AUTO TRANS DIAGNOSIS - F4A23, F4A33 & W4A33

1998 Mitsubishi Galant

1997-98 AUTOMATIC TRANSMISSIONS
Mitsubishi F4A23, F4A33 & W4A33 Electronic Controls

Hyundai; Sonata
Mitsubishi; Eclipse, Galant, 3000GT

APPLICATION

TRANSAXLE APPLICATIONS

Vehicle & Model	Transaxle Model
Hyundai	
Sonata	F4A33
Mitsubishi	
Eclipse 2.0L Turbo AWD	W4A33
Eclipse 2.0L Turbo FWD	F4A33
Eclipse 2.4L	F4A23
Galant	F4A23
3000GT	F4A33

INTRODUCTION

The first step in diagnosing any driveability problem is verifying the customer's complaint with a test drive under the conditions the problem reportedly occurred. Before entering self-diagnostics, perform a careful and complete visual inspection. Most transmission control problems result from mechanical breakdowns or poor electrical connections.

DESCRIPTION

The transaxle electronic control system controls transaxle shift points and torque converter clutch control for torque converter lock-up. Transaxle uses hydraulically operated clutches controlled by the Transaxle Control Module (TCM). Overdrive or 4th gear operation is controlled by a manually operated overdrive control switch. Transaxle will not shift into overdrive unless overdrive control switch is in the ON position.

OPERATION

TRANSAXLE CONTROL MODULE (TCM)

The TCM receives information from various input devices and controls various output devices for different gear operation. The TCM is located behind instrument panel, near center of console, and contains a 42-pin connector. See Figs. 1-3. On 3000GT models, a POWER/ECONOMY switch, located on center of console, is used to change shift patterns. The pre-set shift patterns are controlled by the TCM. The TCM controller contains a self-diagnostic system which stores a Diagnostic Trouble Code (FTC) if a transaxle fault exists. Trouble code can be retrieved to determine transaxle problem area. See SELF-DIAGNOSTIC SYSTEM. The TCM contains a fail-safe mode. If certain trouble codes are set, transaxle will enter fail-safe mode. When in fail-safe mode, transaxle will remain in 2nd or 3rd gear with no

upshifts or downshifts. Transaxle will also function in Park, Neutral and Reverse when in fail-safe mode. TCM works in conjunction with the Engine Control Module (ECM) for receiving information for transaxle control. See Figs. 1-3.

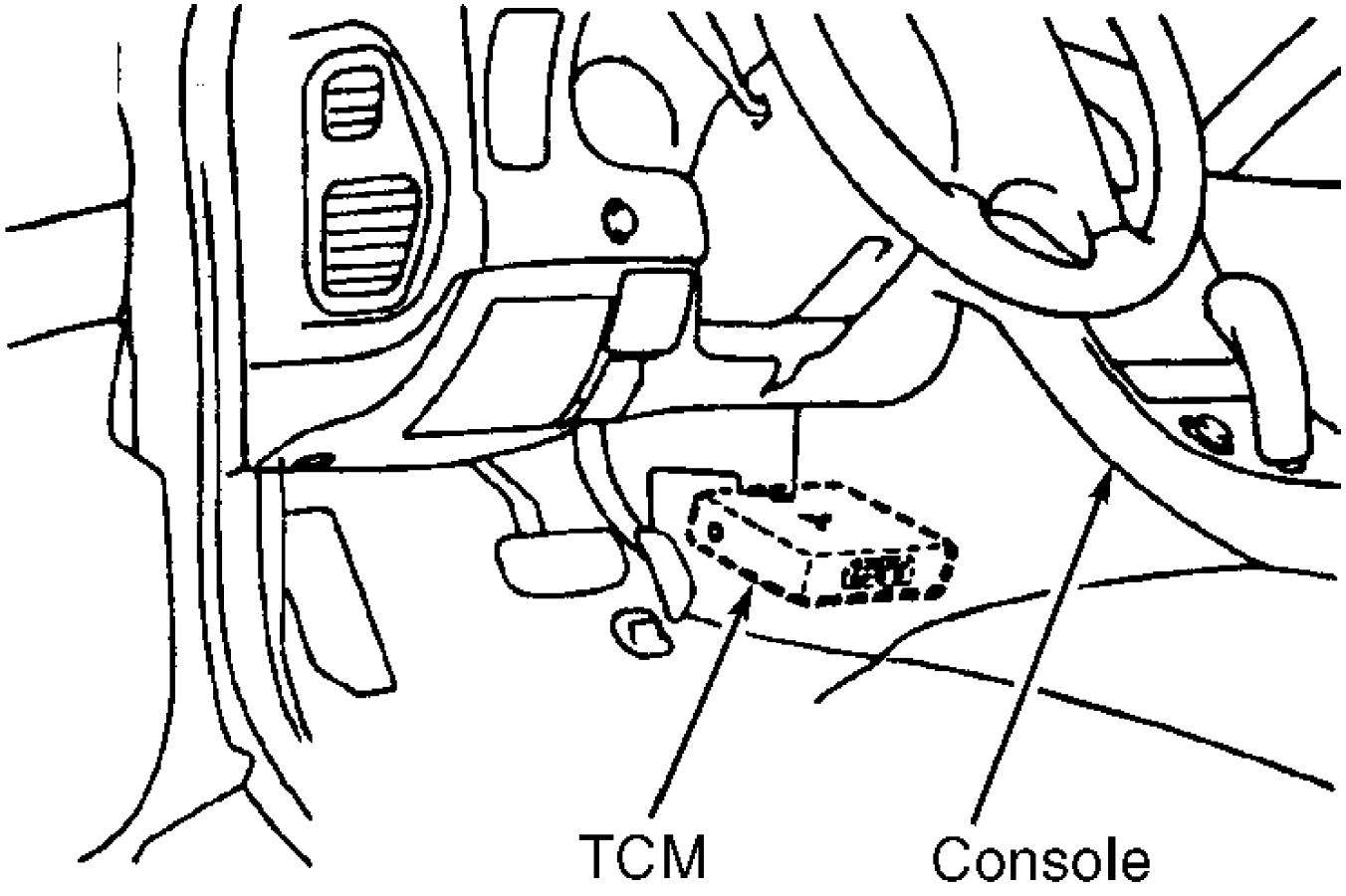

Fig. 1: Locating TCM (Eclipse)
Courtesy of Mitsubishi Motor Sales of America.

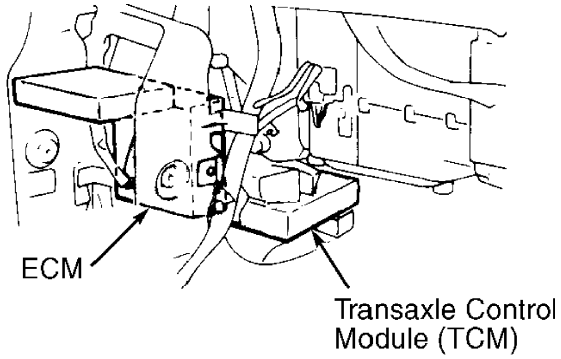

Fig. 2: Locating TCM (3000GT)
Courtesy of Mitsubishi Motor Sales of America.

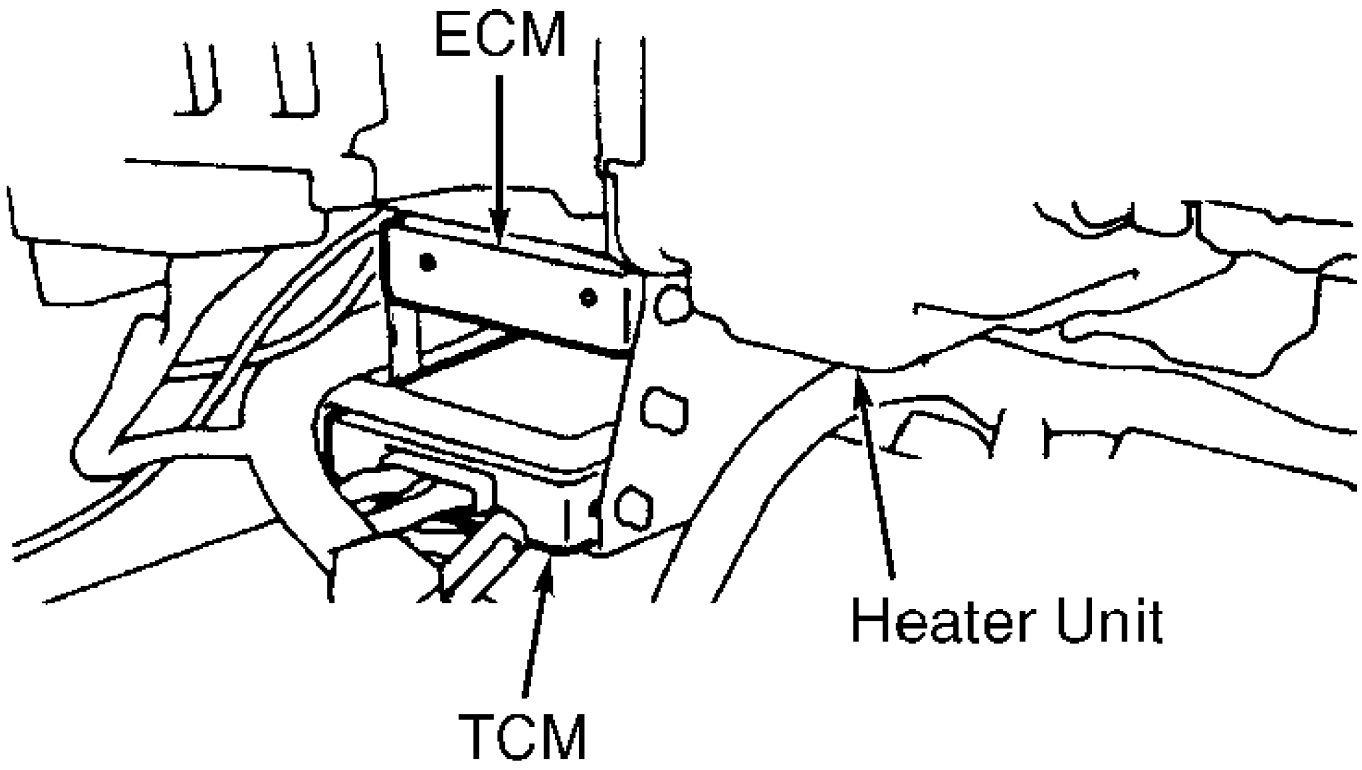

Fig. 3: Locating TCM (Galant & Sonata)
Courtesy of Mitsubishi Motor Sales of America.

INPUT DEVICES

Park Neutral Position (PNP) Switch

PNP switch is an input device mounted on the transaxle manual control shaft. See Fig. 4. PNP switch delivers an input signal to TCM, indicating transaxle manual valve gear position.

Kickdown Servo Switch

Kickdown servo switch is an input device mounted on the side of transaxle case. See Fig. 4. Kickdown servo switch delivers an input signal to the TCM to indicate kickdown servo operation.

NOTE: Oil temperature sensor may also be referred to as fluid temperature sensor. It may be necessary to identify wire color to oil temperature sensor for proper identification. See appropriate wiring diagram under WIRING DIAGRAMS.

Oil Temperature Sensor

Oil temperature sensor is an input device mounted inside the transaxle case. See Fig. 4. Oil temperature sensor delivers an input signal to the TCM to indicate the fluid temperature.

Overdrive Control Switch

Overdrive control switch, located on gear selector lever, delivers an input signal to the TCM. Transaxle will not shift into overdrive unless overdrive control switch is in the ON position.

Pulse Generators

Pulse generators are mounted on transaxle case. See Fig. 4 or

5. Pulse generators indicate transfer shaft speed and end clutch speed. Signals are input to the TCM for transaxle control.

Throttle Position (TP) Sensor

The TP sensor, mounted on the throttle body, determines throttle position and inputs a signal to the TCM. The TCM uses signal to control transaxle upshifts.

Vehicle Speed Sensor (VSS)

Vehicle speed sensor inputs signal to the TCM to indicate vehicle speed. Vehicle speed sensor is mounted on rear of instrument cluster.

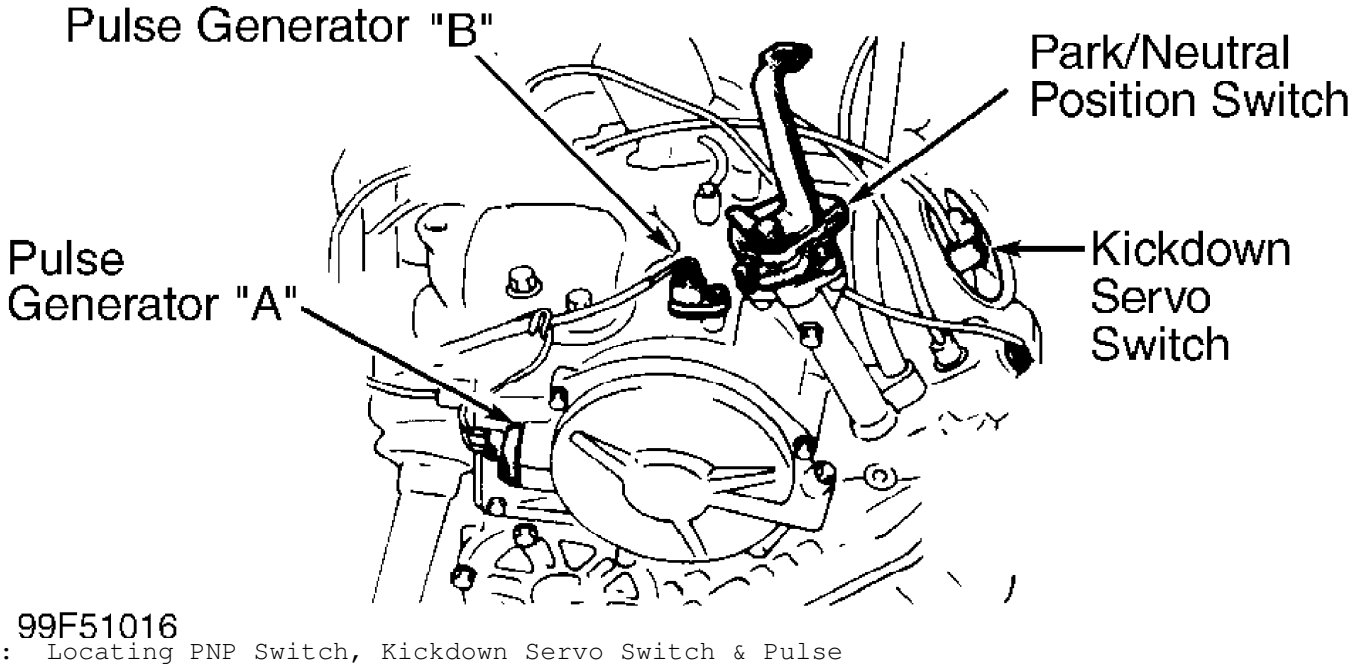

Fig. 4: Locating PNP Switch, Kickdown Servo Switch & Pulse Generators (AWD)
Courtesy of Mitsubishi Motor Sales of America.

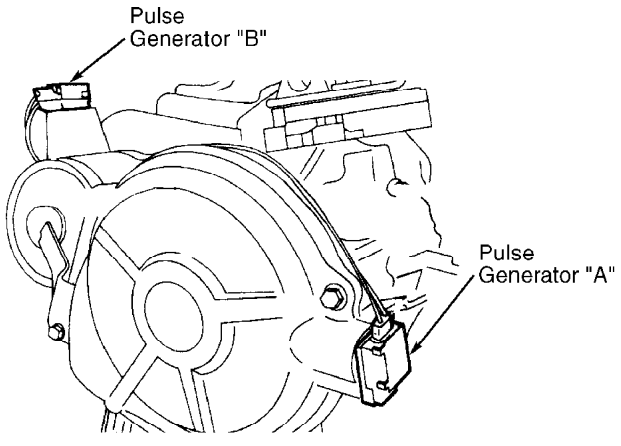

Fig. 5: Locating Pulse Generators (FWD)
Courtesy of Mitsubishi Motor Sales of America.

OUTPUT DEVICES

NOTE: For solenoid valve wire color identification, see WIRING DIAGRAMS.

Pressure Control Solenoid Valve (PCSV)
The PCSV is located on the valve body. See Fig. 6. The TCM operates the PCSV for controlling transaxle shifts.

Shift Control Solenoid Valve (SCSV)
The SCSV "A" or "B" are located on the valve body. See Fig. 6 . The TCM operates SCSV for controlling transaxle shifts.

Torque Converter Clutch Solenoid Valve (TCCSV)
The TCCSV is located on the valve body. See Fig. 6. The TCM operates the TCCSV for torque converter clutch control of torque converter lock-up.

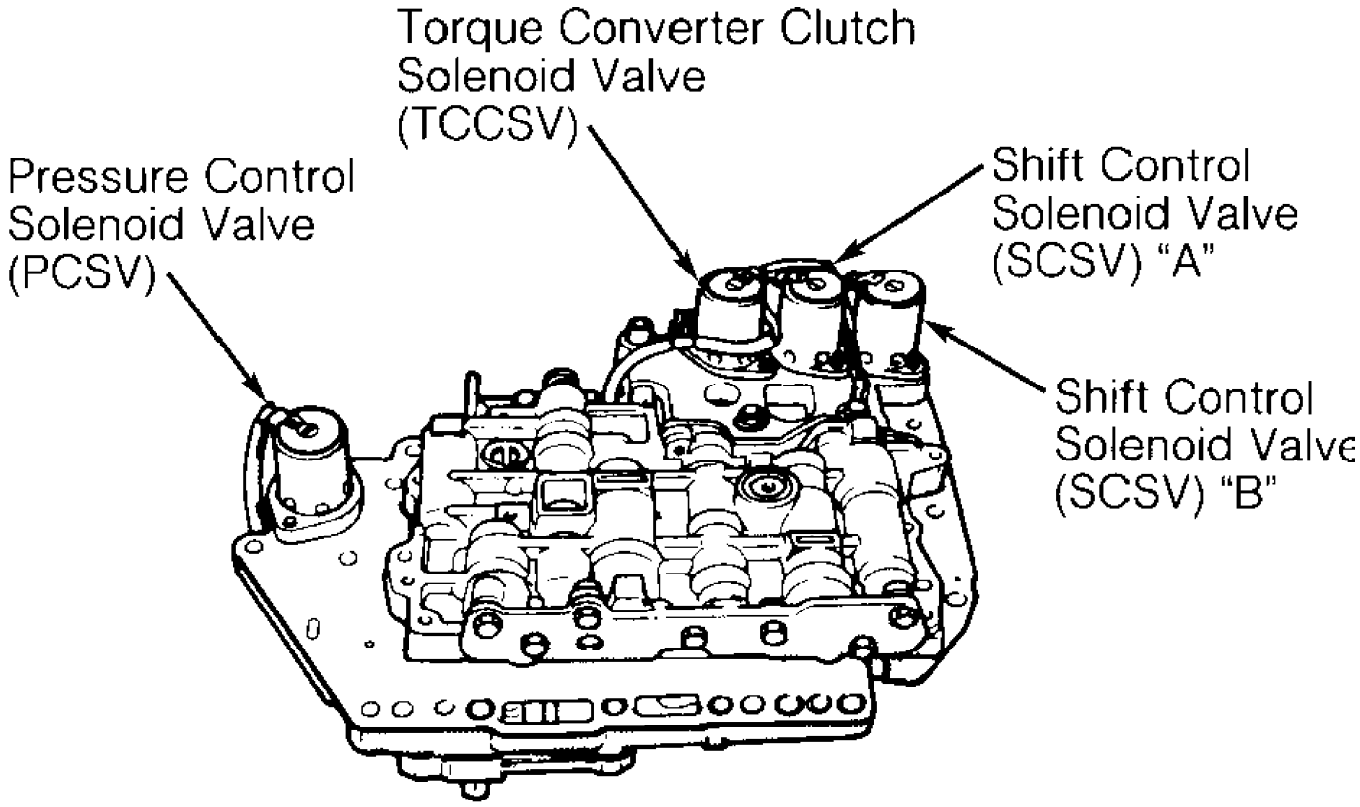

Fig. 6: Identifying Solenoid Valves
Courtesy of Mitsubishi Motor Sales of America.

ADJUSTMENTS

PARK NEUTRAL POSITION (PNP) SWITCH

1) Place gear selector lever and manual control lever on transaxle in Neutral position. Loosen PNP switch retaining screws. Rotate PNP switch body so hole in manual control lever aligns with hole on PNP switch body. See Fig. 7. Tighten PNP switch retaining screws to specification. See TORQUE SPECIFICATIONS.
2) Loosen shift control cable lock nut at shift control cable-to-manual control lever. Pull end of shift control cable toward

manual control lever. Tighten shift control cable lock nut to specification. See TORQUE SPECIFICATIONS.

3) Move gear selector lever through all gear ranges. Ensure manual control lever is in gear position corresponding to gear selector lever. Ensure vehicle starts only in Park and Neutral.

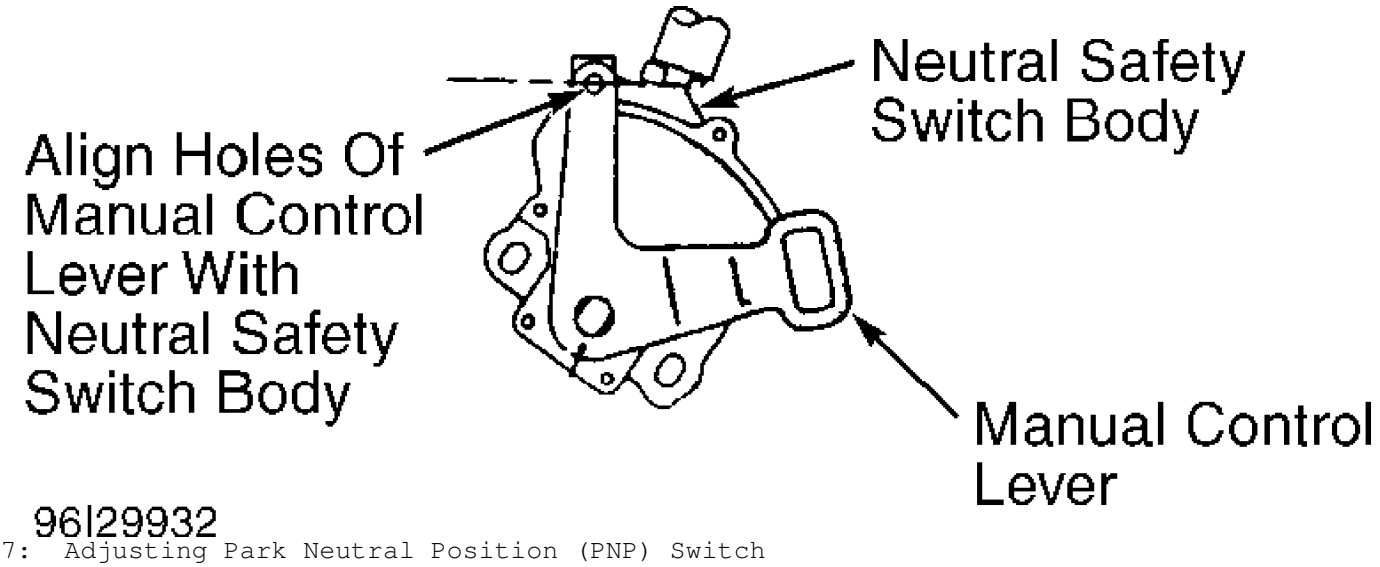

Fig. 7: Adjusting Park Neutral Position (PNP) Switch
Courtesy of Mitsubishi Motor Sales of America.

SELF-DIAGNOSTIC SYSTEM

DIAGNOSTIC PROCEDURE

When performing vehicle diagnosis, the following procedures must be followed:

* Ensure transaxle fluid level is correct and not contaminated or aerated.
* Ensure shift cable is properly adjusted by ensuring vehicle starts in only Park or Neutral. If adjustment is required, see PARK NEUTRAL POSITION (PNP) SWITCH under ADJUSTMENTS.
* Ensure all appropriate electrical connections at transaxle, TCM, throttle position sensor, PNP switch, etc. are clean and properly installed.
* Always clear trouble codes once repair is completed. See CLEARING TROUBLE CODES. Test drive vehicle to determine if complaint or code is repaired. Retrieve trouble codes to confirm code no longer exists. See RETRIEVING TROUBLE CODES.

RETRIEVING TROUBLE CODES

NOTE: Two methods can be used to retrieve trouble codes. Diagnostic Trouble Codes (FTC) can be retrieved with scan tool or voltmeter. Ensure proper method is being used for available tools. If scan tool is not available, see VOLTMETER METHOD to retrieve trouble codes. TCM will store 10 FTC if transaxle has not gone into fail-safe mode. Only 3 FTC will be stored if transaxle goes into fail-safe mode. See FTC IDENTIFICATION table for fail-safe mode trouble codes.

Scan Tool Method

Locate diagnostic connector below instrument panel. On Eclipse, Galant, Sonata and 3000GT models, diagnostic connector is located to the right side of steering wheel under the instrument panel. Connect scan tool and follow manufacturer's instructions. Check scan tool data list for system failure and test probable cause.

SCAN TOOL DATA LIST IDENTIFICATION

Data List No. & Circuit	Test
11 - TP Sensor	A
15 - Oil Temperature Sensor	B
21 - Kickdown Servo Switch	C
23 - Ignition Pulse Signal	D
25 - Closed TP Switch	E
26 - A/C Compressor Clutch Relay Signal	F
27 - Shift Control Solenoids "A" Or "B" Signal	G
28 - Stoplight Switch	H
31 - Pulse Generator "A"	I
32 - Pulse Generator "B"	J
35 - Overdrive Switch	K
37 - Park Neutral Position (PNP) Switch	L
38 - Vehicle Speed Sensor (VSS)	M
45 - PCSV Duty Solenoid	N
47 - Torque Converter Clutch Slippage	O
49 - Torque Converter Clutch Solenoid Duty	P

Test: A

With accelerator pedal released, voltage should be .4-1.0 volts. Voltage should increase smoothly as accelerator is depressed to Wide Open Throttle (WOT). Voltage should be 4.5-5.5 volts at WOT. Possible causes of malfunction may be:

* Incorrectly adjusted TP sensor. See appropriate SELF -DIAGNOSTICS article in ENGINE PERFORMANCE section.
* TP sensor or harness malfunction.
* Defective throttle cable.

Test: B

For cold engine, scan tool temperature should equal outside ambient temperature. Start and run vehicle engine. Temperature should gradually increase to 158-194°F (70-90°C) degrees. Possible cause of malfunction may be defective oil temperature sensor or harness.

Test: C

With engine idling and transaxle in "L" position, switch status should be ON. Test drive vehicle in "2" position, switch status should be OFF with vehicle stopped or above 25 MPH (40 KM/H) and ON when driving at 6 MPH (10 KM/H). Switch status should be ON in "D" position with overdrive switch OFF. Switch status should be OFF in overdrive. Possible causes of malfunction may be:

* Incorrectly adjusted kickdown servo.
* Defective kickdown servo switch or harness.
* Defective kickdown servo.

Test: D

With engine idling in neutral, engine speed should be 600-900 RPM. Drive vehicle at 31 MPH (50 KM/H) in "D" position with overdrive switch OFF. Scan tool should display 1800-2200 RPM. Possible causes of malfunction may be:

* Defective ignition system.
* Defective ignition signal pickup circuit harness.

Test: E

Turn ignition switch to On position, engine OFF and transaxle in "N" position. With accelerator pedal fully released, switch status should be ON. With accelerator pedal slightly depressed or at WOT, switch status should be OFF. Possible causes of malfunction may be:

* Incorrectly adjusted TP sensor. See appropriate SELF -DIAGNOSTICS article in ENGINE PERFORMANCE section.
* Defective TP sensor or harness.

Test: F

With engine idling in "D" position and air conditioning on, switch status should be ON. With air conditioning off, switch status should be OFF. Cause of malfunction may be defective air conditioning compressor clutch power relay ON signal detection circuit.

Test: G

Operate vehicle and note scan tool display. See DATA LIST NO. 27 DISPLAY table.

DATA LIST NO. 27 DISPLAY

Condition	Display
"D" Range	
Idling, Throttle Fully Closed, Vehicle Stopped	C
Throttle Slightly Open, Vehicle Stopped	1
"L" Range, Idling	1
"2" Range, 2nd Gear	
Idling, Vehicle Stopped	C
Driving At 6 MPH (10 KM/H)	1
Driving At Constant 25 MPH (40 KM/H)	2
"D" Range, O/D Off, 3rd Gear	3
"D" Range, O/D On, 4th Gear	4

Possible causes for malfunction may be:

* Defective TCM.
* Defective TP sensor.
* Defective PNP switch.

Test: H

With ignition switch in ON position, engine stopped and brake pedal depressed, switch status should be ON. With brake pedal released, switch status should be OFF. Possible cause for malfunction may be stoplight switch or stoplight signal circuit.

Test: I

Operate vehicle and note scan tool display for pulse generator "A". See DATA LIST NO. 31 DISPLAY table.

DATA LIST NO. 31 DISPLAY

Selector Lever Position & Condition	Display RPM
"D"/Overdrive OFF, 31 MPH (50 KM/H)	1800-2200
"D"/Overdrive ON, 31 MPH (50 KM/H)	1200-1500

Possible causes of malfunction may be:

* Defective pulse generator "A", shielded wire or ground wire.
* External noise interference.

Test: J
Operate vehicle and note scan tool display for pulse generator "B". See DATA LIST NO. 32 DISPLAY table.

DATA LIST NO. 32 DISPLAY

Selector Lever Position & Condition	Display RPM
"D"/Overdrive OFF, 31 MPH (50 KM/H)	1800-2200
"D"/Overdrive ON, 31 MPH (50 KM/H)	1800-2200

Possible causes of malfunction may be:

* Defective pulse generator "B", shielded wire or ground wire.
* External noise interference.

Test: K
Scan tool display should match overdrive switch position with ignition switch in ON position and engine OFF. Possible cause of malfunction may be defective OD switch or harness.

Test: L
Operate shift lever and note scan tool display. Display should match PNP switch position. Possible cause of malfunction is:

* Incorrectly adjusted PNP switch.
* Defective PNP switch or harness.
* Defective manual control cable.

Test: M
Test drive vehicle. Scan tool display should match speedometer reading. Possible cause of malfunction may be VSS or harness is defective.

Test: N
Operate vehicle and note scan tool display. See DATA LIST NO. 45 DISPLAY table.

DATA LIST NO. 45 DISPLAY

Selector Lever Position & Condition	Display
"D" Range, Throttle Closed, Vehicle Stopped	65-85%
"D" Range, Throttle Depressed Slightly, 3 MPH (5 KM/H)	90-100%

Possible causes of malfunction may be:

* Defective TCM.
* Defective TP sensor.

Test: O
Operate vehicle and note scan tool display. See DATA LIST NO. 47 DISPLAY table.

DATA LIST NO. 47 DISPLAY

Selector Lever Position & Condition	Display
"D"/Overdrive Off, 31 MPH (50 KM/H)	100-300 RPM
"D"/Overdrive Off, 43 MPH (70 KM/H)	0-10 RPM

Possible causes of malfunction may be:

* Defective torque converter clutch.
* Defective ignition signal line or pulse generator "B" circuit.
* Incorrect transmission fluid pressure.
* Defective TCC solenoid.

Test: P

Operate vehicle and note scan tool display. See DATA LIST NO. 49 DISPLAY table.

DATA LIST NO. 49 DISPLAY

Selector Lever Position & Condition	Display
"D"/Overdrive Off, 31 MPH (50 KM/H)	0%
"D"/Overdrive Off, 43 MPH (70 KM/H)	40-60%

Possible causes of malfunction may be:

* Defective TCM.
* Defective TP sensor circuit.
* Defective pulse generator "B" circuit.

Voltmeter Method

1) Locate diagnostic connector below instrument panel. On Eclipse, Galant, Sonata and 3000GT models, diagnostic connector is located to the right side of steering wheel under the instrument panel. Install voltmeter between ground terminal No. 4 or No. 5 and diagnostic output terminal No. 6. See Fig. 8.

2) Turn ignition on. Note fluctuations of voltmeter needle to indicate FTC. The first fluctuation indicates first digit of FTC. Following fluctuations indicate the second digit of FTC. See Fig. 9. Record FTC in order displayed. To identify FTC and items to be checked or adjusted, see FTC IDENTIFICATION table.

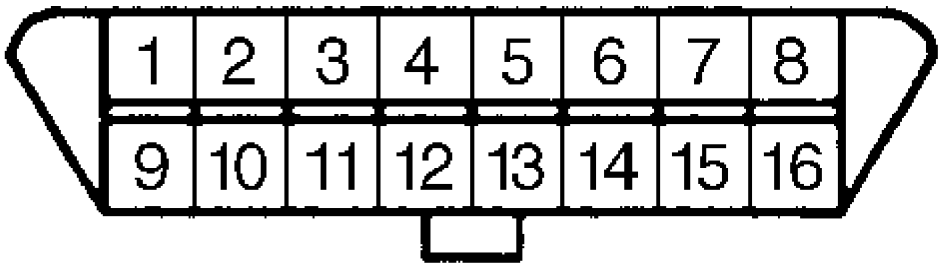

Fig. 8: Identifying Data Link Connector Terminals
Courtesy of Mitsubishi Motor Sales of America.

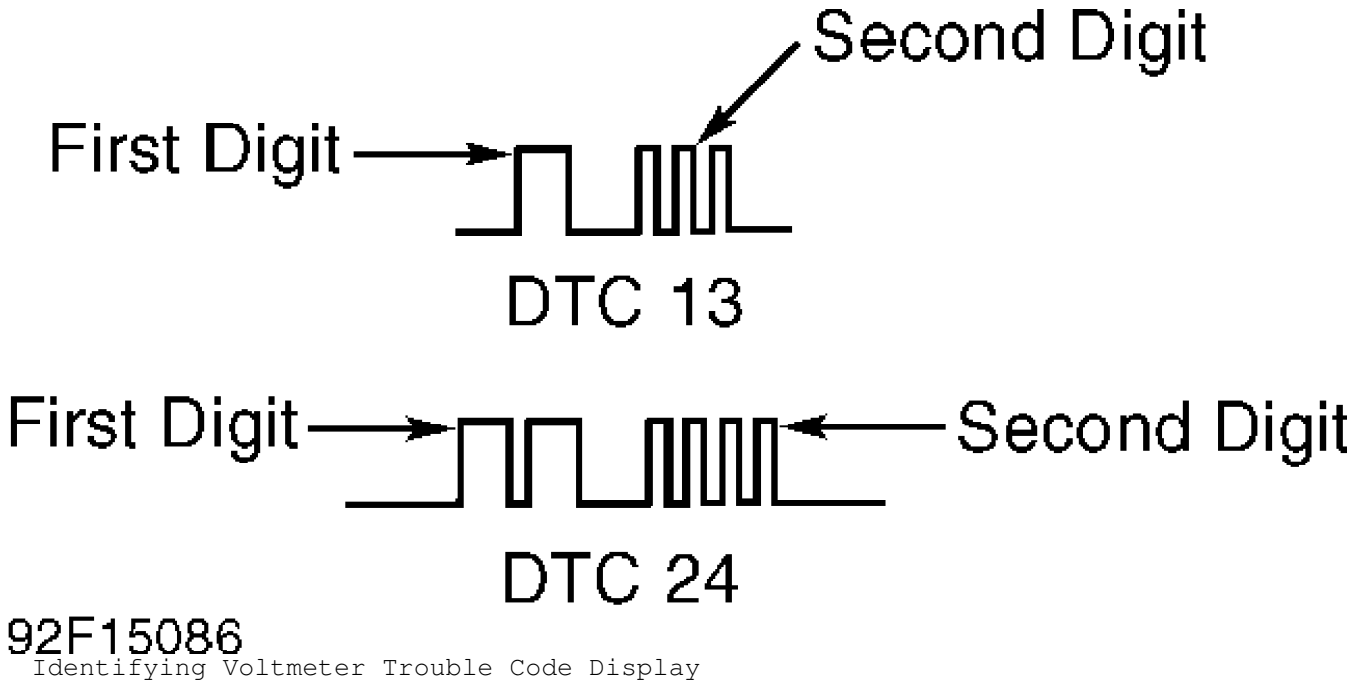

Fig. 9: Identifying Voltmeter Trouble Code Display
Courtesy of Mitsubishi Motor Sales of America.

FTC IDENTIFICATION

FTC IDENTIFICATION

11	High TP Sensor Output	Check TP Sensor Operation, Adjustment & Connector, Check Accelerator Switch
12	Low TP Sensor Output	Check TP Sensor Operation, Adjustment & Connector, Check Accelerator Switch
13	Defective Or Improperly Adjusted TP Sensor	Check TP Sensor Operation & Adjustment
14	Improperly Adjusted TP Sensor	Check TP Sensor Adjustment
15	Open Oil Temperature Sensor Circuit	Check Oil Temperature Sensor & Connector
16 (2)	Shorted Oil Temperature Sensor Circuit	Check Oil Temperature Sensor Wiring Harness
21	Open Kickdown Servo Switch Circuit	Check Kickdown Servo Switch & Connector
22	Shorted Kickdown Servo Switch Circuit	Check Kickdown Servo Switch & Connector
23	Open Ignition Pulse Signal Circuit	Check For Open Circuit To Pins No. 46 Or 63 At TCM
31	Open Pulse Generator "A" Circuit	Check Pulse Generator, Check Vehicle Speed Sensor

32	Open Pulse Generator "B" Circuit	Check Pulse Generator, Check Vehicle Speed Sensor
36 (2)	Short Circuit Neutral Safety Switch	Check Neutral Safety Switch
37 (2)	Open Circuit Neutral Safety Switch	Check Neutral Safety Switch
41	Open Shift Control Solenoid Valve "A" Circuit	Check Shift Control Solenoid Valve & Connector
42	Shorted Shift Control Solenoid Valve "A" Circuit	Check Shift Control Solenoid Valve & Connector
43	Open Shift Control Solenoid Valve "B" Circuit	Check Shift Control Solenoid Valve & Connector
44	Shorted Shift Control Solenoid Valve "B" Circuit	Check Shift Control Solenoid Valve & Connector
45	Open Pressure Control Solenoid Valve Circuit	Check Pressure Control Solenoid Valve & Connector
46	Shorted Pressure Control Solenoid Valve Circuit	Check Pressure Control Solenoid Valve & Connector
47	Open TCC Solenoid Valve Circuit	Check TCC Solenoid Valve & Connector
48	Shorted TCC Solenoid Valve Circuit	Check TCC Solenoid Valve & Connector
49	Defective TCC System	Check TCC Hydraulic Circuit, Check TCC Solenoid Valve, Defective TCM
51	Incorrect Or No Upshift From 1st Gear	Check Pulse Generators "A" & "B" Or Connectors, Rear Clutch Slipping
52	Incorrect Or No Upshift From 2nd Gear	Check Pulse Generators "A" & "B" Or Connectors, Rear Clutch Slipping, Kickdown Band Slipping
53	Incorrect Or No Upshift From 3rd Gear	Check Pulse Generators "A" & "B" Or Connectors, Front Or Rear Clutch Slipping
54	Incorrect Or No Upshift From 4th Gear	Check Pulse Generators "A" & "B" Or Connectors, End Clutch Slipping, Kickdown Band Slipping
59 (2)	Abnormal Vibration	Check Pulse Generator "A" Or Connector, Replace ATF
61 (3)	Shorted Torque Reduction Request Signal Line Or Open Torque Converter Reduction Execution Signal Line	Check Torque Reduction Request Or Execution Signal Line
62 (3)	Open Circuit On Torque Reduction Request Signal Line	Check Torque Reduction Request Signal Line

63 (3)	Shorted Circuit On Torque Reduction Execution Signal Line	Check Torque Reduction Execution Signal Line
81 (4)	Open Pulse Generator "A" Circuit	See DTC No. 31
82 (4)	Open Pulse Generator "B" Circuit	See DTC No. 32
83 (4)	Open Or Shorted Shift Control Solenoid Valve "A" Circuit	See DTC No. 41 & 42
84 (4)	Open Or Shorted Shift Control Solenoid Valve "B"	See DTC No. 43 & 44
85 (4)	Open Or Shorted Pressure Control Solenoid Valve	See DTC No. 45 & 46
86 (4)	Incorrect Or No Upshift	See DTC No. 51, 52, 53 & 54

(1) - To check items listed, see DIAGNOSTIC TESTING or COMPONENT TESTING.
(2) - Testing for Sonata not available.
(3) - Applies to Eclipse and 3000GT models only.
(4) - Trouble code is set in fail-safe mode only.

CLEARING TROUBLE CODES

WARNING: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in APPLICATIONS & IDENTIFICATION before disconnecting battery.

Trouble codes can be cleared from TCM memory by disconnecting negative battery cable for more than 10 seconds. Ensure trouble codes are cleared after performing repairs.

DIAGNOSTIC TESTING

NOTE: For engine-related DTCs, see appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE section. These DTCs apply to engine performance and must be repaired first, as engine performance and related component signals will affect transmission operation and diagnosis. For TCM pin voltage tests, see TCM PIN VOLTAGES table under PIN VOLTAGE TESTING.

FTC 11, 12, 13 & 14: TP SENSOR MALFUNCTION

NOTE: If TP sensor output is excessive, FTC 11 is set. If TP sensor output is insufficient, FTC 12 is set. If TP sensor output and TCM value do not match, FTC 13 is set. If TP sensor adjustment is defective, FTC 14 is set.

1) Inspect TP sensor. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE section. Replace as needed and go to next step. If TP sensor is okay, inspect TP sensor connector and TCM

connector. Repair as needed and go to next step.

2) Clear FTC. See CLEARING TROUBLE CODES. Operate vehicle and check if FTC resets. If FTC is not present, vehicle is currently operating correctly. If FTC is reset, turn ignition off. Inspect continuity of circuits between TCM and TP sensor. See WIRING DIAGRAMS. Repair as needed. If circuit(s) are okay, replace TCM.

FTC 15 & 16: OIL TEMPERATURE SENSOR

NOTE: If FTC 15 is set, check for open circuit in oil temperature sensor. If FTC 16 is set, check for short circuit in oil temperature sensor.

1) Inspect oil temperature sensor. See COMPONENT TESTING. Replace as needed. With sensor connector disconnected, turn ignition on. Using voltmeter, measure voltage between sensor harness connector terminal No. 1 and ground. See Fig. 10. If voltage is not 4.8-5.2 volts, go to next step. If voltage is 4.8-5.2 volts, go to step 4).

2) Turn ignition off. Using ohmmeter, check continuity between ground and terminal No. 2 on sensor harness connector. If continuity does not exist, go to next step. If continuity exists, go to step 4).

3) Turn ignition off. Disconnect TCM connector. Inspect connector and repair as needed. Using ohmmeter, check continuity of circuits between TCM and oil temperature sensor harness connectors. See WIRING DIAGRAMS. Repair as needed. If circuit is okay, replace TCM.

4) Turn ignition off. Disconnect TCM connector(s). Inspect connector and repair as needed. Clear FTC. See CLEARING TROUBLE CODES. Operate vehicle and recheck FTC. If FTC is not present, vehicle is currently operating correctly. If FTC resets, repeat step 1).

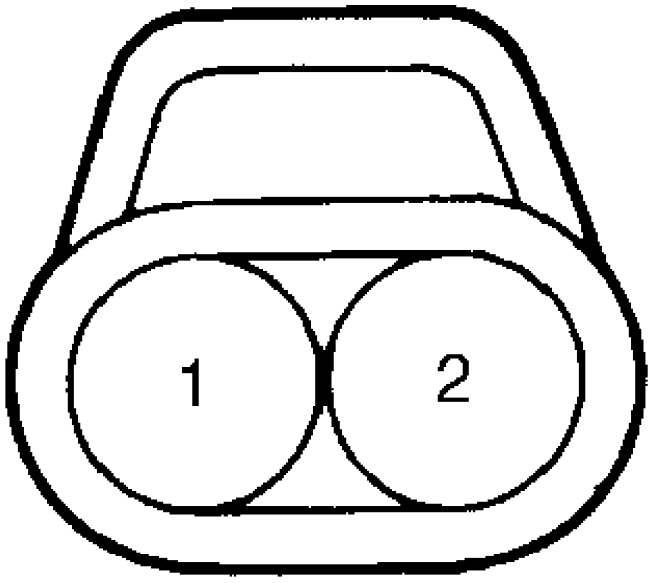

Fig. 10: Identifying Oil Temperature Sensor Terminals
Courtesy of Mitsubishi Motor Sales of America.

FTC 21 & 22: KICKDOWN SERVO SWITCH

NOTE: If FTC 21 is set, check for open circuit in kickdown servo switch. If FTC 22 is set, check for short circuit in kickdown servo switch.

1) Inspect kickdown servo switch. See COMPONENT TESTING. Replace as needed. With switch connector disconnected, turn ignition on. Using voltmeter, measure voltage at harness connector terminal. If battery voltage does not exist, go to next step. If battery voltage exists, go to step 3).
2) Turn ignition off. Disconnect TCM connector. Inspect connector and repair as needed. Using ohmmeter, check continuity between TCM and kickdown servo switch harness connectors. See WIRING DIAGRAMS. Repair as needed. If circuit is okay, replace TCM.
3) Turn ignition off. Disconnect TCM connector. Inspect connector and repair as needed. Clear FTC. See CLEARING TROUBLE CODES. Operate vehicle and recheck FTC. If FTC is not present, vehicle is currently operating correctly. If FTC resets, repeat step 1).

FTC 23: IGNITION SIGNAL

NOTE: FTC 23 may be set by possible open circuit in ignition signal.

1) If ignition pulses are not input to TCM while engine is idling, an open circuit in ignition signal line to TCM exists. Inspect appropriate connectors and wiring and repair as needed. See WIRING DIAGRAMS.
2) If vehicle's tachometer is not functioning correctly, inspect ignition circuit system. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE section. Possible causes of trouble code are ignition coil or power transistor malfunction. If tachometer is functioning correctly, replace TCM.

FTC 28: STOPLIGHT SWITCH MALFUNCTION

NOTE: FTC 28 may be set by possible short circuit in stoplight switch.

1) Inspect stoplight switch. See COMPONENT TESTING. Replace as needed. If stoplight switch is okay, inspect harness and connector. Repair as needed. Check continuity of circuit(s) between stoplight switch and TCM. See WIRING DIAGRAMS. Repair as needed.
2) Turn ignition off. Disconnect TCM connector. Using ohmmeter, check continuity of circuits between stoplight switch and TCM. Repair as needed. If all circuits are okay, replace TCM.

FTC 31 & 81: PULSE GENERATOR "A"

NOTE: If there is an open circuit in pulse generator "A", FTC 31 is set. If there is an open circuit in pulse generator "A" and vehicle is in limp-home mode, FTC 81 is set.

1) Inspect pulse generator "A". See COMPONENT TESTING. Replace as needed. If pulse generator is okay, inspect harness and connector. Repair as needed. Check continuity of circuit(s) between pulse generator "A" and TCM. See WIRING DIAGRAMS. Repair as needed.
2) Inspect end clutch retainer for damage. See appropriate overhaul article. Replace as needed. If end clutch retainer is okay, replace TCM.

FTC 32 & 82: PULSE GENERATOR "B"

NOTE: If there is an open circuit in pulse generator "B", FTC 32 is set. If there is an open circuit in pulse generator "B" and vehicle is in limp-home mode, FTC 82 is set.

1) Inspect pulse generator "B". See COMPONENT TESTING. Replace as needed. If pulse generator is okay, inspect harness and connector. Repair as needed. Check continuity between pulse generator "B" and TCM. See WIRING DIAGRAMS. Repair as needed.
2) Inspect end clutch retainer for damage. See appropriate overhaul article. Replace as needed. If end clutch retainer is okay, replace TCM.

FTC 36 & 37: PARK NEUTRAL POSITION (PNP) SWITCH

NOTE: If there is a short circuit in PNP, FTC 36 is set. If there is an open circuit in PNP, FTC 37 is set.

1) Inspect PNP switch. See COMPONENT TESTING. Replace as needed. If switch is okay, disconnect connector. Turn ignition on. Using voltmeter, measure voltage between PNP switch connector terminal No. 3 or No. 4 and ground. See Fig. 11. See WIRING DIAGRAMS. If battery voltage exists, go to next step. If battery voltage does not exist, repair circuit and recheck FTC.
2) Turn ignition off. Disconnect TCM connector. Using ohmmeter, check continuity of circuits between PNP switch and TCM. Repair as needed. If all circuits are okay, replace TCM.

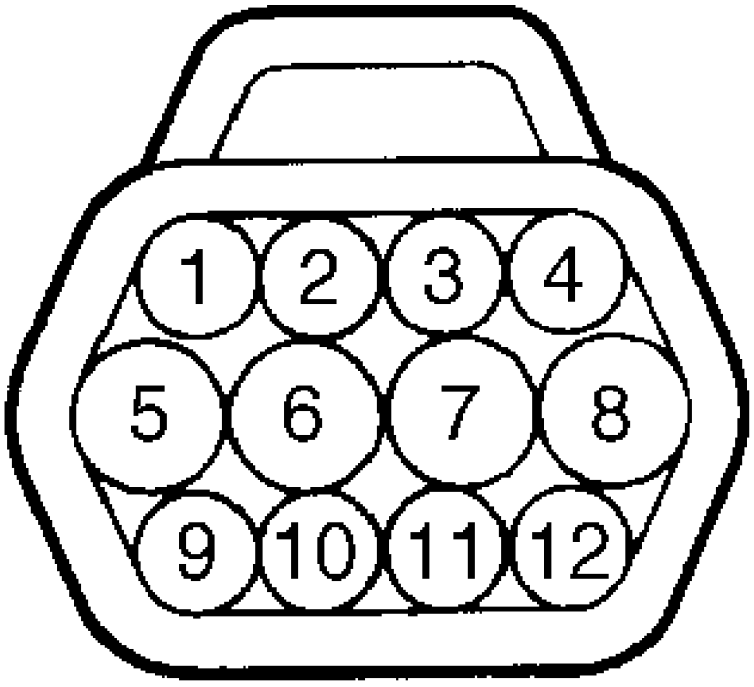

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Fig. 11: Identifying Park Neutral Position (PNP) Switch Connector Terminals
Courtesy of Mitsubishi Motor Sales of America.

FTC 41, 42 & 83: SHIFT CONTROL SOLENOID VALVE "A" (SCSV-A)

NOTE: If there is an open in SCSV-A, FTC 41 is set. If there is a short circuit in SCSV-A, FTC 42 is set. If either FTC 41 or 42 is set and vehicle is in limp-home mode, FTC 83 is set.

Inspect SCSV-A. See COMPONENT TESTING. Replace as needed. If shift solenoid is okay, disconnect TCM connector. Using ohmmeter, check continuity between SCSV-A and TCM. See WIRING DIAGRAMS. Repair as needed. If circuit is okay, replace TCM.

FTC 43, 44 & 84: SHIFT CONTROL SOLENOID VALVE "B" (SCSV-B)

NOTE: If there is an open in SCSV-B, FTC 43 is set. If there is a short circuit in SCSV-B, FTC 44 is set. If either FTC 43 or 44 is set and vehicle is in limp-home mode, FTC 84 is set.

Inspect SCSV-B. See COMPONENT TESTING. Replace as needed. If shift solenoid is okay, disconnect TCM connector. Using ohmmeter, check continuity between SCSV-B and TCM. See WIRING DIAGRAMS. Repair as needed. If circuit is okay, replace TCM.

FTC 45, 46 & 85: PRESSURE CONTROL SOLENOID VALVE (PCSV)

NOTE: If there is an open in PCSV, FTC 45 is set. If there is a short circuit in PCSV, FTC 46 is set. If either FTC 45 or 46 is set and vehicle is in limp-home mode, FTC 85 is set.

Inspect PCSV. See COMPONENT TESTING. Replace as needed. If shift solenoid is okay, disconnect TCM connector. Using ohmmeter, check continuity between PCSV and TCM. See WIRING DIAGRAMS. Repair as needed. If circuit is okay, replace TCM.

FTC 47, 48, 49 & 58: TORQUE CONVERTER CLUTCH (TCC) SOLENOID

NOTE: If there is an open in TCC, FTC 47 is set. If there is a short circuit in TCC, FTC 48 is set. If TCC drive duty stays at 100 percent for more than 4 seconds, an abnormality in TCC circuit has occurred and FTC 49 is set. If calculated slip amount is incorrect and TCC is locked all the time, FTC 58 is set.

Inspect TCC solenoid. See COMPONENT TESTING. Replace as needed. If shift solenoid is okay, disconnect TCM connector. Using ohmmeter, check continuity between TCC solenoid and TCM. See WIRING DIAGRAMS. Repair as needed. If circuit is okay, replace TCM.

FTC 51 & 86: 1ST GEAR RATIO INCORRECT

NOTE: If pulse generator "A" value and pulse generator "B" value do not match after 1st gear is engaged, FTC 51 may be set. If FTC 51, 52, 53 or 54 are set and vehicle is in limp-home mode, FTC 86 is set.

If code 31 is output, see FTC 31 & 81: PULSE GENERATOR "A". If code 32 is output, see FTC 32 & 82: PULSE GENERATOR "B". If neither code is output, inspect wiring harness to both pulse generators on transmission for damage. Noise interference may cause a trouble code to set. If wiring harness is okay, inspect transfer driven gear, end clutch retainer and rear clutch. See appropriate overhaul article.

FTC 52 & 86: 2ND GEAR RATIO INCORRECT

NOTE: If pulse generator "A" value and pulse generator "B" value do not match after 2nd gear is engaged, FTC 52 may be set. If FTC 51, 52, 53 or 54 are set and vehicle is in limp-home mode, FTC 86 is set.

If code 51 is output, see FTC 51 & 86: 1ST GEAR RATIO INCORRECT. If code 51 is not output, replace kickdown brake. See appropriate overhaul article.

FTC 53 & 86: 3RD GEAR RATIO INCORRECT

NOTE: If pulse generator "A" value and pulse generator "B" value do not match after 3rd gear is engaged, FTC 53 may be set. If FTC 51, 52, 53 or 54 are set and vehicle is in limp-home mode, FTC 86 is set.

If code 51 is output, see FTC 51 & 86: 1ST GEAR RATIO INCORRECT. If code 51 is not output, replace front clutch. See appropriate overhaul article.

FTC 54 & 86: 4TH GEAR RATIO INCORRECT

NOTE: If pulse generator "A" value and pulse generator "B" value do not match after 4th gear is engaged, FTC 54 may be set. If FTC 51, 52, 53 or 54 are set and vehicle is in limp-home mode, FTC 86 is set.

If code 52 is output, see FTC 52 & 86: 2ND GEAR RATIO INCORRECT. If code 52 is not output, replace end clutch. See appropriate overhaul article.

FTC 59: ABNORMAL VIBRATION

1) Most common cause of vibration is abnormal torque converter clutch pressure or defective torque converter. See appropriate overhaul article.
2) Disconnect transmission oil temperature sensor. If vibration still exists, engine vibration is most likely source. If vibration does not exist, inspect torque converter clutch hydraulic pressure. See appropriate overhaul article.
3) If pressure readings are not within specification, replace torque converter. If pressure readings are within specification, inspect valve body. Ensure valve body is not loose or has damaged "O" rings.

FTC 61, 62 & 63: TORQUE REDUCTION REQUEST & EXECUTION SIGNAL LINES

1) Code(s) are normally set due to poor connection, open circuit or, TCM or ECM malfunction. Ensure ignition is off. Disconnect ECM harness connector. Turn ignition on. Using voltmeter, measure voltage between ground and terminal No. 7 on ECM connector. See Fig. 12. If voltage is not 4.8-5.2 volts, go to next step. If voltage is 4.8-5.2 volts, substitute ECM with known good unit and retest.
2) Turn ignition off. Disconnect TCM connector. Using ohmmeter, check continuity of torque reduction request circuit between TCM and ECM. Repair as needed. If circuit is okay, replace TCM.

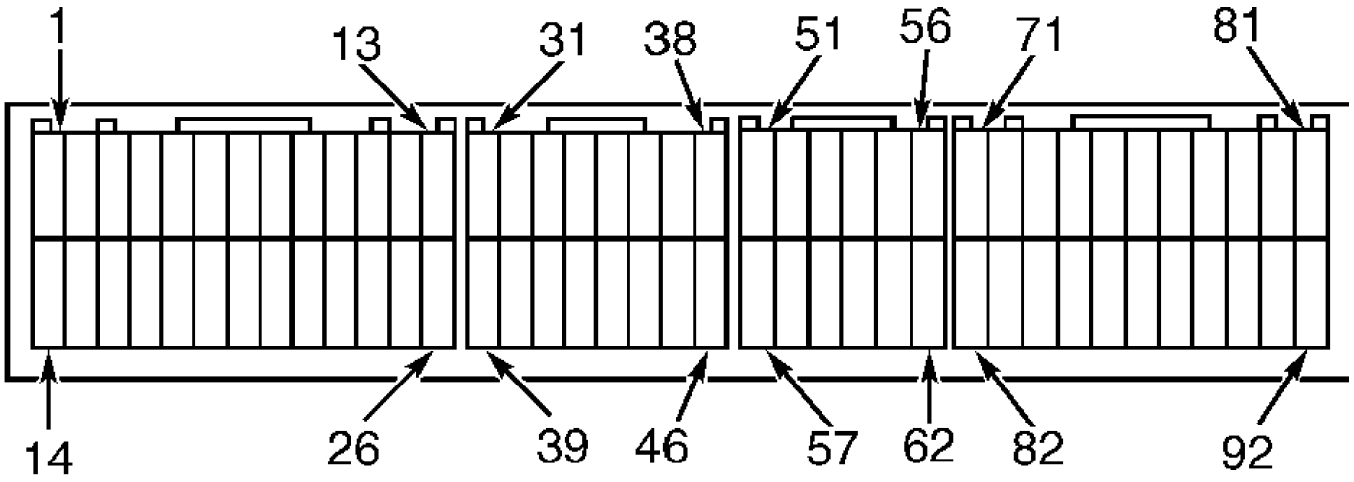

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Fig. 12: ECM Connector Terminals (Eclipse, Galant & 3000GT)
Courtesy of Mitsubishi Motor Sales of America.

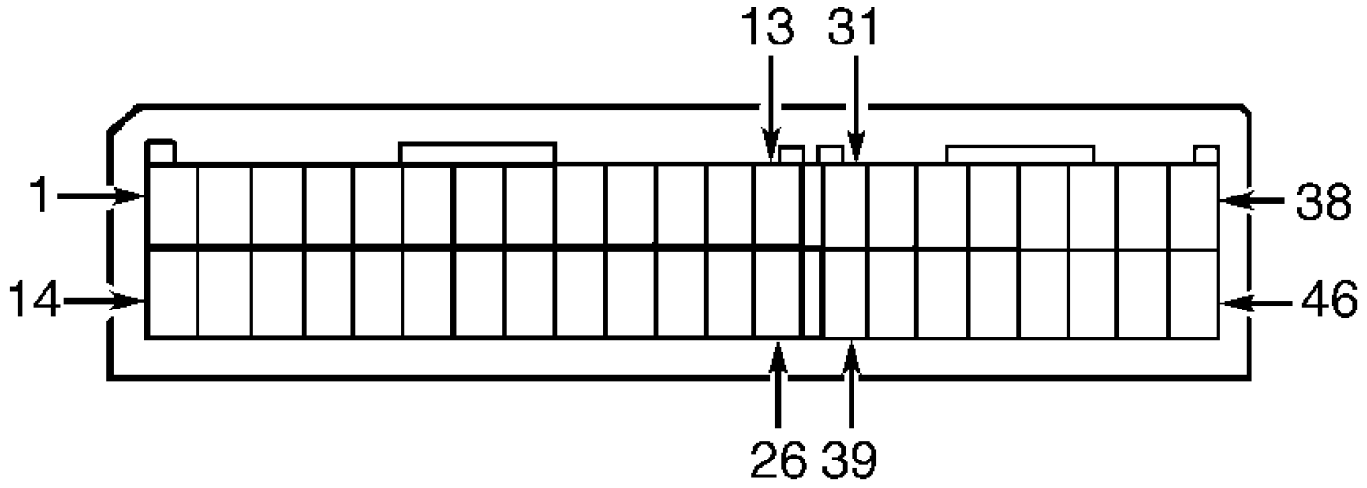

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Fig. 13: TCM Connector Terminal (Eclipse, Galant & 3000GT)
Courtesy of Mitsubishi Motor Sales of America.

PIN VOLTAGE TESTING

For the TCM pin voltage tests and correct TCM terminal locations, see Fig. 13 and TCM PIN VOLTAGES table.

TCM PIN VOLTAGES

Terminal Number	Description & Condition (1)	Value
No. 1 - Torque Converter Clutch (TCC) Solenoid	Selector Lever In "D" Position, Idling	0 Volts
	When Clutch Solenoid Is Operating	1-3 Volts

No. 2 - Shift Control Solenoid Valve "A" (SCSV-A)	Selector Lever In "L" Position, Idling	Battery Voltage
	Selector Lever In "2" Position, Idling	0 Volts
No. 3 - Oil Temperature Light (AWD Only) (2)	At All Times	0 Volts
	5 Minutes After Turning Ignition Switch On	Battery Voltage
No. 4 - ECM Communication, Idling With Selector Lever In "D" Position (2)		.5-4.5 Volts
No. 7 - Kickdown Servo Switch	Selector Lever In "L" Position, Idling	0 Volts
	Selector Lever In "D" Position, In 2nd Gear	Battery Voltage
No. 8 - A/C Compressor Clutch Relay Signal	A/C Switch On	Battery Voltage
	A/C Switch Off	0 Volts
No. 9 - Diagnostic Output Terminal		Fluctuates 0-5 volts
No. 11 - Diagnostic Test Mode Control Terminal (3)		
No. 12 - Power Supply, Idling		Battery Voltage
No. 13 - Ground, Idling		0 Volts
No. 14 - Pressure Control Solenoid Valve (PCSV), Idling In "D" Position		1.5-2.0 Volts
No. 15 - Shift Control Solenoid Valve "B" (SCSV-B)	In 1st & 2nd Gear	Battery voltage
	In 3rd & 4th Gear	0 Volts
No. 17 - ECM Communication, Idling With Engine Warm, Selector Lever In "D" Position		Approximately 2.5 Volts
No. 18 - ECM Communication, Idling With Selector Lever In "D" Position		5 Volts
No. 20 - Closed Throttle	Idling	0 Volts

Position Switch	Off Idle	5 Volts
No. 21 - Throttle Position Sensor	Throttle Fully Closed	.4-1.0 Volts
	Throttle Fully Open	4.5-5.5 Volts
No. 23 - Oil Temperature Sensor	Temperature At 68°F (20°C)	3.9 Volts
	Temperature At 212°F (100°C)	1.4 Volts
No. 24 - Sensor Ground, Idling		0 Volts
No. 25 - Power Supply, Idling		Battery voltage
No. 26 - Ground, Idling		0 Volts
No. 31 - Park Neutral Position (PNP) Switch	Selector Lever In "P" Position	Battery Voltage
	Selector Lever Out Of "P" Position	0 Volts
No. 32 - Park Neutral Position (PNP) Switch	Selector Lever In "R" Position	Battery Voltage
	Selector Lever Out Of "R" Position	0 Volts
No. 33 - Park Neutral Position (PNP) Switch	Selector Lever In "N" Position	Battery Voltage
	Selector Lever Out Of "N" Position	0 Volts
No. 34 - Park Neutral Position (PNP) Switch	Selector Lever In "D" Position	Battery Voltage
	Selector Lever Out Of "D" Position	0 Volts
No. 35 - Park Neutral Position (PNP) Switch	Selector Lever In "2" Position	Battery Voltage
	Selector Lever Out Of "2" Position	0 Volts
No. 36 - Park Neutral Position (PNP) Switch	Selector Lever In "L" Position	Battery Voltage
	Selector Lever Out Of "L" Position	0 Volts
No. 37 - Overdrive Switch	On Position	Battery Voltage
	Off Position	0 Volts
No. 38 - Stoplight	Brake Pedal Depressed	0 Volts

Switch		
	Brake Pedal Released	Battery Voltage
No. 39 - Backup Power Supply, Ignition Switch Off		Battery Voltage
No. 40 - Vehicle Speed Sensor (VSS), Slowly Moving		Fluctuates 0-5 Volts
No. 41 - Pulse Generator "B" (PG-B)	(4)	1.5 AC Volts Or More
No. 42 - Pulse Generator "B" (PG-B)	(4)	1.5 AC Volts Or More
No. 43 - Pulse Generator "A" (PG-A)	(5)	1.5 AC Volts Or More
No. 44 - Pulse Generator "A" (PG-A)	(5)	1.5 AC Volts Or More
No. 45 - Ground, Idling		0 Volts
No. 46 - Ignition Pulse	Engine Idling	1-4 Volts
	At 3000 RPM	.3-3.0 Volts

(1) - Terminals not listed are blank.
(2) - Terminals are not used on Sonata and Galant models.
(3) - Condition and value is not available.
(4) - Measure between terminals No. 41 and No. 42, with selector lever in "D" position, in 3rd gear and at 3000 RPM.
(5) - Measure between terminals No. 43 and No. 44, with selector lever in "D" position, in 3rd gear and at 3000 RPM.

COMPONENT TESTING

PARK NEUTRAL POSITION (PNP) SWITCH

Disconnect harness connector. Using ohmmeter, check continuity between specified terminals in each gear position. See Fig. 11. See PNP SWITCH CONTINUITY SPECIFICATIONS table. If continuity is not as specified, replace switch.

PNP SWITCH CONTINUITY SPECIFICATIONS

Vehicle/Switch Position	Continuity Between Terminals
Eclipse, Sonata & 3000GT	
"P"	3 & 4, 7 & 8
"R"	2 & 3, 5 & 6
"N"	3 & 12, 7 & 8
"D"	3 & 10
"2"	3 & 11
"1"	3 & 9
Galant	
"P"	1 & 4, 5 & 8
"R"	4 & 10, 6 & 7
"N"	2 & 4, 5 & 8

"D"	4 & 9
"2"	3 & 4
"1"	4 & 11

OIL TEMPERATURE SENSOR

Disconnect oil temperature sensor connector. Measure resistance between terminals on component side connector. Replace sensor if resistance is not within specification. See OIL TEMPERATURE SENSOR SPECIFICATION table.

OIL TEMPERATURE SENSOR SPECIFICATION

Oil Temperature °F (°C)	Resistance (Ohms)
32 (0)	16,700-20,500
212 (100)	570-690

OVERDRIVE CONTROL SWITCH

Disconnect electrical connector from overdrive control switch. Using ohmmeter, check continuity between specified wire terminals at switch connector. See Figs. 14-15. See OVERDRIVE CONTROL SWITCH CONTINUITY SPECIFICATIONS table. Replace overdrive control switch if defective.

OVERDRIVE CONTROL SWITCH CONTINUITY SPECIFICATIONS

Vehicle/Switch Position	Continuity Between Terminals
Eclipse & Galant	
ON	3 & 4
OFF	3 & 5
Sonata	
ON	2 & 5
OFF	1 & 2
3000GT	
ON	5 & 6
OFF	4 & 6

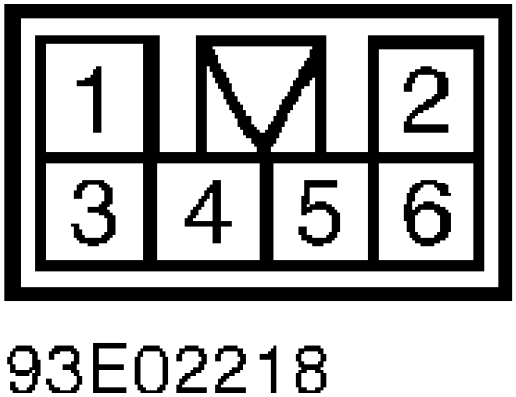


Fig. 14: Overdrive Switch Connector Terminals (All Except Sonata & 3000GT)
Courtesy of Mitsubishi Motor Sales of America.

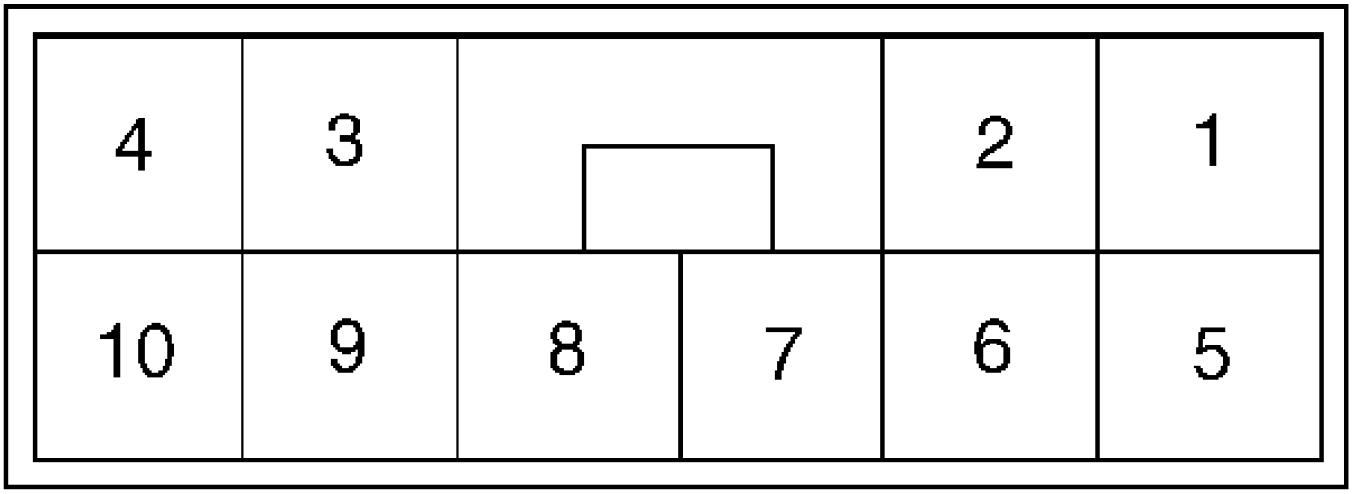


Fig. 15: Overdrive Switch Connector Terminals (Sonata)
Courtesy of Hyundai Motor Co.

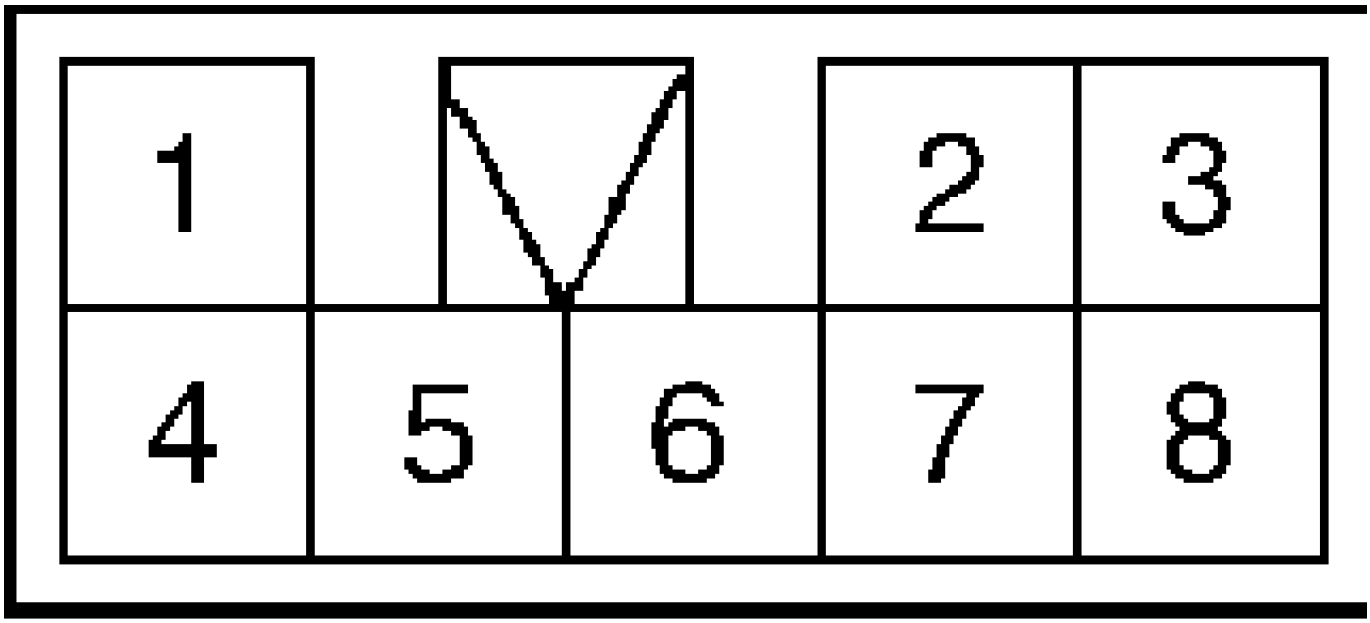


Fig. 16: Overdrive Switch & Power/Economy Switch Terminals (3000GT)
Courtesy of Mitsubishi Motor Sales of America.

POWER/ECONOMY SWITCH

On Sonata, disconnect power/normal switch connector. On 3000GT, disconnect power/economy and overdrive switch connector. Measure continuity between specified terminals. See POWER/ECONOMY SWITCH CONTINUITY SPECIFICATIONS table. See Fig. 16.

POWER/ECONOMY SWITCH CONTINUITY SPECIFICATIONS

Vehicle & Condition	Continuity Between Terminals
Sonata (1)	
Power Mode	3 & 5
Economy Mode	3 & 6
3000GT	
Power Mode	1 & 2
Economy Mode	(2)

(1) - To identify Power/Normal switch connector terminals for Sonata, see WIRING DIAGRAMS.
(2) - Continuity should not exist between any terminals in Economy mode. Continuity exists between terminals 2 and 3 in Hold mode.

PULSE GENERATORS

Disconnect pulse generator harness connector. Measure resistance between terminals No. 1 or No. 2 for generator "A" or terminals No. 3 and No. 4 for generator "B". See Fig. 17. Replace pulse generator if resistance is not 330-390 ohms at 68°F (20°C).

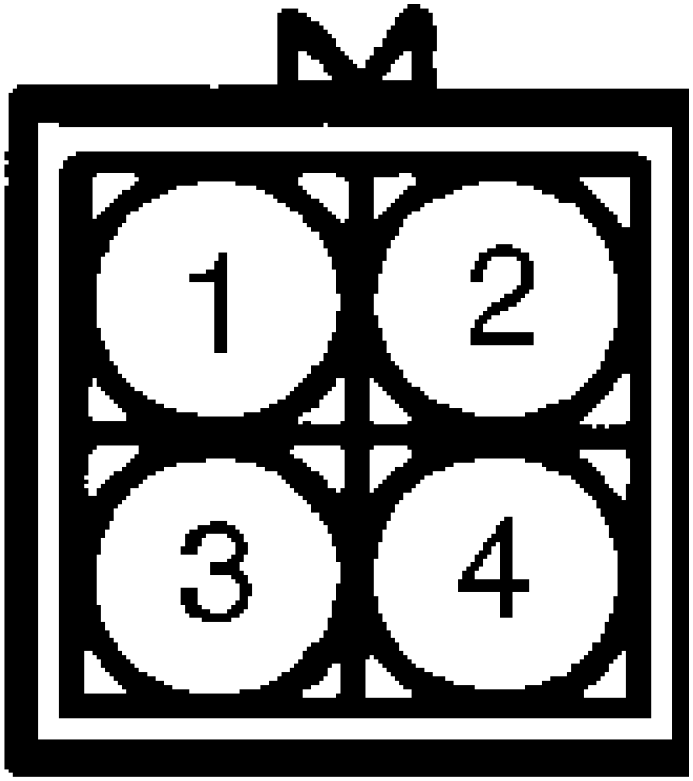


Fig. 17: Identifying Pulse Generator Or Solenoid Connector Terminals
Courtesy of Daimler Chrysler Corp.

SOLENOIDS

NOTE: All solenoids can be operated by applying 12 volts to specific connector terminal and solenoid case. See Fig. 17. See SOLENOID CONNECTOR TERMINAL IDENTIFICATION table.

Disconnect solenoid connector. Measure resistance between ground and appropriate terminal at component side of solenoid connector. See Fig. 17. See SOLENOID CONNECTOR TERMINAL IDENTIFICATION table. If solenoid does not test as specified, replace and retest system.

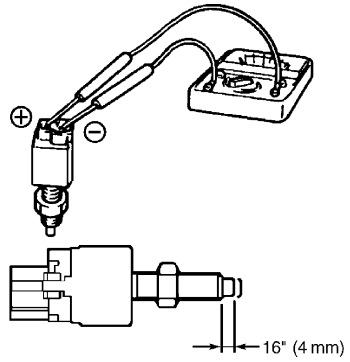
SOLENOID CONNECTOR TERMINAL IDENTIFICATION

Solenoid	Terminal No.	(1) Resistance (Ohms)
PCSV	1	2.6-3.2
SCSV "A"	3	20.8-23.8
SCSV "B"	4	20.8-23.8
TCC	2	13

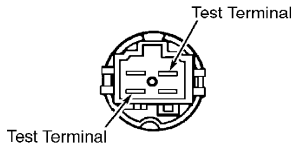
(1) - Test solenoid resistance with ambient temperature at 68°F (20°C).

STOPLIGHT SWITCH

Disconnect connector from stoplight switch and check continuity between terminals shown. See Fig. 18. Continuity should not exist when plunger of switch is pushed in to a depth of within .16" (4 mm) from outer case edge. See Fig. 18. Continuity should exist when released. For vehicles equipped with auto-cruise control system, see Fig. 18 for terminal locations.



VEHICLES WITHOUT CRUISE CONTROL



VEHICLES WITH CRUISE CONTROL

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Fig. 18: Testing Stoplight Switch (All Models)
Courtesy of Mitsubishi Motor Sales of America.

REMOVAL & INSTALLATION

PARK NEUTRAL POSITION (PNP) SWITCH

Removal & Installation

1) Disconnect shift control cable. Remove retaining bolt and manual control lever. Remove retaining screws and PNP switch.

2) To install, reverse removal procedure. DO NOT tighten PNP switch retaining screws at this time. Tighten manual control lever retaining bolt to specification. See TORQUE SPECIFICATIONS. Adjust PNP switch. See PARK NEUTRAL POSITION (PNP) SWITCH under ADJUSTMENTS.

KICKDOWN SERVO SWITCH

Removal & Installation

Disconnect electrical connector. Remove snap ring and kickdown servo switch. To install, reverse removal procedure.

OIL TEMPERATURE SENSOR

Removal & Installation

Oil temperature sensor is mounted inside transaxle case. See Fig. 19. Drain transaxle fluid. Remove oil pan bolts and oil pan. Remove bolts securing oil temperature sensor to valve body. To install, reverse removal procedure.

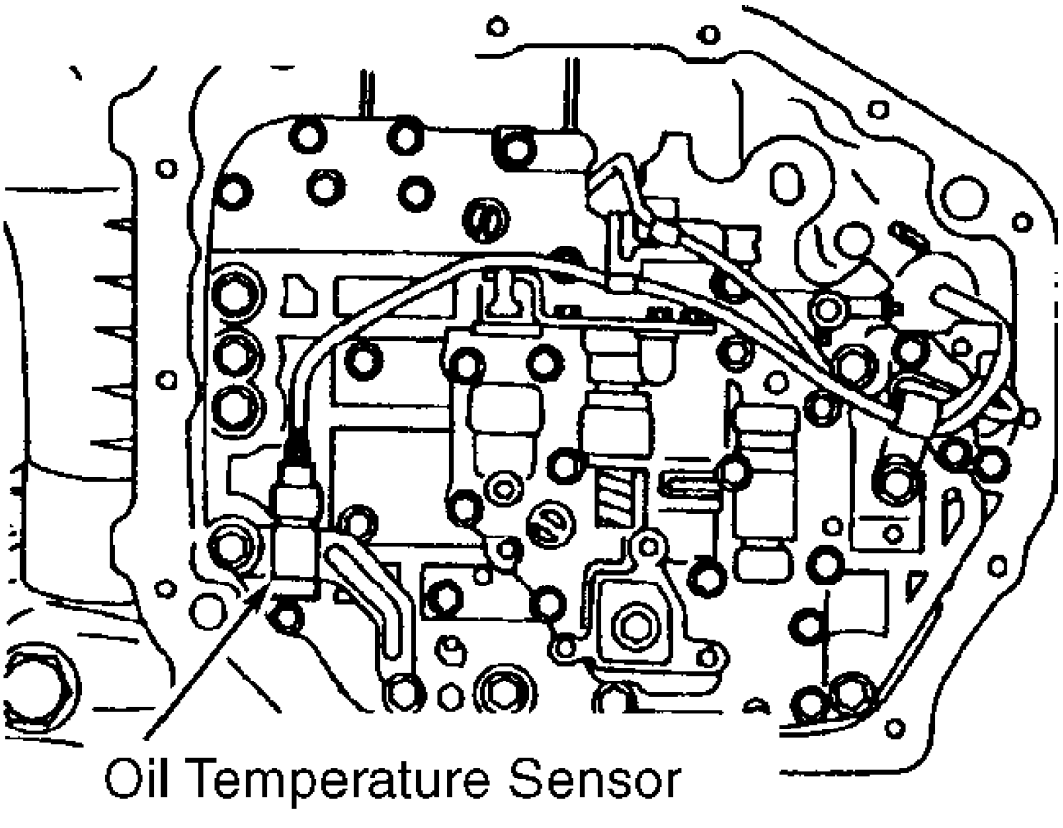

Fig. 19: Locating Oil Temperature Sensor
Courtesy of Mitsubishi Motor Sales of America.

OVERDRIVE CONTROL SWITCH

Removal & Installation

Remove cover plate on inside of gear selector lever. Remove screw securing overdrive switch to lever. Remove overdrive control switch from side of gear selector lever. To install, reverse removal procedure.

POWER/ECONOMY SWITCH

Removal & Installation (3000GT)

Slide flat tipped screw driver down each side of switch to unlatch tabs. Remove power/economy switch from center console. To install, reverse removal procedure.

PULSE GENERATORS

Removal & Installation

1) Note location of pulse generators "A" and "B" for reassembly reference. Pulse generator "A" wires are wrapped in a transparent tube and "B" wires are wrapped in a Black tube. See Fig. 4 .

2) Remove retaining bolt and pulse generator. To install, reverse removal procedure. Tighten retaining bolt to specification. See TORQUE SPECIFICATIONS.

TRANSAXLE CONTROL MODULE (TCM)

Removal & Installation

The TCM is located behind instrument panel, near center of console. See Figs. 1-3. Information is not available on TCM removal.

VALVE BODY SOLENOIDS

NOTE: Valve body solenoids consist of torque converter clutch control, pressure control and shift control solenoid valves.

Removal & Installation

1) Drain transaxle fluid. Remove retaining bolts, oil pan, magnet and gasket. Note location of solenoid valve. See Fig. 6. Disconnect necessary electrical connector. Remove retaining bolt and solenoid valve.

2) To install, reverse removal procedure. Ensure solenoid valve is installed in proper location. See Fig. 6. Solenoid valves can be identified by the wire color. For wire color identification, see WIRING DIAGRAMS. Fill transaxle with ATF.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Manual Control Lever Bolt	13-15 (18-20)
	INCH Lbs. (N.m)
Neutral Safety Switch Bolt	89-102 (10.1-11.5)
Oil Filter Bolt	48-60 (5.4-6.8)
Oil Pan Bolt	48-60 (5.4-6.8)
Pulse Generator Bolt	89-102 (10.1-11.5)
Shift Control Cable Lock Nut	108 (12.2)
TP Sensor Retaining Screw	17 (1.9)

WIRING DIAGRAMS

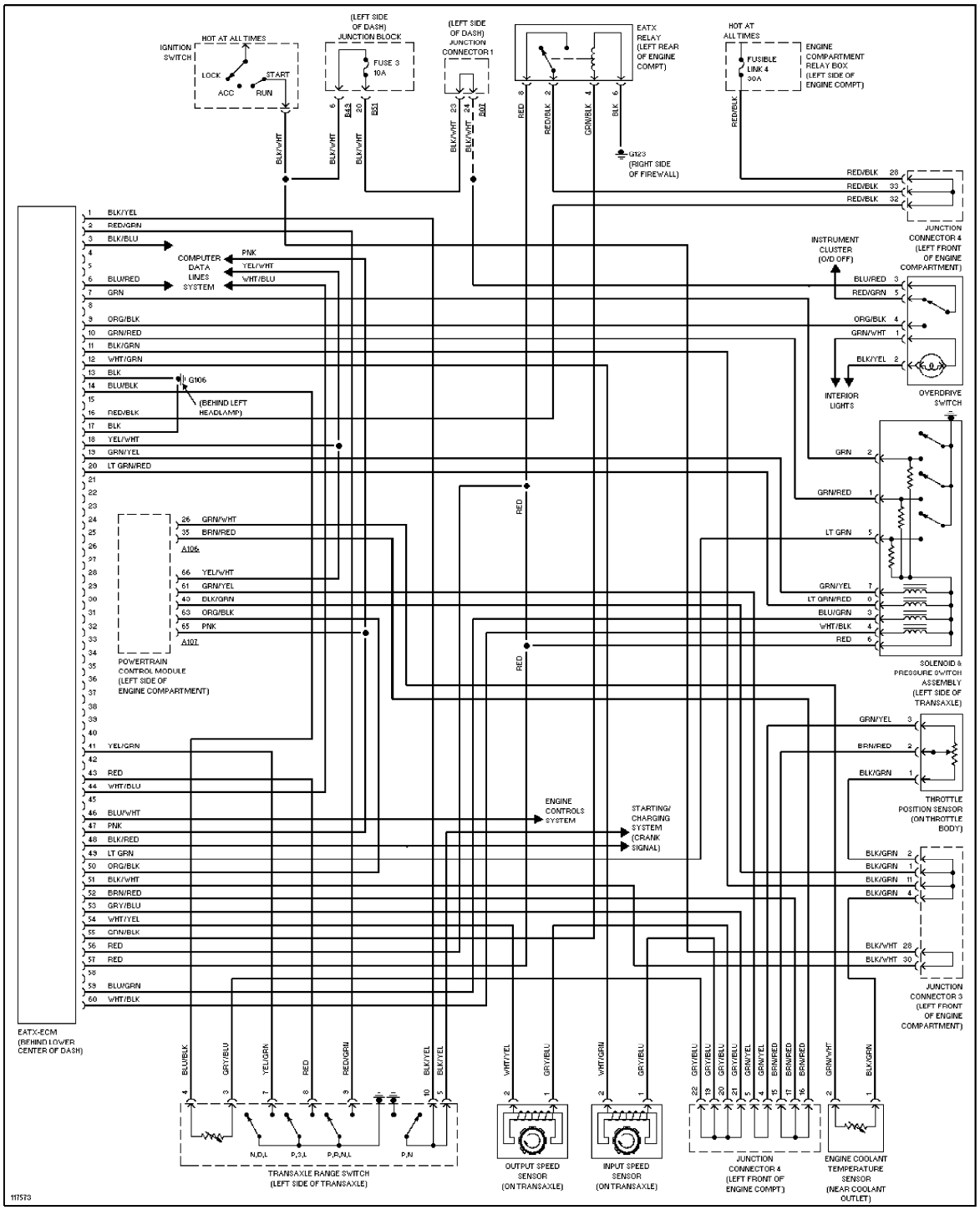

Fig. 20: 1997-98 Transaxle Wiring Diagram (Eclipse 2.0L Turbo & 2.4L)

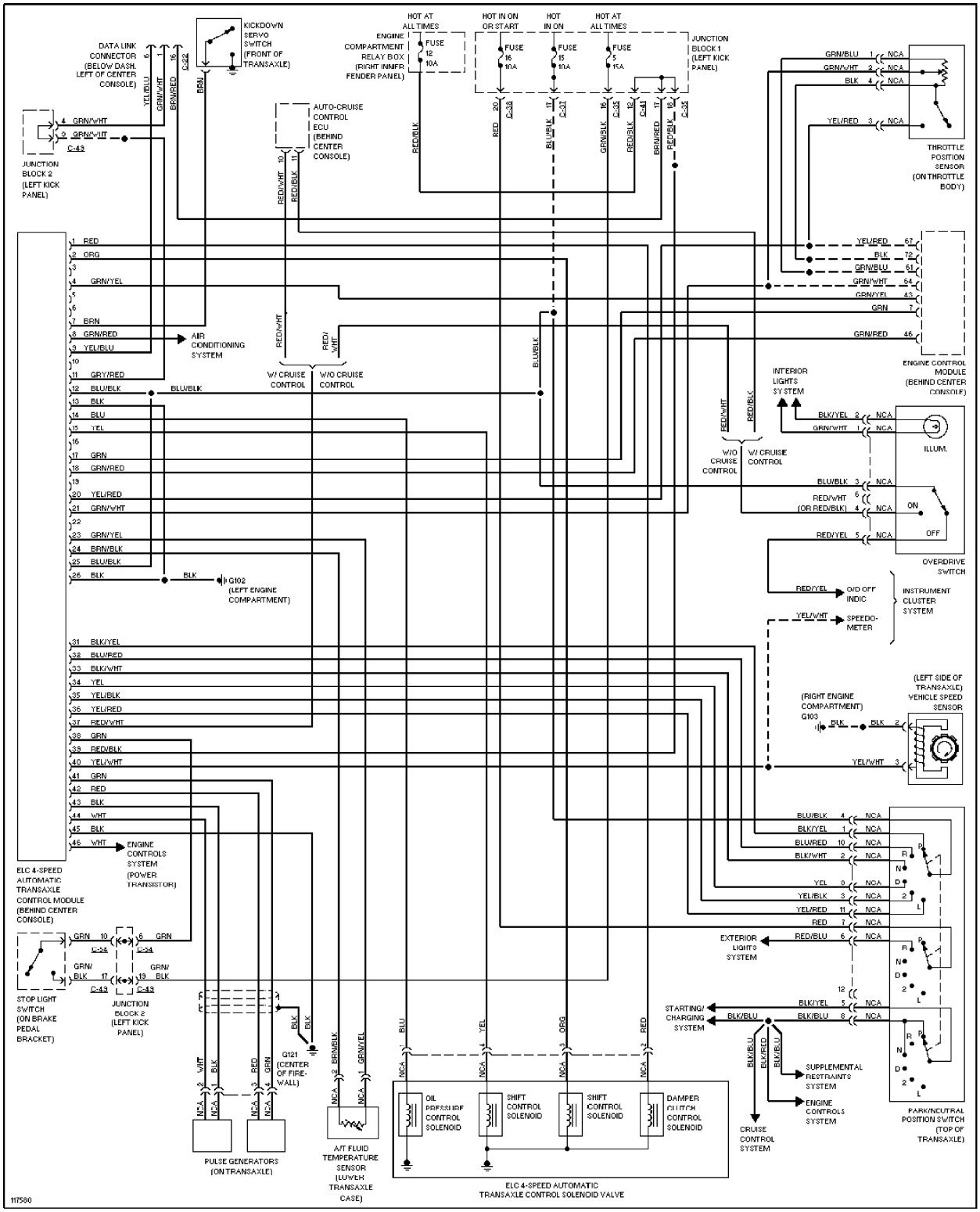

Fig. 21: 1997-98 Transaxle Wiring Diagram (Galant)

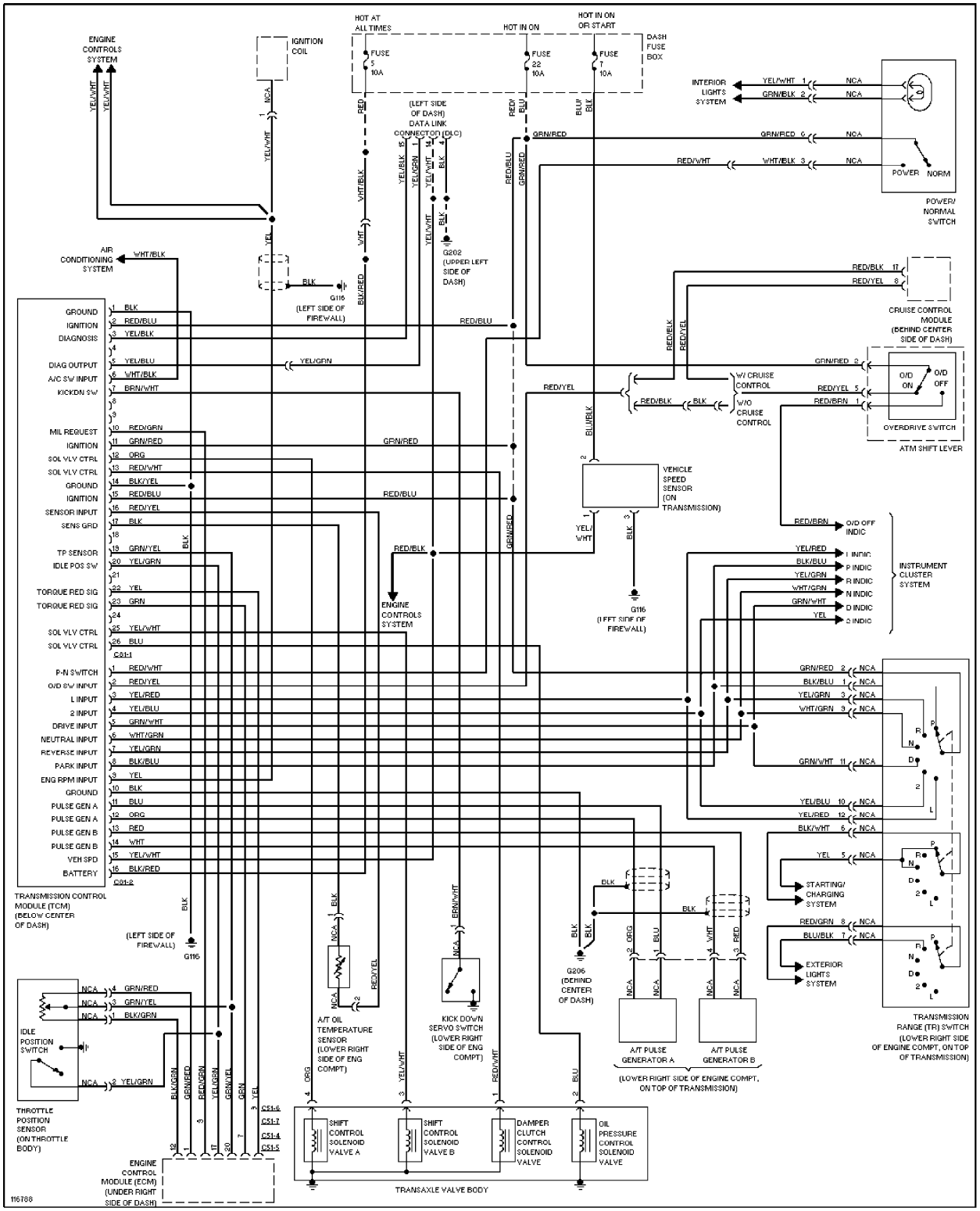

Fig. 22: 1997 Transaxle Wiring Diagram (Sonata 3.0L)

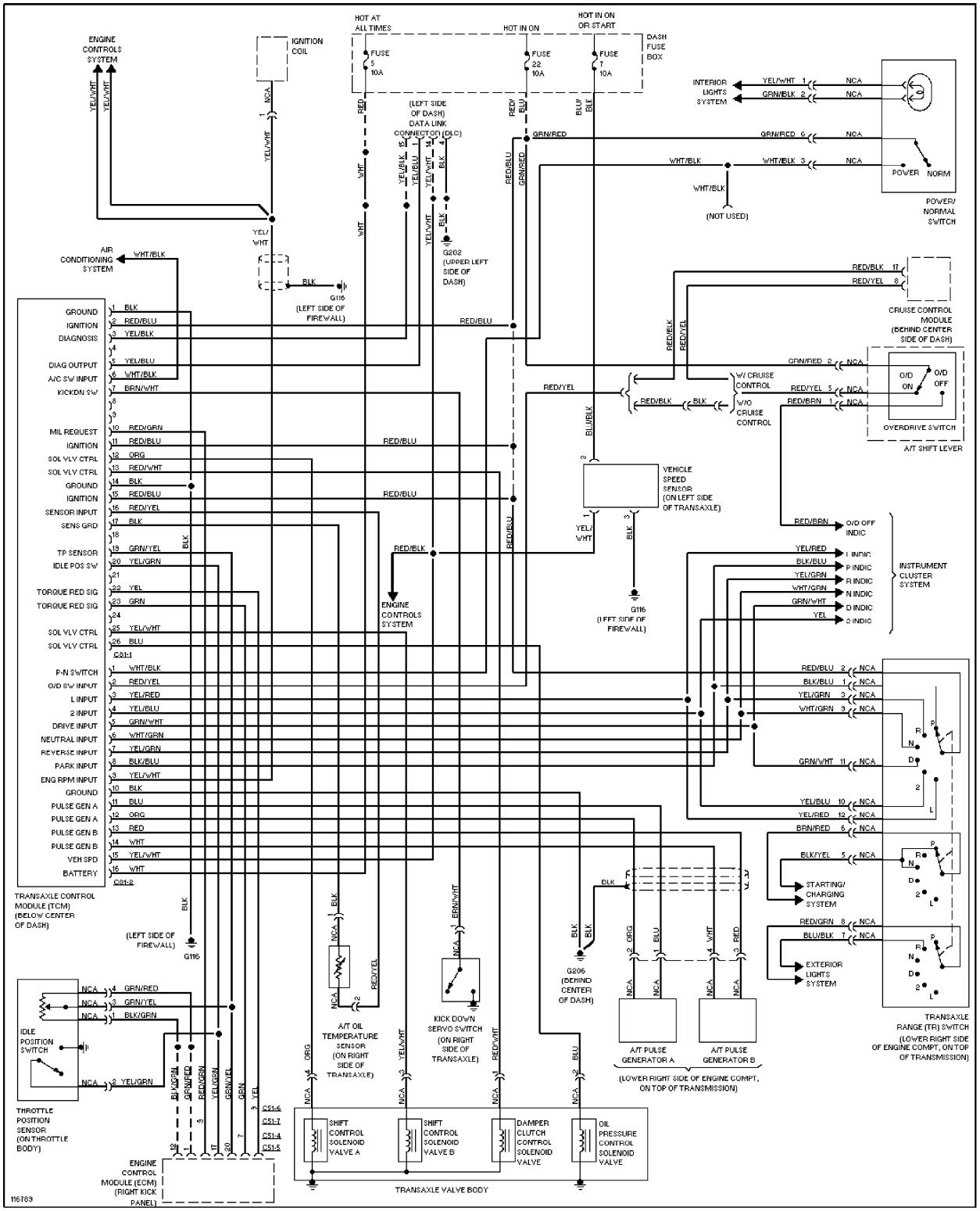

Fig. 23: 1998 Transaxle Wiring Diagram (Sonata 3.0L)

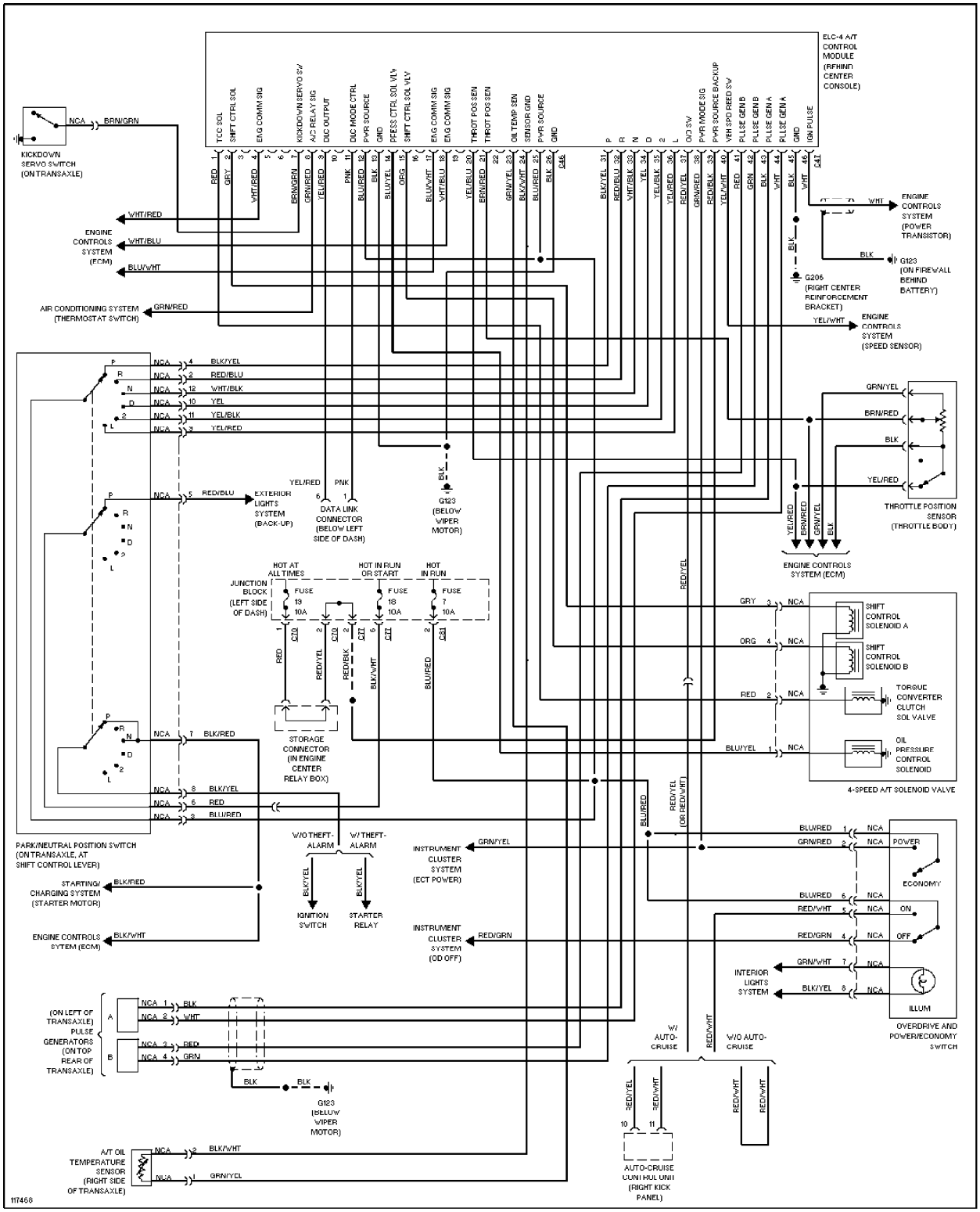

Fig. 24: 1997-98 Transaxle Wiring Diagram (3000GT)