

FAIL-SAFE CHART

1. Fail-safe

This function minimizes the loss of operation when any abnormality occurs in a sensor or solenoid.

Fail-safe Control List

Malfunction Part	Function
Input Turbine Speed Sensor	Shifting to only either the 1st or 3rd gear is allowed.
Counter Gear Speed Sensor	- The counter gear speed is determined based on the signals from the skid control ECU (speed sensor signals). - Shifting between 1st to 4th gears is allowed.
ATF Temp. Sensor	Shifting between 1st to 4th gears is allowed.
ECT ECU Power Supply (Voltage is Low)	When the vehicle is being driven in 6th gear, the transaxle is fixed in 6th gear. When being driven in any of the 1st to 5th gears, the transaxle is fixed in 5th gear.
CAN Communication	Shifting to only either 1st or 3rd gear is allowed.
Knock Sensor	Shifting between 1st to 4th gear is allowed.
Solenoid Valve SL1, SL2, SL3 and SL4	The current to the failed solenoid valve is cut off and operating the other solenoid valves with normal operation performs shift control. (Shift controls in fail-safe mode are described in the table on the next page. For details, refer to Fail-Safe Control Chart)

Solenoid Valve Operation when Normal:

Gear Position		1st	2nd	3rd	4th	5th	6th
Solenoid	SL1	ON	ON	ON	ON	OFF	OFF
	SL2	OFF	OFF	OFF	ON	ON	ON
	SL3	OFF	ON	OFF	OFF	OFF	ON
	SL4	OFF	OFF	ON	OFF	ON	OFF

Fail-safe Control Chart:

	Gear Position in Normal Operation	1st	2nd	3rd	4th	5th	6th
SL1	ON Malfunction (without Fail-safe Control) *1	1st	2nd	3rd	4th	4th	4th
	OFF Malfunction (without Fail-safe Control)	1st to N	2nd to N	3rd to N	4th to N	5th	6th
	Fail-safe Control during OFF Malfunction	Fixed in 3rd or 5th					
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 3rd or 5th					
SL2	ON Malfunction (without Fail-safe Control) *1	1st to 4th	2nd to 4th	3rd to 4th	4th	5th	6th
	OFF Malfunction (without Fail-safe Control)	1st	2nd	3rd	4th to 1st	5th to N	6th to N
	Fail-safe Control during OFF malfunction	1st	2nd	3rd	3rd	3rd	3rd
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 2nd or 3rd					
SL3	ON Malfunction (without Fail-safe Control) *1	1st to 2nd	2nd	3rd	4th	5th	6th
	OFF Malfunction (without Fail-safe Control)	1st	2nd to 1st	3rd	4th	5th	6th to N
	Fail-safe Control during OFF malfunction	1st	3rd	3rd	4th	5th	5th
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 3rd					

	Gear Position in Normal Operation	1st	2nd	3rd	4th	5th	6th
SL4	ON Malfunction (without Fail-safe Control) ^{*1}	3rd	3rd	3rd	4th	5th	5th
	OFF Malfunction (without Fail-safe Control)	1st	2nd	3rd to 1st	4th	5th to N	6th
	Fail-safe Control during OFF malfunction	1st ^{*2}	2nd ^{*2}	4th ^{*2}	4th ^{*2}	6th	6th
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 2nd					

^{*1}: Fail-safe control is not actuated when the ON malfunction occurs.

^{*2}: Shifting to 5th and 6th gears is prohibited.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the DATA LIST using the intelligent tester allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save labor time.

NOTICE:

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

- (a) Warm up the engine.
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- (d) Turn the engine switch on (IG).
- (e) Turn the tester on.
- (f) Enter the following menus: "DIAGNOSIS / OBD/ MOBD / ECT / DATA LIST".
- (g) According to the display on the tester, read "DATA LIST".

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
CALC LOAD	Calculated load by ECM: Min.: 0%, Max.: 100%	15.0 to 35.0%: Idling 10.0 to 30.0%: Running without load (2,000 rpm)	-
ENGINE SPD	Engine speed: Min.: 0 rpm, Max.: 16,383.75 rpm	550 to 800 rpm: Idling	-
VEHICLE SPD	Vehicle speed: Min.: 0 km/h, Max.: 255 km/h	Actual vehicle load	-
COOLANT TEMP	Engine coolant temperature: Min.: -40°C (-40°F), Max.: 140°C (284°F)	80 to 105°C (176 to 221°F): After warming up	- If value is -40°C (-40°F): sensor circuit open - If value is 140°C (284°F): sensor circuit shorted
THROTTLE POS	Throttle position: Min.: 0%, Max.: 100%	10 to 22%: Idling	Calculated value based on VTA1
THROTTLE POS	Throttle position: Min.: 0%, Max.: 100%	0%: Accelerator pedal released 64 to 96%: Accelerator pedal fully depressed	Recognition valve for throttle opening angle on ECM
SPD (NC)	Min.: 0 rpm, Max.: 12,750 rpm	-	-
SPD (NT)	Input turbine speed/ display: 50 r/min	HINT: - Lock-up ON (After warming up the engine): Input turbine speed (NT) equal to the engine speed. - Lock-up OFF (Idling at N position): Input turbine speed (NT) nearly equal to the engine speed.	-
CTP SW	Closed throttle position switch: ON or OFF	- ON: Throttle fully closed - OFF: Throttle open	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP switch status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-177.
STOP LIGHT SW	Stop light switch status/ ON or OFF	- Brake pedal is depressed: ON - Brake pedal is released: OFF	-
BATTERY VOLTAGE	Battery voltage: Min.: 0, Max.: 65.535 V	9 to 14 V: Idling	-
TC/TE1	TC and TE1 terminals of DLC3: ON or OFF	-	Active Test support data
FC IDL	Fuel cut idle: ON or OFF	ON: Fuel cut operating	FC IDL= "ON" when throttle valve fully closed and engine speed over 2,800 rpm
FC TAU	Fuel cut TAU (Fuel cut during very light load):	ON: Fuel cut operating	Fuel cut being performed under very light load to prevent engine combustion from becoming incomplete
SHIFT	ECM gear shift command/ 1st, 2nd, 3rd, 4th, 5th or 6th	Shift lever position is; - D: 1st, 2nd, 3rd, 4th, 5th or 6th - S: 1st, 2nd, 3rd, 4th, 5th or 6th	-
REVERSE	PNP switch status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-170.
PARKING	PNP switch status/ ON or OFF	Shift lever position is; P: ON Except P: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-170.
NEUTRAL	PNP switch status/ ON or OFF	Shift lever position is; N: ON Except N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-170.
DRIVE	PNP switch status/ ON or OFF	Shift lever position is; D and S: ON Except D and S: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-170.

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPORTS UP SW	Sport shift up switch status/ ON or OFF	- Press continuously "+" (Up shift): ON - Release "+" (Up shift): OFF	-
SPORTS DOWN SW	Sport shift down switch status/ ON or OFF	- Press continuously "-" (Down shift): ON - Release "-" (Down shift): OFF	-
MODE SELECT SW	Sport mode select switch status/ ON or OFF	Shift lever position is; S, "+" and "-": ON Except S, "+" and "-": OFF	-
TPS 1 SW	0: OFF / 1: ON	Gear position 1st, 2nd, 3rd or 4th: ON Gear position 5th or 6th: OFF	-
TPS 2 SW	0: OFF / 1: ON	Gear position 4th, 5th or 6th: ON Gear position 1st, 2nd or 3rd: OFF	-
TPS 3 SW	0: OFF / 1: ON	Shift solenoid valve SLU is ON: ON Shift solenoid valve SLU is OFF: OFF	-
A/T OIL TEMP 1	ATF temp. sensor value/ min.: -40°C (-40°F) max.: 215°C (419°F)	- After stall test; Approx. 80°C (176°F) - Equal to ambient temperature when cold soak	If the value is "-40°C (-40°F)" or "215°C (419°F)", ATF temp. sensor circuit is open or shorted.
NT SENS VOL	Min.: 0 V, Max.: 5 V	0.1 to 1.9 V	-
NC SENS VOL	Min.: 0 V, Max.: 5 V	0.1 to 1.9 V	-
ATF	0: OFF / 1: ON		-
LOCK UP	0: OFF / 1: ON	Lock up: ON	-
LOCK UP SOL	Lock up solenoid status/ ON or OFF	- Lock up: ON - Except lock up: OFF	-
SOLENOID (SLU)	Shift solenoid SLU status/ ON or OFF	- Lock up: ON - Except lock up: OFF	-
SOLENOID (SLT)	Shift solenoid SLT status/ ON or OFF	- Accelerator pedal is depressed: OFF - Accelerator pedal is released: ON	-
INTAKE AIR TEMP	Intake air temperature Min.: -40°C (-40°F), Max.: 215°C (419°F)	Equivalent to ambient air temperature	- If value is -40°C (-40°F): sensor circuit open - If value is 215°C (419°F): sensor circuit shorted
THROTTLE POS	Whether throttle position sensor detecting idle: ON or OFF	ON: Idling	-
ACCEL POS	Min.: 0%, Max.: 100%		-
#CODES	# of codes: Min.: 0, Max.: 255	-	Number of detected DTCs
CHECK MODE	Check mode: 0: OFF, 1: ON	ON: Check mode ON	-
SPD TEST	Check mode result for vehicle speed sensor: 0: COMPL, 1: INCMPL	-	-
MIL	MIL status: ON or OFF	ON: MIL ON	-
MIL ON RUN DIST	MIL ON run distance: Min.: 0 mile (65,535 km), Max.: 110,950 mile (178,552 km)	Distance after DTC detected	-
MIL ON RUN TIME	Running time from MIL ON: Min.: 0 minute, Max.: 65,535 minutes	Equivalent to running time after MIL ON	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ENG RUN TIME	Engine run time: Min.: 0 second, Max.: 65,535 seconds	Time after engine start	-
TIME DTC CLEAR	Time after DTC cleared: Min.: 0 minute, Max.: 65,535 minutes	Equivalent to time after DTCs erased	-
DIST DTC CLEAR	Distance after DTC cleared: Min.: 0 km/h, Max.: 65,535 km/h	Equivalent to time after DTCs erased	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared: Min.: 0, Max.: 255	-	Number of warm-up cycles after DTC cleared
OBD CERT	OBD requirement	OBD2	-
COMP ON	Comprehensive component monitor 0: NOT AVL, 1: AVAIL	-	Comprehensive component monitor
CCM ENA	Comprehensive component monitor UNABLE or ENABLE	-	-
CCM CMPL	Comprehensive component monitor COMPL or INCMPL	-	-
FUEL ENA	Fuel system monitor UNABLE or ENABLE	-	-
FUEL CMPL	Fuel system monitor COMPL or INCMPL	-	-
MISFIRE ENA	Misfire monitor UNABLE or ENABLE	-	-
MISFIRE CMPL	Misfire monitor COMPL or INCMPL	-	-
HTR ENA	O2S (A/FS) heater monitor UNABLE or ENABLE	-	-
HTR CMPL	O2S (A/FS) heater monitor COMPL or INCMPL	-	-
O2S(A/FS) ENA	O2S (A/FS) monitor UNABLE or ENABLE	-	-
O2S(A/FS) CMPL	O2S (A/FS) monitor COMPL or INCMPL	-	-
EVAP ENA	EVAP monitor UNABLE or ENABLE	-	-
EVAP CMPL	EVAP monitor COMPL or INCMPL	-	-
CAT ENA	Catalyst monitor: UNABLE or ENABLE	-	-
CAT CMPL	Catalyst monitor COMPL or INCMPL	-	-
TRANSMISSION	Transmission type	-	Identifying transmission type: 6 speed
SYSTEM	System identification	-	Identifying engine type: GASOLINE (gasoline engine)

AX

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

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

- (a) Warm up the engine.
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- (d) Turn the engine switch on (IG).
- (e) Turn the intelligent tester on.
- (f) Enter the following items: "DIAGNOSIS / OBD / MOBD / ECT / ACTIVE TEST".
- (g) According to the display on tester, perform "ACTIVE TEST".

Tester Display	Test Part	Control Range	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] IDL: ON	[Shift Position] 0001: 1st 0010: 2nd 0011: 3rd 0100: 4th 0101: 5th 0110: 6th	Possible to check the operation of the shift solenoid valves. Upshifts and downshifts should be performed consecutively. A 10-second interval is required between gear changes. Do not downshift at high speeds. Doing so will damage the automatic transaxle.
LOCK UP	[Test Details] Control the shift solenoid SLU to set the automatic transaxle to the lock-up condition. [Vehicle Condition] - Throttle valve opening angle: Less than 35% - Vehicle speed: 37 mph (60 km/h) or more, and 6th gear	[Lock-up] 0: OFF 1: ON	Possible to check the SLU solenoid operation.
SOLENOID (SL1)	[Test Details] Operate the shift solenoid SL1 [Vehicle Condition] - Vehicle Stopped - Shift lever in P or N position	[Solenoid (SL1)] 0: OFF 1: ON	-
SOLENOID (SL2)	[Test Details] Operate the shift solenoid SL2 [Vehicle Condition] - Vehicle Stopped - Shift lever in P or N position	[Solenoid (SL2)] 0: OFF 1: ON	-
SOLENOID (SL3)	[Test Details] Operate the shift solenoid SL3 [Vehicle Condition] - Vehicle Stopped - Shift lever in P or N position	[Solenoid (SL3)] 0: OFF 1: ON	-
SOLENOID (SL4)	[Test Details] Operate the shift solenoid SL4 [Vehicle Condition] - Vehicle Stopped - Shift lever in P or N position	[Solenoid (SL4)] 0: OFF 1: ON	-
SOLENOID (SL)	[Test Details] Operate the shift solenoid SL [Vehicle Condition] - Vehicle Stopped - Shift lever in P or N position	[Solenoid (SL)] 0: OFF 1: ON	-

Tester Display	Test Part	Control Range	Diagnostic Note
SOLENOID (SLT)	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] - Vehicle Stopped - IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLT)" is performed, the ECM commands the SLT solenoid to turn off). ON: No action (normal operation)	[Solenoid (SLT)] 0: OFF 1: ON	-
SOLENOID (SLU)	[Test Details] Operate the shift solenoid SLU and raise the line pressure. [Vehicle Condition] - Vehicle Stopped - IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLU)" is performed, the ECM commands the SLU solenoid to turn off). ON: No action (normal operation)	[Solenoid (SLU)] 0: OFF 1: ON	-

*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check the line pressure changes by connecting the SST to the automatic transaxle. The same SST is used for the HYDRAULIC TEST (See page [AX-16](#)) as well.

HINT:

The pressure values in ACTIVE TEST and HYDRAULIC TEST will be different from each other.

FAIL-SAFE CHART

1. Fail-safe

This function minimizes the loss of operation when any abnormality occurs in a sensor or solenoid.

Fail-safe Control List

Malfunction Part	Function
Input Turbine Speed Sensor	Shifting to only either the 1st or 3rd gear is allowed.
Counter Gear Speed Sensor	- The counter gear speed is determined based on the signals from the skid control ECU (speed sensor signals). - Shifting between 1st to 4th gears is allowed.
ATF Temp. Sensor	Shifting between 1st to 4th gears is allowed.
ECT ECU Power Supply (Voltage is Low)	When the vehicle is being driven in 6th gear, the transaxle is fixed in 6th gear. When being driven in any of the 1st to 5th gears, the transaxle is fixed in 5th gear.
CAN Communication	Shifting to only either 1st or 3rd gear is allowed.
Knock Sensor	Shifting between 1st to 4th gear is allowed.
Solenoid Valve SL1, SL2, SL3 and SL4	The current to the failed solenoid valve is cut off and operating the other solenoid valves with normal operation performs shift control. (Shift controls in fail-safe mode are described in the table on the next page. For details, refer to Fail-Safe Control Chart)

Solenoid Valve Operation when Normal:

Gear Position		1st	2nd	3rd	4th	5th	6th
Solenoid	SL1	ON	ON	ON	ON	OFF	OFF
	SL2	OFF	OFF	OFF	ON	ON	ON
	SL3	OFF	ON	OFF	OFF	OFF	ON
	SL4	OFF	OFF	ON	OFF	ON	OFF

Fail-safe Control Chart:

	Gear Position in Normal Operation	1st	2nd	3rd	4th	5th	6th
SL1	ON Malfunction (without Fail-safe Control) *1	1st	2nd	3rd	4th	4th	4th
	OFF Malfunction (without Fail-safe Control)	1st to N	2nd to N	3rd to N	4th to N	5th	6th
	Fail-safe Control during OFF Malfunction	Fixed in 3rd or 5th					
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 3rd or 5th					
SL2	ON Malfunction (without Fail-safe Control) *1	1st to 4th	2nd to 4th	3rd to 4th	4th	5th	6th
	OFF Malfunction (without Fail-safe Control)	1st	2nd	3rd	4th to 1st	5th to N	6th to N
	Fail-safe Control during OFF malfunction	1st	2nd	3rd	3rd	3rd	3rd
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 2nd or 3rd					
SL3	ON Malfunction (without Fail-safe Control) *1	1st to 2nd	2nd	3rd	4th	5th	6th
	OFF Malfunction (without Fail-safe Control)	1st	2nd to 1st	3rd	4th	5th	6th to N
	Fail-safe Control during OFF malfunction	1st	3rd	3rd	4th	5th	5th
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 3rd					

	Gear Position in Normal Operation	1st	2nd	3rd	4th	5th	6th
SL4	ON Malfunction (without Fail-safe Control) ^{*1}	3rd	3rd	3rd	4th	5th	5th
	OFF Malfunction (without Fail-safe Control)	1st	2nd	3rd to 1st	4th	5th to N	6th
	Fail-safe Control during OFF malfunction	1st ^{*2}	2nd ^{*2}	4th ^{*2}	4th ^{*2}	6th	6th
	Fail-safe Control during OFF Malfunction (ATF Pressure Switches 1 and 2 Malfunctions)	Fixed in 2nd					

^{*1}: Fail-safe control is not actuated when the ON malfunction occurs.

^{*2}: Shifting to 5th and 6th gears is prohibited.

DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the DATA LIST using the intelligent tester allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save labor time.

NOTICE:

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

- (a) Warm up the engine.
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- (d) Turn the engine switch on (IG).
- (e) Turn the tester on.
- (f) Enter the following menus: "DIAGNOSIS / OBD/ MOBD / ECT / DATA LIST".
- (g) According to the display on the tester, read "DATA LIST".

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
CALC LOAD	Calculated load by ECM: Min.: 0%, Max.: 100%	15.0 to 35.0%: Idling 10.0 to 30.0%: Running without load (2,000 rpm)	-
ENGINE SPD	Engine speed: Min.: 0 rpm, Max.: 16,383.75 rpm	550 to 800 rpm: Idling	-
VEHICLE SPD	Vehicle speed: Min.: 0 km/h, Max.: 255 km/h	Actual vehicle load	-
COOLANT TEMP	Engine coolant temperature: Min.: -40°C (-40°F), Max.: 140°C (284°F)	80 to 105°C (176 to 221°F): After warming up	- If value is -40°C (-40°F): sensor circuit open - If value is 140°C (284°F): sensor circuit shorted
THROTTLE POS	Throttle position: Min.: 0%, Max.: 100%	10 to 22%: Idling	Calculated value based on VTA1
THROTTLE POS	Throttle position: Min.: 0%, Max.: 100%	0%: Accelerator pedal released 64 to 96%: Accelerator pedal fully depressed	Recognition valve for throttle opening angle on ECM
SPD (NC)	Min.: 0 rpm, Max.: 12,750 rpm	-	-
SPD (NT)	Input turbine speed/ display: 50 r/min	HINT: - Lock-up ON (After warming up the engine): Input turbine speed (NT) equal to the engine speed. - Lock-up OFF (Idling at N position): Input turbine speed (NT) nearly equal to the engine speed.	-
CTP SW	Closed throttle position switch: ON or OFF	- ON: Throttle fully closed - OFF: Throttle open	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP switch status/ ON or OFF	Shift lever position is; P and N: ON Except P and N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-177.
STOP LIGHT SW	Stop light switch status/ ON or OFF	- Brake pedal is depressed: ON - Brake pedal is released: OFF	-
BATTERY VOLTAGE	Battery voltage: Min.: 0, Max.: 65.535 V	9 to 14 V: Idling	-
TC/TE1	TC and TE1 terminals of DLC3: ON or OFF	-	Active Test support data
FC IDL	Fuel cut idle: ON or OFF	ON: Fuel cut operating	FC IDL= "ON" when throttle valve fully closed and engine speed over 2,800 rpm
FC TAU	Fuel cut TAU (Fuel cut during very light load):	ON: Fuel cut operating	Fuel cut being performed under very light load to prevent engine combustion from becoming incomplete
SHIFT	ECM gear shift command/ 1st, 2nd, 3rd, 4th, 5th or 6th	Shift lever position is; - D: 1st, 2nd, 3rd, 4th, 5th or 6th - S: 1st, 2nd, 3rd, 4th, 5th or 6th	-
REVERSE	PNP switch status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-170.
PARKING	PNP switch status/ ON or OFF	Shift lever position is; P: ON Except P: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-170.
NEUTRAL	PNP switch status/ ON or OFF	Shift lever position is; N: ON Except N: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-170.
DRIVE	PNP switch status/ ON or OFF	Shift lever position is; D and S: ON Except D and S: OFF	When the shift lever position displayed on the intelligent tester differs from the actual position, adjustment of the PNP switch or the shift cable may be incorrect. HINT: When the failure still occurs even after adjusting these parts, see page AX-170.

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
SPORTS UP SW	Sport shift up switch status/ ON or OFF	- Press continuously "+" (Up shift): ON - Release "+" (Up shift): OFF	-
SPORTS DOWN SW	Sport shift down switch status/ ON or OFF	- Press continuously "-" (Down shift): ON - Release "-" (Down shift): OFF	-
MODE SELECT SW	Sport mode select switch status/ ON or OFF	Shift lever position is; S, "+" and "-": ON Except S, "+" and "-": OFF	-
TPS 1 SW	0: OFF / 1: ON	Gear position 1st, 2nd, 3rd or 4th: ON Gear position 5th or 6th: OFF	-
TPS 2 SW	0: OFF / 1: ON	Gear position 4th, 5th or 6th: ON Gear position 1st, 2nd or 3rd: OFF	-
TPS 3 SW	0: OFF / 1: ON	Shift solenoid valve SLU is ON: ON Shift solenoid valve SLU is OFF: OFF	-
A/T OIL TEMP 1	ATF temp. sensor value/ min.: -40°C (-40°F) max.: 215°C (419°F)	- After stall test; Approx. 80°C (176°F) - Equal to ambient temperature when cold soak	If the value is "-40°C (-40°F)" or "215°C (419°F)", ATF temp. sensor circuit is open or shorted.
NT SENS VOL	Min.: 0 V, Max.: 5 V	0.1 to 1.9 V	-
NC SENS VOL	Min.: 0 V, Max.: 5 V	0.1 to 1.9 V	-
ATF	0: OFF / 1: ON		-
LOCK UP	0: OFF / 1: ON	Lock up: ON	-
LOCK UP SOL	Lock up solenoid status/ ON or OFF	- Lock up: ON - Except lock up: OFF	-
SOLENOID (SLU)	Shift solenoid SLU status/ ON or OFF	- Lock up: ON - Except lock up: OFF	-
SOLENOID (SLT)	Shift solenoid SLT status/ ON or OFF	- Accelerator pedal is depressed: OFF - Accelerator pedal is released: ON	-
INTAKE AIR TEMP	Intake air temperature Min.: -40°C (-40°F), Max.: 215°C (419°F)	Equivalent to ambient air temperature	- If value is -40°C (-40°F): sensor circuit open - If value is 215°C (419°F): sensor circuit shorted
THROTTLE POS	Whether throttle position sensor detecting idle: ON or OFF	ON: Idling	-
ACCEL POS	Min.: 0%, Max.: 100%		-
#CODES	# of codes: Min.: 0, Max.: 255	-	Number of detected DTCs
CHECK MODE	Check mode: 0: OFF, 1: ON	ON: Check mode ON	-
SPD TEST	Check mode result for vehicle speed sensor: 0: COMPL, 1: INCMPL	-	-
MIL	MIL status: ON or OFF	ON: MIL ON	-
MIL ON RUN DIST	MIL ON run distance: Min.: 0 mile (65,535 km), Max.: 110,950 mile (178,552 km)	Distance after DTC detected	-
MIL ON RUN TIME	Running time from MIL ON: Min.: 0 minute, Max.: 65,535 minutes	Equivalent to running time after MIL ON	-

Tester Display	Measurement Item/Range	Normal Condition	Diagnostic Note
ENG RUN TIME	Engine run time: Min.: 0 second, Max.: 65,535 seconds	Time after engine start	-
TIME DTC CLEAR	Time after DTC cleared: Min.: 0 minute, Max.: 65,535 minutes	Equivalent to time after DTCs erased	-
DIST DTC CLEAR	Distance after DTC cleared: Min.: 0 km/h, Max.: 65,535 km/h	Equivalent to time after DTCs erased	-
WU CYC DTC CLEAR	Warm-up cycle after DTC cleared: Min.: 0, Max.: 255	-	Number of warm-up cycles after DTC cleared
OBD CERT	OBD requirement	OBD2	-
COMP ON	Comprehensive component monitor 0: NOT AVL, 1: AVAIL	-	Comprehensive component monitor
CCM ENA	Comprehensive component monitor UNABLE or ENABLE	-	-
CCM CMPL	Comprehensive component monitor COMPL or INCMPL	-	-
FUEL ENA	Fuel system monitor UNABLE or ENABLE	-	-
FUEL CMPL	Fuel system monitor COMPL or INCMPL	-	-
MISFIRE ENA	Misfire monitor UNABLE or ENABLE	-	-
MISFIRE CMPL	Misfire monitor COMPL or INCMPL	-	-
HTR ENA	O2S (A/FS) heater monitor UNABLE or ENABLE	-	-
HTR CMPL	O2S (A/FS) heater monitor COMPL or INCMPL	-	-
O2S(A/FS) ENA	O2S (A/FS) monitor UNABLE or ENABLE	-	-
O2S(A/FS) CMPL	O2S (A/FS) monitor COMPL or INCMPL	-	-
EVAP ENA	EVAP monitor UNABLE or ENABLE	-	-
EVAP CMPL	EVAP monitor COMPL or INCMPL	-	-
CAT ENA	Catalyst monitor: UNABLE or ENABLE	-	-
CAT CMPL	Catalyst monitor COMPL or INCMPL	-	-
TRANSMISSION	Transmission type	-	Identifying transmission type: 6 speed
SYSTEM	System identification	-	Identifying engine type: GASOLINE (gasoline engine)

AX

2. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the intelligent tester allows relays, VSVs, actuators and other items to be operated without removing any parts. Performing the ACTIVE TEST as the first step in troubleshooting is one method to save labor time.

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

- (a) Warm up the engine.
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester together with the CAN VIM (Controller Area Network Vehicle Interface Module) to the DLC3.
- (d) Turn the engine switch on (IG).
- (e) Turn the intelligent tester on.
- (f) Enter the following items: "DIAGNOSIS / OBD / MOBD / ECT / ACTIVE TEST".
- (g) According to the display on tester, perform "ACTIVE TEST".

Tester Display	Test Part	Control Range	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set each shift position by yourself. [Vehicle Condition] IDL: ON	[Shift Position] 0001: 1st 0010: 2nd 0011: 3rd 0100: 4th 0101: 5th 0110: 6th	Possible to check the operation of the shift solenoid valves. Upshifts and downshifts should be performed consecutively. A 10-second interval is required between gear changes. Do not downshift at high speeds. Doing so will damage the automatic transaxle.
LOCK UP	[Test Details] Control the shift solenoid SLU to set the automatic transaxle to the lock-up condition. [Vehicle Condition] - Throttle valve opening angle: Less than 35% - Vehicle speed: 37 mph (60 km/h) or more, and 6th gear	[Lock-up] 0: OFF 1: ON	Possible to check the SLU solenoid operation.
SOLENOID (SL1)	[Test Details] Operate the shift solenoid SL1 [Vehicle Condition] - Vehicle Stopped - Shift lever in P or N position	[Solenoid (SL1)] 0: OFF 1: ON	-
SOLENOID (SL2)	[Test Details] Operate the shift solenoid SL2 [Vehicle Condition] - Vehicle Stopped - Shift lever in P or N position	[Solenoid (SL2)] 0: OFF 1: ON	-
SOLENOID (SL3)	[Test Details] Operate the shift solenoid SL3 [Vehicle Condition] - Vehicle Stopped - Shift lever in P or N position	[Solenoid (SL3)] 0: OFF 1: ON	-
SOLENOID (SL4)	[Test Details] Operate the shift solenoid SL4 [Vehicle Condition] - Vehicle Stopped - Shift lever in P or N position	[Solenoid (SL4)] 0: OFF 1: ON	-
SOLENOID (SL)	[Test Details] Operate the shift solenoid SL [Vehicle Condition] - Vehicle Stopped - Shift lever in P or N position	[Solenoid (SL)] 0: OFF 1: ON	-

Tester Display	Test Part	Control Range	Diagnostic Note
SOLENOID (SLT)	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] - Vehicle Stopped - IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLT)" is performed, the ECM commands the SLT solenoid to turn off). ON: No action (normal operation)	[Solenoid (SLT)] 0: OFF 1: ON	-
SOLENOID (SLU)	[Test Details] Operate the shift solenoid SLU and raise the line pressure. [Vehicle Condition] - Vehicle Stopped - IDL: ON HINT: OFF: Line pressure up (When the active test of "SOLENOID (SLU)" is performed, the ECM commands the SLU solenoid to turn off). ON: No action (normal operation)	[Solenoid (SLU)] 0: OFF 1: ON	-

*: "SOLENOID (SLT)" in the ACTIVE TEST is performed to check the line pressure changes by connecting the SST to the automatic transaxle. The same SST is used for the HYDRAULIC TEST (See page [AX-16](#)) as well.

HINT:

The pressure values in ACTIVE TEST and HYDRAULIC TEST will be different from each other.

7. CHECK MIL

- (a) 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 (See page [ES-465](#)).
- (b) When the engine is started, the MIL should turn off.

DTC CHECK / CLEAR

1. CHECK DTC

- (a) DTCs which are stored in the TCM can be displayed with the intelligent tester.
These scan tools can display pending DTCs and current DTCs. Some DTCs are not stored if the TCM doesn't detect a malfunction during consecutive driving. However, the malfunction detected while a driving is stored as a pending DTC.
- (1) Connect the intelligent tester to the Controller Area Network Vehicle Interface Module (CAN VIM). Then connect the CAN VIM to the Data Link Connector 3 (DLC3).
- (2) Turn the engine switch on (IG).
- (3) Enter the following menus: DIAGNOSIS / OBD / MOBD / ECT / DTC INFO / CURRENT CODES (or PENDING CODE).
- (4) Confirm the DTCs and freeze frame data and then write them down.
- (5) Confirm the details of the DTCs (See page [AX-45](#)).

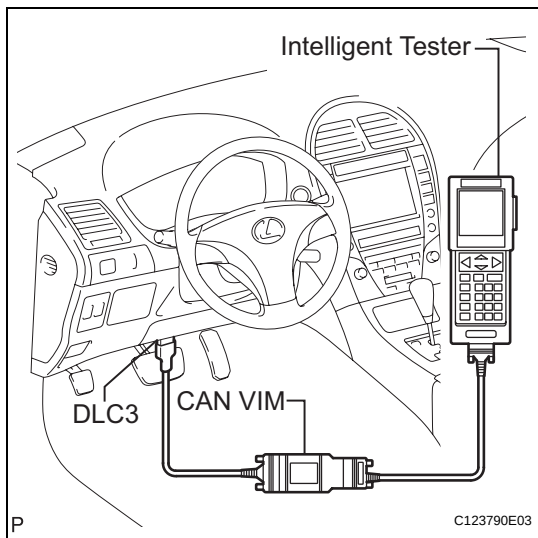
NOTICE:

When a symptom has been duplicated using normal mode, use the intelligent tester to check for DTCs. For DTCs that are subject to "2-trip detection logic", perform the following steps:

Turn the engine switch OFF after the symptom has occurred once. Repeat the process of attempting to duplicate the symptom. When the problem or symptom happens for the second time and a DTC has been recorded, the MIL will illuminate, and the code will be stored.

2. CLEAR DTC

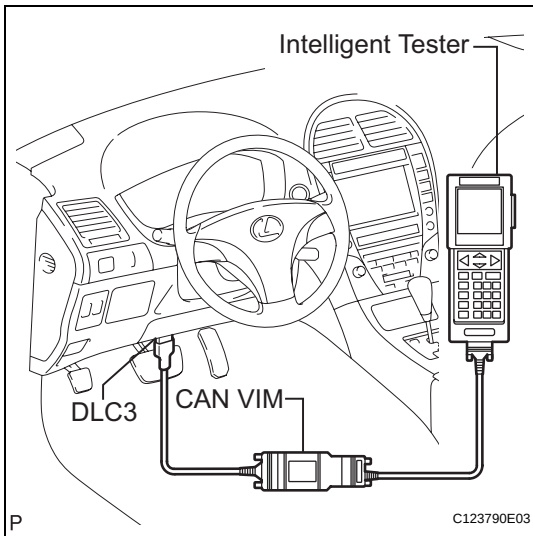
- (a) Connect the intelligent tester to the CAN VIM. Then connect the CAN VIM to the DLC3.
- (b) Turn the engine switch on (IG).
- (c) Enter the following menus: DIAGNOSIS / OBD / MOBD / ECT / DTC INFO / CLEAR CODES and press YES.



CHECK MODE PROCEDURE

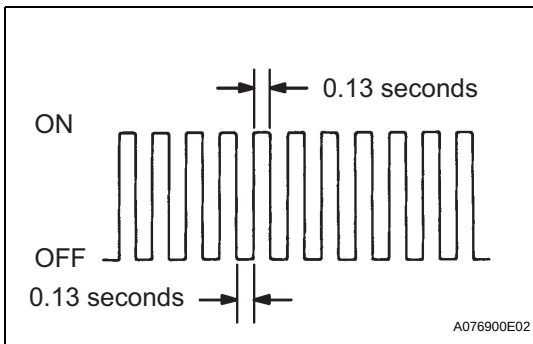
1. DESCRIPTION

- (a) Check mode has a higher sensitivity to malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect. In check mode, DTCs are detected with 1-trip detection logic.



2. CHECK MODE PROCEDURE

- (a) Make sure that the items below are satisfied:
- (1) Battery positive voltage is 11 V or more
 - (2) Throttle valve is fully closed
 - (3) Transaxle is in the P or N position
 - (4) A/C is switched OFF
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester together with the Controller Area Network Vehicle Interface Module (CAN VIM) to the DLC3.
- (d) Turn the engine switch on (IG).
- (e) Enter the following menus: DIAGNOSIS / OBD/ MOBD / ECT / CHECK MODE.
- (f) Change the TCM to check mode. Make sure that the MIL flashes as shown in the illustration.
- NOTICE:**
All DTCs and freeze frame data recorded will be erased if: 1) the intelligent tester is used to change the TCM from normal mode to check mode or vice-versa; or 2) during check mode, the engine switch is turned from on (IG) to on (ACC) or off.
Before entering check mode, make notes of any DTCs and freeze frame data that are present.
- (g) Start the engine. The MIL should turn off after the engine starts.
- (h) Perform "MONITOR DRIVE PATTERN" for the ECT test (See page [AX-26](#)).
 (Or, duplicate the conditions of the malfunction described by the customer.)
- (i) After duplicating the malfunction conditions, use the intelligent tester diagnosis selector to check the DTC and freeze frame data.



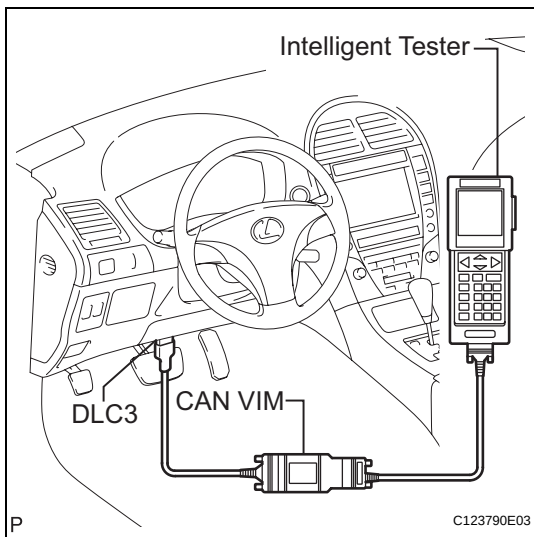
DIAGNOSIS SYSTEM

1. DESCRIPTION

- (a) When troubleshooting On-Board Diagnostic (OBD II) vehicles, the vehicle must be connected to the OBD II scan tool (complying with SAE J1987). Various data output from the vehicle's TCM can be read then.
- (b) OBD II 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 SAE J2012 are recorded in the TCM memory.

If the malfunction does not reoccur in 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the TCM memory.
- (c) To check DTCs, connect the intelligent tester to the Data Link Connector 3 (DLC3) of the vehicle. The intelligent tester displays DTCs, the freeze frame data and a variety of the engine data. The DTCs and freeze frame data can be erased with the intelligent tester (See page [AX-37](#)).



2. NORMAL MODE AND CHECK MODE

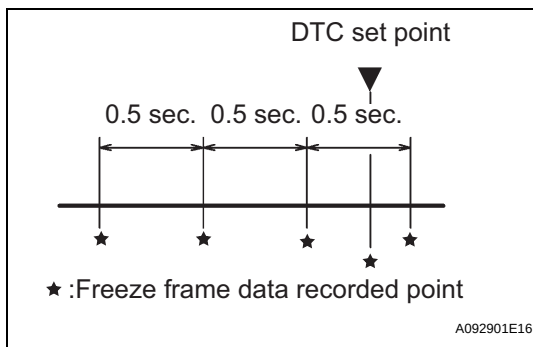
- (a) The diagnosis system operates in "normal mode" during normal vehicle use. In normal mode, "2 trip detection logic" is used to ensure accurate detection of malfunctions. "Check mode" is also available to technicians as an option. In check mode, "1 trip detection logic" is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent malfunctions.

3. 2 TRIP DETECTION LOGIC

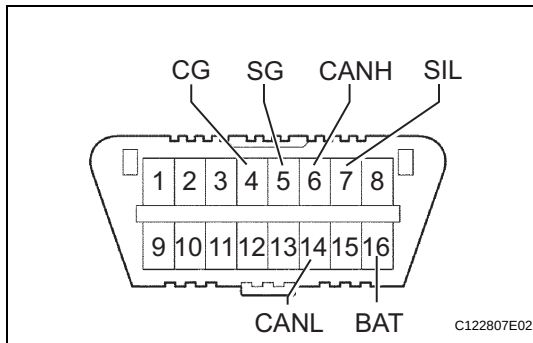
- (a) When a malfunction is first detected, the malfunction is temporarily stored in the TCM memory (1st trip). If the engine switch is turned off and then on (IG) again, and the same malfunction is detected again, the MIL will illuminate.

4. FREEZE FRAME DATA

- (a) The TCM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air/fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.



- (b) The intelligent tester displays freeze frame data recorded at five different points: 1) 3 points before the DTC is set, 2) once when the DTC is set, and 3) once after the DTC is set. The data can be used to simulate the vehicle's condition around the time of the malfunction. The data may be helpful in determining the cause of a malfunction. It may also be helpful in determining whether a DTC is being caused by a temporary malfunction.



5. DLC3 (Data Link Connector 3)

- (a) The vehicle's TCM uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

HINT:

Connect the cable of the intelligent tester to the DLC3, turn the engine switch on (IG) and attempt to use the intelligent tester. If the screen displays a communication error message, a problem exists in the vehicle side or the tester side.

If the communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.

If the communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

Symbols (Terminal No.)	Terminal Description	Condition	Specified Condition
SIL (7) - SG (5)	Bus "+" line	During transmission	Pulse generation
CG (4) - Body ground	Chassis ground	Always	Below 1 Ω
SG (5) - Body ground	Signal ground	Always	Below 1 Ω
BAT (16) - Body ground	Battery positive	Always	11 to 14 V
CANH (6) - CANL (14)	CAN bus line	Engine switch off*	54 to 69 Ω
CANH (6) - CG (4)	HIGH-level CAN bus line	Engine switch off*	200 k Ω or higher
CANL (14) - CG (4)	LOW-level CAN bus line	Engine switch off*	200 k Ω or higher
CANH (6) - BAT (16)	HIGH-level CAN bus line	Engine switch off*	6 k Ω or higher
CANL (14) - BAT (16)	LOW-level CAN bus line	Engine switch off*	6 k Ω or higher

NOTICE:

*: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the engine switch, any other switches or the doors.

6. CHECK BATTERY VOLTAGE

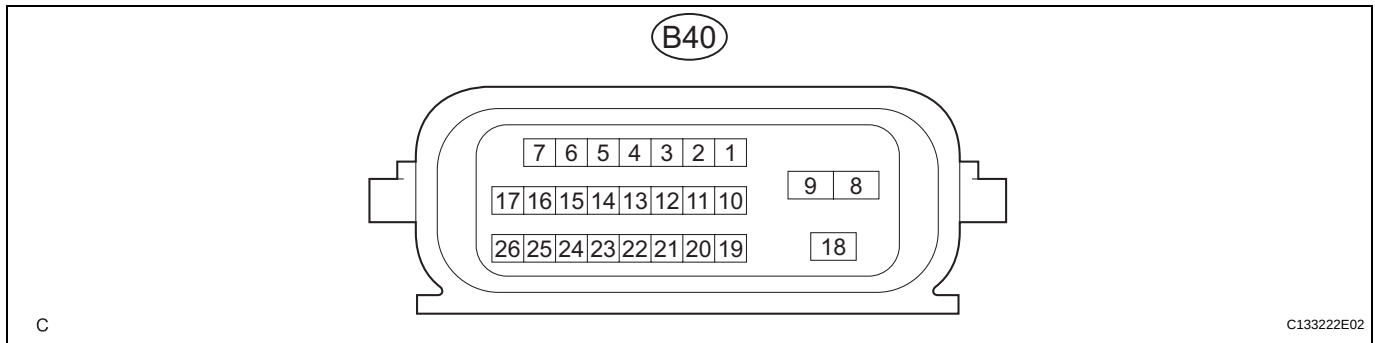
Battery voltage:

11 to 14 V

- (a) If the voltage is below 11 V, replace or recharge the battery before proceeding.

TERMINALS OF ECU

1. TCM



HINT:

Each TCM terminal's standard voltage is shown in the table below.

In the table, first follow the information under "Condition". Look under "Symbols (Terminals No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition". Use the illustration above as a reference for the TCM terminals.

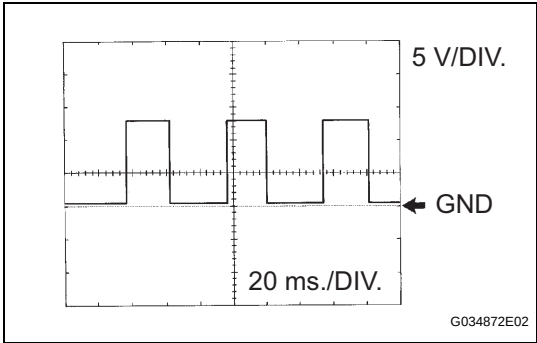
Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
R (B40-15) - E1 (B40-8)	W - B-W	R shift position switch signal	Engine switch on (IG) and shift lever in R position	10 to 14 V
			Engine switch on (IG) and shift lever in any position except R position	Below 1 V
D (B40-16) - E1 (B40-8)	R - B-W	D shift position switch signal	Engine switch on (IG) and shift lever in D or 3 position	10 to 14 V
			Engine switch on (IG) and shift lever in any position except D and 3 position	Below 1 V
STP (B40-12) - E1 (B40-8)	B - B-W	Stop light switch signal	Brake pedal is depressed	7.5 to 14 V
			Brake pedal is released	Below 1.5 V
NSW (B40-11) - E1 (B40-8)	L - B-W	Park/neutral switch signal	Engine switch on (IG) and shift lever in P or N position	Below 1 V
			Engine switch on (IG) and shift lever in any position except P or N position	Below 3 V
STA (B40-10) - E1 (B40-8)	Y - B-W	Starter signal	Cranking (shift lever position in P or N position, engine switch START)	10 to 14 V
			Engine switch on (IG) and shift lever in any position except P or N position	Below 2 V
SPD1 (B40-3) - E1 (B40-8)	BR - B-W	Speed signal from combination meter	Vehicle speed 12 mph (20 km/h)	Pulse generation (See waveform 1)
BATT (B40-1) - E1 (B40-8)	W-L - B-W	Battery (for measuring battery voltage and for TCM memory)	Always	9 to 14 V
IG2 (B40-13) - E1 (B40-8)	L-B - B-W	Engine switch	Engine switch on (IG)	9 to 14 V
+B (B40-18) - E1 (B40-8)	W - B-W	Power source of TCM	Engine switch on (IG)	9 to 14 V
CAN+ (B40-6) - E1 (B40-8)	B - B-W	CAN communication line	Engine switch on (IG)	Pulse generation (See waveform 2)

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
CAN- (B40-7) - E1 (B40-8)	Y - B-W	CAN communication line	Engine switch on (IG)	Pulse generation (See waveform 3)

(a) Waveform 1

Reference:

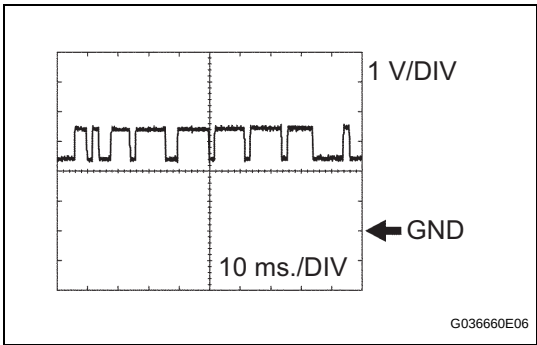
Terminal	SPD1 - E1
Tool setting	2 V/DIV., 20 ms./DIV.
Vehicle condition	Vehicle speed 12 mph (20 km/h)



(b) Waveform 2

Reference:

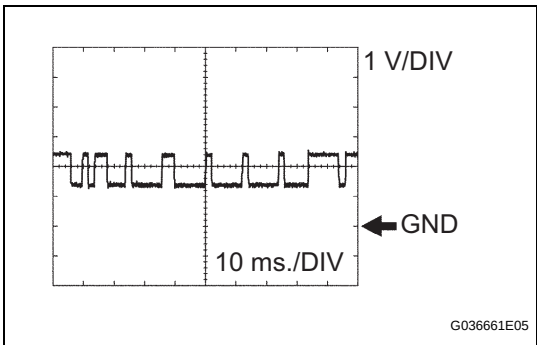
Terminal	CAN+ - E1
Tool setting	1 V/DIV., 10 ms./DIV.
Vehicle condition	Engine is stopped, engine switch ON (IG)



(c) Waveform 3

Reference:

Terminal	CAN- - E1
Tool setting	1 V/DIV., 10 ms./DIV.
Vehicle condition	Engine is stopped, engine switch ON (IG)



2. ECM

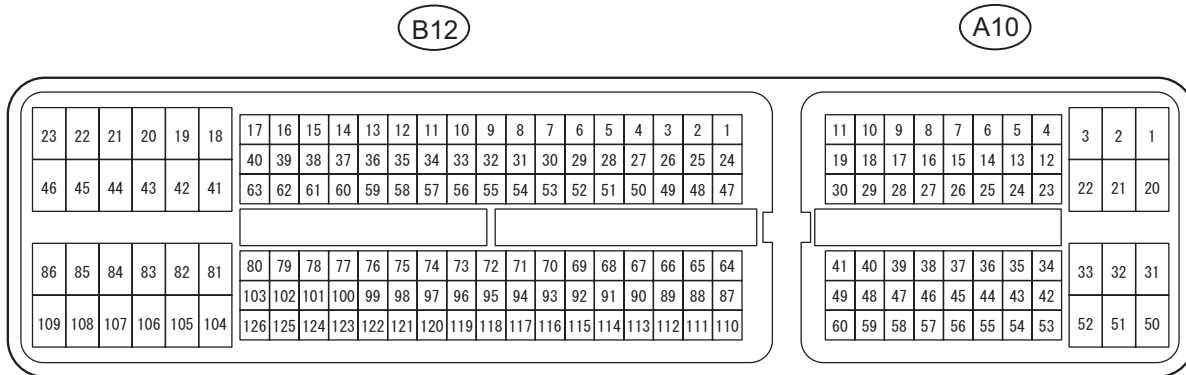
HINT:

Each ECM terminal's standard voltage is shown in the table below.

In the table, first follow the information under "Condition". Look under "Symbols (Terminals No.)" for the terminals to be inspected. The standard voltage between the terminals is shown under "Specified Condition".

Use the illustration below as a reference for the ECM terminals.

ECM:



A107881E56

Symbols (Terminals No.)	Wiring Color	Terminal Description	Condition	Specified Condition
S (A10-25) - E1 (B12-81)	Y - W-B	S shift position switch signal	Engine switch on (IG) and shift lever in S position	10 to 14 V
			Engine switch on (IG) and shift lever in any position except S position	Below 1 V
SFTU (A10-16) - E1 (B12-81)	R - W-B	Up shift switch signal	Engine switch on (IG) and shift lever in S position	10 to 14 V
			Engine switch on (IG) and shift lever in "+" position (Up shift)	Below 1 V
SFTD (A10-51) - E1 (B12-81)	L - W-B	Down shift switch signal	Engine switch on (IG) and shift lever in S position	10 to 14 V
			Engine switch on (IG) and shift lever in "-" position (Down shift)	Below 1 V

PROBLEM SYMPTOMS TABLE

HINT:

If a normal code is displayed during the diagnostic trouble code check although the problem or symptom still occurs, check the electrical circuits for each symptom in the order given in the charts on the following pages. Proceed to the page given in the chart and perform troubleshooting.

The Matrix Chart is divided into 2 chapters.

Chapter 1:

Refer to the table below when the trouble cause is considered to be electrical.

If the instruction "Proceed to next circuit inspection shown on matrix chart" is given in the flow chart of each circuit, proceed to the circuit with the next highest number in the table to continue the check.

If the trouble still occurs even though there are no abnormalities in any of the other circuits, check and replace the TCM.

Chapter 2:

Chapter 2 covers on-and off-vehicle repair of the transaxle. Contents specified in the table below may not match while fail-safe control is operating.

1. Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspected Area	See page
No up-shift (1st to 2nd)	1. Shift solenoid valve (SL3) circuit *1	AX-117
	2. TCM	IN-34
No up-shift (2nd to 3rd)	1. Shift solenoid valve (SL4) circuit *1	AX-160
	2. TCM	IN-34
No up-shift (3rd to 4th)	1. Shift solenoid valve (SL2) circuit *1	AX-104
	2. Engine coolant temp. sensor circuit *1	ES-141
	3. TCM	IN-34
No up-shift (4th to 5th)	1. Shift solenoid valve (SL1) circuit *1	AX-96
	2. Shift solenoid valve (SL4) circuit *1	AX-160
	3. Engine coolant temp. sensor circuit	ES-141
	4. TCM	IN-34
No up-shift (5th to 6th)	1. Engine coolant temp. sensor circuit *1	ES-141
	2. Shift solenoid valve (SL3) circuit *1	AX-117
	3. Shift solenoid valve (SL4) circuit *1	AX-160
	4. TCM	IN-34
No down-shift (6th to 5th)	1. Shift solenoid valve (SL4) circuit *1	AX-160
	2. TCM	IN-34
No down-shift (5th to 4th)	1. Shift solenoid valve (SL1) circuit *1	AX-96
	2. TCM	IN-34
No down-shift (4th to 3rd)	1. Shift solenoid valve (SL2) circuit *1	AX-104
	2. Shift solenoid valve (SL4) circuit *1	AX-160
	3. TCM	IN-34
No down-shift (3rd to 2nd)	1. Shift solenoid valve (SL4) circuit *1	AX-160
	2. Shift solenoid valve (SL3) circuit *1	AX-117
	3. TCM	IN-34
No down-shift (2nd to 1st)	1. Shift solenoid valve (SL3) circuit *1	AX-112
	2. TCM	IN-34

Symptom	Suspected Area	See page
No lock-up	1. Shift solenoid valve (SLU) circuit *1	AX-148
	2. Shift solenoid valve (SL) circuit	AX-151
	3. Engine coolant temp. sensor circuit *1	ES-141
	4. Stop light switch circuit *1	AX-83
	5. Speed sensor NT circuit *1	AX-78
	6. TCM	IN-34
No lock-up off	1. TCM	IN-34
Shift point too high or too low	1. Shift solenoid valve (SLT) circuit *1	AX-140
	2. Speed sensor NT circuit *1	AX-78
	3. Speed sensor NC circuit *1	AX-107
	4. Accelerator pedal position sensor circuit *1	ES-337
	5. ATF temperature sensor circuit *1	AX-67
	6. TCM	IN-34
Up-shift from 3rd to 4th while engine is cold	1. Engine coolant temp. sensor circuit *1	ES-141
	2. TCM	IN-34
Up-shift from 4th to 5th while engine is cold	1. Engine coolant temp. sensor circuit *1	ES-141
	2. TCM	IN-34
No gear change by shifting into "+" or "-" while shifting the lever	1. Transmission control switch circuit	AX-166
	2. TCM	IN-34
Harsh engagement (N to D)	1. Shift solenoid valve (SL1) circuit *1	AX-96
	2. TCM	IN-34
Harsh engagement (Lock-up)	1. Speed sensor NT circuit *1	AX-78
	2. Speed sensor NC circuit *1	AX-107
	3. Shift solenoid valve (SLU) circuit *1	AX-148
	4. TCM	IN-34
Harsh engagement (Any driving position)	1. Accelerator pedal position sensor circuit *1	ES-337
	2. Shift solenoid valve (SLT) circuit *1	AX-140
	3. Speed sensor NC circuit	AX-107
	4. Speed sensor NT circuit *1	AX-78
	5. TCM	IN-34
Poor acceleration	1. Shift solenoid valve (SLT) circuit *1	AX-140
	2. TCM	IN-34
No engine brake	1. TCM	IN-34
No kick-down	1. TCM	IN-34
Engine stalls when starting off or stopping	1. TCM	IN-34
Malfunction in shifting	1. Park/neutral position switch circuit *1	AX-170
	2. Transmission control switch circuit	AX-166
	3. TCM	IN-34
Slip or shudder (5th to 6th and 6th to 5th)	1. Shift solenoid valve (SLT) circuit *1	AX-140
Initial acceleration or subsequent acceleration is improper. Vehicle is stuck in a gear (1st to 6th).	1. Shift solenoid valve (SL1) circuit	AX-96
	2. Shift solenoid valve (SLT) circuit	AX-140
	3. TCM	IN-34
Acceleration is improper when the gear is 4th or higher.	1. Shift solenoid valve (SL2) circuit	AX-104
	2. Shift solenoid valve (SLT) circuit	AX-140
	3. TCM	IN-34
Initial acceleration or subsequent acceleration is improper. Vehicle does not shift down (from 4th to 3rd). Vehicle is stuck in a gear (1st to 6th).	1. Shift solenoid valve (SL2) circuit	AX-104
	2. TCM	IN-34
Acceleration is improper when the gear is 6th.	1. Shift solenoid valve (SL3) circuit	AX-117
	2. TCM	IN-34

Symptom	Suspected Area	See page
Acceleration is improper when the gear is 3rd or 5th.	1. Shift solenoid valve (SL4) circuit *1	AX-160
	2. Shift solenoid valve (SLT) circuit *1	AX-140
	3. TCM	IN-34
Initial acceleration or subsequent acceleration is improper. Vehicle does not shift down (from 3rd to 2nd). No up-shift (5th to 6th).	1. Shift solenoid valve (SL4) circuit *1	AX-160
	2. TCM	IN-34

HINT:

*1: When the circuit is defective, a DTC may be output.

2. Chapter 2: On-Vehicle Repair and Off-Vehicle Repair

Symptom	Suspected Area	See page
Vehicle does not move in any forward and reverse positions.	1. Valve body assembly	AX-192
	2. Torque converter clutch	AX-248
Vehicle does not move in R position.	1. Valve body assembly	AX-192
	2. Brake No. 2 (B2)	AX-283
	3. Brake No. 3 (B3)	AX-283
	4. Shift solenoid valve (SL4)*1	AX-154
No up-shift (1st to 2nd)	1. Valve body assembly	AX-192
	2. Brake No. 1 (B1)	AX-260
	3. Shift solenoid valve (SL3)*1	AX-112
No up-shift (2nd to 3rd)	1. Valve body assembly	AX-192
	2. Brake No. 3 (B3)	AX-283
	3. Shift solenoid valve (SL4)*1	AX-154
No up-shift (3rd to 4th)	1. Valve body assembly	AX-192
	2. Clutch No. 2 (C2)	AX-283
	3. Shift solenoid valve (SL2)*1	AX-99
No up-shift (4th to 5th)	1. Valve body assembly	AX-192
	2. Brake No. 3 (B3)	AX-283
	3. Shift solenoid valve (SL4)*1	AX-154
	4. Shift solenoid valve (SL1)*1	AX-91
No up-shift (5th to 6th)	1. Valve body assembly	AX-192
	2. Brake No. 1 (B1)	AX-283
	3. Shift solenoid valve (SL3)*1	AX-112
	4. Shift solenoid valve (SL4)*1	AX-154
No down-shift (6th to 5th)	1. Valve body assembly	AX-192
	2. Brake No. 3 (B3)	AX-283
	3. Shift solenoid valve (SL4)*1	AX-154
No down-shift (5th to 4th)	1. Valve body assembly	AX-192
	2. Shift solenoid valve (SL1)*1	AX-283
	3. Clutch No. 1 (C1)	AX-91
No down-shift (4th to 3rd)	1. Valve body assembly	AX-192
	2. Brake No. 3 (B3)	AX-283
	3. Shift solenoid valve (SL4)*1	AX-154
	4. Shift solenoid valve (SL2)*1	AX-99
No down-shift (3rd to 2nd)	1. Valve body assembly	AX-192
	2. Brake No. 1 (B1)	AX-283
	3. Shift solenoid valve (SL3)*1	AX-112
	4. Shift solenoid valve (SL4)*1	AX-154
No down-shift (2nd to 1st)	1. Valve body assembly	AX-192
	2. Shift solenoid valve (SL3)*1	AX-112

Symptom	Suspected Area	See page
No lock-up, or no lock-up off	1. Valve body assembly	AX-192
	2. Torque converter clutch	AX-248
Harsh engagement (N to D)	1. Valve body assembly	AX-192
	2. C1 accumulator	AX-283
	3. One-way clutch No. 1 (F1)	AX-283
	4. Clutch No. 1 (C1)	AX-283
	5. Shift solenoid valve (SL1)*1	AX-91
Harsh engagement (Lock-up)	1. Valve body assembly	AX-192
	2. Torque converter clutch	AX-248
	3. Shift solenoid valve (SLU)*1	AX-143
Harsh engagement (N to R)	1. Valve body assembly	AX-192
	2. Brake No. 2 (B2)	AX-283
	3. Brake No. 3 (B3)	AX-283
	4. Shift solenoid valve (SL4)*1	AX-154
Harsh engagement (1 to 2 to 3 to 4 to 5 to 6)	1. Valve body assembly	AX-192
	2. Shift solenoid valve (SLT)*1	AX-133
Harsh engagement (1st to 2nd)	1. Valve body assembly	AX-192
	2. B1 accumulator	AX-283
	3. Brake No. 1 (B1)	AX-283
	4. Shift solenoid valve (SL3)*1	AX-112
Harsh engagement (2nd to 3rd)	1. Valve body assembly	AX-192
	2. B3 accumulator	AX-283
	3. Brake No. 3 (B3)	AX-283
	4. Shift solenoid valve (SL4)*1	AX-154
Harsh engagement (3rd to 4th)	1. Valve body assembly	AX-192
	2. C2 accumulator	AX-283
	3. Clutch No. 2 (C2)	AX-283
	4. Shift solenoid valve (SL2)*1	AX-99
Harsh engagement (4th to 5th)	1. Valve body assembly	AX-192
	2. B3 accumulator	AX-283
	3. Brake No. 3 (B3)	AX-283
	4. Shift solenoid valve (SL4)*1	AX-154
Harsh engagement (5th to 6th)	1. Valve body assembly	AX-192
	2. B1 accumulator	AX-283
	3. Brake No. 1 (B1)	AX-283
	4. Shift solenoid valve (SL3)*1	AX-112
Harsh engagement (6th to 5th)	1. Valve body assembly	AX-192
	2. B3 accumulator	AX-283
	3. Brake No. 3 (B3)	AX-283
	4. Shift solenoid valve (SL4)*1	AX-154
Slip or shudder (Forward and reverse: After warm-up)	1. Valve body assembly	AX-192
	2. Oil strainer	AX-192
	3. Brake No. 1 (B1)	AX-283
	4. Brake No. 2 (B2)	AX-283
	5. Brake No. 3 (B3)	AX-283
	6. One-way clutch No. 1 (F1)	AX-283
	7. Clutch No. 1 (C1)	AX-283
	8. Clutch No. 2 (C2)	AX-283
Slip or shudder (Particular position: just after engine starts)	1. Torque converter clutch	AX-248

Symptom	Suspected Area	See page
Slip or shudder (R position)	1. Brake No. 2 (B2)	AX-283
	2. Brake No. 3 (B3)	AX-283
Slip or shudder (1 position)	1. One-way clutch No. 1 (F1)	AX-283
	2. Clutch No. 1 (C1)	AX-283
Slip or shudder (2 position)	1. Brake No. 1 (B1)	AX-283
	2. Clutch No. 1 (C1)	AX-283
Slip or shudder (3 position)	1. Brake No. 3 (B3)	AX-283
	2. Clutch No. 1 (C1)	AX-283
Slip or shudder (4 position)	1. Clutch No. 1 (C1)	AX-283
	2. Clutch No. 2 (C2)	AX-283
Slip or shudder (5 position)	1. Brake No. 3 (B3)	AX-283
	2. Clutch No. 2 (C2)	AX-283
Slip or shudder (6 position)	1. Brake No. 3 (B3)	AX-283
	2. Clutch No. 2 (C2)	AX-283
No engine braking (1st position)	1. Valve body assembly	AX-192
	2. Brake No. 2 (B2)	AX-283
No engine braking (2nd position)	1. Valve body assembly	AX-192
	2. Brake No. 1 (B1)	AX-215
No engine braking (3rd position)	1. Valve body assembly	AX-192
	2. Brake No. 3 (B3)	AX-283
No engine braking (4th position)	1. Valve body assembly	AX-192
	2. Clutch No. 2 (C2)	AX-283
No kick-down	1. Valve body assembly	AX-192
Shift point too high or too low	1. Valve body assembly	AX-192
Poor acceleration (All positions)	1. Valve body assembly	AX-192
	2. Torque converter clutch	AX-283
Poor acceleration (6th)	1. Brake No. 1 (B1)	AX-283
	2. Clutch No. 2 (C2)	AX-283
Engine stalls when starting off or stopping	1. Valve body assembly	AX-192
	2. Torque converter clutch	AX-248

HINT:

*1: When the circuit is defective, a DTC may be output.

MONITOR DRIVE PATTERN

1. MONITOR DRIVE PATTERN FOR ECT TEST

- (a) Perform this drive pattern as one method to simulate the detection conditions of the ECT malfunctions. (The DTCs may not be detected due to differences from the actual driving conditions. Some codes may not be detected using this drive pattern.)

HINT:

Preparation for driving

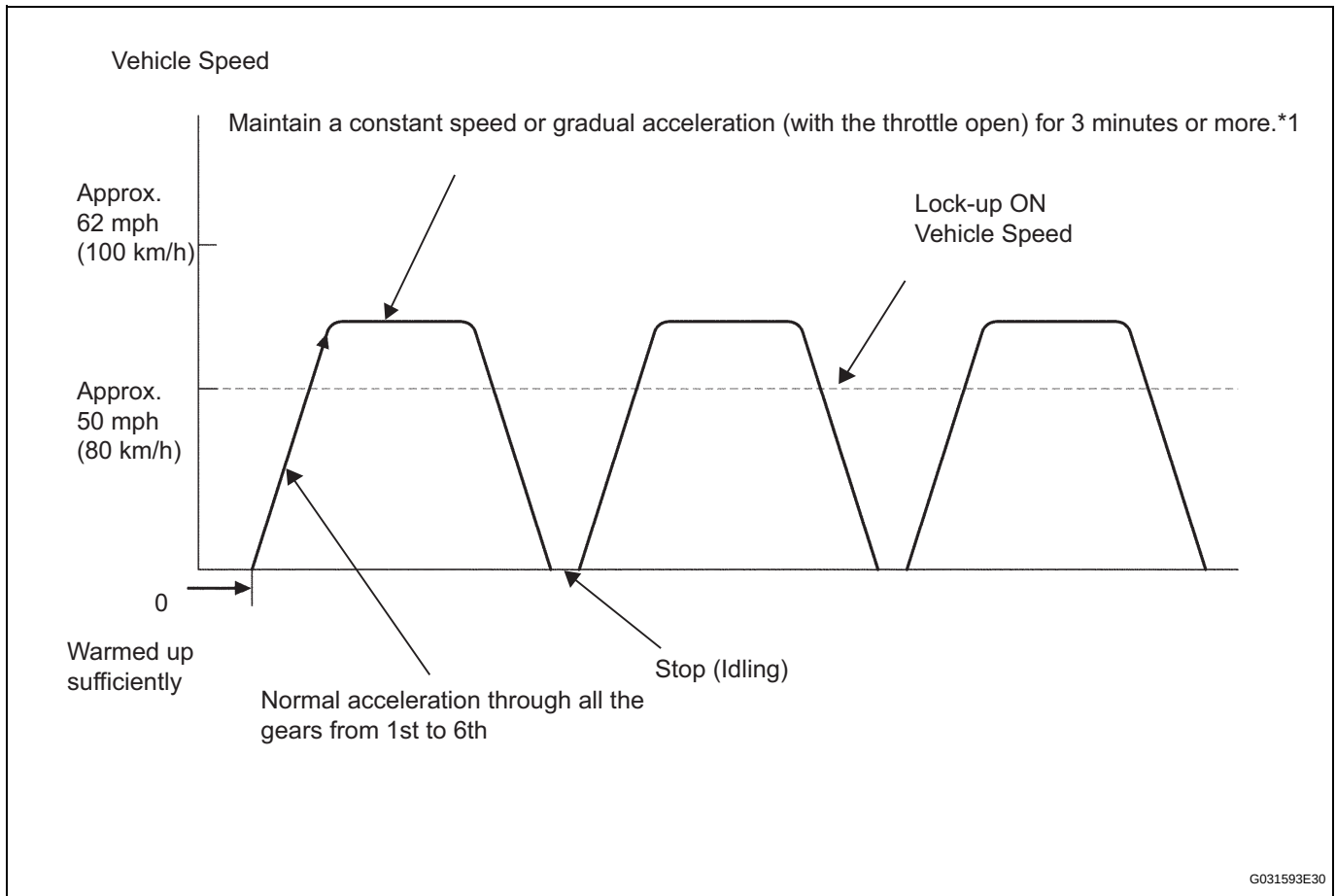
- Warm up the engine sufficiently. (Engine coolant temperature should be 60°C (140°F) or higher.)
- Drive the vehicle when the atmospheric temperature is -10°C (14°F) or higher. (Malfunction may not be detected when the atmospheric temperature is less than -10°C (14°F).)

Notice on driving

- Drive the vehicle through all gears. Stop to 1st to 2nd to 3rd to 4th to 5th to 6th (lock-up ON).
- Confirm engine braking using the S position. While driving in the 6 (S) position and 6th gear lock-up, shift to the "-" position to down-shift from 6th to 5th, 5th to 4th, 4th to 3rd, 3rd to 2nd, 2nd to 1st. Check that proper engine braking occurs whenever down-shift takes place.
- Repeat the above driving pattern three times or more.

NOTICE:

- The monitor status can be checked using the intelligent tester. When using the intelligent tester, monitor status can be found in "OBD/ MOBD / ECT / DATA LIST".
- In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors), the drive pattern can be resumed and, in most cases, the monitor can be completed.
- Perform this drive pattern on a road with the fewest hills possible and strictly observe the posted speed limits and traffic laws while driving.

**HINT:**

*1: Drive the vehicle at a sufficient speed in the uppermost gear, to allow lock-up to engage. The vehicle can be driven at a speed lower than that in the above diagram under the lock-up condition.

NOTICE:

It is necessary to drive the vehicle for approximately 30 minutes to detect DTC P0711 (ATF temperature sensor malfunction).

INITIALIZATION

1. RESET TRANSAXLE COMPENSATION CODE

NOTICE:

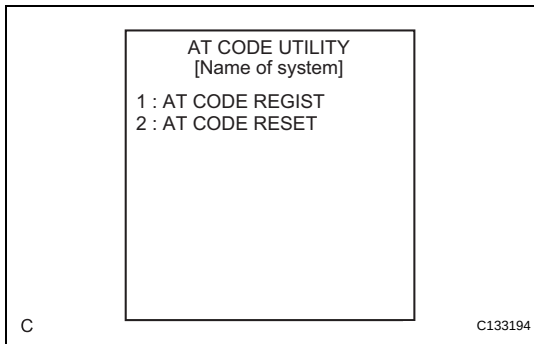
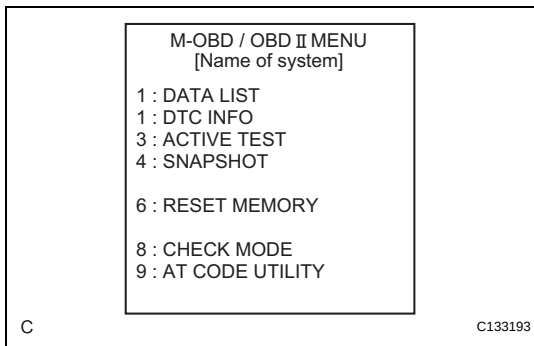
The transaxle compensation code can be reset only with the intelligent tester.

HINT:

The TCM memorizes the condition that the ECT controls the automatic transaxle assembly and engine assembly according to those characteristics. Therefore, when the automatic transaxle assembly, engine assembly, or TCM has been replaced, it is necessary to reset the memory so that the TCM can memorize the new information.

Reset procedure is as follows:

- (a) Shift the shift lever to the N or P position.
- (b) Turn the engine switch off.
- (c) Connect the intelligent tester to the DLC3.
- (d) Turn the engine switch on (IG) and push the intelligent tester main switch on.
- (e) Enter the menu items in this order: DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.



- (f) Select "AT CODE RESET".
- (g) Press the "ENTER".

CAUTION:

After the transaxle compensation code is reset, be sure to perform a road test to allow the TCM to learn.

2. PERFORM ROAD TEST TO ALLOW TCM TO LEARN

NOTICE:

Perform the following procedures while strictly observing all traffic laws and speed limits.

- (a) Warm up the engine.
- (b) From a standstill, achieve highest possible speed with the accelerator pedal opened 15% or less. Keep the accelerator pedal angle steady while driving the vehicle.
- (c) Repeat the previous step until shift shock no longer occurs.
- (d) From a standstill, achieve highest possible speed with the accelerator pedal opened 25% or more. Keep the accelerator pedal angle steady while driving the vehicle.
- (e) Repeat the previous step until shift shock no longer occurs.

3. RESET MEMORY

NOTICE:

- Perform the **RESET MEMORY (AT initialization)** when replacing the engine assembly.
- The **RESET MEMORY** can be performed only with the intelligent tester.

HINT:

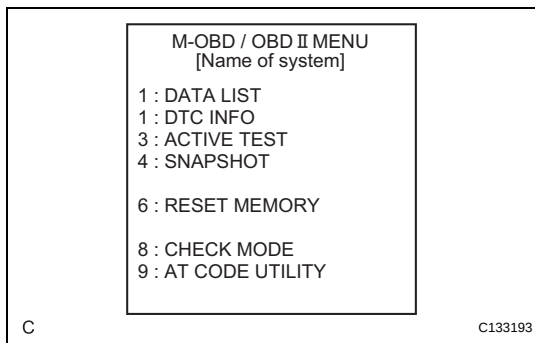
The ECM memorizes the condition that the ECT controls the automatic transaxle assembly and engine assembly according to those characteristics. Therefore, when the automatic transaxle assembly, engine assembly, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information.

(a) Reset procedure is as follows:

- (1) Turn the engine switch off.
- (2) Connect the intelligent tester to the DLC3.
- (3) Turn the engine switch on (IG).
- (4) Turn the intelligent tester main switch on.
- (5) Select the items "DIAGNOSIS / OBD/MOBD / ECT / RESET MEMORY".

NOTICE:

After performing the RESET MEMORY, be sure to perform the ROAD TEST (See page [AX-11](#)) described previously.



MANUAL SHIFTING TEST

1. PERFORM MANUAL SHIFTING TEST

HINT:

- With this test, it can be determined whether trouble occurs in the electrical circuit. Also, trouble can be a mechanical problem in the transaxle.
- If any abnormalities are found in the following test, the problem is in the transaxle itself.

- (a) Disconnect the TCM connector.
- (b) Drive the vehicle with the TCM disconnected.
Shifting the shift lever to the D position to check whether the shifting condition changes as shown in the table below.

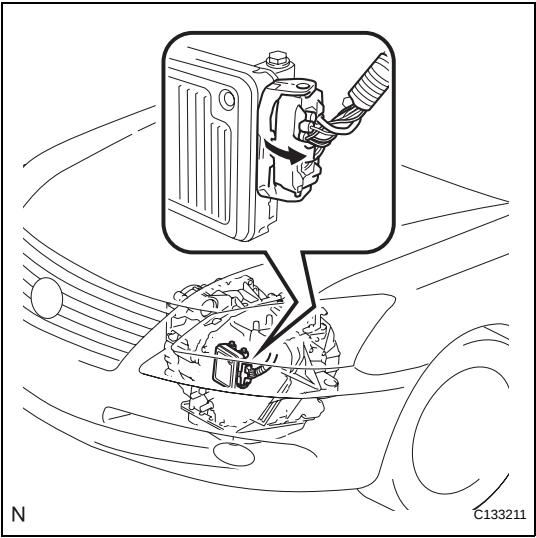
Shift Position	Shifting Condition
D	No Shift (No Change)

HINT:

When driving the vehicle with the TCM disconnected, the gear position will be as follows:

- When the shift lever is in the D position, the transmission will stay in 3rd gear.
- When the shift lever is in the R or P position, the transmission will also be in the R or P position respectively.

- (c) Connect the connector of the TCM.
- (d) Clear the DTC (See page [AX-37](#)).



REGISTRATION

NOTICE:

- When the automatic transaxle is replaced, the transaxle compensation code must be input into the TCM (Proceed to step 1). After the automatic transaxle is reinstalled, the QR code label will be positioned where the code cannot be read. Therefore, before reinstalling the automatic transaxle, record the transaxle compensation codes or input them in the intelligent tester.
- When the TCM is replaced, the existing transaxle compensation codes must be input into the new TCM (Proceed to step 2).

1. INPUT TRANSAXLE COMPENSATION CODE INTO TCM

NOTICE:

Transaxle compensation codes are unique, 60-digit alphanumeric values printed on the QR label. If an incorrect transaxle compensation code is input into the TCM, shift shock may occur.

- Record the transaxle compensation code specified on the QR label.

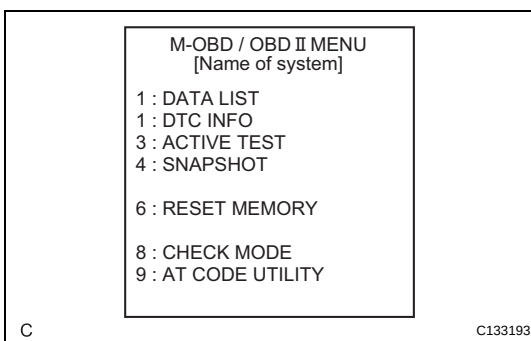
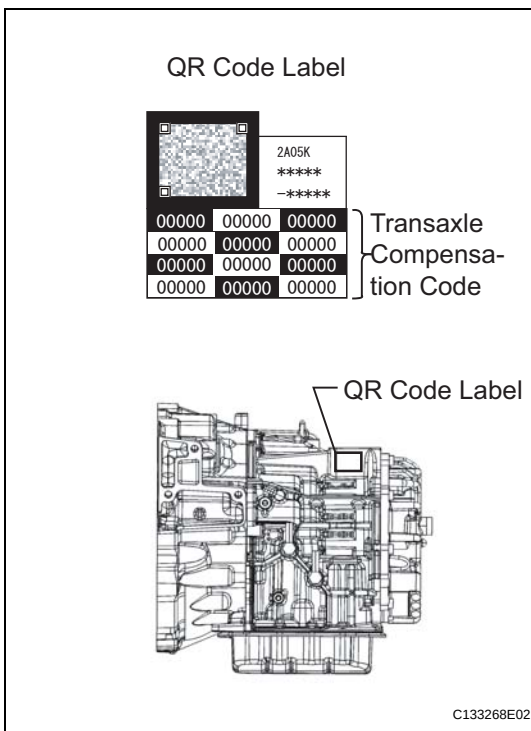
HINT:

The transaxle compensation code is imprinted on the QR label.

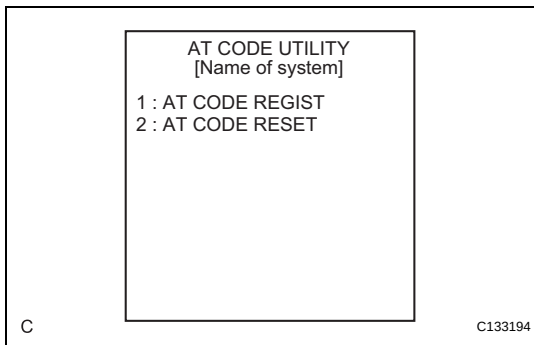
- Shift the shift lever to the N or P position.
- Connect the intelligent tester to the DLC3.
- Turn the engine switch on (IG).
- Turn the tester on.

NOTICE:

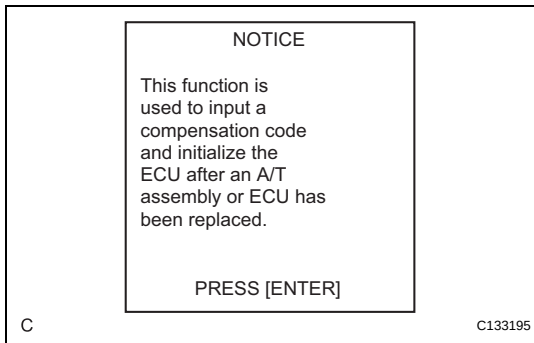
Do not start the engine.



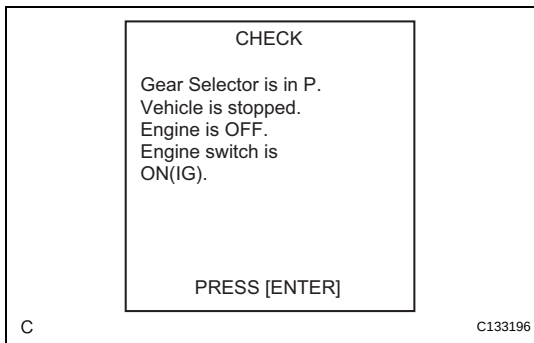
- Enter the menu items in this order: DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.
- Press "ENTER".



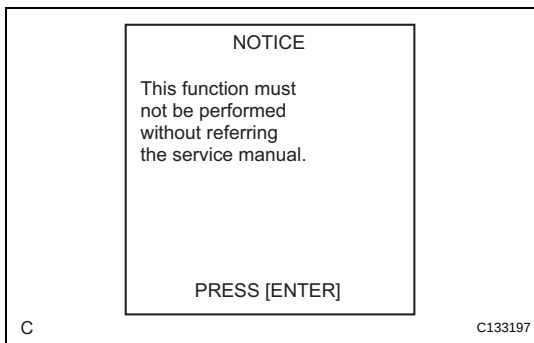
- (h) Select "AT CODE REGIST".
- (i) Press "ENTER".



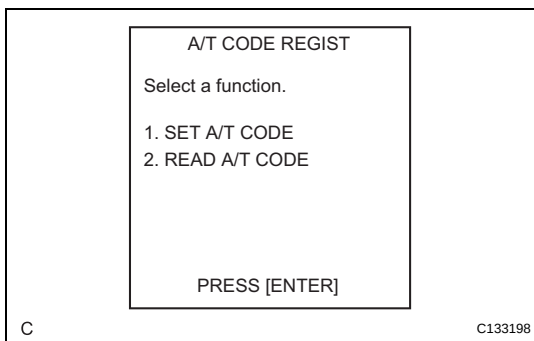
- (j) Press "ENTER" again to proceed.



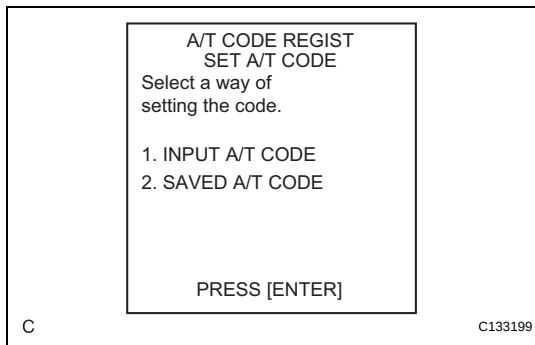
- (k) Press "ENTER" again to proceed.



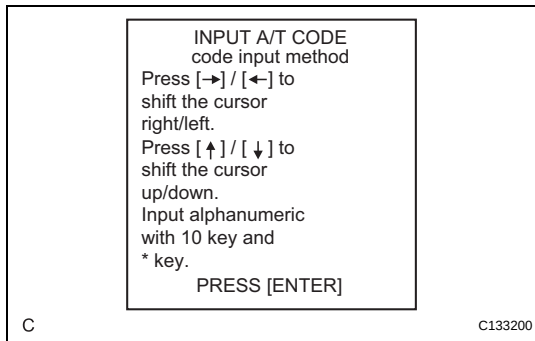
- (l) Press "ENTER" again to proceed.



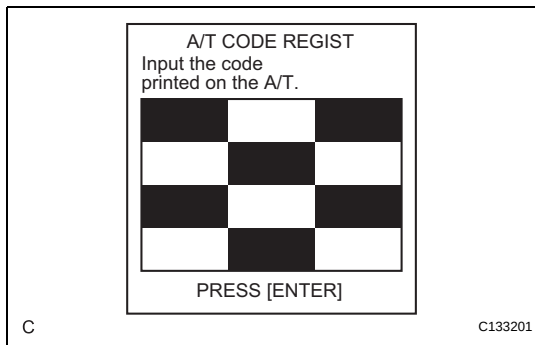
- (m) Select "SET A/T CODE".
- (n) Press "ENTER".



- (o) Select "INPUT A/T CODE".
- (p) Press "ENTER".



- (q) Register the compensation code.
- (1) Press "ENTER".



- (2) Manually input the transaxle compensation code. The code is a 60-digit alphanumeric value imprinted on the QR label.

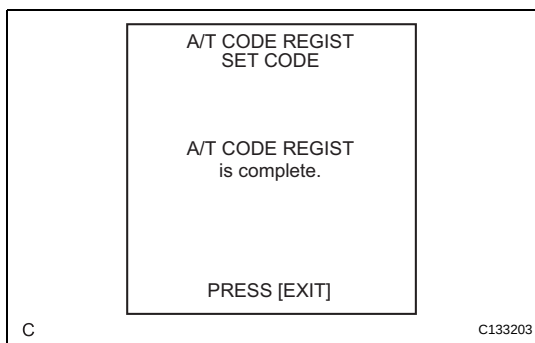
- (r) Check that the compensation code displayed on the screen is correct by comparing it with the 60-digit alphanumeric value on the QR label.

NOTICE:

If an incorrect transaxle compensation code is input into the TCM, shift shock will occur.

HINT:

Input alphabetical letters by operating the keys from 0 to 5 while pressing the * key.

AX

- (s) Press "ENTER" to set the compensation code to the TCM.

HINT:

- If the registration process fails, the compensation code may be incorrect. Check the compensation code again.
- If the attempted compensation code is correct, a problem with the wire harness or a bad connection with the DLC3 may cause a registration failure. Check the wire harness and the DLC3 connection. If no problem is found, the TCM may be malfunctioning. Check the TCM and repeat this operation.

2. TRANSFER TRANSAXLE COMPENSATION CODE

NOTICE:

Transaxle compensation codes are 60-digit alphanumeric values imprinted on the QR label. If an incorrect transaxle compensation code is input into the TCM, shift shock may occur.

HINT:

The following operation is available for use with TCMs that can transmit the registered transaxle compensation code to the intelligent tester.

- (a) Shift the shift lever to the N or P position.
- (b) Connect the intelligent tester to the DLC3.
- (c) Turn the engine switch on (IG).
- (d) Turn the tester on.

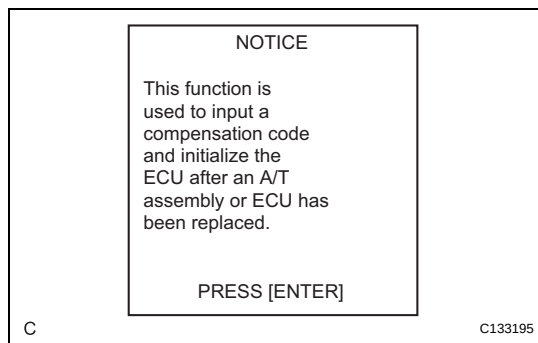
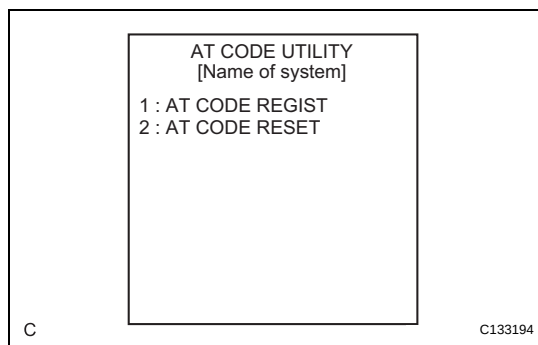
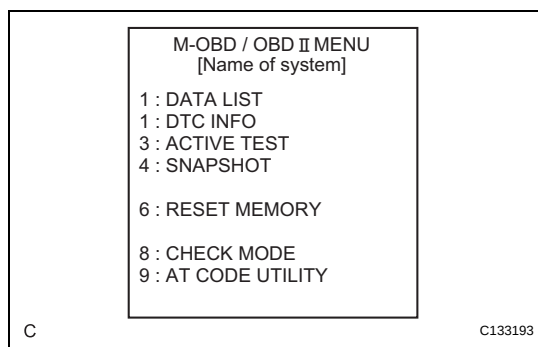
NOTICE:

Do not start the engine.

HINT:

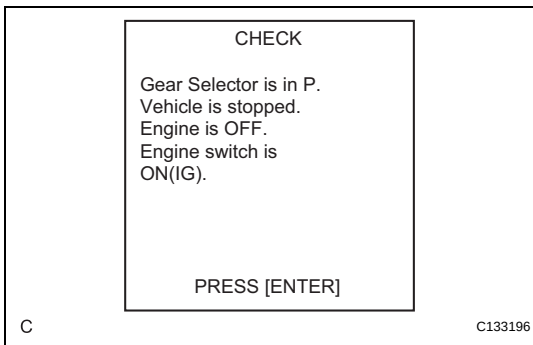
The transaxle compensation code is imprinted on the QR label.

- (e) Read the transaxle compensation code.
 - (1) Enter the menu items in this order:
DIAGNOSIS / OBD/MOBD / ECT / AT CODE UTILITY.
 - (2) Press "ENTER".

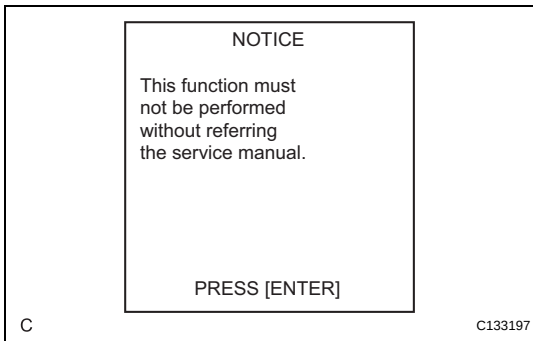


- (3) Select "AT CODE REGIST".
- (4) Press "ENTER".

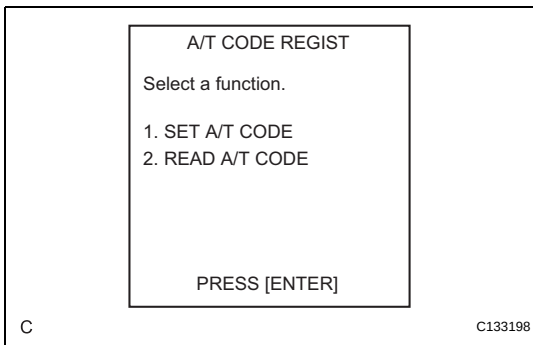
- (5) Press "ENTER" again to proceed.



(6) Press "ENTER" again to proceed.

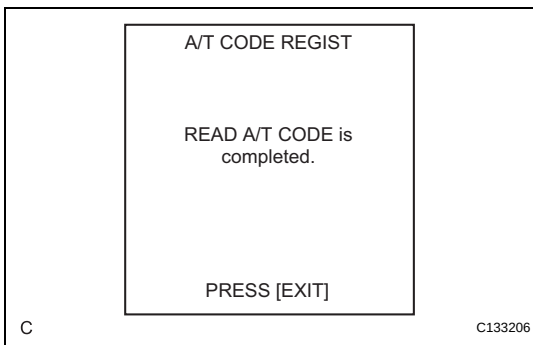


(7) Press "ENTER" again to proceed.



(8) Select "READ A/T CODE".

(9) Press "ENTER".



(10) Press "EXIT".

NOTICE:

Do not use the code specified on the transaxle QR label even if the transmission compensation code cannot be read using the intelligent tester. The code printed on an in-service transaxle may not match its current characteristics. Replace the TCM with a new one and perform a road test to allow the TCM to learn.

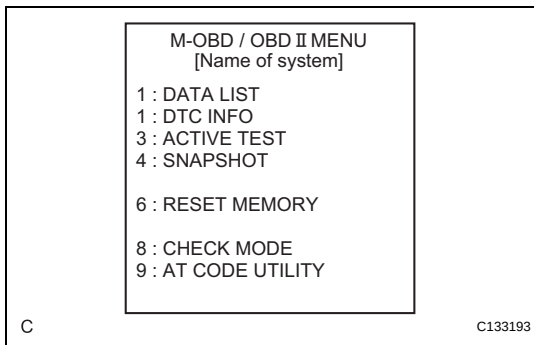
(11) Turn the engine switch off.

(f) Replace the TCM.

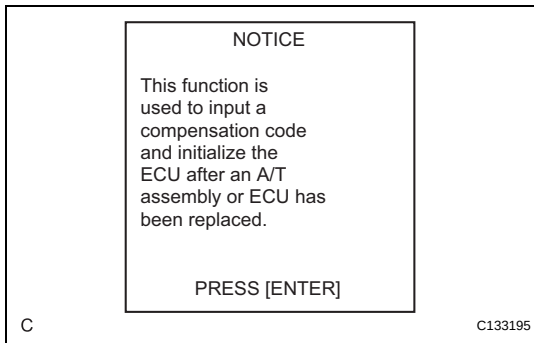
(g) Set the transaxle compensation code.

(1) Turn the engine switch on (IG).

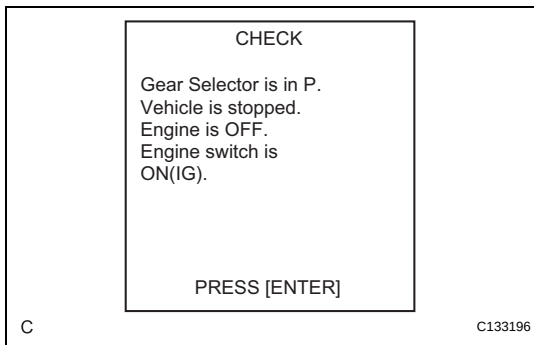
(2) Turn the tester on.



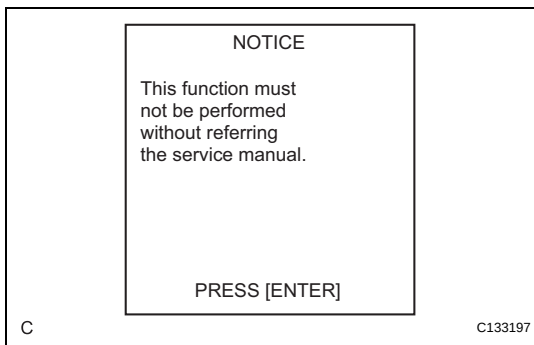
- (3) Enter the menu items in this order:
DIAGNOSIS / OBD/MOBD / ECT / AT CODE
UTILITY.
- (4) Press "ENTER".



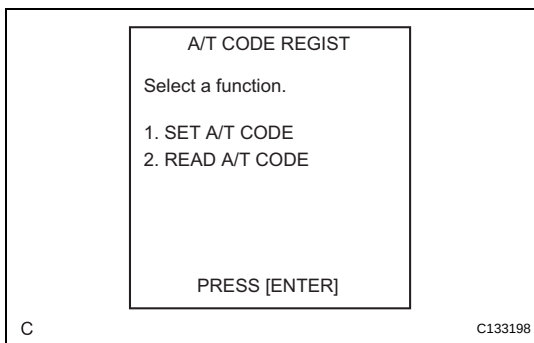
- (5) Press "ENTER" again to proceed.



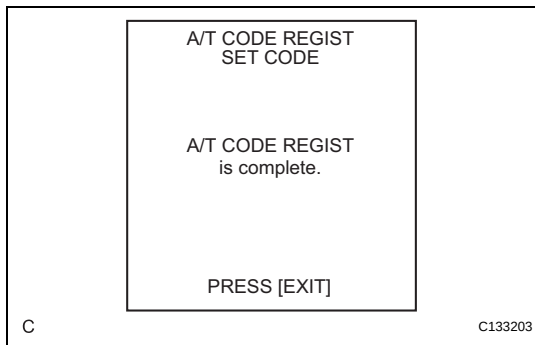
- (6) Press "ENTER" again to proceed.



- (7) Press "ENTER" again to proceed.

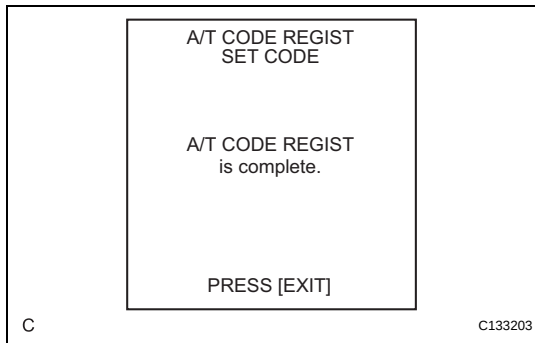


- (8) Select "SET A/T CODE".
- (9) Press "ENTER".



(10) Select "SAVED A/T CODE".

(11) Press "ENTER".



(12) Press "EXIT".

MECHANICAL SYSTEM TESTS

1. PERFORM MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transaxle and engine by measuring the stall speeds in the D position.

NOTICE:

- The driving test should be done on a paved road (a non-skid road).
- Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).
- Do not continuously run this test for longer than 5 seconds.
- To ensure safety, perform this test in a wide, clear level area which provides good traction.
- The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers from a safe location outside the vehicle while the other is doing the test.

(1) Chock the 4 wheels.

(2) Connect the intelligent tester to the DLC3.

(3) Fully apply the parking brake.

(4) Keep your left foot pressed firmly on the brake pedal.

(5) Start the engine.

(6) Using the intelligent tester, shift into the D position and hold 3rd gear using active test.

Press all the way down on the accelerator pedal with your right foot.

(7) Quickly read the stall speed at this time.

Stall speed:

2,520 +- 150 rpm

Evaluation:

Problem	Possible cause
(a) Stall engine speed is low in D position	• Engine power output may be insufficient • Stator one-way clutch is not operating properly HINT: If the value is less than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Stall engine speed is high in D position	• Line pressure is too low • Clutch No. 1 (C₁) slipping • One-way clutch (F₁) is not operating properly • Improper fluid level

- (b) Measure the time lag.
- (1) When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the clutches and brakes.

NOTICE:

- Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).
- Be sure to allow 1 minute interval between tests.
- Perform the test three times and measure the time lags. Calculate the average value of the three time lags.

- (2) Connect the intelligent tester to the DLC3.
- (3) Fully apply the parking brake.
- (4) Start and warm up the engine and check idle speed.

Idle speed:

approx. 650 rpm (In N position and A/C OFF)

- (5) Shift the lever from the N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag:

N to D less than 1.2 seconds

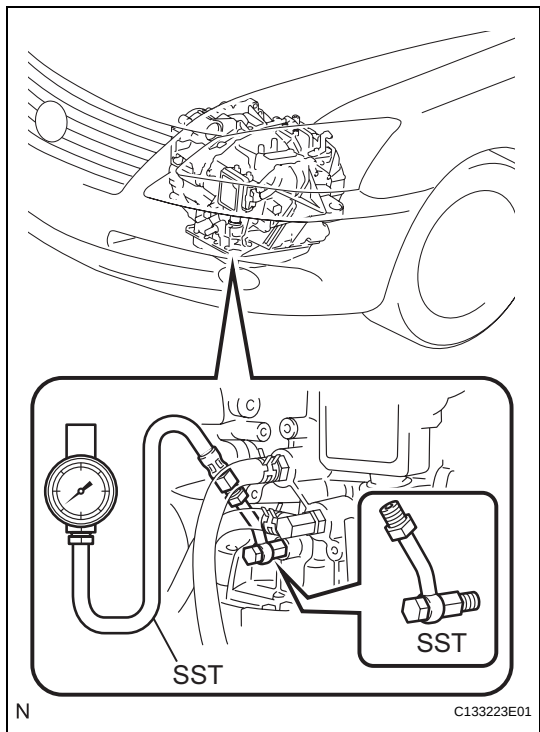
- (6) In the same way, measure the time lag for N to R.

Time lag:

N to R less than 1.5 seconds

Evaluation (If N to D or N to R time lag is longer than the specified time):

Problem	Possible cause
N to D time lag is longer	• Line pressure is too low • Clutch No. 1 (C₁) is worn • One-way clutch (F₁) is not operating properly
N to R time lag is longer	• Line pressure is too low • Brake No. 2 (B₂) is worn • Brake No. 3 (B₃) is worn



HYDRAULIC TEST

1. PERFORM HYDRAULIC TEST

(a) Measure the line pressure.

NOTICE:

- Perform the test at the normal operating ATF (Automatic Transmission Fluid) temperature: 50 to 80°C (122 to 176°F).
- The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is performing the test.
- Be sure to prevent SST hose from interfering with the exhaust pipe.
- This check must be conducted after checking and adjusting the engine.
- Perform the test when the A/C is OFF.
- When conducting the stall test, do not continue for more than 5 seconds.

- (1) Warm up the ATF (Automatic Transmission Fluid).
- (2) Lift the vehicle up.
- (3) Remove the engine under cover.
- (4) Connect the intelligent tester to the DLC3.
- (5) Remove the test plug on the transaxle case front left side and install the SST.

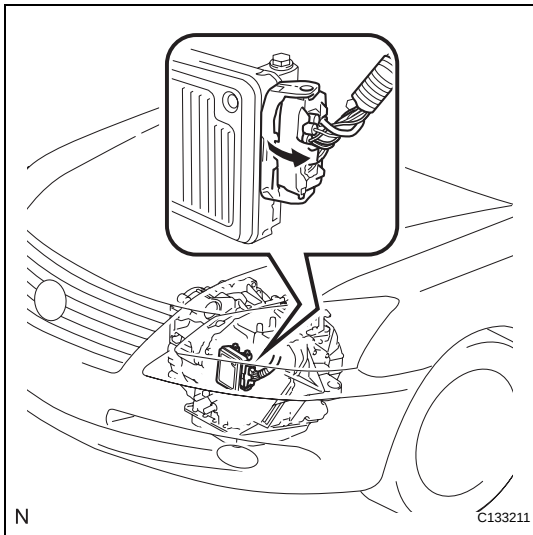
SST 09992-00095 (09992-00231, 09992-00271)

- (6) Start the engine.
- (7) Shift to the D position, and then use the intelligent tester to hold 3rd gear using active test. Measure the line pressure while the engine is idling.

Specified line pressure:

Condition	D position kPa (kgf/cm ² , psi)
Idling	362 to 412 kPa (3.7 to 4.2 kgf/cm ² , 52 to 60 psi)

- (8) Turn the engine switch off.



(9) Disconnect the connector of the TCM.

HINT:

Disconnect the connector only when performing the D position stall test.

(10) Start the engine.

(11) Firmly depress the brake pedal, shift to the D position, depress the accelerator pedal all the way down, and check the line pressure while the stall test is performed.

Specified line pressure:

Condition	D position kPa (kgf/cm ² , psi)
Stall test	1,160 to 1,350 kPa (11.8 to 13.8 kgf/cm ² , 168 to 196 psi)

(12) Turn the engine switch off.

(13) Connect the TCM connector, depress the brake pedal firmly, shift to the R position, and check that the line pressure while the engine is idling and during the stall test.

Specified line pressure:

Condition	R position kPa (kgf/cm ² , psi)
Idling	806 to 916 kPa (8.2 to 9.3 kgf/cm ² , 117 to 133 psi)
Stall test	1,890 to 2,000 kPa (19.3 to 20.4 kgf/cm ² , 274 to 290 psi)

(14) Remove the SST, and install the test plug.

(15) Clear the DTC.

Evaluation:

Problem	Possible cause
Measured values are higher than the specified value in all positions	- Shift solenoid valve (SLT) defective - Regulator valve defective
Measured values are lower than the specified value in all positions	- Shift solenoid valve (SLT) defective - Regulator valve defective - Oil pump defective
Pressure is low in the D position only	- D position circuit fluid leak - Clutch No. 1 (C₁) defective
Pressure is low in the R position only	- R position circuit fluid leak - Brake No. 2 (B₂) defective - Brake No. 3 (B₃) defective

ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

- (a) Based on the result of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transaxle does not shift up or down, or the shift point is too high or too low, conduct the following road test referring to the automatic shift schedule and attempt to duplicate the problem symptoms.

2. ROAD TEST

NOTICE:

Perform the test at the ATF (Automatic Transmission Fluid) temperature 50 to 80°C (122 to 176°F) in the normal operation.

- (a) D position test:

Shift into the D position, fully depress the accelerator pedal and check the following:

- (1) Check up-shift operation.

Check that 1st to 2nd, 2nd to 3rd, 3rd to 4th, 4th to 5th and 5th to 6th up-shifts take place, and that the shift points conform to the automatic shift schedule (See page [SS-23](#)).

HINT:

6th Gear Up-shift Prohibition Control

- Engine coolant temperature is 60°C (140°F) or less and vehicle speed is 50 mph (80 km/h) or less.

5th Gear Up-shift Prohibition Control

- Engine coolant temperature is 55°C (131°F) or less and vehicle speed is 32 mph (51 km/h) or less.

4th Gear Up-shift Prohibition Control

- Engine coolant temperature is 47°C (117°F) or less and vehicle speed is 31 mph (49 km/h) or less.

Lock-up Prohibition Control

- Brake pedal is depressed.
- Accelerator pedal is released.
- Engine coolant temperature is 60°C (140°F) or less.

- (2) Check for shift shock and slip.

Check for shock and slip at the 1st to 2nd, 2nd to 3rd, 3rd to 4th, 4th to 5th and 5th to 6th up-shifts.

- (3) Check for abnormal noise and vibration.

Check for abnormal noise and vibration when up-shifting from 1st to 2nd, 2nd to 3rd, 3rd to 4th, 4th to 5th and 5th to 6th while driving with the shift lever in the D position, and also while driving in the lock-up condition.

HINT:

The check for the cause of abnormal noise and vibration must be done thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

(4) Check kick-down operation.

Check vehicle speeds when the 6th to 5th, 5th to 4th, 5th to 3rd, 3rd to 2nd, and 2nd to 1st kick-downs take place while driving with the shift lever in the D position. Confirm that each speed is within the applicable vehicle speed range indicated in the automatic shift schedule (See page [SS-23](#)).

(5) Check for abnormal shock and slip at kick-down.

(6) Check the lock-up mechanism.

- Drive the vehicle with the shift lever in the D position (2nd, 3rd, 4th, 5th or 6th gear) at a steady speed (lock-up ON).
- Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

HINT:

- There is no lock-up function in the 1st gear.
- If there is a jump in engine speed, this indicates that lock-up is not operating.

(b) S position test

Shift to the S position, depress the accelerator pedal and check the following:

(1) Check shift operation.

- With the shift lever in the S position (while the vehicle is stopped), shift into the "+" position to check that the shift position on the combination meter changes as follows: 1 to 2, 2 to 3, 3 to 4, 4 to 5 and 5 to 6.
- While driving in the 5 (S) position and 5th gear (at a vehicle speed of approximately 34 to 40 mph (55 to 65 km/h)), shift into the "-" position and check if the 4th gear down-shift occurs and proper engine braking occurs.
- While driving in the 4 (S) position and 4th gear (at a vehicle speed of approximately 19 to 25 mph (30 to 40 km/h)), shift into the "-" position and check if the 3rd gear down-shift occurs and proper engine braking occurs.
- While driving in the 3 (S) position and 3rd gear (at a vehicle speed of approximately 12 to 19 mph (20 to 30 km/h)), shift into the "-" position and check if the 2nd gear down-shift occurs and proper engine braking occurs.
- While driving in the 2 (S) position and 2nd gear (at a vehicle speed of approximately 6 to 12 mph (10 to 20 km/h)), shift into the "-" position and check if the 1st gear down-shift occurs and proper engine braking occurs.

HINT:

Manual shift (S position) is prohibited under either of the following conditions:

- Down-shifting may cause engine overrun.

- The driver continuously down-shifts. (Down-shifting to 1st gear may not be performed.)
- (c) R position test:
Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.
- CAUTION:**
Before conducting this test ensure that the test area is free from people and obstruction.
- (d) P position test:
Stop the vehicle on a grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

- (a) The ECT (Electronic controlled automatic transaxle) is an automatic transaxle that has its shift timing electronically controlled by the Transmission Control Module (TCM). The TCM detects electrical signals that indicate engine and driving conditions, and controls the shift point, based on driver's habits and road conditions. As a result, fuel efficiency and transaxle performance are improved. Shift shock has been reduced by controlling the engine and transaxle simultaneously. In addition, the ECT has features such as:
- Diagnostic function.
 - Fail-safe function for use when a malfunction occurs.

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The TCM of this system is connected to the CAN communication system. Therefore, before starting troubleshooting, make sure to check that there is no trouble in the CAN communication system.
- *: Use the intelligent tester.

1 VEHICLE BROUGHT TO WORKSHOP

NEXT

2 CUSTOMER PROBLEM ANALYSIS

NEXT

3 INSPECT BATTERY VOLTAGE

Standard voltage:

11 to 14 V

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

NEXT

4 CONNECT INTELLIGENT TESTER TO DLC3*

NEXT

5 CHECK AND CLEAR DTCS AND FREEZE FRAME DATA*

(a) Refer to the DTC CHECK / CLEAR (See page [AX-37](#)).

NEXT

6 VISUAL INSPECTION

NEXT

7 SETTING CHECK MODE DIAGNOSIS*

(a) Refer to the CHECK MODE PROCEDURE (See page [AX-38](#)).

NEXT

AX

8 PROBLEM SYMPTOM CONFIRMATION

(a) Refer to the ROAD TEST (See page [AX-11](#)).

Result

Result	Proceed to
Symptom does not occur	A
Symptom occurs	B

B**GO TO STEP 10****A****9 SYMPTOM SIMULATION**

(a) Refer to the ELECTRONIC CIRCUIT INSPECTION PROCEDURE (See page [IN-34](#)).

NEXT**10 DTC CHECK***

(a) Refer to the DTC CHECK / CLEAR (See page [AX-37](#)).

Result

Result	Proceed to
DTC is not output	A
DTC is output	B

B**GO TO STEP 18****A****11 BASIC INSPECTION**

- (a) Refer to the AUTOMATIC TRANSMISSION FLUID (See page [AX-176](#)).
- (b) Refer to the PARK/NEUTRAL POSITION SWITCH (See page [AX-184](#)).
- (c) Refer to the SHIFT LEVER ASSEMBLY (See page [AX-232](#)).

NG**GO TO STEP 21****OK****12 MECHANICAL SYSTEM TEST**

(a) Refer to the MECHANICAL SYSTEM TEST (See page [AX-14](#)).

NG**GO TO STEP 17**

OK

13 HYDRAULIC TEST

(a) Refer to the HYDRAULIC TEST (See page [AX-16](#)).

NG

GO TO STEP 17

OK

14 MANUAL SHIFTING TEST

(a) Refer to the MANUAL SHIFTING TEST (See page [AX-17](#)).

NG

GO TO STEP 16

OK

15 PROBLEM SYMPTOMS TABLE CHAPTER 1

(a) Refer to the PROBLEM SYMPTOMS TABLE (See page [AX-28](#)).

NG

GO TO STEP 19

OK

16 PROBLEM SYMPTOMS TABLE CHAPTER 2

(a) Refer to the PROBLEM SYMPTOMS TABLE (See page [AX-28](#)).

NEXT

17 PART INSPECTION

NEXT

GO TO STEP 21

18 DTC CHART

(a) Refer to the DIAGNOSTIC TROUBLE CODE CHART (See page [AX-45](#)).

NEXT

19 CIRCUIT INSPECTION

NEXT

20	IDENTIFICATION OF PROBLEM
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NEXT

21	REPAIR OR REPLACE
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NEXT

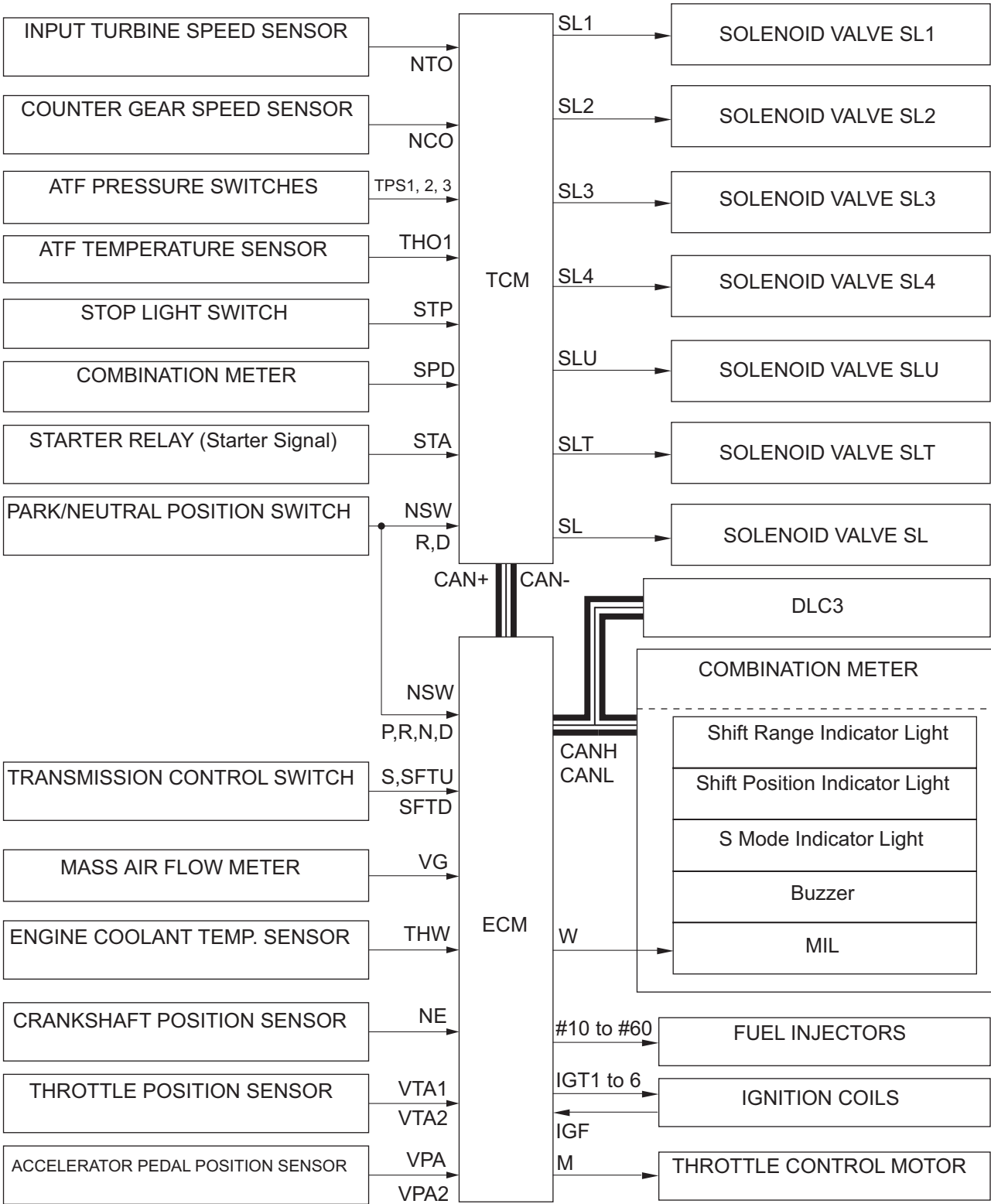
22	CONFIRMATION TEST
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NEXT

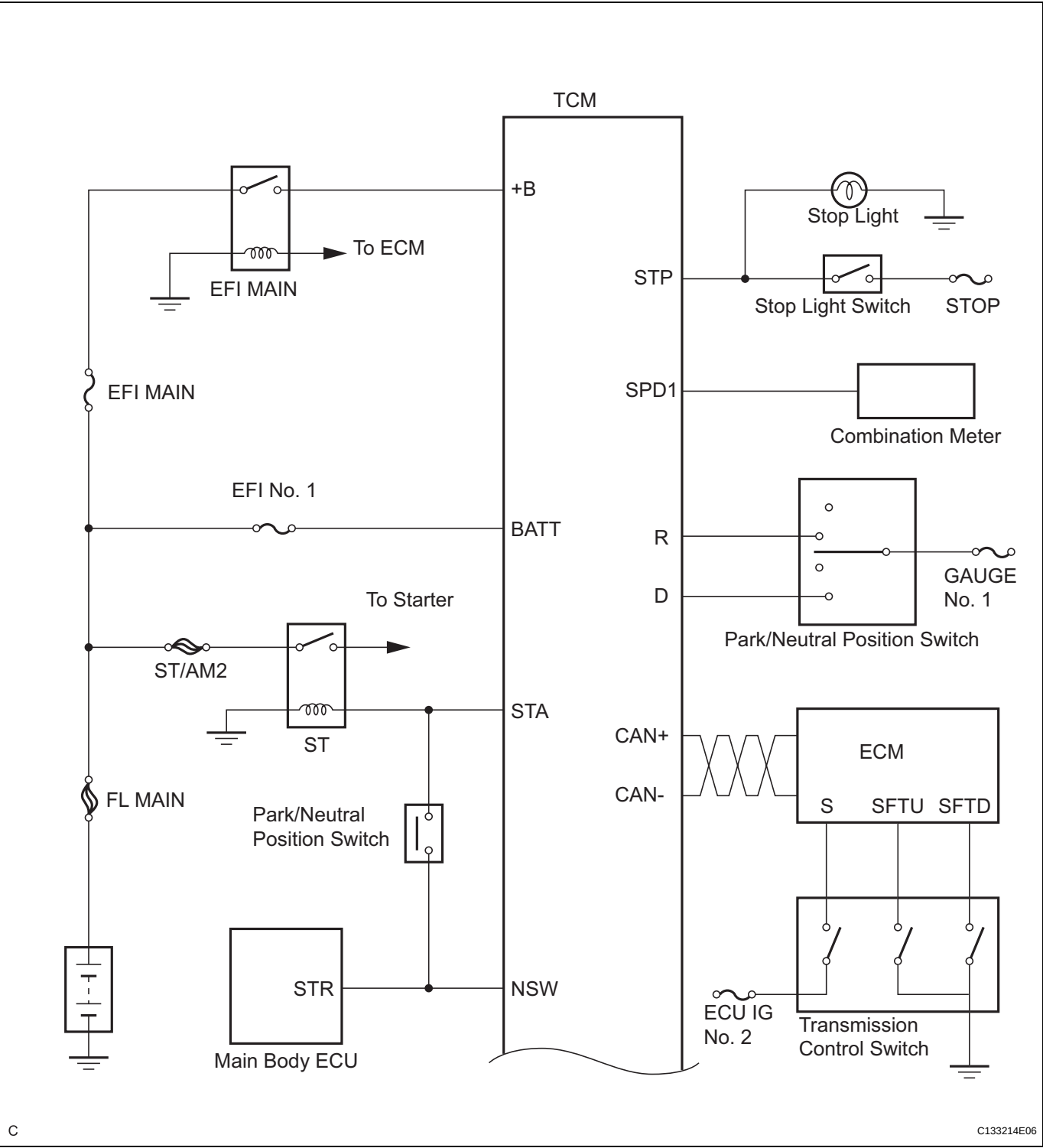
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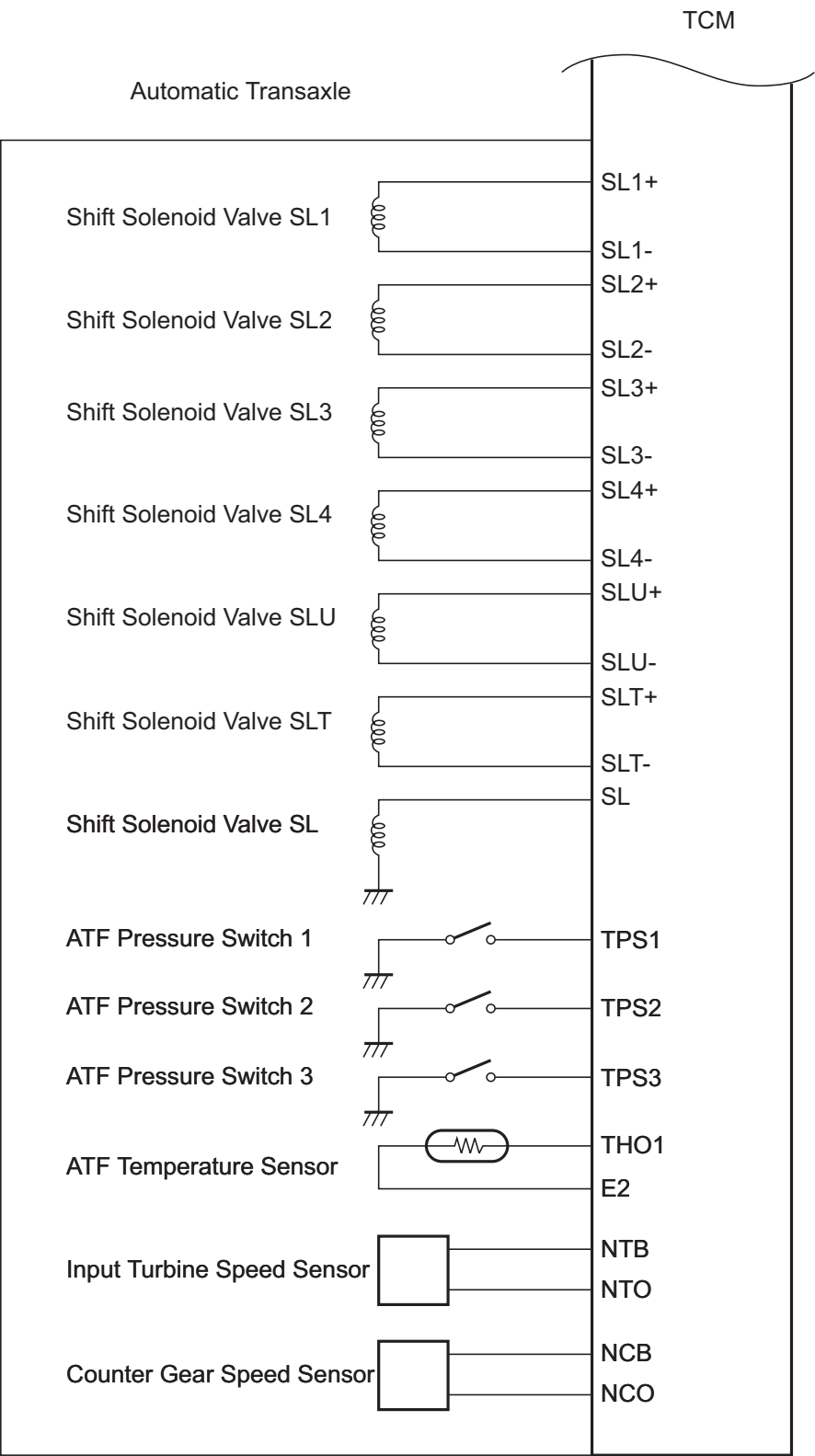
SYSTEM DIAGRAM

The configuration of the electronic control system in the U660E automatic transaxle is as shown in the following chart.



AX



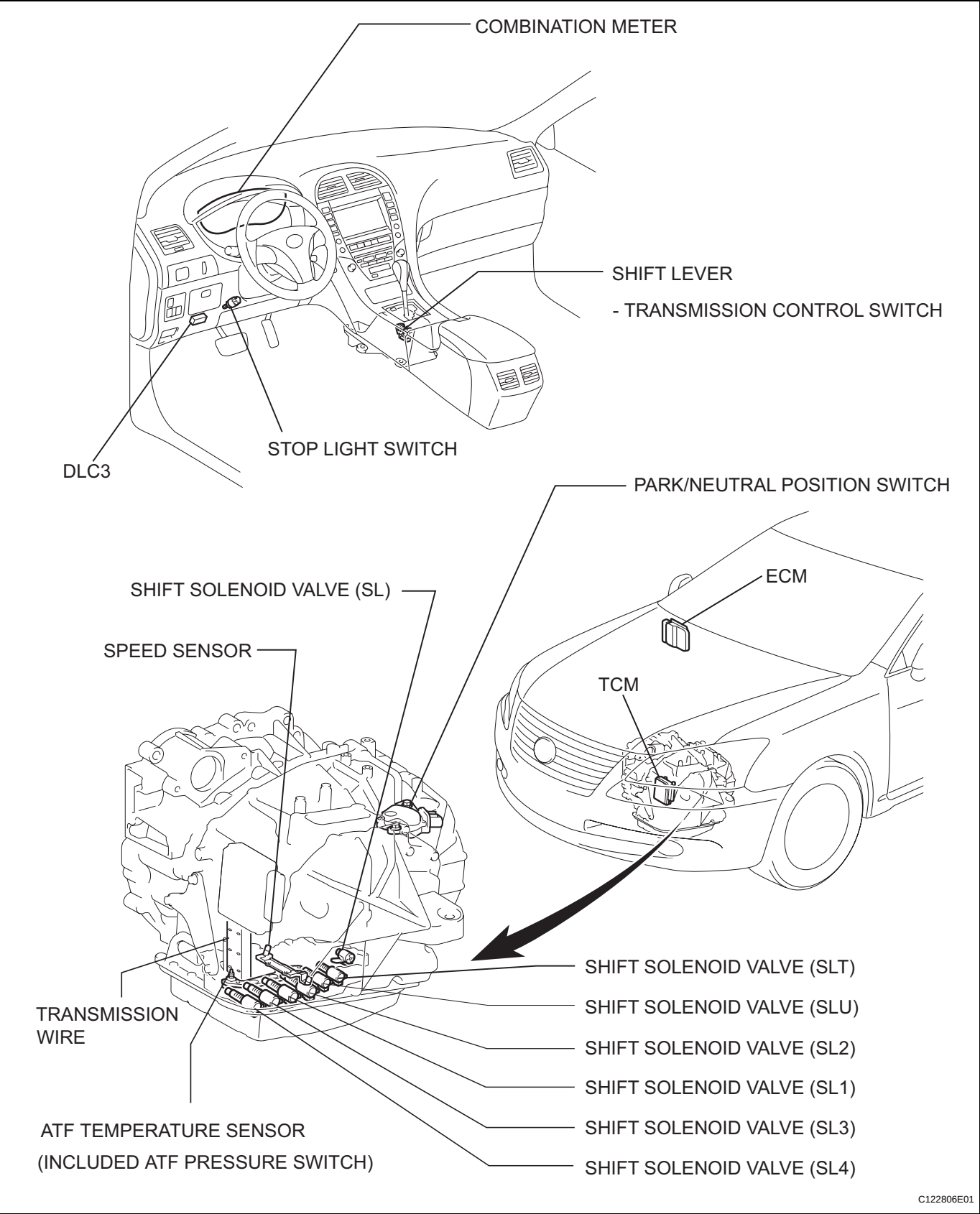


AX

DEFINITION OF TERMS

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

PARTS LOCATION



AUTOMATIC TRANSAXLE SYSTEM

PRECAUTION

NOTICE:

- Some systems need to be initialized after reconnecting the negative (-) battery terminal (See page [IN-33](#)).
- If the automatic transaxle parts are replaced, perform the following as necessary referring to the table below:
 - Registration of the transaxle compensation code (See page [AX-18](#)).
 - Initialization of the transaxle compensation code (See page [AX-24](#)).
 - Road test (See page [AX-24](#)).
 - Reset of the MEMORY (learned values) (See page [AX-24](#)).

Replaced Parts		Transaxle Compensation Code	Road Test	MEMORY (Learned Values)
Automatic Transaxle Assembly		Input	-	Reset
Valve Body Assembly		Initialize	Necessary	Reset
Shift Solenoid Valve SL1 and/or SL2		-	Necessary	-
Shift Solenoid Valve SL3 and/or SL4		Initialize	Necessary	Reset
TCM (If possible, read the transaxle compensation code from the previous TCM)	Possible	Input (Into the new TCM)	-	-
	Impossible	-	Necessary	-

1. The automatic transaxle is composed of highly precision-finished parts which need careful inspection before reassembly. Even a small nick could cause fluid leakage or affect transmission performance. The instructions here are organized so that you work on only one component group at a time. This will help avoid confusion caused by similar-looking parts of different sub-assemblies being on your workbench at the same time. The component groups are inspected and repaired from the converter housing side. Complete as much of the inspection, repair and reassembly as possible before proceeding to the next component group. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because some parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups. Recommended: ATF WS
2. All disassembled parts should be washed clean and any fluid passages and holes should be blown through with compressed air.

3. Dry all parts with compressed air. Never use a shop rag or a piece of cloth to dry them.
4. When using compressed air, always aim away from yourself to prevent accidentally spraying ATF or kerosene in your face.
5. Only recommended automatic transmission fluid or kerosene should be used for cleaning.
6. After cleaning, the parts should be arranged in the correct order for efficient inspection, repair, and reassembly.
7. When disassembling a valve body, be sure to match each valve together with its corresponding spring.
8. New discs for the brakes and clutches must be soaked in ATF for at least 15 minutes before reassembly.
9. All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.
10. All gaskets, seals, and rubber O-rings should be replaced with new ones.
11. Do not apply adhesive cements to gaskets and similar parts.
12. Make sure that the ends of a snap ring are not aligned with one of the cutouts and that the snap ring is installed in the groove correctly.
13. When replacing a worn bushing, the sub-assembly containing the bushing must also be replaced.
14. Check thrust bearings and races for wear or damage. If they are damaged, replace them.
15. When working with FIPG material, you must observe the following:
 - Using a razor blade and a gasket scraper, remove all the old packing (FIPG) material from the gasket surface.
 - Thoroughly clean all components to remove any loose material.
 - Clean both sealing surfaces with a non-residue solvent.
 - Parts must be reassembled within 10 minutes of application. Otherwise, the packing (FIPG) material must be removed and reapplied.