AXIOM

TRANSMISSION

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AUTOMATIC TRANSMISSION (4L30–E)

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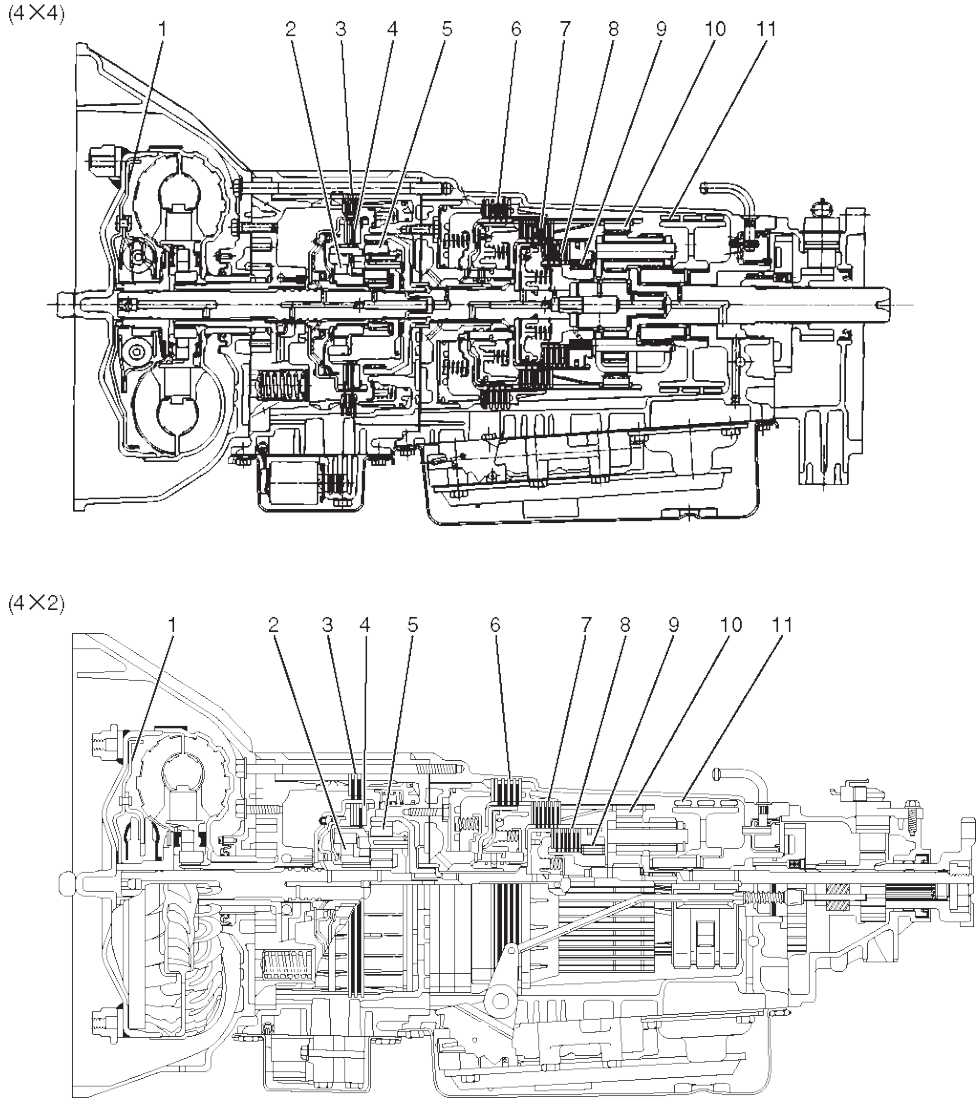
Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

Construction



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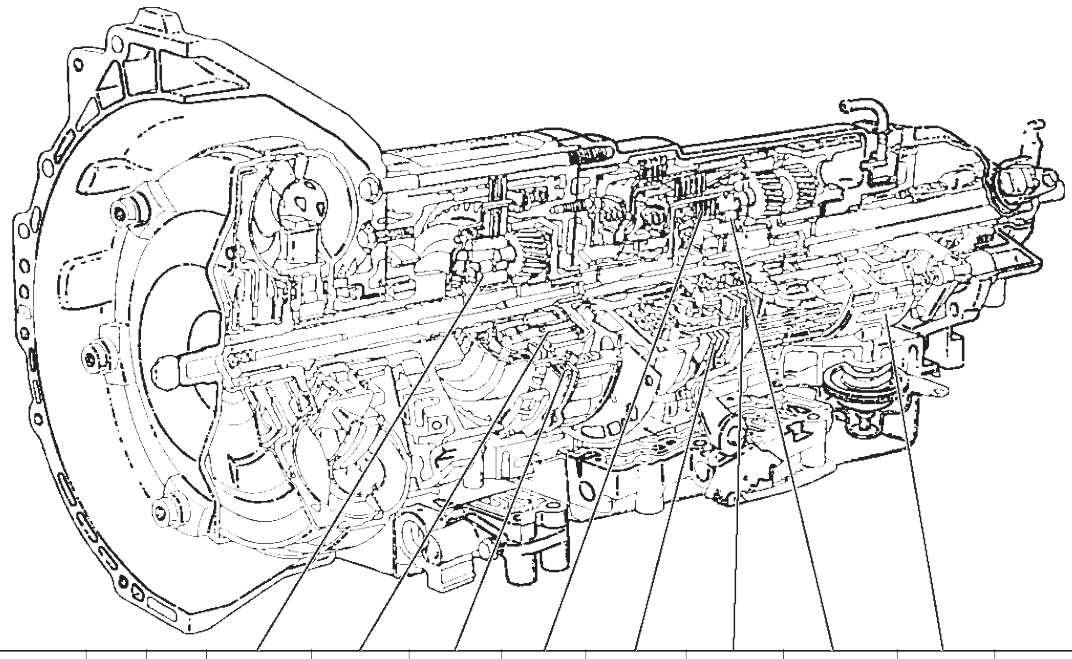
Legend

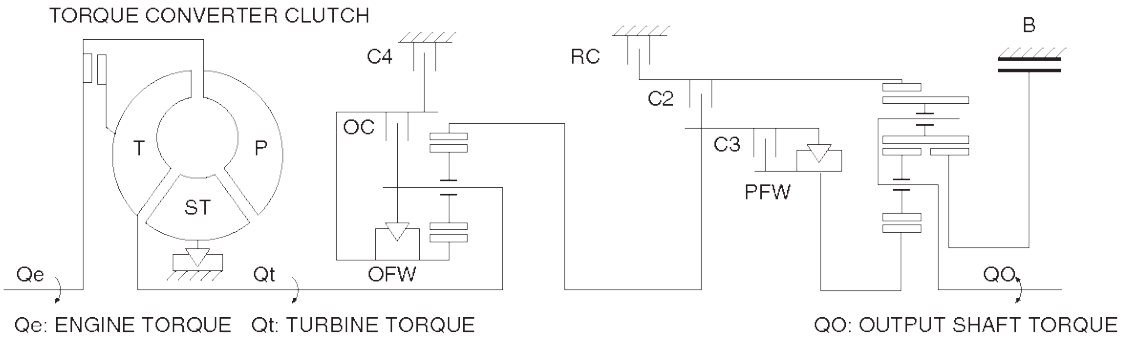
(1) Torque Converter Clutch (TCC)
(2) Overdrive Free Wheel (One Way Clutch) (OFW)
(3) Fourth Clutch (C4)
(4) Overrun Clutch (OC)
(5) Overdrive Unit
(6) Reverse Clutch (RC)
(7) Second Clutch (C2)
(8) Third Clutch (C3)
(9) Principle Sprag Assembly (One Way Clutch) (PFW)
(10) Ravigneaux Planetary Gear Set
(11) Brake Band (B)

Range Reference Chart



RANGE	GEAR	SOL A N.C.	SOL B N.O.	O/DRIVE FREE WHEEL (OFW)	O/RUN CLUTCH (OC)	FOURTH CLUTCH (C4)	THIRD CLUTCH (C3)	REVERSE CLUTCH (RC)	SECOND CLUTCH (C2)	PRINCIPLE SPRAG ASM (PFW)	BAND ASM (B)	ENGINE BRAKING	TORQUE CONV. CLUTCH
P-N		OFF	ON		APP							NO	NO
R	REVERSE	OFF	ON	LD	APP			APP		LD		NO	NO
D	1ST	OFF	ON	LD	APP					LD	APP	NO	NO
	2ND	ON	ON	LD	APP				APP	FW	APP	YES	ECCC
	3RD	ON	OFF	LD	APP		APP		APP	NE		YES	ECCC
	4TH	OFF	OFF	FW		APP	APP		APP	NE		YES	ECCC
3	1ST	OFF	ON	LD	APP					LD	APP	NO	NO
	2ND	ON	ON	LD	APP				APP	FW	APP	YES	ECCC
	3RD	ON	OFF	LD	APP		APP		APP	NE		YES	ECCC
2	1ST	OFF	ON	LD	APP		APP			LD	APP	YES	NO
	2ND	ON	ON	LD	APP				APP	FW	APP	YES	ECCC
L	1ST	OFF	ON	LD	APP		APP			LD	APP	YES	NO

LD : LOCKED IN DRIVE FW : FREEWHEELING NE : NOT EFFECTIVE APP : APPLIED



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Normal Operation Of 2002 4L30–E Transmission

Torque Converter Clutch (Electronically Controlled Capacity Clutch : ECCC) Application Conditions:

The clutch apply is controlled by moving the converter clutch control valve by commanding Torque Converter Clutch (TCC) solenoid using the PWM signal.
The TCC is normally applied in 2nd, 3rd and 4th gears only when all of the following conditions exist:

— The engine coolant temperature is above 70˚C (158˚F) and ATF temperature is above 18˚C (64.5˚F).

— The shift pattern requests TCC apply.

Moreover, TCC is always applied in 2nd, 3rd and 4th gears when the transmission oil temperature is above 135˚C (275˚F).
This mode should be canceled at 125˚C (257˚F).

ATF Warning Lamp

The ATF warning lamp will be constantly on (not flashing) if the transmission oil temperature is above 145˚C (293˚F).
The ATF warning lamp goes off again when the transmission oil temperature is below 125˚C (257˚F).

Reverse Lock Out

With the selector lever in reverse position, the PCM will not close the PWM solenoid until the vehicle is below 11 km/h (6.8 mph), thus preventing reverse engagement above this speed.

Diagnosis

Introduction

The systematic troubleshooting information covered by this Section offers a practical and systematic approach to diagnosing 4L30–E transmission, using information that can be obtained from road tests, electrical diagnosis, oil pressure checks or noise evaluation.
The key to correcting a complaint is to make use of all of the available symptoms and logically letting them direct you to the cause.
When dealing with automatic transmission complaints, it is best to gather as many symptoms as possible before making the decision to remove the transmission from the vehicle.
Frequently, the correction of the complaint does not require removal of the transmission from the vehicle.

Driver Information

To analyze the problem fill out a complete description of the owner’s complaint.
Please draw a circle around the right information and complete the following form. (The next page is an example of a completed form). You can draw a circle around many numbers if you are not sure.

A - Today's date :	Month :	Day :	Year : .....
B - End User Name, Address :			
C - Date of Problem :	Month :	Day :	Year : .....
D - Mileage : ..... Miles / Km	E - With Ignition ON is CHECK TRANS Indicator : 1- Flashing 2- Not Flashing	F -Car load when problem occured : 1 - Towing a trailer 2- ..... people OR ..... Kg	
G - Weather conditions when problem : 1- Clear 2- Cloudy 3- Rain 4- Snow 5- Unstable 6-Any	H - Weather Temperature when problem: 1- Hot 2- Warm 3- Cool 4- Cold 5- Unstable 6- Any	I - Road Conditions when problem : 1- Any 2- Inter City 3- Outside City 4- Highway 5 - Uphill 6- Downhill 7- Unpaved 8- Snow 9 - Others :	J - Frequency of the Problem : 1- Always 2- Occasional : ..... times/day, ... times/month 3- Only Once 4- Others :
K - Engine Condition : 1- Always 2- At Cold 3- During Warming up 4- After Warming or Hot 5- Others	L - Engine Speed when the problem occured : 1- Idling 2- Starting 3- Stalling 4- High RPM 5- Low RPM	M - Transmission Condition when it occured : 1- Any 2- Idling 3- Starting 4- Driving 5- Accelerating 6-Coasting 7- In corner 8- Shifting	

N - If there is a Transmission driveability problem BEFORE THE CHECK TRANS INDICATOR WAS FLASHING :

1- No Power in Range : All - P - R - N - D - 3 - 2 - L during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
2- No shift in Range : All - P - R - N - D - 3 - 2 - L during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
3- Shift Shock in Range : All - P - R - N - D - 3 - 2 - L during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
4- Shift Slip in Range : All - P - R - N - D - 3 - 2 - L during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
5- Shift Delayed in Range : All - P - R - N - D - 3 - 2 - L during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
6- Shift Point too high in Range : All - P - R - N - D - 3 - 2 - L during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
7- Shift Point too low in Range : All - P - R - N - D - 3 - 2 - L during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
8- TCC Shudder in Range : All - P - R - N - D - 3 - 2 - L during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
9- Noise in Range : All - P - R - N - D - 3 - 2 - L during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
Noise type : 1- Buzz 2- Whine 3- Clunk 4- Rattle 5- Whistle // 6- light 7-medium 8- heavy
10- Other : ..... in Range : All - P - R - N - D - 3 - 2 - L during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1

O - Other customer concern and comments			
P - Isuzu Vehicle Code :	.....	Q - VIN Number	.....
R - Date of Vehicle Registration	Month :	Day :	Year : .....
S - Trans. model :	.....	T - A/T Serial Number :	.....
U - Your name :	.....		
V - Dealer Name, Address, Phone			

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Example of form completed.

A - Today's date :	Month : April.....	Day : .13.....	Year : .1994.....
B - End User Name, Address :	Dave Smith 6584, Arlington road Plymouth MI 48170 USA		
C - Date of Problem :	Month : April.....	Day : .8.....	Year : .1994.....

D - Mileage :	E - With Ignition ON is CHECK TRANS Indicator :	F - Car load when problem occured :
12230...Mile / Km	(1)-Flashing 2- Not Flashing	1 - Towing a trailer 2- ..2..... people OR .....Kg

G - Weather conditions when problem :	H - Weather Temperature when problem:	I - Road Conditions when problem :	J - Frequency of the Problem :
1- Clear 2- Cloudy 3- Rain 4- Snow 5- Unstable (6)-Any	1- Hot 2- Warm 3- Cool 4- Cold 5- Unstable (6)-Any	1- Any 2- Inter City 3- Outside City (4)-Highway 5 - Uphill 6- Downhill 7- Unpaved (8)-Snow 9 - Others	1- Always (2)-Occasional : ..... times/day, ...3... times/month 3- Only Once 4- Others :

this means do not take this into account

K - Engine Condition :	L - Engine Speed when the problem occured :	M - Transmission Condition when it occured :
1- Always 2- At Cold 3- During Warming up (4)-After Warming or Hot 5- Others	1- Idling 2- Starting 3- Stalling (4)-High RPM 5- Low RPM	1- Any 2- Idling 3- Starting 4- Driving (5)-Accelerating (6)-Coasting 7- In corner (8)-Shifting

N - If there is a Transmission driveability problem BEFORE THE CHECK TRANS INDICATOR WAS FLASHING :

1- No Power	in Range : All - P - R - N - D - 3 - 2 - L	during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
2- No shift	in Range : All - P - R - N - D - 3 - 2 - L	during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
(3)-Shift Shock	in Range : All - P - R - N - (D) - 3 - 2 - L	during a (upshift) : 1-2 / 2-3 / (3-4) or (downshift) : (4-3) / 3-2 / 2-1
4- Shift Slip	in Range : All - P - R - N - D - 3 - 2 - L	during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
5- Shift Delayed	in Range : All - P - R - N - D - 3 - 2 - L	during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
6- Shift Point too high	in Range : All - P - R - N - D - 3 - 2 - L	during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
7- Shift Point too low	in Range : All - P - R - N - D - 3 - 2 - L	during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
8- TCC Shudder	in Range : All - P - R - N - D - 3 - 2 - L	during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
9- Noise	in Range : All - P - R - N - D - 3 - 2 - L	during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1
Noise type : 1- Buzz	2- Whine 3- Clunk 4- Rattle	5- Whistle // 6- light 7-medium 8- heavy
10- Other :	in Range : All - P - R - N - D - 3 - 2 - L	during a : upshift : 1-2 / 2-3 / 3-4 or downshift : 4-3 / 3-2 / 2-1

O - Other customer concern and comments :

(This is just an example). Shift shock very harsh overall during a downshift. Not sure if it's the 4-3 or 3-2.

P - Isuzu Vehicle Code :	94 UCR	Q - VIN Number	4S2CV58ZXM4324047
R - Date of Vehicle Registration	Month : November.	Day : ....18.....	Year : ..1993.....
S - Trans. model :	4L30-E	T - A/T Serial Number :	96 358 654
U - Your name :	Joe Spring		

V - Dealer Name, Address, Phone

Kent Helfrich

Home-town ISUZU

900 - 999 - 9999

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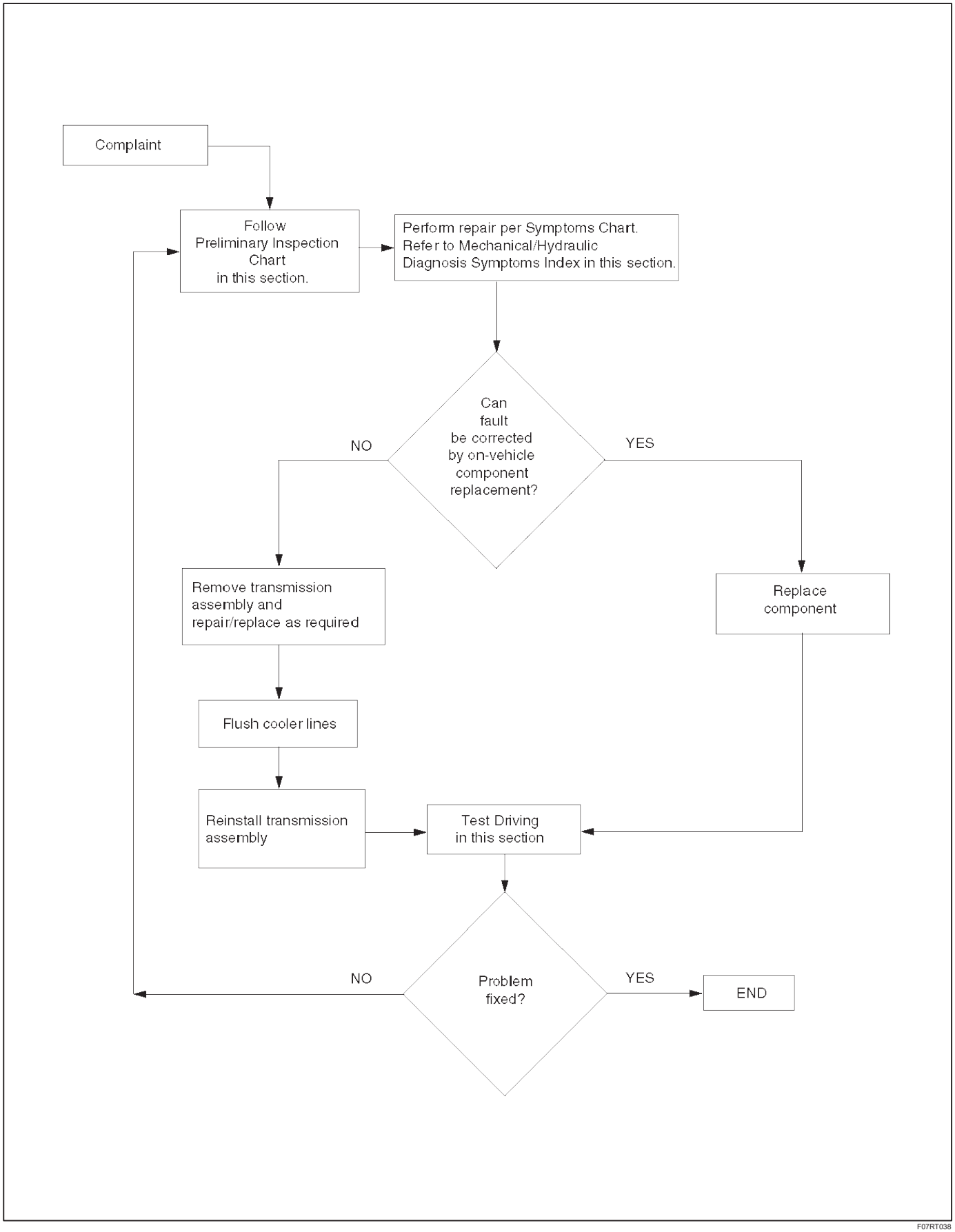
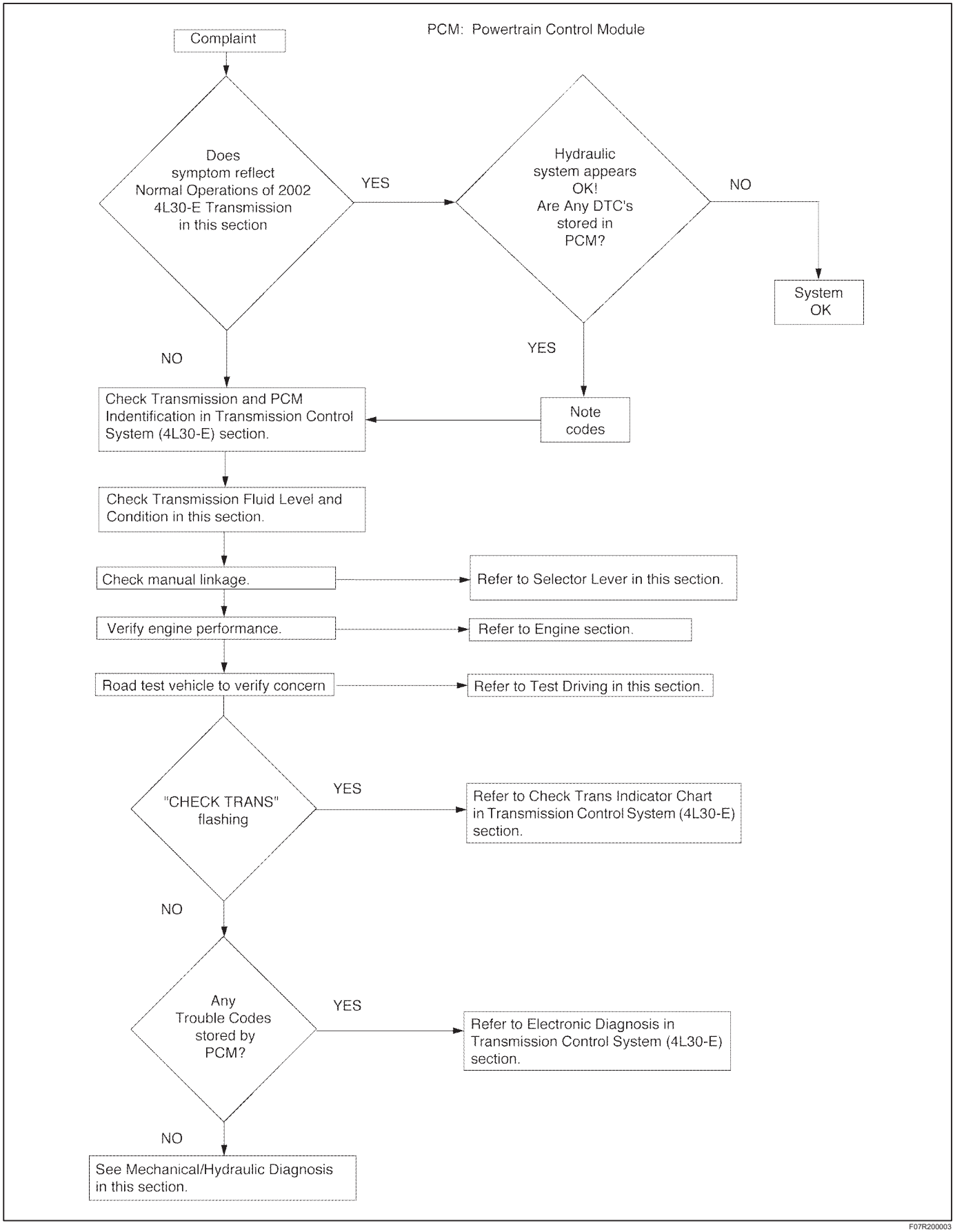
General Diagnosis Procedure



Preliminary Inspection Chart



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Checking Transmission Fluid Level and Condition

Checking fluid level and condition (color and odor) at regular intervals will provide early diagnosis information about the transmission. This information may be used to correct a condition that, if not detected early, could result in major transmission repairs.

IMPORTANT: When new, automatic transmission fluid is red in color. As the vehicle is driven, the transmission fluid will begin to look darker in color. The color may eventually appear light brown.

A dark brown color with burnt odor may indicate excessive fluid deterioration and signal a need for fluid change.

Fluid Level

When adding or changing fluid, use only DEXRON ®–III. Refer to *Maintenance and Lubrication in General Information section for maintenance information and servicing interval.*

CAUTION: DO NOT OVERFILL.

Overfilling will cause foaming, loss of fluid, abnormal shifting and possible damage to the transmission.

1. Park the vehicle on level ground and apply the parking brake firmly.
2. Check fluid level with engine running at idle.

NOTE: Be sure that transmission fluid temperature is below 30˚C (86˚F).

3. Move the selector lever through all gear ranges.
4. Move the selector lever to “Park”.
5. Let engine idle for 3 minutes and open the overfill screw (1).
6. Add released transmission fluid until it flows out over the overfill screw opening.
7. Let engine idle until a fluid temperature between 32˚C (90˚F) and 57˚C (135˚F) is reached, then close the overfill screw (1).

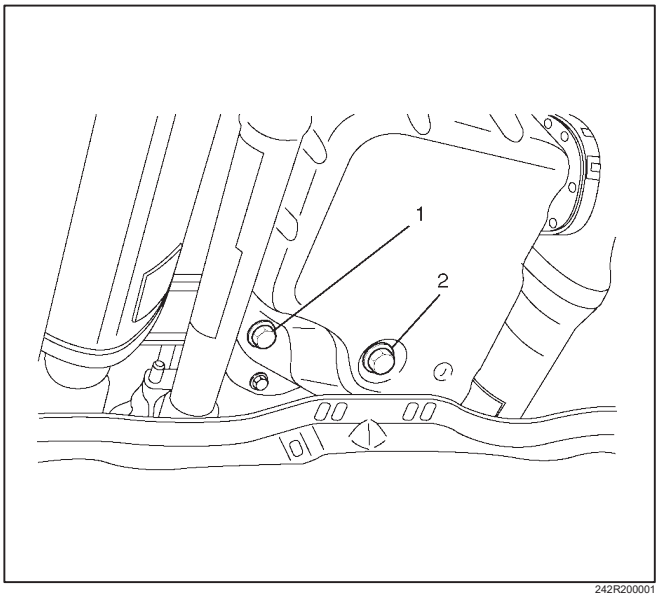
Torque: 38 N•m (28 lb ft)

NOTE: To prevent fluid leaks, the overfill screw and oil drain screws gasket must be replaced each time these screws are removed.

NOTE: Check transmission fluid temperature with scan tool.

Minimum fluid level → 57˚C (135˚F)

Maximum fluid level → 32˚C (90˚F)



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CAUTION: Do not open overfill screw with engine stopped.

CAUTION: DO NOT CHECK FLUID LEVEL UNDER THESE CONDITIONS:

- Immediately after driving at sustained highway speeds.
- In heavy city traffic during hot weather.
- If vehicle is towing a trailer.

If the vehicle has been operated under these conditions, shut the engine off and allow the vehicle to “cool” for thirty (30) minutes. After the cool down period, restart the vehicle and continue from step 2 above.

Fluid Condition

	FLUID CONDITION			
	NORMAL*		CONTAMINATED	
COLOR	RED OR LIGHT BROWN	BROWN	NON–TRANSPARENT / PINK	BROWN
DRAIN REQUIRED?	NO	YES	YES	YES
CONTAMINA–TION	NONE	Very small amount of foreign material in bottom of pan	Contamination by coolant or other source	Large pieces of metal or other foreign material in bottom of pan
CORRECT LEVEL AND CONDITION	1. LOW LEVEL: A. Add fluid to obtain proper level & check for external leaks. B. Correct cause of leak. 2. HIGH LEVEL: – Remove excess fluid	– Remove both pans – Change filter – Flush cooler – Add new fluid – Check level	– Repair/replace radiator cooler – Transmission overhaul required – Check for: ● Damaged plates and seals ● Contaminated solenoids – Flush cooler – Add new fluid – Check level	– Transmission overhaul required – Flush cooler and cooler lines – Add new fluid – Check level

*Fluid should be changed according to maintenance schedule.

Test Driving

Some 4L30–E automatic transmission complaints will require a test drive as a part of the diagnostic procedure. Some codes will not set unless the vehicle is moving. The purpose of the test drive is to duplicate the customer's complaint condition and set a current Powertrain Control Module (PCM) trouble code. Perform this procedure before each 4L30–E automatic transmission repair, and again after repairs are made.

IMPORTANT:

- Duplicate the condition under which the customer's complaint was observed.
- Depending on the complaint, the line pressure gauge and the scan tool may be required during the test drive.
- During the test drive, it is important to record all necessary data from the areas being monitored, for use in diagnosis. Also listen for and note any unusual noises.

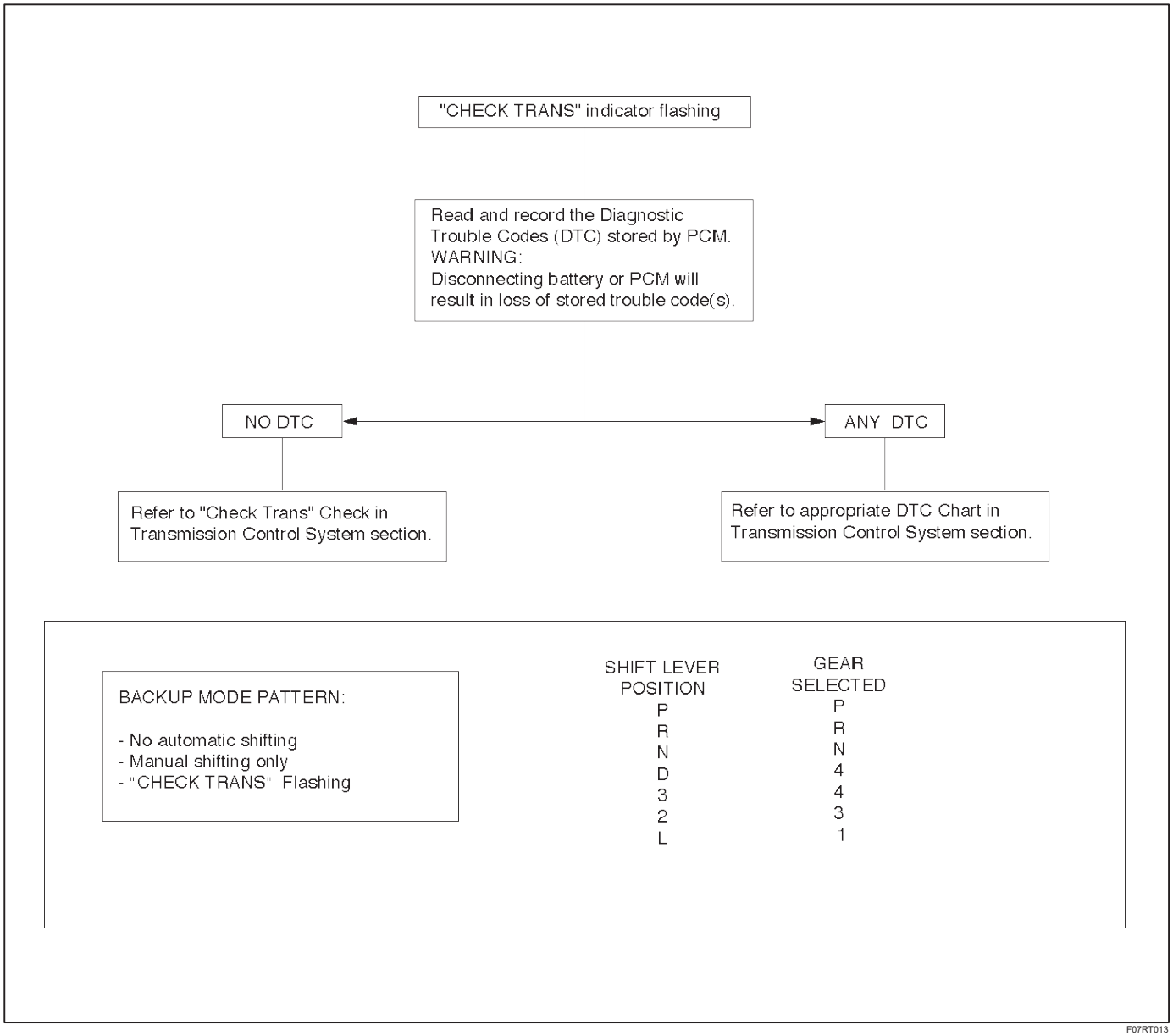
The following procedure should be used to test drive 4L30–E automatic transmission complaint vehicles:

1. Turn the ignition ON without starting the engine. Check that the "CHECK TRANS" lamp comes on for approximately 2 seconds and then goes out and remains out.
   - If the lamp is flashing, GO TO **Check Trans Indicator** in Transmission Control System (4L30–E) section.
   - If no serial data is present, GO TO **OBD System Check.** Refer to *Driveability and Emissions in Engine section.*
   - If the lamp stays ON or stays OFF, GO TO **"Check Trans" Check** in Transmission Control System (4L30–E) section.
2. Drive the vehicle. During the test drive, be sure that the transmission achieves normal operating temperature (approx. 20 minutes).
   Allow the transmission to go through all of its gear ranges, checking shift timing and firmness. Duplicate the owner's complaint condition as closely as possible during the test drive.
3. If, during the test drive, the "CHECK TRANS" lamp comes on, use the scan tool to check for trouble codes.
4. If, during the test drive, a problem is felt, but the "CHECK TRANS" lamp does not come on and no trouble codes are present, drive the vehicle with the PCM disconnected (manually shifting the vehicle).
   - In Manual L, the vehicle operates in first gear.
   - In Manual 2, the vehicle operates in third gear.
   - In Manual 3 or "D", the vehicle operates in fourth gear.

   If the problem still exists with the PCM disconnected, refer to *Mechanical/Hydraulic Diagnosis in this section.*
5. If no problem has been found at this point, check all underhood connections that supply power to the PCM and ignition fuses. Physically and visually inspect all the PCM harness connectors for loose or corroded terminals. Inspect the PCM ground points.

Mechanical / Hydraulic Diagnosis Check Trans Indicator Chart

Perform Preliminary Inspection First!



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When the “CHECK TRANS” indicator is flashing, it indicates that a problem related to the transmission, the Powertrain Control Module (PCM), or the vehicle harness has occurred.
The system is now operating in a “BACKUP MODE” where the risk of further damaging the transmission has been reduced. The vehicle may be shifted manually.
If the initial problem is intermittent or seldom, switching the engine OFF/ON might allow normal operation again until the problem reoccurs.

Mechanical / Hydraulic Diagnosis Symptoms Index

Perform Preliminary Inspection First!

CHART	SYMPTOMS
1	NO ENGINE START IN NEUTRAL OR PARK
2	NO FORWARD GEARS IN ANY RANGE/NO REVERSE
3	NO ENGINE BRAKE IN ANY RANGE
4	POOR SHIFTING IN ALL GEARS (ALL HARSH OR ALL SOFT)
5a	DELAYS IN DRIVE AND REVERSE
5b	DELAYS IN REVERSE ONLY
6	DIAGNOSTIC TROUBLE CODE (DTC) P0730
7	HARSH 1–2 SHIFT
8	HARSH 3–4 SHIFT
9a	3–2 DOWNSHIFT COMPLAINT
9b	HARSH SHIFT WHEN SHIFTING INTO “D” OR ACCELERATING FROM STOP
9c	COASTDOWN HARSH SHIFT OR CLUNK AT 3–2 DOWNSHIFT
10	INTERMITTENT 4TH TO 2ND GEAR DOWNSHIFT AT STEADY SPEED
11	ENGINE FLARE AT SHIFTING DURING TURNING ONLY (USUALLY WITH WARM ENGINE)
12	ENGINE FLARE DURING 1–2 OR 2–3 SHIFT
13	SHUDDER ONLY DURING TORQUE CONVERTER CLUTCH (TCC) APPLYING
14	POSSIBLE CAUSES OF TRANSMISSION NOISE
15a	POSSIBLE CAUSES OF LOW LINE PRESSURE
15b	POSSIBLE CAUSES OF HIGH LINE PRESSURE
16	POSSIBLE CAUSES OF TRANSMISSION FLUID LEAKS

NOTE: Numbers with parenthesis on the following charts refer to *Parts List at end of this section.*

Chart 1: No Engine Start In Neutral Or Park

Step	Action	Yes	No
1	Does engine start when shift lever moved from drive to neutral mostly in hot condition?	Go to *Step 2*	Go to *Step 3*
2	Does engine start in park at any condition?	Re–test vehicle	Go to *Step 4*
3	Does engine also not start in neutral when shift lever moved from park to neutral?	Go to *Step 4*	Go to *Step 5*
4	Check mode switch (63) setting. Readjust if necessary. Problems fixed?	Re–test vehicle	Go to *Step 5*
5	Check start circuit of mode switch (63) open in neutral. Was open found?	Locate and repair open(s)	Replace mode switch (63)

Chart 2: No Forward Gears In Any Range/No Reverse

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Go to *Step 2*	Use Chart 15a: Possible Causes of Low Line Pressure in this section
2	1. Check internal linkage: – Manual linkage (58) not moving manual valve (326). 2. Check for internal mechanical damage: – Turbine shaft (506) broken loose. – Overrun roller clutch (516) broken loose. Was the problem found?	Repair or replace	—

Chart 3: No Engine Brake In Any Range

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Go to *Step 2*	Use Chart 15a: Possible Causes of Low Line Pressure in this section
2	1. Check for overrun clutch leaks caused by: – Damaged piston lip (513) – Check ball defective (504) 2. Check for overrun lockout valve (705) stuck by foreign material. 3. Check for leaks at turbine shaft (506) caused by: – Teflon seal rings damaged (508) – Excessive wear of turbine shaft bearing surfaces. Was the problem found?	Repair or replace	—

Chart 4: Poor Shifting In All Gears (All Harsh Or All Soft)

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Go to *Step 2*	Go to *Step 3*
2	1. Check for these conditions which could affect clutch apply time: – Defective band apply solenoid (323). – Defective servo or/and accumulator piston. – Excessive clutch piston travel. 2. Check of possible causes of internal leaks: – Cut or damaged sealing ring(s) – Damaged sealing gasket(s) – Check ball missing or out of location in 2nd and 3rd clutch pistons. 3. Check for causes of burned clutch plates or band. Was the problem found?	Repair or replace	—
3	Was the line pressure high?	Go to *Step 4*	Use Chart 15a: Possible Causes of Low Line Pressure in this section
4	Does DTC P0705 set?	Diagnose those DTC(s) first	Use Chart 15b: Possible Causes of High Line Pressure in this section

Chart 5a: Delays In Drive And Reverse

NOTE: A short delay (less than 3 seconds) when first engaging drive or reverse after allowing vehicle to sit overnight is normal.

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	More than 3 second delay in drive and reverse with engine off 1 hour or less. Teflon seals (508) on turbine shaft damaged. Repair	Use Chart 15a: Possible Causes of Low Line Pressure in this section.

Chart 5b: Delays In Reverse Only

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Go to *Step 2*	Use Chart 15a: Possible Causes of Low Line Pressure in this section.
2	Main case valve body gasket (88) damaged. – Reverse check ball (85) in valve body (84) missing or out of location. – Check for restrictions at valve body transfer plate orifice. Was the problem found?	Repair	—

Chart 6: Diagnostic Trouble Code (DTC) P0730

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Go to *Step 2*	Use Chart 15b: Possible Causes of High Line Pressure in this section
2	1. 1st and 2nd gear missing or 3rd and 4th gear missing. Check appropriate shift valve. If OK replace solenoid. 2. No engine brake in any range (All ranges in Drive and Reverse are OK). Check for suspected conditions modifying delays to clutch apply: – Overrun clutch seal damaged. – Excessive overrun clutch piston travel. – Defective 3–4 accumulator piston. – Causes of internal leaks. – Causes of burned clutch plates. 3. 1st and 4th gear missing or 2nd and 3rd gear missing. Shift solenoid A stuck. Replace shift solenoid A. 4. DTC P0730 is set in D range 1st gear above 3500 rpm. Go to *Step 3*. 5. DTC P0730 is set in D range 3rd gear between 55-80 mph. NOTE: Perform this test within safe and legal limits. Check for suspected conditions modifying delays to clutch apply: – 4th clutch seal damaged. – Excessive 4th clutch piston travel. – Defective 3–4 accumulator piston. – Causes of internal leaks. – Causes of burned clutch plates. Was the problem found?	Repair or replace	—
3	Check 3rd gear in “D” in winter mode. Does vehicle move?	Shift solenoid A stuck. Replace shift solenoid A.	Go to *Step 4*
4	Check for suspected conditions modifying delays to clutch apply: – 2nd clutch seal damaged. – Excessive 2nd clutch piston travel. – Defective accumulator piston. – Causes of internal leaks. – Check ball missing or out of location in 2nd clutch. – Seals cut, damaged or missing. – Gaskets defective. – Causes of burned clutch plates. Was the problem found?	Repair or replace	—

Chart 7: Harsh 1–2 Shift

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Check for 1–2 accumulator valve (320) stuck by foreign material in main case valve body.	Use Chart 15b: Possible Causes of High Line Pressure in this section.

Chart 8: Harsh 3–4 Shift

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Go to *Step 2*	Use Chart 15b: Possible Causes of High Line Pressure in this section
2	1. Check for 3–4 accumulator valve (407) stuck in adapter case valve body (401). 2. Check for 3–4 accumulator piston (18) stuck in adapter case (20). Was the problem found?	Repair or replace	—

Chart 9a: 3–2 Downshift Complaint

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Go to *Step 2*	Use Chart 15a: Possible Causes of Low Line Pressure in this section
2	Does DTC P1850 set?	Diagnose P1850 first	Replace band apply solenoid (PWM) (323)

Chart 9b: Harsh Shift When Shifting Into “D” Or Accelerating From Stop

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Go to *Step 2*	Use Chart 15b: Possible Causes of High Line Pressure in this section
2	Does DTC P1850 set?	Diagnose P1850 first	Replace band apply solenoid (PWM) (323)

Chart 9c: Coastdown Harsh Shift Or Clunk At 3–2 Downshift

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Go to *Step 2*	Use Chart 15b: Possible Causes of High Line Pressure in this section
2	Does DTC P1850 set?	Diagnose P1850 first	Replace band apply solenoid (PWM) (323)

Chart 10: Intermittent 4TH TO 2ND Gear Downshift At Steady Speed

Step	Action	Yes	No
1	Check for consistent speed sensor reading with scan tool. Was the reading correct?	Replace mode switch for intermittent contact.	Go to *Step 2*
2	1. Check for wiring harness damage or short to ground. If OK, go to *(2)*. 2. Check transmission speed sensor connections. If OK, go to *(3)*. 3. Replace transmission speed sensor. Was the replacement complete?	—	Replace speed sensor.

Chart 11: Engine Flare At Shifting During Turning Only (Usually With Warm Engine)

Step	Action	Yes	No
1	Check for oil leaks at transmission. Was the problem found?	Replace transmission oil filter and gasket	—

Chart 12: Engine Flare During 1–2 Or 2–3 Shift

Step	Action	Yes	No
1	Check line pressure. Refer to *Line Pressure Test in this section.* Was line pressure normal?	Go to *Step 2*	Use Chart 15a: Possible Causes of Low Line Pressure in this section
2	1. Check for a stuck 1–2 accumulator valve (320). 2. Check for servo piston (106) leaks. 3. Check for a stuck band apply solenoid (323). Was line pressure normal?	Repair or replace	—

Chart 13: Shudder Only During Torque Converter Clutch (TCC) Applying

Step	Action	Yes	No
1	1. TCC shudder is one of the most commonly misdiagnosed conditions in an automatic transmission. The key to diagnosing TCC shudder is to note when it happens and under what conditions. Once the TCC has been fully applied, it is nearly impossible to make it shudder. TCC shudder (short burst of noise normally less than 1 second) will only occur during clutch applying. It is not a steady state condition. 2. Drive until whole drivetrain is at normal operating temperature. – On 4WD vehicles, the test must be performed with transfer case selector lever in “2H” position. – Shudder is a short burst of noise normally less than 1 second in duration, and can be induced by the following maneuver: 3. From coast condition at 50 mph in “D” range (Normal mode), depress the throttle to 1/4-1/3 throttle. If present, shudder will occur within 5 seconds together with TCC application.(The scan tool may be used to determine the exact time of TCC applying) Was the problem found?	Replace transmission fluid and filter (remove both pans) and flush cooler lines. Replace converter assembly and O-ring on turbine shaft	Perform mechanical inspection of other drivetrain components.

Chart 14: Possible Causes Of Transmission Noise

CAUTION: Before checking transmission for what is believed to be transmission noise, ensure presence and positioning of insulating plugs, pads etc. Also make sure that noise does not come from other drivetrain components.

Condition	Possible cause	Correction
Whine or Buzz	Oil level low	Fill with ATF, check for external leaks.
	Plugged or restricted oil filter	Inspect oil filter. Replace oil filter or ATF as necessary.
	Damaged oil filter gasket	Replace oil filter gasket.
Knocking noise from front of transmission.	Loose bolts (Converter to flex plate)	Tighten to specifications.
	Cracked or broken flex plate	Replace flex plate.
	Converter damaged	Replace converter.
Knocking noise while driving, mostly on acceleration.	Transmission mount loose or broken	Tighten mount bolts or replace transmission mount.
	Cooler line mounts loose or broken	Tighten or replace cooler line mounts.
	Cooler lines touching body or frame	Repair or replace as necessary.
Knocking noise when vehicle is stationary.	Loose flex plate mounting bolts	Tighten to specifications.
	Cracked or broken flex plate	Replace flex plate.
	Damaged converter	Replace converter.

Chart 15a: Possible Causes of Low Line Pressure

Step	Action	Yes	No
1	Check oil level. Was the problem found?	Fill with ATF	Go to *Step 2*
2	Check for defective throttle position sensor. Was the problem found?	Replace throttle position sensor	Go to *Step 3*
3	Check for plugged, loose, or damaged oil filter (79). Was the problem found?	Inspect oil filter, tighten bolts or replace oil filter (79)	Go to *Step 4*
4	Check for a stuck force motor plunger (404). (Adapter case valve body) Was the problem found?	Replace force motor plunger (404)	Go to *Step 5*
5	Check for a stuck feed limit valve (412). (Adapter case valve body) Was the problem found?	Replace feed limit valve (412)	Go to *Step 6*
6	Check for loose converter bolts (4 & 5). Was the problem found?	Tighten converter bolts (4 & 5)	Go to *Step 7*
7	Check for a stuck pressure regulator valve (217). (Oil pump) Was the problem found?	Replace pressure regulator valve (217)	Go to *Step 8*
8	Check for a stuck boost valve (213).(Oil pump) Was the problem found?	Replace boost valve (213)	Go to *Step 9*
9	Check for blocked intermediate oil passages to pressure regulator valve. (Oil pump) Was the problem found?	Replace oil pump	Go to *Step 10*
10	Check for defective oil pump (9, 201, 202 & 228). Was the problem found?	Replace oil pump	Go to *Step 11*
11	Check for internal leaks. – Check balls missing or out of location in valve bodies – Seals cut or damaged – Gaskets defective, etc. Was the problem found?	Install balls, or correct ball location Replace seals Replace gaskets	—

Chart 15b: Possible Causes Of High Line Pressure

NOTE: If transmission is operating in backup mode, high line pressure will be present.

Step	Action	Yes	No
1	Check for defective throttle position sensor. Was the problem found?	Replace throttle position sensor.	Go to *Step 2*.
2	Check for a stuck force motor plunger (404). (Open circuit/intermittent) (Adapter case valve body) Was the problem found?	Replace force motor plunger (404)	Go to *Step 3*
3	Check for a stuck feed limit valve (412). (Adapter case valve body) Was the problem found?	Replace force motor plunger (412)	Go to *Step 4*
4	Check converter bolts (4 & 5). Was the problem found?	Tighten converter bolts (4 & 5)	Go to *Step 5*
5	Check for a stuck pressure regulator valve (217). (Oil pump) Was the problem found?	Replace pressure regulator valve (217)	Go to *Step 6*
6	Check for a stuck boost valve (213). (Oil pump) Was the problem found?	Replace boost valve (213)	Go to *Step 7*
7	Check for internal leaks. – Check balls missing or out of location in valve bodies – Seals cut or missing – Gaskets defective, etc. Was the problem found?	Install balls, or correct ball location Replace seals Replace gaskets	—

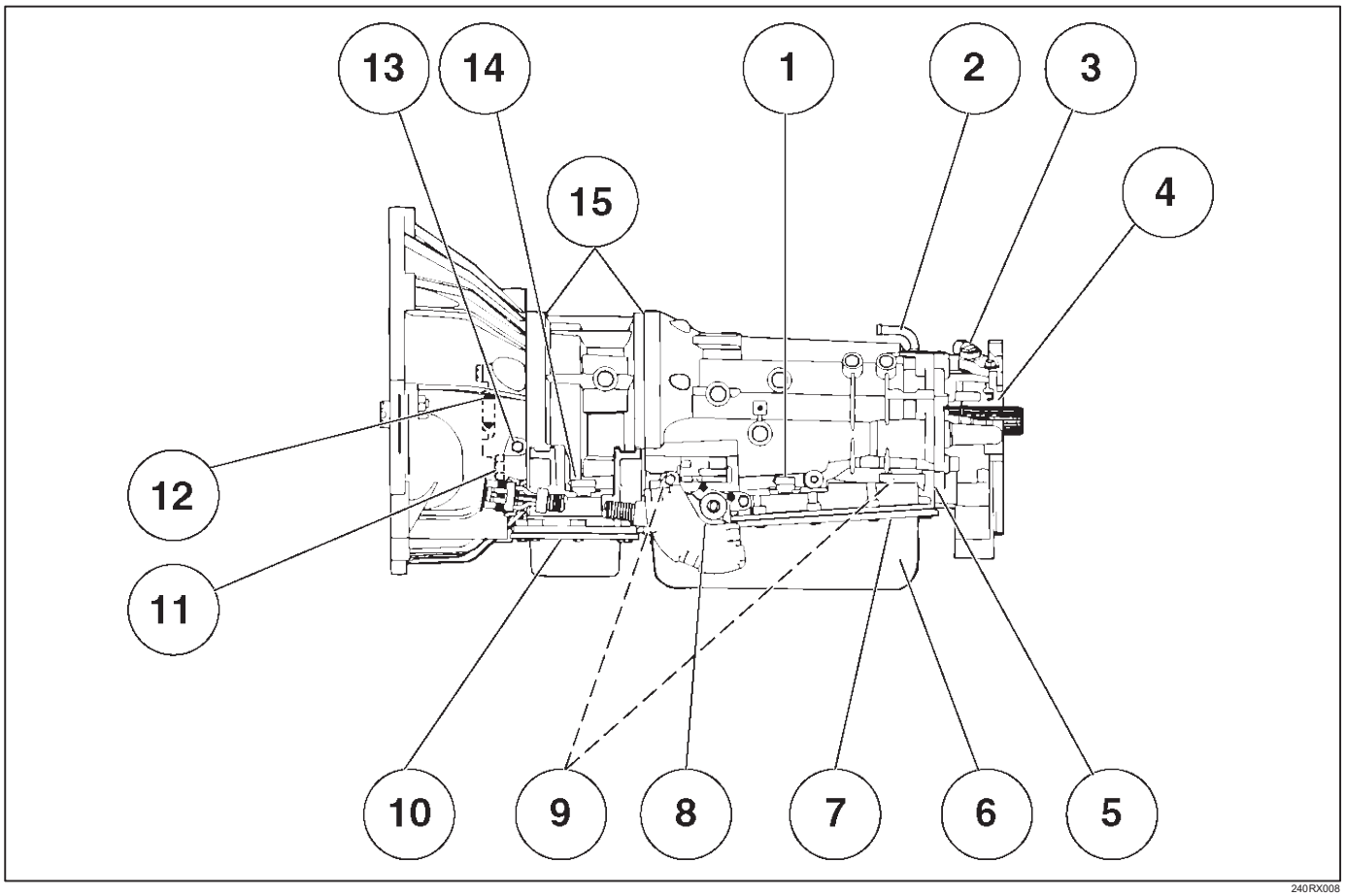
Chart 16: Possible Causes Of Transmission Fluid Leaks

Before attempting to correct an oil leak, the actual source of the leak must be determined. In many cases, the source of the leak may be difficult to determine due to "wind flow" around the engine and transmission.
The suspected area should be wiped clean before inspecting for the source of the leak.

Oil leaks around the engine and transmission are generally carried toward the rear of the vehicle by the air stream. In determining the source of an oil leak, the following two checks should be made:

1. With the engine running, check for external line pressure leaks.
2. With the engine off, check for oil leaks due to the raised oil level caused by drainback of converter oil into the transmission.

Possible Causes Of Fluid Leaks Due To Sealing Malfunction



Legend

(1) Electrical Connector (Main Case) Seal
(2) Transmission Vent (Breather)
(3) Speed Sensor O–Ring
(4) Extension (Adapter) Lip Seal
(5) Extension (Adapter) to Main Case Gasket
(6) Overfill and Oil Drain Screws Gasket
(7) Oil Pan Gasket (Main Case)
(8) Selector Shaft Seal
(9) Oil Cooler Connectors (2)
(10) Oil Pan Gasket (Adapter Case)
(11) Converter housing attaching bolts not correctly torqued
(12) Converter Housing Lip Seal
(13) Line Pressure Tap Plug
(14) Electrical Connector (Adapter Case) Seal
(15) Adapter Case Seal Rings (2)

Stall Test

The stall test allows you to check the transmission for internal abrasion and the one way clutch for slippage. Torque converter performance can also be evaluated.
The stall test results together with the road test results will identify transmission components requiring servicing or adjustment.

Stall Test Procedure:

1. Check the level of the engine coolant, the engine oil, and the automatic transmission fluid. Replenish if necessary.
2. Block the wheels and set the parking brake.
3. Connect a tachometer to the engine.
4. Start the engine and allow it to idle until the engine coolant temperature reaches 70 – 80˚C (158 – 176˚F).
5. Hold the brake pedal down as far as it will go.
6. Place the selector in the “D” range.
7. Gradually push the accelerator pedal to the floor.
   The throttle valve will be fully open.
   Note the engine speed at which the tachometer needle stabilizes.

   Stall Speed : 2,100 ±150 rpm

NOTE: Do not continuously run this test longer than 5 seconds.

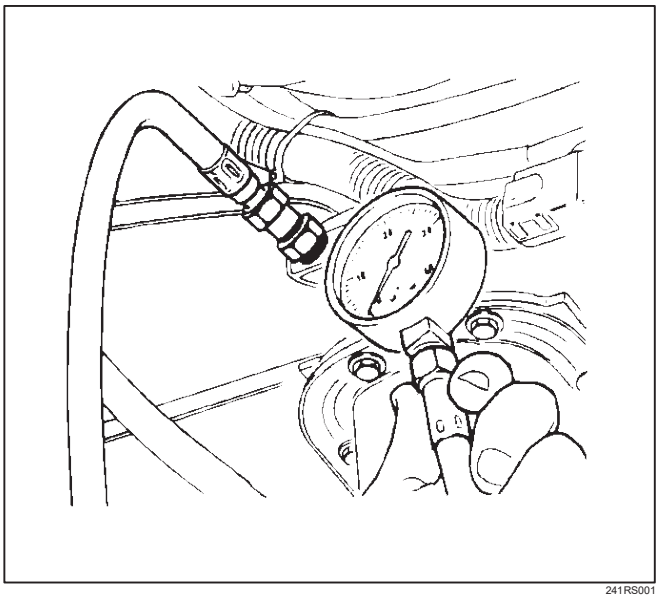
8. Release the accelerator pedal.
9. Place the selector in the “N” range.
10. Run the engine at 1,200 rpm for one minute.
    This will cool the transmission fluid.
11. Repeat Steps 7 – 10 for the “3”, “2”, “L” and “R” ranges.

Line Pressure Test

The line pressure test checks oil pump and control valve pressure regulator valve function. It will also detect oil leakage.

Line Pressure Test Procedure:

1. Check the level of the engine coolant, the engine oil, and the automatic transmission fluid.
   Replenish if required.
2. Block the wheels and set the parking brake.
3. Remove the pressure detection plug at the left side of the transmission case.
   Set J–29770–A pressure gauge and adapter to the pressure detection plug hole.



4. Start the engine and allow it to idle until the engine coolant temperature reaches 70 – 80˚C (158 – 176˚F).
5. Hold the brake pedal down as far as it will go.
6. Place the selector in the “D” range.
7. Note the pressure gauge reading with the engine idling.
8. Gradually push the accelerator pedal to the floor. The throttle valve will be fully open.
   Note the pressure gauge reading with the accelerator pedal fully depressed.

NOTE: Do not continuously run this test longer than 5 seconds.

9. Release the accelerator pedal.
10. Place the selector in the “N” range.
11. Run the engine at 1,200 rpm for one minute.
    This will cool the transmission fluid.
12. Repeat Steps 7 – 11 for the “3”, “2”, “L”, and “R” ranges.
13. Install a pressure detection plug to the transmission case, applying recommended thread locking agent (LOCTITE 242) or its equivalent to thread of plug. Make sure that thread is cleaned before applying locking agents.
14. Tighten the pressure detection plug to the specified torque.

    Torque: 9 – 14N·m (7 – 10lb ft)

MODE	LEVER POSITION	ENGINE SPEED	LINE PRESSURE		FORCE MOTOR CURRENT (mA)
			kPa	PSI	
NORMAL/POWER	D,3,2,L	IDLE	590 – 730	86 – 106	680 – 720
WINTER	D	IDLE	300 – 390	44 – 57	1,020 – 1,060
NORMAL/POWER WINTER	REVERSE	IDLE	460 – 630	67 – 91	880 – 920
NORMAL/POWER	D, 3, 2, L	STALL SPEED	1,250 – 1,380	181 – 200	70 – 110
WINTER	D	STALL SPEED	1,250 – 1,380	181 – 200	70 – 110
NORMAL/POWER WINTER	REVERSE	STALL SPEED	1,400 – 1,580	203 – 229	340 – 380

Shift Speed Chart

Transfer gear ratio:	High: 1.000
Rear axle ratio:	4.300

“Normal mode”

Upshift

Range	Throttle opening	1 → 2 (First Gear) (Second Gear) km/h (mph)	2 → 3 (Second Gear) (Third Gear) km/h (mph)	3 → 4 (Third Gear) (Fourth Gear) km/h (mph)
D (Drive)	Fully opened	53 ~ 59 (33 ~ 37)	110 ~ 116 (68 ~ 72)	166 ~ 172 (103 ~ 107)
	Half throttle	32 ~ 38 (20 ~ 24)	57 ~ 63 (35 ~ 39)	99 ~ 105 (61 ~ 65)
3 (Third)	Fully opened	53 ~ 59 (33 ~ 37)	110 ~ 116 (68 ~ 72)	—
	Half throttle	32 ~ 38 (20 ~ 24)	57 ~ 63 (35 ~ 39)	—
2 (Second)	Fully opened	53 ~ 59 (33 ~ 37)	—	—
	Half throttle	32 ~ 38 (20 ~ 24)	—	—

Downshift

Range	Throttle opening	1 ← 2 (First Gear) (Second Gear) km/h (mph)	2 ← 3 (Second Gear) (Third Gear) km/h (mph)	3 ← 4 (Third Gear) (Fourth Gear) km/h (mph)
D (Drive)	Fully opened	45 ~ 51 (28 ~ 32)	97 ~ 103 (60 ~ 64)	155 ~ 161 (96 ~ 100)
	Half throttle	14 ~ 20 (9 ~ 12)	33 ~ 39 (20 ~ 24)	64 ~ 70 (40 ~ 43)
	Fully closed	13 ~ 19 (8 ~ 12)	19 ~ 25 (12 ~ 16)	27 ~ 33 (17 ~ 21)
3 (Third)	Fully opened	45 ~ 51 (28 ~ 32)	97 ~ 103 (60 ~ 64)	—
	Half throttle	14 ~ 20 (9 ~ 12)	33 ~ 39 (20 ~ 24)	—
	Fully closed	13 ~ 19 (8 ~ 12)	19 ~ 25 (12 ~ 16)	—
2 (Second)	Fully opened	45 ~ 51 (28 ~ 32)	92 ~ 98 (57 ~ 61)	—
	Half throttle	14 ~ 20 (9 ~ 12)	92 ~ 98 (57 ~ 61)	—
	Fully closed	13 ~ 19 (8 ~ 12)	92 ~ 98 (57 ~ 61)	—
L (First)	—	48 ~ 54 (30 ~ 34)	—	—

“Power mode”

Upshift

Range	Throttle opening	1 → 2 (First Gear) (Second Gear) km/h (mph)	2 → 3 (Second Gear) (Third Gear) km/h (mph)	3 → 4 (Third Gear) (Fourth Gear) km/h (mph)
D (Drive)	Fully opened	53 ~ 59 (33 ~ 37)	110 ~ 116 (68 ~ 72)	174 ~ 180 (108 ~ 112)
	Half throttle	41 ~ 47 (25 ~ 29)	84 ~ 90 (52 ~ 56)	136 ~ 142 (84 ~ 88)
3 (Third)	Fully opened	53 ~ 59 (33 ~ 37)	110 ~ 116 (68 ~ 72)	—
	Half throttle	41 ~ 47 (25 ~ 29)	84 ~ 90 (52 ~ 56)	—
2 (Second)	Fully opened	53 ~ 59 (33 ~ 37)	—	—
	Half throttle	41 ~ 47 (25 ~ 29)	—	—

Downshift

Range	Throttle opening	1 ← 2 (First Gear) (Second Gear) km/h (mph)	2 ← 3 (Second Gear) (Third Gear) km/h (mph)	3 ← 4 (Third Gear) (Fourth Gear) km/h (mph)
D (Drive)	Fully opened	45 ~ 51 (28 ~ 32)	104 ~ 110 (65 ~ 68)	163 ~ 169 (101 ~ 105)
	Half throttle	22 ~ 28 (14 ~ 17)	57 ~ 63 (35 ~ 39)	108 ~ 114 (67 ~ 71)
	Fully closed	13 ~ 19 (8 ~ 12)	23 ~ 29 (14 ~ 18)	46 ~ 52 (29 ~ 32)
3 (Third)	Fully opened	45 ~ 51 (28 ~ 32)	104 ~ 110 (65 ~ 68)	—
	Half throttle	22 ~ 28 (14 ~ 17)	57 ~ 63 (35 ~ 39)	—
	Fully closed	13 ~ 19 (8 ~ 12)	23 ~ 29 (14 ~ 18)	—
2 (Second)	Fully opened	45 ~ 51 (28 ~ 32)	92 ~ 98 (57 ~ 61)	—
	Half throttle	22 ~ 28 (14 ~ 17)	92 ~ 98 (57 ~ 61)	—
	Fully closed	13 ~ 19 (8 ~ 12)	92 ~ 98 (57 ~ 61)	—
L (First)	—	48 ~ 54 (30 ~ 34)	—	—

“Winter mode”

D range, winter mode ON → OFF	31 ~ 37 km/h (19 ~ 23 mph)

Lockup Speed Chart

Transfer gear ratio	High: 1.000
Rear axle ratio	4.300

	Mode	ECCC Apply			ECCC Release		
		2nd Km/h (mph)	3rd Km/h (mph)	4th Km/h (mph)	2nd Km/h (mph)	3rd Km/h (mph)	4th Km/h (mph)
D range Throttle opening 6%	Normal	57 ~ 63 (35 ~ 39)	42 ~ 48 (26 ~ 30)	43 ~ 49 (27 ~ 31)	52 ~ 58 (32 ~ 36)	32 ~ 38 (20 ~ 24)	41 ~ 47 (25 ~ 29)
	Power	57 ~ 63 (35 ~ 39)	67 ~ 73 (42 ~ 45)	57 ~ 63 (35 ~ 39)	52 ~ 58 (32 ~ 36)	32 ~ 38 (20 ~ 24)	49 ~ 55 (30 ~ 34)

Changing Transmission Fluid

There is no need to change the transmission fluid unless the transmission is used under one or more of the following heavy duty conditions.

A. Repeated short trips
B. Driving on rough roads
C. Driving on dusty roads
D. Towing a trailer

If the vehicle is used under these conditions, change the fluid every 20,000 miles (32,000 km).

1. Place a large drain pan under the oil pan.
2. Remove the transmission oil drain screw (2) and drain fluid.
3. Tighten drain screw (2).

   Torque: 38 N•m (28 lb ft)

4. Remove the transmission overfill screw (1) and fill transmission through overfill screw opening, using DEXRON®–III ATF.

NOTE: Add transmission fluid until it flows out over the overfill screw opening.

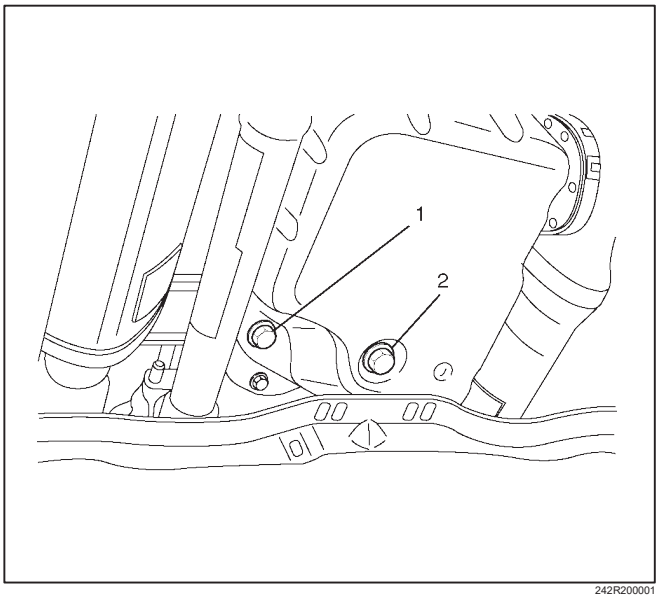
5. Let engine idle until a fluid temperature between 32˚C (90˚F) and 57˚C (135˚F) is reached.
6. Add transmission fluid until it flows out over the overfill screw opening, then close the overfill screw (1).

   Torque: 38 N•m (28 lb ft)

NOTE: To prevent fluid leaks, the overfill screw and oil drain screws gasket must be replaced each time these screws are removed.

NOTE: Check transmission fluid temperature with scan tool.

7. Reset “Oil Life Monitor” data by using Tech 2.
   Refer to *Tech 2 OBD II Connection in Transmission Control System (4L30-E) section.*



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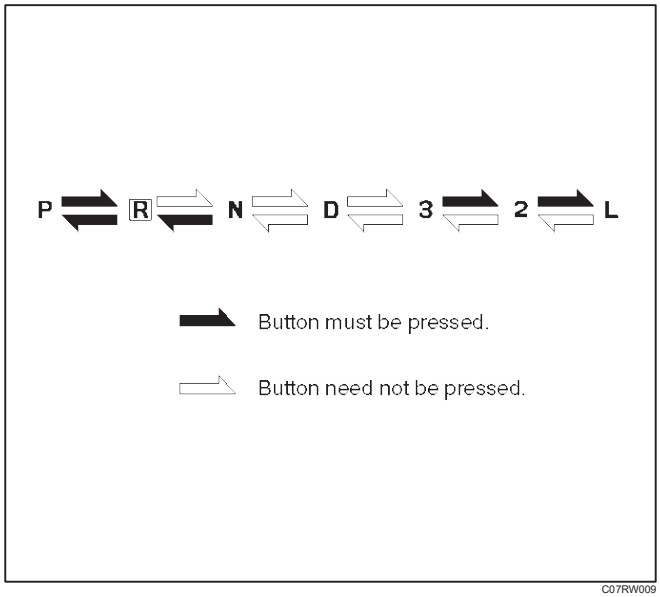
Selector Lever

Inspection

1. Make sure that when the selector lever is shifted from “P” to “L”, a “clicking” can be felt at each shift position. Make sure that the gear corresponds to that of the position plate indicator.
2. Check to see if the selector lever can be shifted as shown in illustration.



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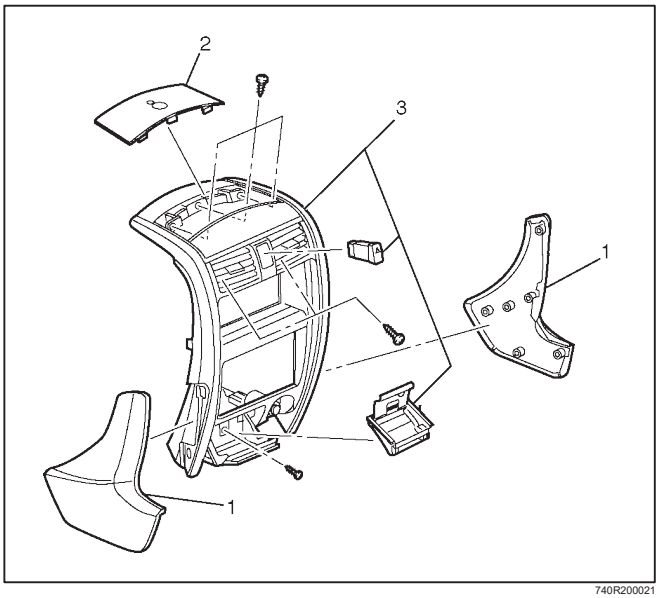
Removal

1. Disconnect battery ground cable.
2. Set ignition Key in “LOCK” position and selector lever in ”P” position.
3. Remove knee pads (1), cluster upper cover (2) and center cluster assembly (3).



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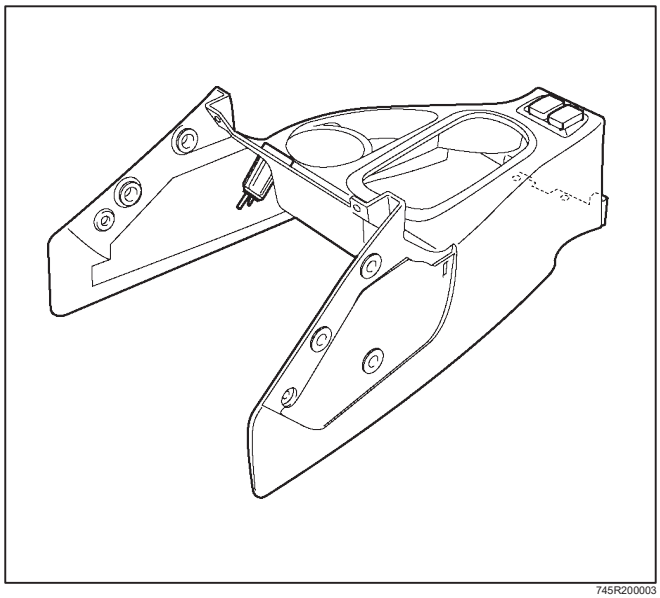
4. Remove rear console.



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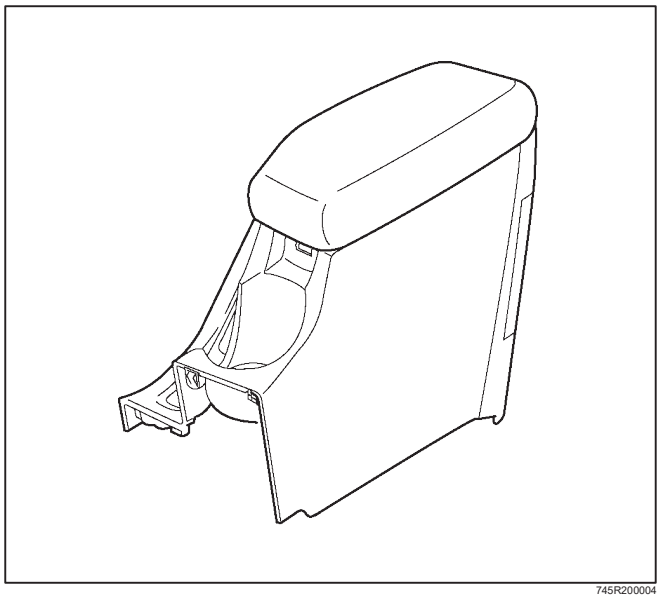
5. Remove front console.



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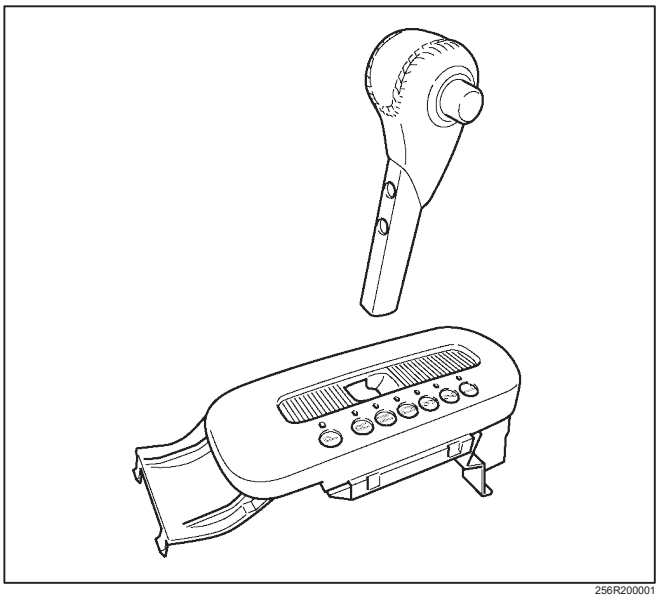
6. Remove selector lever knob and cover assembly.



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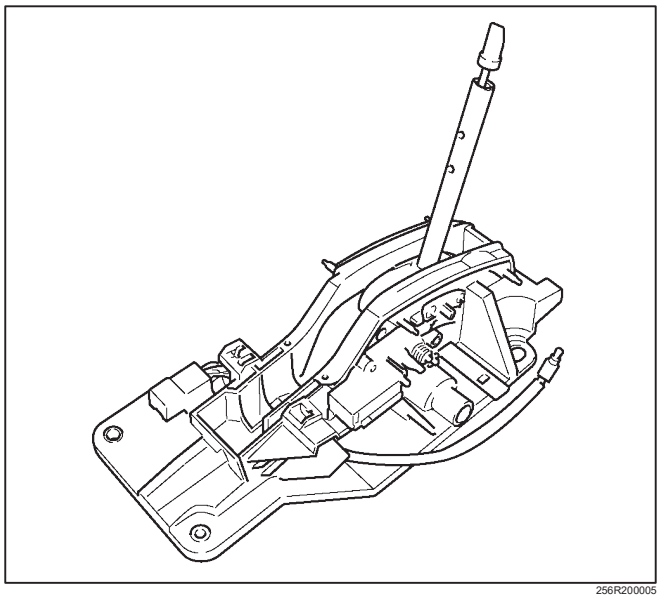
7. Disconnect select cable.
   - Refer to *Select Cable in this section.*
8. Disconnect shift lock cable.
   - Refer to *Shift Lock Cable in this section.*
9. Disconnect harness connector.

10. Remove selector lever subassembly.



256R200005

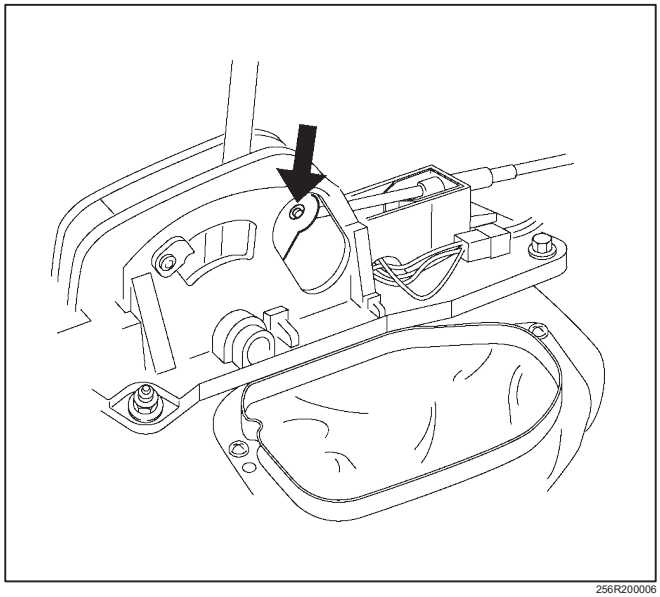
Installation

1. Install selector lever subassembly.
2. Connect harness connector.
3. Connect shift lock cable.
   - Refer to *Shift Lock Cable in this section.*
4. Connect select cable.
   - Refer to *Select Cable in this section.*
5. Install selector lever knob and cover assembly.
6. Install front console.
7. Install rear console.
8. Install center cluster assembly, cluster upper cover and knee pads.
9. Connect negative (–) battery cable.
10. After installation, make sure that the selector lever operates normally, and that each selector position is properly indicated. (The red mark shows through the window.)

Select Cable

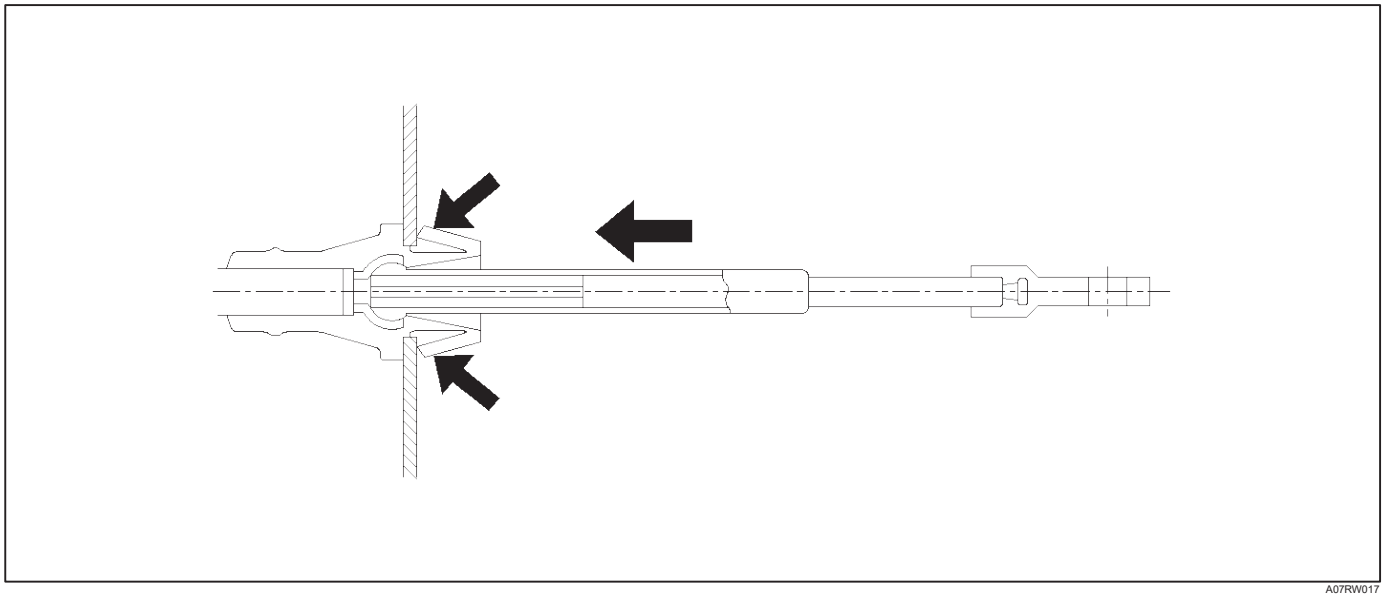
Removal

1. Set selector lever in “P” position.
2. Remove knee pads, cluster upper cover, center cluster assembly, rear console, front console, selector lever knob and cover assembly.
   - Refer to *Selector Lever in this section.*
3. Disconnect inner cable by pulling projection on pin.



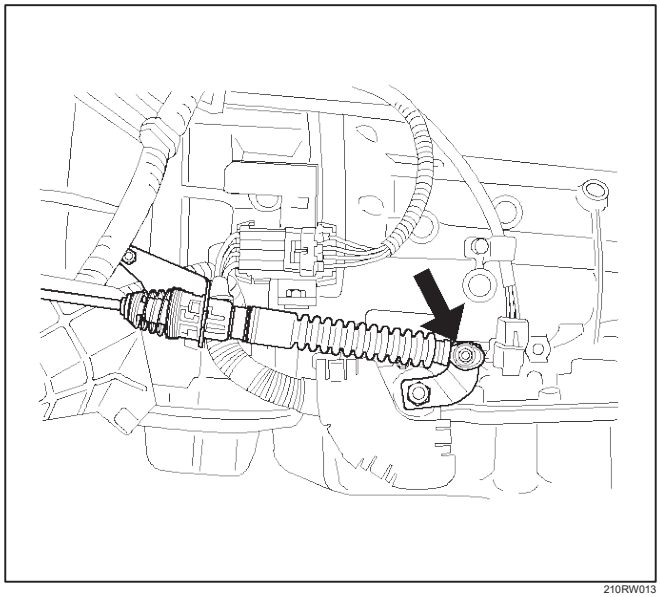
256R200006

4. Press down claws and disconnect cable assembly.



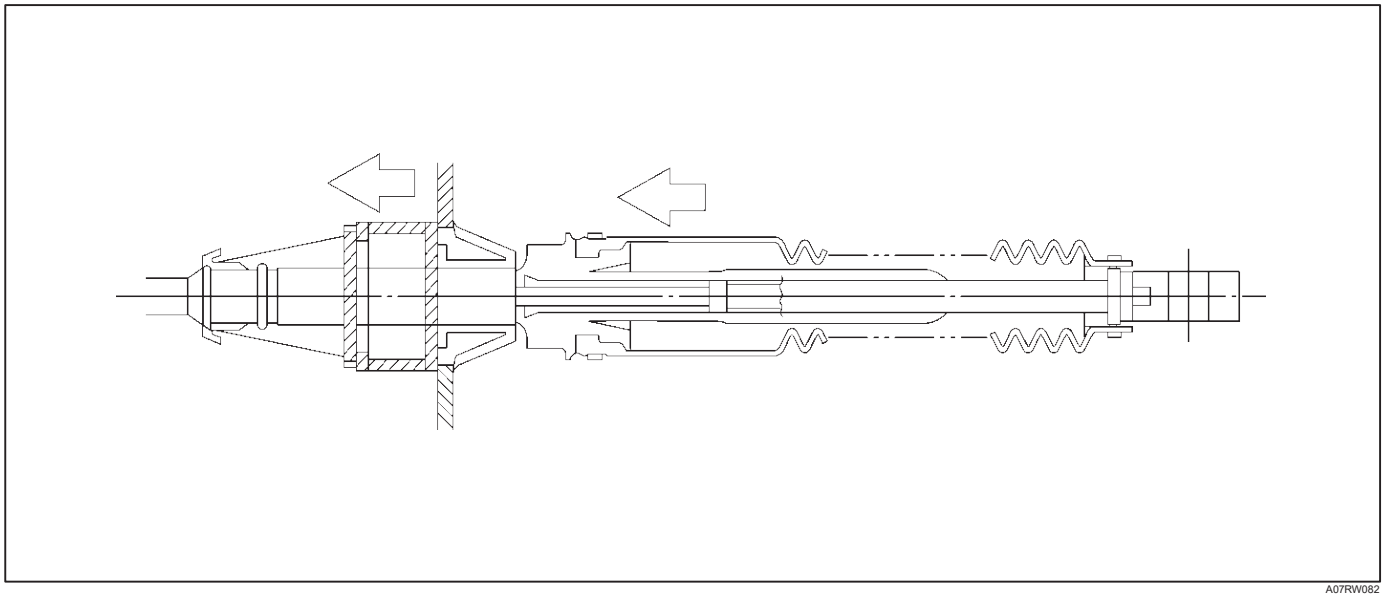
A07RW017

5. Remove nuts that fasten grommet in select cable assembly.
6. Disconnect inner cable.



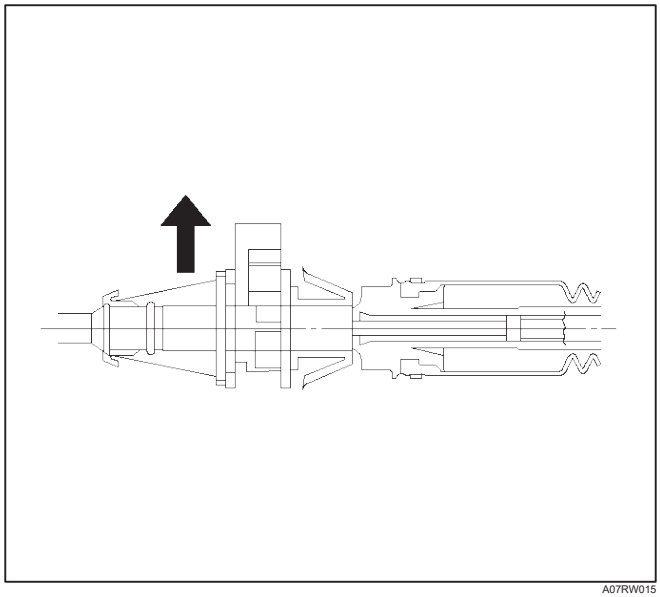
210RW013

7. Slide sleeve and disconnect cable assembly.



A07RW082

8. Pull lock.

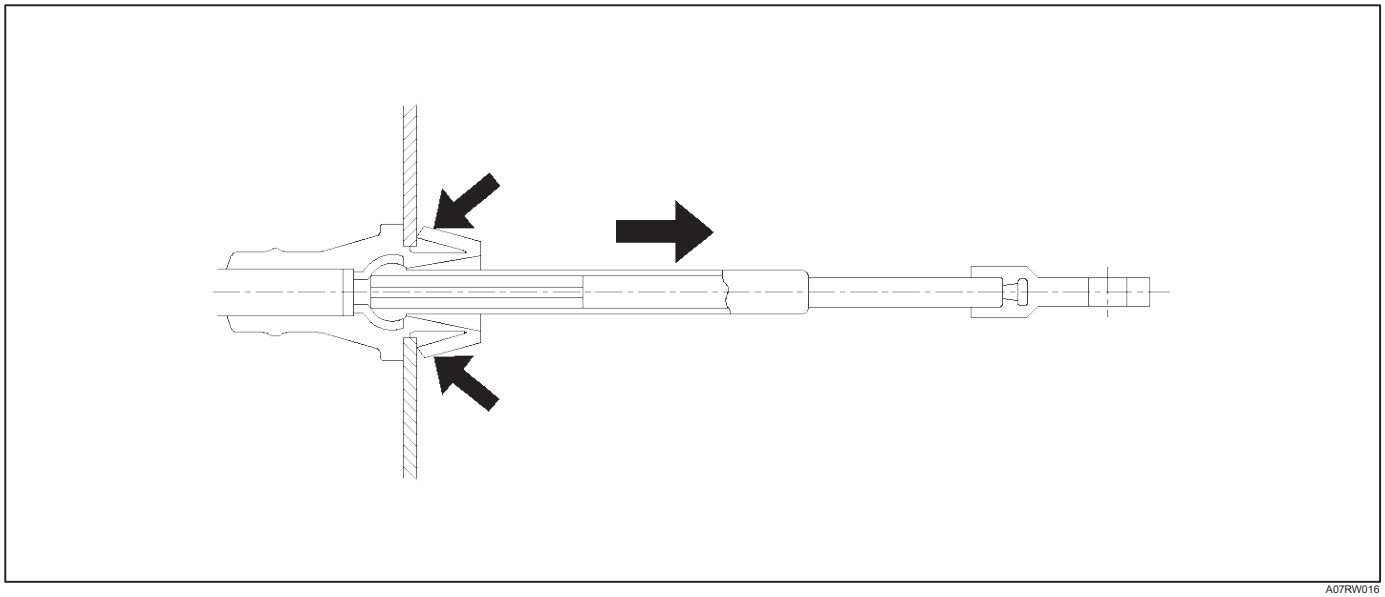


A07RW015

9. Draw select cable assembly into the interior side.

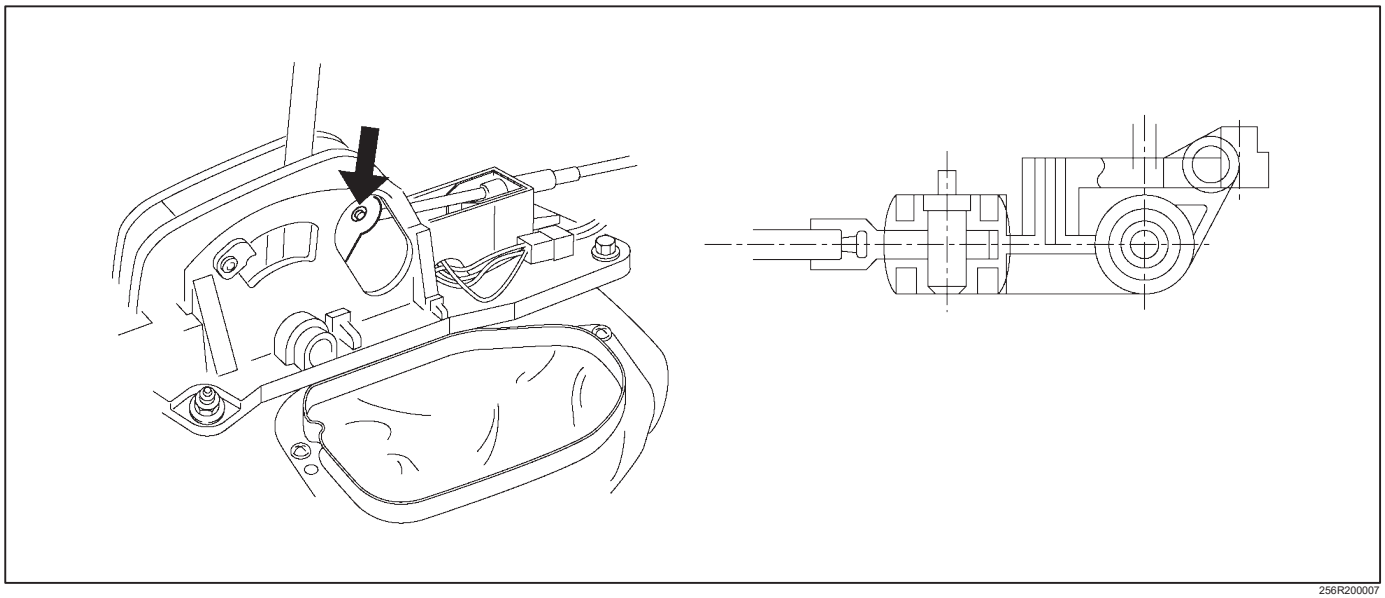
Installation

1. Set selector lever in “P” position.
2. Let out select cable transmission side end from floor hole.
3. Fit outer cable into bracket in selector lever assembly.



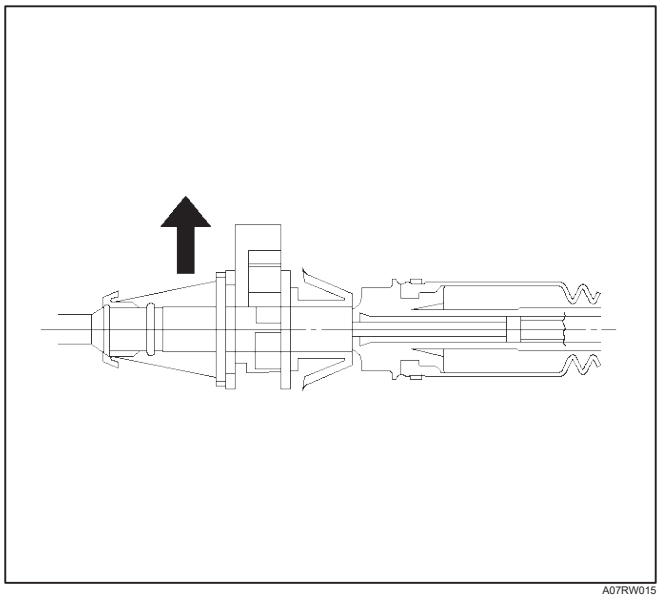
A07RW016

4. Set inner cable end in selector lever and push pin into selector lever hole and inner cable end.

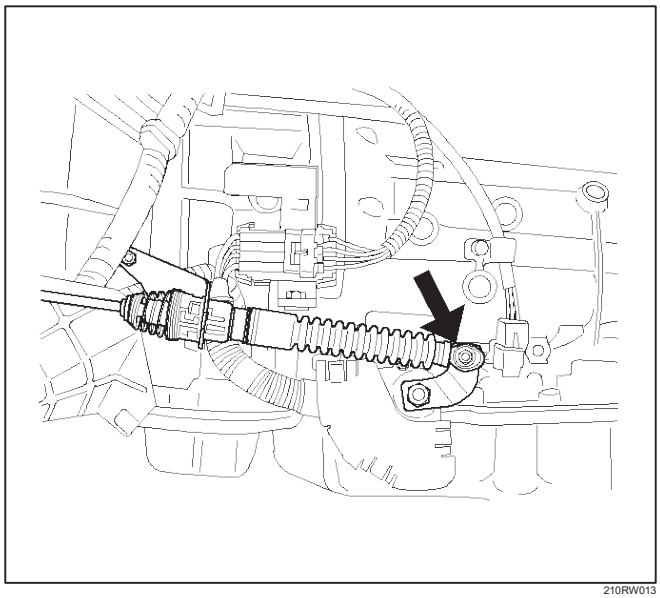


256R200007

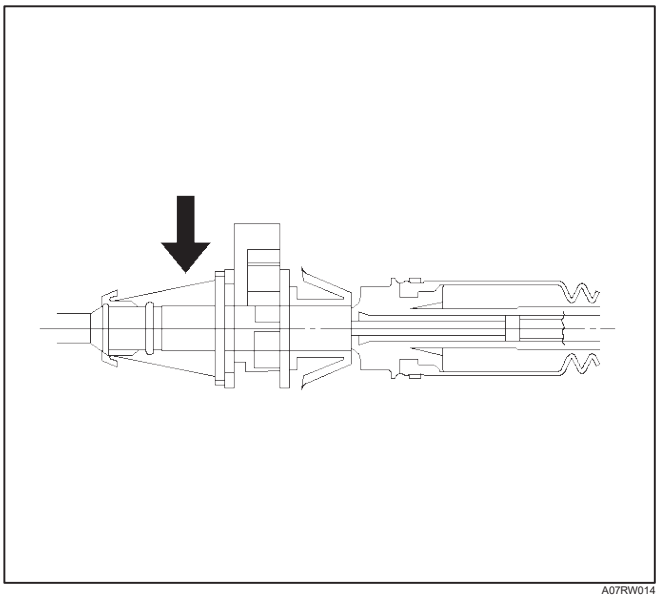
5. Check that lock projects.


A07RW015

6. Connect adjust end fitting attachment to the bracket on transmission.
7. Set select lever “P” position and connect inner cable to select lever.


210RW013

8. Push lock into adjust end fitting attachment.

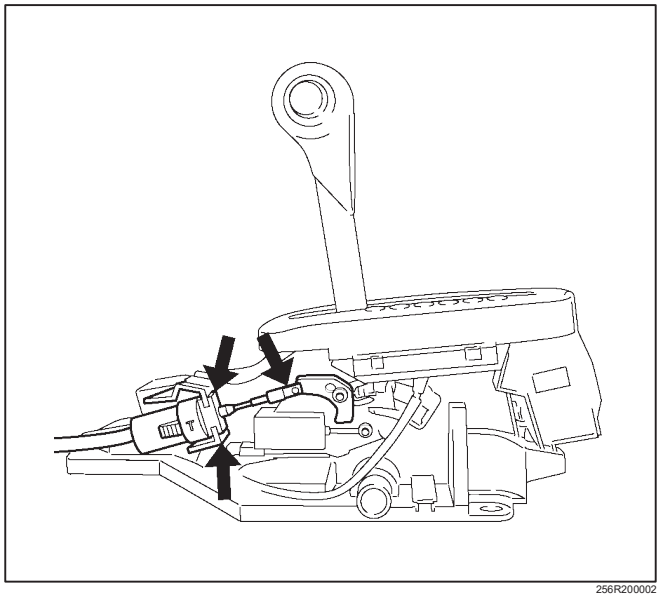

A07RW014

9. Install grommet.
10. About following installation steps, refer to *Selector Lever in this section.*

Shift Lock Cable

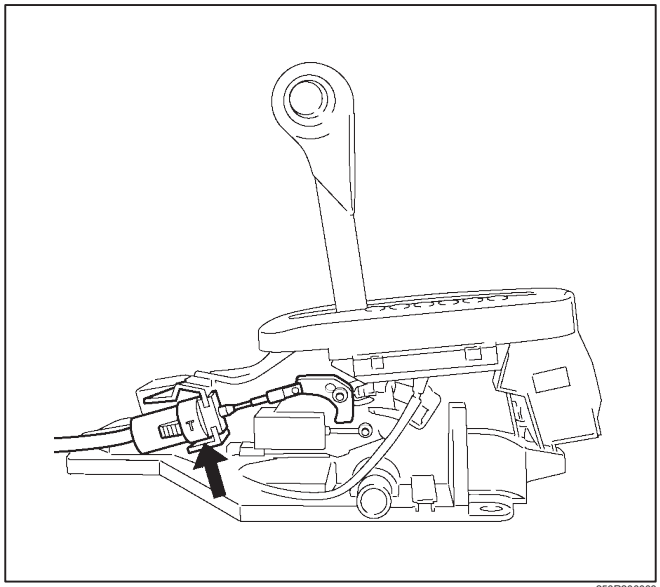
Removal

1. Set ignition key in “LOCK” position and selector lever in “P” position.
2. Remove knee pads, cluster upper cover, center cluster assembly, rear console, and front console.
   - Refer to *Selector Lever in this section.*
3. Disconnect inner cable from selector lever assembly then push claw and disconnect cable assembly.



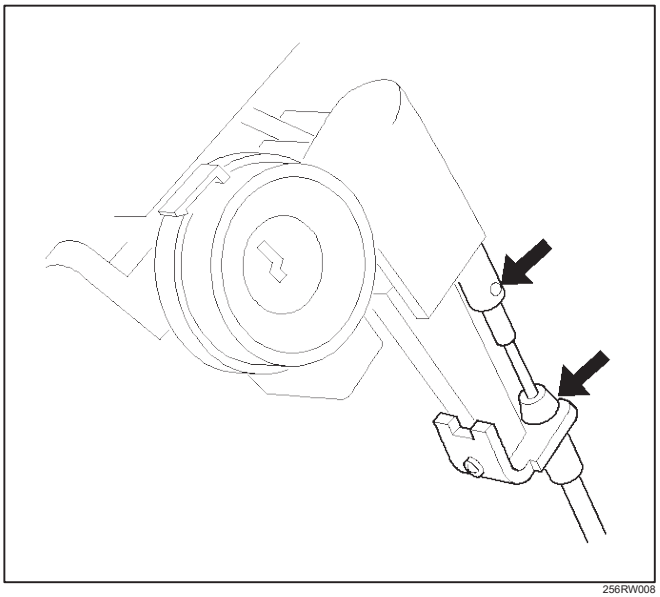
256R200002

4. Disconnect lock adjust.



256R200003

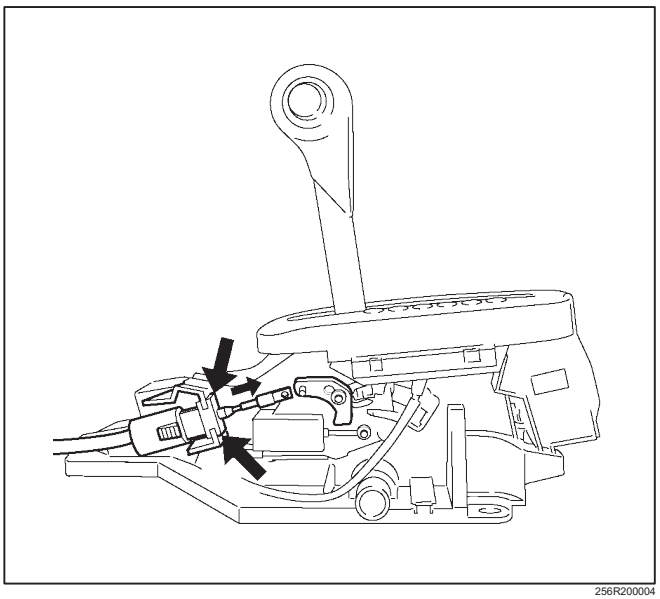
5. Remove instrument panel lower cover and steering column cover.
6. Remove spring pin and disconnect inner cable.
   - Disconnect outer cable from bracket.



256RW008

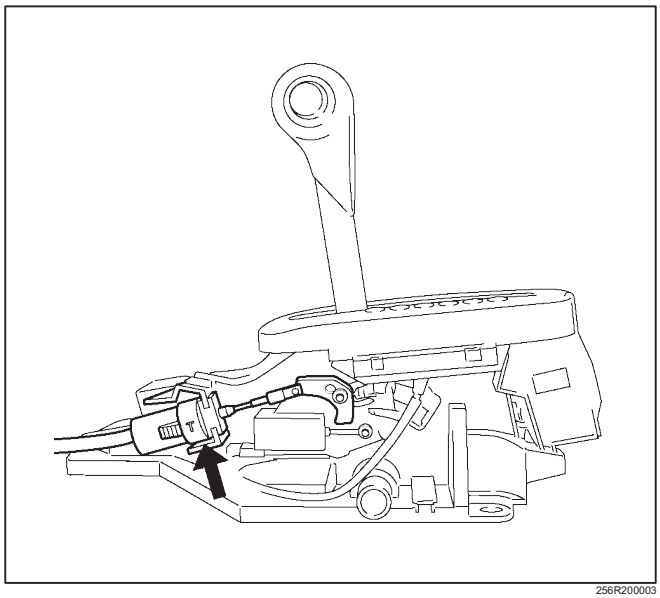
Installation

1. Set ignition key in “LOCK” position and selector lever in “P” position.
2. Connect outer cable to bracket near steering lock.
   - Connect inner cable to steering lock and install spring pin.
3. Install steering column cover and instrument lower cover.
4. Install adjust body of cable assembly to bracket in selector lever assembly.
   - Install inner cable to lever, pulling inner cable with outer cable.



256R200004

5. Check that cable moves smoothly, lightly pulling outer cable rearward.
6. Connect lock adjust, aligning “T” mark in the “Up” position.



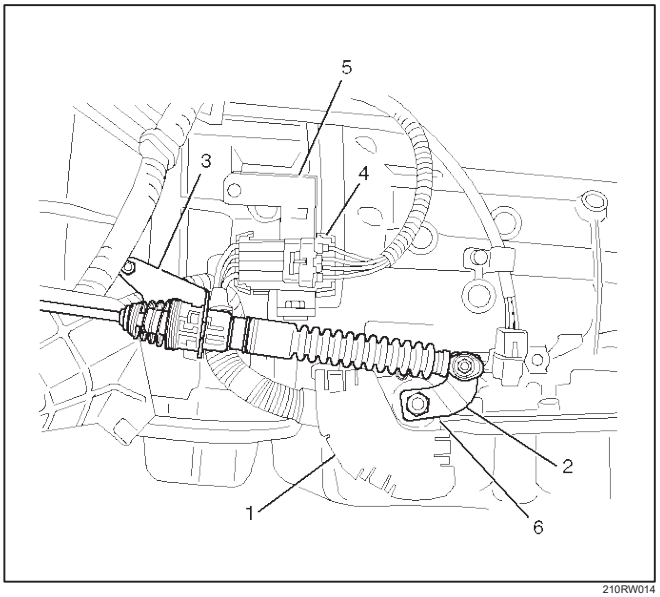
256R200003

7. About following installation steps, refer to *Selector Lever in this section.*
8. Check the shift lock operation:
   a. Selector lever should not be moved out of “P” position with ignition key in “Lock” position.
   b. Selector lever can be moved out of “P” position with ignition key in “ON”position only when brake pedal is depressed.
   c. ignition key can be turned to “LOCK” position only when selector lever is in “P” position (key can be pulled out).
9. If a. and c. fail, readjust cable. If b. fails, readjust connector wiring and brake pedal switch.

Mode Switch

Removal

1. Place selector lever in neutral.
2. Disconnect battery ground cable.
3. Remove mode switch cover (1) (V6).
4. Disconnect selector lever (2) from the mode switch.
5. Remove bracket with cable (3).
6. Disconnect transmission harness from the mode switch connector (4).
7. Remove bracket with mode switch connector from the transmission case.
8. Remove mode switch connector (4) from the bracket (5).
9. Remove two mode switch bolts and nut then remove mode switch (6).



210RW014

Installation

To install, follow the removal steps in the reverse order, noting the following points;

1. Torque

Mode switch bolt: 13 N•m (113 lb in)

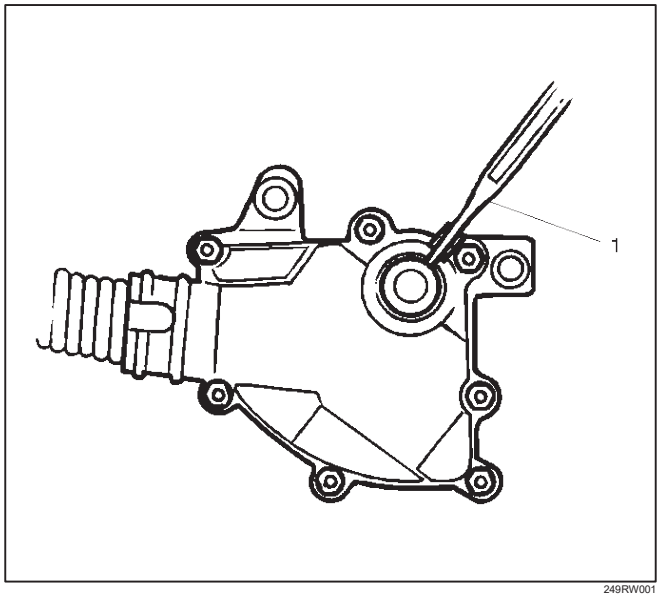
Selector lever nut: 23 N•m (17 lb ft)

2. Mode switch setting procedure

Perform either of the following adjustment procedures:

Procedure 1

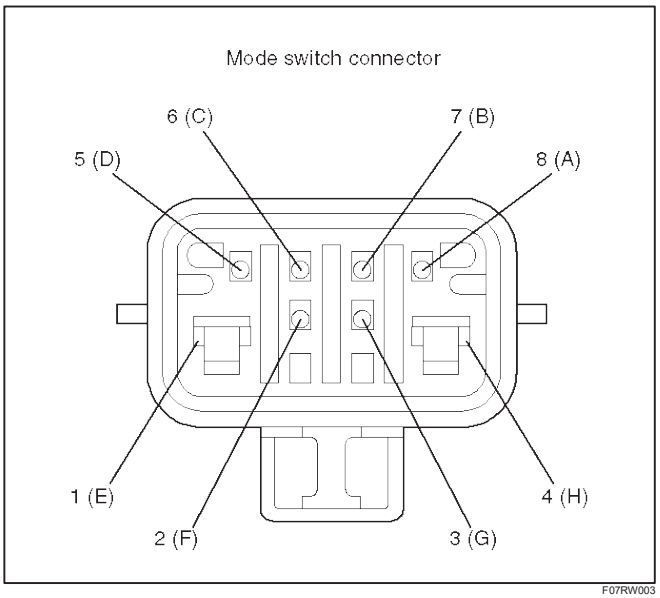
a. Place selector lever in neutral.
b. Remove selector lever from the mode switch.
c. Remove the mode switch cover.
d. Loosen the two 10 mm screws.
e. Rotate the mode switch until the slot in the mode switch housing aligns with the selector shaft bushing, and insert a 3/32 in. (2.4 mm) drill bit or punch (1) into the slot.
f. Tighten the screws to 13 N·m (113 lb in).
g. After completing adjustment, snap the mode switch cover into place.
h. Reinstall the selector lever.



249RW001

Procedure 2

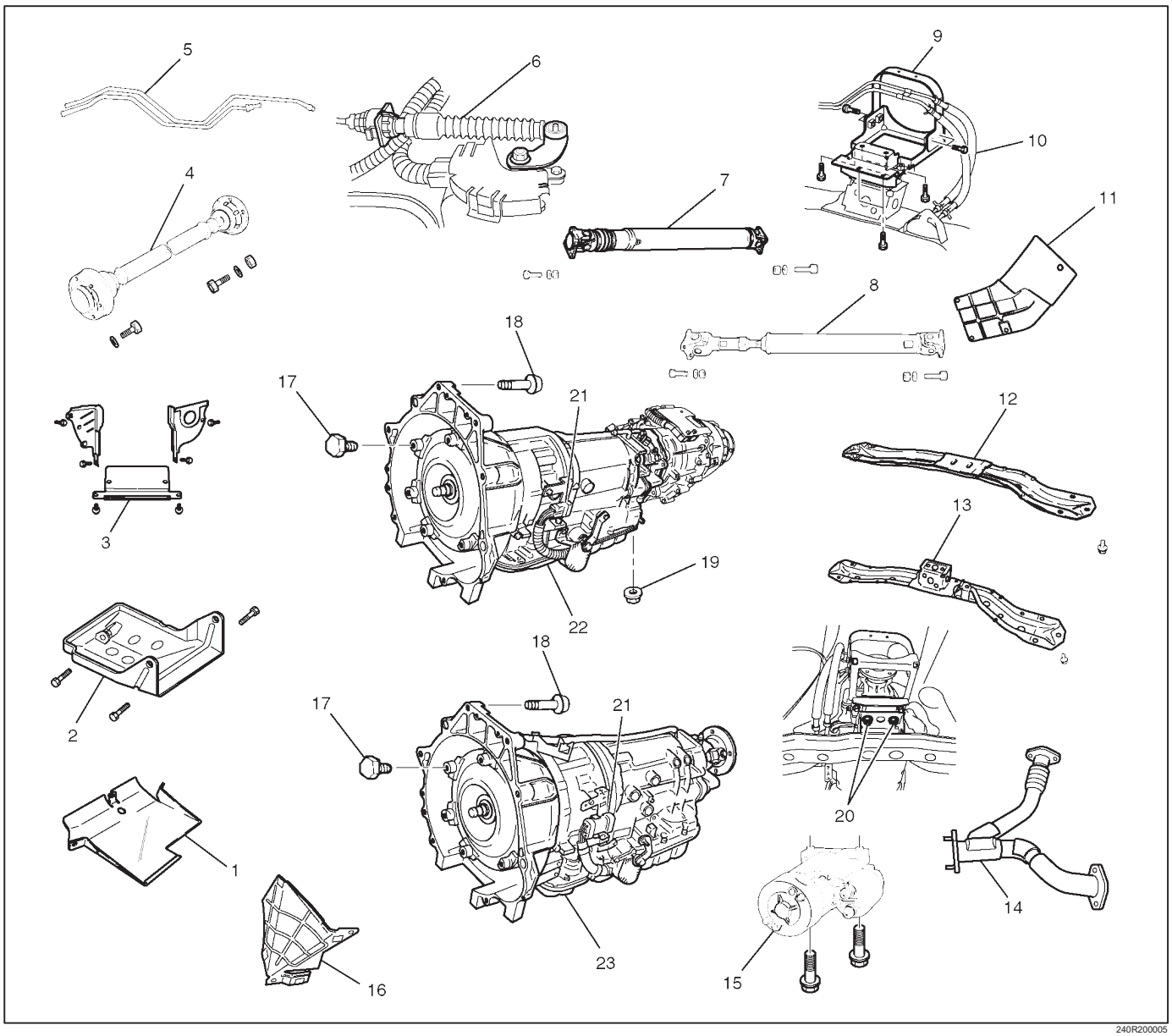
a. Place selector lever in neutral.
b. Disconnect transmission harness connector from mode switch connector.
c. Remove mode switch connector with bracket from the transmission case.
d. Connect multimeter (resistance mode) to terminals 1(E) and 4(H) on mode switch connector.
e. Loosen two mounting screws.
f. Rotate mode switch slightly in both directions to determine the range (approx. 5 degrees) of electrical contact.
g. Position mode switch in middle of contact range.
h. Tighten two mounting screws.
i. Remove multimeter and install mode switch harness connector with bracket to the transmission case.
j. Connect transmission harness connector to mode switch connector.



F07RW003

Transmission Assembly

Transmission and Associated Parts



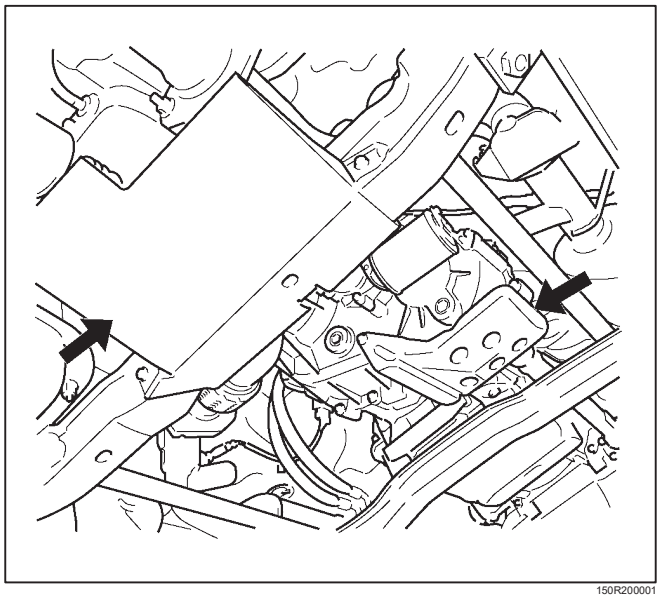
240R200005

Legend

(1) Fairing Plate
(2) Transfer Protector (4×4)
(3) Under Cover
(4) Front Propeller Shaft (4×4)
(5) Transmission Oil Cooler Pipe
(6) Select Cable
(7) Rear Propeller Shaft (4×2)
(8) Rear Propeller Shaft (4×4)
(9) Rear Mount Rubber and Propeller Protector Assembly (4×2)
(10) Fuel Pipe
(11) Fuel Pipe Heat Protector
(12) Third Crossmember (4×4)
(13) Third Crossmember (4×2)
(14) Center Exhaust Pipe (4×4)
(15) Starter
(16) Harness Heat Protector
(17) Torque Converter Bolt
(18) Engine-Transmission Bolt
(19) Rear Mount Nut (4×4)
(20) Rear Mount Nut (4×2)
(21) Harness Connector
(22) Transmission Assembly with Transfer Assembly (4×4)
(23) Transmission Assembly (4×2)

Removal

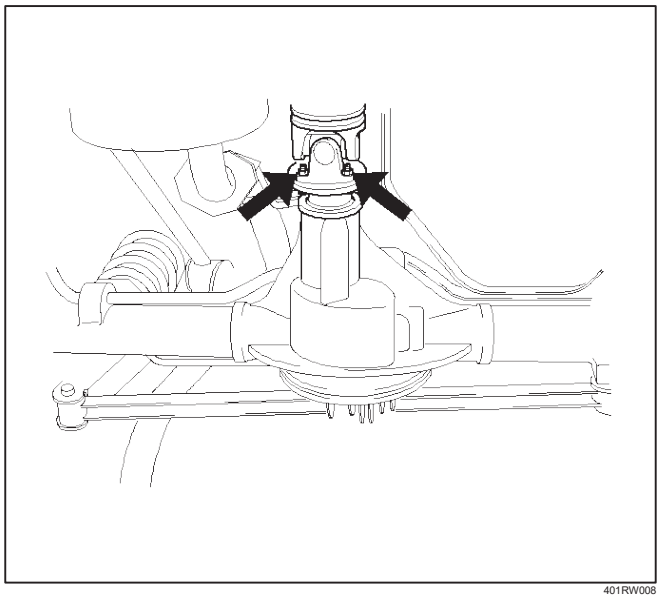
1. Disconnect battery ground cable.
2. Remove transfer protector (4×4) and fairing plate.



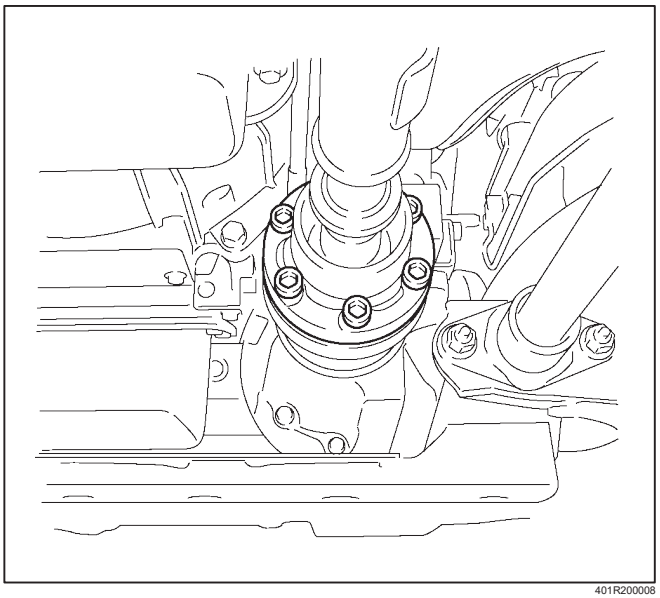
150R200001

3. Remove rear propeller shaft and front propeller shaft (4×4).

NOTE: Apply alignment marks on the flange at both front and rear sides.

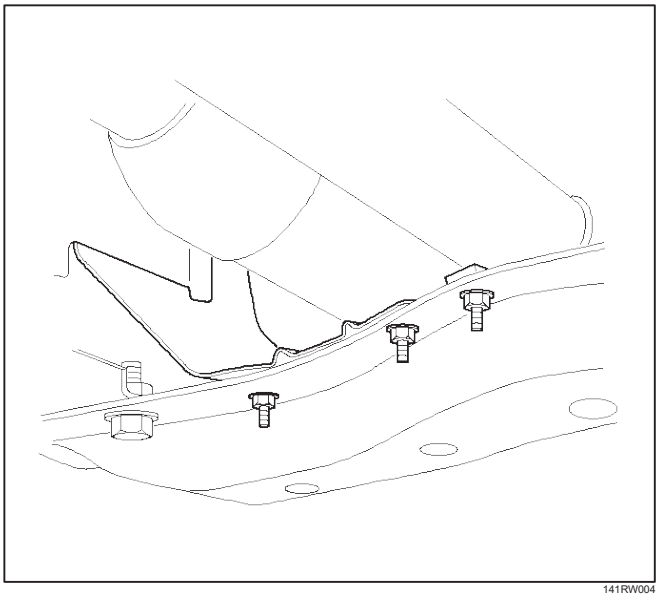


401RW008



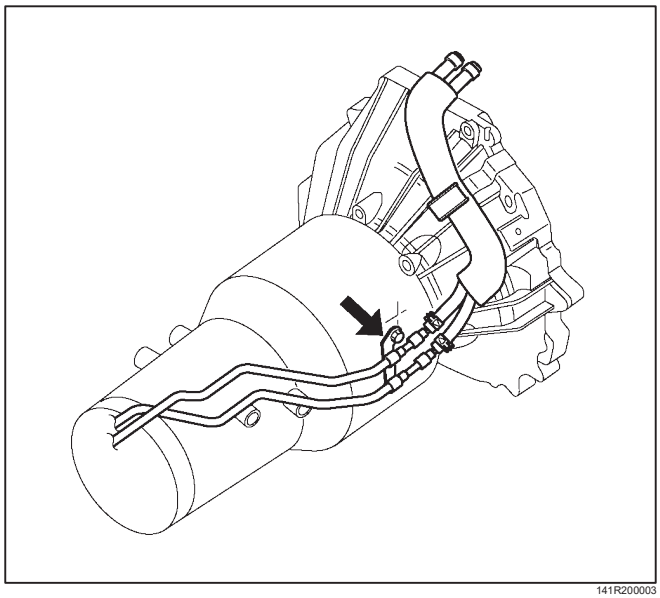
401R200008

4. Remove center exhaust pipe (4×4).
5. Remove fuel pipe heat protector and clip from third crossmember.
6. Disconnect fuel pipe bracket from third crossmember.



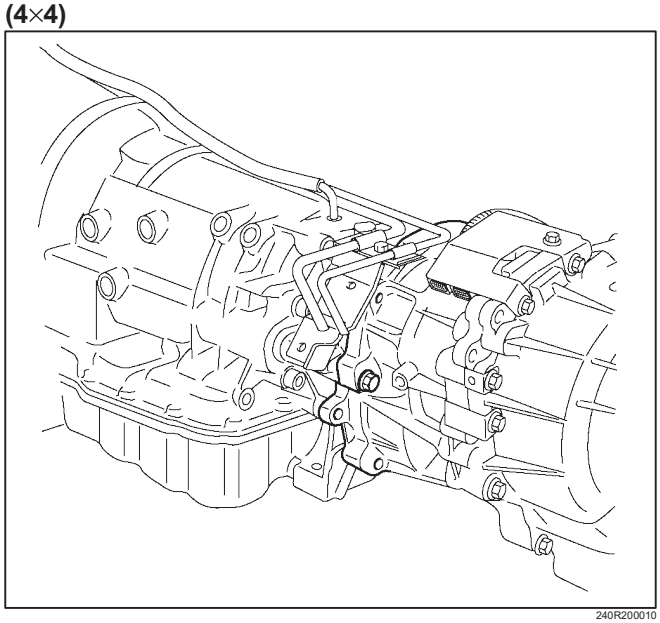
141RW004

7. Disconnect fuel pipe bracket from transmission side.



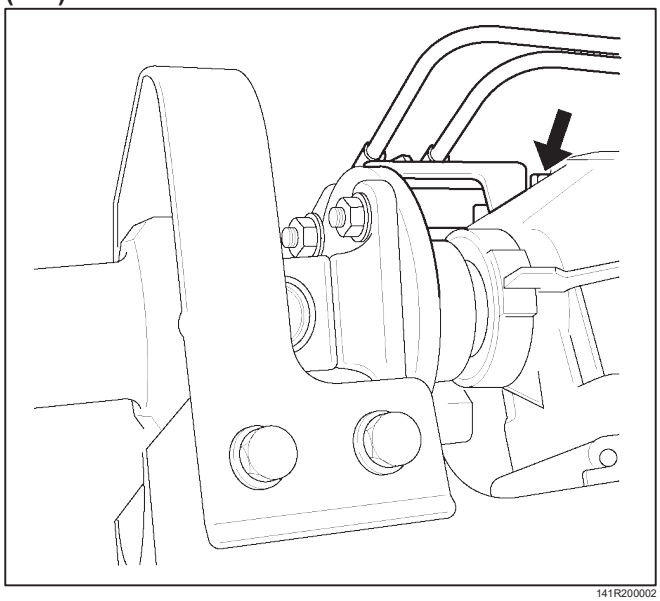
141R200003

(4×4)



240R200010

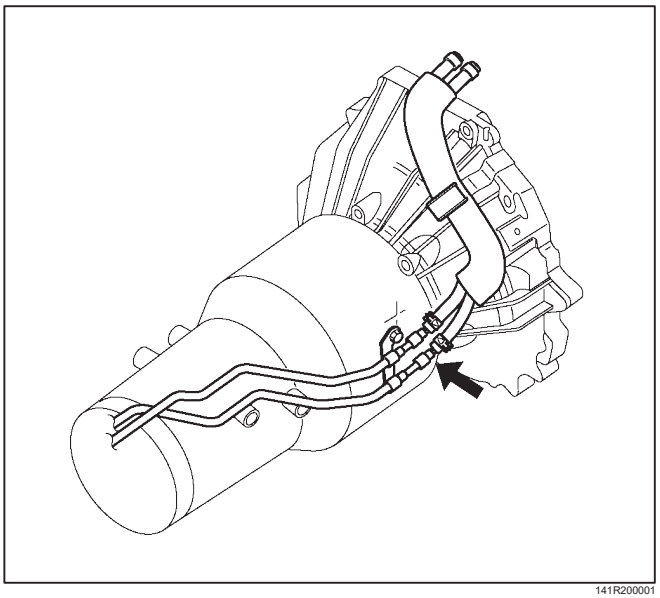
(4×2)



141R200002

Fuel hose connector removal procedure

If removal of the fuel hose connector is required for transmission servicing and/or replacement, follow the steps below.



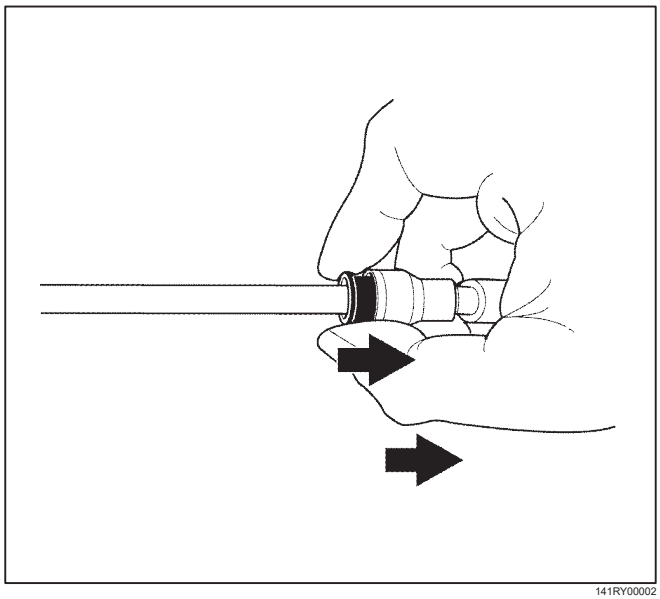
141R200001

NOTE:

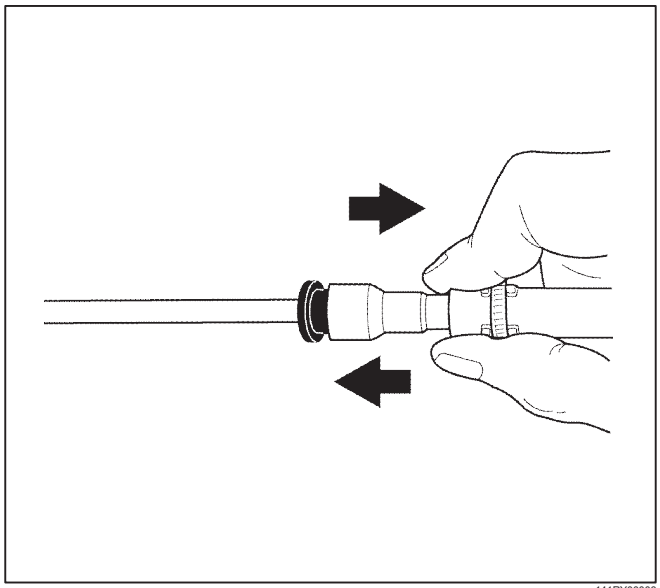
- An O-ring is used as a seal between the fuel pipe and the connector. Take care not to damage the contact surfaces during the removal procedure. Do not allow the surface to become contaminated with dirt or other foreign material.
- Perform the entire removal procedure with your hands. Do not use tools.

1. **Separating the connector and fuel pipe**
   1. Clean the fuel pipe and connector to remove mud and other dirt.
   2. Pull the black plastic piece toward the connector. Hold the piece near the connector. Pull the connector from the fuel pipe.

      If the connector and fuel pipe are stuck together, jiggle the connector back and forth to loosen the connector. Do not yank the connector from the fuel pipe.

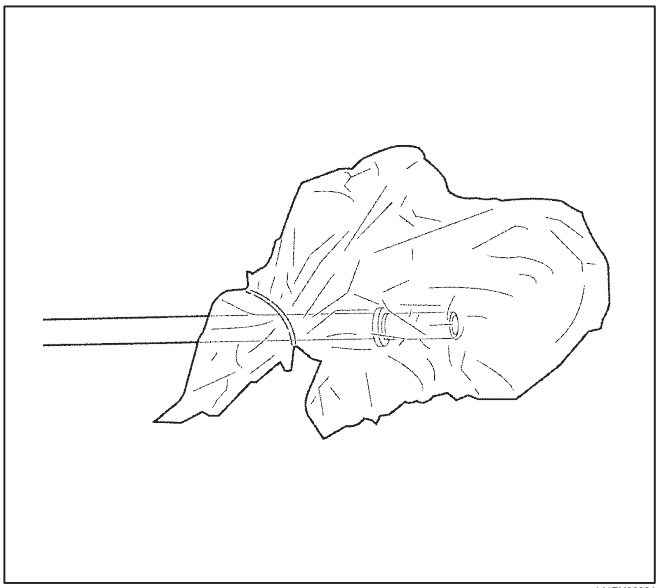


141RY00002



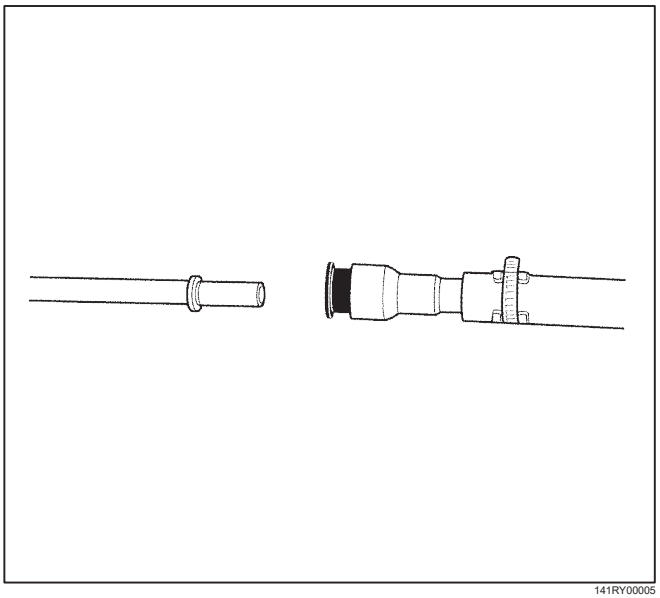
141RY00003

   3. Tie a vinyl bag around the connector and fuel pipe to protect them from dirt.



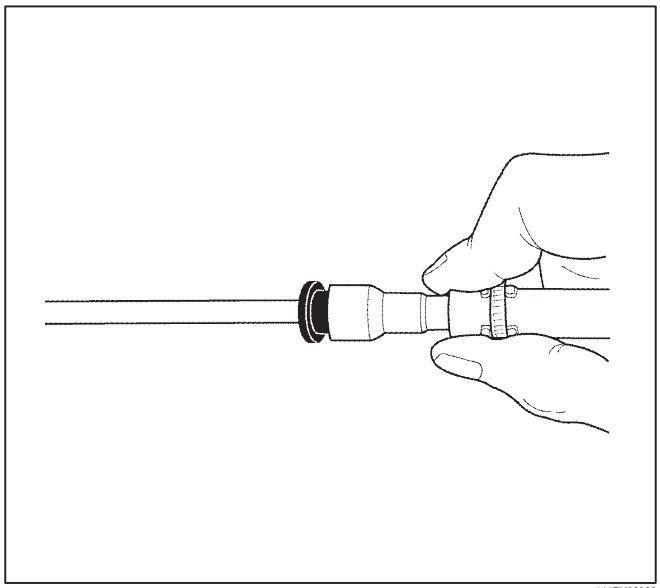
141RY00004

2. **Joining the connector and fuel hose**
   1. Remove the vinyl bag from the connector and fuel hose. Check that the contact surfaces are undamaged and free of dirt and other foreign material. Clean if necessary.
   2. Align the axis of the fuel pipe and connector. Push the connector into the fuel pipe until a distinct click is heard.



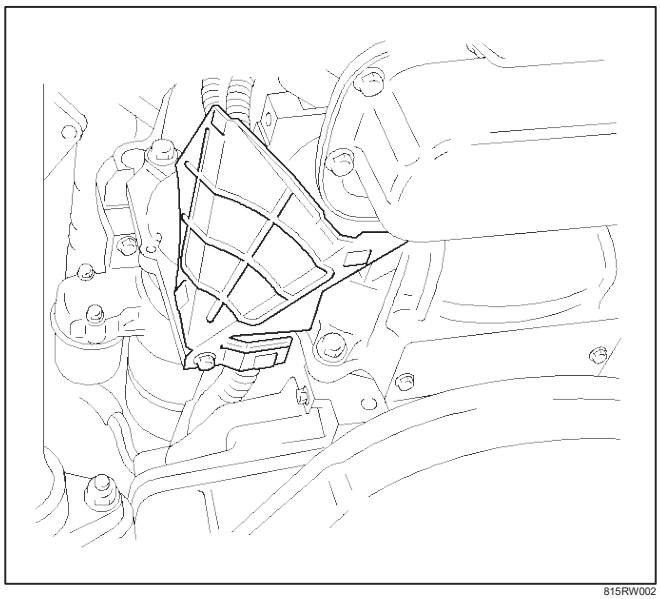
141RY00005

3. Gently pull on the connector to check that it is securely latched.



141RY00006

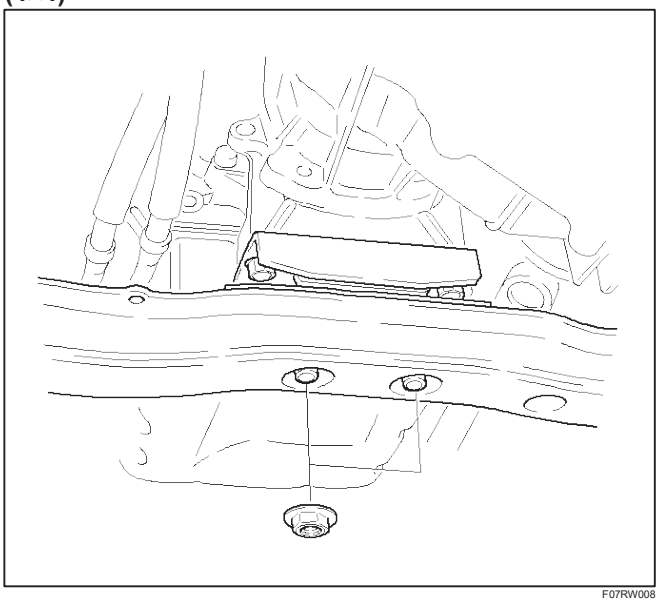
8. Disconnect transmission harness connector and clip.
   Connector : Adapter case, mode switch, main case, magnetic sensor, transfer switch (4×4), 2–4 actuator (4×4) and car speed sensor.
9. Remove harness heat protector.



815RW002

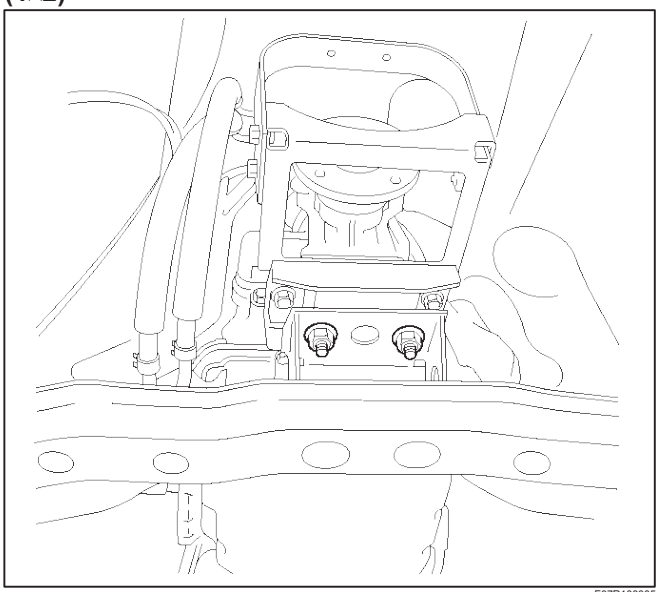
10. Support transmission with a jack.
    Remove rear mount nuts from third crossmember.

(4×4)



F07RW008

(4×2)

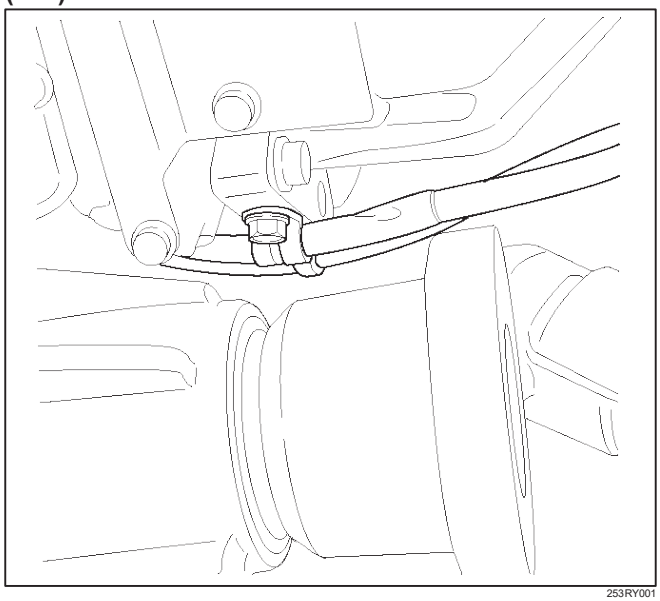


F07R100005

11. Remove third crossmember.
12. Disconnect transmission oil cooler pipes from A/T side.
13. Remove oil pipe clamp and bracket from the converter housing.

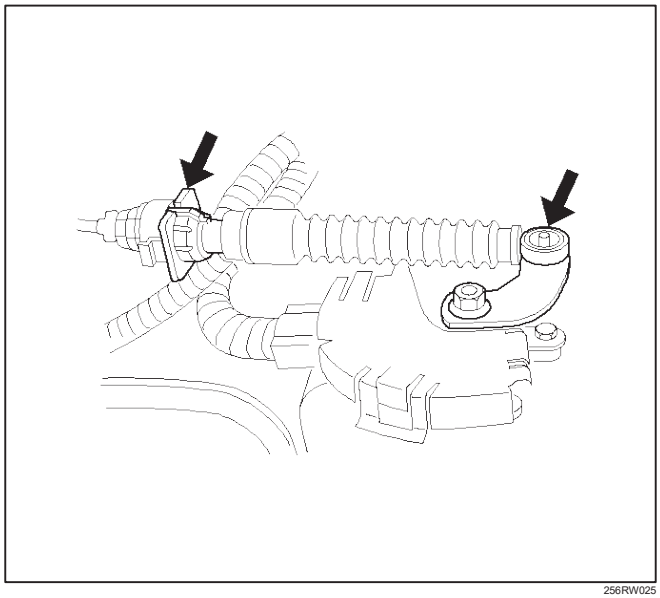
14. Loosen oil cooler pipe clamp bolt at the engine mount side.

(4×4)



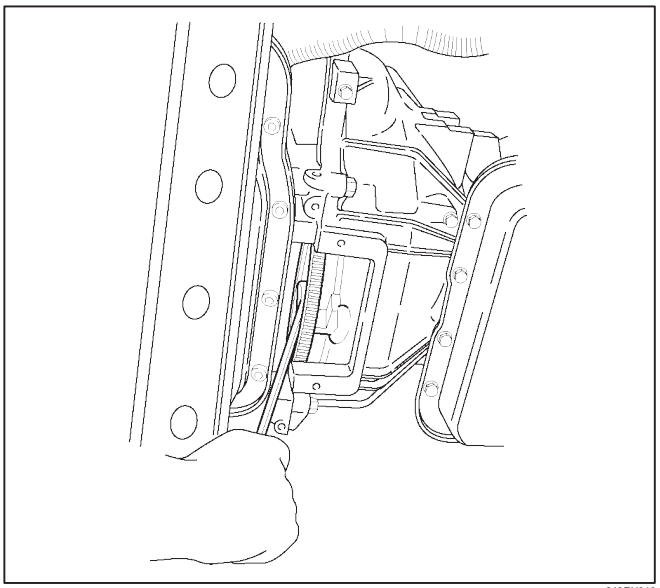
253RY001

15. Remove select cable by disconnecting inner cable from select lever and removing outer cable with bracket.



256RW025

16. Remove starter.
17. Remove under covers from the transmission and engine.
18. Remove flex plate torque converter fixing bolts (6 pieces) by turning crankshaft.

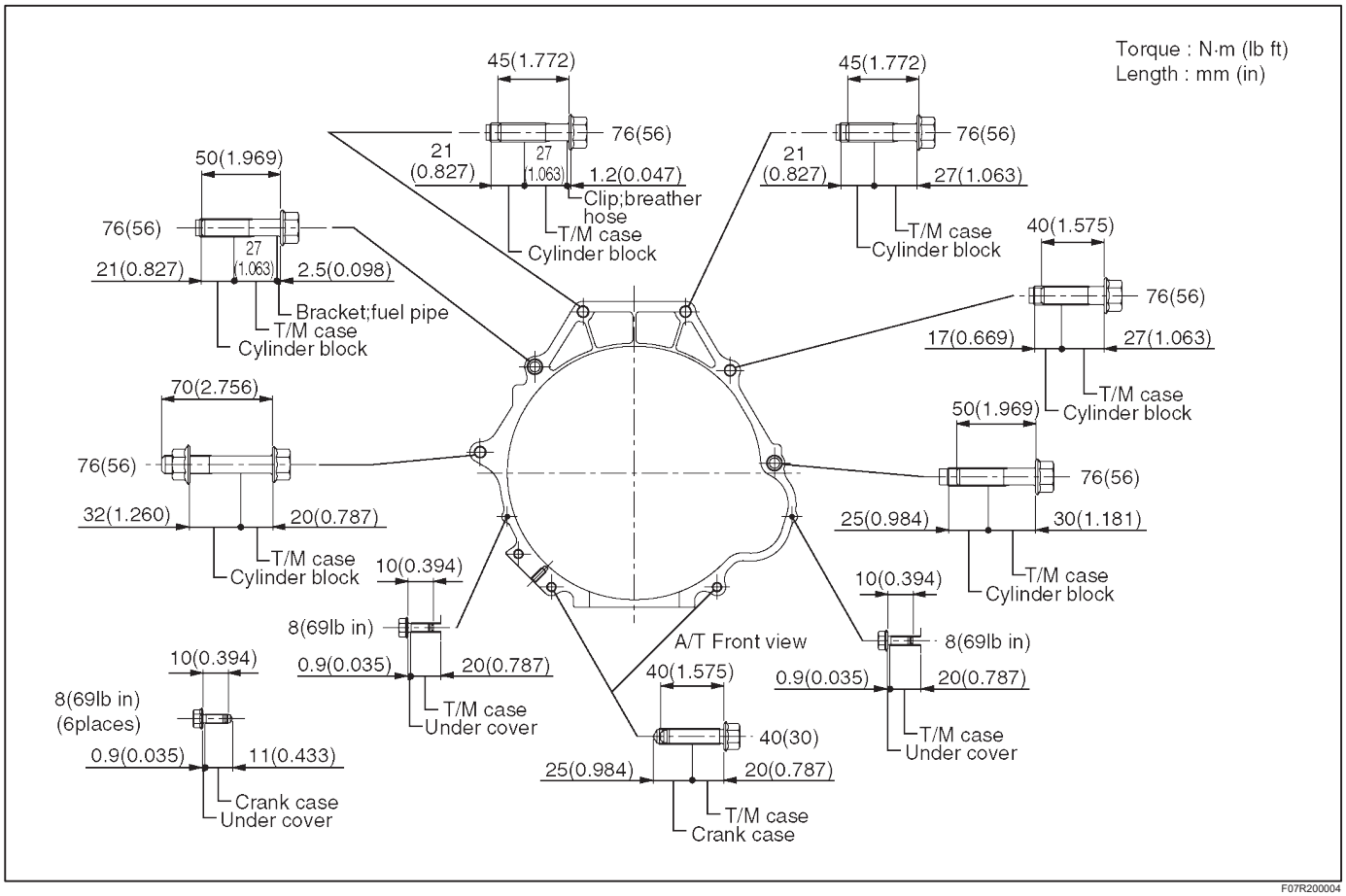


240RX010

19. Remove engine transmission fixing bolts.
20. Pull out transmission assembly from the engine.
21. Remove the rear mount rubber and propeller protector assembly if required (4×2).

Installation

1. Slowly raise transmission jack until front of the transmission assembly is aligned with rear of the engine. Attach the transmission assembly to the engine.
2. Tighten engine transmission bolts as shown in the figure.

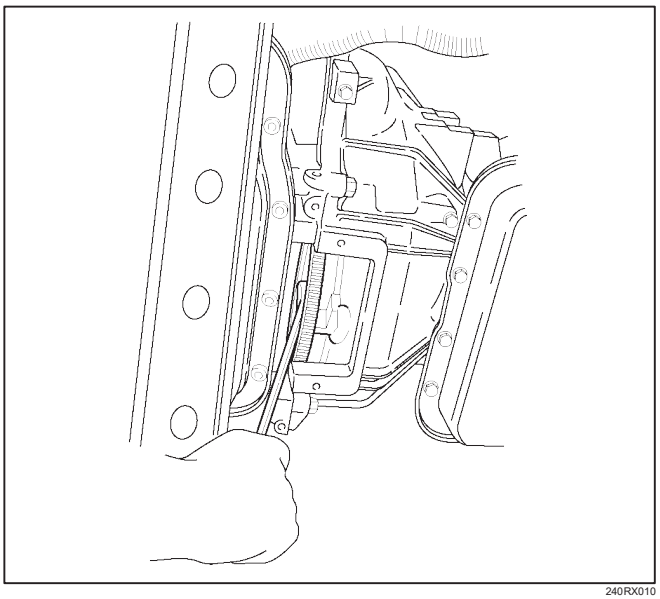


F07R200004

3. Align the flex plate torque converter bolt boss with flex plate hole by turning the torque converter. Install flex plate torque converter bolts (6 pieces) by turning the crankshaft.

Torque: 54 N•m (40 lb ft)

NOTE: Do not reuse the flex plate torque converter bolt.

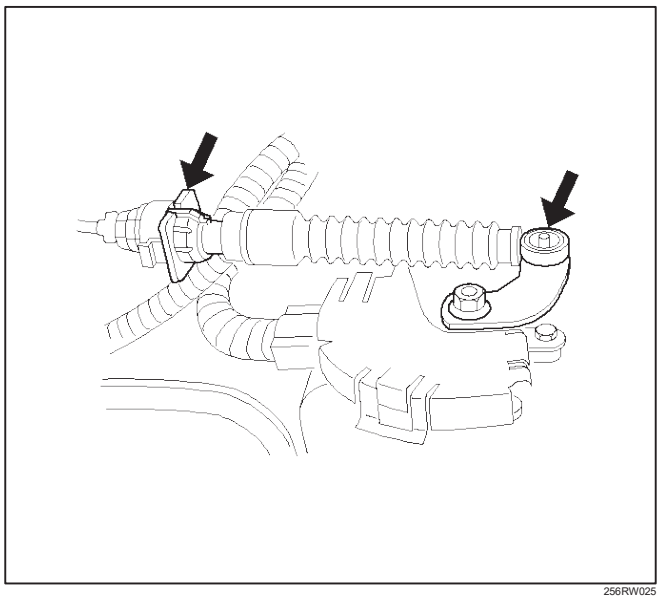


240RX010

4. Install under covers to the transmission and engine.
5. Install starter.

   Torque: 40 N•m (30 lb ft)

6. Install select cable by connecting inner cable to select lever and installing outer cable with bracket.



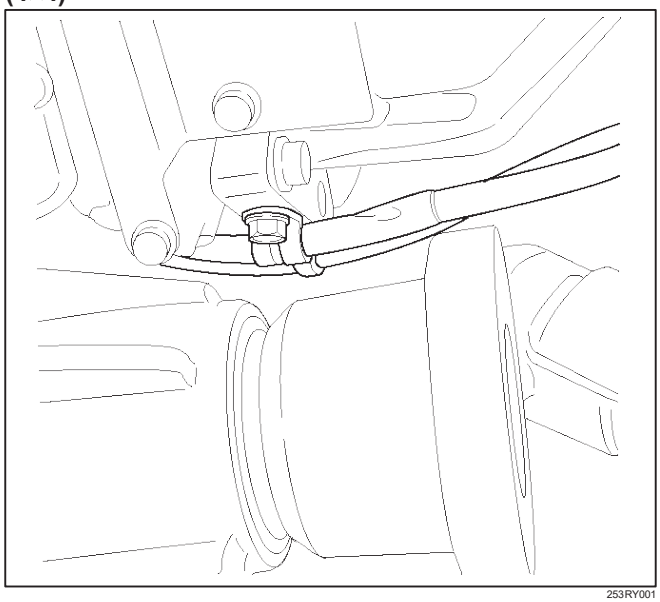
256RW025

7. Connect transmission oil cooler pipes to A/T.

   Torque: 44 N•m (33 lb ft)

8. Install oil cooler pipe clamp and bracket to the converter housing.

(4×4)



253RY001

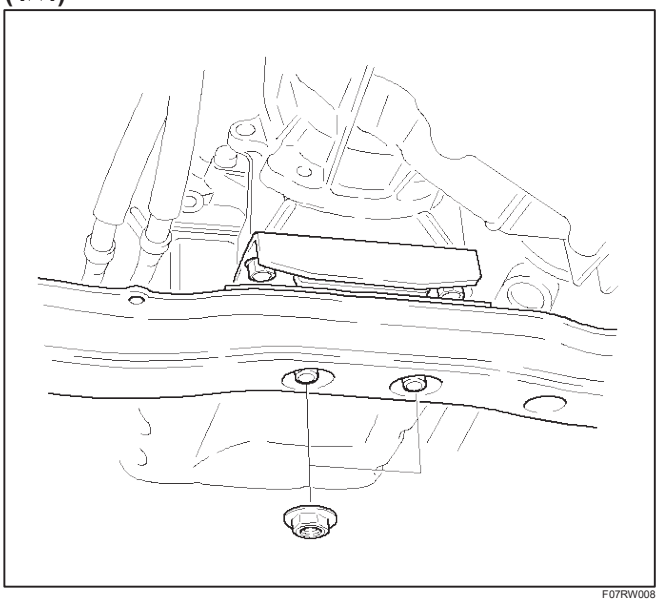
9. Tighten oil cooler pipe clamp bolt at the engine mount side.
10. Install third crossmember.

    Torque: 116 N•m (85 lb ft)

11. Install rear mount nuts.

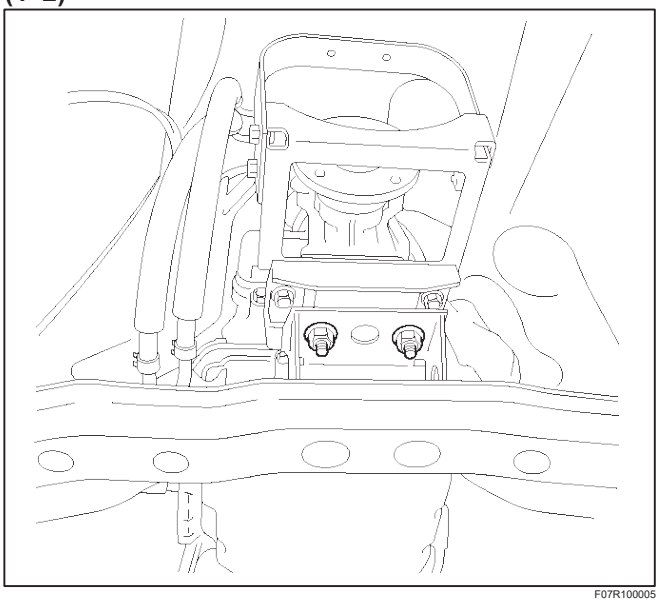
    Torque: 50 N•m (37 lb ft)

(4×4)



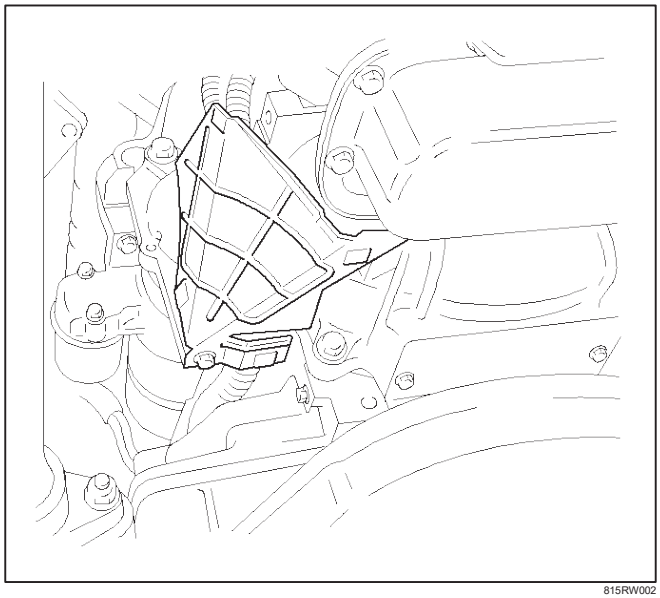
F07RW008

(4×2)



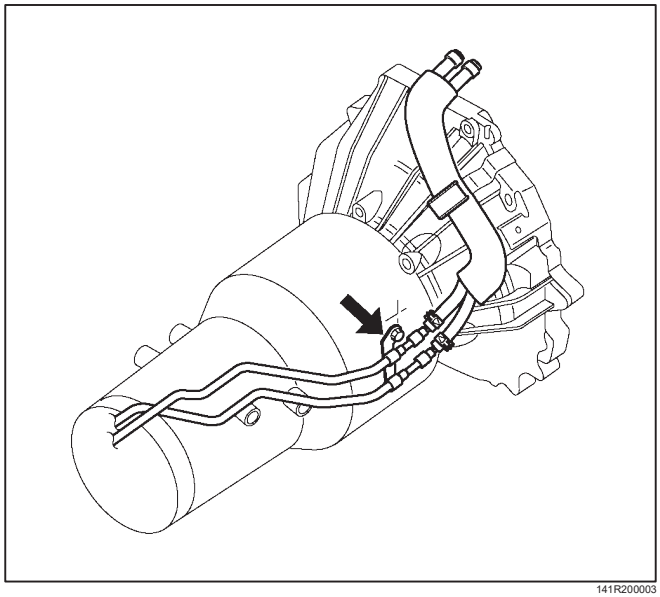
F07R100005

12. Install harness heat protector.
    Torque: 6 N•m (52 lb in)

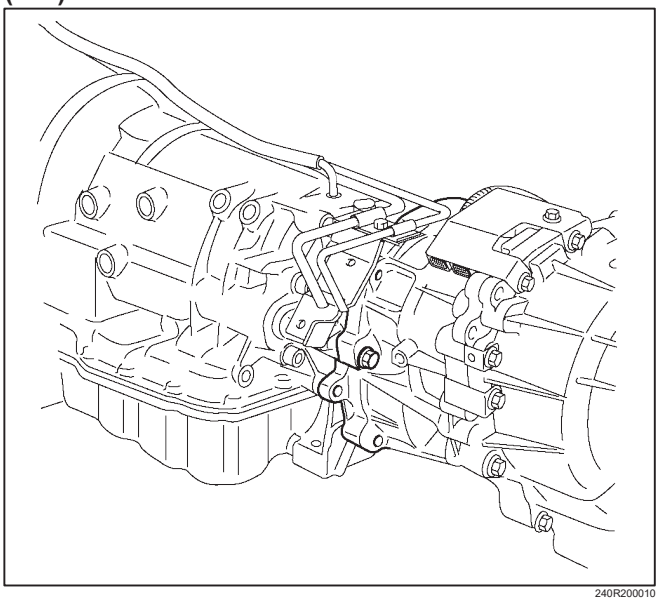

815RW002

13. Connect transmission harness connector and clip.
    Connector : Adapter case, mode switch, main case, magnetic sensor, transfer connectors (4×4) and car speed sensor.
14. Connect fuel pipe bracket to transmission side.

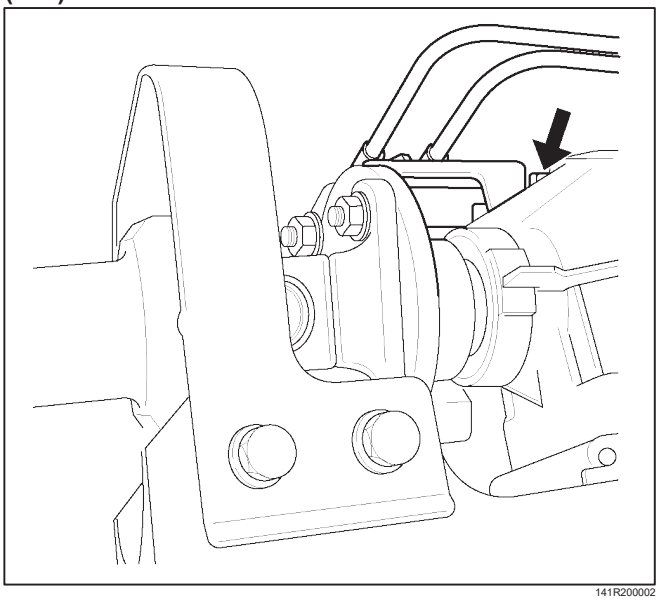
NOTE: See “NOTE” of removal steps.


141R200003

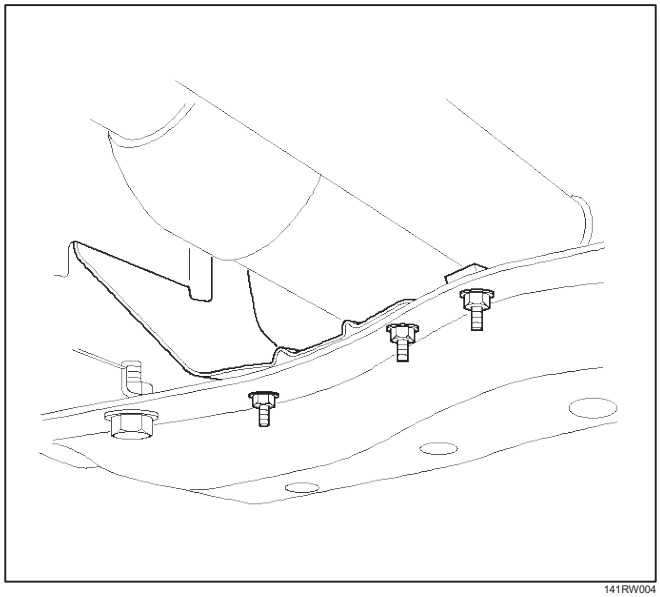
(4×4)


240R200010

(4×2)


141R200002

15. Install fuel pipe heat protector and clip.
16. Connector fuel pipe bracket to third crossmember.


141RW004

17. Install center exhaust pipe (4×4).

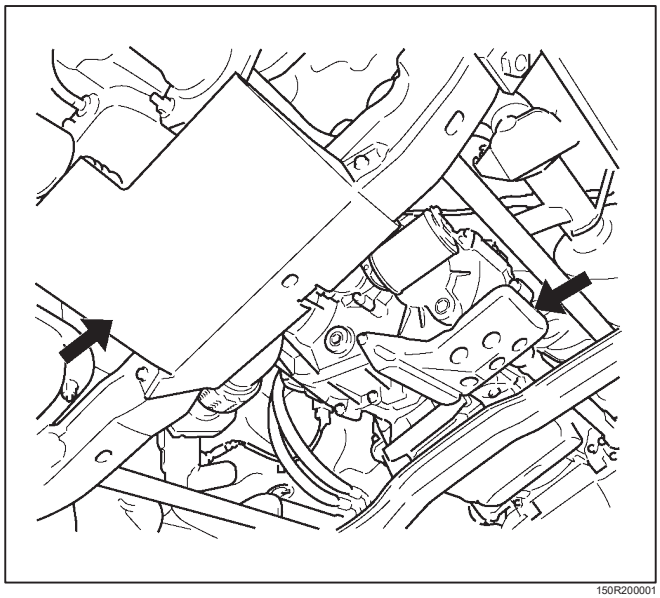
    Torque: 43 N•m (32 lb ft)

18. Install front propeller shaft (4×4) and rear propeller shaft.

    Torque: 63 N•m (46 lb ft)

19. Install transfer protector (4×4) and fairing plate.

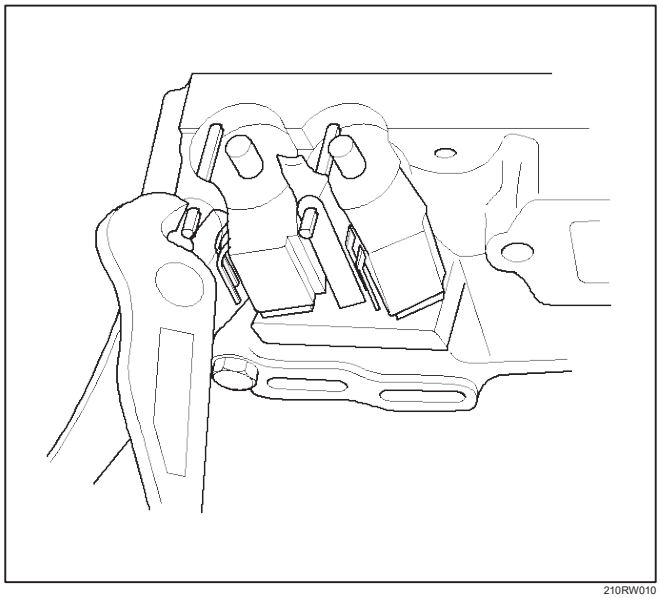
    Torque (transfer protector bolt): 37 N•m (27 lb ft)


150R200001

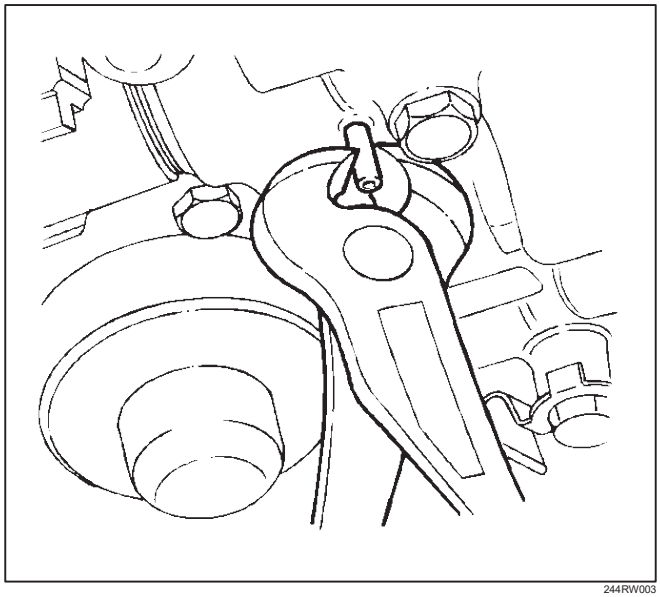
Solenoid (Main Case Valve Body)

Removal

1. Raise the vehicle and support it on jack stands.
2. Disconnect battery ground cable.
3. Remove transfer protector (4×4).
4. Drain fluid.
5. Support transfer case with a jack and remove third crossmember.
6. Remove sixteen 10 mm screws, main case oil pan, magnet, and gasket.
7. Remove three 13 mm screws, oil filter.
8. Disconnect wiring harness from band control solenoid and shift solenoids. Pull only on connectors, not on wiring harness.
9. Remove spring pin for shift solenoid A, shift solenoid B, and band control solenoid respectively, using suitable pliers taking care not to damage solenoids.



210RW010

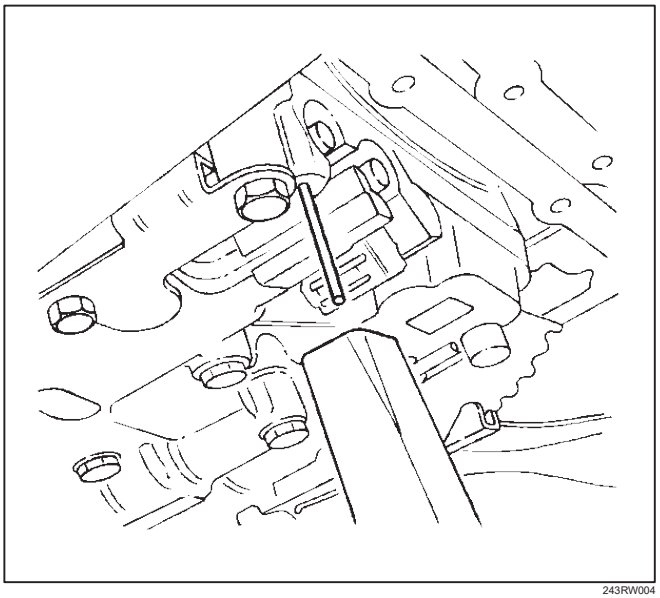


244RW003

10. Remove shift solenoid A, shift solenoid B, band control solenoid, and gaskets from main case valve body. Do not pull on wiring harness. Remove solenoids by grasping the metal tip.

Installation

1. Install shift solenoid A, shift solenoid B, band control solenoid with new gaskets to main case valve body respectively.
2. Carefully install spring pin with hammer to avoid damage to valve body, etc.



243RW004

3. Connect wiring harness to solenoids.
4. Install oil filter with a new gasket and the three 13 mm screws. Tighten the screws to the specified torque.

   Torque: 20 N•m (15 lb ft)

5. Install magnet, main case oil pan with new gasket, sixteen 10 mm screws. Tighten the screws to the specified torque.

   Torque: 11 N•m (96 lb in)

6. Install third crossmember and rear mount nuts. Tighten the nuts and bolts to the specified torque.

   Third crossmember bolt: 116 N•m (85 lb ft)

   Rear mount nut: 50 N•m (37 lb ft)

7. Install the transfer protector. Tighten the bolts to the specified torque (4×4).

   Torque: 37 N•m (27 lb ft)

8. Fill transmission through the overfill screw hole of oil pan, using ATF DEXRON®–III. Refer to *Changing Transmission Fluid in this section.*
9. Connect the battery ground cable.

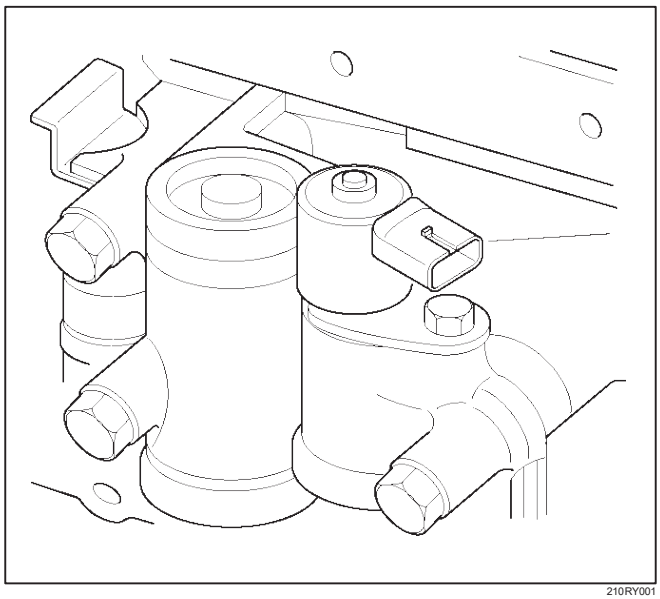
Solenoid (Adapter Case Valve Body)

Removal

1. Raise the vehicle and support it on jack stands.
2. Disconnect battery ground cable.
3. Drain fluid.
4. Remove adapter case oil pan twelve fixing 10 mm screws, adapter case oil pan, and gasket.

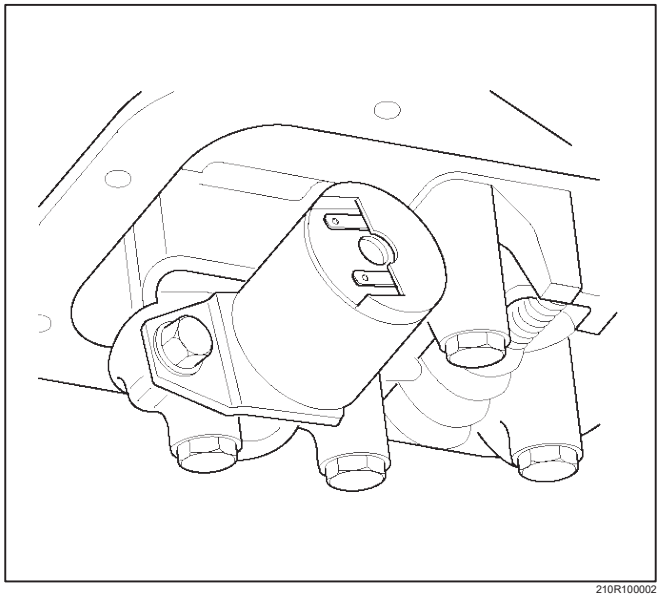
NOTE: Oil pan still contains transmission fluid. Place a large drain container under the oil pan and drain the fluid carefully.

5. Disconnect wiring harness from force motor solenoid and converter clutch PWM solenoid. Pull only on connectors, not on wiring harness.
6. Remove 11 mm bolt, bracket and converter clutch PWM solenoid with two O–rings.



210RY001

7. Remove 11 mm bolt, retainer, and force motor solenoid.



210R100002

Installation

1. Install force motor solenoid, retainer, and 11 mm bolt to adapter case valve body. Tighten the bolt to the specified torque.

   Torque: 10 N•m (87 lb in)

2. Install converter clutch PWM solenoid with two O–rings, bracket, and 11 mm bolt to adapter case valve body. Tighten the bolt to the specified torque.

   Torque : 10 N•m (87 lb in)

3. Connect wiring harness assembly to solenoids.
4. Install adapter case oil pan, new gasket, and twelve 10 mm screws. Tighten the screws to the specified torque.

   Torque : 11 N•m (96 lb in)

5. Fill transmission through overfill screw hole oil pan, using ATF DEXRON®–III. Refer to *Changing Transmission Fluid in this section.*
6. Connect battery ground cable.

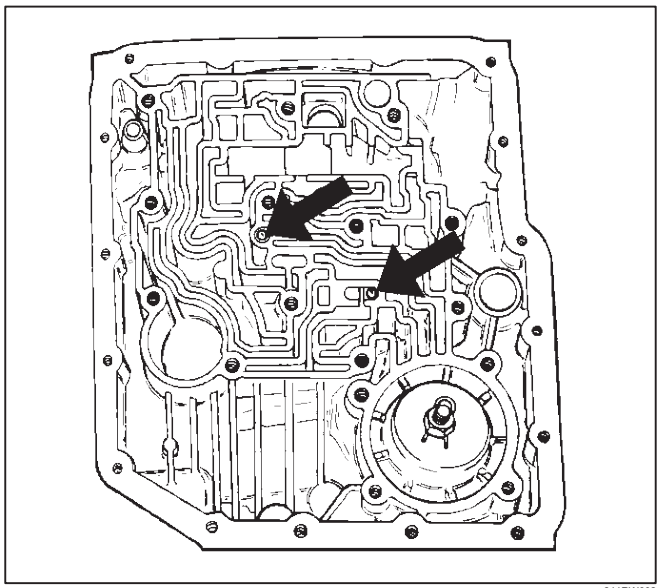
Valve Body Assembly (Main Case)

Removal

1. Raise the vehicle and support it on jack stands.
2. Disconnect battery ground cable.
3. Remove transfer protector (4×4).
4. Drain fluid.
5. Support transfer case with a jack and remove third crossmember.
6. Remove sixteen 10 mm screws, main case oil pan, magnet and gasket.
7. Remove three 13 mm oil filter fixing screws, then remove oil filter.
8. Remove two 13 mm manual detent fixing screws, then remove roller and spring assembly.
9. Disconnect wiring harness from band control solenoid and shift solenoids. Pull only on connectors, not on wiring harness.
10. Remove four 13 mm servo cover fixing screws, then remove servo cover and gasket.
11. Remove seven 13 mm valve body fixing screws.
12. Remove main case valve body with manual valve link and transfer plate. Note the position of the link (long end into valve, short end into range selector lever).
13. Remove transfer plate gasket from main case.
14. Remove two check balls from main case.

Installation

1. Install two check balls to main case.



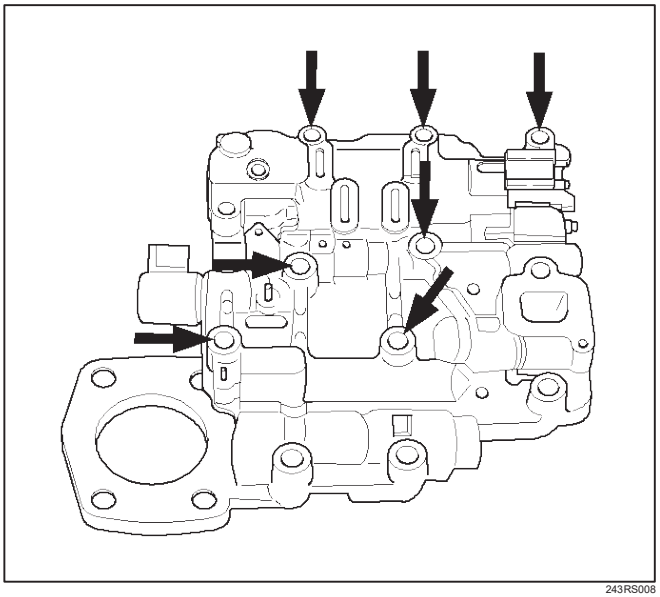
244RW002

2. Inspect electrical 7 way connector and seal of main case. Replace if necessary.
3. Use two J–25025–B guide pin to install main case.
   - Install valve body assembly and manual valve link.

NOTE: Valve must be extended as the short end of manual valve link is connected to the range selector lever. Long end of link goes into valve.

4. Install seven 13 mm screws, and tighten them to the specified torque.

   Torque: 20 N•m (15 lb ft)



243RS008

5. Remove two guide pins from main case.
6. Install servo cover gasket, cover, and four 13 mm screws. Tighten the screws to the specified torque.

   Torque: 25 N•m (18 lb ft)

7. Connect wiring harness to band control and shift solenoids.
8. Install roller and spring assembly to manual detent.
   - Install two 13 mm screws, and tighten them to the specified torque.

   Torque: 20 N•m (15 lb ft)

9. Install oil filter and three 13 mm screws. Tighten the screws to the specified torque.

   Torque : 20 N•m (15 lb ft)

10. Install oil pan gasket, magnet, oil pan and sixteen 10 mm screws. Tighten the screws to the specified torque.

    Torque: 11 N•m (96 lb in)

11. Install third crossmember and rear mount. Tighten the bolts and nuts to the specified torque.

    Torque

    Third crossmember bolt: 116 N•m (85 lb ft)

    Rear mount nut: 50 N•m (37 lb ft)

12. Install transfer protector. Tighten the bolts to the specified torque (4×4).

    Torque: 37 N•m (27 lb ft)

13. Fill transmission through overfill screw hole of oil pan, using ATF DEXRON®–III. Refer to *Changing Transmission Fluid in this section.*
14. Connect battery ground cable.

Valve Body Assembly (Adapter Case)

Removal

1. Raise the vehicle and support it on jack stands.
2. Disconnect battery ground cable.
3. Drain fluid.
4. Remove twelve 10 mm adapter case oil pan fixing screws, adapter case oil pan, and gasket.

NOTE: Oil pan still contains transmission fluid. Place a large drain container under the oil pan.

Drain the fluid carefully.

5. Disconnect wiring harness from force motor solenoid and converter clutch solenoid. Pull only on connectors, not on wiring harness.
6. Remove seven 13 mm screws from adapter case valve body assembly, then remove transfer plate, two gaskets, and adapter case valve body.

Installation

1. Inspect electrical 4 way connector and seal of adapter case. Replace if necessary.
2. Install gasket, transfer plate, and gasket.
3. Install adapter case valve body and seven 13 mm screws. Tighten the screws to the specified torque.

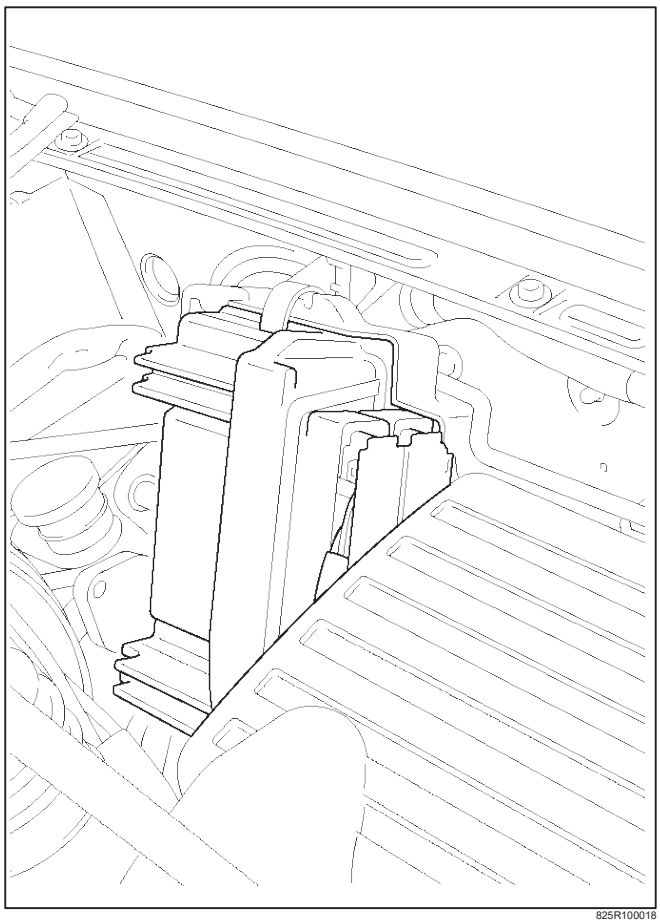
   Torque: 20 N•m (15 lb ft)
4. Connect wiring harness assembly to converter clutch solenoid and force motor.
5. Install oil pan gasket, oil pan, and twelve 10 mm screws. Tighten the screws to the specified torque.

   Torque: 11 N•m (96 lb in)
6. Fill transmission through the overfill screw hole of oil pan, using ATF DEXRON®–III. Refer to *Changing Transmission Fluid in this section.*
7. Connect battery ground cable.

Powertrain Control Module (PCM)

Removal

1. Disconnect battery ground cable.
2. Disconnect PCM wiring harness connectors from PCM.
3. Remove PCM from bracket.



825R100018

Installation

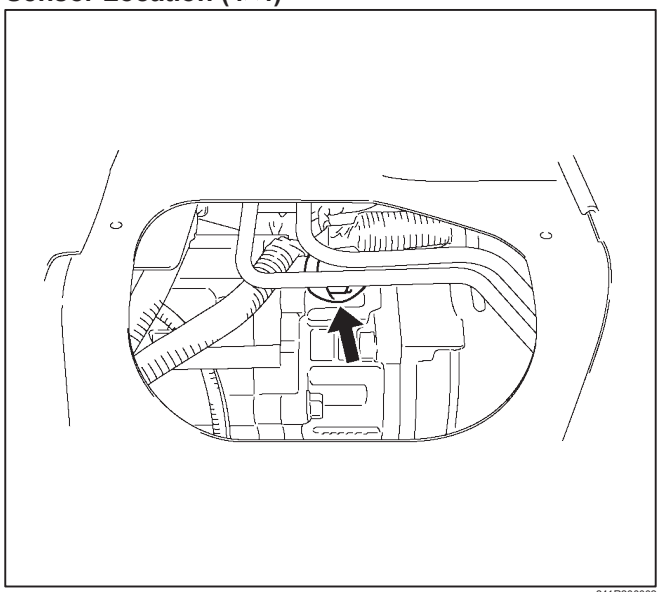
1. Install PCM to bracket.
2. Connect PCM wiring harness connectors to PCM.
3. Connect battery ground cable.

Speed Sensor (Extension Assembly)

Removal

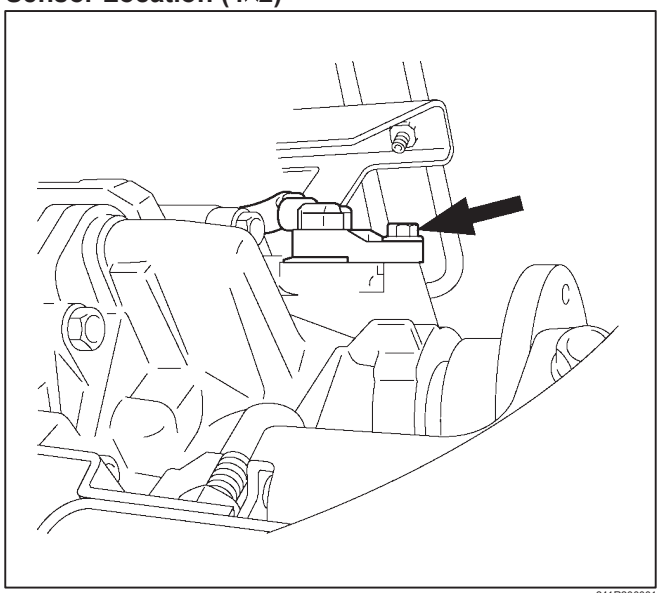
1. Raise the vehicle and support on jack stands.
2. Disconnect battery ground cable.
3. Disconnect speed sensor harness connector from speed sensor.
4. Remove one 10 mm screw and speed sensor with O–ring.

Sensor Location (4×4)



241R200002

Sensor Location (4×2)



241R200001

Installation

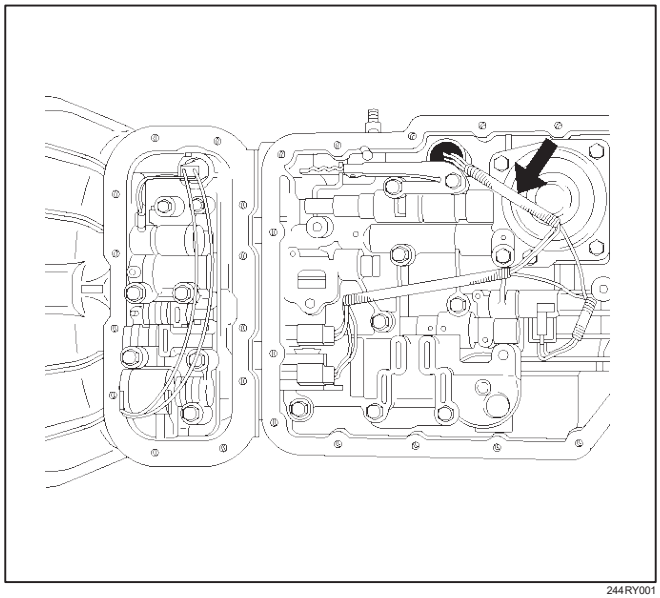
1. Inspect the speed sensor O–ring, and replace it if necessary.
2. Install speed sensor assembly and 10 mm screw.

   Torque: 9 N•m (78 lb in)
3. Connect speed sensor harness connector to speed sensor.
4. Connect battery ground cable.

Transmission Oil Temperature Sensor (Main Case)

Removal

1. Raise the vehicle and support it on jack stands.
2. Disconnect battery ground cable.
3. Drain fluid.
4. Remove sixteen 10 mm main case oil pan fixing screws, main case oil pan, and gasket.
5. Disconnect wiring harness from shift solenoids, band apply solenoid, and 7 way connector of main case. Pull only on connectors, not on wiring harness.
6. Remove wiring harness assembly with transmission oil temperature sensor.



244RY001

Installation

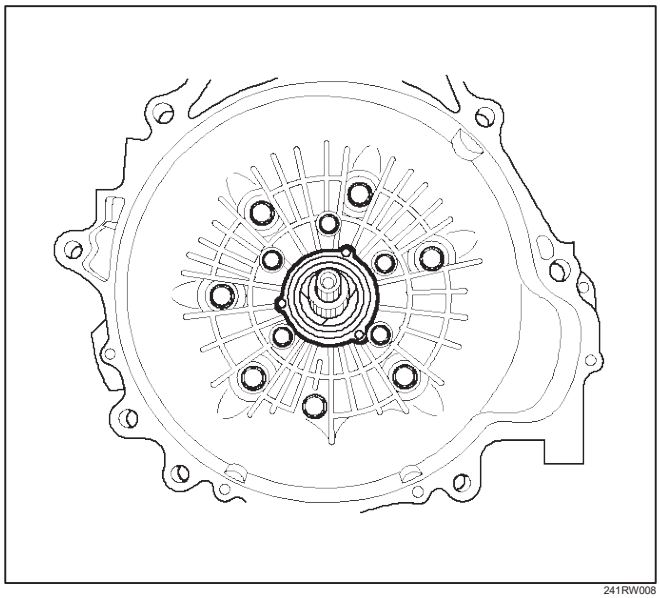
1. Install wiring harness assembly with transmission oil temperature sensor to band apply solenoid, shift solenoids, and 7 way connector of main case.
2. Install oil pan gasket, oil pan, and sixteen 10 mm fixing screws. Tighten the screws to the specified torque.

   Torque: 11 N•m (96 lb in)
3. Fill transmission through the overfill screw hole of oil pan, using ATF DEXRON®–III.
   Refer to *Changing Transmission Fluid in this section.*
4. Connect battery ground cable.

Front Oil Seal (Converter Housing)

Removal

1. Remove transmission assembly from the vehicle. Refer to *Transmission Assembly in this section.*
2. Remove torque converter from converter housing.
3. Remove three screws and oil seal ring from converter housing.



241RW008

Installation

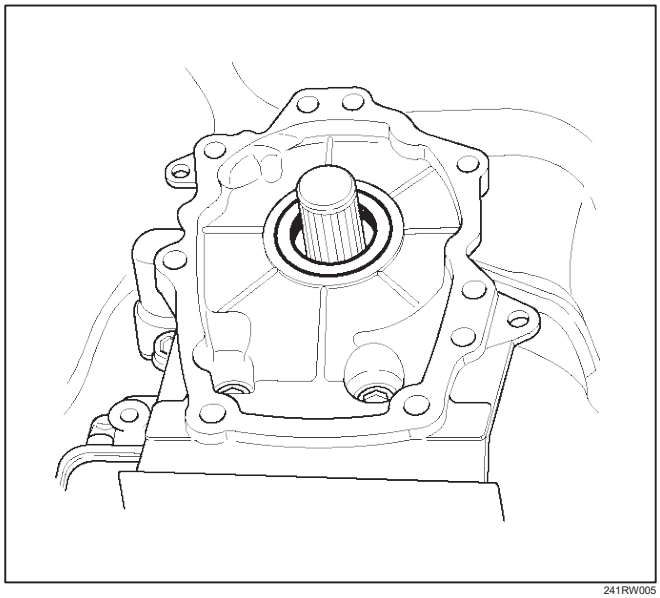
1. Apply clean ATF to the new oil seal ring lip.
   - Install oil seal ring to converter housing. Tighten the screws to the specified torque.

   Torque: 3 N•m (26 lb in)
2. Install torque converter to converter housing.
3. Install transmission assembly to the vehicle. Refer to *Transmission Assembly in this section.*

Rear Oil Seal (Extension Assembly)

Removal

1. Remove transfer case assembly (4×4) or extension assembly (4×2) from the vehicle. Refer to *Transfer Case in Drive Line/Axle section (4×4).*
2. Remove rear oil seal from transmission extension assembly.



241RW005

Installation

1. Use J–36797 extension assembly oil seal installer, and install the rear oil seal to the transmission extension assembly.
2. Install the transfer case assembly (4×4) or extension assembly (4×2) to the vehicle. Refer to *Transfer Case in Drive Line/Axle section (4×4).*

Transmission (4L30–E)

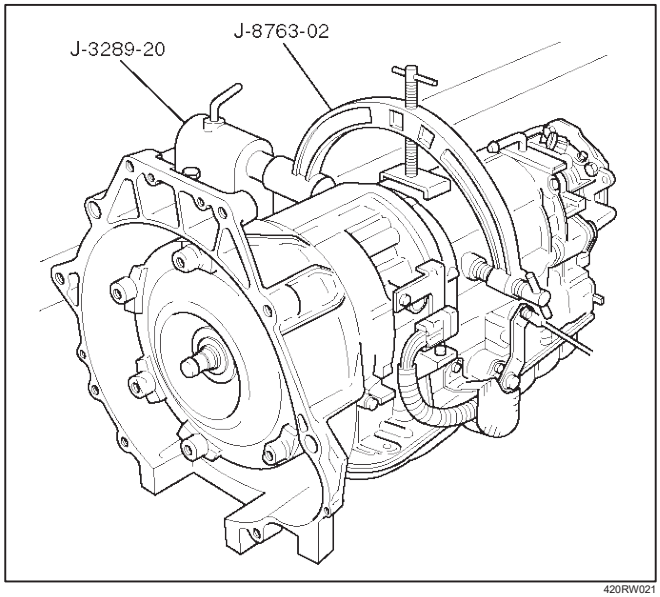
Disassembly

NOTE: During the disassembly and reassembly, perform the following:

- Wash each part thoroughly, and blow air through each oil passage and groove to eliminate blockage.
- Seal rings, roll pins, and gaskets should be replaced.
- When assembling the components, apply DEXRON®–III Automatic Transmission Fluid (ATF) to each seal, rotating part, and sliding part.
- Do not dip part facings, such as clutch or brake drive plates, in cleaner when washing it.
  Also, always coat parts with new ATF two or three times after cleaning with solvent.

1. Remove torque converter (1).
   - Drain fluid from torque converter.
   - Attach J–8763–02 holding fixture to the transmission and set it on J–3289–20 holding fixture base.

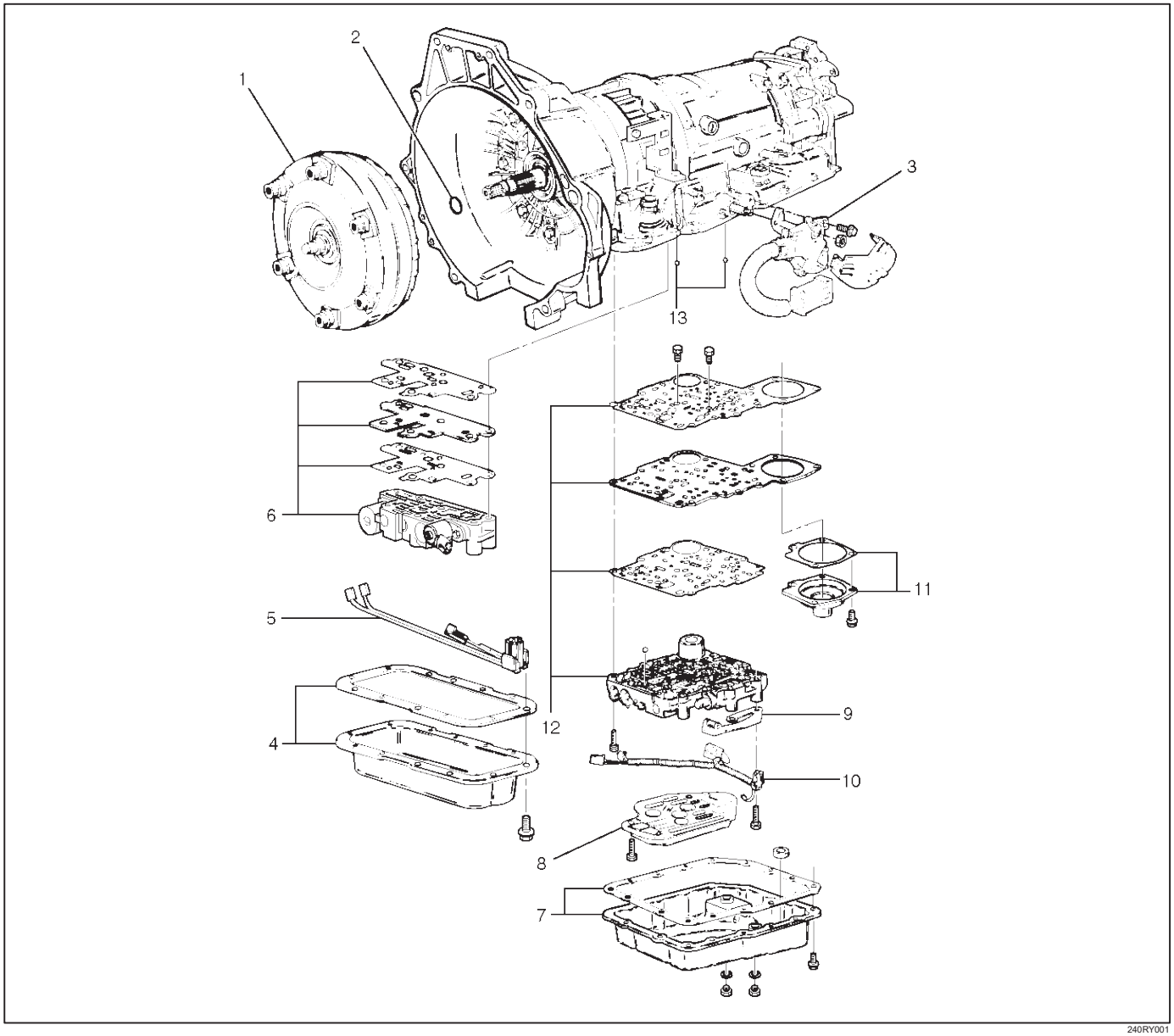
NOTE: Do not overtighten the tool, as case damage may result.



420RW021

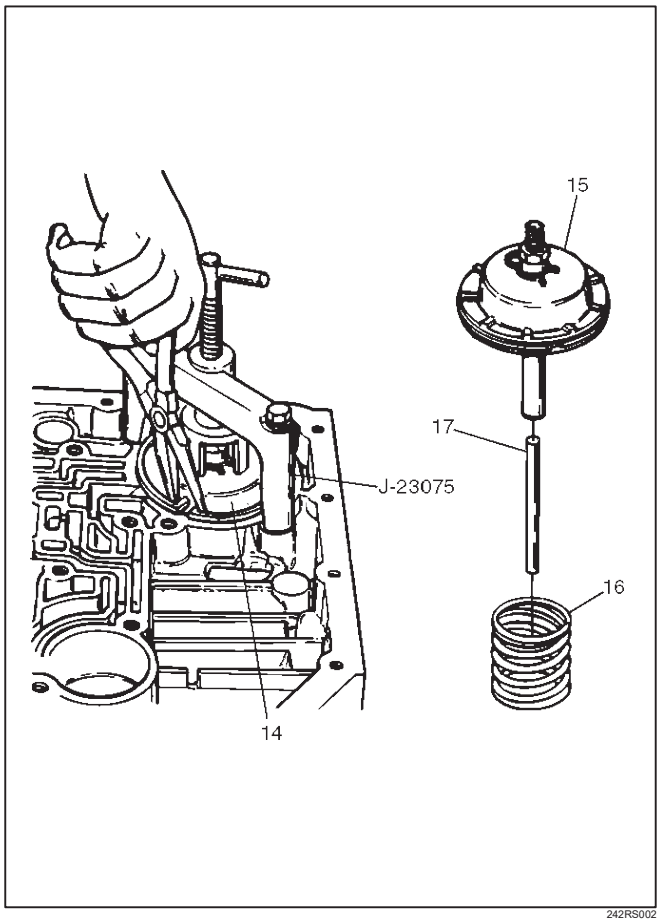
2. Remove O–ring (2) from turbine shaft.
3. Remove two 10mm mode switch screws, selector lever nut, cover, and mode switch (3).
4. Remove twelve 10mm adapter case oil pan (4) fixing screws, adapter oil pan, and gasket.
5. Disconnect electrical wiring connections (5) from solenoids and 4 way connector of adapter case. Pull on connectors only, not on wiring harness.
6. Remove seven 13mm adapter case valve body (6) fixing screws, adapter case valve body assembly, transfer plate, and two gaskets.
   - Remove wiring harness and 4 way connector.
7. Remove sixteen 10mm main case oil pan (7) fixing screws, main oil pan, magnet, and gasket.
8. Remove three 13mm oil filter (8) fixing screws and oil filter.
9. Remove two 13mm manual detent (9) fixing screws, roller and spring, and manual detent.
10. Disconnect wiring harness assembly (10) from band apply solenoid, shift solenoids, and main case 7 way connector.
    Pull on connectors only, not on wiring harness.
11. Remove four 13mm servo cover (11) fixing screws, servo cover, and gasket.
12. Remove seven 13mm valve body screws from main case.
    - Remove wiring harness assembly (5) from the adapter case side.
    - Remove main valve body assembly (12) with manual valve link and transfer plate. Note the position of the link (long end into valve, short end into range selector lever).
    - Remove 7 way connector.
    - Remove gasket transfer plate from main case.

13. Remove two check balls (13) from main case.



14. Turn transmission to vertical position to drain fluid. Return back to horizontal position when drained.
    - Install J–23075 servo piston spring compressor with offset to the rear of case.
    - Compress servo piston assembly.
    - Remove servo piston retaining ring (14).
    - Slowly release servo piston assembly (15).
    - Remove tool.

15. Remove servo piston assembly (15), return spring (16), and servo apply rod (17).

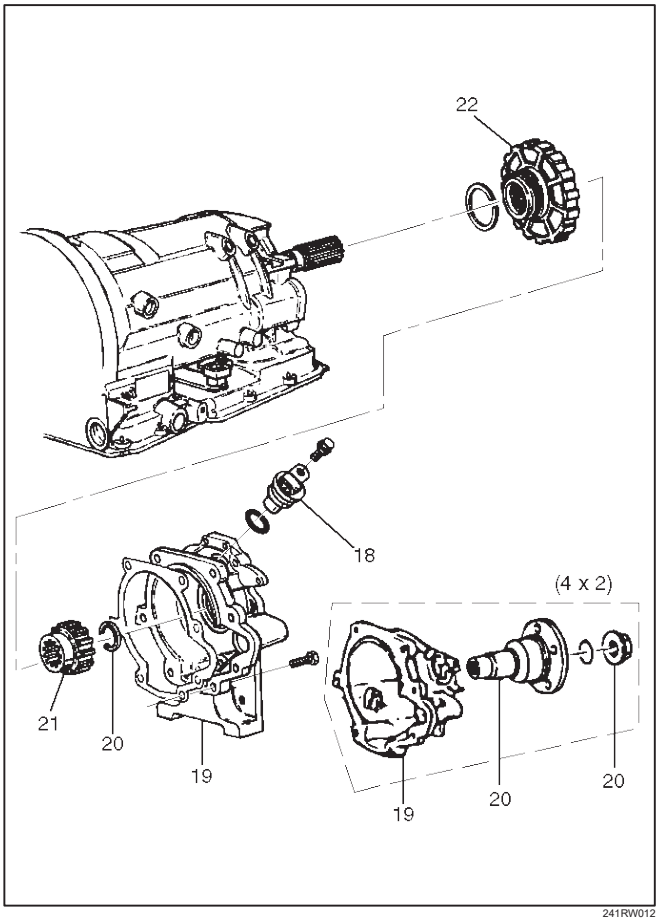


16. Rotate transmission to horizontal position, pan side down.
    - Remove one 10mm screw, and speed sensor (18) with “O” ring.
17. Remove seven 8mm extension housing hexagon socket head screws, extension housing assembly (19), and gasket.
18. Remove retaining ring (20). (4×4)

NOTE: Use extra long, needle- nose pliers.

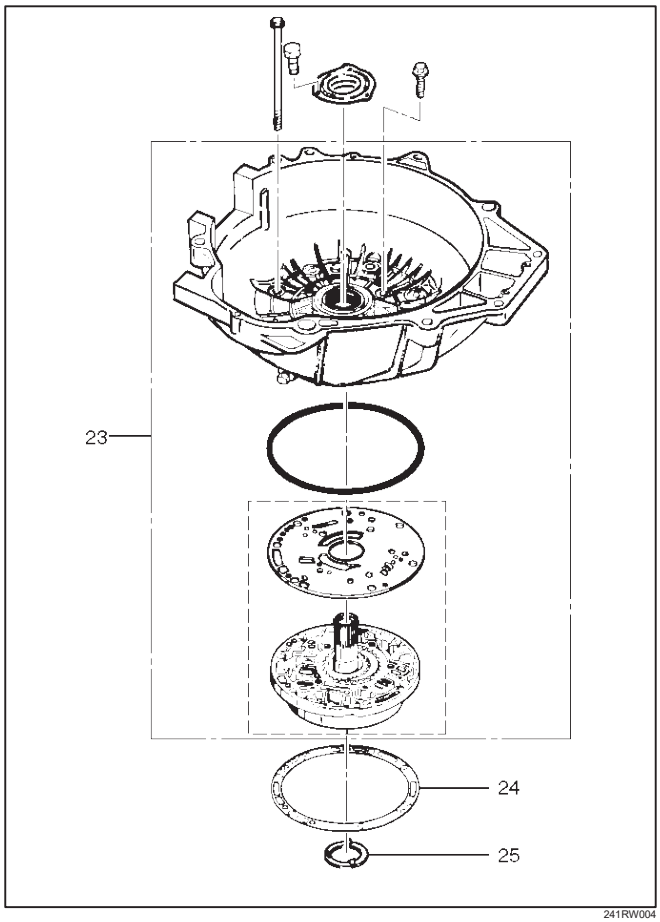
- Remove flange nut (20). (4×4)
- Remove flange and O–ring (20). (4×2)

19. Remove speed wheel (21).
20. Remove wheel parking lock (with seal ring) (22).



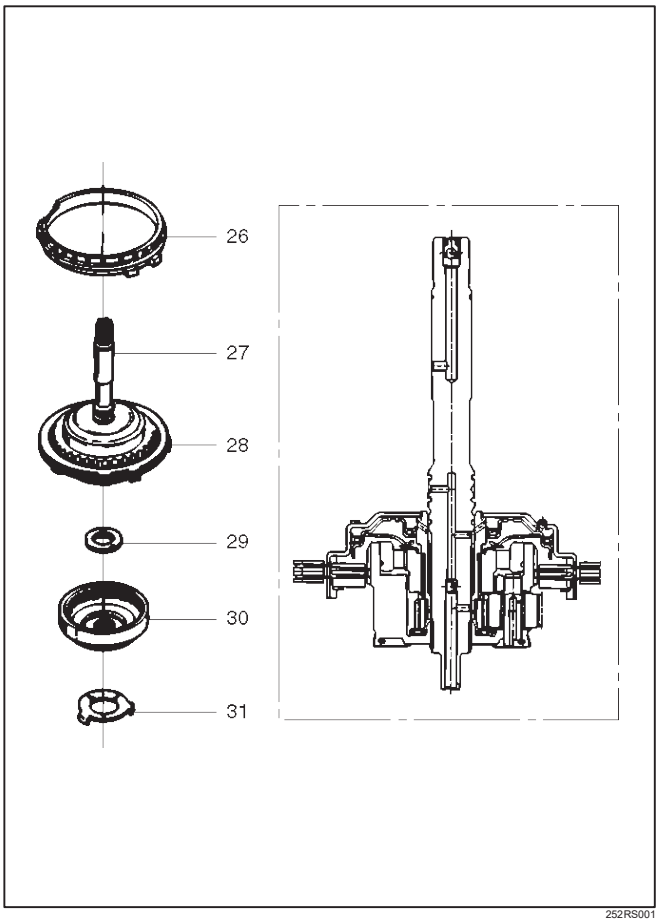
21. Rotate transmission to vertical position, converter housing up.
    - Loosen the converter housing and oil pump assembly fixing screws, but do not remove the five 13 mm inner screws if oil pump disassembly is required.
    - Remove seven outer screws.
    - Remove converter housing and oil pump assembly (23).
22. Remove gasket (24).

23. Remove selective thrust washer (25).



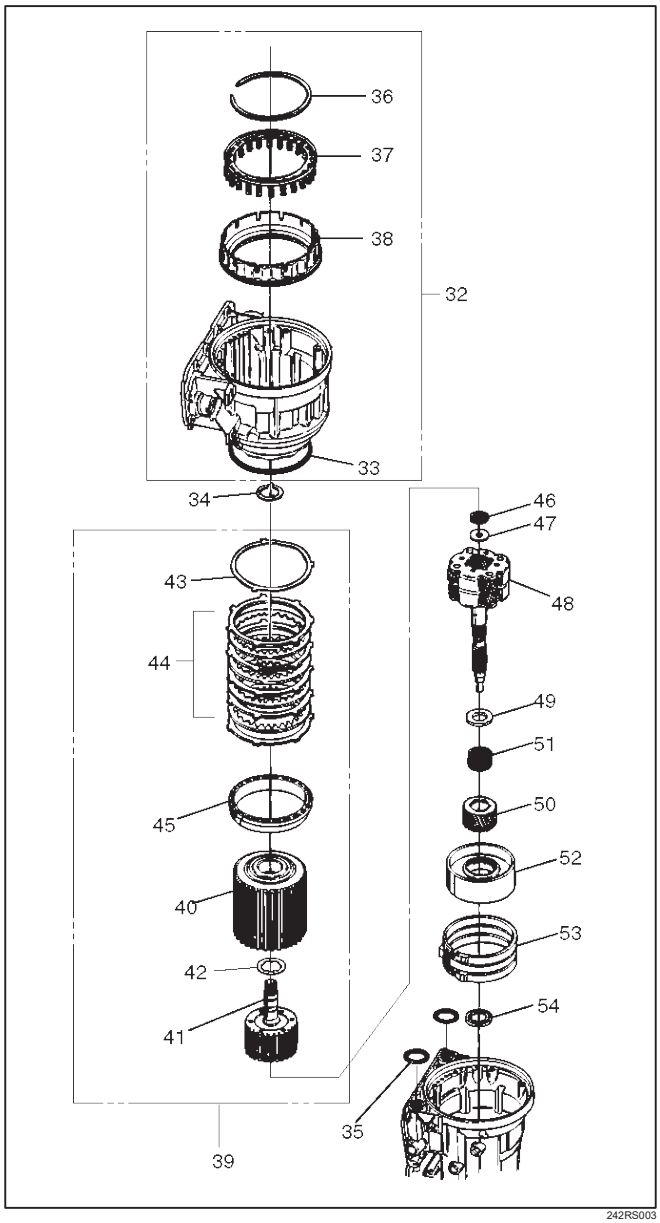
24. Remove fourth clutch retainer (26).
25. Grasp turbine shaft and lift out the overrun clutch housing assembly (27) and fourth clutch plates (28).
26. Remove thrust bearing assembly (29).
27. Remove overdrive internal gear (30).

28. Remove thrust washer (31).



29. Remove adapter case and center support assembly (with fourth clutch piston) (32).
30. Remove seal ring (33).
31. Remove selective thrust washer (34) and two O–ring seals (35) from main case.
32. Use J–23327 and J–23327–90 compressor to compress the fourth clutch spring retainer and springs (37).
    - Release snap ring (36) from groove.
    - Remove clutch compressor and snap ring (36).
33. Remove retainer and spring assembly (37).
34. Insert two converter housing/main case screws to hold adapter case while pulling out fourth clutch piston (38).
    - Remove fourth clutch piston assembly (38) from the adapter case.
    - Remove converter housing/main case screws.
35. Grasp intermediate shaft, twist and pull out the second and third clutch drum assemblies with reverse clutch plates (39) while holding onto output shaft.

36. Separate second (40) and third clutch (41) assemblies.
37. Remove thrust washer (42).
38. Remove reverse clutch plates (43 and 44) and reverse clutch pressure plate (45).
39. Remove bearing (46) and washer (47).
40. Remove planetary carrier assembly (48).
41. Remove thrust bearing (49).
42. Remove reaction sun gear (50)
43. Remove needle bearing (51).
44. Remove brake drum (52).
45. Remove brake band (53).
46. Remove thrust bearing (54).



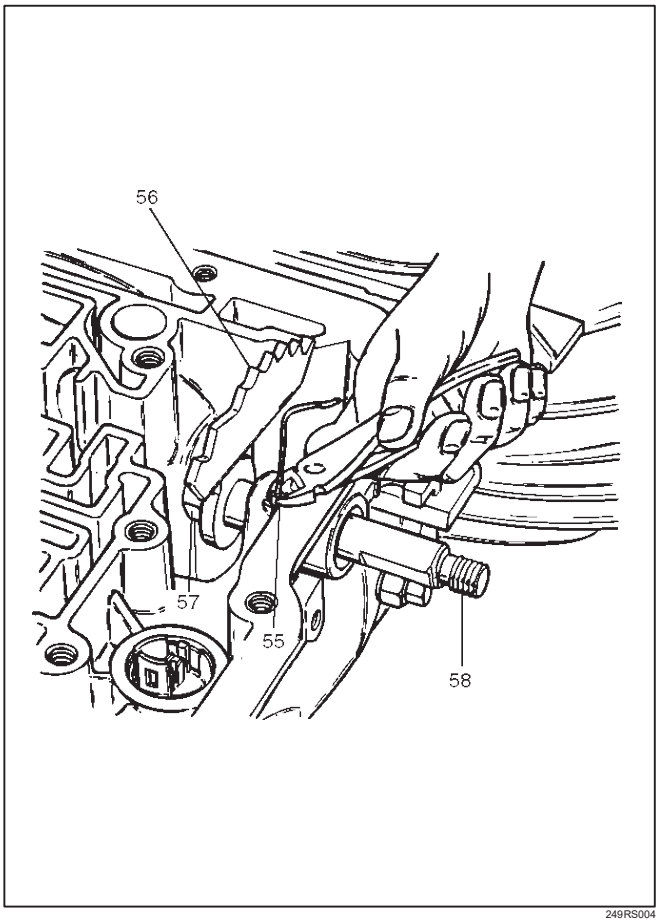
242RS003

47. Rotate case to horizontal position, valve body side facing up.
    - Remove spring pin (55), using cutting pliers, then remove parking lock and selector lever assembly (56).

NOTE: Insert wire in the center of the spring pin to prevent it from collapsing during removal. Be aware of pin height. Protect machined face of main case.

48. Remove parking lock and range selector lever 17 mm nut (57).
49. Remove parking lock and range selector lever (56), and actuator assembly.
50. Remove selector shaft (58).

NOTE: Inspect the shaft for burrs before removing to prevent damaging seal. If necessary, remove burrs by lightly sanding with an oilstone.



249RS004

Reassembly

1. Inspect selector shaft seal, and replace it if necessary.

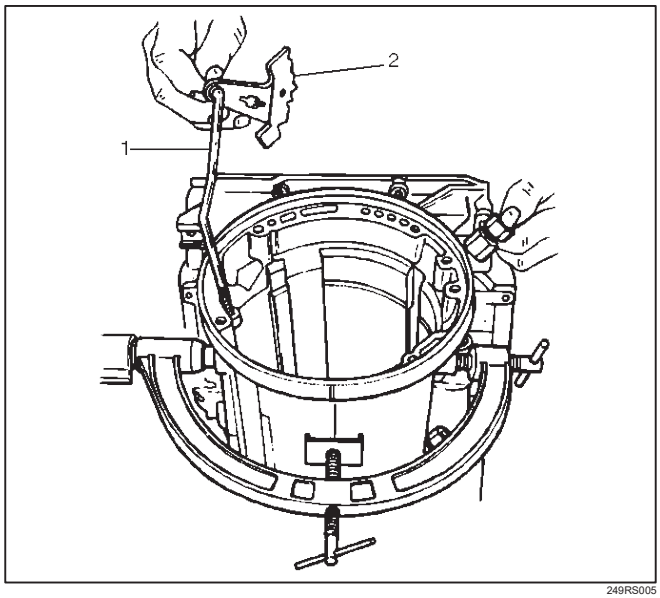
NOTE: Use a seal installer when replacing the seal.

- Install selector shaft.

NOTE: Spring pin groove must be positioned inside the case.

2. Install spring pin. Be sure the selector shaft can move freely. Do not push the pin flush with the case surface. Leave enough height for removal.
3. Install actuator assembly (1).
4. Install parking lock and range selector lever (2) and new 17 mm nut. Tighten the nut to the specified torque.

Torque: 22 N•m (16 lb ft)



249RS005

5. Rotate main case to vertical position, extension end facing down.
   - Install brake band assembly (3).

NOTE: Be sure to align servo pin area with the servo hole.

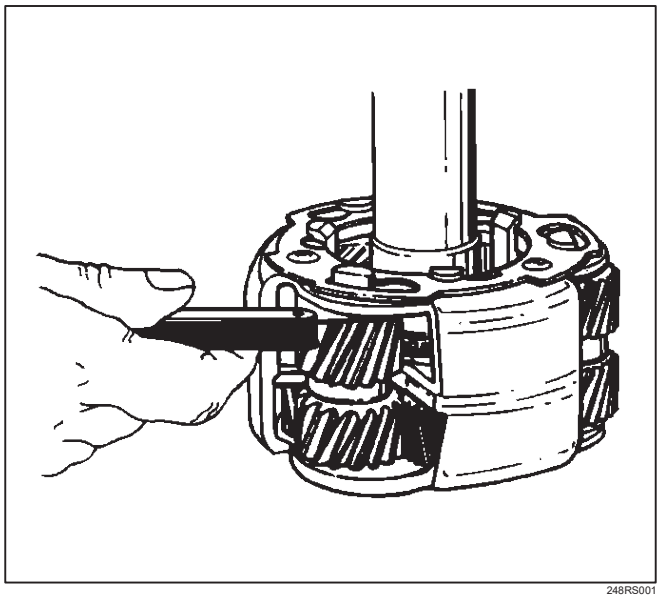
6. Install thrust bearing (4).

NOTE: The case bushing acts as a guide for the thrust bearing.

7. Install brake drum (5).
8. Install reaction sun gear (6).
9. Install needle bearing (7).
10. Inspect planetary carrier assembly (8) for wear and damage. If necessary replace it.
    - Measure pinion end play clearance with a feeler gauge.

    Clearance: 0.13mm–0.89mm (0.005 in–0.035 in)

    If clearance is outside specified value, replace the planetary carrier assembly.

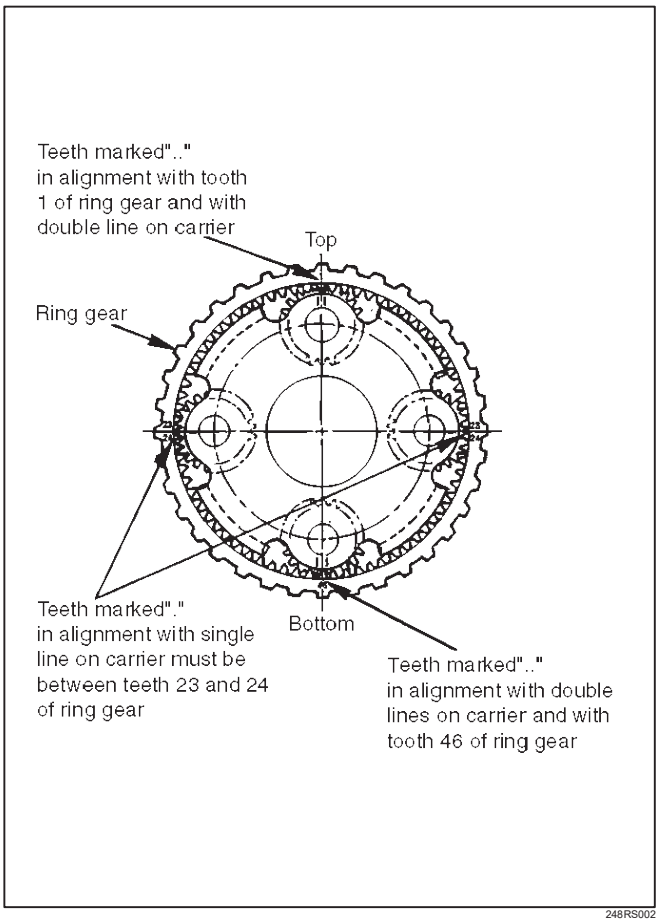

248RS001

11. Install the thrust bearing (9) on the output shaft.

NOTE: Use petroleum jelly to hold the thrust bearing in place.

12. Align planetary pinions. Each pinion is marked with double points to indicate the master tooth space and exactly opposite with a single point to indicate the master tooth. The markings on the planetary carrier consist of double lines which are to be lined up with the double points on two opposite pinions; the single lines are to be lined up with the single points on the other two pinions.
    - After all four pinions are lined up, slide on the third clutch assembly. Rotate third clutch and check mark alignment. Considering that the ring gear tooth between the double points of one planetary pinion is tooth number 1, count the teeth to check that the single points on the two adjacent pinions are between teeth 23 and 24 of the ring gear, and that the ring gear tooth between the double points of the opposite pinion is tooth number 46. If the ring gear and pinions are not lined up, remove, and realign them.
13. Install planetary carrier (8) with third clutch (12).

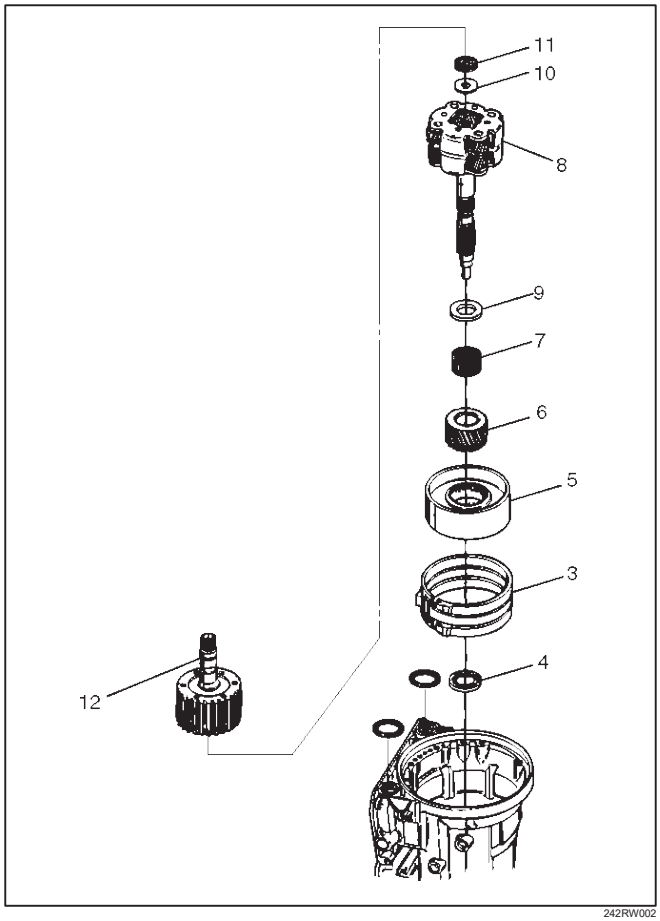
NOTE: Do not force. When properly aligned, the parts will fit together easily.



248RS002

14. Remove the third clutch (12).
15. Install bearing (11) and washer (10).

NOTE: Use petroleum jelly to hold the washer and bearing in place.

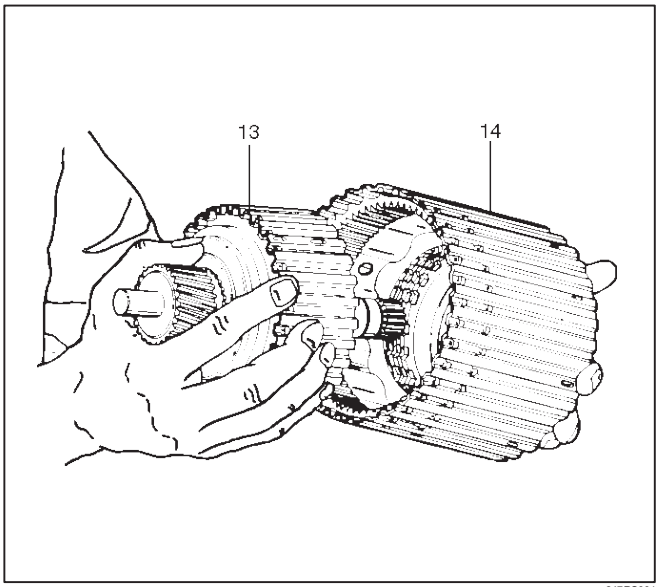


242RW002

16. Carefully align the second clutch plate inner tangs.
    - Install thrust washer, tangs pointing downward, and locating tang positioned in slot on second clutch hub.

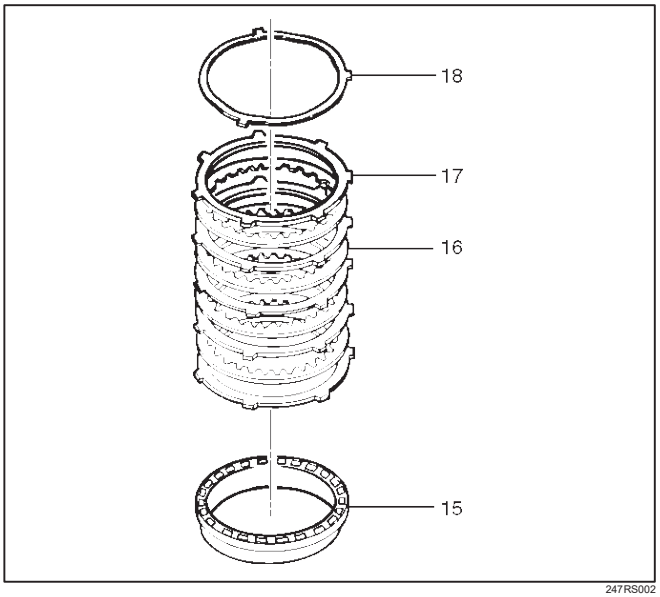
NOTE: Use petroleum jelly to hold thrust washer in place.

17. Install third clutch and intermediate shaft assembly (13) into the second clutch drum (14).
18. Install second and third clutch assemblies into the main case. Twist output shaft and clutch assemblies to ensure proper fit.



247RS001

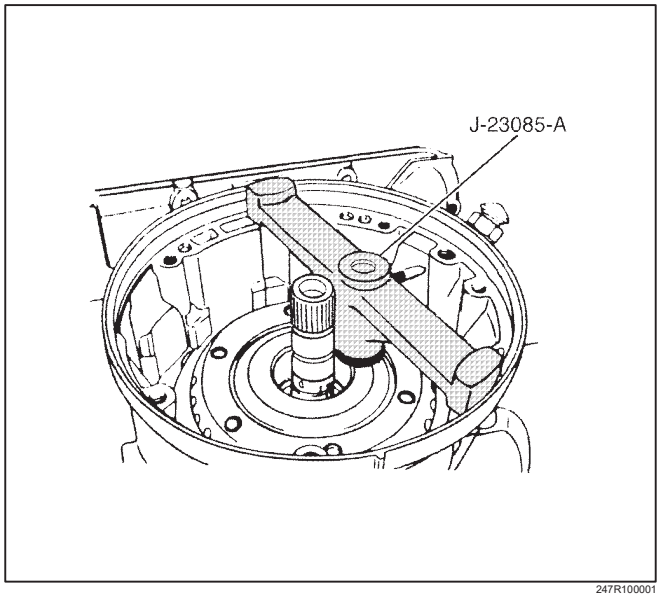
19. Install pressure plate (15) with lip side up, tang facing valve body face.
20. Install reverse clutch plates. Start with a steel plate (17) and alternate with a lined plate (16).
21. Install waved clutch plate (18) with center tang facing valve body side.



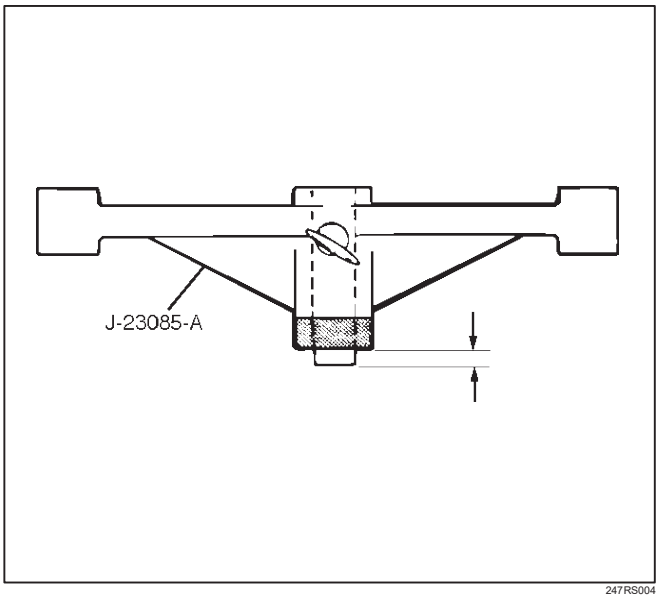
247RS002

22. Second clutch end play measurement
    1. Install the J–23085–A Selective washer gauging tool (with spacer ring) on the case flange and against the intermediate shaft.
    2. Position the inner shaft of the gauging tool against the thrust surface of the second clutch hub.
    3. Tighten thumb screw. Remove the tool.
    4. Fit the spacer ring on the inner shaft of the tool.
    5. Measure the gap, and select the appropriate washer as shown in the chart.

Selective Thrust Washer	
Gap: mm(in)	**Color**
1.53 – 1.63 (0.060 – 0.064)	Yellow
1.72 – 1.82 (0.068 – 0.072)	Red
1.91 – 2.01 (0.075 – 0.079)	Black
2.10 – 2.20 (0.083 – 0.087)	Natural
2.29 – 2.39 (0.090 – 0.094)	Green
2.48 – 2.58 (0.098 – 0.102)	Blue
FOLLOWING THE PROCEDURE SHOULD RESULT IN FINAL END–PLAY FROM 0.36 mm TO 0.79 mm (0.014 in TO 0.031 in)	

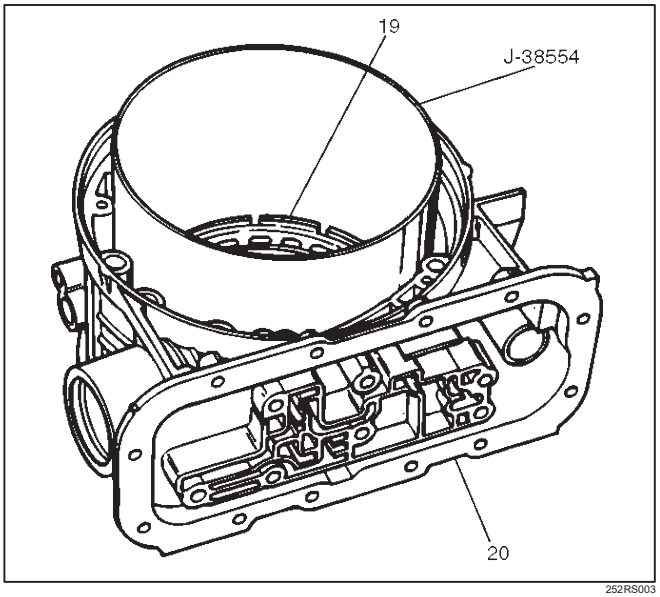


247R100001



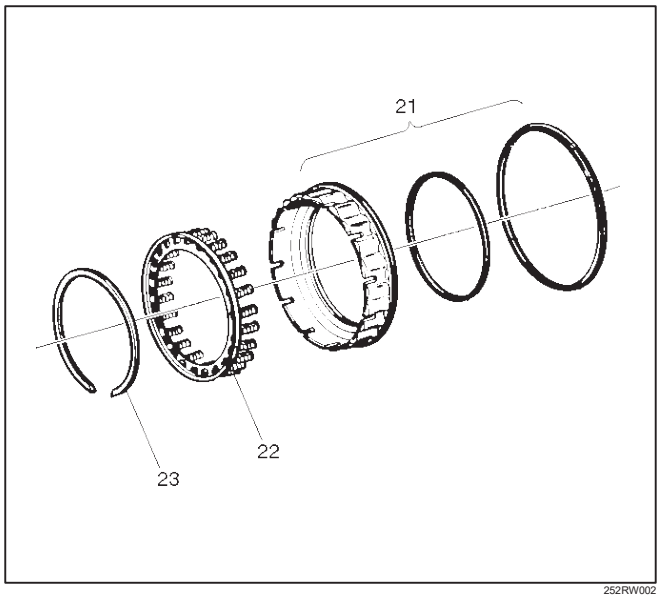
247RS004

23. Inspect fourth clutch piston seals and replace if necessary.
    - Lubricate J–38554 fourth clutch piston fitter and install it on fourth clutch piston (19).
    - Install fourth clutch piston (19) in adapter case (20).
    - Remove fitter.

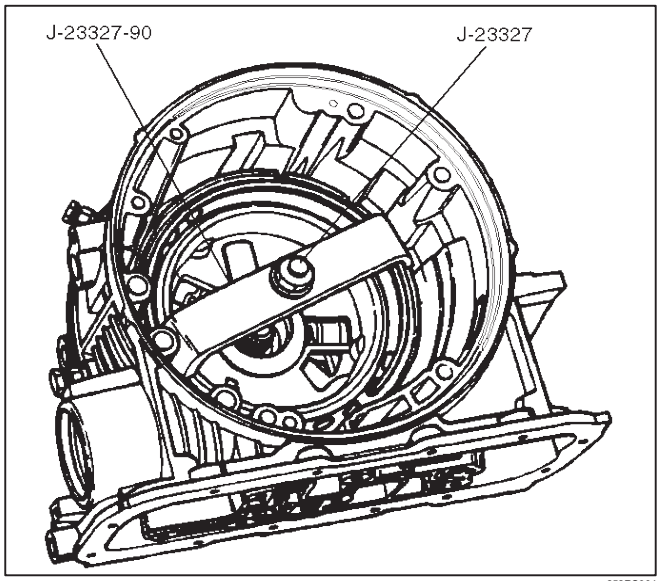


252RS003

24. Install retainer and spring assembly (22) into fourth clutch piston (21).
25. Install snap ring (23) in adapter case.
    - Install J–23327 and J–23327–90 fourth clutch spring compressor.
    - Seat snap ring in groove.
    - Remove compressor.

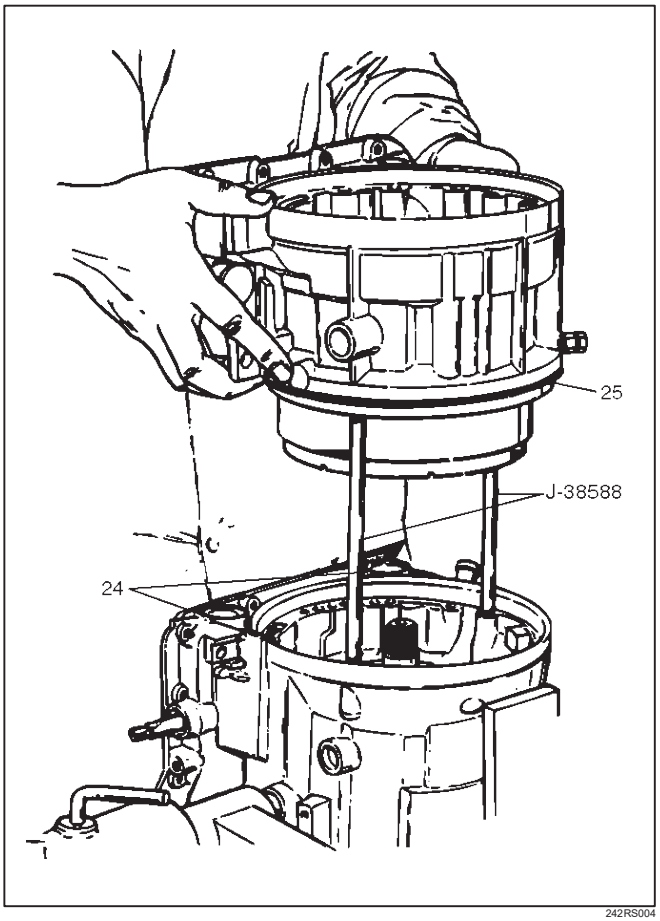


252RW002



252RS004

26. Install selective washer using petroleum jelly.
27. Install two O–ring seals (24) in main case and adapter case/main case seal ring (25).
28. Install J–38588 guide pins.
    - Install adapter case and center support assembly to main case.



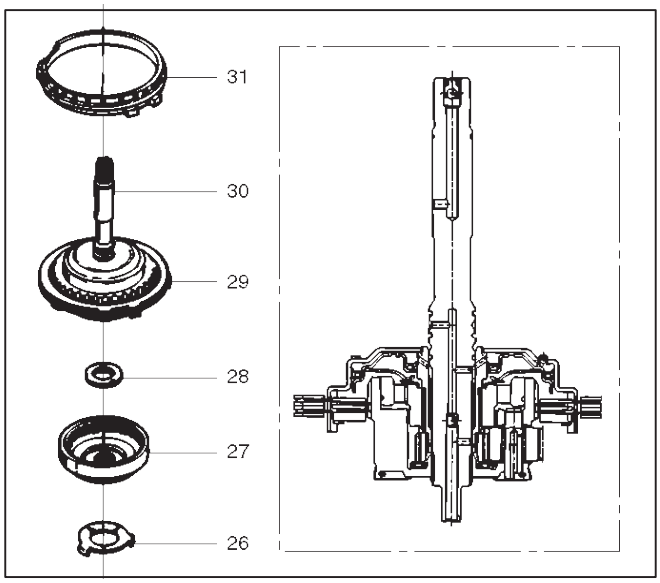
242RS004

29. Install thrust washer (26) into adapter case, with tangs pointing downwards.
30. Preassemble overdrive internal gear (27) and thrust bearing assembly (28) onto the turbine shaft and overrun clutch assembly.

NOTE: Install bearing assembly, black side up. Use petroleum jelly to keep assembly in place.

31. Install overdrive carrier (30) and internal gear assembly into adapter case.
32. Install fourth clutch plates (29) in the following order: Steel, Lined, Steel, Steel, Lined, Steel. Steel plates go in with short tang facing towards valve body surface.

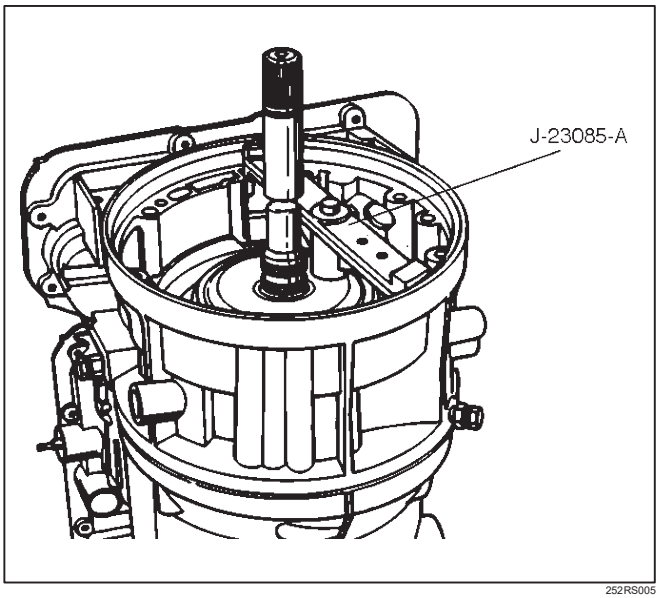
33. Install fourth clutch retainer (31) with the notch facing up and positioned towards valve body surface.



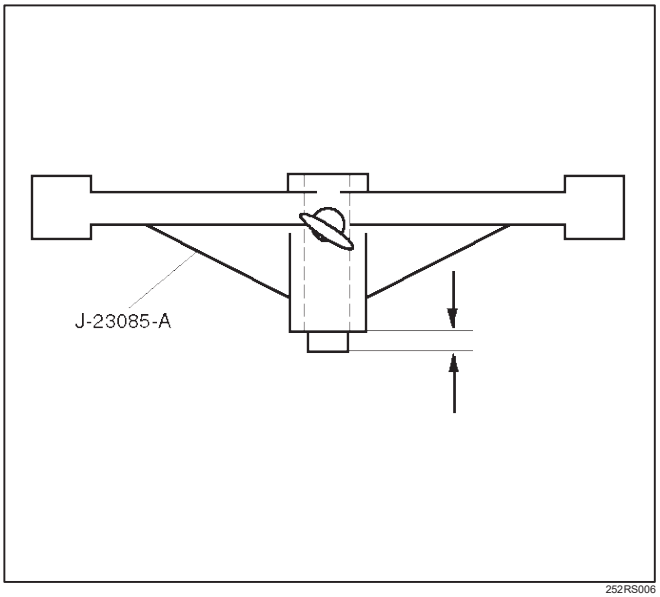
252RW004

34. Overdrive clutch end play measurement
    1. Install the J–23085–A selective washer gauging tool on the adapter case flange and against the input shaft.
    2. Position the inner shaft of the tool against the thrust surface of the overrun clutch housing.
    3. Tighten thumb screw. Remove the tool.
    4. Measure gap. Select appropriate size washer as shown in the chart.
    5. Set selective thrust washer aside.

Selective Thrust Washer	
Gap: mm(in)	**Color**
1.53 – 1.63 (0.060 – 0.064)	Yellow
1.72 – 1.82 (0.068 – 0.072)	Red
1.91 – 2.01 (0.075 – 0.079)	Black
2.10 – 2.20 (0.083 – 0.087)	Natural
2.29 – 2.39 (0.090 – 0.094)	Green
2.48 – 2.58 (0.098 – 0.102)	Blue
FOLLOWING THE PROCEDURE SHOULD RESULT IN FINAL END–PLAY FROM 0.1 mm TO 0.8 mm (0.004 in TO 0.03 in)	



252RS005



252RS006

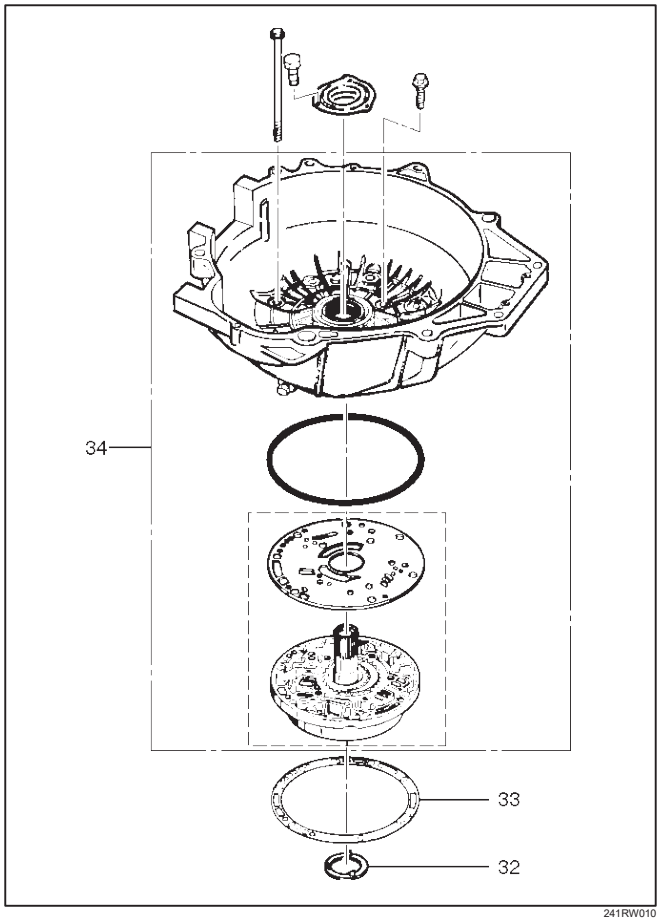
35. Install selective washer (32).

NOTE: Use petroleum jelly to hold selective washer in place.

36. Install gasket (33).
37. Install converter housing and oil pump assembly (34) to adapter case.
    - Fit and tighten seven outer 13 mm screws.

    Torque: 39 N•m (29 lb ft)

- Ensure free rotation of oil pump using J–23082–01 oil pump rotation tool.

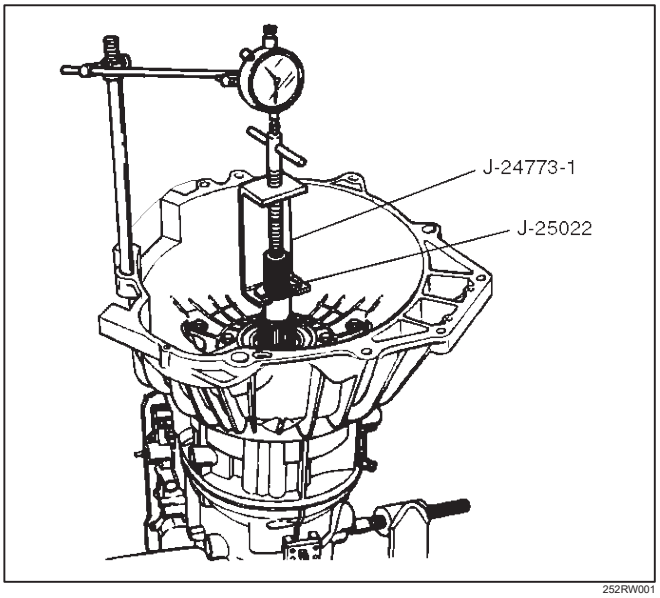


38. Overdrive clutch end play measurement
    1. Fit J–25022 and J–24773–1 turbine shaft puller on turbine shaft.
    2. Position axial play checking tool on converter housing mating face.
    3. Pull turbine shaft upwards with puller until first resistance is met. (due to weight of overdrive assembly).
    4. Maintain shaft in this position and set indicator to zero.
    5. Pull turbine shaft further upwards with puller. Read end play shown on indicator.

    End play: 0.1mm – 0.8mm (0.004 in – 0.031in)

    6. Remove axial play checking tool and puller.

NOTE: If end play is not correct, repeat selective washer selection.



39. Inspect extension housing oil seal and replace if necessary, using J–36797 extension housing oil seal installer.
    - Rotate transmission to horizontal position, with valve body side down.
    - Inspect parking wheel seal ring. Replace if necessary.
    - Install wheel parking lock assembly (35).
40. Install speed wheel (36) and snap ring (37). (4×4)

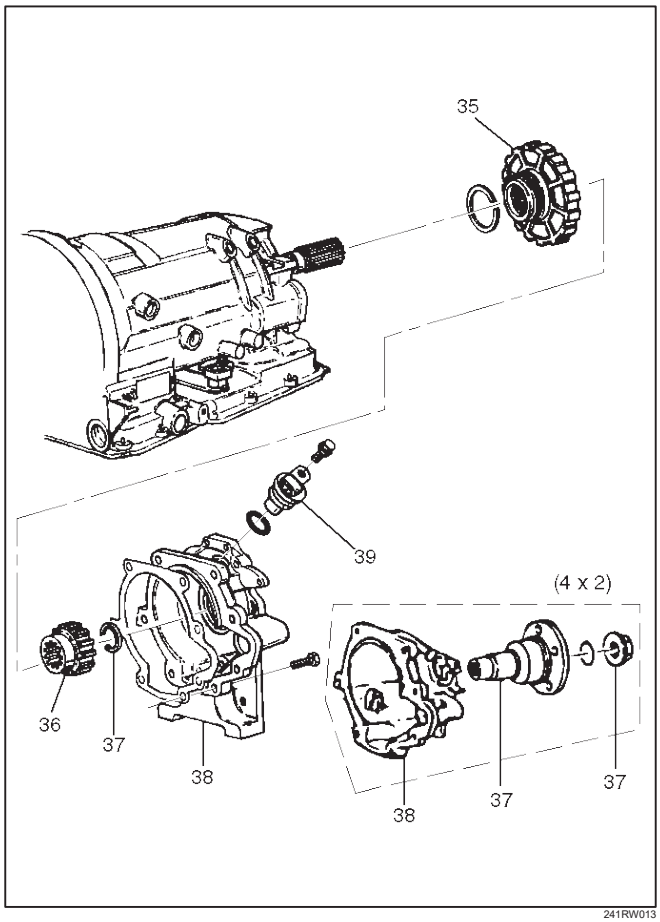
NOTE: Use extra long, needle-nose pliers.

41. Install flange, O–ring and nut. (4×2)
42. Install gasket onto extension assembly with a thin coating of oil.
    - Install extension housing assembly (38), and align parking pawl shaft.
    - Install actuator assembly into extension assembly.
    - Install seven 8 mm hexagon socket head screws.

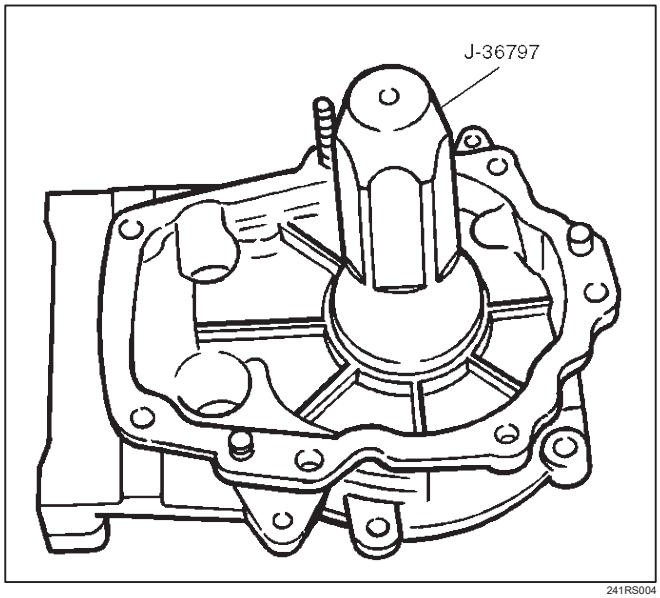
    Torque: 32 N•m (24 lb ft)

43. Inspect speed sensor O–ring. Replace if necessary.
    - Install speed sensor assembly (39) and 10 mm screw.

    Torque: 9 N•m (78 lb in)



241RW013

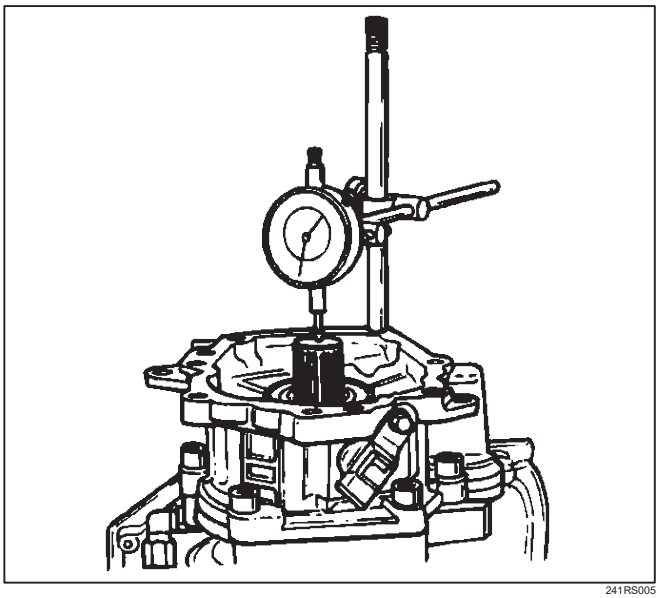


241RS004

44. Main case end play measurement
    1. Attach axial play checking tool on the extension housing and set indicator to zero on output shaft.
    2. Manually push output shaft upwards.

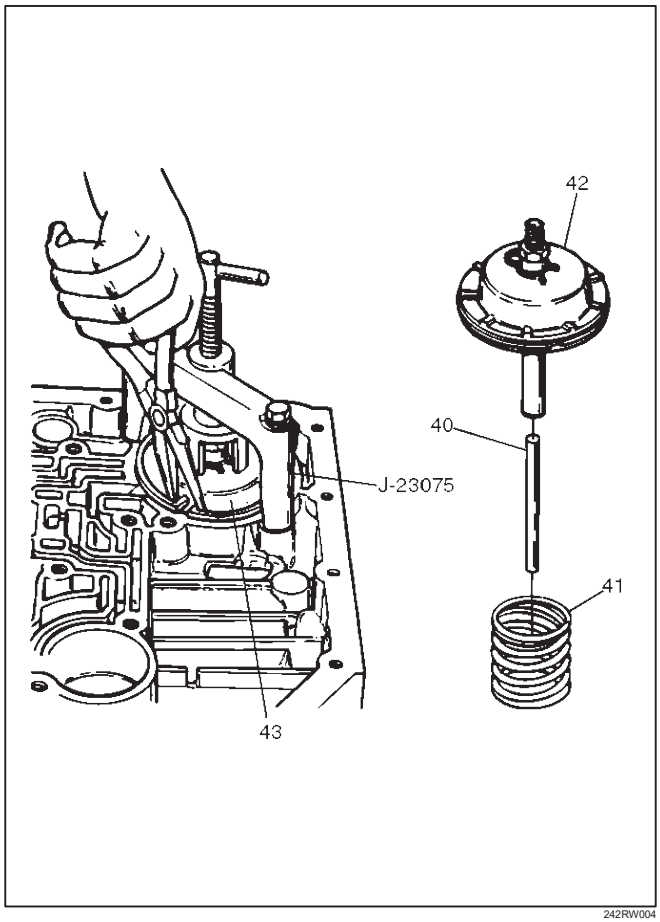
    End play: 0.36mm – 0.80mm (0.014 in – 0.031in)

    3. Remove axial play checking tool.
    4. If end play is not correct, repeat selective washer selection.


241RS005

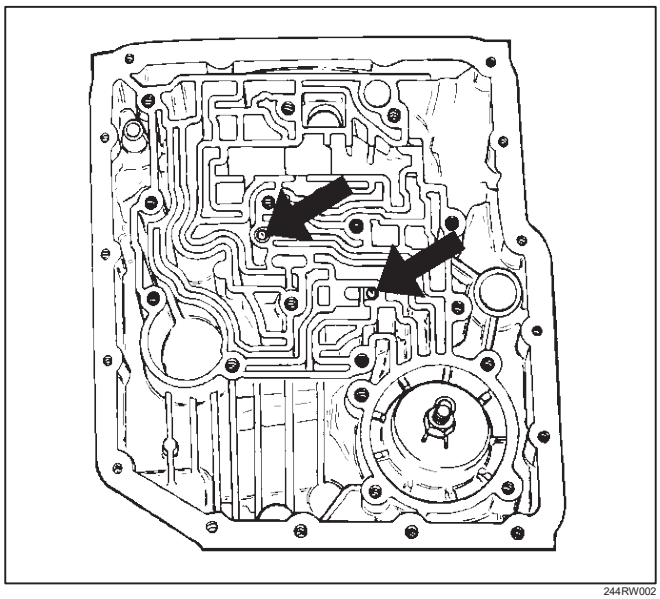
45. Inspect servo piston seal ring. Replace if necessary.
    - Ensure brake band is correctly positioned. Rotate output shaft if necessary.
    - Install J–38428 servo piston fitter in servo bore.
    - Install apply rod (40), round end toward band, return spring (41) and piston assembly (42).

46. Install the J–23075 servo spring compressor with offset to rear of case.
    - Compress servo piston seal ring, using fitter while tightening the tool screw.
    - Install servo piston retaining ring (43).
    - Remove tool.
    - Adjust the brake band by tightening the servo adjusting screw to 4.5 N·m (39.8 lb in) torque. Be certain the lock nut is loose, then back–off the screw five turns exactly. Hold piston sleeve with wrench and tighten lock nut to 18.5 N·m (13.6 lb ft) torque. Be certain the adjusting screw does not turn.



242RW004

47. Install two check balls (44).



244RW002

48. Inspect main case electrical connector and seal, replace if necessary.
    - Install electrical 7 way connector/main case and wiring harness.
49. Install two J–25025–B guide pins into main case.
    - Install main case valve body complete assembly (45) and manual valve link.

NOTE: Valve must be extended as the short end of manual valve link is connected to the range selector lever. Long end of link goes into valve.

- Install seven 13 mm screws.

Torque: 20 N•m (15 lb ft)

- Remove two guide pins.

50. Install servo cover gasket, cover (46) and four 13 mm screws.

Torque: 25 N•m (18 lb ft)

51. Connect wiring harness (47) to band control, shift solenoids, and main case 7 way connector.
52. Install manual detent roller and spring assembly (48) with clip.
    - Install two 13 mm screws.

Torque: 20 N•m (15 lb ft)

53. Install oil filter (49), and three 13 mm screws.

Torque: 20 N•m (15 lb ft)

54. Install oil pan gasket, magnet, main oil pan (50), and sixteen 10 mm screws.

Torque: 11 N•m (96 lb in)

55. Inspect adapter case electrical connector and seal. Replace if necessary.
    - Install electrical 4 way connector and harness assembly (52) in bottom of adapter case.
56. Install gasket, transfer plate, and gasket.
    - Install adapter case valve body (51) and seven 13 mm screws.

Torque: 20 N•m (15 lb ft)

57. Connect wiring harness harness assembly (52) to converter clutch PWM solenoid, force motor, and 4 way connector.
58. Install oil pan gasket, adapter case oil pan (53), and twelve 10 mm screws.

Torque: 11 N•m (96 lb in)

- Rotate transmission, with bottom pan facing down.

59. Install mode switch (54), two 10 mm screws, selector lever nut, and cover.

10 mm screw

Torque: 13 N•m (113 lb in)

Nut

Torque: 23 N•m (17 lb ft)

- Adjust using setting tool, refer to *Mode Switch in this section.*

60. Install O–ring (55) on turbine shaft.
61. Install torque converter (56).

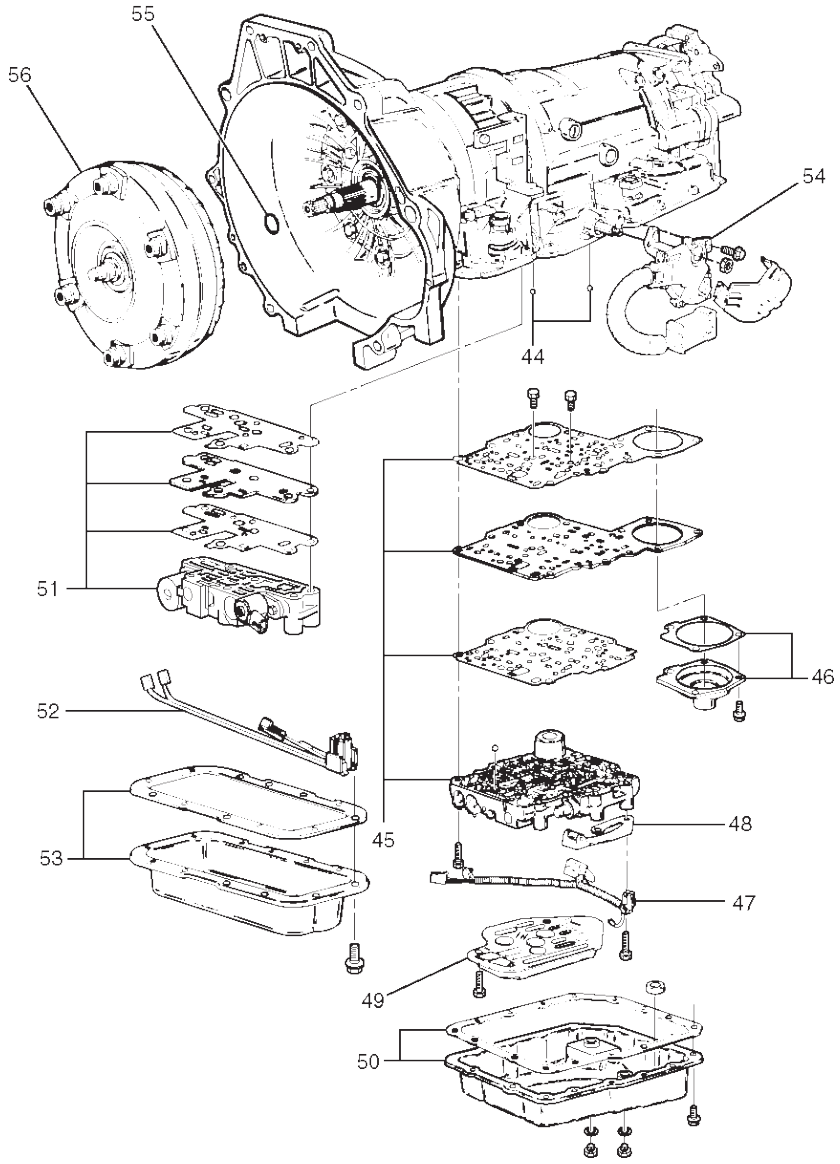
The converter assembly must be replaced under any of the following conditions:

a. Evidence of damage to the pump assembly.
b. Metal particles are found after flushing the cooler lines.
c. External leaks in hub weld area.
d. Converter pilot broken, damaged, or poor fit into crankshaft.

e. Converter hub scored or damaged.
f. Internal failure in stator.
g. Contamination from engine coolant.
h. Excess end play.

- Rotate transmission, bell housing up. Spin converter to insure proper fit.

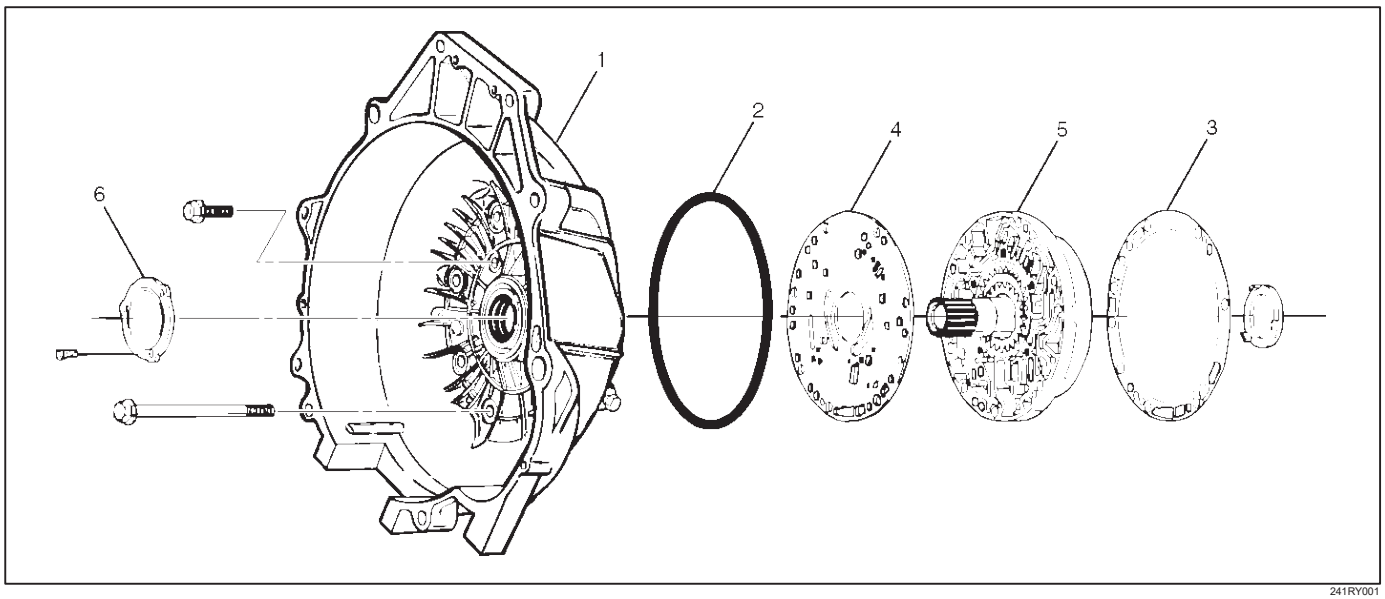
62. Fill transmission through the overfill screw hole of oil pan, using ATF DEXRON®–III. Refer to *Changing Transmission Fluid in this section.*



240RY002

Converter Housing And Oil Pump Assembly

Disassembled View



241RY001

Legend

(1) Converter Housing
(2) Outer Seal Ring
(3) Gasket
(4) Wear Plate
(5) Oil Pump Assembly
(6) Oil Seal Ring

Disassembly

1. Remove oil pump assembly from converter housing.
2. Remove outer seal ring.
3. Remove gasket.
4. Remove wear plate.
5. Remove oil seal ring.

Inspection And Repair

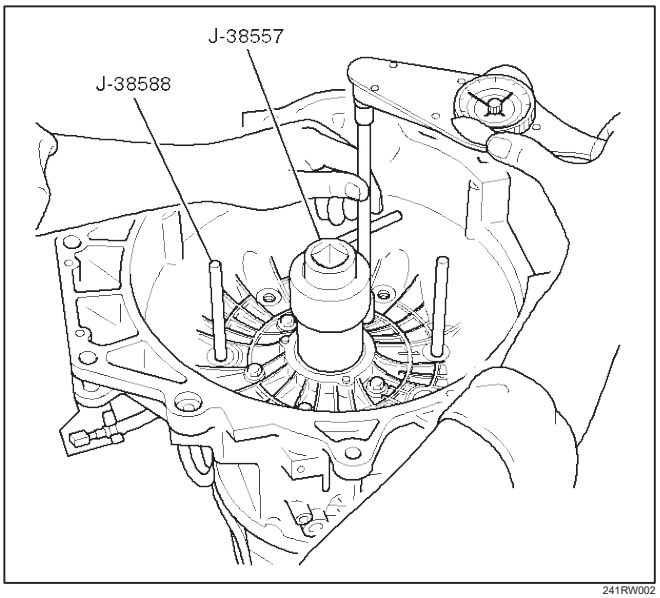
Visual Check:

If any damage, deformation, or local wear is found in a converter housing, outer seal ring, wear plate, or oil seal ring, replace it.

Reassembly

1. Install wear plate onto oil pump assembly.
2. Install converter housing onto complete oil pump assembly. Align with two short J–38588 guide pins on outer bolt holes.
   - Loosely install five 13mm bolts.
   - Center converter housing using J–38557 centering tool.
   - Tighten five inner 13mm bolts in an alternating pattern.

   Torque: 20 N•m (15 lb ft)



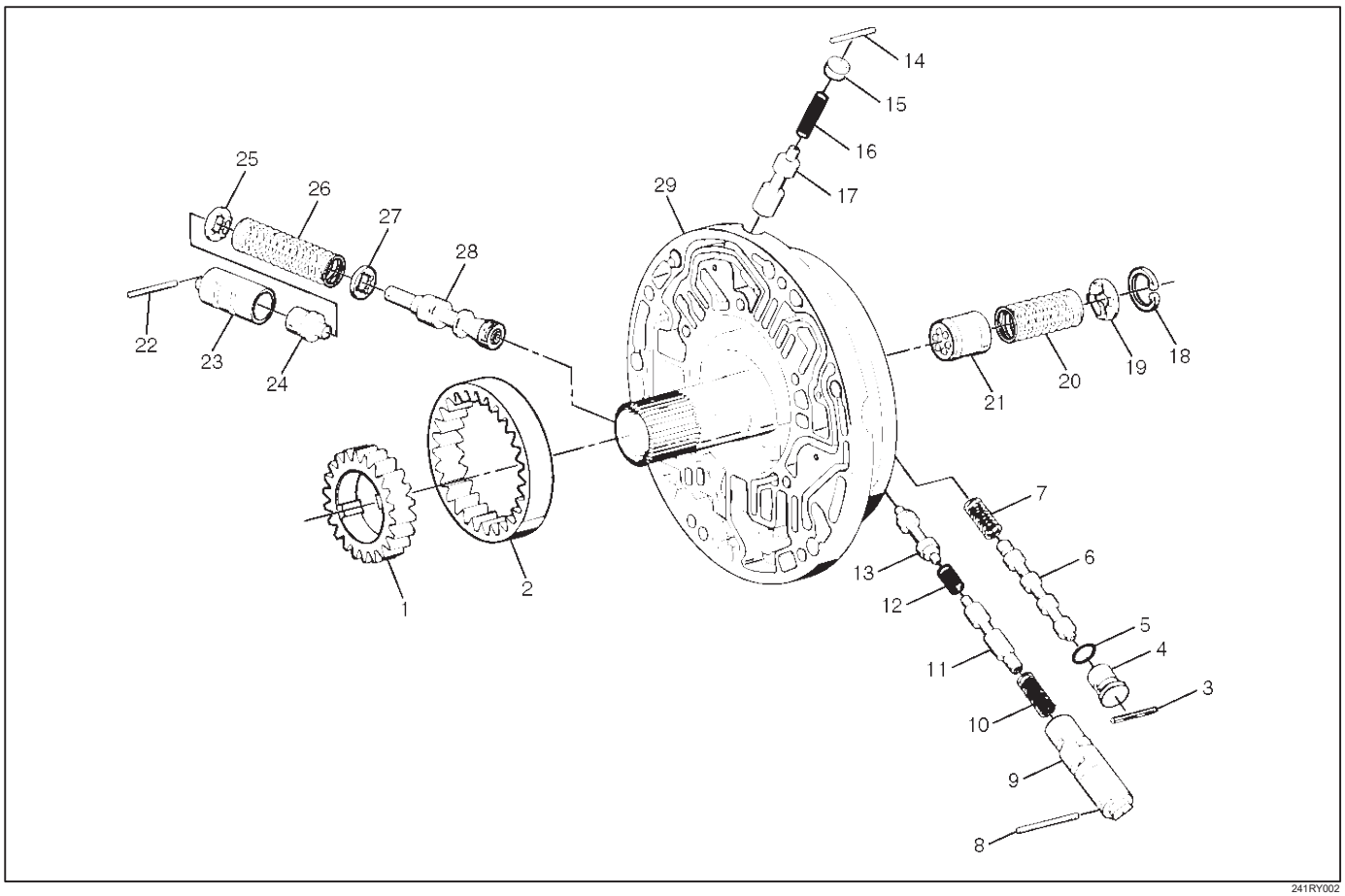
241RW002

3. Install oil seal ring (3 screws).

   Torque: 3 N•m (26 lb in)
4. Install gasket.
5. Install outer seal ring.

Oil Pump

Disassembled View



Legend

(1) Oil Pump Drive Gear
(2) Oil Pump Driven Gear
(3) Pin
(4) Plug
(5) Seal Ring
(6) Torque Converter Clutch Control Valve
(7) Converter Clutch Control Valve Spring
(8) Pin
(9) Converter Clutch Regulator Sleeve
(10) Converter Clutch Regulator Spring
(11) Converter Clutch Regulator Valve
(12) Isolator Spring
(13) Isolator Valve
(14) Pin
(15) Enable Valve Spring Guide
(16) Enable Valve Spring
(17) Enable Valve
(18) Snap Ring
(19) Spring Seat
(20) Throttle Signal Accumulator Spring
(21) Throttle Signal Accumulator Piston
(22) Sleeve Pin
(23) Boost Valve Sleeve
(24) Boost Valve
(25) Spring Seat
(26) Pressure Regulator Valve Spring
(27) Spring Seat
(28) Pressure Regulator Valve
(29) Oil Pump Assembly

Disassembly

1. Remove oil pump drive gear (1) and driven gear (2).
2. Remove pin (3) from oil pump assembly (29).
3. Remove plug (4) and seal ring (5), torque converter clutch control valve (6) and spring (7).
4. Remove pin (8) from oil pump assembly (29).
5. Remove torque converter regulator sleeve (9), converter clutch regulator spring (10), converter clutch regulator valve (11), isolator spring (12) and isolator valve (13).
6. Remove pin (14) from oil pump assembly (29).
7. Remove enable valve spring (16), spring guide (15) and enable valve (17).
8. Remove snap ring (18) from oil pump assembly (29).

9. Remove spring seat (19), spring (20) and throttle signal accumulator piston (21).
10. Remove sleeve pin (22) from oil pump assembly (29).
11. Remove boost valve sleeve (23), boost valve (24), spring seat (25), valve spring (26), spring seat (27), and pressure regulator valve (28).

Inspection And Repair

Visual Check:

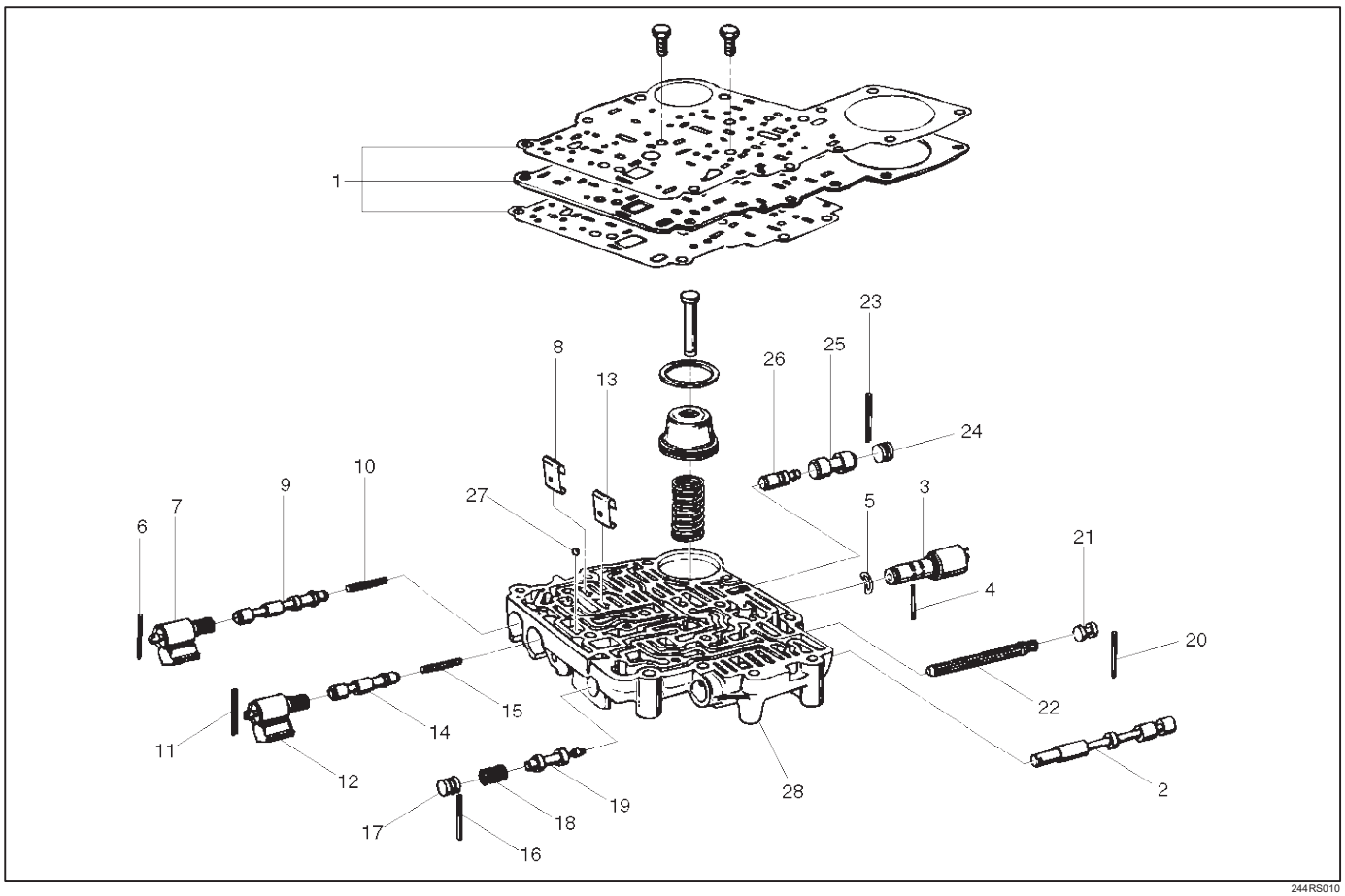
If any damage, deformation or wear is found, replace the damaged part.

Reassembly

1. Lubricate and preinstall pressure regulator spring seat (27) on valve (28), with the flat side against shoulder.
2. Install pressure regulator valve (28) and spring seat (27) assembly, valve spring (26), and spring seat (25) with the flat side away from spring to oil pump assembly (29).
3. Assemble boost valve (24) into sleeve (23).
4. Install boost valve and sleeve assembly, and sleeve pin (22) to oil pump assembly (29).
5. Install throttle signal accumulator piston (21), spring (20), and spring seat (19), with the flat side away from the spring, and snap ring (18) to oil pump assembly (29).
6. Install enable valve (17), spring guide (15), enable valve spring (16) and retainer pin (14) to oil pump assembly (29).
7. Assemble torque converter regulator spring (10) and torque converter regulator valve (11) into sleeve (9).
8. Install isolator valve (13), isolator valve spring (12) and the torque converter regulator sleeve and valve assembly into the oil pump assembly (29).
9. Install torque converter clutch control valve spring (7), torque converter clutch control valve (6), plug (4) and seal ring (5), and retainer pin (3) to oil pump assembly (29).
10. Install oil pump driven gear (2) and drive gear (1).

Main Case Valve Body

Disassembled View



244RS010

Legend

(1) Gaskets and Transfer Plate
(2) Manual Valve
(3) Band Control Solenoid
(4) Pin
(5) Waved Washer
(6) Spring Pin
(7) Solenoid A
(8) Retainer
(9) 1–2/3–4 Shift Valve
(10) Spring
(11) Spring Pin
(12) Solenoid B
(13) Retainer
(14) 2–3 Shift Valve
(15) Spring
(16) Spring Pin
(17) Plug
(18) Spring
(19) Low Pressure Control Valve
(20) Spring Pin
(21) Plug
(22) Band Control Screen Assembly
(23) Spring Pin
(24) Plug
(25) 1–2 Accumulator Valve
(26) 1–2 Accumulator Control Valve
(27) Check Ball
(28) Main Case Valve Body

Disassembly

1. Remove two 11mm bolts from valve body (28), then remove gaskets and transfer plate (1).
2. Remove manual valve (2).
3. Push in band control solenoid (3) to compress waved washer (5), and remove pin (4).
4. Remove band control solenoid (3) and waved washer (5).
5. Remove spring pin (6) with a 3 mm dia punch.
6. Remove solenoid A (7) by grasping the metal tip. Do not grasp the connector housing.
7. Remove retainer (8), 1–2/3–4 shift valve (9), and spring (10).
8. Remove spring pin (11) with a 3 mm dia punch.
9. Remove solenoid B (12) by grasping the metal tip. Do not grasp the connector housing.

10. Remove retainer (13), 2–3 shift valve (14), and spring (15).
11. Remove spring pin (16), plug (17), spring (18), and low pressure control valve (19).
12. Remove spring pin (20), plug (21), and band control screen assembly (22).
13. Remove spring pin (23), plug (24), 1–2 accumulator valve (25), and 1–2 accumulator control valve (26).
14. Remove check ball (27) from valve body (28).

Inspection And Repair

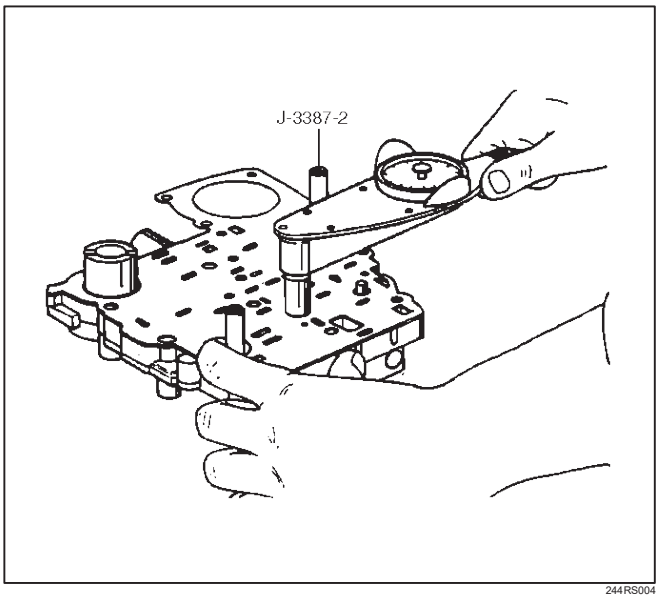
Inspect for the following, and replace any damaged or worn parts:

1. Damage or wear to each valve.
2. Damage in oil passeges.
3. Cracks or damage to valve body.
4. Valve operations.
5. Spring fatigue.

Reassembly

1. Install 1–2 accumulator control valve (26), 1–2 accumulator valve (25), plug (24), and spring pin (23).
2. Install band control screen assembly (22), plug (21), and spring pin (20).
3. Install low pressure control valve (19), spring (18), plug (17), and spring pin (16).
4. Install spring (15), 2–3 shift valve (14), retainer (13), solenoid B (12), and spring pin (11).
5. Install spring (10), 1–2/3–4 shift valve (9), retainer (8), solenoid A (7), and spring pin (6).
6. Install waved washer (5), band control solenoid (3), and pin (4).
7. Install manual valve (2).
8. Install check ball (27) to valve body (28).
9. Install gasket (valve body/transfer plate) and transfer plate using two J–3387–2 guide pins.
   - Install two 11mm bolts.

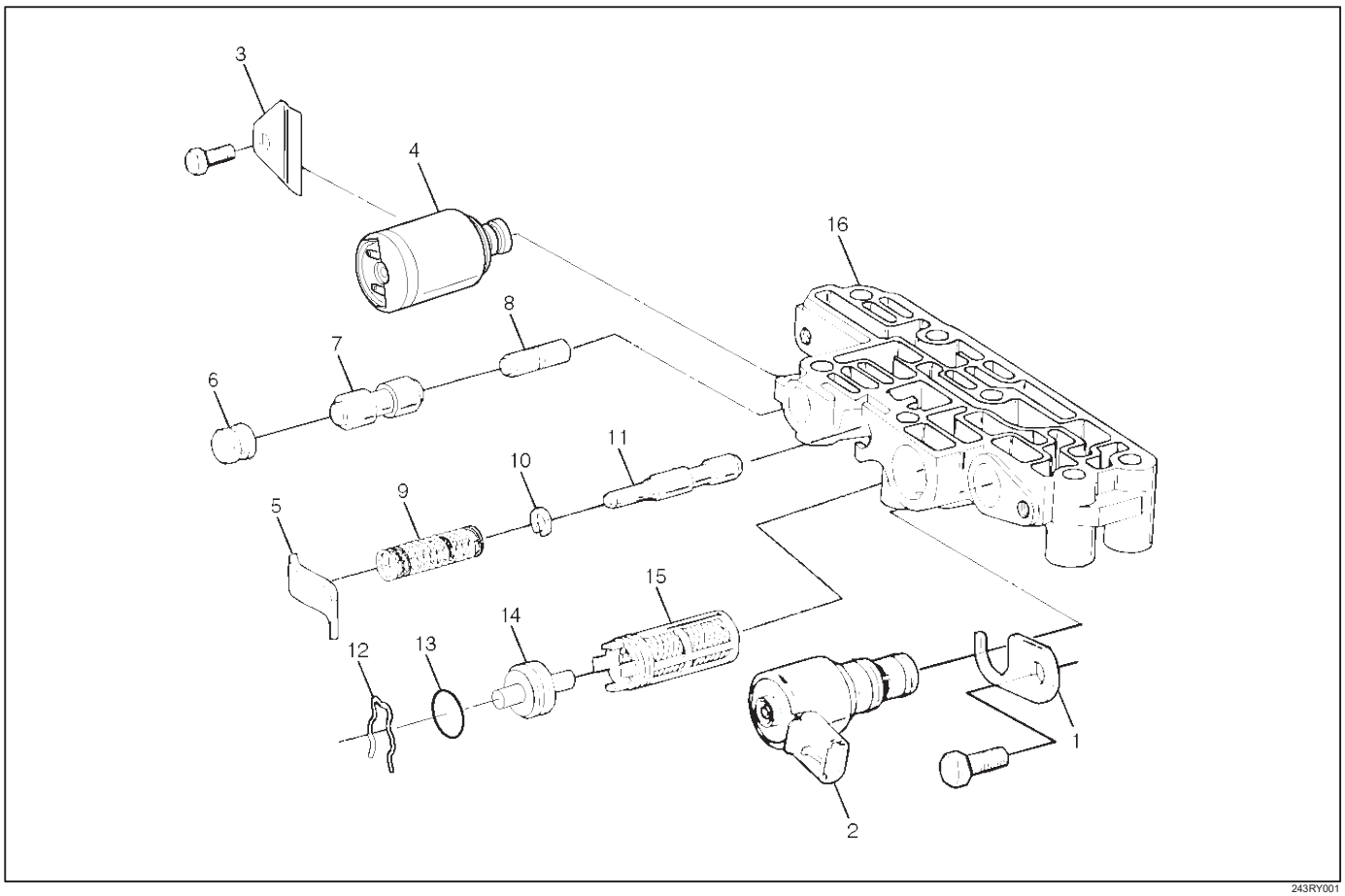
   Torque: 13 N•m (113 lb in)



   - Install gasket (transfer plate/main case).

Adapter Case Valve Body

Disassembled View



243RY001

Legend

(1) Bracket
(2) Converter Clutch PWM Solenoid
(3) Retainer
(4) Force Motor Solenoid
(5) Retainer
(6) Plug
(7) 3/4 Accumulator Valve
(8) 3/4 Accumulator Control Valve
(9) Spring
(10) Retaining Ring
(11) Feed Limit Valve
(12) Plug Retainer
(13) O–Ring
(14) Plug
(15) Force Motor Screen Assembly
(16) Adapter Case Valve Body

Disassembly

1. Remove 11mm bolt from valve body.
   - Remove bracket (1) and converter clutch PWM solenoid (2).
2. Remove 11mm bolt and retainer (3) from valve body.
   - Remove force motor solenoid (4).
3. Remove retainer (5), plug (6), 3/4 accumulator valve (7), and 3/4 accumulator control valve (8).
4. Remove spring (9), retaining ring (10), and feed limit valve (11).
5. Remove plug retainer (12), O–ring (13), plug (14), and force motor screen assembly (15).
   - Use 5 mm bolt to pull plug.

Inspection And Repair

Inspect for the following, and replace any damaged or worn parts:

1. Damage or wear to each valve.
2. Damage in oil passeges.
3. Cracks or damage to valve body.
4. Valve operations.
5. Spring fatigue.

Reassembly

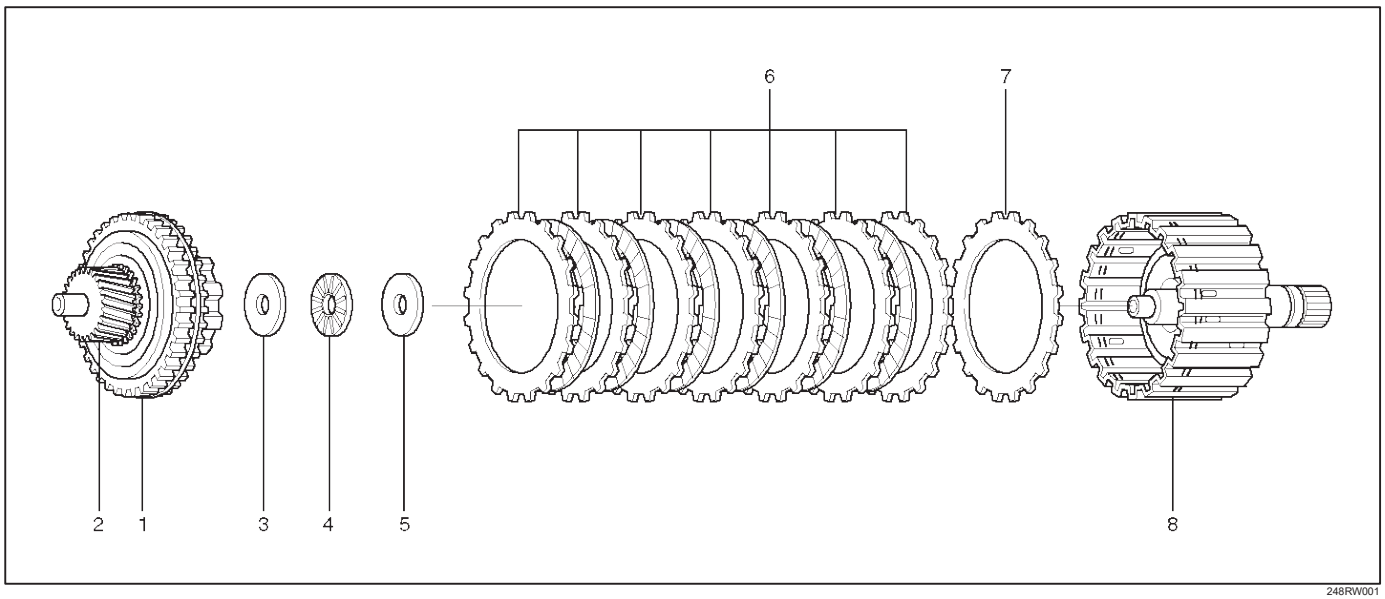
1. Install force motor screen assembly (15), plug (14), O–ring (13), and plug retainer (12).
2. Install feed limit valve (11), retaining ring (10), and spring (9).
3. Install 3/4 accumulator control valve (8), 3/4 accumulator valve (7), plug (6), and retainer (5).
4. Install force motor solenoid (4).
   - Place solenoid terminals pointing towards mating face.
   - Install retainer (3) and bolt.

   Torque: 10 N•m (87 lb in)
5. Install converter clutch PWM solenoid (2) with two O–rings (2) and bracket (1) to valve body.
   - Install bolt.

   Torque: 10 N•m (87 lb in)

Third Clutch And Sprag Unit

Disassembled View



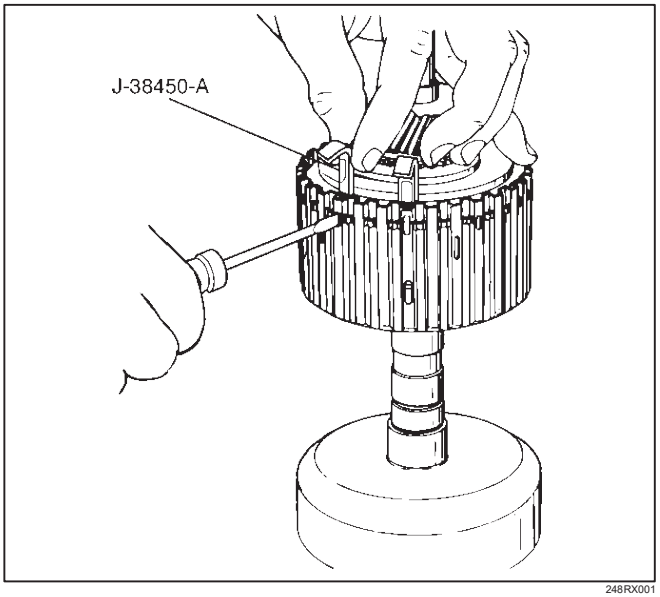
248RW001

Legend

(1) Retaining Ring
(2) Input Sun Gear and Sprag Unit Assembly
(3) Retaining Washer
(4) Bearing
(5) Thrust Washer
(6) Clutch Plates
(7) Third Clutch Spring Cushion Plate
(8) Third Clutch Drum Assembly

Disassembly

1. Place the third clutch drum and intermediate shaft assembly upright, using the overdrive internal gear as a support.
2. Locate the ends of the retaining ring. Depress one end of the ring using a small screwdriver instead of the depressor handle provided with the tool J-38450-A. Slide one blade down between the third clutch drum and the retaining ring.
3. Remove a screwdriver and repeat this step for the other end of retaining ring.
4. Install the remaining four blades approximately (five) notches apart using a screwdriver to depress the retaining ring.
5. Pull up on input sun gear and sprag unit assembly (1 and 2) to release the retaining ring from third clutch drum assembly (8).
6. Remove the tool blades.



248RX001

7. Remove retaining washer (3), bearing (4), thrust washer (5), and clutch plates (6 and 7) from the third clutch drum assembly (8).

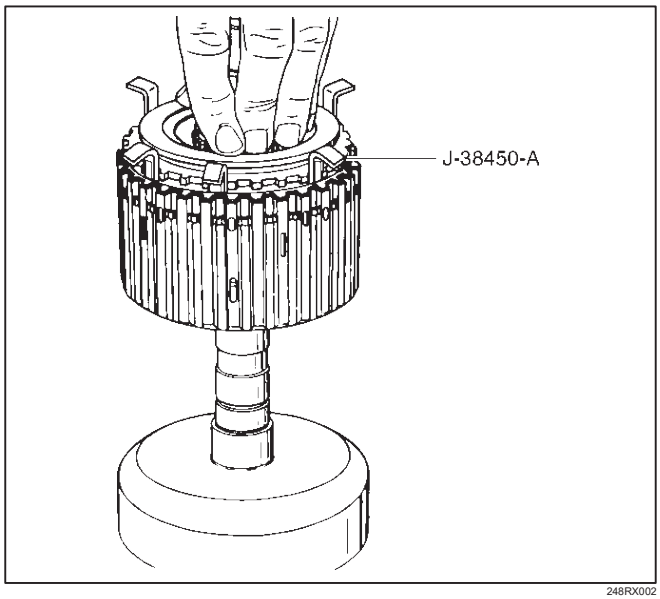
Inspection And Repair

Visual Check:

If any damage, deformation or wear is found, replace the damaged part.

Reassembly

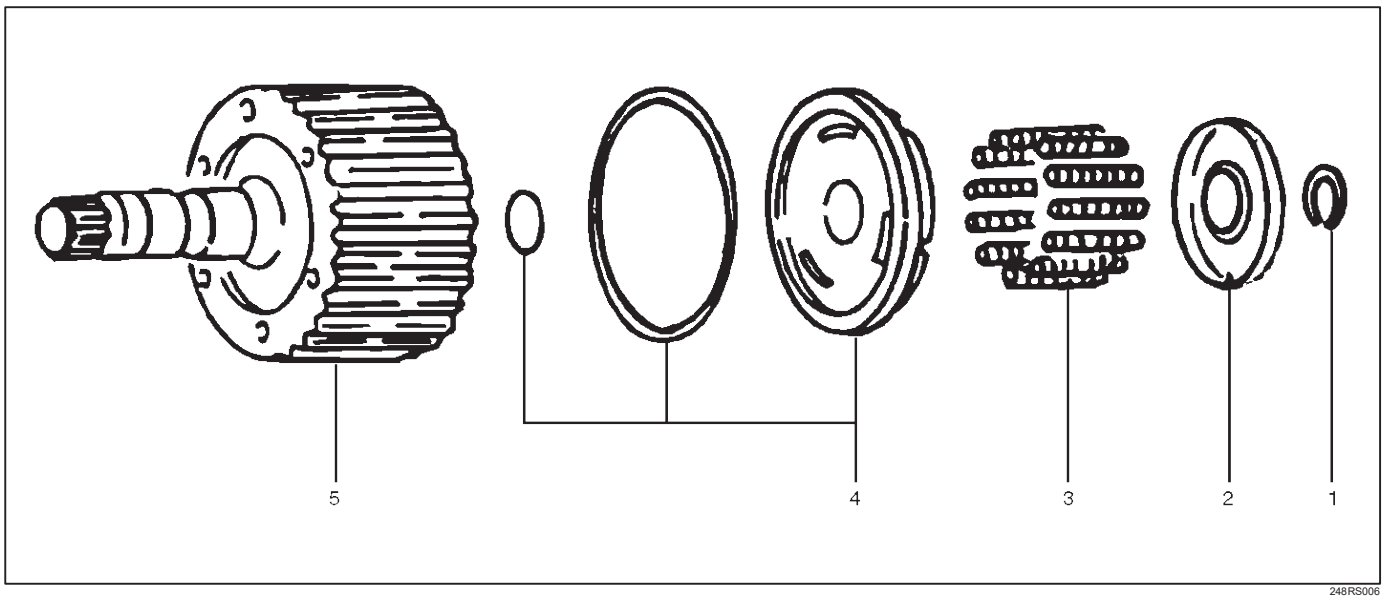
1. Place third clutch drum and intermediate shaft assembly upright, using the overdrive internal gear as a support.
2. Install third clutch spring cushion plate (7), bevel face down.
3. Install third clutch plates (6) into third clutch drum assembly (8). Start with the steel clutch plate and alternate with lined plates.
4. Install thrust washer (5), bearing (4), and retaining washer (3).
5. Fully engage the hub splines of the input sun gear and sprag unit assembly (2) into the third clutch inner tangs.
   - Simultaneously rotate the outer sprag race to engage into the third clutch drum assembly (8).
6. Place J-38450-A blades between the retaining ring and the third clutch drum apporximately (five) notches apart, and one blade at each end of the retaining ring (1). Push down on sprag assembly until the assembly is seated into the third clutch drum assembly (8).
7. Remove the tool blades and engage retaining ring into groove of third clutch drum.



248RX002

Third Clutch

Disassembled View



248RS006

Legend

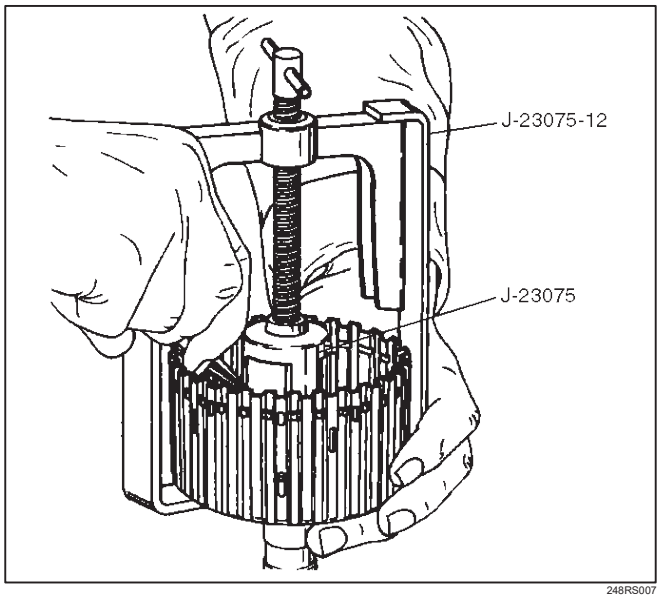
(1) Retaining Ring
(2) Spring Seat
(3) Springs
(4) Piston Assembly
(5) Third Clutch Drum

Disassemble

1. Compress spring seat using the J–23075 spring compressor and J–23075–12 adapter tool.

NOTE: Do not over–stress the springs and seat. This will cause damage to the spring seat.

- Remove the tool.
- Remove retaining ring (1).



248RS007

2. Release the spring seat (2).

NOTE: Do not let the spring seat catch in the ring groove.

- Remove spring seat (2) and springs (3).

3. Remove piston assembly (4) from third clutch drum (5).

Inspection And Repair

Visual check:

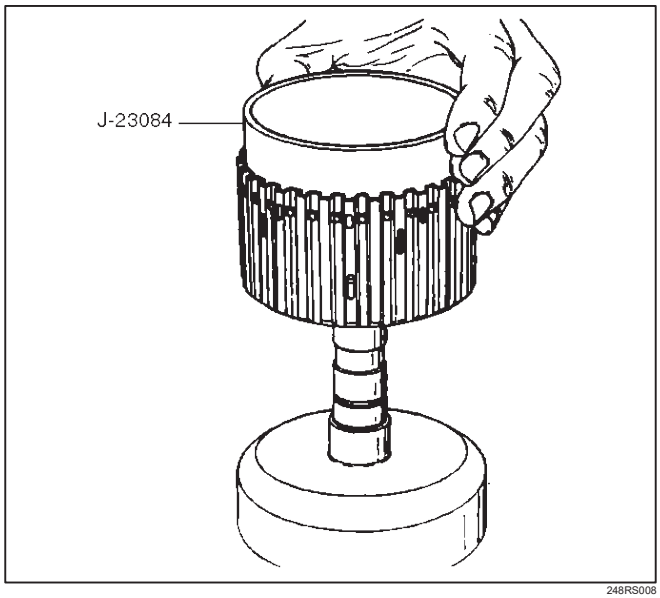
If any damage, deformation or wear is found, replace the damaged part.

Operation check:

Shake the piston and listen for check ball movement indicates proper check ball operation. Replace the piston if the check ball is missing or falls out.

Reassembly

1. The lip of the piston seal must point toward the front of the transmission. Lubricate the seal lip with transmission fluid.
   - Install piston assembly (4) into the third clutch drum (5). Use the J–23084 third clutch piston installer to protect the outer seal during installation.
   - Remove the seal installer.



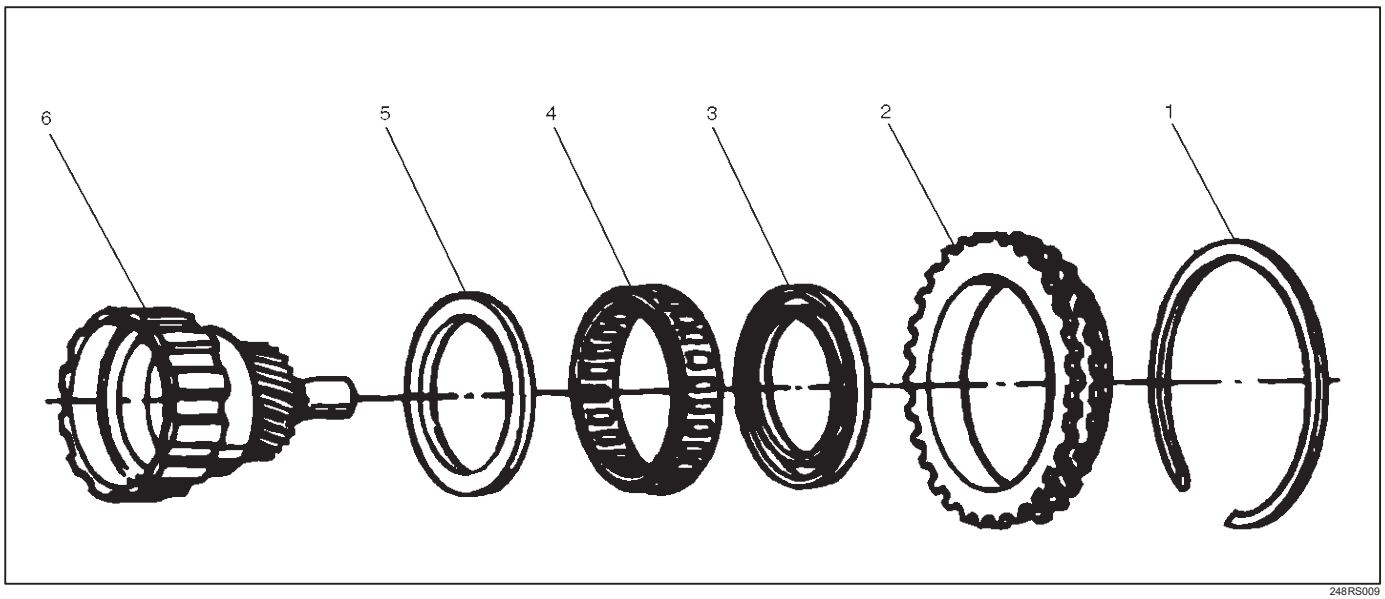
2. Install twelve springs (3) and spring seat (2).
3. Place retaining ring (1) onto spring seat.
   - Compress the piston springs, using the J–23075 piston spring compressor and J–23075–12 adapter.

CAUTION: Do not over stress the springs and seat. Do not let the spring seat catch in the ring groove. This may cause damage to the spring seat.

- Install spring seat retaining ring (1).
- Remove the piston spring compressor and adapter.

Sprag Unit

Disassembled View



248RS009

Legend

(1) Retaining Ring
(2) Sprag Outer Race
(3) Ring
(4) Sprag Assembly
(5) Ring
(6) Third Clutch Hub and Sun Gear Assembly

Disassembly

1. Remove the sprag outer race, retaining ring, and sprag assembly from the third clutch hub and sun gear assembly.
2. Remove the rings and sprag assembly from the sprag outer race.

Inspection And Repair

Visual Check:

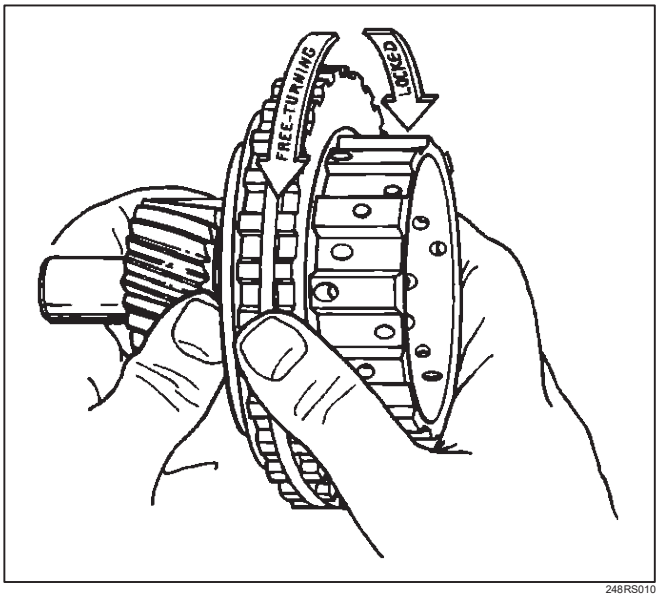
If any damage, deformation or wear is found, replace the damaged part.

Reassembly

NOTE: Flared shoulder of the sprag cage faces the sun gear. This procedure must be followed exactly to be sure that the sprag assembly is installed properly.

1. Install rings and sprag assembly onto the third clutch hub and sun gear.
2. Install sprag outer race and retaining ring assembly over the sprag cage assembly.
   - Place third clutch hub and sun gear assembly on a flat surface, sun gear facing up. Place sprag outer race and sprag assembly over the sun gear assembly, push down and turn the input sun counterclockwise at the same time.

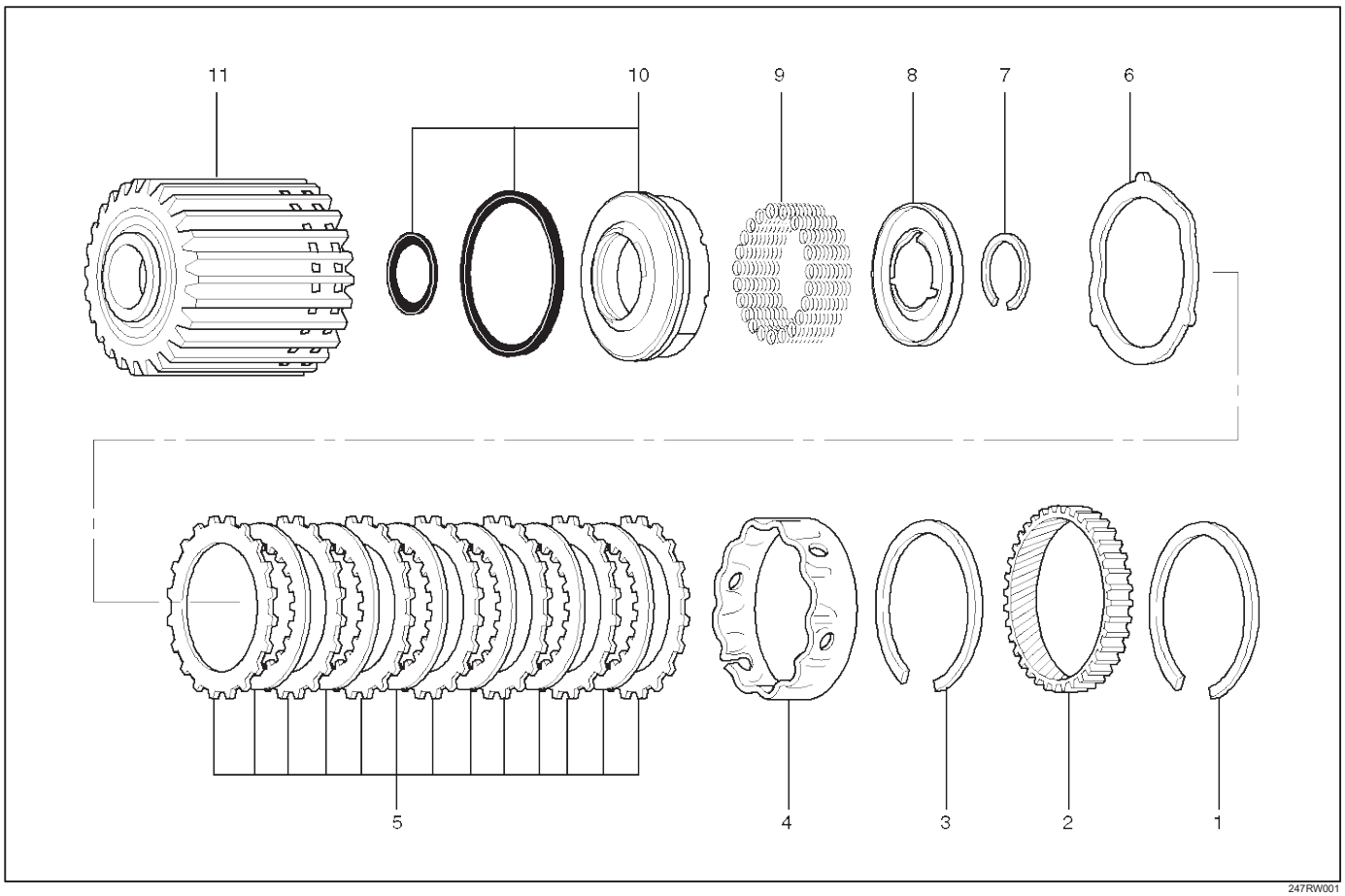
NOTE: Check correct rotation by holding the sun gear in your left hand and turning the outer race. The outer sprag race should turn freely towards you and should lock turning away from you.



248RS010

Second Clutch

Disassembled View



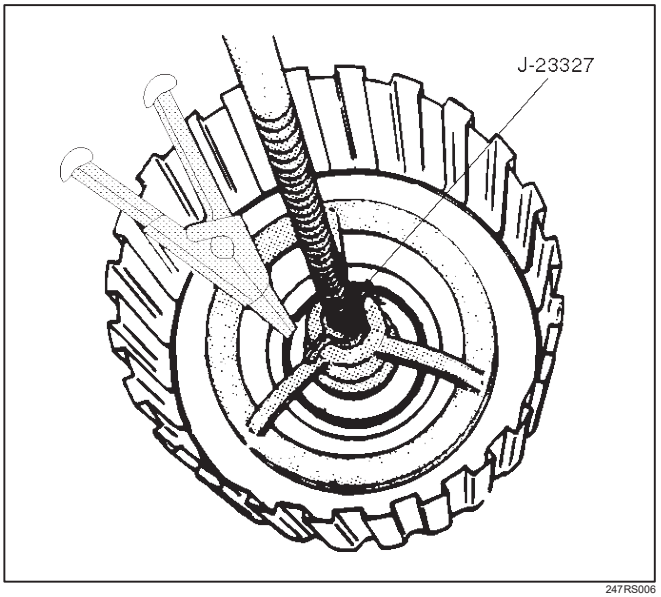
247RW001

Legend

(1) Retaining Ring
(2) Ring Gear
(3) Retaining Ring
(4) Spacer
(5) Clutch Plates
(6) Waved Washer
(7) Retaining Ring
(8) Spring Seat
(9) Springs
(10) Piston Assembly
(11) Second Clutch Drum

Disassembly

1. Remove retaining ring (1) from second clutch drum (11).
2. Remove ring gear (2), retaining ring (3), and spacer (4).
3. Remove clutch plates (5) and waved washer (6).
4. Remove retaining ring (7) using J–23327 compressor to compress the spring seat (8).
5. Remove spring seat (8), springs (9) and piston assembly (10) from second clutch drum (11).



247RS006

Inspection And Repair

Visual Check:

If any damage, deformation or wear is found, replace the damaged part.

Operation Check:

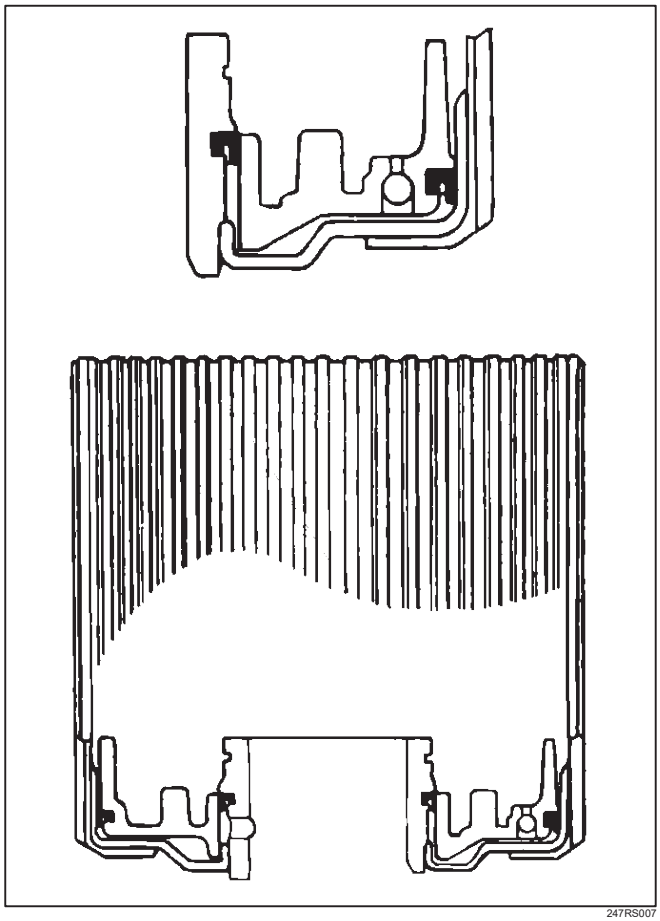
Shake the piston and listen for check ball movement. Movement indicates proper check ball operation. Replace the piston if the check ball is missing or falls out.

Reassembly

1. Install piston assembly (10) into the second clutch drum (11).
   - Lubricate the lip seal with transmission fluid. Use the J–23080–A second clutch piston installer to protect the outer piston lip seal.

NOTE: Lip of the seal should point toward front of transmission.

- Remove the installer.



2. Install twenty–two piston springs (9) and spring seat (8) on the second clutch piston (10). Place retaining ring (7) onto spring seat.
   - Use the J–23327 compressor to compress the piston springs.

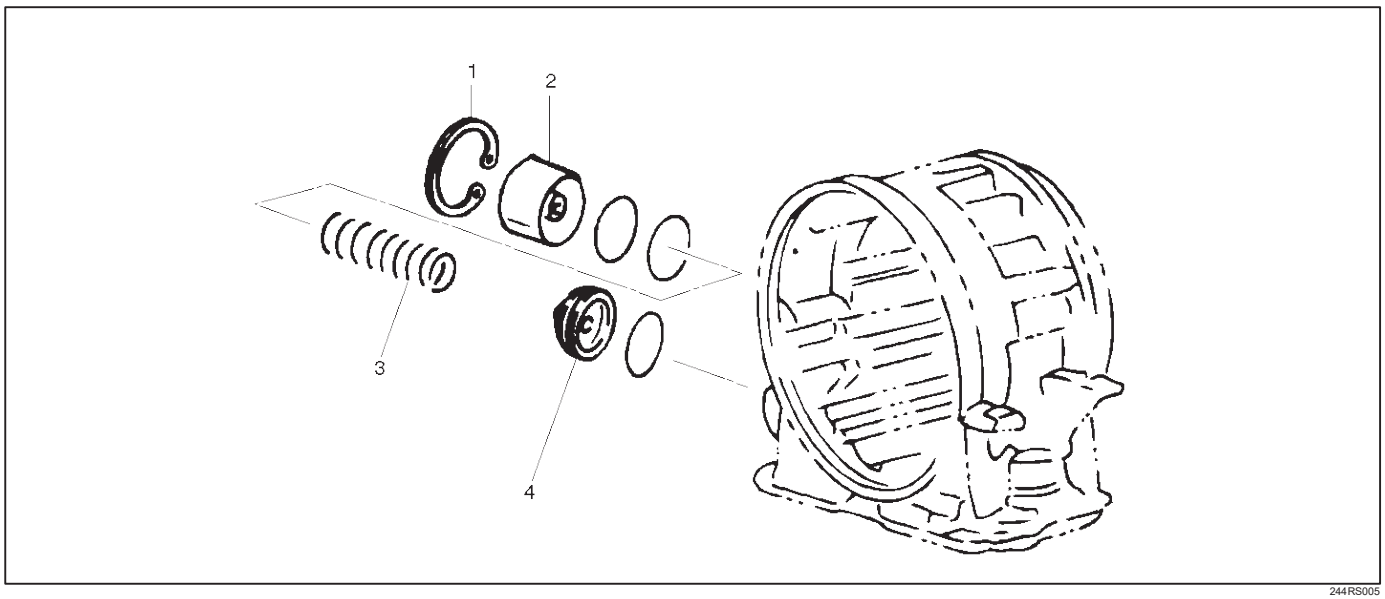
NOTE: Do not let spring seat catch in ring groove.

- Remove the compressor.

3. Install waved plate (6) and clutch plates (5). Start with a steel plate and alternate with lined plates.
   - Align second clutch inner tangs.
4. Install spacer (4), with the fluted end toward clutch plates.
5. Install retaining ring (3), ring gear (2) and retaining ring (1).

3–4 Accumulator Piston

Disassembled View

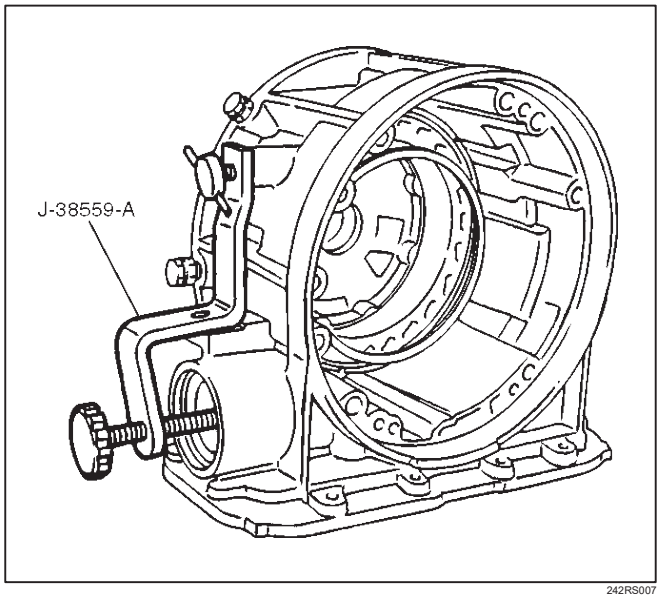


244RS005

Legend
(1) Snap Ring
(2) Cover
(3) Spring
(4) Piston Assembly

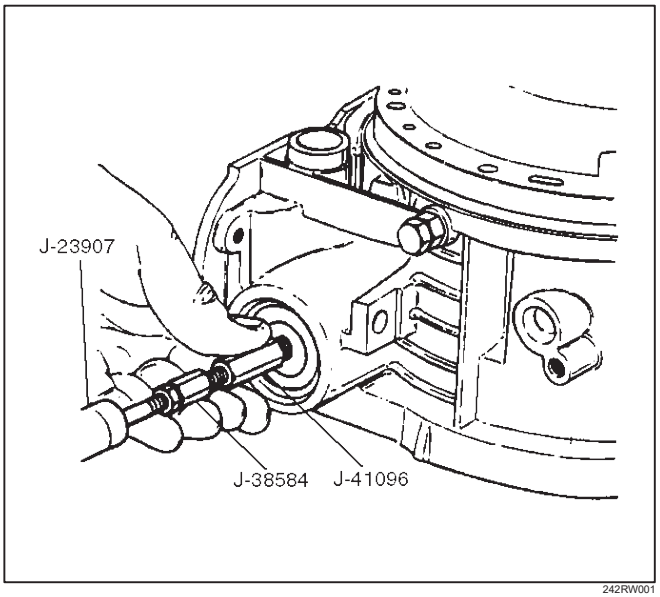
Disassembly

1. Install the J–38559–A cover compressor on adapter case.
   - Compress piston cover then remove snap ring.



242RS007

2. Install the J–41096 cover remover and J–38584 adapter to center hole of cover.
   - Use the J–23907 slide hammer to remove cover.
3. Remove spring and piston assembly.



242RW001

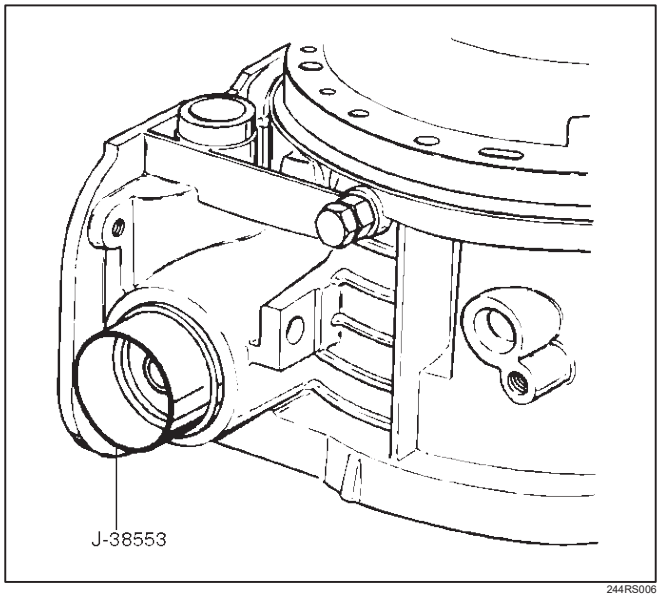
Inspection And Repair

Visual Check:

If any damage, deformation or wear is found, replace the damaged part.

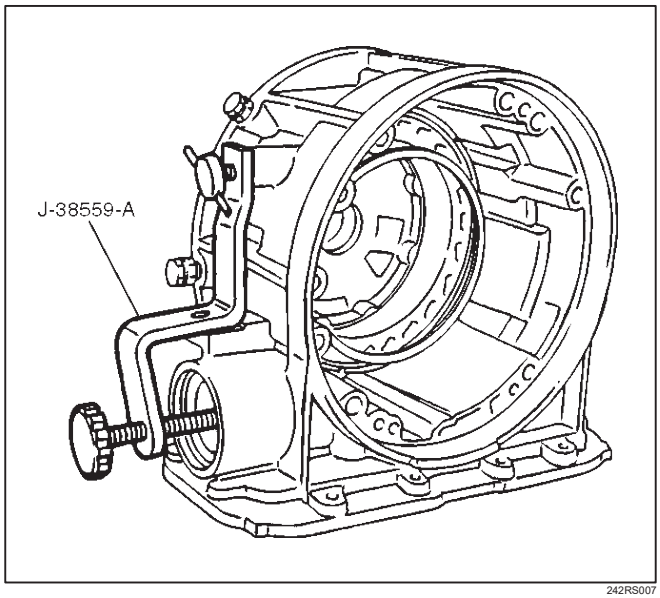
Reassembly

1. Place the J–38553 piston fitter into adaptor case and push the piston into position, using suitable diameter tube.
   - Remove the piston fitter.



244RS006

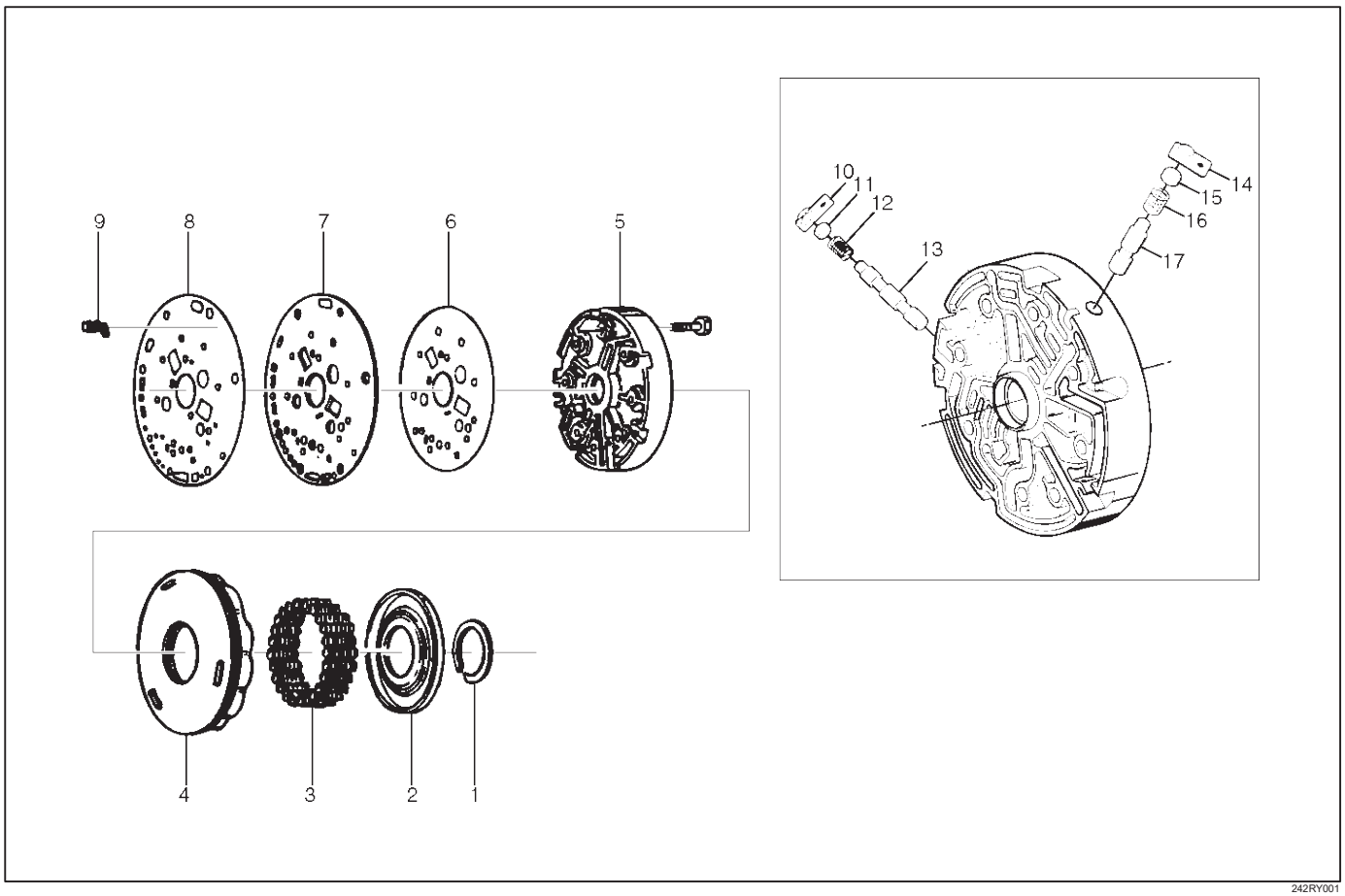
2. Install spring and cover.
3. Install snap ring, using the J–38559–A compressor tool.
   - Install snap ring in groove.
   - Remove the compressor tool.



242RS007

Reverse Clutch Piston And Center Support

Disassembled View



Legend

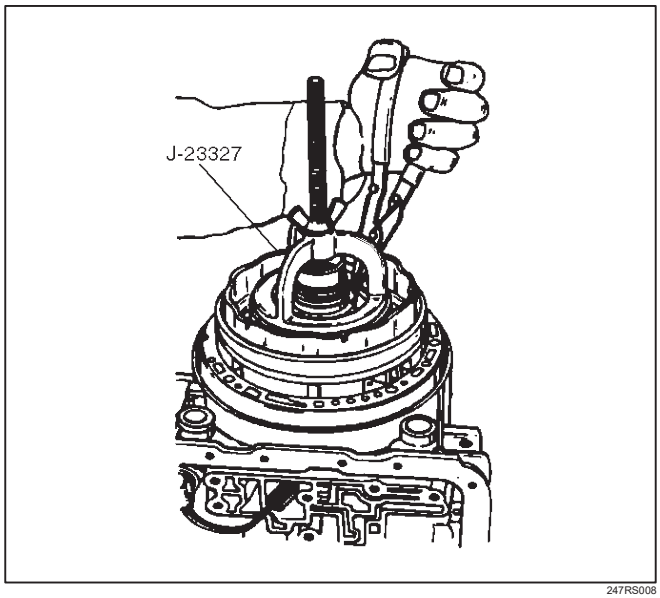
(1) Retaining Ring
(2) Spring Seat
(3) Springs
(4) Piston Assembly
(5) Center Support
(6) Gasket
(7) Transfer Plate
(8) Gasket
(9) Restrictor
(10) Retainer Plate
(11) Plug
(12) Spring
(13) Overrun Lock Out Valve
(14) Retainer Plate
(15) Plug
(16) Spring
(17) Reverse Lock Out Control Valve

Disassembly

1. Install the J–23327 compressor tool on spring seat, then compress the spring seat.
   - Remove retaining ring (1).

NOTE: Do not over–stress the springs and seat, as this will cause damage to the spring seat.

- Remove the compressor tool.



2. Remove spring seat (2) and springs (3).
3. Remove piston assembly (4).
4. Remove 8 bolts from center support (5), then remove center support (5) from adapter case.
5. Remove gasket transfer plate/outer support (6), center support transfer plate (7), and gasket transfer plate/adapter case (8).
6. Remove restrictor (9) from adapter case housing.
7. Remove retainer plate (10), plug (11), spring (12), and overrun lock out valve (13) from center support (5).
8. Remove retainer plate (14), plug (15), spring (16) and reverse lock out valve (17) from center support (5).

Inspection And Repair

Visual Check:

If any damage, deformation or wear is found, replace the damaged part.

Reassembly

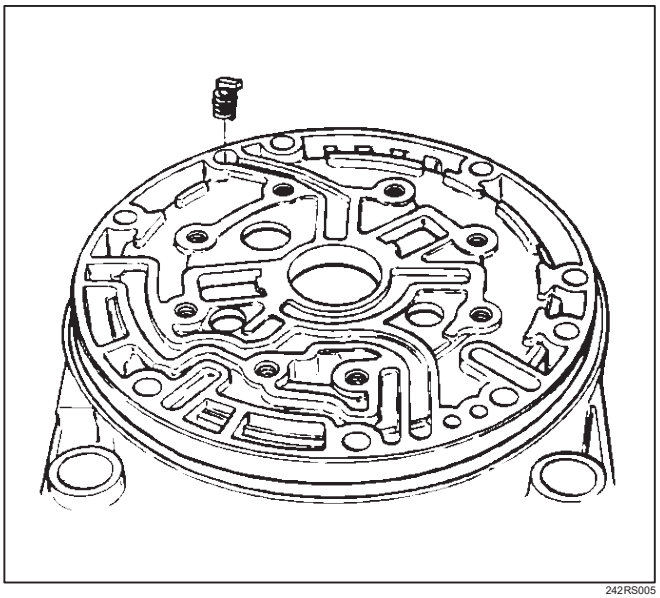
1. Install reverse lock out valve (17) and spring (16) to center support.

NOTE: Ensure correct assembly of valve. The spring should be located over the long small diameter end.

2. Install plug (15) and retainer plate (14).
3. Install overrun lock out valve (13) and spring (12) to center support.

NOTE: Ensure correct assembly of valve. The spring should be located over the long small diameter end.

4. Install plug (11) and retainer plate (10).
5. Place restrictor (9) in the lube overdrive channel in the adapter case housing.



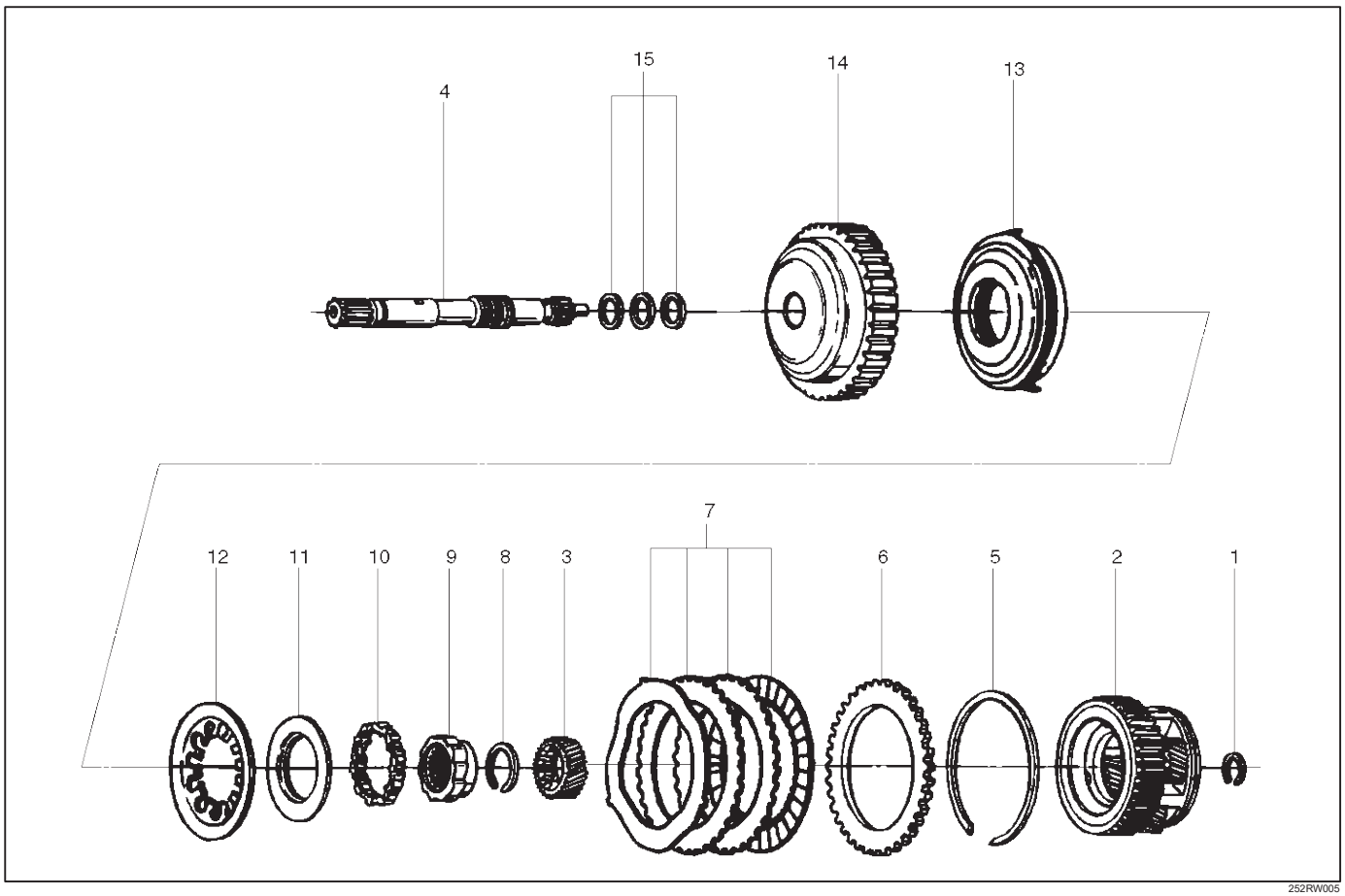
6. Install gasket transfer plate/adapter case (8), center support transfer plate (7), and gasket transfer plate/center support (6).
7. Install center support (5) with 8 bolts.

Torque : 25 N•m (18 lb ft)

8. Install piston assembly (4) into center support (5).
9. Install twenty four springs (3), spring seat (2), and retaining ring (1).
   - Install the J–23327 compressor and compress spring seat (2) and springs (3), then seat snap ring (1) in groove.
   - Remove the tool.

Overrun Clutch And Turbine Shaft

Disassembled View

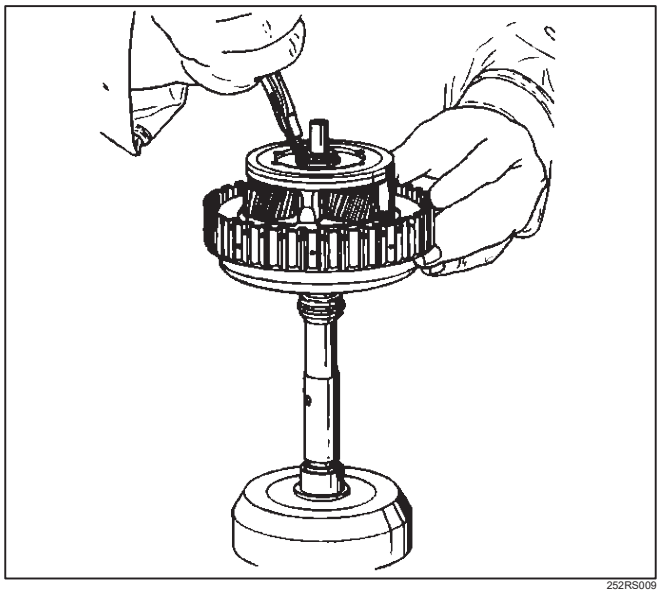


Legend

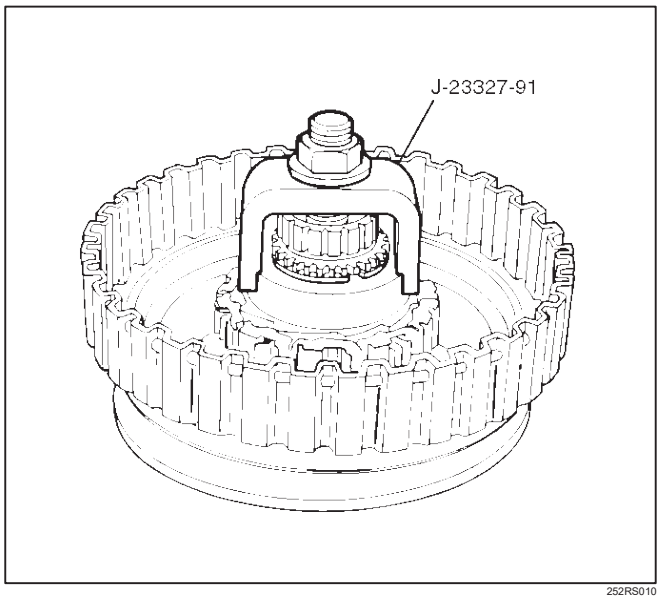
(1) Snap Ring
(2) Overdrive Carrier Assembly
(3) Sun Gear
(4) Turbine Shaft
(5) Snap Ring
(6) Backing Plate
(7) Clutch Plates
(8) Snap Ring
(9) Overrun Roller Clutch Cam
(10) Roller Clutch Assembly
(11) Overrun Clutch Release Spring Retainer
(12) Diaphragm Spring
(13) Piston Assembly
(14) Overrun Clutch Drum
(15) Turbine Shaft Seal Rings

Disassembly

1. Position overrun clutch assembly upright, using the overdrive internal gear as a support.
   - Remove snap ring (1).


252RS009

2. Remove overdrive carrier assembly (2), sun gear (3) and turbine shaft (4).
3. Remove snap ring (5), backing plate (6), and clutch plates (7).
4. Compress diaphragm spring with the J–23327–91 compressor, then remove snap ring (8).



252RS010

5. Remove overrun roller clutch cam (9) and roller clutch assembly (10).
6. Remove overrun clutch release spring retainer (11) and diaphragm spring (12).
7. Remove piston assembly (13) from overrun clutch drum (14).
8. Remove turbine shaft seal rings (15).

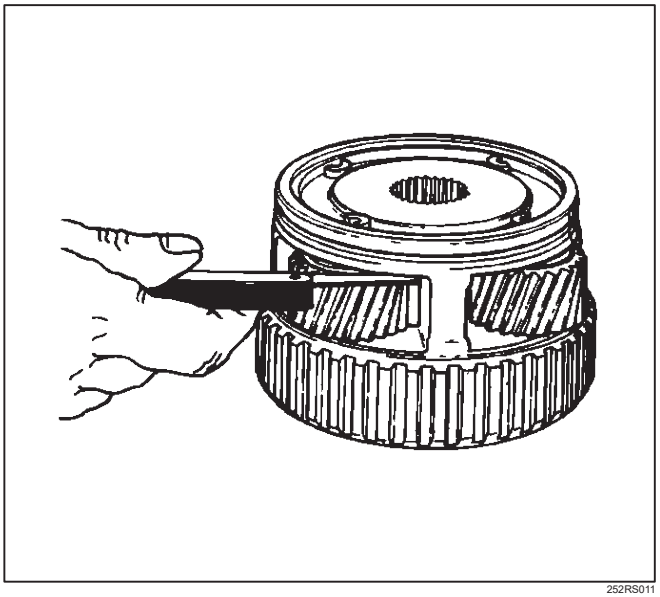
Inspection And Repair

Overdrive Carrier Check

- Check pinion end play with a feeler gauge.

Clearance: 0.24mm–0.64mm (0.0094in–0.025in)

If clearance is outside specified value, replace overdrive carrier assembly.

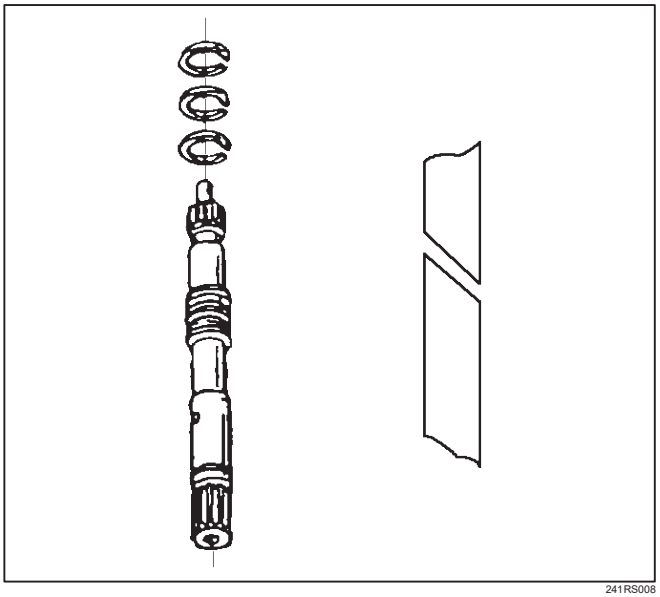

252RS011

Visual Check:

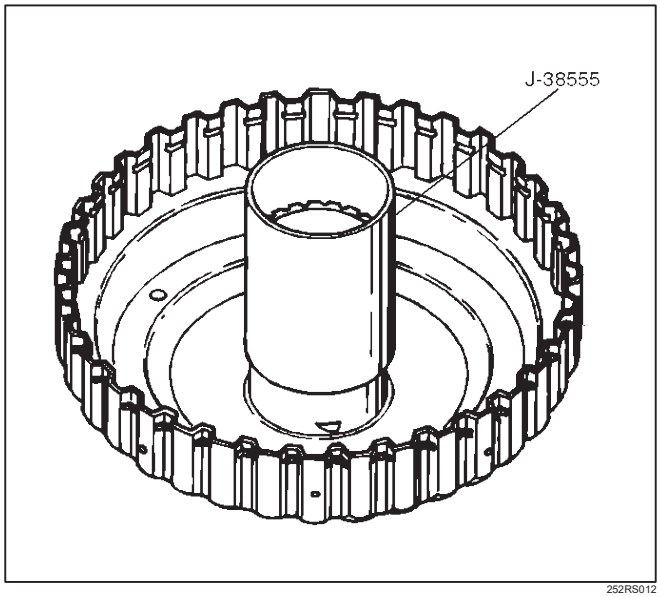
If any damage, deformation or local wear is found, replace the damaged part.

Reassembly

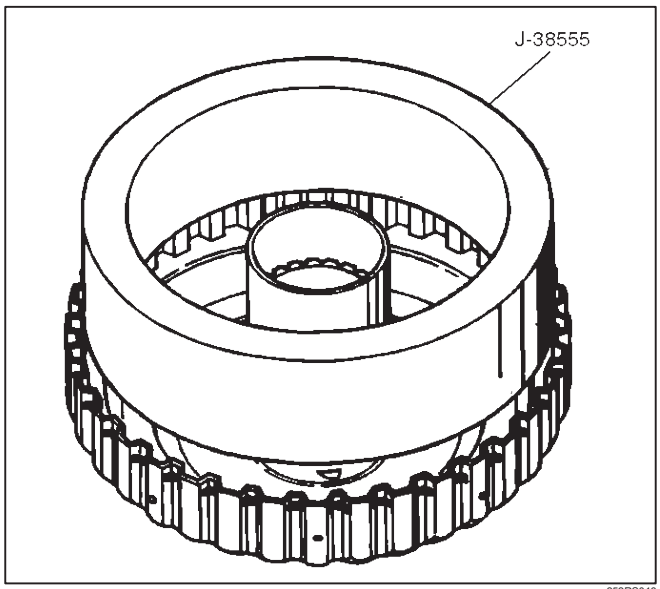
1. Install turbine shaft seal rings (15) with grease (petroleum jelly).


241RS008

2. Install the J–38555 inner installer on the drum (14).
   - Pre–install piston assembly into J–38555 outer installer.
   - Install overrun clutch piston assembly (13). Use the outer installer while pushing piston into drum (14).
   - Remove the installer.



252RS012



252RS013

3. Install diaphragm spring (12).
4. Install overrun clutch release spring retainer (11) (lip faces upwards), overrun roller clutch assembly (10), and cam (9).
5. Place snap ring loosely on spring retainer.
   - Hold the J–23327–91 compressor in a vise and compress piston return spring with compressor.
   - Set snap ring (8) in ring groove.
   - Remove the compressor.
6. Install clutch plates (7), start with steel plate and alternate with lined plates.
7. Install backing plate (6).
8. Install snap ring (5).
9. Install overdrive sun gear with countersink pointing downwards.
10. Install the overdrive carrier assembly (2).

NOTE: Turn the assembly in a counter–clockwise direction only until roller clutch enters the outer race. After installation, rotate the assembly and listen for loose rollers.

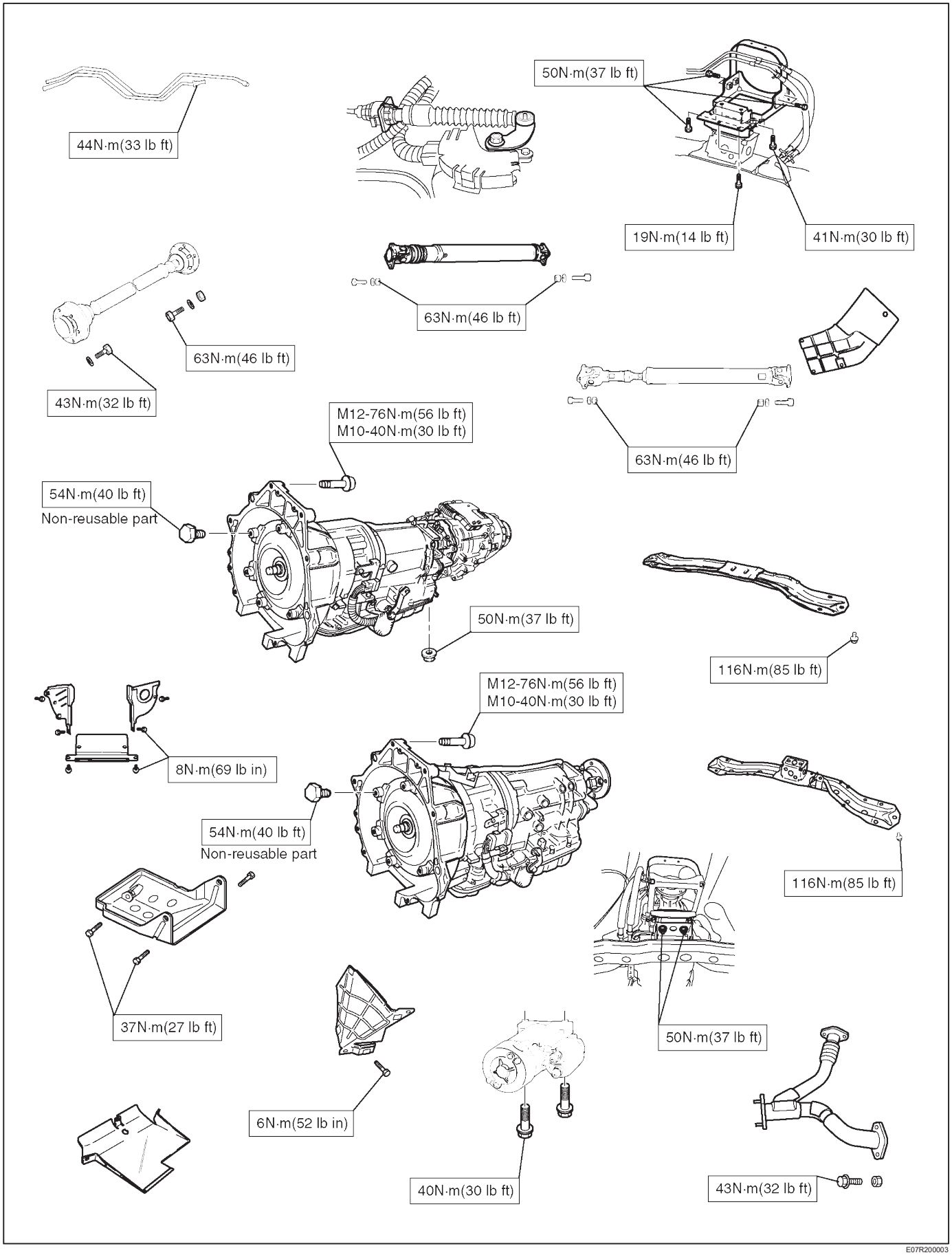
11. Install turbine shaft (4) and snap ring (1).

Main Data And Specification

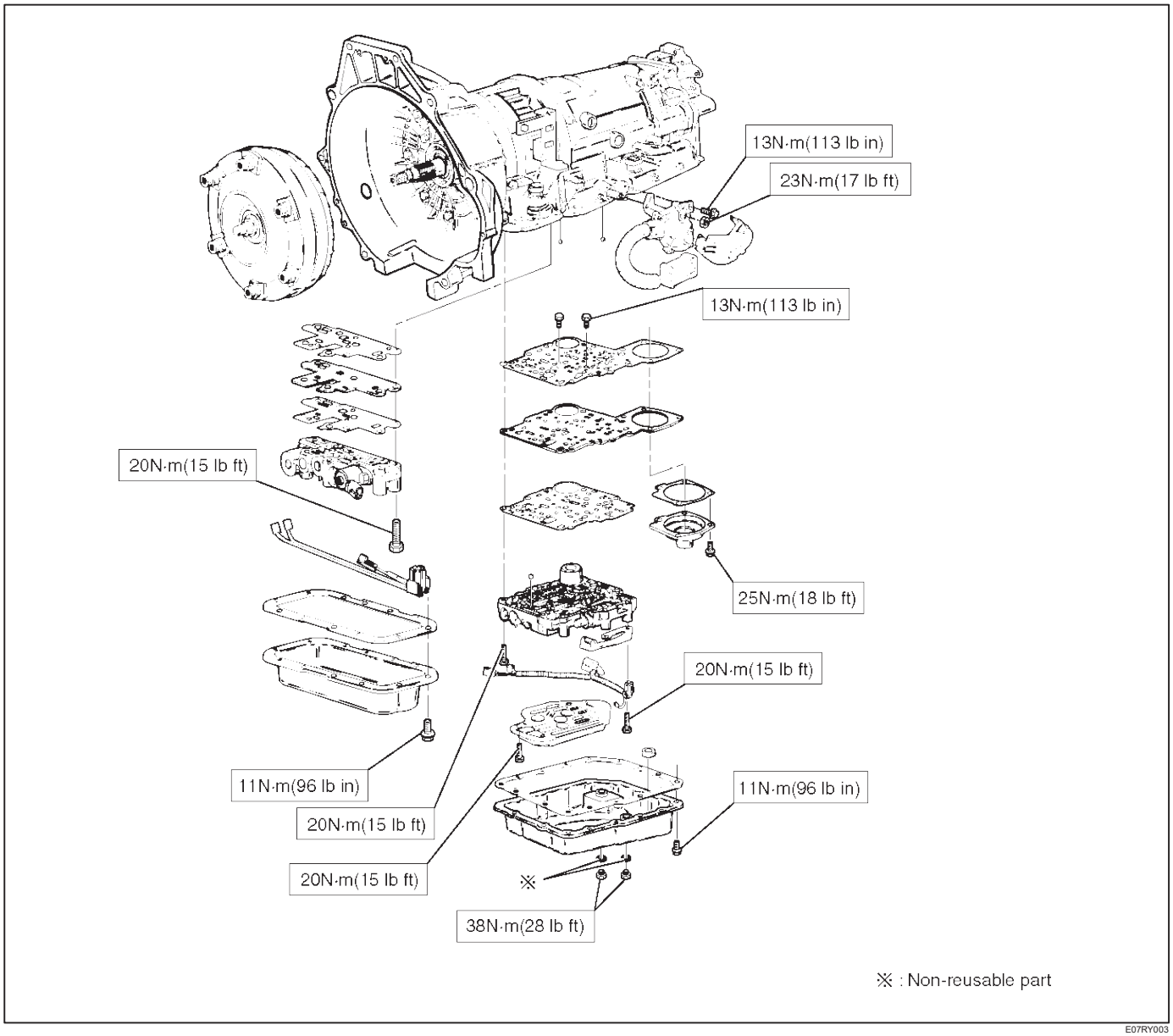
General Specifications

				Remarks
Model			THM 4L30–E	
Engine			V6 3.5L 6VE1	DOHC
Type			Automatic four speed overdrive in 4th gear lock–up clutch torque converter	
Control systems	Shift control		Hydraulic	
	Shift pattern		Electronic	
	Shift quality		Electronic	
	Lock–up clutch		Electronic	
Gear ratio	1st		2.856	
	2nd		1.618	
	3rd		1.000	
	4th (O/D)		0.723	
	Reverse		2.000	
Gear set			Noiseless, high torque capability	
Oil used	Name		ATF DEXRON®–III	
	Q'ty liter (qt)		8.6 (9.1)	
Torque converter			2,100 ± 150	Stall speed (rpm)
	Reverse clutch	RC	4	Number of discs
	Second clutch	C2	6	
	Third clutch	C3	6	
	Brake band		Double wrap	
	Fourth clutch	C4	2	Number of discs
	Overrun clutch	OC	1	
	Overdrive	OFW	10	Number of rollers
	Principal	PFW	26	Number of sprags
	Ravigneaux planetary gear set	Input sun gear	30	Number of teeth
		Pinion gear	19	
		Long pinion	23	
		Ring gear	90	
		Long pinion	19	
		Output sun gear	46	
	Overdrive planetary gear set	Sun gear	31	
		Pinion gear	24	
		Ring gear	81	

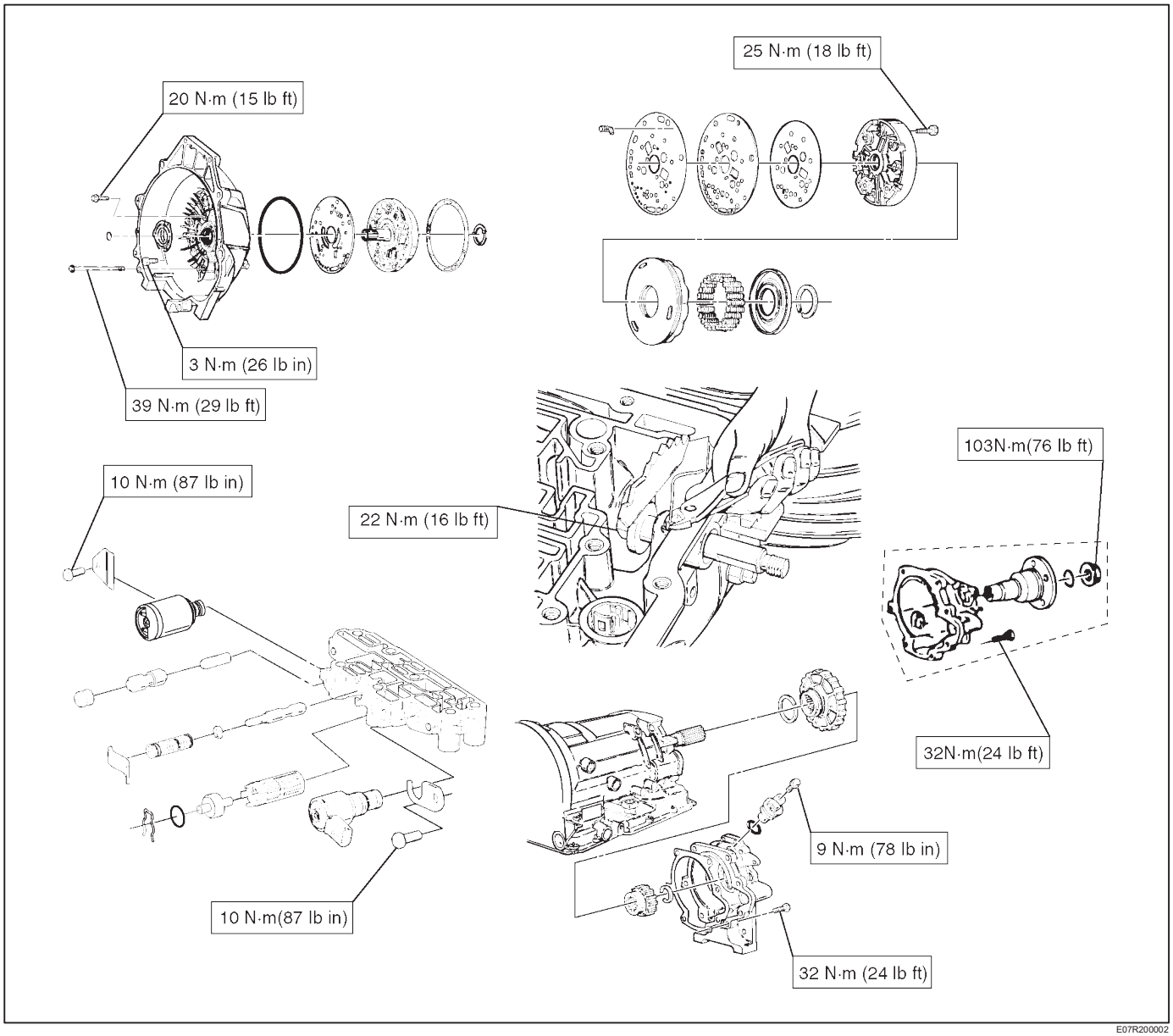
Torque Specifications



E07R200003


13N·m(113 lb in)
23N·m(17 lb ft)
13N·m(113 lb in)
20N·m(15 lb ft)
25N·m(18 lb ft)
20N·m(15 lb ft)
11N·m(96 lb in)
11N·m(96 lb in)
20N·m(15 lb ft)
20N·m(15 lb ft)
※
38N·m(28 lb ft)
※ : Non-reusable part

E07RY003


25 N·m (18 lb ft)
20 N·m (15 lb ft)
3 N·m (26 lb in)
39 N·m (29 lb ft)
10 N·m (87 lb in)
22 N·m (16 lb ft)
103N·m(76 lb ft)
32N·m(24 lb ft)
9 N·m (78 lb in)
10 N·m(87 lb in)
32 N·m (24 lb ft)
E07R200002

Special Tools

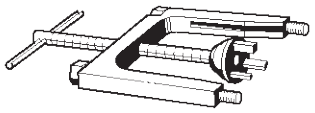
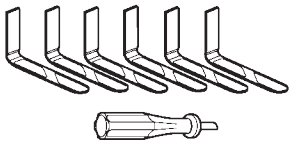
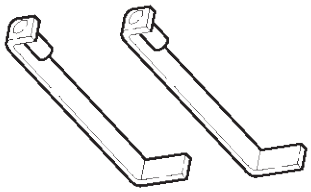
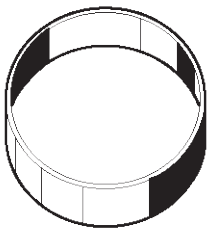
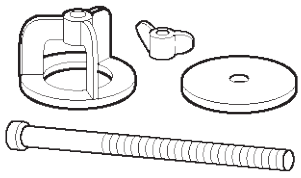
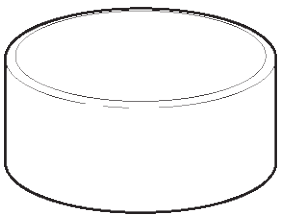
ILLUSTRATION	TOOL NO. TOOL NAME
 901RT071	**J–23075** Spring compressor (For servo piston)
 901RX007	**J–38450–A** Third clutch snap ring compressor
 901RT073	**J–23075–12** Third clutch spring compressor adapter (Use with J–23075)
 901RT074	**J–23084** Third clutch piston installer
 901RT075	**J–23327** Third clutch spring compressor
 901RT076	**J–23080–A** Second clutch piston installer

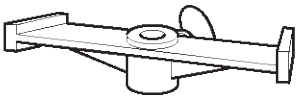
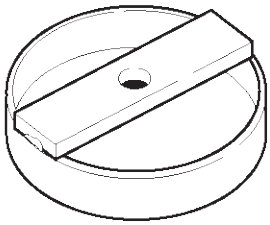
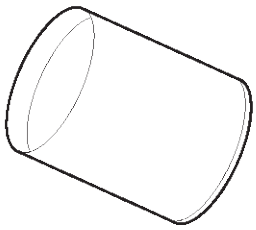
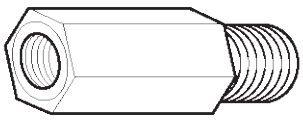
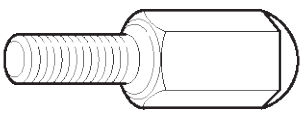
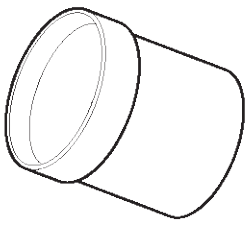
ILLUSTRATION	TOOL NO. TOOL NAME
 901RT077	**J–23085–A** Selective washer gauging tool
 901RT078	**J–23327–90** Fourth clutch spring compressor (Use with J–23327)
 901RT079	**J–38553** 3/4 Accumulator piston fitter
 901RT080	**J–41096** Cover remover (Use with J–38584)
 901RT081	**J–38584** Slide hammer adapter (Use with J–23907)
 901RT082	**J–38554** Fourth clutch piston fitter

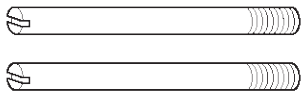
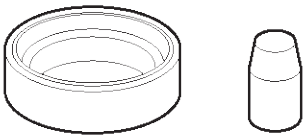
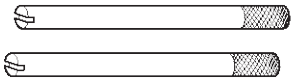
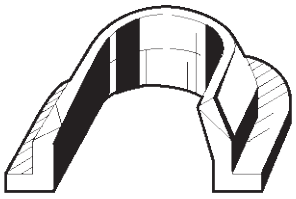
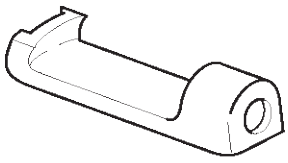
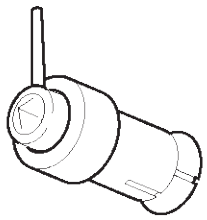
ILLUSTRATION	**TOOL NO.** TOOL NAME
 901RT083	**J–38588** Guide pins; adapter case to main case
 901RT084	**J–38555** Overrun clutch piston seal installer set
 901RT085	**J–3387–2** Guide pins; gasket and transfer plate to valve body
 901RT086	**J–25022** Turbine shaft puller (Use with J–24773–1)
 901RT087	**J–23129** Oil seal remover (Use with J–23907 and J–38584)
 901RT088	**J–38557** Oil pump centering tool

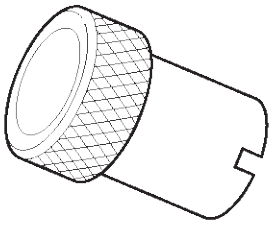
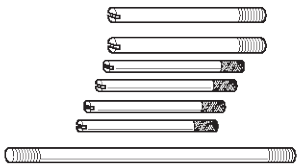
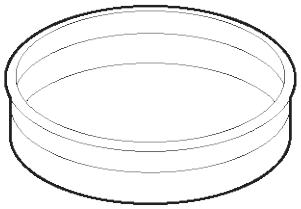
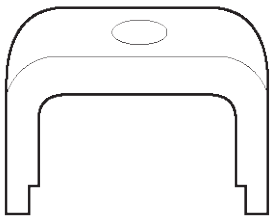
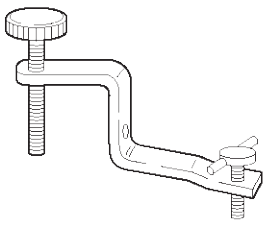
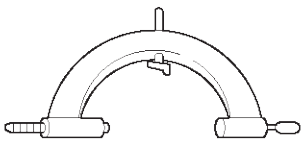
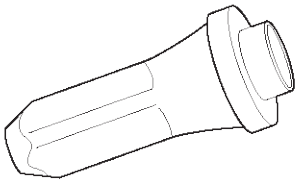
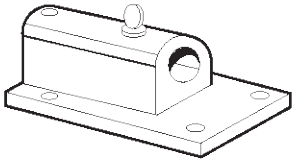
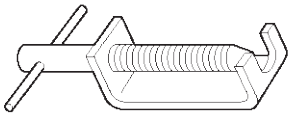
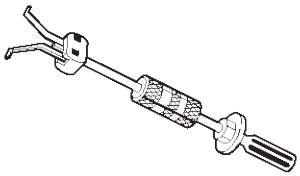
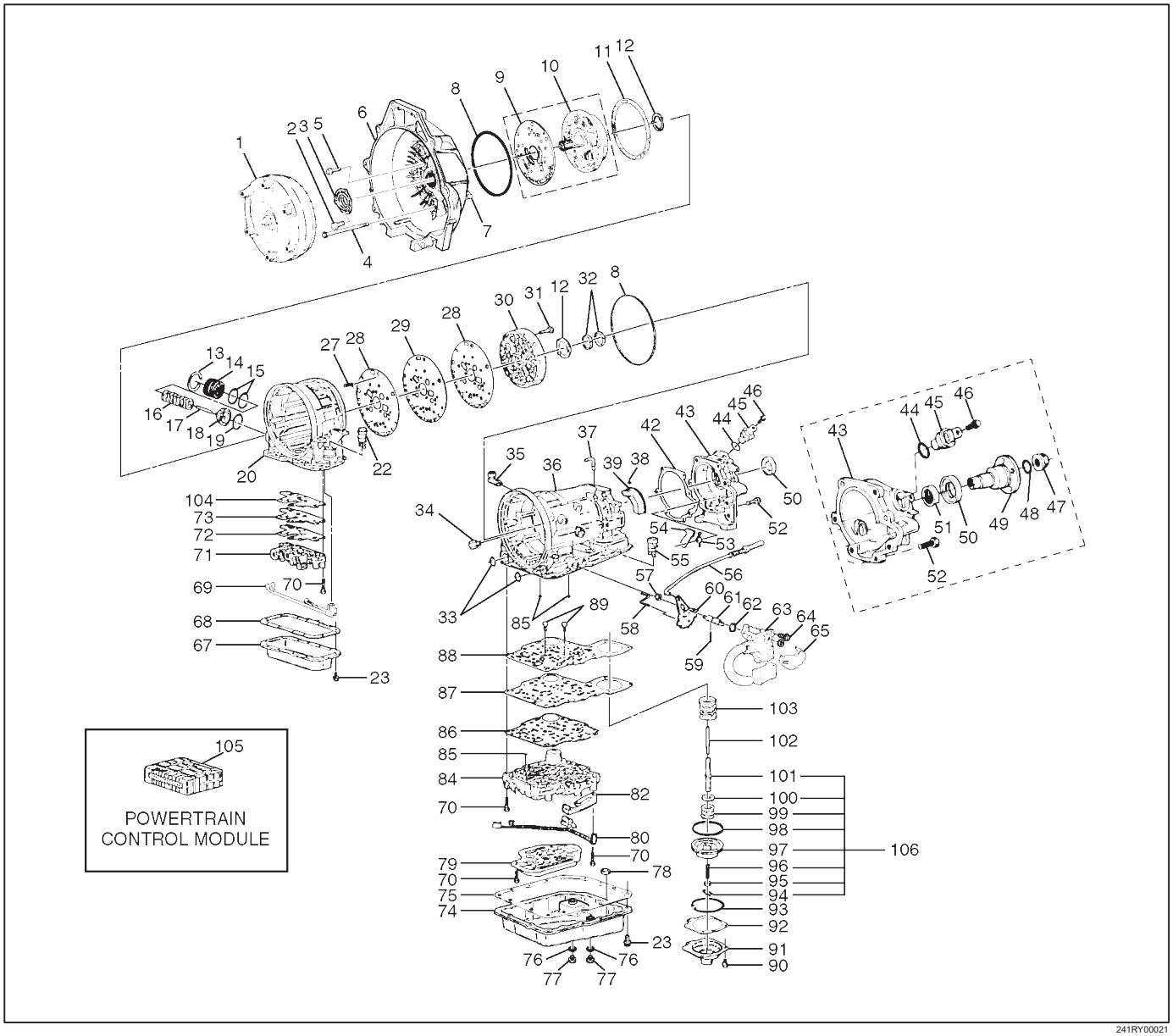
ILLUSTRATION	**TOOL NO.** TOOL NAME
 901RT089	**J–23082–01** Oil pump rotation tool
 901RT090	**J–25025–B** Guide pins; valve body to main case
 901RT091	**J–38428** Servo piston fitter
 901RT092	**J–23327–91** Overrun clutch spring compressor
 901RT093	**J–38559–A** 3/4 Accumulator piston cover compressor
 901RT094	**J–8763–02** Holding fixture

ILLUSTRATION	**TOOL NO.** TOOL NAME
 901RT095	**J–36797** A/T extension assembly oil seal installer (Inside)
 901RT096	**J–3289–20** Holding fixture base
 901RT097	**J–29770–A** Pressure gauge
 901RT098	**J–24773–1** End play fixture (Use with J–25022)
 901RT099	**J–23907** Slide hammer

4L30–E Parts List

Case And Associated Parts



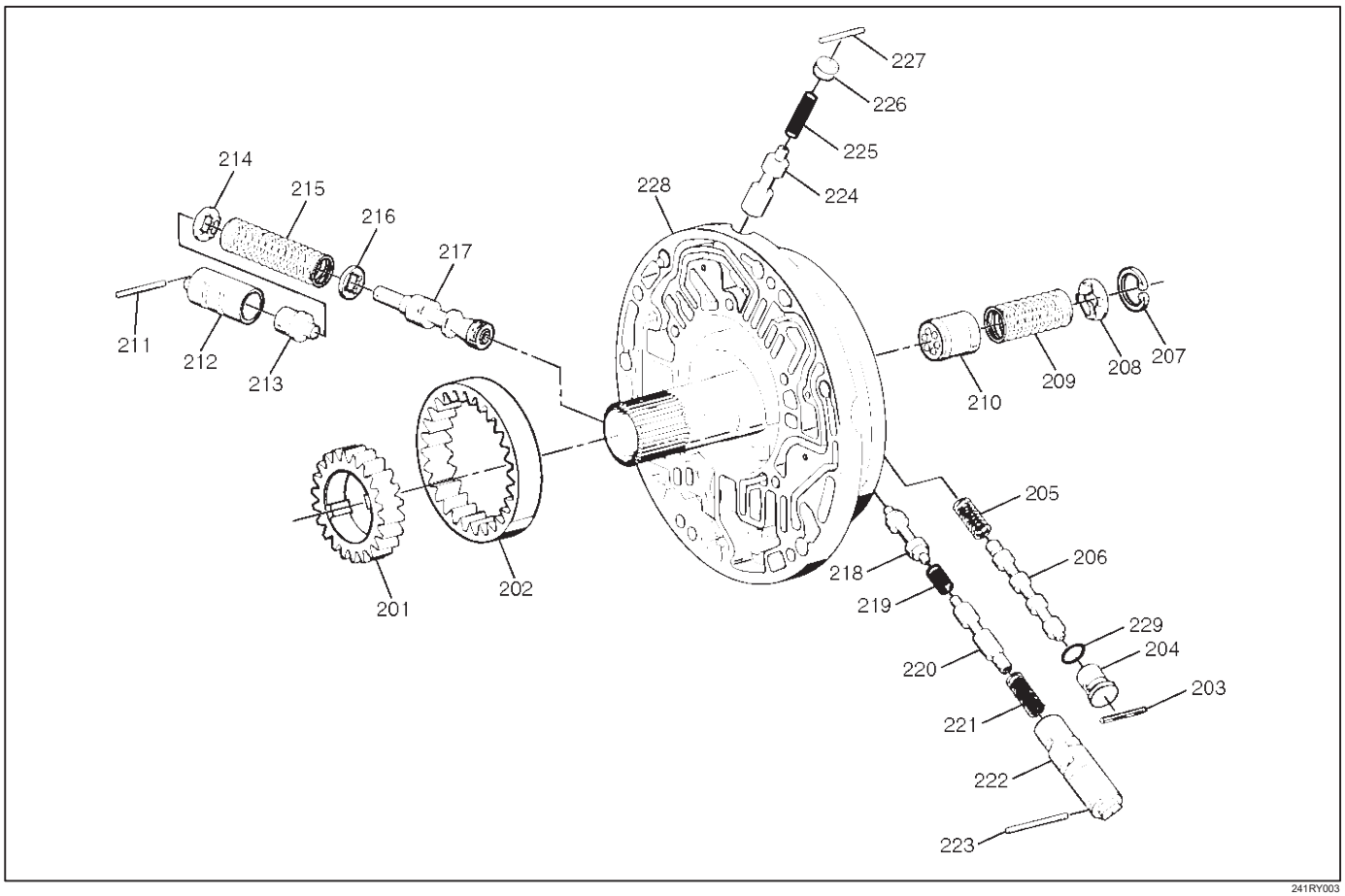
241RY00021

Legend

(1) Torque Converter
(2) Screw, Seal Ring Assembly
(3) Seal Ring Assembly, Converter Housing
(4) Screw, Converter Housing/Main Case
(5) Screw, Converter Housing/Oil Pump
(6) Housing, Converter
(7) Plug, Converter Housing
(8) Seal, O–Ring
(9) Wear Plate, Oil Pump Body
(10) Pump Assembly, Oil
(11) Gasket
(12) Washer, Thrust Selective
(13) Ring, Snap
(14) Cover, 3–4 Accumulator Piston
(15) Seal, O–Ring, 3–4 Accumulator
(16) Spring, 3–4 Accumulator Piston
(17) Pin, 3–4 Accumulator Piston
(18) Piston, 3–4 Accumulator
(19) Ring, 3–4, Accumulator Piston
(20) Case, Adapter
(22) Connector, Electrical/Adapter Case
(23) Screw, Pan
(27) Restrictor, Oil
(28) Gasket, Transfer Plate/Adapter
(29) Plate, Transfer Adapter/Center Support
(30) Support Assembly, Center
(31) Screw, Center Support
(32) Ring, Oil Seal
(33) Seal, O–Ring Main Case
(34) Fitting, Cooler
(35) Fitting Assembly, Cooler
(36) Case, Main
(37) Breather, Pipe

(38) Seal, O–Ring
(39) Reservoir
(42) Gasket, Extension Case
(43) Extension Assembly
(44) Seal, O–Ring/Speed Sensor
(45) Sensor Assembly, Speed
(46) Screw, Speed Sensor
(47) Nut, Output Shaft/Drive Flange
(48) Seal, O–Ring/Drive Flange
(49) Flange, Drive
(50) Seal, Extension Assembly
(52) Screw, Extension/Main Case
(53) Spring, Parking Pawl Lock
(54) Pawl, Parking Lock
(55) Connector, Electrical/Main Case
(56) Actuator Assembly, Parking Lock
(57) Nut, Parking Lock Lever
(58) Link, Manual Valve
(59) Pin, Spring
(60) Lever, Parking Lock and Range Selector
(61) Shaft, Selector
(62) Seal, Selector Shaft
(63) Mode Switch Assembly
(64) Screw and Conical Washer Assembly
(65) Shield, Mode Switch
(67) Pan, Bottom/Adapter Case
(68) Gasket, Bottom Pan/Adapter Case
(69) Harness Assembly, Adapter Case
(70) Screw, Valve Body
(71) Valve Body Assembly, Adapter Case
(72) Gasket, Adapter Valve Body
(73) Plate, Adapter Valve Body/Transfer
(74) Pan, Bottom/Main Case
(75) Gasket, Bottom Pan/Main Case
(76) Gasket, Oil Drain or Overfill Screw
(77) Screw, Oil Drain or Overfill
(78) Magnet, Chip Collector
(79) Filter Oil
(80) Harness Assembly, Main Case
(82) Roller and Spring Assembly, Manual Detent
(84) Valve Body Assembly, Main Case
(85) Ball, Check
(86) Gasket, Main V.B./Transfer Plate
(87) Plate, Main V.B./Transfer
(88) Gasket, Transfer/Main Case
(89) Screw, Transfer Plate on V.B.
(90) Screw, Servo Cover
(91) Cover, Servo Piston
(92) Gasket, Cover/Servo Piston
(93) Ring, Retaining Servo Piston
(94) Clip, Servo Piston
(95) Nut, Servo Screw
(96) Screw, Servo Piston
(97) Piston, Servo
(98) Seal, Ring/Servo Piston
(99) Spring, Cushion/Servo Piston
(100) Seat, Cushion Spring
(101) Sleeve, Servo Piston Adjust
(102) Rod, Apply/Servo Piston
(103) Spring, Return/Servo Piston
(104) Gasket, Adapter Case/Transfer Plate
(105) Powertrain Control Module
(106) Servo Piston Assembly

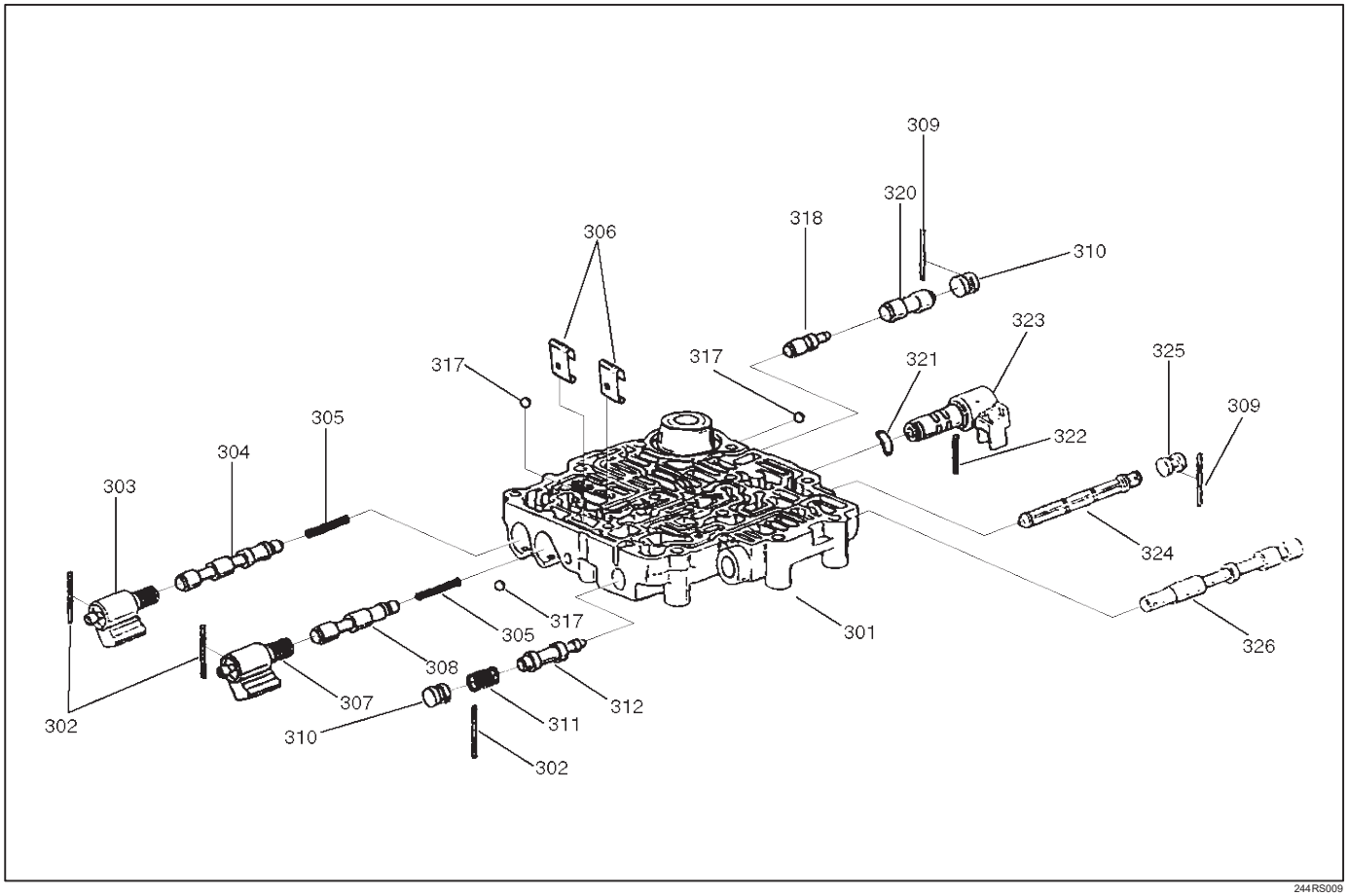
Pump Assembly



Legend

(201) Gear, Oil Pump Drive
(202) Gear, Oil Pump Driven
(203) Pin, Plug Converter Clutch Control
(204) Plug, Converter Clutch Control Valve
(205) Spring, Converter Clutch Control Valve
(206) Valve, Converter Clutch Control
(207) Ring, Snap/Throttle Signal Accumulator
(208) Seat, Spring/Throttle Signal Accumulator
(209) Spring, Throttle Signal Accumulator
(210) Piston, Throttle Signal Accumulator
(211) Pin, Boost Valve Sleeve
(212) Sleeve, Boost Valve
(213) Valve, Boost
(214) Seat, Spring/Pressure Regulator Valve
(215) Spring, Pressure Regulator Valve
(216) Seat, Spring/Pressure Regulator Valve
(217) Valve, Pressure Regulator
(218) Isolator Valve
(219) Spring, Isolator
(220) Valve, Converter Clutch Regulator
(221) Spring, Converter Clutch Regulator
(222) Sleeve, Converter Clutch Regulator
(223) Pin, Retainer Sleeve
(224) Valve, Enable
(225) Spring, Enable Valve
(226) Spring Guide, Enable Valve
(227) Pin, Enable Valve
(228) Pump Assembly
(229) Seal Ring, Plug

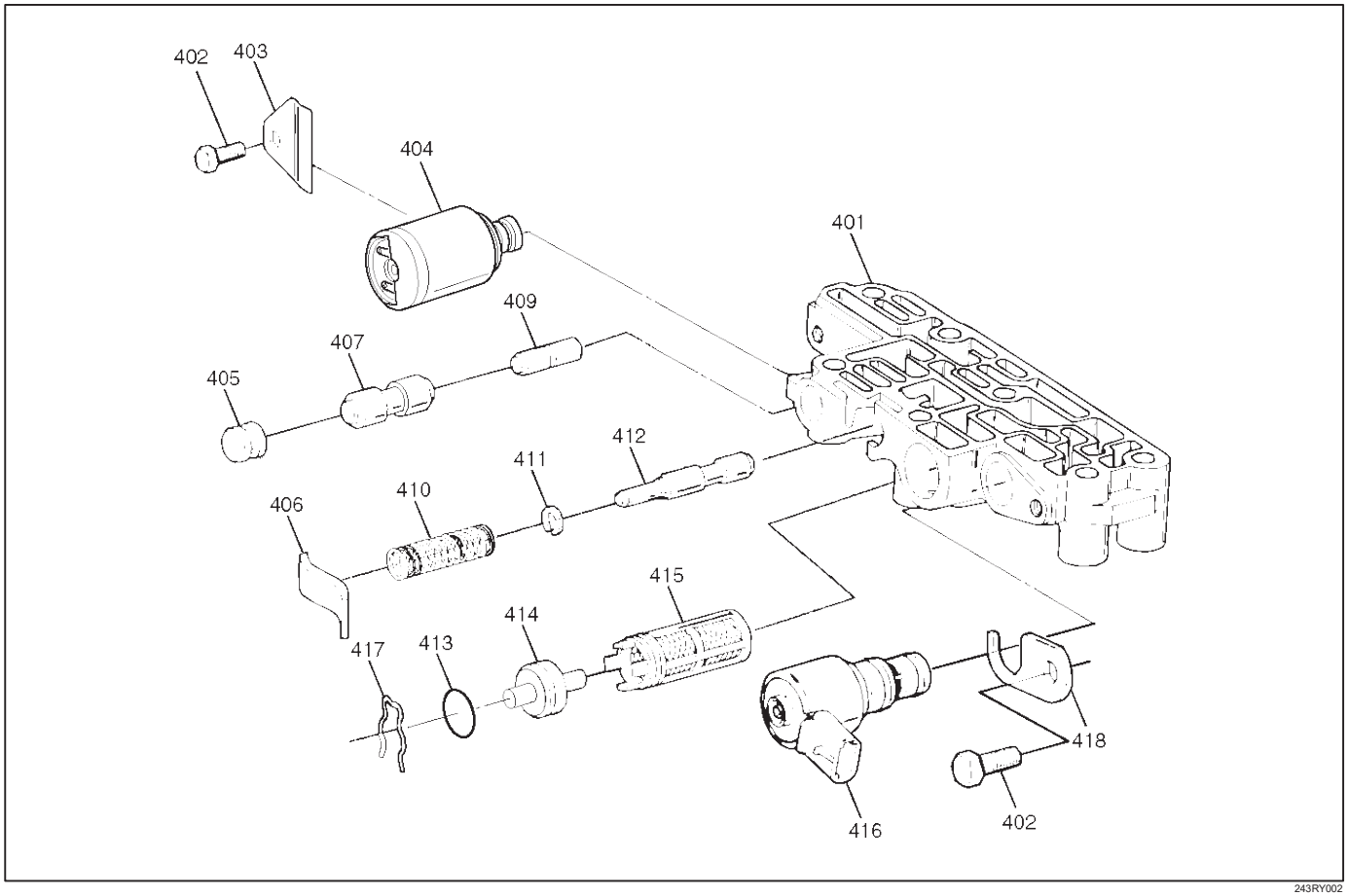
Valve Body Assemblies



244RS009

Legend

(301) Body, Valve Main Case
(302) Pin, Spring
(303) Solenoid Assembly, ON/OFF N.C.
(304) Valve, 1–2 and 3–4 Shift
(305) Spring, 1–2 and 3–4 (2–3) Shift
(306) Retainer, Valve
(307) Solenoid Assembly, ON/OFF N.O.
(308) Valve, 2–3 Shift
(309) Pin, Spring
(310) Plug, Valve Bore
(311) Spring, Valve Low Pressure Control
(312) Valve, Low Pressure Control
(317) Ball, Check
(318) Valve, 1–2 Accumulator Control
(320) Valve, 1–2 Accumulator
(321) Washer, Waved PWM Solenoid
(322) Pin, Solenoid PWM
(323) Solenoid Assembly, Band Control PWM
(324) Screen Assembly, PWM Solenoid
(325) Plug, Screen
(326) Valve, Manual

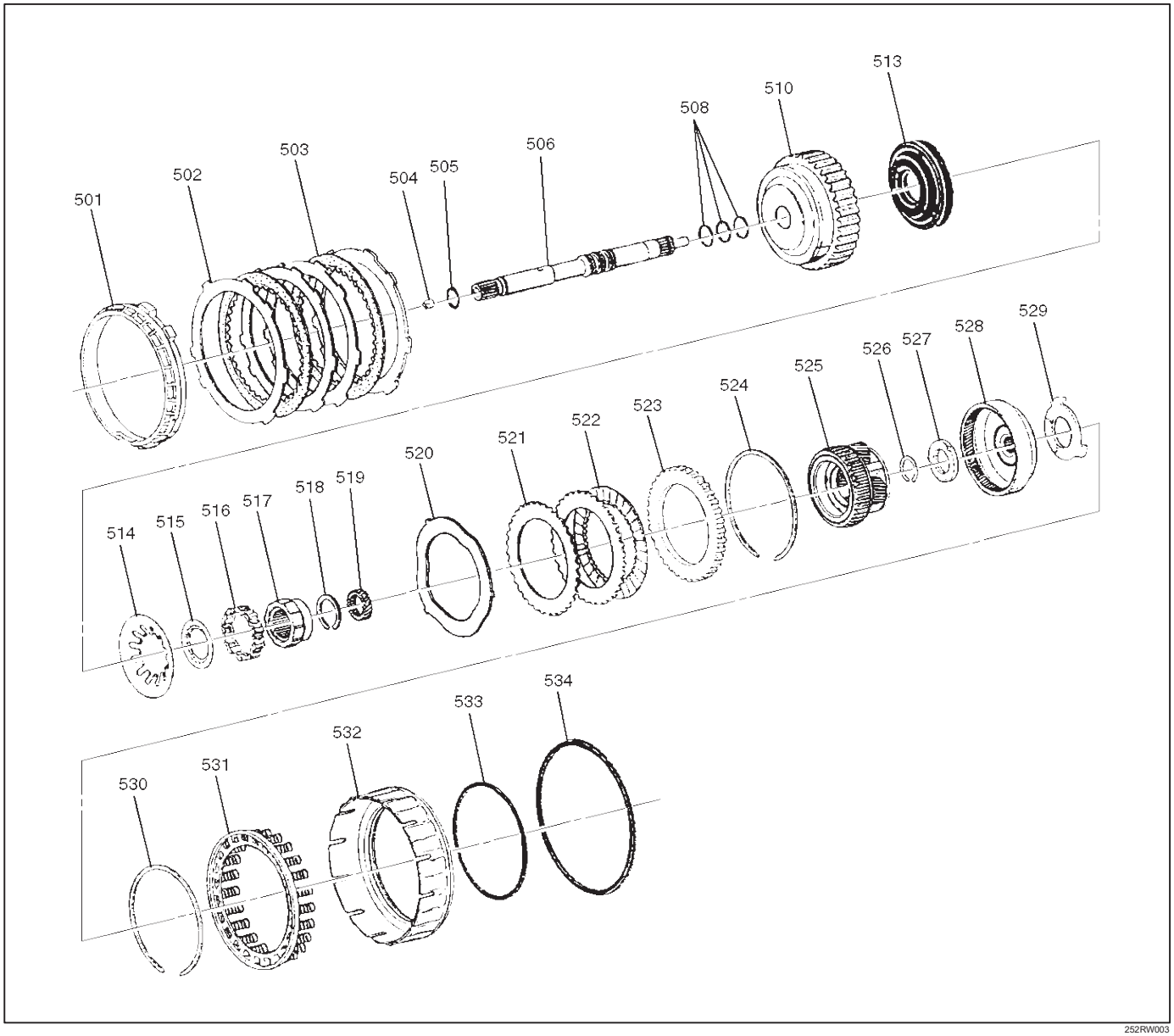


243RY002

Legend

(401) Body, Valve/Adapter Case
(402) Screw, Solenoid Force Motor
(403) Retainer, Force Motor
(404) Solenoid, Force Motor
(405) Plug, 3–4 Accumulator
(406) Plug and Spring Retainer
(407) Valve, 3–4 Accumulator
(409) Valve, 3–4 Accumulator Control
(410) Spring, Feed Limit Valve
(411) Ring, Retainer
(412) Valve, Feed Limit
(413) Seal, O–Ring Plug Filter
(414) Plug, Screen
(415) Screen Assembly, Force Motor
(416) Solenoid, Torque Converter Clutch, PWM
(417) Retainer, Screen Plug
(418) Bracket, PWM Solenoid

Overdrive Internal Components

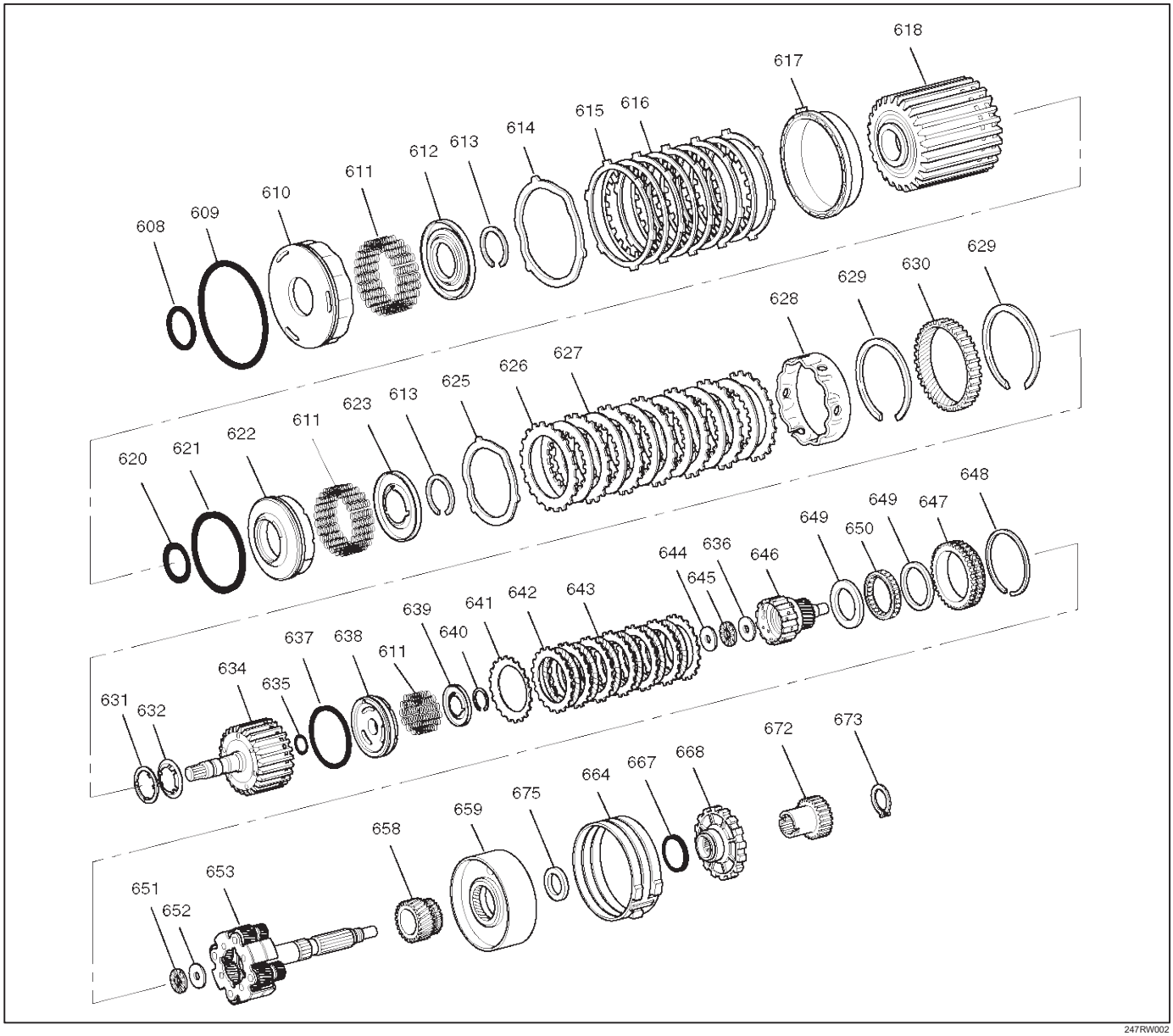


252RW003

Legend

(501) Retainer, 4th Clutch
(502) Plate, 4th Clutch (Steel)
(503) Plate Assembly, 4th Clutch (Lined)
(504) Retainer And Ball Assembly, Check Valve
(505) Seal, O–Ring/Turbine Shaft
(506) Shaft, Turbine
(508) Ring, Oil Seal/Turbine Shaft
(510) Housing, Overrun Clutch
(513) Piston, Overrun Clutch
(514) Spring, Overrun Clutch Release
(515) Retainer, Release Spring/Overrun Clutch
(516) Roller Assembly, Overdrive Clutch
(517) Cam, Overdrive Roller Clutch
(518) Ring, Snap/Overrun Clutch Hub
(519) Gear, Overdrive Sun
(520) Plate, Waved/Overrun Clutch
(521) Plate, Overrun Clutch (Steel)
(522) Plate Assembly, Overrun Clutch (Lined)
(523) Plate, Backing/Overrun Clutch
(524) Ring, Snap/Overrun Clutch Housing
(525) Carrier Assembly, Overdrive Complete
(526) Ring, Snap/Turbine Shaft/Carrier
(527) Bearing Assembly, Thrust
(528) Gear, Overdrive Internal
(529) Washer, Thrust/Internal Gear/Support
(530) Ring, Snap/Adapter/4th Clutch Spring
(531) Retainer and spring assembly, 4th clutch
(532) Piston, 4th Clutch
(533) Seal, 4th Clutch Piston (Inner)
(534) Seal, 4th Clutch Piston (outer)

Internal Components



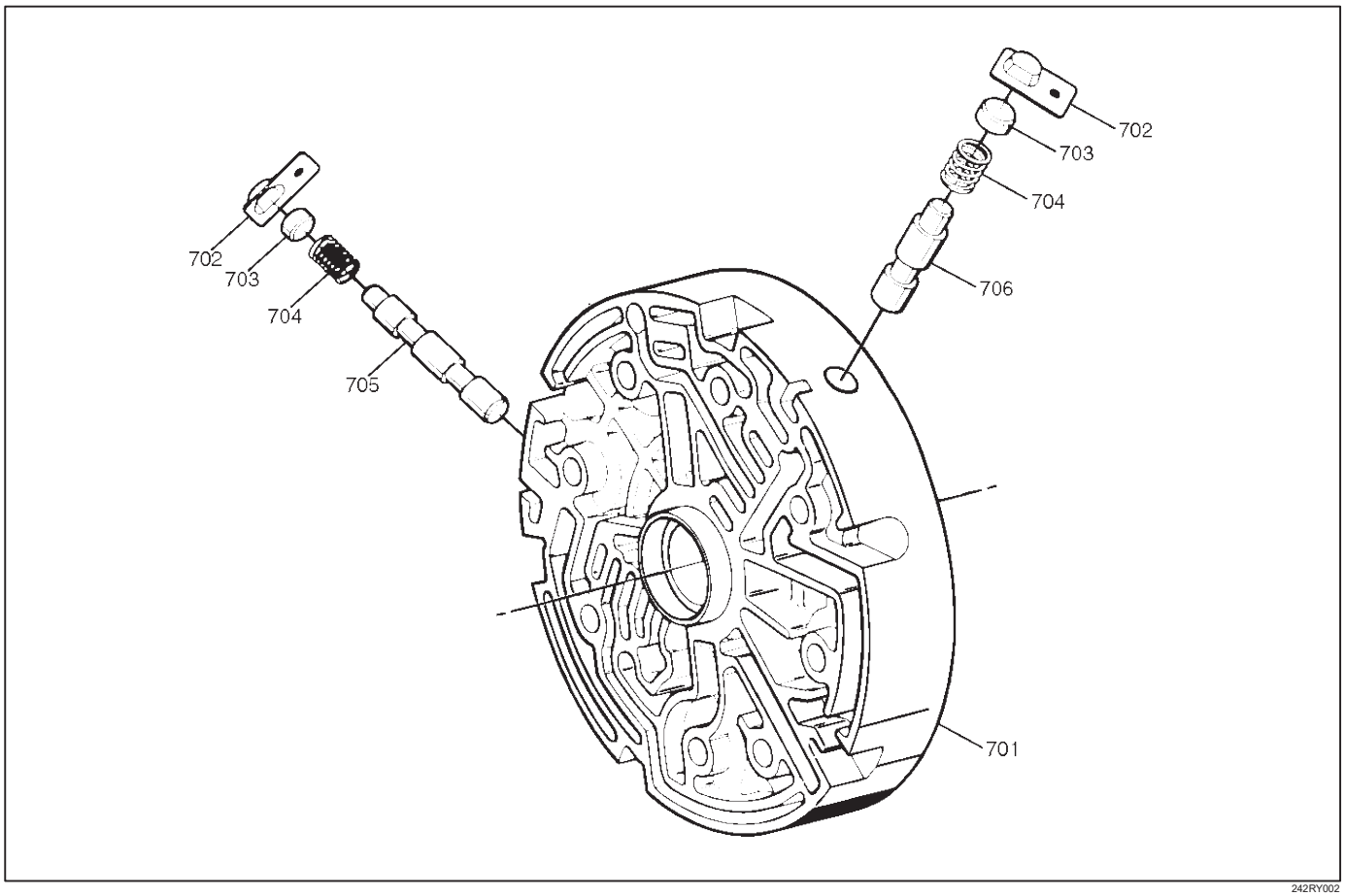
247RW002

Legend

(608) Seal, Reverse Clutch Piston (Inner)
(609) Seal, Reverse Clutch Piston (Outer)
(610) Piston, Reverse Clutch
(611) Spring, Piston Clutch
(612) Seat, Spring/Reverse Clutch
(613) Ring, Retaining
(614) Plate, Waved/Reverse Clutch
(615) Plate, Reverse Clutch (Steel)
(616) Plate Assembly, Reverse Clutch (Lined)
(617) Plate, Reverse Clutch Pressure/Selective
(618) Drum Assembly, 2nd Clutch
(620) Seal, 2nd Clutch Piston (Inner)
(621) Seal, 2nd Clutch Piston (Outer)
(622) Piston, 2nd Clutch
(623) Seat, Spring/2nd Clutch
(625) Plate, Waved/2nd Clutch
(626) Plate, 2nd Clutch (Steel)
(627) Plate Assembly, 2nd Clutch (Lined)
(628) Spacer, 2nd Clutch
(629) Ring, Retaining
(630) Gear, Ring
(631) Washer, Thrust/2nd Clutch/3rd Clutch
(632) Thrust Washer, Clutch Hub
(634) Drum Assembly, 3rd Clutch
(635) Seal, 3rd clutch piston (Inner)
(636) Washer, Retaining
(637) Seal, 3rd Clutch Piston (Outer)
(638) Piston 3rd Clutch
(639) Seat, Spring/3rd Clutch
(640) Ring, Retaining
(641) Plate, Spring Cushion/3rd Clutch
(642) Plate, 3rd Clutch (Steel)
(643) Plate Assembly, 3rd Clutch (Lined)
(644) Washer, Thrust/Input Sun
(645) Bearing, Input Shaft/Gear Assembly

(646) Gear Assembly, Input Sun
(647) Race Assembly, Sprag
(648) Ring, Retaining/Sprag
(649) Ring, Retaining
(650) Cage Assembly, Sprag
(651) Bearing, Output Shaft/Input Sun
(652) Washer, Output Shaft/Input Sun
(653) Carrier Assembly, Planetary
(658) Gear, Reaction Sun
(659) Drum, Reaction Sun
(664) Band Assembly, Brake
(667) Seal, Ring/Wheel Parking Lock
(668) Wheel, Parking Lock
(672) Wheel, Speed
(673) Ring, Retaining
(675) Bearing, Thrust Assembly

Center Support Assembly



242RY002

Legend
(701) Center Support
(702) Retainer Plate
(703) Plug, Lockout
(704) Spring, Lockout
(705) Valve, Overrun Lockout
(706) Valve, Reverse Lockout Control

AXIOM

TRANSMISSION

TRANSMISSION CONTROL SYSTEM (4L30–E)

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Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. UNLESS OTHERWISE SPECIFIED, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

General Description

The 4L30–E is a 4–speed fully automatic transmission. It uses a microcomputer as a control unit to judge running conditions including throttle opening rate and vehicle speed, then it sets the shifting point in the optimum timing so that best driving performance can be achieved.
In addition, the built–in shift mode select function can select three shift modes according to the driver's preference:

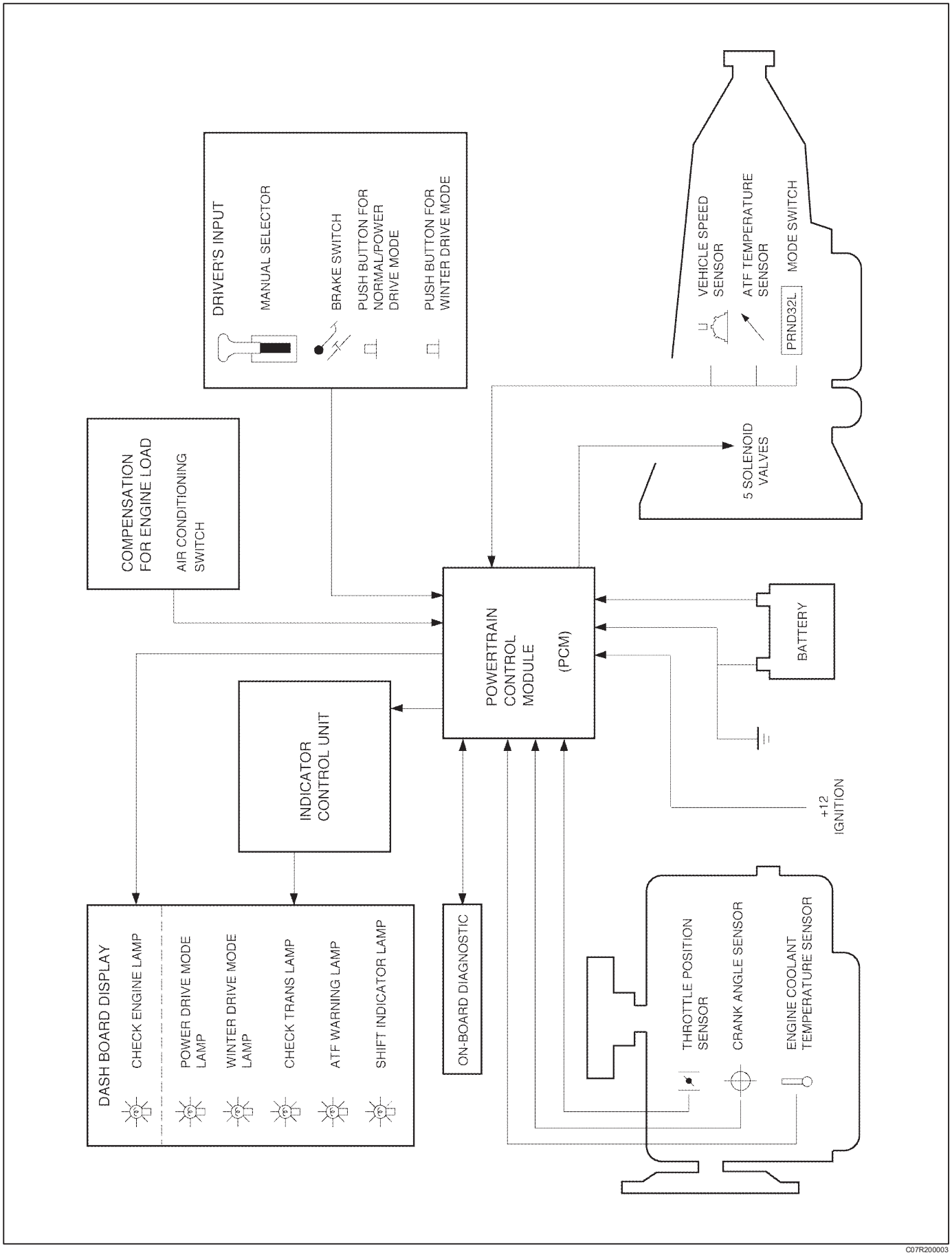
- Normal mode –Normal shift pattern.
- Winter mode –Starts in 3rd gear to reduce slippage on ice or snow.
- Power mode has a delayed upshift when more powerful acceleration is required.

Also, the built–in fail safe function ("backup mode") assures driving performance even if the vehicle speed sensor, throttle signal or any solenoid fails.
Further, the self–diagnostic function conducts diagnosis in a short time when the control system fails, thus improving serviceability.
The major features of 4L30–E are as follows:

- A compact structure consisting of 2 sets of planetary gears and flat torque converter.
- Electronic control selects the optimum shift mode according to the driving conditions.
- Electronic control maintains the optimum hydraulic pressure for clutch, band brake as well as transmission so that shift feeling is improved.
- Two sets of planetary gears reduce friction of power train.

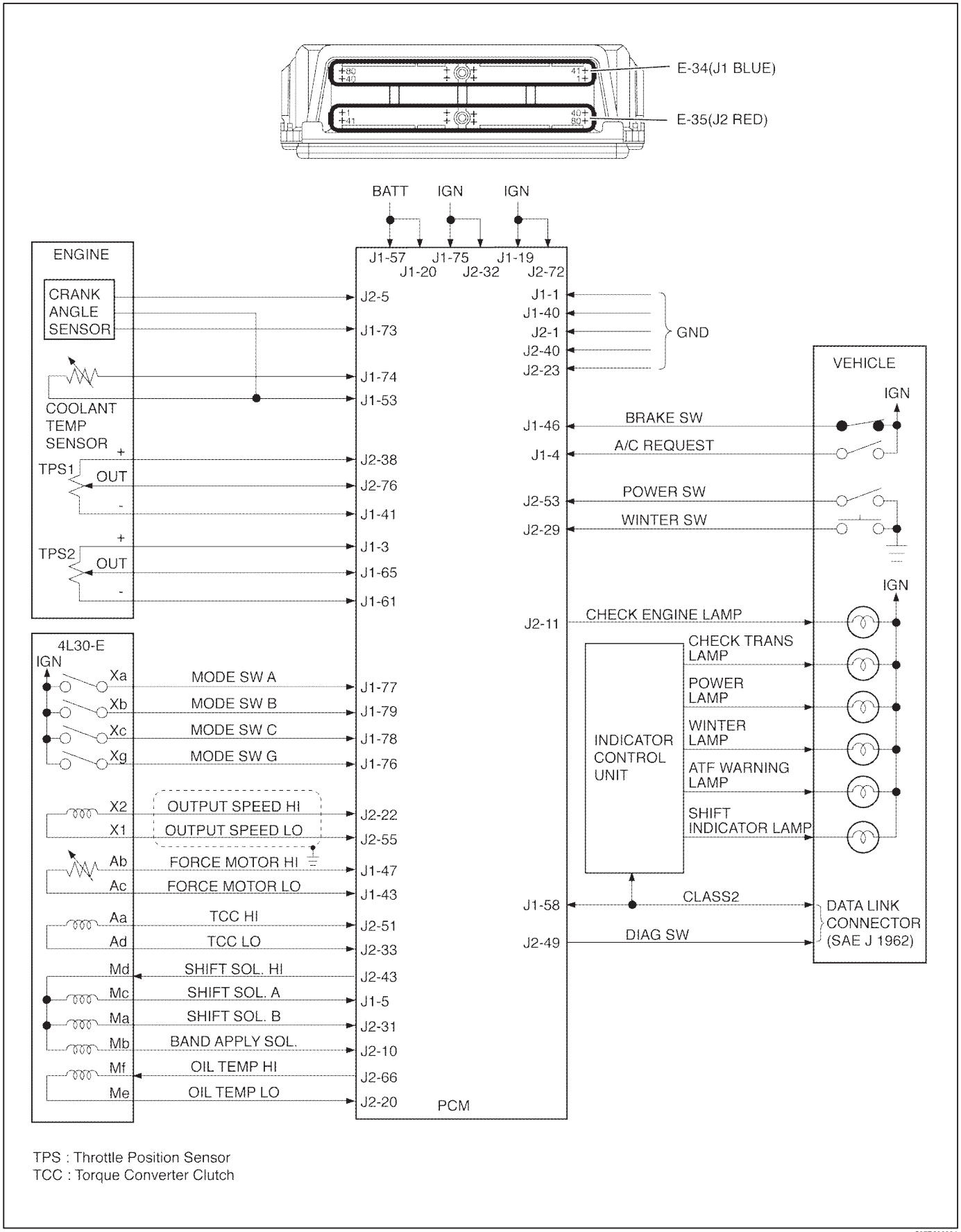
  Also, a lockup mechanism in the torque converter reduces fuel consumption.
- Wide gear ratio and high torque rate of torque converter provide excellent starting performance.

Electronic Control Diagram



C07R200003

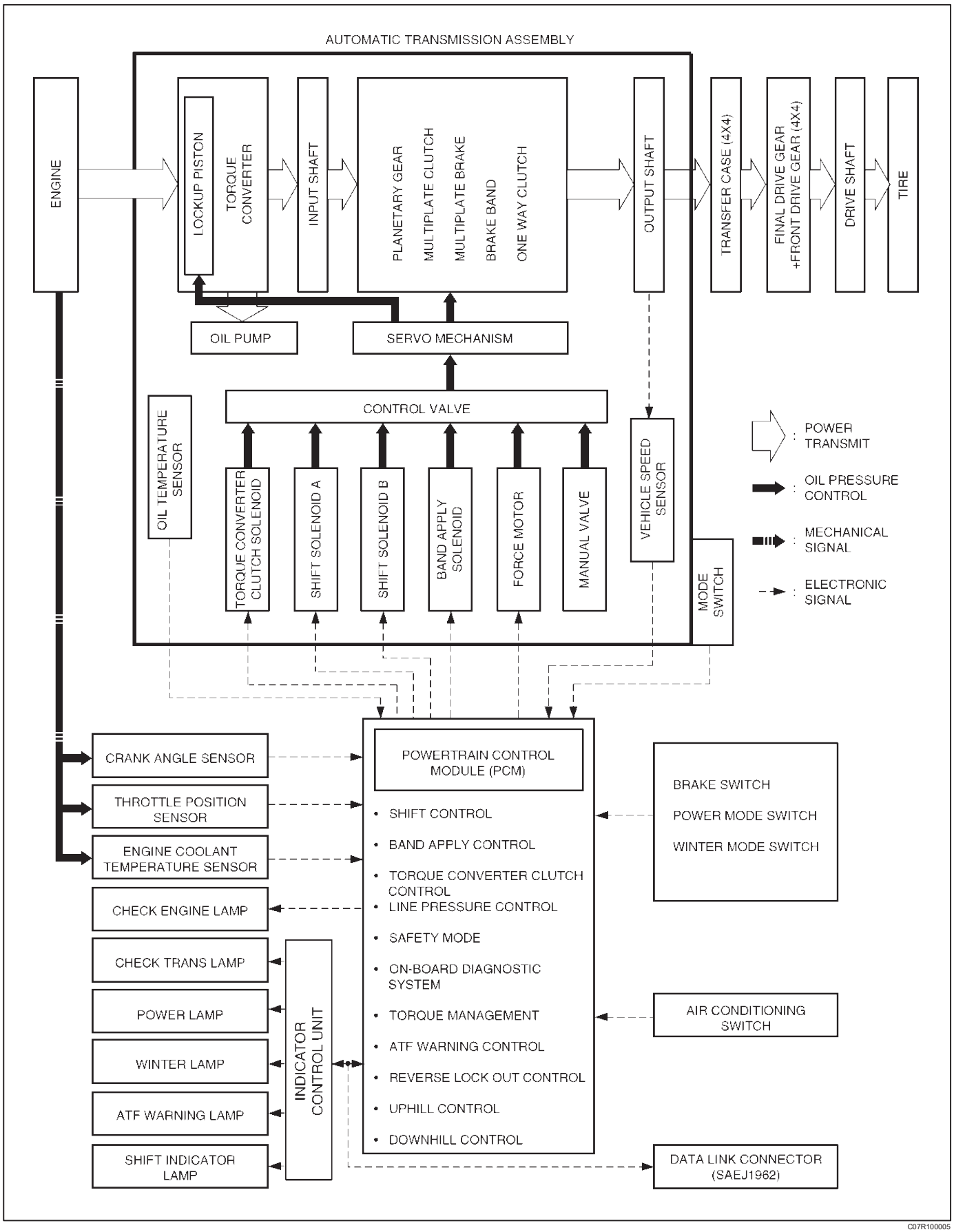
Powertrain Control Module (PCM)



TPS : Throttle Position Sensor
TCC : Torque Converter Clutch

C07R200004

Control System Diagram



Shift Control

The transmission gear is shifted according to the shift pattern selected by the driver. In shifting gears, the gear ratio is controlled by the ON/ OFF signal using the shift solenoid A and the shift solenoid B.

Band Apply Control

The band apply is controlled when in the 3–2 downshift (engine overrun prevention) and the garage shift (shock control).
The band apply solenoid is controlled by the signal from the Pulse Width Modulation (PWM) to regulate the flow of the oil.

Torque Converter Clutch Control (Electronically Controlled Capacity Clutch = ECCC)

The clutch apply is controlled by moving the converter clutch valve by commanding Torque Converter Clutch (TCC) solenoid using the PWM signal.

Line Pressure Control

The throttle signal allows the current signal to be sent to the force motor. After receiving the current signal, the force motor activates the pressure regulator valve to regulate the line pressure.

On–Board Diagnostic System

Several malfunction displays can be stored in the Powertrain Control Module (PCM) memory, and read out of it afterward.
The serial data lines, which are required for the testing of the final assembly and the coupling to other electronic modules, can be regulated by this function.

Fail Safe Mechanism

If there is a problem in the transmission system, the PCM will go into a “backup” mode.
The vehicle can still be driven, but the driver must use the select lever to shift gears.

Torque Management Control

The transmission control side sends the absolute spark advance signal to the engine control side while the transmission is being shifted. This controls the engine spark timing in compliance with the vehicle running condition to reduce the shocks caused by the change of speed.

ATF Warning Control

The oil temperature sensor detects the ATF oil temperature to control the oil temperature warning, TCC, and the winter mode.

Reverse Lock Out Control

With the selector lever in reverse position, the PCM will not close the PWM solenoid until the vehicle is below 11 km/h (6.8 mph), thus preventing reverse engagement above this speed.

Downhill Control

This mode is automatically activated from “NORMAL” mode only when downhill conditions are recognized.
The shift pattern is identical to “NORMAL” mode except 3-4 and 4-3 shift lines at low throttle modified to get engine braking on a larger speed range.
ECCC lines unchanged compared to “NORMAL” mode.

Uphill Control

When Uphill condition are recognized the 2-3 and 3-4 shift and TCC apply take place only when the engine torque is sufficient in order to avoid shift hunting.

Shift Mode Control

① Mode Type

Mode Type	Select lever position
Normal drive mode (NOR)	Entire range (excluding "R")
Power drive mode (PWR)	Entire range (excluding "R")
Winter drive mode	"D" range only

② Mode selection

	SWITCH (SW)		LAMP	
Mode Type	POW/NOR. SW	WINTER SW	POWER DRIVE LAMP	WINTER DRIVE LAMP
Normal drive mode (NOR)	OFF	OFF	OFF	OFF
Power drive mode (PWR)	ON	OFF	ON	OFF
Winter drive mode	ON/OFF	ON	OFF	ON

However, the winter switch prevails over the PWR/NOR switch.
The mode becomes normal drive mode when the winter switch is operated from ON to OFF.

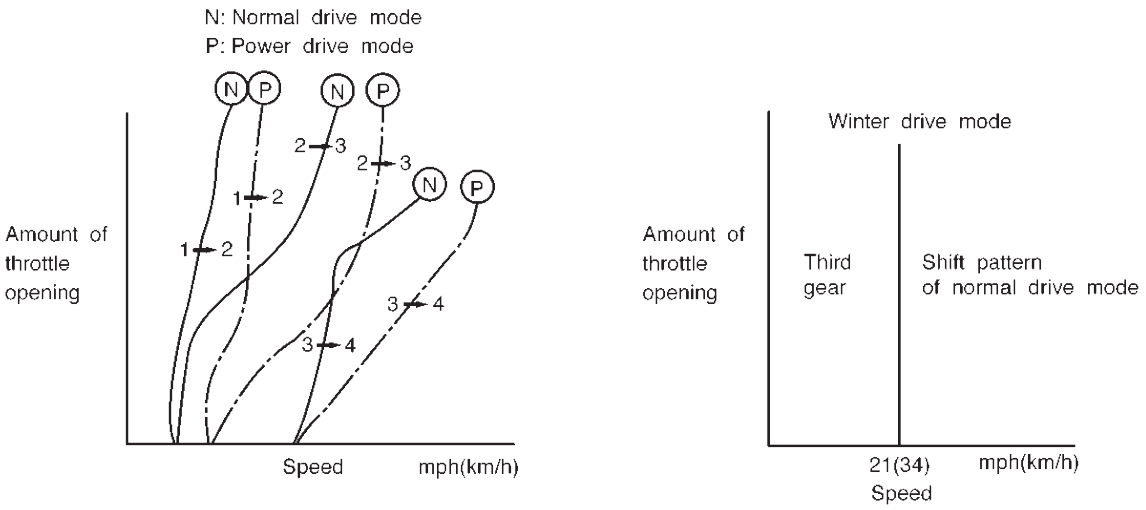
③ Comparison of mode

(1) The normal drive mode is set at the normal shift points.

(2) The shift points of the power drive mode are shifted to the higher speed side, compared to the normal drive mode.

(3) The winter drive mode is a special mode used exclusively for starting in third gear.

Shift diagram



F07RX001

Gear Shift Control

① Shift pattern

SELECT LEVER RANGE	SHIFT PATTERN
D (Drive)	1⇄2TCC ⇄3TCC ⇄4TCC
3 (Third)	1⇄2TCC ⇄3TCC ←4TCC
2 (Second)	1⇄2TCC ←3TCC
L (First)	1←2

TCC = Torque Converter Clutch

② Gear position

The gear is selected by ON/OFF of two solenoids.

Gear \ SOL	A	B
4 (Fourth)	×	×
3 (Third)	○	×
2 (Second)	○	○
1 (First)	×	○
P (park) R (Reverse) N (Neutral)	×	○

○ = ON

× = OFF

Shift solenoid A (Normally closed) ON → PRESSURE TO SHIFT VALVE

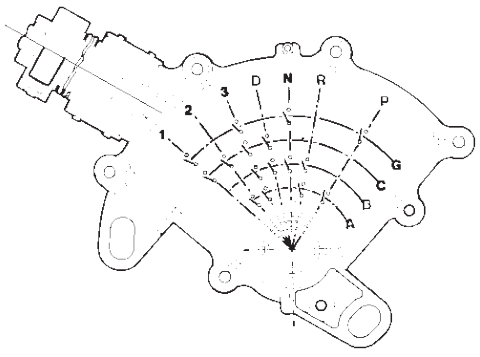
Shift solenoid B (Normally open) OFF → PRESSURE TO SHIFT VALVE

③ Selecting gear pisition

Seven types of positions can be selected according to 5 signals from the mode switch as below.

	MODE SW TERMINALS				
SELECT LEVER RANGE	5(D)	8(A)	7(B)	6(C)	3(G)
P (park)	•	•			•
R (Reverse)	•	•	•		
N (Neutral)	•		•		•
D (Drive)	•		•	•	
3 (Third)	•	•	•	•	•
2 (Second)	•	•		•	
L (First)	•			•	•

• = Continuity



F07RT034

Winter Drive Mode

1. **Operation**
   The winter switch will operate when switched on after all of the following conditions are present:

   Conditions:

   a. The select lever position is “D” range only.
   b. Vehicle speed is 7 mph (11 km/h) or less.
   c. Transmission oil temperature is 130˚C (266˚F) or less.
   d. Accelerator opening is at 8% or less.
2. **Cancel Release**
   1. Cancellation by driver
      a. Turning off the winter drive mode switch
      b. Shifting select position to “3”, “2”, or “L” (winter drive mode is not canceled by selecting “N”, “R”, or “P”).
      c. Ignition key is turned off.
   2. Automatic cancellation
      a. When vehicle runs at 21mph (34 km/h) or more for 1 second or more
      b. When transmission oil temperature reaches 130˚C (266˚F) or above

NOTE: The mode returns to normal drive mode or power drive mode after the winter drive mode is canceled.

Backup Mode

If a major system failure occurs which could affect safety or damage the transmission under normal vehicle operation, the diagnostic system detects the fault and overrides the Powertrain Control Module (PCM).
The “CHECK TRANS” light flashes to alert the driver, and the transmission must be manually shifted as follows:

Select lever position	Gear Ratio Selected
D	4 (Fourth)
Manual 3	4 (Fourth)
Manual 2	3 (Third)
Manual L	1 (First)
R	Reverse

Shifts are firmer to prevent clutch slip and consequent wear. The fault should be corrected as soon as possible.

Functions of Input / Output Components

Components			Function
INPUT SIGNAL	Speed sensor (fixed to transmission)		Senses rotation of output shaft and feeds the data to Powertrain Control Module (PCM).
	Throttle position sensor (TPS) (fixed to engine)		Senses the extent of throttle valve opening and the speed of the throttle valve lever motion to open the valve. Feeds the data to PCM.
	Brake switch (fixed to brake pedal)		Senses whether the driver has pressed the brake pedal or not and feeds the information to PCM.
	Mode switch (fixed to transmission)		Senses the select lever position, and feeds the information to PCM.
	Power drive switch (fixed to front console)		Senses whether the driver has selected the power mode, and feeds the information to PCM.
	T/M oil temperature sensor		Senses the T/M oil temperature and feeds the data to PCM
	Engine coolant temperature sensor		Senses the engine coolant temperature, and feeds the data to PCM.
	Engine speed signal		Feeds the signals monitoring engine speed to PCM from crank angle sensor.
	Air conditioning information		Senses whether the air conditioner has been switched on or not, and feeds the information to PCM.
	Winter switch (fixed to front console)		Senses whether the driver has selected the winter mode, and feeds the information to PCM.
	Cruise controller (Overdrive OFF signal)		Downshift takes place when overdrive OFF signal is received from auto cruise controller integrated in PCM.
OUTPUT SIGNAL	SOLENOID	Shift solenoid A, B	Selects shift point and gear position suited to the vehicle running condition on the basis of PCM output.
		Band apply solenoid	Controls oil flow suited to the vehicle running condition on the basis of PCM output.
		Torque Converter Clutch PWM solenoid	Controls clutch apply suited to the vehicle running condition on the basis of PCM output.
		Force motor (Pressure regulator valve)	Adjusts the oil pump delivery pressure to line pressure suited to the vehicle running condition on the basis of PCM output.

Diagnosis

Electronic Diagnosis

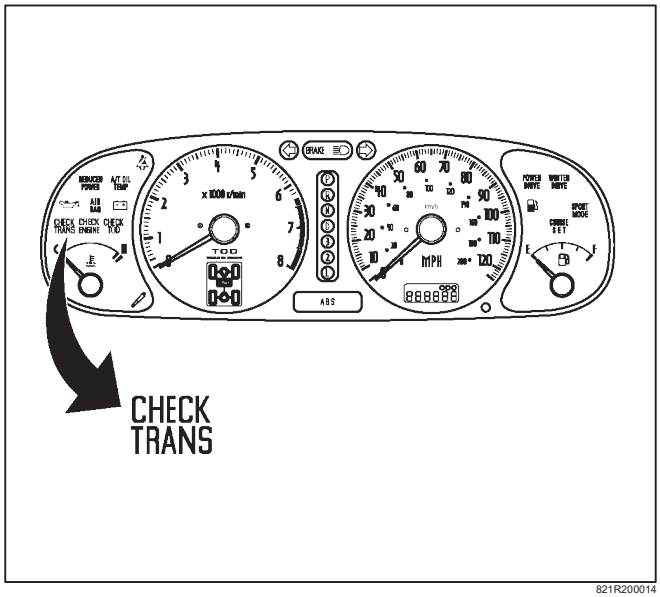
How To Diagnose The Problem

1. To avoid incorrect diagnostics, this book needs to be followed accurately. Unless stated, do not jump directly to a section that could contain the solution. Some important information may be missed.
2. The sections in CAPITALS and bold are the main sections that can be found in the contents.
3. The GO TO **"SECTION"** means to continue to check going to the "section".
4. The GO THROUGH **"SECTION"** means to go through the "section" and then to go back to the place the GO THROUGH was written.
5. BASIC ELECTRIC CIRCUITS:
   You should understand the basic theory of electricity. This includes the meaning of voltage, amps, ohms, and what happens in a circuit with an open or shorted wire. You should also be able to read and understand wiring diagrams.

Check Trans Indicator

Find CHECK TRANS indicator and verify if it is

A. Flashing: GO TO **DIAGNOSTIC CHECK.**
B. Staying on: GO THROUGH **CHECK TRANS CHECK**.
C. Is never ON when the ignition key is turned on: GO THROUGH **CHECK TRANS CHECK**
D. Is ON during 2 seconds at ignition but OFF after: Normal operation. No DTC or malfunction.



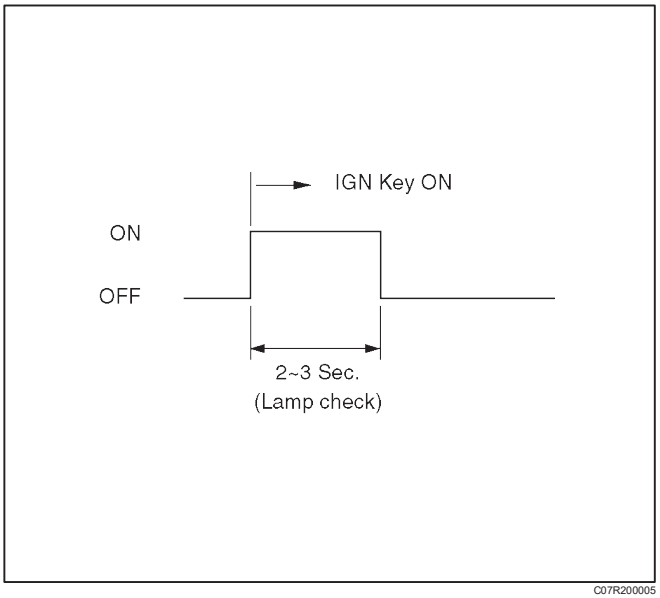
821R200014

Diagnostic Check

This test determines if the transmission or its input or output connections or sensors are failing.

1. Connect the Tech 2: GO THROUGH **Tech 2 OBD II CONNECTION**.
2. Turn on the ignition but not the engine.
3. Push "F0" on Tech 2 to see the Diagnostic Trouble Code (DTC):
4. Do you have a DTC?
   YES: write down all code numbers and do the **DTC CHECK**
   NO: the DTC can not help you finding the problem.
   1. GO THROUGH **"CHECK TRANS" CHECK**
   2. If it is flashing and the flash is 0.2 seconds ON and 0.2 seconds OFF, this means that you should have a DTC stored. Please recheck GO TO **DIAGNOSTIC CHECK** and if you find the same problem, replace the Powertrain Control Module (PCM).

Normal



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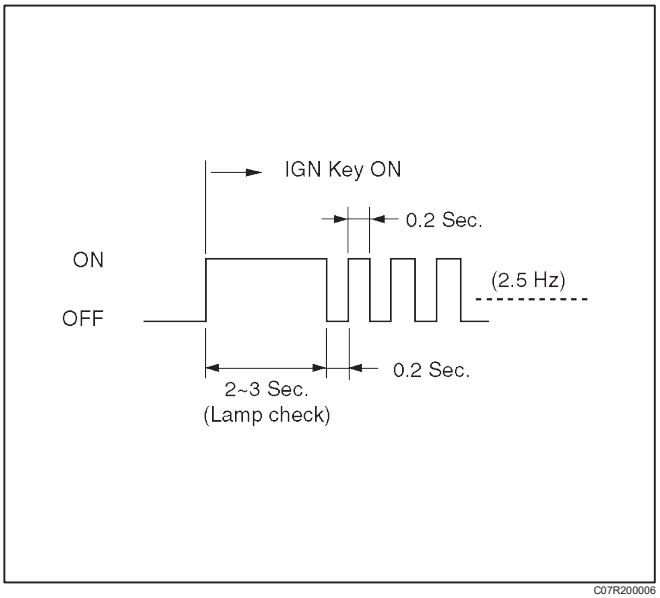
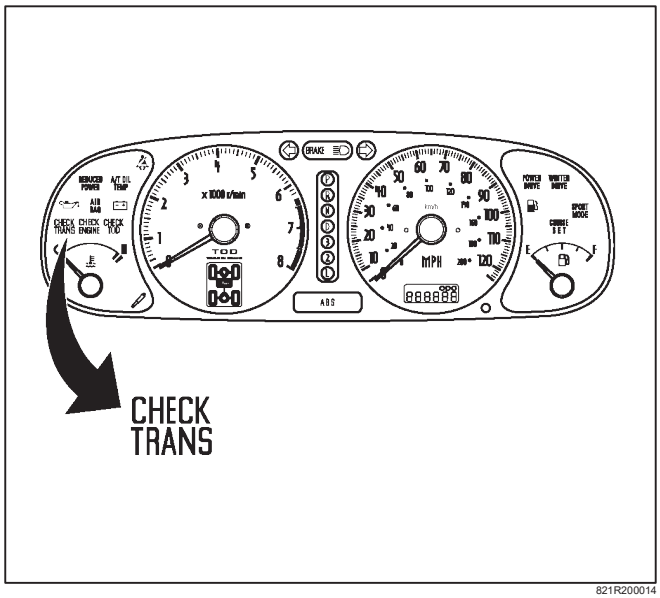
Abnormal



C07R200006

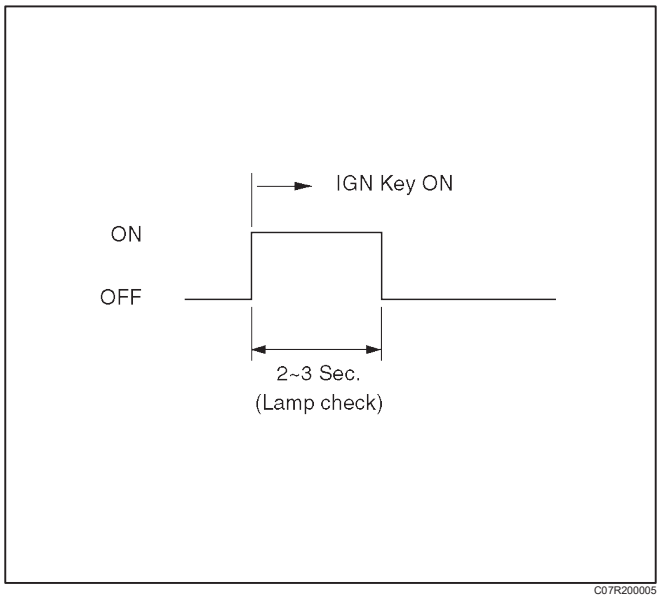
“Check Trans” Check

1. Indicator is ON during 2~3 seconds at ignition (or when the engine is cranked) but it is OFF after the engine starts. The indicator is working normally GO TO **DIAGNOSTIC CHECK**.



821R200014

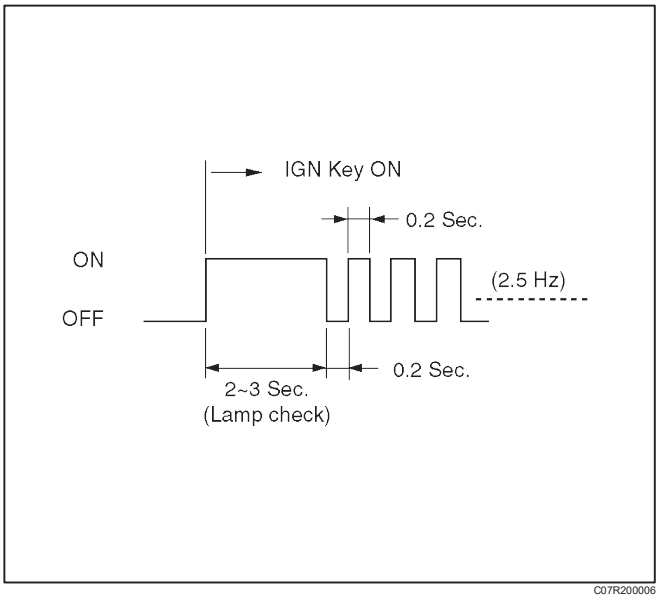
Normal



C07R200005

2. Indicator is flashing and the flash is 0.2 seconds ON and 0.2 seconds OFF always when ignition is on (engine cranked or not). This means that there is a malfunction. GO TO **DIAGNOSTIC CHECK**.

Abnormal



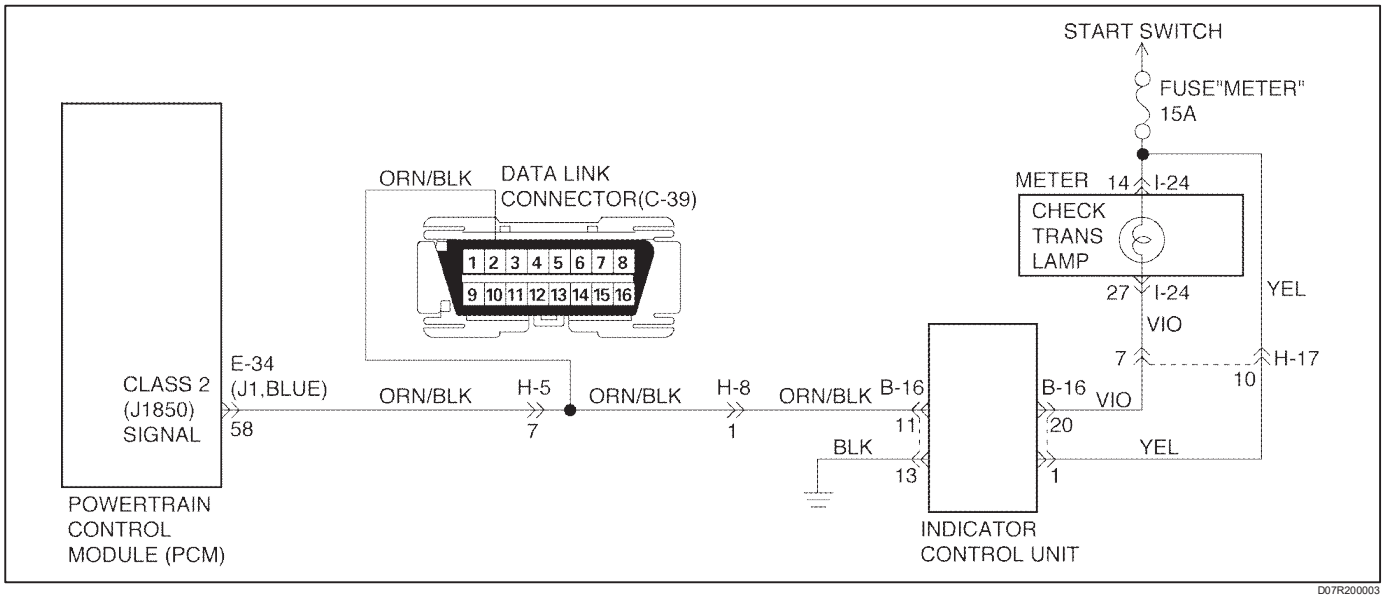
C07R200006

3. Indicator is staying ON always when Ignition is ON.
   1. This means that connection between the lamp and the indicator control unit is shorted to ground.
   2. Verify if instrument panel terminal 27 of connector I–24 is shorted to ground.
   3. Verify if the indicator control unit connector B–16 terminal 20 is shorted to ground.
   4. Verify that the instrument panel terminal 14 of connector I–24 is connected to battery.
   5. If problem solved: GO TO **CHECK TRANS INDICATOR**.

   NO:Replace Powertrain Control Module (PCM).
4. Indicator is staying OFF with the ignition ON (engine OFF).
   1. This means that connection between the lamp and the indicator control unit is shorted to battery or opened.
   2. Verify if instrument panel terminal 27 of connector I–24 is shorted to battery or open.
   3. Verify if the indicator control unit connector B–16 terminal 20 is shorted to battery or open.
   4. Verify that the instrument panel terminal 14 of connector I–24 is connected to battery. If not, check the fuses and the connections (terminal 7 of connector H–17) voltage.

5. If problem solved: GO TO **CHECK TRANS INDICATOR**.

NO: Replace Powertrain Control Module (PCM).

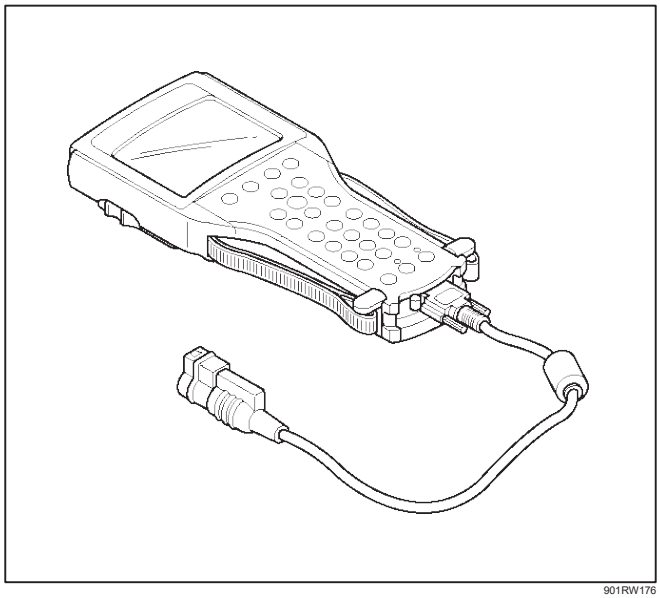


D07R200003

Tech 2 OBD II Connection

In order to access OBD II Powertrain Control Module (PCM) data, use of the Tech 2 scan tool kit (7000086) is required.

1. The electronic diagnosis equipment is composed of:
   1. Tech 2 hand held scan tool unit (7000057) and DLC cable (3000095).



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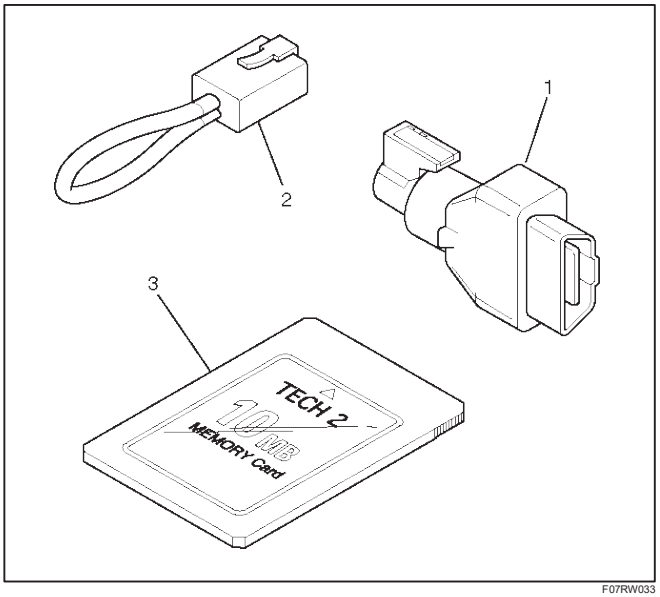
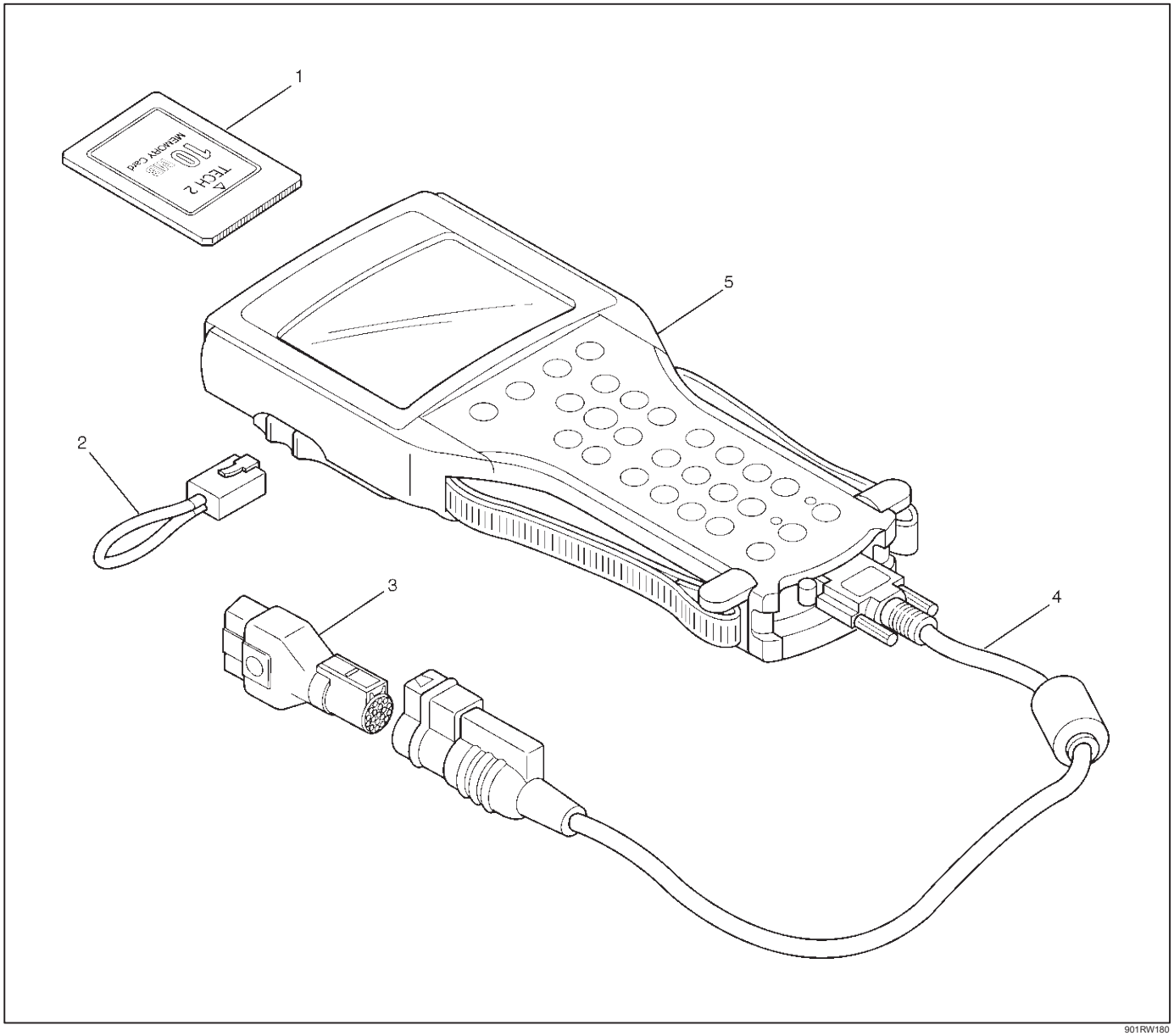
2. SAE 16/19 adaptor (3000098) (1), RS 232 loop back connector (3000112) (2), and PCMCIA card (3000117) (3).



F07RW033

2. Connecting the TECH2



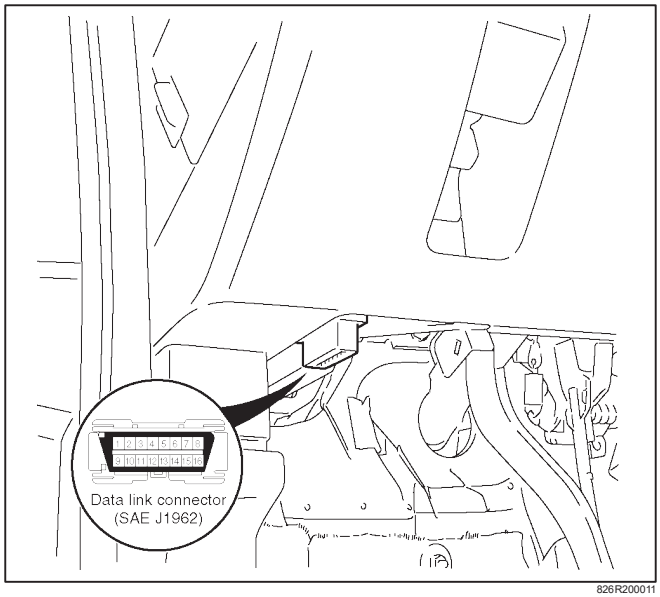
Legend

(1) PCMCIA Card
(2) RS 232 Loop Back Connector
(3) SAE 16/19 Adapter
(4) DLC Cable
(5) Tech 2

- Before operating the Isuzu PCMCIA card with the Tech 2, the following steps must be performed:

1. The Isuzu 2002 System PCMCIA card (1) inserts into the Tech 2 (5).
2. Connect the SAE 16/19 adapter (3) to the DLC cable (4).
3. Connect the DLC cable to the Tech 2 (5)
4. Make sure the vehicle ignition is off.

5. Connect the Tech 2 SAE 16/19 adaptor to the vehicle DLC.



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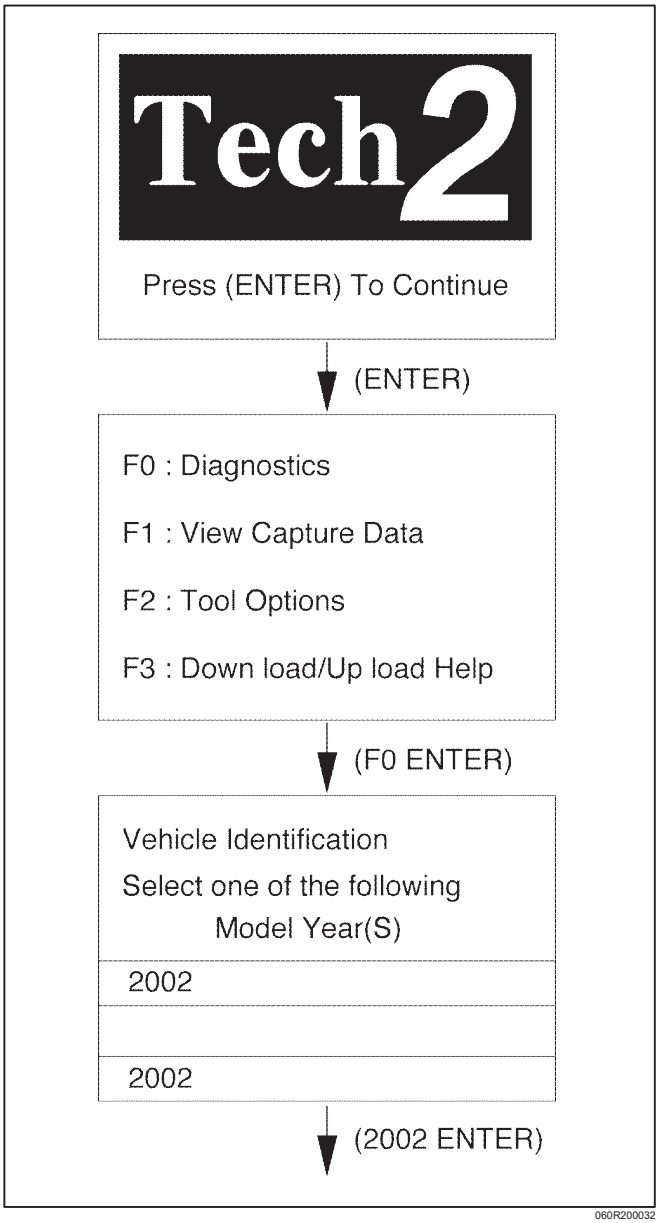
6. The vehicle ignition turns on.
7. Verify the Tech 2 power up display.

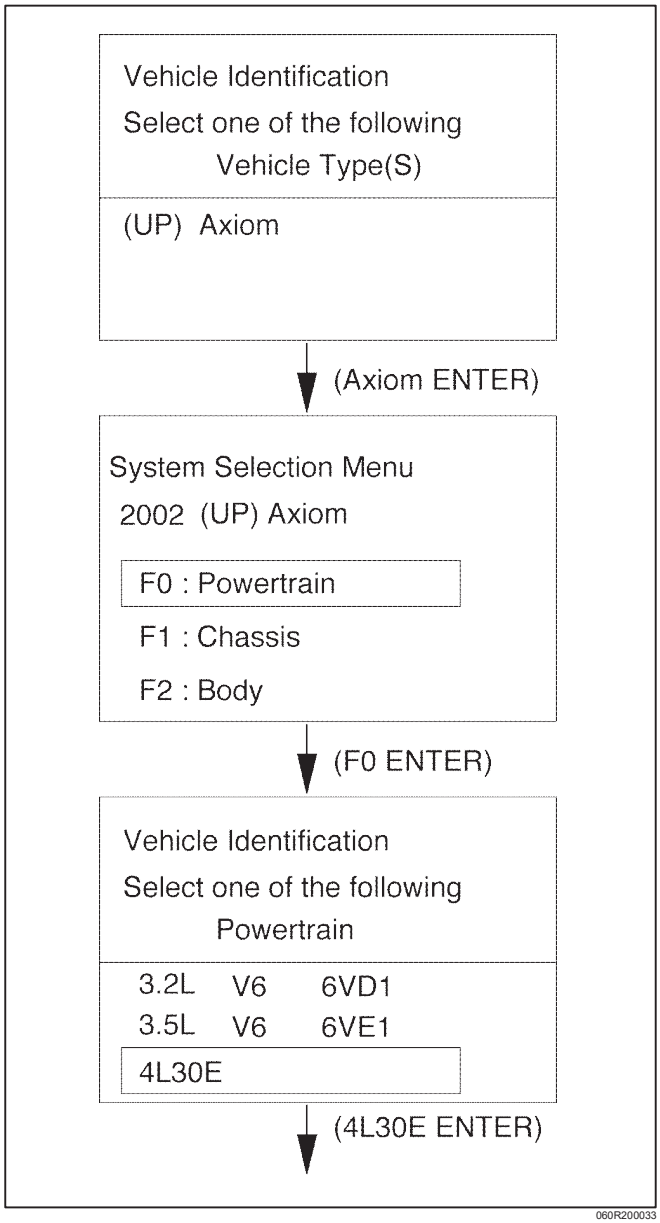
060RW009

NOTE: The RS232 Loop back connector is only to use for diagnosis of Tech 2 and refer to *user guide of the Tech 2.*

8. The power up screen is displayed when you power up the tester with the Isuzu systems PCMCIA card. Follow the operating procedure below.



060R200032



Once the test vehicle has been identified an “Application (Powertrain) Menu” screen appears. Please select the appropriate application.
The following table shows, which functions are used for the available equipment versions.

- F0: Diagnostic Trouble Codes
  - F0: Read DTC Info Ordered By Priority
  - F1: Clear DTC Information
  - F2: DTC Information
- F1: Data Display
  - F0: Transmission Data
- F2: Snap Shot
- F3: Actuator Tests
  - F0: Lamps
    - F0: Check Light
    - F1: Winter Drive Lamp
    - F2: Power Drive Lamp
    - F3: AT Oil Temperature Lamp
  - F1: Solenoids
    - F0: Solenoid 1-2/3-4 Test
    - F1: Solenoid 2-3 Test
    - F2: TCC Solenoid
    - F3: Band Apply Solenoid
    - F4: Pressure Control Solenoid (PCS)
- F4: Function Tests
  - F0: Reset Oil Life Monitor

Diagnostic Trouble Codes

The purpose of the "Diagnostic Trouble Codes" mode is to display stored PCM trouble codes.
When "Diagnostic Trouble Codes" is selected an "Application Menu" screen appears.

Clear DTC Information

The purpose of the "Clear DTC Information" mode is to command the clearing of stored PCM trouble codes.
When "Clear DTC Information" is selected, a "Clear DTC Information", warning screen appears. This screen informs you that by cleaning DTC's, "all stored DTC information in controller will be erased".
Do you want to clear DTC's (Yes/No).
Press either the Yes or No key when answering.
After clearing codes, confirm system operation by test driving the vehicle.
Allow the vehicle to shift through all four forward gears in a manner which attempts to repeat the failure condition.

NOTE: When the trouble has not been repaired and the trouble code cannot be erased, check the vehicle again.

DTC Information

When "DTC Information" is selected, an "Application Menu" appears with a list of DTC information function keys addressing DTC specifics and their origins.
Function key selections may vary for particular vehicle and/or system.

Data Display

The purpose of the "Data Display" mode is to continuously monitor data parameters.
The current actual values of all important sensors and signals in the system are display through F1 mode.
When "Data Display" is selected an "Application Menu" appears. Please select either "Engine" or "Transmission Data Display".
See "Transmission Data" on next page.

Snapshot

When "Snapshot" is selected an "Application Menu" appears.
When "Transmission Snapshot" application is selected from the "Application Menu", a "Snapshot Menu" appears, displaying several options. "Snapshot" options may vary from one system to another.
"Snapshot" allows a recording of all vehicle parameters. There parameters may then be replayed at a future point in time.
This action allows you to focus on making the condition occur, rather than trying to view all of the data in anticipation of the fault. The snapshot will collect parameter information around a trigger point that you select.
When a snapshot is taken. It is recorded onto the PCMCIA memory card. When the Tech 2 is powered down. Snapshots are not lost.

Actuator Tests

The purpose of "Actuator Tests" mode is to check for correct operation of electronic system actuators.

Lamps

You can operate the lamps by pressing the ON and OFF buttons.
Preconditions: none

Solenoid

Solenoid 1-2/3-4, Solenoid 2-3, TCC Solenoid
You can operate the solenoids by pressing the ON and OFF buttons.
Preconditions: P–N position, no vehicle speed, no engine speed

Band Apply Solenoid
You can operate the solenoid by pressing the ON and OFF buttons.
Preconditions: P-N position, idle engine speed, no vehicle speed.

Pressure Control Solenoid (PCS)
You can set desired PCS Current using the "Increment" (+25) and "Decrement" (–25) button. The PC Solenoid Data informs about PCS Current, Pressure and Duty Cycle.
Preconditions: P–N position, no engine speed, no vehicle speed

Reset Oil Life Monitor

Displays parameter "Oil Life Monitor" and resets to 100% if Yes-button is pressed on Reset-question. "No" leaves test.
Preconditions: no vehicle speed, no engine speed

NOTE:

Freeze Frame (Powertrain DTC A/B Type)

Freeze Frame is an element of the Diagnostic Management System which stores various vehicle information at the moment an emissions-related fault is stored in memory and when the MIL is commanded on. These data can help to identify the cause of a fault. Refer to *Storing And Erasing Freeze Frame Data* for more detailed information.

Failure Records (Powertrain DTC C/D Type)

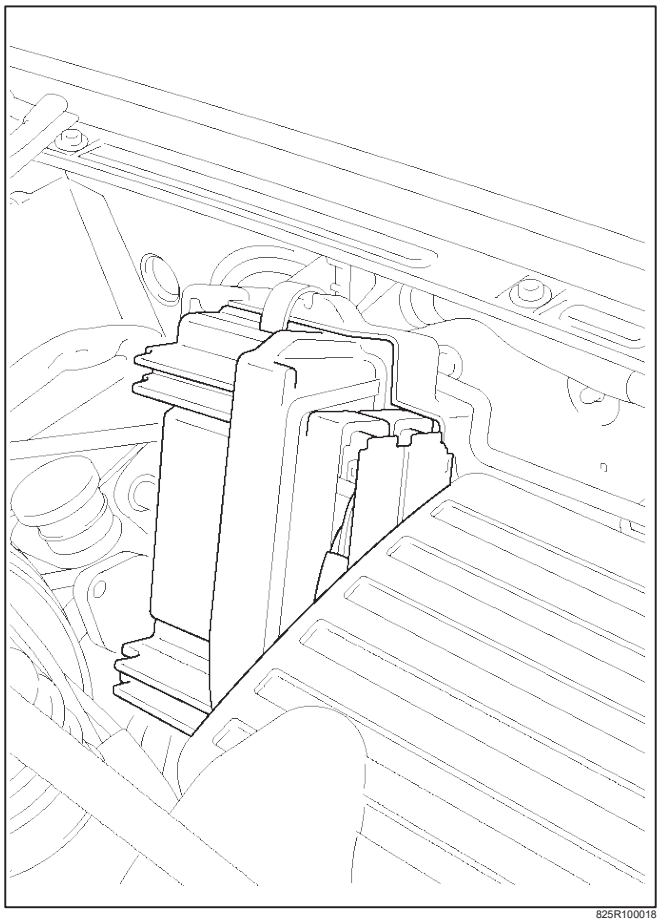
Failure Records data is an enhancement of the OBD II Freeze Frame feature. Failure Records store the same vehicle information as does Freeze Frame, but it will store that information for any fault which is stored in on-board memory, while Freeze Frame stores information only for emission-related faults that command the MIL on.

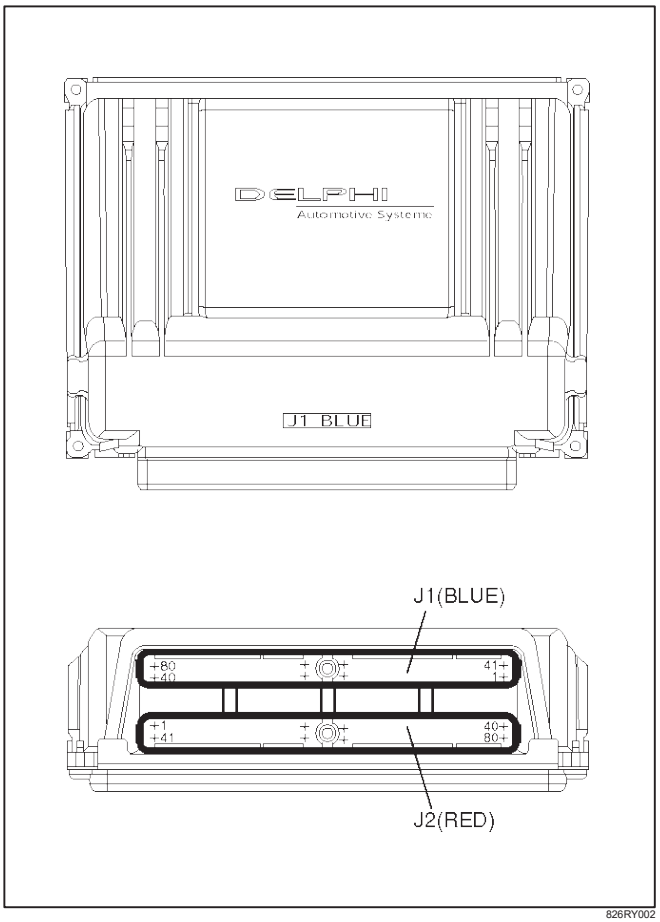
Transmission Data

Tech 2 string	Unit	Engine running at idle
Ignition Voltage	V	12.8 ~ 14.1 V
Engine Speed	RPM	750 ~ 900 RPM
Vehicle Speed	km/h, MPH	0 MPH
AT Output Speed (Automatic Transmission)	RPM	0 RPM
AT Input Speed Ratio (Automatic Transmission)		0.0
Throttle Position	%	0 %
AT Oil Temperature (Automatic Transmission)	˚C, ˚F	70 ~ 80˚C (158 ~ 176˚F)
Transmission Temperature	˚C, ˚F	75 ~ 110˚C (167 ~ 230˚F)
AT Oil Temperature Lamp (Automatic Transmission)	On/Off	Off
AT Oil Life Monitor (Automatic Transmission)	%	100 %
AT Oil Life Lamp (Automatic Transmission)	On/Off	(Not used)
Commanded Gear		1
Current Gear		1
Mode Switch A	Inactive/Active	Active
Mode Switch B	Inactive/Active	Inactive
Mode Switch C	Inactive/Active	Inactive
Mode Switch G	Inactive/Active	Active
Selector Position		Park
1–2 Shift Solenoid A	On/Off	Off
2–3 Shift Solenoid B	On/Off	On
Solenoid Brake Band	On/Off	Off
TCC Slip Speed	RPM	750 ~ 900 RPM
TCC Solenoid	On/Off	Off
TCC Duty Cycle	%	0 %
PCS Current (Pressure Control Solenoid)	A	approx. 1.0 A
PCS Duty Cycle (Pressure Control Solenoid)	%	approx. 45 ~ 60 %
Desired PCS Pressure (Pressure Control Solenoid)	kPa	43 ~ 52 kPa
Shift Pressure	kPa	43 ~ 52 kPa
Brake Switch	On/Off	On
Winter Switch	On/Off	Off
Winter Drive Lamp	On/Off	Off
Power Switch	Normal	Normal
Power Drive Lamp	Off/On	Off
Emergency Mode	Inactive/Active	Inactive
ABS Status	On/Off	(Not used)

OBD II Diagnostic Management System

Powertrain Control Module (PCM) Location





Class 2 Serial Data Bus

OBD II technology requires a much more sophisticated PCM than does OBD I technology. The OBD II PCM diagnostic management system not only monitors systems and components that can impact emissions, but they also run active tests on these systems and components. The decision making functions of OBD II PCMs have also greatly increased. To accommodate this expansion in diagnostic complexity, Isuzu engineers have designed the Class 2 serial data bus, which meets SAE J1850 recommended practice for serial data.

"Serial Data" refers to information which is transferred in a linear fashion – over a single line, one bit at a time. A "Data Bus" is an electronic pathway through which serial data travels.

AXIOM previously used a 5 volt data bus called UART, which is an acronym for "Universal Asynchronous Receive and Transmit". When neither the vehicle's control module nor the diagnostic tool, such as a Tech 2, are "talking," the voltage level of the bus at rest is 5 volts. The two computers talk to each other at a rate of 8,192 bits per second, by toggling or switching the voltage on the data bus from 5 volts to ground.

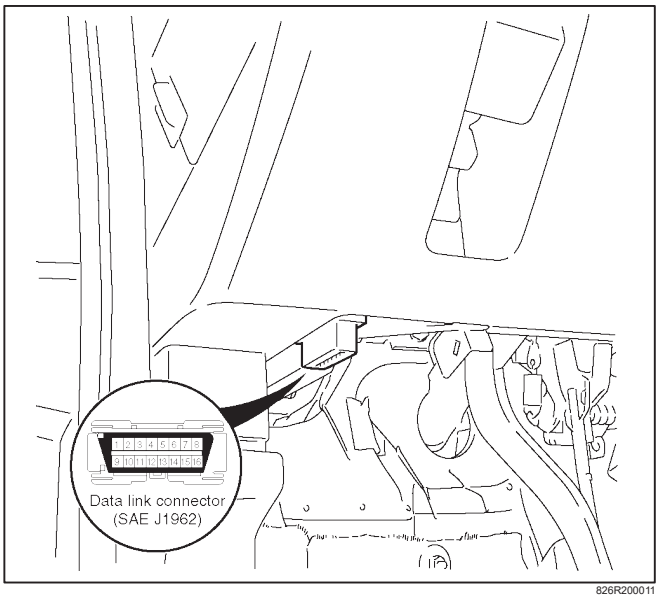
Class 2 data, which is used on OBD II vehicles, is quite different. Data is transferred at a rate of 10.4 kilobits per second, and the voltage is toggled between zero and 7 volts.

C07RT006

Class 2 data is also pulse width modulated. Each bit of information can have one of two lengths: long or short. On the other hand, UART data bits come in only one length (short). The pulse width modulation of Class 2 data allows better utilization of the data line.

The message carried on Class 2 data streams are also prioritized. This means that if two devices try to communicate on the data line at the same time, only the higher priority message will continue. The device with the lower priority message must wait.

NOTE: The Class 2 data wire is always terminal 2 of the new 16–terminal Data Link Connector (DLC).



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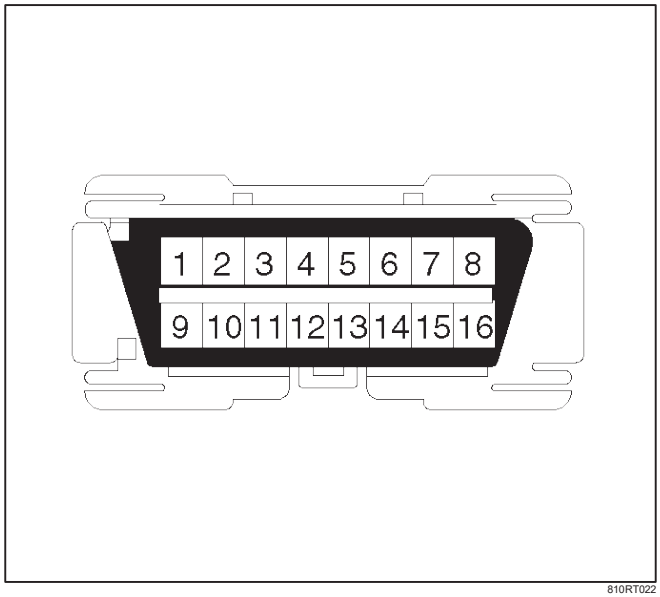
16 – Terminal Data Link Connector (DLC)

OBD II standardizes Data Link Connector (DLC) configurations. The DLC, formerly referred to as the ALDL, will be a 16–terminal connector found on the lower left side of the driver's side instrument panel. All manufacturers must conform to this 16–terminal standard.



PIN 1 – DIAG. SW
PIN 2 – J1850 Bus + L line on 2–wire systems, or single wire (Class 2)
PIN 3 – Active suspension diagnostic enable
PIN 4 – Chassis ground pin
PIN 5 – Signal ground pin
PIN 6 – (Not used)
PIN 7 – TOD diagnostic enable
PIN 8 – TOD diagnostic enable
PIN 9 – Primary UART
PIN 10 – (Not used)
PIN 11 – (Not used)
PIN 12 – ABS diagnostic or CCM diagnostic enable
PIN 13 – SIR diagnostic enable
PIN 14 – (Not used)
PIN 15 – (Not used)
PIN 16 – Battery power from vehicle unswitched (4 AMP MAX.)

Malfunction Indicator Lamp (MIL)

The Malfunction Indicator Lamp (MIL) looks the same as the MIL you are already familiar with (“CHECK ENGINE” lamp). However, OBD II requires for it illuminate under a strict set of guidelines. Basically, the MIL is turned on when the PCM detects a DTC that will impact the vehicle’s emissions.

The MIL is under the control of the Diagnostic Executive. The MIL will be turned on if a component or system which has an impact on vehicle emissions indicates a malfunction or fails to pass an emissions–related diagnostic test. It will stay on until the system or component passes the same test, for three consecutive trips, with no emissions–related faults.

DTC Types

Each DTC is directly related to a diagnostic test. The Diagnostic Management System sets DTC based on the failure of the tests during a trip or trips. Certain tests must fail two (2) consecutive trips before the DTC is set. The following are the four (4) types of DTCs and the characteristics of those codes:

- Type A
  - Emissions related
  - Requests illumination of the MIL of the first trip with a fail
  - Stores a History DTC on the first trip with a fail
  - Stores a Freeze Frame (if empty) (DTC Information for 6VE1 engine)
  - Stores a Fail Record
  - Updates the Fail Record each time the diagnostic test fails
- Type B
  - Emissions related
  - “Armed” after one (1) trip with a fail
  - “Disarmed” after one (1) trip with a pass
  - Requests illumination of the MIL on the *second consecutive trip* with a fail
  - Stores a History DTC on the second consecutive trip with a fail (The DTC will be armed after the first fail)
  - Stores a Freeze Frame on the second consecutive trip with a fail (if empty) (DTC Information for 6VE1 engine)
  - Stores a Fail Record when the first test fails (not dependent on *consecutive trip* fails)
  - Updates the Fail Record each time the diagnostic test fails

(Some special conditions apply to misfire and fuel trim DTCs)

- Type C (if the vehicle is so equipped)
  - Non-Emissions related
  - Requests illumination of the Service Lamp or the service message on the Drive Information Center (DIC) on the *first trip* with a fail
  - Stores a History DTC on the *first trip* with a fail
  - *Does not* store a Freeze Frame
  - Stores Fail Record when test fails
  - Updates the Fail Record each time the diagnostic test fails
- Type D
  - Non-Emissions related
  - Not request illumination of any lamp
  - Stores a History DTC on the *first trip* with a fail
  - *Does not* store a Freeze Frame
  - Stores Fail Record when test fails
  - Updates the Fail Record each time the diagnostic test fails

IMPORTANT: Only four Fail Records can be stored. Each Fail Record is for a different DTC. It is possible that there will not be Fail Records for every DTC if multiple DTCs are set.

Clear DTC

NOTE: If you clear the DTC (Diagnostic Trouble Codes) you will not be able to read any codes recorded during the last occurrence.

NOTE: To use the DTC again to identify a problem, you will need to reproduce the fault or the problem. This may require a new test drive or just turning the ignition on (this depends on the nature of the fault).

1. If you have a Tech 2:
   1. Connect the Tech 2 if it is still not connected GO THROUGH **Tech 2 OBD II CONNECTION.**
   2. Push “F1: Clear DTC Information” in the Application Menu and answer “Yes” to the question “Do you want to clear DTC’s?”
      a. When a malfunction still exists and the Tech 2 displays “4L30E CODES NOT CLEARED”. This means that the problem is still there or that the recovery was not done. Please **GO TO DTC CHECK.**
      b. When a malfunction has been repaired and the recovery is done. The Tech 2 displays “4L30E CODES CLEARED”.
2. If you have no Tech 2:
   Disconnect the PCM battery feed as necessary.

DTC Check

1. Diagnostic Trouble Codes (DTC) have been identified by Tech 2.
2. You have written the list of the DTCs. The order of the malfunctions has no meanings for this PCM. Usually only one or two malfunctions should be set for a given problem.
3. Check directly the DTCs you identified. The DTCs are sorted by number. Refer to *Diagnostic Trouble Code (DTC) Identification in this section.*

PCM Precaution

The PCM can be damaged by:

1. Electrostatic discharge
2. The short circuit of some terminals to voltage or to ground.

Electrostatic Discharge Damage Description:

1. Electronic components used to control systems are often designed to carry very low voltage, and are very susceptible to damage caused by electrostatic discharge. It is possible for less than 100 volts of static electricity to cause damage to some electronic components. By comparison, it takes as much as 4,000 volts for a person to even feel the zap of a static discharge.
2. There are several ways for a person to become statically charged. The most common methods of charging are by friction and induction. An example of charging by friction is a person sliding across a car seat, in which a charge of as much as 25,000 volts can build up. Charging by induction occurs when a person with well insulated shoes stands near a highly charged object and momentarily touches ground. Charges for the same polarity are drained off, leaving the person highly charged with the opposite polarity. Static charges of either type can cause damage, therefore, it is important to use care when handling and testing electronic components.

NOTICE: **To prevent possible electrostatic discharge damage:**

1. Do not touch the PCM connector pins or soldered components on the PCM circuit board.
2. Be sure to follow the guidelines listed below if servicing any of these electronic components:
3. Do not open the replacement part package until it is time to install the part.
4. Avoid touching electrical terminals of the part.
5. Before removing the part from its package, ground the package to a known good ground on the vehicle.
6. Always touch a known good ground before handling the part. This step should be repeated before installing the part if the part has been handled while sliding across the seat, while sitting down from a standing position or while walking some distance.

Information On PCM

1. The Powertrain Control Module (PCM) is located in the center console and is the control center of the electronic transmission control system.
2. The PCM must be maintained at a temperature below 85˚ (185˚F) at all times. This is most essential if the vehicle is put through a paint baking process. The PCM will become inoperative if its temperature exceeds 85˚C (185˚F). Therefore, it is recommended that the PCM be removed or that temporary insulation be placed around the PCM during the time the vehicle is in a paint oven or other high temperature process.
3. The PCM is designed to process the various inputs and then respond by sending the appropriate electrical signals to control transmission upshift, downshift, shift feel and torque converter clutch engagement.
4. The PCM constantly interprets information from the various sensors, and controls the systems that affect transmission and vehicle performance. By analyzing operational problems, the PCM is able to perform a diagnostic function by displaying DTC(s) and aid the technician in making repairs.

Intermittent Conditions

If the Tech 2 displays a diagnostic trouble code as intermittent, or if after a test drive a DTC does not reappear though the detection conditions for this DTC are present, the problem is most likely a faulty electrical connection or loose wiring. Terminals and grounds should always be the prime suspect. Intermittents rarely occur inside sophisticated electronic components such as the PCM.

Use the DTC information to understand which wires and sensors are involved.

When an intermittent problem is encountered, check suspect circuits for:

1. Poor terminal to wire connection.
2. Terminals not fully seated in the connector body (backed out).
3. Improperly formed or damaged terminals.
4. Loose, dirty, or corroded ground connections:
   HINT: Any time you have an intermittent in more than one circuit, check whether the circuits share a common ground connection.
5. Pinched or damaged wires.
6. Electro–Magnetic Interference (EMI):
   HINT: Check that all wires are properly routed away from coil, and generator. Also check for improperly installed electrical options, such as lights, 2–way radios, etc.

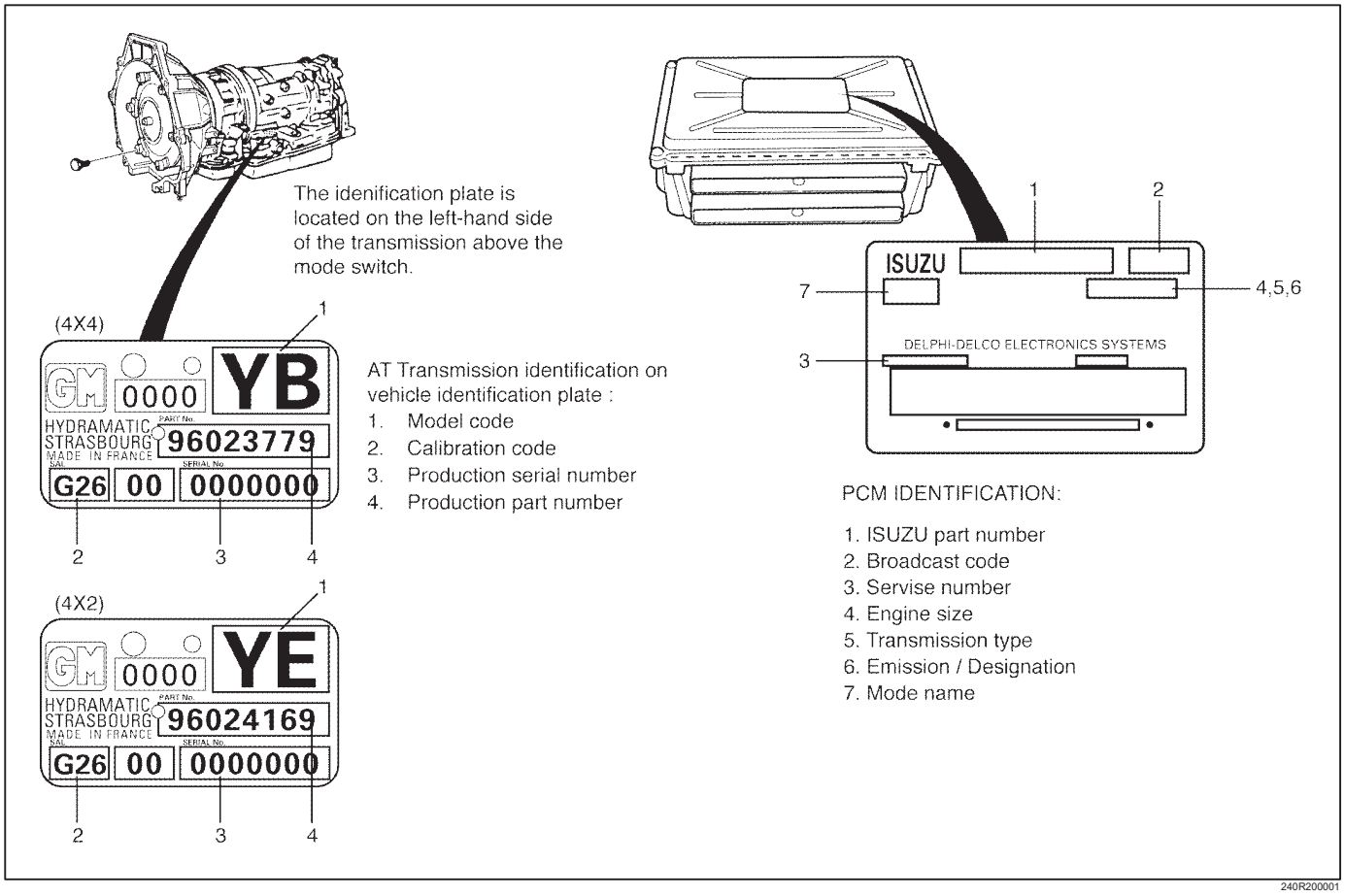
Use the F2: SNAPSHOT mode of the Tech 2 to help isolate the cause of an intermittent fault. The snapshot mode will record information before and after the problem occurs. Set the snapshot to “trigger” on the suspect DTC. If you notice the reported symptom during the test drive, trigger the snapshot manually.

After the snapshot has been triggered, command the Tech 2 to play back the flow of data recorded from each of the various sensors. Signs of an intermittent fault in a sensor circuit are sudden unexplainable jump in data values out of the normal range.

Transmission And PCM Identification

The chart below contains a list of all important information concerning rear axle ratio, Powertrain Control Module (PCM), and transmission identification.

VEHICLE		Rr axle Ratio	PCM	TRANSMISSION		
Type	Engine		ISUZU Parts No.	Calibration Code	Isuzu Part No.	Model Code
Isuzu / Axiom	3.5L V6	4.300	8–97287–830–0 8–09389–969–0	G26	8–96023–779–0	YB (4×4)
				G26	8–96024–169–0	YE (4×2)



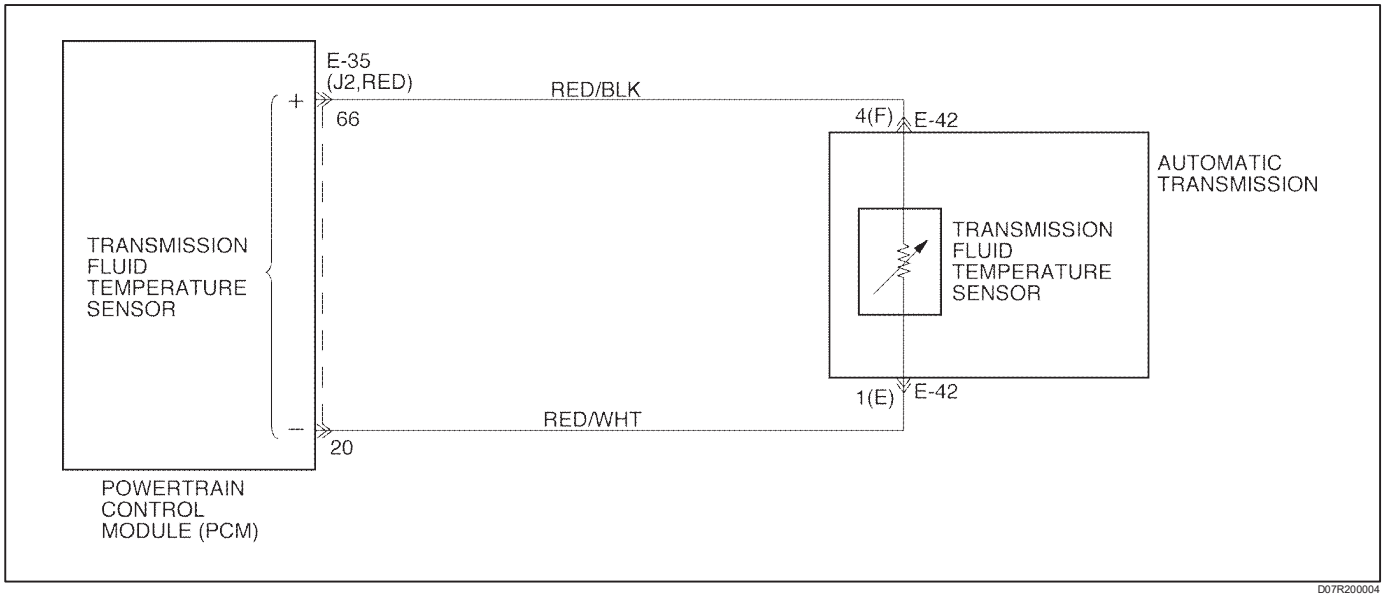
240R200001

Diagnostic Trouble Code (DTC) Identification

DTC NUMBER	DTC NAME	DTC TYPE	MIL "CHECK ENGINE"	"CHECK TRANS"
P0218	Transmission Fluid Over Temperature	D		
P0705	Transmission Range Switch (Mode Switch) Illegal Position	D		
P0706	Transmission Range Switch (Mode Switch) Performance	D		
P0711	Transmission Fluid Temperature (TFT) Sensor Performance	D		
P0712	Transmission Fluid Temperature (TFT) Sensor Circuit Low Input	D		
P0713	Transmission Fluid Temperature (TFT) Sensor Circuit High Input	D		
P0719	Brake Switch Circuit Low (Stuck On)	D		
P0722	Automatic Transmission Output Speed Sensor (OSS) Low Input	B	ON	Flash
P0723	Automatic Transmission Output Speed Sensor (OSS) Intermittent	B	ON	Flash
P0724	Brake Switch Circuit High (Stuck Off)	D		
P0730	Gear Error Without Input Speed	C		Flash
P0742	Torque Converter Clutch (TCC) System Stuck On	B	ON	Flash
P0748	Pressure Control Solenoid (PCS) (Force Motor) Circuit Electrical	C		Flash
P0751	Shift Solenoid A Performance (Stuck Off)	B	ON	Flash
P0752	Shift Solenoid A Performance (Stuck On)	B	ON	Flash
P0753	Shift Solenoid A Electrical	B	ON	Flash
P0756	Shift Solenoid B Performance (Stuck Off)	B	ON	Flash
P0757	Shift Solenoid B Performance (Stuck On)	B	ON	Flash
P0758	Shift Solenoid B Electrical	B	ON	Flash
P1850	Brake Band Apply Solenoid Malfunction	D		
P1860	TCC Solenoid Electrical	B	ON	Flash
P1870	Transmission Component Slipping (TCC Stuck Off)	B	ON	Flash

DTC TYPE	DEFINITION
B	Emission related, turn on MIL (Check Engine) and flashing Check Trans after 2 consecutive trips (Removal to confirmed)
C	Non–emission related, flashing Check Trans on 1st failure
D	Non–emission related, no lamps

DTC P0218 Transmission Fluid Over Temperature



Circuit Description

The Transmission Fluid Temperature (TFT) sensor is a thermister that controls the signal voltage to the PCM. The PCM supplies a 5–volt reference to the sensor on circuit RED/BLK. When the transmission fluid is cold, the sensor resistance is high and the PCM will sense high signal voltage. As the fluid temperature warms to a normal transmission operating temperature of 100˚C (212˚F), the sensor resistance becomes less and the voltage decreases to 1.5 to 2.0 volts.
This DTC detects a high transmission temperature for a long period of time. This is a type “D” DTC.

Conditions For Setting The DTC

- No TFT DTCs P0712 or P0713.
- TFT is greater than 135˚C (275˚F).
- All conditions met for 21 seconds.

Action Taken When The DTC Sets

- Hot mode TCC Shift Pattern.
- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).
- ATF Lamp ON. (TFT is greater than 145˚C (293˚F))
- Disable E–side TCC OFF request.

Conditions For Clearing The DTC

- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warm–up cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the PCM and transmission 7-way connector. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well.

  Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.
- Check harness routing for a potential short to ground in circuit RED/BLK.
- Scan tool TFT sensor temperature should rise steadily to about 100˚C (212˚F), then stabilize.
- Check for a “skewed” (mis–scaled) sensor by comparing the TFT sensor temperature to the ambient temperature after a vehicle cold soak. A “skewed” sensor can cause delayed garage shifts or TCC complaints.
- Check for a possible torque converter stator problem.
- Verify customer driving habits, trailer towing, etc.

Test Description

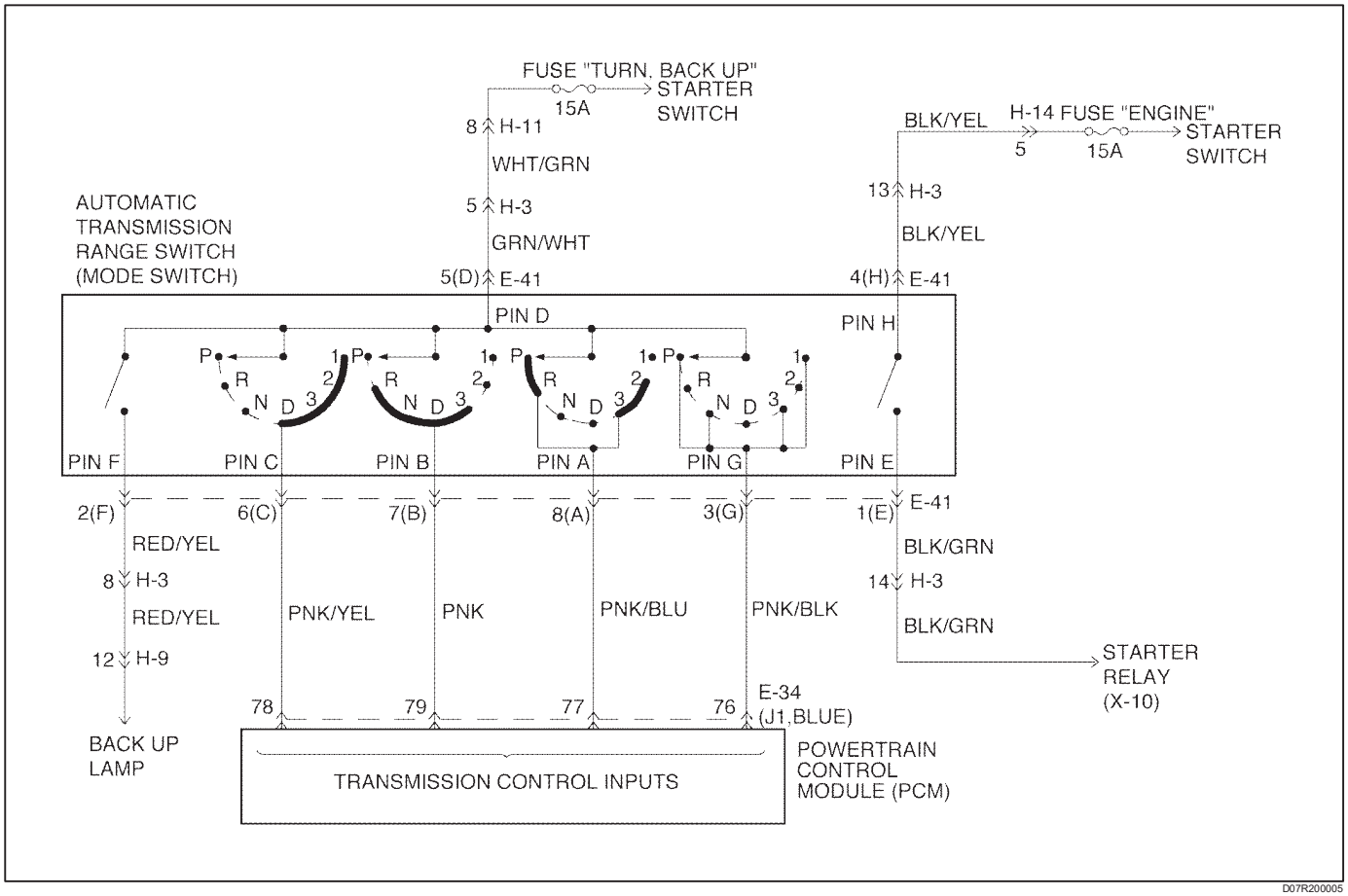
The numbers below refer to *the step numbers on the diagnostic chart.*

3. This test checks for a “skewed” sensor or shorted circuit.
4. This test simulates a TFT DTC P0713.

DTC P0218 Transmission Fluid Over Temperature

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	Perform the following checks: ● Check for possible engine system problems. ● Transmission fluid checking procedure. Refer to *Checking Transmission Fluid Level and Condition in Automatic Transmission (4L30–E) Section.* Were the checks performed?	Go to *Step 3*	—
3	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Failure Records” for reference, as data will be lost when “Clear Info” function is used. 3. Record the DTC “Failure Records”. Is the TFT sensor signal voltage less than 1.54 volts?	Go to *Step 4*	Go to *Diagnostic Aids*
4	1. Turn the ignition “off”. 2. Disconnect the transmission 7–way connector E–42 (additional DTCs may set). 3. With the engine “off”, turn the ignition switch “on”. Is the TFT sensor signal voltage greater than 4.92 volts?	Go to *Internal Wiring Harness Check*	Go to *Step 5*
5	Inspect/repair circuit RED/BLK for a short to ground. Was a problem found?	Go to *Step 7*	Go to *Step 6*
6	1. Inspect the PCM for poor connections. 2. Replace the PCM if no poor connections were found. Is the replacement complete?	Go to *Step 7*	—
7	1. After the repair is complete, use the scan tool to select “DTC”, then “Clear Info” function and ensure the following conditions are met: TFT is less than 125˚C (257˚F) for at least 10 seconds. 2. Review the scan tool “DTC Info”. Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0705 Transmission Range Switch (Mode Switch) Illegal Position



D07R200005

Circuit Description

- The range switch supplies the Powertrain Control Module (PCM) with information regarding the selector lever position: P, R, N, D, 3, 2 or L. The selector lever position is indicated by the state of four ON/OFF contacts. The range switch is located on one side of the transmission. It is on the transmission manual shaft and is fixed to the main case.
- The range switch is also used to provide the information P or N to the engine crank wiring. The engine can be cranked only if connector E–41 terminal 4(H) is connected to terminal 1(E) which is connected to ground.
- The range switch is also used to provide the backup lamp power in reverse. This is the reason why the range switch is supplied through a 15A fuse (TURN, BACK UP). This fuse can burn due to a short circuit in the back up lamp.

This DTC detects when a fuse is open or the range switch circuit does not work. This is a type “D” DTC.

Conditions For Setting The DTC

- Range switch illegal positions met for 5 seconds.

Action Taken When The DTC Sets

- Default to D position.
- Inhibit torque management.
- Maximum line pressure.
- Turn Force Motor OFF.
- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).

Conditions For Clearing The DTC

- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Refer to *accompanying chart for the normal range signals and the illegal combinations.*
- Inspect the wiring for poor electrical connections at the PCM and at the transmission 8–way connector. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.
- Refer to the *“Range Switch Logic Table” for further information.*

Test Description

The numbers below refer to the step numbers on the diagnostic chart:

3. This test checks the indicated range signal to the manual valve actually selected.
6. This test checks for continuity between each selected range switch connector terminals.

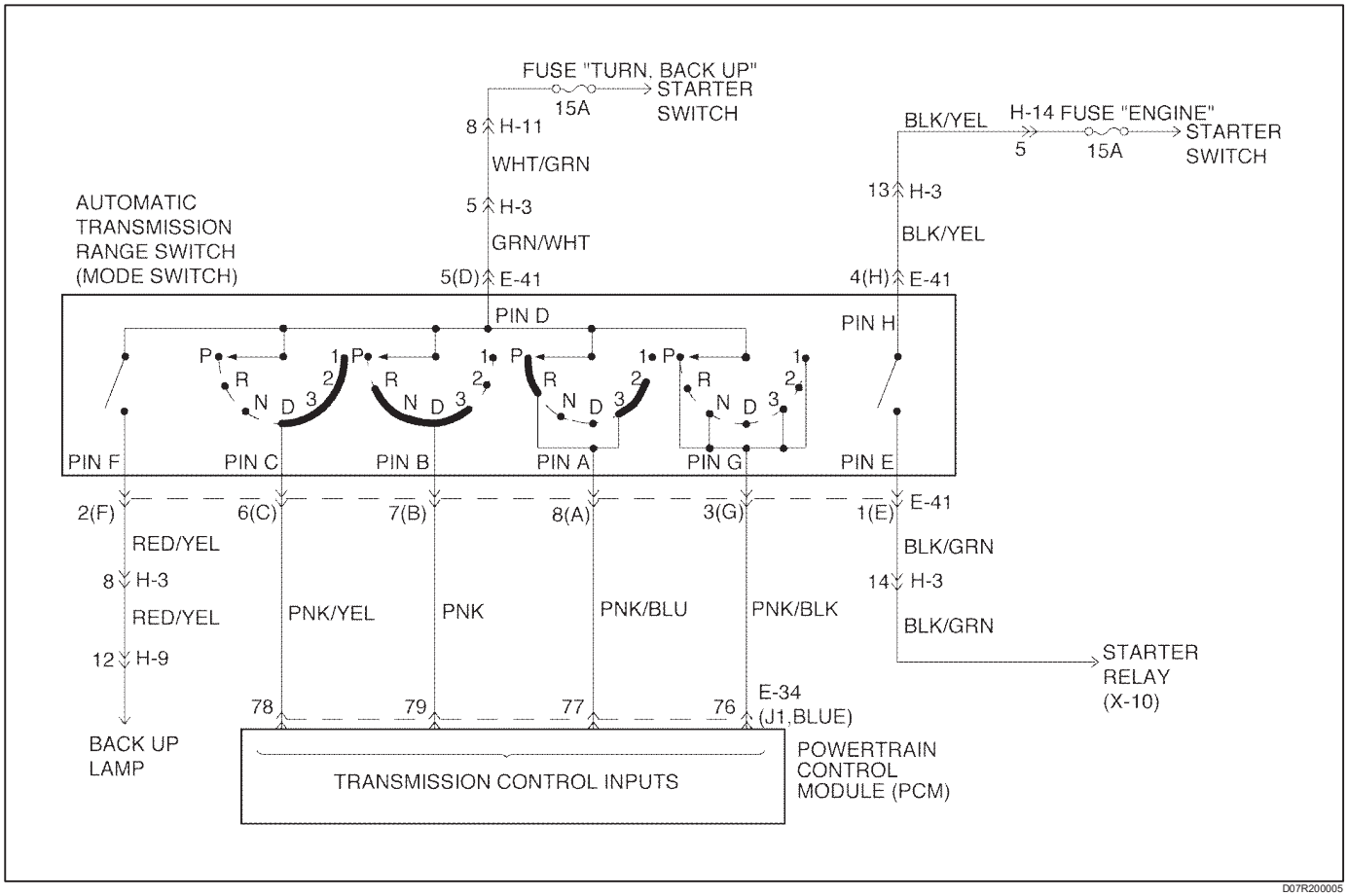
Range Switch Logic Table

Range Position	Range Switch Pin			
	A	B	C	P(G)
Park	ON	OFF	OFF	ON
Reverse	ON	ON	OFF	OFF
Neutral	OFF	ON	OFF	ON
D4	OFF	ON	ON	OFF
D3	ON	ON	ON	ON
2	ON	OFF	ON	OFF
L	OFF	OFF	ON	ON
Illegal	OFF	OFF	OFF	OFF
Illegal	OFF	OFF	OFF	ON

DTC P0705 Transmission Range Switch (Mode Switch) Illegal Position

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	Perform the following checks: ● The transmission linkage from the select lever to the manual valve is adjusted properly. ● Diagnostic circuit check. Were the checks performed?	Go to *Step 3*	—
3	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. 4. Select each transmission range: DL, D2, D3, D4, N, R, and P. Does each selected transmission range match the scan tool “Range Switch” display?	Go to *Diagnostic Aids*	Go to *Step 4*
4	Are all range switch pin displays incorrect?	Go to *Step 5*	Go to *Step 6*
5	Check fuse and wiring to the 8–way connector terminal 5(D) for opens. Refer to *Mode Switch in Automatic Transmission (4L30–E) section.* If no problem was found, replace the range switch. Is the replacement complete?	Go to *Step 9*	—
6	1. Disconnect the 8–way range switch connector. 2. Using ohmmeter, check continuity between terminal 5(D) and respectively terminals 3(G), 6(C), 7(B) and 8(A) of the 8–way range switch connector. 3. Move shift selector lever through all positions and compare results with “Range Switch Logic Table”. Is one range switch pin display incorrect?	Go to *Step 7*	Go to *Step 8*
7	Check the affected wiring and connector, and repair. Is the repair complete?	Go to *Step 9*	—
8	Check the Powertrain Control Module (PCM) connectors for poor connection. If no problem was found, replace the PCM. Is the replacement complete?	Go to *Step 9*	—
9	1. After the repair is complete, use the scan tool to select “DTC”, then “Clear Info” function and road test the vehicle. 2. Review the scan tool “DTC Info”. Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0706 Transmission Range Switch (Mode Switch) Performance



D07R200005

Circuit Description

- The range switch supplies the Powertrain Control Module (PCM) with information regarding the selector lever position: P, R, N, D, 3, 2 or L. The selector lever position is indicated by the state of four ON/OFF contacts. The range switch is located on one side of the transmission. It is on the transmission manual shaft and is fixed to the main case.
- The range switch is also used to provide the information P or N to the engine crank wiring. The engine can be cranked only if connector E–41 terminal 4(H) is connected to terminal 1(E) which is connected to ground.
- The range switch is also used to provide the back up lamp power in reverse. This is the reason why the mode switch is supplied through a 15A fuse (TURN, BACK UP). This fuse can burn due to a short circuit in the back up lamp.
- This DTC detects an invalid state of the range switch or the range switch circuit by deciphering the range switch inputs. This is a type “D” DTC.

Conditions For Setting The DTC

This DTC will set if any of the following conditions occurs:

Condition 1 (“R” bad position):

- Engine is running.
- No output speed DTCP0722, P0723.
- Output speed greater than 3,200 RPM.
- Range switch indicates “R”.
- All conditions met for 4 seconds.

Condition 2 (“P” or “N” bad position):

- Engine is running.
- No TPS codes.
- Engine speed is less than 3,000 RPM.
- TP angle is greater than 20%.
- Range switch indicates “P” or “N”.
- All conditions met for 4 seconds.

Action Taken When The DTC Sets

- Default to “D” position.
- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).

Conditions For Clearing The DTC

- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Refer to *the accompanying chart for the normal range signals and the illegal combinations.*
- Inspect the wiring for poor electrical connections at the PCM and at the transmission 8–way connector. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.
- Refer to the *"Range Switch Logic Table" for further information.*

Test Description

The numbers below refer to the step numbers on the diagnostic chart:

3. This test checks the indicated range signal to the manual valve actually selected.
6. This test checks for continuity between each selected range switch connector terminals.

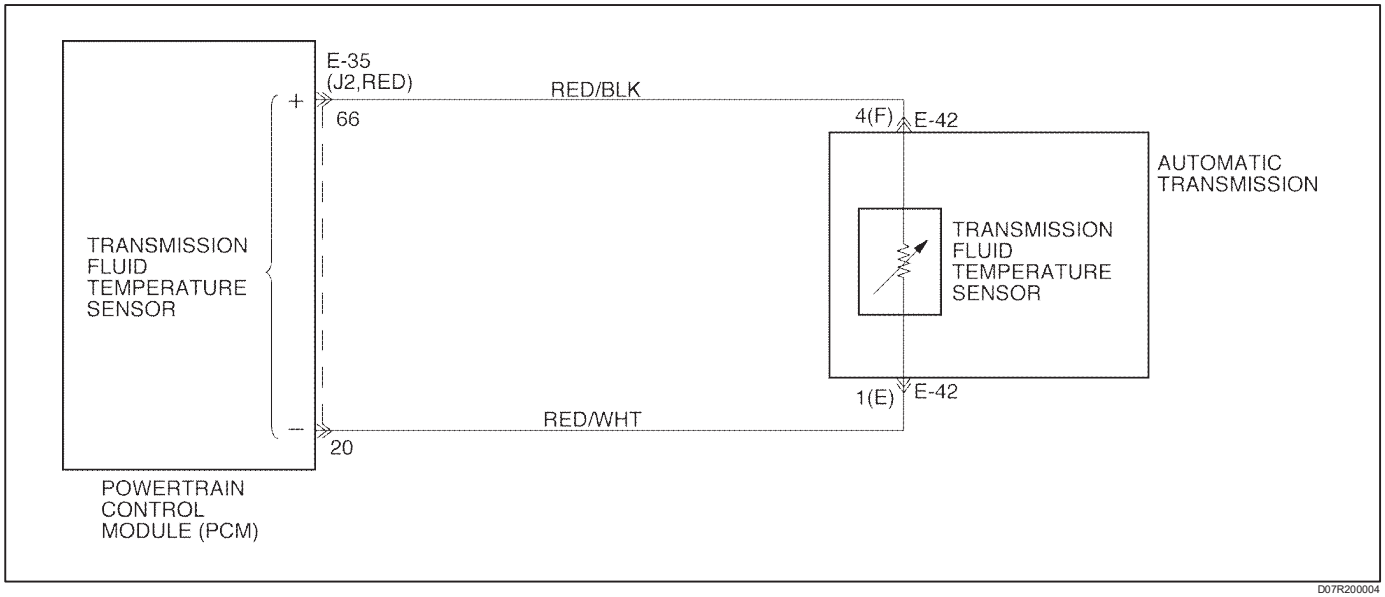
Range Switch Logic Table

Range Position	Range Switch Pin			
	A	B	C	P(G)
Park	ON	OFF	OFF	ON
Reverse	ON	ON	OFF	OFF
Neutral	OFF	ON	OFF	ON
D4	OFF	ON	ON	OFF
D3	ON	ON	ON	ON
2	ON	OFF	ON	OFF
L	OFF	OFF	ON	ON
Illegal	OFF	OFF	OFF	OFF
Illegal	OFF	OFF	OFF	ON

DTC P0706 Transmission Range Switch (Mode Switch) Performance

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	Perform the following checks: ● The transmission linkage from the select lever to the manual valve is adjusted properly. ● Diagnostic circuit check. Were the checks performed?	Go to *Step 3*	—
3	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. 4. Select each transmission range: DL, D2, D3, D4, N, R, and P. Does each selected transmission range match the scan tool “Range Switch” display?	Go to *Diagnostic Aids*	Go to *Step 4*
4	Are all range switch pin displays incorrect?	Go to *Step 5*	Go to *Step 6*
5	Check fuse and wiring to the 8–way connector terminal 5(D) for opens. Refer to *Mode Switch in Automatic Transmission (4L30–E) section.* If no problem was found, replace the range switch. Is the replacement complete?	Go to *Step 9*	—
6	1. Disconnect the 8–way range switch connector. 2. Using ohmmeter, check continuity between terminal 5(D) and respectively terminals 3(G), 6(C), 7(B) and 8(A) of the 8–way range switch connector. 3. Move shift selector lever through all positions and compare results with “Range Switch Logic Table”. Is one range switch pin display incorrect?	Go to *Step 7*	Go to *Step 8*
7	Check the affected wiring and connector, and repair. Is the repair complete?	Go to *Step 9*	—
8	Check the Powertrain Control Module (PCM) connectors for poor connection. If no problem was found, replace the PCM. Is the replacement complete?	Go to *Step 9*	—
9	1. After the repair is complete, use the scan tool to select “DTC”, then “Clear Info” function and road test the vehicle. 2. Review the scan tool “DTC Info”. Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0711 Transmission Fluid Temperature (TFT) Sensor Performance



Circuit Description

The TFT sensor is a thermister that controls the signal voltage to the PCM. The PCM supplies a 5 volt reference signal to the sensor on circuit RED/BLK. When the transmission fluid is cold, the sensor resistance is high and the PCM detects high signal voltage. As the transmission fluid temperature increases to normal operating temperature of 100˚C (212˚F), the sensor resistance becomes less and the voltage decreases to 1.5 to 2 volts.

When the PCM detects a TFT sensor that remains at the startup value, or a sensor that has a change delta of greater than 20˚C (36˚F) less than 1 second, DTC P0711 sets. DTC P0711 is a type D.

Conditions For Setting The DTC

- No VSS DTCs P0722 or P0723.
- No Transmission Component Slipping DTC P1870.
- Engine is running.
- TFT is between 20 A/D (Analog/Digital) counts and 248 A/D counts.
- TFT is between –40˚C (–40˚F) and +21˚C (69.8˚F) at engine startup.
- Engine coolant temperature is greater than 70˚C (150˚F).
- Engine coolant temperature has changed by greater than 50˚C (90˚F) since engine startup.
- Vehicle speed has been greater than 5 mph for greater than 410 seconds since engine startup (cumulative timer).
- TCC slip speed has been greater than 120 rpm for greater than 410 seconds since engine startup (cumulative timer).
- Battery voltage is between 10 and 16 volts.

All of the above is true and either of the following occurs:

- If the sensor is stuck, the TFT has not changed for greater than 2 counts (from startup temperature) for greater than 410 seconds.
- If the sensor shows an unrealistic change, the TFT exhibits a change delta of greater than 20˚C (36˚F), greater than 14 times in 7 seconds.

Action Taken When The DTC Sets

- Transmission default temperature will be:

  80˚C (176˚F) if engine temperature code is set.

  100˚C (212˚F) if engine temperature is warm.

  80˚C (176˚F) if engine run time is greater than 5 minutes.

  21˚C (69.8˚F) if engine run time is less than 5 minutes.
- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).

Conditions For Clearing The DTC

- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Inspect the wiring for poor electrical connection at the PCM. Inspect the wiring for poor electrical connections at the transmission 7-way connector. Look for the following conditions:
  a. A bent terminal
  b. A backed out terminal
  c. A damaged terminal
  d. Poor terminal tension
  e. A chafed wire
  f. A broken wire inside the insulation

- When diagnosing for an intermittent short or open connection, move the wiring harness while watching the test equipment for a change.
- First diagnose and clear any engine DTCs or TP Sensor codes. Then inspect for any transmission DTCs that may have reset.

Test Description

The number below refers to the step number on the diagnostic chart:

3. This test checks PCM and associated wiring up to the 7–way connector. If the voltage increases to match chart the problem is isolated to the transmission wiring.

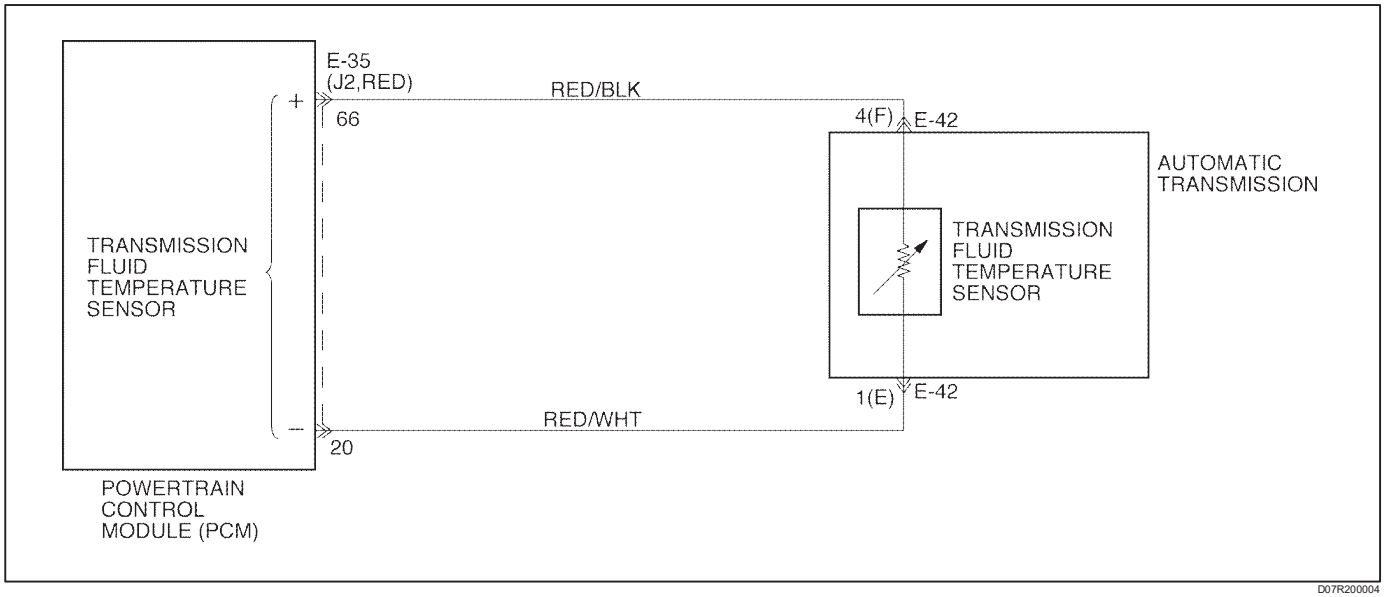
DTC P0711 Transmission Fluid Temperature (TFT) Sensor Performance

Step	Action	Yes	No
1	Was the Powertrain On–Board Diagnostic (OBD) System Check performed?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	Perform the transmission fluid checking procedure. Refer to *Checking Transmission Fluid Level and Condition in Automatic Transmission (4L30–E) section.* Did you perform the fluid checking procedure?	Go to *Step 3*	Go to *Checking Transmission Fluid Level and Condition in Automatic Transmission (4L30–E) section*
3	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch to the “on” position. NOTE: Before clearing DTCs, use the scan tool in order to record the Freeze Frame and Failure Records for reference. The Clear Info function will erase the data. 3. Record the DTC Freeze Frame and Failure Records. 4. Select TFT on the scan tool. 5. While observing the scan tool display, move or massage the engine wiring harness from PCM connectors E35–66 and E35–20 to the transmission 7–way connector E–42. Does the TFT change by more than ±20˚C (36˚F)?	Go to *Step 6*	Go to *Step 4*
4	1. Turn the ignition “off”. 2. Disconnect the transmission 7–way connector E–42. 3. Install Jumper Harness on the transmission side of the 7–way connector E–42. 4. Using the J39200 DVOM and J35616 Connector Test Adapter Kit, connect the DVOM leads from terminal E42–4(F) to terminal E42–1(E). 5. Set the DVOM on MIN/MAX to measure resistance. 6. Record the TFT sensor resistance. 7. Move or massage the automatic transmission wiring harness assembly from the PCM to the TFT sensor connector. (See Transmission Fluid Temperature (TFT) Sensor Specifications.) Does the DVOM MAX display a resistance greater than the value recorded in Action item 6 of this step?	Go to *Step 7*	Go to *Step 5*
5	Does the DVOM MIN display a resistance less than the value recorded in Action item 6 of step 4?	Go to *Step 8*	—
6	Inspect circuit RED/BLK and RED/WHT of the engine wiring harness for an intermittent open or short condition. Repair the circuits if necessary. Did you find a problem?	Go to *Step 12*	Go to *Step 11*

DTC P0711 Transmission Fluid Temperature (TFT) Sensor Performance (Cont'd)

Step	Action	Yes	No
7	Inspect the automatic transmission wiring harness assembly for an intermittent open in circuits RED/BLK and RED/WHT. Did you find a problem?	Go to *Step 9*	Go to *Step 10*
8	Inspect the automatic transmission wiring harness assembly for an intermittent shorted condition in circuits RED/BLK and RED/WHT. Did you find a problem?	Go to *Step 9*	Go to *Step 10*
9	Replace the automatic transmission wiring harness assembly. Is the replacement complete?	Go to *Step 12*	—
10	Replace TFT Sensor. Refer to *Transmission Oil Temperature Sensor (Main Case) in Automatic Transmission (4L30–E) section*. Is the replacement complete?	Go to *Step 12*	—
11	Replace the PCM. Refer to *Powertrain Control Module (PCM) in Automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 12*	—
12	In order to verify your repair, perform the following procedure. 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle and ensure the following conditions are met: ● The TFT changes by more than 2.25˚C (4.05˚F) for 11 seconds since startup. ● The TFT does not change by more than 20˚C (36˚F) within 0.200 second for a period of at least 11 seconds. 4. Select Specific DTC. 5. Enter DTC P0711. Has the test run and passed?	System OK	Begin the diagnosis again Go to *Step 1*

DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input



Circuit Description

The TFT sensor is a thermister that controls the signal voltage to the PCM. The PCM supplies a 5–volt reference signal to the sensor on circuit RED/BLK. When the transmission fluid is cold, the sensor resistance is high. The PCM detects high signal voltage. As the transmission fluid temperature increases to the normal operating temperature of 100˚C (212˚F), the sensor resistance becomes less and the voltage decreases to 1.5 to 2 volts. With transmission fluid over temperature and DTC P0218 also set, check the transmission cooling system.

This DTC detects a continuous short to ground in the TFT signal circuit or the TFT sensor. This is a type “D” DTC.

Conditions For Setting The DTC

- Battery voltage is between 10 and 16 volts.
- Ignition is “on”.
- TFT sensor indicating a voltage less than 0.4 volts.
- All conditions met for 20 seconds.

Action Taken When The DTC Sets

- Transmission default temperature will be:

  80˚C (176˚F) if engine temperature code is set.

  100˚C (212˚F) if engine temperature is warm.

  80˚C (176˚F) if engine run time is greater than 5 minutes.

  21˚C (69.8˚F) if engine run time is less than 5 minutes.
- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).

Conditions For Clearing The DTC

- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Check harness routing for a potential short to ground in circuit RED/BLK. Scan tool TFT display should rise steadily to about 100˚C (212˚F), then stabilize.
- Inspect the wiring for poor electrical connection at the PCM and transmission 7-way connector. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.
- The temperature to resistance value scale may be used to test the TFT sensor at the various temperature levels to evaluate the possibility of a “skewed” (mis–scaled) sensor.

  A “skewed” sensor could result in delayed garage shifts or TCC complaints.
- Verify customer driving habits, trailer towing, etc.

Test Description

The numbers below refer to the step numbers on the diagnostic chart:

3. This test checks for a short to ground or a “skewed” sensor.
4. This test checks for an internal fault within the transmission by creating an open.

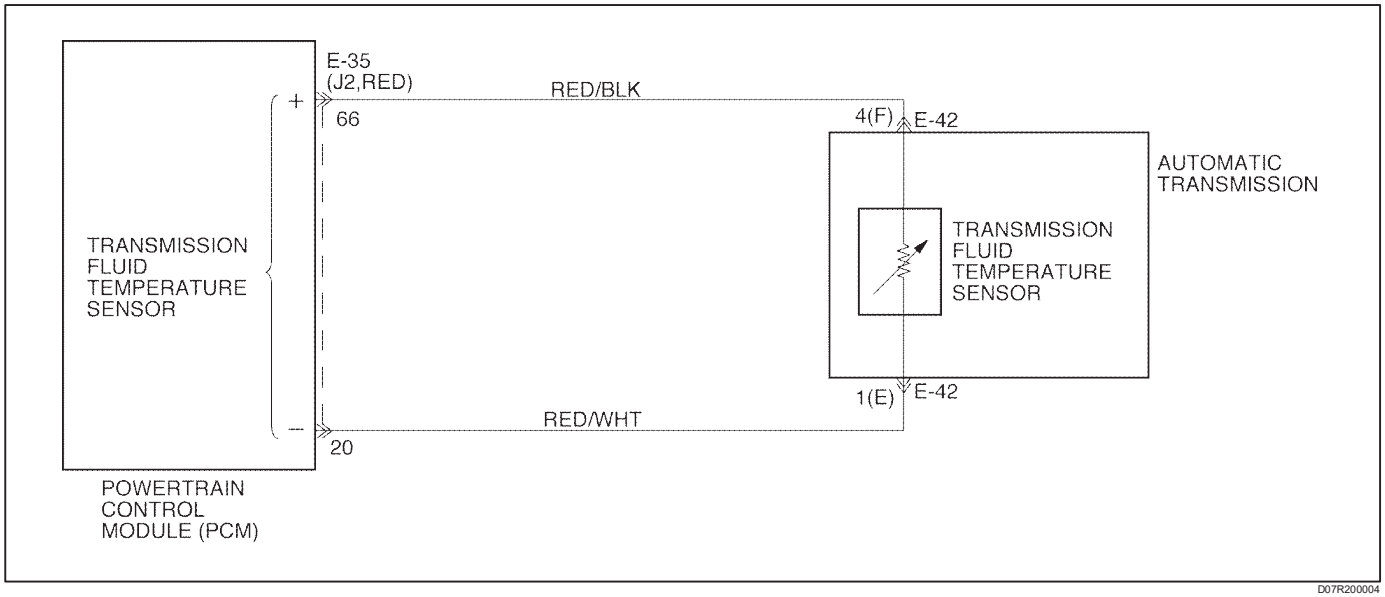
DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	Perform the transmission fluid checking procedure. Refer to *Checking Transmission Fluid Level and Condition in Automatic Transmission (4L30–E) section* Was the fluid checking procedure performed?	Go to *Step 3*	Refer to *Checking Transmission Fluid Level and Condition in Automatic Transmission (4L30–E) section*
3	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. Does the scan tool display a TFT sensor signal voltage less than 0.4 volts?	Go to *Step 4*	Go to *Diagnostic Aids*
4	1. Turn the ignition “off”. 2. Disconnect the transmission 7–way connector E–42. 3. Turn the ignition “on”. Does the TFT signal voltage change to match the voltage 4.92 volts?	Go to *Step 5*	Go to *Step 10*
5	Using the J39200 DVOM, measure the resistance between terminals E42–4(F) and E42–1(E). Is the resistance within specifications? (See Transmission Fluid Temperature (TFT) Sensor Specifications.)	Go to *Diagnostic Aids*	Go to *Step 6*
6	1. Disconnect the transmission 7–way connector E–42. 2. Using the J39200 DVOM, measure the resistance between terminals E42–4(F) and E42–1(E). Is the resistance within specifications? (See Transmission Fluid Temperature (TFT) Sensor Specifications.)	Go to *Diagnostic Aids*	Go to *Step 7*
7	1. Remove the transmission oil pan. Refer to *Transmission Oil Temperature Sensor (Main Case) in Automatic Transmission (4L30–E) section.* 2. Check the internal wiring harness for a short to ground. Was a problem found?	Go to *Step 9*	Go to *Step 8*
8	1. Disconnect the internal wiring harness at the TFT sensor. 2. Measure the resistance of the TFT sensor. Is the resistance within specifications? (See Transmission Fluid Temperature (TFT) Sensor Specifications.)	Go to *Diagnostic Aids*	Go to *Step 9*
9	Replace the TFT Sensor. Is the replacement complete?	Go to *Step 13*	—
10	Check circuit RED/BLK for a short to ground. Was a problem found?	Go to *Step 13*	Go to *Step 11*

DTC P0712 Transmission Fluid Temperature (TFT) Sensor Circuit Low Input (Cont'd)

Step	Action	Yes	No
11	Check the PCM for faulty connections. Was a problem found?	Go to *Step 13*	Go to *Step 12*
12	Replace the PCM. Refer to *Powertrain Control Module (PCM) in Automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 13*	—
13	1. After the repair is complete, use the scan tool to select "DTC", then "Clear Info" function and ensure the following conditions are met: TFT sensor indicates a voltage greater than 0.33 volts for 2 seconds. 2. Review the scan tool "DTC info". Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input



Circuit Description

The TFT sensor is a thermistor that controls the signal voltage to the PCM. The PCM supplies a 5–volt reference signal to the sensor on circuit RED/BLK. When the transmission fluid is cold, the sensor resistance is high and the PCM will sense high signal voltage. As the transmission fluid temperature warms to the normal operating temperature of 100˚C (212˚F), the sensor resistance becomes less and the voltage decreases to about 1.5 to 2 volts.

This DTC detects a continuous open or short to power in the TFT signal circuit or the TFT sensor. This is a type “D” DTC.

Conditions For Setting The DTC

- Battery voltage is between 10 and 16 volts.
- Ignition is “on”.
- TFT sensor indicating a voltage greater than 4.86 volts.
- All conditions met for 20 seconds.

Action Taken When The DTC Sets

- Transmission default temperature will be:

  80˚C (176˚F) if engine temperature code is set.

  100˚C (212˚F) if engine temperature is warm.

  80˚C (176˚F) if engine run time is greater than 5 minutes.

  21˚C (69.8˚F) if engine run time is less than 5 minutes.
- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).

Conditions For Clearing The DTC

- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Inspect the wiring for poor electrical connection at the PCM and transmission 7-way connector. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.
- Scan tool displays transmission fluid temperature in degrees. After transmission is operating, the temperature should rise steadily to about 100˚C (212˚F), then stabilize.
- The temperature to resistance value scale may be used to check the TFT sensor at the various temperature levels to evaluate the possibility of a “skewed” (mis–scaled) sensor.

  A “skewed” sensor could result in hard shifts or TCC complaints.

Test Description

The numbers below refer to the step numbers on the diagnostic chart:

3. This check verifies problem in the TFT sensor circuit.
4. This test simulates a TFT sensor DTC P0712. If the PCM recognizes the low signal voltage (high temperature), and the scan tool displays 146˚C (295˚F) or greater, the PCM and wiring are OK.
5. This test checks the TFT sensor and internal wiring harness.

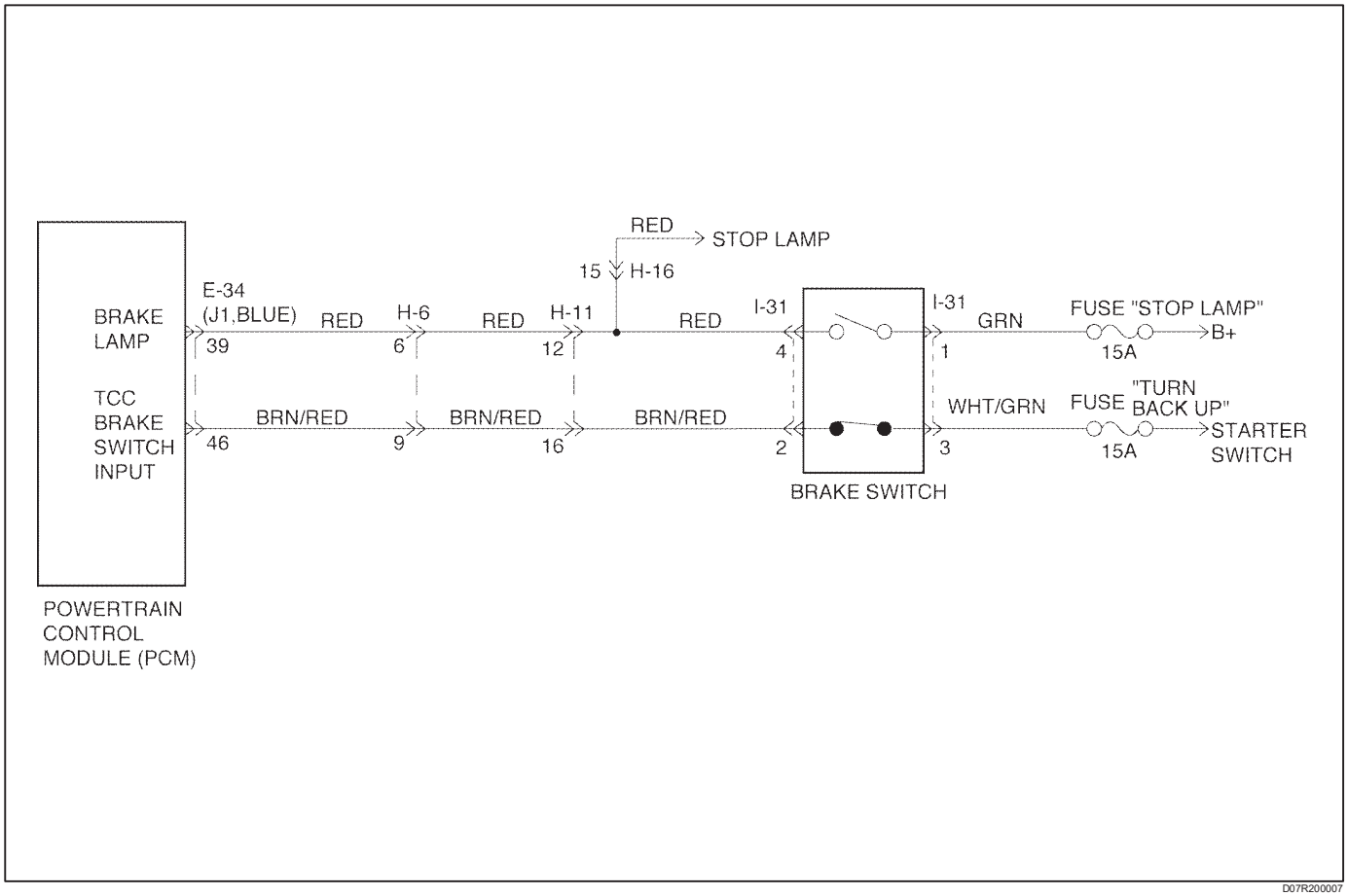
DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emission in Engine section*
2	Perform the transmission fluid checking procedure. Refer to *Checking Transmission Fluid Level and Condition in Automatic Transmission (4L30–E) section.* Was the fluid checking procedure performed?	Go to *Step 3*	Refer to *Checking Transmission Fluid Level and Condition in Automatic Transmission (4L30–E) section*
3	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. Does the scan tool display a TFT sensor signal voltage greater than 4.86 volts?	Go to *Step 4*	Go to *Diagnostic Aids*
4	1. Turn the ignition “off”. 2. Disconnect the transmission 7–way connector E–42. 3. Install a fused jumper wire from terminal E42–4(F) to E42–1(E) on the engine harness. 4. Turn the ignition “on”. Does the TFT signal voltage drop to less than 0.4 volts?	Go to *Step 5*	Go to *Step 10*
5	1. Turn the ignition “off”. 2. Using the J39200 DVOM, measure the resistance between terminals E42–4(F) and E42–1(E). Is the resistance within specifications? (See Transmission Fluid Temperature (TFT) Sensor Specifications.)	Go to *Diagnostic Aids*	Go to *Step 6*
6	1. Disconnect the transmission 7–way connector E–42. 2. Using the J39200 DVOM, measure the resistance between terminals E42–4(F) and E42–1(E). Is the resistance within specifications? (See Transmission Fluid Temperature (TFT) Sensor Specifications.)	Go to *Diagnostic Aids*	Go to *Step 7*
7	1. Remove the transmission oil pan. 2. Check the internal wiring harness for an open. Refer to *Transmission Oil Temperature Sensor (Main Case) in Automatic Transmission (4L30–E) section.* Was a problem found and corrected?	Go to *Step 14*	Go to *Step 8*
8	1. Disconnect the internal wiring harness at the TFT sensor. 2. Measure the resistance of the TFT sensor. Is the resistance within specifications? (See Transmission Fluid Temperature (TFT) Sensor Specifications.)	Go to *Diagnostic Aids*	Go to *Step 9*
9	Replace TFT sensor. Refer to *Transmission Oil Temperature Sensor (Main Case) in Automatic Transmission (4L30–E) section*. Is the replacement complete?	Go to *Step 14*	—

DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input (Cont'd)

Step	Action	Yes	No
10	Check circuit RED/BLK for an open or short to B+. Was a problem found?	Go to *Step 14*	Go to *Step 11*
11	Check circuit RED/WHT for an open. Was a problem found?	Go to *Step 14*	Go to *Step 12*
12	Check the PCM for faulty or intermittent connections. Was a problem found?	Go to *Step 14*	Go to *Step 13*
13	Replace the PCM. Refer to *Powertrain Control Module (PCM) in Automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 14*	—
14	1. After the repair is complete, use the scan tool to select "DTC", then "Clear Info" function and ensure the following conditions are met: 2. TFT sensor indicates a voltage less than 4.92 volts for 2 seconds. 3. Review the scan tool "DTC Info". Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0719 Brake Switch Circuit Low (Stuck On)



D07R200007

Circuit Description:

The brake switch indicates brake pedal status to the Powertrain Control Module (PCM). The brake switch is a normally–closed switch that supplies battery voltage on circuit BRN/RED to the PCM. Applying the brake pedal opens the switch, interrupting voltage to the PCM. When the brake pedal is released, the PCM receives a constant voltage signal. If the PCM receives a zero voltage signal at the brake switch input, and the Torque Converter Clutch (TCC) is engaged, the PCM de–energizes the Torque Converter Clutch Solenoid Valve (TCC Sol. Valve). The PCM disregards the brake switch input for TCC scheduling if there is a brake switch circuit fault (Refer to *Diagnostic Aids*).

When the PCM detects an open brake switch circuit (0 volts, low input) during accelerations, then DTC P0719 sets. DTC P0719 is a type D DTC.

Conditions For Setting The DTC

- No OSS Assy. DTCs P0722 or P0723.
- The PCM detects an open brake switch or circuit (0 volts) for 15 minutes without changing for 2 seconds, and the following events occur seven consecutive times.
  - The vehicle speed is less than 8 km/h (5 mph).
  - then the vehicle speed is 8–32 km/h (5–20 mph) for 4 seconds.
  - then the vehicle speed is greater than 32 km/h (20 mph) for 4 seconds.

Action Taken When The DTC Sets

- The PCM does not illuminate the Malfunction Indicator Lamp (MIL).
- DTC P0719 stores in PCM history.

Conditions For Clearing The DTC

- A scan tool can clear the DTC from the PCM history. The PCM clears the DTC from the PCM history if the vehicle completes 40 warm–up cycles without a failure reported.
- The PCM cancels the DTC default actions when the fault no longer exists and the ignition is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the PCM and brake switch. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.
- Check customer driving habits and/or unusual driving conditions (i.e. stop and go, highway).
- Check brake switch for proper mounting and adjustment.

Test Description

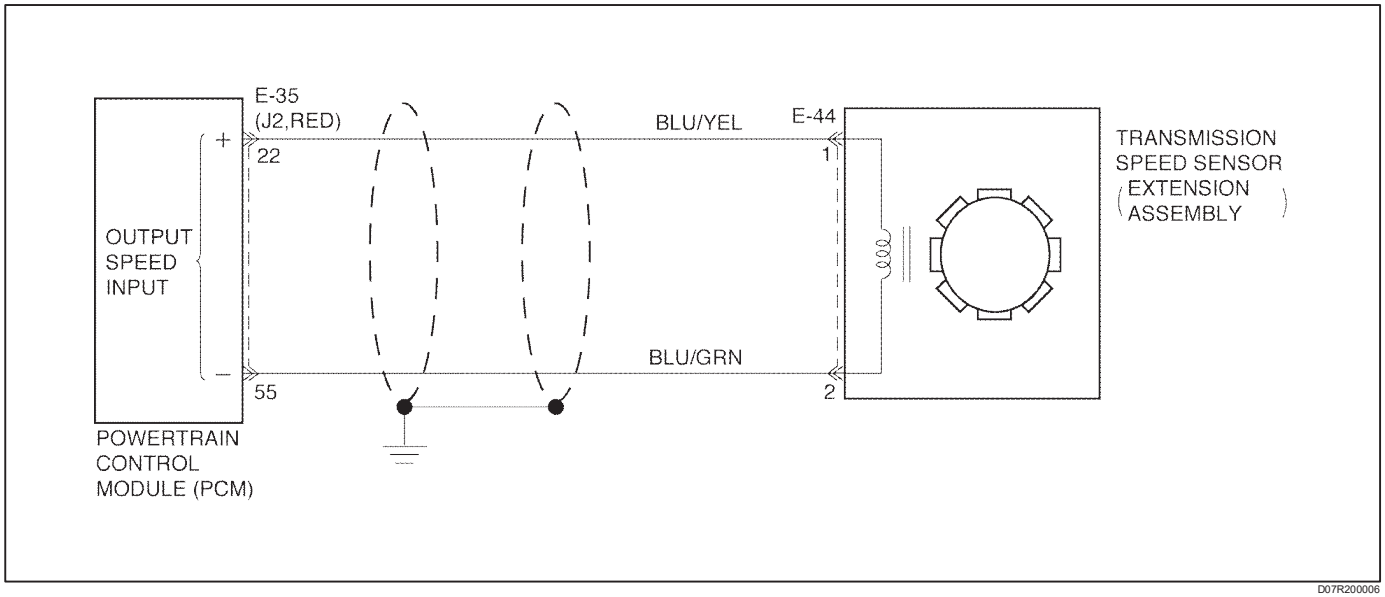
The numbers below refer to the step numbers on the diagnostic chart:

3. This step isolates the brake switch as a source for setting the DTC.

DTC P0719 Brake Switch Circuit Low (Stuck On)

Step	Action	Yes	No
1	Was the Powertrain On–Board Diagnostic (OBD) System Check performed?	Go to *Step 2*	Go to *Powertrain OBD System Check*
2	1. Install the scan tool. 2. With the engine “off,” turn the ignition switch to the “on” position. NOTE: Before clearing the DTC(s), use the scan tool in order to record the “Failure Records” for reference. Using the “Clear Info” function will erase the stored “Failure Records” from the PCM. 3. Record the “DTC Failure Records”, then clear the DTC(s). 4. Select “TCC Brake Switch” on the scan tool. 5. Disconnect the brake switch connector from the brake switch. 6. Connect a test lamp from cavity I31–3 of the brake switch connector to a known good ground. Is the test lamp ON?	Go to *Step 3*	Go to *Step 4*
3	Install a J 36169–A Fused Jumper Wire from terminal I31–2 to terminal I31–3 of the brake switch connector. Did the TCC Brake Switch status change from Open to Closed?	Go to *Step 7*	Go to *Step 9*
4	1. Remove the fuse “TURN, BACK UP”. 2. Inspect the fuse for an open. Is the fuse open?	Go to *Step 5*	Go to *Step 8*
5	Inspect circuit WHT/GRN for a short to ground condition. Repair the circuit if necessary. Did you find a short to ground condition?	Go to *Step 11*	Go to *Step 6*
6	Inspect circuit BRN/RED for a short to ground condition. Repair the circuit if necessary. Did you find a short to ground condition?	Go to *Step 11*	Go to *Step 10*
7	Replace the brake switch. Is the replacement complete?	Go to *Step 11*	—
8	Inspect circuit WHT/GRN for an open condition. Repair the circuit if necessary. Did you find and correct an open condition?	Go to *Step 11*	—
9	Inspect circuit BRN/RED for an open. Did you find an open condition?	Go to *Step 11*	Go to *Step 10*
10	Replace the PCM. Is the replacement complete?	Go to *Step 11*	—
11	In order to verify your repair, perform the following procedure: 1. Select DTC. 2. Select Clear Info. 3. With the engine “off,” turn the ignition switch to the “on” position. 4. Do not depress the brake pedal. 5. Verify that the Brake Switch status indicates “Closed” (12 volts) for 2 seconds. 6. Select Specific DTC. Enter DTC P0719. Has the test run and passed?	System OK	Begin the diagnosis again. Go to *Step 1*

DTC P0722 Automatic Transmission Output Speed Sensor (OSS) Low Input



D07R200006

Circuit Description

Output speed information is provided to the PCM by the OSS, which is a permanent magnet (PM) generator. The PM generator produces a pulsing AC voltage. The AC voltage level and number of pulses increases as the speed of the vehicle increases. The PCM then converts the pulsing voltage to output speed, which is used for calculations. The vehicle speed can be displayed with a scan tool.

This DTC detects a low output speed when there is a high engine speed in a drive gear range. This is a type “B” DTC.

Conditions For Setting The DTC

- No MAP DTCs P0107 or P0108, P0106, P1106, P1107.
- No TPS DTCs P0122 or P0123.
- Not in Park or Neutral.
- TP angle is greater than 10%.
- Engine vacuum is between 0 and 70kPa.
- Engine speed is between 3000 and 7000 rpm.
- Transmission output speed is less than 0 rpm.
- All conditions met for 5 seconds.

Action Taken When The DTC Sets

- Fixed to 4th gear.
- Maximum line pressure.
- Inhibit TCC engagement.
- For lamp illuminate refer to *DTC type definition (type B).*

Conditions For Clearing The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool. The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- An OSS DTC P0722 will set when no output speed is at detected at start off.
- Inspect the wiring for poor electrical connection at the PCM. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move or massage the wiring harness while observing test equipment for a change.

Test Description

The numbers below refer to the step numbers on the diagnostic chart:

4. This test checks the OSS circuit.
5. This test checks the integrity of the OSS.
7. This test checks the 5–volt and ground circuit of the PCM.

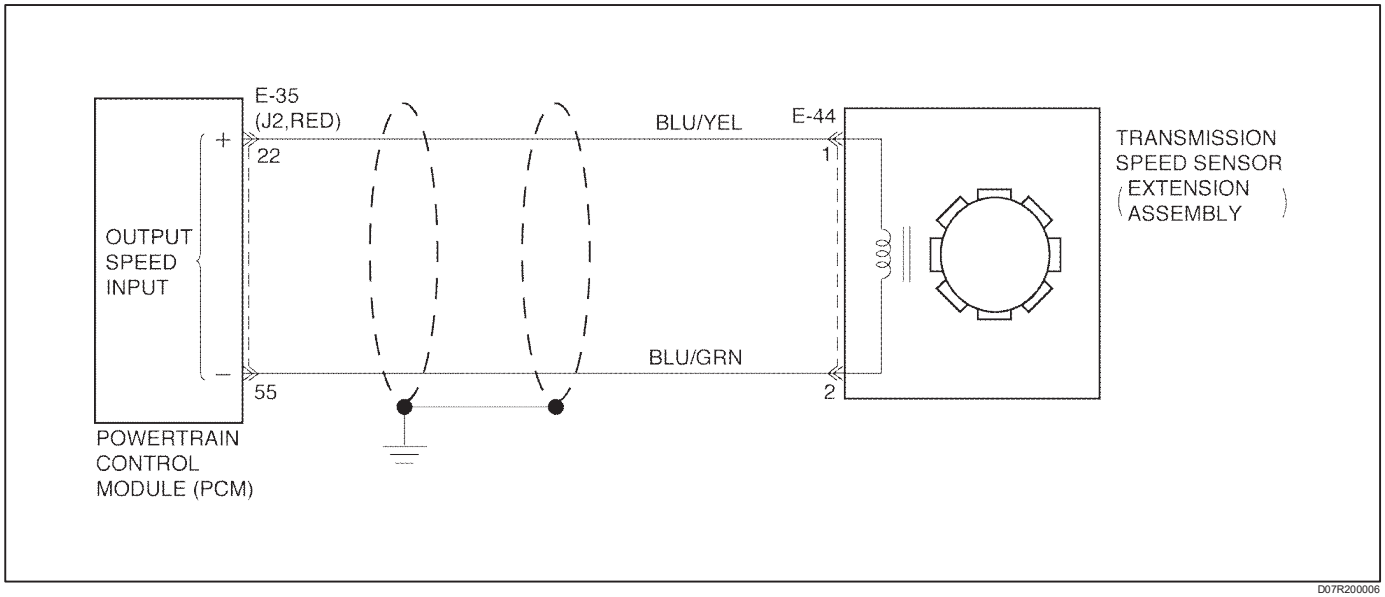
DTC P0722 Automatic Transmission Output Speed Sensor (OSS) Low Input

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. 4. Raise the drive wheels. 5. Start the engine. 6. Place the transmission in any drive range. With the drive wheels rotating, does the “Trans Output Speed” increase with the drive wheel speed?	Go to *Diagnostic Aids*	Go to *Step 3*
3	Check for the most current and/or incorrect calibration. Is the calibration current?	Go to *Step 16*	Go to *Step 4*
4	1. Turn the ignition “off”. 2. Disconnect the E35 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between harness connector terminals E35–22 and E35–55. Is the reading 3000 ohms?	Go to *Step 5*	Go to *Step 6*
5	1. Select AC volts. 2. Rotate the rear wheels, ensuring the driveshaft is turning. Is the voltage greater than 0.5 volts?	Go to *Step 7*	Go to *Step 8*
6	Inspect circuits BLU/YEL and BLU/GRN for a poor connection or an open circuit. Was a problem found?	Go to *Step 17*	Go to *Step 8*
7	1. Reconnect the E35 (RED) PCM connector. 2. Disconnect the OSS harness from the OSS. 3. With the engine “off”, turn the ignition “on”. 4. Using the J 39200 DVOM, measure the voltage at the OSS harness connector terminals E44–1 and E44–2. Is the reading between 4.0 to 5.1 volts?	Go to *Step 16*	Go to *Step 10*
8	1. Remove the OSS. 2. Check the output shaft speed sensor rotor for damage or misalignment. Refer to *Speed Sensor (Extension Assembly) in Automatic Transmission (4L30–E) section.* Was a problem found?	Go to *Step 17*	Go to *Step 9*
9	Replace the OSS. Is the replacement complete?	Go to *Step 17*	—
10	Was the reading in step 7 less than 4.0 volts?	Go to *Step 12*	Go to *Step 11*
11	Was the reading in Step 7 greater than 5.1 volts?	Go to *Step 15*	—
12	Using the J 39200 DVOM to chassis ground, measure the voltage on circuit BLU/YEL. Is the reading between 4.0 to 5.1 volts?	Go to *Step 13*	Go to *Step 14*

DTC P0722 Automatic Transmission Output Speed Sensor (OSS) Low Input (Cont'd)

Step	Action	Yes	No
13	Repair the open in circuit BLU/GRN. Is the repair complete?	Go to *Step 17*	—
14	Check circuit BLU/YEL for a short to ground or open. Was a problem found and corrected?	Go to *Step 17*	Go to *Step 16*
15	Repair the short to B+ in circuit BLU/YEL. Is the repair complete?	Go to *Step 17*	—
16	Replace the PCM. Refer to *Powertrain Control Module (PCM) in automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 17*	—
17	1. After the repair is complete, use the scan tool to select "DTC", then "Clear Info" function and operate the vehicle under the following conditions: Transmission output speed is greater than 101 rpm for 3 seconds. 2. Review the scan tool "DTC Info". Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0723 Automatic Transmission Output Speed Sensor (OSS) Intermittent



D07R200006

Circuit Description

Output speed information is provided to the PCM by the OSS, which is a permanent magnet (PM) generator. The PM generator produces a pulsing AC voltage. The AC voltage level and number of pulses increases as the speed of the vehicle increases. The PCM then converts the pulsing voltage to output speed, which is used for calculations. The vehicle speed can be displayed with a scan tool.

This DTC detects a fast decrease of output speed when engine running in a drive gear range. This is a type “B” DTC.

Conditions For Setting The DTC

Drive range

- Engine running time is greater than 5 seconds.
- Output speed is greater than 1300 rpm for 2 second.
- NORAW–NOLAST < 200 rpm for 2 seconds.
  - NORAW: Latest raw data of output shaft speed.
  - NOLAST: Fitered previous data of output speed.
- Transmission negative output speed change is greater than 1300 rpm.
- Conditions met for 3 seconds.

Action During Detection Time

- Output speed value is frozen

Action Taken When The DTC Sets

- Fixed to 4th gear.
- Maximum line pressure.
- Inhibit TCC engagement.
- For lamp illuminate refer to *DTC type definition (type B).*

Conditions For Clearing The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- A OSS DTC P0723 will set when output speed has been detected and is lost.
- Inspect the wiring for poor electrical connection at the PCM. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.

Test Description

The numbers below refer to the step numbers on the diagnostic chart:

4. This test checks the OSS circuit.
5. This test checks the integrity of the OSS.
7. This test checks the 5–volt and ground circuit of the PCM.

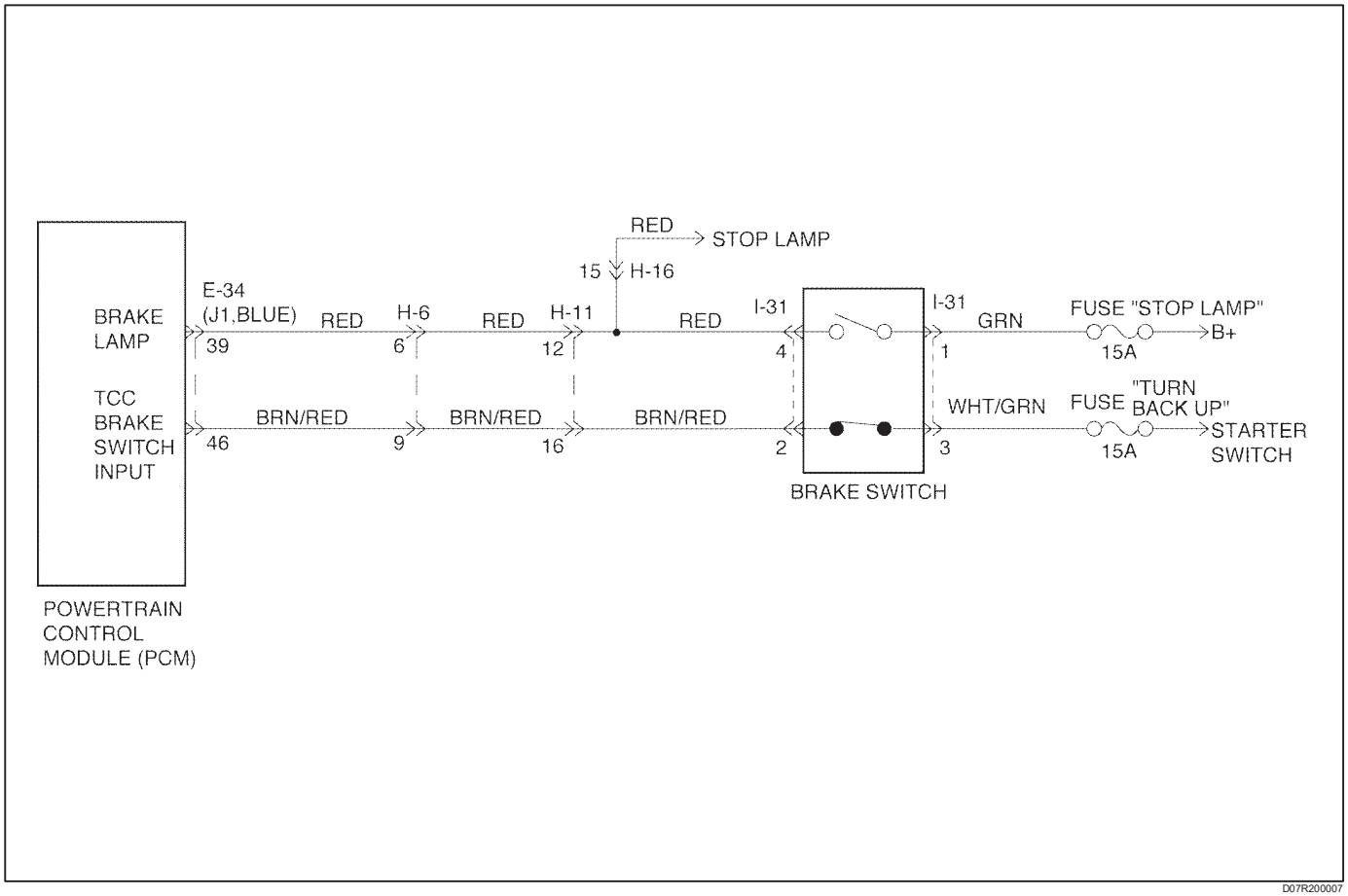
DTC P0723 Automatic Transmission Output Speed Sensor (OSS) Intermittent

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. 4. Raise the drive wheels. 5. Start the engine. 6. Place the transmission in any drive range. With the drive wheels rotating, does the “Trans Output Speed” increase with the drive wheel speed?	Go to *Diagnostic Aids*	Go to *Step 3*
3	Check for the most current and/or incorrect calibration. Is the calibration current?	Go to *Step 16*	Go to *Step 4*
4	1. Turn the ignition “off”. 2. Disconnect the E35 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between harness connector terminals E35–22 and E35–55. Is the reading 3,000 ohms?	Go to *Step 5*	Go to *Step 6*
5	1. Select AC volts. 2. Rotate the rear wheels, ensuring the driveshaft is turning. Is the voltage greater than 0.5 volts?	Go to *Step 7*	Go to *Step 8*
6	Inspect circuits BLU/YEL and BLU/GRN for a poor connection or an open circuit. Was a problem found?	Go to *Step 17*	Go to *Step 8*
7	1. Reconnect the E35 (RED) PCM connector. 2. Disconnect the OSS harness from the OSS. 3. With the engine “off”, turn the ignition “on”. 4. Using the J 39200 DVOM, measure the voltage at the OSS harness connector terminals E44–1 and E44–2. Is the reading between 4.0 to 5.1 volts?	Go to *Step 16*	Go to *Step 10*
8	1. Remove the OSS. 2. Check the output shaft speed sensor rotor for damage or misalignment. Refer to *Speed Sensor (Extension Assembly) in Automatic Transmission (4L30–E) section.* Was a problem found?	Go to *Step 17*	Go to *Step 9*
9	Replace the OSS. Is the replacement complete?	Go to *Step 17*	—
10	Was the reading in step 7 less than 4.0 volts?	Go to *Step 12*	Go to *Step 11*
11	Was the reading in Step 7 greater than 5.1 volts?	Go to *Step 15*	—
12	Using the J 39200 DVOM to chassis ground, measure the voltage on circuit BLU/YEL. Is the reading between 4.0 to 5.1 volts?	Go to *Step 13*	Go to *Step 14*

DTC P0723 Automatic Transmission Output Speed Sensor (OSS) Intermittent (Cont'd)

Step	Action	Yes	No
13	Repair the open in circuit BLU/GRN. Is the repair complete?	Go to *Step 17*	—
14	Check circuit BLU/YEL for a short to ground or open. Was a problem found and corrected?	Go to *Step 17*	Go to *Step 16*
15	Repair the short to B+ in circuit BLU/YEL. Is the repair complete?	Go to *Step 17*	—
16	Replace the PCM. Refer to *Powertrain Control Module (PCM) in Automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 17*	—
17	1. After the repair is complete, use the scan tool to select "DTC", then "Clear Info" function and operate the vehicle under the following conditions: Transmission output speed is greater than 101 rpm for 3 seconds. 2. Review the scan tool "DTC Info". Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0724 Brake Switch Circuit High (Stuck Off)



D07R200007

Circuit Description:

The brake switch indicates brake pedal status to the Powertrain Control Module (PCM). The brake switch is a normally–closed switch that supplies battery voltage on circuit BRN/RED to the PCM. Applying the brake pedal opens the switch, interrupting voltage to the PCM. When the brake pedal is released, the PCM receives a constant voltage signal. If the PCM receives a zero voltage signal at the brake switch input, and the Torque Converter Clutch (TCC) is engaged, the PCM de–energizes the Torque Converter Clutch Solenoid Valve (TCC Sol. Valve). The PCM disregards the brake switch input for TCC scheduling if there is a brake switch circuit fault (Refer to *Diagnostic Aids*).

When the PCM detects a closed brake switch circuit (12 volts, high input) during decelerations, then DTC P0724 sets. DTC P0724 is a type D DTC.

Conditions For Setting The DTC

- No OSS Assy. DTCs P0722 or P0723.
- The PCM detects a closed brake switch circuit (12 volts) without changing and the following events occur seven consecutive times.
  - The vehicle speed is greater than 32 km/h (20 mph) for 4 seconds.
  - then the vehicle speed is between 8–32 km/h (5–20 mph) for 4 seconds.
  - then the vehicle speed is less than 8 km/h (5 mph).

Action Taken When The DTC Sets

- The PCM does not illuminate the Malfunction Indicator Lamp (MIL).
- DTC P0724 stores in PCM history.

Conditions For Clearing The DTC

- A scan tool can clear the DTC from the PCM history. The PCM clears the DTC from the PCM history if the vehicle completes 40 warm–up cycles without a failure reported.
- The PCM cancels the DTC default actions when the fault no longer exists and the ignition is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the wiring for poor electrical connection at the PCM. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.
- Check customer driving habits and/or unusual traffic conditions (i.e. stop and go, expressway).
- Check brake switch for proper mounting and adjustment.

Test Description

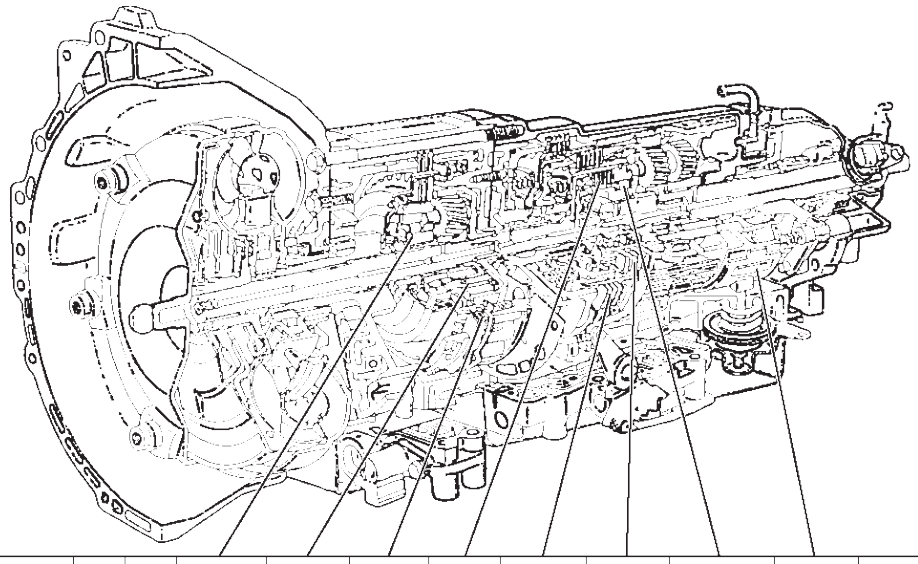
The numbers below refer to the step numbers on the diagnostic chart:

2. This step isolates the brake switch as a source for setting the DTC.

DTC P0724 Brake Switch Circuit High (Stuck Off)

Step	Action	Yes	No
1	Was the Powertrain On–Board Diagnostic (OBD) System Check performed?	Go to *Step 2*	Go to *Powertrain OBD System Check*
2	1. Install the scan tool. 2. With the engine “off,” turn the ignition switch to the “on” position. NOTE: Before clearing the DTC(s), use the scan tool in order to record the “Failure Records” for reference. Using the “Clear Info” function will erase the stored “Failure Records” from the PCM. 3. Record the DTC Failure Records, then clear the DTC(s). 4. Select “Brake Switch” on the scan tool. 5. Disconnect the brake switch connector from the brake switch. Did the TCC brake switch status change from “Closed” to “Open”?	Go to *Step 3*	Go to *Step 4*
3	Replace the brake switch. Is the replacement complete?	Go to *Step 6*	—
4	Inspect circuit BRN/RED for a short to B+ condition. Repair the circuit if necessary. Did you find a short to B+ condition?	Go to *Step 6*	Go to *Step 5*
5	Replace the PCM. Is the replacement complete?	Go to *Step 6*	—
6	In order to verify your repair, perform the following procedure: 1. Select DTC. 2. Select “Clear Info”. 3. With the engine “off” turn the ignition switch to the “on” position. 4. Apply the brake pedal. 5. Verify that the brake switch status indicates “Open” (0 volts) for 2 seconds. 6. Select Specific DTC. Enter DTC P0724. Has the test run and passed?	System OK	Begin the diagnosis again. Go to *Step 1*

DTC P0730 Gear Error Without Input Speed



RANGE	GEAR	SOL A N.C.	SOL B N.O.	O/DRIVE FREE WHEEL (OFW)	O/RUN CLUTCH (OC)	FOURTH CLUTCH (C4)	THIRD CLUTCH (C3)	REVERSE CLUTCH (RC)	SECOND CLUTCH (C2)	PRINCIPLE SPRAG ASM (PFW)	BAND ASM (B)	ENGINE BRAKING	TORQUE CONV. CLUTCH
P-N		OFF	ON		APP							NO	NO
R	REVERSE	OFF	ON	LD	APP			APP		LD		NO	NO
D	1ST	OFF	ON	LD	APP					LD	APP	NO	NO
	2ND	ON	ON	LD	APP				APP	FW	APP	YES	ECCC
	3RD	ON	OFF	LD	APP		APP		APP	NE		YES	ECCC
	4TH	OFF	OFF	FW		APP	APP		APP	NE		YES	ECCC
3	1ST	OFF	ON	LD	APP					LD	APP	NO	NO
	2ND	ON	ON	LD	APP				APP	FW	APP	YES	ECCC
	3RD	ON	OFF	LD	APP		APP		APP	NE		YES	ECCC
2	1ST	OFF	ON	LD	APP		APP			LD	APP	YES	NO
	2ND	ON	ON	LD	APP				APP	FW	APP	YES	ECCC
L	1ST	OFF	ON	LD	APP		APP			LD	APP	YES	NO

LD : LOCKED IN DRIVE FW : FREEWHEELING NE : NOT EFFECTIVE APP : APPLIED

D07RY00055

Circuit Description

- The Powertrain Control Module (PCM) calculates the slippage of the converter and transmission based upon the engine speed, the output speed, and the current gear ratio.
- The slippage of the converter at a high enough engine speed is low. The transmission should not slip more than a given value when there is no shift.
- This DTC detects a slip at each gear. This is a type “C” DTC.

Conditions For Setting The DTC

- No Output Speed Sensor DTC(s) P0722, P0723.
- Not in Park, Neutral, or Reverse.
- Engine speed is greater than 3,500 rpm.
- 3 seconds since upshift.
- No Transmission Range Switch DTC(s) P0705, P0706.
- 3 seconds since downshift.
- 3 seconds since garage shift (N→D).
- And one of the following conditions occur:
  - Slip is greater than 508 rpm in 1st gear.
  - Slip is greater than 468 rpm in 2nd gear.
  - Slip is greater than 449 rpm on 3rd gear.
  - Slip is greater than 440 rpm on 4th gear.
- All conditions met for 5.5 seconds.

Action Taken When The DTC Sets

- Maximum line pressure.
- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).

- The PCM will illuminate the CHECK TRANS Lamp.
- Turn force motor OFF.

Conditions For Clearing The DTC/CHECK TRANS Lamp

- The PCM will turn “off” the CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from PCM memory by using a scan tool.
- The DTC can also be cleared from memory when the vehicle has made 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC Actions Taken items when the fault conditions no longer exist and the ignition is cycles “off” long enough to power down the PCM.

Diagnostic Aids

- Check for intermittent output speed sensor circuit problems.
- Check for possible incorrect calibration. (PCM part No., tire specification, and rear axle ratio)

Test Description

The numbers below refer to the step numbers on the diagnostic chart:

3. This step checks for possible low fluid level causing slipping resulting in an undefined gear ratio.
4. This step checks for correct gear ratios for commanded gears.
5. This step checks for low line pressure.

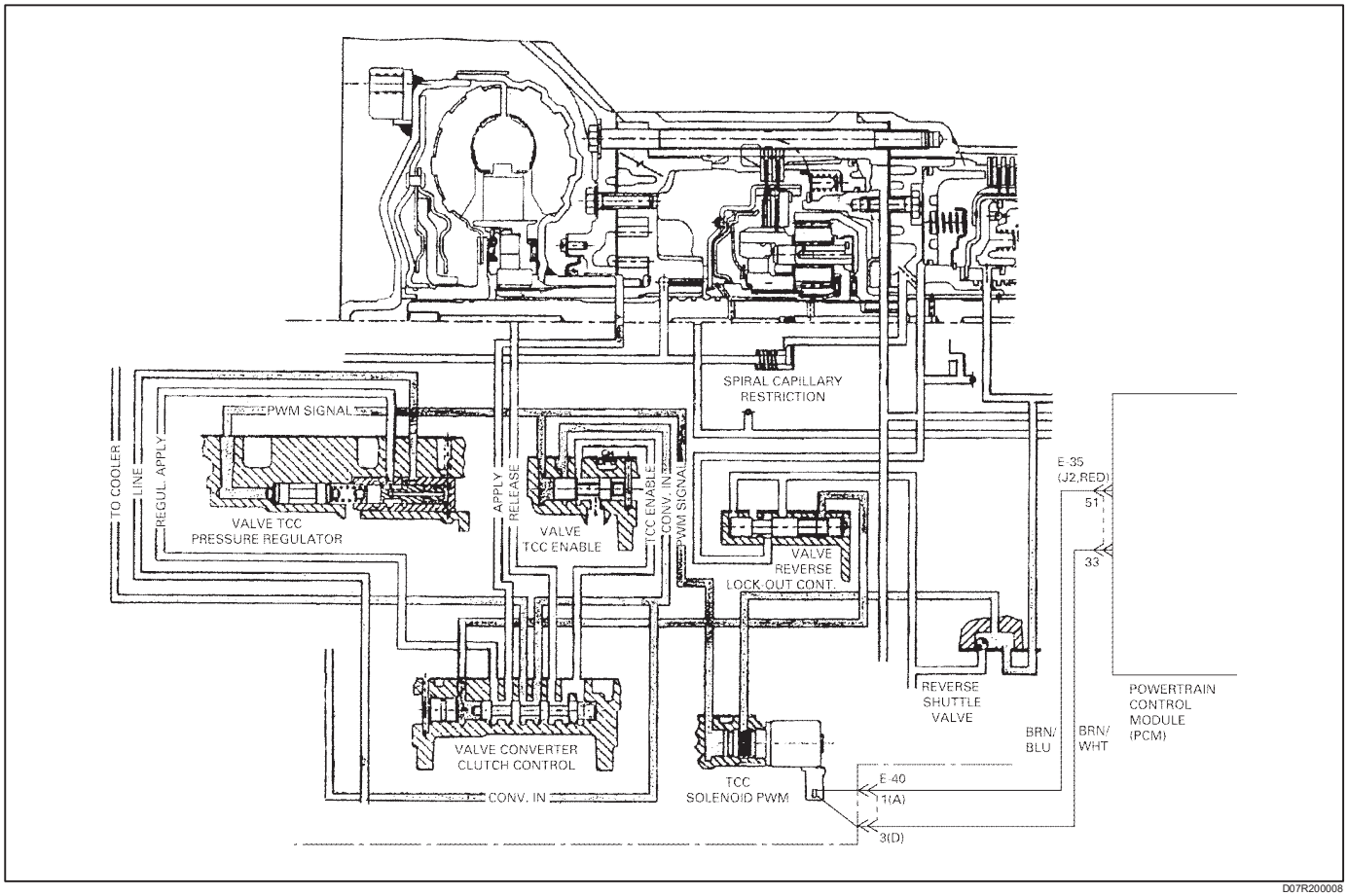
DTC P0730 Gear Error Without Input Speed

Step	Action	Yes	No
1	Were you sent here from the “On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emission in Engine section*
2	Visually inspect the transmission cooling system for fluid leaks. ● Refer to *Chart 16: Possible Causes of Transmission Fluid Leaks of Mechanical/Hydraulic Diagnosis Symptoms Index in Automatic Transmission (4L30–E) section* Was condition found and corrected?	Go to *Step 7*	Go to *Step 3*
3	Refer to *Checking Transmission Fluid Level and Condition in Automatic Transmission (4L30–E) section.* Has transmission fluid checking procedure been performed?	Go to *Step 4*	Go to *Checking Transmission Fluid Level and Condition in Automatic Transmission (4L30–E) section*
4	1. Install the scan tool. 2. Turn the ignition switch to the “on” position. 3. Engine not running. NOTE: Before clearing DTC(s) use the scan tool to record the “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 4. Record the Failure Record data. 5. Use the scan tool snapshot mode to record transmission gear ratios. 6. Drive vehicle in transmission gear ranges L, 2, 3, and D with the engine speed is greater than 3,500 rpm for 5.5 seconds. 7. Record each transmission gear. 1st:2.73 – 2.99 2nd:1.54 – 1.71 3rd:0.93 – 1.05 4th:0.66 – 0.78 Does commanded gear ratio match ranges as shown?	Refer to *Diagnostic Aids*	Go to *Step 5*

DTC P0730 Gear Error Without Input Speed (Cont'd)

Step	Action	Yes	No
5	Perform line pressure check. ● Refer to *Line Pressure Test in Automatic Transmission (4L30–E) section.* Was condition found and corrected?	Go to *Step 7*	Go to *Step 6*
6	Check for possible clutch slippage. ● Refer to *Chart 6: Diagnostic Trouble Code (DTC) P0730 of Mechanical/Hydraulic Diagnosis Symptoms Index in Automatic Transmission (4L30–E) section.* Was condition found and corrected?	Go to *Step 7*	—
7	1. After the repair is complete, use the scan tool to select "DTC", then "Clear info" function. 2. Operate the vehicle under the following conditions: ● Drive the vehicle in D4 with the engine speed greater than 3,500 rpm to obtain anyone of the following gear ratios for seven seconds. 1st 1:2.73 – 1:2.99 2nd 1:1.54 – 1:1.71 3rd 1:0.93 – 1:1.05 4th 1:0.66 – 1:0.78 Has the last test failed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0742 Torque Converter Clutch (TCC) System Stuck On



D07R200008

Circuit Description

The PCM energizes the TCC solenoid by creating an ignition voltage on circuit BRN/BLU. When ignition voltage is energized by the PCM, the TCC solenoid stops converter signal oil from exhausting. This causes converter signal oil pressure to increase and move the TCC valve. The TCC solenoid will deenergize when the PCM no longer provides ignition voltage. When the TCC solenoid is deenergized, it will exhaust fluid and release the TCC.

This DTC detects low torque converter slip when the TCC is commanded “off”. This is a type “B” DTC.

Conditions For Setting The DTC

The following conditions occur once per TCC cycle, three consecutive times:

- No TPS DTCs P0122 or P0123.
- No OSS DTCs P0722 or P0723.
- No TCC solenoid DTC P1860.
- TP angle is greater than 20%.
- Engine speed is greater than 500 rpm and less than 3,000 rpm.
- Engine vacuum is between 0 and 70 kPa.
- Commanded gear is not 1st.
- Gear range is D4.
- TCC is commanded “off”.
- No TCC Stuck off DTC P1870.
- TCC slip speed is between –20 and 40 rpm for 2 seconds.
- Vehicle speed is greater than 25 km/h (15 mph) and less than 120 km/h (75 mph).
- Speed ratio is greater than 0.9 and less than 2.0.

Action Taken When The DTC Sets

- For lamp illuminate refer to *DTC type definition (type B).*
- Inhibit TCC engagement.

Conditions For Clearing The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- If the TCC is mechanically stuck “on” with the parking brake applied and any gear range selected, the TCC fluid will mechanically apply the TCC, possibly causing an engine stall.

Test Description

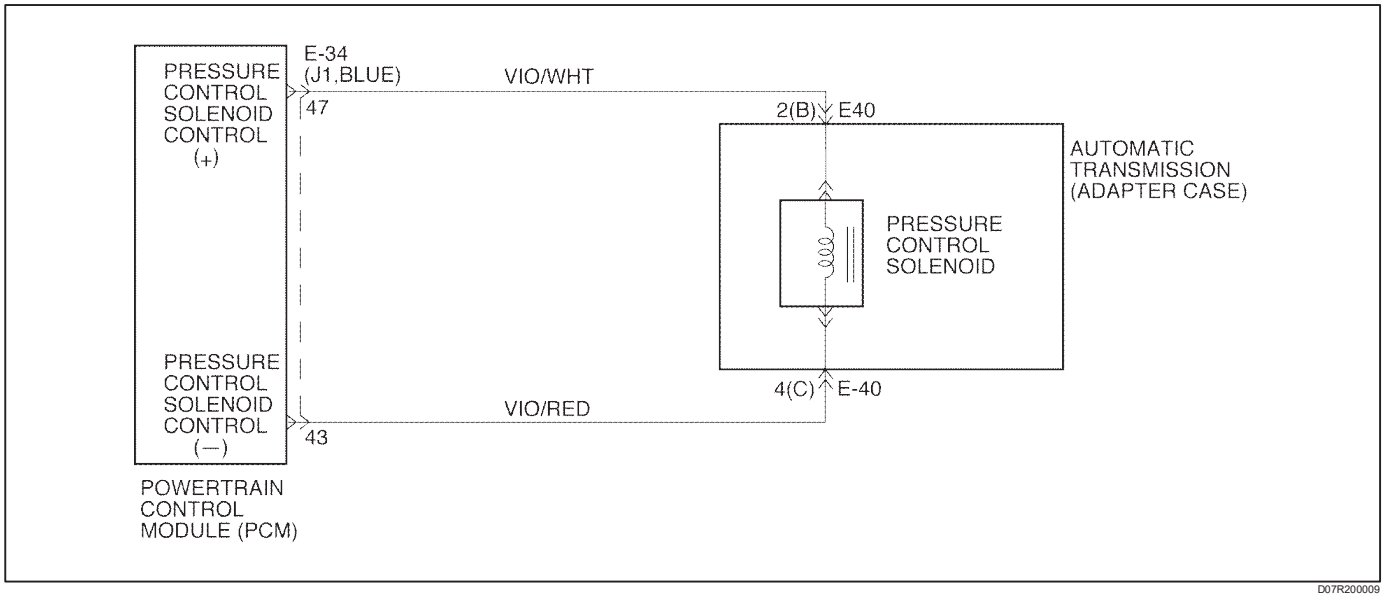
The number below refers to the step number on the diagnostic chart:

3. This test checks the mechanical state of the TCC. (When the PCM commands the TCC solenoid “off”, the slip speed should increase).

DTC P0742 Torque Converter Clutch (TCC) System Stuck On

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. 4. Using the scan tool, verify the “TP Sensor” operation. Are the “TP Sensor” values within 0.6 – 5.0 volts?	Go to *Step 3*	Go to *Diagnostic Aids*
3	Drive the vehicle in the D4 drive range in fourth gear under steady acceleration, with a TP angle greater than 20%. Does the scan tool display “TCC Slip Speed” between –30 and +30 rpm, while the displayed TCC solenoid state is “off”?	Go to *Step 4*	Go to *Diagnostic Aids*
4	The TCC is mechanically stuck “on”. Check the following items: ● Clogged exhaust orifice in the TCC solenoid. ● Converter clutch apply valve stuck in the apply position. ● Misaligned or damaged valve body gasket. ● Restricted release passage. Was a problem found and corrected?	Go to *Step 5*	—
5	1. After the repair is complete, use the scan tool to select “DTC”, then “Clear Info” function and ensure the following conditions are met: TCC slip speed must be between 200 and 2,500 rpm for 4 seconds. 2. Review the scan tool “DTC Info”. Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0748 Pressure Control Solenoid (PCS) (Force Motor) Circuit Electrical



Circuit Description

The PCS is a PCM–controlled device used to regulate transmission line pressure. The PCM compares TPS voltage, engine rpm, and other inputs to determine the line pressure appropriate for a given load. The PCM will regulate the pressure by applying a varying amperage to the PCS. The applied amperage can vary from 70 to 1060 milliampere (mA), and is monitored by the PCM.
This DTC detects a continuous open or short to ground in the PCS circuit or the PCS. This is a type “C” DTC.

Conditions For Setting The DTC

- Battery voltage is between 10 and 16 volts.
- The PCM detects that the different between commanded and actual current is 200 milliampere (mA) for over 1 second.
- Engine speed is greater than 300 rpm.

Action Taken When the DTC Sets

- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).
- Maximum line pressure.
- The PCM will illuminate the CHECK TRANS Lamp.
- Turn Force Motor OFF (Durability).

Conditions For Clearing The DTC/CHECK TRANS Lamp

- The PCM will turn “off” the CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from PCM history by using a scan tool.
- The DTC will be cleared from memory when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Inspect the wiring for poor electrical connection at the PCM and at the transmission 4–way connector. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.

Test Description

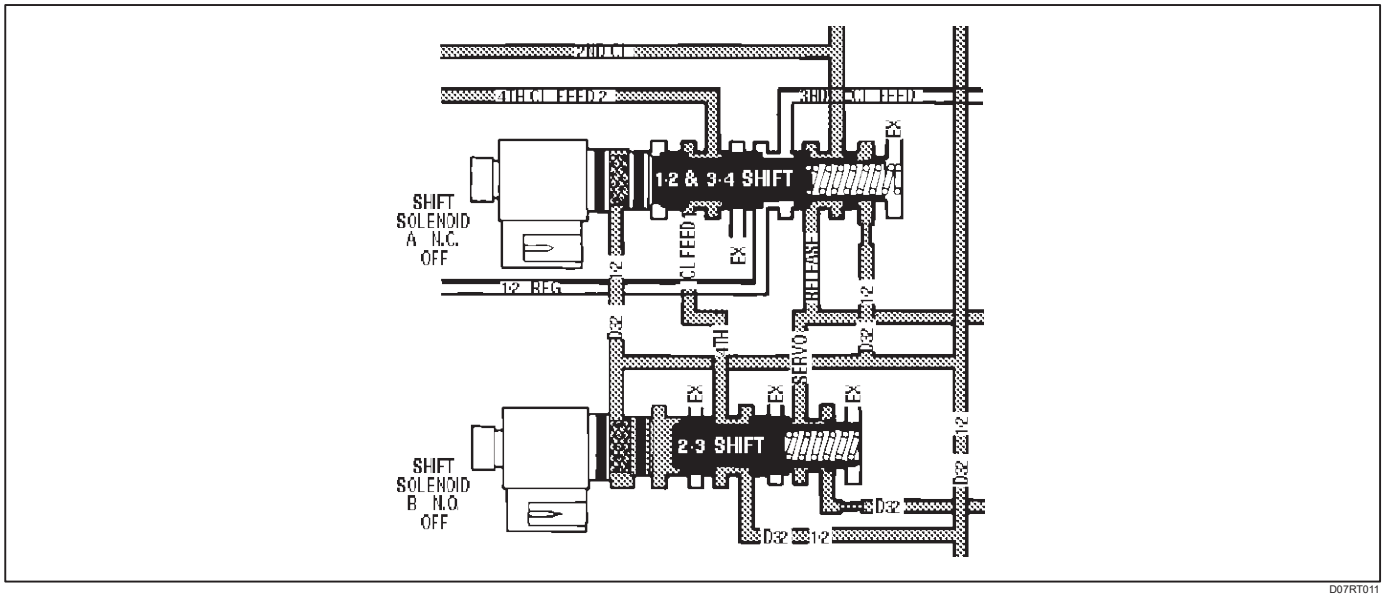
The numbers below refer to the *step numbers on the diagnostic chart:*

2. This test checks the ability of the PCM to command the PCS.
3. This test checks the PCS and internal wiring harness for incorrect resistance.

DTC P0748 Pressure Control Solenoid (PCS) (Force Motor) Circuit Electrical

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emission in Engine section*
2	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Failure Records”. 4. While the engine is operating, put the transmission in Park. 5. Using the scan tool, apply 70 through 1060 milliampere (mA) while observing “PC Ref. Current” and “PC Act. Current”. Is the “PC Act. Current” reading always within 160 mA?	Go to *Diagnostic Aids*	Go to *Step 3*
3	1. Turn the ignition “off”. 2. Disconnect the transmission 4–way connector E–40. 3. Using the J39200 DVOM, measure the resistance between terminals E40–2(B) and E40–4(C). Is the resistance within 3–7 ohms?	Go to *Step 7*	Go to *Step 4*
4	1. Remove the transmission oil pan. Refer to *Solenoid (Adapter Case Valve Body) in Automatic Transmission (4L30–E) section.* 2. Disconnect the internal wiring harness at the PCS. 3. Measure the resistance of the PCS. Is the resistance within 3–7 ohms?	Go to *Step 6*	Go to *Step 5*
5	Replace the PCS. Is the replacement complete?	Go to *Step 10*	—
6	Repair the internal wiring harness for an open. Is the repair complete?	Go to *Step 10*	—
7	Inspect/repair circuits VIO/WHT and VIO/RED. Was a problem found?	Go to *Step 10*	Go to *Step 8*
8	Inspect/repair circuits VIO/WHT and VIO/RED for a short to ground or poor connections. Was a problem found?	Go to *Step 10*	Go to *Step 9*
9	Replace the PCM. Refer to *Powertrain Control Module (PCM) in Automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 10*	—
10	1. After the repair is complete, use the scan tool to select “DTC”, then “Clear Info” function and ensure the following conditions are met: The PCS duty cycle is not at its electrical high or low limit. 2. Review the scan tool “DTC Info”. Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0751 Shift Solenoid A Performance (Stuck Off)



Circuit Description

The shift solenoid A is used to control fluid flow acting on the 1–2 and 3–4 shift valves. The solenoid is a normally close exhaust valve that is used with the shift solenoid B to allow four different shifting combinations.
The DTC detects when there is only a 1–1–4–4 shift pattern depending on the state of the mechanical failure instead of a 1–2–3–4 shift pattern. This is a type “B” DTC.

Conditions For Setting The DTC

- No ETC DTCs.
- No OSS DTCs P0722 or P0723.
- No TCC solenoid DTCs P0742, P1860, P1870.
- No shift solenoid A DTC P0753.
- No shift solenoid B DTC P0758.
- Gear range is D4.
- Transmission temperature is between 20˚ and 130˚C (68˚ and 266˚F).
- Output speed is greater than 375 rpm.
- No range code P0705, P0706.
- No torque code (to be confirmed).
- Engine run for more 0 seconds and not influed cut-off (to be confirmed).

All the above conditions have been met and the combination of conditions 1, 2 occur two consecutive times.

Condition 1:

- 2nd gear is commanded for ≥ 1 second.
- 40 ≤ Engine Torque ≤ 400 N·m
- Speed ratio ≥ 0.6
- Throttle position ≥ 10 %
- 800 ≤ TCC Slip ≤ 4000 rpm
- 2.75 ≤ Modeled Ratio ≤ 3.2 for 1 second.

Condition 2:

- 3rd gear is commanded for ≥ 1 second.
- 40 ≤ Engine Torque ≤ 400 N·m
- Throttle position ≥ 10 %
- –8000 ≤ TCC Slip ≤ 8000 rpm
- Speed ratio ≥ 0.45
- 0.62 ≤ Modeled Ratio ≤ 0.92 for 3 second.

Action Taken When the DTC Sets

- Maximum line pressure.
- For lamp illuminate refer to *DTC type definition (type B).*
- Turn Force Motor OFF.

Conditions For Clearing The The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the 4L30–E shift speed chart.
- Other internal transmission failures may cause more than one shift to occur.

Test Description

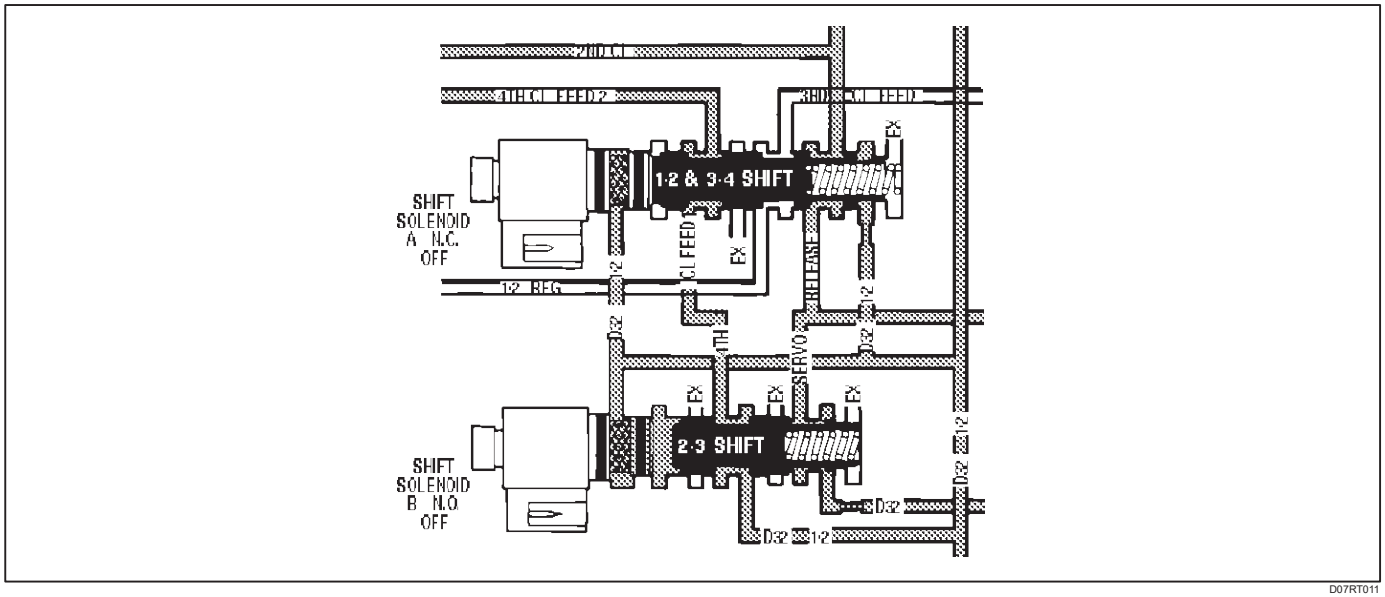
The numbers below refer to the step numbers on the diagnostic chart:

2. This test checks the function of the range switch (mode switch).
3. This test checks that the scan tool commanded all shifts, all shifts solenoids responded correctly, but all the shifts did not occur.

DTC P0751 Shift Solenoid A Performance (Stuck Off)

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emission in Engine section*
2	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. 4. With the engine operating, apply the brake pedal and select each transmission range DL, D2, D3, D4, N, R, and P. Does each selected transmission range match the “TR Switch” on the scan tool?	Go to *Step 3*	Go to *“Range Switch Logic Table”*
3	1. While the engine is operating, raise the drive wheels. 2. With the transmission in D4 range, use the scan tool to command 1st, 2nd and 3rd, and 4th gears while accelerating the vehicle. Was a 1–1–4–4 only shift pattern detected? (Road testing the vehicle may be necessary).	Go to *Step 4*	Go to *Diagnostic Aids*
4	Check the shift solenoid/hydraulic circuit for: ● One or both of the shift solenoids for an internal malfunction. ● Contamination or sediment in one or both of the shift solenoids. ● Damaged seals on one or both of the shift solenoids. Refer to *Solenoid (Main Case Valve Body) in Automatic Transmission (4L30–E) section.* Was a problem found and corrected?	Go to *Step 5*	Go to *Diagnostic Aids*
5	1. After the repair is complete, use the scan tool to select “DTC”, then “Clear Info” function and road test the vehicle. 2. Review the scan tool “DTC Info”. Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0752 Shift Solenoid A Performance (Stuck On)



Circuit Description

The shift solenoid A is used to control fluid flow acting on the 1–2 and 3–4 shift valves. The solenoid is a normally close exhaust valve that is used with the shift solenoid B to allow four different shifting combinations.
The DTC detects when there is only a 2–2–3–3 shift pattern depending on the state of the mechanical failure instead of a 1–2–3–4 shift pattern. This is a type “B” DTC.

Conditions For Setting The DTC

- No ETC DTCs.
- No OSS DTCs P0722 or P0723.
- No TCC solenoid DTC P0742, P1860, P1870.
- No shift solenoid A DTC P0753.
- No shift solenoid B DTC P0758.
- Gear range is D4.
- Output speed is greater than 375 rpm.
- Transmission temperature is between 20˚ and 130˚C (68˚ and 266˚F).
- No range code P0705, P0706.
- No torque code (to be confirmed).
- Engine run for more 0 seconds and not influed cut-off (to be confirmed).

All the above conditions have been met and the combination of condition 1, 2 occur two consecutive times.

Condition 1:

- 1st gear is commanded for ≥ 1 sec
- 40 ≤ Engine Torque ≤ 400 N·m
- Throttle positon ≥ 10%
- –8000 ≤ TCC slip ≤ 8000 rpm
- Transmission out speed ≥ 375 rpm
- Speed ratio ≥ 0.3
- 1.5 ≤ Modeled Ratio ≤ 2.4 for 0.687 seconds

Condition 2:

- 4th Gear is commanded for ≥ 1 sec.
- 40 ≤ Engine Torque ≤ 400 N·m
- Trottle position ≥ 10%
- –8000 ≤ TCC slip ≤ 8000 rpm
- Speed ratio ≥ 0.6
- 0.92 ≤ Modeled Ratio ≤ 1.5 for 7 seconds

Action Taken When the DTC Sets

- Maximum line pressure.
- For lamp illuminate refer to *DTC type definition (type B).*
- Turn Force Motor OFF.

Conditions For Clearing The The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the 4L30–E shift speed chart.
- Other internal transmission failures may cause more than one shift to occur.

Test Description

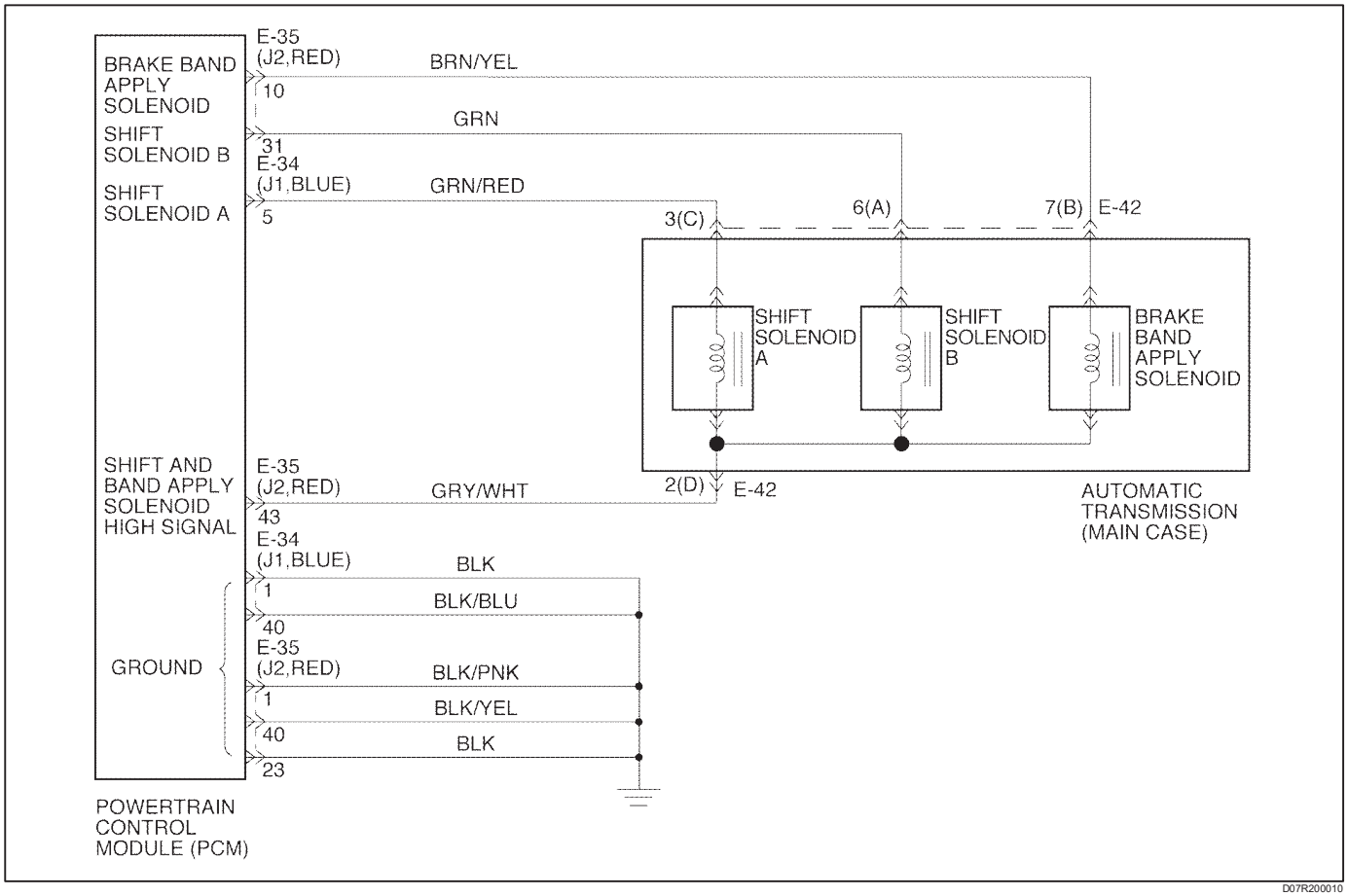
The numbers below refer to the step numbers on the diagnostic chart:

2. This test checks the function of the range switch (mode switch).
3. This test checks that the scan tool commanded all shifts, all shifts solenoids responded correctly, but all the shifts did not occur.

DTC P0752 Shift Solenoid A Performance (Stuck On)

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. 4. With the engine operating, apply the brake pedal and select each transmission range DL, D2, D3, D4, N, R, and P. Does each selected transmission range match the “TR Switch” on the scan tool?	Go to *Step 3*	Go to *“Range Switch Logic Table”*
3	1. While the engine is operating, raise the drive wheels. 2. With the transmission in D4 range, use the scan tool to command 1st, 2nd and 3rd, and 4th gears while accelerating the vehicle. Was a 2–2–3–3 only shift pattern detected? (Road testing the vehicle may be necessary).	Go to *Step 4*	Go to *Diagnostic Aids*
4	Check the shift solenoid/hydraulic circuit for: ● One or both of the shift solenoids for an internal malfunction. ● Contamination or sediment in one or both of the shift solenoids. ● Damaged seals on one or both of the shift solenoids. Refer to *Solenoid (Main Case Valve Body) in Automatic Transmission (4L30–E) section.* Was a problem found and corrected?	Go to *Step 5*	Go to *Diagnostic Aids*
5	1. After the repair is complete, use the scan tool to select “DTC”, then “Clear Info” function and road test the vehicle. 2. Review the scan tool “DTC Info”. Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0753 Shift Solenoid A Electrical



D07R200010

Circuit Description

- The shift solenoid A is a simple on/off solenoid located in the main case valve body. The solenoid is the normally closed type. In second or third gear the Powertrain Control Module (PCM) energizes the solenoid to open a fluid inlet port. When the port is open, fluid pressure actuates the shift valve.
- The solenoid is activated by a current. This current is produced by applying a voltage to one side (the High side) and a ground to the other side (Low side).
- The High Side Driver (HSD) is a circuit of the PCM that acts as a switch between the solenoids and the supply voltage. The High side of the solenoid is permanently supplied with voltage, except in BACKUP MODE or when ignition is off the HSD is turned off.

This DTC detects a continuous open or short to ground in the shift solenoid A circuit or the shift solenoid A. This is a type “B” DTC.

Conditions For Setting The DTC

- Ignition is “on”, Engine “run”.
- Battery voltage is between 10 and 16 volts.
- The PCM commands the solenoid “on” and the voltage remains high (B+), or the PCM commands the solenoid “off” and the voltage remains low (zero volts).
- All conditions met for 0.84 – 1.0 seconds.

Action Taken When The DTC Sets

- Maximum line pressure.
- Immediate landing to 4th gear.
- Inhibit TCC engagement.
- For lamp illuminate refer to *DTC type definition (type B).*

Conditions For Clearing The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Inspect the wiring for poor electrical connection at the PCM and at the transmission 7-way connector. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.

- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.
- An open ignition feed circuit can cause multiple DTCs to set.
- A shift solenoid B DTC P0758 could also set with a shift solenoid A electrical failure.

Test Description

The numbers below refer to the step numbers on the diagnostic chart:

3. This test checks for power to the shift solenoid A from the ignition through the PCM.
5. This test measures the resistance of the component.
8. This test checks the function of the shift solenoid A and the transmission internal wiring harness.

Shift Solenoid Status Chart

Gear	Shift solenoid A	Shift solenoid B
1st	OFF	ON
2nd	ON	ON
3rd	ON	OFF
4th	OFF	OFF

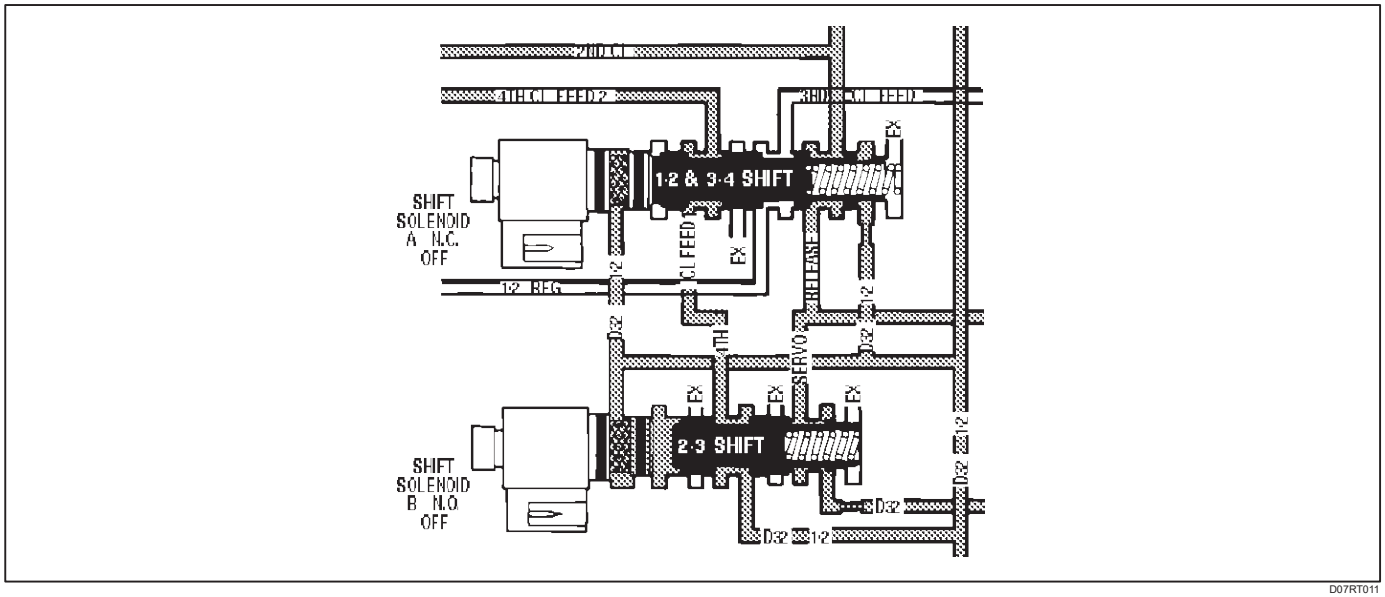
DTC P0753 Shift Solenoid A Electrical

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emission in Engine section*
2	1. Install the scan tool. 2. With the engine “on”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. Were DTCs P0753, P0758, P1860 set?	Go to *Step 3*	Go to *Diagnostic Aids*
3	1. Turn the ignition “on”. 2. Using the J39200 DVOM, measure the voltage between PCM connector terminals E35–43 and E34–1 (GND). Is the voltage within 10–12 volts?	Go to *Step 4*	Go to *Step 5*
4	1. Turn the ignition “off”. 2. Disconnect the E-34 (BLUE) and E-35 (RED) PCM connector. 3. Turn the ignition “on”. 4. Using the J39200 DVOM, measure the voltage between PCM connector terminals E34–5 and ground. Is the voltage within 10 – 12 volts?	Go to *Step 10*	Go to *Step 5*
5	1. Turn the ignition “off”. 2. Disconnect the E-34 (BLUE) and E-35 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between PCM connector terminals E35–43 and E34–5. Is the resistance within 18 – 20 ohms?	Go to *Step 6*	Go to *Step 8*
6	1. Disconnect the E-34 (BLUE) and E-35 (RED) PCM connectors. 2. Using the J39200 DVOM, check a continuity between PCM terminals E34–5 and ground. Is there a continuity?	Go to *Step 11*	Go to *Step 7*
7	Using the J39200 DVOM, check a continuity between E-35 (RED) PCM terminal 43 and ground. Is there a continuity?	Go to *Step 12*	Go to *Step 9*

DTC P0753 Shift Solenoid A Electrical (Cont'd)

Step	Action	Yes	No
8	1. Disconnect the transmission main case 7–way connector E–42. 2. Using the J39200 DVOM, measure the resistance between terminals E42–2(D) and E42–3(C). Is the resistance within 18–20 ohms?	Go to *Step 13*	Go to *Step 14*
9	Check every connection at the PCM connector. Was a problem found?	Go to *Step 16*	Go to *Step 15*
10	The wiring harness between PCM connector terminals E34–5 and transmission harness terminal E42–3(C) is shorted to voltage. Was a problem found and corrected?	Go to *Step 17*	—
11	The wiring harness between PCM connector terminal E34–5 and transmission harness terminal E42–3(C) is shorted to ground. Was a problem found and corrected?	Go to *Step 17*	—
12	The wiring harness between PCM connector terminals E35–43 and transmission harness terminal E42–2(D) is shorted to ground. Was a problem found and corrected?	Go to *Step 17*	—
13	The wiring harness between PCM connector E-34 or E-35 and transmission 7–way connector E42 is open or poor connection. Was a problem found and corrected?	Go to *Step 17*	—
14	The shift solenoid A is faulty. Replace the shift solenoid A. Refer to *Solenoid (Main Case Valve Body) in Automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 17*	—
15	The PCM may be faulty. Replace the PCM. Refer to *Powertrain Control Module (PCM) in Automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 17*	—
16	Repair the PCM connector connection. Was a problem found and corrected?	Go to *Step 17*	—
17	1. After the repair is complete, use the scan tool to select "DTC", then "Clear Info" function and operate the vehicle under the following conditions: ● The shift solenoid A is commanded "on" and the voltage drops to zero. ● The shift solenoid A is commanded "off" and the voltage increases to B+. 2. Review the scan tool "DTC Info". Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0756 Shift Solenoid B Performance (Stuck Off)



D07RT011

Circuit Description

The shift solenoid B is used to control fluid flow acting on the 2–3 shift valves. The solenoid is a normally open exhaust valve that is used with the shift solenoid A to allow four different shift combinations.
This DTC detects when there is only a 4-3-3-4 shift pattern depending on the state of the mechanical failure instead of a 1-2-3-4 shift pattern. This is a type “B” DTC.

Conditions For Setting The DTC

- No ETC DTCs.
- No OSS DTCs P0722 or P0723.
- No TCC solenoid DTCs P0742, P1860, P1870.
- No shift solenoid DTCs P0753, P0758.
- Gear range is D4.
- Output speed is greater than 375 rpm.
- Transmission fluid temperature is between 20° and 130°C (68° and 266°F).
- No range code P0705, P0706.
- No torque code (to be confirmed).
- Engine run for more 0 seconds and influed cut-off (to be confirmed).

  All the above conditions have been met and the combination of condition 1, 2 occur two consecutive times.

Condition 1:

- 1st gear is commanded for ≥ 1 second
- 40 ≤ Engine Torque ≤ 400 N·m
- Throttle position ≥ 10 %
- –2300 ≤ TCC Slip ≤ 200 rpm.
- Transmission output speed ≥ 400 rpm
- Speed ratio ≥ 0.3
- 0.60 ≤ Modeled Ratio ≤ 1.49 for 1 second.

Condition 2:

- 2nd gear is commanded for ≥ 1 second
- 40 ≤ Engine Torque ≤ 400 N·m
- Throttle position ≥ 10 %
- –8000 ≤ TCC Slip ≤ 8000 rpm.
- Speed ratio ≥ 0.6
- 0.92 ≤ Modeled Ratio ≤ 1.5 for 0.687 second.

Action Taken When the DTC Sets

- Maximum line pressure.
- For lamp illuminate refer to *DTC type definition (type B).*
- Turn Force Motor OFF.

Conditions For Clearing The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the 4L30-E shift speed chart.
- Other internal transmission failures may allow more than one shift to occur.

Test Description

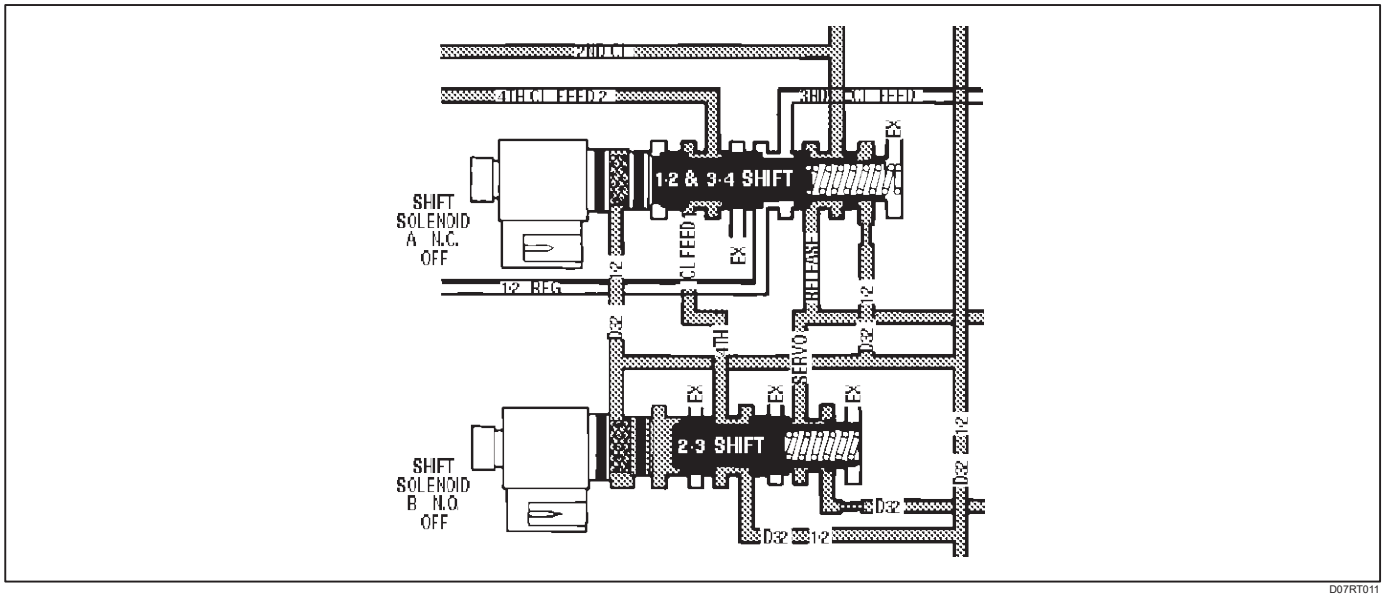
The numbers below refer to the step numbers on the diagnostic chart:

2. This test checks the function of the range switch (mode switch).
3. This test checks for selected gear ratio vs. a ratio not obtainable under normal driving conditions.

DTC P0756 Shift Solenoid B Performance (Stuck Off)

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emission in Engine section*
2	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. 4. With the engine operating, apply the brake pedal and select each transmission range DL, D2, D3, D4, N, R, and P. Does each selected transmission range match the “TR Switch” on the scan tool?	Go to *Step 3*	Go to *“Range Switch Logic Table”*
3	1. While the engine is operating, raise the drive wheels. 2. With the transmission in D4 range, use the scan tool to command 1st, 2nd, and 3rd, and 4th gears while accelerating the vehicle. Was a 4–3–3–4 shift pattern detected? (Road testing the vehicle may be necessary.)	Go to *Step 4*	Go to *Diagnostic Aids*
4	Check the shift solenoid/hydraulic circuit for: ● One or both of the shift solenoids for an internal malfunction. ● Contamination or sediment in one or both of the shift solenoids. ● Damaged seals on the one or both of the shift solenoids. Refer to *Solenoid (Main Case Valve Body) in Automatic Transmission (4L30–E) section.* Was a problem found and corrected?	Go to *Step 5*	Go to *Diagnostic Aids*
5	1. After the repair is complete, use the scan tool to select “DTC”, then “Clear Info” function and road test the vehicle. 2. Review the scan tool “DTC Info”. Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0757 Shift Solenoid B Performance (Stuck On)



D07RT011

Circuit Description

The shift solenoid B is used to control fluid flow acting on the 2–3 shift valves. The solenoid is a normally open exhaust valve that is used with the shift solenoid A to allow four different shift combinations.

This DTC detects when there is only a 1–2–2–1 shift pattern depending on the state of the mechanical failure instead of a 1–2–3–4 shift pattern. This is a type “B” DTC.

Conditions For Setting The DTC

- No ETC DTCs.
- No OSS DTCs P0722 or P0723.
- No TCC solenoid DTC P0742, P1860, P1870.
- No shift solenoid A DTCs P0753.
- No shift solenoid B DTC P0758.
- Gear range is D4.
- Output speed is greater than 375 rpm.
- Transmission fluid temperature is between 20˚ and 130˚C (68˚ and 266˚F).
- No range code P0705, P0706.
- No torque code (to be confirmed).
- Engine run for more 0 seconds and not influed cut-off (to be confirmed).

All of the above conditions have been met and the combination of condition 1,2 occur two consecutive times.

Condition 1:

- 3rd gear is commanded for ≥ 1 second
- 40 ≤ Engine Torque ≤ 400 N·m
- Throttle positon ≥ 10%
- –8000 ≤ TCC slip ≤ 8000 rpm
- Transmission out speed ≥ 375 rpm
- Speed ratio ≥ 0.6
- 1.44 ≤ Modeled Ratio ≤ 2.4 for 4 seconds

Condition 2:

- 4th Gear is commanded for ≥ 1 second
- 15 ≤ Engine Torque ≤ 400 N·m
- Trottle position ≥ 10%
- –8000 ≤ TCC slip ≤ 8000 rpm
- Speed ratio ≥ 0.6
- 2.75 ≤ Modeled Ratio ≤ 3.2 for 2 seconds

Action Taken When the DTC Sets

- Maximum line pressure.
- For lamp illuminate refer to *DTC type definition (type B).*
- Turn Force Motor OFF.

Conditions For Clearing The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the 4L30-E shift speed chart.
- Other internal transmission failures may cause more than one shift to occur.

Test Description

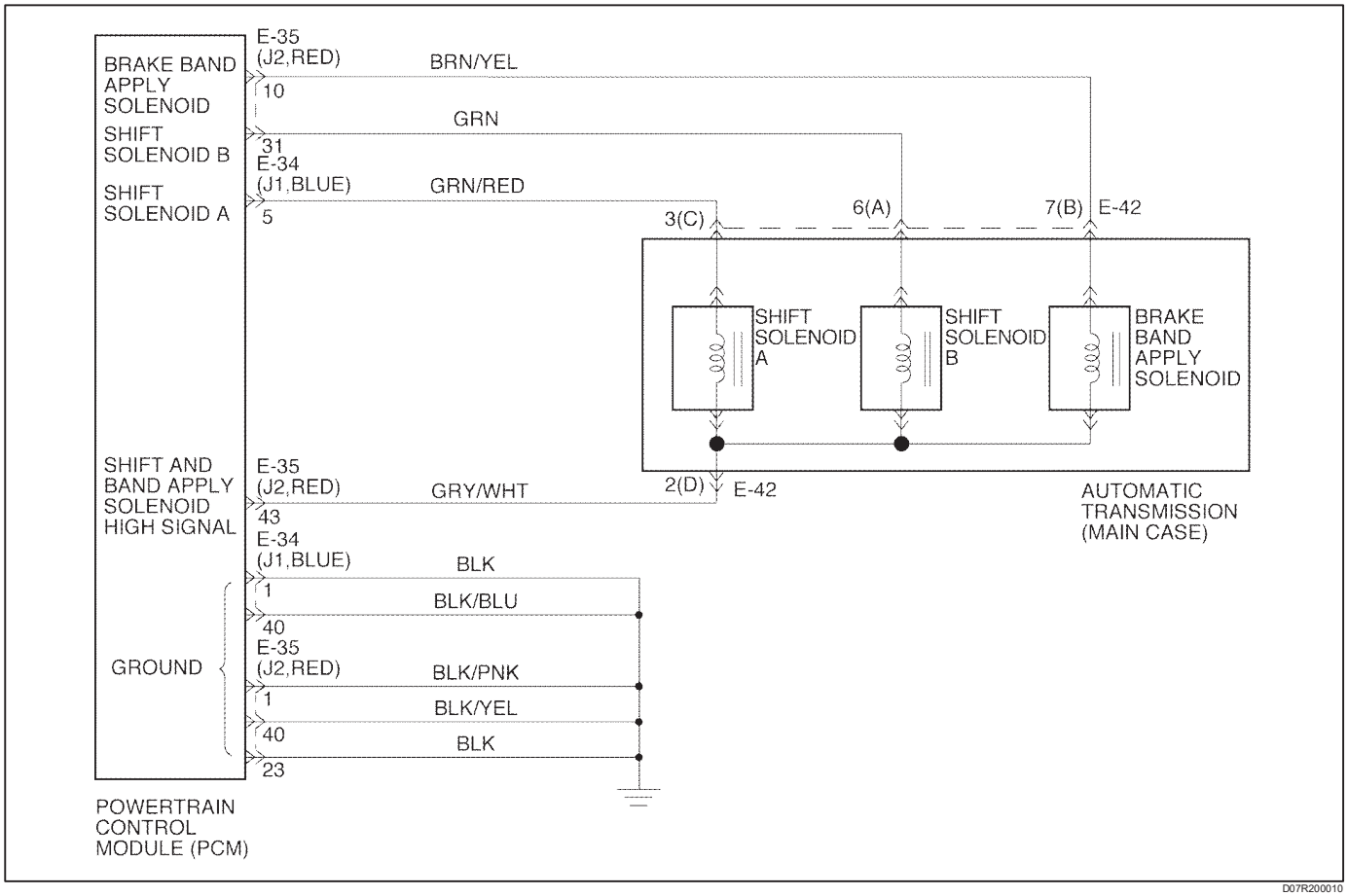
The numbers below refer to the step numbers on the diagnostic chart:

2. This test checks the function of the range switch (mode switch).
3. This test checks for selected gear ratio vs. a ratio not obtainable under normal driving conditions.

DTC P0757 Shift Solenoid B Performance (Stuck On)

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. 4. With the engine operating, apply the brake pedal and select each transmission range DL, D2, D3, D4, N, R, and P. Does each selected transmission range match the “TR Switch” on the scan tool?	Go to *Step 3*	Go to *“Range Switch Logic Table”*
3	1. While the engine is operating, raise the drive wheels. 2. With the transmission in D4 range, use the scan tool to command 1st, 2nd, and 3rd, and 4th gears while accelerating the vehicle. Was a 4–3–3–4 shift pattern detected? (Road testing the vehicle may be necessary.)	Go to *Step 4*	Go to *Diagnostic Aids*
4	Check the shift solenoid/hydraulic circuit for: ● One or both of the shift solenoids for an internal malfunction. ● Contamination or sediment in one or both of the shift solenoids. ● Damaged seals on the one or both of the shift solenoids. Refer to *Solenoid (Main Case Valve Body) in Automatic Transmission (4L30–E) section.* Was a problem found and corrected?	Go to *Step 5*	Go to *Diagnostic Aids*
5	1. After the repair is complete, use the scan tool to select “DTC”, then “Clear Info” function and road test the vehicle. 2. Review the scan tool “DTC Info”. Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P0758 Shift Solenoid B Electrical



Circuit Description

- The shift solenoid B is a simple on/off solenoid located in the main case valve body. It is normally open. When the port is open, fluid pressure actuates the shift valve. In first or second gear, the Powertrain Control Module (PCM) energizes the solenoid to close a fluid inlet port.
- The solenoid is activated by current. This current is produced by applying a voltage to one side (the High side) and a ground to the other side (Low side).
- The High Side Driver (HSD) is a circuit of the PCM that acts as a switch between the solenoids and the supply voltage. The High side of the solenoid is permanently supplied with voltage. In BACKUP MODE or when the ignition is off, the HSD is turned off.

This DTC detects a continuous open or short to ground in the shift solenoid B circuit or shift solenoid B. This is a type “B” DTC.

Conditions For Setting The DTC

- Ignition is “on”, Engine “run”.
- Battery voltage is between 10 and 16 volts.
- The PCM commands the solenoid “on” and the voltage remains high (B+), or the PCM commands the solenoid “off” and the voltage remains low (zero volts).
- All conditions met for 0.84 ~ 1.0 seconds.

Action Taken When The DTC Sets

- Fixed to 4th gear.
- Maximum line pressure.
- Inhibit TCC engagement.
- For lamp illuminate refer to *DTC type definition (type B).*

Conditions For Clearing The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the PCM and transmission 7-way connector. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.

- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.

Test Description

The numbers below refer to the *step numbers on the diagnostic chart:*

5. This test measures the resistance of the component.
6. This test checks the function of the shift solenoid B and the transmission internal wiring harness.
9. This test checks for power to the shift solenoid B from the ignition through the PCM.

Shift Solenoid Status Chart

Gear	Shift solenoid A	Shift solenoid B
1st	OFF	ON
2nd	ON	ON
3rd	ON	OFF
4th	OFF	OFF

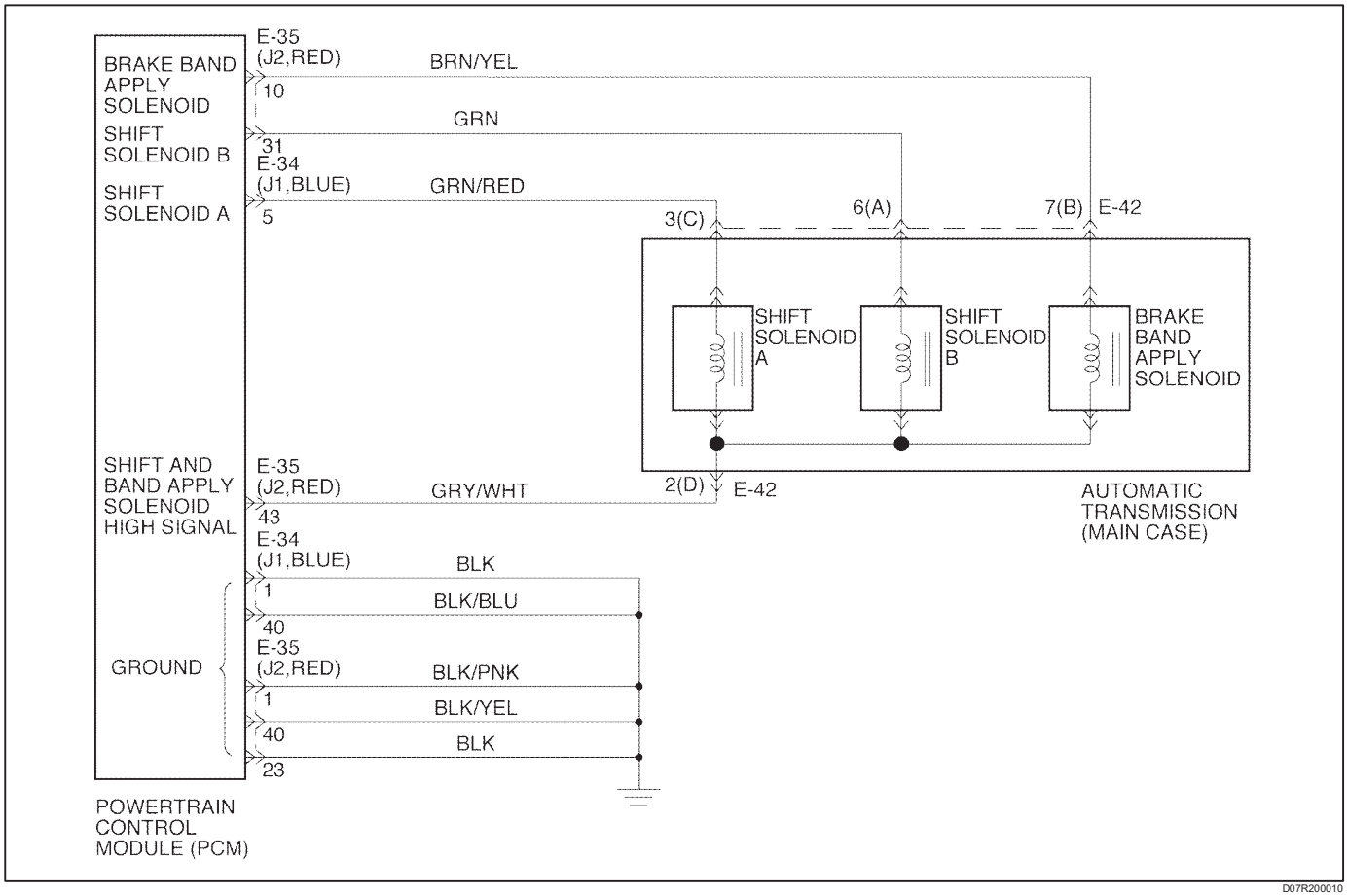
DTC P0758 Shift Solenoid B Electrical

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emission in Engine section*
2	1. Install the scan tool. 2. With the engine “on”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. Were DTCs P0753, P0758, P1860 set?	Go to *Step 4*	Go to *Step 3*
3	1. The engine “on”. 2. Apply brake pedal and select transmission range “D”. 3. Press and hold down the winter switch and select transmission mode “winter”. Does the scan tool display DTC P0758 at 3rd gear?	Go to *Step 7*	Go to *Diagnostic Aids*
4	1. Turn the ignition “off”. 2. Disconnect the E-34 (BLUE) and E-35 (RED) PCM connectors. 3. Turn the ignition “on”. 4. Using the J39200 DVOM, measure the voltage between PCM connector terminals E35–31 and E35–1. Is the voltage within 10 – 12 volts?	Go to *Step 13*	Go to *Step 5*
5	1. Turn the ignition “off”. 2. Using the J39200 DVOM, measure the resistance between PCM connector terminals E35–31 and E35–43. Is the resistance within 18 – 20 ohms?	Go to *Step 14*	Go to *Step 6*
6	1. Disconnect the transmission main case connector E–42. 2. Using the J39200 DVOM, measure the resistance between terminals E42–6(A) and E42–2(D). Is the resistance within 18 – 20 ohms?	Go to *Step 15*	Go to *Step 16*
7	1. Turn the ignition “off”. 2. Disconnect the E-34 (BLUE) and E-35 (RED) PCM connectors. 3. Using the J39200 DVOM, measure the resistance between PCM connector terminals E35–31 and E35–43. Is the resistance within 18 – 20 ohms?	Go to *Step 8*	Go to *Step 10*
8	Using the J39200 DVOM, check a continuity between PCM connector terminal E35–31 and ground. Is there a continuity?	Go to *Step 17*	Go to *Step 9*
9	Using the J39200 DVOM, check a continuity between PCM connector terminal E35–43 and ground. Is there a continuity?	Go to *Step 18*	Go to *Step 11*
10	1. Disconnect the transmission main case connector E-42. 2. Using the J39200 DVOM, measure the resistance between terminals E42–6(A) and E42–2(D). Is the resistance within 18 – 20 ohms?	Go to *Step 19*	Go to *Step 20*

DTC P0758 Shift Solenoid B Electrical (Cont'd)

Step	Action	Yes	No
11	Check every connection of the PCM. Was a problem found and corrected?	Go to *Step 22*	Go to *Step 12*
12	1. Connect the E-34 (BLUE) and E-35 (RED) PCM connectors to the PCM. 2. Turn the ignition "on", the engine "on". 3. Repeat Step 3. Does the scan tool display DTC P0758 at 3rd gear?	Go to *Step 21*	Go to *Diagnostic Aids*
13	The wiring harness between PCM connector terminal E35–31 and transmission main case terminal E42–6(A) is shorted to voltage. Was a problem found and corrected?	Go to *Step 22*	—
14	The PCM internal terminal E35–31 is shorted to voltage. Replace the PCM. Refer to *Powertrain Control Module (PCM) in Automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 22*	—
15	The wiring harness between PCM connector and transmission main case 7-way connector is shorted. Was a problem found and corrected?	Go to *Step 22*	—
16	The shift solenoid B is faulty, or the internal wiring harness from the shift solenoid B is shorted. Was a problem found and corrected?	Go to *Step 22*	—
17	The wiring harness between PCM connector terminal E35–31 and transmission main case connector terminal E42–6(A) is shorted to ground. Was a problem found and corrected?	Go to *Step 22*	—
18	The wiring harness between PCM connector terminal E35–43 and transmission main case connector terminal E42–2(D) is shorted to ground. Was a problem found and corrected?	Go to *Step 22*	—
19	The wiring harness between PCM connector terminal E35–31 and transmission main case connector terminal E42–6(A), or between PCM connector terminal E35–43 and main case connector terminal E42–2(D) is open. Was a problem found and corrected?	Go to *Step 22*	—
20	The internal wiring harness from the shift solenoid B is open, or the shift solenoid B is faulty. Was a problem found and corrected?	Go to *Step 22*	—
21	Replace the PCM. Is the replacement complete?	Go to *Step 22*	—
22	1. After the repair is complete, use the scan tool to select "DTC", then "Clear Info" function and operate the vehicle under the following conditions: ● The shift solenoid B is commanded "on" and voltage drops to zero. ● The shift solenoid B is commanded "off" and voltage increases to B+. 2. Review the scan tool "DTC Info". Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P1850 Brake Band Apply Solenoid Malfunction



D07R200010

Circuit Description

- The brake band apply solenoid is a normally open solenoid which controls the flow of fluid for brake band application. The Powertrain Control Module (PCM) uses Pulse Width Modulation (PWM) and changes the duty cycle to control the solenoid. The PCM turns the solenoid on (energized) and off (deenergized) at a constant frequency. The length of time the solenoid is energized during each on/off cycle is called the pulse width. By varying or “modulating” the pulse width, the solenoid output pressure is changed. Since the solenoid is normally open, increasing the pulse width increases the duty cycle and decreases the output pressure. PWM control provides smooth band application without an accumulator. The band is only applied in first and second gears.
- In the event of an electrical failure (open), the solenoid regulates at the maximum oil flow (0% duty cycle).
- The solenoid is activated by a current. This current is produced by applying a voltage to one side (the High side) and a ground to the other side (Low side).
- The High Side Driver (HSD) is a circuit of the PCM that acts as a switch between the solenoids and the supply voltage. The High side of the solenoid is permanently supplied with voltage. When the ignition is off, the HSD is turned off.

This DTC detects a continuous open or short to ground in the brake band apply solenoid circuit or the brake band apply solenoid. This is a type “D” DTC.

Conditions For Setting The DTC

- Battery voltage is between 10 and 16 volts.
- Ignition is “on”, Engine “run”.
- The PCM commands the solenoid “on” and the voltage remains high (B+), or the PCM commands the solenoid “off” and the voltage remains low (zero volts).
- All conditions met in 1.34 ~ 1.56 seconds.

Action Taken When The DTC Sets

- Inhibit brake band apply solenoid.
- The PCM will not illuminate the Malfunction Indicator Lamp (MIL).

Conditions For Clearing The DTC

- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Inspect the wiring for poor electrical connection at the PCM and at the transmission 7–way connector. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.

Test Description

The numbers below refer to the step numbers on the diagnostic chart:

3. This test checks for power to the brake band apply solenoid from the ignition through the PCM.
4. This test checks the resistance of the transmission internal wiring harness and brake band apply solenoid.
5. This test checks the ability of the PCM and wiring to control the ground circuit.

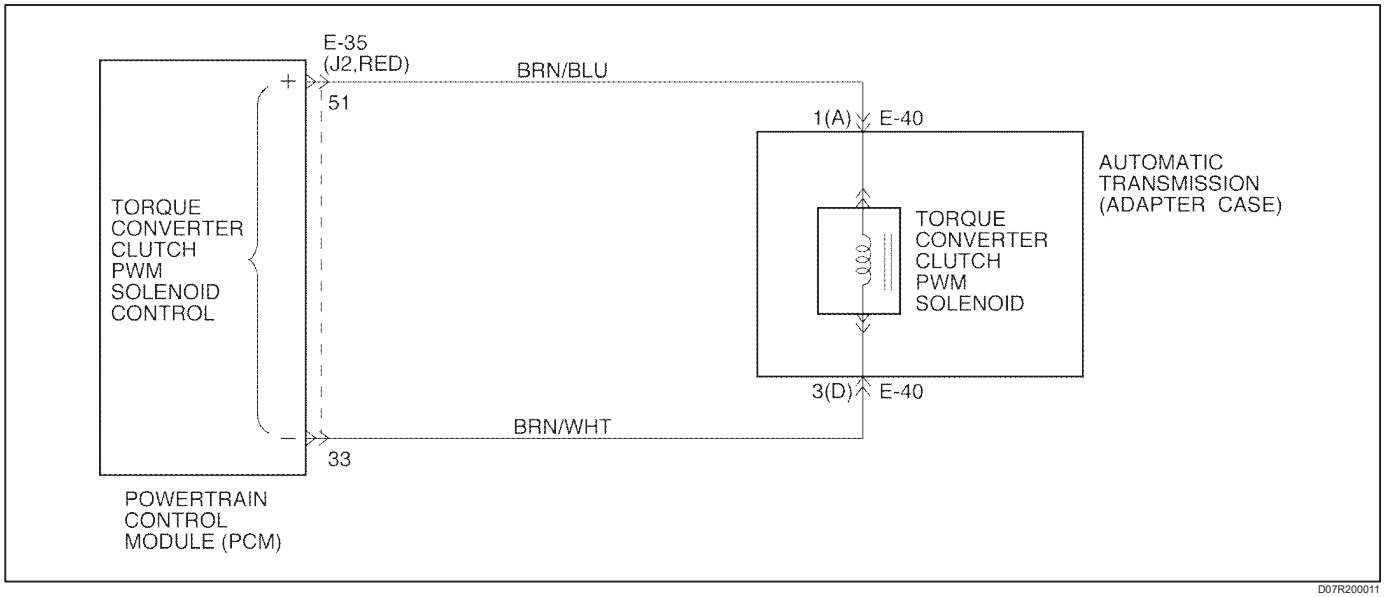
DTC P1850 Brake Band Apply Solenoid Malfunction

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emission in Engine section*
2	1. Install the scan tool. 2. With the engine “on”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. Were DTCs P0753, P0758 set?	Go to *Step 3*	Go to *Step 4*
3	Using the J39200 DVOM, back probe between PCM connector terminals E35–43 and E35–1. Is the voltage between 10 to 12 volts?	Go to *Step 5*	Go to *Step 6*
4	1. Turn the ignition “off”. 2. Disconnect the E-34 (BLUE) and E-35 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between PCM connector terminals E35–43 and E35–10. Is the resistance within 10–12 ohms?	Go to *Step 10*	Go to *Step 11*
5	Using the J39200 DVOM, back probe between PCM connector terminals E35–10 and E35–1. Is the voltage between 10 to 12 volts?	Go to *Step 19*	Go to *Step 4*
6	1. Turn the ignition “off”. 2. Disconnect the E-34 (BLUE) and E-35 (RED) PCM connector. 3. Using the J39200 DVOM, check continuity between PCM terminal E35–43 and ground. Is there a continuity?	Go to *Step 7*	Go to *Step 8*
7	1. Disconnect the transmission main case connector E-42. 2. Using the J39200 DVOM, check continuity between the terminal E42–7(B) and ground. Is there continuity?	Go to *Step 13*	Go to *Step 14*
8	1. Disconnect the E-34 (BLUE) and E-35 (RED) PCM Connector. 2. Using the J39200 DVOM, measure the resistance between the PCM connector terminals E35–43 and E35–10. Is the resistance within 10–12 ohms?	Go to *Step 19*	Go to *Step 9*
9	1. Disconnect the transmission main case connector E-42. 2. Using the J39200 DVOM, measure the resistance between the terminals E42–7(B) and E42–2(D). Is the resistance within 10–12 ohms?	Go to *Step 15*	Go to *Step 16*
10	Using the J39200 DVOM, check continuity between PCM terminal E35–10 and ground. Is there continuity?	Go to *Step 12*	Go to *Step 19*
11	1. Disconnect the transmission main case connector E-42. 2. Using the J39200 DVOM, measure the resistance between the terminals E42-7(B) and E42-2(D). Is the resistance within 10–12 ohms?	Go to *Step 18*	Go to *Step 16*

DTC P1850 Brake Band Apply Solenoid Malfunction (Cont'd)

Step	Action	Yes	No
12	1. Disconnect the transmission main case connector E-42. 2. Using the J39200 DVOM, check continuity between the terminals E42–7(B) and ground. Is there a continuity?	Go to *Step 13*	Go to *Step 17*
13	The brake band apply solenoid is faulty, or the internal wiring harness from the brake band apply solenoid is shorted to ground. Was a problem found and corrected?	Go to *Step 20*	—
14	The wiring harness between the PCM connector terminal E35–43 and the transmission main case connector terminal E42–2(D) is shorted to ground. Was a problem found and corrected?	Go to *Step 20*	—
15	The wiring harness between the PCM connector terminal E35–43 and the transmission main case connector terminal E42–2(D) is open. Was a problem found and corrected?	Go to *Step 20*	—
16	The brake band apply solenoid is faulty, or the internal wiring harness from the brake band apply solenoid is open. Was a problem found and corrected?	Go to *Step 20*	—
17	The wiring harness between the PCM connector terminal E35–10 and the transmission main case connector terminal E42–7(B) is shorted to ground. Was a problem found and corrected?	Go to *Step 20*	—
18	The wiring harness between the PCM connector terminal E35–10 and the transmission main case connector terminal E42–7(B) is open. Was a problem found and corrected?	Go to *Step 20*	—
19	Check every connection at the PCM. If OK, replace the PCM. Refer to *Powertrain Control Module (PCM) in Automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 20*	—
20	1. After the repair is complete, use the scan tool to select "DTC", then "Clear Info" function and ensure the following conditions are met: ● The brake band apply solenoid is commanded "on" and the volts drop to zero. ● The brake band apply solenoid is commanded "off" and the volts increase to B+. 2. Review the scan tool "DTC Info". Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P1860 TCC PWM Solenoid Electrical



Circuit Description

The PCM allows current to flow through the solenoid coil according to the duty cycle (percentage of “on” and “off” time). This current flow through the solenoid coil creates a magnetic field that magnetizes the solid core. The magnetized core attracts the check ball to seat against spring pressure. This blocks the exhaust for the TCC signal fluid and allows 2–3 drive fluid to feed to TCC signal circuit.The TCC signal fluid pressure acts on the TCC regulator valve to regulate line pressure and to apply fluid pressure to the torque converter clutch shift control valve. When the TCC shift valve is in the apply position, regulated apply fluid pressure is directed through the TCC valve to apply the torque converter clutch. The TCC PWM solenoid is used in conjunction with the TCC PWM solenoid to regulate fluid to the torque converter. The TCC PWM solenoid is attached to the valve body within the transmission.

This DTC detects a continuous open or short to ground or ignition in the TCC circuit or the TCC PWM solenoid. This is a type “B” DTC.

Conditions For Setting The DTC

- Battery voltage is between 10 and 16 volts.
- No shift solenoid A DTCs P0751 or P0752 or P0753.
- No shift solenoid B DTCs P0756 or P0757 or P0758.
- Ignition is “on”, Engine “run”.
- The PCM commands the solenoid “on” and the voltage remains low (zero volts).
- The PCM commands the solenoid “off” and the voltage remains high (B+).
- All conditions met for 0.875 ~ 1.25 seconds.

Action Taken When The DTC Sets

- Inhibit TCC engagement.
- For lamp illuminate refer to *DTC type definition (type B).*

Conditions For Clearing The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exists and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Inspect the wiring for poor electrical connections at the PCM and at the transmission connector. Look for possible bent, backed out, deformed or damaged terminals. Check for weak terminal tension as well. Also check for a chafed wire that could short to bare metal or other wiring. Inspect for a broken wire inside the insulation.
- When diagnosing for a possible intermittent short or open condition, move the wiring harness while observing test equipment for a change.

Test Description

The numbers below refer to the step numbers on the diagnostic chart*:*

3. This test checks for voltage to the solenoid.
4. This test checks the ability of the PCM and wiring to control the ignition circuit.
9. This test checks the resistance of the TCC solenoid and the internal wiring harness.

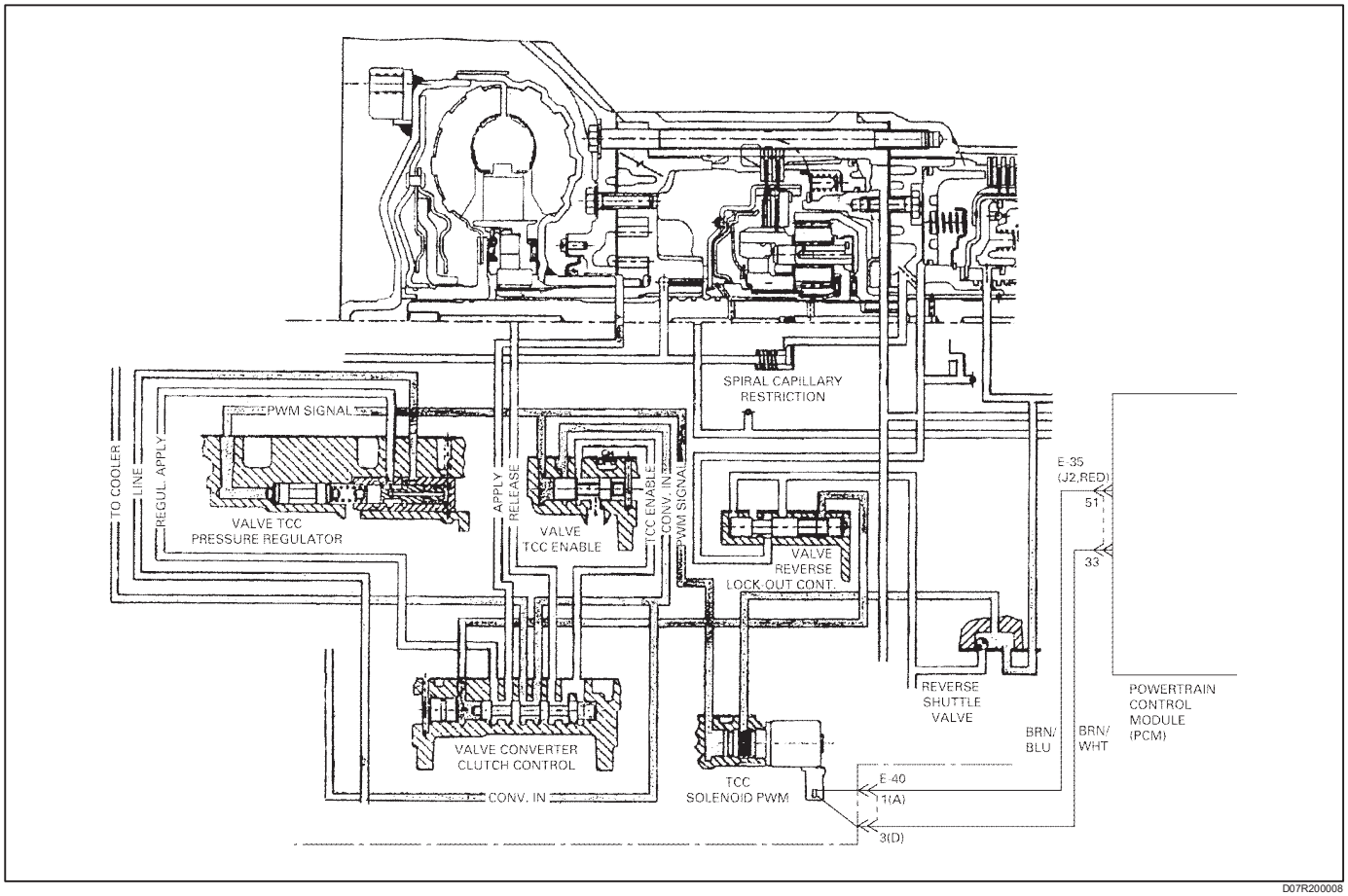
DTC P1860 TCC PWM Solenoid Electrical

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emission in Engine section*
2	1. Install the scan tool. 2. With the engine “on”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the“Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. Was DTC P1860 set?	Go to *Step 3*	Go to *Step 4*
3	Using the J39200 DVOM, back probe between PCM connector terminals E35–51 and E35–33. Is the voltage 0?	Go to *Step 5*	Go to *Step 6*
4	1. Apply brake pedal and select transmission range “D”. 2. Do a test drive, and increase the vehicle speed to TCC “on” at 4th. Does the scan tool display DTC P1860 at TCC “ON”?	Go to *Step 9*	Go to *Diagnostic Aids*
5	1. Turn the ignition “off”. 2. Disconnect the E-35 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between PCM connector terminals E35–51 and E35–33. Is the resistance within 18 – 20 ohms?	Go to *Step 7*	Go to *Step 8*
6	The wiring harness between PCM connector terminal E35–51 and transmission adapter case connector terminal E40–1(A) is shorted to voltage. Was a problem found and corrected?	Go to *Step 15*	Go to *Step 16*
7	Intermittent condition. Check the wiring harness and terminals between PCM connector J2 and transmission adapter case connector E–40. Was a problem found and corrected?	Go to *Step 15*	Go to *Step 16*
8	1. Disconnect the transmission adapter case connector E–40. 2. Using the J39200 DVOM, measure the resistance between terminal E40–1(A) and ground. Is the resistance within 18 – 20 ohms?	Go to *Step 13*	Go to *Step 14*
9	1. Turn the ignition “off”. 2. Disconnect the E-35 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between terminals E35–51 and E35–33. Is the resistance within 18 – 20 ohms?	Go to *Step 15*	Go to *Step 10*
10	1. Disconnect the transmission adapter case connector E–40. 2. Using the J39200 DVOM, measure the resistance between terminal E40–1(A) and ground. Is the resistance within 18–20 ohms?	Go to *Step 11*	Go to *Step 12*
11	The wiring harness between PCM connector E-35 and adapter case connector E-40 is shorted to ground. Was a problem found and corrected?	Go to *Step 17*	—

DTC P1860 TCC PWM Solenoid Electrical (Cont'd)

Step	Action	Yes	No
12	The TCC solenoid is faulty, or the internal wiring harness from the TCC solenoid is shorted to ground. Was a problem found and corrected?	Go to *Step 17*	—
13	The wiring harness between PCM connector terminal E35–51 and adapter case terminal E40–1(A) is open. Was a problem found and corrected?	Go to *Step 17*	—
14	The TCC solenoid is faulty, or the internal wiring harness from the TCC solenoid is open. Was a problem found and corrected?	Go to *Step 17*	—
15	Check every connection at the PCM. If OK, replace the PCM. Refer to *Powertrain Control Module (PCM) in Automatic Transmission (4L30–E) section.* Is the replacement complete?	Go to *Step 17*	—
16	Check the PCM connector terminal E35–51, and transmission adapter case connector terminal E40–1(A). Was a problem found and corrected?	Go to *Step 17*	—
17	1. After the repair is complete, use the scan tool to select "DTC", then "Clear Info" function and ensure the following conditions are met: ● The TCC solenoid is commanded "on" and the volts increase to B+. ● The TCC solenoid is commanded "off" and the volts drop to zero. 2. Review the scan tool "DTC Info". Has the last test failed or is the current DTC displayed?	Begin diagnosis again Go to *Step 1*	Repair verified Exit DTC table

DTC P1870 Transmission Component Slipping (TCC Stuck Off)



D07R200008

Circuit Description

The PCM monitors the difference in engine speed and transmission output speed. For example in D3 drive range with the ECCC commanded, the engine speed should closely match transmission output speed.
This DTC detects excessive TCC slip when the ECCC is engaged. This is a type “B” DTC.

Conditions For Setting The DTC

The following conditions are met for three TCC cycles with reported excessive TCC slip conditions.

- No OSS DTCs P0722 or P0723.
- No shift solenoid A DTCs P0751 or P0752 or P0753.
- No shift solenoid B DTCs P0756 or P0757 or P0758.
- No TCC solenoid DTCs P0742 or P1860 or P1870.
- Engine speed is between 1,000 and 3,500 rpm for 0.5 seconds.
- Gear range is D4.
- 13% < TPS < 99%
- 50 < Engine Torque < 300 N·m
- TFT is between 20° and 150°C (68° and 302°F).
- TCC slip speed is between 250 rpm and 800 rpm for 3 times 7 seconds.
- Vehicle speed is between 25 km/h (15 mph) and 225 km/h (158 mph).
- Speed ratio is between 0.6 and 0.95.
- ECCC is “ON”.
- Low (0.8) < TCC Capacity < hi (0.99) for 5 seconds

Action Taken When The DTC Sets

- Only stored in memory.
- For lamp illuminate refer to *DTC type definition (type B).*

Conditions For Clearing The MIL/DTC

- The PCM will turn off the MIL and CHECK TRANS Lamp after three consecutive ignition cycles without a failure reported.
- The DTC can be cleared from the PCM history by using a scan tool.
- The DTC will be cleared from history when the vehicle has achieved 40 warmup cycles without a failure reported.
- The PCM will cancel the DTC default actions when the fault no longer exist and the ignition is cycled “off” long enough to power down the PCM.

Diagnostic Aids

- Range switch malfunction could set a DTC P1870.
- A mechanical failure of the shift solenoids, TCC solenoid, or TCC PWM solenoid could set a DTC P1870.
- Internal transmission failures may set a DTC P1870.
- An intermittent or incorrect engine speed signal may set a DTC P1870.

Test Description

The numbers below refer to the step numbers on the diagnostic chart:

2. This test checks the indicated range signal to the actual selected range. A faulty switch could set a DTC P1870.
3. This test checks the torque converter for slippage while in a commanded lockup state.

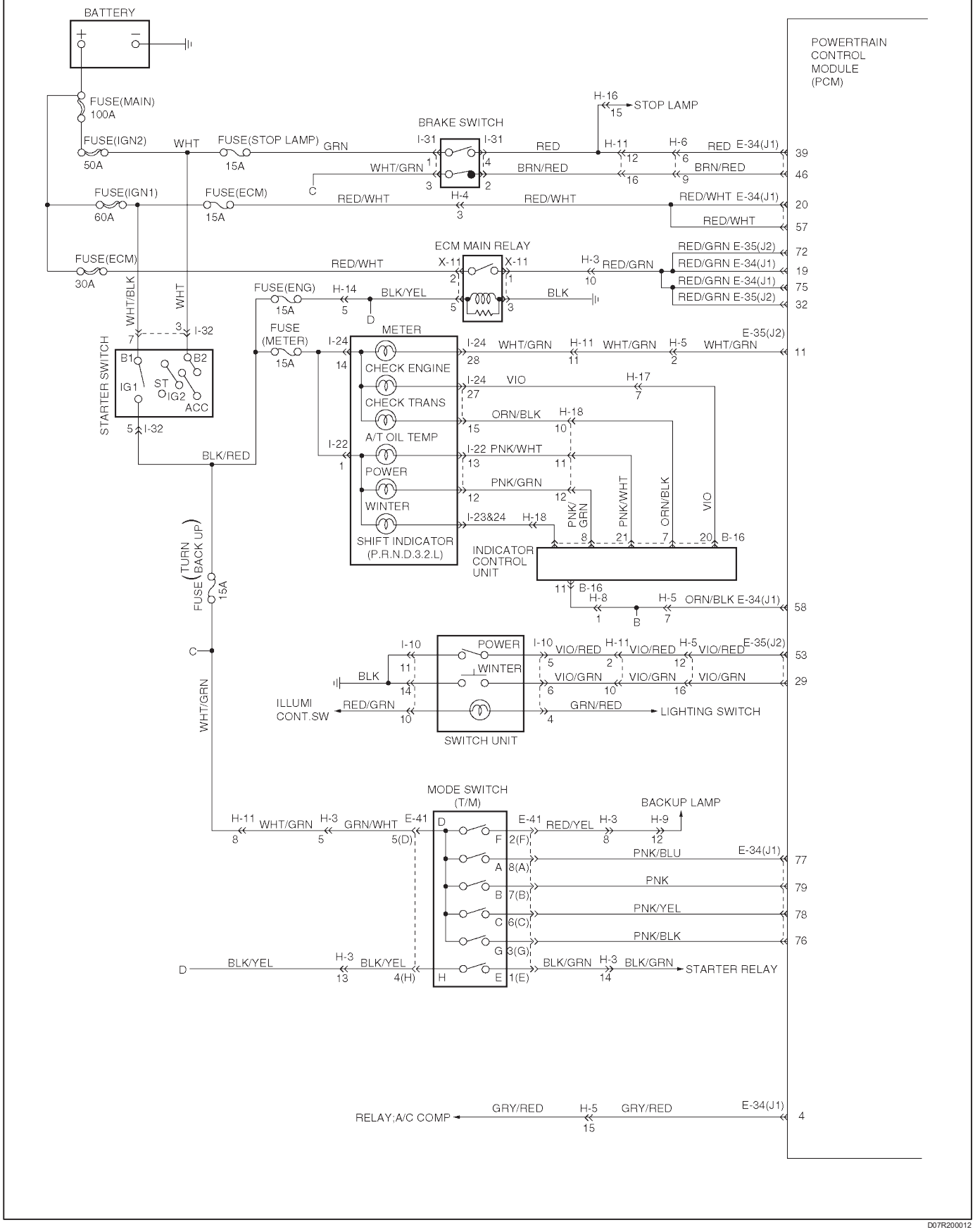
Range Switch Logic Table

Range Position	Range Switch Pin			
	A	B	C	P(G)
Park	ON	OFF	OFF	ON
Reverse	ON	ON	OFF	OFF
Neutral	OFF	ON	OFF	ON
D4	OFF	ON	ON	OFF
D3	ON	ON	ON	ON
2	ON	OFF	ON	OFF
L	OFF	OFF	ON	ON
Illegal	OFF	OFF	OFF	OFF
Illegal	OFF	OFF	OFF	ON

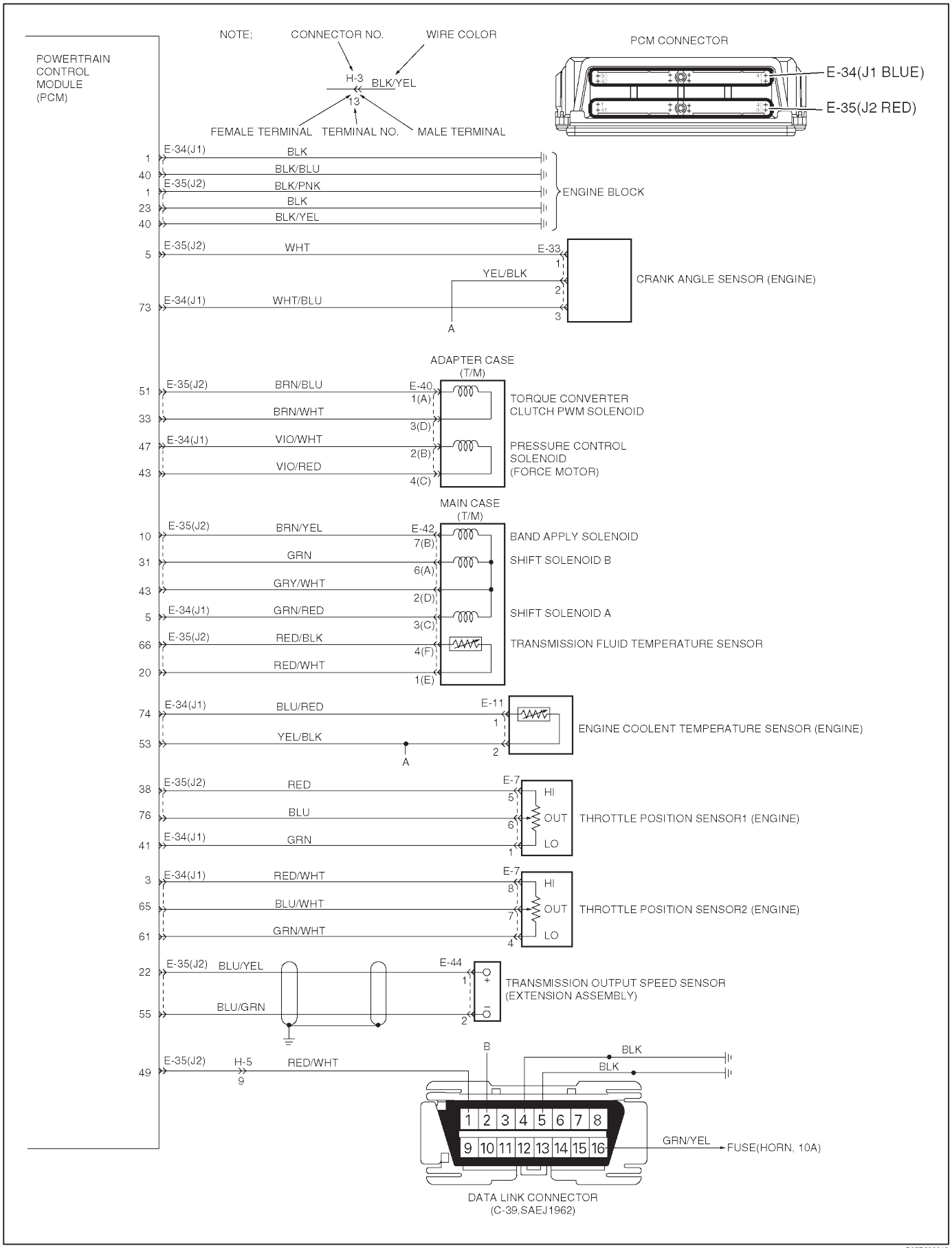
DTC P1870 Transmission Component Slipping (TCC Stuck Off)

Step	Action	Yes	No
1	Were you sent here from the “Powertrain On–Board Diagnostic (OBD) System Check”?	Go to *Step 2*	Go to *OBD System Check* Refer to *Driveability and Emissions in Engine section*
2	1. Install the scan tool. 2. With the engine “off”, turn the ignition switch “on”. NOTE: Before clearing DTC(s), use the scan tool to record “Freeze Frame” and “Failure Records” for reference, as data will be lost when the “Clear Info” function is used. 3. Record the DTC “Freeze Frame” and “Failure Records”. 4. Apply the brake pedal. 5. Select each transmission range: DL, D2, D3, D4, N, R, and P. Does each selected transmission range match the scan tool “TR Switch” display?	Go to *Step 3*	Go to *“Range Switch Logic Table”*
3	Drive the vehicle in 4th gear while the TCC is engaged. At any time is the “TCC Slip Speed” greater than 130 rpm for 8 seconds while the TCC is engaged?	Go to *System Diagnosis Charts*	Go to *Diagnostic Aids*

Circuit Diagram

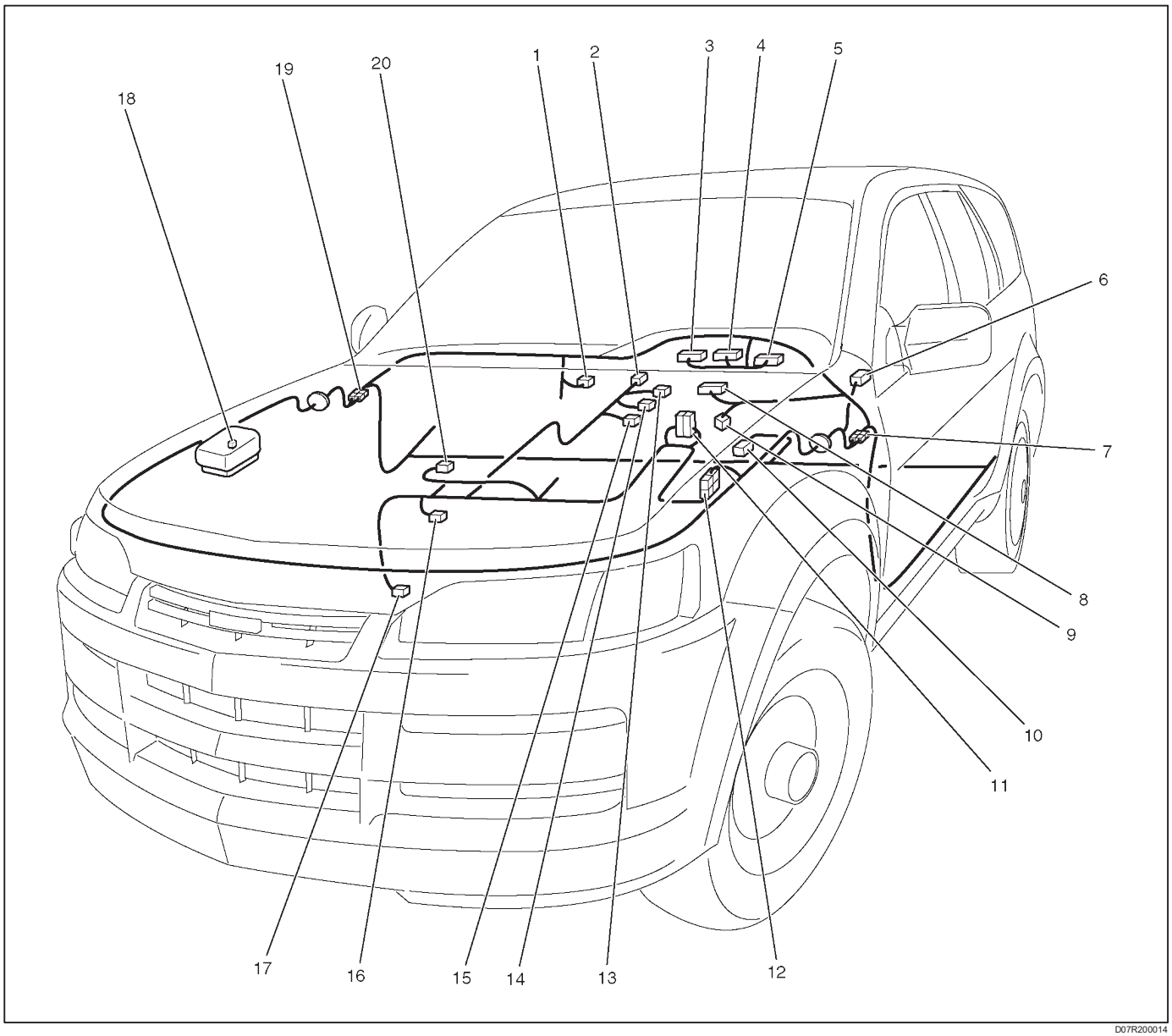


D07R200012


POWERTRAIN CONTROL MODULE (PCM)
NOTE:
CONNECTOR NO.
WIRE COLOR
H-3
BLK/YEL
13
FEMALE TERMINAL
TERMINAL NO.
MALE TERMINAL
PCM CONNECTOR
E-34(J1 BLUE)
E-35(J2 RED)
E-34(J1)
E-35(J2)
BLK
BLK/BLU
BLK/PNK
BLK
BLK/YEL
ENGINE BLOCK
WHT
YEL/BLK
WHT/BLU
E-33
CRANK ANGLE SENSOR (ENGINE)
ADAPTER CASE (T/M)
BRN/BLU
BRN/WHT
VIO/WHT
VIO/RED
E-40
TORQUE CONVERTER CLUTCH PWM SOLENOID
PRESSURE CONTROL SOLENOID (FORCE MOTOR)
MAIN CASE (T/M)
BRN/YEL
GRN
GRY/WHT
GRN/RED
RED/BLK
RED/WHT
E-42
BAND APPLY SOLENOID
SHIFT SOLENOID B
SHIFT SOLENOID A
TRANSMISSION FLUID TEMPERATURE SENSOR
BLU/RED
YEL/BLK
E-11
ENGINE COOLENT TEMPERATURE SENSOR (ENGINE)
RED
BLU
GRN
E-7
HI
OUT
LO
THROTTLE POSITION SENSOR1 (ENGINE)
RED/WHT
BLU/WHT
GRN/WHT
THROTTLE POSITION SENSOR2 (ENGINE)
BLU/YEL
BLU/GRN
E-44
TRANSMISSION OUTPUT SPEED SENSOR (EXTENSION ASSEMBLY)
H-5
RED/WHT
B
BLK
BLK
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
GRN/YEL
FUSE(HORN, 10A)
DATA LINK CONNECTOR (C-39,SAEJ1962)

D07R200013

Parts Location

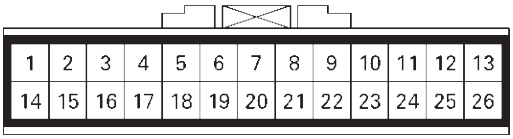
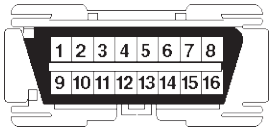
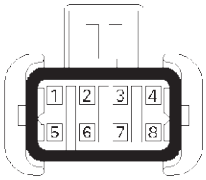
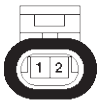
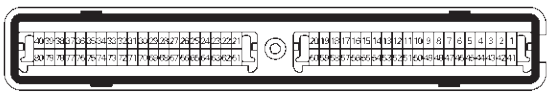
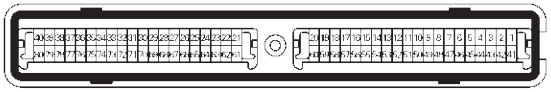
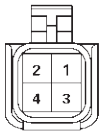
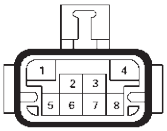


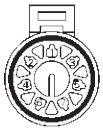
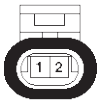
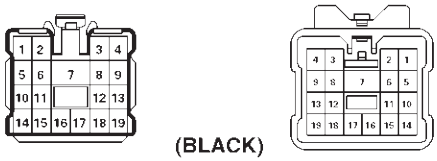
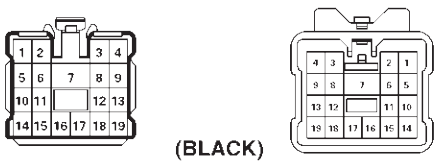
D07R200014

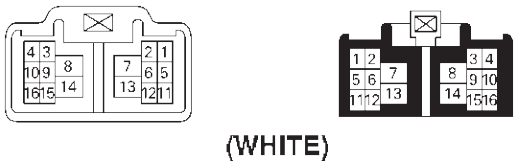
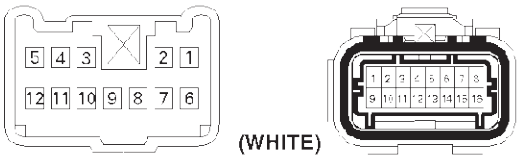
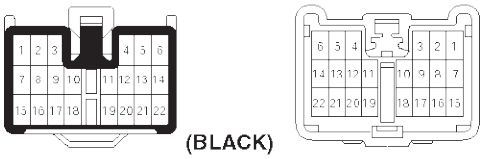
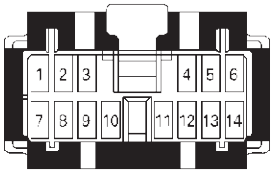
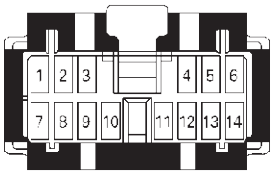
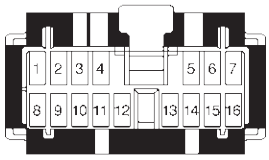
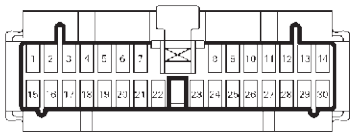
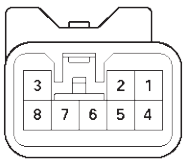
Legend

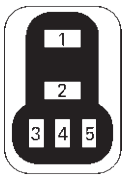
(1) Connector I–10
(2) Connector E–44
(3) Connector I–22
(4) Connector I–23
(5) Connector I–24
(6) Data Link Connector C–39
(7) Connector H–9, H–11, H–16
(8) Connector I–32
(9) Connector I–31
(10) Connector B–16
(11) Powertrain Control Module (PCM) Connector E–34, E–35
(12) Connector H–3, H–5, H–6
(13) Connector E–42
(14) Connector E–41
(15) Connector E–40
(16) Connector E–11
(17) Connector E–33
(18) Connector X–11
(19) Connector H–8, H–14, H–17, H–18
(20) Connector E–7

Harness Connector Faces

No.	Connector face
B-16	
C-39	
E-7	
E-11	
E-33	
E-34 (J1)	 (BLUE)
E-35 (J2)	 (RED)
E-40	 (GRAY)
E-41	 (BLACK)

No.	Connector face
E-42	 (BLACK)
E-44	
H-3	(WHITE)
H-5	(GREEN)
H-6	(BLUE)
H-8	(BLUE)
H-9	(BLUE)
H-11	 (BLACK)
H-14	 (BLACK)

No.	Connector face
H-16	 (WHITE)
H-17	 (WHITE)
H-18	 (BLACK)
I-10	
I-22	
I-23	
I-24	
I-31	
I-32	

No.	Connector face
X-11	

Transmission Fluid Temperature (TFT) Sensor Specifications

Temperature	Temperature	Minimum Resistance	Nominal Resistance	Maximum Resistance	Signal
°F	°C	Ω	Ω	Ω	Volts
-40	-40	600500	664200	731100	5.00
-22	-30	319800	350400	382400	4.65
-4	-20	177400	192700	208600	4.41
14	-10	102200	110100	118300	4.00
32	0	60870	65110	69450	3.52
50	10	37410	39750	42120	2.98
68	20	23660	24980	26300	2.40
86	30	15270	16120	16970	1.85
104	40	10040	10660	11290	1.43
122	50	6758	7211	7673	4.29
140	60	4645	4980	5324	4.04
158	70	3255	3506	3765	3.69
176	80	2323	2513	2710	3.34
194	90	1685	1831	1982	3.04
212	100	1242	1355	1472	2.58
230	110	929	1017	1109	2.24
248	120	704	773	846	1.97
266	130	540	595	653	1.67
284	140	419	464	511	1.42
302	150	329	365	403	1.16