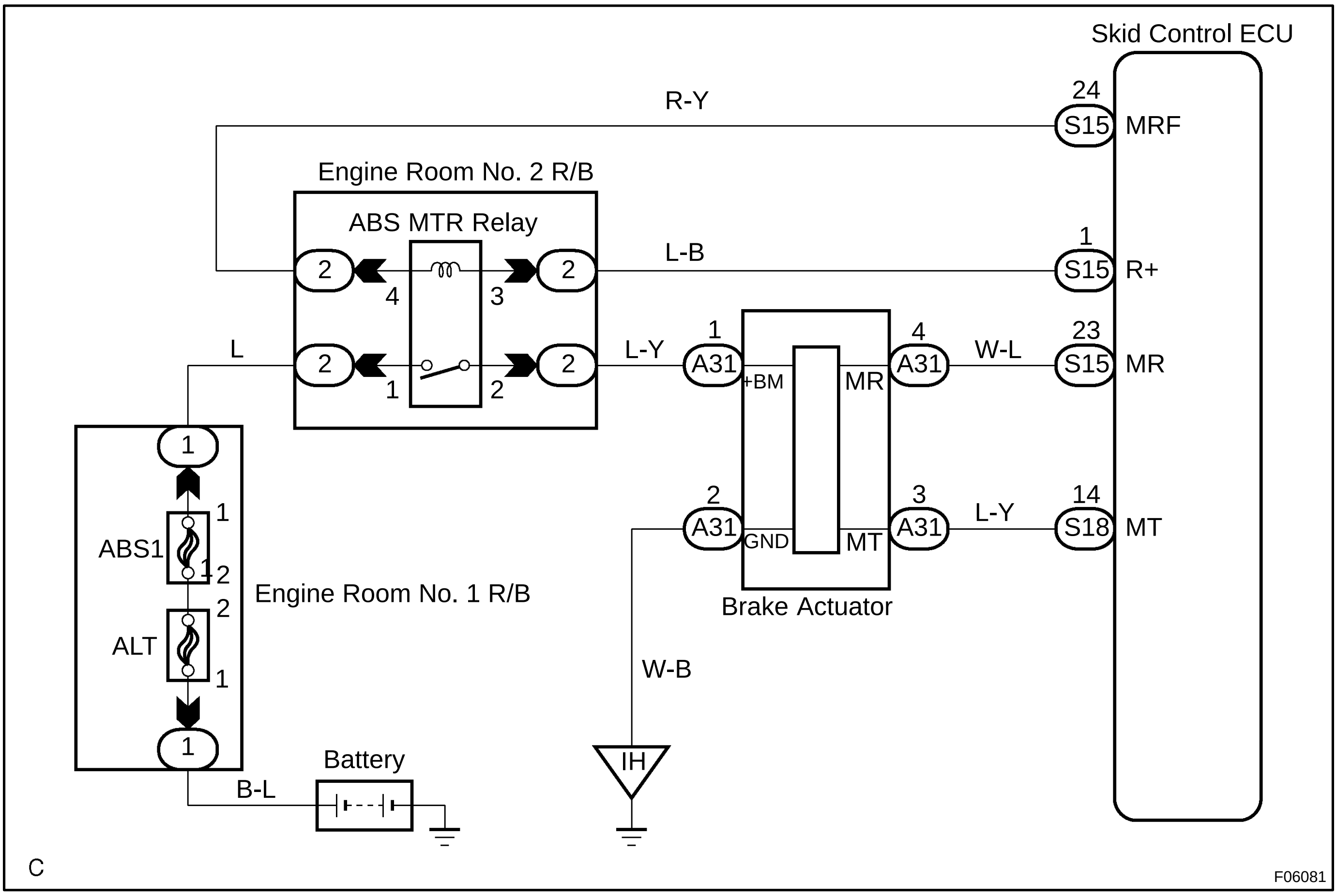
DI7UV-02

DTC	**C1251/51**	**ABS Pump Motor Lock**

CIRCUIT DESCRIPTION

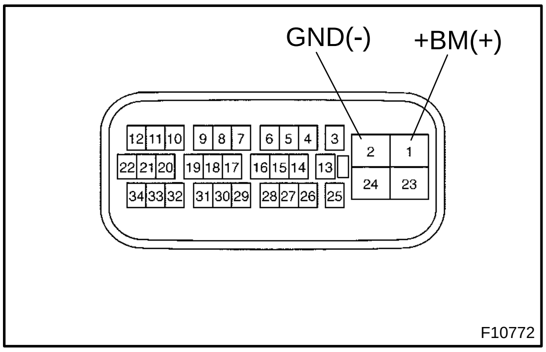
DTC No.	DTC Detecting Condition	Trouble Area
C1251/51	Either of the following 1. or 2. is detected: 1. Actuator drive motor is not operating normally. 2. Open circuit condition of actuator drive motor continues for 2 sec. or more.	Brake actuator Brake actuator Circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check operation of pump motor.



F10772

PREPARATION:
Disconnect the connector from the brake actuator.

CHECK:
Connect positive ± lead to BM terminal and negative ⊖ lead to GND terminal of the brake actuator, check that the pump motor is operated.

OK:

The running sound of the pump motor should be heard.

OK → **Check for open circuit in harness and connector between motor relay, brake actuator and skid control ECU (See page IN-33).**

NG ↓

Replace brake actuator.

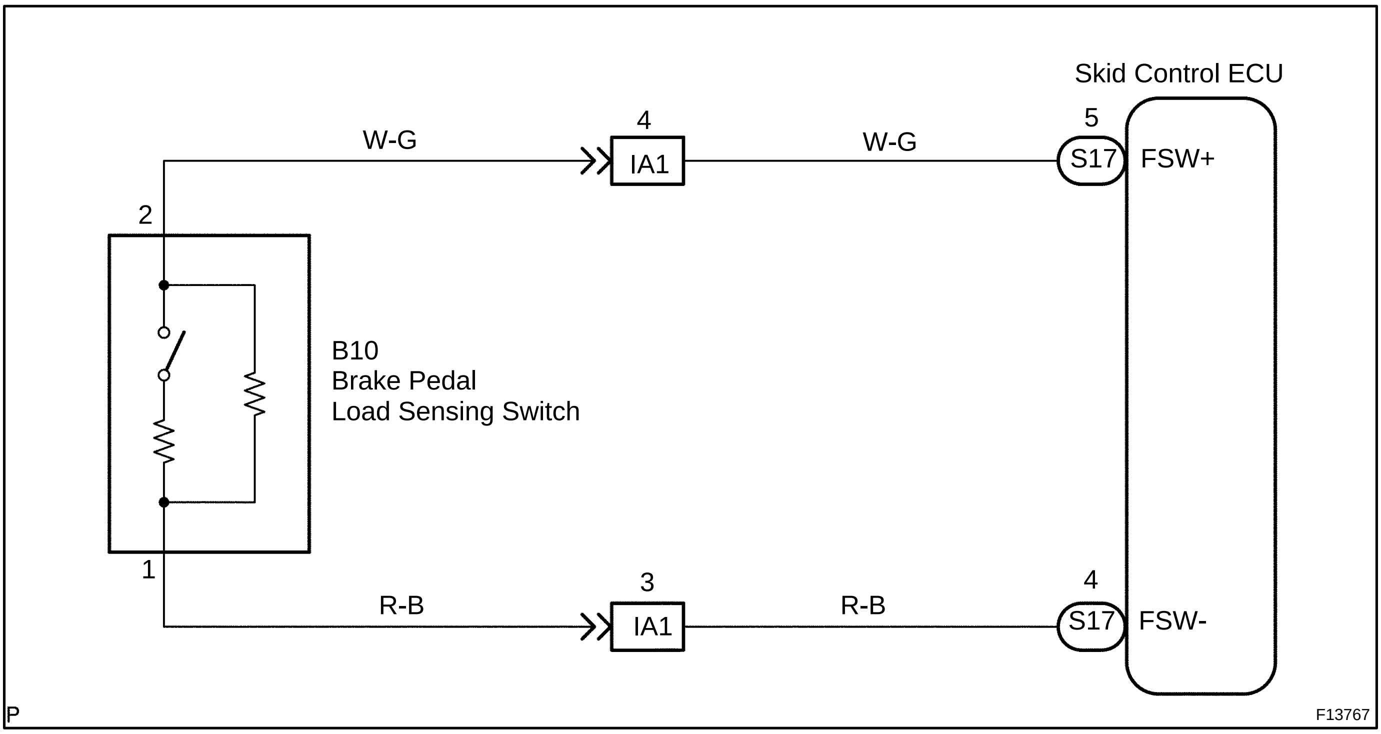
DI7AR-04

DTC	C1267 / 67	Brake Pedal Load Sensing Switch

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1267 / 67	Detection of any of conditions 1. through 4: 1. Open or short circuit of the brake pedal load sensing switch continues for 0.3 sec. or more. 2. Immediately after the ignition switch is turned ON, the condition that the brake load sensing switch is ON and the stop light switch is OFF continues for 10 sec. or more. 3. While the vehicle speed becomes 30 km/h (18 mph) or more from 0 km/h (0 mph), the condition that the brake pedal load sensing switch remains ON occurs 5 times continuously. 4. The condition that the stop light switch is ON, the brake pedal load sensing switch is OFF, the master cylinder pressure is 5 Mpa or more and deceleration is 0.4 G or more continues for 1 sec. or more.	✓Brake pedal load sensing switch ✓Brake pedal load sensing switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	Check output value of the brake pedal load sensing switch.

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

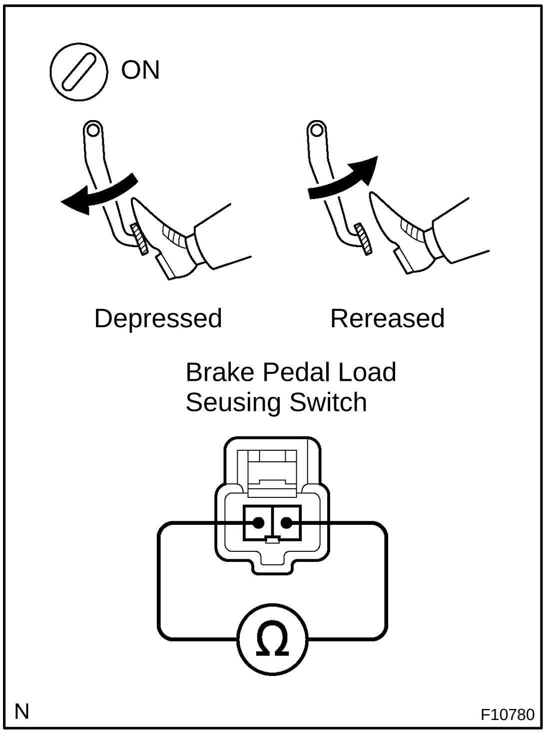
CHECK:
Check that the brake pedal load sensing switch value observed in the hand-held tester is changing when the brake pedal is being depressed.

OK:
Brake pedal load sensing switch value must be changing.

OK → **Go to step 4.**

NG

2	Check brake pedal load sensing switch.



PREPARATION:
Disconnect the brake pedal load sensing switch connector.

CHECK:
Measure resistance between each terminal of brake pedal load sensing switch when brake pedal is depressed.

OK:

Brake pedal depressed	Resistance (about 1 kΩ)
Brake pedal released	Resistance (about 213 Ω)

NG → **Replace brake pedal assembly.**

OK

3	**Check for open and short circuit in harness and connector between brake pedal load sensing switch and skid control ECU.**

NG → **Repair or replace harness or connector.**

OK

4	**Check whether or not the ECU terminal STP input voltage changes when the stop light switch is turned on and off.**

NO → **Check the stop light switch circuit (See page BE-2).**

YES

Check and replace skid control ECU.

DI9JA-01

DTC	Always ON	Skid Control ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	Skid control ECU internal malfunction is detected.	• Combination meter • Combination meter circuit • Battery • Skid control ECU

INSPECTION PROCEDURE

1	Is DTC output?

Check DTC on page DI-497 .

YES → **Repair circuit indicated by the code output.**

NO

2	Is normal code displayed?

YES → **Check solenoid relay. Check for short circuit in harness and connector between solenoid relay and check connector (See page IN-33).**

NO

3	Does ABS warning light go off?

YES → **Check for open or short circuit in harness and connector between ECU-IG fuse and skid control ECU (See page IN-33).**

NO

4	**Check battery positive voltage.**

CHECK:
Check the battery positive voltage.
OK:
10 - 14 V

NG → **Check and repair the charging system (See page CH-1).**

OK

5	**Check ABS warning light.**

PREPARATION:
(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the skid control ECU.
(c) Turn the ignition switch ON.
CHECK:
Check the ABS warning light goes off.

OK → **Check and replace skid control ECU (See page IN-33).**

NG

Check for short circuit in harness and connector between ABS warning light, DLC3 and skid control ECU (See page IN-33).

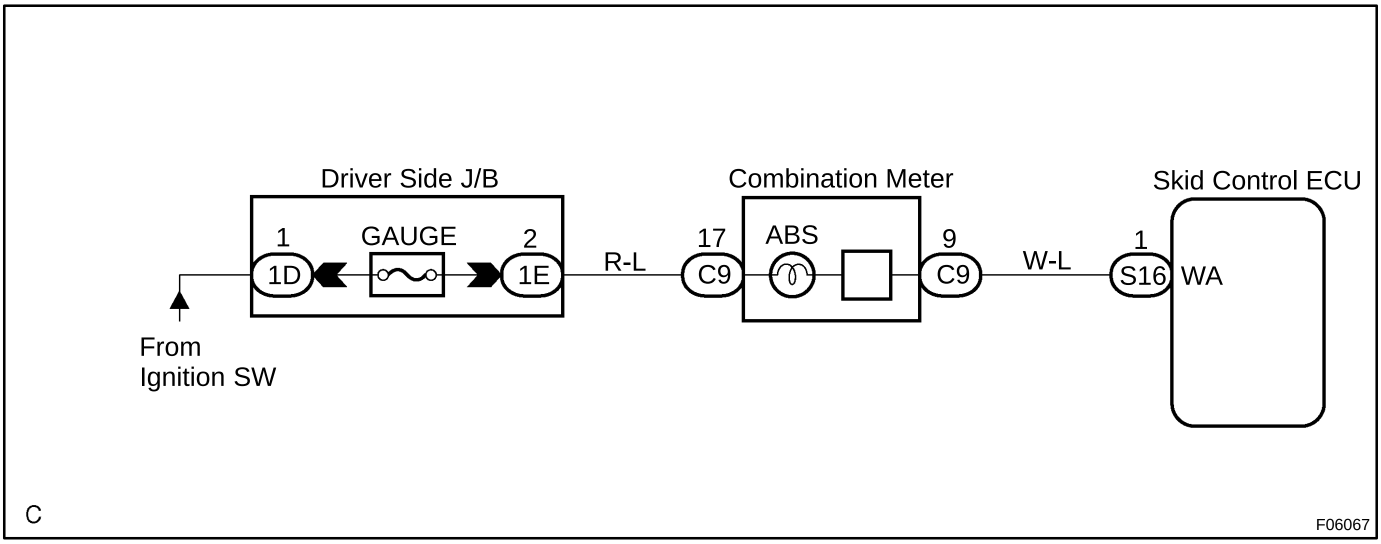
DI7UX-02

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects a trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.
Connect terminals Tc and CG of the DLC3 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Troubleshooting in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	*1
ABS warning light remains on	*2

*1: Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using hand-held tester.
*2: After inspection with step 3, start the inspection from step 4 in case of using the hand-held tester and start from step 5 in case of not using hand-held tester.

1	**Check operation of the ABS warning light.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter by the hand-held tester.

HINT:

ABS warning light turns ”OFF” automatically 2 seconds after is turned ”ON”.

OK → **Check and replace skid control ECU.**

NG ↓

2	**Check ABS warning light.**

See combination meter troubleshooting (See page BE-2).

NG → **Repair bulb or combination meter assembly** **(See page BE-86)****.**

OK ↓

3	**Check that the skid control ECU connectors are securely connected to the skid control ECU.**

NO → **Connect the connector to the skid control ECU.**

YES ↓

4	**Check for open circuit in harness and connector between combination meter and skid control ECU (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

5	**Check operation of the ABS warning light (See step 1).**

OK → **Check and replace skid control ECU (See page IN-33).**

NG

6	**Is DTC output?**

Check DTC on page DI-497 .

YES → **Repair circuit indicated by the output code.**

NO

Check for short circuit in harness and connector between DLC3 and skid control ECU (See page IN-33).

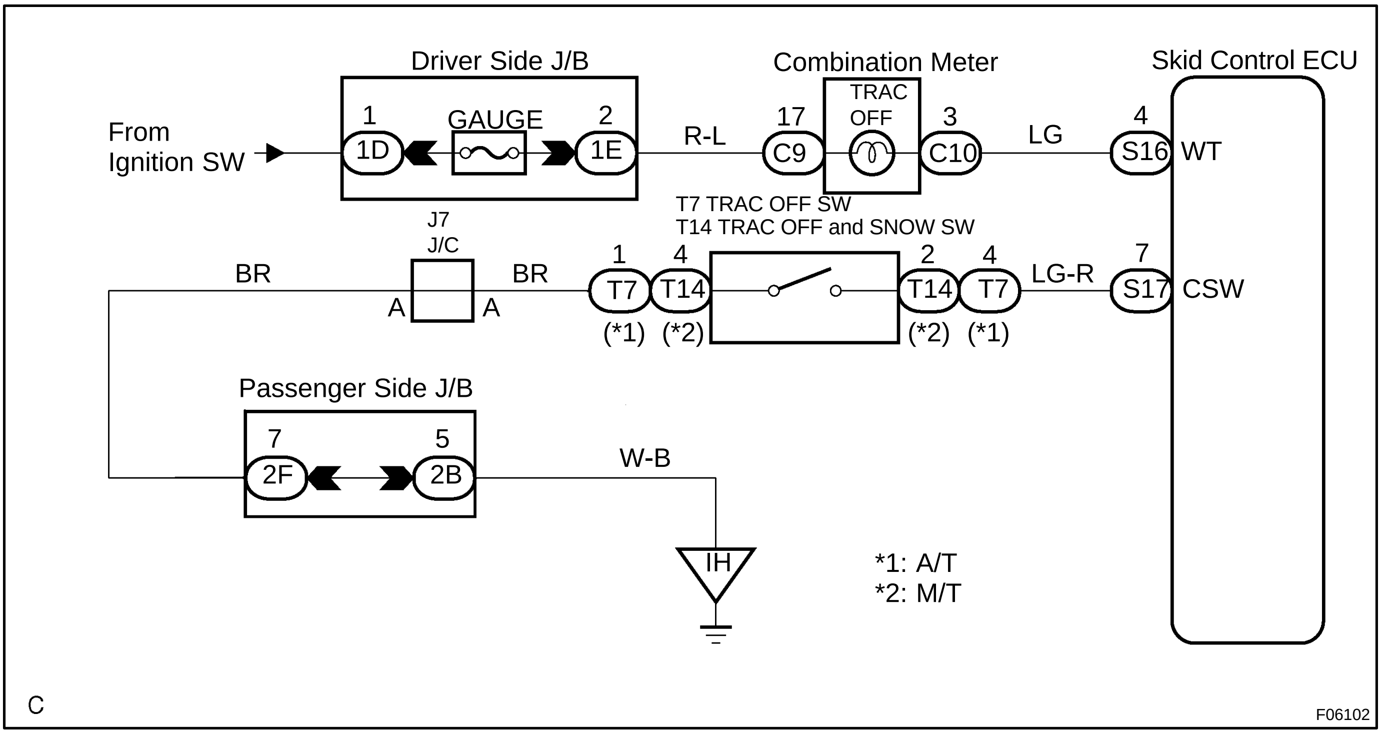
DI7UY-02

TRAC OFF Indicator, TRAC Cut Switch Circuit

CIRCUIT DESCRIPTION

This is the TRAC control main switch. When the TRAC cut switch is pushed on, TRAC control goes off and the TRAC OFF indicator lights up. This indicator blinks for warnings when the trouble occurs and for displaying DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	Check operation of the TRAC OFF indicator light.

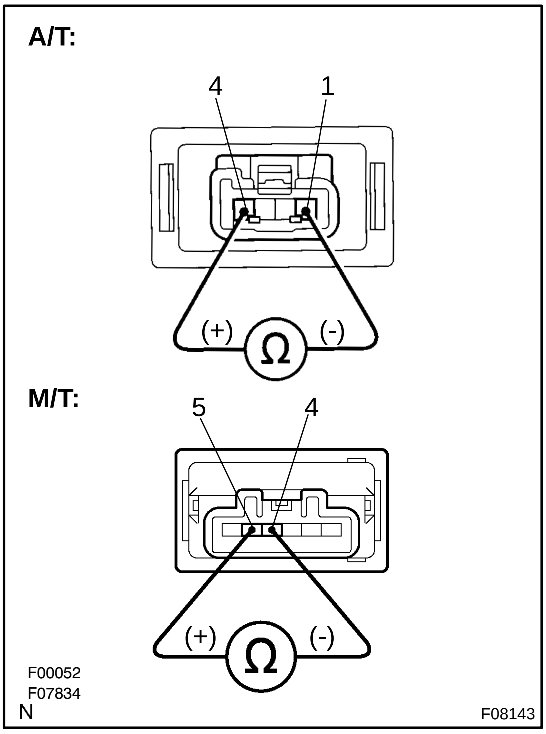
PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:
Check that ”ON” and ”OFF” of the TRAC OFF indicator light can be shown on the combination meter by the hand-held tester.

NG → **Go to step 4.**

OK

2	Check TRAC OFF switch.



PREPARATION:
Remove the TRAC OFF switch and disconnect the connector from the TRAC OFF switch.

CHECK:
Measure resistance between terminals 1 and 4 (A/T) or 4 and 5 (M/T) of TRAC OFF switch when TRAC OFF switch is on and off.

OK:

TRAC OFF switch	Resistance
Pushed in	Continuity
Released	1 MΩ or higher

NG → **Replace TRAC OFF switch.**

OK

3	Check for open and short circuit in harness and connector between terminal CSW of skid control ECU and TRAC OFF switch and body ground (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

4	Check TRAC OFF indicator light.

See combination meter troubleshooting on page BE-2 .

NG → **Repair bulb or combination meter assembly (See page BE-86).**

OK

5	Check for open and short circuit in harness and connector between terminal WT of skid control ECU and TRAC OFF indicator light (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU (See page IN-33).

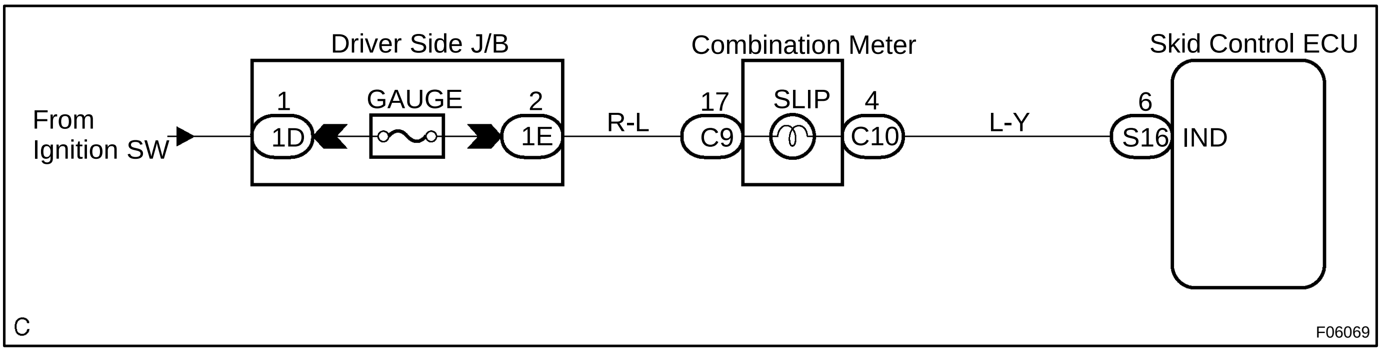
DI7UZ-02

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator blinks during TRAC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check operation of the SLIP indicator light.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that "ON" and "OFF" of the SLIP indicator light can be shown on the combination meter by the hand-held tester.

OK → **Go to step 4.**

NG

2	**Check that the SLIP indicator light is ON for 3 seconds soon after ignition switch is turned ON.**

OK → **Check and replace skid control ECU.**

NG

3	**Check SLIP indicator light.**

See combination meter troubleshooting on page BE-2 .

NG → **Repair bulb or combination meter assembly (See page BE-86).**

OK

4	**Check for open and short circuit in harness and connector between skid control ECU and SLIP indicator light (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU (See page IN-33).

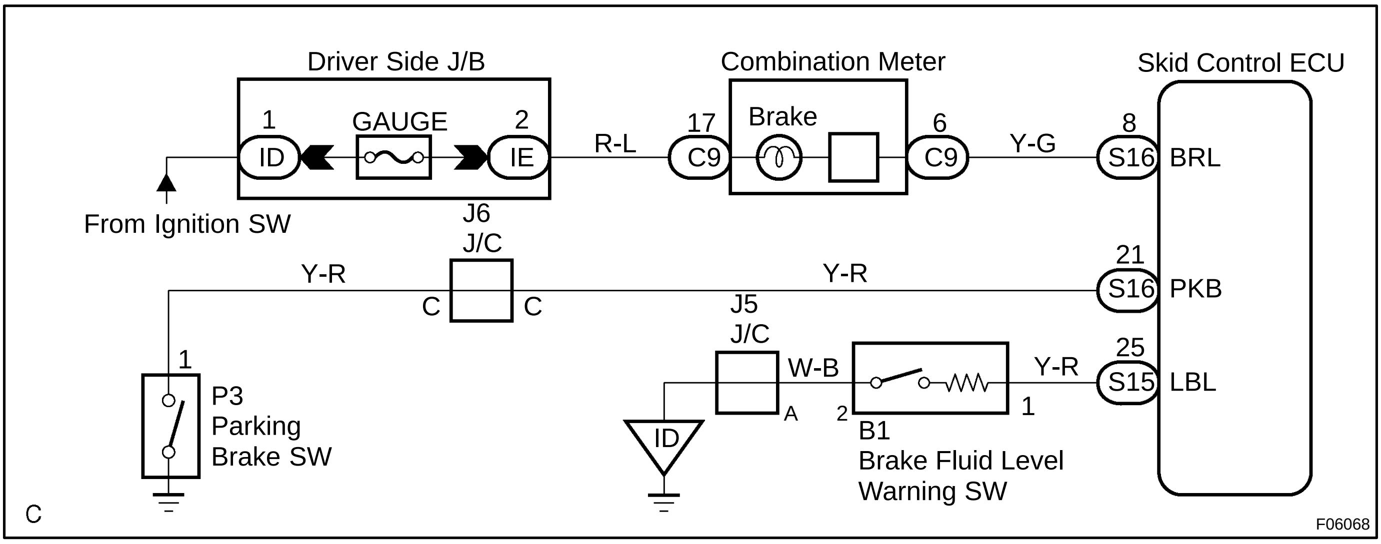
DI6QP-11

BRAKE Warning Light Circuit

CIRCUIT DESCRIPTION

The BRAKE warning light lights up when the brake fluid is insufficient, the parking brake is applied or the EBD is defective.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check parking brake switch circuit (See page BE-2).**

NG → **Repair or replace parking brake switch circuit.**

OK

2	**Check brake fluid level warning switch circuit (See page BE-2).**

NG → **Repair or replace brake fluid level warning switch circuit.**

OK

3	**Is DTC output for ABS?**

Check DTC on page DI-427 .

Yes → **Repair circuit indicated by the output code.**

No

4	**Check BRAKE warning light.**

See combination meter troubleshooting on page BE-2 .

NG → **Repair or replace combination meter.**

OK

Check and replace skid control ECU (See page IN-33).

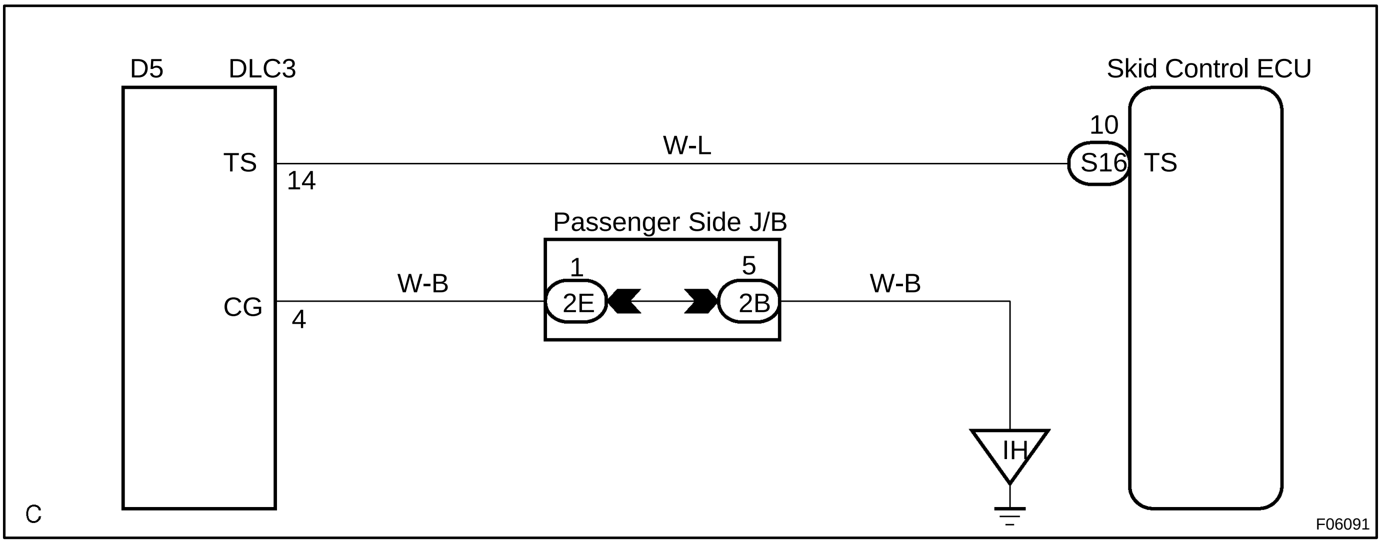
DI7V1-02

Ts Terminal Circuit

CIRCUIT DESCRIPTION

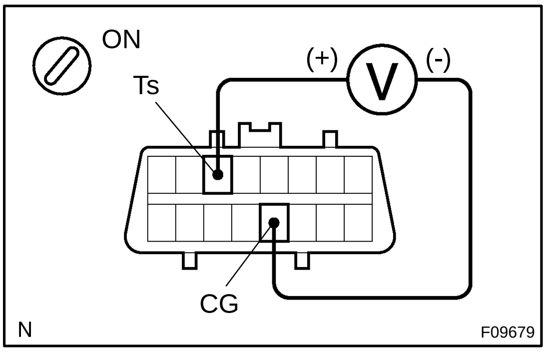
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check. Connecting terminals Ts and CG of the DLC3 starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Ts and CG of DLC3.

OK:

Voltage: 10 - 14 V

OK	**If ABS warning light does not blink even after Ts and E_1 or Ts and CG have been connected, the ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between skid control ECU and DLC3, DLC3 and body ground (See page IN-33).**

NG → **Repair or replace harness or connector.**

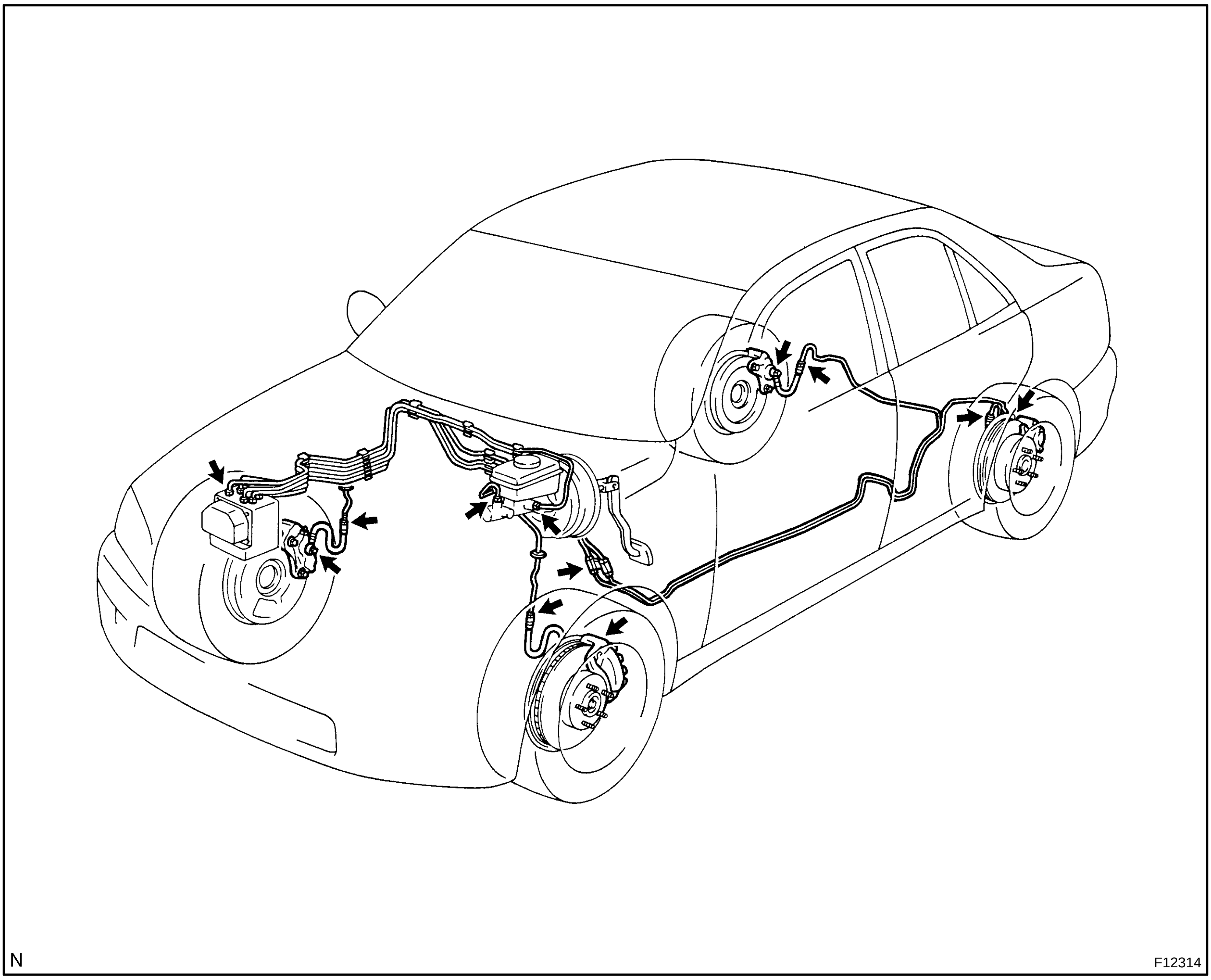
OK

Check and replace skid control ECU (See page IN-33).

DI7V2-04

Check for Fluid Leakage

Check for fluid leakage from actuator or hydraulic lines.

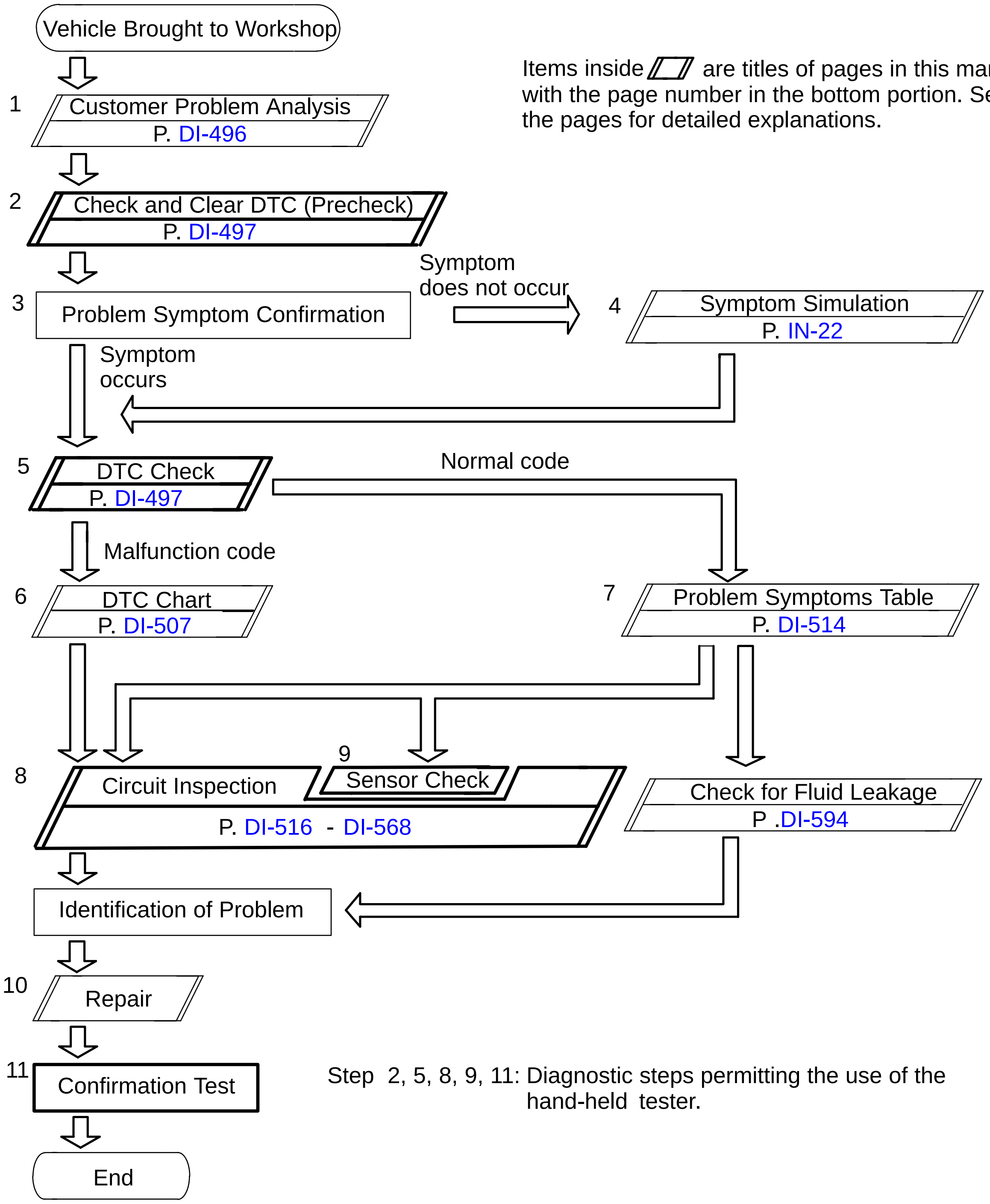


ABS WITH EBD & BA & TRAC & VSC SYSTEM

DI1GR-09

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshooting in accordance with the procedure on the following pages.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5, 8, 9, 11: Diagnostic steps permitting the use of the hand-held tester.

Fail safe function:
ABS WITH EBD & BA & TRAC & VSC SYSTEM:
When a failure occurs in the ABS & BA & TRAC & VSC systems, the ABS warning light and VSC and TRAC OFF indicator light are lit and the ABS & BA & TRAC & VSC operations are prohibited. In addition to this, when the failure that disables the EBD operation occurs, the brake warning light is lit as well and the EBD operation is prohibited.

DI0W4-09

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & BA & TRAC & VSC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Data	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

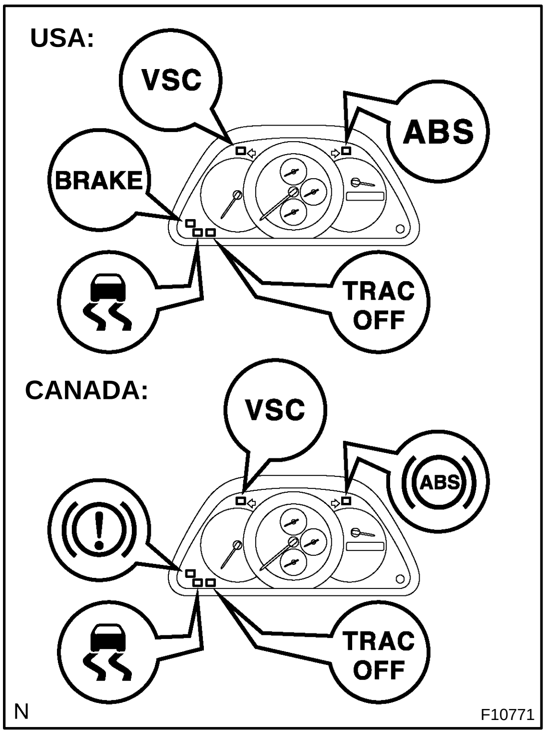
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ TRAC does not operate.	
	☐ VSC does not operate. (Wheels spin when starting rapidly.)	
	☐ BA does not operate.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	TRAC OFF Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up
	VSC Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not Light Up
	BRAKE Warning Light Abnormal	☐ Remains ON ☐ Does not Light Up

Check Item	**Malfunction Indicator Light**	☐ Normal ☐ Does not Light Up

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI9JB-01



PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Inspect the battery positive voltage.

Battery positive voltage: 10 - 14 V

(b) Check the warning lights and indicator lights.

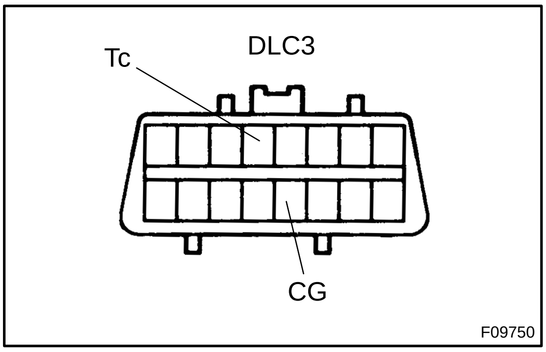
(1) Release the parking brake lever.

(2) When the ignition switch is ON, check that the ABS warning light, BRAKE warning light, TRAC OFF indicator light and SLIP indicator light go on for 3 sec.

HINT:

- If the ECU stores DTC, VSC warning light, ABS warning light and TRAC OFF indicator light BRAKE warning light, are ON.
- If the check result is not normal, proceed to troubleshooting for the light circuit.

Trouble Area	See Page
ABS warning light circuit	DI-578
BRAKE warning light circuit	DI-586
VSC warning light circuit	DI-588
TRAC OFF indicator light circuit	DI-581
SLIP indicator light circuit	DI-584



(c) In case of not using the hand-held tester:

Check the DTC of ABS system.

(1) Using SST, connect terminals Tc and CG of DLC3.

SST 09843-18040

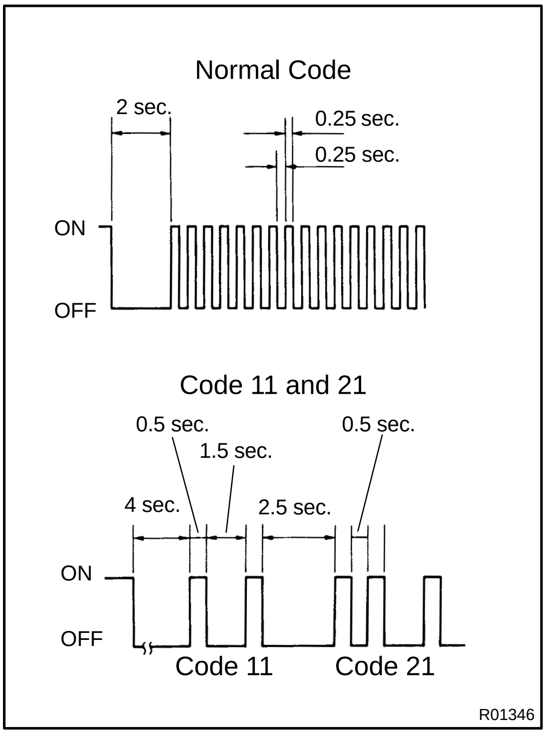
(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS warning light and VSC warning light on the combination meter.

HINT:

- If no code appears, inspect the ABS warning light circuit and VSC warning light circuit.

Trouble Area	See Page
ABS warning light circuit	DI-578
VSC warning light circuit	DI-588

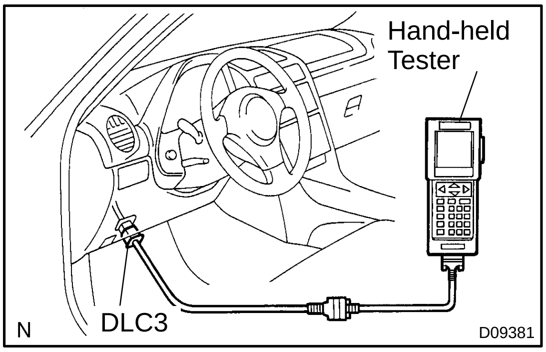


As an example, the blinking patterns for the normal code and codes 11 and 21 are shown on the left.

(4) Codes are examples in the code table on page DI-507 .

(5) After completing the check, disconnect terminal Tc and CG of DLC3, and turn off the display.

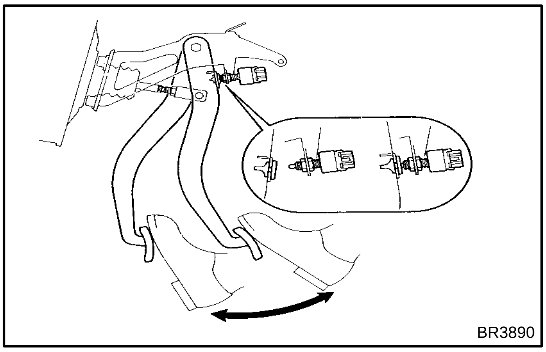
If 2 or more malfunctions are detected at the same time, the lowest numbered DTC will be displayed 1st.



(d) In case of using the hand-held tester:
Check the DTC.

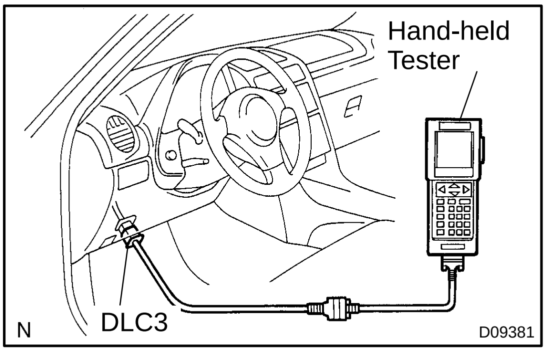
(1) Hook up the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.



(e) In case of not using the hand-held tester:
Clear the DTC.

(1) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in ECU by depressing the brake pedal 8 times or more within 5 sec.
(4) Check that the warning light show the normal code.
(5) Remove the SST from the terminals of DLC3.
SST 09843-18040



(f) In case of using the hand-held tester:
Clear the DTC.
(1) Hook up the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the hand-held tester to erase the codes.

HINT:
Please refer to the hand-held tester operator's manual for further details.

2. FREEZE FRAME DATA

(a) The vehicle (sensor) status at the occurrence of abnormality of the diagnosis code and during the ABS operating can be memorized and displayed using the hand-held tester.

(b) Only one record of freeze frame data is stored, however, freeze frame data during the ABS operating is always up-dated. After the storage of freeze frame data, up to 31 ignition "ON" operations are stored and displayed.

HINT:
If the ignition switch "ON" operation exceeds 31 times, "31" appears on the display.

(c) If the diagnosis code abnormality occurs, the freeze frame data at the occurrence of the abnormality is stored but the ABS actuation data is deleted.

Hand-held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Vehicle speed	Speed indication of a meter
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Numbers of operations of ignition switch ON after memorizing freeze frame data	0 - 31
MAS CYL PRESS	Master cylinder pressure sensor output voltage	Release brake pedal: 0.3 - 0.9 V Depress brake pedal: 3.2 - 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor changing declivity	-30 - 200 MPa/s
SYSTEM	Operate system	ABS operate: ABS BA operate: BA
YAW RATE	Yaw rate angle sensor output value	-70 - 70
STEERING ANG	Steering angle sensor output value	Left turn: Increase Right turn: Drop
G (RIGHT & LEFT)	Right and left G	-1.5 - 1.5
G (BACK & FORTH)	Back and forth G	-1.5 - 1.5
VSC / TRC OFF SW	TRAC OFF switch signal	TRAC OFF SW ON: ON OFF: OFF
SHIFT POSITION	Shift lever position	P: P R: R N: N D: D 2: 2 L: L

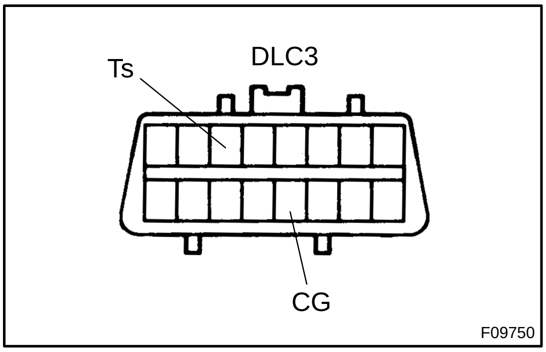
If no conditions are specifically stated for "Idling", it means the shift lever is at N or P position, the A/C switch is OFF and all accessory switches are OFF.

3. In case of not using the hand-held tester:
ABS SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:
When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.).

HINT:
If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.

(a) Procedures for test mode:
 (1) Turn the ignition switch OFF.
 (2) Set the shift lever to P position.



 (3) Using SST, connect terminals Ts and CG of DLC3.
 SST 09846-18040
 (4) Check that the steering wheel is in the straight-ahead position.
 (5) Turn the ignition switch ON.
 (6) Check that the ABS warning light blinks.

HINT:
If the ABS warning light does not blink, inspect the ABS warning light circuit or Ts terminal circuit.

Trouble Area	See page
Ts terminal circuit	DI-592
ABS warning light circuit	DI-578

(b) Check the brake pedal load sensing switch.
 (1) By pumping the brake pedal, replease the booster vacuum.
 (2) Turn the ignition switch to ON (do not start the engine) and keep depressing the brake pedal for 1 sec. or more with a force of approx. 59 N (6 kgf, 14 lbf) or more.
 (3) Check that the brake warning light is lit and the operating sound of the ABS motor is heard.
 (4) Start the engine and depress the brake pedal with a force of approx. 59 N (6 kgf, 14 lbf) or more.
 (5) Check that the brake warning light goes out.

HINT:
When rechecking, once exit the test mode and then activate the test mode again.

(c) Check the deceleration sensor.
Keep the vehicle in a stationary condition on a level place for 1 sec. or more.

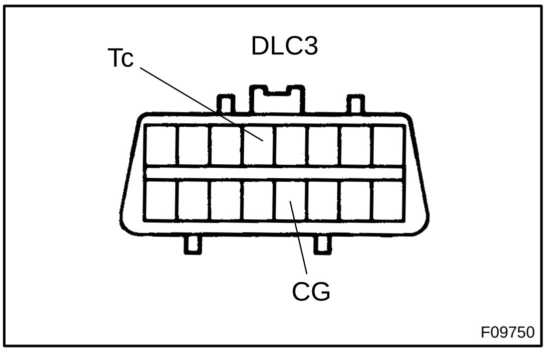
(d) Check the master cylinder pressure sensor.
- (1) Leaving the vehicle in a stationary condition and the brake pedal in free condition for 1 sec. or more, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 sec. or more.
- (2) While the vehicle is stopped, release the brake pedal.
- (3) While the vehicle is stopped, quickly depress the brake pedal once or more and check the ABS warning light is lit for 3 sec.

HINT:
Repeat the operation until the ABS warning light is lit.

(e) Check the speed sensor signal.
Drive the vehicle straightforward.
Drive the vehicle with the speed faster than 45 km/h (28 mph) for several seconds and check that the ABS warning light comes off.

HINT:
The sensor check may not be completed if the wheels spin or the steering wheel is steered during this check.

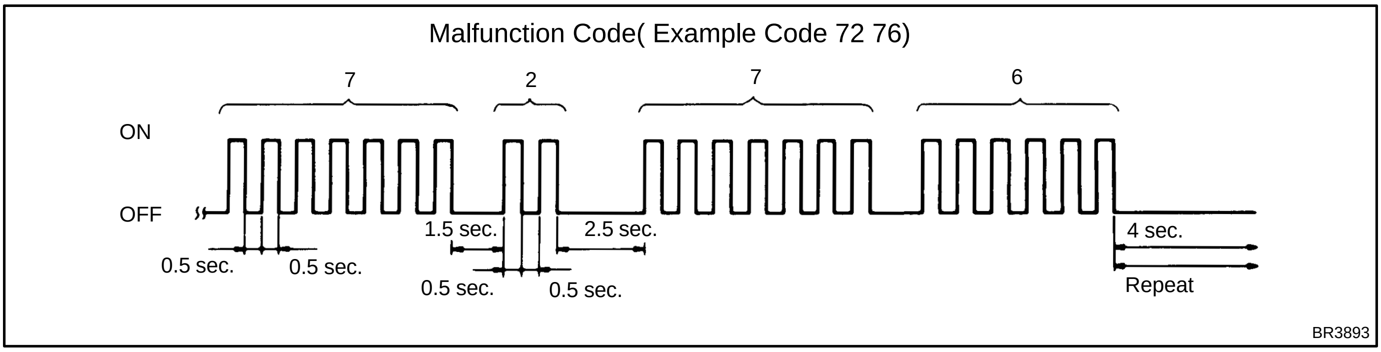
(f) Stop the vehicle.



(g) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040

(h) Read the number of blinks of the ABS warning light.

HINT:
- See the list of DTC on the next page.
- If every sensor is normal, the normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).
- If 2 or more malfunctions are detected at the same time, the lowest numbered will be displayed 1st.

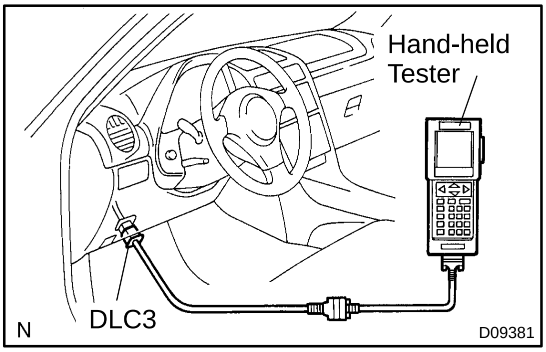


(i) After doing the check, disconnect the SST from terminals Ts and CG, Tc and CG of DLC3 and turn the ignition switch OFF.
SST 09843-18040

4. In case of using the hand-held tester: ABS SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:
When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.). Make sure that this operation should be done before starting the following.

HINT:
If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.



(a) Hook up the hand-held tester to the DLC3.
(b) Do steps 3.-(a)-(2), (4) and from (b) to (f) on the previous pages.
(c) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.

DTC of ABS sensor check function:

Code No.	Diagnosis	Trouble Area
C1271 / 71	Low output voltage of right front speed sensor	✓Right front speed sensor ✓Sensor installation ✓Sensor rotor
C1272 / 72	Low output voltage of left front speed sensor	✓Left front speed sensor ✓Sensor installation ✓Sensor rotor
C1273 / 73	Low output voltage of right rear speed sensor	✓Right rear speed sensor ✓Sensor installation ✓Sensor rotor
C1274 / 74	Low output voltage of left rear speed sensor	✓Left rear speed sensor ✓Sensor installation ✓Sensor rotor
C1275 / 75	Abnormal change in output voltage of right front speed sensor	Right front speed sensor rotor
C1276 / 76	Abnormal change in output voltage of Left front speed sensor	Left front speed sensor rotor
C1277 / 77	Abnormal change in output voltage of right rear speed sensor	Right rear speed sensor rotor

C1278 / 78	Abnormal change in output voltage of Left rear speed sensor	Left rear speed sensor rotor
C1279 / 79	Deceleration sensor is faulty	✓Deceleration sensor ✓Sensor installation
C1281/81	✓Master cylinder pressure sensor output signal is faulty ✓The problem symptoms in the brake cannot be confirmed	✓Master cylinder pressure sensor ✓Brake booster

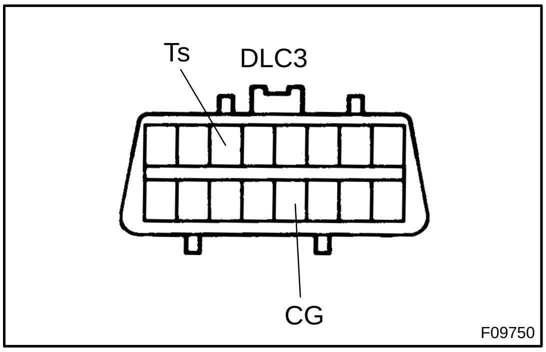
5. In case of not using the hand-held tester:
VSC SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.).

HINT:

If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.



F09750

(a) Procedures for test mode:

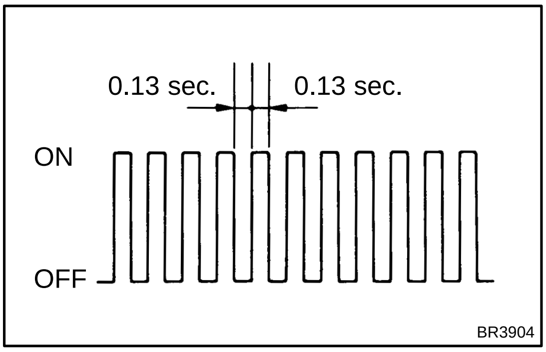
(1) Turn the ignition switch OFF.

(2) Check that the shift lever position is at P range. Turn the steering wheel to the straight-ahead position.

(3) Using SST, connect terminals Ts and CG of DLC3.

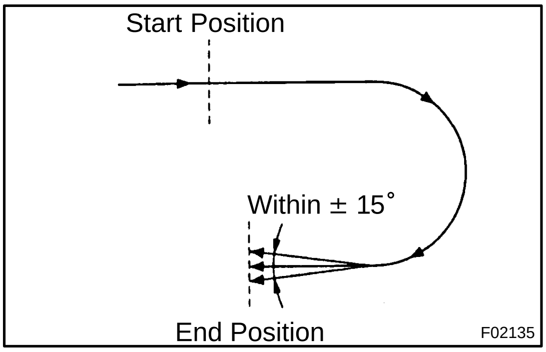
SST 09843-18040

(4) Start the engine.



BR3904

(5) Check that the VSC warning light blinks.



F02135

(b) Check the yaw rate sensor.

Shift the shift lever to the D range and drive the vehicle at the vehicle speed of approx. 5 km/h (3 mph). Turn the steering wheel either to left or right for 90° or more, and maintain 180° circular drive for the vehicle.

Stop the vehicle and shift the shift lever to the P range. Check that the VSC warning buzzer sounds for 3 sec.

If the VSC warning buzzer sounds, the sensor check is in normal completion.

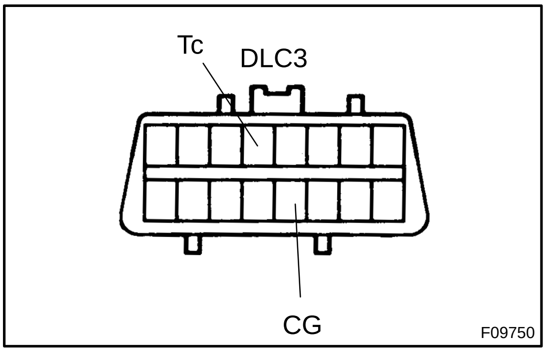
If the VSC warning buzzer does not sound, check the VSC warning buzzer circuit, then do the sensor check again.

Trouble Area	See page
VSC warning buzzer circuit	DI-590

If the VSC warning buzzer still does not sound, there is malfunction in the VSC sensor, so check the DTC.

HINT:

- Drive the vehicle circularly by 180°. At the end of the turn, the direction of the vehicle should be within 180° ± 5° from its start position.
- Do not spin the wheels.
  - (1) Check the steering angle sensor.
    Turn the steering wheel to either left or right to the full lock position, from the vehicle stationary condition, and turn back the steering wheel to the neutral position.



(c) Read the DTC.
  - (1) Using SST, connect terminals Tc and CG of DLC3.
    SST 09843-18040
  - (2) Using SST, connect terminals Tc and CG of DLC3.
    SST 09843-18040
  - (3) Read the number of blinks of the VSC warning light.

HINT:

- See the list of DTC shown in the next page.
- If every sensor is normal, a normal code is output. (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated.)
  - (4) After doing the check, disconnect the SST from terminals Ts and CG ,Tc and CG of DLC3 and turn the ignition switch OFF.
    SST 09843-18040

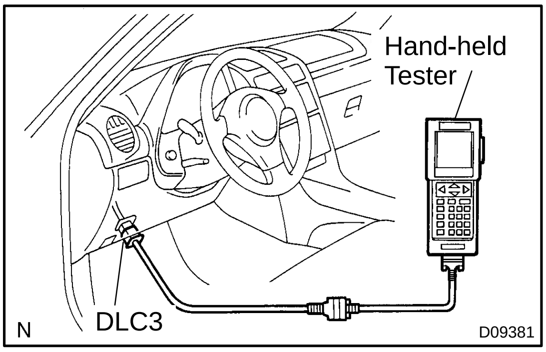
6. In case of using the hand-held tester:
VSC SENSOR SIGNAL CHECK (TEST MODE)

NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform zero point calibration of the yaw rate and deceleration sensors (See step 7.). Make sure that this operation should be done before starting the following.

HINT:

If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.



(a) Hook up the hand-held tester to the DLC3.
(b) Do steps 5.-(a)-(2), (a)-(4) and (b) on the previous pages.
(c) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.

DTC of VSC sensor check function:

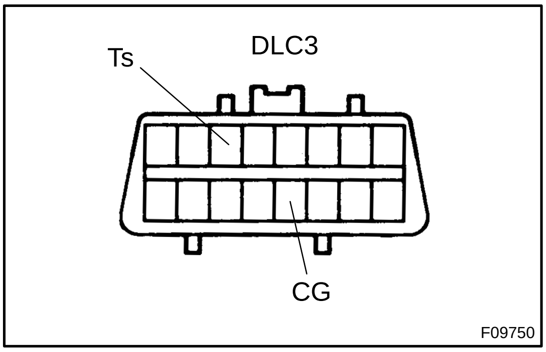
Code No.	Diagnosis	Trouble Area
C0371 / 71	Yaw rate sensor output signal malfunction	✓Yaw rate sensor ✓Yaw rate sensor circuit

7. IF NECESSARY, PERFORM ZERO POINT CALIBRATION OF YAW RATE AND DECELERATION SENSORS

HINT:
- When having replaced the yaw rate sensor, deceleration sensor or the ECU, make sure to perform yaw rate and deceleration sensors' zero point calibration. Be sure to complete this step 7. once it is started.
- During step 7., a not-replaced sensor also requires zero point calibration.

NOTICE:
- **While obtaining the zero point, do not give any vibration to the vehicle by tilting, moving or shaking it and keep it in a stationary condition. (Do not start the engine.)**
- **Be sure to do this on a level surface (within an inclination of 1 %).**

(a) Clear the zero points of the yaw rate and deceleration sensors.
 (1) Shift the shift lever to P range.
 (2) Turn the ignition switch ON in a stationary condition.



 (3) With the lit switch ON, using SST, repeat a cycle of short and open between terminals Ts and CG of DLC3 4 times or more within 8 sec. Check that the TRAC OFFand VSC indicator light is lit indicating the recorded zero point is erased.

SST 09843-18040

 (4) Turn the ignition switch OFFand VSC with in 15 sec.

(b) Obtain zero point of the yaw rate sensor.
 (1) Make the terminals Ts and CG of DLC3 disconnected.

(2) Turn the ignition switch ON.

HINT:

The vehicle should be in a stationary condition with the shift lever in P range.

(3) Check that the lit TRAC OFFand VSC indicator light goes off about 15 sec. after the ignition switch is turned ON.

HINT:

Even if the ignition is not turned OFF in step (a)-(4) and remains ON, the yaw rate sensor zero point calibration can be completed. In this case, the TRAC OFF and VSC indicator light is lit for about 15 sec. and then VSC warning light starts blinking. (Normal code)

(4) After ensuring that the TRAC OFF and VSC indicator light remains OFF for 2 sec., turn the ignition switch OFF.

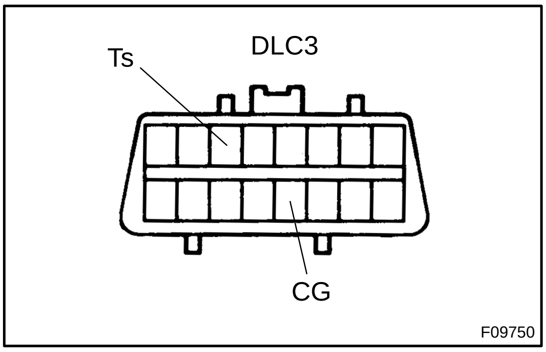
HINT:

If the ignition switch is not turned OFF in step (a)-(4), make sure that the TRAC OFF and VSC indicator light blinks for 2 sec. Then turn the ignition switch OFF.

(c) Perform deceleration sensor zero point calibration.

NOTICE:

After step (b) (the yaw rate sensor zero point calibration), the VSC warning light goes off. At this time, if the vehicle is driven without performing step (c) (deceleration sensor zero point calibration), deceleration sensor zero point calibration malfunction will be detected and the TRAC OFF indecator light and VSC warning light will light up. Therefore, perform step (c) right after step (b).



F09750

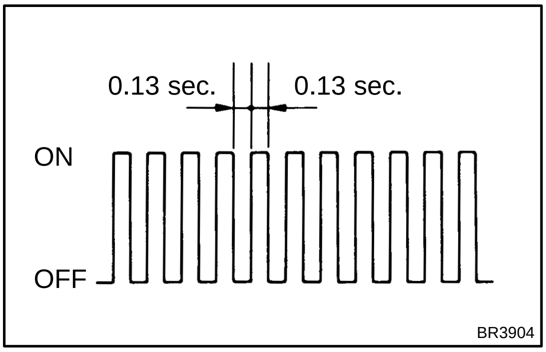
(1) Using SST, connect the terminals Ts and CG of DLC3.

SST 09843-18040

(2) Turn the ignition switch ON.

HINT:

Place the vehicle in a stationary condition with the shift lever in P range.



BR3904

(3) After turning the ignition switch ON, check that the VSC warning light is lit for about 4 sec. and then starts quick blinking at 0.13 sec. intervals.

(4) After ensuring the blinking of the VSC warning light for 2 sec., turn the ignition switch OFF.

(5) Remove the SST and make the terminals Ts and CG of DLC3 disconnected.

SST 09843-18040

DI0WA-16

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

Before replacing or removing the part, turn the ignition switch OFF.

HINT:

- Using SST 09843-18040, connect the terminals Tc and CG of DLC3.
- If any abnormality is not found on inspected parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit indicated by DTC. For details of each code, turn to the pages in the "See page" for respective "DTC No." in the DTC chart.

DTC chart of ABS:

DTC No. (See Page)	Detection Item	Trouble Area
C0200 / 31*1 (DI-516)	Right front wheel speed sensor signal malfunction	- Right front, left front, right rear, left rear speed sensor - Each speed sensor circuit - Sensor rotor
C0205 / 32*1 (DI-516)	Left front wheel speed sensor signal malfunction	
C0210 / 33*1 (DI-516)	Right rear wheel speed sensor signal malfunction	
C0215 / 34*1 (DI-516)	Left rear wheel speed sensor signal malfunction	
C0226 / 21 (DI-522)	Open or short circuit in brake actuator solenoid circuit (SFR circuit)	- Brake actuator - SFRH or SFRR circuit
C0236 / 22 (DI-522)	Open or short circuit in brake actuator solenoid circuit (SFL circuit)	- Brake actuator - SFLH or SFLR circuit
C0246 / 23 (DI-522)	Open or short circuit in brake actuator solenoid circuit (SRR circuit)	- Brake actuator - SRRH or SRRR circuit
C0256 / 24 (DI-522)	Open or short circuit in brake actuator solenoid circuit (SRL circuit)	- Brake actuator - SRLH or SRLR circuit
C0273 / 13*1 (DI-524)	Open circuit in ABS MTR relay circuit	- ABS MTR relay - ABS MTR relay circuit
C0274 / 14 (DI-524)	Short circuit in ABS MTR relay circuit	
C0278 / 11 (DI-528)	Open circuit in ABS SOL relay circuit	- ABS SOL relay - ABS SOL relay circuit
C0279 / 12 (DI-528)	Short circuit in ABS SOL relay circuit	
C1225 / 25 (DI-541)	Open or short circuit in brake actuator solenoid circuit (SM circuit)	- Brake actuator - SMF or SMR circuit
C1226 / 26 (DI-541)	Open or short circuit in brake actuator solenoid circuit (SRM circuit)	- Brake actuator - SRMF or SRMR circuit
C1227 / 27 (DI-541)	Open or short circuit in brake actuator solenoid circuit (SRC circuit)	- Brake actuator - SRCF or SRCR circuit
C1235 / 35 (DI-516)	Foreign matter is attached on the tip of the right front sensor	- Right front, left front, right rear, left rear speed sensor - Sensor rotor
C1236 / 36 (DI-516)	Foreign matter is attached on the tip of the left front sensor	
C1238 / 38 (DI-516)	Foreign matter is attached on the tip of the right rear sensor	
C1239 / 39 (DI-516)	Foreign matter is attached on the tip of the left rear sensor	

C1241 / 41 (DI-550)	Low battery positive voltage	✓Battery ✓Charging system ✓Power source circuit
C1243 / 43*1 (DI-554)	Malfunction in deceleration sensor (constant output)	✓Deceleration sensor ✓Wire harness for deceleration sensor system
C1244 / 44 (DI-554)	Open or short circuit in deceleration sensor circuit	✓Deceleration sensor ✓Deceleration sensor circuit
C1245 / 45*1 (DI-554)	Malfunction in deceleration sensor (Output error)	✓Deceleration sensor ✓Wire harness for deceleration sensor system
C1246 / 46*2 (DI-559)	Malfunction in master cylinder pressure sensor	✓Master cylinder pressure sensor ✓Master cylinder pressure sensor circuit
C1249 / 49*3 (DI-563)	Open circuit in stop light switch circuit	✓Stop light bulb ✓Stop light switch circuit
C1251 / 51*1 (DI-566)	ABS pump motor is locked Open circuit in pump motor circuit	ABS pump motor
C1267 / 67*4 (DI-568)	Malfunction in brake pedal load sensing switch	✓Brake pedal load sensing switch ✓Brake pedal load sensing switch circuit
Always ON (DI-571)	Malfunction in skid control ECU	✓Power source circuit ✓ABS warning light circuit ✓Multiplex communication circuit ✓Skid control ECU

*1, *2, *3, *4:
Even after the troubled areas are repaired, ABS warning light will not go OFF unless the following operations are performed.

- *1:
  (1) Drive the vehicle at 20 km/h (12 mph) for 30 seconds or more and check that the ABS warning light goes off.
  (2) Clear the DTC (See page DI-497).
- *2:
  (1) Keep the vehicle in the stationary condition for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  (2) Drive the vehicle at the vehicle speed 50 km/h (31 mph) and keep depressing the brake pedal strongly for about 3 seconds.
  (3) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  (4) Clear the DTC (See page DI-497).
- *3: Depress the brake pedal for 1 sec.
- *4: Depress the brake pedal strongly for 1 sec. then release the brake pedal for 1 sec.

HINT:
There is a case that hand-held tester cannot be used when ABS warning light is always on.

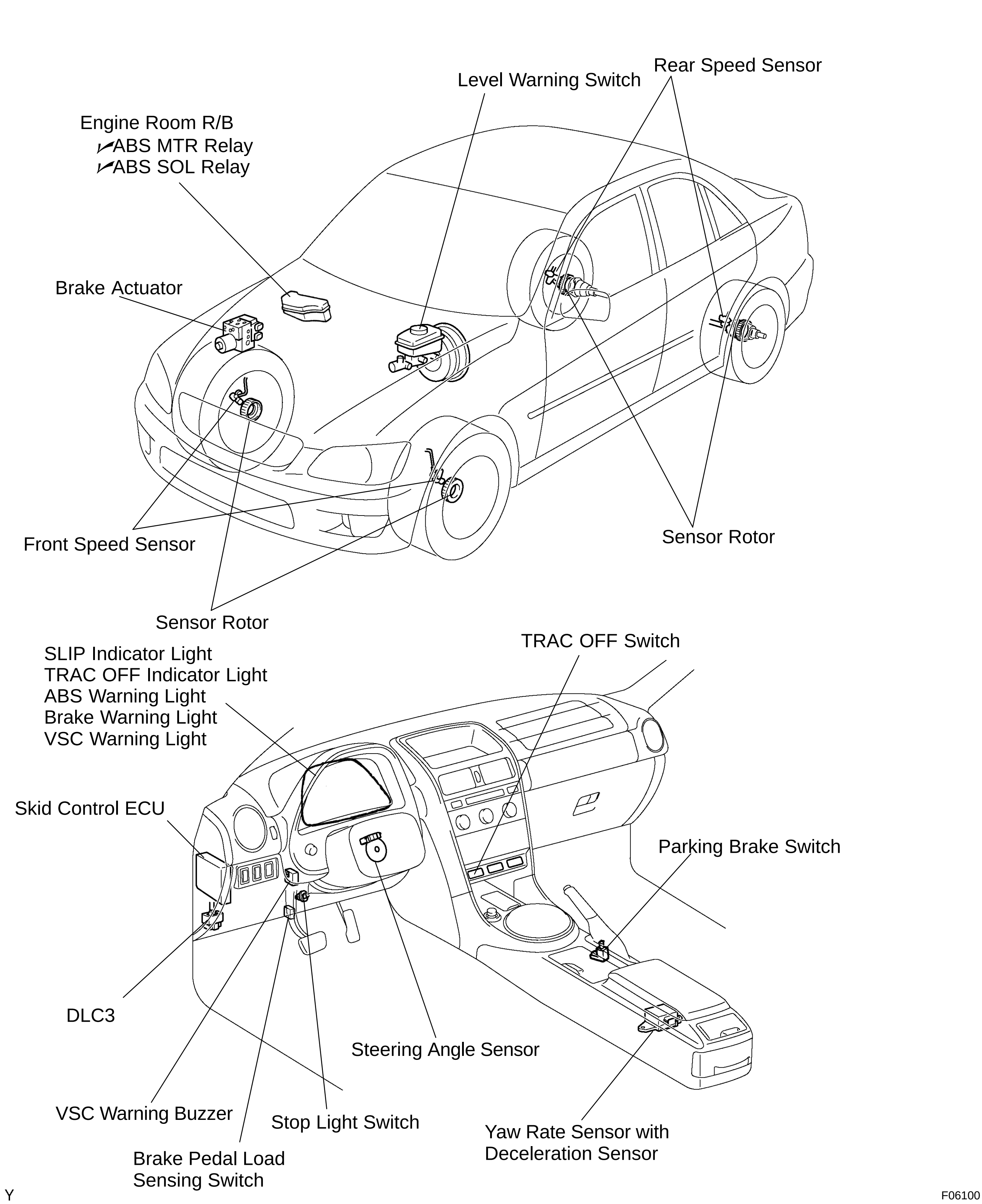
DTC chart of VSC:

DTC No. (See Page)	Detection Item	Trouble Area
C1201 / 51 (DI-533)	Malfunction in ECM	Engine control system
C1202 / 52 (DI-534)	Brake fluid level low Open circuit in brake fluid level warning switch circuit	✓Brake fluid level ✓Brake fluid level warning switch ✓Brake fluid level warning switch circuit
C1203 / 53 (DI-536)	Malfunction in ECM communication circuit	✓TRC+ or TRC- circuit ✓ENG+ or ENG- circuit ✓ECM
C1223/43 (DI-538)	Malfunction in ABS control system	ABS control system
C1224 / 44 (DI-539)	Open or short circuit in NEO signal circuit	✓NEO circuit ✓ECM
C1231 / 31 (DI-543)	Malfunction in steering angle sensor	✓Steering angle sensor ✓Steering angle sensor circuit
C1233 / 33 (DI-547)	Open or short circuit in yaw rate sensor circuit	✓Yaw rate sensor ✓Yaw rate sensor circuit
C1234 / 34 (DI-547)	Malfunction in yaw rate sensor	
C1335 / 35 (DI-543)	Open circuit in steering angle sensor	✓Steering angle sensor ✓Steering angle sensor circuit
C1360/61 (DI-559)	Malfunction in comparative master cylinder pressure sensor	✓Master cylinder pressure sensor ✓Master cylinder pressure sensor circuit
Always ON (DI-575)	Malfunction in skid control ECU Open circuit in VSC warning indicator circuit	✓Power source circuit ✓Skid control ECU

HINT:
In some cases hand-held tester cannot be used when VSC warning light is always on.

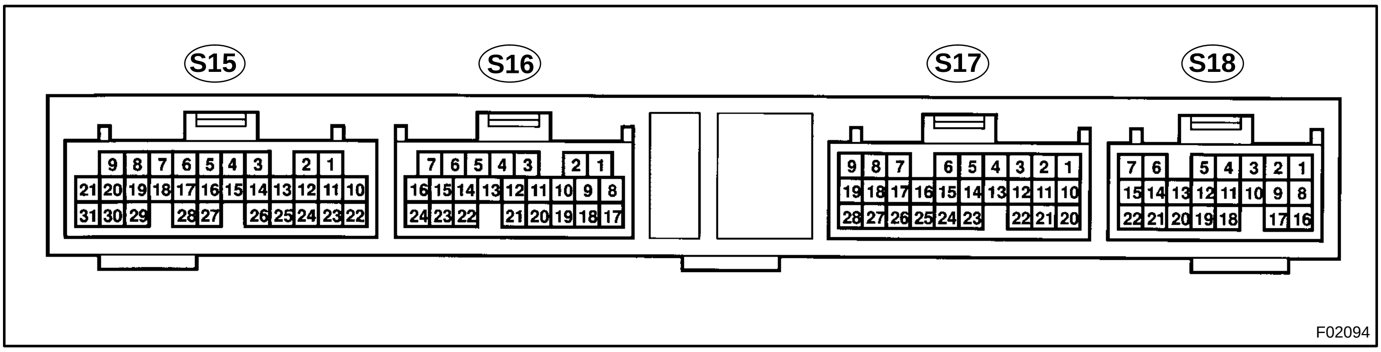
DI8IY-02

PARTS LOCATION



DI1GG-11

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
SRLR (S18 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	B ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SM1- (S18 - 2) - GND (S18 - 15, 22, S15 - 2, 3)	B-L ↔ W-B	IG switch OFF	Continuity
SM1+ (S18 - 3) - GND (S18 - 15, 22, S15 - 2, 3)	B-R ↔ W-B	IG switch ON, ABS warning light OFF	Below 1.0
SM2- (S18 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	L-B ↔ W-B	IG switch OFF	Continuity
SM2+ (S18 - 5) - GND (S18 - 15, 22, S15 - 2, 3)	G-B ↔ W-B	IG switch ON, ABS warning light OFF	Below 1.0
AST (S18 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRLH (S18 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	G-W ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFRR (S18 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
PMC (S18 - 10) - E2 (S18 - 19)	R ↔ W	IG switch ON, stop light switch OFF	0.3 - 0.8
E3 (S18 - 12) - GND (S18 - 15, 22, S15 - 2, 3)	Y ↔ W-B	IG switch OFF	Continuity
FSS (S18 - 13) - GND (S18 - 15, 22, S15 - 2, 3)	Shielded ↔ W-B	IG switch OFF	Continuity
MT (S18 - 14) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON (Motor relay is OFF)	Below 1.5
SFRH (S18 - 16) - GND (S18 - 15, 22, S15 - 2, 3)	B-W ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
PMC2 (S18 - 18) - E3 (S18 - 12)	L ↔ Y	IG switch ON, stop light switch OFF	0.3 - 0.8
E2 (S18 - 19) - GND (S18 - 15, 22, S15 - 2, 3)	W ↔ W-B	IG switch OFF	Continuity
VCM (S18 - 20) - GND (S18 - 15, 22, S15 - 2, 3)	B ↔ W-B	IG switch ON	4.5 - 5.5
VCM2 (S18 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	IG switch ON	4.5 - 5.5
VYS (S17 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	L ↔ W-B	IG switch ON	4.5 - 5.5
YSS (S17 - 3) - GND (S18 - 15, 22, S15 - 2, 3)	Shielded ↔ W-B	IG switch OFF	Continuity

FSW+ (S17 - 5) - FSW- (S17 - 4)	W-G ↔ R-B	IG switch ON, brake pedal depressed	2 - 4
TRIG (S17 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON	Above 3.5
CSW (S17 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	LG-R ↔ W-B	ITRAC OFF switch OFF	10 - 14
YAW2 (S17 - 10) - GND (S18 - 15, 22, S15 - 2, 3)	R ↔ W-B	IG switch ON, yaw rate sensor is stationary	2 - 3
GSS (S17 - 12) - GND (S18 - 15, 22, S15 - 2, 3)	BR-W ↔ W-B	IG switch OFF	Continuity
YD (S17 - 16) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	IG switch ON, VSC warning light OFF	Above 4.5
SS1+ (S17 - 18) - SS1- (S17 - 27)	LG-B ↔ LG	Engine idling, slowly tun steering wheel	Pulse generation
GYAW (S17 - 20) - GND (S18 - 15, 22, S15 - 2, 3)	Y ↔ W-B	IG switch OFF	Continuity
GL1 (S17 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	W ↔ W-B	IG switch ON, vehicle is stopped	0.5 - 4.5
GL2 (S17 - 22) - GND (S18 - 15, 22, S15 - 2, 3)	BR ↔ W-B	IG switch ON, vehicle is stopped	0.5 - 4.5
NEO (S17 - 26) - GND (S18 - 15, 22, S15 - 2, 3)	G ↔ W-B	Engine idling	Pulse generation
D/G (S17 - 28) - GND (S18 - 15, 22, S15 - 2, 3)	W-R ↔ W-B	IG switch ON	10 - 14
WA (S16 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON, ABS warning light ON	4 - 8
		IG switch ON, ABS warning light OFF	Below 2.0
SP1 (S16 - 2) - GND (S18 - 15, 22, S15 - 2, 3)	R-Y ↔ W-B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation
STP (S16 - 3) - GND (S18 - 15, 22, S15 - 2, 3)	G-R ↔ W-B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 - 14
WT (S16 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	LG ↔ W-B	IG switch ON, TRAC OFF indicator light ON	Below 2.0
		IG switch ON, TRAC OFF indicator light OFF	10 - 14
BZ (S16 - 5) - GND (S18 - 15, 22, S15 - 2, 3)	L-R ↔ W-B	IG switch ON, VSC buzzer is sounded	Below 1.0 ↔ 10 - 14
		IG switch ON, VSC buzzer is not sounded	10 - 14
IND (S16 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON, SLIP indicator light ON	Below 2.0
		IG switch ON, SLIP indicator light OFF	10 - 14
IG1 (S16 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	B-R ↔ W-B	IG switch ON	10 - 14
BRL (S16 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	Y-G ↔ W-B	IG switch ON, fluid in master cylinder reservoir above MIN level and parking brake switch is OFF (Brake warning light is OFF)	Below 2.0
ENG+ (S16 - 9) - ENG- (S16 - 18)	L-B ↔ P	IG switch ON	Pulse generation
Ts (S16 - 10) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON	10 - 14
TRC+ (S16 - 11) - TRC- (S16 - 20)	R-Y ↔ W-G	IG switch ON	Pulse deneration
FRO (S16 - 13) - GND (S18 - 15, 22, S15 - 2, 3)	W-R ↔ W-B	Vehicle drives at about 20 km/h (12 mph)	Pulse generation

VSCW (S16 - 14) - GND (S18 - 15, 22, S15 - 2, 3)	Y-B ↔ W-B	IG switch ON, VSC warning light ON	Below 2.0
		IG switch ON, VSC warning light OFF	10 - 14
RR+ (S16 - 16) - RR- (S16 - 15)	GR ↔ B	IG switch ON, slowly turn right rear wheel	Pulse generation
PKB (S16 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IG switch ON, parking brake switch ON	Below 1.5
		IG switch ON, parking brake switch OFF	10 - 14
RL+ (S16 - 22) - RL- (S16 - 23)	R ↔ L	IG switch ON, slowly turn left rear wheel	Pulse generation
+BO (S16 - 24) - GND (S18 - 15, 22, S15 - 2, 3)	W ↔ W-B	Always	10 - 14
R+ (S15 - 1) - GND (S18 - 15, 22, S15 - 2, 3)	L-B ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRM1 (S15 - 4) - GND (S18 - 15, 22, S15 - 2, 3)	B-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRC2 (S15 - 5) - GND (S18 - 15, 22, S15 - 2, 3)	G-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFLH (S15 - 6) - GND (S18 - 15, 22, S15 - 2, 3)	L-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SFLR (S15 - 7) - GND (S18 - 15, 22, S15 - 2, 3)	L-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRRH (S15 - 8) - GND (S18 - 15, 22, S15 - 2, 3)	L-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
SRRR (S15 - 9) - GND (S18 - 15, 22, S15 - 2, 3)	G-Y ↔ W-B	IG switch ON, ABS warning light OFF	10 -14
SR (S15 - 10) - R+ (S15 - 1)	L-R ↔ L-B	IG switch ON, ABS warning light OFF	Below 1.0
FR+ (S15 - 13) - FR- (S15 - 12)	O ↔ B	IG switch ON, slowly turn right front wheel	Pulse generation
SRM2 (S15 - 21) - GND (S18 - 15, 22, S15 - 2, 3)	B-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
+BI (S15 - 22) - GND (S18 - 15, 22, S15 - 2, 3)	W-R ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14
MR (S15 - 23) - GND (S18 - 15, 22, S15 - 2, 3)	W-L ↔ W-B	IG switch ON, ABS motor stops	10 - 14
MRF (S15 - 24) - GND (S18 - 15, 22, S15 - 2, 3)	R-Y ↔ W-B	IG switch ON	10 - 14
LBL (S15 - 25) - GND (S18 - 15, 22, S15 - 2, 3)	Y-R ↔ W-B	IGnswitch ON, fluid in master cylinder reservoir above MIN level	4 - 8
		IG switch ON, fluid in master cylinder reservoir below MIN level	Below 1.0
FL+ (S15 - 28) - FL- (S15 - 27)	LG ↔ V	IG switch ON, slowly turn right front wheel	Pulse generation
SRC1 (S15 - 31) - GND (S18 - 15, 22, S15 - 2, 3)	G-O ↔ W-B	IG switch ON, ABS warning light OFF	10 - 14

DI0WG-16

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the DTC check but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing skid control ECU, sensor or etc., turn the ignition switch OFF.

Symptom	Suspect Area	See page
ABS does not operate BA does not operate	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit 3. Speed sensor circuit 4. Check the brake actuator with a hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-594).	DI-497 DI-550 DI-516 BR-46
ABS does not operate efficiently BA does not operate efficiently	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the brake actuator with a hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-594).	DI-497 DI-516 DI-563 BR-46
ABS warning light abnormal	1. ABS warning light circuit 2. Skid control ECU	DI-578 IN-33
DTC of ABS check cannot be done	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output.	DI-497
Sensor signal check cannot be done	1. Ts terminal circuit 2. Skid control ECU	DI-592 IN-33
TRAC does not operate	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit	DI-497 DI-550 DI-594 DI-516
VSC does not operate	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit 5. Deceleration sensor circuit 6. Yaw rate sensor circuit 7. Steering angle sensor circuit	DI-497 DI-550 DI-594 DI-516 DI-554 DI-547 DI-543

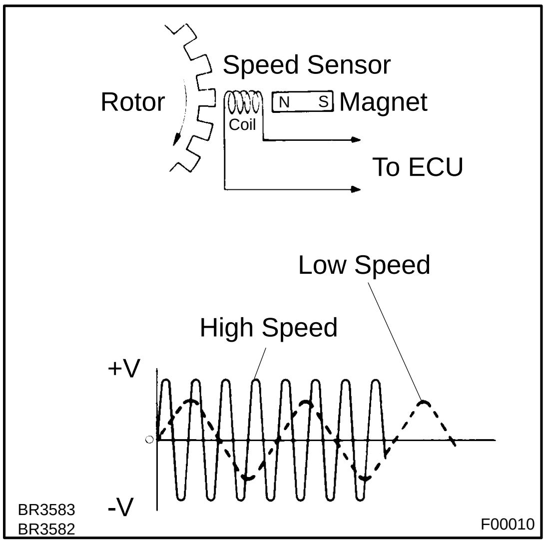
SLIP indicator light abnormal	1. SLIP indicator light circuit 2. Skid control ECU	DI-584 IN-33
TRAC OFF indicator abnormal	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. TRAC OFF switch circuit	DI-497 DI-581
DTC of VSC check cannot be done	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output.	DI-497
VSC warning indicator abnormal	If the symptoms still occur even after the following circuits in suspect areas are inspected and proved to be normal, replace the skid control ECU. 1. Check the DTC again and make sure that the normal code is output. 2. VSC warning indicator circuit	DI-497 DI-588

DI9JC-01

CIRCUIT INSPECTION

DTC	C0200 / 31 - C1239 / 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION

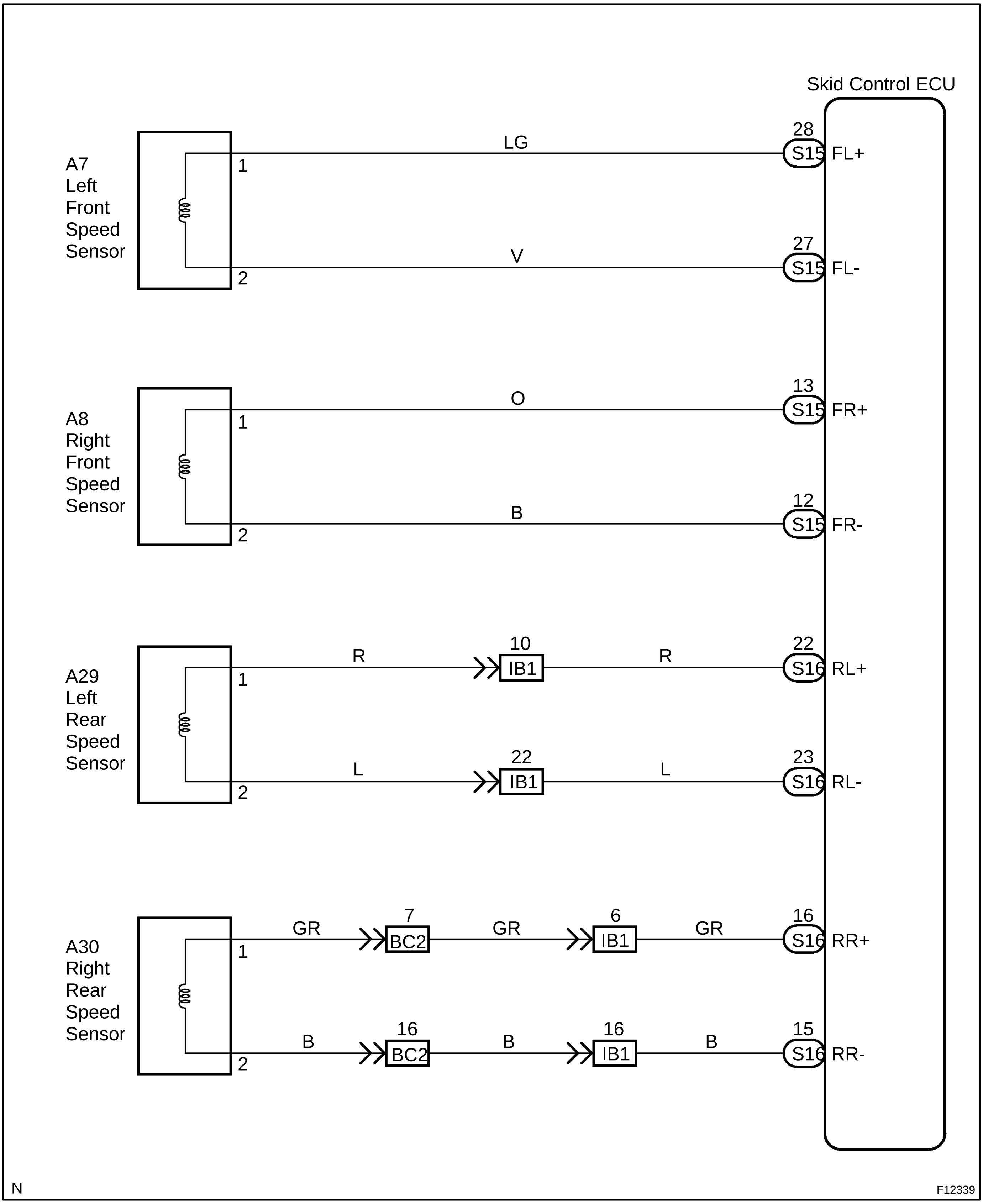


The speed sensor measures wheel speed and sends the corresponding signals to the ECU. These signals are used for control of both the ABS & TRAC & VSC control system. Both the front and rear rotors have 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an AC voltage. Since the frequency of this AC voltage changes in direct proportion to the speed of the rotor, the frequency is used by the ECU to measure the speed of each wheel.

DTC No.	DTC Detecting Condition	Trouble Area
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	Detection of any of conditions 1. through 3.: 1. At vehicle speed of 10 km/h (6 mph) or more, open or short circuit of the speed sensor signal circuit continues for 15 sec. 2. Momentary interruption of the speed sensor signal occurs 7 times or more. 3. Open circuit of the speed sensor signal circuit continues for 0.5 sec. or more.	✓Right front, left front, right rear, left rear speed sensor ✓Each speed sensor circuit ✓Sensor rotor
C1235 / 35 C1236 / 36 C1238 / 38 C1239 / 39	Nose have been counted 75 times in 5 sec.	✓Right front, left front, right rear, left rear speed sensor ✓Sensor rotor

HINT:
- DTC No. C0200 / 31 and C1235 / 35 are for the right front speed sensor.
- DTC No. C0205 / 32 and C1236 / 36 are for the left front speed sensor.
- DTC No. C0210 / 33 and C1238 / 38 are for the right rear speed sensor.
- DTC No. C0215 / 34 and C1239 / 39 are for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of speed sensor.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:
Check that there is no difference between the speed value output from the speed sensor observed in the hand-held tester and the speed value displayed by the speedometer when the vehicle is in motion.

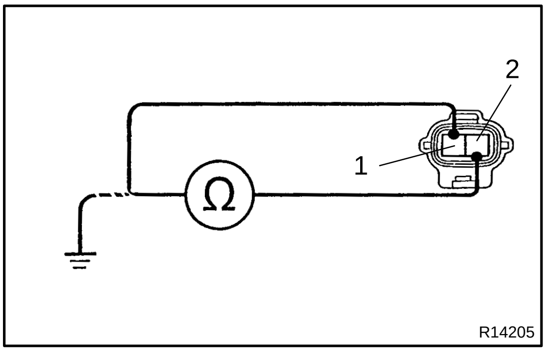
OK:
There is almost no difference in the displayed speed values.

HINT:
There is tolerance of ± 10 % in the speedometer indication.

OK → **Go to step 4.**

NG

2	**Check speed sensor.**



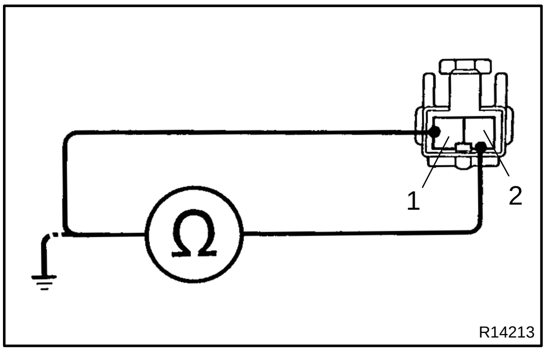
Front:
PREPARATION:
(a) Make sure that the speed sensor connector and the wire harness side connector are securely connected.
(b) Disconnect the speed sensor connector.
(c) Turn the ignition switch OFF.

CHECK:
Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:
Resistance: 1.6 - 1.8 kΩ at 20˚C

CHECK:
Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:
Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the rear seat cushion and the seatback.
(b) Make sure that the speed sensor connector and the wire harness side connector are securely connected.
(c) Disconnect the speed sensor connector.
(d) Turn the ignition switch OFF.

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:

Resistance: 0.9 - 1.3 kΩ at 25 ± 5°C

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	Replace speed sensor.

NOTICE:
Check the speed sensor signal last (See page DI-497).

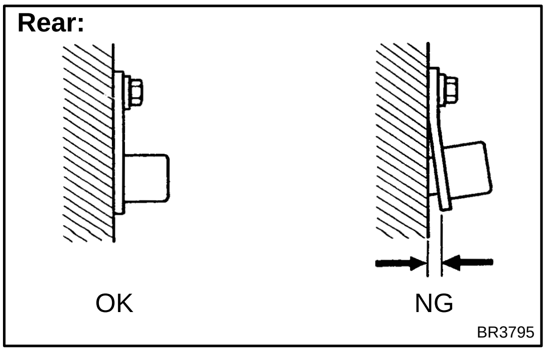
OK

3	Check for open and short circuit in harness and connector between each speed sensor and skid control ECU (See page IN-33).

NG	Repair or replace harness or connector.

OK

4	Check sensor installation.



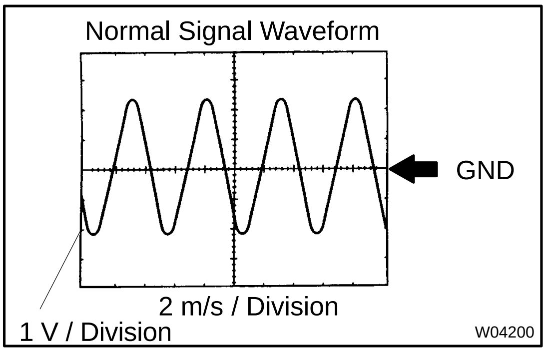
CHECK:
Check the speed sensor installation.
OK:
The installation bolt is tightened properly and there is no clearance between the sensor and front steering knuckle or rear axle carrier.

NG → **Replace speed sensor.**

NOTICE:
Check the speed sensor signal last (See page DI-497).

OK ↓

5	Check speed sensor and sensor rotor serrations.

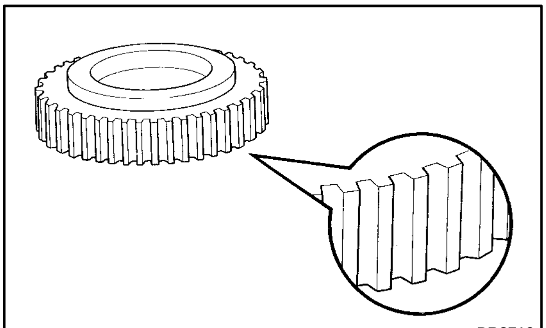


(REFERENCE) INSPECTION USING OSCILLOSCOPE
PREPARATION:
(a) Remove the skid control ECU with the connector still connected.
(b) Connect the oscilloscope to the terminals FR+ - FR-, FL+ - FL-, RR+ - RR- and RL+ - RL- of the skid control ECU.
CHECK:
Drive the vehicle at the speed of about 20 km/h (12 mph), and check the signal waveform.
HINT:
- As the vehicle speed (rpm of the wheels) increases, a cycle of the waveform becomes shorter and the fluctuation in the output voltage becomes greater.
- When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter deposited on it.

OK → **Check and replace skid control ECU (See page IN-33).**

NG ↓

6	Check sensor rotor and sensor tip.


BR3719

Front:

PREPARATION:

Remove the front axle hub and the speed sensor (See page BR-51).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects on the sensor rotor.

CHECK:

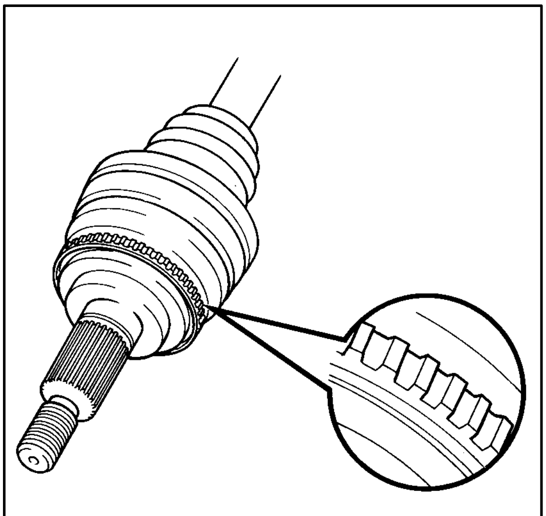
Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.


BR3720

Rear:

PREPARATION:

Remove the drive shaft (See page SA-57).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR-54).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign objects on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.

NG	Replace speed sensor or rotor.

NOTICE:

Check the speed sensor signal last (See page DI-497).

OK

Check and replace skid control ECU (See page IN-33).

DI1GI-12

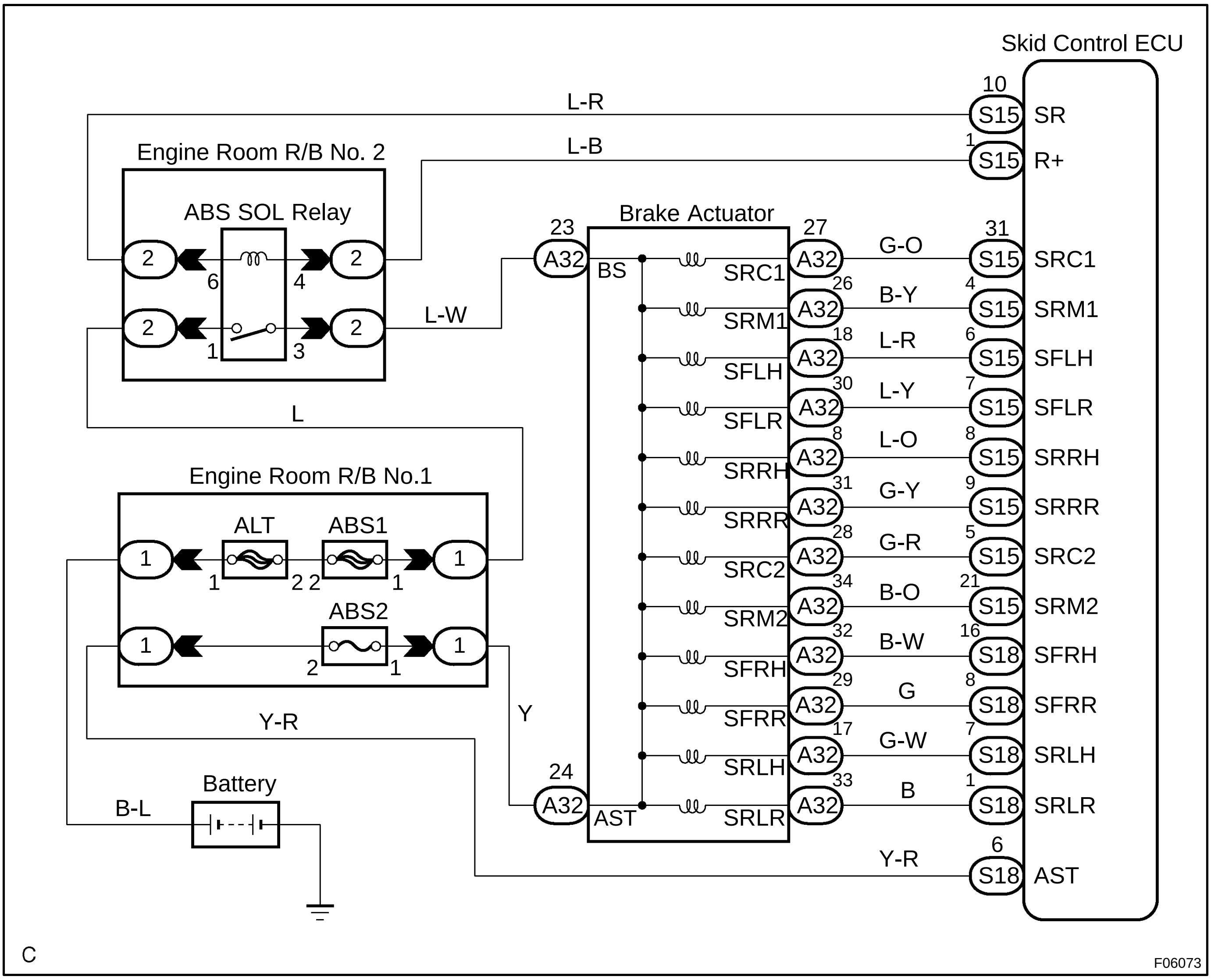
DTC	C0226 / 21 - C0256 / 24	ABS-Related Solenoid Circuits

CIRCUIT DESCRIPTION

ABS-related solenoids operate when signals are received from the ECU, and control the pressure acting on the wheel cylinders thus controlling the braking force.

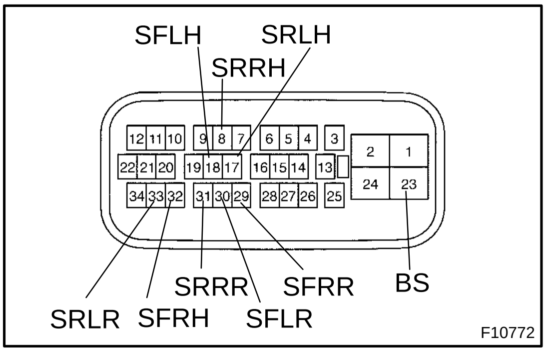
DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Open or short circuit for SFRH or SFRR circuit continues for 0.05 sec. or more.	• Brake actuator • SFRH or SFRR circuit
C0236 / 22	Open or short circuit for SFLH or SFLR circuit continues for 0.05 sec. or more.	• Brake actuator • SFLH or SFLR circuit
C0246 / 23	Open or short circuit for SRRH or SRRR circuit continues for 0.05 sec. or more.	• Brake actuator • SRRH or SRRR circuit
C0256 / 24	Open or short circuit for SRLH or SRLR circuit continues for 0.05 sec. or more.	• Brake actuator • SRLH or SRLR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check brake actuator solenoid.



PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the brake actuator connector.

CHECK:

Check continuity between terminal BS and terminals SFRH, SFLH, SRRH, SRLH, SFRR, SFLR, SRRR and SRLR of brake actuator.

OK:

Continuity

HINT:

Resistance of each solenoid at 25°C

SFRH, SFLH, SRRH, SRLH: 8.1 - 9.1 Ω

SFRR, SFLR, SRRR, SRLR: 4.0 - 4.6 Ω

NG	Replace brake actuator.

OK

2	Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN-33).

NG	Repair or replace harness or connector.

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7UM-03

DTC	C0273/13, C0274/14	ABS Motor Relay Circuit

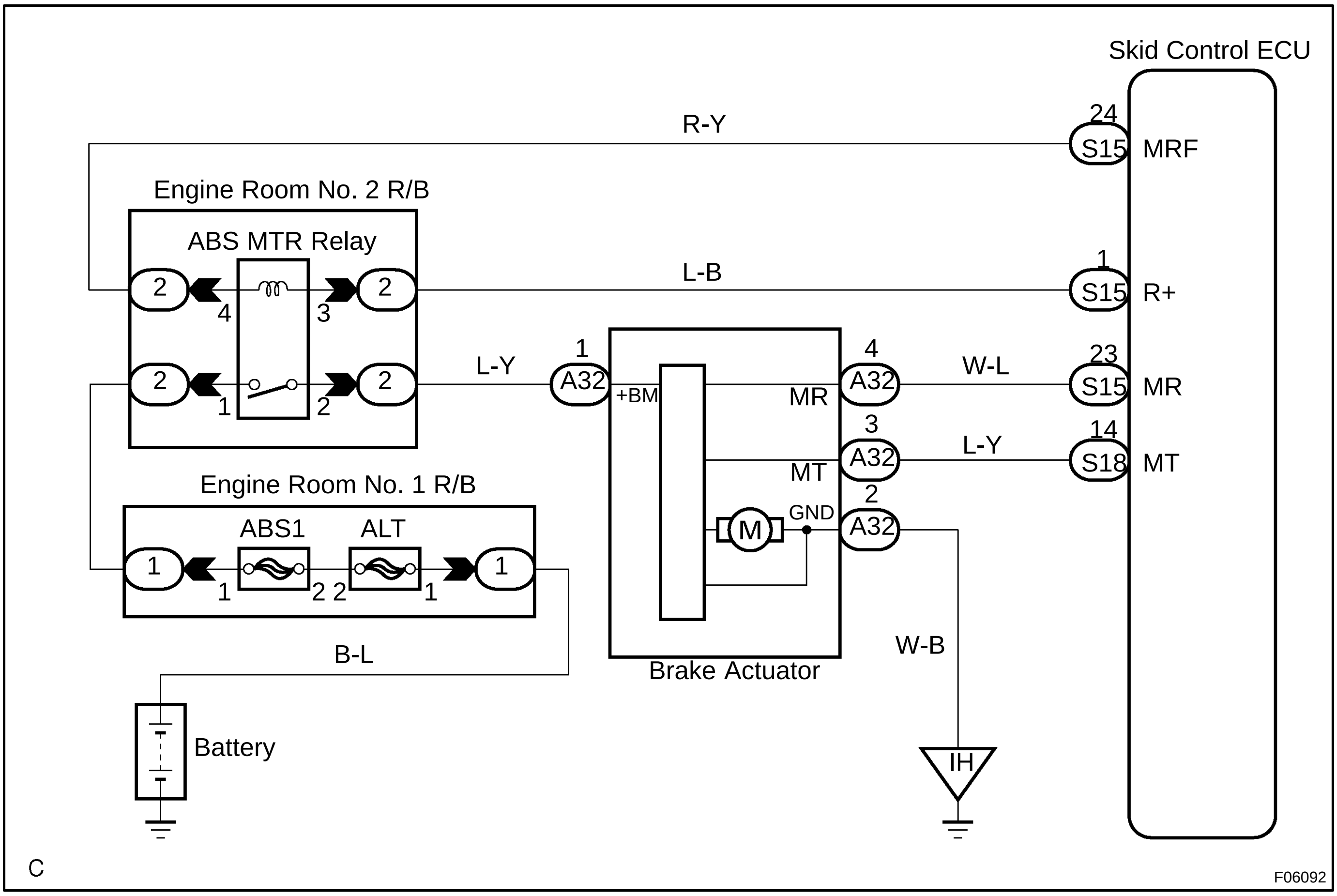
CIRCUIT DESCRIPTION

The ABS motor relay supplies power to the ABS pump motor. While the ABS & TRAC & VSC are activated, the ECU switches the motor relay ON and operates the ABS pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C0273 / 13	Conditions 1. and 2. continued for 0.12 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.2 V in the initial check or ABS, TRC are in operation, and when the motor relay is ON, however, the contact point of the motor relay is OFF.*1 2. ECU terminal IG1 is 9.5 V or less, and when the motor relay is ON, but the contact point of the motor relay does not become ON.*2	• ABS motor relay • ABS motor relay circuit • Skid control ECU
C0274 / 14	When the motor relay is OFF, the condition that the contact point of motor relay is ON continues for 4 sec. or more.	

*1 Relay contact OFF condition: MT terminal voltage is below 3.6 V.
*2 Relay contact ON condition: MT terminal voltage is 3.6 V or above.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using hand-held tester.

1	**Check ABS motor relay operation.**

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

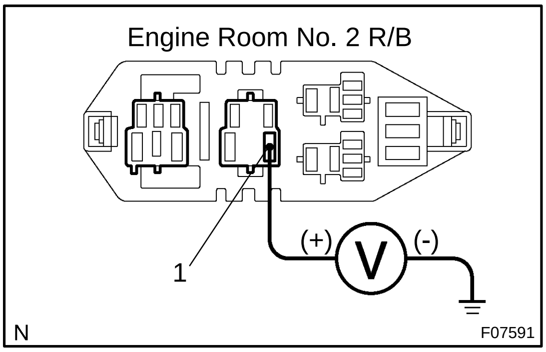
CHECK:
Check the operation sound of the ABS motor relay when operating it with the hand-held tester.

OK:
The operation sound of the ABS motor relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.**



PREPARATION:
Remove the ABS motor relay from the engine room No. 2 R/B.

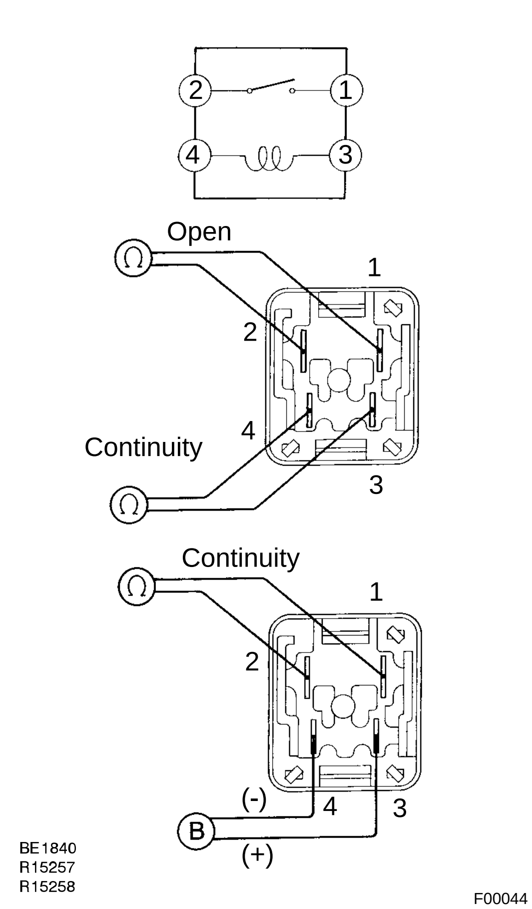
CHECK:
Measure voltage between terminal 1 of engine room No. 2 R/B (for ABS motor relay) and body ground.

OK:
Voltage: 10 - 14 V

NG → **Check and repair harness or connector.**

OK

3	Check ABS motor relay.



CHECK:

Check continuity between each pair of terminal of motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

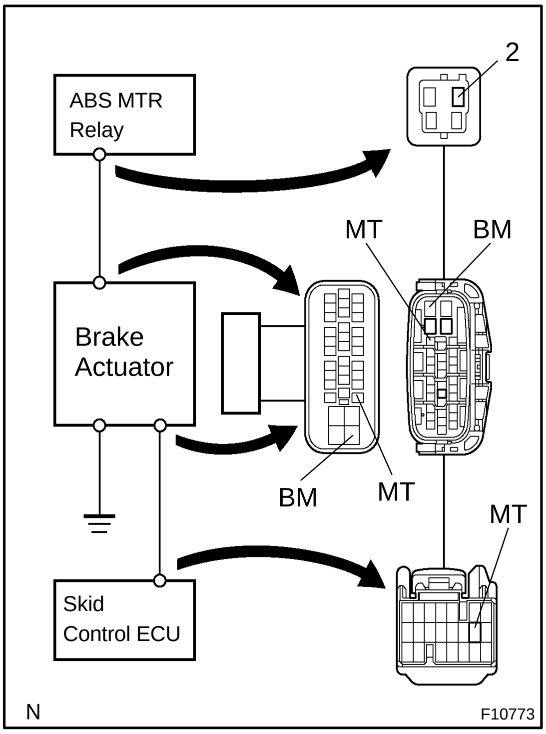
OK:

Terminals 1 and 2	Continuity

NG	Replace ABS motor relay.

OK

4	**Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU.**



PREPARATION:

(a) Remove the ABS motor relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 2 of engine room No. 2 R/B (for ABS motor relay) and terminal MT of skid control ECU harness side connector.

OK:

Continuity

HINT:

There is no continuity between terminals BM and MT of brake actuator.

NG	**Repair or replace harness or brake actuator.**

OK

5	**Check for open and short circuit in harness and connector between ABS motor relay and skid control ECU (See page IN-33).**

NG	**Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7UN-03

DTC	C0278/11, C0279/12	ABS Solenoid Relay Circuit

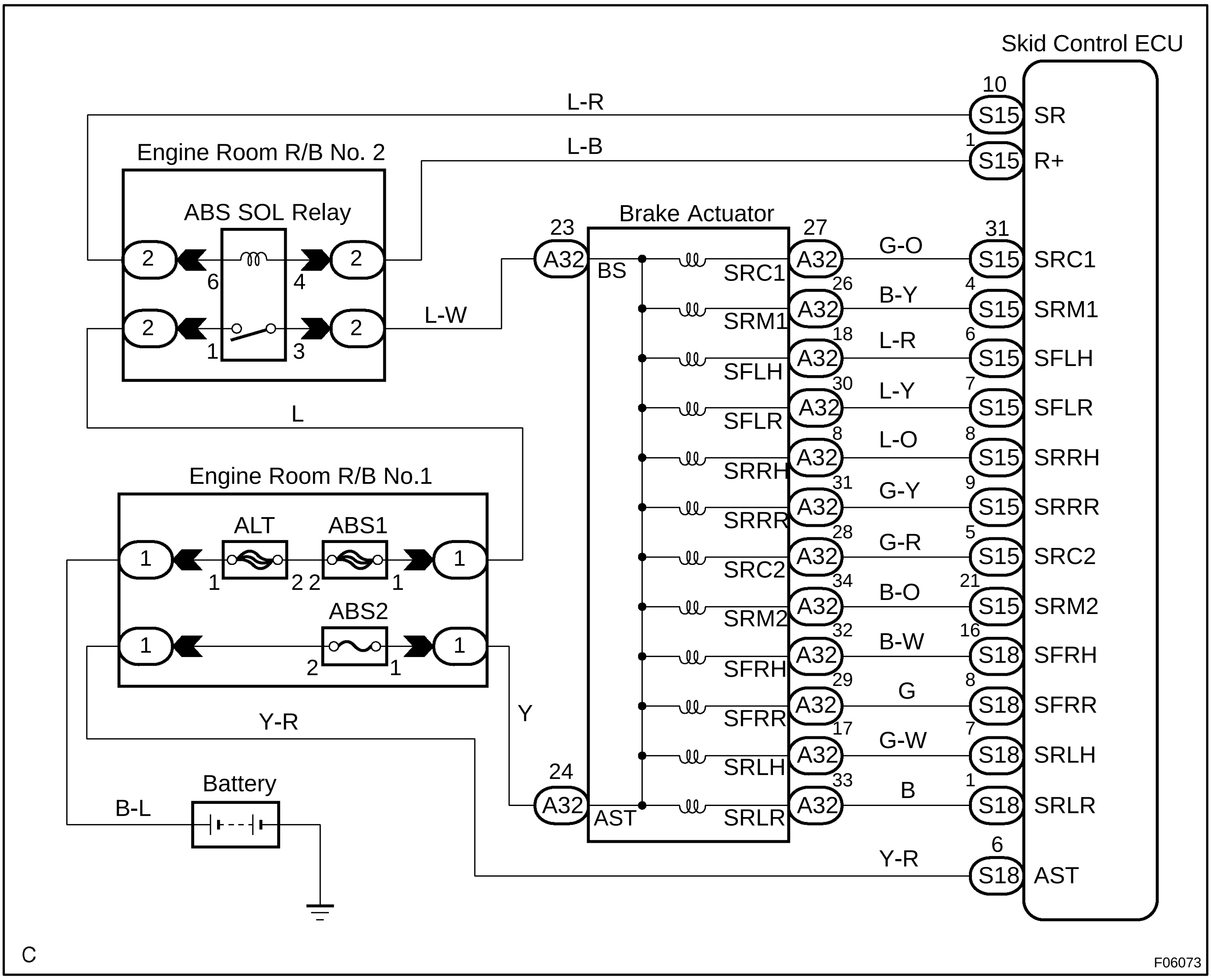
CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278 / 11	Conditions 1. and 2. continue for 0.2 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.2 V and the solenoid relay is ON, however, the contact point of the solenoid relay is OFF.*1 2. With solenoid relay ON driving, ECU terminal IG1 voltage becomes 9.5 V or less and the contact point of the solenoid relay does not become ON.*2	• ABS solenoid relay • ABS solenoid relay circuit • Skid control ECU
C0279 / 12	Immediately after ECU terminal IG1 becomes ON, and solenoid relay is OFF, however, when the condition that the contact point of the solenoid relay is ON continues for 0.2 sec. or more.	• ABS solenoid relay • ABS solenoid relay circuit • Skid control ECU

*1 Solenoid relay contact OFF condition:
All of solenoid terminal voltage is half of IG1 terminal voltage or less than.
*2 Solenoid relay contact ON condition:
All of solenoid terminal voltage is half of IG 1 terminal voltage or more.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check ABS solenoid relay operation.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check the operation sound of the ABS solenoid relay when operating it with the hand-held tester.

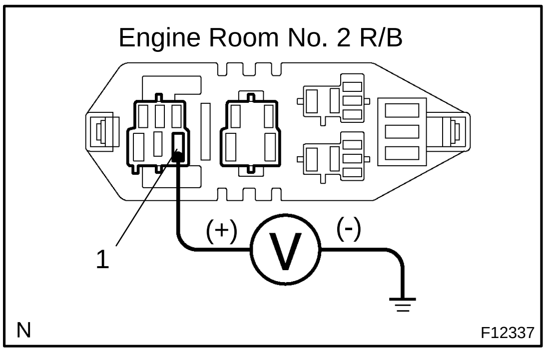
OK:

The operation sound of the ABS solenoid relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminals 1 of engine room No. 2 R/B (for ABS solenoid relay) and body ground.**



PREPARATION:
Remove the ABS solenoid relay from the engine room No. 2 R/B.

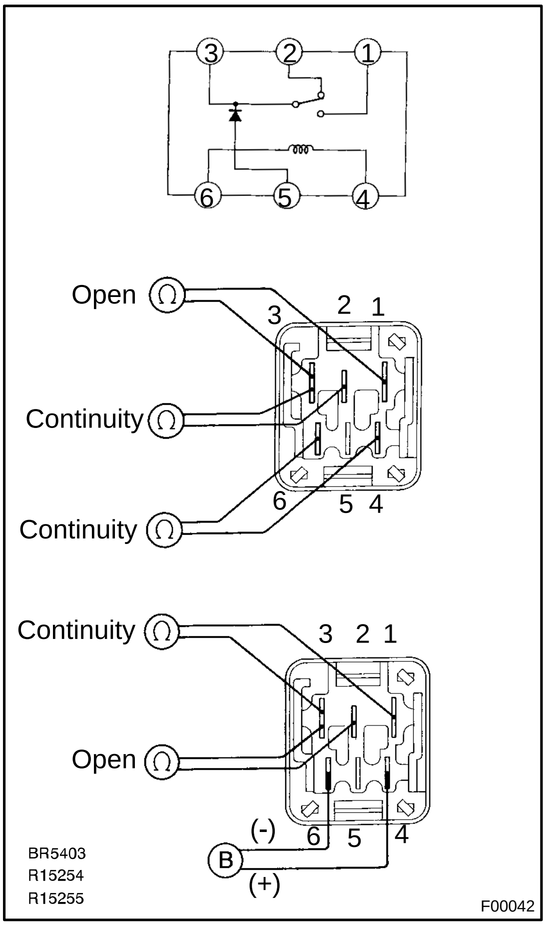
CHECK:
Measure the voltage between terminals 1 of engine room No. 2 R/B (for ABS solenoid relay) and body ground.

OK:
Voltage: 10 - 14 V

NG → **Check and repair harness or connector.**

OK

3	**Check ABS solenoid relay.**



CHECK:
Check continuity between each terminal of ABS solenoid relay.
OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

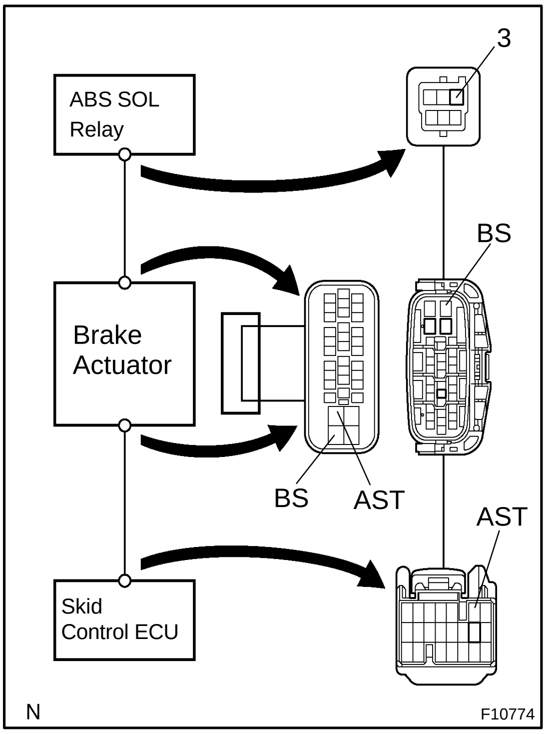
CHECK:
(a) Apply battery positive voltage between terminals 4 and 6.
(b) Check continuity between each terminal of ABS solenoid relay.
OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG **Replace ABS solenoid relay.**

OK

4	**Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU.**



PREPARATION:

(a) Remove the ABS solenoid relay from the engine room No. 2 R/B.

(b) Disconnect the connector from the skid control ECU.

CHECK:

Check continuity between terminals 3 of engine room No. 2 R/B (for ABS solenoid relay) and terminal AST of skid control ECU harness side connector.

OK:

Continuity

NG → **Repair or replace harness or brake actuator.**

OK

5	**Check for open and short circuit in harness and connector between ABS solenoid relay and skid control ECU (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DI7UO-02

DTC	C1201/51	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If any trouble occurs in the engine control system, the ECU prohibits TRAC and VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201 / 51	Conditions 1. and 2. continue for 5 sec.: 1. Engine speed: 500 rpm or more. 2. A trouble signal in the engine control system is input.	✓Engine control system

INSPECTION PROCEDURE

1	Check the DTC for the engine (See page DI-3).

*1 → **Repair engine control system according to the code output.**

*2 ↓

Check for ECM connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DI7UP-03

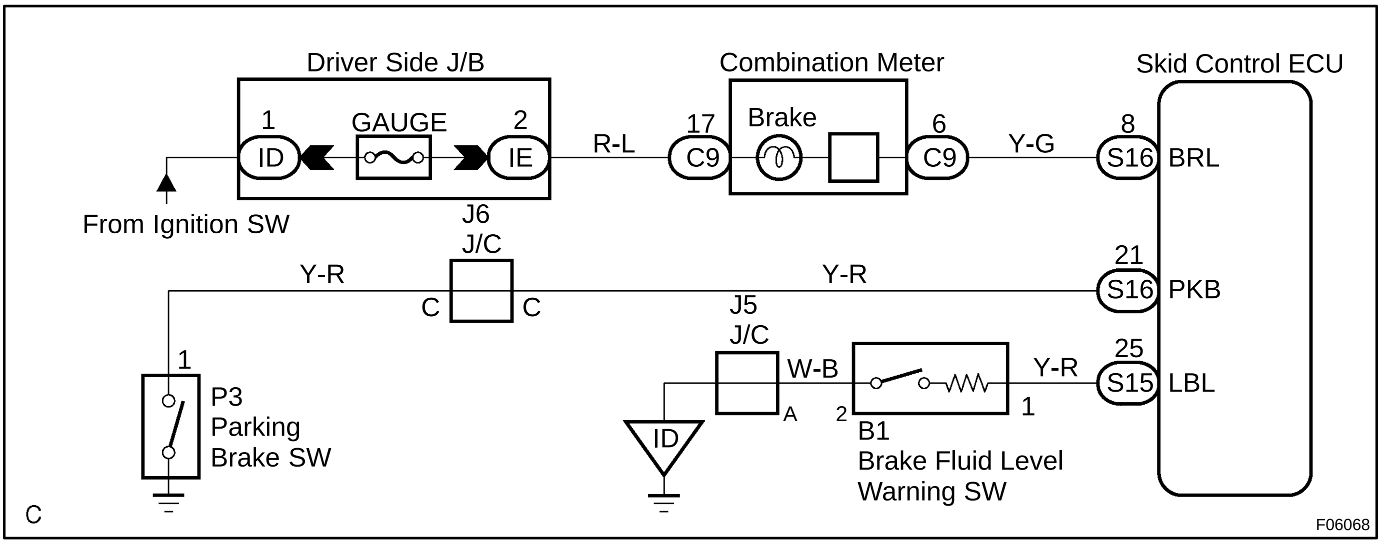
DTC	C1202/52	Brake Fluid Warning Switch Circuit

CIRCUIT DESCRIPTION

The brake fluid level warning switch sends the appropriate signal to the ECU when the brake fluid level drops.
HINT:
Pull the parking brake lever also turns on the brake warning light but does not diagnose DTC No. C1202 / 52.

DTC No.	DTC Detecting Condition	Trouble Area
C1202/52	Low master reservoir fluid level condition continues for 30 sec. or more when vehicle stops, or for 60 sec. or more when driving.	• Brake fluid level • Brake fluid level warning switch • Brake fluid level warning switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check brake fluid level.

CHECK:
Check the amount of fluid in the brake reservoir.

NG → **Check and repair brake fluid leakage and add fluid.**

OK

2	Check brake fluid level warning switch (See page BE-89).

NG — Replace brake fluid level warning switch.

OK

3	Check for open circuit in all the harness and components connected to BRAKE fluid level warning light (See page IN-33).

NG — Repair or replace harness or connector.

OK

Check and replace skid control ECU
(See page IN-33).

DI7UQ-03

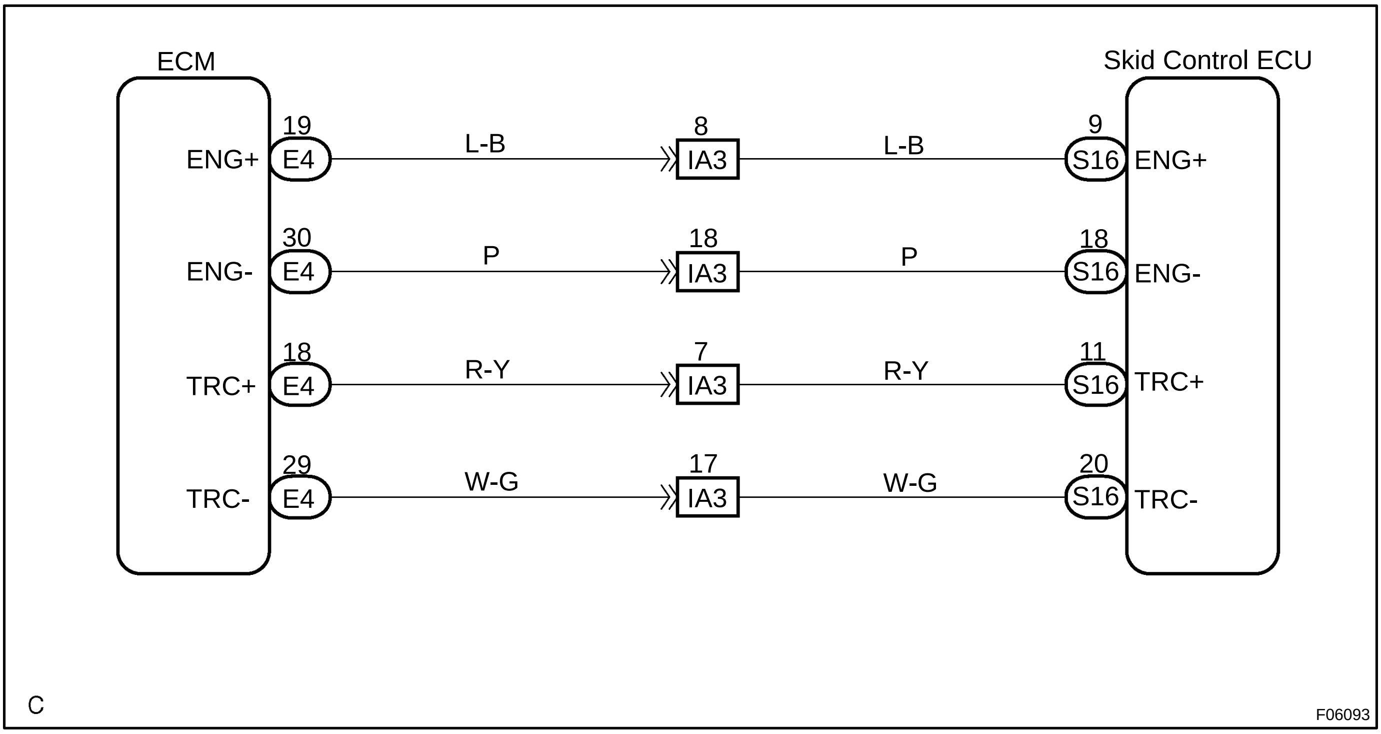
DTC	C1203/53	ECM Communication Circuit Malfunction

CIRCUIT DESCRIPTION

The circuit is used to send TRAC and VSC control information from the skid control ECU to the ECM (TRC+, TRC-), and engine control information from the ECM to the skid control ECU (ENG+, ENG-).

DTC No.	DTC Detecting Condition	Trouble Area
C1203 / 53	1. Either of the following (a),or (b) continues for 5 sec.: (a) When ECU terminal IG1 voltage is 9.5 V or more, the condition that the data is not transmitted to engine ECU continues for more than 5 sec. (b) When ECU terminal IG1 voltage is 9.5 V or more, engine speed is 500 rpm or more and data receipt from engine ECU is impossible. 2. The condition that the data sent from engine ECU becomes repeatedly normal and abnormal occurs 10 times or more for 60 sec. 3. The condition that TRC ± communication is normal ↔ abnormal has been repeated more than 10 times in 60 sec.	• TRC+ or TRC- circuit • ENG+ or ENG- circuit • Engine ECU • Skid control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between terminals ENG+, ENG-, TRC+, TRC- of skid control ECU and ECM (See page IN-33).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace ECM or skid control ECU (See page IN-33).

DI7UR-03

DTC C1223/43 ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1223/43	ABS control system is abnormal.	ABS control system

INSPECTION PROCEDURE

1 Check the DTC for the ABS (See page DI-497).

*1 → **Repair ABS control system according to the code output.**

*2 ↓

Check for ECU connected to malfunction indicator lamp.

*1: Output NG code
*2: Malfunction indicator lamp remains ON

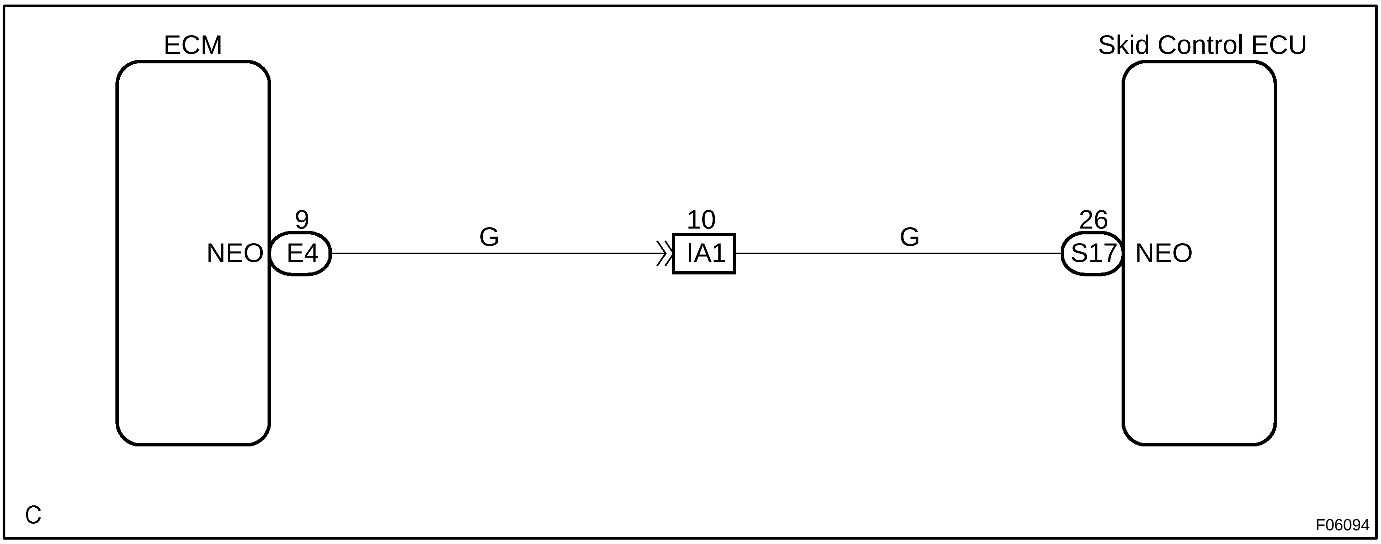
DTC	C1224/44	NE Signal Circuit

CIRCUIT DESCRIPTION

The skid control ECU receives engine revolution speed signals (NE signals) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
C1224/44	When any of the following 1. through 2. is detected: 1. At vehicle speed of 30 km/h (19 mph) or more, and when data receiving from the ECM is in normal condition, and open or short circuit for engine revolution signal circuit continues for 10 sec. or more. 2. While TRAC is operating and when open or short circuit for engine revolution signal circuit continues for 0.24 sec. or more.	✓NEO circuit ✓ECM

WIRING DIAGRAM



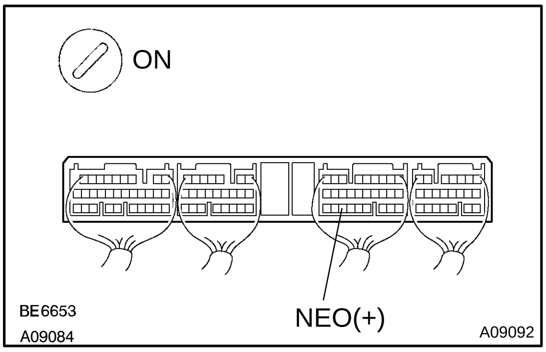
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminals NEO of skid control ECU and terminal NEO of ECM (See page IN-33).**

NG → **Repair or replace harness and connector.**

OK

2	**Check voltage between terminals NEO of skid control ECU and body ground.**



PREPARATION:

(a) Remove the skid control ECU with connectors still connected.

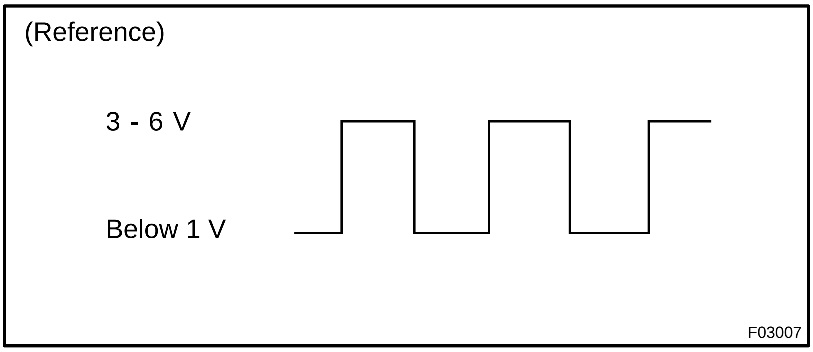
(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal NEO of skid control ECU and body ground for the engine conditions below.

OK:

Engine condition	Voltage
OFF (IG ON)	3 - 6 V or below 1 V
ON (Idling)	3 - 6 V ↔ below 1 V (Pulse)



NG → **Check and replace skid control ECU or ECM (See page IN-33).**

OK

If the same codes is still output after the DTC is deleted, check the contact condition of each connection.

DI9JD-01

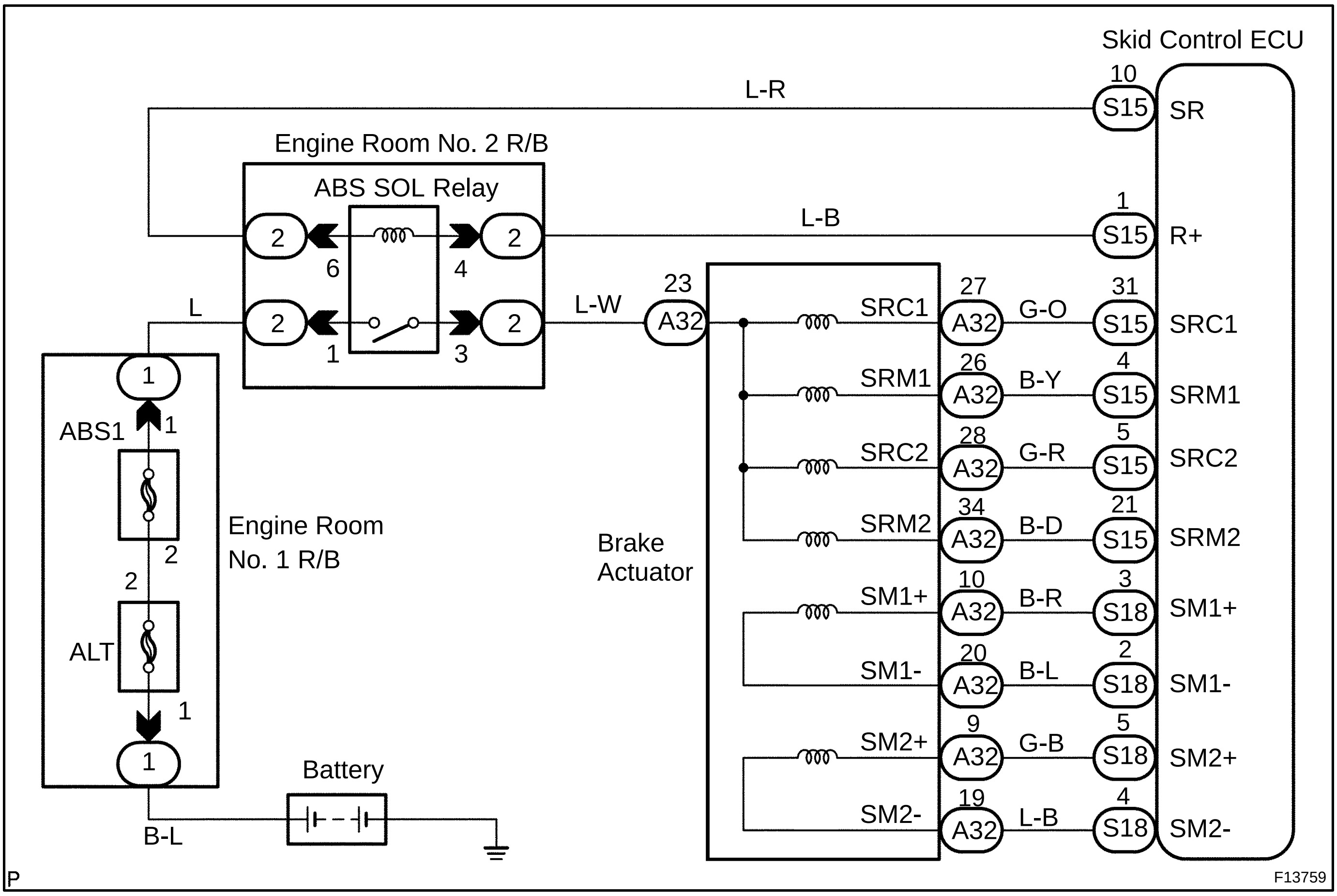
DTC	C1225 / 25 - C1227 / 27	TRAC & VSC-Related Solenoid Circuits

CIRCUIT DESCRIPTION

The TRAC & VSC solenoids operate in accordance with signals from the ECU and raise the fluid pressure in and release it from the brake cylinders.

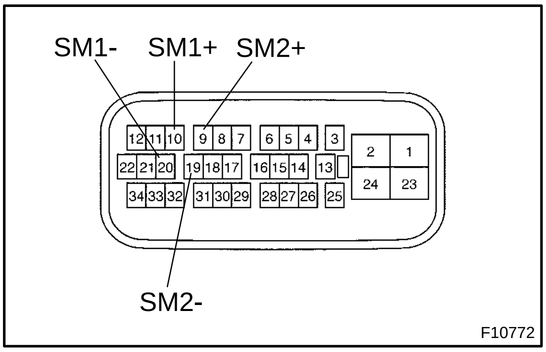
DTC No.	DTC Detecting Condition	Trouble Area
C1225 / 25	Detection of any of conditions 1. through 4.: 1. When SM1 or SM2 is ON, excessive electric current on SM1 or SM2 continues for 0.05 sec. or more. 2. When SM1 or SM2 is OFF, open circuit of SM1 or SM2 continues for 0.05 sec. or more. 3. When SM1 or SM2 is ON, open circuit of SM1 or SM2 continues for 0.1 sec. or more. 4. When SM1 or SM2 is OFF, electric current application on SM1 or SM2 continues for 0.1 sec. or more.	• Brake actuator • SM1 or SM2 circuit
C1226 / 26	Open or short circuit of SRM1 or SRM2 continues for 0.05 sec. or more.	• Brake actuator • SRM1 or SRM2 circuit
C1227 / 27	Open or short circuit of SRC1 or SRC2 continues for 0.05 sec. or more.	• Brake actuator • SRC1 or SRC2 circuit

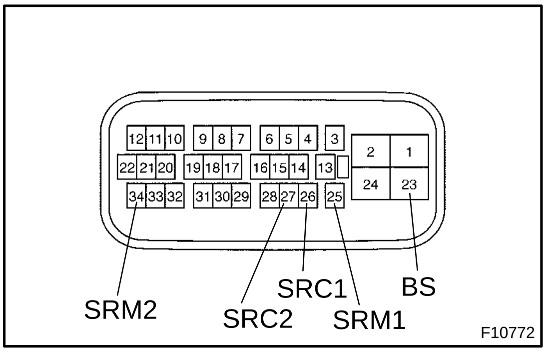
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake actuator solenoid.**





PREPARATION:
Disconnect the brake actuator connector.

CHECK:
Check continuity between terminals SM1+ - SM1-, and terminals SM2+ - SM2- of brake actuator.

OK:
Continuity

HINT:
Resistance of each solenoid: 8.1 - 9.1 Ω at 25 °C

CHECK:
Check continuity between terminal BS and terminals SRC1, SRC2, SRM1 and SRM2 of brake actuator.

OK:
Continuity

HINT:
Resistance of each solenoid at 25 °C
SRC1, SRC2: 8.1 - 9.1 Ω
SRM1, SRM2: 4.9 - 5.5 Ω

NG → **Replace brake actuator.**

OK

2	**Check for open and short circuit in harness and connector between skid control ECU and brake actuator (See page IN-33).**

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

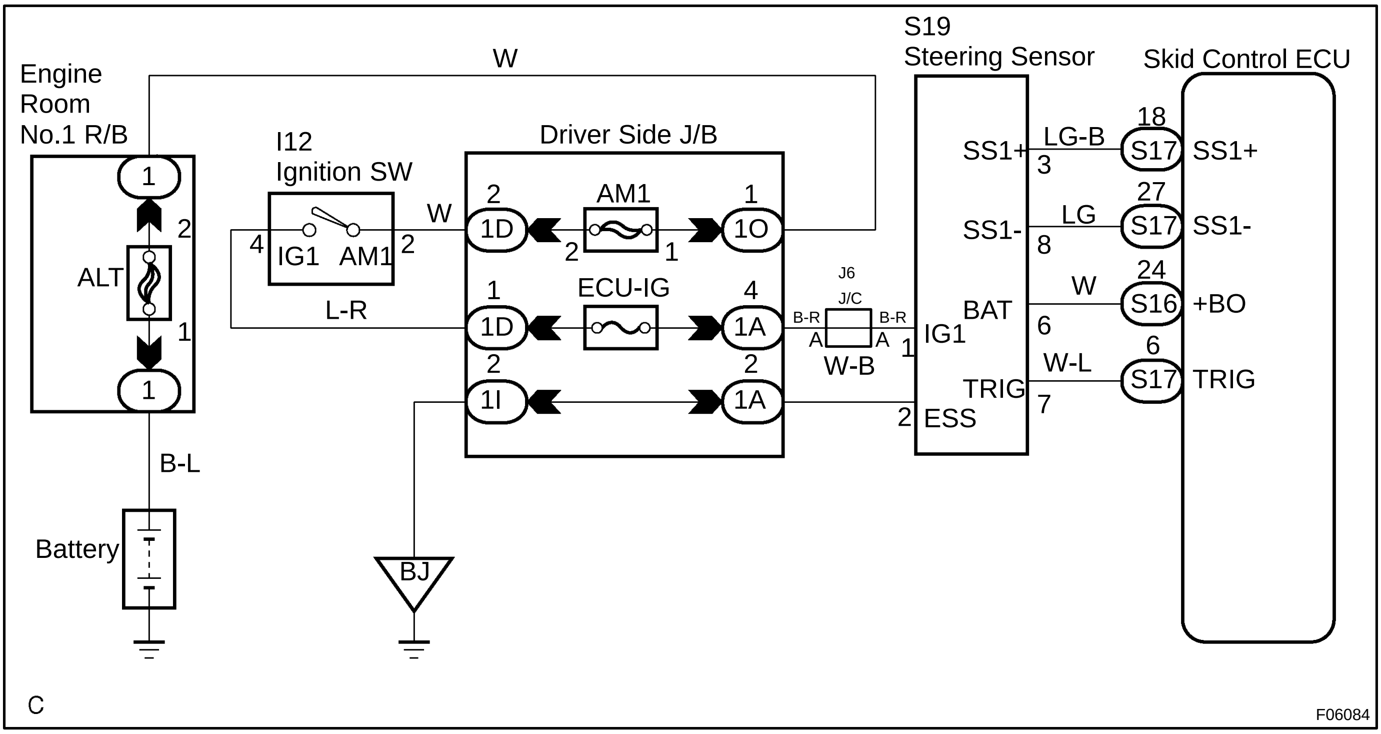
DI1H5-12

DTC	C1231 / 31, C1335 / 35	Steering Angle Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1231 / 31	When detecting the abnormality.	• Steering angle sensor • Steering angle sensor circuit • +BI circuit
C1335 / 35	Detection of either condition 1. or 2.: 1. When the ECU IG1 terminal voltage is 9.5 V or more, data transmission from the steering angle sensor is impossible for 1 sec. or more. 2. Immediately after the terminal BAT is connected and when IG1 terminal voltage is 9.5 V or more, open circuit of terminal TRIG continues for 15 sec. or more.	

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	Check output value of the steering angle sensor.

PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and turn the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

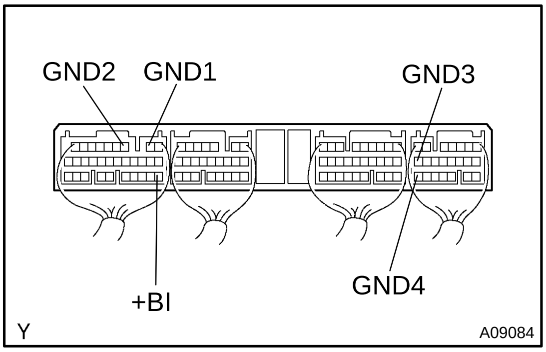
CHECK:
Check that the steering wheel turning angle value of the steering angle sensor observed in the hand-held tester is changing as the steering wheel is turned.

OK:
Steering wheel turning angle value must be changing.

OK → **Go to step 5.**

NG

2	Check voltage between terminals +BI and GND of skid control ECU.



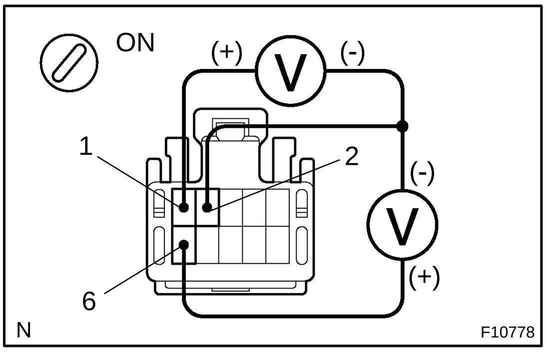
PREPARATION:
(a) Remove the skid control ECU with the connector still connected.
(b) Turn the ignition switch ON.
(c) Measure voltage between terminal +BI and GND of skid control ECU.

OK:
Voltage: 10 - 14 V

NG → **Check and replace harness and connector.**

OK

3	Check input voltage of the steering angle sensor.



PREPARATION:

(a) Remove the steering wheel and column lower cover (See page RS-13).

(b) Disconnect the steering angle sensor connector.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals 1 and 2, 2 and 6 of the steering angle sensor harness side connector.

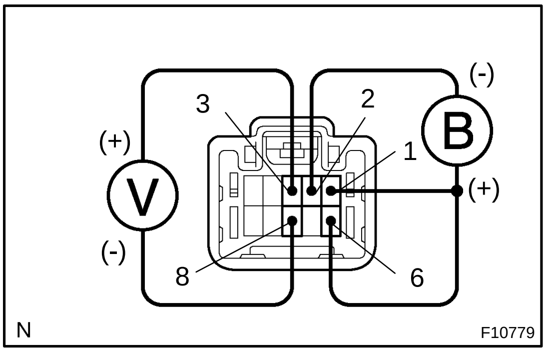
OK:

Voltage: 10 - 14 V

NG	Check and replace harness and connector.

OK

4	Check steering angle sensor.



PREPARATION:

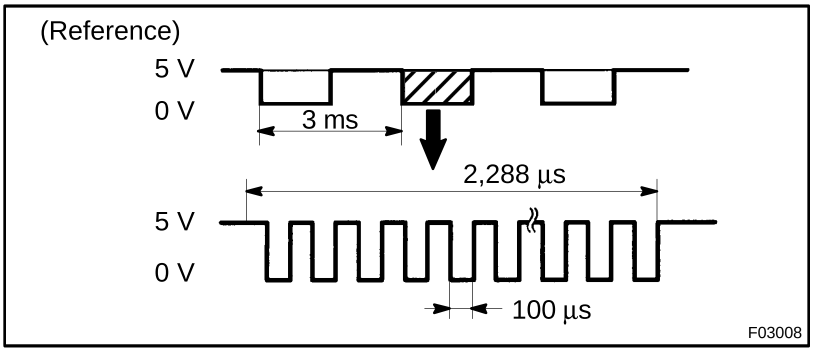
(a) Apply battery positive voltage between terminals 1 and 2, 2 and 6 of the steering angle sensor.

(b) Connect the oscilloscope to the terminals 3 and 8 of the steering angle sensor.

CHECK:

Turn the steering wheel slowly and check the signal waveform.

OK:



HINT:

The above signal wave form does not repeat ON and OFF regularly and this ON-OFF interval changes case by case according to the data.

NG → **Replace steering angle sensor.**

OK ↓

Check and replace skid control ECU (See page IN-33).

5	**Check DTC for ABS (See page DI-497).**

OK → **Check and replace skid control ECU (See page IN-33).**

OK ↓

End.

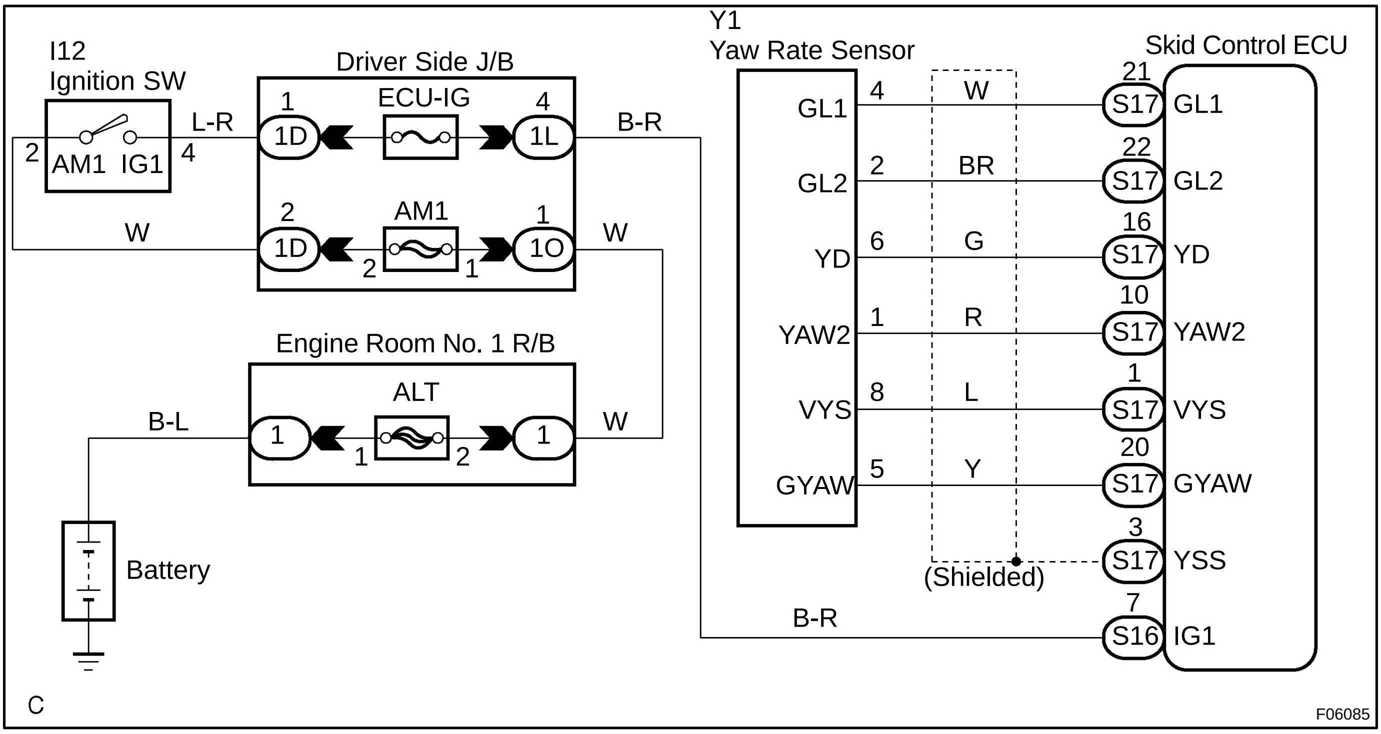
DI8DW-04

DTC	C1233 / 33, C1234 / 34	Yaw Rate Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1233 / 33	Detection of any of conditions 1. through 4.: 1. When the ECU IG1 terminal voltage is 9.5 to 17.2 V, the yaw rate sensor voltage is out of the range from 0.25 to 4.75 V for 1 sec. or more. 2. The yaw rate sensor open circuit detect signal is ON for 1 sec. or more. 3. The yaw rate sensor power source voltage is out of the range from 4.4 to 5.6 V for 1 sec. or more. 4. Momentary open circuit of the yaw rate sensor signal occurs 10 times or more.	• Yaw rate sensor • Yaw rate sensor circuit
C1234 / 34	When the yaw rate sensor VYS terminal voltage is 4.4 to 5.6 V, YD malfunction signal of the yaw rate sensor is ON for 5 sec. or more.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Perform zero point calibration of the yaw rate sensor (See page DI-497).

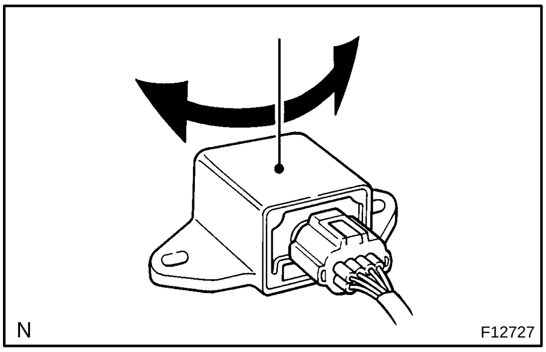
2	**Is DTC still output?**

Check DTC on page DI-497 .

NO → **End.**

YES

3	**Check output value of the yaw rate sensor.**



In case of using the hand-held tester:

PREPARATION:

(a) Remove the consol box.

(b) Remove the 2 nuts and the yaw rate sensor with the connector still connected to it.

(c) Connect the hand-held tester to the DLC3.

(d) Turn the ignition switch ON and push the hand-held tester main switch ON.

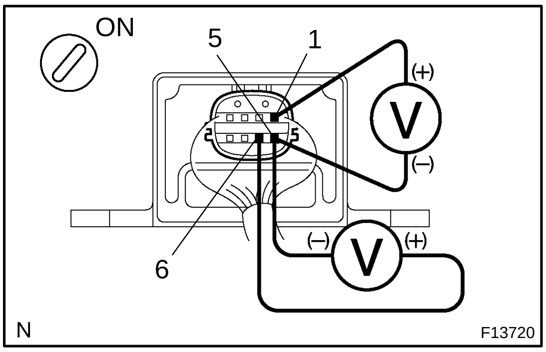
(e) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the yaw rate value of the yaw rate sensor observed in the hand-held tester is changing: Place the yaw rate sensor vertically to the ground and turn the sensor pivoted on its center.

OK:

Yaw rate value must be changing.
(Reference)
When the yaw rate sensor is stationary output value: ± 4 deg/s



In case of not using the hand-held tester:

PREPARATION:

(a) Remove the consol box then remove the yaw rate sensor with the connector still connected to it.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminals YAW (1) - GYAW (5), and terminals YD (6) - GYAW (5) of the yaw rate sensor.

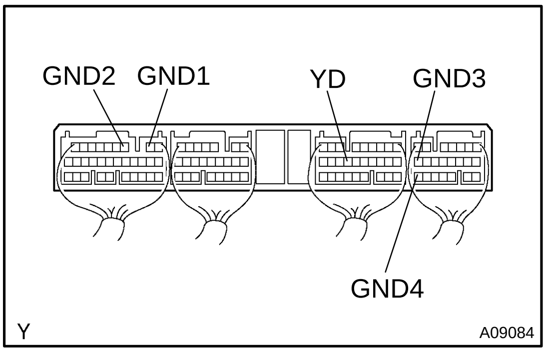
OK:

Terminals 1 and 5 (YAW - GYAW)	About 2.42 - 2.58 V
Terminals 6 and 5 (YD - GYAW)	About 4.5 V - 5.3 V

NG → **Replace yaw rate sensor.**

OK

4	Check voltage between terminals YD and GND of skid control ECU.



PREPARATION:
Remove the skid control ECU with the connector still connected to it.

CHECK:
(a) Turn the ignition switch ON.
(b) Measure voltage between terminals YD and GND of skid control ECU.

OK:
Voltage: 4.5 - 5.3 V

OK → **Check and replace skid control ECU (See page IN-33).**

NG

5	Check for open and short circuit in harness and connector between yaw rate sensor and skid contorl ECU (See page IN-33).

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU (See page IN-33).

FOREWORD

This wiring diagram manual has been prepared to provide information on the electrical system of the 2004 IS 300.

Applicable models: JCE10 Series

For service specifications and repair procedures of the above models other than those listed in this manual, refer to the following manuals;

Manual Name	Pub. No.
✓2003 LEXUS IS 300 Repair Manual	
Volume 1	RM1054U1
Volume 2	RM1054U2
✓2003 LEXUS New Car Features	NCF259U

All information in this manual is based on the latest product information at the time of publication. However, specifications and procedures are subject to change without notice.

TOYOTA MOTOR CORPORATION

NOTICE

When handling supplemental restraint system components (removal, installation or inspection, etc.), always follow the direction given in the repair manuals listed above to prevent accidents and supplemental restraint system malfunction.

2004 IS 300
ELECTRICAL WIRING DIAGRAM

A INTRODUCTION

This manual consists of the following 13 sections:

No.	Section	Description
A	INDEX	Index of the contents of this manual.
	INTRODUCTION	Brief explanation of each section.
B	HOW TO USE THIS MANUAL	Instructions on how to use this manual.
C	TROUBLE–SHOOTING	Describes the basic inspection procedures for electrical circuits.
D	ABBREVIATIONS	Defines the abbreviations used in this manual.
E	GLOSSARY OF TERMS AND SYMBOLS	Defines the symbols and functions of major parts.
F	RELAY LOCATIONS	Shows position of the Electronic Control Unit, Relays, Relay Block, etc. This section is closely related to the system circuit.
G	ELECTRICAL WIRING ROUTING	Describes position of Parts Connectors, Splice points, Ground points, etc. This section is closely related to the system circuit.
H	INDEX	Index of the system circuits.
	SYSTEM CIRCUITS	Electrical circuits of each system are shown from the power supply through ground points. Wiring connections and their positions are shown and classified by code according to the connection method. (Refer to the section, ”How to use this manual”). The ”System Outline” and ”Service Hints” useful for troubleshooting are also contained in this section.
I	GROUND POINT	Shows ground positions of all parts described in this manual.
J	POWER SOURCE (Current Flow Chart)	Describes power distribution from the power supply to various electrical loads.
K	CONNECTOR LIST	Describes the form of the connectors for the parts appeared in this book. This section is closely related to the system circuit.
L	PART NUMBER OF CONNECTORS	Indicates the part number of the connectors used in this manual.
M	OVERALL ELECTRICAL WIRING DIAGRAM	Provides circuit diagrams showing the circuit connections.

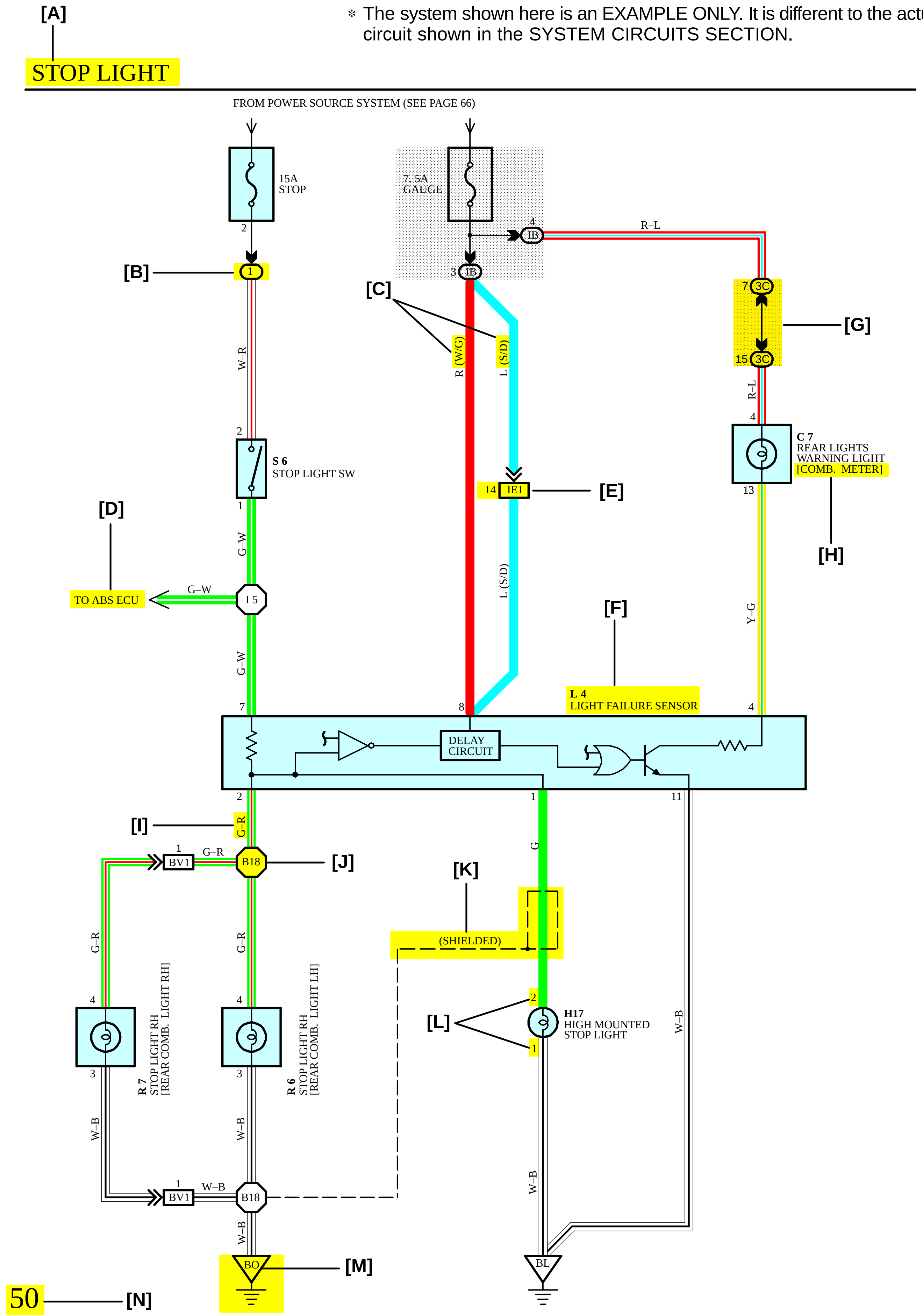
This manual provides information on the electrical circuits installed on vehicles by dividing them into a circuit for each system.

The actual wiring of each system circuit is shown from the point where the power source is received from the battery as far as each ground point. (All circuit diagrams are shown with the switches in the OFF position.)

When troubleshooting any problem, first understand the operation of the circuit where the problem was detected (see System Circuit section), the power source supplying power to that circuit (see Power Source section), and the ground points (see Ground Point section). See the System Outline to understand the circuit operation.

When the circuit operation is understood, begin troubleshooting of the problem circuit to isolate the cause. Use Relay Location and Electrical Wiring Routing sections to find each part, junction block and wiring harness connectors, wiring harness and wiring harness connectors, splice points, and ground points of each system circuit. Internal wiring for each junction block is also provided for better understanding of connection within a junction block.
Wiring related to each system is indicated in each system circuit by arrows (from__, to__). When overall connections are required, see the Overall Electrical Wiring Diagram at the end of this manual.

∗ The system shown here is an EXAMPLE ONLY. It is different to the actual circuit shown in the SYSTEM CIRCUITS SECTION.



[A] : System Title

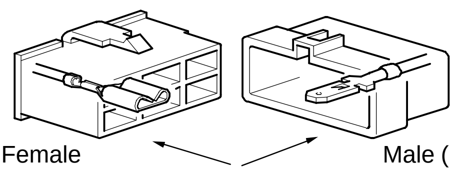
[B] : Indicates a Relay Block. No shading is used and only the Relay Block No. is shown to distinguish it from the J/B

Example: (1) Indicates Relay Block No.1

[C] : (   ) is used to indicate different wiring and connector, etc. when the vehicle model, engine type, or specification is different.

[D] : Indicates related system.

[E] : Indicates the wiring harness and wiring harness connector. The wiring harness with male terminal is shown with arrows (⩔).
Outside numerals are pin numbers.



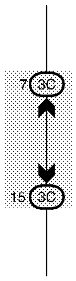
The first letter of the code for each wiring harness and wiring harness connector(s) indicates the component's location, e.g, "E" for the Engine Compartment, "I" for the Instrument Panel and Surrounding area, and "B" for the Body and Surrounding area.

When more than one code has the first and second letters in common, followed by numbers (e.g, IH1, IH2), this indicates the same type of wiring harness and wiring harness connector.

[F] : Represents a part (all parts are shown in sky blue). The code is the same as the code used in parts position.

[G] : Junction Block (The number in the circle is the J/B No. and the connector code is shown beside it). Junction Blocks are shaded to clearly separate them from other parts.

Example:



3C indicates that it is inside Junction Block No.3

[H] : When 2 parts both use one connector in common, the parts connector name used in the wire routing section is shown in square brackets [   ].

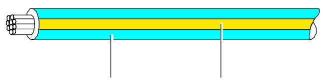
[I] : Indicates the wiring color.

Wire colors are indicated by an alphabetical code.

B = Black	W = White	BR = Brown
L = Blue	V = Violet	SB = Sky Blue
R = Red	G = Green	LG = Light Green
P = Pink	Y = Yellow	GR = Gray
O = Orange		

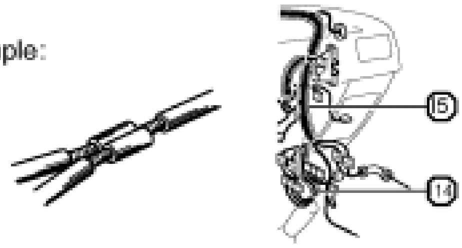
The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

Example: L – Y



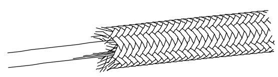
L – Y
(Blue) (Yellow)

[J] : Indicates a wiring Splice Point (Codes are "E" for the Engine Room, "I" for the Instrument Panel, and "B" for the Body).



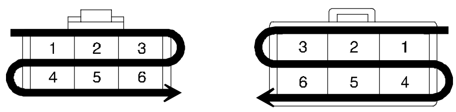
The Location of splice Point I 5 is indicated by the shaded section.

[K] : Indicates a shielded cable.



[L] : Indicates the pin number of the connector.
The numbering system is different for female and male connectors.

Example: Numbered in order from upper left to lower right — Numbered in order from upper right to lower left



Female — Male

[M] : Indicates a ground point.

The first letter of the code for each ground point(s) indicates the component's location, e.g, "E" for the Engine Compartment, "I" for the Instrument Panel and Surrounding area, and "B" for the Body and Surrounding area.

[N] : Page No.

[O] **SYSTEM OUTLINE**

Current is applied at all times through the STOP fuse to TERMINAL 2 of the stop light SW.
When the ignition SW is turned on, current flows from the GAUGE fuse to TERMINAL 8 of the light failure sensor, and also flows through the rear lights warning light to TERMINAL 4 of the light failure sensor.

STOP LIGHT DISCONNECTION WARNING

When the ignition SW is turned on and the brake pedal is pressed (Stop light SW on), if the stop light circuit is open, the current flowing from TERMINAL 7 of the light failure sensor to TERMINALS 1, 2 changes, so the light failure sensor detects the disconnection and the warning circuit of the light failure sensor is activated.
As a result, the current flows from TERMINAL 4 of the light failure sensor to TERMINAL 11 to GROUND and turns the rear lights warning light on. By pressing the brake pedal, the current flowing to TERMINAL 8 of the light failure sensor keeps the warning circuit on and holds the warning light on until the ignition SW is turned off.

[P] **SERVICE HINTS**

S6 STOP LIGHT SW

2–1 : Closed with the brake pedal depressed

L4 LIGHT FAILURE SENSOR

1, 2, 7–GROUND : Approx. **12** volts with the stop light SW on
4, 8–GROUND : Approx. **12** volts with the ignition SW at **ON** position
11–GROUND : Always continuity

[Q] ○ **: PARTS LOCATION**

Code	See Page	Code	See Page	Code	See Page
C7	34	L4	36	R7	37
H17	36	R6	37	S6	35

[R] **: RELAY BLOCKS**

Code	See Page	Relay Blocks (Relay Block Location)
1	18	R/B No.1 (Instrument Panel Left)

[S] **: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR**

Code	See Page	Junction Block and Wire Harness (Connector Location)
IB	20	Instrument Panel Wire and Instrument Panel J/B (Lower Finish Panel)
3C	22	Instrument Panel Wire and J/B No.3 (Instrument Panel Left Side)

[T] □ **: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS**

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IE1	42	Floor Wire and Instrument Panel Wire (Left Kick Panel)
BV1	50	Luggage Room Wire and Floor Wire (Luggage Compartment Left)

[U] ▽ **: GROUND POINTS**

Code	See Page	Ground Points Location
BL	50	Under the Left Quarter Pillar
BO	50	Back Panel Center

[V] **: SPLICE POINTS**

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I5	44	Cowl Wire	B18	50	Luggage Room Wire

[O] : Explains the system outline.

[P] : Indicates values or explains the function for reference during troubleshooting.

[Q] : Indicates the reference page showing the position on the vehicle of the parts in the system circuit.

Example : Part ”L4” (Light Failure Sensor) is on page 36 of the manual.
∗ The letter in the code is from the first letter of the part, and the number indicates its order in parts starting with that letter.

Example : L 4
- 4 — Parts is 4th in order
- L — Light Failure Sensor

[R] : Indicates the reference page showing the position on the vehicle of Relay Block Connectors in the system circuit.

Example : Connector ”1” is described on page 18 of this manual and is installed on the left side of the instrument panel.

[S] : Indicates the reference page showing the position on the vehicle of J/B and Wire Harness in the system circuit.

Example : Connector ”3C” connects the Instrument Panel Wire and J/B No.3. It is described on page 22 of this manual, and is installed on the instrument panel left side.

[T] : Indicates the reference page describing the wiring harness and wiring harness connector (the female wiring harness is shown first, followed by the male wiring harness).

Example : Connector ”IE1” connects the floor wire (female) and Instrument panel wire (male). It is described on page 42 of this manual, and is installed on the left side kick panel.

[U] : Indicates the reference page showing the position of the ground points on the vehicle.

Example : Ground point ”BO” is described on page 50 of this manual and is installed on the back panel center.

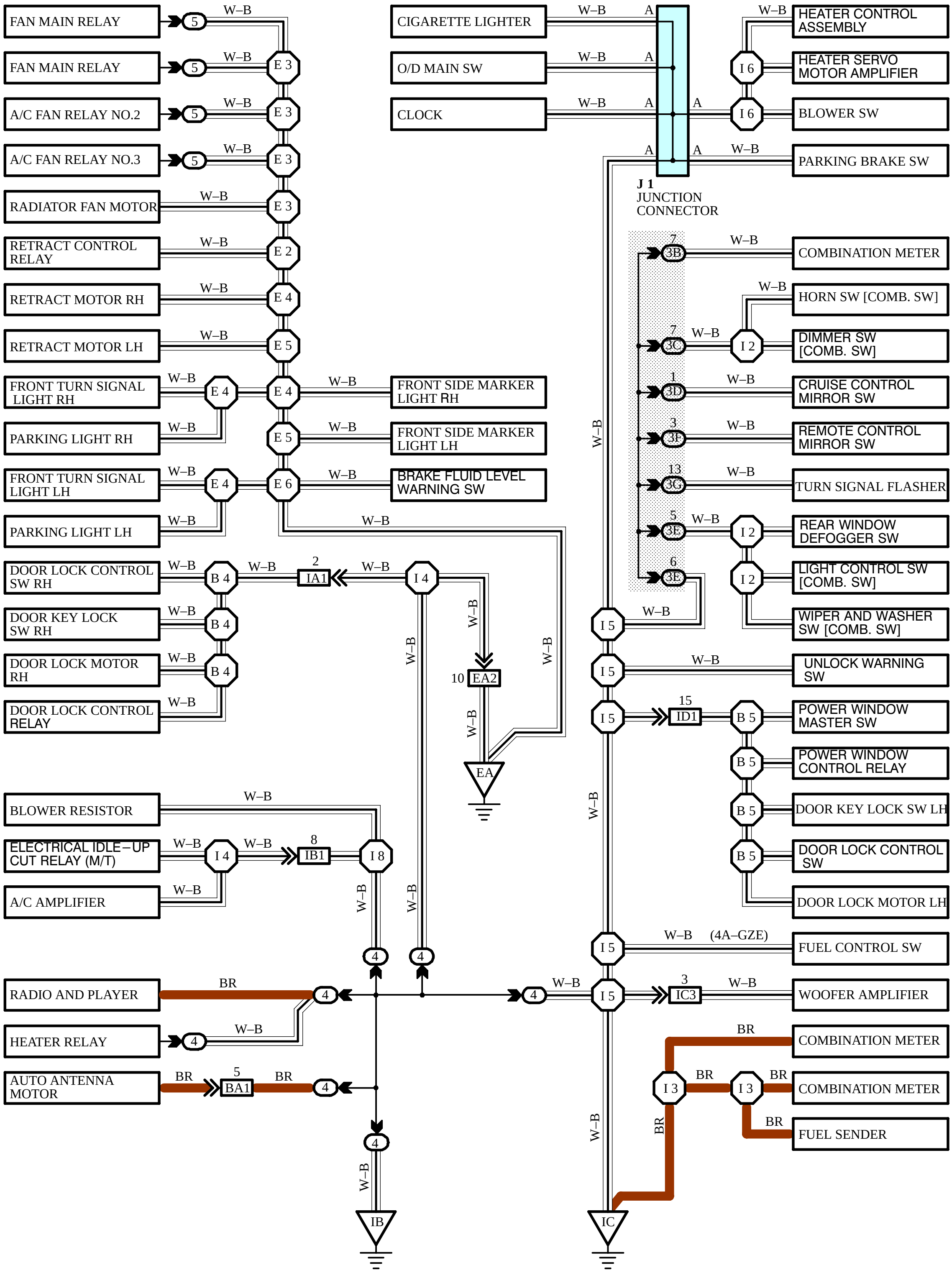
[V] : Indicates the reference page showing the position of the splice points on the vehicle.

Example : Splice point ”I5” is on the Cowl Wire Harness and is described on page 44 of this manual.

B HOW TO USE THIS MANUAL

The ground points circuit diagram shows the connections from all major parts to the respective ground points. When troubleshooting a faulty ground point, checking the system circuits which use a common ground may help you identify the problem ground quickly. The relationship between ground points (EA , IB and IC shown below) can also be checked this way.

I GROUND POINT

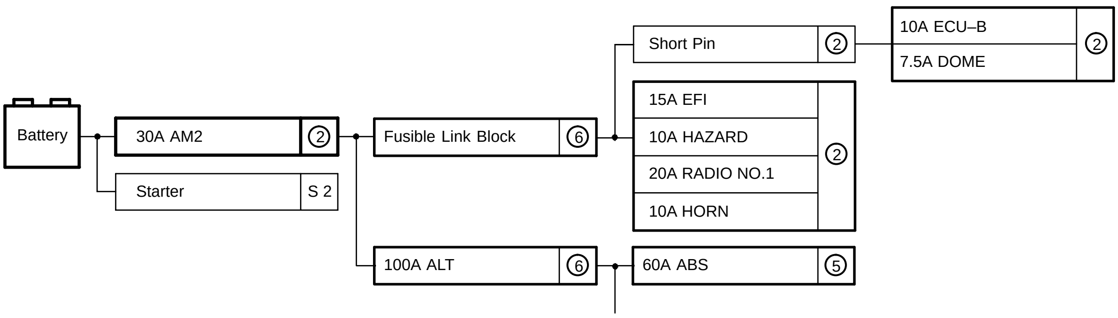


∗ The system shown here is an EXAMPLE ONLY. It is different to the actual circuit shown in the SYSTEM CIRCUITS SECTION.

The "Current Flow Chart" section, describes which parts each power source (fuses, fusible links, and circuit breakers) transmits current to. In the Power Source circuit diagram, the conditions when battery power is supplied to each system are explained. Since all System Circuit diagrams start from the power source, the power source system must be fully understood.

J POWER SOURCE (Current Flow Chart)

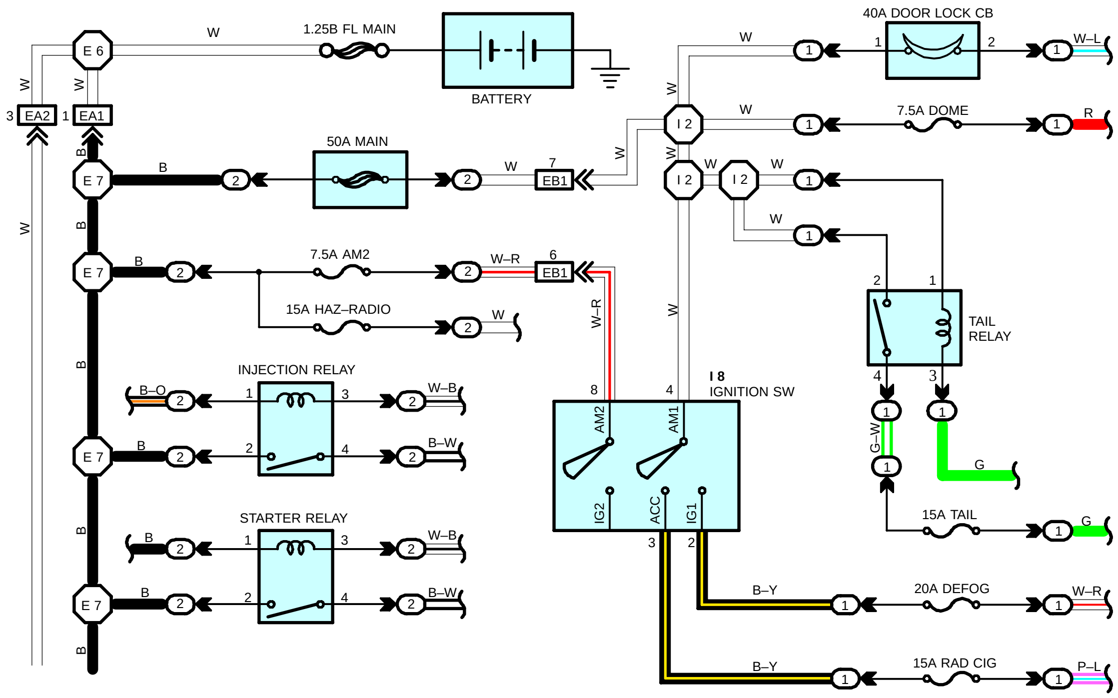
The chart below shows the route by which current flows from the battery to each electrical source (Fusible Link, Circuit Breaker, Fuse, etc.) and other parts.



Engine Room R/B (See Page 20)

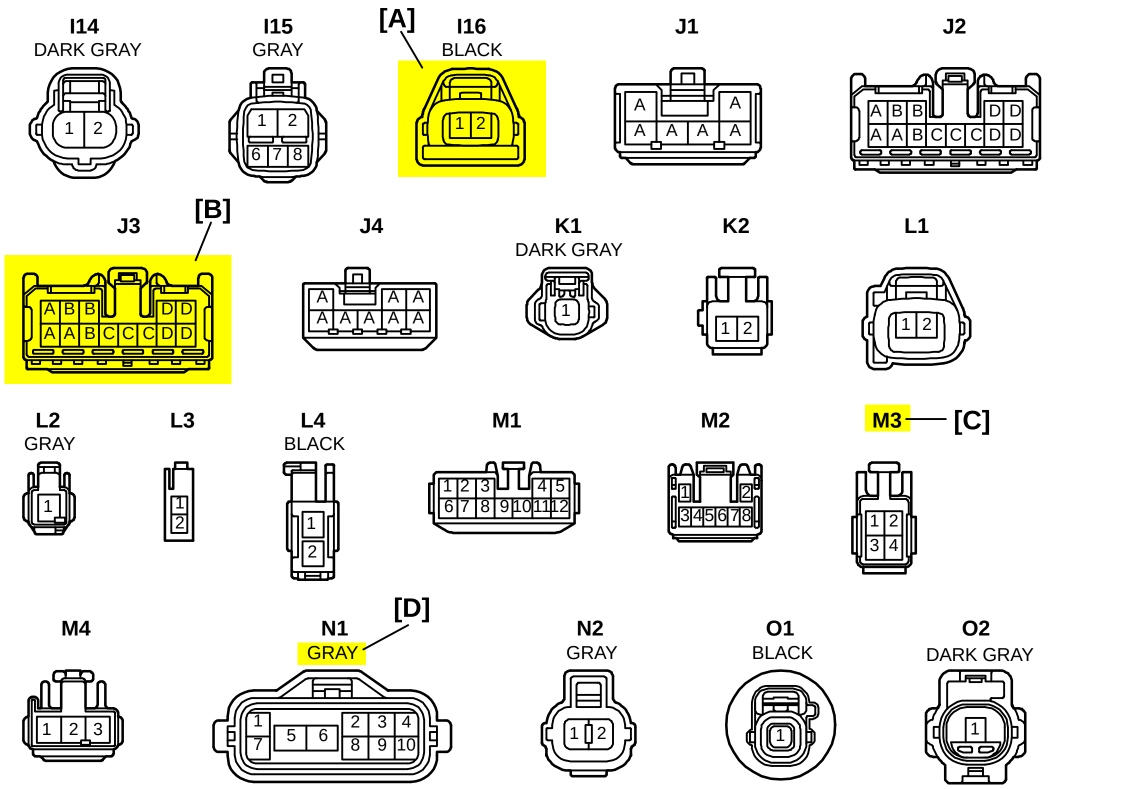
Fuse		System	Page
20A	STOP	ABS ABS and Traction Control Cruise Control Electronically Controlled Transmission and A/T Indicator Multiplex Communication System	194 187 180 166 210
10A	DOME	Cigarette Lighter and Clock Combination Meter Headlight Interior Light Key Reminder and Seat Belt Warning Light Auto Turn Off ft Deterrent and Door L	214 230 112 122

POWER SOURCE



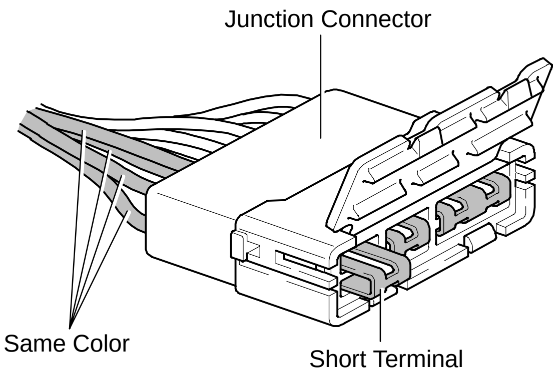
∗ The system shown here is an EXAMPLE ONLY. It is different to the actual circuit shown in the SYSTEM CIRCUITS SECTION.

K CONNECTOR LIST



[A] : Indicates connector to be connected to a part. (The numeral indicates the pin No.)

[B] : Junction Connector
Indicates a connector which is connected to a short terminal.



Junction connector in this manual include a short terminal which is connected to a number of wire harnesses. Always perform inspection with the short terminal installed. (When installing the wire harnesses, the harnesses can be connected to any position within the short terminal grouping. Accordingly, in other vehicles, the same position in the short terminal may be connected to a wire harness from a different part.)
Wire harness sharing the same short terminal grouping have the same color.

[C] : Parts Code
The first letter of the code is taken from the first letter of part, and the numbers indicates its order in parts which start with the same letter.

[D] : Connector Color
Connectors not indicated are milky white in color.

L PART NUMBER OF CONNECTORS

Code	Part Name	Part Number
A 1	A/C Ambient Temp. Sensor	90980–11070
A 2	A/C Condenser Fan Motor	90980–11237
A 3	A/C Condenser Fan Relay	90980–10940
A 4	A/C Triple Pressure SW (A/C Dual and Single Pressure SW)	90980–10943
[A]	A/T Oil Temp. Sensor [B]	909 [C] 413
A 6	ABS Actuator	90980–11151
A 7	ABS Actuator	90980–11009
A 8	ABS Speed Sensor Front LH	90980–10941
A 9	ABS Speed Sensor Front RH	90980–11002
A10	Airbag Sensor Front LH	90980–11856
A11	Airbag Sensor Front RH	
A12	...tor	90980–11194
		90980–...

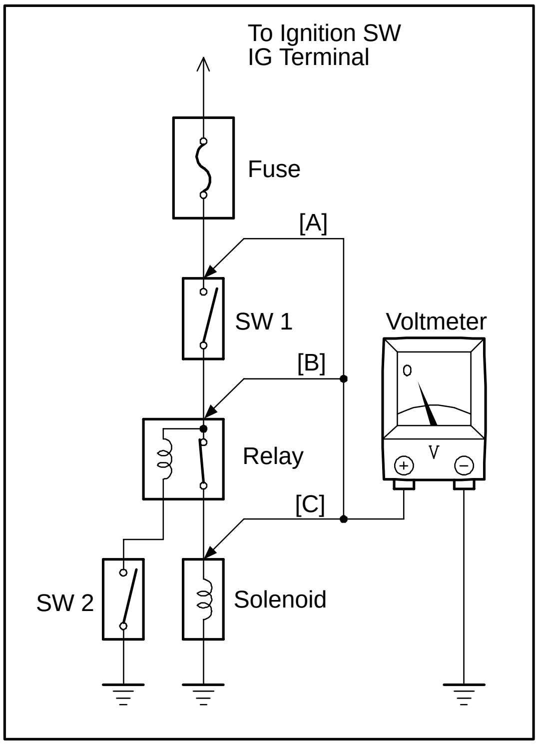
Code	Part Name	Part Number
D 4	Diode (Door Courtesy Light)	90980–11608
D 5	Diode (Key Off Operation)	90980–10962
D 6	Diode (Luggage Compartment Light)	90980–11608
D 7	Door Lock Control Relay	90980–10848
D 8	Door Courtesy Light LH	90980–11148
D 9	Door Courtesy Light RH	
D10	Door Courtesy SW LH	90980–11097
D11	Door Courtesy SW RH	
D12	Door Courtesy SW Front LH	90980–11156
D13	Door Courtesy SW Front RH	
D14	Door Courtesy SW Rear LH	
D15	Door Courtesy SW Rear RH	
D16	...nd Unlock SW LH	90980–11170
	...RH	

[A] : Part Code

[B] : Part Name

[C] : Part Number
Toyota Part Number are indicated.

Not all of the above part numbers of the connector are established for the supply.

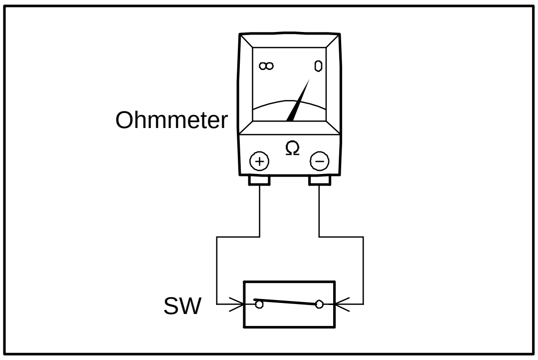


VOLTAGE CHECK

(a) Establish conditions in which voltage is present at the check point.

Example:
[A] – Ignition SW on
[B] – Ignition SW and SW 1 on
[C] – Ignition SW, SW 1 and Relay on (SW 2 off)

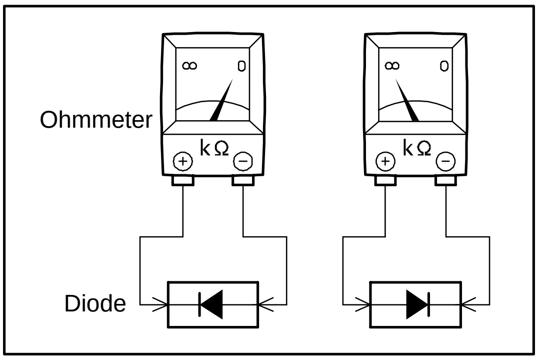
(b) Using a voltmeter, connect the negative lead to a good ground point or negative battery terminal, and the positive lead to the connector or component terminal.
This check can be done with a test light instead of a voltmeter.



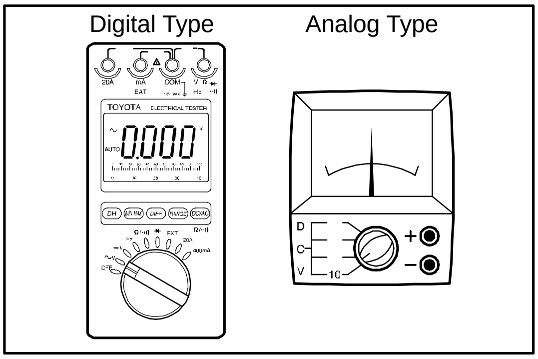
CONTINUITY AND RESISTANCE CHECK

(a) Disconnect the battery terminal or wire so there is no voltage between the check points.

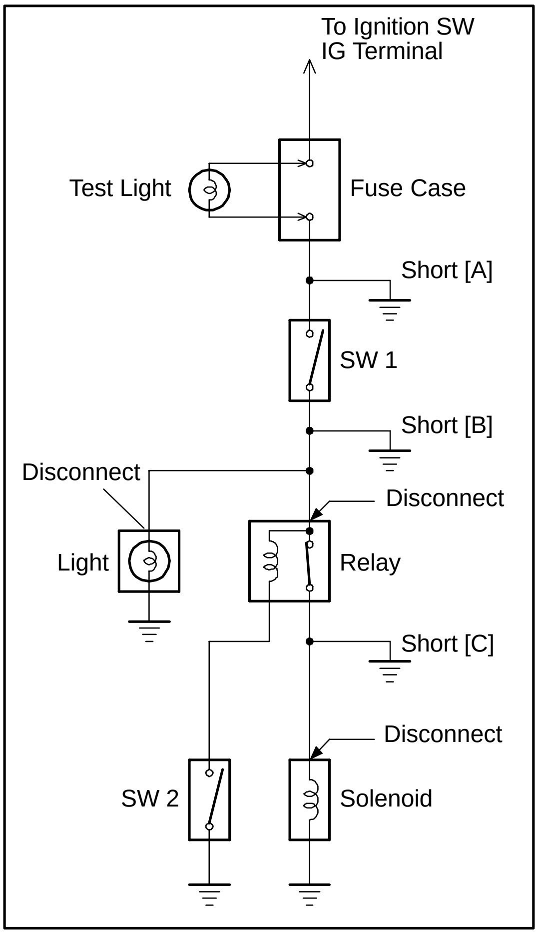
(b) Contact the two leads of an ohmmeter to each of the check points.



If the circuit has diodes, reverse the two leads and check again.
When contacting the negative lead to the diode positive side and the positive lead to the negative side, there should be continuity.
When contacting the two leads in reverse, there should be no continuity.



(c) Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting of the electrical circuit.



FINDING A SHORT CIRCUIT

(a) Remove the blown fuse and disconnect all loads of the fuse.

(b) Connect a test light in place of the fuse.

(c) Establish conditions in which the test light comes on.

Example:
[A] – Ignition SW on
[B] – Ignition SW and SW 1 on
[C] – Ignition SW, SW 1 and Relay on (Connect the Relay) and SW 2 off (or Disconnect SW 2)

(d) Disconnect and reconnect the connectors while watching the test light.
The short lies between the connector where the test light stays lit and the connector where the light goes out.

(e) Find the exact location of the short by lightly shaking the problem wire along the body.

CAUTION:

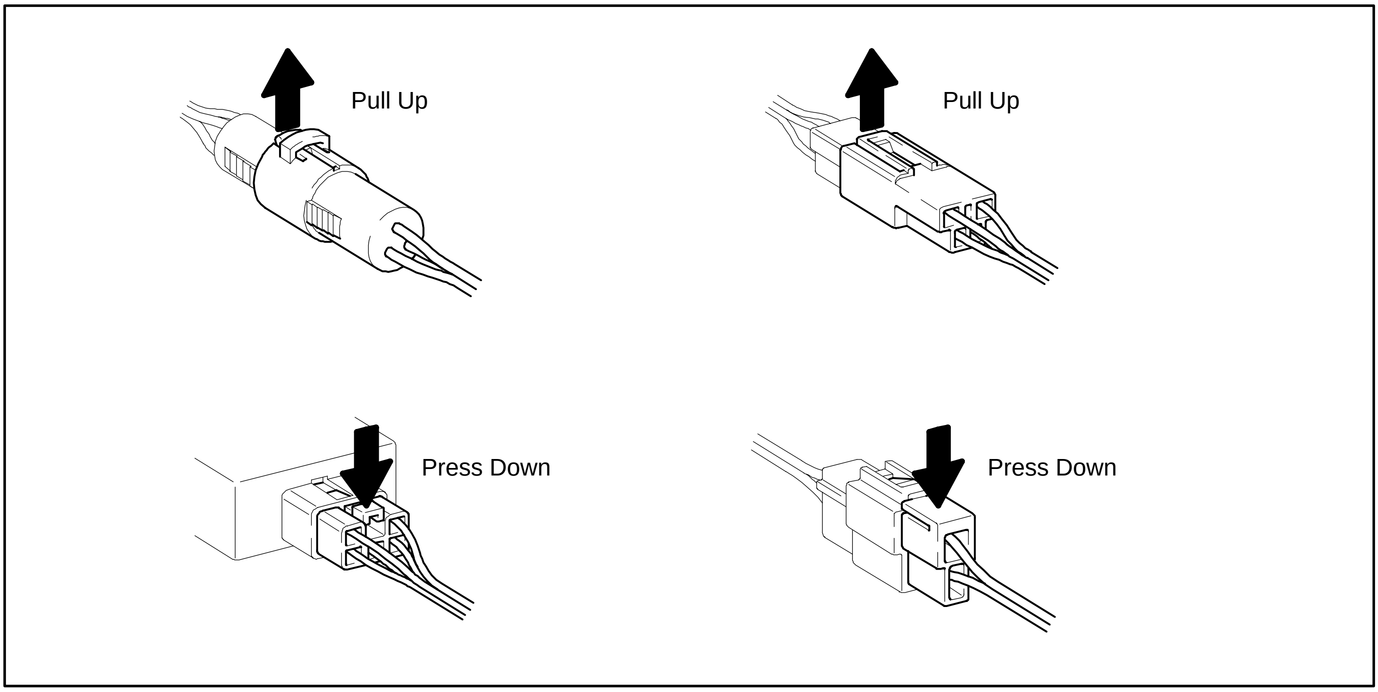
(a) Do not open the cover or the case of the ECU unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)

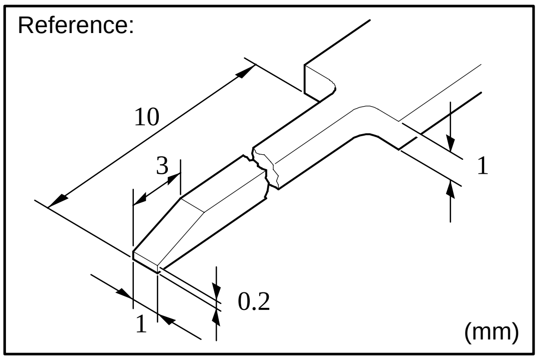
(b) When replacing the internal mechanism (ECU part) of the digital meter, be careful that no part of your body or clothing comes in contact with the terminals of leads from the IC, etc. of the replacement part (spare part).

DISCONNECTION OF MALE AND FEMALE CONNECTORS

To pull apart the connectors, pull on the connector itself, not the wire harness.

HINT : Check to see what kind of connector you are disconnecting before pulling apart.



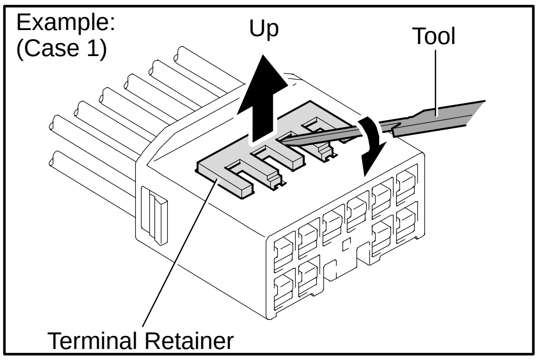


HOW TO REPLACE TERMINAL (with terminal retainer or secondary locking device)

1. PREPARE THE SPECIAL TOOL

HINT : To remove the terminal from the connector, please construct and use the special tool or like object shown on the left.

2. DISCONNECT CONNECTOR



3. DISENGAGE THE SECONDARY LOCKING DEVICE OR TERMINAL RETAINER.

(a) Locking device must be disengaged before the terminal locking clip can be released and the terminal removed from the connector.

(b) Use a special tool or the terminal pick to unlock the secondary locking device or terminal retainer.

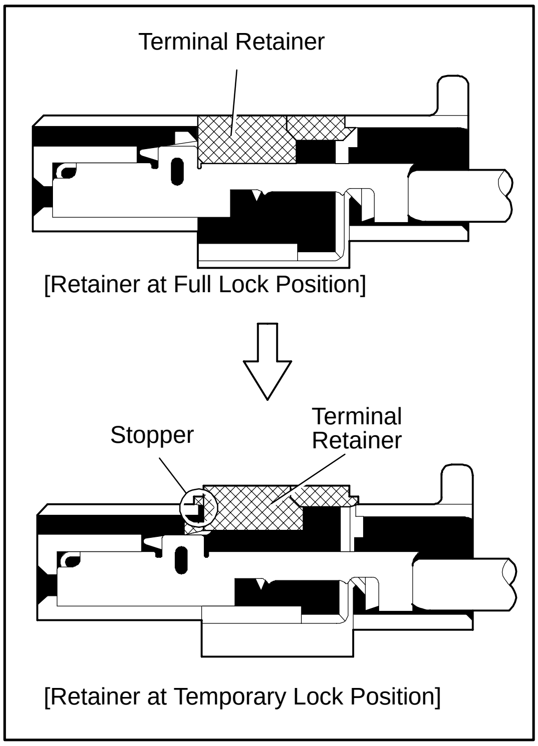
NOTICE:
Do not remove the terminal retainer from connector body.

[A] For Non–Waterproof Type Connector

HINT : The needle insertion position varies according to the connector's shape (number of terminals etc.), so check the position before inserting it.

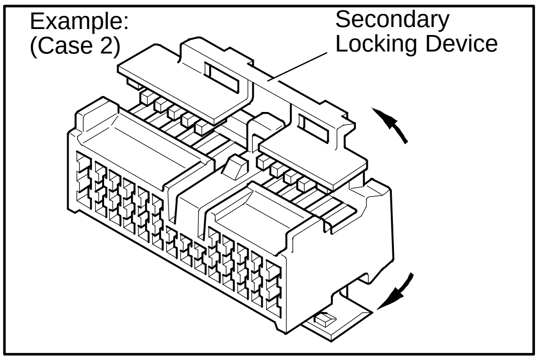
"Case 1"

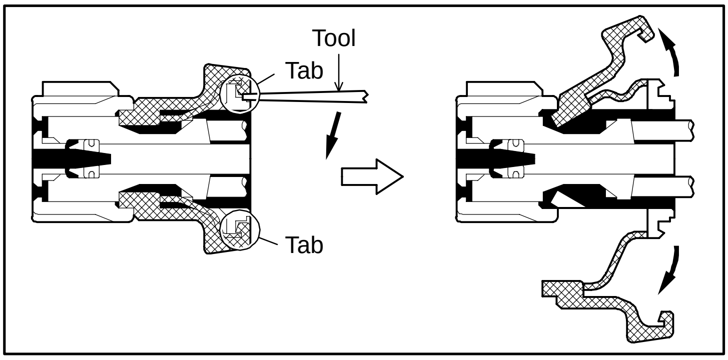
Raise the terminal retainer up to the temporary lock position.

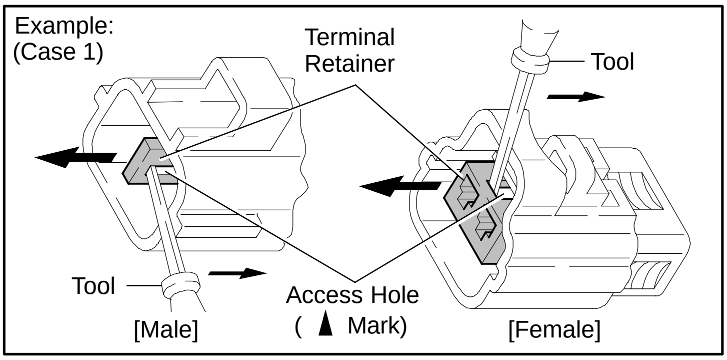


"Case 2"

Open the secondary locking device.





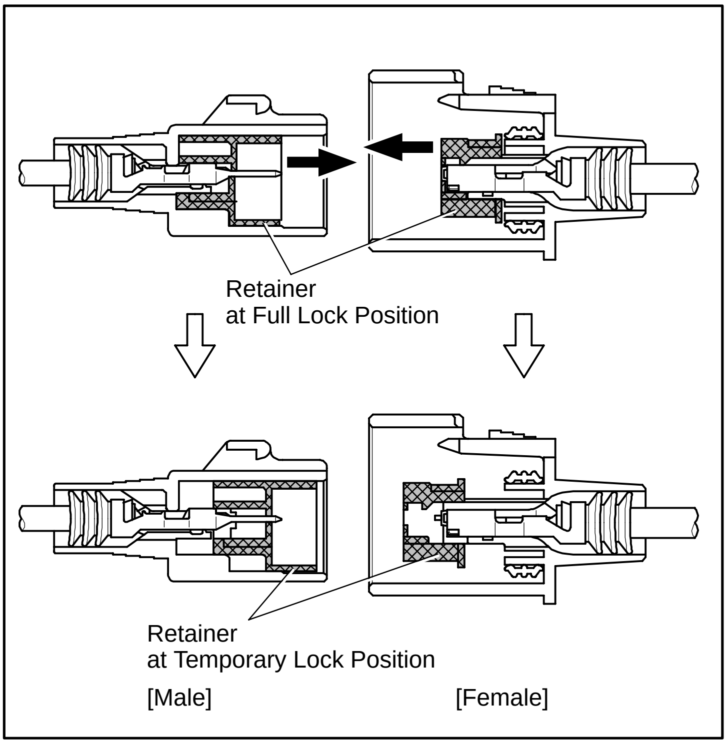


[B] For Waterproof Type Connector

HINT : Terminal retainer color is different according to connector body.

Example:

Terminal Retainer	Connector Body
Black or White	: Gray
Black or White	: Dark Gray
Gray or White	: Black

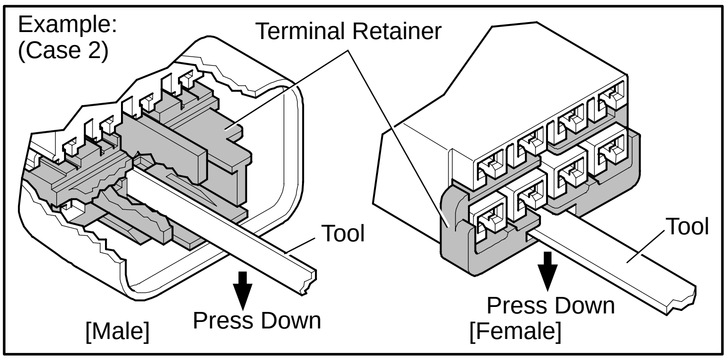


"Case 1"

Type where terminal retainer is pulled up to the temporary lock position (Pull Type).

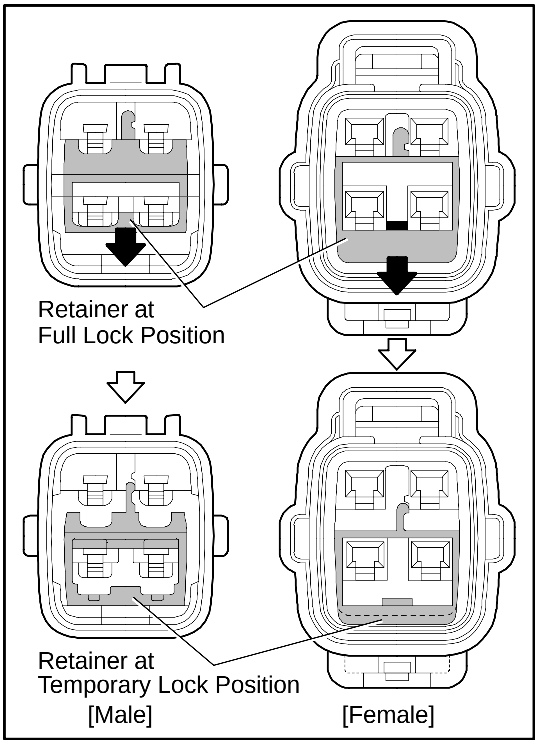
Insert the special tool into the terminal retainer access hole (Mark) and pull the terminal retainer up to the temporary lock position.

HINT : The needle insertion position varies according to the connector's shape (Number of terminals etc.), so check the position before inserting it.

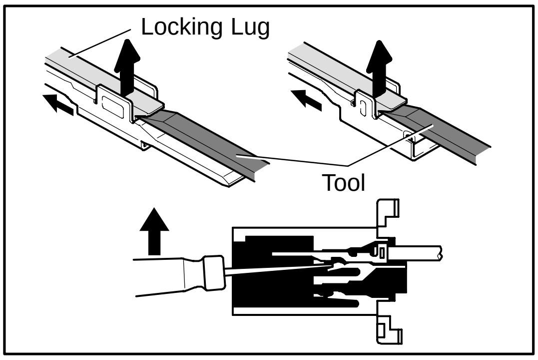


"Case 2"

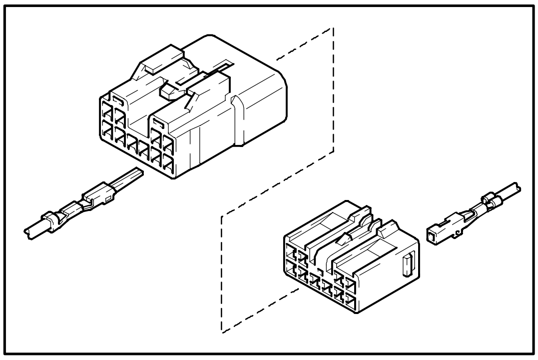
Type which cannot be pulled as far as Power Lock insert the tool straight into the access hole of terminal retainer as shown.



Push the terminal retainer down to the temporary lock position.



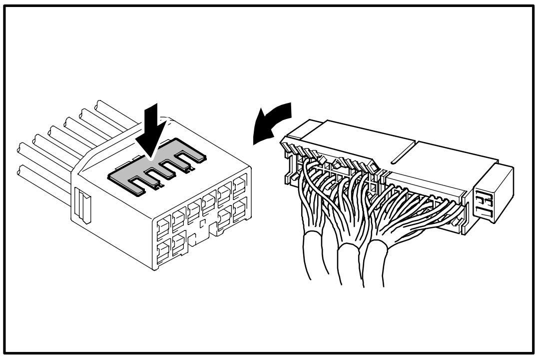
(c) Release the locking lug from terminal and pull the terminal out from rear.



4. INSTALL TERMINAL TO CONNECTOR

(a) Insert the terminal.

HINT:
1. Make sure the terminal is positioned correctly.
2. Insert the terminal until the locking lug locks firmly.
3. Insert the terminal with terminal retainer in the temporary lock position.



(b) Push the secondary locking device or terminal retainer in to the full lock position.

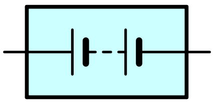
5. CONNECT CONNECTOR

ABBREVIATIONS

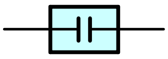
The following abbreviations are used in this manual.

A/C	=	Air Conditioning
A/T	=	Automatic Transmission
ABS	=	Anti–Lock Brake System
ACIS	=	Acoustic Control Induction System
BA	=	Brake Assist
COMB.	=	Combination
ECU	=	Electronic Control Unit
ESA	=	Electronic Spark Advance
ETCS–i	=	Electronic Throttle Control System–intelligent
EVAP	=	Evaporative Emission
FFC	=	Flexible Flat Circuit
IC	=	Integrated Circuit
J/B	=	Junction Block
LCD	=	Liquid Crystal Display
LED	=	Light Emitting Diode
LH	=	Left–Hand
MPX	=	Multiplex
O/D	=	Overdrive
R/B	=	Relay Block
RH	=	Right–Hand
S/D	=	Sedan Type
SFI	=	Sequential Multiport Fuel Injection
SRS	=	Supplemental Restraint System
SW	=	Switch
TEMP.	=	Temperature
TRAC	=	Traction Control
VSC	=	Vehicle Stability Control
VSV	=	Vacuum Switching Valve
W/G	=	Wagon Type
w/	=	With
w/o	=	Without

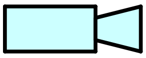
∗ The titles given inside the components are the names of the terminals (terminal codes) and are not treated as being abbreviations.



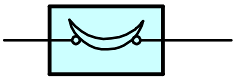
BATTERY
Stores chemical energy and converts it into electrical energy. Provides DC current for the auto's various electrical circuits.



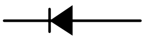
CAPACITOR (Condenser)
A small holding unit for temporary storage of electrical voltage.



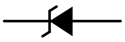
CIGARETTE LIGHTER
An electric resistance heating element.



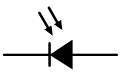
CIRCUIT BREAKER
Basically a reusable fuse, a circuit breaker will heat and open if too much current flows through it. Some units automatically reset when cool, others must be manually reset.



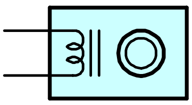
DIODE
A semiconductor which allows current flow in only one direction.



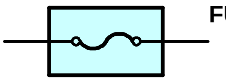
DIODE, ZENER
A diode which allows current flow in one direction but blocks reverse flow only up to a specific voltage. Above that potential, it passes the excess voltage. This acts as a simple voltage regulator.

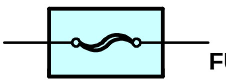


PHOTODIODE
The photodiode is a semiconductor which controls the current flow according to the amount of light.

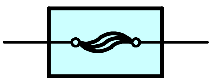


DISTRIBUTOR, IIA
Channels high–voltage current from the ignition coil to the individual spark plugs.





(for Medium Current Fuse)

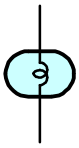


(for High Current Fuse or Fusible Link)

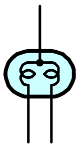
FUSE
A thin metal strip which burns through when too much current flows through it, thereby stopping current flow and protecting a circuit from damage.

FUSIBLE LINK
A heavy–gauge wire placed in high amperage circuits which burns through on overloads, thereby protecting the circuit. The numbers indicate the crosssection surface area of the wires.

GROUND
The point at which wiring attaches to the Body, thereby providing a return path for an electrical circuit; without a ground, current cannot flow.

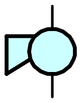


1. SINGLE FILAMENT

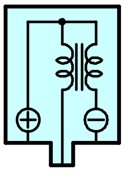


2. DOUBLE FILAMENT

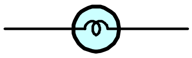
HEADLIGHTS
Current flow causes a headlight filament to heat up and emit light. A headlight may have either a single (1) filament or a double (2) filament



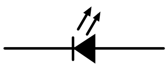
HORN
An electric device which sounds a loud audible signal.



IGNITION COIL
Converts low–voltage DC current into high–voltage ignition current for firing the spark plugs.



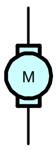
LIGHT
Current flow through a filament causes the filament to heat up and emit light.



LED (LIGHT EMITTING DIODE)
Upon current flow, these diodes emit light without producing the heat of a comparable light.

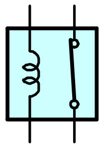
METER, ANALOG
Current flow activates a magnetic coil which causes a needle to move, thereby providing a relative display against a background calibration.

METER, DIGITAL
Current flow activates one or many LED's, LCD's, or fluorescent displays, which provide a relative or digital display.

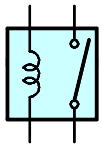


MOTOR
A power unit which converts electrical energy into mechanical energy, especially rotary motion.

RELAY

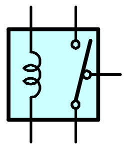


1. NORMALLY CLOSED



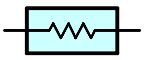
2. NORMALLY OPEN

Basically, an electrically operated switch which may be normally closed (1) or open (2).
Current flow through a small coil creates a magnetic field which either opens or closes an attached switch.



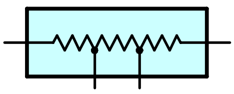
RELAY, DOUBLE THROW

A relay which passes current through one set of contacts or the other.



RESISTOR

An electrical component with a fixed resistance, placed in a circuit to reduce voltage to a specific value.

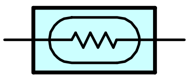


RESISTOR, TAPPED

A resistor which supplies two or more different non adjustable resistance values.

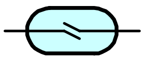
RESISTOR, VARIABLE or RHEOSTAT

A controllable resistor with a variable rate of resistance.
Also called a potentiometer or rheostat.



SENSOR (Thermistor)

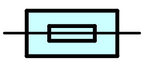
A resistor which varies its resistance with temperature.



(Reed Switch Type)

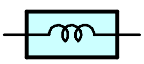
SENSOR, SPEED

Uses magnetic impulses to open and close a switch to create a signal for activation of other components.



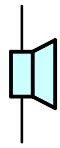
SHORT PIN

Used to provide an unbroken connection within a junction block.



SOLENOID

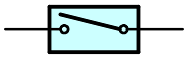
An electromagnetic coil which forms a magnetic field when current flows, to move a plunger, etc.



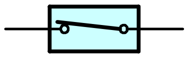
SPEAKER

An electromechanical device which creates sound waves from current flow.

SWITCH, MANUAL

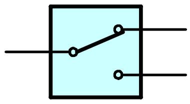


1. NORMALLY OPEN



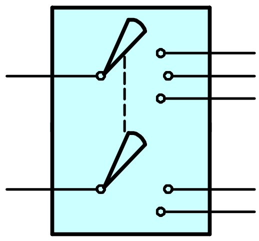
2. NORMALLY CLOSED

Opens and closes circuits, thereby stopping (1) or allowing (2) current flow.



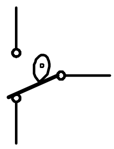
SWITCH, DOUBLE THROW

A switch which continuously passes current through one set of contacts or the other.



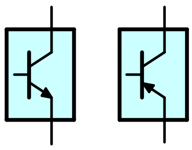
SWITCH, IGNITION

A key operated switch with several positions which allows various circuits, particularly the primary ignition circuit, to become operational.



SWITCH, WIPER PARK

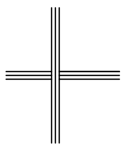
Automatically returns wipers to the stop position when the wiper switch is turned off.



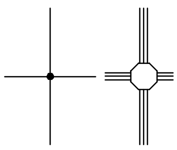
TRANSISTOR

A solidstate device typically used as an electronic relay; stops or passes current depending on the voltage applied at ”base”.

WIRES



(1) NOT CONNECTED

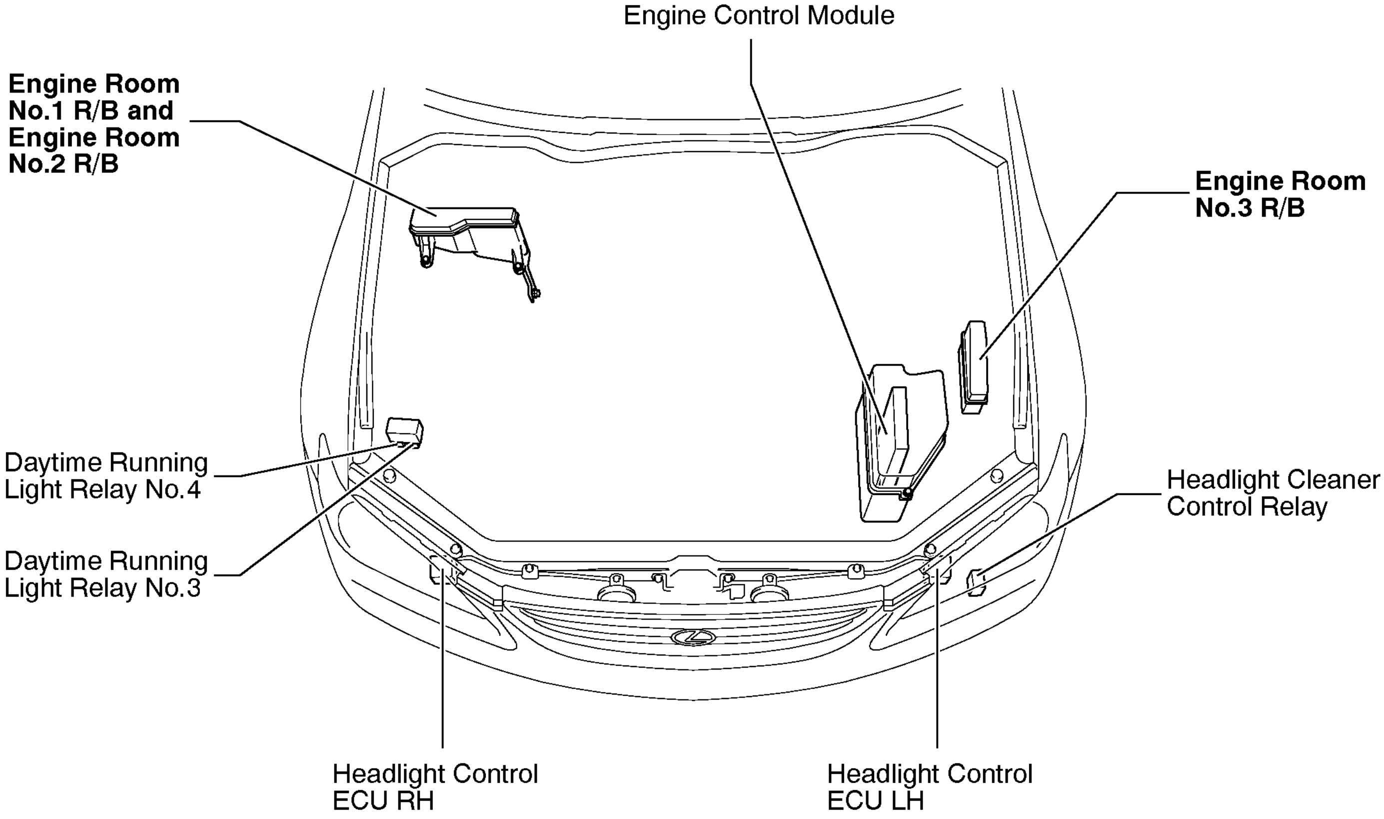


(2) SPLICED

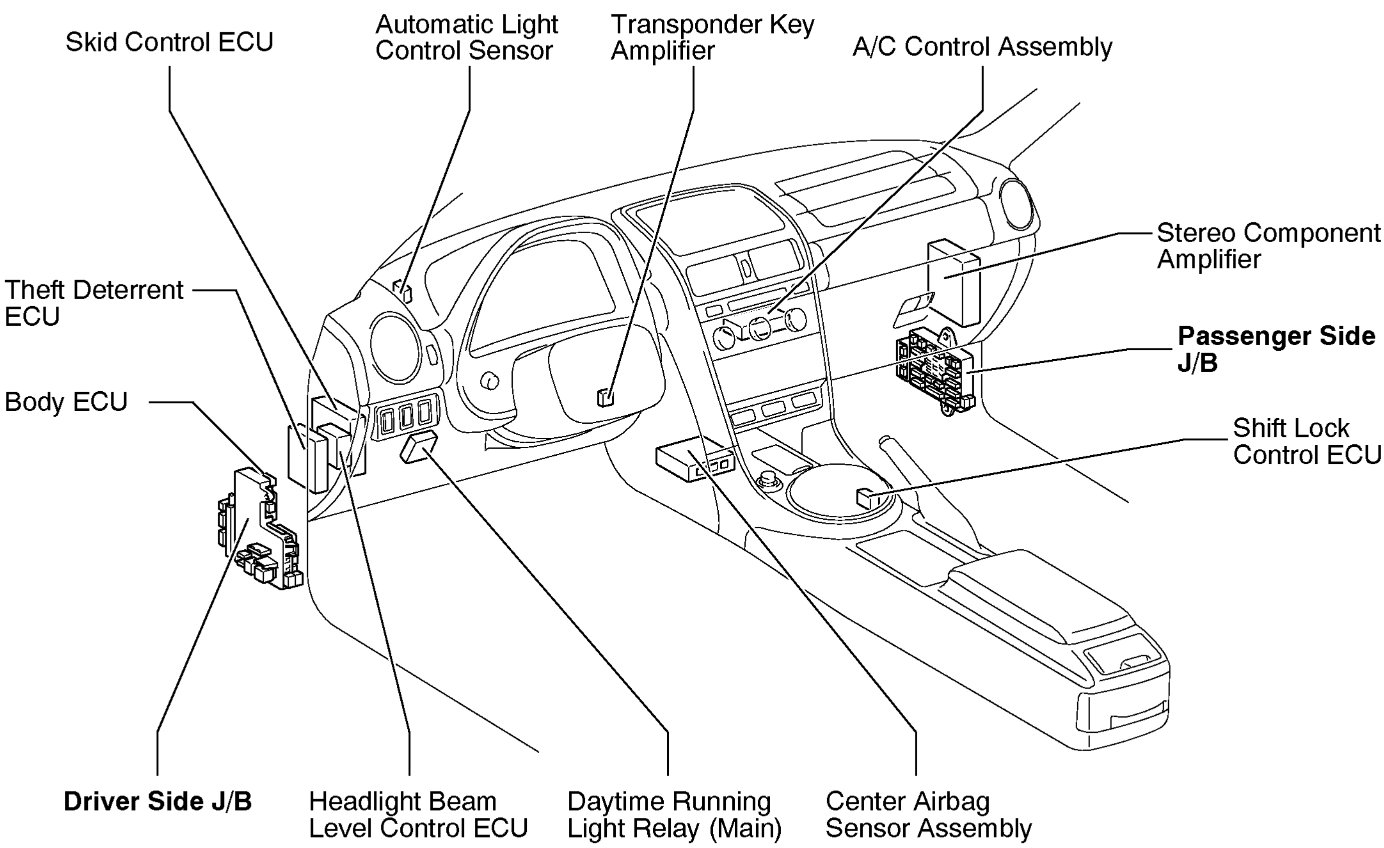
Wires are always drawn as straight lines on wiring diagrams.
Crossed wires (1) without a black dot at the junction are not joined;
crossed wires (2) with a black dot or octagonal ( ) mark at the junction are spliced (joined) connections.

F RELAY LOCATIONS

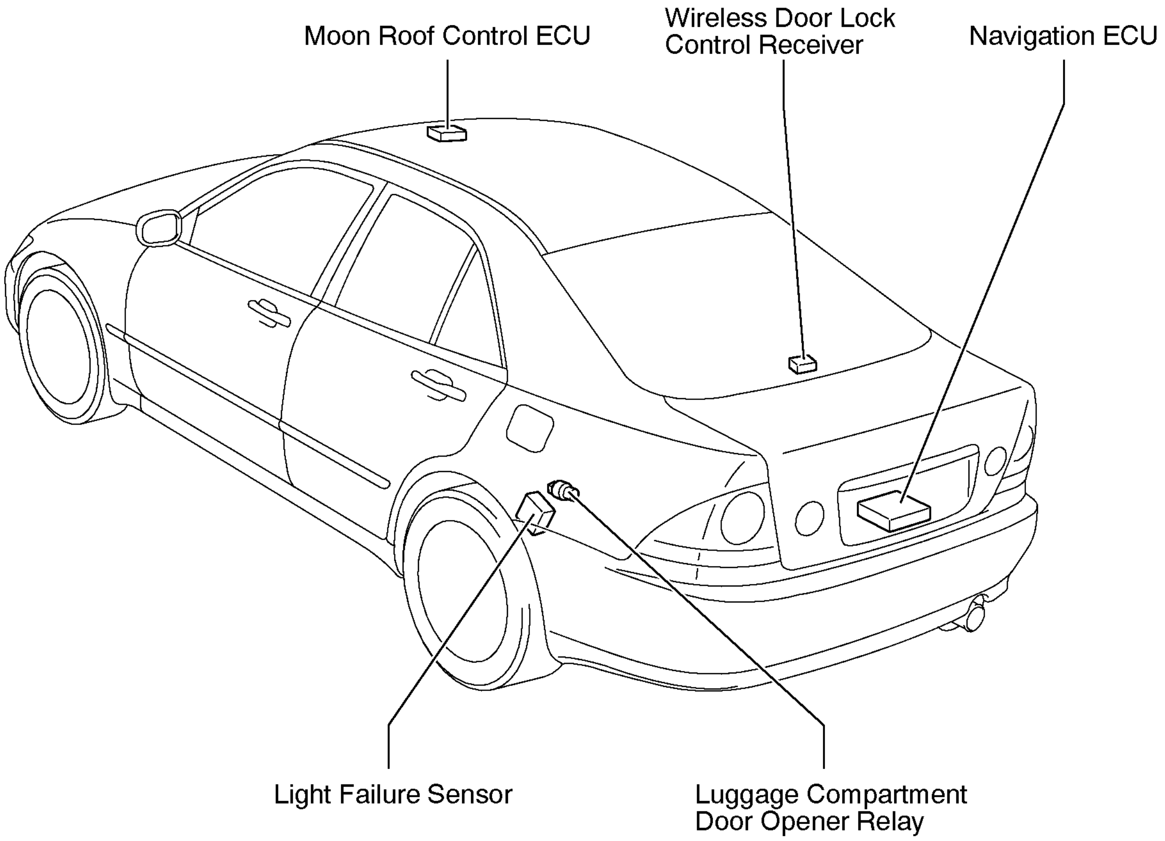
[Engine Compartment]



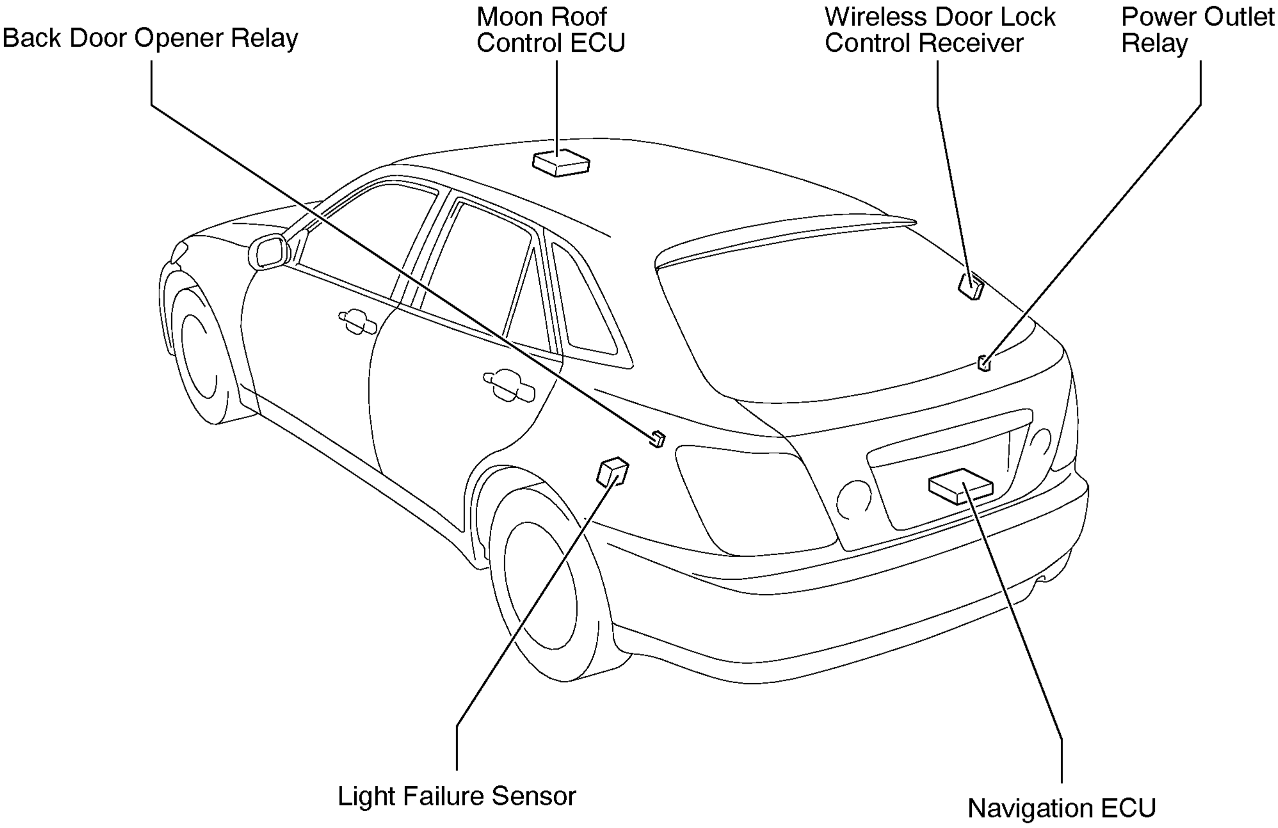
[Instrument Panel]



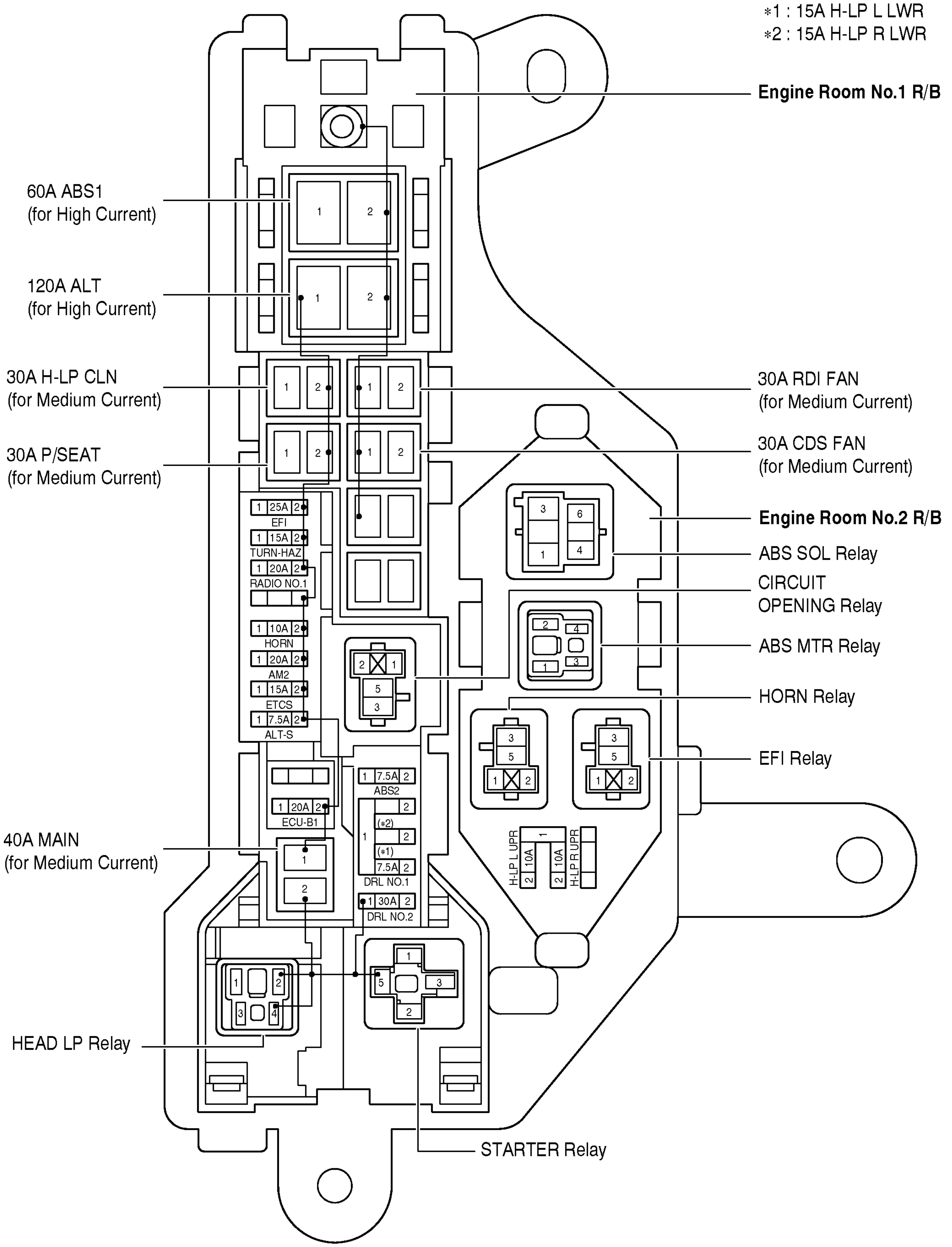
[Body]
(S/D)


Moon Roof Control ECU
Wireless Door Lock Control Receiver
Navigation ECU
Light Failure Sensor
Luggage Compartment Door Opener Relay

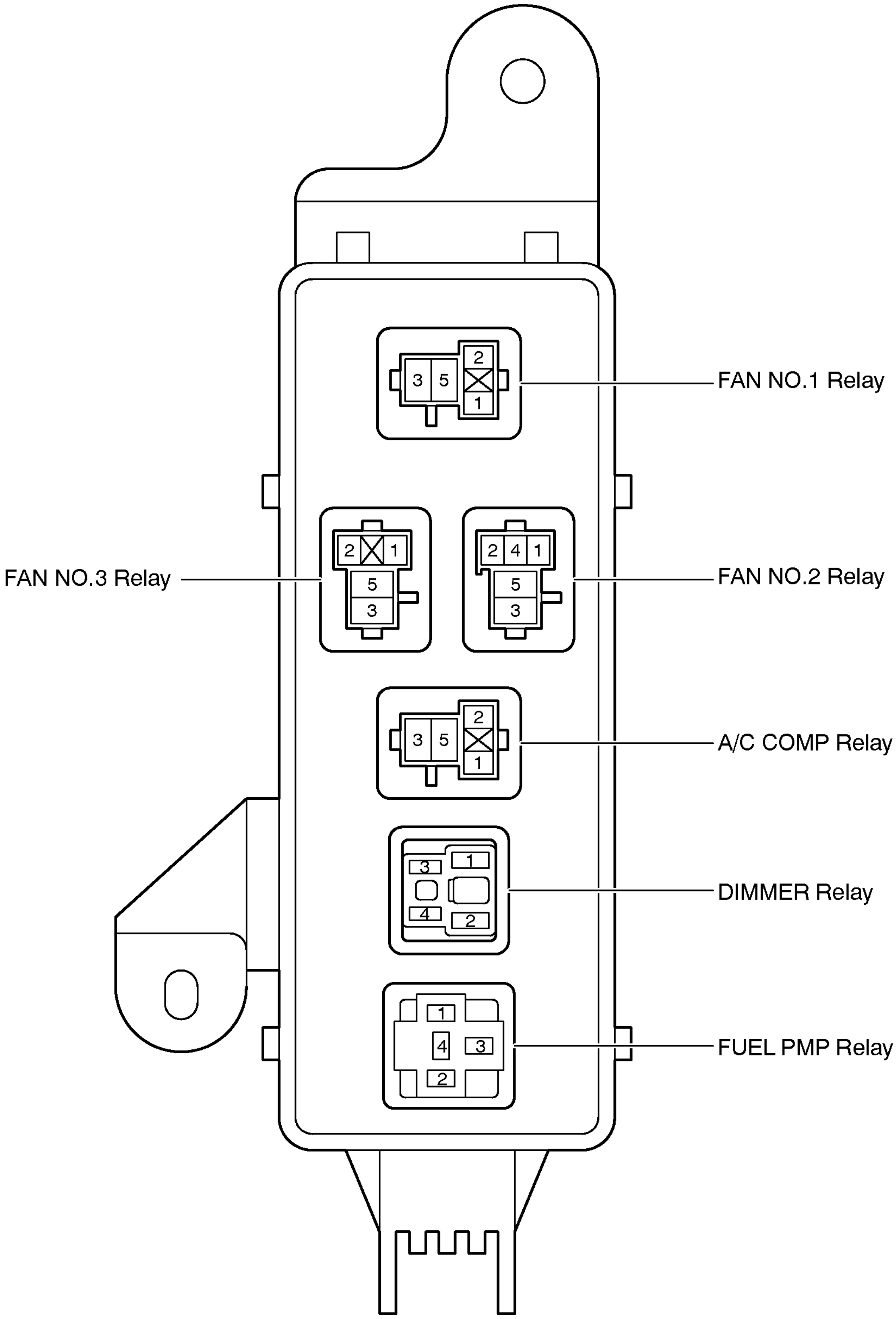
(W/G)


Back Door Opener Relay
Moon Roof Control ECU
Wireless Door Lock Control Receiver
Power Outlet Relay
Light Failure Sensor
Navigation ECU

① : Engine Room No.1 R/B ② : Engine Room No.2 R/B	Engine Compartment Right (See Page 20)

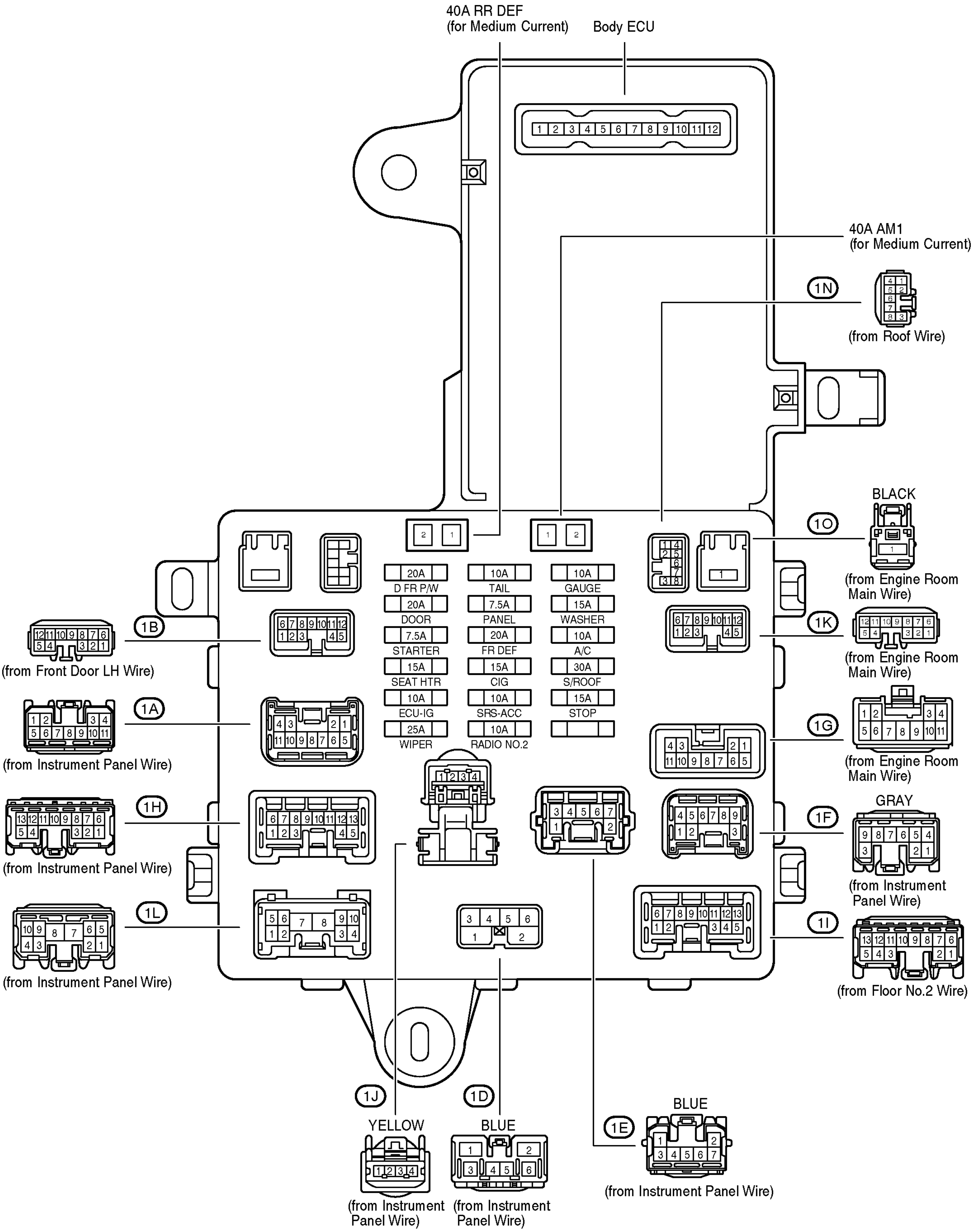


③ : Engine Room No.3 R/B	Engine Compartment Left (See Page 20)

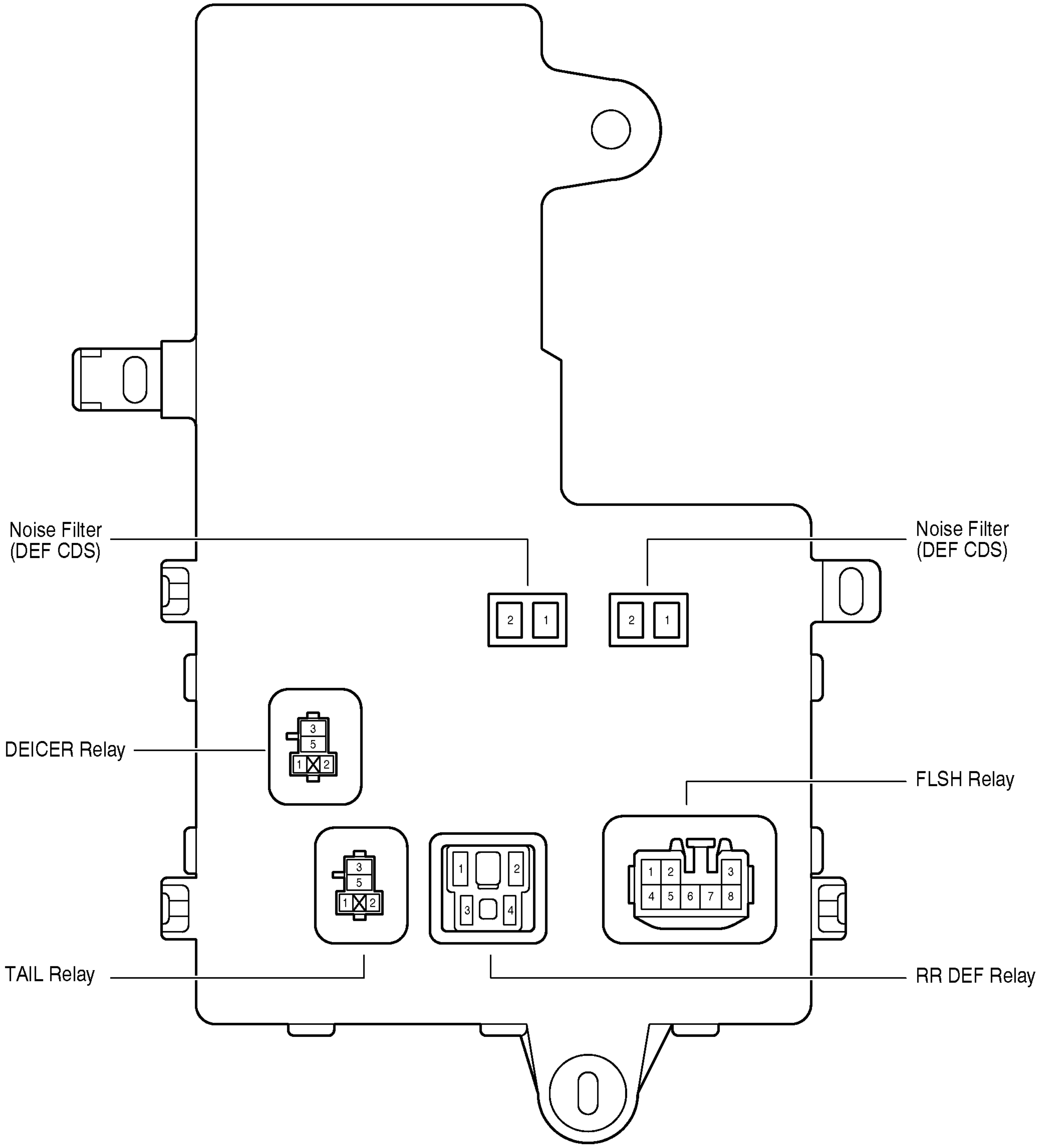


F RELAY LOCATIONS

: Driver Side J/B	Left Kick Panel (See Page 20)

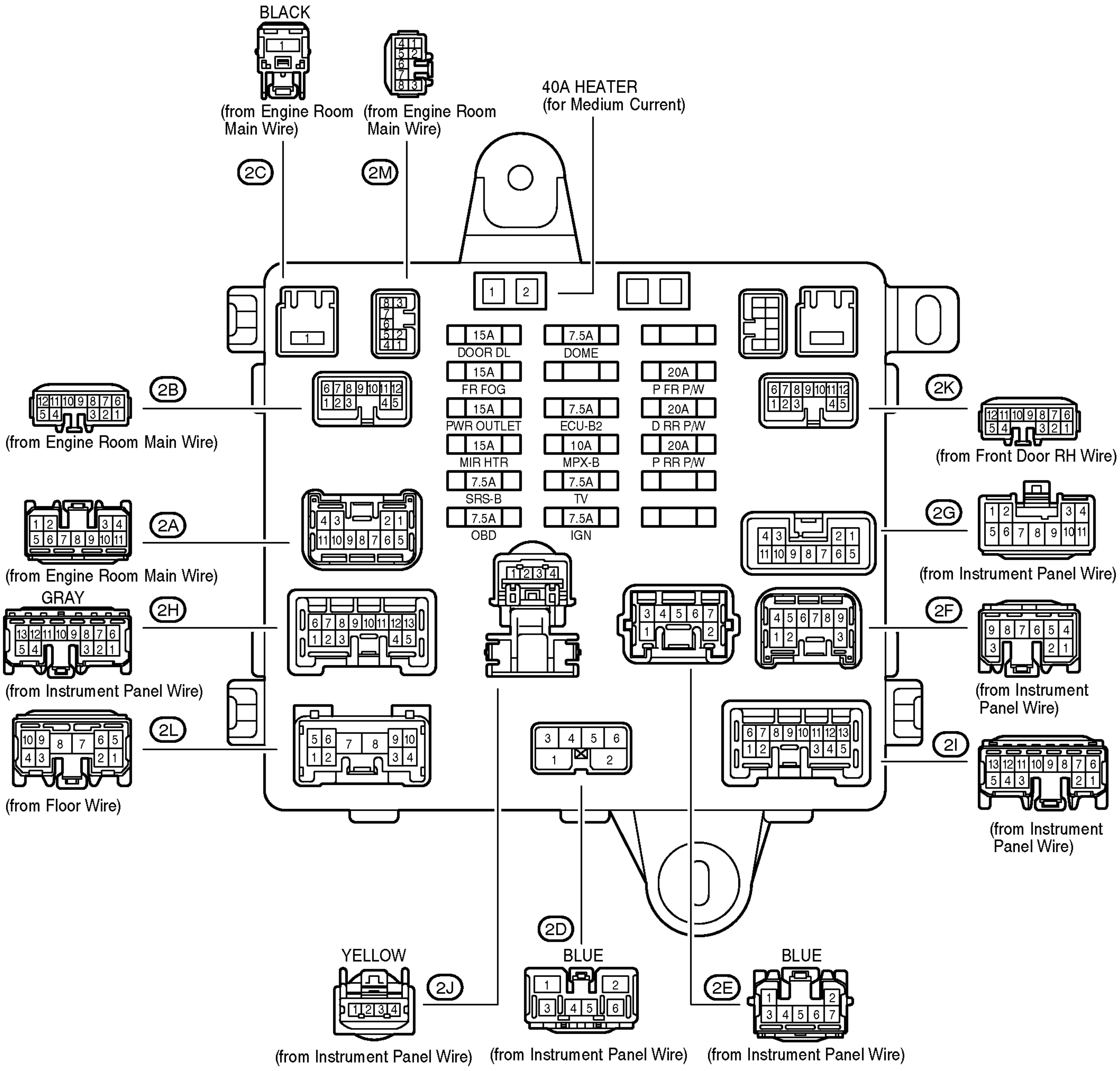


(Inner Circuit : See Page 28)

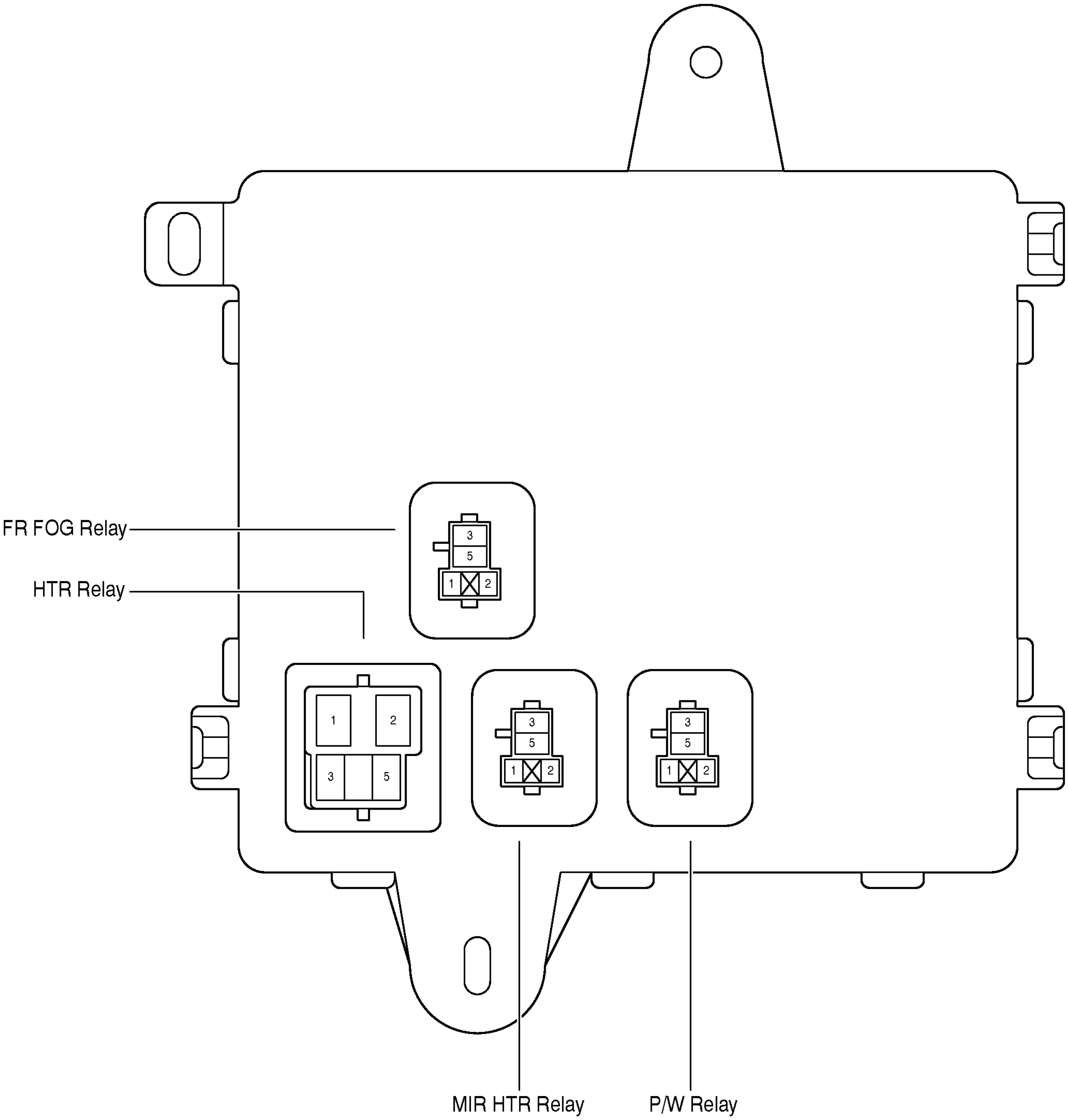


F RELAY LOCATIONS

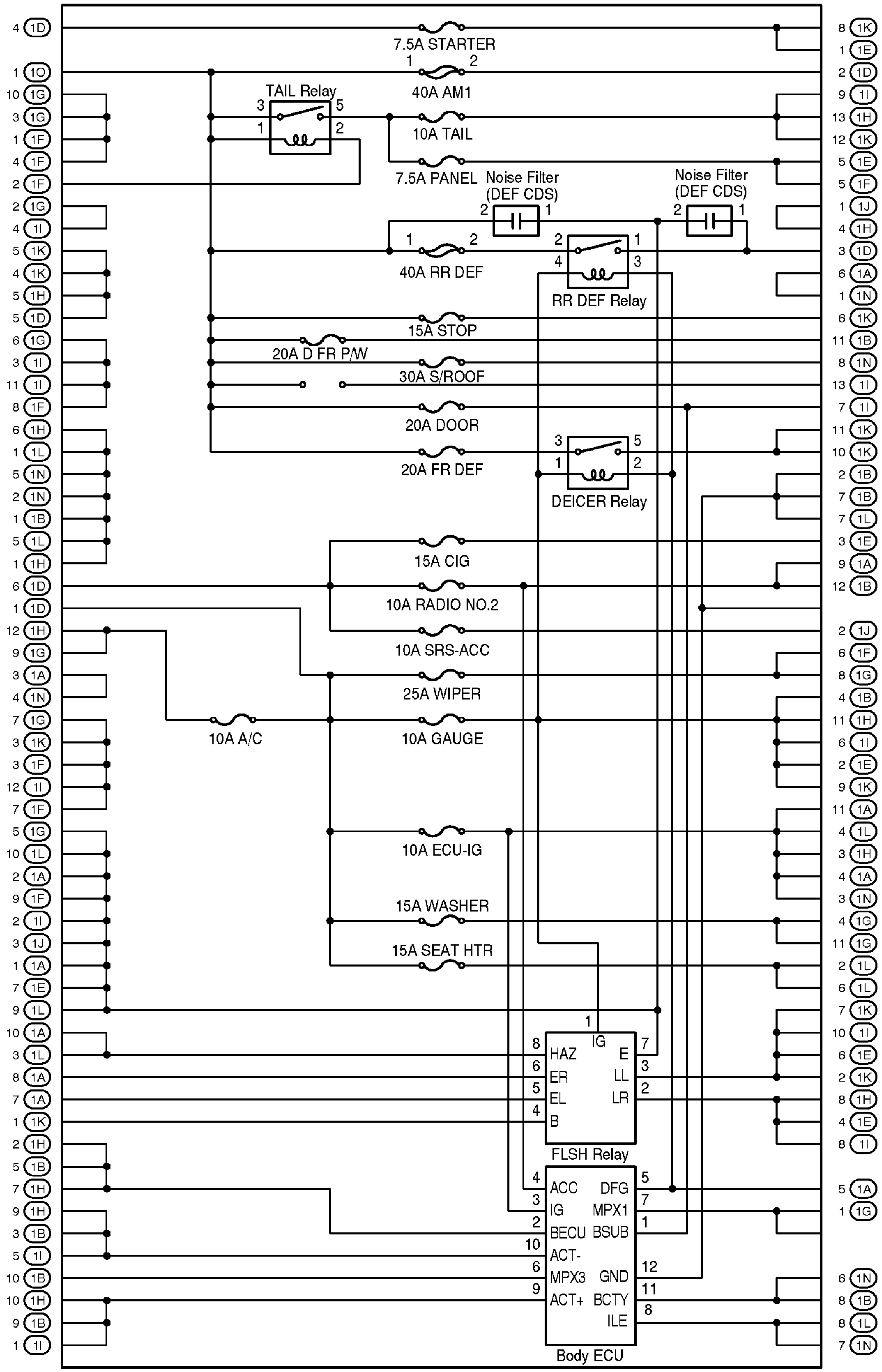
: Passenger Side J/B	Right Kick Panel (See Page 20)



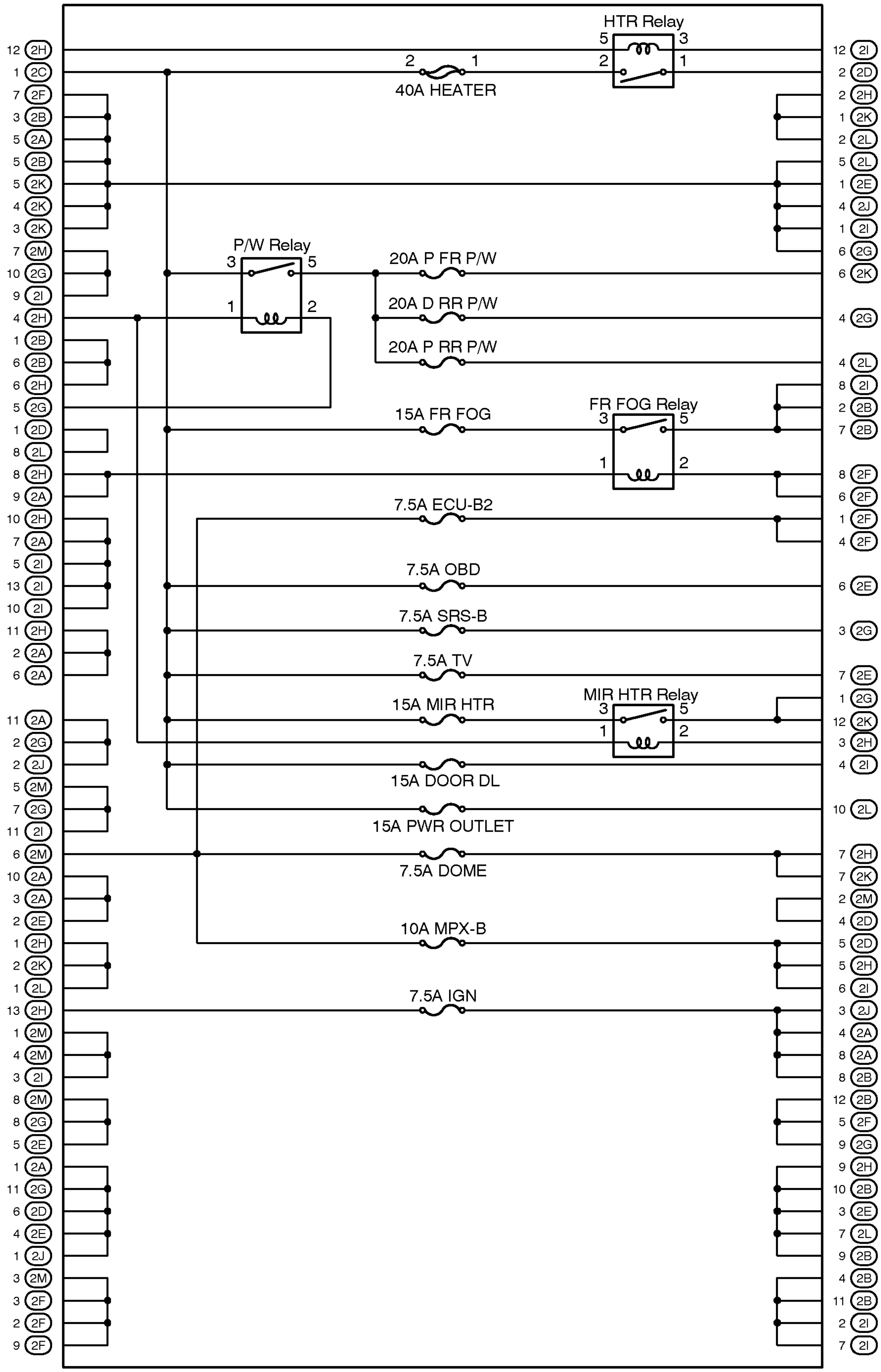
(Inner Circuit : See Page 29)



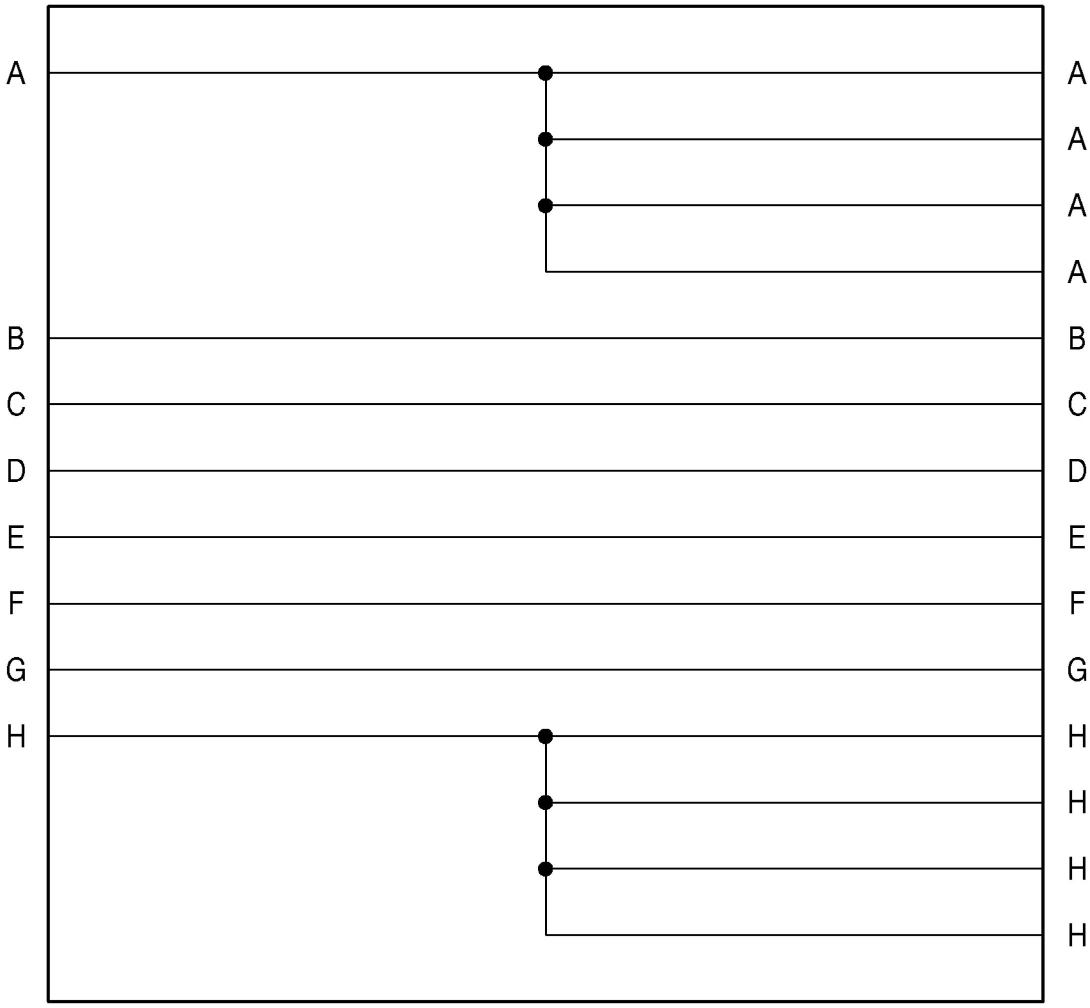
[Driver Side J/B Inner Circuit]



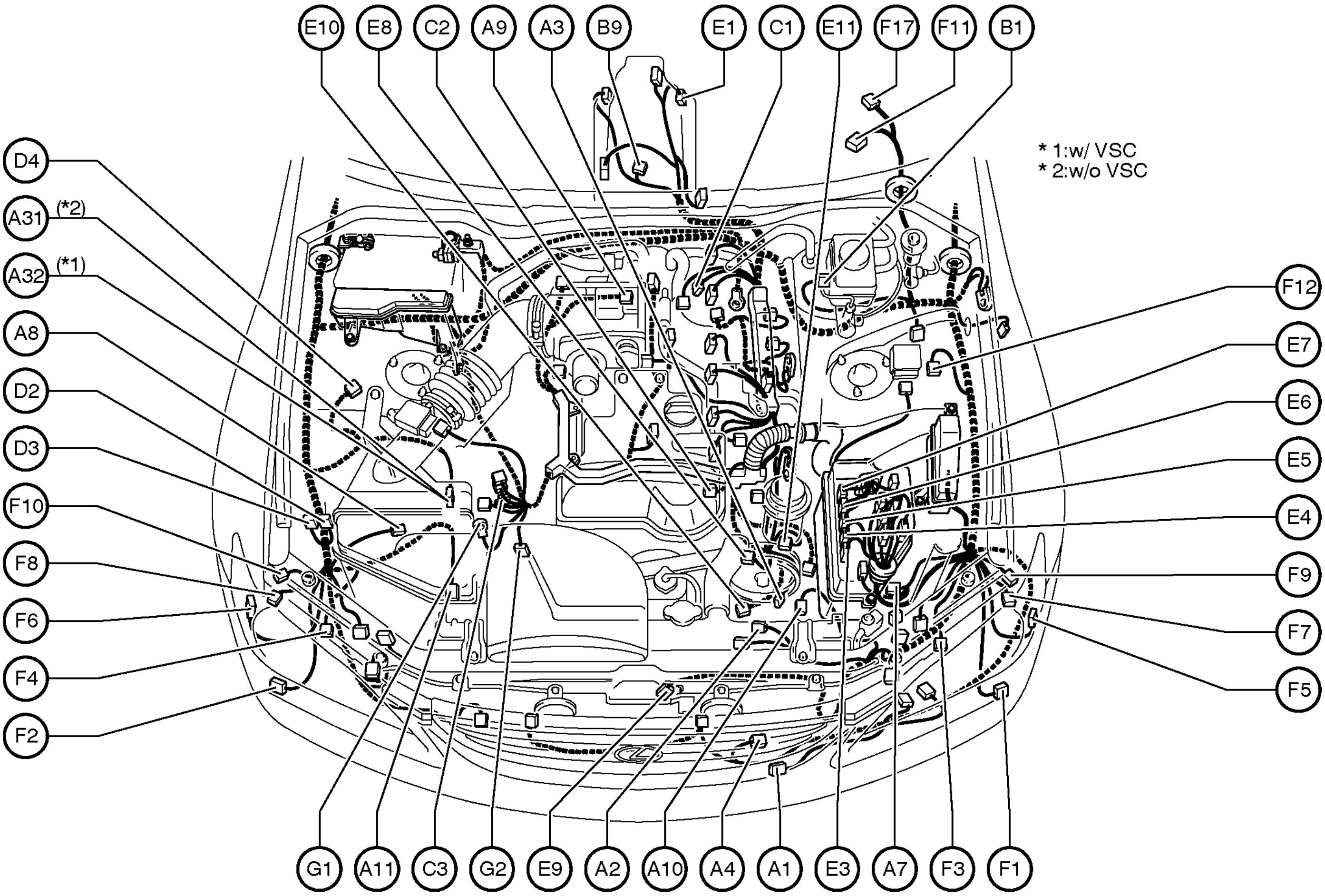
[Passenger Side J/B Inner Circuit]



[W4 : Wire to FFC Holder Inner Circuit]



Position of Parts in Engine Compartment



A 1 A/C Ambient Temp. Sensor
A 2 A/C Condenser Fan Motor
A 3 A/C Magnetic Clutch and Lock Sensor
A 4 A/C Triple Pressure SW
(A/C Dual and Single Pressure SW)
A 7 ABS Speed Sensor Front LH
A 8 ABS Speed Sensor Front RH
A 9 Accel Position Sensor
A10 Airbag Sensor Front LH
A11 Airbag Sensor Front RH
A31 ABS & BA & TRAC Actuator
A32 ABS & BA & TRAC & VSC Actuator

B 1 Brake Fluid Level Warning SW
B 9 Back–Up Light SW

C 1 Camshaft Position Sensor
C 2 Camshaft Timing Oil Control Valve
C 3 Crankshaft Position Sensor

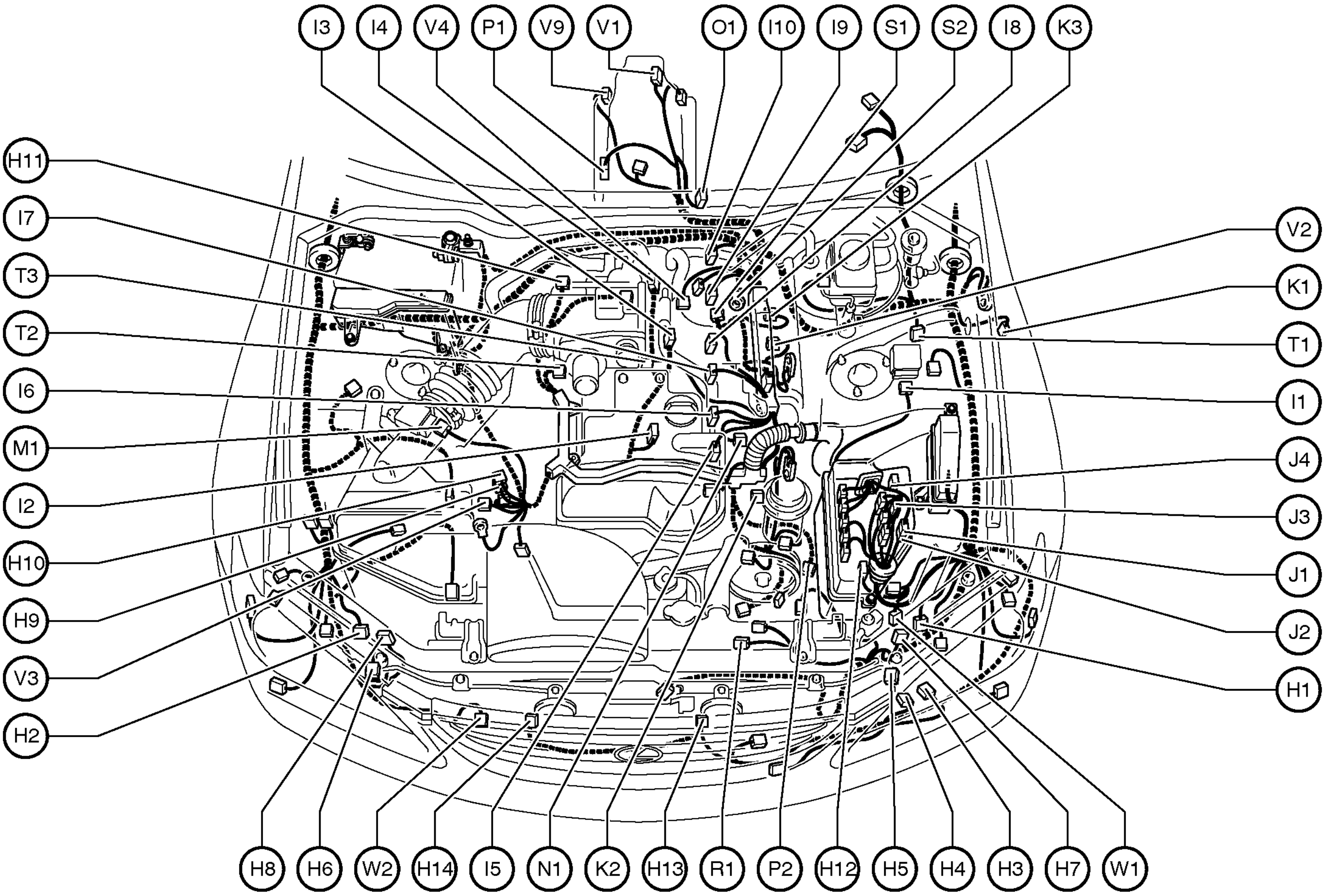
D 2 Daytime Running Light Relay No.3
D 3 Daytime Running Light Relay No.4
D 4 Daytime Running Light Resistor

E 1 Electronically Controlled Transmission Solenoid
E 3 Engine Control Module
E 4 Engine Control Module
E 5 Engine Control Module
E 6 Engine Control Module
E 7 Engine Control Module
E 8 Engine Coolant Temp. Sensor
E 9 Engine Hood Courtesy SW
E10 Engine Oil Level Sensor
E11 Engine Oil Pressure SW

F 1 Front Fog Light LH
F 2 Front Fog Light RH
F 3 Front Parking Light LH
F 4 Front Parking Light RH
F 5 Front Side Marker Light LH
F 6 Front Side Marker Light RH
F 7 Front Side Turn Signal Light LH
F 8 Front Side Turn Signal Light RH
F 9 Front Turn Signal Light LH
F10 Front Turn Signal Light RH
F11 Front Wiper Motor
F12 Fuel Pump Resistor
F17 Front Window Deicer

G 1 Generator
G 2 Generator

Position of Parts in Engine Compartment



H 1 Headlight Beam Level Control Actuator LH
H 2 Headlight Beam Level Control Actuator RH
H 3 Headlight Cleaner Control Relay
H 4 Headlight Cleaner Motor
H 5 Headlight Control ECU LH
H 6 Headlight Control ECU RH
H 7 Headlight LH (High)
H 8 Headlight RH (High)
H 9 Heated Oxygen Sensor (Bank 1 Sensor 1)
H10 Heated Oxygen Sensor (Bank 1 Sensor 2)
H11 Heated Oxygen Sensor (Bank 2 Sensor 1)
H12 Height Control Sensor Front LH
H13 Horn LH
H14 Horn RH

I 1 Igniter
I 2 Ignition Coil No.1
I 3 Ignition Coil No.2
I 4 Ignition Coil No.3
I 5 Injector No.1
I 6 Injector No.2
I 7 Injector No.3
I 8 Injector No.4
I 9 Injector No.5
I 10 Injector No.6

J 1 Junction Connector
J 2 Junction Connector
J 3 Junction Connector
J 4 Junction Connector

K 1 Keyless Buzzer
K 2 Knock Sensor 1
K 3 Knock Sensor 2

M 1 Mass Air Flow Meter

N 1 Noise Filter (Ignition)

O 1 O/D Direct Clutch Speed Sensor

P 1 Park/Neutral Position SW
P 2 Power Steering Oil Pressure Sensor

R 1 Radiator Fan Motor

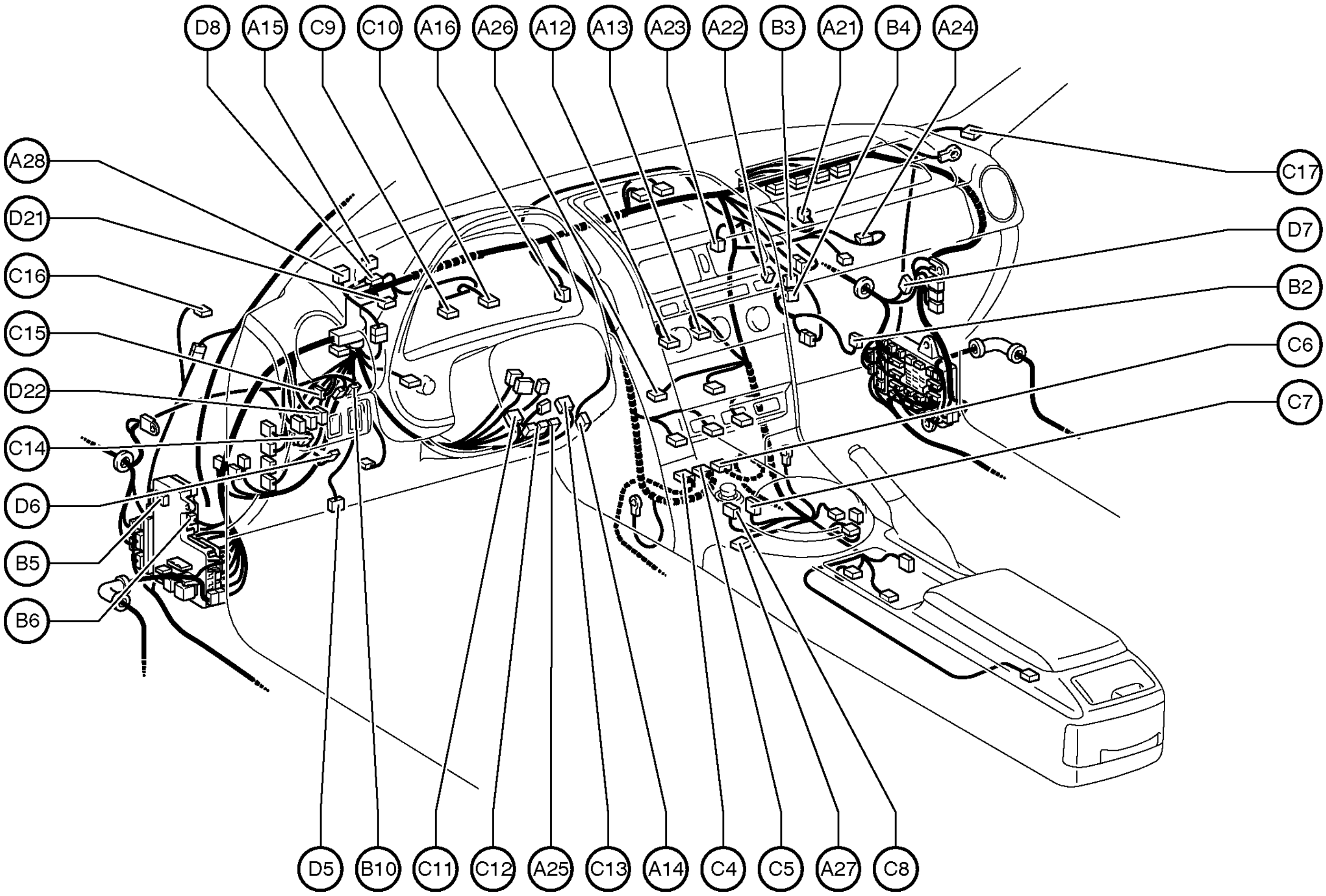
S 1 Starter
S 2 Starter

T 1 Theft Deterrent Horn
T 2 Throttle Control Motor
T 3 Throttle Position Sensor

V 1 Vehicle Speed Sensor (Electronically Controlled Transmission)
V 2 VSV (ACIS)
V 3 VSV (Canister Closed Valve)
V 4 VSV (EVAP)
V 9 Vehicle Speed Sensor (Combination Meter)

W 1 Washer Motor
W 2 Water Temp. SW

Position of Parts in Instrument Panel



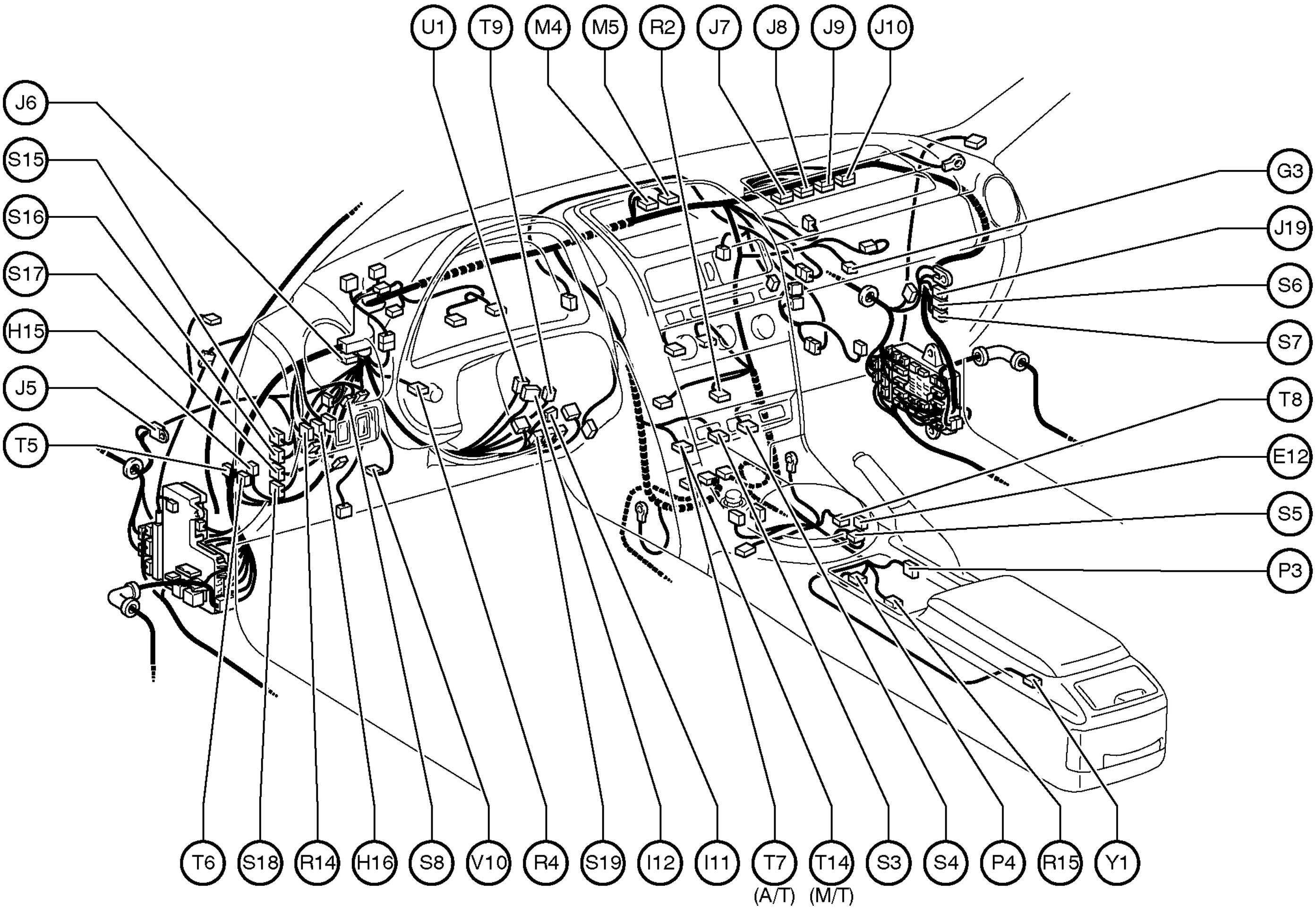
A12 A/C Control Assembly
A13 A/C Control Assembly
A14 A/C Room Temp. Sensor
A15 A/C Solar Sensor
A16 A/C Thermistor
A21 Air Inlet Control Servo Motor
A22 Air Mix Control Servo Motor
A23 Air Vent Mode Control Servo Motor
A24 Airbag Squib (Front Passenger Airbag Assembly)
A25 Airbag Squib (Steering Wheel Pad)
A26 Antenna Amplifier
A27 Ashtray Illumination
A28 Automatic Light Control Sensor

B 2 Blower Motor
B 3 Blower Motor Controller
B 4 Blower Motor Controller
B 5 Body ECU
B 6 Body ECU
B10 Brake Pedal Load Sensing SW

C 4 Center Airbag Sensor Assembly
C 5 Center Airbag Sensor Assembly
C 6 Center Airbag Sensor Assembly
C 7 Cigarette Lighter
C 8 Cigarette Lighter Illumination
C 9 Combination Meter
C10 Combination Meter
C11 Combination SW
C12 Combination SW
C13 Combination SW
C14 Clutch Start SW
C15 Cruise Control Clutch SW
C16 Curtain Shield Airbag Squib LH
C17 Curtain Shield Airbag Squib RH

D 5 Data Link Connector 3
D 6 Daytime Running Light Relay (Main)
D 7 Diode (A/C)
D 8 Diode (Headlight Cleaner)
D21 Diode (Fog Light)
D22 Driver’s Position Memory SW

Position of Parts in Instrument Panel



E12 Electronically Controlled Transmission Pattern Select SW

G 3 Glove Box Light

H15 Headlight Beam Level Control ECU
H16 Headlight Cleaner SW

I 11 Ignition Key Cylinder Light
I 12 Ignition SW

J 5 Junction Connector
J 6 Junction Connector
J 7 Junction Connector
J 8 Junction Connector
J 9 Junction Connector
J 10 Junction Connector
J 19 Junction Connector

M 4 Multi–Display
M 5 Multi–Display

P 3 Parking Brake SW
P 4 Power Outlet

R 2 Radio and Player
R 4 Rheostat
R14 Rear Fog Light SW
R15 Remote Controller (Navigation)

S 3 Seat Heater SW (Driver's Seat)
S 4 Seat Heater SW (Front Passenger's Seat)
S 5 Shift Lock Control ECU
S 6 Stereo Component Amplifier
S 7 Stereo Component Amplifier
S 8 Stop Light SW
S15 Skid Control ECU
S16 Skid Control ECU
S17 Skid Control ECU
S18 Skid Control ECU
S19 Steering Sensor

T 5 Theft Deterrent ECU
T 6 Theft Deterrent ECU
T 7 TRAC Off SW
T 8 Transmission Control SW (L–2)
T 9 Transponder Key Amplifier
T14 TRAC Off SW and SNOW SW

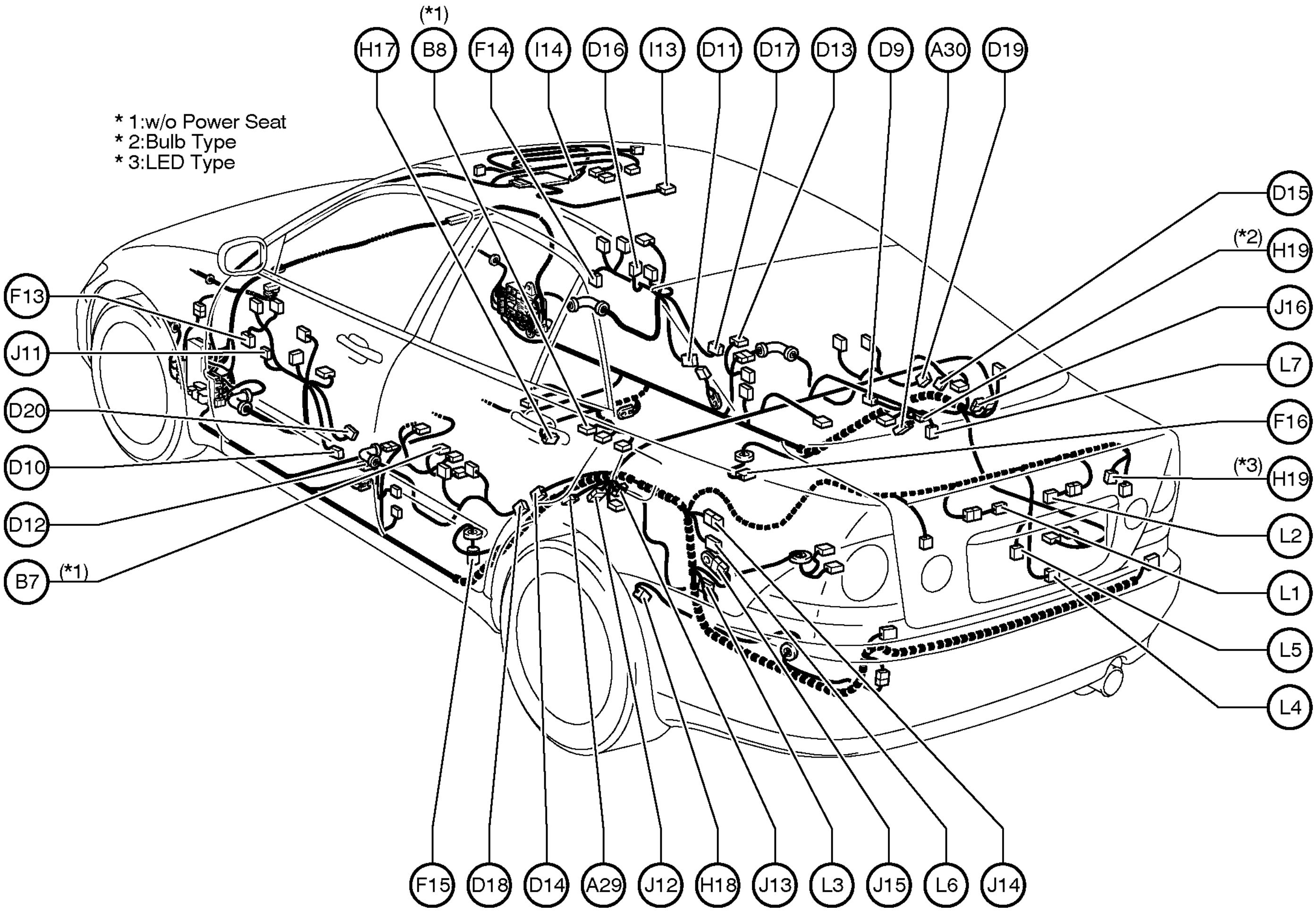
U 1 Unlock Warning SW

V10 VSC Warning Buzzer

Y 1 Yaw Rate Sensor

Position of Parts in Body

[S/D]



A29 ABS Speed Sensor Rear LH
A30 ABS Speed Sensor Rear RH

B 7 Buckle SW LH
B 8 Buckle SW RH and
Seat Belt Warning Occupant Detection Sensor

D 9 Diode (Luggage Compartment Light)
D10 Door Courtesy Light Front LH
D11 Door Courtesy Light Front RH
D12 Door Courtesy SW Front LH
D13 Door Courtesy SW Front RH
D14 Door Courtesy SW Rear LH
D15 Door Courtesy SW Rear RH
D16 Door Lock Control SW RH
D17 Door Lock Motor and Door Lock Detection SW Front RH
D18 Door Lock Motor and Door Lock Detection SW Rear LH
D19 Door Lock Motor and Door Lock Detection SW Rear RH
D20 Door Lock Motor,Door Key Lock and Unlock SW and
Door Lock Detection SW Front LH

F 13 Front Door Speaker LH
F 14 Front Door Speaker RH
F 15 Fuel Pump and Sender
F 16 Fuel Sender (Sub)

H17 Heated Oxygen Sensor (Bank 2 Sensor 2)
H18 Height Control Sensor Rear LH
H19 High Mounted Stop Light

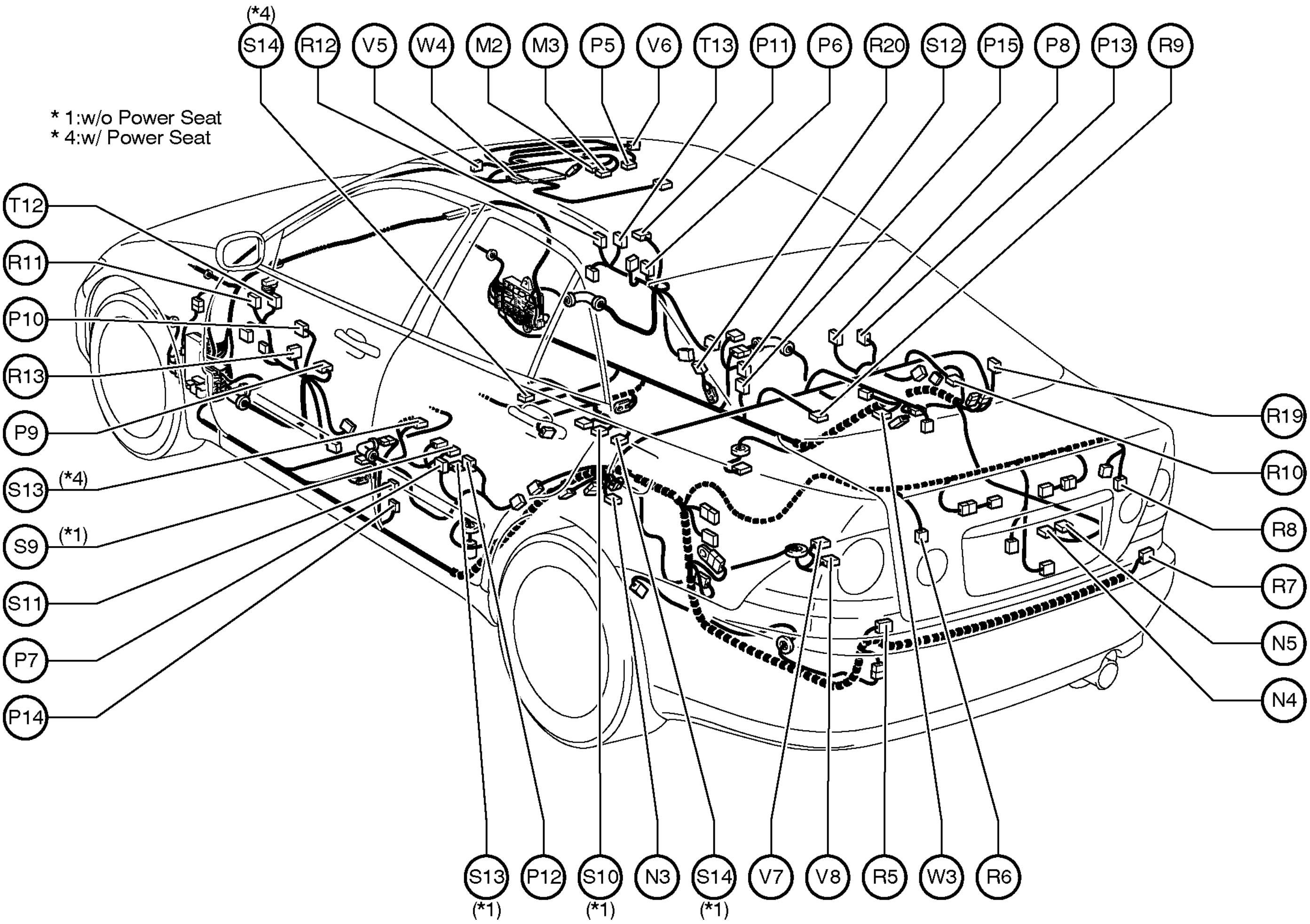
I 13 Interior Light
I 14 Inner Mirror

J 11 Junction Connector
J 12 Junction Connector
J 13 Junction Connector
J 14 Junction Connector
J 15 Junction Connector
J 16 Junction Connector

L 1 License Plate Light LH
L 2 License Plate Light RH
L 3 Light Failure Sensor
L 4 Luggage Compartment Door Courtesy SW and
Opener Motor
L 5 Luggage Compartment Door Key Unlock SW
L 6 Luggage Compartment Door Opener Relay
L 7 Luggage Compartment Light

Position of Parts in Body

[S/D]



M 2 Moon Roof Control ECU
M 3 Moon Roof Control SW

N 3 Noise Filter (Stop Light)
N 4 Navigation ECU
N 5 Navigation ECU

P 5 Personal Light
P 6 Power Window Control SW Front RH
P 7 Power Window Control SW Rear LH
P 8 Power Window Control SW Rear RH
P 9 Power Window Master SW
P10 Power Window Motor Front LH
P11 Power Window Motor Front RH
P12 Power Window Motor Rear LH
P13 Power Window Motor Rear RH
P14 Pretensioner LH
P15 Pretensioner RH

R 5 Rear Combination Light LH
R 6 Rear Combination Light LH
R 7 Rear Combination Light RH
R 8 Rear Combination Light RH
R 9 Rear Speaker and Woofer LH
R10 Rear Speaker and Woofer RH
R11 Remote Control Mirror LH
R12 Remote Control Mirror RH
R13 Remote Control Mirror SW
R19 Rear Window Defogger
R20 Rear Window Defogger

S 9 Seat Heater (Driver's Seat)
S10 Seat Heater (Front Passenger's Seat)
S11 Side Airbag Sensor LH
S12 Side Airbag Sensor RH
S13 Side Airbag Squib LH
S14 Side Airbag Squib RH

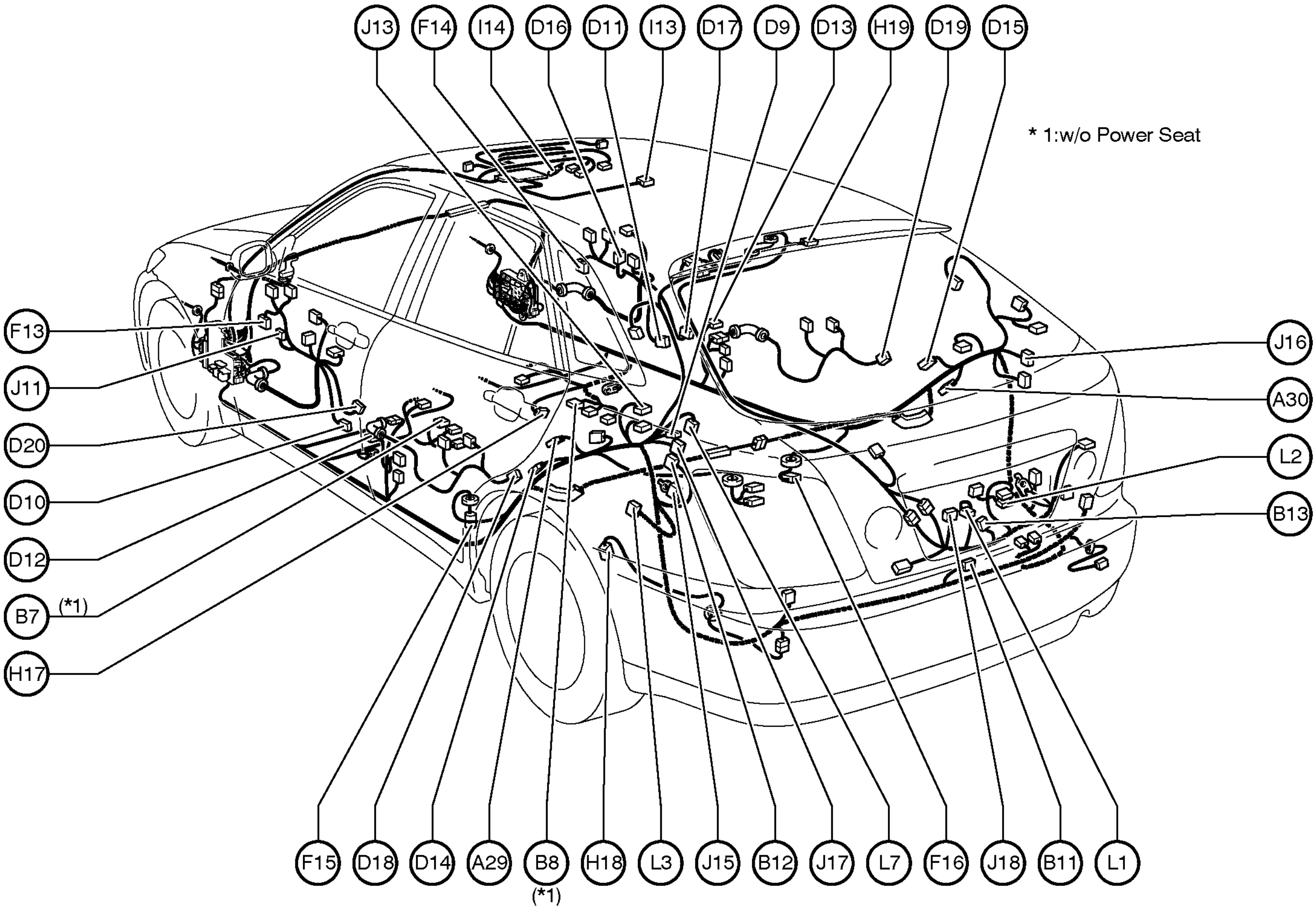
T12 Tweeter LH
T13 Tweeter RH

V 5 Vanity Light LH
V 6 Vanity Light RH
V 7 Vapor Pressure Sensor
V 8 VSV (Pressure Switching Valve)

W 3 Wireless Door Lock Control Receiver
W 4 Wire to FFC Holder

Position of Parts in Body

[W/G]



A29 ABS Speed Sensor Rear LH
A30 ABS Speed Sensor Rear RH

B 7 Buckle SW LH
B 8 Buckle SW RH and
Seat Belt Warning Occupant Detection Sensor
B11 Back Door Courtesy SW and Opener Motor
B12 Back Door Opener Relay
B13 Back Door Opener SW

D 9 Diode (Luggage Compartment Light)
D10 Door Courtesy Light Front LH
D11 Door Courtesy Light Front RH
D12 Door Courtesy SW Front LH
D13 Door Courtesy SW Front RH
D14 Door Courtesy SW Rear LH
D15 Door Courtesy SW Rear RH
D16 Door Lock Control SW RH
D17 Door Lock Motor and Door Lock Detection SW Front RH
D18 Door Lock Motor and Door Lock Detection SW Rear LH
D19 Door Lock Motor and Door Lock Detection SW Rear RH
D20 Door Lock Motor,Door Key Lock and Unlock SW and
Door Lock Detection SW Front LH

F13 Front Door Speaker LH
F14 Front Door Speaker RH
F15 Fuel Pump and Sender
F16 Fuel Sender (Sub)

H17 Heated Oxygen Sensor (Bank 2 Sensor 2)
H18 Height Control Sensor Rear LH
H19 High Mounted Stop Light

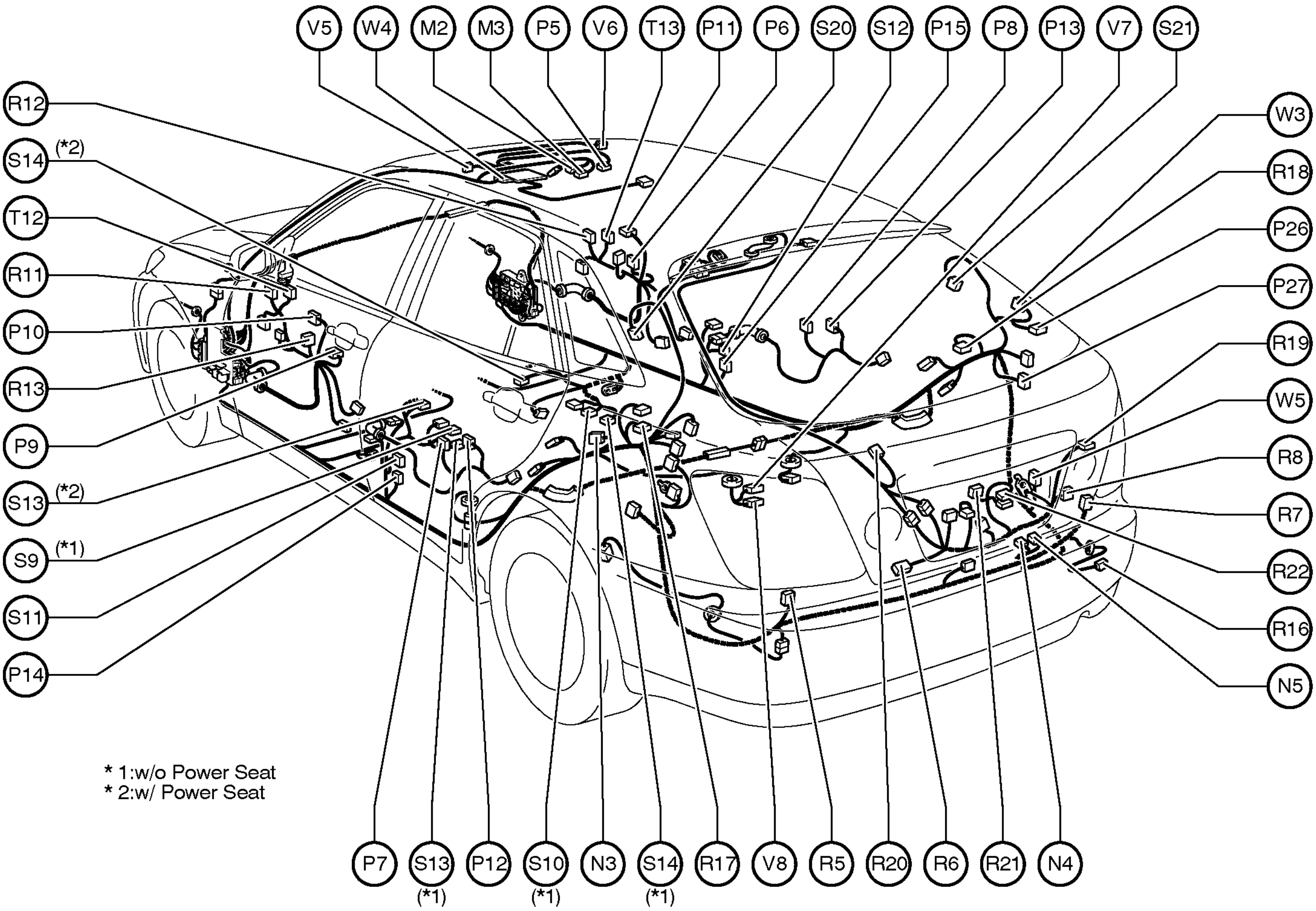
I 13 Interior Light
I 14 Inner Mirror

J 11 Junction Connector
J 13 Junction Connector
J 15 Junction Connector
J 16 Junction Connector
J 17 Junction Connector
J 18 Junction Connector

L 1 License Plate Light LH
L 2 License Plate Light RH
L 3 Light Failure Sensor
L 7 Luggage Compartment Light

Position of Parts in Body

[W/G]



M 2 Moon Roof Control ECU
M 3 Moon Roof Control SW

N 3 Noise Filter (Stop Light)
N 4 Navigation ECU
N 5 Navigation ECU

P 5 Personal Light
P 6 Power Window Control SW Front RH
P 7 Power Window Control SW Rear LH
P 8 Power Window Control SW Rear RH
P 9 Power Window Master SW
P10 Power Window Motor Front LH
P11 Power Window Motor Front RH
P12 Power Window Motor Rear LH
P13 Power Window Motor Rear RH
P14 Pretensioner LH
P15 Pretensioner RH
P26 Power Outlet (Luggage)
P27 Power Outlet Relay

R 5 Rear Combination Light LH
R 6 Rear Combination Light LH
R 7 Rear Combination Light RH
R 8 Rear Combination Light RH
R11 Remote Control Mirror LH
R12 Remote Control Mirror RH
R13 Remote Control Mirror SW

R16 Rear Side Marker Light
R17 Rear Speaker LH
R18 Rear Speaker RH
R19 Rear Window Defogger
R20 Rear Window Defogger
R21 Rear Wiper Motor
R22 Rear Wiper Motor

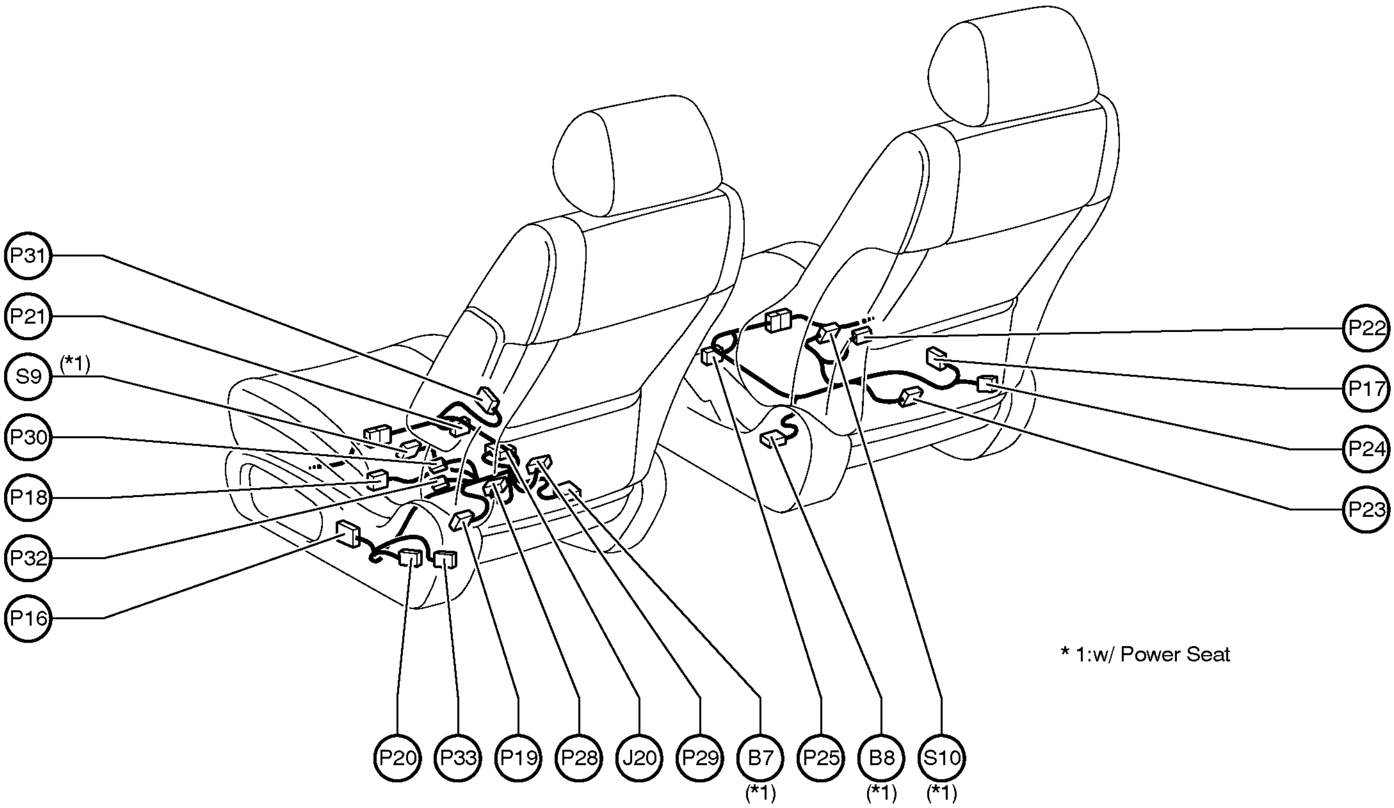
S 9 Seat Heater (Driver's Seat)
S10 Seat Heater (Front Passenger's Seat)
S11 Side Airbag Sensor LH
S12 Side Airbag Sensor RH
S13 Side Airbag Squib LH
S14 Side Airbag Squib RH
S20 Squawker LH
S21 Squawker RH

T12 Tweeter LH
T13 Tweeter RH

V 5 Vanity Light LH
V 6 Vanity Light RH
V 7 Vapor Pressure Sensor
V 8 VSV (Pressure Switching Valve)

W 3 Wireless Door Lock Control Receiver
W 4 Wire to FFC Holder
W 5 Woofer

Position of Parts in Seat



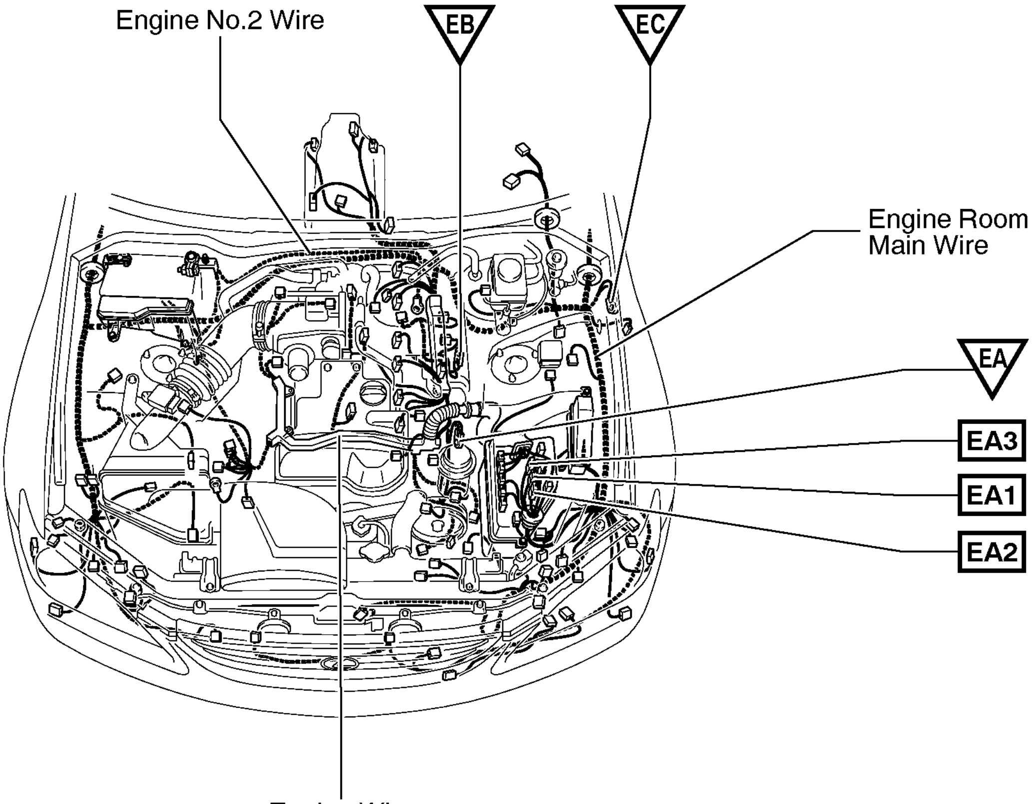
B 7 Buckle SW LH
B 8 Buckle SW RH and
Seat Belt Warning Occupant Detection Sensor

J 20 Junction Connector

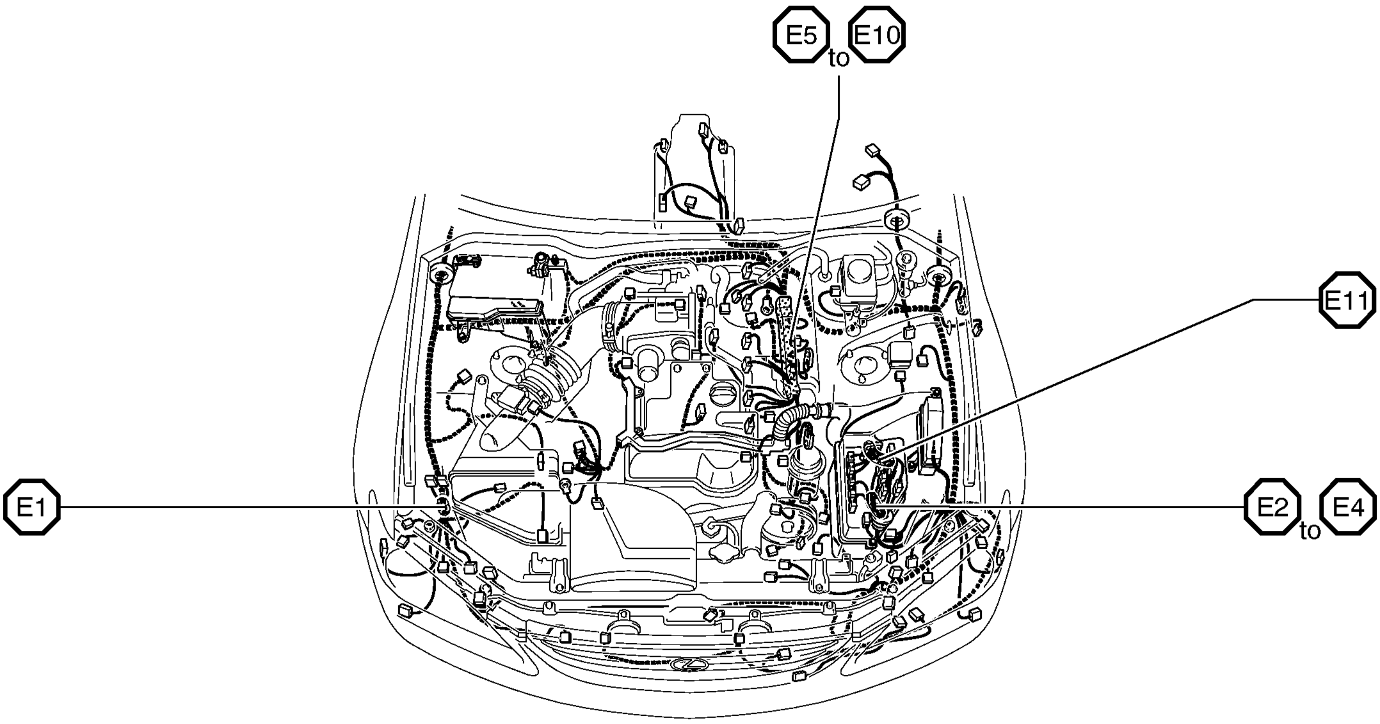
P 16 Power Seat Control SW (Driver's Seat)
P 17 Power Seat Control SW (Front Passenger's Seat)
P 18 Power Seat Motor (Driver's Seat Front Vertical Control)
P 19 Power Seat Motor (Driver's Seat Rear Vertical Control)
P 20 Power Seat Motor (Driver's Seat Reclining Control)
P 21 Power Seat Motor (Driver's Seat Slide Control)
P 22 Power Seat Motor
(Front Passenger's Seat Front Vertical Control)
P 23 Power Seat Motor
(Front Passenger's Seat Rear Vertical Control)
P 24 Power Seat Motor
(Front Passenger's Seat Reclining Control)
P 25 Power Seat Motor
(Front Passenger's Seat Slide Control)
P 28 Power Seat ECU
P 29 Power Seat ECU
P 30 Power Seat Position Sensor
(Driver's Seat Front Vertical Control)
P 31 Power Seat Position Sensor (Driver's Seat Slide Control)
P 32 Power Seat Position Sensor
(Driver's Seat Rear Vertical Control)
P 33 Power Seat Position Sensor
(Driver's Seat Reclining Control)

S 9 Seat Heater (Driver's Seat)
S 10 Seat Heater (Front Passenger's Seat)

▭	: Location of Connector Joining Wire Harness and Wire Harness
▽	: Location of Ground Points

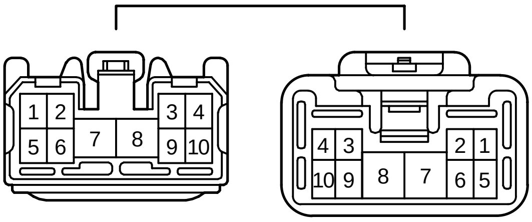


⬡ : Location of Splice Points

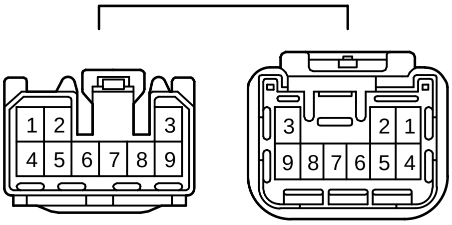


Connector Joining Wire Harness and Wire Harness

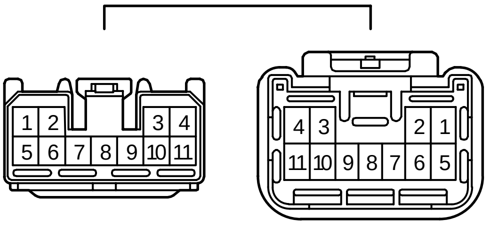
EA1 GRAY



EA2 BLUE

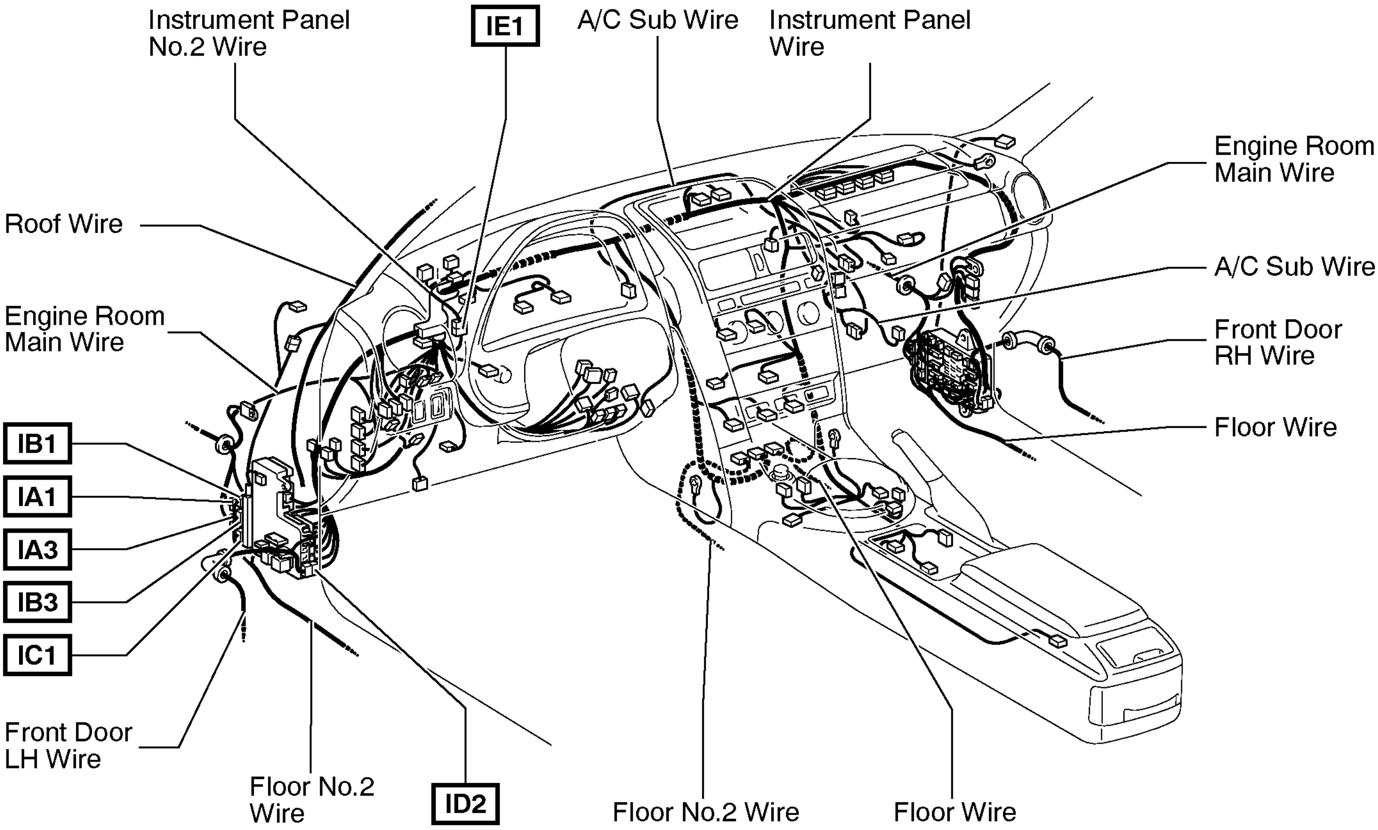


EA3

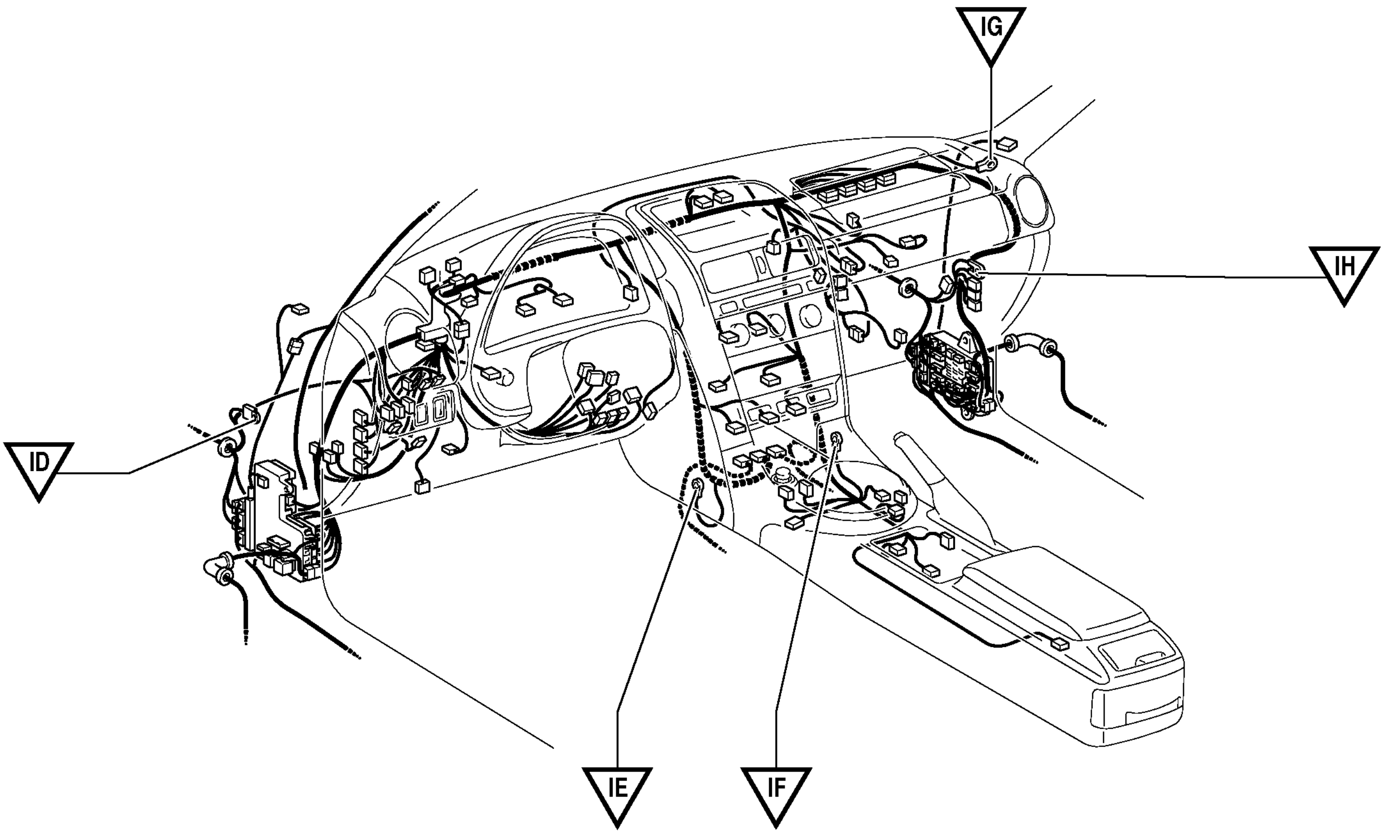


Code	Joining Wire Harness and Wire Harness (Connector Location)
EA1	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
EA2	
EA3	

☐ : Location of Connector Joining Wire Harness and Wire Harness

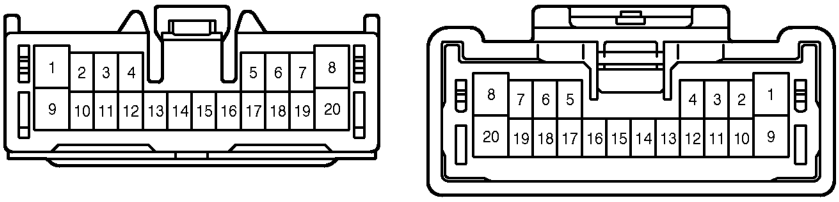


▽ : Location of Ground Points

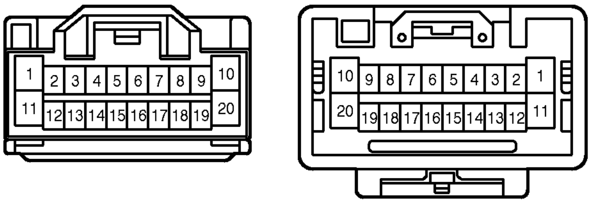


Connector Joining Wire Harness and Wire Harness

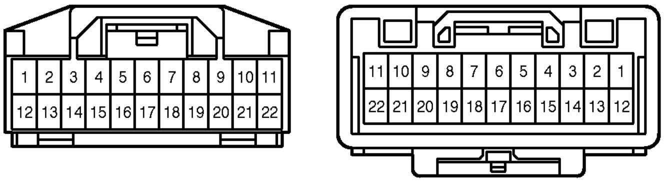
IA1 BLUE



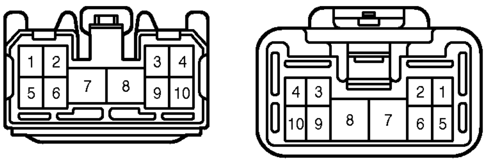
IA3



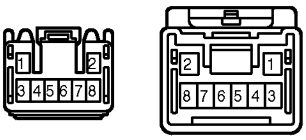
IB1 GRAY



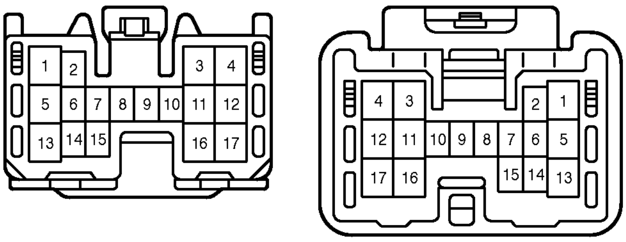
IB3 GRAY



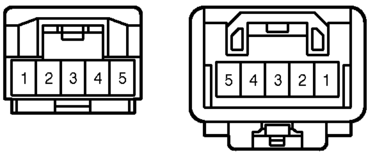
IC1



ID2

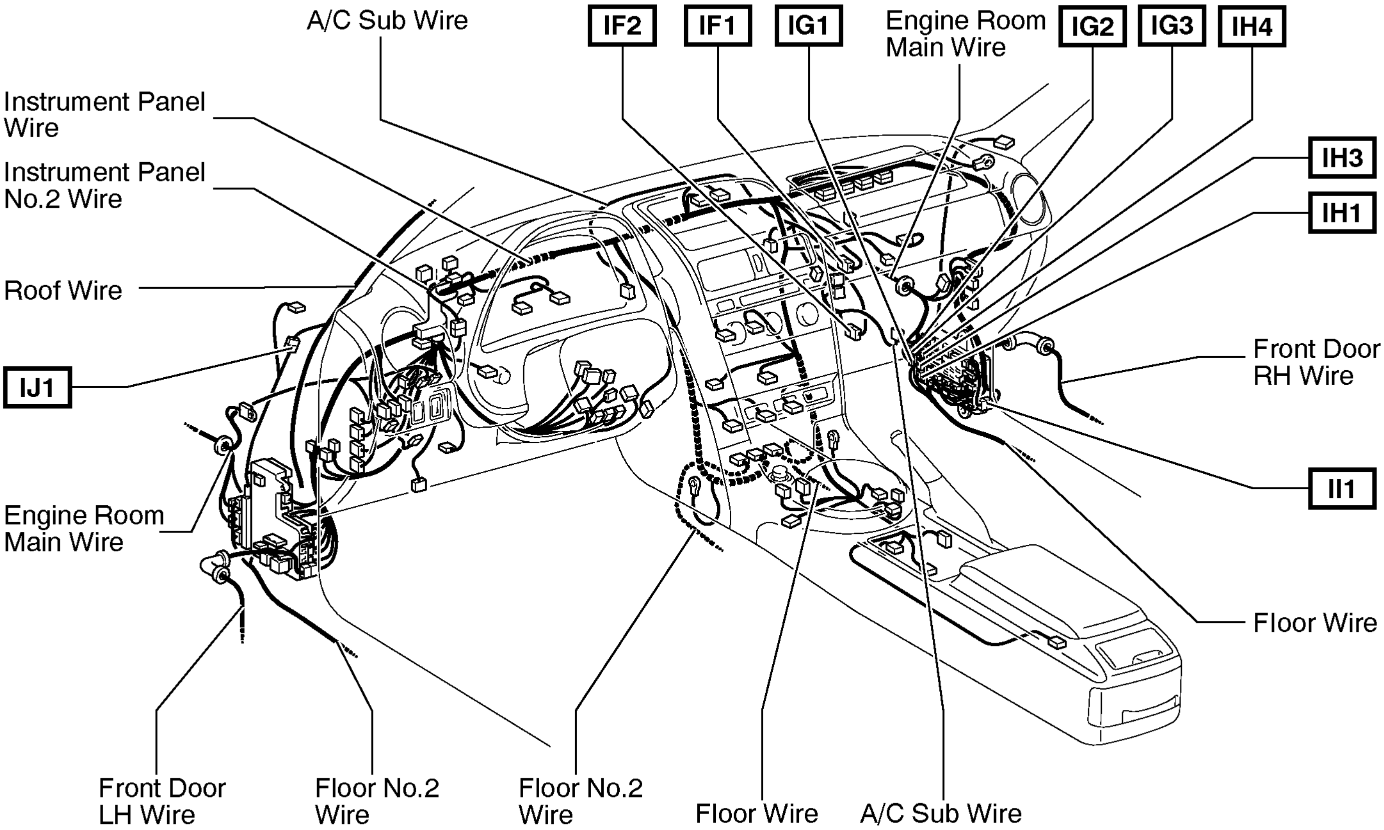


IE1

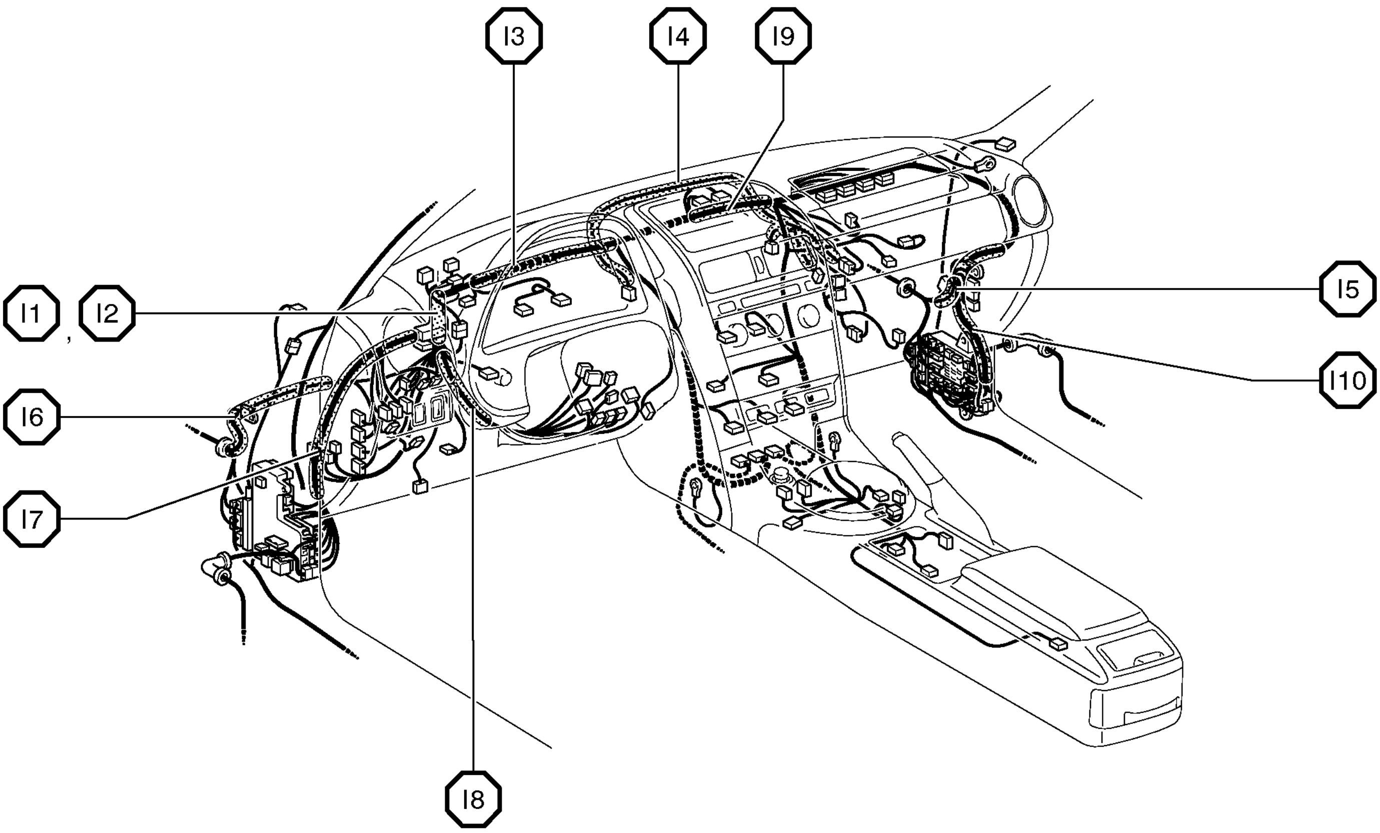


Code	Joining Wire Harness and Wire Harness (Connector Location)
IA1	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3	
IB1	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
IB3	
IC1	Engine Room Main Wire and Floor No.2 Wire (Near the Driver Side J/B)
ID2	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
IE1	Instrument Panel No.2 Wire and Instrument Panel Wire (Left Side of the Instrument Panel)

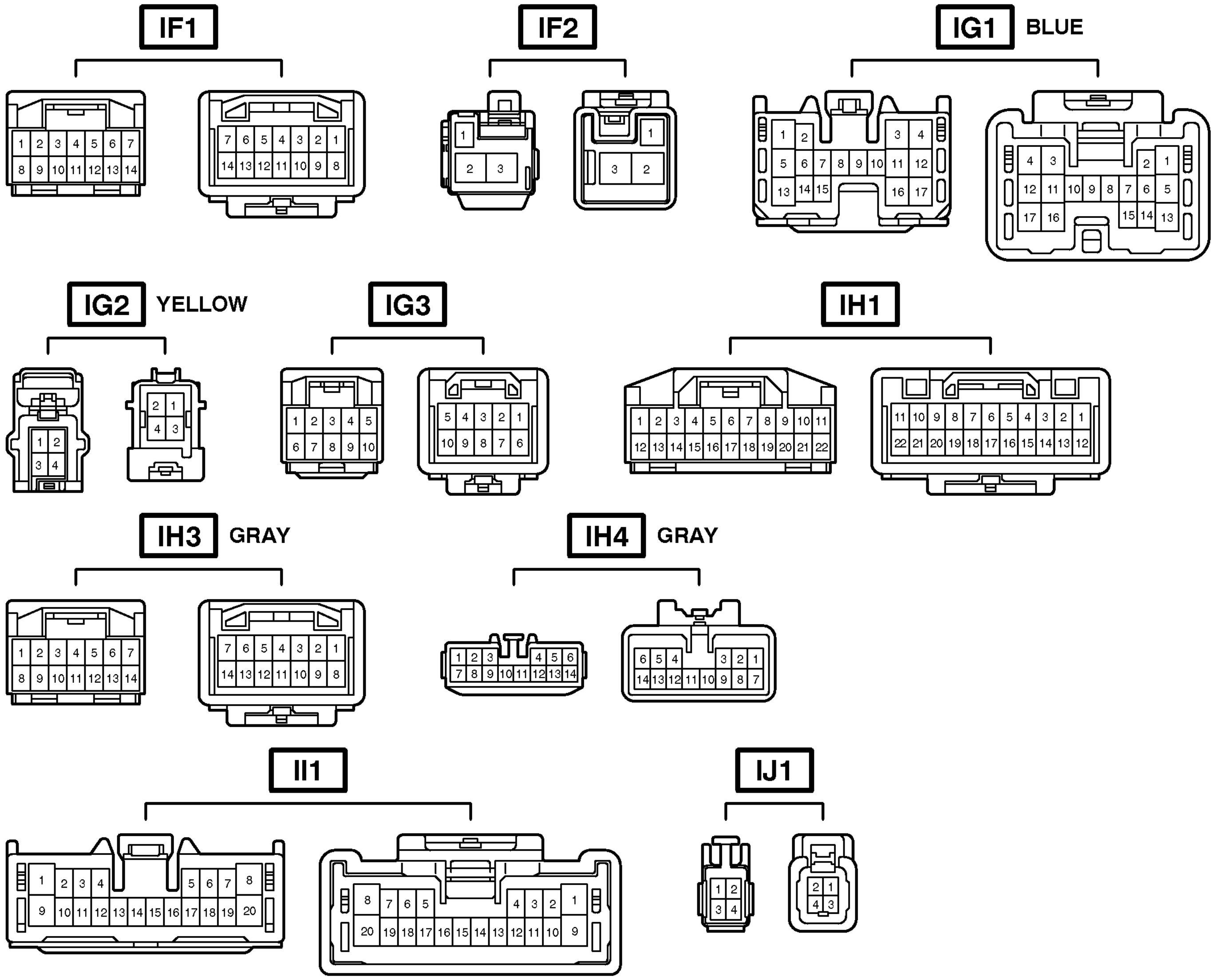
▭ : Location of Connector Joining Wire Harness and Wire Harness



⬡ : Location of Splice Points



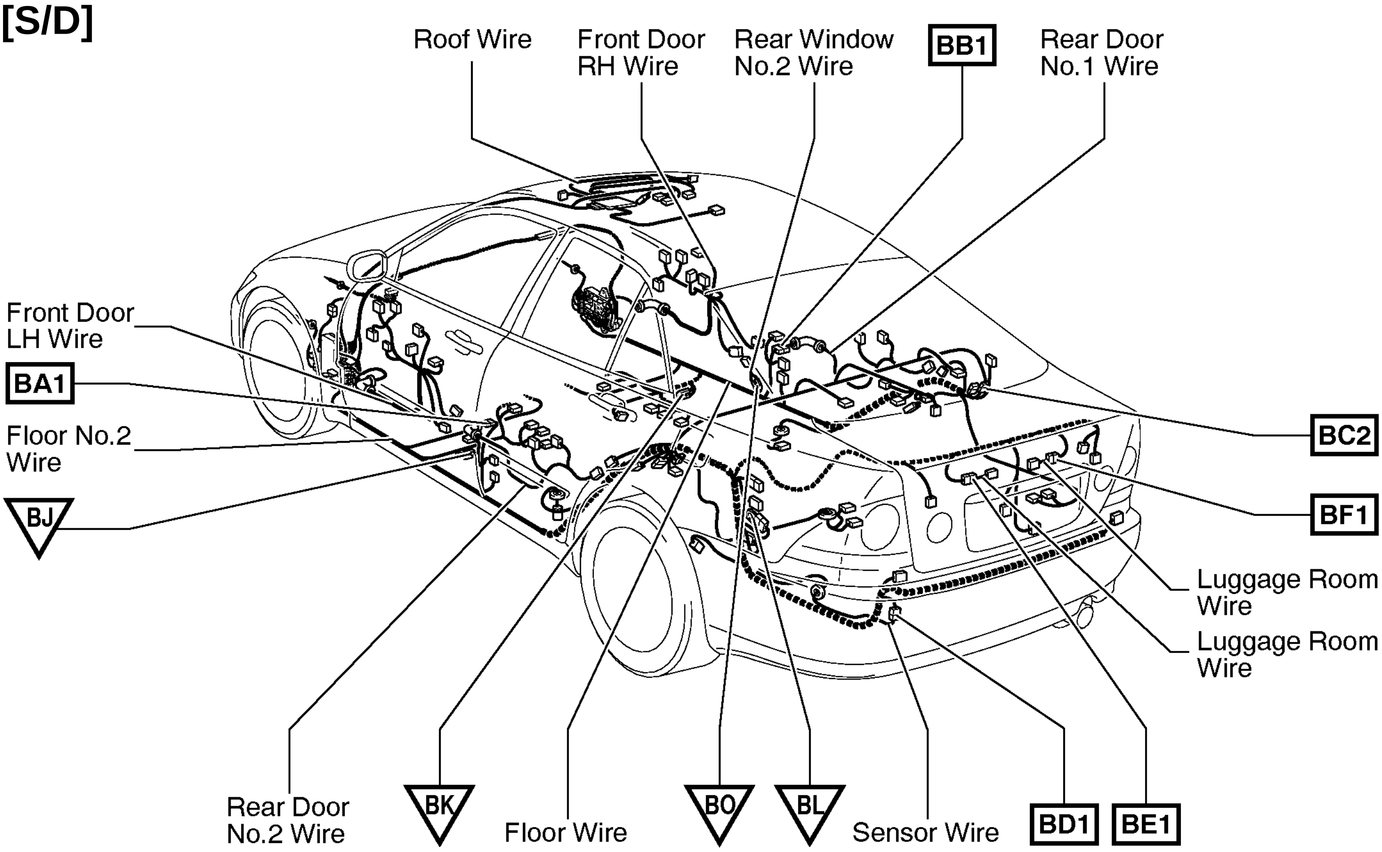
Connector Joining Wire Harness and Wire Harness



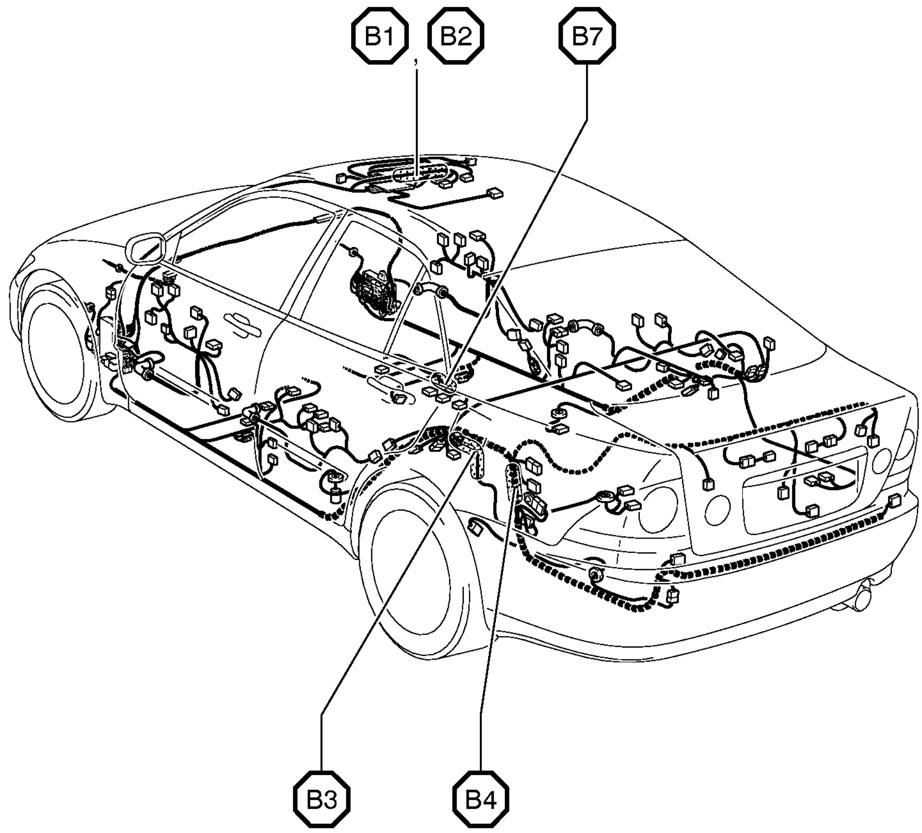
Code	Joining Wire Harness and Wire Harness (Connector Location)
IF1	Instrument Panel Wire and A/C Sub Wire (Left Side of the Blower Unit)
IF2	
IG1	Instrument Panel Wire and Engine Room Main Wire (Near the Passenger Side J/B)
IG2	
IG3	
IH1	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
IH3	
IH4	
II1	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)
IJ1	Roof Wire and Floor No.2 Wire (Left Side of the Instrument Panel)

▭	: Location of Connector Joining Wire Harness and Wire Harness
▽	: Location of Ground Points

[S/D]

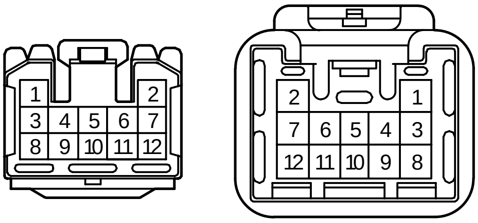


⬡	: Location of Splice Points

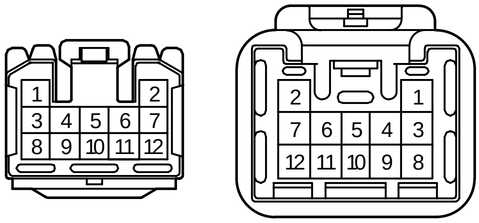


Connector Joining Wire Harness and Wire Harness

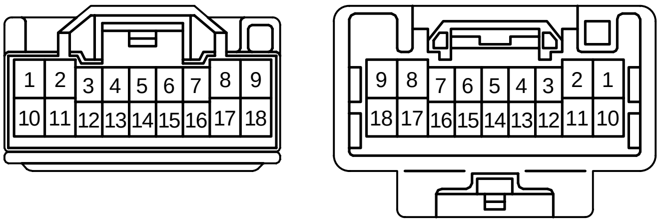
BA1



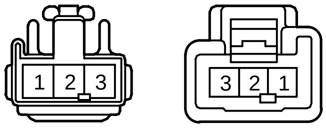
BB1



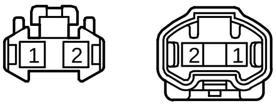
BC2



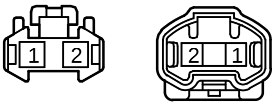
BD1



BE1 GRAY



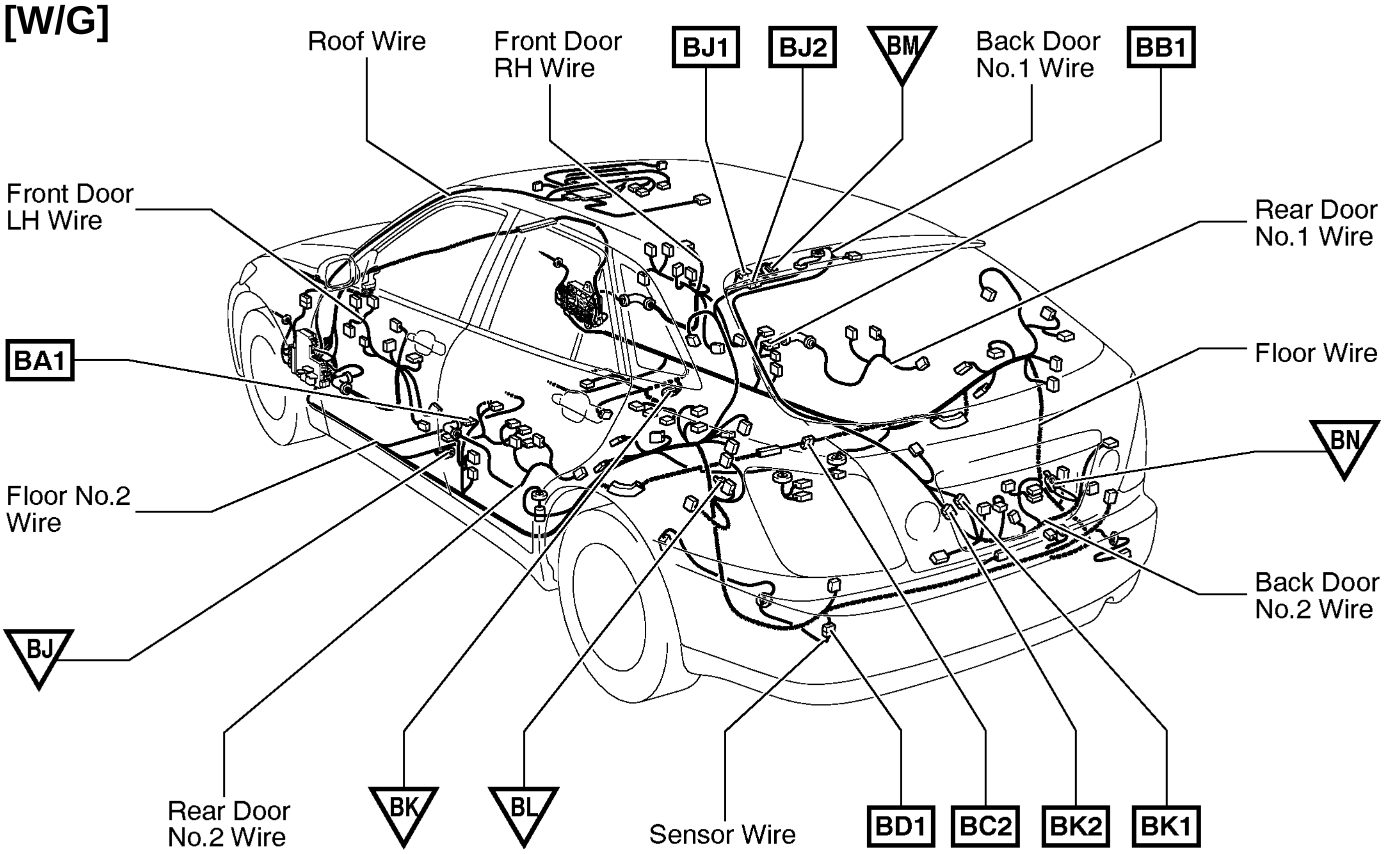
BF1 GRAY



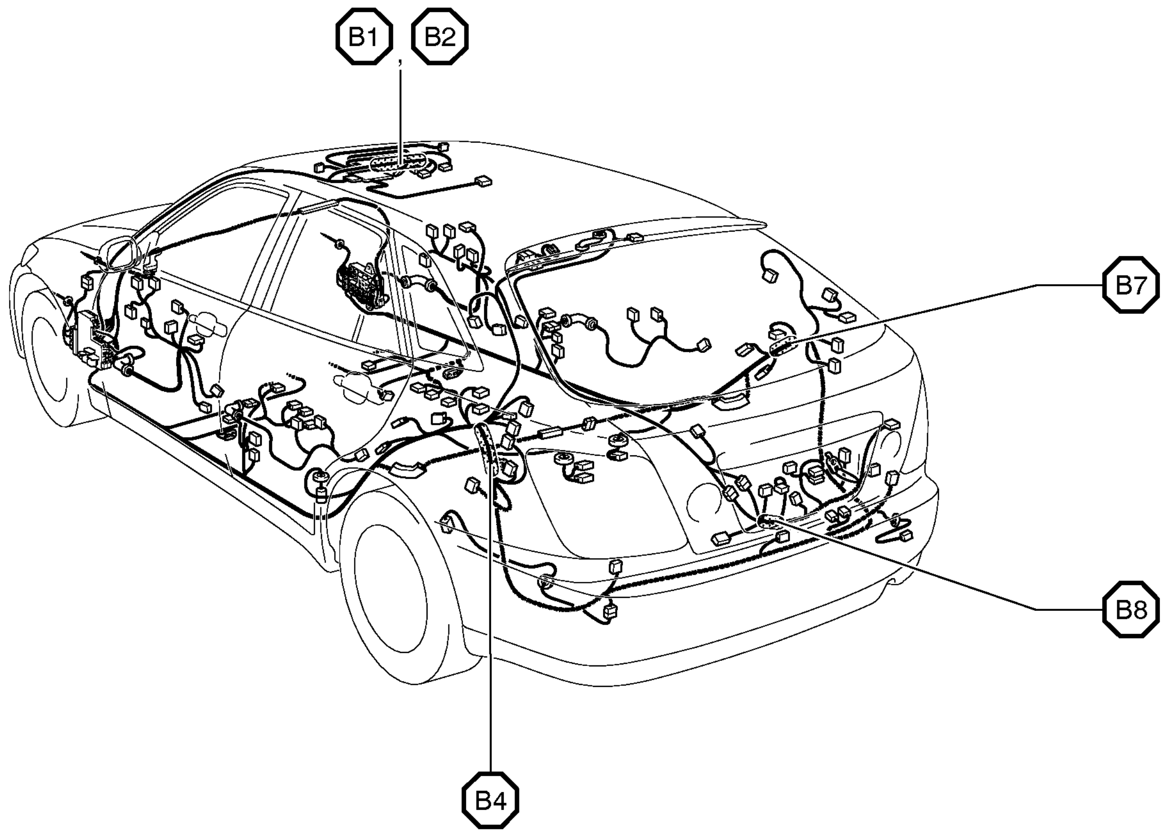
Code	Joining Wire Harness and Wire Harness (Connector Location)
BA1	Rear Door No.2 Wire and Floor No.2 Wire (Left Center Pillar)
BB1	Rear Door No.1 Wire and Floor Wire (Right Center Pillar)
BC2	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)
BD1	Sensor Wire and Floor No.2 Wire (Lower Back Panel LH)
BE1	Floor No.2 Wire and Luggage Room Wire (Near the License Plate Light LH)
BF1	Floor No.2 Wire and Luggage Room Wire (Near the License Plate Light RH)

▭	: Location of Connector Joining Wire Harness and Wire Harness
▽	: Location of Ground Points

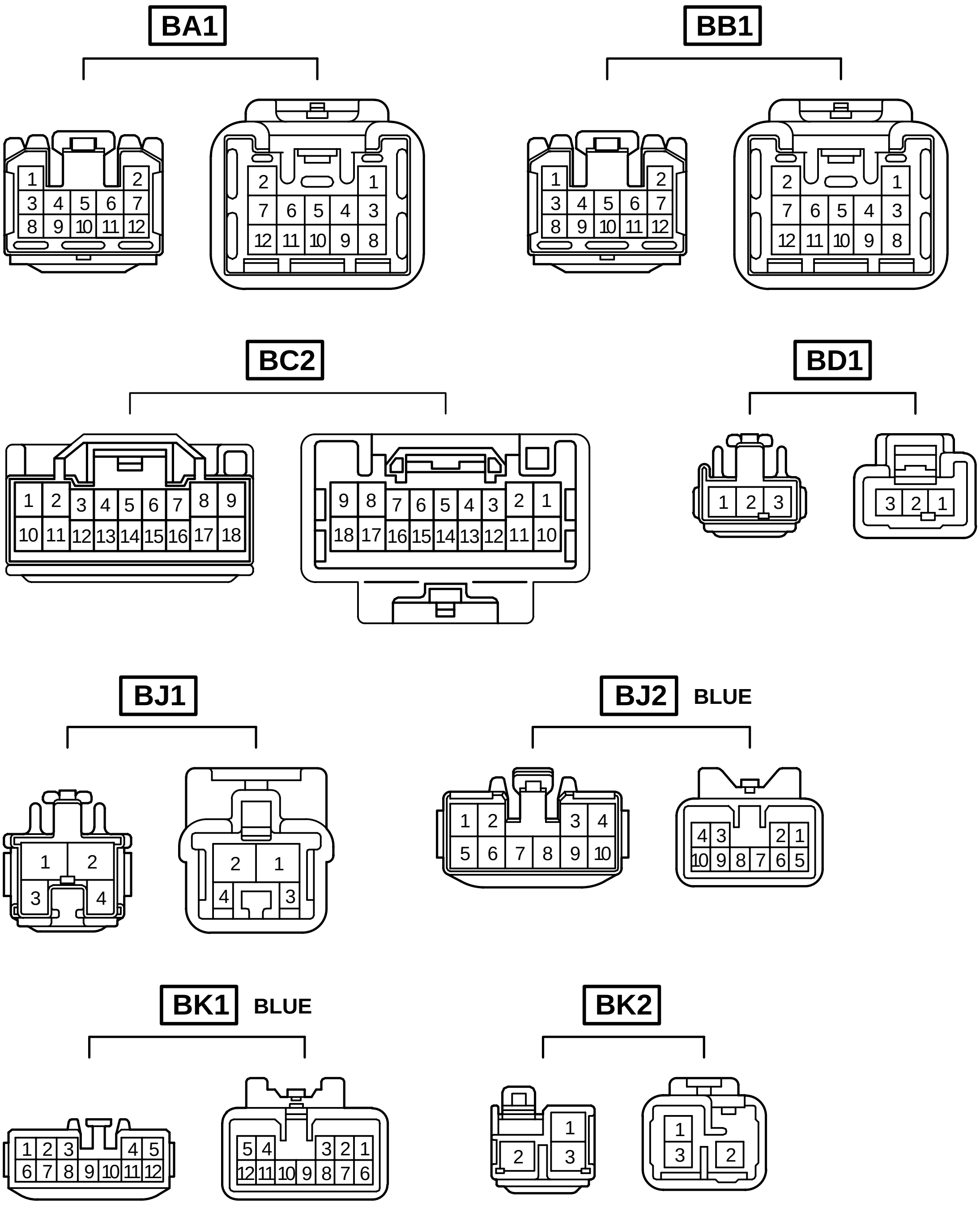
[W/G]



⬡	: Location of Splice Points

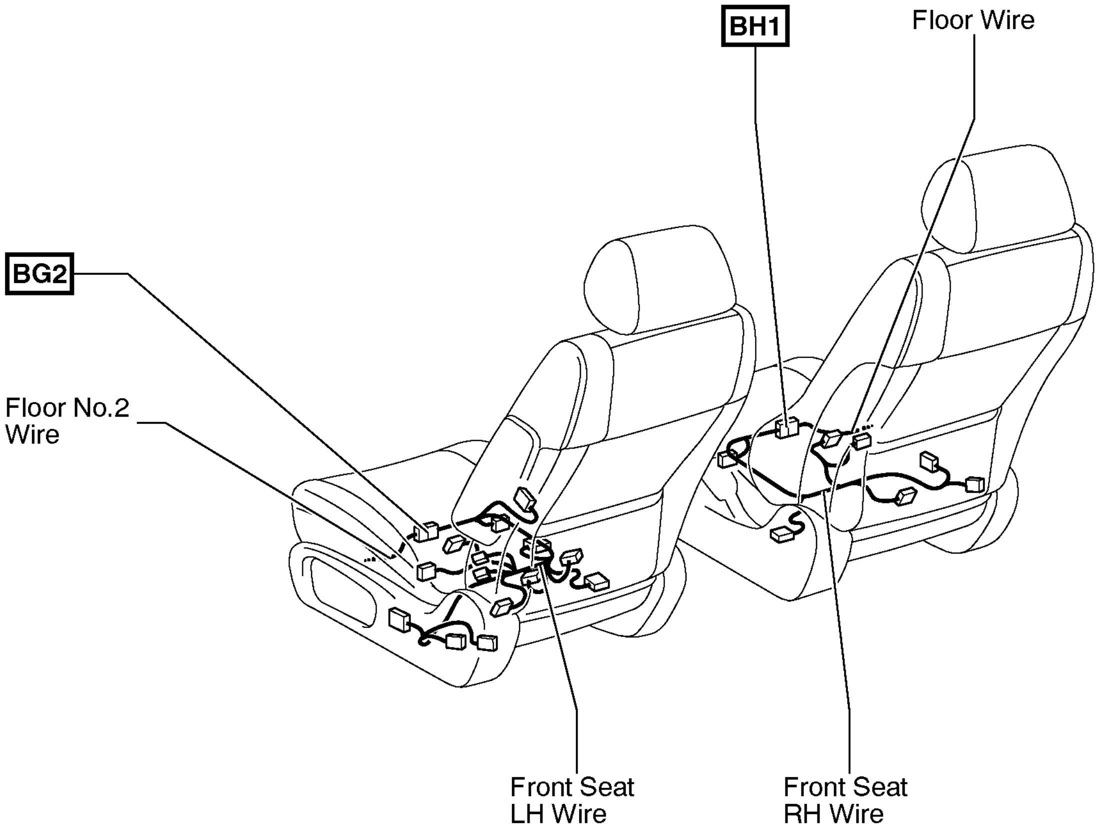


Connector Joining Wire Harness and Wire Harness

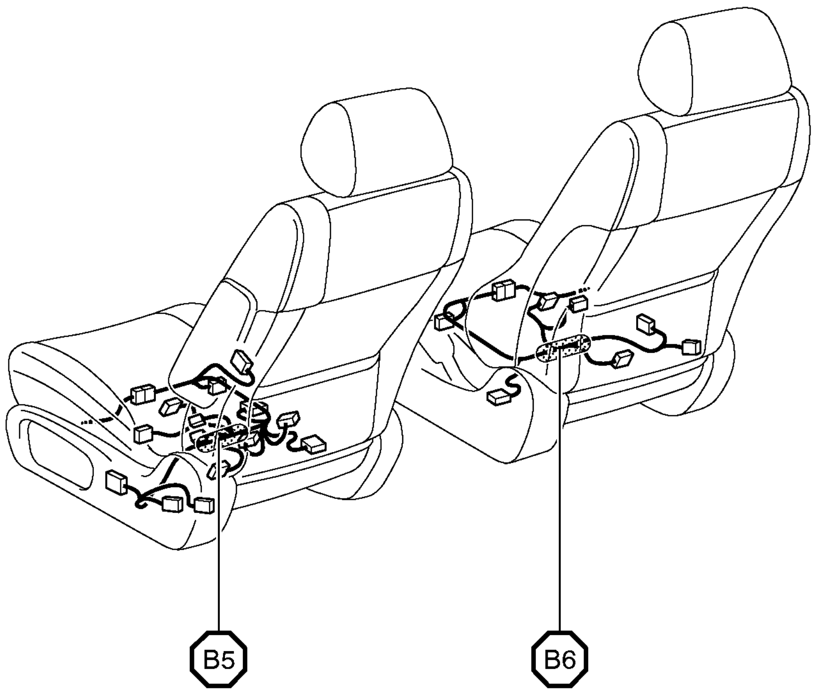


Code	Joining Wire Harness and Wire Harness (Connector Location)
BA1	Rear Door No.2 Wire and Floor No.2 Wire (Left Center Pillar)
BB1	Rear Door No.1 Wire and Floor Wire (Right Center Pillar)
BC2	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel Center)
BD1	Sensor Wire and Floor No.2 Wire (Lower Back Panel LH)
BJ1	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BJ2	
BK1	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)
BK2	

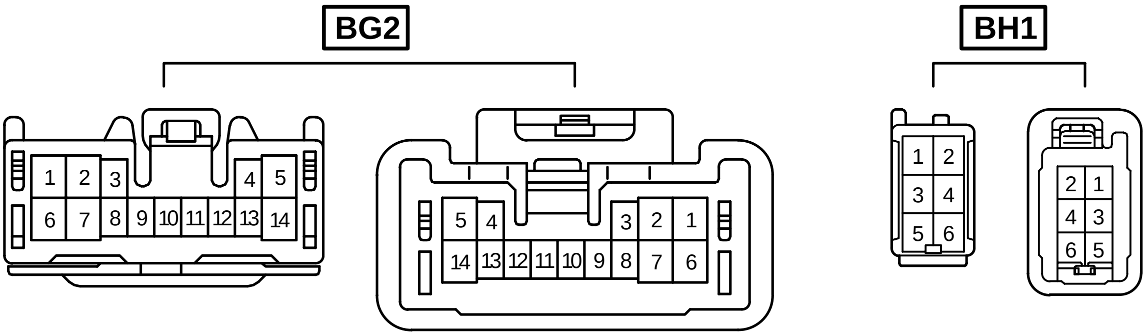
▭ : Location of Connector Joining Wire Harness and Wire Harness



⬡ : Location of Splice Points

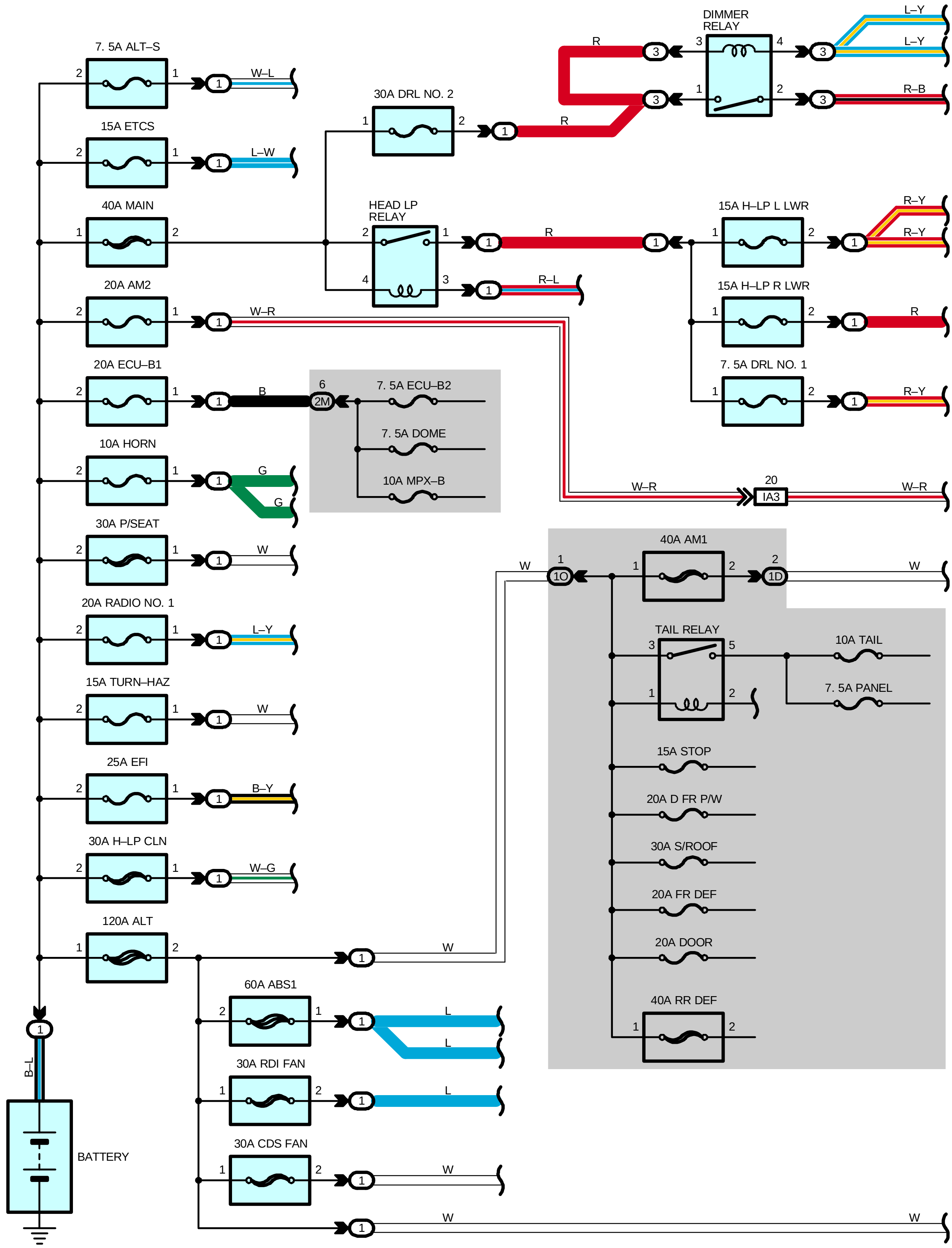


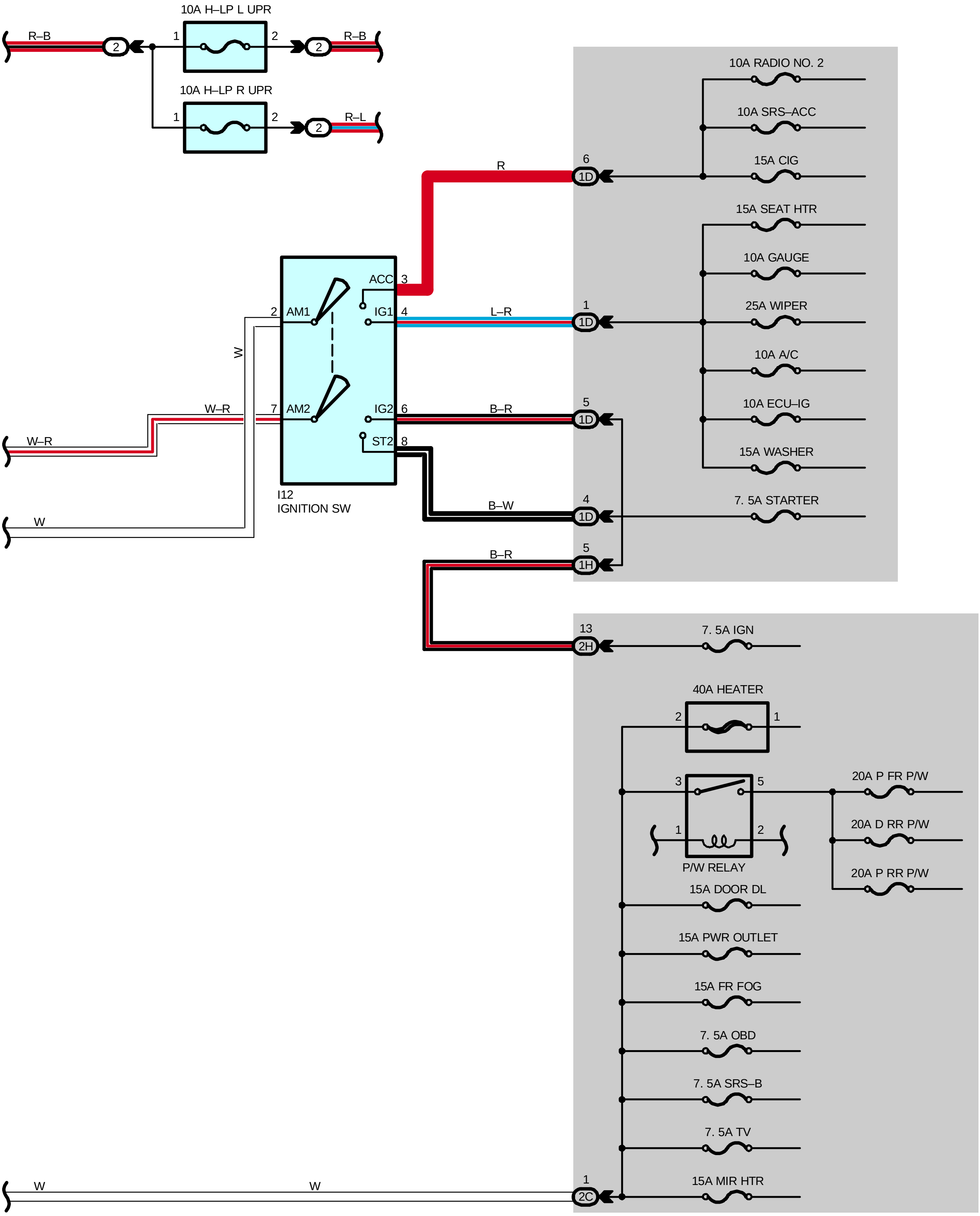
Connector Joining Wire Harness and Wire Harness



Code	Joining Wire Harness and Wire Harness (Connector Location)
BG2	Floor No.2 Wire and Front Seat LH Wire (Under the Driver's Seat)
BH1	Floor Wire and Front Seat RH Wire (Under the Front Passenger's Seat)

2004 IS 300
ELECTRICAL WIRING DIAGRAM
SYSTEM CIRCUITS


7. 5A ALT–S
W–L
15A ETCS
L–W
40A MAIN
20A AM2
W–R
20A ECU–B1
B
10A HORN
G
G
30A P/SEAT
W
20A RADIO NO. 1
L–Y
15A TURN–HAZ
W
25A EFI
B–Y
30A H–LP CLN
W–G
120A ALT
W
60A ABS1
L
L
30A RDI FAN
L
30A CDS FAN
W
W
W
B–L
BATTERY
30A DRL NO. 2
R
R
DIMMER
RELAY
R–B
L–Y
L–Y
HEAD LP
RELAY
R
R–L
15A H–LP L LWR
R–Y
R–Y
15A H–LP R LWR
R
7. 5A DRL NO. 1
R–Y
2M
7. 5A ECU–B2
7. 5A DOME
10A MPX–B
W–R
IA3
W–R
40A AM1
1O
1D
W
W
TAIL RELAY
10A TAIL
7. 5A PANEL
15A STOP
20A D FR P/W
30A S/ROOF
20A FR DEF
20A DOOR
40A RR DEF


10A H–LP L UPR
R–B
R–B
10A H–LP R UPR
R–L
10A RADIO NO. 2
10A SRS–ACC
15A CIG
R
15A SEAT HTR
10A GAUGE
ACC
IG1
AM1
L–R
25A WIPER
10A A/C
W
W–R
AM2
IG2
B–R
10A ECU–IG
W–R
ST2
15A WASHER
I12
IGNITION SW
B–W
7. 5A STARTER
W
B–R
7. 5A IGN
40A HEATER
20A P FR P/W
20A D RR P/W
P/W RELAY
20A P RR P/W
15A DOOR DL
15A PWR OUTLET
15A FR FOG
7. 5A OBD
7. 5A SRS–B
7. 5A TV
W
W
15A MIR HTR

POWER SOURCE

SERVICE HINTS

HEAD LP RELAY

2–1 : Closed with the light control SW at **HEAD** position or the dimmer SW at **FLASH** position

DIMMER RELAY

1–2 : Closed with the light control SW at **HEAD** position and the dimmer SW at **HIGH** position
Closed with the dimmer SW at **FLASH** position
Closed with the daytime running light operation

TAIL RELAY

3–5 : Closed with the light control SW at **TAIL** or **HEAD** position

I12 IGNITION SW

2–3 : Closed with the ignition key at **ACC** or **ON** position
2–4 : Closed with the ignition key at **ON** or **ST** position
7–6 : Closed with the ignition key at **ON** or **ST** position
7–8 : Closed with the ignition key at **ST** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
I12	35				

: RELAY BLOCKS

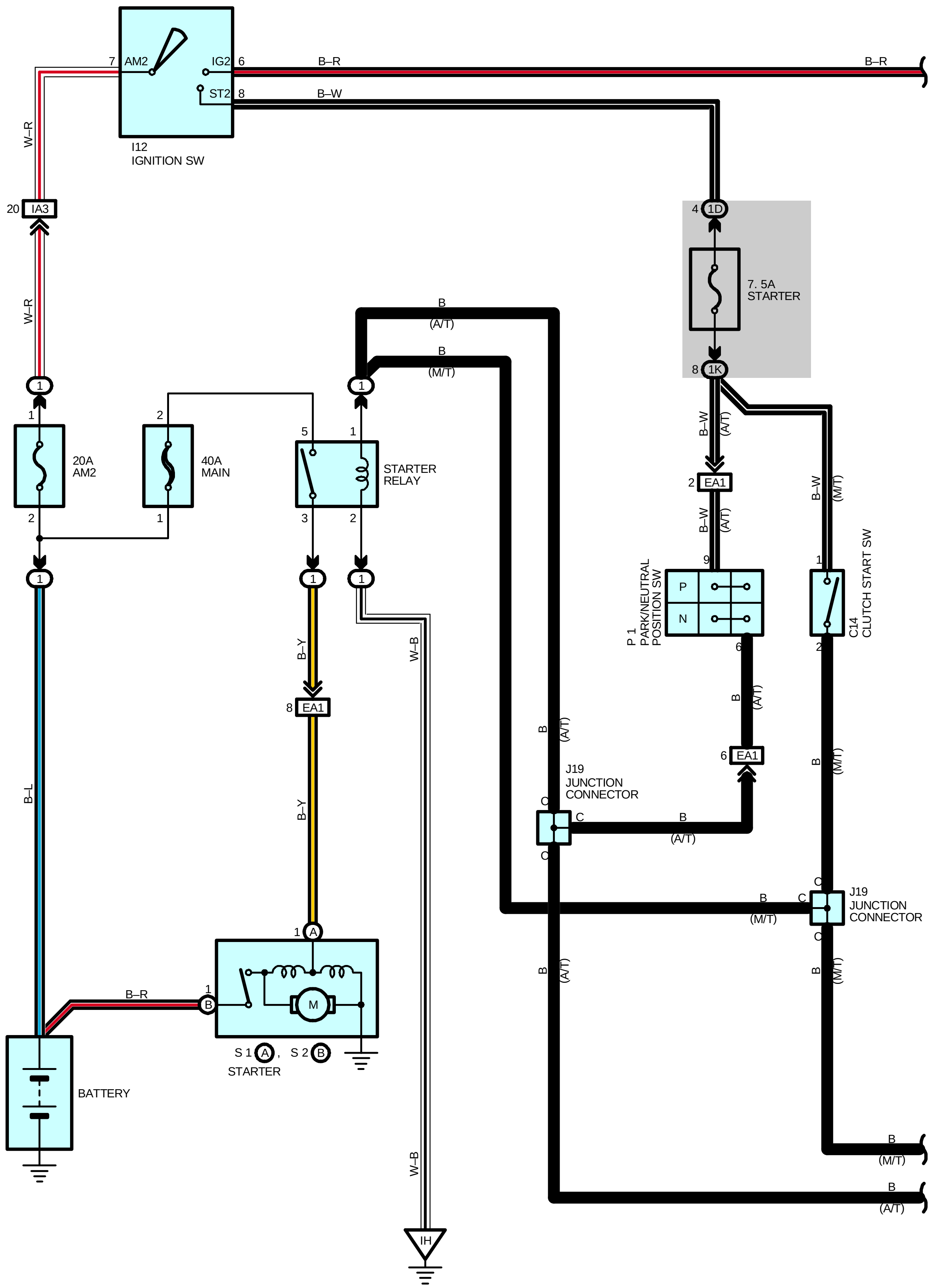
Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)
3	23	Engine Room No.3 R/B (Engine Compartment Left)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

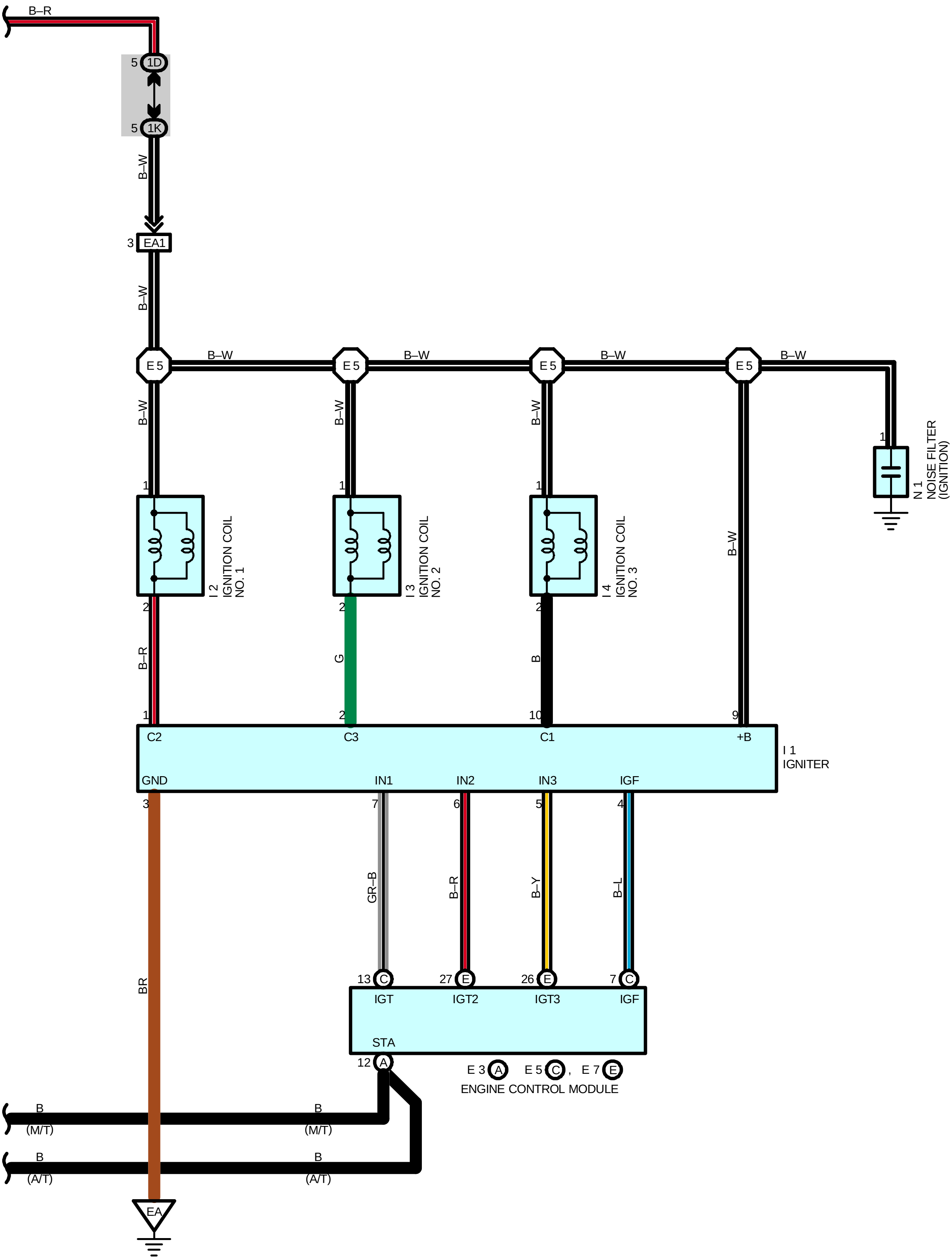
Code	See Page	Junction Block and Wire Harness (Connector Location)
1D	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1H		
1O	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2C	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2H	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)



AM2
IG2
ST2
B–R
B–W
W–R
I12
IGNITION SW
IA3
1D
7. 5A
STARTER
1K
B
(A/T)
(M/T)
20A
AM2
40A
MAIN
STARTER
RELAY
EA1
P 1
PARK/NEUTRAL
POSITION SW
C14
CLUTCH START SW
B–Y
W–B
B–L
J19
JUNCTION
CONNECTOR
M
S 1 A , S 2 B
STARTER
BATTERY
IH


B–R
5 1D
5 1K
B–W
3 EA1
B–W
E 5
B–W
I 2
IGNITION COIL
NO. 1
I 3
IGNITION COIL
NO. 2
I 4
IGNITION COIL
NO. 3
N 1
NOISE FILTER
(IGNITION)
B–R
G
B
C2
C3
C1
+B
I 1
IGNITER
GND
IN1
IN2
IN3
IGF
GR–B
B–R
B–Y
B–L
BR
13 C IGT
27 E IGT2
26 E IGT3
7 C IGF
STA
12 A
E 3 A , E 5 C , E 7 E
ENGINE CONTROL MODULE
B
(M/T)
B
(A/T)
EA

STARTING AND IGNITION

SERVICE HINTS

S1 (A), S2 (B) STARTER

Points closed with the Park/Neutral position SW at **P** or **N** position and the ignition SW at **ST** position

I12 IGNITION SW

7–6 : Closed with the ignition SW at **ON** or **ST** position
7–8 : Closed with the ignition SW at **ST** position

: PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
C14		34	I2		33	N1		33
E3	A	32	I3		33	P1		33
E5	C	32	I4		33	S1	A	33
E7	E	32	I12		35	S2	B	33
I1		33	J19		35			

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1D	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

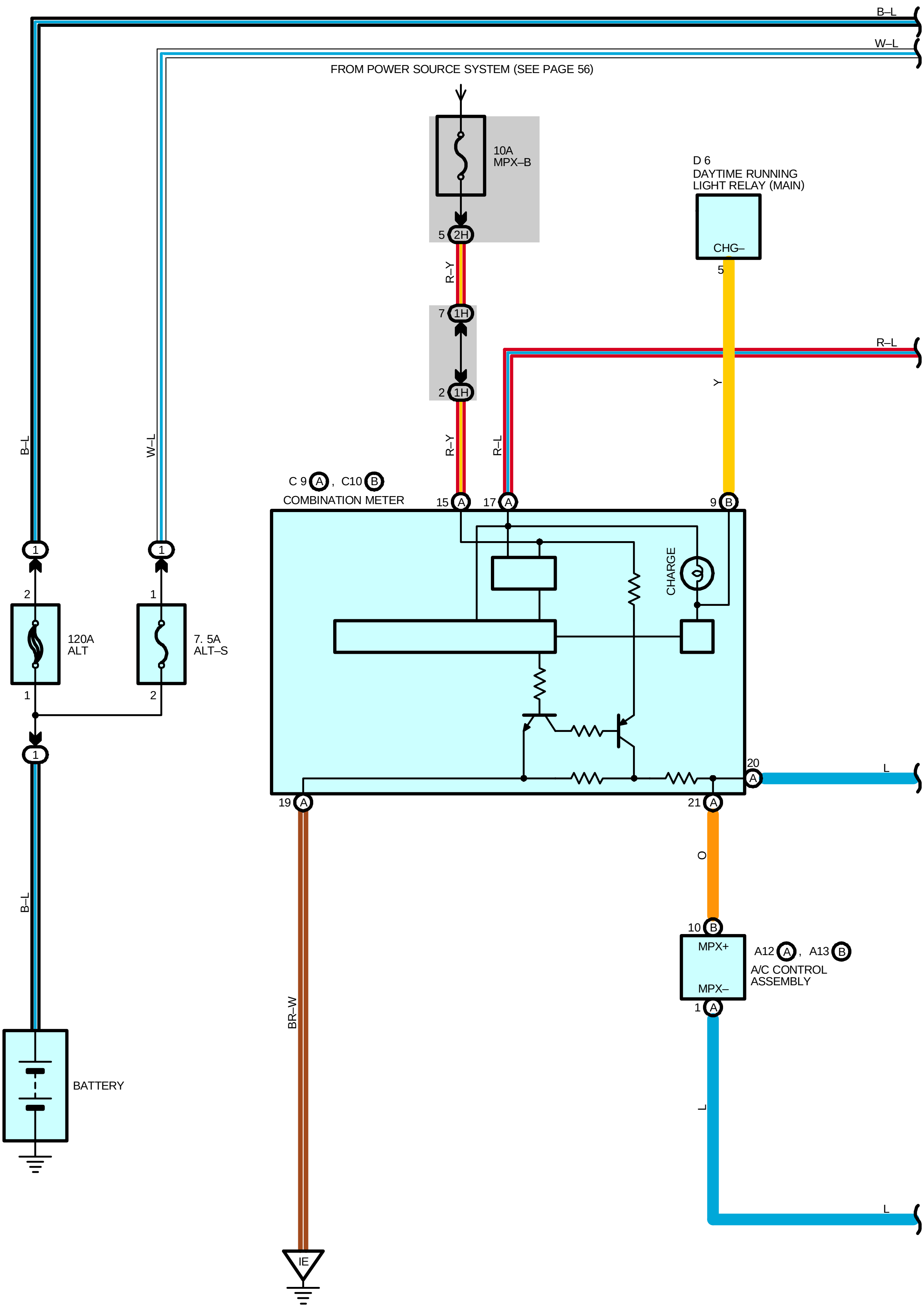
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)

: GROUND POINTS

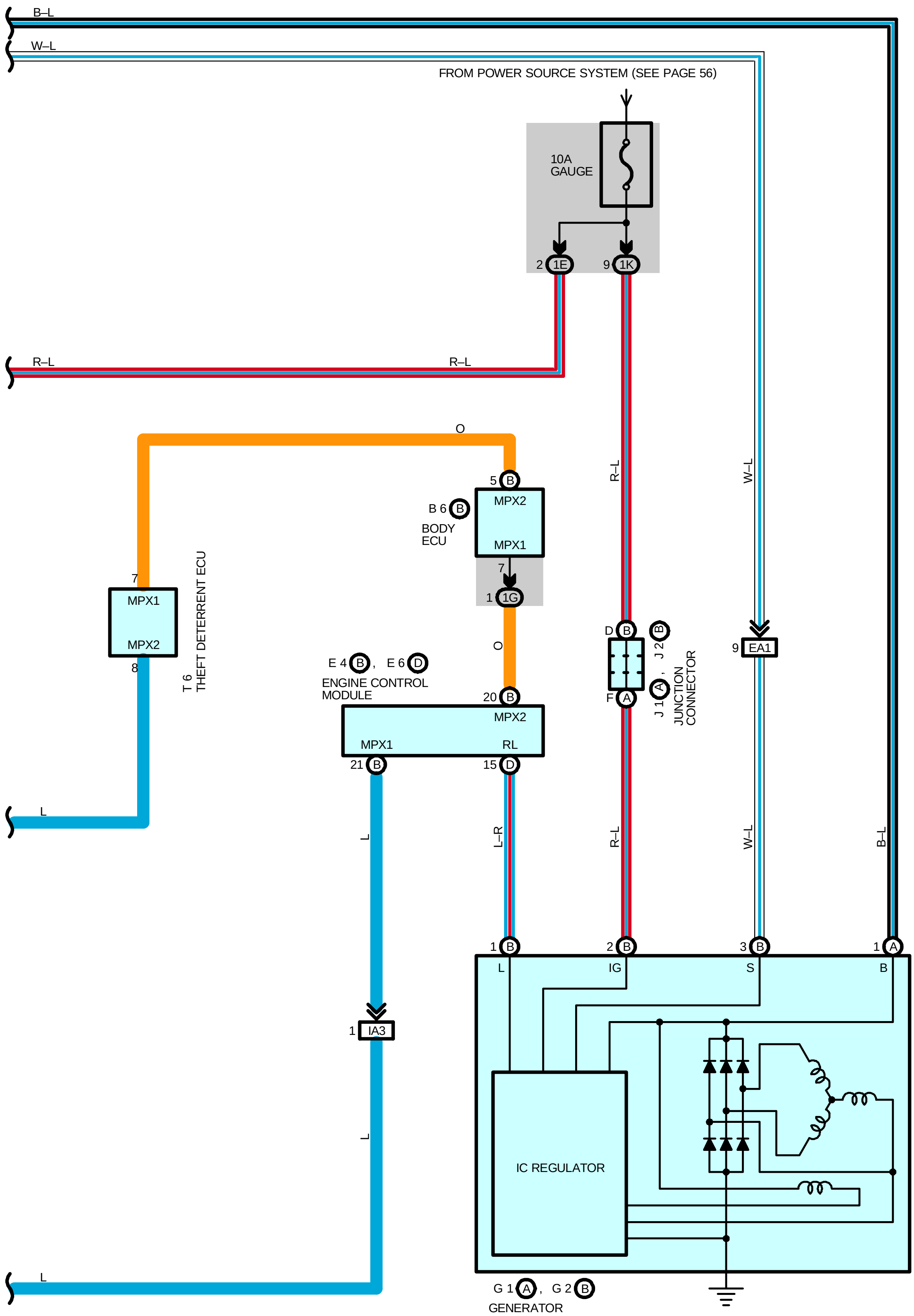
Code	See Page	Ground Points Location
EA	42	Front Side of the Intake Manifold
IH	44	Cowl Side Panel RH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E5	42	Engine Wire			



B–L
W–L
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
MPX–B
5 2H
R–Y
7 1H
2 1H
D 6
DAYTIME RUNNING
LIGHT RELAY (MAIN)
CHG–
5
R–L
Y
C 9 A, C10 B
COMBINATION METER
15 A
17 A
9 B
CHARGE
1
2
120A
ALT
7. 5A
ALT–S
20 A
L
19 A
21 A
O
10 B
MPX+
MPX–
1 A
A12 A, A13 B
A/C CONTROL
ASSEMBLY
BR–W
BATTERY
IE



B–L
W–L
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
GAUGE
2 1E
9 1K
R–L
R–L
O
5 B
MPX2
B 6 B
BODY
ECU
MPX1
7
1 1G
7
MPX1
MPX2
8
T 6
THEFT DETERRENT ECU
O
R–L
W–L
D B
J 2 B
F A
J 1 A
JUNCTION
CONNECTOR
9 EA1
E 4 B , E 6 D
ENGINE CONTROL
MODULE
20 B
MPX2
MPX1
RL
21 B
15 D
L
L
L–R
R–L
W–L
B–L
1 B
2 B
3 B
1 A
L
IG
S
B
1 IA3
L
IC REGULATOR
L
G 1 A , G 2 B
GENERATOR

CHARGING

SERVICE HINTS

G1 (A), G2 (B) GENERATOR

(A) 1–GROUND : **13.8–15.0** volts with the engine running at **5000** rpm and **25**°C (**77**°F)
13.2–14.0 volts with the engine running at **5000** rpm and **115**°C (**239**°F)

(B) 1–GROUND : Below **1.5** volts with the ignition SW at **ON** position and engine not running

: PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
A12	A	34	D6		34	J1	A	33
A13	B	34	E4	B	32	J2	B	33
B6	B	34	E6	D	32	T6		35
C9	A	34	G1	A	32			
C10	B	34	G2	B	32			

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2H	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

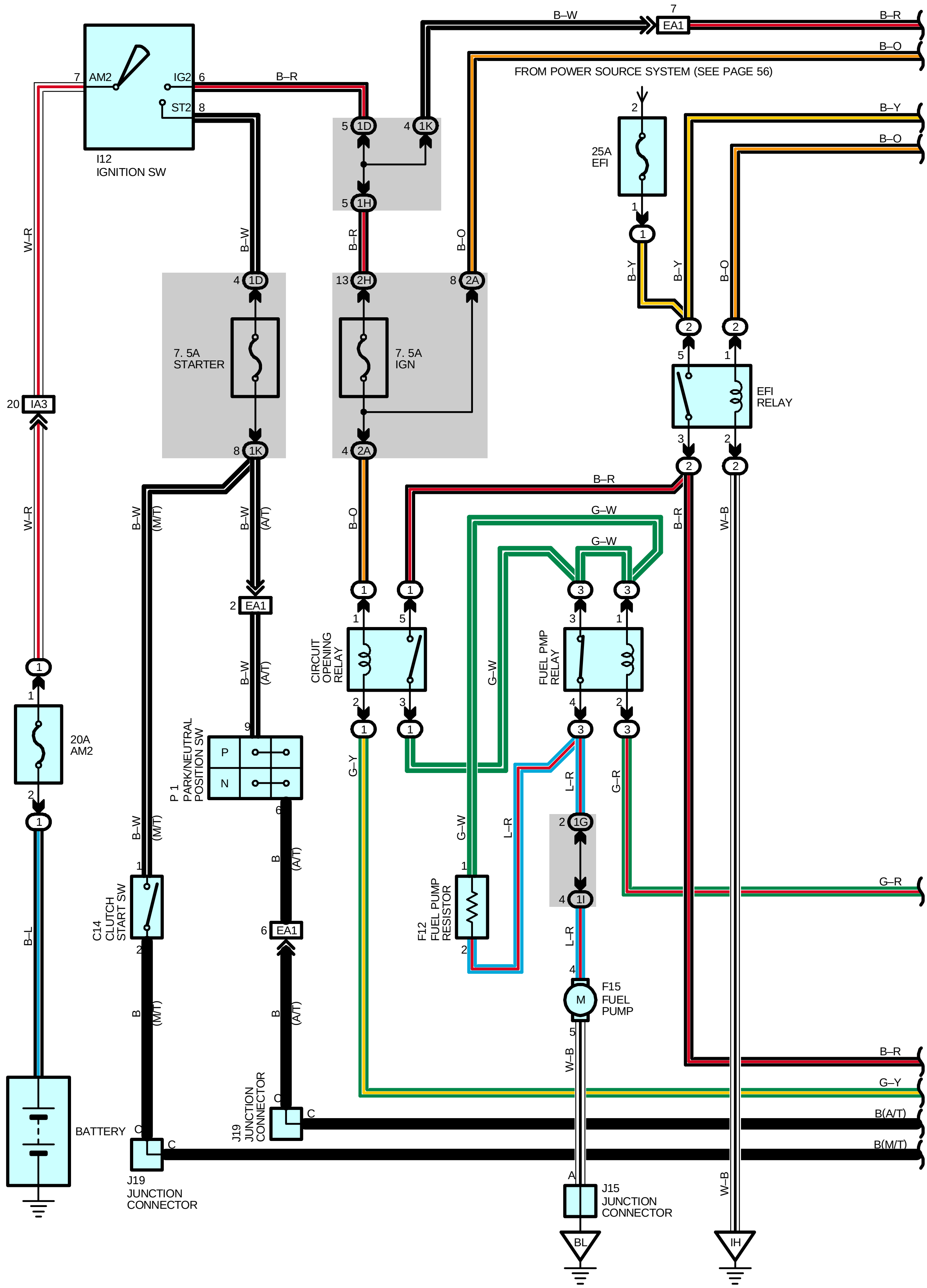
: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

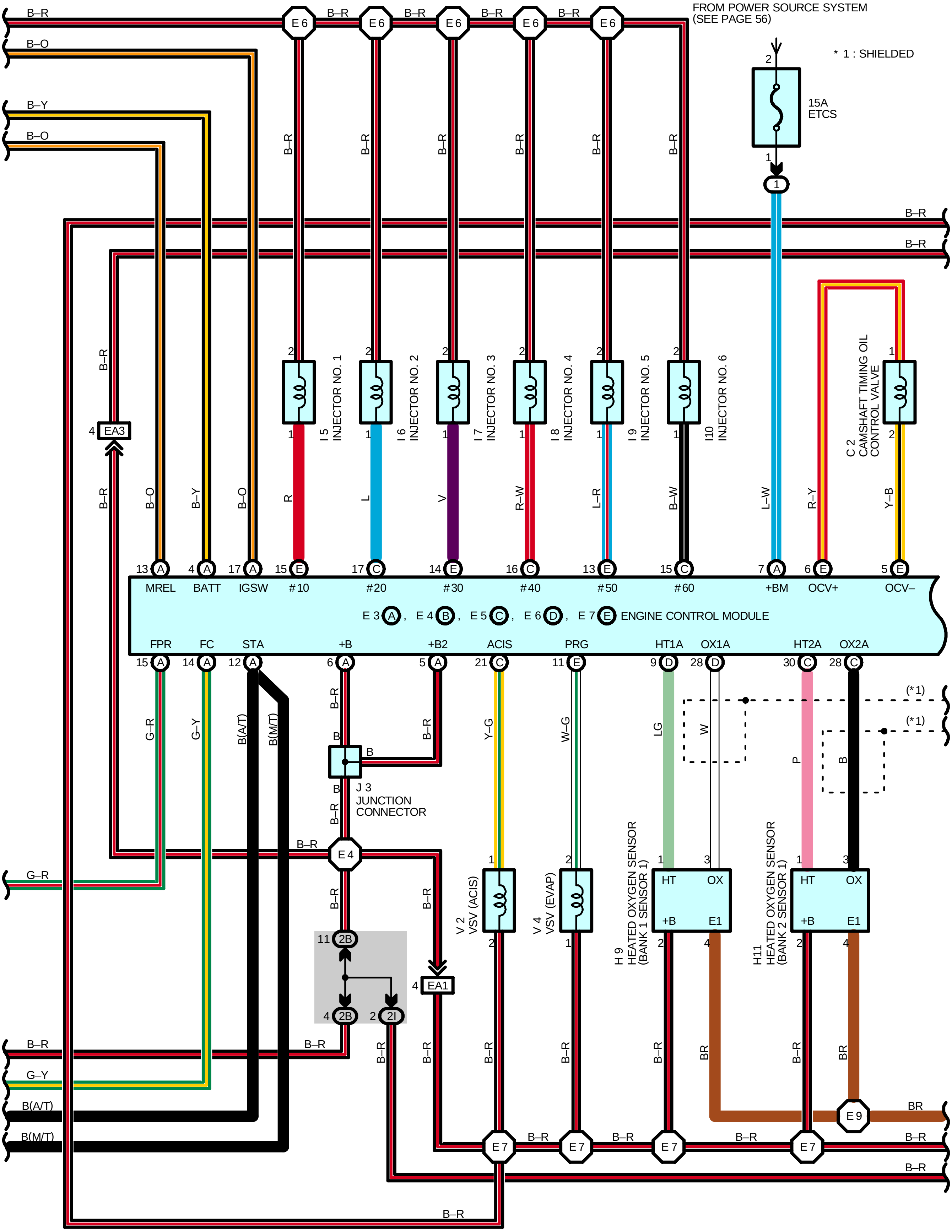
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)

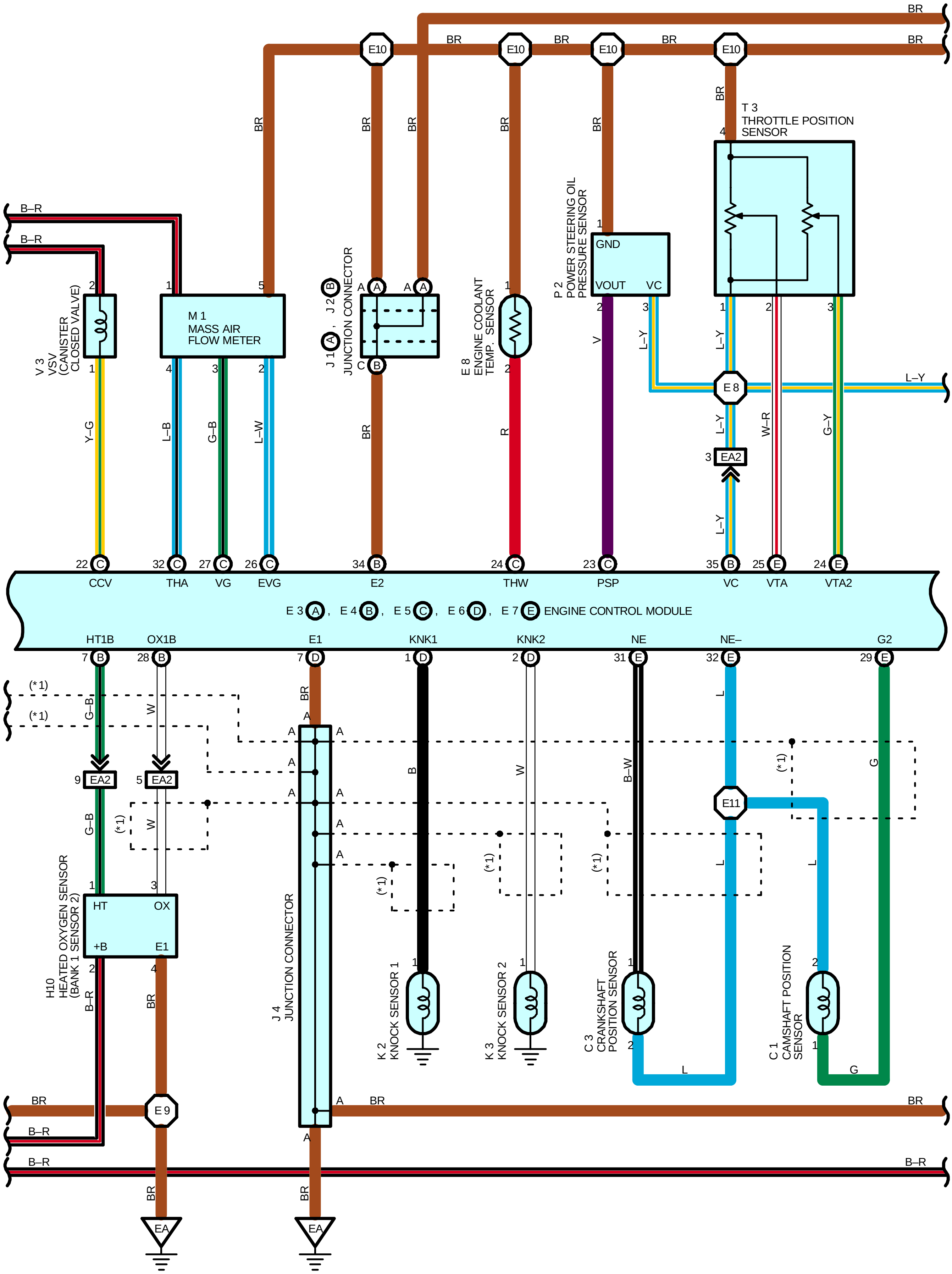
: GROUND POINTS

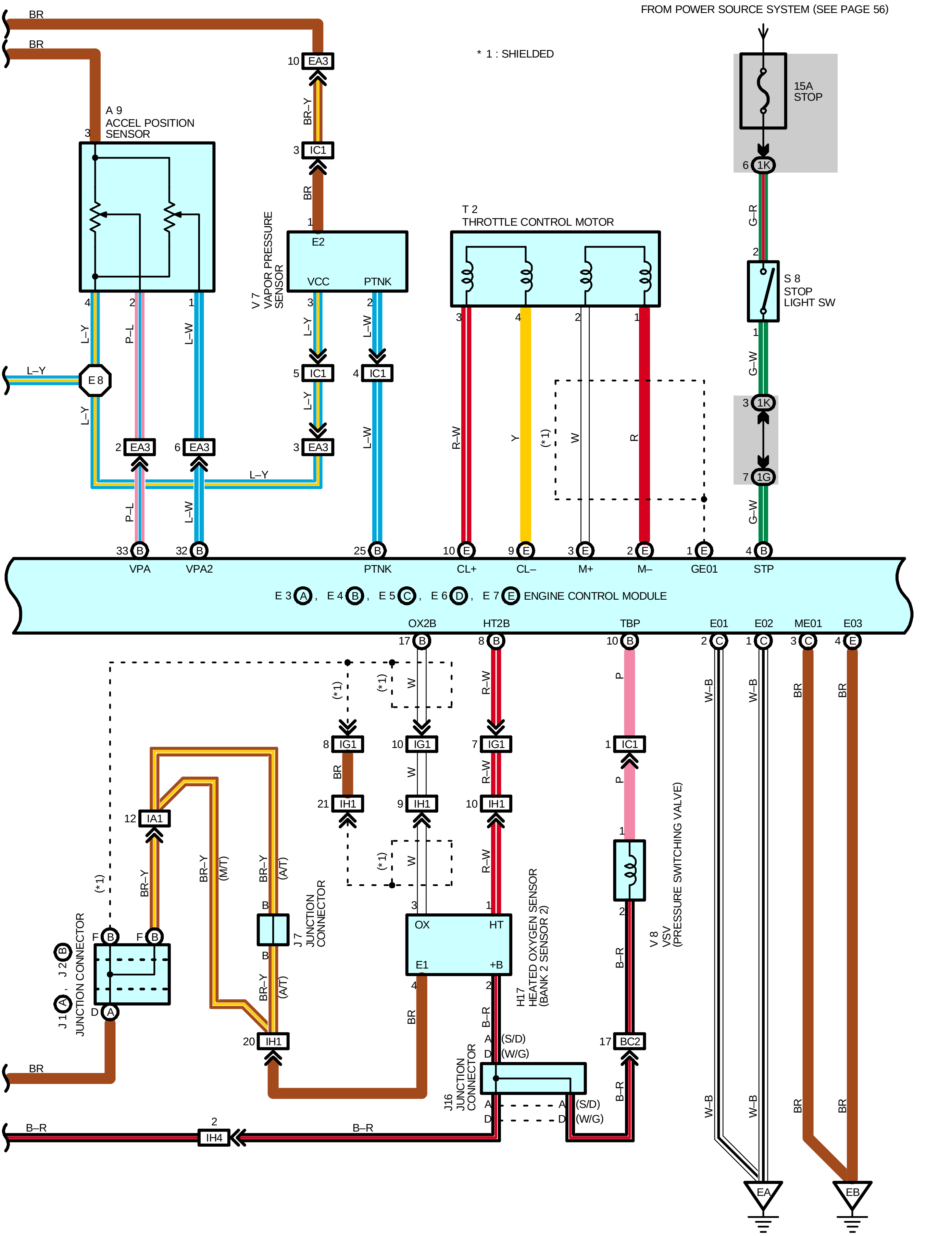
Code	See Page	Ground Points Location
IE	44	Front Floor Panel Center LH

ENGINE CONTROL

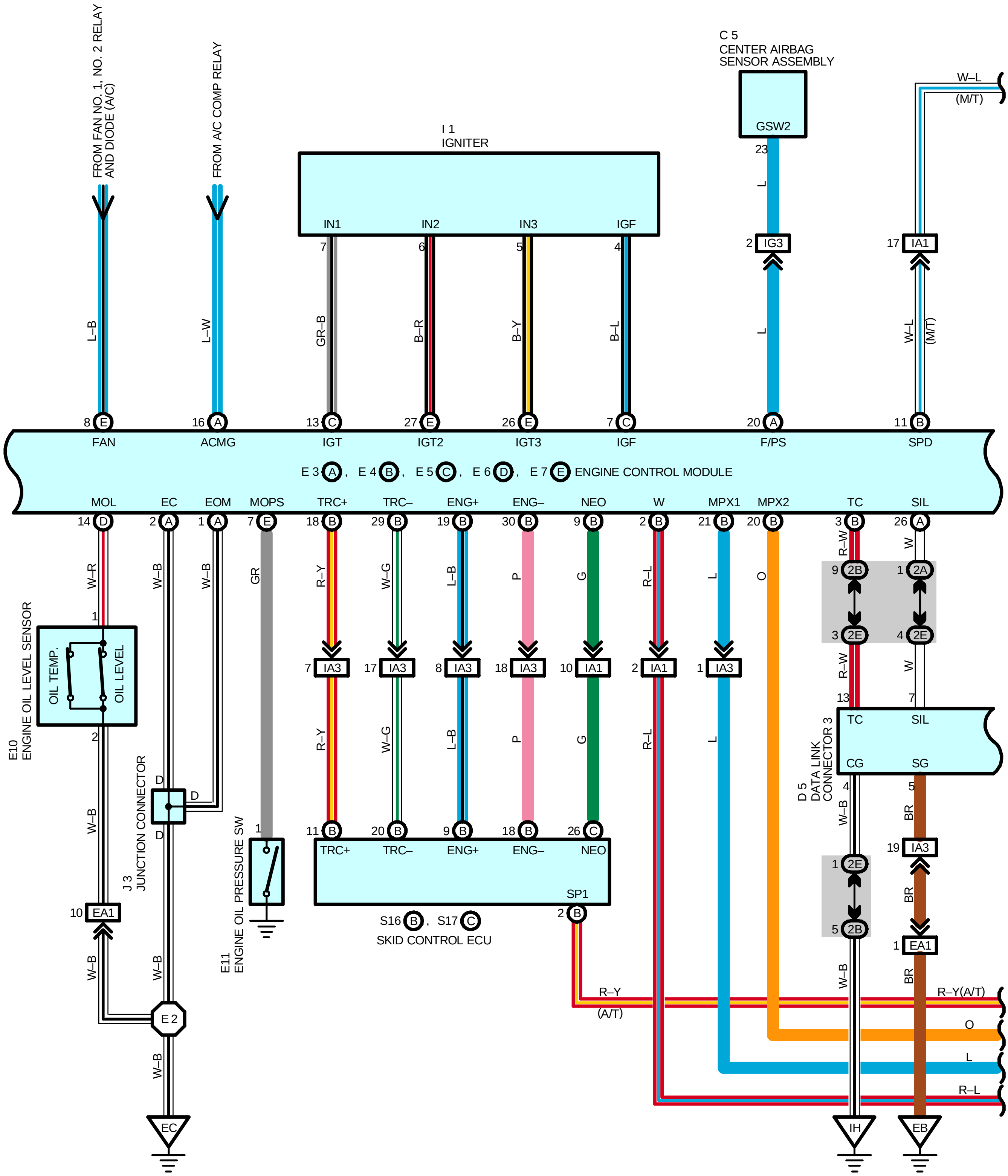


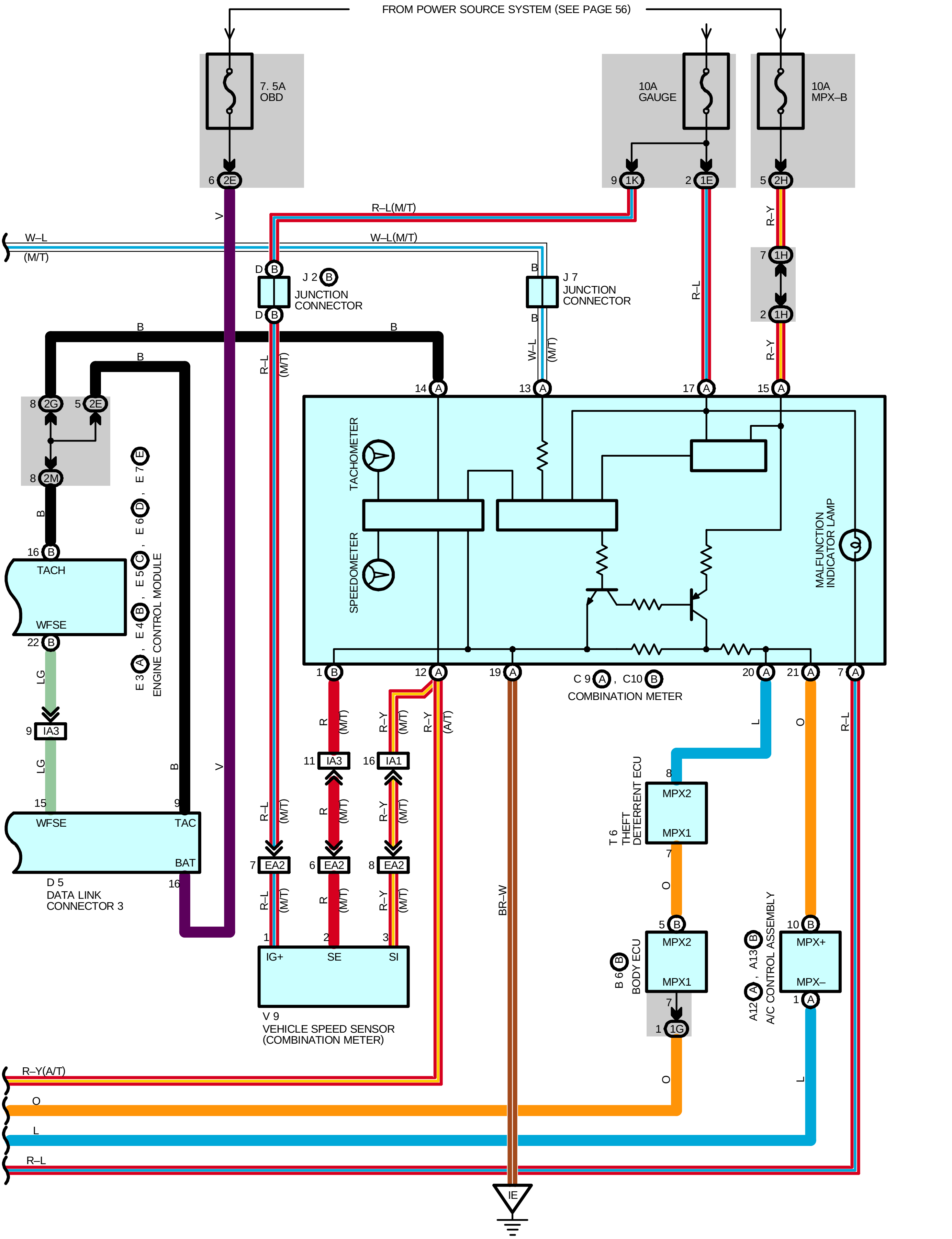

FROM POWER SOURCE SYSTEM (SEE PAGE 56)
* 1 : SHIELDED
15A ETCS
I 5 INJECTOR NO. 1
I 6 INJECTOR NO. 2
I 7 INJECTOR NO. 3
I 8 INJECTOR NO. 4
I 9 INJECTOR NO. 5
I10 INJECTOR NO. 6
C 2 CAMSHAFT TIMING OIL CONTROL VALVE
E 3 A, E 4 B, E 5 C, E 6 D, E 7 E ENGINE CONTROL MODULE
MREL
BATT
IGSW
#10
#20
#30
#40
#50
#60
+BM
OCV+
OCV–
FPR
FC
STA
+B
+B2
ACIS
PRG
HT1A
OX1A
HT2A
OX2A
J 3 JUNCTION CONNECTOR
V 2 VSV (ACIS)
V 4 VSV (EVAP)
H 9 HEATED OXYGEN SENSOR (BANK 1 SENSOR 1)
H11 HEATED OXYGEN SENSOR (BANK 2 SENSOR 1)
HT
OX
+B
E1
EA3
EA1
E 4
E 6
E 7
E 9
2B
2I
(*1)
B–R
B–O
B–Y
G–R
G–Y
B(A/T)
B(M/T)
R
L
V
R–W
L–R
B–W
L–W
R–Y
Y–B
Y–G
W–G
LG
W
P
B
BR


V 3
VSV
(CANISTER CLOSED VALVE)
M 1
MASS AIR FLOW METER
J 1 (A), J 2 (B)
JUNCTION CONNECTOR
E 8
ENGINE COOLANT TEMP. SENSOR
P 2
POWER STEERING OIL PRESSURE SENSOR
GND
VOUT
VC
T 3
THROTTLE POSITION SENSOR
E10
E 8
EA2
E 3 (A), E 4 (B), E 5 (C), E 6 (D), E 7 (E) ENGINE CONTROL MODULE
CCV
THA
VG
EVG
E2
THW
PSP
VC
VTA
VTA2
HT1B
OX1B
E1
KNK1
KNK2
NE
NE–
G2
H10
HEATED OXYGEN SENSOR (BANK 1 SENSOR 2)
HT
OX
+B
E1
J 4
JUNCTION CONNECTOR
K 2
KNOCK SENSOR 1
K 3
KNOCK SENSOR 2
C 3
CRANKSHAFT POSITION SENSOR
C 1
CAMSHAFT POSITION SENSOR
E11
E 9
EA
(*1)
BR
B–R
Y–G
L–B
G–B
L–W
R
V
L–Y
W–R
G–Y
W
B
B–W
L
G



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
* 1 : SHIELDED
15A STOP
S 8 STOP LIGHT SW
A 9 ACCEL POSITION SENSOR
V 7 VAPOR PRESSURE SENSOR
E2
VCC
PTNK
T 2 THROTTLE CONTROL MOTOR
E 8
VPA
VPA2
PTNK
CL+
CL–
M+
M–
GE01
STP
E 3 A, E 4 B, E 5 C, E 6 D, E 7 E ENGINE CONTROL MODULE
OX2B
HT2B
TBP
E01
E02
ME01
E03
J 1 A, J 2 B JUNCTION CONNECTOR
J 7 JUNCTION CONNECTOR
H17 HEATED OXYGEN SENSOR (BANK 2 SENSOR 2)
OX
HT
E1
+B
V 8 VSV (PRESSURE SWITCHING VALVE)
J16 JUNCTION CONNECTOR
(S/D)
(W/G)
(M/T)
(A/T)
EA
EB


FROM FAN NO. 1, NO. 2 RELAY AND DIODE (A/C)
FROM A/C COMP RELAY
I 1
IGNITER
IN1
IN2
IN3
IGF
C 5
CENTER AIRBAG SENSOR ASSEMBLY
GSW2
W–L
(M/T)
L–B
L–W
GR–B
B–R
B–Y
B–L
L
IG3
IA1
FAN
ACMG
IGT
IGT2
IGT3
IGF
F/PS
SPD
E 3 A, E 4 B, E 5 C, E 6 D, E 7 E ENGINE CONTROL MODULE
MOL
EC
EOM
MOPS
TRC+
TRC–
ENG+
ENG–
NEO
W
MPX1
MPX2
TC
SIL
W–R
W–B
GR
R–Y
W–G
P
G
R–L
O
R–W
IA3
2B
2A
2E
E10
ENGINE OIL LEVEL SENSOR
OIL TEMP.
OIL LEVEL
J 3
JUNCTION CONNECTOR
E11
ENGINE OIL PRESSURE SW
S16 B, S17 C
SKID CONTROL ECU
SP1
D 5
DATA LINK CONNECTOR 3
CG
SG
BR
EA1
E 2
R–Y
(A/T)
R–Y(A/T)
EC
IH
EB


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
7. 5A
OBD
10A
GAUGE
10A
MPX–B
6 2E
9 1K
2 1E
5 2H
V
R–L(M/T)
W–L
(M/T)
W–L(M/T)
R–Y
7 1H
2 1H
D B
J 2 B
JUNCTION
CONNECTOR
B
J 7
JUNCTION
CONNECTOR
R–L
W–L
(M/T)
B
8 2G
5 2E
8 2M
14 A
13 A
17 A
15 A
TACHOMETER
SPEEDOMETER
MALFUNCTION
INDICATOR LAMP
16 B
TACH
WFSE
22 B
LG
9 IA3
E 3 A, E 4 B, E 5 C, E 6 D, E 7 E
ENGINE CONTROL MODULE
1 B
12 A
19 A
C 9 A, C10 B
COMBINATION METER
20 A
21 A
7 A
R
(M/T)
R–Y
(A/T)
11 IA3
16 IA1
L
O
8
MPX2
MPX1
T 6
THEFT
DETERRENT ECU
15
WFSE
TAC
BAT
9
16
D 5
DATA LINK
CONNECTOR 3
7 EA2
6 EA2
8 EA2
BR–W
5 B
MPX2
MPX1
B 6 B
BODY ECU
1 1G
10 B
MPX+
MPX–
1 A
A12 A, A13 B
A/C CONTROL ASSEMBLY
1
2
3
IG+
SE
SI
V 9
VEHICLE SPEED SENSOR
(COMBINATION METER)
R–Y(A/T)
O
L
R–L
IE

SYSTEM OUTLINE

The engine control system utilizes a microcomputer and maintains overall control of the engine, transmission etc. An outline of the engine control is given here.

1. INPUT SIGNALS

(1) Engine coolant temp. signal circuit

The engine coolant temp. sensor detects the engine coolant temp. and has a built–in thermistor with a resistance, which varies according to the engine coolant temp.. The engine coolant temp. which is input into TERMINAL THW of the engine control module as a control signal.

(2) Intake air temp. signal circuit

The intake air temp. sensor is installed in the mass air flow meter and detects the intake air temp. which is input as a control signal to TERMINAL THA of the engine control module.

(3) Oxygen density signal circuit

The oxygen density in the exhaust emission is detected by the heated oxygen sensors and input as a control signal to TERMINALS OX1A, OX2A, OX1B and OX2B of the engine control module.

(4) RPM signal circuit

Camshaft position is detected by the camshaft position sensor and its signal is input to TERMINAL G2 of the engine control module as a control signal.
Also,engine RPM is detected by the crankshaft position sensor and is input as a control signal to TERMINAL NE.

(5) Throttle position signal circuit

The throttle position sensor detects the throttle valve opening angle as a control signal, which is input into TERMINALS VTA and VTA2 of the engine control module.

(6) Vehicle speed circuit

(A/T)
Signals detected by ABS speed sensors are input into the combination meter through skid control ECU. Then it is delivered to the engine control module through MPX communication.
(M/T)
The vehicle speed sensor (Combination meter) detects the vehicle speed and inputs a control signal to TERMINAL SPD of the engine control module.

(7) Battery signal circuit

Voltage is constantly applied to TERMINALS BATT and +BM of the engine control module. If you turn on the ignition SW, the current goes from TERMINAL MREL of the engine control module to the EFI relay and put on the relay, and the voltage related to the engine control module operation is supplied to TERMINALS +B and +B2 of the engine control module through the EFI relay.
The current flowing through the IGN fuse flows to TERMINAL IGSW of the engine control module.

(8) Intake air volume signal circuit

Intake air volume is detected by the mass air flow meter and the signal is input to TERMINAL VG of the engine control module as a control signal.

(9) Stop light SW signal circuit

The stop light SW is used to detect whether the vehicle is braking or not and the signal is input into TERMINAL STP of the engine control module as a control signal.

(10) Starter signal circuit

To confirm whether the engine is cranking, the voltage is applied to the starter motor during cranking is detected and the signal is input into TERMINAL STA of the engine control module as a control signal.

(11) Engine knock signal circuit

Engine knocking is detected by knock sensors and the signal is input into TERMINALS KNK1 and KNK2 of the engine control module as a control signal.

2. CONTROL SYSTEM

* SFI system
  The SFI system monitors the engine condition through the signals input from each sensor to the engine control module. And the control signal is output to TERMINALS #10, #20, #30, #40, #50 and #60 of the engine control module to operate the injector (Inject the fuel). The SFI system controls the fuel injection operation by the engine control module in response to the driving conditions.
* ESA system
  The ESA system monitors the engine condition through the signals input to the engine control module from each sensor. The best ignition timing is decided according to this data and the memorized data in the engine control module and the control signal is output to TERMINALS IGT, IGT2 and IGT3. This signal controls the igniter to provide the best ignition timing for the driving conditions.
* Heated oxygen sensor heater control system
  The heated oxygen sensor heater control system turns the heater on when the intake air volume is low (Temp. of exhaust emissions is low), and warms up the oxygen sensors to improve detection performance of the sensors. The engine control module evaluates the signals from each sensor, and outputs current to TERMINALS HT1A, HT2A, HT1B and HT2B to control the heater.
* ACIS
  ACIS includes a valve in the bulkhead separating the surge tank into two parts. This valve is opened and closed in accordance with the driving conditions to control the intake manifold length in two stages for increased engine output in all ranges from low to high speeds.
  The engine control module judges the engine speed by the signals from each sensor and outputs signal to the TERMINAL ACIS of the engine control module and controls the VSV (ACIS).
* ETCS–i
  The ETCS–i controls the engine output at its optimal level corresponding to the opening of the accel. pedal under all driving conditions.
* Fuel pump control system
  The engine control module operation outputs to TERMINAL FPR and controls the FUEL PMP relay. Thus controls the fuel pump drive speed in response to conditions.
* MPX
  The MPX communicates with the combination meter, A/C control assembly, as well as body ECU of the multiplex communication system

3. DIAGNOSIS SYSTEM

With the diagnosis system, when there is a malfunction in the engine control module signal system, the malfunctioning system is recorded in the memory. The malfunctioning system can be found by reading the code displayed by the check engine warning light.

4. FAIL–SAFE SYSTEM

When a malfunction has occurred in any system, if there is a possibility of engine trouble being caused by continued control based on the signals from that system, the fail–safe system either controls the system by using data (Standard values) recorded in the engine control module memory or else stops the engine.

SERVICE HINTS

EFI RELAY

5–3 : Closed with the ignition SW at **ON** or **ST** position

E10 ENGINE OIL LEVEL SENSOR

1–2 : Closed with the float up and the engine oil temp. below **40**˚C–**49**˚C (**104.0**˚F–**120.2**˚F)
Open with the float down and the engine oil temp. above **50**˚C–**60**˚C (**122.0**˚F–**140.0**˚F)

E11 ENGINE OIL PRESSURE SW

1–GROUND : Closed with the oil pressure below approx. **0.2** kgf/cm^2 (**2.8** psi, **19.6** kpa)

E8 ENGINE COOLANT TEMP. SENSOR

1–2 : Approx. **15.04** kΩ at **–20**˚C (**–4**˚F)
Approx. **2.45** kΩ at **20**˚C (**68**˚F)
Approx. **0.32** kΩ at **80**˚C (**176**˚F)
Approx. **0.14** kΩ at **110**˚C (**230**˚F)

E3 (A), E4 (B), E5 (C), E6 (D), E7 (E) ENGINE CONTROL MODULE

BATT–GROUND : Always approx. **12** volts
+BM–GROUND : Always approx. **12** volts
IGSW–GROUND : Approx. **12** volts with the ignition SW at **ON** position
+B, +B2–GROUND : Approx. **12** volts with the ignition SW at **ON** position
VC–GROUND : **4.5**–**5.5** volts with the ignition SW on
VTA2–GROUND : **2.0**–**2.9** volts with the ignition SW on and the throttle valve fully closed
4.6–**5.0** volts with the ignition SW on and the throttle valve fully opened
VTA–GROUND : **0.4**–**1.0** volts with the ignition SW on and the throttle valve fully closed
3.2–**4.8** volts with the ignition SW on and the throttle valve fully opened
VPA–GROUND : **0.25**–**0.9** volts with the ignition SW at on and the accelerator fully closed
3.2–**4.8** volts with the ignition SW at on and the accelerator fully opened
VPA2–GROUND : **1.8**–**2.7** volts with the ignition SW at on and the accelerator fully closed
4.7–**5.0** volts with the ignition SW at on and the accelerator fully opened
THA–GROUND : **0.5**–**3.4** volts with the engine idling and the intake air temp. **20**˚C (**68**˚F)
THW–GROUND : **0.2**–**1.0** volts with the engine idling and the coolant temp. **80**˚C (**176**˚F)
STA–GROUND : **6.0** volts or more with the engine cranking
TC–GROUND : **9.0**–**14.0** volts with the ignition SW on
W–GROUND : **9.0**–**14.0** volts with the engine idling
0–**3.0** volts with the ignition SW on
ACMG–GROUND : **0**–**1.5** volts with the A/C SW on (at the engine idling)
7.5–**14.0** volts with the A/C SW off and the throttle valve fully open
#10, #20, #30, #40, #50, #60–GROUND : Pulse generation with the engine idling
E01, E02, E03, E1, EC, ME01, EOM–GROUND : Always continuity

: PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
A9		32	F15		38 (W/G)	J16		38 (W/G)
A12	A	34	H9		33	J19		35
A13	B	34	H10		33	K2		33
B6	B	34	H11		33	K3		33
C1		32	H17		36 (S/D)	M1		33
C2		32			38 (W/G)	P1		33
C3		32	I1		33	P2		33
C5		34	I5		33	S8		35
C9	A	34	I6		33	S16	B	35
C10	B	34	I7		33	S17	C	35
C14		34	I8		33	T2		33
D5		34	I9		33	T3		33
E3	A	32	I10		33	T6		35
E4	B	32	I12		35	V2		33
E5	C	32	J1	A	33	V3		33
E6	D	32	J2	B	33	V4		33
E7	E	32	J3		33	V7		37 (S/D)
E8		32	J4		33			39 (W/G)
E10		32	J7		35	V8		37 (S/D)
E11		32	J15		36 (S/D)			39 (W/G)
F12		32			38 (W/G)	V9		33
F15		36 (S/D)	J16		36 (S/D)			

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)
3	23	Engine Room No.3 R/B (Engine Compartment Left)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1D	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2B		
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2G		
2H		
2I		
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

ENGINE CONTROL

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1 EA2 EA3	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA1 IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IC1	44	Engine Room Main Wire and Floor No.2 Wire (Near the Driver Side J/B)
IG1 IG3	46	Instrument Panel Wire and Engine Room Main Wire (Near the Passenger Side J/B)
IH1 IH4	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
BC2	48 (S/D)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)
	50 (W/G)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel Center)

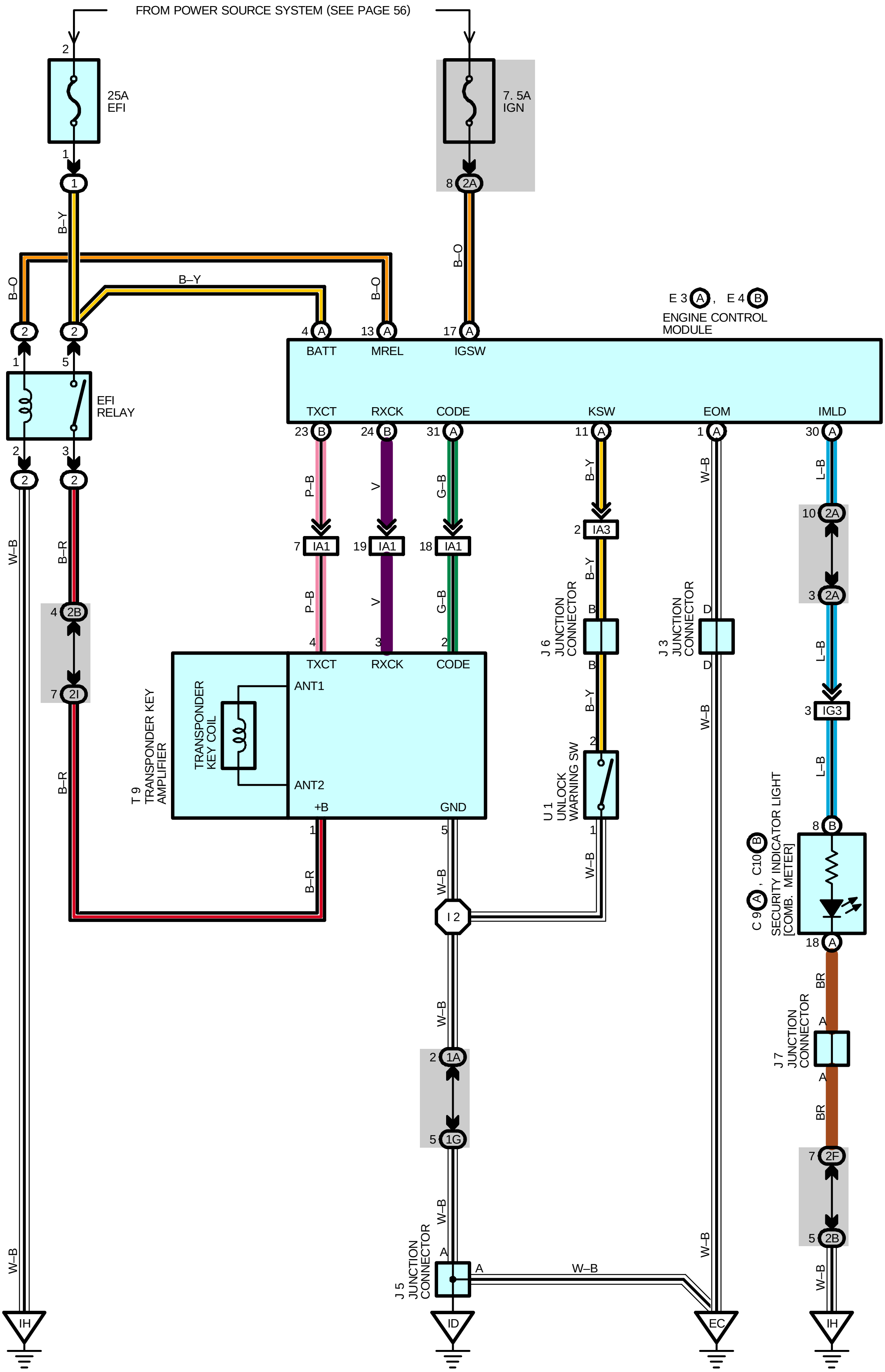
: GROUND POINTS

Code	See Page	Ground Points Location
EA	42	Front Side of the Intake Manifold
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
IE	44	Front Floor Panel Center LH
IH	44	Cowl Side Panel RH
BL	48 (S/D) 50 (W/G)	Left Quarter Panel LH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E2 E4	42	Engine Room Main Wire	E8 E9 E10 E11	42	Engine Wire
E6 E7	42	Engine Wire			

ENGINE IMMOBILISER SYSTEM



SERVICE HINTS

EFI RELAY

5–3 : Closed with the ignition SW at **ON** or **ST** position

U1 UNLOCK WARNING SW

1–2 : Closed with the ignition key in the ignition key cylinder

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
C9	A	34	J3	33	T9	35
C10	B	34	J5	35	U1	35
E3	A	32	J6	35		
E4	B	32	J7	35		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2B		
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2I		

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
IG3	46	Instrument Panel Wire and Engine Room Main Wire (Near the Passenger Side J/B)

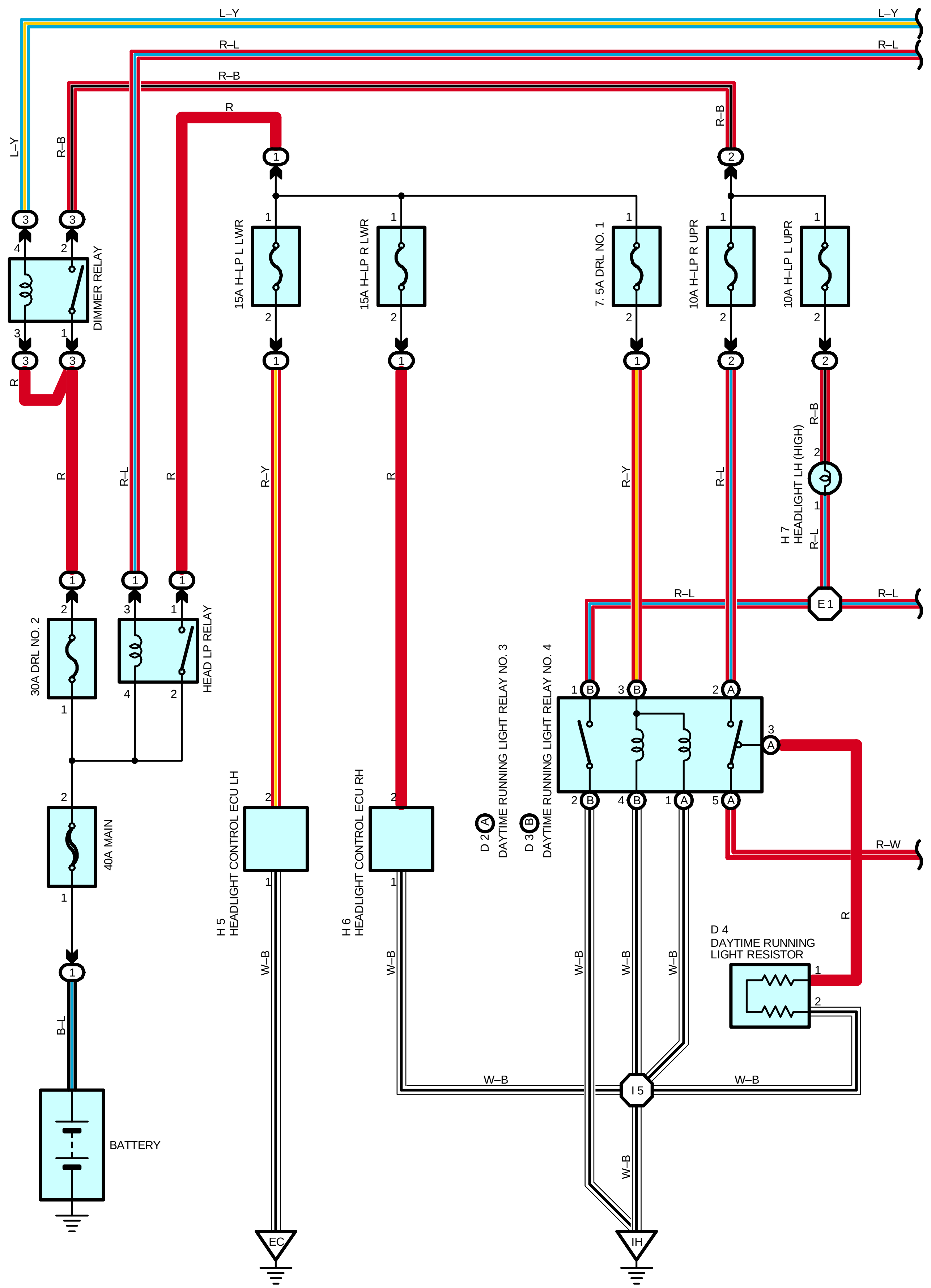
▽ : GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH

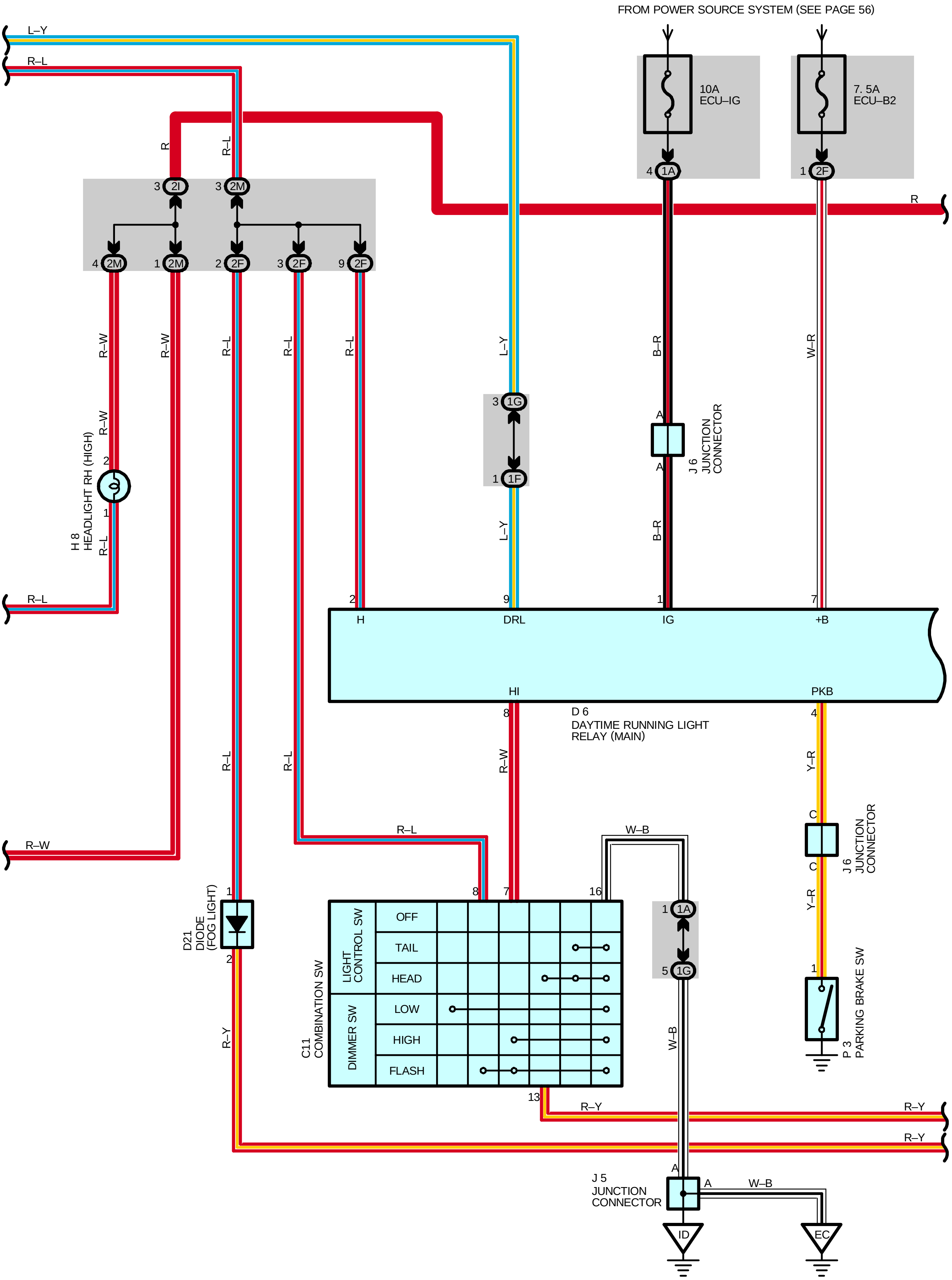
: SPLICE POINTS

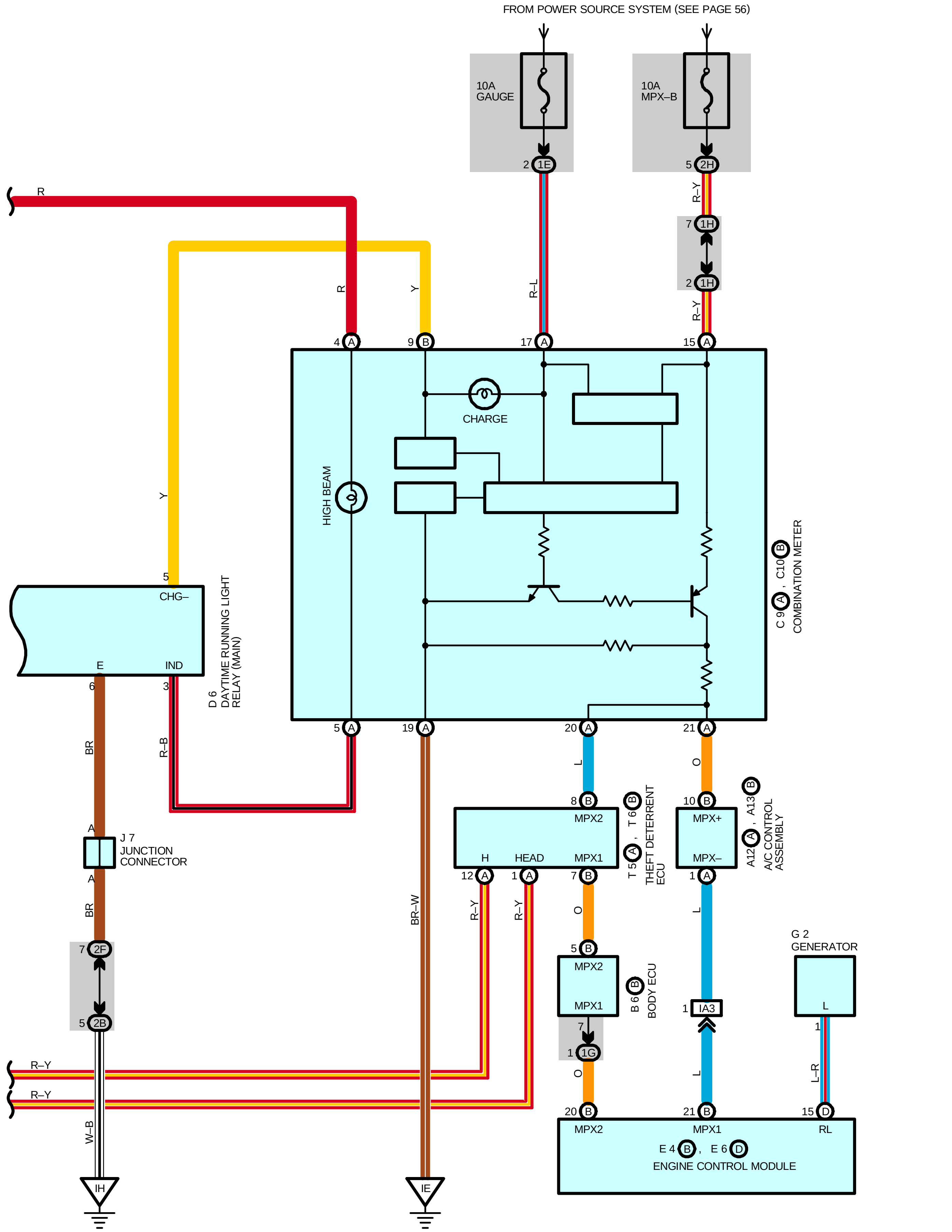
Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I2	46	Instrument Panel Wire			

HEADLIGHT



L–Y
R–L
R–B
R
DIMMER RELAY
15A H–LP L LWR
15A H–LP R LWR
7. 5A DRL NO. 1
10A H–LP R UPR
10A H–LP L UPR
H 7
HEADLIGHT LH (HIGH)
E 1
30A DRL NO. 2
HEAD LP RELAY
40A MAIN
BATTERY
B–L
H 5
HEADLIGHT CONTROL ECU LH
H 6
HEADLIGHT CONTROL ECU RH
D 2 A
DAYTIME RUNNING LIGHT RELAY NO. 3
D 3 B
DAYTIME RUNNING LIGHT RELAY NO. 4
R–Y
R–W
D 4
DAYTIME RUNNING
LIGHT RESISTOR
W–B
I 5
EC
IH


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
ECU–IG
7. 5A
ECU–B2
L–Y
R–L
R
R–W
B–R
W–R
W–B
Y–R
R–Y
H 8
HEADLIGHT RH (HIGH)
J 6
JUNCTION
CONNECTOR
H
DRL
IG
+B
HI
PKB
D 6
DAYTIME RUNNING LIGHT
RELAY (MAIN)
D21
DIODE
(FOG LIGHT)
C11
COMBINATION SW
LIGHT
CONTROL SW
DIMMER SW
OFF
TAIL
HEAD
LOW
HIGH
FLASH
P 3
PARKING BRAKE SW
J 5
JUNCTION
CONNECTOR
ID
EC


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A GAUGE
10A MPX–B
2 1E
5 2H
R–Y
7 1H
2 1H
R–Y
R–L
R
Y
R
Y
4 A
9 B
17 A
15 A
CHARGE
HIGH BEAM
C 9 A , C10 B
COMBINATION METER
5
CHG–
E
IND
6
3
D 6
DAYTIME RUNNING LIGHT RELAY (MAIN)
BR
R–B
5 A
19 A
20 A
21 A
L
O
8 B
MPX2
H
HEAD
MPX1
12 A
1 A
7 B
T 5 A , T 6 B
THEFT DETERRENT ECU
10 B
MPX+
MPX–
1 A
A12 A , A13 B
A/C CONTROL ASSEMBLY
A
J 7
JUNCTION CONNECTOR
A
BR
7 2F
5 2B
BR–W
R–Y
R–Y
O
L
5 B
MPX2
MPX1
B 6 B
BODY ECU
7
1 1G
1 IA3
G 2
GENERATOR
L
1
L–R
O
L
R–Y
R–Y
W–B
20 B
21 B
15 D
MPX2
MPX1
RL
E 4 B , E 6 D
ENGINE CONTROL MODULE
IH
IE

SYSTEM OUTLINE

The current is always flowing from the ECU–B2 fuse to TERMINAL 7 of the daytime running light relay (Main).
When the ignition SW is turned on, the current flowing through the ECU–IG fuse flow to TERMINAL 1 of the daytime running light relay (Main).

1. DAYTIME RUNNING LIGHT OPERATION

When the engine is started, the generator signal is input from the combination meter to TERMINAL 5 of the daytime running light relay (Main). At this time, when the parking brake lever is pulled up (The parking brake SW is on), the relay is not activated and the daytime running light system does not function. When the parking brake lever is released (The parking brake SW is off), the signal is input to TERMINAL 4 of the daytime running light relay (Main). This activates the relay to turn on the DIMMER relay. The current flows from the battery into the MAIN fuse to DRL NO.2 fuse to DIMMER relay (Point side) to H–LP L UPR fuse to TERMINAL 2 of the headlight LH (High) to TERMINAL 1 to TERMINAL 1 of the headlight RH (High) to TERMINAL 2 to TERMINAL (A) 5 of the daytime running light relay No.3 to TERMINAL (A) 3 to TERMINAL 1 of the daytime running light resistor to TERMINAL 2 to GROUND. The headlights light up more dimly than usual as the engine is started.
Once the daytime running light system has been activated, the headlights are remained lit even though the parking brake lever is pulled up (The parking brake SW is on). Even if the engine is stopped and the generator signal is cut off with the ignition SW set at ON, the headlights are remained lit. When the ignition SW is turned from ON to OFF, the daytime running light system is stopped and the headlights go off. If the engine is started with the parking brake lever is released, the daytime running light system starts functioning and the headlights light up as the engine is started.

2. HEADLIGHT OPERATION

∗ Light control SW is set at HEAD.

When the light control SW is set to HEAD position, the signal is input to TERMINAL 12 of the theft deterrent ECU. This activates the theft deterrent ECU and turns on the HEAD LP relay. When the signal is input to TERMINAL 2 of the daytime running light relay (Main), the daytime running light system is deactivated and headlights LH and RH (High) go off. At this time, the current flows from the battery into the MAIN fuse to HEAD LP relay (Point side) to H–LP L LWR and H–LP R LWR fuse to TERMINAL 2 of the headlight control ECU LH and RH to TERMINAL 1 to GROUND, to turn on the headlights (Low beam).

∗ Dimmer SW is set at HIGH.

When the light control SW is set to HEAD position, the current flows from DRL No.1 fuse into the daytime running light relay No.3 and No.4 (Coil side) to turn on the relay as the headlights (Low beam) light up. At this time, when the dimmer SW is set to HIGH position, the signal is input to TERMINAL 8 of the daytime running light relay (Main). This activates the DIMMER relay to flow the current from the battery into the MAIN fuse to DRL NO.2 fuse to DIMMER relay (Point side) to H–LP L UPR fuse to headlight LH (High) to daytime running light relay No.4 (Point side) to GROUND and the current flows from H–LP R UPR to daytime running light relay No.3 (Point side) to headlight RH (High) to daytime running light relay No.4 (Point side) to GROUND, to turn on the headlights (High and low) and high beam indicator light at the same time.

∗ Dimmer SW is set at FLASH.

When the dimmer SW is set to FLASH position, the current flows from the battery into the MAIN fuse, HEAD LP relay (Coil side) to TERMINAL 8 of the combination SW to TERMINAL 16 to GROUND in that order to turn on the HEAD LP relay.
Additionally, the signal is input to TERMINAL 8 of the daytime running light relay (Main) to activate the relay and turn on the DIMMER relay. In the same manner as the dimmer SW set at HIGH position, the headlights (High and low) and high beam indicator light are turned on at the same time.

HEADLIGHT

SERVICE HINTS

HEAD LP RELAY

2–1 : Closed with the light control SW at **HEAD** position or the dimmer SW at **FLASH** position

DIMMER RELAY

1–2 : Closed with the daytime running light operation
Closed with the light control SW at **HEAD** position and the dimmer SW at **HIGH** position
Closed with the dimmer SW at **FLASH** position

D2 (A), D3 (B) DAYTIME RUNNING LIGHT RELAY NO.3, NO.4

(A) 2–(A) 5, (B) 1–(B) 2 : Closed with the light control SW at **HEAD** position and the dimmer SW at **HIGH** position or the dimmer SW at **FLASH** position

C11 COMBINATION SW

13–16 : Closed with the light control SW at **HEAD** position
8–16 : Closed with the dimmer SW at **FLASH** position
7–16 : Closed with the dimmer SW at **HIGH** or **FLASH** position

D6 DAYTIME RUNNING LIGHT RELAY (MAIN)

7–GROUND : Always approx. **12** volts
1–GROUND : Approx. **12** volts with the ignition SW at **ON** position
6–GROUND : Always continuity
4–GROUND : Continuity with the parking brake lever pulled up

: PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
A12	A	34	D4		32	H7		33
A13	B	34	D6		34	H8		33
B6	B	34	D21		34	J5		35
C9	A	34	E4	B	32	J6		35
C10	B	34	E6	D	32	J7		35
C11		34	G2		32	P3		35
D2	A	32	H5		33	T5	A	35
D3	B	32	H6		33	T6	B	35

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)
3	23	Engine Room No.3 R/B (Engine Compartment Left)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2H		
2I		
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

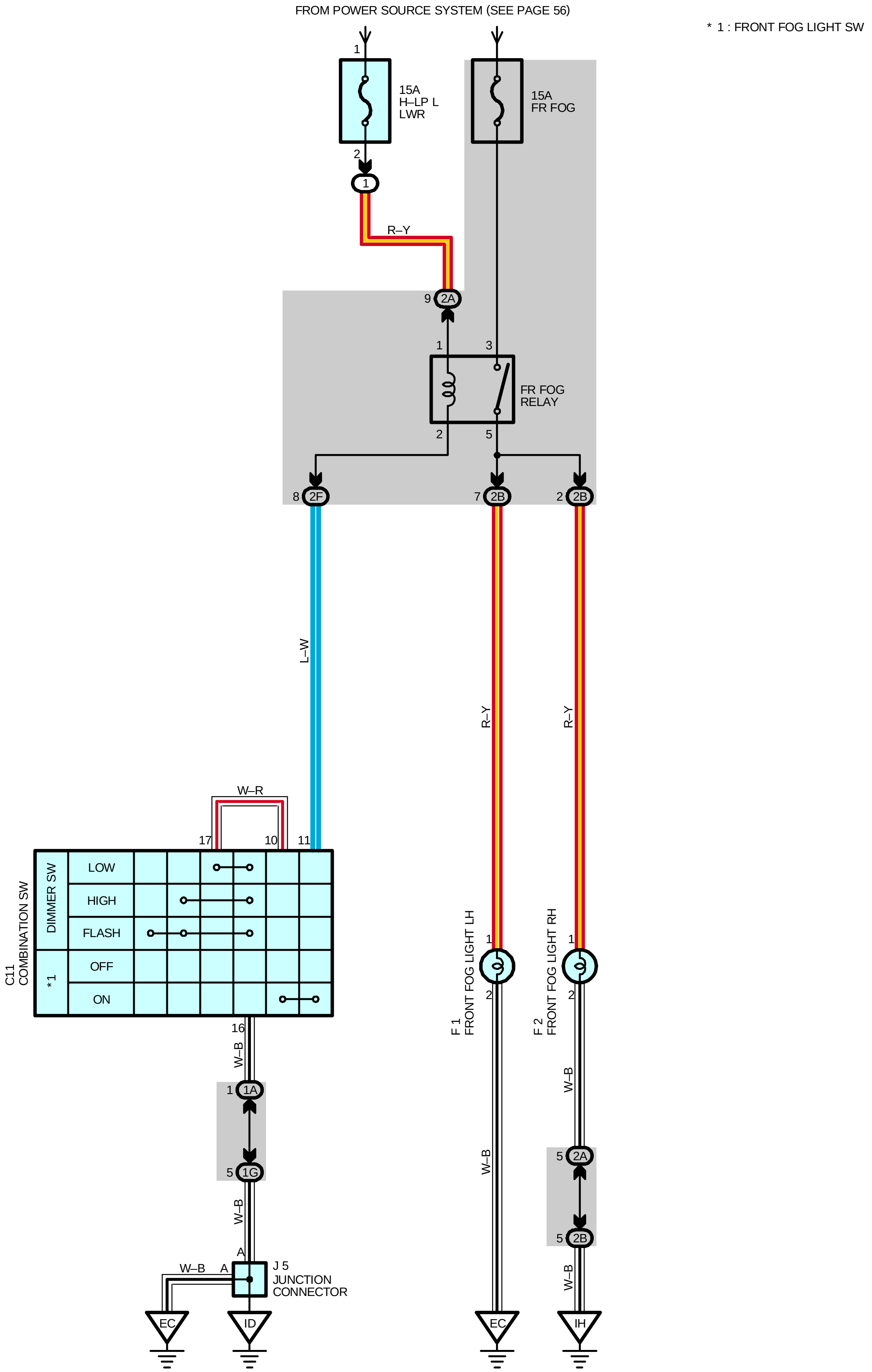
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)

: GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IE	44	Front Floor Panel Center LH
IH	44	Cowl Side Panel RH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E1	42	Engine Room Main Wire	I5	46	Engine Room Main Wire


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
* 1 : FRONT FOG LIGHT SW
15A
H–LP L
LWR
15A
FR FOG
R–Y
FR FOG
RELAY
L–W
R–Y
R–Y
W–R
LOW
HIGH
FLASH
OFF
ON
DIMMER SW
*1
C11
COMBINATION SW
F 1
FRONT FOG LIGHT LH
F 2
FRONT FOG LIGHT RH
W–B
W–B
W–B
W–B
W–B
W–B
J 5
JUNCTION
CONNECTOR
EC
ID
EC
IH

SERVICE HINTS

FR FOG RELAY

3–5 : Closed with the light control SW at **HEAD** position, the dimmer SW at **LOW** position and the front fog light SW at **ON** position

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C11	34	F2	32		
F1	32	J5	35		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

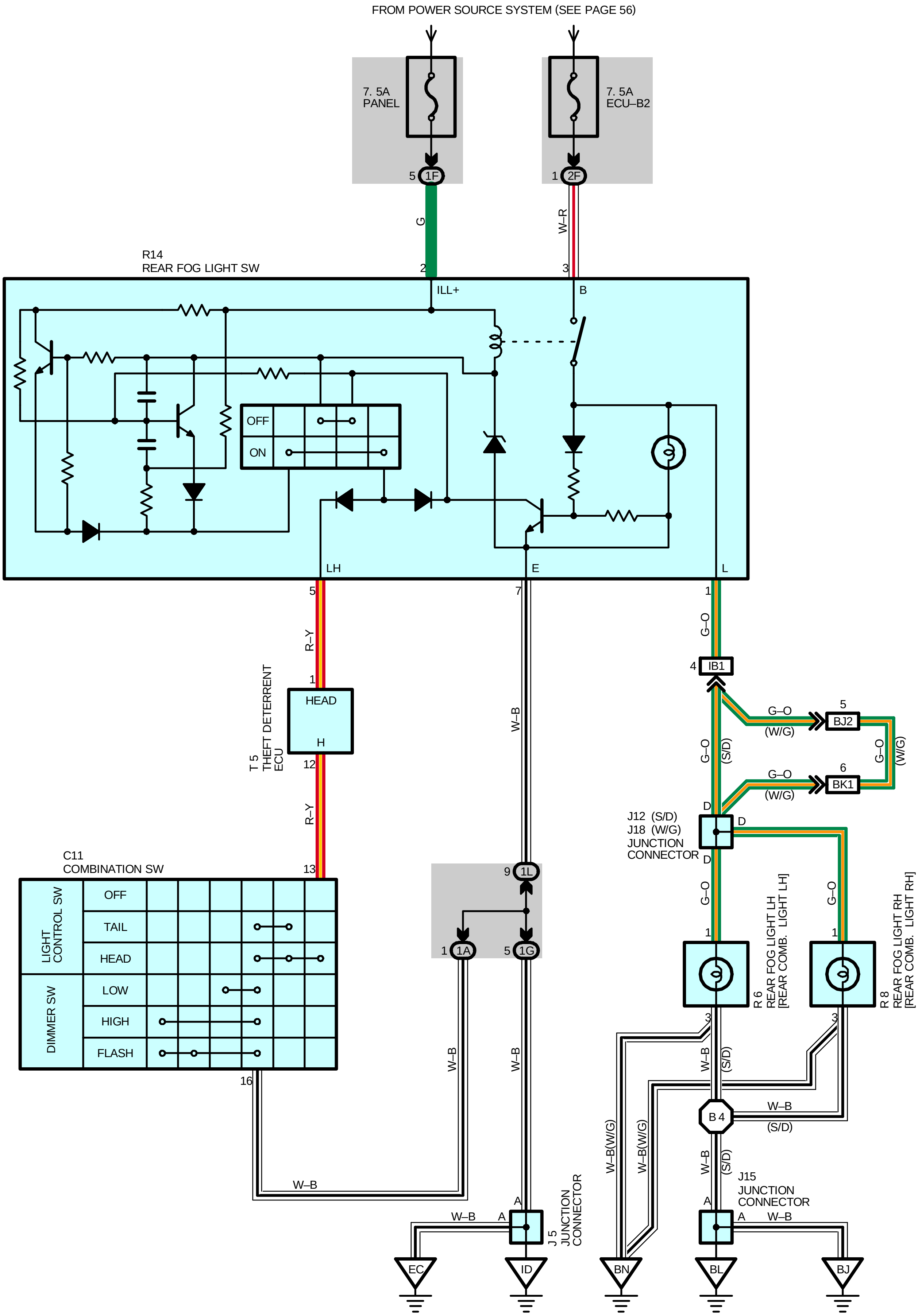
: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2B		
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH

REAR FOG LIGHT



SERVICE HINTS

R14 REAR FOG LIGHT SW

1–GROUND : Approx. **12** volts with the light control SW at **HEAD** position and the rear fog light SW at **ON** position
2–GROUND : Approx. **12** volts with the light control SW at **HEAD** or **TAIL** position
7–GROUND : Always continuity
3–GROUND : Always approx. **12** volts

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C11	34	J18	38 (W/G)	R8	39 (W/G)
J5	35	R6	37 (S/D)	R14	35
J12	36 (S/D)		39 (W/G)	T5	35
J15	36 (S/D)	R8	37 (S/D)		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1L	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
BJ2	50 (W/G)	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BK1	50 (W/G)	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)

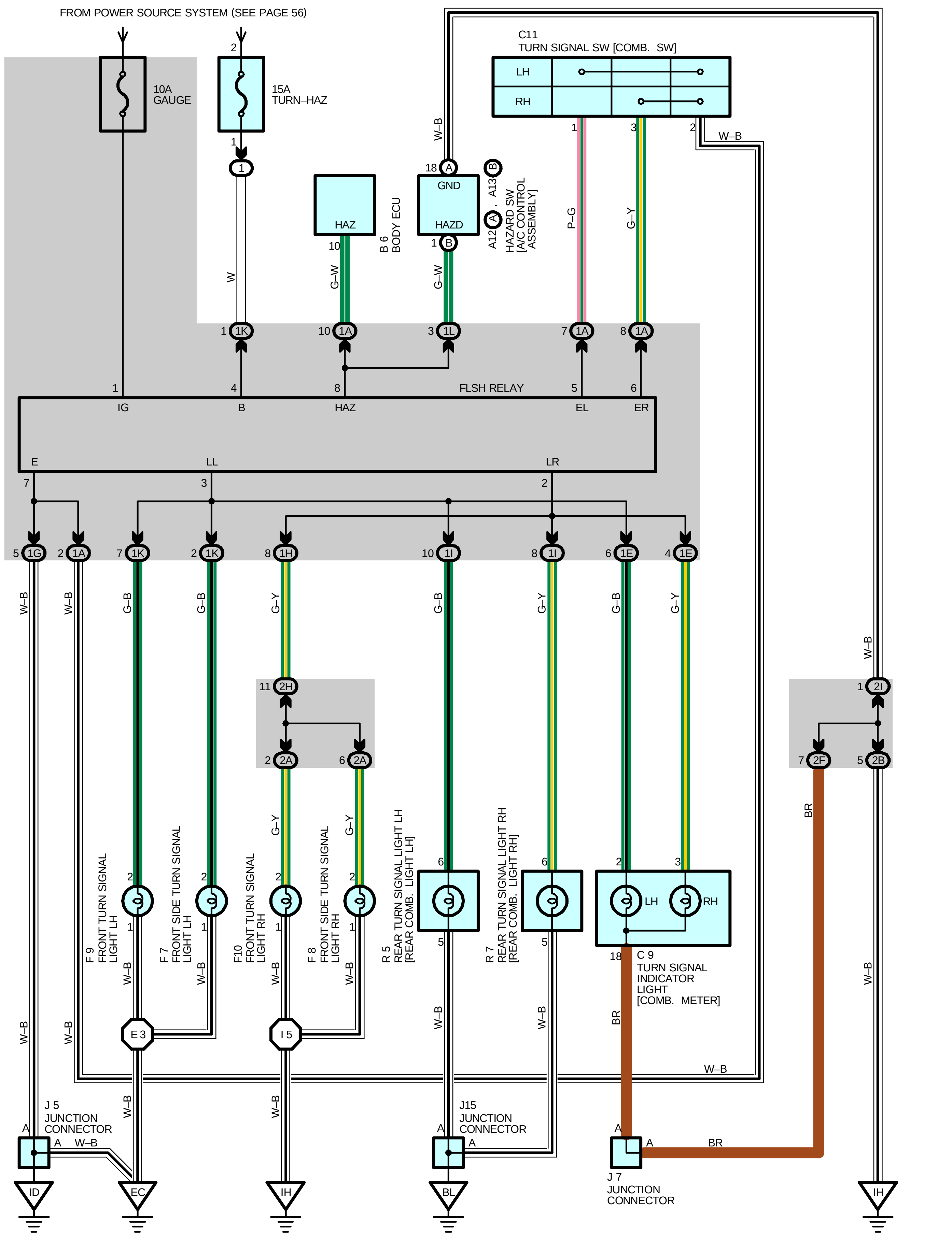
▽ : GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
BJ	48 (S/D)	Front Floor Panel LH
BL	48 (S/D)	Left Quarter Panel LH
BN	50 (W/G)	Right Side of the Back Panel Lower

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B4	48 (S/D)	Floor No.2 Wire			

TURN SIGNAL AND HAZARD WARNING LIGHT



SERVICE HINTS

FLSH RELAY

4–GROUND : Always approx. **12** volts
1–GROUND : Approx. **12** volts with the ignition SW at **ON** position
7–GROUND : Always continuity

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
A12	A	34	F8	32	J15	38 (W/G)
A13	B	34	F9	32	R5	37 (S/D)
B6		34	F10	32		39 (W/G)
C9		34	J5	35	R7	37 (S/D)
C11		34	J7	35		39 (W/G)
F7		32	J15	36 (S/D)		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

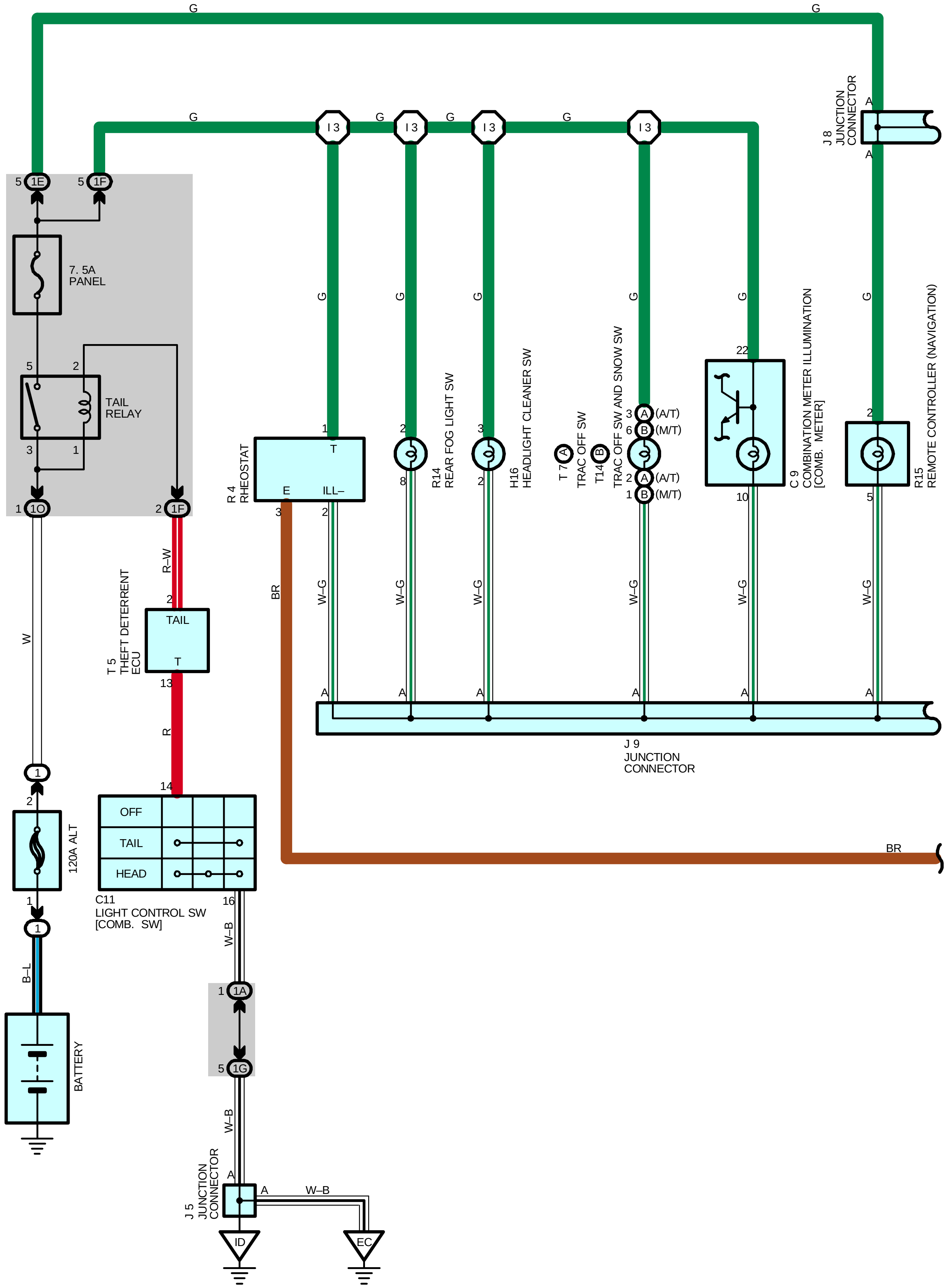
Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1L	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2B		
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2H		
2I		

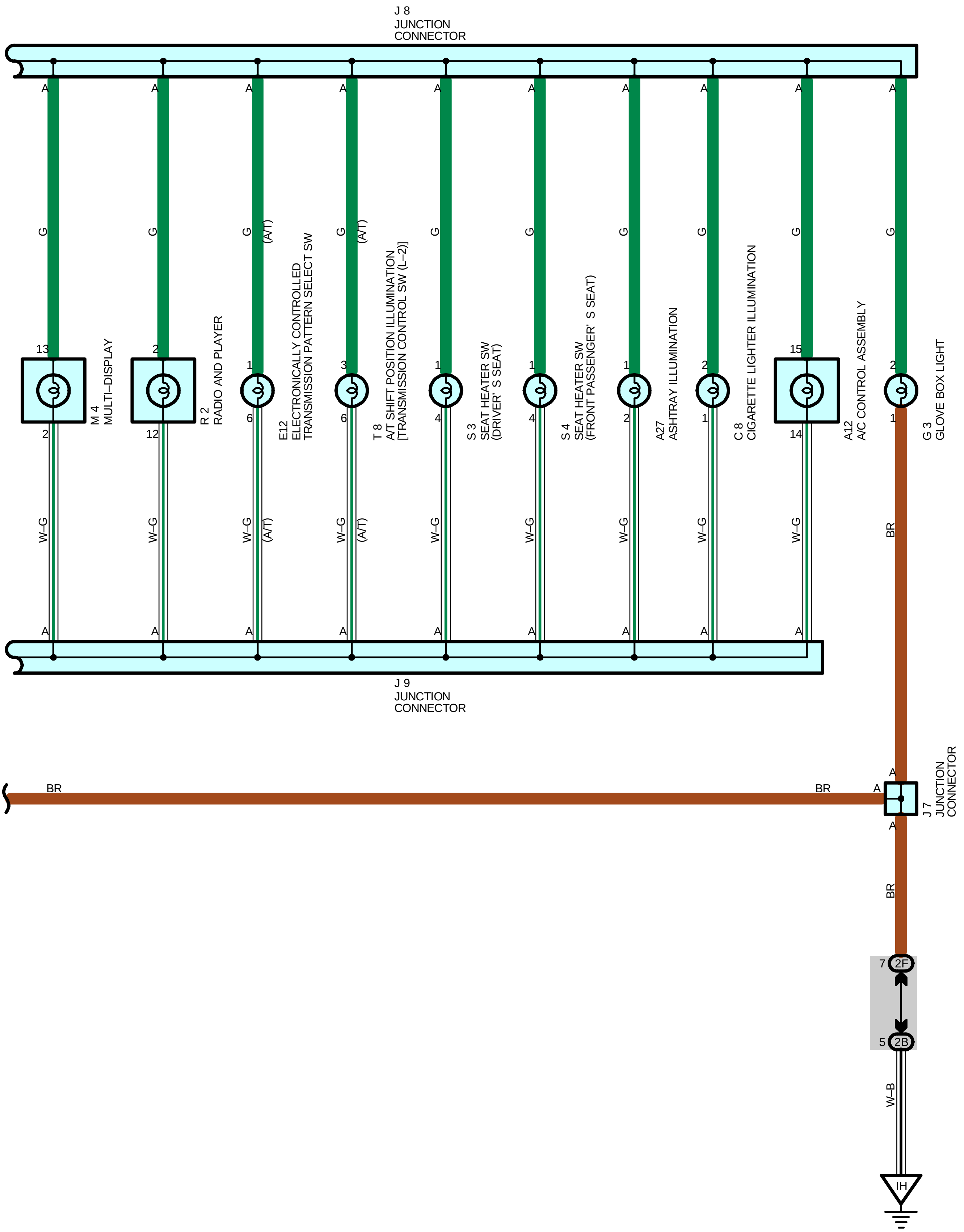
▽ : GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BL	48 (S/D)	Left Quarter Panel LH
	50 (W/G)	

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E3	42	Engine Room Main Wire	I5	46	Engine Room Main Wire


G
G
I 3
7. 5A
PANEL
TAIL
RELAY
R 4
RHEOSTAT
T
E
ILL–
R14
REAR FOG LIGHT SW
H16
HEADLIGHT CLEANER SW
T 7
TRAC OFF SW
T14
TRAC OFF SW AND SNOW SW
(A/T)
(M/T)
C 9
COMBINATION METER ILLUMINATION
[COMB. METER]
R15
REMOTE CONTROLLER (NAVIGATION)
J 8
JUNCTION
CONNECTOR
W–G
BR
R–W
T 5
THEFT DETERRENT
ECU
TAIL
R
W
J 9
JUNCTION
CONNECTOR
120A ALT
OFF
TAIL
HEAD
C11
LIGHT CONTROL SW
[COMB. SW]
W–B
B–L
BATTERY
J 5
JUNCTION
CONNECTOR
ID
EC



J 8
JUNCTION
CONNECTOR
M 4
MULTI–DISPLAY
R 2
RADIO AND PLAYER
E12
ELECTRONICALLY CONTROLLED
TRANSMISSION PATTERN SELECT SW
T 8
A/T SHIFT POSITION ILLUMINATION
[TRANSMISSION CONTROL SW (L–2)]
S 3
SEAT HEATER SW
(DRIVER' S SEAT)
S 4
SEAT HEATER SW
(FRONT PASSENGER' S SEAT)
A27
ASHTRAY ILLUMINATION
C 8
CIGARETTE LIGHTER ILLUMINATION
A12
A/C CONTROL ASSEMBLY
G 3
GLOVE BOX LIGHT
(A/T)
G
W–G
BR
W–B
J 9
JUNCTION
CONNECTOR
J 7
JUNCTION
CONNECTOR
2F
2B
IH

SERVICE HINTS

TAIL RELAY

3–5 : Closed with the light control SW at **TAIL** or **HEAD** position

C11 LIGHT CONTROL SW [COMB. SW]

14–16 : Continuity with the light control SW at **TAIL** or **HEAD** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A12	34	J5	35	R15	35
A27	34	J7	35	S3	35
C8	34	J8	35	S4	35
C9	34	J9	35	T5	35
C11	34	M4	35	T7 A	35
E12	35	R2	35	T8	35
G3	35	R4	35	T14 B	35
H16	35	R14	35		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

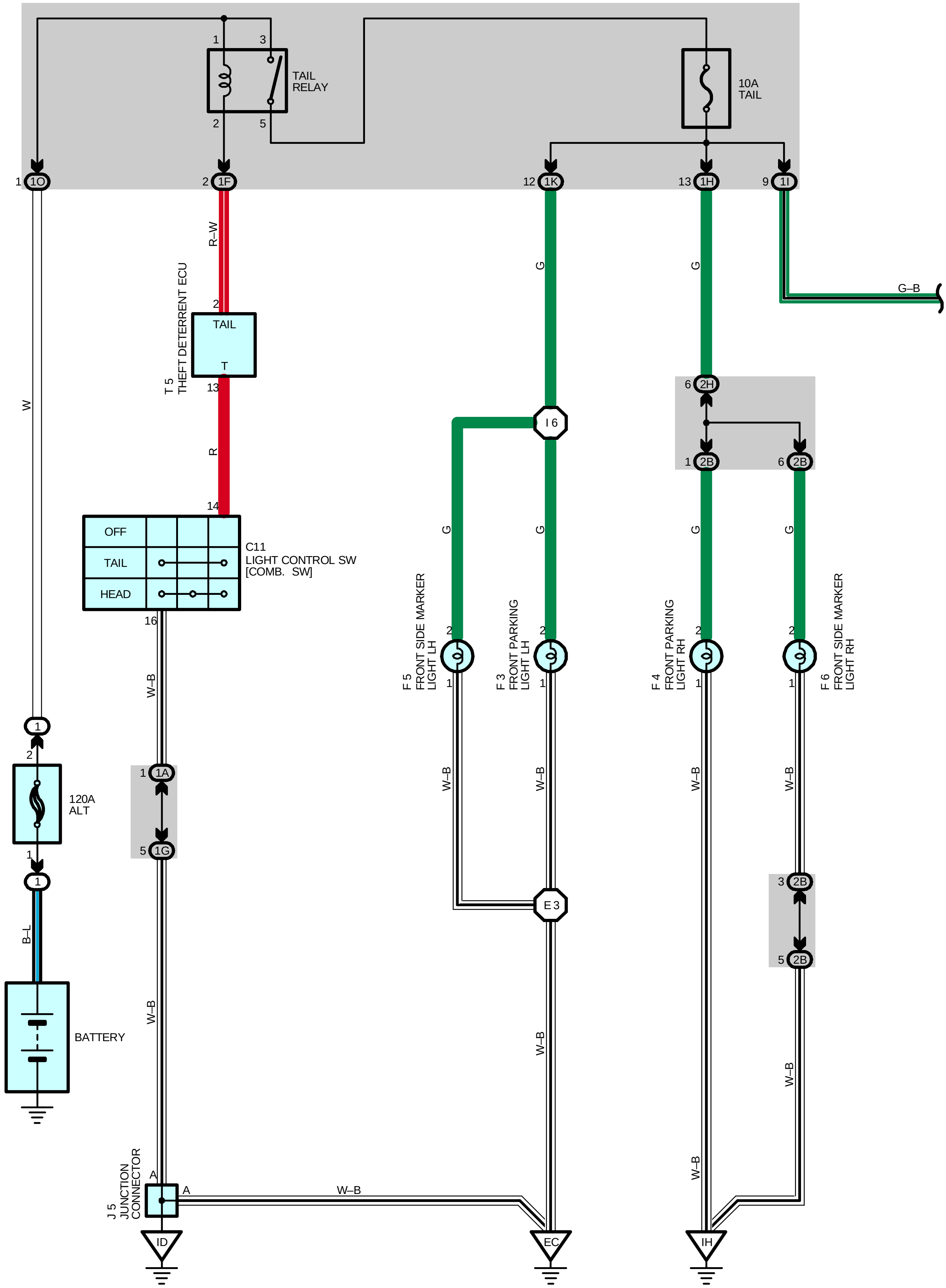
Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1O		
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

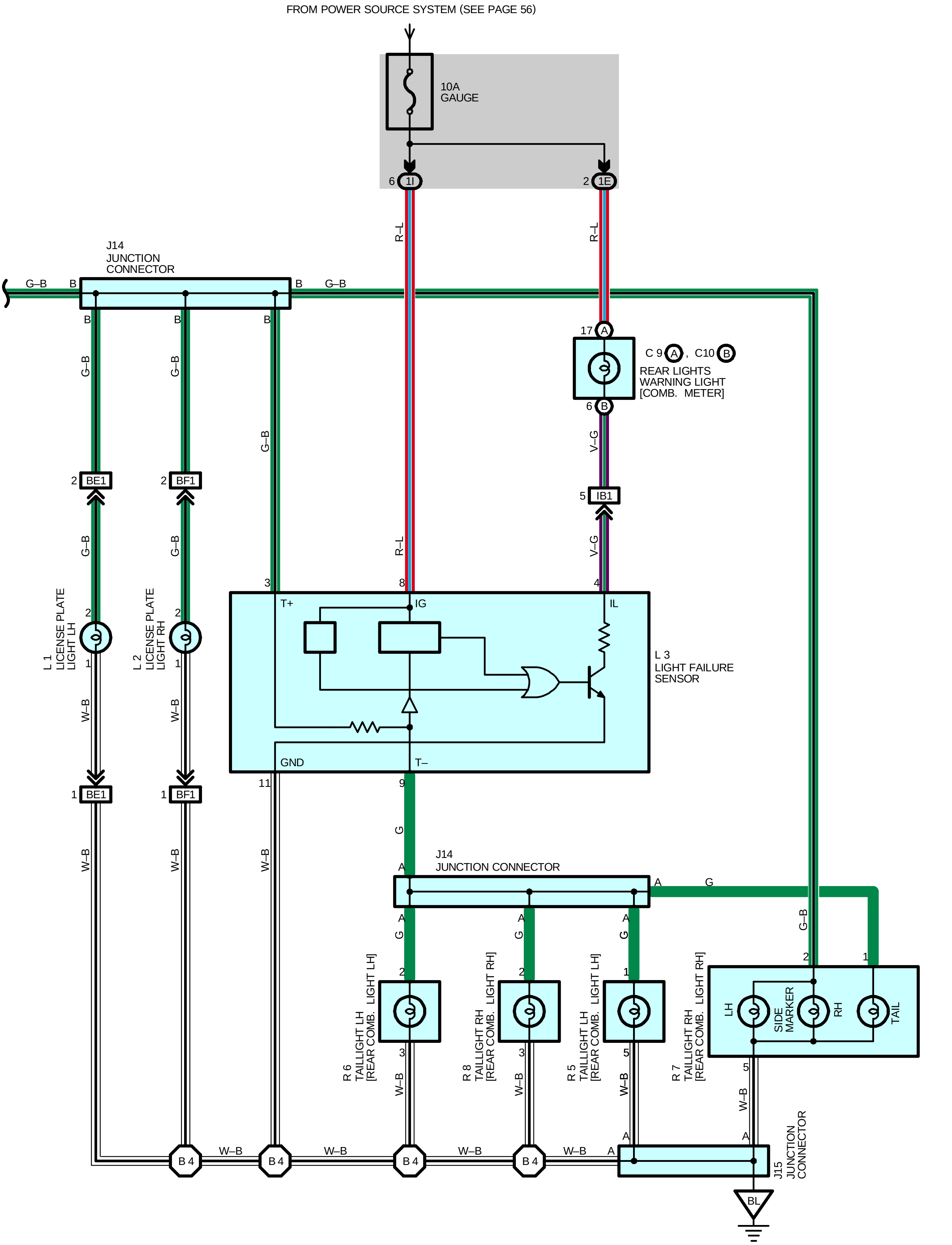
: GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I3	46	Instrument Panel Wire			


TAIL RELAY
10A TAIL
1O
1F
1K
1H
1I
W
R–W
R
G
G–B
T 5 THEFT DETERRENT ECU
TAIL
T
2H
I 6
2B
OFF
TAIL
HEAD
C11 LIGHT CONTROL SW [COMB. SW]
W–B
F 5 FRONT SIDE MARKER LIGHT LH
F 3 FRONT PARKING LIGHT LH
F 4 FRONT PARKING LIGHT RH
F 6 FRONT SIDE MARKER LIGHT RH
120A ALT
B–L
1A
1G
E 3
BATTERY
J 5 JUNCTION CONNECTOR
ID
EC
IH



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
GAUGE
6 1I
2 1E
R–L
R–L
J14
JUNCTION
CONNECTOR
G–B
B
B
G–B
C 9 A , C10 B
REAR LIGHTS
WARNING LIGHT
[COMB. METER]
17 A
6 B
V–G
5 IB1
2 BE1
2 BF1
L 1
LICENSE PLATE
LIGHT LH
L 2
LICENSE PLATE
LIGHT RH
T+
IG
IL
GND
T–
L 3
LIGHT FAILURE
SENSOR
1 BE1
1 BF1
W–B
G
J14
JUNCTION CONNECTOR
R 6
TAILLIGHT LH
[REAR COMB. LIGHT LH]
R 8
TAILLIGHT RH
[REAR COMB. LIGHT RH]
R 5
TAILLIGHT LH
[REAR COMB. LIGHT LH]
R 7
TAILLIGHT RH
[REAR COMB. LIGHT RH]
LH
SIDE
MARKER
RH
TAIL
B 4
J15
JUNCTION
CONNECTOR
BL

TAILLIGHT (S/D)

SYSTEM OUTLINE

When the light control SW is turned to TAIL or HEAD position, the current flows to TERMINAL 3 of the light failure sensor through the TAIL fuse.

When the ignition SW is turned on, the current flows from the GAUGE fuse to TERMINAL 8 of the light failure sensor, and also flows through the rear lights warning light to TERMINAL 4 of the light failure sensor.

TAILLIGHT DISCONNECTION WARNING

With the ignition SW on and the light control SW turned to TAIL or HEAD position, if the taillight circuit is open, the light failure sensor detects the failure by the change in current flowing from TERMINAL 3 of the light failure sensor to TERMINAL 9 and the warning circuit of the light failure sensor is activated.

As a result, the current flows from TERMINAL 4 of the light failure sensor to TERMINAL 11 to GROUND and turns the rear lights warning light on, which remains on until the light control SW is turned off.

SERVICE HINTS

TAIL RELAY

3–5 : Closed with the light control SW at **TAIL** or **HEAD** position

L3 LIGHT FAILURE SENSOR

4, 8–GROUND : Approx. **12** volts with the ignition SW at **ON** position
3, 9–GROUND : Approx. **12** volts with the light control SW at **TAIL** or **HEAD** position
11–GROUND : Always continuity

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
C9	A	34	F6	32	L3	36 (S/D)
C10	B	34	J5	35	R5	37 (S/D)
C11		34	J14	36 (S/D)	R6	37 (S/D)
F3		32	J15	36 (S/D)	R7	37 (S/D)
F4		32	L1	36 (S/D)	R8	37 (S/D)
F5		32	L2	36 (S/D)	T5	35

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1O		
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2H	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
BE1	48 (S/D)	Floor No.2 Wire and Luggage Room Wire (Near the License Plate Light LH)
BF1	48 (S/D)	Floor No.2 Wire and Luggage Room Wire (Near the License Plate Light RH)

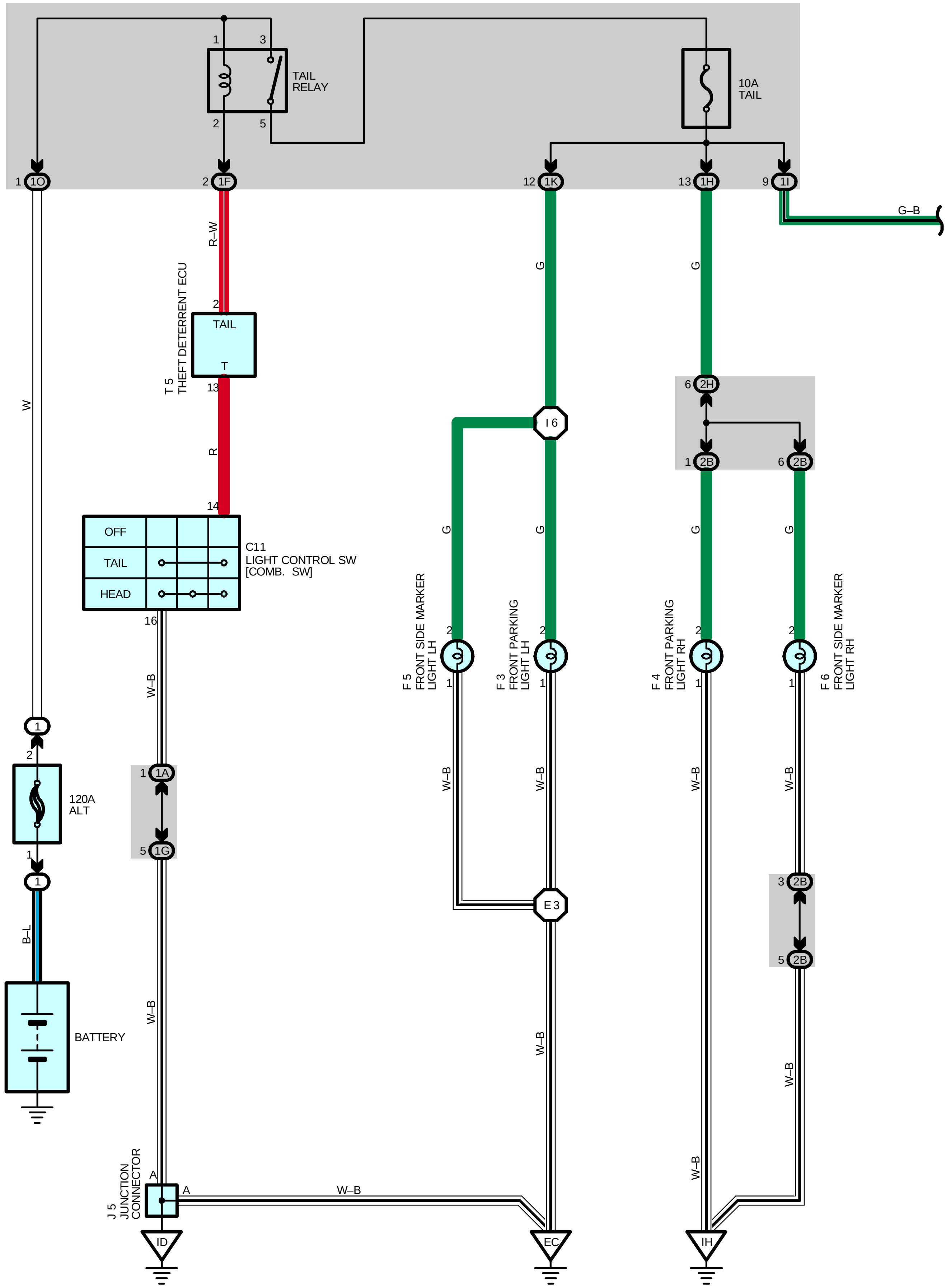
▽ : GROUND POINTS

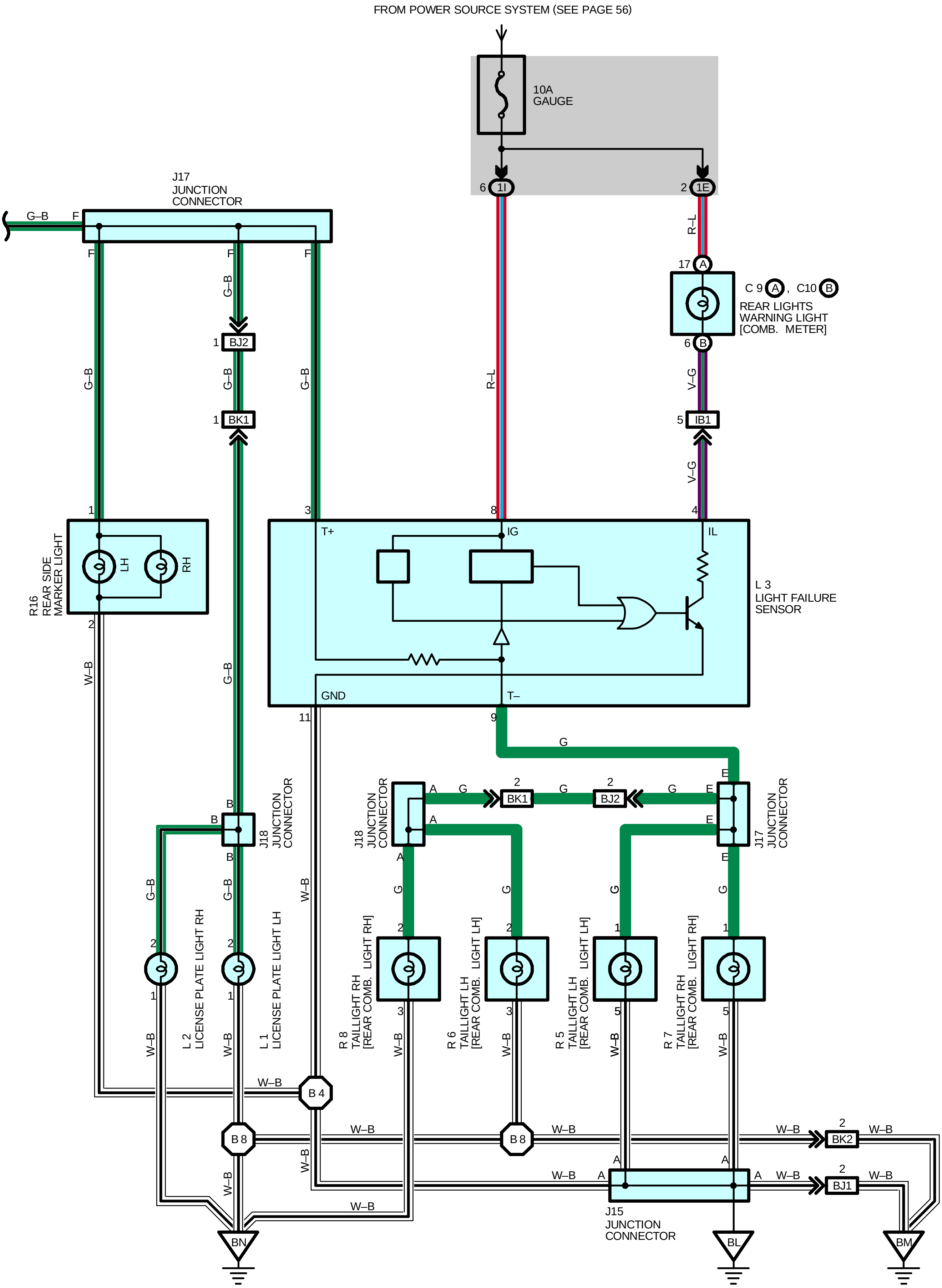
Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BL	48 (S/D)	Left Quarter Panel LH

⬡ : SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E3	42	Engine Room Main Wire	B4	48 (S/D)	Floor No.2 Wire
I6	46				

TAILLIGHT (W/G)




FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
GAUGE
J17
JUNCTION
CONNECTOR
C 9 (A), C10 (B)
REAR LIGHTS
WARNING LIGHT
[COMB. METER]
R16
REAR SIDE
MARKER LIGHT
LH
RH
T+
IG
IL
GND
T–
L 3
LIGHT FAILURE
SENSOR
J18
JUNCTION
CONNECTOR
J17
JUNCTION
CONNECTOR
L 2
LICENSE PLATE LIGHT RH
L 1
LICENSE PLATE LIGHT LH
R 8
TAILLIGHT RH
[REAR COMB. LIGHT RH]
R 6
TAILLIGHT LH
[REAR COMB. LIGHT LH]
R 5
TAILLIGHT LH
[REAR COMB. LIGHT LH]
R 7
TAILLIGHT RH
[REAR COMB. LIGHT RH]
J15
JUNCTION
CONNECTOR
BN
BL
BM

TAILLIGHT (W/G)

SYSTEM OUTLINE

When the light control SW is turned to TAIL or HEAD position, the current flows to TERMINAL 3 of the light failure sensor through the TAIL fuse.
When the ignition SW is turned on, the current flows from the GAUGE fuse to TERMINAL 8 of the light failure sensor, and also flows through the rear lights warning light to TERMINAL 4 of the light failure sensor.

TAILLIGHT DISCONNECTION WARNING

With the ignition SW on and the light control SW turned to TAIL or HEAD position, if the taillight circuit is open, the light failure sensor detects the failure by the change in current flowing from TERMINAL 3 of the light failure sensor to TERMINAL 9 and the warning circuit of the light failure sensor is activated.
As a result, the current flows from TERMINAL 4 of the light failure sensor to TERMINAL 11 to GROUND and turns the rear lights warning light on, which remains on until the light control SW is turned off.

SERVICE HINTS

TAIL RELAY

3–5 : Closed with the light control SW at **TAIL** or **HEAD** position

L3 LIGHT FAILURE SENSOR

4, 8–GROUND : Approx. **12** volts with the ignition SW at **ON** position
3, 9–GROUND : Approx. **12** volts with the light control SW at **TAIL** or **HEAD** position
11–GROUND : Always continuity

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
C9	A	34	J5	35	R5	39 (W/G)
C10	B	34	J15	38 (W/G)	R6	39 (W/G)
C11		34	J17	38 (W/G)	R7	39 (W/G)
F3		32	J18	38 (W/G)	R8	39 (W/G)
F4		32	L1	38 (W/G)	R16	39 (W/G)
F5		32	L2	38 (W/G)	T5	35
F6		32	L3	38 (W/G)		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1O		
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2H	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
BJ1	50 (W/G)	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BJ2		
BK1	50 (W/G)	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)
BK2		

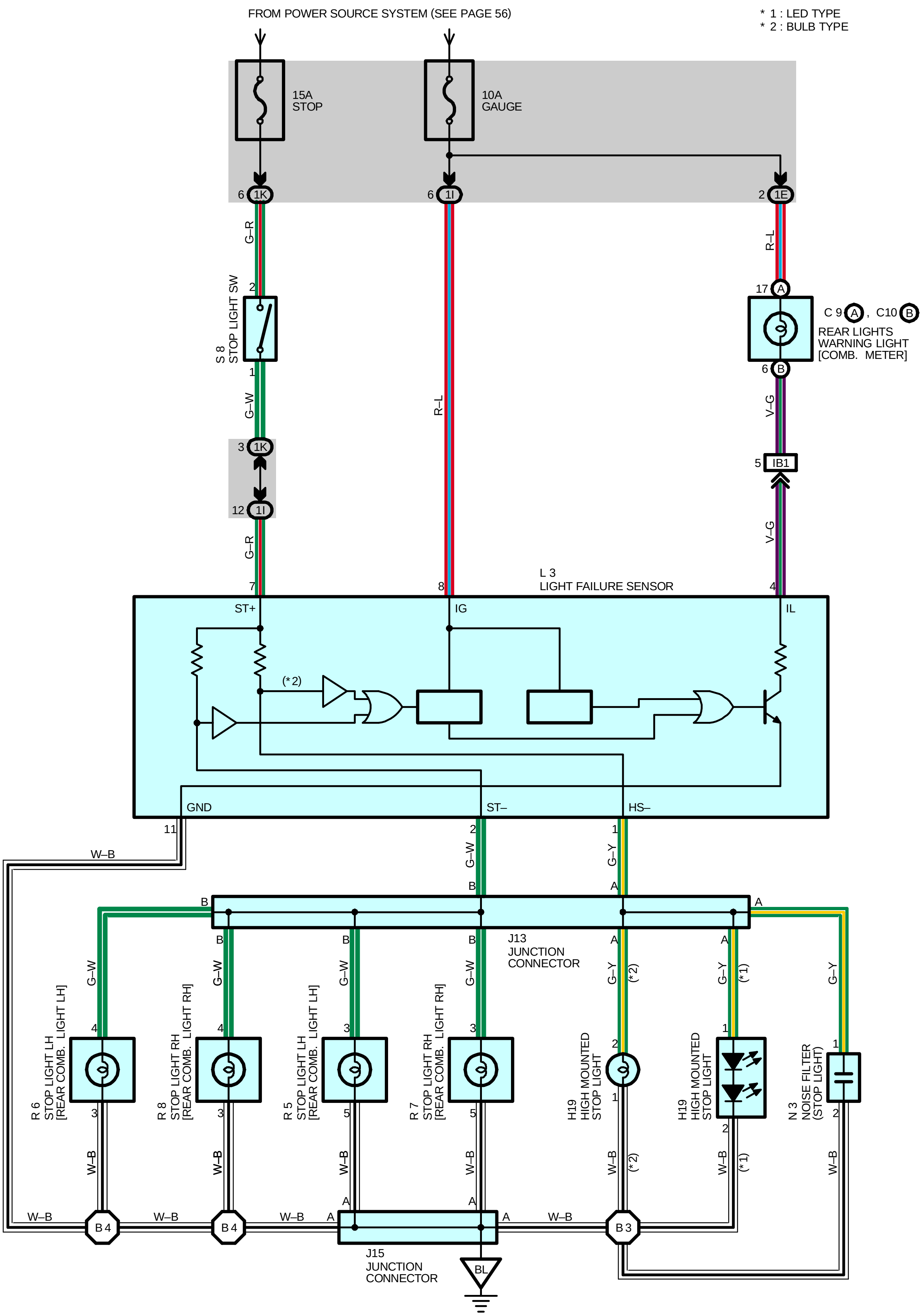
▽ : GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BL	50 (W/G)	Left Quarter Panel LH
BM	50 (W/G)	Left Side of the Back Panel Upper
BN	50 (W/G)	Right Side of the Back Panel Lower

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E3	42	Engine Room Main Wire	B4	50 (W/G)	Floor No.2 Wire
I6	46		B8	50 (W/G)	Back Door No.2 Wire

STOP LIGHT (S/D)



SYSTEM OUTLINE

Current is applied at all times through a STOP fuse to TERMINAL 2 of the stop light SW. When the ignition SW is turned on, current flows from the GAUGE fuse to TERMINAL 8 of the light failure sensor, and also flows through the rear lights warning light to TERMINAL 4 of the light failure sensor.

STOP LIGHT DISCONNECTION WARNING

When the ignition SW is turned on and the brake pedal is depressed (Stop light SW on), if the stop light circuit is open, the current flowing from TERMINAL 7 of the light failure sensor to TERMINALS 1 (Bulb type), 2 changes, so the light failure sensor detects the disconnection and the warning circuit of the light failure sensor is activated. As a result, the current flows from TERMINAL 4 of the light failure sensor to TERMINAL 11 to GROUND and turns the rear lights warning light on. By depressing the brake pedal, the current flowing to TERMINAL 8 of the light failure sensor keeps the warning circuit on and the warning light on until the ignition SW is turned off.

SERVICE HINTS

S8 STOP LIGHT SW

2–1 : Closed with the brake pedal depressed

L3 LIGHT FAILURE SENSOR

1, 2, 7–GROUND : Approx. **12** volts with the brake pedal depressed
4, 8–GROUND : Approx. **12** volts with the ignition SW at **ON** position
11–GROUND : Always continuity

: PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
C9	A	34	J15	36 (S/D)	R6	37 (S/D)
C10	B	34	L3	36 (S/D)	R7	37 (S/D)
H19		36 (S/D)	N3	37 (S/D)	R8	37 (S/D)
J13		36 (S/D)	R5	37 (S/D)	S8	35

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

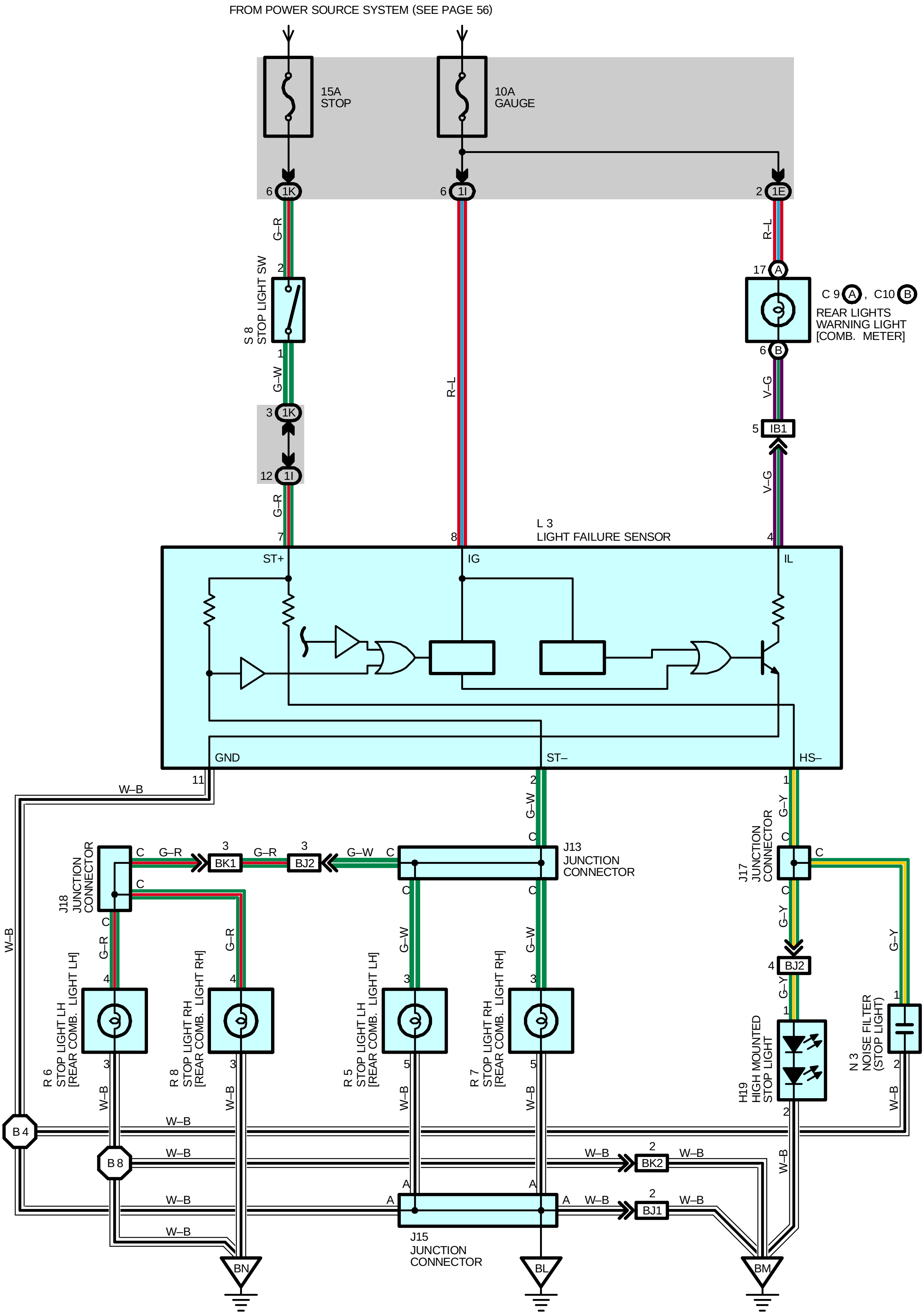
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)

: GROUND POINTS

Code	See Page	Ground Points Location
BL	48 (S/D)	Left Quarter Panel LH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B3	48 (S/D)	Floor No.2 Wire	B4	48 (S/D)	Floor No.2 Wire


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
15A STOP
10A GAUGE
C 9 (A), C10 (B)
REAR LIGHTS WARNING LIGHT [COMB. METER]
S 8 STOP LIGHT SW
L 3 LIGHT FAILURE SENSOR
ST+
IG
IL
GND
ST–
HS–
J13 JUNCTION CONNECTOR
J17 JUNCTION CONNECTOR
J18 JUNCTION CONNECTOR
R 6 STOP LIGHT LH [REAR COMB. LIGHT LH]
R 8 STOP LIGHT RH [REAR COMB. LIGHT RH]
R 5 STOP LIGHT LH [REAR COMB. LIGHT LH]
R 7 STOP LIGHT RH [REAR COMB. LIGHT RH]
H19 HIGH MOUNTED STOP LIGHT
N 3 NOISE FILTER (STOP LIGHT)
J15 JUNCTION CONNECTOR
G–R
G–W
R–L
V–G
G–Y
W–B
BK1
BJ2
BK2
BJ1
IB1
B 4
B 8
BN
BL
BM

SYSTEM OUTLINE

Current is applied at all times through a STOP fuse to TERMINAL 2 of the stop light SW. When the ignition SW is turned on, current flows from the GAUGE fuse to TERMINAL 8 of the light failure sensor, and also flows through the rear lights warning light to TERMINAL 4 of the light failure sensor.

STOP LIGHT DISCONNECTION WARNING

When the ignition SW is turned on and the brake pedal is depressed (Stop light SW on), if the stop light circuit is open, the current flowing from TERMINAL 7 of the light failure sensor to TERMINAL 2 changes, so the light failure sensor detects the disconnection and the warning circuit of the light failure sensor is activated. As a result, the current flows from TERMINAL 4 of the light failure sensor to TERMINAL 11 to GROUND and turns the rear lights warning light on. By depressing the brake pedal, the current flowing to TERMINAL 8 of the light failure sensor keeps the warning circuit on and the warning light on until the ignition SW is turned off.

SERVICE HINTS

S8 STOP LIGHT SW

2–1 : Closed with the brake pedal depressed

L3 LIGHT FAILURE SENSOR

1, 2, 7–GROUND : Approx. **12** volts with the brake pedal depressed
4, 8–GROUND : Approx. **12** volts with the ignition SW at **ON** position
11–GROUND : Always continuity

: PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
C9	A	34	J17	38 (W/G)	R6	39 (W/G)
C10	B	34	J18	38 (W/G)	R7	39 (W/G)
H19		38 (W/G)	L3	38 (W/G)	R8	39 (W/G)
J13		38 (W/G)	N3	39 (W/G)	S8	35
J15		38 (W/G)	R5	39 (W/G)		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
BJ1 BJ2	50 (W/G)	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BK1 BK2	50 (W/G)	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)

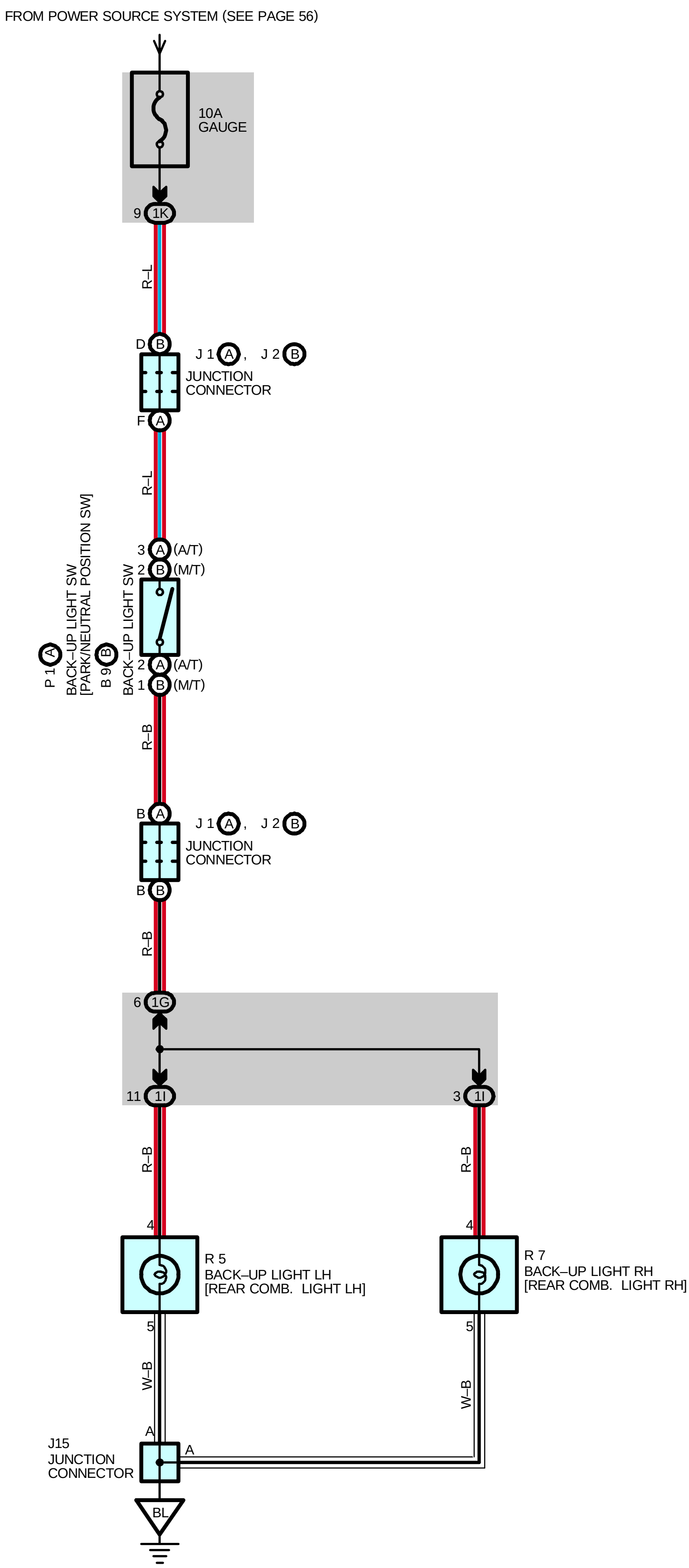
: GROUND POINTS

Code	See Page	Ground Points Location
BL	50 (W/G)	Left Quarter Panel LH
BM	50 (W/G)	Left Side of the Back Panel Upper
BN	50 (W/G)	Right Side of the Back Panel Lower

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B4	50 (W/G)	Floor No.2 Wire	B8	50 (W/G)	Back Door No.2 Wire

BACK–UP LIGHT



SERVICE HINTS

P1 (A) BACK–UP LIGHT SW [PARK/NEUTRAL POSITION SW] (A/T)

(A) 3–(A) 2 : Closed with the shift lever in **R** position

B9 (B) BACK–UP LIGHT SW (M/T)

(B) 2–(B) 1 : Closed with the shift lever in **R** position

: PARTS LOCATION

Code		See Page	Code		See Page	Code	See Page
B9	B	32	J15		38 (W/G)	R7	37 (S/D)
J1	A	33	P1	A	33		39 (W/G)
J2	B	33	R5		37 (S/D)		
J15		36 (S/D)			39 (W/G)		

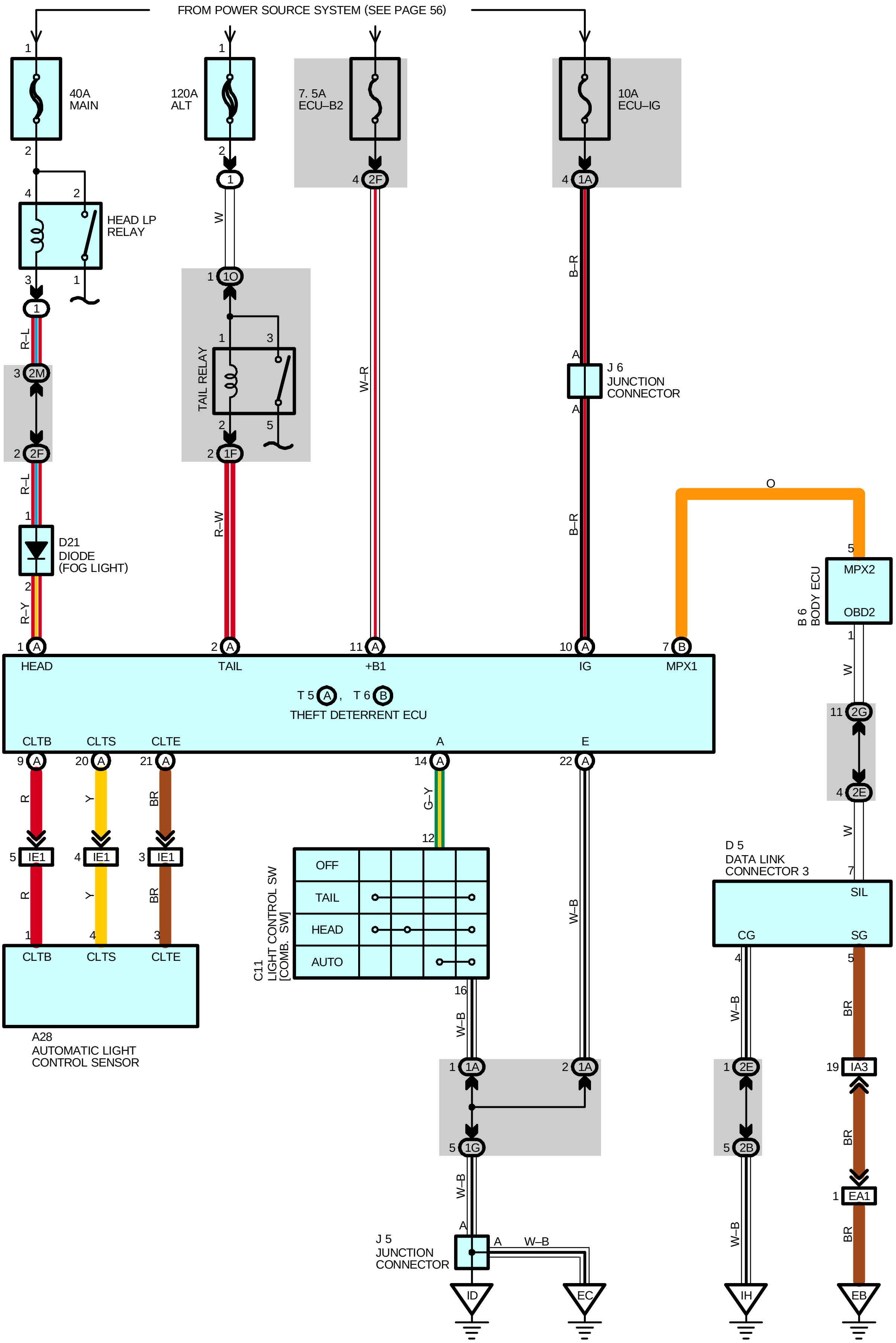
: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)

: GROUND POINTS

Code	See Page	Ground Points Location
BL	48 (S/D)	Left Quarter Panel LH
	50 (W/G)	

AUTOMATIC LIGHT CONTROL



SYSTEM OUTLINE

When the light control SW is set at AUTO, the automatic light control system automatically turns on or off the taillights and headlights depending on the brightness around the vehicle.

AUTOMATIC LIGHT CONTROL OPERATION

The automatic light control sensor converts the intensity of the illumination into frequency and inputs it to the theft deterrent ECU. When the light control SW is set at AUTO, the signal is input to TERMINAL A of the theft deterrent ECU. Through communication control of the body ECU etc. , the taillights and headlights are automatically turned on or off.

∗ Turn on operation

When the theft deterrent ECU receives the frequency signal from the automatic light control sensor and determines that the brightness around the vehicle has decreased below a specified level, TERMINAL TAIL and HEAD of the theft deterrent ECU are controlled through communication control of the body ECU etc. As a result, the taillights and/or headlights light up as the TAIL relay and/or HEAD LP relay are turned on.

∗ Turn off operation

When the theft deterrent ECU receives the frequency signal from the automatic light control sensor and determines that the brightness around the vehicle has exceeded a specified level, TERMINAL TAIL and HEAD of the theft deterrent ECU are controlled through communication control of the body ECU etc. As a result, the taillights and/or headlights go off as the TAIL relay and/or HEAD LP relay are turned off.

SERVICE HINTS

C11 LIGHT CONTROL SW [COMB. SW]

12–16 : Continuity with the light control SW at **AUTO** position

T5 (A), T6 (B) THEFT DETERRENT ECU

(A) 11, (B) 1–GROUND : Always approx. **12** volts

(A) 10–GROUND : Approx. **12** volts with the ignition SW at **ON** position

(A) 22–GROUND : Always continuity

◯ : PARTS LOCATION

Code	See Page	Code	See Page	Code		See Page
A28	34	D5	34	J6		35
B6	34	D21	34	T5	A	35
C11	34	J5	35	T6	B	35

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1O		
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2F		
2G		
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

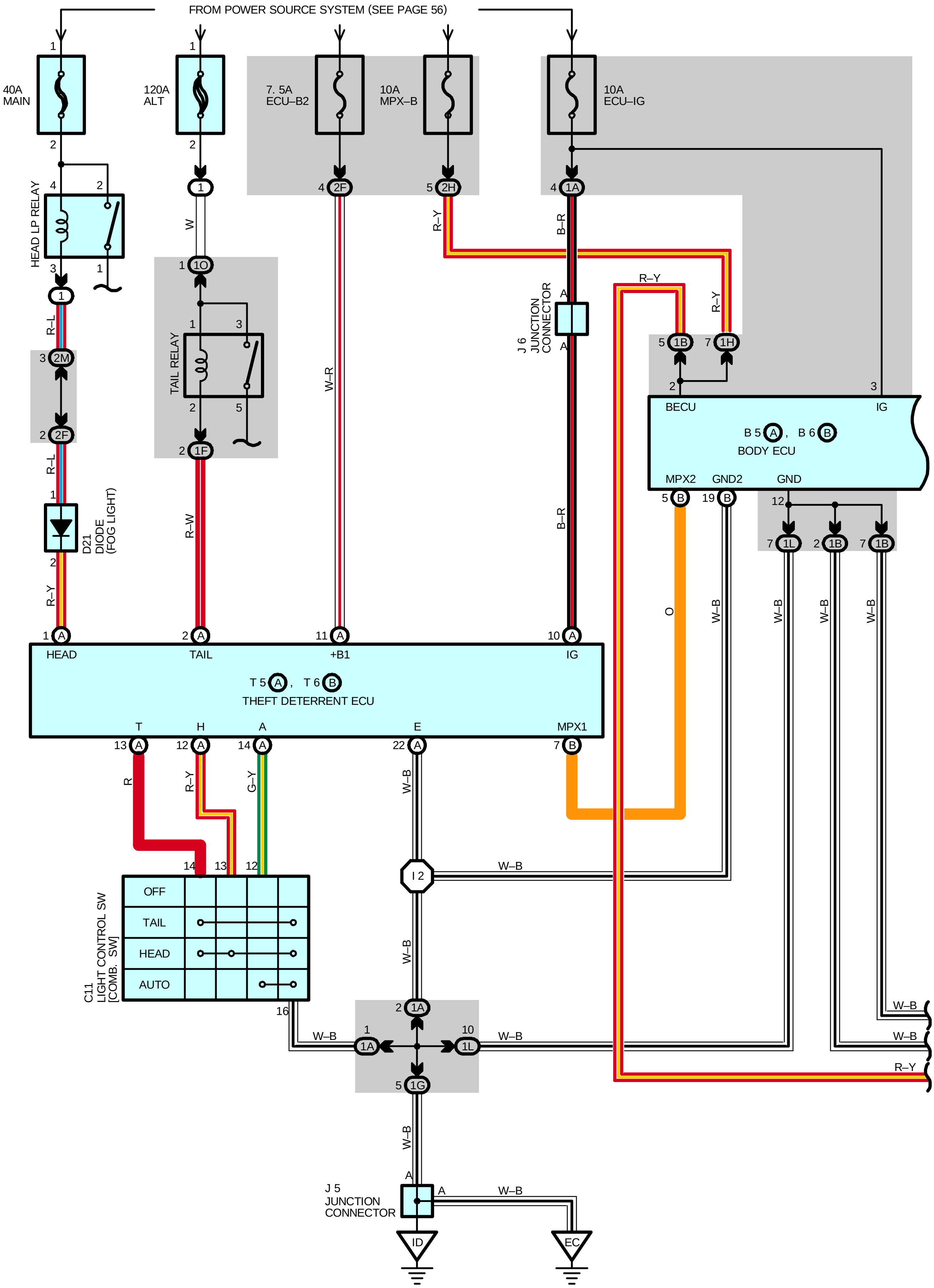
: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

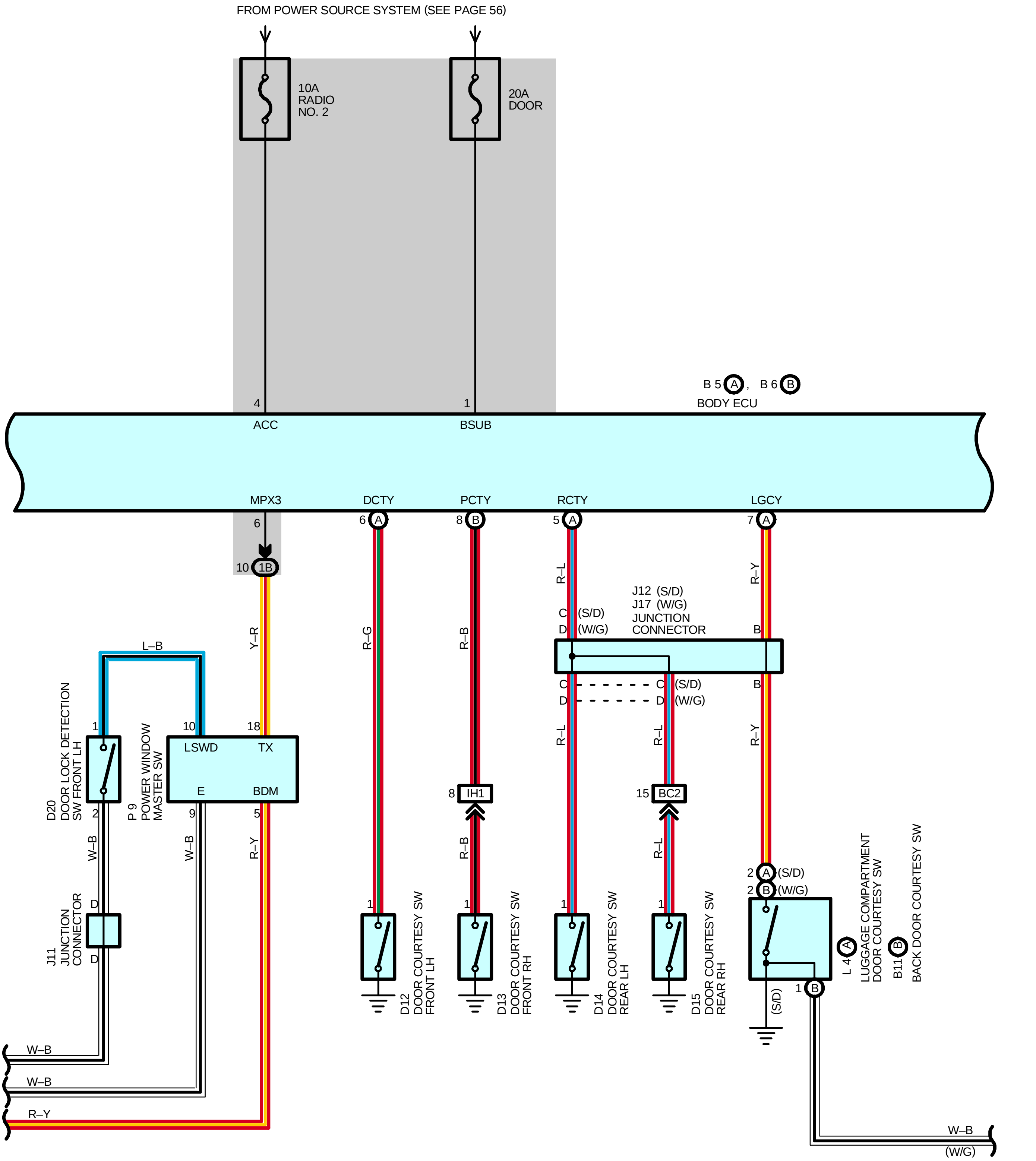
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IE1	44	Instrument Panel No.2 Wire and Instrument Panel Wire (Left Side of the Instrument Panel)

▽ : GROUND POINTS

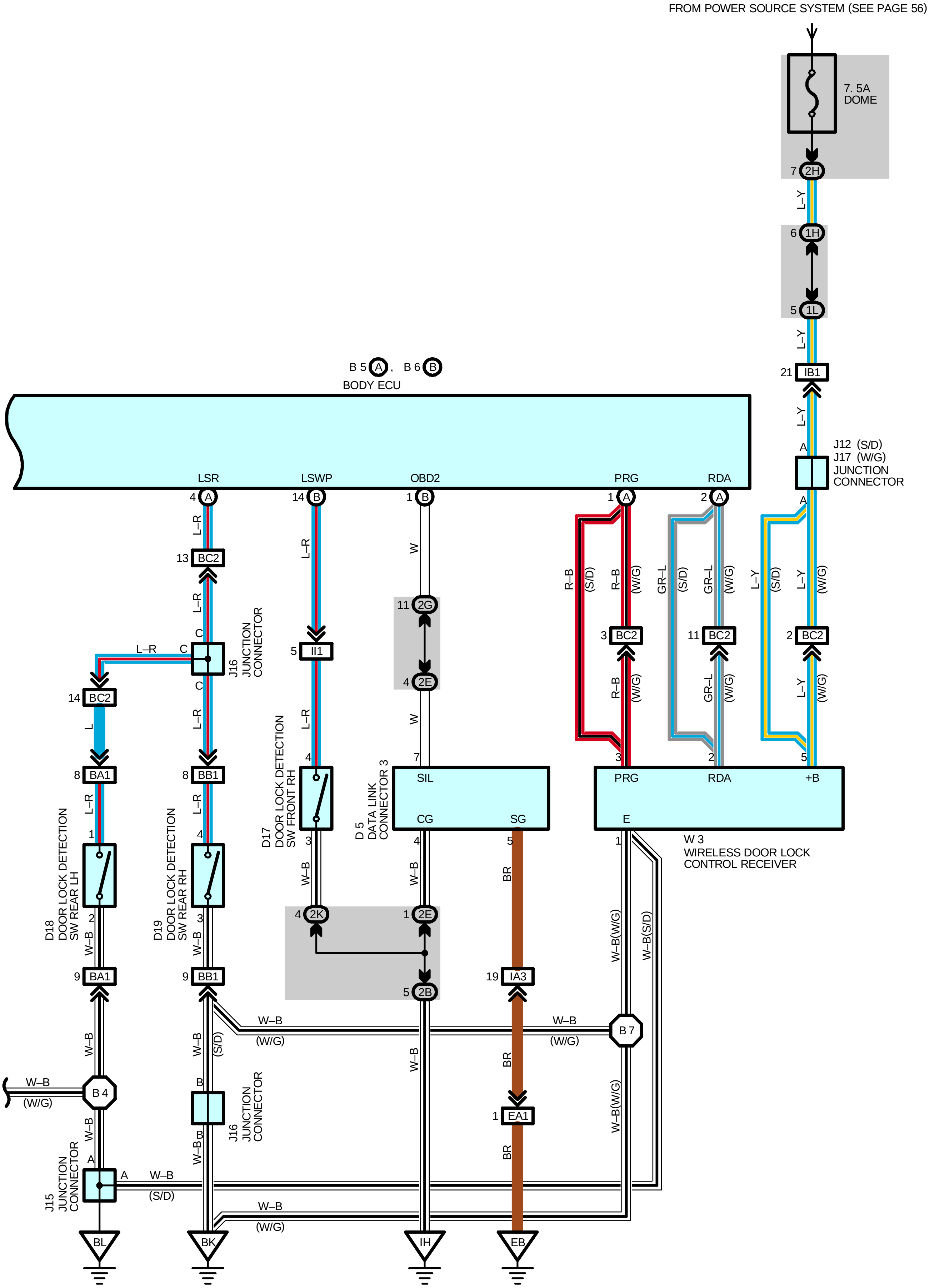
Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH

LIGHT AUTO TURN OFF




FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A RADIO NO. 2
20A DOOR
B 5 A, B 6 B
BODY ECU
ACC
BSUB
MPX3
DCTY
PCTY
RCTY
LGCY
1B
Y–R
R–G
R–B
R–L
R–Y
L–B
J12 (S/D)
J17 (W/G)
JUNCTION CONNECTOR
C (S/D)
D (W/G)
LSWD
TX
E
BDM
D20
DOOR LOCK DETECTION SW FRONT LH
P 9
POWER WINDOW MASTER SW
W–B
J11
JUNCTION CONNECTOR
IH1
BC2
D12
DOOR COURTESY SW FRONT LH
D13
DOOR COURTESY SW FRONT RH
D14
DOOR COURTESY SW REAR LH
D15
DOOR COURTESY SW REAR RH
L 4 A
LUGGAGE COMPARTMENT DOOR COURTESY SW
B11 B
BACK DOOR COURTESY SW
(S/D)
(W/G)

LIGHT AUTO TURN OFF



SYSTEM OUTLINE

This system automatically turns off the taillights and/or headlights when the driver door is opened and closed to prevent the lights from remaining lit.

LIGHT AUTO TURN OFF OPERATION

∗ Taillights ON

If the ignition SW is turned from ON to OFF with the taillights turned on (The light control SW is set at TAIL), the signal is input to TERMINAL IG of the theft deterrent ECU. At this time, if the driver door is opened, the signal is input from the door courtesy SW front LH to TERMINAL DCTY of the body ECU. After that, TERMINAL TAIL of the theft deterrent ECU is controlled through communication control of the body ECU etc. to turn off the TAIL relay. As a result, the current flowing into the taillights is cut off to turn off the taillights.

∗ Taillights and headlights ON

If the ignition SW is turned from ON to OFF with the taillights and headlights turned on (The light control SW is set at HEAD or AUTO), the signal is input to TERMINAL IG of the theft deterrent ECU. At this time, if any door is opened, the signal is input from the door courtesy SW to the body ECU. During this operation, the taillights and headlights are remained lit. When all doors and the luggage door (S/D) back door (W/G) are closed, the taillights and headlights are turned on for 30 sec. ,through communication control of the body ECU etc. After the set time has elapsed, a signal is input to TERMINAL TAIL and HEAD of the theft deterrent ECU, to turn off the TAIL relay and HEAD LP relay. As a result, the current flowing into the taillights and headlights is cut off to turn off the taillights and headlights.

If any door is opened during above operation, the taillights and headlights light up for 30 sec. again, and then go off after all the doors have been closed.
Additionally, if the vehicle is locked using the wireless door lock operation (Lock operation) while the taillights and headlights are being turned on for 30 sec., the taillights and headlights go off immediately.

SERVICE HINTS

C11 LIGHT CONTROL SW [COMB. SW]

14–16 : Continuity with the light control SW at **TAIL** or **HEAD** position
13–16 : Continuity with the light control SW at **HEAD** position
12–16 : Continuity with the light control SW at **AUTO** position

T5 (A), T6 (B) THEFT DETERRENT ECU

(A) 11, (B) 1–GROUND : Always approx. **12** volts
(A) 10–GROUND : Approx. **12** volts with the ignition SW at **ON** position
(A) 22–GROUND : Always continuity

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code		See Page
B5	A	34	D17	36 (S/D)	J12		36 (S/D)
B6	B	34		38 (W/G)	J15		36 (S/D)
B11	B	38 (W/G)	D18	36 (S/D)			38 (W/G)
C11		34		38 (W/G)	J16		36 (S/D)
D5		34	D19	36 (S/D)			38 (W/G)
D12		36 (S/D)		38 (W/G)	J17		38 (W/G)
		38 (W/G)	D20	36 (S/D)	L4	A	36 (S/D)
D13		36 (S/D)		38 (W/G)	P9		37 (S/D)
		38 (W/G)	D21	34			39 (W/G)
D14		36 (S/D)	J5	35	T5	A	35
		38 (W/G)	J6	35	T6	B	35
D15		36 (S/D)	J11	36 (S/D)	W3		37 (S/D)
		38 (W/G)		38 (W/G)			39 (W/G)

▭ : RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

LIGHT AUTO TURN OFF

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1B	24	Front Door LH Wire and Driver Side J/B (Left Kick Panel)
1F	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H 1L	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1O	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2E 2F 2G 2H	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2K	26	Front Door RH Wire and Passenger Side J/B (Right Kick Panel)
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)
BA1	48 (S/D) 50 (W/G)	Rear Door No.2 Wire and Floor No.2 Wire (Left Center Pillar)
BB1	48 (S/D) 50 (W/G)	Rear Door No.1 Wire and Floor Wire (Right Center Pillar)
BC2	48 (S/D)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)
	50 (W/G)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel Center)

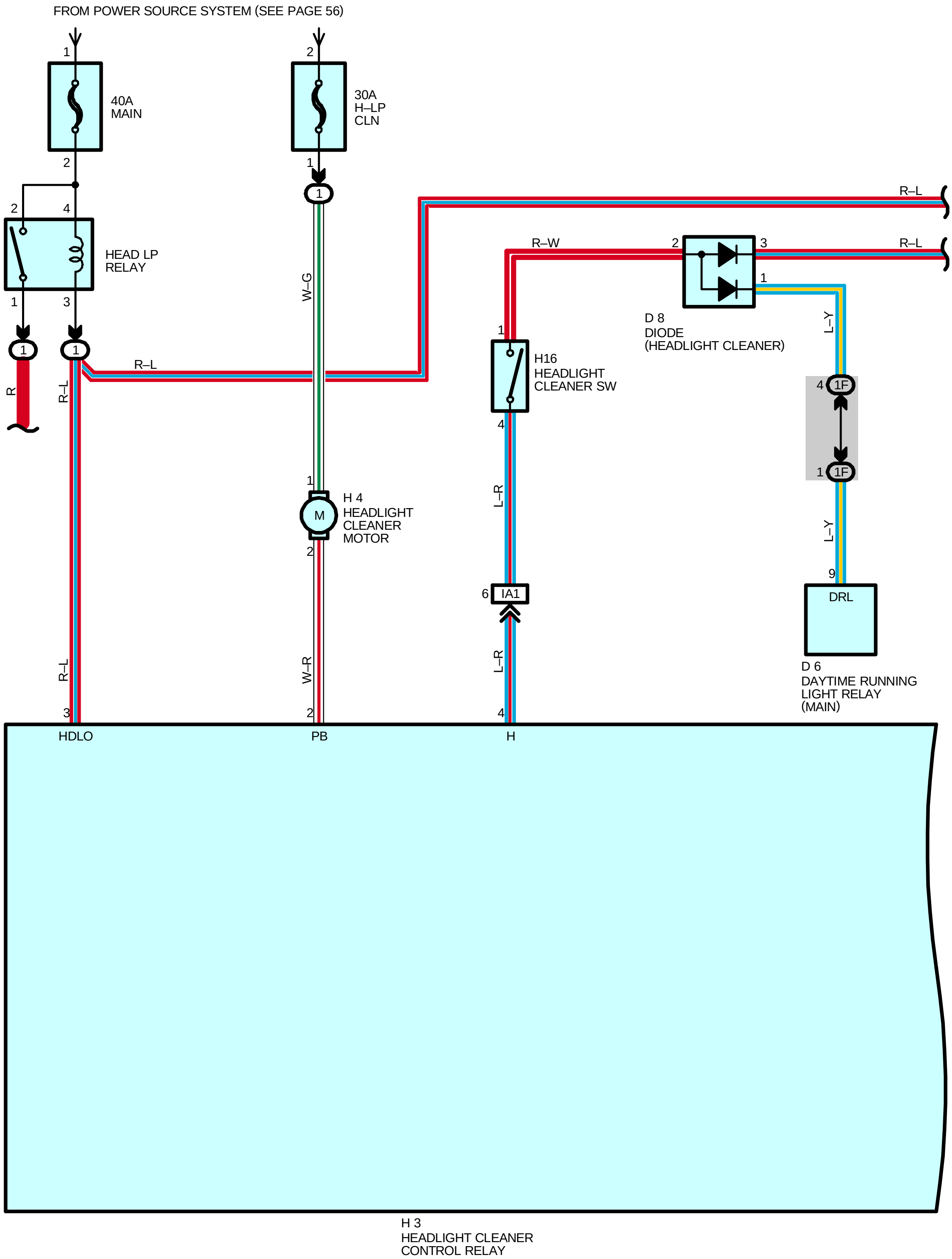
: GROUND POINTS

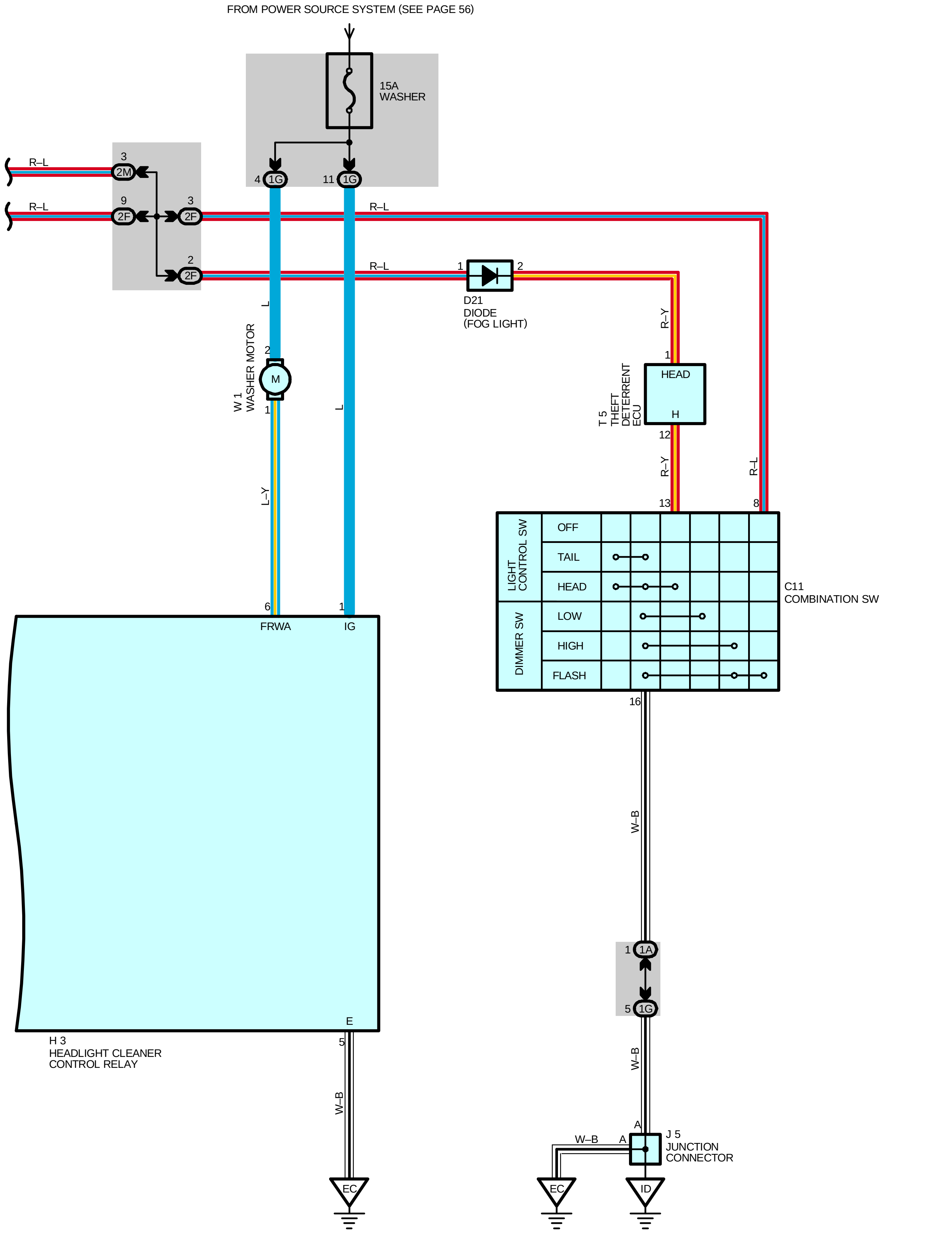
Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BK	48 (S/D) 50 (W/G)	Front Floor Panel RH
BL	48 (S/D) 50 (W/G)	Left Quarter Panel LH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I2	46	Instrument Panel Wire	B7	50 (W/G)	Floor Wire
B4	50 (W/G)	Floor No.2 Wire			

HEADLIGHT CLEANER




FROM POWER SOURCE SYSTEM (SEE PAGE 56)
15A
WASHER
R–L
3
2M
9
2F
3
2F
2
2F
4
1G
11
1G
R–L
R–L
1
2
D21
DIODE
(FOG LIGHT)
L
W 1
WASHER MOTOR
2
M
1
L
L–Y
R–Y
1
HEAD
H
T 5
THEFT
DETERRENT
ECU
12
R–Y
R–L
13
8
LIGHT
CONTROL SW
OFF
TAIL
HEAD
DIMMER SW
LOW
HIGH
FLASH
C11
COMBINATION SW
16
6
1
FRWA
IG
W–B
1
1A
5
1G
E
5
H 3
HEADLIGHT CLEANER
CONTROL RELAY
W–B
W–B
W–B
A
A
J 5
JUNCTION
CONNECTOR
EC
EC
ID

HEADLIGHT CLEANER

SERVICE HINTS

H3 HEADLIGHT CLEANER CONTROL RELAY

1–GROUND : Approx. **12** volts with the ignition SW at **ON** position
5–GROUND : Always continuity

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C11	34	H3	33	T5	35
D6	34	H4	33	W1	33
D8	34	H16	35		
D21	34	J5	35		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

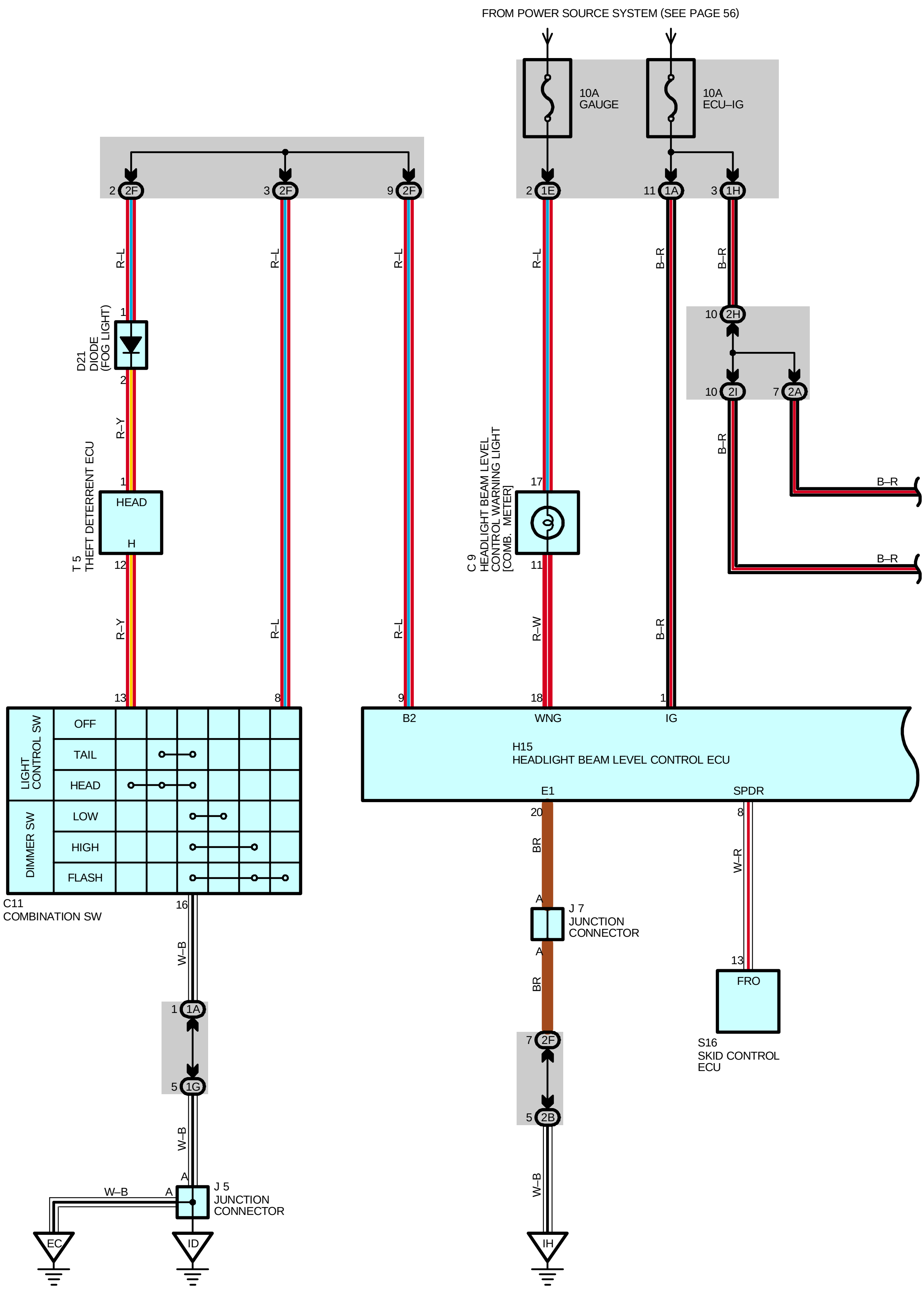
Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

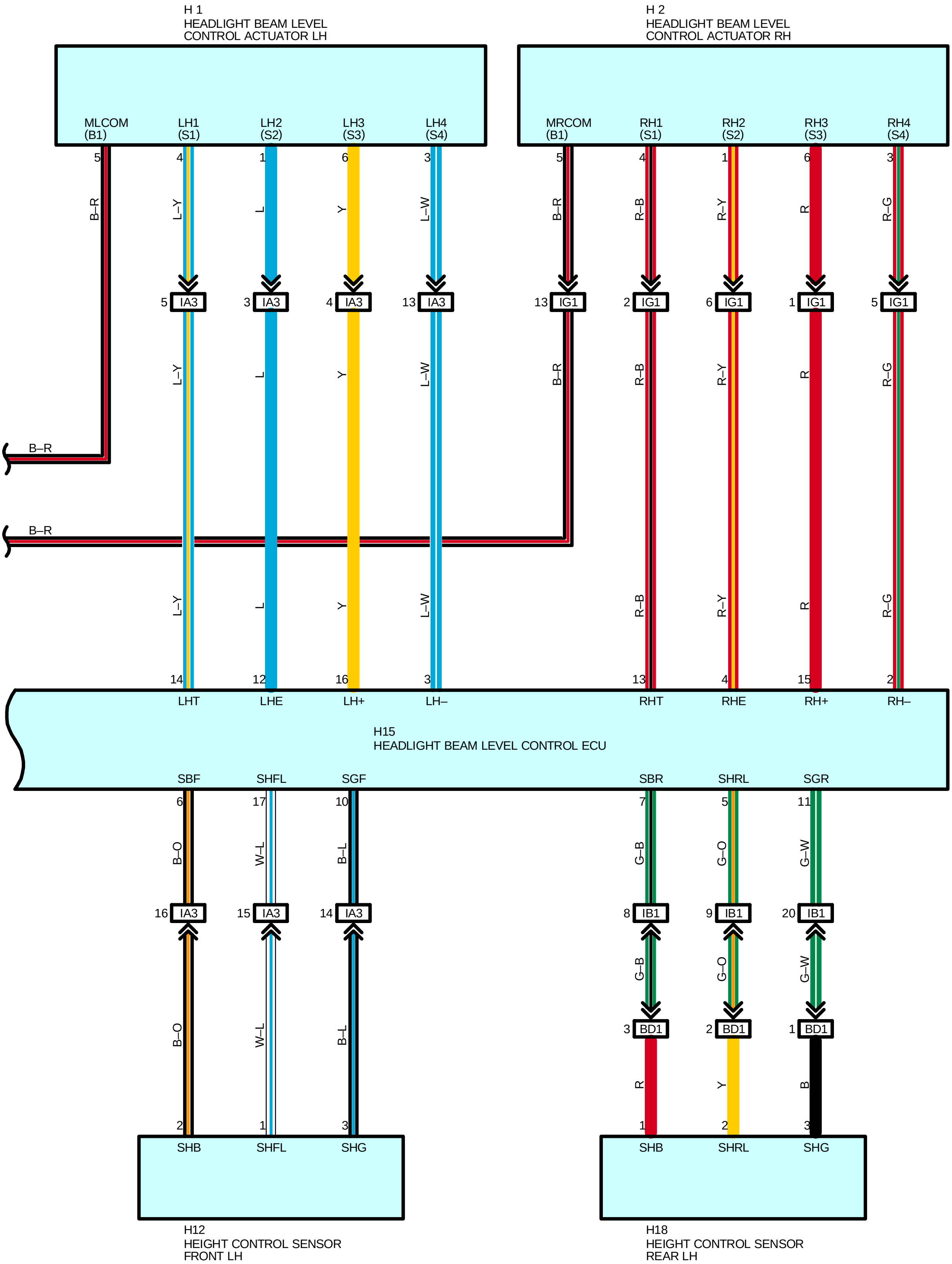
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A GAUGE
10A ECU–IG
2F
1E
1A
1H
2H
2I
2A
R–L
R–Y
B–R
R–W
D21 DIODE (FOG LIGHT)
T 5 THEFT DETERRENT ECU
HEAD
H
C 9 HEADLIGHT BEAM LEVEL CONTROL WARNING LIGHT [COMB. METER]
LIGHT CONTROL SW
DIMMER SW
OFF
TAIL
HEAD
LOW
HIGH
FLASH
C11 COMBINATION SW
B2
WNG
IG
H15 HEADLIGHT BEAM LEVEL CONTROL ECU
E1
SPDR
BR
W–R
W–B
J 7 JUNCTION CONNECTOR
FRO
S16 SKID CONTROL ECU
1G
2B
J 5 JUNCTION CONNECTOR
EC
ID
IH


H 1
HEADLIGHT BEAM LEVEL
CONTROL ACTUATOR LH
H 2
HEADLIGHT BEAM LEVEL
CONTROL ACTUATOR RH
MLCOM (B1)
LH1 (S1)
LH2 (S2)
LH3 (S3)
LH4 (S4)
MRCOM (B1)
RH1 (S1)
RH2 (S2)
RH3 (S3)
RH4 (S4)
B–R
L–Y
L
Y
L–W
R–B
R–Y
R
R–G
IA3
IG1
LHT
LHE
LH+
LH–
RHT
RHE
RH+
RH–
H15
HEADLIGHT BEAM LEVEL CONTROL ECU
SBF
SHFL
SGF
SBR
SHRL
SGR
B–O
W–L
B–L
G–B
G–O
G–W
IB1
BD1
B
SHB
SHFL
SHG
SHB
SHRL
SHG
H12
HEIGHT CONTROL SENSOR
FRONT LH
H18
HEIGHT CONTROL SENSOR
REAR LH

HEADLIGHT BEAM LEVEL CONTROL

SYSTEM OUTLINE

This system calculates changes in the illuminating angle from changes in the vehicle height and axle distance based on the information on the vehicle height detected by the height sensors installed at the front and rear of the vehicle and information on the vehicle speed and acceleration output from the ABS and traction system or VSC system to reversely operate the reflector by the obtained illuminating angle through actuators in order to always keep the beam axis constant.

If an error occurs in this system, the headlight beam level control warning light in the combination meter lights up to warn the driver.

SERVICE HINTS

H15 HEADLIGHT BEAM LEVEL CONTROL ECU

1–GROUND : Approx. **12** volts with the ignition SW at **ON** position

20–GROUND : Always continuity

9–GROUND :Continuity with the light control SW at **HEAD** position or the dimmer SW at **FLASH** position

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C9	34	H12	33	J7	35
C11	34	H15	35	S16	35
D21	34	H18	36 (S/D)	T5	35
H1	33		38 (W/G)		
H2	33	J5	35		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2B		
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2H		
2I		

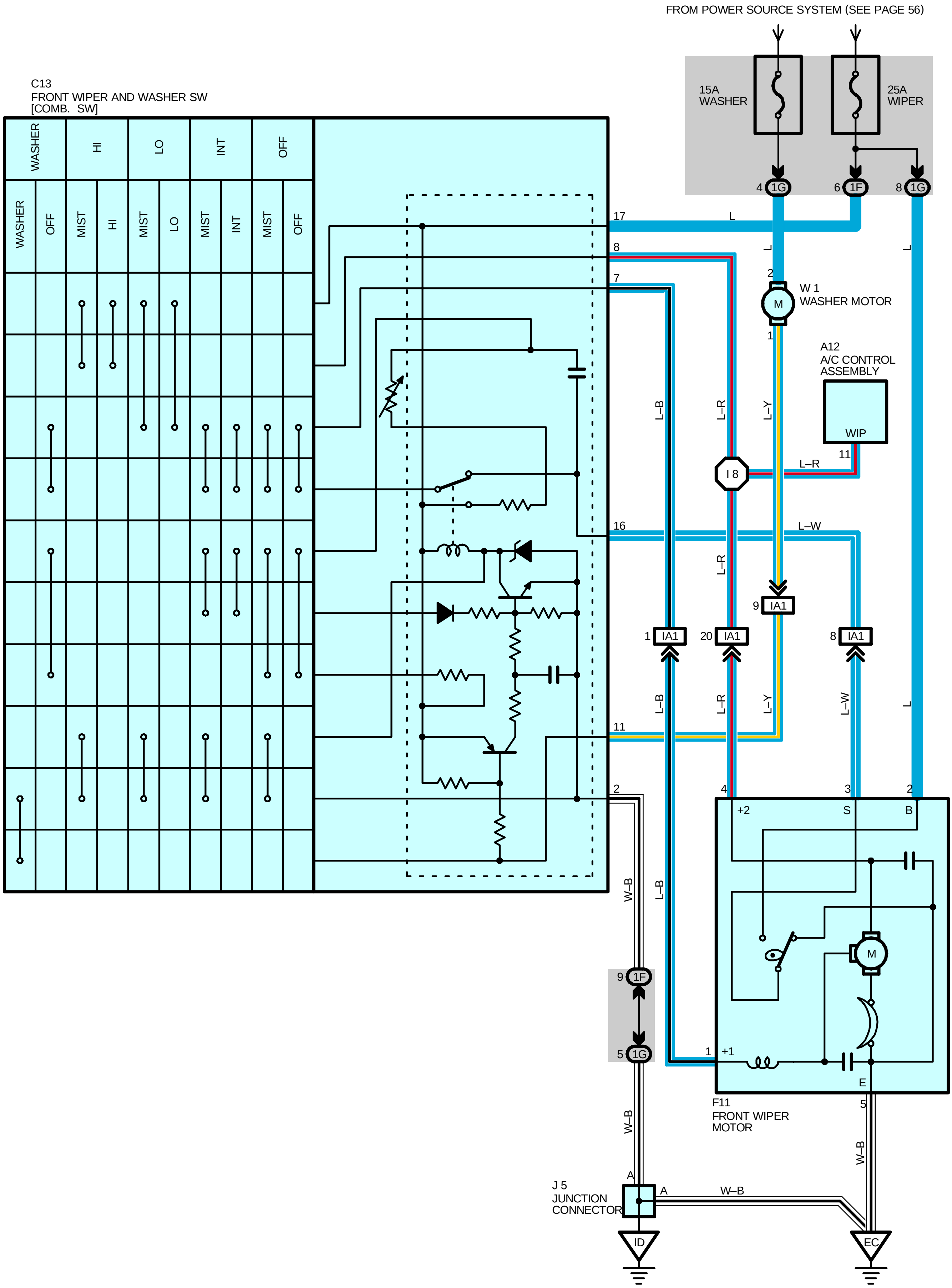
: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
IG1	46	Instrument Panel Wire and Engine Room Main Wire (Near the Passenger Side J/B)
BD1	48 (S/D)	Sensor Wire and Floor No.2 Wire (Lower Back Panel LH)
	50 (W/G)	

: GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH

FRONT WIPER AND WASHER



SYSTEM OUTLINE

With the ignition SW turned on, the current flows to TERMINAL 17 of the front wiper and washer SW, and TERMINAL 2 of the front wiper motor through the WIPER fuse, TERMINAL 2 of washer motor through the WASHER fuse.

1. LOW SPEED POSITION

With the wiper SW turned to LO position, the current flows from TERMINAL 17 of the front wiper and washer SW to TERMINAL 7 to TERMINAL 1 of the front wiper motor to TERMINAL 5 to GROUND and causes the front wiper motor to run at low speed.

2. HIGH SPEED POSITION

With the wiper SW turned to HI position, the current flows from TERMINAL 17 of the front wiper and washer SW to TERMINAL 8 to TERMINAL 4 of the front wiper motor to TERMINAL 5 to GROUND and causes the front wiper motor to run at high speed.

3. INT POSITION

With the wiper SW turned to INT position, the relay operates and the current which is connected by relay function flows from TERMINAL 17 of the front wiper and washer SW to TERMINAL 2 to GROUND. This flow of current operates the intermittent circuit and the current flows from TERMINAL 17 of the front wiper and washer SW to TERMINAL 7 to TERMINAL 1 of the front wiper motor to TERMINAL 5 to GROUND and operates the wiper.

The intermittent operation is controlled by the charge/discharge function of the condenser installed in the relay, and the intermittent time is controlled by a time control SW to change the charging time of the condenser.

4. MIST POSITION

With the wiper SW pulled to MIST position, the current flows from TERMINAL 17 of the front wiper and washer SW to TERMINAL 7 to TERMINAL 1 of the front wiper motor to TERMINAL 5 to GROUND and causes the wiper motor to run at low speed.

5. WASHER INTERLOCKING OPERATION

With the washer SW pushed to on, the current flows from TERMINAL 2 of the washer motor to TERMINAL 1 to TERMINAL 11 of the front wiper and washer SW to TERMINAL 2 to GROUND and causes to the washer motor to run, and the window washer emits a water spray. This causes the current to flow to washer continuous operation circuit in TERMINAL 17 of the front wiper and washer SW to TERMINAL 7 to TERMINAL 1 of the front wiper motor to TERMINAL 5 to GROUND and operates the wiper.

SERVICE HINTS

C13 FRONT WIPER AND WASHER SW [COMB. SW]

2–GROUND : Always continuity
17–GROUND : Approx. **12** volts with the ignition SW at **ON** position
7–GROUND : Approx. **12** volts with the front wiper and washer SW at **LO** position
Approx. **12** volts approx. **1.6** to **10.7** seconds intermittently with the front wiper and washer SW at **INT** position
16–GROUND : Approx. **12** volts with the ignition SW on unless the front wiper motor at **STOP** position
8–GROUND : Approx. **12** volts with the front wiper and washer SW at **HI** position

F11 FRONT WIPER MOTOR

2–3 : Closed unless the wiper motor at **STOP** position

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A12	34	F11	32	W1	33
C13	34	J5	35		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1F	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)

FRONT WIPER AND WASHER

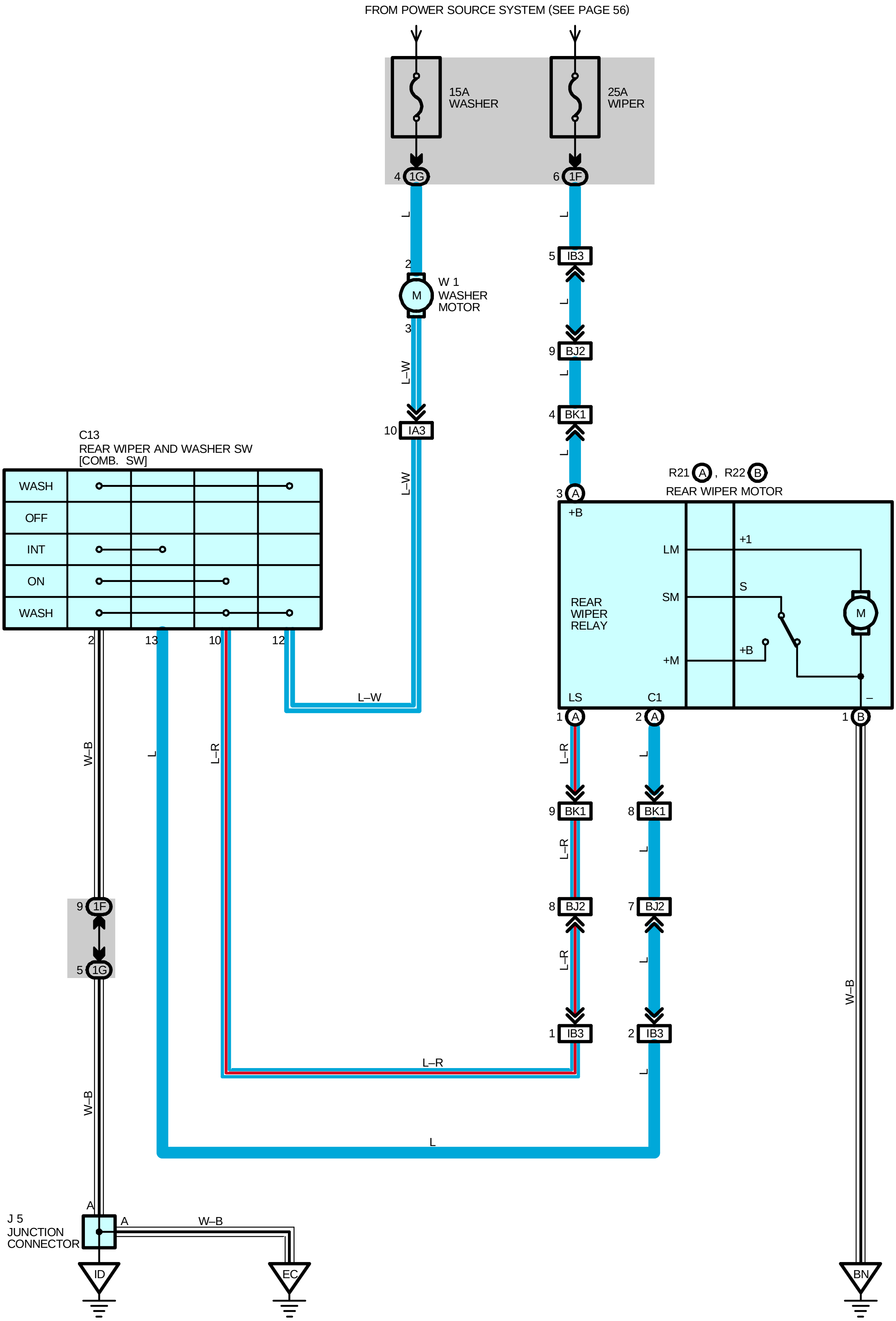
: GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I8	46	Instrument Panel Wire			

REAR WIPER AND WASHER



SERVICE HINTS

W1 WASHER MOTOR

2–GROUND : Approx. **12** volts with the ignition SW at **ON** position

3–GROUND : Continuity with the rear wiper and washer SW at **WASH** position

R21 (A), R22 (B) REAR WIPER MOTOR

(A) 3–GROUND : Approx. **12** volts with the ignition SW at **ON** position

(B) 1–GROUND : Always continuity

○ : PARTS LOCATION

Code		See Page	Code		See Page	Code	See Page
C13		34	R21	A	39 (W/G)	W1	33
J5		35	R22	B	39 (W/G)		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1F	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)

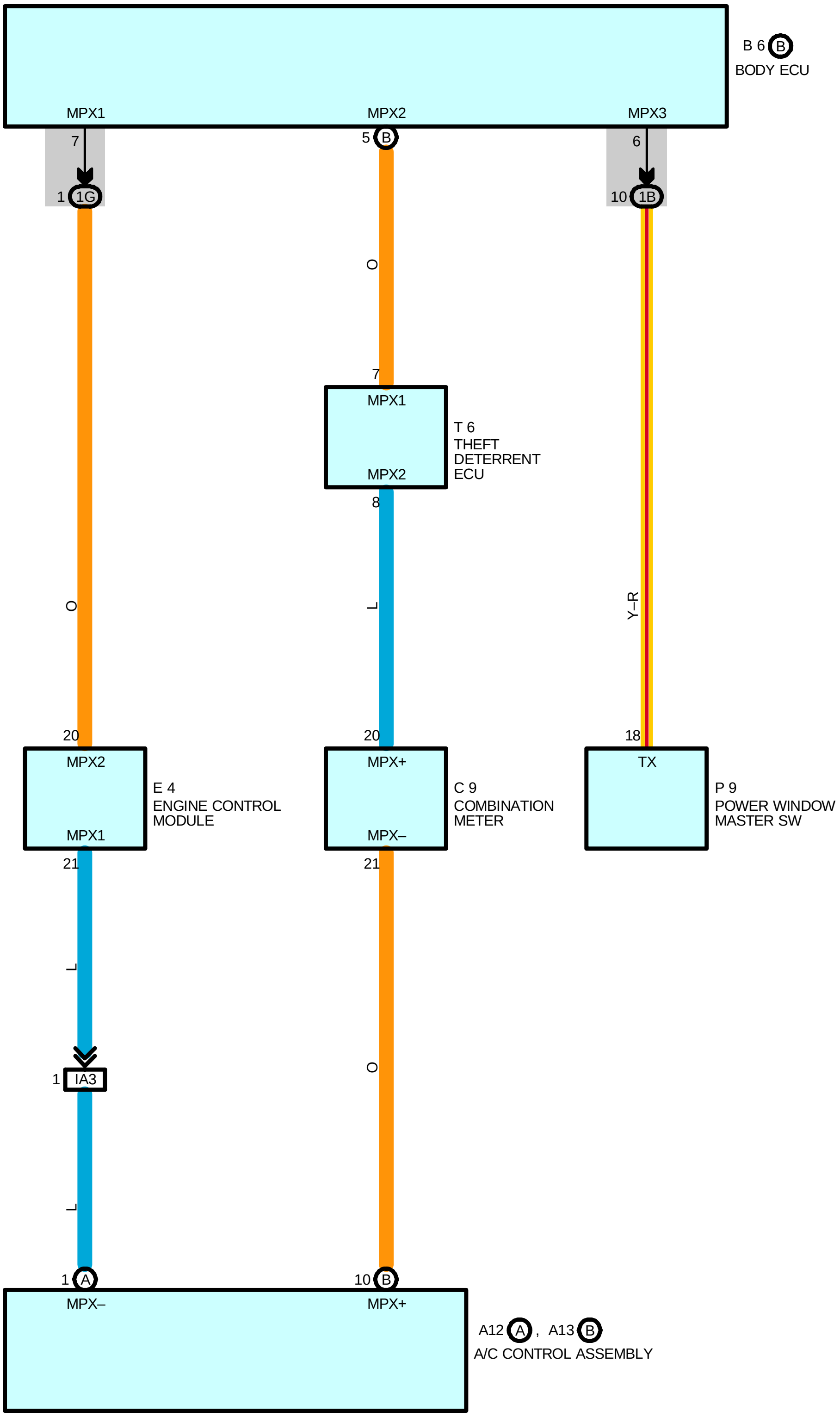
□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IB3	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
BJ2	50 (W/G)	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BK1	50 (W/G)	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)

▽ : GROUND POINTS

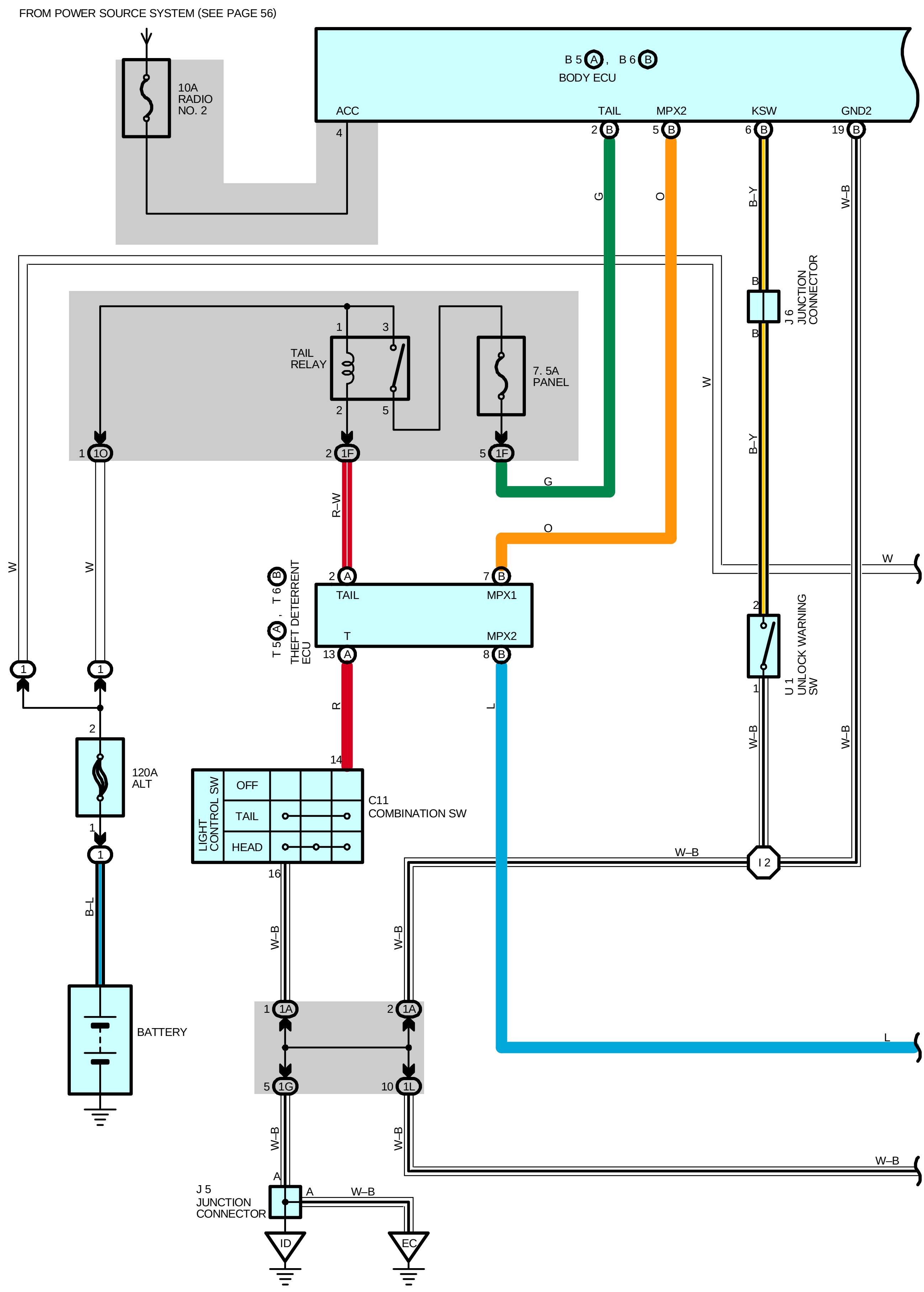
Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
BN	50 (W/G)	Right Side of the Back Panel Lower

MULTIPLEX COMMUNICATION SYSTEM (COMMUNICATION BUS)

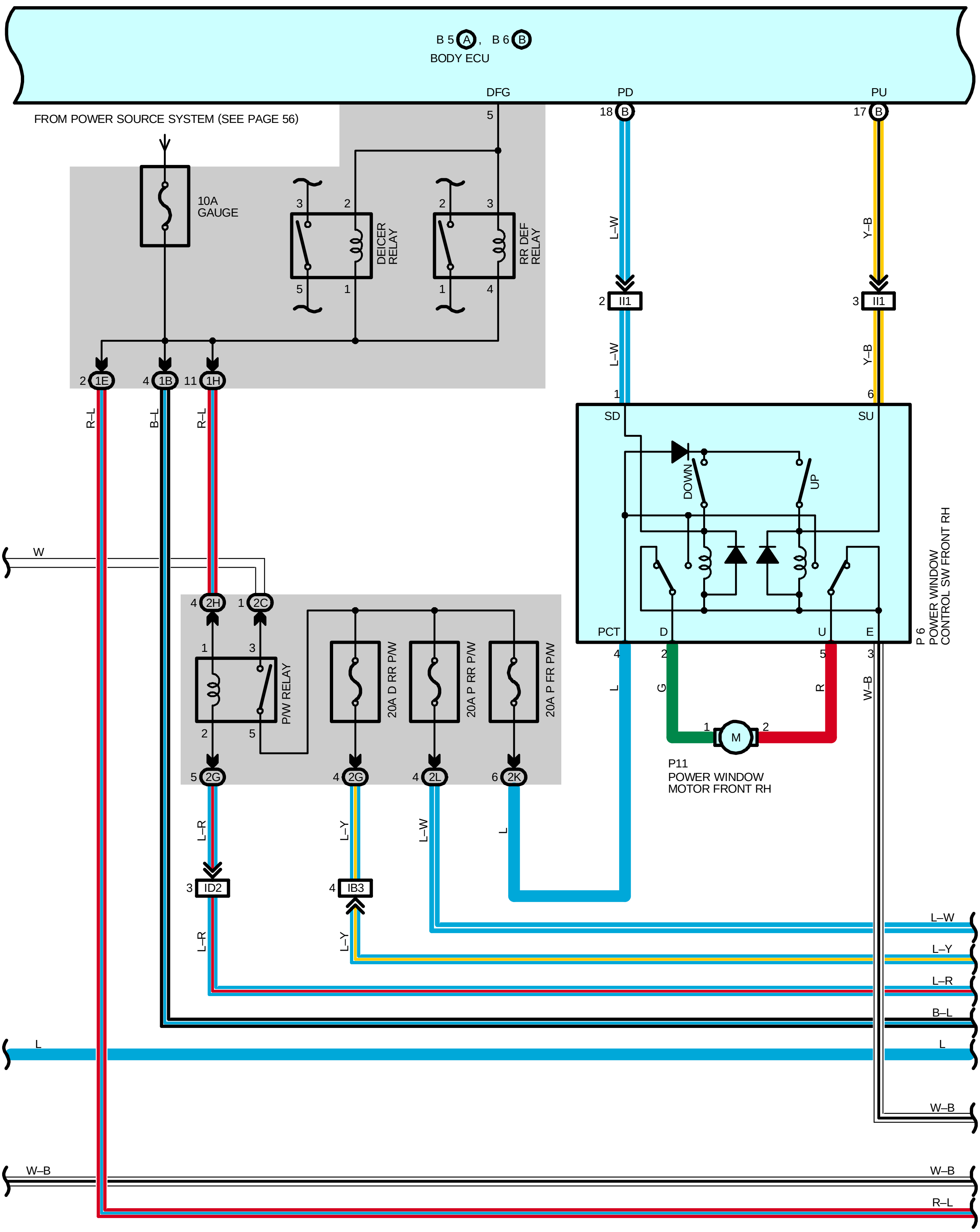


MULTIPLEX COMMUNICATION SYSTEM INCLUDES FOLLOWING SYSTEMS

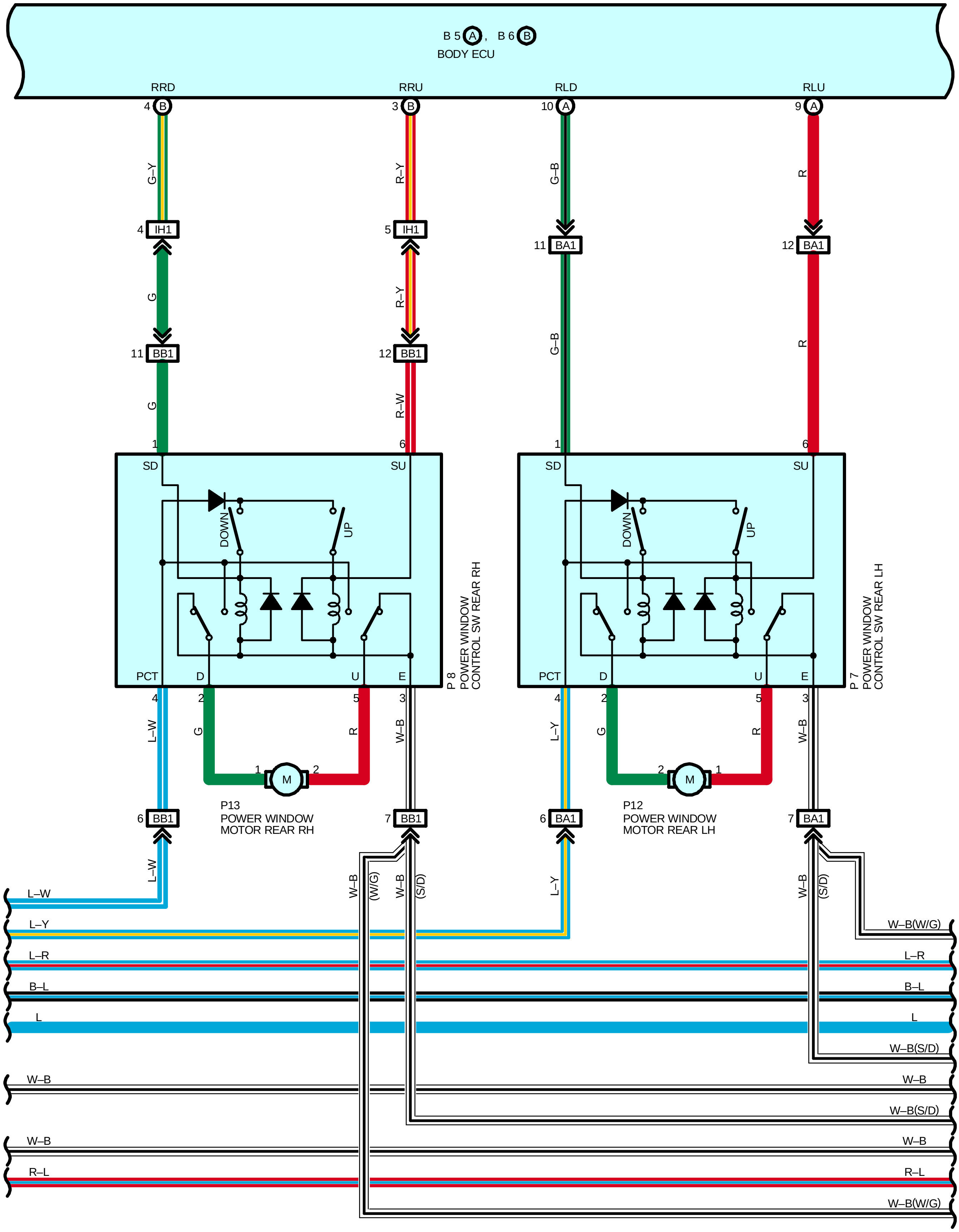
- * AUTOMATIC AIR CONDITIONING
- * AUTOMATIC LIGHT CONTROL
- * BACK DOOR OPENER
- * CHARGING
- * COMBINATION METER
- * CRUISE CONTROL
- * DOOR LOCK CONTROL AND WIRELESS DOOR LOCK CONTROL
- * ELECTRONICALLY CONTROLLED TRANSMISSION AND A/T INDICATOR
- * ENGINE CONTROL
- * FRONT WINDOW DEICER
- * HEADLIGHT
- * INTERIOR LIGHT
- * KEY REMINDER AND SEAT BELT WARNING
- * LIGHT AUTO TURN OFF
- * POWER WINDOW
- * REAR WINDOW DEFOGGER AND MIRROR HEATER
- * THEFT DETERRENT



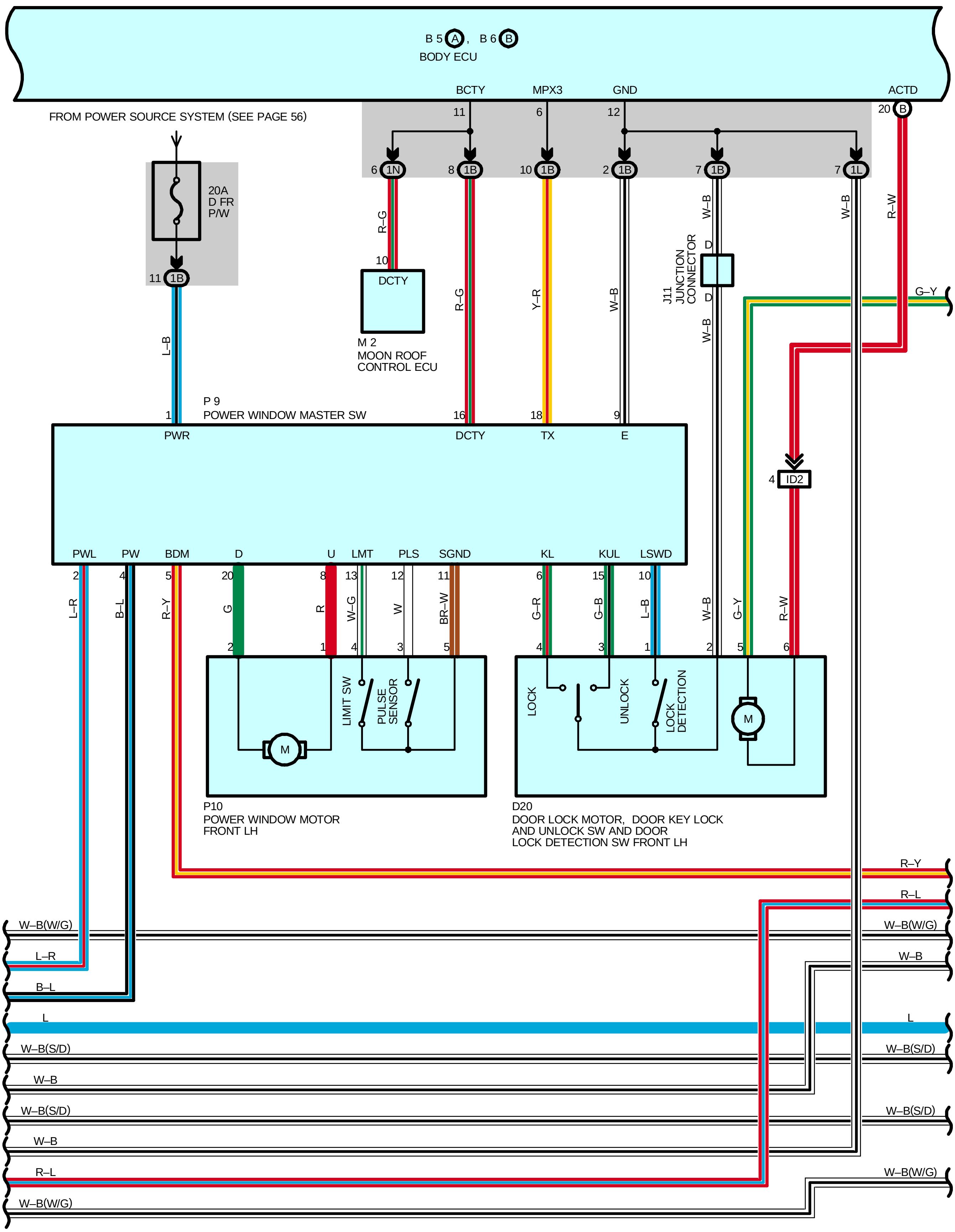
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A RADIO NO. 2
B 5 A , B 6 B
BODY ECU
ACC
TAIL
MPX2
KSW
GND2
TAIL RELAY
7. 5A PANEL
J 6 JUNCTION CONNECTOR
T 5 A , T 6 B
THEFT DETERRENT ECU
TAIL
MPX1
T
MPX2
U 1 UNLOCK WARNING SW
120A ALT
BATTERY
LIGHT CONTROL SW
OFF
TAIL
HEAD
C11 COMBINATION SW
I 2
J 5 JUNCTION CONNECTOR
ID
EC



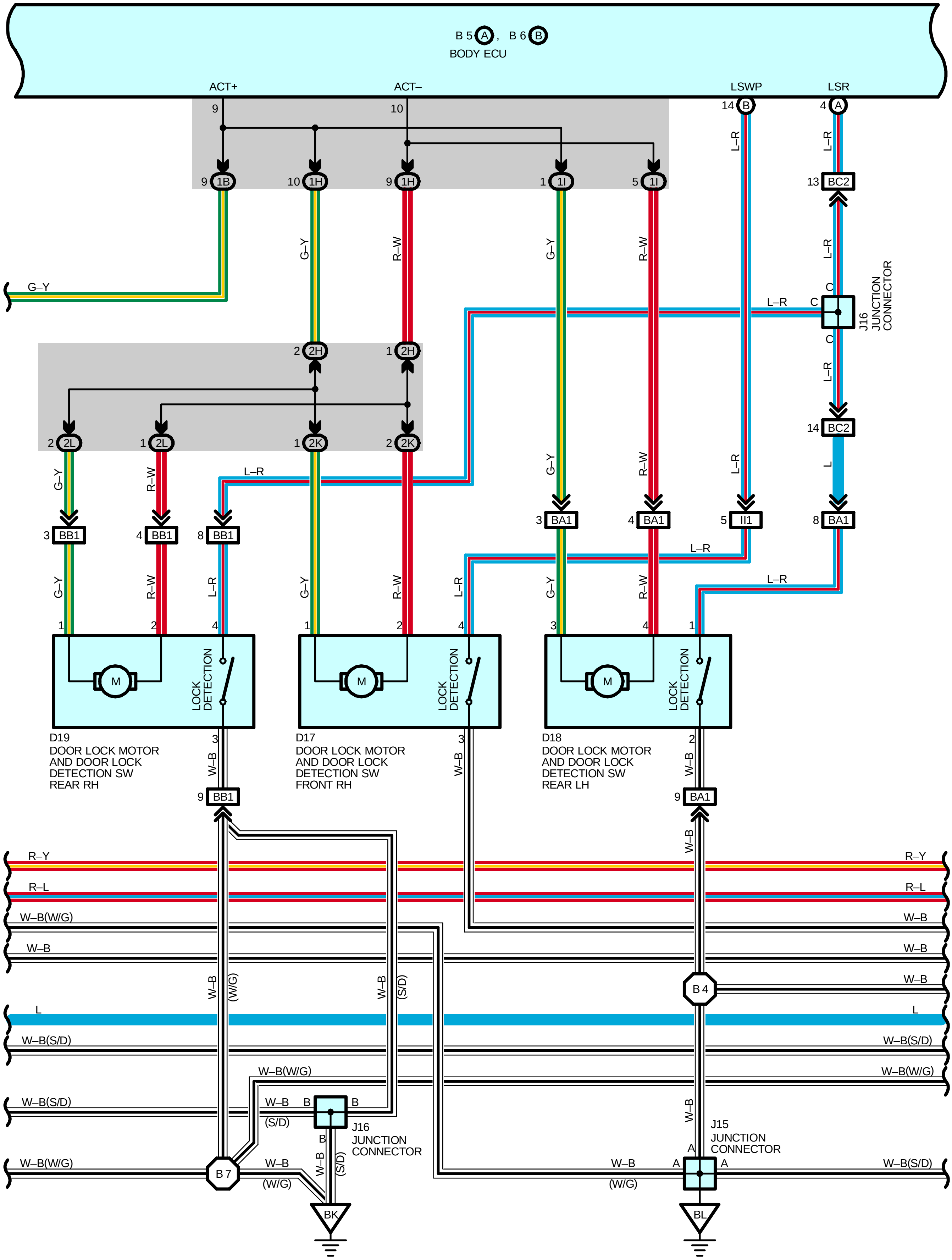
B 5 A , B 6 B
BODY ECU
DFG
PD
PU
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A GAUGE
DEICER RELAY
RR DEF RELAY
P/W RELAY
20A D RR P/W
20A P RR P/W
20A P FR P/W
SD
SU
DOWN
UP
PCT
D
U
E
P 6
POWER WINDOW CONTROL SW FRONT RH
P11
POWER WINDOW MOTOR FRONT RH

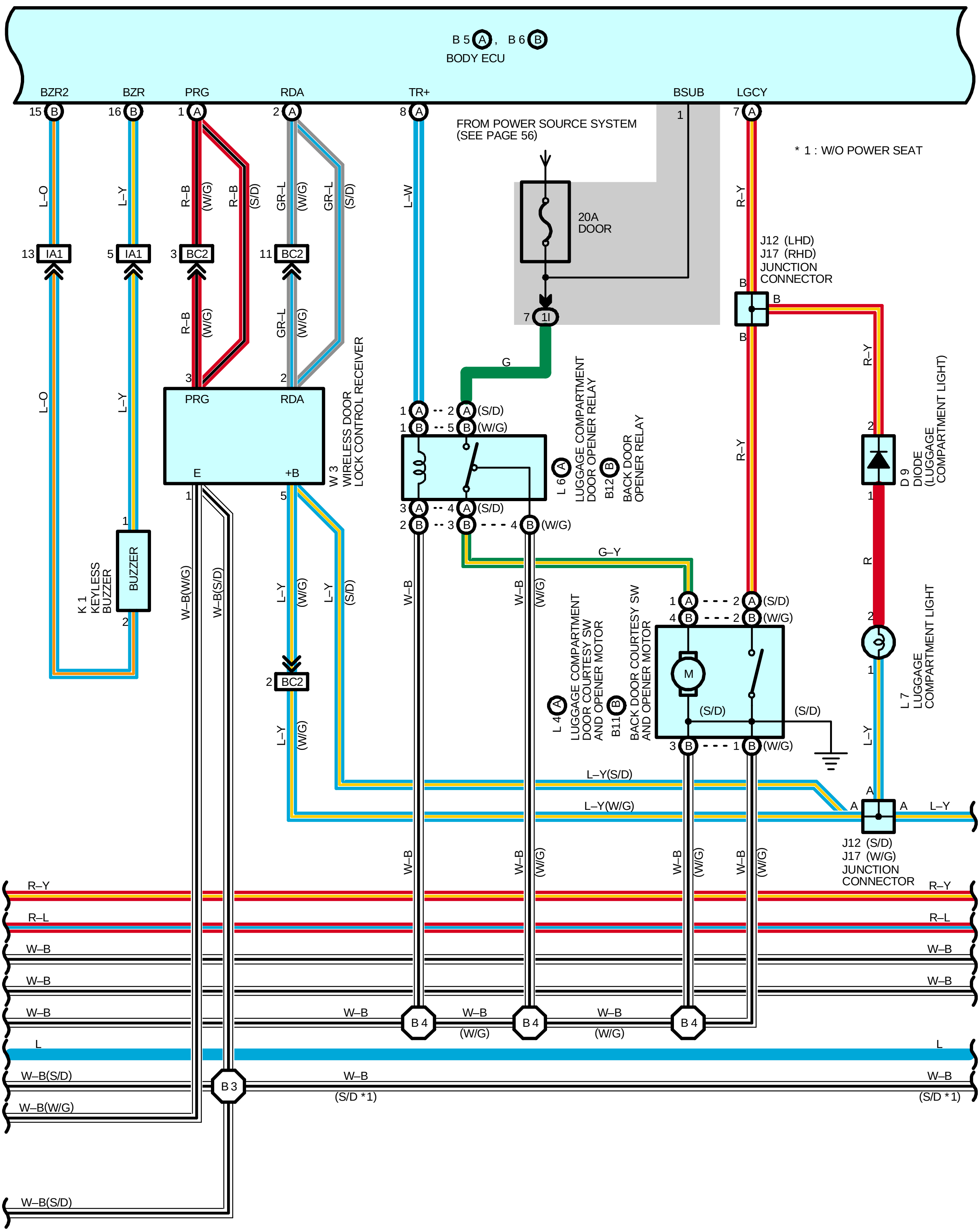


B 5 A , B 6 B
BODY ECU
RRD
RRU
RLD
RLU
G–Y
R–Y
G–B
R
IH1
BA1
G
BB1
R–W
SD
SU
DOWN
UP
PCT
D
U
E
L–W
L–Y
W–B
M
P13
POWER WINDOW
MOTOR REAR RH
P12
POWER WINDOW
MOTOR REAR LH
P 8
POWER WINDOW
CONTROL SW REAR RH
P 7
POWER WINDOW
CONTROL SW REAR LH
(W/G)
(S/D)
L–R
B–L
L
W–B(W/G)
W–B(S/D)
R–L

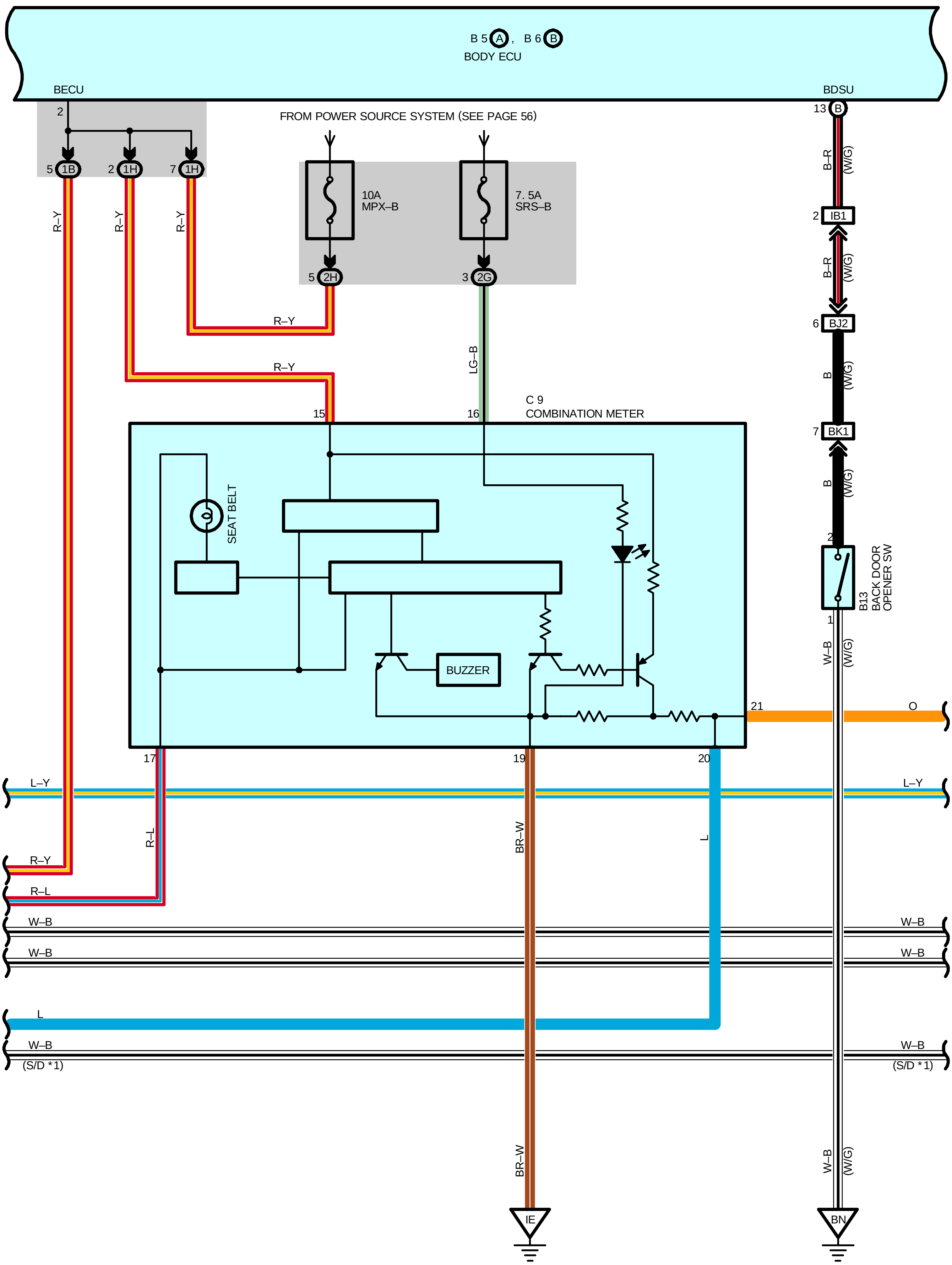


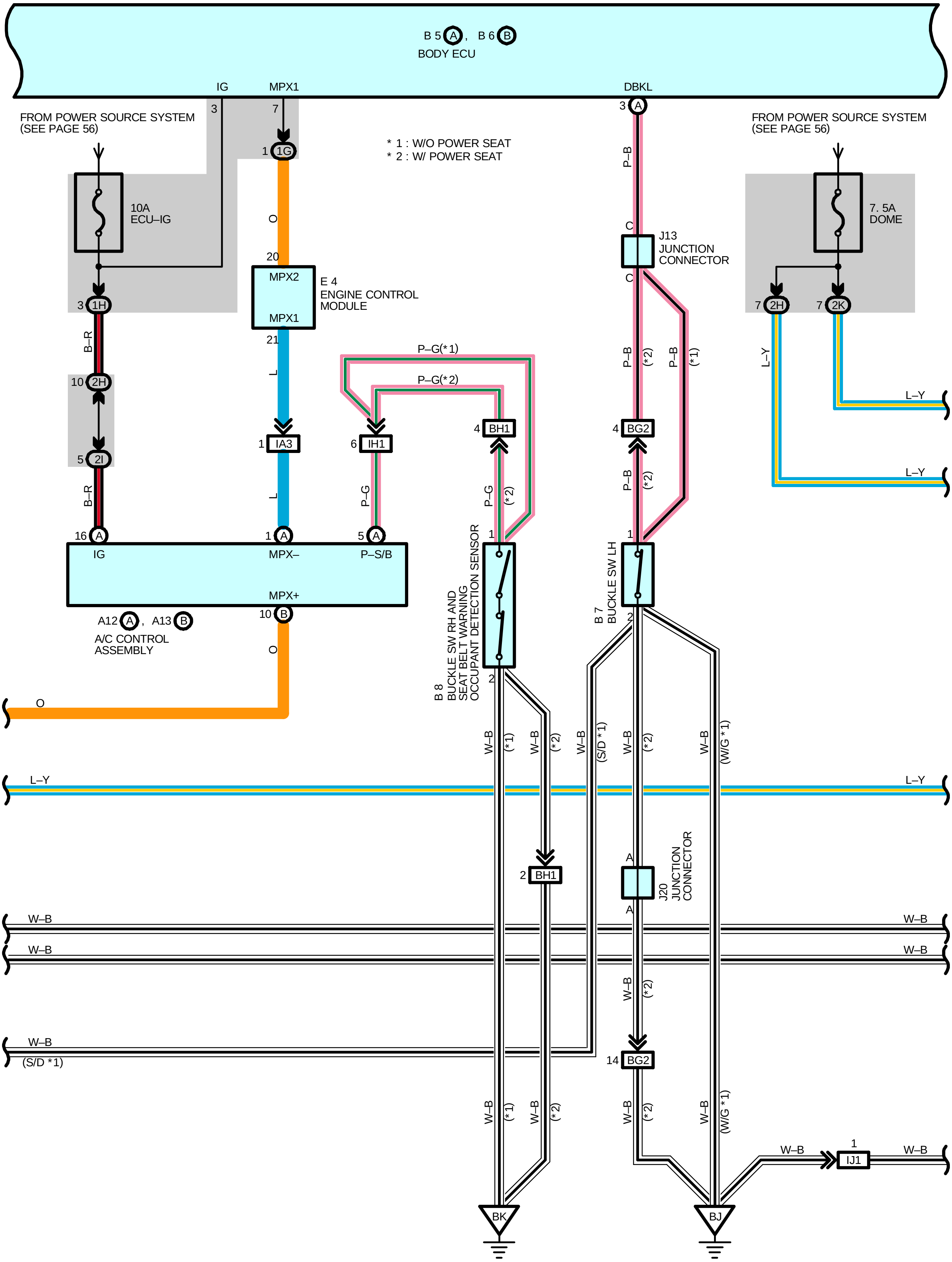
B 5 A, B 6 B
BODY ECU
BCTY
MPX3
GND
ACTD
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
20A
D FR
P/W
1B
1N
1L
ID2
R–G
Y–R
W–B
R–W
L–B
G–Y
DCTY
M 2
MOON ROOF
CONTROL ECU
J11
JUNCTION
CONNECTOR
P 9
POWER WINDOW MASTER SW
PWR
TX
E
PWL
PW
BDM
D
U
LMT
PLS
SGND
KL
KUL
LSWD
L–R
B–L
R–Y
G
R
W–G
W
BR–W
G–R
G–B
LIMIT SW
PULSE
SENSOR
LOCK
UNLOCK
LOCK
DETECTION
M
P10
POWER WINDOW MOTOR
FRONT LH
D20
DOOR LOCK MOTOR, DOOR KEY LOCK
AND UNLOCK SW AND DOOR
LOCK DETECTION SW FRONT LH
R–L
W–B(W/G)
L
W–B(S/D)


B 5 A , B 6 B
BODY ECU
ACT+
ACT–
LSWP
LSR
J16
JUNCTION
CONNECTOR
D19
DOOR LOCK MOTOR
AND DOOR LOCK
DETECTION SW
REAR RH
D17
DOOR LOCK MOTOR
AND DOOR LOCK
DETECTION SW
FRONT RH
D18
DOOR LOCK MOTOR
AND DOOR LOCK
DETECTION SW
REAR LH
LOCK
DETECTION
J16
JUNCTION
CONNECTOR
J15
JUNCTION
CONNECTOR
B 4
B 7
BK
BL

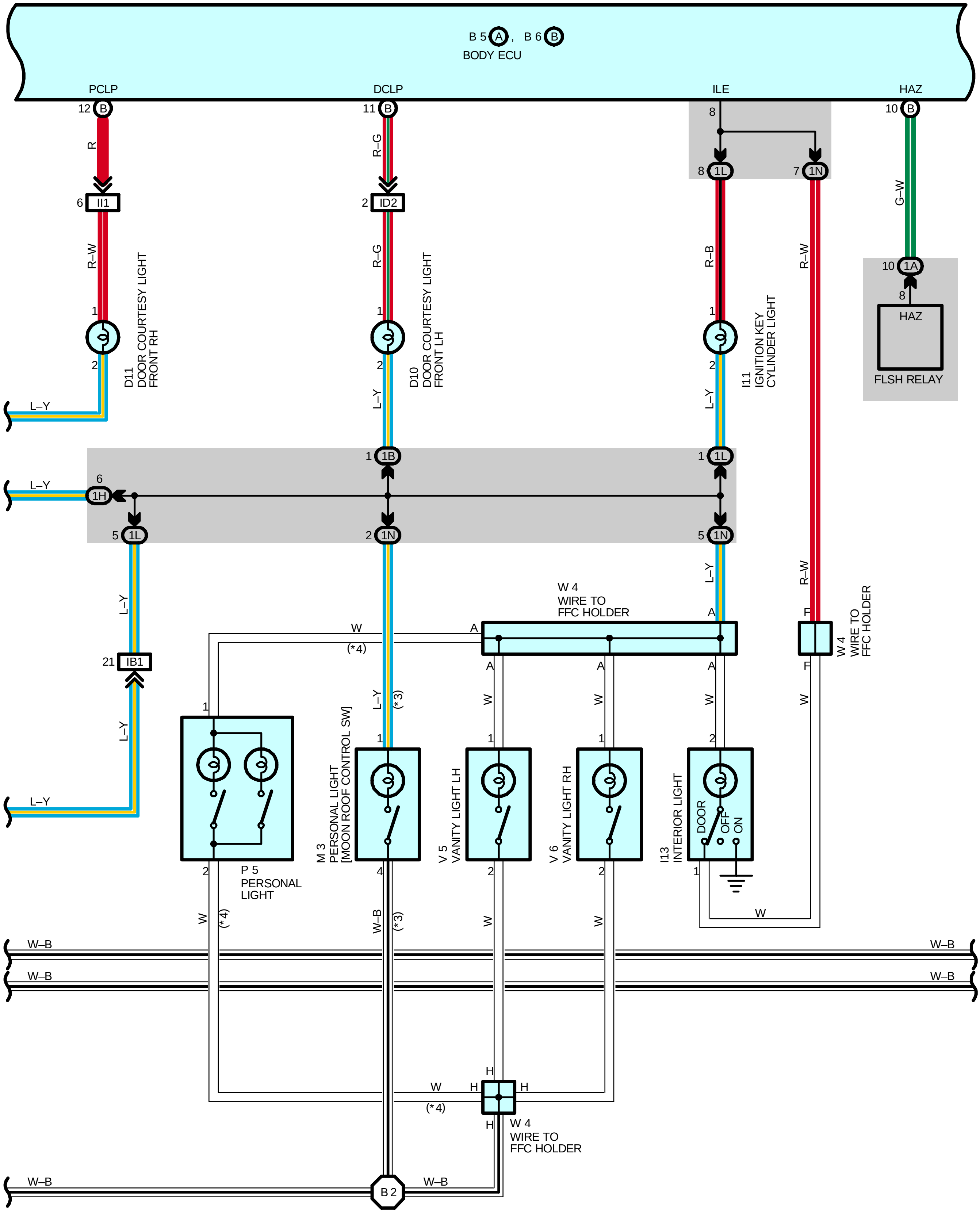


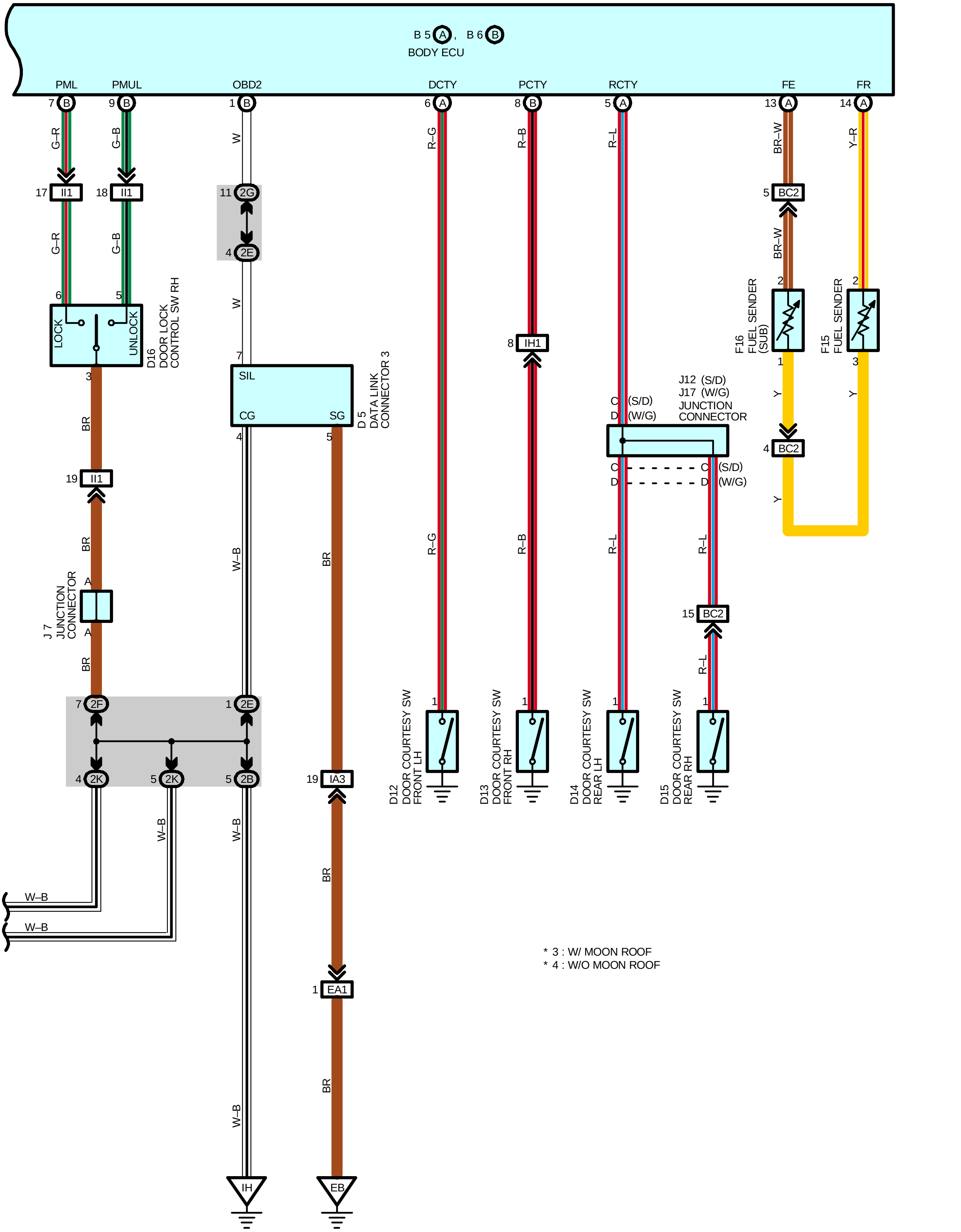
B 5 A , B 6 B
BODY ECU
BZR2
BZR
PRG
RDA
TR+
BSUB
LGCY
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
20A DOOR
* 1 : W/O POWER SEAT
J12 (LHD)
J17 (RHD)
JUNCTION CONNECTOR
W 3 WIRELESS DOOR LOCK CONTROL RECEIVER
K 1 KEYLESS BUZZER
BUZZER
L 6 A LUGGAGE COMPARTMENT DOOR OPENER RELAY
B12 B BACK DOOR OPENER RELAY
L 4 A LUGGAGE COMPARTMENT DOOR COURTESY SW AND OPENER MOTOR
B11 B BACK DOOR COURTESY SW AND OPENER MOTOR
D 9 DIODE (LUGGAGE COMPARTMENT LIGHT)
L 7 LUGGAGE COMPARTMENT LIGHT
J12 (S/D)
J17 (W/G)
JUNCTION CONNECTOR
L–Y(S/D)
L–Y(W/G)
R–Y
R–L
W–B
L
W–B(S/D)
W–B(W/G)
(S/D *1)


B 5 A , B 6 B
BODY ECU
BECU
BDSU
2
5 1B
2 1H
7 1H
R–Y
R–Y
R–Y
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
MPX–B
7. 5A
SRS–B
5 2H
3 2G
R–Y
R–Y
LG–B
13 B
B–R
(W/G)
2 IB1
B–R
(W/G)
6 BJ2
B
(W/G)
7 BK1
B
(W/G)
2
B13
BACK DOOR
OPENER SW
1
W–B
(W/G)
C 9
COMBINATION METER
15
16
SEAT BELT
BUZZER
21
O
17
19
20
L–Y
L–Y
R–L
BR–W
L
R–Y
R–L
W–B
W–B
W–B
W–B
L
W–B
(S/D *1)
W–B
(S/D *1)
BR–W
W–B
(W/G)
IE
BN



B 5 A , B 6 B
BODY ECU
IG
MPX1
DBKL
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A ECU–IG
1G
O
20
MPX2
E 4 ENGINE CONTROL MODULE
MPX1
21
* 1 : W/O POWER SEAT
* 2 : W/ POWER SEAT
P–B
J13 JUNCTION CONNECTOR
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
7. 5A DOME
1H
B–R
2H
2I
2K
L–Y
P–G(*1)
P–G(*2)
IA3
IH1
BH1
BG2
P–G
A12 A , A13 B
A/C CONTROL ASSEMBLY
IG
MPX–
P–S/B
MPX+
B 8 BUCKLE SW RH AND SEAT BELT WARNING OCCUPANT DETECTION SENSOR
B 7 BUCKLE SW LH
W–B
(S/D *1)
(W/G *1)
J20 JUNCTION CONNECTOR
IJ1
BK
BJ


B 5 A , B 6 B
BODY ECU
PCLP
DCLP
ILE
HAZ
12 B
11 B
10 B
R
R–G
8
8 1L
7 1N
G–W
6 II1
2 ID2
R–W
R–G
R–B
R–W
10 1A
8
HAZ
FLSH RELAY
D11
DOOR COURTESY LIGHT
FRONT RH
D10
DOOR COURTESY LIGHT
FRONT LH
I11
IGNITION KEY
CYLINDER LIGHT
L–Y
1 1B
1 1L
6 1H
5 1L
2 1N
5 1N
W 4
WIRE TO
FFC HOLDER
W
(*4)
(*3)
21 IB1
P 5
PERSONAL
LIGHT
M 3
PERSONAL LIGHT
[MOON ROOF CONTROL SW]
V 5
VANITY LIGHT LH
V 6
VANITY LIGHT RH
I13
INTERIOR LIGHT
DOOR
OFF
ON
W–B
W 4
WIRE TO
FFC HOLDER
B 2


B 5 A , B 6 B
BODY ECU
PML
PMUL
OBD2
DCTY
PCTY
RCTY
FE
FR
G–R
G–B
W
R–G
R–B
R–L
BR–W
Y–R
II1
2G
2E
BC2
IH1
D16
DOOR LOCK
CONTROL SW RH
LOCK
UNLOCK
SIL
CG
SG
D 5
DATA LINK
CONNECTOR 3
F16
FUEL SENDER
(SUB)
F15
FUEL SENDER
J12 (S/D)
J17 (W/G)
JUNCTION
CONNECTOR
C (S/D)
D (W/G)
BR
Y
J 7
JUNCTION
CONNECTOR
W–B
2F
2K
2B
IA3
EA1
D12
DOOR COURTESY SW
FRONT LH
D13
DOOR COURTESY SW
FRONT RH
D14
DOOR COURTESY SW
REAR LH
D15
DOOR COURTESY SW
REAR RH
IH
EB
* 3 : W/ MOON ROOF
* 4 : W/O MOON ROOF

SYSTEM OUTLINE

MULTIPLEX COMMUNICATION SYSTEM

The system is comprised of the communication modes of the body ECU, engine control module, theft deterrent ECU, power window master SW, combination meter and A/C control assembly. The body electrical systems are controlled by a serial communication in which each ECU is linked to another via a single communication line. This system is also equipped with a self–diagnosis function.
The table below shows the systems under the control of the MPX communication system and related ECUs (Communication nodes).

	Body ECU	Engine Control Module	Combination Meter	A/C Control Assembly	Theft Deterrent ECU
Door Lock Control	1	–	–	–	–
Wireless Door Lock Control	1	–	–	–	2
Light Auto Turn Off	–	–	–	–	1
Automatic Light Control	–	–	–	–	1
Theft Deterrent	2	–	–	–	1
Illuminated Entry	1	–	–	–	–
Key Reminder Buzzer	1	–	2	–	–
Luggage Compartment Door or Back Door Opener	1	–	–	–	–
C–BEST System	1	–	2	2	2
Diagnosis System	1	–	2	2	2
Seat Belt Warning	1	–	2	–	–
Electronically Controlled Transmission Signal	–	1	2	2	–
A/C Control	–	2	–	1	–
Multi Information Display	2	2	1	2	–

1 : Master control 2 : Sub control

1. COMMUNICATION OUTLINE

Communication is implemented among the combination meter, A/C control assembly, body ECU, engine control module and theft deterrent ECU, and among the body ECU and power window master SW.
Upon receiving signals from applicable switches such as the door lock control switch or door courtesy light switch, each ECU determines the conditions of the switches as well as of the doors, and after converting this information into digital signals, outputs them to other ECUs via serial data communication. The ECU that receives these digital signals determines the conditions of the switches and doors so that it can implement various controls such as to activate a door lock motor.
However, if there are no changes in the input signals because no doors were opened and no switches were used within 30 seconds, the body ECU interrupts the communication to save electricity. Following this interruption, any changes in the input signals will cause the communication to resume.
For details please refer to the new car features and repair manuals.

SERVICE HINTS

B5 (A), B6 (B) BODY ECU

3–GROUND : Approx. **12** volts with the ignition SW at **ON** position
1–GROUND : Always approx. **12** volts
2–GROUND : Always approx. **12** volts
12–GROUND : Always continuity
4–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
(B)19–GROUND : Always continuity

MULTIPLEX COMMUNICATION SYSTEM

○ : PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
A12	A	34	D18		36 (S/D)	M2		39 (W/G)
A13	B	34			38 (W/G)	M3		37 (S/D)
B5	A	34	D19		36 (S/D)			39 (W/G)
B6	B	34			38 (W/G)	P5		37 (S/D)
B7		36 (S/D w/o Power Seat)	D20		36 (S/D)			39 (W/G)
		38 (W/G w/o Power Seat)			38 (W/G)	P6		37 (S/D)
		40 (w/ Power Seat)	E4		32			39 (W/G)
B8		36 (S/D w/o Power Seat)	F15		36 (S/D)	P7		37 (S/D)
		38 (W/G w/o Power Seat)			38 (W/G)			39 (W/G)
		40 (w/ Power Seat)	F16		36 (S/D)	P8		37 (S/D)
B11	B	38 (W/G)			38 (W/G)			39 (W/G)
B12	B	38 (W/G)	I11		35	P9		37 (S/D)
B13		38 (W/G)	I13		36 (S/D)			39 (W/G)
C9		34			38 (W/G)	P10		37 (S/D)
C11		34	J5		35			39 (W/G)
D5		34	J6		35	P11		37 (S/D)
D9		36 (S/D)	J7		35			39 (W/G)
		38 (W/G)	J11		36 (S/D)	P12		37 (S/D)
D10		36 (S/D)			38 (W/G)			39 (W/G)
		38 (W/G)	J12		36 (S/D)	P13		37 (S/D)
D11		36 (S/D)	J13		36 (S/D)			39 (W/G)
		38 (W/G)			38 (W/G)	T5	A	35
D12		36 (S/D)	J15		36 (S/D)	T6	B	35
		38 (W/G)			38 (W/G)	U1		35
D13		36 (S/D)	J16		36 (S/D)	V5		37 (S/D)
		38 (W/G)			38 (W/G)			39 (W/G)
D14		36 (S/D)	J17		38 (W/G)	V6		37 (S/D)
		38 (W/G)	J20		40			39 (W/G)
D15		36 (S/D)	K1		33	W3		37 (S/D)
		38 (W/G)	L4	A	36 (S/D)			39 (W/G)
D16		36 (S/D)	L6	A	36 (S/D)	W4		37 (S/D)
		38 (W/G)	L7		36 (S/D)			39 (W/G)
D17		36 (S/D)			38 (W/G)			
		38 (W/G)	M2		37 (S/D)			

▭ : RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1B	24	Front Door LH Wire and Driver Side J/B (Left Kick Panel)
1E	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1L	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1N	24	Roof Wire and Driver Side J/B (Left Kick Panel)
1O	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2C		
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2F		
2G		
2H		
2I		
2K	26	Front Door RH Wire and Passenger Side J/B (Right Kick Panel)
2L	26	Floor Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

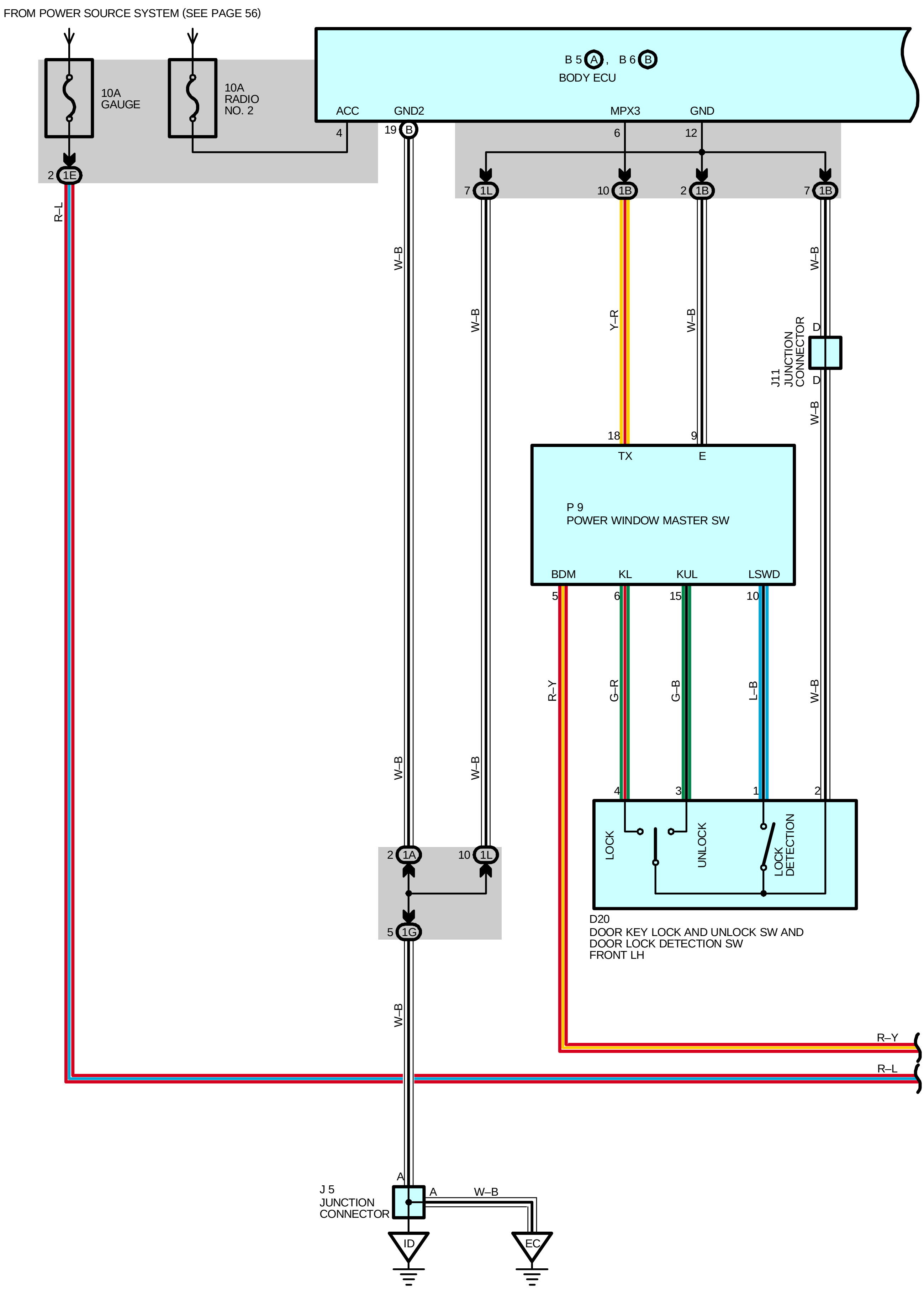
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
IB3		
ID2	44	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)
IJ1	46	Roof Wire and Floor No.2 Wire (Left Side of the Instrument Panel)
BA1	48 (S/D)	Rear Door No.2 Wire and Floor No.2 Wire (Left Center Pillar)
	50 (W/G)	
BB1	48 (S/D)	Rear Door No.1 Wire and Floor Wire (Right Center Pillar)
	50 (W/G)	
BC2	48 (S/D)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)
	50 (W/G)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel Center)
BG2	52	Floor No.2 Wire and Front Seat LH Wire (Under the Driver's Seat)
BH1	52	Floor Wire and Front Seat RH Wire (Under the Front Passenger's Seat)
BJ2	50 (W/G)	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BK1	50 (W/G)	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)

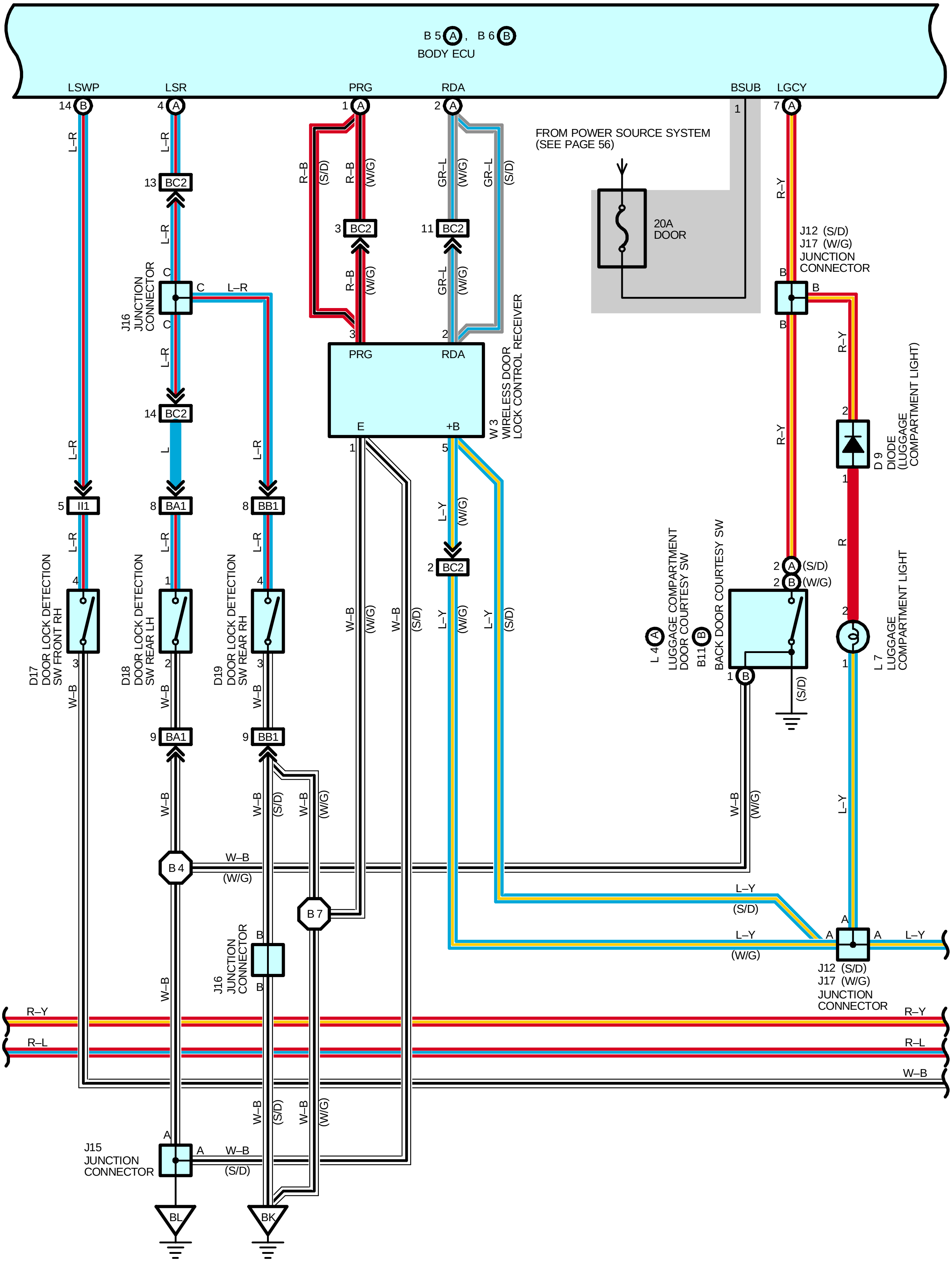
: GROUND POINTS

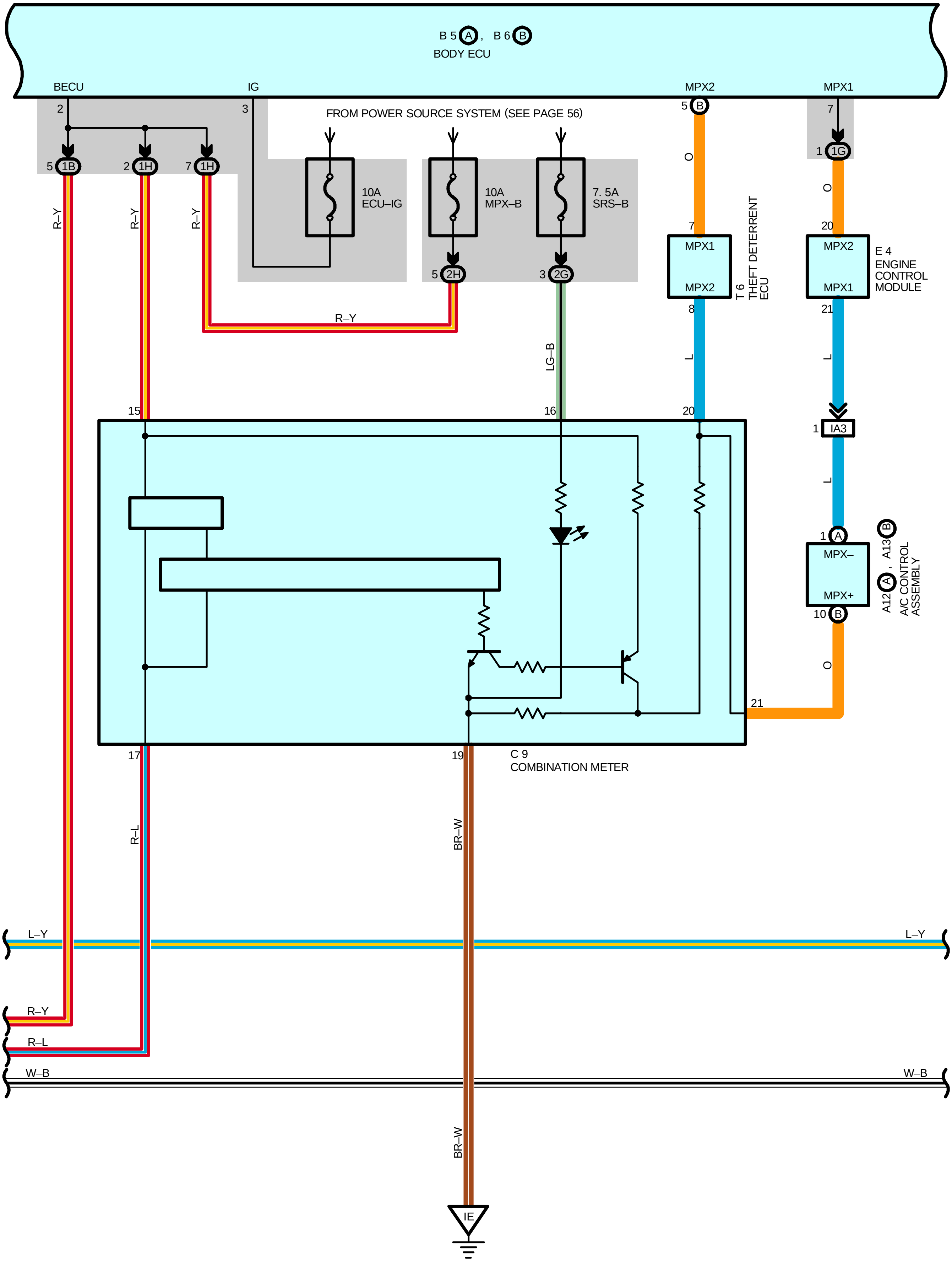
Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IE	44	Front Floor Panel Center LH
IH	44	Cowl Side Panel RH
BJ	48 (S/D)	Front Floor Panel LH
	50 (W/G)	
BK	48 (S/D)	Front Floor Panel RH
	50 (W/G)	
BL	48 (S/D)	Left Quarter Panel LH
	50 (W/G)	
BN	50 (W/G)	Right Side of the Back Panel Lower

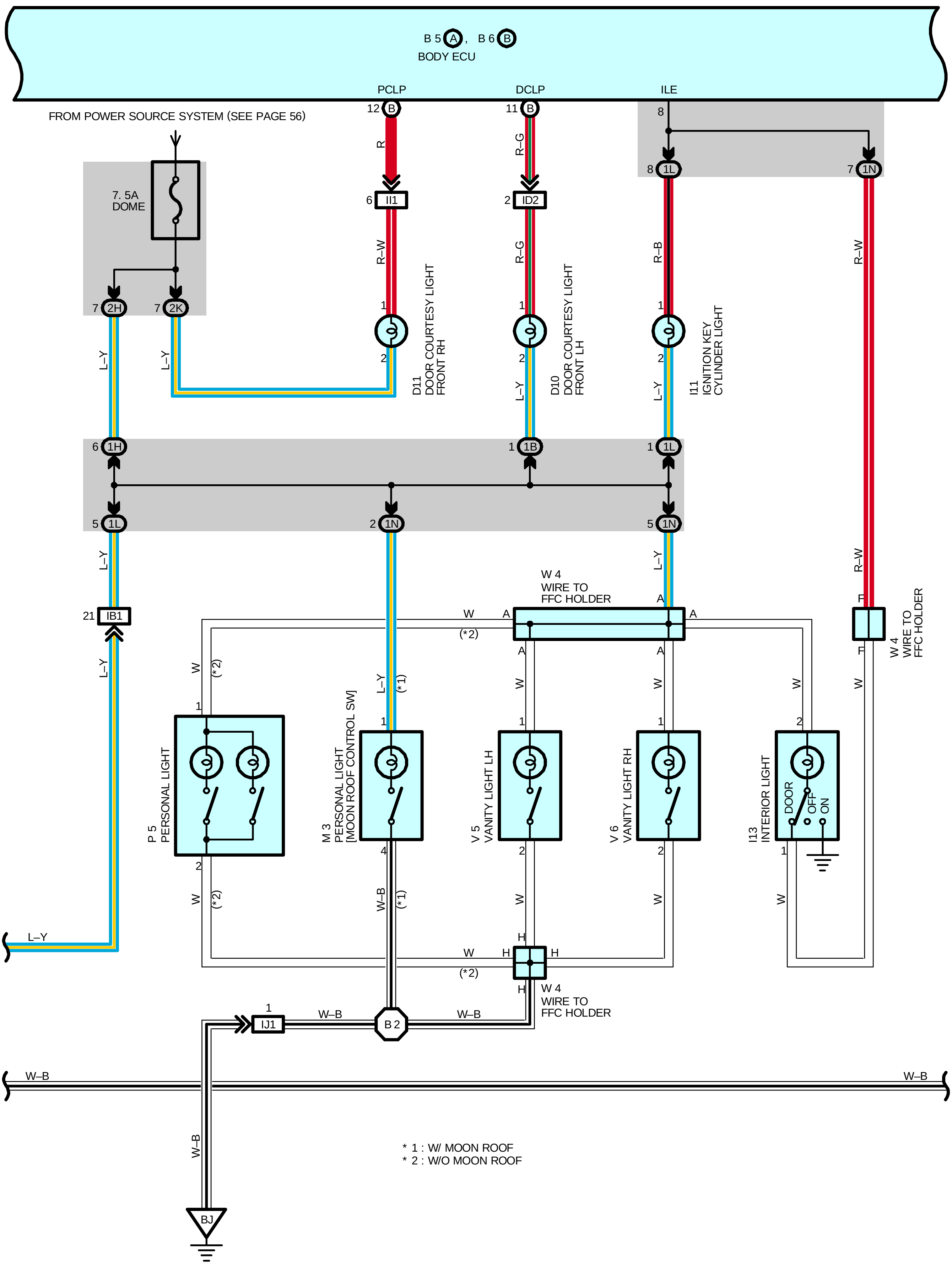
: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I2	46	Instrument Panel Wire	B4	48 (S/D)	Floor No.2 Wire
B2	48 (S/D)	Roof Wire		50 (W/G)	
	50 (W/G)		B7	50 (W/G)	Floor Wire
B3	48 (S/D)	Floor No.2 Wire			

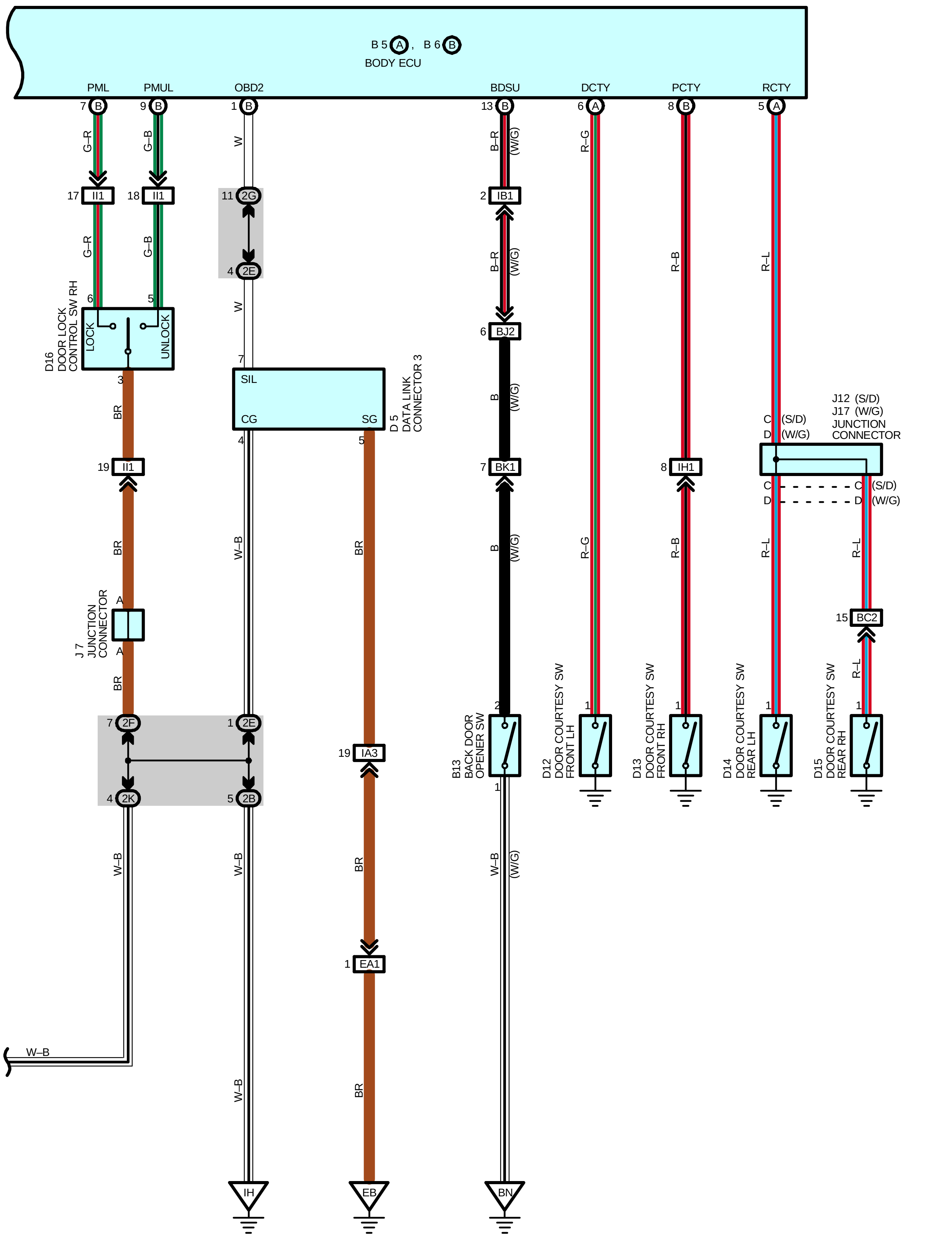

FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A GAUGE
10A RADIO NO. 2
B 5 (A), B 6 (B)
BODY ECU
ACC
GND2
MPX3
GND
4
19 (B)
6
12
2 (1E)
7 (1L)
10 (1B)
2 (1B)
7 (1B)
R–L
W–B
Y–R
W–B
J11 JUNCTION CONNECTOR
D
D
18
9
TX
E
P 9
POWER WINDOW MASTER SW
BDM
KL
KUL
LSWD
5
6
15
10
R–Y
G–R
G–B
L–B
4
3
1
2
LOCK
UNLOCK
LOCK DETECTION
D20
DOOR KEY LOCK AND UNLOCK SW AND DOOR LOCK DETECTION SW FRONT LH
2 (1A)
10 (1L)
5 (1G)
R–Y
R–L
J 5
JUNCTION CONNECTOR
A
A
W–B
ID
EC


B 5 A , B 6 B
BODY ECU
LSWP
LSR
PRG
RDA
BSUB
LGCY
FROM POWER SOURCE SYSTEM
(SEE PAGE 56)
20A
DOOR
J12 (S/D)
J17 (W/G)
JUNCTION
CONNECTOR
J16
JUNCTION
CONNECTOR
W 3
WIRELESS DOOR
LOCK CONTROL RECEIVER
D 9
DIODE
(LUGGAGE
COMPARTMENT LIGHT)
D17
DOOR LOCK DETECTION
SW FRONT RH
D18
DOOR LOCK DETECTION
SW REAR LH
D19
DOOR LOCK DETECTION
SW REAR RH
L 4 A
LUGGAGE COMPARTMENT
DOOR COURTESY SW
B11 B
BACK DOOR COURTESY SW
L 7
LUGGAGE
COMPARTMENT LIGHT
J15
JUNCTION
CONNECTOR
BL
BK
B 4
B 7
R–Y
R–L
W–B
L–Y


B 5 A , B 6 B
BODY ECU
BECU
IG
MPX2
MPX1
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A ECU–IG
10A MPX–B
7. 5A SRS–B
1B
1H
1H
2H
2G
1G
R–Y
LG–B
O
L
MPX1
MPX2
T 6 THEFT DETERRENT ECU
E 4 ENGINE CONTROL MODULE
IA3
MPX–
MPX+
A12 A , A13 B A/C CONTROL ASSEMBLY
C 9 COMBINATION METER
R–L
BR–W
L–Y
W–B
IE



B 5 A , B 6 B
BODY ECU
PCLP
DCLP
ILE
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
7. 5A
DOME
D11
DOOR COURTESY LIGHT
FRONT RH
D10
DOOR COURTESY LIGHT
FRONT LH
I11
IGNITION KEY
CYLINDER LIGHT
W 4
WIRE TO
FFC HOLDER
P 5
PERSONAL LIGHT
M 3
PERSONAL LIGHT
[MOON ROOF CONTROL SW]
V 5
VANITY LIGHT LH
V 6
VANITY LIGHT RH
I13
INTERIOR LIGHT
DOOR
OFF
ON
B 2
BJ
* 1 : W/ MOON ROOF
* 2 : W/O MOON ROOF


B 5 A , B 6 B
BODY ECU
PML
PMUL
OBD2
BDSU
DCTY
PCTY
RCTY
G–R
G–B
W
B–R
(W/G)
R–G
R–B
R–L
II1
2G
2E
IB1
BJ2
D16
DOOR LOCK
CONTROL SW RH
LOCK
UNLOCK
SIL
CG
SG
D 5
DATA LINK
CONNECTOR 3
B
BR
BK1
IH1
J12 (S/D)
J17 (W/G)
JUNCTION
CONNECTOR
(S/D)
W–B
J 7
JUNCTION
CONNECTOR
BC2
2F
2K
2B
IA3
B13
BACK DOOR
OPENER SW
D12
DOOR COURTESY SW
FRONT LH
D13
DOOR COURTESY SW
FRONT RH
D14
DOOR COURTESY SW
REAR LH
D15
DOOR COURTESY SW
REAR RH
EA1
IH
EB
BN

SYSTEM OUTLINE

ILLUMINATED ENTRY SYSTEM

This system provides various functions listed below through communication control of the body ECU etc.

* Each relevant light lights up if any door is opened.
* If all the doors are closed with the ignition SW set at OFF after any door is opened, each light lights up for 15 sec., and then fades out when the time set on the timer has elapsed.
* If any door is unlocked from the driver or passenger side or if any door is unlocked with the unlock SW on the transmitter after all the doors are closed and locked, each light lights up for 15 sec., and then fades out when the time set on the timer has elapsed.
* If the ignition SW is turned to the ACC or ON position while each light is being lit by the timer, the timer lighting is cancelled and the light fades out.
* If all the doors are closed and locked from the driver or passenger side or with the lock SW on the transmitter while each light is being lit, the timer lighting is cancelled and the light fades out.
* If all the doors are closed with the ignition SW set at ACC or ON after any door is opened, the timer lighting is cancelled and the light fades out.
* Each light above is the interior light, ignition key cylinder light, and door courtesy lights.

SERVICE HINTS

D12, D13, D14, D15 DOOR COURTESY SW FRONT LH, RH, REAR LH, RH

1–GROUND : Continuity with the door open

B6 (B) BODY ECU

BECU–GROUND : Always approx. **12** volts
BSUB–GROUND : Always approx. **12** volts
IG–GROUND : Approx. **12** volts with the ignition SW at **ON** position
ACC–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
GND–GROUND : Always continuity
GND2–GROUND : Always continuity

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code		See Page
A12	A	34	D16	36 (S/D)	J16		38 (W/G)
A13	B	34		38 (W/G)	J17		38 (W/G)
B5	A	34	D17	36 (S/D)	L4	A	36 (S/D)
B6	B	34		38 (W/G)	L7		36 (S/D)
B11	B	38 (W/G)	D18	36 (S/D)			38 (W/G)
B13		38 (W/G)		38 (W/G)	M3		37 (S/D)
C9		34	D19	36 (S/D)			39 (W/G)
D5		34		38 (W/G)	P5		37 (S/D)
D9		36 (S/D)	D20	36 (S/D)			39 (W/G)
		38 (W/G)		38 (W/G)	P9		37 (S/D)
D10		36 (S/D)	E4	32			39 (W/G)
		38 (W/G)	I11	35	T6		35
D11		36 (S/D)	I13	36 (S/D)	V5		37 (S/D)
		38 (W/G)		38 (W/G)			39 (W/G)
D12		36 (S/D)	J5	35	V6		37 (S/D)
		38 (W/G)	J7	35			39 (W/G)
D13		36 (S/D)	J11	36 (S/D)	W3		37 (S/D)
		38 (W/G)		38 (W/G)			39 (W/G)
D14		36 (S/D)	J12	36 (S/D)	W4		37 (S/D)
		38 (W/G)	J15	36 (S/D)			39 (W/G)
D15		36 (S/D)		38 (W/G)			
		38 (W/G)	J16	36 (S/D)			

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1B	24	Front Door LH Wire and Driver Side J/B (Left Kick Panel)
1E	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1L		
1N	24	Roof Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2F		
2G		
2H		
2K	26	Front Door RH Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
ID2	44	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)
IJ1	46	Roof Wire and Floor No.2 Wire (Left Side of the Instrument Panel)
BA1	48 (S/D)	Rear Door No.2 Wire and Floor No.2 Wire (Left Center Pillar)
	50 (W/G)	
BB1	48 (S/D)	Rear Door No.1 Wire and Floor Wire (Right Center Pillar)
	50 (W/G)	
BC2	48 (S/D)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)
	50 (W/G)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel Center)
BJ2	50 (W/G)	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BK1	50 (W/G)	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)

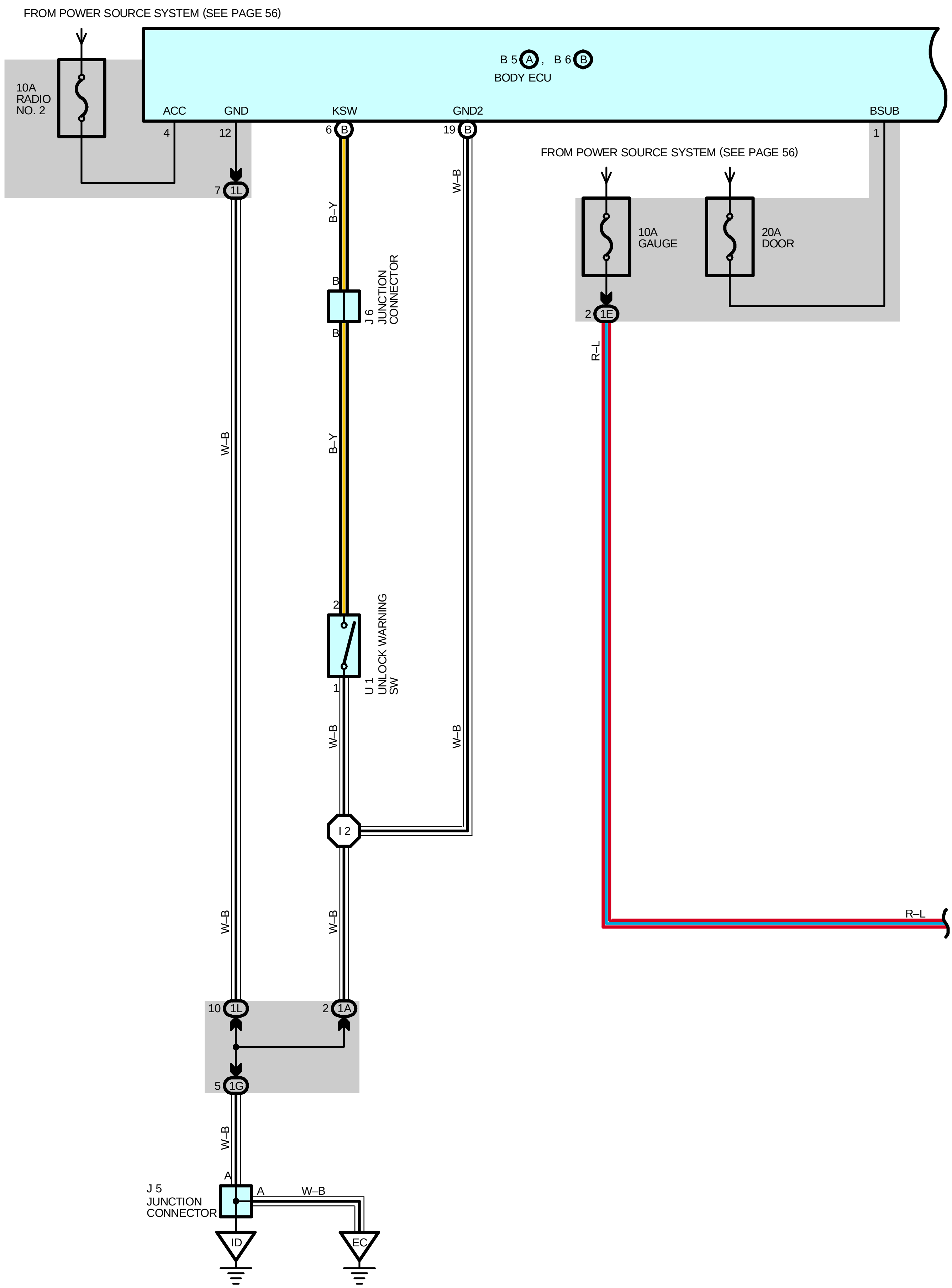
: GROUND POINTS

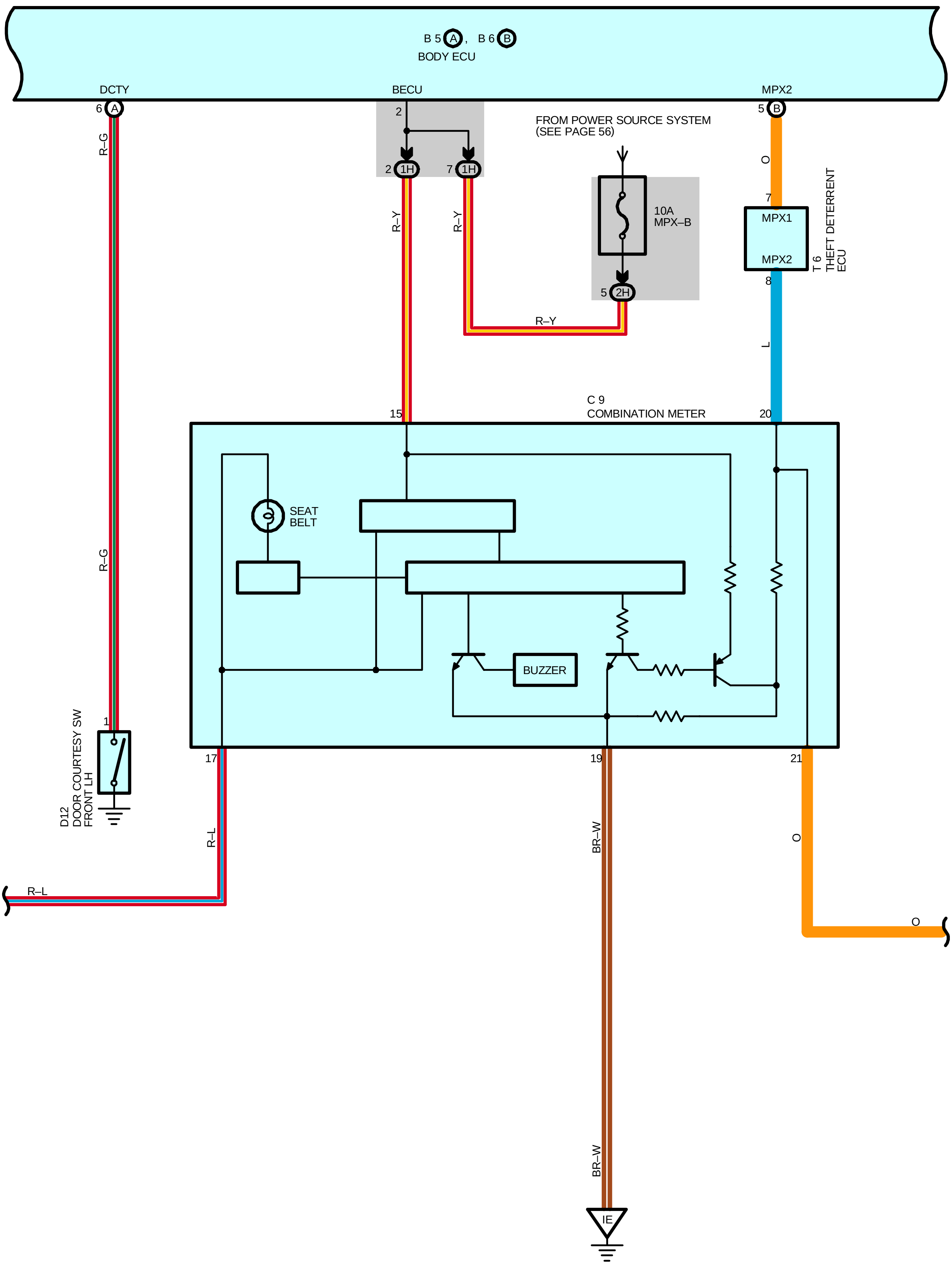
Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IE	44	Front Floor Panel Center LH
IH	44	Cowl Side Panel RH
BJ	48 (S/D)	Front Floor Panel LH
	50 (W/G)	
BK	48 (S/D)	Front Floor Panel RH
	50 (W/G)	
BL	48 (S/D)	Left Quarter Panel LH
	50 (W/G)	
BN	50 (W/G)	Right Side of the Back Panel Lower

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B2	48 (S/D)	Roof Wire	B4	50 (W/G)	Floor No.2 Wire
	50 (W/G)		B7	50 (W/G)	Floor Wire

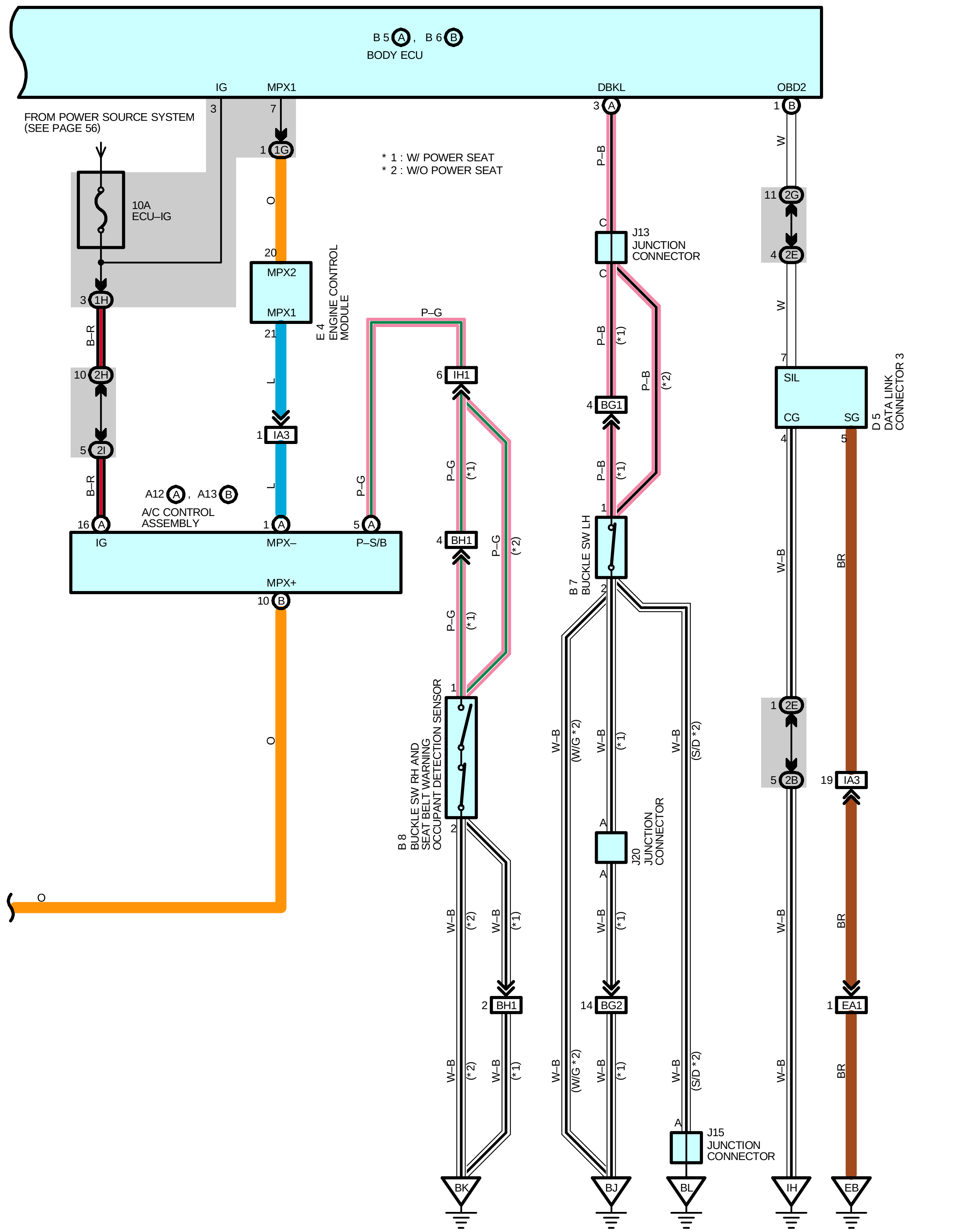
KEY REMINDER AND SEAT BELT WARNING





B 5 A , B 6 B
BODY ECU
DCTY
BECU
MPX2
6 A
2
5 B
FROM POWER SOURCE SYSTEM
(SEE PAGE 56)
R–G
2 1H
7 1H
O
7
MPX1
MPX2
8
T 6
THEFT DETERRENT
ECU
10A
MPX–B
R–Y
R–Y
5 2H
R–Y
L
C 9
COMBINATION METER
15
20
SEAT
BELT
R–G
BUZZER
1
D12
DOOR COURTESY SW
FRONT LH
17
19
21
R–L
BR–W
O
R–L
O
BR–W
IE

KEY REMINDER AND SEAT BELT WARNING



SYSTEM OUTLINE

1. SEAT BELT WARNING SYSTEM

When the ignition SW is turned to the ON position, the signal is input to the body ECU. At this time, to determine whether or not the driver fastens the seat belt, the signal from the buckle SW LH is input to TERMINAL DBKL of the body ECU. If the driver does not fasten the seat belt, the seat belt warning light in the combination meter flashes and the alarm buzzer goes on, in response to the communication control of the body ECU etc.

Additionally, the sensor (Seat belt warning occupant detection sensor) installed on the front passenger seat detects the passenger and determines whether or not the passenger fastens the seat belt.

If the passenger does not fasten the seat belt, the signals from the seat sensor and buckle SW RH are input to TERMINAL P–S/B of the A/C control assembly and through communication control of the body ECU etc. the passenger seat belt warning light is flashed.

2. KEY REMINDER SYSTEM

If the driver door is opened with the ignition SW set at the ACC or OFF position and the ignition key remained inserted into the key cylinder (The unlock warning SW is on), the signal from the unlock warning SW is input to TERMINAL KSW of the body ECU and the signal from the door courtesy SW front LH is input to TERMINAL DCTY of the body ECU. As a result, through communication control of the body ECU etc. the buzzer in the combination meter goes on to warn the driver that the ignition key is still inserted.

SERVICE HINTS

B7 BUCKLE SW LH

1–2 : Continuity with the driver's seat belt not use

B8 BUCKLE SW RH AND SEAT BELT WARNING OCCUPANT DETECTION SENSOR

1–2 : Continuity with the passenger sit on the front passenger seat and front passenger's seat belt not use

U1 UNLOCK WARNING SW

2–1 : Continuity with the ignition key in cylinder

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
A12	A	34	B8	38 (W/G w/o Power Seat)	J6	35
A13	B	34		40 (w/ Power Seat)	J13	36 (S/D)
B5	A	34	C9	34		38 (W/G)
B6	B	34	D5	34	J15	36 (S/D)
B7		36 (S/D w/o Power Seat)	D12	36 (S/D)	J20	40
		38 (W/G w/o Power Seat)		38 (W/G)	T6	35
		40 (w/ Power Seat)	E4	32	U1	35
B8		36 (S/D w/o Power Seat)	J5	35		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1L		
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2G		
2H		
2I		

KEY REMINDER AND SEAT BELT WARNING

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

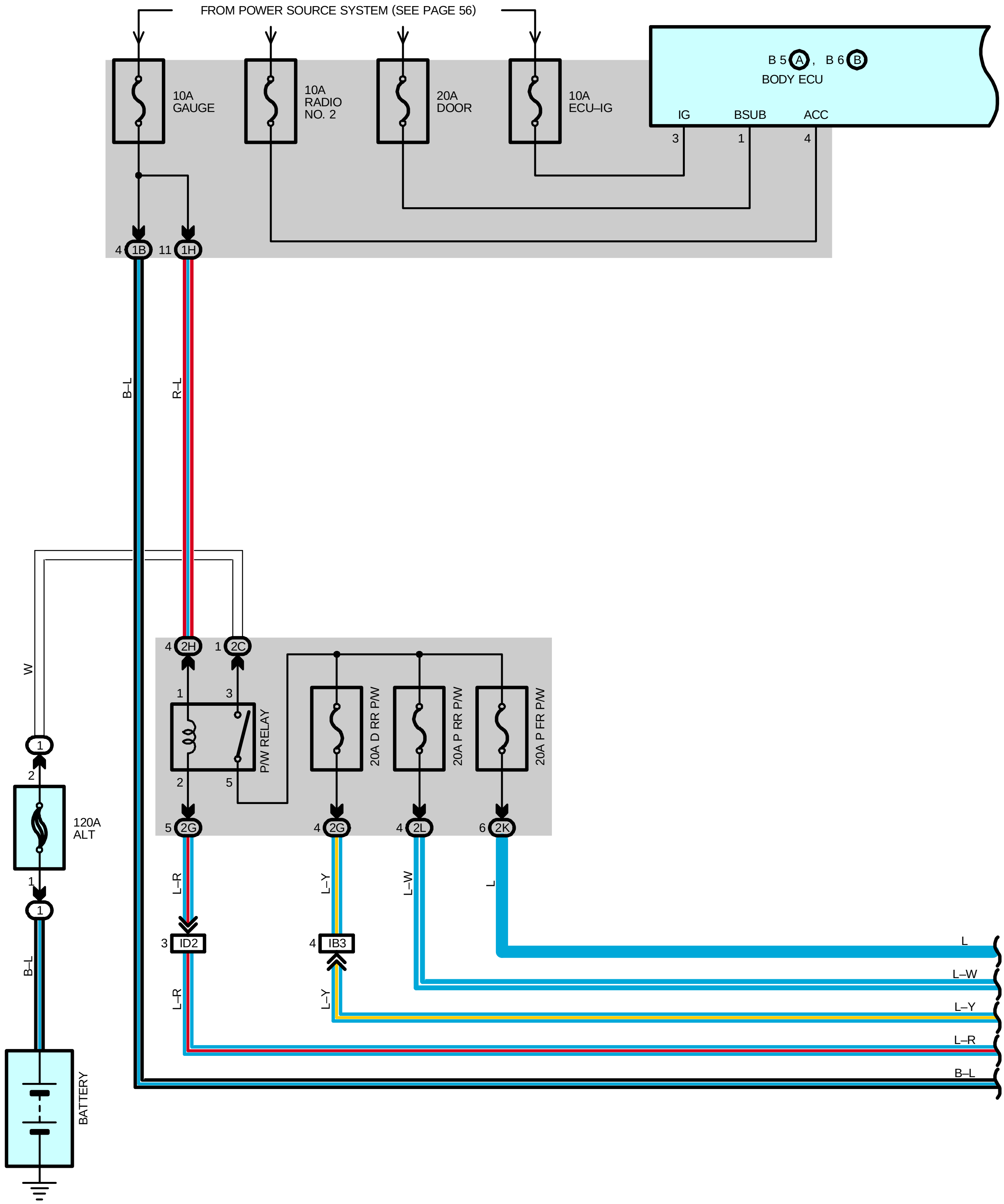
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
BG2	52	Floor No.2 Wire and Front Seat LH Wire (Under the Driver's Seat)
BH1	52	Floor Wire and Front Seat RH Wire (Under the Front Passenger's Seat)

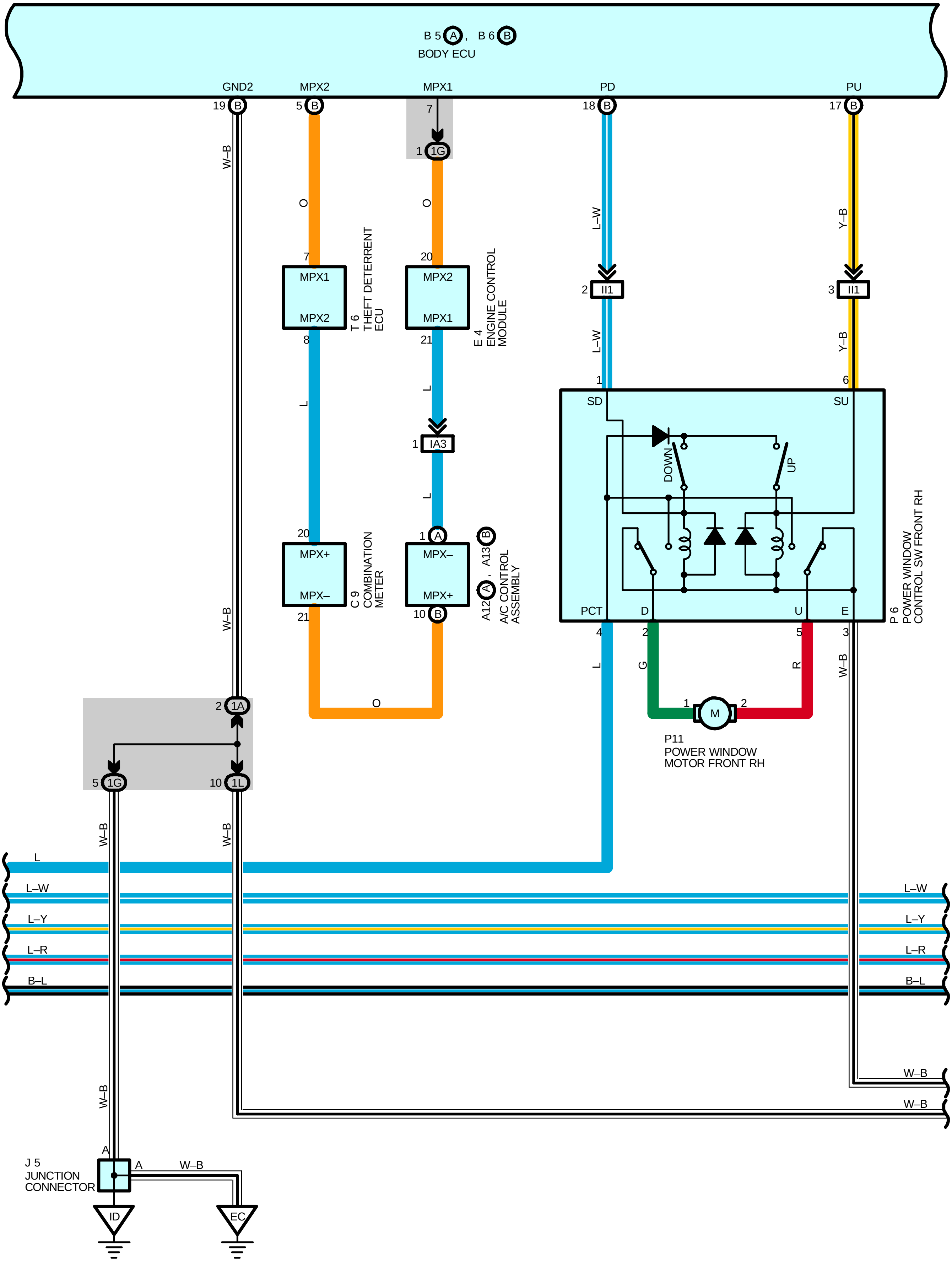
: GROUND POINTS

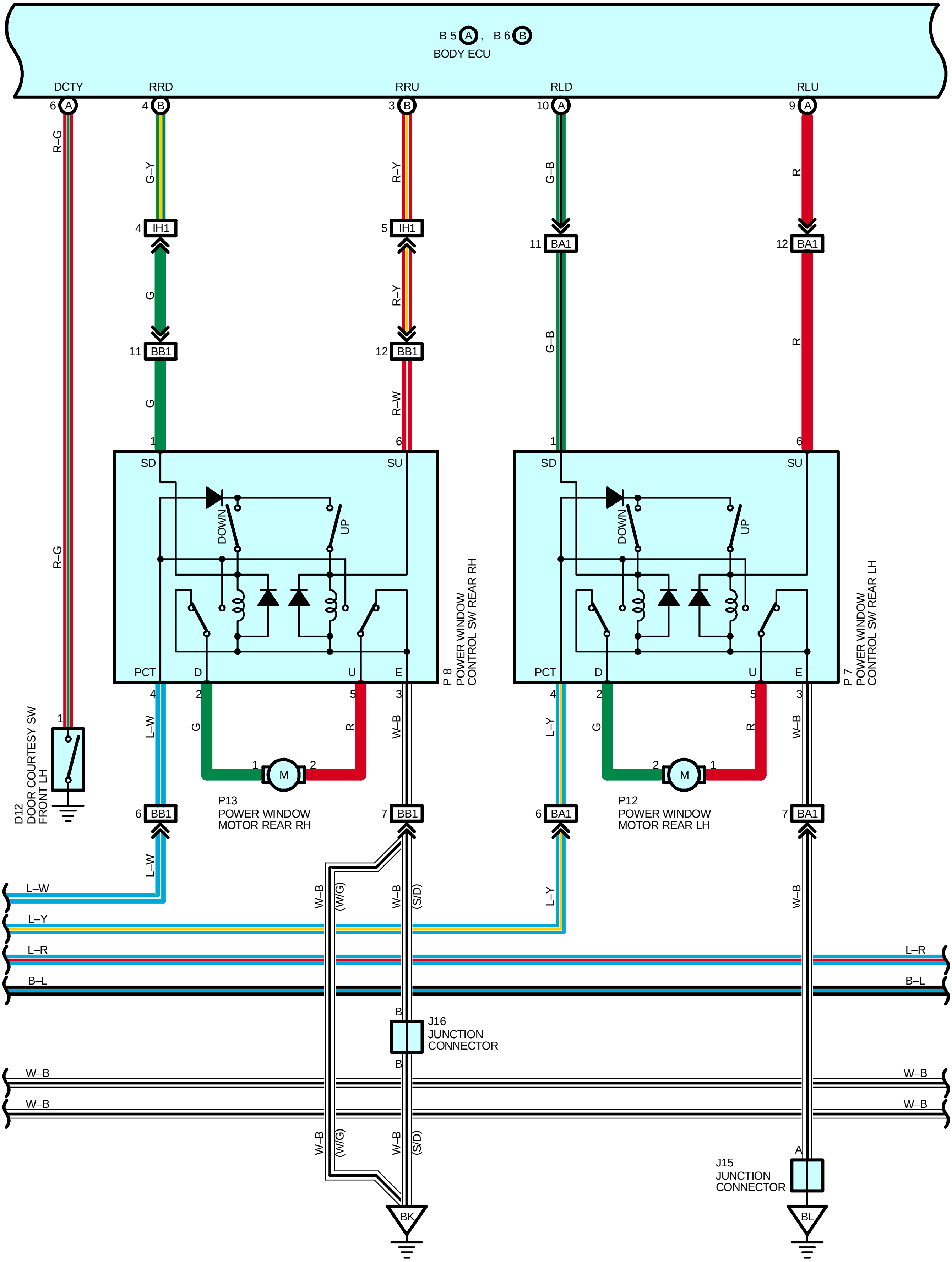
Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IE	44	Front Floor Panel Center LH
IH	44	Cowl Side Panel RH
BJ	48 (S/D) 50 (W/G)	Front Floor Panel LH
BK	48 (S/D) 50 (W/G)	Front Floor Panel RH
BL	48 (S/D)	Left Quarter Panel LH

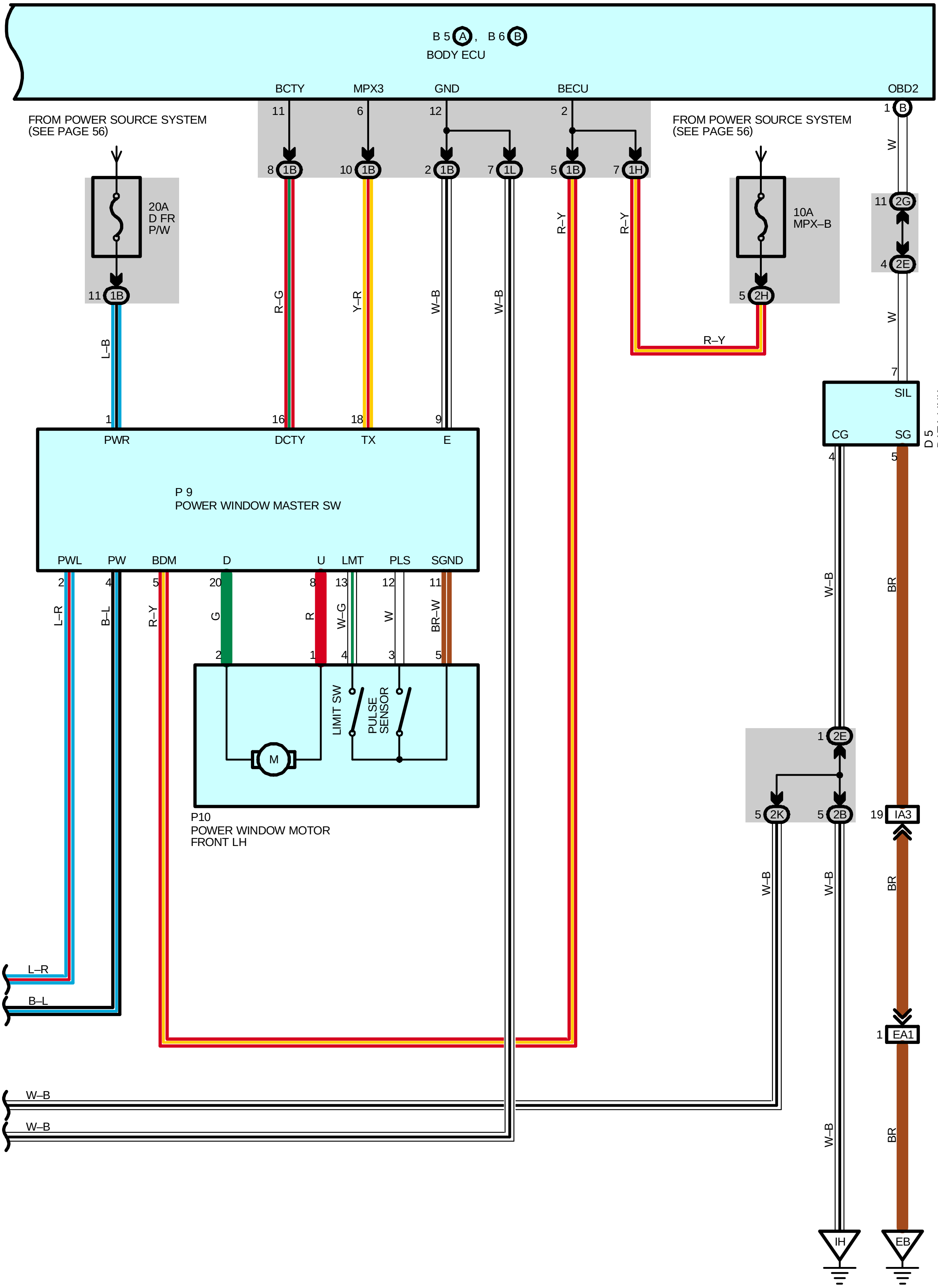
: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I2	46	Instrument Panel Wire			


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A GAUGE
10A RADIO NO. 2
20A DOOR
10A ECU–IG
B 5 A , B 6 B
BODY ECU
IG
BSUB
ACC
3
1
4
4 1B
11 1H
B–L
R–L
W
4 2H
1 2C
1
3
2
5
P/W RELAY
20A D RR P/W
20A P RR P/W
20A P FR P/W
5 2G
4 2G
4 2L
6 2K
1
2
120A ALT
1
1
L–R
L–Y
L–W
L
3 ID2
4 IB3
B–L
BATTERY
L
L–W
L–Y
L–R
B–L


B 5 A , B 6 B
BODY ECU
GND2
MPX2
MPX1
PD
PU
19 B
5 B
7
1 1G
18 B
17 B
W–B
O
L–W
Y–B
7
20
MPX1
MPX2
MPX2
MPX1
8
21
T 6
THEFT DETERRENT
ECU
E 4
ENGINE CONTROL
MODULE
2 II1
3 II1
1
6
SD
SU
DOWN
UP
PCT
D
U
E
L
1 IA3
20
1 A
MPX+
MPX–
MPX–
MPX+
21
10 B
C 9
COMBINATION
METER
A12 A , A13 B
A/C CONTROL
ASSEMBLY
P 6
POWER WINDOW
CONTROL SW FRONT RH
4
2
5
3
G
R
W–B
1
2
M
P11
POWER WINDOW
MOTOR FRONT RH
2 1A
5 1G
10 1L
O
L
L–W
L–Y
L–R
B–L
J 5
JUNCTION
CONNECTOR
A
W–B
ID
EC


B 5 A , B 6 B
BODY ECU
DCTY
RRD
RRU
RLD
RLU
R–G
G–Y
R–Y
G–B
R
IH1
BA1
G
BB1
R–W
SD
SU
DOWN
UP
PCT
D
U
E
P 8
POWER WINDOW
CONTROL SW REAR RH
P 7
POWER WINDOW
CONTROL SW REAR LH
D12
DOOR COURTESY SW
FRONT LH
L–W
L–Y
W–B
M
P13
POWER WINDOW
MOTOR REAR RH
P12
POWER WINDOW
MOTOR REAR LH
(W/G)
(S/D)
L–R
B–L
J16
JUNCTION
CONNECTOR
J15
JUNCTION
CONNECTOR
BK
BL



B 5 A, B 6 B
BODY ECU
BCTY
MPX3
GND
BECU
OBD2
FROM POWER SOURCE SYSTEM (SEE PAGE 56)
20A D FR P/W
10A MPX–B
P 9
POWER WINDOW MASTER SW
PWR
DCTY
TX
E
PWL
PW
BDM
D
U
LMT
PLS
SGND
LIMIT SW
PULSE SENSOR
M
P10
POWER WINDOW MOTOR FRONT LH
SIL
CG
SG
D 5
DATA LINK CONNECTOR 3
L–B
R–G
Y–R
W–B
R–Y
W
L–R
B–L
G
R
W–G
BR–W
BR
IA3
EA1
IH
EB

SYSTEM OUTLINE

1. AUTO OPERATION (DRIVER'S WINDOW)

When the power window master SW is operated to AUTO UP position with the ignition SW on, the current flows from the D FR P/W fuse to power window master SW TERMINAL 1 to TERMINAL 8 to power window motor front LH TERMINAL 1 to TERMINAL 2 to power window master SW TERMINAL 20 to TERMINAL 9 to GROUND, and the motor rotates to close the window. The motor continues to rotate until the window is fully closed or the DOWN position of the power window master SW is operated.

When the power window master SW is operated to AUTO DOWN position with the ignition SW on, the current flows from the D FR P/W fuse to power window master SW TERMINAL 1 to TERMINAL 20 to power window motor front LH TERMINAL 2 to TERMINAL 1 to power window master SW TERMINAL 8 to TERMINAL 9 to GROUND, and the motor rotates to open the window. The motor continues to rotate until the window is fully opened or the UP position of the power window master SW is operated.

2. MANUAL OPERATION (DRIVER'S WINDOW)

When the power window master SW is operated to UP position with the ignition SW on, the current flows from the D FR P/W fuse to power window master SW TERMINAL 1 to TERMINAL 8 to power window motor front LH TERMINAL 1 to TERMINAL 2 to power window master SW TERMINAL 20 to TERMINAL 9 to GROUND, and the motor rotates to close the window.

When the power window master SW is operated to DOWN position with the ignition SW on, the current flows from the D FR P/W fuse to power window master SW TERMINAL 1 to TERMINAL 20 to power window motor front LH TERMINAL 2 to TERMINAL 1 to power window master SW TERMINAL 8 to TERMINAL 9 to GROUND, and the motor rotates to open the window.

3. MANUAL OPERATION (EXCEPT DRIVER'S WINDOW)

When the power window control SW front RH, rear LH, RH is operated to UP position, the current flows to the power window control SW TERMINAL PCT to TERMINAL U to power window motor to power window control SW TERMINAL D to TERMINAL E to GROUND, and the motor rotates to close the window.

When the power window control SW front RH, rear LH, RH is operated to DOWN position, the current flows to the power window control SW TERMINAL PCT to TERMINAL D to power window motor to power window control SW TERMINAL U to TERMINAL E to GROUND, and the motor rotates to open the window.

When controlling the respective windows with the power window master SW, a communication signal is input from the power window master TERMINAL TX to body ECU TERMINAL MPX3, and the current flows from the body ECU to respective power window control SW TERMINAL SU (UP operation), SD (DOWN operation), and the motor rotates in the controlled direction.

4. KEY OFF POWER WINDOW OPERATION

After the ignition SW is turned off, the driver's side power window can be operated for approximately 45 seconds, unless the driver's side door is opened. However, if the key off operation time finishes during AUTO operation, the AUTO operation is stopped immediately.

5. CATCHING PREVENTION FUNCTION

If any foreign matter is caught in the window while it is rising, the pulse sensor installed in the power window motor detects changes in the number of motor rotations, forcibly lowers the door window 50 mm or if the door window opening amount is 200 mm or less, the window is lowered so that the opening amount is 200 mm.

SERVICE HINTS

P6, P7, P8 POWER WINDOW CONTROL SW FRONT RH, REAR LH, RH

3–GROUND : Always continuity
4–GROUND : Approx. **12** volts with the ignition SW at **ON** position

P9 POWER WINDOW MASTER SW

9–GROUND : Always continuity
4–GROUND : Approx. **12** volts with the ignition SW at **ON** position
1–GROUND : Always approx. **12** volts

: PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
A12	A	34	J15	36 (S/D)	P9	39 (W/G)
A13	B	34		38 (W/G)	P10	37 (S/D)
B5	A	34	J16	36 (S/D)		39 (W/G)
B6	B	34	P6	37 (S/D)	P11	37 (S/D)
C9		34		39 (W/G)		39 (W/G)
D5		34	P7	37 (S/D)	P12	37 (S/D)
D12		36 (S/D)		39 (W/G)		39 (W/G)
		38 (W/G)	P8	37 (S/D)	P13	37 (S/D)
E4		32		39 (W/G)		39 (W/G)
J5		35	P9	37 (S/D)	T6	35

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1B	24	Front Door LH Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1L		
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2C		
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2G		
2H		
2K	26	Front Door RH Wire and Passenger Side J/B (Right Kick Panel)
2L	26	Floor Wire and Passenger Side J/B (Right Kick Panel)

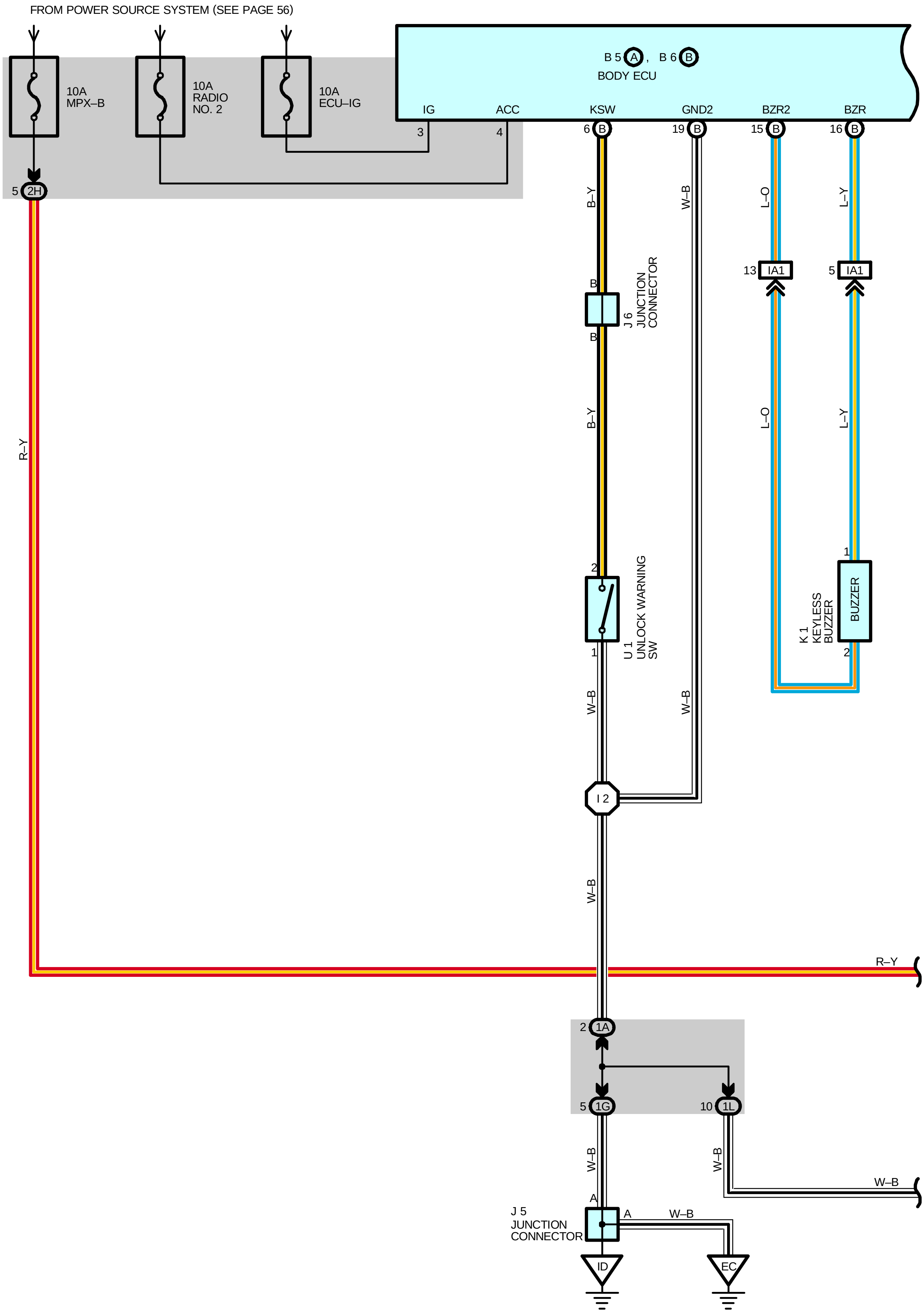
: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

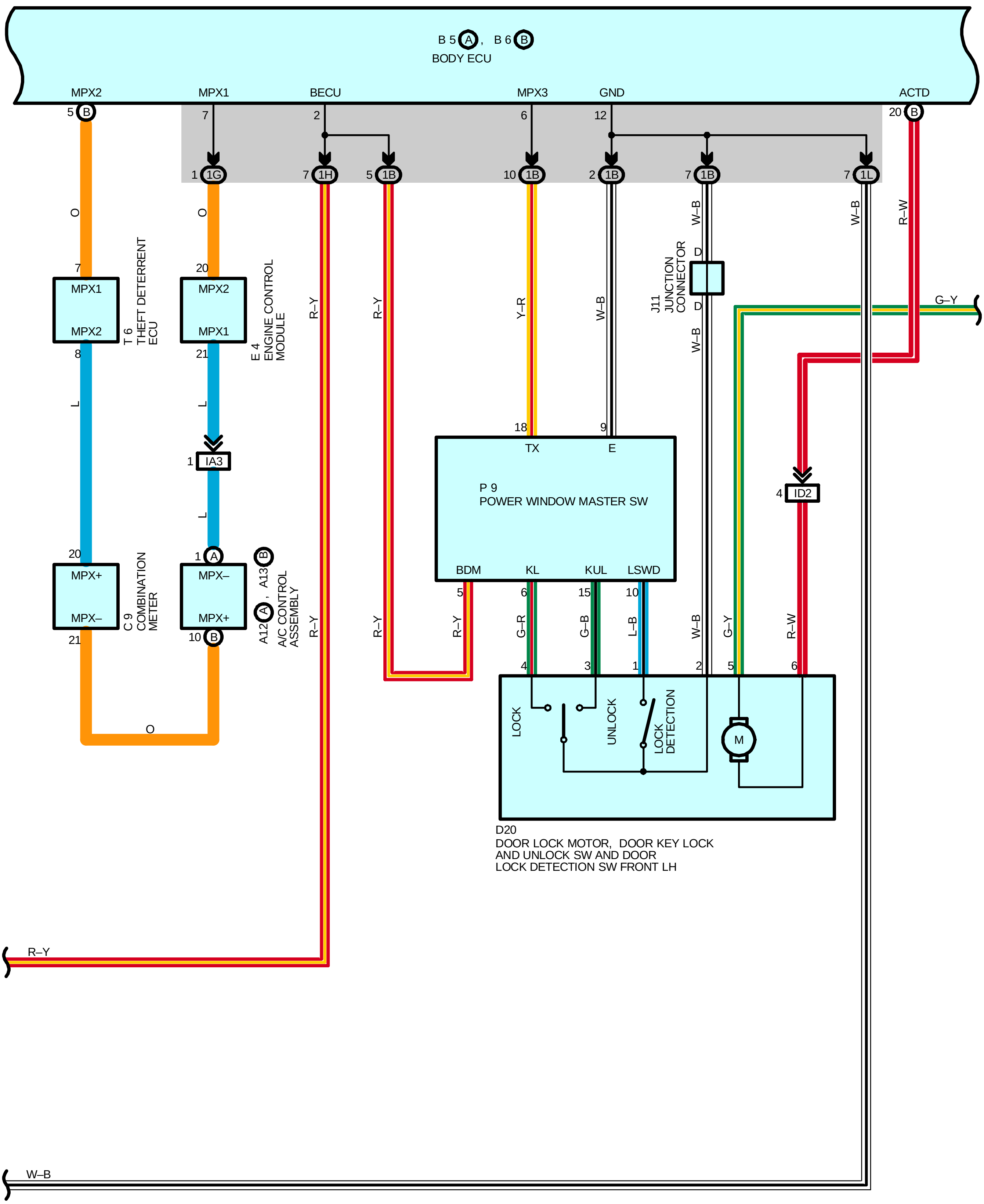
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IB3	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
ID2	44	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)
BA1	48 (S/D)	Rear Door No.2 Wire and Floor No.2 Wire (Left Center Pillar)
	50 (W/G)	
BB1	48 (S/D)	Rear Door No.1 Wire and Floor Wire (Right Center Pillar)
	50 (W/G)	

▽ : GROUND POINTS

Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BK	48 (S/D) 50 (W/G)	Front Floor Panel RH
BL	48 (S/D) 50 (W/G)	Left Quarter Panel LH

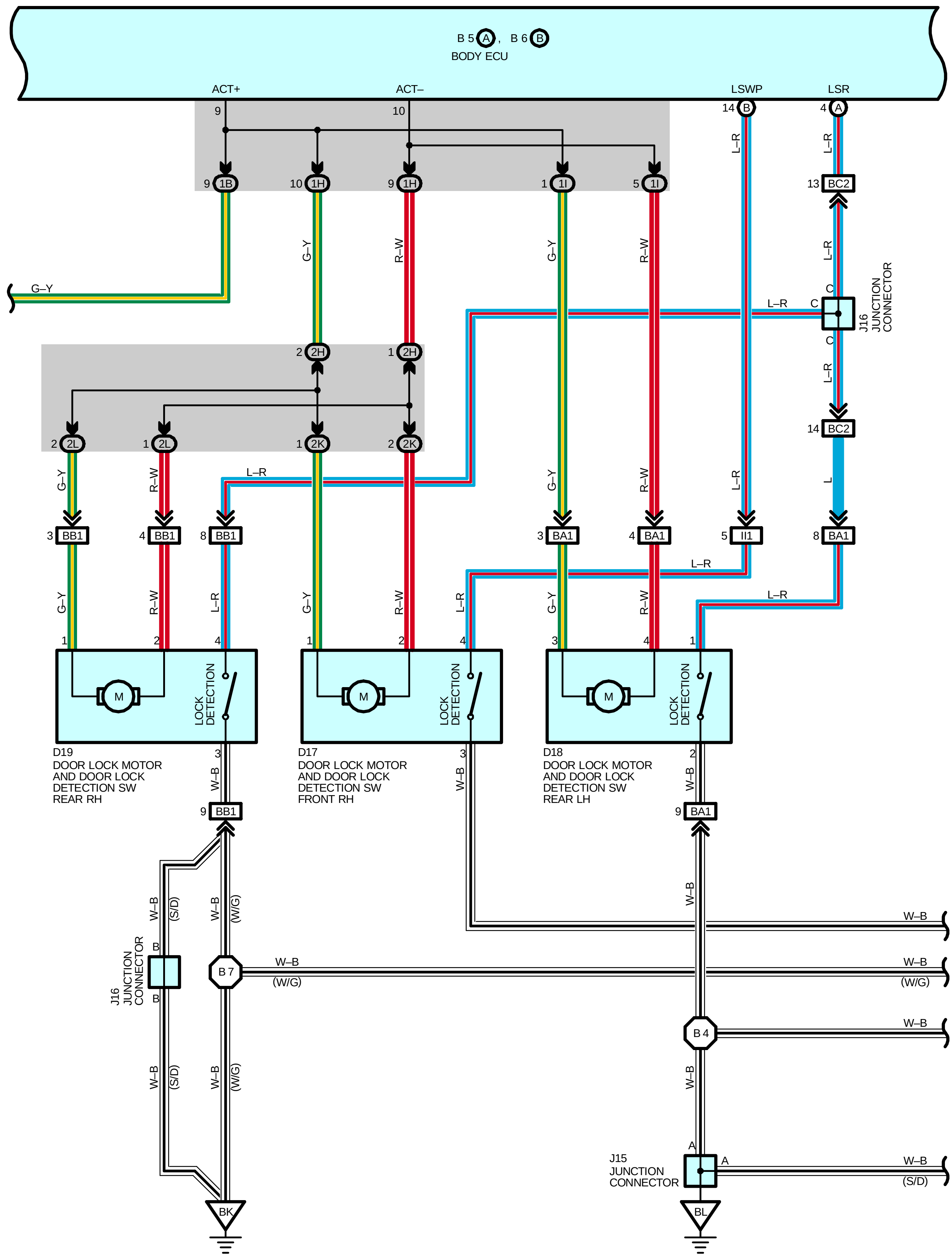
DOOR LOCK CONTROL AND WIRELESS DOOR LOCK CONTROL

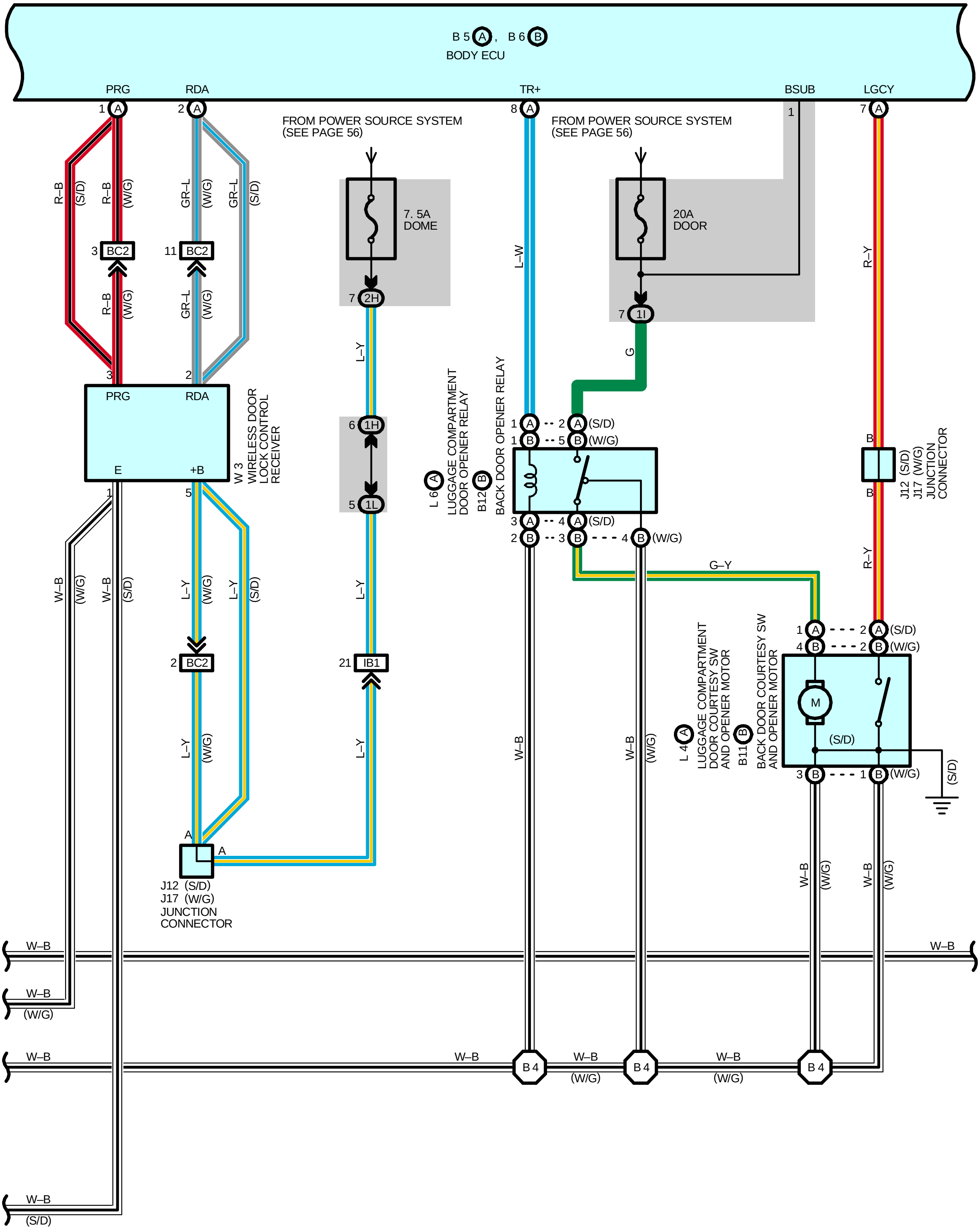




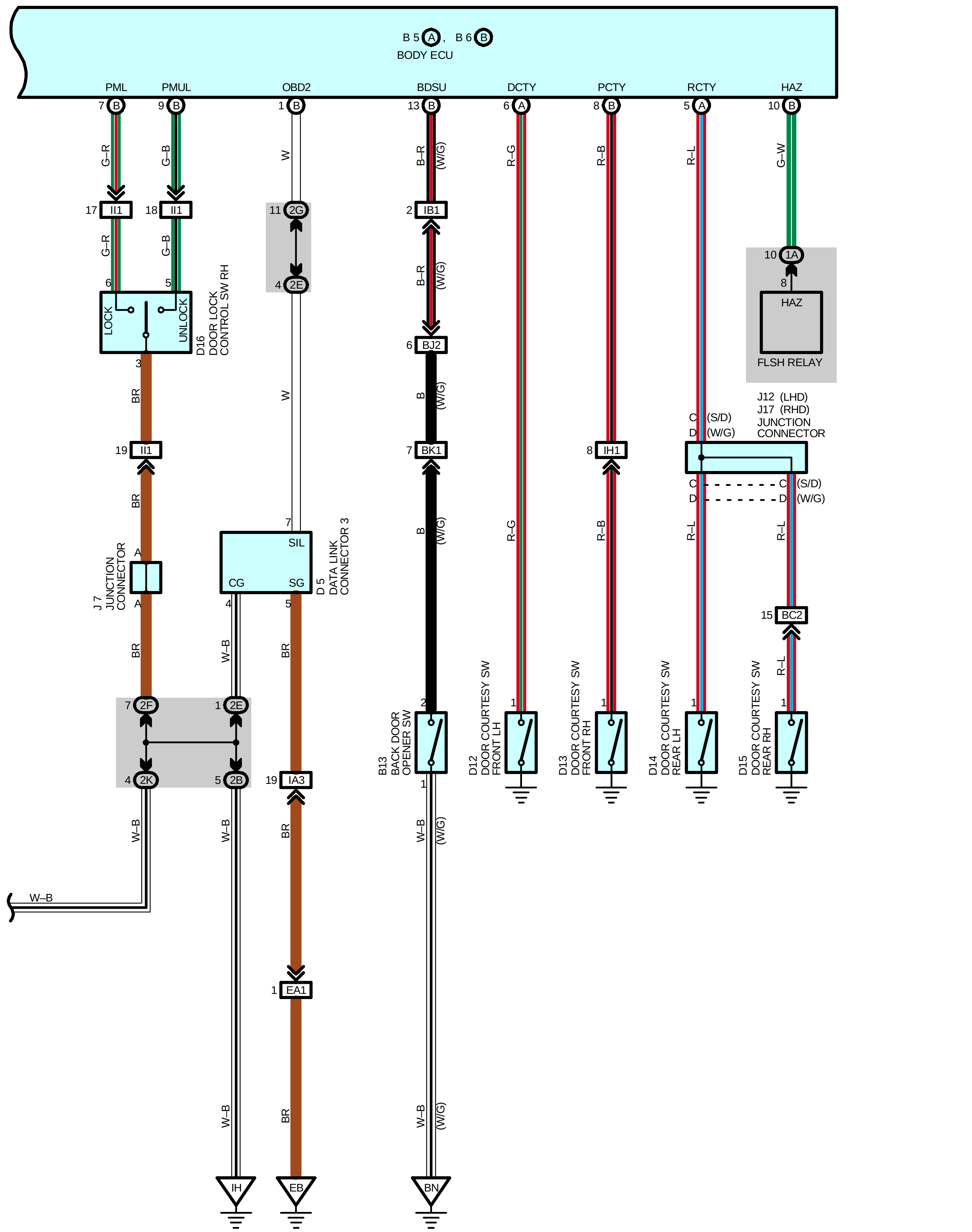
B 5 A , B 6 B
BODY ECU
MPX2
MPX1
BECU
MPX3
GND
ACTD
T 6
THEFT DETERRENT
ECU
E 4
ENGINE CONTROL
MODULE
C 9
COMBINATION
METER
A12 A , A13 B
A/C CONTROL
ASSEMBLY
J11
JUNCTION
CONNECTOR
P 9
POWER WINDOW MASTER SW
TX
E
BDM
KL
KUL
LSWD
LOCK
UNLOCK
LOCK
DETECTION
M
D20
DOOR LOCK MOTOR, DOOR KEY LOCK
AND UNLOCK SW AND DOOR
LOCK DETECTION SW FRONT LH
IA3
ID2
R–Y
W–B
G–Y
R–W
Y–R
G–R
G–B
L–B

DOOR LOCK CONTROL AND WIRELESS DOOR LOCK CONTROL




B 5 A , B 6 B
BODY ECU
PRG
RDA
TR+
BSUB
LGCY
FROM POWER SOURCE SYSTEM
(SEE PAGE 56)
FROM POWER SOURCE SYSTEM
(SEE PAGE 56)
7. 5A
DOME
20A
DOOR
BC2
BC2
2H
1I
1H
1L
IB1
W 3
WIRELESS DOOR
LOCK CONTROL
RECEIVER
L 6 A
LUGGAGE COMPARTMENT
DOOR OPENER RELAY
B12 B
BACK DOOR OPENER RELAY
J12 (S/D)
J17 (W/G)
JUNCTION
CONNECTOR
L 4 A
LUGGAGE COMPARTMENT
DOOR COURTESY SW
AND OPENER MOTOR
B11 B
BACK DOOR COURTESY SW
AND OPENER MOTOR
M
B 4
B 4
B 4

DOOR LOCK CONTROL AND WIRELESS DOOR LOCK CONTROL



SYSTEM OUTLINE

(Door lock control)
The door lock control is controlled through the various signals input into the body ECU through communication control of the body ECU etc.

1. MANUAL OPERATION
All doors can be Locked/Unlocked through the operation of the driver and passenger side door lock control SW.

2. DOUBLE OPERATION UNLOCK OPERATION
When the door key lock and unlock SW front LH is turned to the unlock side, only the driver’s door is unlocked. And if the door key lock and unlock SW front LH is turned to the unlock side again within 3 seconds, all the doors to unlock.

3. MANUAL UNLOCK PROTECTION
Once the doors are locked by the door knob (Key less operation), the door key or the transmitter, they can not be unlocked by the door lock control SW. The protection is canceled when the ignition SW is turned on or unlock operation is made by the door key or the transmitter.

4. IGNITION KEY REMINDER OPERATION
When the door lock operation is made using the door knob with the ignition key remained inserted in the key cylinder and the door open, unlock operation is automatically made. Additionally, if lock operation is made with the door lock control SW or door key lock and unlock SW, unlock operation is automatically made after the lock operation has been completed.

(Wireless door lock control)
In this system, the wireless door lock control receiver receives weak radio wave transmitted from the transmitter and outputs the signal to the body ECU. Through communication control of the body ECU etc., all the doors can be locked and unlocked by the remote control.

1. NORMAL OPERATION
Lock operation
When the lock SW on the transmitter is pressed, all the doors are locked.
Unlock operation
When the unlock SW on the transmitter is pressed once, only the driver door is unlocked. When the unlock SW is pressed again within 3 sec., all the doors are unlocked.
Luggage compartment door opener operation (S/D)
When the luggage compartment door opener SW on the transmitter is pressed, the luggage door is opened.

2. AUTO LOCK FUNCTION
With the ignition key not inserted into the ignition key cylinder and all the doors completely closed, if the door is not actually opened within 30 sec. after the door has been unlocked by pressing the unlock SW on the transmitter, all the doors are automatically locked.

3. KEY REMINDER FUNCTION
When the ignition key inserted into the ignition key cylinder, the unlock warning SW inputs a signal to the body ECU, causing wireless door lock control is not to operate.

4. BUZZER SOUND FUNCTION
If all door indicate that they are locked after the lock command, the keyless buzzer goes on once. If any door indicates that it is open after the unlock command, the keyless buzzer goes on twice. If luggage door indicate that it is open after the open command, the keyless buzzer goes on once.
When the body ECU receives the lock signal from the wireless door lock control receiver while any door is open, the keyless buzzer goes on approx. 10 sec.

5. CAR FINDER FUNCTION

∗ Lock
The hazard light flashes once when the signal is sent and the door is locked.

∗ Unlock
The hazard light flashes twice when the signal is sent and the door is unlocked.

6. REPEAT FUNCTION

When any door does not respond to the lock/unlock signal, the signal output is repeated once.

7. ILLUMINATED ENTRY OPERATION

When the body ECU detects that any door is unlocked, the interior light, ignition key cylinder light and door courtesy light front LH, RH comes on.

8. PANIC MODE FUNCTION

When the lock switch on the transmitter is kept pressed for approximately 2.5 sec., the theft alarm goes on, and the headlights and taillights flash through the communication of the body ECU etc. At this time, when any SW on the transmitter is pressed, the panic mode is cancelled, the theft alarm is stopped, and the headlights and taillights go off.

9. THEFT DETERRENT FUNCTION

Although the data configuration is the same, when the receiver receives 10 kinds of radio wave signals within 10 minutes, which does not comply with the identification code, the system inhibits further control.

SERVICE HINTS

W3 WIRELESS DOOR LOCK CONTROL RECEIVER

1–GROUND : Always continuity
5–GROUND : Always approx. **12** volts

L4 (A) LUGGAGE COMPARTMENT DOOR OPENER MOTOR (S/D)

(A) 1–GROUND : Approx. **12** volts with the luggage door open operate

B11 (B) BACK DOOR COURTESY SW AND OPENER MOTOR (W/G)

(B) 4–GROUND : Approx. **12** volts with the back door open operate

D20 DOOR LOCK MOTOR, DOOR KEY LOCK AND UNLOCK SW AND DOOR LOCK DETECTION SW FRONT LH

5–GROUND : Approx. **12** volts with the door lock motor at lock operate
6–GROUND : Approx. **12** volts with the door lock motor at unlock operate
4–2 : Closed with the door lock cylinder locked with the key
3–2 : Closed with the door lock cylinder unlocked with the key

D17 DOOR LOCK MOTOR AND DOOR LOCK DETECTION SW FRONT RH

1–GROUND : Approx. **12** volts with the door lock motor at lock operate
2–GROUND : Approx. **12** volts with the door lock motor at unlock operate

D18 DOOR LOCK MOTOR AND DOOR LOCK DETECTION SW REAR LH

3–GROUND : Approx. **12** volts with the door lock motor at lock operate
4–GROUND : Approx. **12** volts with the door lock motor at unlock operate

D19 DOOR LOCK MOTOR AND DOOR LOCK DETECTION SW REAR RH

1–GROUND : Approx. **12** volts with the door lock motor at lock operate
2–GROUND : Approx. **12** volts with the door lock motor at unlock operate

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code		See Page
A12	A	34	D15	38 (W/G)	J11		38 (W/G)
A13	B	34	D16	36 (S/D)	J12		36 (S/D)
B5	A	34		38 (W/G)	J15		36 (S/D)
B6	B	34	D17	36 (S/D)			38 (W/G)
B11	B	38 (W/G)		38 (W/G)	J16		36 (S/D)
B12	B	38 (W/G)	D18	36 (S/D)			38 (W/G)
B13		38 (W/G)		38 (W/G)	J17		38 (W/G)
C9		34	D19	36 (S/D)	K1		33
D5		34		38 (W/G)	L4	A	36 (S/D)
D12		36 (S/D)	D20	36 (S/D)	L6	A	36 (S/D)
		38 (W/G)		38 (W/G)	P9		37 (S/D)
D13		36 (S/D)	E4	32			39 (W/G)
		38 (W/G)	J5	35	T6		35
D14		36 (S/D)	J6	35	U1		35
		38 (W/G)	J7	35	W3		37 (S/D)
D15		36 (S/D)	J11	36 (S/D)			39 (W/G)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1B	24	Front Door LH Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1L	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2F		
2G		
2H		
2K	26	Front Door RH Wire and Passenger Side J/B (Right Kick Panel)
2L	26	Floor Wire and Passenger Side J/B (Right Kick Panel)

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
ID2	44	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)
BA1	48 (S/D)	Rear Door No.2 Wire and Floor No.2 Wire (Left Center Pillar)
	50 (W/G)	
BB1	48 (S/D)	Rear Door No.1 Wire and Floor Wire (Right Center Pillar)
	50 (W/G)	
BC2	48 (S/D)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)
	50 (W/G)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel Center)
BJ2	50 (W/G)	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BK1	50 (W/G)	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)

DOOR LOCK CONTROL AND WIRELESS DOOR LOCK CONTROL

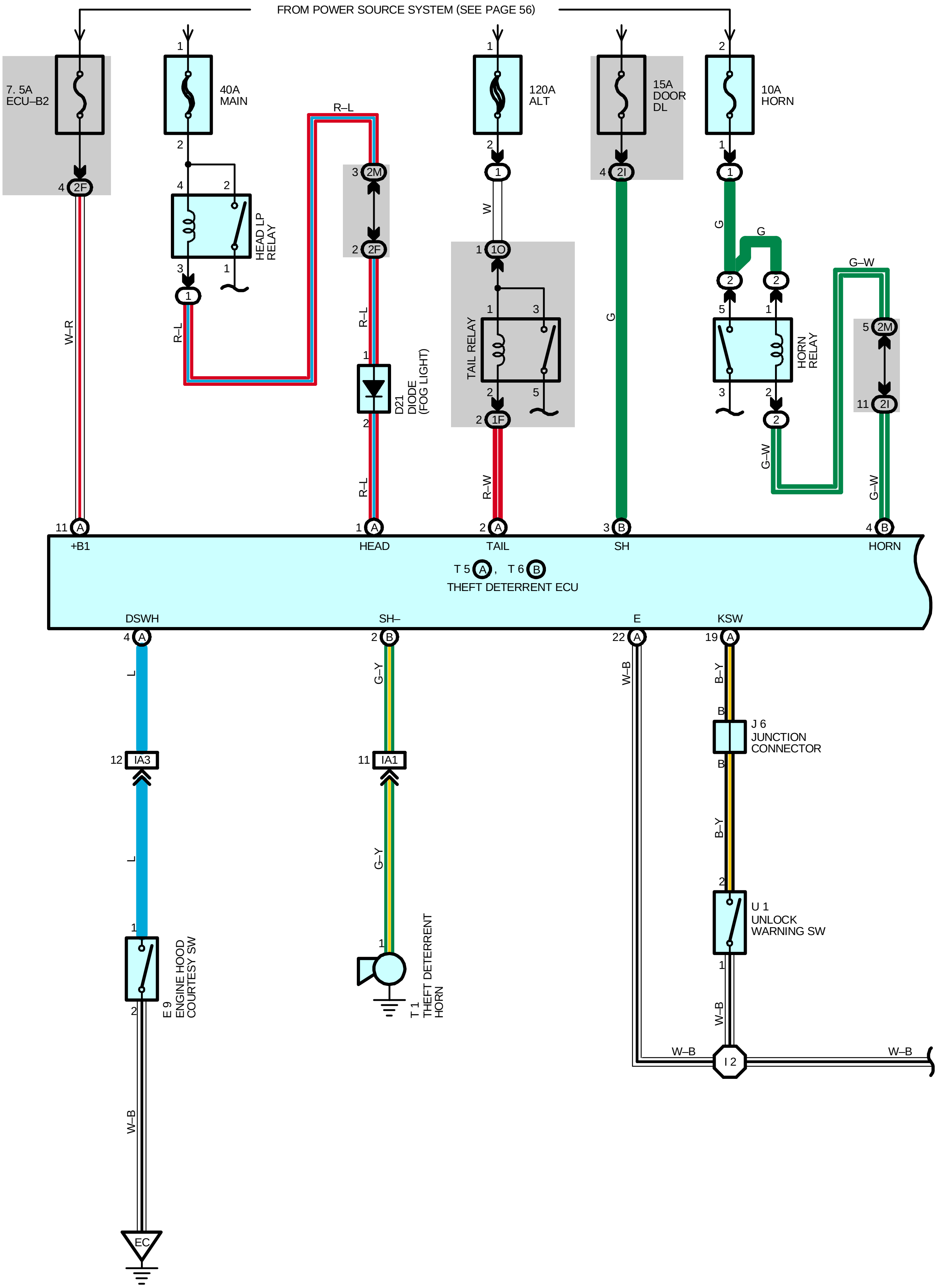
: GROUND POINTS

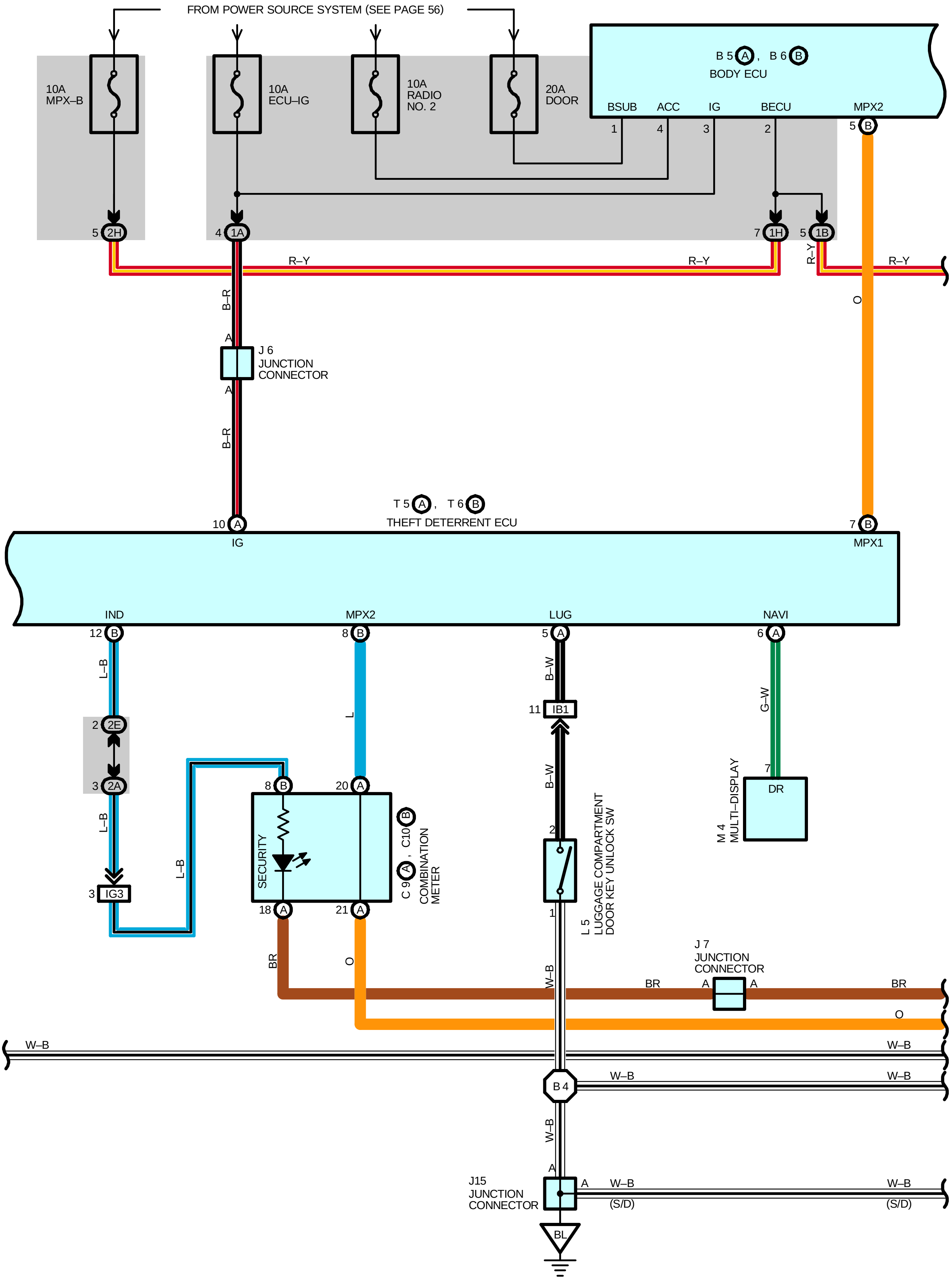
Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BK	48 (S/D)	Front Floor Panel RH
	50 (W/G)	
BL	48 (S/D)	Left Quarter Panel LH
	50 (W/G)	
BN	50 (W/G)	Right Side of the Back Panel Lower

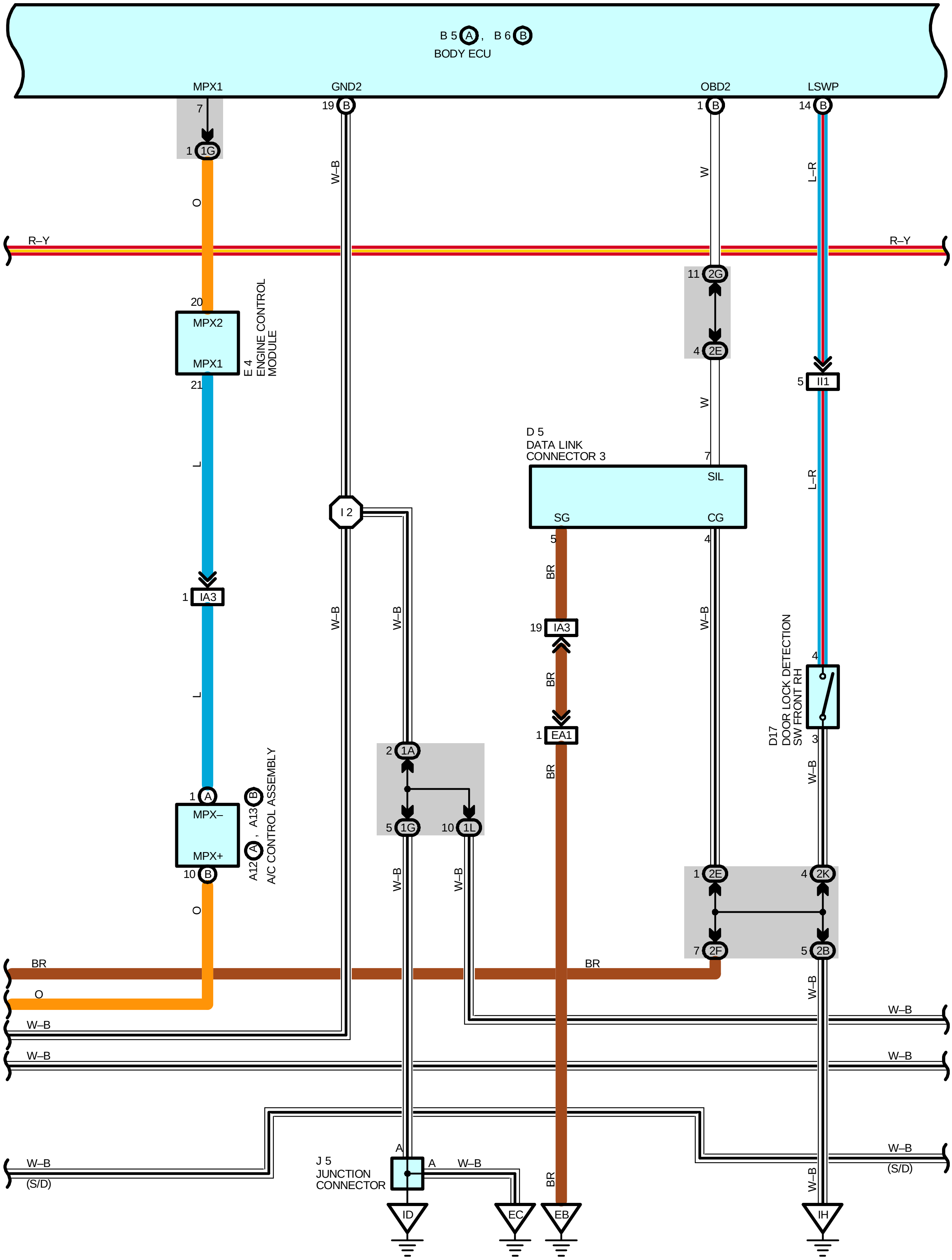
: SPLICE POINTS

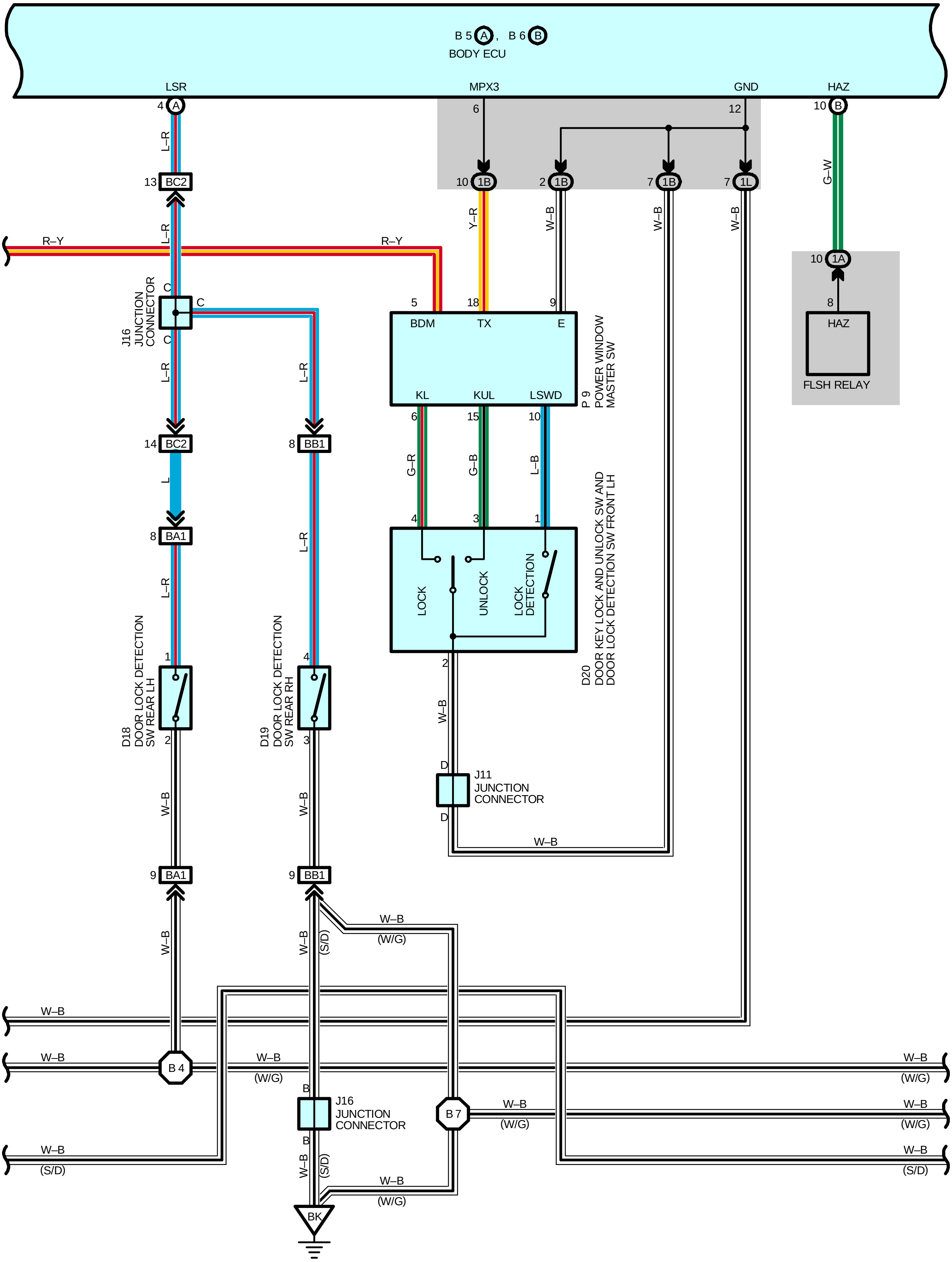
Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I2	46	Instrument Panel Wire	B4	50 (W/G)	Floor No.2 Wire
B4	48 (S/D)	Floor No.2 Wire	B7	50 (W/G)	Floor Wire

THEFT DETERRENT

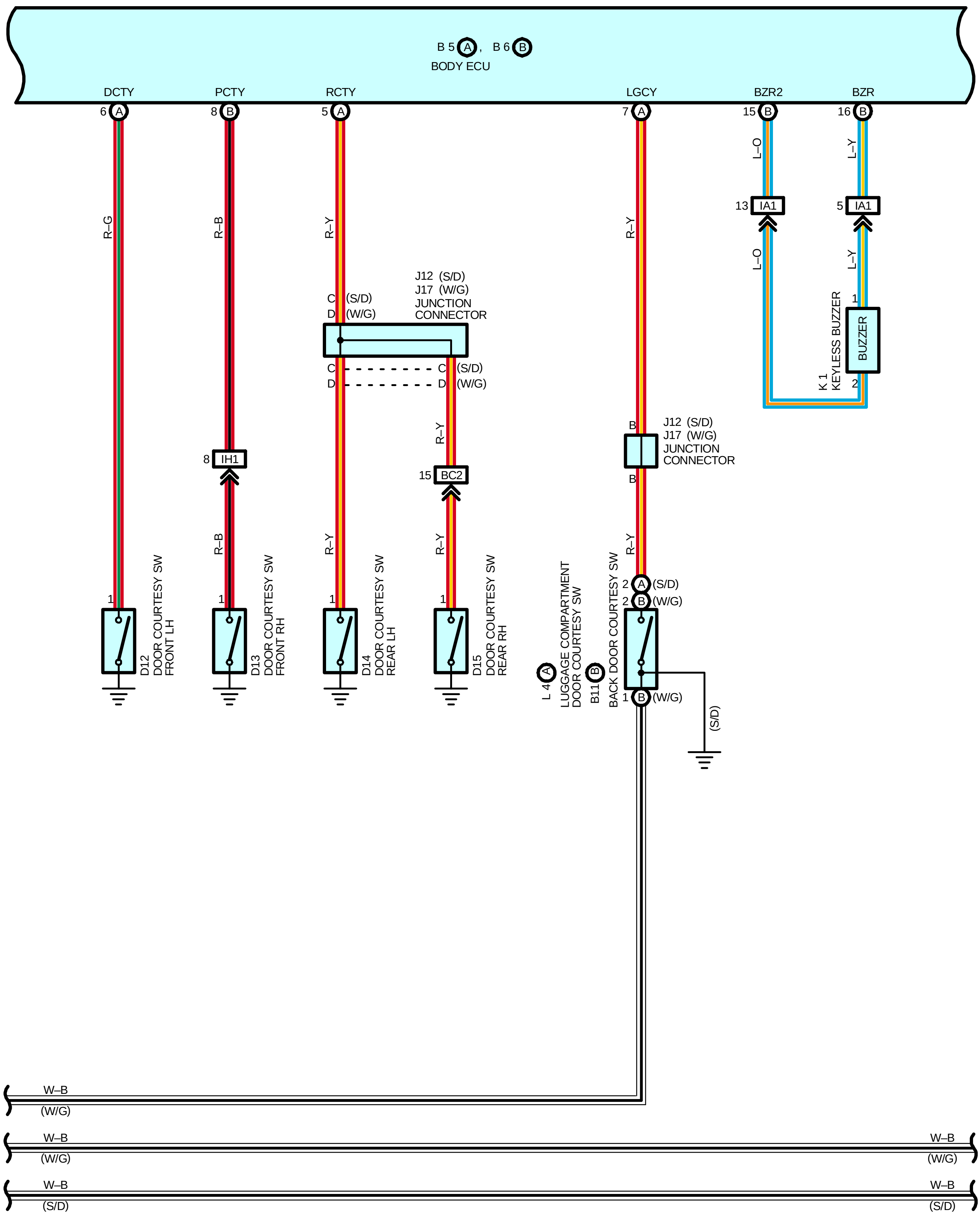


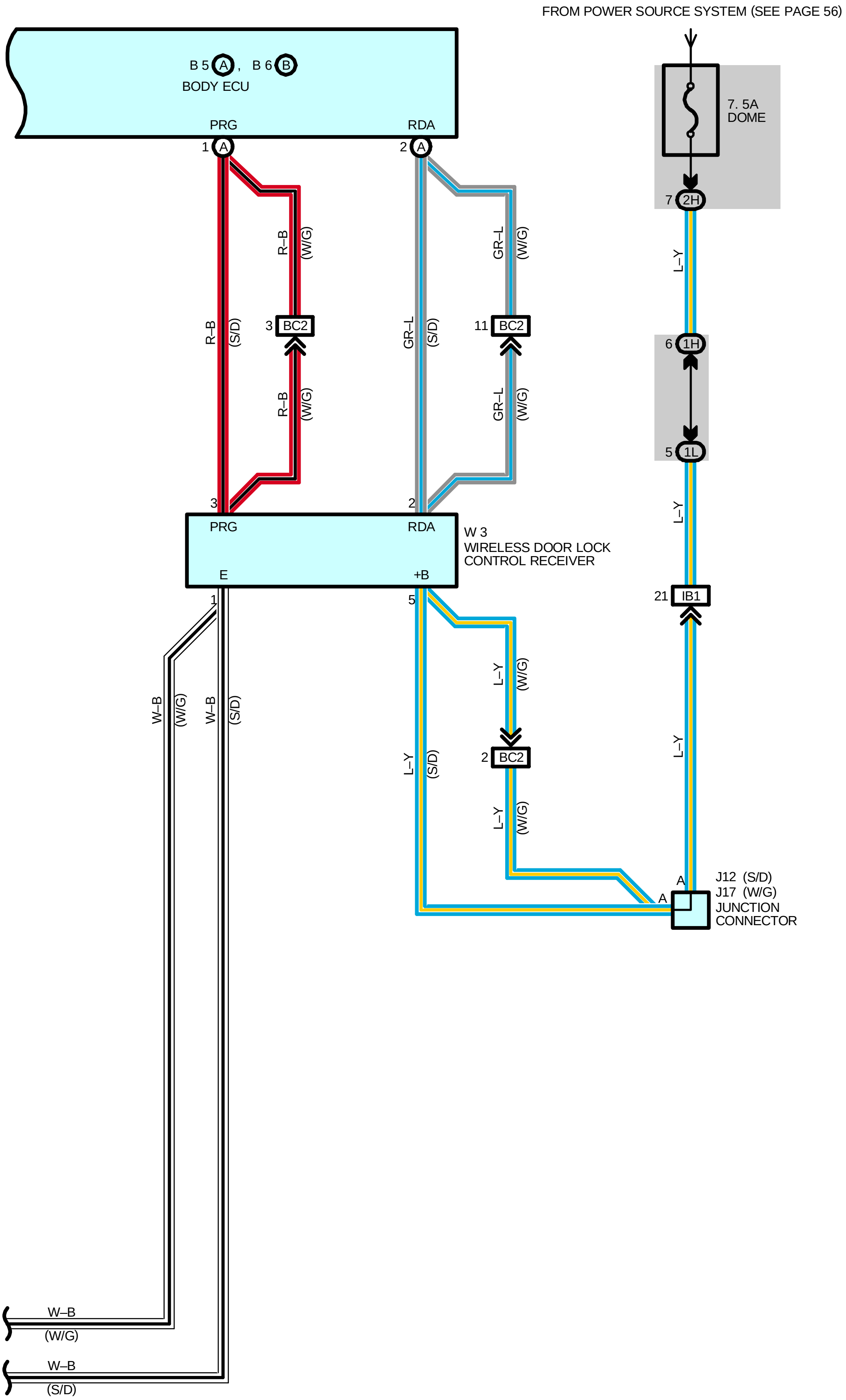

FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A MPX–B
10A ECU–IG
10A RADIO NO. 2
20A DOOR
B 5 (A), B 6 (B)
BODY ECU
BSUB
ACC
IG
BECU
MPX2
R–Y
B–R
J 6
JUNCTION CONNECTOR
O
T 5 (A), T 6 (B)
THEFT DETERRENT ECU
IG
MPX1
IND
MPX2
LUG
NAVI
L–B
L
B–W
G–W
IB1
IG3
SECURITY
C 9 (A), C10 (B)
COMBINATION METER
L 5
LUGGAGE COMPARTMENT DOOR KEY UNLOCK SW
M 4
MULTI–DISPLAY
DR
BR
J 7
JUNCTION CONNECTOR
W–B
B 4
J15
JUNCTION CONNECTOR
(S/D)
BL


B 5 A , B 6 B
BODY ECU
MPX1
GND2
OBD2
LSWP
R–Y
E 4
ENGINE CONTROL
MODULE
MPX2
MPX1
D 5
DATA LINK
CONNECTOR 3
SIL
SG
CG
I 2
D17
DOOR LOCK DETECTION
SW FRONT RH
A12 A , A13 B
A/C CONTROL ASSEMBLY
MPX–
MPX+
BR
O
W–B
(S/D)
J 5
JUNCTION
CONNECTOR
ID
EC
EB
IH



B 5 A , B 6 B
BODY ECU
LSR
MPX3
GND
HAZ
R–Y
L–R
G–W
Y–R
W–B
J16 JUNCTION CONNECTOR
BC2
BB1
BA1
BDM
TX
E
KL
KUL
LSWD
P 9 POWER WINDOW MASTER SW
G–R
G–B
L–B
LOCK
UNLOCK
LOCK DETECTION
D20 DOOR KEY LOCK AND UNLOCK SW AND DOOR LOCK DETECTION SW FRONT LH
HAZ
FLSH RELAY
D18 DOOR LOCK DETECTION SW REAR LH
D19 DOOR LOCK DETECTION SW REAR RH
J11 JUNCTION CONNECTOR
(W/G)
(S/D)
B 4
B 7
BK


B 5 A , B 6 B
BODY ECU
DCTY
PCTY
RCTY
LGCY
BZR2
BZR
R–G
R–B
R–Y
L–O
L–Y
IA1
J12 (S/D)
J17 (W/G)
JUNCTION CONNECTOR
C (S/D)
D (W/G)
K 1
KEYLESS BUZZER
BUZZER
IH1
BC2
D12
DOOR COURTESY SW
FRONT LH
D13
DOOR COURTESY SW
FRONT RH
D14
DOOR COURTESY SW
REAR LH
D15
DOOR COURTESY SW
REAR RH
L 4 A
LUGGAGE COMPARTMENT DOOR COURTESY SW
B11 B
BACK DOOR COURTESY SW
(S/D)
(W/G)
W–B


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
B 5 A , B 6 B
BODY ECU
PRG
RDA
1 A
2 A
7. 5A
DOME
7 2H
R–B
(W/G)
GR–L
(W/G)
L–Y
R–B
(S/D)
3 BC2
GR–L
(S/D)
11 BC2
6 1H
5 1L
3
2
PRG
RDA
W 3
WIRELESS DOOR LOCK
CONTROL RECEIVER
E
+B
1
5
21 IB1
W–B
(W/G)
W–B
(S/D)
L–Y
(W/G)
2 BC2
L–Y
(S/D)
A
A
J12 (S/D)
J17 (W/G)
JUNCTION
CONNECTOR
W–B
(W/G)
W–B
(S/D)

SERVICE HINTS

L5 LUGGAGE COMPARTMENT DOOR KEY UNLOCK SW

2–1 : Continuity with the door lock cylinder unlocked with the key

E9 ENGINE HOOD COURTESY SW

1–2 : Continuity with the engine hood open

D12, D13, D14, D15 DOOR COURTESY SW FRONT LH, RH, REAR LH, RH

1–GROUND : Continuity with the door open

D20 DOOR KEY LOCK AND UNLOCK SW AND DOOR LOCK DETECTION SW FRONT LH

4–2 : Continuity with the door lock cylinder locked with the key
3–2 : Continuity with the door lock cylinder unlocked with the key

B6 (B) BODY ECU

BECU–GROUND : Always approx. **12** volts
BSUB–GROUND : Always approx. **12** volts
ACC–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
IG–GROUND : Approx. **12** volts with the ignition SW at **ON** position
GND–GROUND : Always continuity
GND2–GROUND : Always continuity

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code		See Page
A12	A	34	D17	38 (W/G)	J15		38 (W/G)
A13	B	34	D18	36 (S/D)	J16		36 (S/D)
B5	A	34		38 (W/G)			38 (W/G)
B6	B	34	D19	36 (S/D)	J17		38 (W/G)
B11	B	38 (W/G)		38 (W/G)	K1		33
C9	A	34	D20	36 (S/D)	L4	A	36 (S/D)
C10	B	34		38 (W/G)	L5		36 (S/D)
D5		34	D21	34	M4		35
D12		36 (S/D)	E4	32	P9		37 (S/D)
		38 (W/G)	E9	32			39 (W/G)
D13		36 (S/D)	J5	35	T1		33
		38 (W/G)	J6	35	T5	A	35
D14		36 (S/D)	J7	35	T6	B	35
		38 (W/G)	J11	36 (S/D)	U1		35
D15		36 (S/D)		38 (W/G)	W3		37 (S/D)
		38 (W/G)	J12	36 (S/D)			39 (W/G)
D17		36 (S/D)	J15	36 (S/D)			

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1B	24	Front Door LH Wire and Driver Side J/B (Left Kick Panel)
1F	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1L		
1O	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2B		
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2F		
2G		
2H		
2I		
2K	26	Front Door RH Wire and Passenger Side J/B (Right Kick Panel)
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
IG3	46	Instrument Panel Wire and Engine Room Main Wire (Near the Passenger Side J/B)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)
BA1	48 (S/D)	Rear Door No.2 Wire and Floor No.2 Wire (Left Center Pillar)
	50 (W/G)	
BB1	48 (S/D)	Rear Door No.1 Wire and Floor Wire (Right Center Pillar)
	50 (W/G)	
BC2	48 (S/D)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)
	50 (W/G)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel Center)

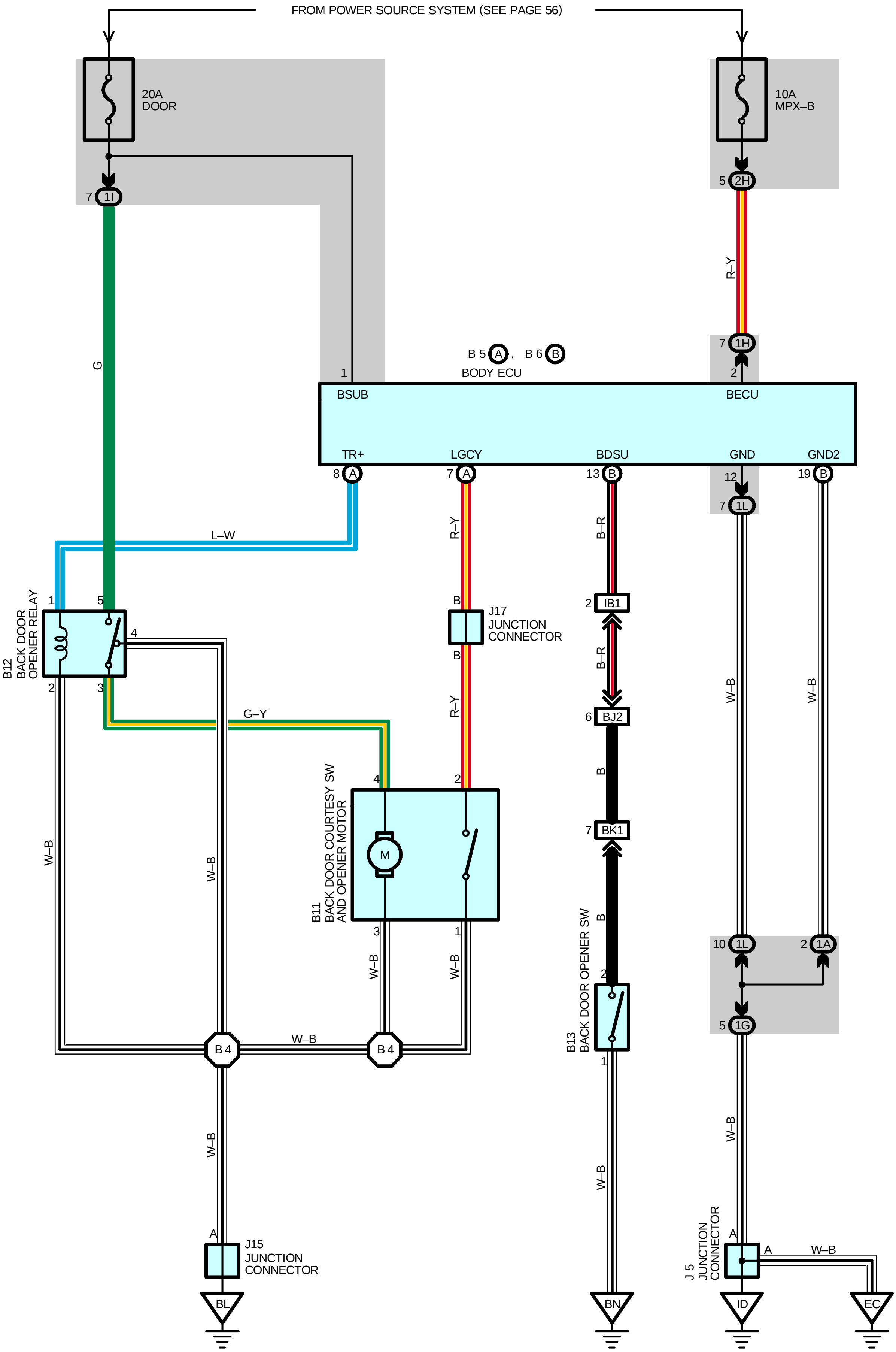
: GROUND POINTS

Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BK	48 (S/D)	Front Floor Panel RH
	50 (W/G)	
BL	48 (S/D)	Left Quarter Panel LH
	50 (W/G)	

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I2	46	Instrument Panel Wire	B4	50 (W/G)	Floor No.2 Wire
B4	48 (S/D)	Floor No.2 Wire	B7	50 (W/G)	Floor Wire

BACK DOOR OPENER



SERVICE HINTS

B11 BACK DOOR COURTESY SW AND OPENER MOTOR

4–GROUND : Approx. **12** volts with the back door open operate
1, 3–GROUND : Always continuity

B13 BACK DOOR OPENER SW

1–2 : Continuity with the back door opener SW is pushed

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
B5	A	34	B12	38 (W/G)	J15	38 (W/G)
B6	B	34	B13	38 (W/G)	J17	38 (W/G)
B11		38 (W/G)	J5	35		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1L	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2H	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

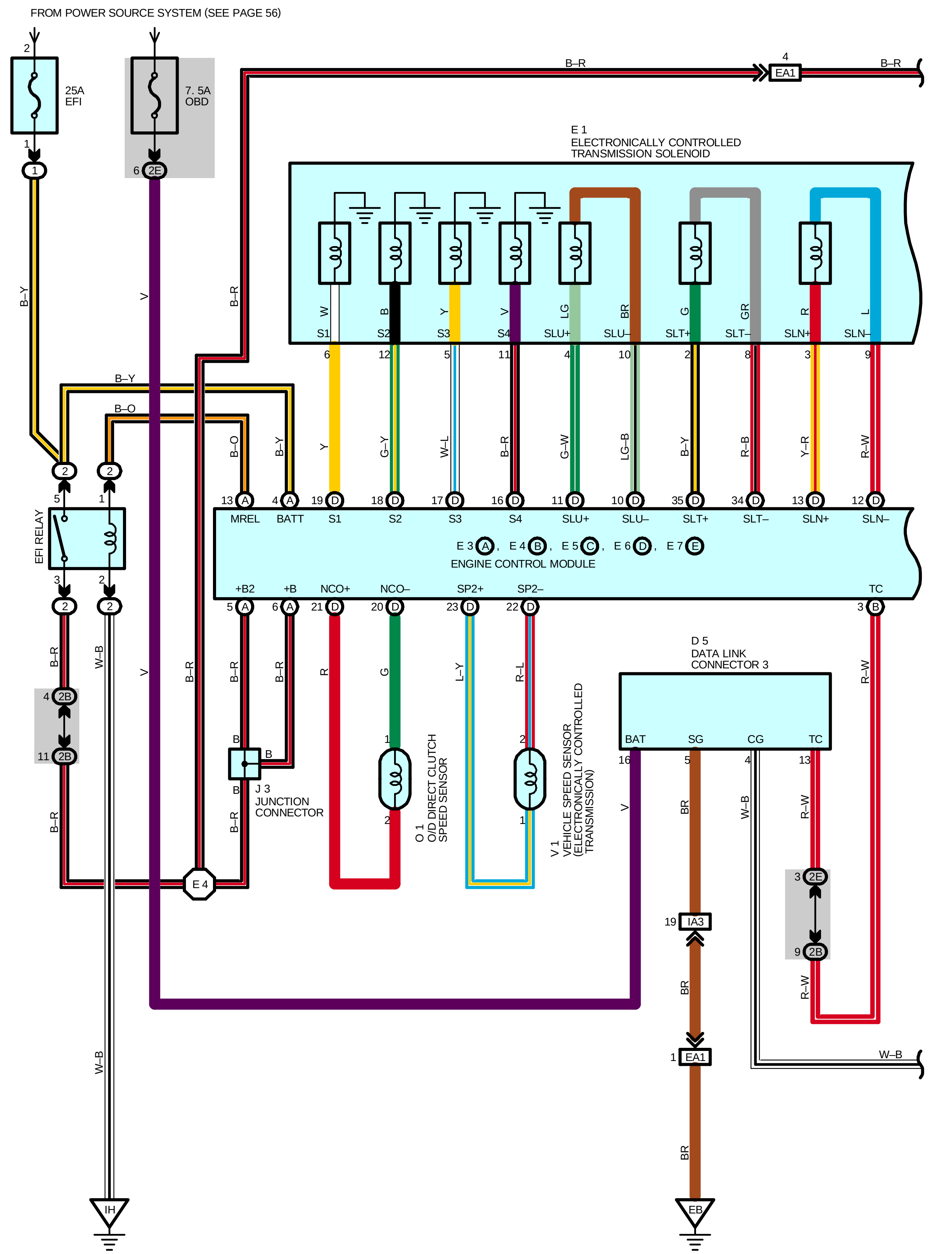
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
BJ2	50 (W/G)	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BK1	50 (W/G)	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)

▽ : GROUND POINTS

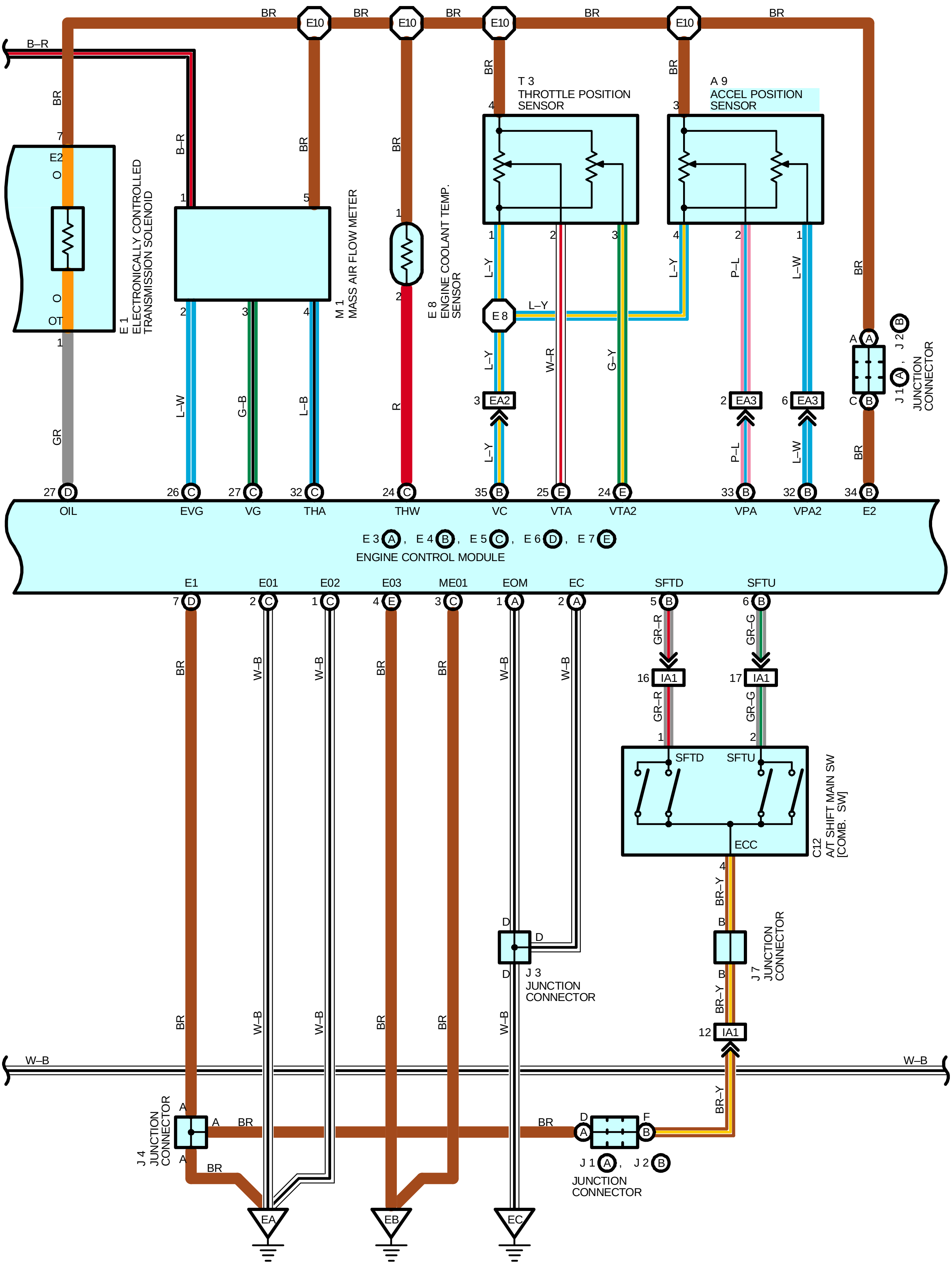
Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
BL	50 (W/G)	Left Quarter Panel LH
BN	50 (W/G)	Right Side of the Back Panel Lower

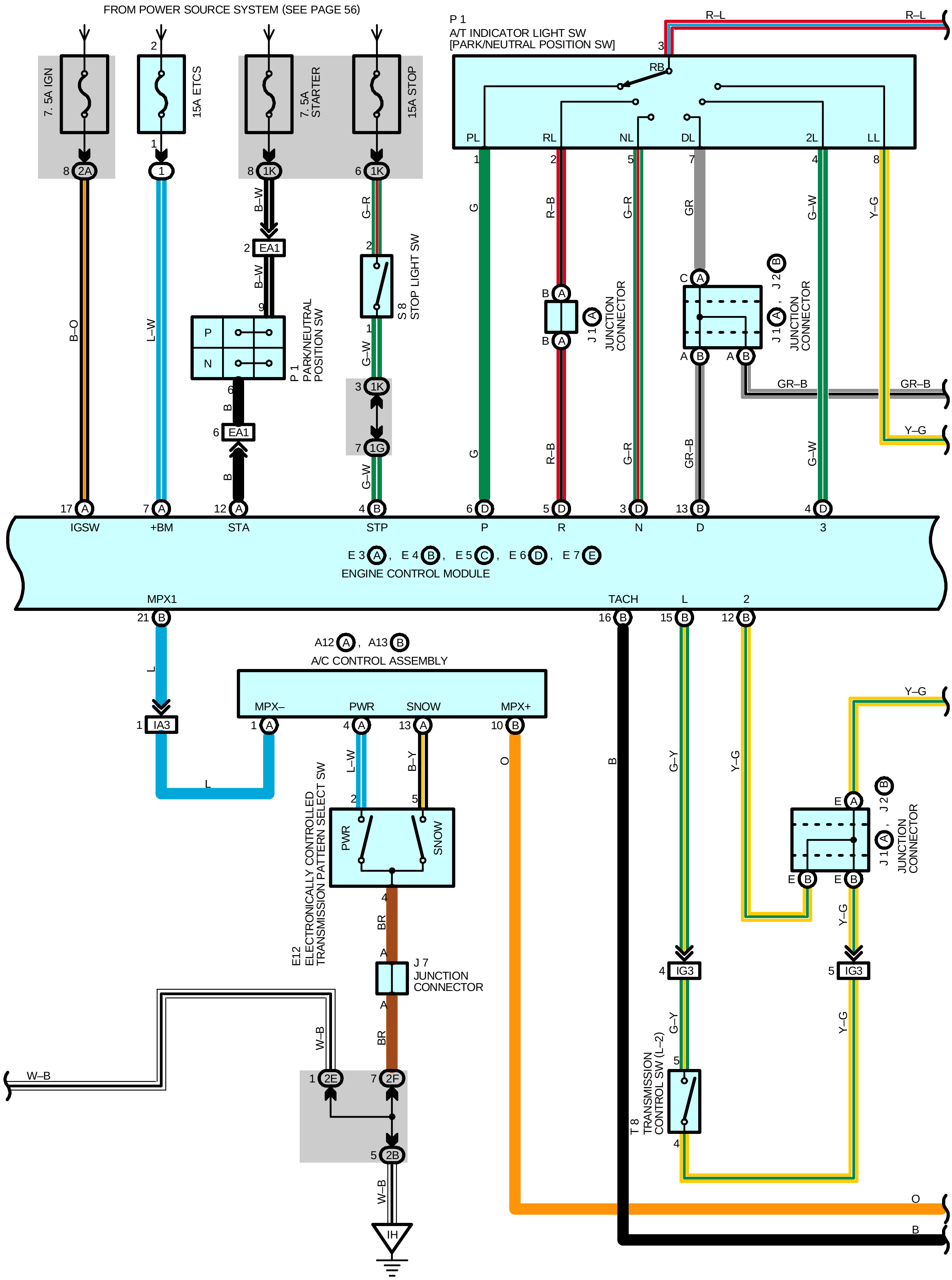
: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B4	50 (W/G)	Floor No.2 Wire			

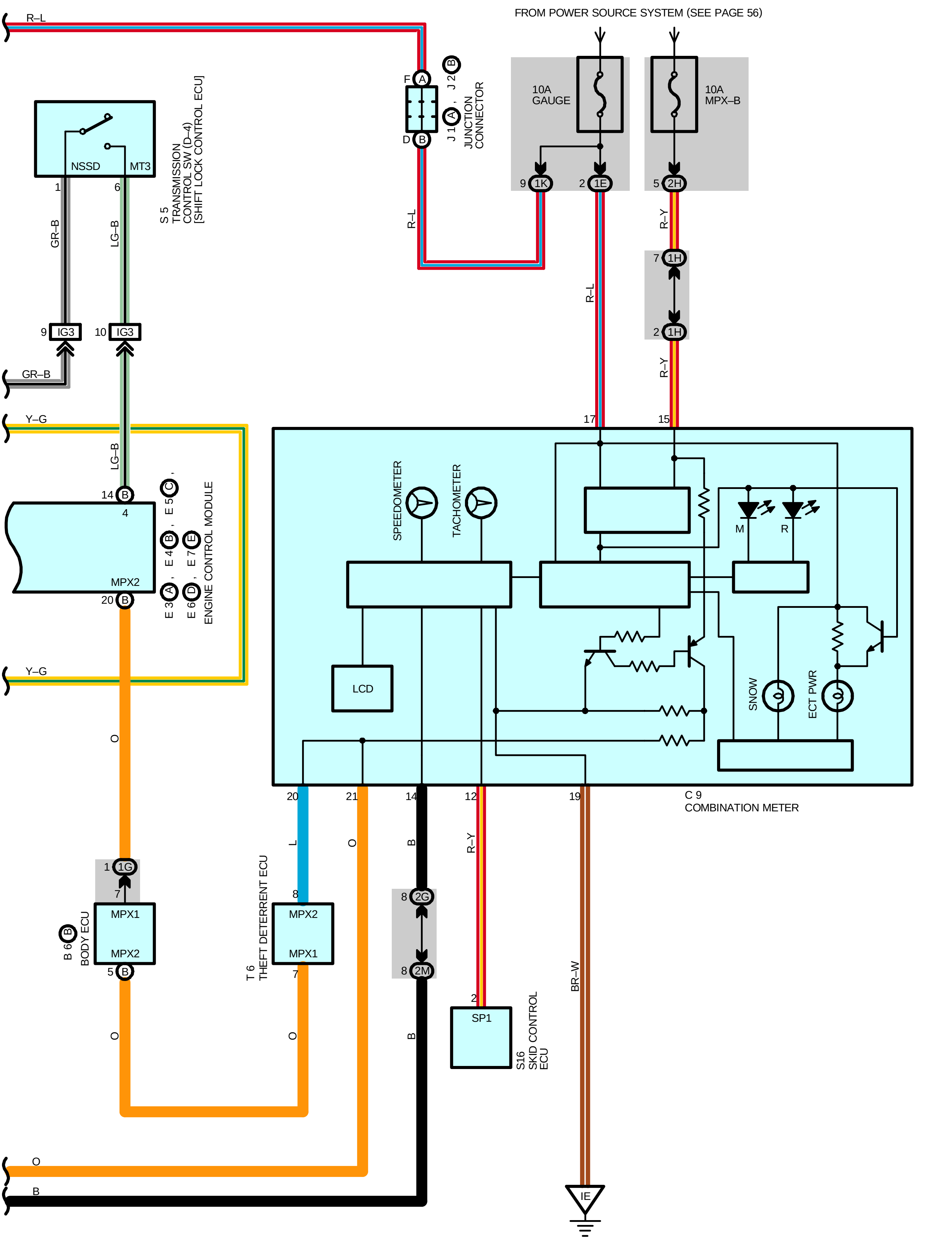


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
25A EFI
7. 5A OBD
E 1 ELECTRONICALLY CONTROLLED TRANSMISSION SOLENOID
EFI RELAY
E 3 (A), E 4 (B), E 5 (C), E 6 (D), E 7 (E) ENGINE CONTROL MODULE
MREL
BATT
S1
S2
S3
S4
SLU+
SLU–
SLT+
SLT–
SLN+
SLN–
+B2
+B
NCO+
NCO–
SP2+
SP2–
TC
J 3 JUNCTION CONNECTOR
O 1 O/D DIRECT CLUTCH SPEED SENSOR
V 1 VEHICLE SPEED SENSOR (ELECTRONICALLY CONTROLLED TRANSMISSION)
D 5 DATA LINK CONNECTOR 3
BAT
SG
CG
EA1
IA3
E 4
IH
EB


E10
T 3
THROTTLE POSITION
SENSOR
A 9
ACCEL POSITION
SENSOR
E 1
ELECTRONICALLY CONTROLLED
TRANSMISSION SOLENOID
M 1
MASS AIR FLOW METER
E 8
ENGINE COOLANT TEMP.
SENSOR
E 8
EA2
EA3
J 1 A , J 2 B
JUNCTION
CONNECTOR
OIL
EVG
VG
THA
THW
VC
VTA
VTA2
VPA
VPA2
E2
E 3 A , E 4 B , E 5 C , E 6 D , E 7 E
ENGINE CONTROL MODULE
E1
E01
E02
E03
ME01
EOM
EC
SFTD
SFTU
IA1
ECC
C12
A/T SHIFT MAIN SW
[COMB. SW]
J 7
JUNCTION
CONNECTOR
J 3
JUNCTION
CONNECTOR
J 4
JUNCTION
CONNECTOR
EA
EB
EC
BR
B–R
W–B
GR
L–W
G–B
L–B
R
L–Y
W–R
G–Y
P–L
GR–R
GR–G
BR–Y



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
7. 5A IGN
15A ETCS
7. 5A STARTER
15A STOP
P 1
A/T INDICATOR LIGHT SW
[PARK/NEUTRAL POSITION SW]
R–L
RB
PL
RL
NL
DL
2L
LL
B–O
L–W
B–W
EA1
G–R
S 8
STOP LIGHT SW
P 1
PARK/NEUTRAL POSITION SW
G–W
G
R–B
GR
Y–G
J 1 A
JUNCTION CONNECTOR
J 1 A , J 2 B
JUNCTION CONNECTOR
GR–B
GR–B
Y–G
IGSW
+BM
STA
STP
P
R
N
D
3
E 3 A , E 4 B , E 5 C , E 6 D , E 7 E
ENGINE CONTROL MODULE
MPX1
TACH
L
2
A12 A , A13 B
A/C CONTROL ASSEMBLY
MPX–
PWR
SNOW
MPX+
IA3
L
B–Y
O
G–Y
E12
ELECTRONICALLY CONTROLLED TRANSMISSION PATTERN SELECT SW
BR
J 7
JUNCTION CONNECTOR
W–B
IG3
T 8
TRANSMISSION CONTROL SW (L–2)
IH



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A GAUGE
10A MPX–B
R–L
GR–B
LG–B
Y–G
O
B
L
R–Y
BR–W
NSSD
MT3
S 5 TRANSMISSION CONTROL SW (D–4) [SHIFT LOCK CONTROL ECU]
IG3
J 1 A , J 2 B JUNCTION CONNECTOR
1K
1E
2H
1H
E 3 A , E 4 B , E 5 C , E 6 D , E 7 E ENGINE CONTROL MODULE
MPX2
SPEEDOMETER
TACHOMETER
LCD
M
R
SNOW
ECT PWR
C 9 COMBINATION METER
1G
MPX1
B 6 B BODY ECU
T 6 THEFT DETERRENT ECU
2G
2M
SP1
S16 SKID CONTROL ECU
IE

ELECTRONICALLY CONTROLLED TRANSMISSION AND A/T INDICATOR

SYSTEM OUTLINE

Previous automatic transmissions have selected each gear shift using mechanically controlled throttle hydraulic pressure, governor hydraulic pressure and lock–up hydraulic pressure. The electronically controlled transmission, however, electrically controls the line pressure, throttle pressure, lock–up pressure and accumulator pressure etc. through the solenoid valve. The electronically controlled transmission is a system which precisely controls gear shift timing and lock–up timing in response to the vehicle's driving conditions and the engine condition detected by various sensors. It makes smooth driving possible by shift selection for each gear which is the most appropriate to the driving conditions at that time, and by preventing downing, squat and gear shift shock when starting off.

1. GEAR SHIFT OPERATION

When driving, the engine warm up condition is input as a signal to TERMINAL THW of the engine control module from the engine coolant temp. sensor and the vehicle speed signal from vehicle speed sensor is input to TERMINAL SP2+ of the engine control module. At the same time, the throttle valve opening signal from the throttle position sensor is input to TERMINALS VTA and VTA2 of the engine control module as throttle angle signal.

Based on these signals, the engine control module selects the best shift position for the driving conditions and sends current to the electronically controlled transmission solenoid.

2. LOCK–UP OPERATION

When the engine control module decides based on each signal that the lock–up condition has been met, the current flows through TERMINAL SLU+ of the engine control module to TERMINAL 4 of the electronically controlled transmission solenoid to TERMINAL 10 to TERMINAL SLU– of the engine control module to GROUND.

3. STOP LIGHT SW CIRCUIT

If the brake pedal is depressed (Stop light SW on) when driving in lock–up condition, a signal is input to TERMINAL STP of the engine control module. The engine control module operates and cuts the current to the solenoid to release lock–up.

4. ELECTRONICALLY CONTROLLED TRANSMISSION PATTERN SELECT SW CIRCUIT

When the electronically controlled transmission pattern select SW is switched to PWR, a signal is input to TERMINAL PWR of the A/C control assembly, and control signals are distributed to the engine control module through communication control of the body ECU. This enables shift–up and shift–down at a higher speed range.

5. E–SHIFT SYSTEM

When the shift lever is set to the M position, the shift range can be switched with the UP or DOWN switch on the steering. (This limits to the maximum gear step and enables automatic shift–up and shift–down within the allowable range.)

SERVICE HINTS

E1 ELECTRONICALLY CONTROLLED TRANSMISSION SOLENOID

4–10 : **5.0**–**5.6** Ω
5, 6, 11, 12–GROUND : **11**–**15** Ω

E12 ELECTRONICALLY CONTROLLED TRANSMISSION PATTERN SELECT SW

2–4 : Closed with the select SW at **PWR** position
5–4 : Only closed with the select SW at **SNOW** position

E3 (A), E4 (B), E5 (C), E6 (D), E7 (E) ENGINE CONTROL MODULE

BATT–GROUND : Always approx. **12** volts
+B, +B2–GROUND : Approx. **12** volts with the ignition SW at **ON** position
STA–GROUND : Approx. **12** volts with the ignition SW at **ST** position and shift lever in **P** or **N** position
STP–GROUND : Approx. **12** volts with the brake pedal depressed
E01, E02, E03, ME01, E1, EC, EOM–GROUND : Always continuity

P1 A/T INDICATOR LIGHT SW [PARK / NEUTRAL POSITION SW]

3–1 : Closed with the shift lever in **P** position
3–2 : Closed with the shift lever in **R** position
3–5 : Closed with the shift lever in **N** position
3–7 : Closed with the shift lever in **D** position or **M** position
3–4 : Closed with the shift lever in **3** position
3–8 : Closed with the shift lever in **2** position or **L** position

: PARTS LOCATION

Code		See Page	Code		See Page	Code	See Page
A9		32	E5	C	32	M1	33
A12	A	34	E6	D	32	O1	33
A13	B	34	E7	E	32	P1	33
B6	B	34	E8		32	S5	35
C9		34	E12		35	S8	35
C12		34	J1	A	33	S16	35
D5		34	J2	B	33	T3	33
E1		32	J3		33	T6	35
E3	A	32	J4		33	T8	35
E4	B	32	J7		35	V1	33

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2B		
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2F		
2G		
2H		
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
EA2		
EA3		
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
IG3	46	Instrument Panel Wire and Engine Room Main Wire (Near the Passenger Side J/B)

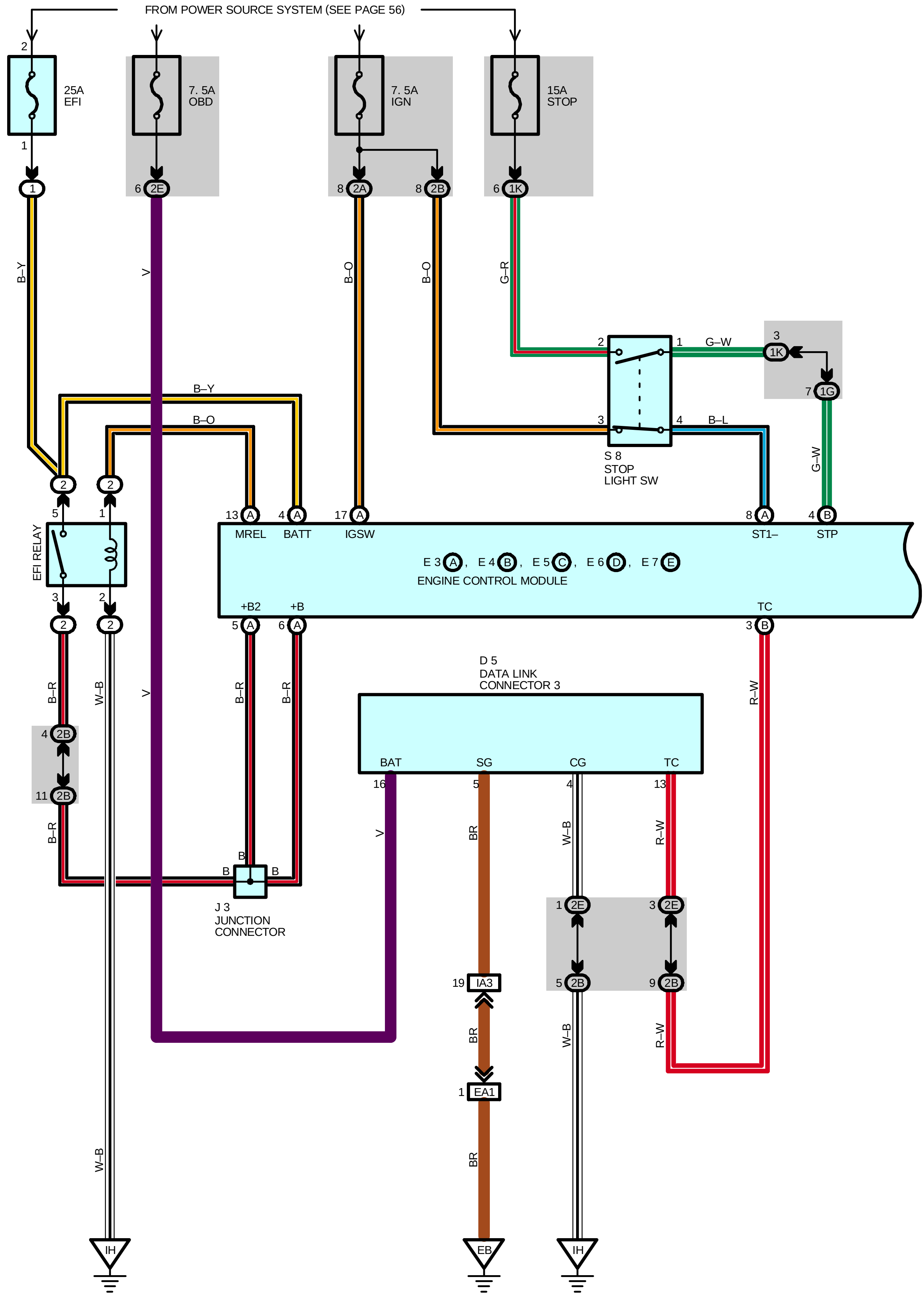
: GROUND POINTS

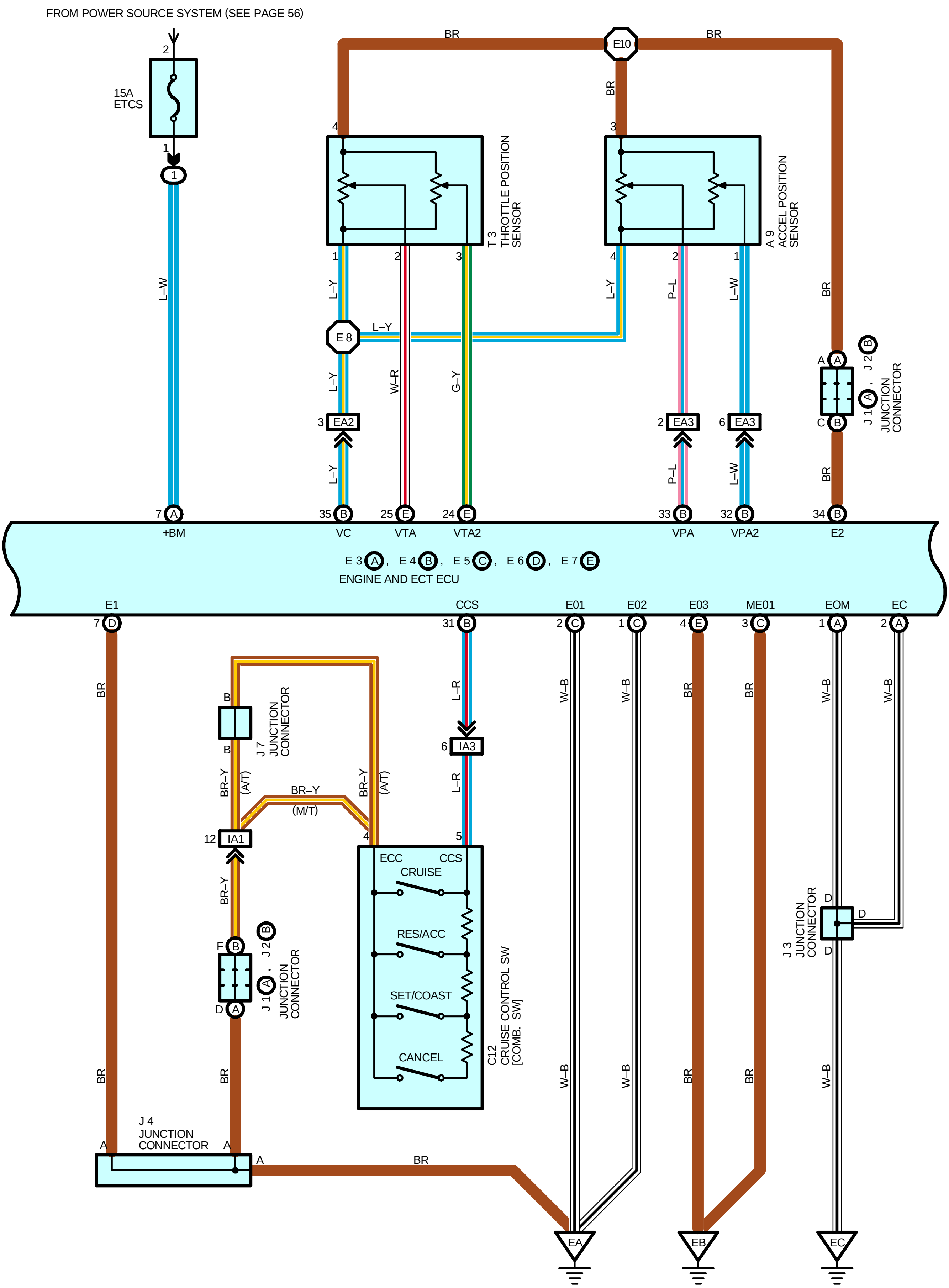
Code	See Page	Ground Points Location
EA	42	Front Side of the Intake Manifold
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
IE	44	Front Floor Panel Center LH
IH	44	Cowl Side Panel RH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E4	42	Engine Room Main Wire	E10	42	Engine Wire
E8	42	Engine Wire			

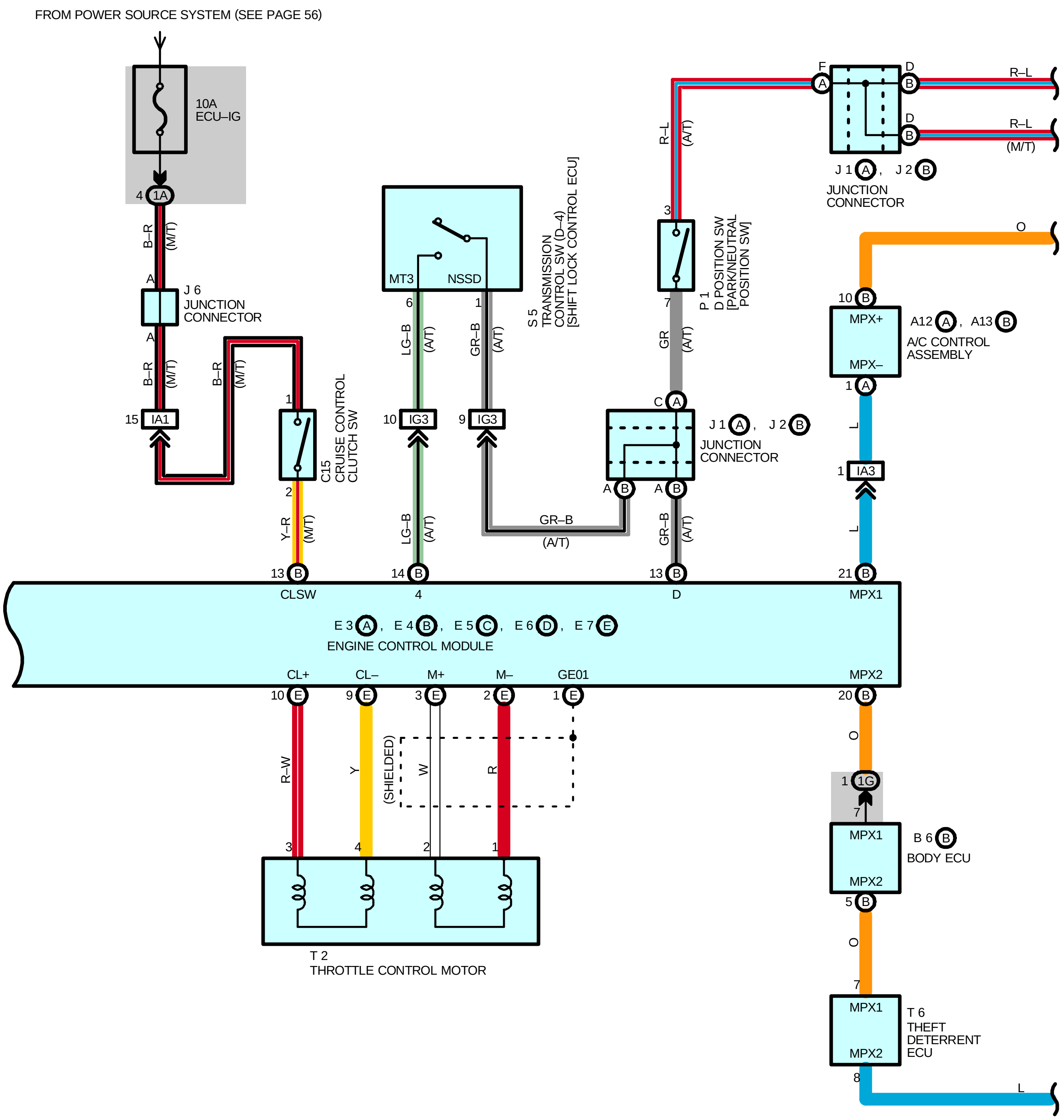
CRUISE CONTROL

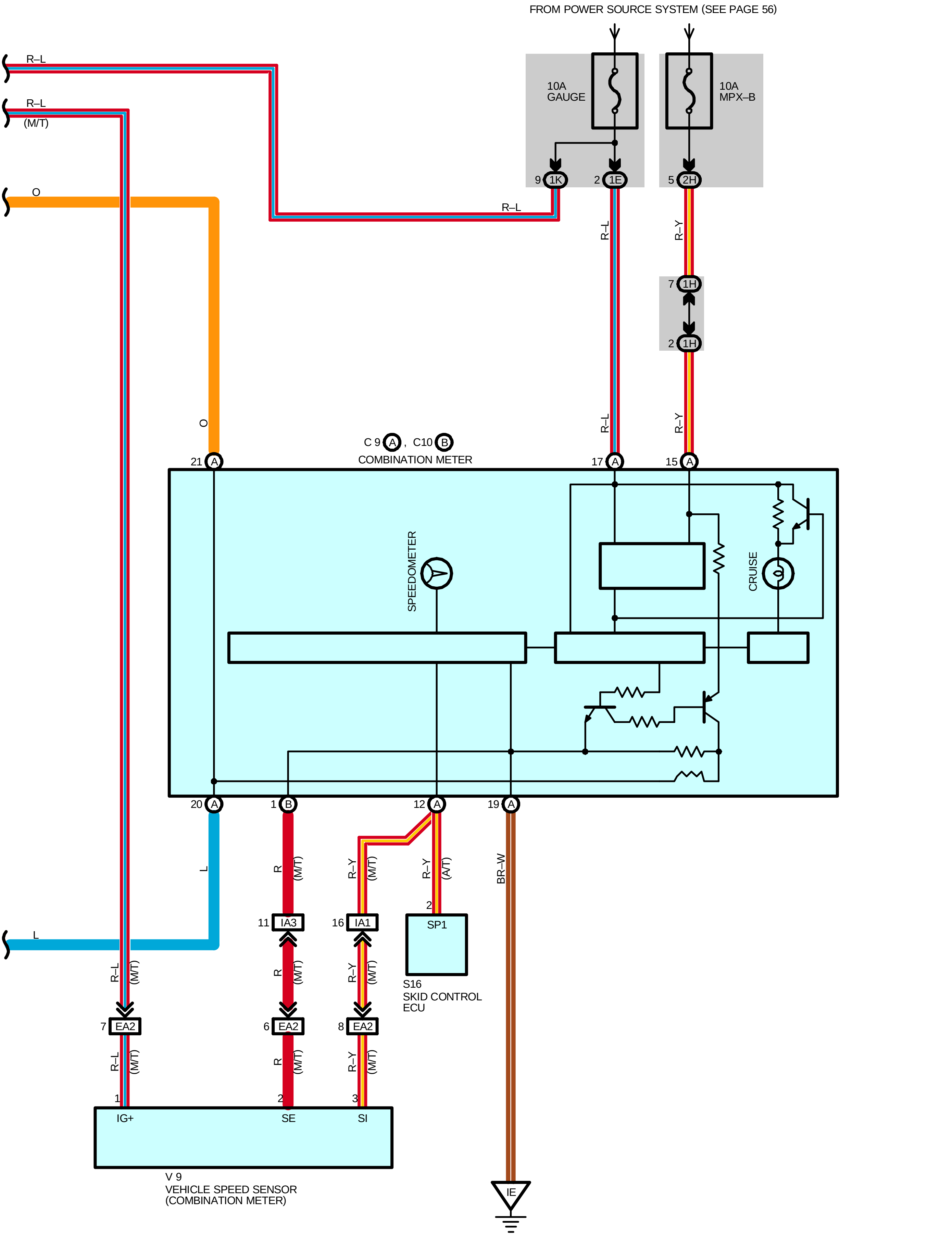




FROM POWER SOURCE SYSTEM (SEE PAGE 56)
15A
ETCS
L–W
BR
E10
T 3
THROTTLE POSITION
SENSOR
A 9
ACCEL POSITION
SENSOR
L–Y
E 8
W–R
G–Y
P–L
EA2
EA3
J 1 A , J 2 B
JUNCTION
CONNECTOR
+BM
VC
VTA
VTA2
VPA
VPA2
E2
E 3 A , E 4 B , E 5 C , E 6 D , E 7 E
ENGINE AND ECT ECU
E1
CCS
E01
E02
E03
ME01
EOM
EC
W–B
J 7
JUNCTION
CONNECTOR
BR–Y
(A/T)
(M/T)
IA1
L–R
IA3
ECC
CCS
CRUISE
RES/ACC
SET/COAST
CANCEL
C12
CRUISE CONTROL SW
[COMB. SW]
J 3
JUNCTION
CONNECTOR
J 4
JUNCTION
CONNECTOR
EA
EB
EC

CRUISE CONTROL





FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
GAUGE
10A
MPX–B
R–L
R–L
(M/T)
O
9 1K
2 1E
5 2H
R–L
R–Y
7 1H
2 1H
C 9 A , C10 B
COMBINATION METER
21 A
17 A
15 A
SPEEDOMETER
CRUISE
20 A
1 B
12 A
19 A
L
R (M/T)
R–Y (M/T)
R–Y (A/T)
BR–W
11 IA3
16 IA1
SP1
S16
SKID CONTROL
ECU
R–L (M/T)
7 EA2
6 EA2
8 EA2
IG+
SE
SI
V 9
VEHICLE SPEED SENSOR
(COMBINATION METER)
IE

CRUISE CONTROL

SYSTEM OUTLINE

The cruise control system allows the driver to control the vehicle speed at a constant speed, such as on a high way, without depressing the accelerator pedal. By operating the SW, the engine throttle valve is automatically adjusted to control the vehicle speed at a constant speed.

1. SET OPERATION

The actual vehicle speed is compared with the memorized vehicle speed, and when the actual vehicle speed is faster than the memorized speed, a signal is output to rotate the electronic throttle motor to close the throttle valve. When the actual vehicle speed is slower than the memorized speed, a signal is output to rotate the electronic throttle motor to open the throttle valve.

2. SET SPEED CONTROL

While traveling (Within the set speed limit) with the CRUISE SW on (Power indicator on), the speed when the SET/COAST SW is operated to off is memorized and the vehicle is controlled at that speed.

3. COAST CONTROL

When the SET/COAST SW is operated to on during cruise control driving, the cruise control opening angle requirement is controlled to 0 to decrease the vehicle speed (However the throttle valve itself is not fully closed due to ISC etc.), and the speed when the SW is operated to off is memorized, and the vehicle is controlled at that speed. Furthermore, every time the SET/COAST SW is operated to on momentarily (Approximately 0.5 seconds), the memorized vehicle speed is decreased by approximately 1.5km/h.In case of tap down operation where the difference between the memorized vehicle speed and the actual vehicle speed is more than 5km/h, the speed when the SW is operated to off is memorized, and the vehicle is controlled at that speed.

4. ACCEL CONTROL

When the RES/ACC SW is operated to on during cruise control driving, the electronic throttle motor is rotated so that the throttle valve opens to increase the vehicle speed, and the speed when the SW is operated to off is memorized, and the vehicle is controlled at that speed.
Furthermore, every time the RES/ACC SW is operated to on momentarily (Approximately 0.5 seconds), the memorized vehicle speed is increased by approximately 1.5km/h.
In case of tap up operation where the difference between the memorized vehicle speed and the actual vehicle speed is more than 5km/h, the memorized speed will not be changed.

5. MANUAL CANCEL MECHANISM

If any of the following signals are input during cruise control driving, the current to the motor flows in the direction to close the throttle valve, and the cruise control is canceled. (Vehicle speed memory will not be not erased)

* Stop light SW is on (Brake pedal is depressed)
* D position circuit in the Park/Neutral position SW is turned from on to off (Shift position is changed from D to N, 2, or 1) (A/T)
* The cruise control clutch SW is on (Clutch pedal depressed) (M/T)
* The CANCEL SW of the control SW is on
* The CRUISE SW is off (Vehicle speed memory will be erased)
* Shift lever in M position and shift range other than D or 3 position (A/T)

6. RESUME CONTROL

After canceling the cruise control (Except when the CRUISE SW is off) if the vehicle speed is above the minimum speed limit (Approximately 40km/h, 25mph) operating the RES/ACC SW from off to on will cause the system to accelerate to resume the vehicle speed before manual cancellation.

7. OVERDRIVE CONTROL FUNCTION

During cruise control driving, the overdrive may be cut on an uphill grade.
After the overdrive is cut, if the vehicle speed reaches the overdrive resume speed (Set speed minus 2km/h), and if the system determines that the uphill grade has finished, the overdrive will resume after overdrive resume timer operation. However, if the actual vehicle speed becomes slower than the overdrive resume speed before the timer operation has finished, the timer will be reset, and will start again when the vehicle speed reaches the overdrive resume speed.

8. AUTO CANCEL OPERATION

(1) If any of the following conditions are detected, the set speed is erased and the control is canceled.
At this time, the power indicator will blink, and control of the system will be prohibited until the CRUISE SW is turned on again.

- * Disconnection and/or short in the stop light SW
- * Failure in the vehicle speed signal
- * Failure in the electronic throttle parts

(2) If any of the following conditions are detected, the set speed is erased and the control is canceled.
At this time, the power indicator will blink, and control of the system will be prohibited until the ignition SW is turned off.

- * Failure in the stop light SW input circuit
- * Failure in the cancel circuit

(3) If any of the following conditions are detected, the set speed is erased and the control is canceled. (Reset is possible)

- * The actual speed becomes slower than the minimum speed limit.
- * The actual speed becomes –16km/h slower than the set speed.

SERVICE HINTS

E3 (A), E4 (B), E5 (C), E6 (D), E7 (E) ENGINE CONTROL MODULE

IGSW–GROUND : Approx. **12** volts with the ignition SW at **ON** position
BATT, +BM–GROUND : Always approx. **12** volts
E01, E02, E03, ME01, EOM, EC, E1–GROUND : Always continuity
STP–GROUND : Approx. **12** volts with the stop light SW at on
CCS–GROUND : Continuity with the CRUISE SW at on
Approx. **1540** Ω with the CANCEL SW on in cruise control SW
Approx. **240** Ω with the RES/ACC SW on in cruise control SW
Approx. **630** Ω with the SET/COAST SW on in cruise control SW

C12 CRUISE CONTROL SW [COMB. SW]

5–4 : Approx. **1540** Ω with the CANCEL SW on
Approx. **240** Ω with the RES/ACC SW on
Approx. **630** Ω with the SET/COAST SW on

○ **: PARTS LOCATION**

Code		See Page	Code		See Page	Code	See Page
A9		32	E4	B	32	P1	33
A12	A	34	E5	C	32	S5	35
A13	B	34	E6	D	32	S8	35
B6	B	34	E7	E	32	S16	35
C9	A	34	J1	A	33	T2	33
C10	B	34	J2	B	33	T3	33
C12		34	J3		33	T6	35
C15		34	J4		33	V9	33
D5		34	J6		35		
E3	A	32	J7		35		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)

CRUISE CONTROL

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2B		
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2H		

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

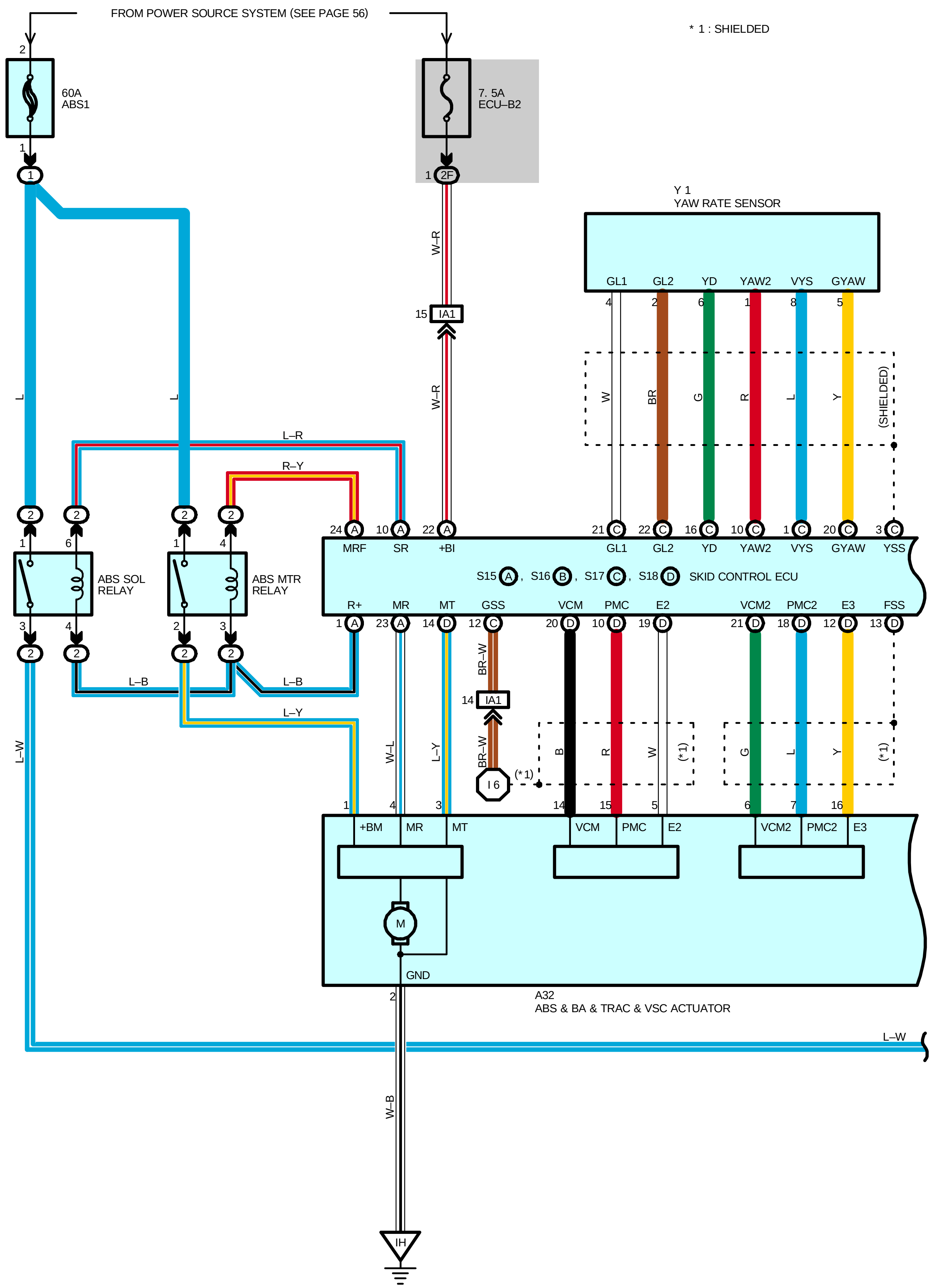
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
EA2		
EA3		
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
IG3	46	Instrument Panel Wire and Engine Room Main Wire (Near the Passenger Side J/B)

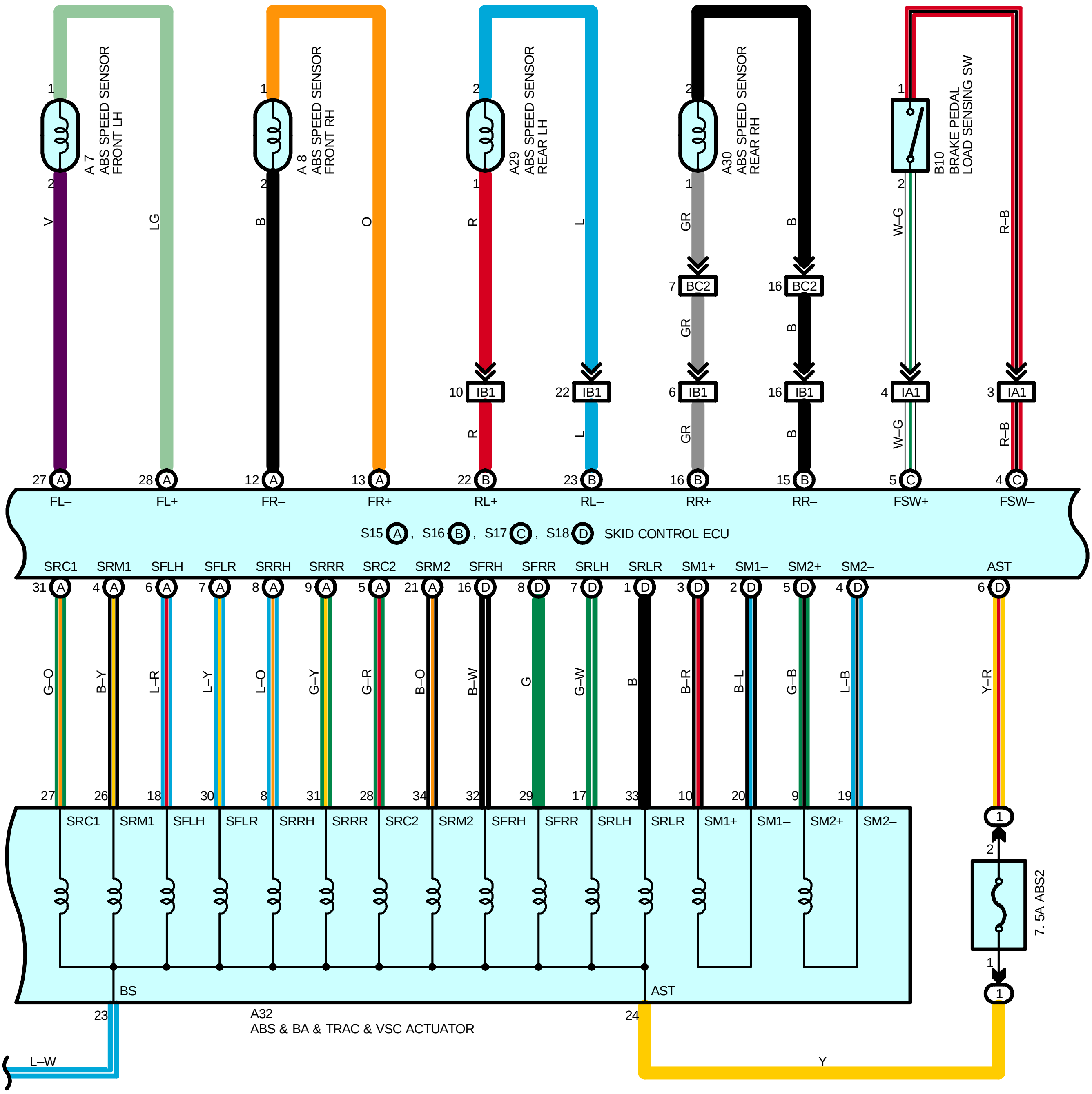
: GROUND POINTS

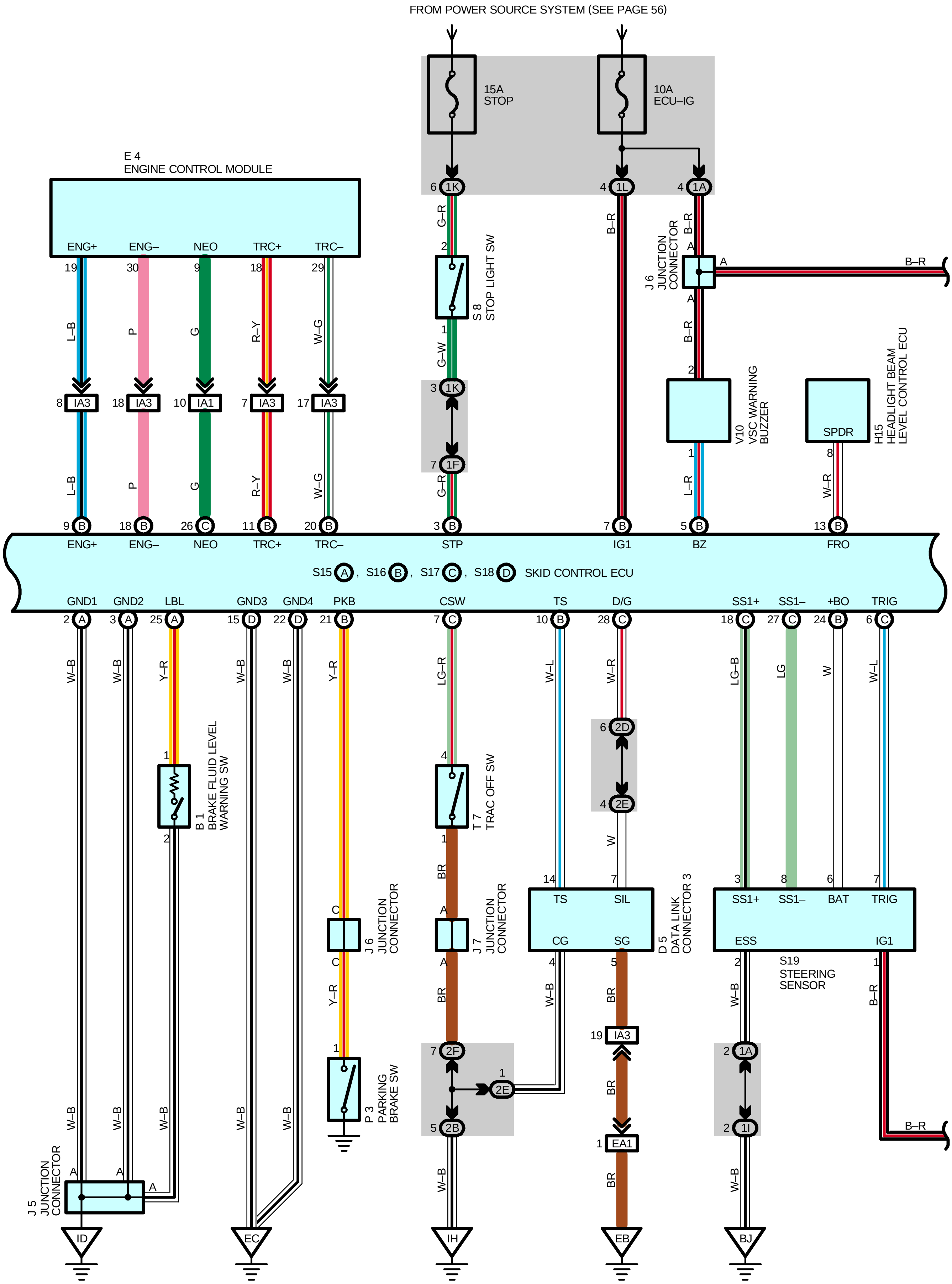
Code	See Page	Ground Points Location
EA	42	Front Side of the Intake Manifold
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
IE	44	Front Floor Panel Center LH
IH	44	Cowl Side Panel RH

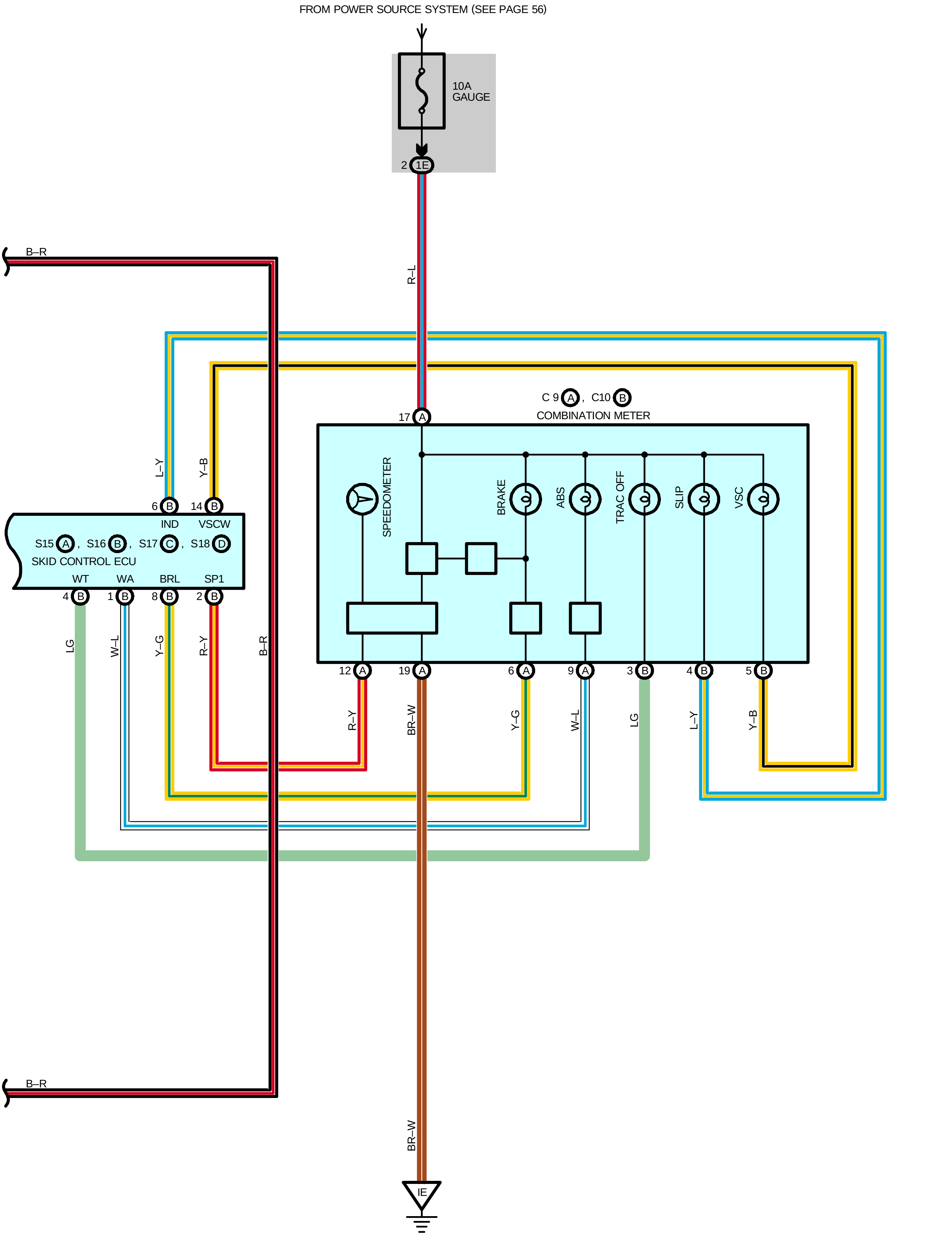
: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E8	42	Engine Wire	E10	42	Engine Wire


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
* 1 : SHIELDED
60A
ABS1
7. 5A
ECU–B2
Y 1
YAW RATE SENSOR
GL1
GL2
YD
YAW2
VYS
GYAW
(SHIELDED)
ABS SOL
RELAY
ABS MTR
RELAY
L–R
R–Y
L–B
L–Y
L–W
W–R
IA1
MRF
SR
+BI
YSS
S15 A , S16 B , S17 C , S18 D SKID CONTROL ECU
R+
MR
MT
GSS
VCM
PMC
E2
VCM2
PMC2
E3
FSS
BR–W
I 6
(*1)
W–L
+BM
GND
M
A32
ABS & BA & TRAC & VSC ACTUATOR
W–B
IH


A 7
ABS SPEED SENSOR
FRONT LH
A 8
ABS SPEED SENSOR
FRONT RH
A29
ABS SPEED SENSOR
REAR LH
A30
ABS SPEED SENSOR
REAR RH
B10
BRAKE PEDAL
LOAD SENSING SW
V
LG
B
O
R
L
GR
W–G
R–B
BC2
IB1
IA1
FL–
FL+
FR–
FR+
RL+
RL–
RR+
RR–
FSW+
FSW–
S15 A, S16 B, S17 C, S18 D SKID CONTROL ECU
SRC1
SRM1
SFLH
SFLR
SRRH
SRRR
SRC2
SRM2
SFRH
SFRR
SRLH
SRLR
SM1+
SM1–
SM2+
SM2–
AST
G–O
B–Y
L–R
L–Y
L–O
G–Y
G–R
B–O
B–W
G
G–W
B–R
B–L
G–B
L–B
Y–R
7. 5A ABS2
BS
A32
ABS & BA & TRAC & VSC ACTUATOR
L–W
Y


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
15A
STOP
10A
ECU–IG
E 4
ENGINE CONTROL MODULE
ENG+
ENG–
NEO
TRC+
TRC–
L–B
P
G
R–Y
W–G
IA3
IA1
1K
1L
1A
1F
G–R
G–W
B–R
L–R
W–R
S 8
STOP LIGHT SW
J 6
JUNCTION
CONNECTOR
V10
VSC WARNING
BUZZER
H15
HEADLIGHT BEAM
LEVEL CONTROL ECU
SPDR
STP
IG1
BZ
FRO
S15 A, S16 B, S17 C, S18 D SKID CONTROL ECU
GND1
GND2
LBL
GND3
GND4
PKB
CSW
TS
D/G
SS1+
SS1–
+BO
TRIG
W–B
Y–R
LG–R
W–L
LG–B
LG
W
B 1
BRAKE FLUID LEVEL
WARNING SW
T 7
TRAC OFF SW
2D
2E
BR
J 7
JUNCTION
CONNECTOR
SIL
CG
SG
D 5
DATA LINK
CONNECTOR 3
BAT
ESS
S19
STEERING
SENSOR
P 3
PARKING
BRAKE SW
2F
2B
EA1
1I
J 5
JUNCTION
CONNECTOR
ID
EC
IH
EB
BJ


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
GAUGE
2 1E
R–L
B–R
17 A
C 9 A , C10 B
COMBINATION METER
SPEEDOMETER
BRAKE
ABS
TRAC OFF
SLIP
VSC
12 A
19 A
6 A
9 A
3 B
4 B
5 B
R–Y
BR–W
Y–G
W–L
LG
L–Y
Y–B
6 B
14 B
IND
VSCW
S15 A , S16 B , S17 C , S18 D
SKID CONTROL ECU
WT
WA
BRL
SP1
4 B
1 B
8 B
2 B
IE

SYSTEM OUTLINE

1. ABS OPERATION

If the brake pedal is depressed suddenly, the ABS controls the hydraulic pressure of the wheel cylinders for all the four wheels to automatically avoid wheel locking and ensure the directional and steering stability of the vehicle. If the brake pedal is depressed suddenly, the skid control ECU controls the solenoids in the actuators using the signals from the sensors to move the brake fluid to the reservoir in order to release the braking pressure applied to the wheel cylinder. If the skid control ECU detects that the fluid pressure in the wheel cylinder is insufficient, the ECU controls the solenoids in the actuators to increase the braking pressure.

2. TRACTION CONTROL OPERATION

The traction control system controls the engine torque, the hydraulic pressure of the driving wheel cylinders, slipping of the wheels which may occur at start or acceleration of the vehicle, to ensure an optimal driving power and vehicle stability corresponding to the road conditions.
Traction control SW
The traction control SW is used to stop the TRAC function. After the engine is started, the TRAC system is stopped (turned off) and the TRAC OFF indicator light lights up. When the traction control SW is pressed again, the TRAC system enters the stand–by mode. If the engine is stopped and restarted, the TRAC system enters the stand–by mode regardless of the traction control SW.

3. VSC OPERATION

Unexpected road conditions, vehicle speed, emergency situation, and any other external factors may cause large front wheel skid or rear wheel skid of the vehicle. If this occurs, the VSC system automatically controls the engine power and wheel brakes to reduce the front wheel skid or rear wheel skid.
To reduce large rear wheel skid :
If the VSC system determines that the rear wheel skid is large, it activates the brakes for the outer turning wheels depending on the degree of the rear wheel skid to produce the moment toward the outside of the vehicle and reduce the rear wheel skid.
To reduce large front wheel skid :
If the VSC system determines that the front wheel skid is large, it controls the engine power and activates the front and rear wheel brakes to reduce the front wheel skid.

4. MUTUAL SYSTEM CONTROL

To efficiently operate the VSC system at its optimal level, the VSC system and other control systems are mutually controlled while the VSC system is being operated.
Engine throttle control
The engine power does not interfere with the VSC brake control by controlling the opening of the throttle and reducing the engine output.
Engine control and electronically controlled transmission control
The strong braking force does not interfere with the braking force control of the VSC system by turning off the accel. and reducing changes in the driving torque at shift–down.
VSC system operation indication
The SLIP indicator light flashes and the buzzer sounds intermittently to warn the driver that the current road is slippery, while the VSC system is being operated.

5. FAIL SAFE FUNCTION

If an error occurs in the skid control ECU, sensor signals, and/or actuators, the skid control ECU inhibits the brake actuator control and inputs the error signal to the engine control module. According to the error signal, the brake actuator turns off the solenoid and the engine control module rejects any electronically controlled throttle open request from the VSC system. As a result, the vehicle functions regardless of the ABS, TRAC, and VSC systems.

SERVICE HINTS

S15 (A), S16 (B), S18 (D) SKID CONTROL ECU

IG1–GROUND : **10**–**14** volts with the ignition SW at **ON** position
STP–GROUND : **0**–**1.5** volts with the stop light SW off
: **8**–**14** volts with the stop light SW on
GND1, GND2, GND3, GND4–GROUND : Always continuity

S8 STOP LIGHT SW

2–1 : Closed with the brake pedal depressed

A7, A8 ABS SPEED SENSOR FRONT LH, RH

1–2 : Approx. **1.6** kΩ at **20**˚C (**68**˚F)

A29, A30 ABS SPEED SENSOR REAR LH, RH

1–2 : Approx. **1.0** kΩ at **25**˚C (**77**˚F)

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A7	32	C9 A	34	S8	35
A8	32	C10 B	34	S15 A	35
A29	36 (S/D)	D5	34	S16 B	35
	38 (W/G)	E4	32	S17 C	35
A30	36 (S/D)	H15	35	S18 D	35
	38 (W/G)	J5	35	S19	35
A32	32	J6	35	T7	35
B1	32	J7	35	V10	35
B10	34	P3	35	Y1	35

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A 1E 1F	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1L	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2D 2E 2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA1 IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
BC2	48 (S/D)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)
	50 (W/G)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel Center)

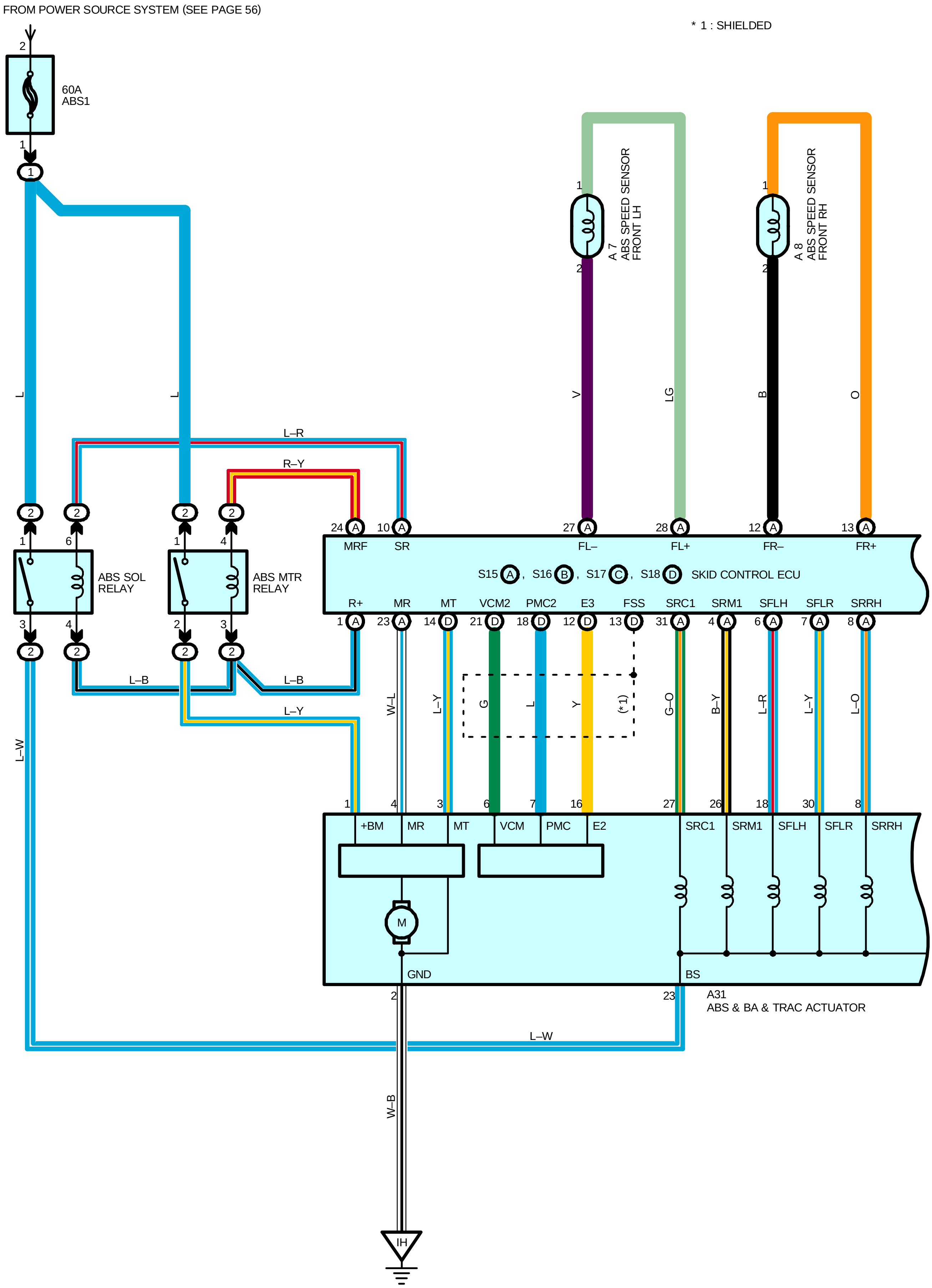
: GROUND POINTS

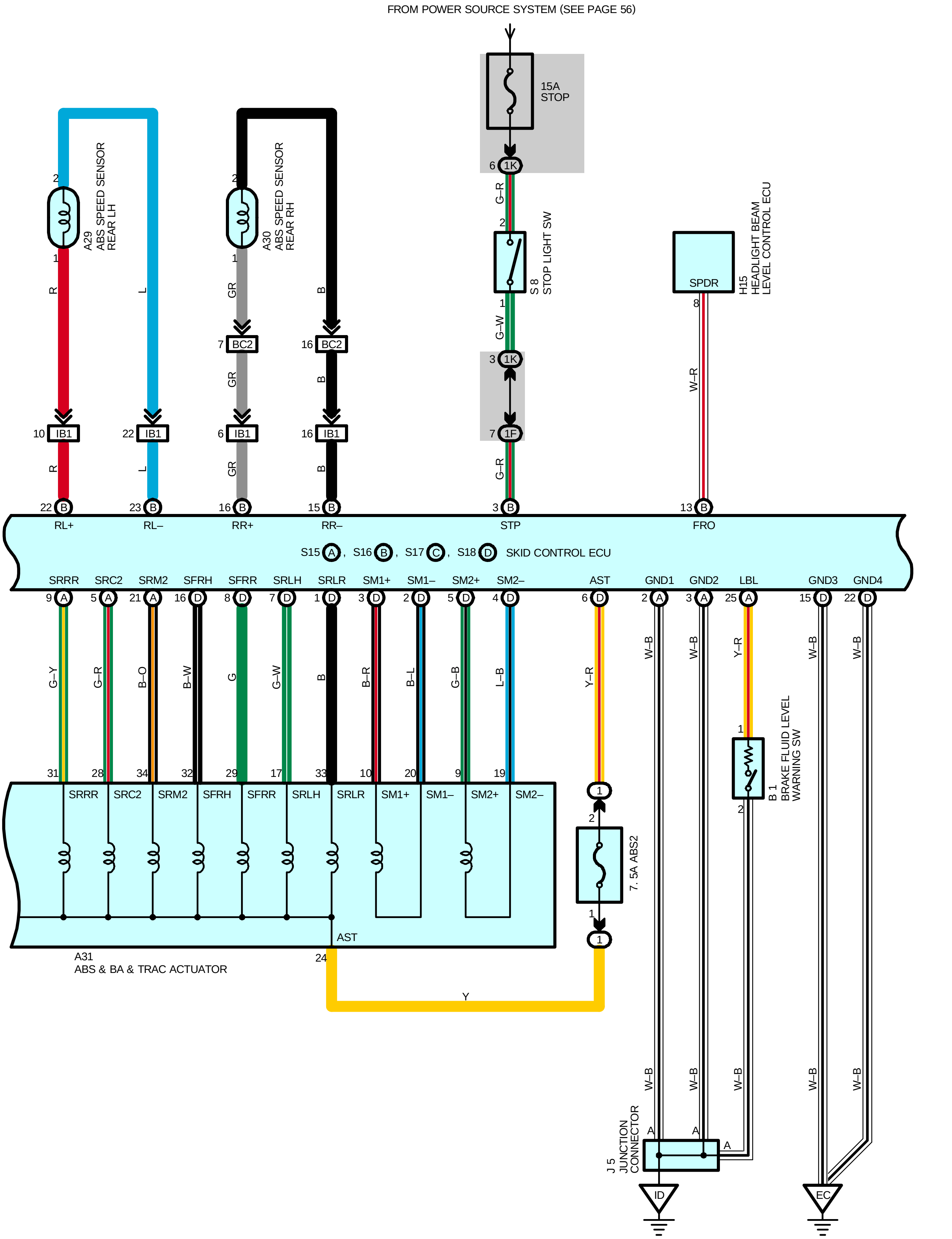
Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IE	44	Front Floor Panel Center LH
IH	44	Cowl Side Panel RH
BJ	48 (S/D) 50 (W/G)	Front Floor Panel LH

: SPLICE POINTS

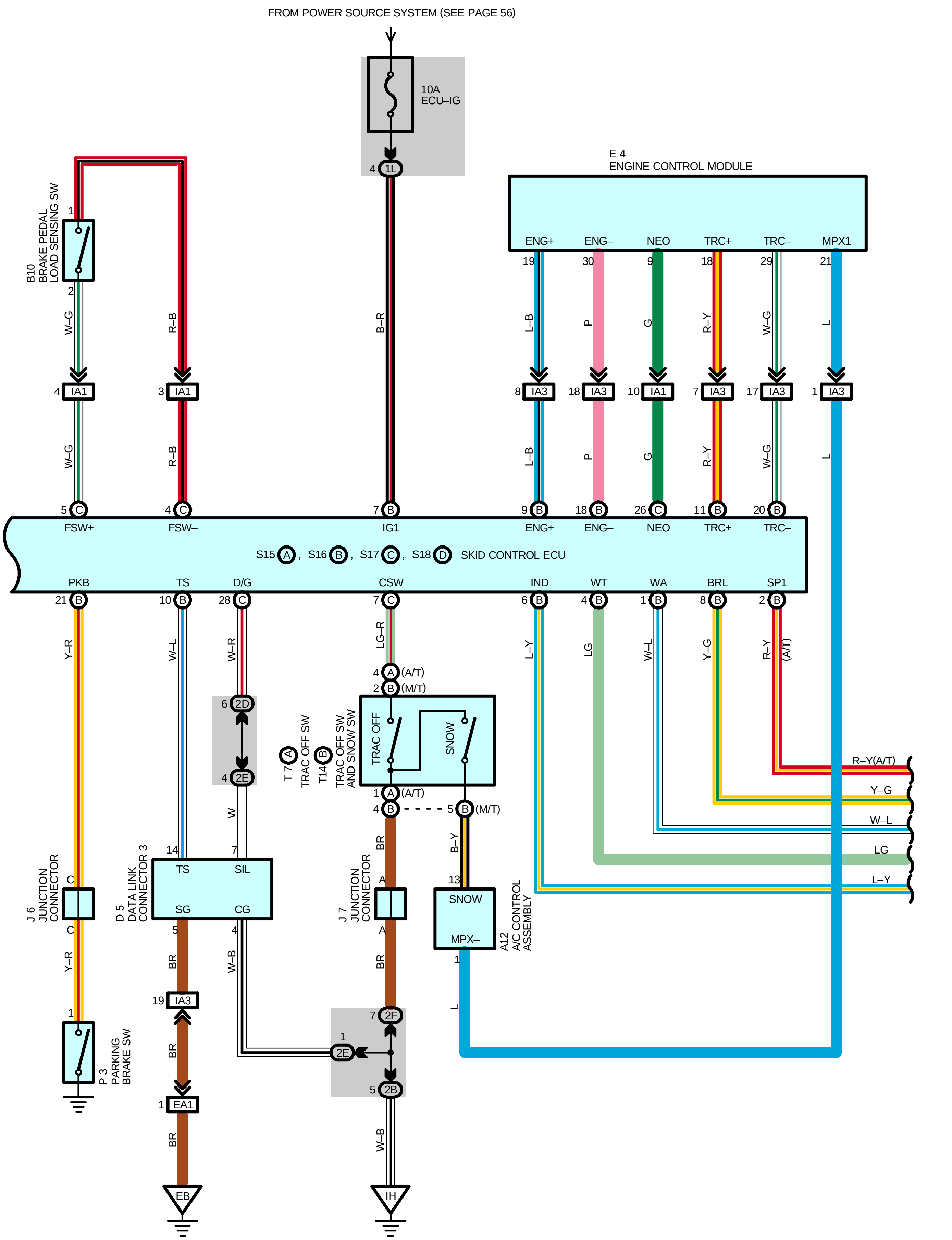
Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I6	46	Engine Room Main Wire			

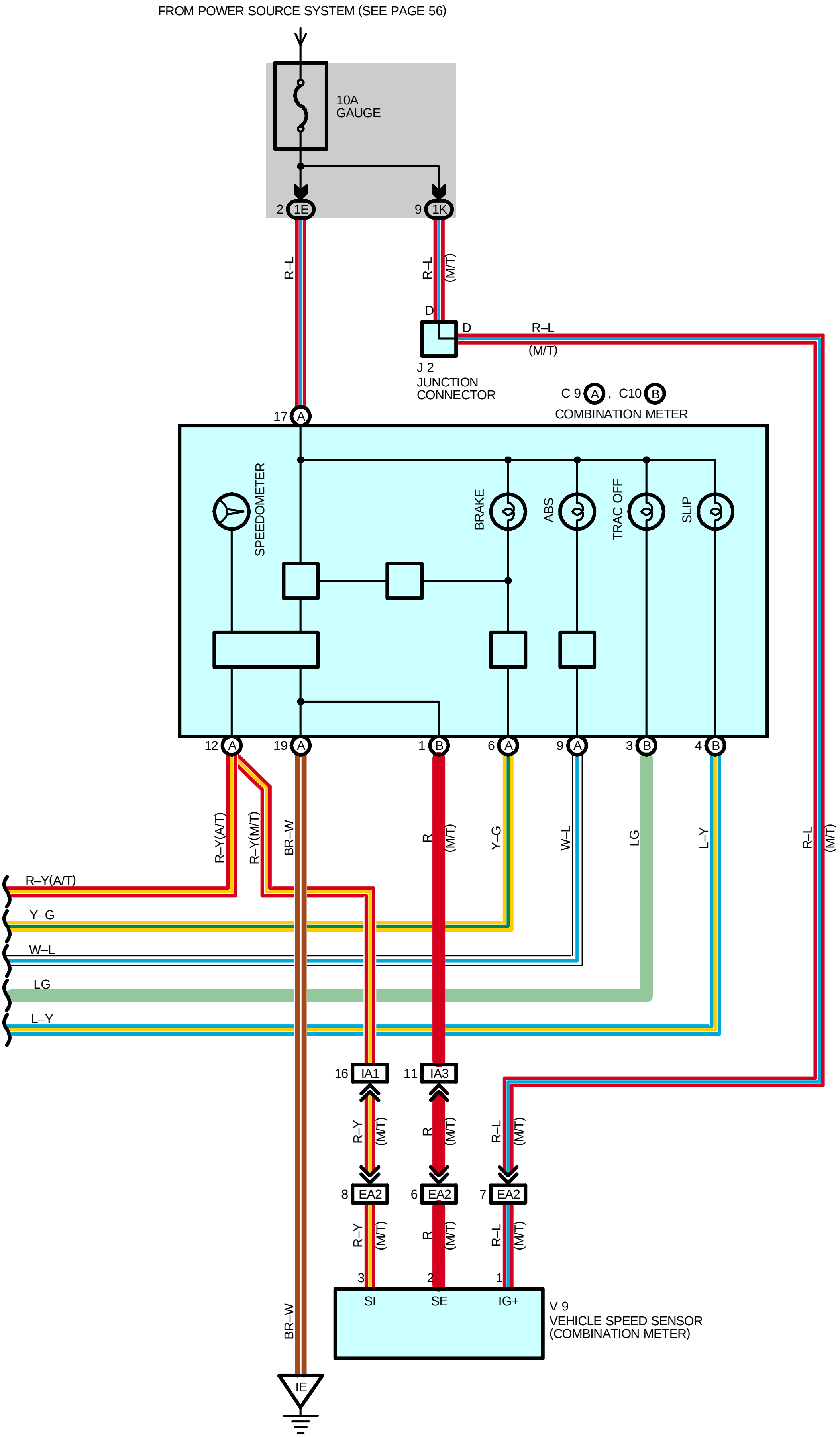
ABS AND TRACTION CONTROL




FROM POWER SOURCE SYSTEM (SEE PAGE 56)
15A STOP
A29 ABS SPEED SENSOR REAR LH
A30 ABS SPEED SENSOR REAR RH
S 8 STOP LIGHT SW
H15 HEADLIGHT BEAM LEVEL CONTROL ECU
SPDR
RL+
RL–
RR+
RR–
STP
FRO
S15 A, S16 B, S17 C, S18 D SKID CONTROL ECU
SRRR SRC2 SRM2 SFRH SFRR SRLH SRLR SM1+ SM1– SM2+ SM2– AST GND1 GND2 LBL GND3 GND4
A31 ABS & BA & TRAC ACTUATOR
AST
7. 5A ABS2
B 1 BRAKE FLUID LEVEL WARNING SW
J 5 JUNCTION CONNECTOR
ID
EC

ABS AND TRACTION CONTROL




FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
GAUGE
2 1E
9 1K
R–L
R–L (M/T)
D
D R–L (M/T)
J 2
JUNCTION
CONNECTOR
C 9 A , C10 B
COMBINATION METER
17 A
SPEEDOMETER
BRAKE
ABS
TRAC OFF
SLIP
12 A
19 A
1 B
6 A
9 A
3 B
4 B
R–Y(A/T)
R–Y(M/T)
BR–W
R (M/T)
Y–G
W–L
LG
L–Y
R–L (M/T)
R–Y(A/T)
Y–G
W–L
LG
L–Y
16 IA1
11 IA3
R–Y (M/T)
R (M/T)
R–L (M/T)
8 EA2
6 EA2
7 EA2
3
2
1
SI
SE
IG+
V 9
VEHICLE SPEED SENSOR
(COMBINATION METER)
BR–W
IE

ABS AND TRACTION CONTROL

SYSTEM OUTLINE

1. ABS OPERATION

If the brake pedal is depressed suddenly, the ABS controls the hydraulic pressure of the wheel cylinders for all the four wheels to automatically avoid wheel locking and ensure the directional and steering stability of the vehicle. If the brake pedal is depressed suddenly, the skid control ECU controls the solenoids in the actuators using the signals from the sensors to move the brake fluid to the reservoir in order to release the braking pressure applied to the wheel cylinder. If the skid control ECU detects that the fluid pressure in the wheel cylinder is insufficient, the ECU controls the solenoids in the actuators to increase the braking pressure.

2. TRACTION CONTROL OPERATION

The traction control system controls the engine torque, the hydraulic pressure of the driving wheel cylinders, slipping of the wheels which may occur at start or acceleration of the vehicle, to ensure an optimal driving power and vehicle stability corresponding to the road conditions.

Traction control SW

The traction control SW is used to stop the TRAC function. After the engine is started, the TRAC system is stopped (turned off) and the TRAC OFF indicator light lights up. When the traction control SW is pressed again, the TRAC system enters the stand–by mode. If the engine is stopped and restarted, the TRAC system enters the stand–by mode regardless of the traction control SW.

SERVICE HINTS

S15 (A), S16 (B), S18 (D) SKID CONTROL ECU

IG1–GROUND : **10**–**14** volts with the ignition SW at **ON** position
STP–GROUND : **0**–**1.5** volts with the stop light SW off
: **8**–**14** volts with the stop light SW on
GND1, GND2, GND3, GND4–GROUND : Always continuity

S8 STOP LIGHT SW

2–1 : Closed with the brake pedal depressed

A7, A8 ABS SPEED SENSOR FRONT LH, RH

1–2 : Approx. **1.6** kΩ at **20**°C (**68**°F)

A29, A30 ABS SPEED SENSOR REAR LH, RH

1–2 : Approx. **1.0** kΩ at **25**°C (**77**°F)

○ : **PARTS LOCATION**

Code	See Page	Code		See Page	Code		See Page
A7	32	C9	A	34	S8		35
A8	32	C10	B	34	S15	A	35
A12	34	D5		34	S16	B	35
A29	36 (S/D)	E4		32	S17	C	35
	38 (W/G)	H15		35	S18	D	35
A30	36 (S/D)	J2		33	T7	A	35
	38 (W/G)	J5		35	T14	B	35
A31	32	J6		35	V9		33
B1	32	J7		35			
B10	34	P3		35			

▭ : **RELAY BLOCKS**

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1F		
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1L	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2D	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2E		
2F		

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
EA2		
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
BC2	48 (S/D)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)
	50 (W/G)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel Center)

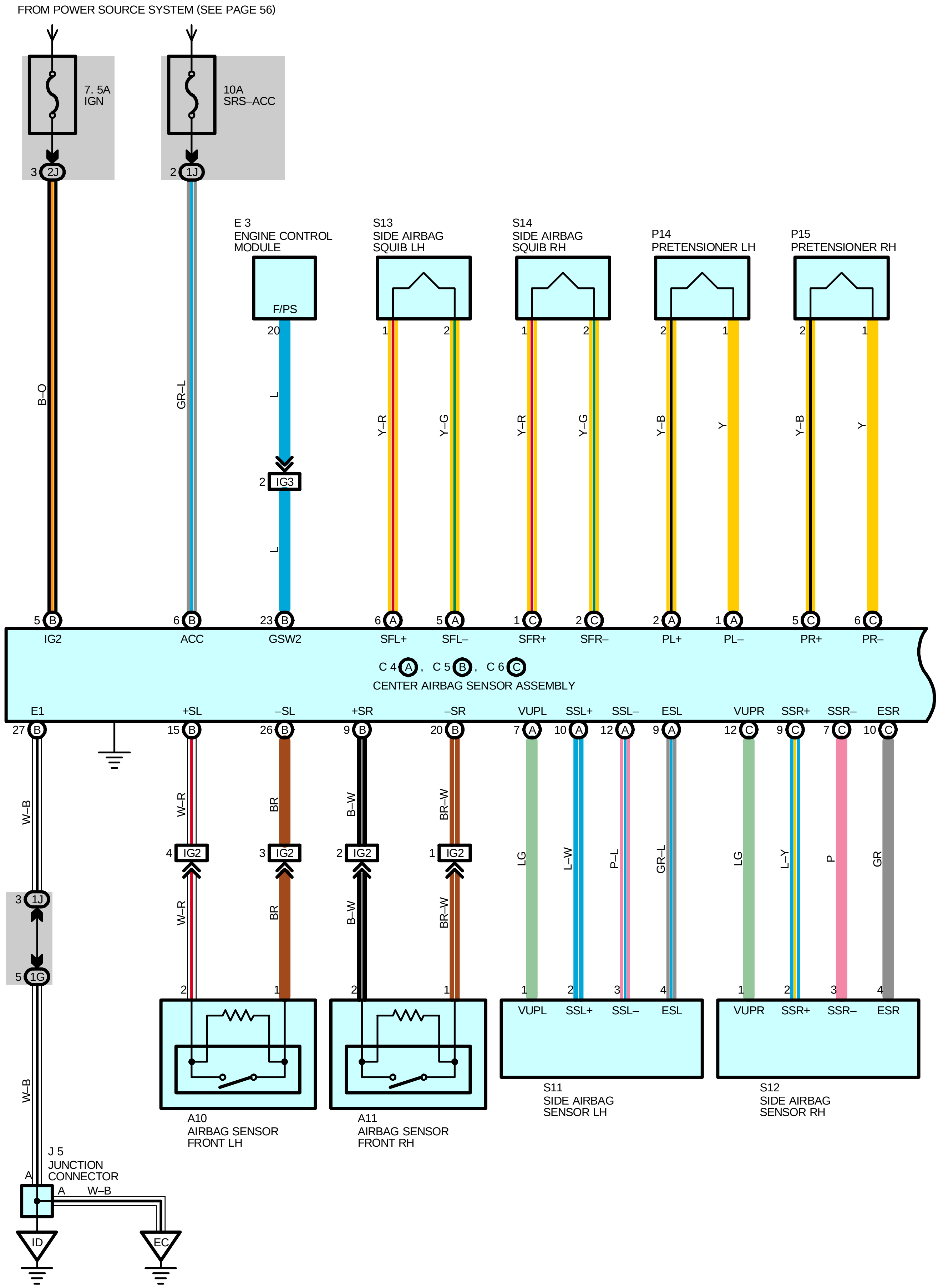
: GROUND POINTS

Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IE	44	Front Floor Panel Center LH
IH	44	Cowl Side Panel RH

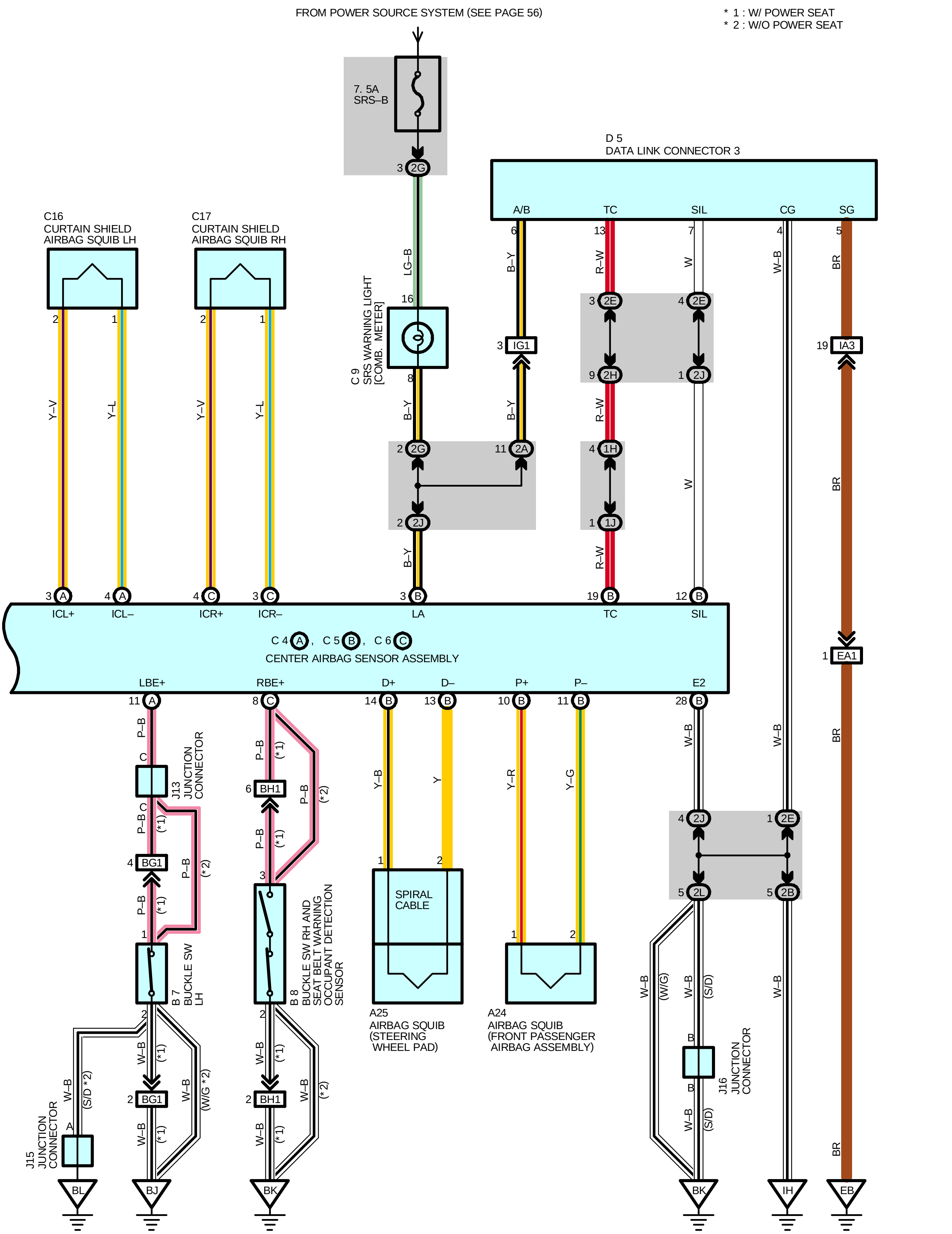
MEMO

NOTICE: When inspecting or repairing the SRS, perform the operation in accordance with the following precautionary instructions and the procedure and precautions in the Repair Manual for the applicable model year.

- Malfunction symptoms of the SRS are difficult to confirm, so the DTCs become the most important source of information when troubleshooting. When troubleshooting the SRS, always inspect the DTCs before disconnecting the battery.
- **Work must be started after 90 seconds from when the ignition switch is turned to the "LOCK" position and the negative (–) terminal cable is disconnected from the battery.**
  (The SRS is equipped with a back–up power source so that if work is started within 90 seconds from disconnecting the negative (–) terminal cable of the battery, the SRS may be deployed.)
- When the negative (–) terminal cable is disconnected from the battery, the memory of the clock and audio system will be canceled. So before starting work, make a record of the contents memorized in the audio memory system. When work is finished, reset the audio systems as they were before and adjust the clock. To avoid erasing the memory in each memory system, never use a back–up power supply from outside the vehicle.
- Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.
- Do not expose the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, seat belt pretensioner, center airbag sensor assembly, front airbag sensor assembly or side airbag sensor assembly directly to hot air or flames.
- Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, seat belt pretensioner, center airbag sensor assembly, front airbag sensor assembly and side airbag sensor assembly should be inspected.
- Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.
- Never disassemble and repair the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, seat belt pretensioner, center airbag sensor assembly, front airbag sensor assembly or side airbag sensor assembly in order to reuse it.
- If the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, seat belt pretensioner, center airbag sensor assembly, front airbag sensor assembly or side airbag sensor assembly has been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.
- Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting the system's electrical circuits.
- Information labels are attached to the periphery of the SRS components. Follow the instructions on the notices.
- After work on the SRS is completed, perform the SRS warning light check.
- If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section of the Repair Manual.



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
7. 5A
IGN
10A
SRS–ACC
3 2J
2 1J
B–O
GR–L
E 3
ENGINE CONTROL
MODULE
F/PS
20
L
2 IG3
L
S13
SIDE AIRBAG
SQUIB LH
S14
SIDE AIRBAG
SQUIB RH
P14
PRETENSIONER LH
P15
PRETENSIONER RH
Y–R
Y–G
Y–B
Y
5 B IG2
6 B ACC
23 B GSW2
6 A SFL+
5 A SFL–
1 C SFR+
2 C SFR–
2 A PL+
1 A PL–
5 C PR+
6 C PR–
C 4 A , C 5 B , C 6 C
CENTER AIRBAG SENSOR ASSEMBLY
E1
+SL
–SL
+SR
–SR
VUPL
SSL+
SSL–
ESL
VUPR
SSR+
SSR–
ESR
27 B
15 B
26 B
9 B
20 B
7 A
10 A
12 A
9 A
12 C
9 C
7 C
10 C
W–B
W–R
BR
B–W
BR–W
4 IG2
3 IG2
2 IG2
1 IG2
LG
L–W
P–L
GR–L
L–Y
P
GR
3 1J
5 1G
A10
AIRBAG SENSOR
FRONT LH
A11
AIRBAG SENSOR
FRONT RH
S11
SIDE AIRBAG
SENSOR LH
S12
SIDE AIRBAG
SENSOR RH
J 5
JUNCTION
CONNECTOR
A
A W–B
ID
EC



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
* 1 : W/ POWER SEAT
* 2 : W/O POWER SEAT
7. 5A
SRS–B
D 5
DATA LINK CONNECTOR 3
A/B
TC
SIL
CG
SG
C16
CURTAIN SHIELD
AIRBAG SQUIB LH
C17
CURTAIN SHIELD
AIRBAG SQUIB RH
C 9
SRS WARNING LIGHT
[COMB. METER]
LG–B
B–Y
R–W
W
W–B
BR
Y–V
Y–L
IG1
IA3
EA1
ICL+
ICL–
ICR+
ICR–
LA
TC
SIL
C 4 A , C 5 B , C 6 C
CENTER AIRBAG SENSOR ASSEMBLY
LBE+
RBE+
D+
D–
P+
P–
E2
P–B
J13
JUNCTION
CONNECTOR
BG1
BH1
B 7
BUCKLE SW
LH
B 8
BUCKLE SW RH AND
SEAT BELT WARNING
OCCUPANT DETECTION
SENSOR
Y–B
Y
Y–R
Y–G
SPIRAL
CABLE
A25
AIRBAG SQUIB
(STEERING
WHEEL PAD)
A24
AIRBAG SQUIB
(FRONT PASSENGER
AIRBAG ASSEMBLY)
(S/D *2)
(W/G *2)
(W/G)
(S/D)
J15
JUNCTION
CONNECTOR
J16
JUNCTION
CONNECTOR
BL
BJ
BK
IH
EB

SYSTEM OUTLINE

The SRS is a driver and front passenger protection device which has a supplemental role to the seat belts.
When the ignition SW is turned to ACC or ON, the current from the SRS–ACC fuse flows to TERMINAL (B) 6 of the center airbag sensor assembly. Only when the ignition SW is on does the current flow from the IGN fuse to TERMINAL (B) 5 of the center airbag sensor assembly.
If an accident occurs while driving, when the frontal impact exceeds a set level, the current from the SRS–ACC or IGN fuse flows to TERMINALS (B) 14, (B) 10, (A) 2 and (C) 5 of the center airbag sensor assembly to TERMINAL 1 of the airbag squibs, TERMINAL 2 of the pretensioners to TERMINAL 2 of the airbag squibs, TERMINAL 1 of the pretensioners to TERMINALS (B) 13, (B) 11, (A) 1 and (C) 6 of the center airbag sensor assembly to TERMINAL (B) 27, (B) 28 or BODY GROUND to GROUND, so that current flows to the airbag squibs and the pretensioners and causes them to operate.
When the side impact also exceeds a set level, the current from the SRS–ACC or IGN fuse flows to TERMINALS (A) 6, (C) 1, (A) 3 and (C) 4 of the center airbag sensor assembly to TERMINAL 1 of the side airbag squibs and the curtain shield airbag squibs to TERMINAL 2 to TERMINALS (A) 5, (C) 2, (A) 4, (C) 3, (A) 1 and (C) 6 of the center airbag sensor assembly to TERMINAL (B) 27, (B) 28 or BODY GROUND to GROUND, causing the side airbag squibs and the curtain shield airbag squibs to operate.
The airbag stored inside the steering wheel pad is instantaneously expanded to soften the shock to the driver.
The airbag stored inside the front passenger's instrument panel is instantaneously expanded to soften the shock to the front passenger.
Side airbags are instantaneously expanded to soften the shock of side to the driver and front passenger.
The curtain shield airbag can ease an impact on the head of the front and rear passengers and reduce risks of injury.
The pretensioners make sure of the seat belt restrainability.

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A10	32	C6 C	34	P14	39 (W/G)
A11	32	C9	34	P15	37 (S/D)
A24	34	C16	34		39 (W/G)
A25	34	C17	34	S11	37 (S/D)
B7	36 (S/D w/o Power Seat)	D5	34		39 (W/G)
	38 (W/G w/o Power Seat)	E3	32	S12	37 (S/D)
	40 (w/ Power Seat)	J5	35		39 (W/G)
B8	36 (S/D w/o Power Seat)	J13	36 (S/D)	S13	37 (S/D)
	38 (W/G w/o Power Seat)		38 (W/G)		39 (W/G)
	40 (w/ Power Seat)	J15	36 (S/D)	S14	37 (S/D)
C4 A	34	J16	36 (S/D)		39 (W/G)
C5 B	34	P14	37 (S/D)		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1J		
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2B		
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2G		
2H		
2J		
2L	26	Floor Wire and Passenger Side J/B (Right Kick Panel)

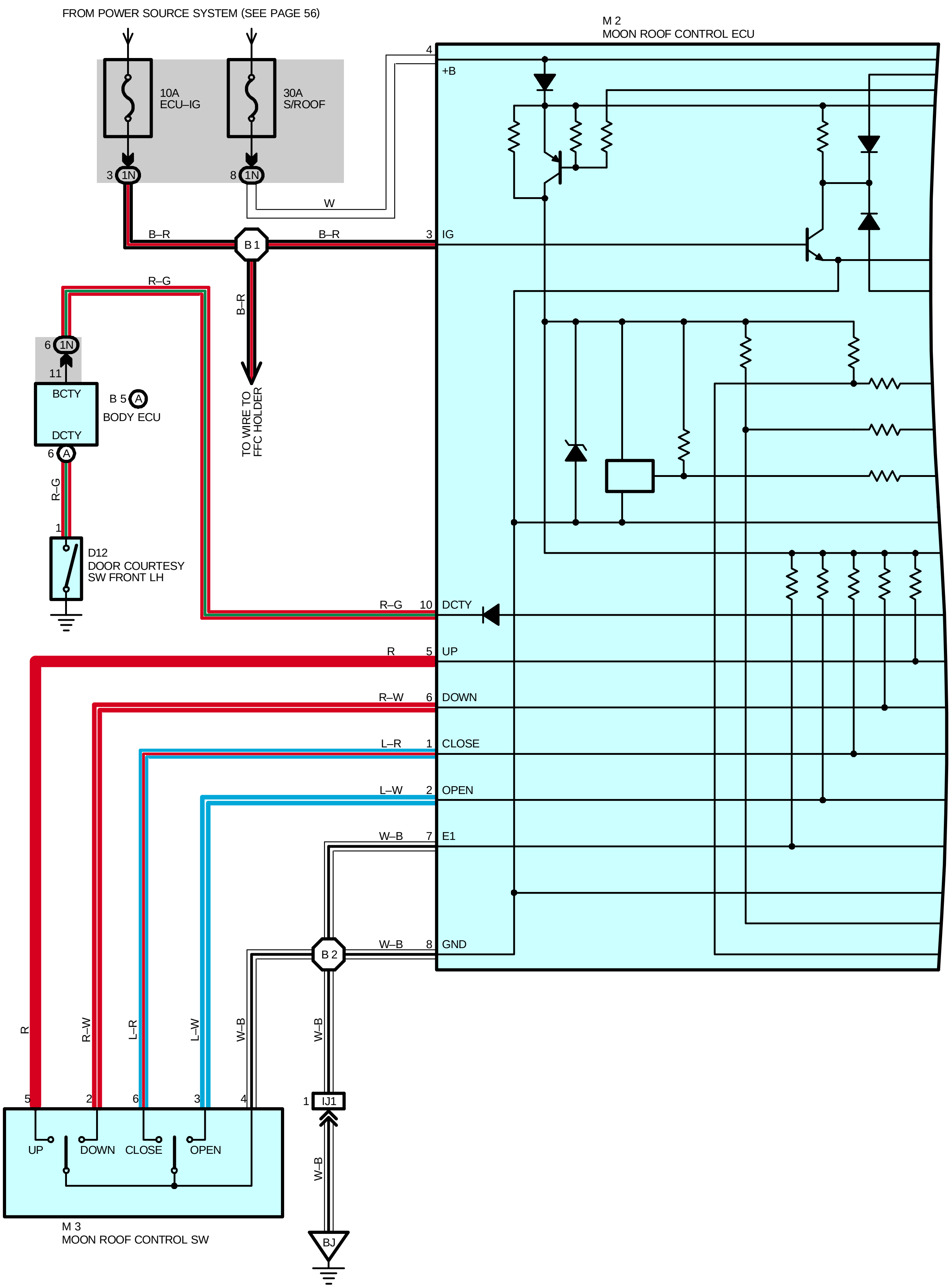
▭ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

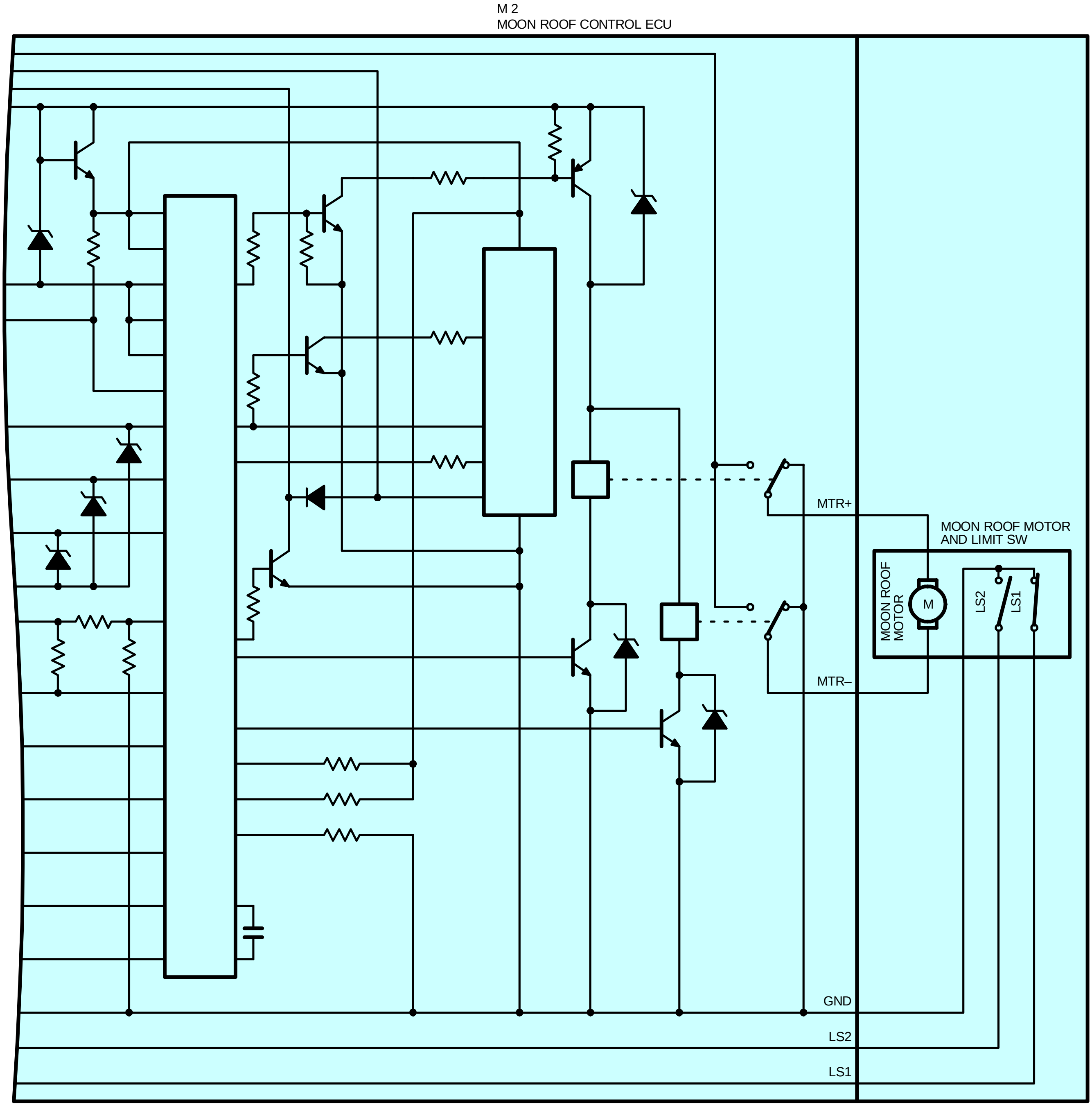
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IG1	46	Instrument Panel Wire and Engine Room Main Wire (Near the Passenger Side J/B)
IG2		
IG3		
BG1	52	Floor No.2 Wire and Front Seat LH Wire (Under the Driver's Seat)
BH1	52	Floor Wire and Front Seat RH Wire (Under the Front Passenger's Seat)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BJ	48 (S/D)	Front Floor Panel LH
	50 (W/G)	
BK	48 (S/D)	Front Floor Panel RH
	50 (W/G)	
BL	48 (S/D)	Left Quarter Panel LH

MOON ROOF


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
ECU–IG
30A
S/ROOF
M 2
MOON ROOF CONTROL ECU
+B
IG
DCTY
UP
DOWN
CLOSE
OPEN
E1
GND
B–R
W
R–G
B 1
B 2
TO WIRE TO FFC HOLDER
BCTY
DCTY
B 5
BODY ECU
D12
DOOR COURTESY SW FRONT LH
R
R–W
L–R
L–W
W–B
IJ1
BJ
UP
DOWN
CLOSE
OPEN
M 3
MOON ROOF CONTROL SW


M 2
MOON ROOF CONTROL ECU
MTR+
MTR–
MOON ROOF MOTOR
AND LIMIT SW
MOON ROOF
MOTOR
M
LS2
LS1
GND
LS2
LS1

SYSTEM OUTLINE

In this system, the HALL IC in the moon roof control ECU detects changes in the motor rotation to allow opening/closing and tilting up/down of the moon roof using one touch operation. Additionally, catching prevention mechanism during moon roof operation is also provided.

Voltage is always applied from the S/ROOF fuse to TERMINAL 4 of the moon roof control ECU. When the ignition SW is turned to ON, the voltage is applied from the ECU–IG fuse to TERMINAL 3 of the moon roof control ECU.

1. SLIDE OPEN OPERATION

When the moon roof control SW is pressed to OPEN position (The limit SW No.1 is off and limit SW No.2 is on), the signal is input from TERMINAL 3 of the moon roof control SW to TERMINAL 2 of the moon roof control ECU. This activates the relay and rotates the motor to open the moon roof. After that, when the limit SW No.1 is turned on, and then turned off again, the pulse signal sent from the HALL IC activates the relay, and it determines that the moon roof is opened (30 mm from the fully opened position), and stops the motor rotation. After that, when the moon roof control SW is pressed to OPEN position again, the moon roof is fully open. If other operation SW or open SW is operated while the moon roof is being opened, the relay is activated to stop the moon roof operation. Additionally, when the moon roof is tilted up, the slide open operation does not function.

2. SLIDE CLOSE OPERATION

When the moon roof control SW is pressed to CLOSE position (The limit SW No.1 is off and limit SW No.2 is off), the signal is input from TERMINAL 6 of the moon roof control SW to TERMINAL 1 of the moon roof control ECU. This activates the relay and rotates the motor to automatically close the moon roof. After that, when the limit SW No.2 is turned on, the pulse signal sent from the HALL IC activates the relay, and it determines that the moon roof is fully closed, and stops the motor rotation. If other operation SW or close SW is operated while the moon roof is being closed, the relay is activated to stop the moon roof operation.

3. TILT UP OPERATION

When the moon roof control SW is pressed to TILT UP position (The limit SW No.1 is off and limit SW No.2 is on), the signal is input from TERMINAL 5 of the moon roof control SW to TERMINAL 5 of the moon roof control ECU. This activates the relay and rotates the motor to automatically tilt up the moon roof. If the pulse signal sent from the HALL IC is not input when the moon roof is fully tilted up, the relay determines that the motor has stopped, and stops the current flowing into the motor.

If other operation SW or tilt up SW is operated while the moon roof is being tilted up, the relay is activated to stop the moon roof operation. Additionally, when the moon roof is open, the tilt up operation does not function.

4. TILT DOWN OPERATION

When the moon roof control SW is pressed to TILT DOWN position (The limit SW No.1 is on and limit SW No.2 is on), the signal is input from TERMINAL 2 of the moon roof control SW to TERMINAL 6 of the moon roof control ECU. This activates the relay and rotates the motor to automatically tilt down the moon roof. When the limit SW No.1 is turned off, the pulse signal sent from the HALL IC activates the relay, and it determines that the moon roof is fully closed, and stops the motor rotation.

If other operation SW or tilt down SW is operated while the moon roof is being tilted down, the relay is activated to stop the moon roof operation.

5. CATCHING PREVENTION FUNCTION

If the moon roof control ECU detects a catching load from changes in the motor rotation during slide close or tilt down operation, the operation is stopped, and then the motor is rotated in the reverse direction.

Slide close operation

The moon roof is moved approximately 200 mm in the reverse direction (Slide open) after a catching load has been detected. However, if the full open position is detected before moving approximately 200 mm completely, the reverse movement is stopped.

Tilt down operation

If a catching load is detected during tilt down operation, the moon roof is fully tilted up.

6. KEY OFF MOON ROOF OPERATION

The moon roof can be operated for approximately 45 seconds, when the ignition SW is turned from ON to OFF with all doors closed. However, when the driver side door is opened during this time, the operation is canceled.

7. FAIL SAFE FUNCTION

If the moon roof is operated continuously in the same operating direction, the current flowing into the motor is cut off when the time shown below has elapsed after the motor operation has been started.

Slide open/close operation with the moon roof control SW Approximately 20 sec.

Tilt up/down operation with the moon roof control SW Approximately 2 sec.

Slide open operation for reverse movement in case of activation of the catching prevention function Approximately 20 sec.

Tilt open operation for reverse movement in case of activation of the catching prevention function Approximately 2 sec.

SERVICE HINTS

M2 MOON ROOF CONTROL ECU

4–GROUND : Always approx. **12** volts
3–GROUND : Approx. **12** volts with the ignition SW at **ON** position
7–GROUND : Always continuity

M3 MOON ROOF CONTROL SW

5–4 : Closed with the moon roof control SW at **TILT UP** position
2–4 : Closed with the moon roof control SW at **TILT DOWN** position
3–4 : Closed with the moon roof control SW at **OPEN** position
6–4 : Closed with the moon roof control SW at **CLOSE** position
4–GROUND : Always continuity

: PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
B5	A	34	M2	37 (S/D)	M3	39 (W/G)
D12		36 (S/D)		39 (W/G)		
		38 (W/G)	M3	37 (S/D)		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1N	24	Roof Wire and Driver Side J/B (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

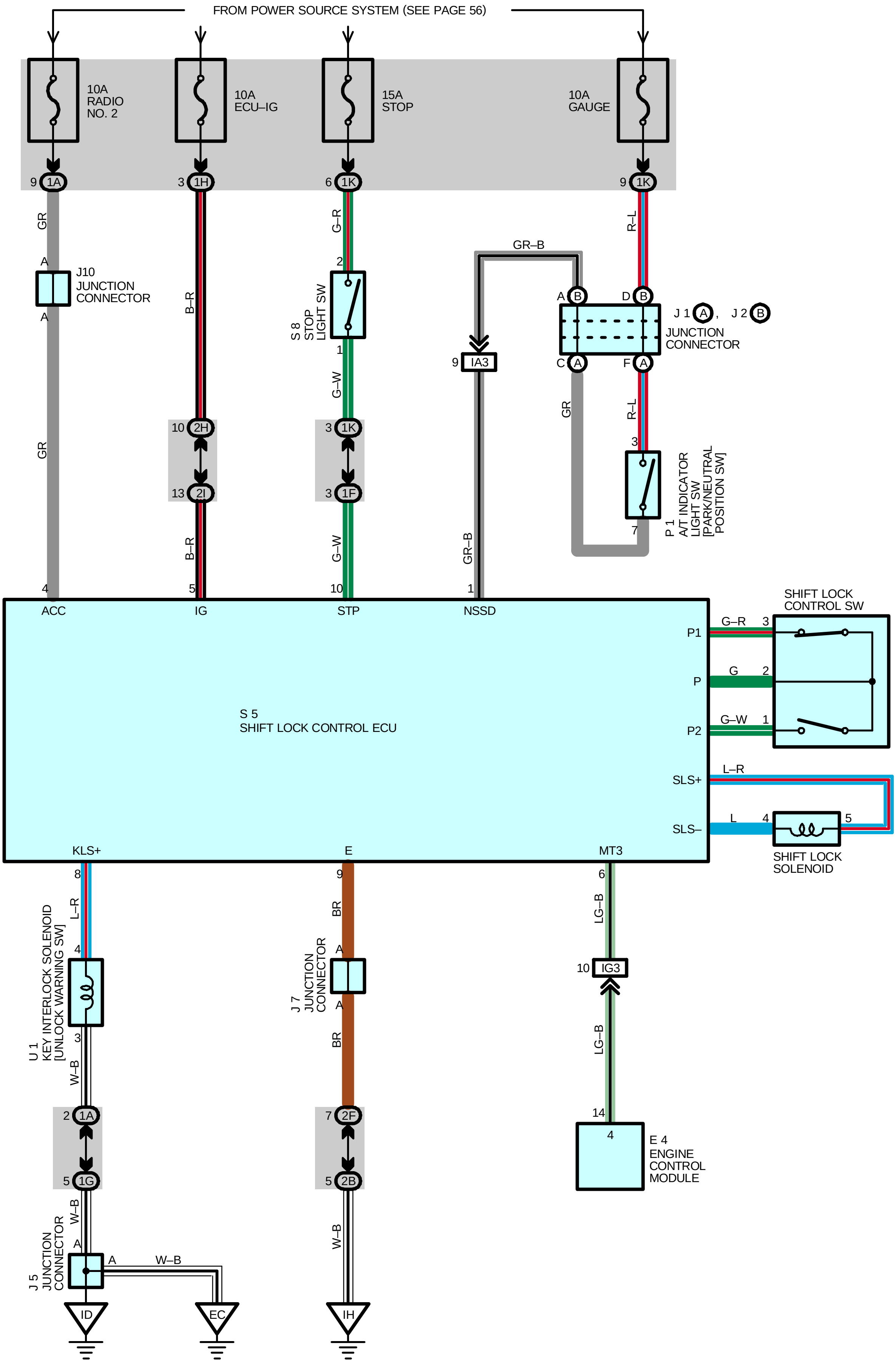
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IJ1	46	Roof Wire and Floor No.2 Wire (Left Side of the Instrument Panel)

: GROUND POINTS

Code	See Page	Ground Points Location
BJ	48 (S/D)	Front Floor Panel LH
	50 (W/G)	

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B1	48 (S/D)	Roof Wire	B2	48 (S/D)	Roof Wire
	50 (W/G)			50 (W/G)	



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A RADIO NO. 2
10A ECU–IG
15A STOP
10A GAUGE
J10 JUNCTION CONNECTOR
S 8 STOP LIGHT SW
J 1, J 2 JUNCTION CONNECTOR
P 1 A/T INDICATOR LIGHT SW [PARK/NEUTRAL POSITION SW]
SHIFT LOCK CONTROL SW
S 5 SHIFT LOCK CONTROL ECU
ACC
IG
STP
NSSD
P1
P
P2
SLS+
SLS–
KLS+
E
MT3
SHIFT LOCK SOLENOID
U 1 KEY INTERLOCK SOLENOID [UNLOCK WARNING SW]
J 7 JUNCTION CONNECTOR
E 4 ENGINE CONTROL MODULE
J 5 JUNCTION CONNECTOR
GR
B–R
G–R
G–W
GR–B
R–L
L–R
L
G
BR
LG–B
W–B
ID
EC
IH

SYSTEM OUTLINE

When the ignition SW is turned to ACC position, the current from the RADIO NO.2 fuse flows to TERMINAL 4 of the shift lock control ECU. When the ignition SW is turned to ON position, the current from the ECU–IG fuse flows to TERMINAL 5 of the ECU.

1. SHIFT LOCK MECHANISM

With the ignition SW on, when a signal that the brake pedal is depressed (Stop light SW on) and a signal that the shift lever is put in P position (Continuity between P1 and P of the shift lock control SW) is input to the ECU, the ECU activates and the current flows from TERMINAL 5 of the ECU to TERMINAL SLS+ of the shift lock solenoid to solenoid to TERMINAL SLS– to TERMINAL 9 of the ECU to GROUND. This causes the shift lock solenoid to turn on (Lock plate disengages) and the shift lever can be shifted into other position than the P position

2. KEY INTER LOCK MECHANISM

With the ignition SW at ON or ACC position, when the shift lever is put in P position (No continuity between P2 and P of shift lock control SW), the current flowing from TERMINAL 8 of the ECU to the key interlock solenoid is cut off. This causes the key interlock solenoid to turn off (Lock plate disengages from LOCK position) and the ignition key can be turned from ACC to LOCK position.

SERVICE HINTS

S5 SHIFT LOCK CONTROL ECU

4–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
5–GROUND : Approx. **12** volts with the ignition SW at **ON** position
9–GROUND : Always continuity
10–GROUND : Approx. **12** volts with the brake pedal depressed

S8 STOP LIGHT SW

2–1 : Closed with the brake pedal depressed

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
E4		32	J7	35	S8	35
J1	A	33	J10	35	U1	35
J2	B	33	P1	33		
J5		35	S5	35		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2H		
2I		

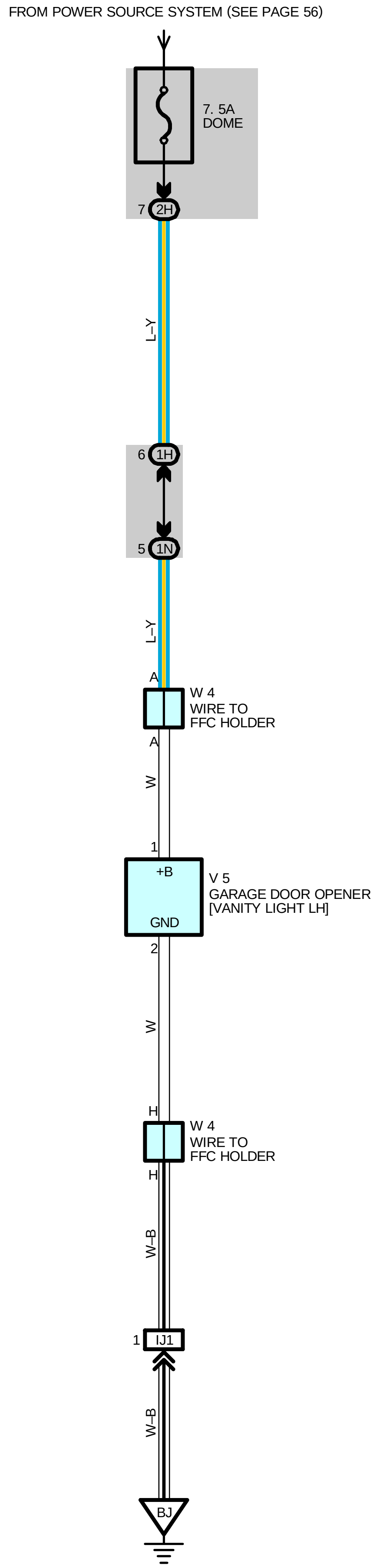
□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IG3	46	Instrument Panel Wire and Engine Room Main Wire (Near the Passenger Side J/B)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH

GARAGE DOOR OPENER



SERVICE HINTS

V5 GARAGE DOOR OPENER [VANITY LIGHT LH]

1–GROUND : Always approx. **12** volts

2–GROUND : Always continuity

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
V5	37 (S/D)	W4	37 (S/D)		
	39 (W/G)		39 (W/G)		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

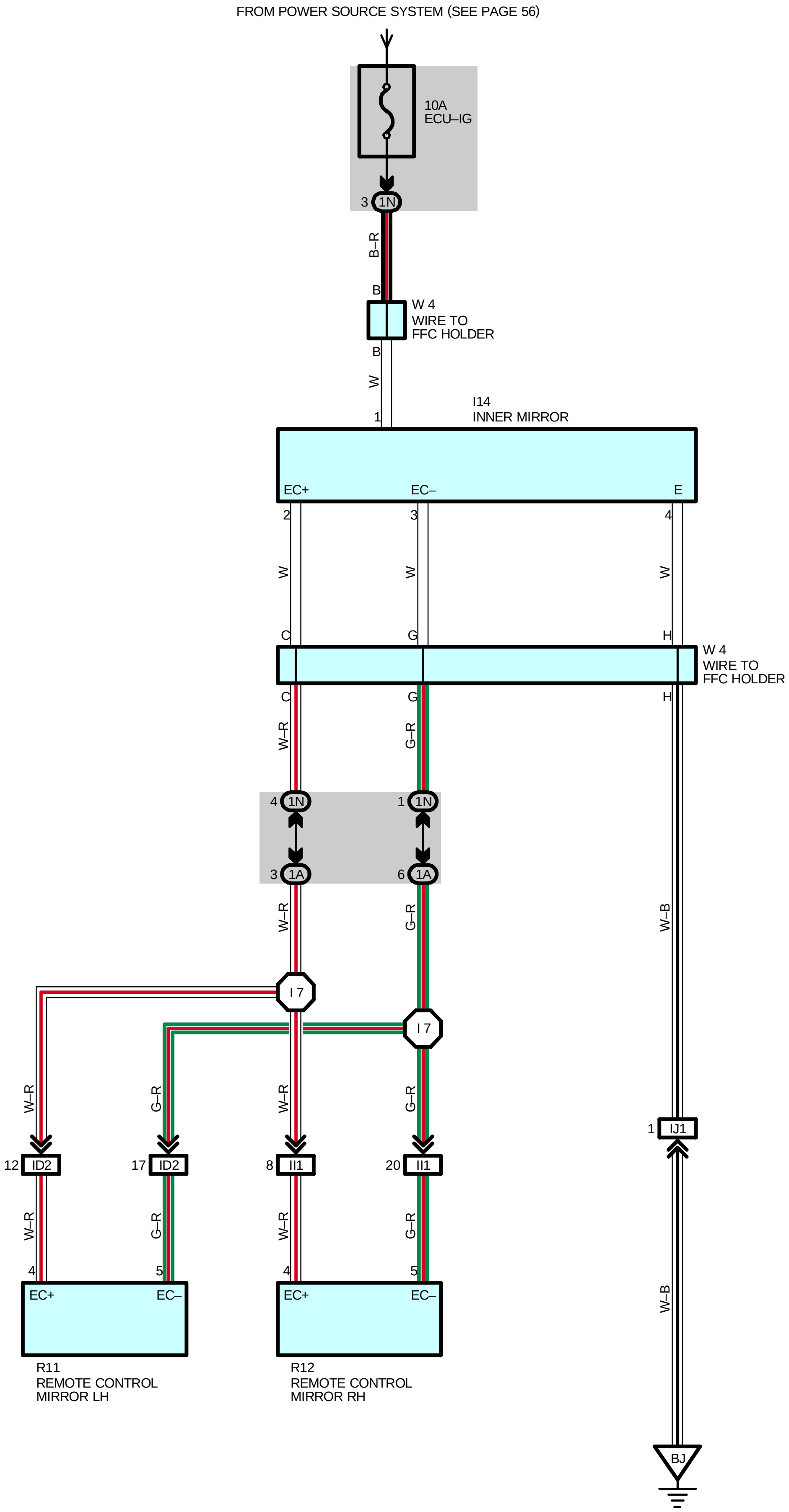
Code	See Page	Junction Block and Wire Harness (Connector Location)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1N	24	Roof Wire and Driver Side J/B (Left Kick Panel)
2H	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IJ1	46	Roof Wire and Floor No.2 Wire (Left Side of the Instrument Panel)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
BJ	48 (S/D)	Front Floor Panel LH
	50 (W/G)	


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
ECU–IG
3 1N
B–R
B
W 4
WIRE TO
FFC HOLDER
B
W
1
I14
INNER MIRROR
EC+
EC–
E
2
3
4
W
W
W
C
G
H
W 4
WIRE TO
FFC HOLDER
C
G
H
W–R
G–R
4 1N
1 1N
3 1A
6 1A
W–R
G–R
W–B
I 7
I 7
W–R
G–R
W–R
G–R
1 IJ1
12 ID2
17 ID2
8 II1
20 II1
W–R
G–R
W–R
G–R
4
5
4
5
EC+
EC–
EC+
EC–
W–B
R11
REMOTE CONTROL
MIRROR LH
R12
REMOTE CONTROL
MIRROR RH
BJ

SERVICE HINTS

I14 INNER MIRROR

1–GROUND : Approx. **12** volts with the ignition SW at **ON** position

4–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
I14	36 (S/D)	R11	39 (W/G)	W4	37 (S/D)
	38 (W/G)	R12	37 (S/D)		39 (W/G)
R11	37 (S/D)		39 (W/G)		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1N	24	Roof Wire and Driver Side J/B (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

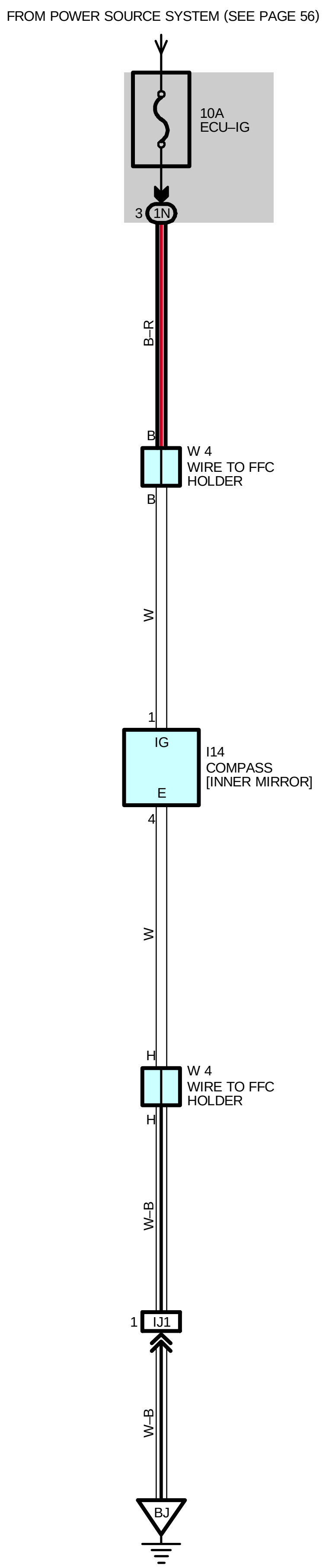
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
ID2	44	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)
IJ1	46	Roof Wire and Floor No.2 Wire (Left Side of the Instrument Panel)

: GROUND POINTS

Code	See Page	Ground Points Location
BJ	48 (S/D)	Front Floor Panel LH
	50 (W/G)	

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I7	46	Instrument Panel Wire			



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
ECU–IG
3
1N
B–R
B
W 4
WIRE TO FFC
HOLDER
B
W
1
IG
I14
COMPASS
[INNER MIRROR]
E
4
W
H
W 4
WIRE TO FFC
HOLDER
H
W–B
1
IJ1
W–B
BJ

SERVICE HINTS

I14 COMPASS [INNER MIRROR]

1–GROUND : Approx. **12** volts with the ignition SW at **ON** position

4–GROUND : Always continuity

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
I14	36 (S/D)	W4	37 (S/D)		
	38 (W/G)		39 (W/G)		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

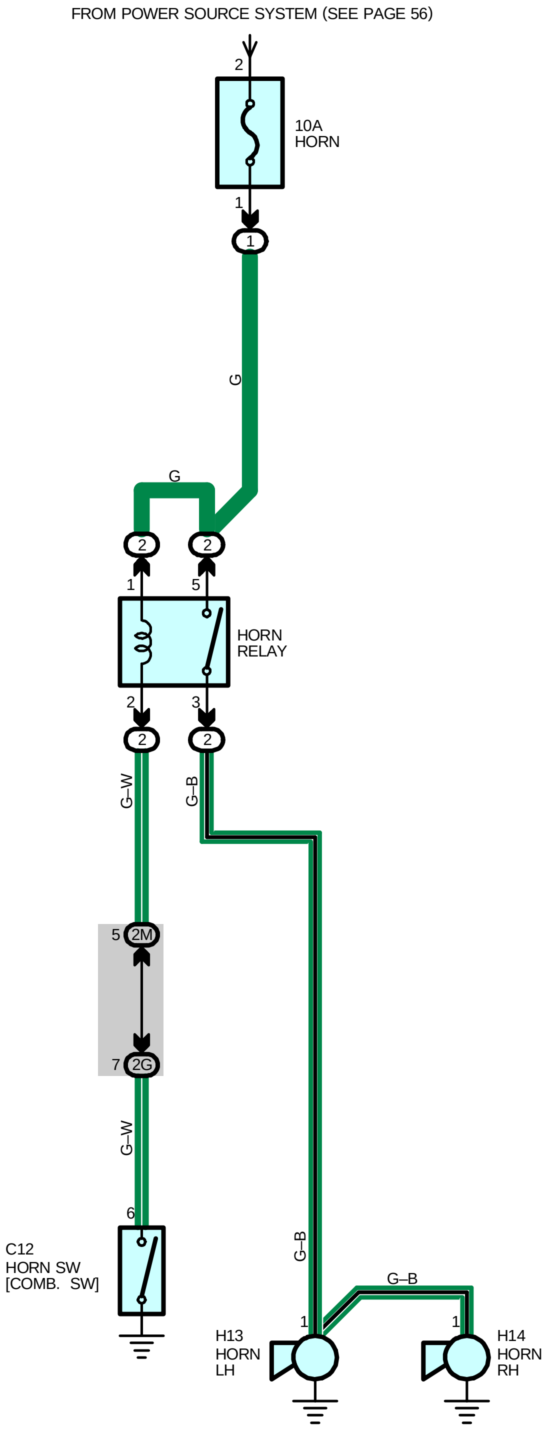
Code	See Page	Junction Block and Wire Harness (Connector Location)
1N	24	Roof Wire and Driver Side J/B (Left Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IJ1	46	Roof Wire and Floor No.2 Wire (Left Side of the Instrument Panel)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
BJ	48 (S/D)	Front Floor Panel LH
	50 (W/G)	


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
2
10A
HORN
1
1
G
G
2
2
1
5
HORN
RELAY
2
3
2
2
G–W
G–B
5
2M
7
2G
G–W
6
C12
HORN SW
[COMB. SW]
G–B
G–B
1
1
H13
HORN
LH
H14
HORN
RH

SERVICE HINTS

HORN RELAY

5–3 : Closed with the horn SW on

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
C12	34	H13	33	H14	33

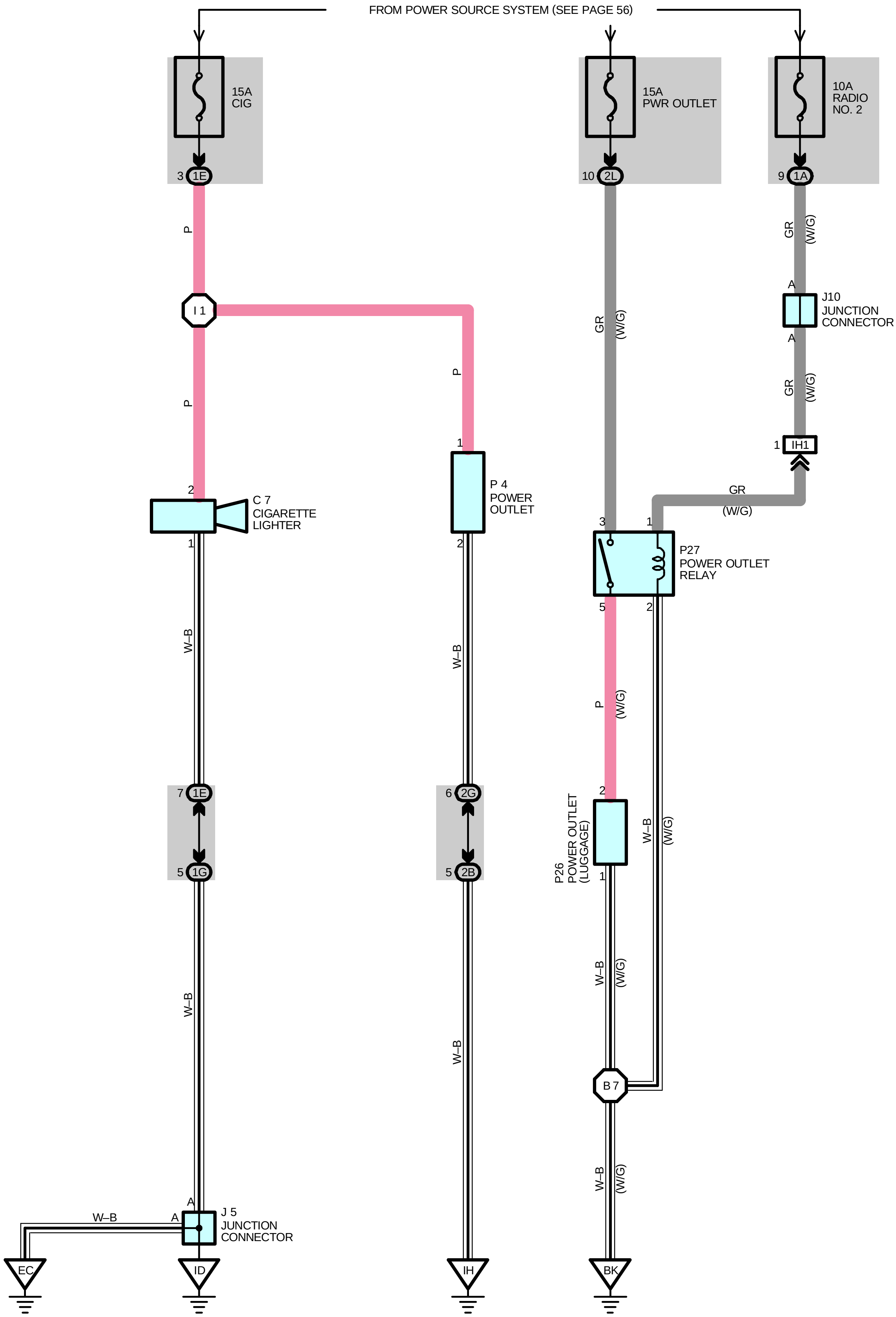
: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
2G	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

CIGARETTE LIGHTER AND POWER OUTLET



SERVICE HINTS

C7 CIGARETTE LIGHTER

2–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
1–GROUND : Always continuity

P4 POWER OUTLET

1–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
2–GROUND : Always continuity

○ : **PARTS LOCATION**

Code	See Page	Code	See Page	Code	See Page
C7	34	J10	35	P26	39 (W/G)
J5	35	P4	35	P27	39 (W/G)

: **JUNCTION BLOCK AND WIRE HARNESS CONNECTOR**

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2G	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2L	26	Floor Wire and Passenger Side J/B (Right Kick Panel)

: **CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS**

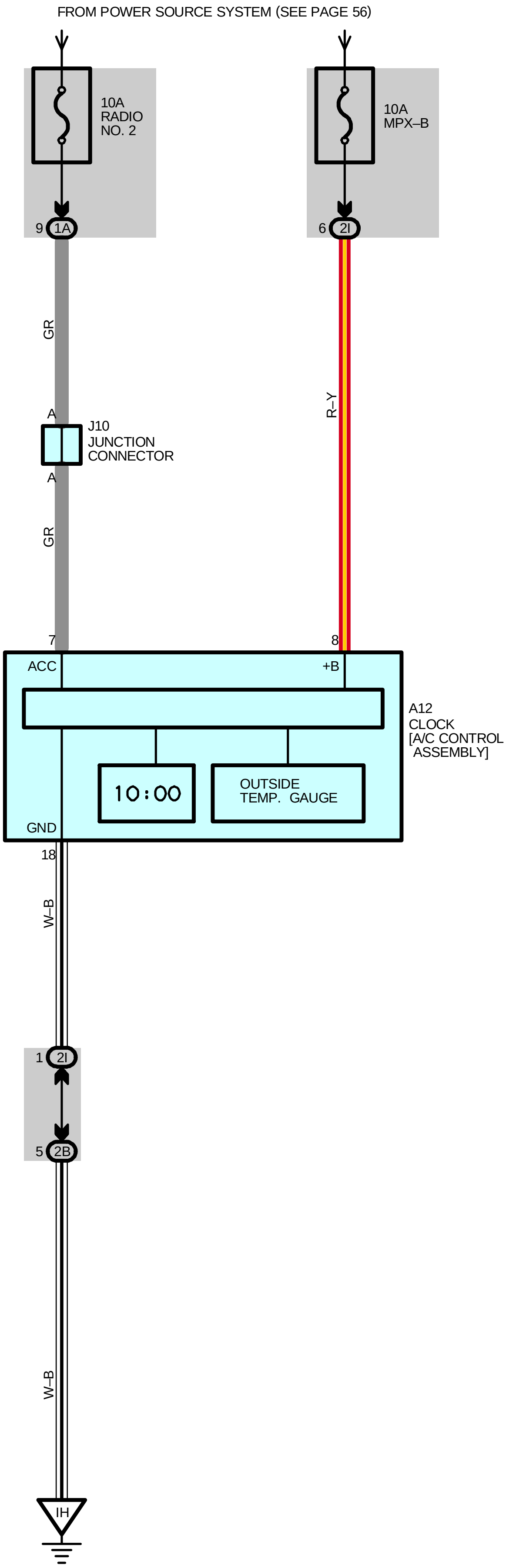
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)

▽ : **GROUND POINTS**

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BK	50 (W/G)	Front Floor Panel RH

: **SPLICE POINTS**

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I1	46	Instrument Panel Wire	B7	50 (W/G)	Floor Wire


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
RADIO
NO. 2
10A
MPX–B
9
1A
6
2I
GR
R–Y
A
J10
JUNCTION
CONNECTOR
A
GR
7
8
ACC
+B
A12
CLOCK
[A/C CONTROL
ASSEMBLY]
10:00
OUTSIDE
TEMP. GAUGE
GND
18
W–B
1
2I
5
2B
W–B
IH

SERVICE HINTS

A12 CLOCK [A/C CONTROL ASSEMBLY]

8–GROUND : Always approx. **12** volts (Power for clock)
7–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position (Power for indication)
18–GROUND : Always continuity

○ : PARTS LOCATION

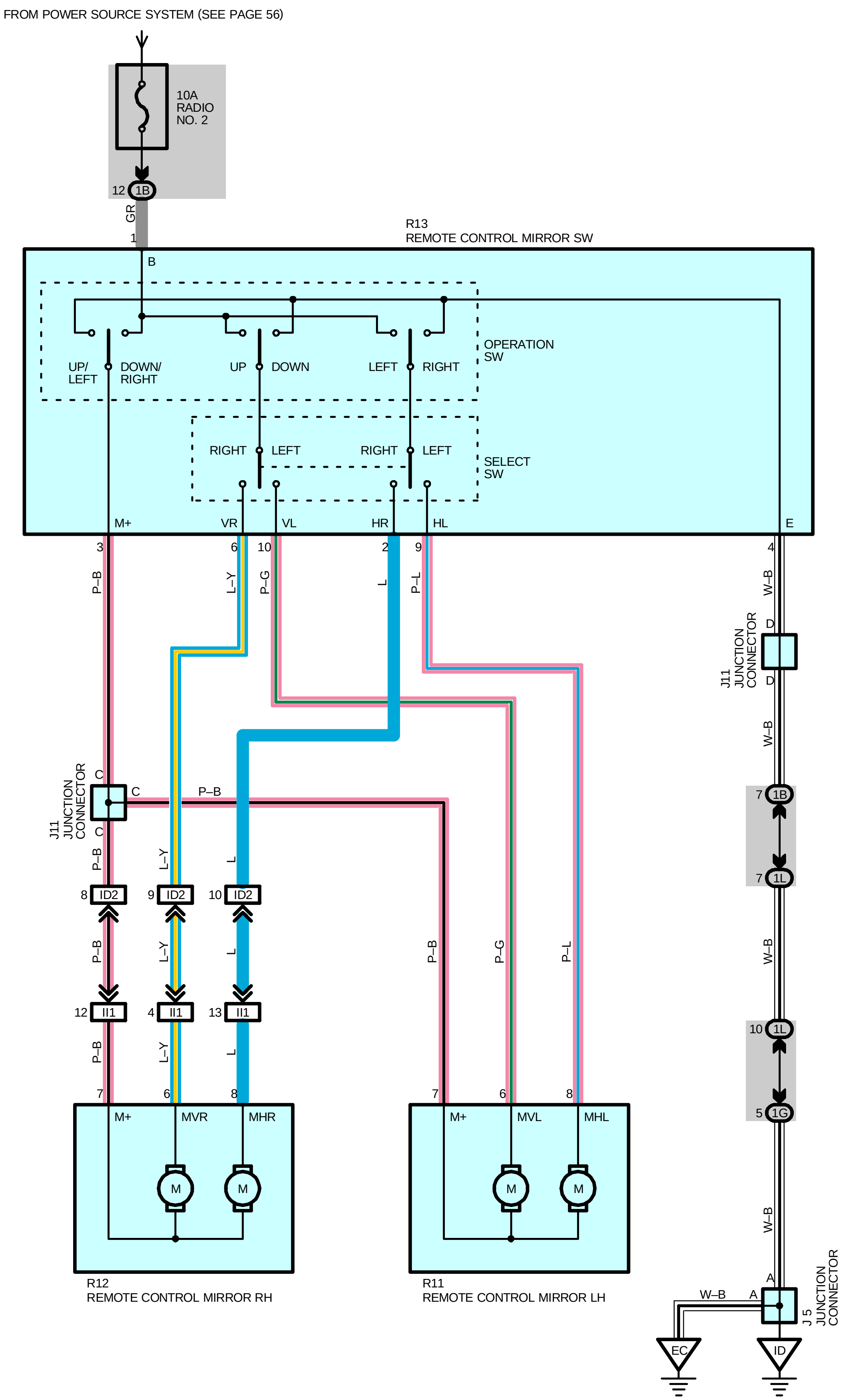
Code	See Page	Code	See Page	Code	See Page
A12	34	J10	35		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2I	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
IH	44	Cowl Side Panel RH


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
RADIO
NO. 2
12 1B
GR
1
R13
REMOTE CONTROL MIRROR SW
B
OPERATION
SW
UP/
LEFT
DOWN/
RIGHT
UP
DOWN
LEFT
RIGHT
RIGHT
LEFT
RIGHT
LEFT
SELECT
SW
M+
VR
VL
HR
HL
E
3
6
10
2
9
4
P–B
L–Y
P–G
L
P–L
W–B
J11
JUNCTION
CONNECTOR
D
D
W–B
7 1B
7 1L
W–B
10 1L
5 1G
W–B
C
C
C
P–B
J11
JUNCTION
CONNECTOR
P–B
L–Y
L
8 ID2
9 ID2
10 ID2
P–B
L–Y
L
12 II1
4 II1
13 II1
P–B
L–Y
L
P–B
P–G
P–L
7
6
8
7
6
8
M+
MVR
MHR
M
M
M+
MVL
MHL
M
M
R12
REMOTE CONTROL MIRROR RH
R11
REMOTE CONTROL MIRROR LH
W–B
A
A
J 5
JUNCTION
CONNECTOR
EC
ID

SERVICE HINTS

R13 REMOTE CONTROL MIRROR SW

1–3 : Continuity with the operation SW at **DOWN** or **RIGHT** position
3–4 : Continuity with the operation SW at **UP** or **LEFT** position
1–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
4–GROUND : Always continuity

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
J5	35	R11	37 (S/D)	R12	39 (W/G)
J11	36 (S/D)		39 (W/G)	R13	37 (S/D)
	38 (W/G)	R12	37 (S/D)		39 (W/G)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1B	24	Front Door LH Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1L	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)

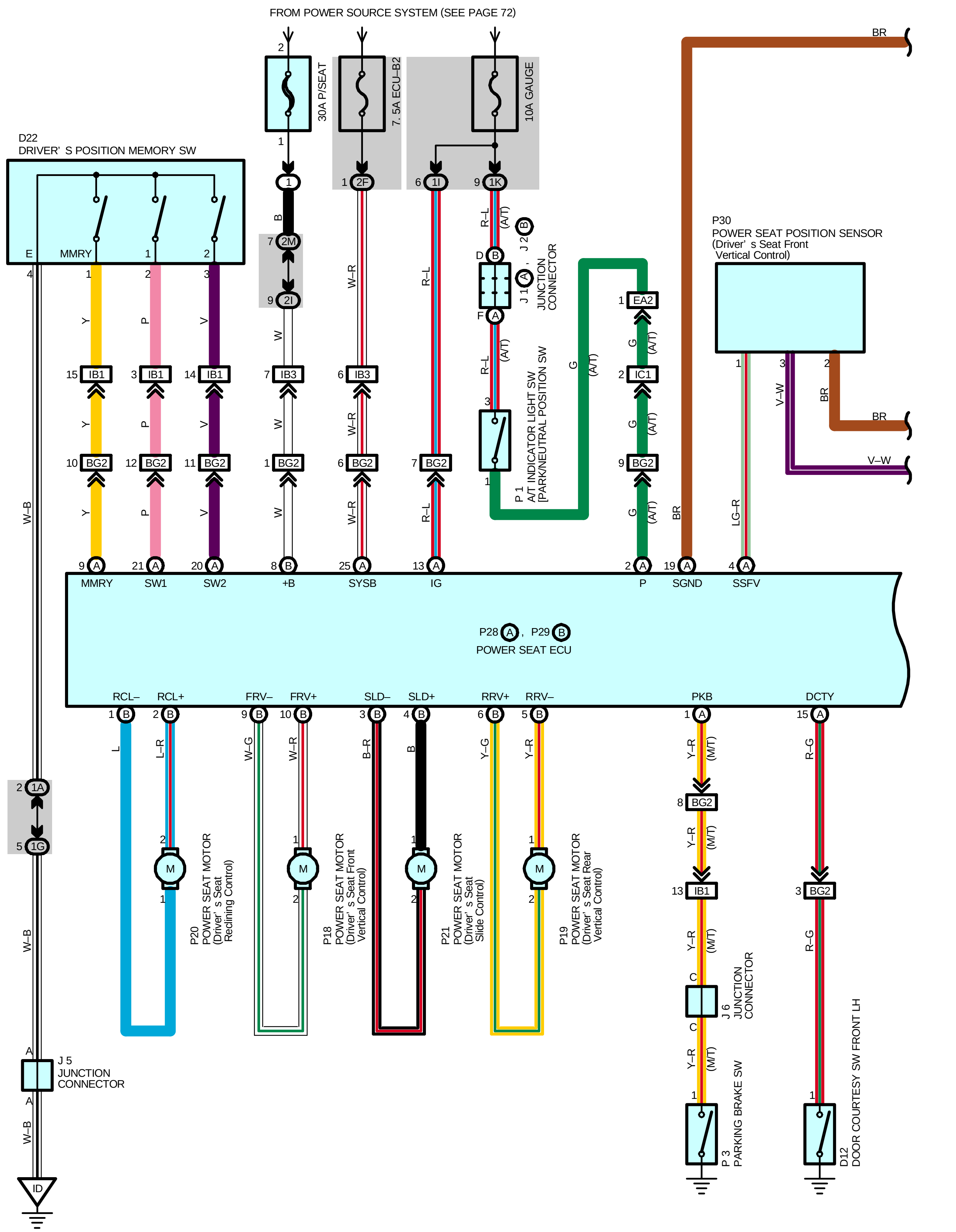
□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

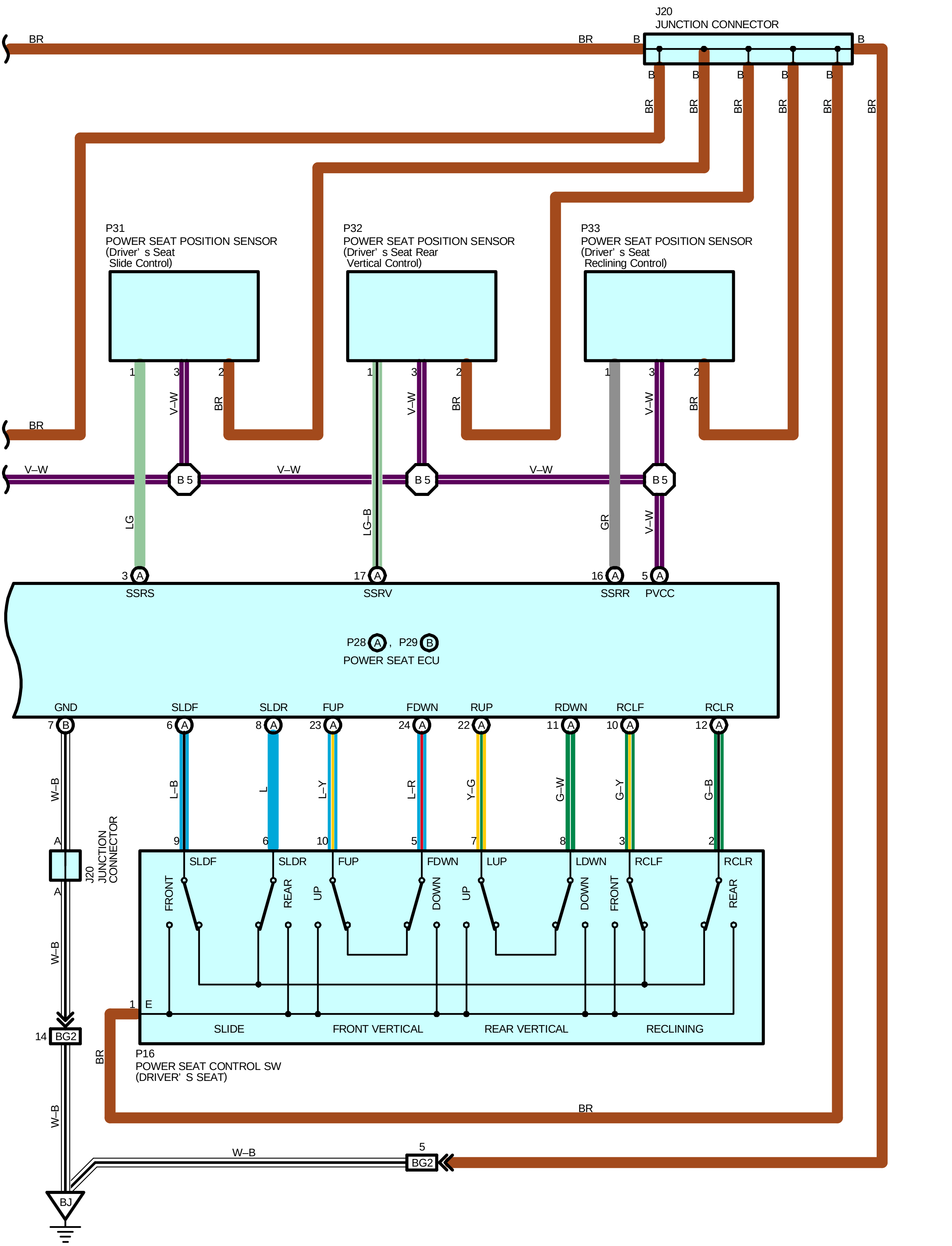
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
ID2	44	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH

POWER SEAT (DRIVER'S SEAT)





J20
JUNCTION CONNECTOR
BR
B
P31
POWER SEAT POSITION SENSOR
(Driver' s Seat
Slide Control)
P32
POWER SEAT POSITION SENSOR
(Driver' s Seat Rear
Vertical Control)
P33
POWER SEAT POSITION SENSOR
(Driver' s Seat
Reclining Control)
V–W
LG
LG–B
GR
B 5
SSRS
SSRV
SSRR
PVCC
P28 A , P29 B
POWER SEAT ECU
GND
SLDF
SLDR
FUP
FDWN
RUP
RDWN
RCLF
RCLR
W–B
L–B
L
L–Y
L–R
Y–G
G–W
G–Y
G–B
J20
JUNCTION
CONNECTOR
FRONT
REAR
UP
DOWN
LUP
LDWN
SLIDE
FRONT VERTICAL
REAR VERTICAL
RECLINING
P16
POWER SEAT CONTROL SW
(DRIVER' S SEAT)
BG2
BJ

POWER SEAT (DRIVER'S SEAT)

SYSTEM OUTLINE

* In the power seat system, the power seat ECU receives the operation signal from the power seat control switch via infrared communication to operate each power seat motor and adjust the seat position.
* In the event that a malfunction occurs during infrared communication, this system has a fail–safe function to only slide the seat.
* This system has the following function:
  * Manual slide operation
  * Manual reclining control
  * Manual front vertical control
  * Manual rear vertical operation
  * Driving position memory function

SERVICE HINTS

P28 (A), P29 (B) POWER SEAT ECU

(A) 25, (B) 8–GROUND : Always approx. **12** volts
(A)13–GROUND : Approx. **12** volts with the ignition SW at **ON** position
(A)19–GROUND : Always continuity

: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
D12	36 (S/D)	J20	40	P21	40
	38 (W/G)	P1	33	P28 A	40
D22	34	P3	35	P29 B	40
J1 A	33	P16	40	P30	40
J2 B	33	P18	40	P31	40
J5	35	P19	40	P32	40
J6	35	P20	40	P33	40

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2I		
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA2	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IB1	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
IB3		
IC1	44	Engine Room Main Wire and Floor No.2 Wire (Near the Driver Side J/B)
BG2	52	Floor No.2 Wire and Front Seat LH Wire (Under the Driver's Seat)

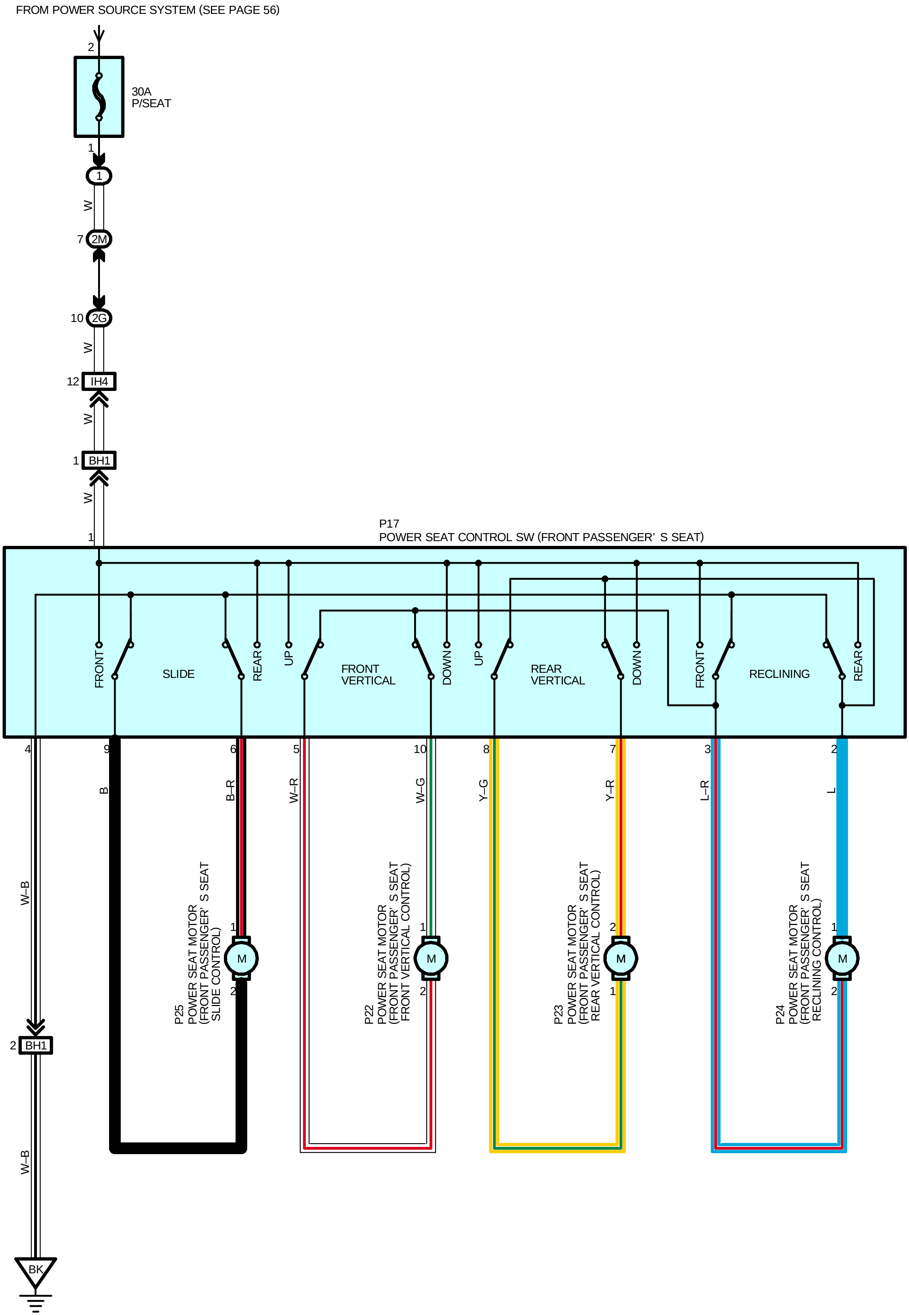
: GROUND POINTS

Code	See Page	Ground Points Location
ID	44	Cowl Side Panel LH
BJ	48 (S/D)	Front Floor Panel LH
	50 (W/G)	

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
B5	52	Front Seat LH Wire			

POWER SEAT (FRONT PASSENGER'S SEAT)



SERVICE HINTS

P17 POWER SEAT CONTROL SW (FRONT PASSENGER'S SEAT)

1–GROUND : Always approx. **12** volts

4–GROUND : Always continuity

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
P17	40	P23	40	P25	40
P22	40	P24	40		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

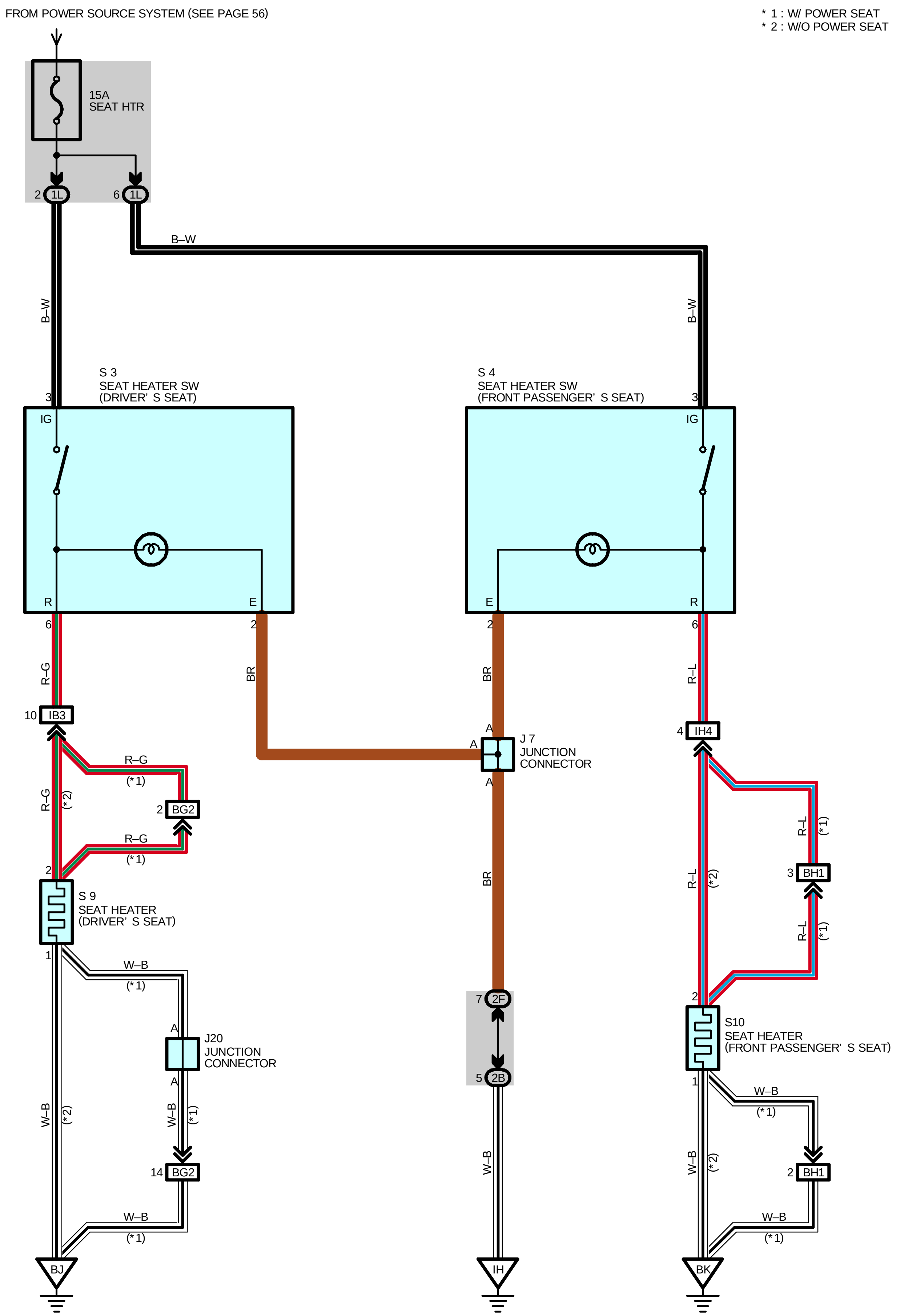
Code	See Page	Junction Block and Wire Harness (Connector Location)
2G	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2M	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IH4	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
BH1	52	Floor Wire and Front Seat RH Wire (Under the Front Passenger's Seat)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
BK	48 (S/D) 50 (W/G)	Front Floor Panel RH



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
* 1 : W/ POWER SEAT
* 2 : W/O POWER SEAT
15A
SEAT HTR
2 1L
6 1L
B–W
S 3
SEAT HEATER SW
(DRIVER' S SEAT)
S 4
SEAT HEATER SW
(FRONT PASSENGER' S SEAT)
IG
R
E
R–G
BR
R–L
10 IB3
4 IH4
J 7
JUNCTION
CONNECTOR
2 BG2
(*1)
(*2)
S 9
SEAT HEATER
(DRIVER' S SEAT)
3 BH1
7 2F
5 2B
S10
SEAT HEATER
(FRONT PASSENGER' S SEAT)
W–B
J20
JUNCTION
CONNECTOR
14 BG2
2 BH1
BJ
IH
BK

SERVICE HINTS

S3, S4 SEAT HEATER SW (DRIVER'S SEAT, FRONT PASSENGER'S SEAT)

3–GROUND : Approx. **12** volts with the ignition SW at **ON** position

2–GROUND : Always continuity

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
J7	35	S9	37 (S/D w/o Power Seat)	S10	39 (W/G w/o Power Seat)
J20	40		39 (W/G w/o Power Seat)		40 (w/ Power Seat)
S3	35		40 (w/ Power Seat)		
S4	35	S10	37 (S/D w/o Power Seat)		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

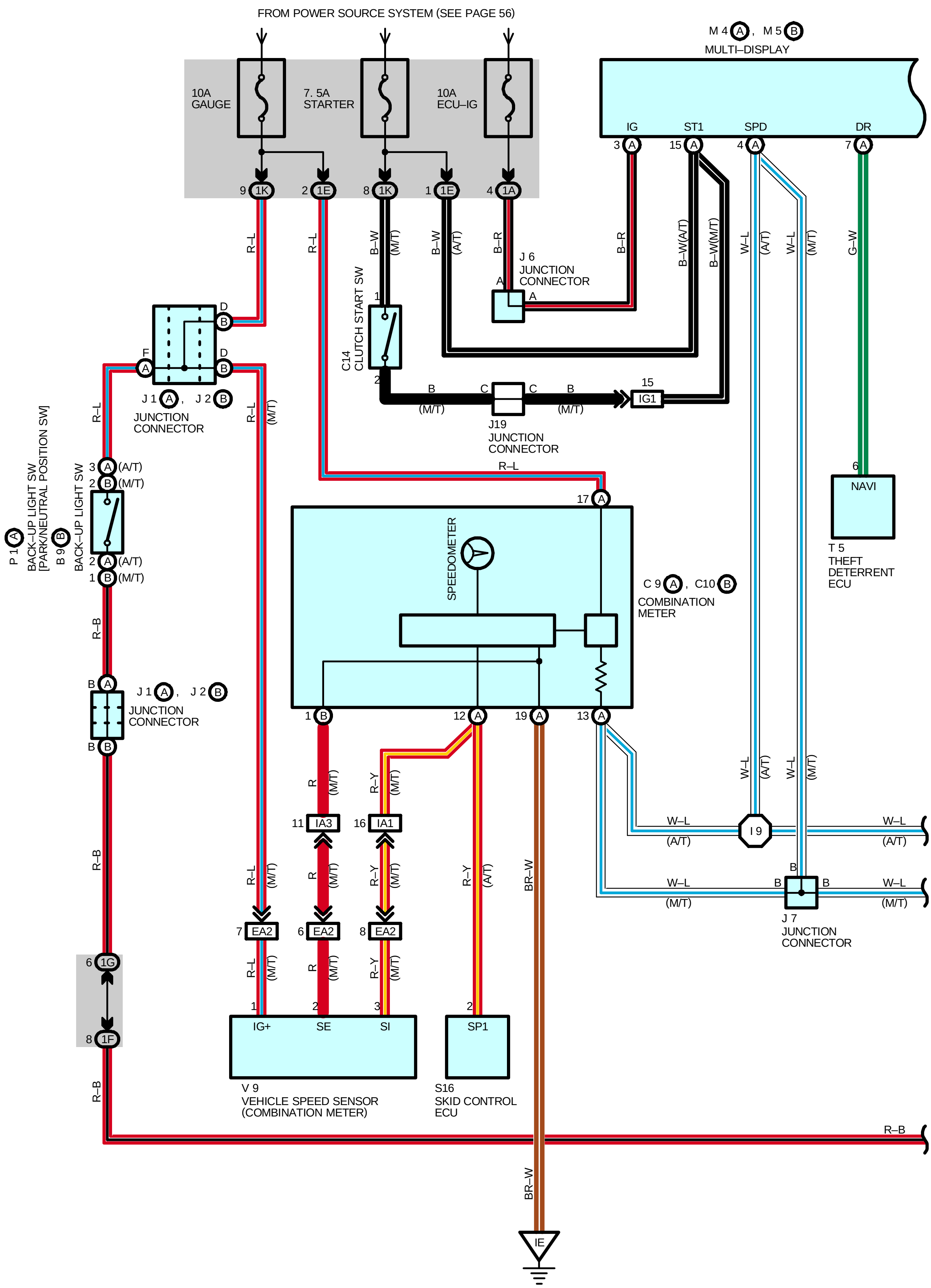
Code	See Page	Junction Block and Wire Harness (Connector Location)
1L	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

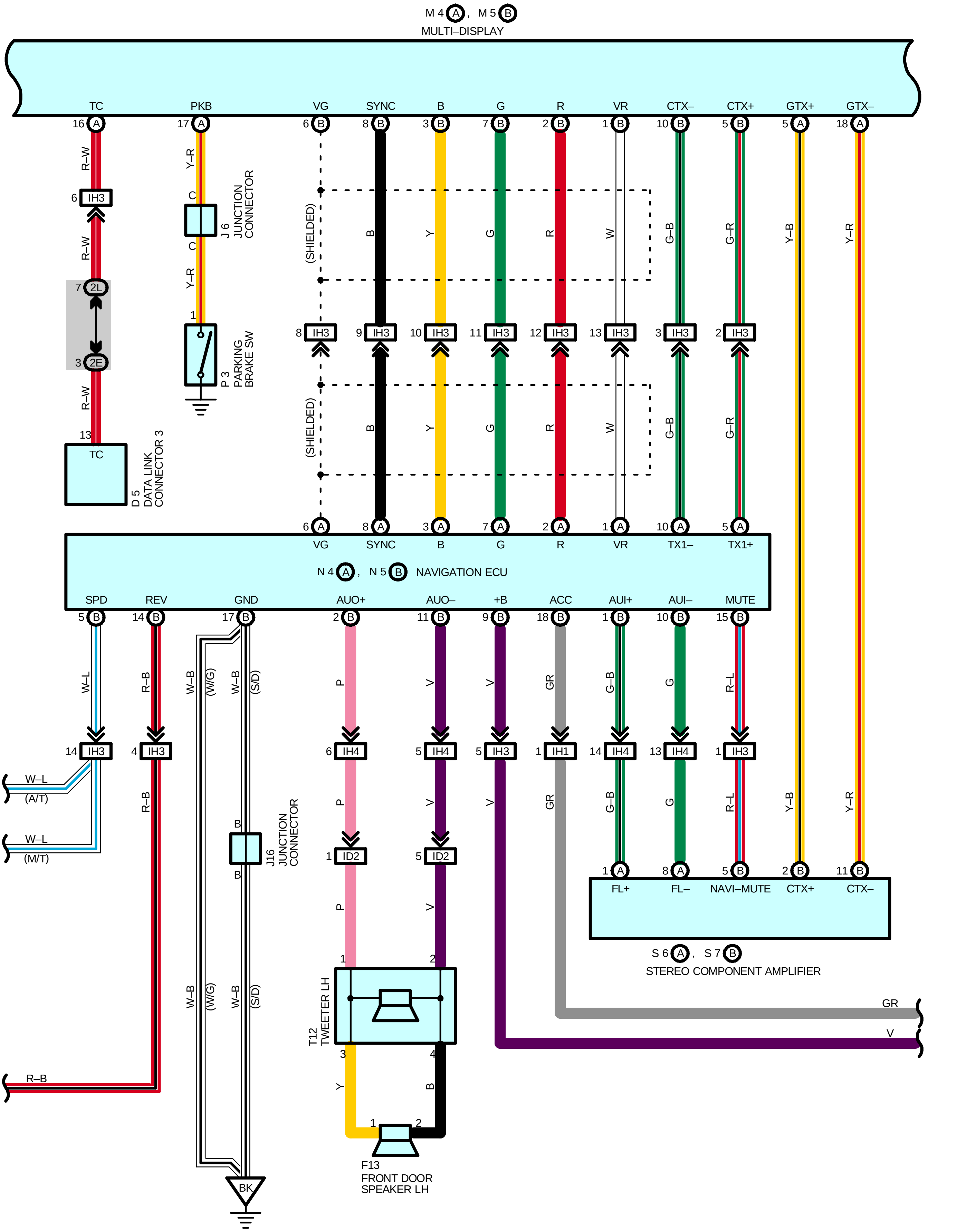
□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

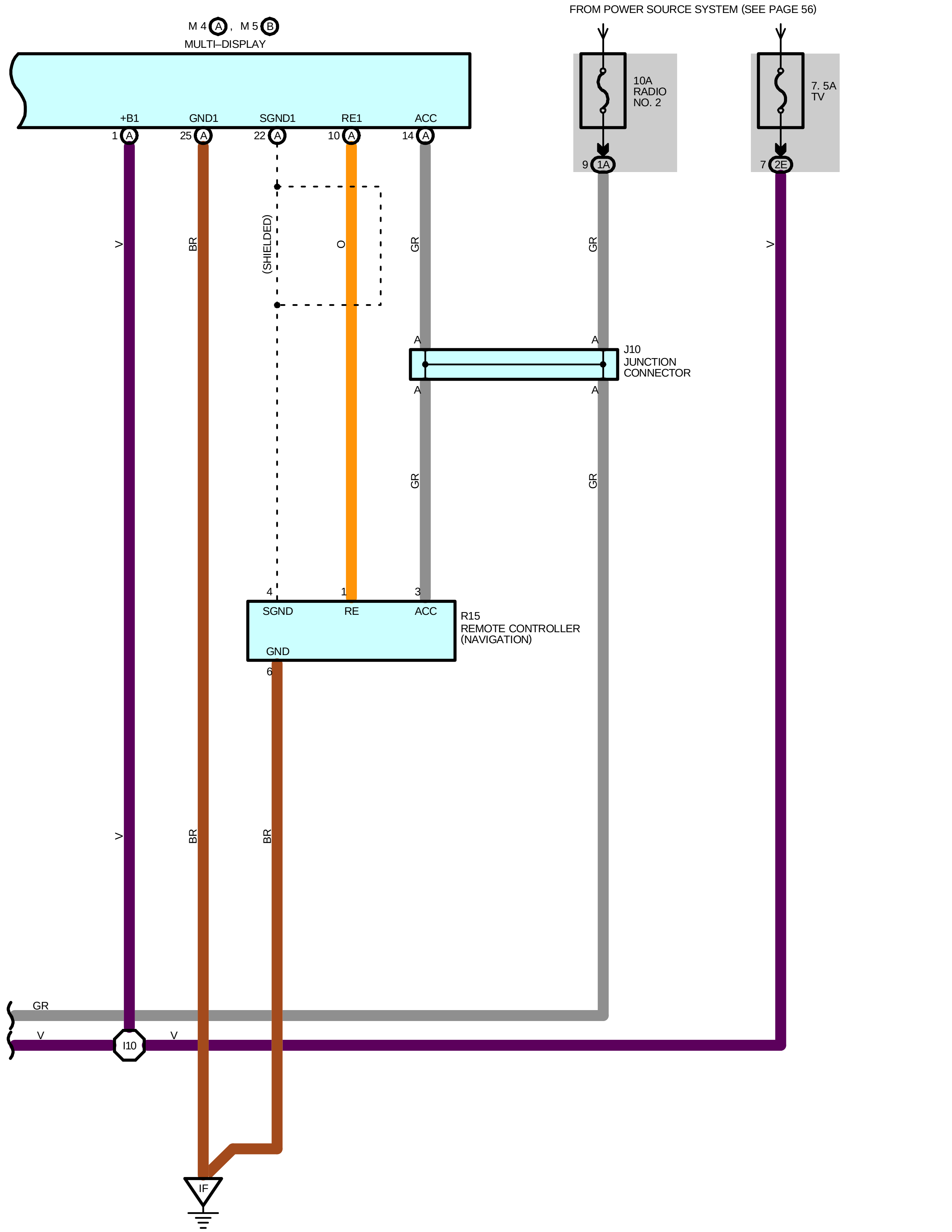
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IB3	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
IH4	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
BG2	52	Floor No.2 Wire and Front Seat LH Wire (Under the Driver's Seat)
BH1	52	Floor Wire and Front Seat RH Wire (Under the Front Passenger's Seat)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
IH	44	Cowl Side Panel RH
BJ	48 (S/D)	Front Floor Panel LH
	50 (W/G)	
BK	48 (S/D)	Front Floor Panel RH
	50 (W/G)	


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A GAUGE
7. 5A STARTER
10A ECU–IG
M 4 A , M 5 B
MULTI–DISPLAY
IG
ST1
SPD
DR
R–L
B–W
(M/T)
(A/T)
B–R
J 6 JUNCTION CONNECTOR
B–W(A/T)
B–W(M/T)
W–L
G–W
C14 CLUTCH START SW
J 1 A , J 2 B
JUNCTION CONNECTOR
J19 JUNCTION CONNECTOR
NAVI
T 5 THEFT DETERRENT ECU
P 1 A BACK–UP LIGHT SW [PARK/NEUTRAL POSITION SW]
B 9 B BACK–UP LIGHT SW
R–B
SPEEDOMETER
C 9 A , C10 B
COMBINATION METER
R
R–Y
BR–W
I 9
J 7 JUNCTION CONNECTOR
IG+
SE
SI
SP1
V 9 VEHICLE SPEED SENSOR (COMBINATION METER)
S16 SKID CONTROL ECU
IE


M 4 A, M 5 B
MULTI–DISPLAY
TC
PKB
VG
SYNC
B
G
R
VR
CTX–
CTX+
GTX+
GTX–
J 6
JUNCTION CONNECTOR
P 3
PARKING BRAKE SW
D 5
DATA LINK CONNECTOR 3
(SHIELDED)
VG
SYNC
B
G
R
VR
TX1–
TX1+
N 4 A, N 5 B NAVIGATION ECU
SPD
REV
GND
AUO+
AUO–
+B
ACC
AUI+
AUI–
MUTE
W–L
(A/T)
W–L
(M/T)
R–B
J16
JUNCTION CONNECTOR
T12
TWEETER LH
F13
FRONT DOOR SPEAKER LH
FL+
FL–
NAVI–MUTE
CTX+
CTX–
S 6 A, S 7 B
STEREO COMPONENT AMPLIFIER
GR
V
BK



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
M 4 A , M 5 B
MULTI–DISPLAY
+B1
GND1
SGND1
RE1
ACC
1 A
25 A
22 A
10 A
14 A
10A
RADIO
NO. 2
7. 5A
TV
9 1A
7 2E
V
BR
(SHIELDED)
O
GR
GR
V
A
A
J10
JUNCTION
CONNECTOR
A
A
GR
GR
4
1
3
SGND
RE
ACC
R15
REMOTE CONTROLLER
(NAVIGATION)
GND
6
V
BR
BR
GR
V
I10
V
IF

SYSTEM OUTLINE

The LEXUS navigation system displays the operating status and instructions for the radio and player, as well as trip information. Additionally, the navigation system precisely measures the current vehicle position, displays the map obtained from the map database on the screen, and informs the route to the destination shown on the map using voice guidance.

SERVICE HINTS

N5 (B) NAVIGATION ECU

(B) 9–GROUND : Always approx. **12** volts
(B)18–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
(B)17–GROUND : Always continuity

R15 REMOTE CONTROLLER (NAVIGATION)

3–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
6–GROUND : Always continuity

M4 (A) MULTI–DISPLAY

(A) 1–GROUND : Always approx. **12** volts
(A)14–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
(A) 3–GROUND : Approx. **12** volts with the ignition SW at **ON** position
(A)25–GROUND : Always continuity

○ : PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
B9	B	32	J7		35	P1	A	33
C9	A	34	J10		35	P3		35
C10	B	34	J16		36 (S/D)	R15		35
C14		34	J19		35	S6	A	35
D5		34	M4	A	35	S7	B	35
F13		36 (S/D)	M5	B	35	S16		35
		38 (W/G)	N4	A	37 (S/D)	T5		35
J1	A	33			39 (W/G)	T12		37 (S/D)
J2	B	33	N5	B	37 (S/D)			39 (W/G)
J6		35			39 (W/G)	V9		33

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1E		
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1K		
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2L	26	Floor Wire and Passenger Side J/B (Right Kick Panel)

□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA2	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
ID2	44	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
IG1	46	Instrument Panel Wire and Engine Room Main Wire (Near the Passenger Side J/B)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
IH3		
IH4		

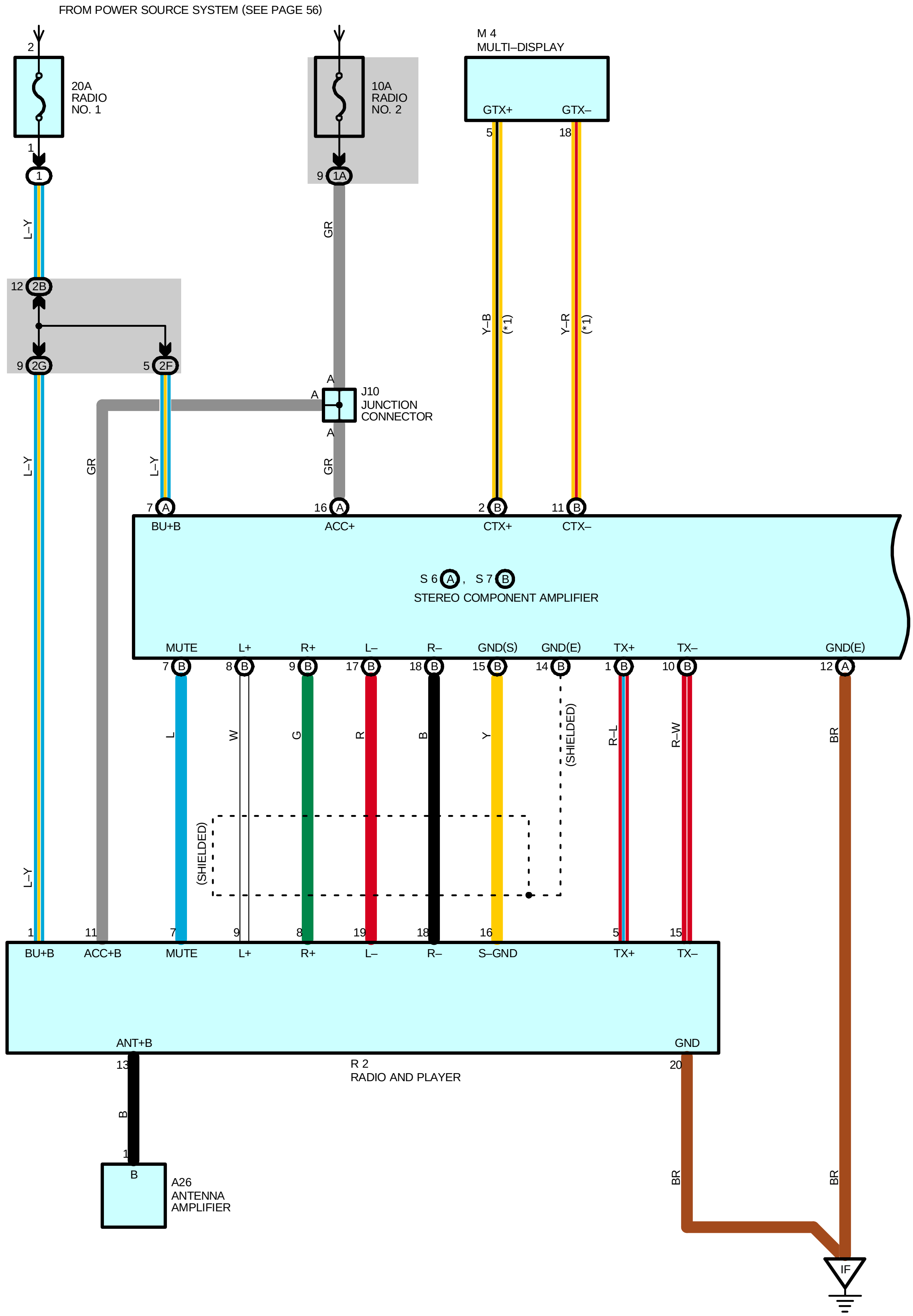
: GROUND POINTS

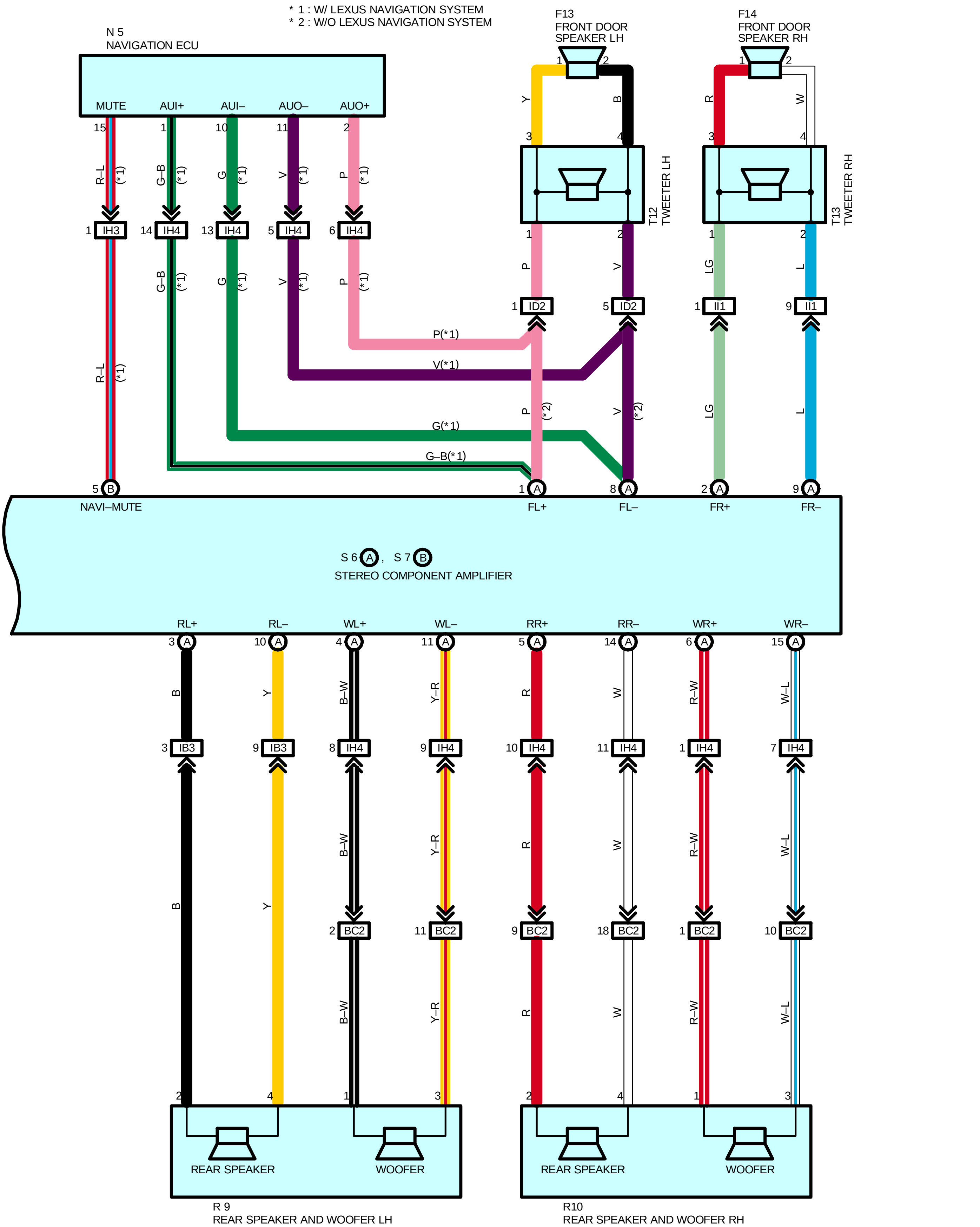
Code	See Page	Ground Points Location
IE	44	Front Floor Panel Center LH
IF	44	Front Floor Panel Center RH
BK	48 (S/D) 50 (W/G)	Front Floor Panel RH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I9	46	Instrument Panel Wire	I10	46	Instrument Panel Wire

RADIO AND PLAYER (S/D)





* 1 : W/ LEXUS NAVIGATION SYSTEM
* 2 : W/O LEXUS NAVIGATION SYSTEM
N 5
NAVIGATION ECU
MUTE
AUI+
AUI–
AUO–
AUO+
F13
FRONT DOOR
SPEAKER LH
F14
FRONT DOOR
SPEAKER RH
T12
TWEETER LH
T13
TWEETER RH
IH3
IH4
ID2
II1
P(*1)
V(*1)
G(*1)
G–B(*1)
NAVI–MUTE
FL+
FL–
FR+
FR–
S 6 A , S 7 B
STEREO COMPONENT AMPLIFIER
RL+
RL–
WL+
WL–
RR+
RR–
WR+
WR–
IB3
BC2
REAR SPEAKER
WOOFER
R 9
REAR SPEAKER AND WOOFER LH
R10
REAR SPEAKER AND WOOFER RH

RADIO AND PLAYER (S/D)

SERVICE HINTS

S6 (A) STEREO COMPONENT AMPLIFIER

(A)16–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
(A) 7–GROUND : Always approx. **12** volts
(A)12–GROUND : Always continuity

R2 RADIO AND PLAYER

11–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
1–GROUND : Always approx. **12** volts
20–GROUND : Always continuity

○ : PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
A26	34	N5	37 (S/D)	S7 B	35
F13	36 (S/D)	R2	35	T12	37 (S/D)
F14	36 (S/D)	R9	37 (S/D)	T13	37 (S/D)
J10	35	R10	37 (S/D)		
M4	35	S6 A	35		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2F 2G	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

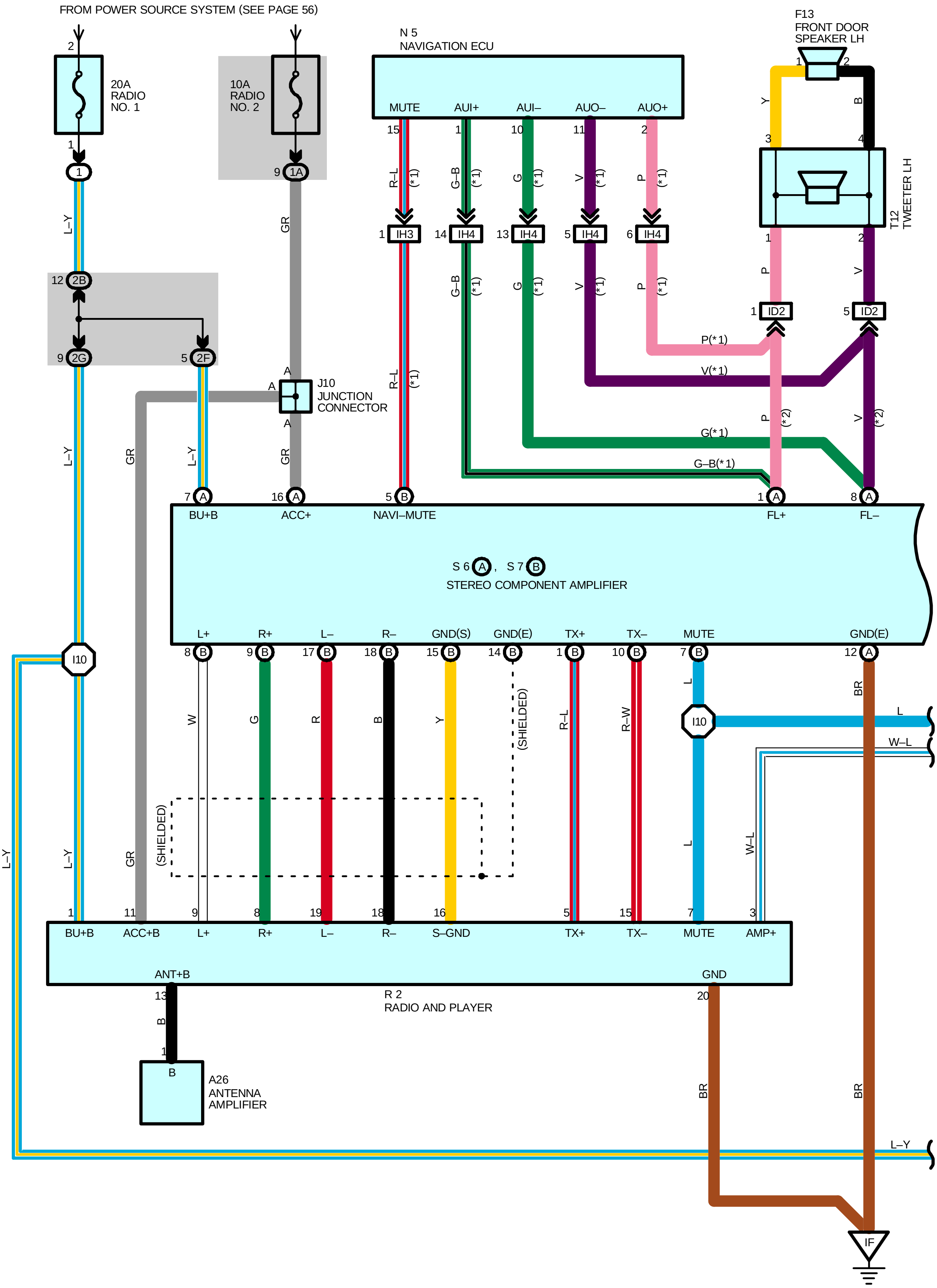
: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

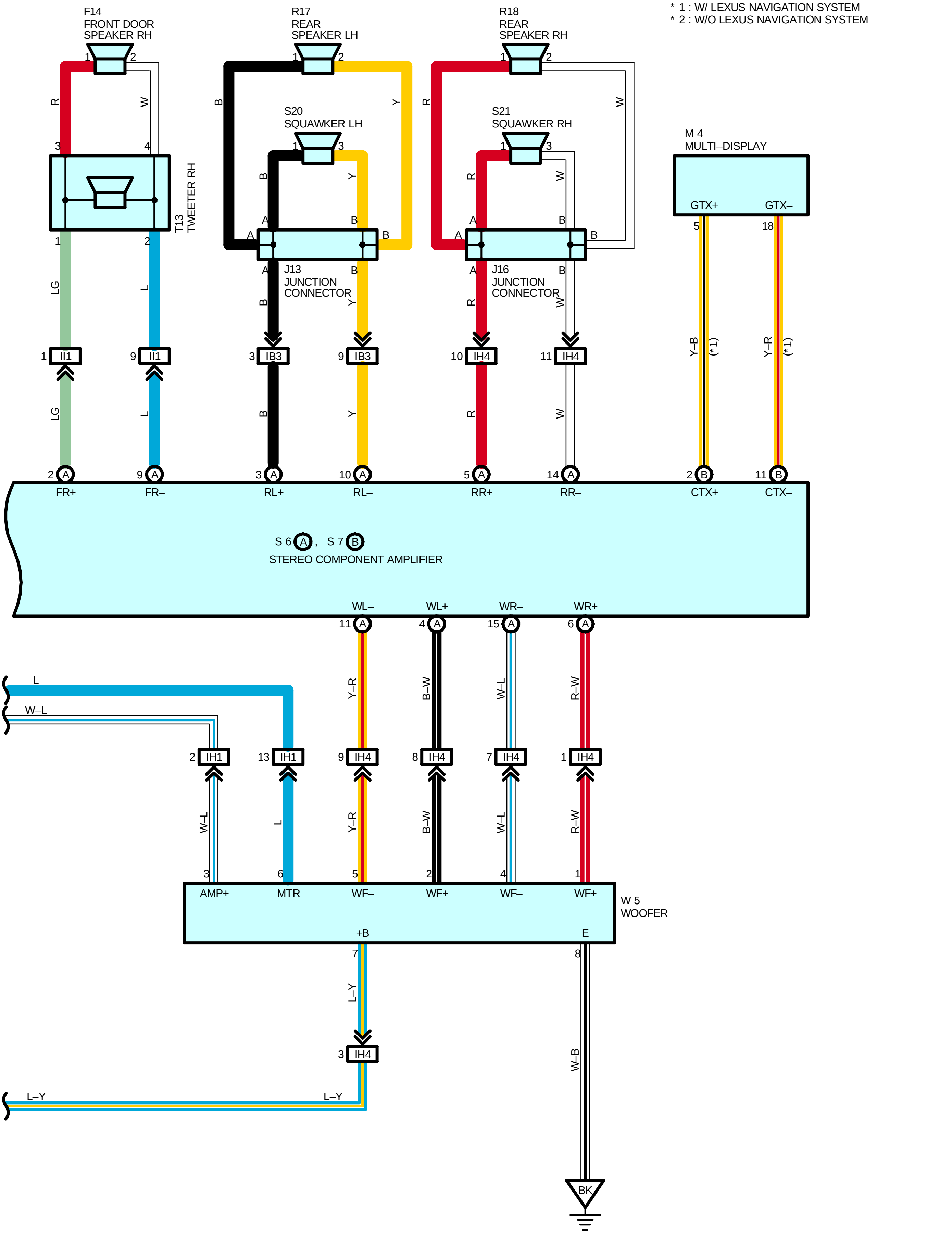
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IB3	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
ID2	44	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
IH3 IH4	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)
BC2	48 (S/D)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
IF	44	Front Floor Panel Center RH

RADIO AND PLAYER (W/G)





F14
FRONT DOOR
SPEAKER RH
R17
REAR
SPEAKER LH
R18
REAR
SPEAKER RH
* 1 : W/ LEXUS NAVIGATION SYSTEM
* 2 : W/O LEXUS NAVIGATION SYSTEM
S20
SQUAWKER LH
S21
SQUAWKER RH
M 4
MULTI–DISPLAY
GTX+
GTX–
T13
TWEETER RH
J13
JUNCTION
CONNECTOR
J16
JUNCTION
CONNECTOR
II1
IB3
IH4
(*1)
FR+
FR–
RL+
RL–
RR+
RR–
CTX+
CTX–
S 6 A , S 7 B
STEREO COMPONENT AMPLIFIER
WL–
WL+
WR–
WR+
IH1
AMP+
MTR
WF–
WF+
WF–
WF+
W 5
WOOFER
+B
E
L–Y
W–B
BK

RADIO AND PLAYER (W/G)

SERVICE HINTS

S6 (A) STEREO COMPONENT AMPLIFIER

(A)16–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
(A) 7–GROUND : Always approx. **12** volts
(A)12–GROUND : Always continuity

R2 RADIO AND PLAYER

11–GROUND : Approx. **12** volts with the ignition SW at **ACC** or **ON** position
1–GROUND : Always approx. **12** volts
20–GROUND : Always continuity

: PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
A26		34	M4		35	S7	B	35
F13		38 (W/G)	N5		39 (W/G)	S20		39 (W/G)
F14		38 (W/G)	R2		35	S21		39 (W/G)
J10		35	R17		39 (W/G)	T12		39 (W/G)
J13		38 (W/G)	R18		39 (W/G)	T13		39 (W/G)
J16		38 (W/G)	S6	A	35	W5		39 (W/G)

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2G		

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

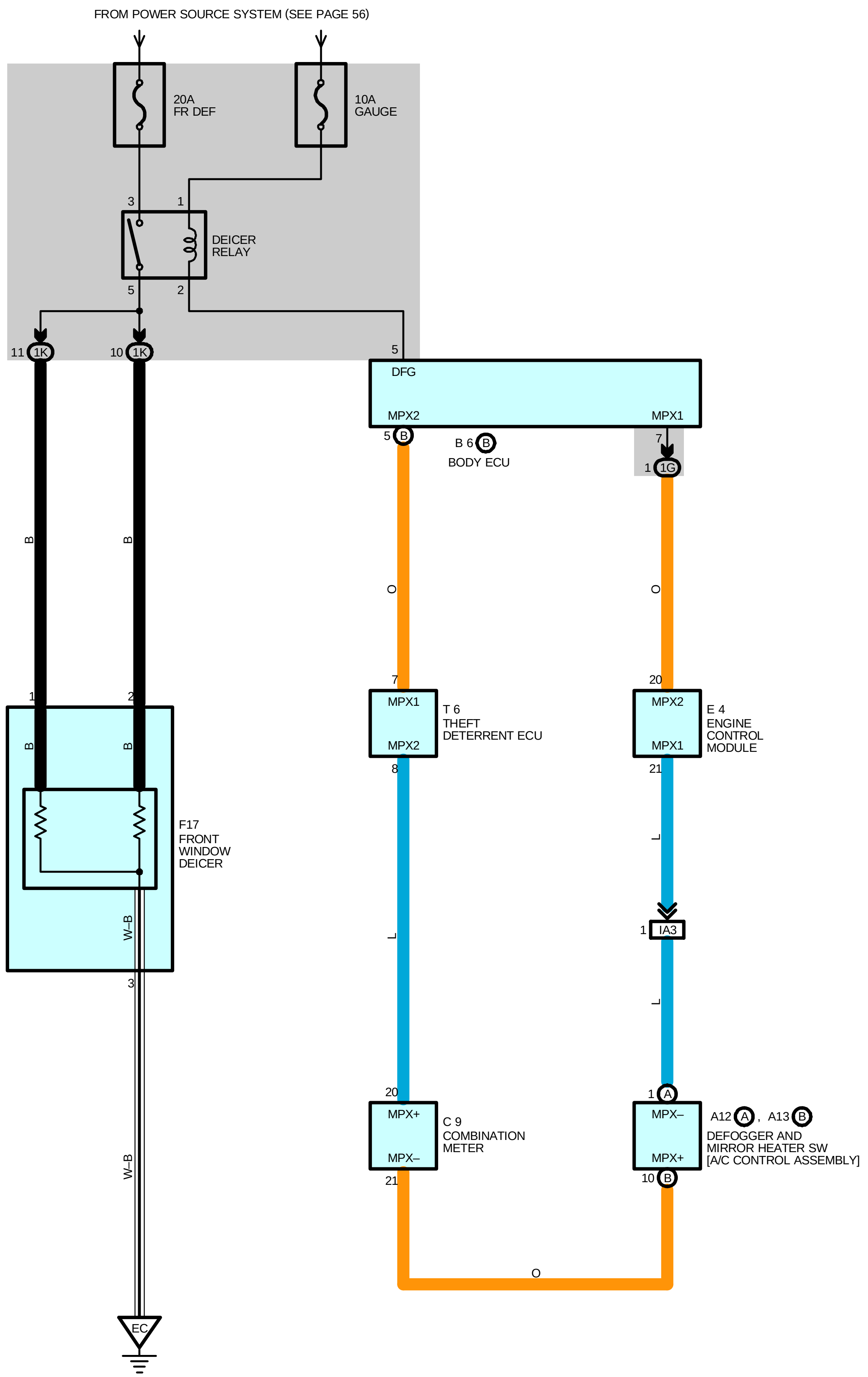
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IB3	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
ID2	44	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
IH3		
IH4		
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)

: GROUND POINTS

Code	See Page	Ground Points Location
IF	44	Front Floor Panel Center RH
BK	50 (W/G)	Front Floor Panel RH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I10	46	Instrument Panel Wire			


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
20A
FR DEF
10A
GAUGE
DEICER
RELAY
3
1
5
2
11
1K
10
1K
5
DFG
MPX2
MPX1
5
B
B 6
B
BODY ECU
7
1
1G
B
B
O
O
7
MPX1
MPX2
8
T 6
THEFT
DETERRENT ECU
20
MPX2
MPX1
21
E 4
ENGINE
CONTROL
MODULE
1
2
B
B
F17
FRONT
WINDOW
DEICER
W–B
3
L
L
1
IA3
L
20
MPX+
MPX–
21
C 9
COMBINATION
METER
1
A
MPX–
MPX+
10
B
A12
A
, A13
B
DEFOGGER AND
MIRROR HEATER SW
[A/C CONTROL ASSEMBLY]
W–B
O
EC

SERVICE HINTS

DEICER RELAY

3–5 : Closed with the ignition SW at **ON** position and defogger and mirror heater SW [A/C control assembly] on

○ : PARTS LOCATION

Code		See Page	Code	See Page	Code	See Page
A12	A	34	C9	34	T6	35
A13	B	34	E4	32		
B6	B	34	F17	32		

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1K		

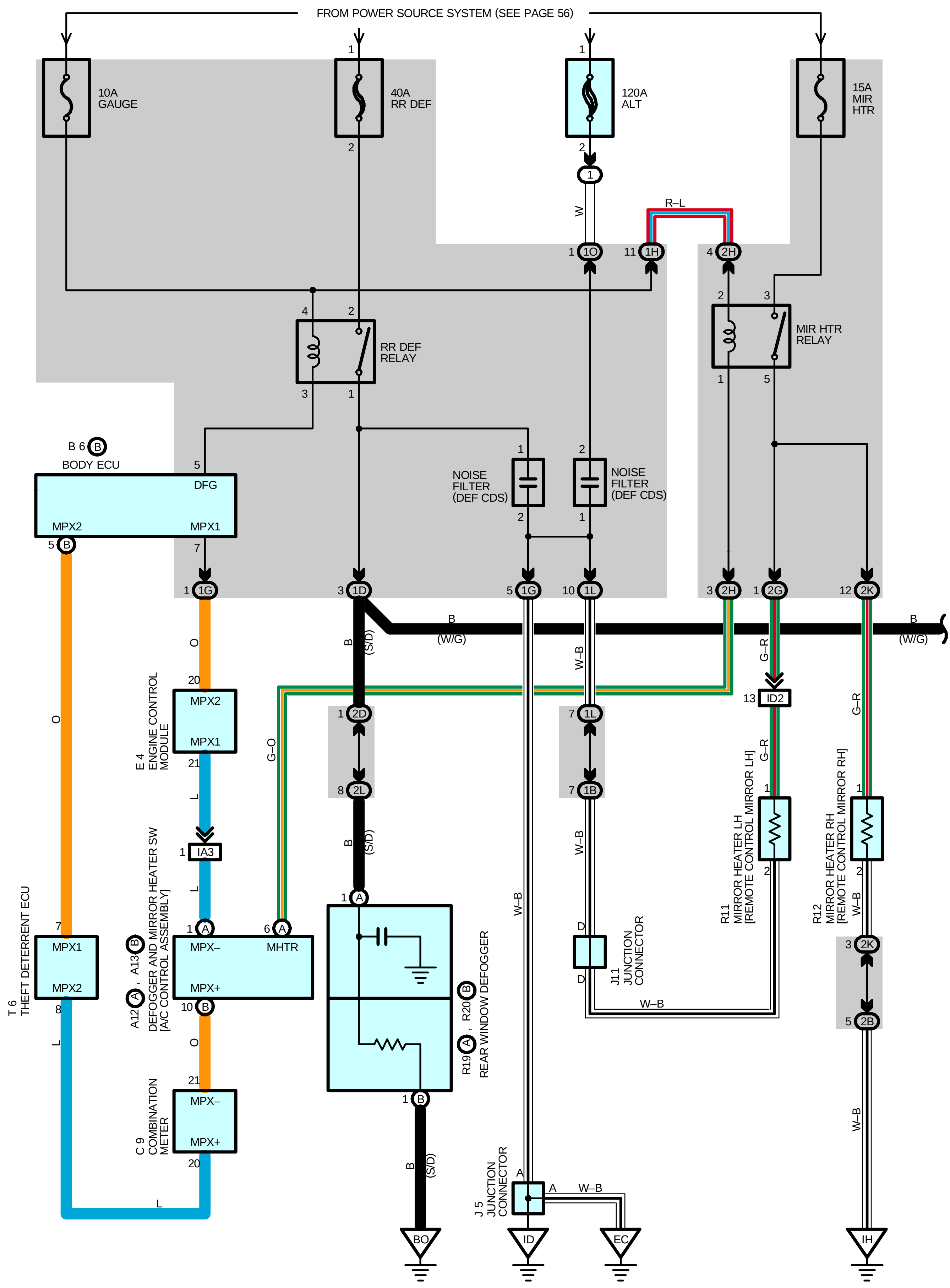
□ : CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

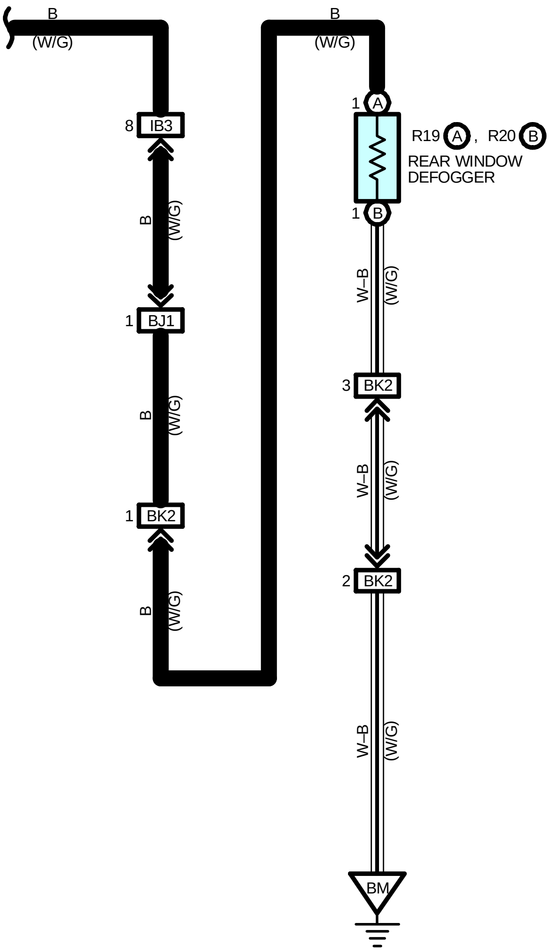
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)

▽ : GROUND POINTS

Code	See Page	Ground Points Location
EC	42	Left Fender Apron

REAR WINDOW DEFOGGER AND MIRROR HEATER




B
(W/G)
B
(W/G)
1 A
8 IB3
R19 A , R20 B
REAR WINDOW
DEFOGGER
1 B
B (W/G)
W–B (W/G)
1 BJ1
3 BK2
B (W/G)
W–B (W/G)
1 BK2
2 BK2
B (W/G)
W–B (W/G)
BM

REAR WINDOW DEFOGGER AND MIRROR HEATER

SERVICE HINTS

RR DEF RELAY

2–1 : Closed with the ignition SW at **ON** position and the defogger and mirror heater SW [A/C control assembly] on

: PARTS LOCATION

Code		See Page	Code	See Page	Code		See Page
A12	A	34	J11	36 (S/D)	R19	A	37 (S/D)
A13	B	34		38 (W/G)			39 (W/G)
B6	B	34	R11	37 (S/D)	R20	B	37 (S/D)
C9		34		39 (W/G)			39 (W/G)
E4		32	R12	37 (S/D)	T6		35
J5		35		39 (W/G)			

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1B	24	Front Door LH Wire and Driver Side J/B (Left Kick Panel)
1D	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1L		
1O	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2D	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2G		
2H		
2K	26	Front Door RH Wire and Passenger Side J/B (Right Kick Panel)
2L	26	Floor Wire and Passenger Side J/B (Right Kick Panel)

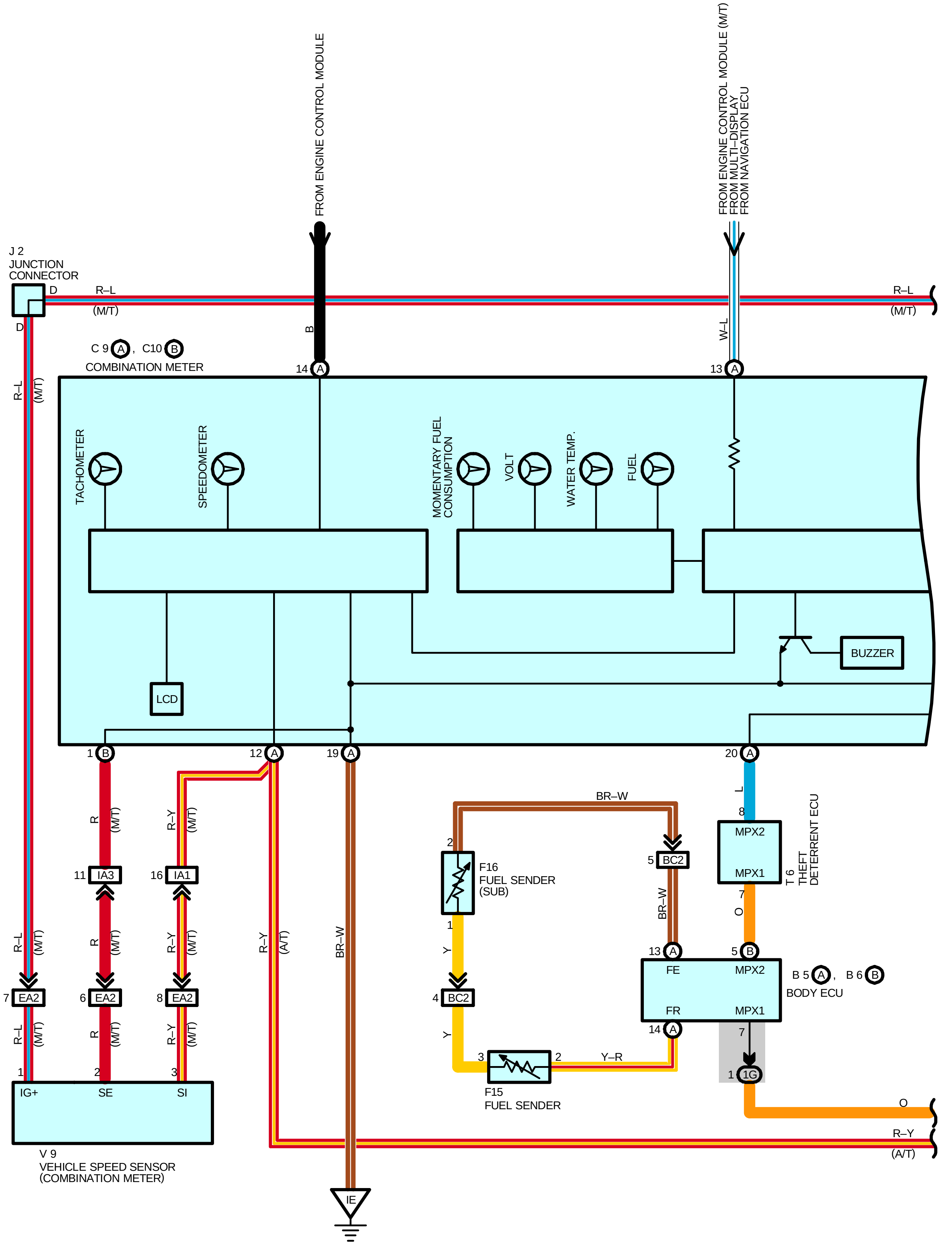
: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

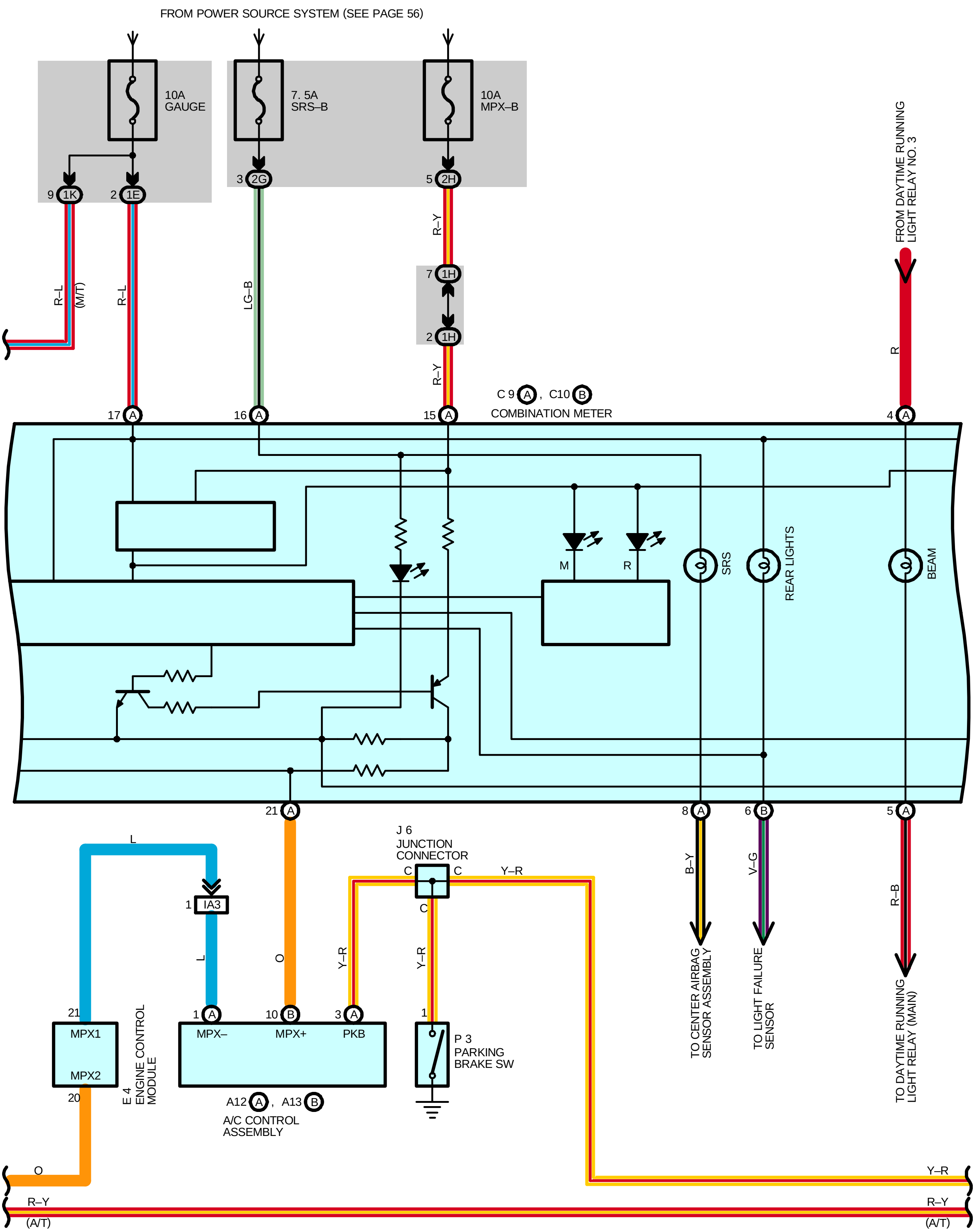
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
IA3	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IB3	44	Instrument Panel Wire and Floor No.2 Wire (Near the Driver Side J/B)
ID2	44	Front Door LH Wire and Instrument Panel Wire (Left Kick Panel)
BJ1	50 (W/G)	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BK2	50 (W/G)	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)

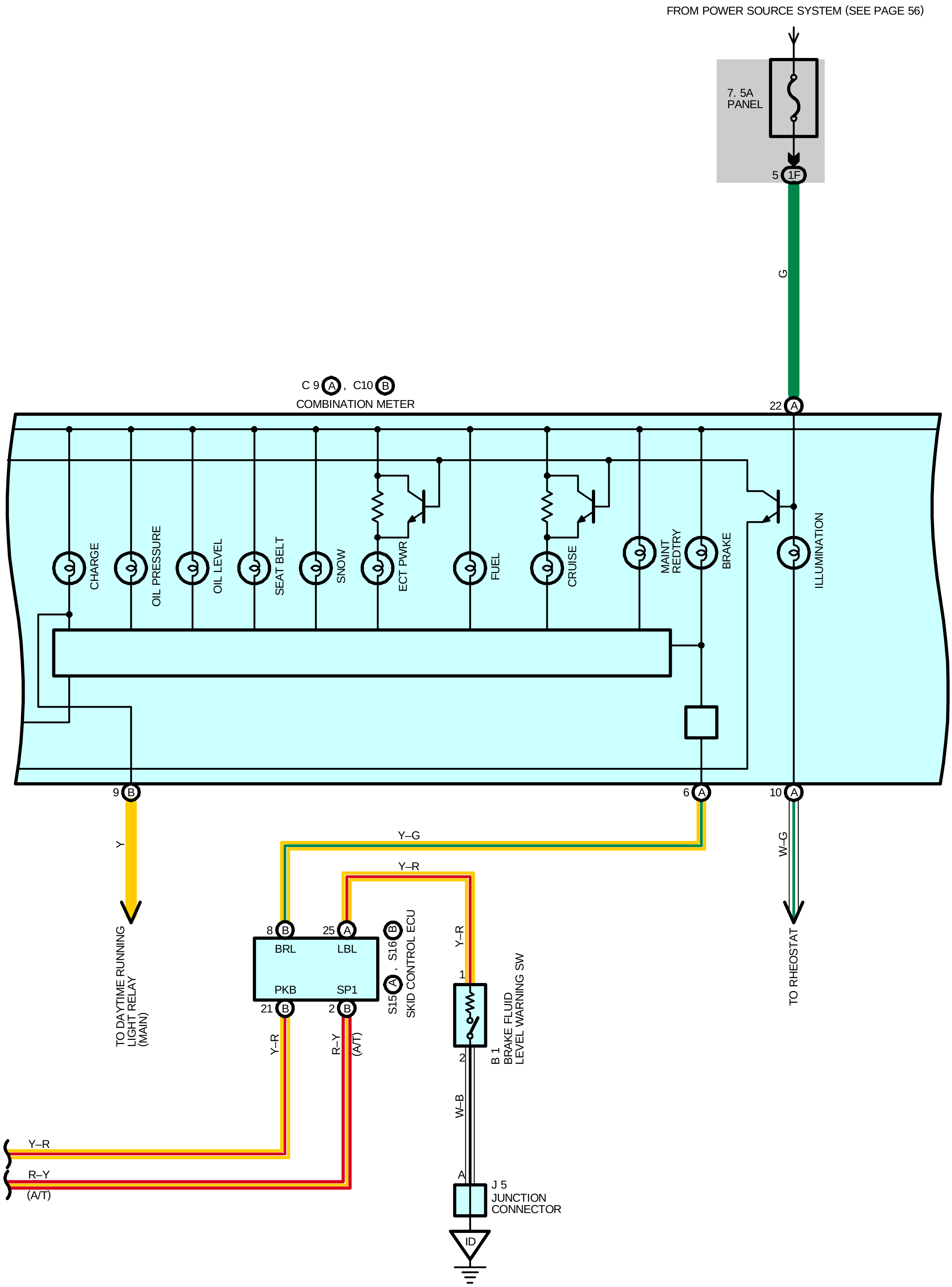
: GROUND POINTS

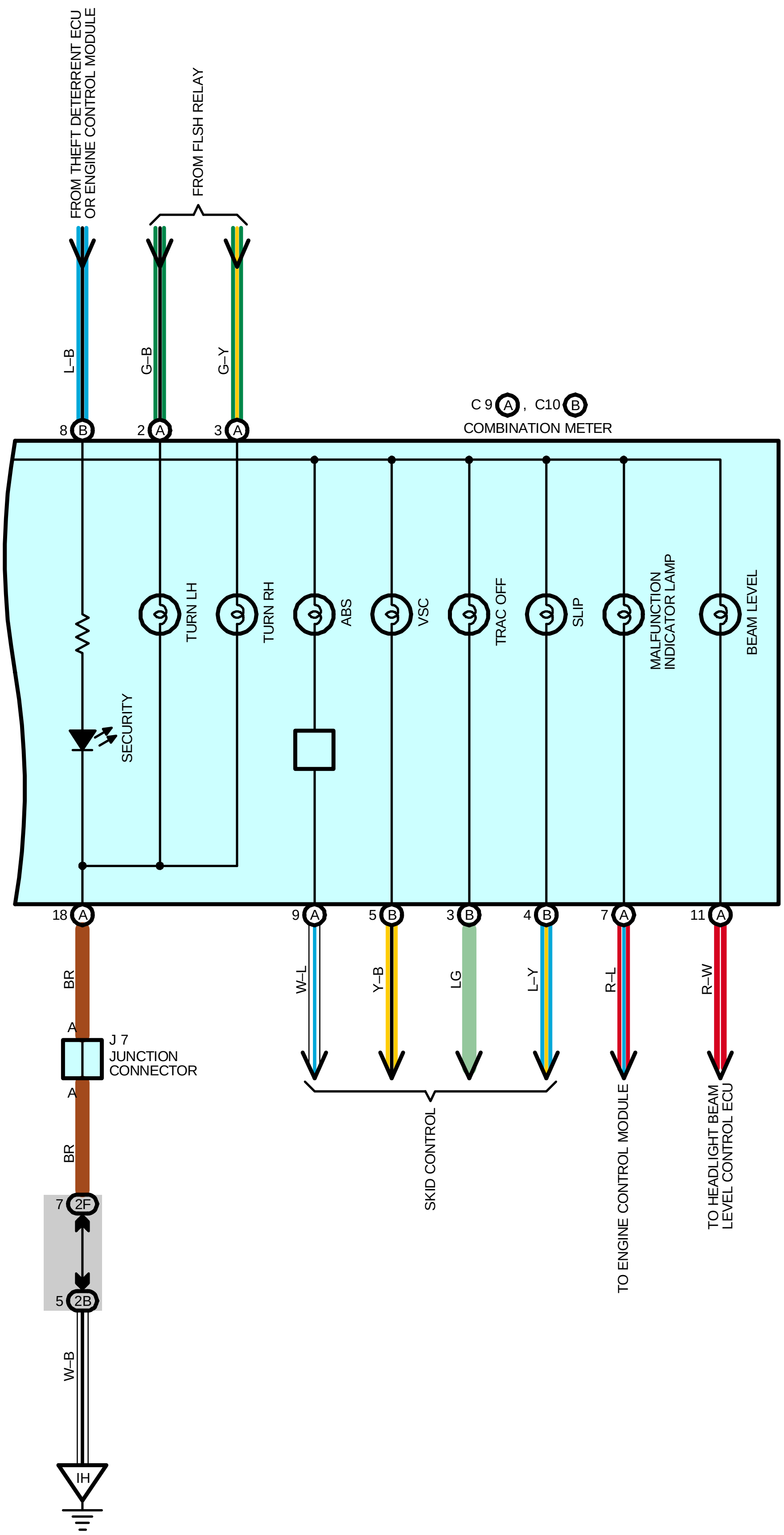
Code	See Page	Ground Points Location
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IH	44	Cowl Side Panel RH
BM	50 (W/G)	Left Side of the Back Panel Upper
BO	48 (S/D)	Roof Side Panel LH

COMBINATION METER




FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
GAUGE
7. 5A
SRS–B
10A
MPX–B
FROM DAYTIME RUNNING
LIGHT RELAY NO. 3
9 1K
2 1E
3 2G
5 2H
R–Y
7 1H
2 1H
R–L
(M/T)
R–L
LG–B
R–Y
R
C 9 A , C10 B
COMBINATION METER
17 A
16 A
15 A
4 A
M
R
SRS
REAR LIGHTS
BEAM
21 A
8 A
6 B
5 A
L
J 6
JUNCTION
CONNECTOR
C
C
Y–R
C
1 IA3
L
O
Y–R
Y–R
B–Y
V–G
R–B
TO CENTER AIRBAG
SENSOR ASSEMBLY
TO LIGHT FAILURE
SENSOR
TO DAYTIME RUNNING
LIGHT RELAY (MAIN)
21
MPX1
MPX2
20
E 4
ENGINE CONTROL
MODULE
1 A
10 B
3 A
MPX–
MPX+
PKB
1
P 3
PARKING
BRAKE SW
A12 A , A13 B
A/C CONTROL
ASSEMBLY
O
R–Y
(A/T)
Y–R
R–Y
(A/T)


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
7. 5A
PANEL
5
1F
G
C 9 A , C10 B
COMBINATION METER
22 A
CHARGE
OIL PRESSURE
OIL LEVEL
SEAT BELT
SNOW
ECT PWR
FUEL
CRUISE
MAINT
REDTRY
BRAKE
ILLUMINATION
9 B
6 A
10 A
Y
Y–G
Y–R
W–G
TO DAYTIME RUNNING
LIGHT RELAY
(MAIN)
8 B
25 A
BRL
LBL
PKB
SP1
21 B
2 B
S15 A , S16 B
SKID CONTROL ECU
Y–R
R–Y
(A/T)
1
2
B 1
BRAKE FLUID
LEVEL WARNING SW
W–B
A
J 5
JUNCTION
CONNECTOR
ID
TO RHEOSTAT
Y–R
R–Y
(A/T)


FROM THEFT DETERRENT ECU
OR ENGINE CONTROL MODULE
FROM FLSH RELAY
L–B
G–B
G–Y
8 B
2 A
3 A
C 9 A , C10 B
COMBINATION METER
TURN LH
TURN RH
ABS
VSC
TRAC OFF
SLIP
MALFUNCTION
INDICATOR LAMP
BEAM LEVEL
SECURITY
18 A
9 A
5 B
3 B
4 B
7 A
11 A
BR
W–L
Y–B
LG
L–Y
R–L
R–W
A
J 7
JUNCTION
CONNECTOR
A
BR
SKID CONTROL
TO ENGINE CONTROL MODULE
TO HEADLIGHT BEAM
LEVEL CONTROL ECU
7 2F
5 2B
W–B
IH

COMBINATION METER

SERVICE HINTS

P3 PARKING BRAKE SW

1–GROUND : Continuity with the parking brake lever pulled up

F15 FUEL SENDER

2–3 : Approx. **2.0** Ω at fuel full
Approx. **55.0** Ω at fuel empty

C9 (A) COMBINATION METER

(A)17–GROUND : Approx. **12** volts with the ignition SW at **ON** position
(A)18–GROUND : Always continuity
(A)19–GROUND : Always continuity
(A)15–GROUND : Always approx. **12** volts
(A)16–GROUND : Always approx. **12** volts

: PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
A12	A	34	E4		32	J6		35
A13	B	34	F15		36 (S/D)	J7		35
B1		32			38 (W/G)	P3		35
B5	A	34	F16		36 (S/D)	S15	A	35
B6	B	34			38 (W/G)	S16	B	35
C9	A	34	J2		33	T6		35
C10	B	34	J5		35	V9		33

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

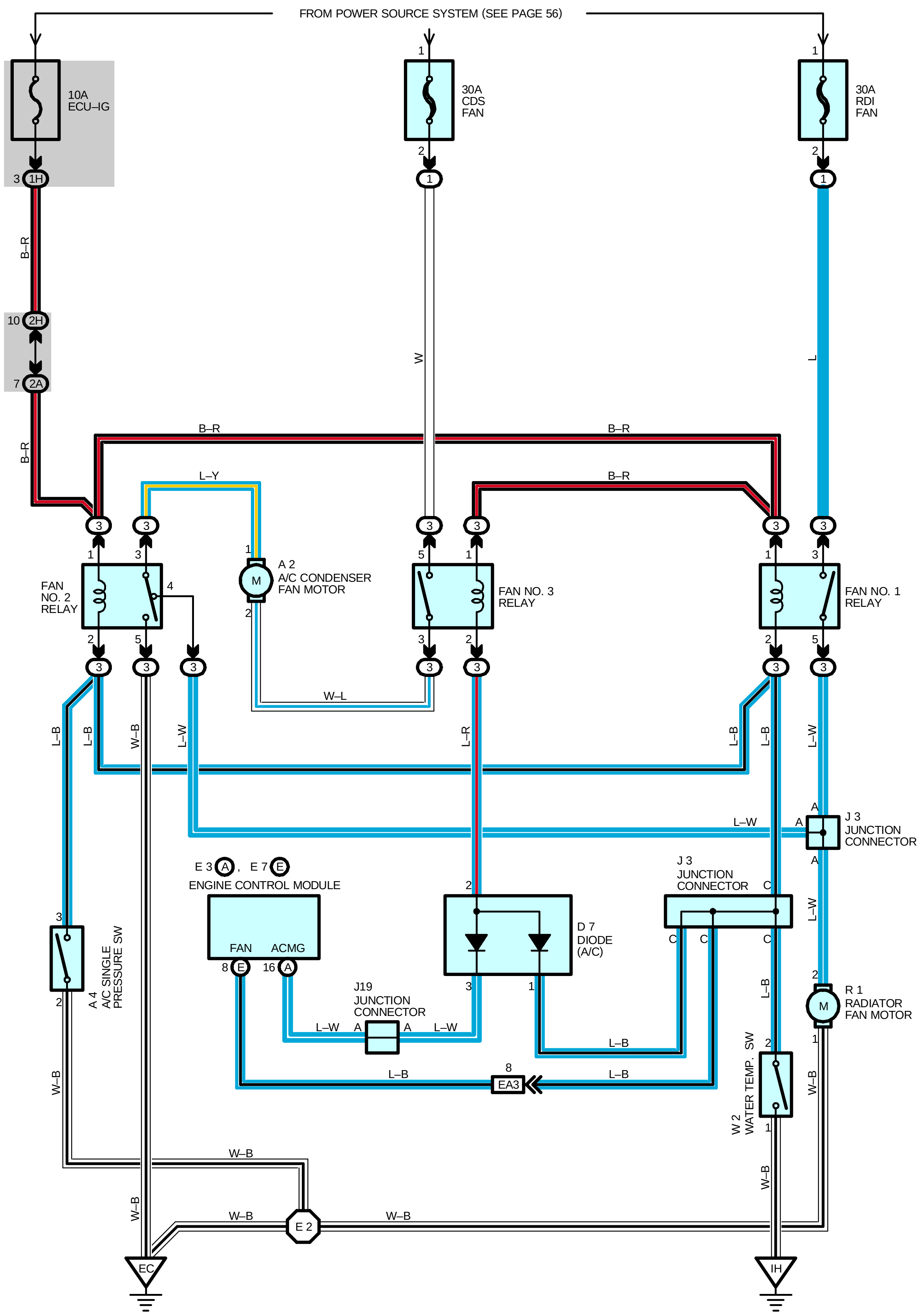
Code	See Page	Junction Block and Wire Harness (Connector Location)
1E	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1K	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2F	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2G		
2H		

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA2	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
BC2	48 (S/D)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel RH)
	50 (W/G)	Floor No.2 Wire and Floor Wire (Rear Floor Partition Panel Center)

: GROUND POINTS

Code	See Page	Ground Points Location
ID	44	Cowl Side Panel LH
IE	44	Front Floor Panel Center LH
IH	44	Cowl Side Panel RH



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A
ECU–IG
30A
CDS
FAN
30A
RDI
FAN
1H
2H
2A
B–R
W
L
L–Y
FAN NO. 2 RELAY
A 2
A/C CONDENSER FAN MOTOR
FAN NO. 3 RELAY
FAN NO. 1 RELAY
W–L
L–B
W–B
L–W
L–R
J 3
JUNCTION CONNECTOR
E 3 A , E 7 E
ENGINE CONTROL MODULE
FAN
ACMG
D 7
DIODE
(A/C)
J19
JUNCTION CONNECTOR
EA3
A 4
A/C SINGLE PRESSURE SW
R 1
RADIATOR FAN MOTOR
W 2
WATER TEMP. SW
E 2
EC
IH

SYSTEM OUTLINE

With the ignition SW turned on, the current through the ECU–IG fuse flows to the FAN NO.1 relay (Coil side), FAN NO.2 relay (Coil side) and FAN NO.3 relay (Coil side).

1. LOW SPEED OPERATION

Only when the A/C system is activated, the A/C condenser fan motor and the radiator fan motor rotates at low speed.
When the A/C system is activated, the current from ECU–IG fuse flows to the FAN NO.3 relay (Coil side) to TERMINAL 2 of the diode (A/C) to TERMINAL 3 to TERMINAL (A) 16 of the engine control module, causing the FAN NO.3 relay to turn on. As a result, the current through the CDS FAN fuse flows to FAN NO.3 relay (Point side) to TERMINAL 2 of the A/C condenser fan motor to TERMINAL 1 to TERMINAL 3 of the FAN NO.2 relay to TERMINAL 4 to TERMINAL 2 of the radiator fan motor to TERMINAL 1 to GROUND. As this flowing in series for the motors, the motors rotate at low speed.

2. HIGH SPEED OPERATION

With the A/C single pressure SW is turned on and/or the water temp. SW is turned on, the A/C condenser fan motor and the radiator fan motor rotate at high speed.
When the A/C single pressure SW is turned on, the current through the ECU–IG fuse flows to the FAN NO.1 and NO.2 relay (Coil side) to TERMINAL 3 of the A/C single pressure SW to TERMINAL 2 to GROUND, and the current through the ECU–IG fuse flows to the FAN NO.3 relay (Coil side) to TERMINAL 2 of the diode (A/C) to TERMINAL 1 to TERMINAL 3 of the A/C single pressure SW to TERMINAL 2 to GROUND. As a result, FAN NO.1, NO.2. and NO.3 relay is turned on. At the same time, the current from the RDI FAN fuse flows to FAN NO.1 relay (Point side) to TERMINAL 2 of the radiator fan motor to TERMINAL 1 to GROUND, and the current from the CDS FAN fuse flows to FAN NO.3 relay (Point side) to TERMINAL 2 of the A/C condenser fan motor to TERMINAL 1 to TERMINAL 3 of the FAN NO.2 relay to TERMINAL 5 to GROUND.
As the current flowing in parallel for motors as above, the motors rotate at high speed.
When the water temp. SW is turned on, the current through the ECU–IG fuse flows to the FAN NO.1 and NO.2 relay (Coil side) to TERMINAL 2 of the water temp. SW to TERMINAL 1 to GROUND, and the current through the ECU–IG fuse flows to the FAN NO.3 relay (Coil side) to TERMINAL 2 of the diode (A/C) to TERMINAL 1 to TERMINAL 2 of the water temp. SW to TERMINAL 1 to GROUND. As a result, FAN NO.1, NO.2 and NO.3 relay is turned on. At the same time, the current from the RDI FAN fuse flows to FAN NO.1 relay (Point side) to TERMINAL 2 of the radiator fan motor to TERMINAL 1 to GROUND, and the current from the CDS FAN fuse flows to FAN NO.3 relay (Point side) to TERMINAL 2 of the A/C condenser fan motor to TERMINAL 1 to TERMINAL 3 of the FAN NO.2 relay to TERMINAL 5 to GROUND.
As the current flowing in parallel for motors as above, the motors rotate at high speed.

SERVICE HINTS

A4 A/C SINGLE PRESSURE SW

3–2 : Close above approx. **15.5** kgf/cm^2 (**220** psi, **1520** kpa)
Open below approx. **12.5** kgf/cm^2 (**178** psi, **1226** kpa)

W2 WATER TEMP. SW

1–2 : Close above approx. **95**˚C (**203**˚F)

○ : PARTS LOCATION

Code	See Page	Code		See Page	Code	See Page
A2	32	E3	A	32	J19	35
A4	32	E7	E	32	R1	33
D7	34	J3		33	W2	33

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
3	23	Engine Room No.3 R/B (Engine Compartment Left)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2H	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)

RADIATOR FAN AND CONDENSER FAN

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

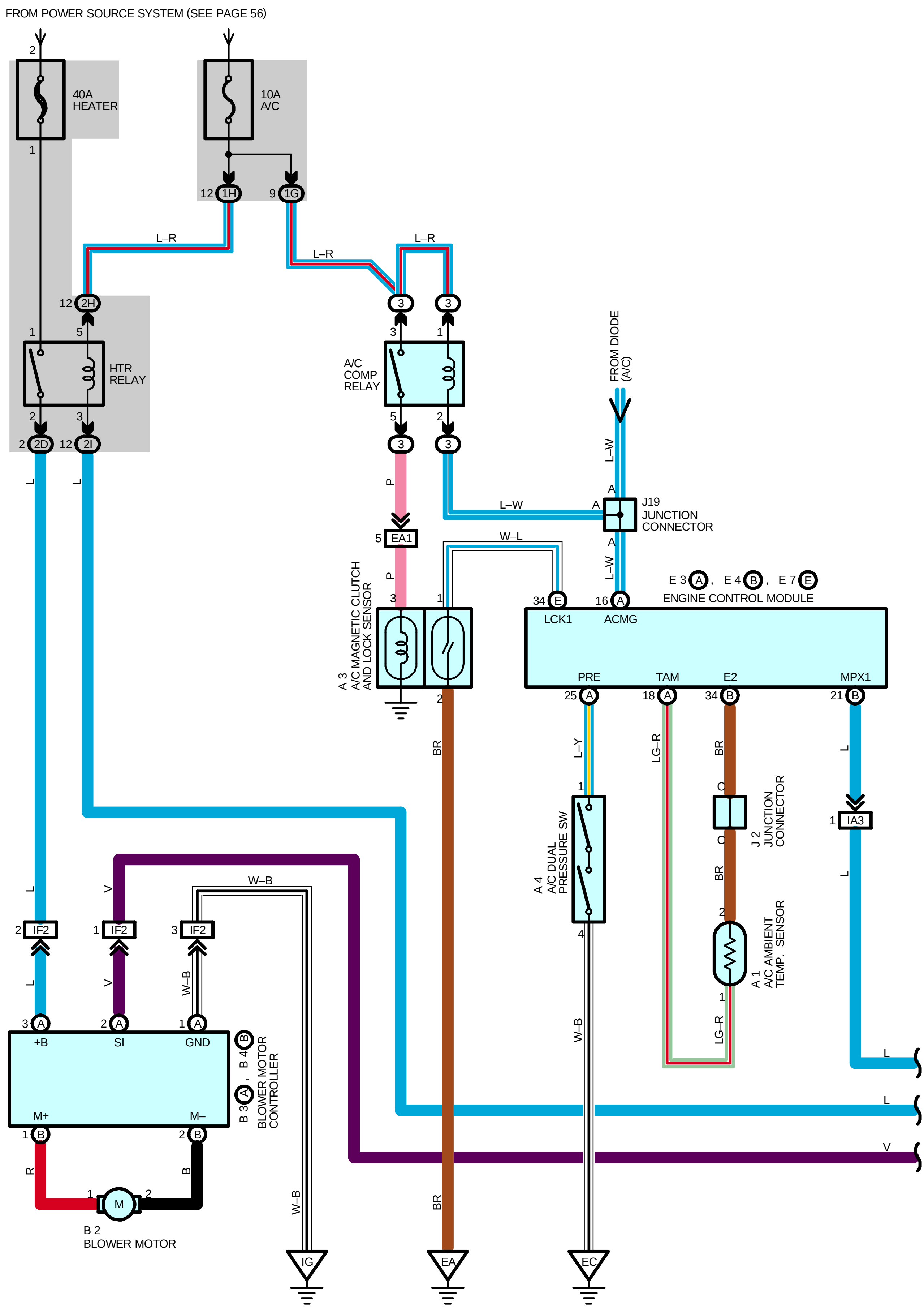
Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA3	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)

: GROUND POINTS

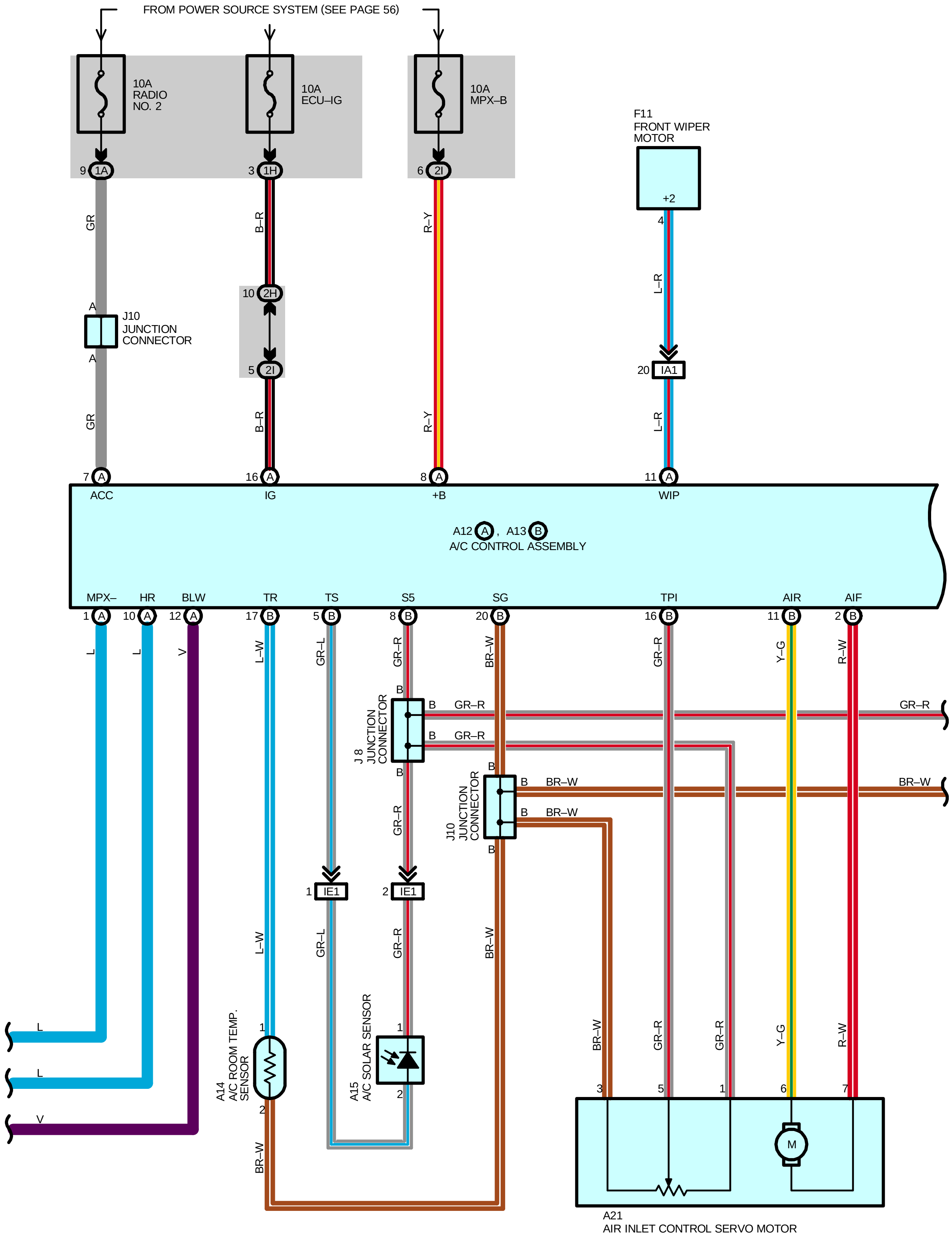
Code	See Page	Ground Points Location
EC	42	Left Fender Apron
IH	44	Cowl Side Panel RH

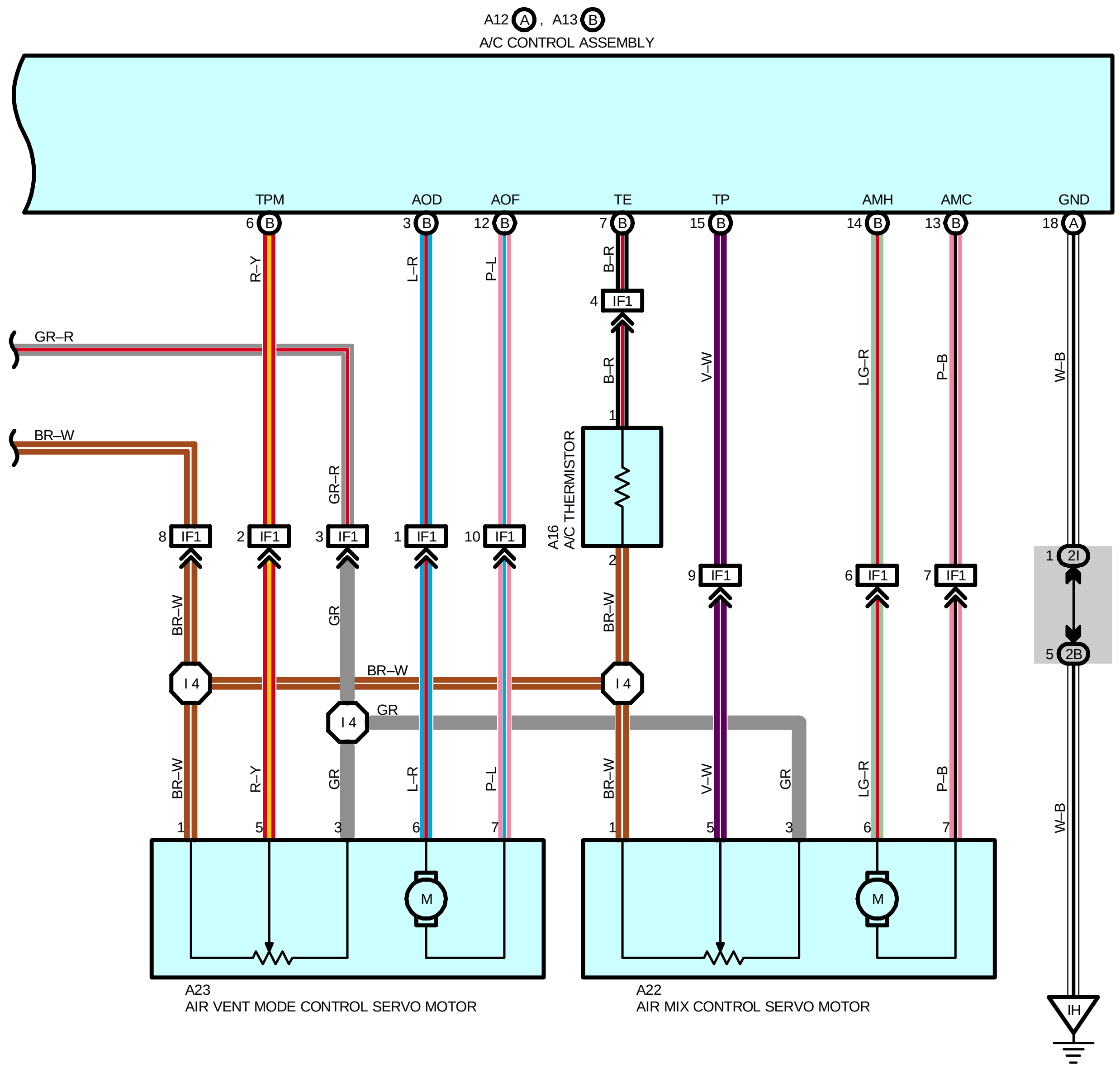
: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E2	42	Engine Room Main Wire			



FROM POWER SOURCE SYSTEM (SEE PAGE 56)
40A HEATER
10A A/C
HTR RELAY
A/C COMP RELAY
FROM DIODE (A/C)
J19 JUNCTION CONNECTOR
A 3 A/C MAGNETIC CLUTCH AND LOCK SENSOR
E 3 A, E 4 B, E 7 E
ENGINE CONTROL MODULE
LCK1
ACMG
PRE
TAM
E2
MPX1
A 4 A/C DUAL PRESSURE SW
J 2 JUNCTION CONNECTOR
A 1 A/C AMBIENT TEMP. SENSOR
B 3 A, B 4 B BLOWER MOTOR CONTROLLER
+B
SI
GND
M+
M–
B 2 BLOWER MOTOR
L–R
L–W
W–L
W–B
L–Y
LG–R
BR
IF2
IA3
EA1
IG
EA
EC


FROM POWER SOURCE SYSTEM (SEE PAGE 56)
10A RADIO NO. 2
10A ECU–IG
10A MPX–B
F11 FRONT WIPER MOTOR
+2
9 1A
3 1H
6 2I
GR
B–R
R–Y
L–R
4
10 2H
5 2I
J10 JUNCTION CONNECTOR
A
20 IA1
7 A
16 A
8 A
11 A
ACC
IG
+B
WIP
A12 A , A13 B
A/C CONTROL ASSEMBLY
MPX–
HR
BLW
TR
TS
S5
SG
TPI
AIR
AIF
1 A
10 A
12 A
17 B
5 B
8 B
20 B
16 B
11 B
2 B
L
V
L–W
GR–L
GR–R
BR–W
Y–G
R–W
J 8 JUNCTION CONNECTOR
J10 JUNCTION CONNECTOR
B
1 IE1
2 IE1
A14 A/C ROOM TEMP. SENSOR
A15 A/C SOLAR SENSOR
M
A21 AIR INLET CONTROL SERVO MOTOR



A12 A , A13 B
A/C CONTROL ASSEMBLY
TPM
AOD
AOF
TE
TP
AMH
AMC
GND
R–Y
L–R
P–L
B–R
V–W
LG–R
P–B
W–B
GR–R
BR–W
IF1
A16
A/C THERMISTOR
I 4
GR
2I
2B
IH
M
A23
AIR VENT MODE CONTROL SERVO MOTOR
A22
AIR MIX CONTROL SERVO MOTOR

SYSTEM OUTLINE

1. HEATER BLOWER OPERATION

Manual operation

When the blower speed is set to a certain level using the blower control SW, the A/C control assembly sends the signals to the blower control to control the blower motor speed.

Auto operation

When the auto SW is turned on, the A/C control assembly sends the signals from various sensors and temperature SW to the blower control to automatically control the blower motor speed.

2. AIR INLET CONTROL SERVO MOTOR CONTROL

When the FRESH/RECIRC select SW is set to RECIRC, the motor in the air inlet control servo motor starts rotating to move the damper toward the RECIRC side. The motor is continuously rotated until the damper reaches its stop position. When the FRESH/RECIRC select SW is set to FRESH, the motor in the air inlet control servo motor starts rotating to move the damper toward the FRESH side. The motor is continuously rotated until the damper reaches its stop position.

3. AIR VENT MODE CONTROL SERVO MOTOR CONTROL

When the mode select SW is pushed, the ECU in the A/C control assembly activates the air vent mode control servo motor. This causes the servo motor to rotate to the position (FACE, BI–LEVEL, FOOT, FOOT/DEF, DEF) selected using the mode select SW, and moves the film damper.

4. AIR MIX CONTROL SERVO MOTOR CONTROL

When the temperature control SW is pressed, the ECU in the A/C control assembly sends a signal to the air mix control servo motor. This signal drives the motor to reach the temperature set by the temperature control SW, and moves the film damper.

5. AIR CONDITIONING OPERATION

The A/C control assembly receives various signals, I.E., the engine RPM from the crankshaft position sensor, outlet temperature signal from the A/C ambient temp. sensor, coolant temperature from the engine coolant temp. sensor, etc. When the engine is started and the A/C SW is on, a signal is input to the ECU (Built into the A/C control assembly) to engine control module, through communication control of the body ECU etc. As a result, the current flows from A/C fuse to TERMINAL 1 of the A/C COMP relay to TERMINAL 2 to TERMINAL ACMG of the engine control module, turning the relay on so that the A/C magnetic clutch is on and the A/C compressor operates. At the same time, the engine control module detects the magnetic clutch is on and the A/C compressor operates and rotates the motor to the open direction to avoid lowering the engine RPM during A/C operation. When any of the following signals are input to the A/C control assembly, the A/C control assembly operates to turn off the air conditioning.

∗ Coolant temp. signal is high.
∗ A signal that the temperature at the air outlet is low.
∗ A signal that there is a large difference between engine speed and compressor speed.
∗ A signal that the refrigerant pressure is abnormally high or low.

SERVICE HINTS

A4 A/C DUAL PRESSURE SW

1–4 : Open with the refrigerant pressure at less than approx. **216** kpa (**2.2** kgf/cm^2, **31** psi) or more than approx. **3138** kpa (**32** kgf/cm^2, **455** psi)

A12 (A) A/C CONTROL ASSEMBLY

+B–GROUND : Always approx. **12** volts
ACC–GROUND: Approx. **12** volts with the ignition SW at **ACC** or **ON** position
IG–GROUND : Approx. **12** volts with the ignition SW at **ON** position
GND–GROUND :
Always continuity

○ : PARTS LOCATION

Code		See Page	Code		See Page	Code		See Page
A1		32	A21		34	E7	E	32
A3		32	A22		34	F11		32
A4		32	A23		34	J2		33
A12	A	34	B2		34	J8		35
A13	B	34	B3	A	34	J10		35
A14		34	B4	B	34	J19		35
A15		34	E3	A	32			
A16		34	E4	B	32			

AUTOMATIC AIR CONDITIONING

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
3	23	Engine Room No.3 R/B (Engine Compartment Left)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1H	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
2B	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2D	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2H		
2I		

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
IE1	44	Instrument Panel No.2 Wire and Instrument Panel Wire (Left Side of the Instrument Panel)
IF1	46	Instrument Panel Wire and A/C Sub Wire (Left Side of the Blower Unit)
IF2		

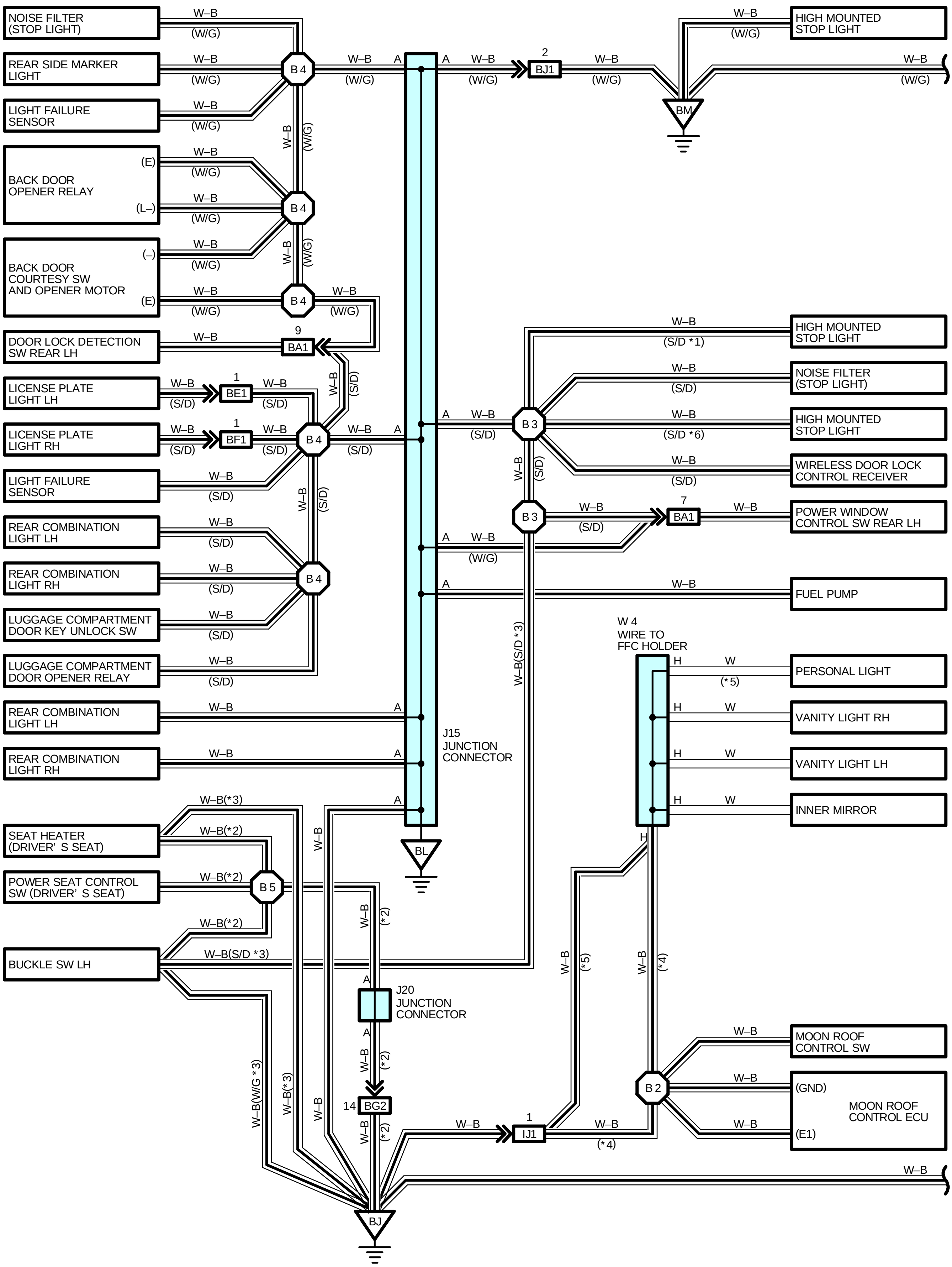
: GROUND POINTS

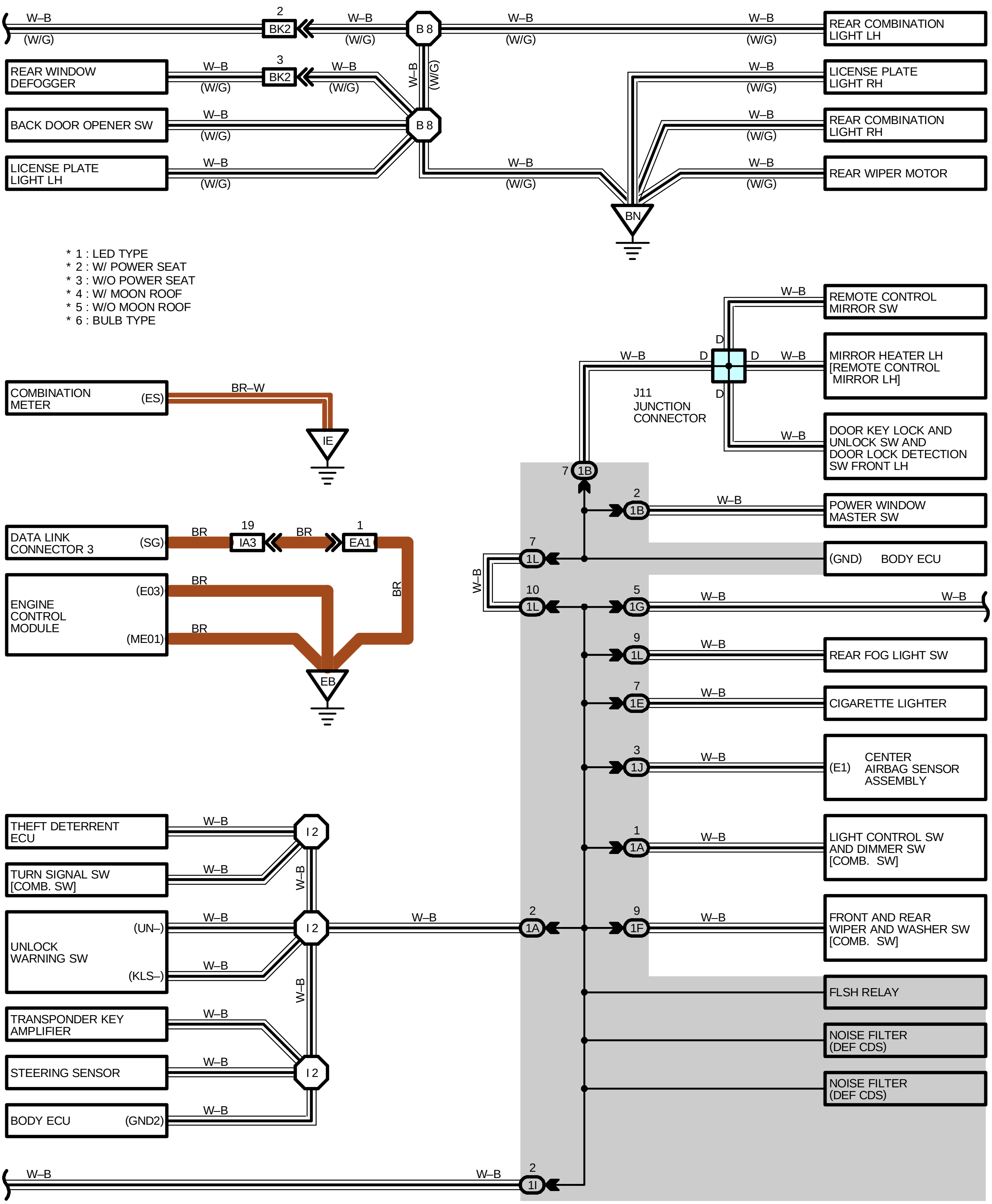
Code	See Page	Ground Points Location
EA	42	Front Side of the Intake Manifold
EC	42	Left Fender Apron
IG	44	Instrument Panel Reinforcement RH
IH	44	Cowl Side Panel RH

: SPLICE POINTS

Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
I4	46	A/C Sub Wire			

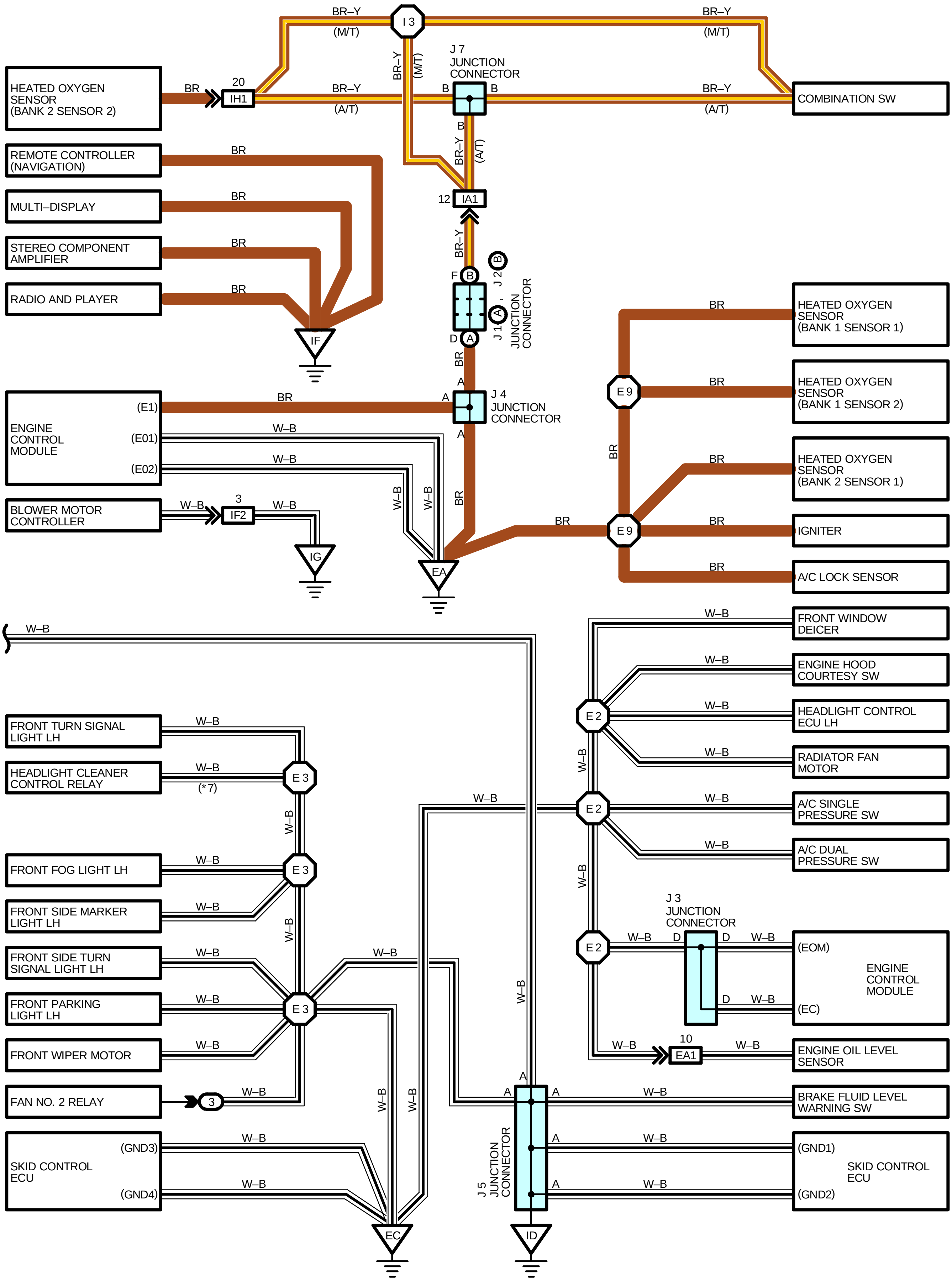
I GROUND POINT

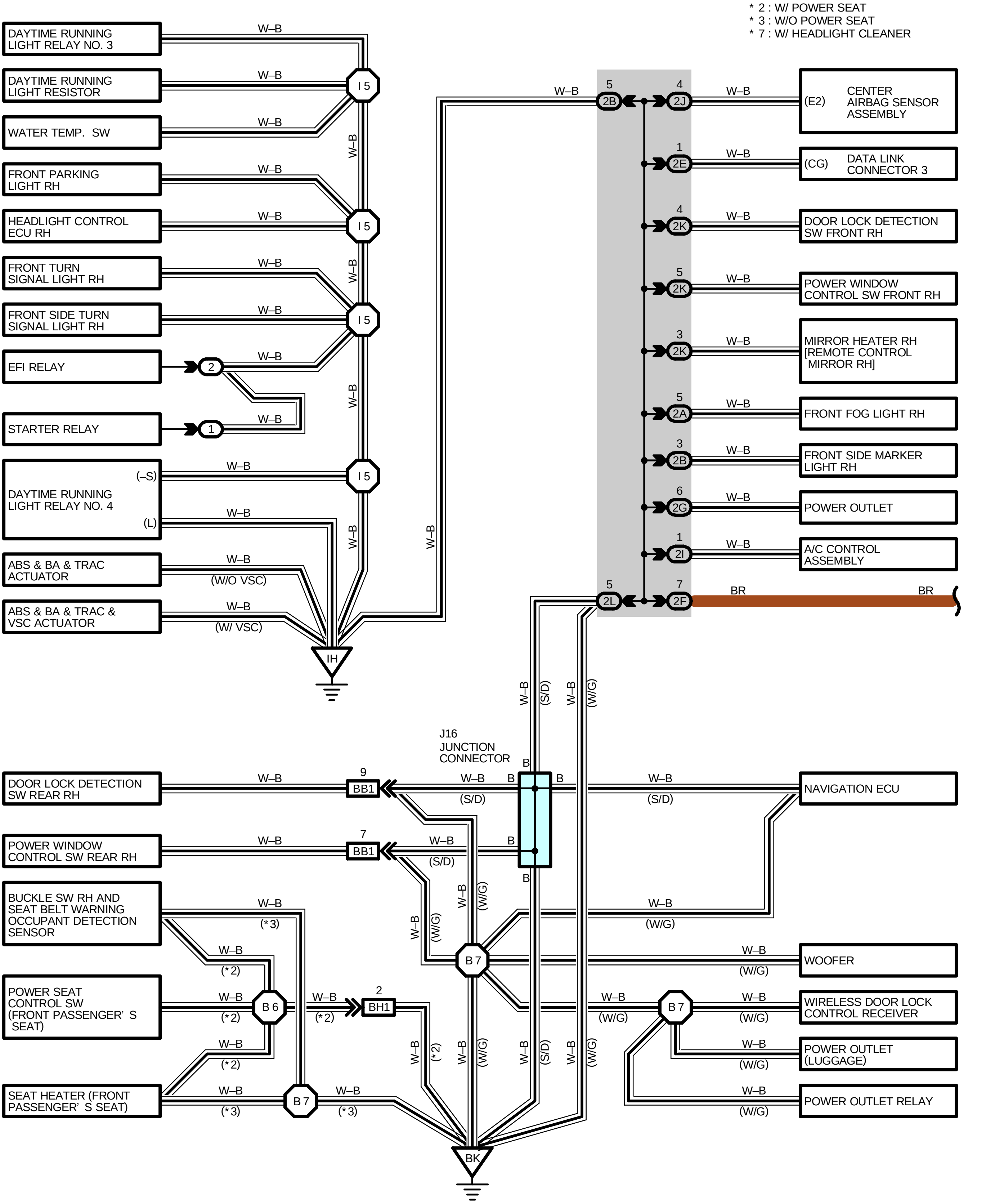




W–B
(W/G)
2
BK2
B 8
REAR COMBINATION LIGHT LH
REAR WINDOW DEFOGGER
3
BK2
LICENSE PLATE LIGHT RH
BACK DOOR OPENER SW
B 8
REAR COMBINATION LIGHT RH
LICENSE PLATE LIGHT LH
REAR WIPER MOTOR
BN
* 1 : LED TYPE
* 2 : W/ POWER SEAT
* 3 : W/O POWER SEAT
* 4 : W/ MOON ROOF
* 5 : W/O MOON ROOF
* 6 : BULB TYPE
REMOTE CONTROL MIRROR SW
MIRROR HEATER LH [REMOTE CONTROL MIRROR LH]
D
J11 JUNCTION CONNECTOR
DOOR KEY LOCK AND UNLOCK SW AND DOOR LOCK DETECTION SW FRONT LH
COMBINATION METER
(ES)
BR–W
IE
7
1B
2
1B
POWER WINDOW MASTER SW
DATA LINK CONNECTOR 3
(SG)
BR
19
IA3
1
EA1
7
1L
(GND)
BODY ECU
ENGINE CONTROL MODULE
(E03)
(ME01)
10
1L
5
1G
9
1L
REAR FOG LIGHT SW
EB
7
1E
CIGARETTE LIGHTER
3
1J
(E1)
CENTER AIRBAG SENSOR ASSEMBLY
THEFT DETERRENT ECU
I 2
1
1A
LIGHT CONTROL SW AND DIMMER SW [COMB. SW]
TURN SIGNAL SW [COMB. SW]
UNLOCK WARNING SW
(UN–)
(KLS–)
I 2
2
1A
9
1F
FRONT AND REAR WIPER AND WASHER SW [COMB. SW]
FLSH RELAY
TRANSPONDER KEY AMPLIFIER
NOISE FILTER (DEF CDS)
STEERING SENSOR
I 2
NOISE FILTER (DEF CDS)
BODY ECU
(GND2)
2
1I

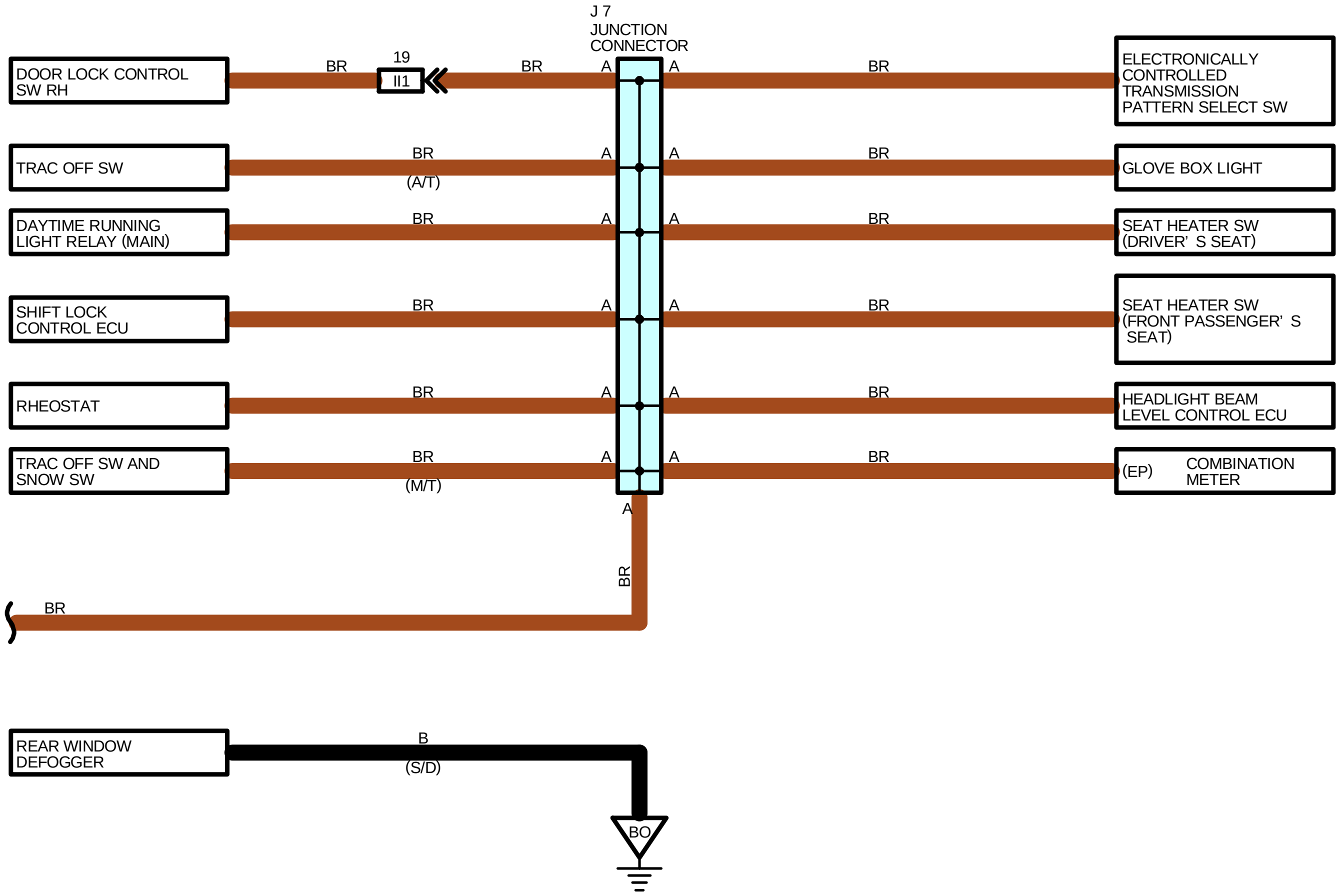
I GROUND POINT





* 2 : W/ POWER SEAT
* 3 : W/O POWER SEAT
* 7 : W/ HEADLIGHT CLEANER
DAYTIME RUNNING LIGHT RELAY NO. 3
DAYTIME RUNNING LIGHT RESISTOR
WATER TEMP. SW
FRONT PARKING LIGHT RH
HEADLIGHT CONTROL ECU RH
FRONT TURN SIGNAL LIGHT RH
FRONT SIDE TURN SIGNAL LIGHT RH
EFI RELAY
STARTER RELAY
DAYTIME RUNNING LIGHT RELAY NO. 4
(–S)
(L)
ABS & BA & TRAC ACTUATOR
(W/O VSC)
ABS & BA & TRAC & VSC ACTUATOR
(W/ VSC)
I 5
IH
W–B
CENTER AIRBAG SENSOR ASSEMBLY
(E2)
DATA LINK CONNECTOR 3
(CG)
DOOR LOCK DETECTION SW FRONT RH
POWER WINDOW CONTROL SW FRONT RH
MIRROR HEATER RH [REMOTE CONTROL MIRROR RH]
FRONT FOG LIGHT RH
FRONT SIDE MARKER LIGHT RH
POWER OUTLET
A/C CONTROL ASSEMBLY
BR
2B 2J 2E 2K 2A 2G 2I 2L 2F
J16 JUNCTION CONNECTOR
DOOR LOCK DETECTION SW REAR RH
POWER WINDOW CONTROL SW REAR RH
BUCKLE SW RH AND SEAT BELT WARNING OCCUPANT DETECTION SENSOR
POWER SEAT CONTROL SW (FRONT PASSENGER' S SEAT)
SEAT HEATER (FRONT PASSENGER' S SEAT)
BB1
BH1
B 6
B 7
(S/D)
(W/G)
(*2)
(*3)
NAVIGATION ECU
WOOFER
WIRELESS DOOR LOCK CONTROL RECEIVER
POWER OUTLET (LUGGAGE)
POWER OUTLET RELAY
BK

I GROUND POINT



: PARTS LOCATION

Code	See Page	Code	See Page	Code	See Page
J1 A	33	J7	35	J16	36 (S/D)
J2 B	33	J11	36 (S/D)	J20	40
J3	33		38 (W/G)	W4	37 (S/D)
J4	33	J15	36 (S/D)		39 (W/G)
J5	35		38 (W/G)		

: RELAY BLOCKS

Code	See Page	Relay Blocks (Relay Block Location)
1	22	Engine Room No.1 R/B (Engine Compartment Right)
2	22	Engine Room No.2 R/B (Engine Compartment Right)
3	23	Engine Room No.3 R/B (Engine Compartment Left)

: JUNCTION BLOCK AND WIRE HARNESS CONNECTOR

Code	See Page	Junction Block and Wire Harness (Connector Location)
1A	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1B	24	Front Door LH Wire and Driver Side J/B (Left Kick Panel)
1E	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1F		
1G	24	Engine Room Main Wire and Driver Side J/B (Left Kick Panel)
1I	24	Floor No.2 Wire and Driver Side J/B (Left Kick Panel)
1J	24	Instrument Panel Wire and Driver Side J/B (Left Kick Panel)
1L		
2A	26	Engine Room Main Wire and Passenger Side J/B (Right Kick Panel)
2B		
2E	26	Instrument Panel Wire and Passenger Side J/B (Right Kick Panel)
2F		
2G		
2I		
2J		
2K	26	Front Door RH Wire and Passenger Side J/B (Right Kick Panel)
2L	26	Floor Wire and Passenger Side J/B (Right Kick Panel)

: CONNECTOR JOINING WIRE HARNESS AND WIRE HARNESS

Code	See Page	Joining Wire Harness and Wire Harness (Connector Location)
EA1	42	Engine Wire and Engine Room Main Wire (Inside of the ECU Box)
IA1	44	Instrument Panel Wire and Engine Room Main Wire (Near the Driver Side J/B)
IA3		
IF2	46	Instrument Panel Wire and A/C Sub Wire (Left Side of the Blower Unit)
IH1	46	Instrument Panel Wire and Floor Wire (Near the Passenger Side J/B)
II1	46	Front Door RH Wire and Instrument Panel Wire (Right Kick Panel)
IJ1	46	Roof Wire and Floor No.2 Wire (Left Side of the Instrument Panel)
BA1	48 (S/D)	Rear Door No.2 Wire and Floor No.2 Wire (Left Center Pillar)
	50 (W/G)	
BB1	48 (S/D)	Rear Door No.1 Wire and Floor Wire (Right Center Pillar)
	50 (W/G)	
BE1	48 (S/D)	Floor No.2 Wire and Luggage Room Wire (Near the License Plate Light LH)
BF1	48 (S/D)	Floor No.2 Wire and Luggage Room Wire (Near the License Plate Light RH)
BG2	52	Floor No.2 Wire and Front Seat LH Wire (Under the Driver’s Seat)
BH1	52	Floor Wire and Front Seat RH Wire (Under the Front Passenger’s Seat)
BJ1	50 (W/G)	Back Door No.1 Wire and Floor No.2 Wire (Left Side of the Back Panel Upper)
BK2	50 (W/G)	Back Door No.1 Wire and Back Door No.2 Wire (Left Side of the Back Panel Lower)

I GROUND POINT

: GROUND POINTS

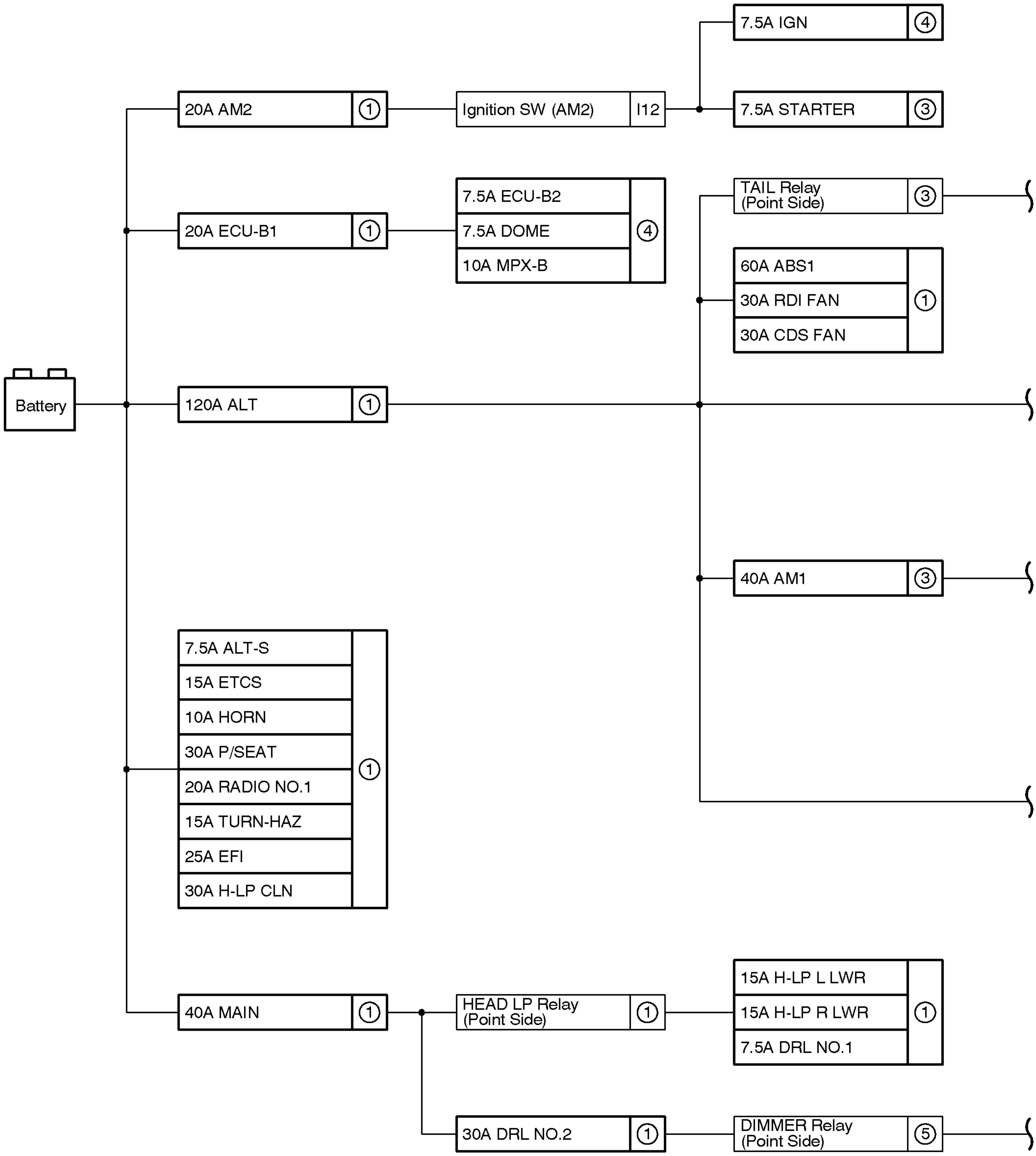
Code	See Page	Ground Points Location
EA	42	Front Side of the Intake Manifold
EB	42	Center Side of the Intake Manifold
EC	42	Left Fender Apron
ID	44	Cowl Side Panel LH
IE	44	Front Floor Panel Center LH
IF	44	Front Floor Panel Center RH
IG	44	Instrument Panel Reinforcement RH
IH	44	Cowl Side Panel RH
BJ	48 (S/D)	Front Floor Panel LH
	50 (W/G)	
BK	48 (S/D)	Front Floor Panel RH
	50 (W/G)	
BL	48 (S/D)	Left Quarter Panel LH
	50 (W/G)	
BM	50 (W/G)	Left Side of the Back Panel Upper
BN	50 (W/G)	Right Side of the Back Panel Lower
BO	48 (S/D)	Roof Side Panel LH

: SPLICE POINTS

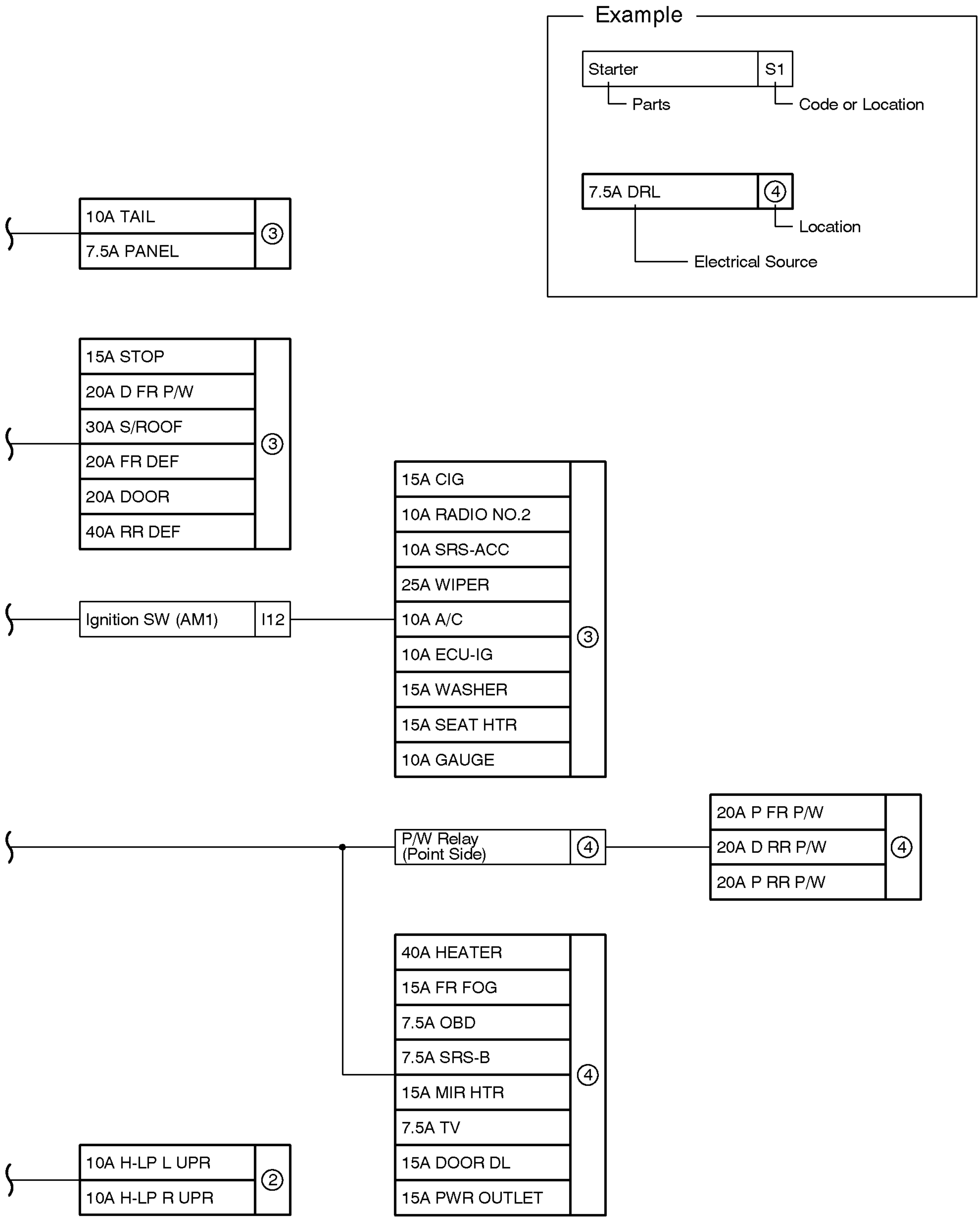
Code	See Page	Wire Harness with Splice Points	Code	See Page	Wire Harness with Splice Points
E2	42	Engine Room Main Wire	B3	48 (S/D)	Floor No.2 Wire
E3			B4	48 (S/D)	
E9	42	Engine Wire		50 (W/G)	
I2	46	Instrument Panel Wire	B5	52	Front Seat LH Wire
I3			B6	52	Front Seat RH Wire
I5	46	Engine Room Main Wire	B7	48 (S/D)	Floor Wire
B2	48 (S/D)	Roof Wire		50 (W/G)	
	50 (W/G)		B8	50 (W/G)	Back Door No.2 Wire

J POWER SOURCE (Current Flow Chart)

The chart below shows the route by which current flows from the battery to each electrical source (Fusible Link, Circuit Breaker, Fuse, etc.) and other Parts.



[LOCATION] ① : Engine Room No.1 R/B (See Page 22) ② : Engine Room No.2 R/B (See Page 22)
⑤ : Engine Room No.3 R/B (See Page 23)



3 : Driver Side J/B (See Page 24)   4 : Passenger Side J/B (See Page 26)

Engine Room No.1 R/B

Fuse		System	Page
7.5A	ABS2	ABS and Traction Control VSC	216 210
7.5A	ALT–S	Charging	64
7.5A	DRL NO.1	Headlight	82
10A	HORN	Horn Theft Deterrent	240 186
15A	ETCS	Cruise Control Electronically Controlled Transmission and A/T Indicator Engine Control	202 196 68
15A	H–LP L LWR	Front Fog Light Headlight	88 82
15A	H–LP R LWR	Headlight	82
15A	TURN–HAZ	Turn Signal and Hazard Warning Light	92
20A	AM2	Engine Control Starting and Ignition	68 60
20A	RADIO NO.1	Radio and Player (S/D) Radio and Player (W/G)	262 266
25A	EFI	Cruise Control Electronically Controlled Transmission and A/T Indicator Engine Control Engine Immobiliser System	202 196 68 80
30A	CDS FAN	Radiator Fan and Condenser Fan	282
30A	DRL NO.2	Headlight	82
30A	H–LP CLN	Headlight Cleaner	122
30A	P/SEAT	Power Seat (Driver's Seat) Power Seat (Front Passenger's Seat)	248 252
30A	RDI FAN	Radiator Fan and Condenser Fan	282
40A	MAIN	Automatic Light Control Headlight Headlight Cleaner Light Auto Turn Off Starting and Ignition Theft Deterrent	112 82 122 116 60 186
60A	ABS1	ABS and Traction Control VSC	216 210
120A	ALT	Automatic Light Control Charging Illumination Light Auto Turn Off Multiplex Communication System Power Window	112 64 94 116 138 168

∗ These are the page numbers of the first page on which the related system is shown.

Fuse		System	Page
120A	ALT	Rear Window Defogger and Mirror Heater	272
		Taillight (S/D)	98
		Taillight (W/G)	102
		Theft Deterrent	186

Engine Room No.2 R/B (See Page 22)

Fuse		System	Page
10A	H–LP L UPR	Headlight	82
10A	H–LP R UPR	Headlight	82

Driver Side J/B (See Page 24)

Fuse		System	Page
7.5A	PANEL	Combination Meter	276
		Illumination	94
		Multiplex Communication System	138
		Rear Fog Light	90
7.5A	STARTER	Electronically Controlled Transmission and A/T Indicator	196
		Engine Control	68
		LEXUS Navigation System	256
		Starting and Ignition	60
10A	A/C	Automatic Air Conditioning	286
10A	ECU–IG	ABS and Traction Control	216
		Automatic Air Conditioning	286
		Automatic Glare–Resistant EC Mirror	236
		Automatic Light Control	112
		Compass	238
		Cruise Control	202
		Door Lock Control and Wireless Door Lock Control	176
		Headlight	82
		Headlight Beam Level Control	126
		Interior Light	154
		Key Reminder and Seat Belt Warning	162
		LEXUS Navigation System	256
		Light Auto Turn Off	116
		Moon Roof	228
		Multiplex Communication System	138
		Power Window	168
		Radiator Fan and Condenser Fan	282
		Shift Lock	232
		Theft Deterrent	186
		VSC	210
10A	GAUGE	ABS and Traction Control	216
		Back–Up Light	110
		Charging	64

∗ These are the page numbers of the first page on which the related system is shown.

J POWER SOURCE (Current Flow Chart)

Fuse		System	Page
10A	GAUGE	Combination Meter	276
		Cruise Control	202
		Electronically Controlled Transmission and A/T Indicator	196
		Engine Control	68
		Front Window Deicer	270
		Headlight	82
		Headlight Beam Level Control	126
		Interior Light	154
		Key Reminder and Seat Belt Warning	162
		LEXUS Navigation System	256
		Multiplex Communication System	138
		Power Seat (Driver's Seat)	248
		Power Window	168
		Rear Window Defogger and Mirror Heater	272
		Shift Lock	232
		Stop Light (S/D)	106
		Stop Light (W/G)	108
		Taillight (S/D)	98
		Taillight (W/G)	102
		Turn Signal and Hazard Warning Light	92
		VSC	210
10A	RADIO NO.2	Automatic Air Conditioning	286
		Cigarette Lighter and Power Outlet	242
		Clock	244
		Door Lock Control and Wireless Door Lock Control	176
		Interior Light	154
		Key Reminder and Seat Belt Warning	162
		LEXUS Navigation System	256
		Light Auto Turn Off	116
		Multiplex Communication System	138
		Power Window	168
		Radio and Player (S/D)	262
		Radio and Player (W/G)	266
		Remote Control Mirror	246
		Shift Lock	232
		Theft Deterrent	186
10A	SRS–ACC	SRS	223
10A	TAIL	Taillight (S/D)	98
		Taillight (W/G)	102
15A	CIG	Cigarette Lighter and Power Outlet	242
15A	SEAT HTR	Seat Heater	254
15A	STOP	ABS and Traction Control	216
		Cruise Control	202
		Electronically Controlled Transmission and A/T Indicator	196

∗ These are the page numbers of the first page on which the related system is shown.

Fuse		System	Page
15A	STOP	Engine Control	68
		Shift Lock	232
		Stop Light (S/D)	106
		Stop Light (W/G)	108
		VSC	210
15A	WASHER	Front Wiper and Washer	130
		Headlight Cleaner	122
		Rear Wiper and Washer	134
20A	D FR P/W	Multiplex Communication System	138
		Power Window	168
20A	DOOR	Back Door Opener	194
		Door Lock Control and Wireless Door Lock Control	176
		Interior Light	154
		Key Reminder and Seat Belt Warning	162
		Light Auto Turn Off	116
		Multiplex Communication System	138
		Power Window	168
		Theft Deterrent	186
20A	FR DEF	Front Window Deicer	270
25A	WIPER	Front Wiper and Washer	130
		Rear Wiper and Washer	134
30A	S/ROOF	Moon Roof	228
40A	RR DEF	Rear Window Defogger and Mirror Heater	272

Passenger Side J/B

Fuse		System	Page
7.5A	DOME	Door Lock Control and Wireless Door Lock Control	176
		Garage Door Opener	234
		Interior Light	154
		Light Auto Turn Off	116
		Multiplex Communication System	138
		Theft Deterrent	186
7.5A	ECU–B2	Automatic Light Control	112
		Headlight	82
		Light Auto Turn Off	116
		Power Seat (Driver’s Seat)	248
		Rear Fog Light	90
		Theft Deterrent	186
		VSC	210
7.5A	IGN	Cruise Control	202
		Electronically Controlled Transmission and A/T Indicator	196
		Engine Control	68
		Engine Immobiliser System	80
		SRS	223

∗ These are the page numbers of the first page on which the related system is shown.

J POWER SOURCE (Current Flow Chart)

Fuse		System	Page
7.5A	OBD	Cruise Control Electronically Controlled Transmission and A/T Indicator Engine Control	202 196 68
7.5A	SRS–B	Combination Meter Interior Light Multiplex Communication System SRS	276 154 138 223
7.5A	TV	LEXUS Navigation System	256
10A	MPX–B	Automatic Air Conditioning Back Door Opener Charging Clock Combination Meter Cruise Control Door Lock Control and Wireless Door Lock Control Electronically Controlled Transmission and A/T Indicator Engine Control Headlight Interior Light Key Reminder and Seat Belt Warning Light Auto Turn Off Multiplex Communication System Power Window Theft Deterrent	286 194 64 244 276 202 176 196 68 82 154 162 116 138 168 186
15A	DOOR DL	Theft Deterrent	186
15A	FR FOG	Front Fog Light	88
15A	MIR HTR	Rear Window Defogger and Mirror Heater	272
15A	PWR OUTLET	Cigarette Lighter and Power Outlet	242
20A	D RR P/W	Multiplex Communication System Power Window	138 168
20A	P FR P/W	Multiplex Communication System Power Window	138 168
20A	P RR P/W	Multiplex Communication System Power Window	138 168
40A	HEATER	Automatic Air Conditioning	286

∗ These are the page numbers of the first page on which the related system is shown.

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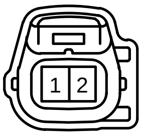
Black



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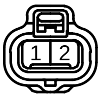

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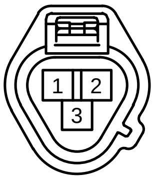

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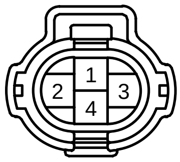

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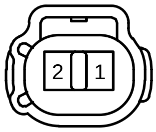

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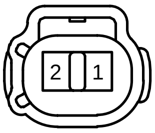

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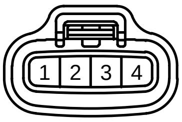

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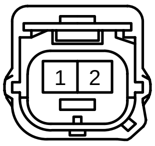

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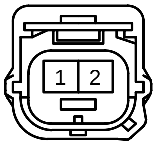

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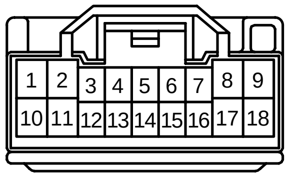

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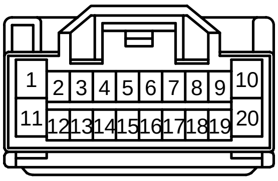

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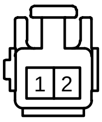
Blue



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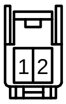

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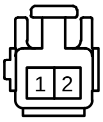

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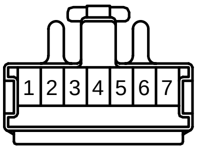

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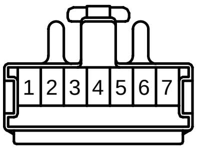

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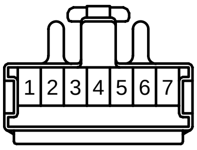
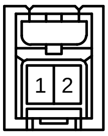


A24
Yellow



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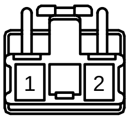
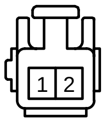


A26

A27



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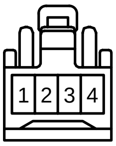
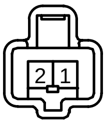


A29
(S/D) Gray



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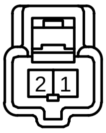
(W/G) Gray



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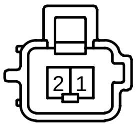
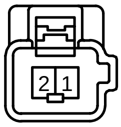
(S/D)



A30
(W/G)



A31
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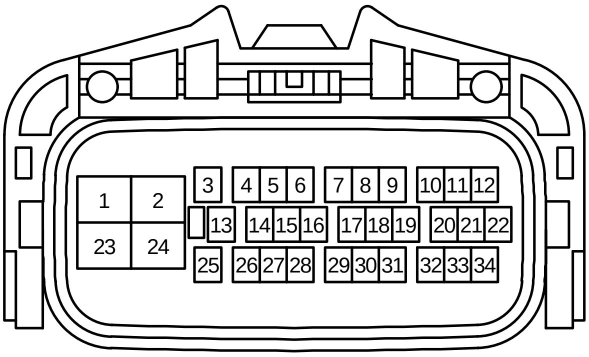

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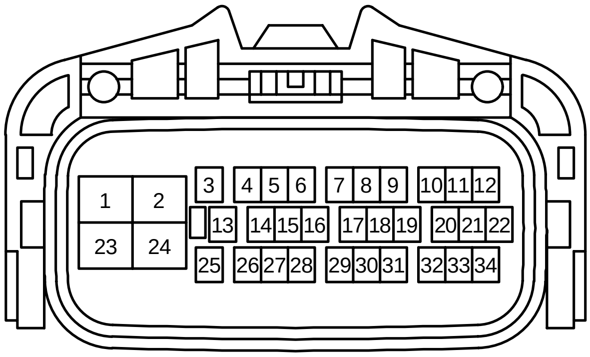

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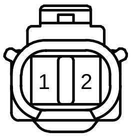

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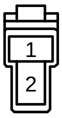

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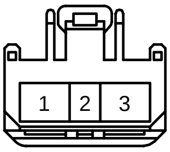

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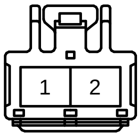

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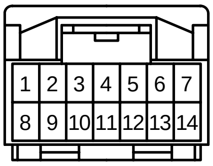

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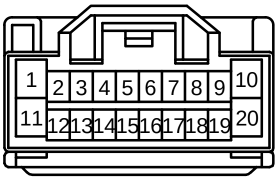
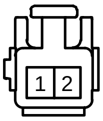
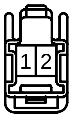


B 7
(w/ Power Seat)



B 7
(w/o Power Seat)



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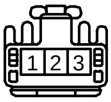

B 9
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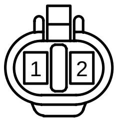

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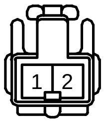

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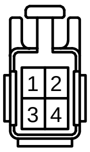

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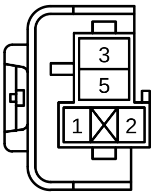

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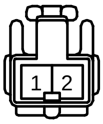

C 1
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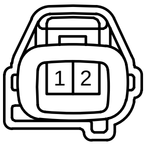

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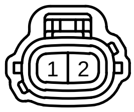

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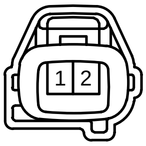

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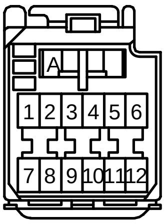

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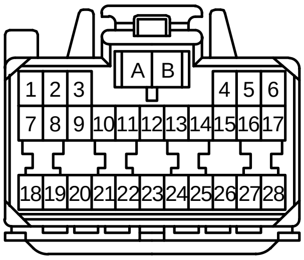
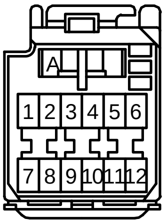
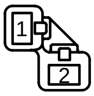
Yellow



C 6
Yellow



C 7



C 8
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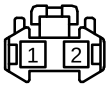
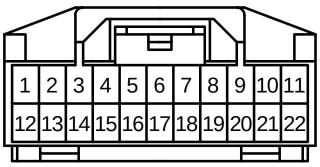


C 9



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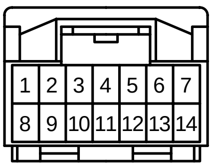

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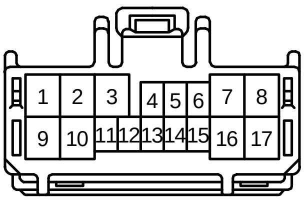

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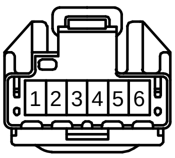

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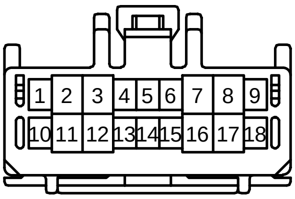

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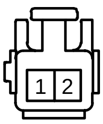
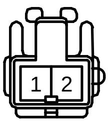
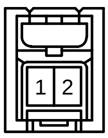


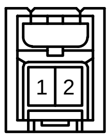
C15



C16
Yellow



C17
Yellow



K CONNECTOR LIST

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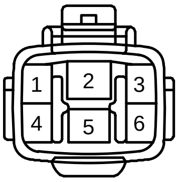

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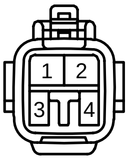

D 4
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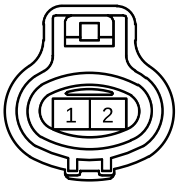
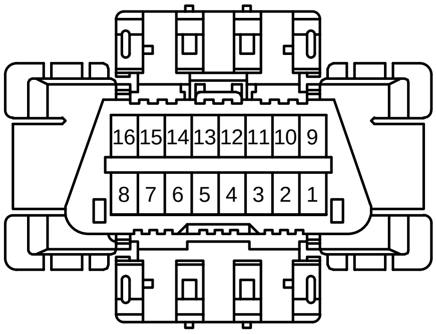


D 5



D 6
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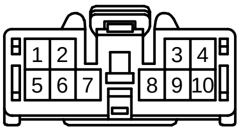
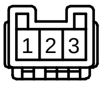
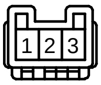


D 7



D 8



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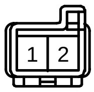

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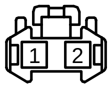

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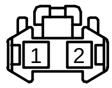


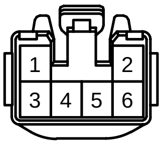
D12

D13

D14

D15

D16
Black



D17
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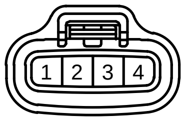

D18
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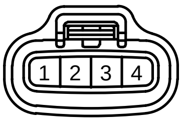

D19
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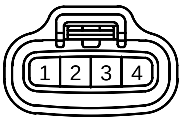

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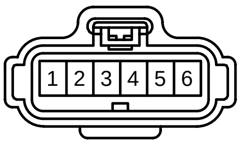

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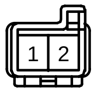
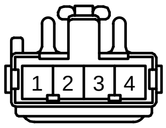


D22



E 1
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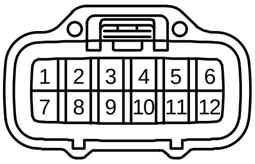

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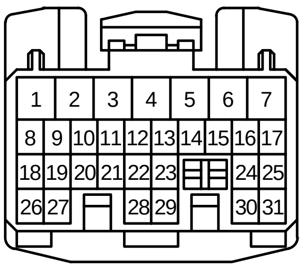

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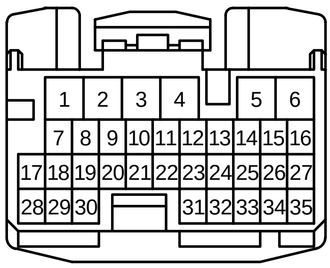
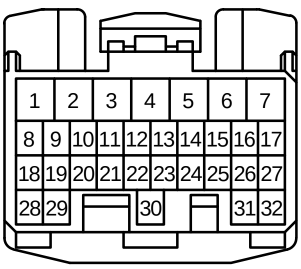


E 5



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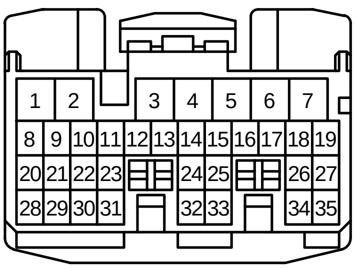
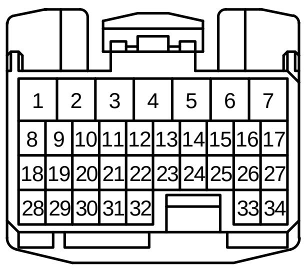


E 7



E 8
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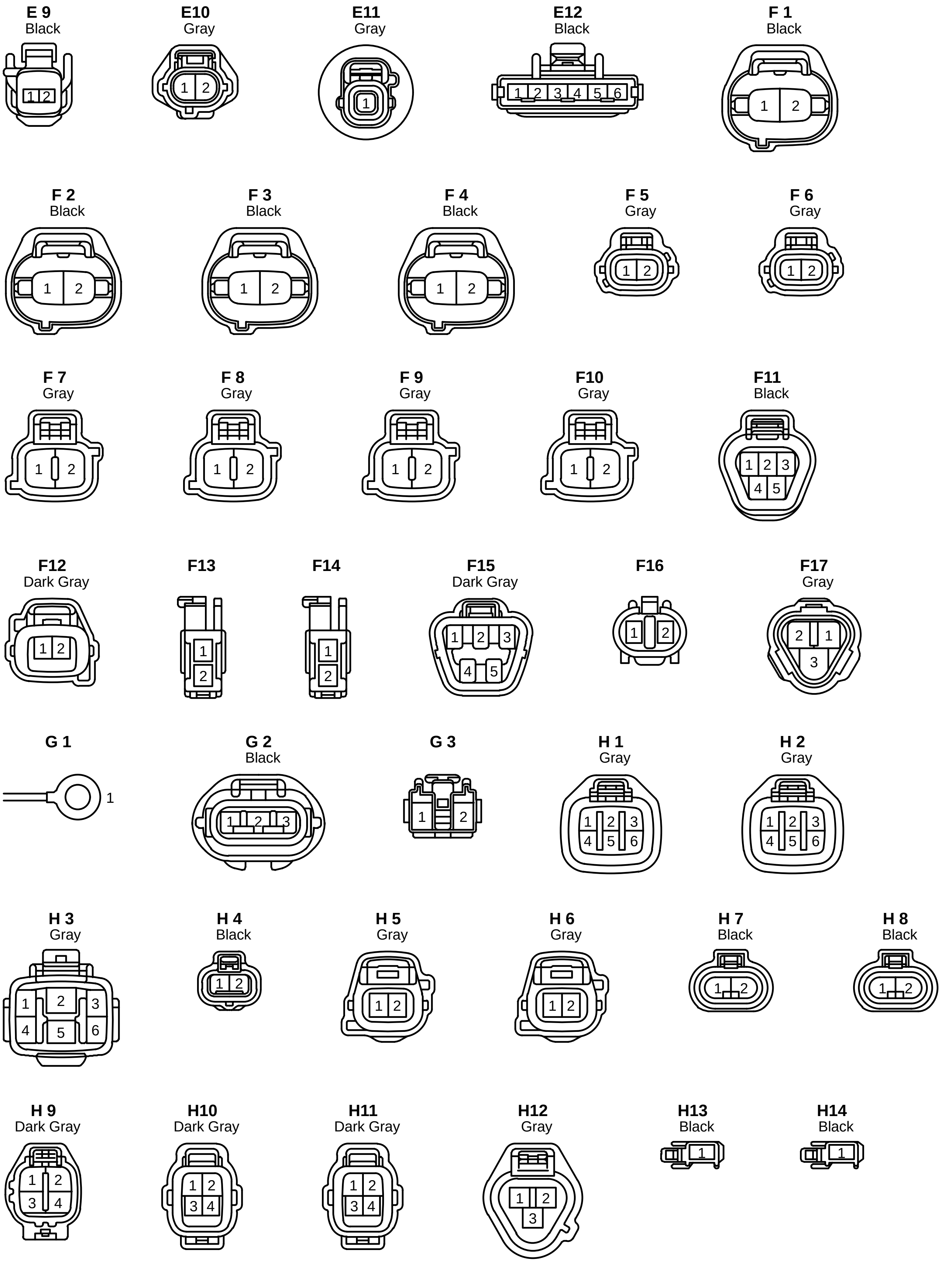
E 9
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E10
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E11
Gray
E12
Black
F 1
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F 2
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F 3
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F 4
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F 6
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F 7
Gray
F 8
Gray
F 9
Gray
F10
Gray
F11
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F12
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F13
F14
F15
Dark Gray
F16
F17
Gray
G 1
G 2
Black
G 3
H 1
Gray
H 2
Gray
H 3
Gray
H 4
Black
H 5
Gray
H 6
Gray
H 7
Black
H 8
Black
H 9
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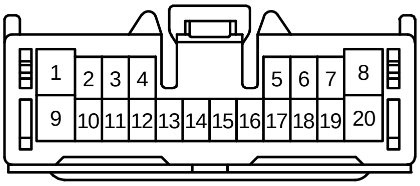
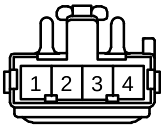
H10
Dark Gray
H11
Dark Gray
H12
Gray
H13
Black
H14
Black

K CONNECTOR LIST

H15



H16
Black



H17
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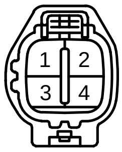
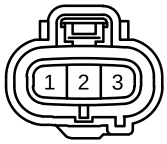
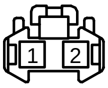


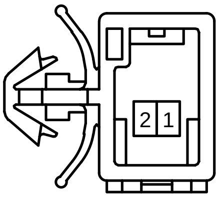
H18
Black



H19
(Bulb Type)



H19
(LED Type)



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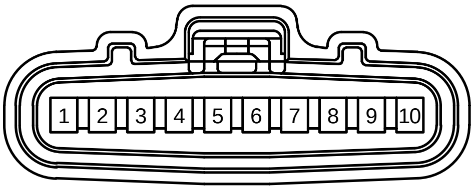
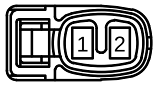
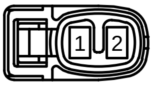


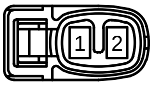
I 2
Black



I 3
Black



I 4
Black



I 5
Dark Gray

I 6
Brown

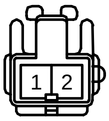
I 7
Dark Gray

I 8
Brown

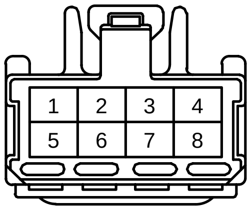
I 9
Dark Gray

I10
Brown

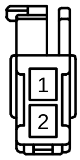
I11



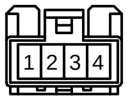
I12



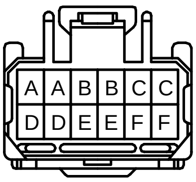
I13



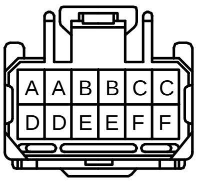
I14



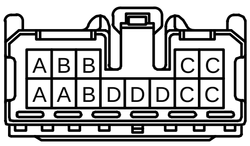
J 1



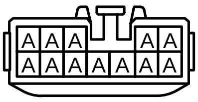
J 2



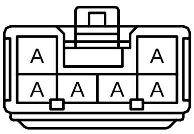
J 3



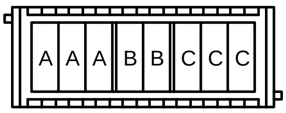
J 4



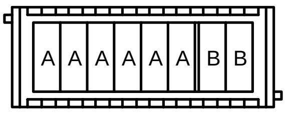
J 5



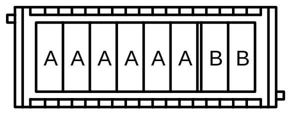
J 6
Black



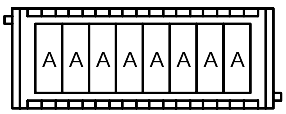
J 7
Gray



J 8
Gray



J 9
Blue



J10
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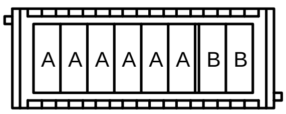
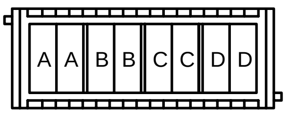
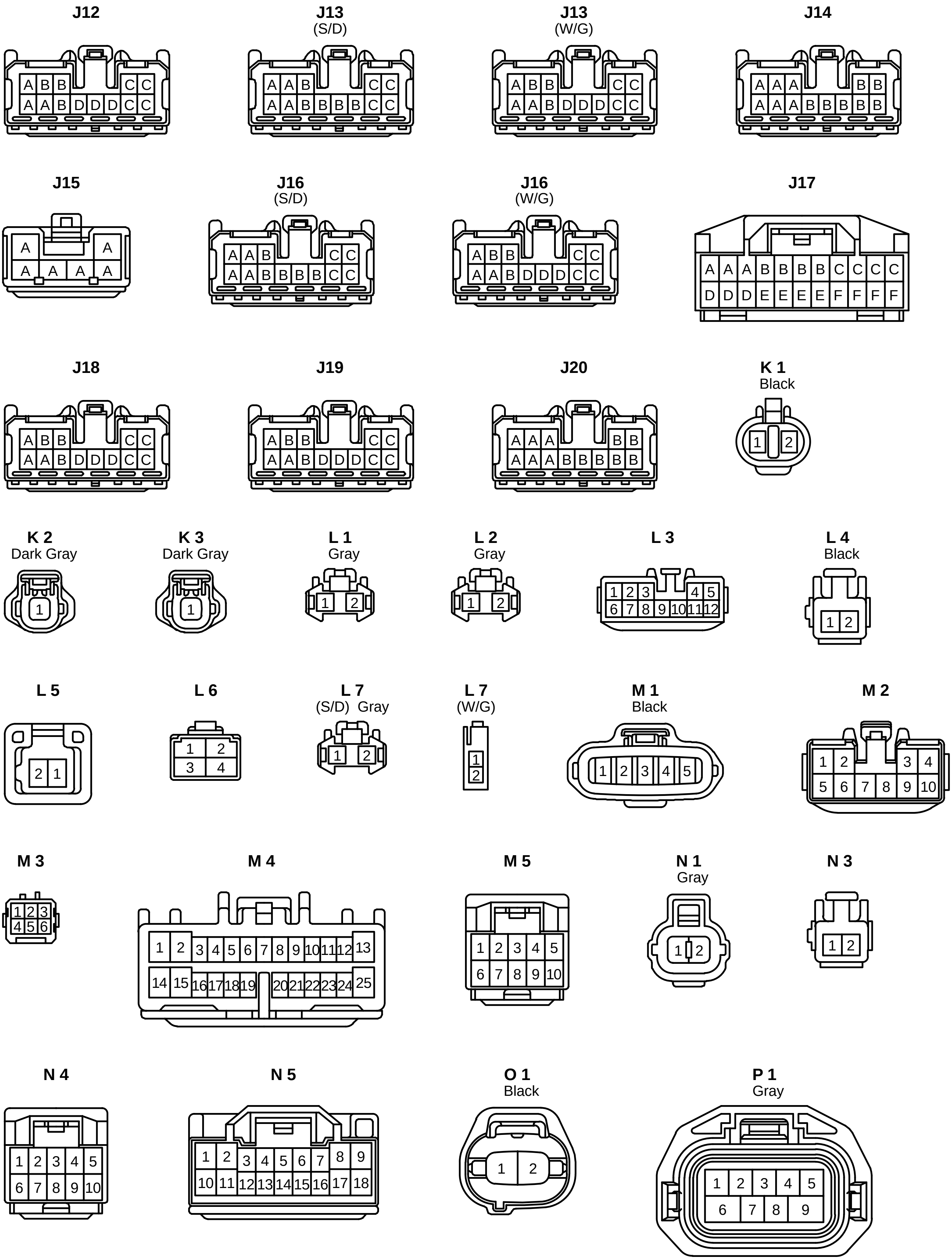


J11




J12
A B B C C
A A B D D D C C
J13
(S/D)
A A B C C
A A B B B B C C
J13
(W/G)
A B B C C
A A B D D D C C
J14
A A A B B
A A A B B B B B
J15
A A
A A A A
J16
(S/D)
A A B C C
A A B B B B C C
J16
(W/G)
A B B C C
A A B D D D C C
J17
A A A B B B B C C C C
D D D E E E E F F F F
J18
A B B C C
A A B D D D C C
J19
A B B C C
A A B D D D C C
J20
A A A B B
A A A B B B B B
K 1
Black
1 2
K 2
Dark Gray
1
K 3
Dark Gray
1
L 1
Gray
1 2
L 2
Gray
1 2
L 3
1 2 3 4 5
6 7 8 9 10 11 12
L 4
Black
1 2
L 5
2 1
L 6
1 2
3 4
L 7
(S/D) Gray
1 2
L 7
(W/G)
1
2
M 1
Black
1 2 3 4 5
M 2
1 2 3 4
5 6 7 8 9 10
M 3
1 2 3
4 5 6
M 4
1 2 3 4 5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20 21 22 23 24 25
M 5
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6 7 8 9 10
N 1
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1 2
N 3
1 2
N 4
1 2 3 4 5
6 7 8 9 10
N 5
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10 11 12 13 14 15 16 17 18
O 1
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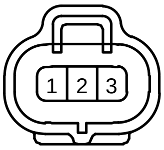
1 2
P 1
Gray
1 2 3 4 5
6 7 8 9

P 2
Black


P 3
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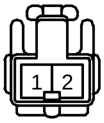
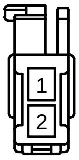
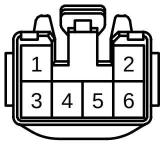
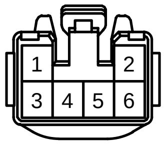
P 4


P 5


P 6


P 7


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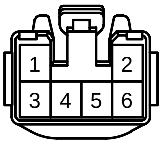

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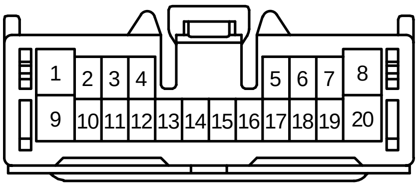

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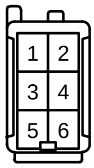

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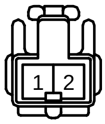

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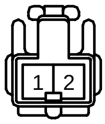

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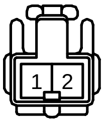

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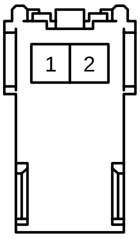

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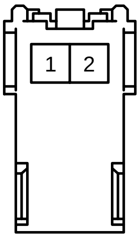

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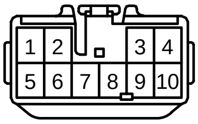

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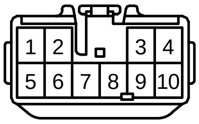

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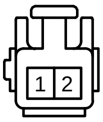

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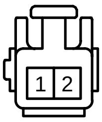

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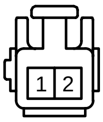

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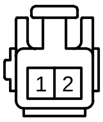

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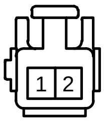

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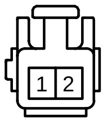

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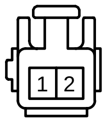

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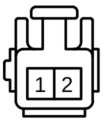

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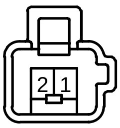

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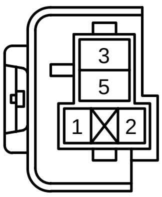

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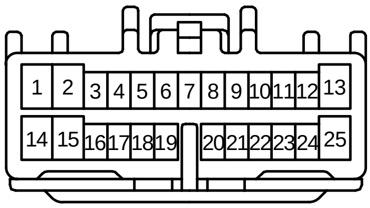

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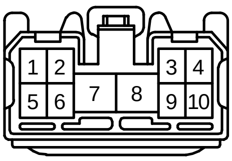

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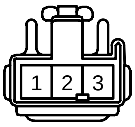

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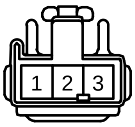

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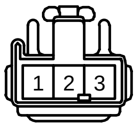

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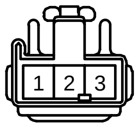

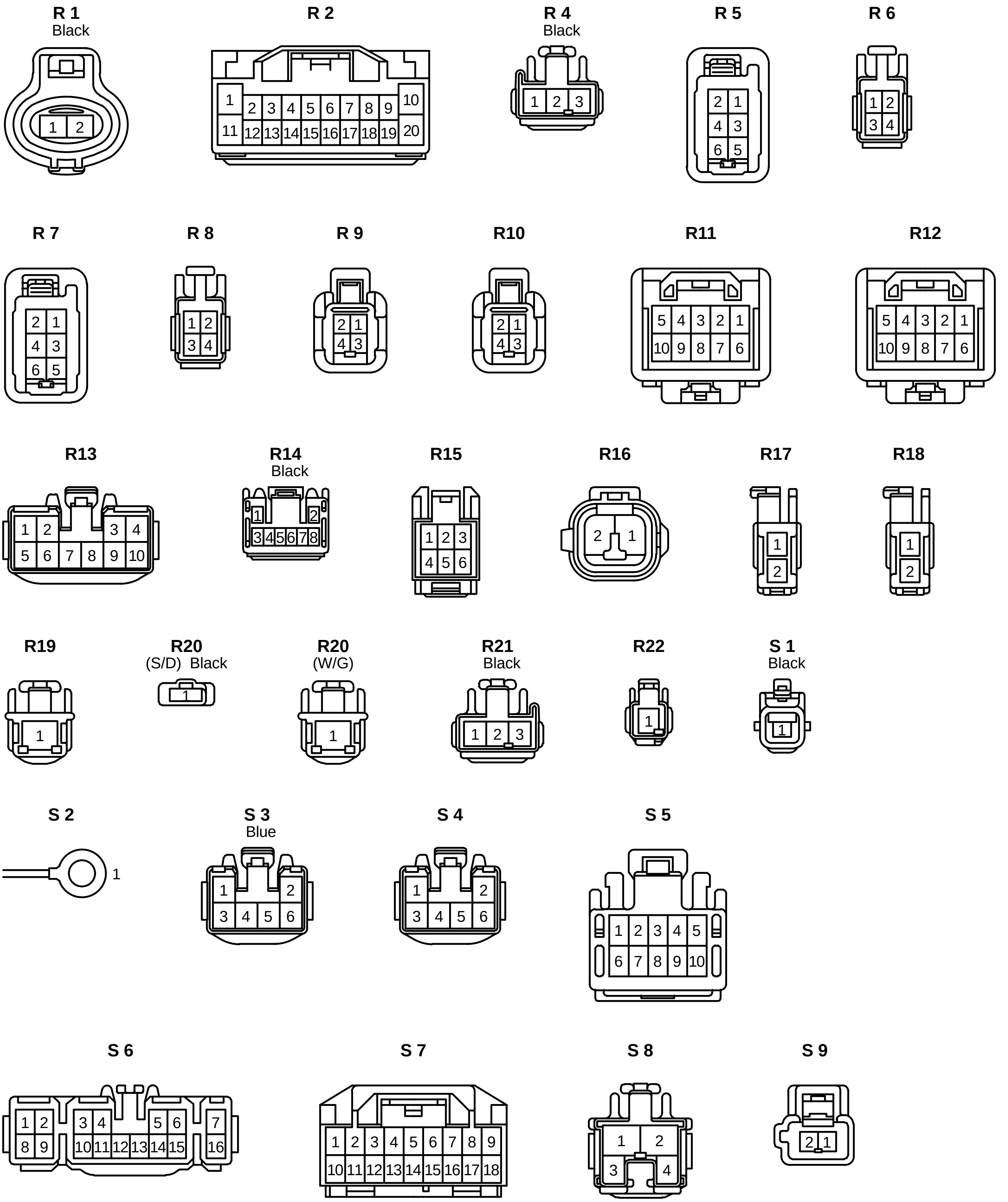
R 1
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R 2
R 4
Black
R 5
R 6
R 7
R 8
R 9
R10
R11
R12
R13
R14
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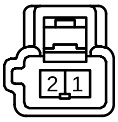
R15
R16
R17
R18
R19
R20
(S/D) Black
R20
(W/G)
R21
Black
R22
S 1
Black
S 2
S 3
Blue
S 4
S 5
S 6
S 7
S 8
S 9

S10



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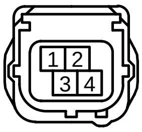

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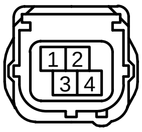

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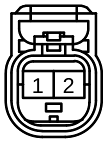

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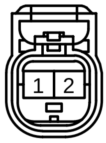

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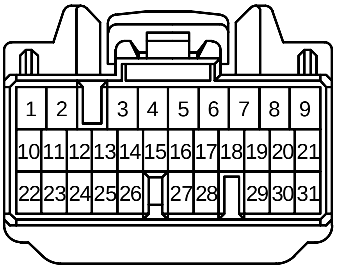

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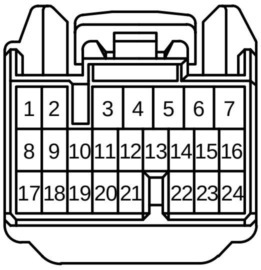

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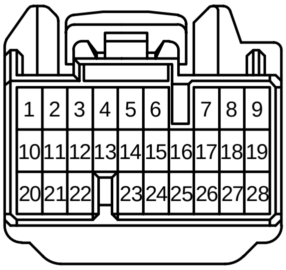

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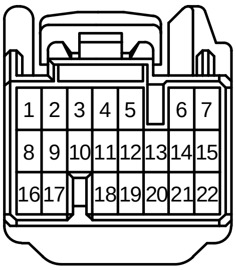

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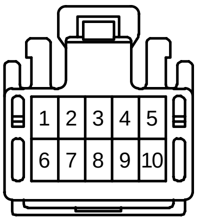

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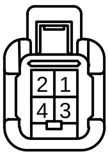

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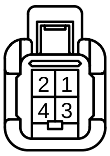

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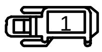

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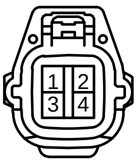

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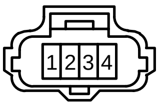

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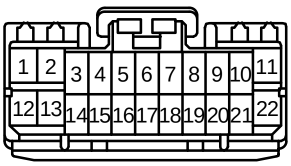

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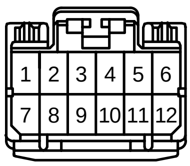

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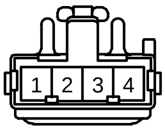

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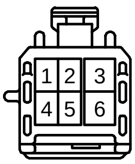

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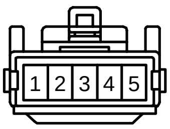

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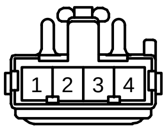

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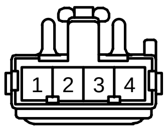

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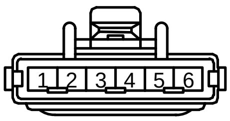

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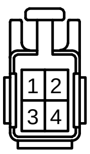

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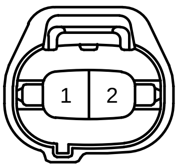

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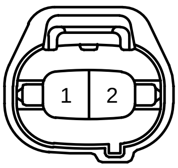
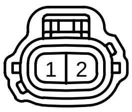
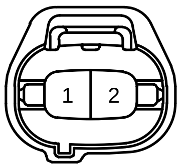


V 3
Gray



V 4
Blue



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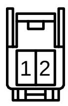

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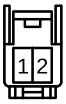

V 7
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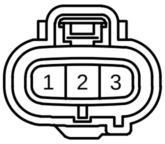

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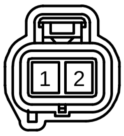
Blue



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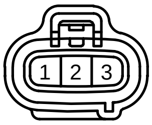

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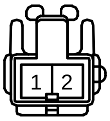

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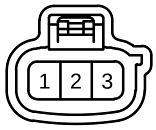

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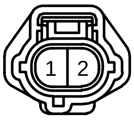

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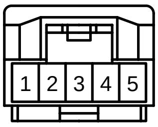

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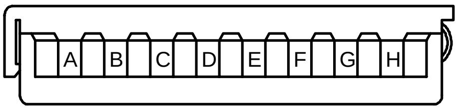

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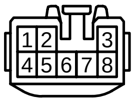

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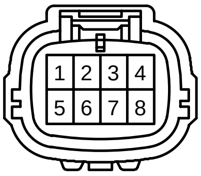


L PART NUMBER OF CONNECTORS

Code	Part Name	Part Number
A 1	A/C Ambient Temp. Sensor	90980–11070
A 2	A/C Condenser Fan Motor	90980–11410
A 3	A/C Magnetic Clutch and Lock Sensor	90980–11016
A 4	A/C Triple Pressure SW (A/C Dual and Single Pressure SW)	90980–10943
A 7	ABS Speed Sensor Front LH	90980–11002
A 8	ABS Speed Sensor Front RH	
A 9	Accel Position Sensor	90980–11150
A10	Airbag Sensor Front LH	90980–11856
A11	Airbag Sensor Front RH	
A12	A/C Control Assembly	90980–11973
A13	A/C Control Assembly	90980–11971
A14	A/C Room Temp. Sensor	90980–10825
A15	A/C Solar Sensor	90980–11918
A16	A/C Thermistor	90980–10825
A21	Air Inlet Control Servo Motor	90980–11165
A22	Air Mix Control Servo Motor	
A23	Air Vent Mode Control Servo Motor	
A24	Airbag Squib (Front Passenger Airbag Assembly)	90980–11886
A25	Airbag Squib (Steering Wheel Pad)	90980–10850
A26	Antenna Amplifier	90980–10871
A27	Ashtray Illumination	90980–10825
A28	Automatic Light Control Sensor	90980–11107
A29	ABS Speed Sensor Rear LH (S/D)	90980–11060
	ABS Speed Sensor Rear LH (W/G)	90980–10859
A30	ABS Speed Sensor Rear RH (S/D)	90980–11299
	ABS Speed Sensor Rear RH (W/G)	90980–10824
A31	ABS & BA & TRAC Actuator	90980–12020
A32	ABS & BA & TRAC & VSC Actuator	
B 1	Brake Fluid Level Warning SW	90980–11207
B 2	Blower Motor	90980–10214
B 3	Blower Motor Controller	90980–11667
B 4	Blower Motor Controller	90980–11579
B 5	Body ECU	90980–11911
B 6	Body ECU	90980–11971
B 7	Buckle SW LH (w/ Power Seat)	90980–10825
	Buckle SW LH (w/o Power Seat)	90980–11212
B 8	Buckle SW RH and Seat Belt Warning Occupant Detection Sensor	90980–11471
B 9	Back–Up Light SW	90980–11142
B10	Brake Pedal Load Sensing SW	90980–10860
B11	Back Door Courtesy SW and Opener Motor	90980–10795
B12	Back Door Opener Relay	82660–53010
B13	Back Door Opener SW	90980–10860
C 1	Camshaft Position Sensor	90980–10947
C 2	Camshaft Timing Oil Control Valve	90980–11162

Code	Part Name	Part Number
C 3	Crankshaft Position Sensor	90980–10947
C 4	Center Airbag Sensor Assembly	90980–11873
C 5	Center Airbag Sensor Assembly	90980–11872
C 6	Center Airbag Sensor Assembly	90980–11871
C 7	Cigarette Lighter	90980–10760
C 8	Cigarette Lighter Illumination	90980–11148
C 9	Combination Meter	90980–11915
C10	Combination Meter	90980–11911
C11	Combination SW	90980–11672
C12	Combination SW	90980–11616
C13	Combination SW	90980–11594
C14	Clutch Start SW	90980–10825
C15	Cruise Control Clutch SW	90980–10906
C16	Curtain Shield Airbag Squib LH	90980–11886
C17	Curtain Shield Airbag Squib RH	
D 2	Daytime Running Light Relay No.3	90980–10939
D 3	Daytime Running Light Relay No.4	90980–10940
D 4	Daytime Running Light Resistor	90980–10928
D 5	Data Link Connector 3	90980–11665
D 6	Daytime Running Light Relay (Main)	90980–11450
D 7	Diode (A/C)	90980–11251
D 8	Diode (Headlight Cleaner)	
D 9	Diode (Luggage Compartment Light)	90980–10962
D10	Door Courtesy Light Front LH	90980–11148
D11	Door Courtesy Light Front RH	
D12	Door Courtesy SW Front LH	90980–10871
D13	Door Courtesy SW Front RH	
D14	Door Courtesy SW Rear LH	
D15	Door Courtesy SW Rear RH	
D16	Door Lock Control SW RH	90980–10797
D17	Door Lock Motor and Door Lock Detection SW Front RH	90980–11150
D18	Door Lock Motor and Door Lock Detection SW Rear LH	
D19	Door Lock Motor and Door Lock Detection SW Rear RH	
D20	Door Lock Motor, Door Key Lock and Unlock SW and Door Lock Detection SW Front LH	90980–11858
D21	Diode (Fog Light)	90980–10962
D22	Driver’s Position Memory SW	90980–11090
E 1	Electronically Controlled Transmission Solenoid	90980–11151
E 3	Engine Control Module	90980–12142
E 4	Engine Control Module	90980–12146
E 5	Engine Control Module	90980–12143
E 6	Engine Control Module	90980–12145
E 7	Engine Control Module	90980–12144

Note: Not all of the above part numbers of the connector are established for the supply.

Code	Part Name	Part Number
E 8	Engine Coolant Temp. Sensor	90980–10736
E 9	Engine Hood Courtesy SW	90980–11189
E10	Engine Oil Level Sensor	90980–11235
E11	Engine Oil Pressure SW	90980–11363
E12	Electronically Controlled Transmission Pattern Select SW	90980–10933
F 1	Front Fog Light LH	90980–11156
F 2	Front Fog Light RH	
F 3	Front Parking Light LH	
F 4	Front Parking Light RH	
F 5	Front Side Marker Light LH	90980–11162
F 6	Front Side Marker Light RH	
F 7	Front Side Turn Signal Light LH	90980–11019
F 8	Front Side Turn Signal Light RH	
F 9	Front Turn Signal Light LH	
F10	Front Turn Signal Light RH	
F11	Front Wiper Motor	90980–11599
F12	Fuel Pump Resistor	90980–10901
F13	Front Door Speaker LH	90980–10935
F14	Front Door Speaker RH	
F15	Fuel Pump and Sender	90980–11077
F16	Fuel Sender (Sub)	90980–11140
F17	Front Window Deicer	90980–11295
G 1	Generator	90980–09363
G 2	Generator	90980–11349
G 3	Glove Box Light	90980–11098
H 1	Headlight Beam Level Control Actuator LH	90980–11144
H 2	Headlight Beam Level Control Actuator RH	
H 3	Headlight Cleaner Control Relay	90980–10939
H 4	Headlight Cleaner Motor	90980–11410
H 5	Headlight Control ECU LH	90980–11255
H 6	Headlight Control ECU RH	
H 7	Headlight LH (High)	90980–11095
H 8	Headlight RH (High)	
H 9	Heated Oxygen Sensor (Bank 1 Sensor 1)	90980–11028
H10	Heated Oxygen Sensor (Bank 1 Sensor 2)	90980–10869
H11	Heated Oxygen Sensor (Bank 2 Sensor 1)	
H12	Height Control Sensor Front LH	90980–11016
H13	Horn LH	90980–10619
H14	Horn RH	
H15	Headlight Beam Level Control ECU	90980–11469
H16	Headlight Cleaner SW	90980–11013
H17	Heated Oxygen Sensor (Bank 2 Sensor 2)	90980–11028
H18	Height Control Sensor Rear LH	90980–11860
H19	High Mounted Stop Light (Bulb Type)	90980–11148
	High Mounted Stop Light (LED Type)	90980–11967
I 1	Igniter	90980–11653

Code	Part Name	Part Number
I 2	Ignition Coil No.1	90980–11246
I 3	Ignition Coil No.2	
I 4	Ignition Coil No.3	
I 5	Injector No.1	90980–11153
I 6	Injector No.2	
I 7	Injector No.3	
I 8	Injector No.4	
I 9	Injector No.5	
I10	Injector No.6	
I11	Ignition Key Cylinder Light	90980–10906
I12	Ignition SW	90980–11615
I13	Interior Light	90980–10935
I14	Inner Mirror	90980–11950
J 1	Junction Connector	90980–11661
J 2	Junction Connector	
J 3	Junction Connector	90980–11542
J 4	Junction Connector	90980–10803
J 5	Junction Connector	90980–10976
J 6	Junction Connector	82824–10020
J 7	Junction Connector	82824–16060
J 8	Junction Connector	
J 9	Junction Connector	82824–10030
J10	Junction Connector	82824–16060
J11	Junction Connector	82824–10010
J12	Junction Connector	90980–11542
J13	Junction Connector	
J14	Junction Connector	
J15	Junction Connector	90980–10976
J16	Junction Connector	90980–11542
J17	Junction Connector	90980–11915
J18	Junction Connector	90980–11542
J19	Junction Connector	
J20	Junction Connector	
K 1	Keyless Buzzer	90980–11142
K 2	Knock Sensor 1	90980–11166
K 3	Knock Sensor 2	
L 1	License Plate Light LH	90980–11148
L 2	License Plate Light RH	
L 3	Light Failure Sensor	90980–10803
L 4	Luggage Compartment Door Courtesy SW and Opener Motor	90980–10825
L 5	Luggage Compartment Door Key Unlock SW	90980–11368
L 6	Luggage Compartment Door Opener Relay	90980–10171
L 7	Luggage Compartment Light (S/D)	90980–11148
	Luggage Compartment Light (W/G)	90980–10121
M 1	Mass Air Flow Meter	90980–11317

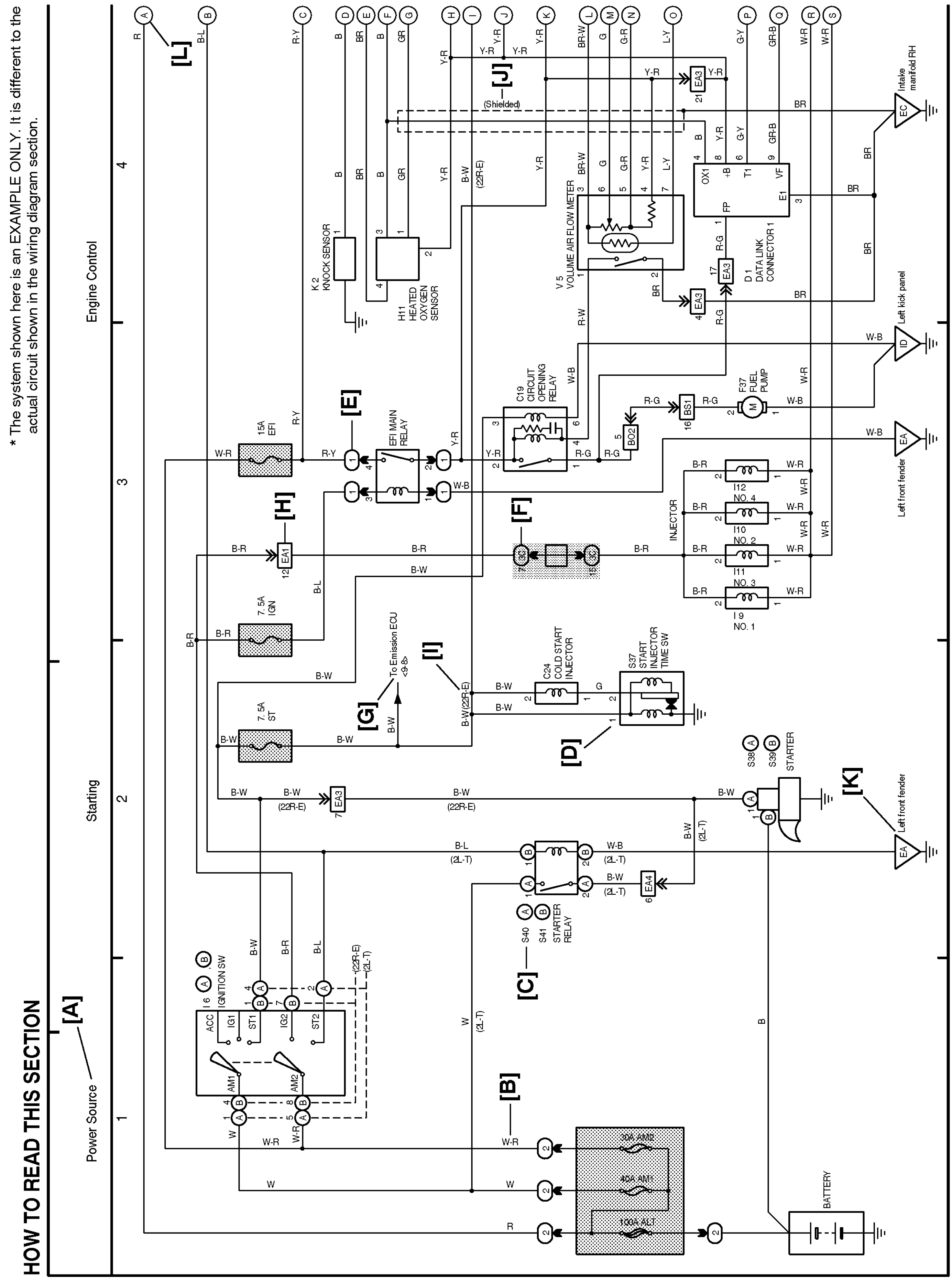
L PART NUMBER OF CONNECTORS

Code	Part Name	Part Number
M 2	Moon Roof Control ECU	90980–10801
M 3	Moon Roof Control SW	90980–10367
M 4	Multi–Display	90980–11877
M 5	Multi–Display	90980–11923
N 1	Noise Filter (Ignition)	90980–10843
N 3	Noise Filter (Stop Light)	90980–10825
N 4	Navigation ECU	90980–11923
N 5	Navigation ECU	90980–11973
O 1	O/D Direct Clutch Speed Sensor	90980–11156
P 1	Park/Neutral Position SW	90980–11784
P 2	Power Steering Oil Pressure Sensor	90980–10845
P 3	Parking Brake SW	90980–10871
P 4	Power Outlet	90980–10860
P 5	Personal Light	90980–10935
P 6	Power Window Control SW Front RH	90980–10797
P 7	Power Window Control SW Rear LH	
P 8	Power Window Control SW Rear RH	
P 9	Power Window Master SW	90980–11469
P10	Power Window Motor Front LH	90980–11011
P11	Power Window Motor Front RH	90980–10860
P12	Power Window Motor Rear LH	
P13	Power Window Motor Rear RH	
P14	Pretensioner LH	90980–12253
P15	Pretensioner RH	
P16	Power Seat Control SW (Driver’s Seat)	90980–10997
P17	Power Seat Control SW (Front Passenger’s Seat)	
P18	Power Seat Motor (Driver’s Seat Front Vertical Control)	90980–10825
P19	Power Seat Motor (Driver’s Seat Rear Vertical Control)	
P20	Power Seat Motor (Driver’s Seat Reclining Control)	
P21	Power Seat Motor (Driver’s Seat Slide Control)	
P22	Power Seat Motor (Front Passenger’s Seat Front Vertical Control)	
P23	Power Seat Motor (Front Passenger’s Seat Rear Vertical Control)	
P24	Power Seat Motor (Front Passenger’s Seat Reclining Control)	
P25	Power Seat Motor (Front Passenger’s Seat Slide Control)	
P26	Power Outlet (Luggage)	90980–11300
P27	Power Outlet Relay	82660–20340
P28	Power Seat ECU	90980–11877
P29	Power Seat ECU	90980–11527
P30	Power Seat Position Sensor (Driver’s Seat Front Vertical Control)	90980–11296
P31	Power Seat Position Sensor (Driver’s Seat Slide Control)	90980–10908
P32	Power Seat Position Sensor (Driver’s Seat Rear Vertical Control)	
P33	Power Seat Position Sensor (Driver’s Seat Reclining Control)	
R 1	Radiator Fan Motor	90980–10928
R 2	Radio and Player	90980–12038
R 4	Rheostat	90980–10908
R 5	Rear Combination Light LH	90980–11587
R 6	Rear Combination Light LH	90980–10795
R 7	Rear Combination Light RH	90980–11587
R 8	Rear Combination Light RH	90980–10795
R 9	Rear Speaker and Woofer LH	90980–11399
R10	Rear Speaker and Woofer RH	
R11	Remote Control Mirror LH	90980–11922
R12	Remote Control Mirror RH	
R13	Remote Control Mirror SW	90980–10801
R14	Rear Fog Light SW	90980–11533
R15	Remote Controller (Navigation)	90980–12012
R16	Rear Side Marker Light	90980–11247
R17	Rear Speaker LH	90980–10935
R18	Rear Speaker RH	
R19	Rear Window Defogger	90980–11259
R20	Rear Window Defogger (S/D)	90980–10913
	Rear Window Defogger (W/G)	90980–11259
R21	Rear Wiper Motor	90980–11296
R22	Rear Wiper Motor	90980–10871
S 1	Starter	90980–11400
S 2	Starter	90980–09531
S 3	Seat Heater SW (Driver’s Seat)	90980–10797
S 4	Seat Heater SW (Front Passenger’s Seat)	
S 5	Shift Lock Control ECU	90980–11581
S 6	Stereo Component Amplifier	90980–10848
S 7	Stereo Component Amplifier	90980–11913
S 8	Stop Light SW	90980–11118
S 9	Seat Heater (Driver’s Seat)	90980–10905
S10	Seat Heater (Front Passenger’s Seat)	
S11	Side Airbag Sensor LH	90980–11857
S12	Side Airbag Sensor RH	
S13	Side Airbag Squib LH	90980–11864
S14	Side Airbag Squib RH	
S15	Skid Control ECU	90980–11421
S16	Skid Control ECU	90980–11476
S17	Skid Control ECU	90980–11637
S18	Skid Control ECU	90980–11638

Note: Not all of the above part numbers of the connector are established for the supply.

Code	Part Name	Part Number
S19	Steering Sensor	90980–11581
S20	Squawker LH	90980–11399
S21	Squawker RH	
T 1	Theft Deterrent Horn	90980–10619
T 2	Throttle Control Motor	90980–10942
T 3	Throttle Position Sensor	90980–10711
T 5	Theft Deterrent ECU	90980–11392
T 6	Theft Deterrent ECU	90980–11424
T 7	TRAC Off SW	90980–11013
T 8	Transmission Control SW (L–2)	90980–11493
T 9	Transponder Key Amplifier	90980–10789
T12	Tweeter LH	90980–11013
T13	Tweeter RH	
T14	TRAC Off SW and SNOW SW	90980–10933
U 1	Unlock Warning SW	90980–10795
V 1	Vehicle Speed Sensor (Electronically Controlled Transmission)	90980–11156

Code	Part Name	Part Number
V 2	VSV (ACIS)	90980–11149
V 3	VSV (Canister Closed Valve)	90980–11162
V 4	VSV (EVAP)	90980–11156
V 5	Vanity Light LH	90980–11918
V 6	Vanity Light RH	
V 7	Vapor Pressure Sensor	90980–11860
V 8	VSV (Pressure Switching Valve)	90980–11859
V 9	Vehicle Speed Sensor (Combination Meter)	90980–11143
V10	VSC Warning Buzzer	90980–10906
W 1	Washer Motor	90980–10981
W 2	Water Temp. SW	90980–11235
W 3	Wireless Door Lock Control Receiver	90980–11909
W 4	Wire to FFC Holder	82824–53010
W 5	Woofer	90980–10799
Y 1	Yaw Rate Sensor	90980–12080



HOW TO READ THIS SECTION
* The system shown here is an EXAMPLE ONLY. It is different to the actual circuit shown in the wiring diagram section.
Power Source
Starting
Engine Control
[A]
[B]
[C]
[D]
[E]
[F]
[G]
[H]
[I]
[J]
[K]
[L]
I 6 A, B IGNITION SW
AM1
AM2
ACC
IG1
ST1
IG2
ST2
30A AM2
40A AM1
100A ALT
BATTERY
S40 A S41 B STARTER RELAY
S38 A S39 B STARTER
Left front fender
7.5A ST
7.5A IGN
15A EFI
EFI MAIN RELAY
To Emission ECU <9-8>
C24 COLD START INJECTOR
S37 START INJECTOR TIME SW
C19 CIRCUIT OPENING RELAY
F37 FUEL PUMP
INJECTOR
I12 NO. 4
I10 NO. 2
I11 NO. 3
I 9 NO. 1
Left kick panel
K 2 KNOCK SENSOR
H11 HEATED OXYGEN SENSOR
V 5 VOLUME AIR FLOW METER
D 1 DATA LINK CONNECTOR 1
Intake manifold RH
(Shielded)

[A] : System Title

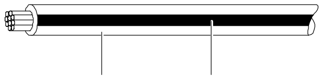
[B] : Indicates the wiring color.

Wire colors are indicated by an alphabetical code.

B = Black	W = White	BR = Brown
L = Blue	V = Violet	SB = Sky Blue
R = Red	O = Orange	LG = Light Green
P = Pink	Y = Yellow	GR = Gray
G = Green		

The first letter indicates the basic wire color and the second letter indicates the color of the stripe.

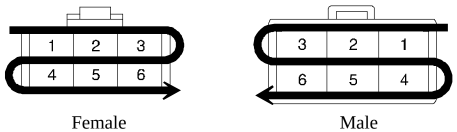
Example: L – Y



[C] : The position of the parts is the same as shown in the wiring diagram and wire routing.

[D] : Indicates the pin number of the connector. The numbering system is different for female and male connectors.

Example : Numbered in order from upper left to lower right — Numbered in order from upper right to lower left



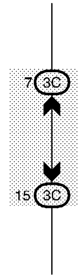
The numbering system for the overall wiring diagram is the same as above

[E] : Indicates a Relay Block. No shading is used and only the Relay Block No. is shown to distinguish it from the J/B.

Example : (1) Indicates Relay Block No.1

[F] : Junction Block (The number in the circle is the J/B No. and the connector code is shown beside it). Junction Blocks are shaded to clearly separate them from other parts.

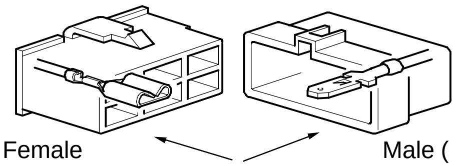
Example:



3C indicates that it is inside Junction Block No.3

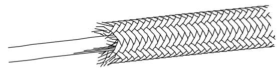
[G] : Indicates related system.

[H] : Indicates the wiring harness and wiring harness connector. The wiring harness with male terminal is shown with arrows (≚).
Outside numerals are pin numbers.



[I] : ( ) is used to indicate different wiring and connector, etc. when the vehicle model, engine type, or specification is different.

[J] : Indicates a shielded cable.

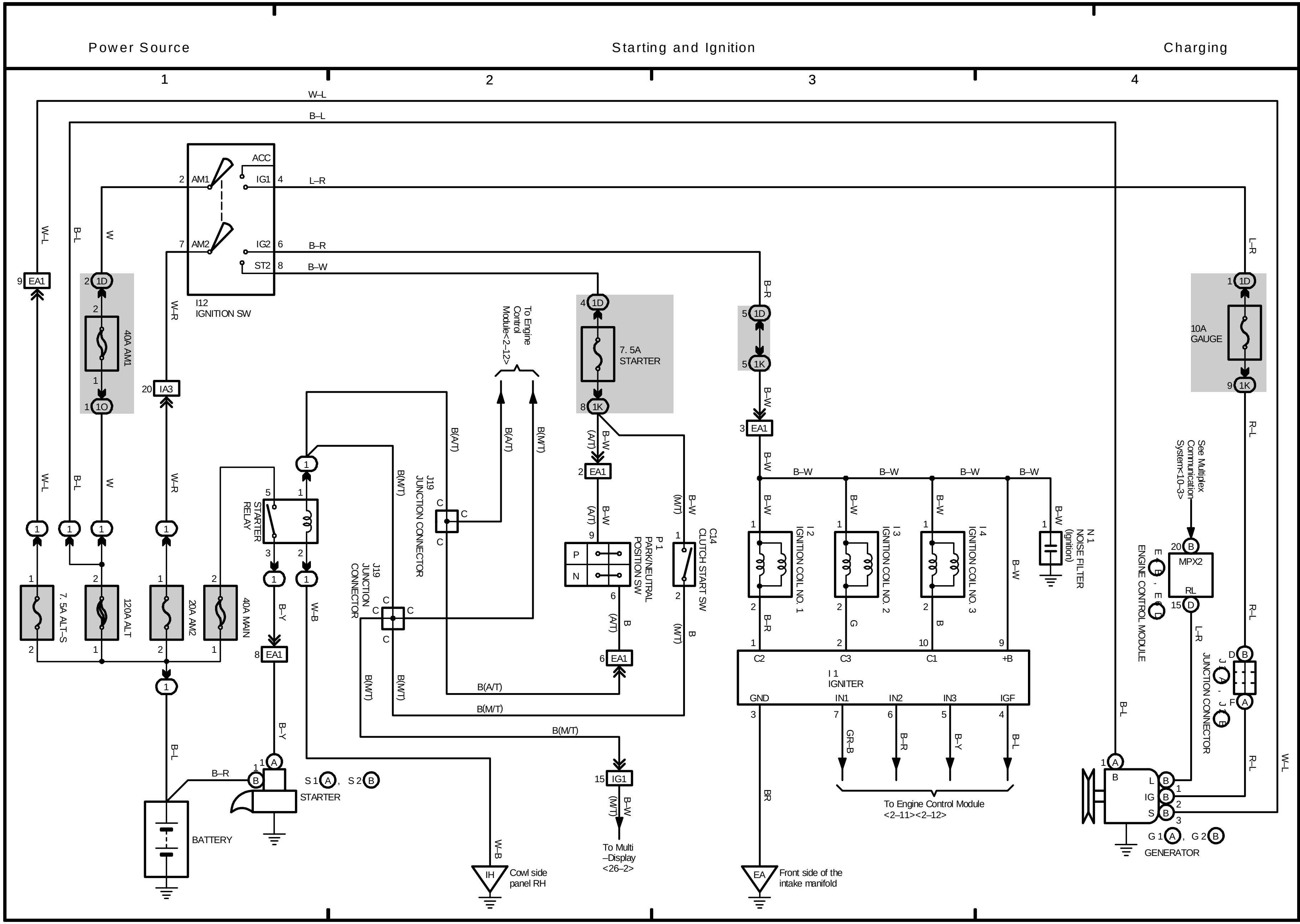


[K] : Indicates and located on ground point.

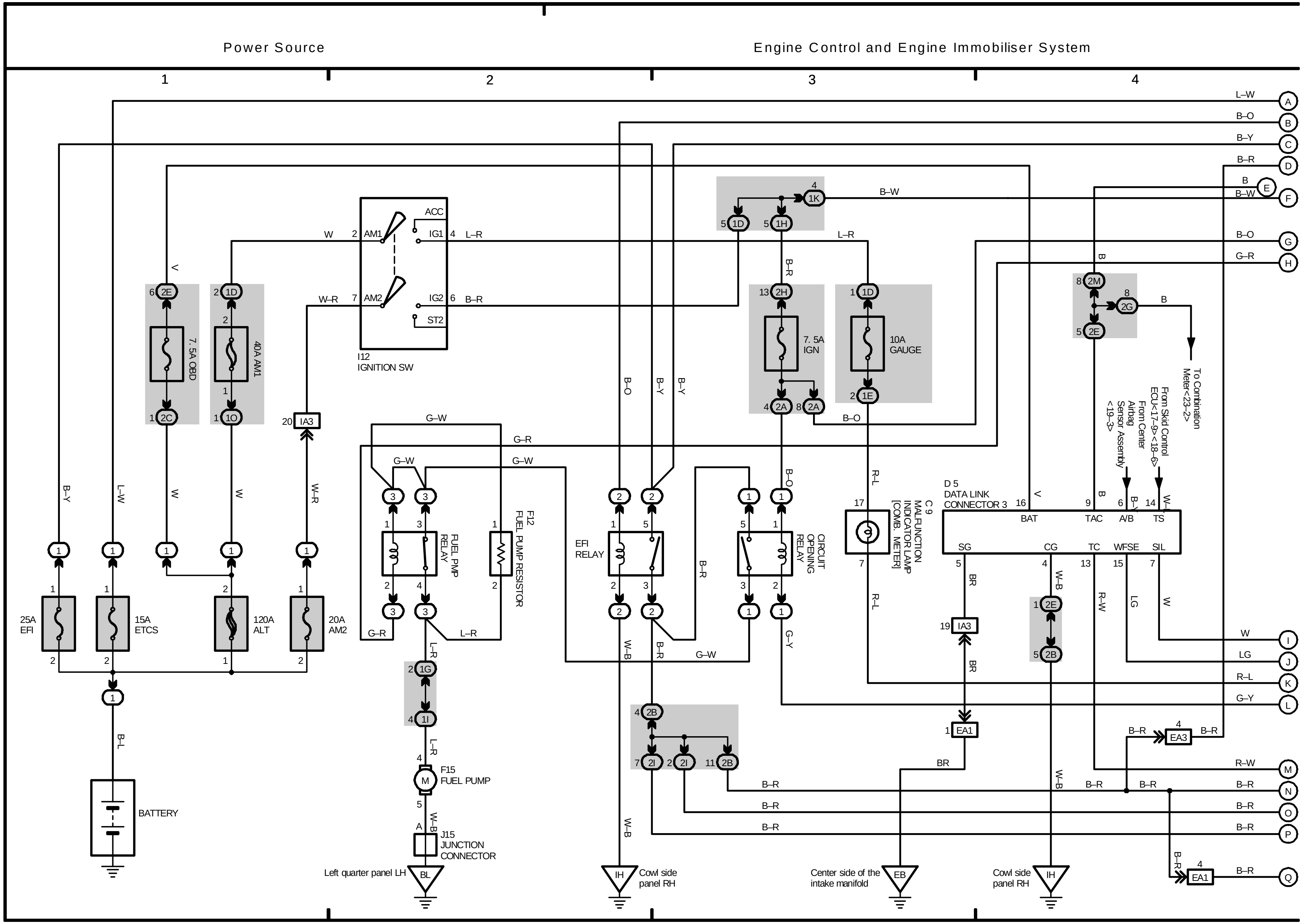
[L] : The same code occuring on the next page indicates that the wire harness is continuous.

SYSTEM INDEX

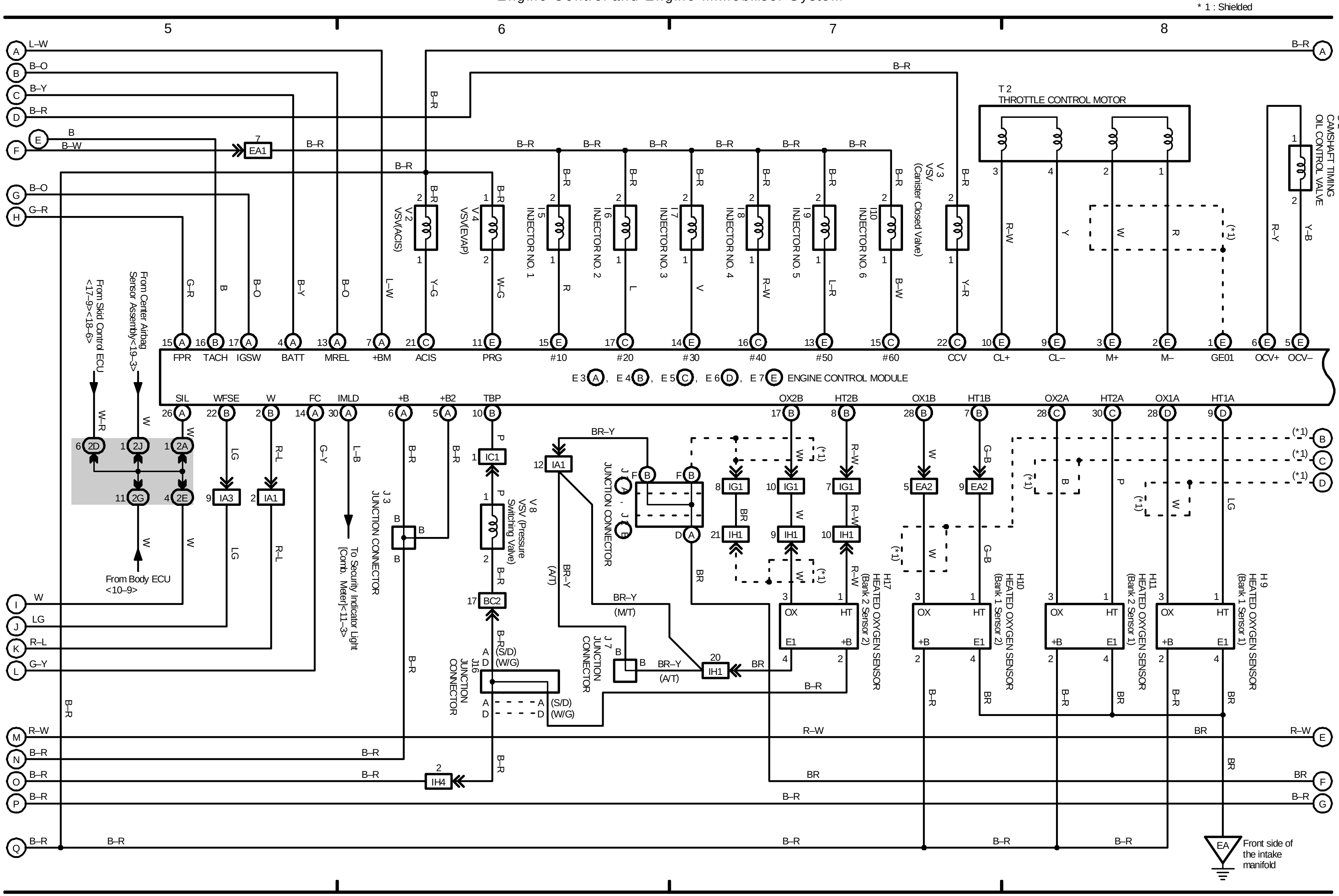
1 IS 300 ELECTRICAL WIRING DIAGRAM



M OVERALL ELECTRICAL WIRING DIAGRAM


Power Source
Engine Control and Engine Immobiliser System
1
2
3
4
25A EFI
15A ETCS
120A ALT
20A AM2
BATTERY
7. 5A OBD
40A AM1
I12 IGNITION SW
ACC
IG1
AM1
AM2
IG2
ST2
FUEL PMP RELAY
F12 FUEL PUMP RESISTOR
F15 FUEL PUMP
J15 JUNCTION CONNECTOR
Left quarter panel LH
EFI RELAY
CIRCUIT OPENING RELAY
Cowl side panel RH
7. 5A IGN
10A GAUGE
C 9 MALFUNCTION INDICATOR LAMP [COMB. METER]
D 5 DATA LINK CONNECTOR 3
BAT
TAC
A/B
TS
SG
CG
TC
WFSE
SIL
Center side of the intake manifold
Cowl side panel RH
To Combination Meter<23–2>
From Skid Control ECU<17–9><18–6>
From Center Airbag Sensor Assembly <19–3>

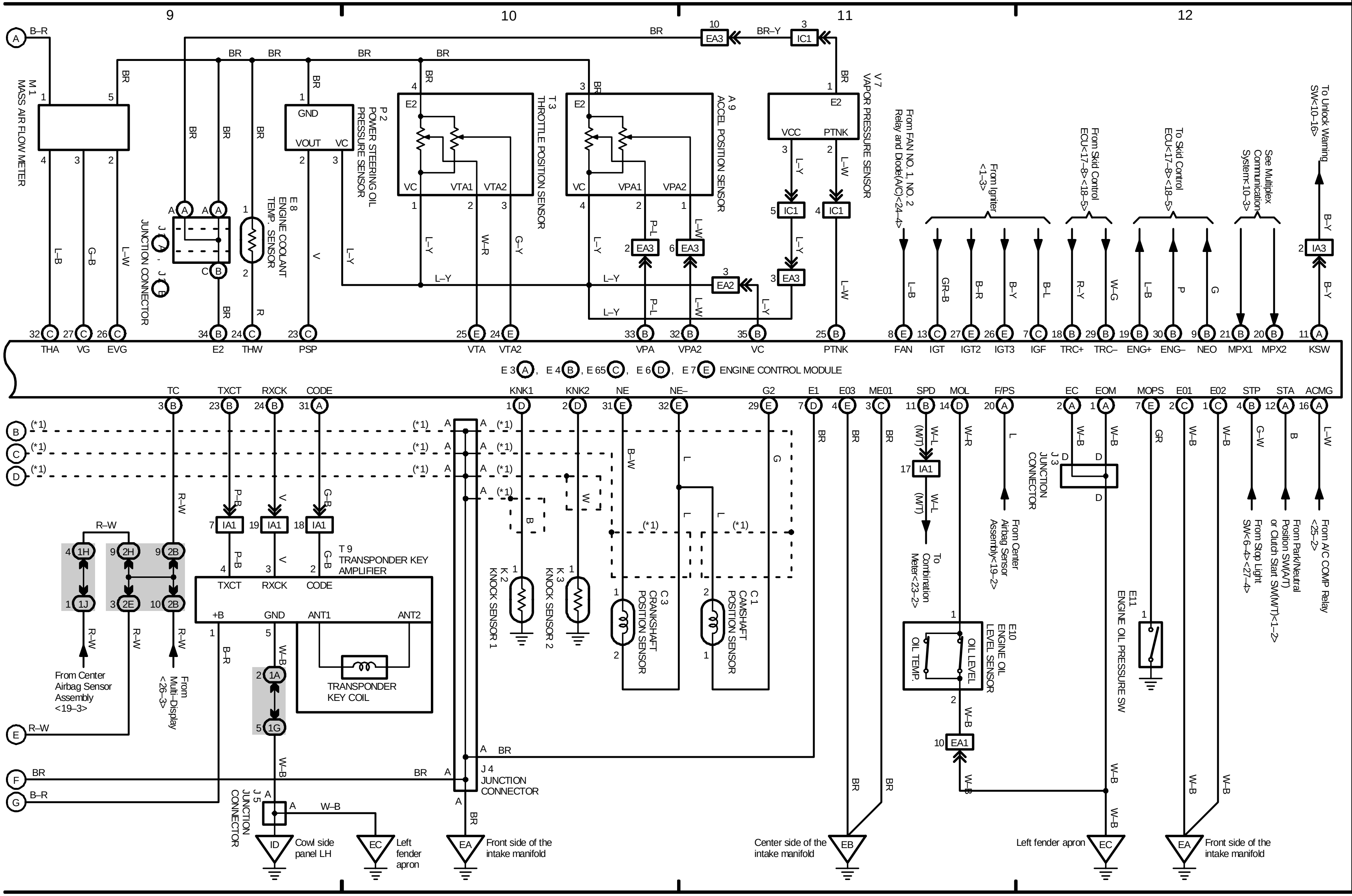
Engine Control and Engine Immobiliser System

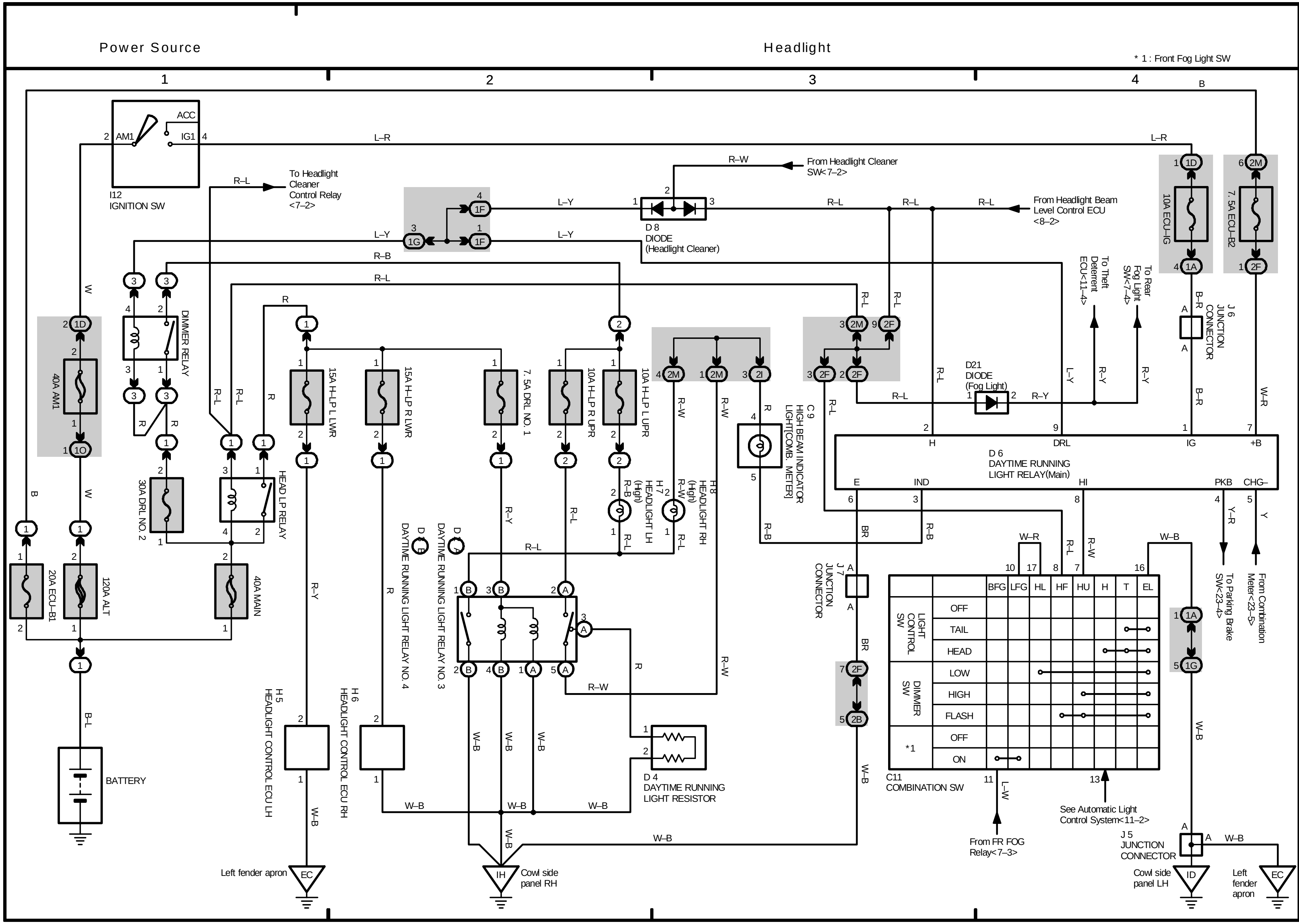


M OVERALL ELECTRICAL WIRING DIAGRAM

Engine Control and Engine Immobiliser System

* 1 : Shielded

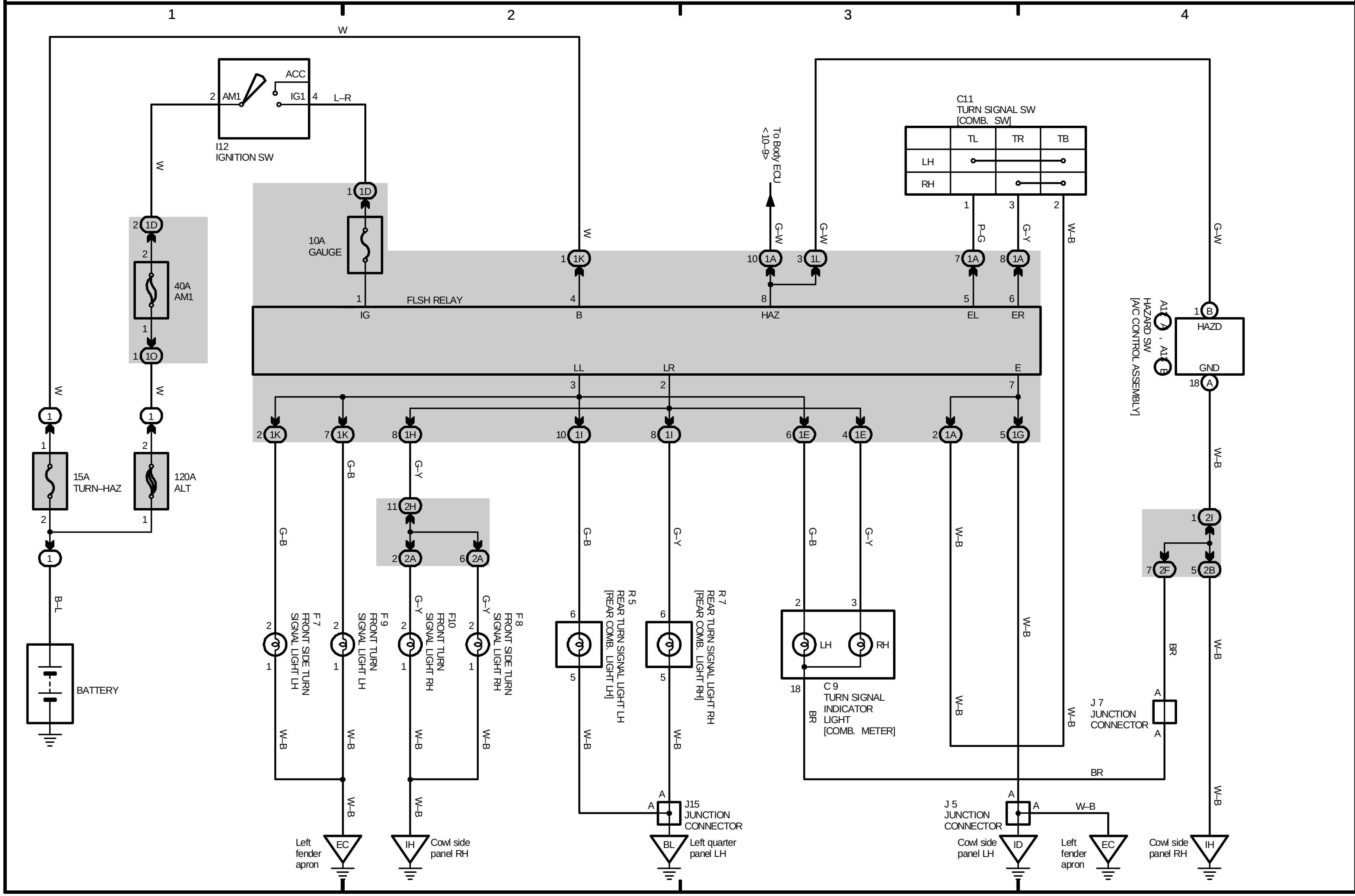


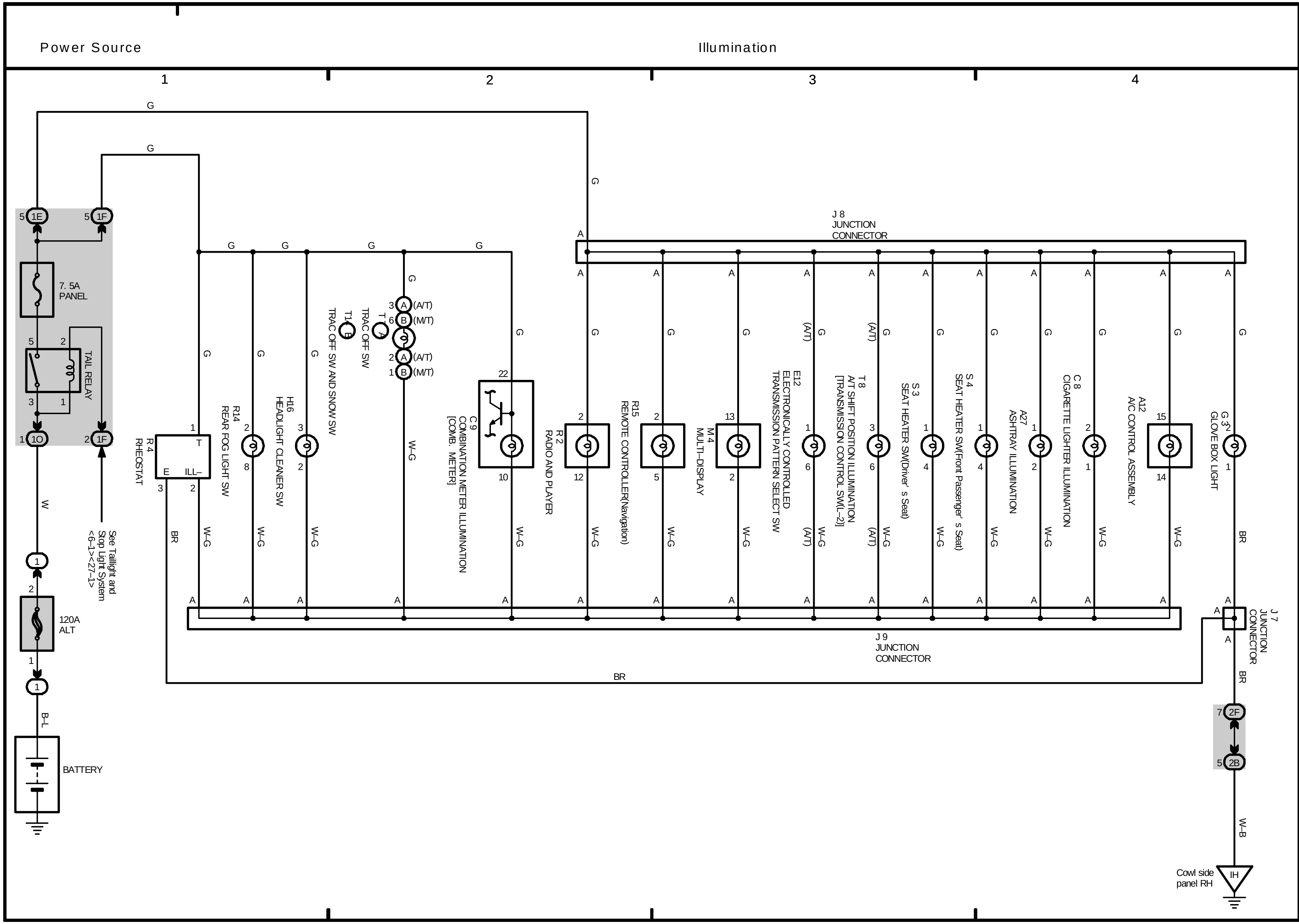


Power Source
Headlight
* 1 : Front Fog Light SW
I12
IGNITION SW
ACC
AM1
IG1
To Headlight Cleaner Control Relay <7–2>
From Headlight Cleaner SW<7–2>
From Headlight Beam Level Control ECU <8–2>
D 8
DIODE
(Headlight Cleaner)
10A ECU–IG
7. 5A ECU–B2
DIMMER RELAY
40A AM1
To Theft Deterrent ECU<11–4>
To Rear Fog Light SW<7–4>
J 6
JUNCTION CONNECTOR
15A H–LP L LWR
15A H–LP R LWR
7. 5A DRL NO. 1
10A H–LP R UPR
10A H–LP L UPR
D21
DIODE
(Fog Light)
C 9
HIGH BEAM INDICATOR LIGHT[COMB. METER]
D 6
DAYTIME RUNNING LIGHT RELAY(Main)
30A DRL NO. 2
HEAD LP RELAY
H 7
HEADLIGHT LH
(High)
H 8
HEADLIGHT RH
(High)
D 7
DAYTIME RUNNING LIGHT RELAY NO. 3
D 5
DAYTIME RUNNING LIGHT RELAY NO. 4
J 7
JUNCTION CONNECTOR
To Parking Brake SW<23–4>
From Combination Meter<23–5>
20A ECU–B1
120A ALT
40A MAIN
LIGHT CONTROL SW
DIMMER SW
OFF
TAIL
HEAD
LOW
HIGH
FLASH
ON
*1
BFG
LFG
HL
HF
HU
H
T
EL
C11
COMBINATION SW
H 5
HEADLIGHT CONTROL ECU LH
H 6
HEADLIGHT CONTROL ECU RH
D 4
DAYTIME RUNNING LIGHT RESISTOR
BATTERY
From FR FOG Relay<7–3>
See Automatic Light Control System<11–2>
J 5
JUNCTION CONNECTOR
Left fender apron
Cowl side panel RH
Cowl side panel LH

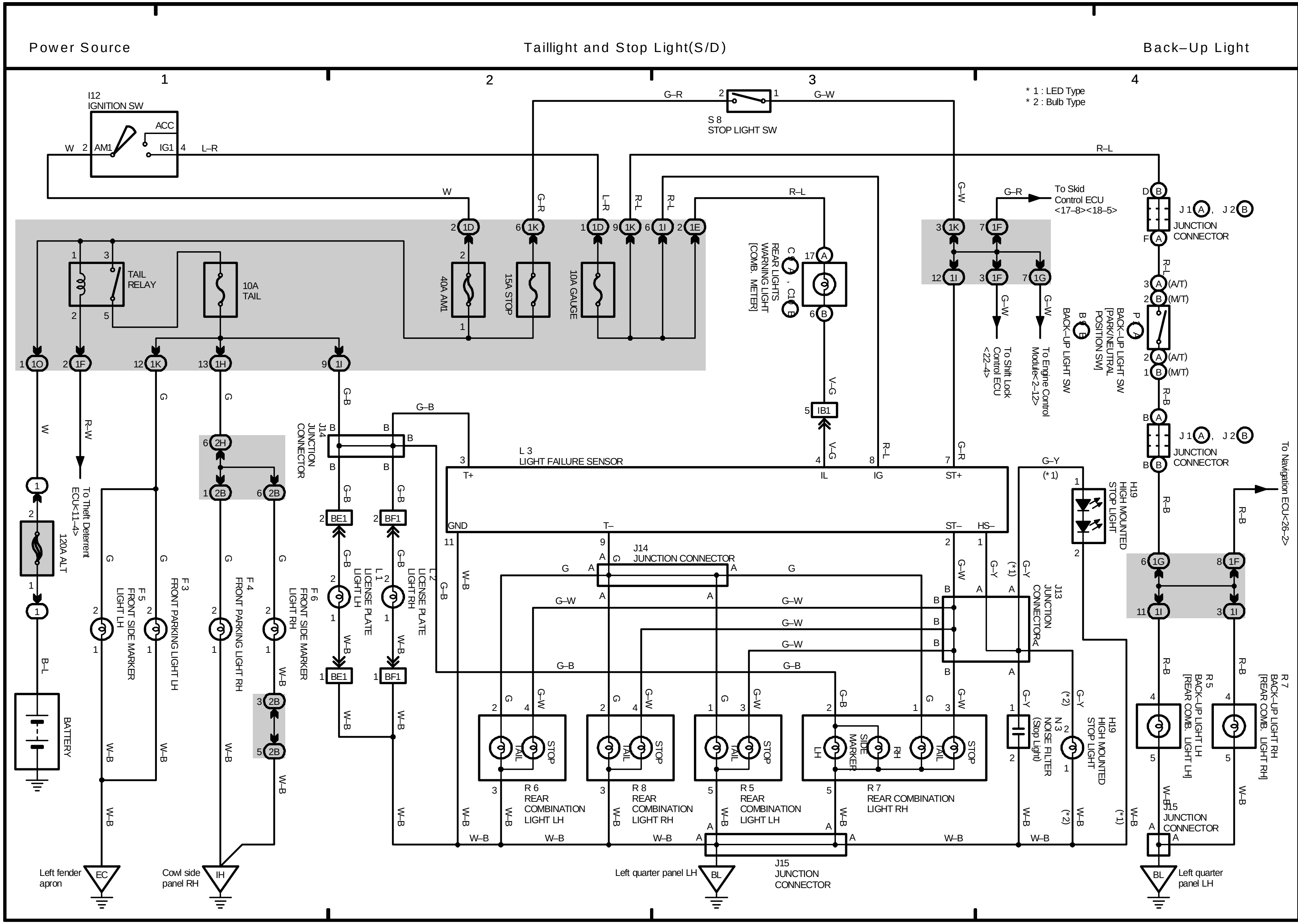
M OVERALL ELECTRICAL WIRING DIAGRAM

Power Source	Turn Signal and Hazard Warning Light

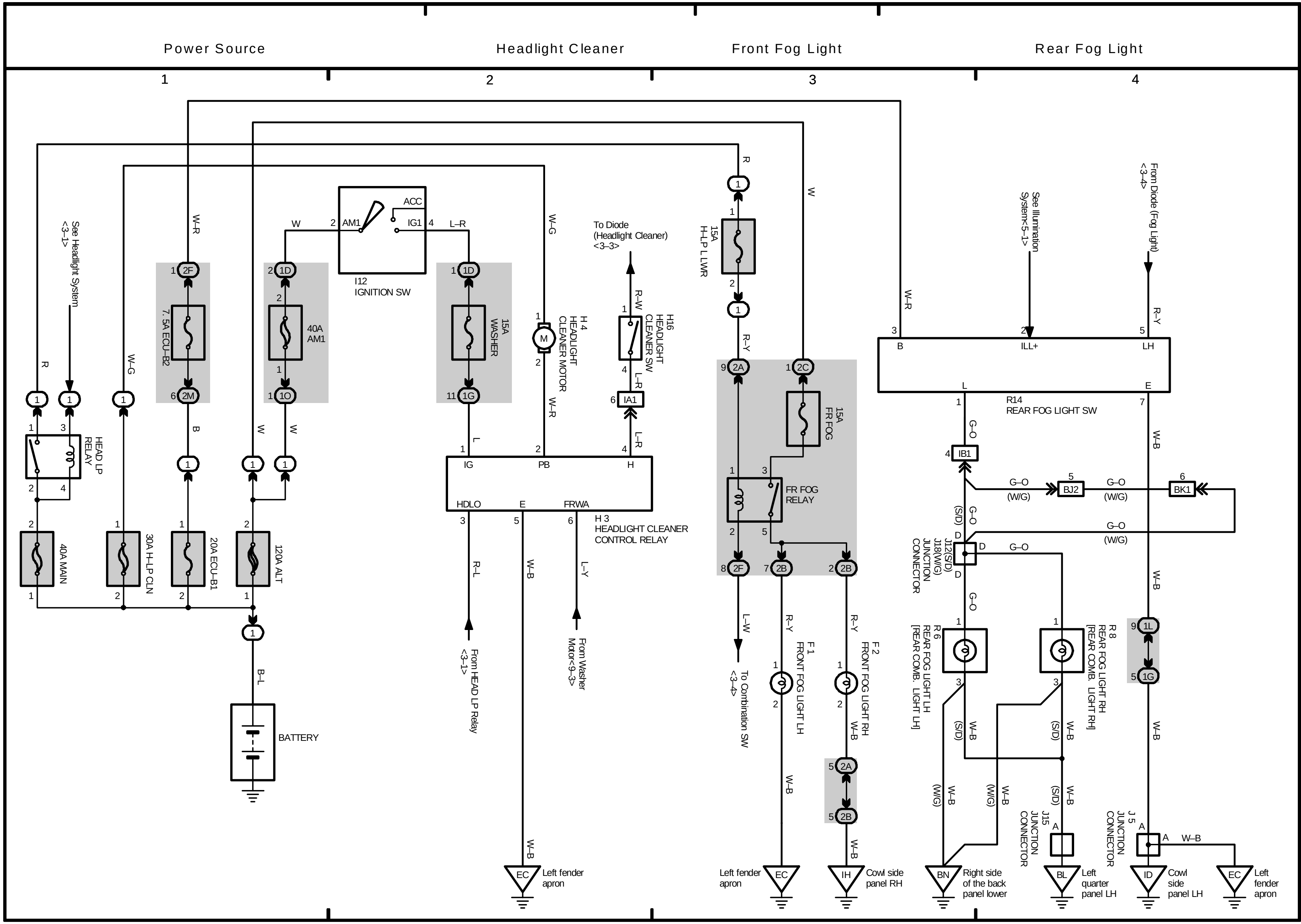




2004 LEXUS IS 300 (EWD545U)

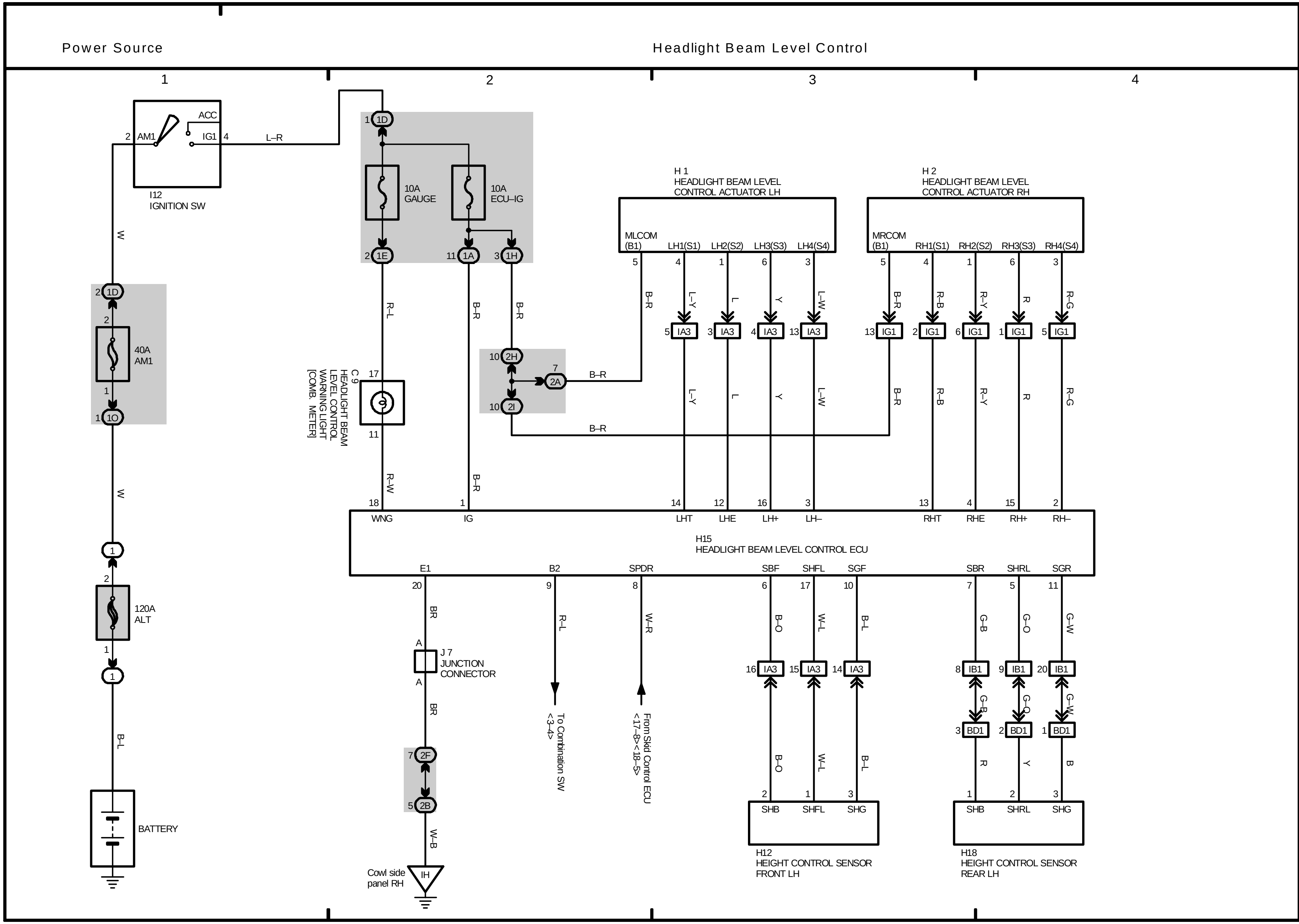


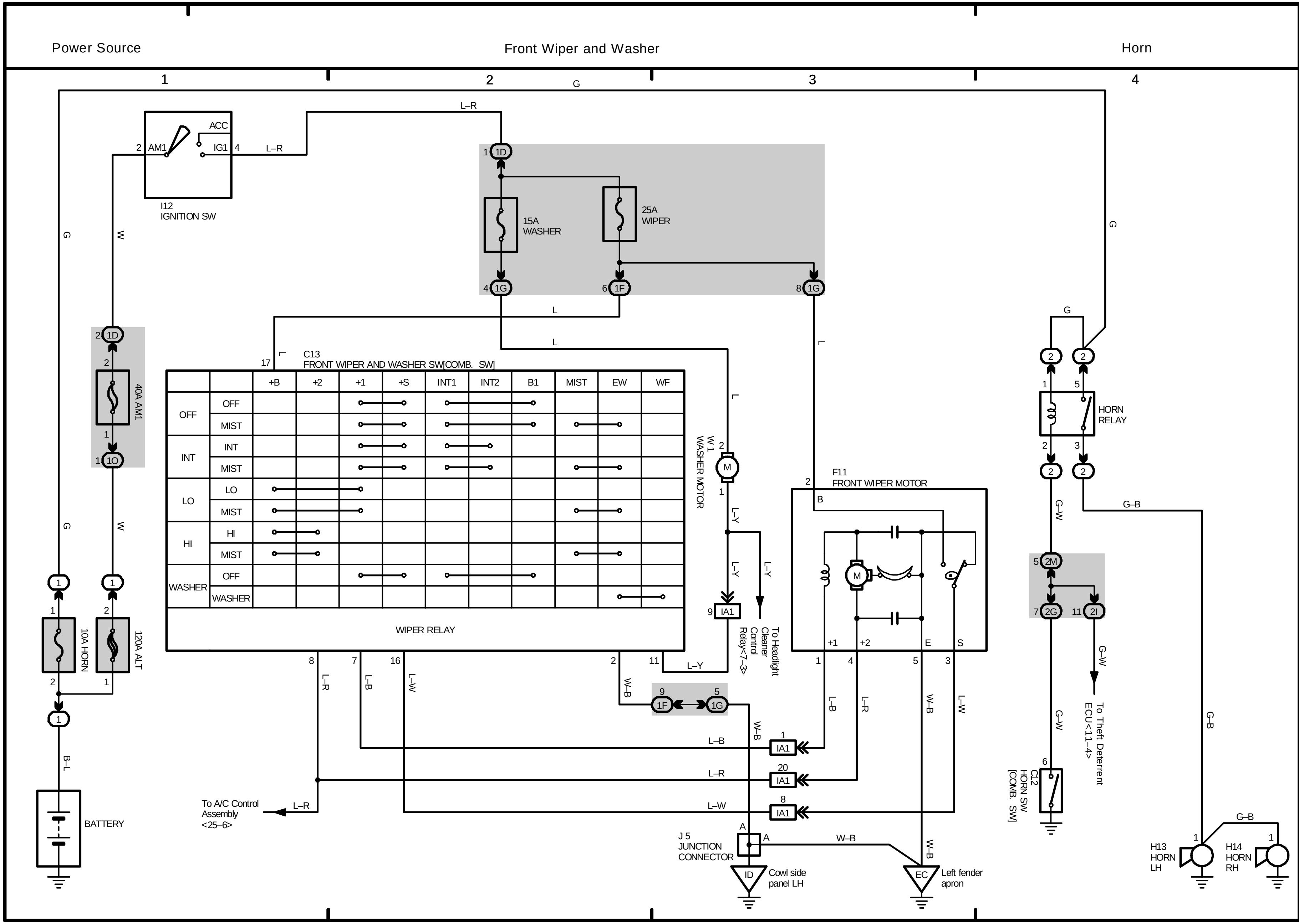
2004 LEXUS IS 300 (EWD545U)



2004 LEXUS IS 300 (EWD545U)

M OVERALL ELECTRICAL WIRING DIAGRAM


Power Source
Headlight Beam Level Control
1
2
3
4
I12
IGNITION SW
ACC
AM1
IG1
L–R
W
40A
AM1
120A
ALT
B–L
BATTERY
10A
GAUGE
10A
ECU–IG
C 9
HEADLIGHT BEAM
LEVEL CONTROL
WARNING LIGHT
[COMB. METER]
R–L
B–R
R–W
H 1
HEADLIGHT BEAM LEVEL
CONTROL ACTUATOR LH
MLCOM
(B1)
LH1(S1)
LH2(S2)
LH3(S3)
LH4(S4)
H 2
HEADLIGHT BEAM LEVEL
CONTROL ACTUATOR RH
MRCOM
(B1)
RH1(S1)
RH2(S2)
RH3(S3)
RH4(S4)
L–Y
L
Y
L–W
R–B
R–Y
R
R–G
IA3
IG1
WNG
IG
LHT
LHE
LH+
LH–
RHT
RHE
RH+
RH–
H15
HEADLIGHT BEAM LEVEL CONTROL ECU
E1
B2
SPDR
SBF
SHFL
SGF
SBR
SHRL
SGR
BR
J 7
JUNCTION
CONNECTOR
W–B
Cowl side
panel RH
IH
To Combination SW
<3–4>
From Skid Control ECU
<17–8><18–5>
B–O
W–L
G–B
G–O
G–W
IB1
BD1
B
SHB
SHFL
SHG
H12
HEIGHT CONTROL SENSOR
FRONT LH
SHB
SHRL
SHG
H18
HEIGHT CONTROL SENSOR
REAR LH



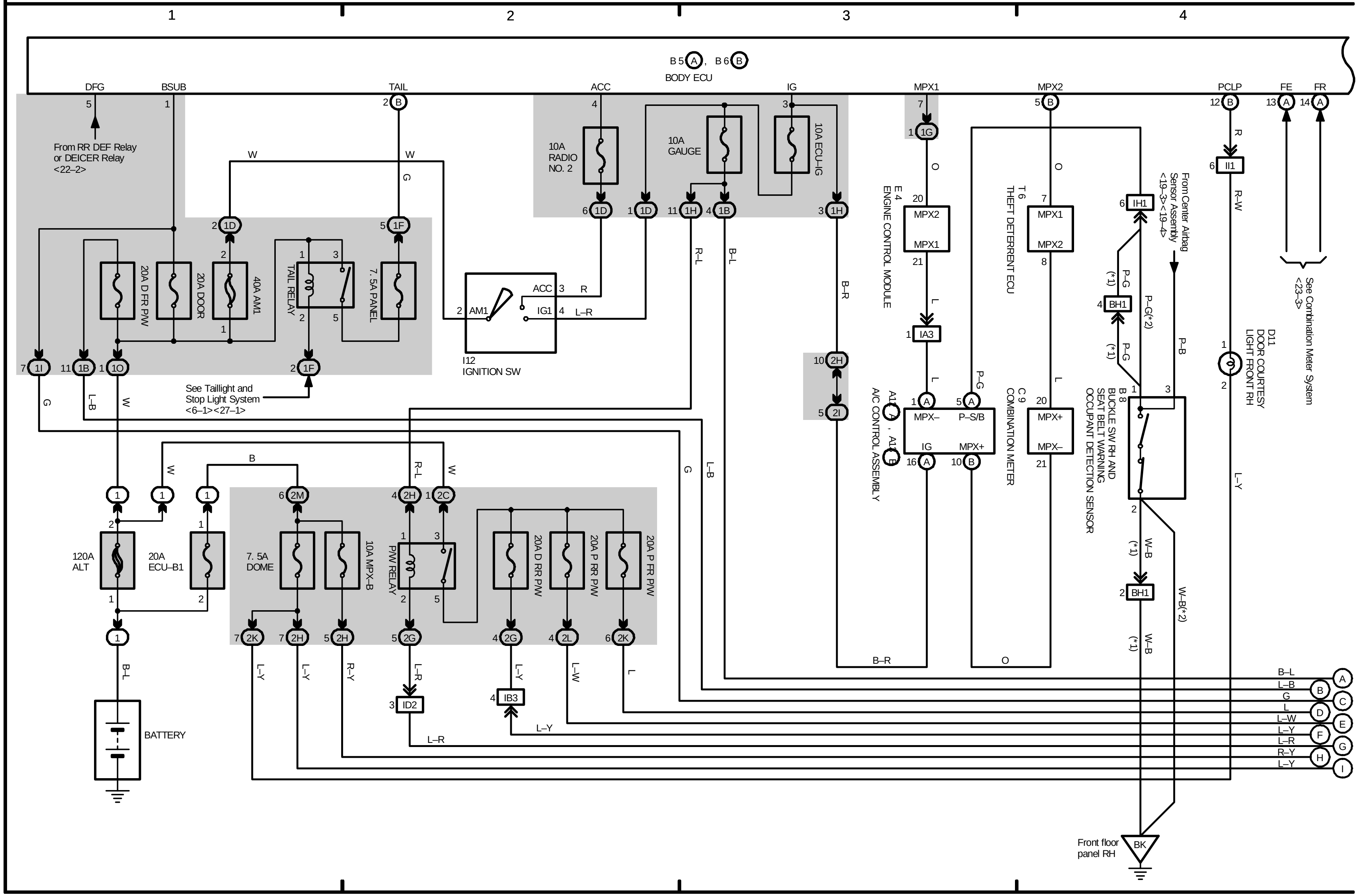
Power Source
Front Wiper and Washer
Horn
1
2
3
4
G
L–R
ACC
2 AM1
IG1 4
I12
IGNITION SW
1D
15A
WASHER
25A
WIPER
1G
1F
L
W
2 1D
40A AM1
1 1O
C13
FRONT WIPER AND WASHER SW[COMB. SW]
+B
+2
+1
+S
INT1
INT2
B1
MIST
EW
WF
OFF
MIST
INT
LO
HI
WASHER
WIPER RELAY
8
7
16
2
11
17
W 1
WASHER MOTOR
M
L–Y
9 IA1
To Headlight Cleaner Control Relay<7–3>
F11
FRONT WIPER MOTOR
B
+1
+2
E
S
10A HORN
120A ALT
B–L
BATTERY
W–B
1F
1G
L–B
IA1
L–W
To A/C Control Assembly <25–6>
J 5
JUNCTION CONNECTOR
ID
Cowl side panel LH
EC
Left fender apron
HORN RELAY
2M
2G
2I
G–W
G–B
To Theft Deterrent ECU<11–4>
C12
HORN SW
[COMB. SW]
H13
HORN
LH
H14
HORN
RH

M OVERALL ELECTRICAL WIRING DIAGRAM

Power Source

Multiplex Communication System

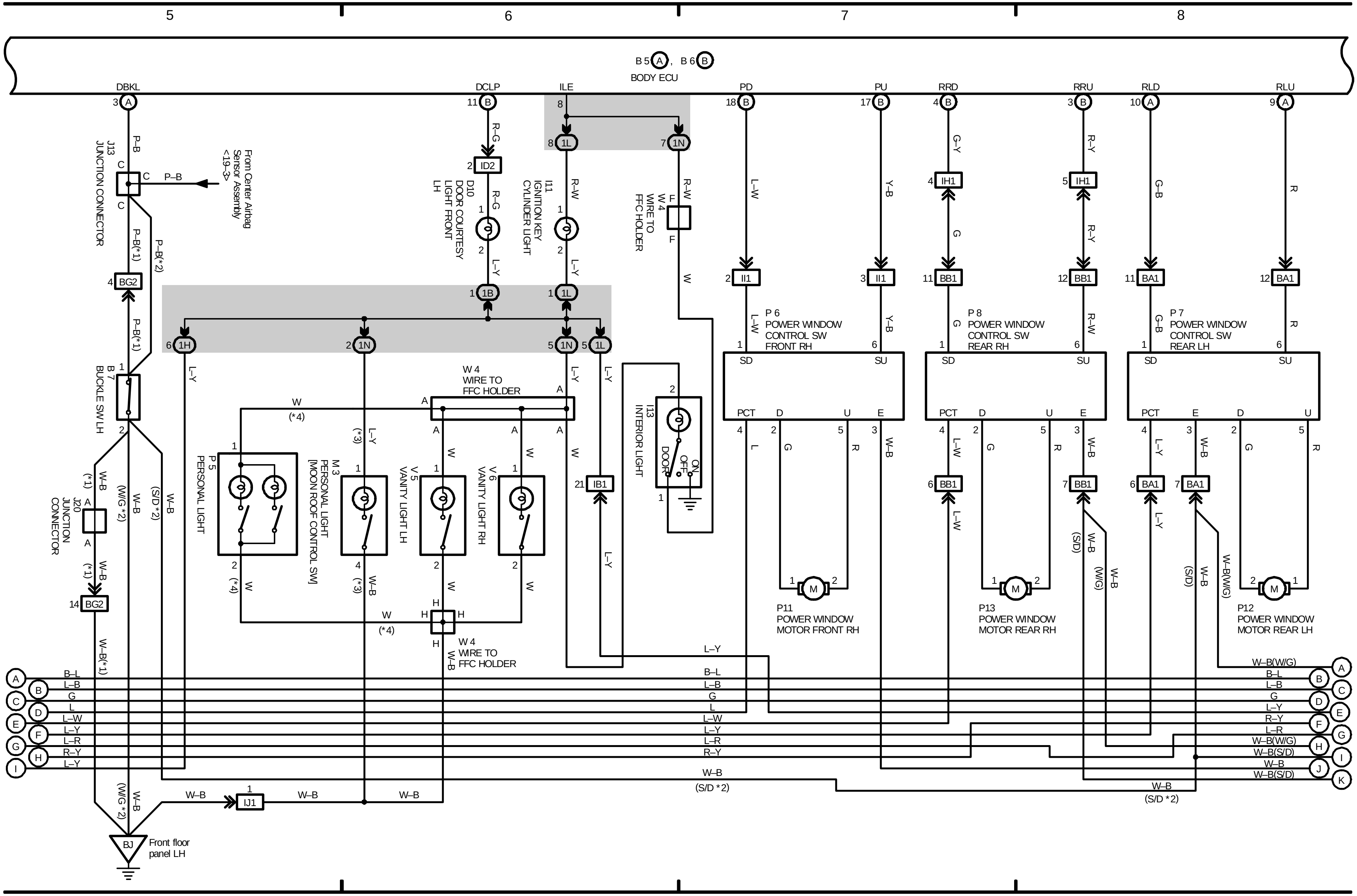
* 1 : w/ Power Seat
* 2 : w/o Power Seat



2004 LEXUS IS 300 (EWD545U)

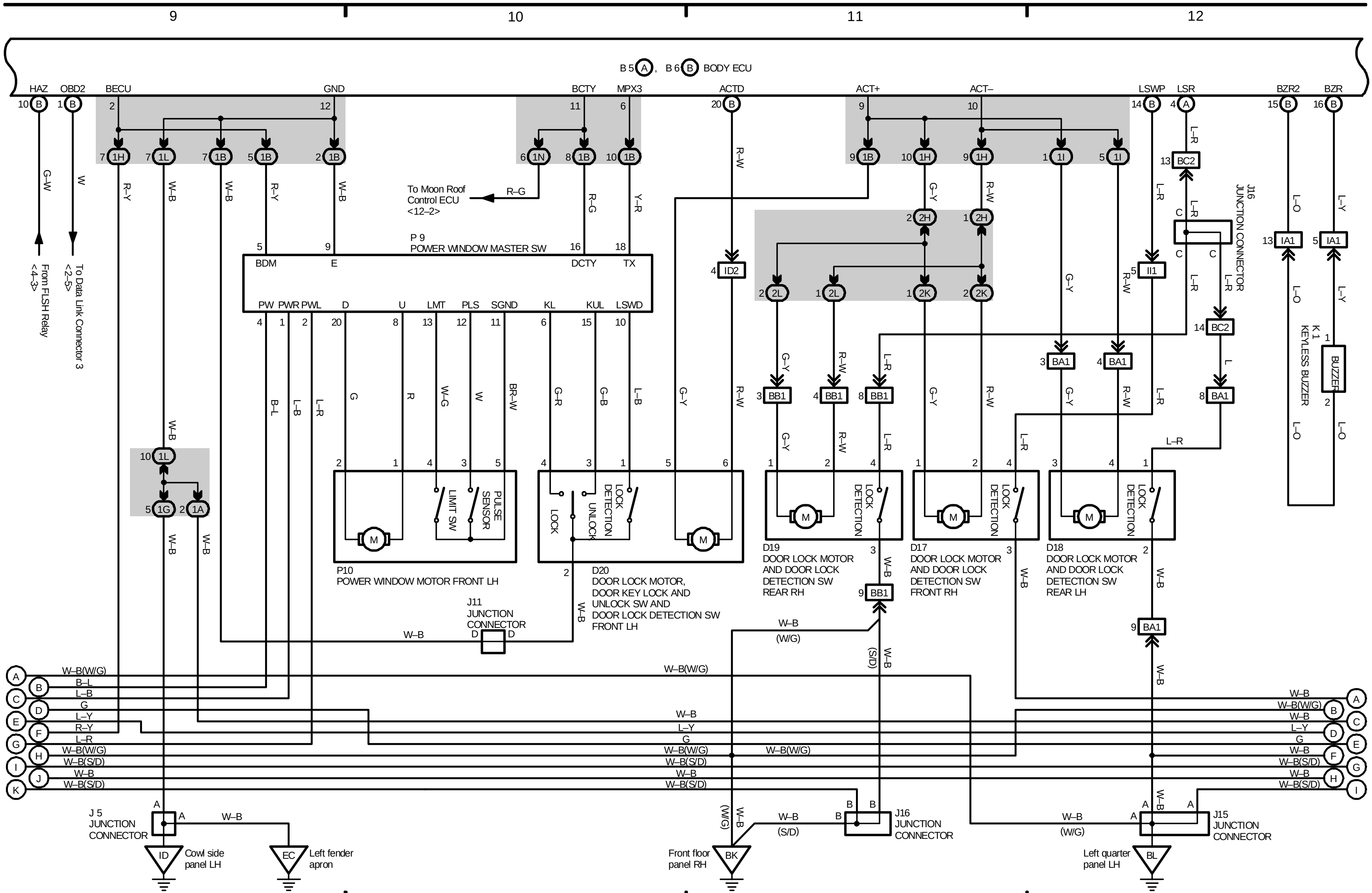
Multiplex Communication System

* 1 : w/ Power Seat
* 2 : w/o Power Seat
* 3 : w/ Moon Roof
* 4 : w/o Moon Roof

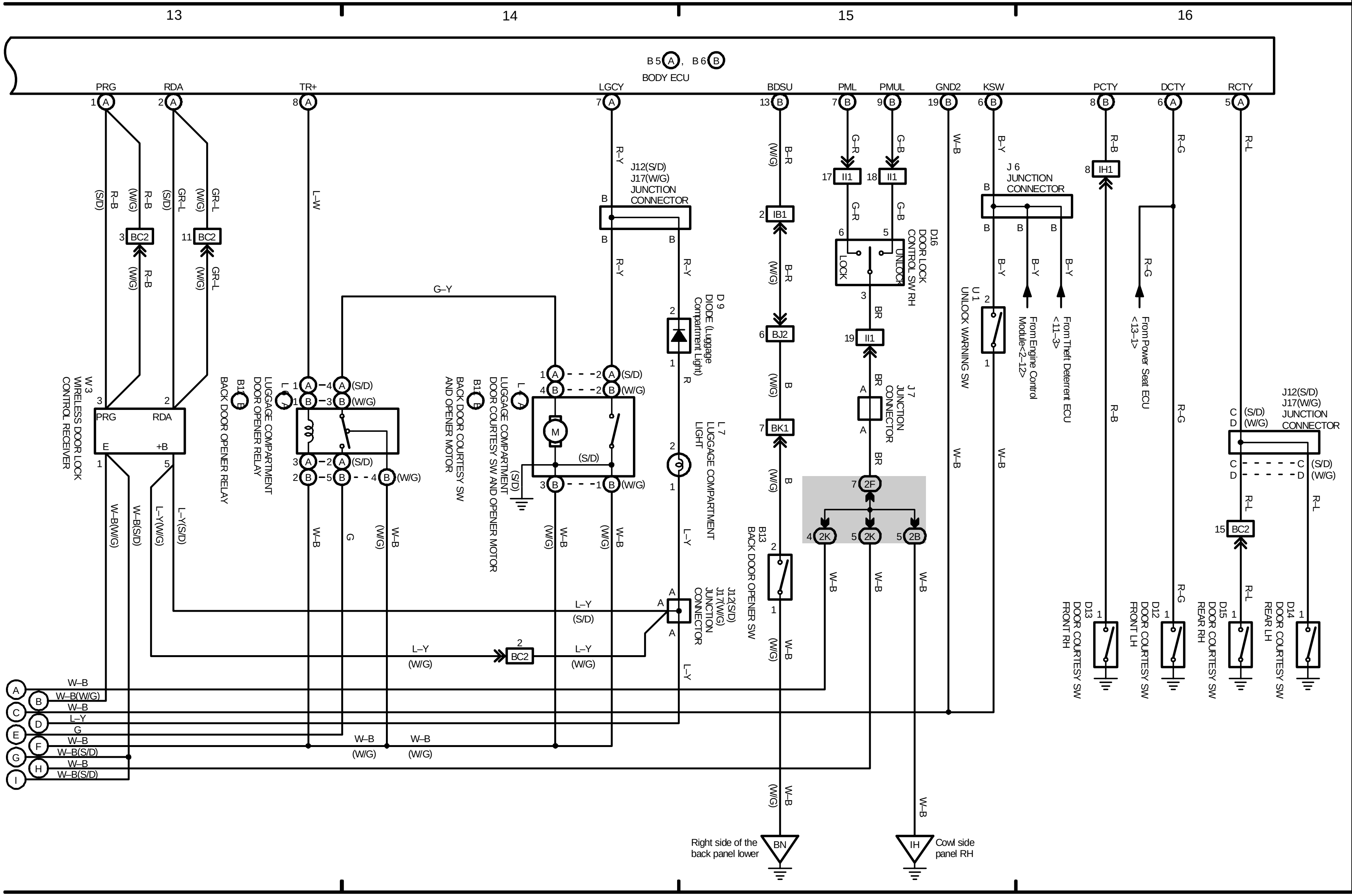


M OVERALL ELECTRICAL WIRING DIAGRAM

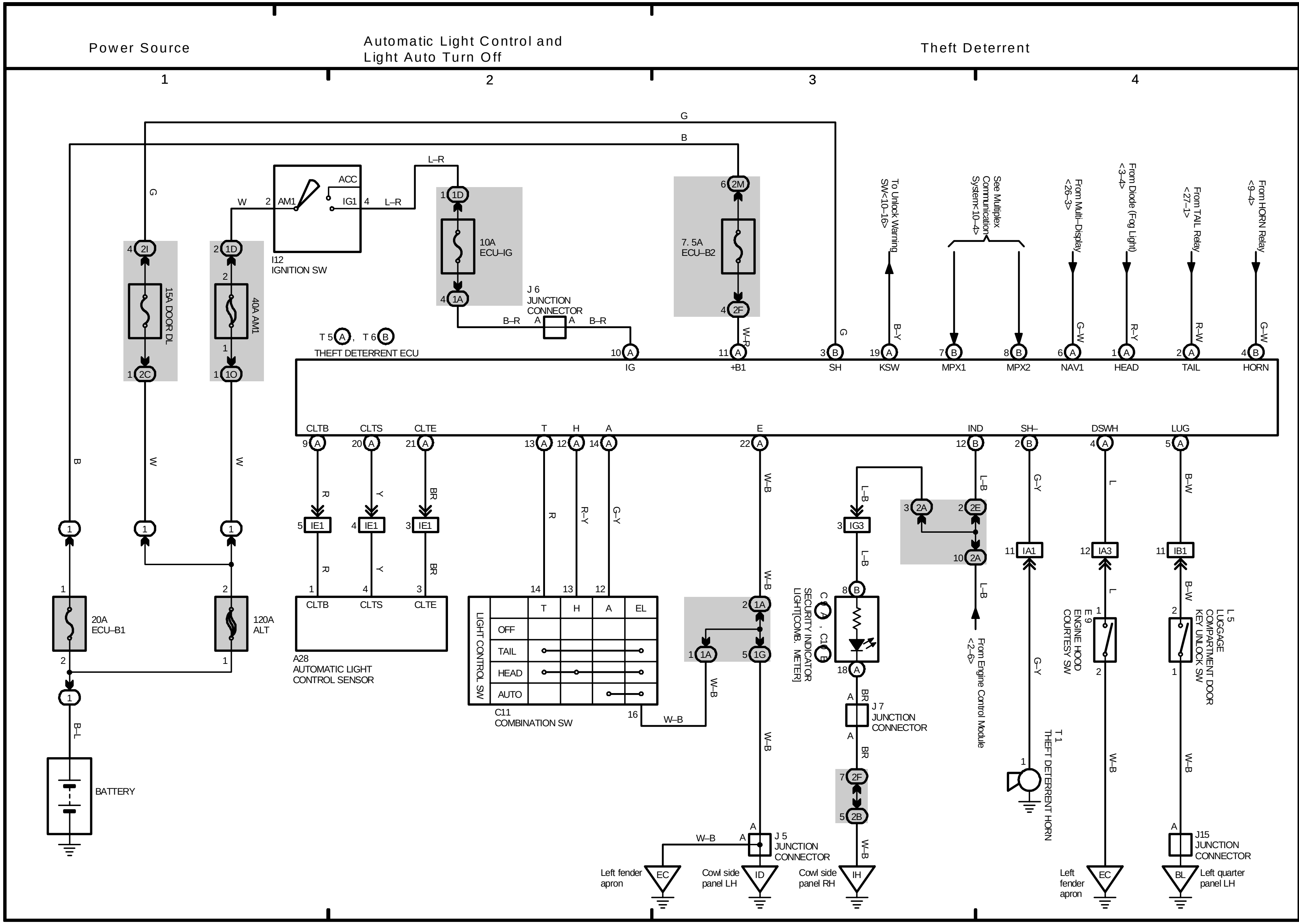
Multiplex Communication System



Multiplex Communication System

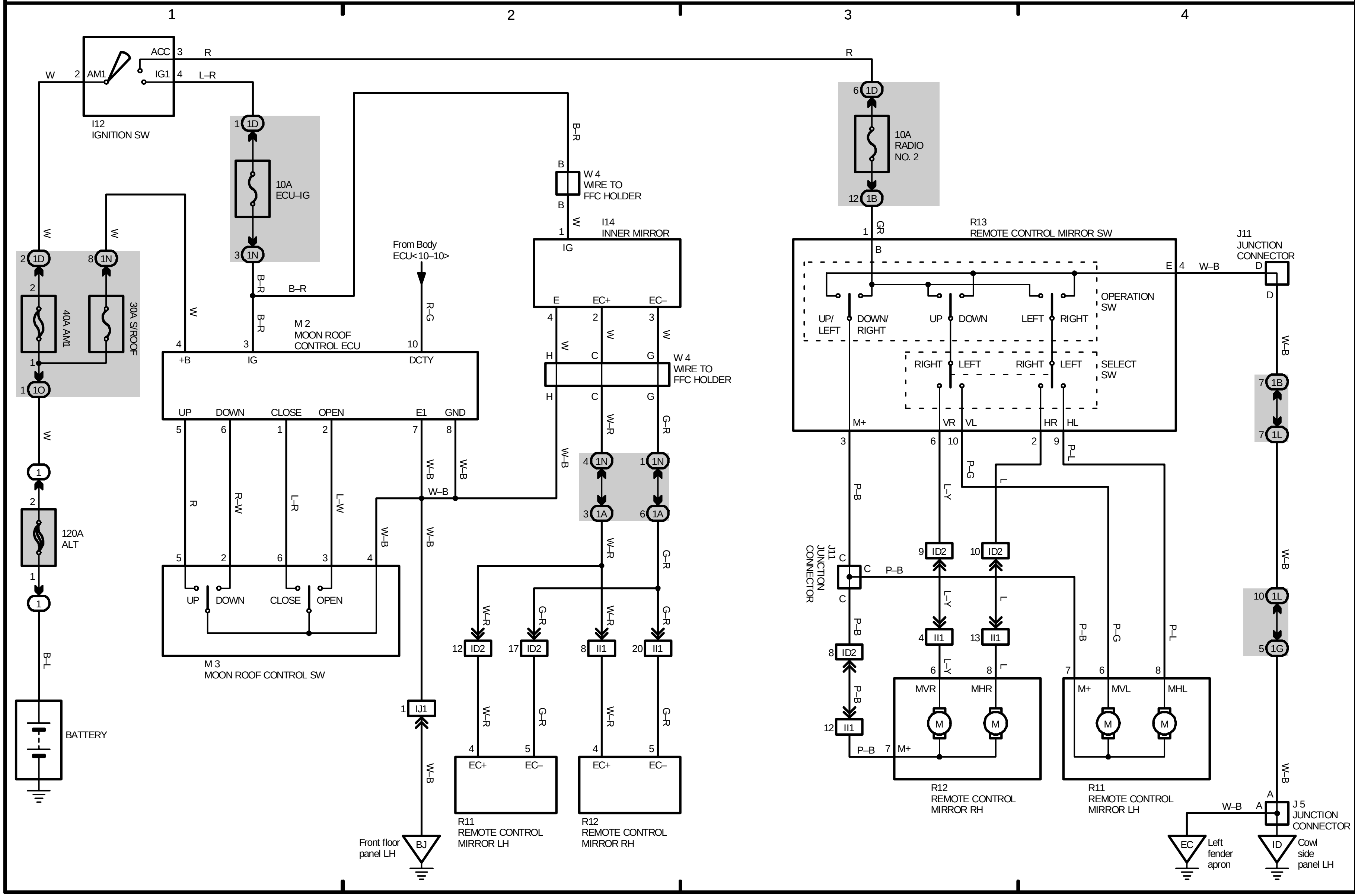


M OVERALL ELECTRICAL WIRING DIAGRAM



Power Source
Automatic Light Control and Light Auto Turn Off
Theft Deterrent
1
2
3
4
15A DOOR DL
40A AM1
I12
IGNITION SW
ACC
AM1
IG1
10A
ECU–IG
7. 5A
ECU–B2
J 6
JUNCTION
CONNECTOR
T 5 A , T 6 B
THEFT DETERRENT ECU
IG
+B1
SH
KSW
MPX1
MPX2
NAV1
HEAD
TAIL
HORN
To Unlock Warning SW<10–16>
See Multiplex Communication System<10–4>
From Multi-Display <26–3>
From Diode (Fog Light) <3–4>
From TAIL Relay <27–1>
From HORN Relay <9–4>
CLTB
CLTS
CLTE
T
H
A
E
IND
SH–
DSWH
LUG
20A
ECU–B1
120A
ALT
BATTERY
A28
AUTOMATIC LIGHT
CONTROL SENSOR
LIGHT CONTROL SW
OFF
TAIL
HEAD
AUTO
EL
C11
COMBINATION SW
C 4 , C16 B
SECURITY INDICATOR LIGHT[COMB. METER]
J 7
JUNCTION
CONNECTOR
From Engine Control Module <2–6>
T1
THEFT DETERRENT HORN
E 9
ENGINE HOOD
COURTESY SW
L 5
LUGGAGE
COMPARTMENT DOOR
KEY UNLOCK SW
J 5
JUNCTION
CONNECTOR
J15
JUNCTION
CONNECTOR
Left fender apron
Cowl side panel LH
Cowl side panel RH
Left fender apron
Left quarter panel LH

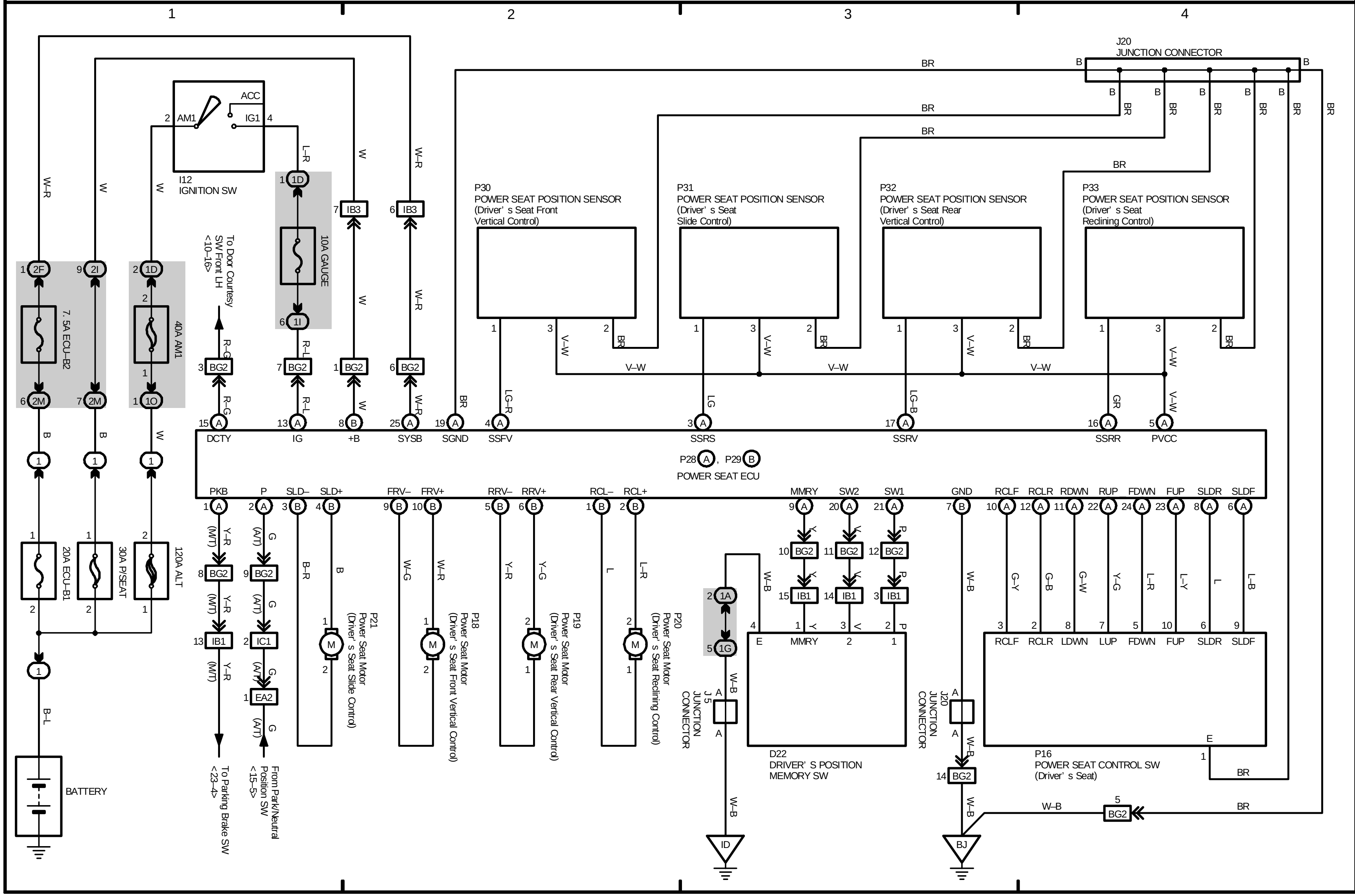
Power Source | Moon Roof | Automatic Glare–Resistant EC Mirror | Remote Control Mirror

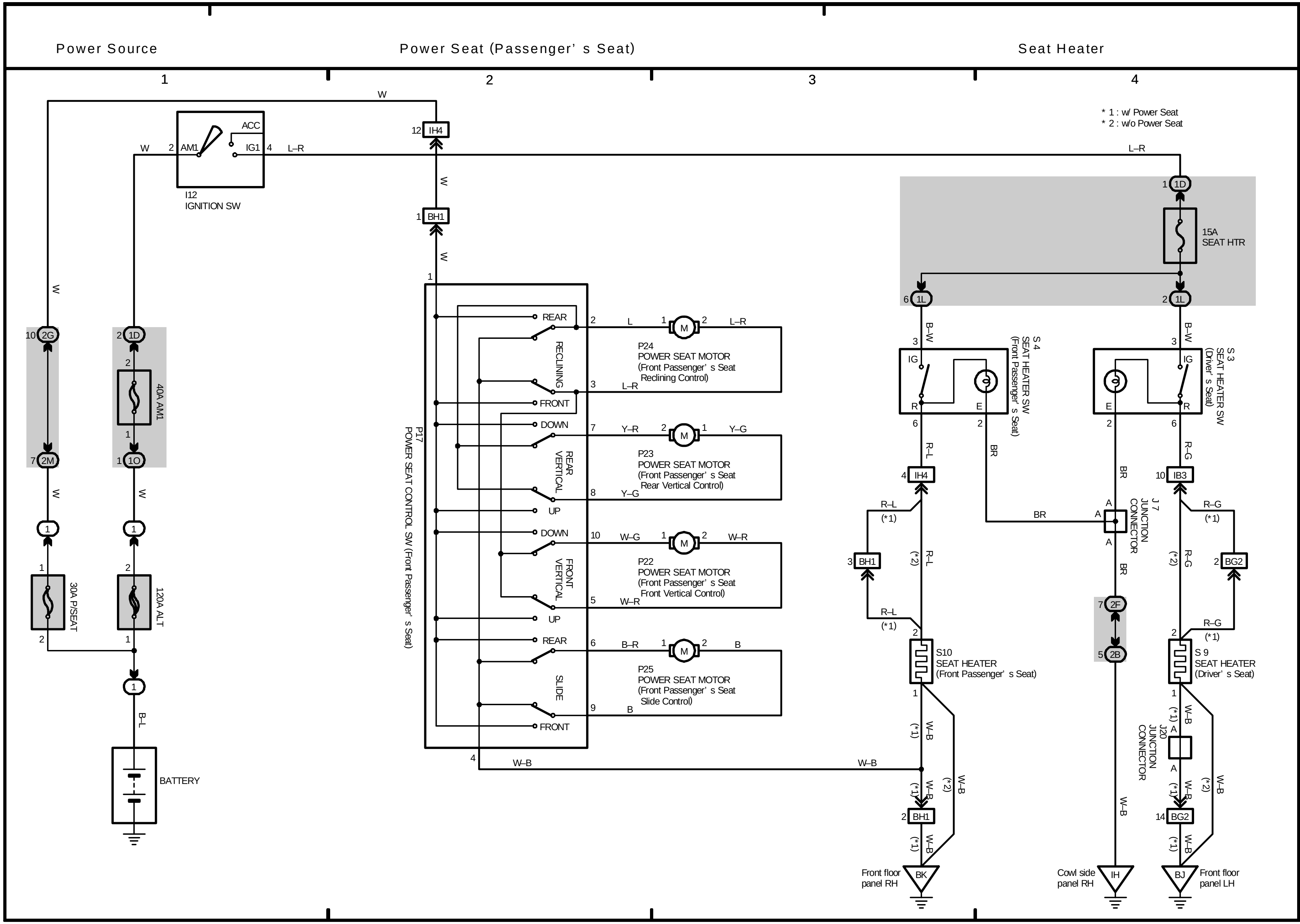


M OVERALL ELECTRICAL WIRING DIAGRAM

Power Source

Power Seat(Driver' s Seat)



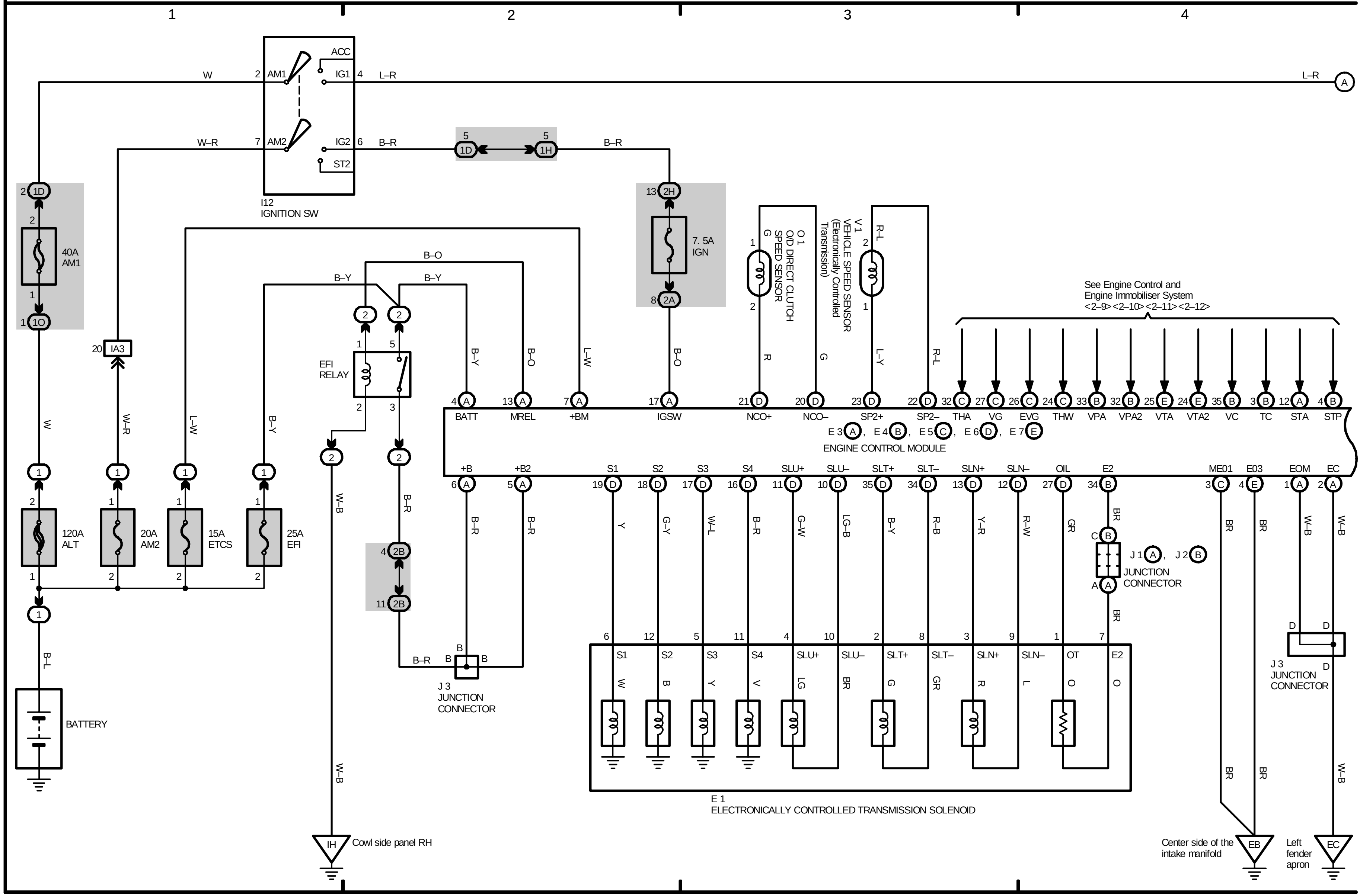


Power Source
Power Seat (Passenger' s Seat)
Seat Heater
1
2
3
4
* 1 : w/ Power Seat
* 2 : w/o Power Seat
ACC
AM1
IG1
I12
IGNITION SW
IH4
BH1
2G
2M
1D
1O
40A AM1
30A P/SEAT
120A ALT
BATTERY
W
L–R
B–L
REAR
RECLINING
FRONT
DOWN
REAR VERTICAL
UP
FRONT VERTICAL
SLIDE
P17
POWER SEAT CONTROL SW (Front Passenger' s Seat)
P24
POWER SEAT MOTOR
(Front Passenger' s Seat
Reclining Control)
P23
POWER SEAT MOTOR
(Front Passenger' s Seat
Rear Vertical Control)
P22
POWER SEAT MOTOR
(Front Passenger' s Seat
Front Vertical Control)
P25
POWER SEAT MOTOR
(Front Passenger' s Seat
Slide Control)
L
Y–R
Y–G
W–G
W–R
B–R
B
W–B
15A
SEAT HTR
1L
B–W
S 4
SEAT HEATER SW
(Front Passenger' s Seat)
S 3
SEAT HEATER SW
(Driver' s Seat)
IG
R
E
R–L
R–G
BR
IB3
J 7
JUNCTION CONNECTOR
BG2
2F
2B
S10
SEAT HEATER
(Front Passenger' s Seat)
S 9
SEAT HEATER
(Driver' s Seat)
J20
JUNCTION CONNECTOR
(*1)
(*2)
BK
Front floor panel RH
IH
Cowl side panel RH
BJ
Front floor panel LH

M OVERALL ELECTRICAL WIRING DIAGRAM

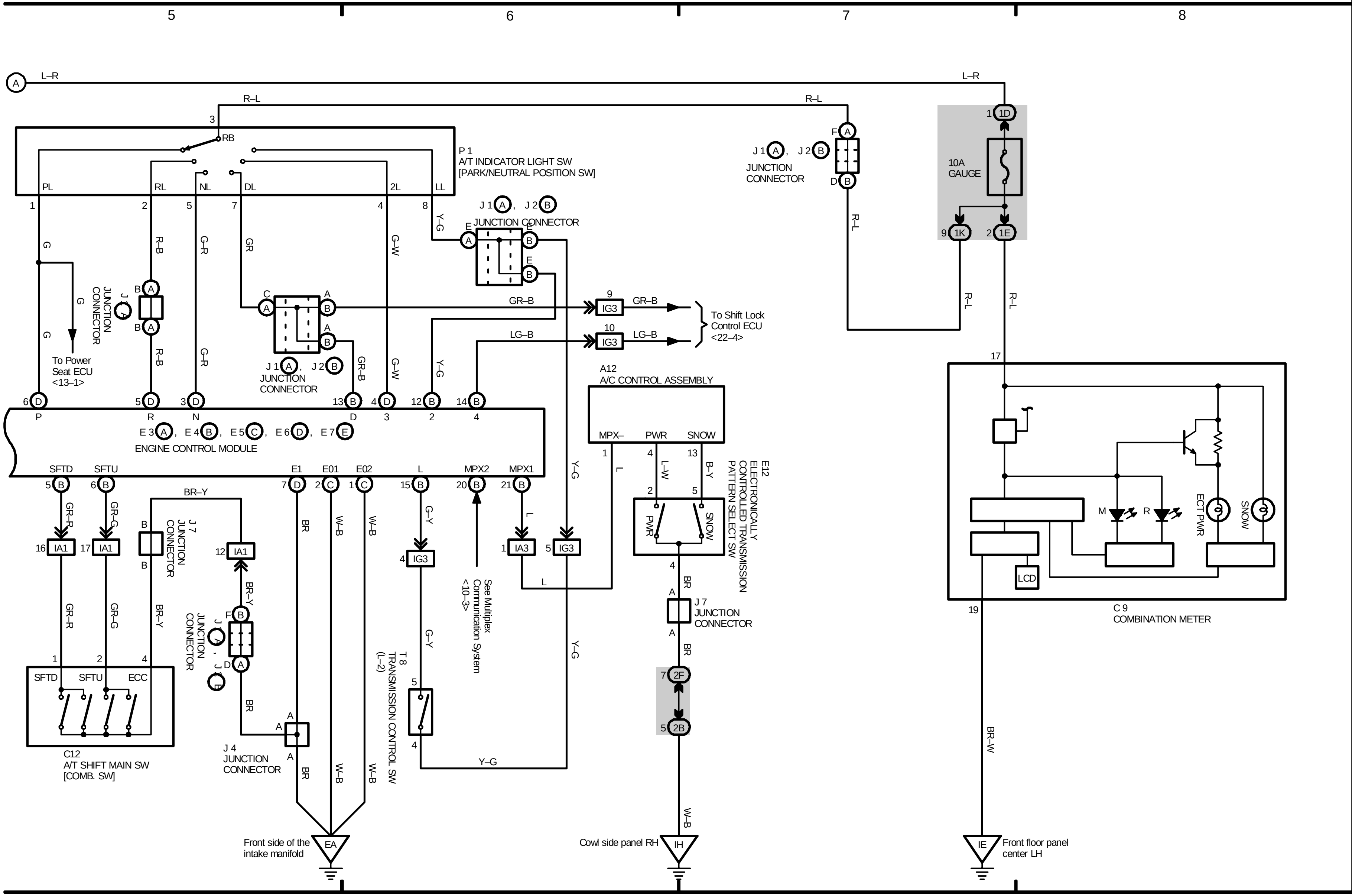
Power Source

Electronically Controlled Transmission and A/T Indicator

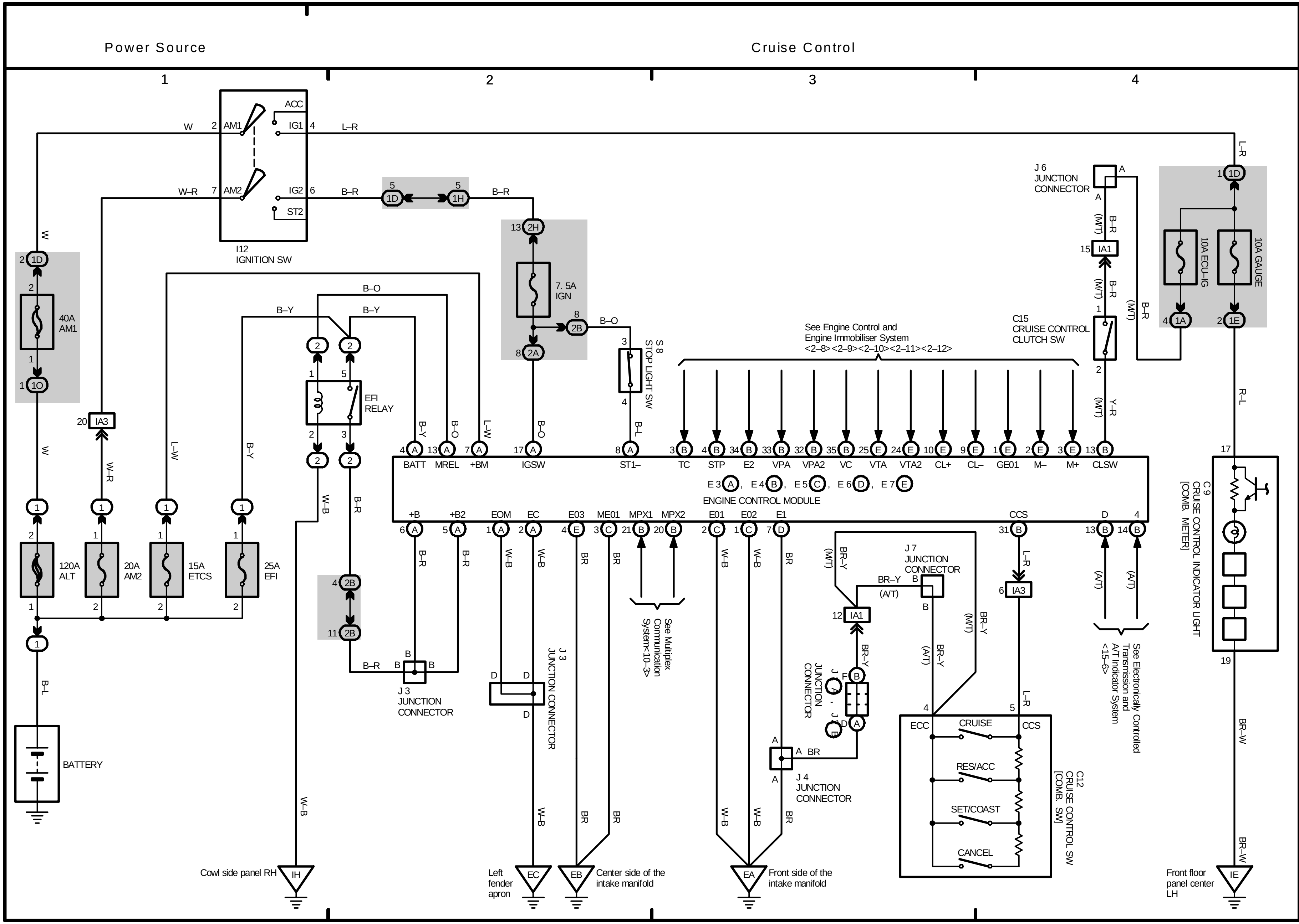


2004 LEXUS IS 300 (EWD545U)

Electronically Controlled Transmission and A/T Indicator

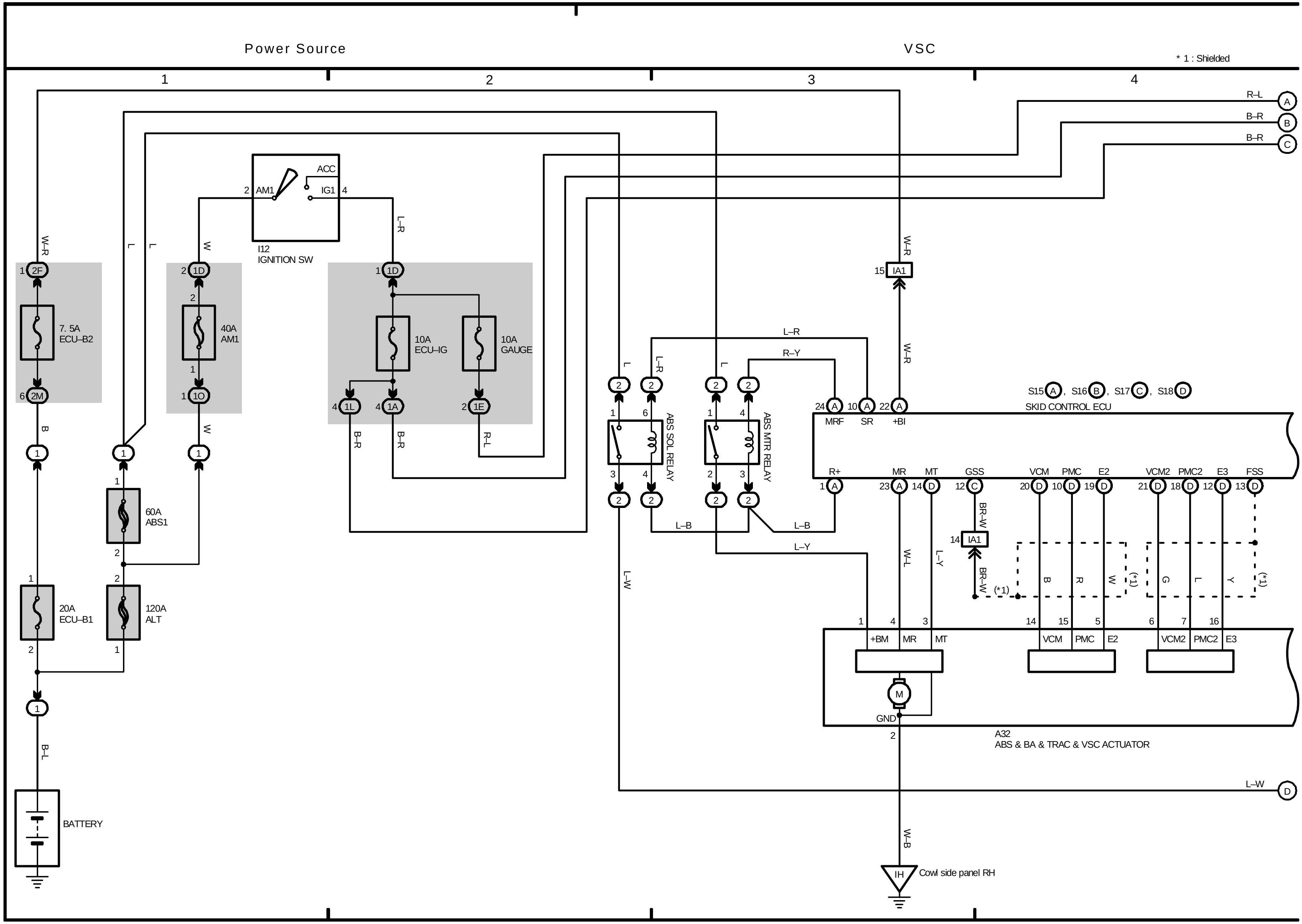


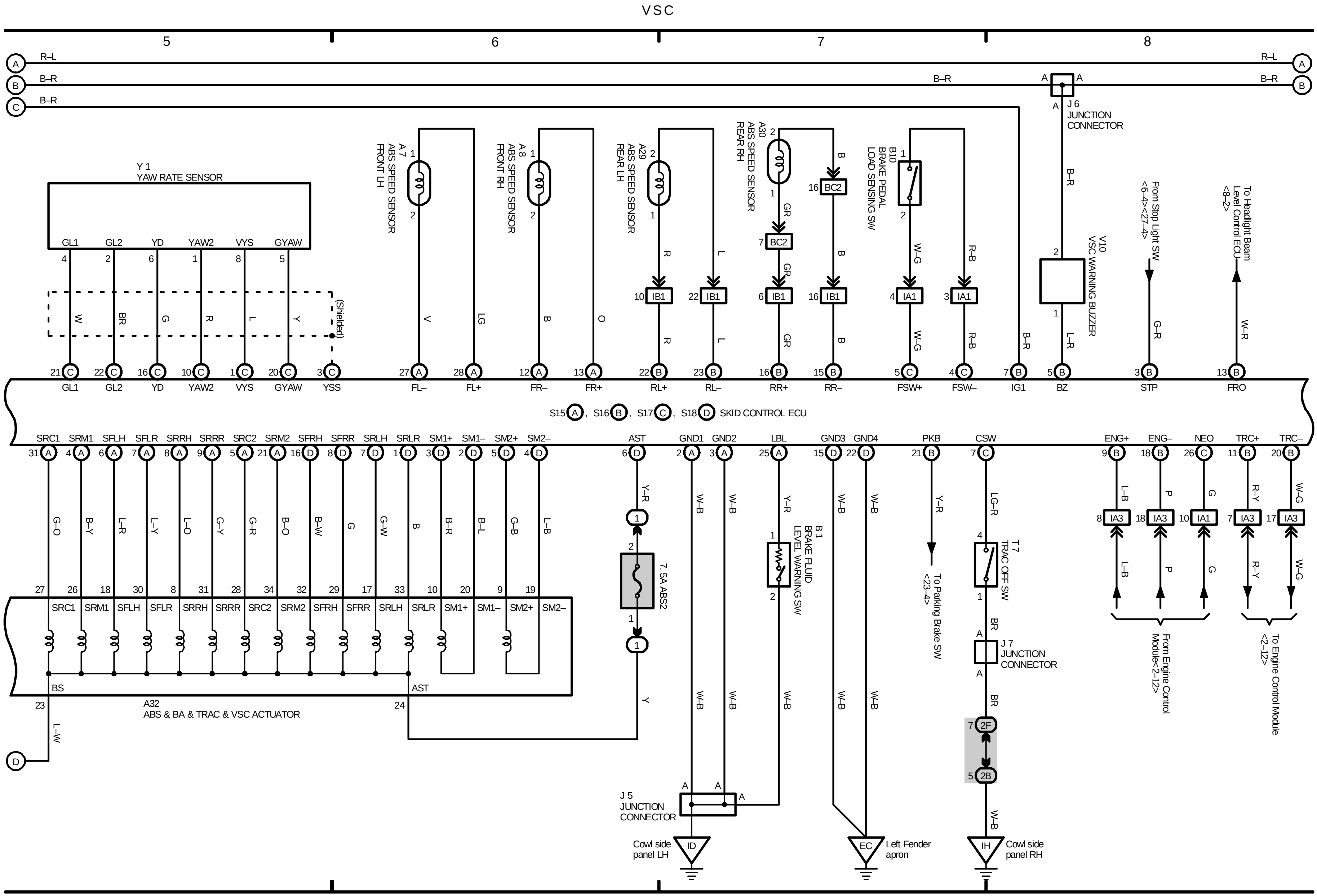
M OVERALL ELECTRICAL WIRING DIAGRAM



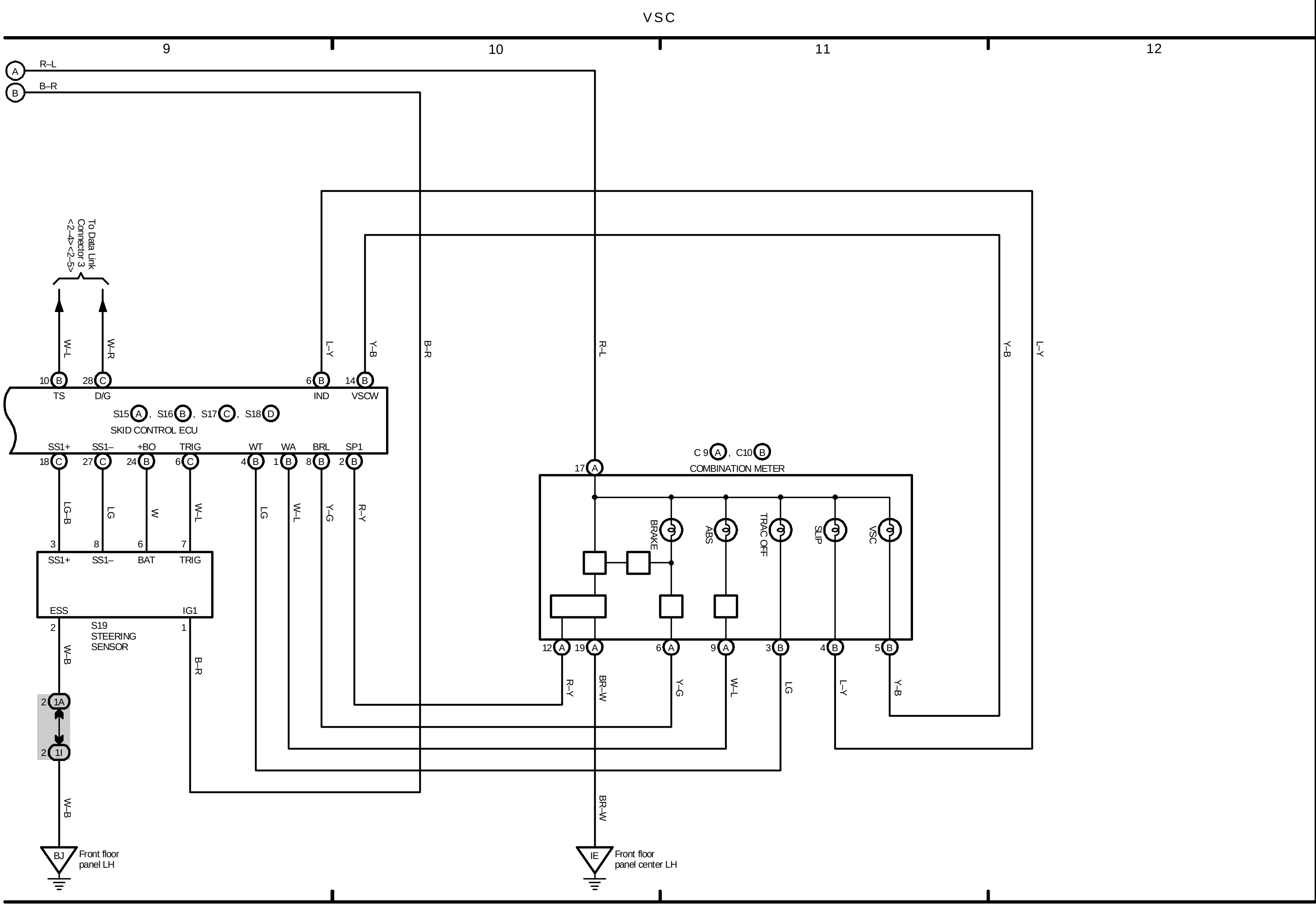
2004 LEXUS IS 300 (EWD545U)

(Cont. next page)



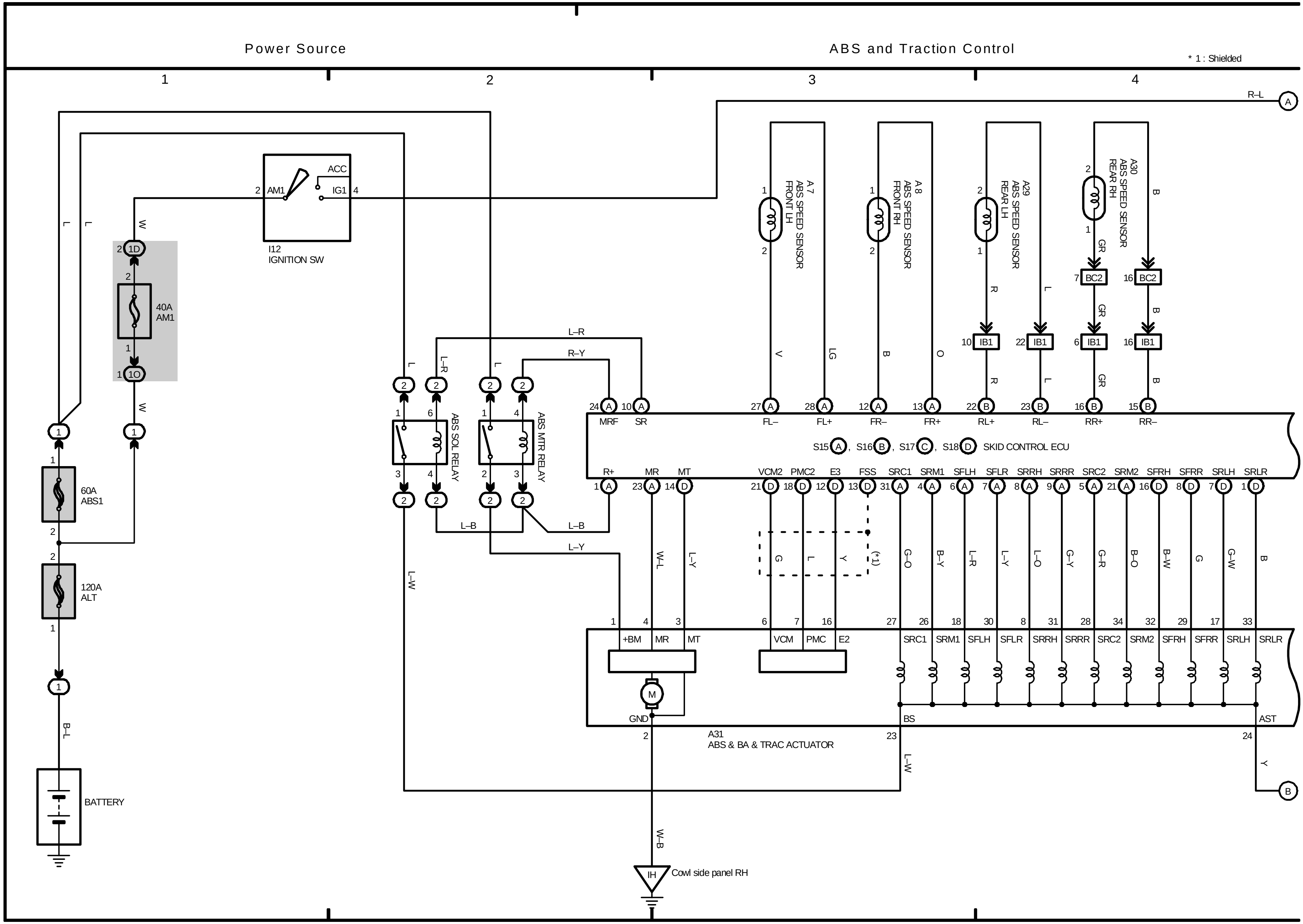

VSC
5
6
7
8
Y 1
YAW RATE SENSOR
(Shielded)
A 7
ABS SPEED SENSOR
FRONT LH
A 8
ABS SPEED SENSOR
FRONT RH
A29
ABS SPEED SENSOR
REAR LH
A30
ABS SPEED SENSOR
REAR RH
B10
BRAKE PEDAL
LOAD SENSING SW
J 6
JUNCTION
CONNECTOR
V10
VSC WARNING BUZZER
From Stop Light SW
<6–4><27–4>
To Headlight Beam
Level Control ECU
<8–2>
S15 A , S16 B , S17 C , S18 D SKID CONTROL ECU
7. 5A ABS2
B 1
BRAKE FLUID
LEVEL WARNING SW
To Parking Brake SW
<23–4>
T7
TRAC OFF SW
J 7
JUNCTION
CONNECTOR
From Engine Control
Module<2–12>
To Engine Control Module
<2–12>
A32
ABS & BA & TRAC & VSC ACTUATOR
J 5
JUNCTION
CONNECTOR
Cowl side
panel LH
Left Fender
apron
Cowl side
panel RH

M OVERALL ELECTRICAL WIRING DIAGRAM

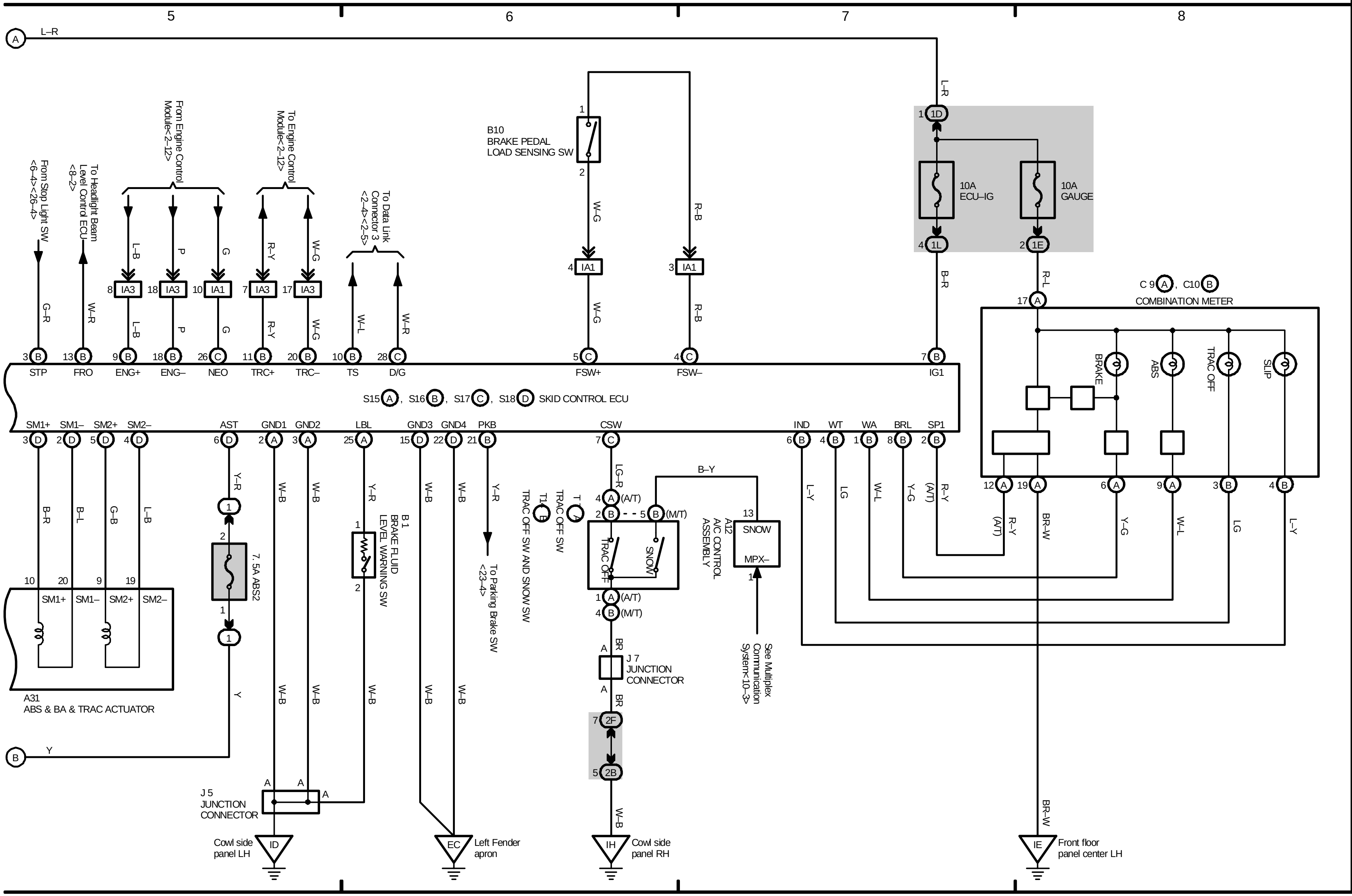


2004 LEXUS IS 300 (EWD545U)

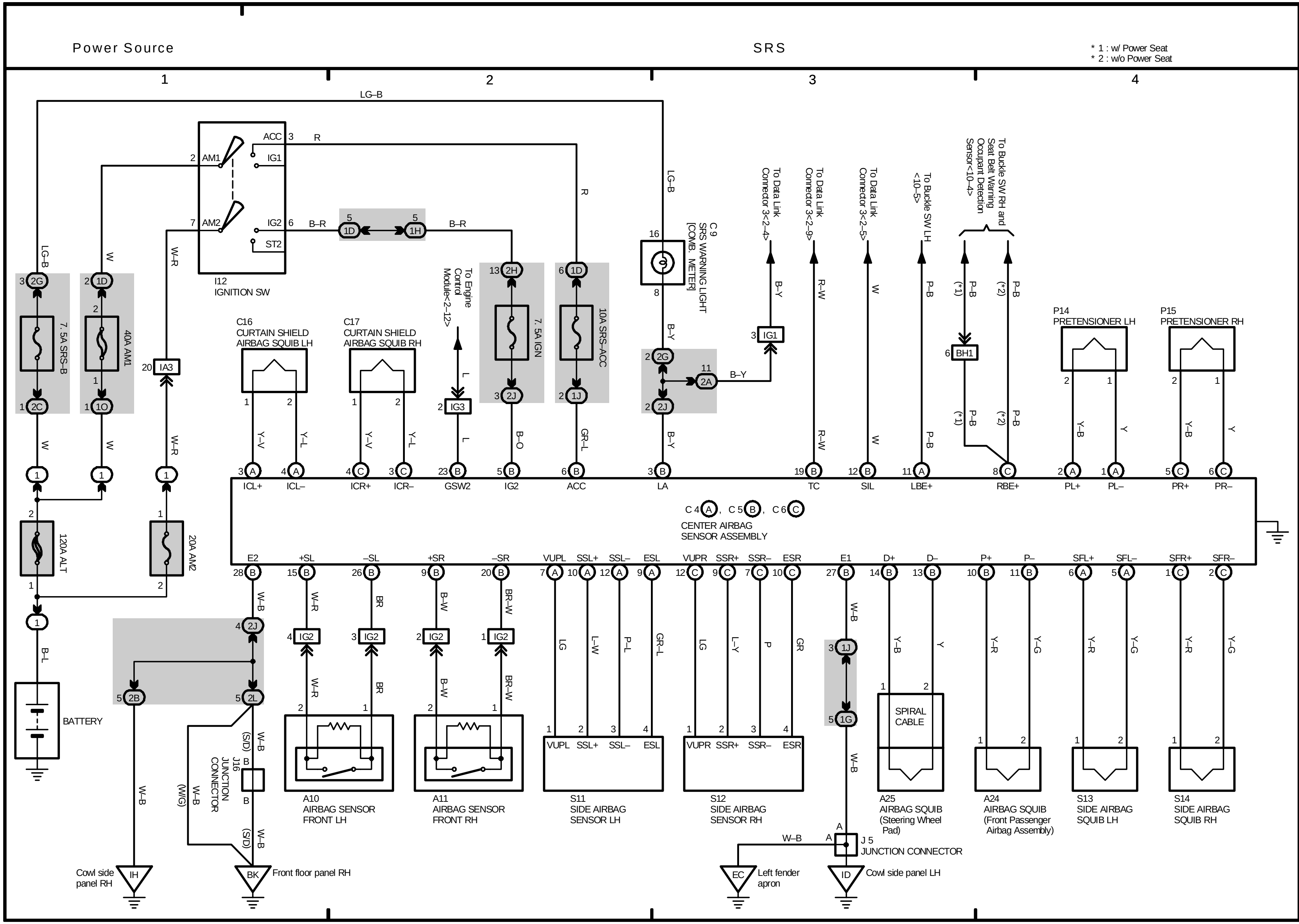
M OVERALL ELECTRICAL WIRING DIAGRAM


Power Source
ABS and Traction Control
* 1 : Shielded
1
2
3
4
I12
IGNITION SW
AM1
ACC
IG1
40A
AM1
60A
ABS1
120A
ALT
BATTERY
ABS SOL RELAY
ABS MTR RELAY
A 7
ABS SPEED SENSOR
FRONT LH
A 8
ABS SPEED SENSOR
FRONT RH
A29
ABS SPEED SENSOR
REAR LH
A30
ABS SPEED SENSOR
REAR RH
S15 A , S16 B , S17 C , S18 D SKID CONTROL ECU
MRF SR FL– FL+ FR– FR+ RL+ RL– RR+ RR–
R+ MR MT VCM2 PMC2 E3 FSS SRC1 SRM1 SFLH SFLR SRRH SRRR SRC2 SRM2 SFRH SFRR SRLH SRLR
+BM MR MT VCM PMC E2 SRC1 SRM1 SFLH SFLR SRRH SRRR SRC2 SRM2 SFRH SFRR SRLH SRLR
GND BS AST
A31
ABS & BA & TRAC ACTUATOR
IH
Cowl side panel RH
R–L
L–R
R–Y
L–B
L–Y
L–W
W–L
W–B
B–L
(*1)

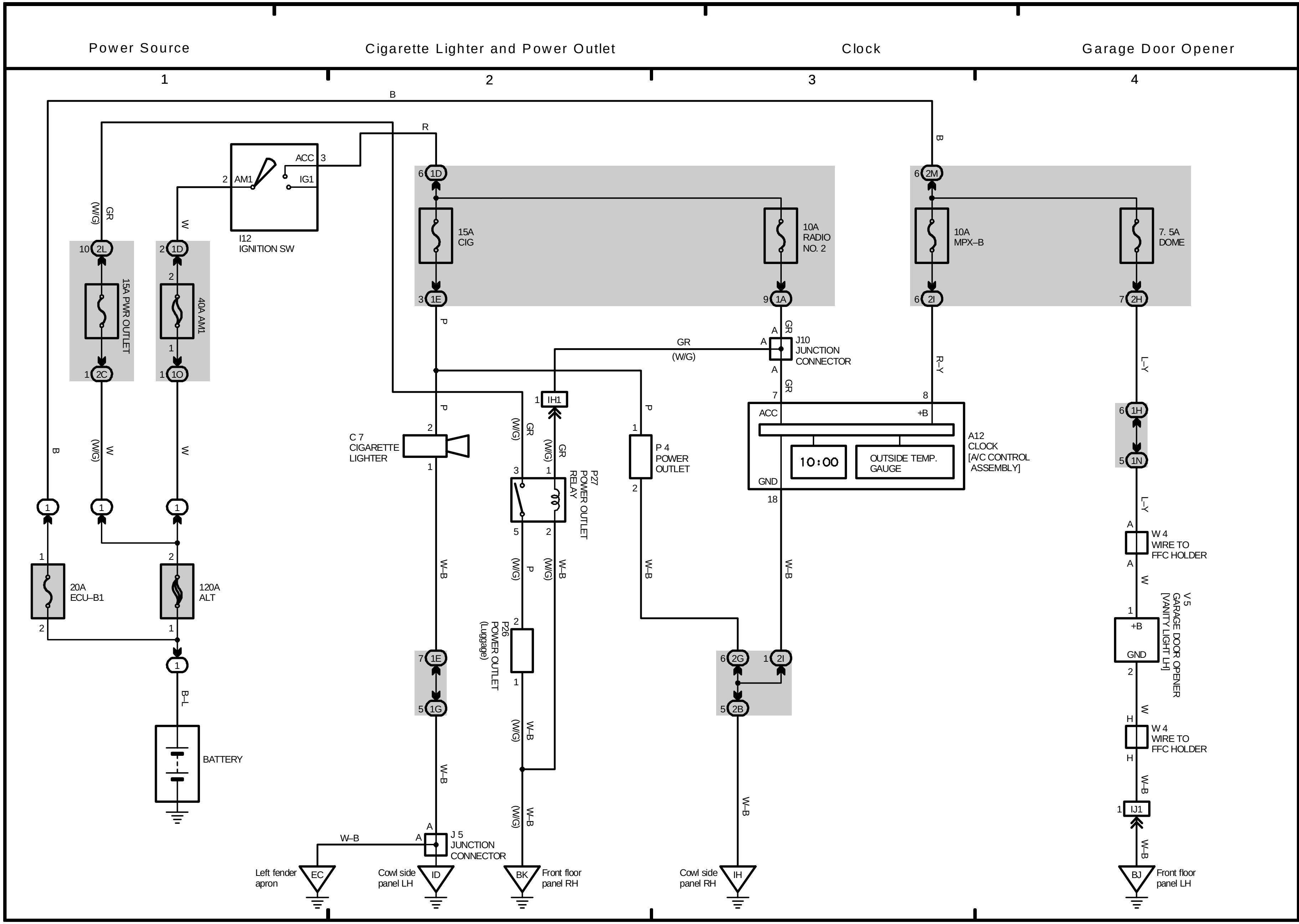
ABS and Traction Control



M OVERALL ELECTRICAL WIRING DIAGRAM

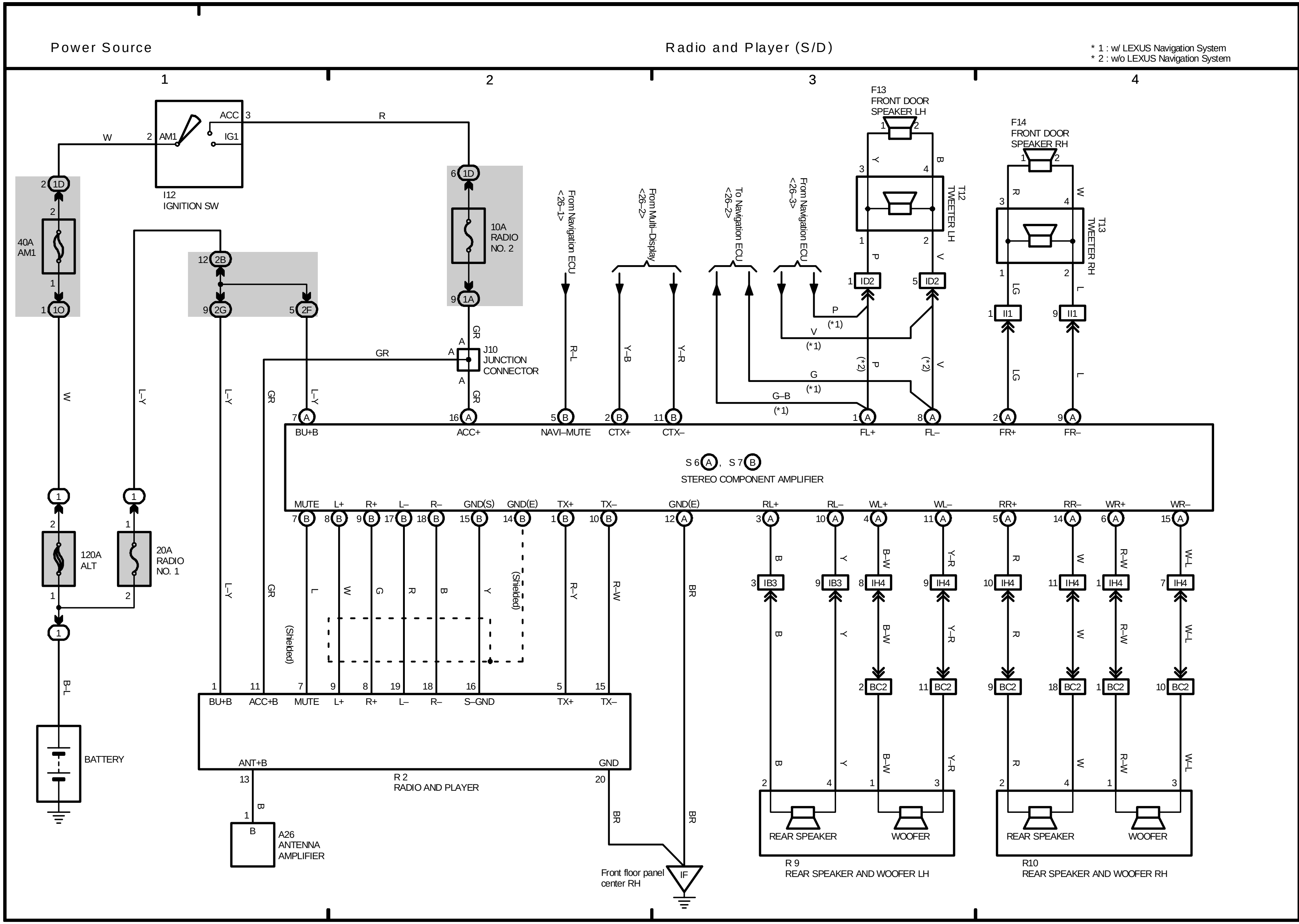


2004 LEXUS IS 300 (EWD545U)



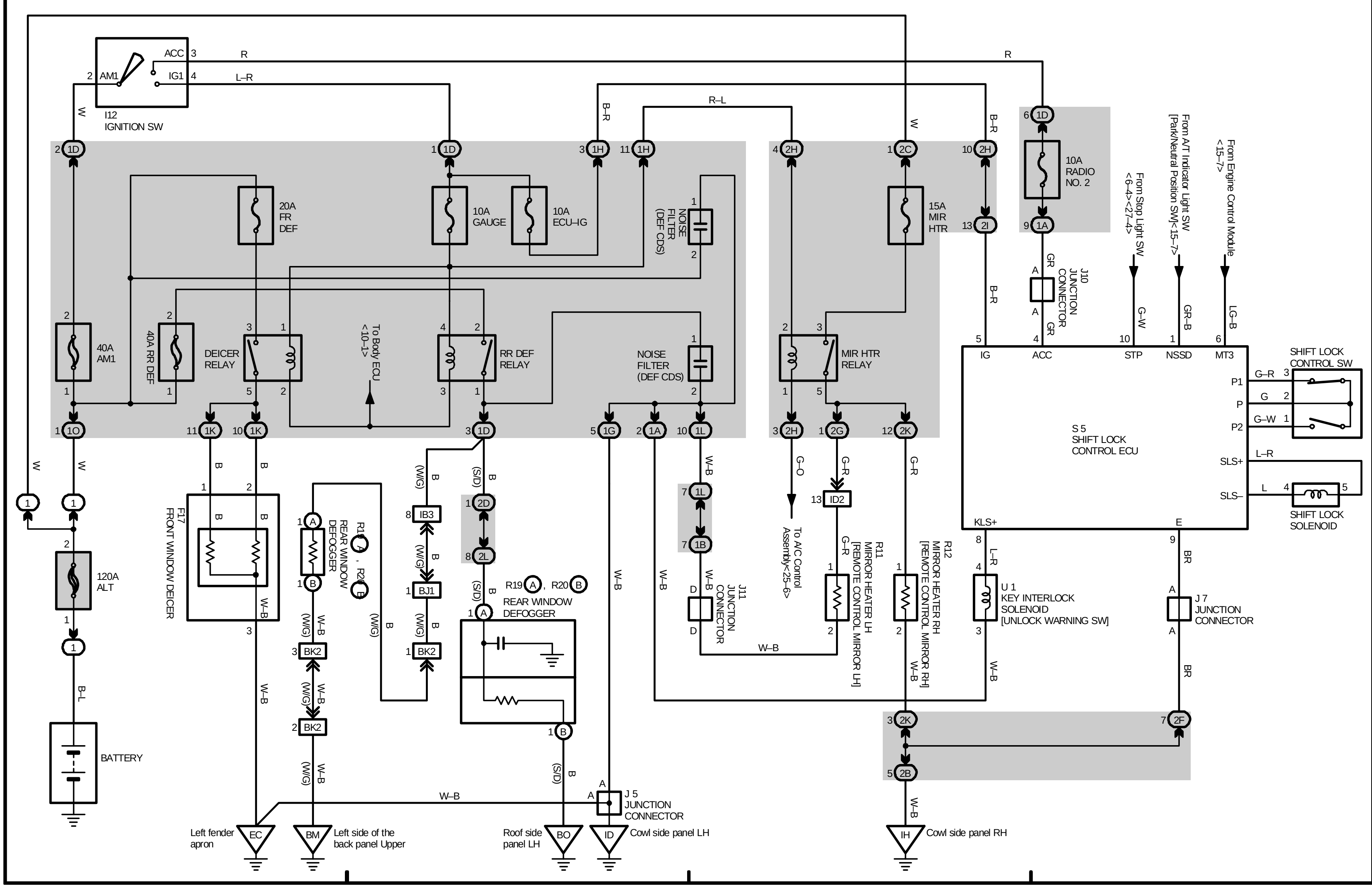
2004 LEXUS IS 300 (EWD545U)

M OVERALL ELECTRICAL WIRING DIAGRAM

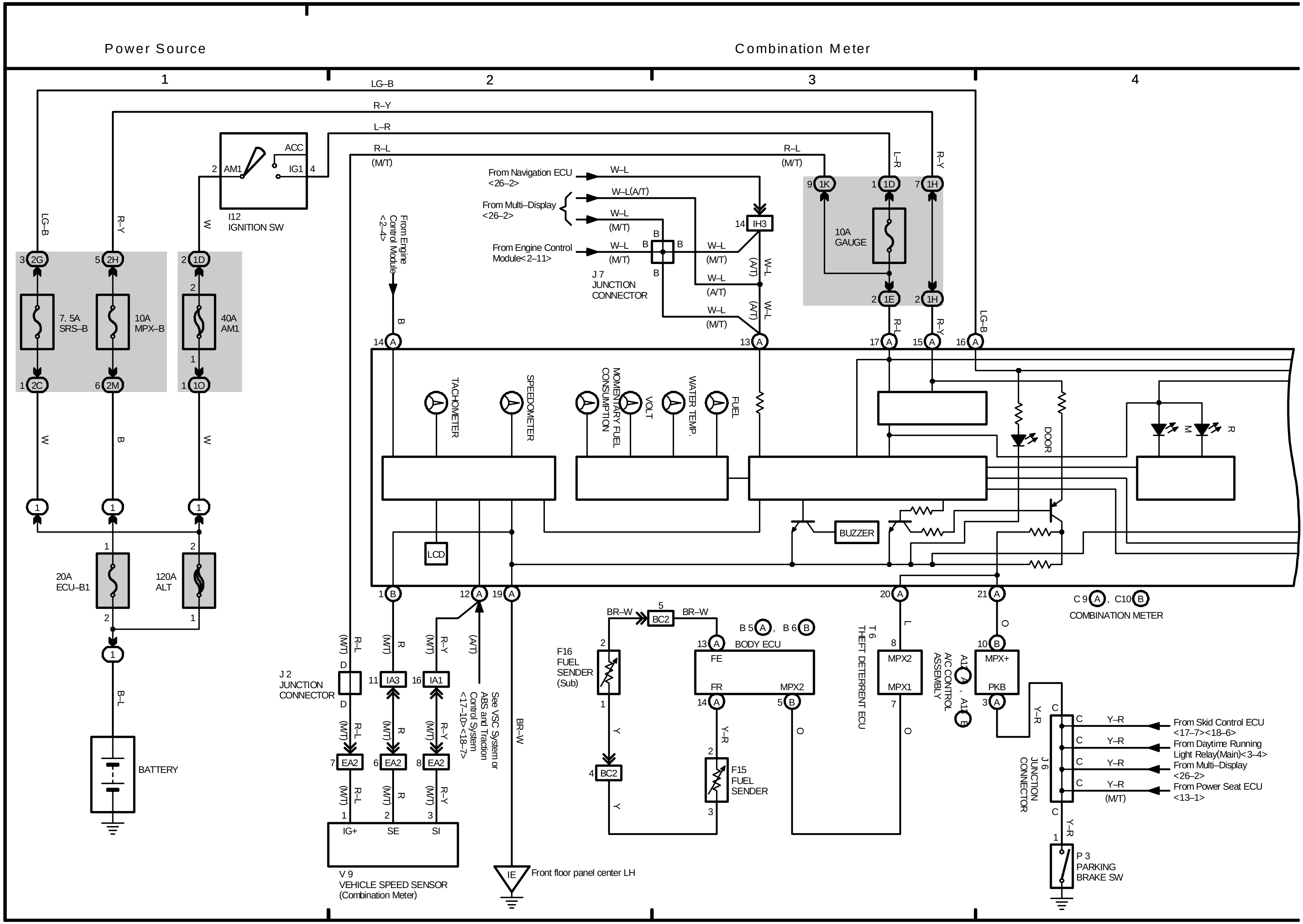


2004 LEXUS IS 300 (EWD545U)

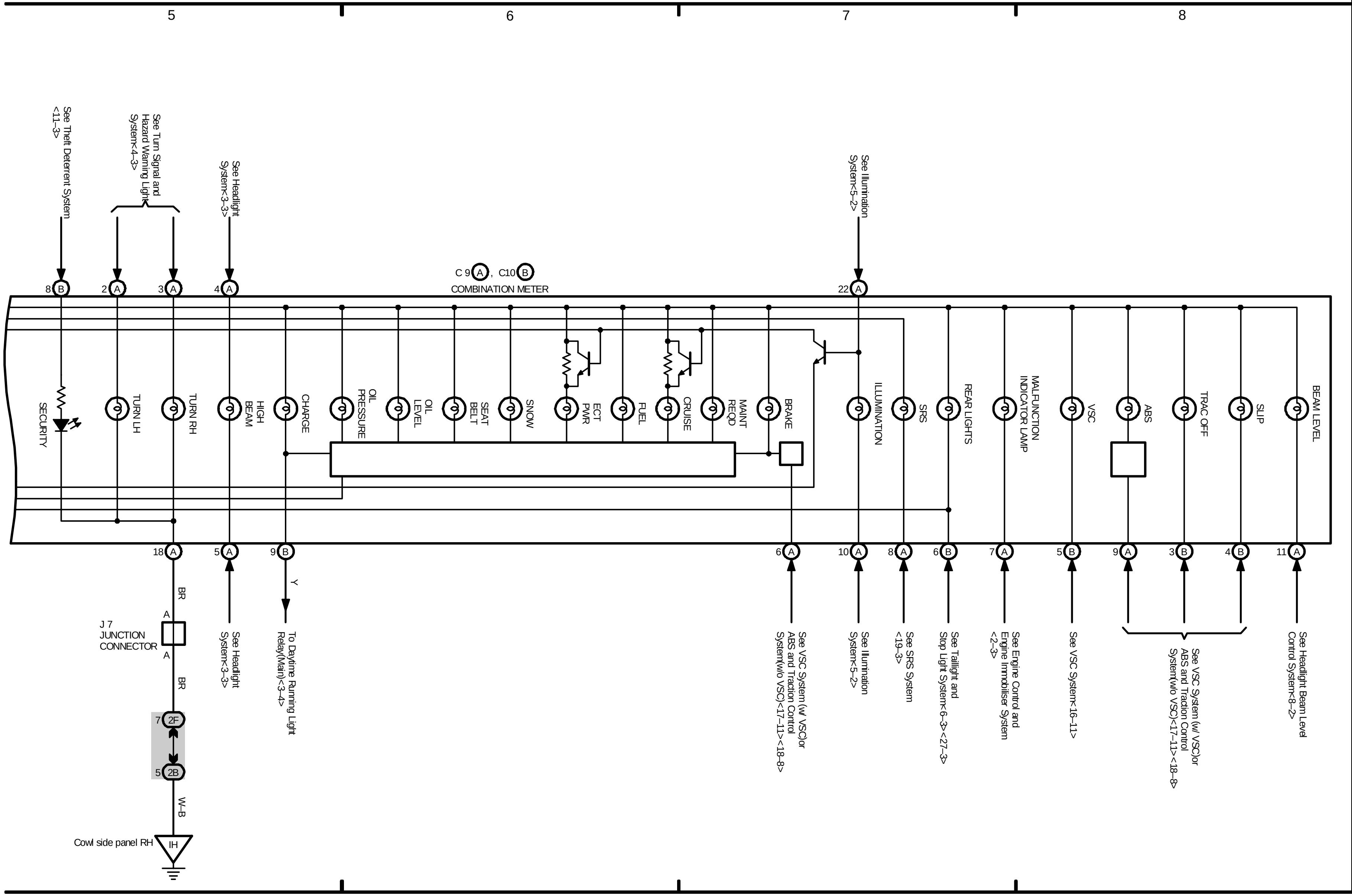
Power Source	Front Window Deicer	Rear Window Defogger and Mirror Heater	Shift Lock



M OVERALL ELECTRICAL WIRING DIAGRAM


Power Source
Combination Meter
1
2
3
4
LG–B
R–Y
L–R
R–L
(M/T)
ACC
AM1
IG1
I12
IGNITION SW
7. 5A
SRS–B
10A
MPX–B
40A
AM1
20A
ECU–B1
120A
ALT
BATTERY
From Navigation ECU
<26–2>
From Multi–Display
<26–2>
From Engine Control
Module<2–11>
J 7
JUNCTION
CONNECTOR
From Engine
Control Module
<2–4>
10A
GAUGE
TACHOMETER
SPEEDOMETER
MOMENTARY FUEL
CONSUMPTION
VOLT
WATER TEMP.
FUEL
DOOR
BUZZER
LCD
C 9 A, C10 B
COMBINATION METER
J 2
JUNCTION
CONNECTOR
See VSC System or
ABS and Traction
Control System
<17–10><18–7>
V 9
VEHICLE SPEED SENSOR
(Combination Meter)
IE
Front floor panel center LH
F16
FUEL
SENDER
(Sub)
F15
FUEL
SENDER
B 5 A, B 6 B
BODY ECU
FE
FR
MPX2
T 6
THEFT DETERRENT ECU
MPX2
MPX1
A/C CONTROL
ASSEMBLY
MPX+
PKB
J 6
JUNCTION
CONNECTOR
From Skid Control ECU
<17–7><18–6>
From Daytime Running
Light Relay(Main)<3–4>
From Multi–Display
<26–2>
From Power Seat ECU
<13–1>
P 3
PARKING
BRAKE SW

Combination Meter

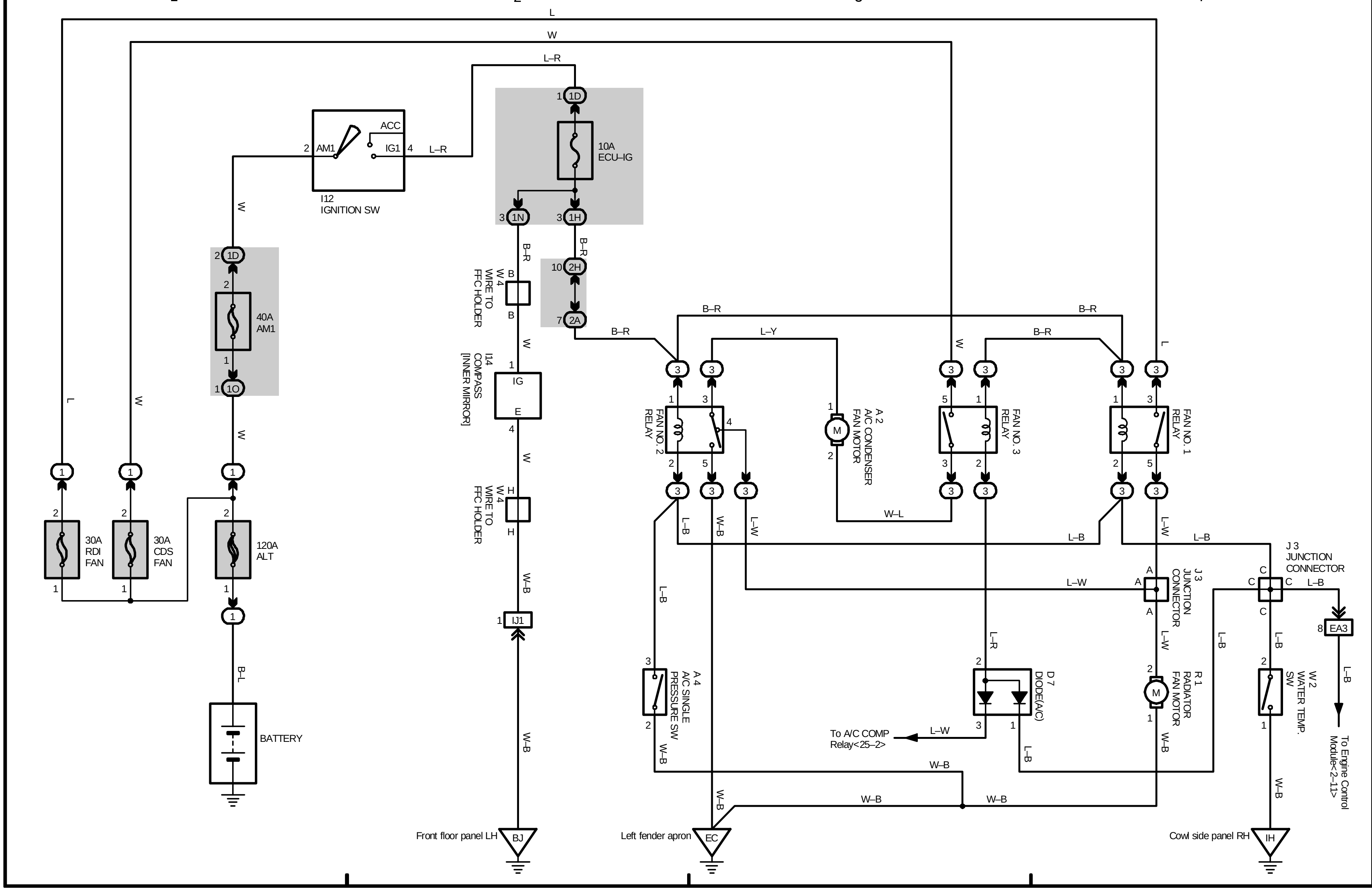


2004 LEXUS IS 300 (EWD545U)

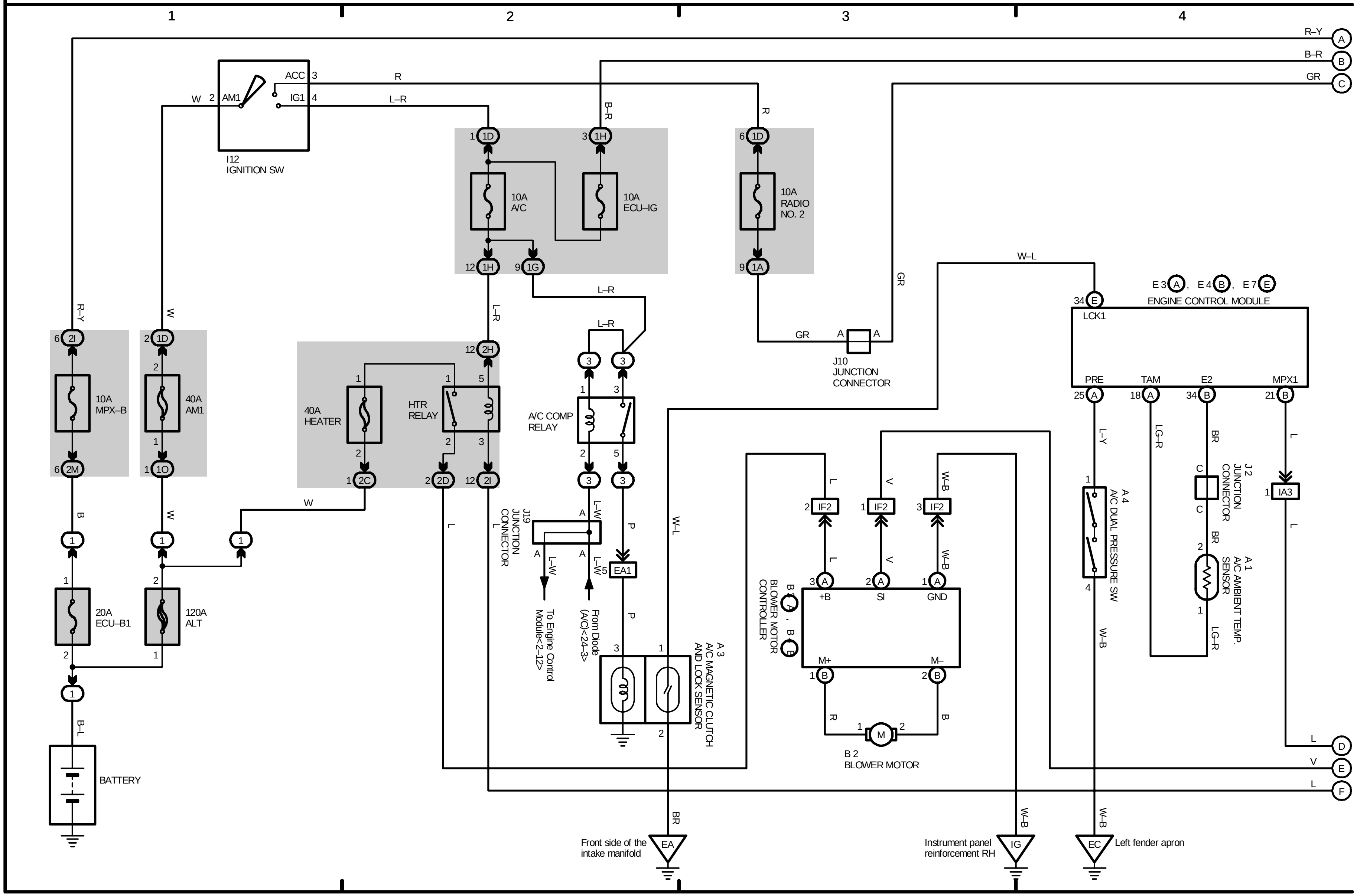
M OVERALL ELECTRICAL WIRING DIAGRAM

Power Source | Compass | Radiator Fan and Condenser Fan

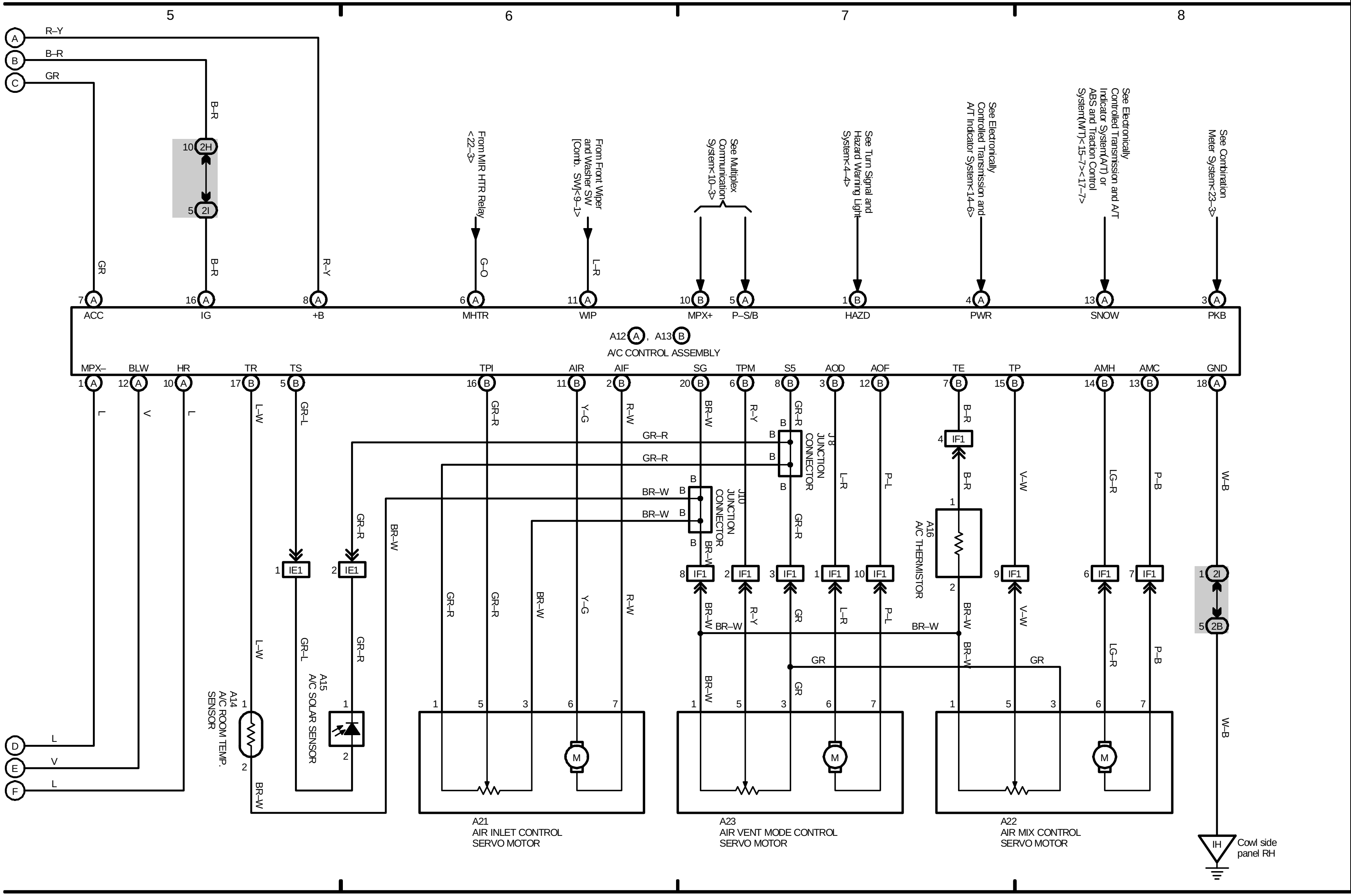
1 2 3 4



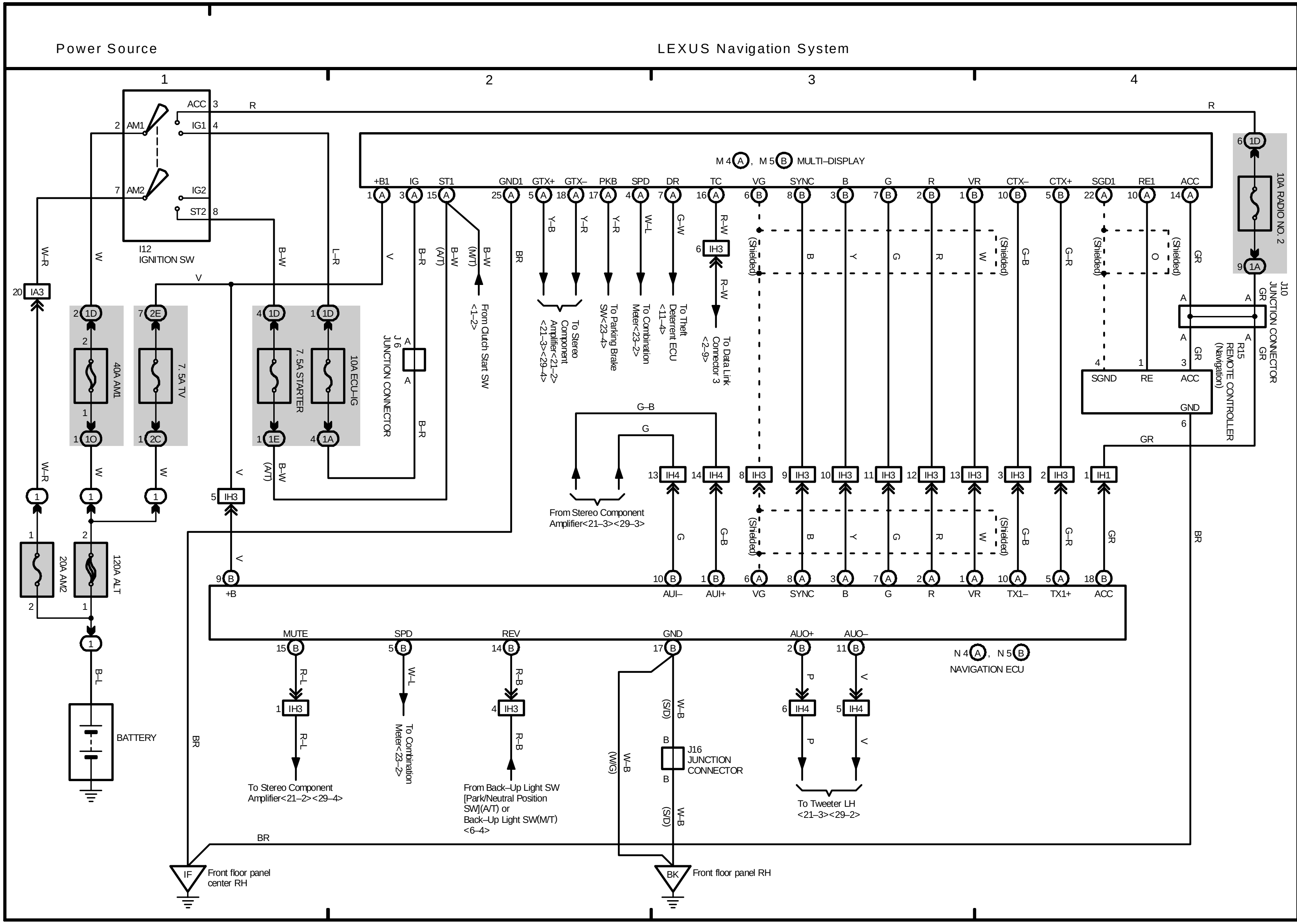
Power Source | Automatic Air Conditioning



Automatic Air Conditioning

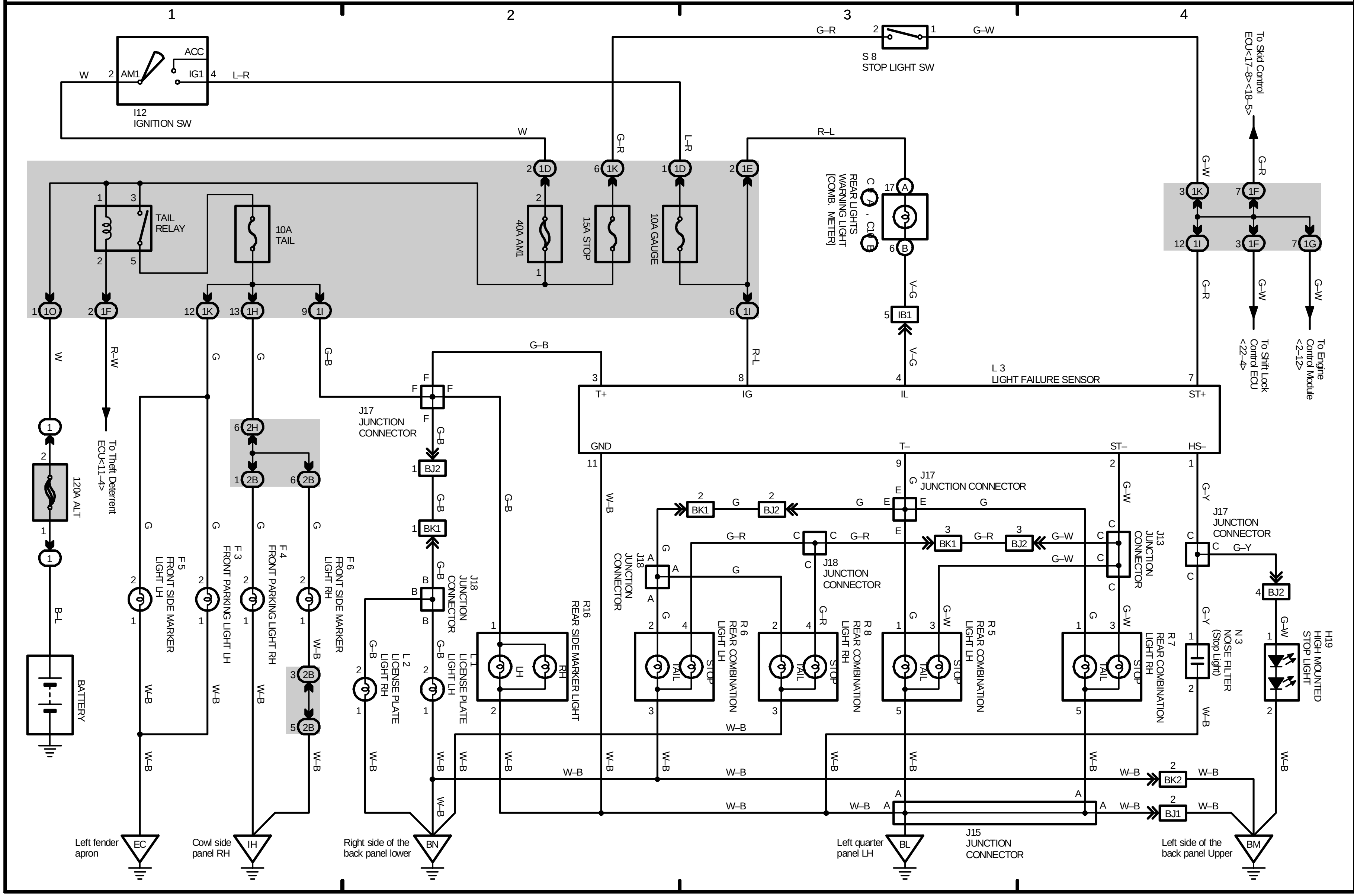


M OVERALL ELECTRICAL WIRING DIAGRAM

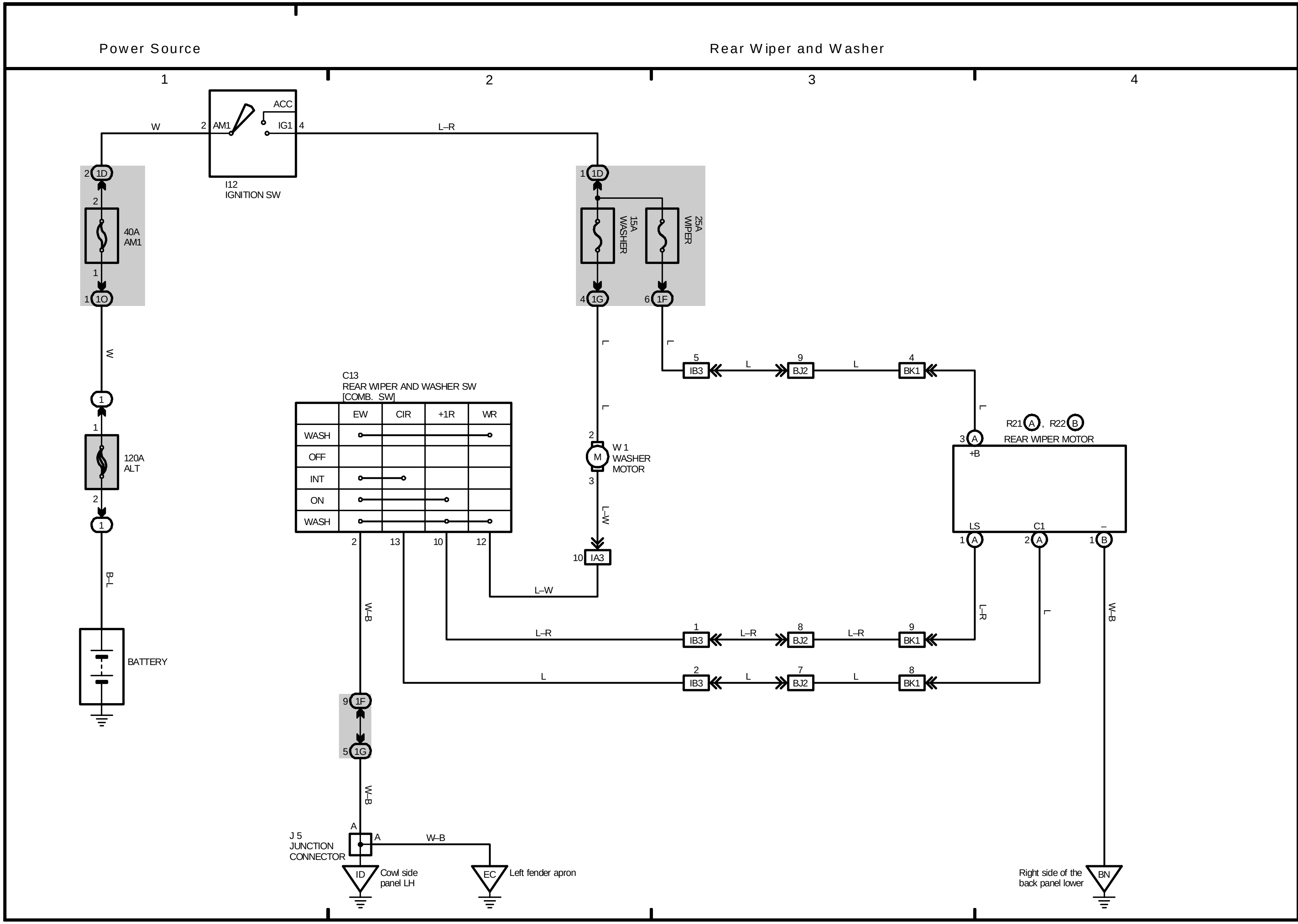

Power Source
LEXUS Navigation System
1
2
3
4
I12
IGNITION SW
ACC
AM1
IG1
AM2
IG2
ST2
40A AM1
7. 5A TV
7. 5A STARTER
10A ECU–IG
20A AM2
120A ALT
BATTERY
J 6
JUNCTION CONNECTOR
From Clutch Start SW
<1–2>
M 4 A , M 5 B MULTI–DISPLAY
+B1
IG
ST1
GND1
GTX+
GTX–
PKB
SPD
DR
TC
VG
SYNC
B
G
R
VR
CTX–
CTX+
SGD1
RE1
ACC
To Stereo Component Amplifier<21–2><21–3><29–4>
To Parking Brake SW<23–4>
To Combination Meter<23–2>
To Theft Deterrent ECU <11–4>
To Data Link Connector 3 <2–9>
(Shielded)
10A RADIO NO. 2
J10
JUNCTION CONNECTOR
R15
REMOTE CONTROLLER
(Navigation)
SGND
RE
ACC
GND
From Stereo Component Amplifier<21–3><29–3>
+B
AUI–
AUI+
VG
SYNC
B
G
R
VR
TX1–
TX1+
ACC
MUTE
SPD
REV
GND
AUO+
AUO–
N 4 A , N 5 B
NAVIGATION ECU
To Stereo Component Amplifier<21–2><29–4>
To Combination Meter<23–2>
From Back–Up Light SW [Park/Neutral Position SW](A/T) or Back–Up Light SW(M/T) <6–4>
J16
JUNCTION CONNECTOR
To Tweeter LH <21–3><29–2>
IF
Front floor panel center RH
BK
Front floor panel RH

Power Source

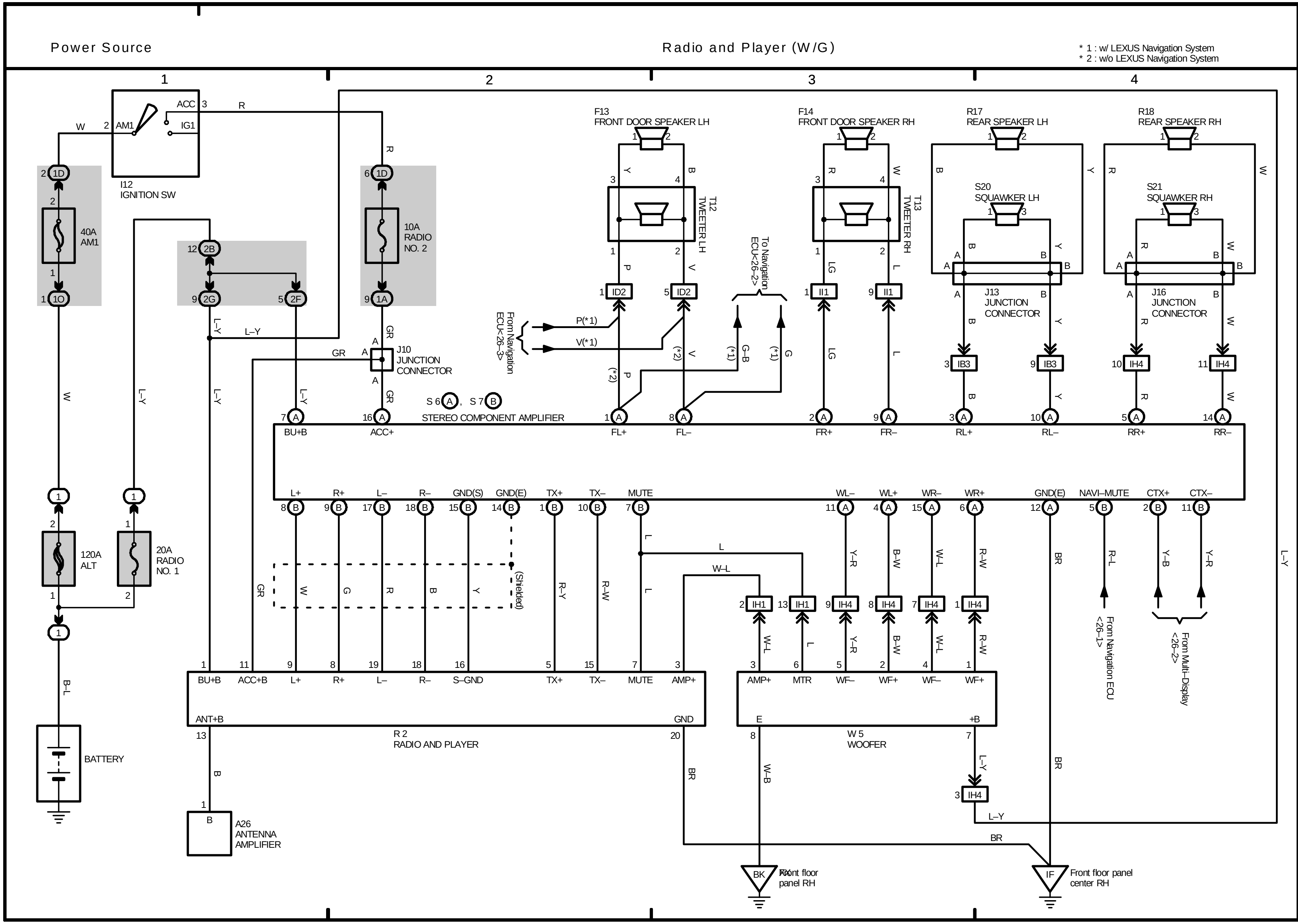
Taillight and Stop Light (W/G)



M OVERALL ELECTRICAL WIRING DIAGRAM



Power Source
Rear Wiper and Washer
1
2
3
4
ACC
AM1
IG1
I12
IGNITION SW
40A
AM1
120A
ALT
BATTERY
15A
WASHER
25A
WIPER
C13
REAR WIPER AND WASHER SW
[COMB. SW]
EW
CIR
+1R
WR
WASH
OFF
INT
ON
WASH
W 1
WASHER
MOTOR
R21 A , R22 B
REAR WIPER MOTOR
+B
LS
C1
J 5
JUNCTION
CONNECTOR
Cowl side
panel LH
Left fender apron
Right side of the
back panel lower



2004 LEXUS IS 300 (EWD545U)

Technical Service Information Bulletin

December 16, 2004

Title:

SENSOR INSPECTION FOR AIR CONDITIONING SYSTEM

Models:

'90 – Current All Models

TSIB

AC005-04

HEATING & AIR CONDITIONING

Introduction

This service bulletin contains inspection procedures to more precisely confirm proper operation of the following temperature sensors of the air conditioning system. Follow the procedures in this service bulletin when inspecting these sensors. These contents will be reflected in future repair manuals.

- Room Temperature Sensor
- Ambient Temperature Sensor
- Air Duct Sensor
- Evaporator Temperature Sensor
- Solar Sensor
- Room Humidity Sensor

Applicable Vehicles

- **All 1990 – Current** model year **Lexus** vehicles.

Warranty Information

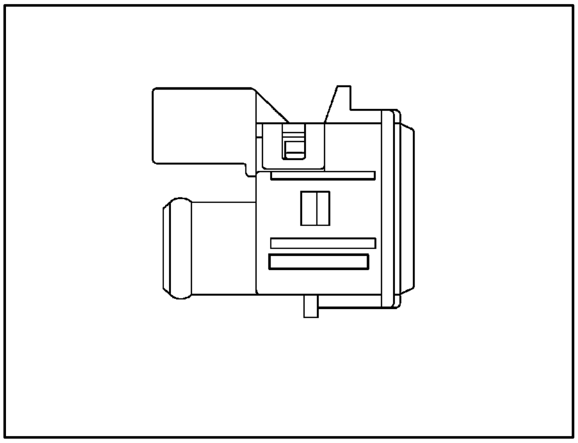
OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Inspection Procedure

1. Inspect Room Temperature Sensor.

A. Measure the sensor resistance.

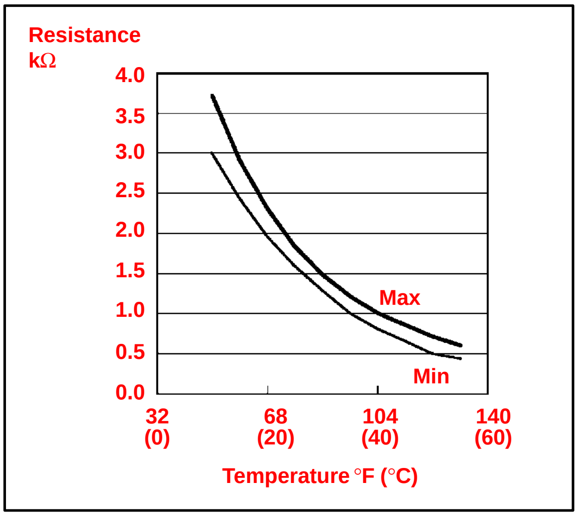
Resistance Value at 77°F (25°C)	1700 +/– 85Ω



NOTE:
- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:
As the temperature increases, the resistance decreases.

TEMPERATURE °F (°C)	SPECIFICATION kΩ
50 (10)	3.00 to 3.73
59 (15)	2.45 to 2.88
68 (20)	1.95 to 2.30
77 (25)	1.60 to 1.80
86 (30)	1.28 to 1.47
95 (35)	1.00 to 1.22
104 (40)	0.80 to 1.00
113 (45)	0.65 to 0.85
122 (50)	0.50 to 0.70
131 (55)	0.44 to 0.60
140 (60)	0.36 to 0.50

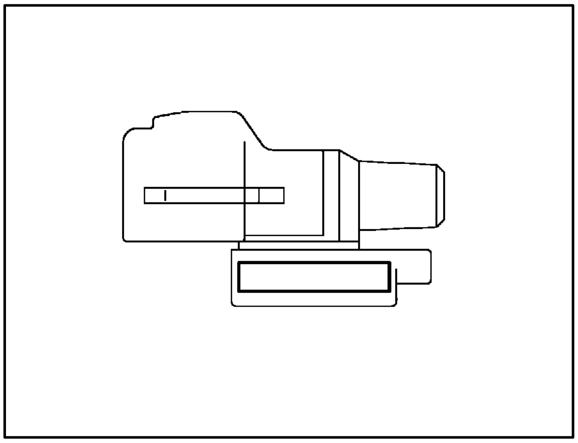


Inspection Procedure (Continued)

2. Inspect Ambient Temperature Sensor.

A. Measure the sensor resistance according to the selected graph (specification).

Resistance Value at 77°F (25°C)	1700 +/– 85Ω



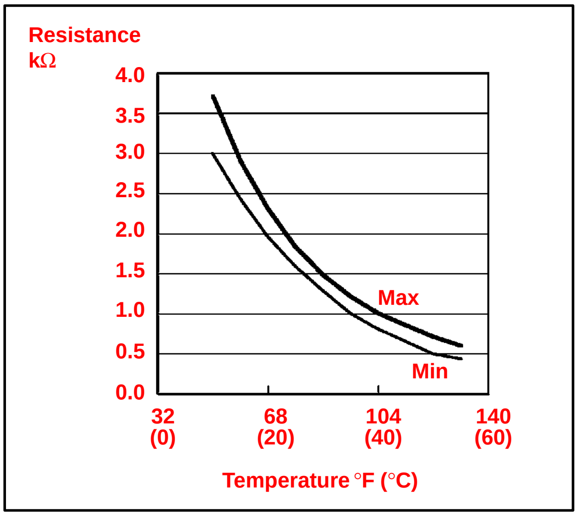
NOTE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases.

TEMPERATURE °F (°C)	SPECIFICATION kΩ
50 (10)	3.00 to 3.73
59 (15)	2.45 to 2.88
68 (20)	1.95 to 2.30
77 (25)	1.60 to 1.80
86 (30)	1.28 to 1.47
95 (35)	1.00 to 1.22
104 (40)	0.80 to 1.00
113 (45)	0.65 to 0.85
122 (50)	0.50 to 0.70
131 (55)	0.44 to 0.60
140 (60)	0.36 to 0.50



Inspection Procedure
(Continued)

3. Inspect Air Duct Sensor.

A. Measure the sensor resistance according to the table and graph (specification).

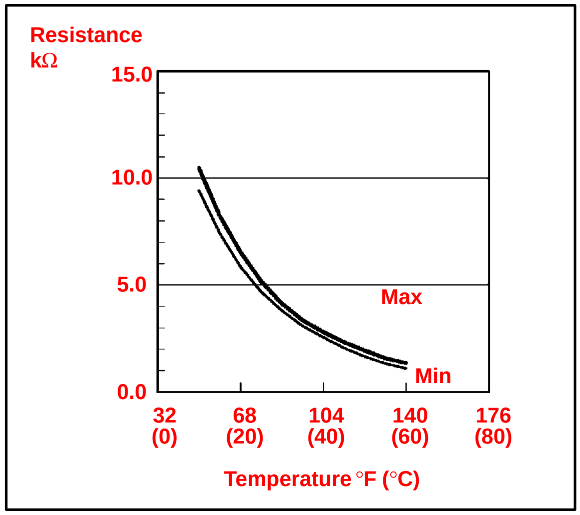
NOTE:

- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

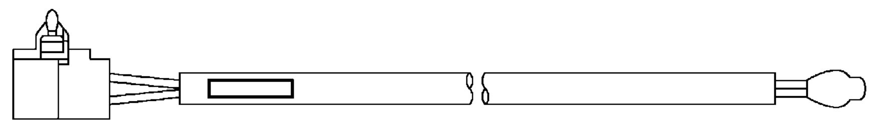
As the temperature increases, the resistance decreases.

TEMPERATURE °F (°C)	SPECIFICATION kΩ
50 (10)	9.48 to 10.49
59 (15)	7.50 to 8.28
68 (20)	5.95 to 6.57
77 (25)	4.77 to 5.25
86 (30)	3.85 to 4.21
95 (35)	3.12 to 3.40
104 (40)	2.53 to 2.79
113 (45)	2.06 to 2.30
122 (50)	1.69 to 1.91
131 (55)	1.39 to 1.59
140 (60)	1.15 to 1.33



Inspection Procedure (Continued)

4. Inspect Evaporator Temperature Sensor.



Select the appropriate graph (specification) using the following table.

NOTE:
Please inspect the sensors for model years not indicated by this bulletin, according to the instructions in the applicable repair manual.

MODEL	MODEL YEAR	COMMENTS	PART NUMBER	GRAPH
ES 300	1992 – 2001		88625–33070	2
ES 300/330	2002 – 2003		88625–17130	2
	2003		88625–33170	3
GS 300	1993 – 1997		88625–3A020	2
GS 300/400/430	1998 – 2002		88625–3A120	2
GX 470	2003 – 2005	Thermistor No. 1	88625–35050	3
		Thermistor No. 2	88625–16210	2
IS 300	2000 – 2001		88625–48010	2
LS 400	1990 – 1992		88625–32040	2
	1993 – 1994		88625–50100	2
	1995 – 2000		88625–50140	2
LS 430	2001 – 2005		88625–50160	2
LX 450	1996 – 1997		88625–60060	2
LX 470	1998 – 2000	Thermistor No. 2	88625–60140	2
	1998 – 2002	Thermistor No. 1	88625–60130	2
	2003 – 2005		88625–47011	2
RX 300	1998 – 2003		88625–48010	2
RX 330	2004	CBU	88625–48050	1
	2004 – 2005	CBU	88625–48060	3
		NAP		
SC 300/400	1991 – 2000		88625–32040	2

Inspection Procedure (Continued)

A. Measure the sensor resistance according to the selected graph (specification).

NOTE:

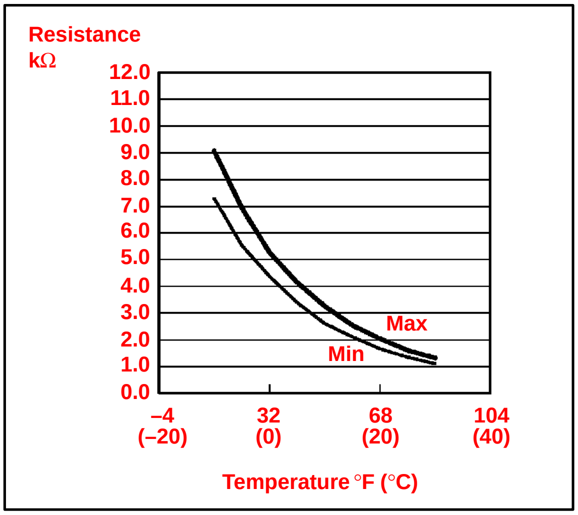
- **Even slightly touching the sensor may change the resistance value. Be sure to hold the connector of the sensor.**
- **When measuring, the sensor temperature must be the same as the ambient temperature.**

HINT:

As the temperature increases, the resistance decreases.

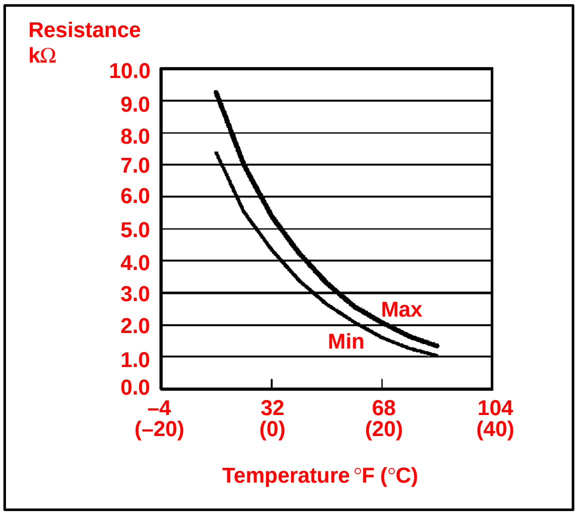
Graph 1:

TEMPERATURE °F (°C)	SPECIFICATION kΩ
14 (–10)	7.30 to 9.10
23 (–5)	5.65 to 6.95
32 (0)	4.40 to 5.35
41 (5)	3.40 to 4.15
50 (10)	2.70 to 3.25
59 (15)	2.14 to 2.58
68 (20)	1.71 to 2.05
77 (25)	1.38 to 1.64
86 (30)	1.11 to 1.32



Graph 2:

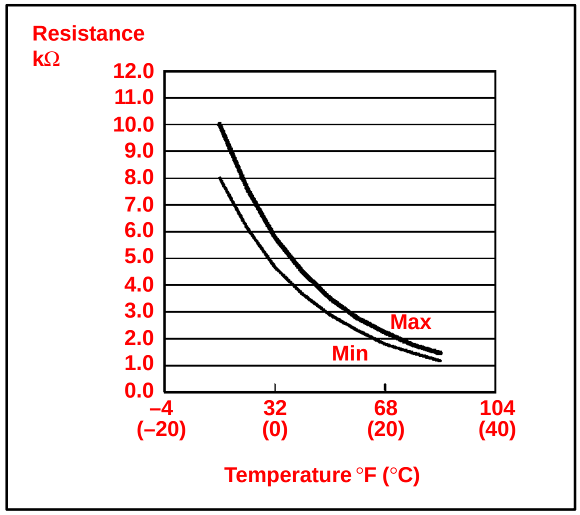
TEMPERATURE °F (°C)	SPECIFICATION kΩ
14 (–10)	7.40 to 9.20
23 (–5)	5.65 to 7.00
32 (0)	4.35 to 5.40
41 (5)	3.40 to 4.20
50 (10)	2.68 to 3.30
59 (15)	2.10 to 2.60
68 (20)	1.66 to 2.10
77 (25)	1.32 to 1.66
86 (30)	1.05 to 1.35



Inspection Procedure (Continued)

Graph 3:

TEMPERATURE °F (°C)	SPECIFICATION kΩ
14 (–10)	8.00 to 10.00
23 (–5)	6.15 to 7.65
32 (0)	4.75 to 5.85
41 (5)	3.70 to 4.55
50 (10)	2.91 to 3.55
59 (15)	2.32 to 2.80
68 (20)	1.85 to 2.22
77 (25)	1.48 to 1.77
86 (30)	1.20 to 1.43



Inspection Procedure (Continued)

5. Inspect Solar Sensor.

Four types of solar sensors are used on Lexus vehicles depending on the vehicle specifications. The inspection procedure for each type of sensor differs from the others. Select the appropriate inspection procedure from the table below according to vehicle specifications and perform the inspection.

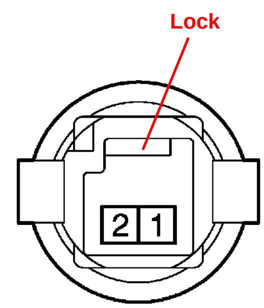
EQUIPPED WITH AUTOMATIC LIGHT CONTROL SYSTEM	A/C SYSTEM WITH RIGHT/LEFT INDEPENDENT TEMPERATURE CONTROL	INSPECTION PROCEDURE
No	No	A
No	Yes	B
Yes	Yes	C
Yes	No	D

Procedure A:

a. Disconnect the solar sensor connector.

b. Measure the resistance between terminals 1 and 2 of the solar sensor under the following conditions:

- Cover the sensor with a cloth to avoid direct light.
- Expose the sensor to light from a distance of 300 mm (11.81 in.) or less with an inspection light.



NOTE:
- **Terminal 1 of the sensor is always on the right, when the lock is facing up.**
- **When using an analog tester, connect the positive (+) lead to terminal 2 and negative (–) lead to terminal 1 of the solar sensor.**

HINT:
If the light is weak, the sensor may not react. Be sure to use an incandescent light for an inspection light.

Standard:

CONDITION	SPECIFICATION
When the sensor is covered with a cloth (to avoid direct light)	Infinite ohms
When the sensor is exposed to light	Less than infinite resistance

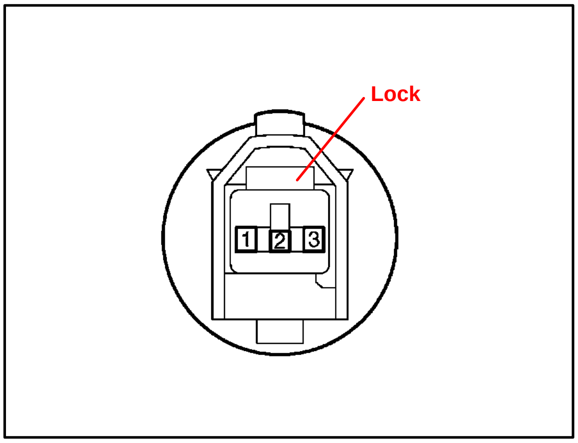
Inspection Procedure
(Continued)

Procedure B:

a. Disconnect the solar sensor connector.

b. Measure the resistance between terminals 2 and 3 of the solar sensor under the following conditions:

- Cover the sensor with a cloth to avoid direct light.
- Expose the sensor to light from a distance of 300 mm (11.81 in.) or less with an inspection light.



NOTE:
When using an analog tester, connect the positive (+) lead to terminal 3 and negative (–) lead to terminal 2 of the solar sensor.

HINT:
If the light is weak, the sensor may not react. Be sure to use an incandescent light for an inspection light.

Standard:

CONDITION	SPECIFICATION
When the sensor is covered with a cloth (to avoid direct light)	Infinite ohms
When the sensor is exposed to light	Less than infinite resistance

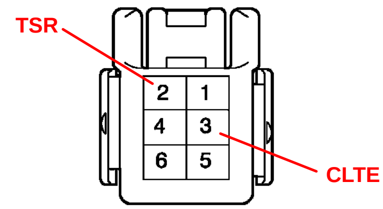
Inspection Procedure (Continued)

Procedure C:

a. Turn the ignition switch ON.

b. Measure the voltage between terminals TSR (+) and CLTE (–) of the connector under the following conditions:

- Cover the sensor with a cloth to avoid direct light.
- Expose the sensor to light from a distance of 300 mm (11.81 in.) or less with an inspection light.



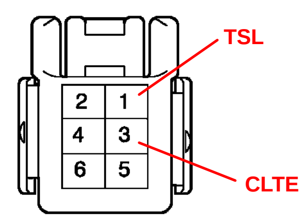
HINT:
- **If the light is weak, the sensor may not react. Be sure to use an incandescent light for an inspection light.**
- **Do not disconnect the solar sensor connector.**

Standard:

CONDITION	SPECIFICATION
When the sensor is covered with a cloth (to avoid direct light)	Below 0.8 V
When the sensor is exposed to light	4.3 +/– 0.3 V

c. Measure the voltage between terminals TSL (+) and CLTE (–) of the connector under the following conditions:

- Cover the sensor with a cloth to avoid direct light.
- Expose the sensor to light from a distance of 300 mm (11.81 in.) or less with an inspection light.



HINT:
- **If the light is weak, the sensor may not react. Be sure to use an incandescent light for an inspection light.**
- **Do not disconnect the solar sensor connector.**

Standard:

CONDITION	SPECIFICATION
When the sensor is covered with a cloth (to avoid direct light)	Below 0.8 V
When the sensor is exposed to light	4.3 +/– 0.3 V

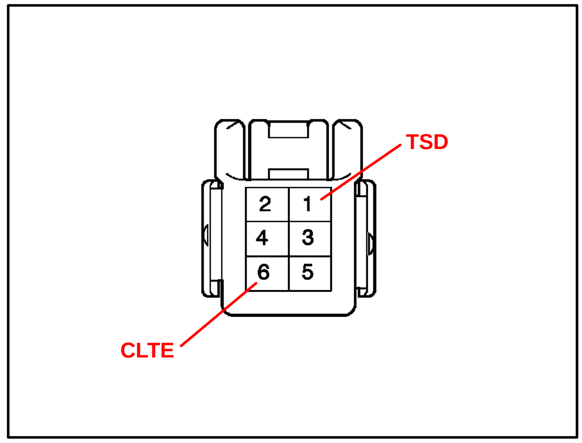
Inspection Procedure (Continued)

Procedure D:

a. Turn the ignition switch ON.

b. Using the tester, measure the voltage between terminals TSD (+) and CLTE (–) of the connector under the following conditions:

- Cover the sensor with a cloth to avoid direct light.
- Expose the sensor to light from a distance of 300 mm (11.81 in.) or less with an inspection light.



HINT:

- **If the light is weak, the sensor may not react. Be sure to use an incandescent light for an inspection light.**
- **Do not disconnect the solar sensor connector.**

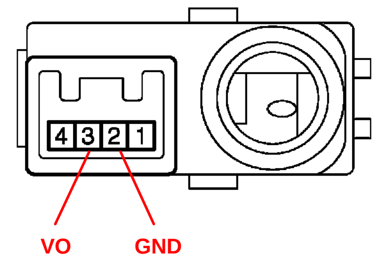
Standard:

CONDITION	SPECIFICATION
When the sensor is covered with a cloth (to avoid direct light)	Below 0.8 V
When the sensor is exposed to light	4.3 +/– 0.3 V

Inspection Procedure (Continued)

6. **Inspect Room Humidity Sensor.**

   Measure the humidity and output voltage of the humidity sensor when the sensor is installed on the vehicle and the temperature at the humidity sensor position (room temperature sensor position) is 77°F (25°C).
   If the output voltage is within the specifications according to the graph and table below, the sensor is normal.



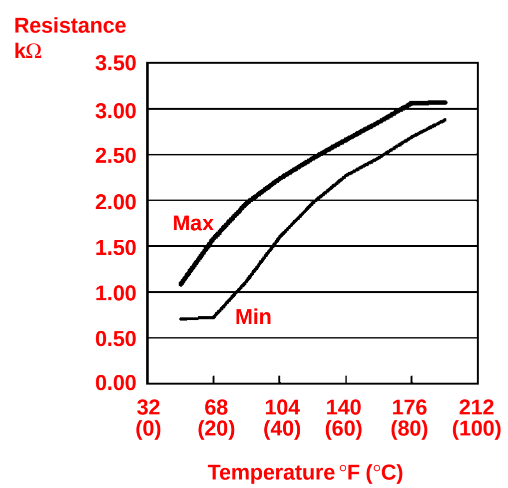
> **HINT:**
> **For the inspection procedure of the room temperature sensor, refer to "Room Temperature Sensor Inspection Procedure" in this bulletin.**

A. Turn the ignition switch to the ON position.

B. Measure the voltage between terminal VO (3) and GND (2) of the room humidity sensor.

C. Measure the humidity and voltage when the room temperature (humidity sensor position) is 77°F (25°C). According to the result, determine whether the sensor is normal or not.

HUMIDITY (% RH)	OUTPUT VOLTAGE AT 77°F (25°C)
10	0.70 to 1.08 V
20	0.72 to 1.57 V
30	1.13 to 1.95 V
40	1.61 to 2.24 V
50	1.99 to 2.46 V
60	2.26 to 2.66 V
70	2.48 to 2.85 V
80	2.68 to 3.04 V
90	2.87 to 3.05 V



Title:
AUDIO QUICK REFERENCE GUIDE
Models:
’01 – ’07 All Lexus

TSIB

Introduction

Lexus has developed a quick reference guide to be used by technicians when troubleshooting typical audio system concerns. This guide is intended only as a supplement to the diagnostics already available in the Repair Manual.

Applicable Vehicles

- **2001 – 2007** model year **Lexus** vehicles.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Repair Procedure

CAUTION:
If the connectors are removed from the radio for any reason, please wait one minute before reconnecting the connectors; otherwise, damage may occur to the CD changer.

Repair Procedure

No Sound (Display is normal)

1. Gather detailed information.

   Ask the customer which mode the problem occurs (AM, FM, or CD).

   If condition ONLY occurs in CD mode, go to step 3 of “CD Skips/CD Does NOT Play/CD Does NOT Eject/CD Will NOT Accept”.

2. Confirm speaker operation.

   Adjust the sound settings.

   A. Check each speaker individually using the Balance/Fade settings.

Repair Procedure (Continued)

B. **System with external amplifier:** Enter Diagnostic mode and check for codes under P440 and P190.

How to enter Diagnostic mode:

- **Cars without navigation system:** On the radio, while pressing the disc button 3 times, press and hold presets “1” and “6”.
- **Cars with navigation system:** Press and hold the info switch on the navigation display while cycling the tail lights ON and OFF three times.

OK

Go to step 3.

NG

If P440 = NCON (no connection), go to step 7.

3. Check if sound is heard from at least one speaker.

OK

Go to step 4.

NG

No sound from all speakers:
Ext amp: Confirm MUTE wire.
Confirm continuity of MUTE wire between radio and amplifier before going to step 4.

4. Measure speaker resistance.

Disconnect the radio connector or amplifier connector for external amplifier systems. Measure resistance across **+** and **–** speaker circuits.

OK = 1.5 to 9.5 ohm (for external amplifier systems)

OK = 3.5 to 4.5 ohm (for radio with internal amplifier)

OK

Go to step 5.

NG

If individual speaker resistance measurements are NG, inspect the speaker wire-harness and speaker.

5. Check for speaker short to ground.

Measure resistance across both **+** and **–** speaker circuits to ground.

OK = Infinite

OK

Replace the audio head unit.
External amplifier: Go to step 6.

NG

Repair the speaker wiring.

Repair Procedure (Continued)

6. Verify proper communication.
   A. Disconnect radio and amp connectors.
   B. Check continuity (TX+ and TX–) from audio head unit to amplifier.
   C. Confirm NO continuity to ground on TX+ and TX–.

OK

NG → **Repair wiring.**

Replace amplifier.

CD Skips/CD Does NOT Play/CD Does NOT Eject/CD Will NOT Accept

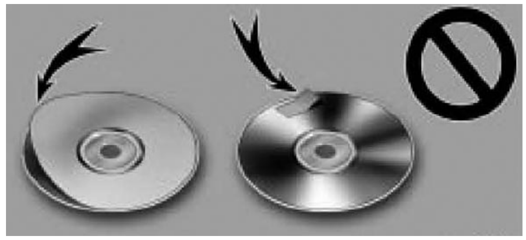
ERROR CODE DESCRIPTIONS:
- **Error 1: Dirty Disc/Cannot Read Disc (Clean CD as needed and try again.)**
- **Error 3: Mechanical Malfunction (Replace CD player.)**
- **Error 4: CD Player Overcurrent (Allow CD player to cool and try again.)**

1. Gather detailed information.

   Ask the customer when the problem occurs (for example: rough roads, after ## minutes, hot/cold days, or error code).

Repair Procedure (Continued)

2. Inspect customer's CDs. Common problem areas are:
   - CDR (with label)



   - Scratches/cracks
   - Fingerprints
   - Dust and/or dirt
   - 8 cm diameter CDs
   - CD Digital Audio logo (Confirm the CD has this logo. Lexus CD player may NOT be able to play CDs that do NOT have this logo.)

3. Test CD Player.
   - For CDs that skip and/or will NOT play, use the Lexus Master CD.

NOTE:
For more information on how to use the Lexus Master CD, refer to TSB No. SS003-05, "*CD Skip Verification Using Lexus Master CD*."

   - For CDs that will NOT eject, test the operation of the eject mechanism using the customer's CD.

OK

If playback is normal, go to step 4.

NG

If playback quality does NOT improve, replace the CD player through the exchange program.

4. Explain to the customer that the CD player operates normally.

Repair Procedure (Continued)

Speaker Noise/Rattle Noise

1. Gather detailed information.

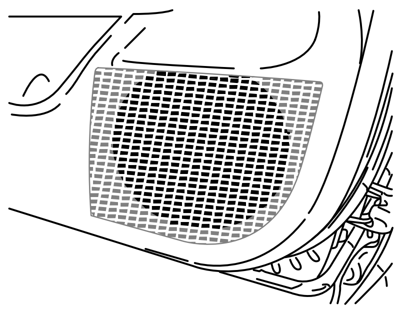
   Ask the customer when the problem occurs (for example: rough roads, bumps, or volume level maximum/minimum).

2. Confirm the condition.

   A. Remove the door trim panel, if necessary.

   B. Confirm if noise occurs in AM/FM mode or CD mode.

3. Repair the door trim panel as needed.



   A. Confirm rattle noise is gone in the area where the vibration is occurring.

   B. Reinstall the door trim and confirm the area where the vibration is occurring. Use the NVH kit (P/N 08231–00810) on the trim panel area that is vibrating.

4. Repair loose parts.

   Check the wiring harness, water shield, clips, and/or other parts that are vibrating. Use the NVH kit (P/N 08231–00810) on parts that are vibrating.

5. Replace the speaker.

   A. Unbolt the speaker and remove from the door/body panel.

   B. If the noise is still coming from the speaker, replace the speaker.

Poor Reception (AM/FM)

NOTE:
Because a noise filter may exist in the antenna plug, which plugs into the radio, the antenna cable will normally show an open circuit when checking continuity.

1. Gather detailed information.

   Ask the customer when and where the problem occurs (for example: certain area only, AM/FM or both, or which stations are affected).

Repair Procedure (Continued)

2. Check for aftermarket accessories, such as Rear Seat Entertainment (RSE) system, metallic window tint, and/or FM modulator.

   Disconnect the component and recheck reception.

3. Check all antenna connections.

   A. Confirm secure antenna connection(s) at the back of the radio.

   B. Confirm secure antenna connections at the mast antenna or glass antenna connector.

4. Check the signal using a test antenna.

   Disconnect the vehicle antenna and connect a test antenna at the back of the radio (drive the vehicle outside).

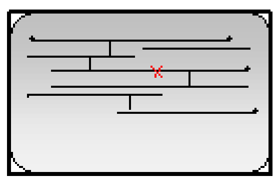
OK

If reception improves, go to step 5 for glass antenna vehicles or go to step 6 for pole antenna vehicles.

NG

If reception does NOT improve, replace radio.

5. Inspect the glass antenna for open/cut patterns.



OK

If an OPEN pattern is found, repair as needed and recheck reception quality.

NG

If NO OPEN pattern is found or reception is still poor after glass antenna repair, go to step 7 for antenna amplifier systems.

Repair Procedure (Continued)

6. Install test antenna at pole antenna connection.

OK

Replace mast antenna assembly.

NG

For vehicles with antenna amplifier systems, go to step 7.
For vehicles without antenna amplifier systems, replace the antenna cable.

7. Inspect the antenna amplifier (if equipped).

   If antenna amp is NOT powered, inspect ANT+B wiring from radio and confirm 12V output to the antenna amplifier.

   If an antenna amp is receiving power:

   - For vehicles where the amplifier is part of the antenna cable, replace the antenna cable.
   - For vehicles where the amplifier is separate, plug the antenna cable directly into the antenna.

OK

If reception improves, replace the antenna amplifier.

NG

If reception is still poor, replace the antenna cable.

Technical Service Information Bulletin

July 13, 2005

Title:

WINDSHIELD WIPER BLADE MAINTENANCE AND CLEANING

Models:

’98 – ’06 All Models

Introduction

The following procedures are recommended to maintain windshield wiper blade performance.

Applicable Vehicles

- **1998 – 2006** model year **Lexus** vehicles.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Maintenance, Cleaning & Use

Recommendations for Windshield Wiper Maintenance, Cleaning, and Use:

1. Scheduled Maintenance
   - Check wiper rubber blades every 4 – 6 months or 7,500 miles for wear, cracking, and contamination.
   - Clean glass and rubber wiper blades if blades are not clearing glass adequately. If this does not correct the problem, then replace the rubber elements.
2. Cleaning Procedure
   - **Wiper Rubber:** Bugs, dirt, sap, and road grime on blades will cause streaking. Clean wiper rubber of road and environmental debris using cloth or paper towel soaked with windshield washer fluid or mild detergent.
   - **DO NOT USE** fuel, kerosene, or petroleum based products to clean rubber wiper blades.
   - **Windshield:** Bugs, sap, road grime, and car wash wax treatments decrease wiper performance.
   - Rinse windshield with water and apply non–abrasive cleaner, such as Bon–Ami (www.faultless.com), with a sponge.

NOTE:

Make sure to use plenty of water with all powder based cleaners so the glass is not scratched.

Maintenance, Cleaning & Use (Continued)

3. Contributors to Poor Performance/Decreased Rubber Blade Life (require rubber replacement)
   - Dusty areas cause the rubber edge to wear quickly.
   - Sand and salt used for road conditioning during winter causes the edge to wear quickly, so areas with significant snowfall require more frequent wiper replacement.
   - Heat and time cause the rubber to become excessively “permanent set,” so the rubber does not turn over, resulting in streaking and/or unwiped areas on the glass.
   - Rubber is easily cut or torn while using ice scrapers on the glass.
   - Rubber can be torn when pulling blades off a frozen windshield.
   - Using wipers instead of an ice scraper to remove frost and ice from the windshield during a car warm up can dull, nick, or tear the rubber.
   - Banging wiper on the glass to remove ice & snow can cause the blade to bend and rubber to come out of the blade providing the potential to scratch the glass.
   - Ice forms in wiper blade pin joints, which causes streaking and unwiped areas. To remove ice from pin joints, compress the blade and rubber with your hand to loosen the frozen joints. To prevent this condition, use winter blades with a rubber cover.

Technical Service Information Bulletin

February 24, 2006

TSIB

Title:

REPLACEMENT RKE KEY CASINGS

Models:

’98 – ’05 Applicable Lexus

REVISED

BO005-06

BODY

TSIB REVISION NOTICE:

- **May 11, 2006: 2004 – 2005 model year ES 330, 2003 – 2005 model year GX 470, 2002 – 2005 model year IS 300, 2001 – 2005 model year LS 430, 2003 – 2005 LX 470, 1999 – 2003 RX 300, and 2001 – 2005 model year SC 430 to Applicable Vehicles. The Parts Information table has been updated.**
- **March 10, 2006: The Replacement Cut Key Casing P/N for 1998 – 2000 model year LX 470 vehicles in the Parts Information table has been updated.**

Previous versions of this TSIB should be discarded.

Introduction

Remote Keyless Entry (RKE) outer key casings are now available without the transmitter assembly. In addition, improvements to the material have been made to increase the durability of the key casing.

Applicable Vehicles

- **1998 – 2005** model year **LX 470** vehicles.
- **1999 – 2003** model year **RX 300** vehicles.
- **2001 – 2005** model year **LS 430** and **SC 430** vehicles.
- **2002 – 2005** model year **IS 300** vehicles.
- **2003 – 2005** model year **GX 470** vehicles.
- **2004 – 2005** model year **ES 330** vehicles.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
BD5015	R & R RKE Key Cases	0.1	89070–#####	62	99

Applicable Warranty*:

This repair is covered under the Lexus Comprehensive Warranty. This warranty is in effect for 48 months or 50,000 miles, whichever occurs first, from the vehicle’s in-service date.

* Warranty application is limited to correction of a problem based upon a customer’s specific complaint.

Parts Information

MODEL	MODEL YEAR	PREVIOUS P/N	REPLACMENT CUT KEY CASING P/N	PART NAME	QTY
ES 330	2004 – 2005	89070–33751	89072–33540–RK	Housing Set, Door Control Transmitter	1
GX 470	2003 – 2005	89070–60801	89072–60640–RK		1
IS 300	2002 – 2005	89070–53531	89072–53200–RK		1
LS 430	2001 – 2003	89070–50660	89072–50630–RK		1
	2004 – 2005	89070–50C11	89072–50750–RK		1
LX 470	1998 – 2000	89070–60080	89070–60600–RK		1
	2001 – 2002	89070–60081	89072–60610–RK		1
	2003 – 2005	89070–60801	89072–60640–RK		1
RX 300	1998 – 2003	89070–48020	89072–48380–RK		1
SC 430	2001 – 2005	89070–24171	89072–24130–RK		1

Repair Procedure

1. Remove the screw from the key case.
2. Open the old key casing.
3. Remove the transmitter and place into the NEW key casing.
4. Reassemble the new casing in reverse order.
5. Install the new screw and tighten (be sure NOT to overtighten).

Technical Service Information Bulletin

September 12, 2003

Title:

TRIM GARNISH LOOSE

Models:

All Models

TSIB

BODY

BO007-03

Introduction

Customers may experience an interior trim panel either loose or fitting poorly due to a deformed or missing clip. When a trim garnish (A, B, C or D pillar garnishes, door trim panel, etc.) is removed and reinstalled using the old clips, it may cause the garnish to exhibit a loose condition. To prevent this condition from occurring, ensure that new clips are utilized for all attachment points every time a garnish is reinstalled. When installing new parts, use either the new clips supplied with the part, or order new clips. Refer to the parts catalog for specific part numbers.

Applicable Vehicles

- **All models.**

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Technical Service Information Bulletin

September 29, 2004

Title:

SEAT BELT EXTENDER

Models:

’03 – ’05 Model Year

TSIB REVISION NOTICE:

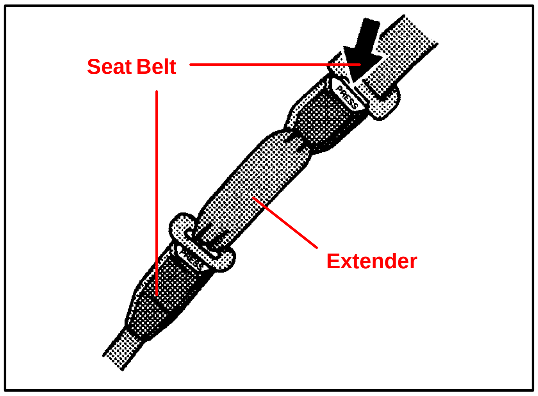
- **December 9, 2005: The “Rear Seat Belt Extender Applications” section has been updated. In the Part Number Information table, the part numbers for series Q–6 have been updated.**
- **June 28, 2005: In the “Rear Seat Belt Extender Applications” section, the series number for the ’05 ES 330 has been updated to R–7.**

Previous versions of this TSIB should be discarded.

Introduction

Lexus customers who find it necessary to increase the length of their seat belts may obtain Seat Belt Extenders at **no cost** through their local Lexus dealer.

- The extender is available in 6 inch, 9 inch, 12 inch, 15 inch, and 18 inch lengths.
- The extender is available **only in black.**
- Owners are informed of the Seat Belt Extender availability through the Lexus Owner’s Manual included in each vehicle.



The customer (individual requiring the extender) must visit a Lexus dealership to have the required measurements made and to complete the Seat Belt Extender Worksheet. The worksheet will allow the proper fitting and selection of a Seat Belt Extender for the customer. The dealership personnel should then determine the applicable part number and place an order through ***Dealer Daily.***

The dealership service department should complete the affixed Seat Belt Extender Customer Information Label on the part and review the “Owner Instruction Sheet” with the customer. The dealership should give a copy of the completed worksheet to the customer and keep the original in the customer’s file.

To assure utmost owner satisfaction, it is recommended that a dealership designate one person to coordinate all activities related to the Seat Belt Extender issue.

It is recommended that dealerships **do NOT stock** Seat Belt Extenders due to the need for proper fitting to individual customers.

This bulletin contains the following information:

Applicable Vehicles

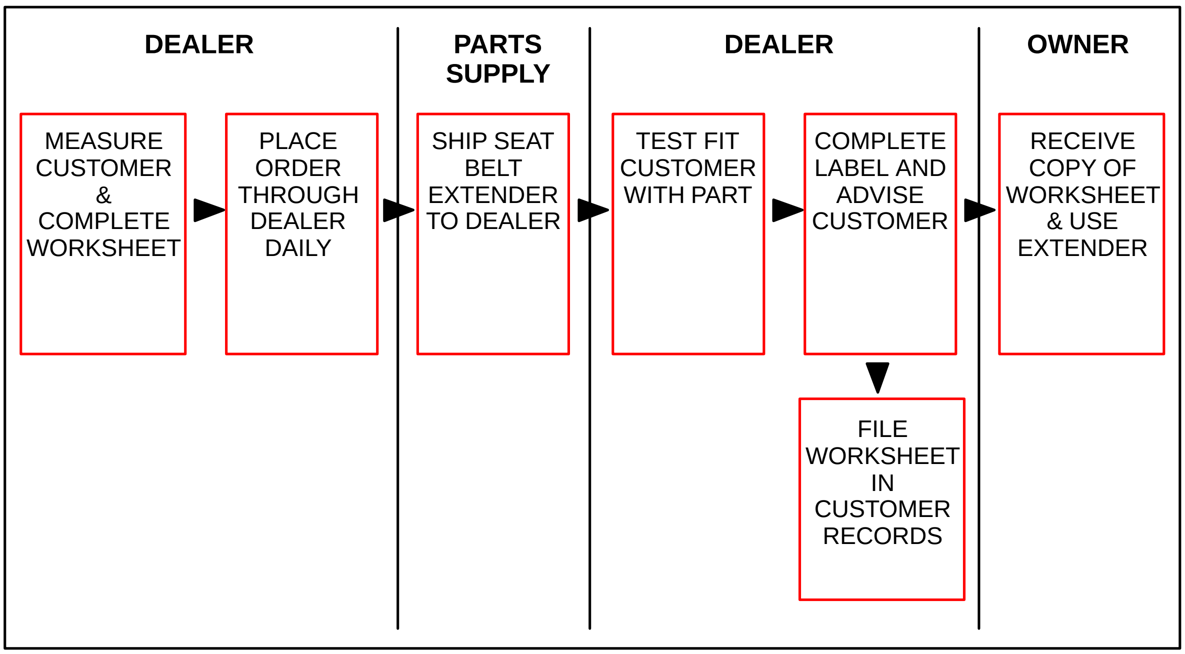
- **2003** – **2005** model year **Lexus** vehicles.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Procedure

1. Customer requests a Seat Belt Extender from dealer.
2. Dealer verifies the need for a Seat Belt Extender and obtains a current copy of this TSIB and copies the Worksheet.
3. Dealer measures the customer and completes the Worksheet. Dealer determines the correct part number and places an order for the part through Dealer Daily.
4. Dealer receives Seat Belt Extender and calls the customer to check the fit of the part.
5. If the Seat Belt Extender fit is good, dealership personnel completes the Customer Information Label on the part, explains usage of the part, and gives the customer a copy of the completed Worksheet.
6. Dealer places copy of the completed Worksheet in the customer’s records.



Sample Seat Belt Extender Customer Information Label

CAUTION

THIS SEAT BELT EXTENDER IS TO BE USED ONLY BY: ______________________

ON VEHICLE:______________________

VIN: ______________________

SEATING POSITION: ______________________

USE BY OTHERS, OR IN ANOTHER SEATING POSITION, OR IN ANOTHER VEHICLE COULD REDUCE SEAT BELT RESTRAINT IN AN ACCIDENT AND RESULT IN PERSONAL INJURY.

Front Seat Belt Extender Applications

FRONT SEAT – EXTENDER APPLICATION				
MODEL	**TYPE**	**’05**	**’04**	**’03**
ES 300	All Models	–	–	R–5
ES 330		R–6	R–6	–
GS 300		R–3	R–3	R–3
GS 430		R–3	R–3	R–3
GX 470		K–6	K–6	K–6
IS 300		K–6	K–6	K–6
LS 430		R–3	R–3	R–3
LX 470		K–6	K–6	K–6
RX 300		–	–	R–5
RX 330		R–7	R–7	–
SC 430		R–3	R–3	R–3

Rear Seat Belt Extender Applications

REAR SEAT – EXTENDER APPLICATION				
MODEL	**TYPE**	**’05**	**’04**	**’03**
ES 300	All Models	–	–	R–5
ES 330		R–7	R–5	–
GS 300		K–5	K–5	K–5
GS 430		K–5	K–5	K–5
GX 470		K–5	K–5	K–5
IS 300		R–5	R–5	R–5
LS 430	RH, LH	R–3	R–3	R–3
LX 470	All Models	K–5	K–5	K–5
RX 300		–	–	R–5
RX 330	RH, LH	R–6 or Q–5	R–6 or Q–5	–
SC 430	All Models	R–5	R–5	R–5

NOTE:
The extender must NOT be used for the center rear seat belt.

Part Number Information

PART NUMBER PREFIX: 73399–					
SERIES	**LENGTH**				
	6 INCH	**9 INCH**	**12 INCH**	**15 INCH**	**18 INCH**
R–3	–50010	–50020	–50030	–50040	–50050
R–5	–16060	–16070	–16080	–16090	–16100
R–6	–35110	–35120	–35130	–35140	–35150
R–7	–48010	–48020	–48030	–48040	–48050
N–6	–20160	–20170	–20180	–20190	–20200
K–5	–35010	–35020	–35030	–35040	–35050
K–6	–35060	–35070	–35080	–35090	–35100
Q–5	–AE010	–AE020	–AE030	–AE040	–AE050
Q–6	–AE061	–AE071	–AE081	–AE091	–AE101

Owner Instructions

Failure to follow the recommendations indicated below could result in reduced effectiveness of the seat belt restraint system in case of vehicle collision, causing personal injury.

If your seat belt cannot be fastened securely because it is not long enough, a personalized Seat Belt Extender is available from your Lexus dealer free of charge.

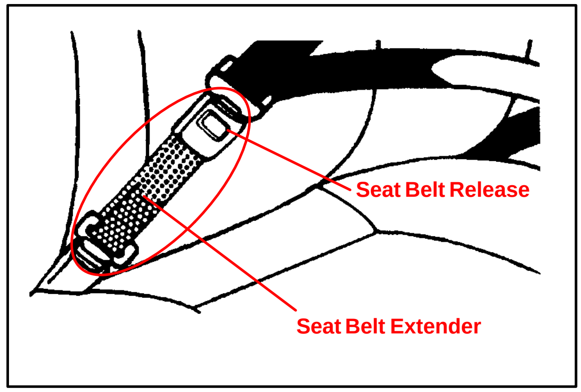
Please visit your local Lexus dealer so that the dealer can order the proper required length extender. Bring the heaviest coat you expect to wear for proper measurement and selection of length. Additional ordering information is available at your Lexus dealer.

When the Seat Belt Extender is provided for rear seat positions (with automatic locking retractor), make sure that the retractor is locked when in use.

To connect the extender to the seat belt, insert the tab into the seat belt buckle so that the buckle-release buttons of the extender and the seat belt are both facing outward as shown.

You will hear a click when the tab locks into the buckle.

When not in use, remove the extender and store in the vehicle for future use.



CAUTION:

On vehicles equipped with SRS – Occupant Classification System (OCS)*, it is critical that the extender tab be buckled into the buckle AFTER the occupant sits down in the seat.

Leaving extender installed in the buckle before sitting down will cause the OCS to be in the "airbag off" or disarmed state.

* OCS will enable or disable the passenger front and side airbags based on passenger weight and seat belt latch position classifying the passenger as a child or adult.

CAUTION:

When using the Seat Belt Extender, observe the following. Failure to follow these instructions could result in reduced effectiveness of the seat belt restraint system in case of vehicle accident, increasing the chance of personal injury.

- **Never use the Seat Belt Extender if you can COMFORTABLY fasten the seat belt without it.**
- **The Seat Belt Extender must never be used with any child safety seats.**
- **Remember that the extender provided for you may not be safe when used on a different vehicle, for another person or for a different seating position than the one originally intended.**

SEAT BELT EXTENDER WORKSHEET

PLEASE COPY THIS ORIGINAL WORKSHEET FOR EACH EXTENDER NEEDED

CAUTIONS:

- **To minimize the chance and/or severity of injury in an accident, the Seat Belt Extender must only be used:**
  1 **By the person for whom it was provided.**
  2 **In the seat position for which it was provided.**
- **The Seat Belt Extender must never be used with any child safety seats.**
- **When the Seat Belt Extender is provided for rear seat positions (with automatic locking retractor), make sure the retractor is locked when extender belt is in use.**

DEALER			SEAT BELT EXTENDER APPLICATION		APPLICANT	
DEALER CODE	DEALER NAME			APPLICANT NAME		
ADDRESS				ADDRESS		
CITY & STATE			ZIP	CITY & STATE	ZIP	PHONE
EMPLOYEE NAME		MODEL YEAR	BODY TYPE	SEATING POSITION	VEHICLE IDENTIFICATION NUMBER	

DIRECTIONS FOR DETERMINING PROPER EXTENDER LENGTH

1. **Place the seat in the position the applicant normally uses.**
2. **With the applicant in the seat, wearing the thickest coat expected to be worn, pull belt all the way out and try to buckle belt.**
   - **If belt latches into buckle and feels comfortable against upper chest area, an extender is not needed.**
   - **If belt does not buckle, continue with Step 3.**
   - **If buckle latches but belt has no slack remaining, continue with Step 3.**
3. **Measure distance between applicant's navel and seat belt buckle (Dimension A) and enter on Worksheet.**
4. **With belt all the way out, measure distance between latch tip and buckle tip (Dimension B) and enter on Worksheet.**

   NOTE: If belt latches but there is no slack enter zero as Dimension B.
5. **Subtract Dimension B from Dimension A and record number in Check Number box on Worksheet.**
6. **Seat Belt Extender length is Dimension B rounded up to next extender length (without exceeding Check Number).**

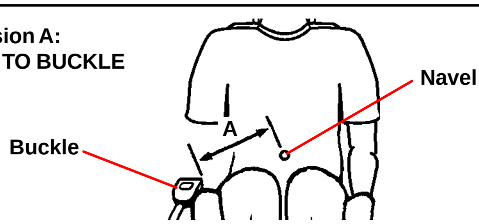
NOTE: If extender length exceeds Check Number, an extender <u>cannot</u> be provided to the customer.

CAUTION:

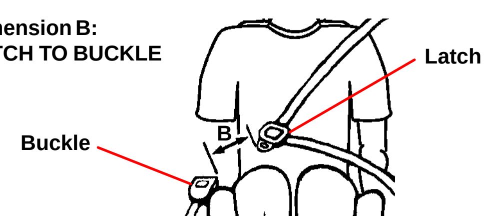
On vehicles equipped with SRS — Occupant Classification System (OCS), it is critical that the extender tab be buckled into the buckle AFTER the occupant sits down in the seat.

Leaving extender installed in the buckle before sitting down will cause the OCS to be in the "airbag off" or disarmed state.

Dimension A:
NAVEL TO BUCKLE



Dimension B:
LATCH TO BUCKLE



SEAT BELT EXTENDER CALCULATION		
DIMENSION A:	DIMENSION B:	CHECK NUMBER:

SEAT BELT EXTENDER AUTHORIZATION

- ***The same Seat Belt Extender can be used for right and left seating applications*. Each Seat Belt Extender will have a label identifying the owner, VIN and seating position.**
- **Applicant's Signature:**______________________________ **Date:**______________

  (Actual user of Seat Belt Extender)

Technical Service Information Bulletin

December 9, 2003

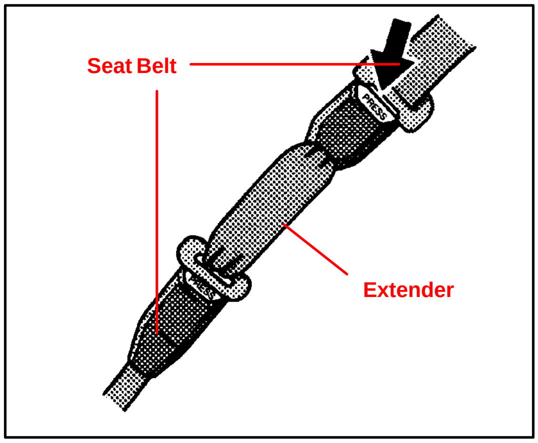
Title:
SEAT BELT EXTENDER

Models:
’02 – ’04 Model Year

TSIB

Introduction

Lexus customers who find it necessary to increase the length of their seat belts may obtain Seat Belt Extenders at **no cost** through their local Lexus dealer.



- The extender is available in 6 inch, 9 inch, 12 inch, 15 inch and 18 inch lengths.
- The extender is available **only in black.**
- Owners are informed of the Seat Belt Extender availability through the Lexus Owner’s Manual included in each vehicle.

The customer (individual requiring the extender) must visit a Lexus dealership to have the required measurements made and to complete the Seat Belt Extender Worksheet. The worksheet will allow the proper fitting and selection of a Seat Belt Extender for the customer. The dealership personnel should then determine the applicable part number and place an order through ***Dealer Daily.***

The dealership service department should complete the affixed Seat Belt Extender Customer Information Label on the part and review the “Owner Instruction Sheet” with the customer. The dealership should give a copy of the completed worksheet to the customer and keep the original in the customer’s file.

To assure utmost owner satisfaction, it is recommended that a dealership designate one person to coordinate all activities related to the Seat Belt Extender issue.

It is recommended that dealerships **do NOT stock** Seat Belt Extenders due to the need for proper fitting to individual customers.

This bulletin contains the following information:

Applicable Vehicles

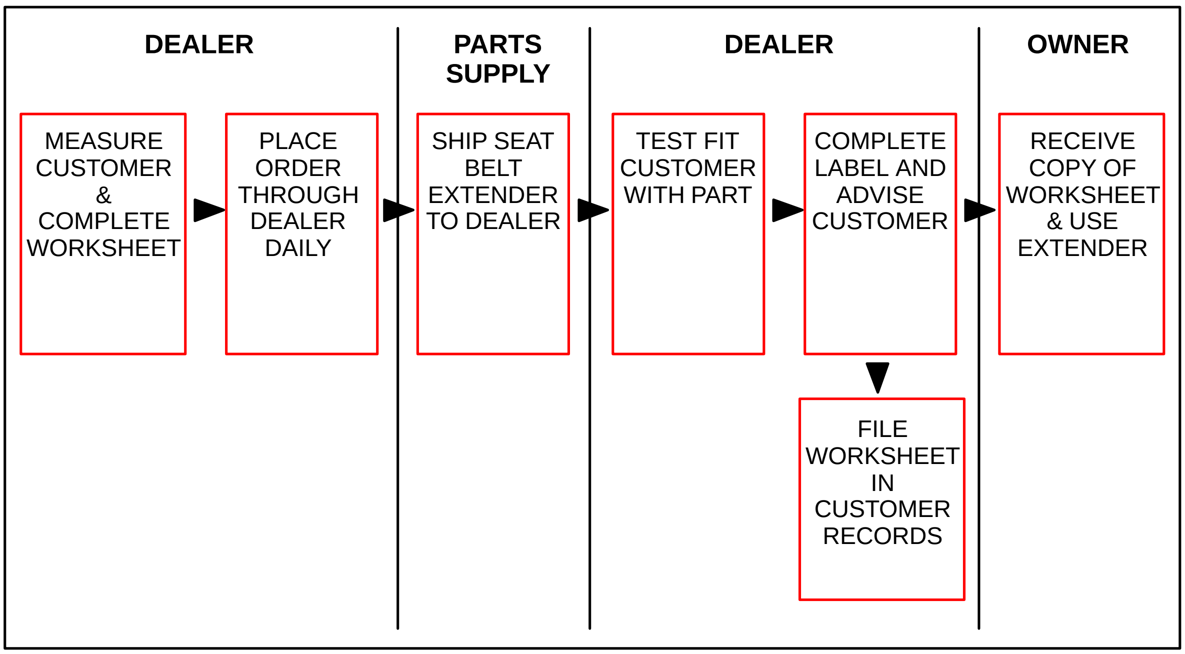
- **2002** – **2004** model year **Lexus** vehicles.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Procedure

1. Customer requests a Seat Belt Extender from dealer.
2. Dealer verifies the need for a Seat Belt Extender and obtains a current copy of this TSIB and copies the Worksheet.
3. Dealer measures the customer and completes the Worksheet. Dealer determines the correct part number and places an order for the part through Dealer Daily.
4. Dealer receives Seat Belt Extender and calls the customer to check the fit of the part.
5. If the Seat Belt Extender fit is good, dealership personnel completes the Customer Information Label on the part, explains usage of the part, and gives the customer a copy of the completed Worksheet.
6. Dealer places copy of the completed Worksheet in the customer’s records.



Sample Seat Belt Extender Customer Information Label

CAUTION

THIS SEAT BELT EXTENDER IS TO BE USED ONLY BY: ______________________

ON VEHICLE: ______________________

VIN: ______________________

SEATING POSITION: ______________________

USE BY OTHERS, OR IN ANOTHER SEATING POSITION, OR IN ANOTHER VEHICLE COULD REDUCE SEAT BELT RESTRAINT IN AN ACCIDENT AND RESULT IN PERSONAL INJURY.

Front Seat Belt Extender Applications

FRONT SEAT – EXTENDER APPLICATION				
MODEL	**TYPE**	**’04**	**’03**	**’02**
ES 300	All Models	–	R–5	R–5
ES 330		R–6	–	–
GS 430		R–3	R–3	R–3
GS 300		R–3	R–3	R–3
GX 470		K–6	K–6	–
IS 300		K–6	K–6	N–6
LS 430		R–3	R–3	R–3
LX 470		K–6	K–6	K–5
RX 300		–	R–5	R–5
RX 330		R–7	–	–
SC 430		R–3	R–3	R–3

Rear Seat Belt Extender Applications

REAR SEAT – EXTENDER APPLICATION				
MODEL	**TYPE**	**’04**	**’03**	**’02**
ES 300	All Models	–	R–5	R–5
ES 330		R–5	–	–
GS 430		K–5	K–5	K–5
GS 300		K–5	K–5	K–5
GX 470		K–5	K–5	–
IS 300		R–5	R–5	R–5
LS 430	RH, LH	R–3	R–3	R–3
LS 430	Center	R–6	–	–
LX 470	All Models	K–5	K–5	K–5
RX 300		–	R–5	R–5
RX 330	RH, LH	R–6 or Q–5	–	–
RX 330	Center	Q–6	–	–
SC 430	All Models	R–5	R–5	R–5

NOTE:

The extender must not be used for the center rear seat belt except on the 2004 model year LS 430 and RX 330.

Part Number Information

PART NUMBER PREFIX: 73399–					
SERIES	**LENGTH**				
	6 INCH	**9 INCH**	**12 INCH**	**15 INCH**	**18 INCH**
R–3	–50010	–50020	–50030	–50040	–50050
R–5	–16060	–16070	–16080	–16090	–16100
R–6	–35110	–35120	–35130	–35140	–35150
R–7	–48010	–48020	–48030	–48040	–48050
N–6	–20160	–20170	–20180	–20190	–20200
K–5	–35010	–35020	–35030	–35040	–35050
K–6	–35060	–35070	–35080	–35090	–35100
Q–5	–AE010	–AE020	–AE030	–AE040	–AE050
Q–6	–AE060	–AE070	–AE080	–AE090	–AE100

Owner Instructions

Failure to follow the recommendations indicated below could result in reduced effectiveness of the seat belt restraint system in case of vehicle collision, causing personal injury.

If your seat belt cannot be fastened securely because it is not long enough, a personalized Seat Belt Extender is available from your Lexus dealer free of charge.

Please visit your local Lexus dealer so that the dealer can order the proper required length extender. Bring the heaviest coat you expect to wear for proper measurement and selection of length. Additional ordering information is available at your Lexus dealer.

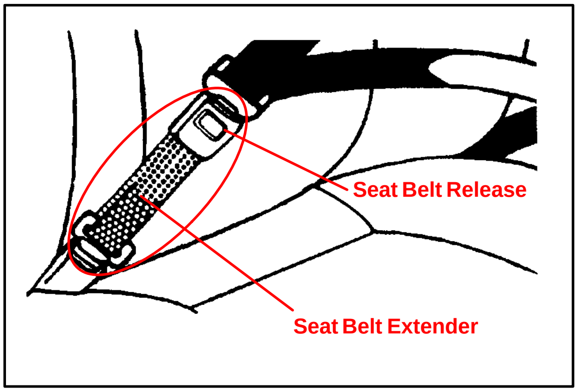
When the Seat Belt Extender is provided for rear seat positions (with automatic locking retractor), make sure that the retractor is locked when in use.

Owner Instructions (Continued)

To connect the extender to the seat belt, insert the tab into the seat belt buckle so that the buckle-release buttons of the extender and the seat belt are both facing outward as shown.

You will hear a click when the tab locks into the buckle.

When not in use, remove the extender and store in the vehicle for future use.



CAUTION:

On vehicles equipped with SRS – Occupant Classification System (OCS)*, it is critical that the extender tab be buckled into the buckle AFTER the occupant sits down in the seat.

Leaving extender installed in the buckle before sitting down will cause the OCS to be in the “airbag off” or disarmed state.

* OCS will enable or disable the passenger front and side airbags based on passenger weight and seat belt latch position classifying the passenger as a child or adult.

CAUTION:

When using the Seat Belt Extender, observe the following. Failure to follow these instructions could result in reduced effectiveness of the seat belt restraint system in case of vehicle accident, increasing the chance of personal injury.

- **Never use the Seat Belt Extender if you can COMFORTABLY fasten the seat belt without it.**
- **The Seat Belt Extender must never be used with any child safety seats.**
- **Remember that the extender provided for you may not be safe when used on a different vehicle, for another person or for a different seating position than the one originally intended.**

SEAT BELT EXTENDER WORKSHEET

PLEASE COPY THIS ORIGINAL WORKSHEET FOR EACH EXTENDER NEEDED

CAUTIONS:

- **To minimize the chance and/or severity of injury in an accident, the Seat Belt Extender must only be used:**
  1. **By the person for whom it was provided.**
  2. **In the seat position for which it was provided.**
- **The Seat Belt Extender must never be used with any child safety seats.**
- **When the Seat Belt Extender is provided for rear seat positions (with automatic locking retractor), make sure the retractor is locked when extender belt is in use.**

SEAT BELT EXTENDER APPLICATION

DEALER		
DEALER CODE	DEALER NAME	
ADDRESS		
CITY & STATE		ZIP
EMPLOYEE NAME	MODEL YEAR	BODY TYPE

APPLICANT		
APPLICANT NAME		
ADDRESS		
CITY & STATE	ZIP	PHONE
SEATING POSITION	VEHICLE IDENTIFICATION NUMBER	

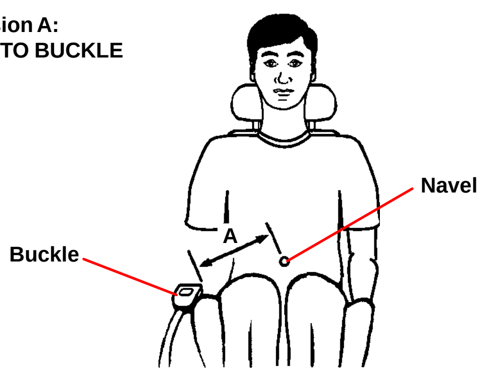
DIRECTIONS FOR DETERMINING PROPER EXTENDER LENGTH

1. **Place the seat in the position the applicant normally uses.**
2. **With the applicant in the seat, wearing the thickest coat expected to be worn, pull belt all the way out and try to buckle belt.**
   - **If belt latches into buckle and feels comfortable against upper chest area, an extender is not needed.**
   - **If belt does not buckle, continue with Step 3.**
   - **If buckle latches but belt has no slack remaining, continue with Step 3.**
3. **Measure distance between applicant's navel and seat belt buckle (Dimension A) and enter on Worksheet.**
4. **With belt all the way out, measure distance between latch tip and buckle tip (Dimension B) and enter on Worksheet.**

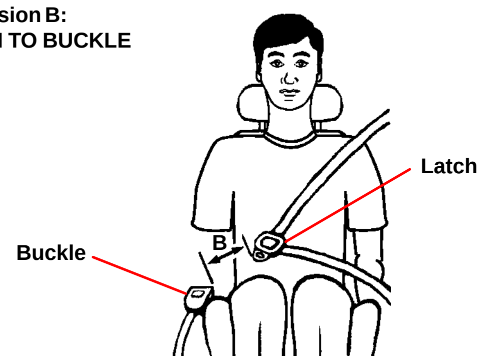
   NOTE: If belt latches but there is no slack enter zero as Dimension B.
5. **Subtract Dimension B from Dimension A and record number in Check Number box on Worksheet.**
6. **Seat Belt Extender length is Dimension B rounded up to next extender length (without exceeding Check Number).**

   NOTE: If extender length exceeds Check Number, an extender <u>cannot</u> be provided to the customer.

Dimension A:
NAVEL TO BUCKLE



Dimension B:
LATCH TO BUCKLE



SEAT BELT EXTENDER CALCULATION

DIMENSION A:	DIMENSION B:	CHECK NUMBER:

SEAT BELT EXTENDER AUTHORIZATION

- ***The same Seat Belt Extender can be used for right and left seating applications*. Each Seat Belt Extender will have a label identifying the owner, VIN and seating position. Seat Belt Extenders are available only in black.**
- **Applicant's Signature:**____ **Date:**____________________

  (Actual user of Seat Belt Extender)

LEXUS

Technical Service Information Bulletin

November 10, 2005

Title:

SEAT COVER REPLACEMENT FOR SIDE AIRBAG EQUIPPED VEHICLES

Models:

'97 – '06 All Lexus Models

TSIB

TSIB UPDATE NOTICE:

The information contained in this TSIB supercedes TSIB No. BO004-98.
TSIB No. BO004-98 is now obsolete and should be discarded.

Introduction

Beginning in 1997, Lexus introduced side airbags for the LS 400. Starting with 1998, all Lexus vehicles are equipped with side airbags as standard equipment.

Lexus does **NOT** recommend replacement of original seat covers* with non-Lexus leather or other seat cover materials due to the following:

- Seat covers NOT recommended by Lexus may affect side airbag performance, in general or in part, during an accident.
- Modifications that negatively affect side airbag performance can result in severe occupant injuries.
- Seat covers are an integral part of this safety system. Replacing original seat covers* with non-Lexus leather or other seat cover materials may compromise the effectiveness of this safety system.
- The design of the seat is complex, integrating safety and strength with comfort and luxury.

***NOTE:**

Lexus original seat covers that were NOT designed for side airbag equipped seats cannot be used due to the effect on proper airbag performance.

Lexus strongly discourages modifying original equipment seats that have side airbags.

Additionally, Lexus strongly advises against the installation or use of aftermarket seat covers, which could impair the performance of the side airbags in the event of an accident.

Applicable Vehicles

- All **1997 – 2006** model year **Lexus** vehicles.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Technical Service Information Bulletin

March 10, 2004

Title:

ZERO POINT CALIBRATION

Models:

’04 All Models with VSC

TSIB

BRAKES

BR001-04

Introduction

The following information is intended to clarify the repair manual procedures for Zero Point Calibration and sensor checks after the replacement of any of the following components or procedures.

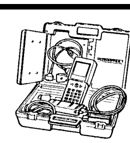
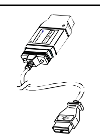
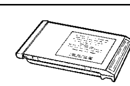
- Vehicle Stability Control Computer
- Steering Angle Sensor
- Yaw Rate Sensor
- Deceleration Sensor
- After Performing an Alignment

Zero Point Calibration of the above sensors must also be performed when replacing or repairing steering related parts. These steps are necessary for the correct and accurate repair of VSC related systems.

Applicable Vehicles

- **All 2004** model year **Lexus** vehicles **equipped with VSC**.

Required SSTs

SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QUANTITY
Lexus Diagnostic Tester Kit* 	01001270	1
CAN Interface Module Kit* 	01002744	1
12 Megabyte Diagnostic Tester Program Card with version 10.2a Software (or later)* 	01002593-005	1
Diagnostic Check Wire* (or equivalent)	09843–18040	1

* Essential SSTs.

NOTE:

Additional Diagnostic Tester Kits, CAN Interface Modules, Program Cards or other SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

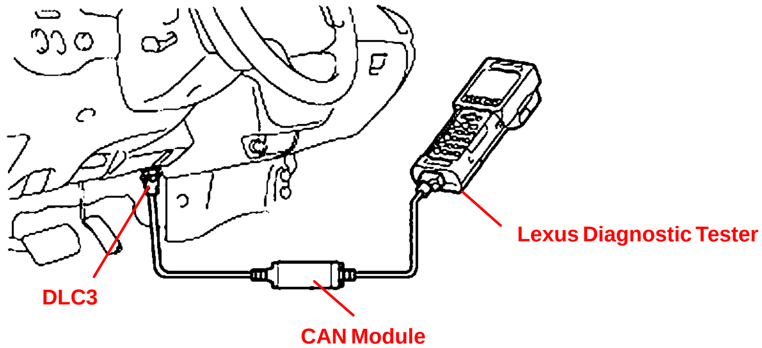
Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Calibration Procedure With Diagnostic Tester

Zero Point Calibration Procedure Using Diagnostic Tester

1. Connect Diagnostic Tester to DLC3.



2. Follow the flow below for the calibration procedure. If the vehicle is equipped with automatic transmission (A/T), ensure that the shift lever is in the "P" range and the parking brake is applied. If the vehicle is equipped with manual transmission (M/T), ensure that the parking brake is applied.

NOTE:
While performing the Zero Point Calibration, do not tilt, move or shake the vehicle. The vehicle must remain in a stationary condition throughout the entire process. Be sure to perform the procedure on a level surface with an inclination of less than 1%.

Zero Point Calibration

A

TOYOTA
DIAGNOSTIC TOOLSET
PROGRAM CARD

Version 10.2a

12/11/03

PRESS [ENTER]

B

APPLICATION SELECT

1: DIAGNOSIS
2: CUSTOMIZE
3: ECU REPROGRAM

C

FUNCTION SELECT
FOR NORTH AMERICA

1: OBD/MOBD
2: ENHANCED OBD II
3: CARB OBD II
4: BREAK–OUT BOX
5: NVH
6: AUTOPROBE
7: O2 RPM CHECK
8: SNAPSHOT REVIEW
9: SETUP
0: GAS ANALYSIS

D

VEHICLE SELECT

NEW VEHICLE

LAST VEHICLE

E

VEHICLE SELECT
NEW VEHICLE

Select Model Year

F

VEHICLE SELECT

Model Selection
↓

** Select Appropriate Model

(Continued on next page)

Calibration Procedure With Diagnostic Tester (Continued)

Zero Point Calibration (Continued)

G

OBD/MOBD MENU

1: CODES (ALL)
2: ENGINE AND ECT
3: AIR SUSPENSION
4: ABS/VSC/TRAC
5: TIRE PRESSURE
6: CCS
7: IMMOBILIZER
8: SRS AIRBAG
9: BODY

H

* WARNING *

This vehicle requires that the engine is idling to communicate w/ the ABS/TR(A)C/VSC ECU.

Please ensure that the engine is idling

PRESS [ENTER]

I

DIAGNOSTIC MENU
ABS/VSC

1: DATA LIST
2: DTC INFO
3: ACTIVE TEST
4: SNAPSHOT
5: AIR BLEEDING
6: RESET MEMORY
7: SIGNAL CHECK

J

RESET MEMORY

Reset the learning value in the ABS ECU memory to the initialized condition by this function.
Do you want to start this function?

PRESS [YES] or [NO]

Press Yes

K

RESET MEMORY

COMPLETED

PRESS [ENTER]

L

DIAGNOSTIC MENU
ABS/VSC

1: DATA LIST
2: DTC INFO
3: ACTIVE TEST
4: SNAPSHOT
5: AIR BLEEDING
6: RESET MEMORY
7: SIGNAL CHECK

M

NOTICE

ALL TROUBLE CODES WILL BE CLEARED AFTER THIS FUNCTION IS SELECTED.

PRESS [EXIT] TO ABORT SIGNAL CHECK

PRESS [ENTER] TO CONTINUE

Press Enter

N

CHECK PROCEDURE

PERFORM CHECK OPERATION ON VEHICLE ACCORDING TO REPAIR MANUAL.*

PRESS [ENTER] WHEN OPERATION COMPLETED

PRESS [EXIT] TO QUIT SIGNAL CHECK

Select EXIT when VSC/TRAC and ABS lights begin to flash at 0.13 second intervals.

* NOTE:
- It is not necessary to perform any repair manual procedures at this step.
- This step may take up to 1 minute.

O

CONFIRM EXIT

NOTE: WHEN EXITING FUNCTION, ALL STORED TROUBLE CODES WILL BE CLEARED.

Do you wish to EXIT

PRESS [YES] or [NO]

Press Yes

3. Drive the vehicle for **at least 5 minutes** to confirm Zero Point Calibration is complete.

NOTE:
If viewing Diagnostic Tester Data List after repair, the Steering Angle Sensor may remain at 1150 until the vehicle reaches 28 mph. This is a normal condition until the learned values of the steering angle have been achieved.

Calibration Procedure With SST

Zero Point Calibration Using SST 09843–18040

The following procedure may be used in the cases where a Diagnostic Tester is not available.

NOTE:

While performing the Zero Point Calibration, do not tilt, move or shake the vehicle. The vehicle must remain in a stationary condition throughout the entire process. Be sure to perform the procedure on a level surface with an inclination of less than 1%.

1. Ensure the shift lever is in the "P" range.
2. Turn the ignition switch ON.
3. Using SST 09843–18040, repeat a cycle of short and open between terminals Ts and CG of DLC3 4 times or more within 8 seconds (refer to the specific vehicle EWD for TS and CG pin location in the DLC3).
4. Verify that the VSC indicator light is lit indicating the recorded zero point is erased.
5. Turn the ignition switch OFF.
6. Be sure the terminals Ts and CG of DLC3 are disconnected.
7. Turn the ignition switch ON.
8. Check that the VSC warning light goes off about 15 seconds after the ignition switch is turned ON.
9. After ensuring that the VSC warning light remains OFF for 2 seconds, turn the ignition switch OFF.
10. Connect terminals Ts and CG of DLC3 using SST 09843–18040.
11. Turn the ignition switch ON.
12. After turning the ignition switch ON, check that the VSC warning light is lit for about 4 seconds and then starts quick blinking at 0.13 second intervals.
13. After ensuring the blinking of the VSC warning light for 2 seconds, turn the ignition switch OFF.
14. Remove the SST from terminals Ts and CG of DLC3.
15. Drive the vehicle for **at least 5 minutes** to confirm Zero Point Calibration is complete.

NOTE:

If viewing Diagnostic Tester Data List after repair, the Steering Angle Sensor may remain at 1150 until the vehicle reaches 28 mph. This is a normal condition until the learned values of the steering angle have been achieved.

Technical Service Information Bulletin
March 28, 2005

Title:
RADIATOR CAP INSPECTION

Models:
All Models

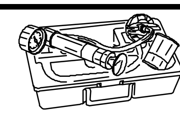
Introduction

The procedure for inspecting the radiator cap has been revised. Please refer to the following procedures when inspecting the radiator cap on all Lexus models.

Applicable Vehicles

- **All Lexus models.**

Required Equipment

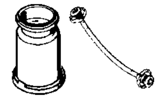
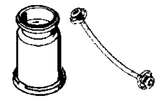
MANUFACTURER	EQUIPMENT	QTY
Snap–On/Sun SVTS262A (or equivalent)	Cooling System Tester (Radiator Cap Tester) 	1

NOTE:
Additional Lexus Approved Dealer Equipment may be ordered by calling Lexus Approved Dealer Equipment at 1–800–368–6787.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Required SSTs

ITEM NO.	SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QTY	DRW**
1	**Radiator Cap Test Set*** 	09230–00030–02	1	7
2	**Radiator Cap Test Set (Small)*** 	09230–00020–02	1	7

* Essential SSTs.

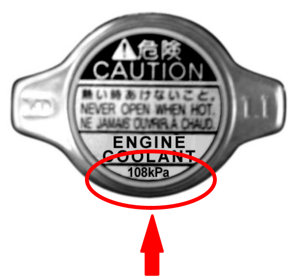
** Refers to drawer number in SST Storage System.

NOTE:
Additional SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

Radiator Cap Identification Procedure

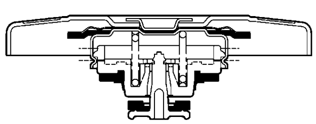
1. Use the illustration below to identify the vehicle's radiator cap type and kPa rating.
2. Proceed to the required inspection procedure for the radiator cap and kPa rating.

Radiator Cap Identification

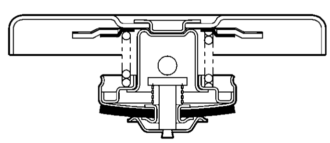


kPa Rating

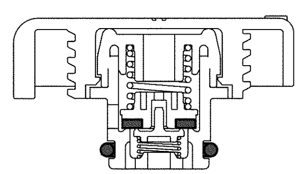
N–Cap



Compact Cap

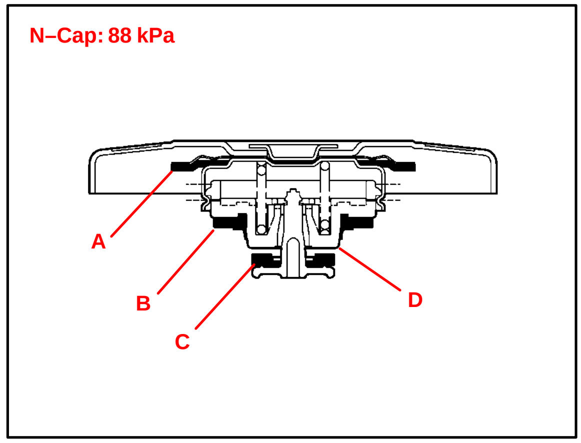


Plastic Cap



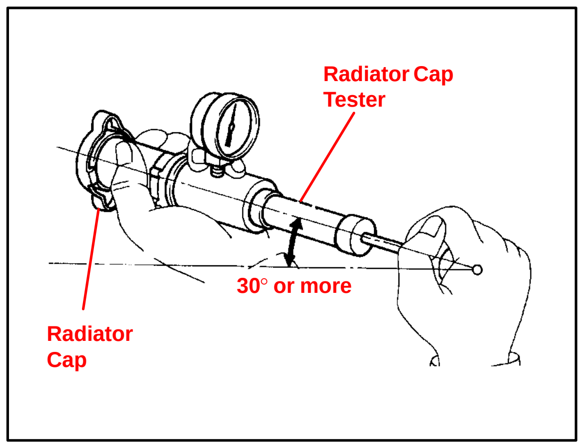
Radiator Cap Inspection Procedure

Type: N–cap, 88 kPa



1. Remove coolant and any foreign material on rubber points "A," "B," and "C."
2. Check that points "A," "B," and "C" are not deformed, cracked, or swollen.
3. Check that points "C" and "D" are not stuck together.
4. Apply engine coolant to points "B" and "C" before using the radiator cap tester.
   - Radiator Cap Tester: Snap–On/Sun P/N SVTS262A (or equivalent)
5. Before installing the radiator cap tester, use the applicable radiator cap adaptor provided in the following SST kits in conjunction with the radiator cap tester:
   - SST P/N 09230–00030–02 (09231–10080–01) or 09230–00020–02 (09231–10060–01)
6. When using the radiator cap tester, tilt it more than 30 degrees.
7. Pump the radiator cap tester several times, and check the maximum pressure.

   Pumping speed: 1 pump/second



HINT:
Stop pumping when the valve opens and read the gauge. The gauge must be within the standard values listed below when the pressure valve opens. The cap is considered OK when the pressure holds steady or falls very slowly, but holds within the standard values listed below for one minute.

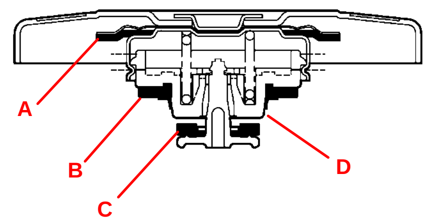
Specification:

VALVE OPENING PRESSURE	SPECIFIED CONDITION
Standard value (for brand–new cap)	74.0 to 103.0 kPa (0.75 to 1.05 kgf/cm^2, 10.7 to 14.9 psi)
Minimum standard value (for in–service cap)	59 kPa (0.60 kgf/cm^2, 8.53 psi)

If the maximum pressure is less than the minimum standard value, replace the radiator cap sub–assembly.

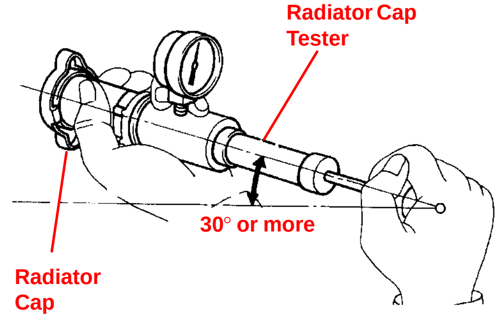
Radiator Cap Inspection Procedure (Continued)

Type: N–cap, 108 kPa



1. Remove coolant and any foreign material on rubber points "A," "B," and "C."
2. Check that points "A," "B," and "C" are not deformed, cracked, or swollen.
3. Check that points "C" and "D" are not stuck together.
4. Apply engine coolant to points "B" and "C" before using the radiator cap tester.
   - Radiator Cap Tester: Snap–On/Sun P/N SVTS262A (or equivalent)
5. Before installing the radiator cap tester, use the applicable radiator cap adaptor provided in the following SST kits in conjunction with the radiator cap tester:
   - SST P/N 09230–00030–02 (09231–10080–01) or 09230–00020–02 (09231–10060–01)
6. When using the radiator cap tester, tilt it more than 30 degrees.
7. Pump the radiator cap tester several times, and check the maximum pressure.

   Pumping speed: 1 pump/second



HINT:
Stop pumping when the valve opens and read the gauge. The gauge must be within the standard values listed below when the pressure valve opens. The cap is considered OK when the pressure holds steady or falls very slowly, but holds within the standard values listed below for one minute.

Specification:

VALVE OPENING PRESSURE	SPECIFIED CONDITION
Standard value (for brand–new cap)	93.3 to 122.7 kPa (0.95 to 1.25 kgf/cm^2, 13.5 to 17.8 psi)
Minimum standard value (for in–service cap)	78.5 kPa (0.80 kgf/cm^2, 11.38 psi)

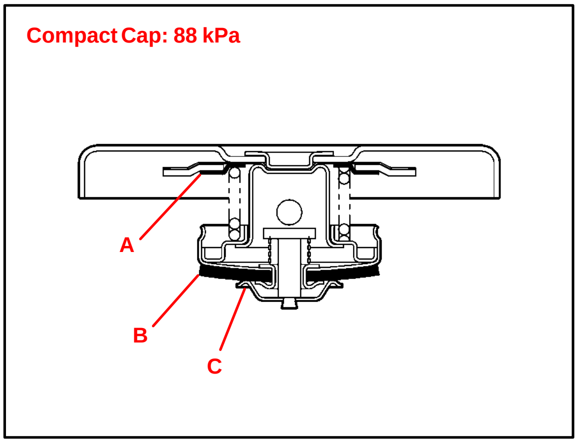
If the maximum pressure is less than the minimum standard value, replace the radiator cap sub–assembly.

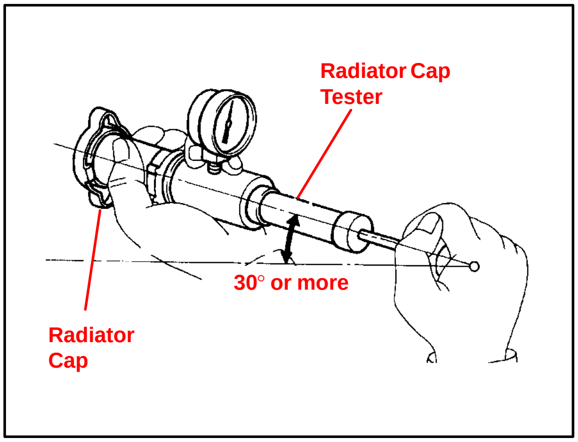
Radiator Cap Inspection Procedure (Continued)

Type: Compact Cap, 88 kPa

1. Remove coolant and any foreign material on rubber points "A," "B," and "C."
2. Check that points "A" and "B" are not deformed, cracked, or swollen.
3. Check that points "B" and "C" are not stuck together.
4. Apply engine coolant to point "B" before using the radiator cap tester.
   - Radiator Cap Tester: Snap–On/Sun P/N SVTS262A (or equivalent)
5. Before installing the radiator cap tester, use the applicable radiator cap adaptor provided in the following SST kits in conjunction with the radiator cap tester:
   - SST P/N 09230–00030–02 (09231–10080–01) or 09230–00020–02 (09231–10060–01)
6. When using the radiator cap tester, tilt it more than 30 degrees.
7. Pump the radiator cap tester several times, and check the maximum pressure.

   Pumping speed: 1 pump/second





HINT:
Stop pumping when the valve opens and read the gauge. The gauge must be within the standard values listed below when the pressure valve opens. The cap is considered OK when the pressure holds steady or falls very slowly, but holds within the standard values listed below for one minute.

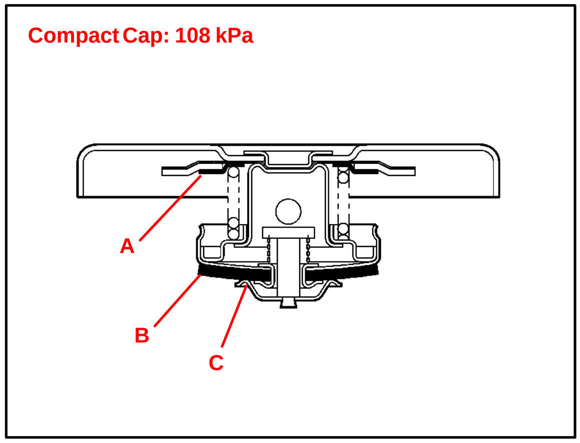
Specification:

VALVE OPENING PRESSURE	SPECIFIED CONDITION
Standard value (for brand–new cap)	74.0 to 103.0 kPa (0.75 to 1.05 kgf/cm^2, 10.7 to 14.9 psi)
Minimum standard value (for in–service cap)	59 kPa (0.60 kgf/cm^2, 8.53 psi)

If the maximum pressure is less than the minimum standard value, replace the radiator cap sub–assembly.

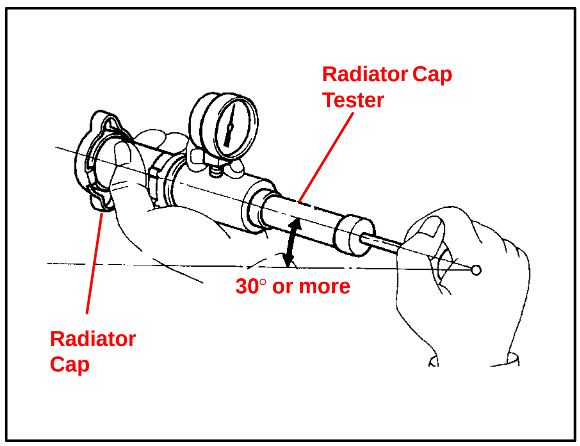
Radiator Cap Inspection Procedure (Continued)

Type: Compact Cap, 108 kPa



1. Remove coolant and any foreign material on rubber points "A," "B," and "C."
2. Check that points "A" and "B" are not deformed, cracked, or swollen.
3. Check that points "B" and "C" are not stuck together.
4. Apply engine coolant to point "B" before using the radiator cap tester.
   - Radiator Cap Tester: Snap–On/Sun P/N SVTS262A (or equivalent)
5. Before installing the radiator cap tester, use the applicable radiator cap adaptor provided in the following SST kits in conjunction with the radiator cap tester:
   - SST P/N 09230–00030–02 (09231–10080–01) or 09230–00020–02 (09231–10060–01)
6. When using the radiator cap tester, tilt it more than 30 degrees.
7. Pump the radiator cap tester several times, and check the maximum pressure.

   Pumping speed: 1 pump/second



HINT:
Stop pumping when the valve opens and read the gauge. The gauge must be within the standard values listed below when the pressure valve opens. The cap is considered OK when the pressure holds steady or falls very slowly, but holds within the standard values listed below for one minute.

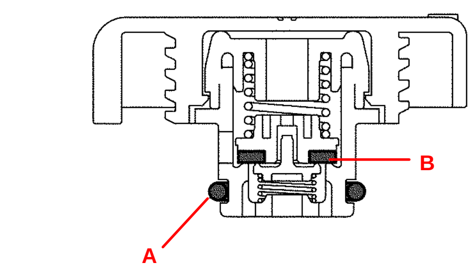
Specification:

VALVE OPENING PRESSURE	SPECIFIED CONDITION
Standard value (for brand–new cap)	93.3 to 122.7 kPa (0.95 to 1.25 kgf/cm^2, 13.5 to 17.8 psi)
Minimum standard value (for in–service cap)	78.5 kPa (0.80 kgf/cm^2, 11.38 psi)

If the maximum pressure is less than the minimum standard value, replace the radiator cap sub–assembly.

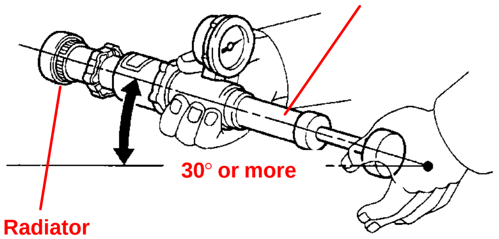
Radiator Cap Inspection Procedure (Continued)

Type: Plastic Cap, 108 kPa



1. Remove coolant and any foreign material on O–ring "A."
2. Check that O–ring "A" is not deformed, cracked, or swollen.
3. Apply engine coolant to O–ring "A" and rubber point "B" before using the radiator cap tester.
   - Radiator Cap Tester: Snap–On/Sun P/N SVTS262A (or equivalent)
4. Before installing the radiator cap tester, use the applicable radiator cap adaptor provided in the following SST kits in conjunction with the radiator cap tester:
   - SST P/N 09230–00030–02 (09231–10080–01) or 09230–00020–02 (09231–10060–01)
5. When using the radiator cap tester, tilt it more than 30 degrees.
6. Pump the radiator cap tester several times, and check the maximum pressure.

   Pumping speed: 1 pump/second



HINT:
Stop pumping when the valve opens and read the gauge. The gauge must be within the standard values listed below when the pressure valve opens. The cap is considered OK when the pressure holds steady or falls very slowly, but holds within the standard values listed below for one minute.

Specification:

VALVE OPENING PRESSURE	SPECIFIED CONDITION
Standard value (for brand–new cap)	93.3 to 122.7 kPa (0.95 to 1.25 kgf/cm^2, 13.5 to 17.8 psi)
Minimum standard value (for in–service cap)	78.5 kPa (0.80 kgf/cm^2, 11.38 psi)

If the maximum pressure is less than the minimum standard value, replace the radiator cap sub–assembly.

Technical Service Information Bulletin

October 14, 2004

Title:

ENTERING VIN DURING ECM (PCM) REPLACEMENT AND/OR DTC P0630

Models:

All '04 – '06 Models

TSIB

REVISED

EG012-04

ENGINE

TSIB REVISION NOTICE:

- **June 3, 2005: Content has been updated to include 2004 and 2006 model year vehicles. Step 4 of the VIN Write Procedure (page 2) and step 3 of the VIN Read Procedure (page 3) have been clarified to include RX 400h vehicles.**

Previous versions of this TSB should be discarded.

Introduction

All 2005 and subsequent model year Lexus vehicles have the VIN (Vehicle Identification Number) stored in the Electronic Control Module (ECM) (SAE term: Powertrain Control Module/PCM) non–volatile memory. The VIN is accessible on the data stream using the Lexus Diagnostic Tester and can also be written to a new ECM (PCM) using a "VIN Read/Write" utility.

Service ECMs (supply parts) are shipped without the VIN; therefore, as part of the ECM (PCM) replacement procedure, the VIN must be written to the replacement ECM (PCM) using the Diagnostic Tester utility function. Failure to write the VIN to the ECM (PCM) will result in a M.I.L. "ON" condition and set DTC P0630: VIN Not Programmed or Mismatch – ECM (PCM).

It is very important to remember to enter the VIN on these vehicles. Vehicles with missing VINs are subject to failing some state and local vehicle emissions Inspection and Maintenance programs.

NOTE:

2004 model year vehicles which have been flash reprogrammed may contain updated 2005 model year OBD II logic. These vehicles will require VIN entry into the ECM (PCM) after reprogramming.

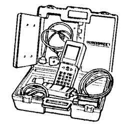
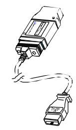
Applicable Vehicles

- **2004** model year vehicles that have been **flash reprogrammed.**
- **All 2005 – 2006** model year vehicles.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Required SSTs

ITEM NO.	SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QTY	DRW**
1	**Lexus Diagnostic Tester Kit***  NOTE: • All components from this kit/set are required • 12 Megabyte Diagnostic Tester Program Card (P/N 01002593–005) with version 12.2a Software (or later) is required	LEX220036	1	8
2	**CAN Interface Module Kit***  NOTE: • All components from this kit/set are required	01002744	1	8

* Essential SSTs.

** Refers to drawer number in SST Storage System.

NOTE:

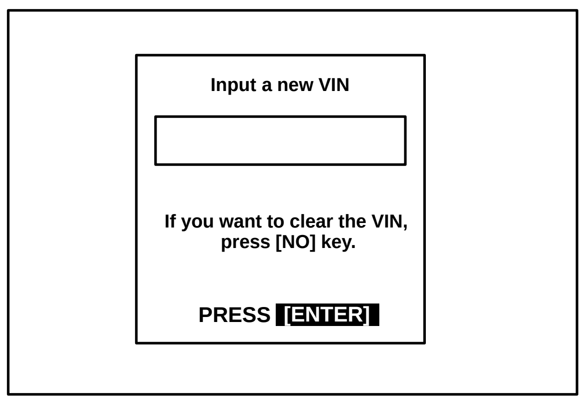
Additional Diagnostic Tester Kits, CAN Interface Modules, Program Cards, or other SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

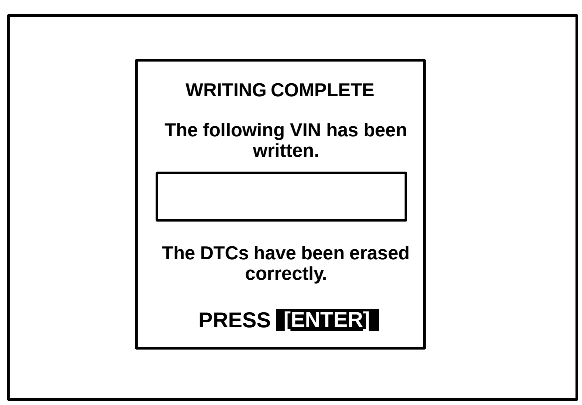
VIN Write Procedure

To write a VIN to a replacement ECM (PCM), use the following process:

1. Confirm the VIN. It is located on the front left of the instrument panel.
2. Connect the Diagnostic Tester to DLC3.
3. Turn the ignition switch and Diagnostic Tester switch ON.
4. **All vehicles except RX 400h:** Select from the Diagnostic Tester menus: DIAGNOSIS, ENHANCED OBDII, VIN, and VIN WRITE.

   RX 400h vehicles: Select from the Diagnostic Tester menus: DIAGNOSIS, OBD/MOBD, HV ECU, VIN, and VIN WRITE.
5. Write the VIN in accordance with the Diagnostic Tester display.
6. Compare the VIN displayed on the Diagnostic Tester with the VIN on the instrument panel. If these are not the same, write the VIN again after turning the ignition switch OFF.

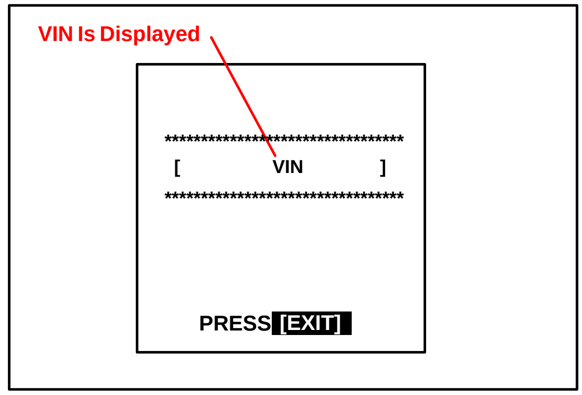




VIN Read Procedure

1. Connect the Diagnostic Tester to DLC3.
2. Turn the ignition switch and Diagnostic Tester switch ON.
3. **All vehicles except RX 400h:**
   Select from the Diagnostic Tester menus: DIAGNOSIS, ENHANCED OBDII, VIN, and VIN READ.

   RX 400h vehicles:
   Select from the Diagnostic Tester menus: DIAGNOSIS, OBD/MOBD, HV ECU, VIN, and VIN READ.
4. Check the VIN displayed on the Diagnostic Tester.



HINT:
For further explanations, refer to the Technical Information System (TIS), appropriate model repair manual: ***Diagnostics: SFI System: Registration.***

LEXUS

Technical Service Information Bulletin

May 23, 2006

Title:

FRONT SEAT SQUEAK NOISE

Models:

’04 – ’07 Lexus

TSIB

NV001-06

NVH

Introduction

Some customers may experience a squeak noise due to contact between the seat track locating pin(s) and the floor pan location hole(s). The following procedure describes the repair method to correct this condition.

Applicable Vehicles

- **2004 – 2007** model year **Lexus** vehicles.

Required Tools & Material

TOOLS & MATERIAL	QUANTITY
Flat Blade Screwdriver (Taped Tip)	1
Power Cut-off Tool (or equivalent)	1

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
NV5011	R & R Front Seat Track Pins (1 seat)	0.5	72011–##### 72012–#####	91	99
Combo A	Opposite Side	0.5			

Applicable Warranty*:

This repair is covered under the Lexus Comprehensive Warranty. This warranty is in effect for 48 months or 50,000 miles, whichever occurs first, from the vehicle’s in-service date.

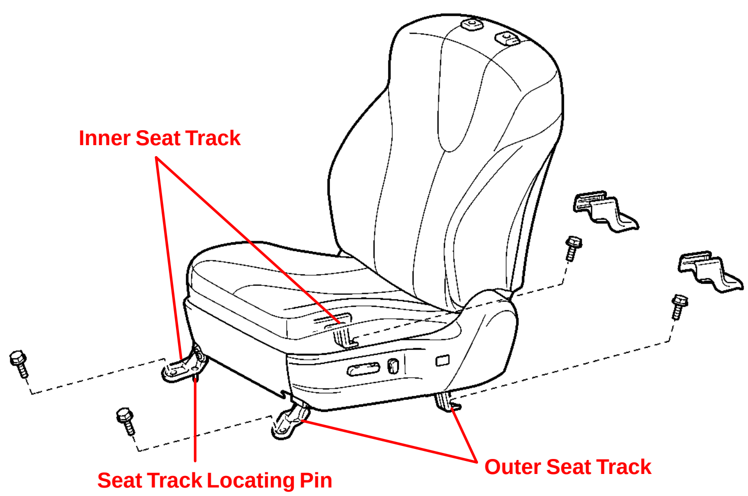
* Warranty application is limited to correction of a problem based upon a customer’s specific complaint.

Pin Location The following table indicates the location and the number of seat track locating pins that should be removed from the seat track assembly:

MODEL	NUMBER OF PINS TO REMOVE	PIN LOCATION
ES (All Models)	2	Front, Inner, & Outer Track
GS (All Models)	2	Front, Inner, & Outer Track
GX (All Models)	2	Front, Inner, & Outer Track
IS (All Models)	2	Front, Inner, & Outer Track
LS 430	2	Front, Inner, & Outer Track
LX (All Models)	2	Front, Inner, & Outer Track
RX (All Models)	1 (Inner Side ONLY)	Front & Inner Track ONLY
SC 430	2	Front, Inner, & Outer Track

Parts Location

Typical View of Driver's Side Seat



Repair Procedure

CAUTION:

- **Wear safety gloves to prevent injury to your hands.**
- **Work must be started more than 90 seconds after the ignition switch is turned to the LOCK position and the negative (–) terminal cable is disconnected from the battery. (The SRS is equipped with a backup power source. If work is started within 90 seconds from disconnecting the negative (–) terminal cable of the battery, the SRS may deploy.)**
- **The yaw rate sensor is installed under the front RH seat. Be careful NOT to step on the yaw rate sensor after the seat has been removed.**

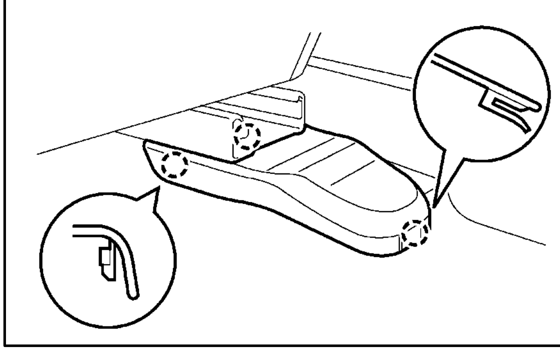
HINT:

- **The installation is the reverse order of removal. However, when there is a special point concerning installation, it is indicated.**
- **Use the same procedure on the RH side as on the LH side.**
- **When removing/installing and performing repairs on the passenger seat, perform the Occupant Classification System Zero Point Calibration as outlined in the Diagnostics section of the applicable model year Repair Manual for each model.**

1. Disconnect the negative (–) battery terminal.
2. Remove the plastic front seat track covers — Use a screwdriver to disengage the claws and **carefully** remove the plastic seat track covers.

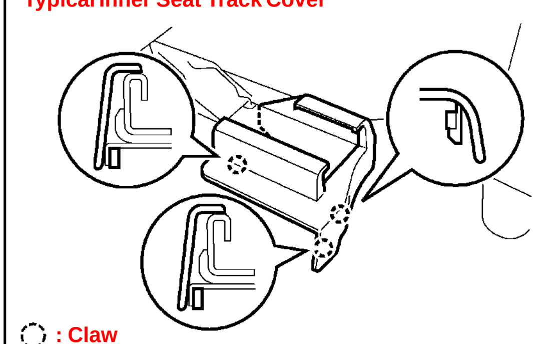
NOTE:
Tape the screwdriver tip before use.

Typical Outer Seat Track Cover



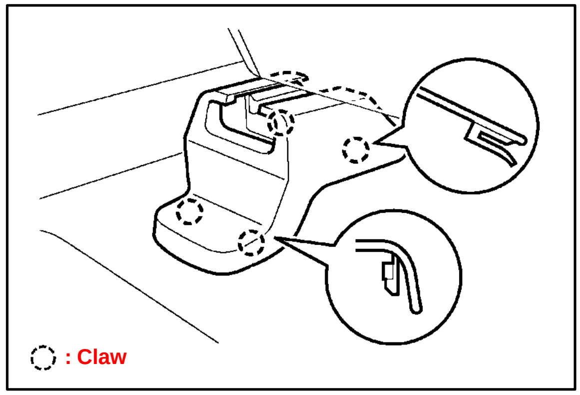
NOTE:
Refer to the appropriate Lexus Repair Manual for each model for detailed instructions on how to remove the plastic seat track covers.

Typical Inner Seat Track Cover



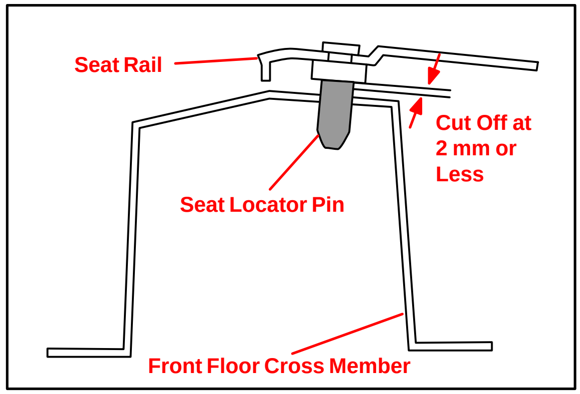
Repair Procedure (Continued)

3. Remove the plastic rear seat track covers — Use the taped screwdriver to disengage the claws and **carefully** remove the plastic seat track covers.



4. Remove the LH front seat assembly.
   A. Move the seatback to the full upright position.
   B. Remove the four (4) seat track securing bolts.
   C. Disconnect the electrical connectors and remove the complete seat assembly.

5. Remove the seat track locating pins.
   A. With the seat removed from the vehicle, tilt the seat assembly backward to gain access to the seat track locating pins.
   B. Use a power cut-off tool (or equivalent) to cut off the two (2) locating pins leaving 2 mm (0.1 in.) or less of each pin.



CAUTION:
Do NOT permit the power cut-off tool to contact the seat track. ONLY cut off the shaft of the pin (near the base of the seat track).

NOTE:
The seat track locating pins' function is to ease installation during manufacturing and does NOT provide any other function.

6. Clean and paint bare metal surfaces.
   A. Remove any metal shavings from the seat track/seat assembly.
   B. Clean the bare metal surface of the remainder of the seat track locating pin with wax, grease, and silicone remover.
   C. To prevent corrosion, coat any bare metal surfaces still attached to the seat track with a brush-on type paint.

7. Install LH front seat assembly.
   A. Place the seat on the cabin floor.
   B. Reconnect all electrical connectors under the seat.
   C. Install all four (4) seat track retaining bolts (fingertight).

Repair Procedure (Continued)

D. Tighten the two (2) front seat track attaching bolts.

NOTE:
The bolt torque specification varies by model. Please refer to the Repair Manual for the correct bolt torque for the model you are working on.

E. Tighten the two (2) rear seat track attaching bolts.

NOTE:
The bolt torque specification varies by model. Please refer to the Repair Manual for the correct bolt torque for the model you are working on.

F. Reinstall all plastic seat track covers.

8. Repeat steps 1 – 6 for the RH seat assembly.
9. Reconnect the negative (–) battery terminal.
10. Test power seat operation and seat heater (if equipped) for proper operation.
11. Initialize front passenger occupant classification system and re-initialize any other power systems.
    - Refer to TSIB No. PD010-05, "*Power System Initialization During PDS*."
    - Refer to TSIB No. PD009-06, "*Power System Initialization During PDS*."
12. Inspect SRS warning light operation.
13. Test drive vehicle and confirm that the seat squeak has been eliminated.

Technical Service Information Bulletin

January 31, 2003

Title:

PAINT STAINS UNDER RAPGARD™

Models:

’02 – ’06 All Models

PAINT

PA001-03

REVISED

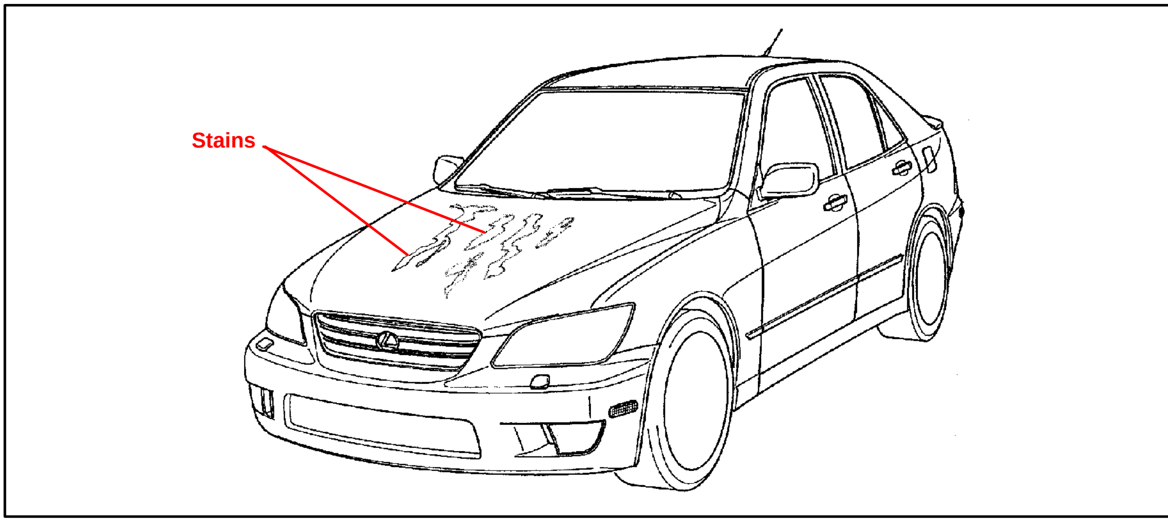
TSIB REVISION NOTICE:

- **May 11, 2005: Applicable Vehicles has been updated to include 2004 – 2006 model years.**

The previous TSB should be discarded.

Introduction

On some vehicles, when Rapgard™ is removed, the paint may have a stained appearance under the clear coat. These stains should not be considered a defect in the paint (clear coat or color coat). Wrinkles in the Rapgard™ sometimes trap water and cause the paint to stain from the trapped moisture, especially on horizontal surfaces, such as the hood, roof, and trunk. Stains can be removed by heating the stained surface to remove the trapped moisture.



Applicable Vehicles

- **2002 – 2006** model year vehicles, **all models.**

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
BD1055	Remove Paint Stain Under Rapgard™	0.6	53301–#####	67	99

Applicable Warranty*:

This repair is covered under the Lexus Comprehensive Warranty. This warranty is in effect for 48 months or 50,000 miles, whichever occurs first, from the vehicle’s in-service date.

* Warranty application is limited to correction of a problem based upon a customer’s specific complaint.

Required Tools & Material

TOOLS & MATERIALS	QUANTITY
Infrared Lamp or Heat Gun	1
Aluminum Foil or Damp Cloth	1
Thermometer	1

Repair Procedure

1. Use the aluminum foil or damp cloth to cover plastic/rubber parts that are near the stain.

2. Apply heat to the stain using an infrared lamp or heat gun.

> **NOTE:**
> **Apply heat for 5 – 10 minutes at 158°F – 176°F (70°C – 80°C). Do NOT allow the surface to become hotter than 176°F (80°C). Measure the temperature with a thermometer.**

3. After applying heat for 5 minutes, examine the area to determine if the stain has been removed. If the stain still exists, continue to apply heat and re–examine the stain 5 minutes later.

Title:

EXTERIOR COLOR AND SCRATCH RESISTANT AND ANTI-ACID PAINT

Models:

'04 All Models

Introduction

Most colors on Lexus vehicles sold in the U.S. use a combination of scratch resistant and/or acid rain resistant exterior (body color) paint finishes. These types of finishes provide improved resistance to minor scratching and acid rain.

This bulletin outlines the precautions that should be taken when polishing or refinishing anti–scratch automotive type paint surfaces.

The repair of acid rain damaged paint surfaces is explained in TSIB No. BO015–91, *"Prevention and Repair of Acid Rain Damage."*

Applicable Vehicles

- **All 2004** model year **vehicles.**

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Paint Application

MODEL	PLANT	EXTERIOR COLOR AVAILABILITY					SCRATCH RESISTANT PAINT	ANTI–ACID PAINT
ES 330	TMC	062	1C0	202	3Q2	3Q4	All Colors	All Colors Except 202
		4P7	6S5	772	8P8			
GS 430/300		062	066	1C0	202	3P2		All Colors
		4P7	6S5	8P8	8P9			
GX 470		070	1E8	1F0	202	587		All Colors
		8R4						
IS 300		062	1C0	1C6	202	3P0		All Colors Except 202
		4R4	6R4	8N6	8P4			
LS 430		062	072	1E0	1F2	202		All Colors
		3P2	4P7	4S1	6T7	8P8		
LX 470		070	1E9	202	4R2	6T2		All Colors Except 202
		8P6						
RX 330		062	1C0	1E0	202	4R4		All Colors
		6T1	6T3	8R6	8R7			
	TMMC	062	1C0	1E0	202	4R4		All Colors
		6T1	6T3	8R6	8R7			
SC 430	TMC	065	1C0	202	3P0	3P6		All Colors
		4Q8	6S6	8P4				

Paint Application

Polishing Tips for Anti–Scratch Finishes:

Since this type of paint technology is meant to resist scratching, it is important to understand that sanding and polishing to remove scratches is quite difficult and will require significantly more time to finesse the paint surface to achieve an acceptable appearance.

- Use an ultra–fine grit sandpaper to remove scratches.
- Soak sandpaper in soapy water for at least one hour (overnight preferred) prior to sanding the paint surface (this will reduce the possibility of rescratching the paint surface).
- Use polishing compounds and materials specifically designed to be used with clearcoated urethane paint finishes.

Refinish Recommendations:

NOTE:
To improve appearance and durability of the refinished paint surface, it is recommended that a clearcoat be used when refinishing color 202 (non–metallic black). All metallic and pearl coat finishes must be clearcoated. Please refer to the specific refinish recommendations issued by the paint manufacturer used by the body/paint shop.

Refinish materials providing similar scratch resistant qualities to that of the original factory finish have been developed by the refinish paint suppliers in the U.S. Please contact your refinish supplier for a list of appropriate refinish materials as well as specific refinish instructions.

LEXUS

Technical Service Information Bulletin

January 12, 2005

Title:

IRON PARTICLE RUST CONTAMINATION REPAIR

Models:

'94 – Current

TSIB

PA001-05

PAINT

Introduction

The purpose of this bulletin is to provide information regarding the proper procedures to clean vehicles that may have been subjected to contamination by airborne iron particles such as rail dust.

Applicable Vehicles

- **1994 – Current** model year **Lexus** vehicles.

Required Tools & Materials

TOOLS & MATERIALS	QUANTITY
Auto Magic✓Special Cleaner Concentrate™ #713*	1
Rubber Gloves, Aprons, Boots	As Needed
Eye Protection	
Sponges or Wash Mitts	
Pail or Bucket	

* Contact the main office of Auto Wax Company Inc. (1–800–826–0828 or www.automagic.biz) to find a local source for Auto Magic✓Special Cleaner Concentrate.™

Condition

During rail transportation or extended storage near industrial areas, vehicles may occasionally be subjected to contamination by airborne iron particles shed from railroad tracks, train wheels, exposure to heavy machinery facilities, grinding, welding, etc.

Inspection

This type of contamination can be identified by the presence of small red or brown particles on the paint surface. These particles are often difficult to see on dark color paints, but can be easily felt when brushing a hand across horizontal body surfaces such as hood, roof, or deck lid.

CAUTION:

Because of the abrasiveness of these small iron particles, polishing or buffing procedures should not be attempted to repair the paint surface of an affected vehicle. This will result in further paint damage and detract from vehicle appearance.

Repair

Washing the affected paint surfaces with Auto Magic✓Special Cleaner Concentrate™ is the recommended method to dislodge embedded iron particles and remove the surrounding rust stains. The correct usage of Auto Magic✓Special Cleaner Concentrate™ is described in this bulletin.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

General Precautions

WARNING:

Auto Magic✓Special Cleaner Concentrate™ is a corrosive material. Appropriate personal protection equipment must be worn to protect persons performing the contamination removal procedure. Please refer to the precautions on the product prior to use.

CAUTION:

Consult local or state regulations regarding the handling, use, and disposal of Auto Magic✓Special Cleaner Concentrate™ prior to use.

Under no circumstances should contamination removal be performed in direct sunlight or contamination removal solution be allowed to dry on vehicle surfaces, as staining of plastic, rubber, or painted parts may result.

Repair Procedure

1. Move vehicle out of direct sunlight. Initially rinse with cool water then wash with liquid car wash detergent. Rinse again thoroughly with fresh water.

2. Dilute the mixture to a 1:8 ratio for painted surfaces. Use the recommended dilution ratio when applying to any other surface. Apply the diluted cleaner concentrate so that it evenly covers the affected area. Use an appropriate mitt or sponge to agitate the surface.

3. Thoroughly rinse vehicle with fresh water.

4. Inspect vehicle carefully both visually and by feel to determine if all iron particles have been removed. Repeat the wash several times if necessary to achieve complete removal.

5. Dry vehicle with a soft terry cloth towel and apply a non–abrasive, non–silicone glaze to obtain a high–gloss finish.

LEXUS

Technical Service Information Bulletin

July 24, 2003

Title:

2004 PAINT COLORS

Models:

All ’04 Models

TSIB

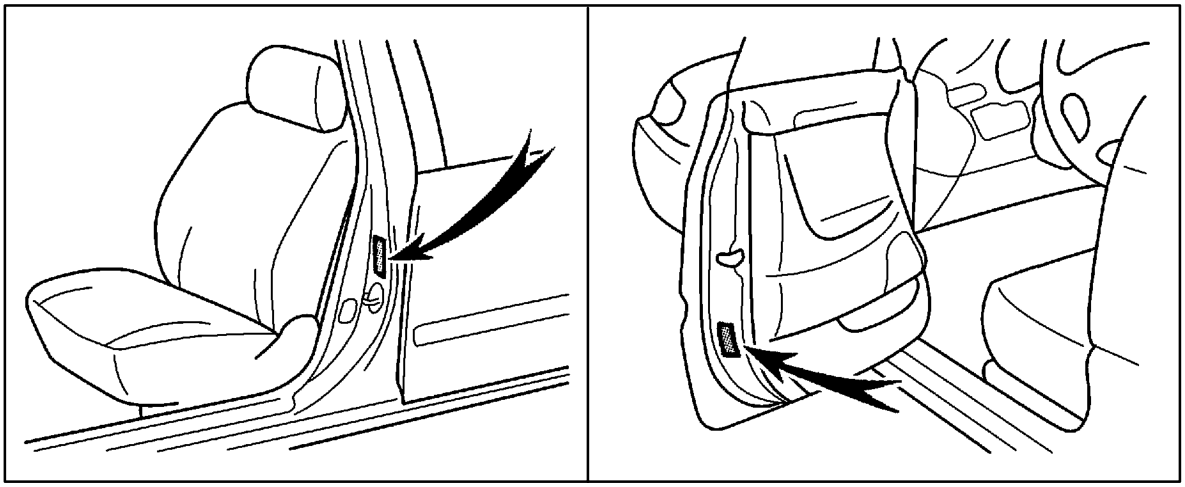
PAINT

PA003-03

Introduction

Attached for your reference is a list of all 2004 model year OEM paint codes.

> **NOTE:**
> **The body color code is on the vehicle Certification Regulation Label, located on the left front door “B” pillar or door rear lower surface.**



Please contact your local paint representative for the actual paint mixing formulas or if you need help in color matching.

Applicable Vehicles

- **All 2004** model year vehicles.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Paint Codes & Color Names

CODE	COLOR NAME	ES 330	GS 430/300	GX 470	IS 300	LS 430	LX 470	RX 330	SC 430
062	Crystal White	✓	✓		✓	✓		✓	
065	White Gold Crystal								✓
066	Parchment Crystal		✓						
070	Blizzard Pearl			✓			✓		
072	Moonlight Pearl					✓			
1C0	Millennium Silver Metallic	✓	✓		✓			✓	✓
1C6	Graphite Gray Pearl				✓				
1E0	Flint Mica					✓		✓	
1E8	Ash Blue Mica			✓					
1E9	Galactic Gray Mica						✓		
1F0	Silver Pine Metallic			✓					
1F2	Mecury Metallic					✓			
202	Black Onyx	✓	✓	✓	✓	✓	✓	✓	✓
3P0	Absolute Red				✓				✓
3P2	Black Cherry Pearl		✓			✓			
3P6	Concord Shadow								✓
3Q2	Black Garnet Pearl	✓							
3Q4	Alabaster Metallic	✓							
4P7	Mystic Gold Metallic	✓	✓			✓			
4Q8	Egyptian Sand Pearl								✓
4R2	Sand Dollar Pearl						✓		
4R4	Savanah Metallic				✓			✓	
4S1	Briarwood Pearl					✓			
587	Dorado Gold Pearl			✓					
6R4	Electric Green Metallic				✓				
6S5	Mystic Sea Opalescence	✓	✓						
6S6	Midnight Pine Pearl								✓
6T1	Bamboo Pearl							✓	
6T2	Eucalyptus Mica						✓		
6T3	Black Forest Pearl							✓	
6T7	Cypress Pearl					✓			
772	Starlight Pearl	✓							
CODE	COLOR NAME	ES 330	GS 430/300	GX 470	IS 300	LS 430	LX 470	RX 330	SC 430

Paint Codes & Color Names
(Continued)

CODE	COLOR NAME	ES 330	GS 430/300	GX 470	IS 300	LS 430	LX 470	RX 330	SC 430
8N6	Bluestone Metallic				✓				
8P4	Indigo Ink Pearl				✓				✓
8P6	Blue Vapor Metallic						✓		
8P8	Blue Onyx Pearl	✓	✓			✓			
8P9	Blue Marlin Pearl		✓						
8Q6	Azure Pearl								✓
8R4	Blue Meridan Pearl			✓					
8R6	Breakwater Blue Metallic							✓	
8R7	Neptune Blue Mica							✓	

Technical Service Information Bulletin

July 16, 2004

Title:

WHEEL FILM FOR BRAKE ROTOR RUST PREVENTION

Models:

All Models with Wheel Film

PD001-04

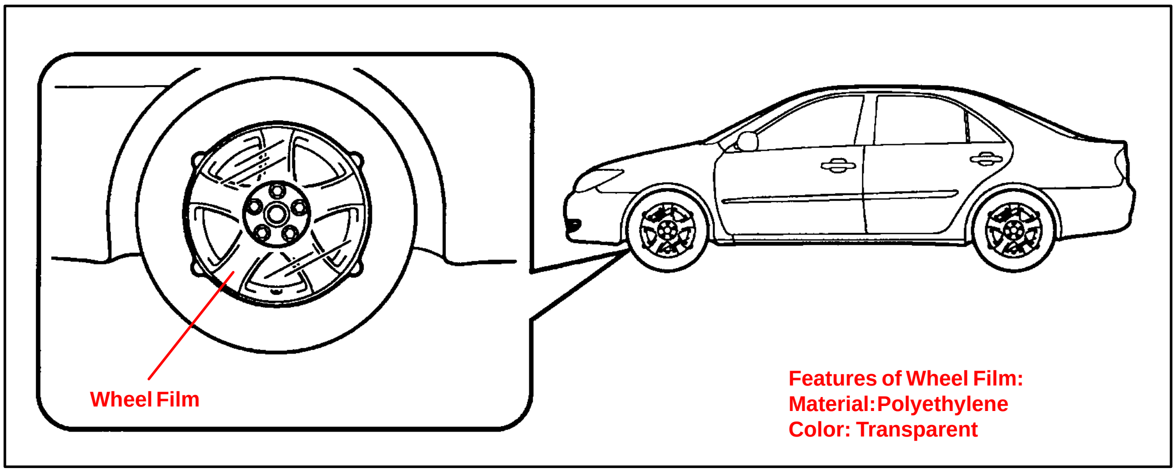
PRE–DELIVERY SERVICE

Introduction

To prevent brake rotor rust from forming during transportation and storage, wheel film will be adopted instead of using a cardboard type anti–rust cover.

The purpose of the wheel film is to protect the disc brake rotor from weather elements and initial rust before the vehicle is delivered to the customer. Consequently, the film should remain on the wheel as long as possible.

NOTE:
- **Retain the wheel film on the disc wheel during vehicle display and storage.**
- **Do not remove the wheel film right away at Pre–Delivery Service (PDS) if the vehicle will be stored after PDS.**
- **Remove the wheel film just prior to delivery to customers.**



Applicable Vehicles

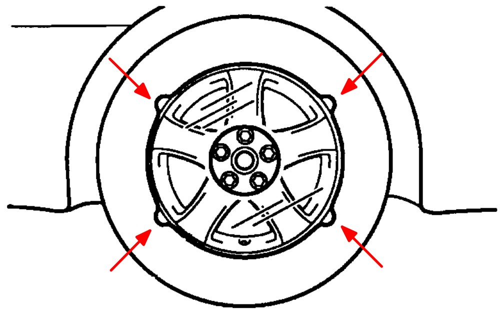
- **All Models** with **wheel film.**

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Removal Procedure

Firmly hold the outer end of the wheel film to pull it off.



NOTE:

- **If film adhesive residue is found on the disc wheel, remove it with a soft cloth dipped in ethyl alcohol (ethanol). Do not use thinner to remove the adhesive residue.**
- **When the wheel film is removed below an ambient temperature of 0°C (32°F), it is possible that the film may tear. For ease of film removal in cold conditions, please warm the film above 0°C (32°F) using one of the following methods:**
  - **Splash (hot) water on the wheel film.**
  - **Warm wheel film with cotton cloth soaked in hot water.**
  - **Warm wheel film with heat gun. Be sure not to overheat the film and wheel.**
  - **Warm wheel film by infrared heater (lamp) for paint. Be sure not to overheat the film and wheel.**
  - **Warm wheel film by steam car wash.**
  - **Park vehicle indoors (e.g. garage, etc.) for an extended period of time.**

Disposal Procedure

Please follow local laws for disposal. Polyethylene film will not generate harmful gasses when it is burned.

Introduction Schedule

MODEL (FRONT & REAR)	PLANT	2003												2004											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
GS 430/300	JAPAN													Beginning January 2005											
GX 470	JAPAN													Beginning January 2005											
LX 470	JAPAN													Beginning January 2005											
RX 330	TMMC																								
RX 330	JAPAN																								
SC 430	JAPAN																								

This is a tentative schedule. There is a possibility that the introduction timing may be delayed on some models.

LEXUS

Technical Service Information Bulletin

January 1, 1999

TSIB

Title:
VOLUME 4 INFORMATION

Models:
All Models

Introduction

Lexus Technical Service Information Bulletins (TSIBs) continue to be one of the most current sources of technical information available. To ensure complete access to this reference source, use the following steps:

- Volume Four will begin with 1999 Technical Service Information Bulletins.
- Place this bulletin along with all 1999 TSIBs into the new binders received with this bulletin.
- Label this new binder "Volume Four" using the labels provided with the binder.
- Additional copies of 1994 through 1999 TSIBs are available to all Lexus Dealerships through the Non–Parts System (MDC NPM System) by using the following Part Number designation:

TSB Part Number Prefix
TSB Chapter Code
Chapter Code Sequence Number
Year

00216 – EG 001 – 99

Related TSIB Part Numbers

MATERIAL DESCRIPTION	PART NUMBER
1999 TSIB Binder complete with all bulletins issued to date	VOL4
New TSIB Binder and tabs only	00216–00001

LEXUS

Technical Service Information Bulletin

May 18, 2004

Title:

REPAIR MANUAL CORRECTIONS INDEX

Models:

All Models

TSIB

PG001-04

PRODUCT GENERAL INFORMATION

Introduction

Correction pages are available for the service publications listed below. This bulletin summarizes service publication content changes that have been released between February 2003 and March 2004. These changes have already been implemented in the Toyota Technical Information System (TIS). For the most accurate service information content, technicians are strongly encouraged to refer to TIS (*http://tis.toyota.com*). Internet access is also available to Lexus service information content by subscription (*http://techinfo.lexus.com*).

NOTE:

Inventory quantities of printed correction pages are limited, and part numbers are obsolete when supplies are exhausted. When ordering a technical publication (i.e., Repair Manual, Electrical Wiring Diagram) from the MDC, any correction page(s) associated with that particular publication which were published at the time of purchase will automatically be included with your order.

Parts Information

Correction pages may be ordered from the Materials Distribution Center (MDC) through Dealer Daily or by calling the MDC at 1–800–622–2033 using the corresponding part numbers from the following table.

	Publication	Number	Page(s)	Part Number
ES 300	2002 ES 300	RM 911–U1	05–748, 05–749,	00245–RM911–3157
			05–749–1, 05–749–2	↓
			05–93, 05–99	00245–RM911–3272
	2003 ES 300	RM989–U1	05–844, 05–845,	00245–RM989–3152
			05–845–1, 05–845–2	↓
GX 470	2003 GX 470	RM1006–U1	02–32 to 02–34	00245–RM100–3112
			05–883, 05–884,	00245–RM100–3161
			05–884–1, 05–884–2	↓
			03–43	00245–RM100–3193
		RM1006–U2	27–7, 27–8	00245–RM100–3026B
			30–38	00245–RM100–3112B
IS 300	2002 IS 300	RM869–U2	BE–38, BE–39	00245–RM869–3050B
			BE–95	00245–RM869–3098B
	2003 IS 300	RM980–U2	BE–38, BE–39	00245–RM980–3051B
			BE–95	00245–RM980–3095B

	Publication	Number	Page(s)	Part Number
LS 430	2001 LS 430	RM812–U2	BE–101	00245–RM812–2202B
	2002 LS 430	EWD457–U	414	00245–EWD45–3190
		RM874–U2	BE–101	00245–RM874–2201B
			BO–94 to BO–97,	00245–RM874–3039B
			BO–97–1, BO–97–2,	↓
			BO–99 to BO–104,	↓
			BO–104–1, BO–104–2	↓
			BE–31, BE–32	00245–RM874–3047B
			BE–69	00245–RM874–3120B
	2003 LS 430	EWD504–U	414	00245–EWD45–3191
		RM988–U2	BE–101	00245–RM988–2200B
			BO–94 to BO–97,	00245–RM988–3040B
			BO–97–1, BO–97–2,	↓
			BO–99 to BO–104,	↓
			BO–104–1, BO–104–2	↓
			BE–31, BE–32	00245–RM988–3048B
			BE–69	00245–RM988–3121B
LX 470	2002 LX 470	RM914–U2	BE–39, BE–40	00245–RM914–3055B
	2003 LX 470	EWD508–U	72, 73, 86, 87, 102,	00245–EWD50–2203
			103, 269, 288, 289, 437,	↓
			442, 443, 451, 456,	↓
			Overall M:13 (cont'd), M:27	↓
		RM973–U1	SS–23	00245–RM973–3197
			DI–136, DI–137, DI–143,	00245–RM973–3268
			DI–144, DI–150, DI–151,	↓
			DI–171, DI–172	↓
		RM973–U2	BE–121	00245–RM973–2186B
			BE–41, BE–42	00245–RM973–3056B
RX 300	2002 RX 300	RM876–U1	DI–221, DI–223	00245–RM876–3315
	2003 RX 300	RM961–U1	DI–122, DI–124, DI–129,	00245–RM961–3269
			DI–131, DI–136, DI–138, DI–158	↓
			DI–278, DI–280	00245–RM961–3316
RX 330	2004 RX 330	EWD523–U	400, Overall M:33–1	00245–EWD52–3192
		RM1027–U1	03–30, 05–343, 05–347	00245–RM102–3034
		RM1027–U2	26–8	00245–RM102–3034B
			05–1164 to 05–1168	00245–RM102–3122B
		RM1027–U3	82–4 to 82–7, 82–7–1,	00245–RM102–3185C
			82–7–2	↓
SC 430	2003 SC 430	RM962–U2	73–8	00245–RM962–2182B

Technical Service Information Bulletin

February 18, 2005

Title:

REPAIR MANUAL CORRECTIONS INDEX

Models:

All Models

PG001-05

PRODUCT GENERAL INFORMATION

Introduction

Correction pages are available for the service publications listed below. This bulletin summarizes recently released service publication content changes. These changes have already been implemented in the Lexus Technical Information System (TIS).
For the most accurate service information content, technicians are strongly encouraged to refer to TIS (*http://tis.toyota.com*). Internet access is also available to Lexus service information content by subscription (*http://techinfo.lexus.com*).

NOTE:

Inventory quantities of printed correction pages are limited, and part numbers are obsolete when supplies are exhausted. When ordering a technical publication (i.e., Repair Manual, Electrical Wiring Diagram) from the MDC, any correction page(s) associated with that particular publication which were published at the time of purchase will automatically be included with your order.

Parts Information

Correction pages may be ordered from the Materials Distribution Center (MDC) through Dealer Daily or by calling the MDC at 1–800–622–2033 using the corresponding part numbers from the following table.

	Publication	Number	Page(s)	Part Number
ES 300	2001 ES 300	RM831–U1	DI–103	00245–RM831–3320
		RM831–U2	BE–34 to BE–37	00245–RM831–3045B
IS 300	2001 IS 300	RM779–U2	BE–35, BE–36	00245–RM779–3049B
			BE–81	00245–RM779–3099B
LS 430	2001 LS 430	RM812–U2	BE–31, BE–32	00245–RM812–3046B
			BO–94 to BO–97,	00245–RM812–3038B
			BO–97–1, BO–97–2,	↓
			BO–99 to BO–104,	↓
			BO–104–1, BO–104–2	↓
LX 470	2001 LX 470	RM802–U2	BE–39, BE–40	00245–RM802–3054B

	Publication	Number	Page(s)	Part Number
RX 300	2001 RX 300	RM784–U1	DI–213, DI–215	00245–RM784–3314
			DI–105	00245–RM784–3326
	2002 RX 300	RM876–U1	DI–221, DI–223	00245–RM876–3315
			DI–110	00245–RM876–3327
RX 330	2004 RX 330	EWD563–U	44, 47, 127,	00245–EWD56–4011
			128, 464, 465,	↓
			Overall: 4–9, 4–13	↓

LEXUS

Technical Service Information Bulletin

March 30, 2006

Title:

BATTERY MAINTENANCE FOR IN-STOCK VEHICLES & PRE-DELIVERY

Models:

All Models & Model Years Through Current

PG001-06

PRODUCT GENERAL INFORMATION

TSIB UPDATE NOTICE:

**The information contained in this TSIB supercedes TSIB No. PG009–02.
TSIB No. PG009–02 is now obsolete and should be discarded.**

Introduction

A battery in a stored vehicle is subject to conditions that can reduce its performance and life. These conditions include storage period, temperature, parasitic drain, and battery load. Because of these factors, battery inspection and maintenance are required in order to ensure proper operation and optimal battery life.

As a matter of policy, Lexus does not provide battery warranty coverage for discharged and/or failed batteries due to lack of maintenance. It is the dealer's responsibility to maintain the specified State of Charge (SOC) of the vehicle's battery while in stock and assure proper State of Charge (SOC) at delivery.

To eliminate customer service concerns due to an undercharged battery during the first few weeks of ownership, **all dealers should check battery State of Charge (SOC) and recharge, if necessary, just prior to delivery** (i.e., within 48 hours of delivery).

Applicable Vehicles

- **All models and model years through current.**

Required SSTs

ITEM NO.	SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QTY	DRW**
1	**Digital Battery System Analyzer*** NOTE: • All components from this kit/set are required 	00002–V8150–KIT	1	19

* Essential SSTs.

** Refers to drawer number in SST Storage System.

NOTE:

- **The Digital Battery System Analyzer (P/N 00002–V8150–KIT) supercedes the Midtronics MICROPRO 815 Digital Battery Tester (P/N 0002–MP815–T). P/N 0002–MP815–T is now obsolete.**
- **Additional SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.**

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Recommended Equipment

TOOLS & EQUIPMENT	MANUFACTURER	PART NUMBER
Fast Battery Charger**	Associated	ASE6003
Fast Battery Charger**	Christie	CAPPDQ

** These tools can be ordered through the Lexus Approved Dealer Equipment program by calling 1–800–368–6787.

NOTE:
The "Fast Battery Chargers" listed above have been tested and approved by Lexus. These state-of-the-art "smart" chargers were designed to charge batteries at an accelerated rate, without the possibility of damage. Using non-microprocessor-controlled battery chargers for fast charging purposes can damage the battery.

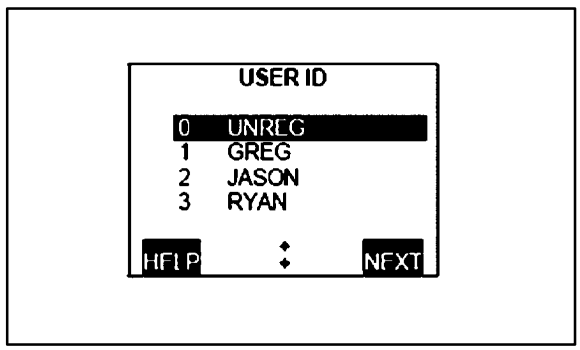
Battery Inspection Procedure

All vehicles are to be inspected according to the procedures listed below using the Digital Battery System Analyzer no more than 48–hours prior to customer vehicle delivery.

IMPORTANT NOTE FOR HYBRID VEHICLES:
The Digital Battery System Analyzer (SST P/N 00002–V8150–KIT) is to be used on the AUXILIARY (12 volt) battery — NOT the HV battery.

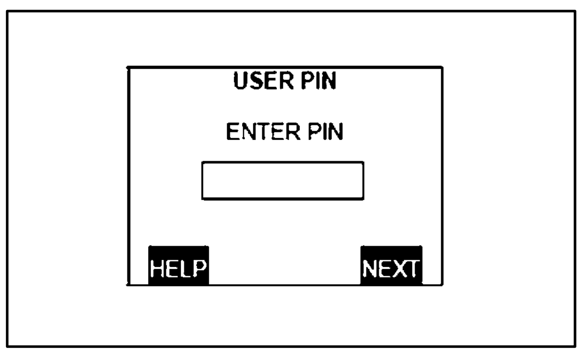
1. Connect test clamps to battery. (If analyzer does NOT power up automatically, press the **POWER** button.)

2. Select the correct **USER ID** (if applicable) and press the **NEXT** soft key.



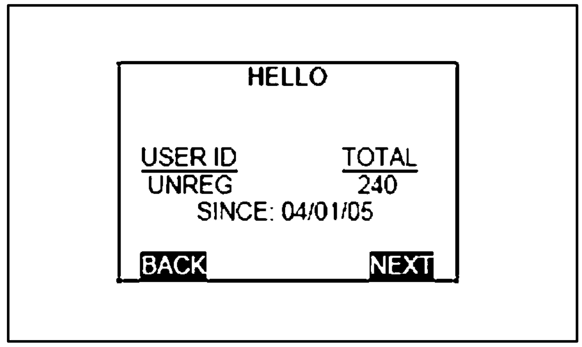
3. Enter password (if applicable) and press the **NEXT** soft key.

NOTE:
For details on defining USER ID or PIN, refer to the NVS–8150 Instruction Manual.

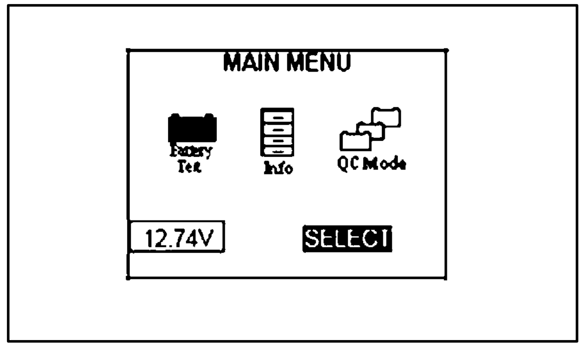


Battery Inspection Procedure (Continued)

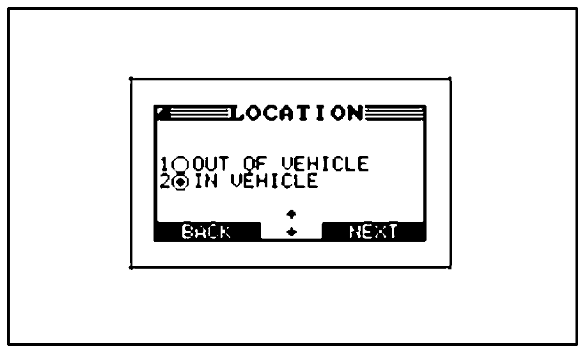
4. Press the **NEXT** soft key (if applicable) when the **HELLO** screen appears to proceed to the Main Menu.



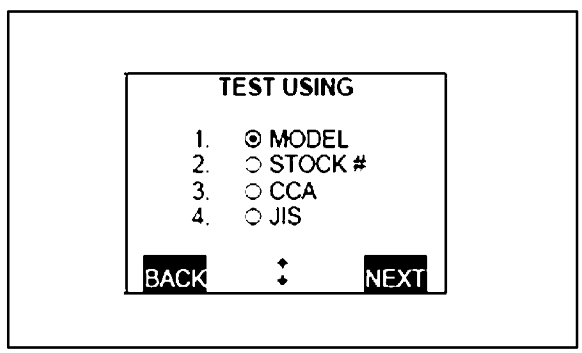
5. Choose **BATTERY TEST** and press the **SELECT** soft key.



6. Select **IN VEHICLE** and press the **NEXT** soft key.

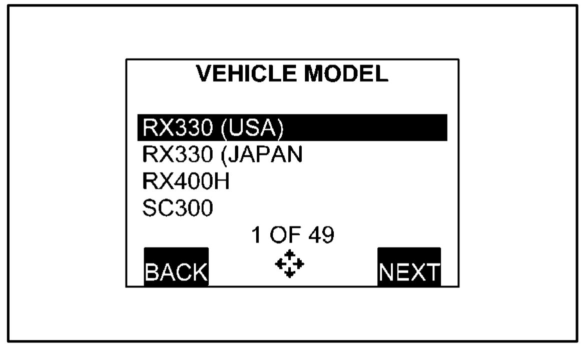


7. Select **MODEL** and press the **NEXT** soft key.

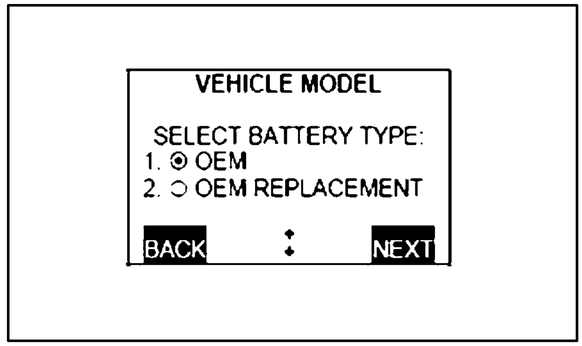


Battery Inspection Procedure (Continued)

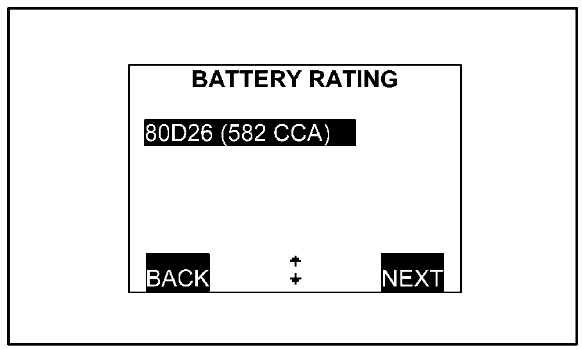
8. Proceed to the appropriate model and press the **NEXT** soft key.



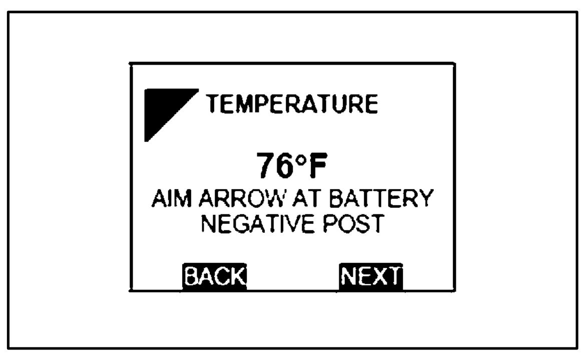
9. Select **OEM** battery type and press the **NEXT** soft key.



10. Choose the correct battery (model number) and press the **NEXT** soft key.

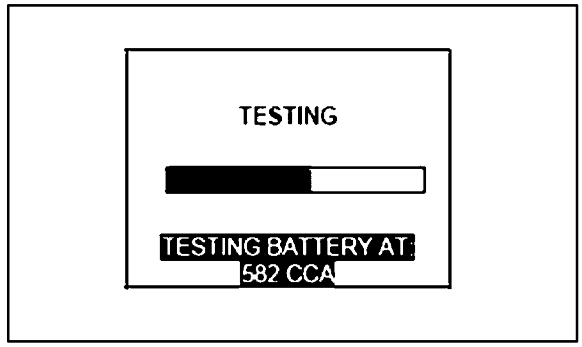


11. Aim the **IR** temperature measurement sensor at the negative (–) battery post and press the **NEXT** soft key.

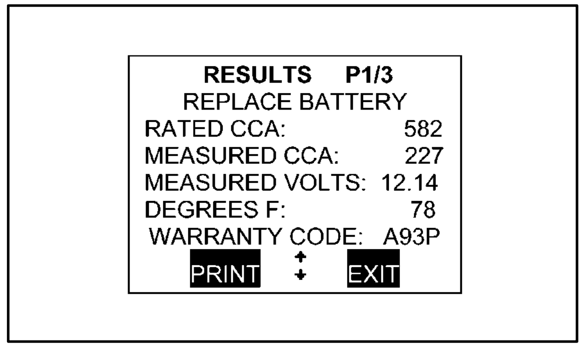


Battery Inspection Procedure (Continued)

12. The battery is now being tested. The progress bar fills in across the screen while testing.



13. Read or print the battery test results (press the **PRINT** soft key to print).



Battery Service Procedure

Once the test completes, proceed with 1 of the 5 procedures below according to the **BATTERY CONDITION** results.

1. **Battery Condition: "GOOD BATTERY"**

   Return the battery to service.

2. **Battery Condition: "GOOD–RECHARGE"**

   Fully charge the battery and return it to service.

3. **Battery Condition: "CHARGE & RETEST"**

   Fully charge the battery and retest.

> **NOTE:**
> **Failure to fully charge the battery before retesting may cause false readings.**

4. **Battery Condition: "REPLACE BATTERY"**

   Replace the Battery.

> **NOTE:**
> **A REPLACE BATTERY result may also mean a poor connection between the battery cables and the battery. Retest the battery using the out–of–vehicle test before replacing it.**

Battery Service Procedure (Continued)

5. **Battery Condition: “BAD CELL–REPLACE”**

   Replace the battery. The decision indicates a bad cell within the battery.

> **CAUTION:**
>
> **If “FROZEN BATTERY” is displayed as the test result, allow the battery to reach a temperature of 40°F (4°C) before retesting.**
> ***NEVER CHARGE A FROZEN BATTERY. GASES MAY FORM, CRACKING THE CASE AND CAUSING BATTERY ACID TO LEAK.***

Battery Replacement

If a vehicle battery needs to be replaced for a warrantable condition, complete a Warranty Battery Label and affix it to the failed battery for proper warranty parts and claim processing. **Include the Vehicle Identification Number (VIN) and warranty code on the Warranty Battery Label.**

WARRANTY BATTERY LABEL
ETIQUETA PARA BATERIA DE GARANTIA
(Please Print / Llénese con Letra de Molde Por Favor)

Dealer Code
Código de Agencia

Vehicle Identification Number (VIN)
Número de Identificación de Vehículo (NIV)

Repair Order No. / No. de Orden de Reparación	Repair Date / Fecha de Reparación	Failure Code / Código de Falla
Veh. Date of First Use / Fecha de Primer Uso del Veh.	Original Install Date / Fecha de Instalación Original (Svc. part replacement only/ solamente para el reemplazo de partes de servicio)	Battery Mos. In Svc. / Número de meses que Batería está en servicio

08/02 00404–BTTRY–LABEL

Battery Maintenance

Recommended Battery Maintenance:

In addition to this new pre–delivery battery test, a monthly battery inspection is still required for stored vehicles. If your dealership is located in an area subject to extreme temperatures (hot or cold), periodic maintenance may need to be performed more frequently.

To reduce parasitic battery drain on vehicles in storage for one week or more, the negative (–) battery cable should always be disconnected to reduce battery discharge. When the negative (–) battery cable is reconnected, please check and reset electrical components, and re–initialize electronic systems as necessary.

Technical Service Information Bulletin

January 18, 2002

Title:
REPLACEMENT CERTIFICATION LABELS

Models:
All Models

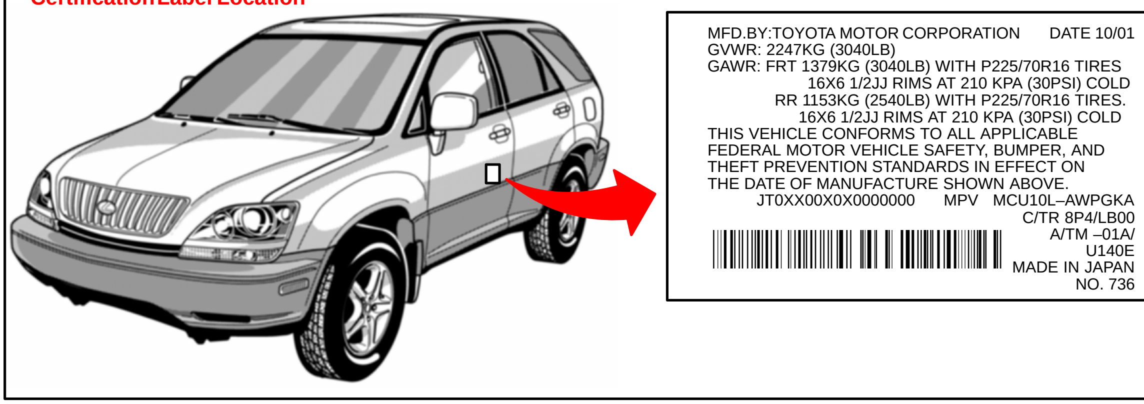
TSB UPDATE NOTICE:

The information contained in this TSIB updates PG015–01 dated May 4, 2001. Revised text is red and underlined. The changes will take place February 1, 2002.

Introduction

Replacement Certification Labels (vinyl label affixed to driver's door or door post) **may be** available from Lexus providing the request meets one of the criteria listed below.

Certification Label Location



Applicable Vehicles

- All Lexus vehicles.

Certification Label Criteria

1. The vehicle is in an accident and the label is damaged or is attached to a part that will be replaced during the repair.

NOTE:
- **Processing a new label *will be delayed significantly if the original certification label is not available.***
- **A replacement label MAY NOT be available if the vehicle is more than 5 years old and the old label does not accompany this request.**

2. The label is stolen.

Procurement Procedure

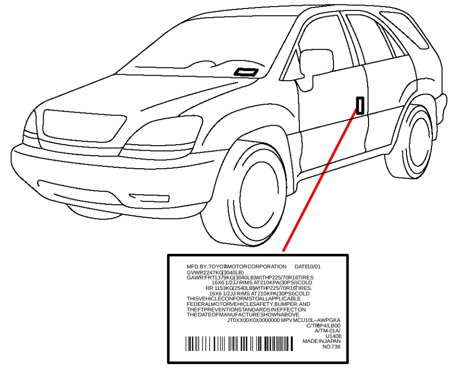
To request a replacement label, complete a copy of the form on the back of this bulletin. Your dealer parts account will be billed $25.00 for each replacement of a damaged or stolen label.

NOTE:
All replacement labels for damaged and/or stolen vehicles are subject to approval by the Technical Compliance Department. If you have any specific questions, contact (310) 468–3390.

Warranty Information

OP CODE	DESCRIPTION	TIME	OPN	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

APPLICATION FOR REPLACEMENT CERTIFICATION LABEL



REASON FOR REPLACEMENT

☐ ACCIDENT DAMAGE

☐ STOLEN

☐ OTHER ____

REASON/EXPLANATION

PLEASE PROVIDE CORRECT VIN _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

ATTACH ORIGINAL LABEL HERE

NOTE:
Original label MUST accompany this application or order will be significantly delayed.

DEALER INFORMATION

DEALER CODE: ☐☐☐☐☐

DEALER NAME: ____

ADDRESS: ____

STREET ADDRESS

____

CITY, STATE, ZIP CODE

TELEPHONE: (   ) ____

AREA CODE, TELEPHONE NUMBER

CONTACT: ____

FIRST NAME, LAST NAME

MAIL (*DO NOT FAX*) THE COMPLETED REQUEST FORM WITH THE OLD LABEL TO:

TOYOTA MOTOR SALES, U.S.A. INC.
TECHNICAL COMPLIANCE DEPARTMENT, S207
19001 S. WESTERN AVENUE
TORRANCE, CA 90509–2991

Technical Service Information Bulletin

January 18, 2002

Title:
REPLACEMENT VIN PLATES

Models:
All Models

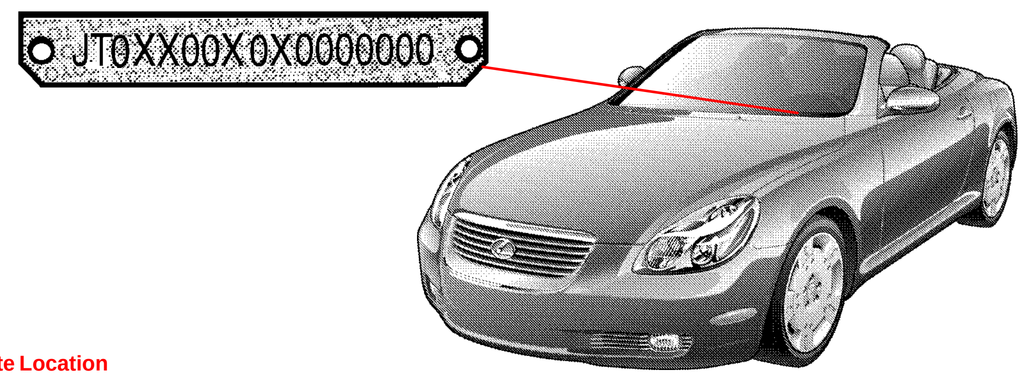
TSIB

TSB UPDATE NOTICE:

The information contained in this TSIB updates PG016–01 dated May 4, 2001. Revised text is red and underlined. The changes will take place February 1, 2002.

Introduction

Replacement **VIN** plates (metal plates riveted to dashboard) **may be** available from Lexus providing the request meets the criteria listed below.



VIN Plate Location

Applicable Vehicles

- All Lexus vehicles.

Replacement VIN Plate Criteria

- The vehicle is in an accident and the plate is damaged.

NOTE:

The original plate to be replaced MUST accompany the request.

NOTE:

If a plate is stolen, be sure to contact the State Police or your State's Department of Motor Vehicles (DMV). In most cases the State DMV will issue a unique number so that the original number can be included on stolen vehicle listings. If this is the case, a replacement plate is NOT available from Lexus. However, the original VIN, NOT the state issued VIN, must be used on all warranty claims.

Procurement Procedure

To request a replacement plate, complete a copy of the form on the back of this page. Note that the damaged VIN plate **MUST** accompany the request form. Your dealer parts account will be billed $25.00 for each replacement of a damaged plate.

NOTE:

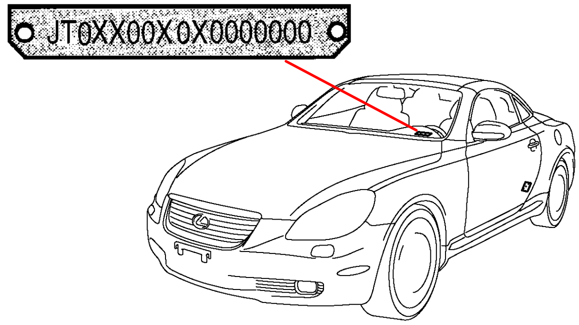
All replacement plates for damaged and/or stolen vehicles are subject to approval by the Technical Compliance Department. If you have any specific questions, contact (310) 468–3390.

Warranty Information

OP CODE	DESCRIPTION	TIME	OPN	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Lexus Supports ASE Certification

APPLICATION FOR REPLACEMENT VIN PLATE



REASON FOR REPLACEMENT

☐ ACCIDENT DAMAGE

☐ OTHER ____

REASON/EXPLANATION

PLEASE PROVIDE CORRECT VIN _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

ATTACH DAMAGED PLATE HERE

DEALER INFORMATION

DEALER CODE: ☐☐☐☐☐

DEALER NAME: ____

ADDRESS: ____

STREET ADDRESS

____

CITY, STATE, ZIP CODE

TELEPHONE: (   ) ____

AREA CODE, TELEPHONE NUMBER

CONTACT: ____

FIRST NAME, LAST NAME

MAIL (*DO NOT FAX*) THE COMPLETED REQUEST FORM WITH THE OLD PLATE TO:

TOYOTA MOTOR SALES, U.S.A. INC.
TECHNICAL COMPLIANCE DEPARTMENT, S207
19001 S. WESTERN AVENUE
TORRANCE, CA. 90509–2991

Lexus

Technical Service Information Bulletin

September 26, 2003

Title:

WARRANTY PARTS MARKING PROCEDURE

Models:

All Models

TSIB

PG006–03

PRODUCT GENERAL INFORMATION

Introduction

Effective September 1, 2003, all warranty parts (as indicated on the next page) must be marked in the area or location of the failure. The technician should complete this procedure after the failed part has been removed from the vehicle and before the part is placed in the 10–bin storage. (Exchanged parts and remanufactured parts are not included in this procedure.)

Failed parts marking will be beneficial in detecting and resolving product and parts quality issues. This will also offer additional opportunities to make future enhancements to our parts and products.

Parts are subject to random inspection in the dealership by field representatives to ensure compliance with this new policy.

Failure to comply with this policy may result in a debit of the corresponding warranty claim(s).

Applicable Vehicles

- All models.

Parts Marking Procedure

All technicians must follow these procedures to ensure proper parts marking:

- Wipe the part clean (no excess fluid should be present).
- Indicate area of defect or failure by marking the specific part(s) with a water resistant permanent marker. Use a color that can be easily seen against the background of the part being marked. For dark surfaces the color yellow is highly recommended as well as the color black for light surfaces.
- Mark the area of failure or defect by drawing a circle, a square, pointing an arrow or adhering tape with an indication of the failed or defect location.
- Attach a completed Warranty Parts Tag (M/N 00404–PRETN–TAGS) to the marked part.

All other parts recovery/shipping policies and procedures apply.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Parts Marking Requirement

Dealers are requested to mark the location of the failure of all warranty parts that are listed below. ***This list is not inclusive.*** There may be other components that can be marked in the area of failure. All other parts that can be marked should be marked.

Parts Marking List

- assist grip assy
- audio (blemish)
- back door garnish
- bumper covers
- cargo cover (retractable)
- carpet
- clutch disc
- clutch flywheel
- combination meter glass
- console and components
- cowl assy
- cowl side trim sub–assy
- cupholders
- cylinder head cover sub–assy
- dash panel insulator assy
- dashboard and trim
- disc wheel
- display panels
- door handle assy
- door moulding
- door trim panel & molding
- emblems
- engine oil pan
- exhaust manifold
- floor and cargo mats
- gear shift knob
- grills
- headlamps
- headliner
- hoses
- instrument panel safety pad sub–assy
- Interior light assemblies and covers
- knobs, levers, handles
- l/pulley pump assy
- mirrors (side and rearview)
- navigation or VES screens
- pillar garnish
- rack and pinion/power steering gear assy
- radiator
- room partition board
- rotors (mark where min. runout is exceeded or warped)
- seat covers/cushions
- seat tracks
- soft trim
- spare tire cover
- steering column cover
- steering wheel
- tail lamps and covers
- transmission oil pan
- visor
- washer jar
- wheel cap
- wheels

Parts Marking List
(Continued)

NOTE:

The following parts do not have to be marked unless the technician can determine failure and location.

air induction/ejection systems
all computers
alternators
audio (internal)
batteries
bearings
belts
catalytic converter
crankshaft
cruise control
distributors
EGR systems
engine control systems
exchange parts
exhaust systems
fuel injection systems
fuel injectors
fuel pump
ignition system
internal engine components
internal transmission components
oil cooler
power door lock switches
remanufactured parts
starters
suspension components
valve covers
window regulators
wiper motors

OBSOLETE

PLEASE SEE PG001–06 (superceding TSIB)

LEXUS

Technical Service Information Bulletin

September 12, 2002

Title:
BATTERY MAINTENANCE FOR IN-STOCK VEHICLES & PRE-DELIVERY

Models:
All Models & Model Years Through Current

PG009-02

PRODUCT GENERAL INFORMATION

Introduction

A battery in a stored vehicle is subject to conditions that can reduce its performance and life. These conditions include storage period, temperature, parasitic drain, and battery load. Because of these factors, battery inspection and maintenance are required in order to ensure proper operation and optimal battery life.

As a matter of policy, Lexus does not provide battery warranty coverage for discharged and/or failed batteries due to lack of maintenance; it is the dealer's responsibility to maintain the specified state of charge of the vehicle's battery while in stock and assure proper state of charge at delivery.

To eliminate customer service concerns due to an undercharged battery during the first few weeks of ownership, **all dealers should check battery state of charge and recharge, if necessary, just prior to delivery** (i.e., within 48 hours of delivery).

This new procedure will improve the new vehicle ownership experience by greatly reducing the risk of having a low performance battery concern due to extended storage periods and/or short engine run times prior to the vehicle sale.

Applicable Vehicles

- **All models and model years through current.**

Required Tools & Material

SPECIAL SERVICE TOOLS (SSTs)	MANUFACTURER	PART NUMBER
MICROPRO 815 Digital Battery Analyzer (Essential SST)* 	Midtronics	00002–MP815–T

* This SST can be ordered through SPX/OTC by calling 1–800–933–8335.

NOTE:
MICROPRO 815 Digital Battery Analyzer should be periodically updated through the Technical Information System (TIS) for new vehicle models. For detailed information, please see TSIB SS002–02, "Midtronics Battery Tester Software Update."

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Recommended Equipment

TOOLS & EQUIPMENT	MANUFACTURER	PART NUMBER
Fast Battery Charger**	Associated	ASE6003
Fast Battery Charger**	Christie	CAPPDQ

** These tools can be ordered through the Lexus Approved Dealer Equipment program by calling 1–800–368–6787.

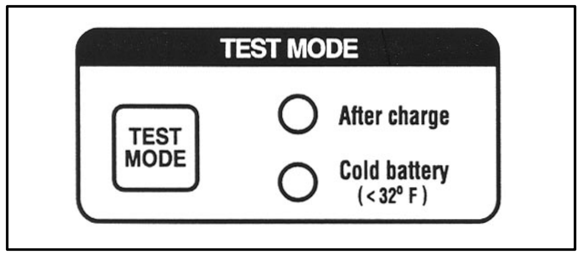
NOTE:
The "Fast Battery Chargers" listed above have been tested and approved by Lexus. These state–of–the–art "smart" chargers were designed to charge batteries at an accelerated rate, without the possibility of damage. Using non–microprocessor controlled battery chargers for fast charging purposes can damage the battery.

Inspection Procedure

All vehicles are to be inspected according to the procedures listed below using the MICROPRO 815 battery tester no more than 48 hours prior to customer vehicle delivery.

PRIOR TO TESTING:
If necessary, remove battery surface charge by turning on high beam headlights for 60 seconds, then let battery voltage recover for one minute.

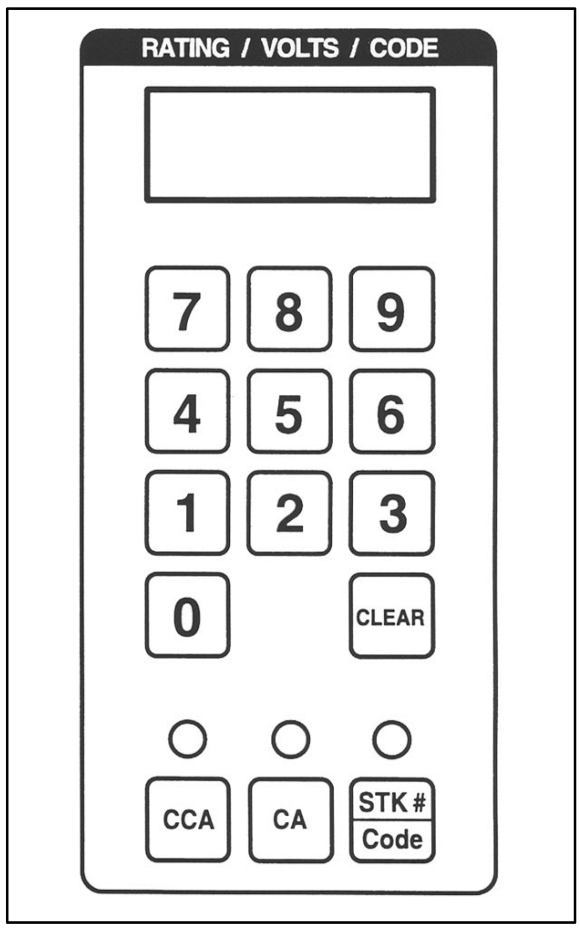
1. Connect test clamps to battery. (Display will show four zeros indicating a good connection).
2. For cold battery (<32°F) or after charge test, press TEST MODE key until appropriate test is selected.



3. Input battery stock number.

NOTE:
Stock number must be used for warranty cases because you cannot read the warranty code if CCA/CA rating is input.

4. Press STK#/Code key to start test.

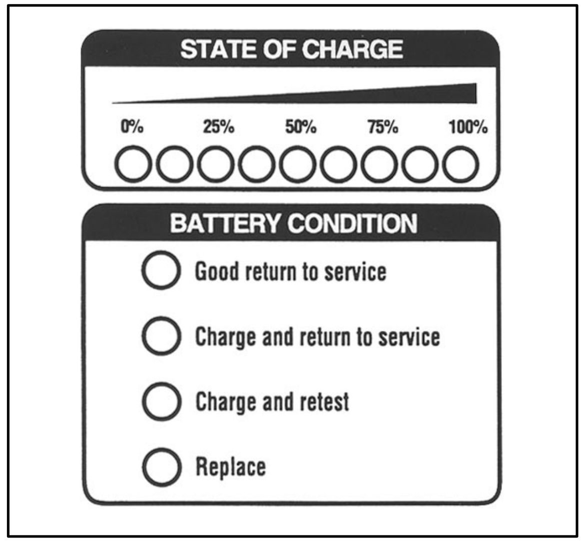


NOTE:
Stock numbers are listed on the reference card located in the tester's cover. Stock numbers can also be referenced on TIS. The TIS listings will always have up–to–date information.

Stock number location in TIS:
1. Go to TIS Home Page.
2. Click on "Diagnostics."
3. Click on "Midtronics Battery Tester Software."
4. Click on "Stock Number Chart."

Inspection Procedure
(Continued)

5. Read STATE OF CHARGE and BATTERY CONDITION.
   a. If battery is at 75% STATE OF CHARGE or greater, release vehicle to new owner.
   b. If battery is less than 75% STATE OF CHARGE proceed to Battery Service Procedure.



Battery Service Procedure

Follow the procedures below according to the BATTERY CONDITION results.

BATTERY CONDITION: “Good return to service” (less than 75% State of Charge)
Charge battery using one of the recommended chargers indicated above (or equivalent) following the Quick Charge instructions accompanying that machine.

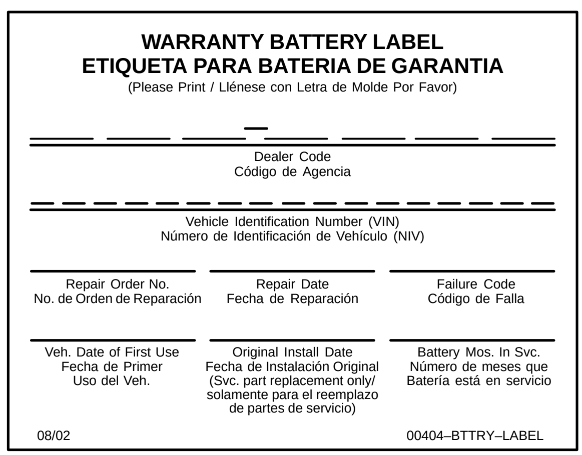
BATTERY CONDITION: “Charge and return to service”
Charge battery using one of the recommended chargers indicated above (or equivalent) following the Quick Charge instructions accompanying that machine.

BATTERY CONDITION: “Charge and retest”
The battery must be Quick Charged and retested using the **After charge** test mode. Carry out the service according to the result of the retest.

BATTERY CONDITION: “Replace”
The battery must be replaced. Press the STK#/CODE key to show the warranty code for the repair order and for the Warranty Battery Label.

Battery Replacement

If a vehicle battery needs to be replaced for a warrantable condition, make sure to complete a Warranty Battery Label and affix it to the failed battery for proper warranty parts and claim processing. **Please include the Vehicle Identification Number and warranty code on the Warranty Battery Label.**



WARRANTY BATTERY LABEL
ETIQUETA PARA BATERIA DE GARANTIA
(Please Print / Llénese con Letra de Molde Por Favor)

Dealer Code
Código de Agencia

Vehicle Identification Number (VIN)
Número de Identificación de Vehículo (NIV)

Repair Order No. / No. de Orden de Reparación	Repair Date / Fecha de Reparación	Failure Code / Código de Falla
Veh. Date of First Use / Fecha de Primer Uso del Veh.	Original Install Date / Fecha de Instalación Original (Svc. part replacement only/ solamente para el reemplazo de partes de servicio)	Battery Mos. In Svc. / Número de meses que Batería está en servicio

08/02 00404–BTTRY–LABEL

Recommended Battery Maintenance

In addition to this new pre–delivery battery test, a **monthly battery inspection** is still required for stored vehicles. If your dealership is located in an area subject to extreme temperatures (hot or cold), periodic maintenance may need to be performed more frequently.

To reduce parasitic battery drain for vehicles in storage for one week or more, the negative battery cable should always be disconnected to reduce battery discharge. When the negative battery cable is reconnected, please check and reset electrical components such as the clock, radio, etc.

NOTE:

For your reference, the electrical system is made inoperative by removing the appropriate fuse indicated in the Electrical Wiring Diagram.

Technical Service Information Bulletin

July 27, 2001

Title:

BACK DOOR ACCESS PRIOR TO PDS

Models:

’02 IS 300 Sport Cross

TSIB

PG020-01

PRODUCT GENERAL INFORMATION

Introduction

To prevent battery drain during shipping and storage of the 2002 model year IS 300 Sport Cross, the ECU–B1 fuse has been removed at the assembly plant. As a result of the removal of this fuse, the back door lock release actuator will be disabled. If it is necessary to open the back door before installation of this fuse, the following procedure should be used.

Applicable Vehicles

- **2002** model year **IS 300 Sport Cross** vehicles.

Opening Procedure

1. Turn the ignition switch to the “ON” position to activate the body ECU.
2. Push the “Unlock” side of the Power Door Lock Switch, so that the door lock motors activate.
3. Lift the exterior back door handle.

Warranty Information

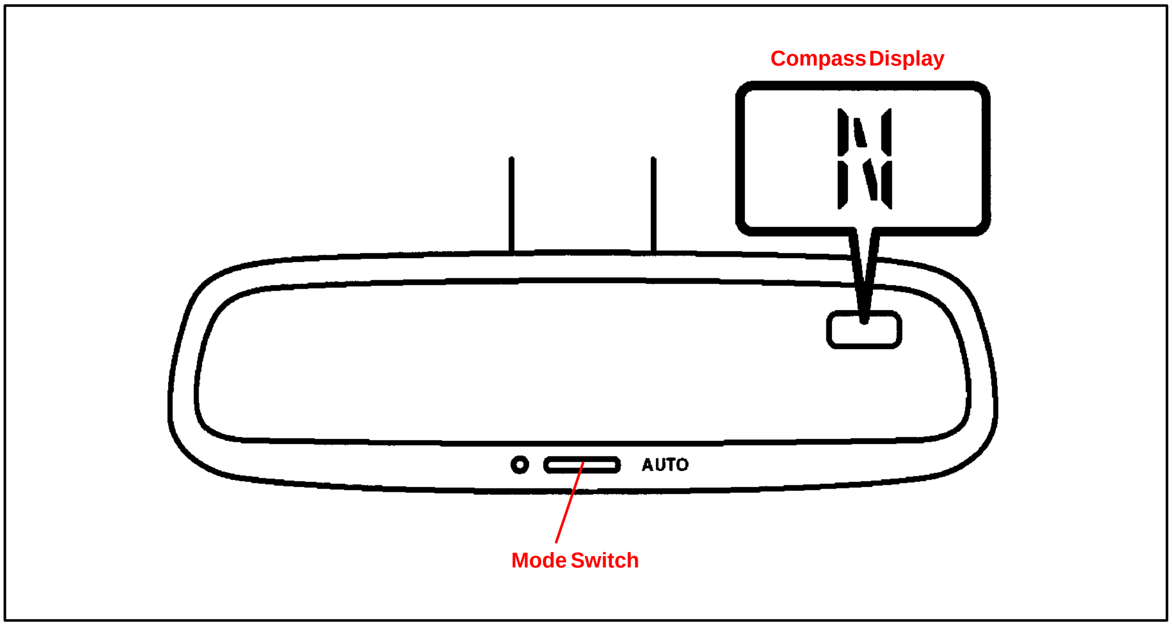
OP CODE	DESCRIPTION	TIME	OPN	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Title:
INITIAL CALIBRATION OF COMPASS DURING PDS

Models:
’02 IS 300

Introduction

The 2002 model year IS 300 is equipped with a compass in the rear view mirror. Use the following procedure to complete initial calibration of the compass during the ROAD TEST section of Pre–Delivery Service (PDS).



Applicable Vehicles

- **2002** model year **IS 300** vehicles.

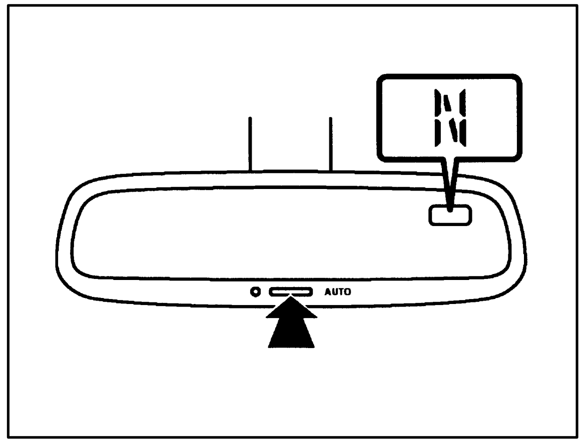
Warranty Information

OP CODE	DESCRIPTION	TIME	OPN	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

ROAD TEST Compass Calibration

1. Turn the ignition switch to the “ON” position and check that the Direction (N, NE, E, SE, S, SW, W or NW) or “C” appears on the compass display.

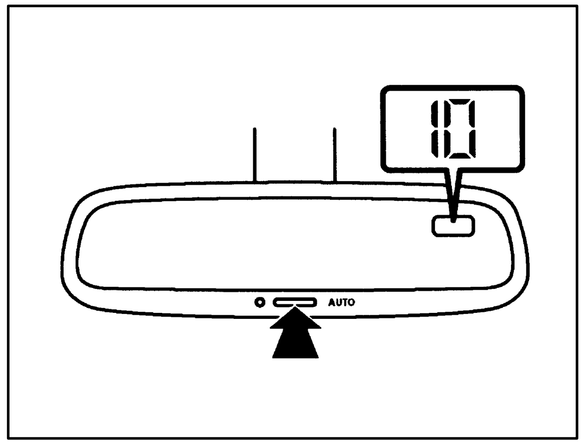
> **NOTE:**
> **Pushing the mode switch for longer than 3 seconds turns the compass display “ON” or “OFF.”**

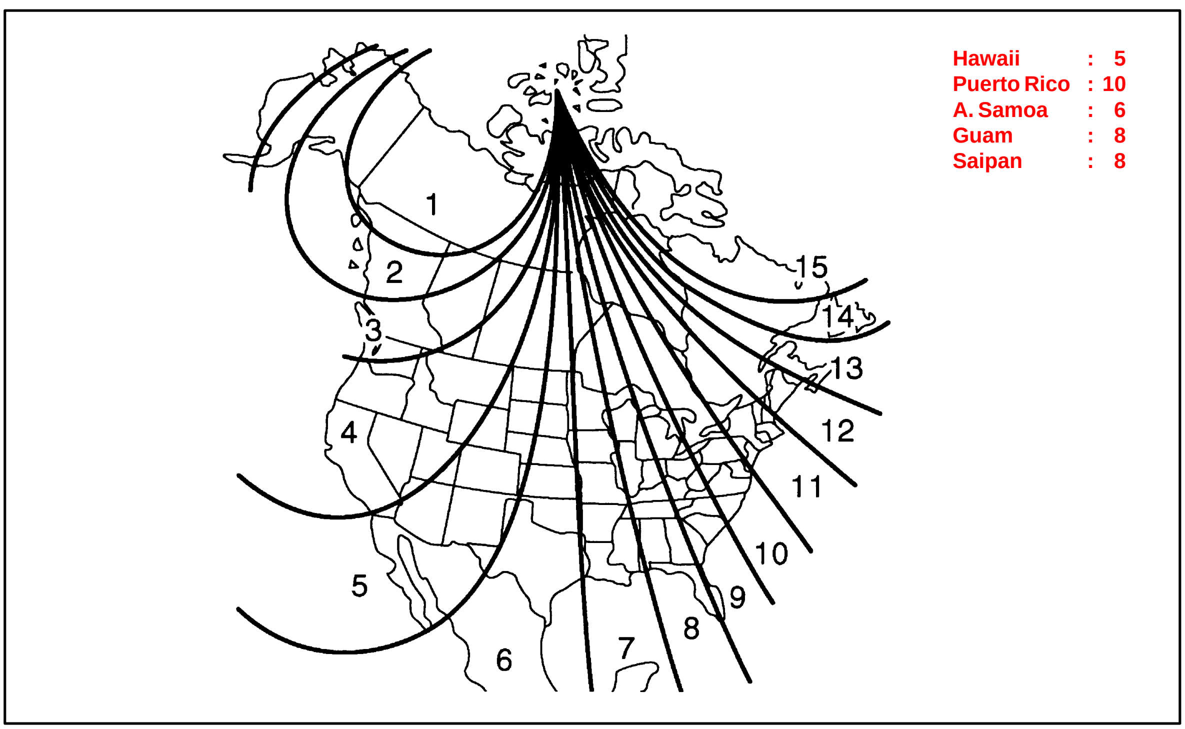


2. Push the mode switch for longer than 6 seconds until the zone number (1–15) appears on the display. Then push the switch to select the number of the zone where the vehicle is located.

   See the map below for zone reference.

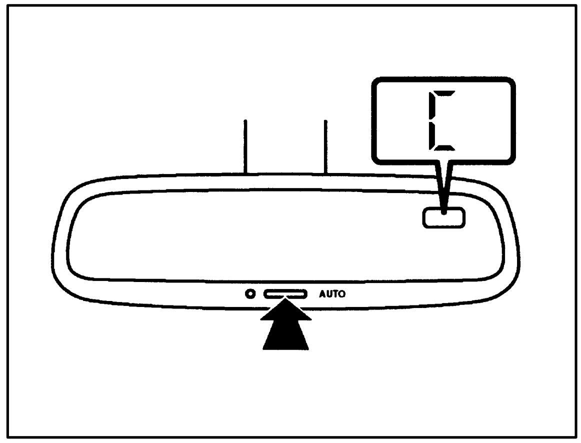
3. Check that the direction (N, NE, E, SE, S, SW, W or NW) or “C” appears several seconds after adjustment.



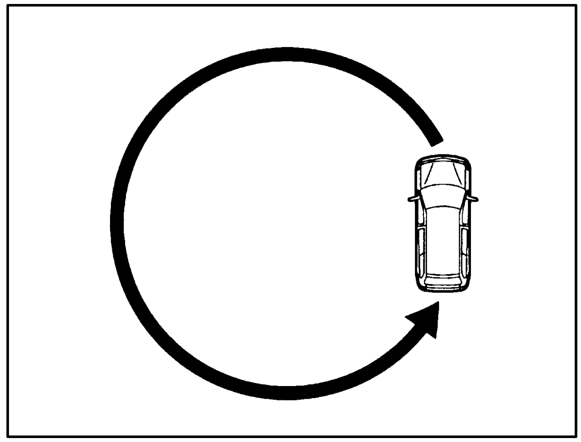


ROAD TEST
Compass Calibration
(Continued)

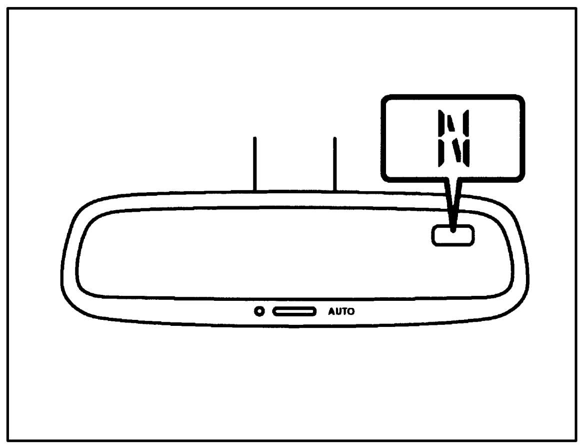
4. Start the engine and push the switch for longer than 9 seconds until "C" appears on the display.



5. Drive the vehicle at 5 mph, or less, in a circle until the direction is displayed. If there is not enough space to drive in a circle, drive around the block until the direction is displayed.



After performing the above steps calibration is complete.



NOTE:

- **Do not perform calibration of the compass in a place where the earth's magnetic field is subject to interference by artificial magnetic fields (underground parking, under a steel tower, between buildings, roof parking, near a railroad crossing, near a large vehicle, etc.).**
- **During calibration, do not operate electric systems (moon roof, power windows, etc.) as they may interfere with the calibration.**

LEXUS

Technical Service Information Bulletin

March 9, 2001

TSIB

Title:

ECU FLASH REPROGRAMMING PROCESS

Models:

Applicable Models

REVISED

SS001-01

SPECIAL SERVICE TOOLS

TSIB REVISION NOTICE:

- **September 22, 2003: 2003 (and later) models added; Operation Procedures updated for CAN Interface Module with the latest Diagnostic Tester software (v. 10.1a and 10.2a), Calibration Update Wizard (v. 6.0), and calibration files.**
- **The previous TSIB should be discarded.**

Introduction

Electronic Control Unit (ECU) is a Lexus term used to describe integrated computerized devices responsible for managing the operation of a system or sub–system. For the purposes of this bulletin, the term "ECU" is used as a generic label for the following SAE J1930 standard references:

- Powertrain Control Module (PCM)
- Engine Control Module (ECM)
- Transmission Control Module (TCM)
- or any other Lexus specific control unit

Flash reprogramming allows the ECU software to be updated for changes in vehicle calibrations without removing the ECU from the vehicle. Flash calibration updates for specific vehicle models/ECUs will be released as field fix procedures described in individual service bulletins. This bulletin details the ECU flash reprogramming process and the applications within the Technical Information System (TIS) and the Lexus Diagnostic Tester used for reprogramming.

Flash calibration updates can only be applied to the vehicle/ECU combination for which they are intended. ECUs have internal security that will not allow them to be programmed with another ECU's information.

Applicable Vehicles

- **2001** (and later) model year **GS 430/300, IS 300, LS 430 & LX 470** vehicles.
- **2002** (and later) model year **SC 430** vehicles.
- **All 2003** (and later) model year **Lexus** vehicles.

Parts Information

PREVIOUS PART NUMBER	CURRENT PART NUMBER	PART NAME
N/A	00451–00001–LBL	Authorized Modifications Label

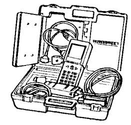
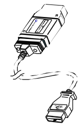
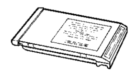
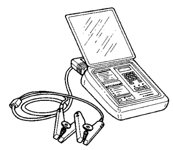
NOTE:

Authorized Modifications Labels may be ordered in packages of 25 from the Materials Distribution Center (MDC) through the TDN Dealer Support Materials System, or by calling the MDC at 1-800-622-2033.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Required SSTs

SPECIAL SERVICE TOOLS (SSTs)		PART NUMBER	QUANTITY
Lexus Diagnostic Tester Kit*		01001270	1
CAN Interface Module*		01002744	1
12 Megabyte Diagnostic Tester Program Card with version 10.2a Software (or later)*		01002593-005	1
Midtronics Battery Tester*		00002–MP815–L	1

* Essential SSTs.

NOTE:
Additional Diagnostic Tester Kits, CAN Interface Modules, Program Cards or SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

Process Overview

ECU Flash Reprogramming is a 4-step process:

1. **Locate the desired calibration file on TIS (Technical Information System).**
   Calibration files may be found in two areas:
   a. Search by model and year for a Technical Service Information Bulletin addressing a specific product issue.
   b. Search by model under the *ECU Flash Reprogramming* section.

2. **Download the calibration file from TIS to the Diagnostic Tester.**
   The Calibration Update Wizard (CUW) is an application on TIS which downloads calibration files from TIS to the Diagnostic Tester Program Card. This step is only required when the calibration file is not currently stored on the Diagnostic Tester Program Card.

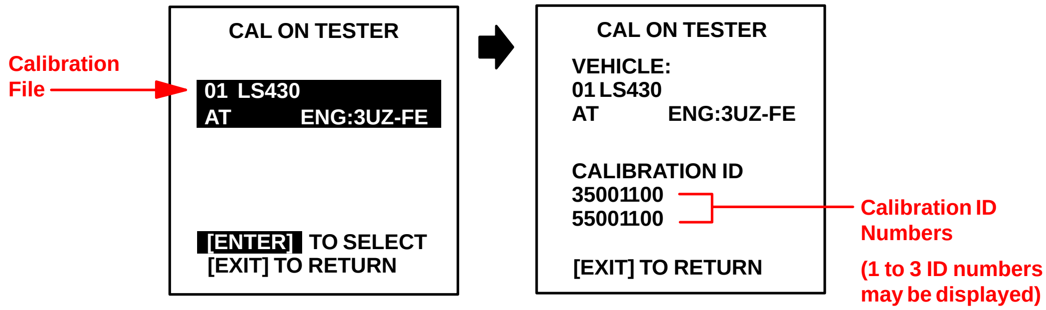
3. **Reprogram the vehicle ECU with the Diagnostic Tester.**
   Diagnostic Tester Software now incorporates a function to update a vehicle's ECU calibration through flash reprogramming.

4. **Confirm successful flash update and affix calibration update sticker.**
   Modifications to ECU calibration files must be recorded and properly displayed on the vehicle using the calibration update sticker.

Process Overview (Continued)

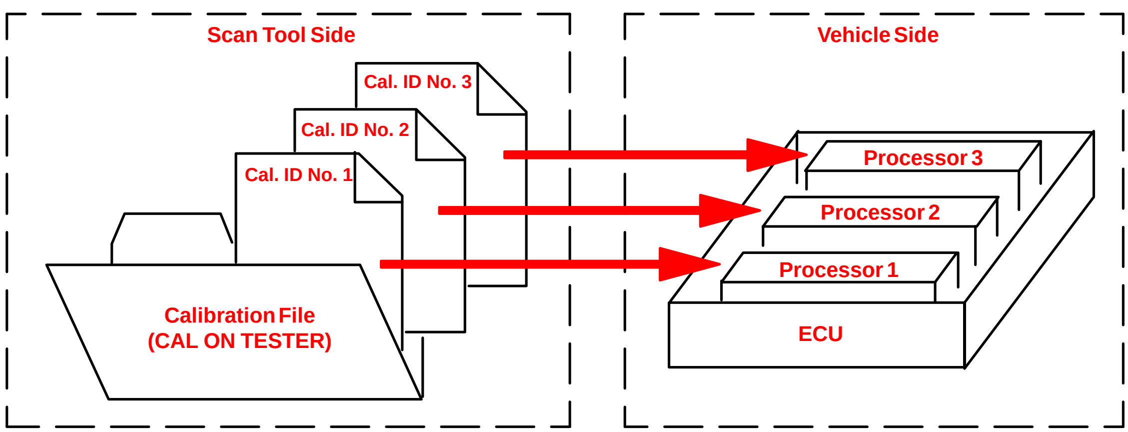
NOTE:
The calibration file contains the Calibration ID number(s) for a specific vehicle ECU (see Figure 1).

FIGURE 1. SAMPLE CALIBRATION FILE



NOTE:
The total number of Calibration ID numbers corresponds to the number of reprogrammable processors in the ECU (see Figure 2).

FIGURE 2. ECU FLASH REPROGRAMMING PROCESS



Operation Procedure

The following steps in this bulletin describe how to properly flash reprogram an ECU.

LOCATE CALIBRATION FILE

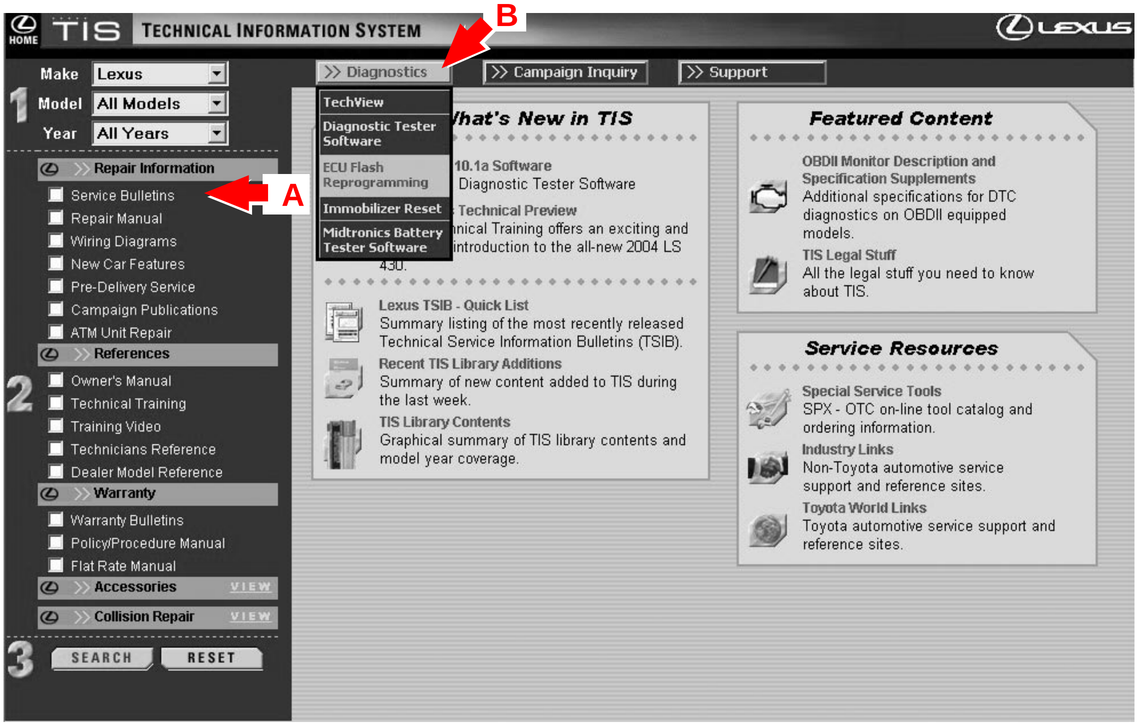
1. **Locate calibration file on TIS.**
   Calibration files may be found in two areas (see Figure 3):

   A. Search by model and year for a Technical Service Information Bulletin addressing a specific Product issue.
      - Within the TSIB, click on the link for the calibration file.

   B. Search by model under the *ECU Flash Reprogramming* Section.
      - Under the *ECU Flash Reprogramming* section on TIS, a drop–down list of the latest calibration files will be displayed.

   C. Proceed to step 2 for instructions on how to download the calibration file from TIS to the Diagnostic Tester Program Card.

FIGURE 3. LOCATING CALIBRATION FILE



Operation Procedure (Continued)

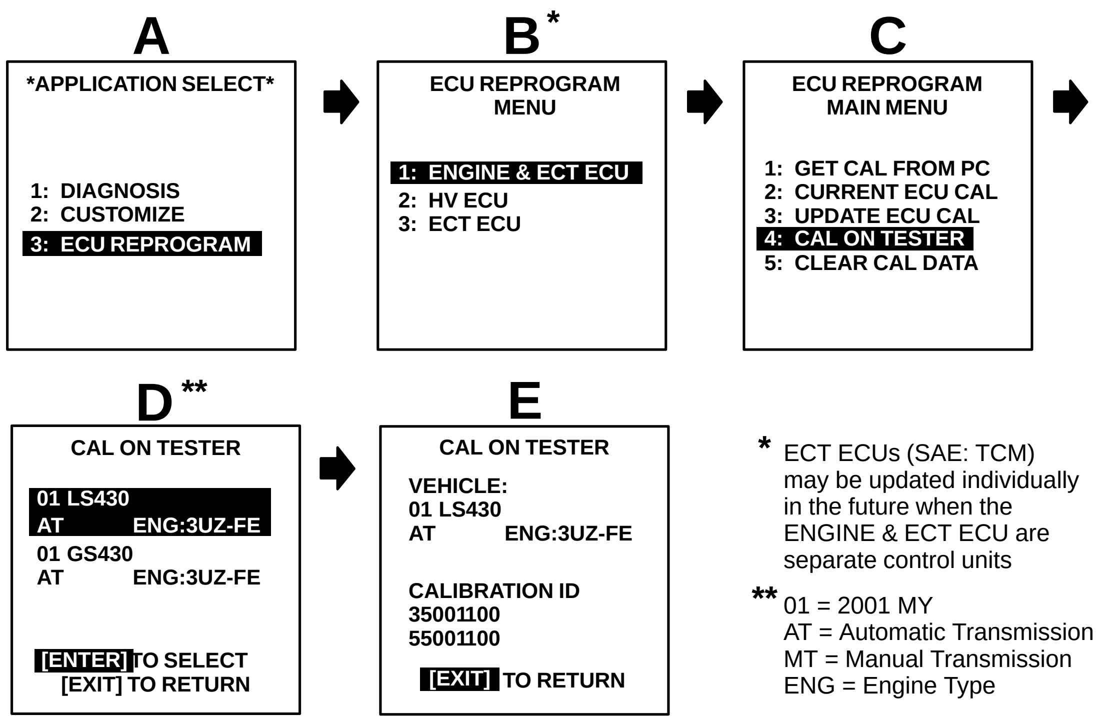
DOWNLOAD FILE TO TESTER

2. Download the calibration file to the Diagnostic Tester.
The Calibration Update Wizard (CUW) is an application on TIS which downloads calibration files from TIS onto the Diagnostic Tester Program Card.

> **NOTE:**
> **Before you begin, ensure that the Diagnostic Tester is equipped with software version 8.0a, or later. Only a 12 MB program card (P/N 01002593–005) may be used for this process.**

A. Before downloading a new calibration file from TIS, check the current calibration files stored on the Diagnostic Tester Program Card by following the screen flow below (Figure 4).

FIGURE 4. CHECKING CALIBRATION FILES ON DIAGNOSTIC TESTER PROGRAM CARD



* ECT ECUs (SAE: TCM) may be updated individually in the future when the ENGINE & ECT ECU are separate control units

** 01 = 2001 MY
AT = Automatic Transmission
MT = Manual Transmission
ENG = Engine Type

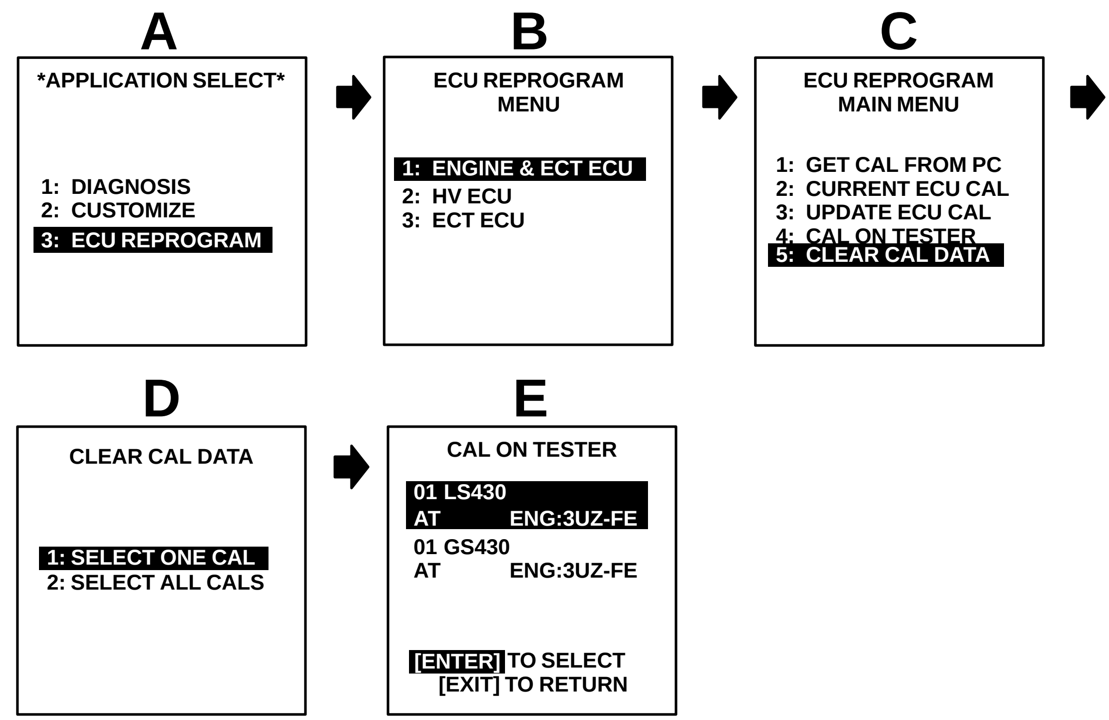
> **NOTE:**
> - **Screen D may be blank if no calibrations are stored on the Diagnostic Tester Program Card.**
> - **If the desired calibration file is already on the Diagnostic Tester, proceed to Step 3 (page 16 of this bulletin).**
> - **A maximum of <u>two</u> calibration files may be loaded on the tester at one time with Diagnostic Tester software version 10.2a and later. Prior versions may store up to four calibration files.**

Operation Procedure (Continued)

DOWNLOAD FILE TO TESTER

B. You have the option to delete calibrations off the tester before downloading a new calibration. The CUW also provides this option if there is not enough memory for the new calibration. To delete one or all of the calibrations, follow the screen flow below (Figure 5).

FIGURE 5. DELETING CALIBRATIONS FROM DIAGNOSTIC TESTER PROGRAM CARD

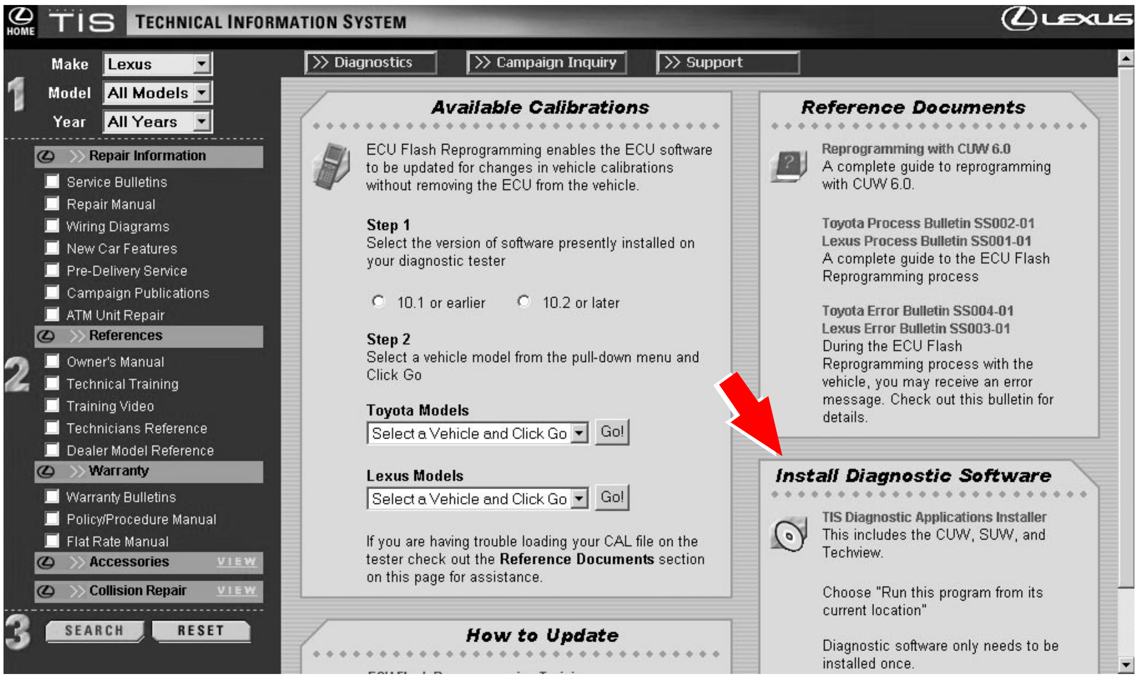


Operation Procedure (Continued)

DOWNLOAD FILE TO TESTER

C. If this is the first time you have downloaded a calibration file from TIS to the Diagnostic Tester Program Card, you MUST first install the latest version of the Calibration Update Wizard (CUW) onto your TIS workstation PC, as shown in Figure 6.
This step is also required if you are using a version of CUW earlier than version 6.0. CUW 6.0 is the only version compatible with Diagnostic Tester software version 10.2a and later. If necessary, select the link to the TIS Diagnostic Applications Installer and follow the on–screen prompts to install or reinstall CUW.

FIGURE 6. INSTALLING CALIBRATION UPDATE WIZARD (CUW)



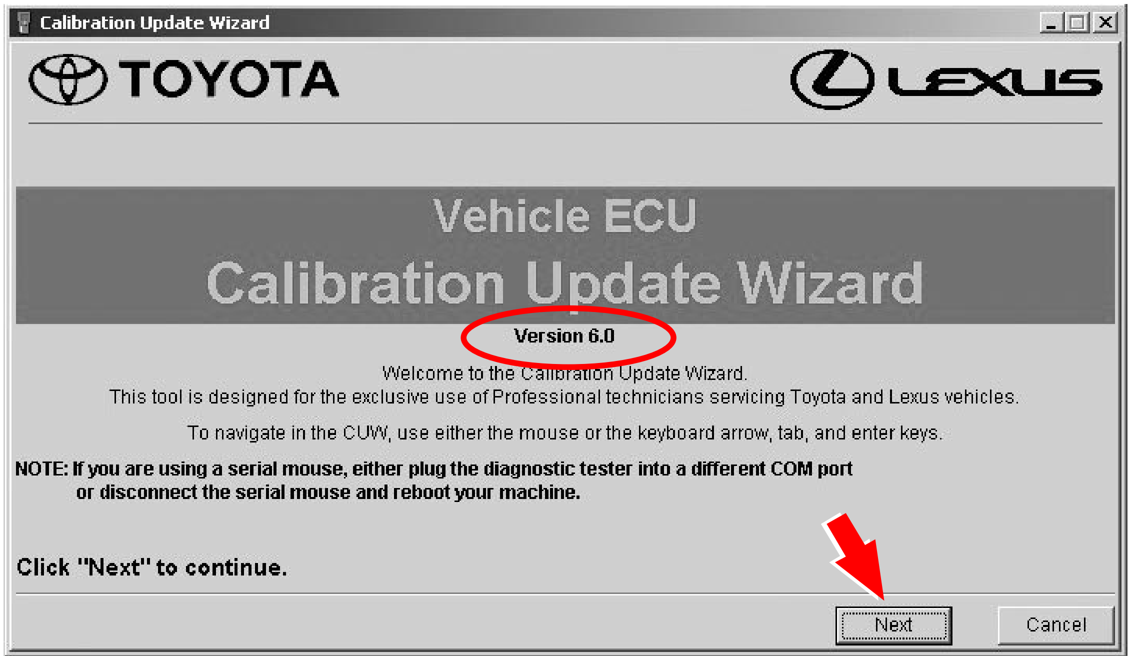
Operation Procedure
(Continued)

DOWNLOAD FILE TO TESTER

D. The Calibration Update Wizard (CUW) launches automatically when a calibration file link is selected (or clicked).
Verify that the CUW version is 6.0 or higher. If not, refer to the Note below.
The CUW will guide you through the steps to download the calibration file to the Diagnostic Tester Program Card. Click **NEXT** on the first screen (Figure 7).

NOTE:
If the CUW does not launch, or the version is older than 6.0, install Diagnostic Software *(TIS Diagnostic Applications Installer)*. Specific installation instructions *(Reprogramming with CUW 6.0)* are located under *Diagnostics* → *ECU Flash Reprogramming* (Figure 6).

FIGURE 7. LAUNCHING CALIBRATION UPDATE WIZARD

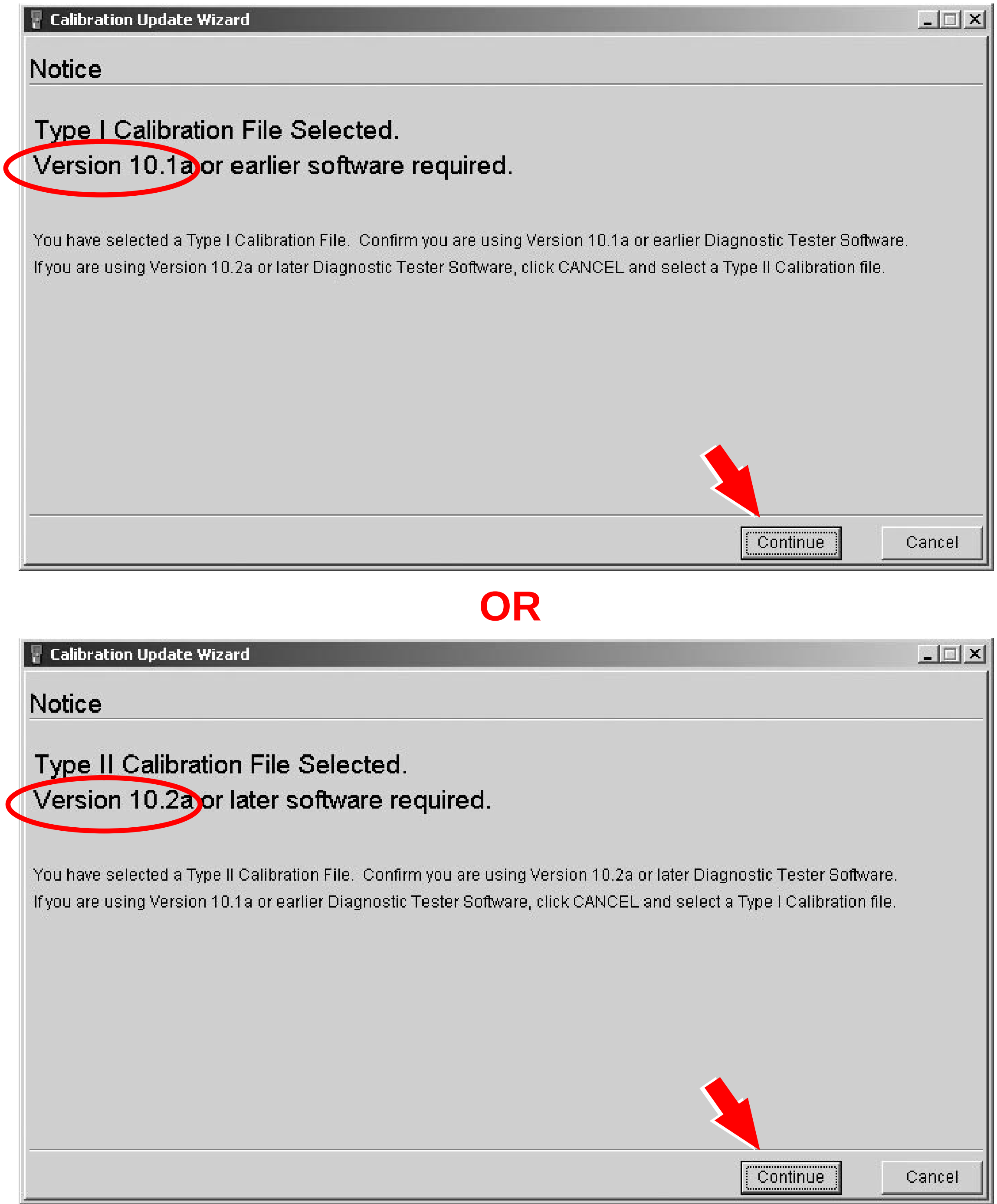


Operation Procedure (Continued)

DOWNLOAD FILE TO TESTER

E. Confirm the Diagnostic Tester has the appropriate software for the type of calibration file that was downloaded.

FIGURE 8. CONFIRMING CALIBRATION SOFTWARE VERSION



NOTE:

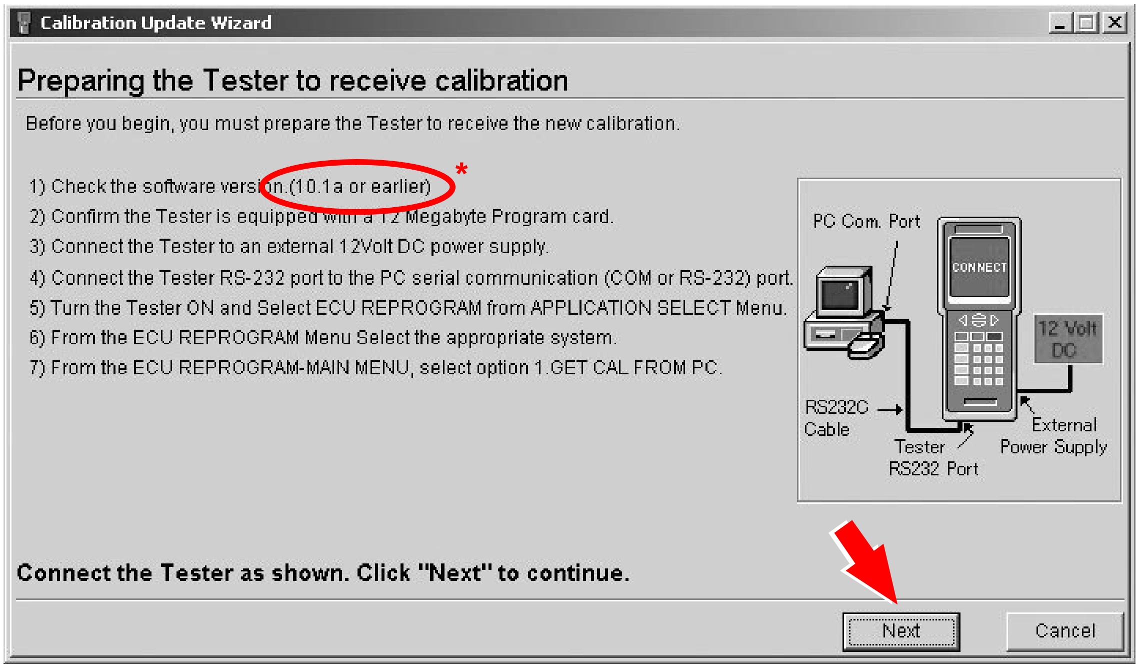
The calibration type is specific to the software version loaded on your Diagnostic Tester. If you selected the wrong version when downloading the calibration file, you will receive an error when attempting to install the file on the Diagnostic Tester.

Operation Procedure (Continued)

DOWNLOAD FILE TO TESTER

F. Confirm the Diagnostic Tester software version and connections to the TIS workstation are correct.

FIGURE 9. CONFIRMING DIAGNOSTIC TESTER CONNECTIONS



*** NOTE:**

This screen displays the required version of Diagnostic Tester software that is compatible with the selected calibration file, and the other required steps to properly connect the Diagnostic Tester to your PC.

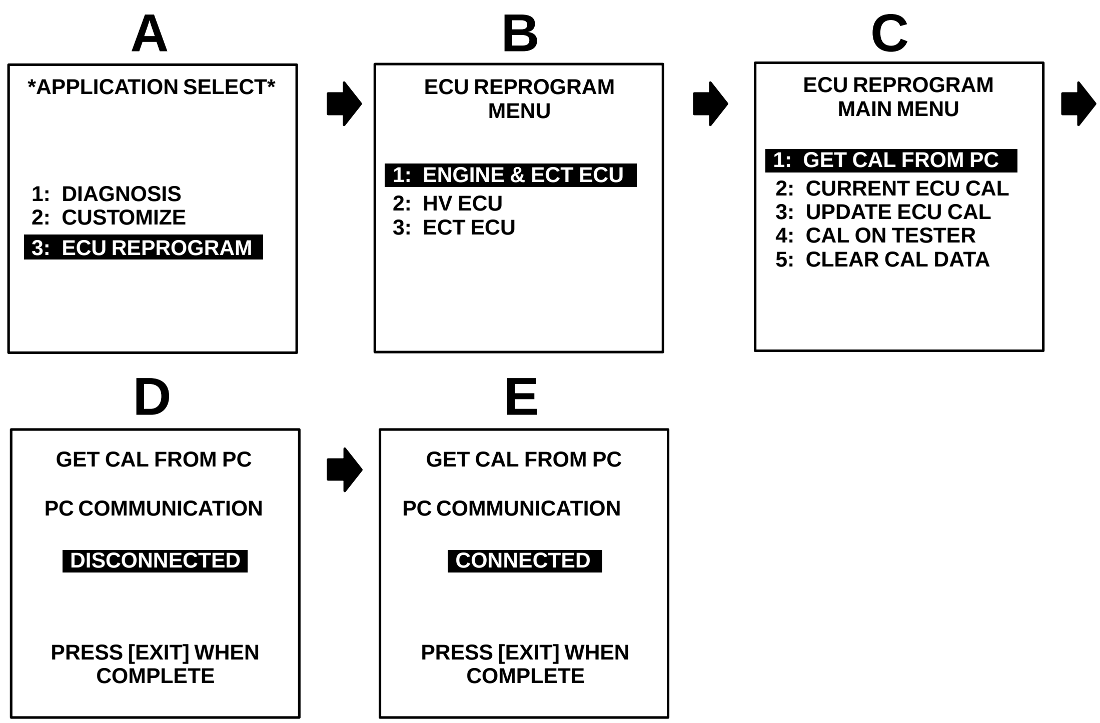
- **Type I calibration files are only compatible with software version 10.1a and older versions.**
- **Type II calibration files are only compatible with software version 10.2a and newer versions.**

Operation Procedure
(Continued)

DOWNLOAD FILE TO TESTER

G. Place the Diagnostic Tester in the "GET CAL FROM PC" mode to receive the calibration file (Figure 10).
Click **NEXT** on the TIS workstation. Once communications begin between the PC and the Diagnostic Tester, the Diagnostic Tester display will flash **CONNECTED**.

FIGURE 10. PLACING DIAGNOSTIC TESTER IN "GET CAL FROM PC" MODE



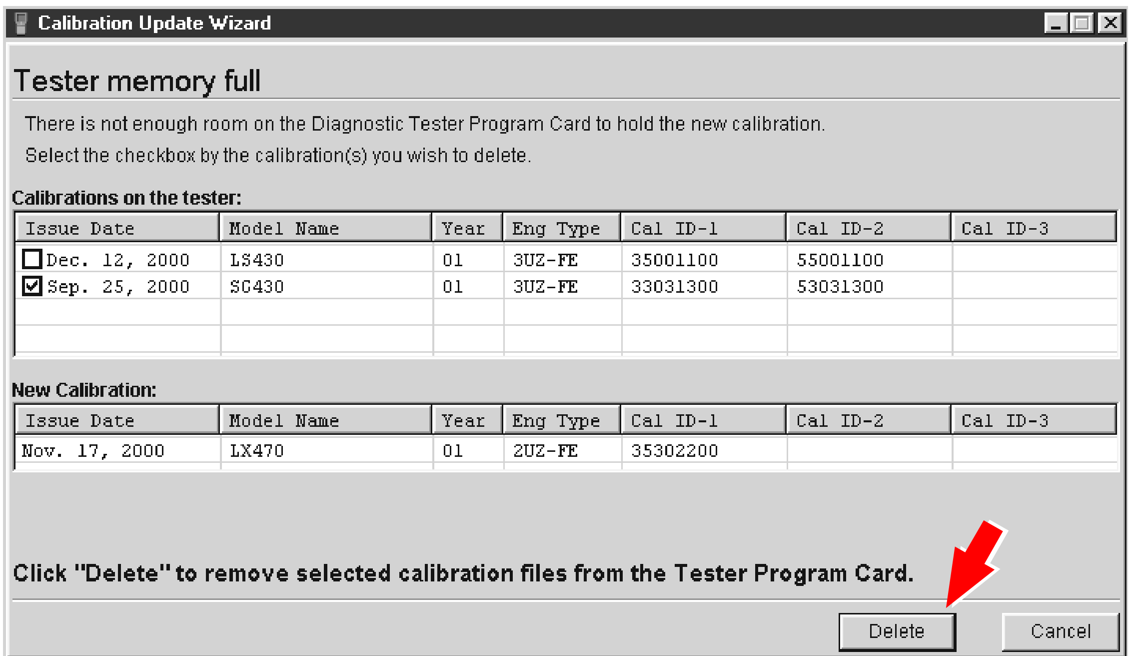
Operation Procedure (Continued)

DOWNLOAD FILE TO TESTER

H. The CUW determines if there is enough memory to store the calibration file on the Diagnostic Tester Program Card. If there is insufficient memory, the CUW will ask you to select the calibration file(s) to delete from the Diagnostic Tester Program Card to make room for the new calibration file.
If necessary, check the calibration file(s) to delete, as shown in Figure 11.
Click **DELETE**.

> **NOTE:**
> **If there is adequate memory to store the calibration file, skip to Step J, page 13.**

FIGURE 11. DELETING SELECTED CALIBRATION FILES

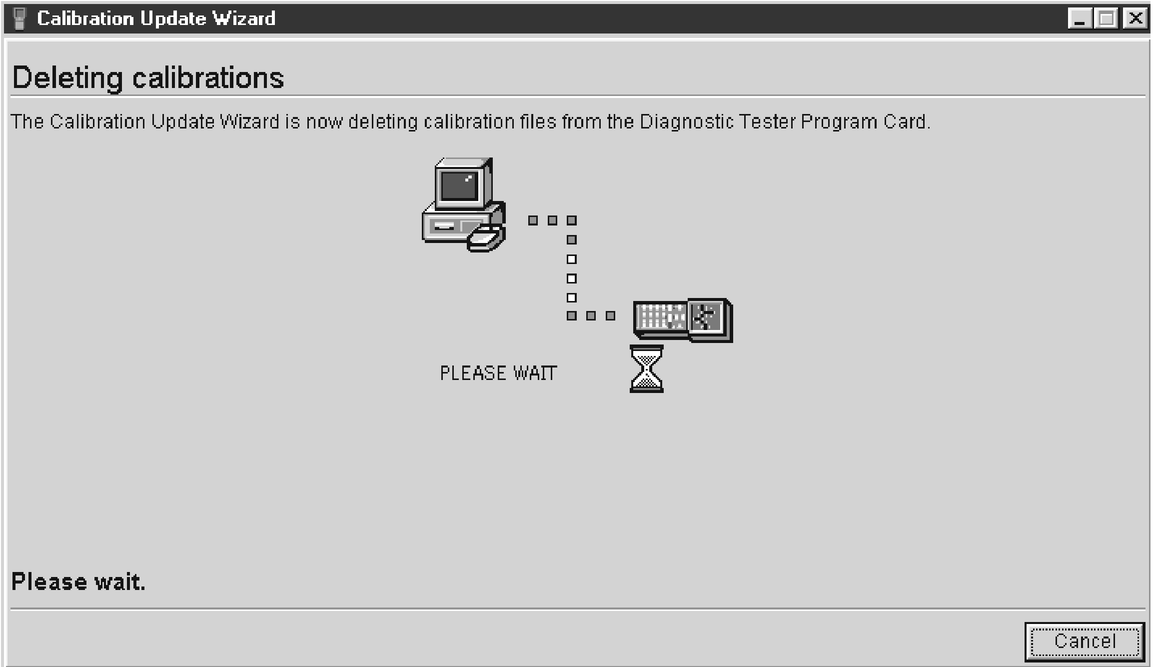


Operation Procedure (Continued)

DOWNLOAD FILE TO TESTER

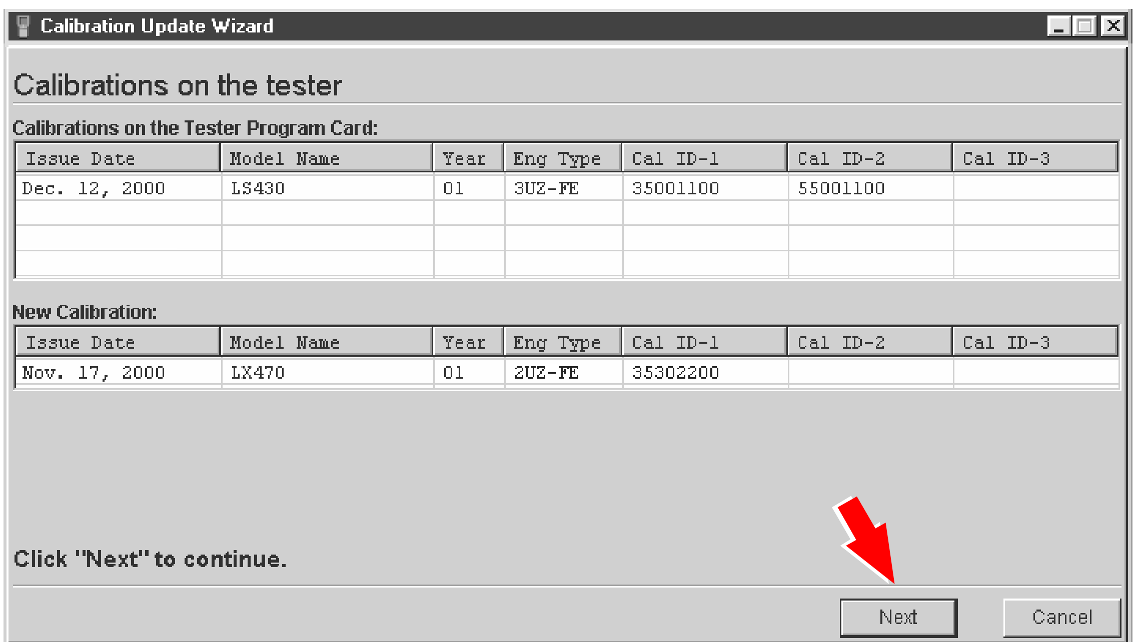
I. The CUW will now delete the calibration file(s) selected (see Figure 12).

FIGURE 12. DELETION OF CALIBRATION FILES IN PROCESS



J. The top half of the CUW screen displays the calibrations currently stored on the Diagnostic Tester Program Card. The bottom half of the screen displays the new calibration to be loaded onto the Diagnostic Tester Program Card (see Figure 13). Click **NEXT** to continue the process.

FIGURE 13. DISPLAY OF CALIBRATION FILES ON DIAGNOSTIC TESTER PROGRAM CARD

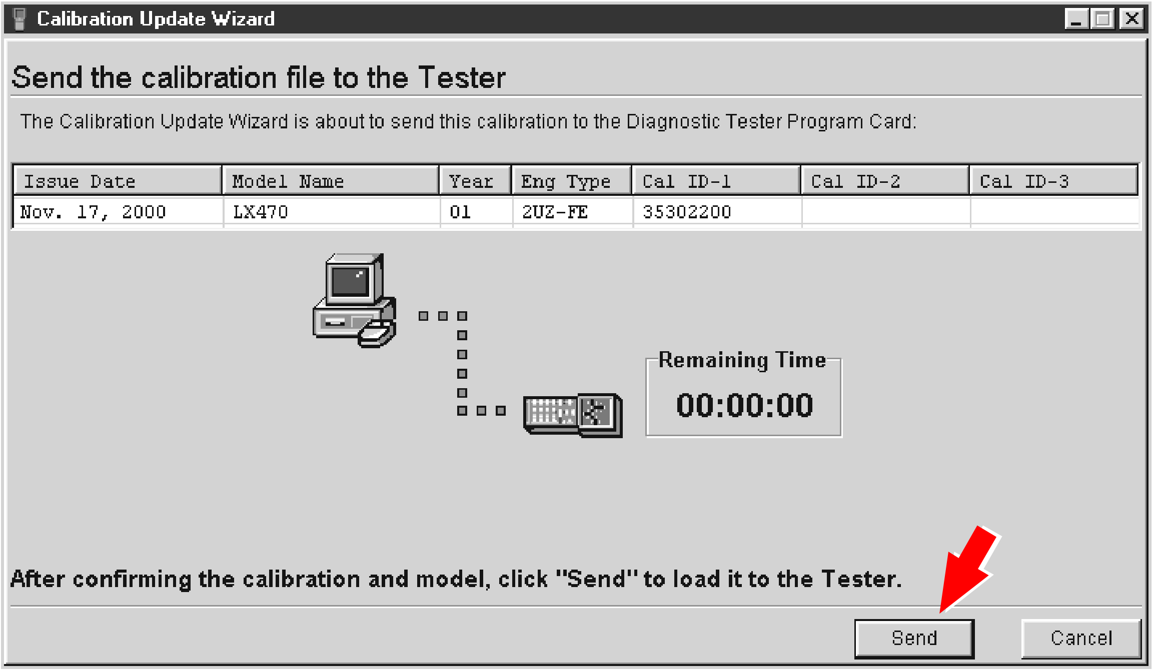


Operation Procedure (Continued)

DOWNLOAD FILE TO TESTER

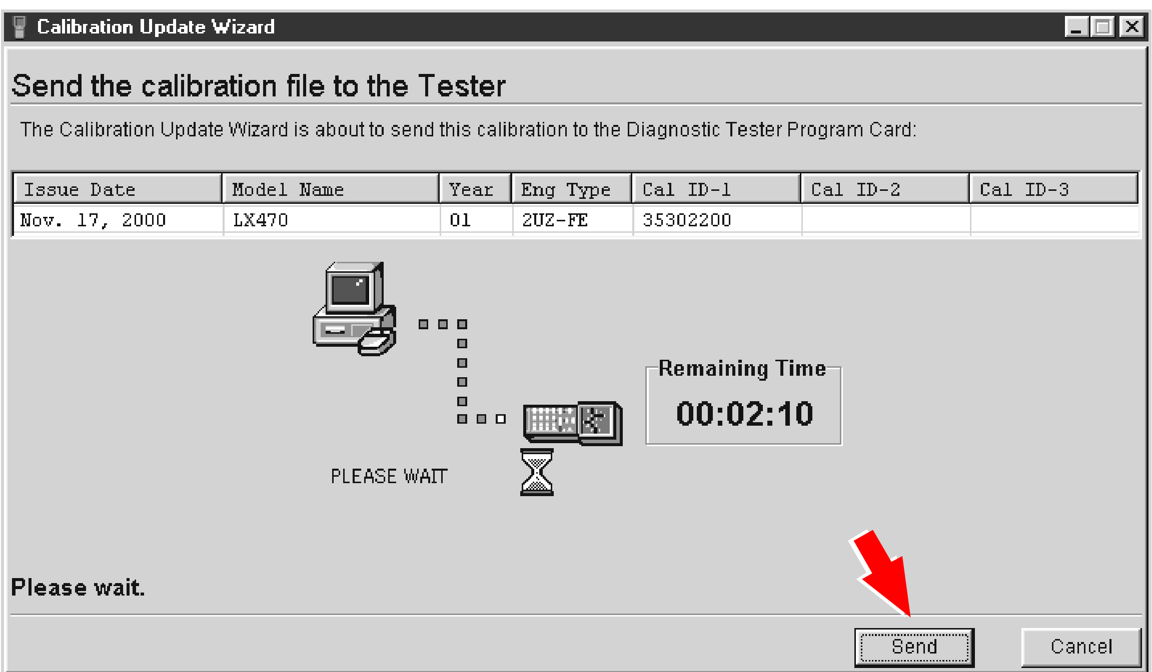
K. Confirm the calibration file to be sent to the Diagnostic Tester Program Card (Figure 14). Click **SEND**.

FIGURE 14. SENDING NEW CALIBRATION FILE TO DIAGNOSTIC TESTER PROGRAM CARD



L. The calibration file will now be downloaded to the Diagnostic Tester Program Card. This process takes approximately 2-6 minutes (see Figure 15).

FIGURE 15. DOWNLOADING OF CALIBRATION FILE IN PROCESS

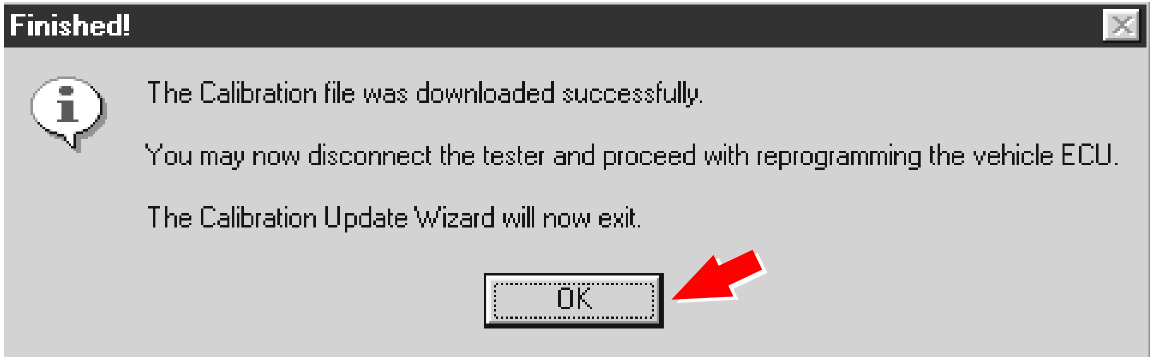


Operation Procedure
(Continued)

DOWNLOAD FILE TO TESTER

M. The CUW will prompt when the calibration file is completely downloaded. Click **OK** to close the CUW (Figure 16).

FIGURE 16. DOWNLOAD OF CALIBRATION FILE COMPLETED



NOTE:
With the calibration file loaded on the Diagnostic Tester Program Card, it is not necessary to repeat the above steps to reprogram a different vehicle needing the same calibration file. The steps above are only required when a new calibration file must be loaded onto the Diagnostic Tester Program Card.

The Diagnostic Tester now has the calibration file stored and you may proceed to the next step to reprogram the vehicle ECU.

Operation Procedure (Continued)

REPROGRAM ECU WITH TESTER

3. Reprogram the vehicle ECU with the Diagnostic Tester.

NOTICE:

Errors during the flash reprogramming process can permanently damage the vehicle ECU. Minimize the risks by following the steps below.

- **Battery voltage MUST NOT FALL BELOW 11.4 volts during reprogramming.**
- **Confirm battery voltage is higher than 11.4 volts, but be sure voltage DOES NOT RISE ABOVE 16.0 volts during reprogramming.**
- **Turn off all electrical accessories (e.g. Audio system, A/C, interior lights, DRL, etc.).**
- **Do not add to or significantly change the vehicle's electrical load while reprogramming.**
- **Confirm the hood is open and ensure under hood temperatures do not exceed 158°F.**
- **Confirm cable connections between the vehicle and Diagnostic Tester are secure. (Reference TSIB No. SS003–01, "ECU Flash Reprogramming Error Message.")**
- **Do not disconnect or turn off the Diagnostic Tester or the vehicle ignition during reprogramming.**
- **Set the parking brake.**
- **Complete ALL flash calibration updates provided for each ECU.**

If the battery's state of charge or capacity are in question, test with SST No. 00002–MP815–L, "Midtronics Battery Tester," and follow TSIB No. PG009–02, "Battery Maintenance for In–Stock Vehicles & Pre–Delivery."

To ensure stable battery voltage, a battery charger may be connected during reprogramming if:

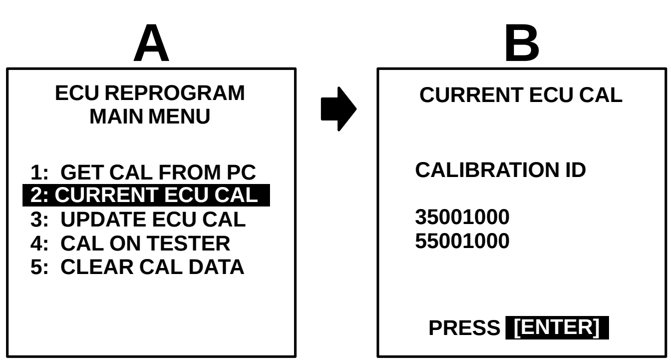
- **Voltage does not fall below 11.4 volts.**
- **Voltage does not rise above 16.0 volts.**
- **Setting is on SLOW charge and not BOOST.**

A. Connect the Diagnostic Tester to the vehicle and select *CURRENT ECU CAL* from the *ECU REPROGRAM MAIN MENU*. Determine the vehicle's current ECU calibration. (See Figure 17.)

NOTE:

The vehicle may contain up to 3 separate calibration ID numbers. In the example shown below, the vehicle ECU contains only 2 calibration IDs.

FIGURE 17. DETERMINING CURRENT ECU CALIBRATION

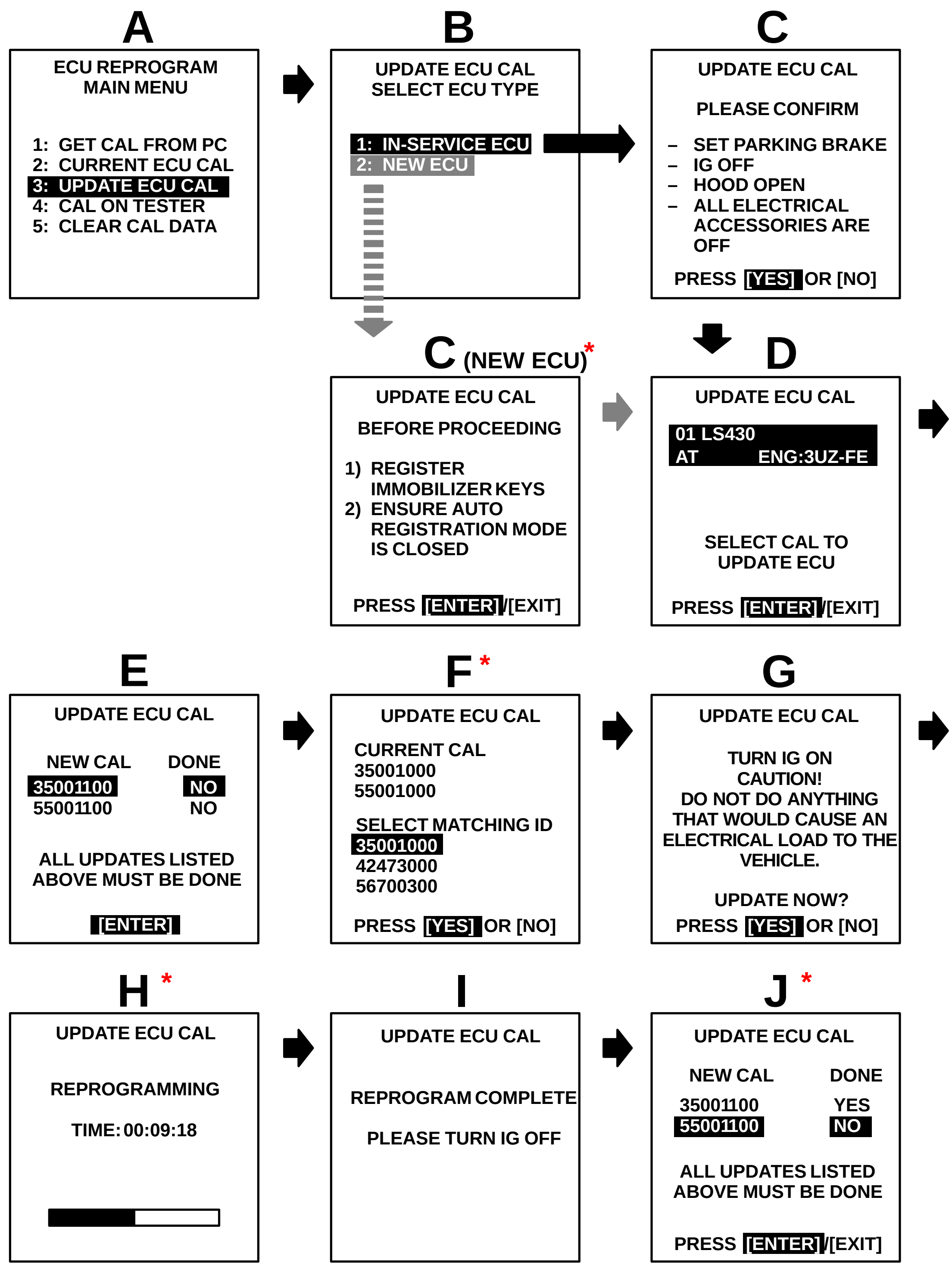


Operation Procedure (Continued)

REPROGRAM ECU WITH TESTER

B. Continue to update the ECU calibration file following the screen flow below (Figure 18). Details for selected screens are shown in Figure 19.

FIGURE 18. ECU REPROGRAMMING OVERVIEW



*** See Figure 19 for more detail on these steps.**

NOTE: In step B above a "NEW ECU" is defined as a unit installed from parts inventory that has not been previously installed into a vehicle and the Immobilizer Registration function has not been completed.

Operation Procedure (Continued)

REPROGRAM ECU WITH TESTER

NOTE:

- **Each flash calibration update will take approximately 15 to 45 minutes.**
- **Screens E through J (Figure 18) will need to be repeated for each flash calibration update (calibration ID number).**
- **All updates must display "YES" to complete the entire calibration file update for the vehicle ECU.**
- **Failure to complete all updates may result in PERMANENT ECU DAMAGE!**

FIGURE 19. ECU REPROGRAMMING DETAIL

C (NEW ECU)

UPDATE ECU CAL

BEFORE PROCEEDING

1) REGISTER IMMOBILIZER KEYS
2) ENSURE AUTO REGISTRATION MODE IS CLOSED

PRESS [ENTER]/[EXIT]

This screen is only displayed if attempting to reprogram a new ECU that has not yet had the Immobilizer registered. REPROGRAMMING WILL NOT BEGIN IF THE IMMOBILIZER KEYS ARE NOT REGISTERED FIRST.

- Refer to TSIB No. SS006–99, "*Scantool Immobilizer Key Code Utility,*" for instructions on immobilizer key registration.
- Refer to Repair Manual procedure "Engine Immobilizer System Registration" for vehicles with separate Transponder and Engine ECUs.

F

UPDATE ECU CAL

CURRENT CAL
35001000
55001000

SELECT MATCHING ID
35001000
42473000
56700300

PRESS [YES] OR [NO]

This screen displays the current ECU calibration. Scroll through the list of matching ID numbers and select a number that matches the current ECU calibration. Press ENTER.

H

UPDATE ECU CAL

REPROGRAMMING

TIME: 00:09:18

It may take up to 2 minutes for the progress bar to begin moving.

J

UPDATE ECU CAL

NEW CAL	**DONE**
35001100	**YES**
55001100	**NO**

ALL UPDATES LISTED ABOVE MUST BE DONE

PRESS [ENTER]/[EXIT]

Flash Calibration Update Completed = "YES"
Flash Calibration Update NOT Completed = "NO"
(1 to 3 updates may be displayed)

- Scroll down to the update displaying "NO" and press "ENTER" to begin the second flash sequence (see Steps E through J in Figure 18).
- If all updates display "YES", press "EXIT" to complete the reprogramming process.

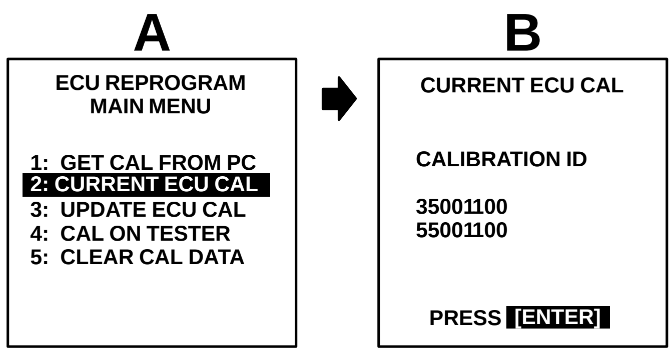
Operation Procedure (Continued)

CONFIRM UPDATE

4. Confirm successful flash calibration update and affix calibration update sticker.
Follow these steps to confirm the calibration was reprogrammed to the ECU.

A. The new calibration file should be displayed as the current ECU calibration file.

FIGURE 20. CONFIRMATION OF ECU REPROGRAMMING



B. Using a permanent marker or ball point pen, enter the required information on the Authorized Modifications Label (Figures 21 and 22).

FIGURE 21. AUTHORIZED MODIFICATIONS LABEL

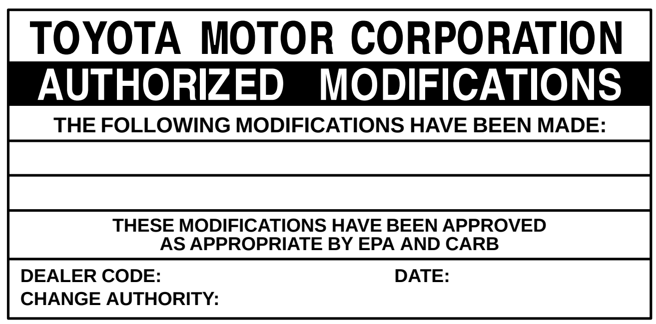
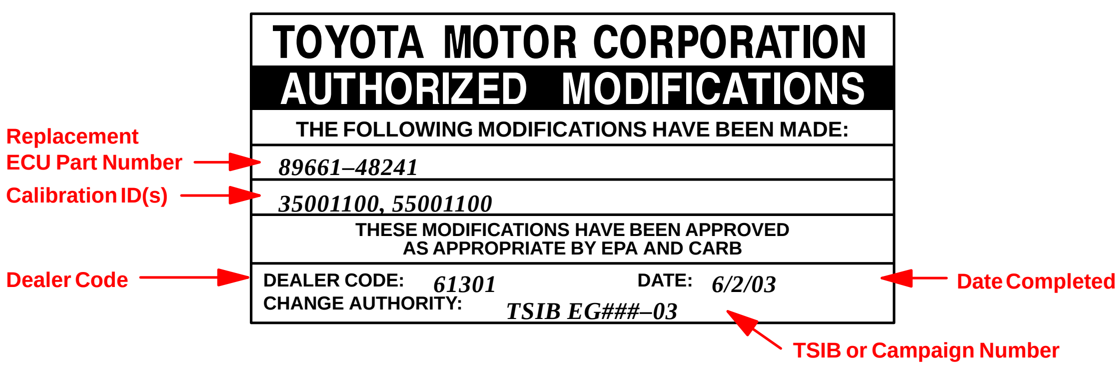


FIGURE 22. SAMPLE OF COMPLETED AUTHORIZED MODIFICATIONS LABEL



C. Affix this label under the hood in the location determined by the specific vehicle TSIB or Campaign.

> **NOTE:**
> **Wait 60–90 seconds for ink to set before handling.**

Technical Service Information Bulletin

September 8, 2003

Title:

DIAGNOSTIC TESTER CONTROLLER AREA NETWORK (CAN) INTERFACE MODULE

Models:

All Models

TSIB

SS001-03

SPECIAL SERVICE TOOLS

Introduction

Over the next three model years, all Lexus vehicles will begin using an all–new diagnostic communication protocol, Controller Area Network (CAN). CAN will be introduced on the 2004 LS 430 this fall. A CAN Interface Module has been distributed to all dealers as an essential Special Service Tool (SST) and will allow the Diagnostic Tester to communicate with CAN–equipped vehicles. Please use the following instructions to install the new CAN Interface Module as soon as it arrives at your dealership.

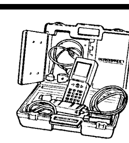
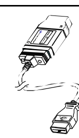
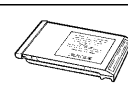
NOTE:

- **Version 10.2a or later Diagnostic Tester Software must be used to enable communication with CAN–equipped vehicles. Version 10.2a will be distributed to dealers via TIS before CAN–equipped vehicles arrive at dealers.**
- **There is no need to remove the CAN Interface Module when working with non–CAN systems or older software versions (Version 10.1a or earlier). The Diagnostic Tester will communicate with all DLC3/J1962 based systems with the CAN Interface Module installed.**

Applicable Vehicles

- **All Models**.

Required SSTs

SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QUANTITY
Lexus Diagnostic Tester Kit* 	01001270	1
CAN Interface Module Kit* 	01002744	1
12 Megabyte Diagnostic Tester Program Card with version 10.2a Software (or later)* 	01002593-005	1

* Essential SSTs.

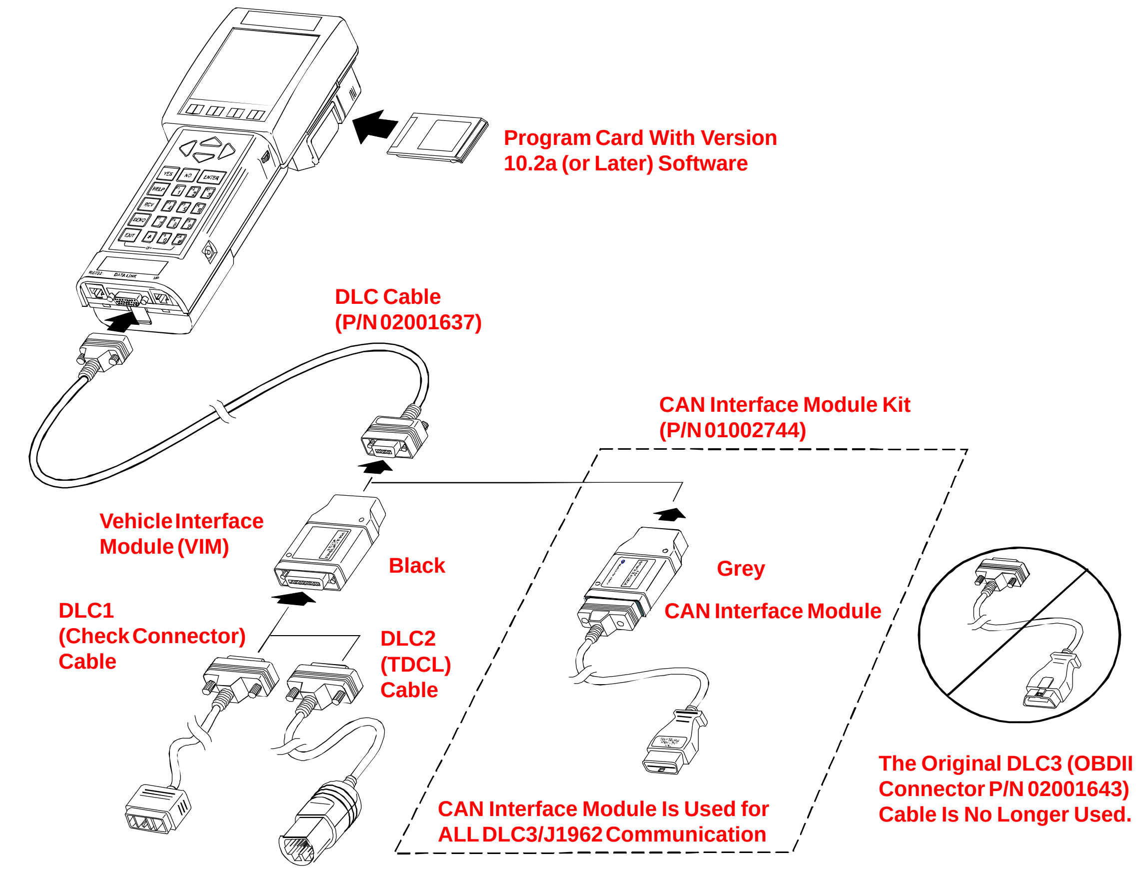
NOTE:

Additional Diagnostic Tester Kits, CAN Interface Modules, Program Cards or SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Installation Procedure



1. Remove the original DLC3 Cable and store it in the Diagnostic Tester storage case.
2. Connect the CAN Interface Module to the DLC Cable.
3. Use the Diagnostic Tester with the CAN Module installed for all DLC3/J1962 based vehicle communication.
4. If you experience problems with the Diagnostic Tester or CAN Interface Module, please contact Lexus Special Service Tool Customer Support at 1–800–933–8335.

NOTE:

- **There is no need to remove the CAN Interface Module when working with non–CAN systems or older software versions (Version 10.1a or earlier). The Diagnostic Tester will communicate with all DLC3/J1962 based systems with the CAN Interface Module installed.**
- **For DLC1 and DLC2 communication you must continue to use the Vehicle Interface Module (VIM).**

Technical Service Information Bulletin

September 8, 2003

Title:

DIAGNOSTIC TESTER CONTROLLER AREA NETWORK (CAN) INTERFACE MODULE

Models:

All Models

SS001-03

SPECIAL SERVICE TOOLS

Introduction

Over the next three model years, all Lexus vehicles will begin using an all–new diagnostic communication protocol, Controller Area Network (CAN). CAN will be introduced on the 2004 LS 430 this fall. A CAN Interface Module has been distributed to all dealers as an essential Special Service Tool (SST) and will allow the Diagnostic Tester to communicate with CAN–equipped vehicles. Please use the following instructions to install the new CAN Interface Module as soon as it arrives at your dealership.

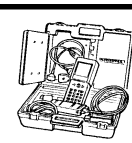
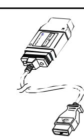
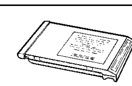
NOTE:

- **Version 10.2a or later Diagnostic Tester Software must be used to enable communication with CAN–equipped vehicles. Version 10.2a will be distributed to dealers via TIS before CAN–equipped vehicles arrive at dealers.**
- **There is no need to remove the CAN Interface Module when working with non–CAN systems or older software versions (Version 10.1a or earlier). The Diagnostic Tester will communicate with all DLC3/J1962 based systems with the CAN Interface Module installed.**

Applicable Vehicles

- **All Models**.

Required SSTs

SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QUANTITY
Lexus Diagnostic Tester Kit* 	01001270	1
CAN Interface Module Kit* 	01002744	1
12 Megabyte Diagnostic Tester Program Card with version 10.2a Software (or later)* 	01002593-005	1

* Essential SSTs.

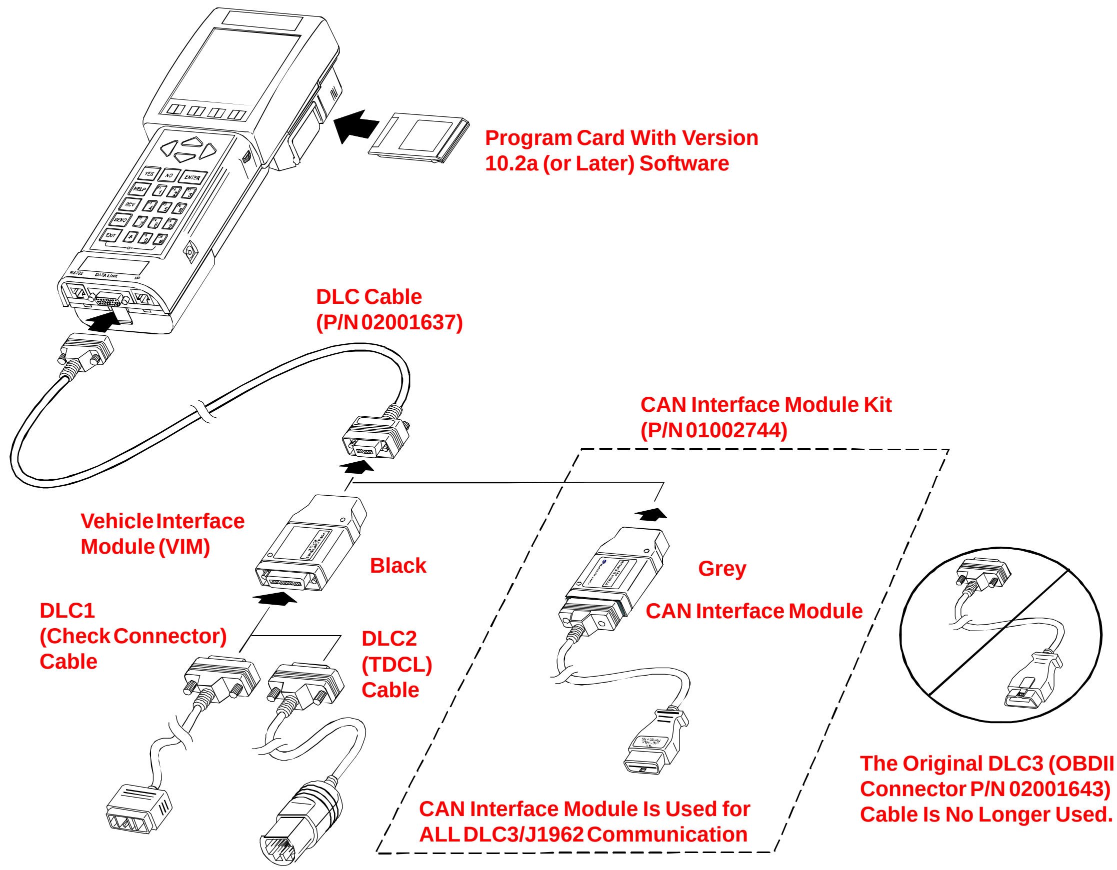
NOTE:

Additional Diagnostic Tester Kits, CAN Interface Modules, Program Cards or SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Installation Procedure



1. Remove the original DLC3 Cable and store it in the Diagnostic Tester storage case.
2. Connect the CAN Interface Module to the DLC Cable.
3. Use the Diagnostic Tester with the CAN Module installed for all DLC3/J1962 based vehicle communication.
4. If you experience problems with the Diagnostic Tester or CAN Interface Module, please contact Lexus Special Service Tool Customer Support at 1–800–933–8335.

NOTE:

- **There is no need to remove the CAN Interface Module when working with non–CAN systems or older software versions (Version 10.1a or earlier). The Diagnostic Tester will communicate with all DLC3/J1962 based systems with the CAN Interface Module installed.**
- **For DLC1 and DLC2 communication you must continue to use the Vehicle Interface Module (VIM).**

LEXUS

Technical Service Information Bulletin

March 11, 2005

Title:

FAILURE TO INITIALIZE CAN INTERFACE MODULE

Models:

’04 – ’05 Applicable Models

TSIB

REVISED

SS001-05

SPECIAL SERVICE TOOLS

TSIB REVISION NOTICE:

- **June 23, 2005: The “Required SSTs” section has been updated.**

The previous TSIB should be discarded.

Introduction

If the Diagnostic Tester fails to initialize CAN–based communication with on–board vehicle controllers, a damaged cable or inoperative CAN Interface Module may be at fault. This bulletin provides test procedures to check the integrity of the Diagnostic Tester cables and the CAN Interface Module.

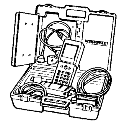
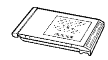
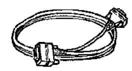
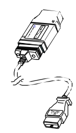
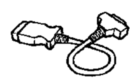
Applicable Vehicles

- **2004 – 2005** model year **CAN–equipped** vehicles including 2004 model year LS 430 and 2005 model year GX 470 and LS 430.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Required SSTs

ITEM NO.	SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QTY	DRW**
1	**Diagnostic Tool Set*** 	LEX220036	1	8
COMPONENT(S) OF KIT/SET	**Four (4) components from this kit/set are required:** • Tester (P/N 02002019)  • 12 Megabyte Program Card Kit (P/N 01002593–005) with version 12.2a Software (or later)  • 14/26 Pin DLC Cable (P/N 02001637)  • 14 Pin DLC Self Test Adapter (P/N 02001607) 			
2	**CAN Module Kit*** 	01002744	1	8
COMPONENT(S) OF KIT/SET	NOTE: • All components from this kit/set are required • Module box cannot be ordered separately • J1962 OBD2–II (CAN DLC) (P/N 02003180) 			

* Essential SSTs.

** Refers to drawer number in SST Storage System.

NOTE:

Additional Diagnostic Tool Sets, CAN Module Kits, Program Cards, or other SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

Diagnostic Procedure

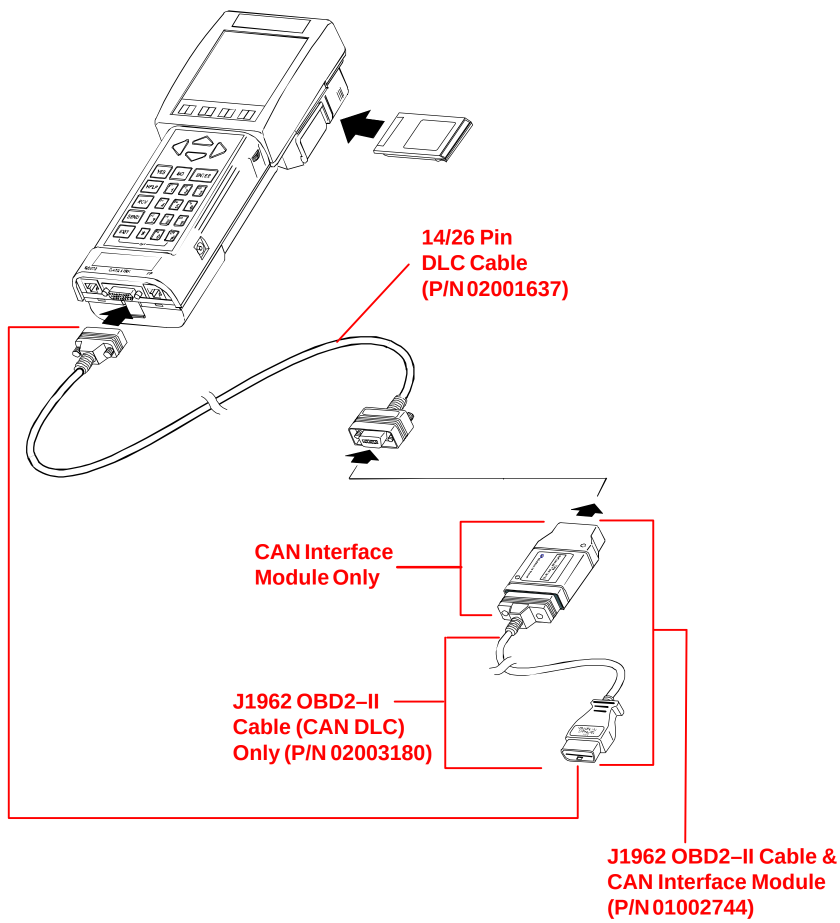
Failure to initialize CAN–based communications between the Diagnostic Tester and on–board vehicle controllers can be caused by the following issues:

- The 14/26 Pin DLC cable is damaged, causing an open communication circuit.
- The DLC cable is damaged, causing an open communication circuit.
- The CAN Interface Module is damaged.
- The vehicle's CAN Communication System has a fault, requiring further vehicle diagnostics.

NOTE:

The Diagnostic Tester may operate properly in other modes such as OBD/MOBD and CARB OBDII with a damaged cable or CAN module.

Figure 1



NOTE:
To lengthen the Diagnostic Tester cable life, do not wrap the cable around the tester, or hold the tester only by the cable.

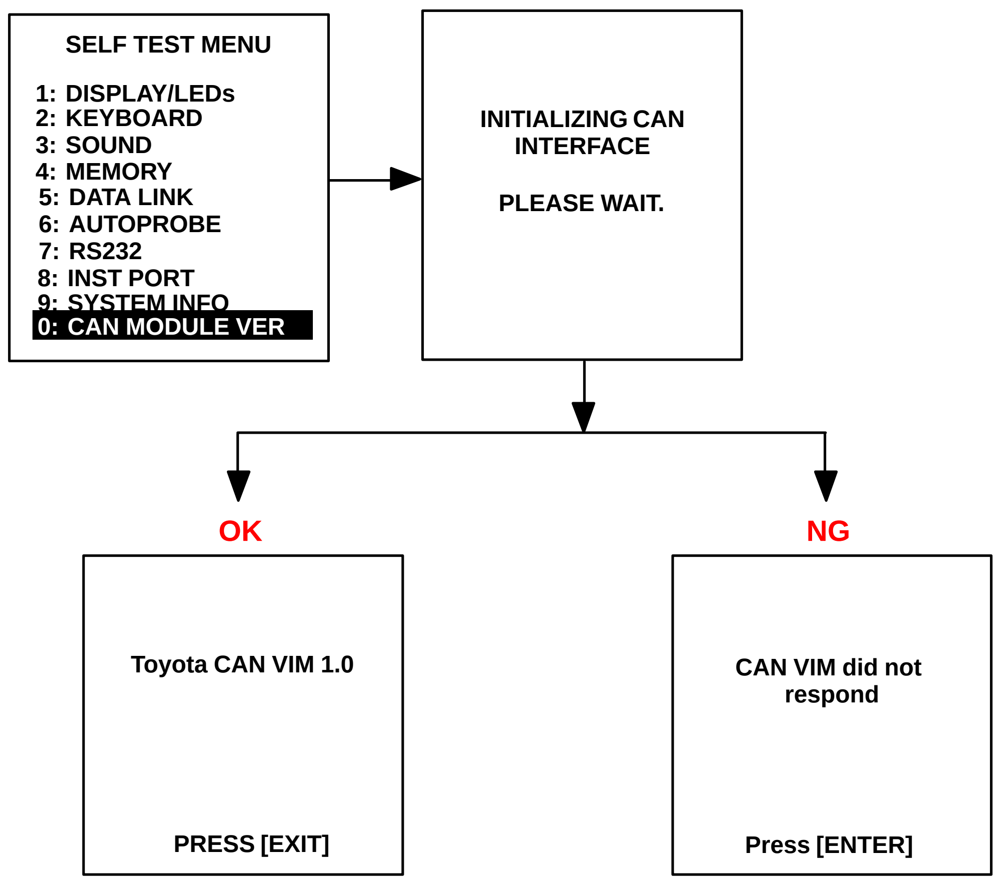
Diagnostic Procedure (Continued)

To determine the cause of communication error, perform the following steps:

1. Using the Diagnostic Tester, perform the CAN MODULE VERSION self test. Select DIAGNOSIS/SETUP/SELF TEST and perform the following screen flow.

NOTE:
Before performing test, confirm that the Diagnostic Tester, 14/26 Pin DLC cable, and CAN Interface Module are all securely connected.

Figure 2



SELF TEST Result:

OK

NG — **SELF TEST FAILED: CAN VIM did not respond. Go to step 2.**

SELF TEST PASSED: Go to step 3.
This response verifies the CAN module and the 14/26 Pin DLC cable are OK.

Diagnostic Procedure (Continued)

2. Perform the Data Link Self Test (Figure 3).

Figure 3

SELF TEST MENU

1: DISPLAY/LEDs
2: KEYBOARD
3: SOUND
4: MEMORY
5: DATA LINK
6: AUTOPROBE
7: RS232
8: INST PORT
9: SYSTEM INFO

DATA LINK SELF–TEST

Install Data Link Self–Test Adapter to the end of the Data Link Cable

Press [ENTER]

The Data Link Self Test Adapter (P/N 02001607) is included in the Lexus Diagnostic Tool Set (P/N LEX220036)

DATA LINK SELF–TEST

Now testing the data link.

To test cable integrity, please flex cable repeatedly. (15–20 seconds)

Press [EXIT] to QUIT

OK

DATA LINK SELF–TEST

PASSED

Press [EXIT]

NG

DATA LINK SELF–TEST

****FAILED****

FAILED
SDL 1

Check Self–Test Adapter Installation

PRESS [EXIT]

DATA LINK SELF TEST Result:

OK

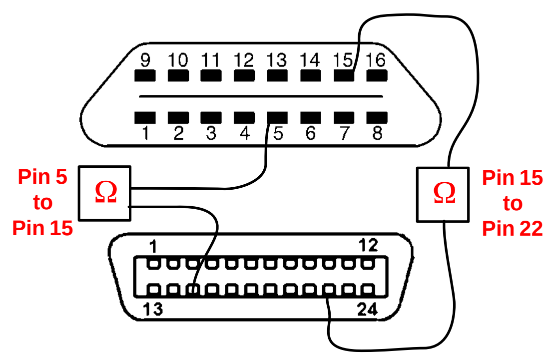
NG → **DATA LINK TEST FAILED: Replace 14/26 Pin DLC cable (P/N 02001637).**

DATA LINK TEST PASSED: Replace CAN Interface Module (P/N 01002744).

Diagnostic Procedure (Continued)

3. Inspect the J1962 OBD2–II cable (CAN DLC).
   A. Disconnect the CAN Interface Module from the J1962 OBD2–II cable (CAN DLC).
      A small Phillips screwdriver is required to separate the CAN Interface Module from the J1962 OBD2–II cable.
   B. Test the J1962 OBD2–II cable (CAN DLC) for continuity.

Figure 4



J1962 OBD2–II Cable (CAN DLC) Test Result:

OK

NG — **(More than 6 Ω) Replace the J1962 OBD2–II cable (CAN DLC, P/N 02003180).**

Suspect vehicle side problem.
Refer to the Technical Information System (TIS): applicable model year Repair Manual: *Diagnostics: CAN Communication System: Problem Symptoms Table: Check CAN Bus Line.*

NOTE:
If the Diagnostic Tester successfully communicates with another CAN–equipped vehicle, suspect vehicle side problem.

LEXUS

Technical Service Information Bulletin

August 26, 2002

Title:

IMMOBILIZER KEY CODE RESET

Models:

Applicable ES 300, GS 430, GS 300, IS 300, & LX 470

TSIB

REVISED

SS002-01

SPECIAL SERVICE TOOLS

TSIB REVISION NOTICE:

- **August 26, 2005: The model years for each model have been specifically defined in the "Applicable Vehicles" section. The "Required SSTs" section has been updated.**
- **February 11, 2003: Model years for LX 470 revised to apply to 2001 and 2002 only.**
- **August 26, 2002: ES 300, GS 300, and IS 300 models added. Model years for GS 430 and LX 470 vehicles expanded to include 2002 and later. Diagnostic Tester software in Required Tools & Material updated to version 9.01a (or later).**

Previous versions of this TSIB should be discarded.

Introduction

Immobilizer Reset is a new feature that allows the registration of a new Master Key even if all original Master Keys are lost. Once the Immobilizer system is reset, all previously registered keys will be erased.

Applicable Vehicles

MODEL YEAR	MODEL	ENGINE MODEL
2001 – 2005*	GS 430	3UZ–FE
2001 – 2002*	LX 470	2UZ–FE
2002 – 2003*	ES 300	1MZ–FE
2002 – 2005*	GS 300	2JZ–GE
2002 & Later*	IS 300	2JZ–GE

* Immobilizer Key Code Reset procedure is not available for prior model years.

NOTE:
Refer to TIS (Technical Information System) for the most current applicable vehicle information.

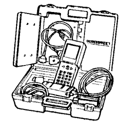
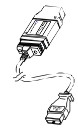
Parts Information

PREVIOUS PART NUMBER	CURRENT PART NUMBER	PART NAME
N/A	Model Specific	Replacement Key (Master or Sub)

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Required SSTs

ITEM NO.	SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QTY	DRW**
1	**Lexus Diagnostic Tester Kit***  NOTE: • All components from this kit/set are required • 12 Megabyte Diagnostic Tester Program Card (P/N 01002593–005) with version 13.0a Software (or later) is required	LEX220036	1	8
2	**CAN Interface Module Kit***  NOTE: • All components from this kit/set are required	01002744	1	8

* Essential SSTs.

** Refers to drawer number in SST Storage System.

NOTE:

Additional Diagnostic Tester Kits, CAN Interface Modules, Program Cards, or other SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

Function Description

The Immobilizer Reset function is a 5-step process:

1. Using the Diagnostic Tester, retrieve a "Seed Number" through the **OBD/MOBD Immobilizer** function.
   - A "Seed Number" is a unique number provided by the Diagnostic Tester and validated by TIS (Technical Information System) in order to return a Passcode.
2. Using TIS, select **Immobilizer Reset**, and complete the request form to retrieve a "Passcode Number."
   - A "Passcode Number" is a unique number required by the Diagnostic Tester to reset the ECU allowing it to accept a new Master Key.
3. Enter the "Passcode Number" received from TIS into the Diagnostic Tester.
4. Confirm successful Immobilizer reset and new Master Key registration.
5. Register any additional customer keys.

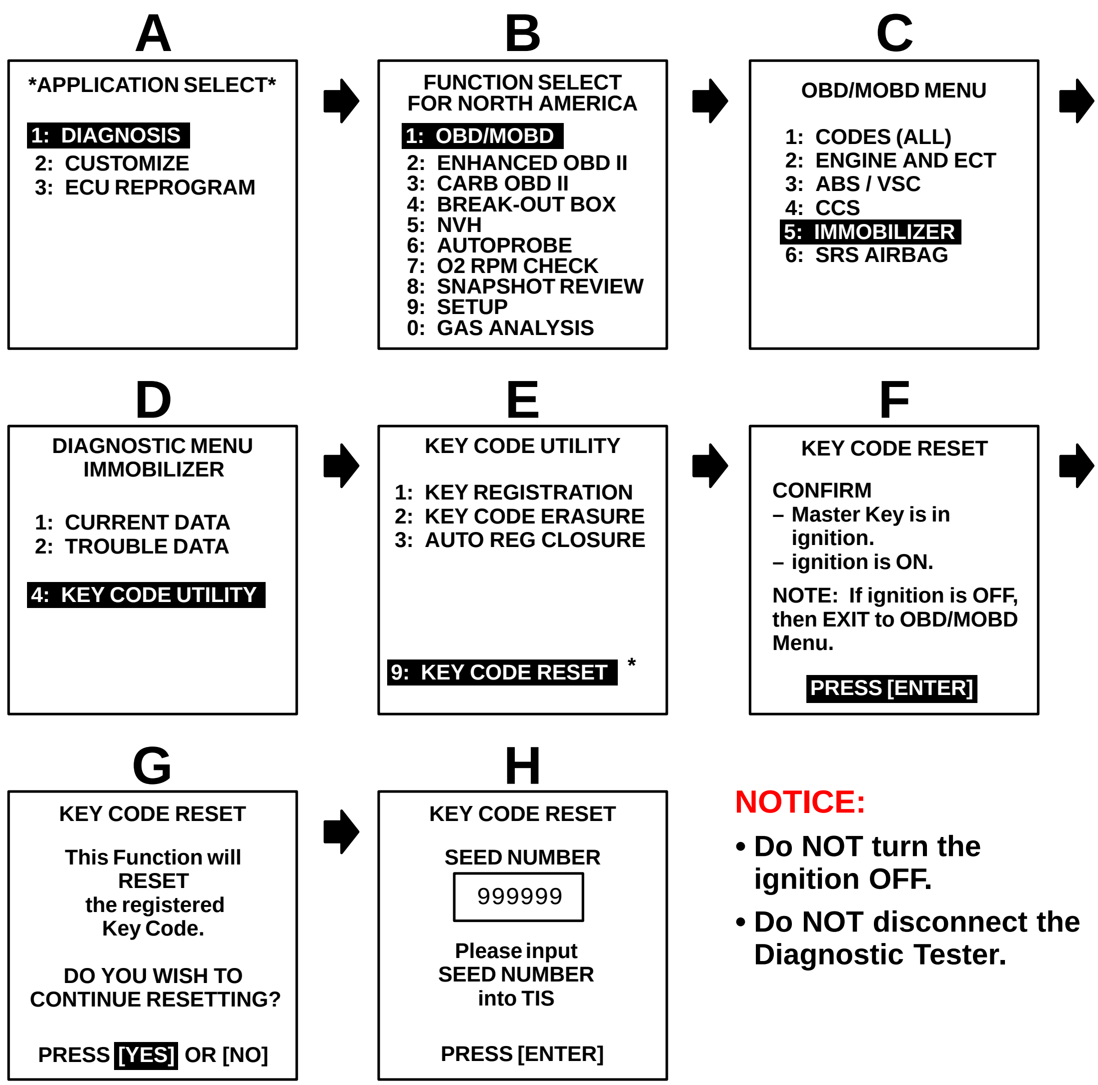
Key Code Reset Procedure

> **NOTE:**
> **Ensure that the Diagnostic Tester is equipped with the latest version of software (13.0a or later).**

Connect the Diagnostic Tester to DLC3 and turn ignition ON.

1. Using the Diagnostic Tester, follow the screen flows below to retrieve the "Seed Number." (**DO NOT DISCONNECT** the Diagnostic Tester from the vehicle during this process.)

FIGURE 2. DIAGNOSTIC TESTER SCREEN FLOW



NOTICE:

- **Do NOT turn the ignition OFF.**
- **Do NOT disconnect the Diagnostic Tester.**

* Option "9: KEY CODE RESET" will not appear if your present vehicle does not support the key code reset functions.

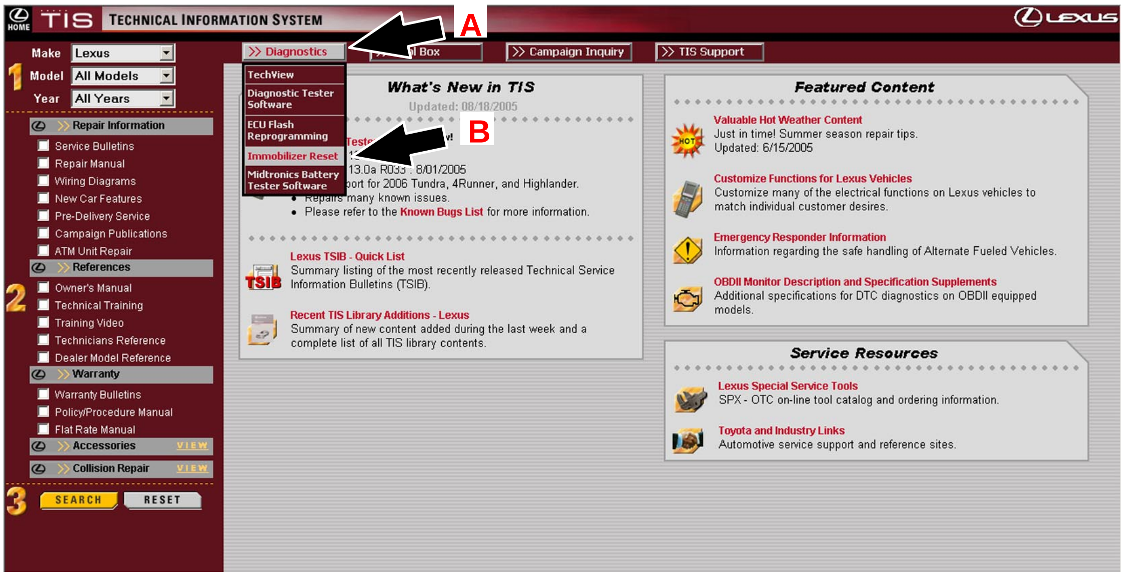
Key Code Reset Procedure (Continued)

2. Using TIS, select **Immobilizer Reset**, and complete the request form to retrieve a "Passcode Number."

   A. Click on **Diagnostics**.

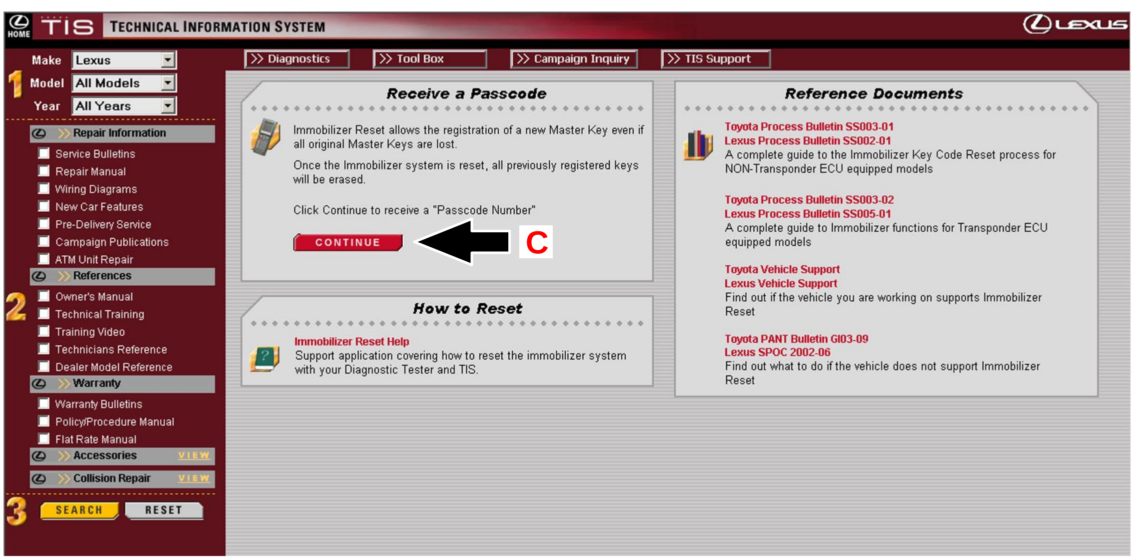
   B. Click on **Immobilizer Reset**.

FIGURE 3. SELECTING IMMOBILIZER RESET ON TIS



C. Read the instructions on the screen and click on **Continue**. (See Figure 4 below.)

FIGURE 4. IMMOBILIZER RESET INSTRUCTIONS ON TIS

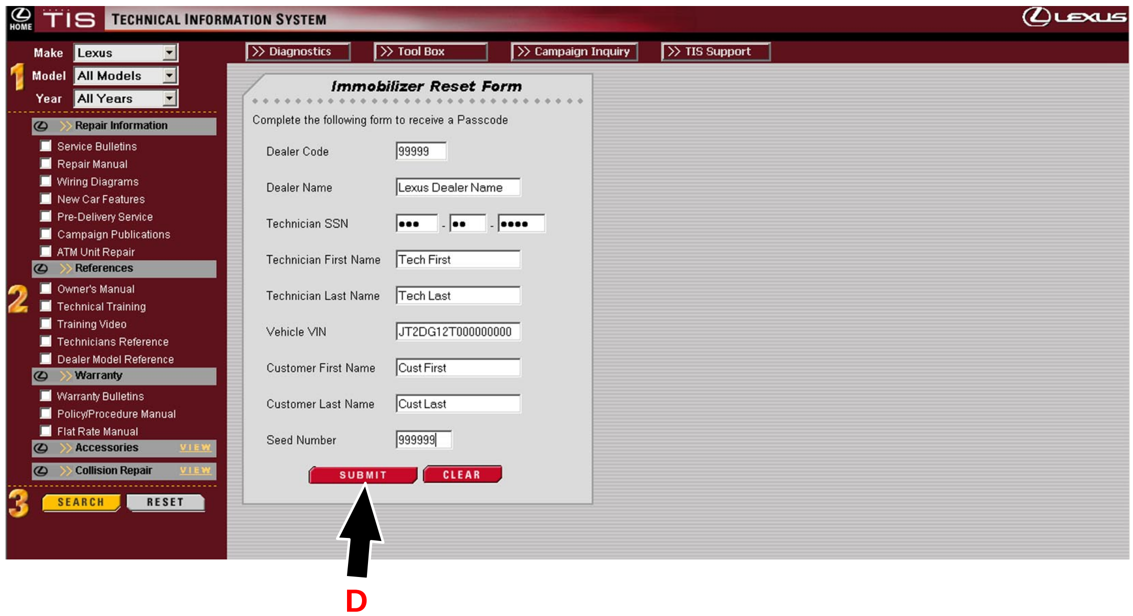


Key Code Reset Procedure (Continued)

D. Complete the request form and enter the "Seed Number" from the Diagnostic Tester. Click on **Submit** (Figure 5).

NOTE:
All fields must be completed.

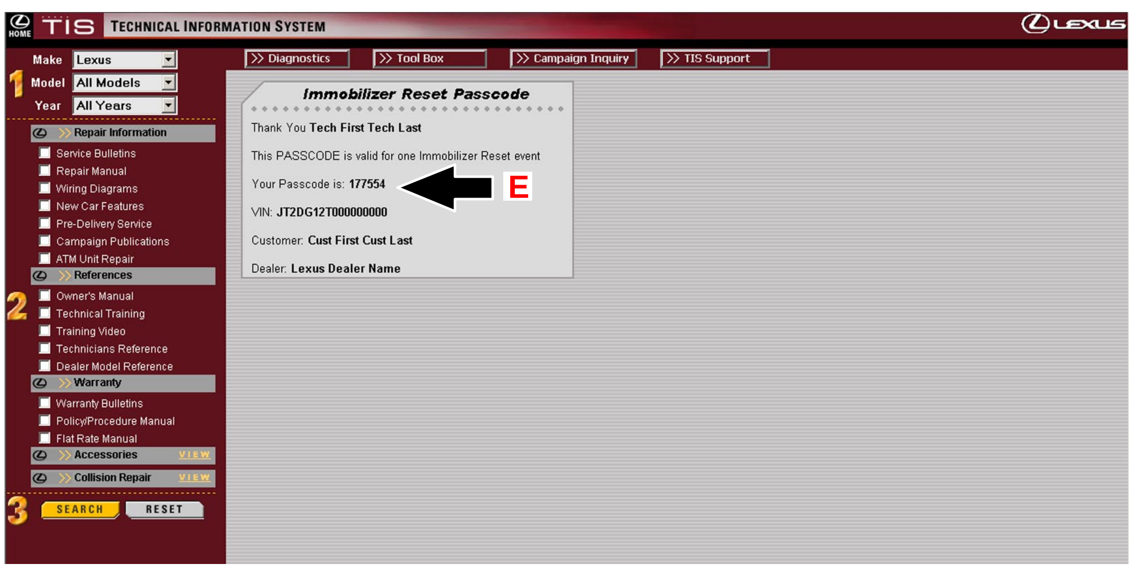
FIGURE 5. REQUEST FORM ON TIS



E. TIS will now return the Passcode that needs to be entered into the Diagnostic Tester.

NOTE:
The Passcode given by TIS is only valid for one Immobilizer Reset Event.

FIGURE 8. RECEIVING PASSCODE FOR DIAGNOSTIC TESTER

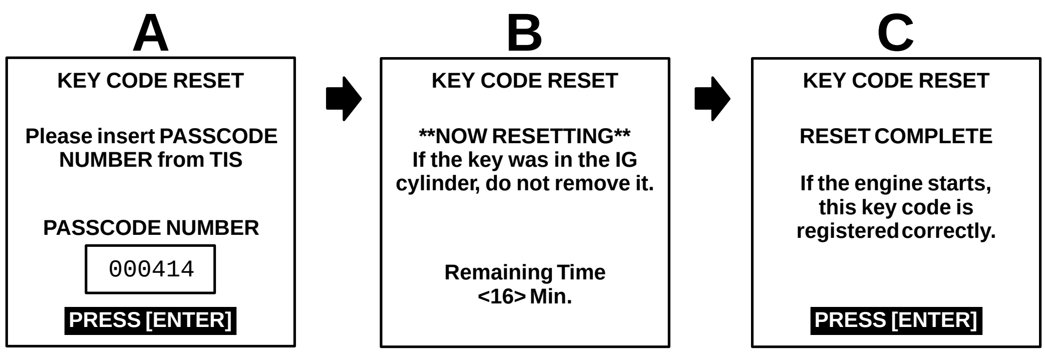


Key Code Reset Procedure (Continued)

3. Using the numbered keys (0–9) on the Diagnostic Tester, enter the "Passcode Number" received from TIS. (See Figure 7 below.) Press **ENTER** to clear all registered key codes.

NOTE:
Key Code Reset takes approximately 16 minutes.

FIGURE 7. PASSCODE ENTRY SCREEN FLOW



4. Confirm successful Immobilizer reset and new Master Key registration by starting the vehicle.

NOTE:
If the vehicle starts, the new Master Key code is registered correctly.
If the vehicle does not start, perform the Immobilizer Reset function again.

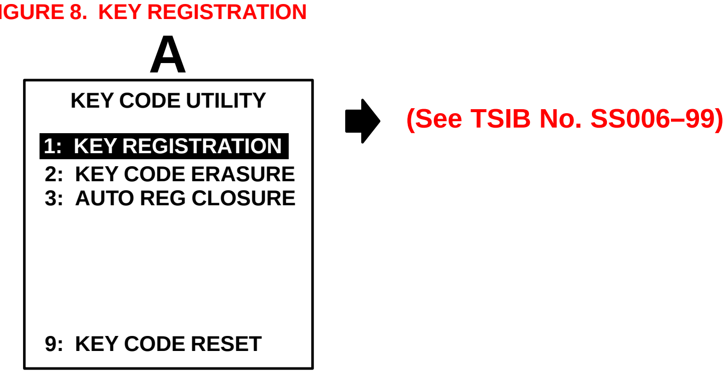
5. All previously registered key codes have been erased except the Master Key used during "Key Code Reset."

   Register any additional customer keys by using "Key Registration."

   Each key will start the engine if registered correctly.

   - Please refer to TSIB No. SS006–99, *"Scantool Immobilizer Key Code Utility,"* for additional detail on this procedure.

FIGURE 8. KEY REGISTRATION



Technical Service Information Bulletin

May 25, 2001

Title:

ECU FLASH REPROGRAMMING ERROR MESSAGE

Models:

Applicable Models

TSIB

REVISED

SS003-01

SPECIAL SERVICE TOOLS

TSIB REVISION NOTICE:

September 23, 2003: 2003 models added; Test Procedures updated for new CAN Interface Module.
The previous TSIB should be discarded.

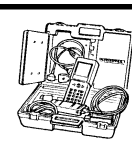
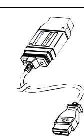
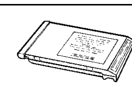
Introduction

During ECU flash reprogramming, an error message may be displayed on the Diagnostic Tester that will not allow ECU flash reprogramming to complete.
This bulletin provides test procedures to determine the cause for the error message.

Applicable Vehicles

- **2001** (and later) model year **GS 430/300, IS 300, LS 430, LX 470** vehicles.
- **2002** (and later) model year **SC 430** vehicles.
- **All 2003** (and later) model year **Lexus** vehicles.

Required SSTs

SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QUANTITY
Lexus Diagnostic Tester Kit* 	01001270	1
CAN Interface Module Kit* 	01002744	1
12 Megabyte Diagnostic Tester Program Card with version 10.2a Software (or later)* 	01002593-005	1
Diagnostic Tester 14/26 Pin DLC Cable	02001637	1
Diagnostic Tester J1962 OBDII Cable (CAN DLC)	02003180	1

* Essential SSTs.

NOTE:

Additional Diagnostic Tester Kits, CAN Interface Modules, Program Cards or other SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Test Procedure

During ECU flash reprogramming, the Error screen at right may be displayed on the Diagnostic Tester for one of the following reasons:

1. Immobilizer key not properly registered or auto–registration mode left open.
2. Ignition ON/OFF cycling not followed correctly during the flash reprogramming procedure.
3. The Diagnostic Tester cable is damaged, causing an open communication circuit.

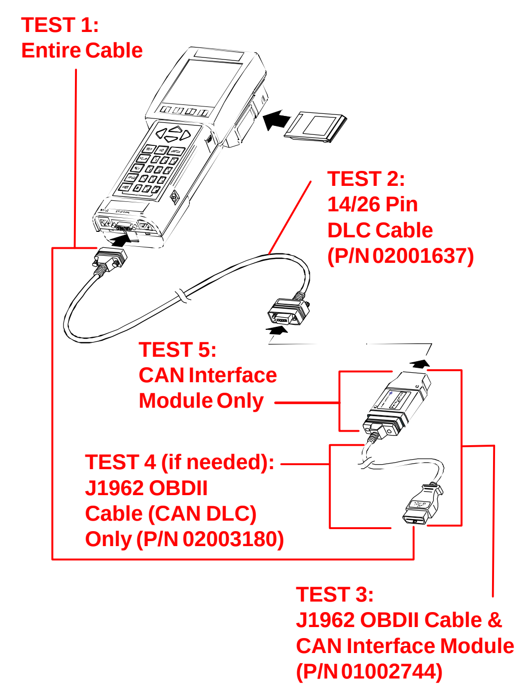
UPDATE ECU CAL
CANNOT CHANGE TO REPROGRAM MODE PLEASE CHECK
– IG TURNED OFF/ON PROPERLY
– ALL KEY CODES REGISTERED
PRESS [ENTER]

NOTE:
The Diagnostic Tester may operate properly in other modes such as OBD, OBDII, or CARB, with a damaged cable.

To eliminate the possibility of the first 2 reasons causing the error message, do the following:

1. Confirm the Immobilizer Transponder Master Key is properly registered and auto registration mode is closed. Refer to the Technical Information System (TIS) and follow the appropriate Repair Manual procedure and consult TSIB SS006–99, *"Scantool Immobilizer Key Code Utility."*
2. Conduct the ECU flash reprogramming process explicitly following key operation instructions. Refer to TSIB SS001–01, *"ECU Flash Reprogramming Process,"* for more details.

To determine if the Diagnostic Tester cable is damaged, follow the test procedures below to check the electrical integrity of the cable. Conduct all continuity tests with an Ohm meter. For all five continuity test procedures, the resistance values <u>must be below 6.0 ohms to pass</u>.



NOTE:
To Lengthen the Diagnostic Tester cable life, do not wrap the cable around the tester, or hold the tester only by the cable.

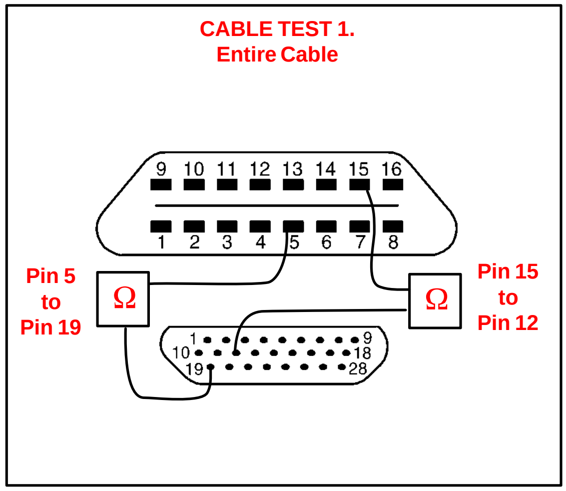
Test Procedure (Continued)

CABLE TEST 1.

A. Connect Diagnostic Tester cables DLC (P/N 02001637) and CAN Interface Module / J1962 OBDII together (P/N 01002744).

B. Test for continuity.

- If there is continuity, the cable is OK. Check steps 1 and 2 above to complete the flash reprogramming process.
- If there is no continuity, proceed to CABLE TEST 2.

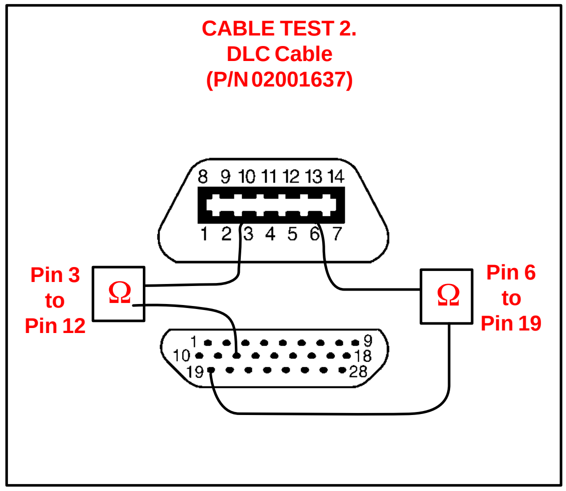


CABLE TEST 2.

A. Disconnect Diagnostic Tester cables DLC (P/N 02001637) and CAN Interface Module / J1962 OBDII (P/N 01002744).

B. Test DLC cable (P/N 02001637) for continuity.

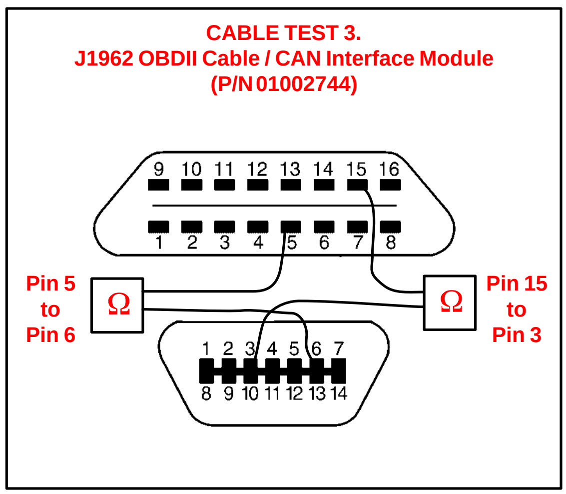
- If there is continuity, the cable is OK. Proceed to CABLE TEST 3.
- If there is no continuity, the cable needs to be replaced.



CABLE TEST 3.

A. Test J1962 OBDII / CAN Interface Module (P/N 01002744) for continuity.

- If there is continuity, the cable and CAN Interface Module are OK. Re–check Cable Tests 1, 2, and 3 while wiggling and flexing the cables.
- If there is no continuity, proceed to CABLE TEST 4.

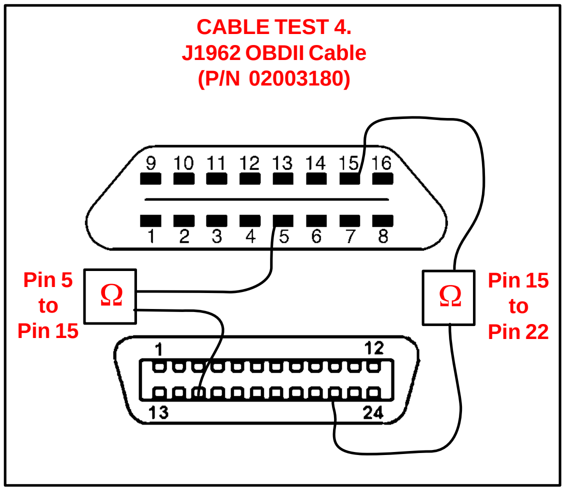


Test Procedure (Continued)

CABLE TEST 4.

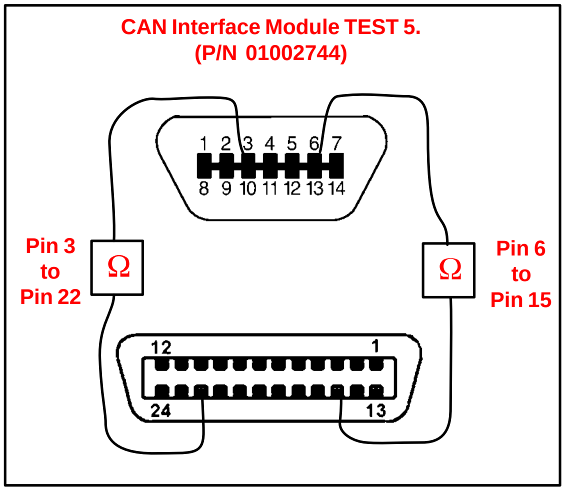
A. Disconnect the CAN Interface Module (P/N 01002744) from the J1962 OBDII cable using a Phillips screwdriver.

B. Test J1962 OBDII cable (P/N 02003180) for continuity.
   - If there is no continuity, the cable needs to be replaced.
   - If there is continuity, proceed to CAN Interface Module Test 5.



CAN INTERFACE MODULE TEST 5.

A. Test the CAN Interface Module (P/N 01002744) for continuity.
   - If there is no continuity, the CAN Interface Module needs to be replaced.
   - If there is continuity, the CAN Interface Module is OK. Re–check Cable Tests 1, 2, 3, and 4 while wiggling and flexing the cables.



LEXUS

Technical Service Information Bulletin

November 28, 2005

Title:

CD SKIP VERIFICATION USING LEXUS MASTER CD

Models:

’01 – ’06 All Models

SS003-05

SPECIAL SERVICE TOOLS

Introduction

Lexus has developed a master CD to be used for customer complaints of the CD player skipping or CD player cannot read disc. This disc has been specially manufactured to test the performance of the Lexus CD players. Using this master CD will confirm that the radio exceeds Lexus’ specification for CD player performance.

Applicable Vehicles

- **2001 – 2006** model year **Lexus** vehicles.

Test Disc Specifications

TRACKS	DEFECT	MUSIC	TRACK TIME
1	None	Minuetto	3:15
2	0.8 mm Black Dot	2ème Gymnopédie	2:32
3	0.6 mm Black Dot	Overture Minature	3:02
4	None	Marche	2:36
5	None	Claire de Lune	3:09
6	None	Nocturne	3:12
7	0.4 mm Scratch	Danse de la Fée Dragée	2:28
8	0.6 mm Scratch	Danse Arabe	2:29
9	0.8 mm Scratch	Fantanisie-Improptu	2:51
10	1.0 mm Scratch	Hungarian Dance No. 5	2:02
11	None	Prelude <Raindrop>	3:38
12	None	Maiden’s Prayer	3:15
13	Fingerprint 65 um	Valse des Fleurs	3:08
14	None	1ère Gymnopedie	2:54
15	Fingerprint 75 um	Danse Des Mirlitons	2:06

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Required SSTs

ITEM NO.	SPECIAL SERVICE TOOLS (SSTs)	PART NUMBER	QTY	DRW**
1	**Lexus Master CD*** NOTE: • All components from this kit/set are required	00002–07130–SCD	1	22

* Essential SSTs.

** Refers to drawer number in SST Storage System.

NOTE:
Additional SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

Repair Procedure

1. Make sure the vehicle is stationary during the test.
2. Insert a compact disc (NOT the Lexus Master CD) to make sure the radio can accept and eject the disc without damaging it.
3. Check the Lexus Master CD for any unintended scratches or dirt. Wipe away dirt using a glass cleaning cloth. If the disc is damaged, order a replacement master CD.
4. Insert the Lexus Master CD and change to track number 9.
5. Play the track for one minute.
   A. If skips are heard, replace the CD player.
   B. If NO skips are heard, the CD player is working normally. Check the customer's CDs for scratches or other damage to the discs. Confirm that the customer is using a pre-recorded CD, NOT CD-Rs or CD-RWs as they may NOT have been burned properly.

NOTE:
- **Tracks 1 – 8 and 11 – 14 are reference tracks. They can be used, but the conditions are less severe than track 9. Do NOT use tracks 10 and 15.**
- **Track 9 (0.8 mm scratch) is much more severe than the Lexus engineering specification in order to ensure customer satisfaction. If the customer's radio passes this test, a replacement radio will NOT improve the performance.**
- **This disc has been specially manufactured with a physical defect for the purposes of testing the CD player's performance. It is NOT possible to make copies of this disc that can be used to test the CD player's performance.**

Technical Service Information Bulletin

December 21, 2001

Title:

REPAIR MANUAL SUPPLEMENT: VEHICLE PULLING TO ONE SIDE

Models:

All ’02 – ’07 Model

TSIB

STEERING

ST004-01

REVISED

TSIB REVISION NOTICE:

- **April 4, 2006: 2007 model year has been added to Applicable Vehicles.**
- **October 5, 2005: 2003 – 2006 model years have been added to Applicable Vehicles. A note has been added to the illustration in step 3.**
- **March 1, 2002: OP Codes updated in Warranty Information.**

All previous versions of this TSIB should be discarded.

Introduction

This bulletin contains general vehicle pulling diagnosis and repair procedures along with specific information to help correct pulling complaints.

This information supplements Repair Manual procedures when the symptoms are:

- The driver holds the steering wheel without exerting steering effort while driving straight ahead, and the vehicle drifts to the right or the left.
- While driving straight ahead, the driver has to steer either to the right or the left to maintain straight driving.

Applicable Vehicles

- **2002 – 2007** model year **Lexus** vehicles.

Warranty Information

<table>
<tr><th>OP CODE</th><th>DESCRIPTION</th><th>TIME</th><th>OPN</th><th>T1</th><th>T2</th></tr>
<tr><td>ST1004</td><td>Preliminary Check & Road Test</td><td>0.6</td><td rowspan="6">45046–09020</td><td rowspan="8">31</td><td rowspan="8">99</td></tr>
<tr><td>Combo A</td><td>Switch Front Tire/Wheel & Road Test</td><td>0.5</td></tr>
<tr><td>Combo B</td><td>Reverse the Front One Side Tire</td><td>0.7</td></tr>
<tr><td>Combo C</td><td>Check Front Wheel Alignment</td><td>1.2</td></tr>
<tr><td>Combo D</td><td>Adjust Front Wheel Alignment</td><td>0.7</td></tr>
<tr><td>Combo E</td><td>Adjust Camber Setting</td><td>0.7</td></tr>
<tr><td>420091</td><td>Dismount and Mount Tire and Balance Wheel and Tire Assembly</td><td>0.5</td><td rowspan="2">42611–48030</td></tr>
<tr><td>Combo A</td><td>Each additional Wheel</td><td>0.3</td></tr>
</table>

NOTE:
Above combination codes A, B, D and E include road test time.

Applicable Warranty*:
This repair is covered under the Lexus Comprehensive Warranty. This warranty is in effect for 12 months or 20,000 miles, whichever occurs first, from the vehicle’s in-service date.

* Warranty application is limited to correction of a problem based upon a customer’s specific complaint.

Contents

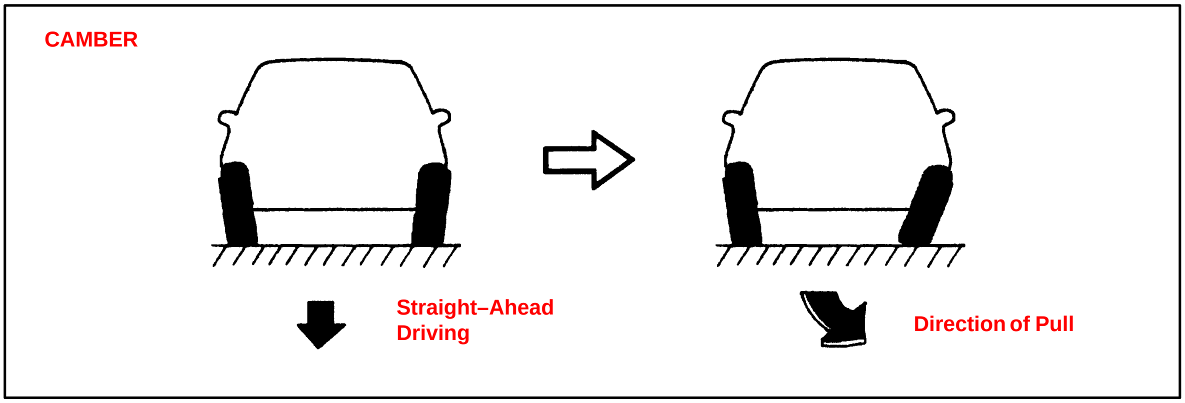
This bulletin is divided into the following sections:

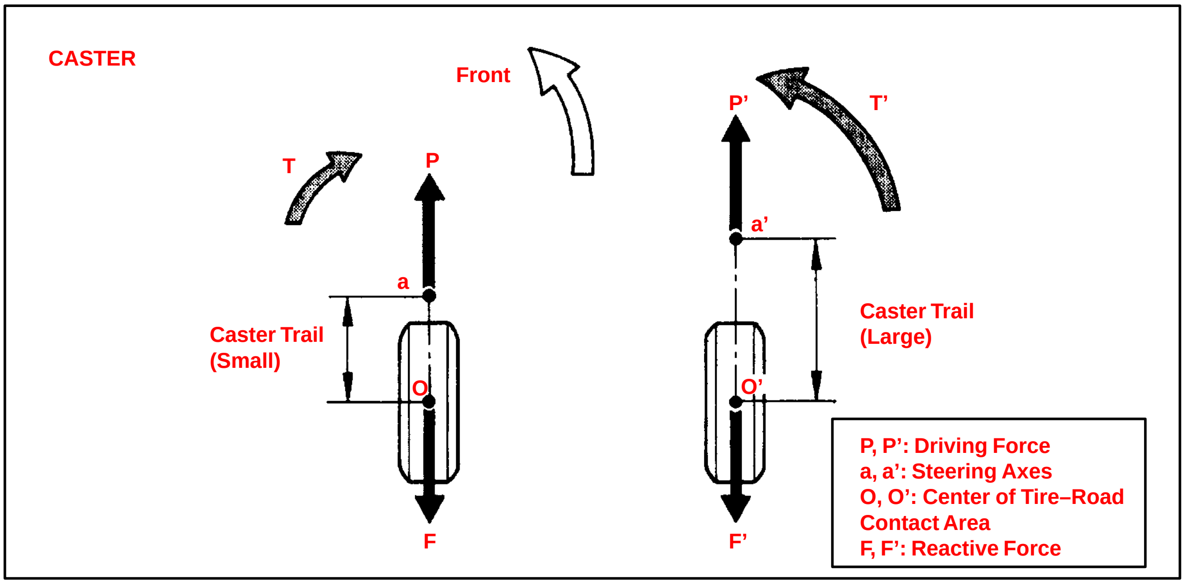
Wheel Alignment & Tire Characteristics

1. Relationship Between Wheel Alignment and Vehicle Pulling to One Side

When the cross camber or caster of the front wheel alignment is large, it can cause vehicle pulling.

WHEEL ALIGNMENT	DIRECTION OF VEHICLE PULLING
Camber	Vehicle pulls in direction of wheel with large camber value
Caster	Vehicle pulls in direction of wheel with small caster value





If the cross camber or caster is within the specified range (30' or less), noticeable vehicle pulling will not occur due to side-to-side differences in camber or caster.

NOTE:

On a flat road, if the cross camber or caster is 30' or less and the steering wheel is held without exerting steering effort for 100 m (109 yards) when driving at 100 km/h (62 mph), the alignment–induced drift distance is approximately 0.5 m (1.64 ft).

Wheel Alignment & Tire Characteristics (Continued)

2. Relationship Between Tire Characteristics and Vehicle Pulling to One Side

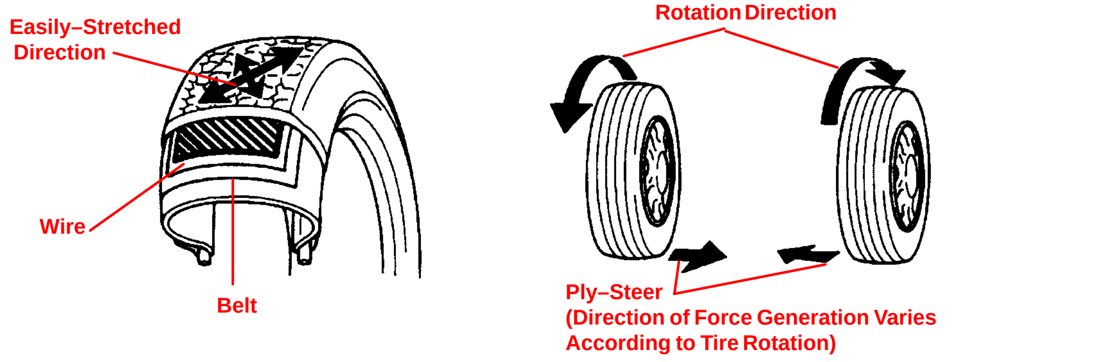
When radial tires are rotating, they have the characteristic of generating force in the lateral direction between the tire and the road surface. This lateral force is comprised of two factors:

- Ply-steer, which changes direction according to the rotation direction of the tires.
- Conicity, which is generated in a fixed direction regardless of the tire rotation direction.

If these lateral forces are too strong, vehicle pulling will occur.

A. Ply–Steer

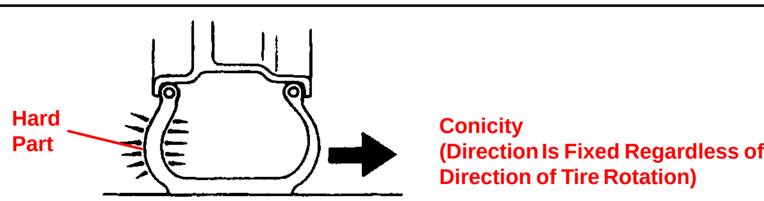
Lateral force due to ply-steer is produced by the construction of the belts inside the tire tread. With radial tires, the wire of the belt is slanted as shown in the illustration below. Thus, it is in the lateral direction that tire tread easily changes shape (stretches), and lateral force is generated between the tire and the road surface in the lateral direction.



NOTE:
Lateral force from ply-steer prevents vehicle drift caused by road slant, so in many cases lateral force to the right is provided for left-handed steering vehicles.

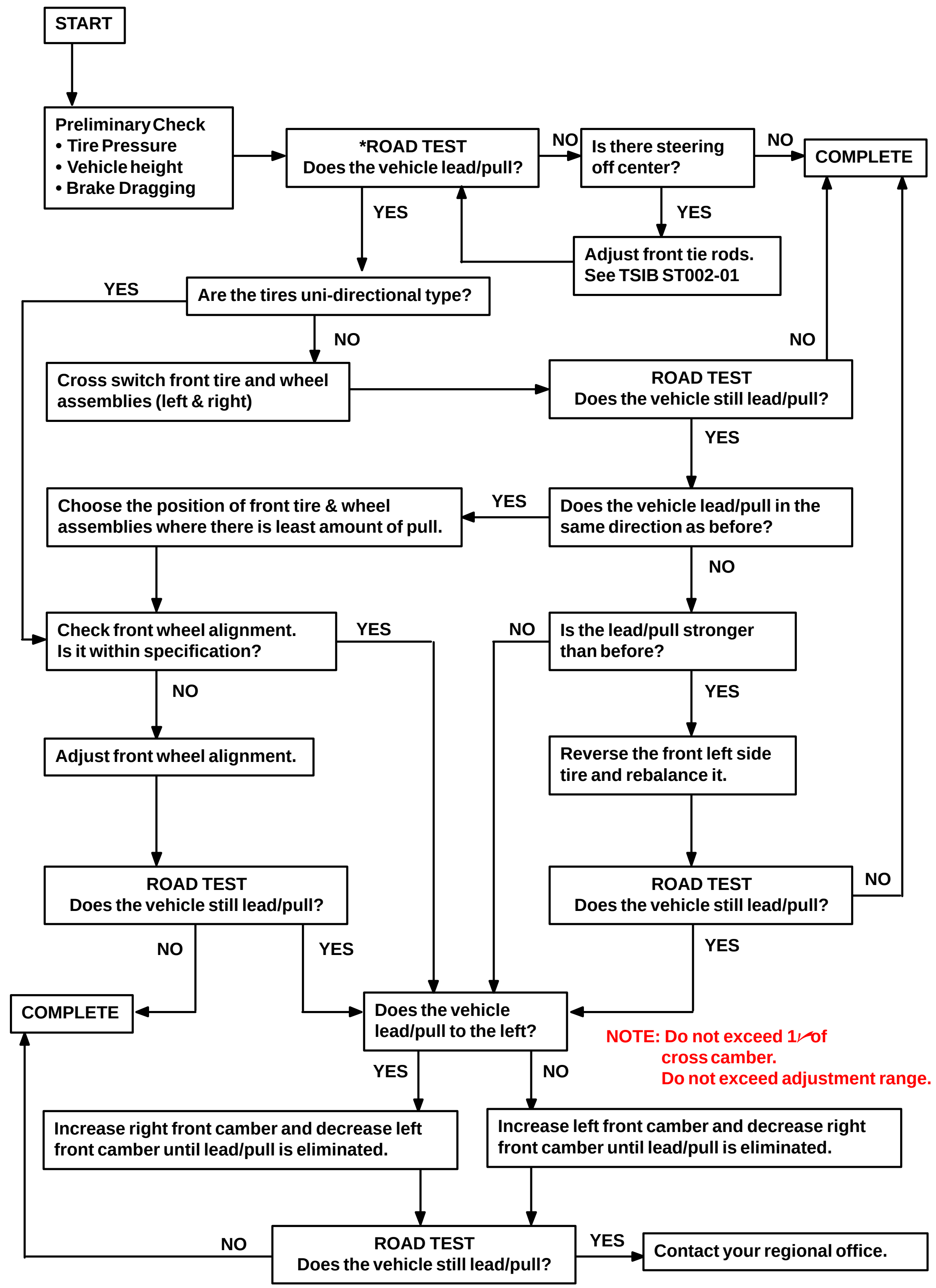
B. Conicity

Conicity is lateral force resulting from uneven formation of the left and right sides of the tire. The direction the lateral force is exerted depends on the hardness of the side walls and the difference in height between the left/right sides of the tire.



NOTE:
- **In the case of vehicle pulling caused by tires, the lateral force which is exerted as a result of conicity has the greatest effect. On a flat road, if the steering wheel is held without exerting steering effort for 100 m (109 yards) when travelling at 100 km/h (62 mph), the vehicle may drift as much as 1.5 m (5 ft).**
- **When vehicle pulling is due to conicity, the amount of drift can be reduced and the direction of drift can be changed by changing the location of the tire or reversing the tire when installing it on the wheel.**

Repair Procedure Flow Chart



* Select a flat road where the vehicle can be driven in a straight line for 100 meters at a constant speed of 35 mph. Please confirm safety and set the steering wheel to its straight position. Drive the vehicle in a straight line for 100 meters at a constant speed of 35 mph without exerting steering effort on the steering wheel.

(1) The vehicle goes straight but the steering wheel has some angle. → STEERING OFF CENTER

(2) The vehicle does not go straight. → STEERING PULL

Repair Procedures

1. IMPORTANT NOTICE

Before repairing vehicle pulling to one side, it is necessary to clearly identify the cause of the pulling condition. Frequently, the cause of the vehicle pulling to one side is diagnosed as wheel alignment. However, the actual cause may be lateral force generated by the tires. Performing wheel alignment when tire force is the cause could result in the wheel alignment being set at a value outside of specifications. This would then cause other problems such as uneven tire wear, etc.

2. Troubleshooting

First determine whether vehicle pulling to one side is caused by a wheel alignment problem or tire characteristics, then decide which repairs to make.

A. Perform the following checks and correct as necessary.

a. Check tires for size, wear and for proper inflation pressure.

b. Check whether the vehicle is noticeably tilted backward/forward or left/right.

NOTE:

Tilting of the vehicle produces a left–right difference in the camber and caster and can cause vehicle pulling to one side.

c. Check brakes for dragging.

B. Confirm problem symptoms.

With the customer accompanying you, drive the vehicle to confirm if the customer’s complaint involves vehicle pulling to one side or steering wheel off center. If the problem is steering wheel off center, adjust the front tie rods on the vehicle. **Refer to Lexus TSIB ST002-01**. Also check the direction of vehicle pulling and the extent of the pulling.

C. Decide if vehicle pulling is due to wheel alignment or tires.

a. Switch the left and right front tires (If the tires are non–unidirectional).

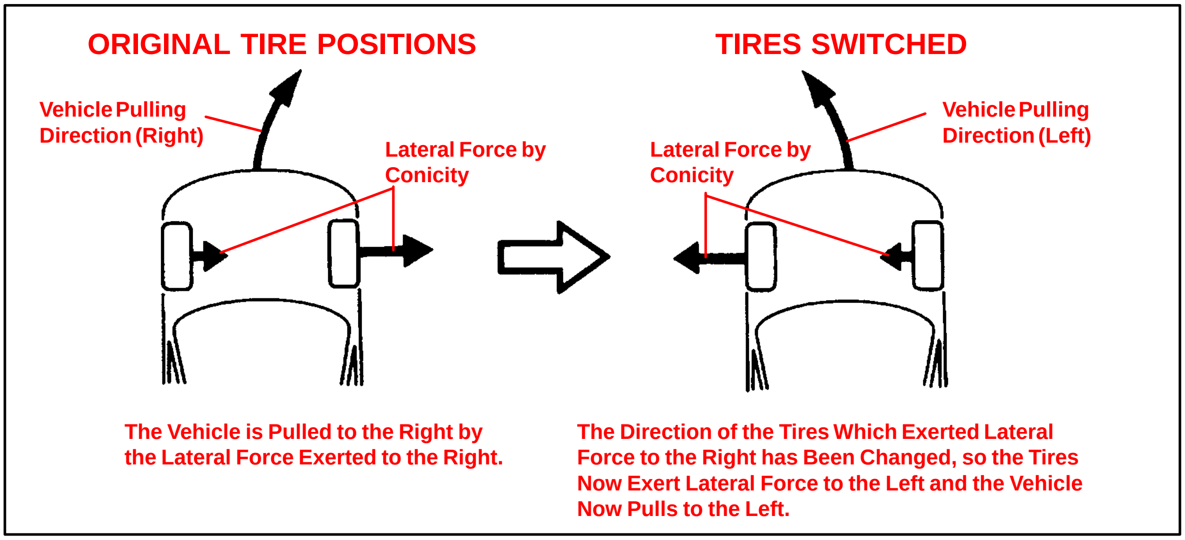
b. Conduct a drive test to check whether the direction that the vehicle pulls has changed.

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
No change in vehicle pulling condition	Front wheel alignment	Proceed to Repair Procedure 3. Vehicle pulling caused by Wheel Alignment (Page 7)
Vehicle pulling eliminated	Tire conicity	Repair complete. Vehicle Pulling Caused by Tire Conicity (Page 4 and 8)
Vehicle pulling direction is reversed	Tire conicity	Proceed to Repair Procedure 4. Vehicle Pulling Caused by Tire Conicity (Page 8)

Repair Procedures (Continued)

Helpful hints to determine cause of vehicle pulling:

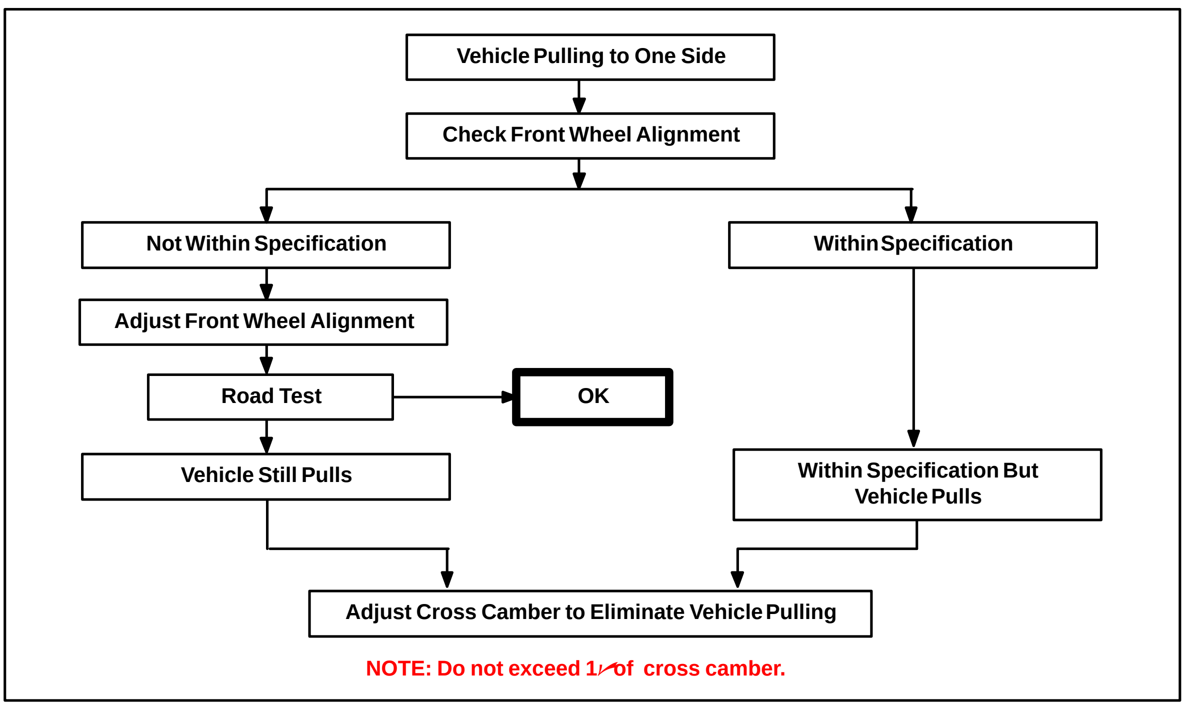
- The direction of lateral force from tire conicity becomes reversed when the left and right tires are switched. Therefore, if the pulling direction changes when the tires are switched, it can be concluded that vehicle pulling is caused by tire conicity.



- If the pulling direction does not change after the front tires are switched, the cause of vehicle pulling is not tire conicity. In this case, the likely cause is a front wheel alignment condition.

3. Vehicle Pulling Caused by Wheel Alignment

When it is determined by troubleshooting that the vehicle pulling to one side is caused by wheel alignment, perform repairs according to the following procedure.



Repair Procedures (Continued)

WHEN VEHICLE PULLS TO LEFT	WHEN VEHICLE PULLS TO RIGHT
Increase right front camber and decrease left front camber until vehicle pulling is eliminated	Increase left front camber and decrease right front camber until vehicle pulling is eliminated

NOTE:

- **Keep the cross camber within 1° or less.**
- **Keep the camber of each wheel within specifications (+/–45’ of center value).**
- **If adjustment exceeds the specifications, uneven tire wear will result.**

4. Vehicle Pulling Caused by Tire Conicity

When it is determined by troubleshooting that the vehicle pulling to one side is caused by tire conicity, perform repairs according to the following procedures.

Indication of Tire Conicity as a Cause:
When the front tires are switched, the pulling direction changes. Proceed to STEP 1.

STEP 1:

Remove the front left tire from the wheel and reverse the tire. Then perform a road test and check for change in the pulling direction.

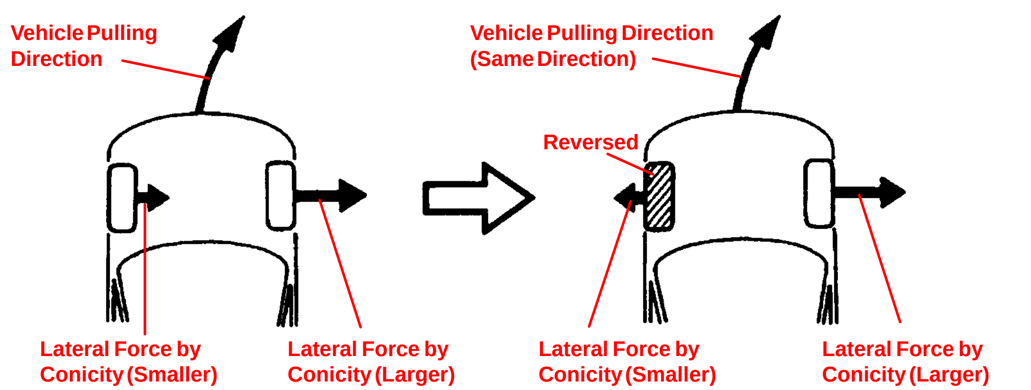
HINT:

By performing this operation, it can be checked whether the left or right tire exerts a stronger lateral force. Either tire can be reversed. Shown here is an example of the left tire reversed.

If Vehicle Pulls in the Same Direction: Go to STEP 2.

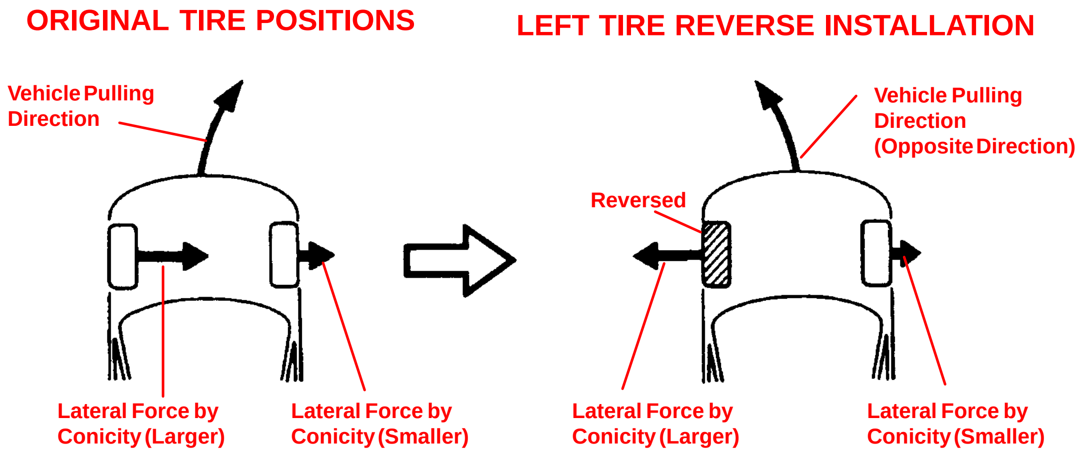
The lateral force generated by the right front tire is greater than the left tire, so the vehicle is pulling due to the lateral force of the right tire.

ORIGINAL TIRE POSITIONS **LEFT TIRE REVERSE INSTALLATION**



Repair Procedures (Continued)

If Vehicle Pulls in the Opposite Direction: Go to STEP 2.
The lateral force generated by the left front tire is greater than the right tire, so the vehicle is pulling due to the lateral force of the left tire.



If Vehicle Pull Is Eliminated: Repair Is Now Complete.

The lateral force generated by the left and right front tires is virtually the same, so the lateral force is neutralized and the vehicle travels straight ahead. The repair operation is now completed.

STEP 2:
Rotate the **larger** lateral force front tire with the rear tire and check the change in the vehicle pulling.

NOTE:
By shifting the front tire with the larger lateral force to the rear, the vehicle pulling level is usually reduced.

If Vehicle Is Still Pulling: Go to STEP 3.

If Vehicle Pull Is Eliminated: Repair Is Now Complete.

Repair Procedures
(Continued)

STEP 3:
Adjust cross camber to eliminate vehicle pulling.

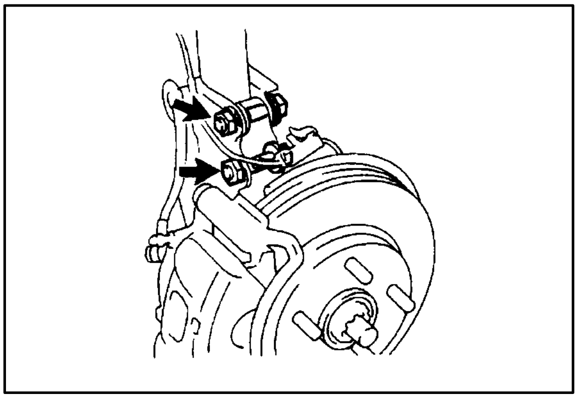
HINT:
If the tires are placed in the positions they were in during tire rotation when the least amount of vehicle pulling occurred, wheel alignment can be performed with a minimal amount of adjustment.

WHEN VEHICLE PULLS TO LEFT	WHEN VEHICLE PULLS TO RIGHT
Increase right front camber and decrease left front camber until vehicle pulling is eliminated	Increase left front camber and decrease right front camber until vehicle pulling is eliminated

NOTE:
- **Keep the cross camber within 1✓or less.**
- **Keep the camber of each wheel within specifications (+/–45’ of center value).**
- **If adjustment exceeds the specifications, uneven tire wear will result.**

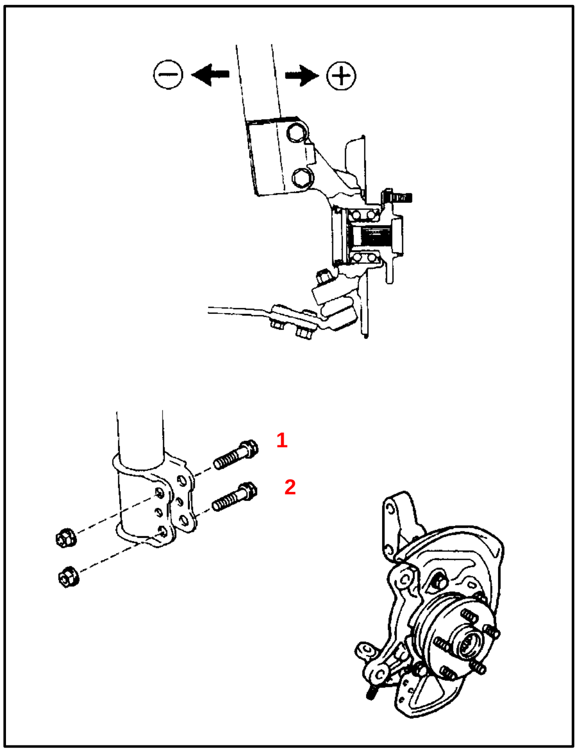
5. Camber Adjustment Method

NOTE:
After the camber has been adjusted, inspect the toe-in.



NOTE:
The method of camber adjustment differs for different models, so please refer to the repair manual of the vehicle involved. (This is a sample from the RX 300 Repair Manual).

A. Remove the front wheels and ABS speed sensor clamp.
B. Remove the two nuts on the lower side of the shock absorber.
C. Coat the threads of the nuts with engine oil.
D. Temporarily install the two nuts.
E. Adjust the camber by pushing or pulling the lower side of the shock absorber in the direction in which the camber adjustment is required.
F. Tighten the nuts.
Torque: 210 N•m
(2,150 kgf•cm, 155 ft•lbf)



Repair Procedures (Continued)

G. Install the front wheels.
Torque: 103 N•m (1,050 kgf•cm, 76 ft•lbf)

H. Check the camber.

NOTE:
Adjusting value for the <u>set bolts</u> is 6’ – 30’ (0.1° – 0.5°).
When making an adjustment of more than 45’, replace the upper and lower steering knuckle set bolts with the <u>adjusting bolts</u>. If the camber is not within the specification, use the table shown to estimate how much additional camber adjustment will be required, and select the appropriate camber adjusting bolt.

Bolt / Adjusting Value	Set Bolt		Adjusting Bolt: 1 Dot		Adjusting Bolt: 2 Dots		Adjusting Bolt: 3 Dots	
	11		•11		•11.		•11:	
	1	2	1	2	1	2	1	2
15’	●			●				
30’	●					●		
45’	●							●
1°00’			●					●
1°15’					●			●
1°30’							●	●

I. Follow steps 5–a through 5–h again. Between steps 5–b and 5–c, exchange one or two selected bolts.

HINT:
When exchanging the two bolts, exchange one bolt each time.

If Vehicle Pull Is Eliminated: Repair Is Now Complete.

If Vehicle Is Still Pulling: Contact Your Regional Office For Further Assistance.

Technical Service Information Bulletin

May 5, 2003

Title:

ECM RESET MEMORY FUNCTION

Models:

’98 – ’05 Applicable Models

TSIB REVISION NOTICE:

December 20, 2004: Applicable Vehicles section has been updated and modified, 2004 and 2005 model years added; and Reset Procedure 2 has been revised. Previous versions of this TSIB should be discarded.

Introduction

Whenever an automatic transmission is replaced, overhauled or individual components are replaced, use this procedure to erase Engine Control Module (ECM, SAE term: Powertrain Control Module, PCM) “Learned Values” and minimize subsequent performance concerns.

CAUTION:

Failure to follow the following procedure may lengthen the time to readjust the “Learned Values,” potentially resulting in performance concerns.

Applicable Vehicles

Refer to **Reset Procedure 1** for the following vehicles with Electronically Controlled Automatic Transmissions:

- **1999 – 2003** model year **ES 300** and **RX 300** vehicles.
- **2003 – 2005** model year **GX 470** vehicles.
- **2004 – 2005** model year **RX 330** vehicles.

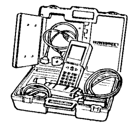
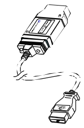
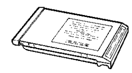
Refer to **Reset Procedure 2** for the following vehicles with Electronically Controlled Automatic Transmissions:

- **1998 – 2005** model year **GS 430/400/300, LS 430/400, LX 470,** and **SC 430/400/300** vehicles.
- **2001 – 2005** model year **IS 300** vehicles.

Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Required SSTs

SPECIAL SERVICE TOOLS (SSTs)		PART NUMBER	QUANTITY
Lexus Diagnostic Tester Kit*		01001270	1
CAN Interface Module Kit*		01002744	1
12 Megabyte Diagnostic Tester Program Card with version 12.01a Software (or later)*		01002593-005	1

* Essential SSTs.

NOTE:
Additional Diagnostic Tester Kits, CAN Interface Modules, Program Cards or other SSTs may be ordered by calling SPX/OTC at 1-800-933-8335.

Reset Procedure 1

1. Connect the Lexus Diagnostic Tester to the vehicle.
2. Reset the ECM (PCM). Refer to the procedures below.

A

APPLICATION SELECT

1: DIAGNOSIS
2: CUSTOMIZE
3: ECU REPROGRAM

B

FUNCTION SELECT FOR NORTH AMERICA

1: OBD/MOBD
2: ENHANCED OBD II
3: CARB OBD II
4: BREAK–OUT BOX
5: NVH
6: AUTOPROBE
7: 02 RPM CHECK
8: SNAPSHOT REVIEW
9: SETUP
0: GAS ANALYSIS

C

DIAGNOSTIC MENU ENGINE

1: DATA LIST
2: DTC INFO
3: ACTIVE TEST
4: SNAPSHOT
5: SYSTEM CHECK
6: RESET MEMORY
7: MONITOR STATUS
8: CHECK MODE

D

RESET MEMORY NOTICE

DO NOT USE THIS FUNCTION UNLESS INSTRUCTED BY REPAIR MANUAL.

ONLY USE AFTER REPLACING THE ENGINE, AUTO TRANS, OR ECM ON CERTAIN VEHICLES.

E

RESET MEMORY

EXECUTING THIS FUNCTION WILL RESET THE LEARNED VALUES IN THE ECM.

DO YOU WISH TO RESET THE ECM?
[YES] to CONTINUE
[NO] to EXIT

F

RESET MEMORY

RESETTING COMPLETE

PRESS [ENTER]

3. Start the engine and warm it up to normal operating temperatures before test–driving.
4. Perform a thorough test drive with several accelerations from a stop with “light throttle” application until proper transmission shifting is verified.

Reset Procedure 2

1. Disconnect the negative battery cable for 5 minutes.
2. Reconnect battery cable.
3. Start the engine and warm it up to normal operating temperatures before test–driving.
4. Perform a thorough test drive with several accelerations from a stop with “light throttle” application until proper transmission shifting is verified.

LEXUS

Technical Service Information Bulletin

August 4, 2005

Title:

A650E TRANSMISSION SOLENOID IDENTIFICATION

Models:

Applicable GS 300, GS 400, GS 430, IS 300, LS 400, LS 430, SC 400, & SC 430

TSIB

TC004-05

TRANSMISSION & CLUTCH

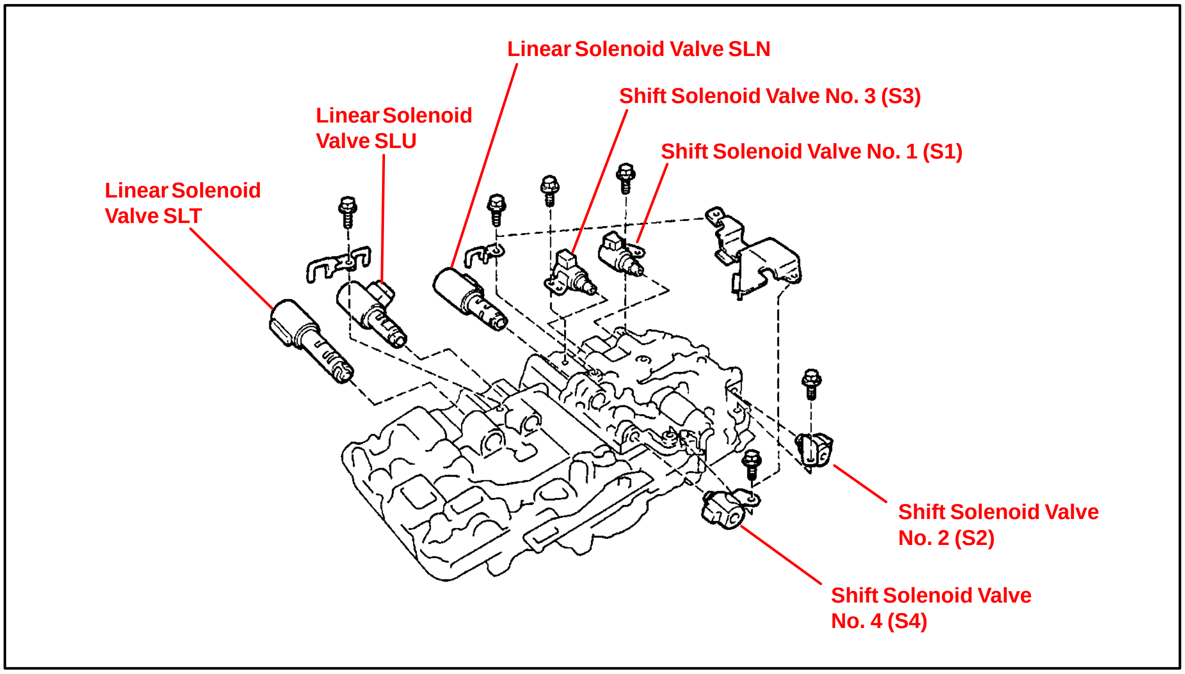
Introduction

This service bulletin provides information on the proper identification of the 7 solenoids used in the A650E transmission.

Applicable Vehicles

- **1998 – 2005** model year **GS 300** vehicles.
- **1998 – 2000** model year **GS 400** vehicles.
- **2001 – 2005** model year **GS 430** vehicles.
- **2001 – 2005** model year **IS 300** vehicles.
- **1998 – 2000** model year **LS 400** vehicles.
- **2001 – 2003** model year **LS 430** vehicles.
- **1998 – 2000** model year **SC 400** vehicles.
- **2002 – 2005** model year **SC 430** vehicles.

Transmission Solenoid Identification



Warranty Information

OP CODE	DESCRIPTION	TIME	OFP	T1	T2
N/A	Not Applicable to Warranty	–	–	–	–

Lexus Supports ASE Certification

Parts Information

Provided below is a chart listing the repair manual name of each solenoid used in the A650E transmission as well as the part name description provided in the electronic parts catalog.

REPAIR MANUAL SOLENOID NAME	PART CATALOG DESCRIPTION
S1	Solenoid Assembly, Automatic Transmission 3–Way No. 1
S2	Solenoid Assembly, Transmission No. 3 (No. 1)
S3	Solenoid Assembly, Automatic Transmission 3–Way No. 2
S4	Solenoid Assembly, Transmission No. 3 (No. 2)
SLN	Solenoid Assembly, Shift Control
SLT	Solenoid Assembly, Line Pressure Control
SLU	Solenoid Assembly, Lock–up Control

NOTE:

Part numbers have not been included due to possible future part number changes. Refer to the parts catalog for proper current part number.