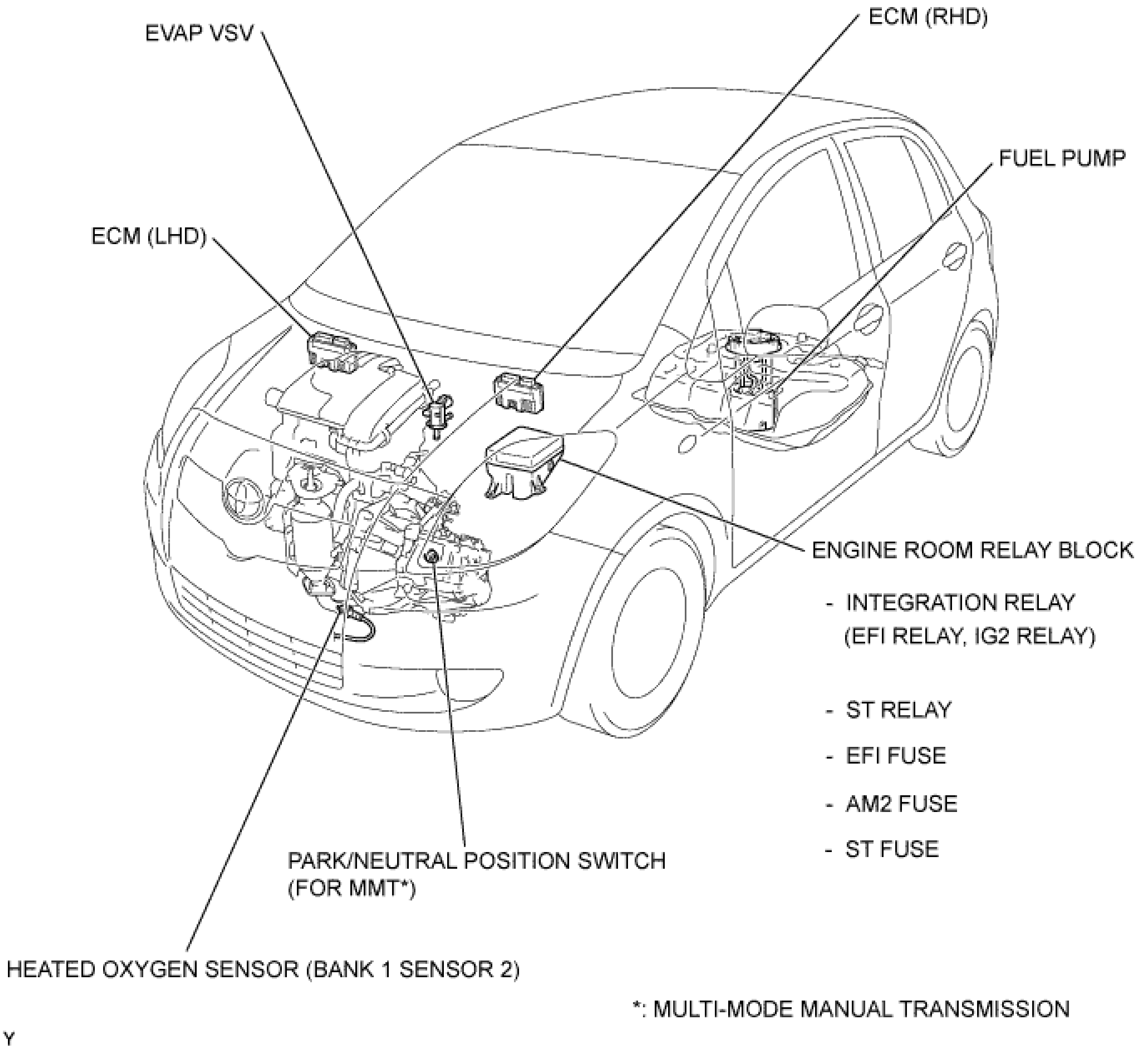
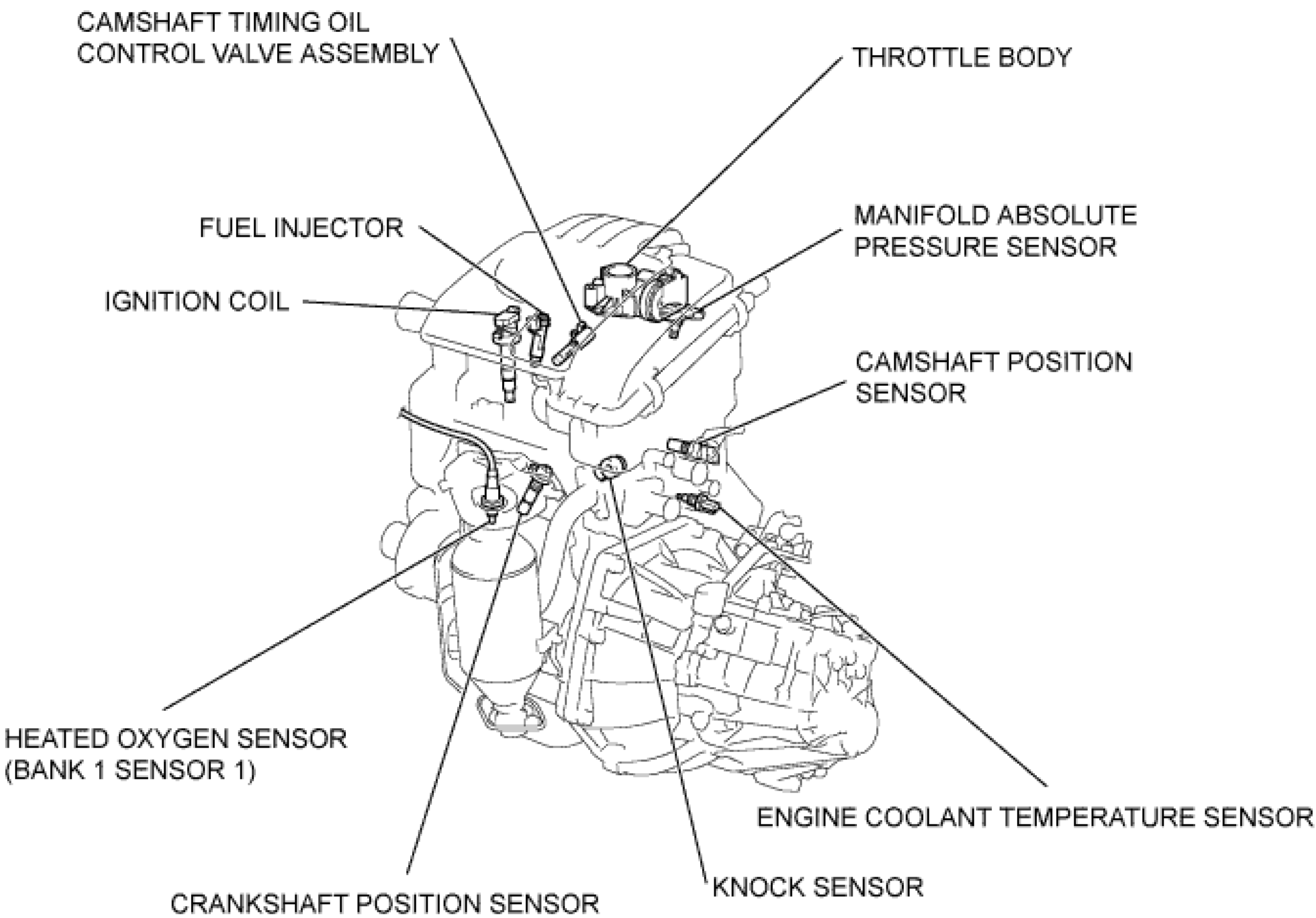
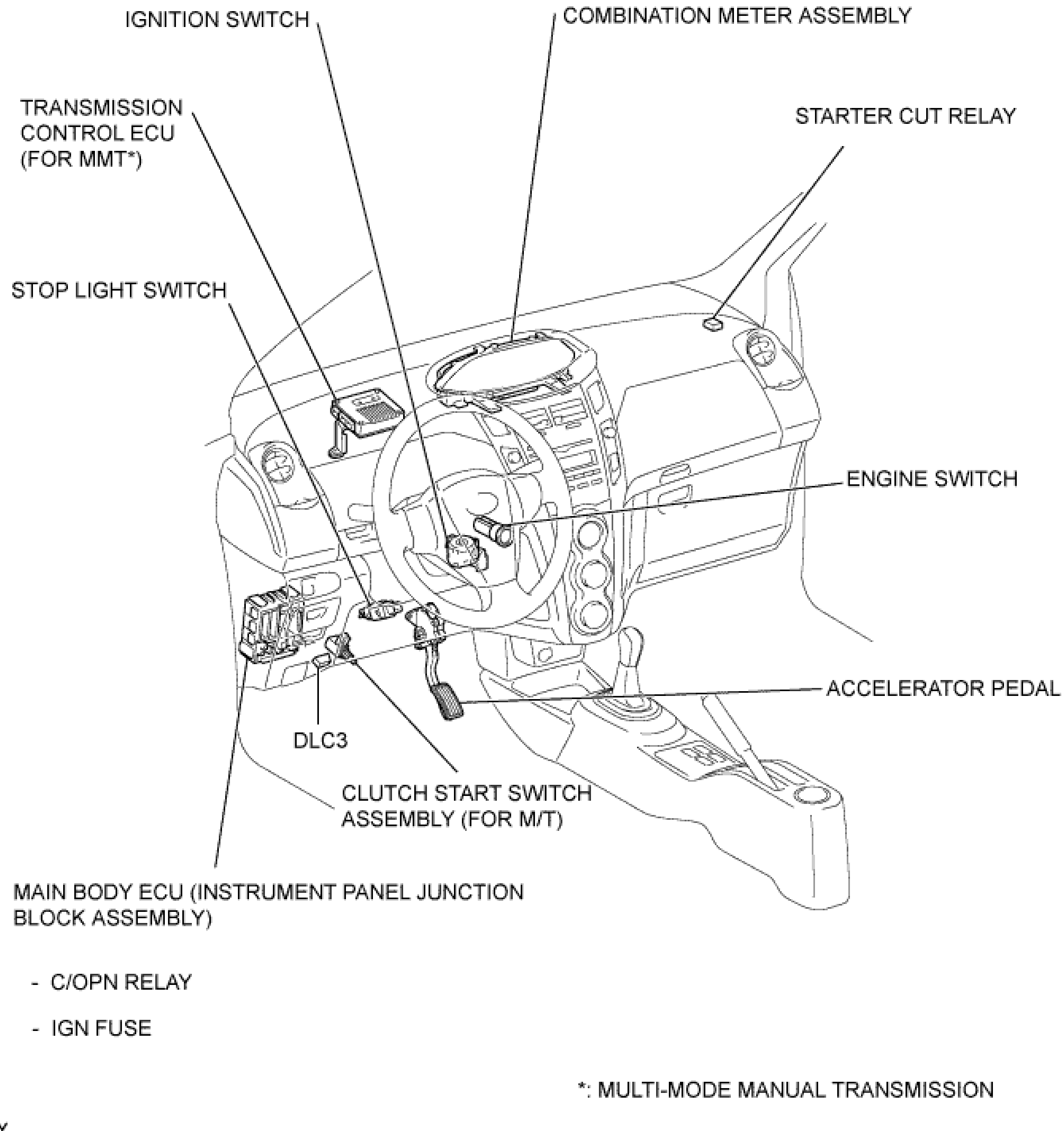
SFI SYSTEM > PARTS LOCATION


EVAP VSV
ECM (RHD)
FUEL PUMP
ECM (LHD)
ENGINE ROOM RELAY BLOCK
- INTEGRATION RELAY
(EFI RELAY, IG2 RELAY)
- ST RELAY
- EFI FUSE
- AM2 FUSE
- ST FUSE
PARK/NEUTRAL POSITION SWITCH
(FOR MMT*)
HEATED OXYGEN SENSOR (BANK 1 SENSOR 2)
*: MULTI-MODE MANUAL TRANSMISSION
Y

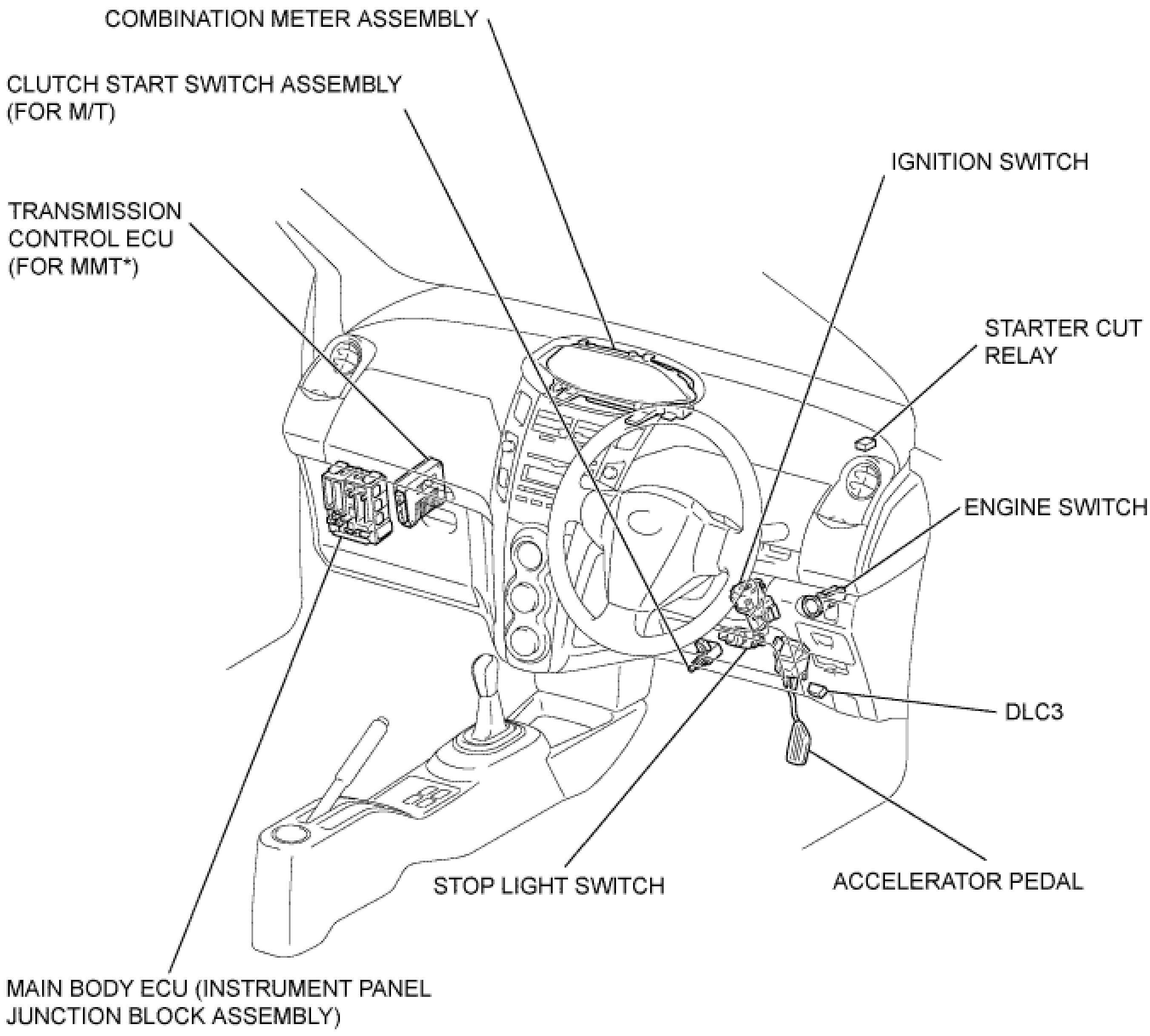

CAMSHAFT TIMING OIL
CONTROL VALVE ASSEMBLY
THROTTLE BODY
FUEL INJECTOR
MANIFOLD ABSOLUTE
PRESSURE SENSOR
IGNITION COIL
CAMSHAFT POSITION
SENSOR
HEATED OXYGEN SENSOR
(BANK 1 SENSOR 1)
ENGINE COOLANT TEMPERATURE SENSOR
CRANKSHAFT POSITION SENSOR
KNOCK SENSOR

Y

FOR LHD:


IGNITION SWITCH
COMBINATION METER ASSEMBLY
TRANSMISSION CONTROL ECU (FOR MMT*)
STARTER CUT RELAY
STOP LIGHT SWITCH
ENGINE SWITCH
ACCELERATOR PEDAL
DLC3
CLUTCH START SWITCH ASSEMBLY (FOR M/T)
MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY)
- C/OPN RELAY
- IGN FUSE
*: MULTI-MODE MANUAL TRANSMISSION
Y

FOR RHD:



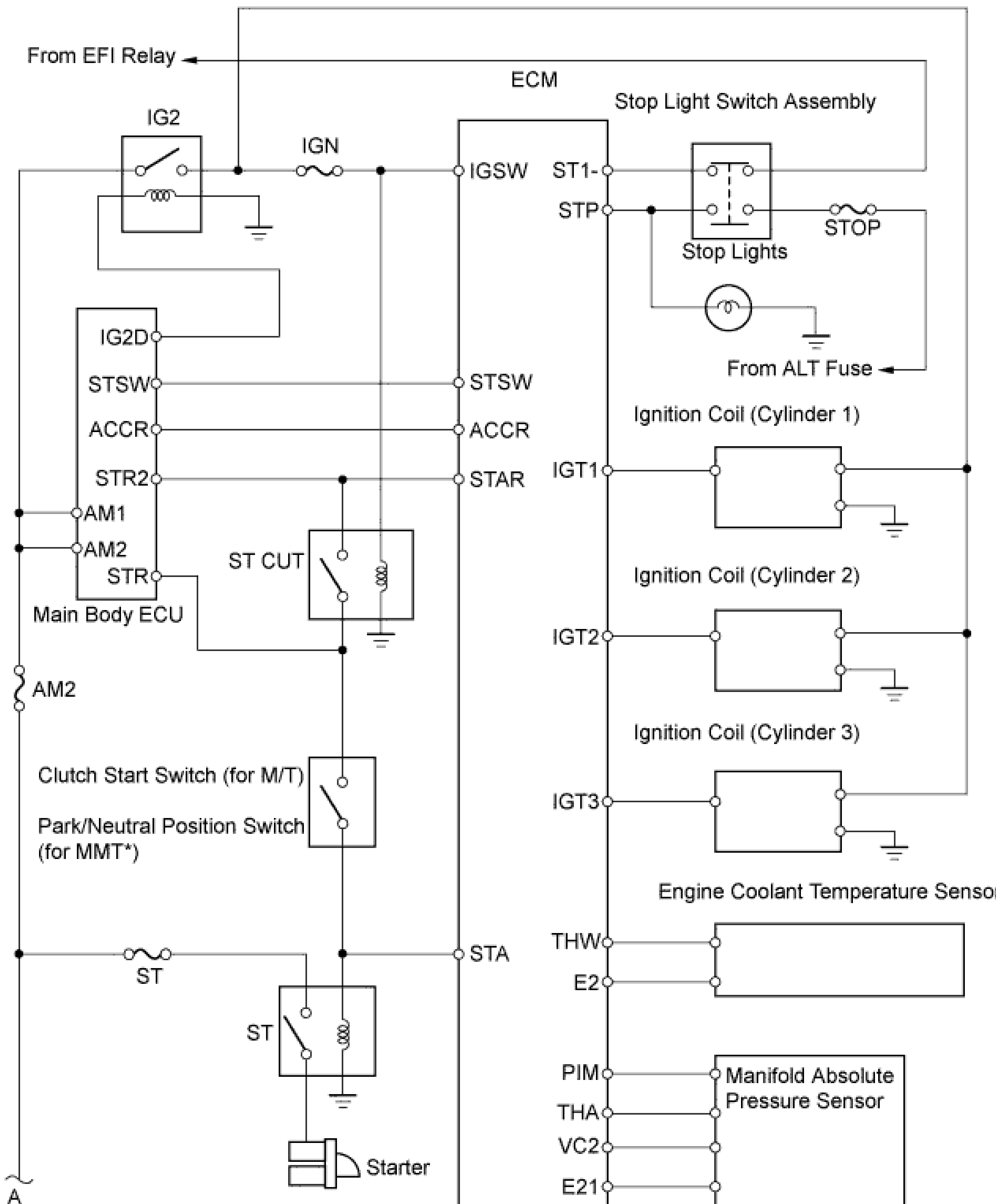
- C/OPN RELAY
- IGN FUSE

*: MULTI-MODE MANUAL TRANSMISSION

Y

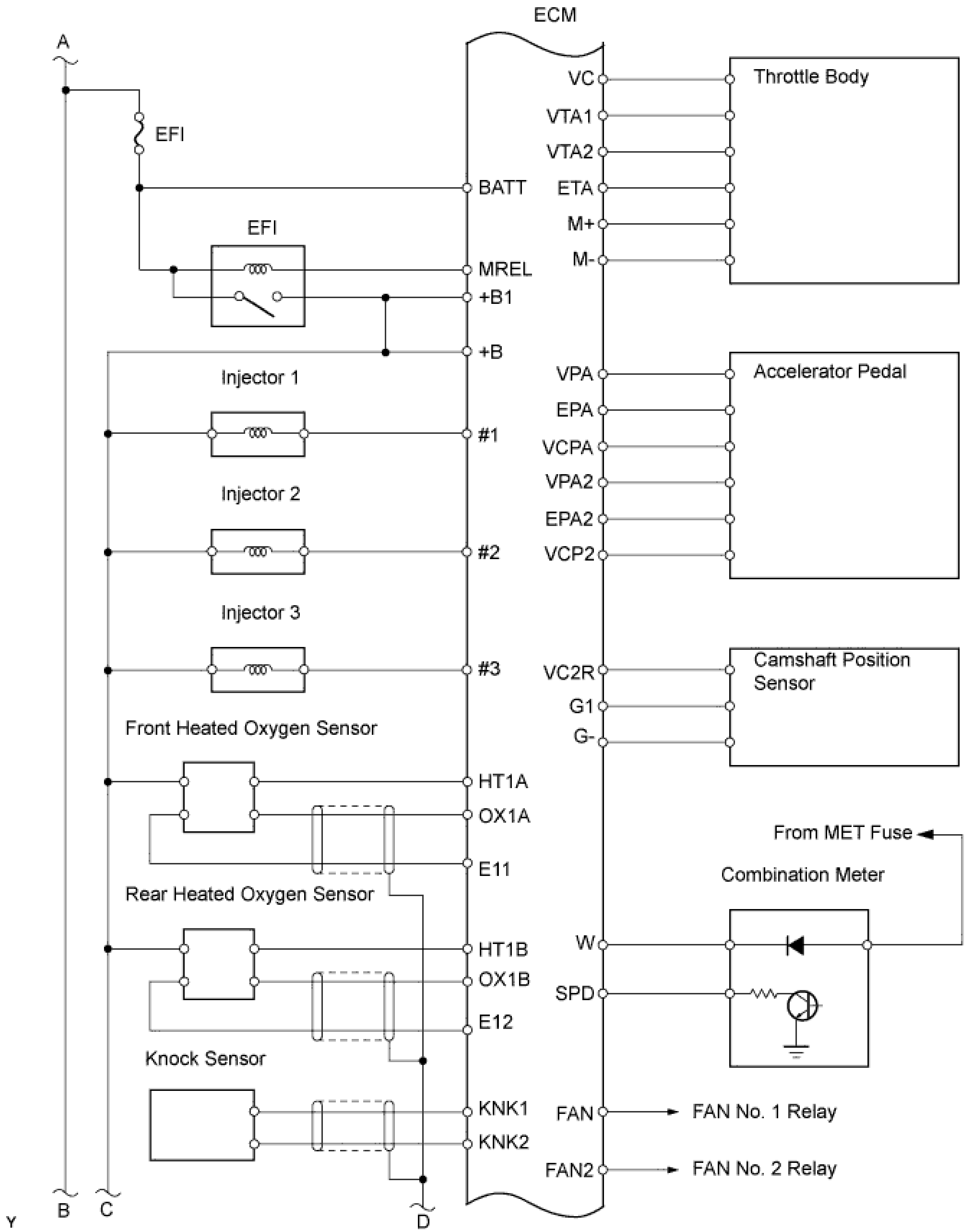
SFI SYSTEM > SYSTEM DIAGRAM

WITH ENTRY AND START SYSTEM:

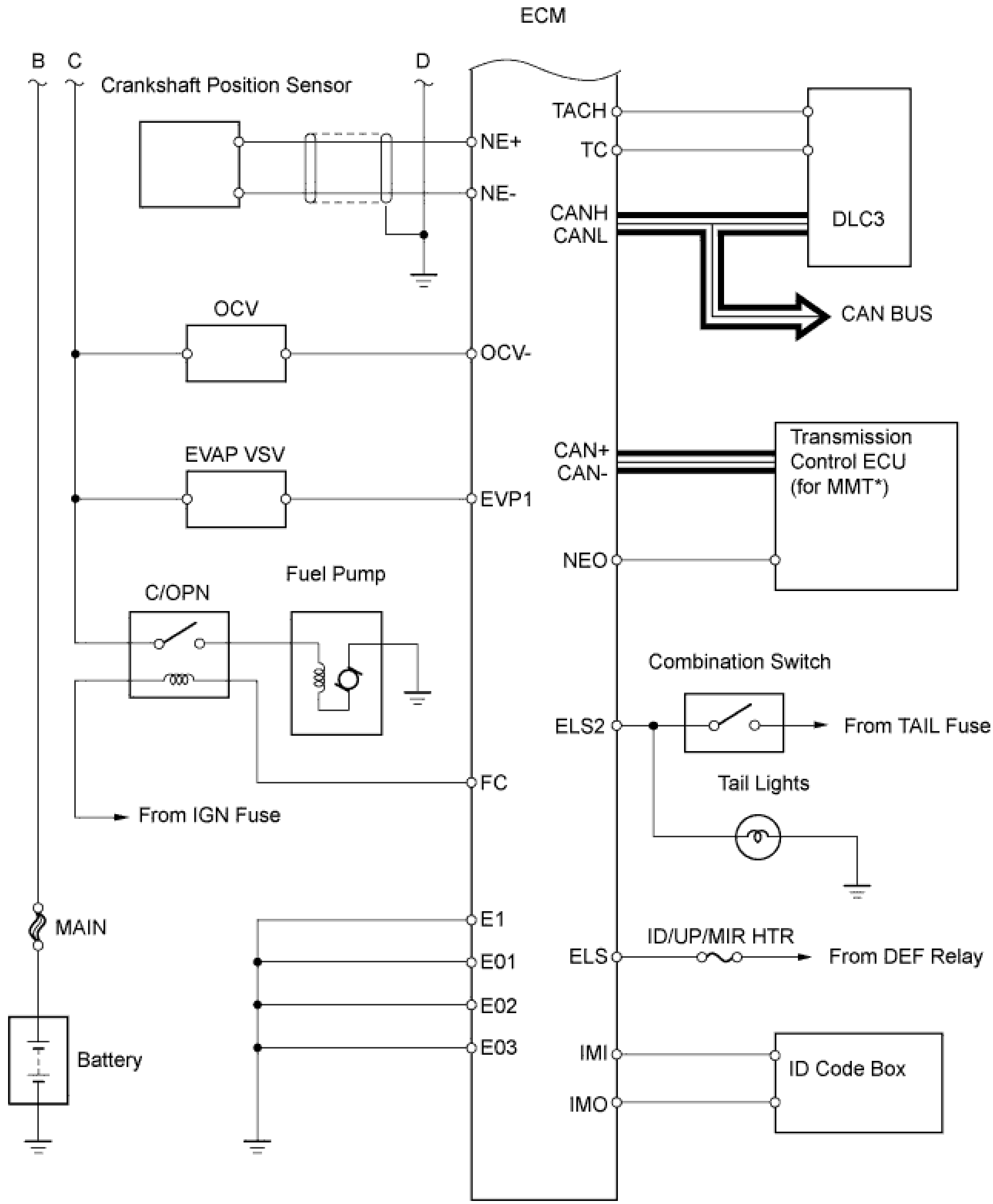


*: Multi-Mode Manual Transmission

Y



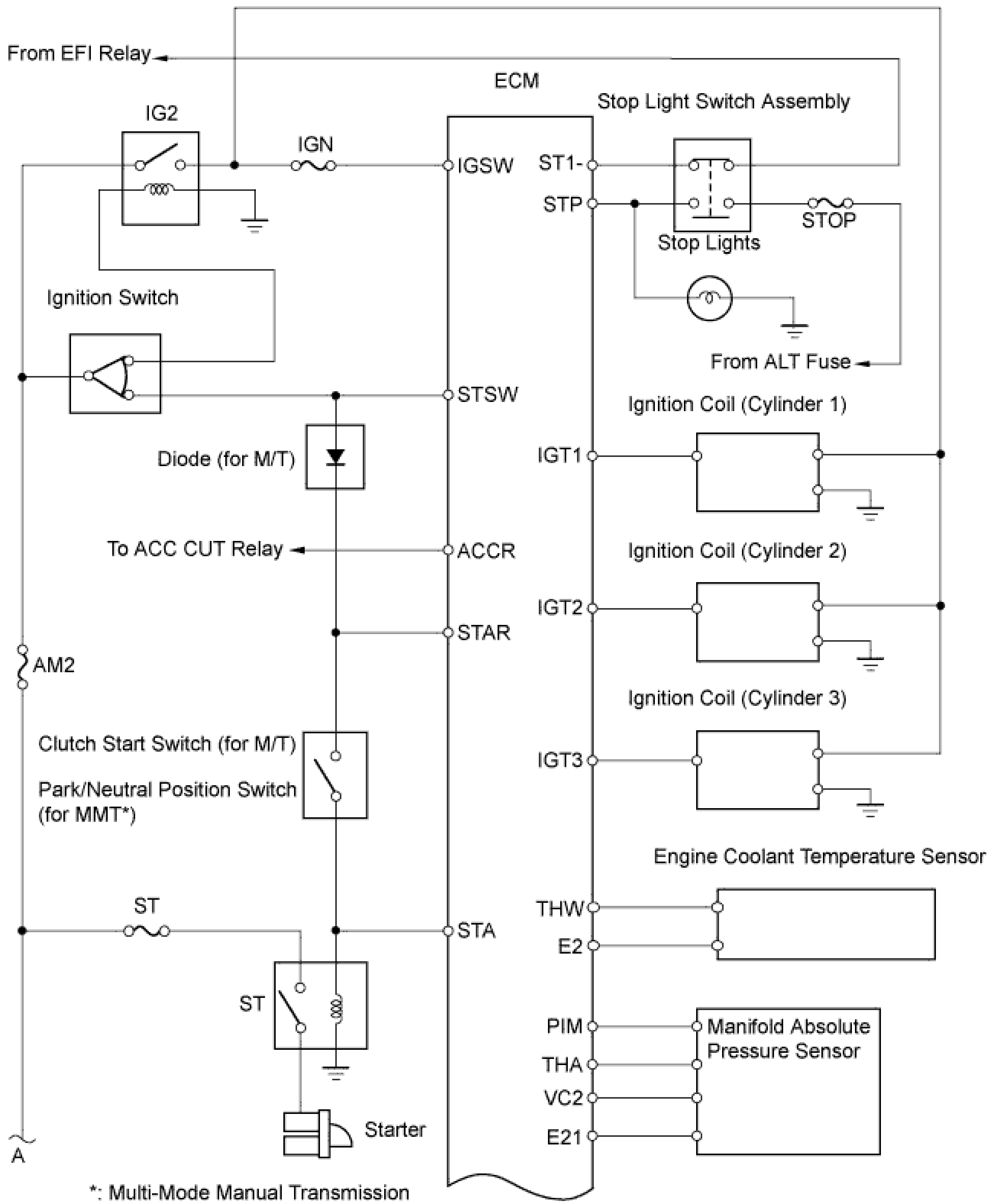
ECM
A
EFI
BATT
EFI
MREL
+B1
+B
Injector 1
#1
Injector 2
#2
Injector 3
#3
Front Heated Oxygen Sensor
HT1A
OX1A
E11
Rear Heated Oxygen Sensor
HT1B
OX1B
E12
Knock Sensor
KNK1
KNK2
B
C
D
Y
VC
VTA1
VTA2
ETA
M+
M-
Throttle Body
VPA
EPA
VCPA
VPA2
EPA2
VCP2
Accelerator Pedal
VC2R
G1
G-
Camshaft Position Sensor
From MET Fuse
Combination Meter
W
SPD
FAN
FAN No. 1 Relay
FAN2
FAN No. 2 Relay



*: Multi-Mode Manual Transmission

Y

WITHOUT ENTRY AND START SYSTEM:



*: Multi-Mode Manual Transmission

Y

SFI SYSTEM > PROBLEM SYMPTOMS TABLE

HINT:

- When a malfunction is not confirmed by a DTC check and the cause of the problem cannot be identified through a basic inspection, troubleshoot according to the priority order indicated in the table below.
- Inspect the fuse and relay before confirming the suspected areas as shown in the chart below.

NOTICE:
When removing the following parts, follow the precautions on the relevant pages.

SFI SYSTEM		
Symptom	Suspected area	See page
Engine does not crank (Does not start)	1. Starter signal circuit (Cranking holding function circuit)	
	2. Battery	
	3. Starter (for 0.8 kW type)	
	4. Starter (for 1.0 kW type)	
	5. ST relay	
	6. VC output circuit	
	7. Clutch start switch	
	8. ECM	
No initial combustion (Does not start)	1. ECM power source circuit	
	2. Fuel pump control circuit	
	3. VC output circuit	
	4. ECM	
Incomplete combustion	1. Fuel pump control circuit	
Engine cranks normally but difficult to start	1. Starter signal circuit (Cranking holding function circuit)	
	2. Fuel pump control circuit	
	3. Compression	
Difficult to start with cold engine	1. Starter signal circuit (Cranking holding function circuit)	
	2. Fuel pump control circuit	
Difficult to start with hot engine	1. Starter signal circuit (Cranking holding function circuit)	
	2. Fuel pump control circuit	
High engine idling speed	1. A/C signal circuit (Compressor circuit) for manual air conditioning system	

	2. A/C signal circuit (Compressor circuit) for automatic air conditioning system	
	3. ECM power source circuit	
Low engine idling speed	1. A/C signal circuit (Compressor circuit) for manual air conditioning system	
	2. A/C signal circuit (Compressor circuit) for automatic air conditioning system	
	3. Fuel pump control circuit	
Rough idling (Poor idling)	1. Compression	
	2. Fuel pump control circuit	
Hunting (Poor idling)	1. ECM power source circuit	
	2. Fuel pump control circuit	
Hesitation/Poor acceleration (Poor drivability)	1. Fuel pump control circuit	
Surging (Poor drivability)	1. Fuel pump control circuit	
Engine stalls soon after starting	1. Fuel pump control circuit	
Engine stalls during A/C operation	1. A/C signal circuit (Compressor circuit) for manual air conditioning system	
	2. A/C signal circuit (Compressor circuit) for automatic air conditioning system	
	3. ECM	

SFI SYSTEM > PROBLEM SYMPTOMS TABLE

HINT:

- When a malfunction is not confirmed by a DTC check and the cause of the problem cannot be identified through a basic inspection, troubleshoot according to the priority order indicated in the table below.
- Inspect the fuse and relay before confirming the suspected areas as shown in the chart below.

NOTICE:

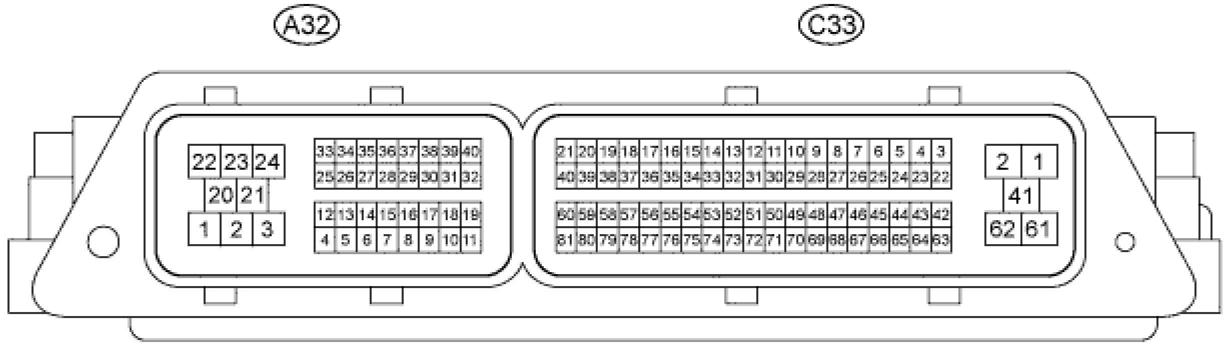
When removing the following parts, follow the precautions on the relevant pages.

SFI SYSTEM		
Symptom	Suspected area	See page
Engine does not crank (Does not start)	1. Starter signal circuit (Cranking holding function circuit)	
	2. Battery	
	3. Starter (for 0.8 kW type)	
	4. Starter (for 1.0 kW type)	
	5. Starter (for 0.9 kW type)	
	6. Starter (for 1.3 kW type)	
	7. ST relay	

	8. VC output circuit	
	9. Clutch start switch (for M/T models)	
	10. Park/neutral position switch (for MMT models)	
	11. Stop light switch circuit (for MMT models)	
	12. Multi-mode manual transmission system	
	13. ECM	
No initial combustion (Does not start)	1. ECM power source circuit	
	2. Fuel pump control circuit	
	3. VC output circuit	
	4. ECM	
Incomplete combustion	1. Fuel pump control circuit	
Engine cranks normally but difficult to start	1. Starter signal circuit (Cranking holding function circuit)	
	2. Fuel pump control circuit	
	3. Compression	
Difficult to start with cold engine	1. Starter signal circuit (Cranking holding function circuit)	
	2. Fuel pump control circuit	
Difficult to start with hot engine	1. Starter signal circuit (Cranking holding function circuit)	
	2. Fuel pump control circuit	
High engine idling speed	1. A/C signal circuit (Compressor circuit) for manual air conditioning system	
	2. A/C signal circuit (Compressor circuit) for automatic air conditioning system	
	3. ECM power source circuit	
Low engine idling speed	1. A/C signal circuit (Compressor circuit) for manual air conditioning system	
	2. A/C signal circuit (Compressor circuit) for automatic air conditioning system	
	3. Fuel pump control circuit	
Rough idling (Poor idling)	1. Compression	
	2. Fuel pump control circuit	
Hunting (Poor idling)	1. ECM power source circuit	
	2. Fuel pump control circuit	
Hesitation/Poor acceleration	1. Fuel pump control circuit	

(Poor drivability)		
Surging (Poor drivability)	1. Fuel pump control circuit	
Engine stalls soon after starting	1. Fuel pump control circuit	
Engine stalls during A/C operation	1. A/C signal circuit (Compressor circuit) for manual air conditioning system	
	2. A/C signal circuit (Compressor circuit) for automatic air conditioning system	
	3. ECM	

SFI SYSTEM > TERMINALS OF ECM



Y

HINT:

The standard normal voltage between each pair of ECM terminals is shown in the table below. The appropriate conditions for checking each pair of terminals are also indicated. The result of checks should be compared with the standard normal voltage for that pair of terminals, displayed in the STD Voltage column. The illustration above can be used as a reference to identify the ECM terminal locations.

Symbols (Terminals No.)	Wiring Colors	Terminal Descriptions	Conditions	STD Voltages
BATT (A32-22) - E1 (A32-1)	V - W-B	Battery (for measuring battery voltage and for ECM memory)	Always	9 to 14 V
IGSW (A32-4) - E1 (A32-1)	R - W-B	Ignition switch	Ignition switch on (IG)	9 to 14 V
+B (A32-24) - E1 (A32-1)	B - W-B	Power source of ECM	Ignition switch on (IG)	9 to 14 V
+B1 (A32-	B - W-	Power source of	Ignition switch on	9 to 14 V

23) - E1 (A32-1)	B	ECM	(IG)	
MREL (A32-6) - E1 (A32-1)	GR - W-B	EFI relay	Ignition switch on (IG)	9 to 14 V
VC (C33-54) - ETA (C33-39)	W - SB	Power source of throttle position sensor (specific voltage)	Ignition switch on (IG)	4.5 to 5.5 V
VCPA (A32-11) - EPA (A32-9)	B - G	Power source of accelerator pedal position sensor (for VPA)	Ignition switch on (IG)	4.5 to 5.5 V
VCP2 (A32-19) - EPA2 (A32-17)	W - BR	Power source of accelerator pedal position sensor (for VPA2)	Ignition switch on (IG)	4.5 to 5.5 V
VC2 (C33-40) - E21 (C33-35)	W - G	Power source of manifold absolute pressure sensor (specific voltage)	Ignition switch on (IG)	4.5 to 5.5 V
VC2R (C33-74) - E1 (A32-1)	LG - W-B	Power source of camshaft position sensor (specific voltage)	Ignition switch on (IG)	4.5 to 5.5 V
PIM (C33-20) - E21 (C33-35)	GR - G	Manifold absolute pressure sensor	Idling	1.2 to 2.0 V
VTA1 (C33-21) - ETA (C33-39)	Y - SB	Throttle position sensor (for engine control)	Ignition switch on (IG), Accelerator pedal fully released	0.2 to 1.0 V
VTA1 (C33-21) - ETA (C33-39)	Y - SB	Throttle position sensor 1 (for engine control)	Ignition switch on (IG), Accelerator pedal fully depressed	4.2 to 4.6 V
VTA2 (C33-37) - ETA (C33-39)	GR - SB	Throttle position sensor 2 (for engine control)	Ignition switch on (IG), Accelerator pedal fully released	4.2 to 4.8 V
VTA2 (C33-37) - ETA (C33-39)	GR - SB	Throttle position sensor 2 (for engine control)	Ignition switch on (IG), Accelerator pedal fully depressed	0.2 to 1.0 V

VPA (A32-10) - EPA (A32-9)	R - G	Accelerator pedal position sensor (for engine control)	Ignition switch on (IG), Accelerator pedal fully released	0.7 to 1.2 V
VPA (A32-10) - EPA (A32-9)	R - G	Accelerator pedal position sensor 1 (for engine control)	Ignition switch on (IG), Accelerator pedal fully depressed	2.8 to 4.6 V
VPA2 (A32-18) - EPA2 (A32-17)	L - BR	Accelerator pedal position sensor 2 (for engine control)	Ignition switch on (IG), Accelerator pedal fully released	1.2 to 2.0 V
VPA2 (A32-18) - EPA2 (A32-17)	L - BR	Accelerator pedal position sensor 2 (for engine control)	Ignition switch on (IG), Accelerator pedal fully depressed	3.6 to 4.0 V
THA (C33-76) - E21 (C33-35)	P - G	Intake air temperature sensor	Idling, Intake air temperature 20°C (68°F)	1.5 to 3.0 V
THW (C33-56) - E2 (C33-36)	L - P	Engine coolant temperature sensor	Idling, Engine coolant temperature 80°C (176°F)	0.2 to 1.0 V
#1 (C33-43) - E01 (A32-20) #2 (C33-42) - E01 (A32-20) #3 (C33-44) - E01 (A32-20)	SB - W-B GR - W-B P - W-B	Injector	Ignition switch on (IG)	9 to 14 V
IGT1 (C33-12) - E1 (A32-1) IGT2 (C33-10) - E1 (A32-1) IGT3 (C33-11) - E1 (A32-1)	W - W-B O - W-B G - W-B	Ignition coil with igniter (ignition signal)	Idling	Pulse generation (See waveform 1)
G1 (C33-13) - G- (C33-32)	R - W-B	Camshaft position sensor	Idling	Pulse generation (See waveform 2)
NE+ (C33-60) - NE-	L - P	Crankshaft position sensor	Idling	Pulse generation (See waveform 2)

(C33-81)				
STA (A32-27) - E1 (A32-1)	BR - W-B	Starter signal	Cranking	5.5 V or more
STSW (A32-12) - E1 (A32-1)	B - W-B	Engine cranking required signal	Ignition switch on (IG) → Cranking	Push start type engine switch: Below 1 V → 9 to 14 V momentary Mechanical type ignition switch: Below 1 V → 9 to 14 V
STAR (C33-80) - E1 (A32-1)	O - W-B	Starter relay drive signal	Cranking	9 to 14 V
ACCR (C33-4) - E1 (A32-1)	G - W-B	Accessory power cut signal	Ignition switch on (IG) → Cranking	9 to 14 V → Below 1 V
FC (C33-63) - E1 (A32-1)	V - W-B	Fuel pump control	Ignition switch on (IG)	9 to 14 V
OX1A (C33-18) - E11 (C33-17)	W - O	Heated oxygen sensor (Sensor 1)	Engine speed maintained at 2,500 rpm for 2 minutes after warming up sensor	Pulse generation (See waveform 3)
OX1B (C33-55) - E12 (C33-34)	Y - BR	Heated oxygen sensor (Sensor 2)	Engine speed maintained at 2,500 rpm for 2 minutes after warming up sensor	Pulse generation (See waveform 4)
HT1A (C33-41) - E1 (A32-1)	G - W-B	Heated oxygen sensor heater	Ignition switch on (IG)	9 to 14 V
HT1B (C33-62) - E1 (A32-1)	LG - W-B	Heated oxygen sensor heater	Ignition switch on (IG)	9 to 14 V
KNK1 (C33-78) - KNK2 (C33-57)	R - G	Knock sensor	Engine speed maintained at 4,000 rpm after warming up engine	Pulse generation (See waveform 5)
OCV- (C33-61) - E1	R - W-B	Camshaft timing oil control valve	Ignition switch on (IG)	Pulse generation (See waveform 6)

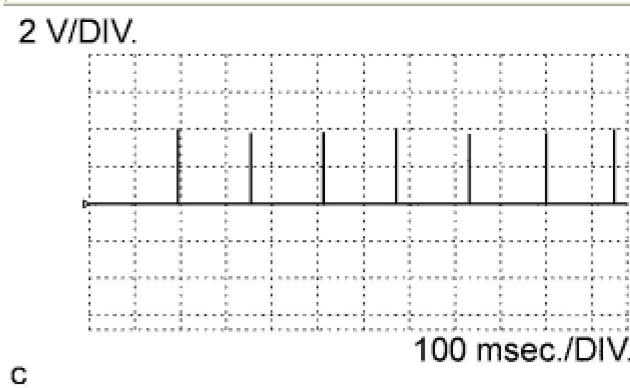
(A32-1)				
EVP1 (C33-22) - E1 (A32-1)	L - W-B	EVAP VSV	Ignition switch on (IG)	9 to 14 V
STP (A32-38) - E1 (A32-1)	G - W-B	Stop light switch	Brake pedal depressed	9 to 14 V
STP (A32-38) - E1 (A32-1)	G - W-B	Stop light switch	Brake pedal released	Below 1.5 V
ST1- (A32-16) - E1 (A32-1)	Y - W-B	Stop light switch	Brake pedal depressed	Below 1.5 V
ST1- (A32-16) - E1 (A32-1)	Y - W-B	Stop light switch	Brake pedal released	9 to 14 V
W (A32-39) - E1 (A32-1)	B - W-B	MIL	Ignition switch on (IG) (MIL goes off)	Below 3.0 V
SPD (A32-37) - E1 (A32-1)	V - W-B	Speed signal from combination meter	Vehicle speed of approximately 20 km/h (12 mph)	Pulse generation (See waveform 7)
M+ (A32-2) - M- (A32-3)	G - R	Throttle actuator	Idling with warm engine	Pulse generation (See waveform 8)
FAN (C33-23) - E1 (A32-1)	O - W-B	FAN No .1 relay	Ignition switch on (IG)	9 to 14 V: When radiator fan not operates Below 1 V: When radiator fan operates Radiator fan operates according to engine coolant temperature and air conditioning operation
FAN2 (C33-5) - E1 (A32-1)	W - W-B	FAN No. 2 relay	Ignition switch on (IG)	9 to 14 V: ECT 94.5°C (202.1°F) or less; Fan motor low speed control Below 1 V: ECT 96°C (204.8°F) or more; Fan motor high speed control

ELS (A32-36) - E1 (A32-1)	V - W-B	Rear defogger switch	Defogger ON	9 to 14 V
ELS2 (A32-28) - E1 (A32-1)	G - W-B	Tail light switch	Tail light ON	9 to 14 V
CANH (A32-25) - E1 (A32-1)	L - W-B	Communication signal with other components	Ignition switch on (IG)	Pulse generation (See waveform 9)
CANL (A32-33) - E1 (A32-1)	W - W-B	Communication signal with other components	Ignition switch on (IG)	Pulse generation (See waveform 10)
TACH (A32-32) - E1 (A32-1)	LG - W-B	Engine revolution signal	Idling	Pulse generation (See waveform 11)
TC (A32-7) - E1 (A32-1)	P - W-B	Mode switch signal	Ignition switch on (IG)	9 to 14 V
* CAN+ (A32-34) - CAN- (A32-26)	W - B	Communication signal with transmission control ECU	Ignition switch on (IG)	Pulse generation (See waveform 12)
* NEO (C33-64) - E1 (A32-1)	L - W-B	Engine speed signal	Idling	Pulse generation (See waveform 13)

HINT:

*: With Multi-mode Manual Transmission System

WAVEFORM 1



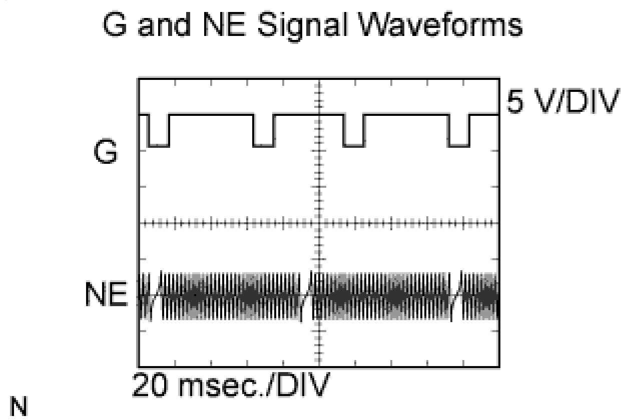
1. Igniter IGT signal (from ECM to igniter)

ECM Terminal	Between IGT1 (to

Name	IGT3) and E1
Tester Range	2 V/DIV, 20 msec/DIV
Condition	Idling

2. HINT:
3. The wavelength becomes shorter as engine rpm increases.

WAVEFORM 2

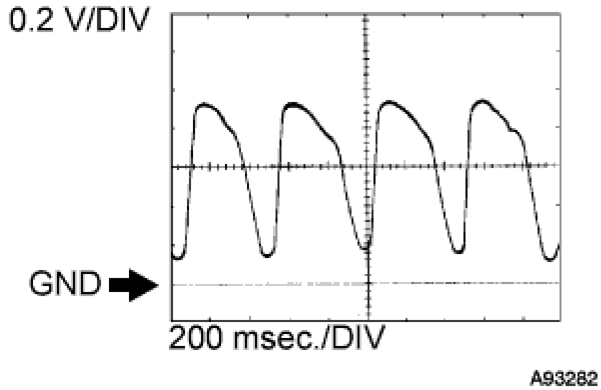


1. Camshaft position sensor
2. Crankshaft position sensor

ECM Terminal Name	(a) Between G1 and G- (b) Between NE+ and NE-
Tester Range	5 V/DIV, 20 msec/DIV
Condition	Idling after engine warmed up

3. HINT:
4. The wavelength becomes shorter as engine rpm increases.

WAVEFORM 3

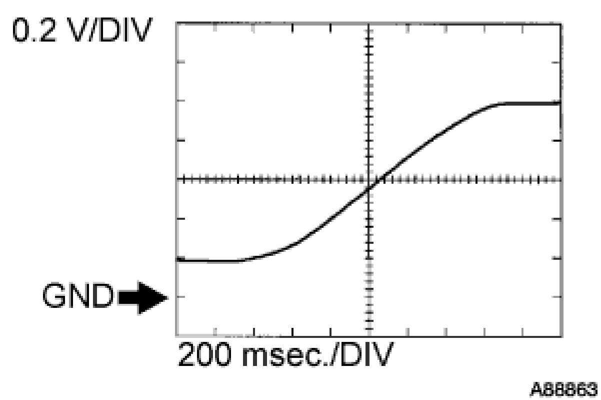


1. HO2S (sensor 1)

ECM Terminal Name	Between OX1A and E11
Tester Range	0.2 V/DIV, 200 msec/DIV
Condition	Engine RPM maintained at 2,500 rpm after engine warmed up

2. HINT:
3. In the Data List, the item HO2S B1 S1 shows the ECM input values of the HO2S (sensor 1).

WAVEFORM 4



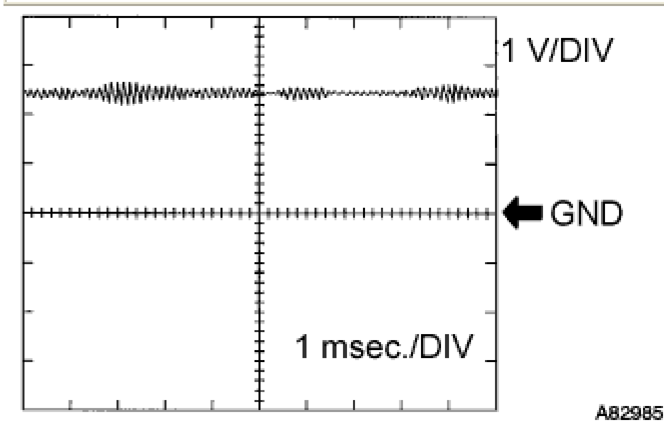
1. HO2S (sensor 2)

ECM Terminal	Between OX1B and E12

Name	
Tester Range	0.2 V/DIV, 200 msec/DIV
Condition	Engine RPM maintained at 2,500 rpm after engine warmed up

2. HINT:
3. In the Data List, the item HO2S B1 S2 shows the ECM input values of the HO2S (sensor 2).

WAVEFORM 5

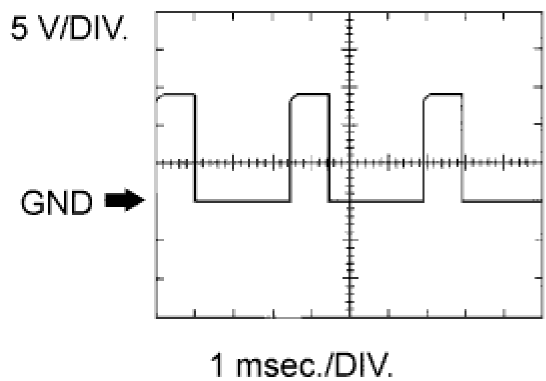


1. Knock sensor

ECM Terminal Name	Between KNK1 and KNK2
Tester Range	1 V/DIV, 1 msec/DIV
Condition	Engine RPM maintained at 2,500 rpm after engine warmed up

2. HINT:
    - The wavelength becomes shorter as engine rpm increases.
    - The waveforms and amplitudes displayed differ slightly depending on the vehicle.

WAVEFORM 6

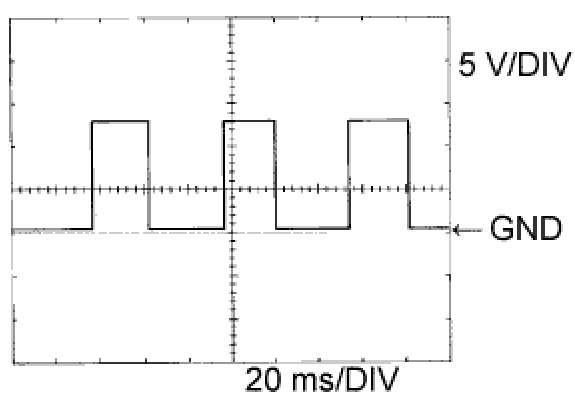


1. VVT OCV

ECM Terminal Name	Between OCV- and E1
Tester Range	5 V/DIV, 1 msec/DIV
Condition	Engine RPM maintained at 2,500 rpm after engine warmed up

2. HINT:
3. In the Data List, the item VVT OCV DUTY shows the duty ratio of voltage applied to the OCV ().

WAVEFORM 7



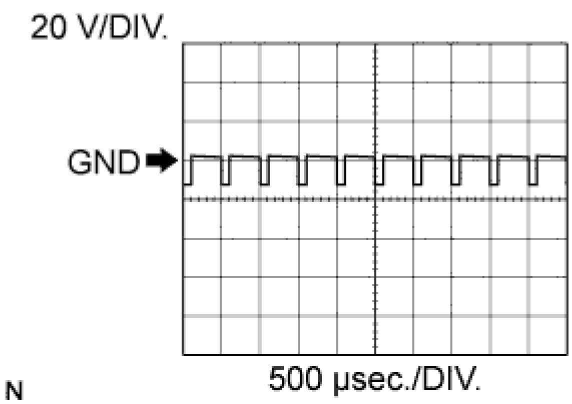
1. Vehicle speed signal

ECM	Between SPD and E1

Terminal Name	
Tester Range	5 V/DIV, 20 msec/DIV
Condition	Vehicle speed of approximately 20 km/h (12 mph)

2. HINT:
3. The wavelength becomes shorter as the vehicle speed increases.

WAVEFORM 8

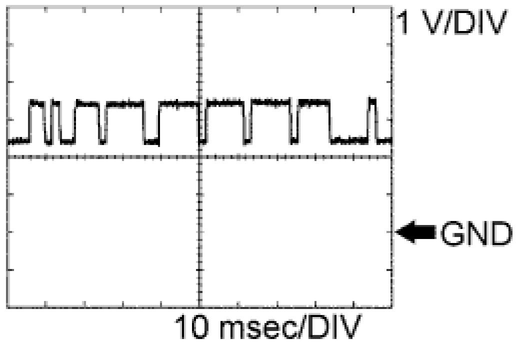


1. Throttle actuator

ECM Terminal Name	Between M+ and M-
Tester Range	20 V/DIV, 500 μsec/DIV
Condition	Idling after engine warmed up

2. HINT:
3. The duty ratio varies depending on the throttle actuator operation.

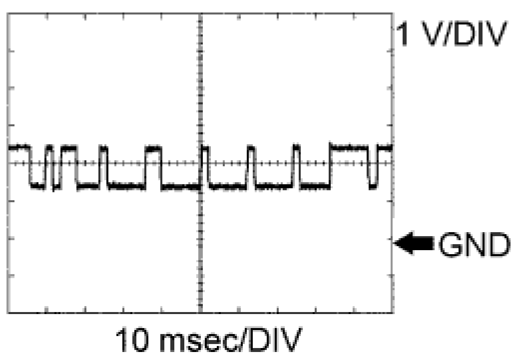
WAVEFORM 9



1. Communication signal

ECM Terminal Name	Between CANH and E1
Tester Range	1 V/DIV, 10 msec/DIV
Condition	Ignition switch on (IG)

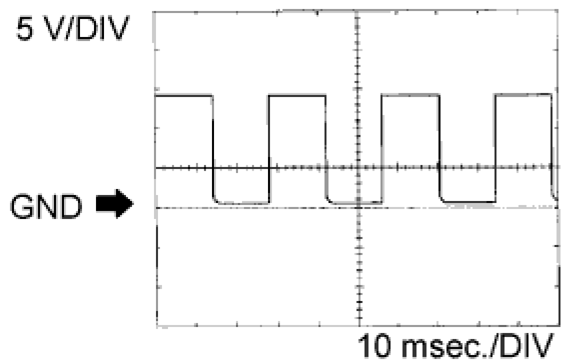
WAVEFORM 10



1. Communication signal

ECM Terminal Name	Between CANL and E1
Tester Range	1 V/DIV, 10 msec/DIV
Condition	Ignition switch on (IG)

WAVEFORM 11

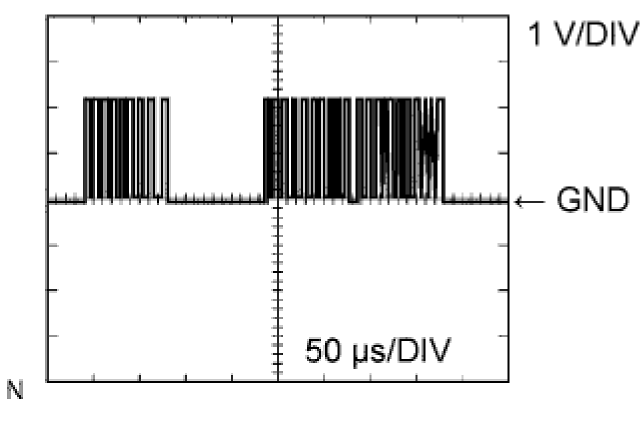


1. Engine speed signal

ECM Terminal Name	Between TACH and E1
Tester Range	5 V/DIV, 10 msec/DIV
Condition	Idling

2. HINT:
3. The wavelength becomes shorter as engine rpm increases.

WAVEFORM 12

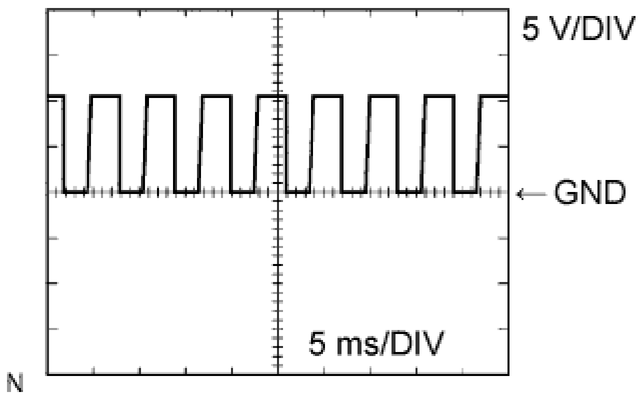


1. Communication signal with transmission control ECU (for Multi-mode Manual Transmission System)

ECM Terminal	Between CAN+ and

Name	CAN-
Tester Range	1 V/DIV, 50 μs/DIV
Condition	Ignition switch on (IG)

WAVEFORM 13



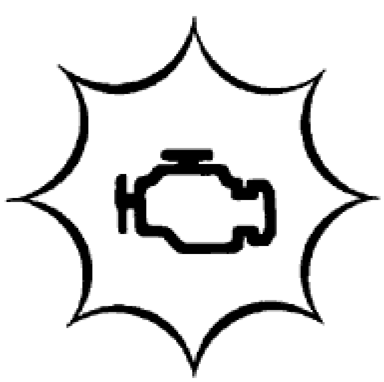
1. Engine speed signal (for Multi-mode Manual Transmission System)

ECM Terminal Name	Between NEO and E1
Tester Range	5 V/DIV, 5 ms/DIV
Condition	Idling

SFI SYSTEM > DIAGNOSIS SYSTEM

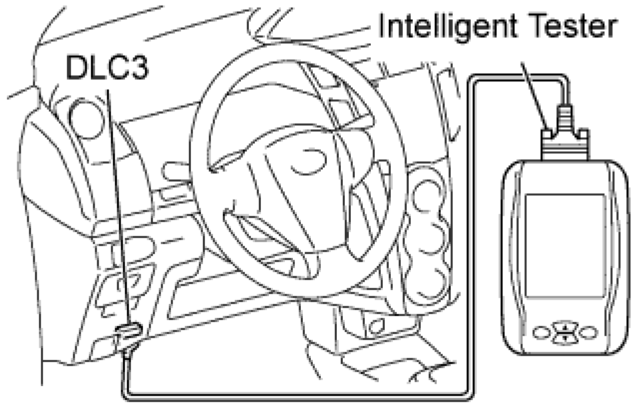
EURO-OBD (EUROPE)

When troubleshooting Europe On-Board Diagnostic (Euro-OBD) vehicles, the vehicle must be connected to an OBD scan tool (complying with ISO 15765-4). Various data output from the vehicle's ECM can then be read.
Euro-OBD regulations require that the vehicle's on-board computer illuminate the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in:



1. The emission control system/components

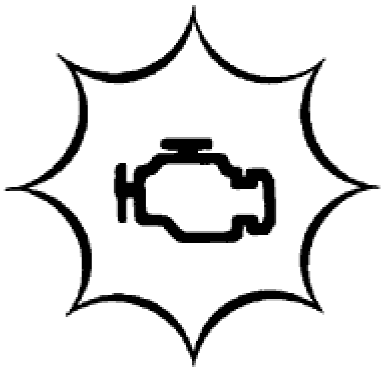
2. The power train control components (which affect vehicle emissions)



3. The computer
   In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by ISO 15765-4 are recorded in the ECM memory. If the malfunction does not recur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.
   To check DTCs, connect an intelligent tester or OBD scan tool to the Data Link Connector 3 (DLC3) of the vehicle.
   The scan tool displays DTCs, the freeze frame data and a variety of the engine data.
   The DTCs and freeze frame data can be erased with the scan tool ().

M-OBD (EXCEPT EUROPEAN SPEC.)

When troubleshooting Multiplex On-Board Diagnostic (M-OBD) vehicles, the vehicle must be connected to the intelligent tester. Various data output from the ECM can then be read.
OBD regulations require that the vehicle's on-board computer illuminate the MIL on the instrument panel when the computer detects a malfunction in:

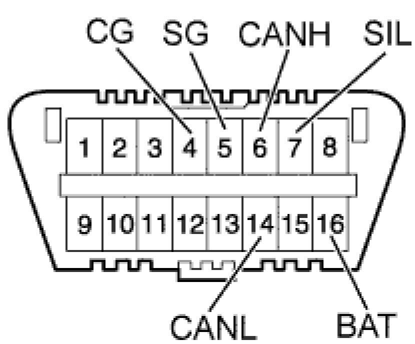


1. The emission control system/components
2. The power train control components (which affect vehicle emissions)
3. The computer
   In addition, the applicable DTCs are recorded in the ECM memory. If the malfunction does not recur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.

2-TRIP DETECTION LOGIC

When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected again after the engine switch is turned off and then on (IG), the MIL illuminates.

DLC3 (Data Link Connector 3)



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1. The ECM uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with ISO 15031-3 and matches the ISO 15765-4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 - Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1Ω or less	Always
SG	5	Signal ground	Body ground	1Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always
CANH	6	HIGH-lever CAN bus line	CANL	54 to 69 Ω	Ignition switch off *
CANH	6	HIGH-lever CAN bus line	Body ground	1 MΩ or higher	Ignition switch off *
CANH	6	HIGH-lever CAN bus line	CG	1 kΩ or higher	Ignition switch off *
CANL	14	LOW-lever CAN bus line	Body ground	1 MΩ or higher	Ignition switch off *
CANL	14	LOW-lever CAN bus line	CG	1 kΩ or higher	Ignition switch off *

2. NOTICE:
3. *: Before measuring the resistance, leave the vehicle as is for at least 1 minutes and do not operate the ignition switch, any other switches or the doors.
4. Connect the cable of the intelligent tester to the DLC3, turn the engine switch on (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the tester.
   If communication is normal when the tester is connected to another vehicle, inspect the DLC3 of the original vehicle.
   If communication is still not possible when the tester is connected to another vehicle, the problem may be in the tester itself. Consult the Service Department listed in the tester's instruction manual.

INSPECT BATTERY VOLTAGE

If the voltage is below 11 V, replace the battery before proceeding to the next step.
Standard voltage:
    11 to 14 V

CHECK MIL

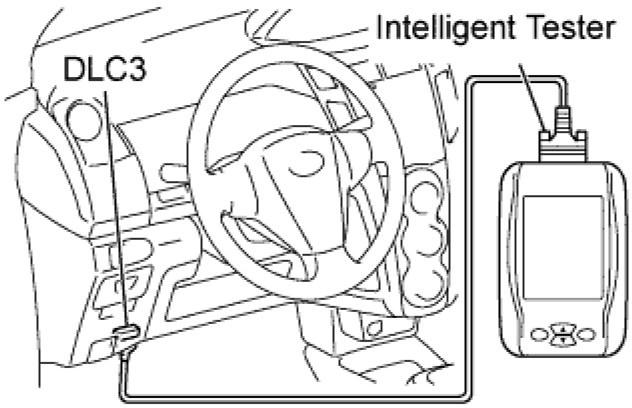
1. Check that the MIL illuminates when turning the engine switch on (IG).
   If the MIL does not illuminate, there is a problem in the MIL circuit ().
2. When the engine is started, the MIL should go off.

ALL READINESS

For this vehicle, using the intelligent tester allows readiness codes corresponding to all DTCs to be read. When diagnosis (normal or malfunctioning) is complete, readiness codes are set.

SFI SYSTEM > DTC CHECK / CLEAR

CHECK DTC



1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch on (IG) and turn the intelligent tester ON.
3. Select the following menu items: Powertrain / Engine and ECT / DTC.
4. Check DTCs and freeze frame data, and then write them down.

   HINT:
   If you need help using the intelligent tester, refer to the instruction manual.

5. Confirm the details of the DTCs. ()

FREEZE FRAME DATA

1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch on (IG) and turn the intelligent tester ON.
3. Read DTCs by selecting the following menu items: Powertrain / Engine and ECT / DTC.
4. Select a parameter(s) to check the freeze frame data.
5. Note down the DTC(s) and freeze frame data.

   HINT:
   If you need help using the intelligent tester, refer to the instruction manual.

CLEAR DTC AND FREEZE FRAME DATA (using the intelligent tester)

1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch on (IG) (do not start the engine) and turn the intelligent tester ON.
3. Select the following menu items: Powertrain / Engine and ECT / DTC / Clear.
4. Erase DTCs and freeze frame data by pressing the YES button on the tester.

   HINT:
   If you need help using the intelligent tester, refer to the instruction manual.

CLEAR DTC AND FREEZE FRAME DATA (not using the intelligent tester)

1. Remove the EFI fuse from the engine room R/B for more than 60 seconds, or disconnect the negative battery cable for more than 60 seconds.

SFI SYSTEM > FAIL-SAFE CHART

If any of the following DTCs are recorded, the ECM enters fail-safe mode to allow the vehicle to be driven temporarily.

DTC	Item	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0112 and P0113	Intake Air Temperature (IAT) sensor	ECM assumes that IAT is 20°C (68°F)	"Pass" condition detected
P0117 and P0118	Engine Coolant Temperature (ECT) sensor	ECM performs engine control using estimated ECT calculated from IAT at time of engine start and intake air volume	"Pass" condition detected
P0121, P0122, P0123, P0221, P0222 or P0223	Throttle Position (TP) sensor	ECM limits its accelerator pedal position sensor value to below 40%.	"Pass" condition detected and ignition switch off
P0135 and P0141	Heated Oxygen Sensor (HO2S) heater	If engine load is specific value or more, heater operates after specified length of time has elapsed	"Pass" condition detected
P0301, P0302 and P0303	Misfire detected	If misfire rate of cylinder exceeds catalytic damage misfire rate, fuel supply to that cylinder is suspended	"Pass" condition detected
P0327	Knock sensor	ECM sets ignition timing to maximum retard	"Pass" condition detected
P2111, P2101, P2102, P2103, P2118, P2129, P2109, P0606	Throttle control system	Power source of throttle control motor shut down, and engine speed is limited by fuel cut.	"Pass" condition detected and ignition switch off
P2122, P2123, P2128, P2127 or P2138	Accelerator position sensor	ECM limits its accelerator pedal position sensor value below 40%.	"Pass" condition detected and ignition switch off

"P2122 or P2123" and "P2128 or P2127 "	Accelerator position sensor	Drive with "First idle" condition	"Pass" condition detected and ignition switch off

SFI SYSTEM > DATA LIST / ACTIVE TEST

DATA LIST

HINT:

By reading the Data List displayed on an intelligent tester, you can check values, including those of the switches, sensors, and actuators, without removing any parts. Reading the Data List as the first step of troubleshooting is one method of shortening diagnostic time.

NOTICE:

In the table below, the values listed under Normal Conditions are for reference only. Do not depend solely on these values when determining whether or not a part is faulty.

1. Warm up the engine.
2. Turn the ignition switch off.
3. Connect an intelligent tester to the DLC3.
4. Turn the ignition switch on (IG) and turn the tester ON.
5. Select the following menu items: Powertrain / Engine and ECT / Data List.
6. Check the values by referring to the table below.

Items [Abbreviation]	Measurement Items: Display	Normal Conditions	Diagnostic Notes
Injector [Injector]	Injection period of No. 1 cylinder: Min.: 0 ms, Max.: 32.64 ms	1.3 to 3.1 ms: Idling	-
IGN Advance [Ign Advance]	Ignition timing advance for No. 1 cylinder: Min.: -64°, Max.: 63.5°	BTDC 0 to 15°: Idling	-
Calculate Load [Calc Load]	Calculated engine load by ECM: Min.: 0 %, Max.: 100 %	11 to 25 %: Idling 15 to 35 %: Running without load (2,500 rpm)	-
Vehicle Load [Vehicle Load]	Vehicle load: Min.: 0 %, Max.: 25700 %	-	Value calculated from MAP and Engine speed
MAP [MAP]	Intake manifold pressure: Min.: 0 kPa, Max.: 255 kPa	50 to 115 kPa: ignition switch on (IG) 17 to 39 kPa: Idling 22 to 50 kPa: 2,500 rpm	-

Engine Speed [Engine Spd]	Engine speed: Min.: 0 rpm, Max.: 16383.75 rpm	730 to 830rpm: Idling	-
Vehicle Speed [Vehicle Spd]	Vehicle speed: Min.: 0 km/h, Max.: 255 km/h	Actual vehicle speed	Speed indicated on speedometer
Coolant Temp [Coolant Temp]	Engine coolant temperature: Min.: -40°C, Max.: 140°C	75° to 95°C (167° to 203°F): After warming up engine	If value is -40°C (-40°F) or less: sensor circuit is open If value is 140°C (284°F) or more: sensor circuit is shorted
Intake Air [Intake Air]	Intake air temperature: Min.: -40°C, Max.: 140°C	Equivalent to ambient air temperature	If value is -40°C (-40°F) or less: sensor circuit is open If value is 140°C (284°F) or more: sensor circuit is shorted
Air-Fuel Ratio [Air-Fuel Ratio]	Air-fuel ratio: Min.: 0 , Max.: 1.999	0.8 to 1.2 : During idling	-
EVAP (Purge) VSV [Evap Purge VSV]	EVAP (Purge) VSV control duty: Min.: 0 %, Max.: 100 %	0 to 10 %: During Idling	Order signal from ECM
Knock Correct Learn Value [Knock Crrt Val]	Correction learning value of knocking: Min.: -64°CA, Max.: 1984°CA	-14 to 0°CA	Service data
Knock Feedback Value [Knock FB Val]	Feedback value of knocking: Min.: -64°CA, Max.: 1984°CA	-4.5 to 0°CA	Service data
Accelerator Position No. 1 [Accel Pos #1]	Absolute Accelerator Pedal Position (APP) No. 1: Min.: 0 %, Max.: 100 %	10 to 25 %: accelerator pedal released 60 to 90 %: accelerator pedal depressed	ETCS service data

Accelerator Position No. 2 [Accel Pos #2]	Absolute APP No. 2: Min.: 0 %, Max.: 100 %	20 to 45 %: accelerator pedal released 80 to 100 %: accelerator pedal depressed	ETCS service data
Accelerator Position No. 1 [Accel Pos #1]	APP sensor No. 1 voltage: Min.: 0 V, Max.: 5 V	0.7 to 1.2 V: accelerator pedal released 2.8 to 4.6 V: accelerator pedal depressed	ETCS service data
Accelerator Position No. 2 [Accel Pos #2]	APP sensor No. 2 voltage: Min.: 0 V, Max.: 5 V	1.2 to 2.0 V: accelerator pedal released 3.6 to 4.6 V: accelerator pedal depressed	ETCS service data
Accelerator Idle Position [Accel Idl Pos]	Whether or not accelerator pedal position sensor detecting idle: OFF or ON	ON: Idling	ETCS service data
Throttle Fully Close Learn [Thrtl Learn Val]	Throttle valve fully closed (learned value): Min.: 0 V, Max.: 5 V	0.6 to 0.9 V	ETCS service data
Fail Safe Drive [Fail #1]	Whether or not fail safe function executed: OFF or ON	ON: ETCS has failed	ETCS service data
Fail Safe Drive (Main CPU) [Fail #2]	Whether or not fail safe function executed: OFF or ON	ON: ETCS has failed	ETCS service data
ST1 [ST1]	Brake signal: OFF or ON	ON: Brake pedal depressed	-
Throttle Position [Throttle Pos]	Absolute throttle position sensor: Min.: 0 %, Max.: 100 %	10 to 22 %: Idling 75 to 95 %: Throttle fully open	Calculated value based on VTA1
Throttle Sensor	Throttle sensor	• 0 %:	Recognition value for

Position [Throttle Pos]	positioning: Min.: 0 %, Max.: 100 %	Accelerator pedal released • 64 to 96 %: Accelerator pedal fully depressed	throttle opening angle on ECM
Throttle Sensor Position #2 [Throttle Pos #2]	Throttle sensor positioning #2: Min.: 0 %, Max.: 100 %	-	Calculated value based on VTA2
Throttle Position No. 1 [Throttle Pos #1]	Throttle position No. 1: Min.: 0 V, Max.: 5 V	• 0.2 to 1.0 V: Throttle fully closed • 4.0 to 4.6 V: Throttle fully open	ETCS service data
Throttle Position No. 2 [Throttle Pos #2]	Throttle position No. 2: Min.: 0 V, Max.: 5 V	• 4.0 to 4.8 V: Throttle fully closed • 0.2 to 1.0 V: Throttle fully open	ETCS service data
Throttle Position Command [Thrtl Comnd Val]	Throttle position command value: Min.: 0 V, Max.: 4.9804 V	0.5 to 4.8 V	ETCS service data
Throttle Sens Open Pos #1 [Throttle Ssr #1]	Throttle sensor opener position No. 1: Min.: 0 V, Max.: 4.9804 V	0.6 to 0.9 V	ETCS service data
Throttle Sens Open Pos #2 [Throttle Ssr	Throttle sensor opener position No. 2:	2.2 to 2.6 V	ETCS service data

#2]	Min.: 0 V, Max.: 4.9804 V		
Throttle Sens Open #1(AD) [Thrtl Ssr #1 AD]	Throttle sensor opener position No. 1 (AD): Min.: 0 V, Max.: 4.9804 V	0.6 to 0.9 V	ETCS service data
Throttle Motor [Throttle Mot]	Whether or not throttle motor control permitted: OFF or ON	ON: Idling	ETCS service data
Throttle Motor [Throttle Mot]	Throttle motor: Min.: 0 %, Max.: 100 %	10 to 20 %: Idling	ETCS service data
Throttle Motor Duty (Open) [Thrtl Mot (Opn)]	Throttle motor duty ratio (open): Min.: 0 %, Max.: 100 %	0 to 40 %: Idling	ETCS service data
Throttle Motor Duty (Close) [Thrtl Mot (Cls)]	Throttle motor duty ratio (close): Min.: 0 %, Max.: 100 %	0 to 40 %: Idling	ETCS service data
O2S B1 S1 [O2S B1 S1]	Heated oxygen sensor output voltage for bank 1 sensor 1: Min.: 0 V, Max.: 1.275 V	0 to 1.0 V: Driving (50 km/h, 31 mph)	Performing Inj Vol function of Active Test enables technician to check voltage output of sensor
O2S B1 S2 [O2S B1 S2]	Heated oxygen sensor output voltage for bank 1 sensor 2: Min.: 0 V, Max.: 1.275 V	0 to 1.0 V: Driving (50 km/h, 31 mph)	Performing Inj Vol function of Active Test enables technician to check voltage output of sensor
Short FT #1 [Short FT #1]	Short-term fuel trim of bank 1: Min.: -100 %, Max.: 99.2 %	- 20 to 20 %	Short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
Long FT #1 [Long FT #1]	Long-term fuel trim of bank 1: Min.: -100 %, Max.: 99.2 %	- 20 to 20 %	Overall fuel compensation carried out in long-term to compensate continual

			deviation of short-term fuel trim from central value
Fuel System Status (Bank1) [Fuel Sys #1]	Fuel system status (Bank1): OL or CL or OL DRIVE or OL FAULT or CL FAULT	CL: Idling after warming up	OL (Open Loop): Has not yet satisfied conditions to go closed loop CL (Closed Loop): Using heated oxygen sensor as feedback for fuel control OL DRIVE: Open loop due to driving conditions (fuel enrichment) OL FAULT: Open loop due to detected system fault CL FAULT: Closed loop but heated oxygen sensor, which used for fuel control malfunctioning
Fuel System Status (Bank2) [Fuel Sys #2]	Fuel system status (Bank2): OL or CL or OL DRIVE or OL FAULT or CL FAULT	-	-
O2FT B1 S1 [O2FT B1 S1]	Short-term fuel trim associated with bank 1 sensor 1: Min.: -100 %, Max.: 99.2 %	-20 to 20 %	-
Catalyst Temp (B1 S1) [Cat Temp B1S1]	Catalyst temperature (Bank 1, Sensor 1): Min.: -40°C, Max.: 6513.5°C	-	-
Catalyst Temp (B1 S2) [Cat Temp	Catalyst temperature (Bank 1, Sensor	-	-

B1S2]	2): Min.: -40°C, Max.: 6513.5°C		
Initial Engine Coolant Temp [Ini Cool Temp]	Initial engine coolant temperature: Min.: -40°C, Max.: 120°C	Close to ambient air temperature	Service data
Initial Intake Air Temp [Ini Intake Temp]	Initial intake air temperature: Min.: -40°C, Max.: 120°C	Close to ambient air temperature	Service data
Injection Volume (Cylinder1) [Inj Vol]	Injection volume (cylinder 1): Min.: 0 ml, Max.: 2.048 ml	-	-
Starter Signal [Starter Sig]	Starter signal: OFF or ON	ON: Cranking	-
Starter Control [Starter Control]	Starter switch status: OFF or ON	ON: Cranking	Cranking requirement signal from ignition switch or main body ECU
Closed Throttle Position SW [Ctp SW]	Closed throttle position switch (idling position switch): OFF or ON	ON: Accelerator pedal released	-
A/C Signal [A/C Signal]	A/C signal: OFF or ON	ON: A/C ON	-
Neutral Position SW Signal [Pnp SW (NSW)]	Park/neutral position switch signal status (NSW signal): OFF or ON	-	-
Electrical Load Signal [Elect Load Sig]	Electrical load signal: OFF or ON	ON: Headlights or defogger turned ON	-
Stop Light Switch [Stop Light SW]	Stop lamp switch: OFF or ON	ON: Brake pedal depressed	-

+BM Voltage [+BM Voltage]	+BM terminal voltage: Min.: 0 , Max.: 19.92182	10 to 15 V: Idling	-
Battery Voltage [Batt]	Battery voltage: Min.: 0 V, Max.: 65.535 V	10 to 15 V: Idling	-
Actuator Power Supply [Actuator Power]	Actuator power supply: OFF or ON	ON: Idling	ETCS service data
EVAP Purge VSV [Evap (Purge) VSV]	VSV status for EVAP control: OFF or ON	-	Active Test support data
Fuel Pump/Speed Status [Fuel Pump / Spd]	Fuel pump/speed status: OFF or ON	-	Active Test support data
Electric Fan Motor [Fan Motor]	Radiator fan motor status: OFF or ON	-	Active Test support data
TC and TE1 [TC/TE1]	TC and TE1 terminals of DLC3: OFF or ON	-	Active Test support data
VVT Aim Angle (Bank1) [VVTL Aim Angl#1]	VVT aim angle (bank 1): Min.: 0 %, Max.: 100 %	0 %: Idling	VVT duty signal value during intrusive operation
VVT Change Angle (Bank1) [VVT Chng Angl#1]	VVT change angle: Min.: 0°FR, Max.: 60°FR	0°FR: Idling	Displacement angle during intrusive operation
VVT OCV Duty (Bank1) [VVT Ocv Duty B1]	VVT OCV operation duty: Min.: 0 %, Max.: 100 %	10 to 40 %: Idling	Requested duty value for intrusive operation
Idle Fuel Cut [FC Idl]	Fuel cut idle: OFF or ON	ON: Fuel cut operation	FC IDL is ON when throttle valve fully closed and engine speed over 2,800 rpm

Cylinder #1 Misfire Rate [Cyl #1]	Misfire ratio of cylinder 1: Min.: 0 , Max.: 255	0: No misfire	Displayed only during idling
Cylinder #2 Misfire Rate [Cyl #2]	Misfire ratio of cylinder 2: Min.: 0 , Max.: 255	0: No misfire	Displayed only during idling
Cylinder #3 Misfire Rate [Cyl #3]	Misfire ratio of cylinder 3: Min.: 0 , Max.: 255	0: No misfire	Displayed only during idling
All Cylinders Misfire Rate [Cyl All]	All cylinders misfire rate: Min.: 0 , Max.: 255	0 to 35	-
Misfire RPM [Misfire RPM]	Engine RPM for first misfire range: Min.: 0 rpm, Max.: 6375 rpm	0 rpm: Misfire 0	-
# Codes [# Codes]	Number of codes: Min.: 0 , Max.: 255	-	Number of detected DTCs
MIL ON Run Distance [MIL On Run Dist]	MIL ON Run Distance: Min.: 0 km, Max.: 65535 km	Distance after DTC detected	-
Running Time from MIL ON [MIL On Run Time]	Running time from MIL ON: Min.: 0 min, Max.: 65535 min	Equivalent to running time after MIL ON	-
Engine Run Time [Eng Run Time]	Engine run time: Min.: 0 s, Max.: 65535 s	Time after engine start	-
Time after DTC Cleared [Time DTC Clear]	Time after DTC cleared: Min.: 0 min, Max.: 65535 min	Equivalent to time after DTCs erased	-
Distance from DTC Cleared [Dist DTC	Distance after DTC cleared: Min.: 0 Km,	Equivalent to drive distance after DTCs erased	-

Clear]	Max.: 65535 Km		
Warmup Cycle Cleard DTC [Wu Cyc DTC clear]	Warm-up cycle after DTC cleared: Min.: 0 , Max.: 255	-	Number of warm-up cycles after DTC cleared
Model Code [Model Code]	Model code:	KSP	-
Engine Type [Engine Type]	Engine type:	1KRFE	-
Cylinder Number [Cylinder Number]	Number of cylinder	3	-
Transmission Type [Transmission Type]	Transmission type:	MT or MMT	-
Destination [destination]	Destination:	W: Europe	-
Model Year [Model Year]	Model year: Min.: 1900 MY, Max.: 2155 MY	2005	-
System Identification [System Identification]	System identification:	Gasoline	-

ACTIVE TEST

HINT:

Performing an Active Test enables components including the relays, VSV (Vacuum Switching Valve), and actuators, to be operated without removing any parts. The Active Test can be performed with an intelligent tester. Performing an Active Test as the first step of troubleshooting is one method of shortening diagnostic time. Data Lists can be displayed during Active Tests.

1. Connect an intelligent tester to the DLC3.
2. Turn the ignition switch on (IG).
3. Turn the tester ON.
4. Select the following menu items: Powertrain / Engine and ECT / Active Test.

5. Perform the Active Test by referring to the table below.

Items [Abbreviation]	Test Details	Control Ranges	Diagnostic Note
Control the Injection Volume [Inj Vol]	Change injection volume	Between -12.5 % and 24.8 %	• All injectors tested at same time • Perform test at less than 3,000 rpm • Injection volume can be changed in 1 % graduations within control range
Control the Injection Volume for A/F Sensor [A/F Control]	Change injection volume	Lower by 12.5 % or increase by 24.8 %	• Perform test at less than 3,000 rpm • Control the Injection Volume for A/F Sensor enables checking and graphing of Heated Oxygen (HO2) sensor voltage outputs • To conduct test, select following menu items: Active Test / Control the Injection Volume for A/F Sensor / User Data / O2S B1S1 and O2S B1S2
Activate the VSV for Evap Control [Evap VSV (Alone)]	Activate EVAP VSV control	ON/OFF	Only EVAP VSV is commanded during this test
Control the Fuel Pump / Speed [Fuel Pump / Spd]	Fuel pump speed control	ON (low speed) / OFF (high speed)	Test possible when following conditions met: • Ignition switch on (IG) • Engine is stopped
Connect the TC	Turn on and	ON/OFF	• ON: TC and TE1

and TE1 [TC/TE1]	off TC and TE1 connection		connected • OFF: TC and TE1disconnected
Control the Idle Fuel Cut Prohibit [FC Idl Prohbt]	Prohibit idling fuel cut control	ON/OFF	-
Control the Electric Cooling Fan [Cooling Fan]	Control Electric Cooling Fan	ON/OFF	Test possible when following conditions met: • Ignition switch on (IG) • Engine is stopped
Activate the ACC Cut Relay [ACC Cut]	Active ACC cut relay	ON/OFF	Test possible when following conditions met: • Ignition switch on (IG) • Engine is stopped
Activate the Starter Relay [Starter]	Starter	ON/OFF	-
Control the Cylinder#1 Fuel Cut [Fuel Cut #1]	Cylinder #1 injector fuel cut	ON/OFF	Same as above
Control the Cylinder#2 Fuel Cut [Fuel Cut #2]	Cylinder #2 injector fuel cut	ON/OFF	Same as above
Control the Cylinder#3 Fuel Cut [Fuel Cut #3]	Cylinder #3 injector fuel cut	ON/OFF	Test possible during vehicle stopping and engine idling.
Control the VVT Linear (Bank1) [VVT Linear B1]	Control VVT (bank 1)	-128 to 127% OCV control duty ratio can be set to any value within this range	Engine stall or rough idle when VVT actuator operated by 100 %. Test possible during idle.

		100%: Maximum advance -100%: Maximum retard	
Control the VVT System (Bank1) [VVT Ctrl B1]	Control VVT (bank 1)	ON/OFF	Engine stalls or idles roughly when OCV turned on Normal engine running or idling when OCV off Test possible while vehicle stopped and engine idling

SFI SYSTEM > DIAGNOSTIC

TROUBLE CODE CHART

HINT:

Parameters listed in the chart may be different from your readings depending on the type of instruments and other factors.

If any DTCs are displayed during check mode, check the circuit for the DTCs listed in the below. For details of each DTC, refer to the page indicated.

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P0010	Camshaft Position "A" Actuator Circuit (Bank 1)	1. Open or short in camshaft timing oil control valve circuit 2. Camshaft timing oil control valve 3. ECM	Comes on	DTC stored	
P0011	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1)	1. Valve timing 2. Camshaft timing oil control valve (OCV) 3. VVT controller assembly 4. ECM	Comes on	DTC stored	
P0012	Camshaft Position "A" - Timing Over-Retarded (Bank 1)	1. Valve timing 2. Camshaft timing oil control valve (OCV) 3. VVT controller assembly 4. ECM	Comes on	DTC stored	
P0106	Manifold Absolute Pressure / Barometric Pressure Circuit Range / Performance Problem	1. Air induction system 2. Manifold absolute pressure sensor	Comes on	DTC stored	
P0107	Manifold Absolute Pressure / Barometric Pressure Circuit Low Input	1. Open or short in manifold absolute pressure sensor circuit 2. Manifold absolute pressure sensor	Comes on	DTC stored	

		3. ECM			
P0108	Manifold Absolute Pressure / Barometric Pressure Circuit High Input	1. Open or short in manifold absolute pressure sensor circuit 2. Manifold absolute pressure sensor 3. ECM	Comes on	DTC stored	
P0112	Intake Air Temperature Circuit Low Input	1. Open or short in intake air temperature sensor circuit 2. Short to power source circuit 3. Intake air temperature sensor (built into manifold absolute pressure sensor) 4. ECM	Comes on	DTC stored	
P0113	Intake Air Temperature Circuit High Input	1. Short in intake air temperature sensor circuit 2. Intake air temperature sensor (built into manifold absolute pressure sensor) 3. ECM	Comes on	DTC stored	
P0117	Engine Coolant Temperature Circuit Low Input	1. Open or short in engine coolant temperature sensor circuit 2. Short to power source circuit 3. Engine coolant temperature sensor 4. ECM	Comes on	DTC stored	
P0118	Engine Coolant Temperature Circuit High Input	1. Short in engine coolant temperature sensor circuit 2. Engine coolant temperature sensor 3. ECM	Comes on	DTC stored	
P0121	Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem	1. Throttle Position (TP) sensor (built into throttle body) 2. ECM	Comes on	DTC stored	

P0122	Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input	1. TP sensor (built into throttle body) 2. Open or short in VTA1 circuit 3. Open in VC circuit 4. ECM	Comes on	DTC stored	
P0123	Throttle / Pedal Position Sensor / Switch "A" Circuit High Input	1. TP sensor (built into throttle body) 2. Open in VTA1 circuit 3. Open in E2 circuit 4. Short between VC and VTA1 circuits 4. ECM	Comes on	DTC stored	
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	1. Engine coolant temperature sensor 2. Thermostat 3. Cooling system	Comes on	DTC stored	
P0130	Oxygen (A/F) Sensor Circuit (Bank 1 Sensor 1)	1. Short to GND in heated oxygen sensor (sensor 1) circuit 2. Heated oxygen sensor (sensor 1) 3. ECM	Comes on	DTC stored	
P0132	Oxygen (A/F) Sensor Circuit High Voltage (Bank 1 Sensor 1)	1. Short in signal output circuit and power source circuit of heated oxygen sensor (sensor 1) 2. Heated oxygen sensor (sensor 1) 3. ECM	Comes on	DTC stored	
P0133	Oxygen (A/F) Sensor Circuit Slow Response (Bank 1 Sensor 1)	1. Open or short in heated oxygen sensor circuit 2. Heated oxygen sensor (sensor 1) 3. Fuel pressure 4. Injector 5. Gas leakage from exhaust system 6. ECM	Comes on	DTC stored	
P0134	Oxygen (A/F) Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	1. Open or short in heated oxygen sensor (sensor 1) circuit 2. Heated oxygen sensor	Comes on	DTC stored	

		(sensor 1) 3. ECM			
P0135	Oxygen (A/F) Sensor Heater Circuit (Bank 1 Sensor 1)	1. Open or short in heated oxygen sensor (sensor 1) heater circuit 2. Heated oxygen sensor heater (sensor 1) 3. EFI relay 4. ECM	Comes on	DTC stored	
P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	1. Short to GND in heated oxygen sensor (sensor 2) circuit 2. Heated oxygen sensor (sensor 2) 3. Heated oxygen sensor heater (sensor 2) 4. EFI relay	Comes on	DTC stored	
P0138	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)	1. Short in signal output circuit and power source circuit of heated oxygen sensor (sensor 2) 2. Heated oxygen sensor (sensor 2) 3. ECM	Comes on	DTC stored	
P0139	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 2)	1. Open or short in heated oxygen sensor (sensor 2) circuit 2. Heated oxygen sensor (sensor 2) 3. Fuel pressure 4. Injector 5. Gas leakage from exhaust system 6. ECM	Comes on	DTC stored	
P0140	Heated Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 2)	1. Open in heated oxygen sensor (sensor 2) circuit 2. Heated oxygen sensor (sensor 2) 3. Heated oxygen sensor heater (sensor 2) 4. EFI relay	Comes on	DTC stored	
P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1	1. Open or short in heated oxygen sensor	Comes on	DTC stored	

	Sensor 2)	(sensor 2) heater circuit 2. Heated oxygen sensor heater (sensor 2) 3. EFI relay 4. ECM			
P0171	System Too Lean (Bank 1)	1. Injector blockage 2. Manifold absolute pressure sensor 3. Engine coolant temperature sensor 4. Fuel pressure 5. Gas leakage from exhaust system 6. Open or short in heated oxygen sensor (sensor 1) circuit 7. Heated oxygen sensor (sensor 1) 8. ECM	Comes on	DTC stored	
P0172	System Too Rich (Bank 1)	1. Injector blockage 2. Manifold absolute pressure sensor 3. Engine coolant temperature sensor 4. Fuel pressure 5. Gas leakage from exhaust system 6. Open or short in heated oxygen sensor (sensor 1) circuit 7. Heated oxygen sensor (sensor 1) 8. ECM	Comes on	DTC stored	
P0221	Throttle / Pedal Position Sensor / Switch "B" Circuit Range / Performance Problem	1. Throttle Position (TP) sensor (built into throttle body) 2. ECM	Comes on	DTC stored	
P0222	Throttle / Pedal Position Sensor / Switch "B" Circuit Low Input	1. TP sensor (built into throttle body) 2. Open or short in VTA2 circuit 3. Open in VC circuit 4. ECM	Comes on	DTC stored	
P0223	Throttle / Pedal Position	1. TP sensor (built into	Comes	DTC	

	Sensor / Switch "B" Circuit High Input	throttle body) 2. Open in VTA2 circuit 3. Open in E2 circuit 4. Short between VC and VTA2 circuits 5. ECM	on	stored	
P0261	Cylinder 1 Injector Circuit Low	1. Open or short to GND in injector circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0262	Cylinder 1 Injector Circuit High	1. Short in injector power source circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0264	Cylinder 2 Injector Circuit Low	1. Open or short to GND in injector circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0265	Cylinder 2 Injector Circuit High	1. Short in injector power source circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0267	Cylinder 3 Injector Circuit Low	1. Open or short to GND in injector circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0268	Cylinder 3 Injector Circuit High	1. Short in injector power source circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0300	Random / Multiple Cylinder Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Ignition system 4. Injector 5. Fuel pressure 6. Manifold absolute pressure sensor 7. Engine coolant temperature sensor 8. Compression pressure 9. Valve clearance 10. Valve timing 11. ECM	Comes on	DTC stored	

P0301	Cylinder 1 Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Ignition system 4. Injector 5. Fuel pressure 6. Manifold absolute pressure sensor 7. Engine coolant temperature sensor 8. Compression pressure 9. Valve clearance 10. Valve timing 11. ECM	Comes on	DTC stored	
P0302	Cylinder 2 Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Ignition system 4. Injector 5. Fuel pressure 6. Manifold absolute pressure sensor 7. Engine coolant temperature sensor 8. Compression pressure 9. Valve clearance 10. Valve timing 11. ECM	Comes on	DTC stored	
P0303	Cylinder 3 Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Ignition system 4. Injector 5. Fuel pressure 6. Manifold absolute pressure sensor 7. Engine coolant temperature sensor 8. Compression pressure 9. Valve clearance 10. Valve timing 11. ECM	Comes on	DTC stored	
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	1. Open or short in knock sensor circuit 2. Knock sensor	Comes on	DTC stored	

		3. Knock sensor looseness 4. ECM			
P0335	Crankshaft Position Sensor "A" Circuit	1. Open or short in crankshaft position sensor circuit 2. Crankshaft position sensor 3. Crankshaft (sensor plate) 4. ECM	Comes on	DTC stored	
P0336	Crankshaft Position Sensor "A" Circuit Range / Performance	1. Open or short in crankshaft position sensor circuit 2. Crankshaft position sensor 3. Crankshaft (sensor plate) 4. ECM	Comes on	DTC stored	
P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	1. Mechanical system malfunction (jumped teeth of timing chain, chain stretched) 2. ECM	Comes on	DTC stored	
P0341	Camshaft Position Sensor "A" Circuit Range / Performance (Bank 1 or Single Sensor)	1. Open or short in camshaft position sensor circuit 2. Camshaft position sensor 3. Intake camshaft 4. ECM	Comes on	DTC stored	
P0342	Camshaft Position Sensor Circuit Low Input	1. Short in camshaft position sensor circuit 2. Camshaft position sensor 3. Intake camshaft 4. ECM	Comes on	DTC stored	
P0343	Camshaft Position Sensor Circuit High Input	1. Open in camshaft position sensor circuit 2. Short in power source circuit 3. Camshaft position sensor 4. Intake camshaft	Comes on	DTC stored	

		5. ECM			
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	1. Gas leakage from exhaust system 2. Heated oxygen sensor (sensor 1) 3. Heated oxygen sensor (sensor 2) 4. TWC	Comes on	DTC stored	
P0443	Evaporative Emission Control System Purge Control Valve Circuit Malfunction	1. Open or short in EVAP VSV circuit 2. EVAP VSV 3. ECM	Comes on	DTC stored	
P0501	Vehicle Speed Sensor Range / Performance	1. Open or short in speed signal circuit 2. Combination meter 3. ECM	Comes on	DTC stored	
P0561	System Voltage Unstable	1. ECM	Comes on	DTC stored	
P0562	System Voltage Low	1. Open or short in backup power source circuit 2. Tired battery 3. Electrical over work 4. Generator 5. ECM	Comes on	DTC stored	
P0563	System Voltage High	1. Generator 2. Battery (if 24 V battery is installed, DTC P0563 is output) 3. ECM	Comes on	DTC stored	
P0571	Brake Switch "A" Circuit	1. Short in stop light switch signal circuit 2. Stop light switch 3. ECM	Comes on	DTC stored	
P0603	Internal Control Module Keep Alive Memory (KAM) Error	1. ECM	Comes on	DTC stored	
P0604	Internal Control Module Random Access Memory (RAM) Error	1. ECM	Comes on	DTC stored	
P0605	Internal Control Module Read Only Memory (ROM) Error	1. ECM	Comes on	DTC stored	

P0606	ECM / PCM Processor	1. ECM	Comes on	DTC stored	
P1127	Condition for ETCS initialization	-	Comes on	DTC stored	
P2101	Throttle Actuator Control Motor Circuit Range/Performance	1. ECM	Comes on	DTC stored	
P2102	Throttle Actuator Control Motor Circuit Low	1. Short in throttle control motor circuit 2. Throttle body assembly	Comes on	DTC stored	
P2103	Throttle Actuator Control Motor Circuit High	1. Open in throttle control motor circuit 2. Throttle body assembly	Comes on	DTC stored	
P2109	Throttle / Pedal Position Sensor "A" Minimum Stop Performance	1. Throttle body assembly	Comes on	DTC stored	
P2111	Throttle Actuator Control System - Stuck Open	1. Open or short in throttle control motor circuit 2. Throttle body assembly	Comes on	DTC stored	
P2112	Throttle Actuator Control System - Stuck Closed	1. Open or short circuit in throttle control motor circuit 2. Throttle body assembly	Comes on	DTC stored	
P2118	Throttle Actuator Control Motor Current Range / Performance	1. Throttle body assembly	Comes on	DTC stored	
P2119	Throttle Actuator Control Throttle Body Range / Performance	1. Throttle body assembly	Comes on	DTC stored	
P2122	Throttle / Pedal Position Sensor / Switch "D" Circuit Low Input	1. Accelerator pedal 2. Open in VCPA circuit 3. VPA circuit open or ground short 4. ECM	Comes on	DTC stored	
P2123	Throttle / Pedal Position Sensor / Switch "D" Circuit	1. Accelerator pedal 2. Open in EPA circuit	Comes on	DTC stored	

	High Input	3. Short in VCPA circuit 4. ECM			
P2127	Throttle / Pedal Position Sensor / Switch "E" Circuit Low Input	1. Accelerator pedal 2. Open in VCP2 circuit 3. VPA2 circuit open or ground short 4. ECM	Comes on	DTC stored	
P2128	Throttle / Pedal Position Sensor / Switch "E" Circuit High Input	1. Accelerator pedal 2. Open in EPA2 circuit 3. Short in VCPA circuit 4. ECM	Comes on	DTC stored	
P2138	Throttle / Pedal Position Sensor / Switch "D" / "E" Voltage Correlation	1. Accelerator pedal	Comes on	DTC stored	

Multiple failure detection list			
Malfunction	Regularly output DTC	Possibly output DTC	Engine condition
Open or short in injector circuit	P0261 or P0262 P0264 or P0265 P0267 or P0268	P0301, P0300 P0302, P0300 P0303, P0300	Rough idle
Open or short in igniter circuit	P0301 P0302 P0303	-	Rough idle
Misfire	P0301 P0302 P0303 P0300	-	Rough idle
Open or short manifold absolute pressure sensor circuit	P0107 or P0108	-	Rough idle or lack of power
Manifold absolute pressure sensor characteristic	P0106	P0171, P0172	Rough idle or lack of power
Air leakage intake system after throttle	-	P0106, P0606 (rare case)	High idle engine speed
Fuel system	P0171, P0172	P0300, P0301, P0302, P0303	High idle engine

			speed
Engine speed sensor	P0335	-	Does not start
EEPROM (inside ECM)	P0603	P2109 (This DTC also output when new ECM installed), P1127	Does not start
Accelerator pedal position sensor characteristic	P2138	-	Lack of power
ETCS throttle position sensor characteristic	P0121 or P0221	P0106	-
Open or short in throttle position sensor circuit	P0122, P0123, P0222 or P0223	P2109 (This DTC also output when new ECM installed), P1127	-
Open in ETCS throttle drive line	P2111	P2109 (This DTC also output when new ECM installed), P2109 (ETCS initialization triggered)	-
This DTC also output when new ECM installed	-	P1127 (ETCS initialization triggered), P2112	-
Short in ETCS throttle drive line	P2102 and/or P2111	P1127 (ETCS initialization triggered), P2112, P2109	-
ETCS throttle valve stiff or sticking	P2111	P2109 (This DTC also output when new ECM installed), P1127, P0120, P2112, P2118 (rare case)	-
ETCS throttle return spring (cannot closed)	P2119	P2109 (This DTC also output when new ECM installed, ETCS initialization triggered), P1127 (ETCS initialization triggered)	-
ETCS throttle return spring (cannot opened)	P2112	P2111	-
ETCS throttle mechanical stop performance (throttle closing performance)	P2109 (This DTC also output when new ECM installed)	-	-
ETCS initialization does not complete	P1127	-	-
ETCS throttle opener	P0121	-	-

position was changed from previously (This indicates ECM detects that throttle has been replaced)			
ECM	P0606	-	-

SFI SYSTEM > DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may be different from your readings depending on the type of instruments and other factors.

If any DTCs are displayed during check mode, check the circuit for the DTCs listed in the below. For details of each DTC, refer to the page indicated.

DTC No.	Detection Item	Trouble Area	MIL	Memory	See page
P0010	Camshaft Position "A" Actuator Circuit (Bank 1)	1. Open or short in camshaft timing oil control valve circuit 2. Camshaft timing oil control valve 3. ECM	Comes on	DTC stored	
P0011	Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1)	1. Valve timing 2. Camshaft timing oil control valve (OCV) 3. VVT controller assembly 4. ECM	Comes on	DTC stored	
P0012	Camshaft Position "A" - Timing Over-Retarded (Bank 1)	1. Valve timing 2. Camshaft timing oil control valve (OCV) 3. VVT controller assembly 4. ECM	Comes on	DTC stored	
P0106	Manifold Absolute Pressure / Barometric Pressure Circuit Range / Performance Problem	1. Air induction system 2. Manifold absolute pressure sensor	Comes on	DTC stored	
P0107	Manifold Absolute Pressure / Barometric Pressure Circuit Low Input	1. Open or short in manifold absolute pressure sensor circuit 2. Manifold absolute pressure sensor 3. ECM	Comes on	DTC stored	
P0108	Manifold Absolute Pressure / Barometric Pressure Circuit High Input	1. Open or short in manifold absolute pressure sensor circuit 2. Manifold absolute pressure sensor 3. ECM	Comes on	DTC stored	

P0112	Intake Air Temperature Circuit Low Input	1. Open or short in intake air temperature sensor circuit 2. Short to power source circuit 3. Intake air temperature sensor (built into manifold absolute pressure sensor) 4. ECM	Comes on	DTC stored	
P0113	Intake Air Temperature Circuit High Input	1. Short in intake air temperature sensor circuit 2. Intake air temperature sensor (built into manifold absolute pressure sensor) 3. ECM	Comes on	DTC stored	
P0117	Engine Coolant Temperature Circuit Low Input	1. Open or short in engine coolant temperature sensor circuit 2. Short to power source circuit 3. Engine coolant temperature sensor 4. ECM	Comes on	DTC stored	
P0118	Engine Coolant Temperature Circuit High Input	1. Short in engine coolant temperature sensor circuit 2. Engine coolant temperature sensor 3. ECM	Comes on	DTC stored	
P0121	Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem	1. Throttle Position (TP) sensor (built into throttle body) 2. ECM	Comes on	DTC stored	
P0122	Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input	1. TP sensor (built into throttle body) 2. Open or short in VTA1 circuit 3. Open in VC circuit 4. ECM	Comes on	DTC stored	
P0123	Throttle / Pedal Position	1. TP sensor (built into	Comes	DTC	

	Sensor / Switch "A" Circuit High Input	throttle body) 2. Open in VTA1 circuit 3. Open in E2 circuit 4. Short between VC and VTA1 circuits 4. ECM	on	stored	
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	1. Engine coolant temperature sensor 2. Thermostat 3. Cooling system	Comes on	DTC stored	
P0130	Oxygen (A/F) Sensor Circuit (Bank 1 Sensor 1)	1. Short to GND in heated oxygen sensor (sensor 1) circuit 2. Heated oxygen sensor (sensor 1) 3. ECM	Comes on	DTC stored	
P0132	Oxygen (A/F) Sensor Circuit High Voltage (Bank 1 Sensor 1)	1. Short in signal output circuit and power source circuit of heated oxygen sensor (sensor 1) 2. Heated oxygen sensor (sensor 1) 3. ECM	Comes on	DTC stored	
P0133	Oxygen (A/F) Sensor Circuit Slow Response (Bank 1 Sensor 1)	1. Open or short in heated oxygen sensor circuit 2. Heated oxygen sensor (sensor 1) 3. Fuel pressure 4. Injector 5. Gas leakage from exhaust system 6. ECM	Comes on	DTC stored	
P0134	Oxygen (A/F) Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	1. Open or short in heated oxygen sensor (sensor 1) circuit 2. Heated oxygen sensor (sensor 1) 3. ECM	Comes on	DTC stored	
P0135	Oxygen (A/F) Sensor Heater Circuit (Bank 1 Sensor 1)	1. Open or short in heated oxygen sensor (sensor 1) heater circuit 2. Heated oxygen sensor	Comes on	DTC stored	

		heater (sensor 1) 3. EFI relay 4. ECM			
P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	1. Short to GND in heated oxygen sensor (sensor 2) circuit 2. Heated oxygen sensor (sensor 2) 3. Heated oxygen sensor heater (sensor 2) 4. EFI relay	Comes on	DTC stored	
P0138	Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2)	1. Short in signal output circuit and power source circuit of heated oxygen sensor (sensor 2) 2. Heated oxygen sensor (sensor 2) 3. ECM	Comes on	DTC stored	
P0139	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 2)	1. Open or short in heated oxygen sensor (sensor 2) circuit 2. Heated oxygen sensor (sensor 2) 3. Fuel pressure 4. Injector 5. Gas leakage from exhaust system 6. ECM	Comes on	DTC stored	
P0140	Heated Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 2)	1. Open in heated oxygen sensor (sensor 2) circuit 2. Heated oxygen sensor (sensor 2) 3. Heated oxygen sensor heater (sensor 2) 4. EFI relay	Comes on	DTC stored	
P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	1. Open or short in heated oxygen sensor (sensor 2) heater circuit 2. Heated oxygen sensor heater (sensor 2) 3. EFI relay 4. ECM	Comes on	DTC stored	

P0171	System Too Lean (Bank 1)	1. Injector blockage 2. Manifold absolute pressure sensor 3. Engine coolant temperature sensor 4. Fuel pressure 5. Gas leakage from exhaust system 6. Open or short in heated oxygen sensor (sensor 1) circuit 7. Heated oxygen sensor (sensor 1) 8. ECM	Comes on	DTC stored	
P0172	System Too Rich (Bank 1)	1. Injector blockage 2. Manifold absolute pressure sensor 3. Engine coolant temperature sensor 4. Fuel pressure 5. Gas leakage from exhaust system 6. Open or short in heated oxygen sensor (sensor 1) circuit 7. Heated oxygen sensor (sensor 1) 8. ECM	Comes on	DTC stored	
P0221	Throttle / Pedal Position Sensor / Switch "B" Circuit Range / Performance Problem	1. Throttle Position (TP) sensor (built into throttle body) 2. ECM	Comes on	DTC stored	
P0222	Throttle / Pedal Position Sensor / Switch "B" Circuit Low Input	1. TP sensor (built into throttle body) 2. Open or short in VTA2 circuit 3. Open in VC circuit 4. ECM	Comes on	DTC stored	
P0223	Throttle / Pedal Position Sensor / Switch "B" Circuit High Input	1. TP sensor (built into throttle body) 2. Open in VTA2 circuit 3. Open in E2 circuit 4. Short between VC and VTA2 circuits 5. ECM	Comes on	DTC stored	

P0261	Cylinder 1 Injector Circuit Low	1. Open or short to GND in injector circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0262	Cylinder 1 Injector Circuit High	1. Short in injector power source circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0264	Cylinder 2 Injector Circuit Low	1. Open or short to GND in injector circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0265	Cylinder 2 Injector Circuit High	1. Short in injector power source circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0267	Cylinder 3 Injector Circuit Low	1. Open or short to GND in injector circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0268	Cylinder 3 Injector Circuit High	1. Short in injector power source circuit 2. Injector 3. ECM	Comes on	DTC stored	
P0300	Random / Multiple Cylinder Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Ignition system 4. Injector 5. Fuel pressure 6. Manifold absolute pressure sensor 7. Engine coolant temperature sensor 8. Compression pressure 9. Valve clearance 10. Valve timing 11. ECM	Comes on	DTC stored	
P0301	Cylinder 1 Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Ignition system 4. Injector	Comes on	DTC stored	

		5. Fuel pressure 6. Manifold absolute pressure sensor 7. Engine coolant temperature sensor 8. Compression pressure 9. Valve clearance 10. Valve timing 11. ECM			
P0302	Cylinder 2 Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Ignition system 4. Injector 5. Fuel pressure 6. Manifold absolute pressure sensor 7. Engine coolant temperature sensor 8. Compression pressure 9. Valve clearance 10. Valve timing 11. ECM	Comes on	DTC stored	
P0303	Cylinder 3 Misfire Detected	1. Open or short in engine wire harness 2. Connector connection 3. Ignition system 4. Injector 5. Fuel pressure 6. Manifold absolute pressure sensor 7. Engine coolant temperature sensor 8. Compression pressure 9. Valve clearance 10. Valve timing 11. ECM	Comes on	DTC stored	
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	1. Open or short in knock sensor circuit 2. Knock sensor 3. Knock sensor looseness	Comes on	DTC stored	

		4. ECM			
P0335	Crankshaft Position Sensor "A" Circuit	1. Open or short in crankshaft position sensor circuit 2. Crankshaft position sensor 3. Crankshaft (sensor plate) 4. ECM	Comes on	DTC stored	
P0336	Crankshaft Position Sensor "A" Circuit Range / Performance	1. Open or short in crankshaft position sensor circuit 2. Crankshaft position sensor 3. Crankshaft (sensor plate) 4. ECM	Comes on	DTC stored	
P0340	Camshaft Position Sensor "A" Circuit (Bank 1 or Single Sensor)	1. Mechanical system malfunction (jumped teeth of timing chain, chain stretched) 2. ECM	Comes on	DTC stored	
P0341	Camshaft Position Sensor "A" Circuit Range / Performance (Bank 1 or Single Sensor)	1. Open or short in camshaft position sensor circuit 2. Camshaft position sensor 3. Intake camshaft 4. ECM	Comes on	DTC stored	
P0342	Camshaft Position Sensor Circuit Low Input	1. Short in camshaft position sensor circuit 2. Camshaft position sensor 3. Intake camshaft 4. ECM	Comes on	DTC stored	
P0343	Camshaft Position Sensor Circuit High Input	1. Open in camshaft position sensor circuit 2. Short in power source circuit 3. Camshaft position sensor 4. Intake camshaft 5. ECM	Comes on	DTC stored	
P0420	Catalyst System Efficiency	1. Gas leakage from	Comes	DTC	

	Below Threshold (Bank 1)	exhaust system 2. Heated oxygen sensor (sensor 1) 3. Heated oxygen sensor (sensor 2) 4. TWC	on	stored	
P0443	Evaporative Emission Control System Purge Control Valve Circuit Malfunction	1. Open or short in EVAP VSV circuit 2. EVAP VSV 3. ECM	Comes on	DTC stored	
P0501	Vehicle Speed Sensor Range / Performance	1. Open or short in speed signal circuit 2. Combination meter 3. ECM	Comes on	DTC stored	
P0561	System Voltage Unstable	1. ECM	Comes on	DTC stored	
P0562	System Voltage Low	1. Open or short in backup power source circuit 2. Tired battery 3. Electrical over work 4. Generator 5. ECM	Comes on	DTC stored	
P0563	System Voltage High	1. Generator 2. Battery (if 24 V battery is installed, DTC P0563 is output) 3. ECM	Comes on	DTC stored	
P0571	Brake Switch "A" Circuit	1. Short in stop light switch signal circuit 2. Stop light switch 3. ECM	Comes on	DTC stored	
P0603	Internal Control Module Keep Alive Memory (KAM) Error	1. ECM	Comes on	DTC stored	
P0604	Internal Control Module Random Access Memory (RAM) Error	1. ECM	Comes on	DTC stored	
P0605	Internal Control Module Read Only Memory (ROM) Error	1. ECM	Comes on	DTC stored	
P0606	ECM / PCM Processor	1. ECM	Comes on	DTC stored	

P1127	Condition for ETCS initialization	-	Comes on	DTC stored	
P2101	Throttle Actuator Control Motor Circuit Range/Performance	1. ECM	Comes on	DTC stored	
P2102	Throttle Actuator Control Motor Circuit Low	1. Short in throttle control motor circuit 2. Throttle body assembly	Comes on	DTC stored	
P2103	Throttle Actuator Control Motor Circuit High	1. Open in throttle control motor circuit 2. Throttle body assembly	Comes on	DTC stored	
P2109	Throttle / Pedal Position Sensor "A" Minimum Stop Performance	1. Throttle body assembly	Comes on	DTC stored	
P2111	Throttle Actuator Control System - Stuck Open	1. Open or short in throttle control motor circuit 2. Throttle body assembly	Comes on	DTC stored	
P2112	Throttle Actuator Control System - Stuck Closed	1. Open or short circuit in throttle control motor circuit 2. Throttle body assembly	Comes on	DTC stored	
P2118	Throttle Actuator Control Motor Current Range / Performance	1. Throttle body assembly	Comes on	DTC stored	
P2119	Throttle Actuator Control Throttle Body Range / Performance	1. Throttle body assembly	Comes on	DTC stored	
P2122	Throttle / Pedal Position Sensor / Switch "D" Circuit Low Input	1. Accelerator pedal 2. Open in VCPA circuit 3. VPA circuit open or ground short 4. ECM	Comes on	DTC stored	
P2123	Throttle / Pedal Position Sensor / Switch "D" Circuit High Input	1. Accelerator pedal 2. Open in EPA circuit 3. Short in VCPA circuit 4. ECM	Comes on	DTC stored	

P2127	Throttle / Pedal Position Sensor / Switch "E" Circuit Low Input	1. Accelerator pedal 2. Open in VCP2 circuit 3. VPA2 circuit open or ground short 4. ECM	Comes on	DTC stored	
P2128	Throttle / Pedal Position Sensor / Switch "E" Circuit High Input	1. Accelerator pedal 2. Open in EPA2 circuit 3. Short in VCPA circuit 4. ECM	Comes on	DTC stored	
P2138	Throttle / Pedal Position Sensor / Switch "D" / "E" Voltage Correlation	1. Accelerator pedal	Comes on	DTC stored	
U0101	Lost Communication with TCM	. Wire harness (CAN+, CAN- circuit) . ECM . Transmission control ECU assembly	Comes on	DTC stored	

Multiple failure detection list			
Malfunction	Regularly output DTC	Possibly output DTC	Engine condition
Open or short in injector circuit	P0261 or P0262 P0264 or P0265 P0267 or P0268	P0301, P0300 P0302, P0300 P0303, P0300	Rough idle
Open or short in igniter circuit	P0301 P0302 P0303	-	Rough idle
Misfire	P0301 P0302 P0303 P0300	-	Rough idle
Open or short manifold absolute pressure sensor circuit	P0107 or P0108	-	Rough idle or lack of power
Manifold absolute pressure sensor characteristic	P0106	P0171, P0172	Rough idle or lack of power
Air leakage intake system after throttle	-	P0106, P0606 (rare case)	High idle engine speed

Fuel system	P0171, P0172	P0300, P0301, P0302, P0303	High idle engine speed
Engine speed sensor	P0335	-	Does not start
EEPROM (inside ECM)	P0603	P2109 (This DTC also output when new ECM installed), P1127	Does not start
Accelerator pedal position sensor characteristic	P2138	-	Lack of power
ETCS throttle position sensor characteristic	P0121 or P0221	P0106	-
Open or short in throttle position sensor circuit	P0122, P0123, P0222 or P0223	P2109 (This DTC also output when new ECM installed), P1127	-
Open in ETCS throttle drive line	P2111	P2109 (This DTC also output when new ECM installed), P2109 (ETCS initialization triggered)	-
This DTC also output when new ECM installed	-	P1127 (ETCS initialization triggered), P2112	-
Short in ETCS throttle drive line	P2102 and/or P2111	P1127 (ETCS initialization triggered), P2112, P2109	-
ETCS throttle valve stiff or sticking	P2111	P2109 (This DTC also output when new ECM installed), P1127, P0120, P2112, P2118 (rare case)	-
ETCS throttle return spring (cannot closed)	P2119	P2109 (This DTC also output when new ECM installed, ETCS initialization triggered), P1127 (ETCS initialization triggered)	-
ETCS throttle return spring (cannot opened)	P2112	P2111	-
ETCS throttle mechanical stop performance (throttle closing performance)	P2109 (This DTC also output when new ECM installed)	-	-
ETCS initialization does not complete	P1127	-	-

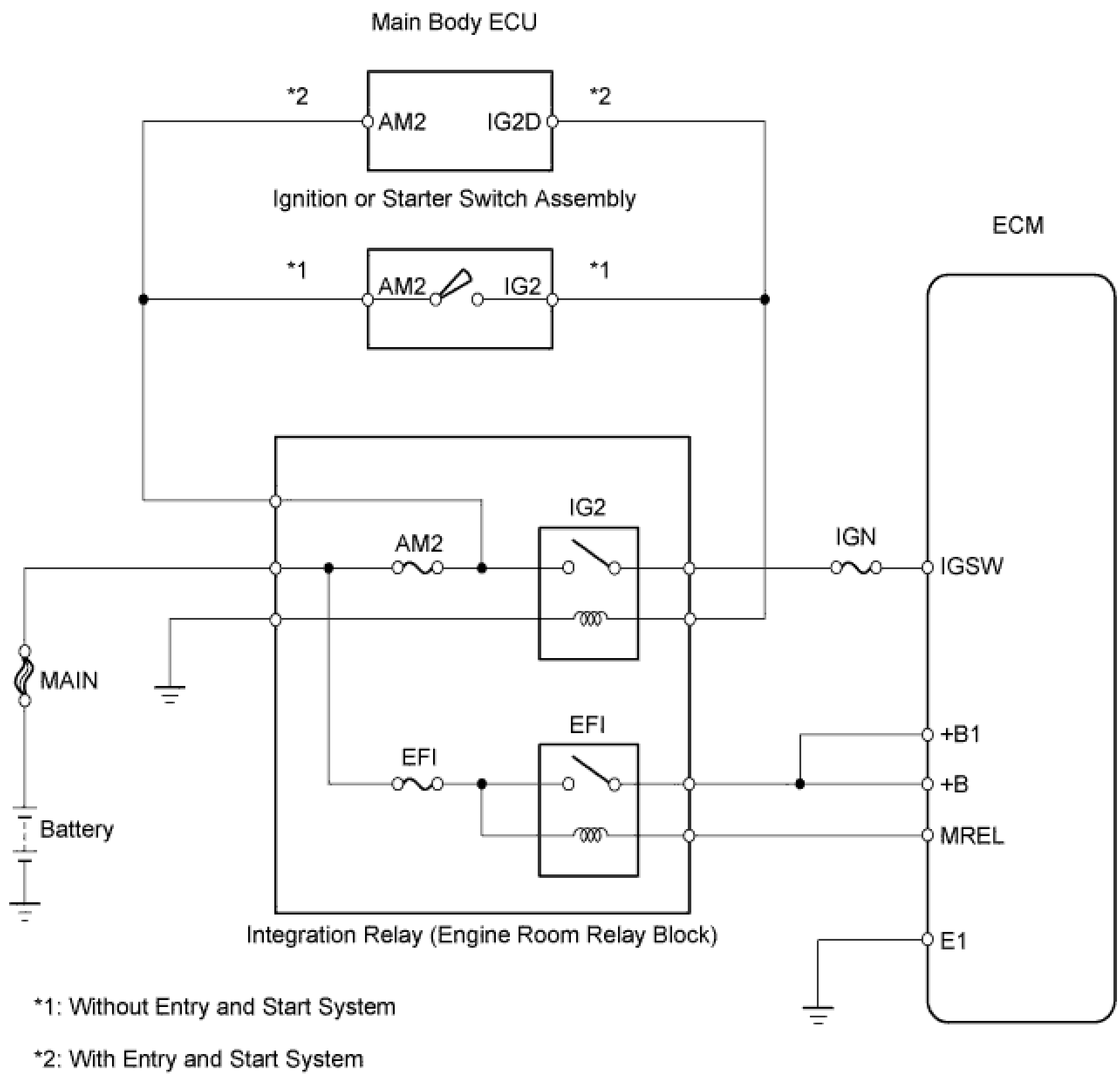
ETCS throttle opener position was changed from previously (This indicates ECM detects that throttle has been replaced)	P0121	-	-
ECM	P0606	-	-

SFI SYSTEM > ECM Power Source Circuit

DESCRIPTION

When the ignition switch is turned on (IG), the battery voltage is applied to the IGSW terminal of the ECM. The input signal to the MREL terminal of the ECM causes a current to flow to the EFI relay coil, closing the EFI relay contacts and supplying power to terminals +B and +B1 of the ECM.

WIRING DIAGRAM

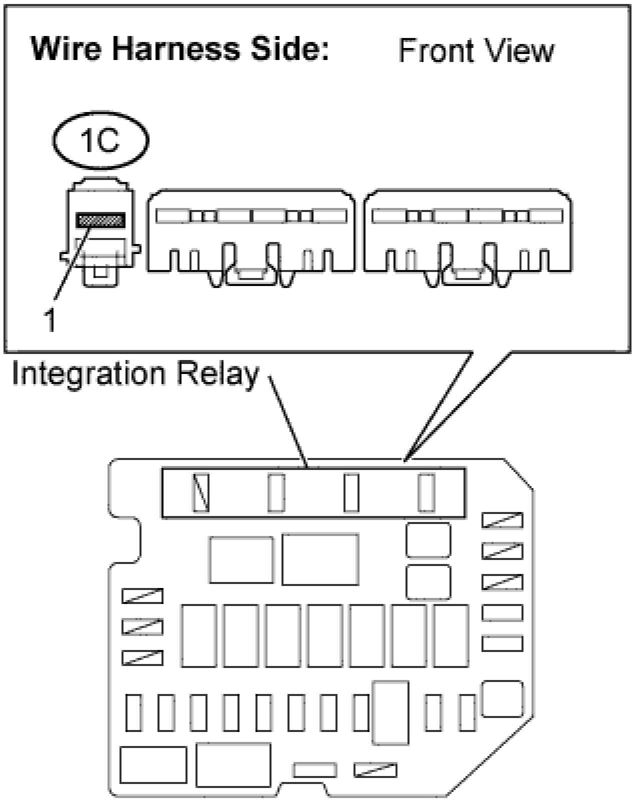


INSPECTION PROCEDURE

NOTICE:

Perform electronic throttle learning after replacing the ECM ().

1.INSPECT INTEGRATION RELAY



Y

1. Remove the integration relay from the engine room relay block.
2. Measure the voltage between the terminal of the integration relay and body ground.

   Standard voltage:

Tester Connection	Specified Condition
1C-1 - Body ground	10 to 14 V

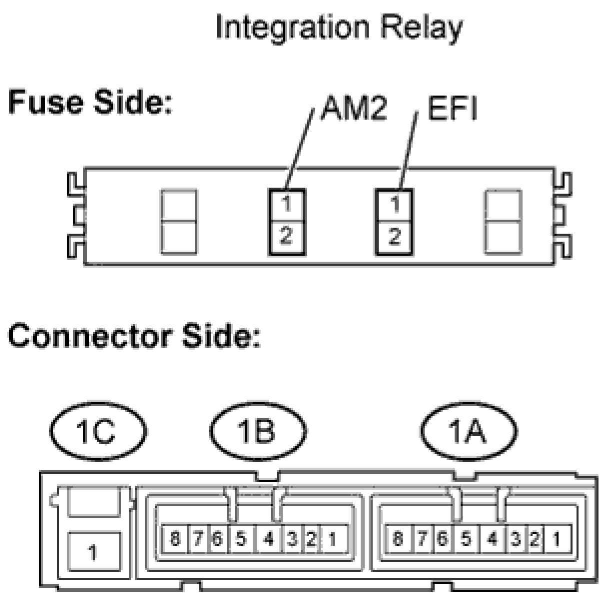
3. Reinstall the integration relay.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY - BATTERY)

OK

2.INSPECT INTEGRATION RELAY (EFI RELAY AND IG2 RELAY)



Y

1. Inspect the AM2 fuse and EFI fuse.
    1. Remove the AM2 fuse and EFI fuse.
    2. Check the fuse resistance.

       Standard resistance:
   Below 1 Ω

    3. Reinstall the fuses.

2. Inspect the relay.
    1. Check the relay resistance.

       Standard resistance:

Tester Connection	Specified Condition
1C-1 - 1B-4	10 kΩ or higher
1C-1 - 1B-4	Below 1 Ω (When battery voltage applied to terminals 1B-2 and 1B-3)
1C-1 - 1A-8	10 kΩ or higher
1C-1 - 1A-8	Below 1 Ω (When battery voltage applied to

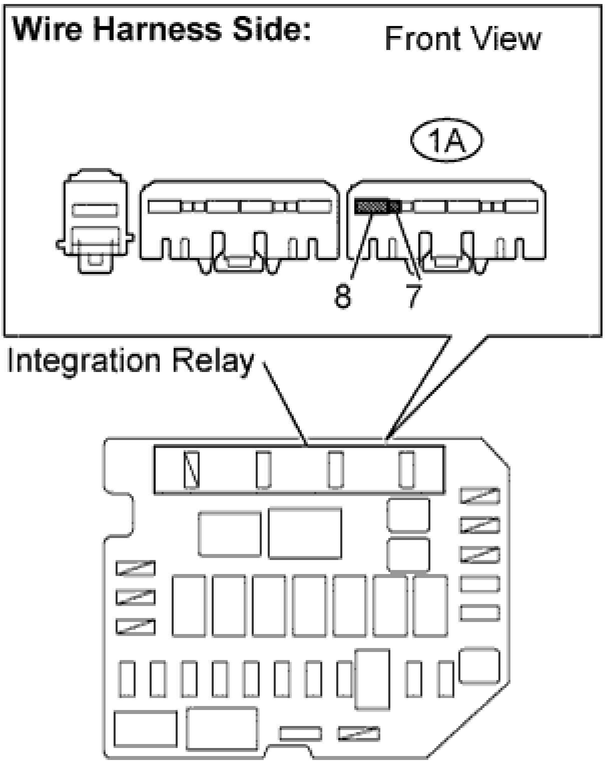
	terminals 1C-1 and 1A-7)

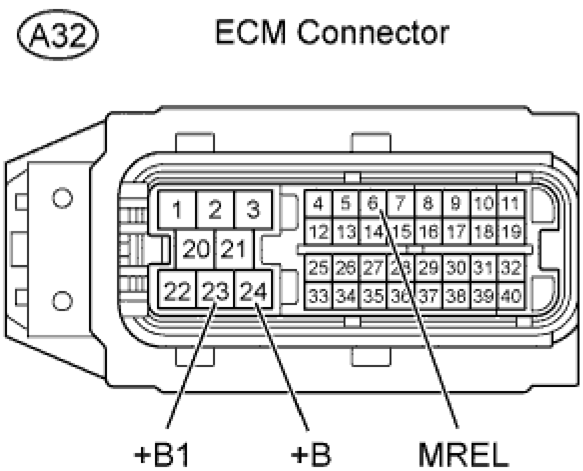
NG

REPLACE INTEGRATION RELAY

OK

3.CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - ECM)





1. Remove the integration relay from the engine room relay block.
2. Disconnect the ECM connector.
3. Check the resistance.

   Standard resistance (Check for open):

Tester Connection	Specified Condition
MREL (A32-6) - Integration relay (1A-7)	Below 1 Ω
+B (A32-24) - Integration relay (1A-8)	Below 1 Ω
+B1 (A32-23) - Integration relay (1A-8)	Below 1 Ω

Standard resistance (Check for short):

Tester Connection	Specified Condition
MREL (A32-6) - Body ground	10 kΩ or higher
+B (A32-24) - Body ground	10 kΩ or higher
+B1 (A32-23) - Body ground	10 kΩ or higher

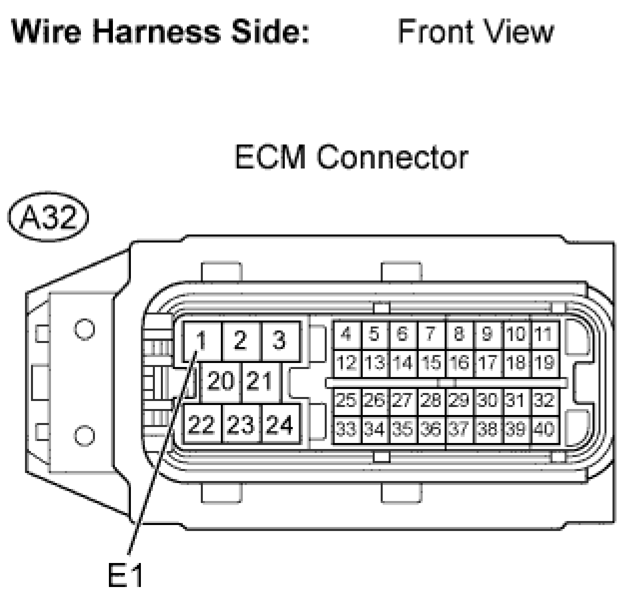
4. Reinstall the integration relay.
5. Reconnect the ECM connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

4.CHECK HARNESS AND CONNECTOR (ECM - BODY GROUND)



1. Disconnect the ECM connector.
2. Check the resistance.

   Standard resistance (Check for open):

Tester Connection	Specified Condition
E1 (A32-1) - Body ground	Below 1 Ω

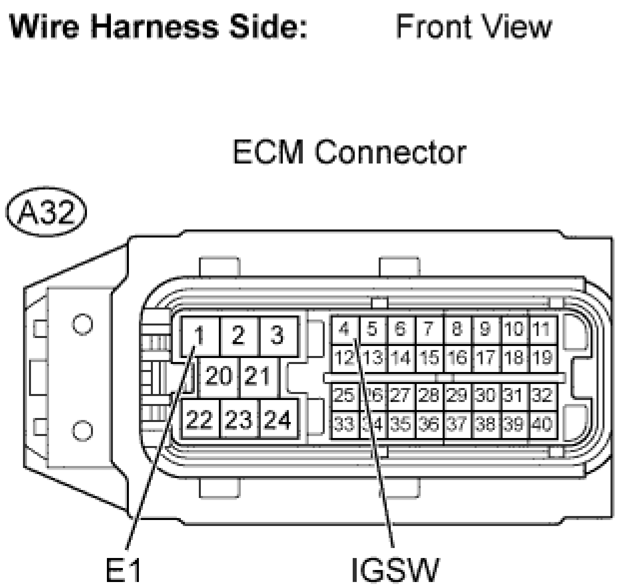
3. Reconnect the ECM connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

5.INSPECT ECM (IGSW TERMINAL VOLTAGE)



1. Disconnect the ECM connector.
2. Turn the ignition switch on (IG).
3. Measure the voltage between the terminals of ECM connector.

   Standard voltage:

Switch Condition	Specified Condition
IGSW (A32-4) - E1 (A32-1)	10 to 14 V

4. Reconnect the ECM connector.

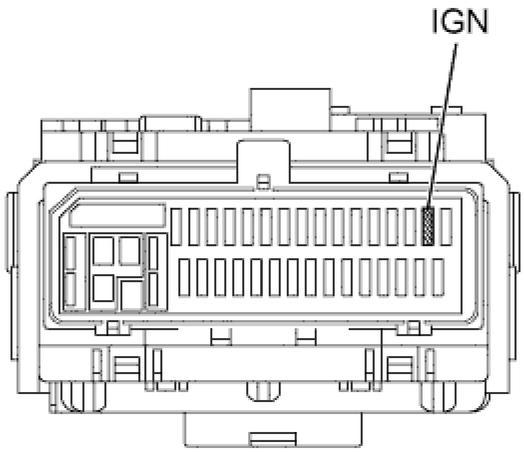
OK

REPLACE ECM

NG

6.INSPECT FUSE (IGN FUSE)

Main Body ECU:



Y

1. Remove the IGN fuse from the instrument panel junction block.
2. Check the fuse resistance.

   Standard resistance:
   Below 1 Ω

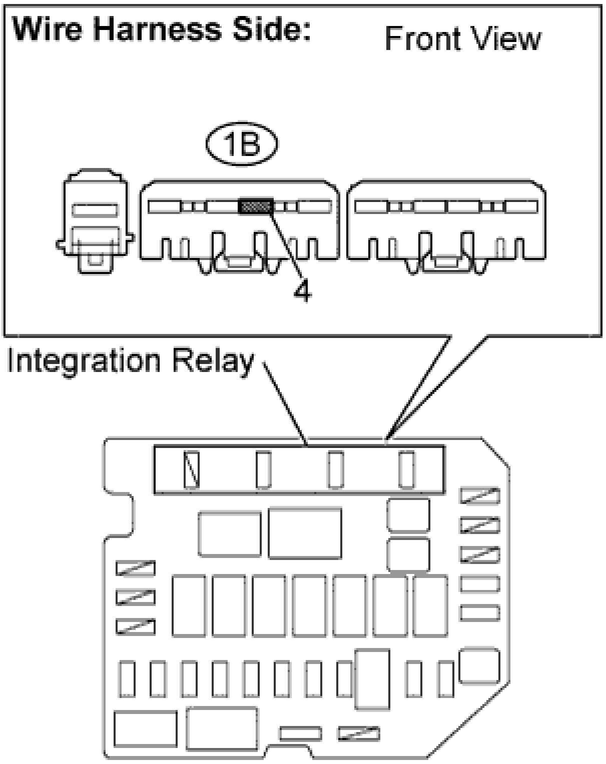
3. Reinstall the IGN fuse.

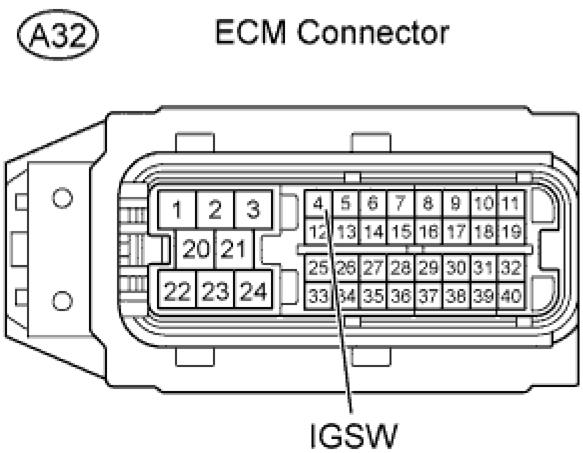
NG

CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED TO FUSE

OK

7.CHECK HARNESS AND CONNECTOR (ECM - INTEGRATION RELAY)





1. Remove the integration relay from the engine room relay block.

2. Disconnect the ECM connector.

3. Check the resistance.

   Standard resistance (Check for open):

Tester Connection	Specified Condition
IGSW (A32-4) - Integration relay (1B-4)	Below 1 Ω

Standard resistance (Check for short):

Tester Connection	Specified Condition
IGSW (A32-4) - Body ground	10 kΩ or higher

4. Reinstall the integration relay.

5. Reconnect the ECM connector.

   Result:

Result	Proceed To
Out of normal range	A
Within normal range (with Entry and Start System)	B
Within normal range (without Entry and Start System)	C

B

Go to step 8

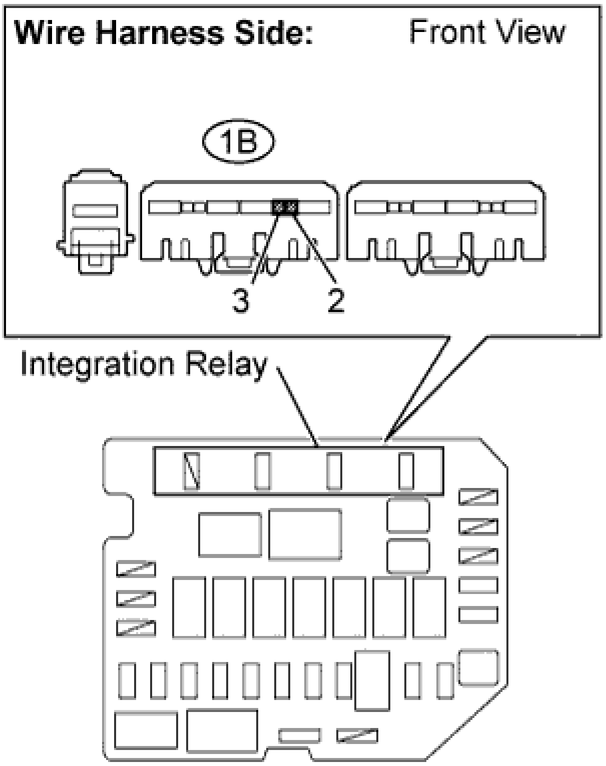
C

Go to step 9

A

REPAIR OR REPLACE HARNESS OR CONNECTOR

8.CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - MAIN BODY ECU)



Main Body ECU Connector

1. Remove the integration relay from the engine room relay block.
2. Remove the instrument panel junction block (main body ECU).
3. Check the resistance.

   Standard resistance (Check for open):

Tester Connection	Specified Condition
Integration relay (1B-2) - IG2D (D65-5)	Below 1 Ω
Integration relay (1B-3) - Body ground	Below 1 Ω

Standard resistance (Check for short):

Tester Connection	Specified Condition
IG2D (D65-5) - Body ground	10 kΩ or higher

4. Reinstall the integration relay.

5. Reinstall the main body ECU.

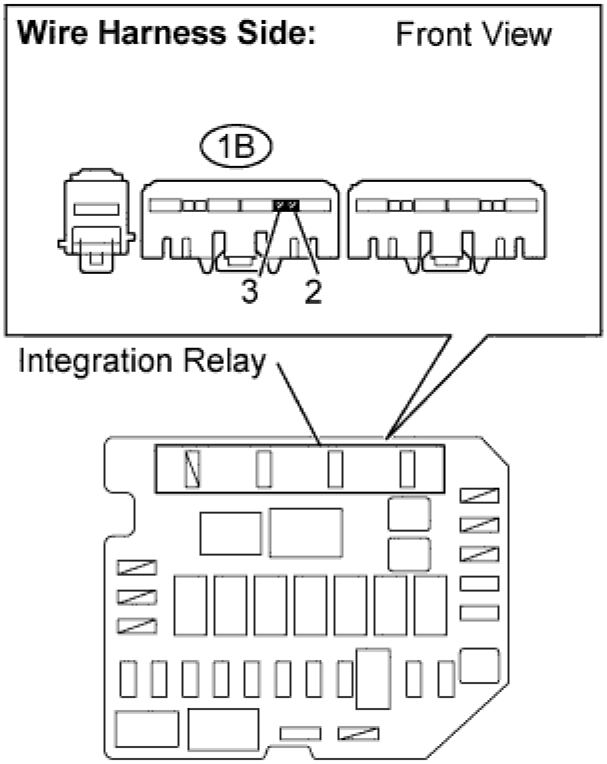
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

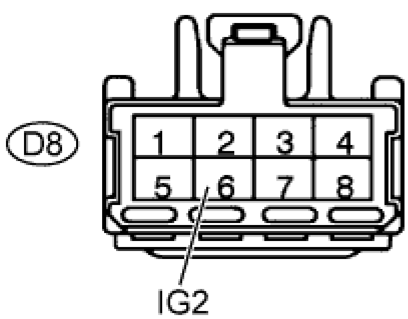
OK

CHECK ENTRY AND START SYSTEM

9.CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - IGNITION SWITCH)



Ignition Switch Connector



1. Remove the integration relay from the engine room relay block.

2. Disconnect the ignition or starter switch assembly connector.

3. Check the resistance.

   Standard resistance (Check for open):

Tester Connection	Specified Condition
Integration relay (1B-2) - Ignition or starter switch (D8-6)	Below 1 Ω
Integration relay (1B-3) - Body ground	Below 1 Ω

Standard resistance (Check for short):

Tester Connection	Specified Condition
Ignition or starter switch (D8-6) - Body ground	10 kΩ or higher

4. Reinstall the integration relay.

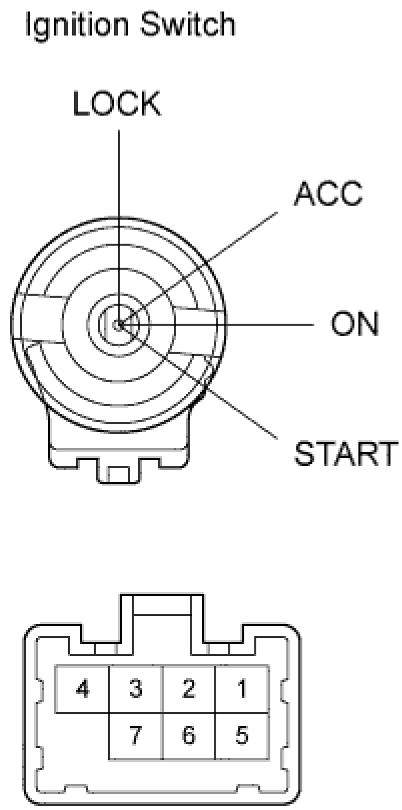
5. Reconnect the ignition or starter switch assembly connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

10.INSPECT IGNITION OR STARTER SWITCH ASSEMBLY



Y

1. Remove the ignition or starter switch assembly.
2. Measure the resistance between the terminals of ignition or starter switch assembly.

   Standard resistance:

Switch Position	Tester Connection	Specified Condition
LOCK	-	10 kΩ or higher
ACC	2 - 4	Below 1 Ω
ON	1 - 2 - 4	Below 1 Ω
	5 - 6	Below 1 Ω
START	1 - 3 - 4	Below 1 Ω
	5 - 6 - 7	Below 1 Ω

3. Reinstall the ignition or starter switch assembly.

NG

REPLACE IGNITION OR STARTER SWITCH ASSEMBLY

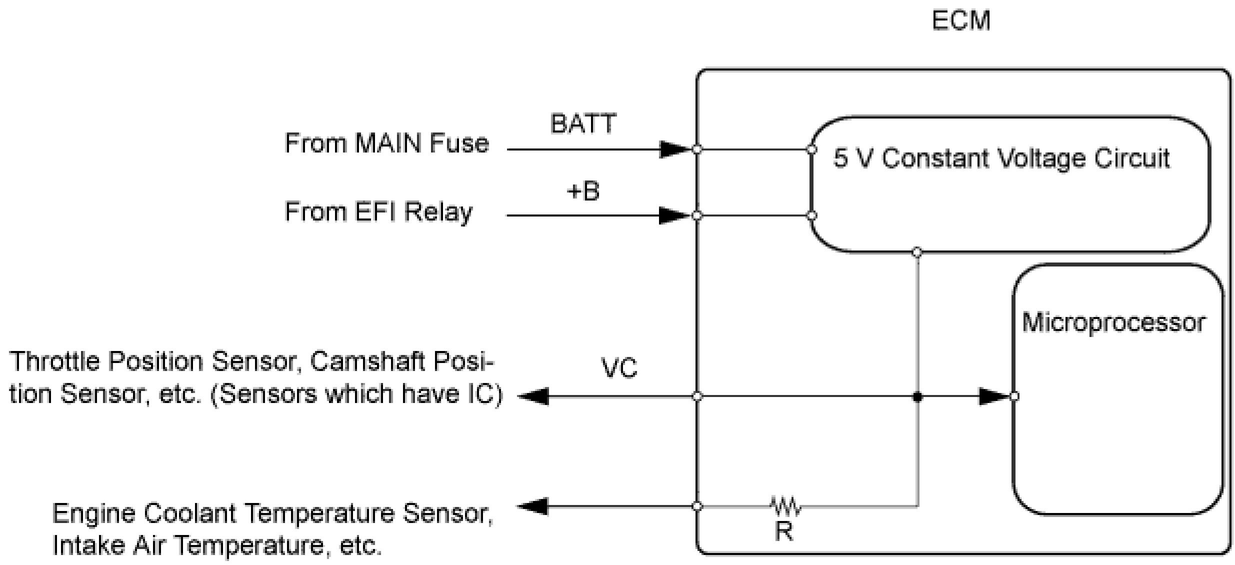
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (IGNIITON SWITCH - BATTERY)

SFI SYSTEM > VC Output Circuit

DESCRIPTION

The ECM constantly generates 5 V of power from the battery voltages supplied to the +B (BATT) terminal to operate the microprocessor while the ignition switch is on (engine running). The ECM also provides this power to the sensors through the VC output circuit.

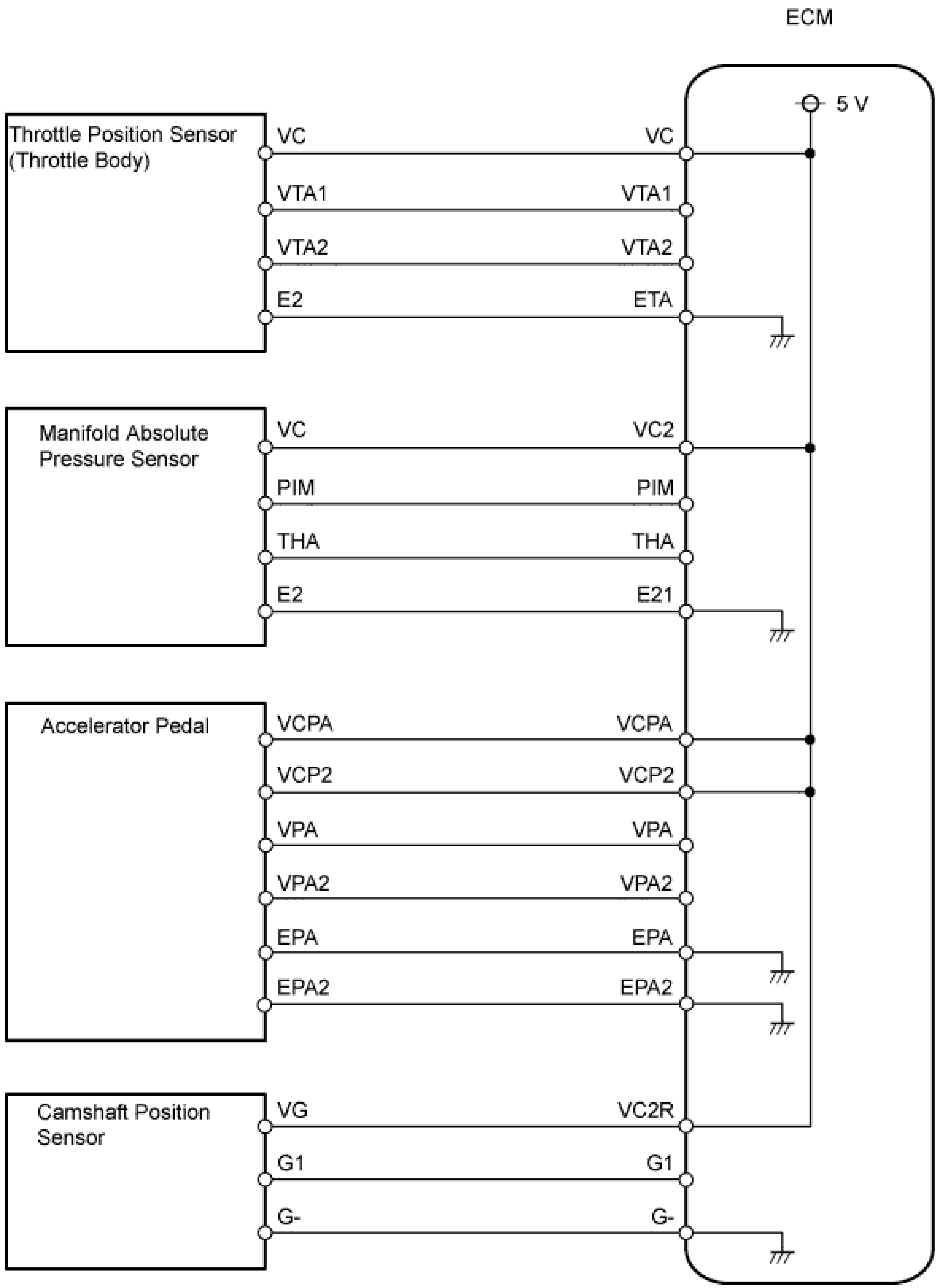


When the VC circuit is short-circuited, the microprocessor in the ECM and sensors that are supplied with power through the VC circuit are inactivated because the power is not supplied from the VC circuit. Under this condition, the system does not start up and the MIL does not illuminate even if the system malfunctions.

HINT:

Under normal conditions, the MIL is illuminated for several seconds when the ignition switch is first turned on (IG). The MIL goes off when the engine is started.

WIRING DIAGRAM


ECM
5 V
Throttle Position Sensor
(Throttle Body)
VC
VTA1
VTA2
E2
VC
VTA1
VTA2
ETA
Manifold Absolute
Pressure Sensor
VC
PIM
THA
E2
VC2
PIM
THA
E21
Accelerator Pedal
VCPA
VCP2
VPA
VPA2
EPA
EPA2
VCPA
VCP2
VPA
VPA2
EPA
EPA2
Camshaft Position
Sensor
VG
G1
G-
VC2R
G1
G-

INSPECTION PROCEDURE

NOTICE:

Perform electronic throttle learning after replacing the ECM ().

1.CHECK MIL CONDITION

1. Check that Malfunction Indicator Lamp (MIL) illuminates when turning the ignition switch on (IG).

   OK:
   MIL illuminates

OK

SYSTEM OK

NG

2.CHECK CONNECTION BETWEEN INTELLIGENT TESTER AND ECM

1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch on (IG) and the tester ON.
3. Check the communication between the intelligent tester and ECM.

Result:

Result	Proceed To
Communication is possible	A
Communication is impossible	B

A

GO TO MIL CIRCUIT

B

3.CHECK MIL (THROTTLE POSITION SENSOR)

1. Disconnect the throttle body connector.
2. Turn the ignition switch on (IG).
3. Check the MIL.

   Result:

Result	Proceed To
MIL is illuminated	A
MIL is not illuminated	B

4. Reconnect the throttle body connector.

A

REPLACE THROTTLE BODY

B

4.CHECK MIL (MANIFOLD ABSOLUTE PRESSURE SENSOR)

1. Disconnect the manifold absolute pressure sensor connector.
2. Turn the ignition switch on (IG).
3. Check the MIL.

Result:

Result	Proceed To
MIL is illuminated	A
MIL is not illuminated	B

4. Reconnect the manifold absolute pressure sensor connector.

A

REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR

B

5.CHECK MIL (ACCELERATOR PEDAL)

1. Disconnect the accelerator pedal connector.
2. Turn the ignition switch on (IG).
3. Check the MIL.

Result:

Result	Proceed To
MIL is illuminated	A
MIL is not illuminated	B

4. Reconnect the accelerator pedal connector.

A

REPLACE ACCELERATOR PEDAL

B

6.CHECK MIL (CAMSHAFT POSITION SENSOR)

1. Disconnect the camshaft position sensor connector.
2. Turn the ignition switch on (IG).
3. Check the MIL.

Result:

Result	Proceed To
MIL is illuminated	A
MIL is not illuminated	B

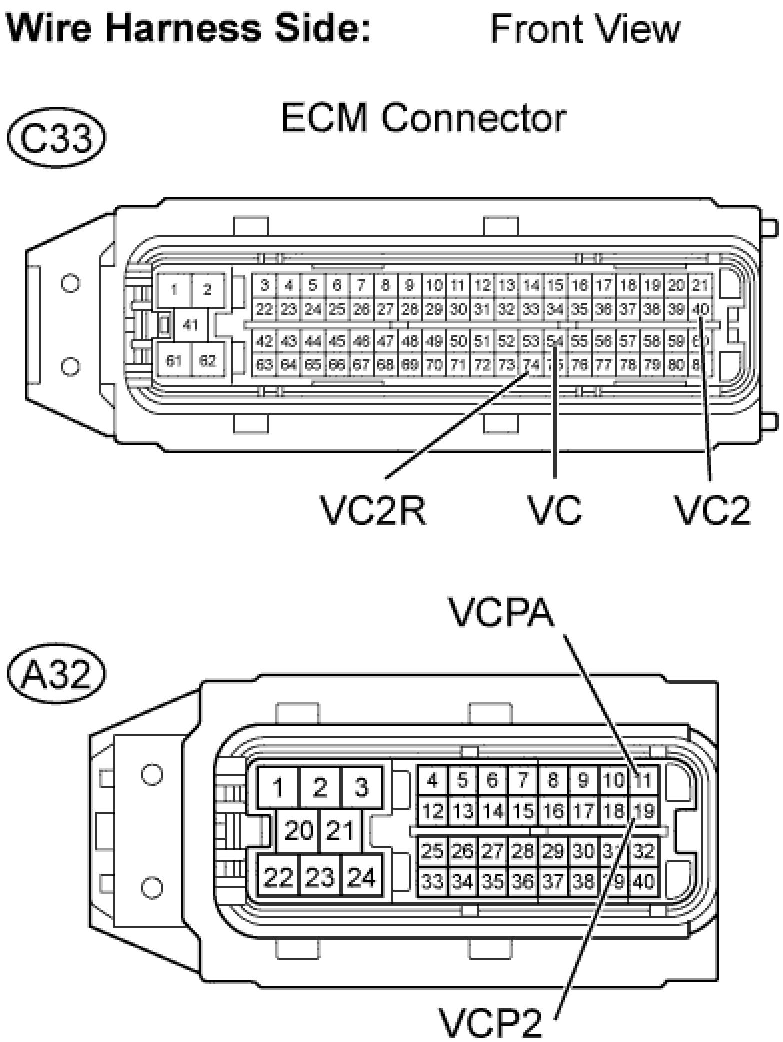
4. Reconnect the camshaft position sensor connector.

A

REPLACE CAMSHAFT POSITION SENSOR

B

7.CHECK HARNESS AND CONNECTOR (VC CIRCUIT)



1. Disconnect the throttle body connector.
2. Disconnect the manifold absolute pressure sensor connector.
3. Disconnect the accelerator pedal connector.
4. Disconnect the camshaft position sensor connector.
5. Disconnect the ECM connectors.

6. Check the resistance.

   Standard resistance (Check for short):

Tester Connection	Specified Condition
VC (C33-54) - Body ground	10 k Ω or higher
VC2 (C33-40) - Body ground	10 k Ω or higher
VC2R (C33-74) - Body ground	10 k Ω or higher
VCPA (A32-11) - Body ground	10 k Ω or higher
VCP2 (A32-19) - Body ground	10 k Ω or higher

7. Reconnect the throttle body connector, manifold absolute pressure sensor connector, accelerator pedal connector, and camshaft position sensor connector.

8. Reconnect the ECM connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

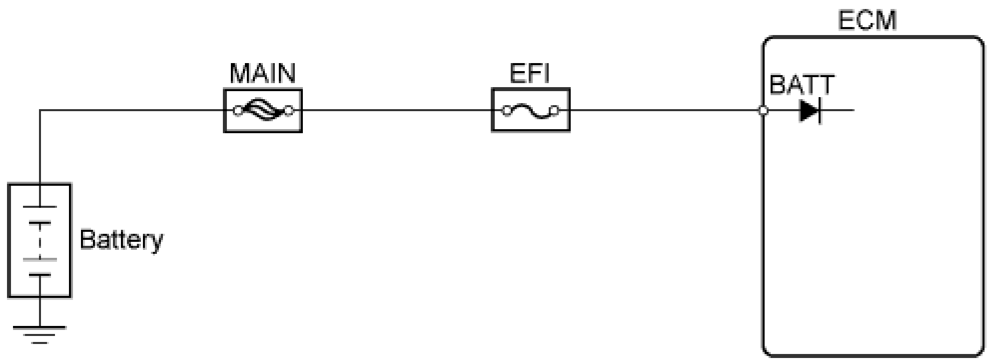
REPLACE ECM

SFI SYSTEM > ECM Back-up Power Source Circuit

DESCRIPTION

The battery supplies electricity to terminal BATT of the ECM even when the ignition switch is off. This electricity allows the ECM to store DTC histories, freeze frame data, fuel trim values and other data.

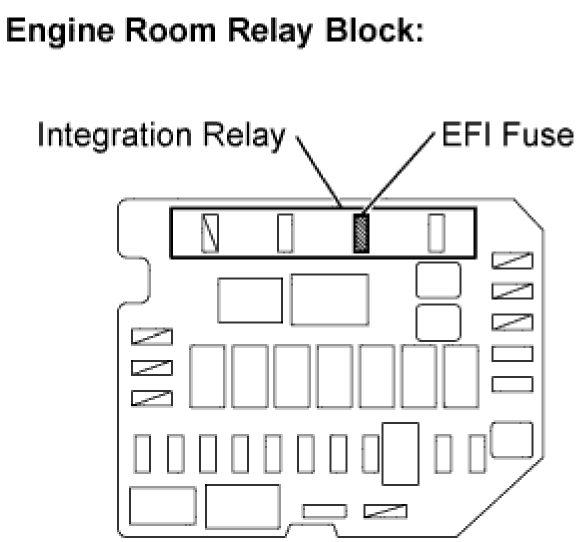
WIRING DIAGRAM



c

INSPECTION PROCEDURE

1.INSPECT FUSE (EFI FUSE)



1. Remove the EFI fuse from the engine room relay block.
2. Check the EFI fuse resistance.

Standard resistance:
Below 1 Ω

3. Reinstall the EFI fuse.

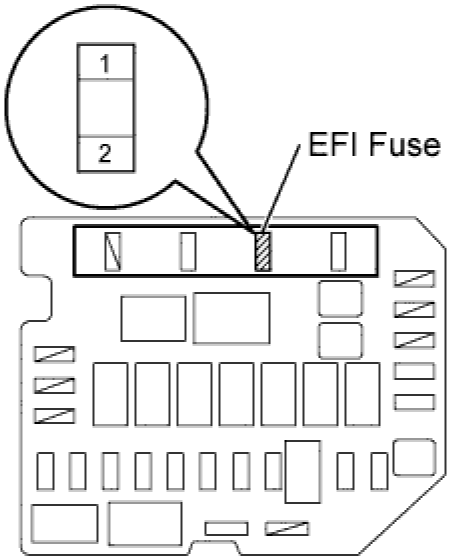
NG

CHECK FOR SHORT IN ALL HARNESS AND COMPONENTS CONNECTED TO FUSE, AND REPLACE FUSE

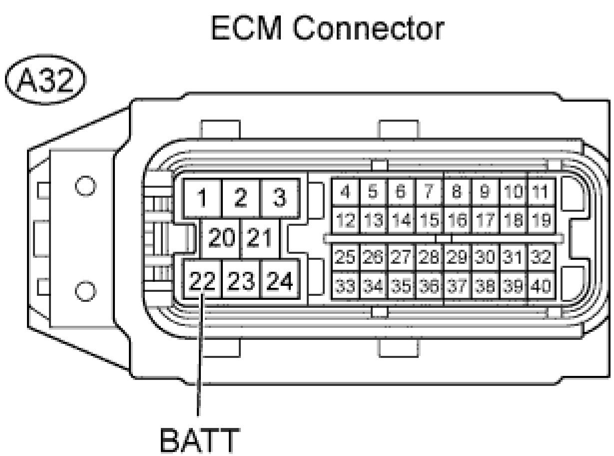
OK

2.CHECK HARNESS AND CONNECTOR (ECM - INTEGRATION RELAY)

Engine Room Relay Block:



Wire Harness Side: Front View



1. Remove the EFI fuse from the engine room relay block.

2. Disconnect the ECM connector.

3. Check the resistance.

   Standard resistance (Check for open):

Tester Connection	Specified Condition
BATT (A32-22) - EFI fuse holder (2)	Below 1 Ω

Standard resistance (Check for short):

Tester Connection	Specified Condition
BATT (A32-22) - Body ground	10 kΩ or higher

4. Reinstall the EFI fuse.

5. Reconnect the ECM connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - INTEGRATION RELAY)

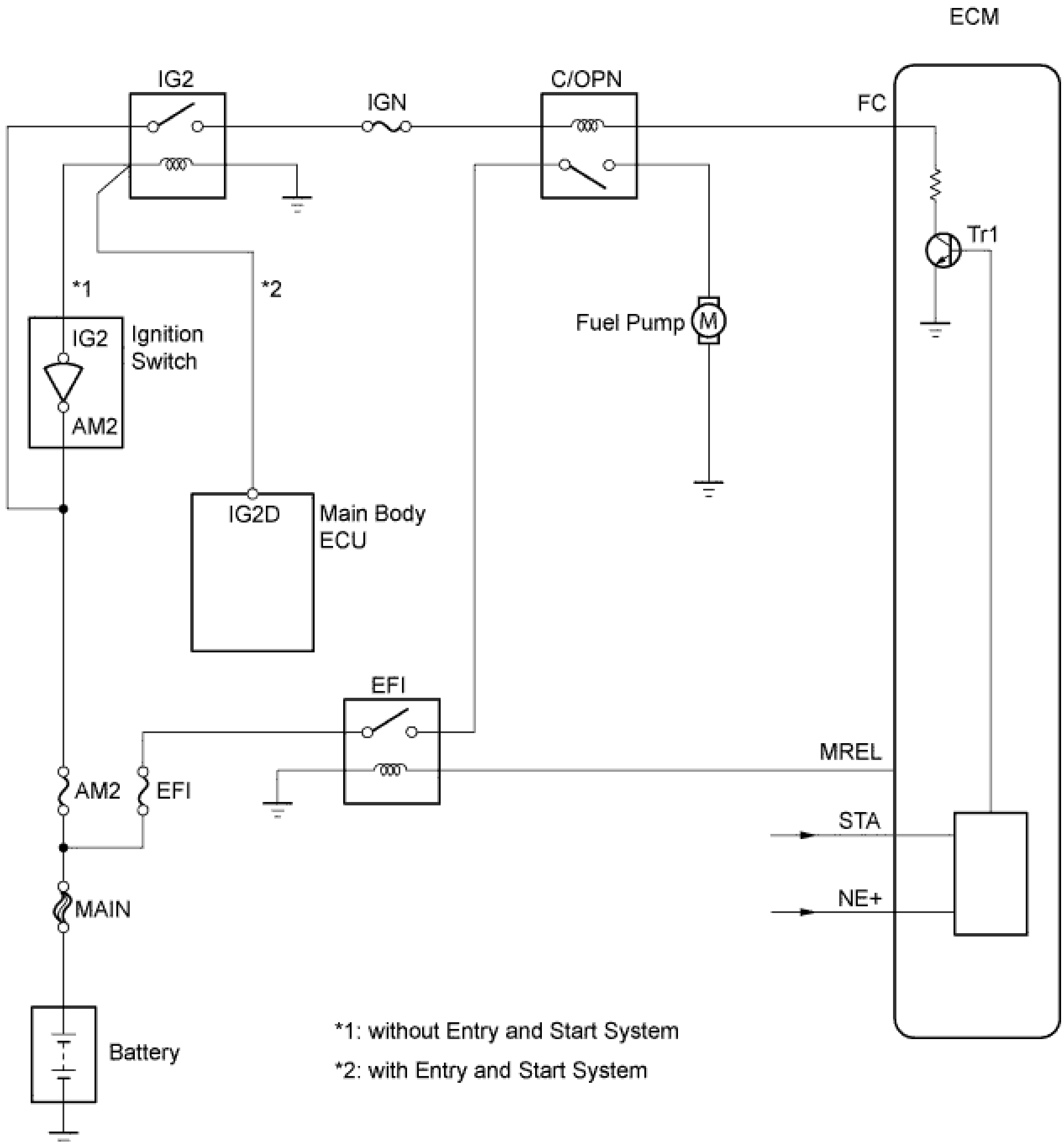
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY - BATTERY)

SFI SYSTEM > Fuel Pump Control Circuit

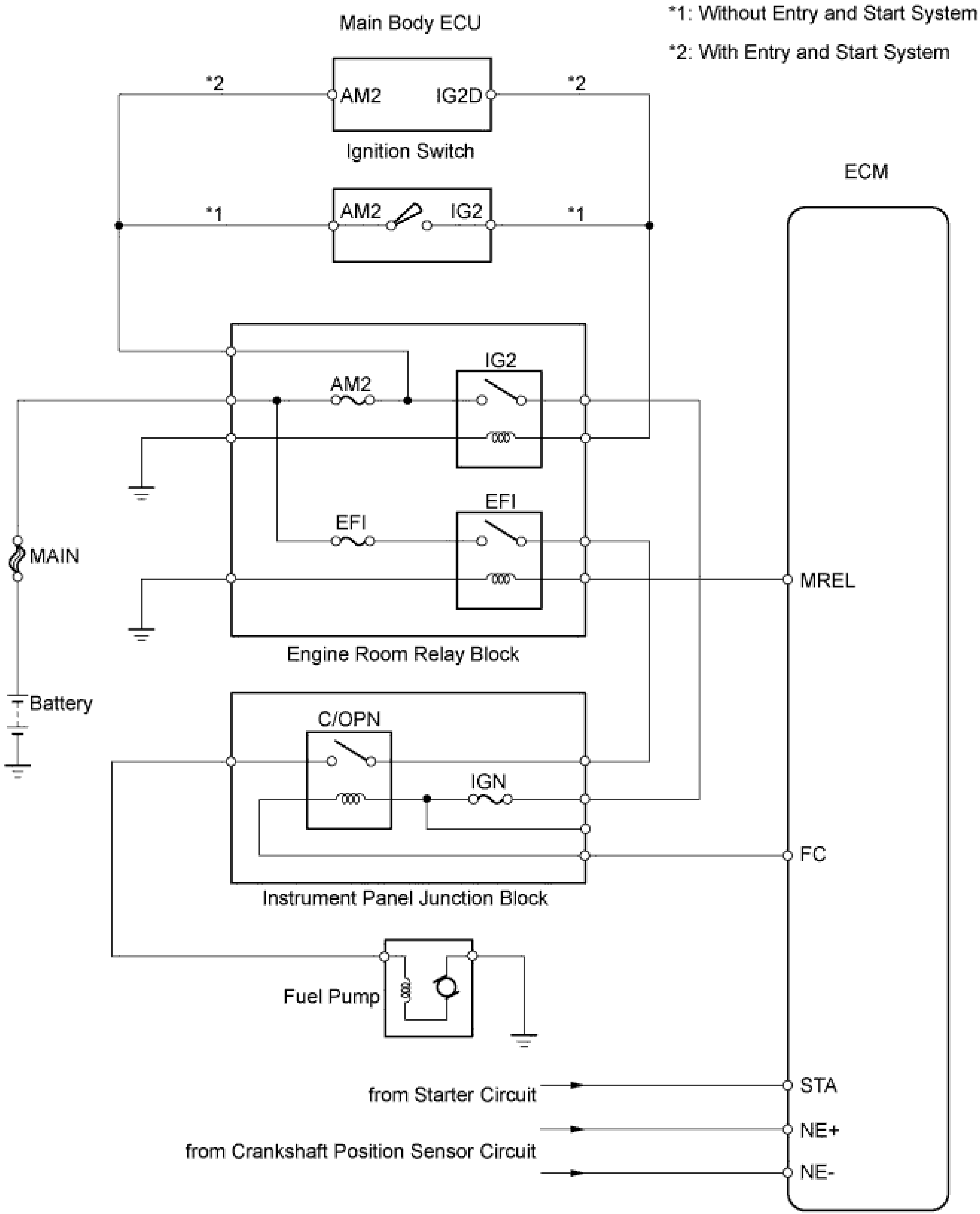
DESCRIPTION

When the engine is cranked, the starter relay drive signal output from the STAR terminal of the ECM is input to the STA terminal of the ECM, and NE signal generated by the crankshaft position sensor is also input to the NE+ terminal. Thus, the ECM interprets that the engine has been cranked, and turns the transistor Tr1 in the ECM internal circuit ON. The current flows to the C/OPN (Circuit Opening) relay by turning the Tr1 ON. Then, the fuel pump operates.
While the NE signal is input to the ECM with the while engine running, the ECM turns the Tr1 on continuously.



Y

WIRING DIAGRAM



*1: Without Entry and Start System
*2: With Entry and Start System
Main Body ECU
AM2
IG2D
*2
*2
Ignition Switch
AM2
IG2
*1
*1
ECM
IG2
AM2
EFI
EFI
MAIN
MREL
Engine Room Relay Block
Battery
C/OPN
IGN
FC
Instrument Panel Junction Block
Fuel Pump
from Starter Circuit
STA
NE+
from Crankshaft Position Sensor Circuit
NE-

INSPECTION PROCEDURE

NOTICE:

Perform electronic throttle learning after replacing the ECM ().

1.PERFORM ACTIVE TEST USING INTELLIGENT TESTER

1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch on (IG) and turn the tester ON.
3. Select the following menu items: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump/Speed.
4. Check whether the fuel pump operating sound occurs when performing the Active Test on the tester.

   OK:
   Fuel pump operating sound occurs.

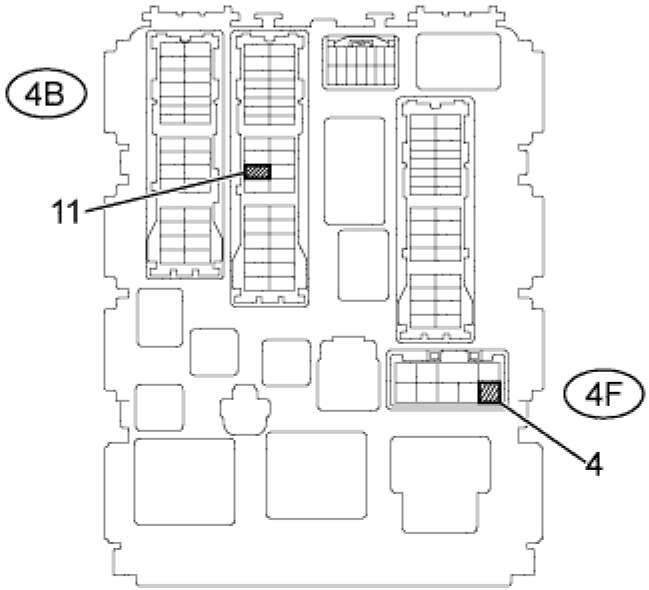
OK

Go to step 8

NG

2.INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY (C/OPN RELAY INPUT VOLTAGE)

Instrument Panel Junction Block Assembly:



Y

1. Measure the voltage between the terminal of the instrument panel junction block and the body ground when the ignition switch is on (IG) and off.

   Standard voltage:

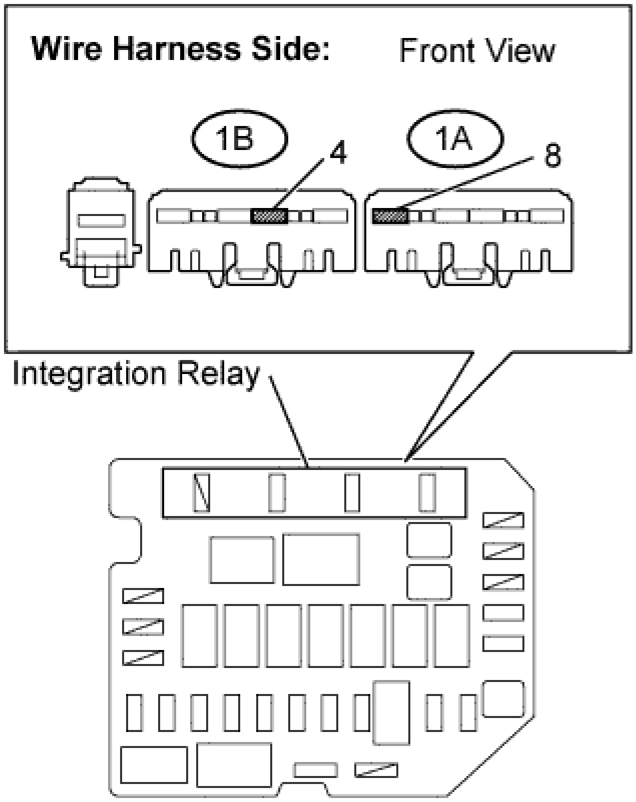
Tester Connection	Ignition Switch Condition	Specified Condition
4B-11 - Body ground	Off	Below 1 V
4F-4 - Body ground	Off	Below 1 V
4B-11 - Body ground	On (IG)	10 to 14 V
4F-4 - Body ground	On (IG)	10 to 14 V

OK

Go to step 4

NG

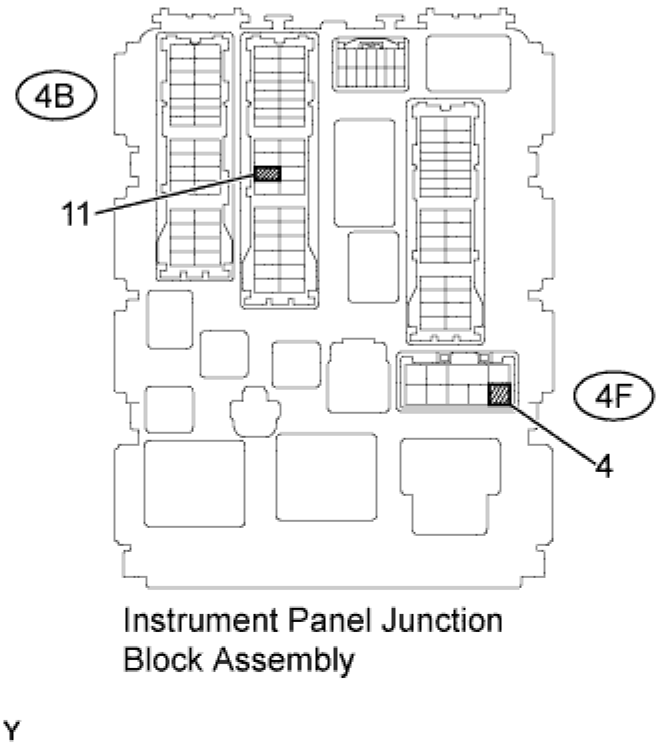
3.CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B - INTEGRATION RELAY)



Y

1. Remove the integration relay from the engine room relay block.

Wire Harness Side:



2. Disconnect the instrument panel junction block connector.

3. Check the resistance.

   Standard resistance (Check for open):

Tester Connection	Specified Condition
1B-4 - 4F-4	Below 1 Ω
1A-8 - 4B-11	Below 1 Ω

   Standard resistance (Check for short):

Tester Connection	Specified Condition
4F-4 - Body ground	10 kΩ or higher
4B-11 - Body ground	10 kΩ or higher

4. Reinstall the integration relay.

5. Reconnect the instrument panel junction block connector.

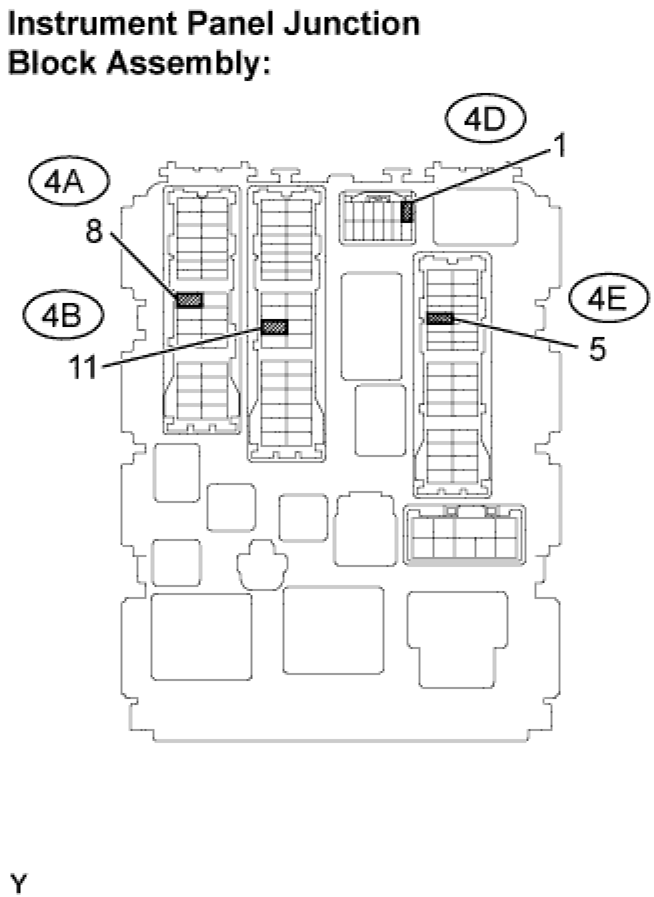
NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

GO TO ECM POWER SOURCE CIRCUIT

4.INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY (C/OPN RELAY)



1. Remove the instrument panel junction block assembly.

2. Connect the battery positive terminal to the 4D-1 terminal, and connect the battery negative terminal to the 4E-5 terminal.

3. Check the C/OPN relay resistance.

   Standard resistance:

Tester Connection	Specified Condition
4A-8 - 4B-11	10 kΩ or higher
4A-8 - 4B-11	Below 1 Ω (when battery voltage applied to terminal 4D-1 and 4E-5)

   HINT:
   The relay coil circuit between 4D-1 and 4E-5 is not through the IGN fuse.

4. Reinstall the instrument panel junction block assembly.

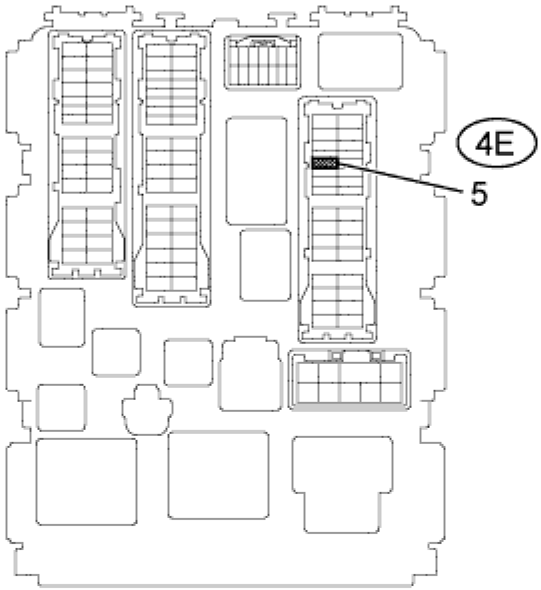
NG

REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK

5.CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B - ECM)

Wire Harness Side:

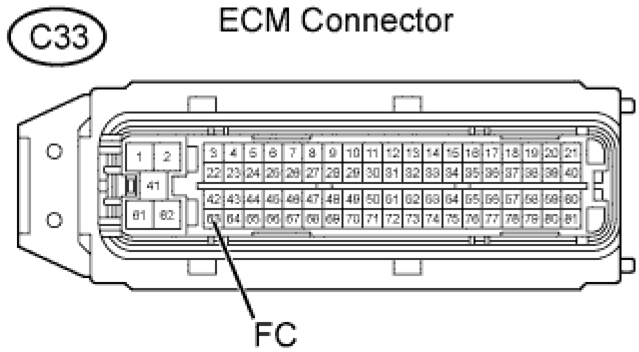


Instrument Panel Junction
Block Assembly

Y

1. Disconnect the instrument panel junction block connector.

Wire Harness Side: Front View



Y

2. Disconnect the ECM connector.

3. Check the resistance.

Standard resistance (Check for open):

Tester Connection	Specified Condition
4E-5 - FC (C33-63)	Below 1 Ω

Standard resistance (Check for short):

Tester Connection	Specified Condition
FC (C33-63) - Body ground	10 kΩ or higher

4. Reconnect the instrument panel junction block connector.

5. Reconnect the ECM connector.

NG

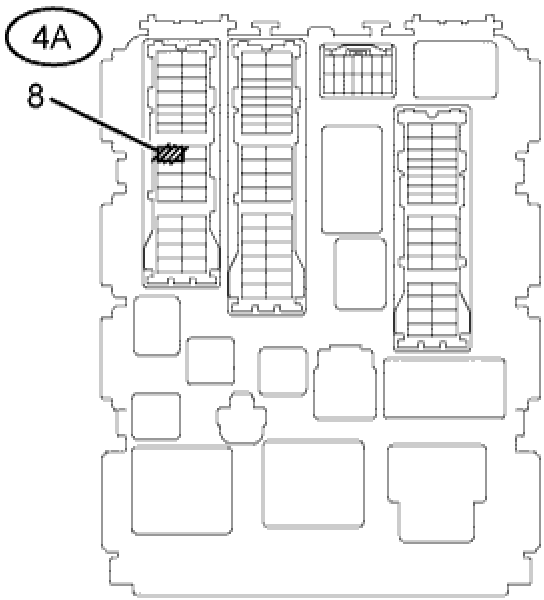
REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

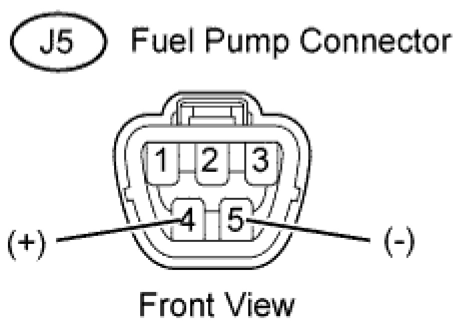
6.CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL J/B - FUEL PUMP - BODY GROUND)

Instrument Panel Junction Block Assembly:

Wire Harness Side :



Wire Harness Side :



1. Check the harness and the connectors between the instrument panel junction block assembly and the fuel pump.
    1. Disconnect the instrument panel junction block connector.
    2. Disconnect the fuel pump connector.
    3. Check the resistance.

       Standard resistance (Check for open):

Tester Connection	Specified Condition
4A-8 - Fuel pump (J5-4)	Below 1 Ω

Standard resistance (Check for short):

Tester Connection	Specified Condition
4A-8 - Body ground	10 kΩ or higher

4. Reconnect the instrument panel junction block connector.
5. Reconnect the fuel pump connector.

2. Check the harness and connector between the fuel pump and the body ground.
    1. Disconnect the fuel pump connector.
    2. Check the resistance.

    Standard resistance (Check for open):

Tester Connection	Specified Condition
Fuel pump (J5-5) - Body ground	Below 1 Ω

3. Reconnect the fuel pump connector.

NG

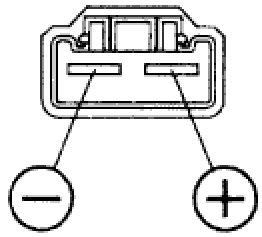
REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

7.INSPECT FUEL PUMP

Component Side :

Fuel Pump



1. Inspect fuel pump resistance.
    1. Measure the resistance between the fuel pump terminals.

        Standard resistance:
    0.2 to 3.0 Ω at 20°C (68°F)

2. Inspect fuel pump operation.
    1. Apply battery voltage to the fuel pump terminals.
    2. Check that the fuel pump operates.

        NOTICE:

        - This test must be done quickly (within 10 seconds) to prevent the coil from burning out.
        - Keep the fuel pump as far away from the battery as possible.
        - Always switch at the battery side.

NG

REPLACE FUEL PUMP

OK

REPLACE ECM

8.READ VALUE USING INTELLIGENT TESTER

1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch on (IG) and turn the tester ON.

3. Select the following menu items: Powertrain / Engine and ECT / Data List / Starter Signal.

4. Check the result when the ignition switch is on (IG).

5. Check the result when the engine starts.

   Standard:

Ignition Switch Condition	Tester Display (Starter Signal)
On (IG)	OFF
Engine Start	ON

NG

REPAIR OR REPLACE STARTING SYSTEM

OK

9.READ VALUE USING INTELLIGENT TESTER

1. Connect the intelligent tester to the DLC3.
2. Turn the ignition switch on (IG) and turn the tester ON.
3. Select the following menu items: Powertrain / Engine and ECT / Data List / Engine Speed.

4. Read the value while cranking.

   OK:
   The value is the same as the actual engine speed and is displayed with no interruption on the tester.

NG

REPAIR OR REPLACE CRANKSHAFT POSITION SENSOR CIRCUIT

OK

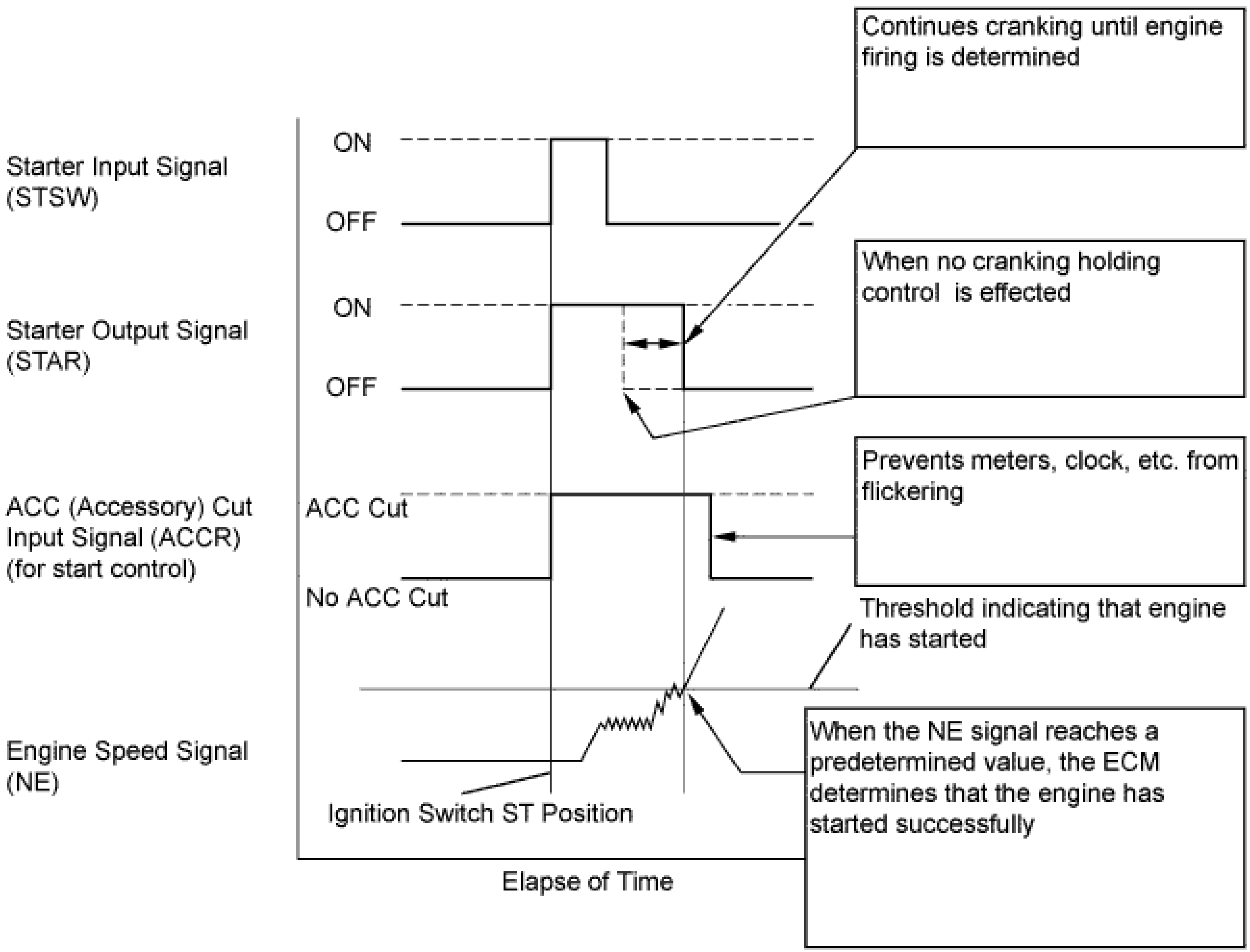
REPLACE ECM

SFI SYSTEM > Cranking Holding Function Circuit

DESCRIPTION

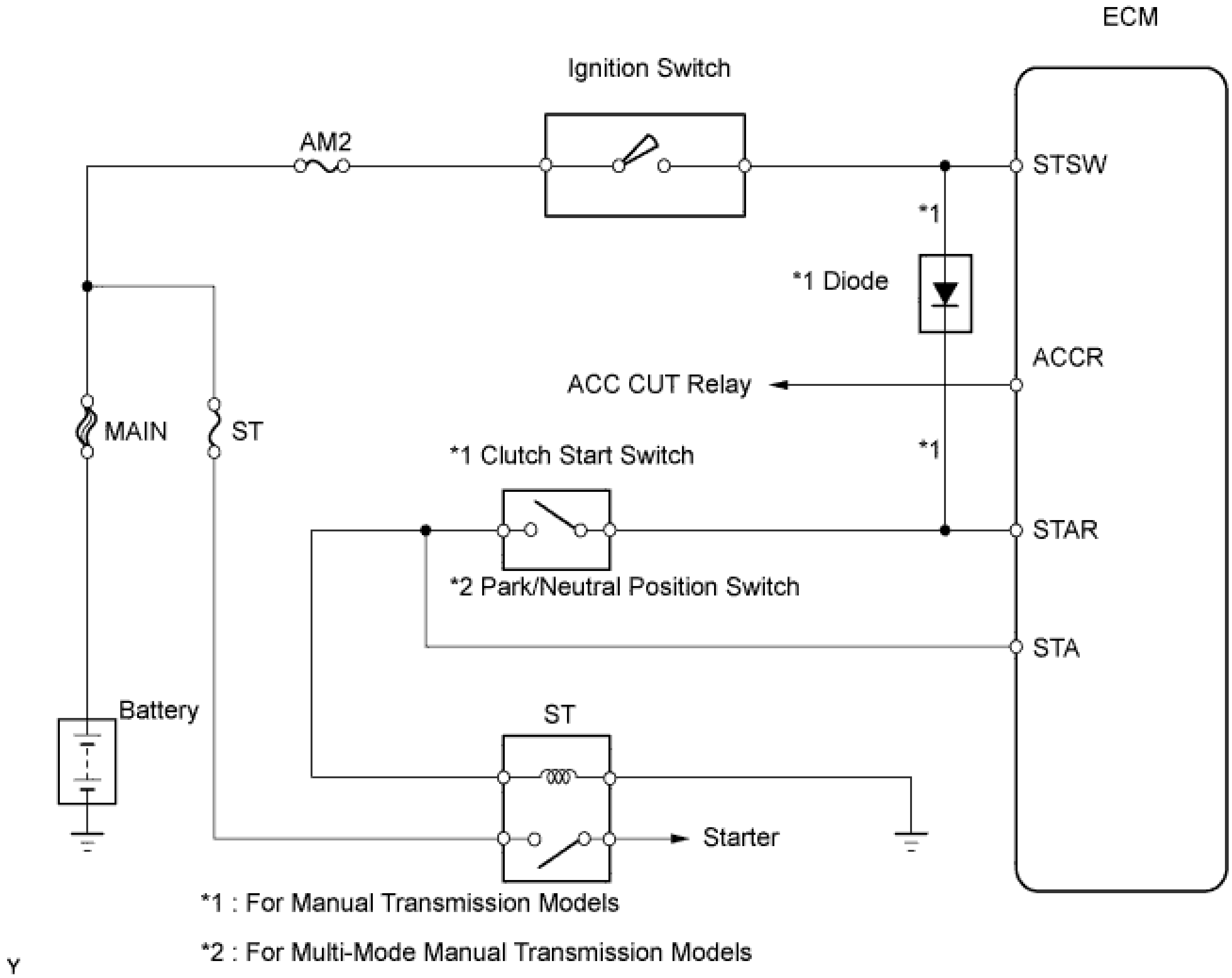
The cranking holding control system keeps energizing the starter relay after the ECM detects the starter signal (STSW signal) from the ignition switch or the main body ECU until the ECM performs a judgement of "Engine started". Furthermore, the ECM outputs an accessory cut signal (ACCR signal) to the ACC cut relay during cranking to prevent flickering of the combination meter, clock, audio system, and so on.

When the ECM detects the STSW signal, the ECM outputs the starter relay drive signal (STAR signal) to the starter relay through the clutch start switch (or the park/neutral position switch), and then, the engine is cranked. When the ECM receives a stable engine speed signal (NE signal), more specifically, when the NE signal reaches a predetermined value, the ECM stops outputting the STAR signal. Also, the ECM monitors the starter relay operating conditions based on the STA terminal voltage status.



WIRING DIAGRAM

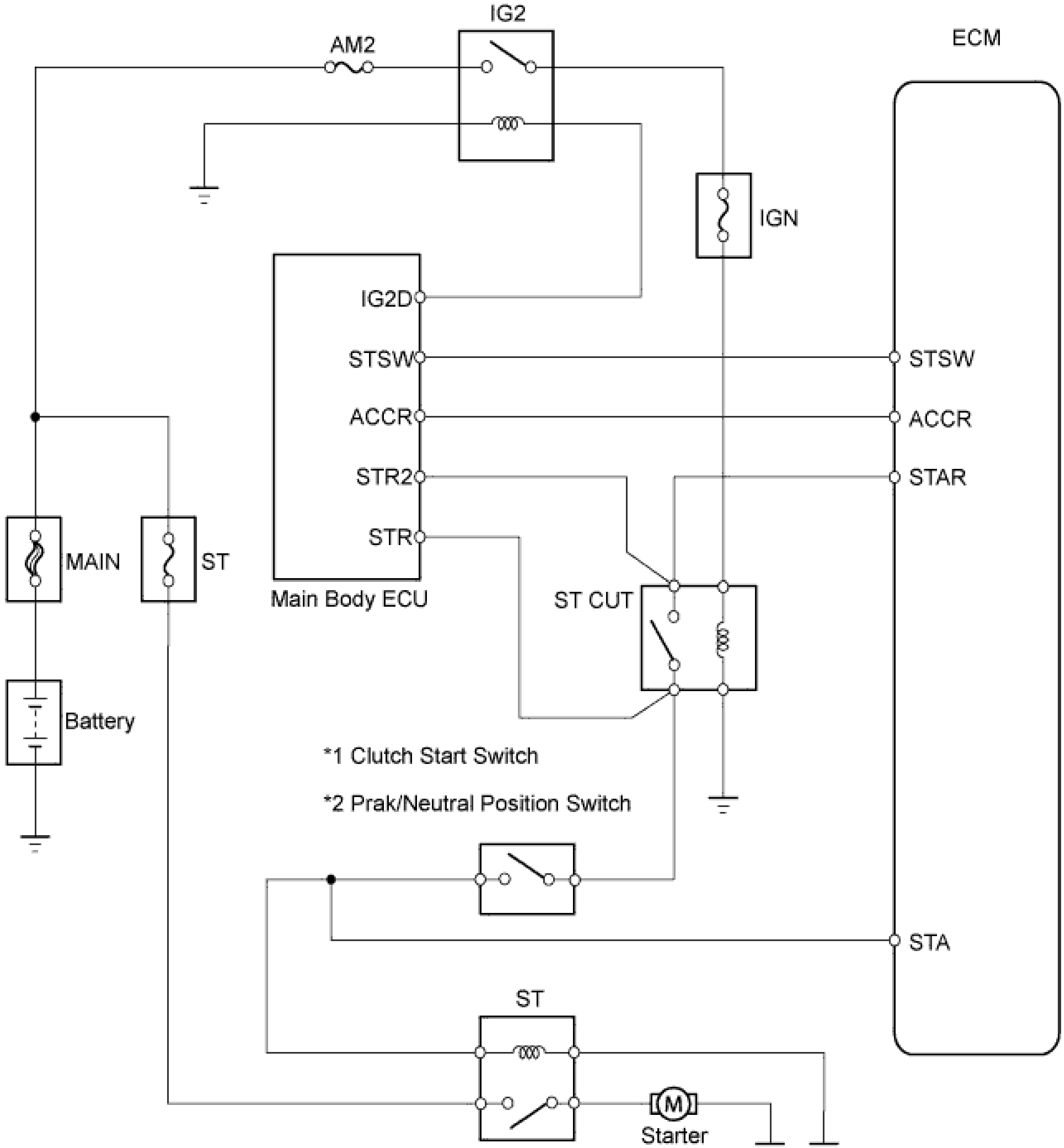
Without Entry and Start System:



*1 : For Manual Transmission Models

*2 : For Multi-Mode Manual Transmission Models

With Entry and Start System:



*1 : For Manual Trasmission Models

*2 : For Multi-Mode Manual Transmission Models

INSPECTION PROCEDURE

NOTICE:

Perform electronic throttle learning after replacing the ECM ().

1.READ VALUE USING INTELLIGENT TESTER

1. Connect an intelligent tester to the DLC3.
2. Turn the ignition switch on (IG) and turn the tester ON.
3. Select the following menu items: Powertrain / Engine and ECT / Data List / Starter Signal.
4. Check the result when the ignition switch is turned on (IG).
5. Check the result when the engine starts.

   Standard:

Ignition Switch Condition	Tester Display (Starter Signal)
On (IG)	OFF
Engine starts	ON

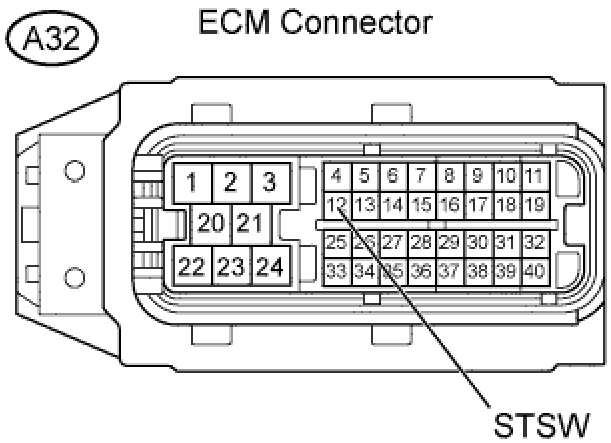
OK

Go to step 12

NG

2.INSPECT ECM (STSW TERMINAL VOLTAGE)

Wire Harness Side: Front View



1. Park the vehicle with the transmission gear in neutral (for MMT models).
2. Disconnect the ECM connector.
3. Depress the brake pedal.
4. Depress the clutch pedal fully (for M/T models).
5. Measure the voltage between the ECM terminal and the body ground when operating the ignition switch to start cranking.

   Standard voltage:

Tester Connection	Specified Condition
STSW (A32-12) - Body ground	10 to 14 V

6. Reconnect the ECM connector.

Result:

Result	Proceed To

Within standard range	A
Outside standard range (vehicle without entry and start system)	B
Outside standard range (vehicle with entry and start system)	C

7. Connect the intelligent tester to the DLC3, and check the DTC output. If any DTC outputs, erase the DTC using the tester.

   HINT:
   DTCs related CAN communication might be detected due to the inspection in this step.

B

Go to step 5

C

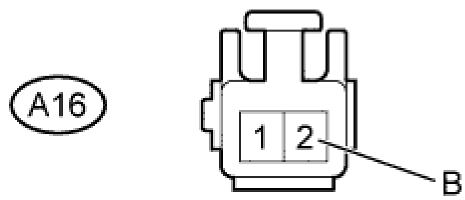
Go to step 6

A

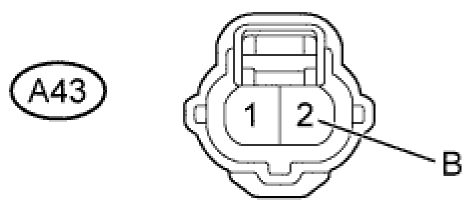
3.INSPECT ECM (STAR OUTPUT VOLTAGE)

Wire Harness Side :

Clutch Start Switch Assembly Connector



Park/Neutral Position Switch Assembly
Connctor



1. Inspect the STAR output voltage (for M/T models).
    1. Disconnect the clutch start switch assembly connector.
    2. Measure the voltage between the terminal of clutch start switch assembly connector and the body ground while cranking the engine.

       Standard voltage:

Tester Connection	Specified Condition
B (A16-2) - Body ground	10 to 14 V

    3. Reconnect the clutch start switch assembly connector.

2. Inspect the STAR output voltage (for MMT models).
    1. Disconnect the Park/Neutral Position (PNP) switch assembly connector.
    2. Measure the voltage between the terminal of PNP switch assembly connector and the body ground while cranking the engine.

       Standard voltage:

Tester Connection	Specified Condition
B (A43-2) - Body ground	10 to 14 V

3. Reconnect the PNP switch assembly connector.

Result:

Result	Proceed To
Within standard range	A
Outside standard range (vehicle without entry and start system)	B
Outside standard range (vehicle with entry and start system)	C

B

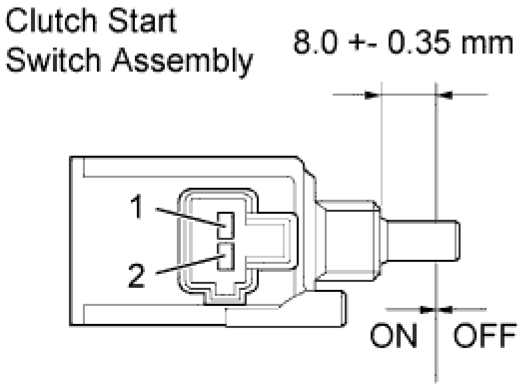
Go to step 7

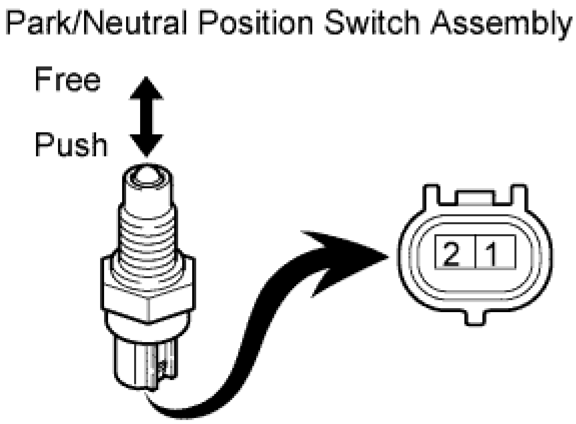
C

Go to step 8

A

4.INSPECT PARK/NEUTRAL POSITION SWITCH ASSEMBLY (MMT) OR CLUTCH START SWITCH ASSEMBLY (M/T)





1. Inspect the clutch start switch assembly (for M/T models).
    1. Remove the clutch start switch assembly.
    2. Measure the resistance between the terminals of the clutch start switch assembly connector.

       Standard resistance:

Switch Condition	Specified Condition
Pushed in	Below 1 Ω
Released	10 kΩ or higher

    3. Reinstall the clutch start switch assembly.

2. Inspect the Park/Neutral Position (PNP) switch assembly (for MMT models).
    1. Remove the PNP switch assembly.
    2. Measure the resistance between the terminals of the PNP switch assembly.

       Standard resistance:

Switch	Tester	Specified

Condition	Connection	Condition
Pushed	1 - 2	Below 1 Ω
Free	1 - 2	10 kΩ or higher

3. Reinstall the PNP switch assembly.

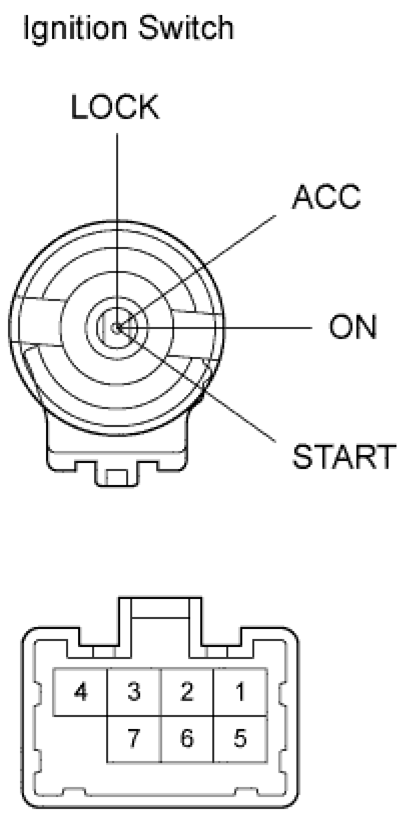
OK

Go to step 12

NG

REPLACE CLUTCH START SWITCH ASSEMBLY

5.INSPECT IGNITION SWITCH



Y

1. Remove the ignition switch.
2. Measure the resistance between the terminals of the ignition switch.

Standard resistance:

Switch Position	Tester Connection	Specified Condition
LOCK	-	10 kΩ or higher
ACC	2 - 4	Below 1 Ω
ON	1 - 2 - 4	Below 1 Ω
	5 - 6	Below 1 Ω
START	1 - 3 - 4	Below 1 Ω

	5 - 6 - 7	Below 1 Ω

3. Reinstall the ignition switch.

NG

REPLACE IGNITION SWITCH

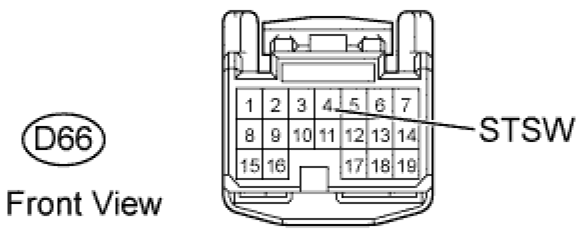
OK

REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - IGNITION SWITCH - BATTERY)

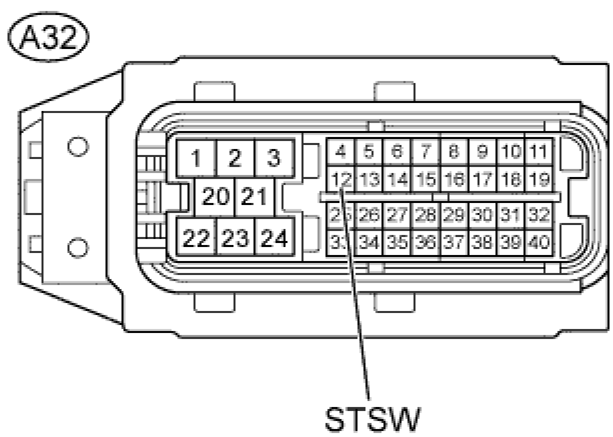
6.CHECK HARNESS AND CONNECTOR (ECM - MAIN BODY ECU)

Wire Harness Side: Front View

Main Body ECU Connector



ECM Connector



1. Disconnect the main body ECU connector.

2. Disconnect the ECM connector.

3. Check the resistance.

   Standard resistance (Check for open):

Tester Connection	Specified Condition
STSW (D66-4) - STSW (A32-12)	Below 1 Ω

   Standard resistance (Check for short):

Tester Connection	Specified Condition
STSW (D66-4) - Body ground	Below 1 Ω

4. Reconnect the main body ECU connector.

5. Reconnect the ECM connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

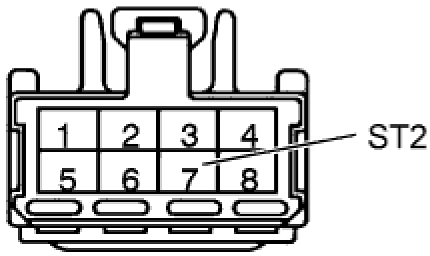
CHECK ENTRY AND START SYSTEM

7.CHECK HARNESS AND CONNECTOR (CLUTCH START SWITCH - IG SWITCH AND ECM, OR PNP SWITCH - ECM)

Wire Harness Side: Front View

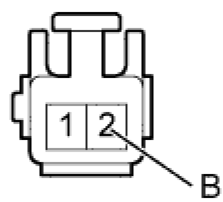
Ignition Switch Connector

D8



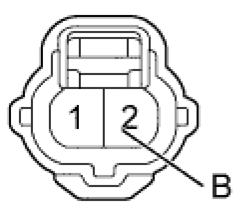
Clutch Start Switch Assembly Connector (for M/T models)

A16

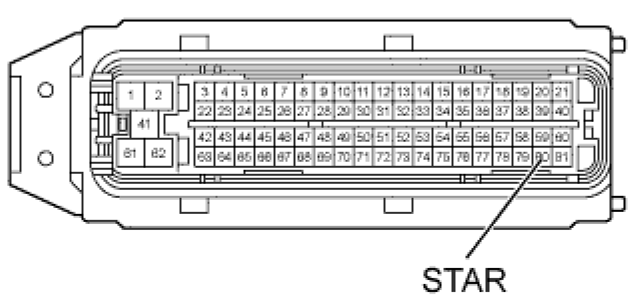


Park / Neutral Position Switch Assembly Connector (for MMT models)

A43



A32 ECM Connector



1. Check harness and connectors (for M/T models).
    1. Disconnect the ignition switch connector.
    2. Disconnect the clutch start switch assembly connector.
    3. Disconnect the ECM connector.
    4. Check the resistance.

       Standard resistance (Check for open):

Tester Connection	Specified Condition
ST2 (D8-7) - B (A16-2)	Below 1 Ω
STAR (A32-80) - B (A16-2)	Below 1 Ω

       Standard resistance (Check for short):

Tester Connection	Specified Condition
ST2 (D8-7) - Body ground	10 kΩ or higher
STAR (A32-80) - Body ground	10 kΩ or higher

       HINT:
       The wire between the clutch start switch and the ignition switch has a diode (Refer to the wiring diagram). The current flowing to the clutch start switch is rectified by the diode.

    5. Reconnect the ignition switch connector.
    6. Reconnect the clutch start switch assembly connector.
    7. Reconnect the ECM connector.

2. Check harness and connectors (for MMT models).
    1. Disconnect the ECM connector.
    2. Disconnect the Park/Neutral Position (PNP) switch assembly connector.
    3. Check the resistance.

       Standard resistance (Check for open):

Tester Connection	Specified Condition
STAR (A32-80) - B (A43-2)	Below 1 Ω

       Standard resistance (Check for short):

Tester Connection	Specified Condition
STAR (A32-80) -	10 kΩ or

Body ground	higher

4. Reconnect the ECM connector.
5. Reconnect the PNP switch assembly connector.

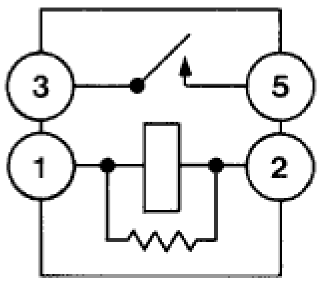
NG

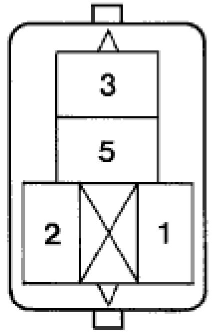
REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

REPLACE ECM

8.INSPECT ST CUT RELAY





1. Remove the ST CUT relay.
2. Check the resistance.

   Standard resistance:

Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (When battery voltage applied to terminals 1 and 2)

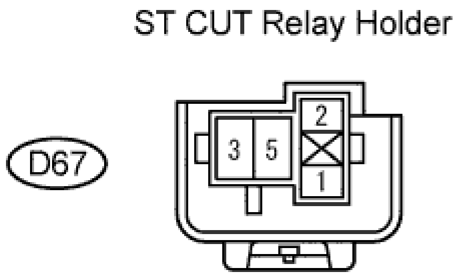
3. Reinstall the relay.

NG

REPLACE ST CUT RELAY

OK

9.INSPECT ST CUT RELAY (RELAY HOLDER TERMINAL VOLTAGE)



1. Remove the ST CUT relay.
2. Turn the ignition switch on (IG).
3. Measure the voltage between the terminals of the ST CUT relay holder.

   Standard voltage:

Tester Connection	Specified Condition
1 - 2	10 to 14 V

4. Reinstall the relay.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

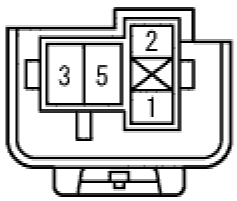
OK

10.CHECK HARNESS AND CONNECTOR (ST CUT RELAY - ECM, MAIN BODY ECU, PNP AND CLUTCH ST SWITCH)

Wire Harness Side: Front View

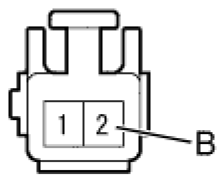
ST CUT Relay Holder

D67



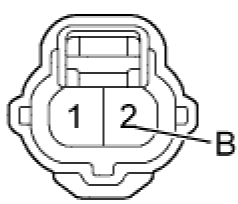
Clutch Start Switch Assembly Connector (for M/T models)

A16



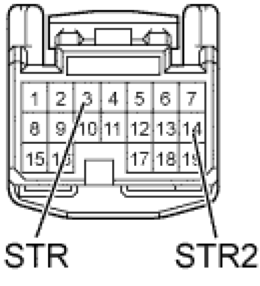
Park/Neutral Position Switch Assembly Connector (for MMT models)

A43



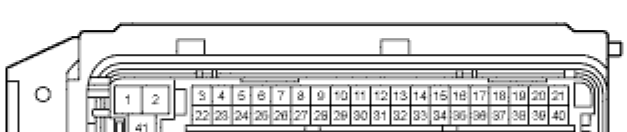
Main Body ECU Connector

D66



A32

ECM Connector



1. Remove the ST CUT relay.

2. Disconnect the clutch start switch assembly connector (for M/T models).

3. Disconnect the Park/Neutral Position (PNP) switch assembly (for MMT models).

4. Disconnect the main body ECU connector.

5. Disconnect the ECM connector.

6. Check the resistance.

   Standard resistance (Check for open):

Tester Connection	Specified Condition
ST CUT relay (D67-3) - STAR (A32-80)	Below 1 Ω
ST CUT relay (D67-3) - STR2 (D66-14)	Below 1 Ω
STR (D66-3) - ST CUT relay (D67-5)	Below 1 Ω
For M/T models: B (A16-2) - ST CUT relay (D67-5) For MMT models: B (A43-2) - ST CUT relay (D67-5)	Below 1 Ω

   Standard resistance (Check for short):

Tester Connection	Specified Condition
ST CUT relay (D67-3) - Body ground	10 kΩ or higher
ST CUT relay (D67-5) - Body ground	10 kΩ or higher

7. Reconnect the ECM connector.

8. Reconnect the main body ECU connector.

9. Reconnect the clutch start switch assembly connector (for M/T models).

10. Reconnect the PNP switch assembly connector (for MMT models).

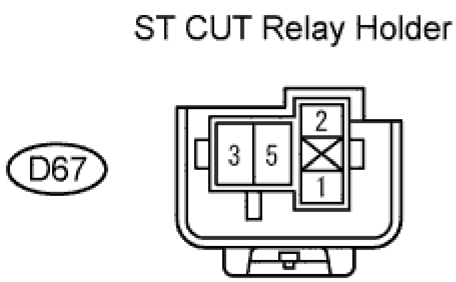
11. Reinstall the ST CUT relay.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

11.INSPECT MAIN BODY ECU (CHECK FOR SHORT)



1. Disconnect the ECM connector.
2. Disconnect the clutch start switch assembly connector (for M/T models).
3. Disconnect the Park/Neutral Position (PNP) switch assembly (for MMT models).
4. Remove the ST CUT relay.
5. Check the resistance between the terminals of the ST CUT relay holder.

   Standard resistance (Check for short):

Tester Connection	Specified Condition
ST CUT relay (D67-3) - Body ground	10 kΩ or higher
ST CUT relay (D67-5) - Body ground	10 kΩ or higher

6. Reinstall the ST CUT relay.
7. Reconnect the clutch start switch assembly connector (for M/T models).
8. Reconnect the PNP switch assembly connector (for MMT models).
9. Reconnect the ECM connector.

NG

CHECK ENTRY AND START SYSTEM

OK

REPLACE ECM

12.INSPECT BATTERY

1. Check that the battery is not depleted.

   OK:
   Battery is not depleted.

NG

REPLACE BATTERY

OK

13.CHECK BATTERY TERMINAL

1. Check that the battery terminals are not loose or corroded.

   OK:
   Battery terminals are not loose or corroded.

NG

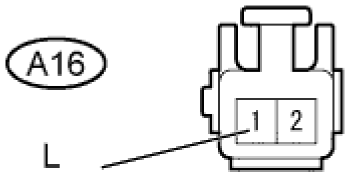
REPAIR OR REPLACE BATTERY TERMINAL

OK

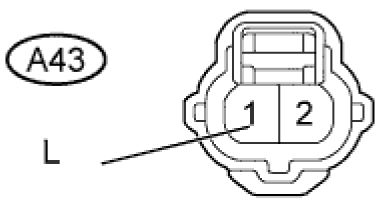
14.CHECK HARNESS AND CONNECTOR (CLUTCH START SWITCH OR PNP SWITCH - ECM, ST RELAY)

Wire Harness Side: Front View

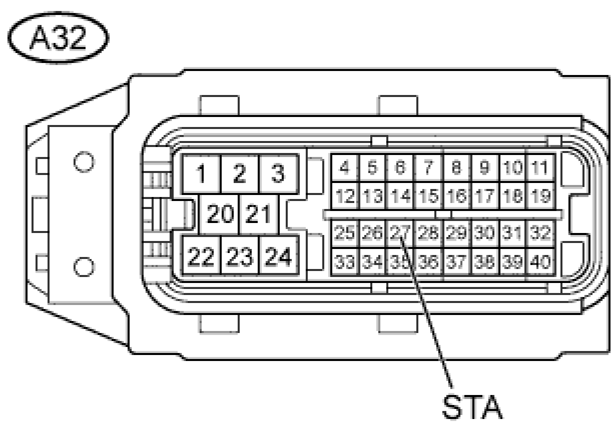
Clutch Start Switch Assembly Connector
(for M/T models)

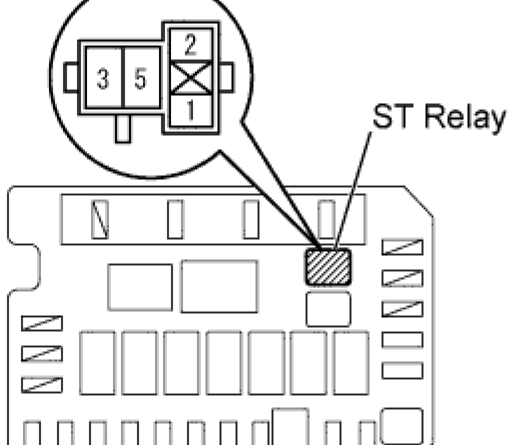


Park/Neutral Position Switch Assembly
Connector (for MMT models)



ECM Connector





1. Check harness and connectors (for M/T models).
    1. Remove the ST relay from the engine room relay block.
    2. Disconnect the clutch start switch assembly connector.
    3. Disconnect the ECM connector.
    4. Check the resistance.

       Standard resistance (Check for open):

Tester Connection	Specified Condition
L (A16-1) - STA (A32-27)	Below 1 Ω
L (A16-1) - ST relay (2)	Below 1 Ω
ST relay (1) - Body ground	Below 1 Ω

       Standard resistance (Check for short):

Tester Connection	Specified Condition
L (A16-1) - Body ground	10 kΩ or higher

    5. Reinstall the ST relay.
    6. Reconnect the clutch start switch assembly connector.
    7. Reconnect the ECM connector.

2. Check harness and connectors (for MMT models).
    1. Remove the ST relay from the engine room relay block.
    2. Disconnect the Park/Neutral Position (PNP) switch assembly connector.
    3. Disconnect the ECM connector.
    4. Check the resistance.

       Standard resistance (Check for open):

Tester Connection	Specified Condition
L (A43-1) - STA (A32-27)	Below 1 Ω
L (43-1) - ST relay (2)	Below 1 Ω
ST relay (1) - Body ground	Below 1 Ω

       Standard resistance (Check for short):

Tester Connection	Specified

	Condition
L (A43-1) - Body ground	10 kΩ or higher

5. Reinstall the ST relay.
6. Reconnect the PNP switch assembly connector.
7. Reconnect the ECM connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

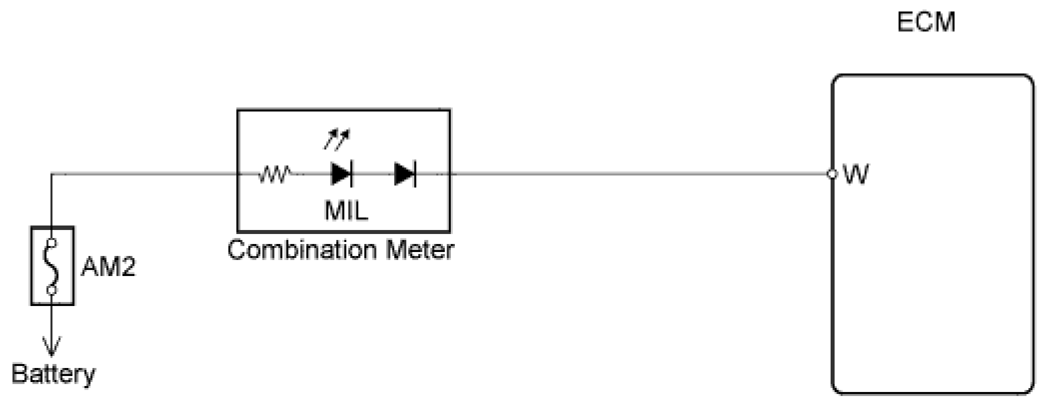
CHECK AND REPLACE STARTER CIRCUIT (STARTER - ST RELAY - BATTERY)

SFI SYSTEM > MIL Circuit

DESCRIPTION

The MIL (Malfunction Indicator Lamp) is used to indicate vehicle malfunction detections by the ECM. By turning the ignition switch on (IG), power is supplied to the MIL circuit, and the ECM provides the circuit ground which illuminates the MIL.
The MIL operation can be checked visually: When the ignition switch is first turned on (IG), the MIL illuminates and then goes off. If the MIL remains illuminated or is not illuminated, conduct the following troubleshooting procedure using an intelligent tester.

WIRING DIAGRAM



c

INSPECTION PROCEDURE

NOTICE:

Perform electronic throttle learning after replacing the ECM ().

1.CHECK MIL CONDITION

1. Perform troubleshooting in accordance with the chart below.

   Result:

MIL Condition	Proceed to
MIL remains ON	A
MIL does not illuminate	B

B

Go to step 4

A

2.CHECK WHETHER MIL GOES OFF

1. Connect an intelligent tester to the DLC3.
2. Turn the ignition switch on (IG).
3. Turn the tester ON.
4. Check whether any DTCs have been stored (). Note them down if necessary.

5. Clear DTCs ().

6. Check if the MIL goes off.

   OK:
   MIL goes off.

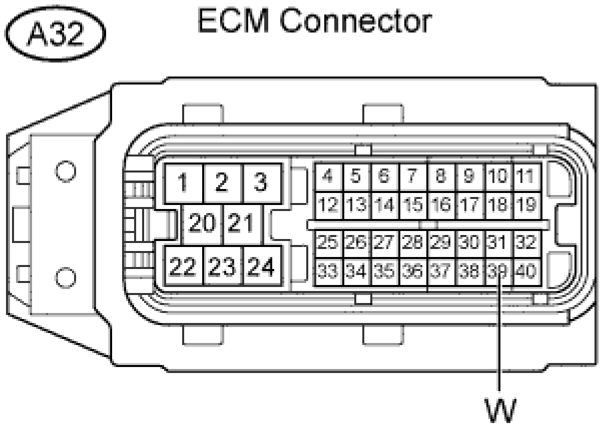
OK

REPAIR CIRCUIT INDICATED BY OUTPUT DTC

NG

3.CHECK HARNESS AND CONNECTOR

Wire Harness Side: Front View



1. Disconnect the ECM connector.
2. Turn the ignition switch on (IG).
3. Check that MIL is not illuminated.

   OK:
   MIL is not illuminated.
4. Reconnect the ECM connector.

NG

CHECK HARNESS AND CONNECTOR (ECM - COMBINATION METER)

OK

REPLACE ECM

4.CHECK THAT MIL IS ILLUMINATED

1. Check if the MIL illuminates when turning the ignition switch on (IG).

   OK:
   MIL illuminates.

OK

END

NG

5.CHECK THAT ENGINE STARTS

1. Turn the ignition switch on (IG).
2. Check whether the engine starts

Result:

Engine Condition	Proceed To
Engine starts	A
Engine does not start	B

HINT:

*: The intelligent tester cannot communicate with the ECM.

B

GO TO VC OUTPUT CIRCUIT

A

6.INSPECT COMBINATION METER ASSEMBLY (MIL CIRCUIT)

1. See the combination meter troubleshooting procedure ().

   OK:
   MIL illuminates

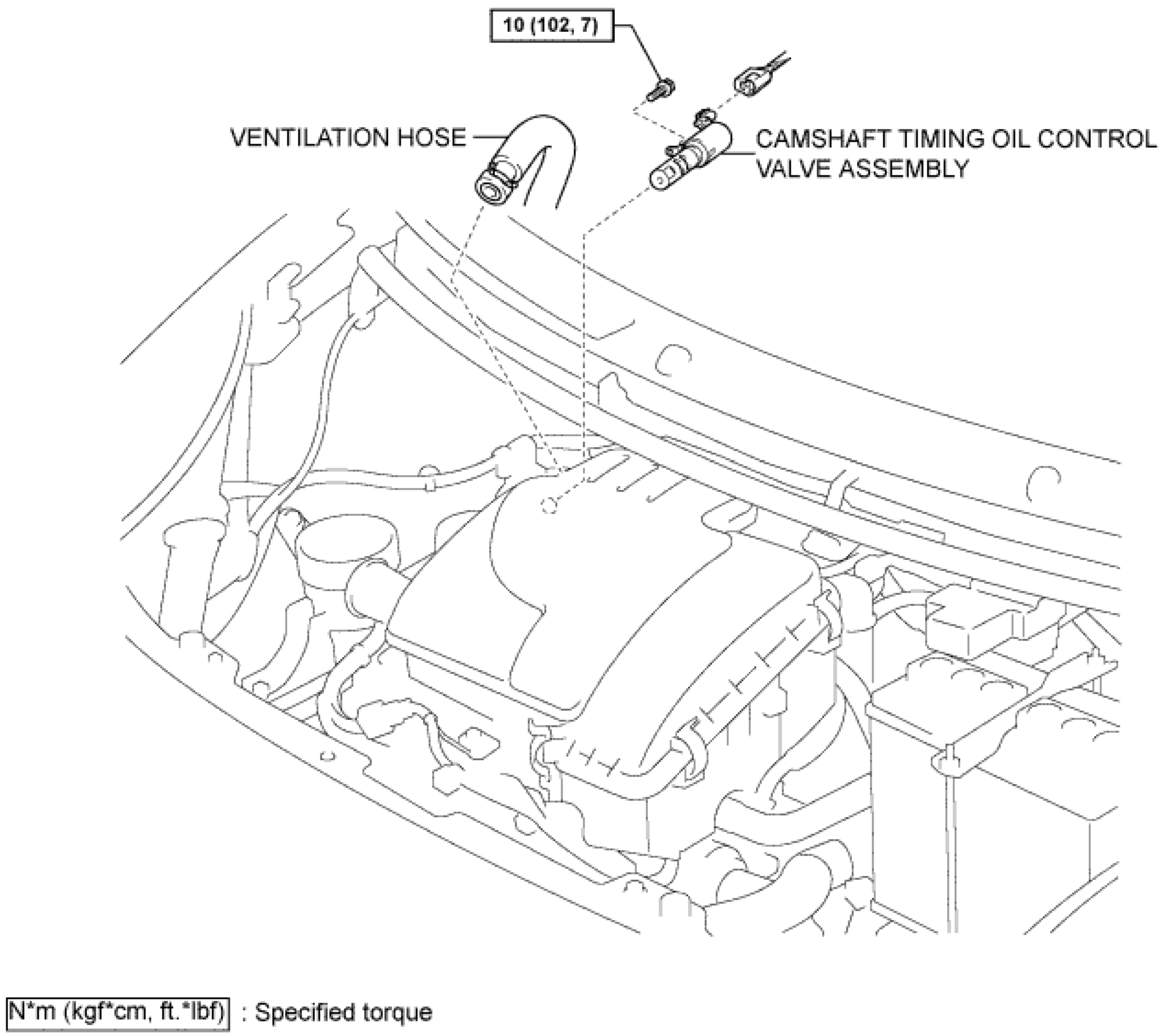
NG

REPAIR OR REPLACE COMBINATION METER ASSEMBLY

OK

CHECK AND REPLACE HARNESS AND CONNECTOR (COMBINATION METER - ECM)

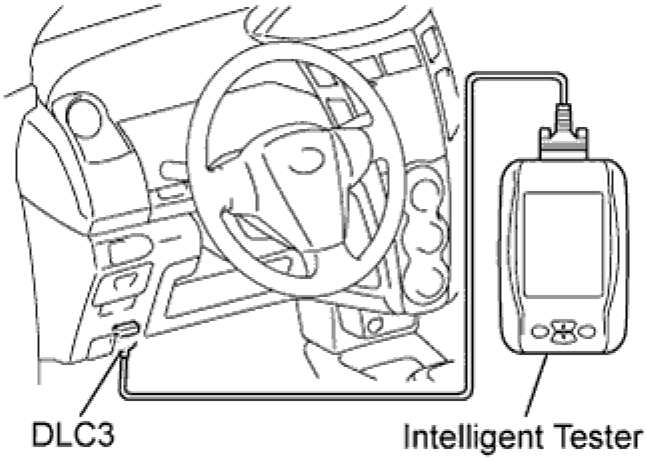
CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY > COMPONENTS


10 (102, 7)
VENTILATION HOSE
CAMSHAFT TIMING OIL CONTROL
VALVE ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque

Y

CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY > ON-VEHICLE INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



1. Connect the intelligent tester to the DLC3.

2. Warm up the engine.

3. Select the following menu items: Powertrain / Engine / Active Test / Control the VVT system (Bank1).

   Specification:

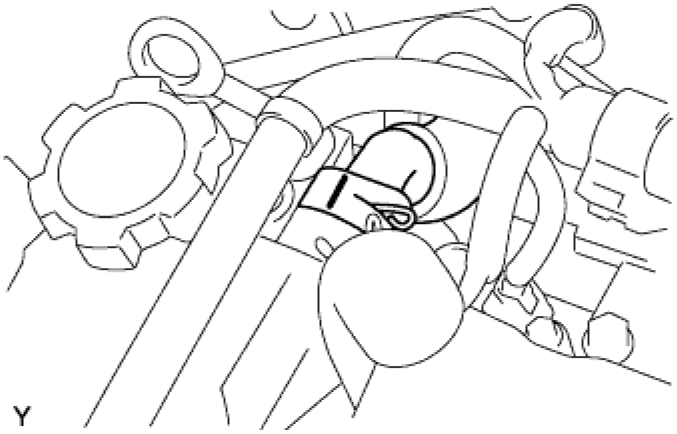
Tester operation	Specification
OCV OFF	Normal engine speed
OCV ON	Rough idling or engine stalls (soon after OCV switched from OFF to ON)

   If the result is not as specified, check the oil control valve and wirings.

CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY > REMOVAL

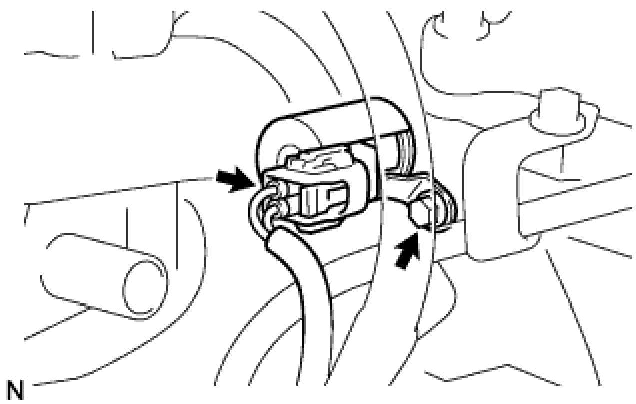
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. DISCONNECT VENTILATION HOSE



1. Loosen the hose clip, then disconnect the ventilation hose.

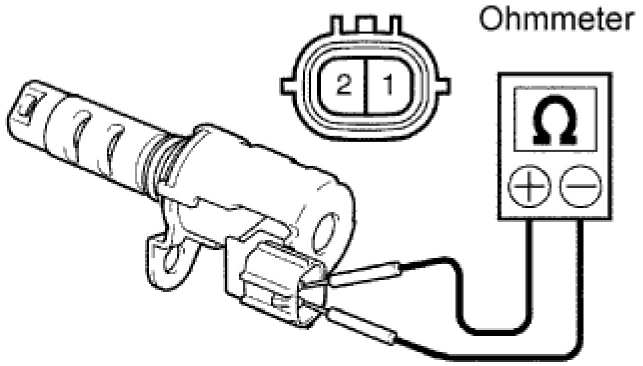
3. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



1. Disconnect the camshaft timing oil control valve connector.
2. Remove the bolt, then remove the camshaft timing oil control valve.

CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY > INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



P

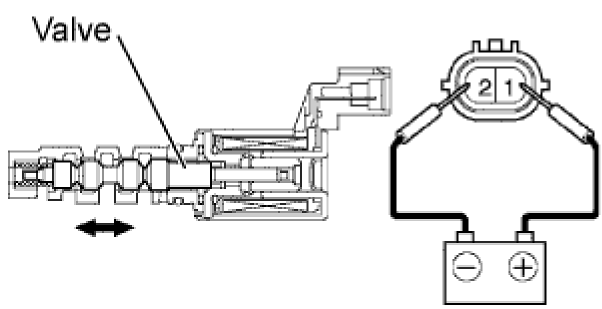
1. Check the resistance.

    1. Using an ohmmeter, measure the resistance between the terminals.

       Standard resistance:

Tester Connection	Specified Condition
1 (+B) - 2 (GND)	6.9 to 7.9 Ω at 20°C (68°F)

   If the resistance is not as specified, replace the camshaft timing oil control valve.



Y

2. Check the operation.

1. Connect the positive (+) lead from the battery to terminal 1 (+) and the negative (-) lead to terminal 2 (-), then check the movement of the spool valve.

   NOTICE:

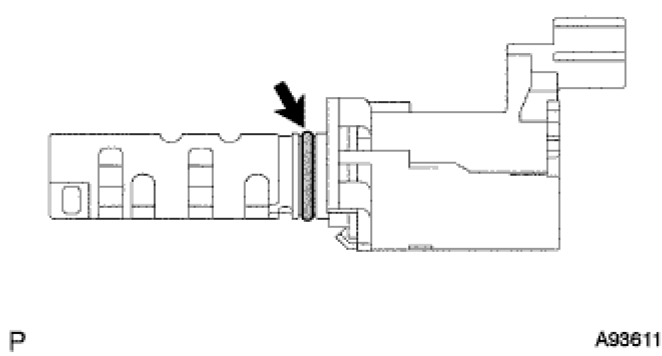
   - Do not bring the positive and negative tester probes too close to each other while using the battery for inspection as short circuit may occur.
   - Confirm that the spool valve moves freely and does not stick in any position.

   HINT:

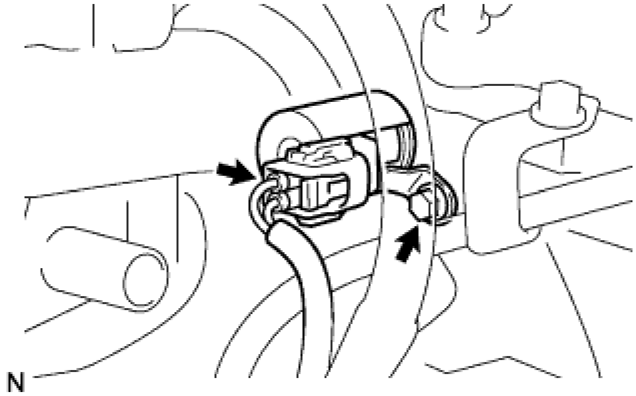
Poor returning of the spool valve resulting from contamination causes subtle pressure leak in the advance direction. In such a case, a DTC will be detected.

CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY > INSTALLATION

1. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



1. Apply a light coat of fresh engine oil to the O-ring.

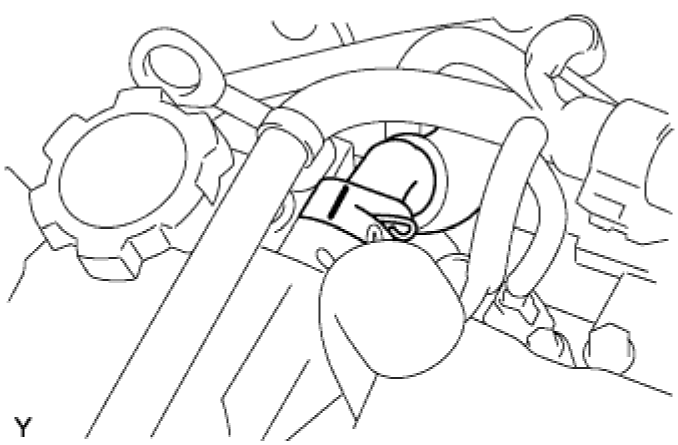


2. Install the camshaft timing oil control valve with the bolt.

   Torque:
   10 N*m{ 102 kgf*cm , 7 ft.*lbf }
   NOTICE:
   Do not twist the O-ring.

3. Connect the camshaft timing oil control valve connector.

2. CONNECT VENTILATION HOSE



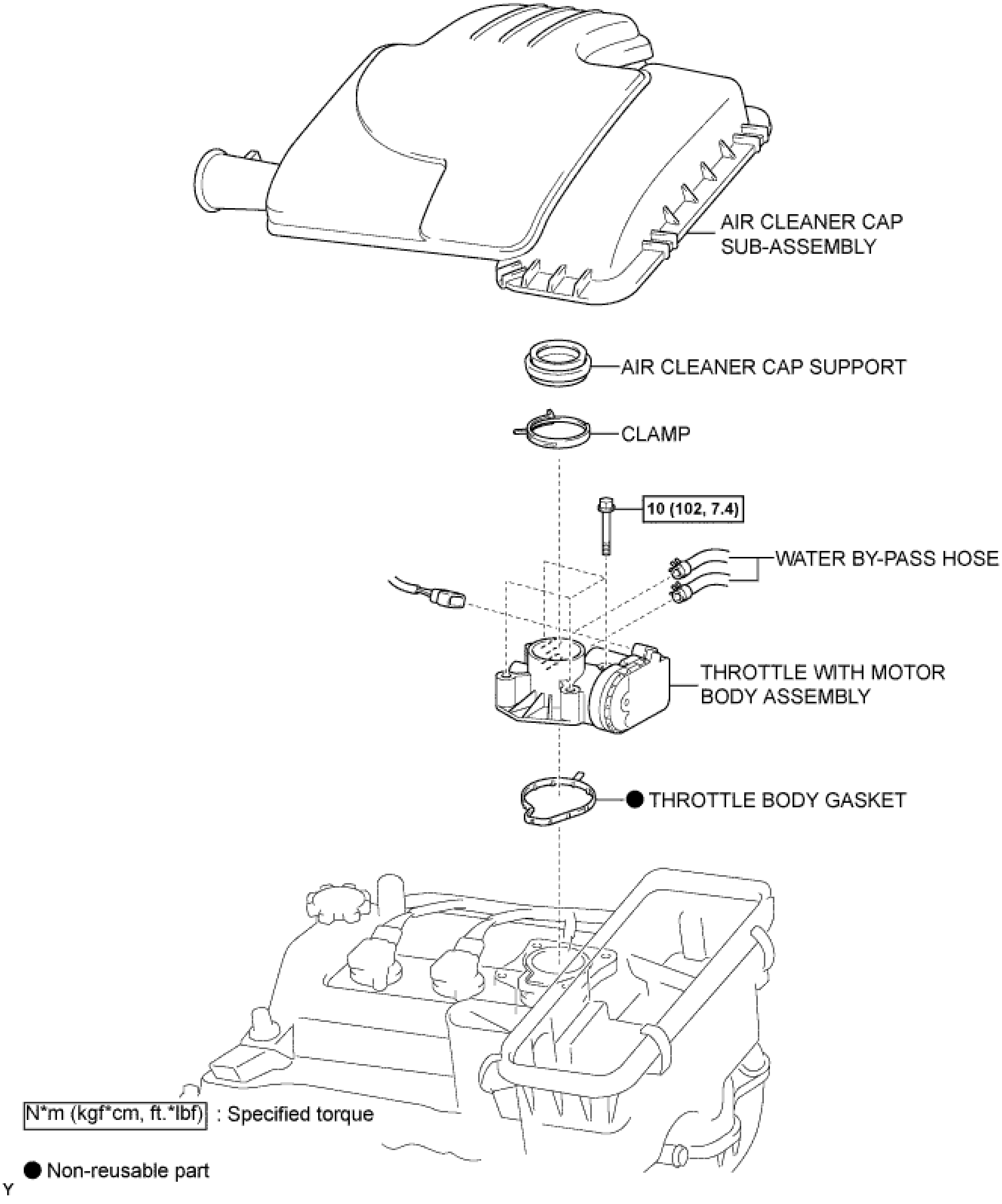
1. Connect the ventilation hose.

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

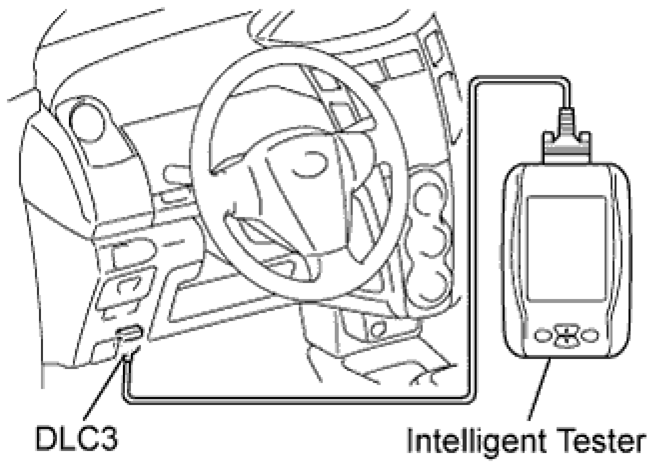
5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

THROTTLE BODY > COMPONENTS


AIR CLEANER CAP SUB-ASSEMBLY
AIR CLEANER CAP SUPPORT
CLAMP
10 (102, 7.4)
WATER BY-PASS HOSE
THROTTLE WITH MOTOR BODY ASSEMBLY
THROTTLE BODY GASKET
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Y

THROTTLE BODY > ON-VEHICLE INSPECTION

1. INSPECT THROTTLE WITH MOTOR BODY ASSEMBLY



1. Connect the intelligent tester to the DLC3.
2. Warm up the engine.
3. Select the following menu items: Powertrain / Engine / Data List / Throttle Sensor Position and Throttle Sensor Position #2.

   Standard:

Item	Condition	Specification
Throttle Sensor Position [Throttle Pos]	Accelerator pedal released	64 - 96%
	Accelerator pedal fully depressed	10 - 22%
Throttle Sensor Position	Accelerator pedal released	90 - 100%

#2 [Throttle Pos #2]	Accelerator pedal fully depressed	40 - 50%

If the result is not as specified, replace the throttle body.

NOTICE:
Check the standard throttle valve opening percentage with the shift lever in the N position.

4. Perform a driving test and confirm that there is nothing wrong with the throttle body.

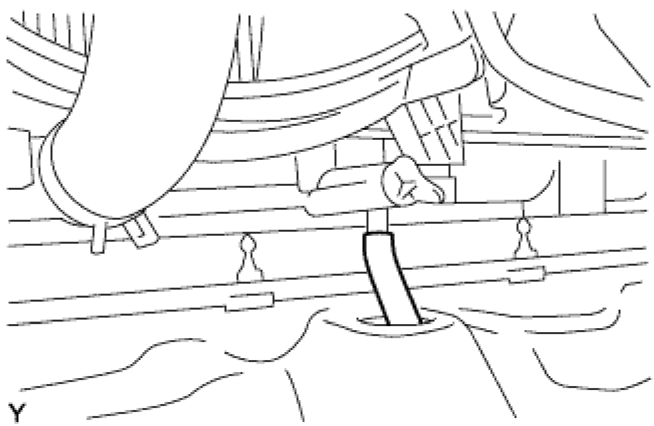
THROTTLE BODY > REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. DRAIN ENGINE COOLANT

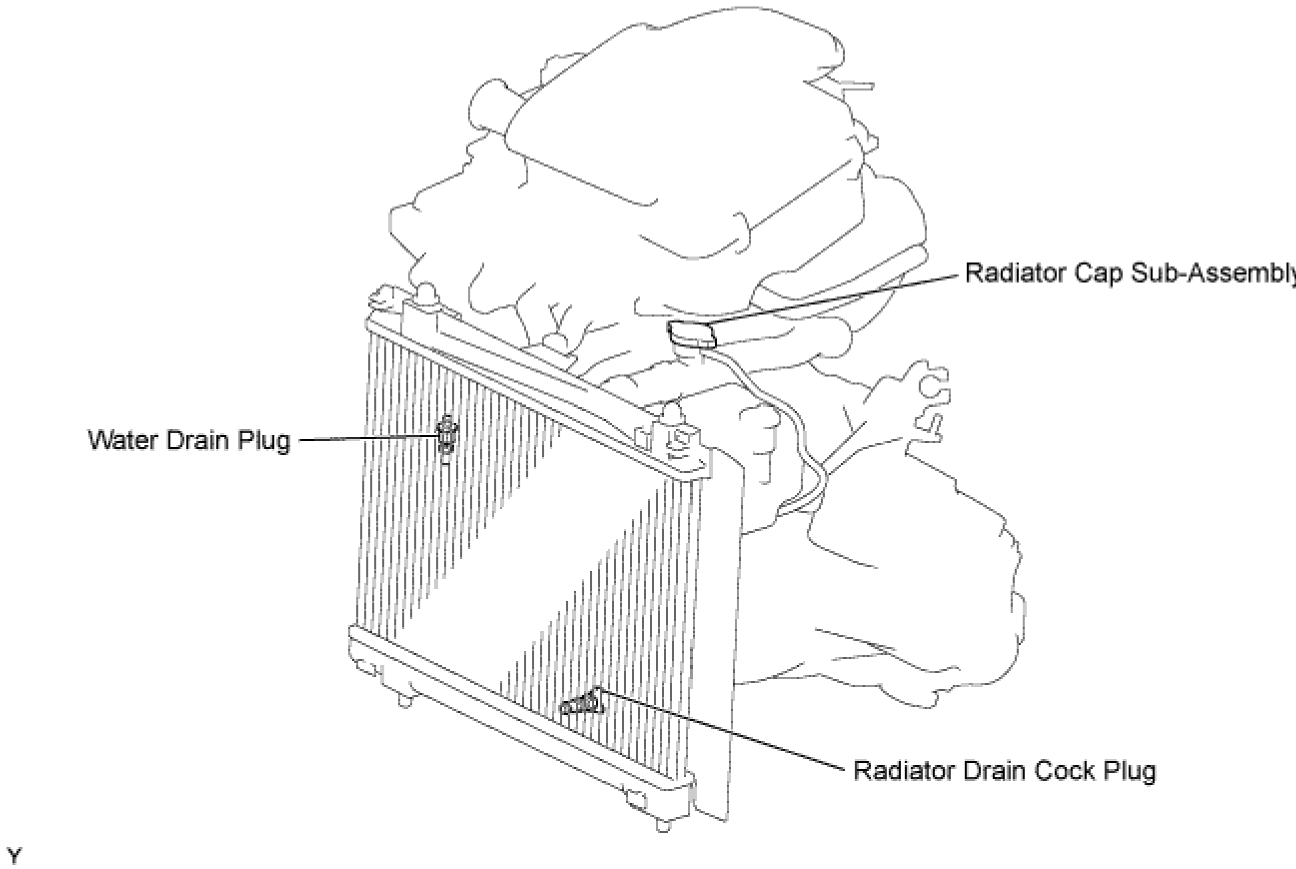
CAUTION:

To avoid the danger of being burned, do not remove the radiator cap sub-assembly while the engine and radiator assembly are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator assembly.

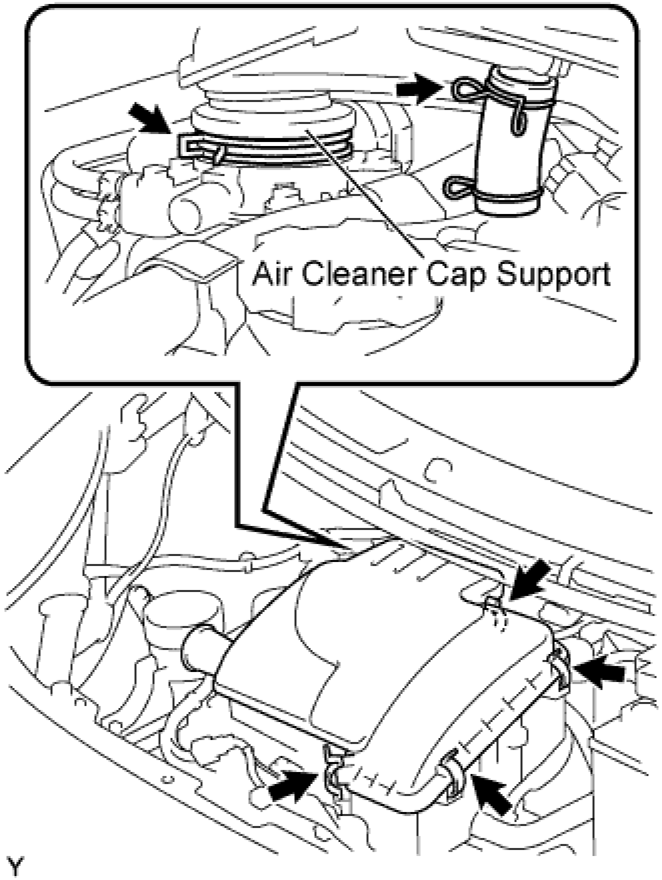


1. Install a vinyl hose onto the radiator side.
2. Loosen the radiator drain cock plug.
3. Remove the radiator cap sub-assembly.

4. Loosen the water drain plug, then drain the coolant.

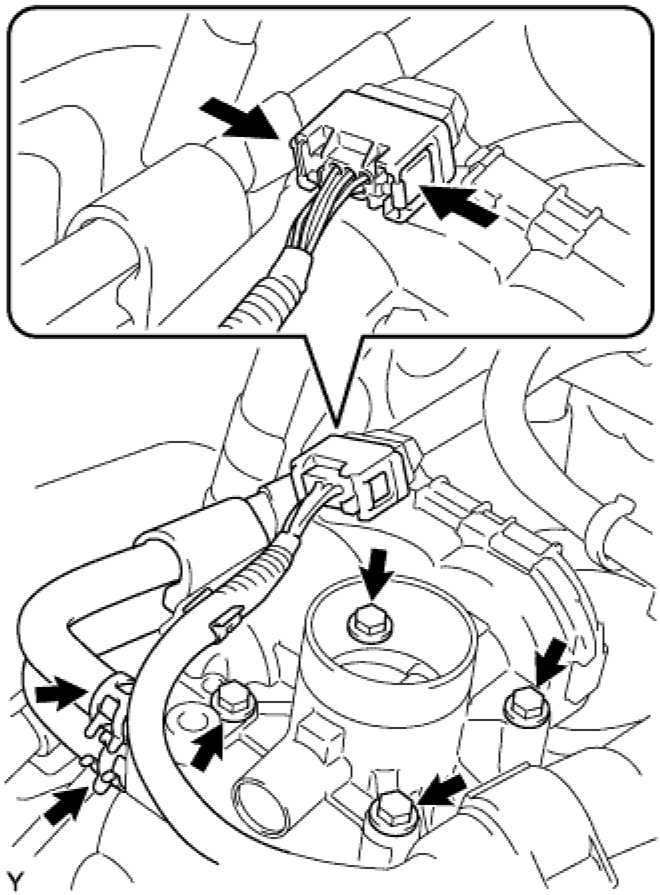


3. REMOVE AIR CLEANER CAP SUB-ASSEMBLY



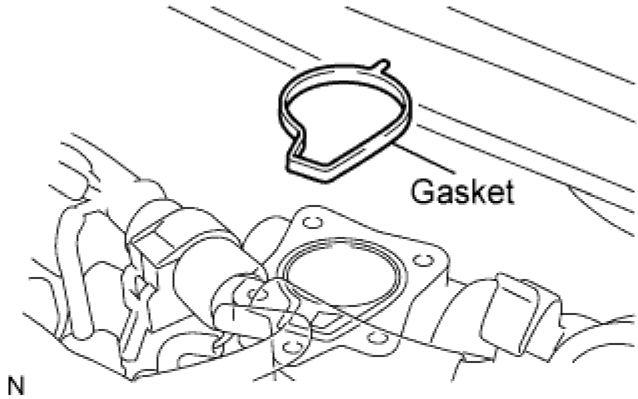
1. Remove the 4 clamps.
2. Remove the 2 clamps and remove the air cleaner cap.

4. REMOVE THROTTLE WITH MOTOR BODY ASSEMBLY



1. Disconnect the 2 water by-pass hoses.
2. Disconnect the connector.
3. Remove the 4 bolts and the throttle body.

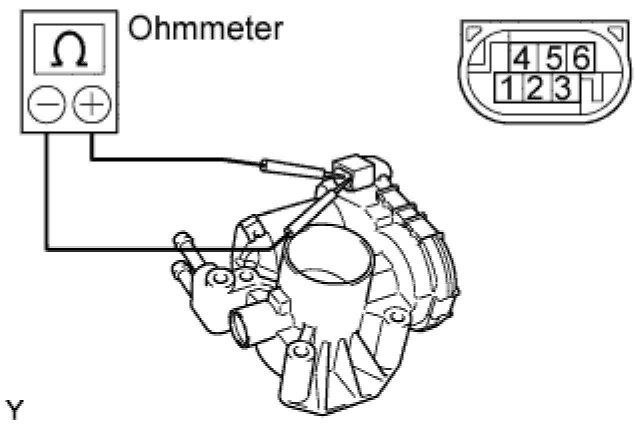
5. REMOVE THROTTLE BODY GASKET



1. Remove the gasket from the intake manifold.

THROTTLE BODY > INSPECTION

1. INSPECT THROTTLE WITH MOTOR BODY ASSEMBLY



1. Check the resistance.

    1. Using an ohmmeter, measure the resistance between the terminals.

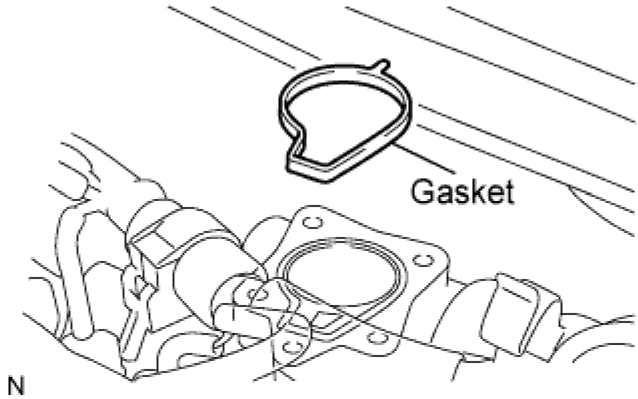
        Standard resistance:

Tester Connection	Specified Condition
1 (M-) - 4 (M+)	1.2 to 1.8 Ω

If the resistance is not as specified, replace the throttle body.

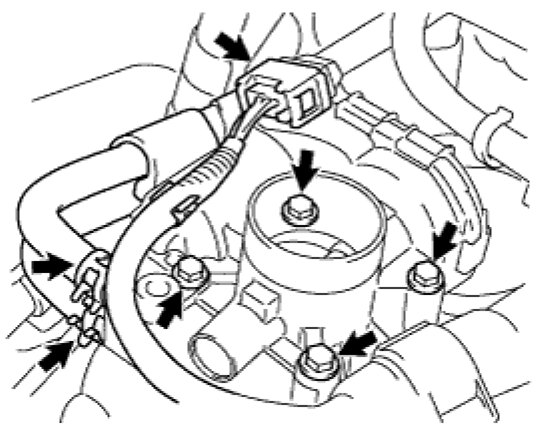
THROTTLE BODY > INSTALLATION

1. INSTALL THROTTLE BODY GASKET



1. Install a new gasket onto the intake manifold.

2. INSTALL THROTTLE WITH MOTOR BODY ASSEMBLY



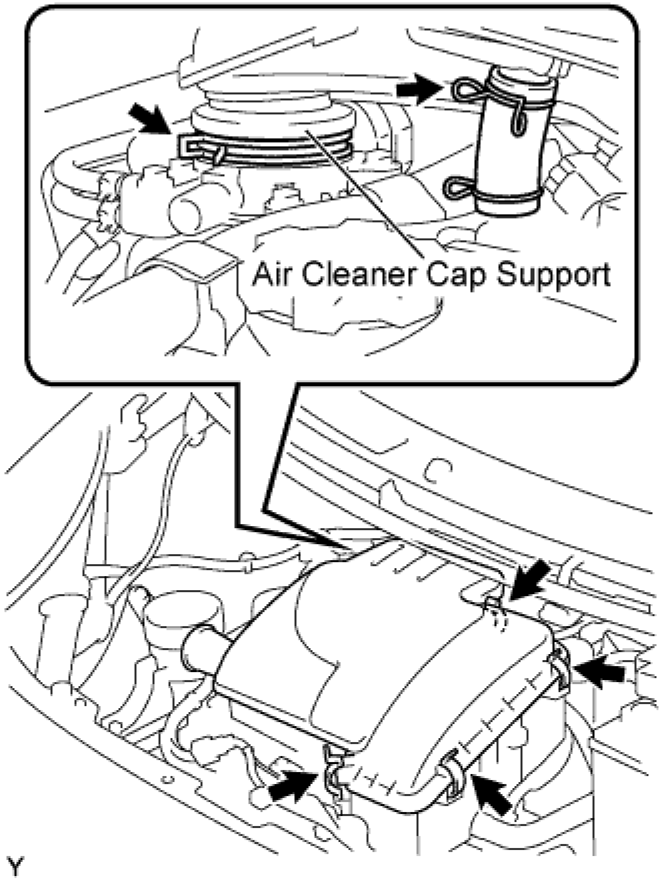
1. Install the throttle body with the 4 bolts.

   Torque:
   10 N*m{ 102 kgf*cm , 7.4 ft.*lbf }

2. Connect the connector.

3. Connect the 2 water by-pass hoses.

3. INSTALL AIR CLEANER CAP SUB-ASSEMBLY



1. Install the air cleaner cap with the 2 clamps.
2. Tighten the 4 clamps.

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

5. ADD ENGINE COOLANT

1. Tighten all the plugs.

2. Disconnect the vinyl hose.

3. Pour engine coolant into the radiator assembly until it overflows.

   Capacity:
   4.5 liters (4.8 USqts, 4.2 lmp. qts)
   NOTICE:
   Do not substitute water for engine coolant.
   HINT:

   - Use of improper engine coolant may damage the engine coolant system.
   - Use only Toyota Super Long Life Coolant or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate engine coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).

4. Check the engine coolant level inside the radiator assembly by squeezing the inlet and outlet radiator hoses several times by hand. If the engine coolant level goes down, add engine coolant.

5. Install the radiator cap sub-assembly securely.

6. Slowly pour engine coolant into the radiator reservoir until it reaches the FULL line.

7. Warm up the engine until the cooling fan operates.

   1. Set the air conditioning as follows while warming up the engine.

Item	Manual air conditioning system	Automatic air conditioning system
Set control as follows	Fan speed - Any setting except "OFF" Temperature - Toward WARM Air conditioning switch "OFF"	Fan speed - Any setting except "OFF" Temperature - To the highest temperature Air conditioning switch "OFF" "AUTO" switch "OFF"

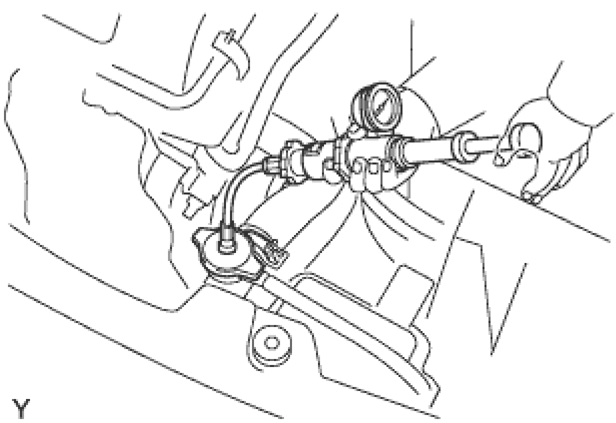
    2. Maintain the engine speed at 2,000 to 2,500 rpm and warm up the engine until the cooling fan operates.

8. Stop the engine and wait until the coolant cools down.
9. If the engine coolant level is below the full level, perform steps (c) through (h) again and repeat the operation until the engine coolant level stays at the full level.
10. Recheck the engine coolant level inside the radiator reservoir tank assembly. If it is below the full level, add engine coolant.

6. CHECK FOR ENGINE COOLANT LEAKAGE

CAUTION:

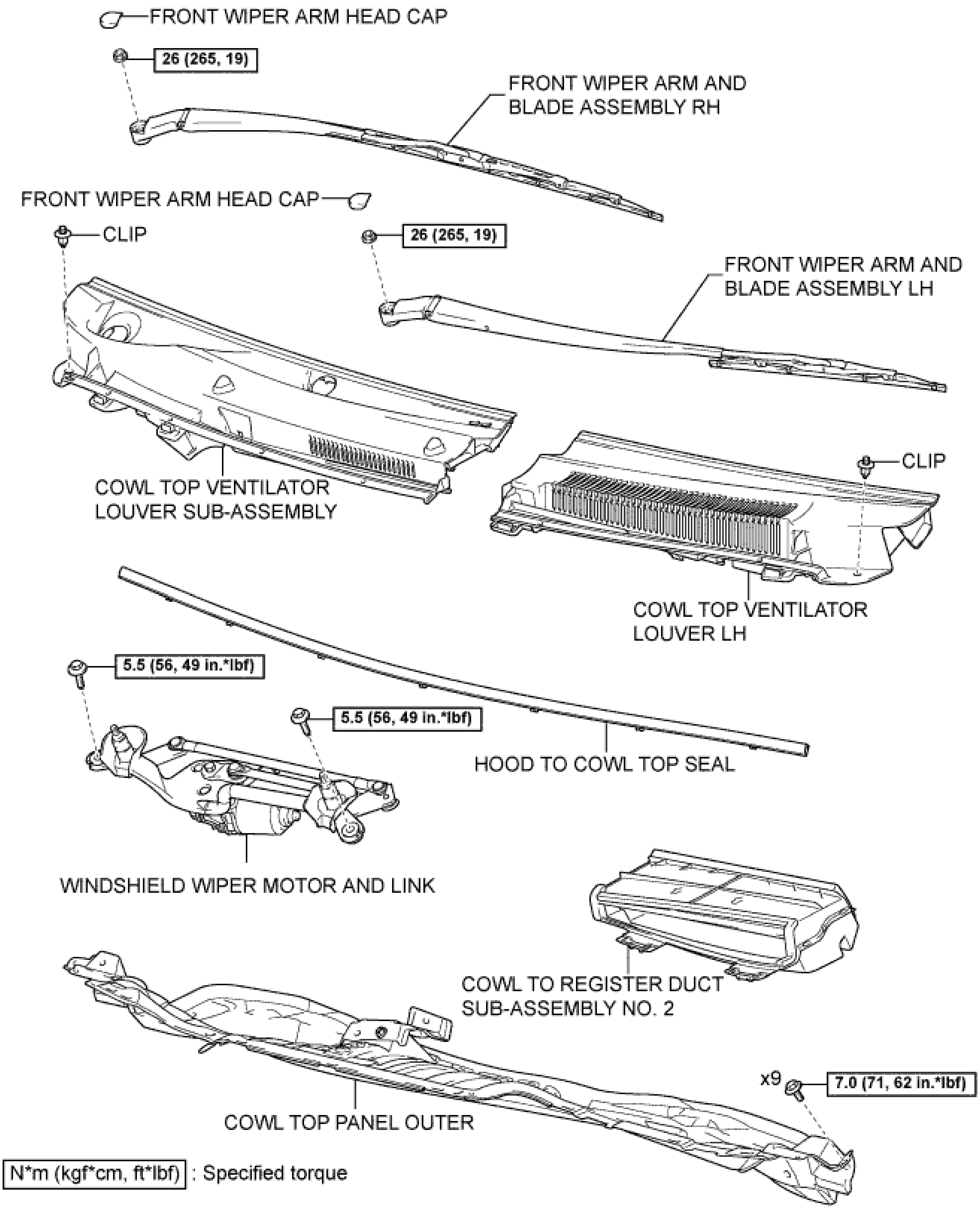
To avoid the danger of being burned, do not remove the radiator cap sub-assembly while the engine and radiator assembly are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator assembly.



1. Fill the radiator assembly with engine coolant, then attach a radiator cap tester.
2. Pump it to 137 kPa (1.4 kgf/cm^2, 19.9 psi), then check that the pressure does not drop.
   If the pressure drops, check the hoses, radiator assembly and water pump assembly for leakage. If there are no signs or traces of external engine coolant leakage, check the heater core, cylinder block and head.

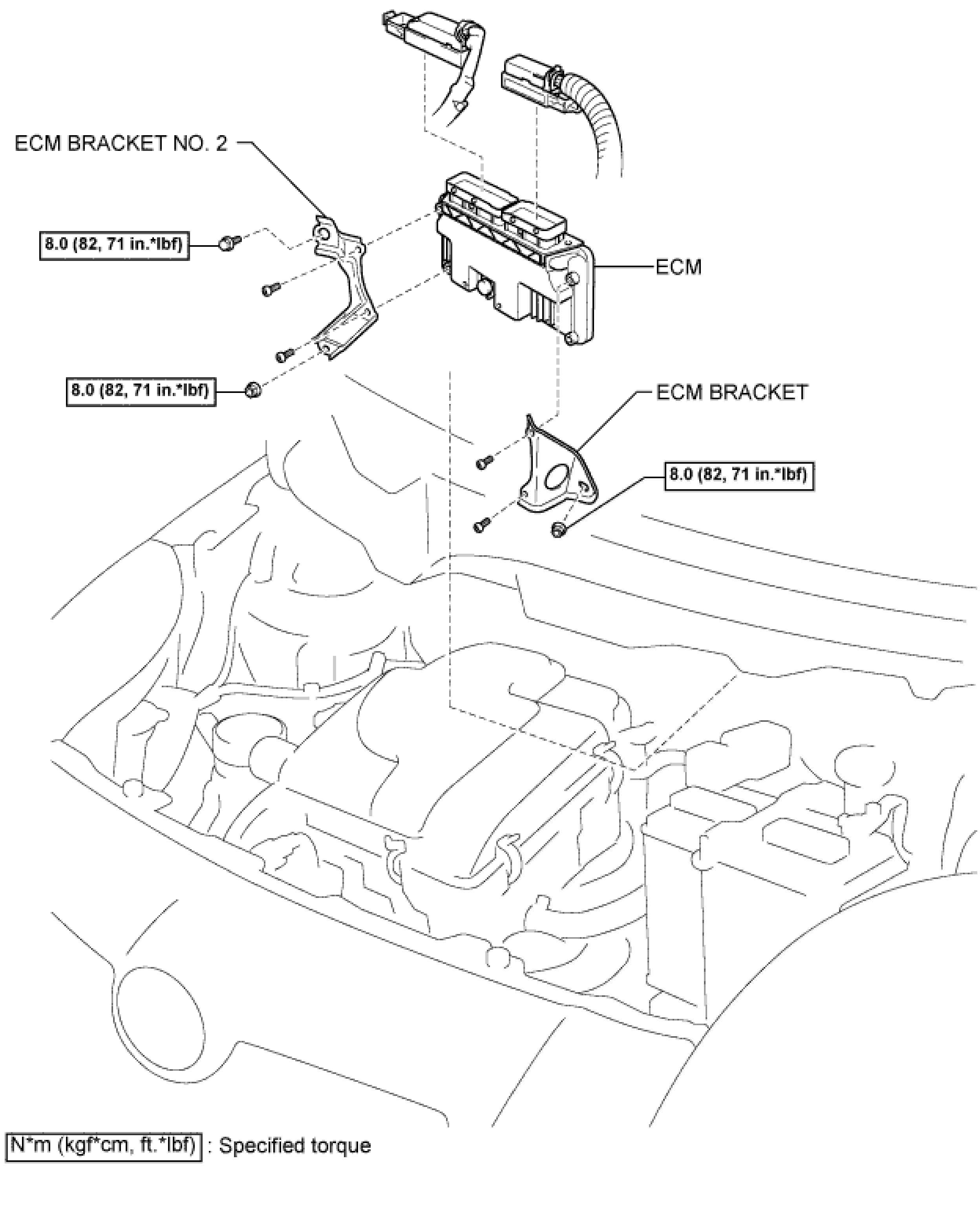
ECM > COMPONENTS

for Hatchback RHD:

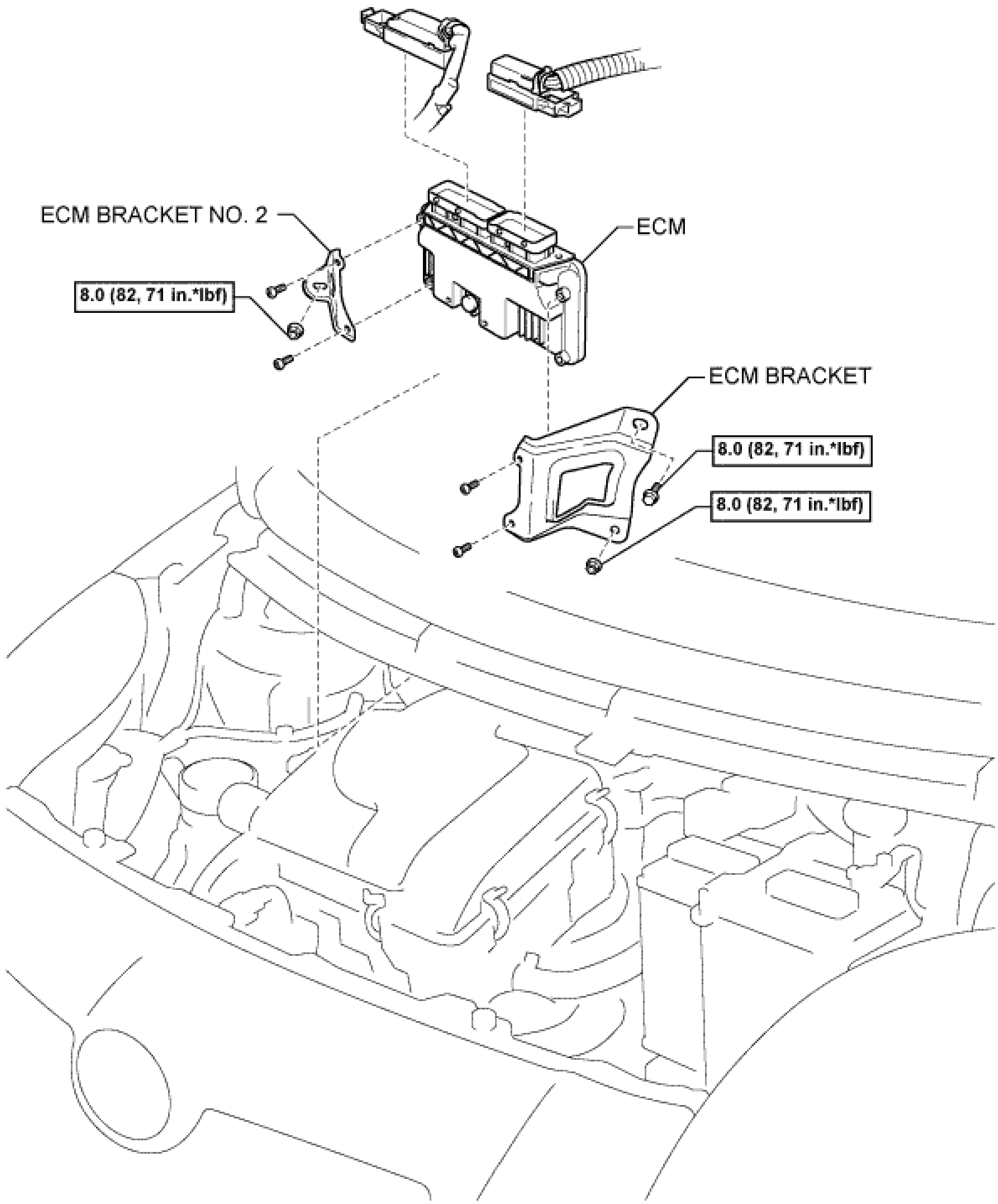


P

for RHD:


ECM BRACKET NO. 2
8.0 (82, 71 in.*lbf)
ECM
8.0 (82, 71 in.*lbf)
ECM BRACKET
8.0 (82, 71 in.*lbf)
N*m (kgf*cm, ft.*lbf) : Specified torque
N

for LHD:



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

N

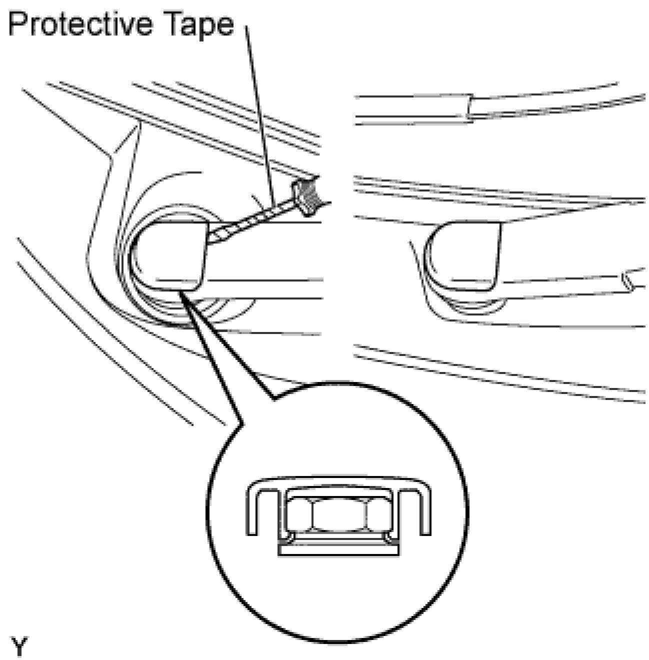
ECM > REMOVAL

NOTICE:

Replace the ECM with a new one if necessary.

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL (for RHD)

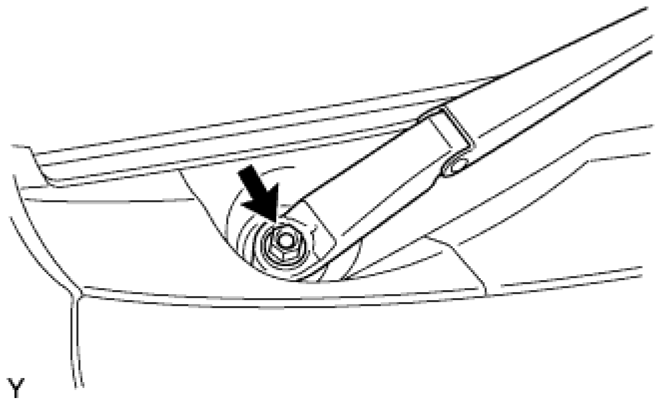
2. REMOVE FRONT WIPER ARM HEAD CAP (for RHD)



1. Using a screwdriver with its tip wrapped in protective tape, disengage the claw and remove the 2 front wiper arm head caps.

3. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH (for RHD)

1. Operate the wiper, then stop the windshield wiper motor in the automatic stop position.



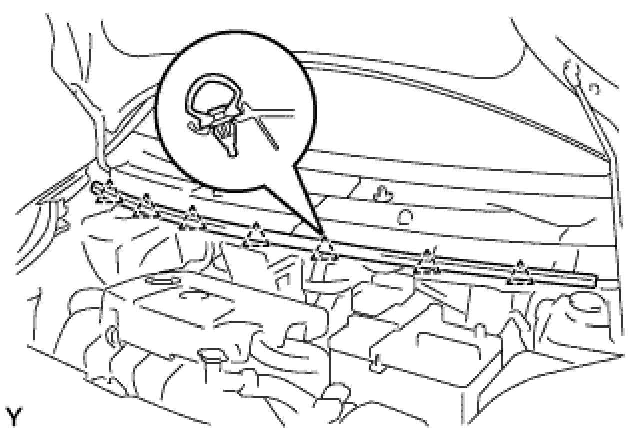
2. Remove the nut and front wiper arm.

4. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH (for RHD)

HINT:

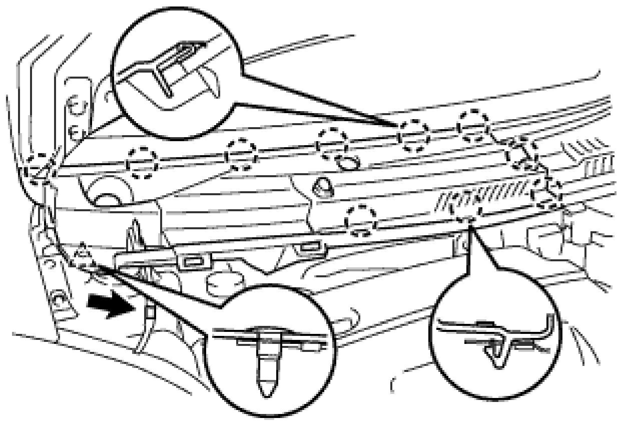
Use the same procedure as for the RH side.

5. REMOVE HOOD TO COWL TOP SEAL (for RHD)



1. Disengage the 7 clips and remove the hood to cowl top seal.

6. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (for RHD)

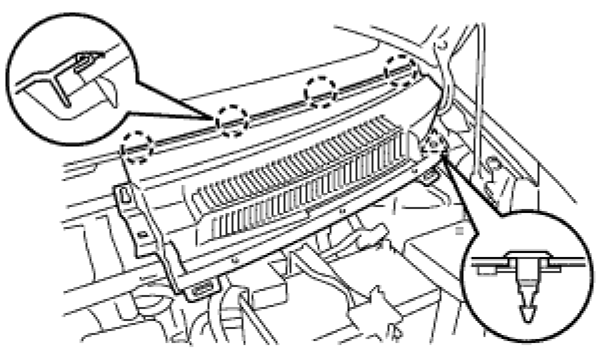


Y

1. Disconnect the washer hose.

2. Disengage the 10 claws and clip and remove the cowl top ventilator louver sub-assembly.

7. REMOVE COWL TOP VENTILATOR LOUVER LH (for RHD)

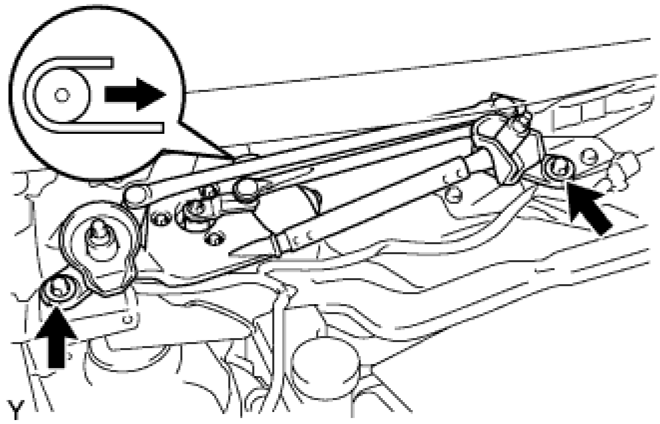


Y

1. Remove the clip.

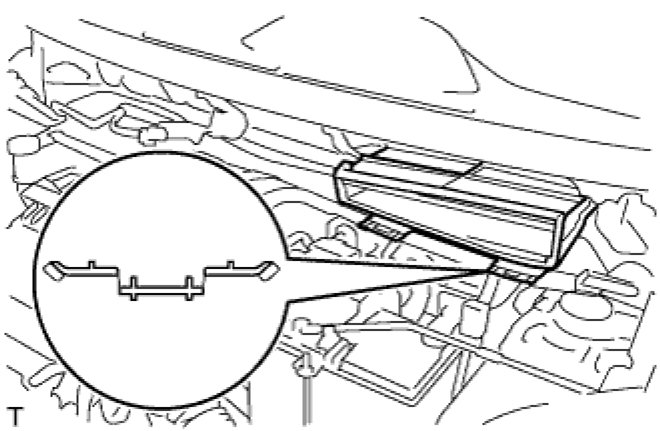
2. Disengage the 4 claws and remove the cowl top ventilator louver LH.

8. REMOVE WINDSHIELD WIPER MOTOR AND LINK (for RHD)



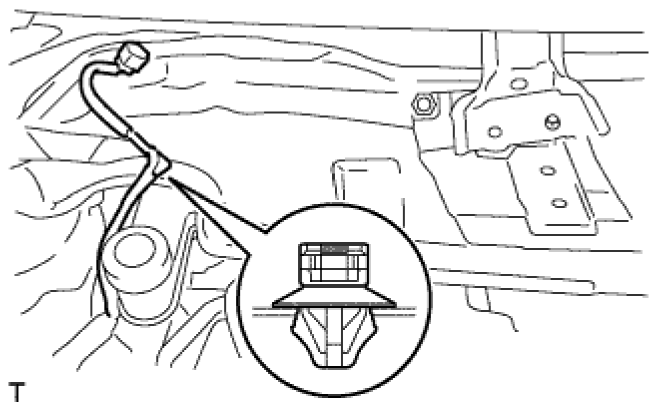
1. Remove the 2 bolts.
2. Slide the wiper link. Disengage the meshing of the rubber pin, then disconnect the connector and remove the front wiper motor and link.

9. REMOVE COWL TO REGISTER DUCT SUB-ASSEMBLY NO. 2 (for RHD)

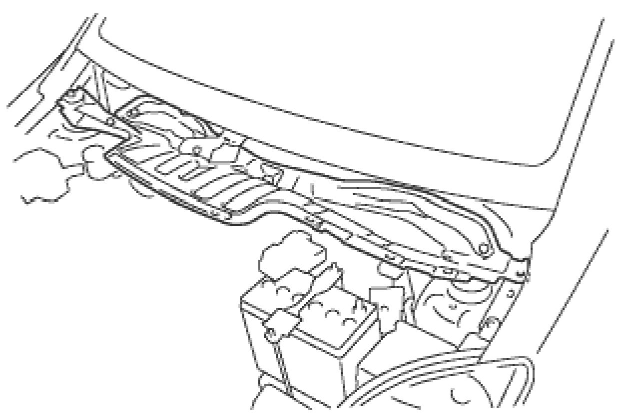


1. Disengage the claw and remove cowl to register duct sub-assembly No. 2.

10. REMOVE COWL TOP PANEL OUTER (for RHD)

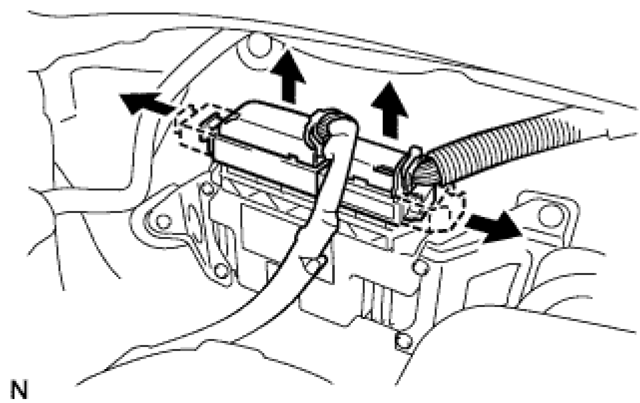


1. Disengage the wire harness clamp.

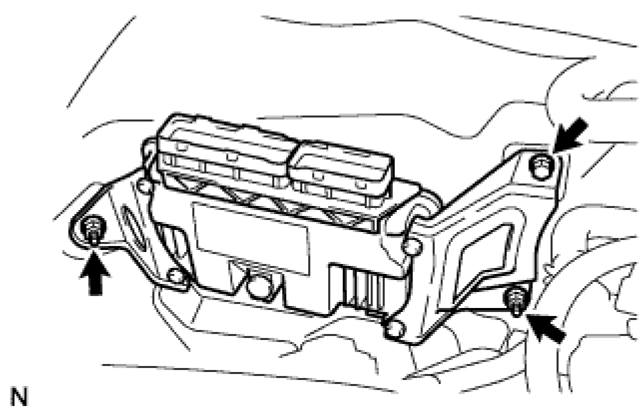


2. Remove the 9 bolts and remove the cowl top panel outer.

11. REMOVE ECM

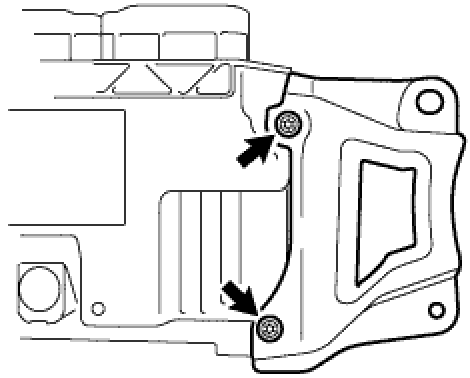


1. Remove the 2 lock knobs and harness clamp.
2. Disconnect the 2 ECM connectors.



3. Remove the bolt and 2 nuts and the ECM.

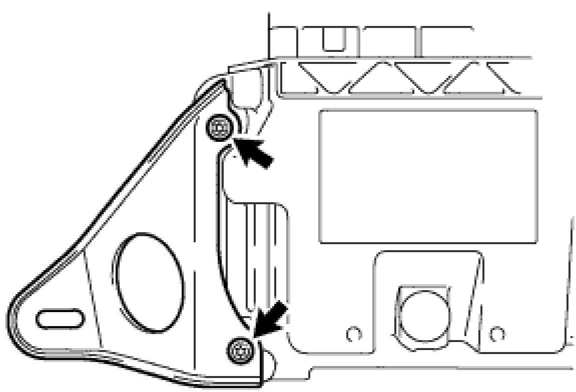
12. REMOVE ECM BRACKET



N

1. Remove the 2 screws and remove the ECM bracket.

13. REMOVE ECM BRACKET NO. 2

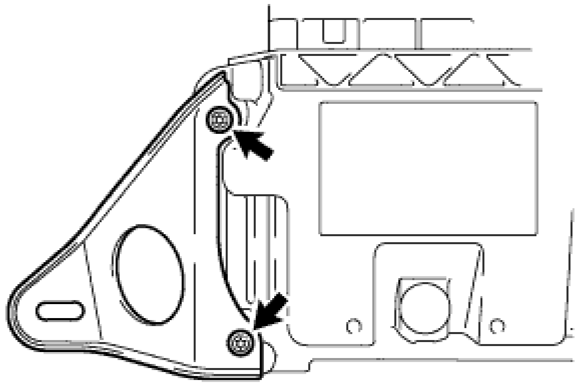


N

1. Remove the 2 screws and ECM bracket No. 2.

ECM > INSTALLATION

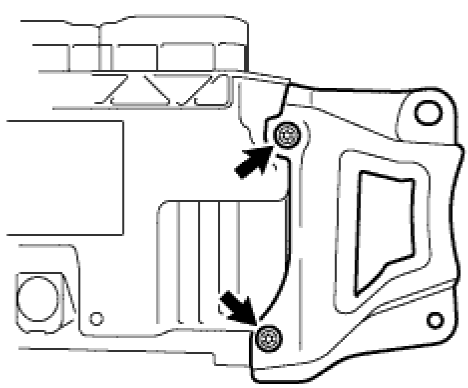
1. INSTALL ECM BRACKET NO. 2



N

1. Install ECM bracket No. 2 with the 2 screws.

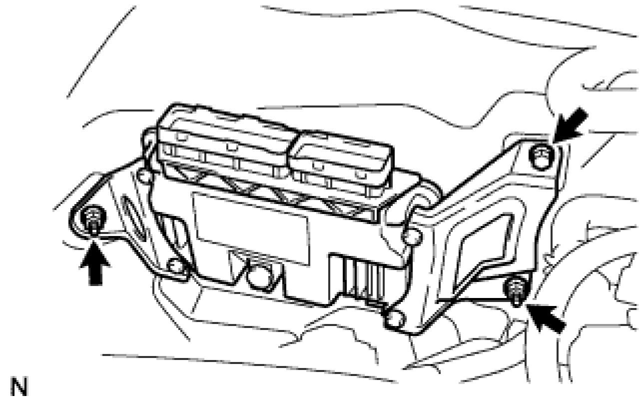
2. INSTALL ECM BRACKET



N

1. Install the ECM bracket with the 2 screws.

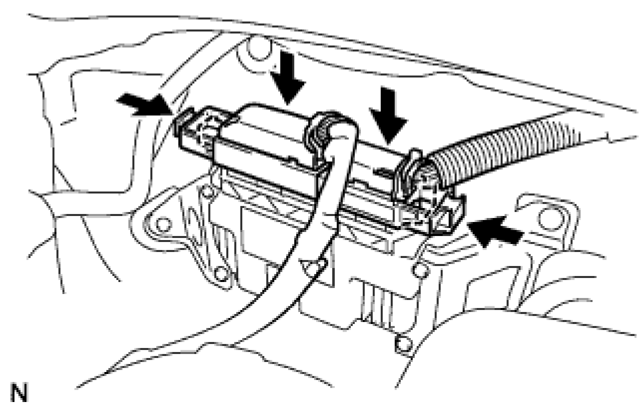
3. INSTALL ECM



1. Install the ECM with the bolt and 2 nuts.

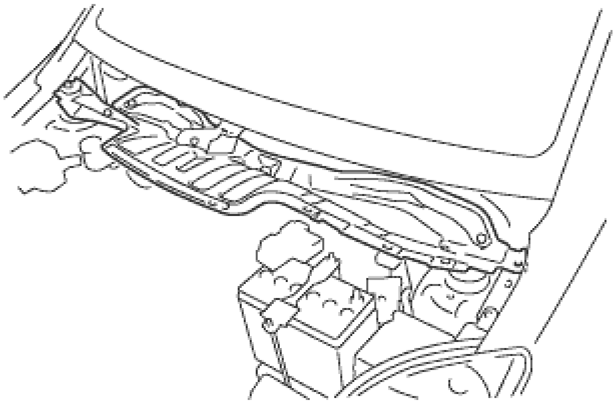
   Torque:
   8.0 N*m{ 82 kgf*cm , 71 in.*lbf }

2. Connect the 2 ECM connectors.



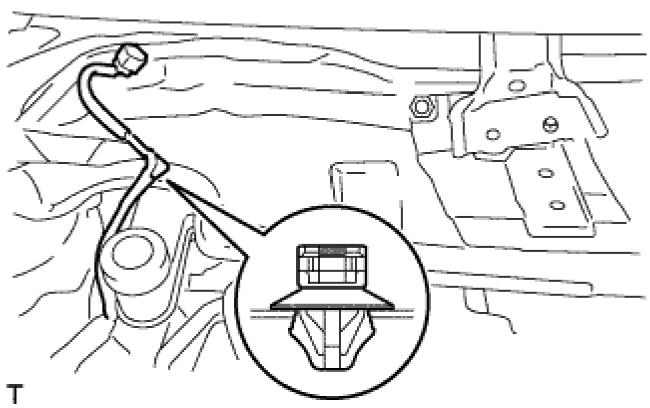
3. Install the 2 lock knobs and harness clamp.

4. INSTALL COWL TOP PANEL OUTER (for RHD)



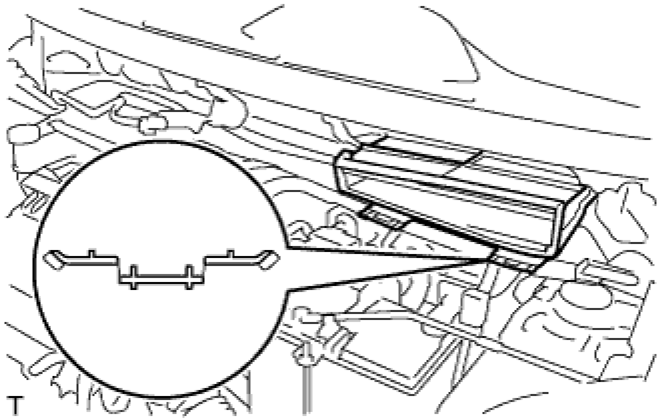
1. Install the cowl top panel with the 9 bolts.

   Torque:
   6.5 N*m{ 66 kgf*cm , 57 in.*lbf }



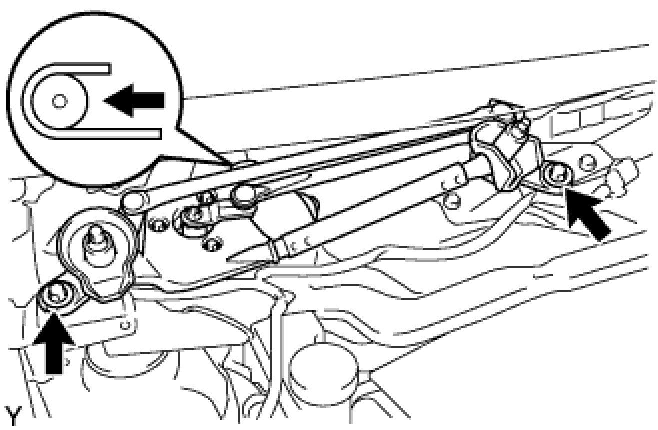
2. Connect the wire harness clamp.

5. INSTALL COWL TO REGISTER DUCT SUB-ASSEMBLY NO. 2 (for RHD)



1. Engage the claw to install cowl to register duct No. 2.

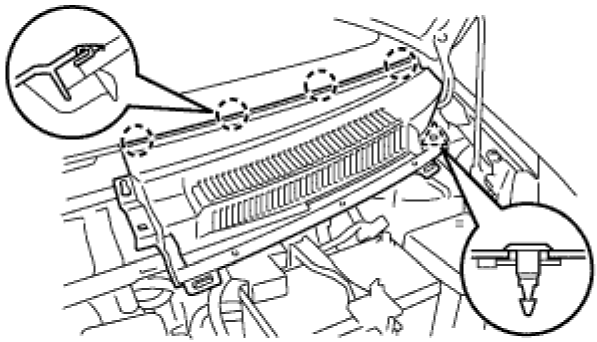
6. INSTALL WINDSHIELD WIPER MOTOR AND LINK (for RHD)



1. Connect the connector.
2. Slide the wiper link as shown in the illustration and engage the rubber pin with the body.
3. Install the front wiper motor and link with the 2 bolts.

   Torque:
   5.5 N*m{ 56 kgf*cm , 49 in.*lbf }

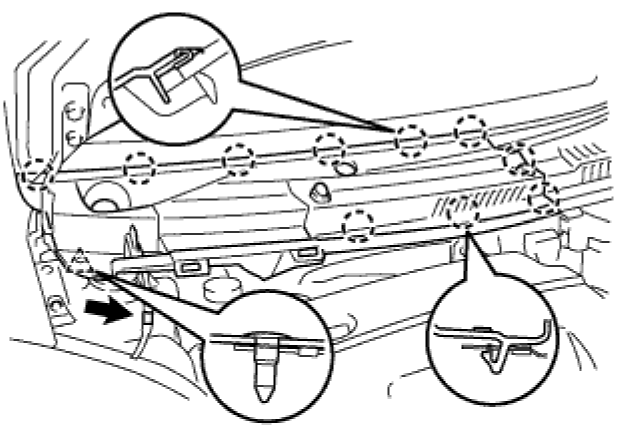
7. INSTALL COWL TOP VENTILATOR LOUVER LH (for RHD)



Y

1. Engage the 4 claws and install the cowl top ventilator louver LH.
2. Install the clip.

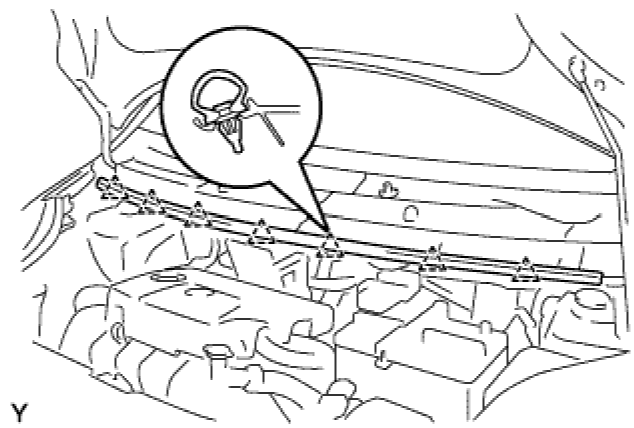
8. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY (for RHD)



Y

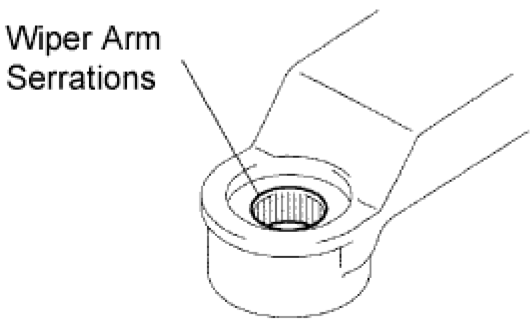
1. Engage the 10 claws and install the cowl top ventilator louver sub-assembly.
2. Install the clip.
3. Connect the washer hose.

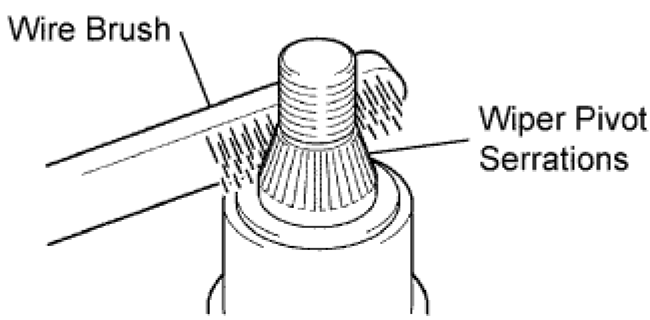
9. INSTALL HOOD TO COWL TOP SEAL (for RHD)



1. Engage the 7 clips and install the hood to cowl top seal.

10. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH (for RHD)



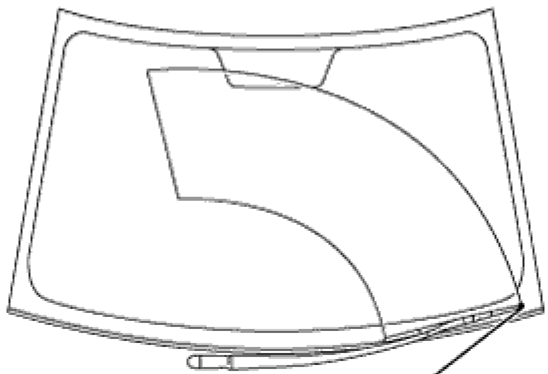


P

1. Scrape any metal powder off the serrated part of the wiper arm with a round file or the equivalent (when reinstalling).

2. Clean the wiper pivot serrations with a wire brush.

3. Operate the wiper, then stop the windshield wiper motor in the automatic stop position.



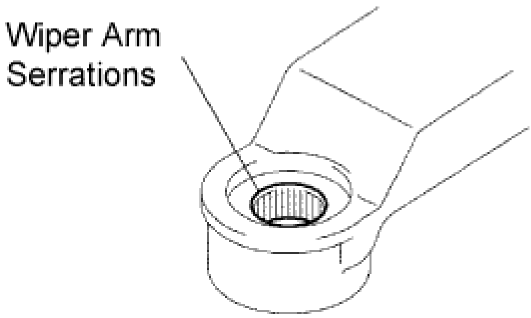
Y

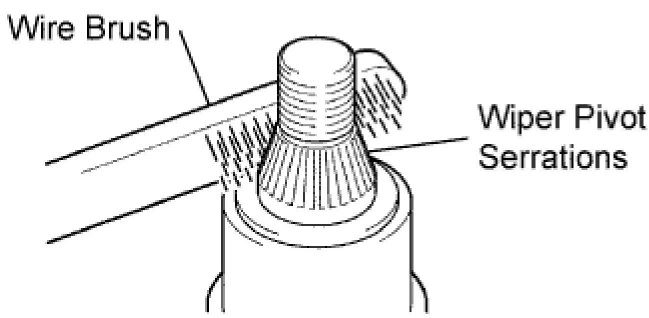
4. Align the blade tip with the mark on the windshield glass, as shown in the illustration.

5. Tighten the nut of the front wiper arm.

   Torque:
   26 N*m{ 265 kgf*cm , 19 ft.*lbf }

11. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH (for RHD)



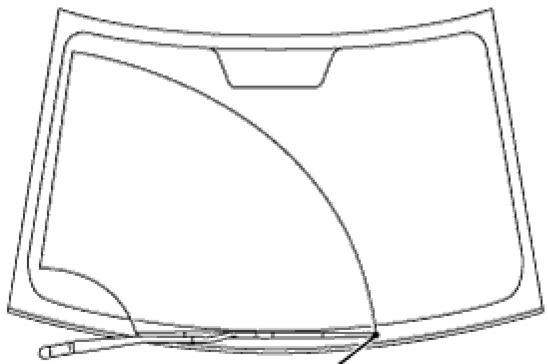


P

1. Scrape any metal powder off the serrated part of the wiper arm with a round file or the equivalent (when reinstalling).

2. Clean the wiper pivot serrations with a wire brush.

3. Operate the wiper, then stop the windshield wiper motor in the automatic stop position.

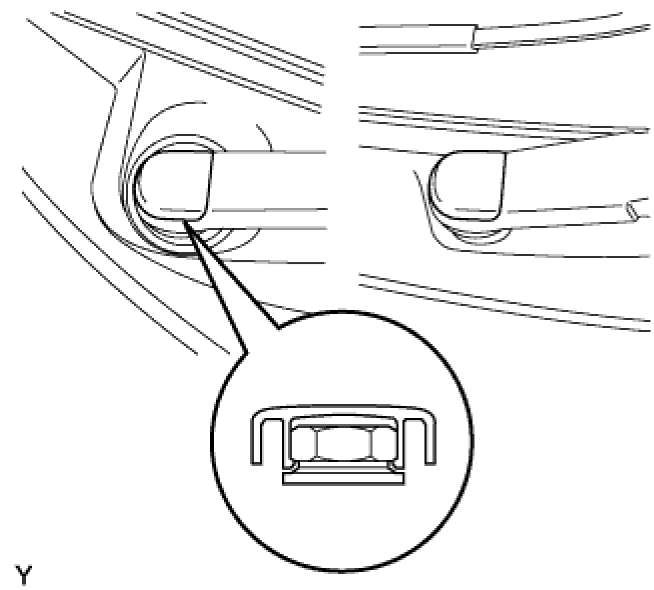


4. Align the blade tip with the mark on the windshield glass, as shown in the illustration.

5. Tighten the nut of the front wiper arm.

   Torque:
   26 N*m{ 265 kgf*cm , 19 ft.*lbf }

12. INSTALL FRONT WIPER ARM HEAD CAP (for RHD)



1. Engage the claw and install the 2 front wiper arm head caps.

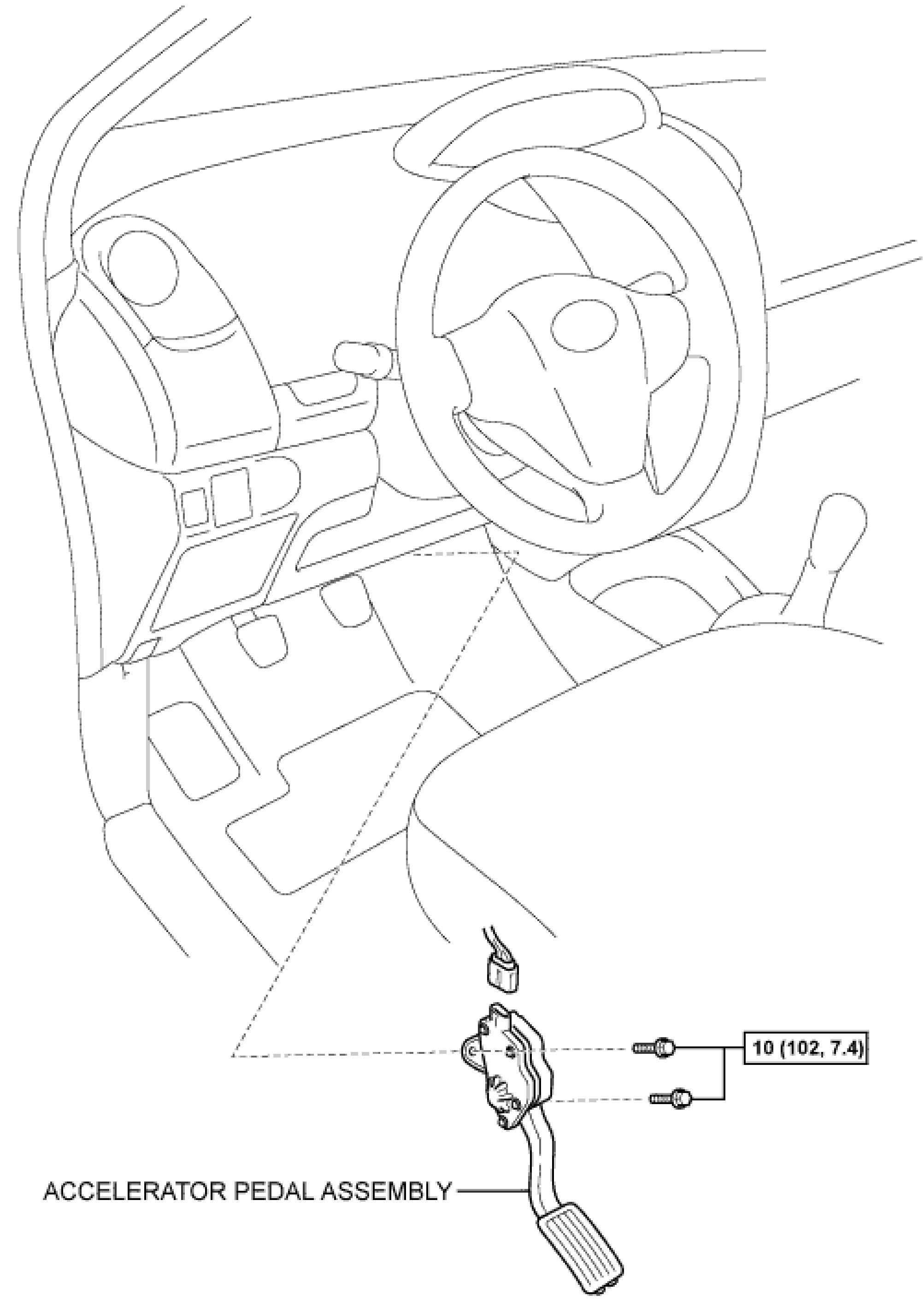
13. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

ACCELERATOR PEDAL (for TMC Made) > COMPONENTS

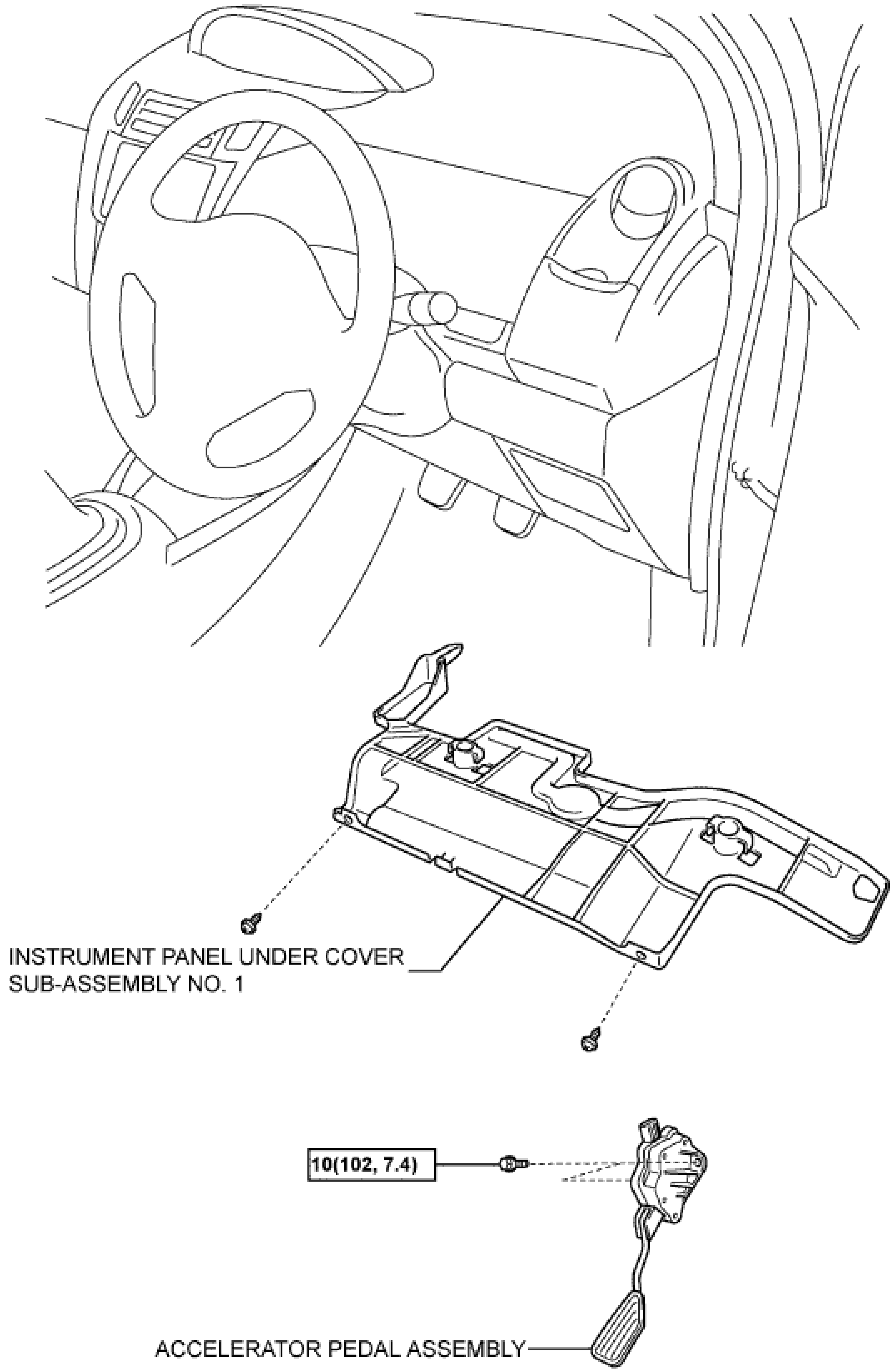
for LHD:



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

N

for RHD:

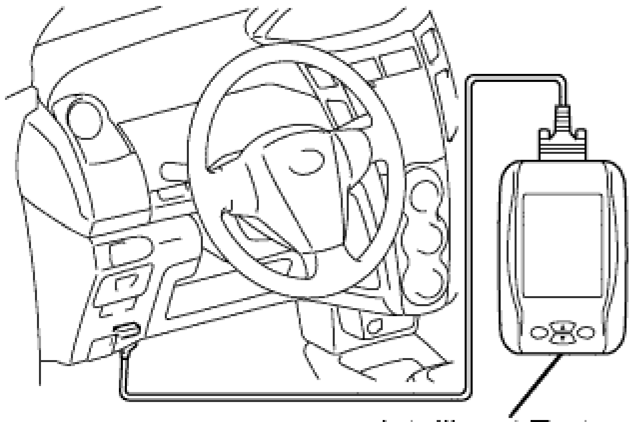


N*m (kgf*cm, ft.*lbf) : Specified torque

Y

ACCELERATOR PEDAL (for TMC Made) > ON-VEHICLE INSPECTION

1. INSPECT ACCELERATOR PEDAL ASSEMBLY



1. Connect an intelligent tester to the DLC3.

2. Turn the ignition switch on (IG) and turn the tester on.

3. Select the following menu items: Powertrain / Engine and ECT / Data List / Accelerator Pedal Position No. 1 and Accelerator Pedal Position No. 2.

4. While the accelerator pedal is depressed and released, check that the values of accelerator pedal position No. 1 and accelerator pedal position No. 2 are within the specification.

   Accelerator Pedal Position No. 1 Standard voltage:

Condition	Specified Condition
Accelerator pedal released	0.5 to 1.1 V
Accelerator pedal depressed	2.6 to 4.5 V

   Accelerator Pedal Position No. 2 Standard voltage:

Condition	Specified Condition
Accelerator pedal released	1.2 to 2.0 V

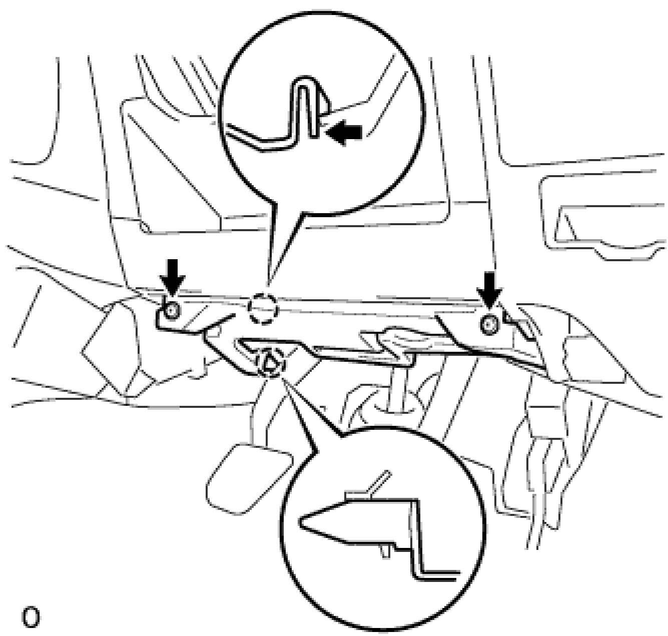
Accelerator pedal depressed	3.4 to 5.0 V

HINT:
If the results are not as specified, check the accelerator pedal, wire harness and ECM.

ACCELERATOR PEDAL (for TMC Made) > REMOVAL

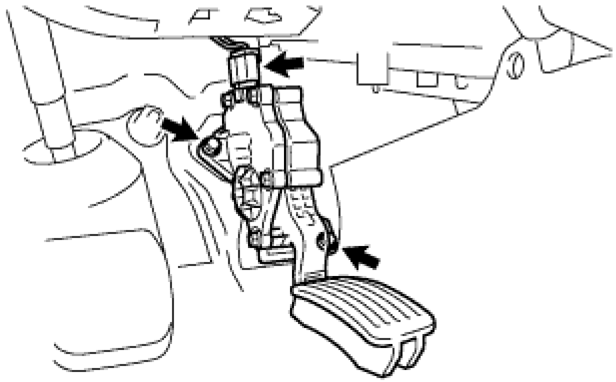
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY NO. 1 (for RHD)



1. Remove the 2 screws.
2. Disengage the 2 claws and remove instrument panel undercover No. 1.

3. REMOVE ACCELERATOR PEDAL ASSEMBLY



N

1. Disconnect the accelerator pedal connector.

2. Remove the 2 bolts and accelerator pedal.

   NOTICE:

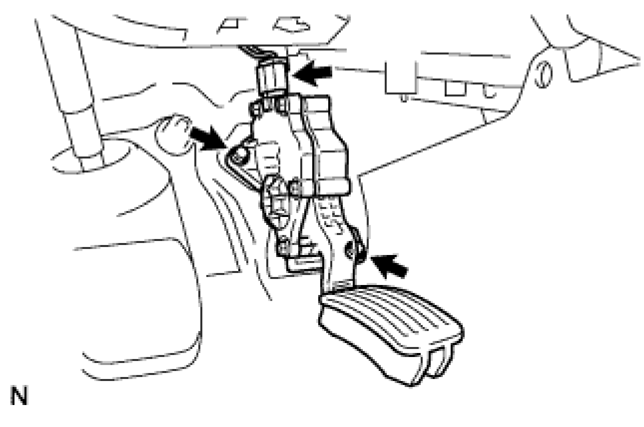
   - Do not drop or strike the accelerator pedal.
   - Do not disassemble the accelerator pedal.

ACCELERATOR PEDAL (for TMC Made) > INSTALLATION

NOTICE:

- Avoid any physical shock to the accelerator pedal.
- Do not disassemble the accelerator pedal.

1. INSTALL ACCELERATOR PEDAL ASSEMBLY



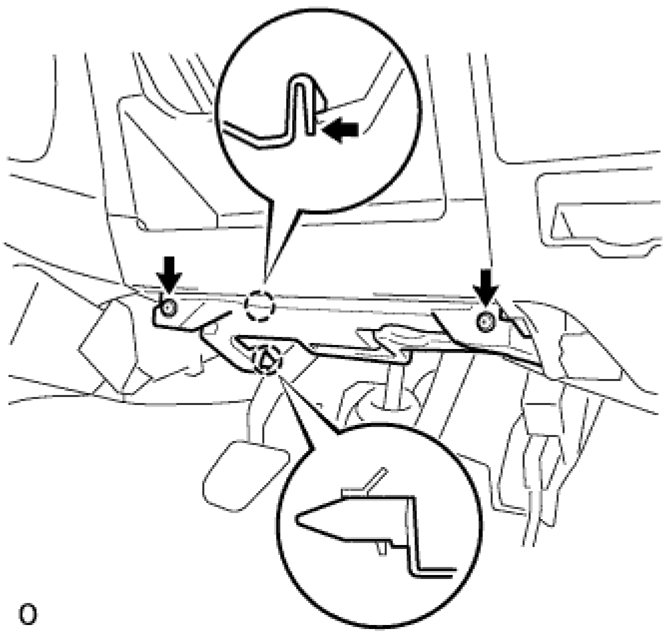
1. Install the accelerator pedal with the 2 bolts.

   Torque:

10 N*m{ 102 kgf*cm , 7.4 ft.*lbf }

2. Connect the accelerator pedal connector.

2. INSTALL INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY NO. 1 (for RHD)



1. Engage the 2 claws and install instrument panel undercover No. 1.
2. Install the 2 screws.

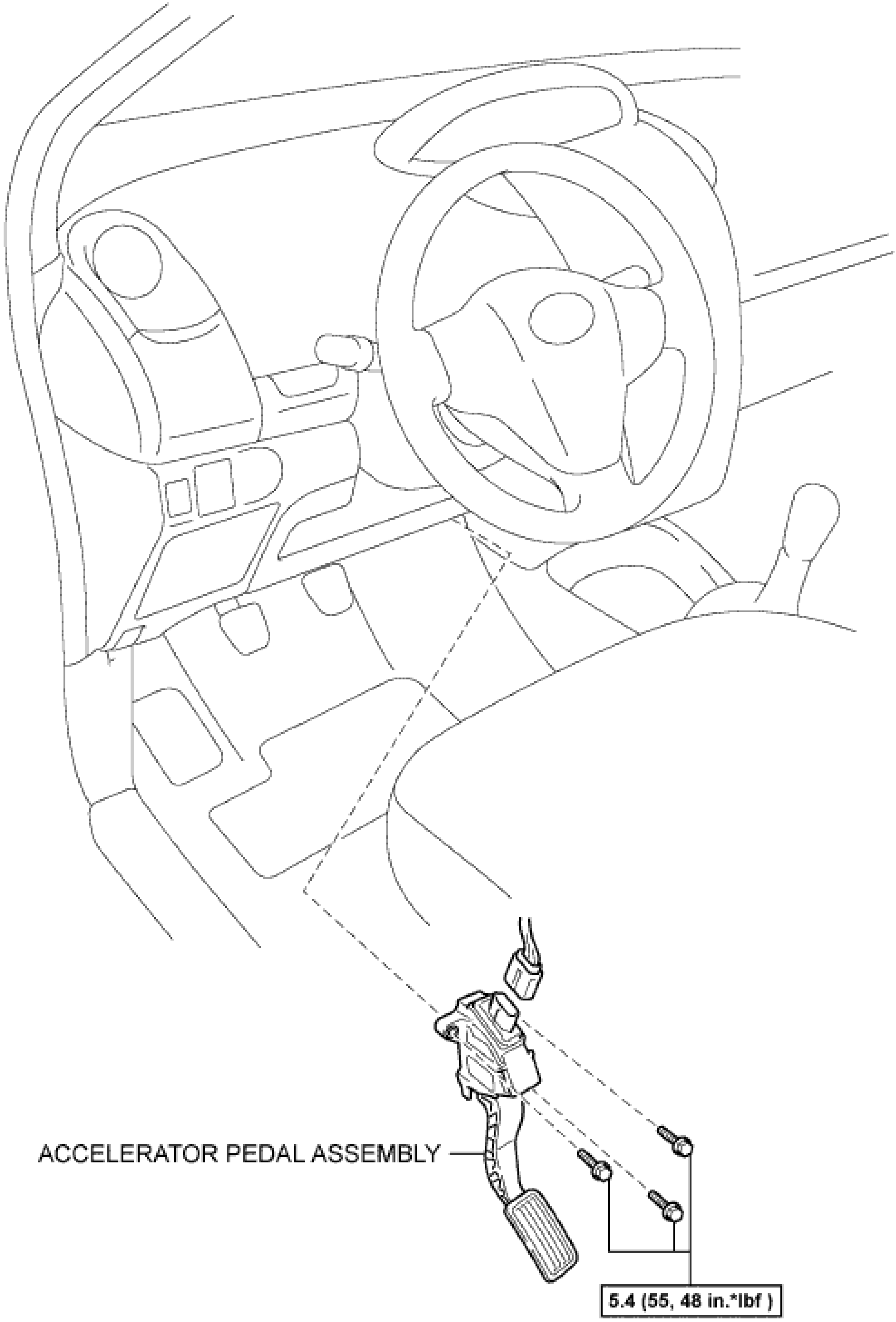
3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

ACCELERATOR PEDAL (for TMMF Made) > COMPONENTS

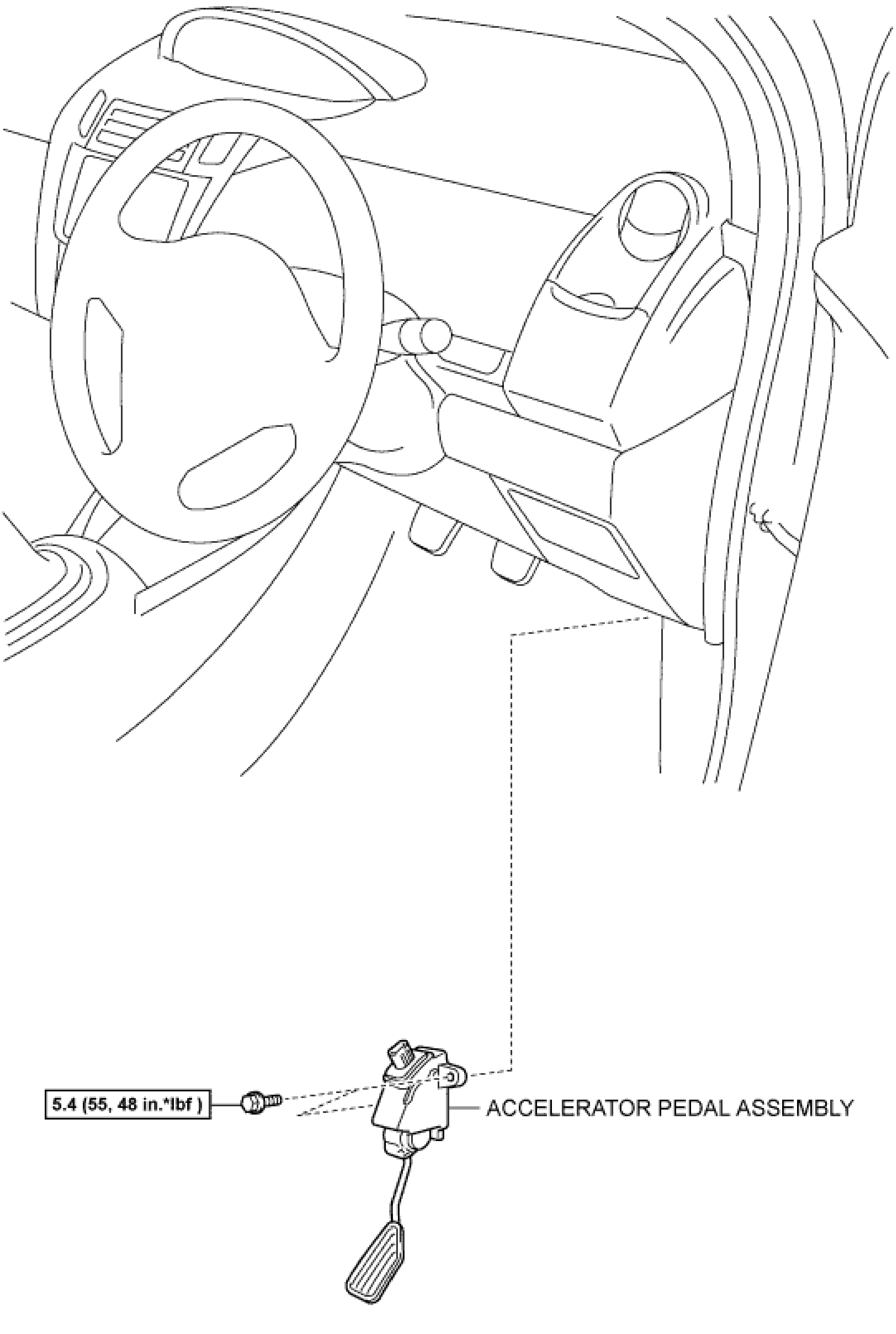
for LHD:



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

N

for RHD:

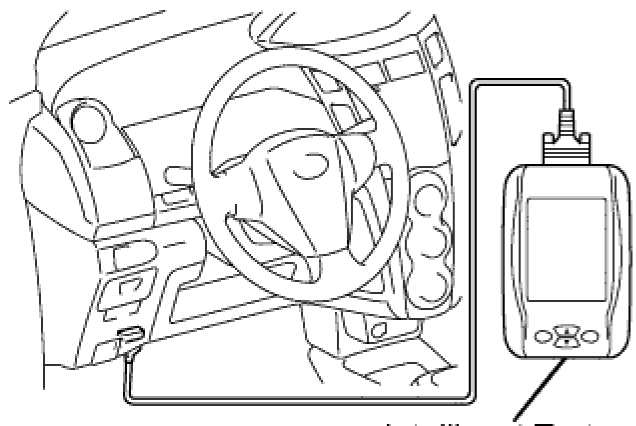


N*m (kgf*cm, ft*lbf) : Specified torque

Y

ACCELERATOR PEDAL (for TMMF Made) > ON-VEHICLE INSPECTION

1. INSPECT ACCELERATOR PEDAL ASSEMBLY



1. Connect an intelligent tester to the DLC3.
2. Turn the ignition switch on (IG) and turn the tester on.
3. Select the following menu items: Powertrain / Engine and ECT / Data List / Accelerator Pedal Position No. 1 and Accelerator Pedal Position No. 2.
4. While the accelerator pedal is depressed and released, check that the values of accelerator pedal position No. 1 and accelerator pedal position No. 2 are within the specifications.

   Accelerator Pedal Position No. 1 Standard voltage:

Condition	Specified Condition
Accelerator pedal released	0.5 to 1.1 V
Accelerator pedal depressed	2.6 to 4.5 V

Accelerator Pedal Position No. 2 Standard voltage:

Condition	Specified Condition
Accelerator pedal released	1.2 to 2.0 V

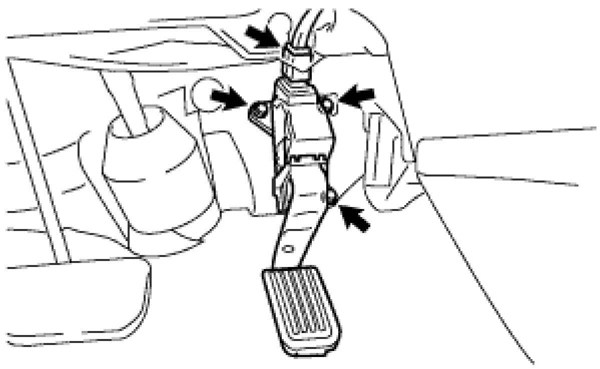
Accelerator pedal depressed	3.4 to 5.0 V

HINT:
If the results are not as specified, check the accelerator pedal, wire harness and ECM.

ACCELERATOR PEDAL (for TMMF Made) > REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE ACCELERATOR PEDAL ASSEMBLY (for LHD)



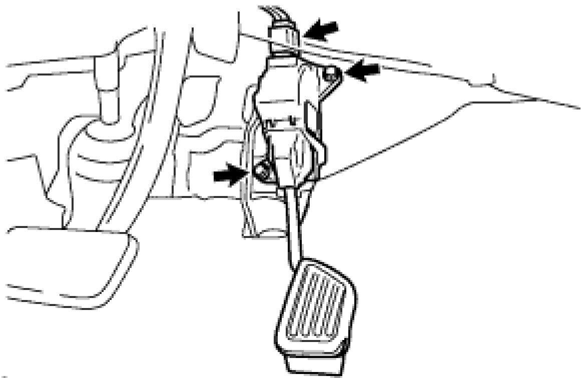
N

1. Disconnect the accelerator pedal connector.
2. Remove the 3 bolts and accelerator pedal.

   NOTICE:

   - Do not drop or strike the accelerator pedal.
   - Do not disassemble the accelerator pedal.

3. REMOVE ACCELERATOR PEDAL ASSEMBLY (for RHD)



N

1. Disconnect the accelerator pedal connector.

2. Remove the 2 bolts and accelerator pedal.

   NOTICE:

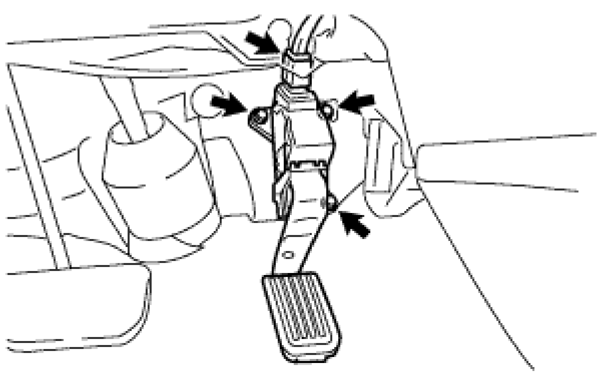
   - Do not drop or strike the accelerator pedal.
   - Do not disassemble the accelerator pedal.

ACCELERATOR PEDAL (for TMMF Made) > INSTALLATION

NOTICE:

- Avoid any physical shock to the accelerator pedal.
- Do not disassemble the accelerator pedal.

1. INSTALL ACCELERATOR PEDAL ASSEMBLY (for LHD)



N

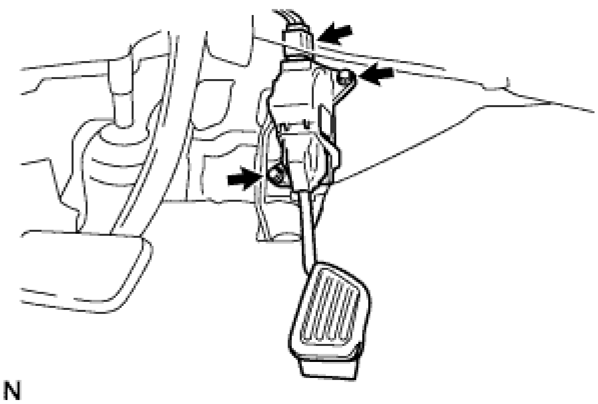
1. Install the accelerator pedal with the 3 bolts.

   Torque:

5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

2. Connect the accelerator pedal connector.

2. INSTALL ACCELERATOR PEDAL ASSEMBLY (for RHD)



1. Install the accelerator pedal with the 2 bolts.

   Torque:
   5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

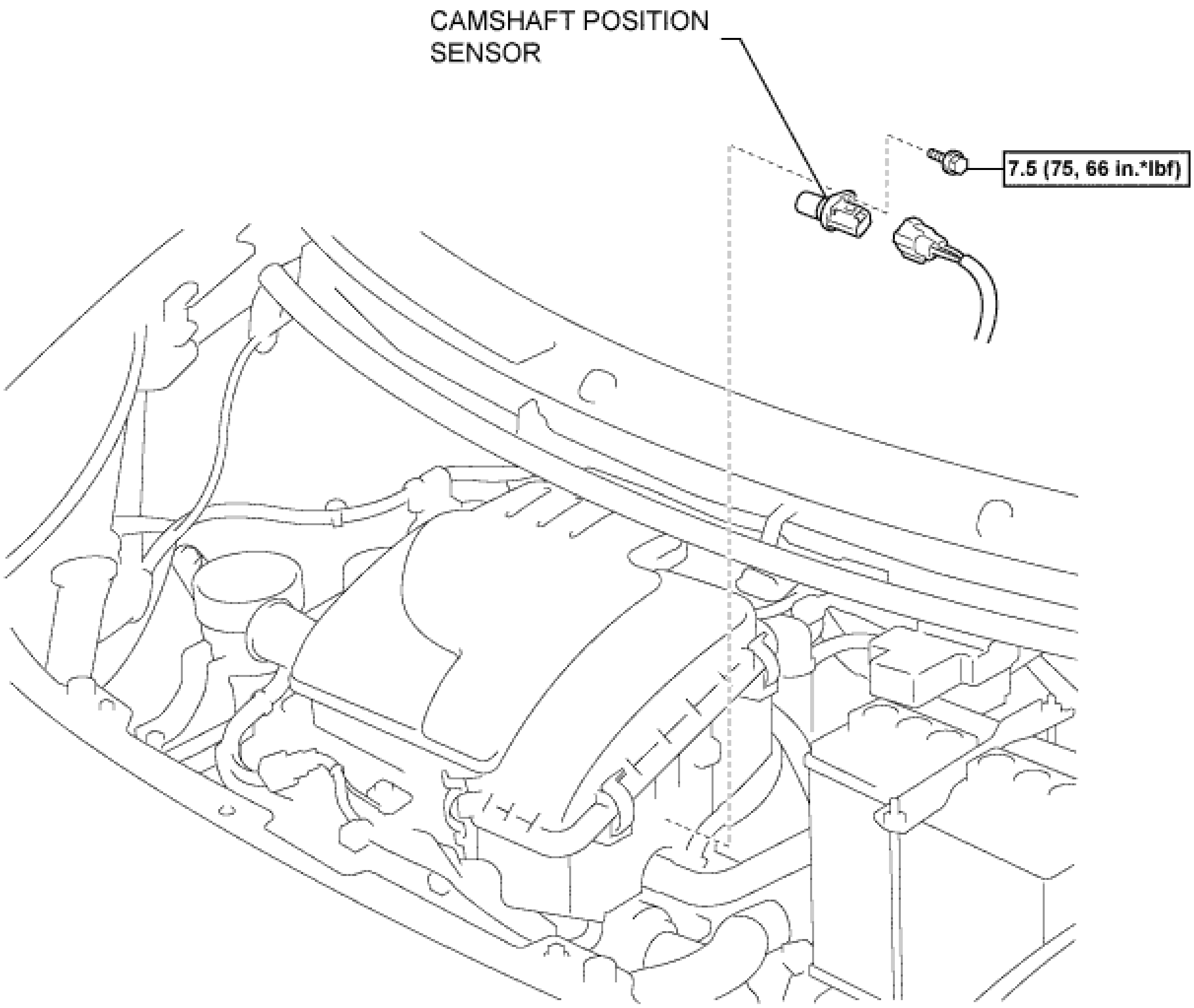
2. Connect the accelerator pedal connector.

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

CAMSHAFT POSITION SENSOR > COMPONENTS



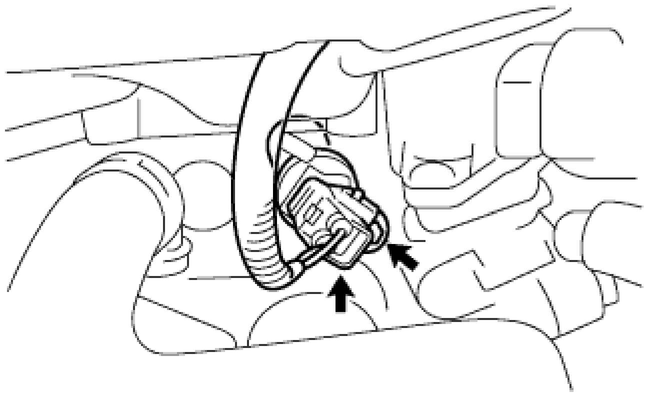
N*m (kgf*cm, ft.*lbf) : Specified torque

Y

CAMSHAFT POSITION SENSOR > REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE CAMSHAFT POSITION SENSOR

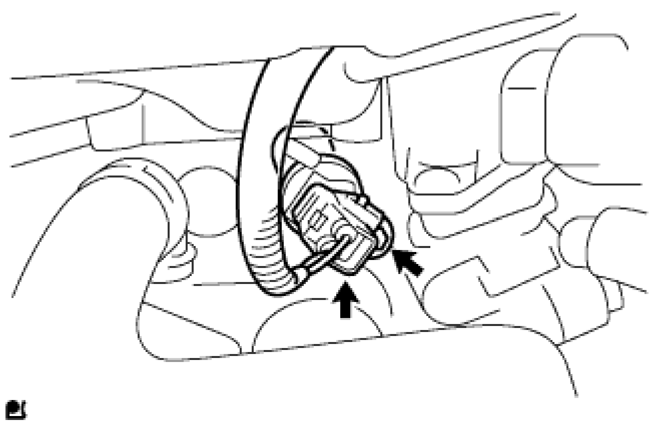


1. Disconnect the connector.

2. Remove the bolt and remove the camshaft position sensor.

CAMSHAFT POSITION SENSOR > INSTALLATION

1. INSTALL CAMSHAFT POSITION SENSOR



1. Apply a light coat of engine oil to the O-ring on the camshaft position sensor.
2. Install the camshaft position sensor with the bolt.

   Torque:
   7.5 N*m{ 76 kgf*cm , 66 in.*lbf }
   NOTICE:
   Check that the O-ring is not cracked or jammed when installing it onto the timing chain cover.

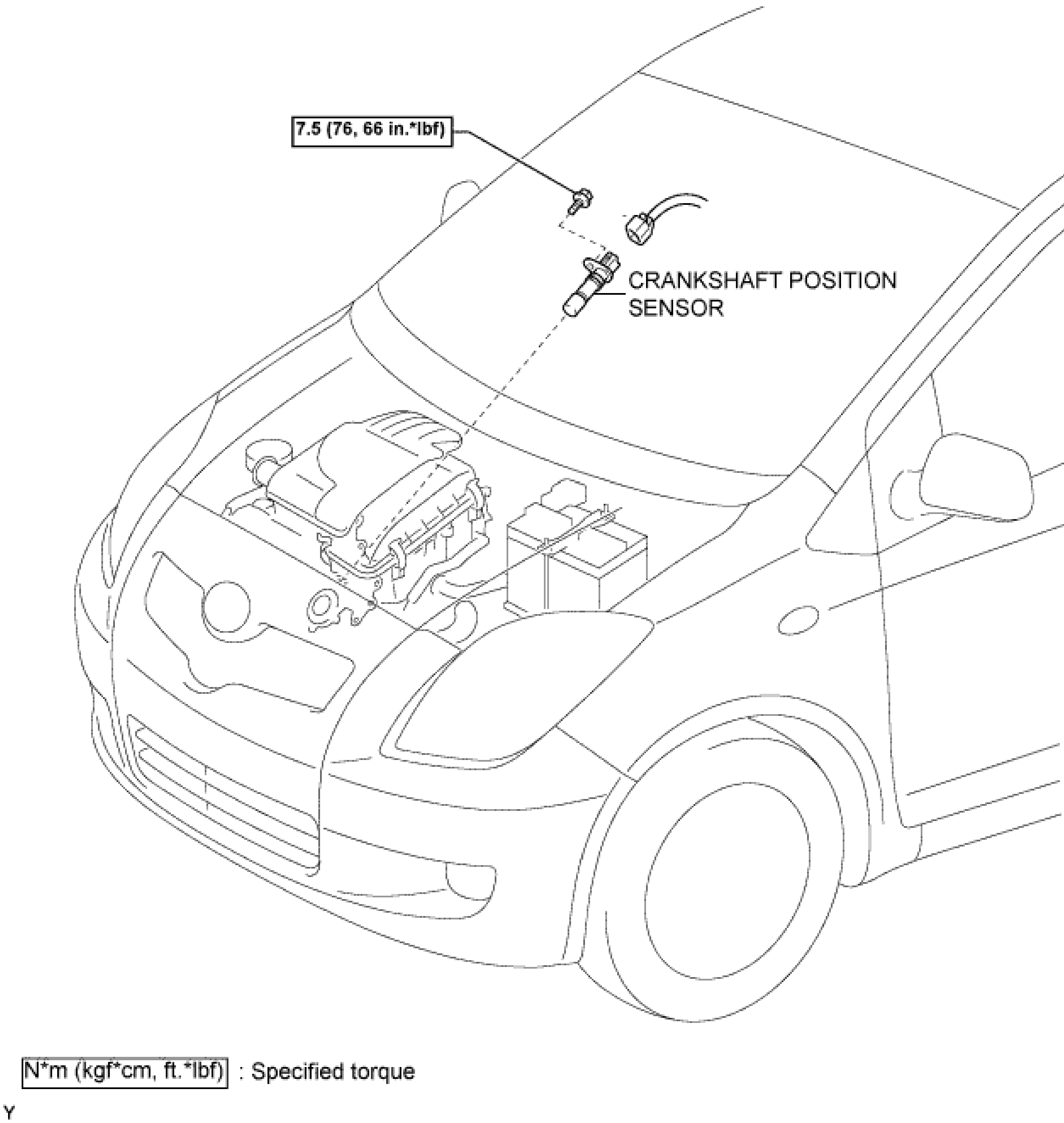
3. Connect the connector.

2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

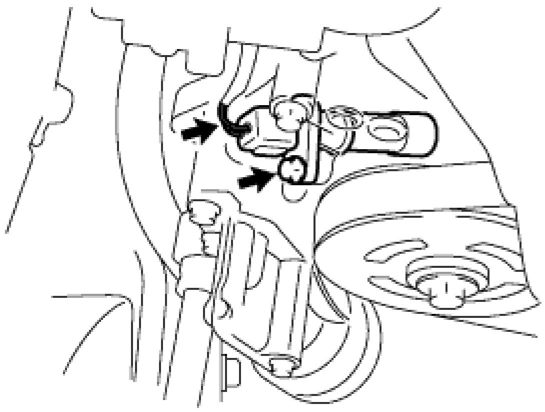
CRANKSHAFT POSITION SENSOR > COMPONENTS


7.5 (76, 66 in.*lbf)
CRANKSHAFT POSITION
SENSOR
N*m (kgf*cm, ft.*lbf) : Specified torque
Y

CRANKSHAFT POSITION SENSOR > REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE CRANKSHAFT POSITION SENSOR



1. Disconnect the connector.
2. Remove the bolt and remove the crankshaft position sensor.

CRANKSHAFT POSITION SENSOR > INSPECTION

1. INSPECT CRANKSHAFT POSITION SENSOR

Y

1. Measure the resistance between the terminals.

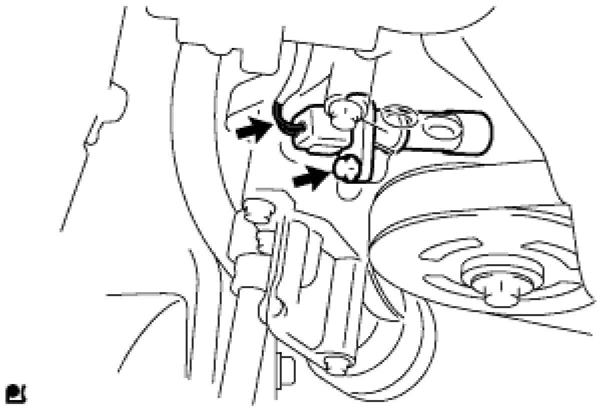
   Standard resistance:

Temperature	Specified Condition
20°C (68°F)	1,850 to 2,450 Ω

   If the result is not as specified, replace the crankshaft position sensor.

CRANKSHAFT POSITION SENSOR > INSTALLATION

1. INSTALL CRANKSHAFT POSITION SENSOR



1. Apply a light coat of engine oil to the O-ring on the crankshaft position sensor.

2. Install the crankshaft position sensor with a bolt.

   Torque:
   7.5 N*m{ 76 kgf*cm , 66 in.*lbf }
   NOTICE:
   Check that the O-ring is not cracked or jammed when installing it onto the timing chain cover.

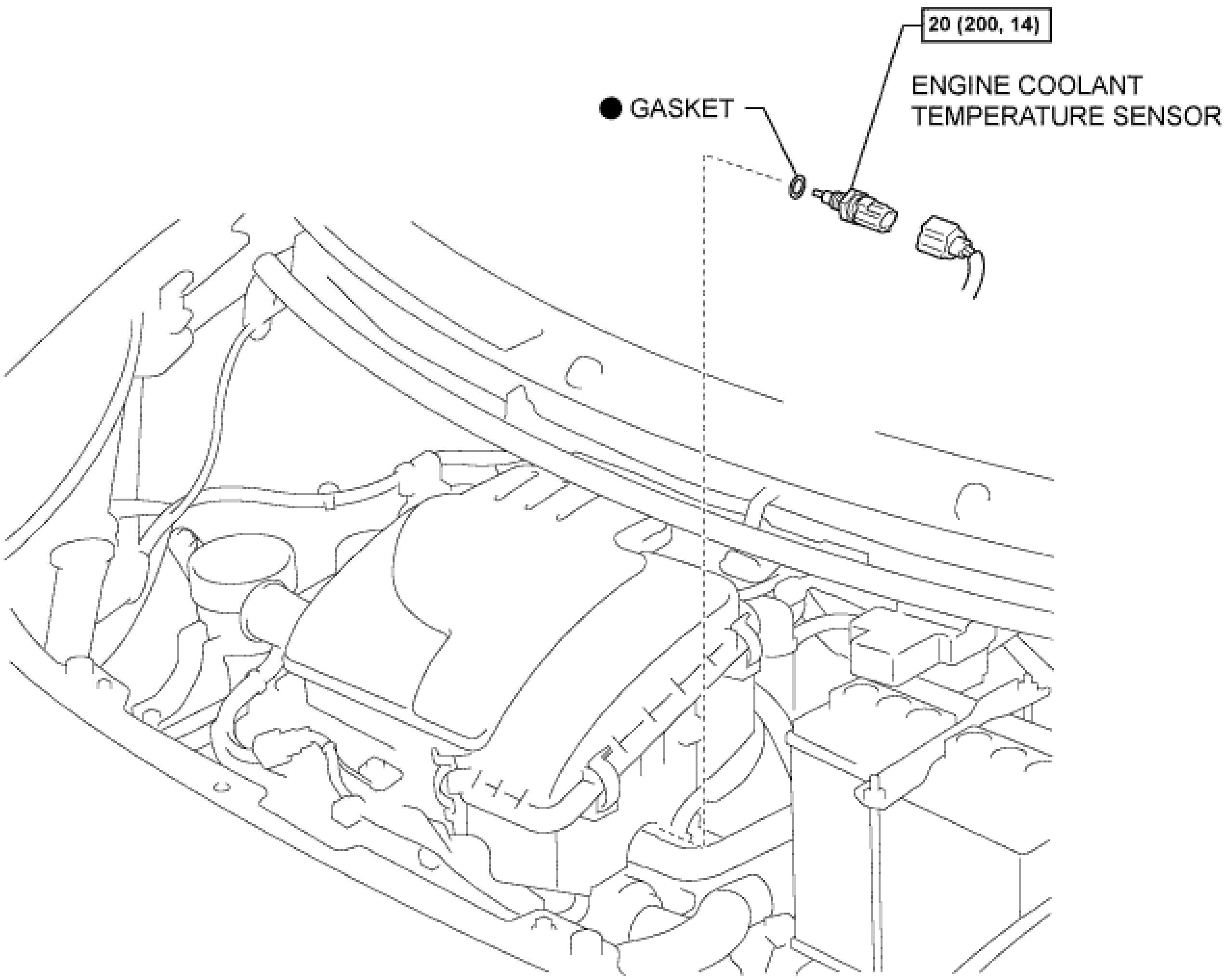
3. Connect the connector.

2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

ENGINE COOLANT TEMPERATURE SENSOR > COMPONENTS



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

● Non-reusable part

Y

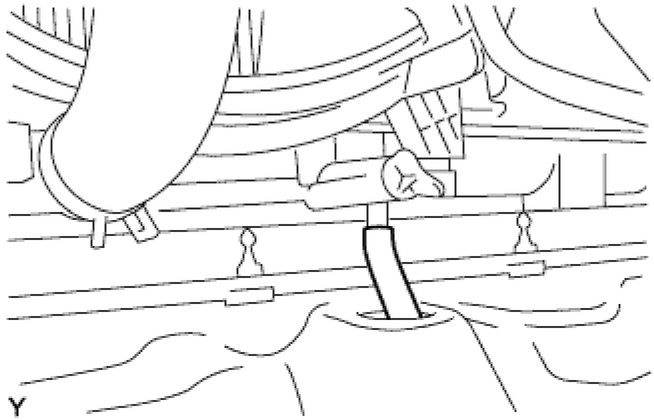
ENGINE COOLANT TEMPERATURE SENSOR > REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. DRAIN ENGINE COOLANT

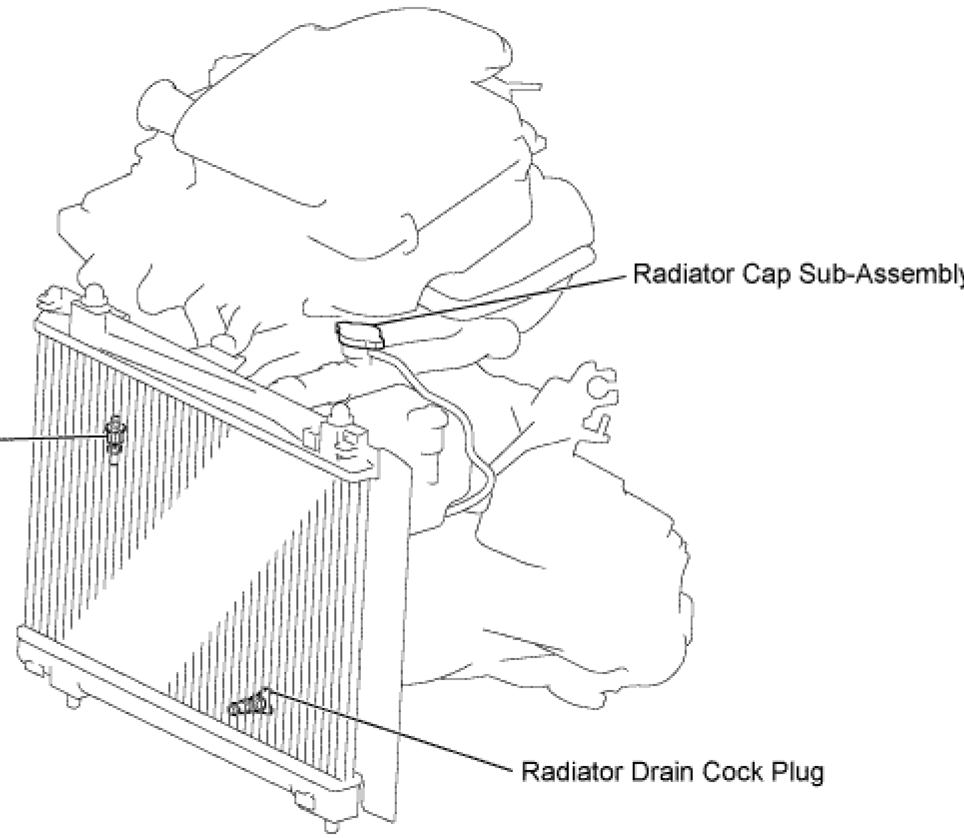
CAUTION:

To avoid the danger of being burned, do not remove the radiator cap sub-assembly while the engine and radiator assembly are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator assembly.



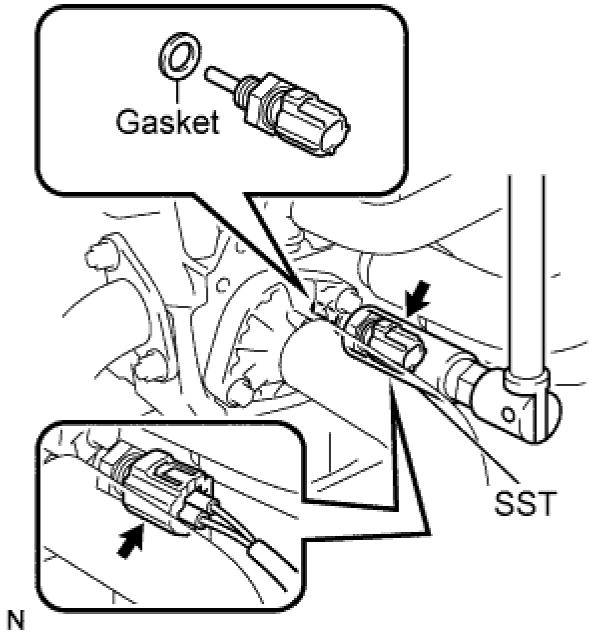
1. Install a vinyl hose onto the radiator side.
2. Loosen the radiator drain cock plug.
3. Remove the radiator cap sub-assembly.

4. Loosen the water drain plug, then drain the coolant.



Y

3. REMOVE ENGINE COOLANT TEMPERATURE SENSOR



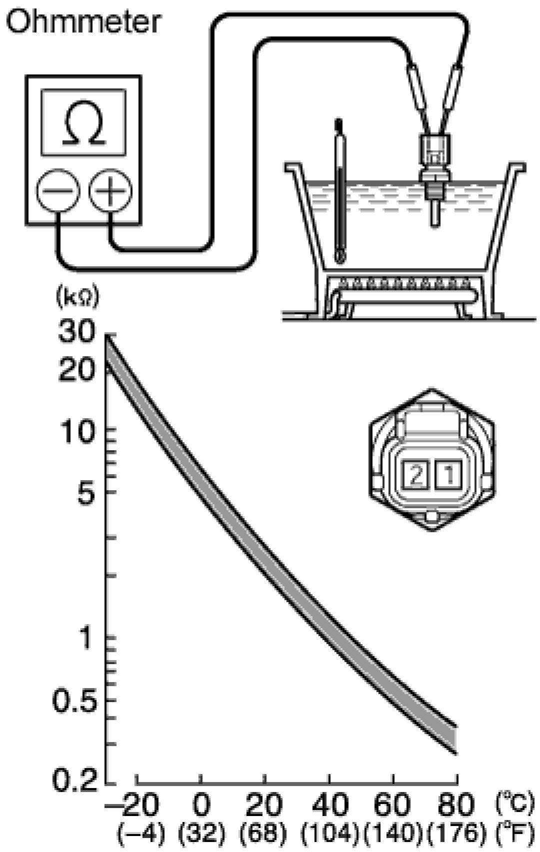
1. Disconnect the engine coolant temperature sensor connector.

2. Using SST, remove the engine coolant temperature sensor and gasket.

   SST
   09817-33190

ENGINE COOLANT TEMPERATURE SENSOR > INSPECTION

1. INSPECT ENGINE COOLANT TEMPERATURE SENSOR



N

1. Check the resistance.

   1. Using an ohmmeter, measure the resistance between the terminals.

      Standard resistance:

Tester Connection	Specified Condition
1 - 2	2.32 to 2.59 kΩ at 20°C (68°F)
1 - 2	0.310 to 0.326 kΩ at 80°C (176°F)

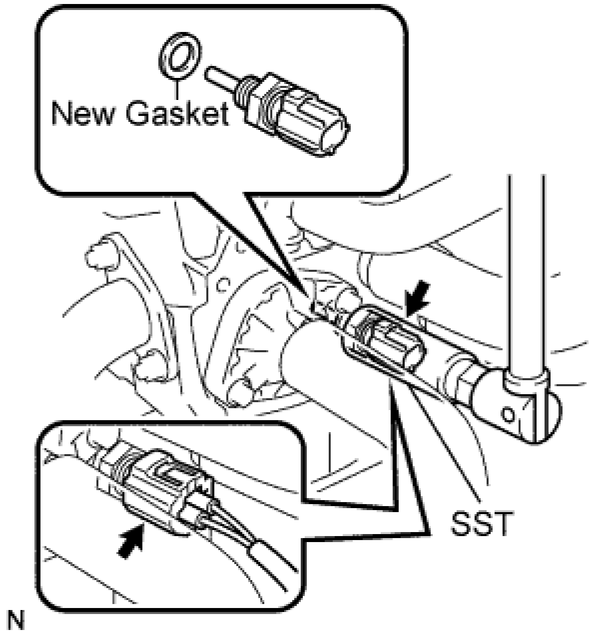
      If the resistance is not as specified, replace the engine coolant temperature sensor.

      NOTICE:
Do not immerse terminals on the sensor in the water, while inspecting the engine coolant temperature sensor, as shown in the illustration. After the inspection, wipe

the water off the engine coolant temperature sensor so that the terminals do not get wet.

ENGINE COOLANT TEMPERATURE SENSOR > INSTALLATION

1. INSTALL ENGINE COOLANT TEMPERATURE SENSOR



1. Install a new gasket onto the engine coolant temperature sensor.
2. Using SST, install the engine coolant temperature sensor.

   SST
   09817-33190
   Torque:
   20 N*m{ 200 kgf*cm , 14 ft.*lbf }

3. Connect the engine coolant temperature sensor connector.

2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

3. ADD ENGINE COOLANT

1. Tighten all the plugs.

2. Disconnect the vinyl hose.

3. Pour engine coolant into the radiator assembly until it overflows.

   Capacity:
   4.5 liters (4.8 USqts, 4.2 lmp. qts)
   NOTICE:
   Do not substitute water for engine coolant.
   HINT:

   - Use of improper engine coolant may damage the engine coolant system.
   - Use only Toyota Super Long Life Coolant or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate engine coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).

4. Check the engine coolant level inside the radiator assembly by squeezing the inlet and outlet radiator hoses several times by hand. If the engine coolant level goes down, add engine coolant.

5. Install the radiator cap sub-assembly securely.

6. Slowly pour engine coolant into the radiator reservoir until it reaches the FULL line.

7. Warm up the engine until the cooling fan operates.

   1. Set the air conditioning as follows while warming up the engine.

Item	Manual air conditioning system	Automatic air conditioning system
Set control as follows	Fan speed - Any setting except "OFF" Temperature - Toward WARM Air conditioning switch "OFF"	Fan speed - Any setting except "OFF" Temperature - To the highest temperature Air conditioning switch "OFF" "AUTO" switch "OFF"

   2. Maintain the engine speed at 2,000 to 2,500 rpm and warm up the engine until the cooling fan operates.

8. Stop the engine and wait until the coolant cools down.

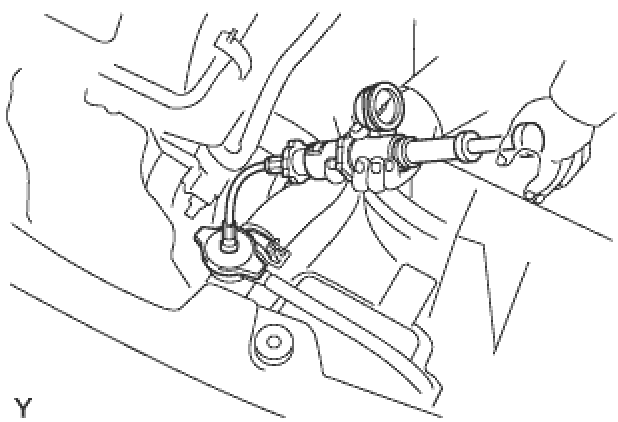
9. If the engine coolant level is below the full level, perform steps (c) through (h) again and repeat the operation until the engine coolant level stays at the full level.

10. Recheck the engine coolant level inside the radiator reservoir tank assembly. If it is below the full level, add engine coolant.

4. CHECK FOR ENGINE COOLANT LEAKAGE

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap sub-assembly while the engine and radiator assembly are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator assembly.

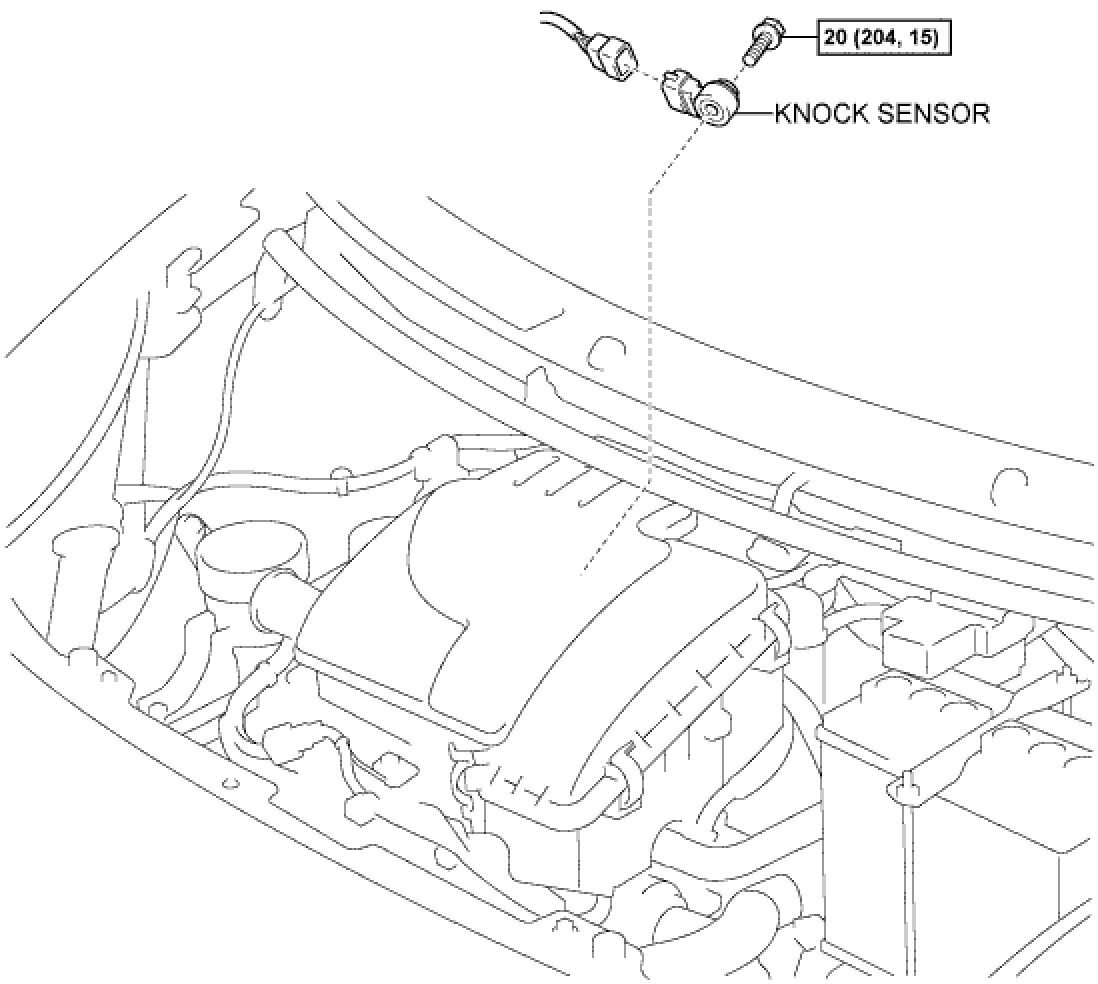


Y

1. Fill the radiator assembly with engine coolant, then attach a radiator cap tester.

2. Pump it to 137 kPa (1.4 kgf/cm^2, 19.9 psi), then check that the pressure does not drop.
   If the pressure drops, check the hoses, radiator assembly and water pump assembly for leakage. If there are no signs or traces of external engine coolant leakage, check the heater core, cylinder block and head.

KNOCK SENSOR > COMPONENTS



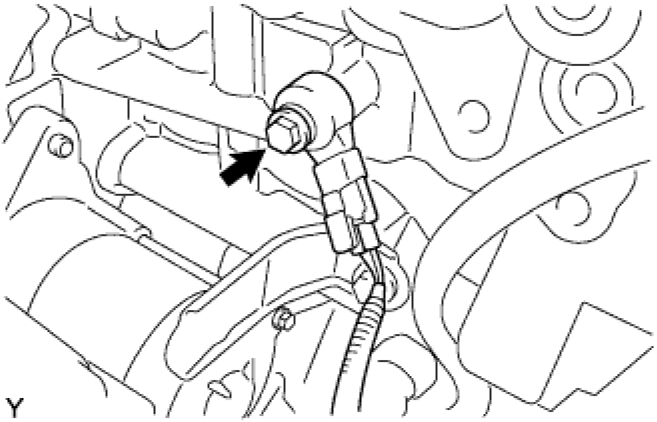
N*m (kgf*cm, ft.*lbf) : Specified torque

Y

KNOCK SENSOR > REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE KNOCK SENSOR

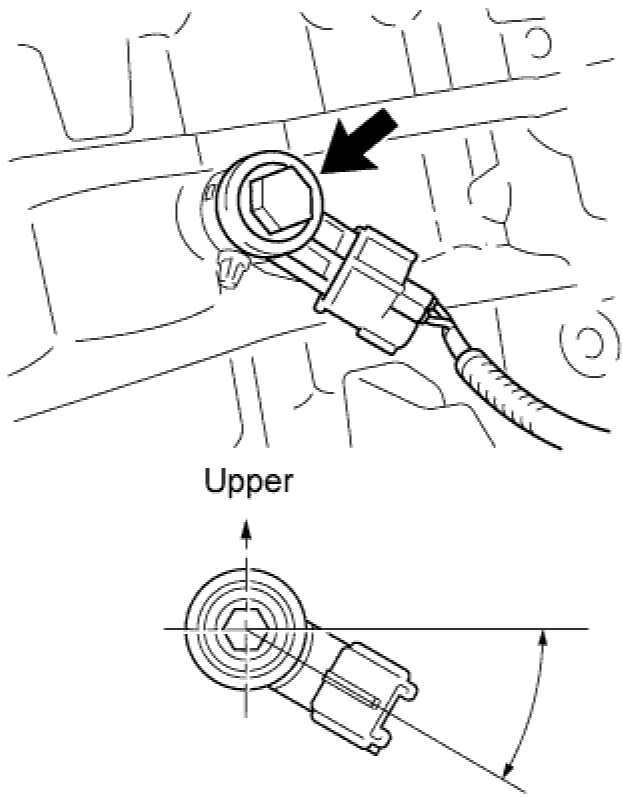


Y

1. Disconnect the connector.
2. Remove the bolt and knock sensor.

KNOCK SENSOR > INSTALLATION

1. INSTALL KNOCK SENSOR



Y

1. Install the knock sensor with the bolt.

   Torque:
   20 N*m{ 204 kgf*cm , 15 ft.*lbf }
   HINT:
   It is acceptable for the sensor to be tilted 0 to 45°.

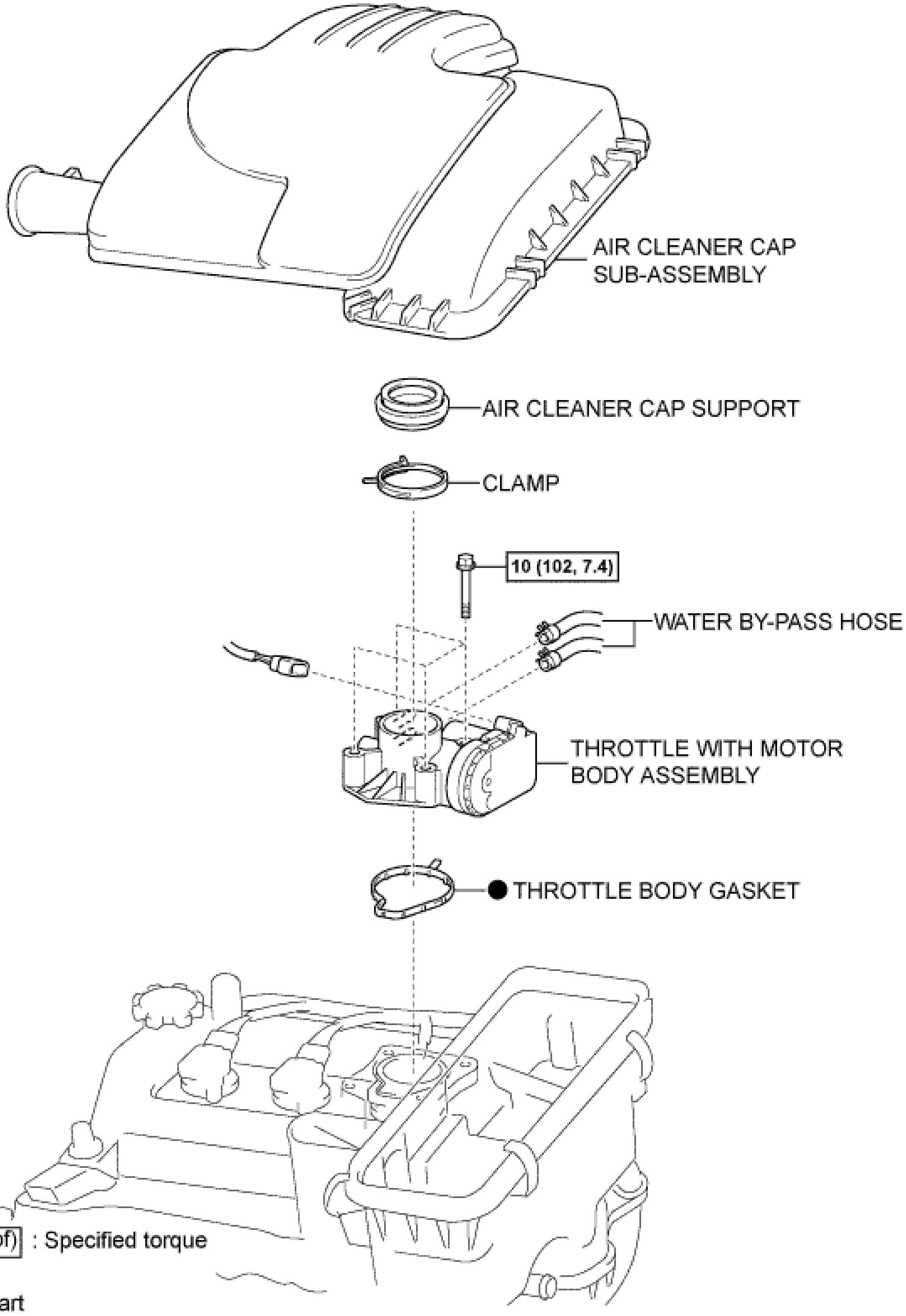
2. Connect the connector.

2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

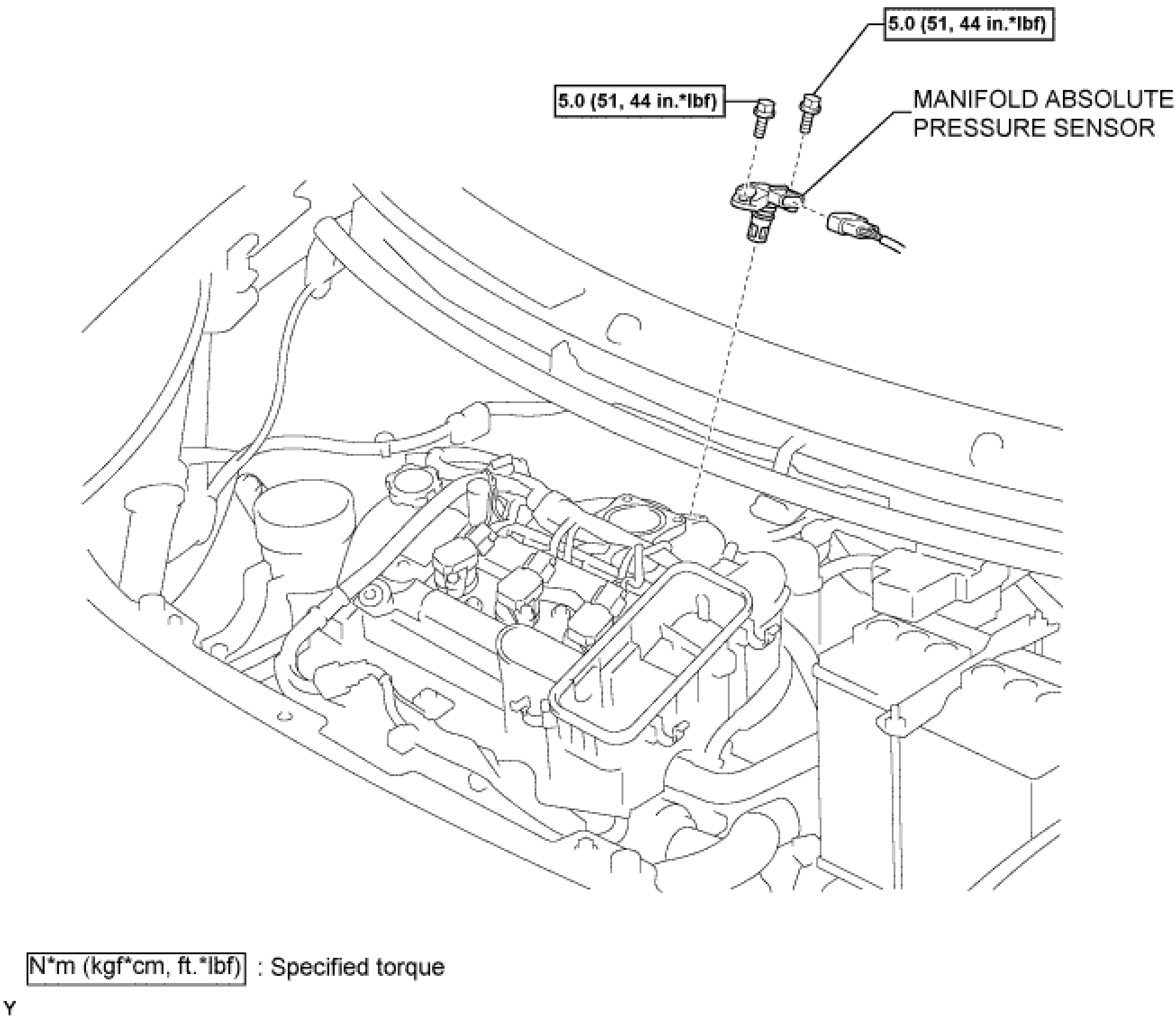
MANIFOLD ABSOLUTE PRESSURE SENSOR > COMPONENTS



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

● Non-reusable part

Y


5.0 (51, 44 in.*lbf)
5.0 (51, 44 in.*lbf)
MANIFOLD ABSOLUTE
PRESSURE SENSOR
N*m (kgf*cm, ft.*lbf) : Specified torque
Y

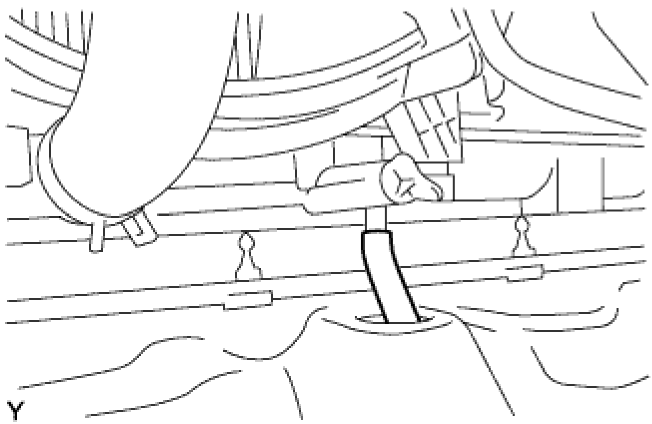
MANIFOLD ABSOLUTE PRESSURE SENSOR > REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

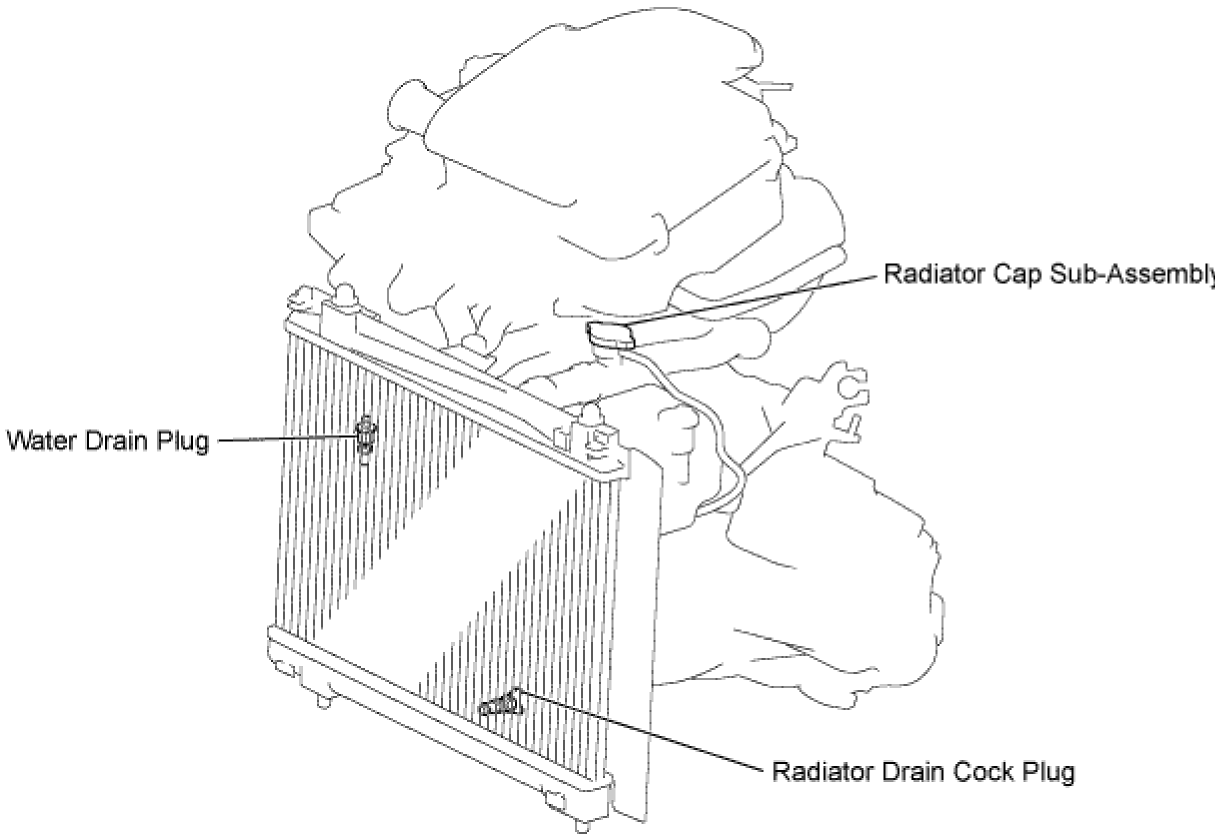
2. DRAIN ENGINE COOLANT

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap sub-assembly while the engine and radiator assembly are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator assembly.

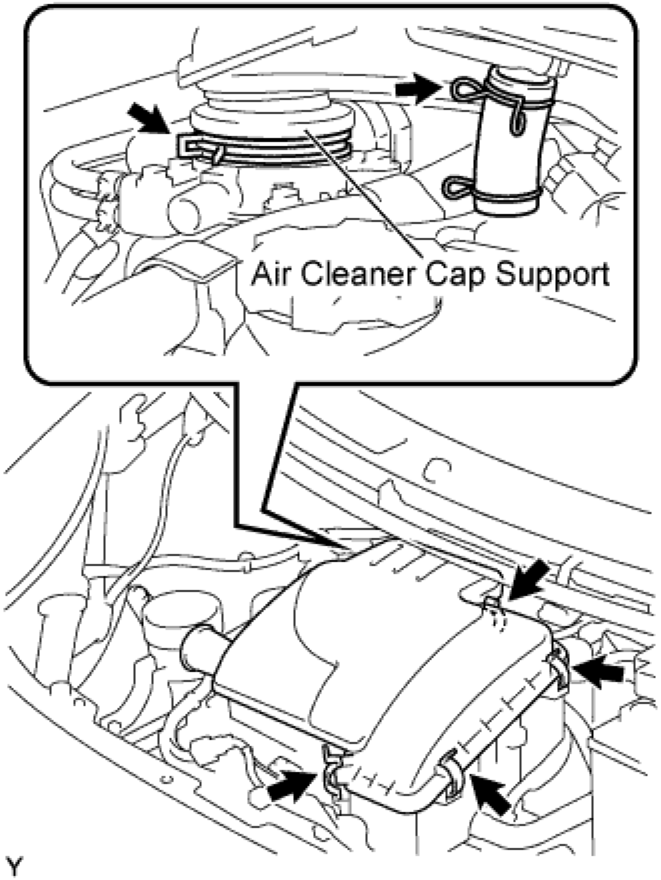


1. Install a vinyl hose onto the radiator side.
2. Loosen the radiator drain cock plug.
3. Remove the radiator cap sub-assembly.
4. Loosen the water drain plug, then drain the coolant.



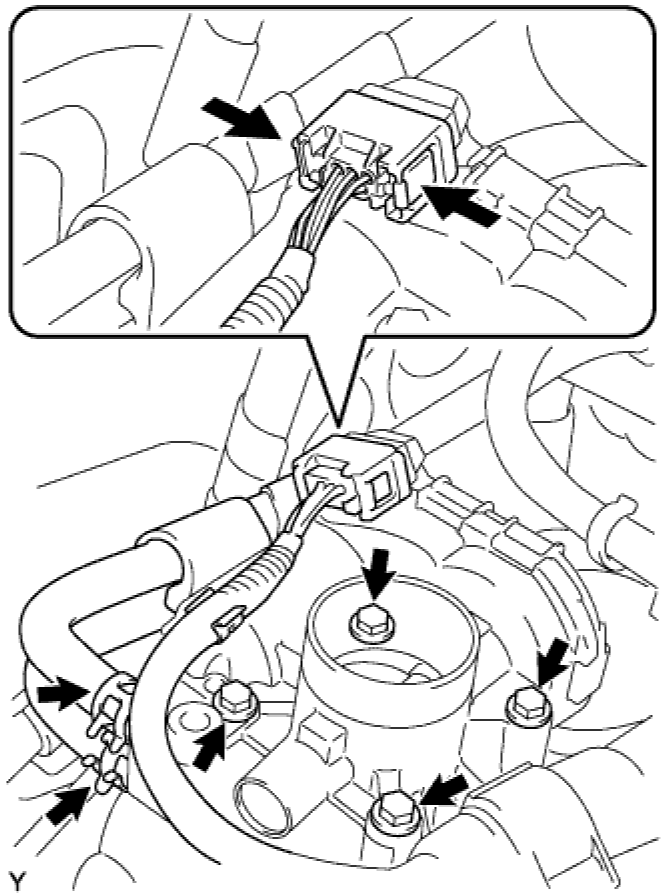
Y

3. REMOVE AIR CLEANER CAP SUB-ASSEMBLY



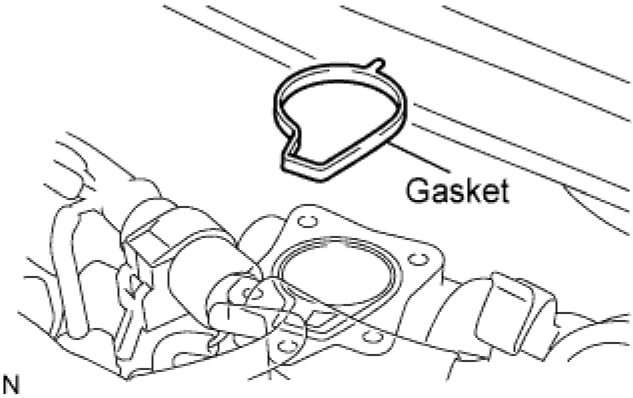
1. Remove the 4 clamps.
2. Remove the 2 clamps and remove the air cleaner cap.

4. REMOVE THROTTLE WITH MOTOR BODY ASSEMBLY



1. Disconnect the 2 water by-pass hoses.
2. Disconnect the connector.
3. Remove the 4 bolts and the throttle body.

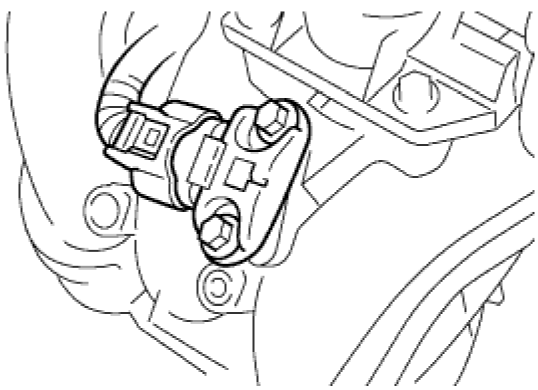
5. REMOVE THROTTLE BODY GASKET



N

1. Remove the gasket from the intake manifold.

6. REMOVE MANIFOLD ABSOLUTE PRESSURE SENSOR

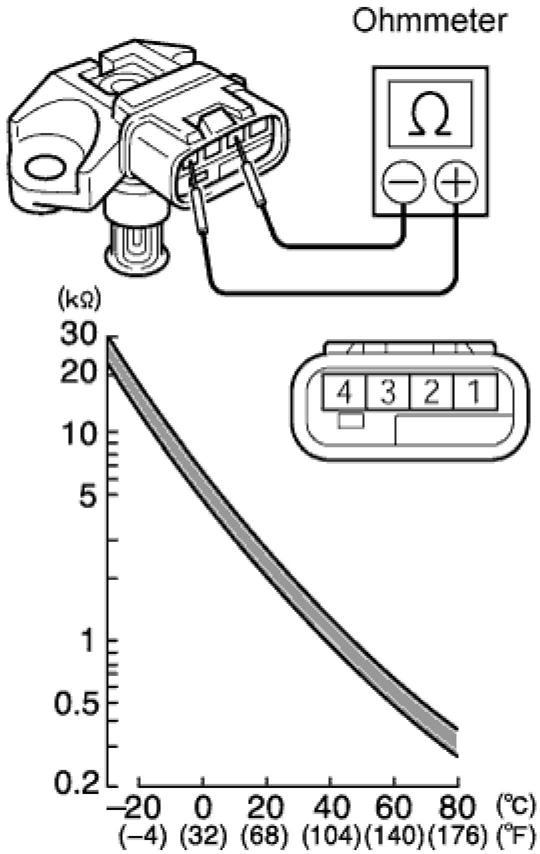


N

1. Disconnect the connector.
2. Remove the 2 bolts and manifold absolute pressure sensor.

MANIFOLD ABSOLUTE PRESSURE SENSOR > INSPECTION

1. INSPECT MANIFOLD ABSOLUTE PRESSURE SENSOR



N

1. Check the resistance.

    1. Using an ohmmeter, measure the resistance between the terminals.

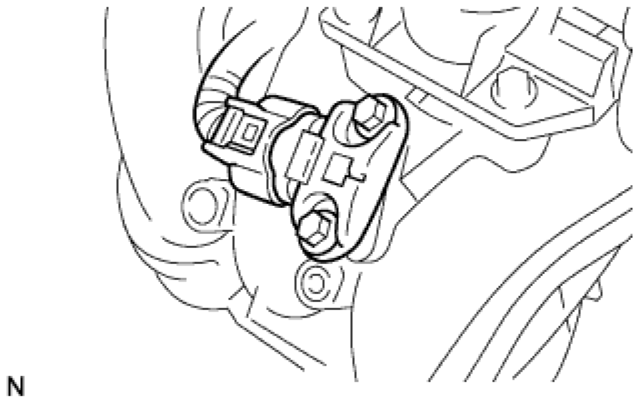
       Standard resistance:

Tester Connection	Specified Condition
2 (E2) - 4 (THA)	14.6 to 17.8 kΩ at -20°C (-4°F)
2 (E2) - 4 (THA)	2.21 to 2.69 kΩ at 20°C (68°F)
2 (E2) - 4 (THA)	0.29 to 0.354 kΩ at 80°C (176°F)

       If the resistance is not as specified, replace the manifold absolute pressure sensor.

MANIFOLD ABSOLUTE PRESSURE SENSOR > INSTALLATION

1. INSTALL MANIFOLD ABSOLUTE PRESSURE SENSOR

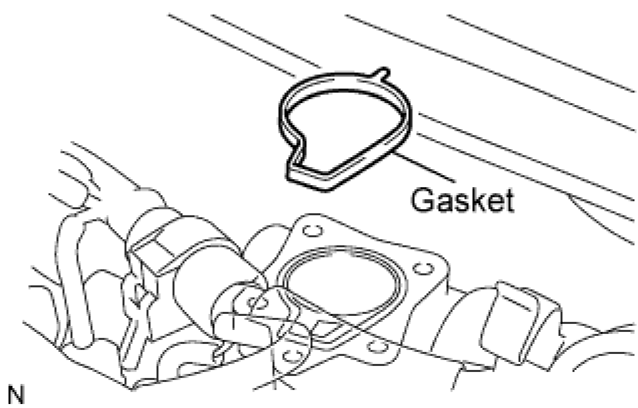


1. Install the manifold absolute pressure sensor with the 2 bolts.

   Torque:
   5.0 N*m{ 51 kgf*cm , 44 in.*lbf }

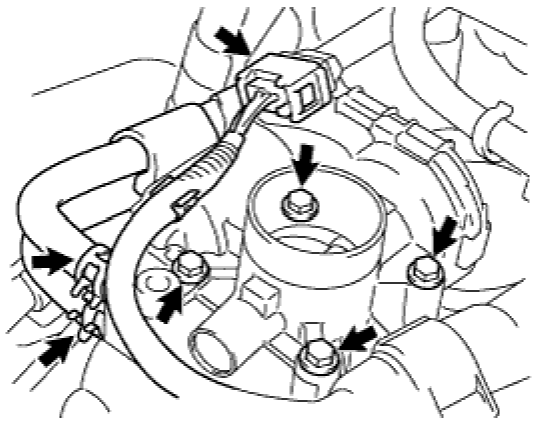
2. Connect the connector.

2. INSTALL THROTTLE BODY GASKET



1. Install a new gasket onto the intake manifold.

3. INSTALL THROTTLE WITH MOTOR BODY ASSEMBLY



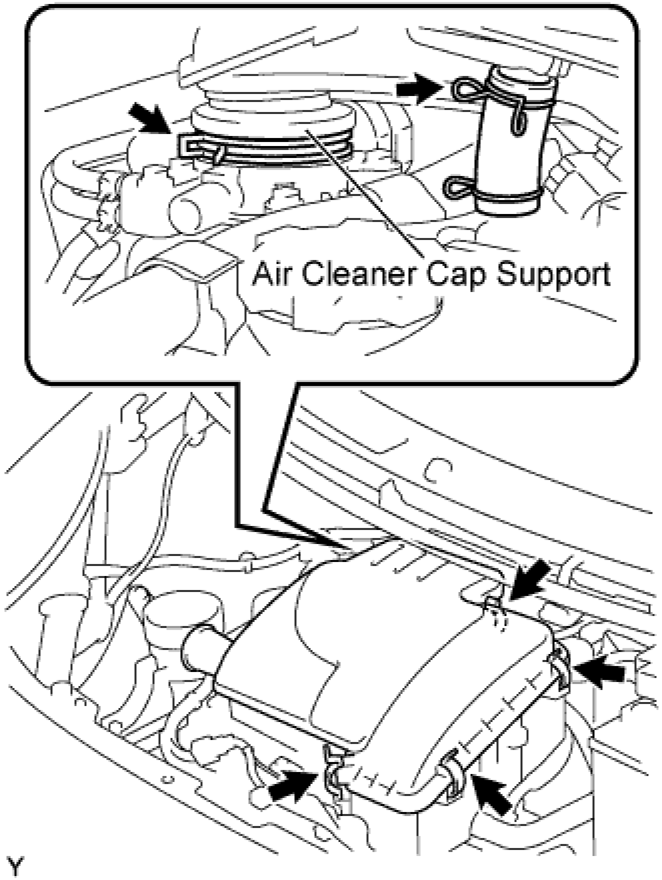
1. Install the throttle body with the 4 bolts.

   Torque:
   10 N*m{ 102 kgf*cm , 7.4 ft.*lbf }

2. Connect the connector.

3. Connect the 2 water by-pass hoses.

4. INSTALL AIR CLEANER CAP SUB-ASSEMBLY



1. Install the air cleaner cap with the 2 clamps.
2. Tighten the 4 clamps.

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N*m{ 55 kgf*cm , 48 in.*lbf }

6. ADD ENGINE COOLANT

1. Tighten all the plugs.
2. Disconnect the vinyl hose.
3. Pour engine coolant into the radiator assembly until it overflows.

Capacity:
4.5 liters (4.8 USqts, 4.2 lmp. qts)
NOTICE:
Do not substitute water for engine coolant.
HINT:

- Use of improper engine coolant may damage the engine coolant system.
- Use only Toyota Super Long Life Coolant or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate engine coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology consists of a combination of low phosphates and organic acids).

4. Check the engine coolant level inside the radiator assembly by squeezing the inlet and outlet radiator hoses several times by hand. If the engine coolant level goes down, add engine coolant.

5. Install the radiator cap sub-assembly securely.

6. Slowly pour engine coolant into the radiator reservoir until it reaches the FULL line.

7. Warm up the engine until the cooling fan operates.

    1. Set the air conditioning as follows while warming up the engine.

Item	Manual air conditioning system	Automatic air conditioning system
Set control as follows	Fan speed - Any setting except "OFF" Temperature - Toward WARM Air conditioning switch "OFF"	Fan speed - Any setting except "OFF" Temperature - To the highest temperature Air conditioning switch "OFF" "AUTO" switch "OFF"

    2. Maintain the engine speed at 2,000 to 2,500 rpm and warm up the engine until the cooling fan operates.

8. Stop the engine and wait until the coolant cools down.

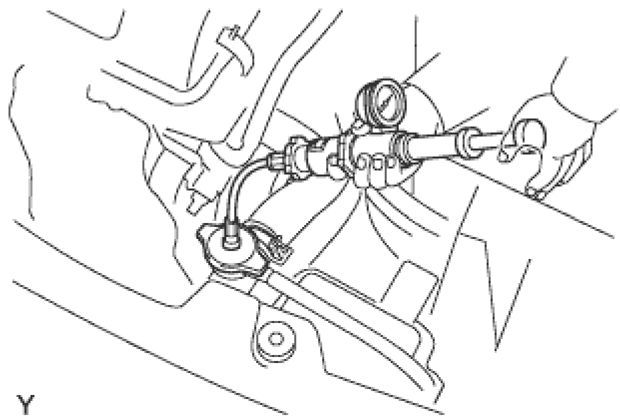
9. If the engine coolant level is below the full level, perform steps (c) through (h) again and repeat the operation until the engine coolant level stays at the full level.

10. Recheck the engine coolant level inside the radiator reservoir tank assembly. If it is below the full level, add engine coolant.

7. CHECK FOR ENGINE COOLANT LEAKAGE

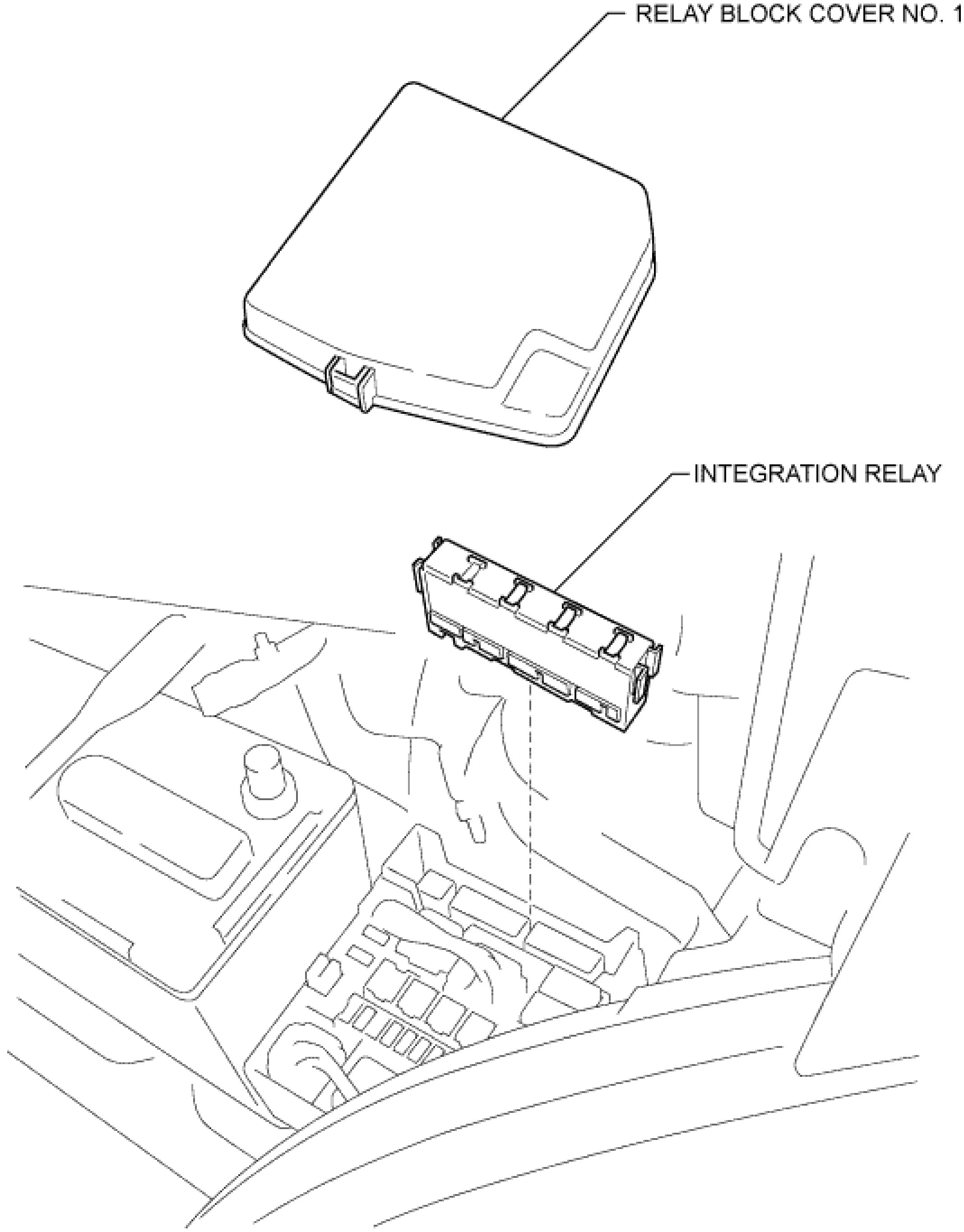
CAUTION:

To avoid the danger of being burned, do not remove the radiator cap sub-assembly while the engine and radiator assembly are still hot. Thermal expansion will cause hot engine coolant and steam to blow out from the radiator assembly.



1. Fill the radiator assembly with engine coolant, then attach a radiator cap tester.
2. Pump it to 137 kPa (1.4 kgf/cm^2, 19.9 psi), then check that the pressure does not drop.
   If the pressure drops, check the hoses, radiator assembly and water pump assembly for leakage. If there are no signs or traces of external engine coolant leakage, check the heater core, cylinder block and head.

INTEGRATION RELAY > COMPONENTS



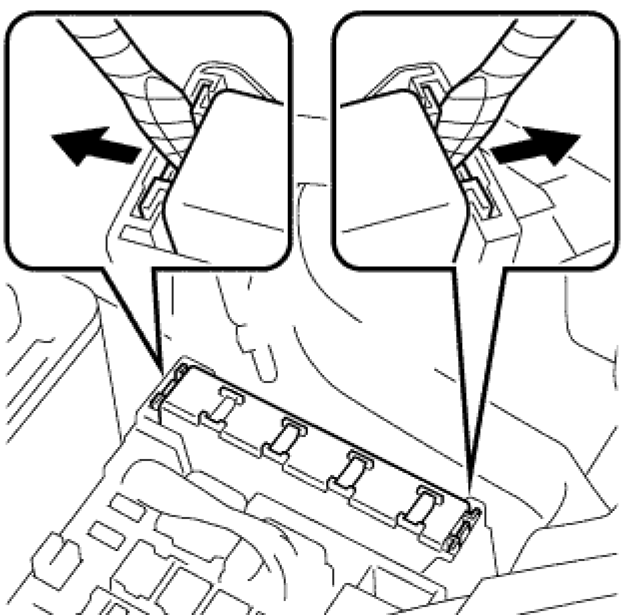
N

INTEGRATION RELAY > REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

2. REMOVE RELAY BLOCK COVER NO. 1

3. REMOVE INTEGRATION RELAY



N

1. Using a screwdriver with its tip wrapped in protective tape, disengage the 2 claws and disconnect the integration relay.

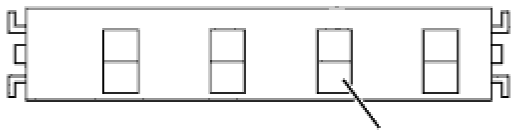
2. Disconnect the 3 connectors.

INTEGRATION RELAY > INSPECTION

1. INSPECT INTEGRATION RELAY

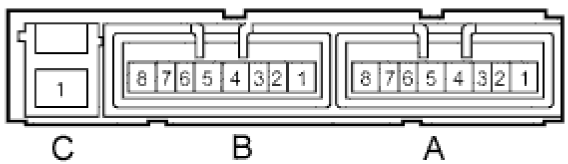
Integration Relay

Fuse Side:



EFI (20A) Fuse

Connector Side:



1. Inspect EFI (20A) fuse.

    1. Disconnect the fuse.
    2. Using an ohmmeter, measure the resistance of the fuse.

    Standard resistance:

Tester Connection	Specified condition
1 - 2	Below 1 Ω

2. Inspect EFI relay.

    1. Using an ohmmeter, measure the resistance between the terminals.

    Standard resistance:

Tester Connection	Specified condition
A1 - C1	Below 1 Ω
A1 - A4	10 kΩ or higher
A4 - C1	10 kΩor higher
A1 - A4	Below 1 Ω (Apply battery voltage between terminals A2 and A3)

A4 - C1	Below 1 Ω (Apply battery voltage between terminals A2 and A3)

NOTICE:

While using the battery for the inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.

INTEGRATION RELAY > INSTALLATION

1. INSTALL INTEGRATION RELAY

1. Connect the 3 connectors.
2. Attach the integration relay to the engine room relay block.

2. INSTALL RELAY BLOCK COVER NO. 1

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque:

5.4 N*m{ 55 kgf*cm , 4.8 in.*lbf }