

RODEO

TRANSMISSION

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AUTOMATIC TRANSMISSION (4L30-E)

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7A-2 AUTOMATIC TRANSMISSION (4L30-E)

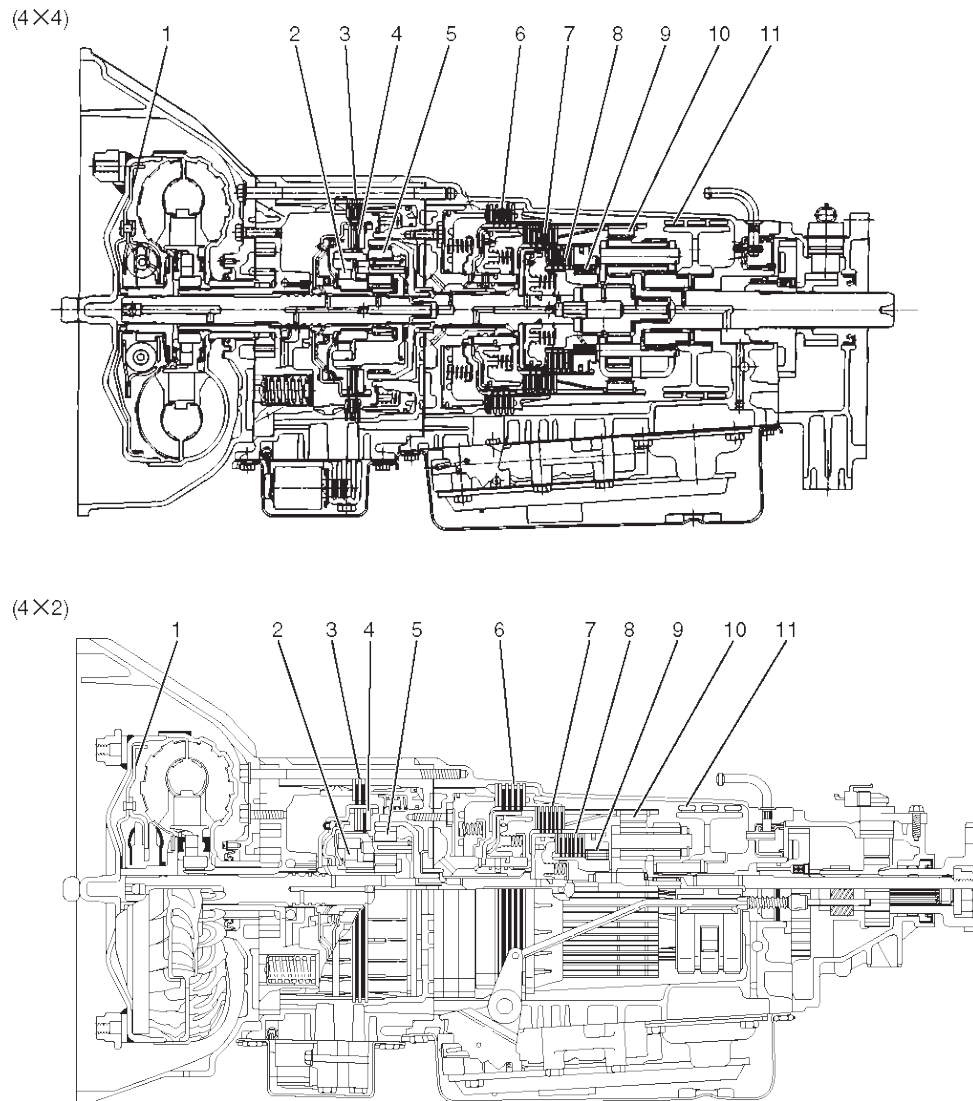
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Service Precaution

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

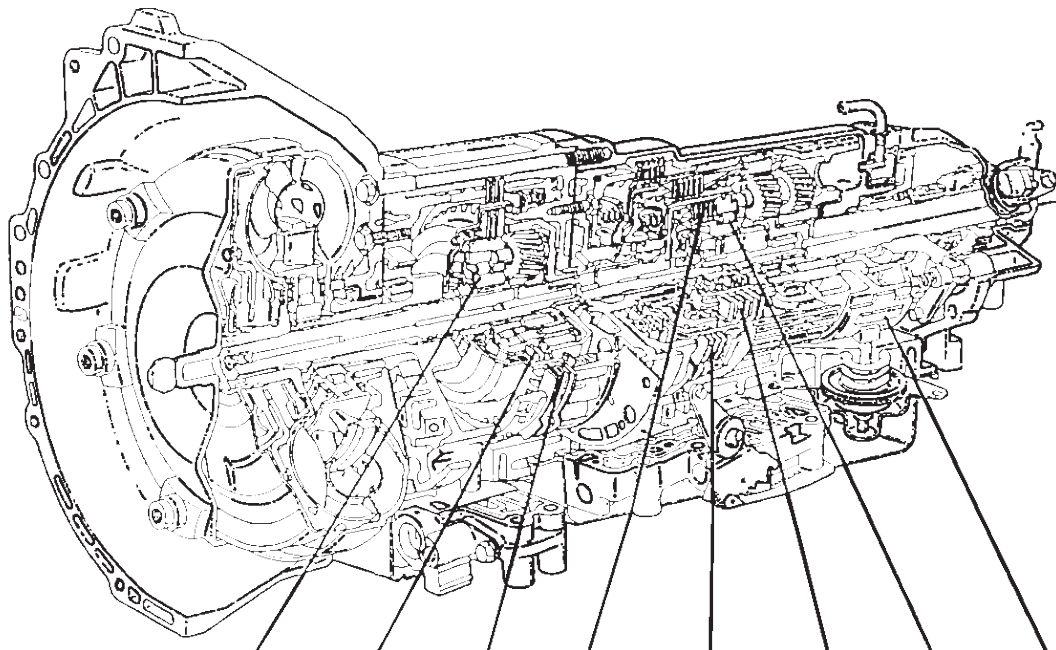


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Legend

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

Range Reference Chart



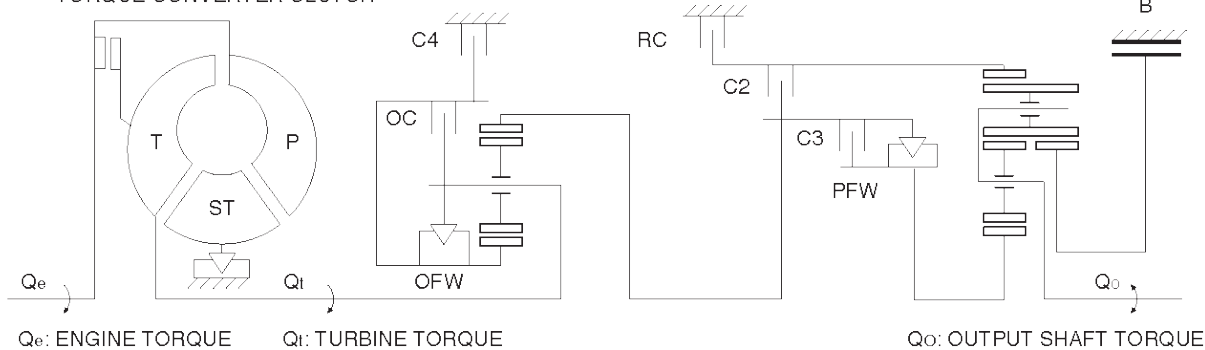
RANGE	GEAR	SOL A N.C.	SOL B N.O.	O/DRIVE ROLLER CLUTCH (OFW)	OVERRUN CLUTCH (OC)	FOURTH CLUTCH (C4)	THIRD CLUTCH (C3)	REVERSE CLUTCH (RC)	SECOND CLUTCH (C2)	PRINCIPLE SPRAG ASSEMBLY (PFW)	BAND ASSEMBLY (B)	ENGINE BRAKING
P-N		OFF	ON		APPLIED							NO
R	REVERSE	OFF	ON	LD	APPLIED			APPLIED		LD		NO
D	1ST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

LD : LOCKED IN DRIVE

FW : FREEWHEELING

NE : NOT EFFECTIVE

TORQUE CONVERTER CLUTCH



Normal Operation of 2001 4L30–E Transmission

Torque Converter Clutch (TCC)

Application Conditions:

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).
- The brake pedal is released.
- 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 (V6)

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 (V6)

With the selector lever in reverse position, the PCM will not close the PWM solenoid until the vehicle is below 15 km/h (9.3 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.

7A-6 AUTOMATIC TRANSMISSION (4L30-E)

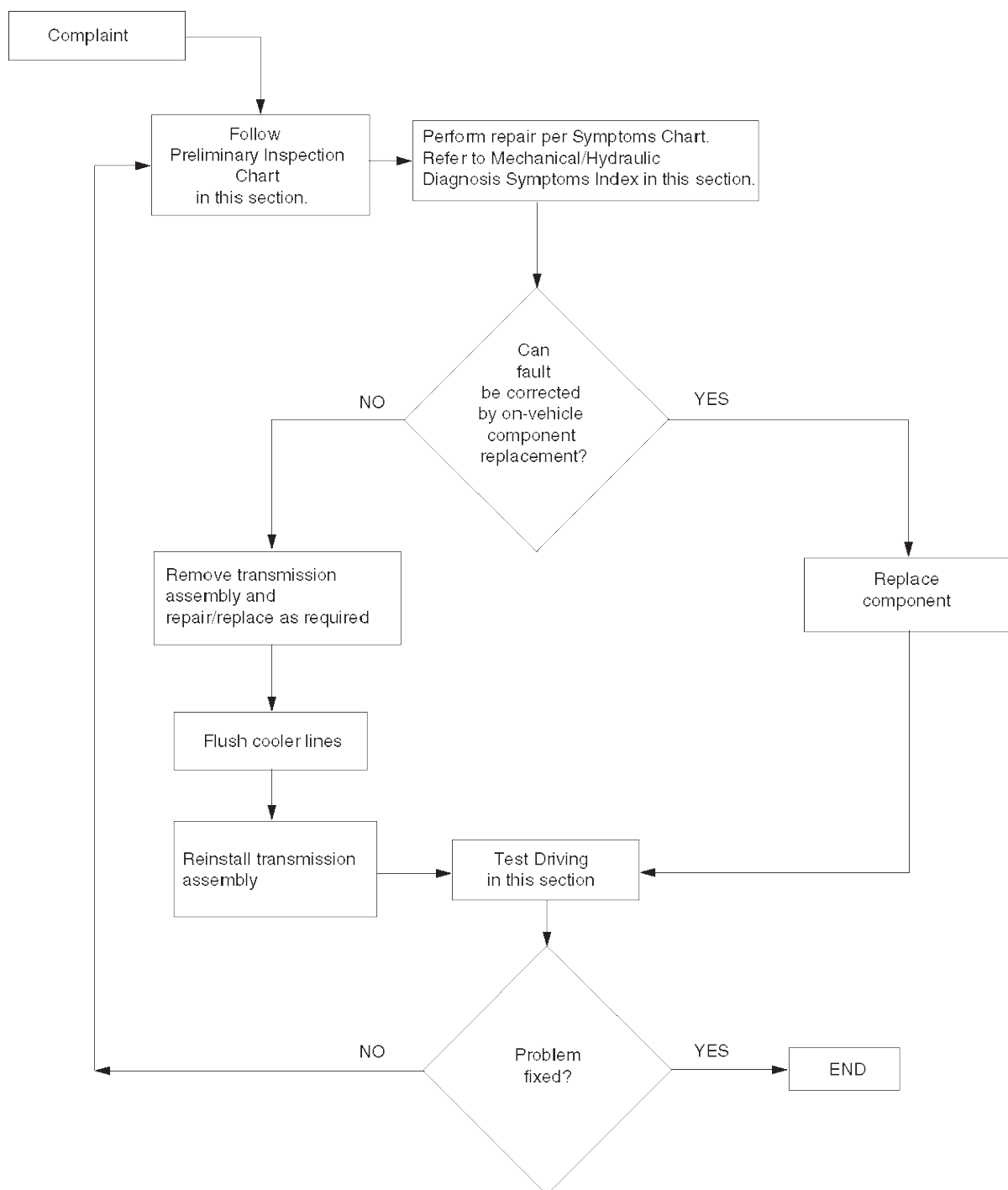
A - Today's date :	Month :	Day :	Year :
B - End User Name, Address :			
C - Date of Problem :			
Month :		Day :	
Year :			
D - Mileage : Miles / Km	E - With Ignition ON is CHECK TRANS Indicator : 1- Flashing 2- Not Flashing		F - Car load when problem occurred : 1 - Towing a trailer 2- people OR Kg
G - 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 occurred : 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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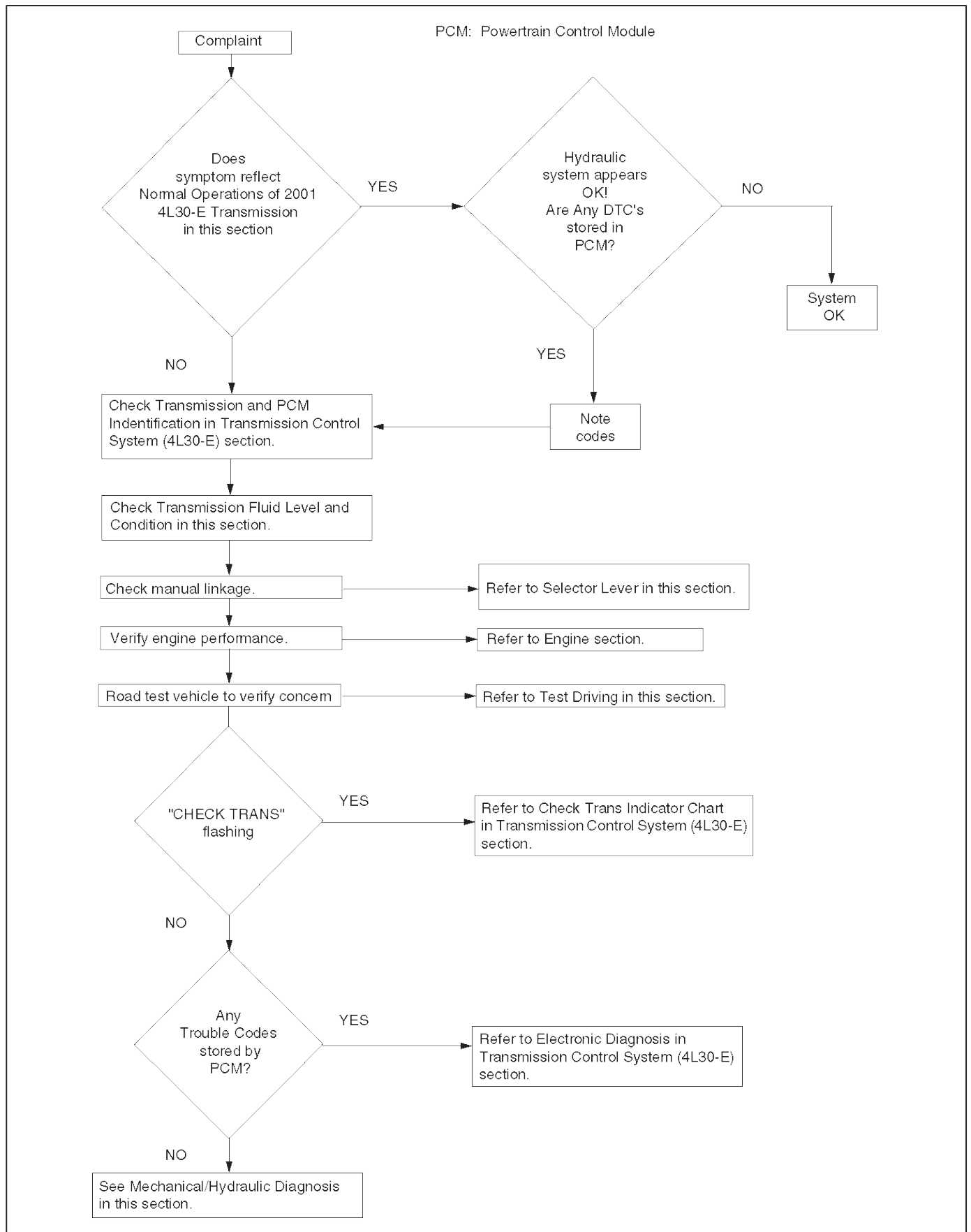
Example of form completed.

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 : 12230 Miles / Km	E - With Ignition ON is CHECK TRANS Indicator : 1- Flashing 2- Not Flashing	F - Car load when problem occurred : 1- Towing a trailer 2- 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 occurred : 1- Idling 2- Starting 3- Stalling 4- High RPM 5- Low RPM	M - Transmission Condition when it occurred : 1- Any 2- Idling 3- Starting 4- Driving 5- Accelerating 6- Coasting 7- In corner 8- Shifting	this means do not take this into account
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		

General Diagnosis Procedure



Preliminary Inspection Chart



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).

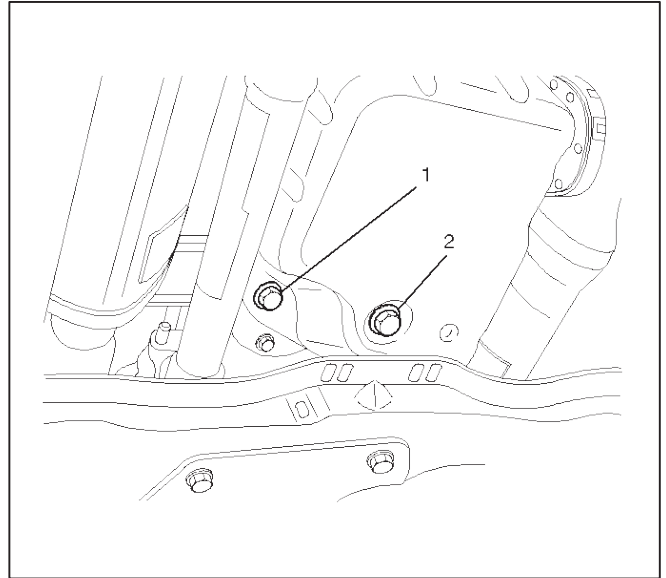
Torque: 38 N•m (28 lb ft)

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)



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
CONTAMINATION	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, GOTO Check Trans Indicator in Transmission Control System (4L30-E) section.
 - If no serial data is present, GOTO OBD System Check. Refer to Driveability and Emissions in Engine section.

- If the lamp stays ON or stays OFF, GOTO "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.

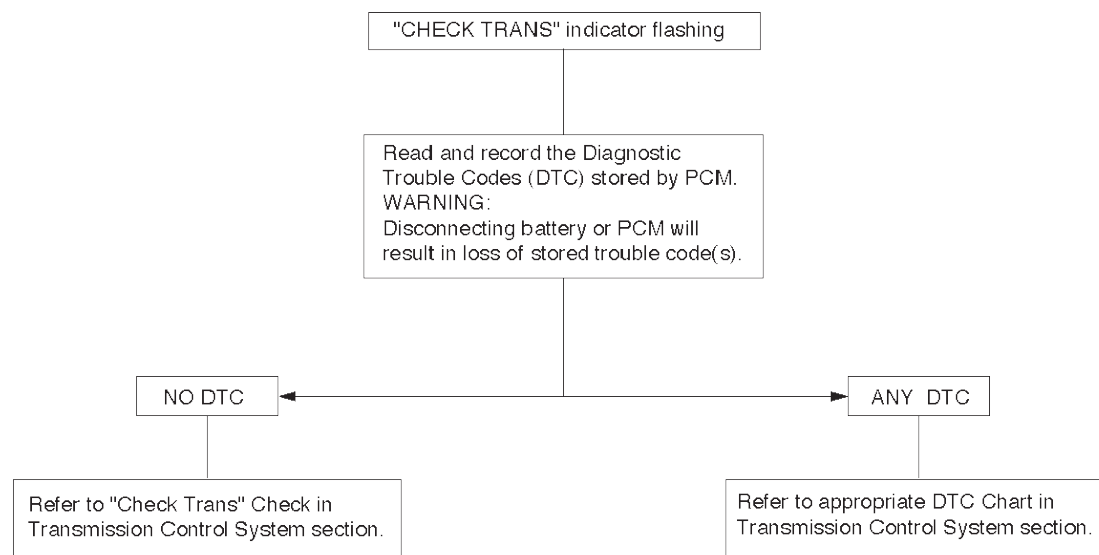
5. If no problem has been found at this point, check all underhood connections that supply power to the PCM and ignition fuses. Physically and visually inspect all the PCM harness connectors for loose or corroded terminals. Inspect the PCM ground points.

Mechanical / Hydraulic Diagnosis Check Trans Indicator Chart

Perform Preliminary Inspection First!

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.



BACKUP MODE PATTERN:

- No automatic shifting
- Manual shifting only
- "CHECK TRANS" Flashing

SHIFT LEVER POSITION

P
R
N
D
3
2
L

GEAR SELECTED

P
R
N
4
4
3
1

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.

7A-14 AUTOMATIC TRANSMISSION (4L30-E)**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 DTCs P0560 (HEC Model) and 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	—

7A-16 AUTOMATIC TRANSMISSION (4L30-E)
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).

7A-18 AUTOMATIC TRANSMISSION (4L30-E)**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 application.) 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.

7A-20 AUTOMATIC TRANSMISSION (4L30-E)

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 (208). (Oil pump) Was the problem found?	Replace pressure regulator valve (208).	Go to Step 8
8	Check for a stuck boost valve (205). (Oil pump) Was the problem found?	Replace boost valve (205).	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 & 209). 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 feed limit valve (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 (208). (Oil pump) Was the problem found?	Replace pressure regulator valve (208).	Go to Step 6
6	Check for a stuck boost valve (205). (Oil pump) Was the problem found?	Replace boost valve (205).	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

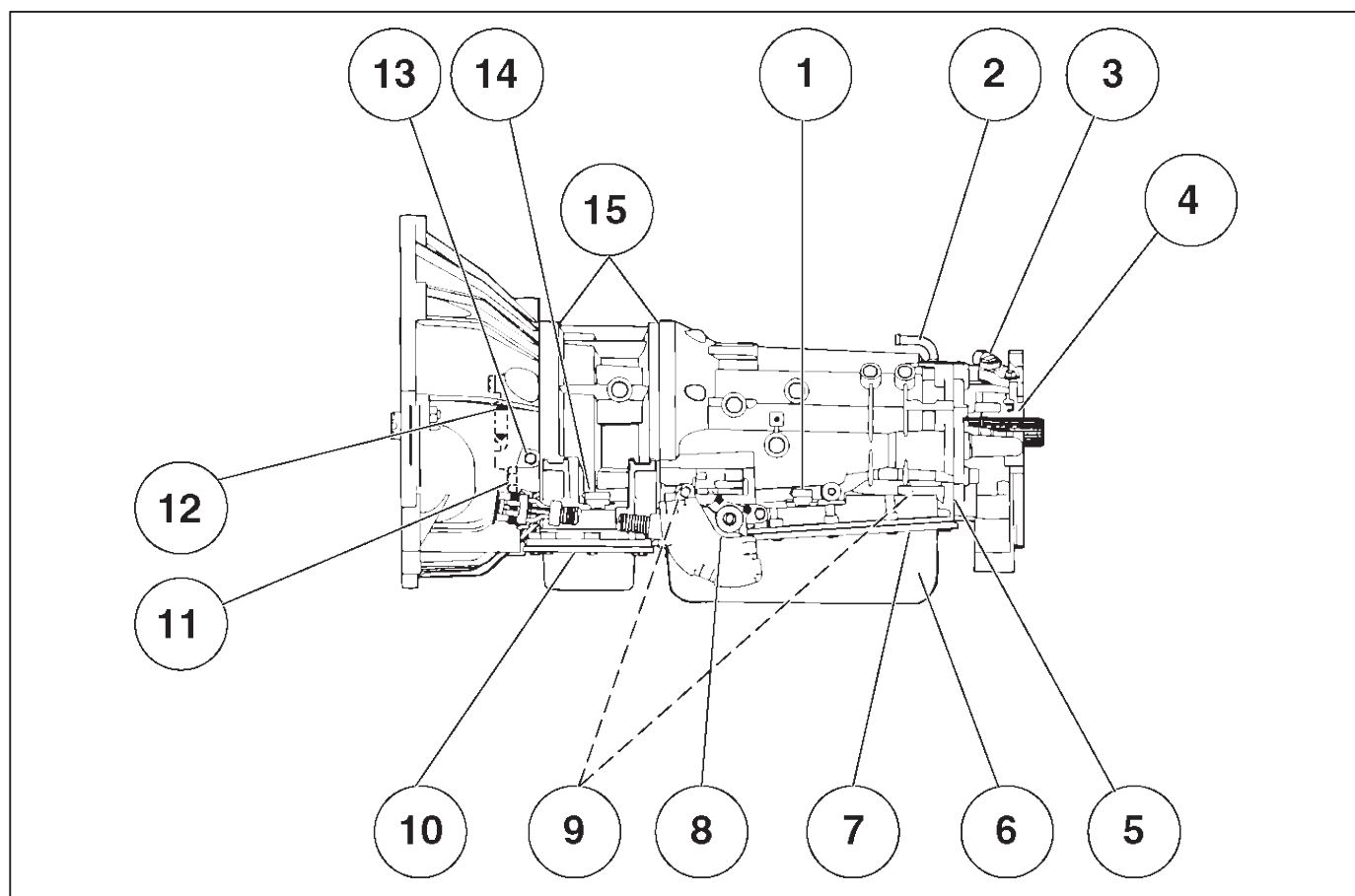
Before attempting to correct an oil leak, the actual source of the leak must be determined. In many cases, the source of the leak may be difficult to determine due to "wind flow" around the engine and transmission.

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



240RX008

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 ±150rpm (V6)

: 2,200 ±150rpm (HEC)

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.

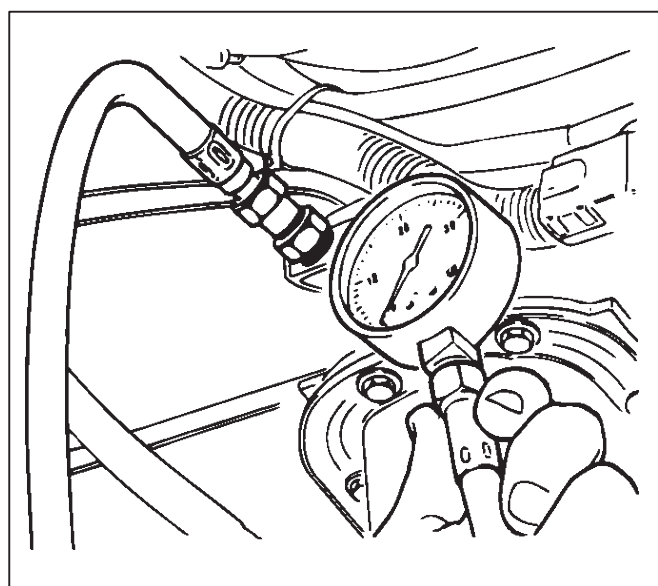
11. Repeat Steps 7 – 10 for the “3”, “2”, “L” and “R” ranges.

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)

7A-24 AUTOMATIC TRANSMISSION (4L30-E)

(V6)

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

(HEC)

MODE	LEVER POSITION	ENGINE SPEED	LINE PRESSURE		FORCE MOTOR CURRENT (mA)
			kPa	PSI	
NORMAL/POWER	D,3,2,L	IDLE	317-373	46-54	VARIABLE
WINTER	D	IDLE	317-373	46-54	900-1,000
NORMAL/POWER WINTER	REVERSE	IDLE	400-476	58-69	900-1,000
NORMAL/POWER	D, 3, 2, L	STALL SPEED	1,054-1,172	153-170	100-200
WINTER	D	STALL SPEED	1,054-1,172	153-170	100-200
NORMAL/POWER WINTER	REVERSE	STALL SPEED	1,206-1,344	175-195	100-200

Shift Speed Chart (V6)

Transfer gear ratio	High: 1.000
Rear axle ratio	4.100

“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	54 ~ 60 (34 ~ 37)	111 ~ 117 (69 ~ 73)	169 ~ 175 (105 ~ 109)
	Half throttle	34 ~ 40 (21 ~ 25)	64 ~ 70 (40 ~ 44)	117 ~ 123 (73 ~ 76)

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	46 ~ 52 (29 ~ 32)	89 ~ 95 (55 ~ 59)	159 ~ 165 (99 ~ 103)
	Half throttle	15 ~ 21 (9 ~ 13)	36 ~ 42 (22 ~ 26)	74 ~ 80 (46 ~ 50)
	Fully closed	14 ~ 20 (9 ~ 12)	21 ~ 27 (13 ~ 17)	28 ~ 34 (17 ~ 21)

“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	54 ~ 60 (34 ~ 37)	111 ~ 117 (69 ~ 73)	169 ~ 175 (105 ~ 109)
	Half throttle	42 ~ 48 (26 ~ 30)	78 ~ 84 (49 ~ 52)	133 ~ 139 (83 ~ 86)

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	46 ~ 52 (29 ~ 32)	89 ~ 95 (55 ~ 59)	159 ~ 165 (99 ~ 103)
	Half throttle	23 ~ 29 (14 ~ 18)	59 ~ 65 (37 ~ 40)	108 ~ 114 (67 ~ 71)
	Fully closed	14 ~ 20 (9 ~ 12)	24 ~ 30 (15 ~ 19)	48 ~ 54 (30 ~ 33)

“Winter mode”

D range, winter mode ON → OFF	31 ~ 37 km/h (19 ~ 23 mph)
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7A-26 AUTOMATIC TRANSMISSION (4L30-E)**Lockup Speed Chart (V6)**

Transfer gear ratio	High: 1.000
Rear axle ratio	4.100

D range, Throttle opening 6%	Mode	Lockup ON			Lockup OFF		
		2nd km/h (mph)	3rd km/h (mph)	4th km/h (mph)	2nd km/h (mph)	3rd km/h (mph)	4th km/h (mph)
	Normal	75 ~ 81 (47 ~ 50)	68 ~ 74 (42 ~ 46)	76 ~ 82 (47 ~ 51)	69 ~ 75 (43 ~ 47)	47 ~ 53 (29 ~ 33)	72 ~ 78 (45 ~ 48)
	Power	75 ~ 81 (47 ~ 50)	80 ~ 86 (50 ~ 53)	80 ~ 86 (50 ~ 53)	69 ~ 75 (43 ~ 47)	71 ~ 77 (44 ~ 48)	75 ~ 81 (47 ~ 50)

Shift Speed Chart (HEC)

Rear axle ratio	4.777
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“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	45 ~ 51 (28 ~ 32)	98 ~ 104 (61 ~ 65)	149 ~ 155 (93 ~ 96)
	Half throttle	28 ~ 34 (17 ~ 21)	52 ~ 58 (32 ~ 36)	96 ~ 102 (60 ~ 63)

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	40 ~ 46 (25 ~ 29)	93 ~ 99 (58 ~ 62)	140 ~ 146 (87 ~ 91)
	Half throttle	13 ~ 19 (8 ~ 12)	29 ~ 35 (18 ~ 22)	58 ~ 64 (36 ~ 40)
	Fully closed	12 ~ 18 (7 ~ 11)	18 ~ 24 (11 ~ 15)	24 ~ 30 (15 ~ 19)

“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	45 ~ 51 (28 ~ 32)	98 ~ 104 (61 ~ 65)	149 ~ 155 (93 ~ 96)
	Half throttle	37 ~ 43 (23 ~ 27)	68 ~ 74 (42 ~ 46)	117 ~ 123 (73 ~ 76)

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	40 ~ 46 (25 ~ 29)	93 ~ 99 (58 ~ 62)	140 ~ 146 (87 ~ 91)
	Half throttle	20 ~ 26 (12 ~ 16)	52 ~ 58 (32 ~ 36)	95 ~ 101 (59 ~ 63)
	Fully closed	12 ~ 18 (7 ~ 11)	21 ~ 27 (13 ~ 17)	42 ~ 48 (26 ~ 30)

“Winter mode”

D range, winter mode ON → OFF	31 ~ 37 km/h (19 ~ 23 mph)
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7A-28 AUTOMATIC TRANSMISSION (4L30-E)**Lockup Speed Chart (HEC)**

Rear axle ratio	4.777
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D range, Throttle opening 6%	Mode	Lockup ON			Lockup OFF		
		2nd km/h (mph)	3rd km/h (mph)	4th km/h (mph)	2nd km/h (mph)	3rd km/h (mph)	4th km/h (mph)
	Normal	77 ~ 83 (48 ~ 52)	77 ~ 83 (48 ~ 52)	77 ~ 83 (48 ~ 52)	72 ~ 78 (45 ~ 48)	41 ~ 47 (25 ~ 29)	61 ~ 67 (38 ~ 42)
	Power	66 ~ 72 (41 ~ 45)	70 ~ 76 (44 ~ 47)	70 ~ 76 (44 ~ 47)	61 ~ 67 (38 ~ 42)	62 ~ 68 (38 ~ 42)	66 ~ 72 (41 ~ 31)

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).

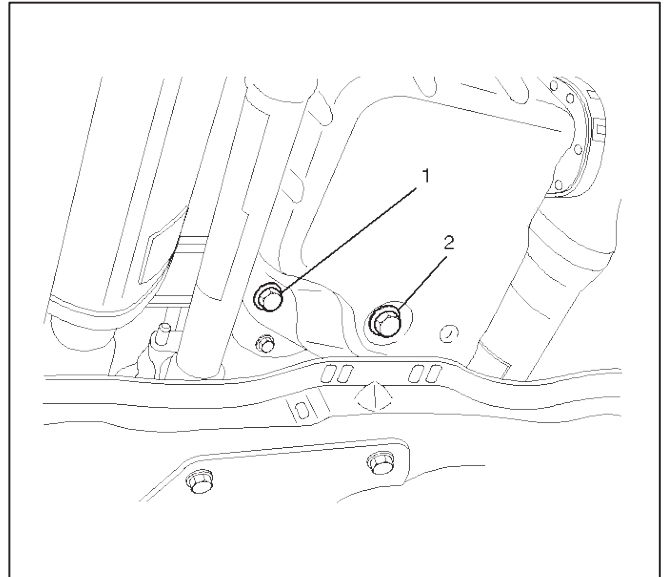
Torque: 38 N•m (28 lb ft)

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.

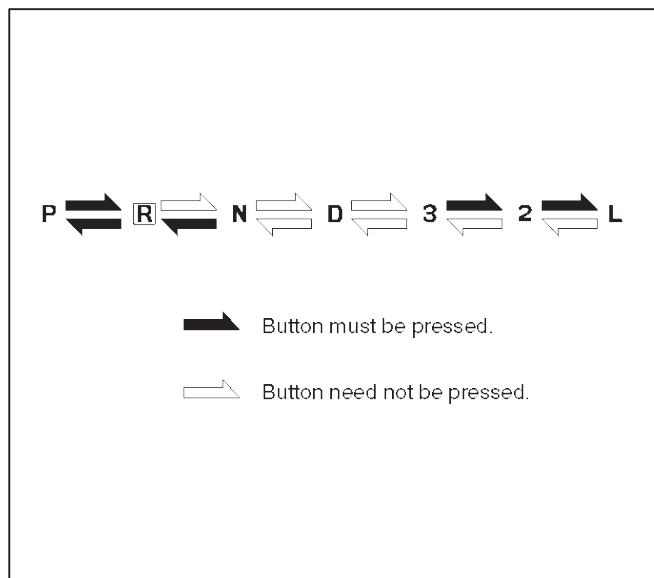


242RW003

Selector Lever

Inspection

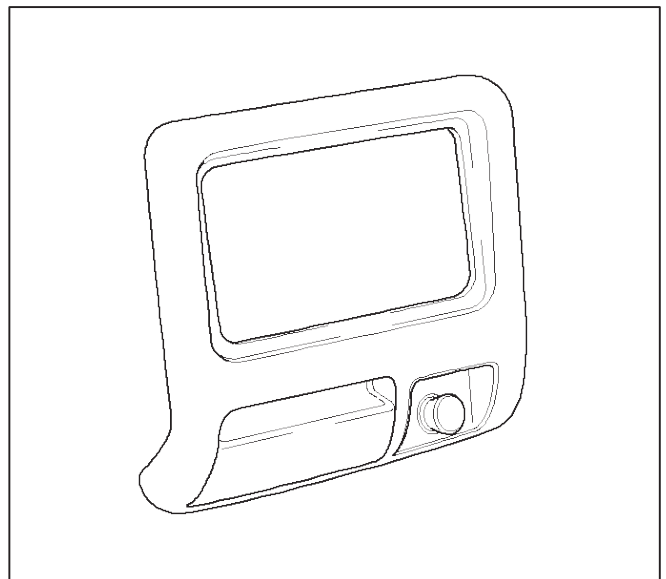
1. Make sure that when the selector lever is shifted from "P" to "L", a "clicking" can be felt at each shift position. Make sure that the gear corresponds to that of the position plate indicator.
2. Check to see if the selector lever can be shifted as shown in illustration.



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Removal

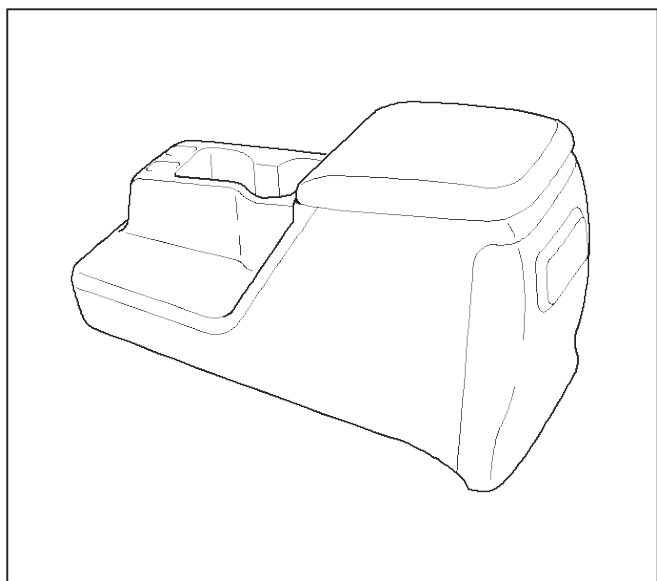
1. Disconnect battery ground cable.
2. Set ignition Key in "LOCK" position and selector lever in "P" position.
3. Remove transfer control lever knob (4×4).
4. Remove lower cluster assembly.



740RW021

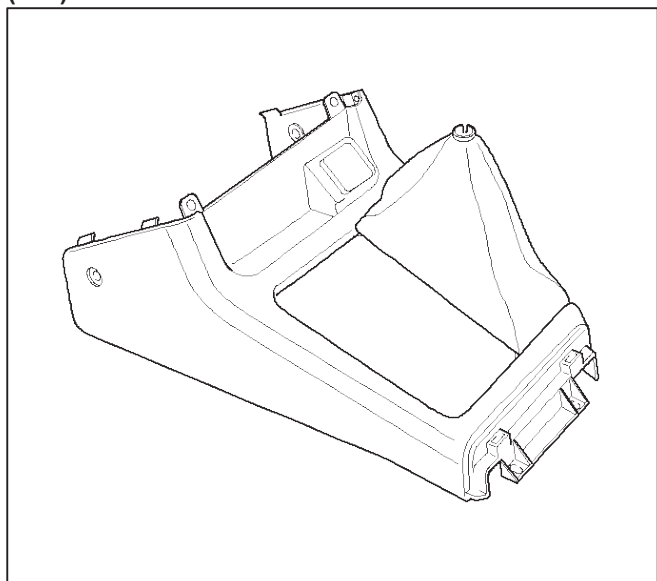
7A-30 AUTOMATIC TRANSMISSION (4L30-E)

5. Remove rear console.

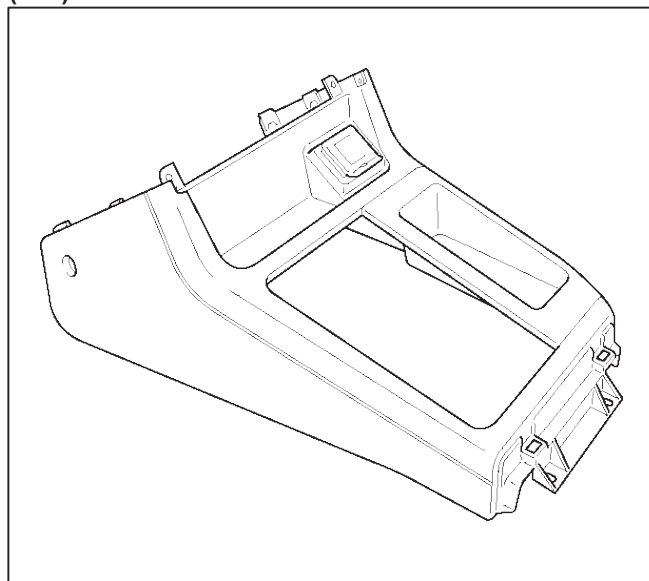


6. Remove center console.

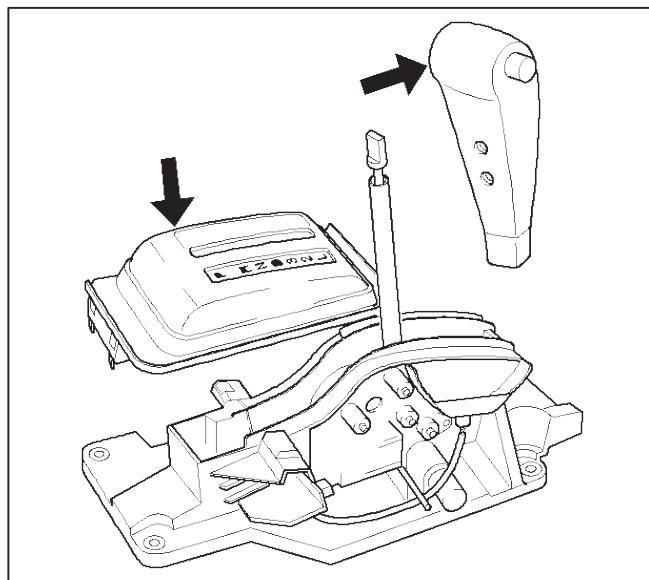
(4×4)



(4×2)



7. Remove selector lever knob and cover.



8. Disconnect select cable.

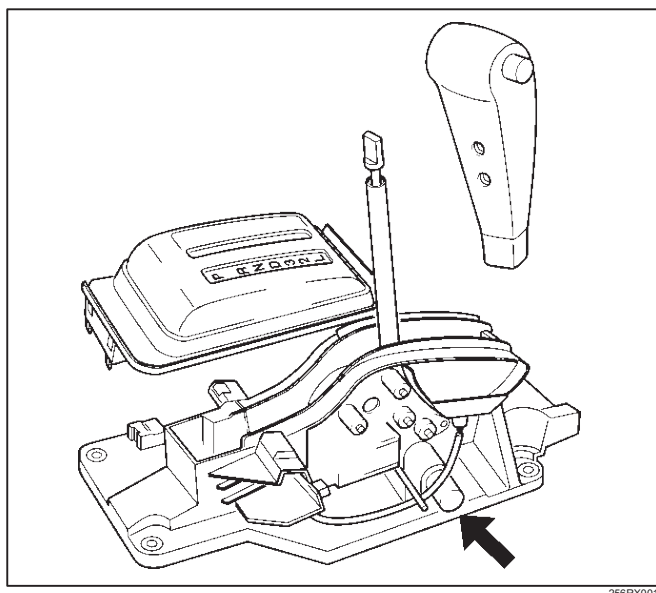
- Refer to Select Cable in this section.

9. Disconnect shift lock cable.

- Refer to Shift Lock Cable in this section.

10. Disconnect harness connector.

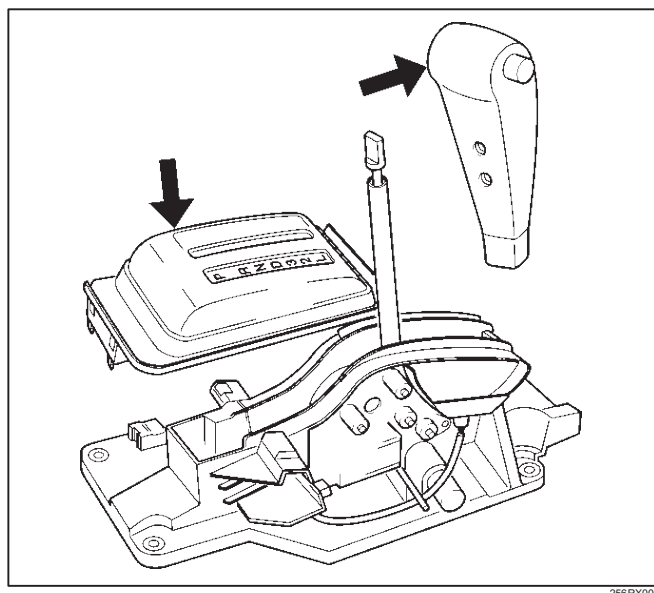
11. Remove selector lever subassembly.



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.



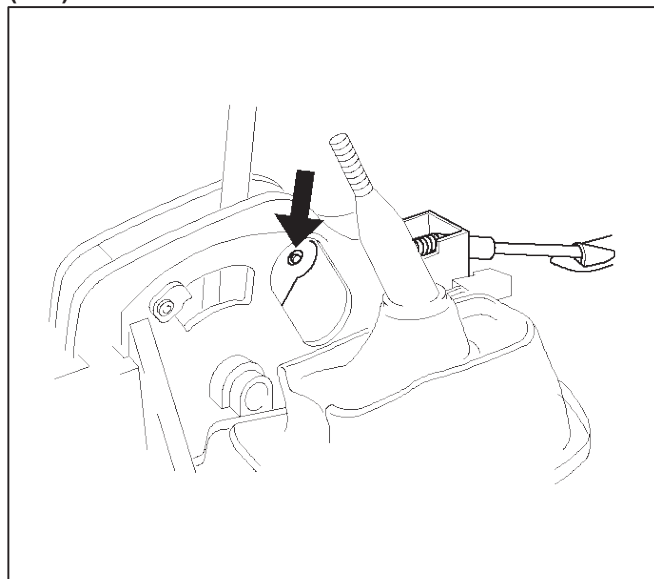
6. Install center console.
7. Install rear console.
8. Install lower cluster assembly.
9. Install transfer control lever knob (4×4).
10. Connect negative (–) battery cable.
11. After installation, make sure that the selector lever operates normally, and that each selector position is properly indicated. (The red mark shows through the window.)

Select Cable

Removal

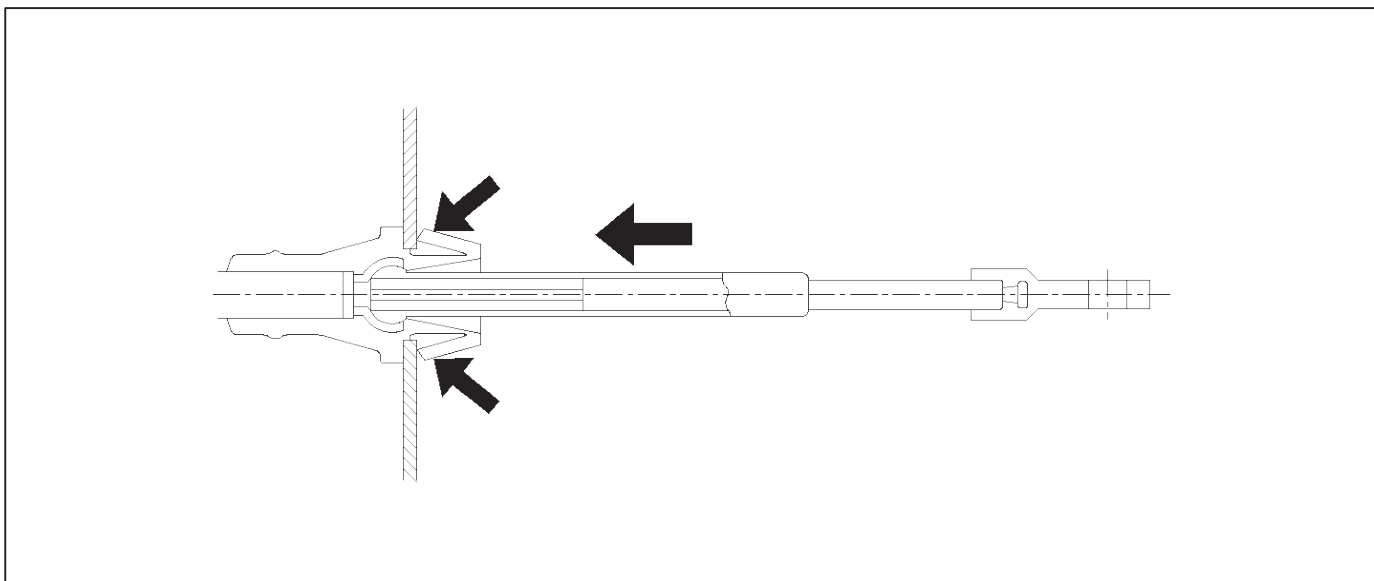
1. Set selector lever in “P” position.
2. Remove transfer control lever knob, lower cluster assembly, rear console, center console, selector lever knob and cover.
 - Refer to Selector Lever in this section.
3. Disconnect inner cable by pulling projection on pin.

(4×4)



7A-32 AUTOMATIC TRANSMISSION (4L30-E)

4. Press down claws and disconnect cable assembly.

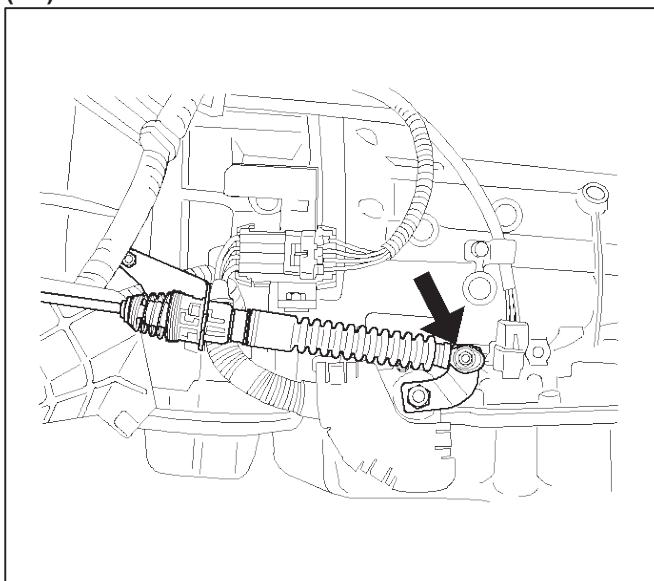


A07RW017

5. Disconnect PCM harness connectors and remove nuts that fasten grommet in select cable assembly.

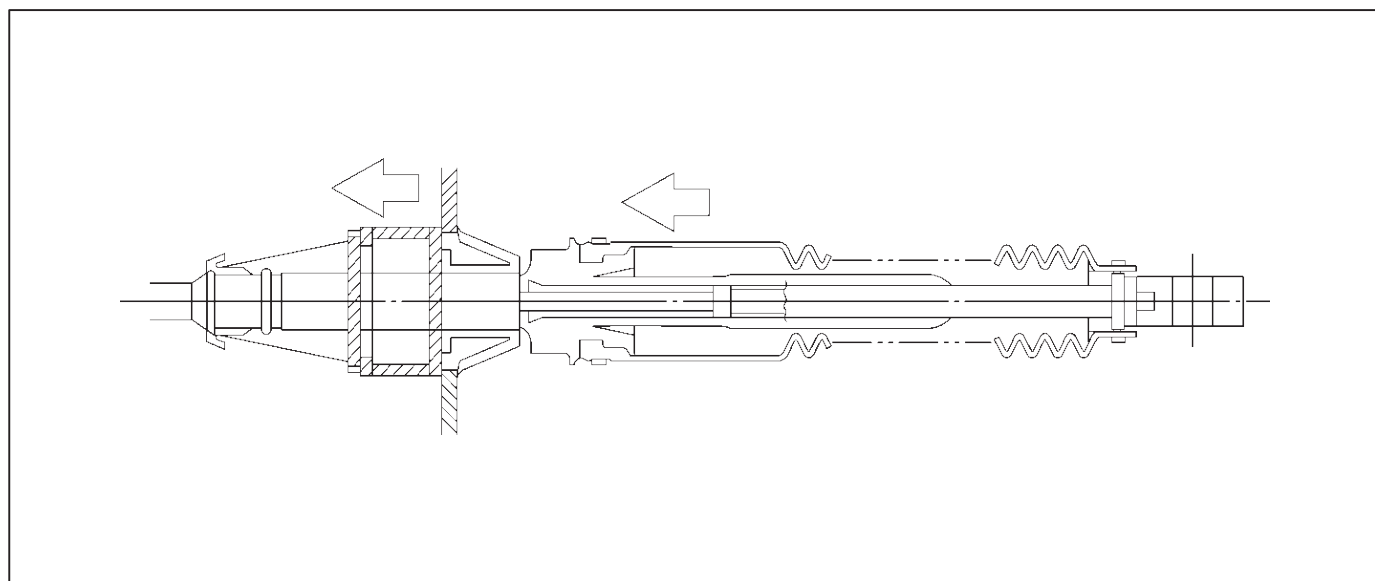
6. Disconnect inner cable.

(V6)



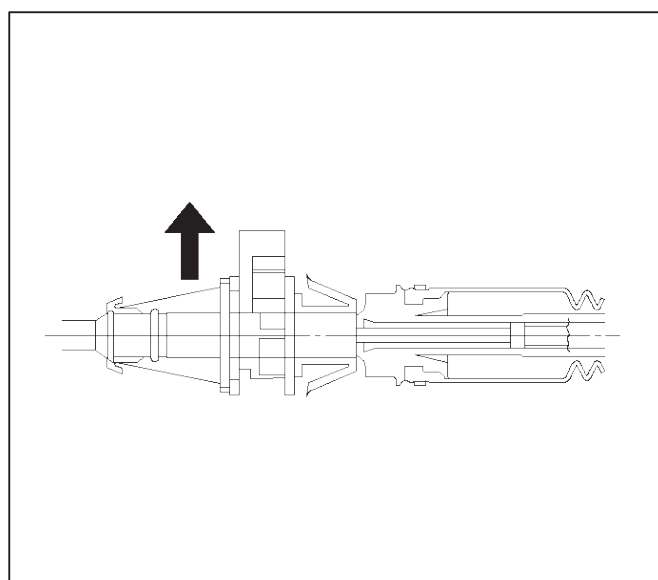
210RW013

7. Slide sleeve and disconnect cable assembly.



A07RW082

8. Pull lock.

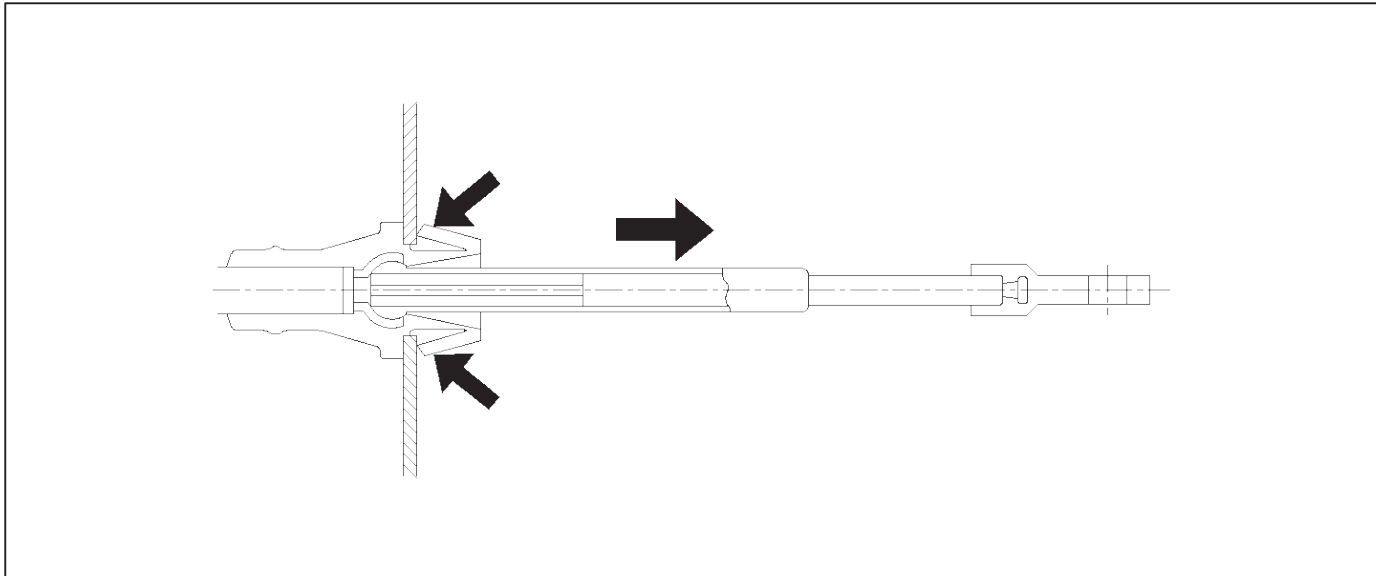


A07RW015

9. Draw select cable assembly into the interior side.

Installation

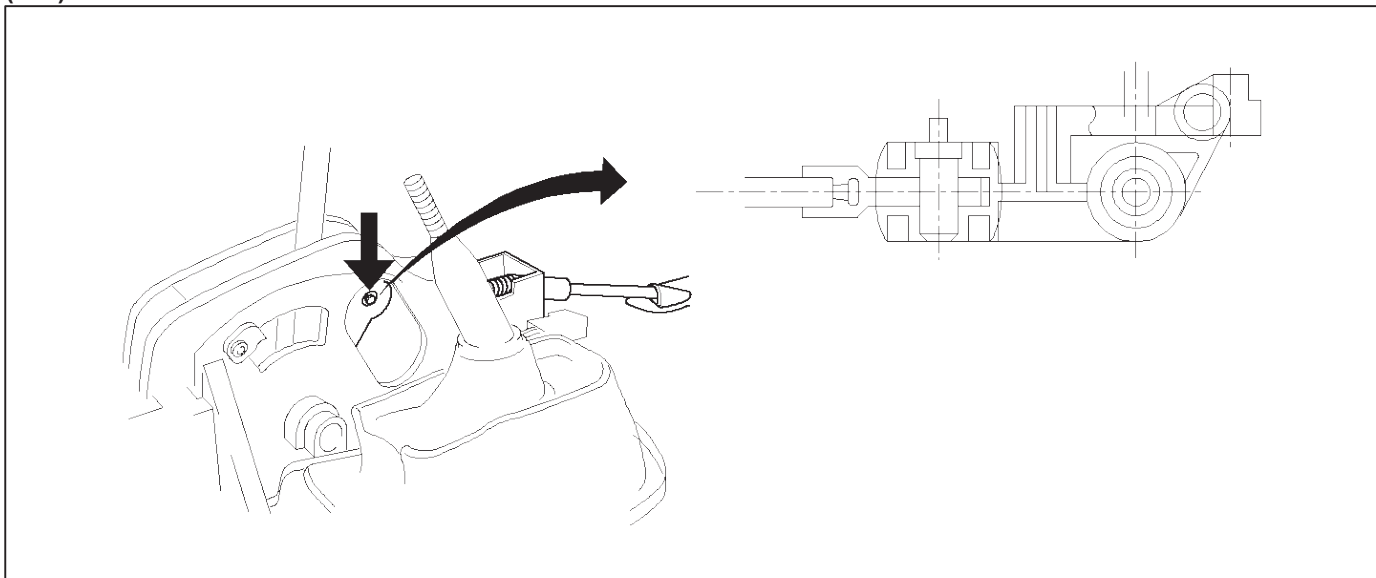
1. Set selector lever in "P" position.
2. Let out select cable transmission side end from floor hole.
3. Fit outer cable into bracket in selector lever assembly.



A07RW016

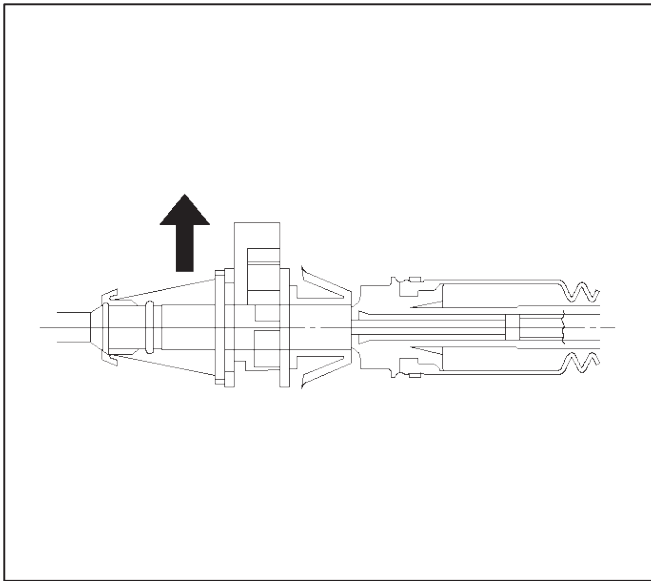
4. Set inner cable end in selector lever and push pin into selector lever hole and inner cable end.

(4×4)



256RW023

5. Check that lock projects.

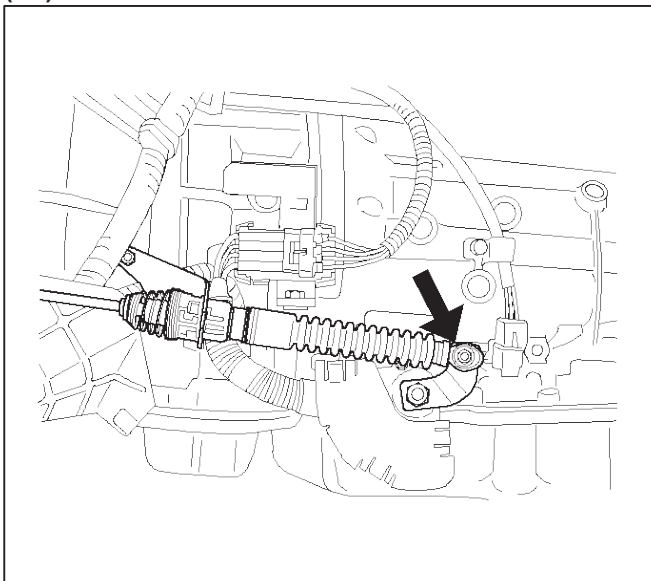


A07RW015

6. Connect adjust end fitting attachment to the bracket on transmission.

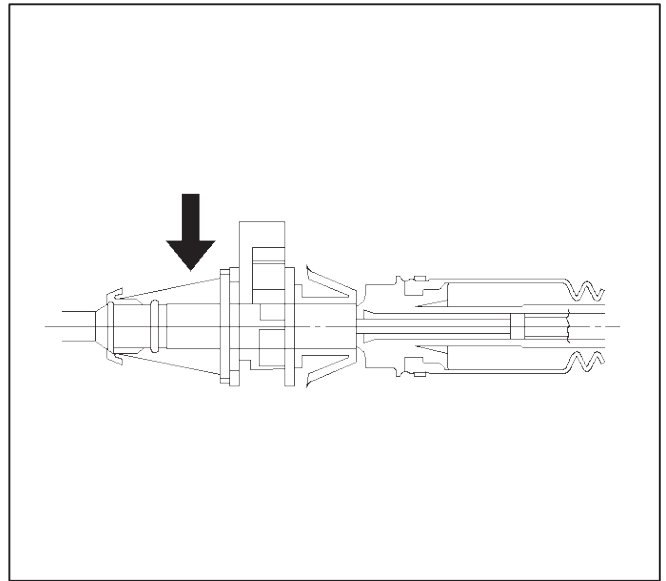
7. Set select lever "P" position and connect inner cable to select lever.

(V6)



210RW013

8. Push lock into adjust end fitting attachment.



A07RW014

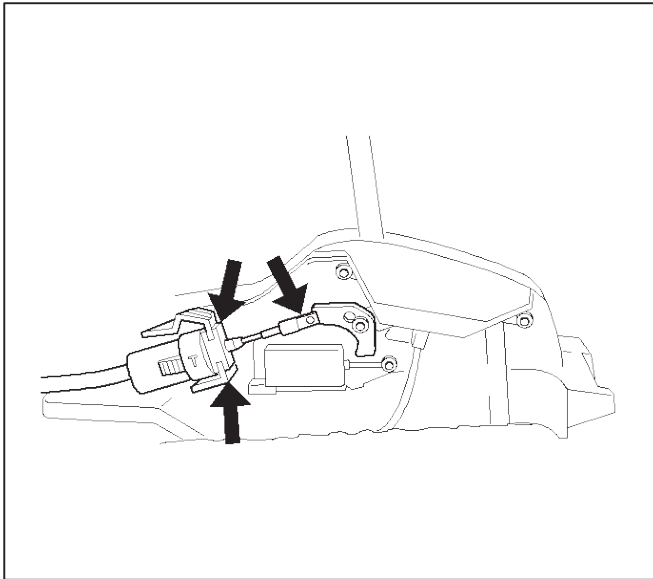
9. Install grommet.

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

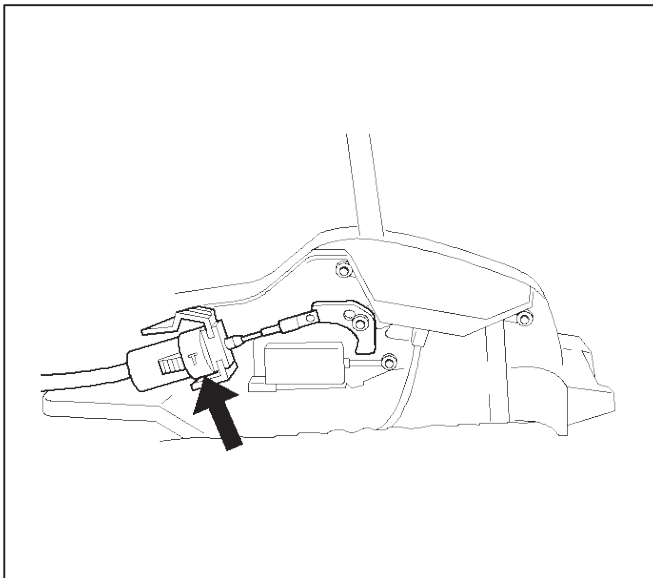
Shift Lock Cable

Removal

1. Set ignition key in "LOCK" position and selector lever in "P" position.
2. Remove transfer control lever knob (4×4), lower cluster assembly, rear console, center console, selector lever knob and cover.
 - Refer to Selector Lever in this section.
3. Disconnect inner cable from selector lever assembly then push claw and disconnect cable assembly.

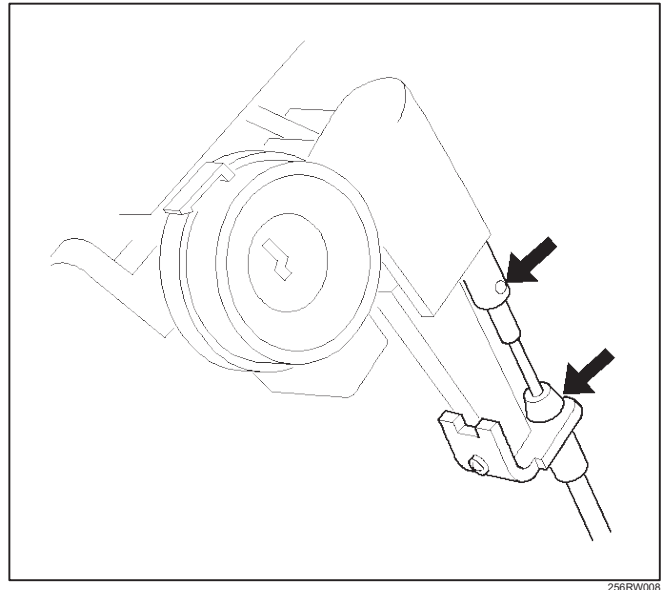


4. Disconnect lock adjust.



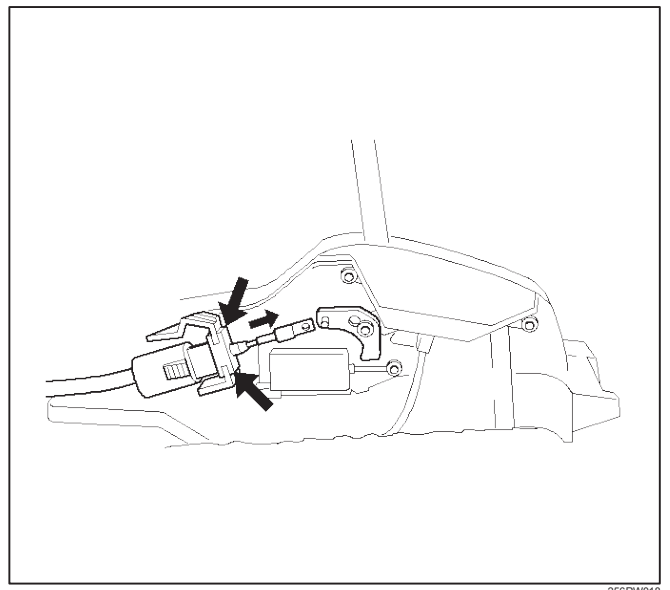
5. Remove instrument panel lower cover and steering column cover.

6. Remove spring pin and disconnect inner cable.
 - Disconnect outer cable from bracket.

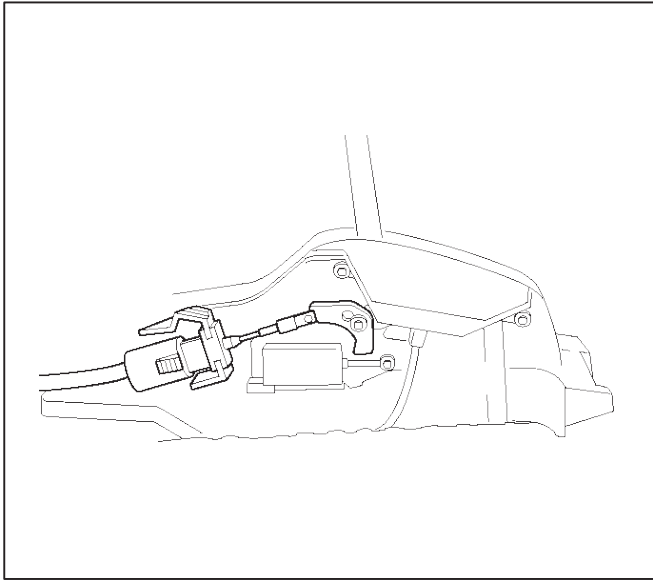


Installation

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.

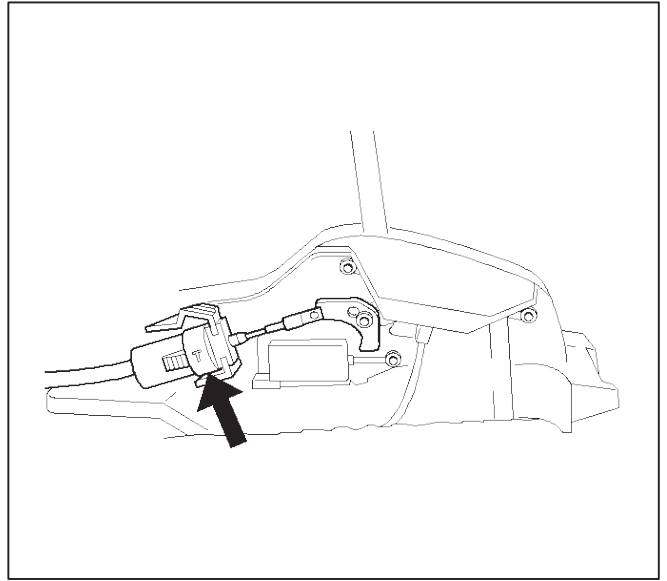


5. Check that cable moves smoothly, lightly pulling outer cable rearward.



256R100001

6. Connect lock adjust, aligning "T" mark in the "Up" position.



256RW017

7. About following installation steps, refer to *Selector Lever in this section*.

8. Check the shift lock operation:

- Selector lever should not be moved out of "P" position with ignition key in "Lock" position.
- Selector lever can be moved out of "P" position with ignition key in "ON" position only when brake pedal is depressed.
- ignition key can be turned to "LOCK" position only when selector lever is in "P" position (key can be pulled out).

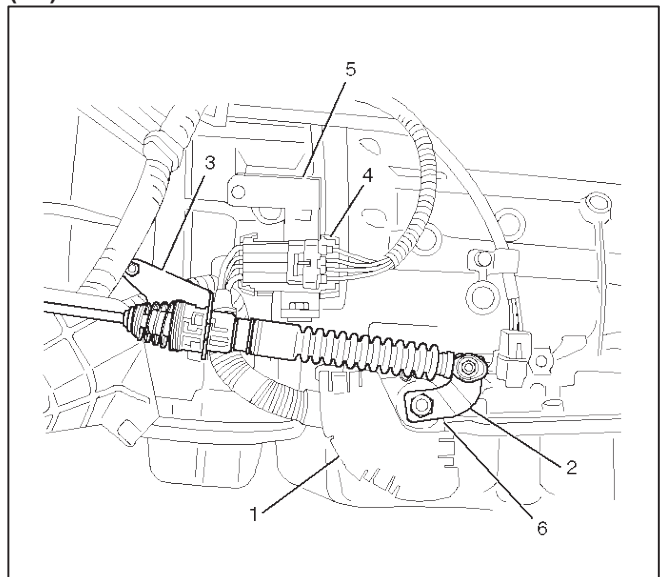
9. If a. and c. fail, readjust cable. If b. fails, readjust connector wiring and brake pedal switch.

Mode Switch

Removal

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

(V6)



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)

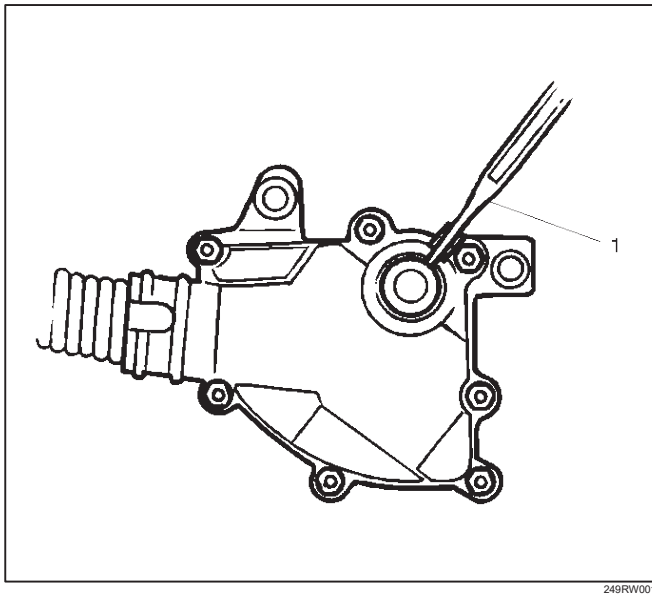
Selector lever nut: 23 N•m (17 lb ft)

2. Mode switch setting procedure

Perform either of the following adjustment procedures:

Procedure 1

- Place selector lever in neutral.
- Remove selector lever from the mode switch.
- Remove the mode switch cover.
- Loosen the two 10 mm screws.
- 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.
- Tighten the screws to 13 N•m (113 lb in).
- After completing adjustment, snap the mode switch cover into place.
- Reinstall the selector lever.

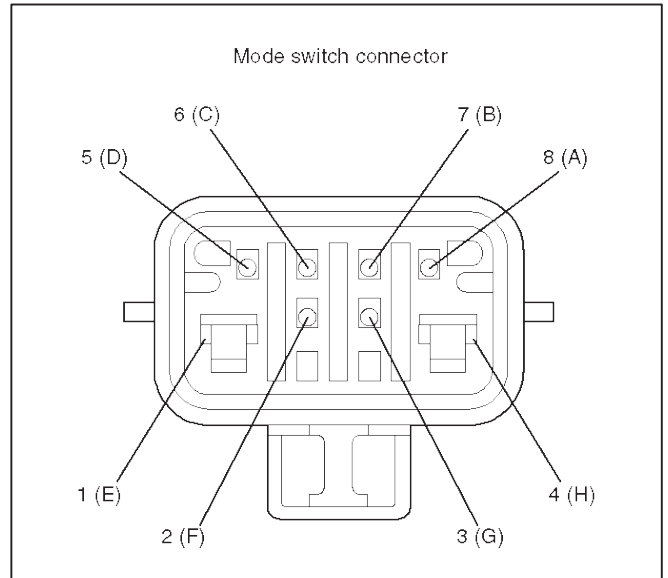


249RW001

Procedure 2

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

- Remove multimeter and install mode switch harness connector with bracket to the transmission case.
- Connect transmission harness connector to mode switch connector.

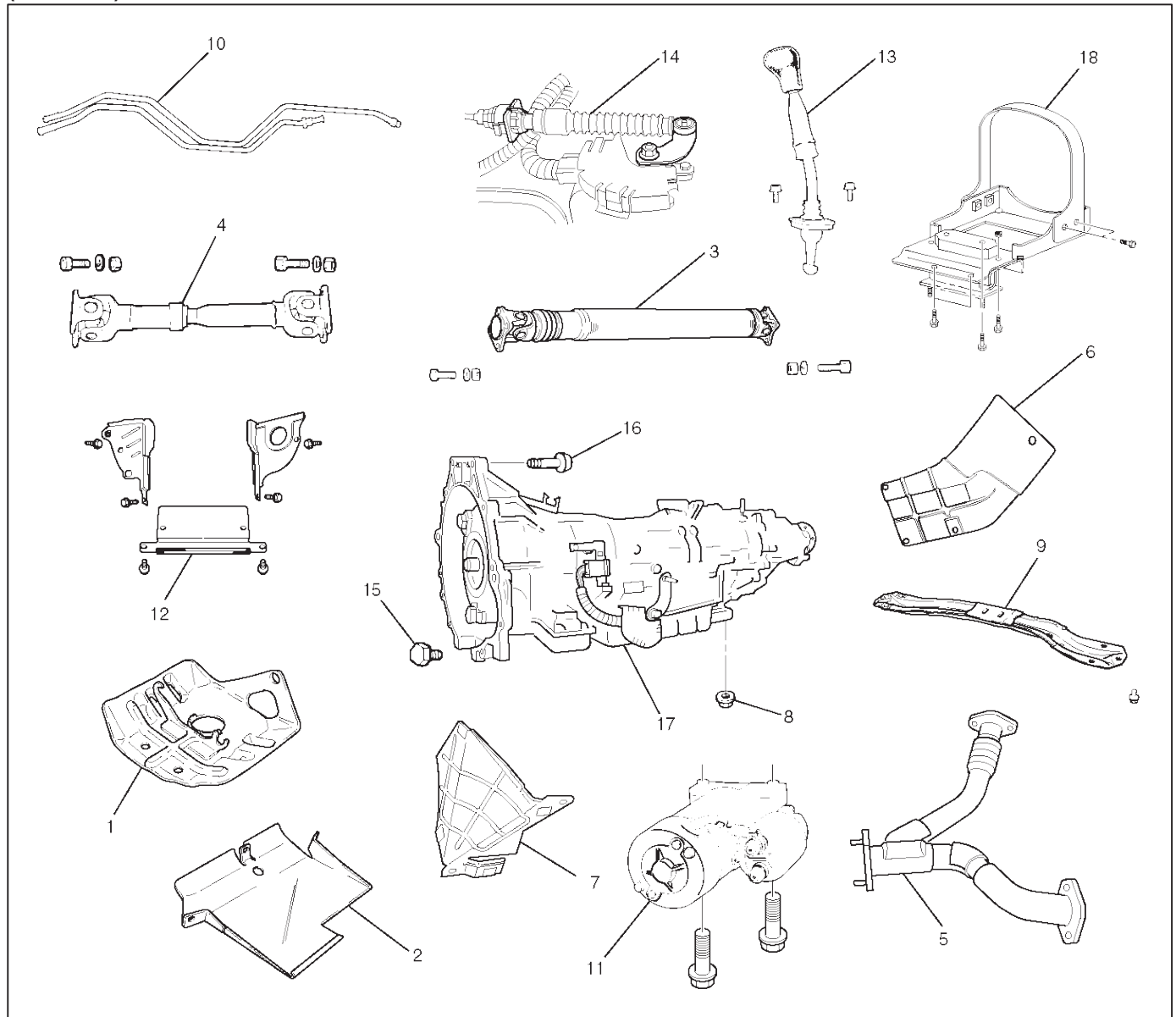


F07RW003

Transmission Assembly

Transmission and Associated Parts

(V6 Model)



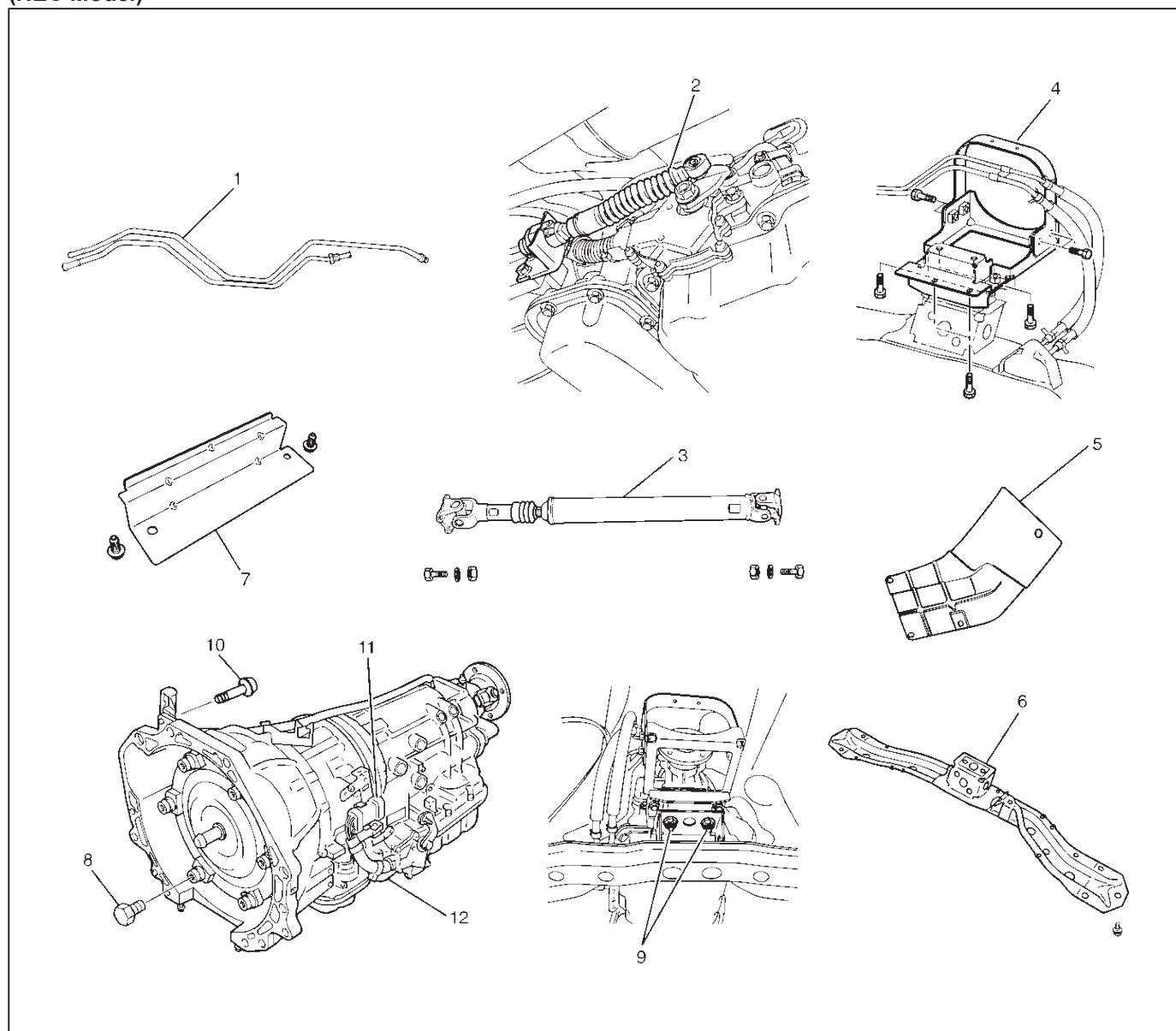
240RY00041

Legend

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

7A-40 AUTOMATIC TRANSMISSION (4L30-E)

(HEC Model)



240R100007

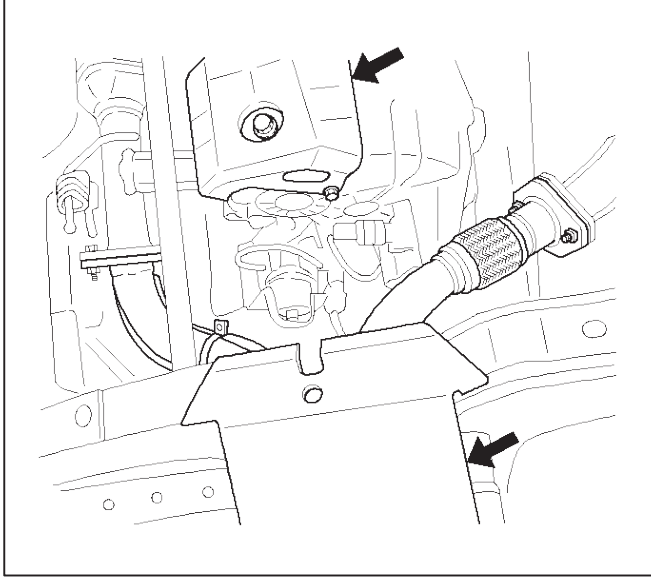
Legend

- | | |
|--|-------------------------------|
| (1) Transmission Oil Cooler Pipe | (6) Third Crossmember |
| (2) Select Cable | (7) Under Cover |
| (3) Rear Propeller Shaft | (8) Torque Converter Bolt |
| (4) Rear Mount Rubber and Propeller Protector Assembly | (9) Rear Mount Nut |
| (5) Fuel Pipe Heat Protector | (10) Engine-Transmission Bolt |
| | (11) Harness Connector |
| | (12) Transmission Assembly |

Removal

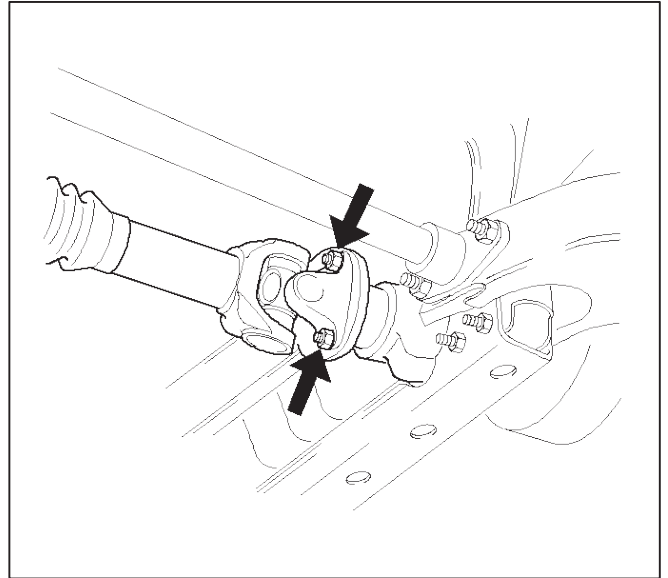
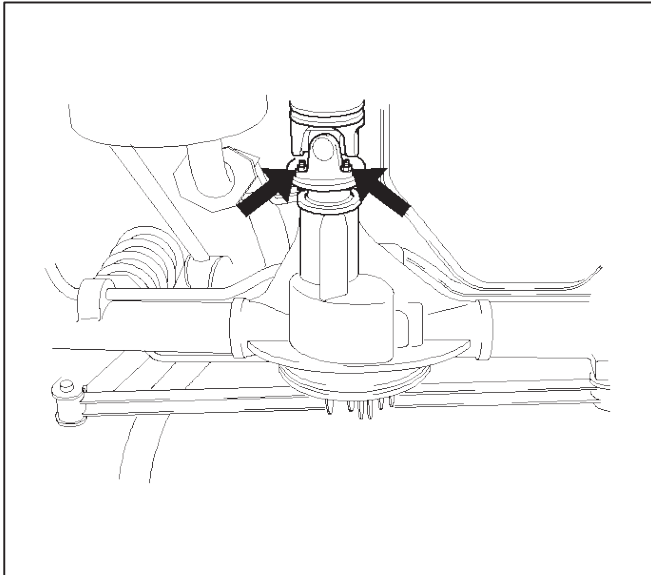
NOTE: Before removing transmission and transfer assembly from vehicle, change the transfer mode to 2WD using push button on dash panel (V6, 4×4).

1. Disconnect battery ground cable.
2. Remove transfer protector (4×4) and fairing plate (V6).

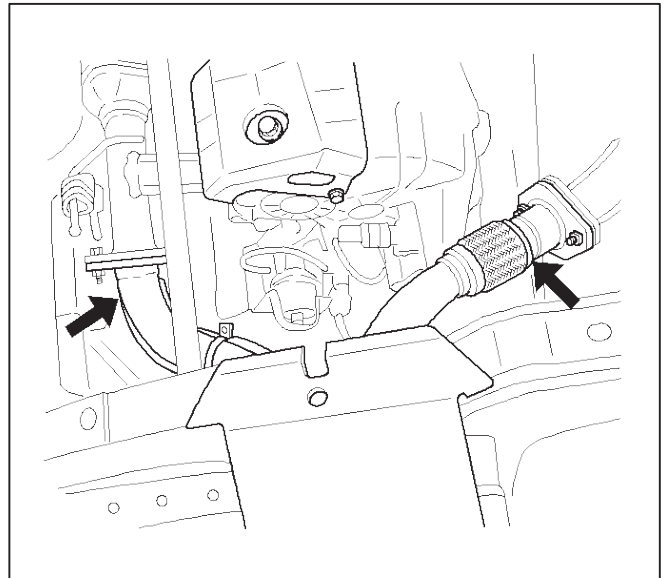


3. Remove rear propeller shaft and front propeller shaft (4×4).

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

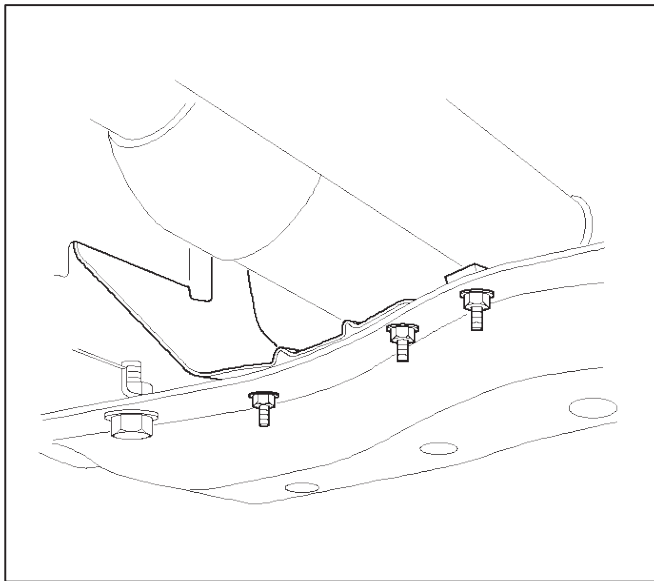


4. Remove center exhaust pipe (V6, 4×4).



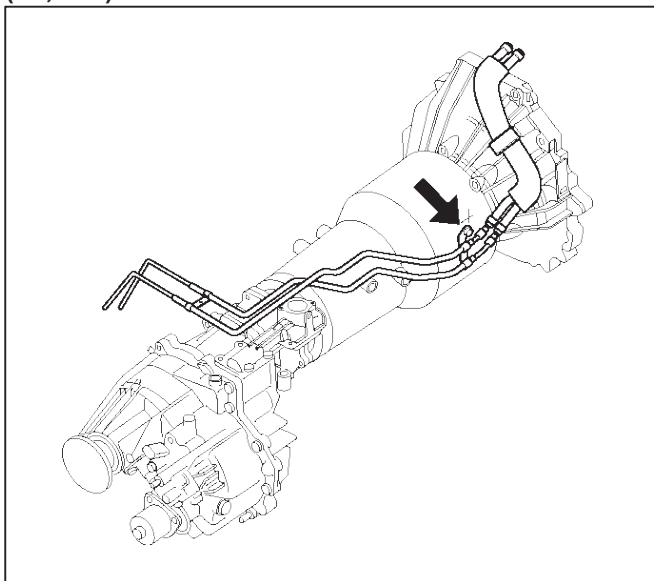
7A-42 AUTOMATIC TRANSMISSION (4L30-E)

5. Remove fuel pipe heat protector and clip.
6. Disconnect fuel pipe bracket from third crossmember.

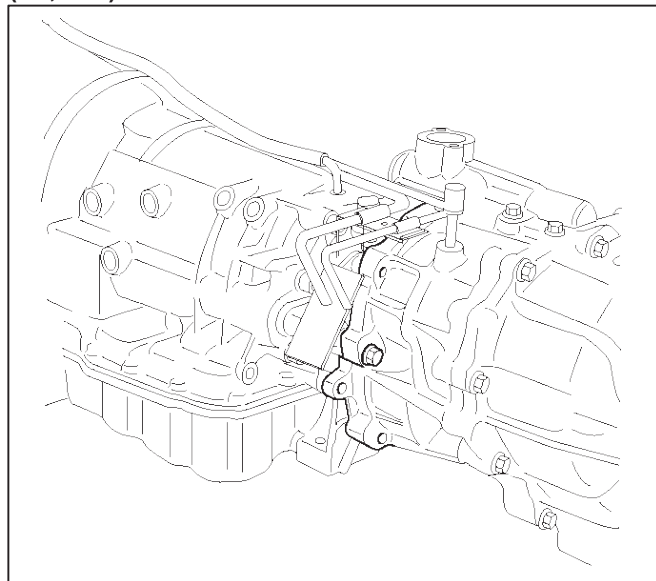


7. Disconnect fuel pipe bracket from transmission side.

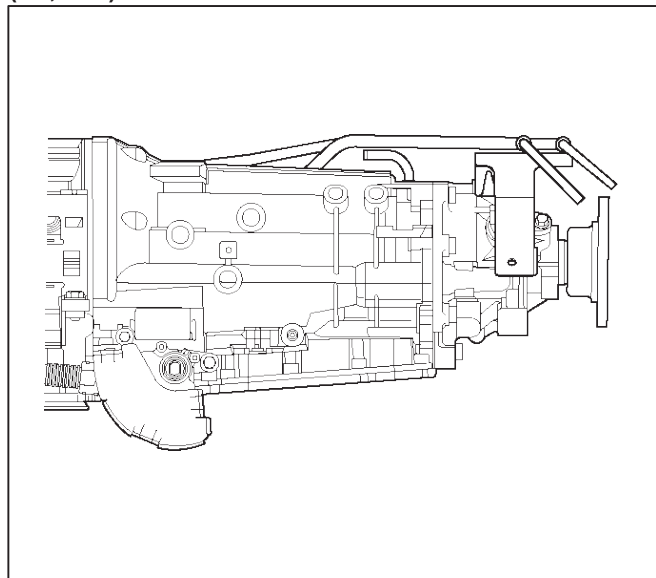
(V6, 4×4)



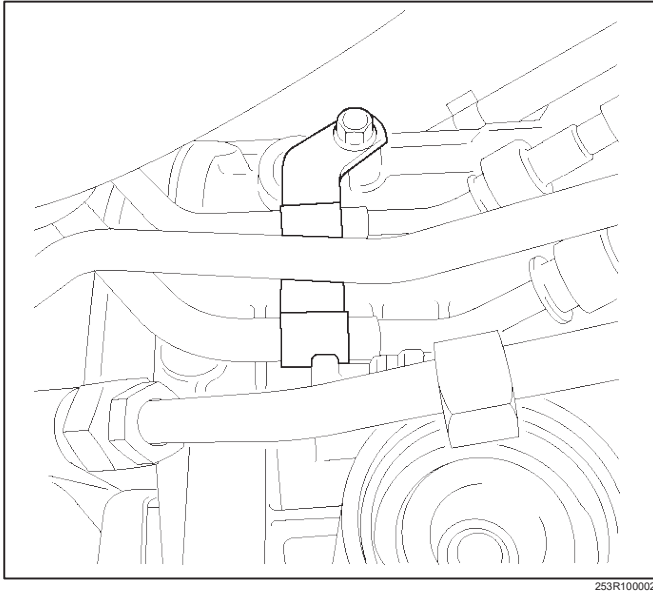
(V6, 4×4)



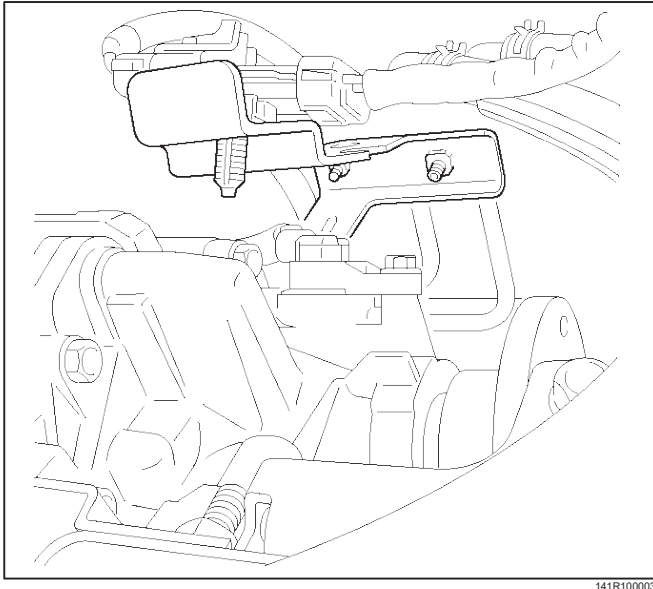
(V6, 4×2)



(HEC)

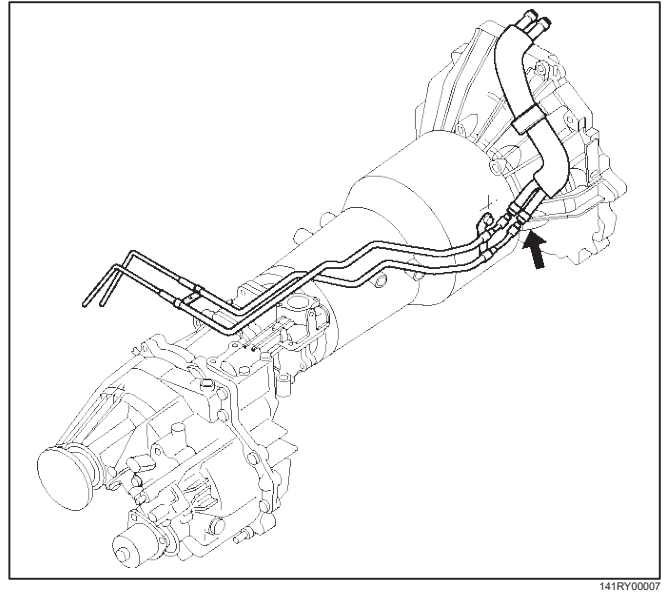


(HEC)



Fuel hose connector removal procedure

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

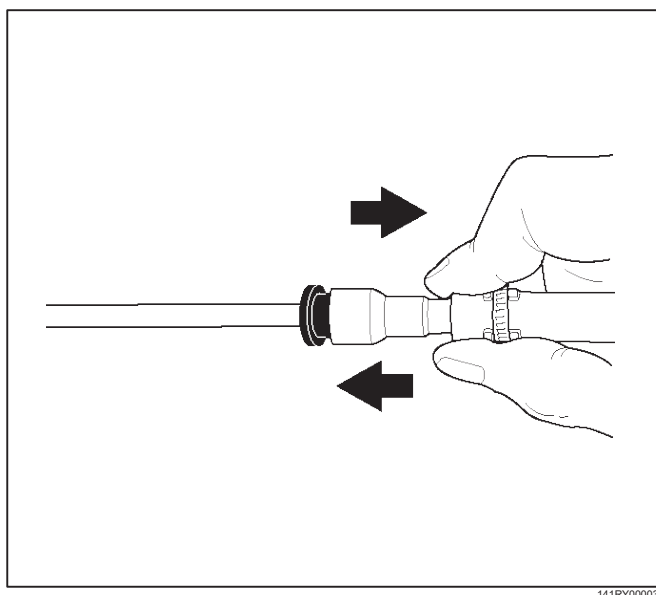
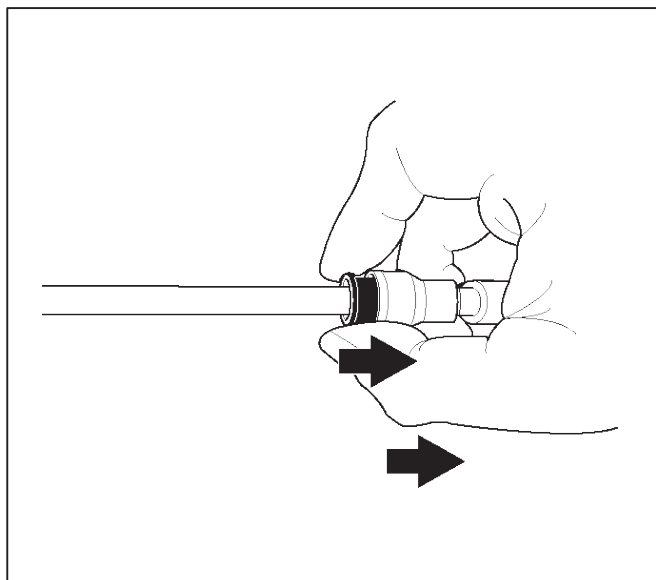


NOTE:

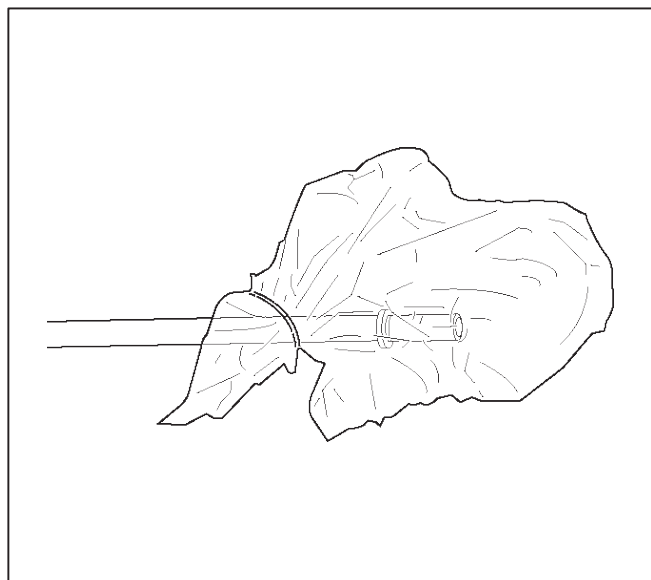
- An O-ring is used as a seal between the fuel pipe and the connector. Take care not to damage the contact surfaces during the removal procedure. Do not allow the surface to become contaminated with dirt or other foreign material.
 - Perform the entire removal procedure with your hands. Do not use tools.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

7A-44 AUTOMATIC TRANSMISSION (4L30-E)

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.

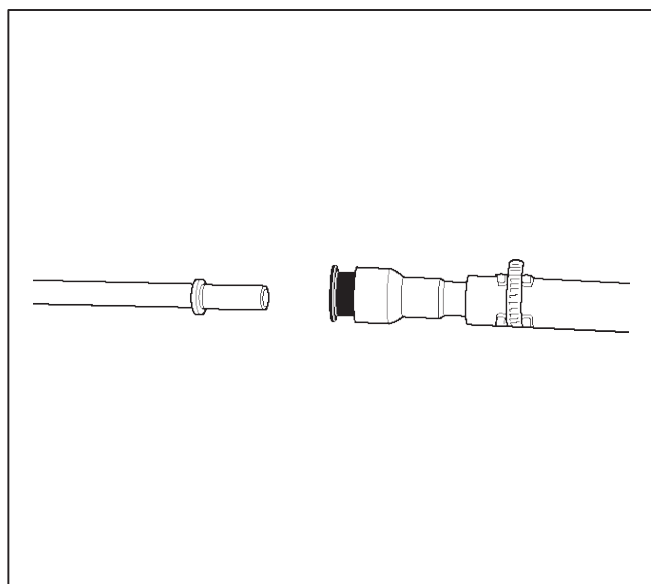


3. Tie a vinyl bag around the connector and fuel pipe to protect them from dirt.

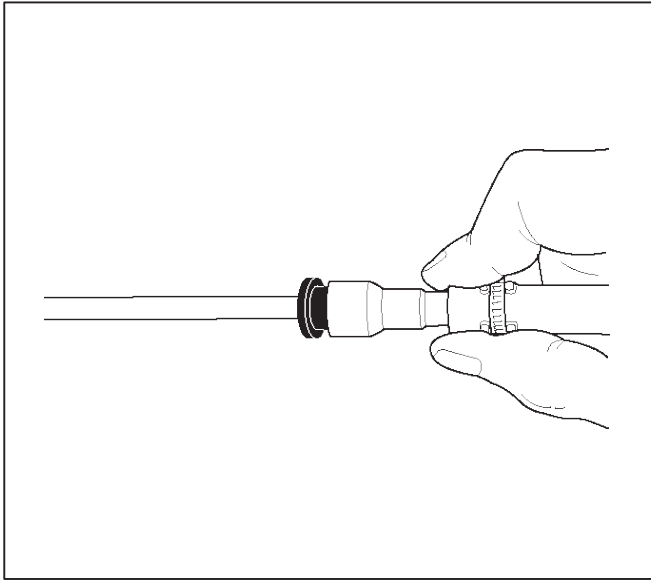


2. Joining the connector and fuel hose

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.



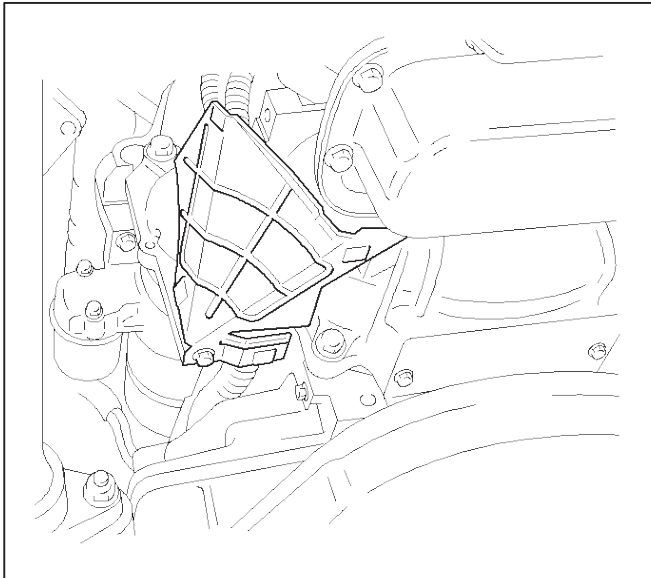
3. Gently pull on the connector to check that it is securely latched.



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.

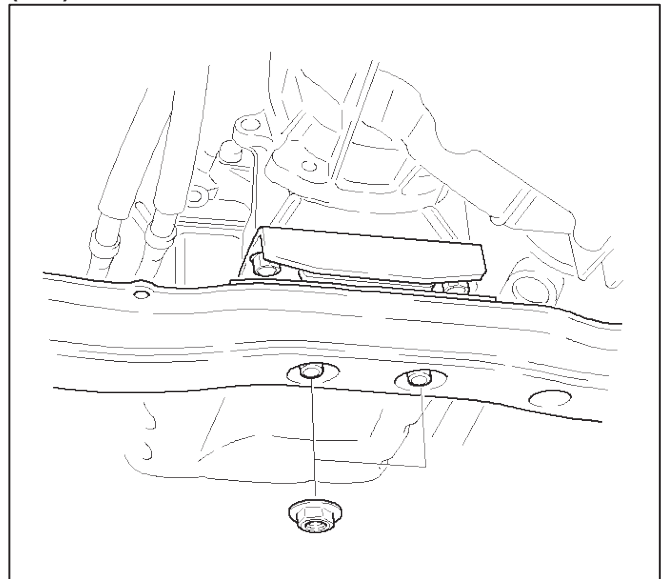
9. Remove harness heat protector (V6).



815RW002

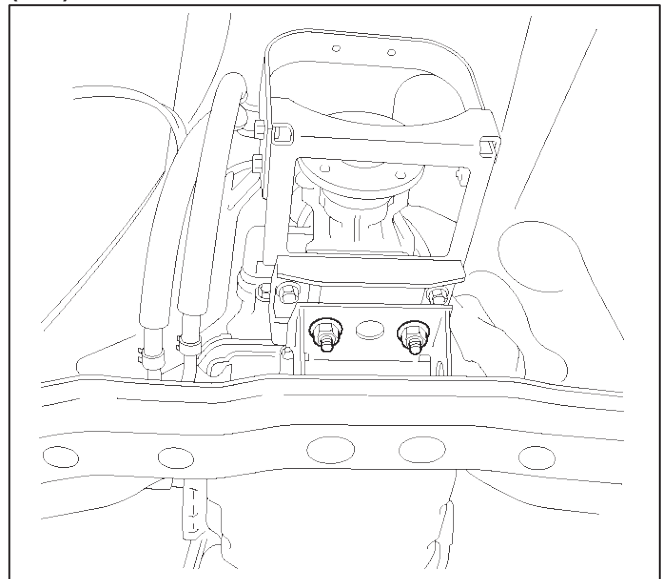
10. Support transmission with a jack.
Remove rear mount nuts from third crossmember.

(4×4)



F07RW008

(4×2)



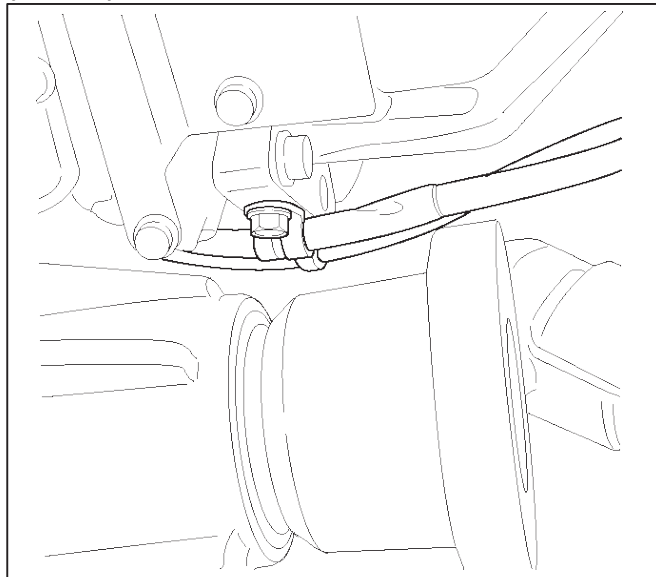
F07R100005

11. Remove third crossmember.

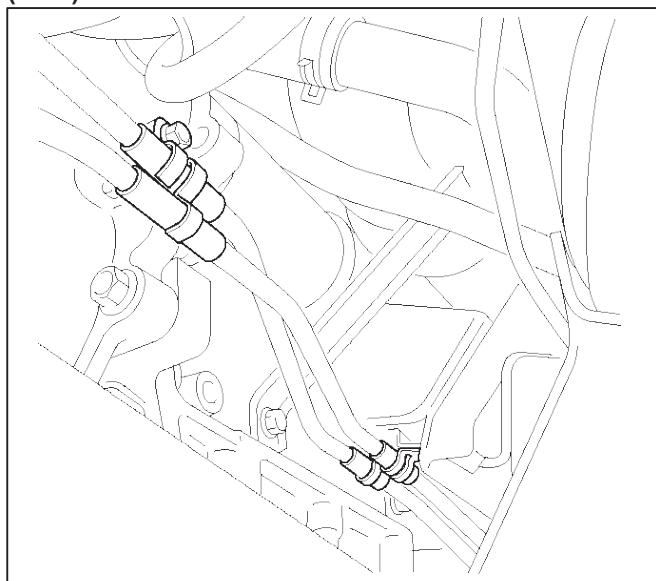
7A-46 AUTOMATIC TRANSMISSION (4L30-E)

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.

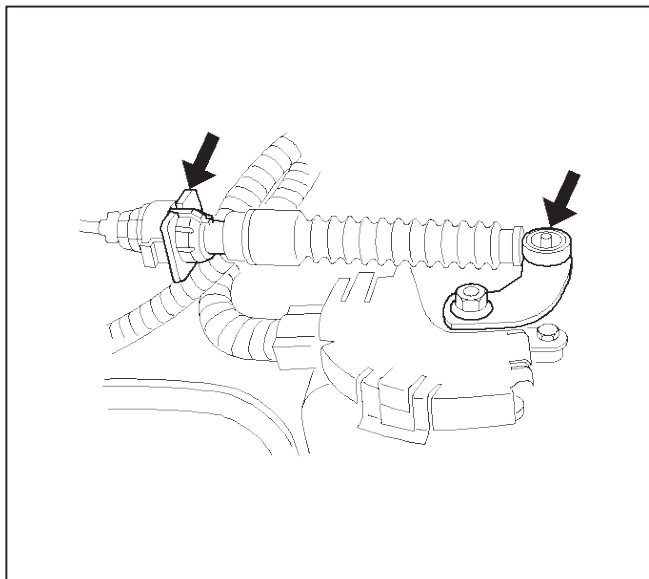
(V6, 4×4)



(HEC)



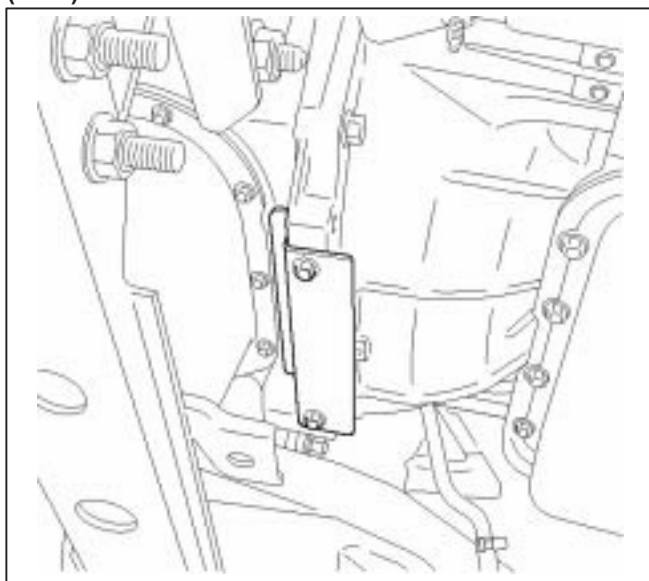
15. Remove select cable by disconnecting inner cable from select lever and removing outer cable with bracket.



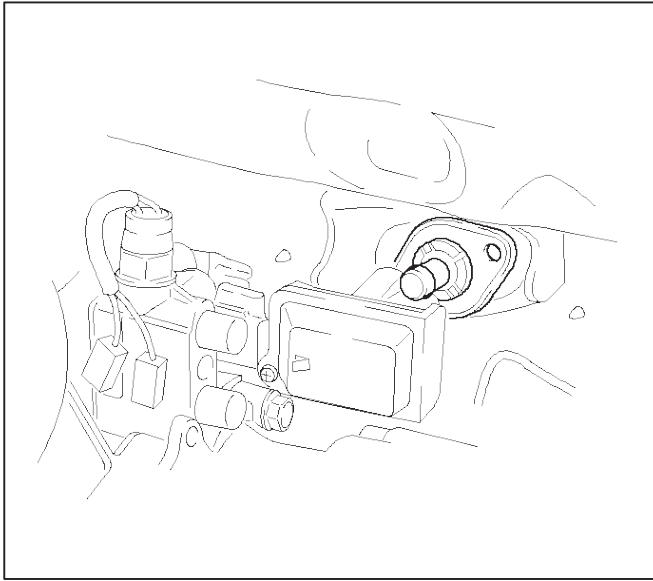
16. Remove starter (V6).

17. Remove under covers from the transmission and engine.

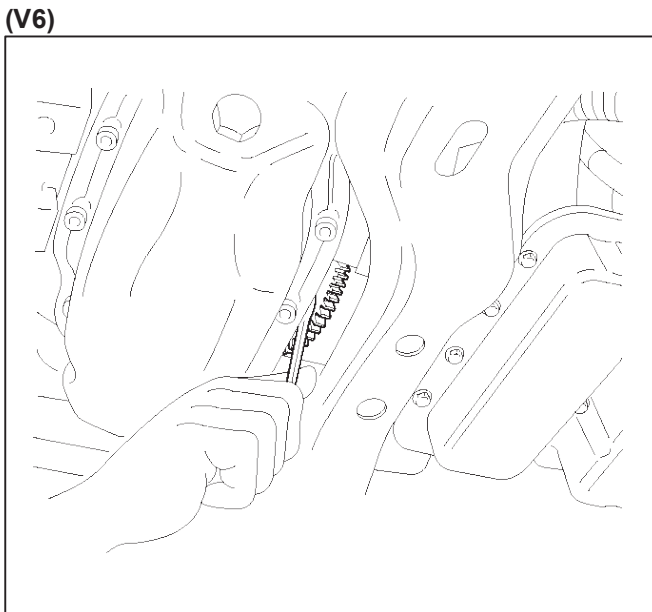
(HEC)



18. Remove transfer control lever fixing bolts and push up transfer control lever (V6, 4×4).

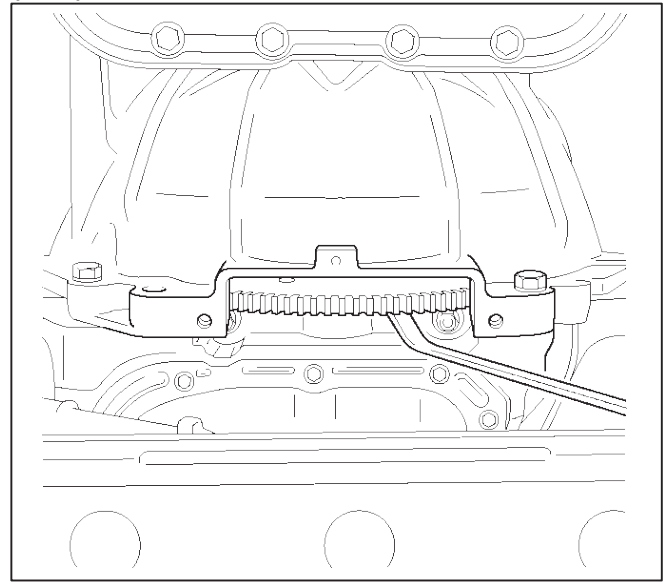


19. Remove flex plate torque converter fixing bolts (6 pieces) by turning crankshaft.



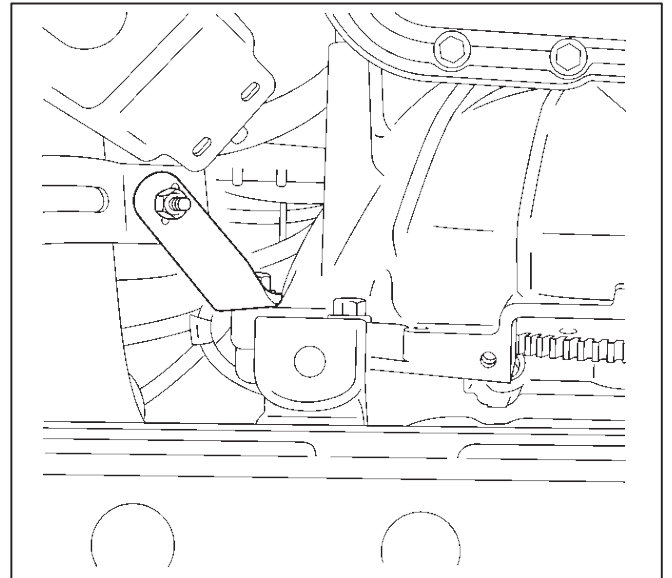
(V6)

(HEC)



20. Remove engine transmission fixing bolts.

21. Remove exhaust pipe bracket from converter housing and exhaust pipe (HEC).



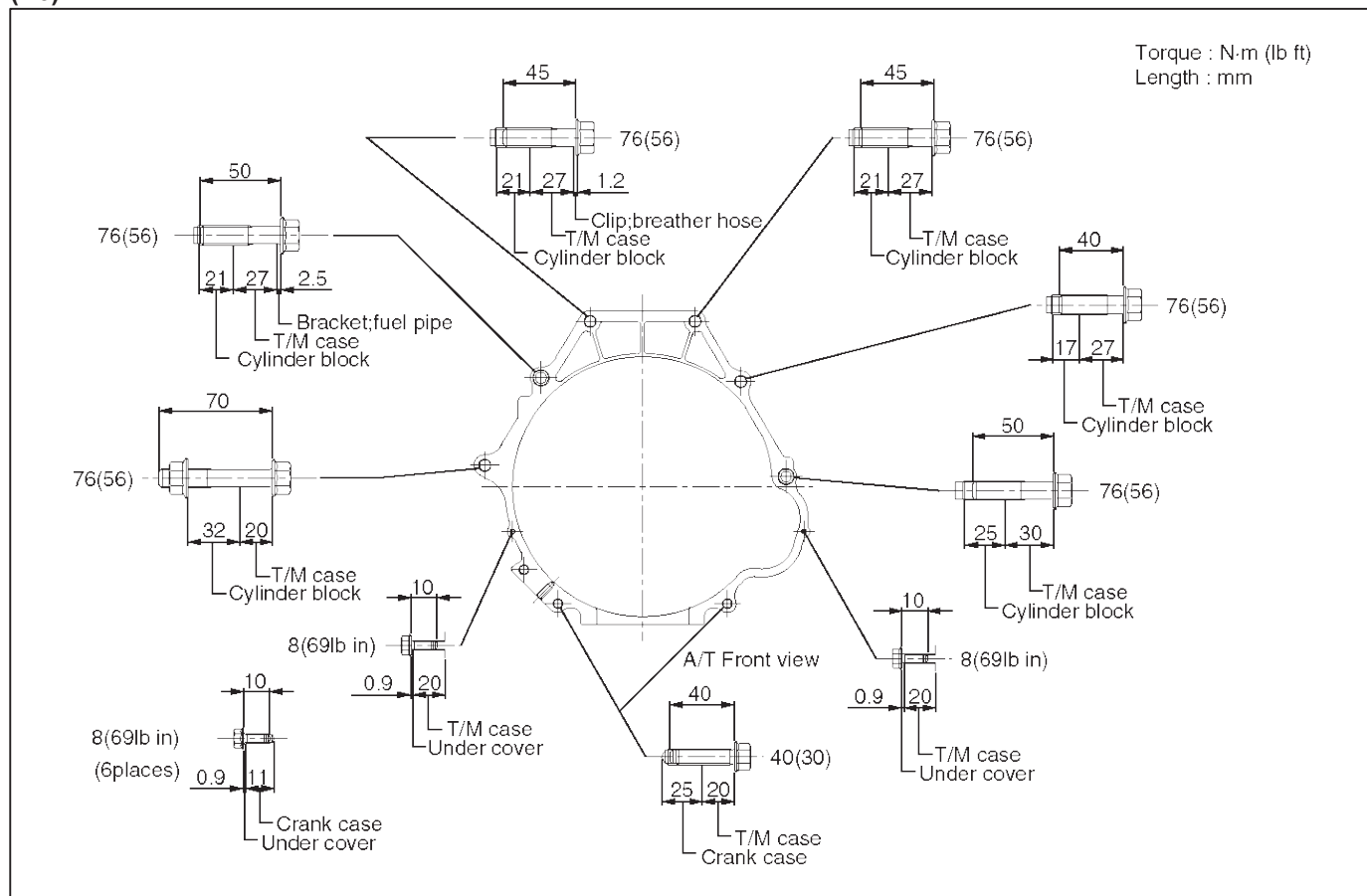
22. Pull out transmission from the engine.

23. Remove the rear mount rubber and propeller protector assembly if required (4×2).

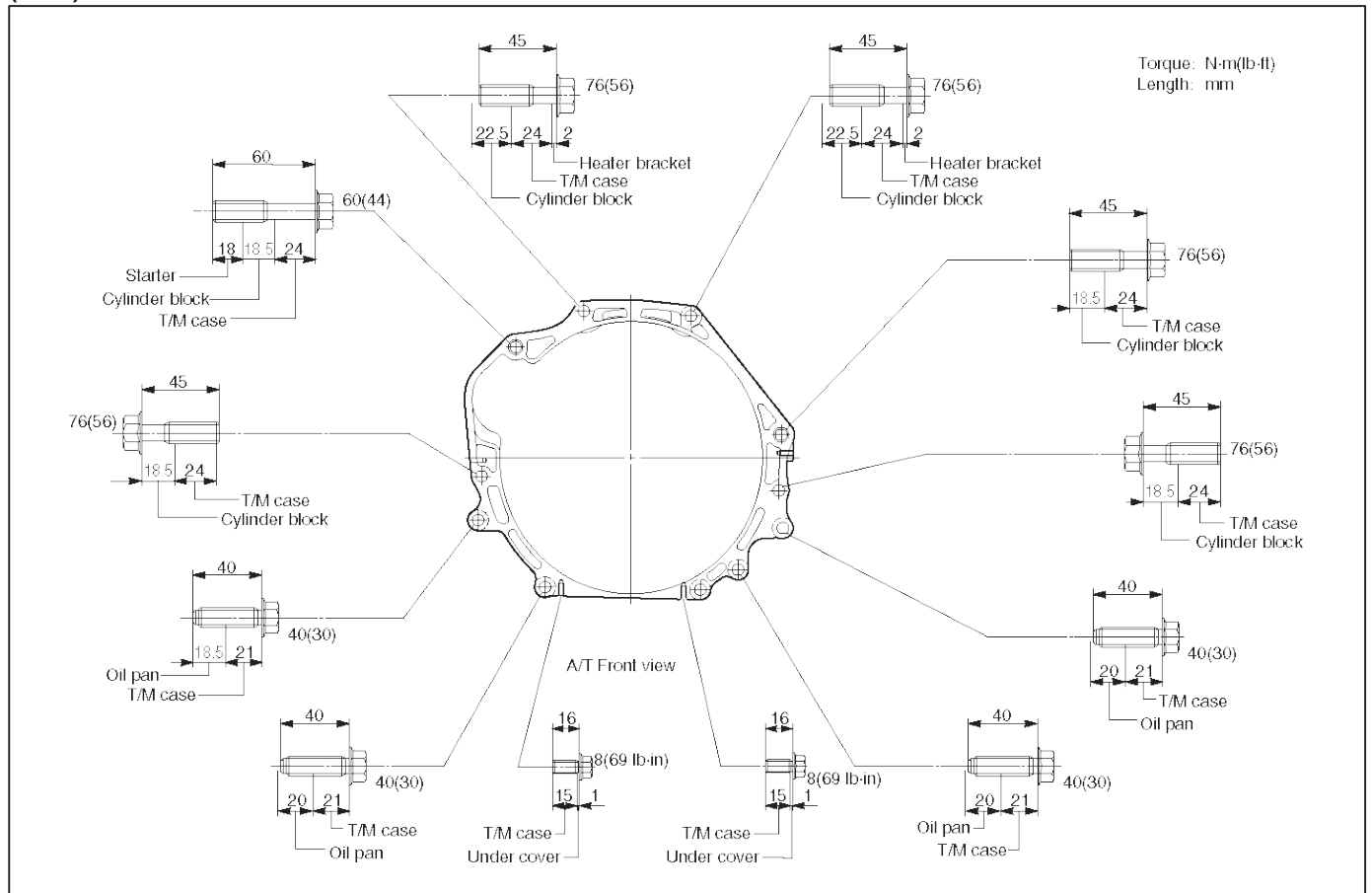
Installation

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

(V6)

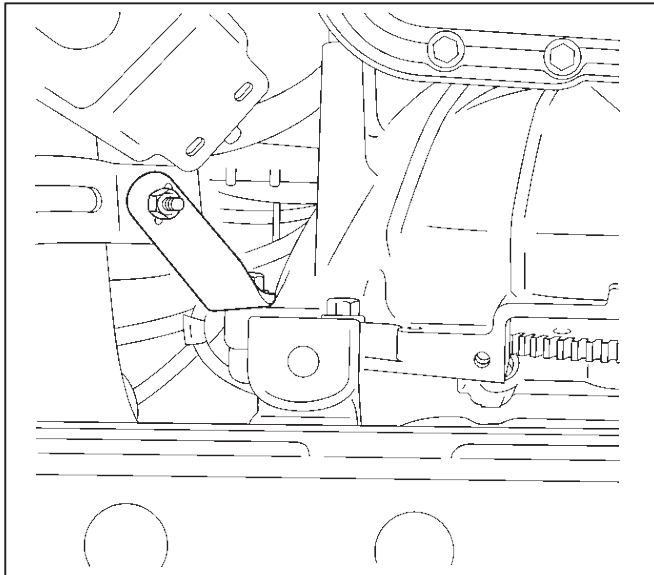


(HEC)



F07R100006

- Install exhaust pipe bracket to converter housing and exhaust pipe (HEC).



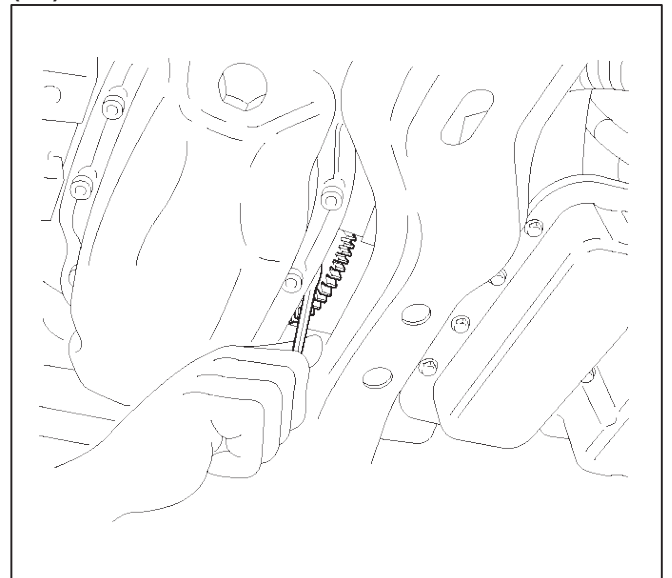
150R100009

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) (V6)
: 29 N·m (22 lb ft) (HEC)

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

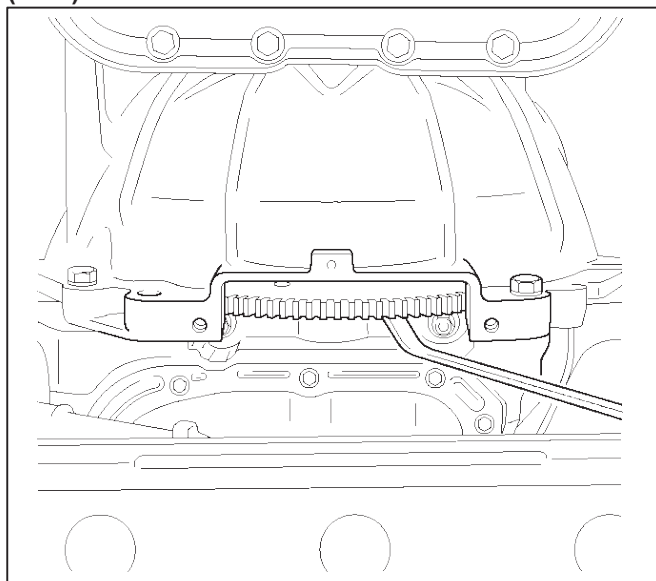
(V6)



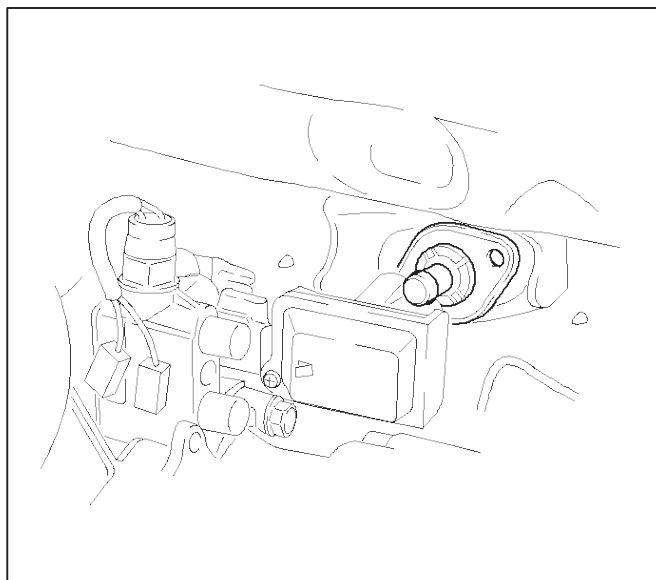
240RW005

7A-50 AUTOMATIC TRANSMISSION (4L30-E)

(HEC)

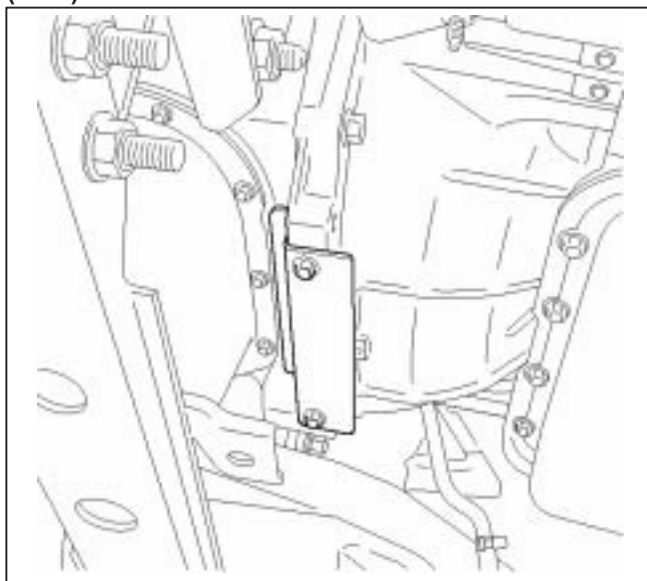


4. Install transfer control lever on the transfer case (V6, 4x4).



5. Install under covers to the transmission and engine.

(HEC)

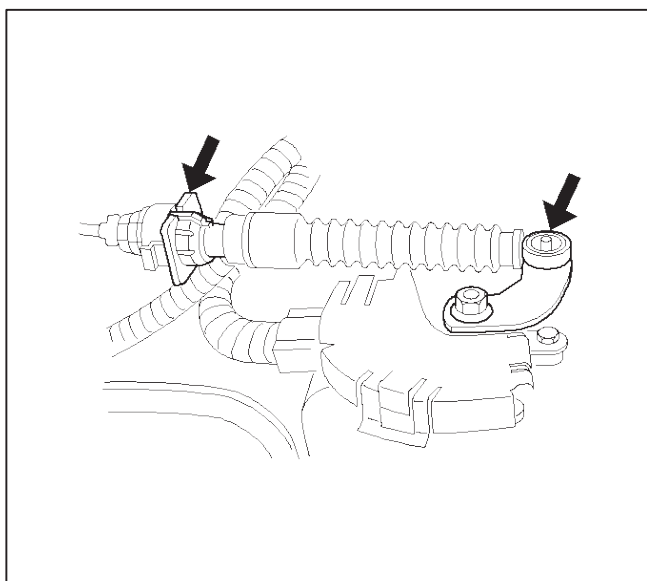


Torque: 8 N•m (69 lb in) (V6 / HEC)

6. Install starter (V6).

Torque: 40 N•m (30 lb ft)

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

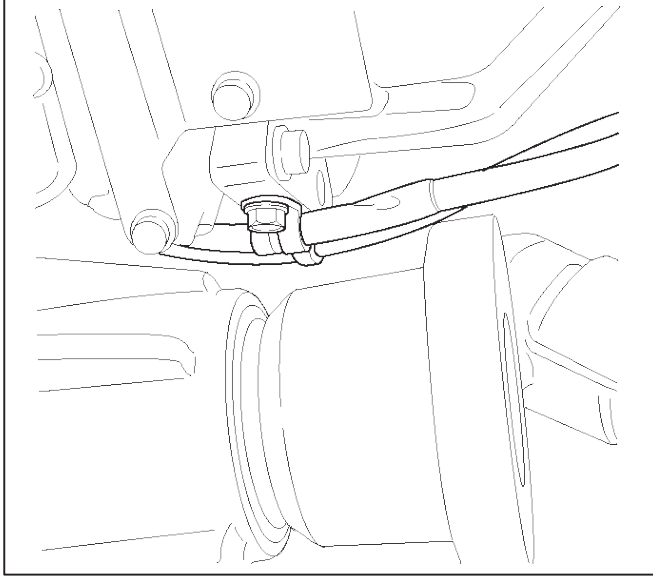


8. Connect transmission oil cooler pipes to A/T.

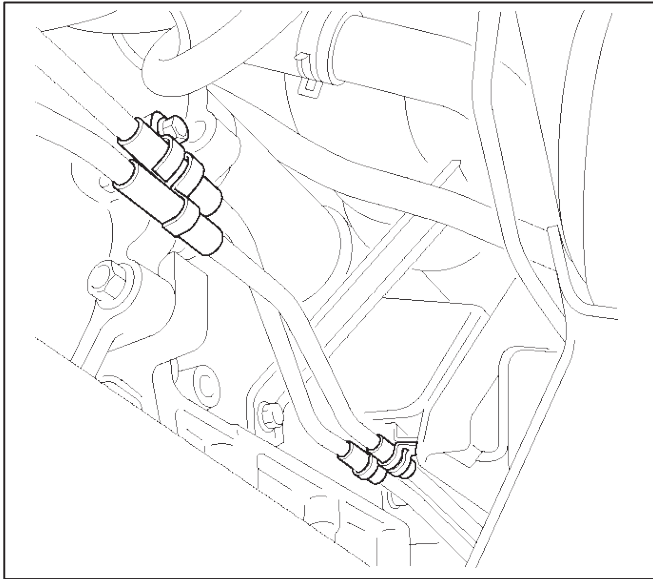
Torque: 44 N•m (33 lb ft)

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

(V6, 4×4)



(HEC)



10. Tighten oil cooler pipe clamp bolt at the engine mount side.

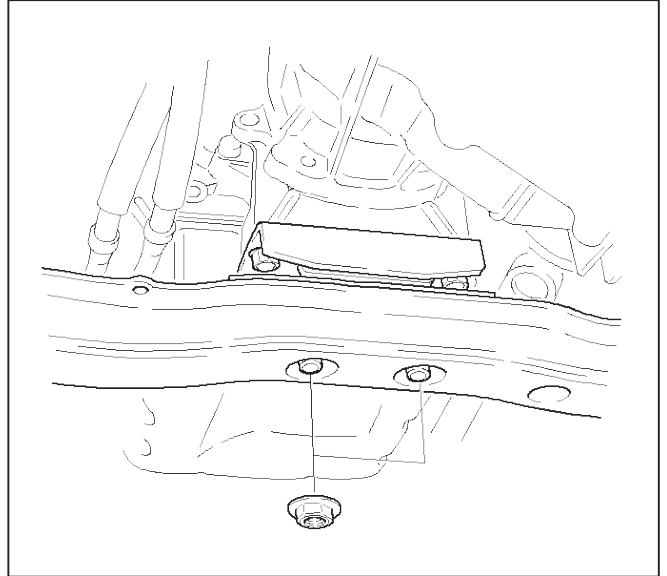
11. Install third crossmember.

Torque: 76 N•m (56 lb ft)

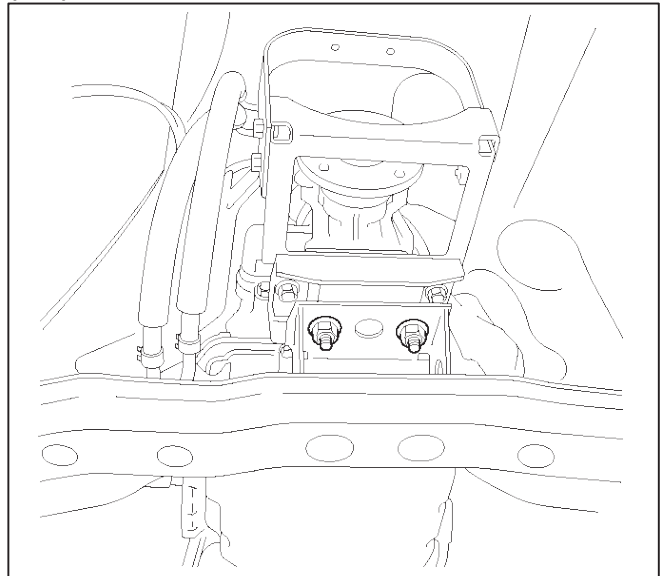
12. Install rear mount nuts.

Torque: 50 N•m (37 lb ft)

(4×4)



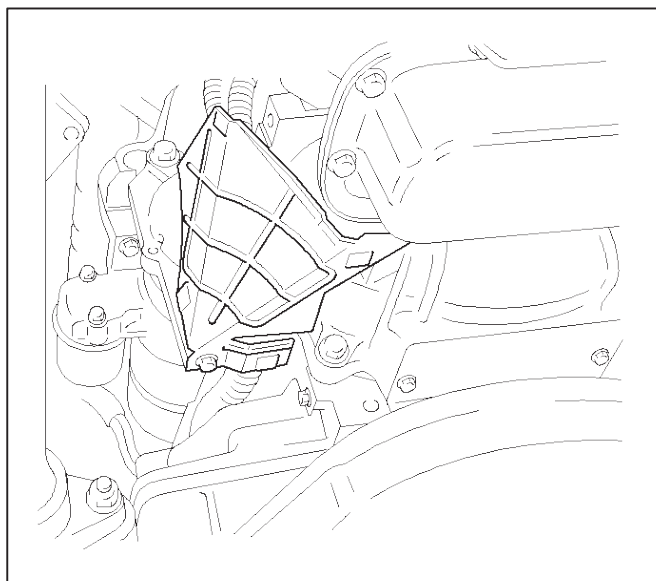
(4×2)



7A-52 AUTOMATIC TRANSMISSION (4L30-E)

13. Install harness heat protector (V6).

Torque: 6 N•m (52 lb in)



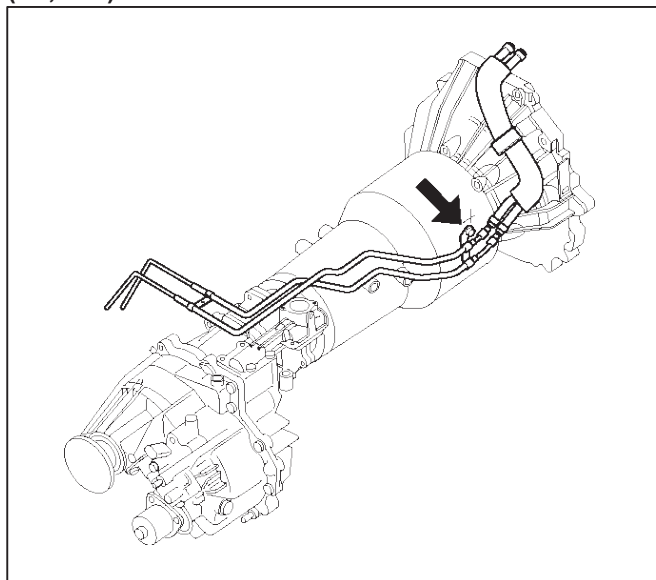
815RW002

14. Connect 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.

15. Connect fuel pipe bracket to transmission side.

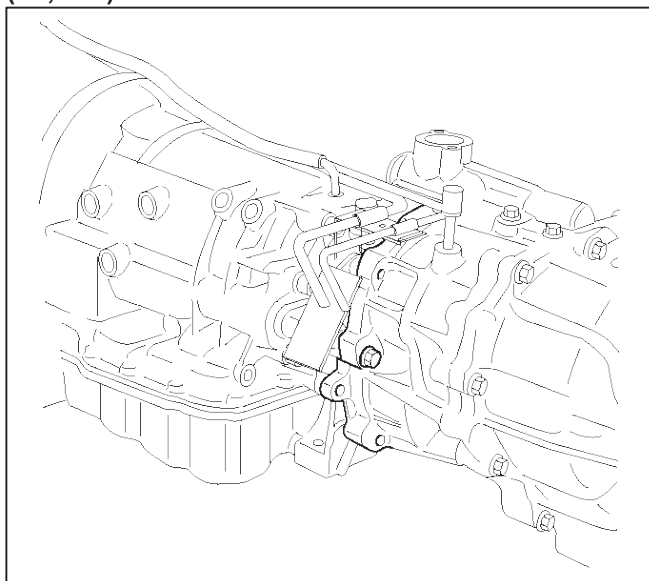
NOTE: See "NOTE" of removal steps.

(V6, 4×4)



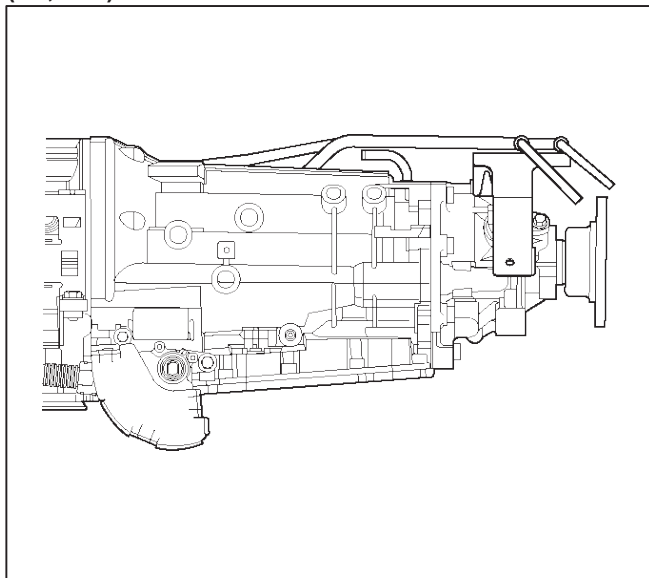
141R100004

(V6, 4×4)



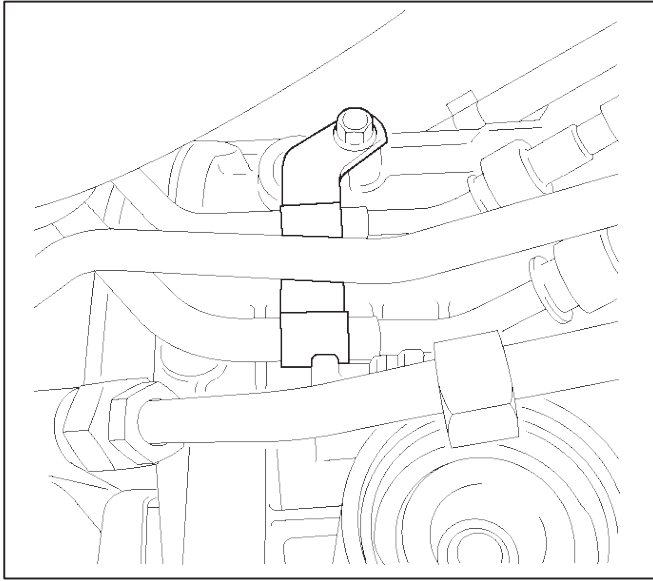
240RW014

(V6, 4×2)

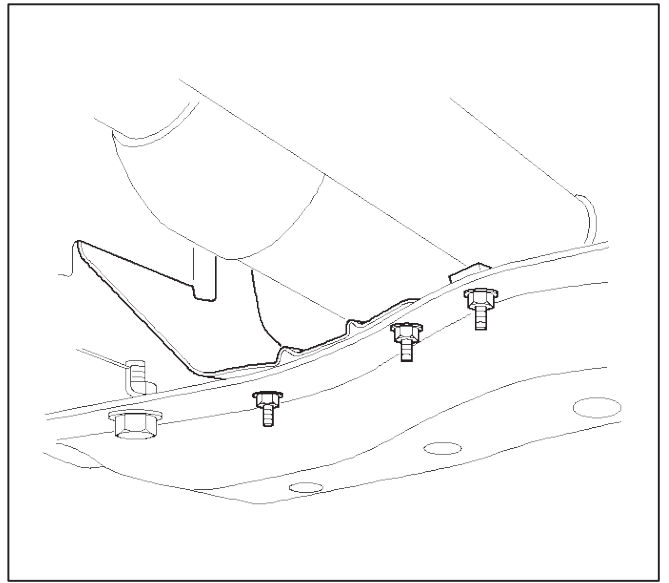


141RW006

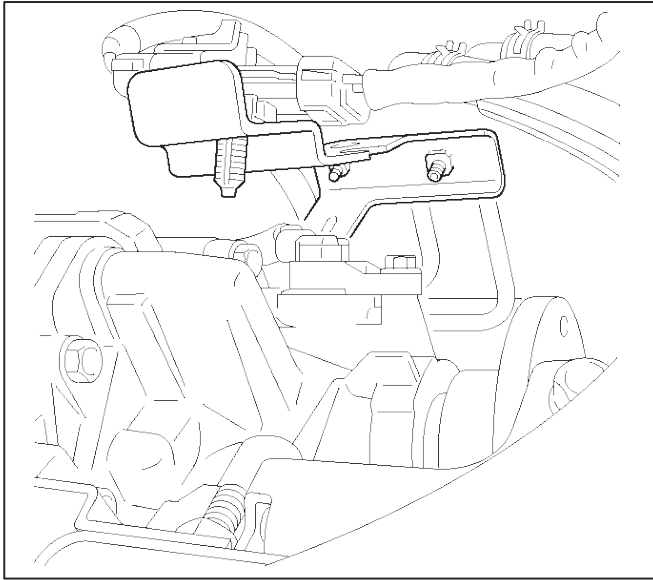
(HEC)



17. Connector fuel pipe bracket to third crossmember.



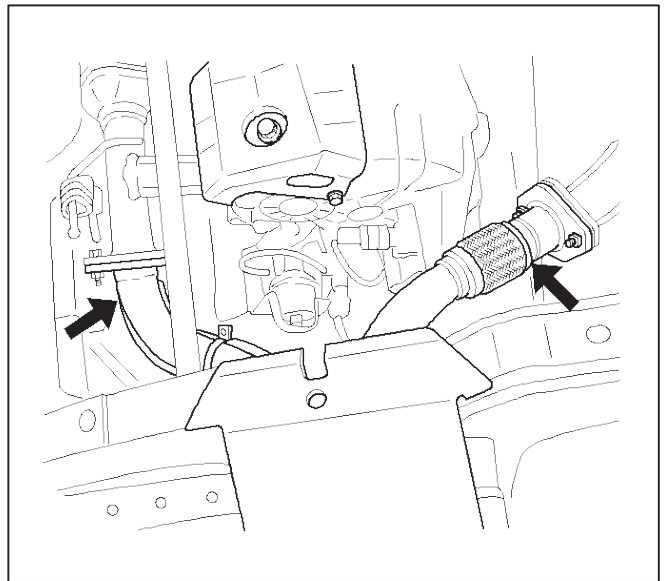
(HEC)



16. Install fuel pipe heat protector and clip.

18. Install center exhaust pipe (V6, 4x4).

Torque: 43 N•m (32 lb ft)

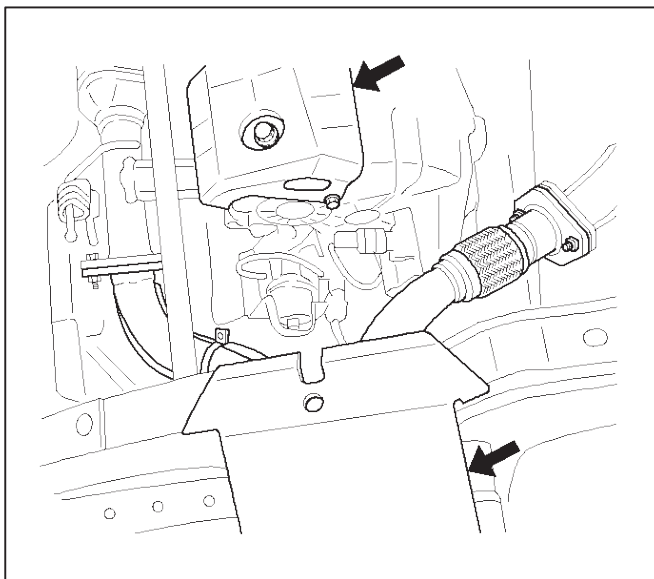


7A-54 AUTOMATIC TRANSMISSION (4L30-E)

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

Torque: 63 N•m (46 lb ft)

20. Install transfer protector (4×4) and fairing plate (V6).

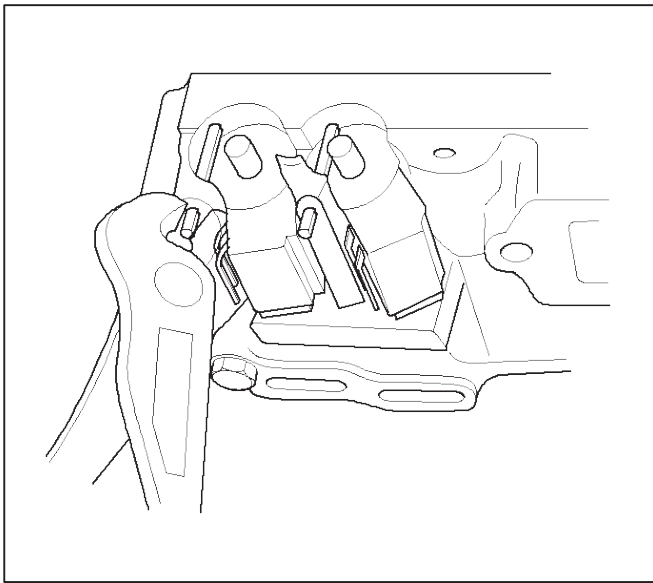


150RW006

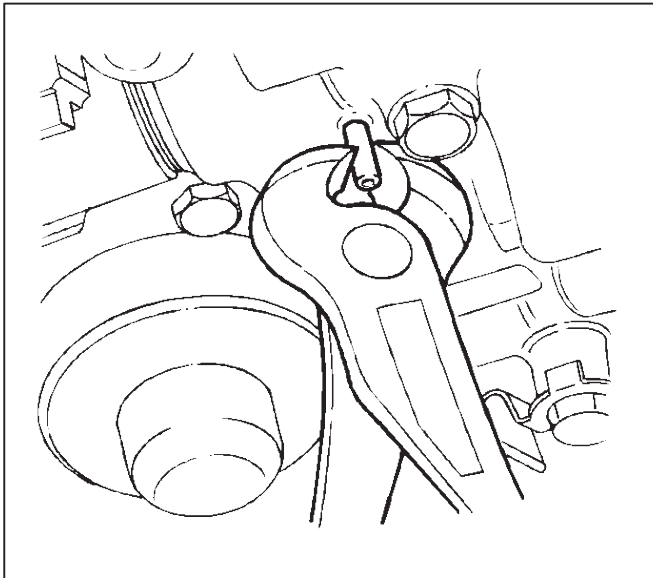
Solenoid (Main Case Valve Body)

Removal

1. Raise the vehicle and support it on jack stands.
2. Disconnect battery ground cable.
3. Drain fluid.
4. Remove sixteen 10 mm screws, main case oil pan, magnet, and gasket.
5. Remove three 13 mm screws, oil filter.
6. Disconnect wiring harness from band control solenoid and shift solenoids. Pull only on connectors, not on wiring harness.
7. 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

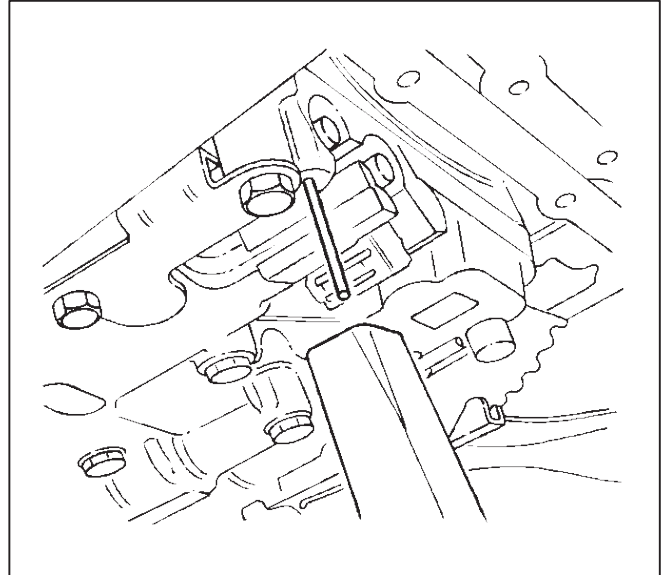


244RW003

8. 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 to the specified torque.

Torque: 20 N•m (15 lb ft)

5. Install magnet, main case oil pan with new gasket, and sixteen 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.

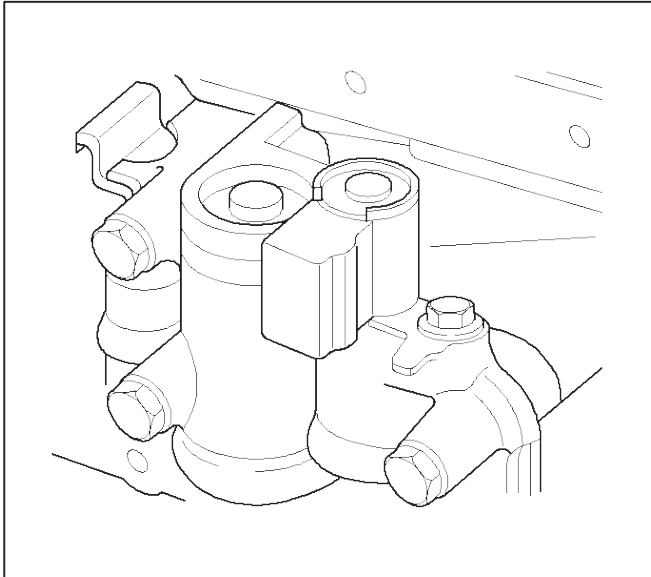
Solenoid (Adapter Case Valve Body)

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.

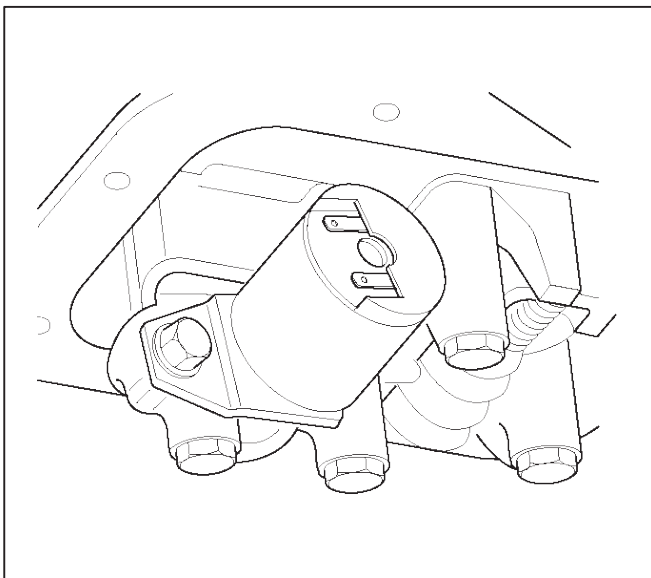
NOTE: Oil pan still contains transmission fluid. Place a large drain container under the oil pan and drain the fluid carefully.

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



210RW011

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



210R10002

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 solenoid with two O-rings, 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.

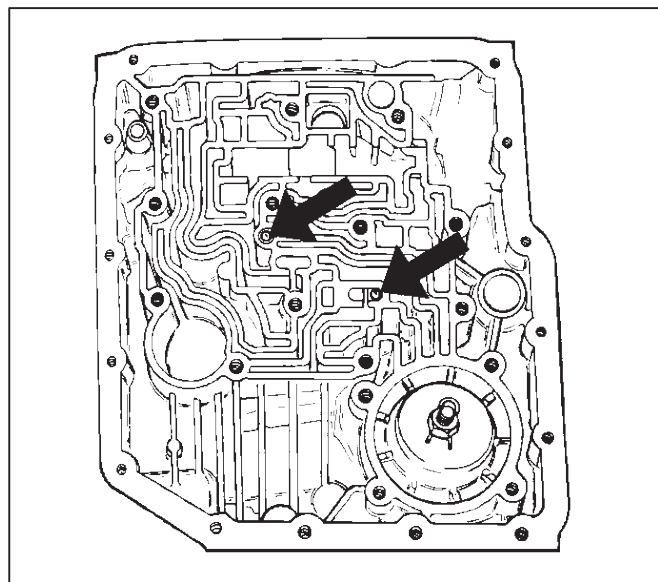
Valve Body Assembly (Main Case)

Removal

1. Raise the vehicle and support it on jack stands.
2. Disconnect battery ground cable.
3. Drain fluid.
4. Remove sixteen 10 mm screws, main case oil pan, magnet and gasket.
5. Remove three 13 mm oil filter fixing screws, then remove oil filter.
6. Remove two 13 mm manual detent fixing screws, then remove roller and spring assembly.
7. Disconnect wiring harness from band control solenoid and shift solenoids. Pull only on connectors, not on wiring harness.
8. Remove four 13 mm servo cover fixing screws, then remove servo cover and gasket.
9. Remove seven 13 mm valve body fixing screws.
 - Disconnect ground wire from the main case valve body (HEC).
10. 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).
11. Remove transfer plate gasket from main case.
12. Remove two check balls from main case.

Installation

1. Install two check balls to main case.



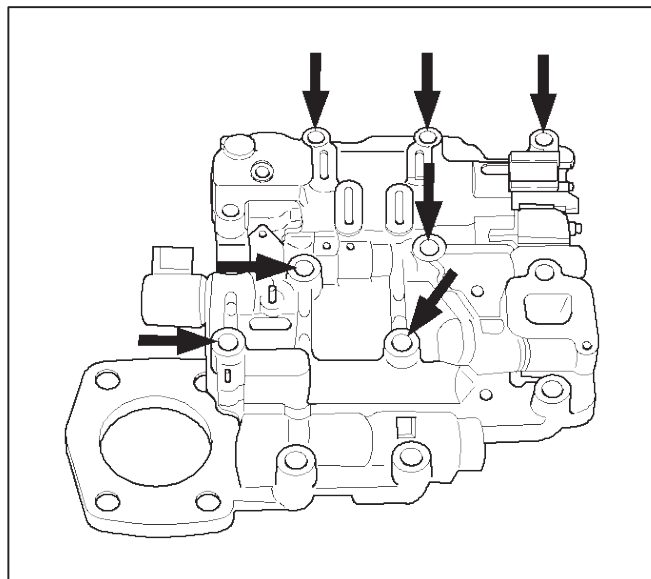
244RW002

2. Inspect electrical 7 way (V6) or 4 way (HEC) connector and seal of main case. Replace if necessary.
3. Use two J-25025-B guide pin to install main case.
 - Install valve body complete 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.

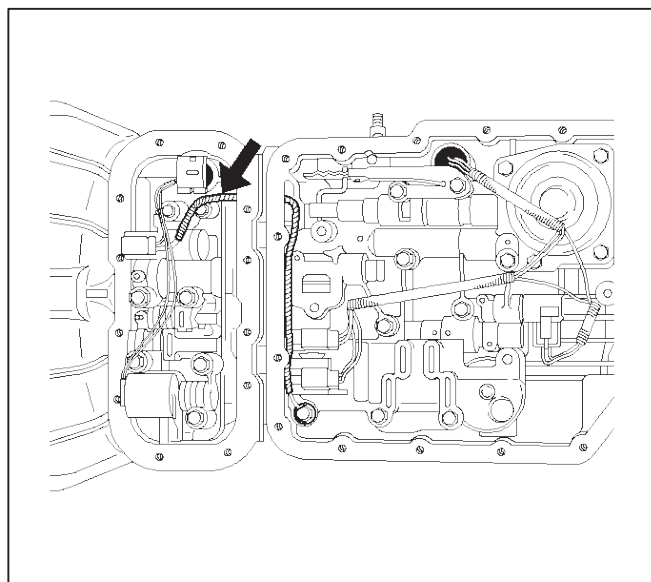
Torque: 20 N•m (15 lb ft)



243RS008

5. Install 8.5 mm connector of ground wire under the head of this valve body bolt and reinstall it. Tighten the bolt to the specified torque (HEC).

Torque: 20 N•m (15 lb ft)



244RW001

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

Torque: 25 N•m (18 lb ft)
8. Connect wiring harness to band control and shift solenoids.
9. 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)

7A-58 AUTOMATIC TRANSMISSION (4L30-E)

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

Torque : 20 N•m (15 lb ft)

11. 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)

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

13. 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 (V6) or 5 way (HEC) 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.

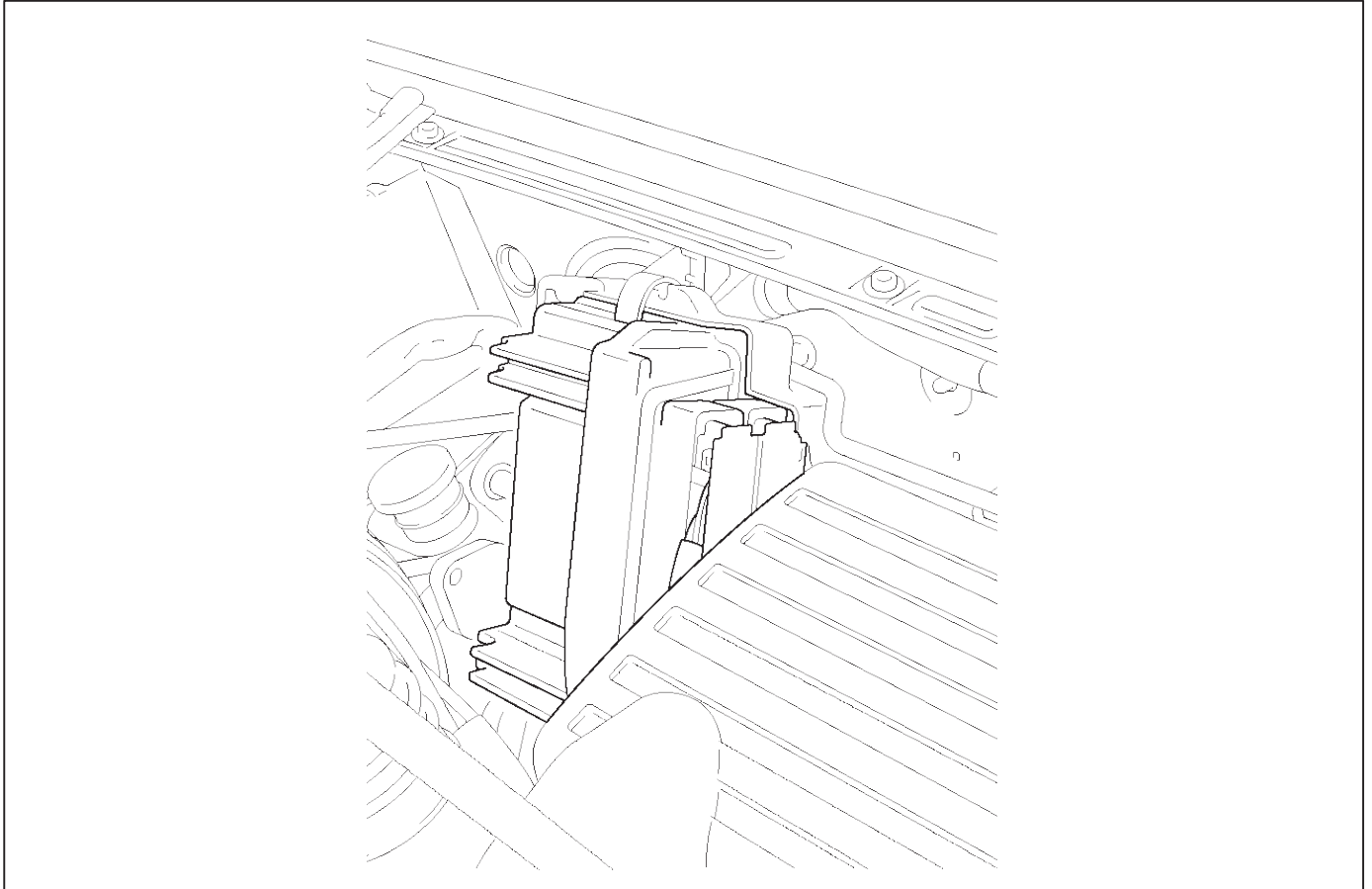
Torque: 11 N•m (96 lb in)

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) (V6)

Removal

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



825R100018

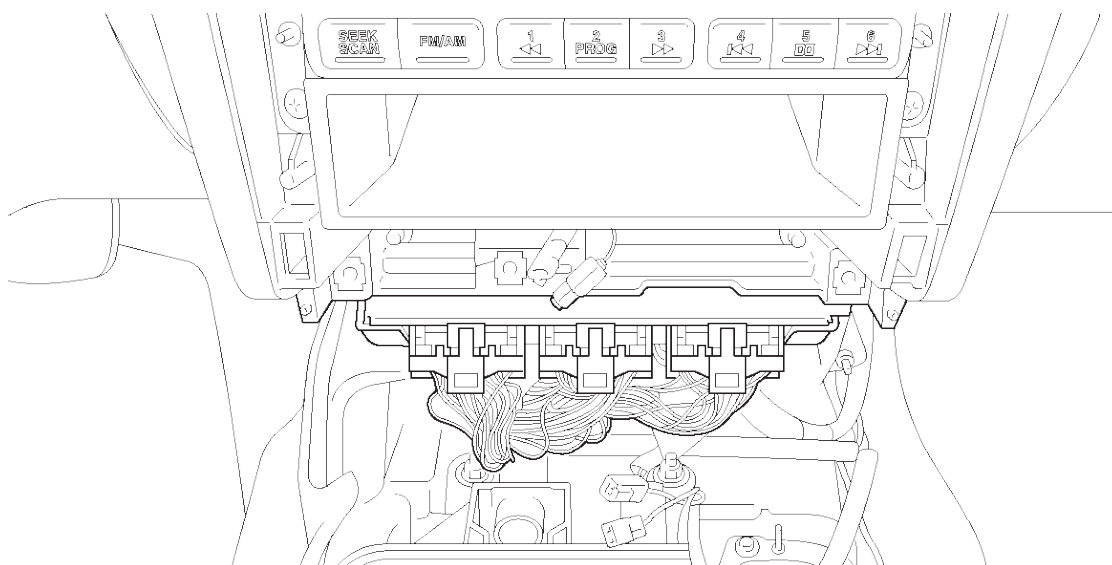
Installation

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

Powertrain Control Module (PCM) (HEC)

Removal

1. Disconnect battery ground cable.
2. Remove lower cluster assembly, center console and front console.
3. Disconnect PCM wiring harness connectors from PCM.
4. Remove four retaining nuts and PCM with bracket from instrument panel stay.
5. Remove PCM from bracket.



828R100002

Installation

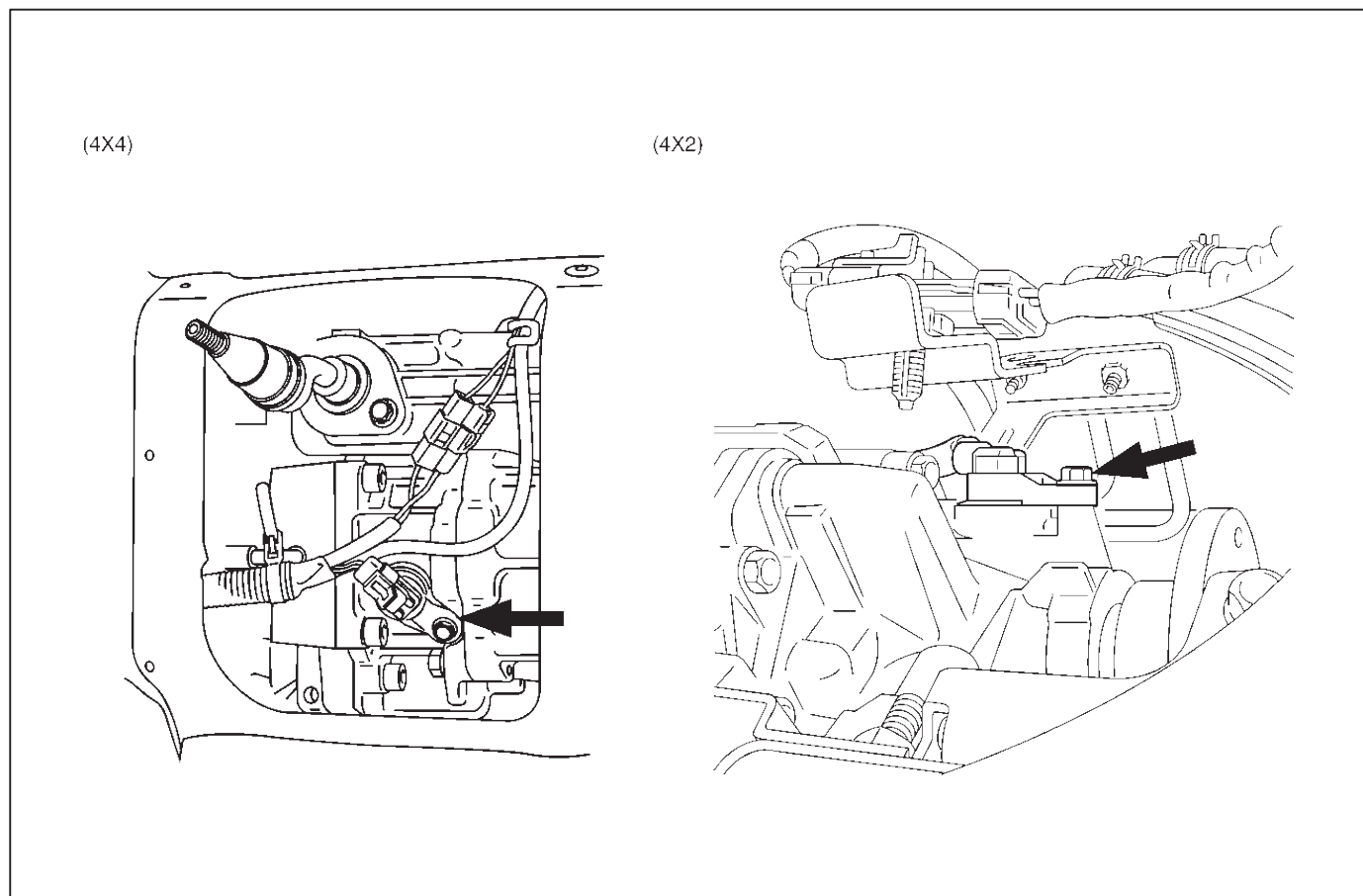
1. Install two brackets to PCM.
2. Install PCM with bracket to instrument panel stay and four retaining nuts.
3. Connect PCM wiring harness connectors to PCM.
4. Install center console, front console, and lower cluster assembly.
5. Connect battery ground cable.

Speed Sensor (Extension Assembly)

Removal

1. Disconnect battery ground cable.
2. Remove front console (V6, 4×4).
3. Remove selector lever assembly (V6, 4×4).

4. Disconnect speed sensor harness connector from speed sensor.
5. Remove one 10 mm screw and speed sensor with O-ring.



241R100002

Installation

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

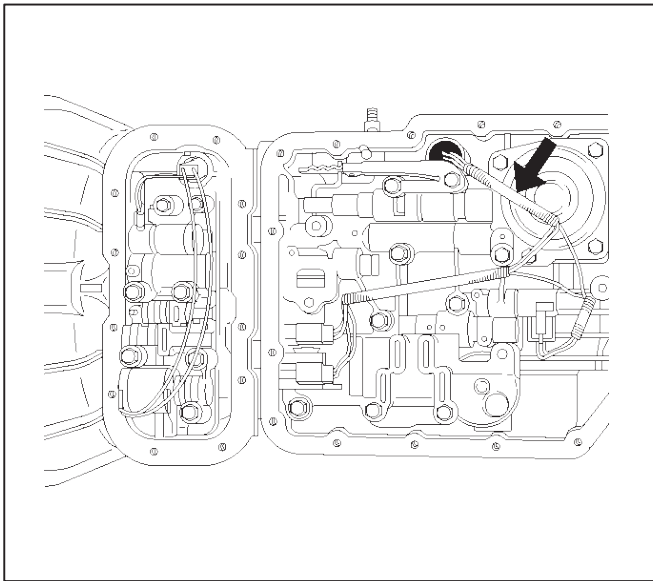
Torque: 9 N•m (78 lb in)

3. Connect speed sensor harness connector to speed sensor.
4. Install selector lever assembly (V6, 4×4).
 - Adjust shift lock cable. Refer to Shift Lock Cable in this section.
5. Install front console (V6, 4×4).
6. Connect battery ground cable.

Transmission Oil Temperature Sensor (Main Case) (V6)

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.

Transmission Oil Temperature Sensor (Adapter Case) (HEC)

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 and drain the fluid carefully.

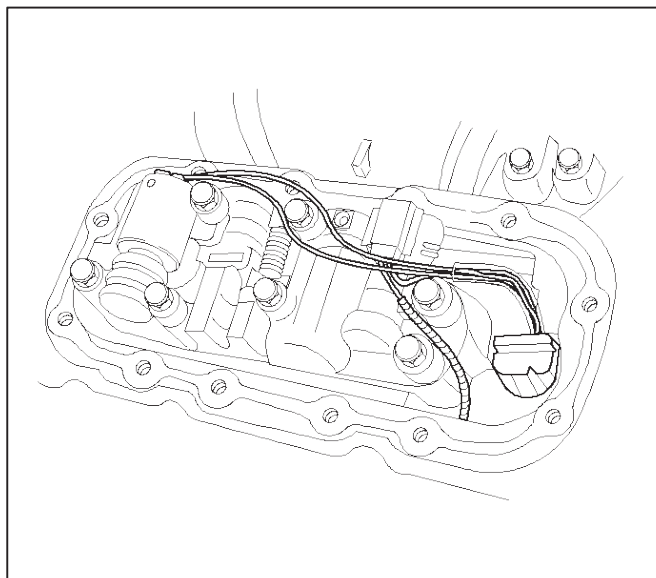
5. Disconnect wiring harness from force motor solenoid, converter clutch solenoid, and 5 way connector of adapter case. Pull only on connectors, not on wiring harness.
6. Disconnect ground wire from converter clutch solenoid wiring harness connector.
7. Remove wiring harness assembly with transmission oil temperature sensor.

Installation

1. Connect ground wire to converter clutch solenoid wiring harness connector of the wiring harness assembly.
2. Install wiring harness assembly with transmission oil temperature sensor to converter clutch solenoid, force motor, and 5 way connector of adapter case.
3. Install oil pan gasket, oil pan and twelve 10 mm fixing screws. Tighten the screws to the specified torque.

Torque: 11 N•m (96 lb in)

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



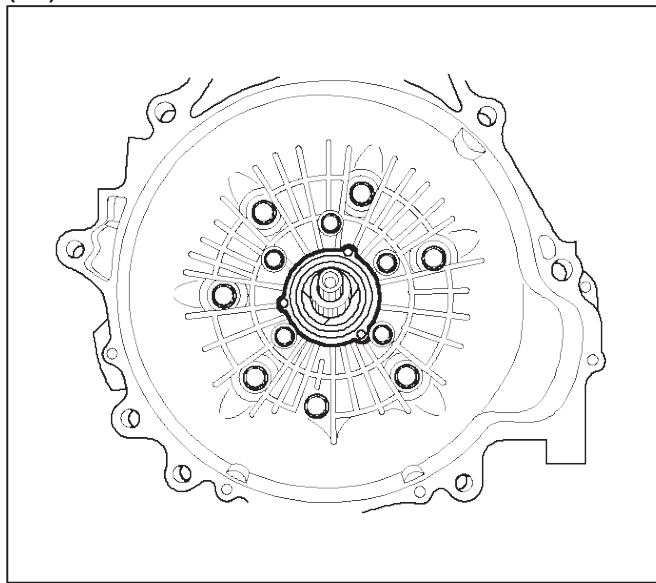
243RW002

Front Oil Seal (Converter Housing)

Removal

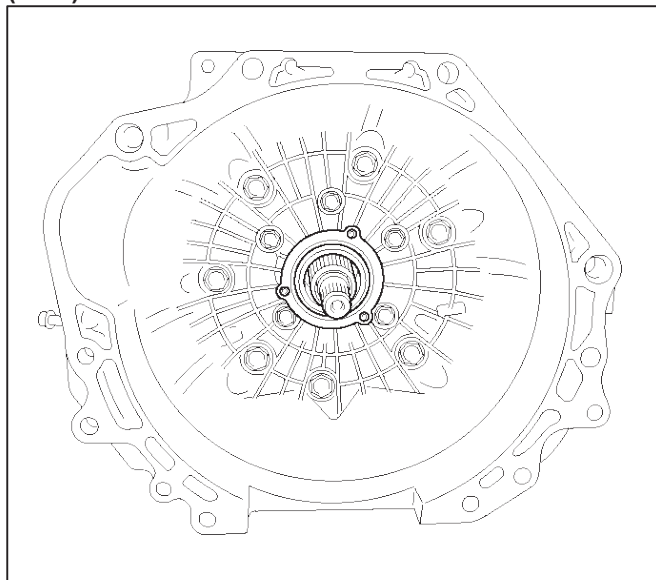
1. Remove transmission assembly from the vehicle, refer to *Transmission Assembly in this section*.
2. Remove torque converter from converter housing.
3. Remove three screws and oil seal ring from converter housing.

(V6)



241RW008

(HEC)



241R100001

Installation

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

Torque: 3 N•m (26 lb in)

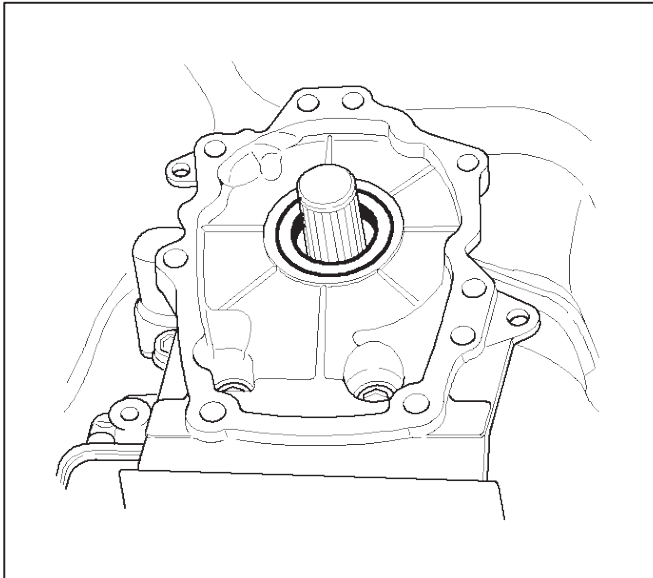
2. Install torque converter to converter housing.
3. Install transmission assembly to the vehicle, refer to *Transmission in this section*.

Rear Oil Seal (Extension Assembly)

Removal

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

(4×4)



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 to the vehicle (4×4). Refer to Transfer Case in Drive Line/Axle section.

Transmission (4L30-E)

Disassembly

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

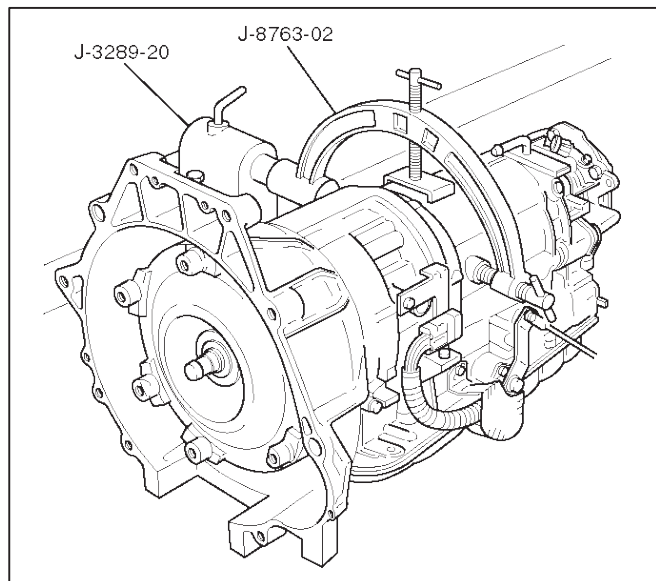
- Wash each part thoroughly, and blow air through each oil passage and groove to eliminate blockage.
- Seal rings, roll pins, and gaskets should be replaced.
- When assembling the components, apply DEXRON®-III Automatic Transmission Fluid (ATF) to each seal, rotating part, and sliding part.
- Do not 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.

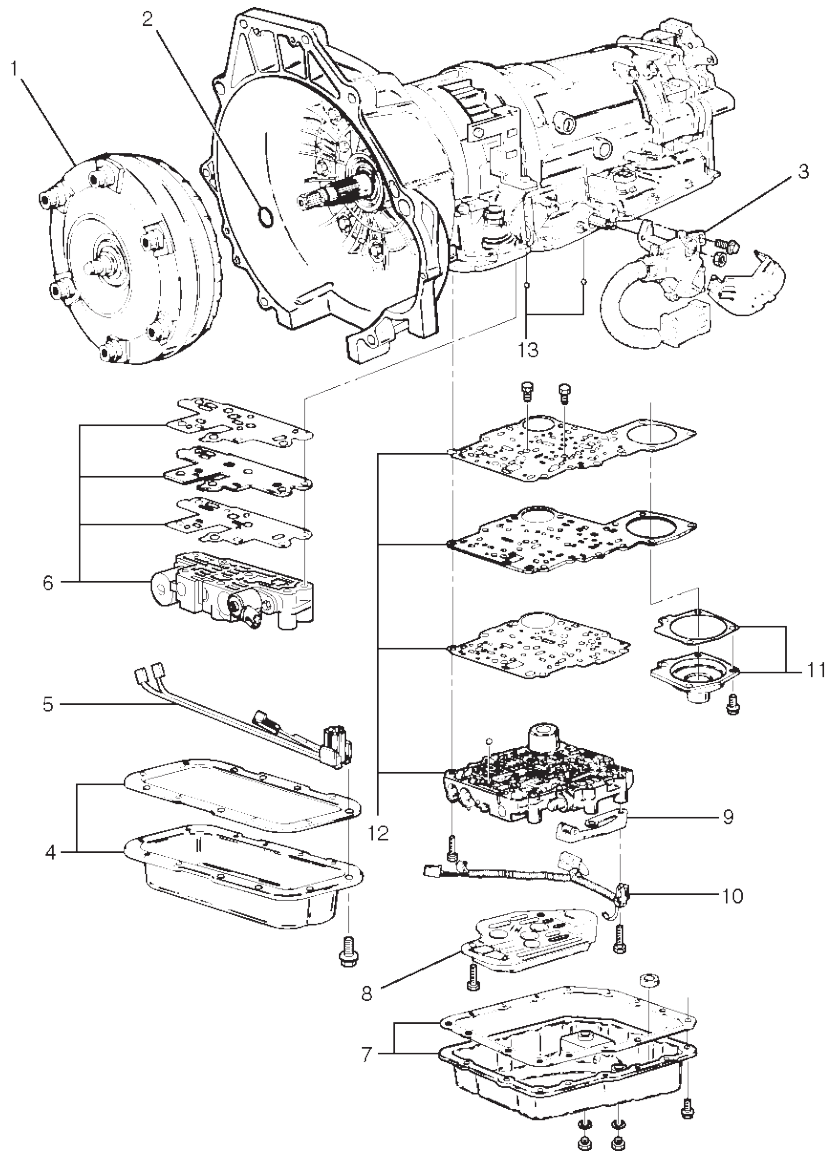
NOTE: Do not overtighten the tool, as case damage may result.



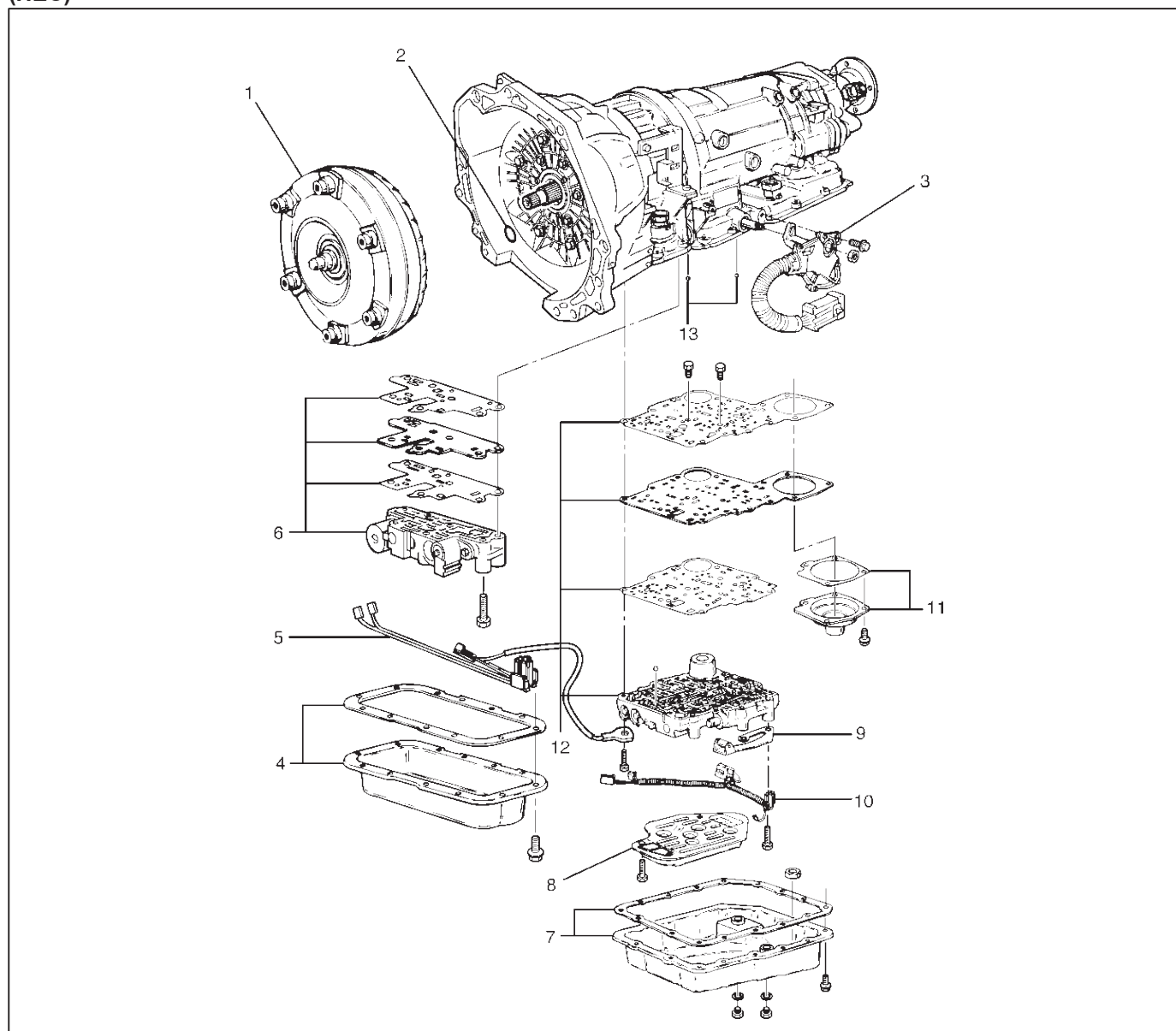
420RW021

2. Remove O-ring (2) from turbine shaft.
3. Remove two 10mm mode switch screws, selector lever nut, cover (V6), 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 (V6) or 5 way (HEC) 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 (V6) or 5 way (HEC) 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 (V6) or 4 way (HEC) 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 and ground wire (HEC) 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 (V6) or 4 way (HEC) connector.
 - Remove gasket transfer plate from main case.
13. Remove two check balls (13) from main case.

(V6)



(HEC)



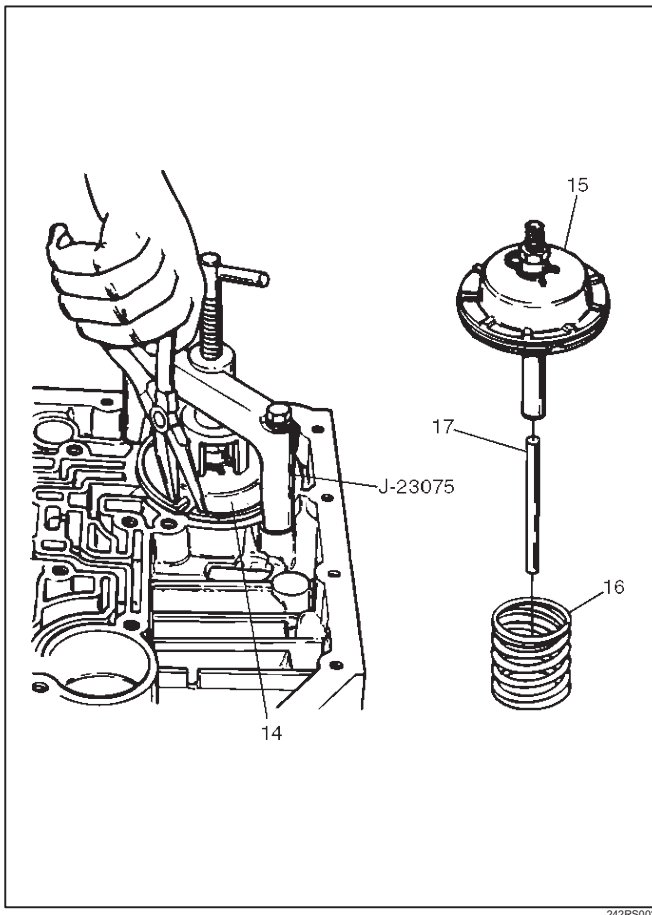
240R100008

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 assembly hexagon socket head screws, extension assembly (19), and gasket.

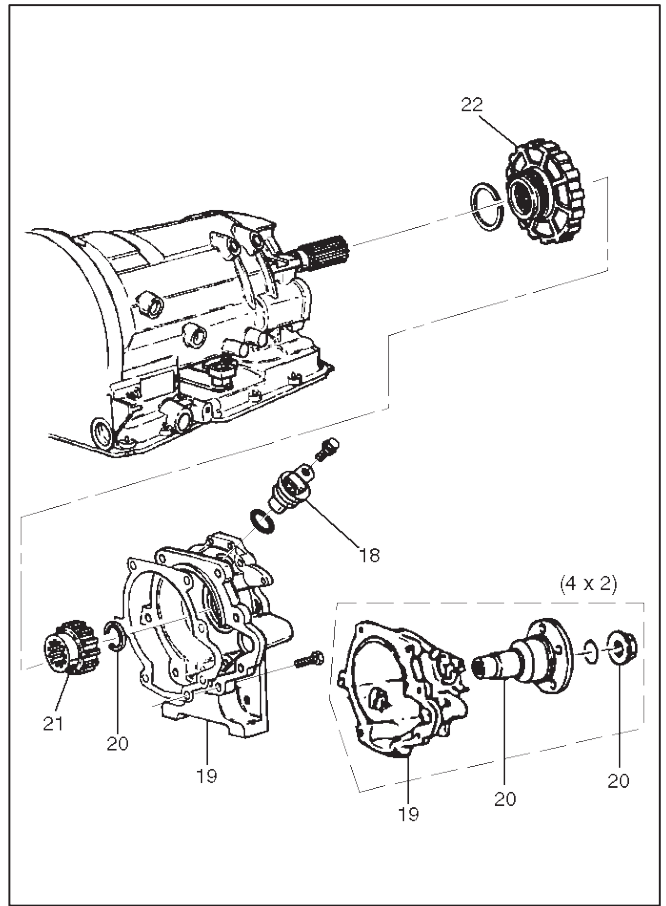
18. Remove retaining ring (20). (4×4)

NOTE: Use extra long, needle nose pliers.

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

19. Remove speed wheel (21).

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



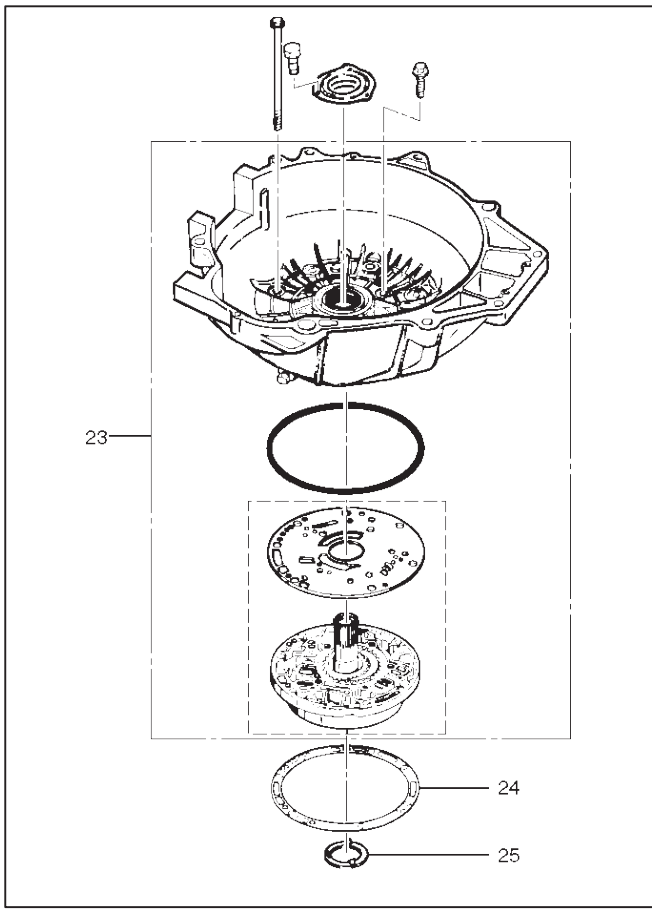
21. Rotate transmission to vertical position, converter housing up.

- Loosen the converter housing and oil pump assembly fixing screws, but do not remove, the five 13 mm inner screws unless oil pump disassembly is required.
- Remove seven outer screws.
- Remove converter housing and oil pump assembly (23).

22. Remove gasket (24).

7A-70 AUTOMATIC TRANSMISSION (4L30-E)

23. Remove selective thrust washer (25).



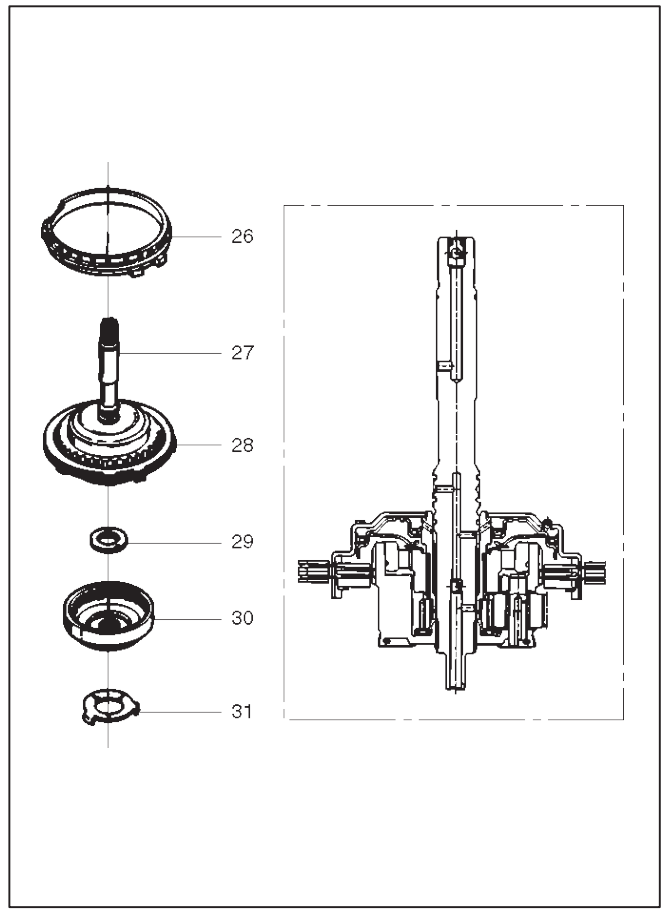
24. Remove fourth clutch retainer (26).

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).

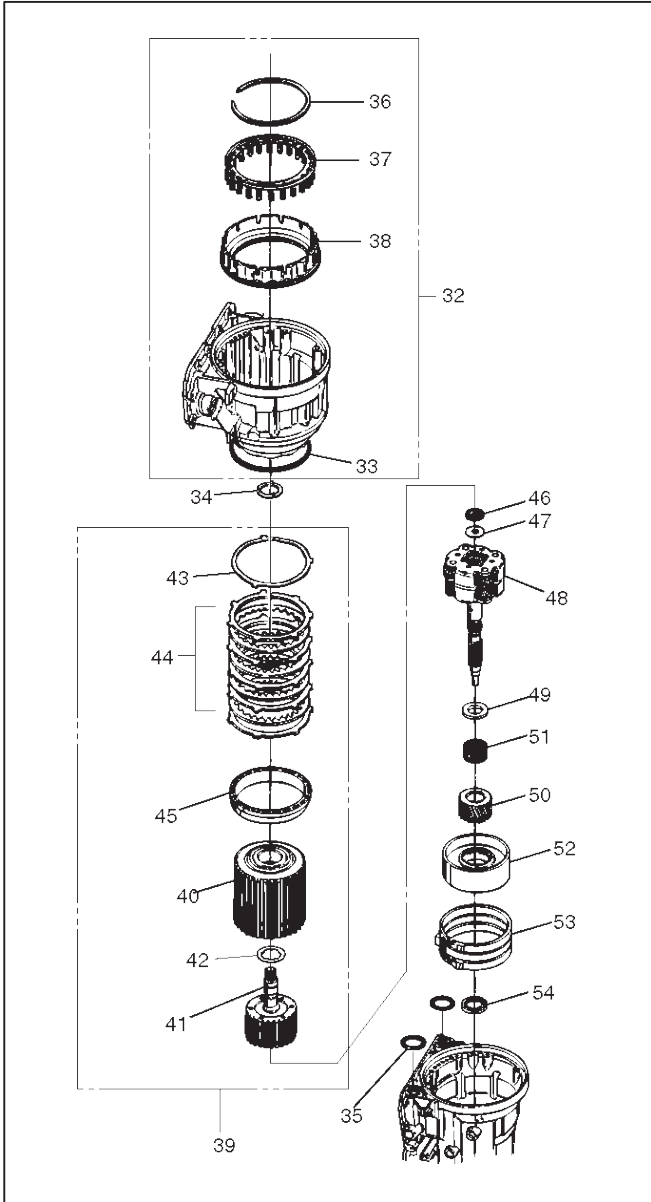
38. Remove reverse clutch plates (43 and 44) and reverse clutch pressure plate (45).

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).



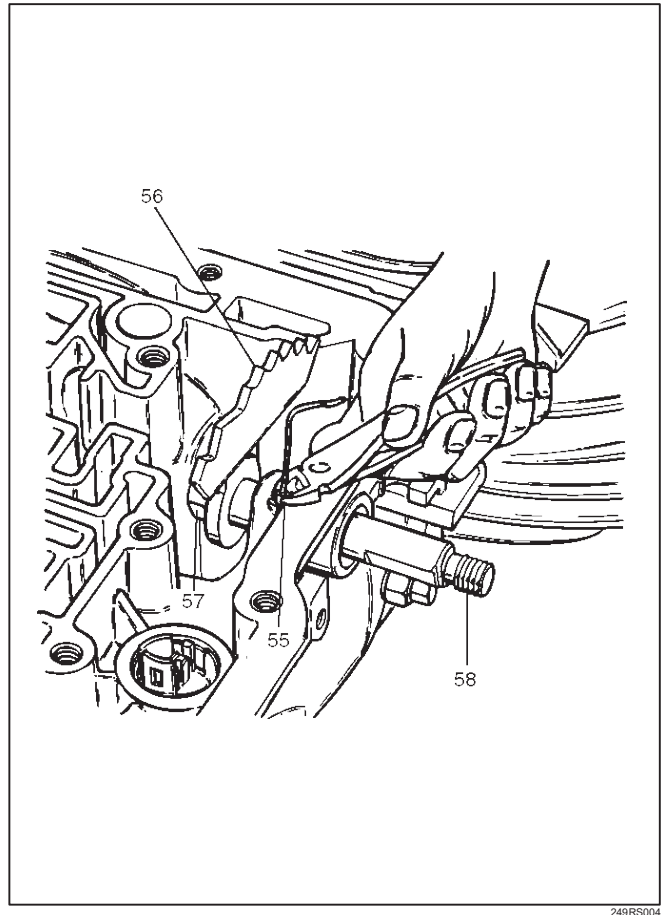
47. Rotate case to horizontal position, valve body side facing up.

- 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.



Reassembly

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

NOTE: Use a seal installer when replacing the seal.

- Install selector shaft.

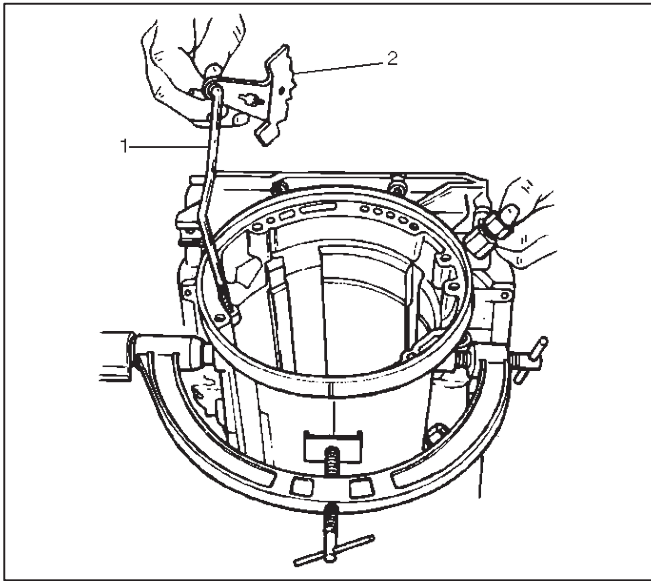
NOTE: Spring pin groove must be positioned inside the case.

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).

7A-72 AUTOMATIC TRANSMISSION (4L30-E)

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)



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).

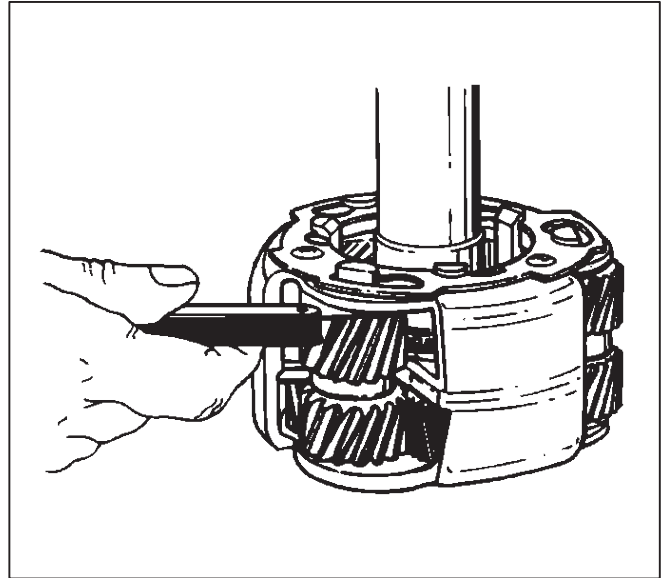
9. Install needle bearing (7).

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.



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

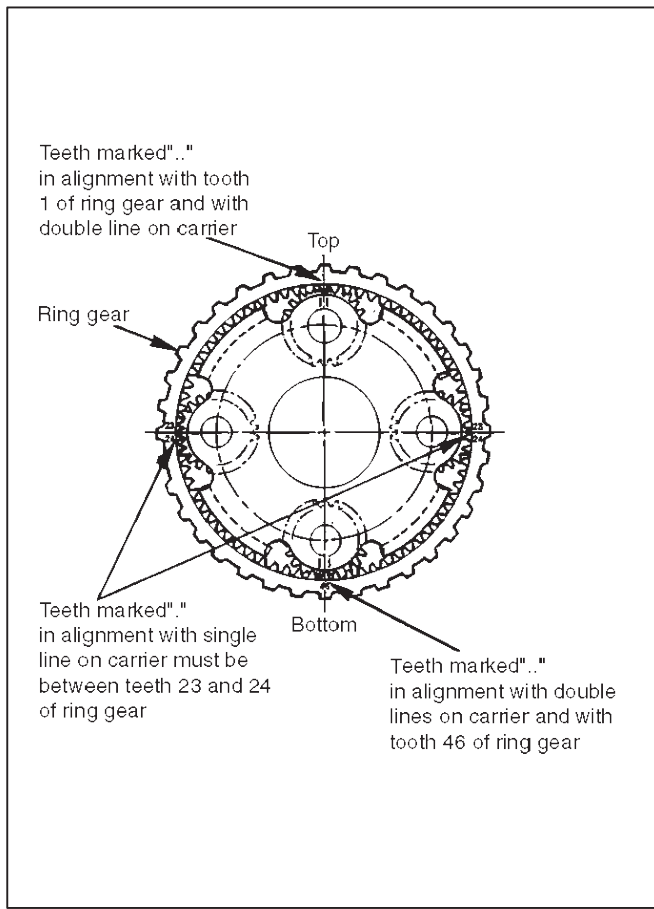
NOTE: Use petroleum jelly to hold the thrust bearing in place.

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.

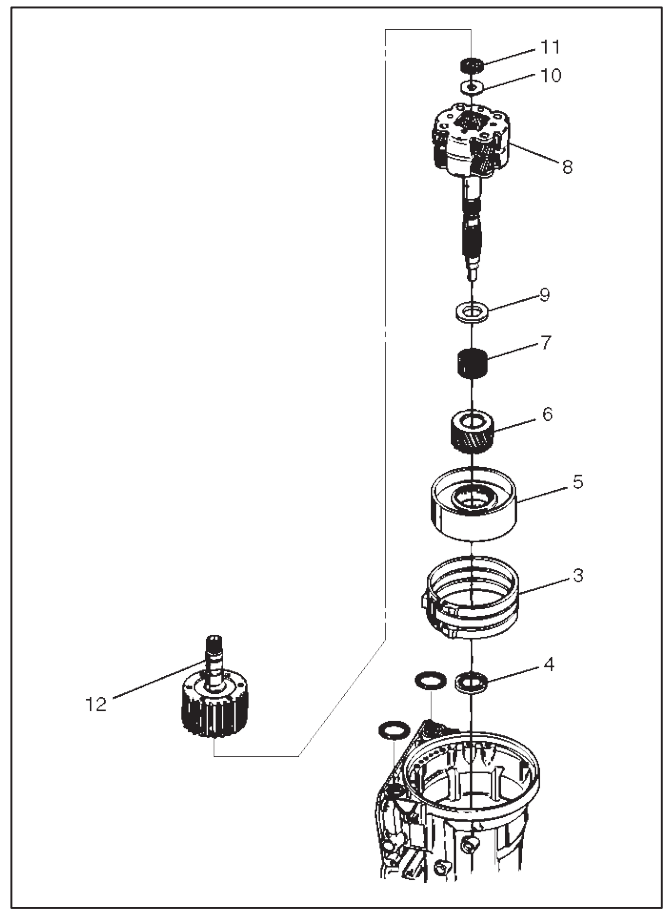


14. Remove the third clutch (12).

248RS002

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.

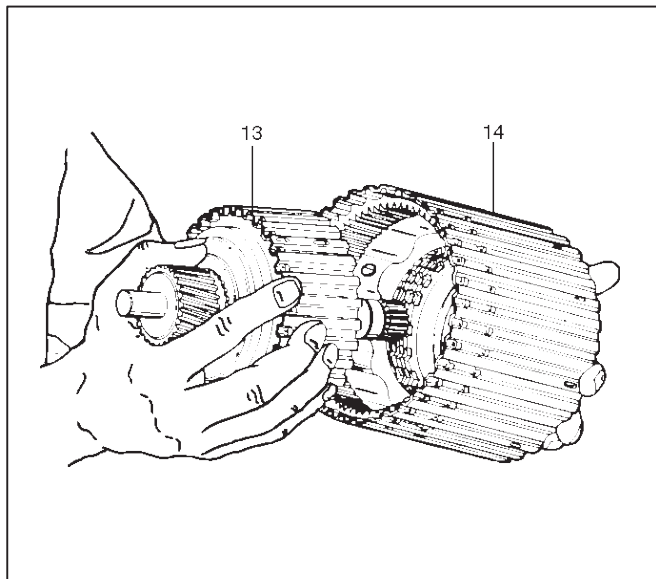
- Install thrust washer, tangs pointing downward, and locating tang positioned in slot on second clutch hub.

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).

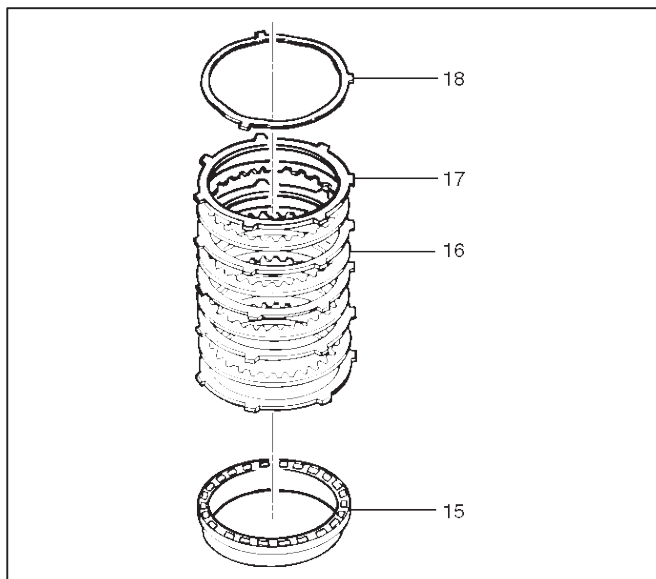
7A-74 AUTOMATIC TRANSMISSION (4L30-E)

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.



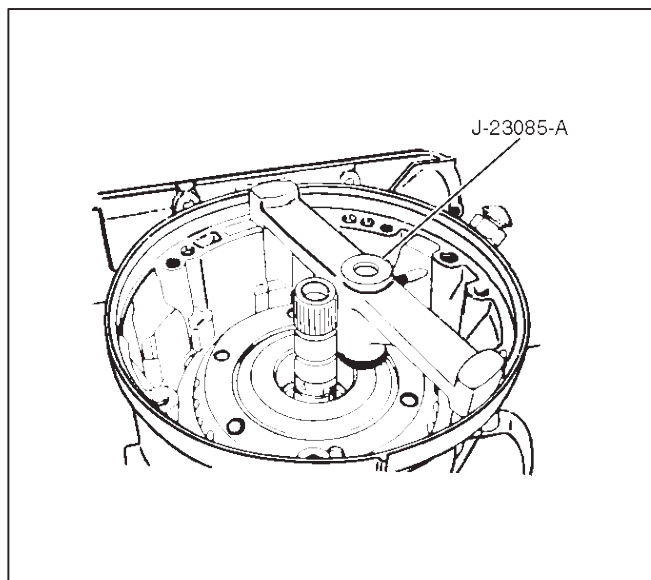
247RS002

22. Second clutch end play measurement

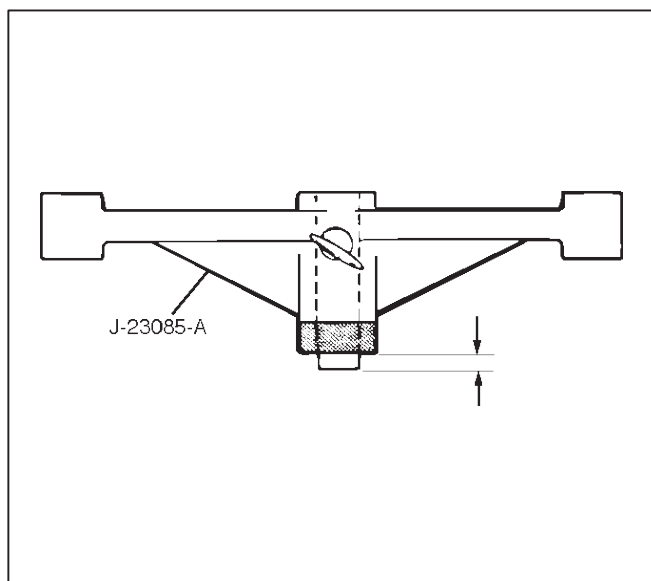
1. Install the J-23085-A selective washer gauging tool (with spacer ring) on the case flange and against the intermediate shaft.
2. Position the inner shaft of the gauging tool against the thrust surface of the second clutch hub.
3. Tighten thumb screw. Remove the tool.
4. Fit the spacer ring on the inner shaft of the tool.

5. Measure the gap and select 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)	



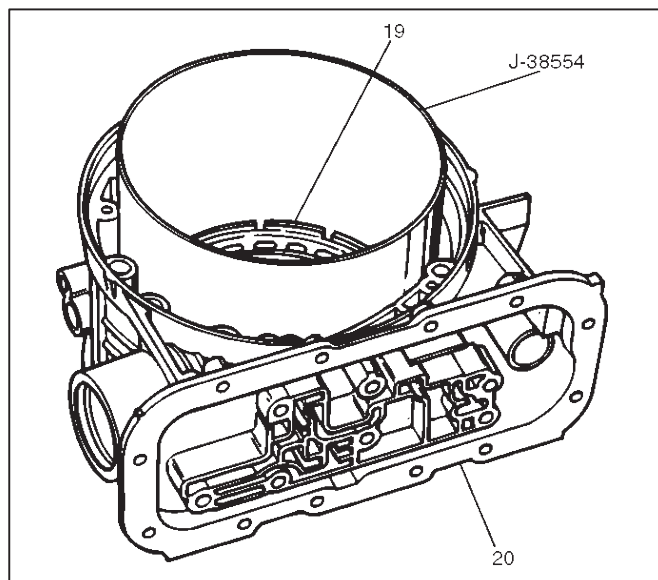
247R100001



247RS004

23. Inspect fourth clutch piston seals and replace if necessary.

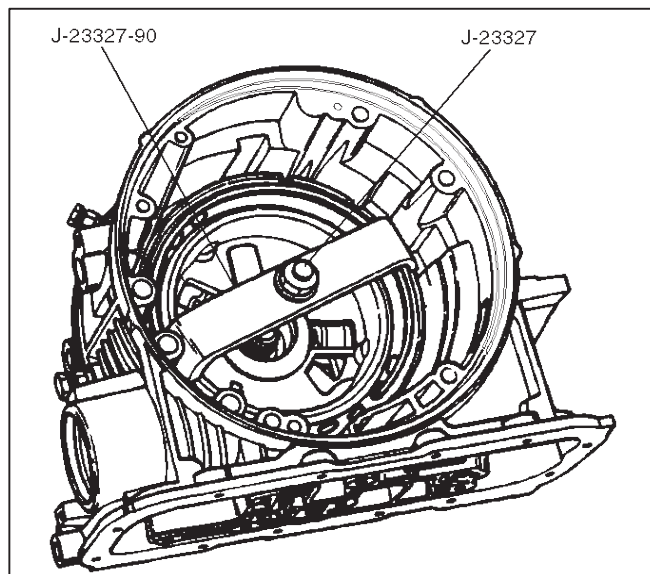
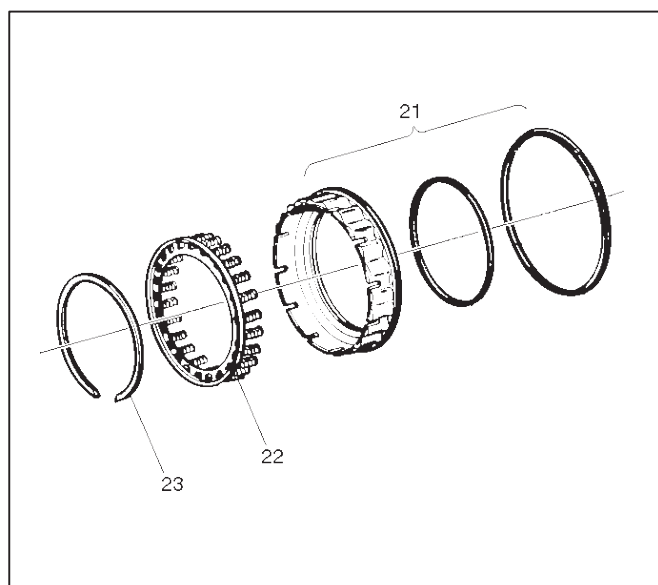
- Lubricate J-38554 fourth clutch piston fitter and install it on fourth clutch piston (19).
- Install fourth clutch piston (19) in adapter case (20).
- Remove fitter.



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.

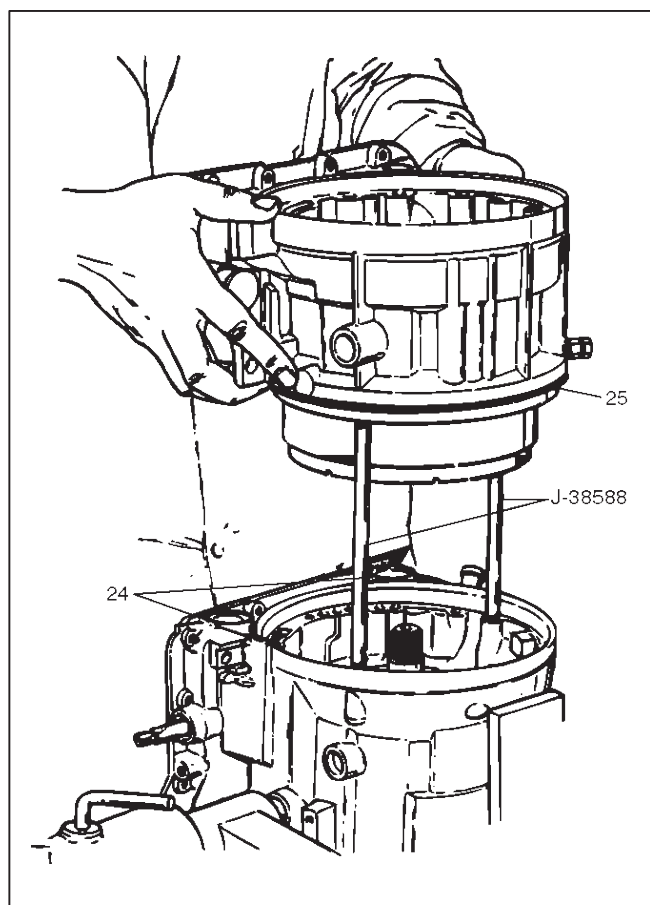


26. Install selective washer using petroleum jelly.

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.

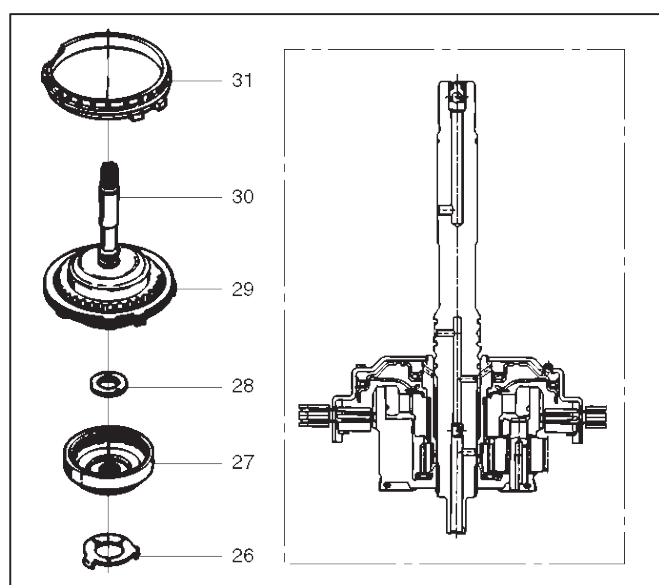


7A-76 AUTOMATIC TRANSMISSION (4L30-E)

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

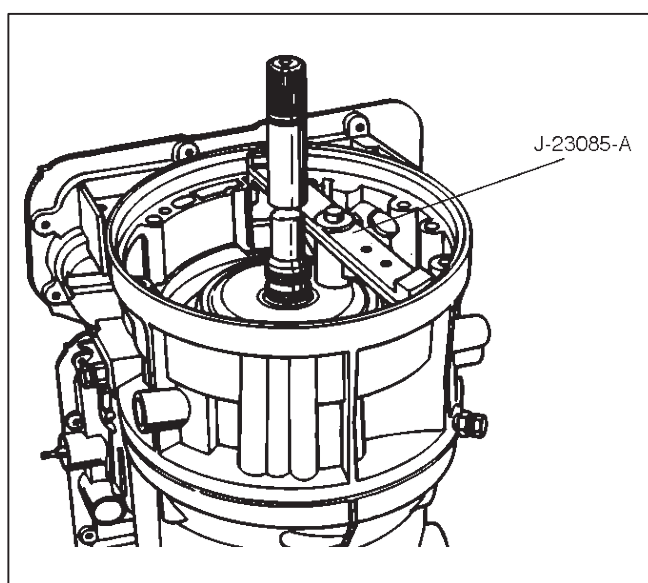
1. Install the J-23085-A selective washer gauging tool on the adapter case flange and against the input shaft.
2. Position the inner shaft of the tool against the thrust surface of the overrun clutch housing.
3. Tighten thumb screw. Remove the tool.
4. Measure gap. Select appropriate size washer as shown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

5. Set selective thrust washer aside.

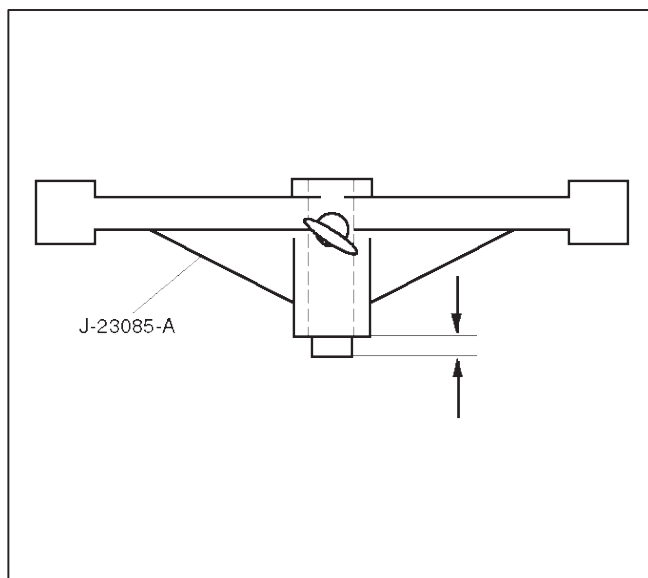
Selective Thrust Washer

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.

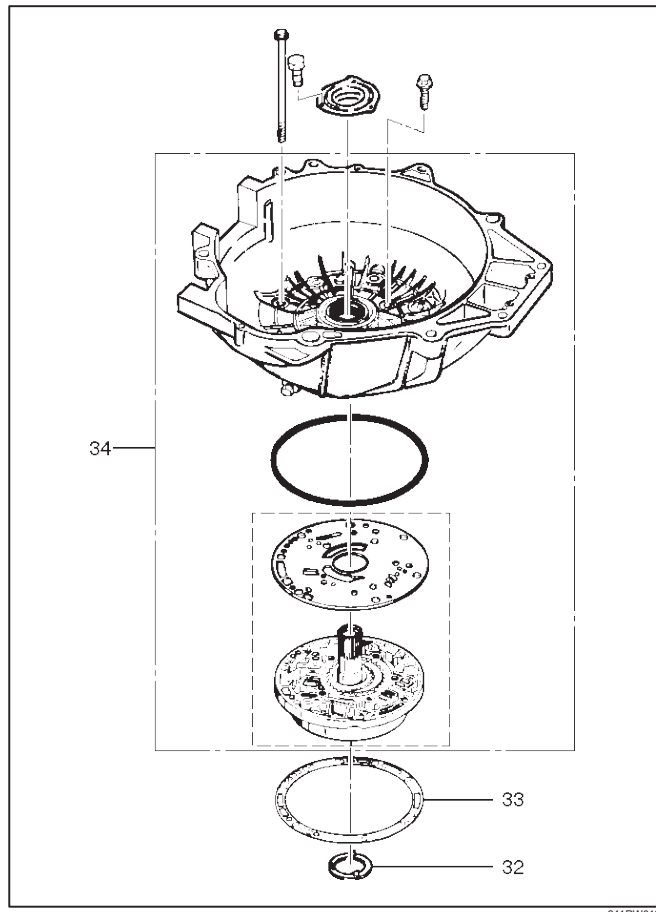
36. Install gasket (33).

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

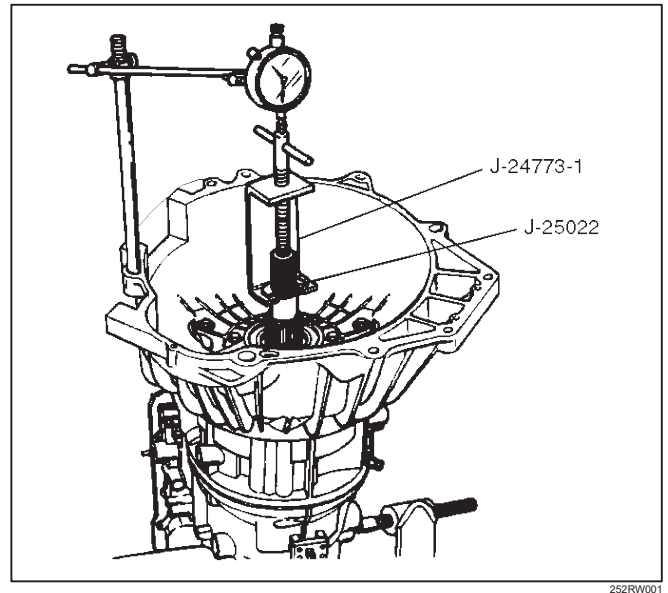
1. Fit J-25022 and J-24773-1 turbine shaft puller on turbine shaft.
2. Position axial play checking tool on converter housing mating face.
3. Pull turbine shaft upwards with puller until first resistance is met. (due to weight of overdrive assembly)
4. Maintain shaft in this position and set indicator 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 assembly oil seal and replace if necessary, using J-36797 extension assembly 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.

Install flange, O-ring and nut. (4×2)

41. Install gasket onto extension assembly with a thin coating of oil.

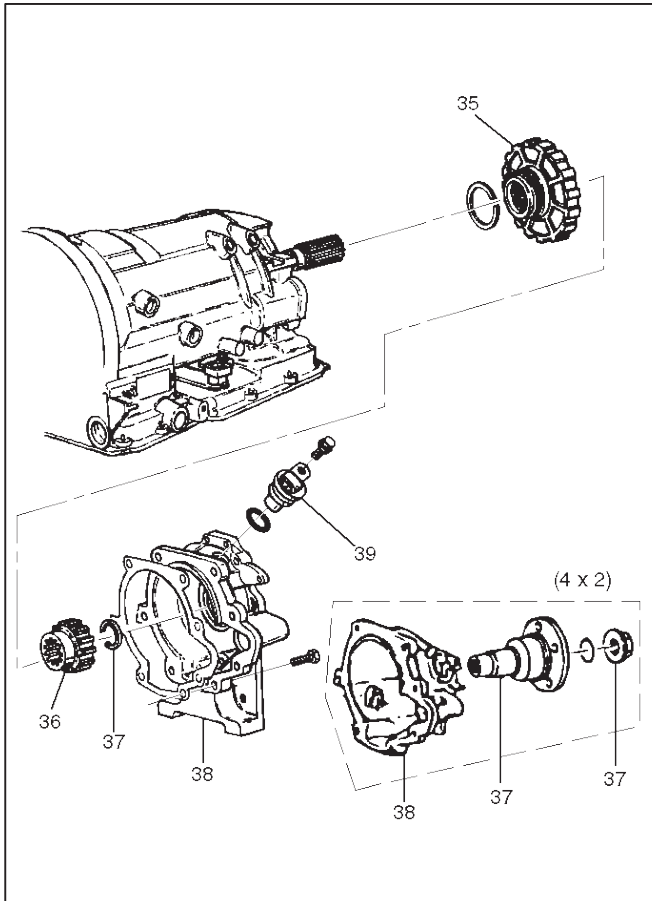
- Install extension assembly (38), and align parking pawl shaft.
- Install actuator assembly into extension assembly.
- Install seven 8 mm hexagon socket head screws.

Torque: 32 N•m (24 lb ft)

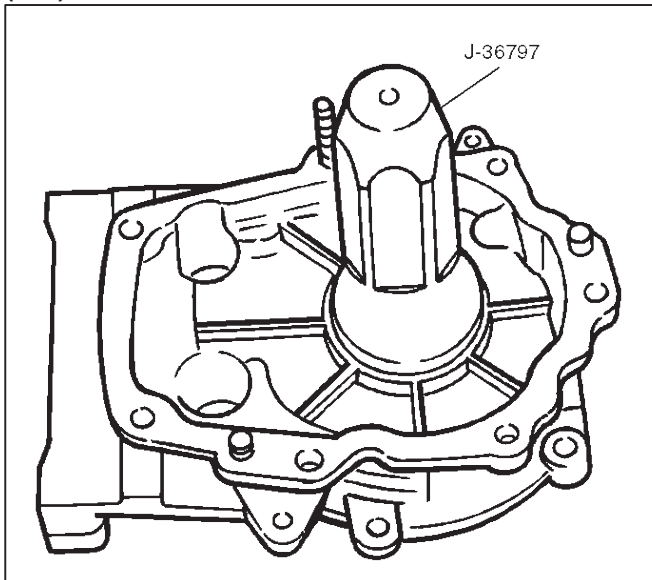
42. Inspect speed sensor O-ring. Replace if necessary.

- Install speed sensor assembly (39) and 10 mm screw.

Torque: 9 N•m (78 lb in)



(4x4)

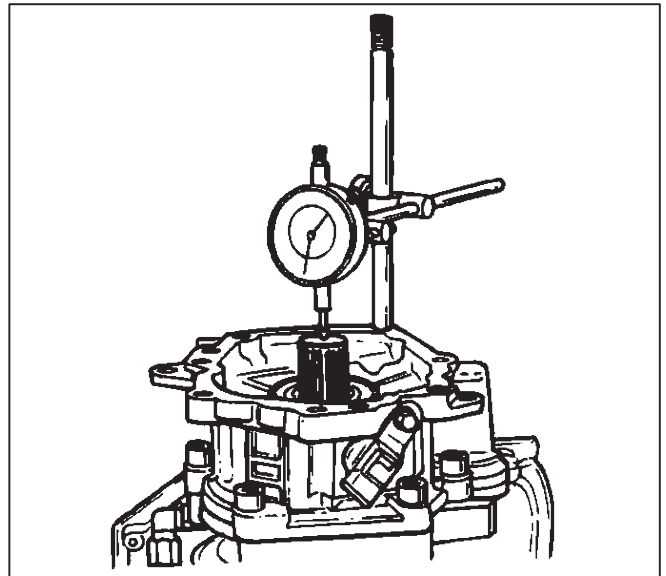


43. Main case end play measurement

1. Attach axial play checking tool on the extension assembly 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.

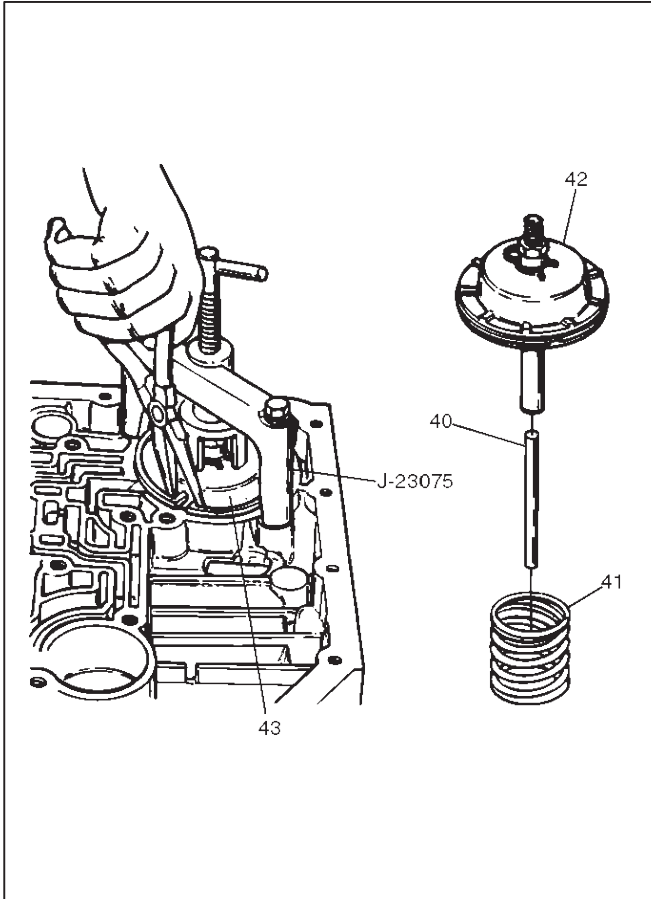


44. Inspect servo piston seal ring. Replace if necessary.

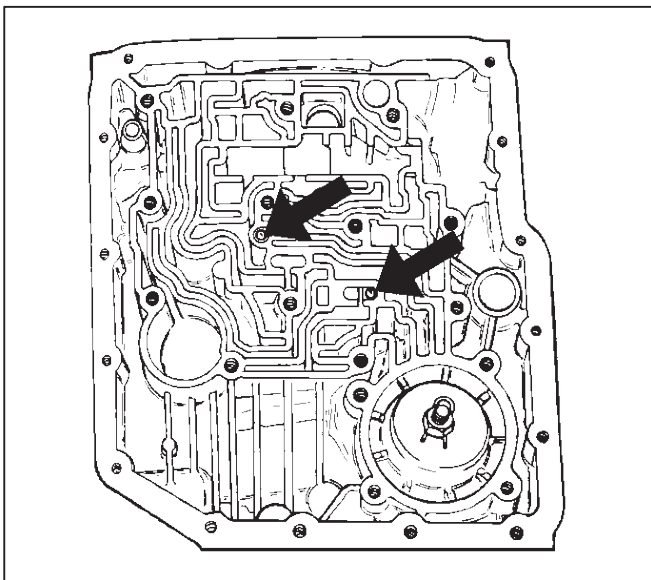
- Ensure brake band is correctly positioned. Rotate output shaft if necessary.
- Install J-38428 servo piston fitter in servo bore.
- Install apply rod (40), round end toward band, return spring (41) and piston assembly (42).

45. 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 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 torque. Be certain the adjusting screw does not turn.



46. Install two check balls (44).



47. Inspect main case electrical connector and seal, replace if necessary.

- Install electrical 7 way (V6) or 4 way (HEC) connector/main case and wiring harness.

48. Install two J-25025-B guide pins into main case.

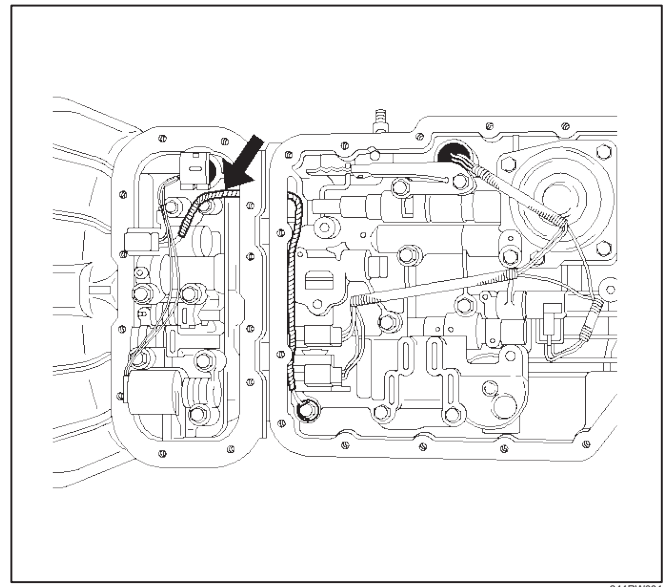
- Install main case valve body complete assembly (45) and manual valve link.

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, tighten the specified torque.

Torque: 20 N•m (15 lb ft)

- Pass ground wire of adapter case wiring harness assembly through the hole joining adapter fluid area and main case fluid area (HEC).
- Assemble 8.5 mm connector of ground wire under the head of this valve body bolt and reinstall it (HEC).
- Remove two guide pins.



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

Torque: 25 N•m (18 lb ft)

50. Connect wiring harness (47) to band control, shift solenoids, and main case 7 way (V6) or 4 way (HEC) connector.

51. Install manual detent roller and spring assembly (48) with clip.

- Install two 13 mm screws.

Torque: 20 N•m (15 lb ft)

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

Torque: 20 N•m (15 lb ft)

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

Torque: 11 N•m (96 lb in)

54. Inspect adapter case electrical connector and seal. Replace if necessary.

- Install electrical 4 way (V6) or 5 way (HEC) connector and harness assembly (52) in bottom of adapter case.

55. Install gasket, transfer plate, and gasket.

- Install adapter case valve body (51) complete and seven 13 mm screws.

Torque: 20 N•m (15 lb ft)

7A-80 AUTOMATIC TRANSMISSION (4L30-E)

56. Connect wiring harness assembly (52) to converter clutch solenoid, force motor, and 4 way (V6) or 5 way (HEC) connector.

57. 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.

58. Install mode switch (54), two 10 mm screws, selector lever nut, and cover (V6).

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*.

59. Install O-ring (55) on turbine shaft.

60. Install torque converter (56).

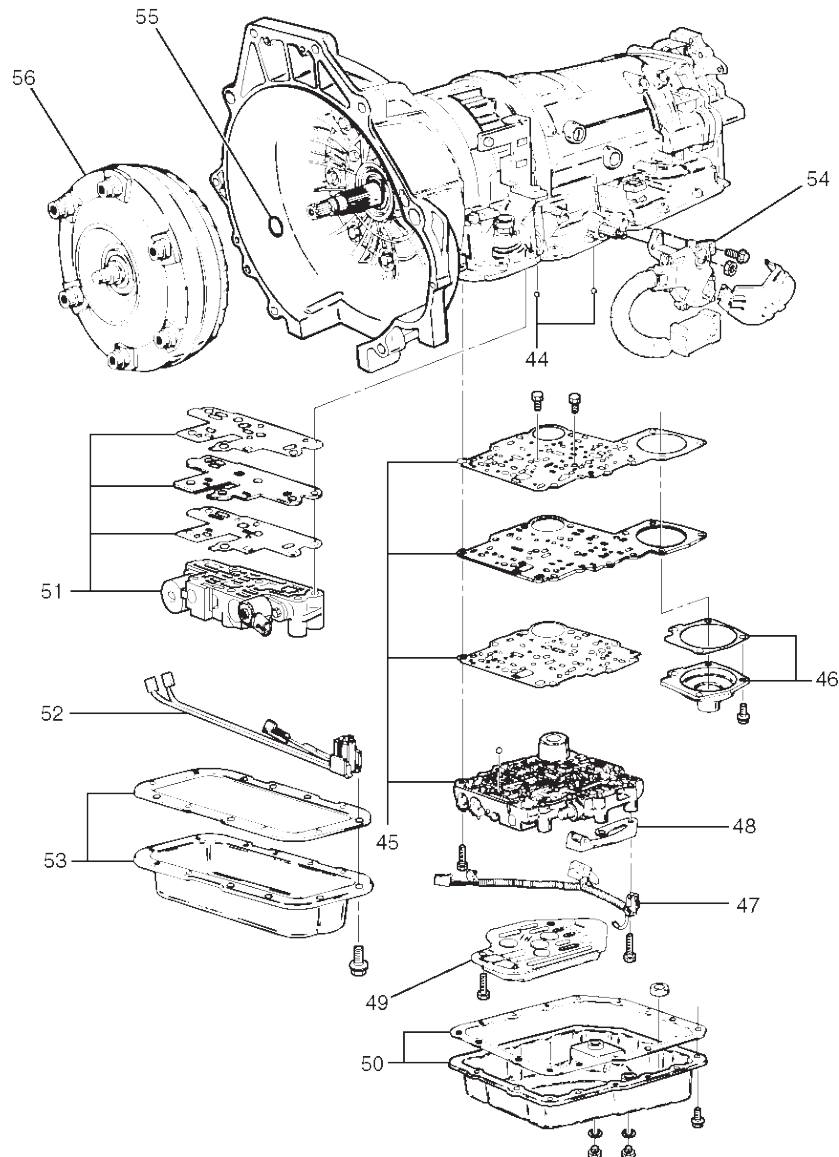
The converter assembly must be replaced under any of the following conditions:

- Evidence of damage to the pump assembly.
- Metal particles are found after flushing the cooler lines.
- External leaks in hub weld area.
- Converter pilot broken, damaged, or poor fit into crankshaft.
- Converter hub scored or damaged.
- Internal failure in stator.
- Contamination from engine coolant.
- Excess end play.

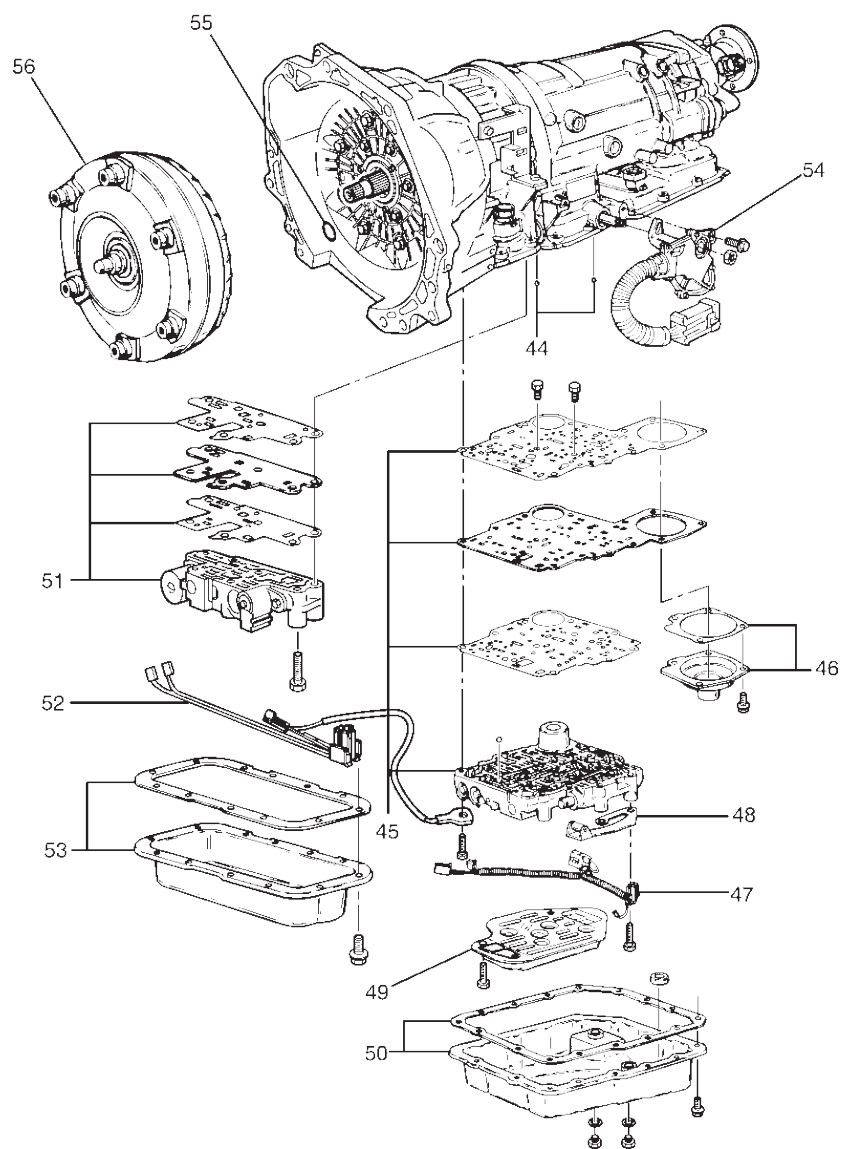
- Rotate transmission, bell housing up. Spin converter to insure proper fit.

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

(V6)

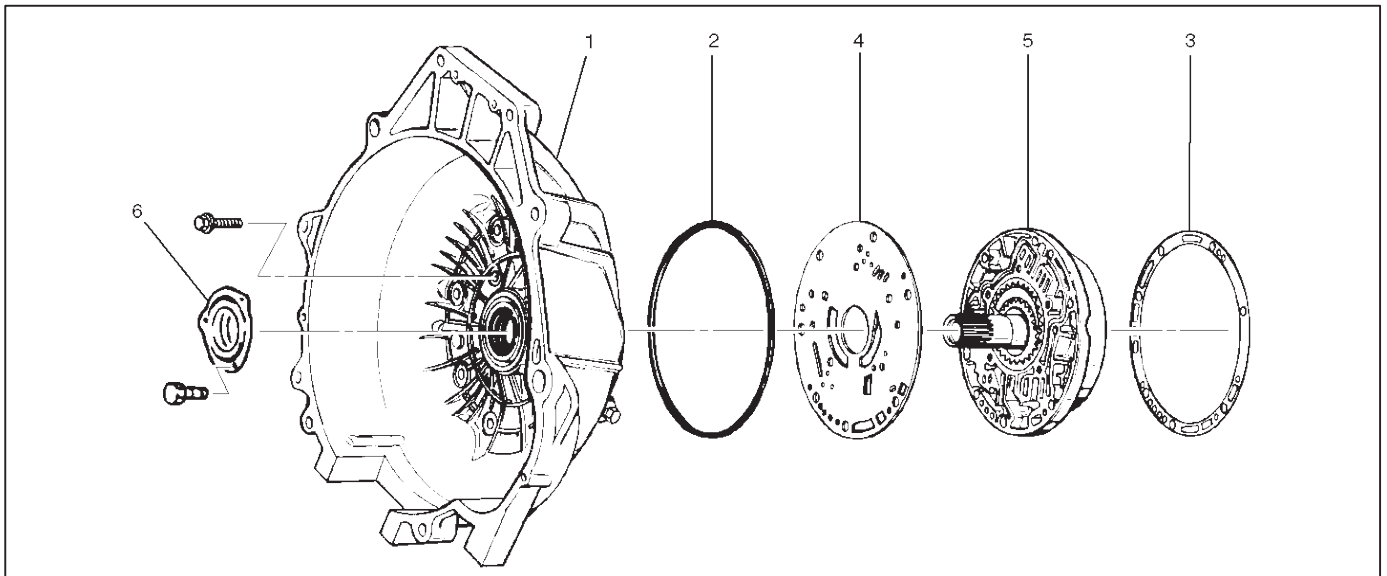


(HEC)



Converter Housing and Oil Pump Assembly

Disassembled View



241RW003

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.

- Tighten five inner 13mm bolts in an alternating pattern.

Torque: 20 N•m (15 lb ft)

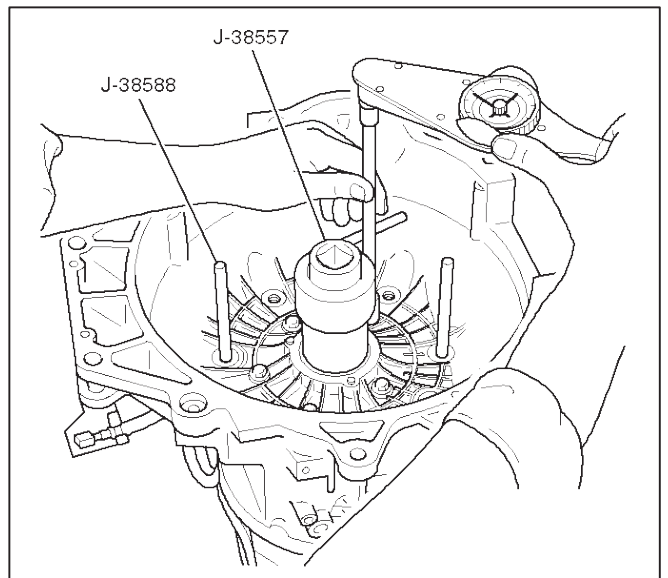
Inspection and Repair

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.



241RW002

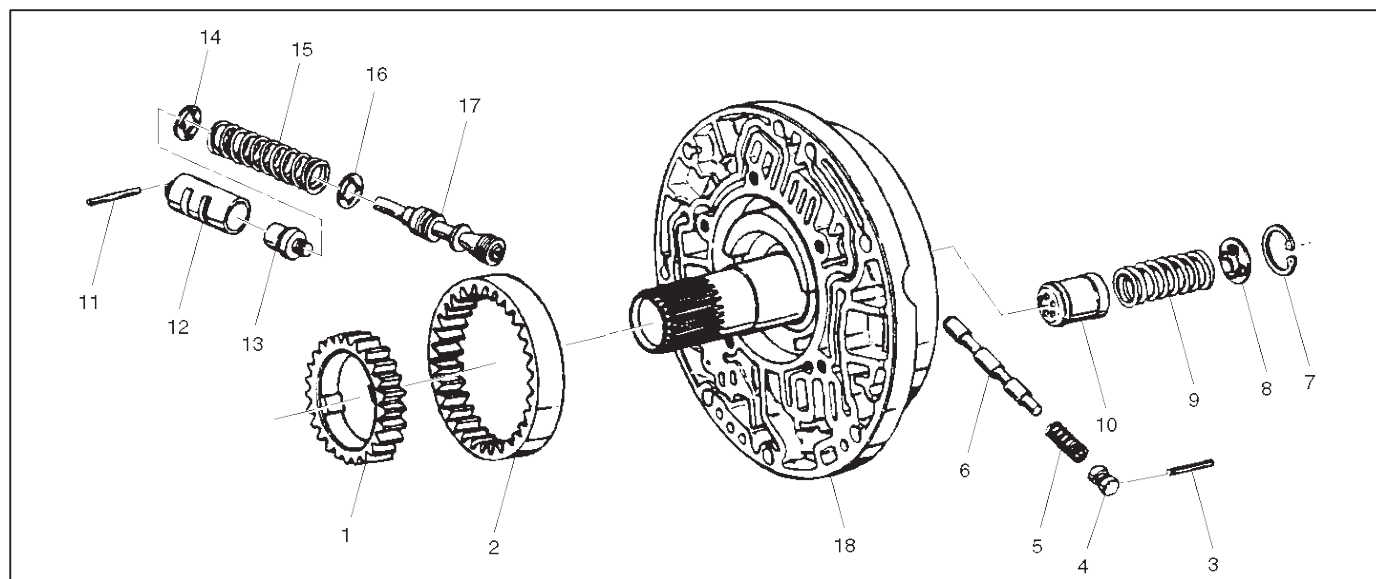
3. Install oil seal ring (3 screws).

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 | (10) Throttle Signal Accumulator Piston |
| (2) Oil Pump Driven Gear | (11) Sleeve Pin |
| (3) Pin | (12) Sleeve |
| (4) Plug | (13) Boost Valve |
| (5) Spring | (14) Spring Seat |
| (6) Converter Clutch Control Valve | (15) Valve Spring |
| (7) Snap Ring | (16) Spring Seat |
| (8) Spring Seat | (17) Pressure Regulator valve |
| (9) Spring | (18) Oil Pump Assembly |

Disassembly

1. Remove oil pump drive gear (1) and driven gear (2).
2. Remove pin (3) from oil pump assembly (18).
3. Remove plug (4), spring (5), and converter clutch control valve (6).
4. Remove snap ring (7) from oil pump assembly (18).
5. Remove spring seat (8), spring (9), and throttle signal accumulator piston (10).
6. Remove sleeve pin (11) from oil pump assembly (18).
7. Remove sleeve (12), boost valve (13), spring seat (14), valve spring (15), spring seat (16), and pressure regulator valve (17).

Inspection and Repair

Visual Check:

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

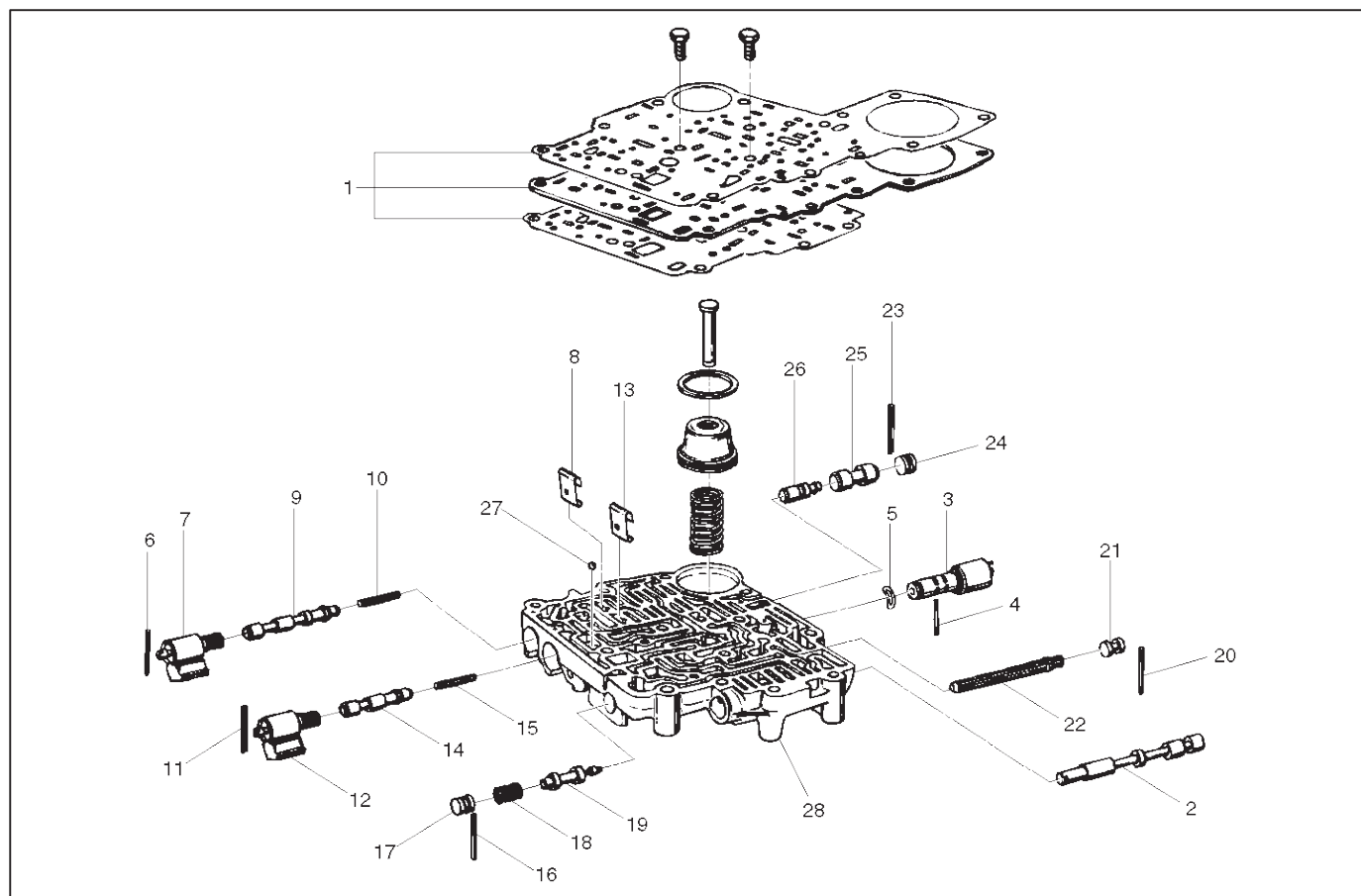
Reassembly

1. Lubricate and preinstall pressure regulator spring seat (16) on valve (17), with the flat side against shoulder.
2. Install pressure regulator valve (17) and spring seat (16) assembly, valve spring (15), and spring seat (14) with the flat side away from spring to oil pump assembly (18).
3. Assemble boost valve (13) into sleeve (12).
4. Install boost valve and sleeve assembly, and sleeve pin (11) to oil pump assembly (18).
5. Install throttle signal accumulator piston (10), spring (9), and spring seat (8), with the flat side away from the spring, and snap ring (7) to oil pump assembly (18).
6. Install converter clutch control valve (6), spring (5), plug (4), and pin (3) to oil pump assembly (18).
7. Install oil pump driven gear (2) and drive gear (1).

241 RS014

Main Case Valve Body

Disassembled View



244RS010

Legend

- | | |
|--------------------------------|------------------------------------|
| (1) Gaskets and Transfer Plate | (15) Spring |
| (2) Manual Valve | (16) Spring Pin |
| (3) Band Control Solenoid | (17) Plug |
| (4) Pin | (18) Spring |
| (5) Waved Washer | (19) Low Pressure Control Valve |
| (6) Spring Pin | (20) Spring Pin |
| (7) Solenoid A | (21) Plug |
| (8) Retainer | (22) Band Control Screen Assembly |
| (9) 1-2/3-4 Shift Valve | (23) Spring Pin |
| (10) Spring | (24) Plug |
| (11) Spring Pin | (25) 1-2 Accumulator Valve |
| (12) Solenoid B | (26) 1-2 Accumulator Control Valve |
| (13) Retainer | (27) Check ball |
| (14) 2-3 Shift Valve | (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 diameter 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 diameter 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 1 check ball (27) from valve body (28).

Inspection and Repair

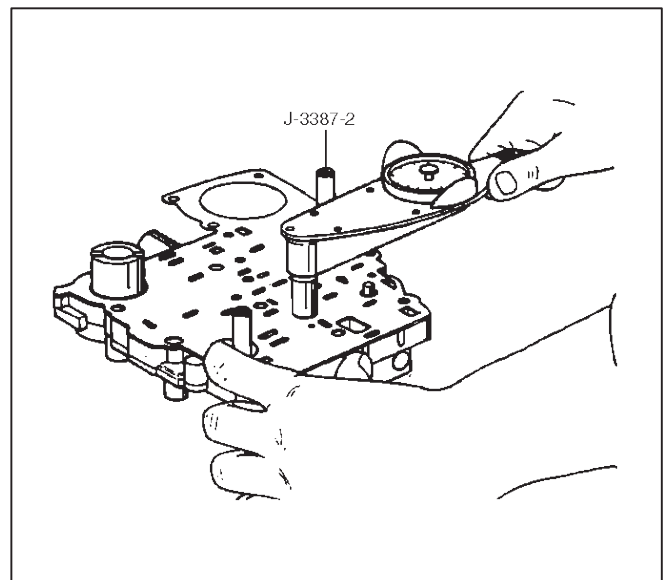
Inspect for the following, and replace any damaged or worn parts:

1. Damage or wear to each valve.
2. Damage in oil passages.
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)

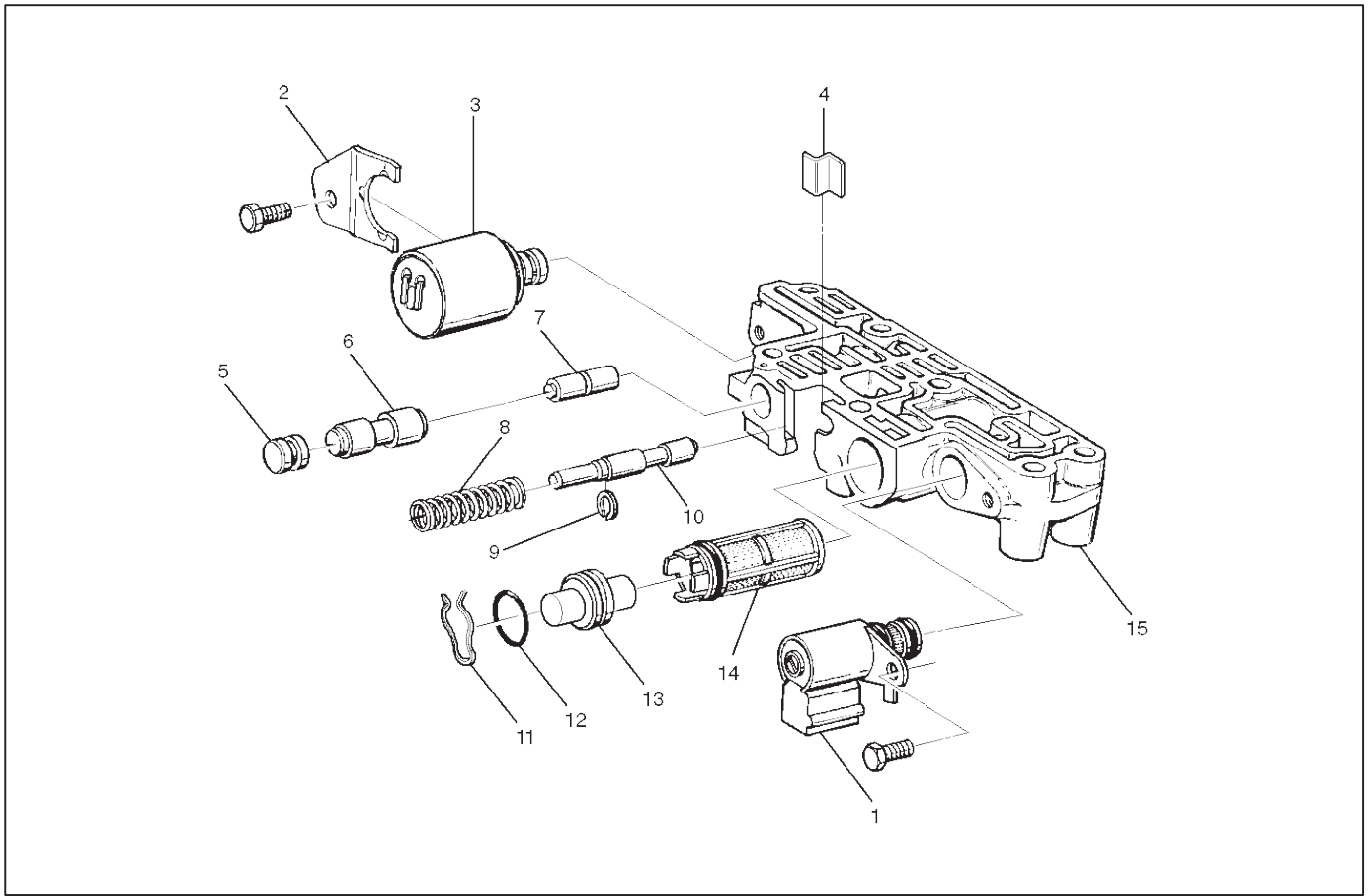


- Install gasket (transfer plate/main case).

244RS004

Adapter Case Valve Body

Disassembled View



243RW001

Legend

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

Disassembly

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

Inspection and Repair

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

- Damage or wear to each valve.
- Damage in oil passages.
- Cracks or damage to valve body.
- Valve operations.
- Spring fatigue.

Reassembly

- Install force motor screen assembly (14), plug (13), O-ring (12), and plug retainer (11).
- Install feed limit valve (10), retaining ring (9), and spring (8).

3. Install 3/4 accumulator control valve (7), 3/4 accumulator valve (6), plug (5), and retainer (4).

4. Install force motor solenoid (3).

- Place solenoid terminals pointing towards mating face.

- Install retainer (2) and bolt.

Torque: 10 N•m (87 lb in)

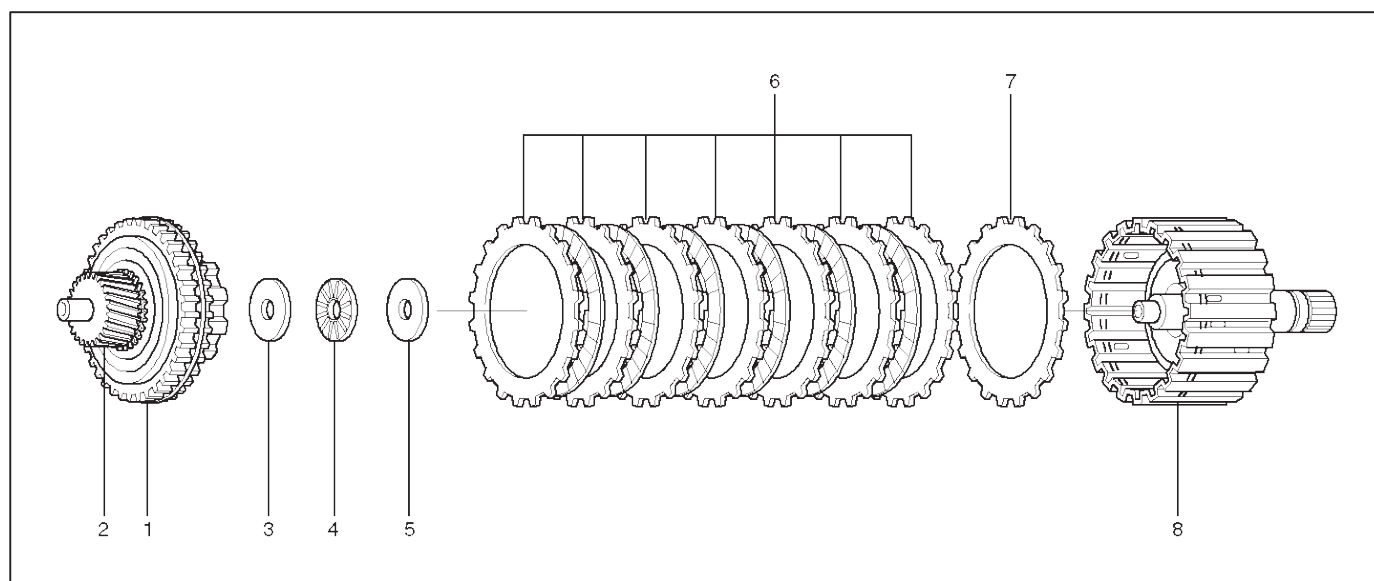
5. Install converter clutch solenoid assembly with two O-rings (1) to valve body.

- Install bolt.

Torque: 10 N•m (87 lb in)

Third Clutch and Sprag Unit

Disassembled View



248RW001

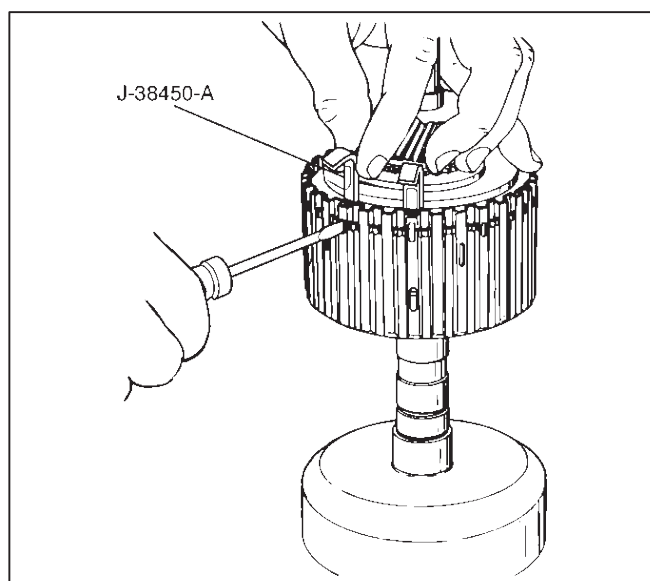
Legend

- (1) Retaining Ring
- (2) Input Sun Gear and Sprag Unit Assembly
- (3) Retaining Washer
- (4) Bearing
- (5) Thrust Washer

- (6) Clutch Plates
V6: 6 Discs, 6 Plates
HEC: 4 Discs, 4 Plate
- (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

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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:

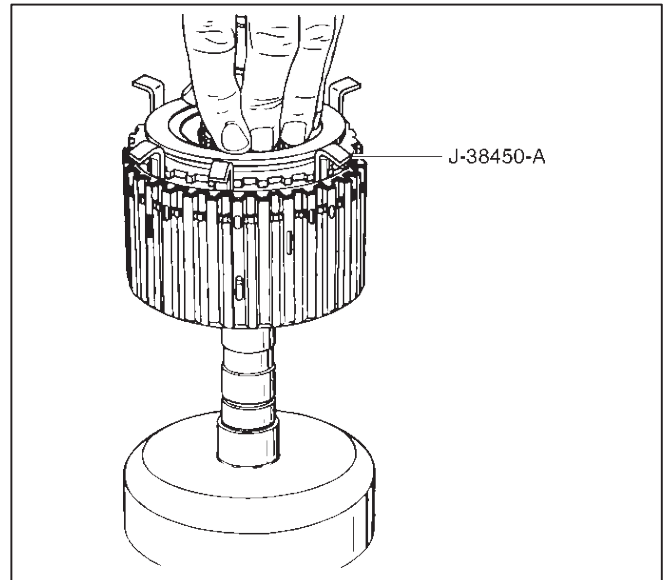
If any damage, deformation or wear is found, replace the damaged part.

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 spline 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 approximately (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).

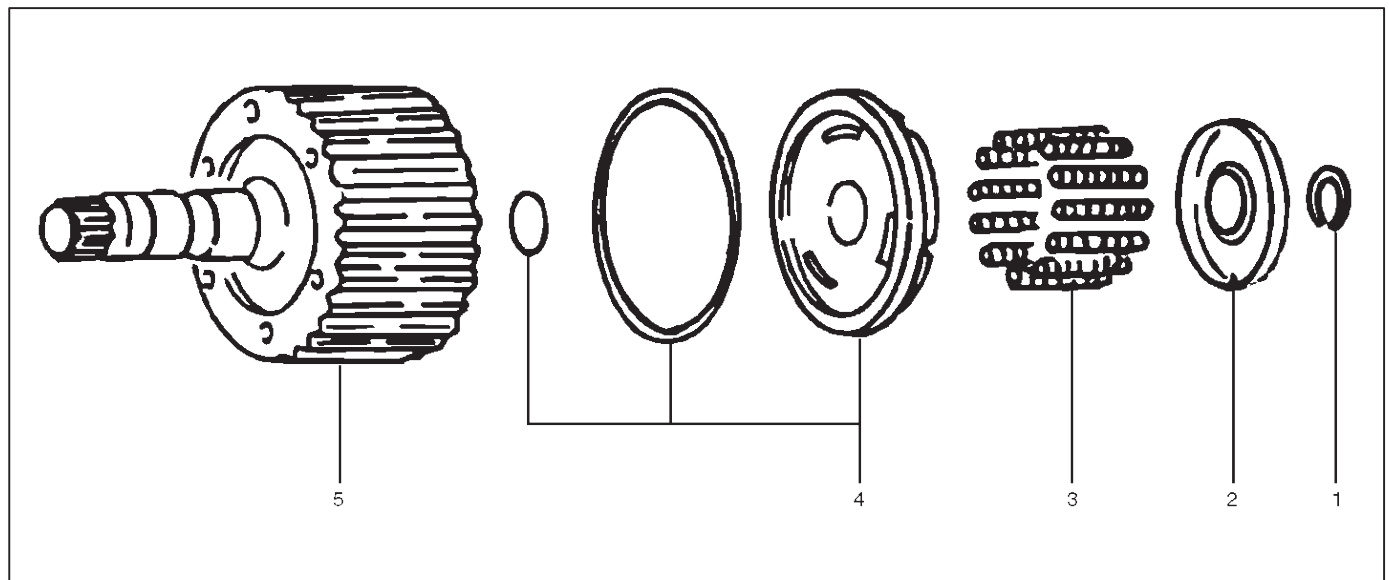
7. Remove the tool blades and engage retaining ring into groove of third clutch drum.



248RX002

Third Clutch

Disassembled View



248RS006

Legend

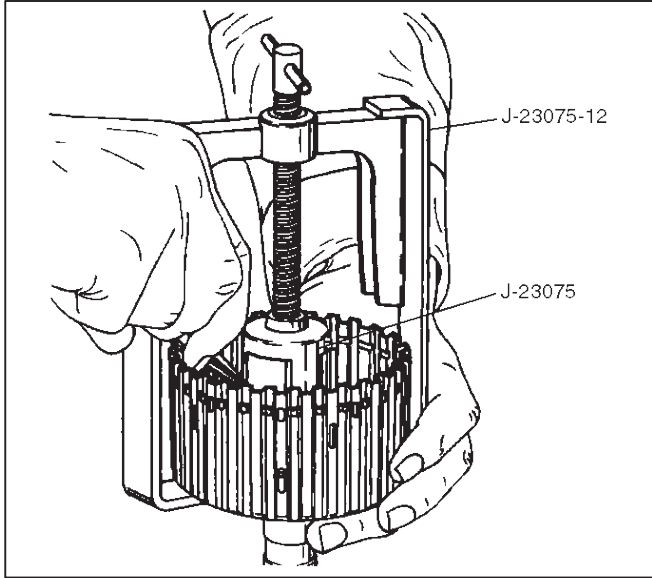
- | | |
|--------------------|-----------------------|
| (1) Retaining Ring | (3) Springs |
| (2) Spring Seat | (4) Piston Assembly |
| | (5) Third Clutch Drum |

Disassemble

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

NOTE: Do not overstress the springs and seat. This will cause damage to the spring seat.

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



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.

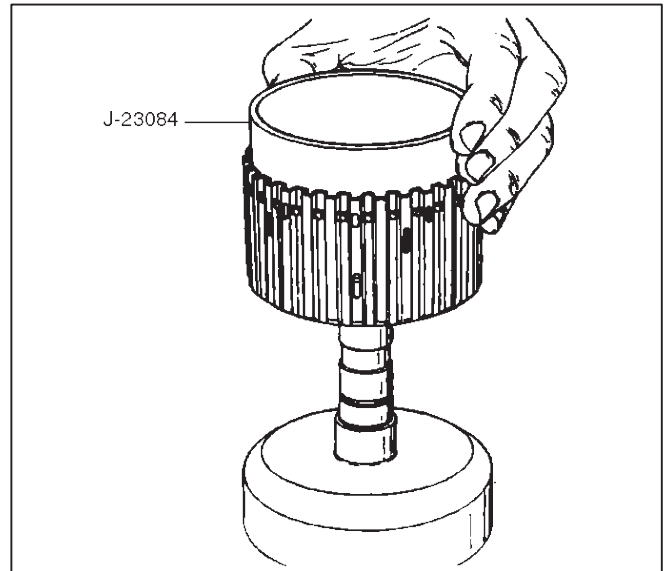
Operation check:

Shake the piston and listen for check ball movement. 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.

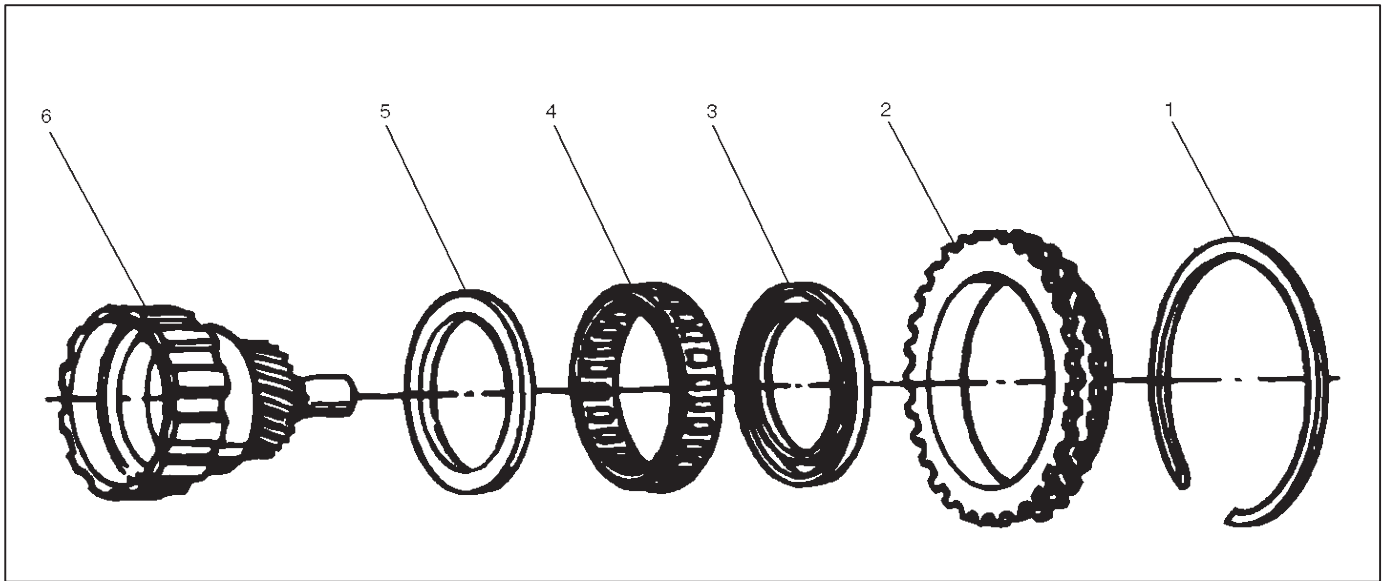
- Compress the piston springs, using the J-23075 piston spring compressor and J-23075-12 adapter.

CAUTION: Do not overstress 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 | (4) Sprag Assembly |
| (2) Sprag Outer Race | (5) Ring |
| (3) 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:

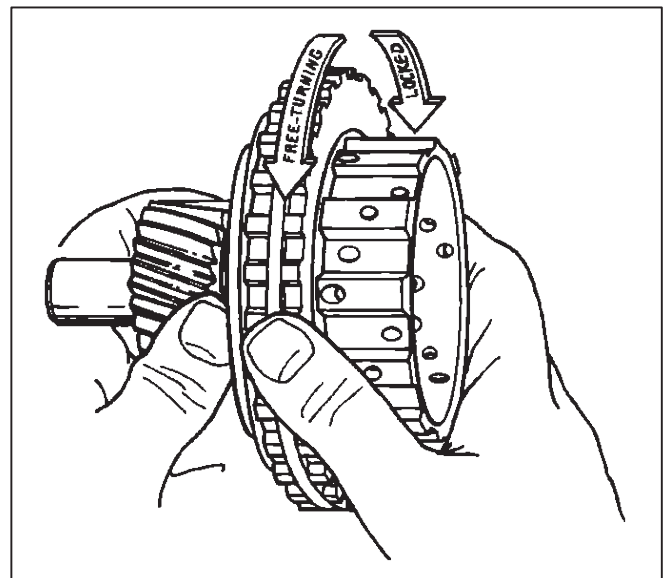
If any damage, deformation or local wear is found, replace the damaged part.

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.

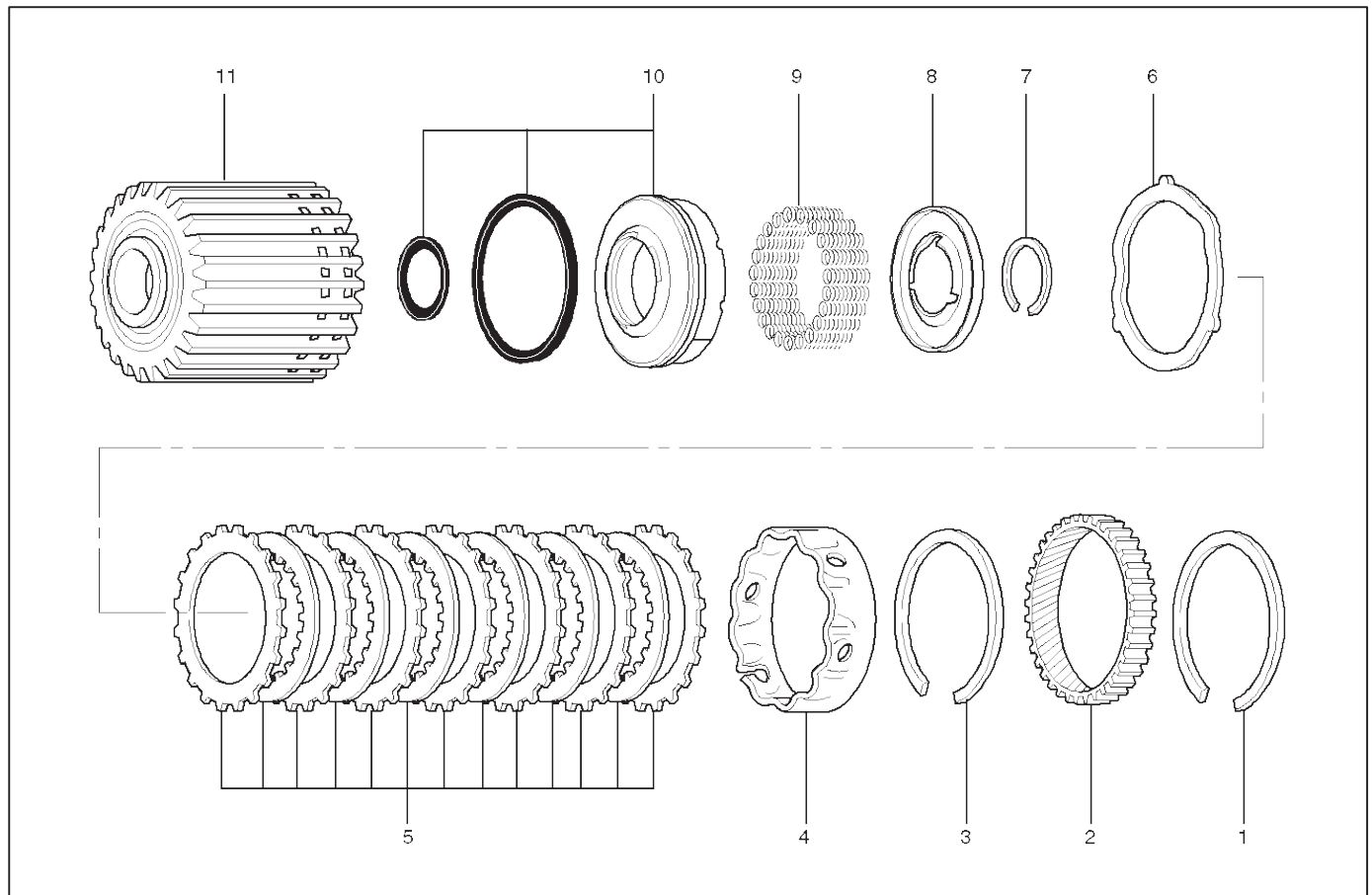
NOTE: Check correct rotation by holding the sun gear in your left hand and turning the outer race. The outer sprag race should turn freely towards you and should lock turning away from you.



248RS010

Second Clutch

Disassembled View



247RW001

Legend

- (1) Retaining Ring
- (2) Ring Gear
- (3) Retaining Ring
- (4) Spacer
- (5) Clutch Plates

V6: 6 Discs, 6 Plates

HEC: 5 Discs, 5 Plates

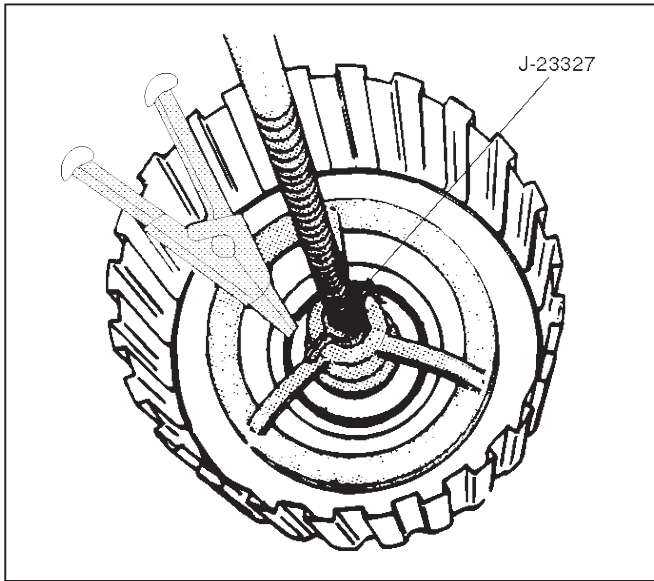
- (6) Waved Washer
- (7) Retaining Ring
- (8) Spring Seat
- (9) Springs
- (10) Piston Assembly
- (11) Second Clutch Drum

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).

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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.

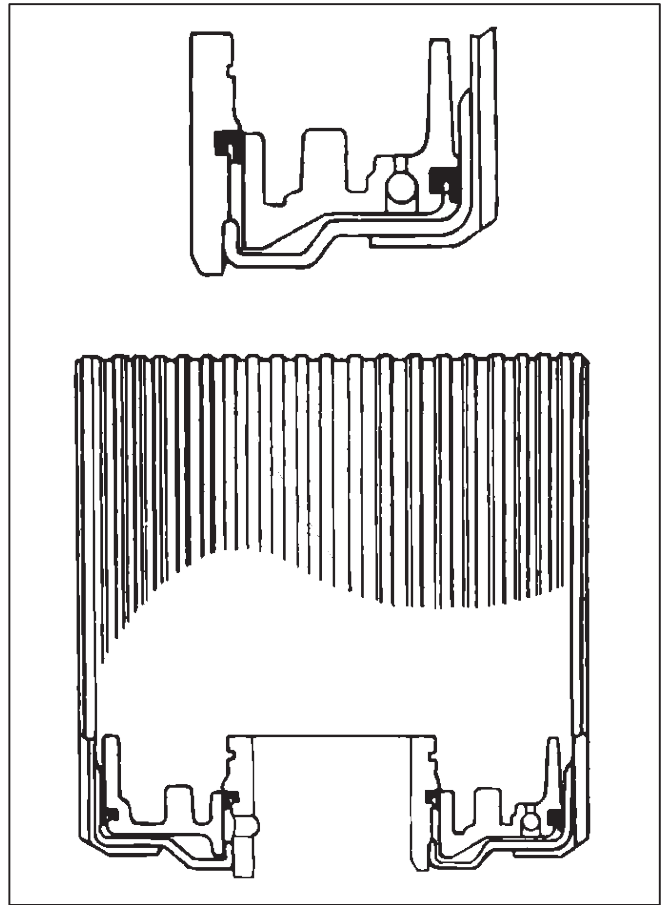
Reassembly

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.



247RS007

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.

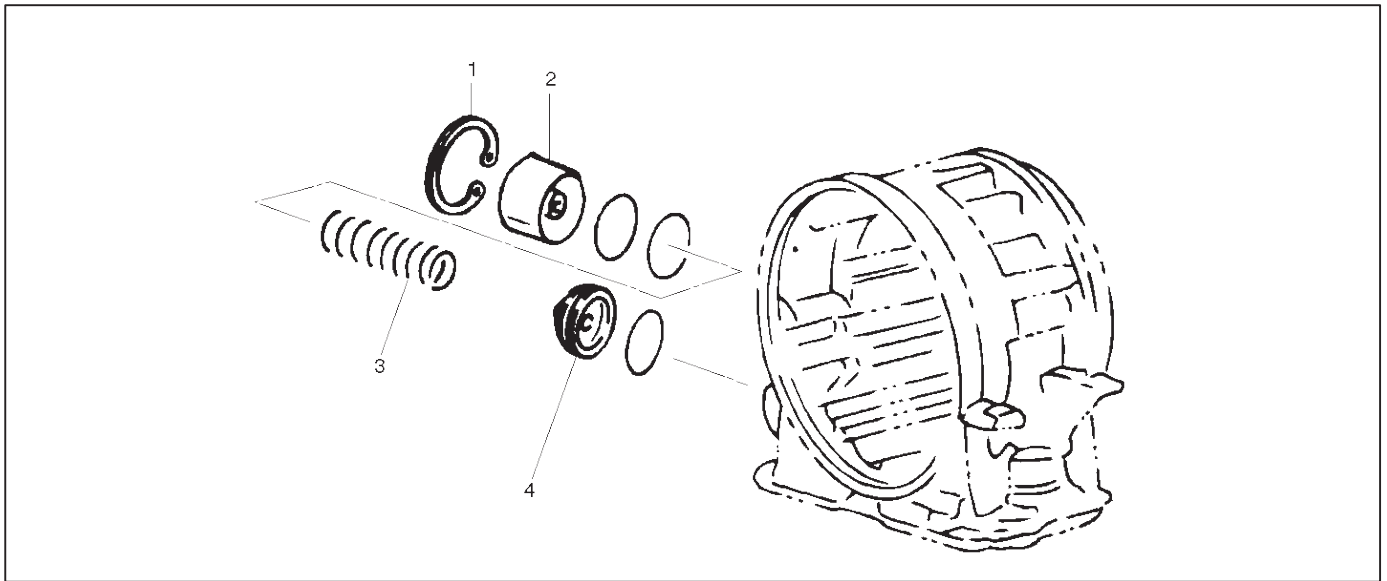
- Align second clutch inner tangs.

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

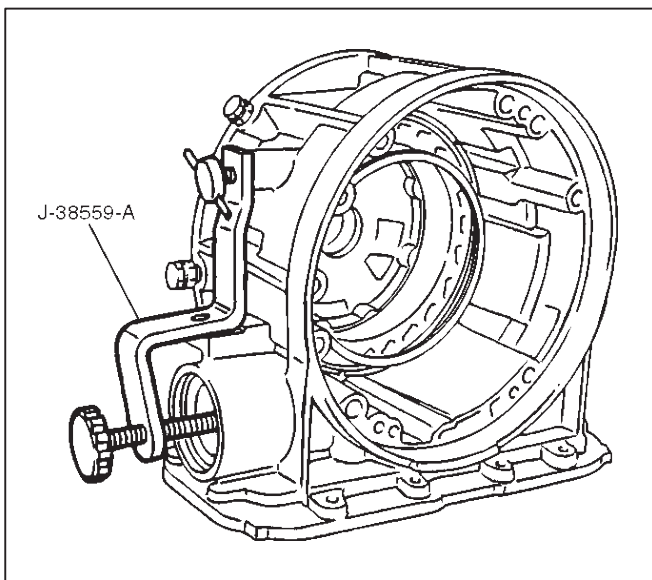
Legend

- (1) Snap Ring
- (2) Cover

- (3) Spring
- (4) Piston Assembly

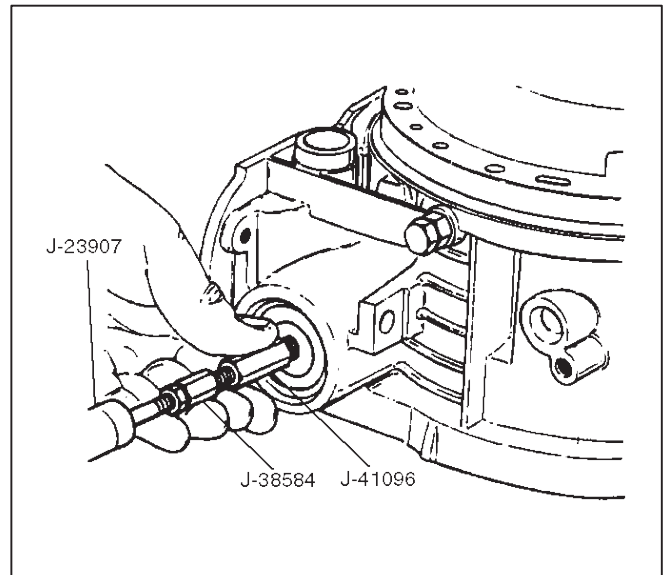
Disassembly

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

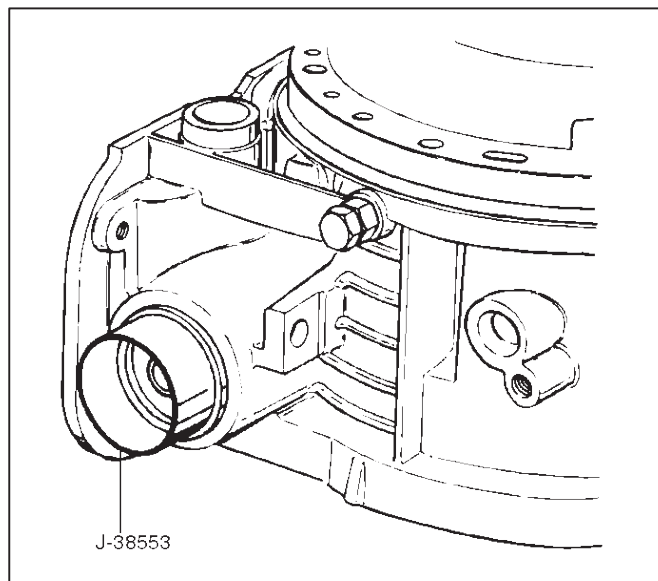
Visual Check:

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

Reassembly

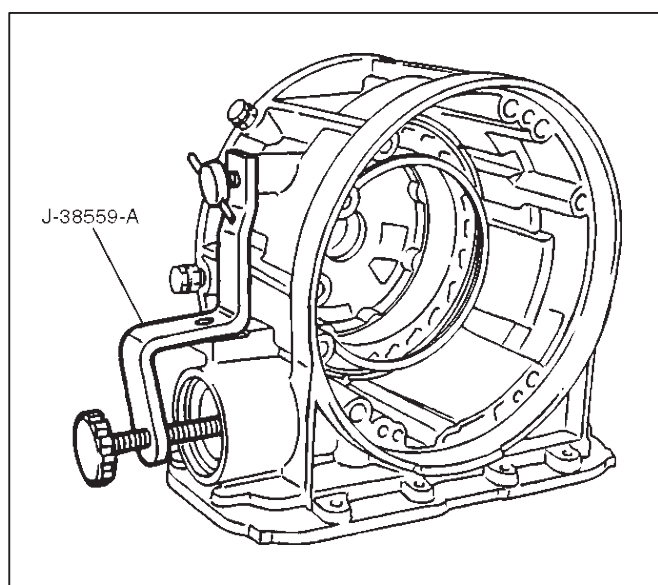
1. Place the J-38553 piston fitter into adaptor case and push the piston into position, using suitable diameter tube.

- Remove the piston fitter.



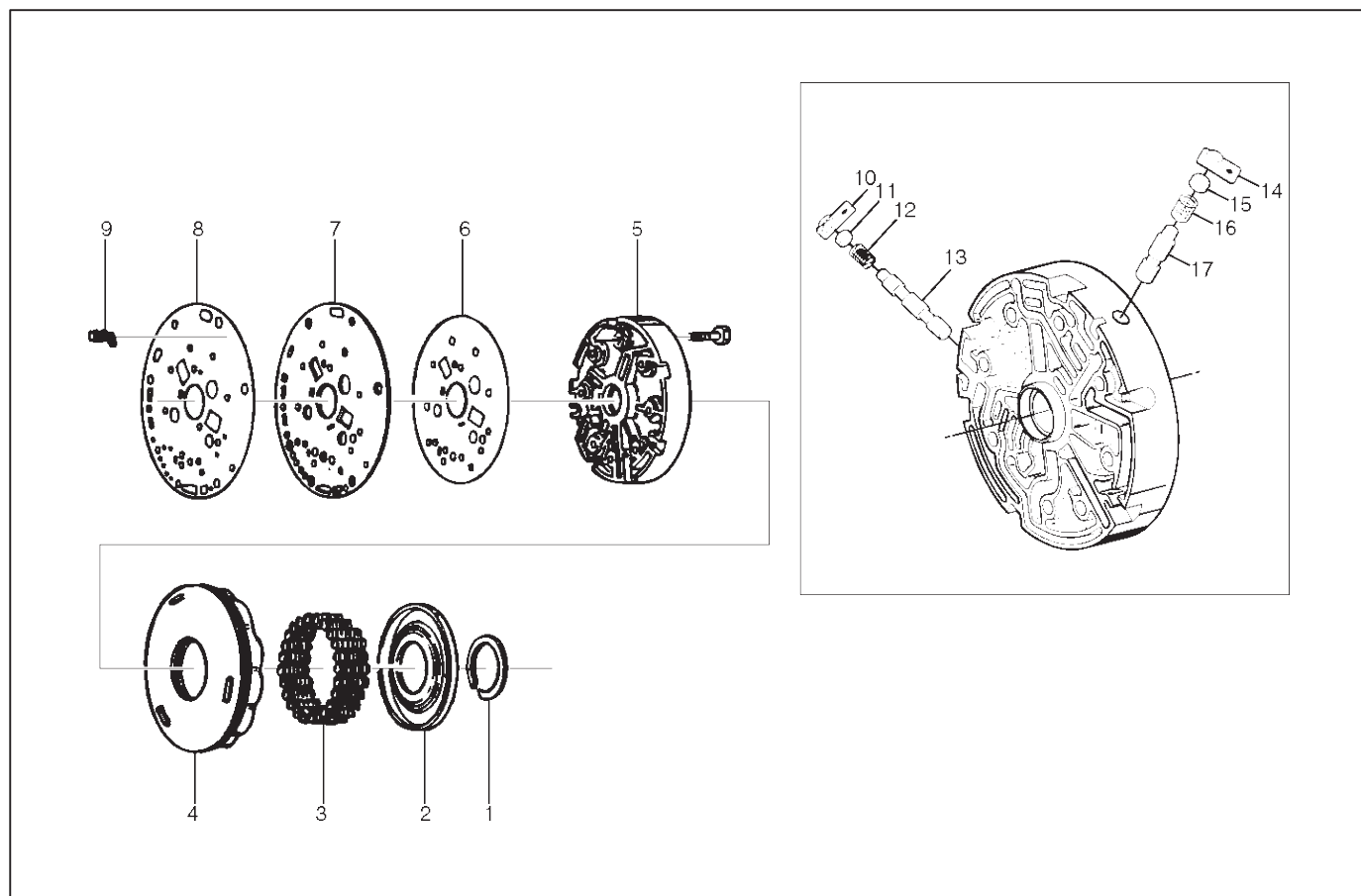
2. Install spring and cover.
3. Install snap ring, using the J-38559-A compressor tool.

- Install snap ring in groove.
- Remove the compressor tool.



Reverse Clutch Piston and Center Support

Disassembled View



242RY001

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 (V6)
- (15) Plug (V6)
- (16) Spring (V6)
- (17) Reverse Lock Out Control Valve (V6)

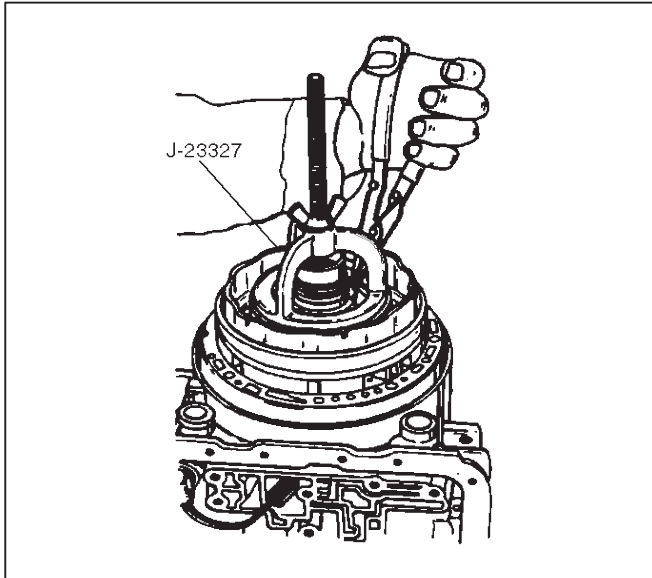
Disassembly

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.



247RS008

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

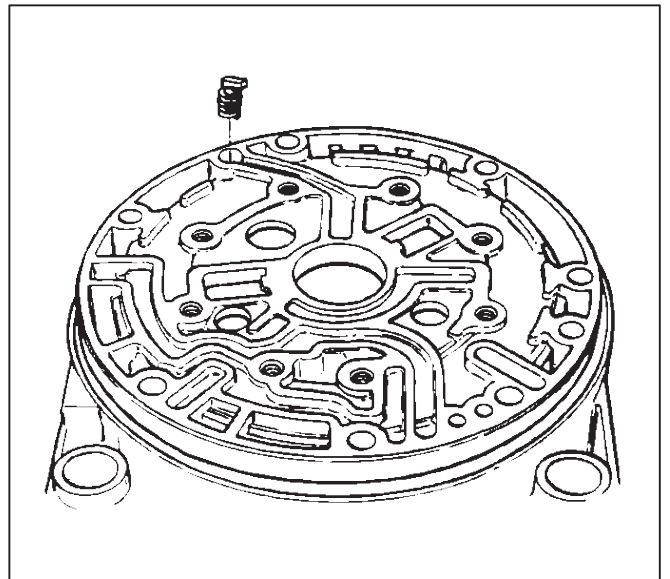
1. Install reverse lock out valve (17) and spring (16) to center support.

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.



242RS005

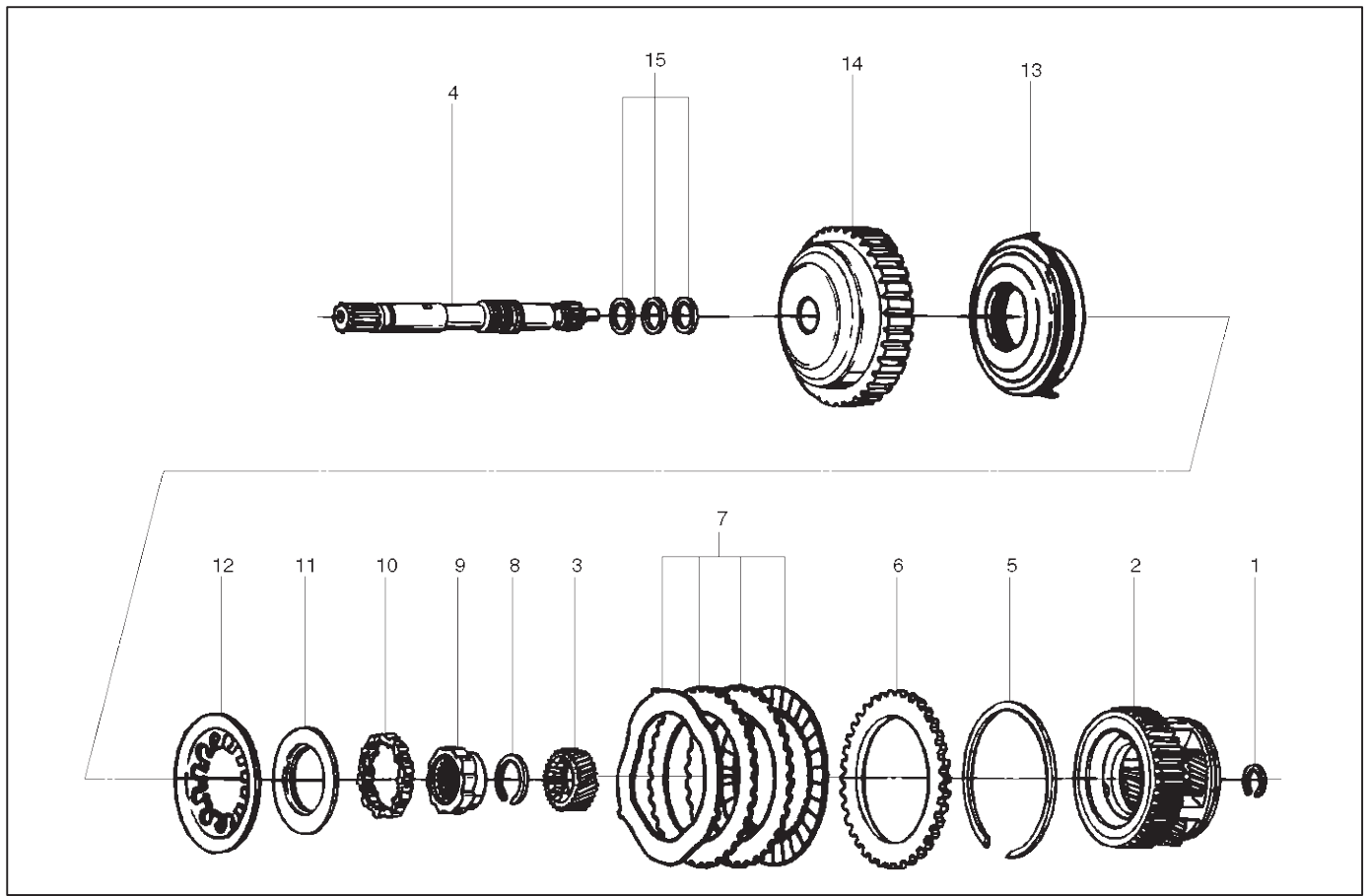
6. Install gasket transfer plate/adapter case (8), center support transfer plate (7), and gasket transfer plate/center support (6).
7. Install center support (5) with 8 bolts.

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



252RW005

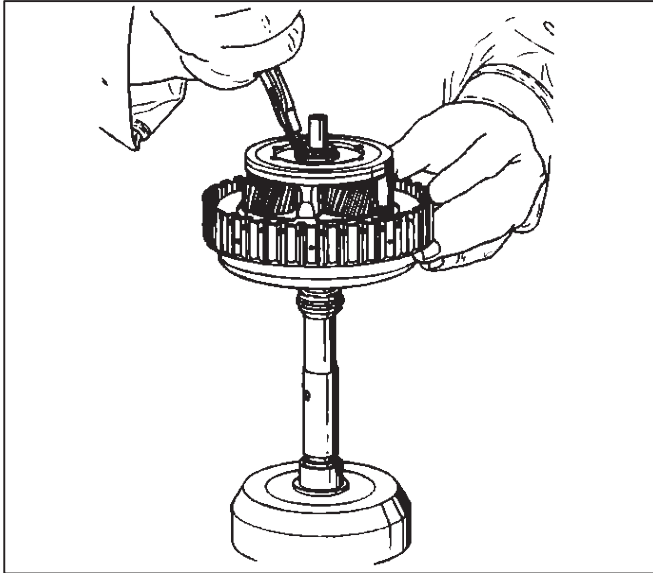
Legend

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

Disassembly

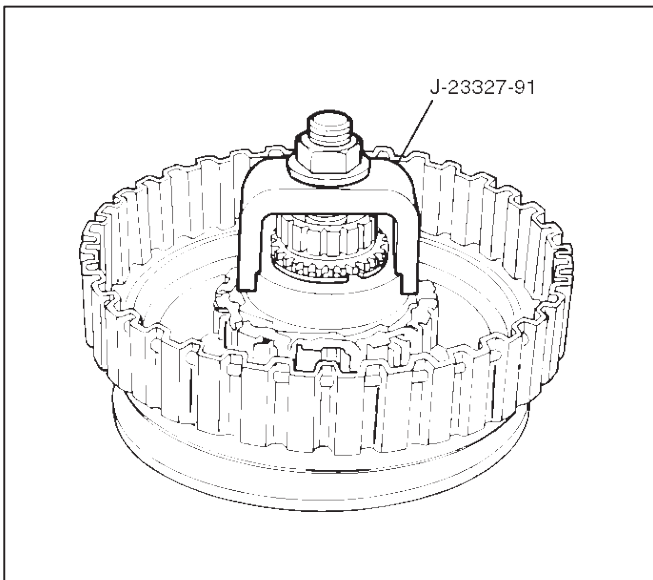
1. Position overrun clutch assembly upright, using the overdrive internal gear as a support.

- 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).

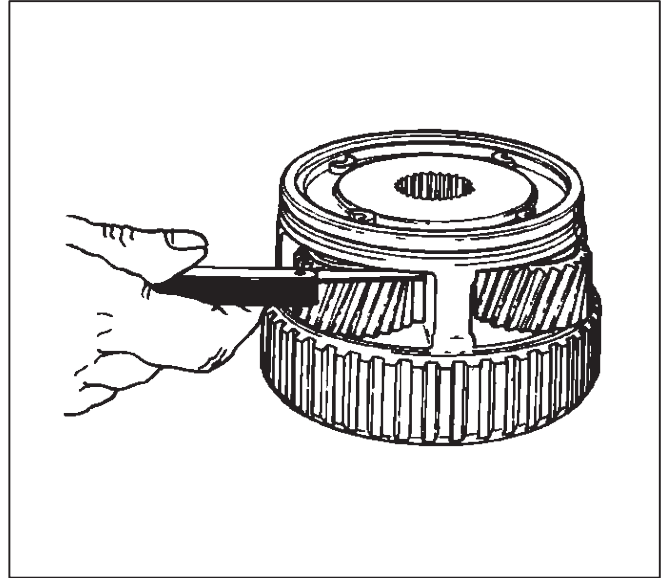
Inspection and Repair

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.



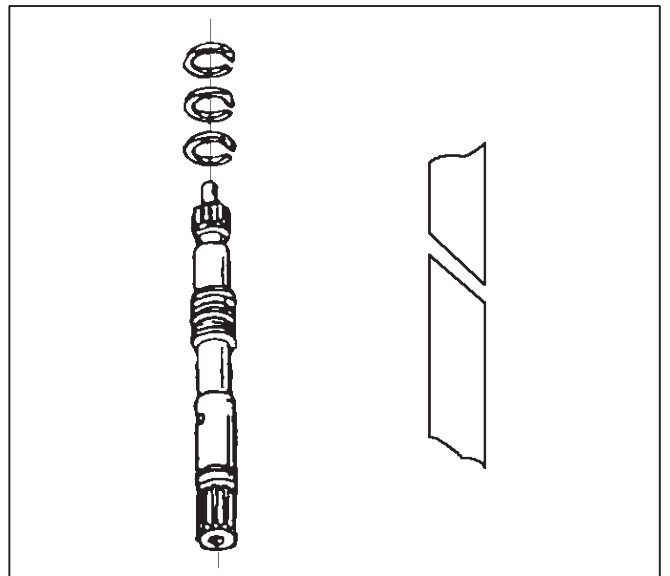
252RS011

Visual Check:

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

Reassembly

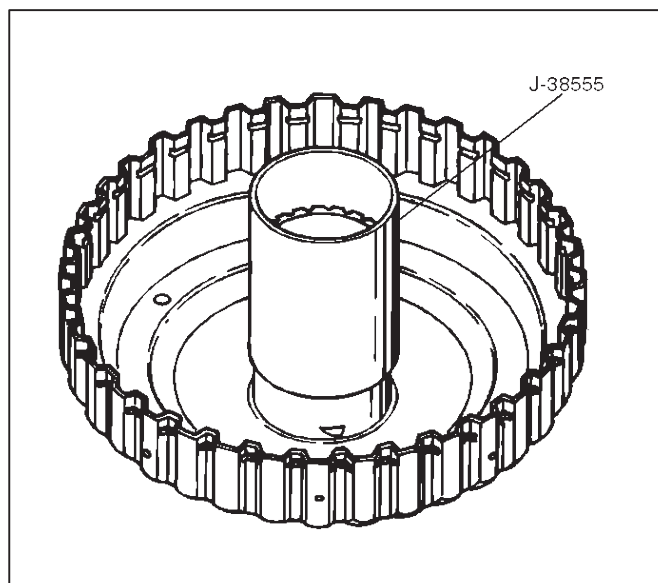
1. Install turbine shaft seal rings (15) with grease (petroleum jelly).



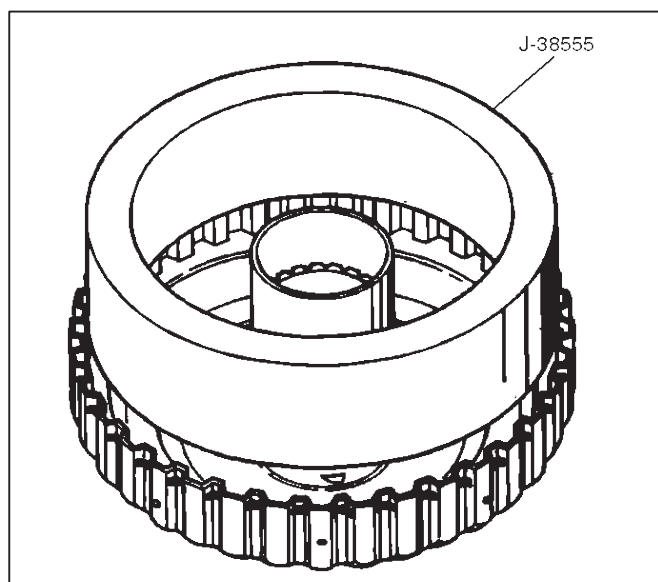
241RS008

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

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).

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).

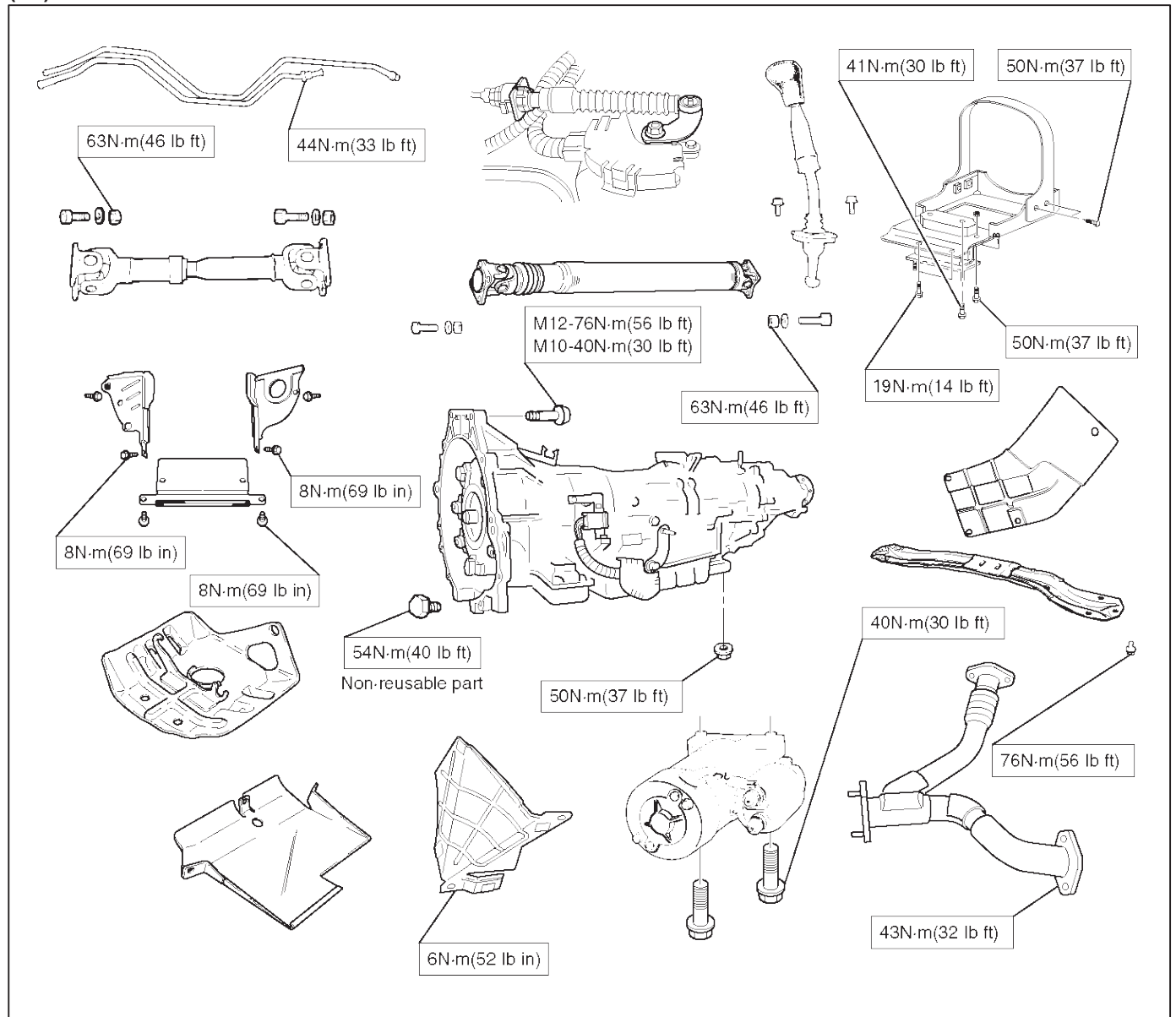
Main Data and Specification

General Specifications

					Remarks	
Model			THM 4L30-E	←		
Engine			V6 3.2L 6VD1	HEC (2.2L)		
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	2,200±150	Stall speed (rpm)	
	Reverse clutch		RC	5	4	Number of discs
	Second clutch		C2	6	5	
	Third clutch		C3	6	4	
	Brake band			Double wrap	←	
	Fourth clutch		C4	2	←	Number of discs
	Overrun clutch		OC	1	←	
	Overdrive roller clutch		OFW	10	←	Number of rollers
	Principle sprag		PFW	26	←	Number of sprags
	Ravigneaux type gear train (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 car- rier (planetary gear set)	Sun gear		31	←	
		Pinion gear		24	←	
		Ring gear		81	←	

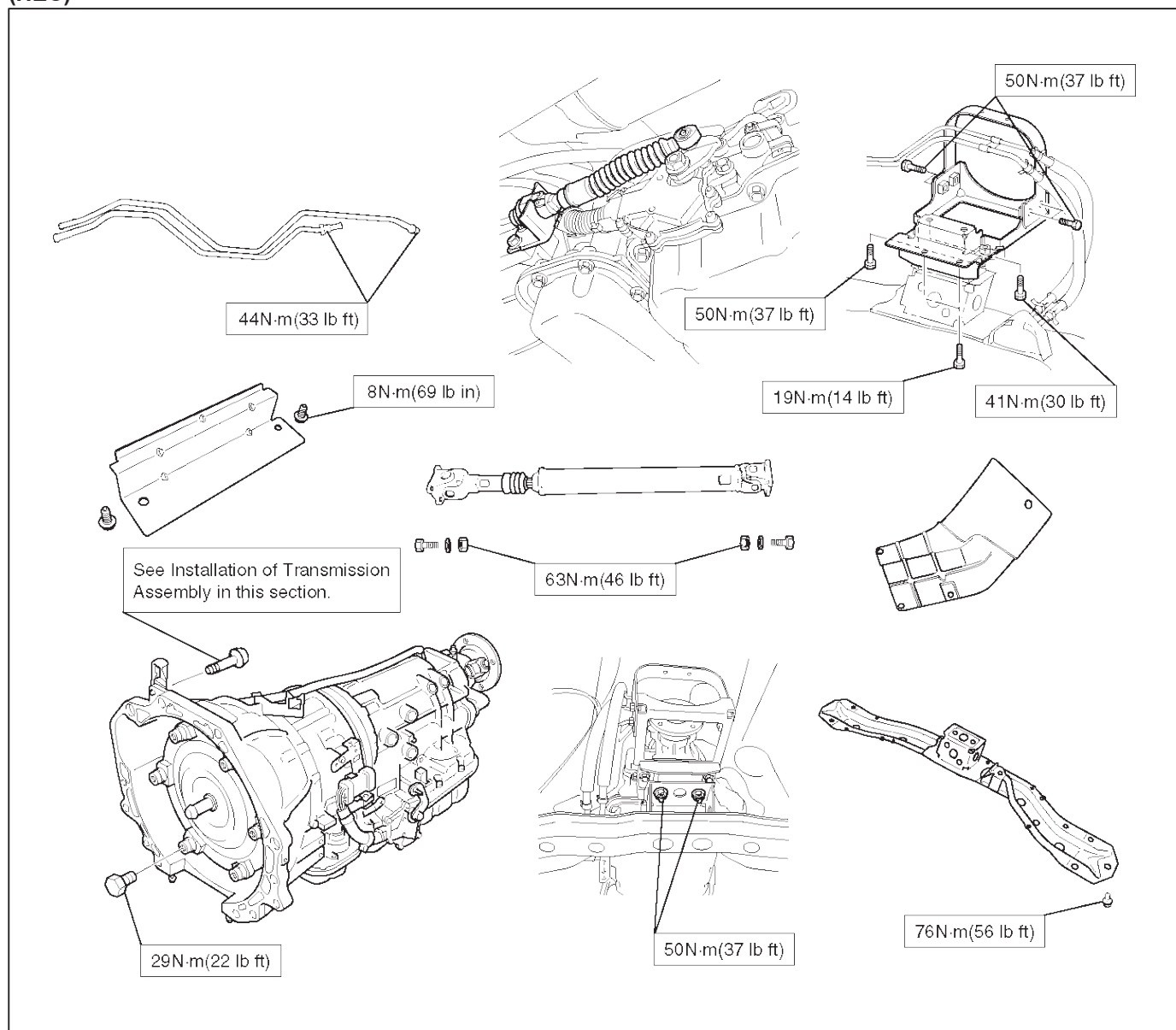
Torque Specifications

(V6)

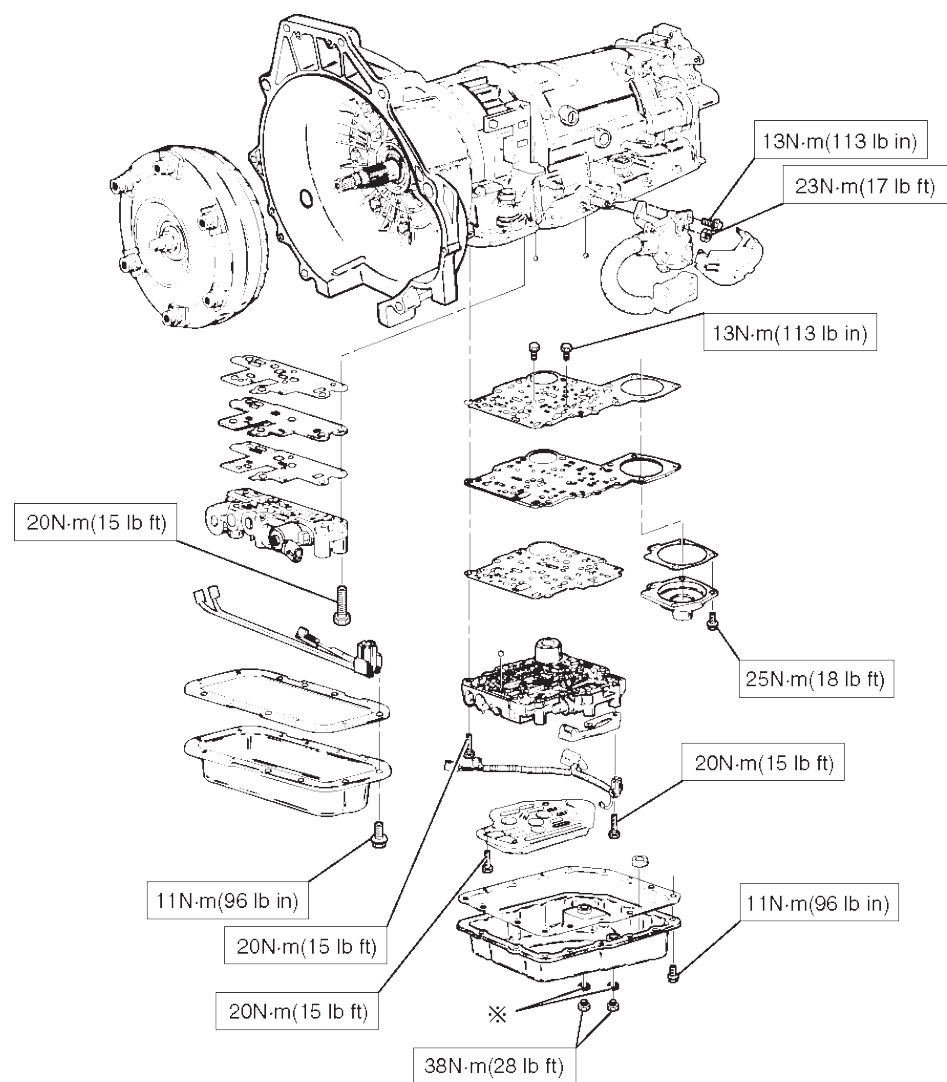


7A-102 AUTOMATIC TRANSMISSION (4L30-E)

(HEC)



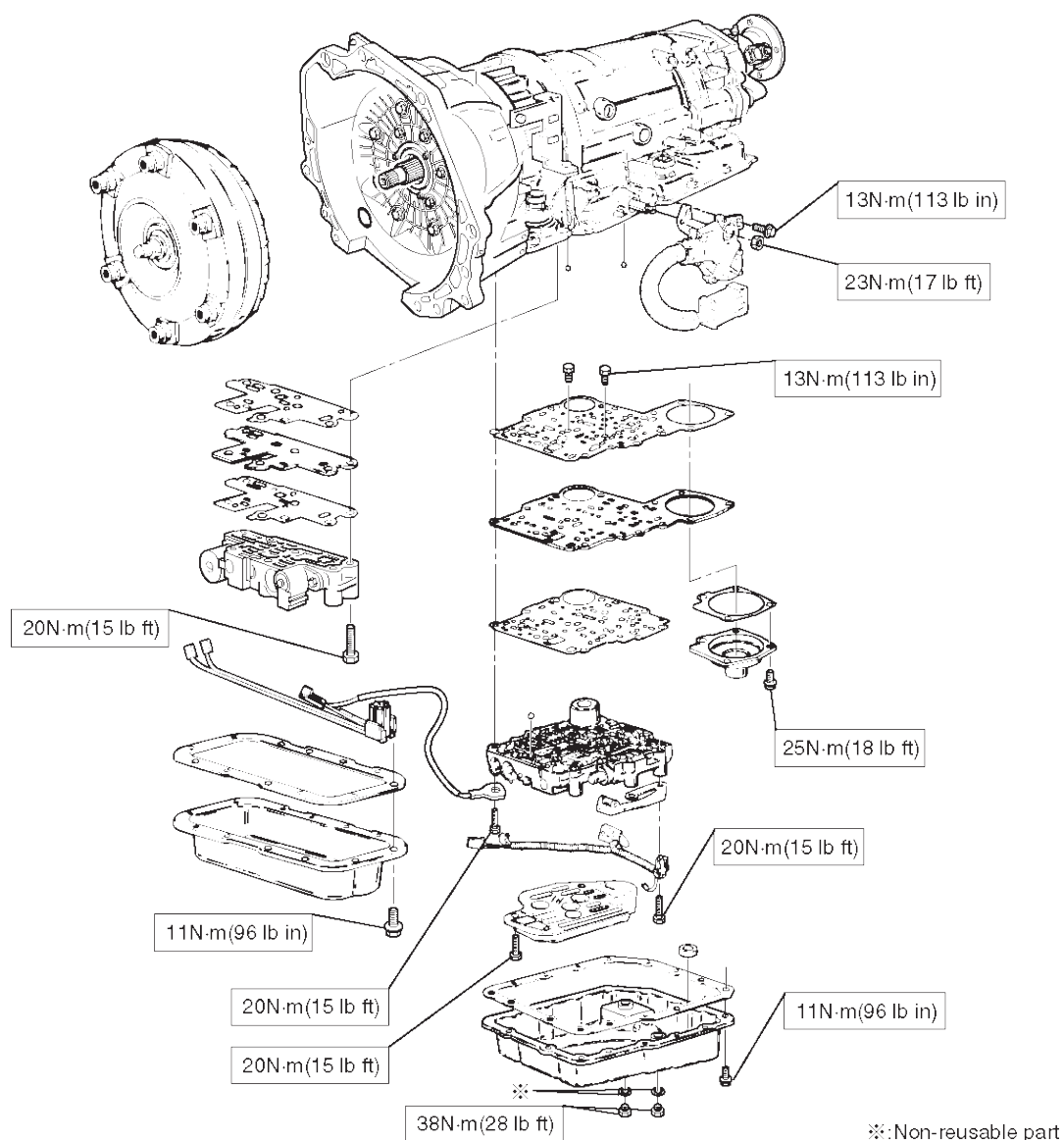
(V6)

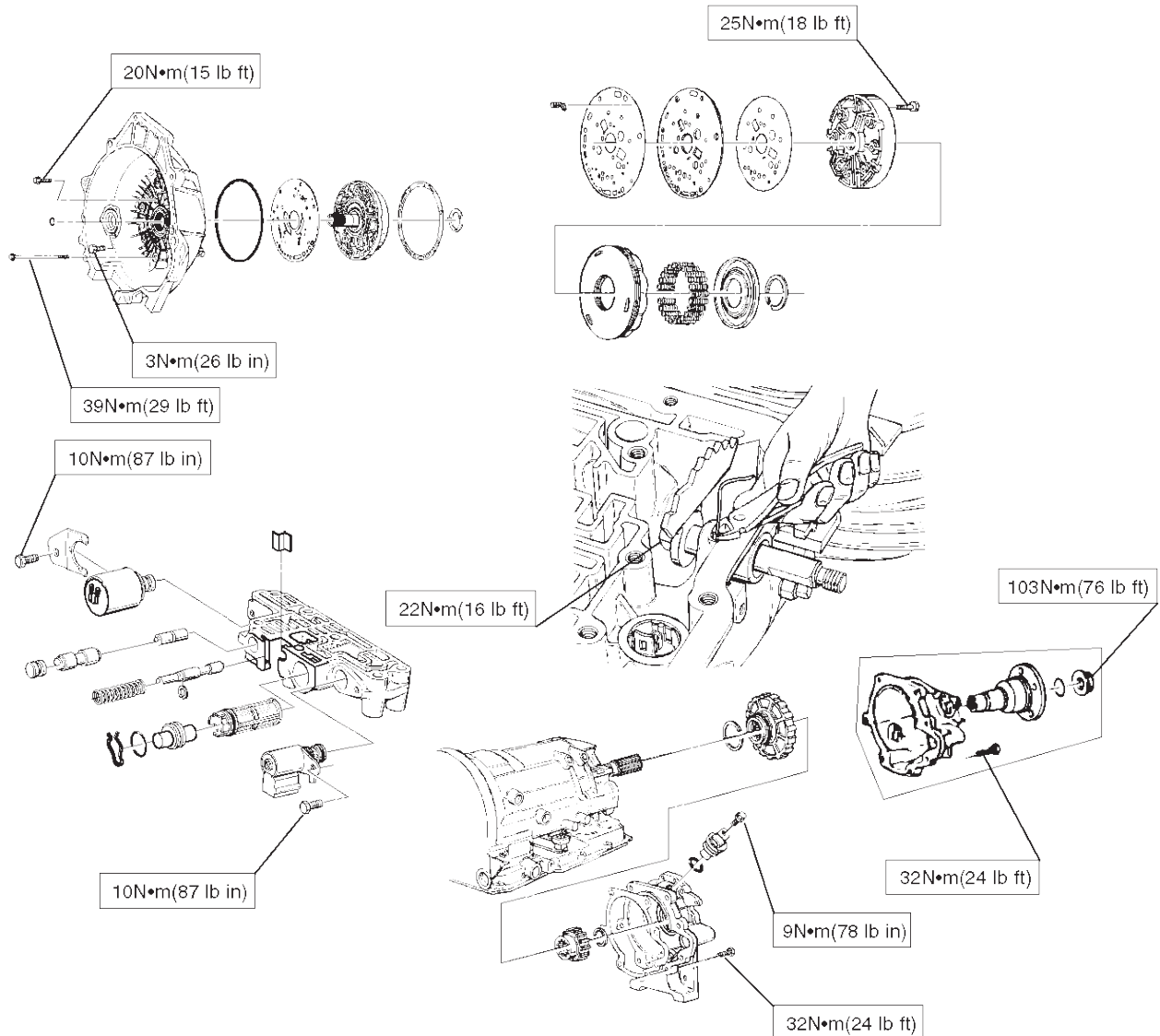


※ : Non-reusable part

7A-104 AUTOMATIC TRANSMISSION (4L30-E)

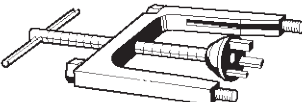
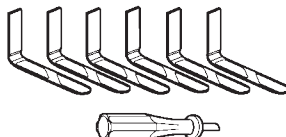
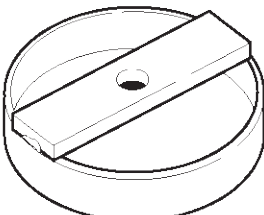
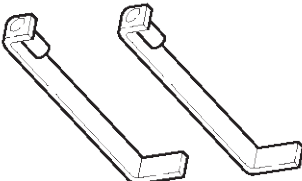
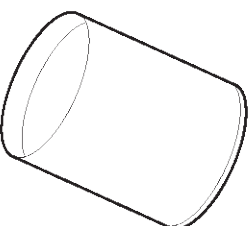
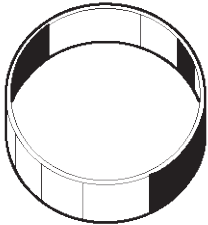
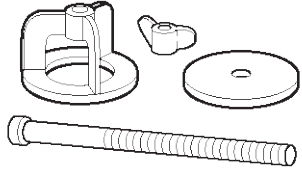
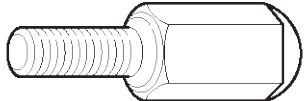
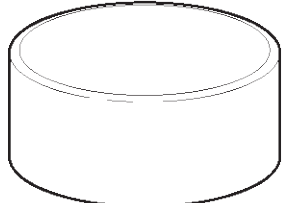
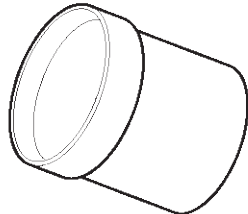
(HEC)





7A-106 AUTOMATIC TRANSMISSION (4L30-E)

Special Tools

ILLUSTRATION	TOOL NO. TOOL NAME	ILLUSTRATION	TOOL NO. TOOL NAME
 901RT071	J-23075 Spring compressor (For servo piston)	 901RT077	J-23085-A Selective washer gaging tool
 901RX007	J-38450-A Third clutch snap ring compressor	 901RT078	J-23327-90 Fourth clutch spring compressor (Use with J-23327)
 901RT073	J-23075-12 Third clutch spring compressor adapter (Use with J-23075)	 901RT079	J-38553 3/4 accumulator piston fitter
 901RT074	J-23084 Third clutch piston installer	 901RT080	J-41096 Cover remover (Use with J-38584)
 901RT075	J-23327 Third clutch spring compressor	 901RT081	J-38584 Slide hammer adapter (Use with J-23907)
 901RT076	J-23080-A Second clutch piston installer	 901RT082	J-38554 Fourth clutch piston fitter

AUTOMATIC TRANSMISSION (4L30-E) 7A-107

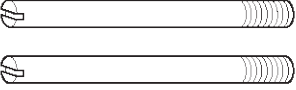
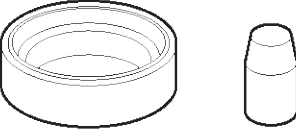
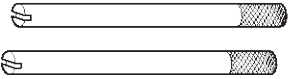
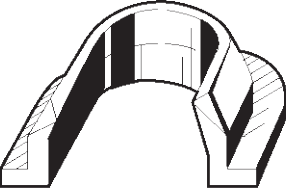
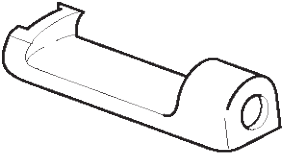
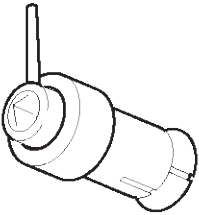
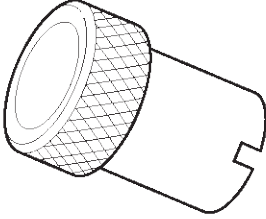
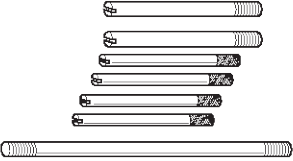
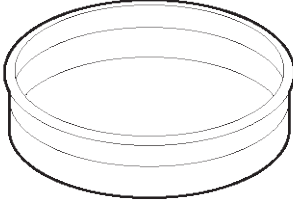
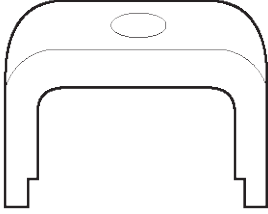
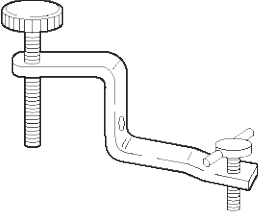
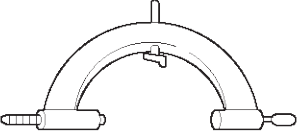
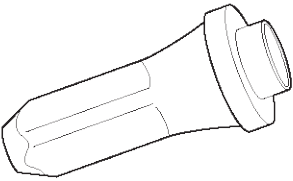
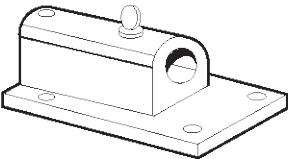
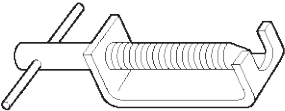
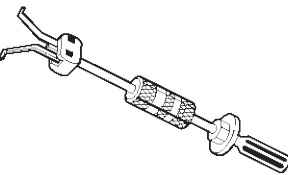
ILLUSTRATION	TOOL NO. TOOL NAME
 901RT083	J-38588 Guide pins; adapter case to main case
 901RT084	J-38555 Overrun clutch piston seal installer set
 901RT085	J-3387-2 Guide pins; gasket and transfer plate to valve body
 901RT086	J-25022 Turbine shaft puller (Use with J-24773-1)
 901RT087	J-23129 Oil seal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

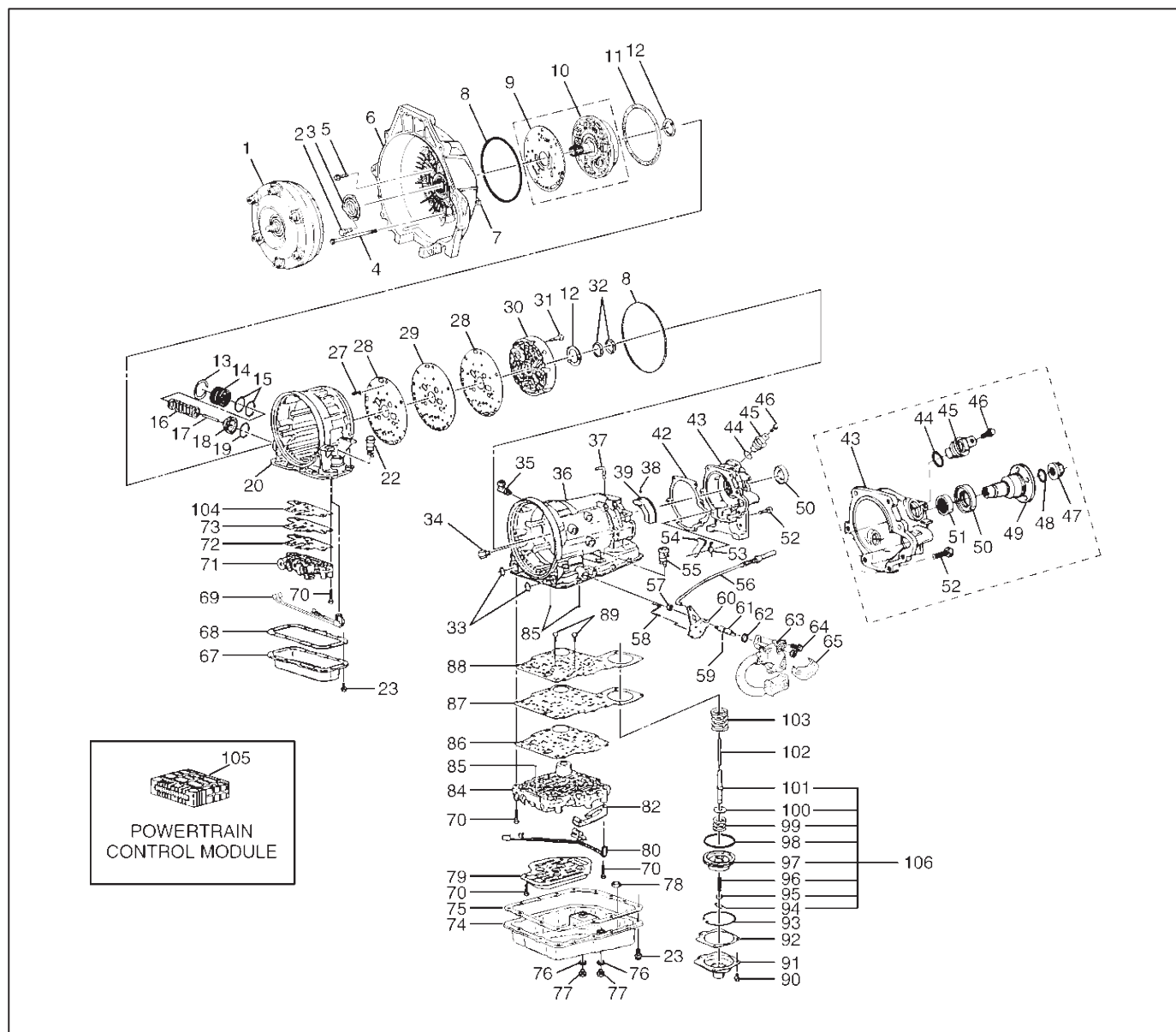
ILLUSTRATION	TOOL NO. TOOL NAME
 901RT089	J-23082-01 Oil pump rotation tool
 901RT090	J-25025-B Guide pins; valve body to main case
 901RT091	J-38428 Servo piston fitter
 901RT092	J-23327-91 Overrun clutch spring compressor
 901RT093	J-38559-A 3/4 accumulator piston cover compressor
 901RT094	J-8763-02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

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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



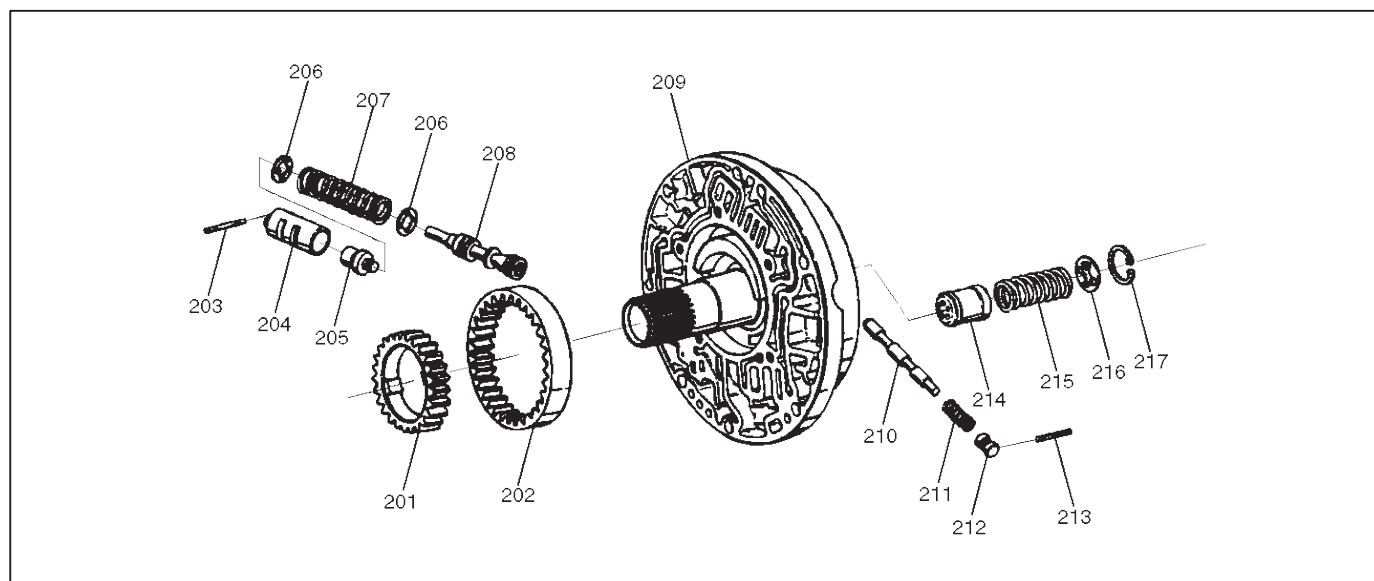
Legend

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

7A-110 AUTOMATIC TRANSMISSION (4L30-E)

- | | |
|---|--|
| (38) Seal, O-ring | (73) Plate, Adapter Valve Body/Transfer |
| (39) Reservoir | (74) Pan, Bottom/Main Case |
| (42) Gasket, Extension Case | (75) Gasket, Bottom Pan/Main Case |
| (43) Extension Assembly | (76) Gasket, Oil Drain or Overfill Screw |
| (44) Seal, O-ring/Speed Sensor | (77) Screw, Oil Drain or Overfill |
| (45) Sensor Assembly, Speed | (78) Magnet, Chip Collector |
| (46) Screw, Speed Sensor | (79) Filter Oil |
| (47) Nut, Output Shaft/Drive Flange | (80) Harness Assembly, Main Case |
| (48) Seal, O-ring/Drive Flange | (82) Roller and Spring Assembly, Manual Detent |
| (49) Flange, Drive | (84) Valve Body Assembly, Main Case |
| (50) Seal, Extension Assembly | (85) Ball, Check |
| (51) Bearing, Needle/Extension | (86) Gasket, Main V.B./Transfer Plate |
| (52) Screw, Extension/Main Case | (87) Plate, Main V.B./Transfer |
| (53) Spring, Parking Pawl Lock | (88) Gasket, Transfer/Main Case |
| (54) Pawl, Parking Lock | (89) Screw, Transfer Plate on V.B. |
| (55) Connector, Electrical/Main Case | (90) Screw, Servo Cover |
| (56) Actuator Assembly, Parking Lock | (91) Cover, Servo Piston |
| (57) Nut, Parking Lock Lever | (92) Gasket, Cover/Servo Piston |
| (58) Link, Manual Valve | (93) Ring, Retaining Servo Piston |
| (59) Pin, Spring | (94) Clip, Servo Piston |
| (60) Lever, Parking Lock and Range Selector | (95) Nut, Servo Screw |
| (61) Shaft, Selector | (96) Screw, Servo Piston |
| (62) Seal, Selector Shaft | (97) Piston, Servo |
| (63) Mode Switch Assembly | (98) Seal, Ring/Servo Piston |
| (64) Screw & Conical Washer Assembly | (99) Spring, Cushion/Servo Piston |
| (65) Shield, Mode Switch (V6) | (100) Seat, Cushion Spring |
| (67) Pan, Bottom/Adapter Case | (101) Sleeve, Servo Piston Adjust |
| (68) Gasket, Bottom Pan/Adapter Case | (102) Rod, Apply/Servo Piston |
| (69) Harness Assembly, Adapter Case | (103) Spring, Return/Servo Piston |
| (70) Screw, Valve Body | (104) Gasket, Adapter Case/Transfer Plate |
| (71) Valve Body Assembly, Adapter Case | (105) Powertrain Control Module |
| (72) Gasket, Adapter Valve Body | (106) Servo Piston Assembly |

Pump Assembly

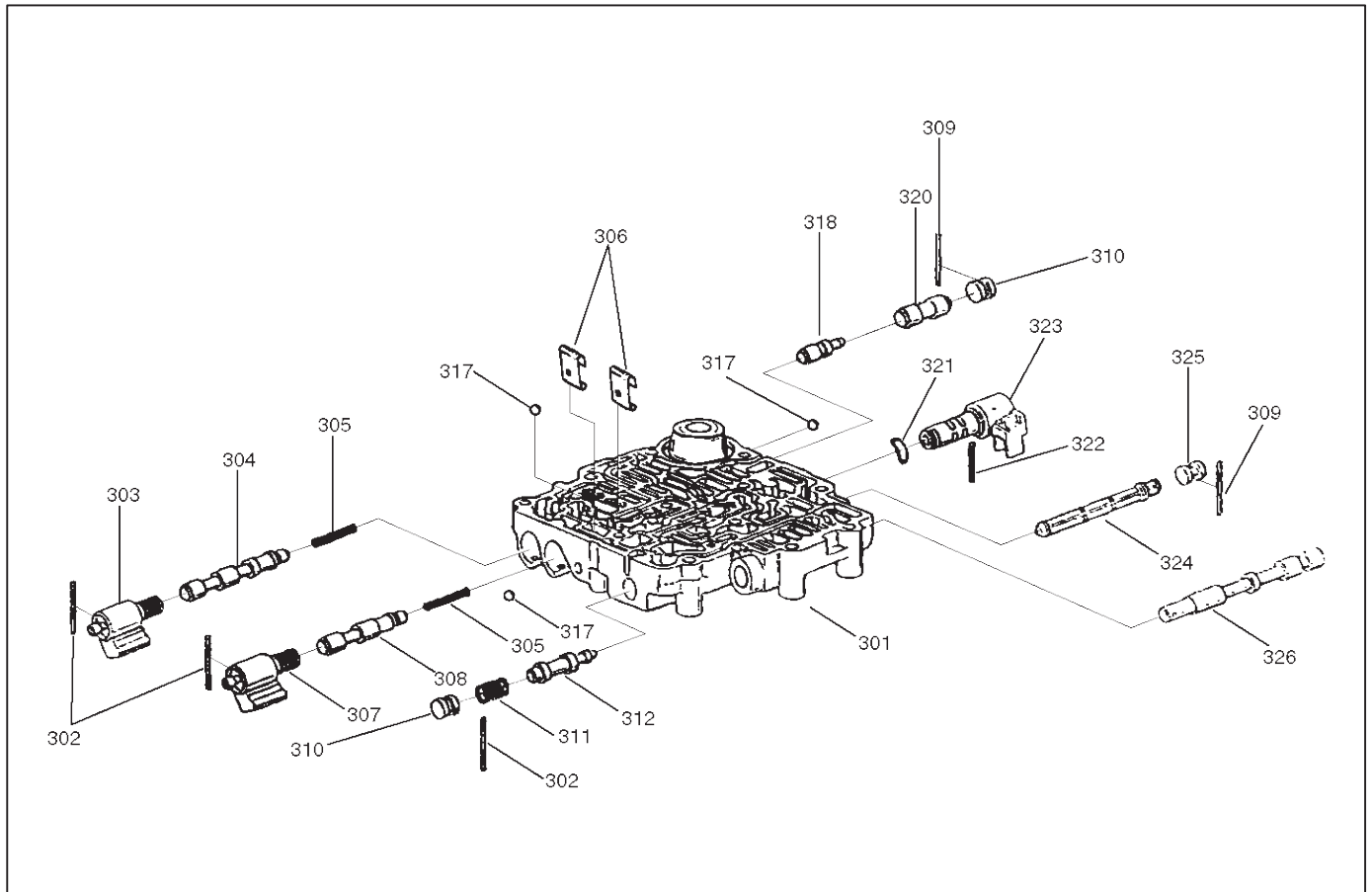


Legend

- | | |
|-----------------------------|-------------------------------|
| (201) Gear, Oil Pump Drive | (203) Pin, Boost Valve Sleeve |
| (202) Gear, Oil Pump Driven | (204) Sleeve, Boost Valve |
| | (205) Valve, Boost |

(206) Seat, Spring/Pressure Regulator Valve	(212) Plug, Converter Clutch Control Valve
(207) Spring, Pressure Regulator Valve	(213) Pin, Spring
(208) Valve, Pressure Regulator	(214) Piston, Throttle Signal Accumulator
(209) Pump Assembly, Oil	(215) Spring, Throttle Signal Accumulator
(210) Valve, Converter Clutch Control	(216) Seat, Spring/Throttle Signal Accumulator
(211) Spring, Converter Clutch Control Valve	(217) Ring, Snap/Throttle Signal Accumulator

Valve Body Assemblies

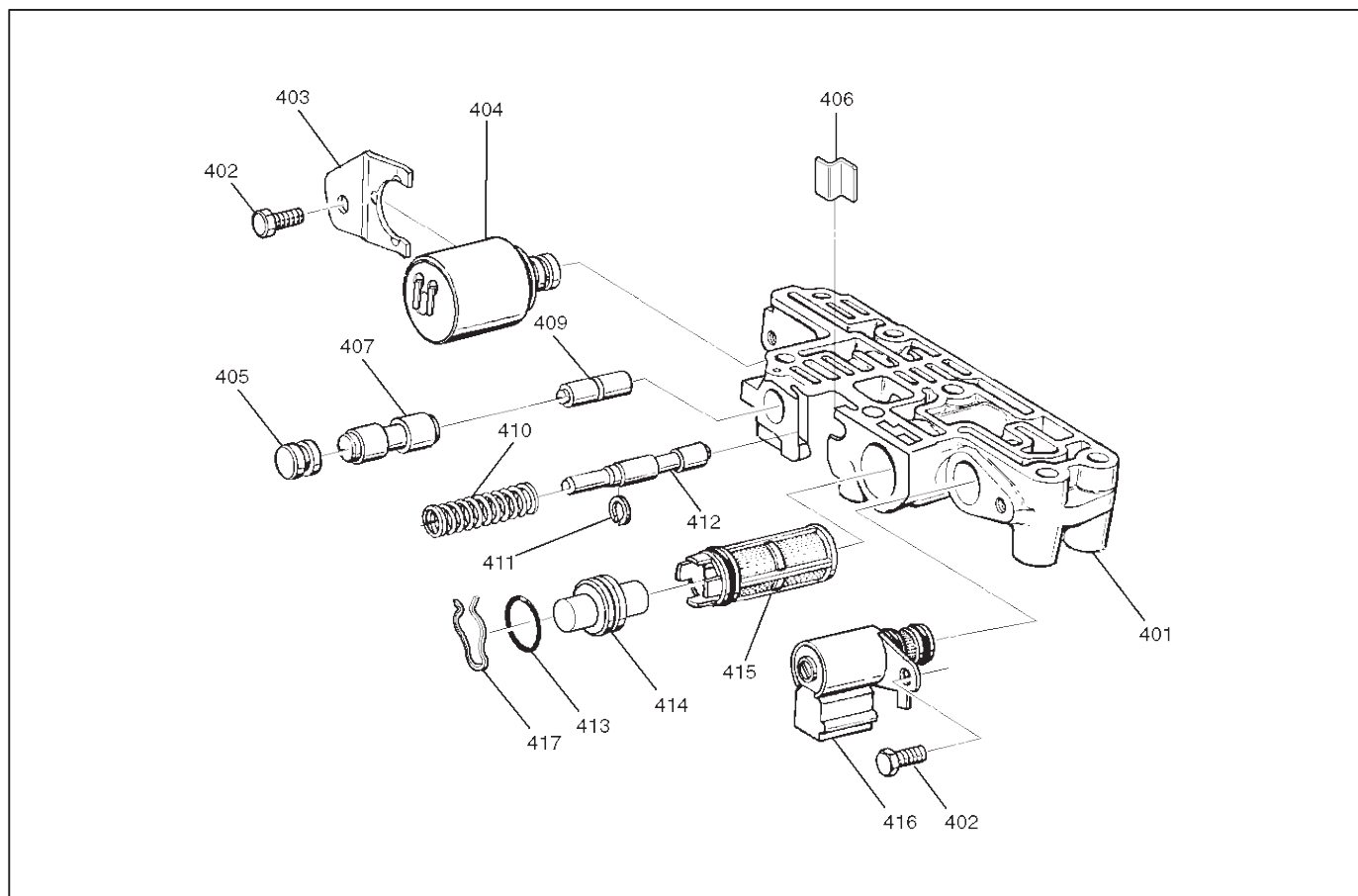


244RS009

Legend

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

7A-112 AUTOMATIC TRANSMISSION (4L30-E)

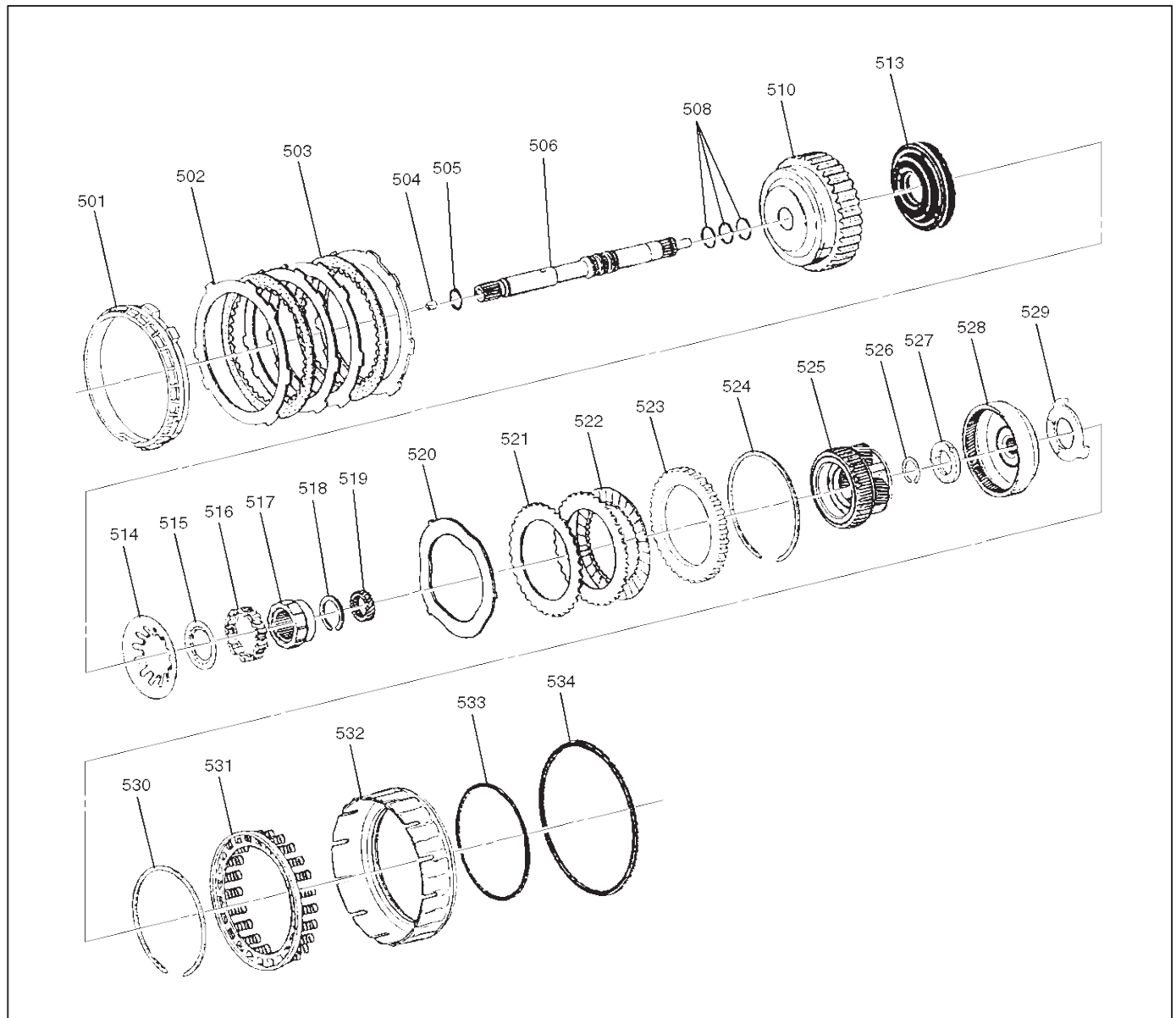


243RW003

Legend

- | | |
|--------------------------------------|---|
| (401) Body, Valve/Adapter Case | (410) Spring, Feed Limit Valve |
| (402) Screw, Solenoid Force Motor | (411) Ring, Retainer |
| (403) Retainer, Force Motor | (412) Valve, Feed Limit |
| (404) Solenoid, Force Motor | (413) Seal, O-ring Plug Filter |
| (405) Plug, 3-4 Accumulator | (414) Plug, Screen |
| (406) Plug and Spring Retainer | (415) Screen Assembly, Force Motor |
| (407) Valve, 3-4 Accumulator | (416) Solenoid, Torque Conv. Clutch ON/OFF N.C. |
| (409) Valve, 3-4 Accumulator Control | (417) Plug Retainer |

Overdrive Internal Components



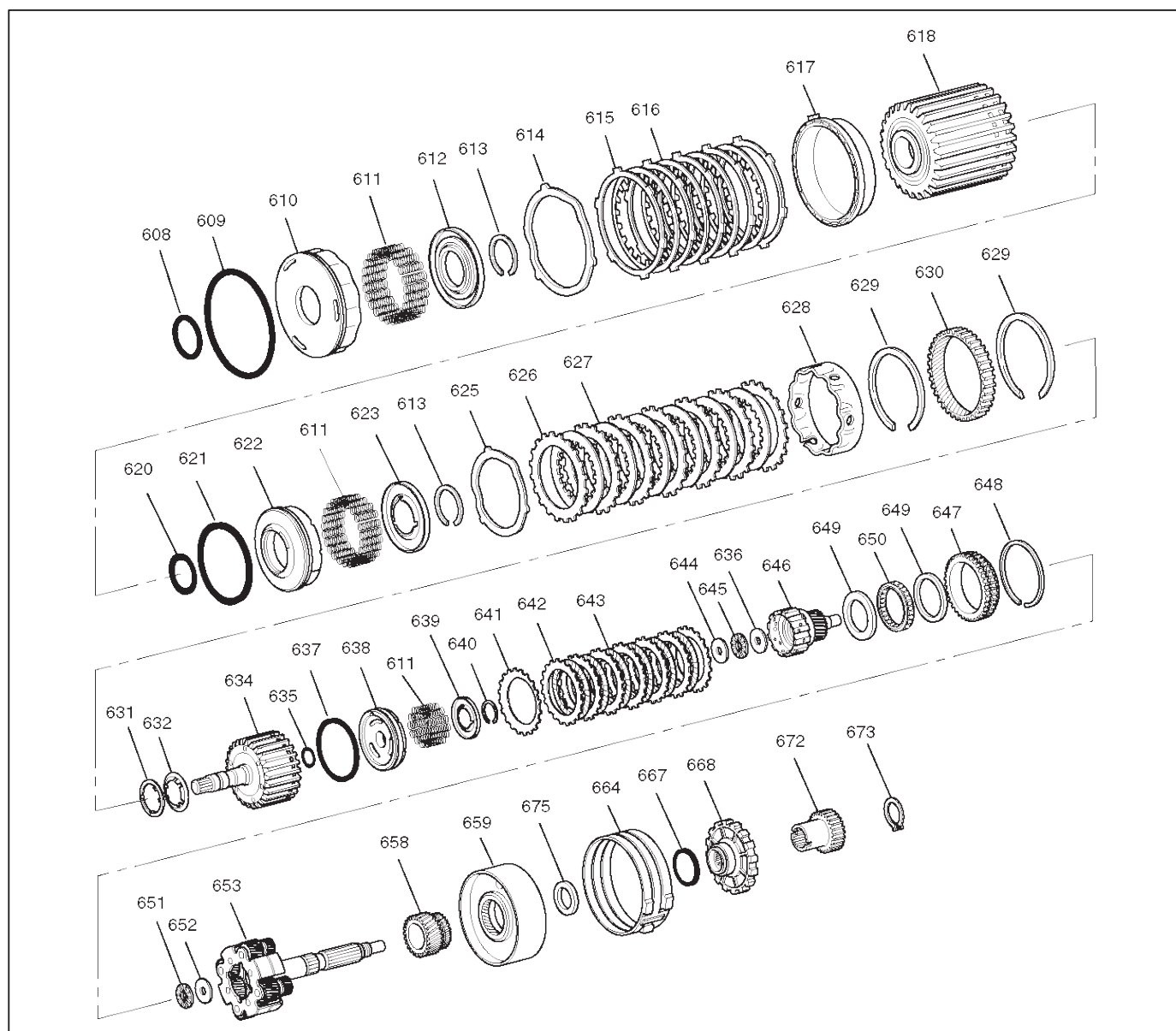
252RW003

Legend

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

7A-114 AUTOMATIC TRANSMISSION (4L30-E)

Internal Components



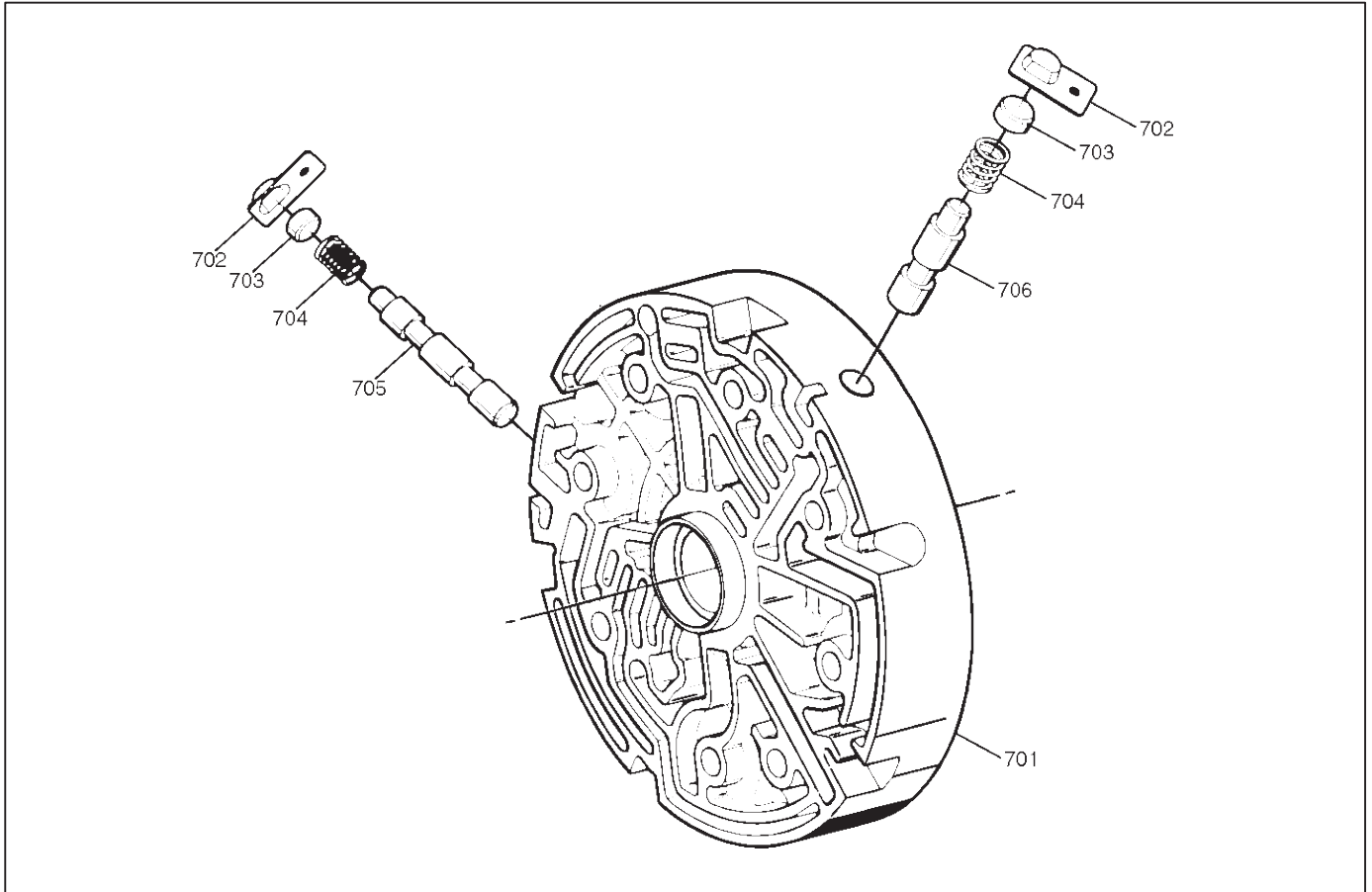
247RW002

Legend

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

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

Center Support Assembly



242RY002

Legend

(701) Center Support	(704) Spring, Lockout
(702) Retainer Plate	(705) Valve, Overrun Lockout
(703) Plug, Lockout	(706) Valve, Reverse Lockout Control (V6)

RODEO

TRANSMISSION

TRANSMISSION CONTROL SYSTEM (4L30-E) (V6 3.2L)

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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.

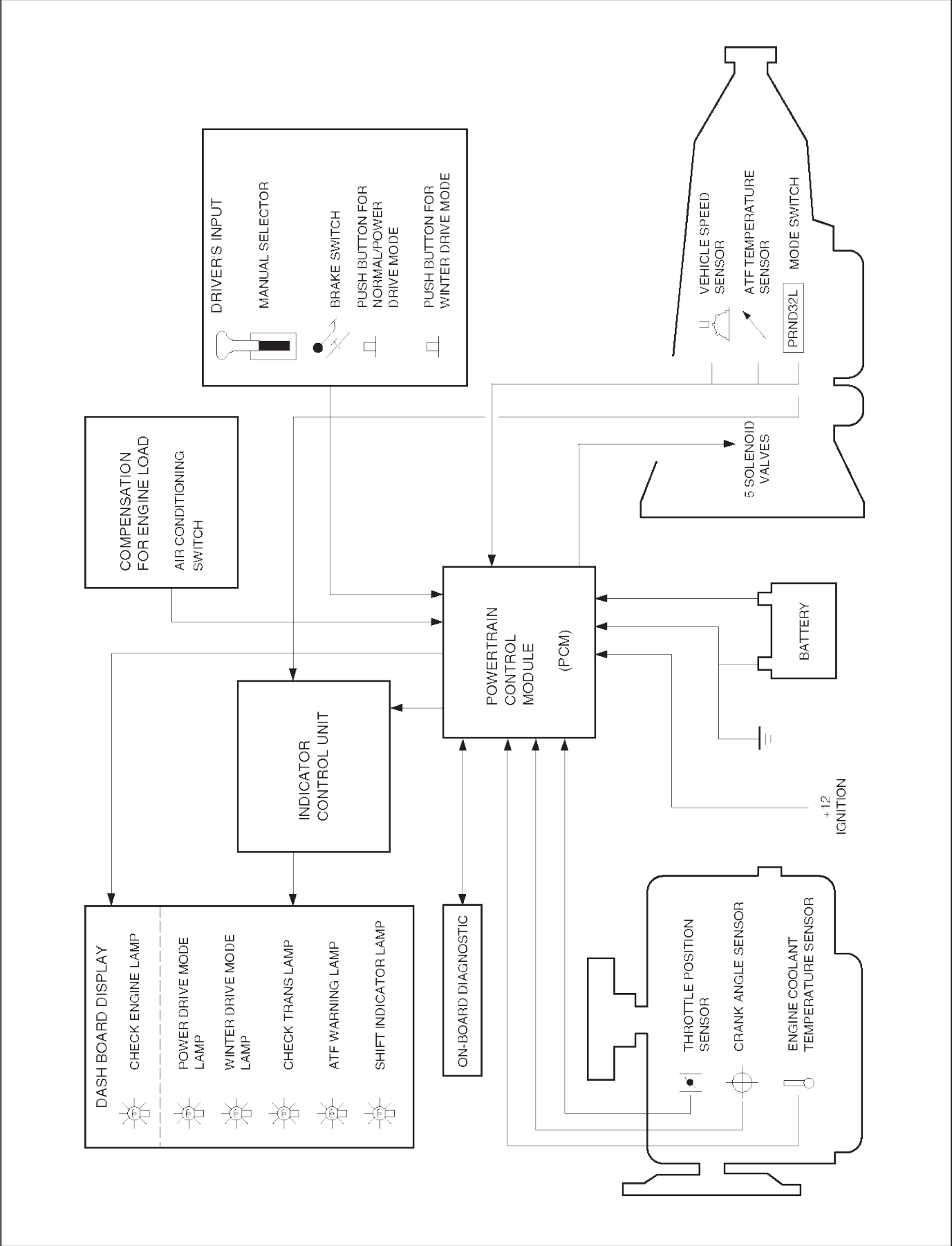
The major features of 4L30-E are as follows:

- 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.

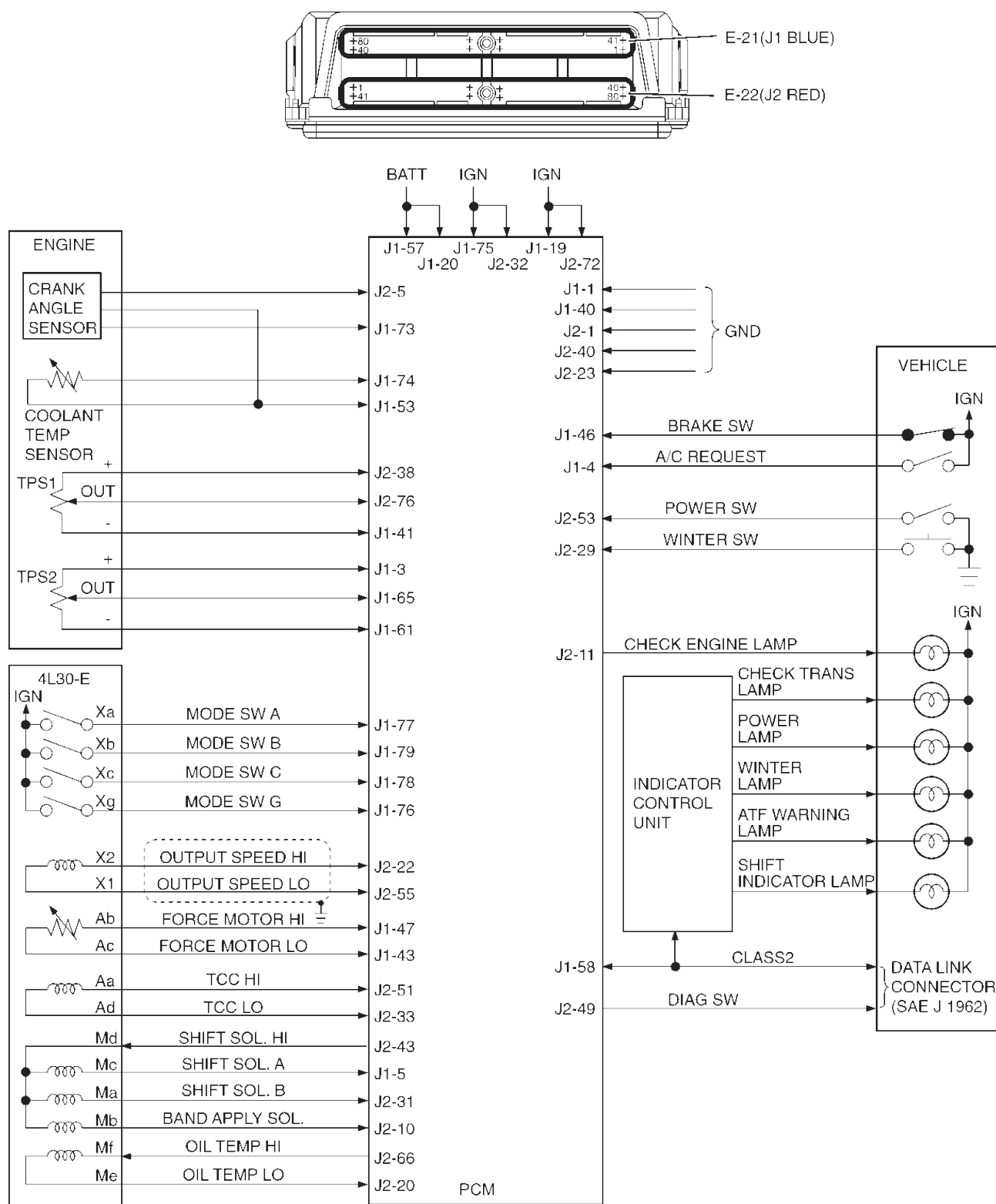
- Wide gear ratio and high torque rate of torque converter provide excellent starting performance.

Electronic Control Diagram



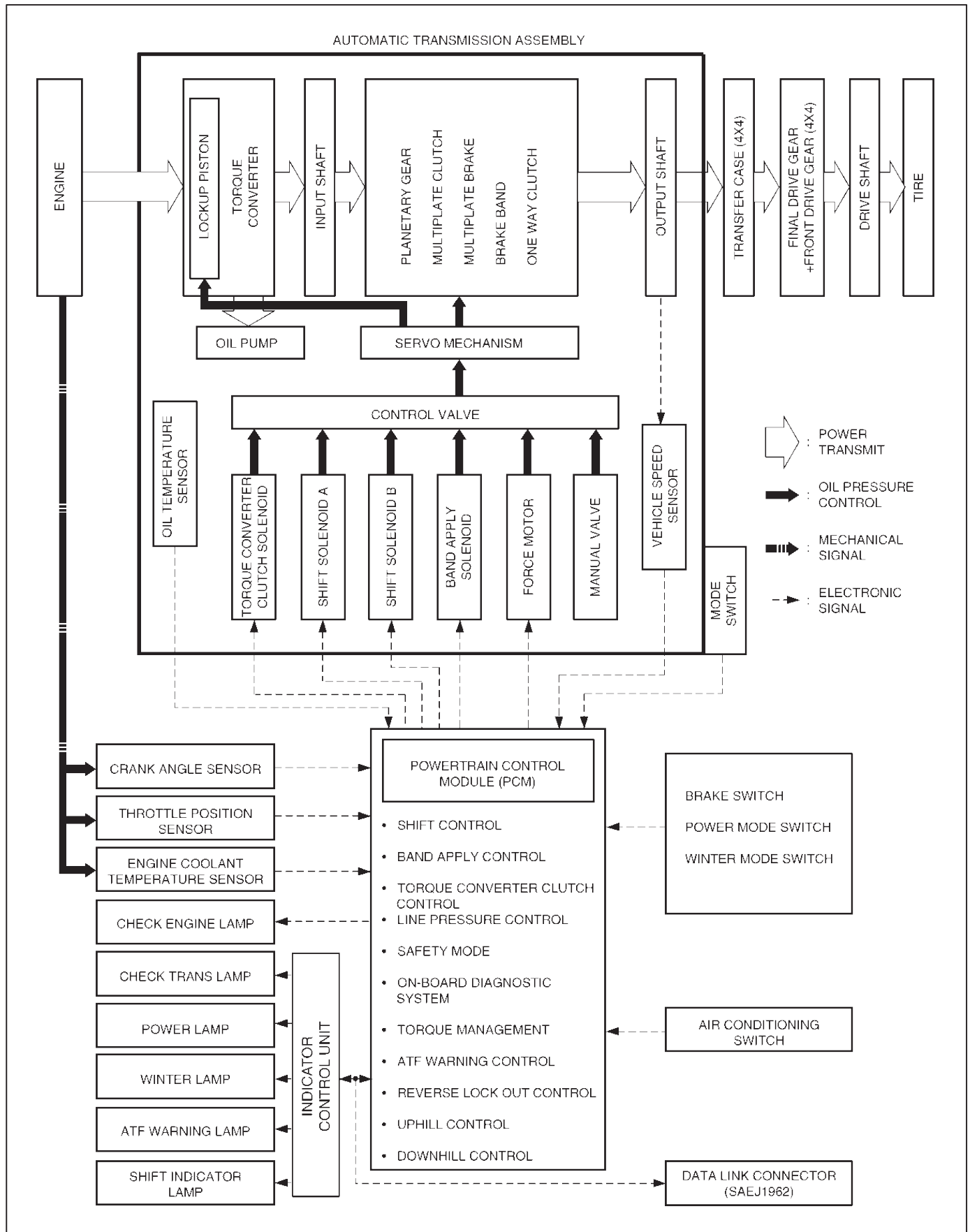
7A1-4 TRANSMISSION CONTROL SYSTEM (4L30-E)

Powertrain Control Module (PCM)



TPS : Throttle Position Sensor
TCC : Torque Converter Clutch

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

The clutch ON/OFF is controlled by moving the converter clutch valve through shifting Torque Converter Clutch (TCC) solenoid using the ON/OFF 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 15 km/h (9.3 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.

Uphill Control

When uphill condition are recognized the 2-3 and 3-4 shift and TCC apply are down 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

Mode Type	SWITCH (SW)		LAMP	
	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

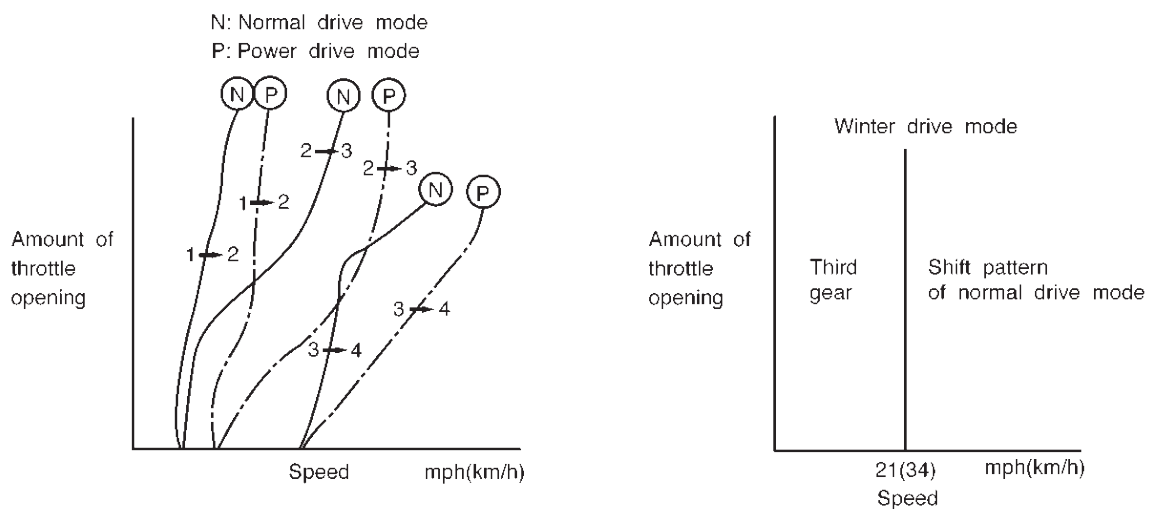
However, the winter switch prevails over the PWR/NOR switch.

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



7A1-8 TRANSMISSION CONTROL SYSTEM (4L30-E)

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)

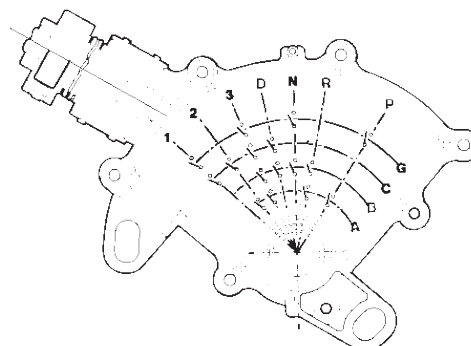
OFF → PRESSURE TO
SHIFT VALVE

③ Selecting gear position

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

SELECT LEVER RANGE	MODE SW TERMINALS				
	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



Winter Drive Mode

1. The winter switch will operate when switched on after all of the following conditions are present:
 - a. The gear select 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.

7A1-10 TRANSMISSION CONTROL SYSTEM (4L30-E)

Functions of Input / Output Components

Components			Function
I N P U T S I G N A L	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 and 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.
O U T P U T S I G N A L	S O L E N O I D	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 solenoid	Controls clutch engagement/disengagement suited to the vehicle running condition on the basis of PCM output.
		Force motor (Pressure control solenoid)	Adjusts the oil pump delivery pressure to line pressure suited to the vehicle running condition on the basis of PCM output.
	Power drive mode lamp		Informs the driver whether the vehicle is in power mode or not.
	Winter drive mode lamp		Informs the driver whether the vehicle is in winter mode or not.
	“CHECK TRANS” lamp		Informs the driver of failure in the system.
	ATF warning lamp		Lights when ATF oil temperature rises. (only 4×4)

Diagnosis

Electronic Diagnosis

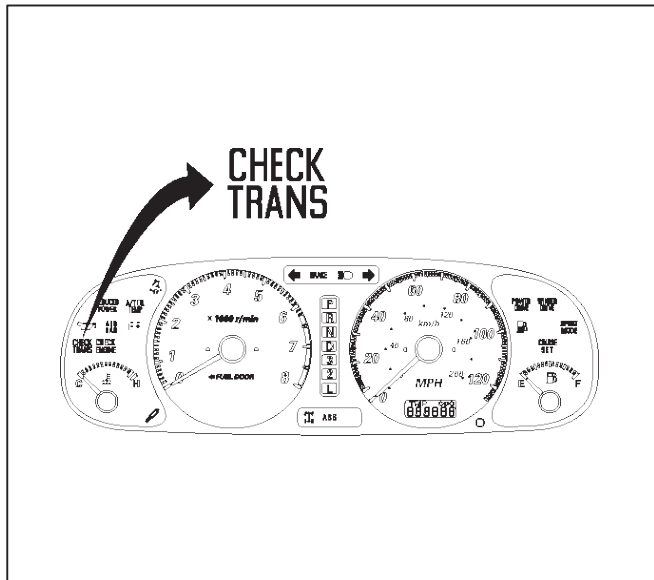
How To Diagnose The Problem

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.



821RY00067

Diagnostic Check

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

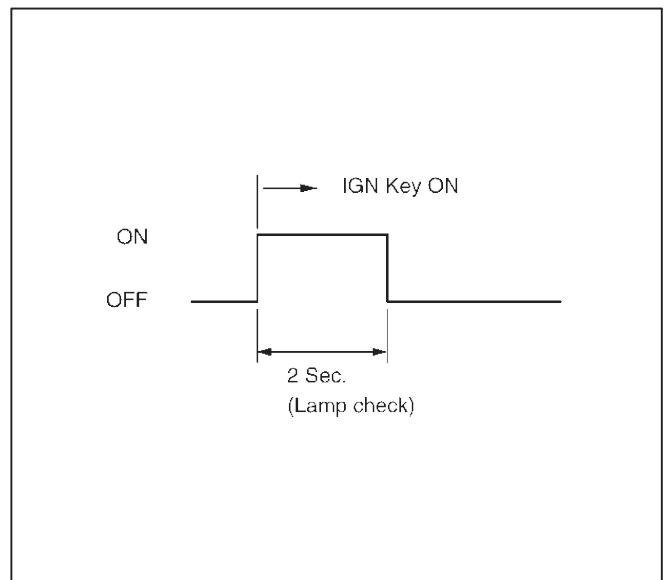
1. Connect the Tech 2: Go through **Tech 2 OBD II CONNECTION.**
2. Turn on the ignition but not the engine.
3. Push "F0" on Tech 2 to see the Diagnostic Trouble Code (DTC):
4. Do you have a DTC?

YES: write down all code numbers and do the **DTC CHECK**

NO: the DTC can not help you find the problem.

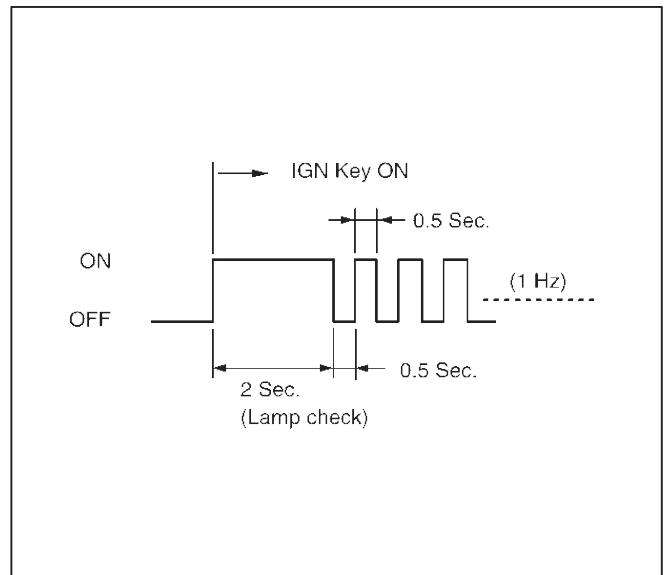
1. Go through "**CHECK TRANS**" **CHECK**
2. IF it is flashing and the flash is 0.5 seconds ON and 0.5 seconds OFF, this means that you should have a DTC stored. Please recheck go to **DIAGNOSTIC CHECK** and if you find the same problem, replace the Powertrain Control Module (PCM).

Normal



C07RY005

Abnormal

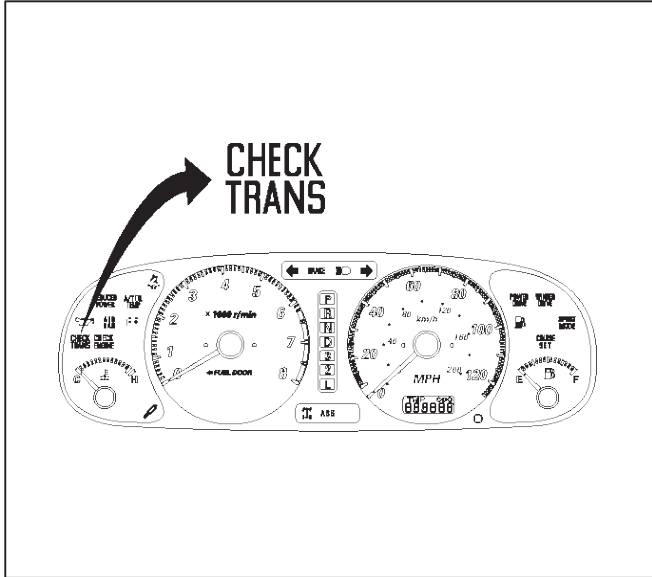


C07RY00042

7A1-12 TRANSMISSION CONTROL SYSTEM (4L30-E)

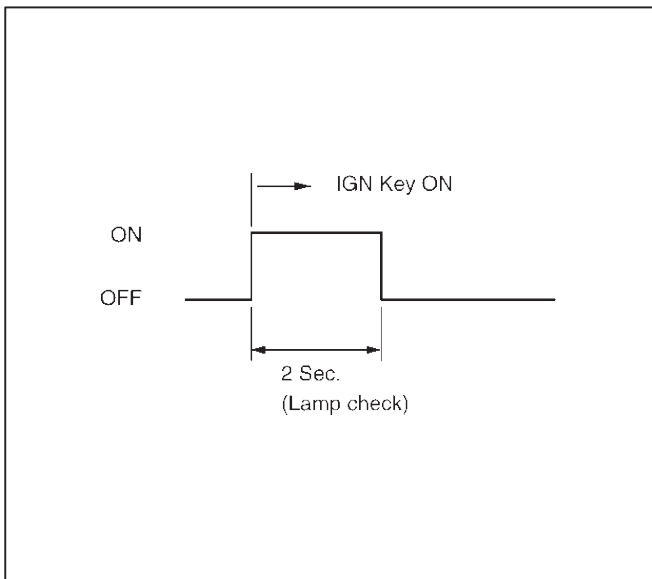
“Check Trans” Check

1. Indicator is ON during 2 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**.



821RY00067

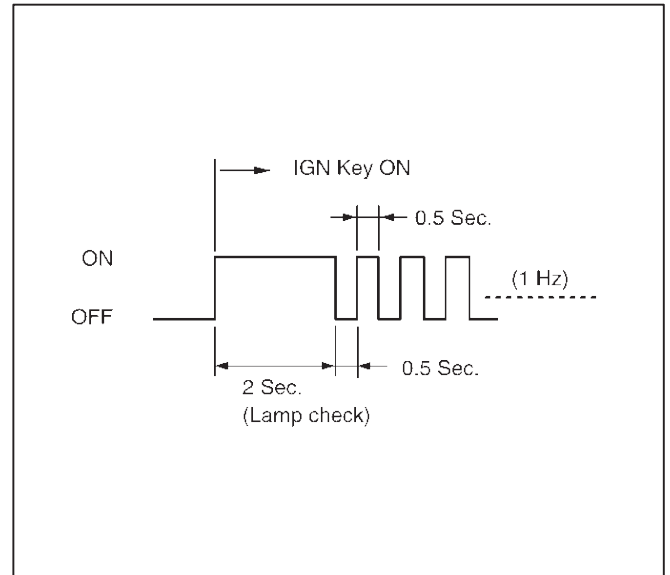
Normal



C07RY005

2. Indicator is flashing and the flash is 0.5 seconds ON and 0.5 seconds OFF always when ignition is on (engine cranked or not). This means that there is a malfunction. Go to **DIAGNOSTIC CHECK**.

Abnormal

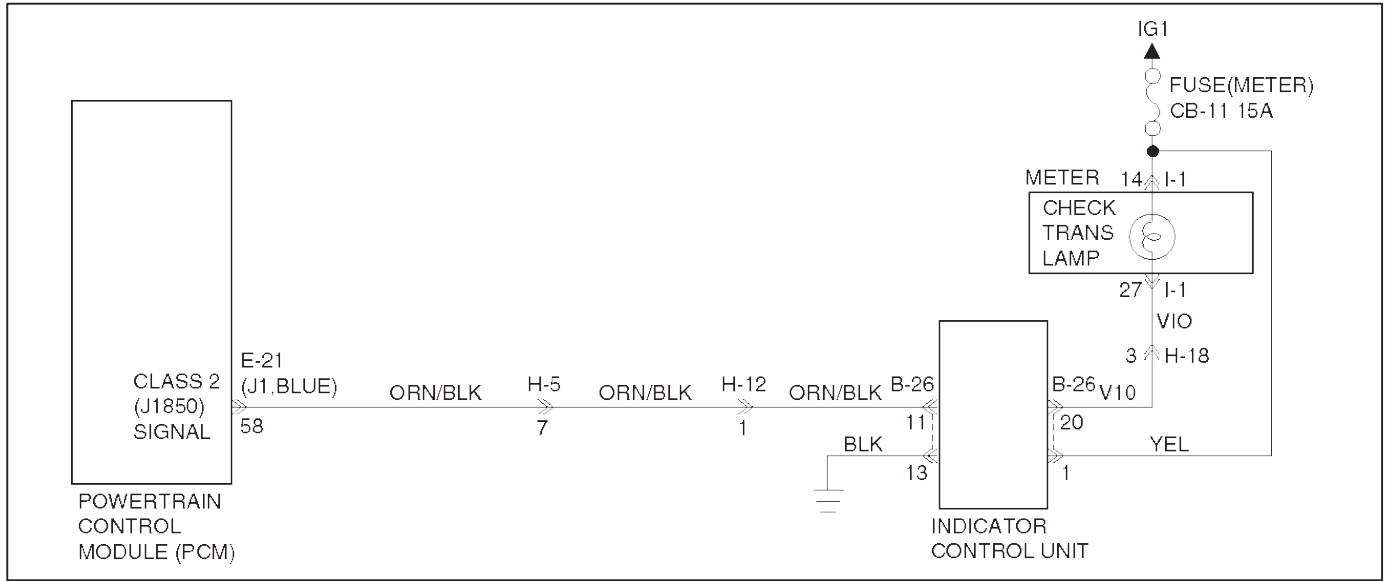


C07RY00042

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-1 is shorted to ground.
 3. Verify if the indicator control unit connector B-26 terminal 20 is shorted to ground.
 4. Verify that the instrument panel terminal 14 of connector I-1 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-1 is shorted to battery or open.
 3. Verify if the indicator control unit connector B-26 terminal 20 is shorted to battery or open.
 4. Verify that the instrument panel terminal 14 of connector I-1 is connected to battery. If not, check the fuses and the connections (terminal 3 of connector H-18) voltage.

5. If problem solved: Go to **CHECK TRANS INDICATOR**.

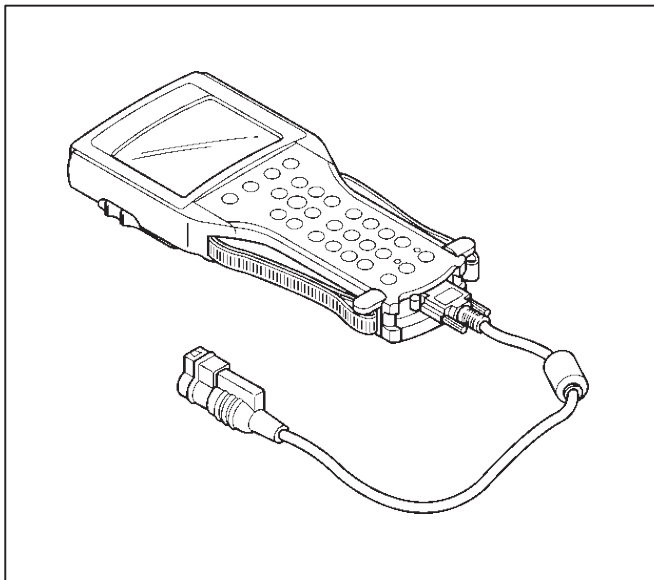
NO: Replace Powertrain Control Module (PCM).



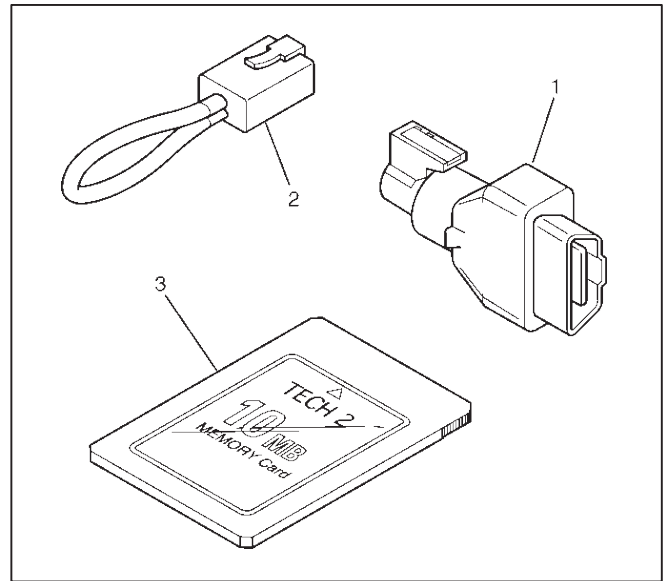
Tech 2 OBD II Connection

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

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

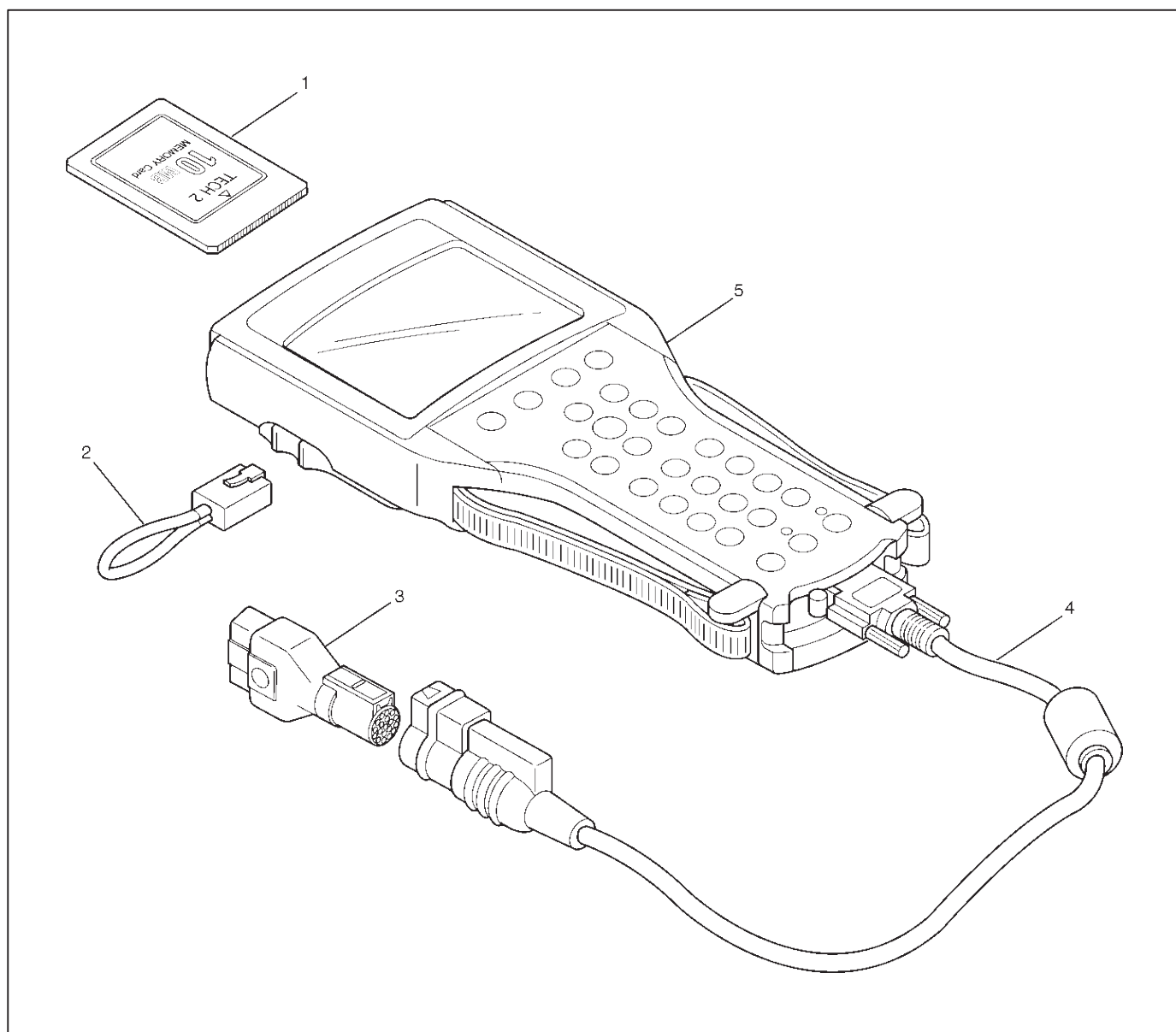


- SAE 16/19 Pin Adapter (3000098)(1), RS232 Loop Back Connector (3000112)(2), and PCMCIA Card (3000117)(3).



7A1-14 TRANSMISSION CONTROL SYSTEM (4L30-E)

2. Connecting the Tech 2



901RW180

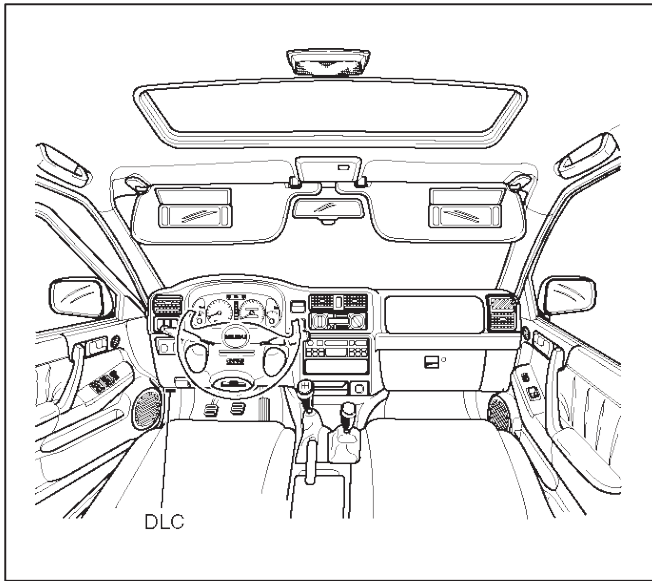
Legend

- | | |
|--------------------------------|-----------------------|
| (1) PCMCIA Card | (3) SAE 16/19 Adapter |
| (2) RS 232 Loop Back Connector | (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 2001 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. Mark sure the vehicle ignition is off.

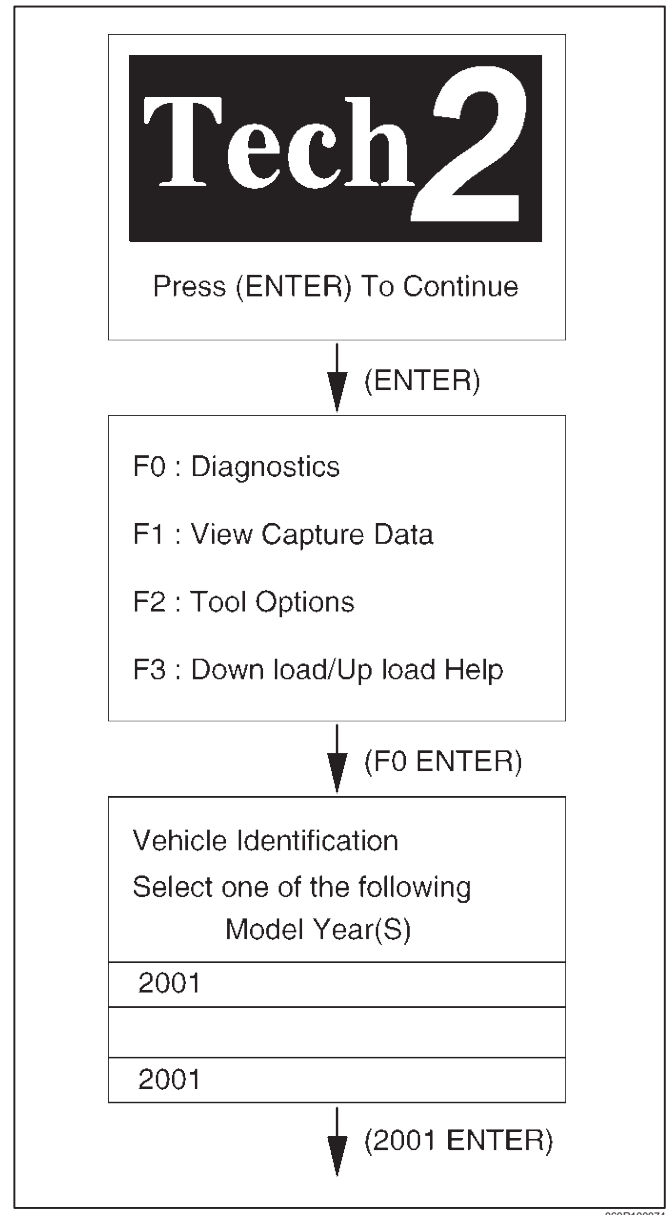
5. Connect the Tech 2 SAE 16/19 adapter to the vehicle DLC.



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

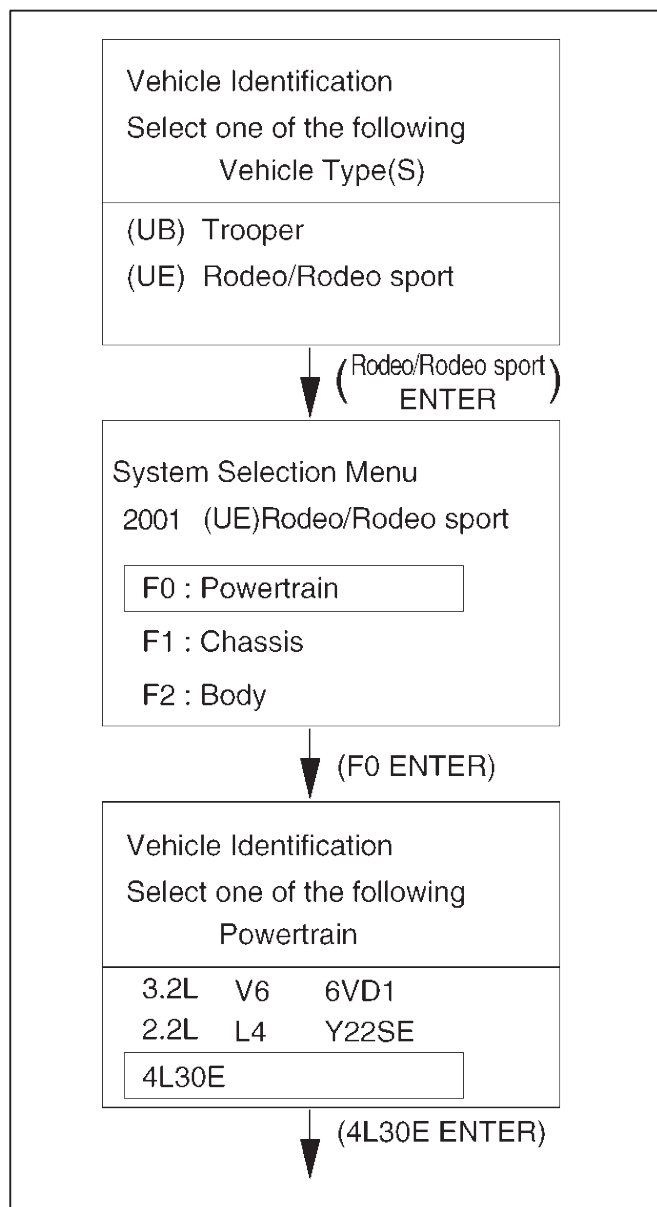


8. The power up screen is displayed when you power up the tester with the Isuzu systems PCMCIA card. Follow the operating procedure below.



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

7A1-16 TRANSMISSION CONTROL SYSTEM (4L30-E)



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" (+20) and "Decrement" (-20) 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.

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 emission-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)

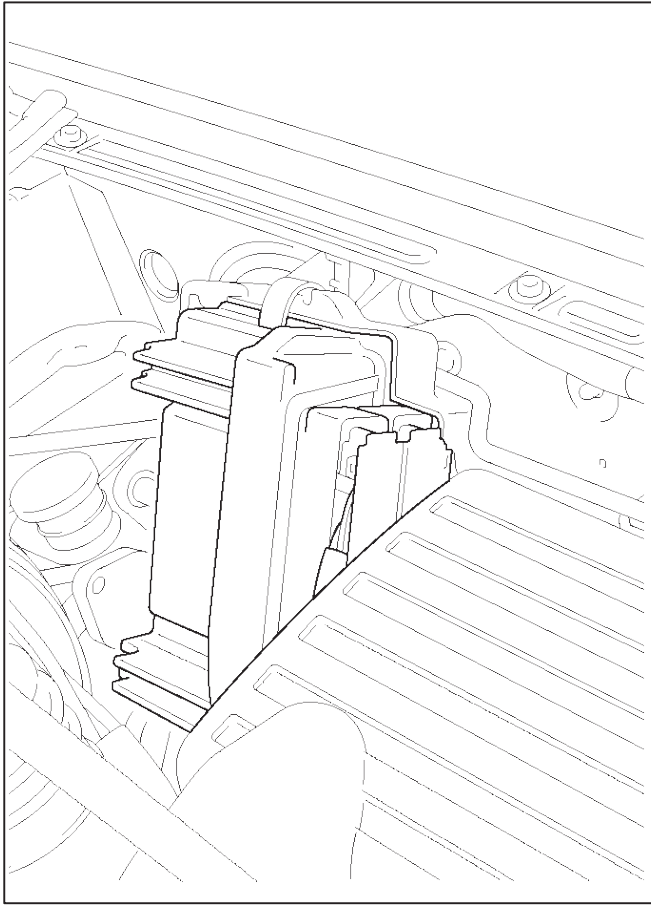
Failure Records data is an enhancement of the OBD II Freeze Frame feature. Failure Records store the same vehicle information as does Freeze Frame, but it will store that information for any fault which is stored in on-board memory, while Freeze Frame stores information only for emission-related faults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

7A1-18 TRANSMISSION CONTROL SYSTEM (4L30-E)**Transmission Data**

Item	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
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	On/Off	Off
Emergency Mode	Inactive, Active	Inactive
ABS Status	On/Off	(Not used)

OBD II Diagnostic Management System

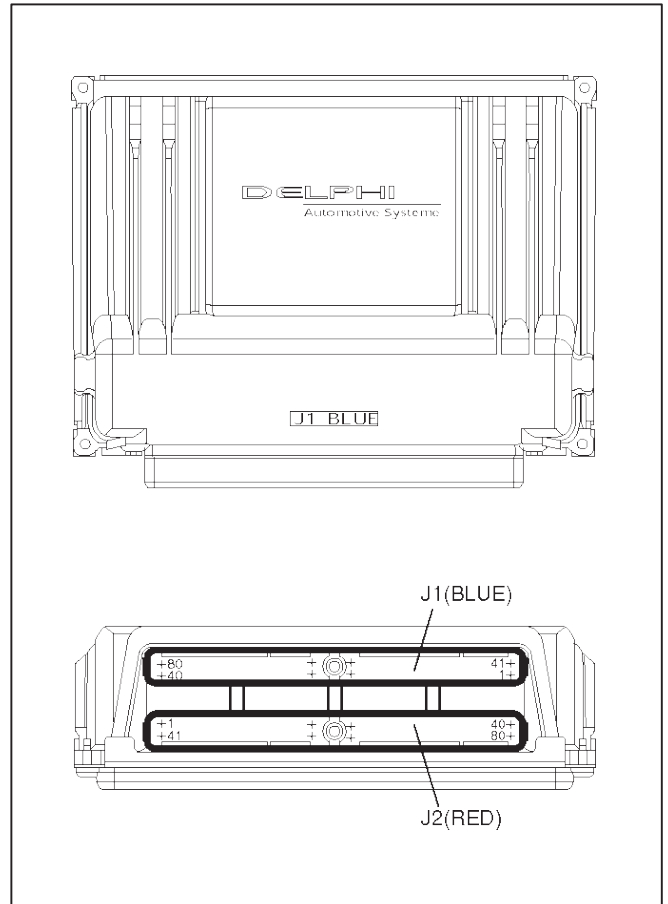
Powertrain Control Module (PCM) Location



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 PCM 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.

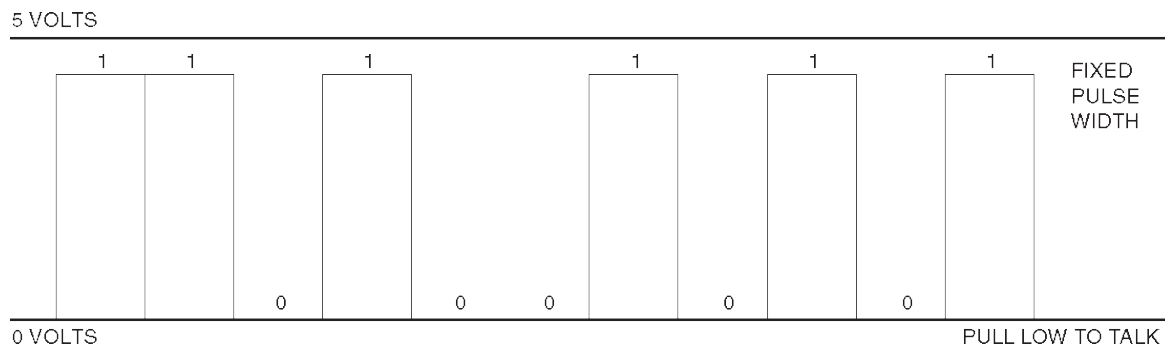


RODEO previously used a 5 volt data bus called UART, which is an acronym for “Universal Asynchronous Receive and Transmit”. When neither the vehicle’s control module nor the diagnostic tool, such as a Tech 2, are “talking,” the voltage level of the bus at rest is 5 volts. The two computers talk to each 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.

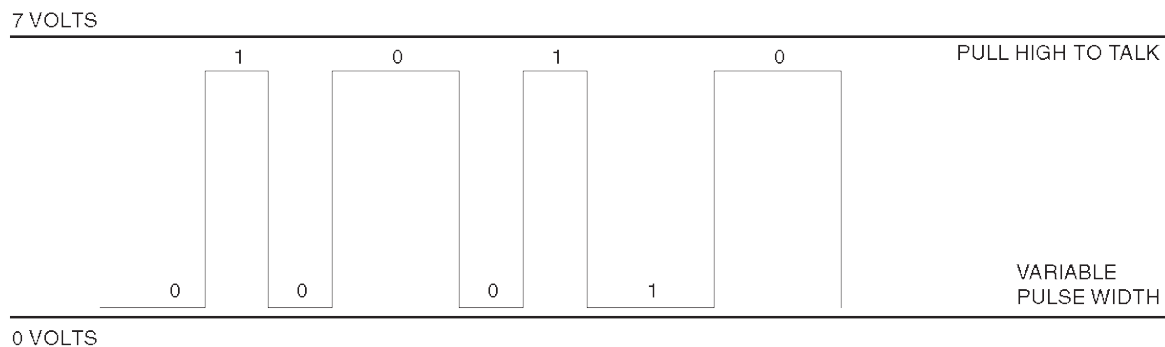
Class 2 data, which is used on OBD II vehicles, is quite different. Data is transferred at a rate of 10.4 kilobits per second, and the voltage is toggled between zero and 7 volts.

7A1-20 TRANSMISSION CONTROL SYSTEM (4L30-E)

UART



CLASS 2



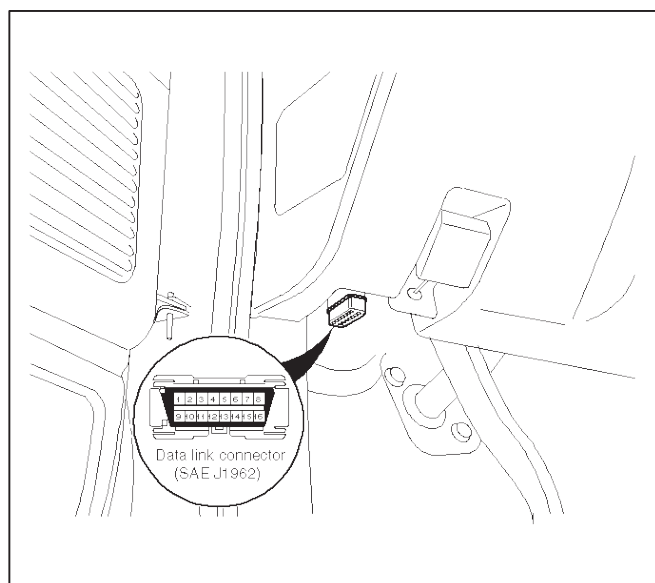
Class 2 data is also pulse width modulated. Each bit of information can have one of two lengths: long or short. On the other hand, UART data bits come in only one length (short). The pulse width modulation of Class 2 data allows better utilization of the data line.

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).

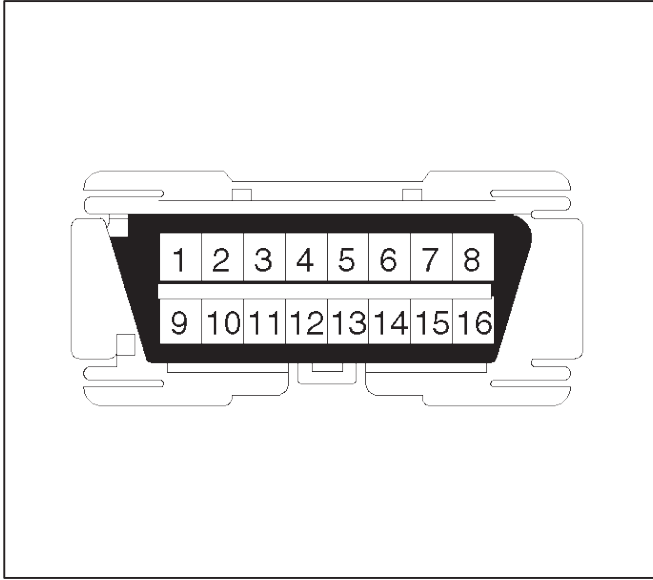
16 – Terminal Data Link Connector (DLC)

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.



C07RT006

826RW002



810RT022

PIN 1 –	(Not used)
PIN 2 –	J1850 Bus + L line on 2-wire systems, or single wire (Class 2)
PIN 3 –	(Not used)
PIN 4 –	Chassis ground pin
PIN 5 –	Signal ground pin
PIN 6 –	(Not used)
PIN 7 –	(Not used)
PIN 8 –	(Not used)
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 6VD1 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 6VD1 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.

7A1-22 TRANSMISSION CONTROL SYSTEM (4L30-E)

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. The 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 engine room and is the control center of the electronic transmission control system.
2. The PCM must be maintained at a temperature below 85°C (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. Electromagnetic 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 or, if you notice the reported symptom during the test drive, trigger the snapshot manually.

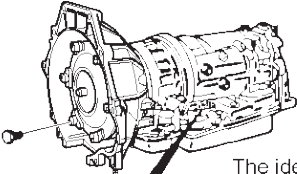
After the snapshot has been triggered, command the Tech 2 to play back the flow of data recorded from each of the various sensors. Sign of an intermittent fault in a sensor circuit is a sudden unexplainable jump in data values out of the normal range.

7A1-24 TRANSMISSION CONTROL SYSTEM (4L30-E)

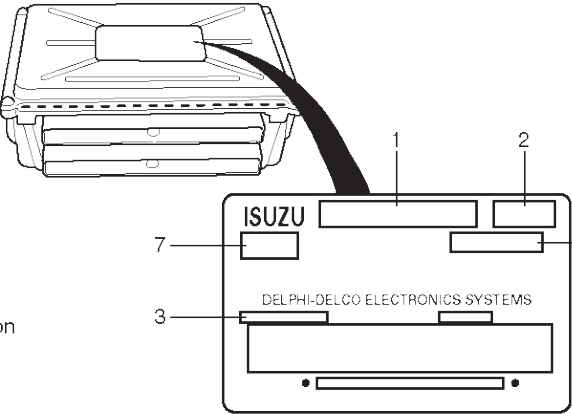
Transmission and PCM Identification

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 / Rodeo	3.2L V6	4.100	8-12206-369-0	I36	8-96018-555-0	FT (4×4)
			8-12206-359-0	I36	8-96022-838-0	FU (4×2)



The identification plate is located on the left-hand side of the transmission above the mode switch.



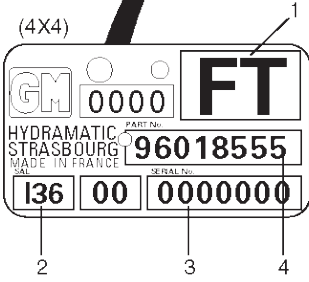
AT Transmission identification on vehicle identification plate :

1. Model code
2. Calibration code
3. Production serial number
4. Production part number

PCM IDENTIFICATION:

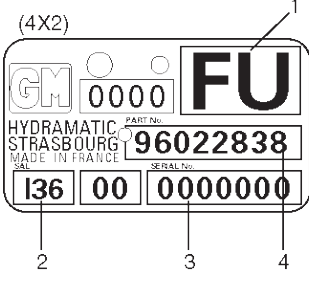
1. ISUZU part number
2. Broadcast code
3. Service number
4. Engine size
5. Transmission type
6. Emission / Designation
7. Mode name

(4X4)



1. Model code (FT)
2. Calibration code (I36)
3. Production serial number (00)
4. Production part number (0000000)

(4X2)



1. Model code (FU)
2. Calibration code (I36)
3. Production serial number (00)
4. Production part number (0000000)

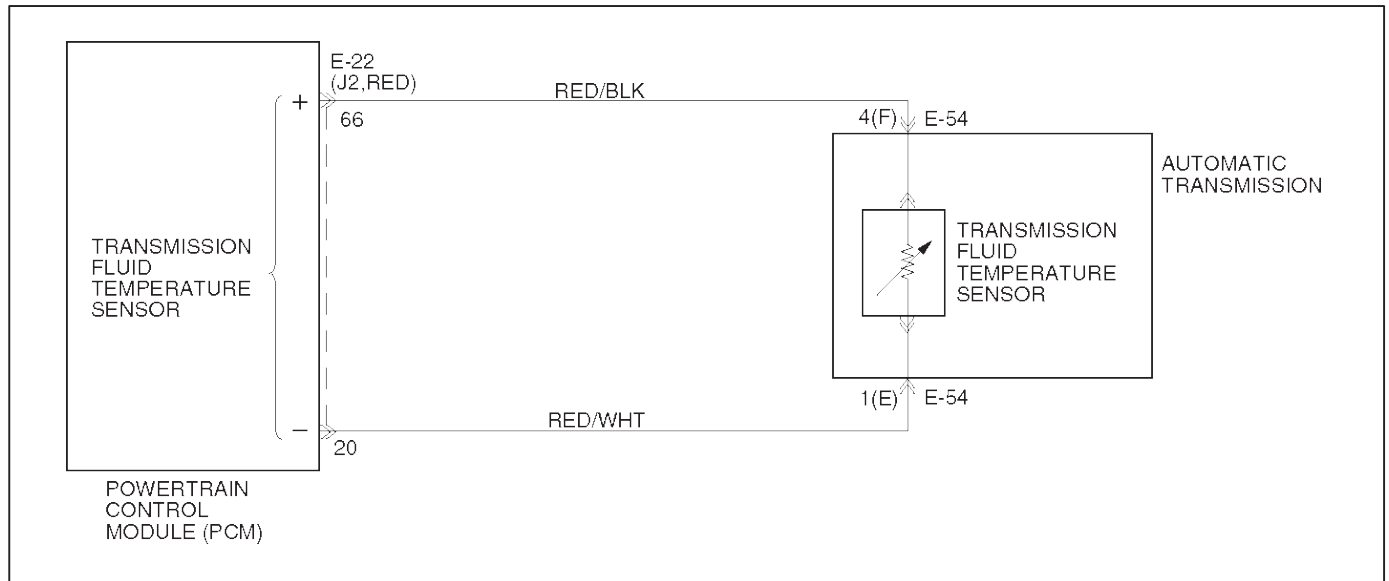
Diagnostic Trouble Code (DTC) Identification

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

NOTE: On the following charts, refer to Powertrain Control Module (PCM) section for Wiring System and the Body and Accessories section for circuit diagram details, parts location, and connector configuration.

DTC P0218 Transmission Fluid Over Temperature



D07RY00029

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.

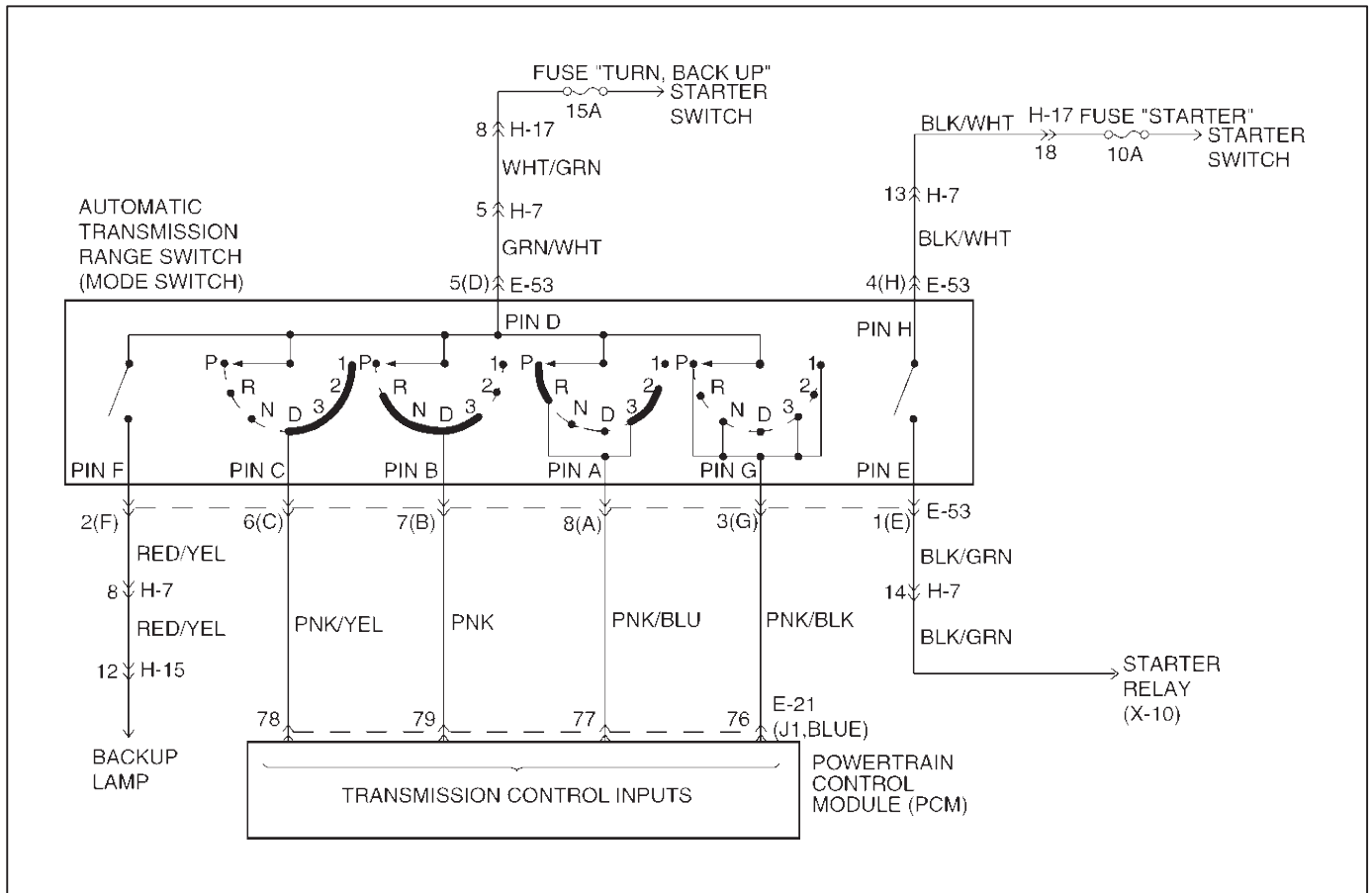
Test Description

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 0.33 volts?	Go to Step 4	Go to Diagnostic Aids
4	1. Turn the ignition "off". 2. Disconnect the transmission 7-way connector E-54 (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**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-53 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.

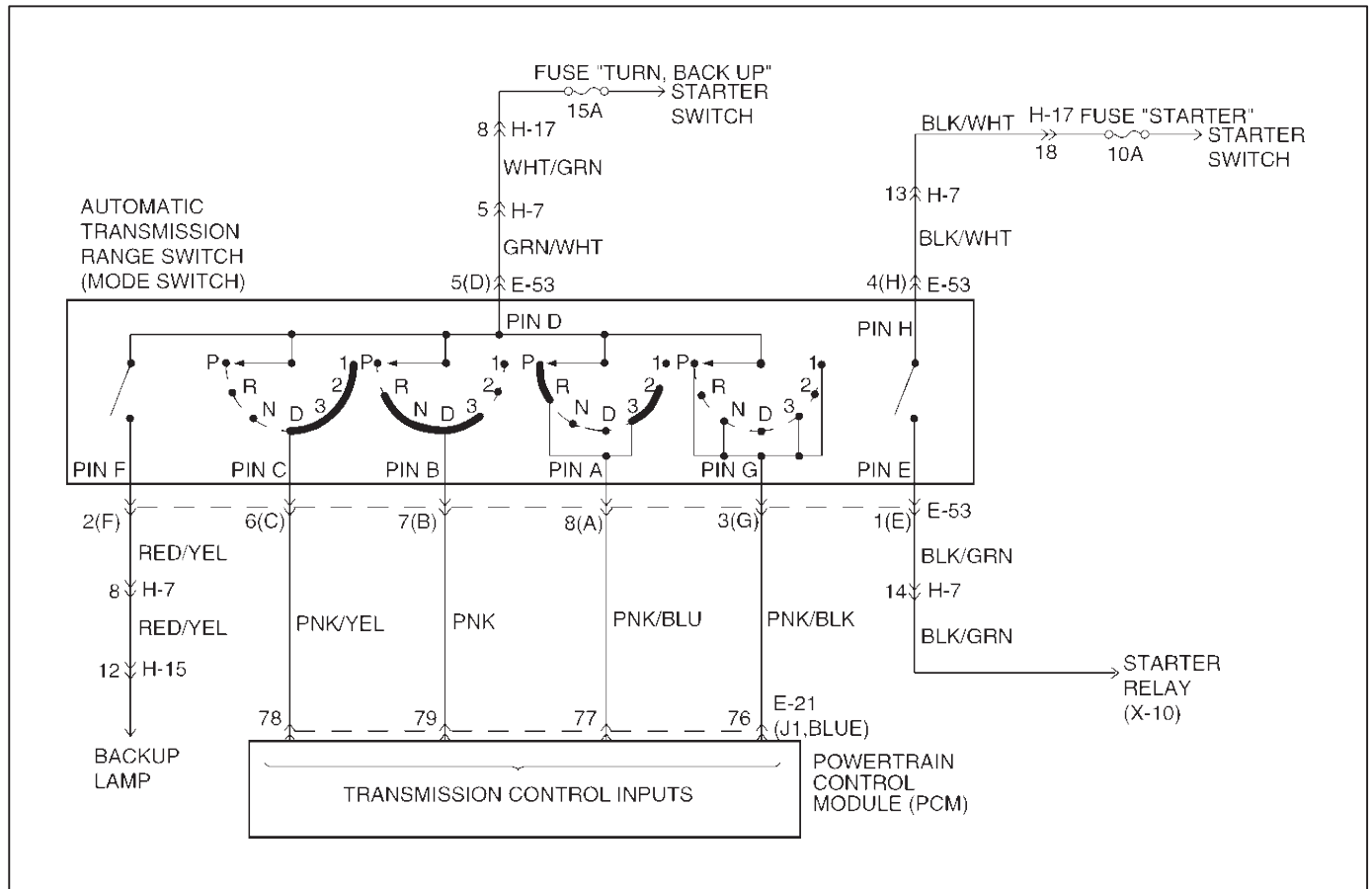
Range Switch Logic Table

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

7A1-30 TRANSMISSION CONTROL SYSTEM (4L30-E)**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



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-53 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.

7A1–32 TRANSMISSION CONTROL SYSTEM (4L30–E)

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.

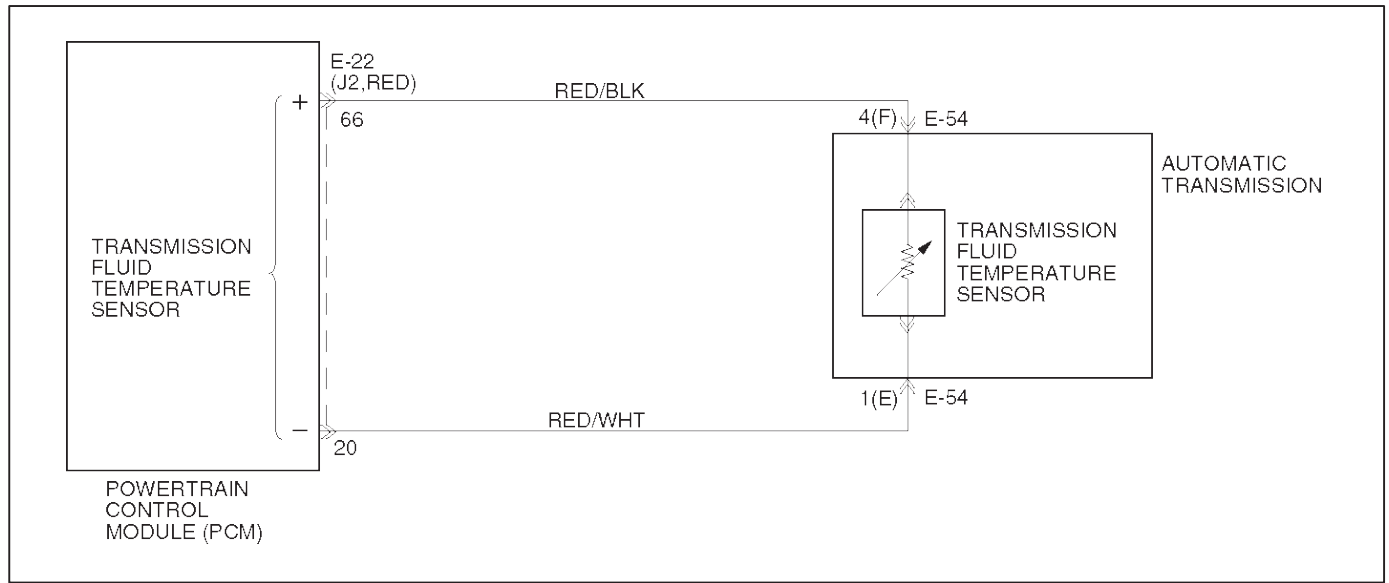
Range Switch Logic Table

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



D07RY00029

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 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 bent terminal
 - A backed out terminal
 - A damaged terminal
 - Poor terminal tension
 - A chafed wire
 - 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:

- This test checks PCM and associated wiring up to the 7–way connector E–54. If the voltage increases to match chart the problem is isolated to the transmission wiring.

Resistance Chart

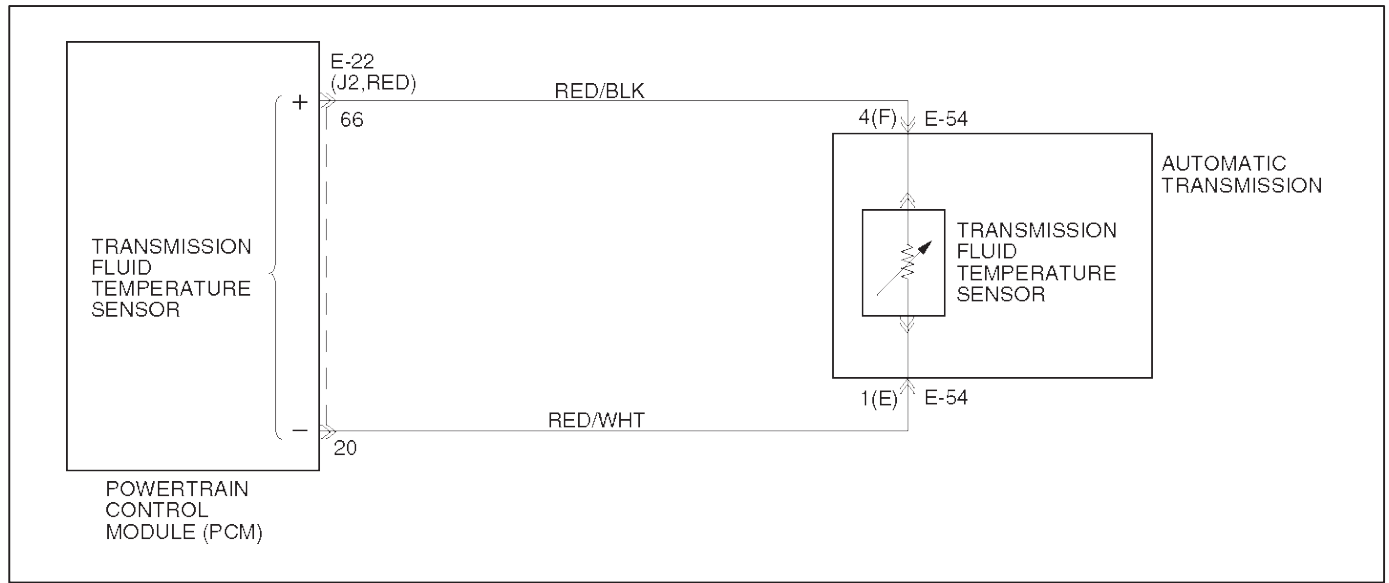
°C	°F	Resistance (kΩ)
–40	–40	672
0	32	65
20	68	25
80	176	2.5
120	248	0.78
150	304	0.37

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 J2–66 and J2–20 to the transmission 7–way connector E–54. Does the TFT change by more than $\pm 20^{\circ}\text{C}$ (36°F)?	Go to Step 6	Go to Step 4
4	1. Turn the ignition “off”. 2. Disconnect the transmission 7–way connector E–54. 3. Install Jumper Harness on the transmission side of the 7–way connector E–54. 4. Using the J39200 DVOM and J35616 Connector Test Adapter Kit, connect the DVOM leads from terminal E54–4(F) to terminal E54–1(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. 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	—

7A1-36 TRANSMISSION CONTROL SYSTEM (4L30-E)**DTC P0711 Transmission Fluid Temperature (TFT) Sensor Performance (Cont'd)**

Step	Action	Yes	No
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
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

D07RY00029

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.

7A1-38 TRANSMISSION CONTROL SYSTEM (4L30-E)

Resistance Chart

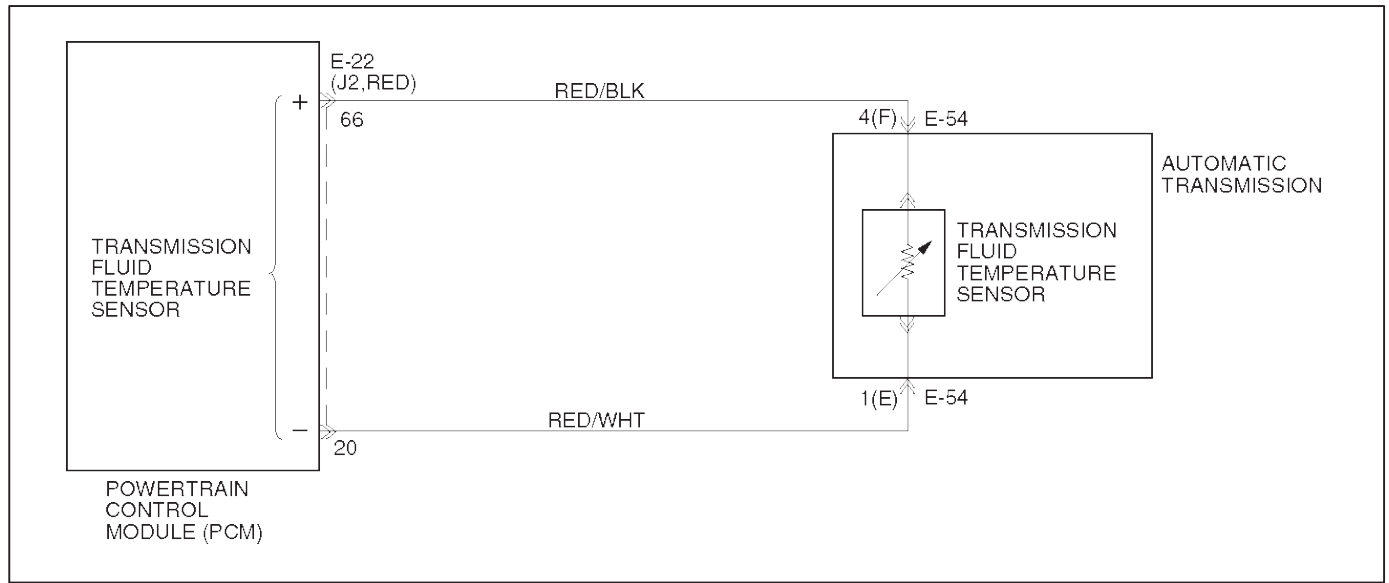
°C	°F	Resistance (kΩ)
-40	-40	672
0	32	65
20	68	25
80	176	2.5
120	248	0.78
150	304	0.37

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-54. 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 E54-4(F) and E54-1(E). Is the resistance within specifications? (See Resistance Chart.)	Go to Diagnostic Aids	Go to Step 6
6	1. Disconnect the transmission 7-way connector E-54. 2. Using the J39200 DVOM, measure the resistance between terminals E54-4(F) and E54-1(E). Is the resistance within specifications? (See Resistance Chart.)	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

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

Step	Action	Yes	No
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 Resistance Chart.)	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
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

D07FY00029

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.

Resistance Chart

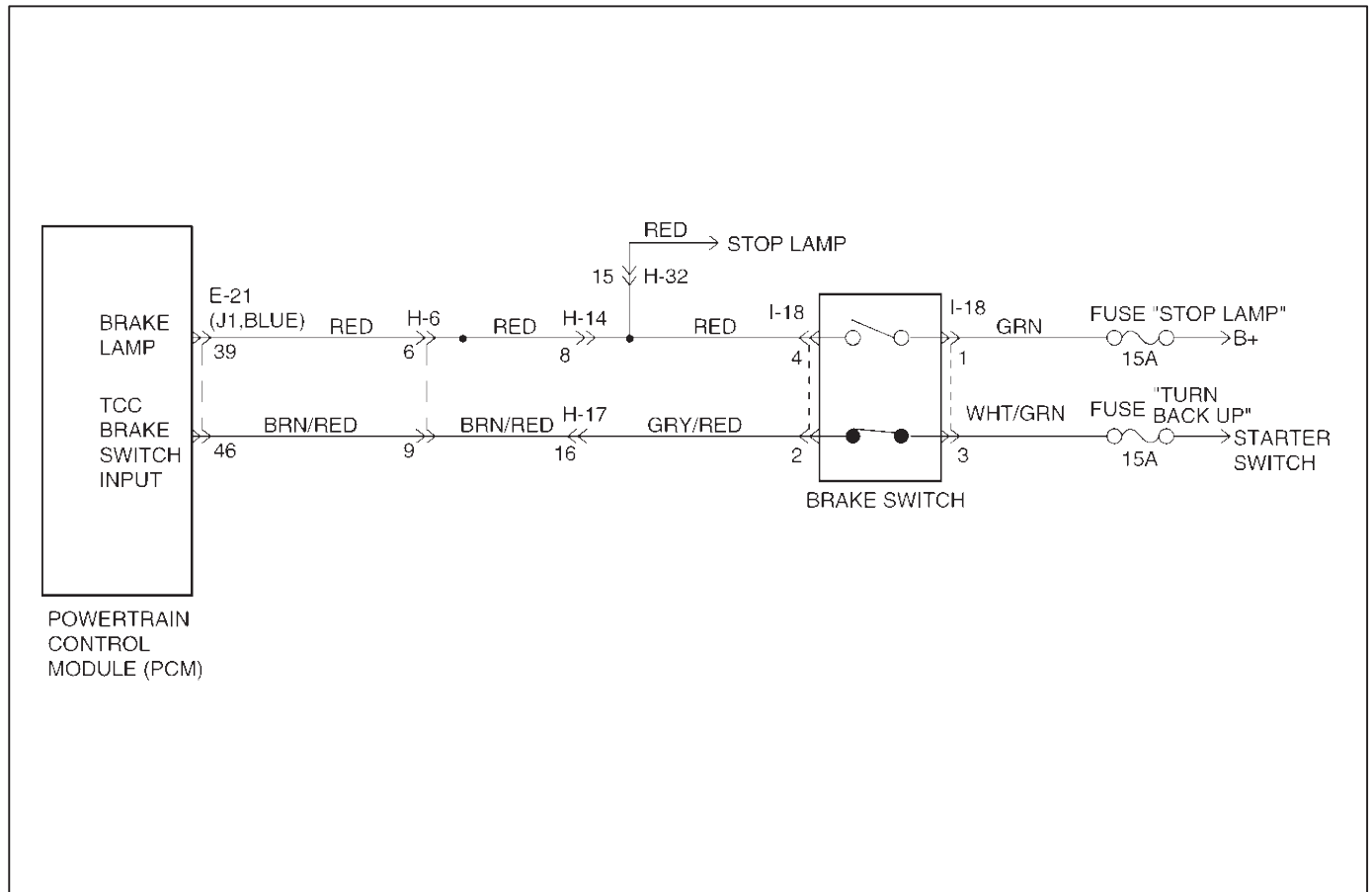
°C	°F	Resistance (kΩ)
–40	–40	672
0	32	65
20	68	25
80	176	2.5
120	248	0.78
150	304	0.37

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–54. 3. Install a fused jumper wire from terminal E54–4(F) to E54–1(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 E54–4(F) and E54–1(E). Is the resistance within specifications? (See Resistance Chart.)	Go to Diagnostic Aids	Go to Step 6
6	1. Disconnect the transmission 7–way connector E–54. 2. Using the J39200 DVOM, measure the resistance between terminals E54–4(F) and E54–1(E). Is the resistance within specifications? (See Resistance Chart.)	Go to Diagnostic Aids	Go to Step 7

7A1-42 TRANSMISSION CONTROL SYSTEM (4L30-E)**DTC P0713 Transmission Fluid Temperature (TFT) Sensor Circuit High Input (Cont'd)**

Step	Action	Yes	No
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 Resistance Chart.)	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	—
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)**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 GRY/RED-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.

7A1-44 TRANSMISSION CONTROL SYSTEM (4L30-E)

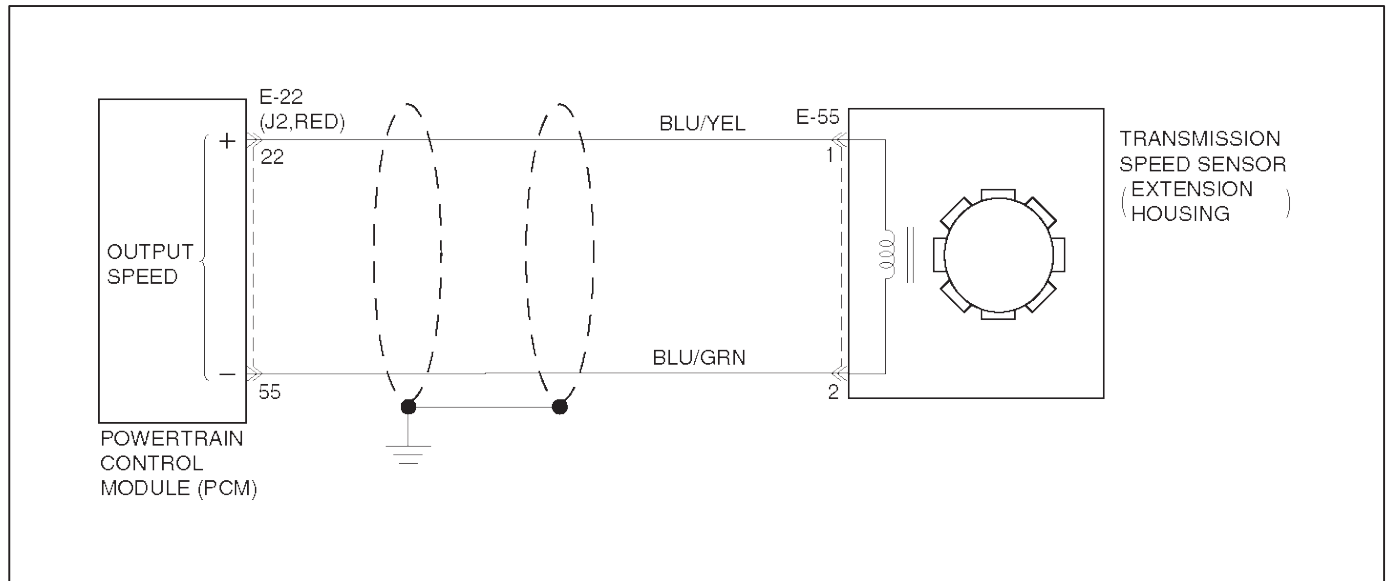
Test Description

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 I18-3 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 I18-2 to terminal I18-3 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 "ECM" (15A). 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 GRY/RED-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 GRY/RED-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 TCC 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

D07RY00032

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:

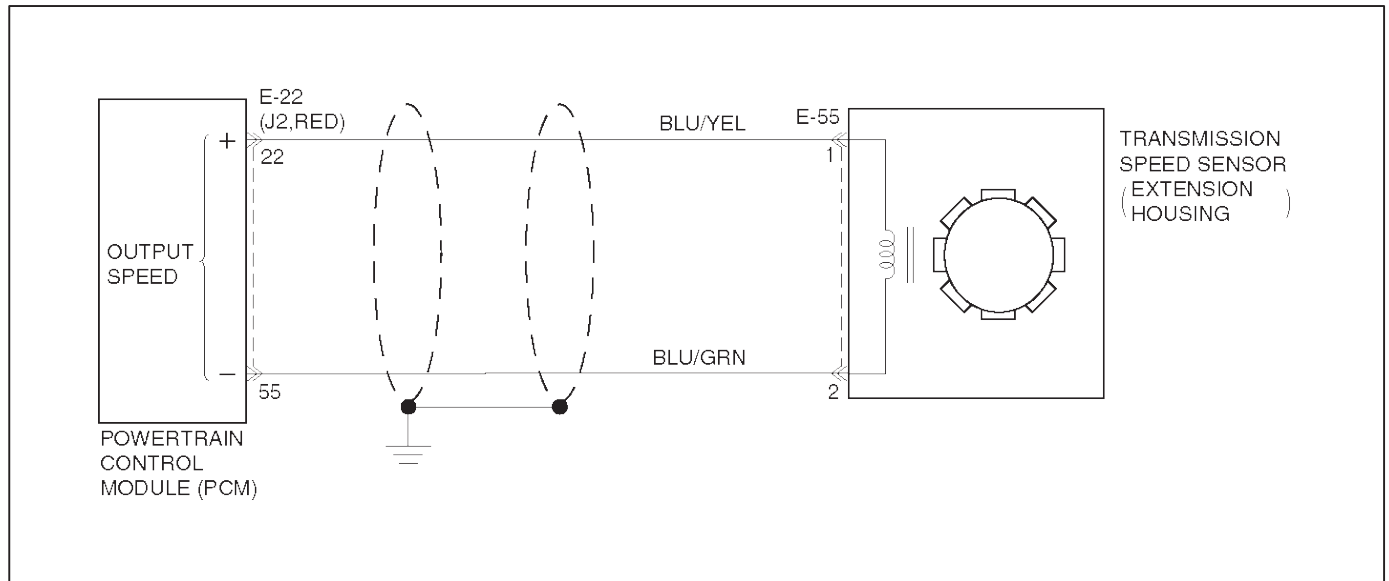
4. This test checks the OSS circuit.
5. This test checks the integrity of the OSS.
7. This test checks the 5-volt and ground circuit of the PCM.

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 J2 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between harness connector terminals J2-22 and J2-55. 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 J2 (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 E55-1 and E55-2. 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 Housing) 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

7A1-48 TRANSMISSION CONTROL SYSTEM (4L30-E)**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

D07RY00032

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: Filtered 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:

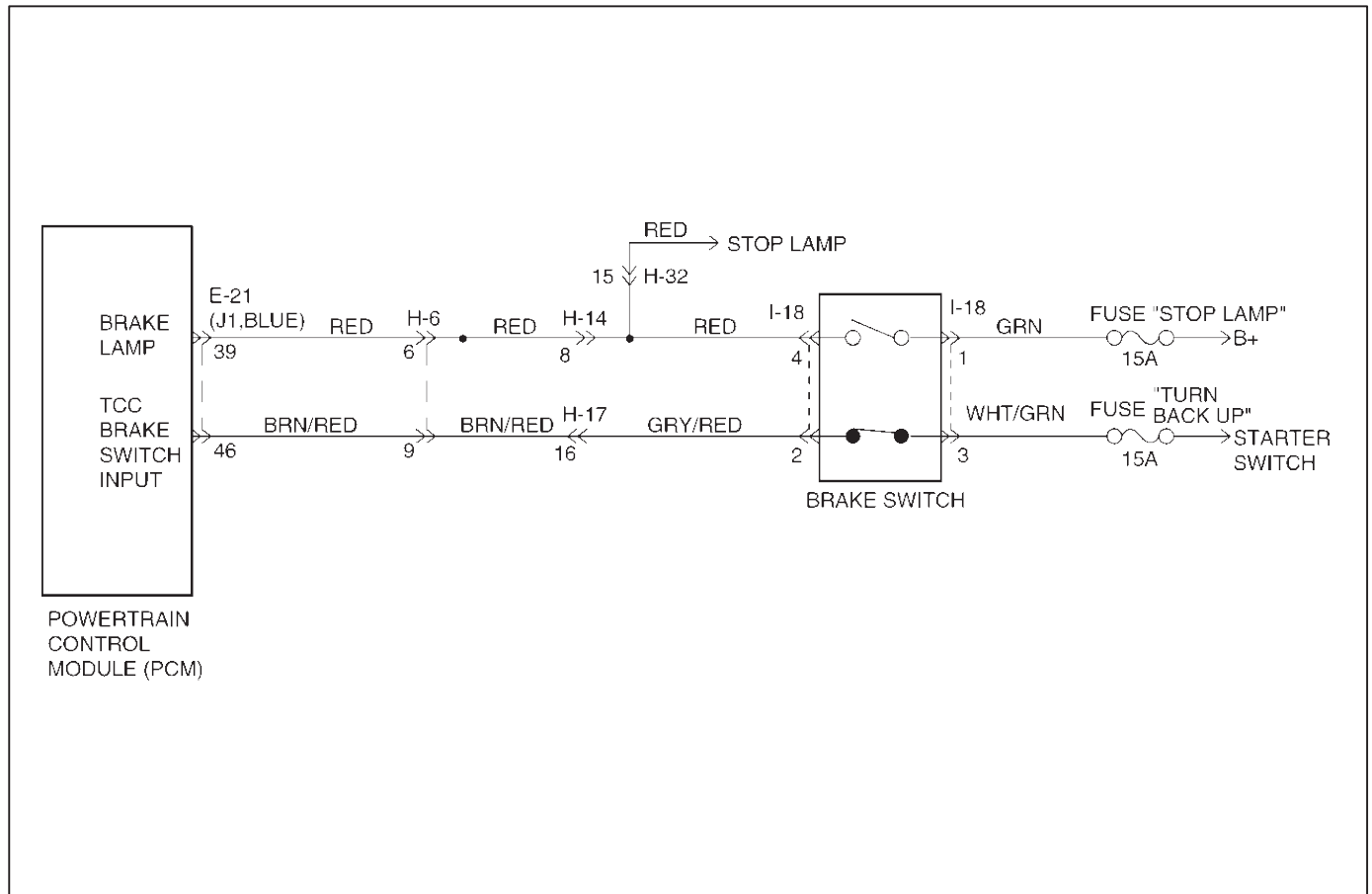
4. This test checks the OSS circuit.
5. This test checks the integrity of the OSS.
7. This test checks the 5-volt and ground circuit of the PCM.

7A1-50 TRANSMISSION CONTROL SYSTEM (4L30-E)**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 J2 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between harness connector terminals J2-22 and J2-55. 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 J2 (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 E55-1 and E55-2. 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 Housing) 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)

D07R100018

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 GRY/RED-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

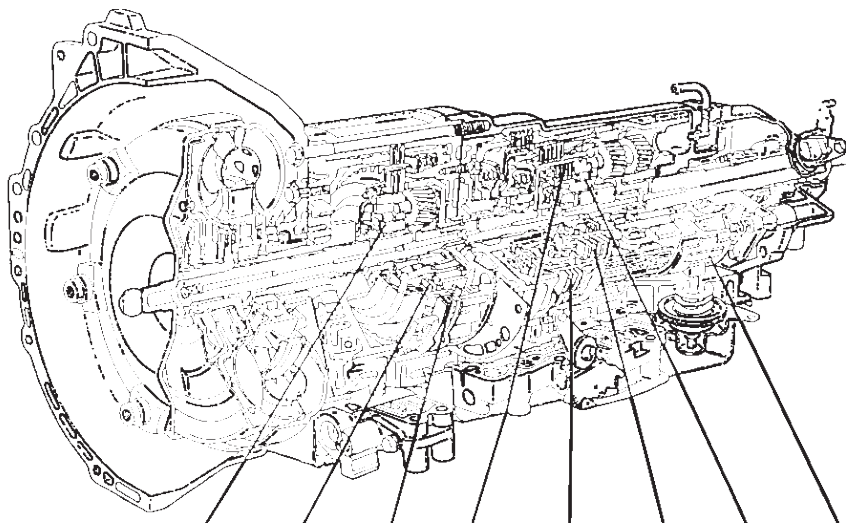
The numbers below refer to the step numbers on the diagnostic chart.

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 “TCC 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 GRY/RED–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 TCC 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 ROLLER CLUTCH (OFW)	OVERRUN CLUTCH (OC)	FOURTH CLUTCH (C4)	THIRD CLUTCH (C3)	REVERSE CLUTCH (RC)	SECOND CLUTCH (C2)	PRINCIPLE SPRAG ASSEMBLY (PFW)	BAND ASSEMBLY (B)	ENGINE BRAKING
P-N		OFF	ON		APPLIED							NO
R	REVERSE	OFF	ON	LD	APPLIED			APPLIED		LD		NO
D	1ST	OFF	ON	LD	APPLIED					LD	APPLIED	NO
	2ND	ON	ON	LD	APPLIED				APPLIED	FW	APPLIED	YES
	3RD	ON	OFF	LD	APPLIED		APPLIED		APPLIED	NE		YES
	4TH	OFF	OFF	FW		APPLIED	APPLIED		APPLIED	NE		YES
3	1ST	OFF	ON	LD	APPLIED					LD	APPLIED	NO
	2ND	ON	ON	LD	APPLIED				APPLIED	FW	APPLIED	YES
	3RD	ON	OFF	LD	APPLIED		APPLIED		APPLIED	NE		YES
2	1ST	OFF	ON	LD	APPLIED		APPLIED			LD	APPLIED	YES
	2ND	ON	ON	LD	APPLIED				APPLIED	FW	APPLIED	YES
L	1ST	OFF	ON	LD	APPLIED		APPLIED			LD	APPLIED	YES

LD : LOCKED IN DRIVE

FW : FREEWHEELING

NE : NOT EFFECTIVE

D07RT015

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.
- No Transmission Range Switch DTC(s) P0705, P0706.
- Not in Park, Neutral or Reverse.
- Engine speed is greater than 3500 rpm.

- 3 seconds since upshift.
- 3 seconds since downshift.
- 3 seconds since garage shift (N→D).
- And one of the following conditions occur:
 - Slip is greater than 720 rpm in 1st gear.
 - Slip is greater than 680 rpm in 2nd gear.
 - Slip is greater than 660 rpm on 3rd gear.
 - Slip is greater than 650 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 specifications, 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	Inspect the transmission fluid level and condition. 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

7A1-56 TRANSMISSION CONTROL SYSTEM (4L30-E)**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 any one 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

Circuit Description

The PCM energizes the TCC solenoid by creating a 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 an 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 3000 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.

7A1–58 TRANSMISSION CONTROL SYSTEM (4L30–E)

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.

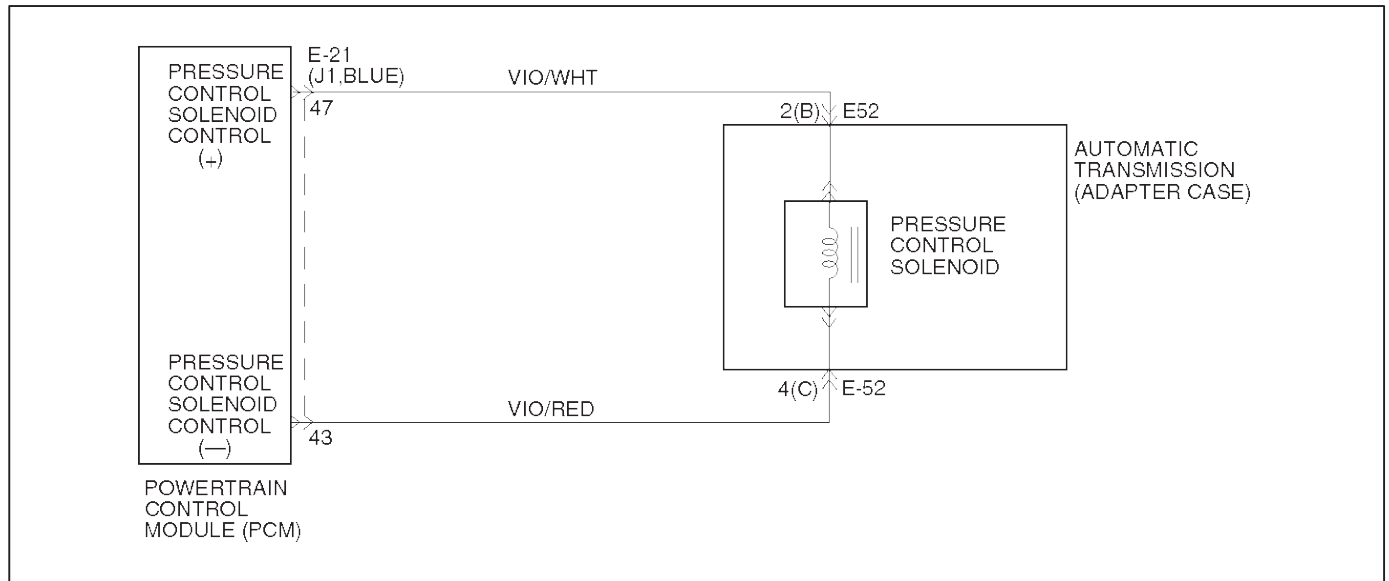
Test Description

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 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. 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

D07RY00034

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 milliamperes (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 difference between commanded and actual current is 200 milliamperes (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.

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.

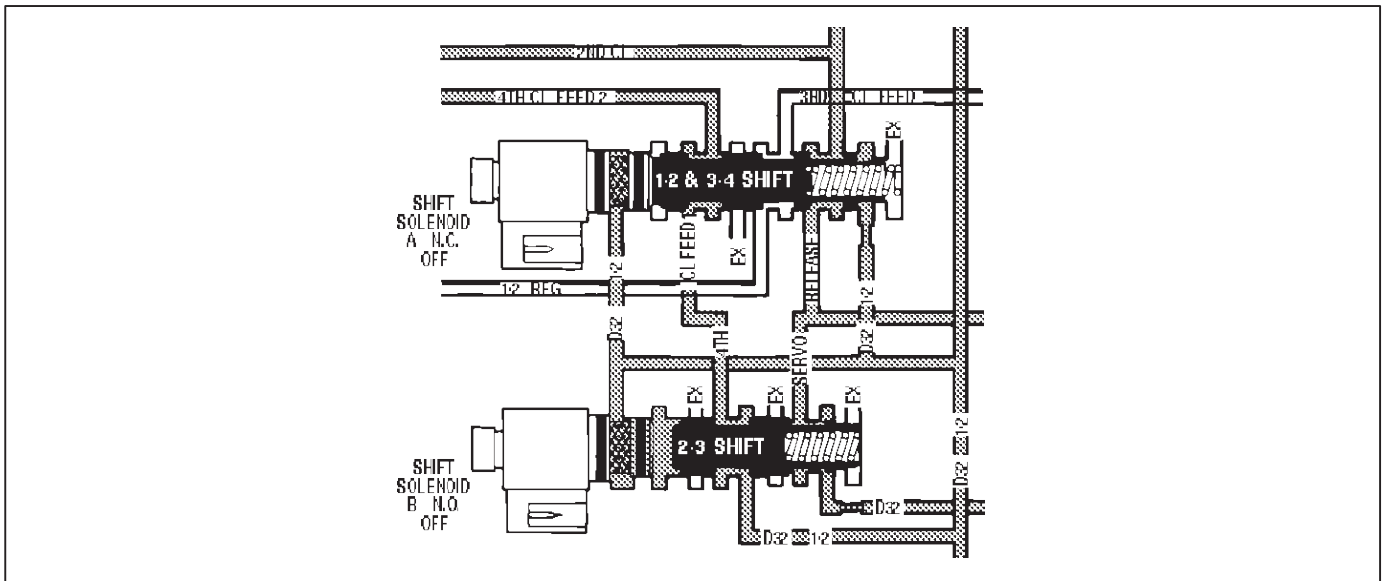
Test Description

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.

7A1-60 TRANSMISSION CONTROL SYSTEM (4L30-E)**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-52. 3. Using the J39200 DVOM, measure the resistance between terminals E52-2(B) and E52-4(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)

D07RT01

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.
- $40 \leq \text{Engine Torque} \leq 400 \text{ N}\cdot\text{m}$
- Speed ratio ≥ 0.6
- Throttle position $\geq 10 \%$
- $800 \leq \text{TCC Slip} \leq 4000 \text{ rpm}$
- $2.75 \leq \text{Modeled Ratio} \leq 3.2$ for 1 second.

Condition 2:

- 3rd gear is commanded for ≥ 1 second.
- $40 \leq \text{Engine Torque} \leq 400 \text{ N}\cdot\text{m}$
- Throttle position $\geq 10 \%$
- $-8000 \leq \text{TCC Slip} \leq 8000 \text{ rpm}$
- Speed ratio ≥ 0.45
- $0.62 \leq \text{Modeled Ratio} \leq 0.92$ 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.

7A1–62 TRANSMISSION CONTROL SYSTEM (4L30–E)

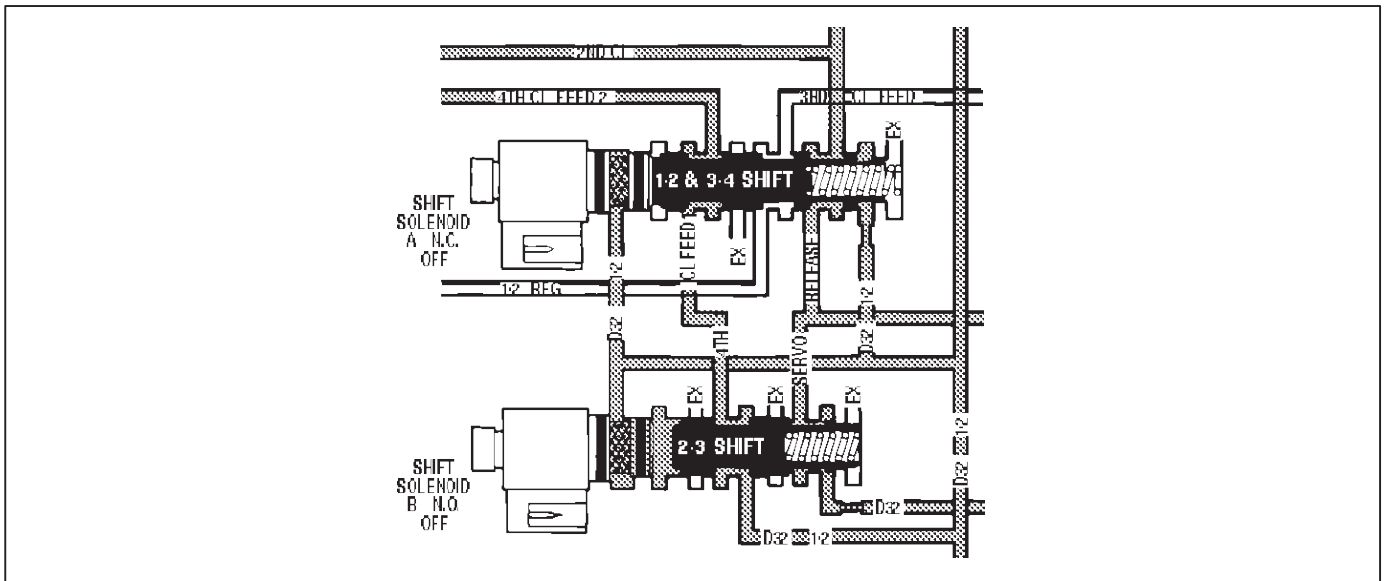
Test Description

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)

D07RT011

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
- $40 \leq \text{Engine Torque} \leq 400 \text{ N}\cdot\text{m}$
- Throttle positon $\geq 10\%$
- $-8000 \leq \text{TCC slip} \leq 8000 \text{ rpm}$
- Transmission out speed $\geq 375 \text{ rpm}$
- Speed ratio ≥ 0.3
- $1.5 \leq \text{Modeled Ratio} \leq 2.4$ for 0.687 seconds

Condition 2:

- 4th Gear is commanded for ≥ 1 sec.
- $40 \leq \text{Engine Torque} \leq 400 \text{ N}\cdot\text{m}$
- Trottle position $\geq 10\%$
- $-8000 \leq \text{TCC slip} \leq 8000 \text{ rpm}$
- Speed ratio ≥ 0.6
- $0.92 \leq \text{Modeled Ratio} \leq 1.5$ 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.

7A1-64 TRANSMISSION CONTROL SYSTEM (4L30-E)

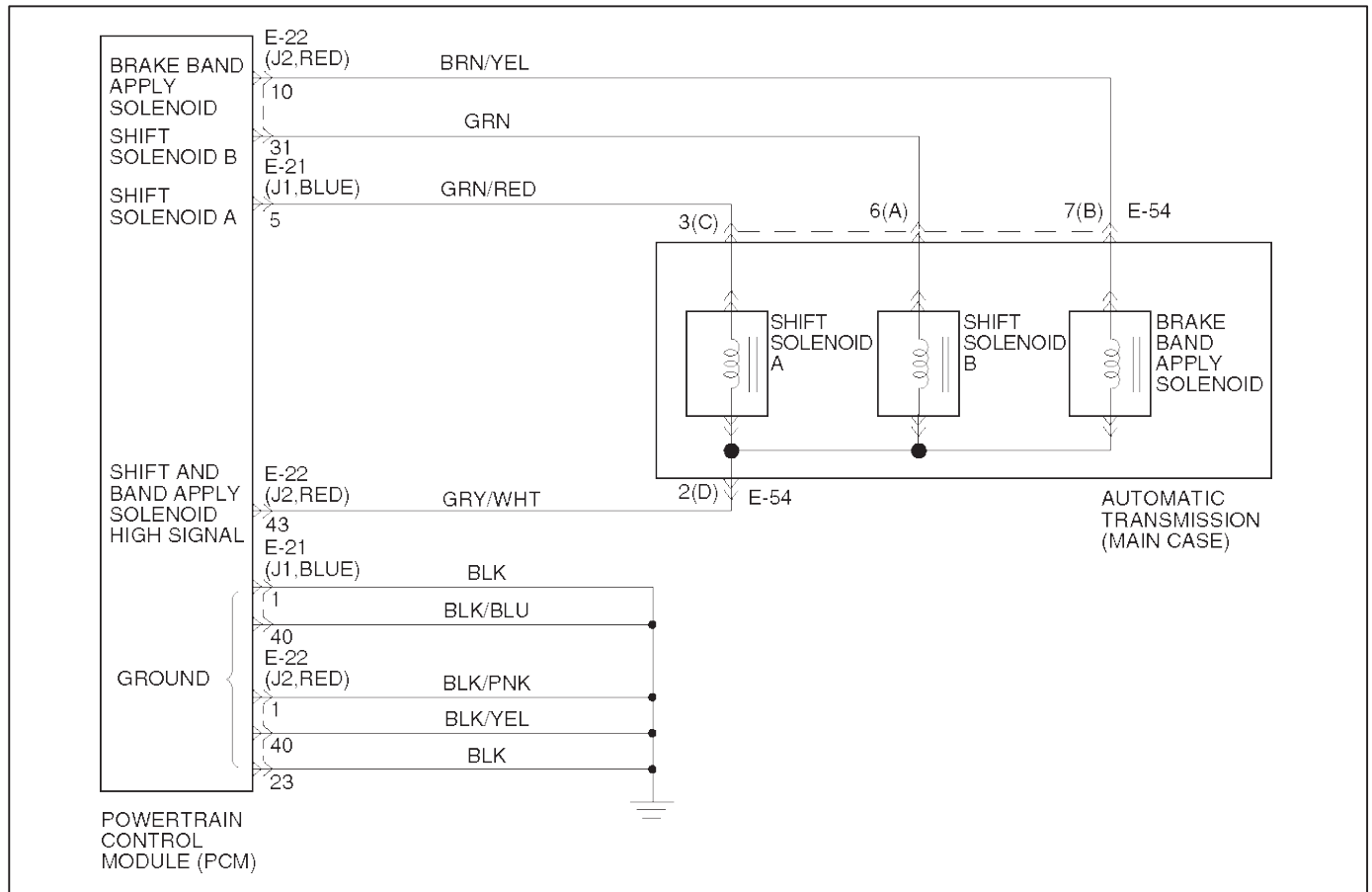
Test Description

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**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.

7A1–66 TRANSMISSION CONTROL SYSTEM (4L30–E)

- 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

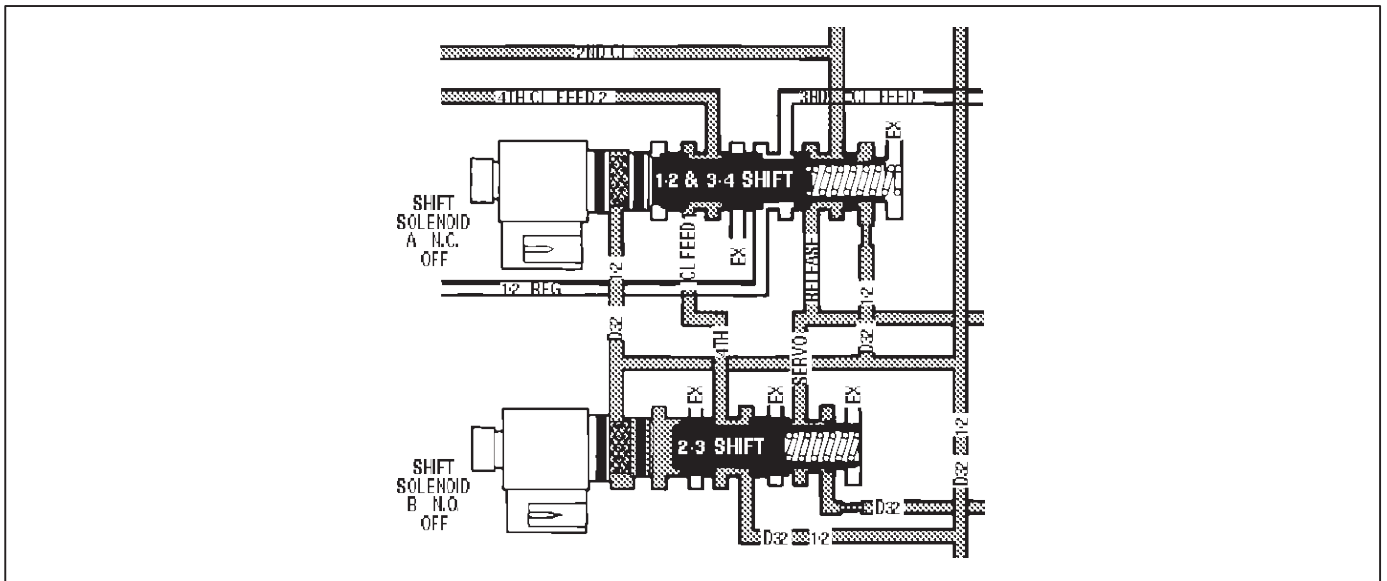
Gear	Shift solenoid A	Shift solenoid B
1st	OFF	ON
2nd	ON	ON
3rd	ON	OFF
4th	OFF	OFF

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 J2–43 and J1–1 (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 J1 (BLUE) and J2 (RED) PCM connector. 3. Turn the ignition "on". 4. Using the J39200 DVOM, measure the voltage between PCM connector terminals J1–5 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 J1 (BLUE) and J2 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between PCM connector terminals J2–43 and J1–5. Is the resistance within 18 – 20 ohms?	Go to Step 6	Go to Step 8
6	1. Disconnect the J1 (BLUE) and J2 (RED) PCM connectors. 2. Using the J39200 DVOM, check a continuity between PCM terminals J1–5 and ground. Is there a continuity?	Go to Step 11	Go to Step 7
7	Using the J39200 DVOM, check a continuity between J2 (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-54. 2. Using the J39200 DVOM, measure the resistance between terminals E54-2(D) and E54-3(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 J1-5 and transmission harness terminal E54-3(C) is shorted to voltage. Was a problem found and corrected?	Go to Step 17	—
11	The wiring harness between PCM connector terminal J1-5 and transmission harness terminal E54-3(C) is shorted to ground. Was a problem found and corrected?	Go to Step 17	—
12	The wiring harness between PCM connector terminals J2-43 and transmission harness terminal E54-2(D) is shorted to ground. Was a problem found and corrected?	Go to Step 17	—
13	The wiring harness between PCM connector J1 or J2 and transmission 7-way connector E-54 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
- $40 \leq \text{Engine Torque} \leq 400 \text{ N}\cdot\text{m}$
- Throttle position $\geq 10 \%$
- $-2300 \leq \text{TCC Slip} \leq 200 \text{ rpm}$
- Transmission output speed $\geq 400 \text{ rpm}$
- Speed ratio ≥ 0.3
- $0.60 \leq \text{Modeled Ratio} \leq 1.49$ for 1 second.

Condition 2:

- 2nd gear is commanded for ≥ 1 second
- $40 \leq \text{Engine Torque} \leq 400 \text{ N}\cdot\text{m}$
- Throttle position $\geq 10 \%$
- $-8000 \leq \text{TCC Slip} \leq 8000 \text{ rpm}$
- Speed ratio ≥ 0.6
- $0.92 \leq \text{Modeled Ratio} \leq 1.5$ 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

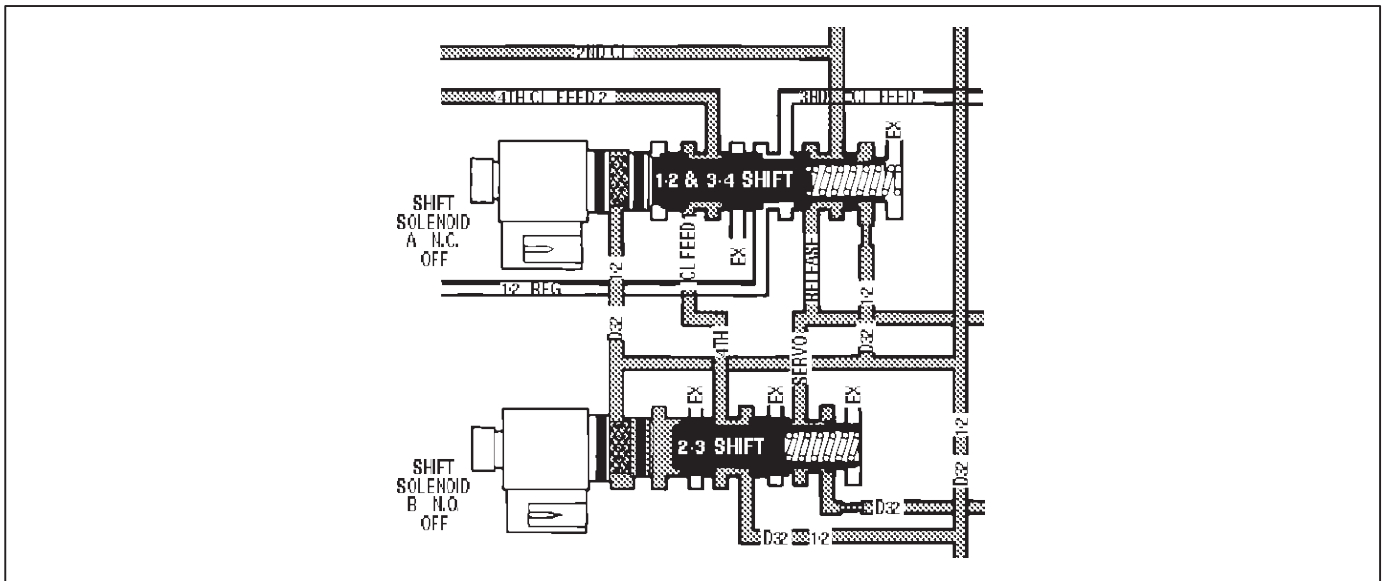
The numbers below refer to the step numbers on the diagnostic chart:

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
- $40 \leq \text{Engine Torque} \leq 400 \text{ N}\cdot\text{m}$
- Throttle positon $\geq 10\%$
- $-8000 \leq \text{TCC slip} \leq 8000 \text{ rpm}$
- Transmission out speed $\geq 375 \text{ rpm}$
- Speed ratio ≥ 0.6
- $1.44 \leq \text{Modeled Ratio} \leq 2.4$ for 4 seconds

Condition 2:

- 4th Gear is commanded for ≥ 1 second
- $15 \leq \text{Engine Torque} \leq 400 \text{ N}\cdot\text{m}$
- Trottle position $\geq 10\%$
- $-8000 \leq \text{TCC slip} \leq 8000 \text{ rpm}$
- Speed ratio ≥ 0.6
- $2.75 \leq \text{Modeled Ratio} \leq 3.2$ 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

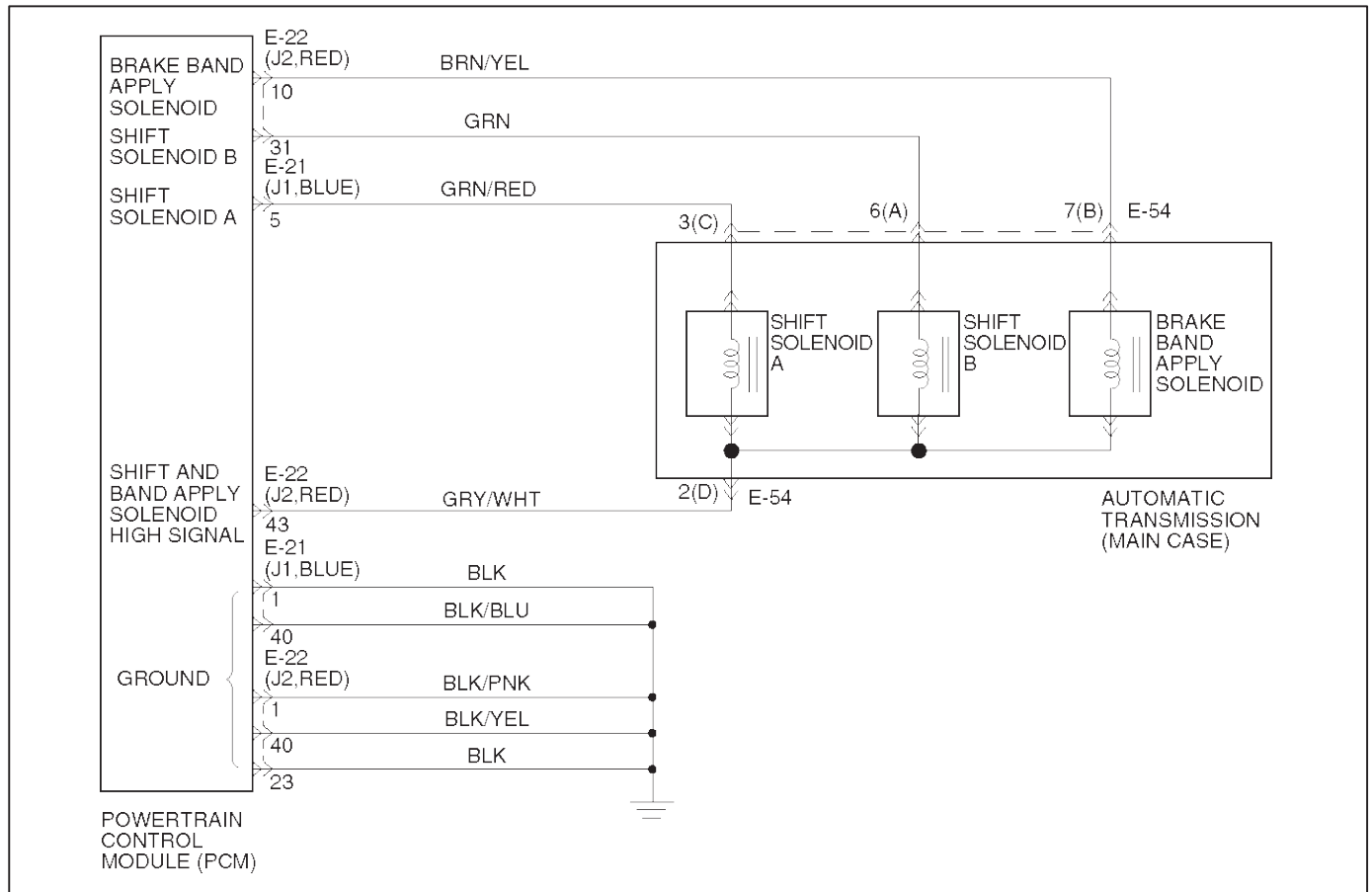
The numbers below refer to the step numbers on the diagnostic chart:

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 1-2-2-1 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

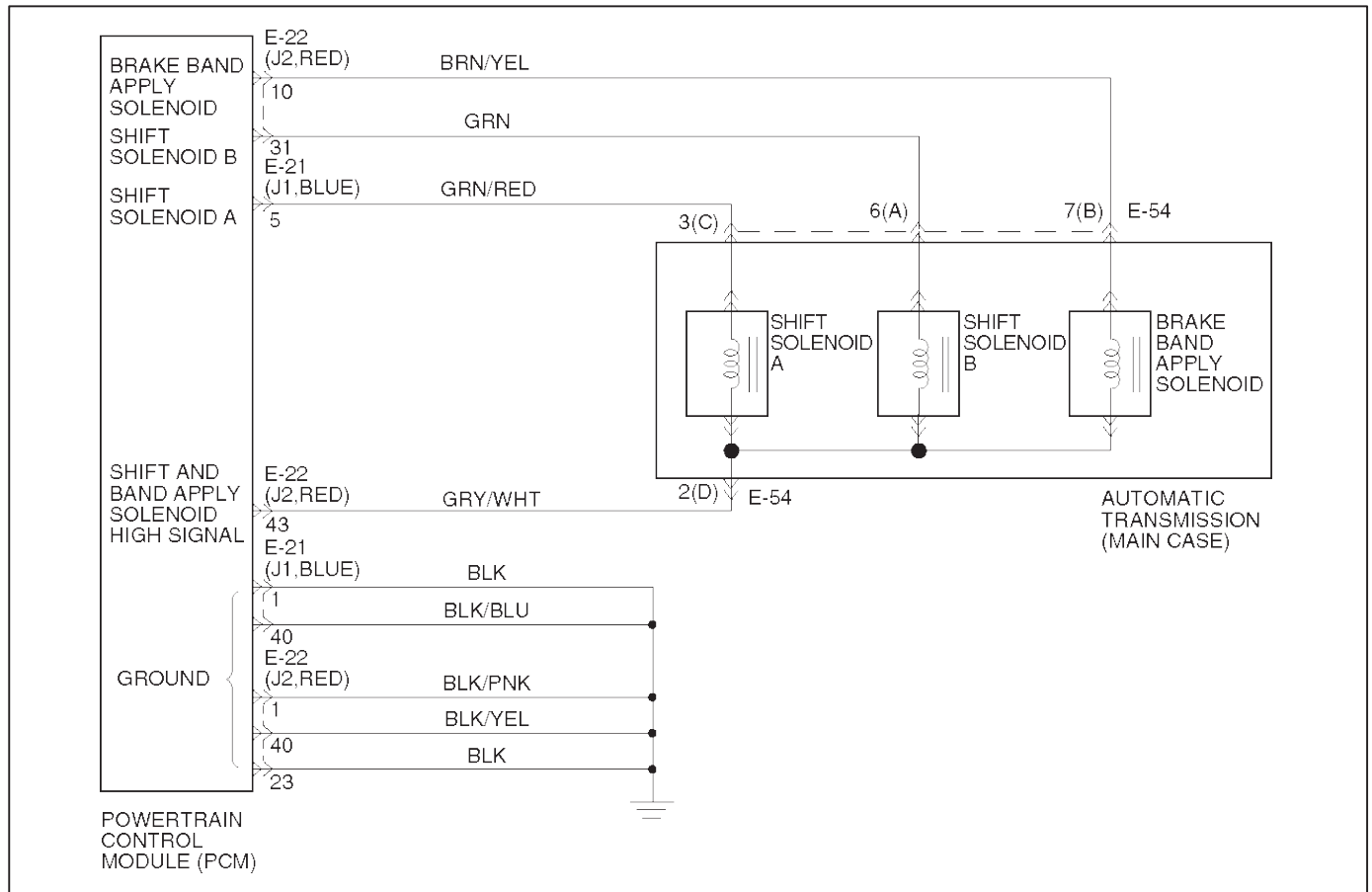
7A1-74 TRANSMISSION CONTROL SYSTEM (4L30-E)**DTC P0758 Shift Solenoid B Electrical**

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 J1 (BLUE) and J2 (RED) PCM connectors. 3. Turn the ignition "on". 4. Using the J39200 DVOM, measure the voltage between PCM connector terminals J2-31 and J2-1. 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 J2-31 and J2-43. Is the resistance within 18 – 20 ohms?	Go to Step 14	Go to Step 6
6	1. Disconnect the transmission main case connector E-54. 2. Using the J39200 DVOM, measure the resistance between terminals E54-6(A) and E54-2(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 J1 (BLUE) and J2 (RED) PCM connectors. 3. Using the J39200 DVOM, measure the resistance between PCM connector terminals J2-31 and J2-43. 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 J2-31 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 J2-43 and ground. Is there a continuity?	Go to Step 18	Go to Step 11
10	1. Disconnect the transmission main case connector E-54. 2. Using the J39200 DVOM, measure the resistance between terminals E54-6(A) and E54-2(D). Is the resistance within 18 – 20 ohms?	Go to Step 19	Go to Step 20
11	Check every connection of the PCM. Was a problem found and corrected?	Go to Step 22	Go to Step 12

DTC P0758 Shift Solenoid B Electrical (Cont'd)

Step	Action	Yes	No
12	1. Connect the J1 (BLUE) and J2 (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 J2-31 and transmission main case terminal E54-6(A) is shorted to voltage. Was a problem found and corrected?	Go to Step 22	—
14	The PCM internal terminal J2-31 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 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 J2-31 and transmission main case connector terminal E54-6(A) is shorted to ground. Was a problem found and corrected?	Go to Step 22	—
18	The wiring harness between PCM connector terminal J2-43 and transmission main case connector terminal E54-2(D) is shorted to ground. Was a problem found and corrected?	Go to Step 22	—
19	The wiring harness between PCM connector terminal J2-31 and transmission main case connector terminal E54-6(A), or between PCM connector terminal J2-43 and main case connector terminal E54-2(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



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.

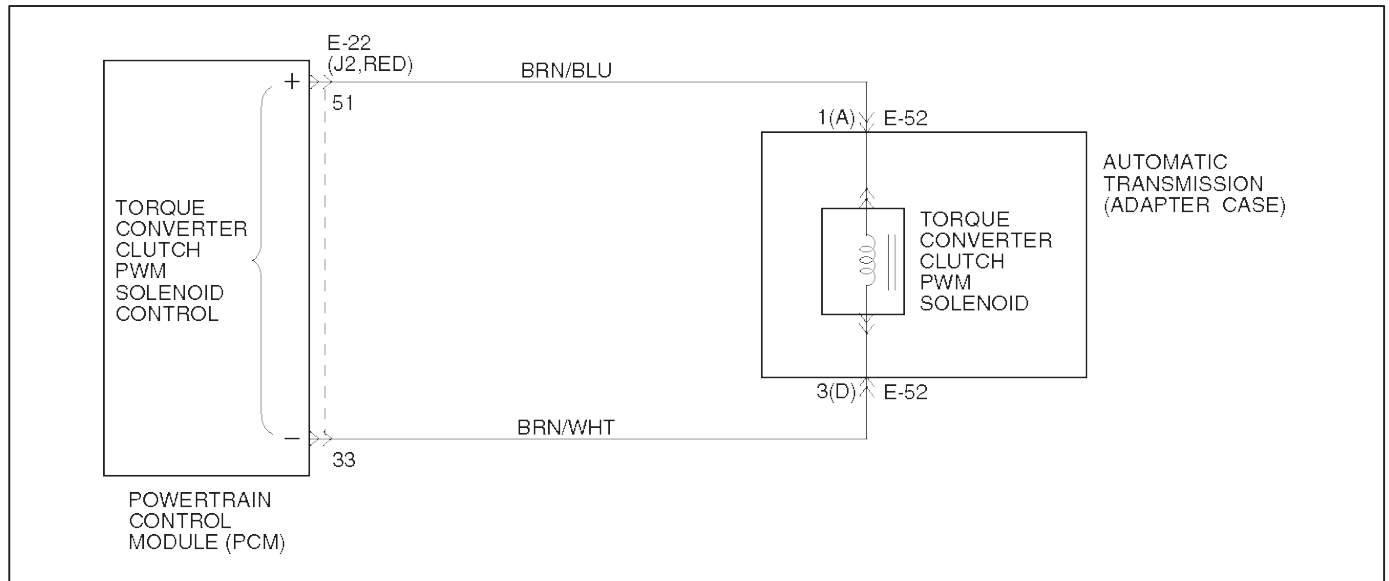
7A1-78 TRANSMISSION CONTROL SYSTEM (4L30-E)**DTC P1850 Brake Band Apply Solenoid Malfunction**

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 J2-43 and J2-1. 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 J1 (BLUE) and J2 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between PCM connector terminals J2-43 and J2-10. 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 J2-10 and J2-1. 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 J1 (BLUE) and J2 (RED) PCM connector. 3. Using the J39200 DVOM, check continuity between PCM terminal J2-43 and ground. Is there a continuity?	Go to Step 7	Go to Step 8
7	1. Disconnect the transmission main case connector E-54. 2. Using the J39200 DVOM, check continuity between the terminal E54-7(B) and ground. Is there continuity?	Go to Step 13	Go to Step 14
8	1. Disconnect the J1 (BLUE) and J2 (RED) PCM Connector. 2. Using the J39200 DVOM, measure the resistance between the PCM connector terminals J2-43 and J2-10. Is the resistance within 10-12 ohms?	Go to Step 19	Go to Step 9
9	1. Disconnect the transmission main case connector E-54. 2. Using the J39200 DVOM, measure the resistance between the terminals E54-7(B) and E54-2(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 J2-10 and ground. Is there continuity?	Go to Step 12	Go to Step 19
11	1. Disconnect the transmission main case connector E-54. 2. Using the J39200 DVOM, measure the resistance between the terminals E54-7(B) and E54-2(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-54. 2. Using the J39200 DVOM, check continuity between the terminals E54-7(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 J2-43 and the transmission main case connector terminal E54-2(D) is shorted to ground. Was a problem found and corrected?	Go to Step 20	—
15	The wiring harness between the PCM connector terminal J2-43 and the transmission main case connector terminal E54-2(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 J2-10 and the transmission main case connector terminal E54-7(B) is shorted ground. Was a problem found and corrected?	Go to Step 20	—
18	The wiring harness between the PCM connector terminal J2-10 and the transmission main case connector terminal E54-7(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 Solenoid Electrical



D07RY00036

Circuit Description

The PCM allows current to flow through the solenoid (0 or 12 volts). 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 solenoid feed drive fluid to feed to TCC signal circuit. The TCC signal fluid pressure acts on the torque converter clutch control valve. When the TCC control valve is in the apply position, line pressure is directed through the TCC valve to apply the torque converter clutch. The TCC 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 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 "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 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:

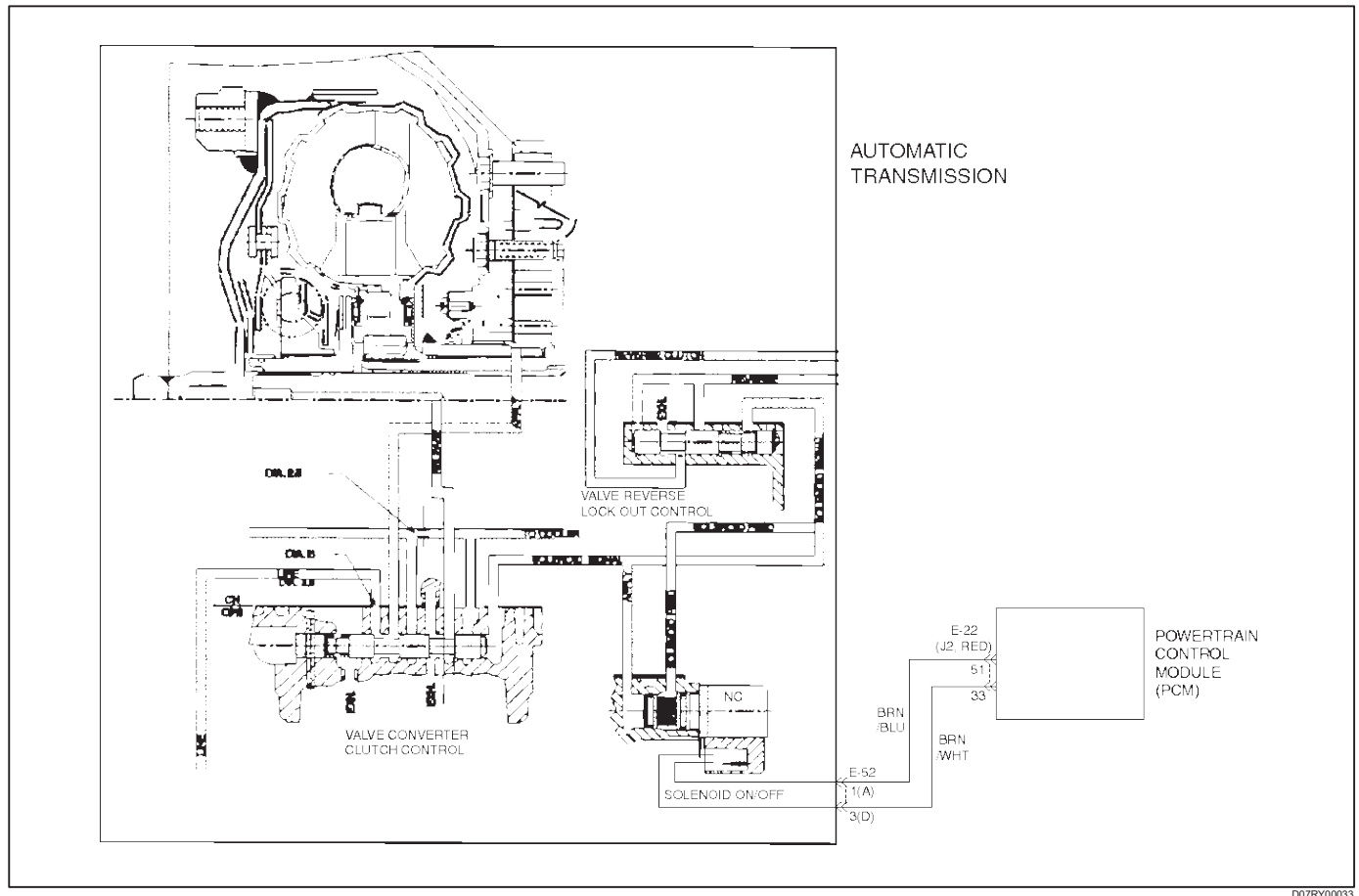
3. This test checks for voltage to the solenoid.
4. This test checks the ability of the PCM and wiring to control the ignition circuit.
8. This test checks the resistance of the TCC solenoid and the internal wiring harness.

DTC P1860 TCC 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 J2-51 and J2-33. 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 J2 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between PCM connector terminals J2-51 and J2-33. Is the resistance within 18 – 20 ohms?	Go to Step 7	Go to Step 8
6	The wiring harness between PCM connector terminal J2-51 and transmission adapter case connector terminal E52-1(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-52. Was a problem found and corrected?	Go to Step 15	Go to Step 16
8	1. Disconnect the transmission adapter case connector E-52. 2. Using the J39200 DVOM, measure the resistance between terminal E52-1(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 J2 (RED) PCM connector. 3. Using the J39200 DVOM, measure the resistance between terminals J2-51 and J2-33. Is the resistance within 18 – 20 ohms?	Go to Step 15	Go to Step 10
10	1. Disconnect the transmission adapter case connector E-52. 2. Using the J39200 DVOM, measure the resistance between terminal E52-1(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 J2 and adapter case connector E-52 is shorted to ground. Was a problem found and corrected?	Go to Step 17	—

7A1–82 TRANSMISSION CONTROL SYSTEM (4L30–E)**DTC P1860 TCC 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 J2–51 and adapter case terminal E52–1(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 J2–51, and transmission adapter case connector terminal E52–1(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)

D07RY00033

Circuit Description

The PCM monitors the difference in engine speed and transmission output speed. In D3 drive range with the TCC engaged, the engine speed should closely match transmission output speed.

This DTC detects excessive TCC slip when the TCC 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 1000 and 3500 rpm for 0.5 seconds.
- Engine vacuum is between 0 and 70 kPa.
- Gear range is D4.
- TP angle is greater than 10%.
- 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 255 km/h (158 mph).
- Speed ratio is between 0.6 and 0.95.

- 13% < TPS < 99%
- 50 < Engine Torque < 300 N·m
- 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 exists 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.

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- 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.

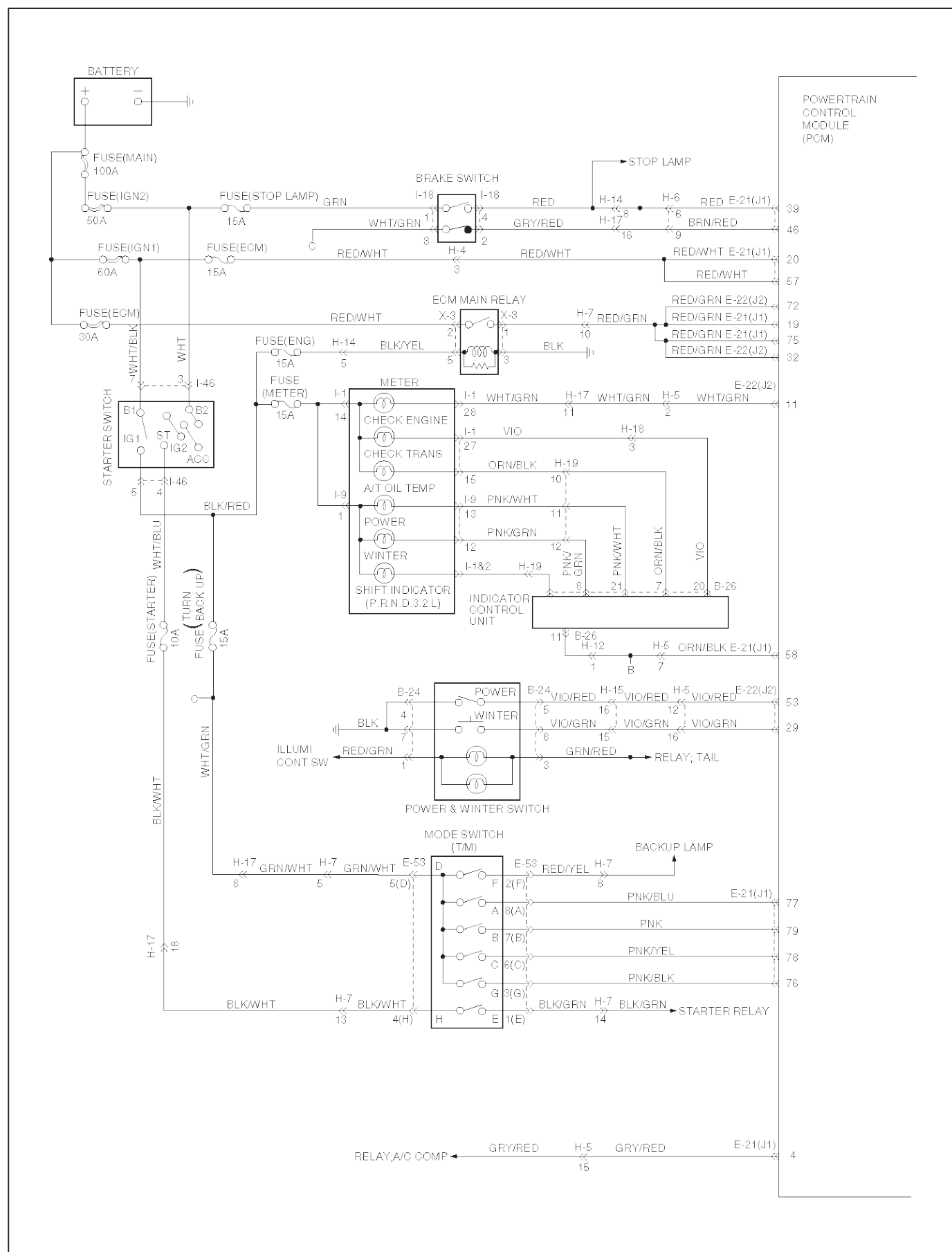
Range Switch Logic Table

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

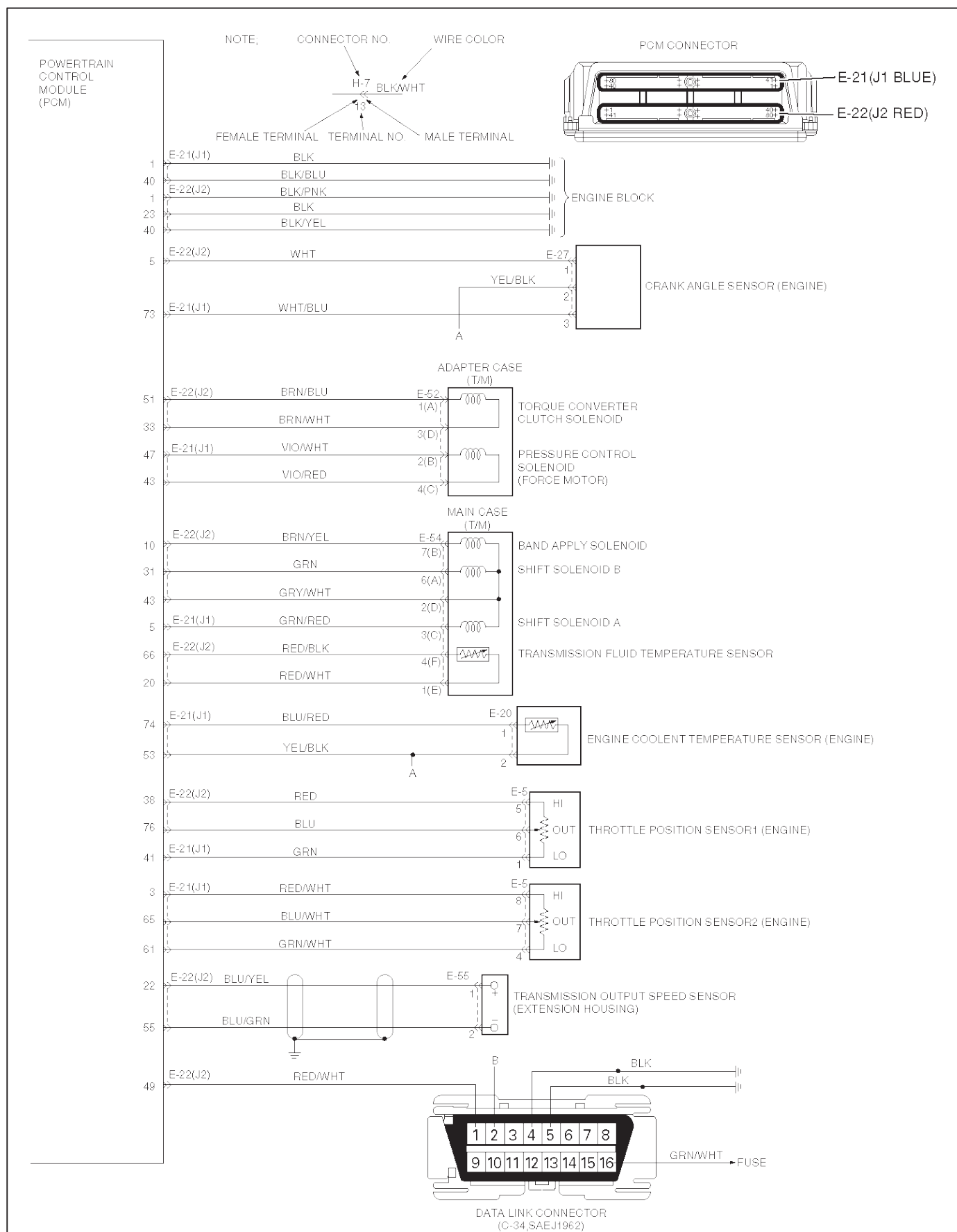
DTC P1870 Transmission Component Slipping (TCC Stuck Off)

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 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. 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

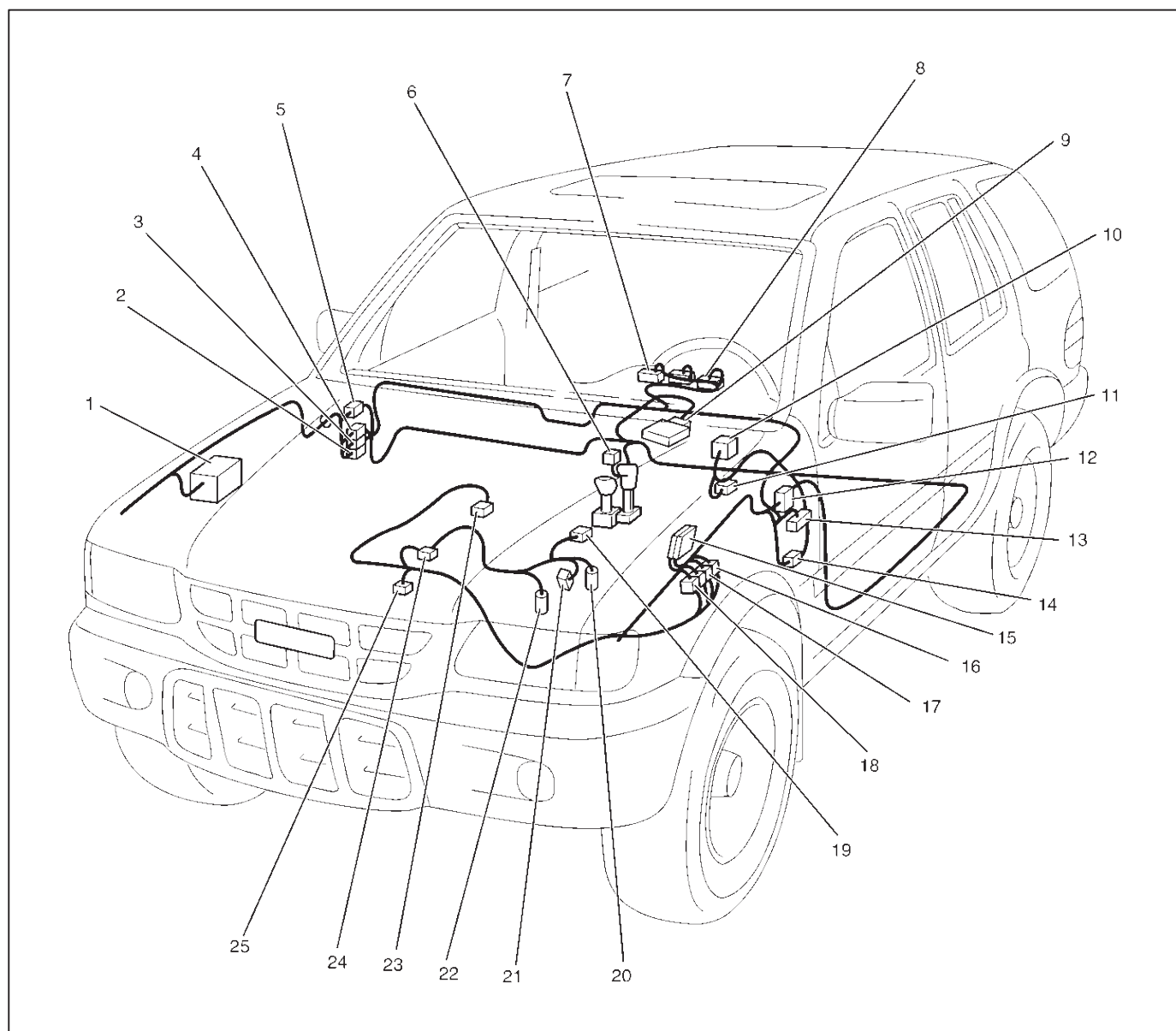
Circuit Diagram



7A1-86 TRANSMISSION CONTROL SYSTEM (4L30-E)



Parts Location



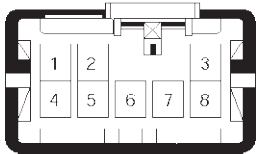
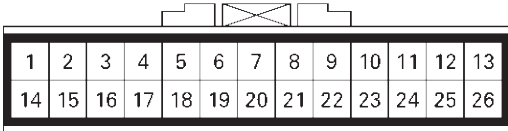
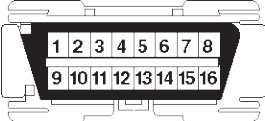
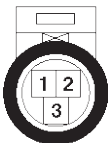
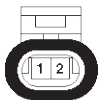
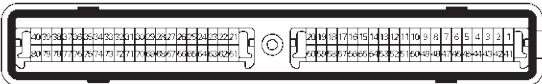
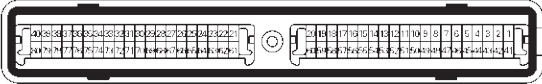
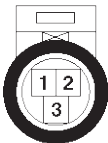
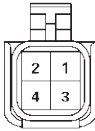
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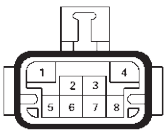
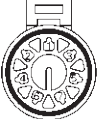
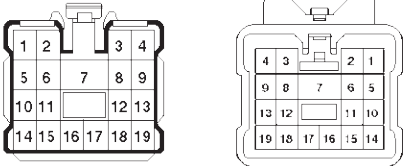
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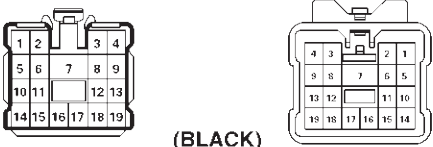
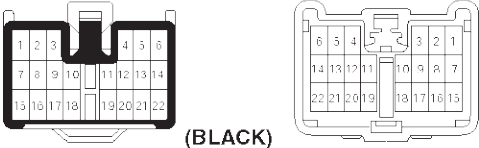
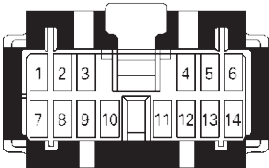
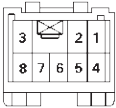
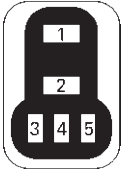
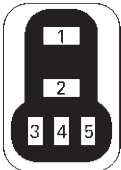
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|---------------------|-------------------------------|
| (1) Connector X-3 | (13) Data Link Connector C-34 |
| (2) Connector H-14 | (14) Connector H-17 |
| (3) Connector H-19 | (15) PCM Connector E-21, E-22 |
| (4) Connector H-18 | (16) Connector H-6 |
| (5) Connector H-12 | (17) Connector H-5 |
| (6) Connector B-24 | (18) Connector H-7 |
| (7) Connector I-9 | (19) Connector E-55 |
| (8) Connector I-1 | (20) Connector E-54 |
| (9) Connector B-26 | (21) Connector E-53 |
| (10) Connector I-46 | (22) Connector E-52 |
| (11) Connector H-18 | (23) Connector E-27 |
| (12) Connector H-15 | (24) Connector E-5 |
| | (25) Connector E-20 |

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Harness Connector Faces

No.	Connector face
B-24	
B-26	
C-34	
E-5	
E-20	
E-21 (J1)	 (BLUE)
E-22 (J2)	 (RED)
E-27	
E-52	 (GRAY)

No.	Connector face
E-53	 (BLACK)
E-54	 (BLACK)
E-55	
H-5	 (GREEN)
H-6	 (BLUE)
H-7	 (WHITE)
H-12	 (BLUE)
H-14	
H-15	 (BLUE)

No.	Connector face
H-17	 (BLACK)
H-18	 (WHITE)
H-19	 (BLACK)
I-1	
I-9	
I-18	
I-46	
X-3	
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RODEO

TRANSMISSION

MANUAL TRANSMISSION MUA 5C

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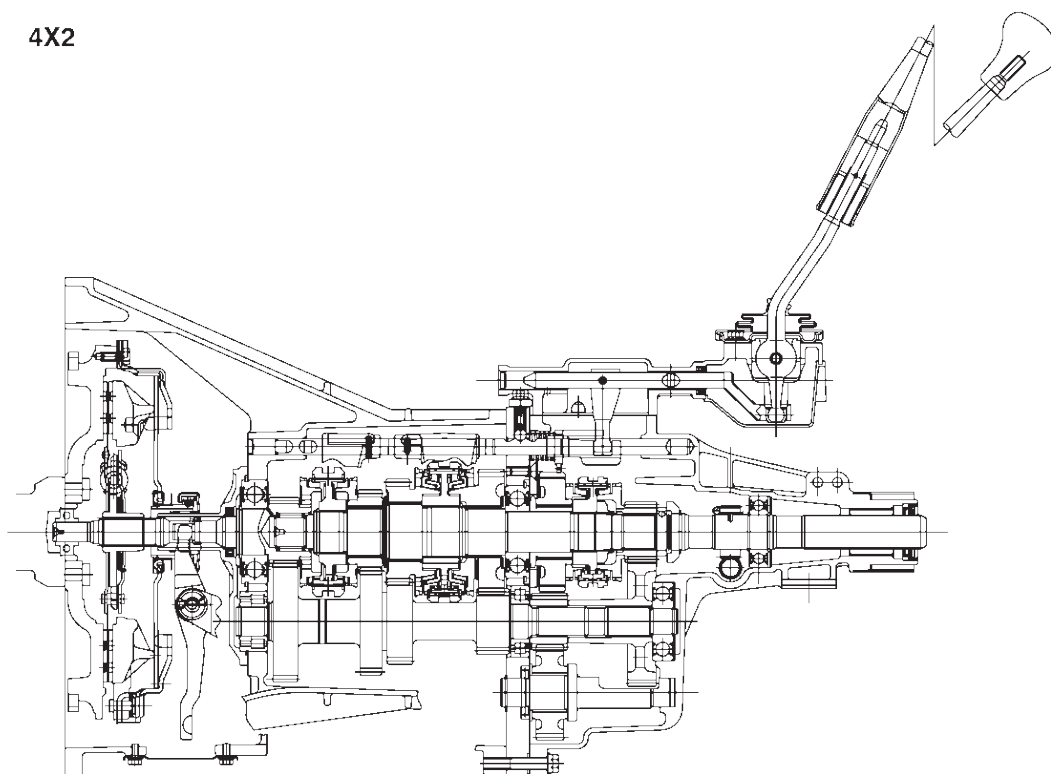
Service Precaution

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.

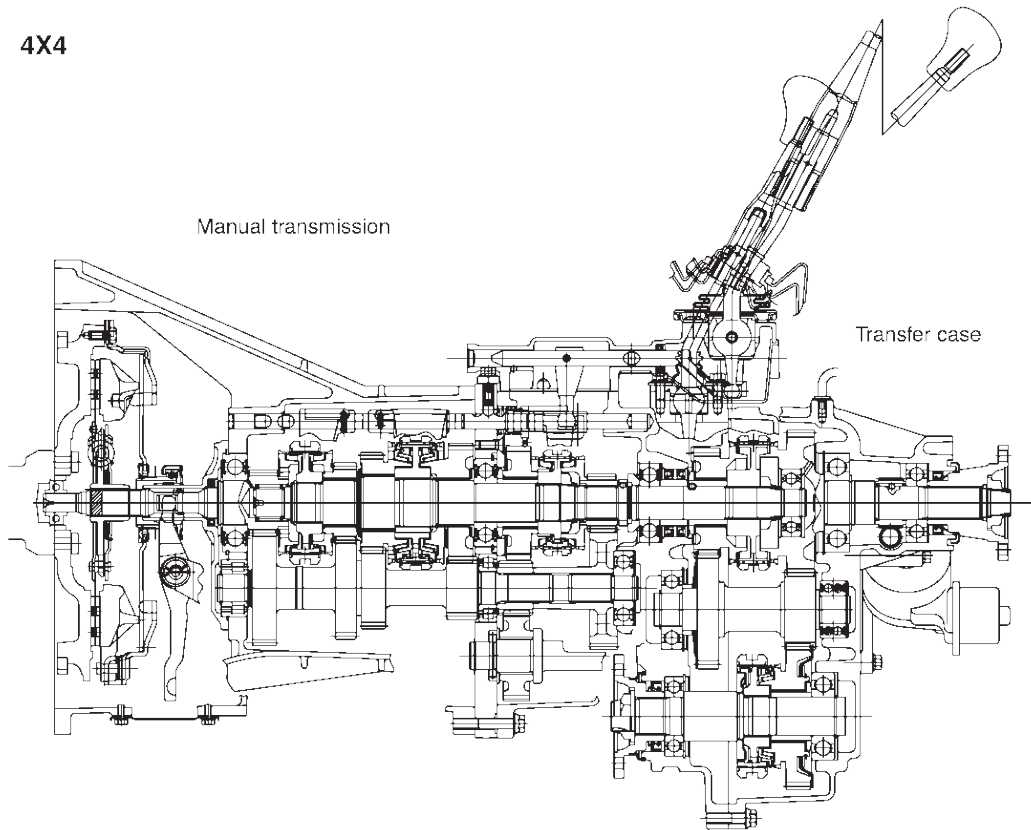
CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use ONLY the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread 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

4X2



4X4



A07RW040

The MUA5C is a constant mesh transmission, synchronized in all speeds. The transmission is designed for a great reduction of the shift effort and the quietest possible operation.

Principle parts of the transmission are the integral clutch housing, intermediate plate, the transfer case, the rear cover, and the gears.

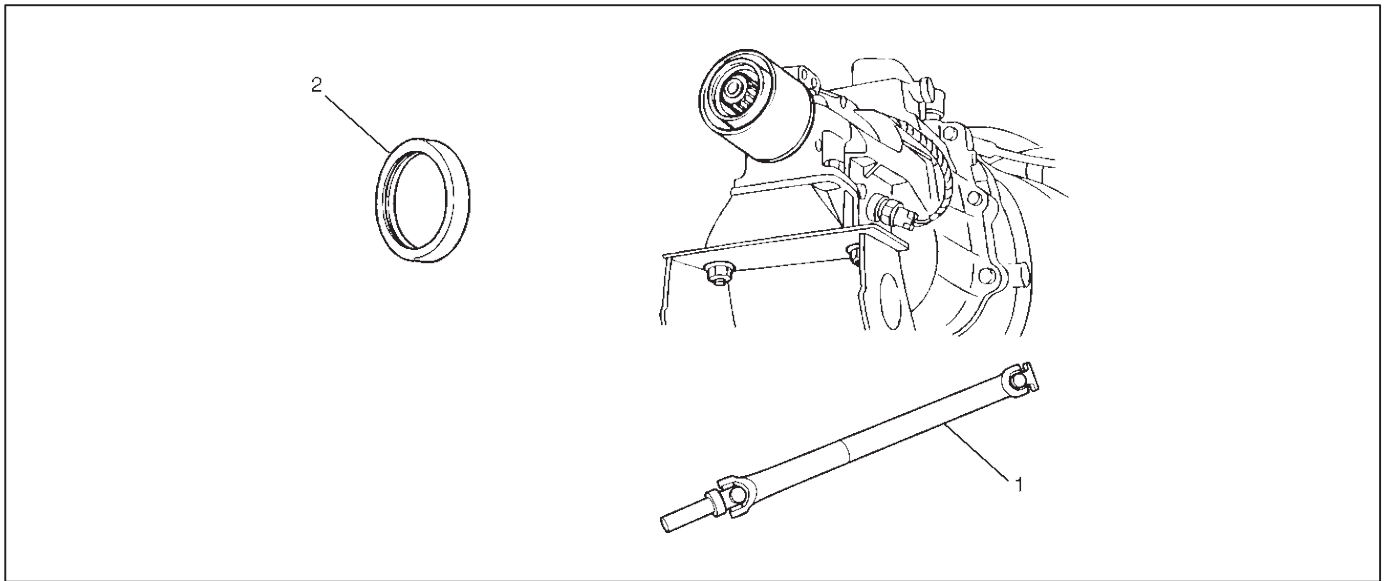
The transmission control box and transfer control box are built into the transmission and transfer case.

Diagnosis

Condition	Possible cause	Correction
Abnormal noise	Flywheel pilot bearing worn	Replace
	Bearings worn or broken (Mainshaft, counter shaft, and transfer shaft)	Replace
	Gear tooth contact surfaces worn or scuffed (Mainshaft, counter shaft, reverse idler gear and transfer gears)	Replace
	Splines worn (Mainshaft, synchronizer clutch hub)	Replace
	Gear or bearing thrust face seized	Replace
	Lack of backlash between meshing gears	Replace
Hard Shifting	Improper clutch pedal free play	Readjust
	Change lever sliding portions worn	Repair or replace Regrease
	Shift block, shift rod and/or control box sliding faces worn	Replace
	Shift arm and synchronizer sleeve groove worn	Replace worn parts
	Thrust washer, collar, and/or gear thrust faces worn (Mainshaft and counter shaft thrust play)	Replace worn parts
	Synchronizer parts worn	Replace
Walking or Jumping out of gear	Detent ball worn	Replace
	Detent spring weakened or broken	Replace
	Shift rod and/or control box sliding faces worn	Replace
	Shift arm and synchronizer sleeve groove worn	Replace worn parts
	Thrust washer, collar, and/or gear thrust faces worn (Mainshaft and counter shaft thrust play)	Replace worn parts
	Bearings worn or broken	Replace
	Splines worn (Mainshaft, synchronizer hub)	Replace
	Synchronizer spring weakened or broken	Replace
Oil leakage	Loose drain plug(s) and/or filler plug(s)	Tighten Replenish oil
	Defective or improperly installed gasket(s)	Replace
	Oil seal worn or scratched	Replace

Rear Oil Seal (4X2)

Disassembled View



220RY00016

Legend

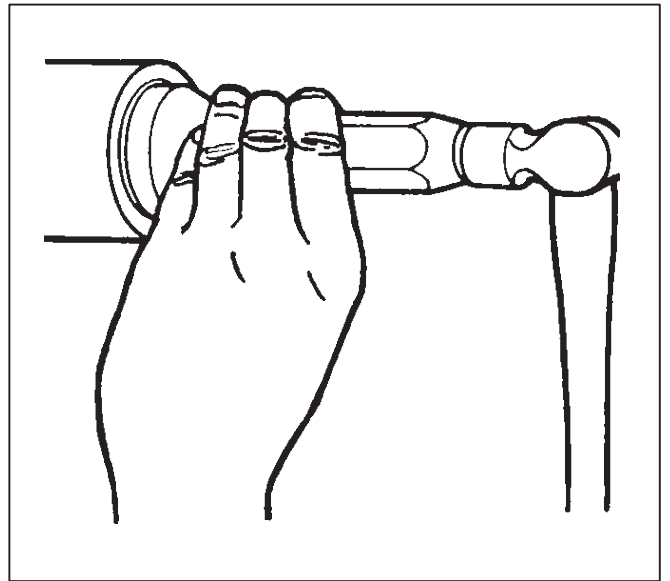
- (1) Rear Propeller Shaft
- (2) Rear Oil Seal

Removal

1. Raise and support vehicle with suitable jack stands.
2. Remove propeller shaft flange yoke bolts and nuts at the differential side.
Remove propeller shaft from the transmission main shaft spline.
3. Use a screwdriver to pry the rear oil seal from the rear cover.

Installation

1. Install a new oil seal(2) or (3) using the installer J-29769.



220RS044

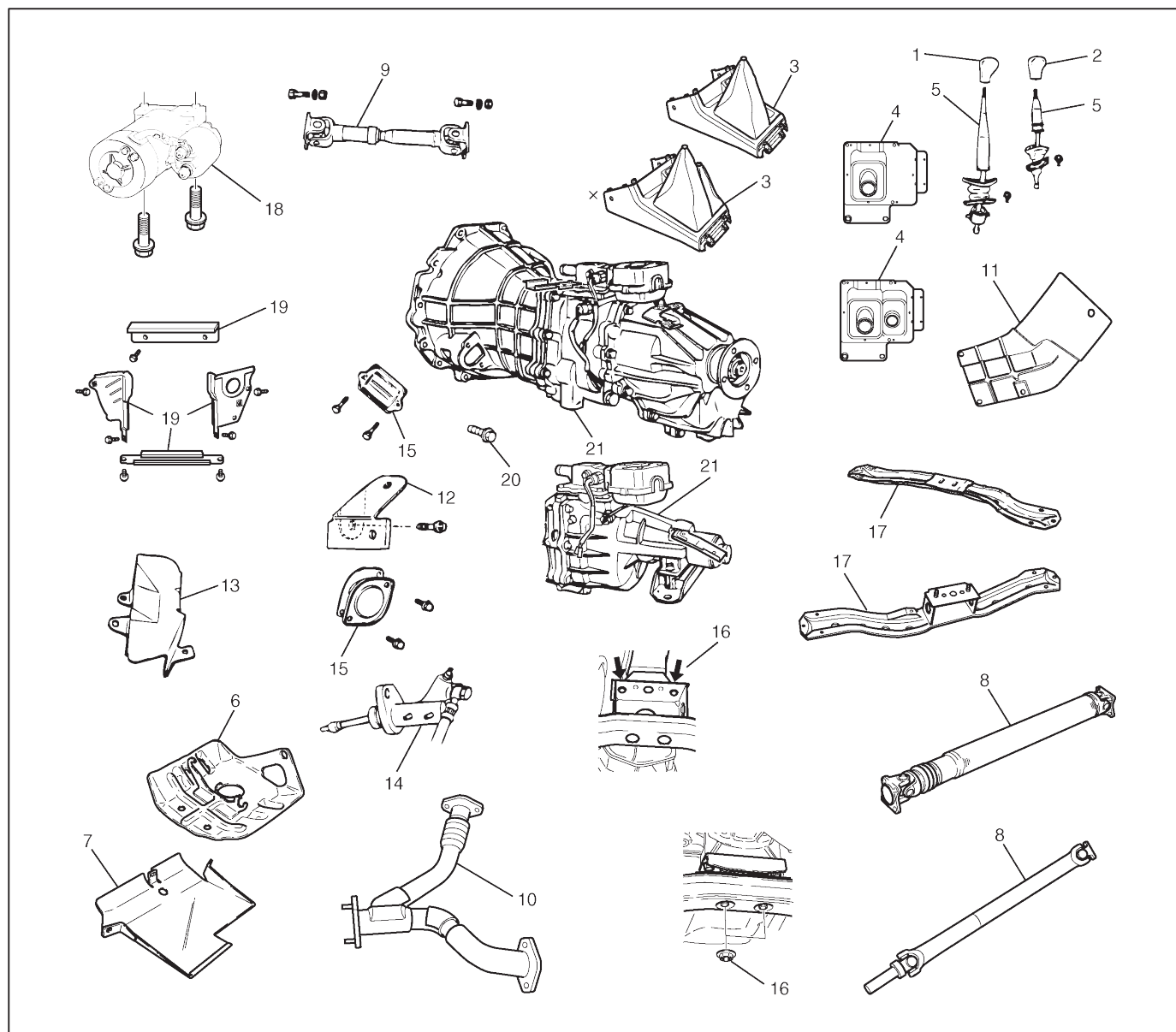
2. Insert the splined yoke into the transmission mainshaft spline.
3. Install the propeller shaft flange yoke to the drive pinion flange.

Torque: 63 N·m (46 lb ft)

4. Check transmission fluid level.
5. Lower vehicle.

Transmission

Disassembled View



220RW040

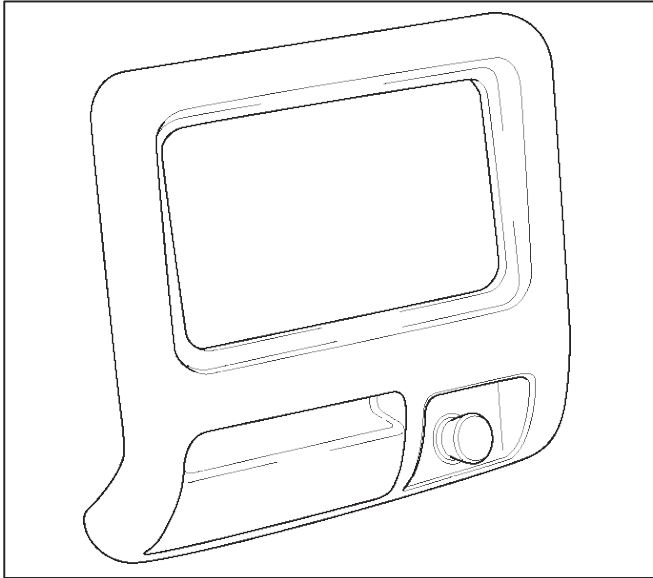
Legend

- | | |
|---|--|
| (1) Gear Control Lever Knob | (11) Fuel Pipe Heat Protector |
| (2) Transfer Control Lever Knob | (12) Harness Clamp |
| (3) Center Console | (13) Harness Heat Protector |
| (4) Grommet Assembly | (14) Slave Cylinder |
| (5) Gear Control Lever and Transfer Control Lever | (15) Dust Cover |
| (6) Transfer Protector | (16) Rear Mount Nut |
| (7) Fairing Plate | (17) Third Crossmember |
| (8) Rear Propeller Shaft | (18) Starter |
| (9) Front Propeller Shaft | (19) Flywheel Undercover |
| (10) Center Exhaust Pipe | (20) Transmission Retaining Nut and Bolt |
| | (21) Transmission |

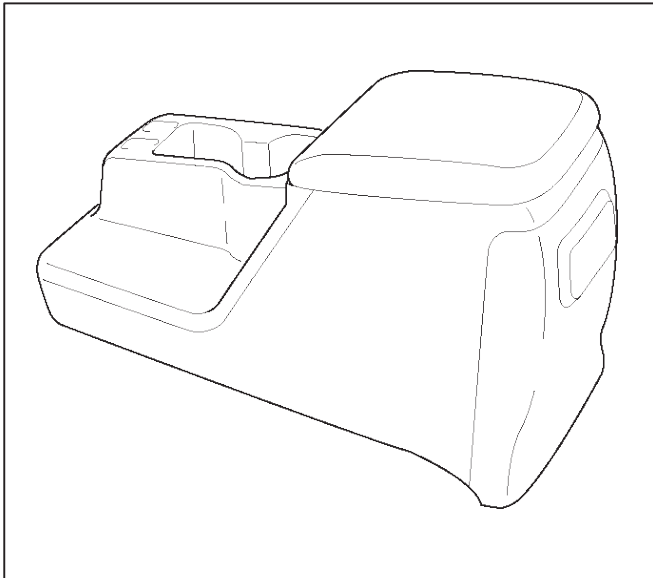
Removal

NOTE: Before removing transmission assembly(4X4) from vehicle, change the transfer mode to 2WD using the 4WD push button on dash panel.

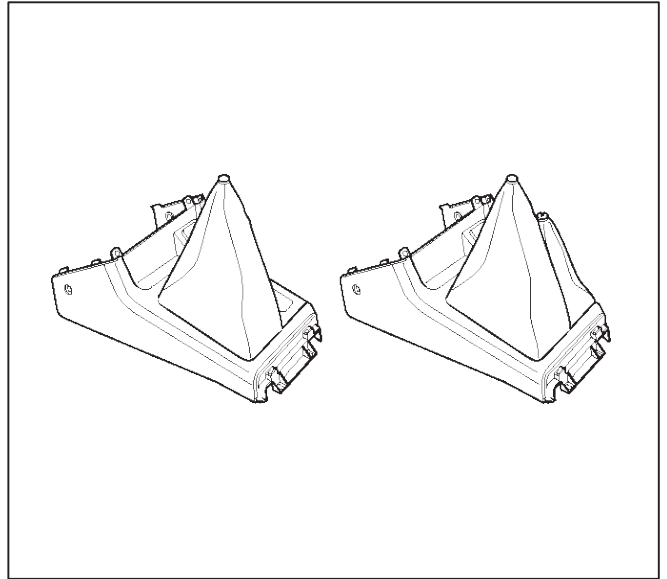
1. Disconnect battery ground cable.
2. Remove gear control lever knob(1).
3. Remove transfer control lever knob(2) (4X4).
4. Remove lower cluster assembly.



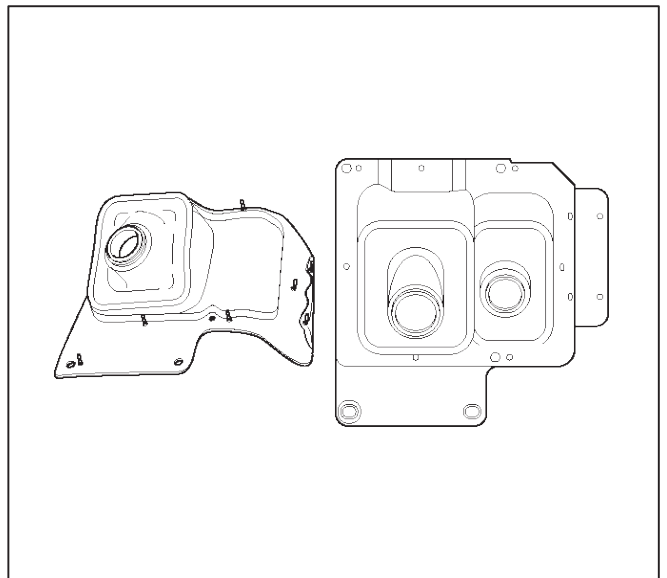
5. Remove rear console.



6. Remove center console(3).

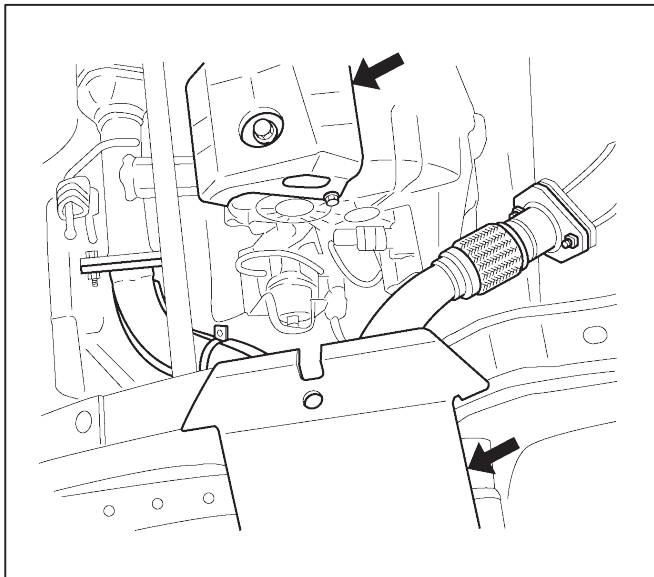


7. Remove grommet assembly(4).



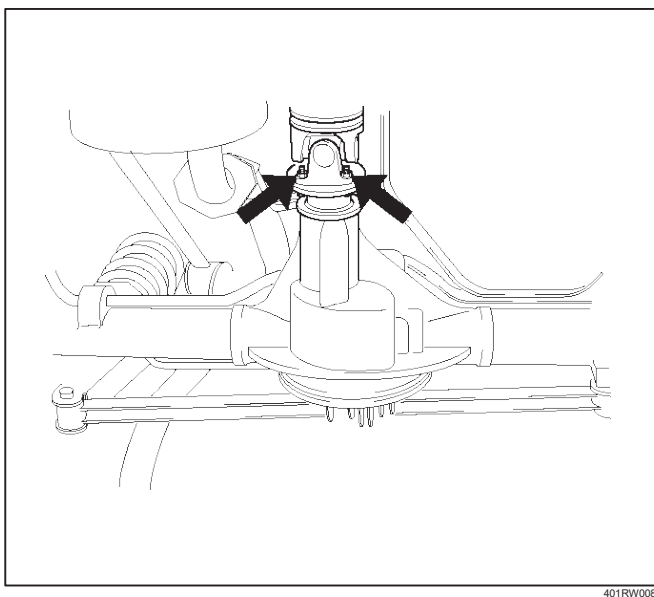
7B-8 MANUAL TRANSMISSION

8. Remove gear control lever(5) and transfer control lever(5) (4X4).
9. Raise and support vehicle with suitable stands. Remove transfer protector(6) (4X4) and fairing plate(7).



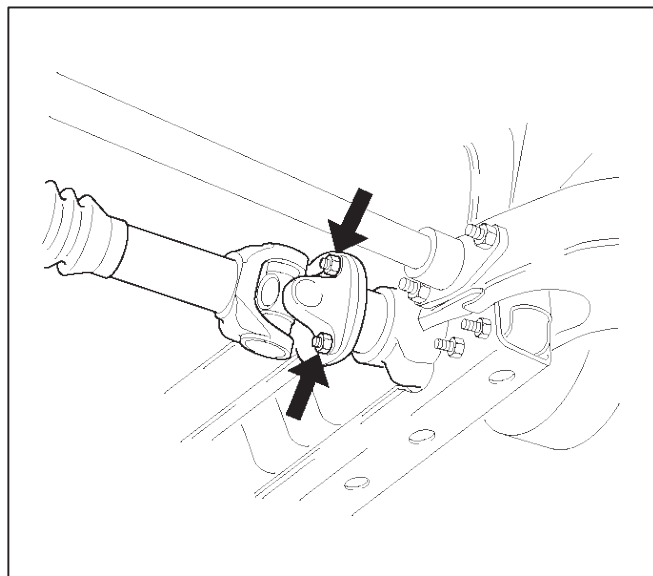
10. Remove rear propeller shaft(8).

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

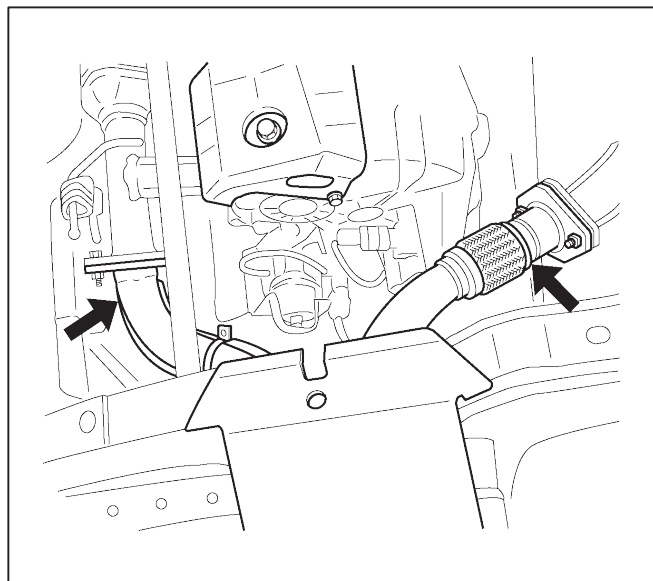


11. Remove front propeller shaft(9) (4X4).

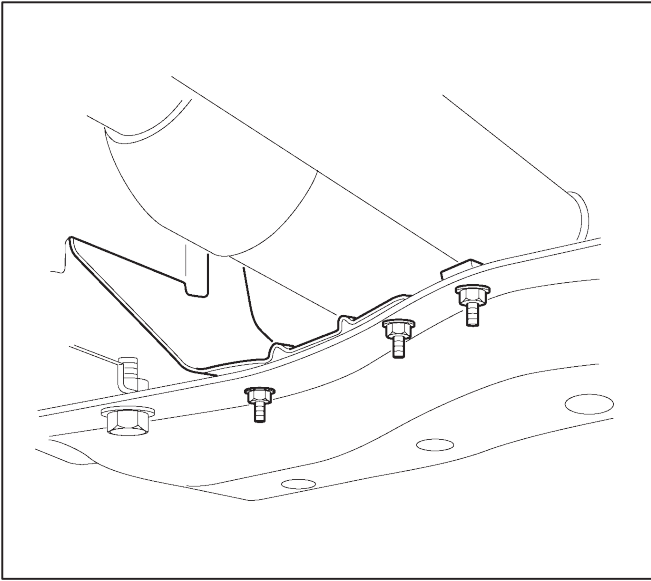
NOTE: Apply alignment marks on the flange at both front and rear sides.



12. Remove center exhaust pipe(10) (6VD1 engine).



13. Remove fuel pipe heat protector(11) and clip.

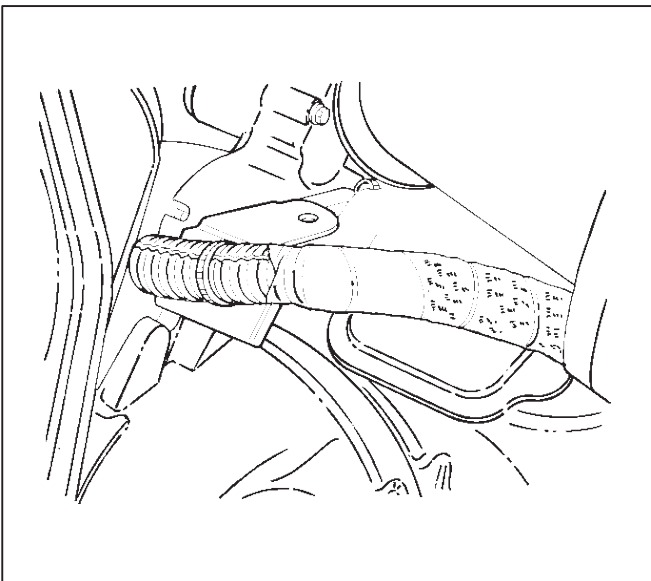


141RW004

14. Disconnect transmission harness connectors and clip.

Connector: Transfer switch (4X4), 2-4 actuator (4X4), speed sensor, back up switch 1-2 and 3-4 indicator switch.

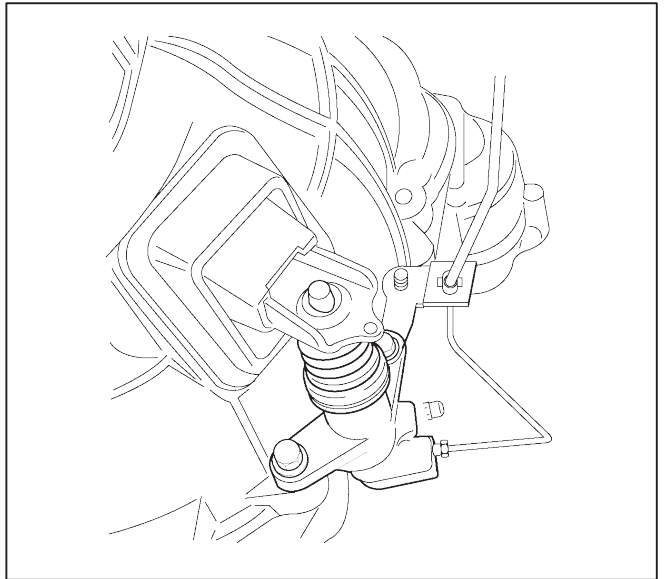
15. Remove transmission harness clamps(12) from the transmission case and bracket.



220RS028

16. Remove harness heat protector(13) (6VD1 engine).

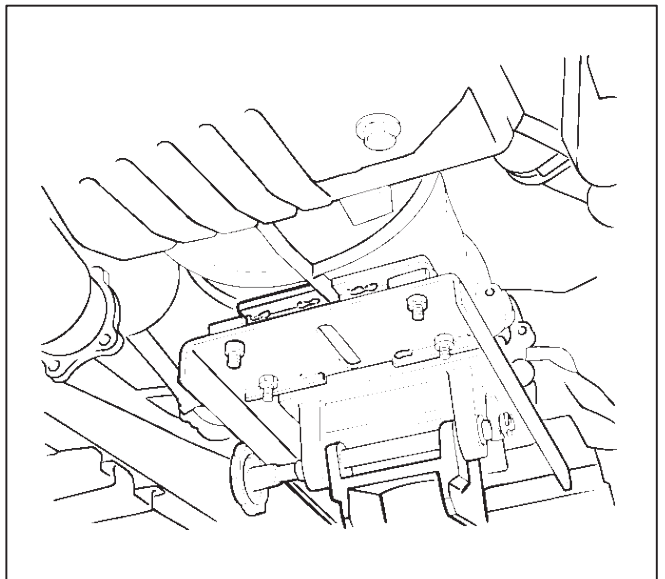
17. Remove slave cylinder(14) and flexible hose fixing bracket (Y22SE engine).



205RW001

18. Remove dust covers(15) (6VD1 engine).

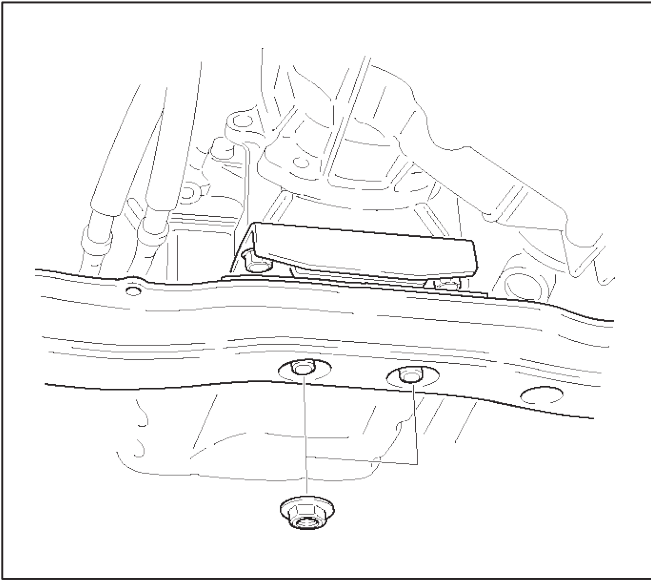
19. Support transmission with a transmission jack.



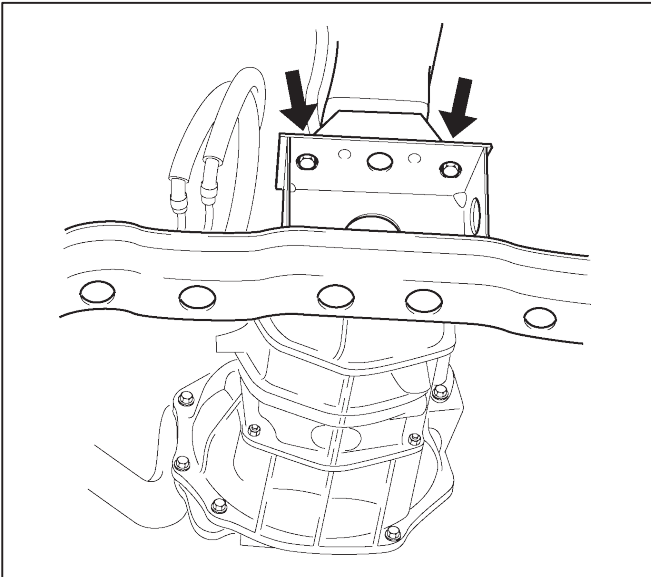
220RS001

7B-10 MANUAL TRANSMISSION

20. Remove engine rear mount nuts(16) from third crossmember.



F07RW008



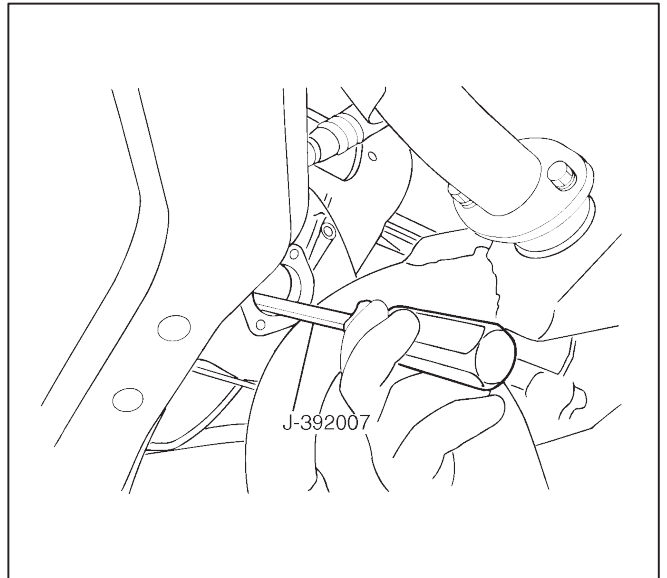
022RW001

21. Remove third crossmember(17) by removing six fixing bolts.

22. Remove starter(18) (6VD1 engine).

23. Remove flywheel under cover(19). 6VD1 engine:3 pieces, Y22SE engine:1 piece.

24. Use clutch release bearing remover J-39207 to disconnect the clutch release bearing from the clutch pressure plate (6VD1 engine).

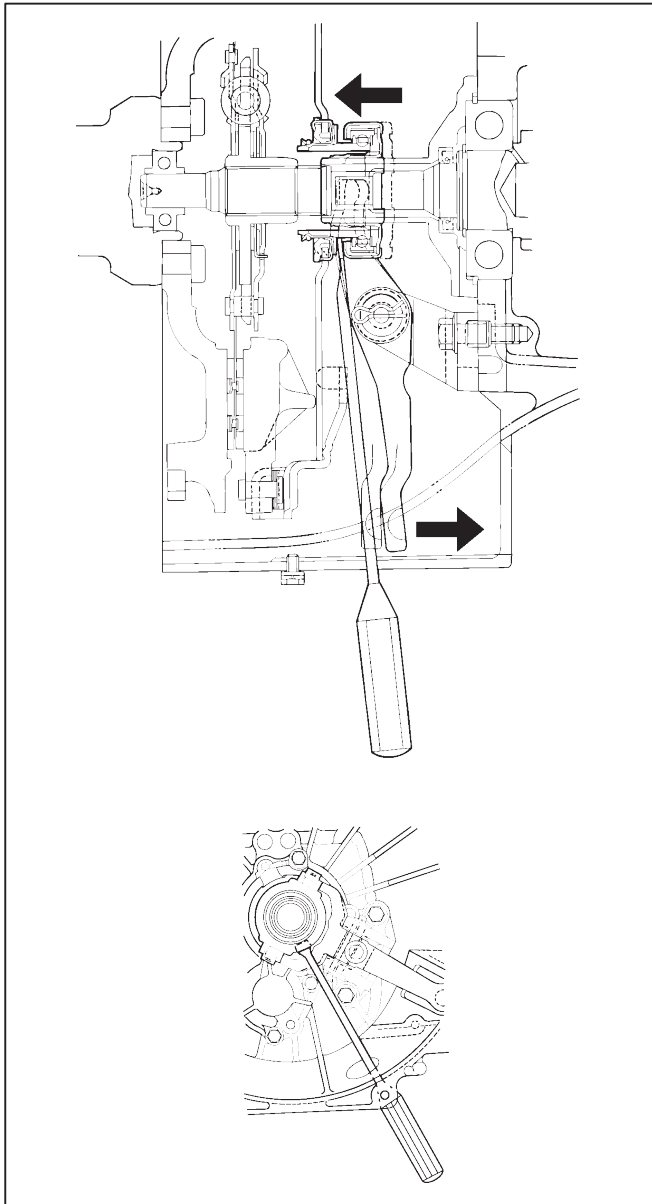


220RS002

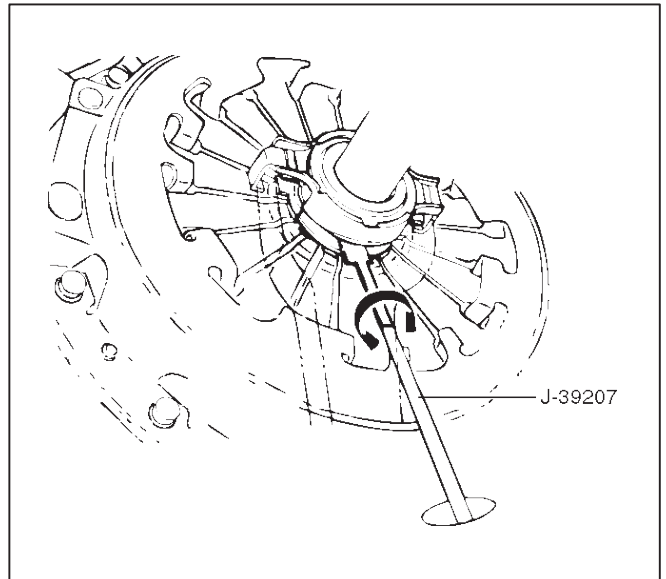
25. Pull the shift fork toward the transmission to press the clutch release bearing against the clutch (6VD1 engine).

26. Insert the clutch release bearing remover between the wedge collar and the release bearing (6VD1 engine).

NOTE: Be sure not to insert the remover between the wedge collar and the clutch.



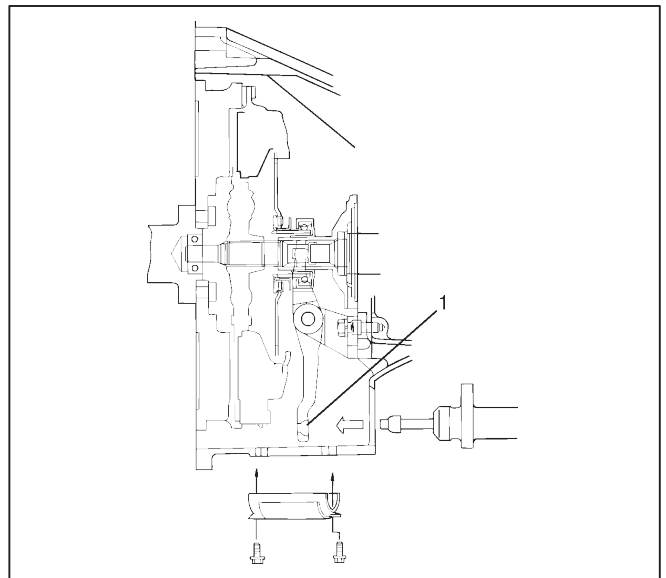
27. Turn the remover to separate the release bearing (6VD1 engine).



28. Remove transmission retaining nuts and bolts(20).
Remove transmission(21) from the vehicle.

Installation

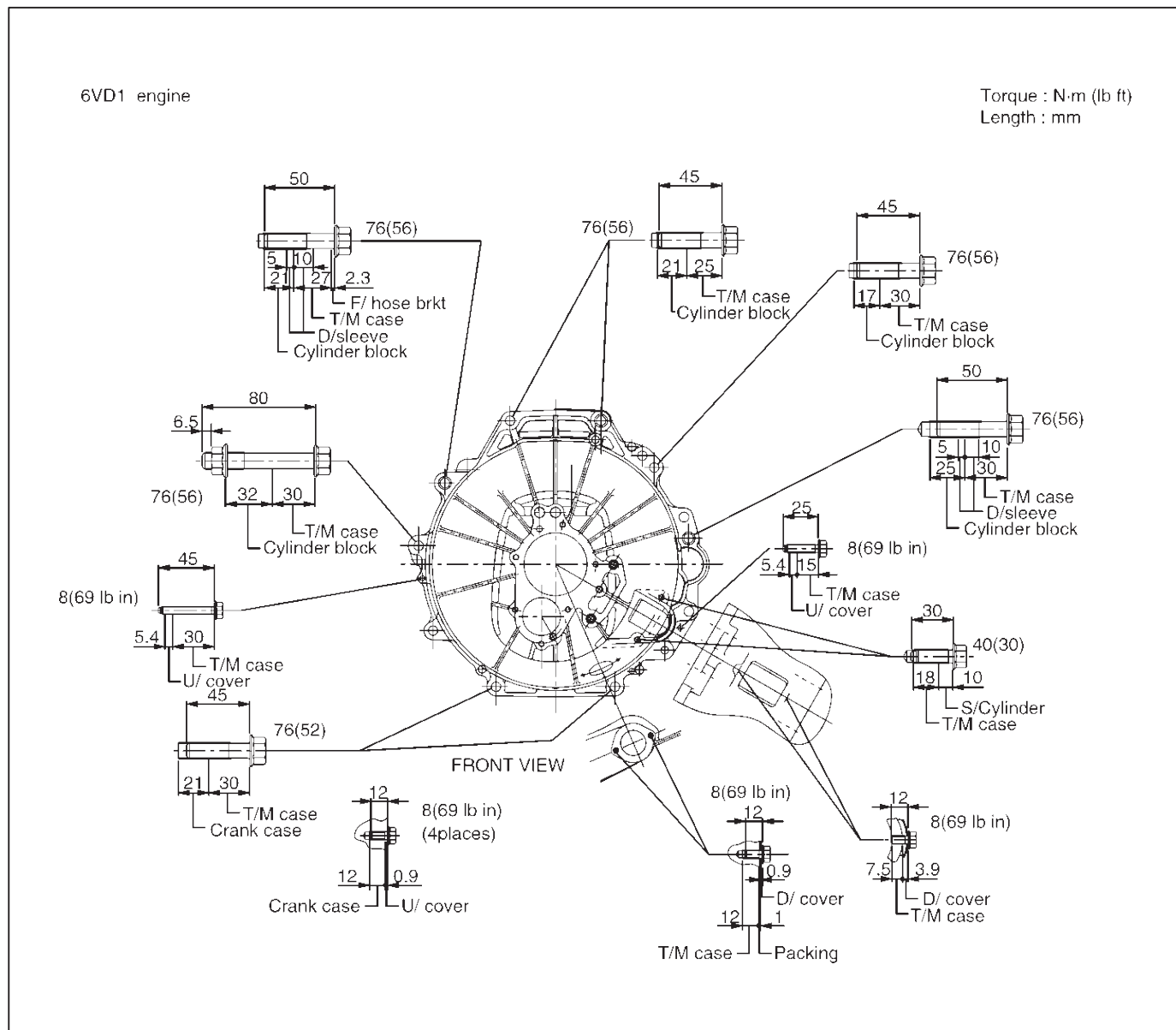
1. Apply a thin coat of molybdenum disulfide grease to the top gear shaft spline.
2. Slowly operate the transmission jack until the front of transmission is aligned with the rear of the engine.
The slope of the engine and the transmission must be the same.
3. Align the top gear shaft spline with the clutch driven plate spline.



7B-12 MANUAL TRANSMISSION

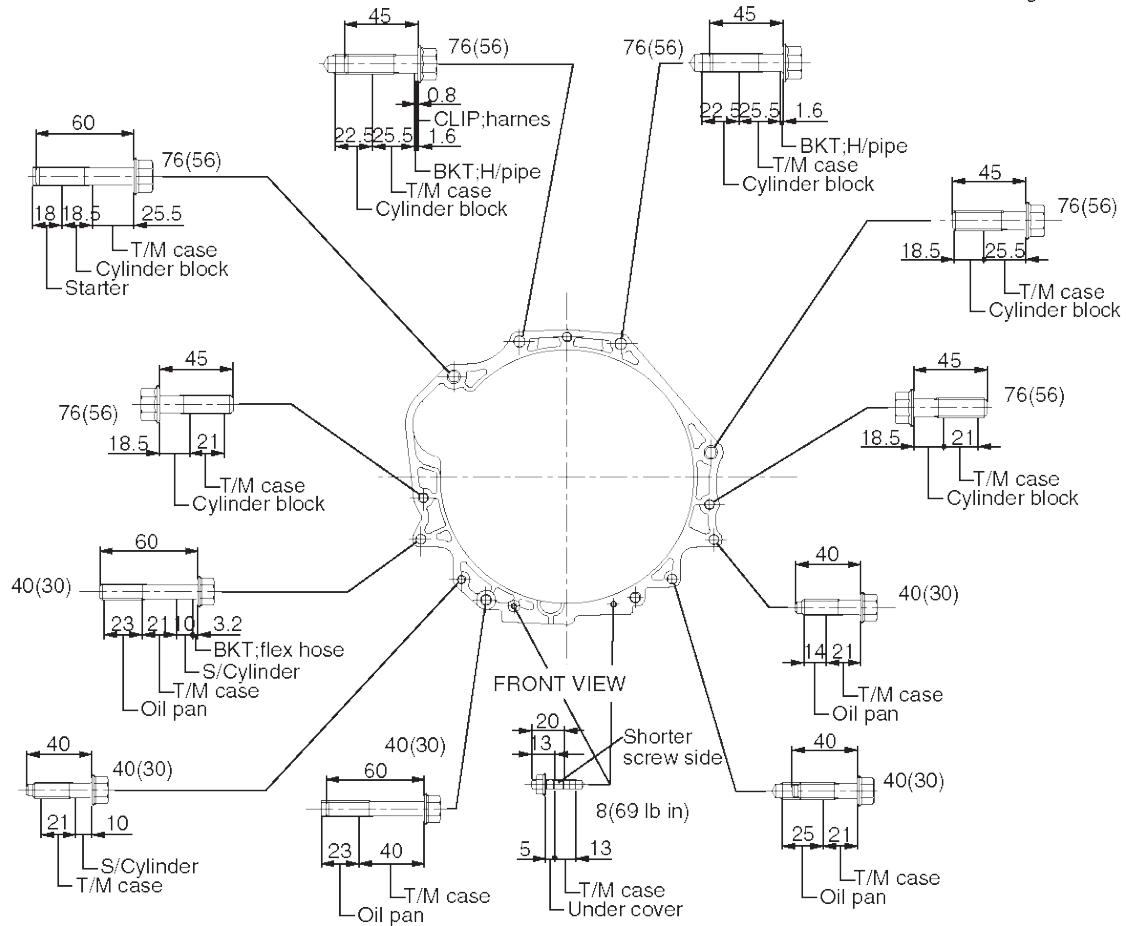
4. Install the transmission to the engine.

Tighten the transmission nuts and bolts as shown in the figure.



Y22SE engine

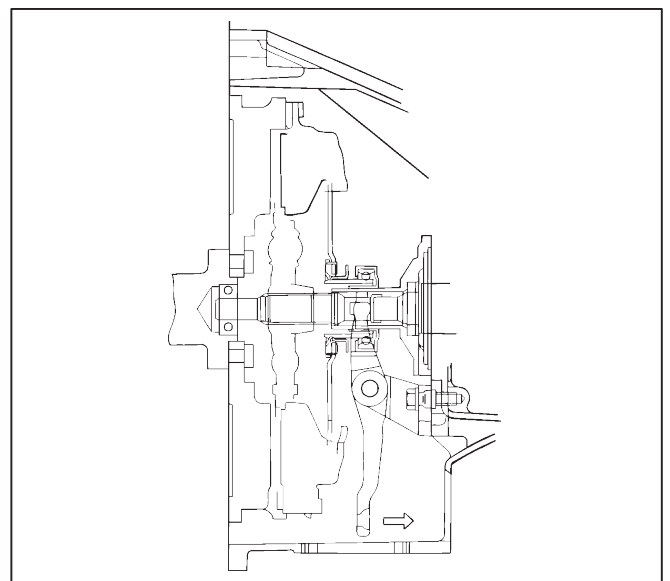
Torque : N·m (lb ft)
Length : mm



225R100001

5. Apply a force of 59 – 78 N (13.2 – 17.6 lb) to the tip of the shift fork in the direction of the transmission to engage the clutch pressure plate and release bearing.

NOTE: A click sound is heard when the release bearing and the tip of the diaphragm spring engage each other. Check to see if they are securely engaged by pushing the tip of the shift fork toward the engine side while applying a force of about 25 N (5.5 lb). If the shift fork will not move, then they are securely engaged.



220RS006

7B-14 MANUAL TRANSMISSION

6. Install flywheel under cover(19). 6VD1 engine 3 pieces, HEC engine 1 piece.

Torque: 8 N·m (69 lb in)

7. Install starter(18).

Torque: 40 N·m (30 lb ft)

8. Install third crossmember(17).

Torque: 50 N·m (37 lb ft)

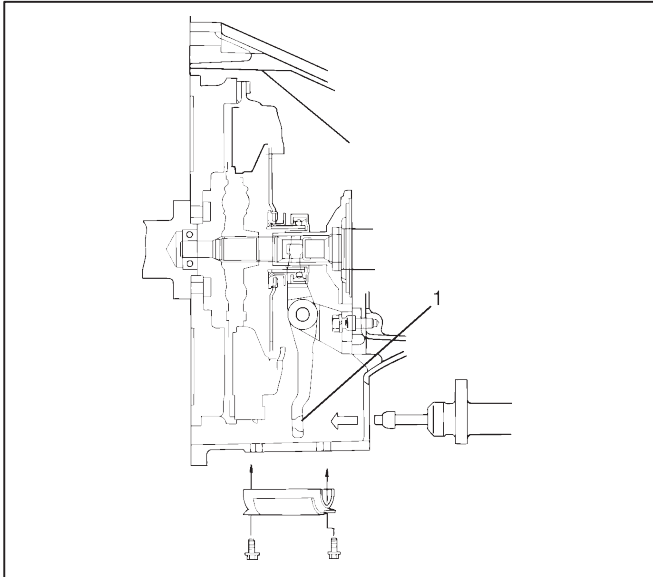
9. Install engine rear mount nuts(16).

Torque: 40 N·m (30 lb ft)

Remove the transmission jack from transmission side.

10. Apply grease to top hole portion of the shift fork.
Install slave cylinder(14) and flexible hose fixing bracket (Y22SE engine).

Torque: 43 N·m (32 lb ft)



Legend

- (1) Apply Grease

11. Install clutch dust covers(15) to clutch housing (6VD1 engine).

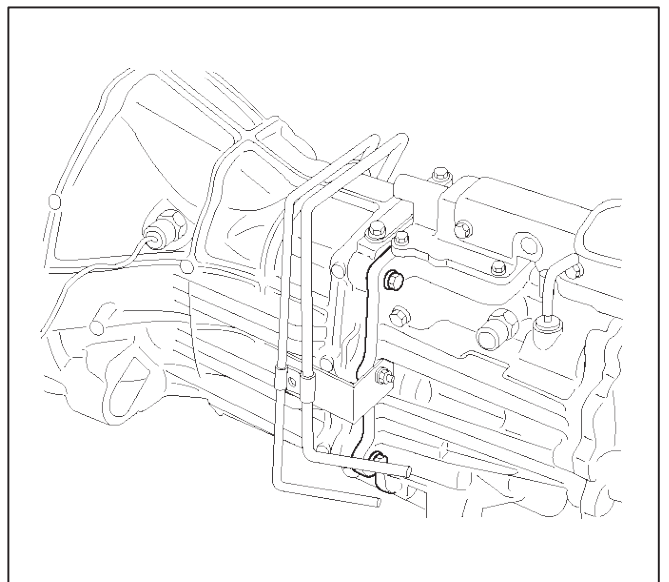
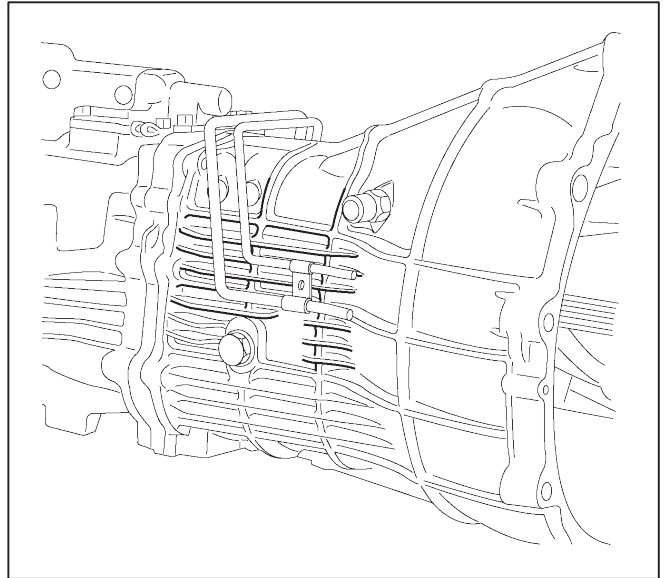
Torque: 6 N·m (52 lb in)

12. Connect transmission harness connectors and clip.
Connector: transfer switch (4X4), 2-4 actuator (4X4), car speed sensor, 1-2 and 3-4 indicator switch.

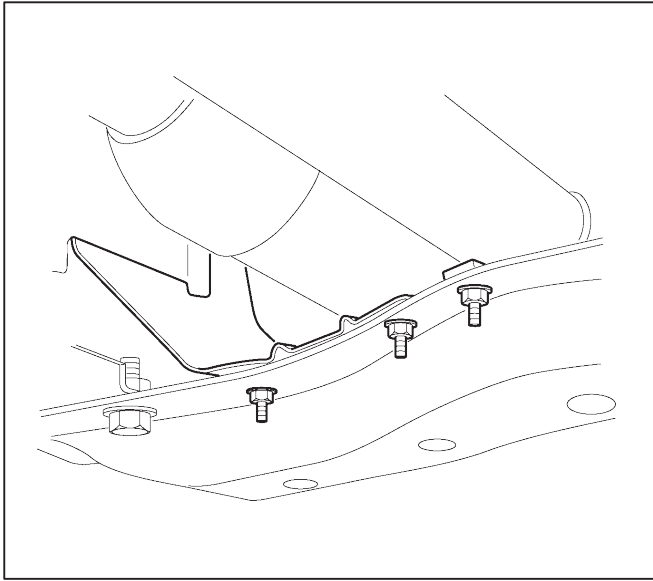
13. Install bracket and transmission harness clamps(12) to the transmission case.

14. Install harness heat protector(13) (6VD1 engine).

15. Connect fuel pipe to transmission side.



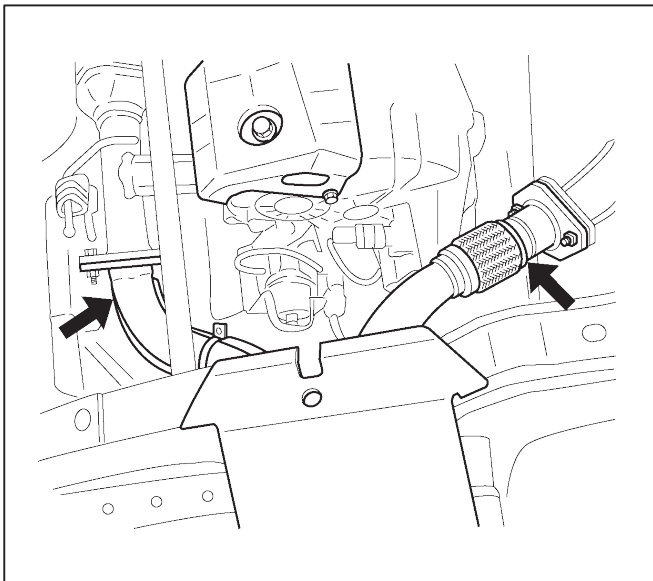
16. Install fuel pipe heat protector(11) and clip.



141RW004

17. Install center exhaust pipe(10) (6VD1 engine).

Torque: 43 N·m (32 lb ft)

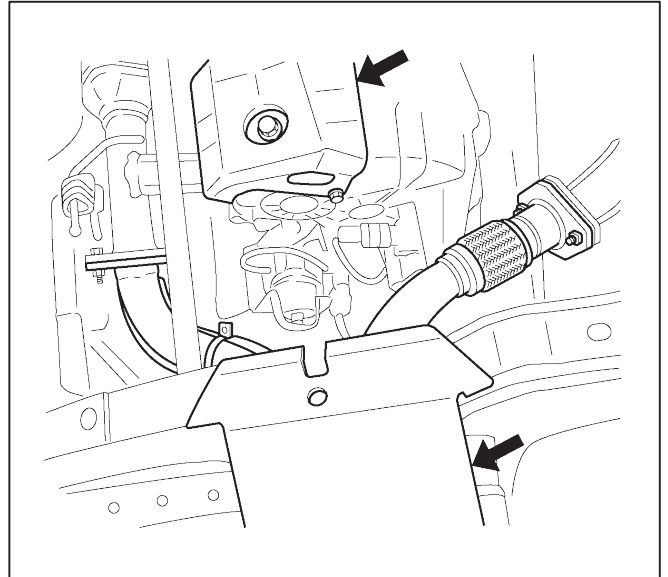


150RW008

18. Install front(9) (4X4) and rear propeller shaft(8).

Torque: 63 N·m (46 lb ft)

19. Install transfer protector(6) (4X4) and fairing plate(7).
Lower the vehicle.



150RW006

20. Install gear control lever(5) and transfer control lever(5) (4X4).

21. Install grommet assembly(4).

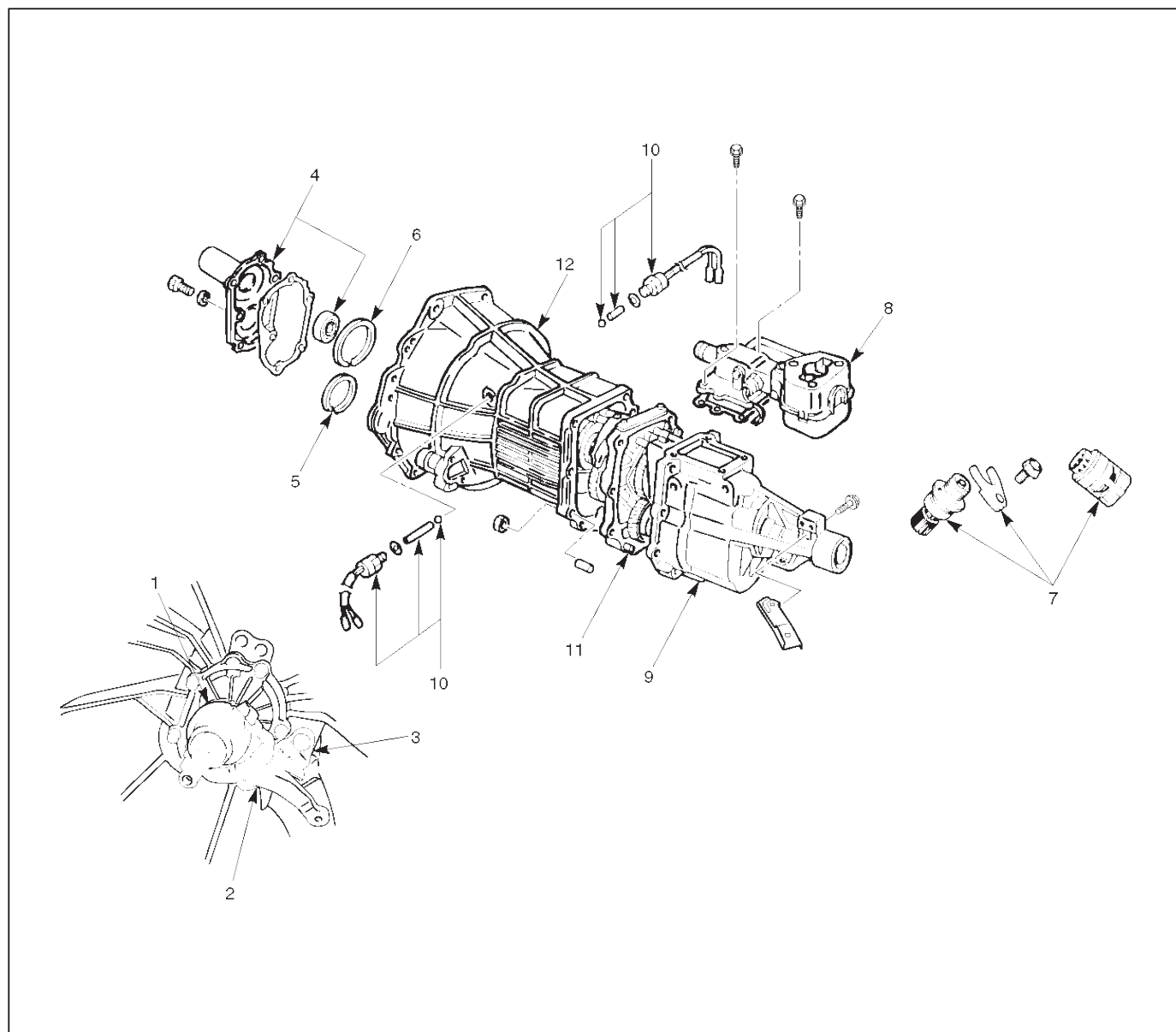
22. Install center console(3), rear console and lower cluster assembly.

23. Install transfer control lever knob(2) (4X4) and gear control lever knob(1).

24. Connect battery ground cable.

Transmission Case

Major Component (4X2)



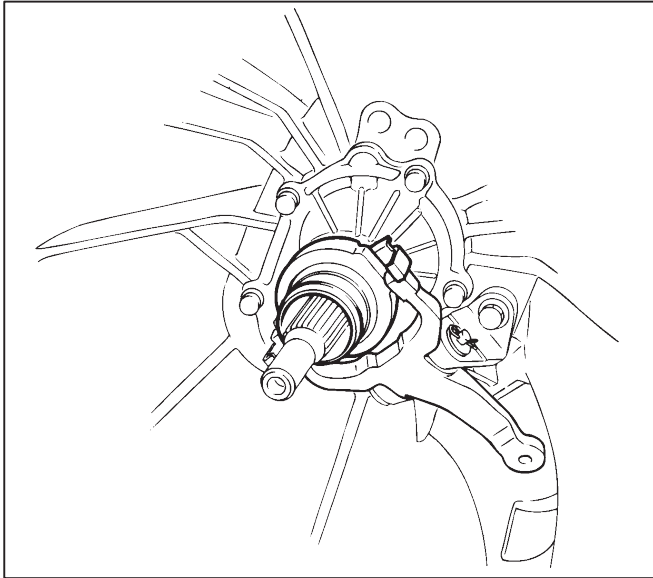
220RW050

Legend

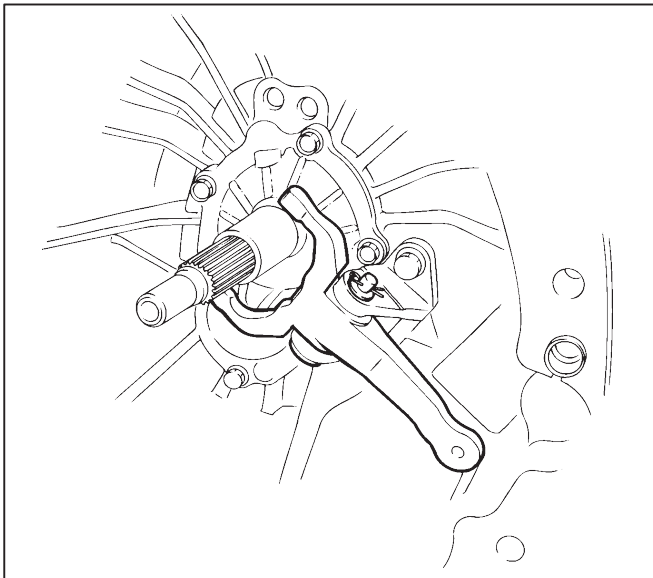
- | | |
|-------------------------------------|--|
| (1) Clutch Release Bearing | (7) Speedometer Sensor and Speedometer Driven Gear |
| (2) Shift Fork | (8) Gear Control Box Assembly |
| (3) Fulcrum Bridge | (9) Rear Cover with Oil Seal |
| (4) Front Cover (with Oil Seal) | (10) 1-2 and 3-4 Indicator Switch, Pin, and Ball |
| (5) Counter Front Bearing Snap Ring | (11) Intermediate Plate with Gear Assembly |
| (6) Top Gear Bearing Snap Ring | (12) Transmission Case |

Disassembly

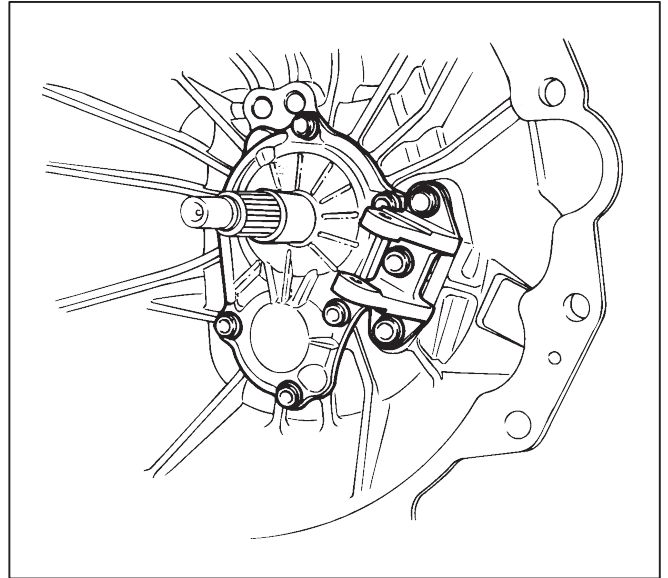
1. Clean the exterior of the unit with solvent.
2. Remove the drain plug from the transmission case and drain the lubricant.
3. Remove the clutch release bearing(1) from the transmission case.



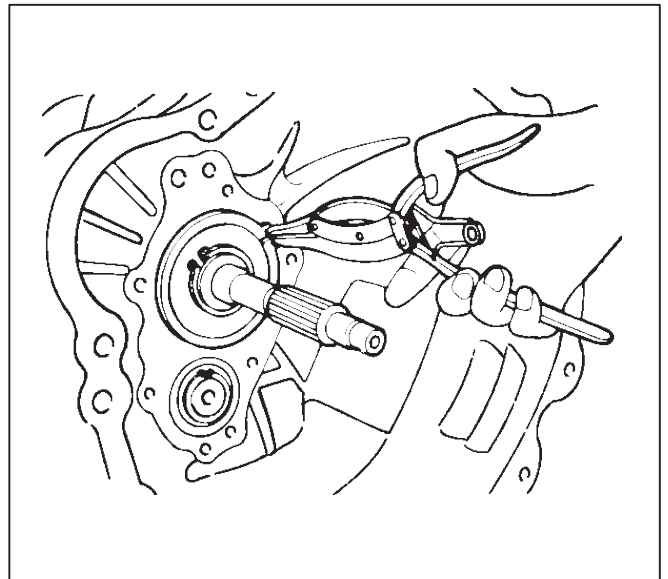
4. Remove the snap pin.
Remove the shift fork pin and shift fork(2) from the fulcrum bridge.



5. Remove the fulcrum bridge bolts.
Remove the fulcrum bridge(3) from the transmission case.
Remove the front cover(4) and gasket from the transmission case.



6. Remove snap ring(5) fixing counter front bearing.
7. Use a pair of snap ring pliers to remove the snap ring(6) fixing top gear bearing.



8. Remove the speedometer sensor(7).
Remove the plate(7).
Remove the driven gear bushing and driven gear(7).

NOTE: Apply a reference mark to the driven gear bushing before removal.

9. Remove gear control box assembly(8).
10. Remove the rear cover assembly from the transmission case.
11. Remove 1-2 and 3-4 indicator switch(10), pin(10) and ball(10).
Remove intermediate plate with gear assembly(11) from transmission case(12).

Reassembly

1. Apply recommended liquid gasket (LOCTITE 17430) or its equivalent to the transmission case(12), intermediate plate(11) and rear cover(9) fitting surfaces.

2. Install the intermediate plate with gear assembly(11) to the transmission case(12).

Pull out the top gear shaft until the ball bearing snap ring groove protrudes from the transmission case front cover fitting face.

Avoid subjecting the mainshaft to sudden shock or stress.

3. Tighten the transmission rear cover bolts to the specified torque.

Torque: 37 N·m (27 lb ft)

NOTE:

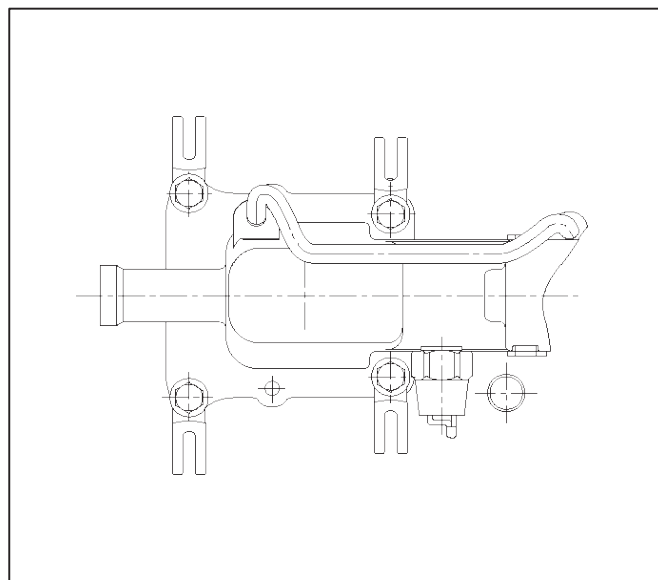
Notes When Tightening the Bolt:

- After cleaning the bolt hole, dry it thoroughly with air.
- After cleaning the screw face of a removed bolt or new one, dry it thoroughly. Apply recommended liquid gasket (LOCTITE 242) or its equivalent before tightening it.

4. Install a new gasket and gear control box assembly(8).

Install the harness clips and brackets and then tighten four new gear control box bolts to the specified torque.

Torque: 20 N·m (14 lb ft)



261RW043

5. Install the O-ring(4) to the speedometer driven gear bushing(3).
Install the driven gear to the speedometer driven gear bushing(3).

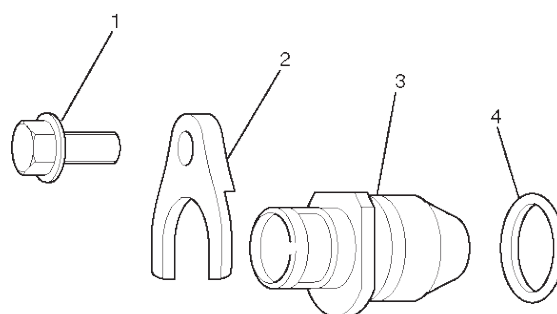
6. Install the speedometer driven gear assembly(7) to the transmission rear cover(9).

Install the plate(1) to the transmission rear cover(9).

Torque: 15 N·m (11 lb ft)

7. Install the speedometer sensor(7).

Torque: 27 N·m (20 lb ft)



Type		Drive gear teeth × Driven gear teeth
A		6 × 17 6 × 18
B		6 × 20

225RW008

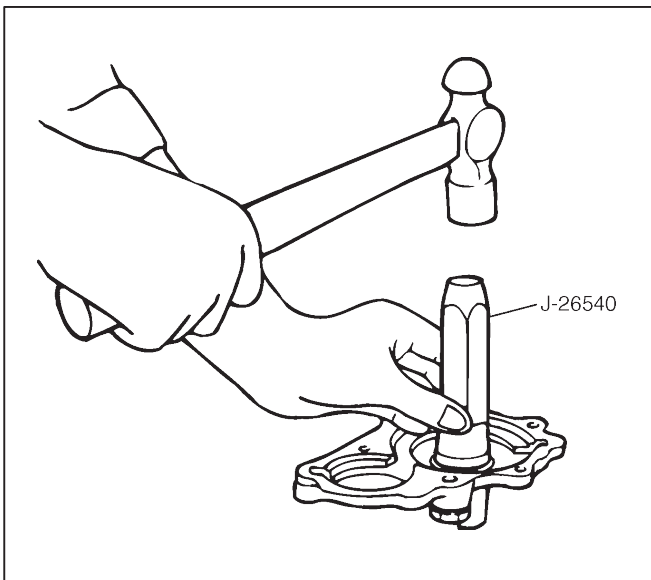
8. Install top gear bearing snap ring(6) and counter front bearing snap ring(5).

- Use a pair of snap ring pliers to install the snap rings to the mainshaft and countershaft.
- The snap rings must be fully inserted into the bearing snap ring groove.

9. Install front cover (with oil seal) (4).

Front Cover Oil Seal Replacement

- Remove the oil seal from the front cover.
- Apply engine oil to a new oil seal outer circumference.
- Apply recommended grease to the oil seal lip.
- Use the oil seal installer J-26540 to install the oil seal to the front cover.



220RS008

10. Install a new packing and front cover(4) to the transmission case.

NOTE: Take care not to damage the oil seal.

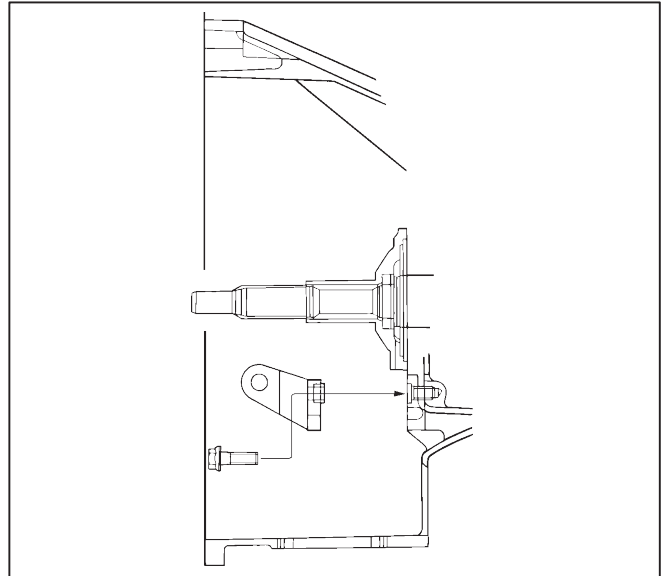
Notes When Tightening the Bolt:

- After cleaning the bolt hole, dry it thoroughly with air.
 - After cleaning the screw face of a removed bolt or new one, dry it thoroughly. Apply recommended liquid gasket (LOCTITE 242) or its equivalent before tightening it.
- Tighten six new front cover bolts to the specified torque.

Torque: 25 N·m (18 lb ft)

11. Install the fulcrum bridge(3) to the transmission case. Tighten three fulcrum bridge bolts to the specified torque.

Torque: 38 N·m (28 lb ft)

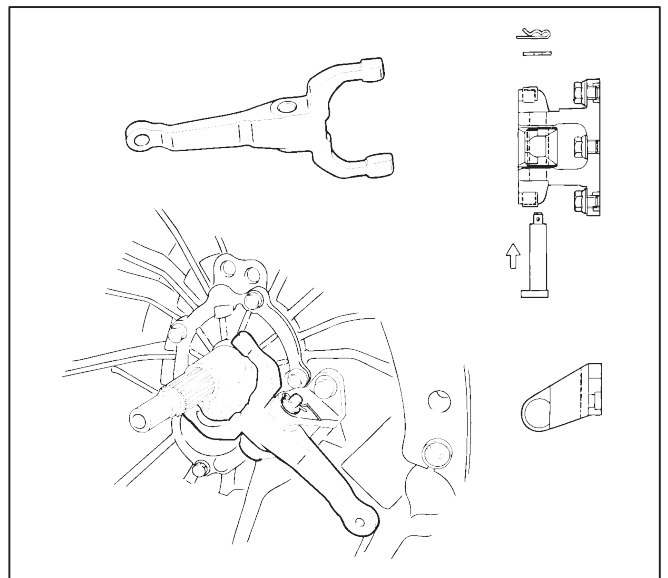


220RS009

12. Apply grease to the pin hole inner circumferences and thrust surfaces.

Attach the shift fork(2) to the fulcrum bridge(3) by inserting the shift fork pin from the bottom side of the fulcrum bridge.

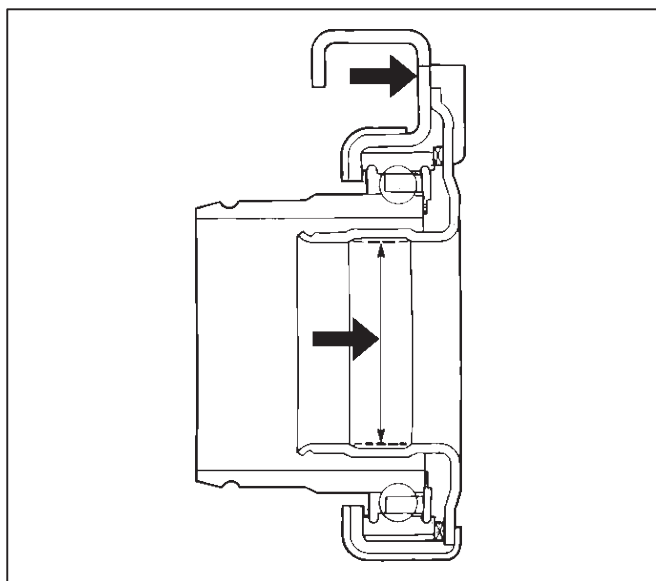
Install the washer and snap pin.



201RS018

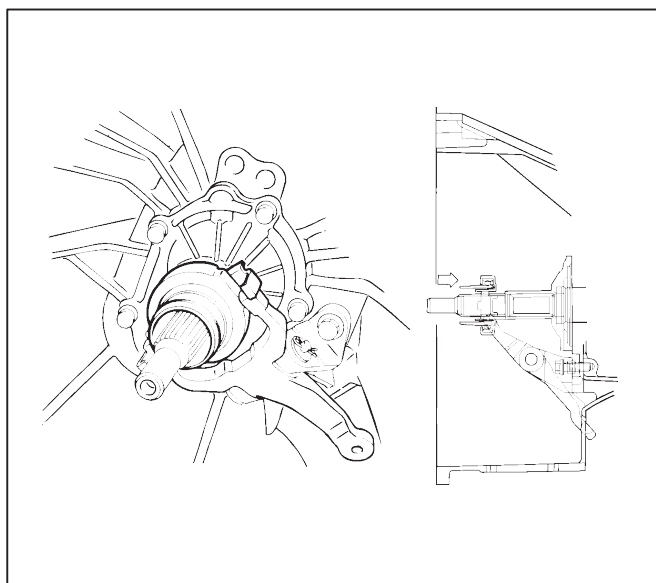
7B-20 MANUAL TRANSMISSION

13. Apply grease to the areas as shown in the figure.



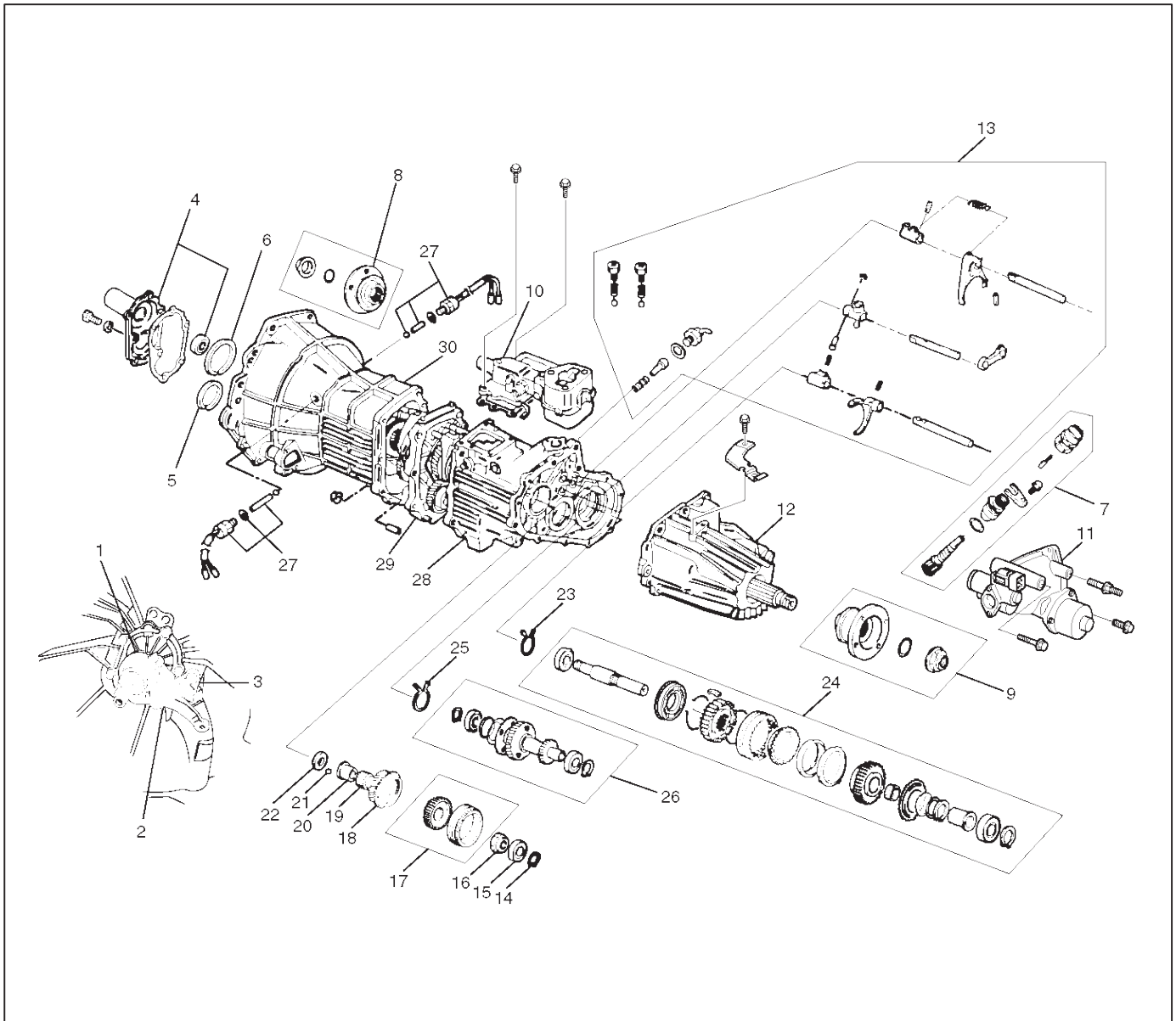
- Install the release bearing(1) to the shift fork(2) in the proper direction.

NOTE: Ensure release bearing is properly positioned during installation, as shown in the figure.



Transmission Case and Transfer Case

Major Component (4X4)



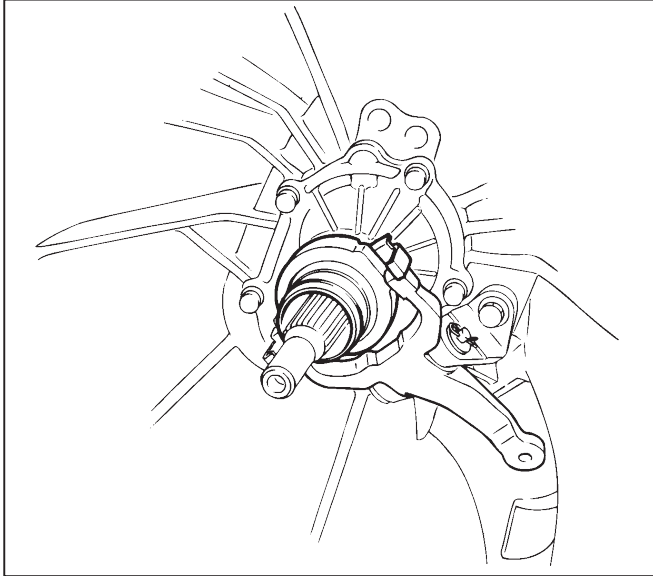
220RW041

Legend

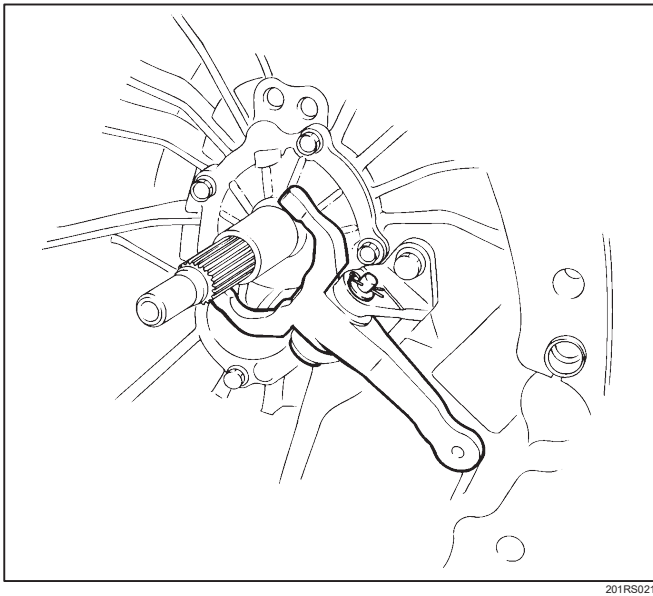
- | | |
|--|--|
| (1) Clutch Release Bearing | (15) Ball Bearing |
| (2) Shift Fork | (16) Lock Nut |
| (3) Fulcrum Bridge | (17) High-Low Clutch Hub and Sleeve |
| (4) Front Cover (with Oil Seal) | (18) Transfer Input Gear |
| (5) Counter Front Bearing Snap Ring | (19) Needle Bearing |
| (6) Top Gear Bearing Snap Ring | (20) Bearing Collar |
| (7) Speedometer Sensor and Speedometer Driven Gear | (21) Ball |
| (8) Front Companion Flange | (22) Plate |
| (9) Rear Companion Flange | (23) Bearing Snap Ring |
| (10) Gear Control Box Assembly | (24) Front Output Gear Assembly |
| (11) 2WD-4WD Actuator Assembly | (25) Bearing Snap Ring |
| (12) Transfer Rear Case Assembly | (26) Counter Gear Assembly |
| (13) Detent, Shift Arm, and Interlock Pin | (27) 1-2 and 3-4 Indicator Switch, Pin, and Ball |
| (14) Bearing Snap Ring | (28) Transfer Case Assembly |
| | (29) Intermediate Plate with Gear Assembly |
| | (30) Transmission Case |

Disassembly

1. Clean the exterior of the unit with solvent.
2. Remove the drain plug from the transmission case and transfer case and drain the lubricant.
3. Remove the clutch release bearing(1) from the transmission case.



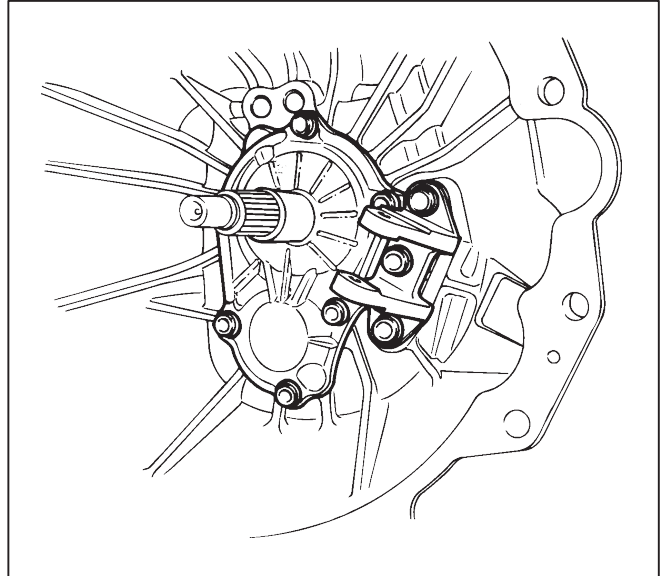
4. Remove the snap pin.
Remove the shift fork pin and shift fork(2) from the fulcrum bridge(3).



5. Remove the fulcrum bridge bolts.

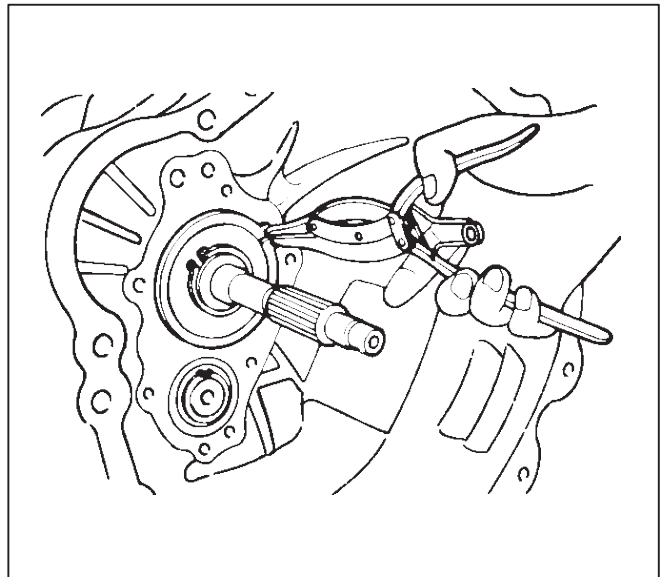
- Remove the fulcrum bridge(3) from the transmission case.

Remove the front cover(4) and gasket from the transmission case.



6. Remove counter front bearing snap ring(5) and top gear bearing snap ring(6).

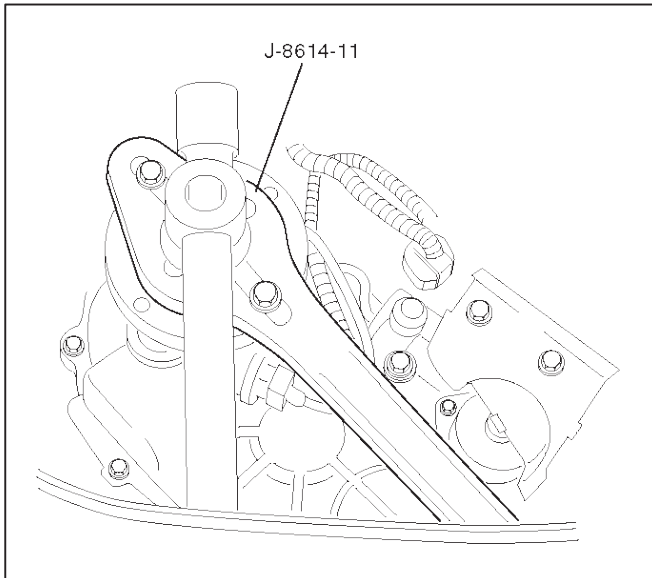
Use a pair of snap ring pliers to remove the snap ring.



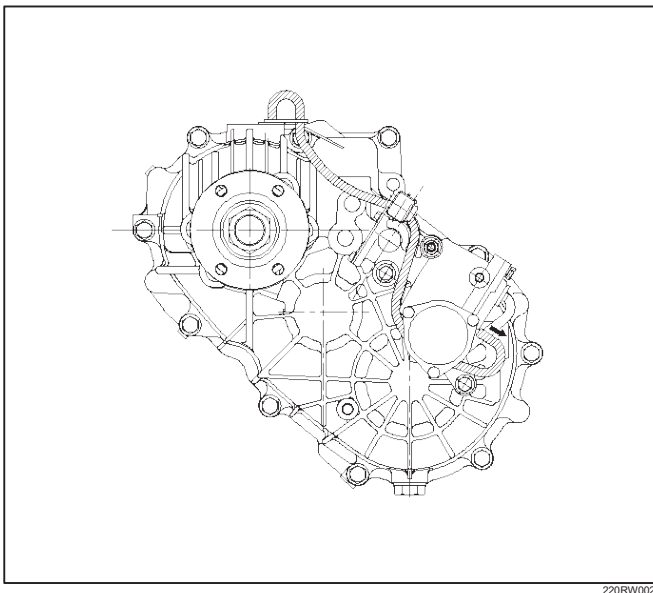
7. Remove the speedometer sensor(7).
Remove the plate(7).
Remove the driven gear bushing and driven gear(7).

NOTE: Apply a reference mark to the driven gear bushing before removal.

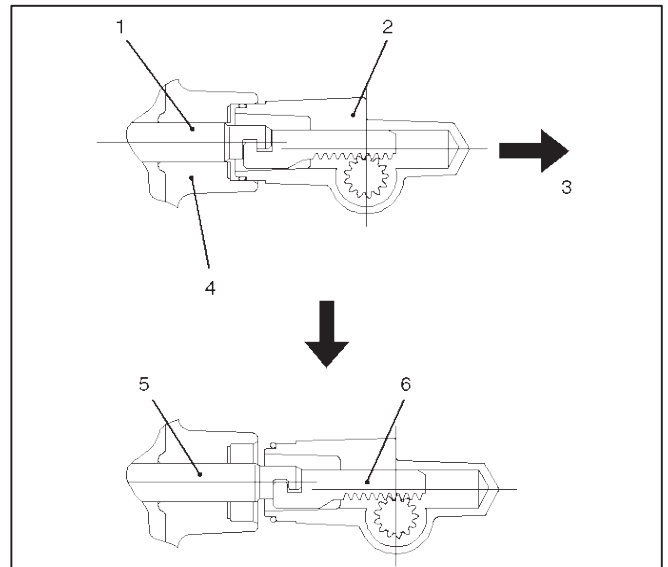
8. Remove front companion flange(8) and rear companion flange(9) using the flange holder J-8614-11 to remove the end nut.



9. Disconnect breather hose from transmission and remove gear control box assembly(10).
10. Remove 2WD-4WD actuator assembly(11) by performing the following steps:
 1. Disconnect the actuator breather hose from 2WD-4WD actuator assembly(11).



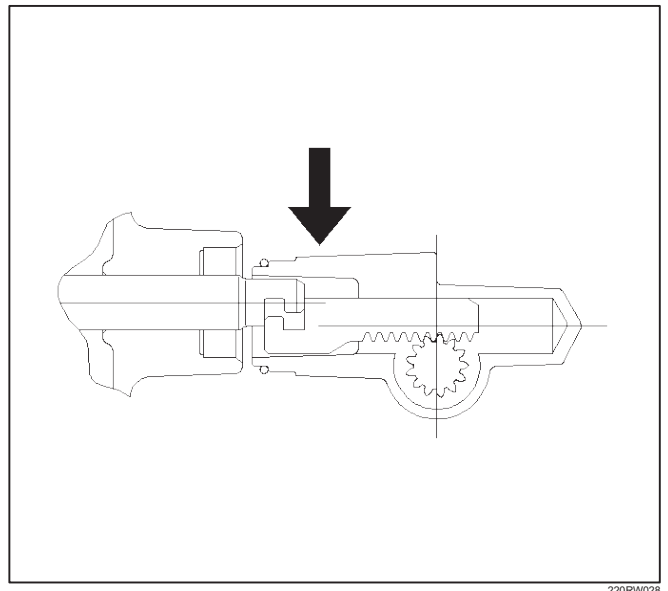
2. Remove the 2WD-4WD actuator assembly bolts.
3. Pull the 2WD-4WD actuator assembly with 2WD-4WD shift rod.



Legend

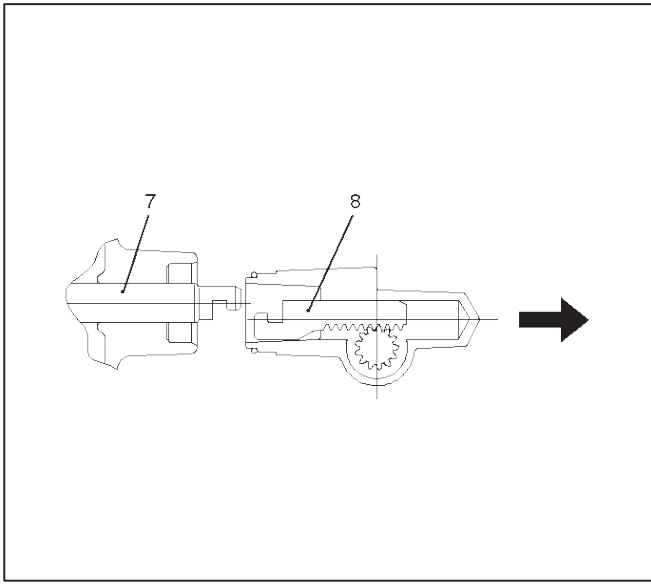
- (1) Shift Rod: 2WD-4WD (Position: 2WD)
- (2) 2WD-4WD Actuator Assembly
- (3) Pull
- (4) Rear Case Assembly
- (5) Position: 4WD
- (6) Position: 2WD

4. Offset the actuator assembly.



7B-24 MANUAL TRANSMISSION

5. Remove the actuator assembly.



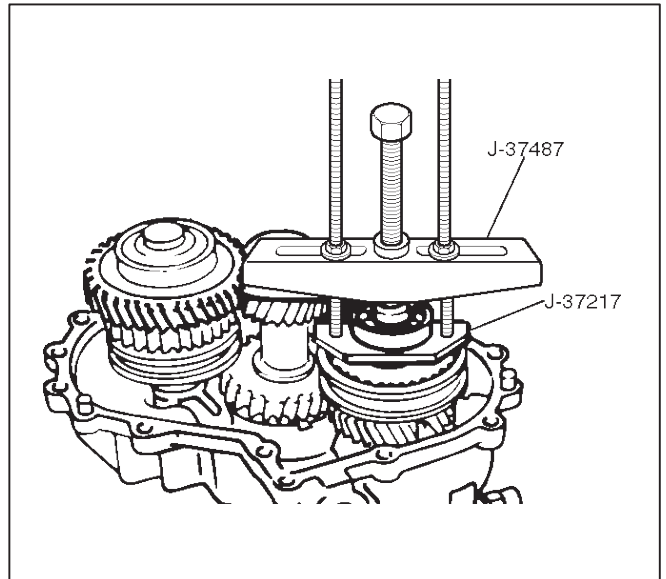
Legend

- (7) Position: 4WD
- (8) Mode: 2WD

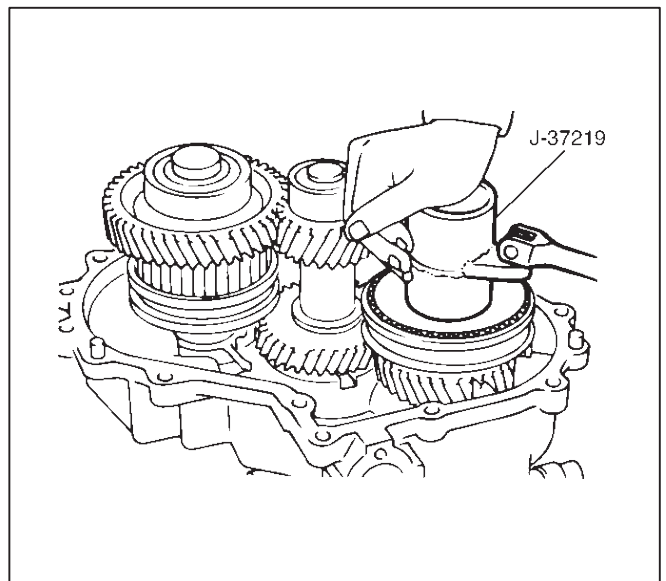
NOTE: Before removing the transmission and transfer assembly from vehicle, change the transfer mode to 2WD using the 4WD push button switch on dash panel.

- 11. Remove the transfer rear cover assembly(12) from the transfer case(28).
- 12. Regarding detent, shift arm, and interlock pin(13) disassembly, refer to Detent, Shift Arm, and Interlock Pin in Drive Line/Axle section.
- 13. Use a pair of snap ring pliers to remove the bearing snap ring(14).

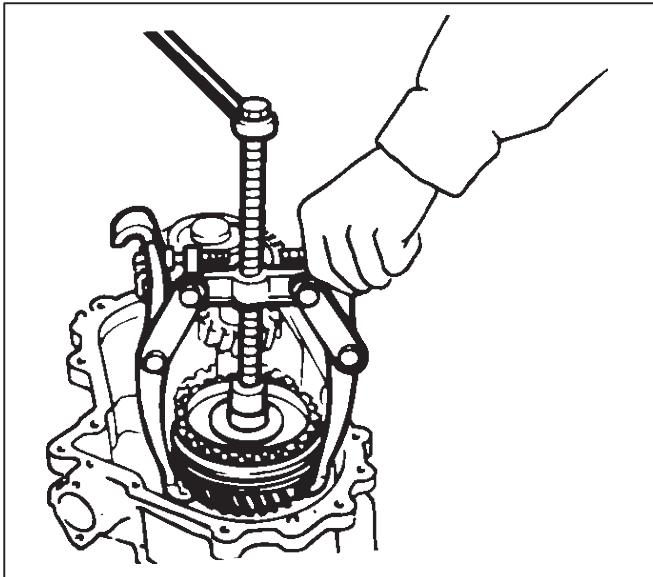
14. Use a bearing remover J-37217 and puller J-37487 to remove the ball bearing(15).



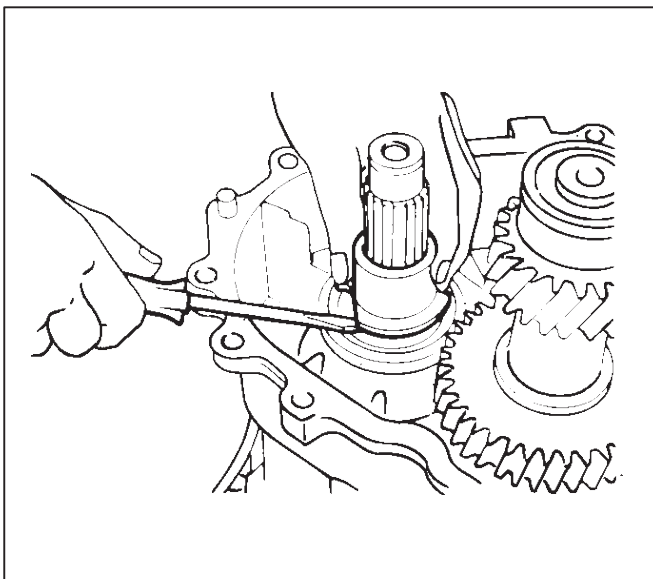
15. Install the front companion flange temporarily. Use the flange holder J-8614-11 and lock nut wrench J-37219 to remove the lock nut(16). Remove the front companion flange.



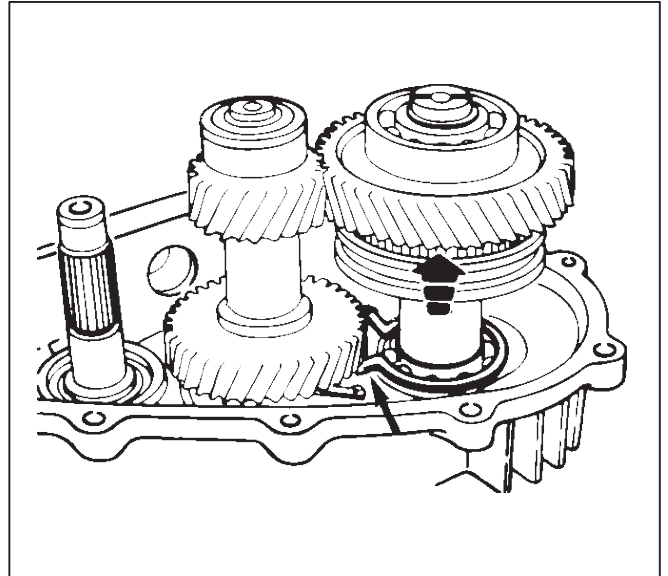
16. Remove high-low clutch sleeve(17).
Use the universal puller to remove the high-low clutch hub(17) and transfer input gear(18).



17. Remove needle bearing(19), bearing collar(20), ball(21), and plate(22).



18. Use a pair of snap ring pliers to remove the bearing snap ring(23).
19. Use a plastic hammer to tap the front output gear assembly(24) free.



20. Remove bearing snap ring(25) by using a pair of snap ring pliers.
21. Remove the counter gear assembly(26) from the transfer case(28).
22. Remove 1-2 and 3-4 indicator switch, pin and ball(27).
23. Remove the transfer case assembly(28) from the transmission case.
• Refer to Transfer Case Assembly in Drive Line/Axle section for repair of transfer case assembly.
24. Pull out intermediate plate with gear assembly(29) from transmission case.

Reassembly

1. Apply recommended liquid gasket (LOCTITE 17430) or its equivalent to the transmission case(30), intermediate plate(29) and transfer case(28) fitting surfaces.
2. Install the intermediate plate with gear assembly(29) to the transmission case(30).
Pull out the top gear shaft until the ball bearing snap ring groove protrudes from the transmission case front cover fitting face.
Avoid subjecting the mainshaft to sudden shock or stress.
3. Install the transfer case assembly(28) to the intermediate plate with gear assembly.
Tighten the eight transmission-transfer case bolts to the specified torque.

Torque: 37 N·m (27 lb ft)

Refer to Transfer Rear Case Assembly in Drive Line/Axle section for oil seal replacement.

4. Install 1-2 and 3-4 indicator switch, pin and ball(27).
5. Install the counter gear assembly(26) to the transfer case(28).
6. Use a pair of snap ring pliers to install the snap ring(25) to the transfer case(28).

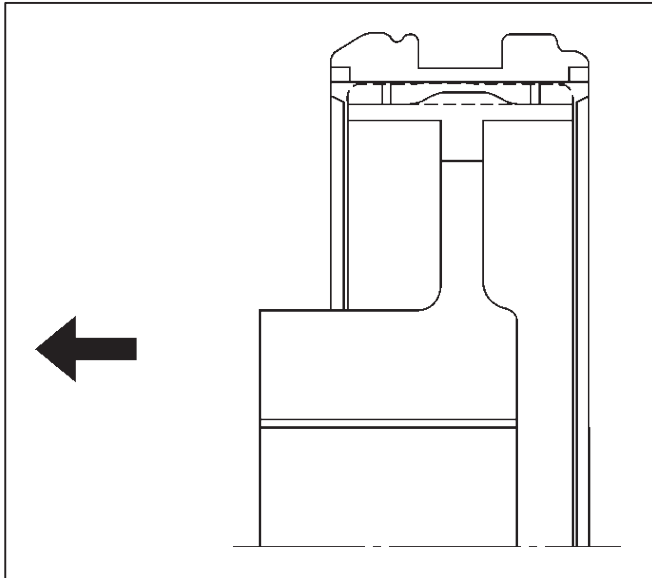
7B-26 MANUAL TRANSMISSION

NOTE: The snap ring must be fully inserted into the transfer case snap ring groove.

7. Install front output gear assembly(24).
8. Use a pair of snap ring pliers to install the snap ring (23) to the transfer case(28).

NOTE: The snap ring must be fully inserted into the transfer case snap ring groove.

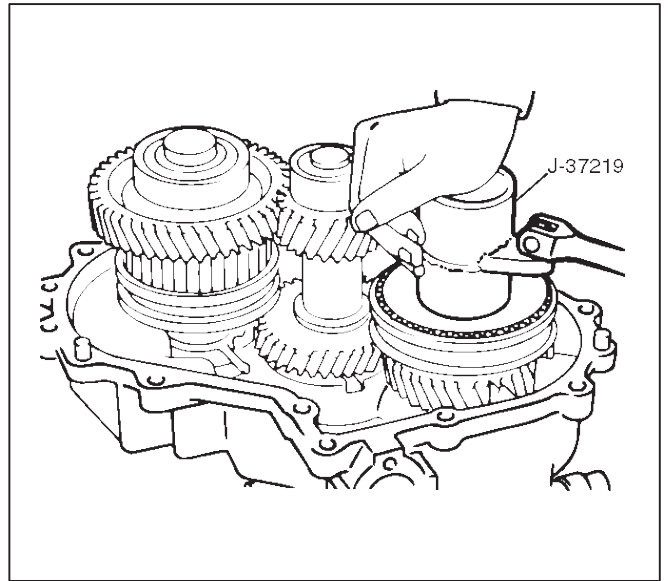
9. Install plate(22), ball(21), bearing collar(20), needle bearing(19), and transfer input gear(18).
10. Install High-low clutch hub and sleeve(17).
The clutch hub face (with the heavy boss) must be facing the transfer input gear side.



11. Install the front companion flange temporarily.

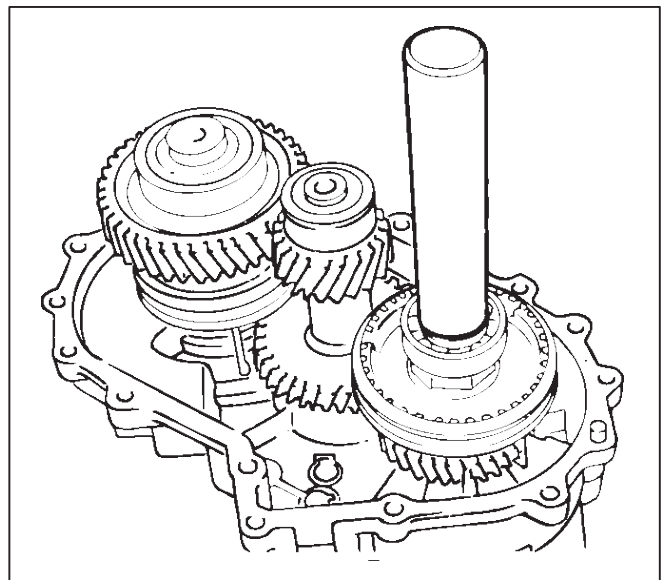
- Use the flange holder J-8614-11 and lock nut wrench J-37219 to install the lock nut(16).

Torque: 137 N·m (101 lb ft)



12. Use the punch to stake the lock nut at one spot.

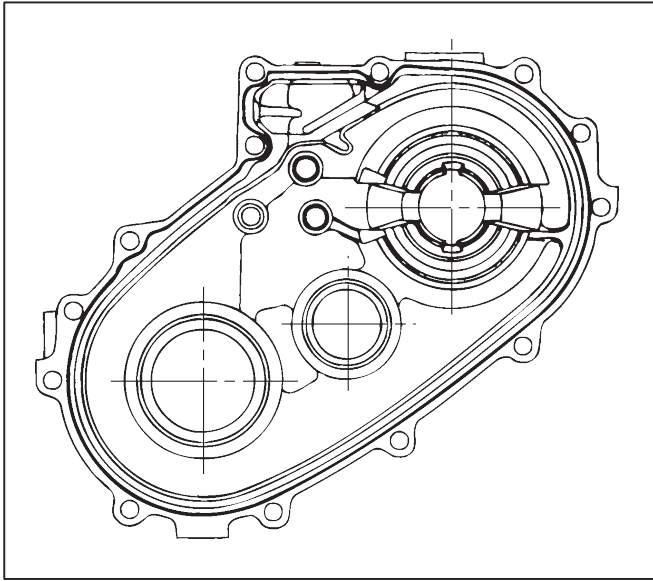
13. Use a suitable drift and hammer to install the ball bearing(15).



14. Use a pair of snap ring pliers to install the bearing snap ring(14).

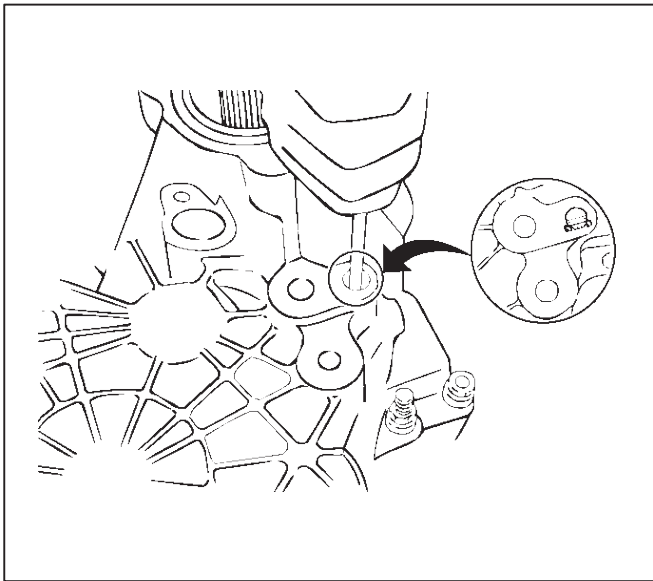
15. Regarding detent, shift arm, and interlock pin(13) assembly, refer to Detent, Shift Arm, and Interlock Pin in Drive Line/Axle section.

16. Apply recommended liquid gasket (LOCTITE 17430) or its equivalent to the transfer rear case fitting faces.



17. Perform the following steps before fitting the transfer rear case(12):

1. Shift the High-Low shift rod to the 4H side.
2. The cut-away portion of select rod head should align with the rear case hole's stopper.



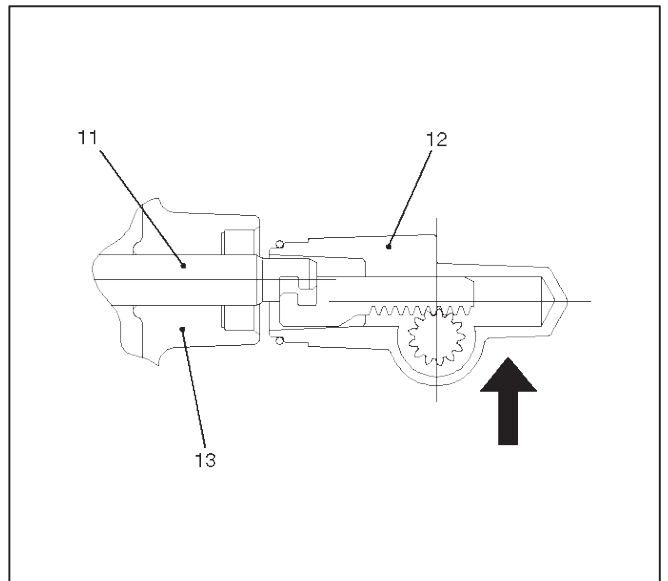
18. Tighten the eleven transfer rear case bolts to the specified torque.

Torque: 37 N·m (27 lb ft)

19. Install 2WD-4WD actuator assembly(11) by performing the following steps.

1. Shift the 2WD-4WD shift rod to the 4WD side.

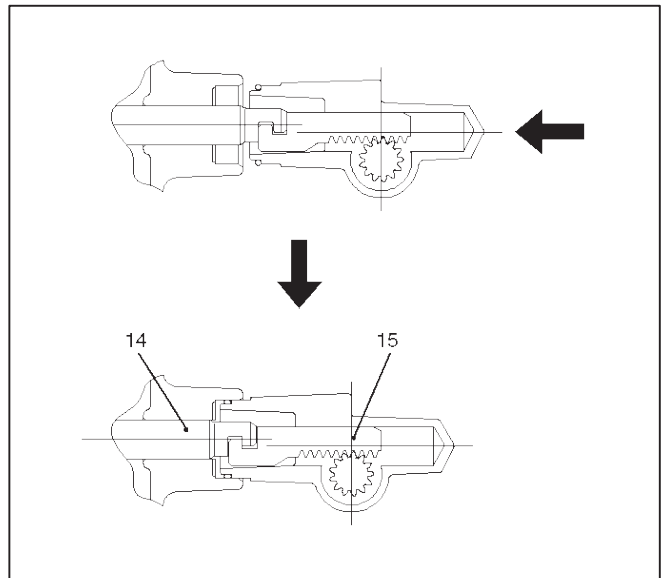
2. Join the rod grooves of 2WD-4WD actuator assembly and shift rod.



Legend

- (11) Shift Rod: 2WD-4WD (Position: 4WD)
 (12) 2WD-4WD Actuator Assembly (Mode: 2WD)
 (13) Rear Case Assembly

3. Push the 2WD-4WD actuator assembly with 2WD-4WD shift rod till the shift rod reaches the 2WD position.



Legend

- (14) Position: 2WD
 (15) Mode: 2WD

4. Tighten the 2WD-4WD actuator bolts to the specified torque.

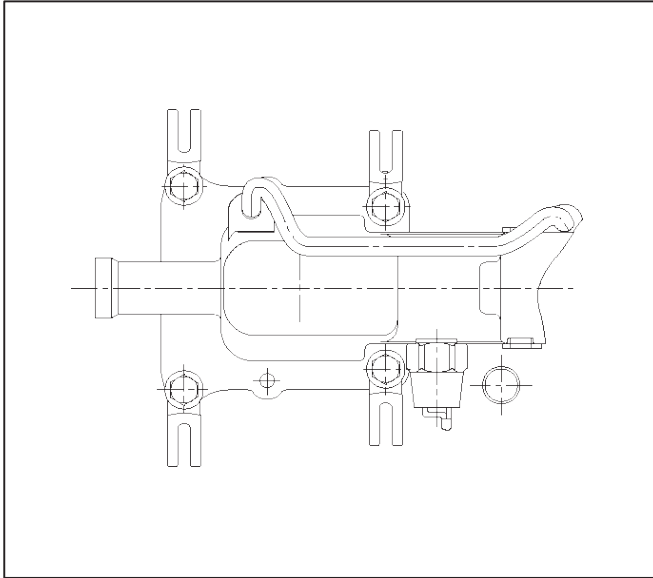
Torque: 19 N·m (14 lb ft)

5. Connect the actuator breather hose to actuator.

7B-28 MANUAL TRANSMISSION

20. Install a new packing and gear control box assembly(10).
Install the harness clips and brackets and then tighten four new gear control box bolts to the specified torque.

Torque: 20 N·m (14 lb ft)



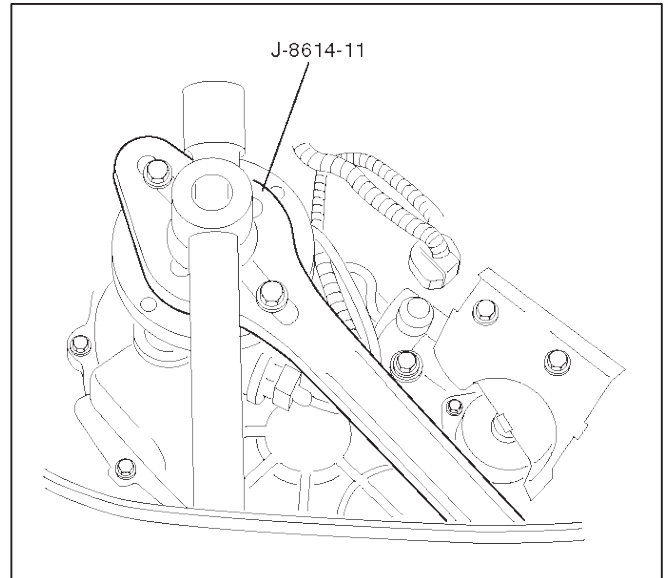
21. Install the rear and front companion flange(9) (8).
Install the O-ring(9).
Use the flange holder J-8614-11 to tighten the flange nuts(9) (8) to the transfer case.
Tighten new transfer flange nuts(9) (8) to the specified torque.

Rear Companion Flange

Torque: 167 N·m (123 lb ft)

Front Companion Flange

Torque: 137 N·m (101 lb ft)

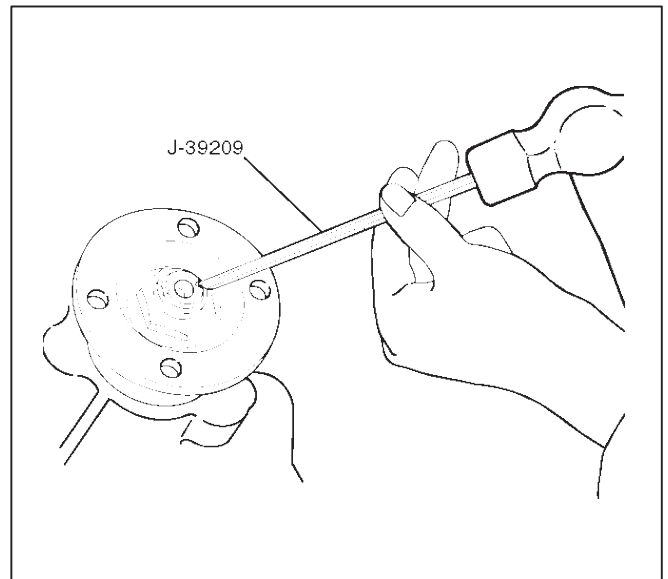


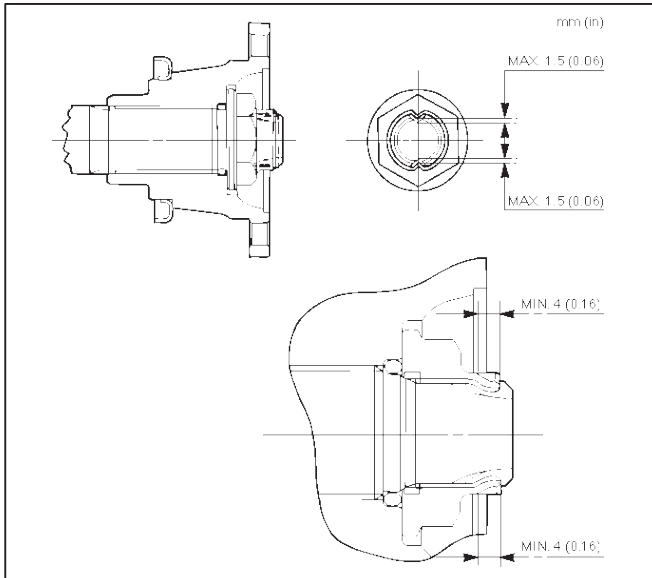
22. Use the punch J-39209 to stake the rear companion flange nut at two spots.

Punch: J-39209

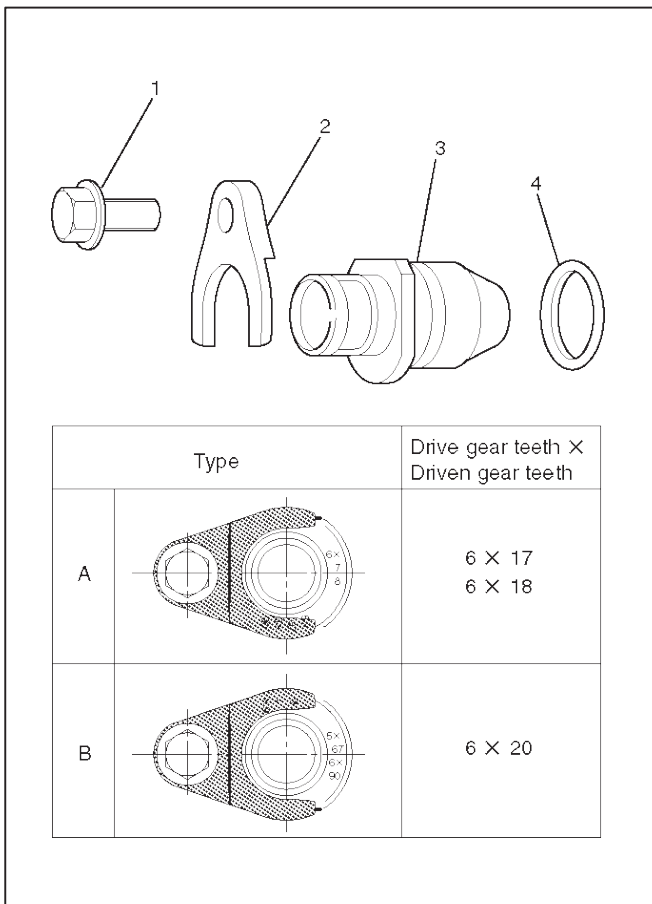
- Stake the front companion flange nut at one spot.

NOTE: Be sure to confirm that there is no crack at the staked portion of the flange nut after staking.





23. Install the O-ring (4) to the speedometer driven gear bushing(3).
Install the driven gear to the speedometer driven gear bushing(3).
Install the speedometer driven gear assembly(7) to the transfer rear cover.



24. Install the plate to the transfer rear cover.

Torque: 15 N·m (11 lb ft)

25. Install the speedometer sensor.

Torque: 27 N·m (20 lb ft)

26. Install top gear bearing snap ring(6) and counter front bearing snap ring(5).

Use a pair of snap ring pliers to install the snap rings to the mainshaft and countershaft.

The snap rings must be fully inserted into the bearing snap ring groove.

27. Install a new packing and front cover (with oil seal) (4) to the transmission case.

NOTE: Take care not to damage the oil seal.

Notes When Tightening the Bolt:

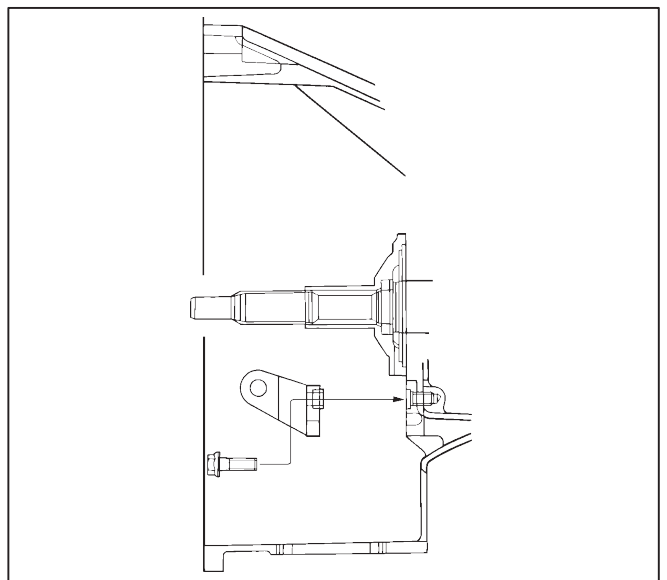
- After cleaning the bolt hole, dry it thoroughly with air.
 - After cleaning the screw face of a removed bolt or new one, dry it thoroughly. Apply recommended liquid gasket (LOCTITE 242) or its equivalent before tightening it.
- Tighten six new front cover bolts to the specified torque.

Torque: 25 N·m (18 lb ft)

28. Install the fulcrum bridge(3) to the transmission case.

Tighten three fulcrum bridge bolts to the specified torque.

Torque: 38 N·m (28 lb ft)

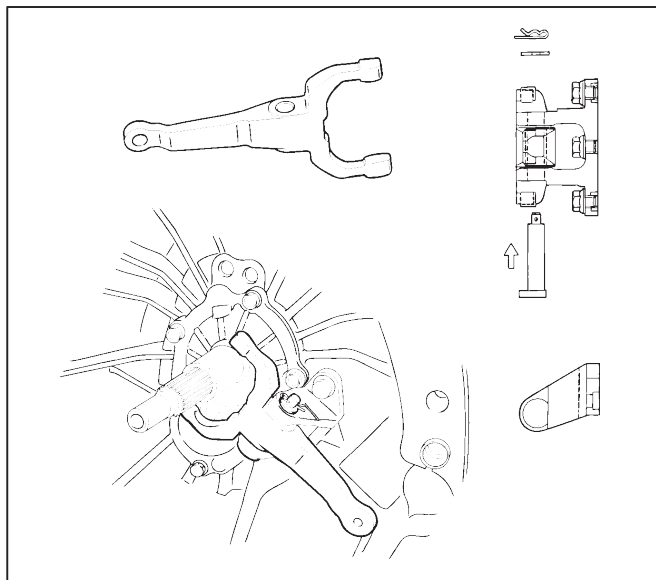


7B-30 MANUAL TRANSMISSION

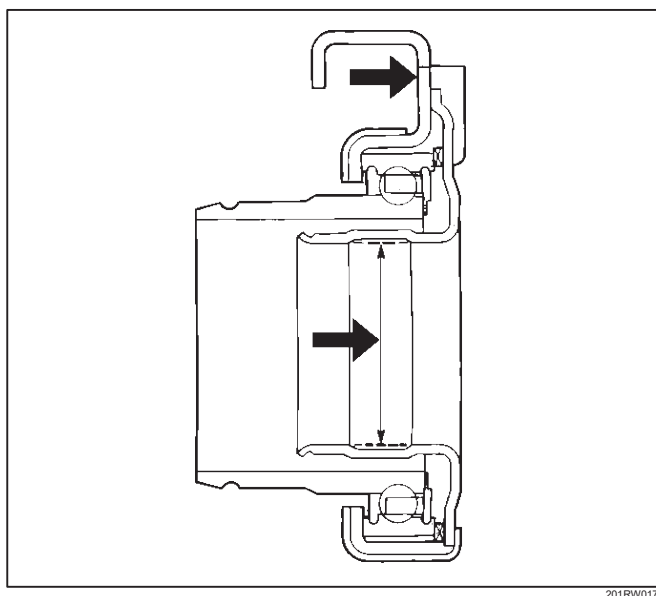
29. Apply grease to the pin hole inner circumferences and thrust surfaces.

Attach the shift fork(2) to the fulcrum bridge(3) by inserting the shift fork pin from the bottom side of the fulcrum bridge.

Install the washer and snap pin.

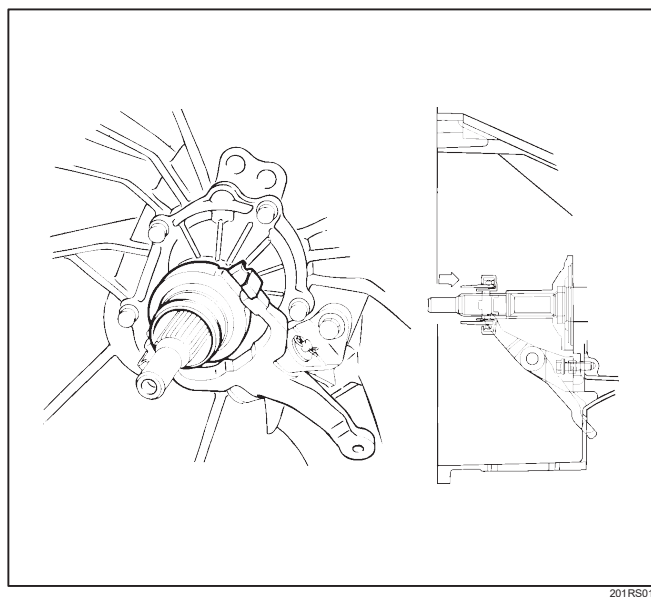


30. Apply grease to the areas shown in the figure.



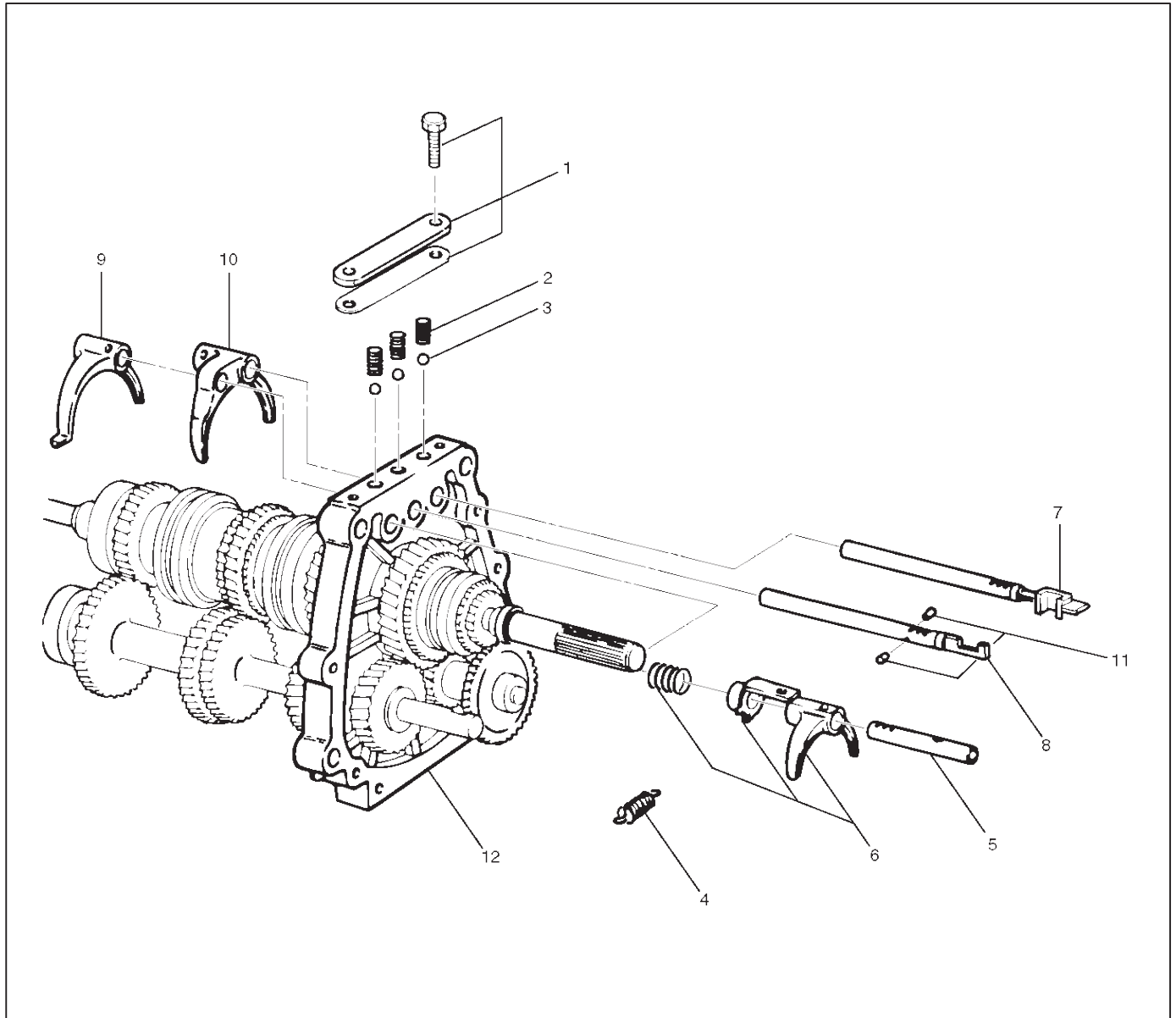
Install the release bearing(1) to the shift fork(2) in the proper direction.

NOTE: Ensure release bearing is properly positioned during installation, as shown in the figure.



Intermediate Plate with Gear Assembly, Detent, Shift Arm, and Interlock Pin

Disassembled View



220RS010

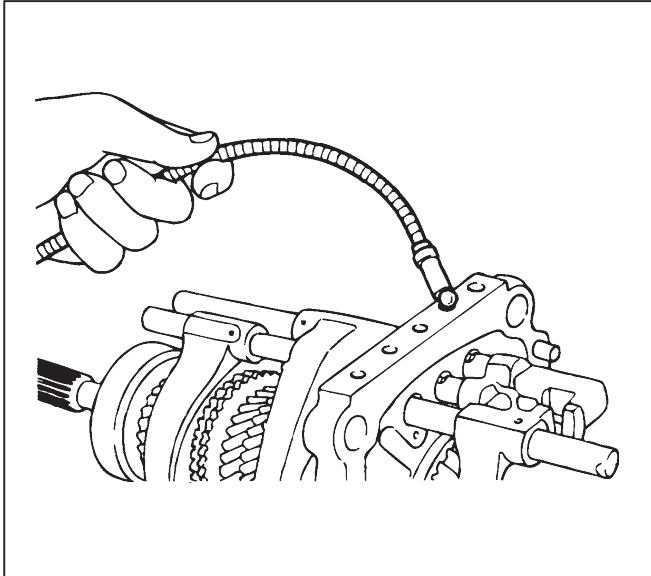
Legend

- | | |
|---|---|
| (1) Detent Spring Plate and Gasket | (7) 1st-2nd Shift Rod |
| (2) Detent Spring | (8) 3rd-4th Shift Rod |
| (3) Detent Ball | (9) 3rd-4th Shift Arm |
| (4) Spring | (10) 1st-2nd Shift Arm |
| (5) Rev-5th Shift Rod | (11) Interlock Pin |
| (6) Rev-5th Shift Arm and Reverse Inhibitor | (12) Intermediate Plate and Gear Assembly |

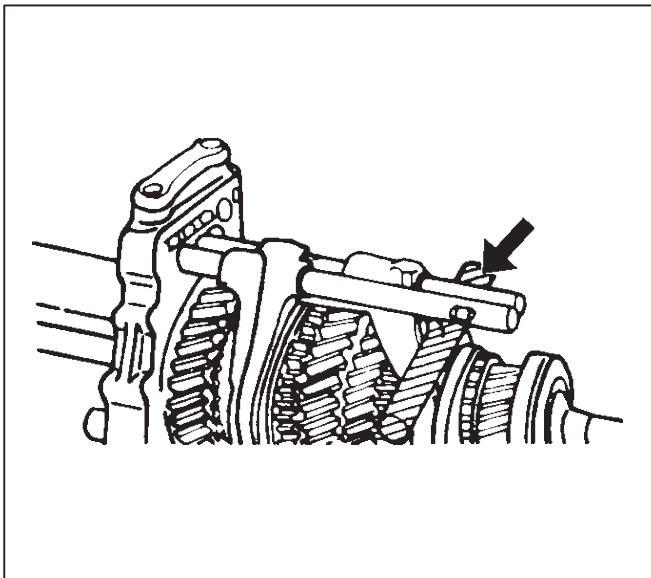
Disassembly

1. Remove detent spring plate and gasket(1), detent spring(2) and detent ball(3).

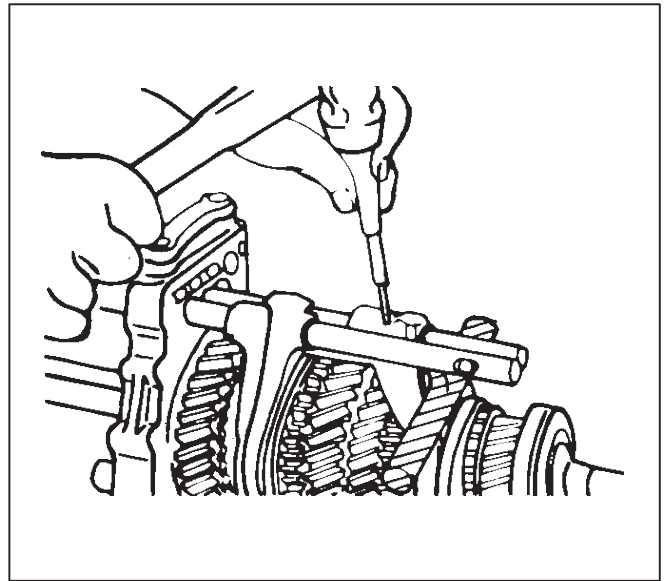
Use a magnetic hand to remove the detent balls from the intermediate plate.



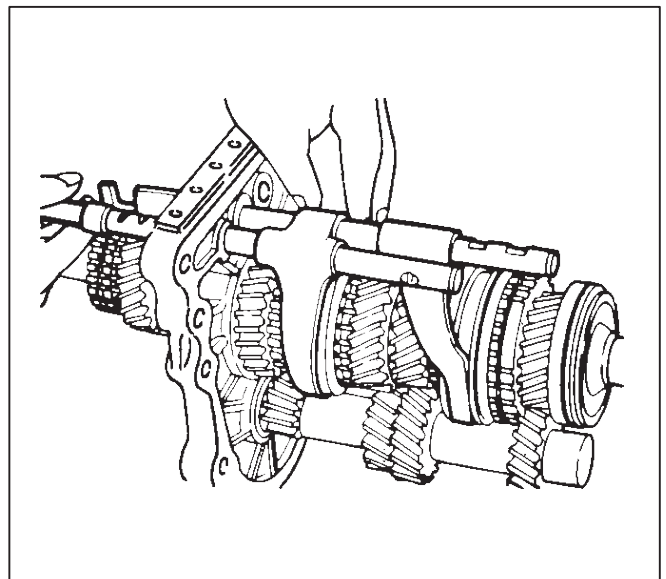
2. Remove spring(4).
 3. Remove rev-5th shift rod(5), and rev-5th shift arm and reverse inhibitor(6).
Remove 1st-2nd shift rod(7), 3rd-4th shift rod(8), 3rd-4th shift arm(9), and 1st-2nd shift arm (10).
- Hold a round bar against the shift rod end.



- Use a spring pin remover to remove the shift arm spring pins from the shift arms and the shift rods.



- Move the 3rd-4th shift rod forward.



- Remove the rev-5th, 1st-2nd and 3rd-4th shifter rods carefully. Interlock pins are located between the shifter rods in the intermediate plate.
4. Remove interlock pin(11) from intermediate plate and gear assembly(12).

Inspection and Repair

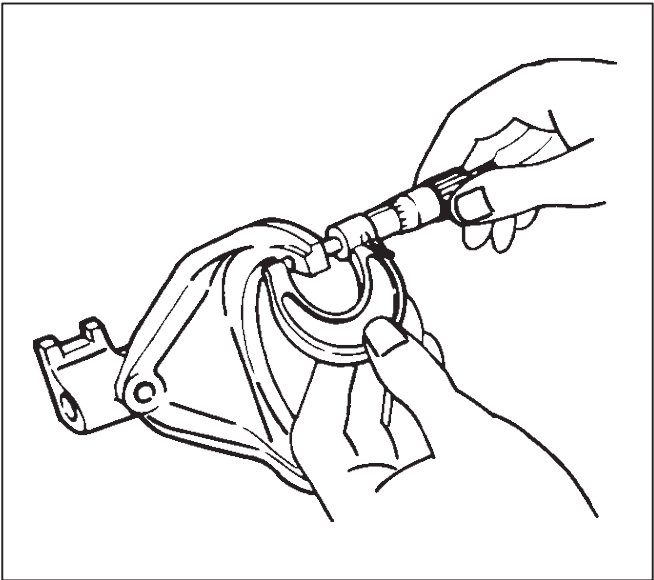
Make the necessary adjustments, and part replacements if excessive wear or damage is discovered during inspection.

Shift Arm Thickness

- Use a micrometer to measure the shift arm thickness. If the measured value is less than the specified limit, the shift arm must be replaced.

Shift Arm Thickness

	Standard	Limit
1st-2nd	9.60-9.85 mm (0.378-0.388 in)	9.0 mm (0.354 in)
3rd-4th Rev.5th	9.60-9.80 mm (0.378-0.386 in)	



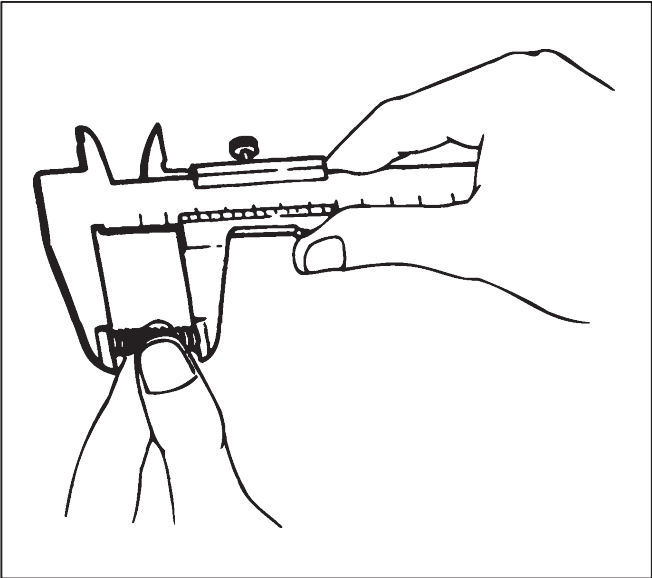
230RS006

Detent Spring Free Length

- Use a vernier caliper to measure the detent spring free length. If the measured value is less than the specified limit, the detent spring must be replaced.

Detent Spring Free Length

Standard	Limit
26.8 mm (1.06 in)	26.2 mm (1.03 in)



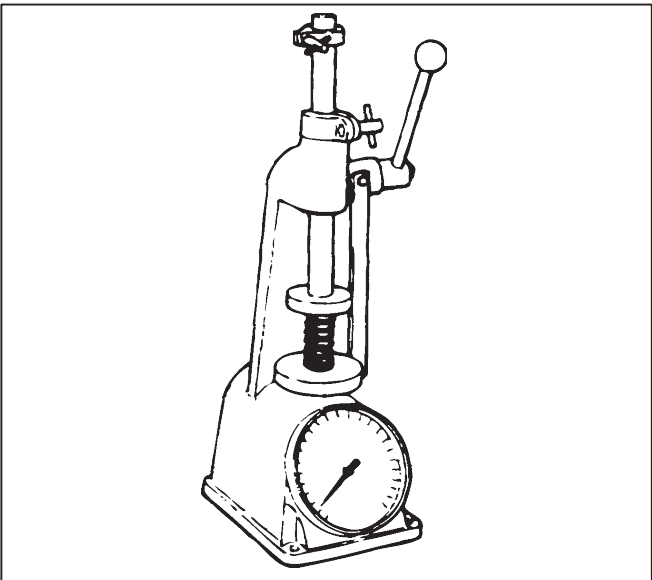
220RS012

Detent Spring Tension

- Use a spring tester to measure the valve spring tension. If the measured value is less than the specified limit, the detent spring must be replaced.

Detent Spring Tension

Compressed height	Standard
20 mm (0.787 in)	87.2 - 97.1 N (19.6 - 21.8 lb)



220RS013

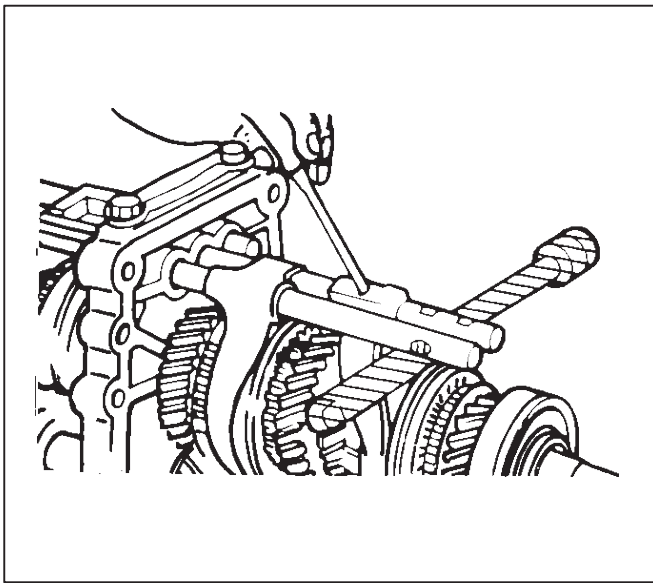
Reassembly

1. Install 1st-2nd shift arm(10) and 3rd-4th shift arm(9) to intermediate plate and gear assembly(12).
2. Install 3rd-4th shift rod(8) and 1st-2nd shift rod(7).
 - Install the interlock pin(11) to the shift rod.
 - Install the shift rod together with the interlock pin to the intermediate plate.

Do not allow the interlock pin to fall from the shift rod.

 - Hold a round bar against the shift rod end lower face to protect it against damage.
 - Install a new spring pin.

Never reinstall the used spring pin.



3. Install rev-5th shift arm and reverse inhibitor(6) and rev-5th shift rod(5).
 - Apply oil to the reverse inhibitor inner surface.
 - Install the interlock pin(11) to the shift rod.
 - Install the shift rod together with the interlock pin to the intermediate plate.

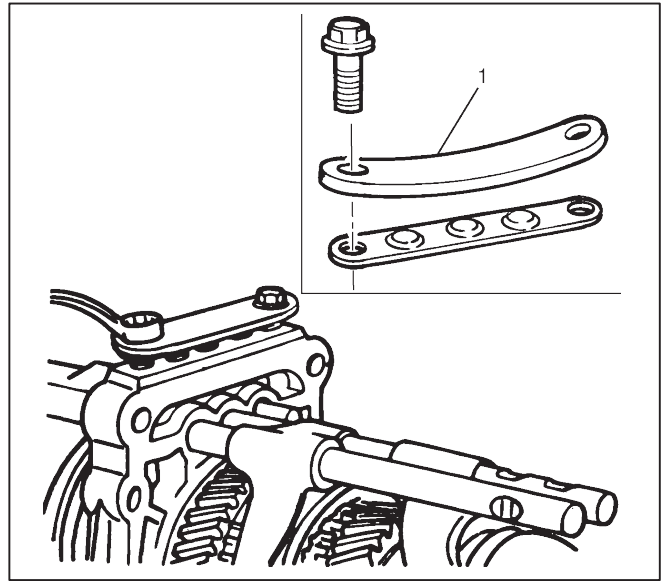
Do not allow the interlock pin to fall from the shift rod.

 - Hold a round bar against the shift rod end lower face to protect it against damage.
 - Install a new spring pin.

Never reinstall the used spring pin.

4. Install spring(4).
5. Put detent balls(3) in the intermediate plate holes.
 - Apply oil to the detent balls.
6. Install detent springs(2) and detent spring plate and gasket(1).
 - Install a new gasket and the detent spring plate.
 - Tighten the detent spring plate bolts to the specified torque.

Torque: 20 N·m (14 lb ft)

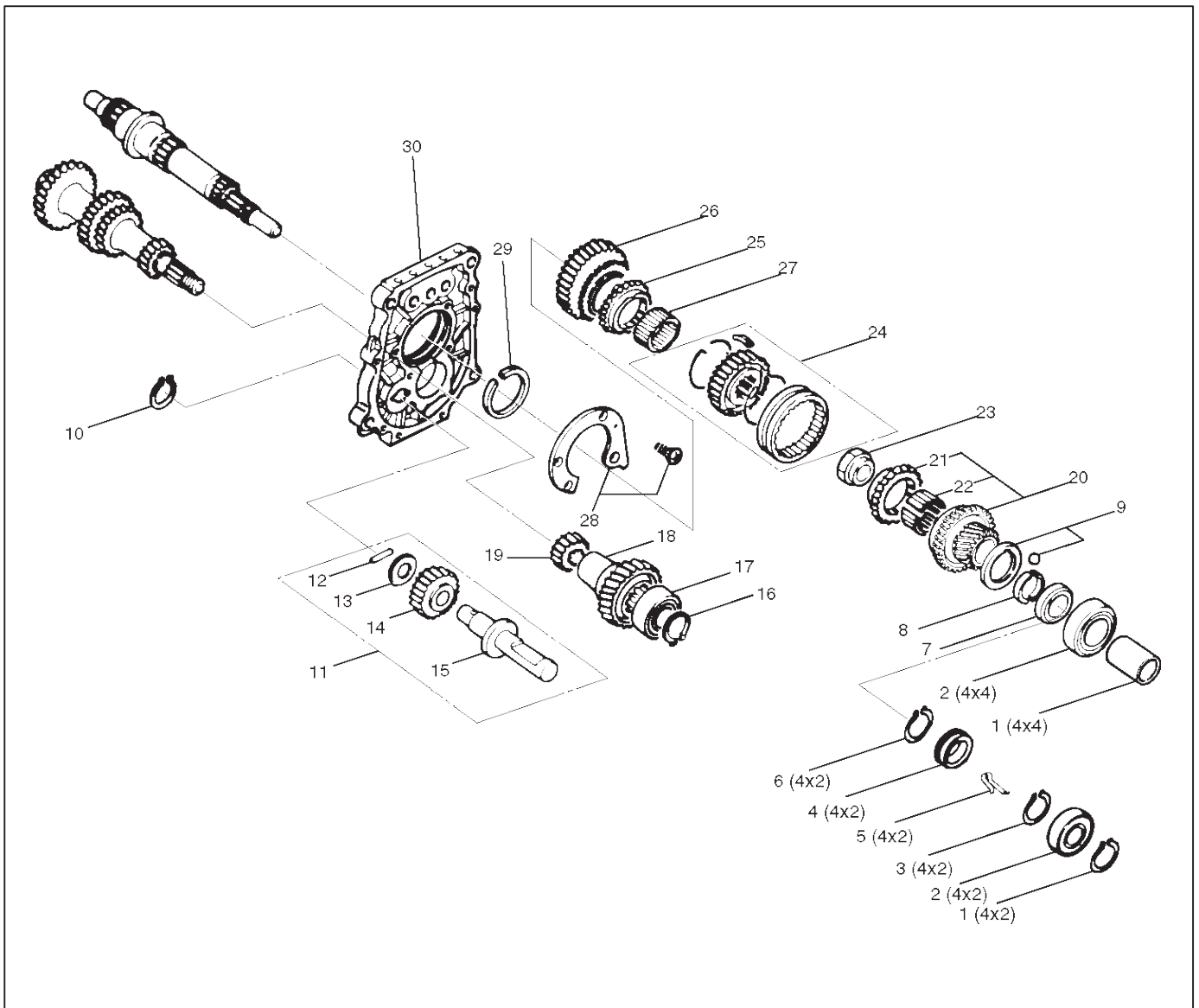


Legend

(1) Warped

Reverse Gear and 5th Gear

Disassembled View

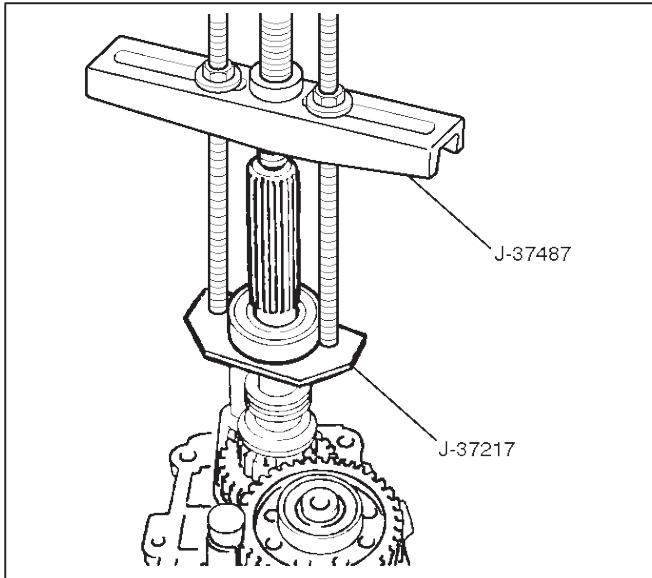


Legend

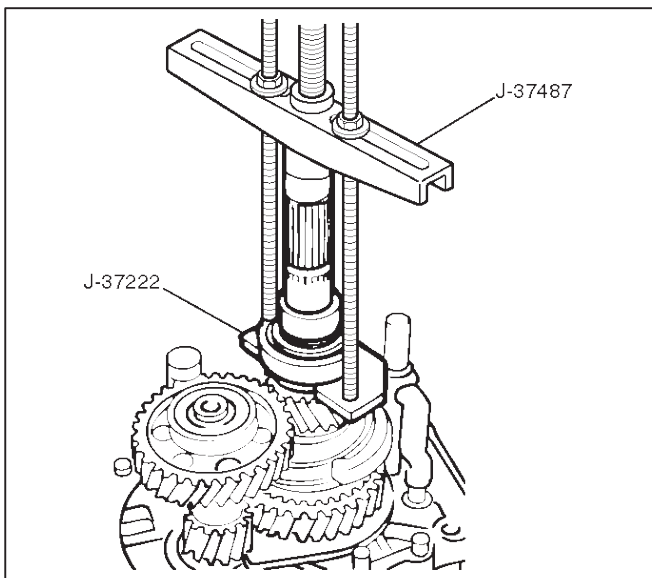
- | | |
|-----------------------------------|------------------------------------|
| (1) Oil Seal Collar (4X4) | (15) Reverse Idler Shaft |
| (2) Ball Bearing (4X4) | (16) Bearing Snap Ring |
| | (17) Ball Bearing |
| (1) Bearing Snap Ring (4X2) | (18) Counter 5th Gear |
| (2) Ball Bearing (4X2) | (19) Counter Reverse Gear |
| (3) Bearing Snap Ring (4X2) | (20) 5th Gear |
| (4) Speedometer Drive Gear (4X2) | (21) 5th Block Ring |
| (5) Clip (4X2) | (22) Needle Bearing |
| (6) Retainer Snap Ring (4X2) | (23) Mainshaft Nut |
| (7) Retainer | (24) Rev-5th Synchronizer Assembly |
| (8) Thrust Plate | (25) Reverse Block Ring |
| (9) Thrust Washer and Lock Ball | (26) Reverse Gear |
| (10) Reverse Idler Gear Snap Ring | (27) Needle Baring |
| (11) Reverse Idler Gear Assembly | (28) Bearing Plate and Screw |
| (12) Idle Shaft Pin | (29) Bearing Snap Ring |
| (13) Thrust Washer | (30) Intermediate Plate |

Disassembly

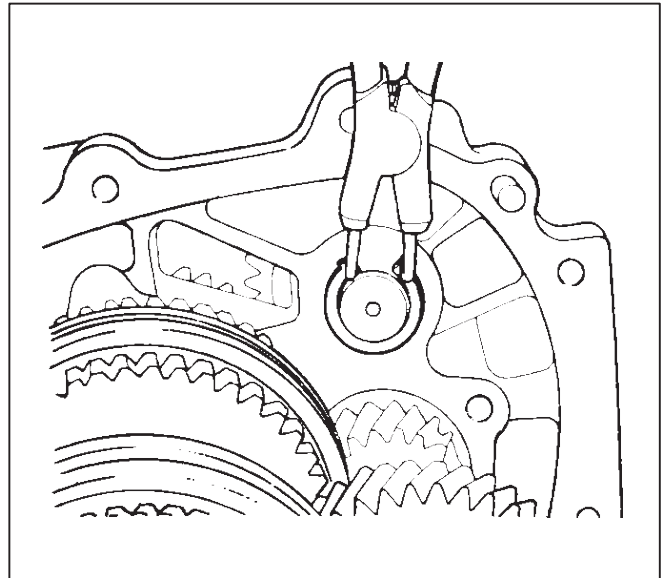
1. Use a pair of snap ring pliers to remove the bearing snap ring(1). (4X2)
2. Set the bearing remover J-37217 and puller J-37487 to the bearing and the mainshaft end to remove ball bearing(2). (4X2)



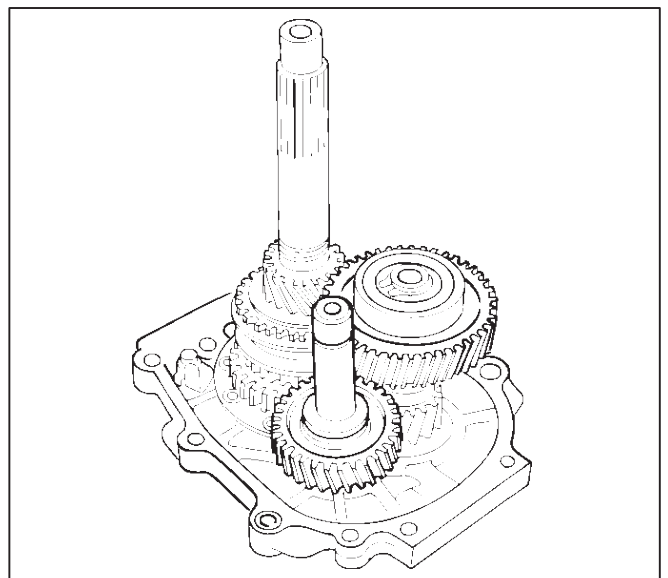
3. Remove bearing snap ring(3), speedometer drive gear(4), clip(5), retainer snap ring(6) and retainer(7). (4X2)
4. Set the retaining ring remover J-37222 and puller J-37487 to the retainer(7) and the mainshaft end. (4X4)



5. Remove the retainer(7) together with the bearing(2) and the oil seal collar(1). (4X4)
The universal puller may be used in place of the retaining ring remover.
6. Remove thrust plate(8) and thrust washer and lock ball(9).
7. Use a pair of snap ring pliers to remove reverse idler gear snap ring(10).

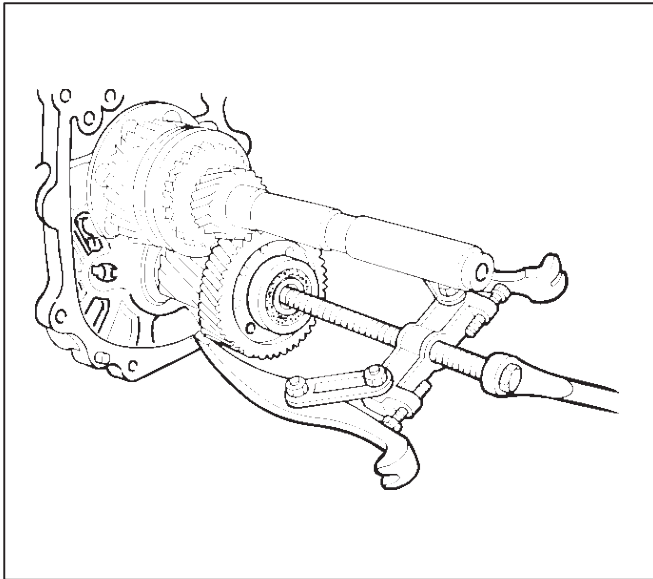


8. Remove the reverse idler gear assembly(11) from the intermediate plate(30).



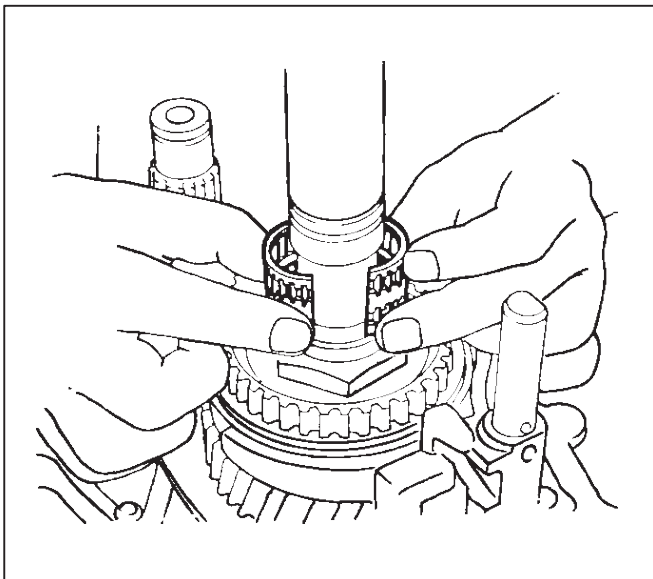
9. Remove idle shaft pin(12), thrust washer(13), reverse idler gear(14), and reverse idler shaft(15).
10. Use a pair of snap ring pliers to remove the snap ring(16).

11. Attach the bearing remover to the counter gear shaft. Use the bearing remover to remove the ball bearing(17) and the counter 5th gear(18).

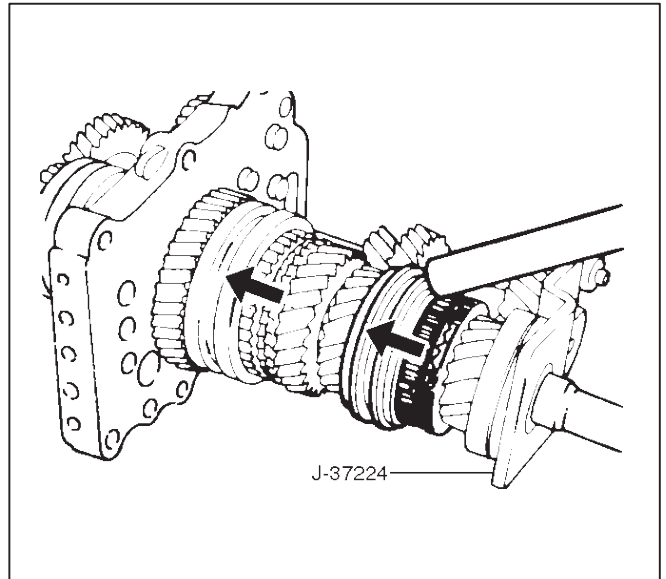


12. Remove counter reverse gear(19).

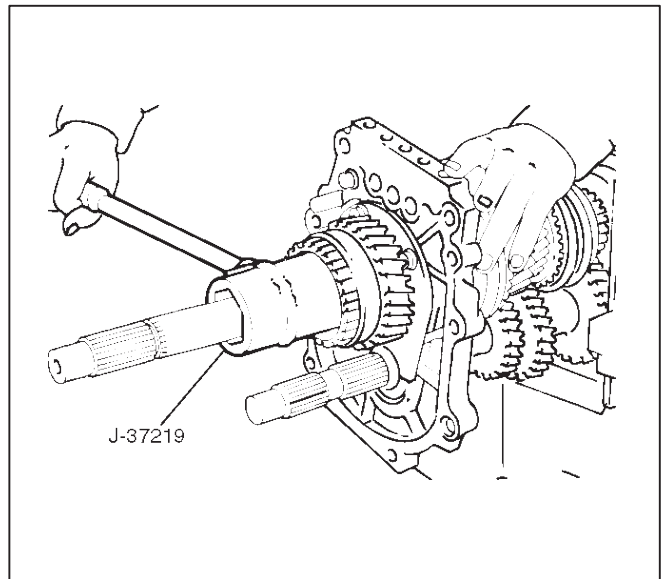
13. Remove 5th gear(20), 5th block ring(21), and needle bearing (2 piece type) (22).



14. Engage the 3rd-4th synchronizer with the 3rd gear. Engage the 1st-2nd synchronizer with the 1st gear. Attach the holding fixture J-37224 and base J-3289-20 to the mainshaft and the counter gear.

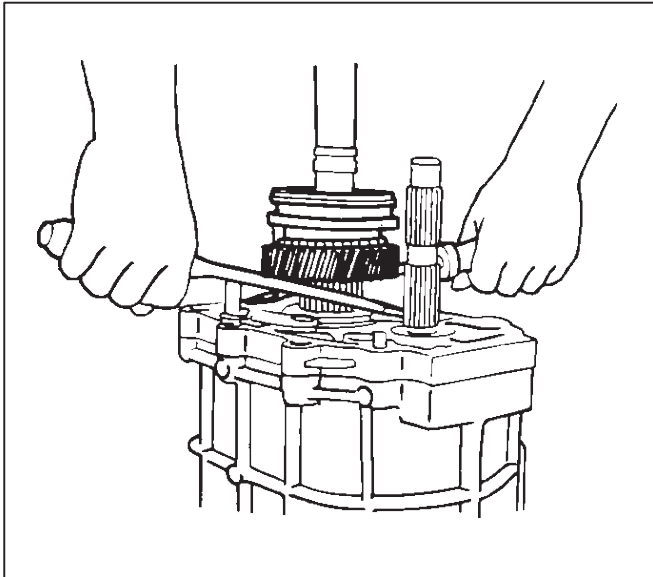


- Use the mainshaft nut wrench J-37219 to remove the mainshaft nut(23).



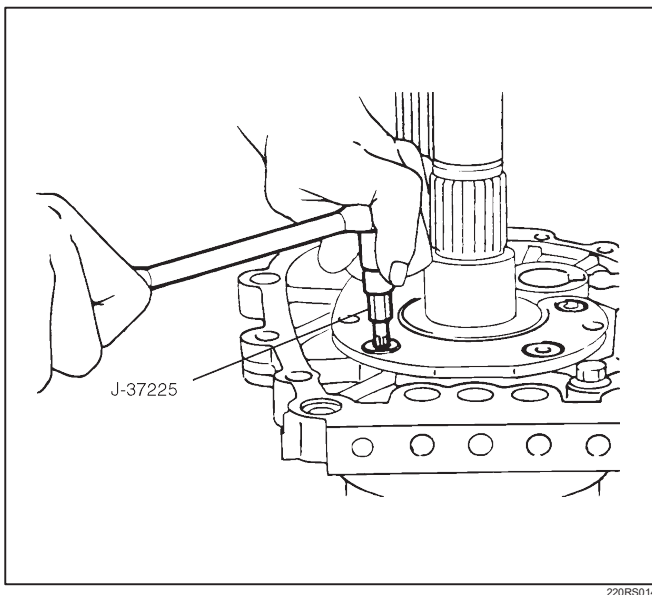
7B-38 MANUAL TRANSMISSION

15. Use pry bars between the reverse gear(26) and bearing plate(28) to remove the Rev-5th synchronizer assembly(24) together with reverse block ring(25) and reverse gear(26).

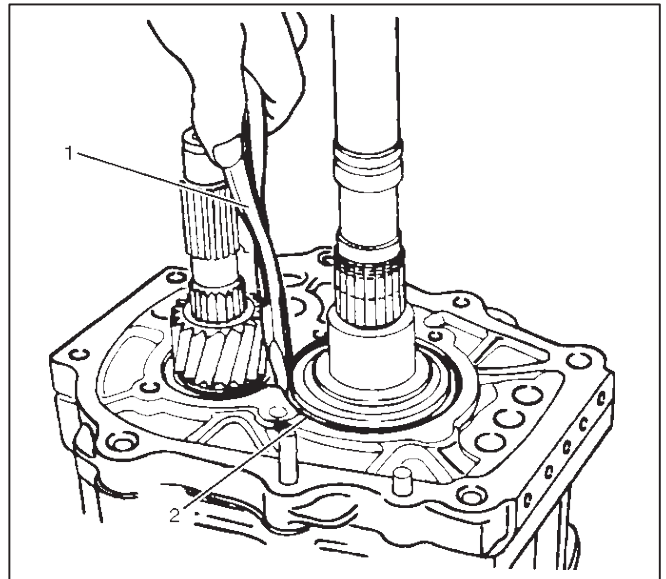


16. Remove needle bearing(27).

17. Use the torx bit wrench J-37225(T45) to remove the bearing plate and screw(28) from the intermediate plate.



18. Use the snap ring pliers(2) to remove the mainshaft bearing snap ring(1) (29).



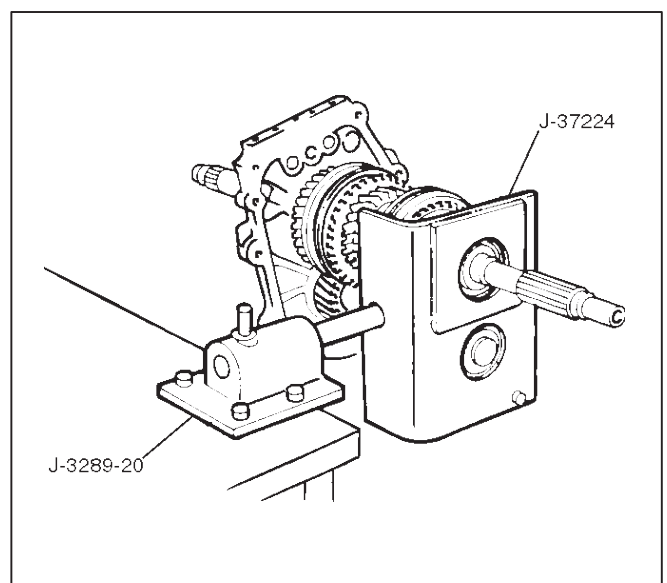
19. Hold the snap ring open with the pliers.
Push the intermediate plate(30) toward the rear of the transmission to remove it.
The bearing snap ring will come free.

Inspection and Repair

Refer to Top Gear Shaft, Main Gear Shaft, and Counter Gear in this section for inspection and repair.

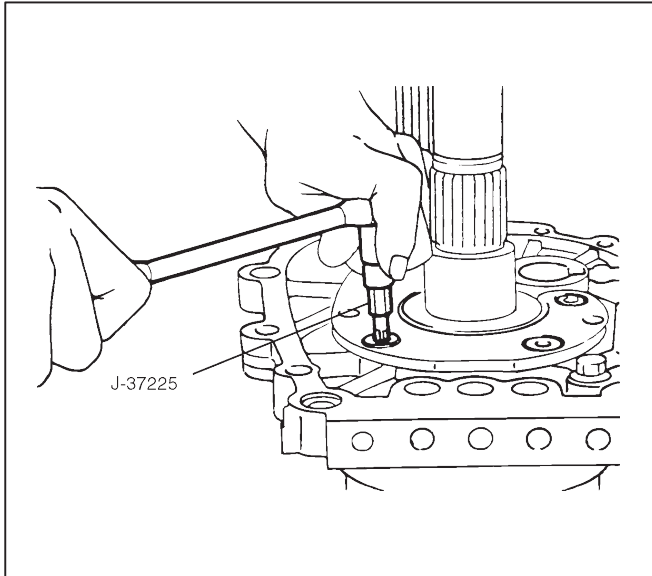
Reassembly

1. Mesh the counter gear with the mainshaft assembly.
Install the holding fixture J-37224 and base J-3289-20 to the mainshaft and the counter gear.



2. Place the holding fixture (with the mainshaft and the counter shaft) in a vise.
Install the intermediate plate(30).
3. Install bearing snap ring(29).
4. Apply recommended thread locking agents (LOCTITE 242) or its equivalent to each of the bearing plate screw threads.
Install bearing plate and screw(28).
Tighten the screws to the specified torque by using torx bit wrench J-37225.

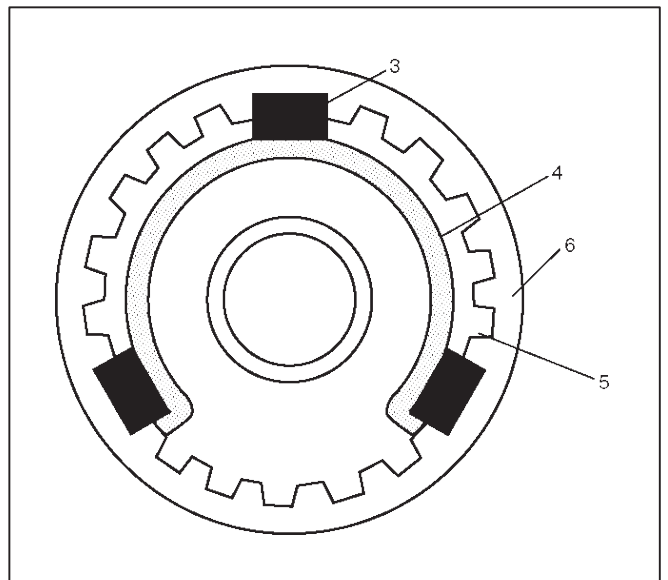
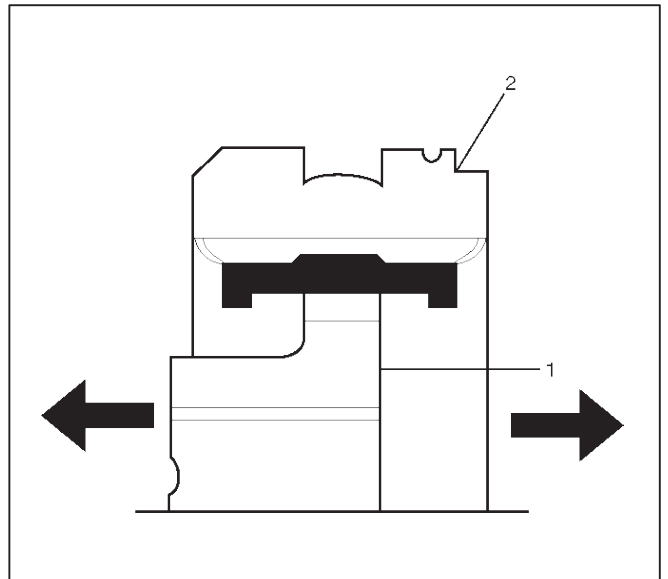
Torque: 15 N·m (11 lb ft)



5. Install needle bearing(27), reverse gear(26), and reverse block ring(25).
6. Assemble rev-5th synchronizer assembly(24) by performing the following steps.
 1. Turn the clutch hub face(1) toward the sleeve groove(2) (rear side) on the outer circumference.
 2. Check that the inserts(3) fit snugly into the block ring insert grooves.
 3. Check that the inserts springs(4) are fitted to the inserts as shown in the illustration.
 4. Check that the clutch hub(5) and the sleeve(6) slide smoothly.

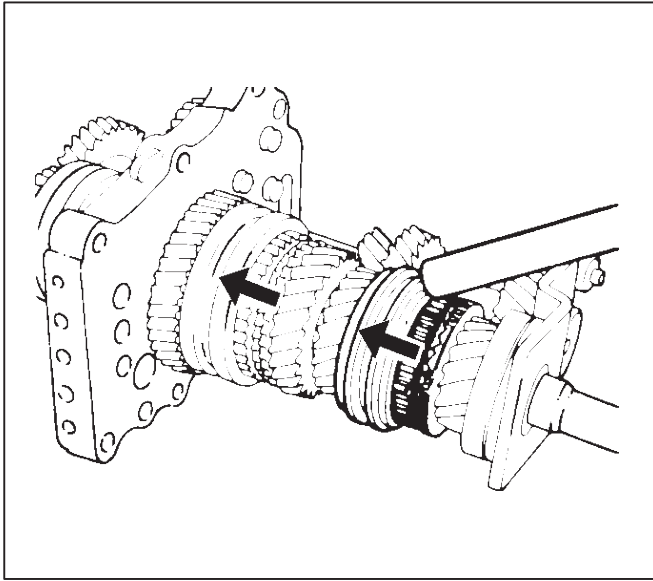
5. Install the synchronizer assembly to the mainshaft.

The clutch hub face (with the heavy boss) must be facing the reverse gear side.



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7. Mesh the 1st-2nd and 3rd-4th synchronizers with both the 1st and 3rd gears (double engagement).



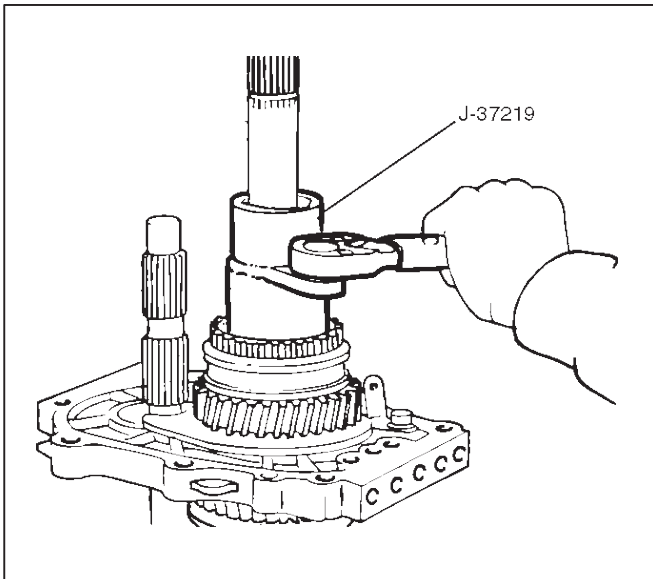
226RS015

This will prevent the mainshaft from turning.

8. Install the new mainshaft hub nut.

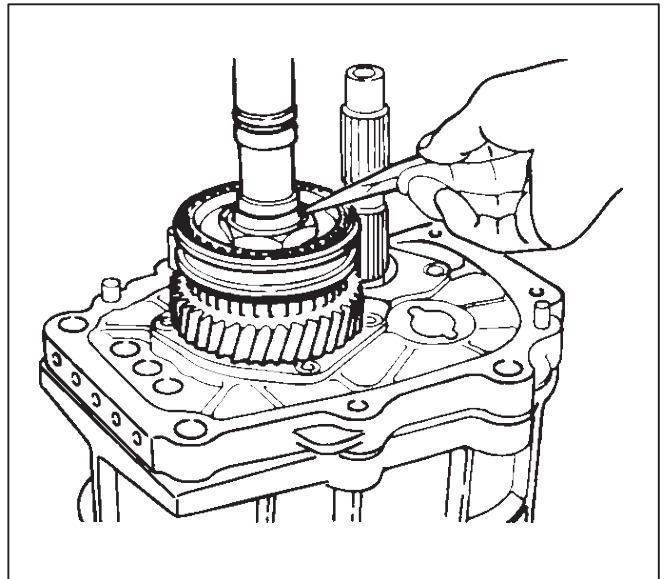
Use the mainshaft nut wrench J-37219 to tighten the mainshaft nut(23) to the specified torque.

Torque: 137 N·m (101 lb ft)



226RS016

9. Use a punch to stake the mainshaft nut.



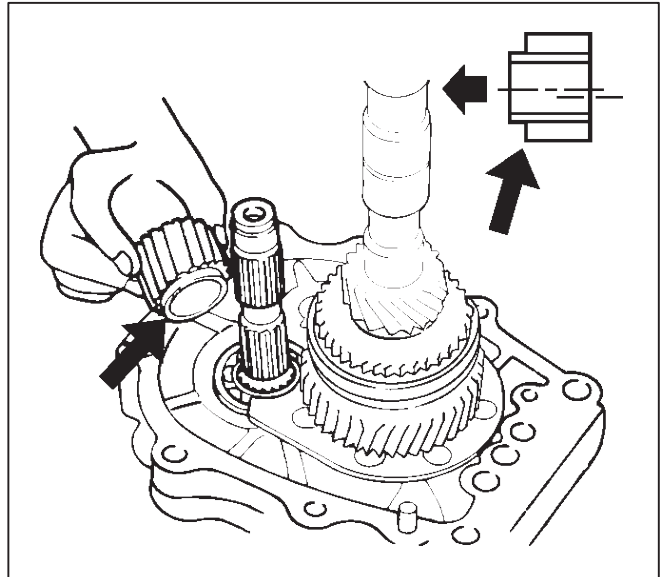
226RW153

10. Install needle bearing(22), 5th block ring(21), and 5th gear(20).

11. Apply engine oil to the counter reverse gear(19) and the reverse gear(26).

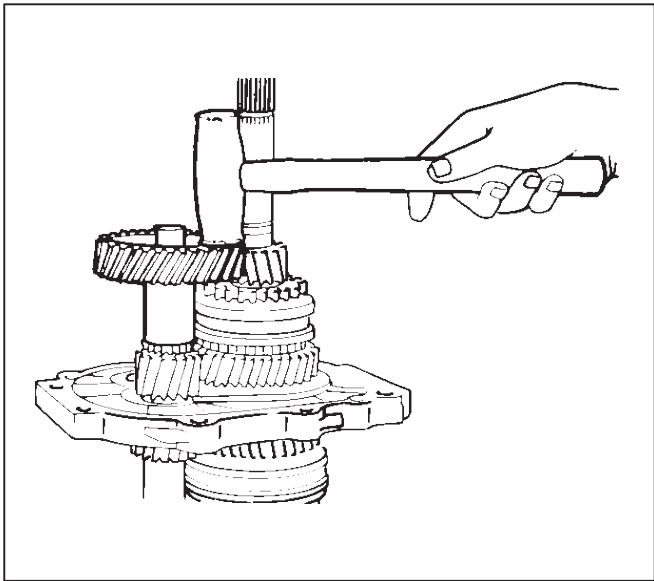
Install the counter reverse gear(19) to the counter shaft.

The reverse gear projection must be facing the intermediate plate.



226RW151

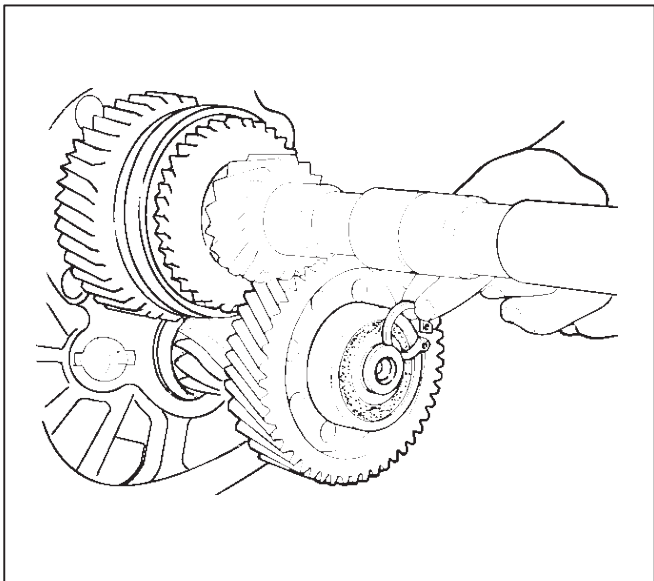
12. Install the counter 5th gear(18) to the transmission.



226RS019

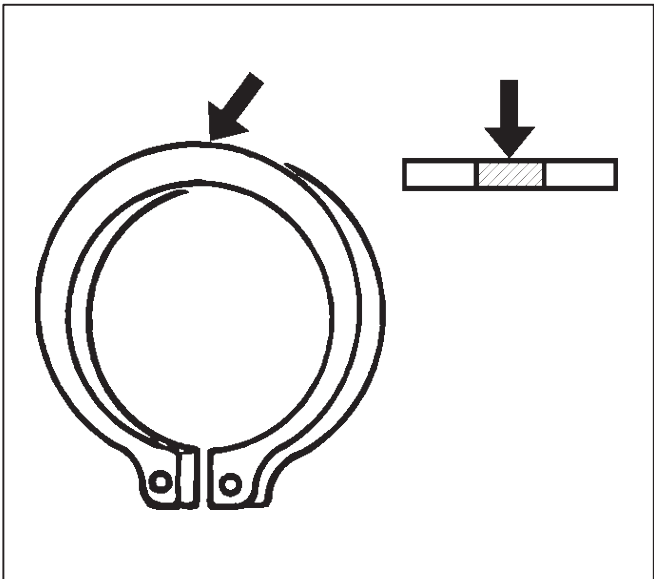
13. Install ball bearing(17) and bearing snap ring by performing the following steps:

- Select the snap ring which will provide the minimum clearance between the ball bearing and the snap ring.



226RS020

- There are six snap ring sizes available.
The snap rings are color-coded to indicate their thickness.



226RS021

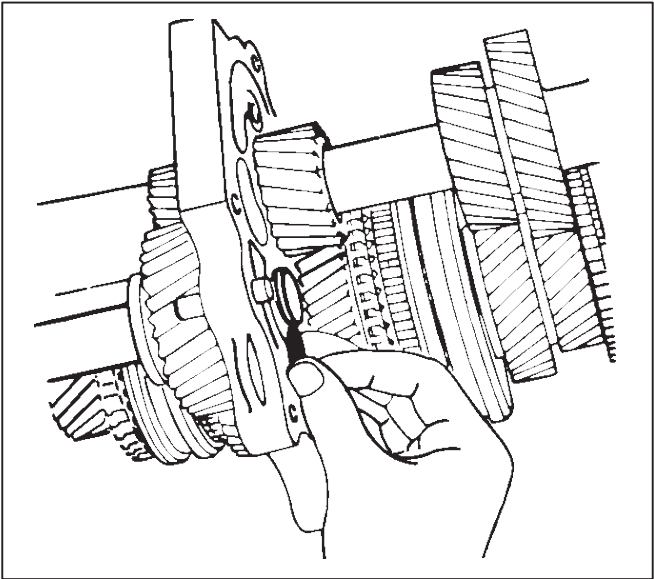
Ball Bearing and Snap Ring Clearance
Standard: 0–0.15 mm (0–0.0059 in)

Snap Ring Availability

Thickness	Color Coding
1.1 mm (0.043 in)	White
1.2 mm (0.047 in)	Yellow
1.3 mm (0.051 in)	Blue
1.4 mm (0.055 in)	Pink
1.5 mm (0.059 in)	Green
1.6 mm (0.063 in)	Brown

- Use a pair of snap ring pliers to install the snap ring(16) to the counter gear shaft.
The snap ring must be fully inserted into the counter gear shaft snap ring groove.
14. Assemble reverse idler shaft(15), reverse idler gear(14), thrust washer(13), and idle shaft pin(12) into reverse idler gear assembly(11).

15. Select reverse idler gear snap ring(10) which will provide the minimum clearance between the intermediate plate(30) and the snap ring(10).



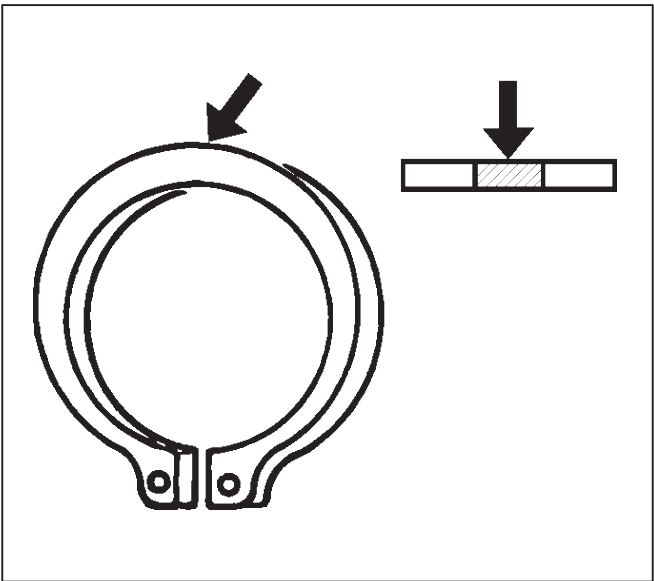
- There are three snap ring sizes available. The snap rings are color-coded to indicate their thickness.

Intermediate Plate and Snap Ring Clearance

Standard: 0 – 0.15 mm (0 – 0.0059 in)

Snap Ring Availability

Thickness	Color Coding
1.2 mm (0.047 in)	White
1.3 mm (0.051 in)	Yellow
1.4 mm (0.055 in)	Blue



- Use a pair of snap ring pliers to install the snap ring to the reverse idler shaft. The snap ring must be fully inserted into the reverse idler shaft snap ring groove.

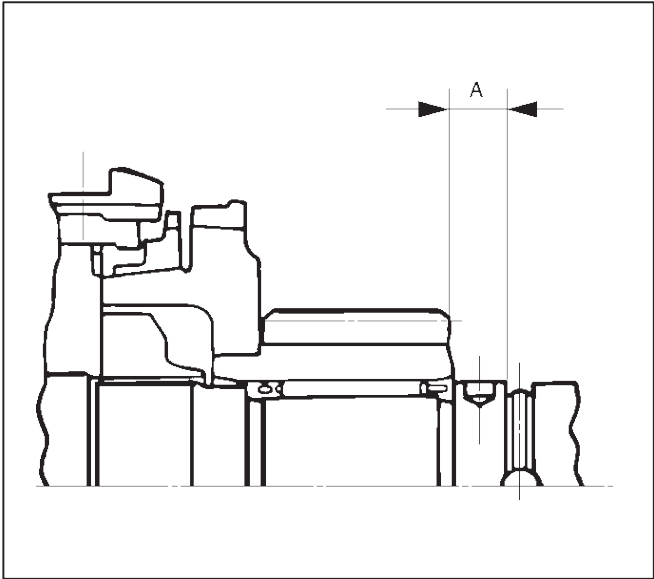
16. Install thrust washer and lock ball(9) by performing the following steps:

- Use a thickness gauge to measure the clearance between the 5th gear and the thrust washer.

5th Gear and Thrust Washer Clearance

Standard: 0.10 – 0.25 mm (0.004 – 0.010 in)

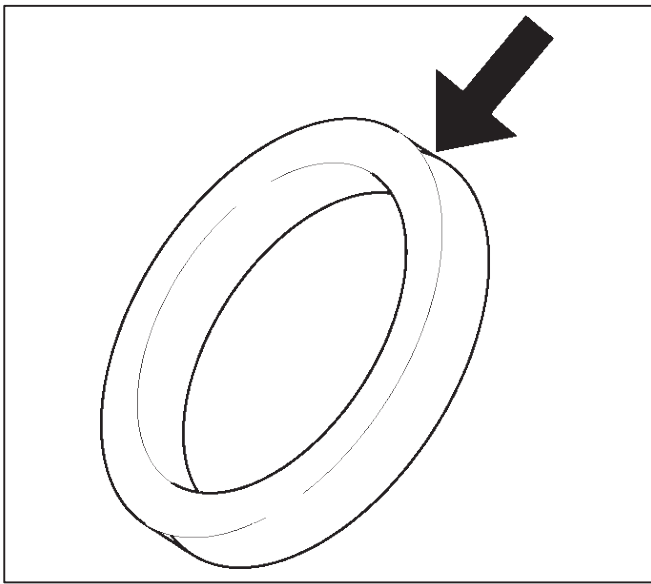
- Measure clearance “A” as shown in the figure.



- Select appropriate thrust washer from chart.
- There are four thrust washer sizes available.
- The thrust washers are color coded to indicate their thickness.

Thrust Washer Availability

Thickness mm (in)	Color Coding	A mm (in)	Clearance mm (in)
7.9 (0.311)	White	8.05–8.1 (0.317–0.319)	0.15–0.25 (0.006–0.010)
8.0 (0.315)	Yellow	8.1–8.2 (0.319–0.323)	0.1–0.25 (0.004–0.010)
8.1 (0.319)	Green	8.2–8.3 (0.323–0.327)	0.1–0.25 (0.004–0.010)
8.2 (0.323)	Blue	8.3–8.36 (0.327–0.329)	0.1–0.21 (0.004–0.008)



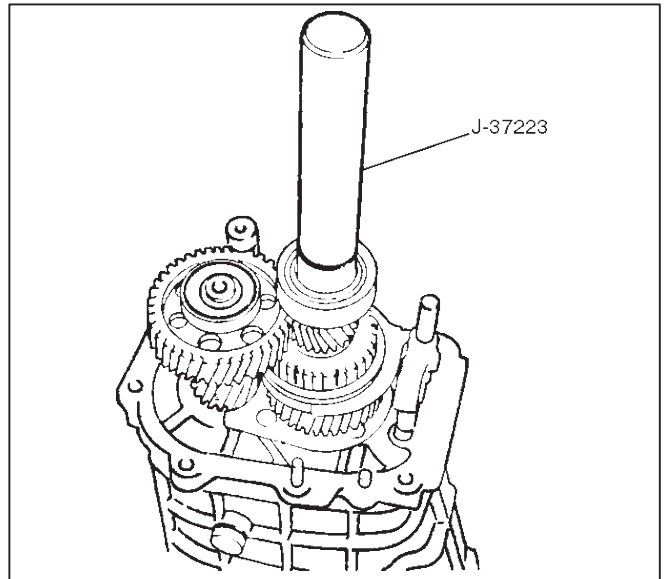
226RS024

- Apply grease to the thrust washer and the lock ball.
- Install the thrust washer and the lock ball.

17. Install thrust plate(8) and retainer(7).

18. Install retaining snap ring(6), clip(5), speedometer drive gear(4), and bearing snap ring(3). (4X2)

19. Use the installer J-37223 to install the ball bearing(2) to the mainshaft. (4X2)

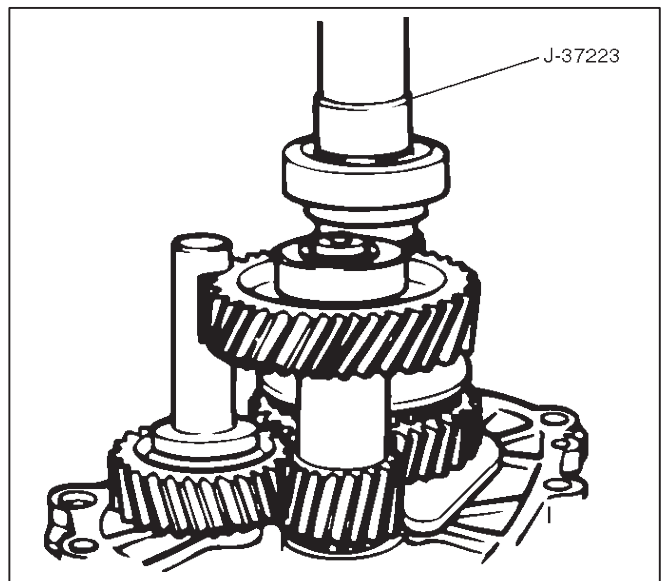


226RS096

20. Install bearing snap ring(1). (4X2)

21. Apply engine oil to the bearing inner and outer circumference. (4X4)

Use the installer J-37223 to install the ball bearing(2) to the mainshaft in proper direction. (4X4)

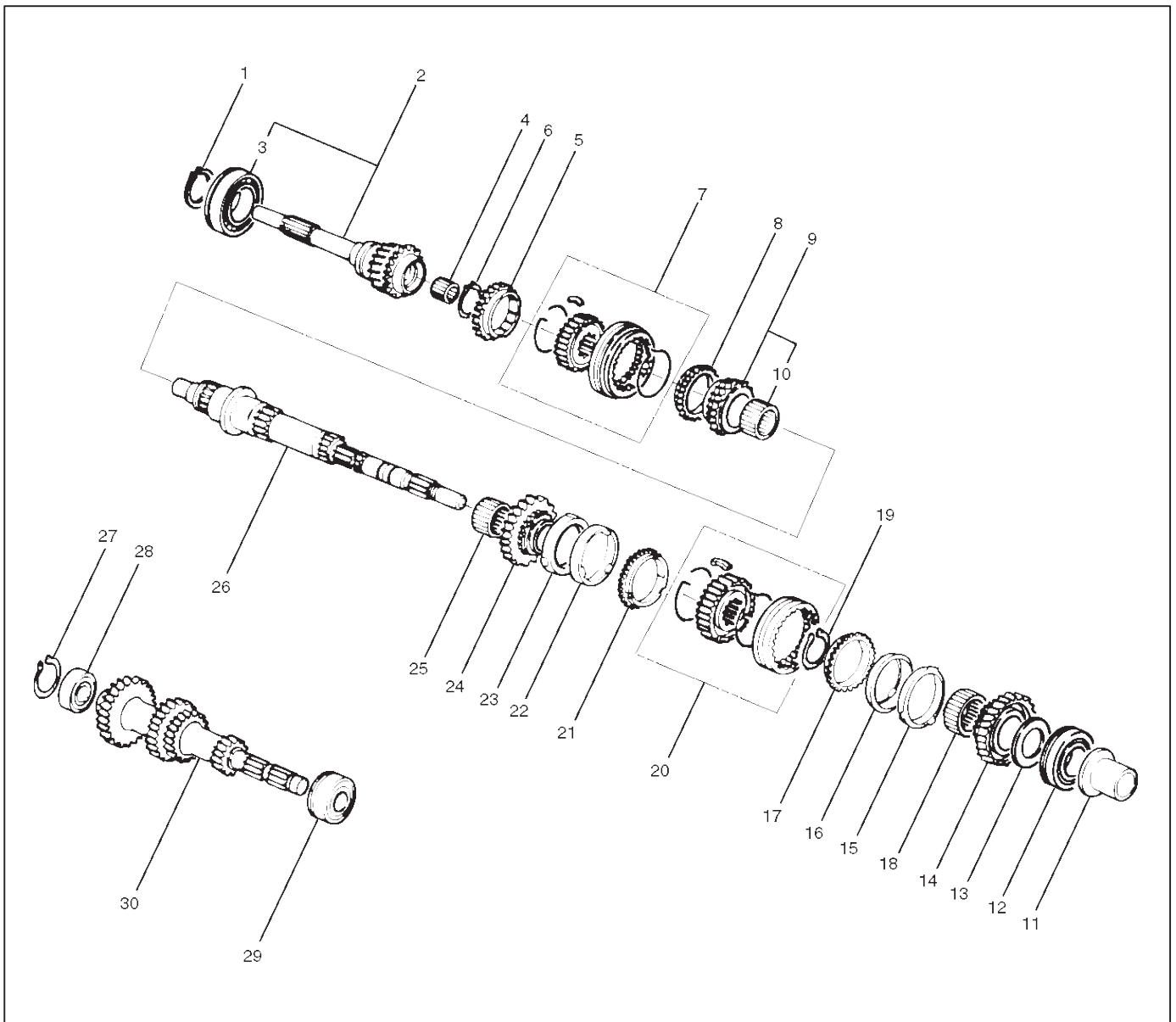


226RS025

22. Install oil seal collar(1). (4X4)

Top Gear Shaft, Main Gear Shaft, and Counter Gear Shaft

Disassembled View



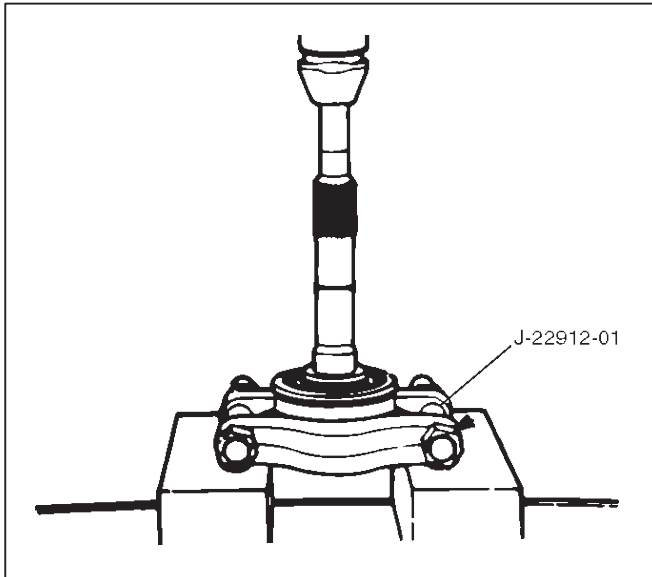
226RS026

Legend

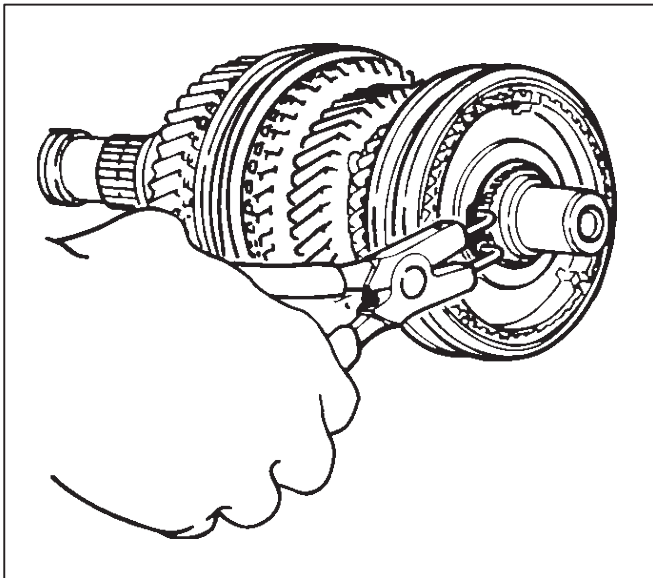
- | | |
|-----------------------------------|------------------------------------|
| (1) Top Gear Shaft Snap Ring | (16) 1st Outside Ring |
| (2) Top Gear Shaft | (17) 1st Block Ring |
| (3) Ball Bearing | (18) Needle Bearing |
| (4) Needle Bearing | (19) Clutch Hub Snap Ring |
| (5) Top Block Ring | (20) 1st-2nd Synchronizer Assembly |
| (6) Mainshaft Snap Ring | (21) 2nd Block Ring |
| (7) 3rd-4th Synchronizer Assembly | (22) 2nd Outside Ring |
| (8) 3rd Block Ring | (23) 2nd Inside Ring |
| (9) 3rd Gear | (24) 2nd Gear |
| (10) Needle Bearing | (25) Needle Bearing |
| (11) Needle Bearing Collar | (26) Mainshaft |
| (12) Mainshaft Ball Bearing | (27) Bearing Snap Ring |
| (13) 1st Gear Thrust Bearing | (28) Front Rollar Bearing |
| (14) 1st Gear | (29) Center Roller Bearing |
| (15) 1st Inside Ring | (30) Counter Gear Shaft |

Disassembly

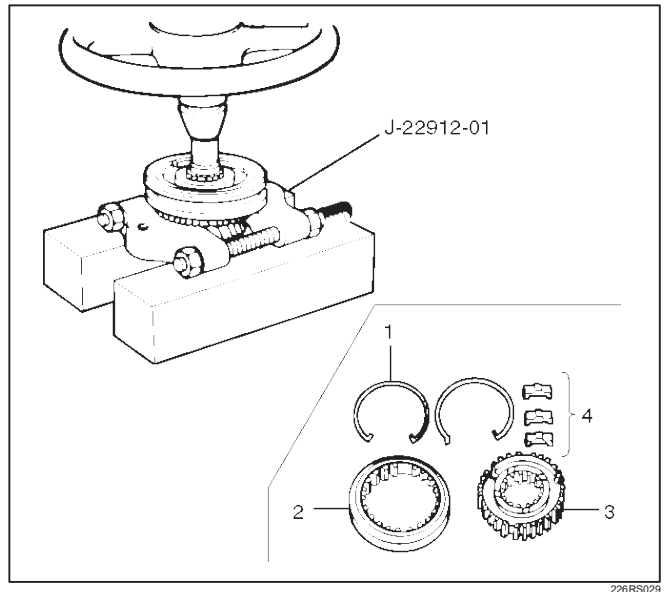
1. Use a pair of snap ring pliers to remove the top gear shaft snap ring(1).
2. Remove top gear shaft(2) with ball bearing(3).
3. Use a bench press and the bearing remover J-22912-01 to remove the ball bearing(3).



4. Remove needle bearing(4) and top block ring(5), mainshaft snap ring.
5. Use a pair of snap ring pliers to remove the mainshaft snap ring(6).



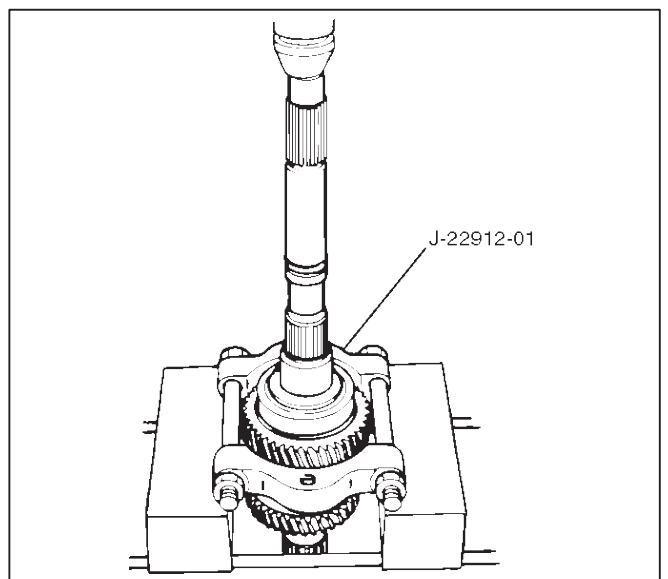
6. Use a bench press and the bearing remover J-22912-01 to remove the 3rd-4th synchronizer assembly(7) as a set. Disassemble the synchronizer assembly.



Legend

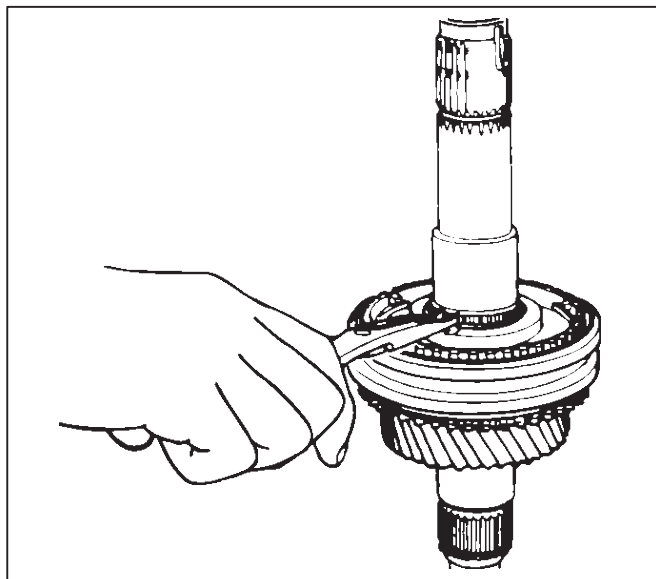
- (1) Springs
- (2) Sleeve
- (3) Clutch Hub
- (4) Inserts

7. Remove 3rd block ring(8), 3rd gear(9), and needle bearing(10).
8. Remove needle bearing collar(11).
9. Use a bench press and the bearing remover J-22912-01 to remove the 1st gear(14) together with the mainshaft ball bearing(12) and 1st gear thrust bearing(13).

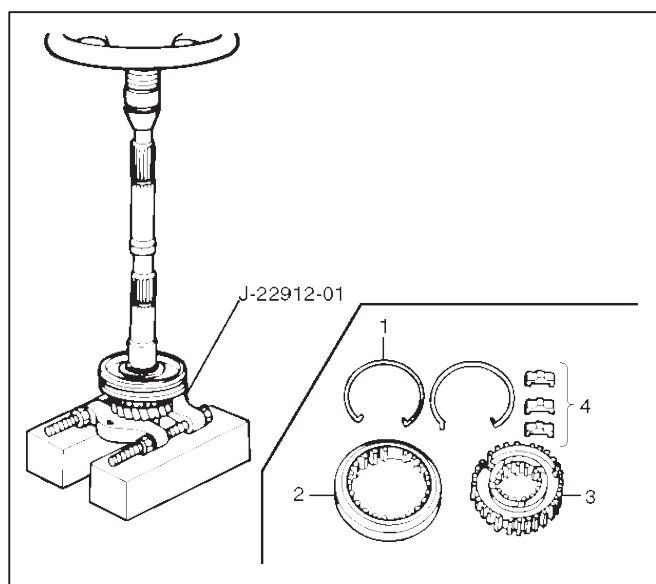


7B-46 MANUAL TRANSMISSION

10. Disassemble 1st inside ring(15), 1st outside ring(16), and 1st block ring(17).
11. Remove needle bearing(18).
12. Use a pair of snap ring pliers to remove the clutch hub snap ring(19).



13. Use a bench press and the bearing remover J-22912-01 to remove the 2nd gear(24) together with 1st-2nd synchronizer assembly(20), 2nd block ring(21), 2nd outside ring(22), and 2nd inside ring(23). Disassemble the synchronizer assembly.

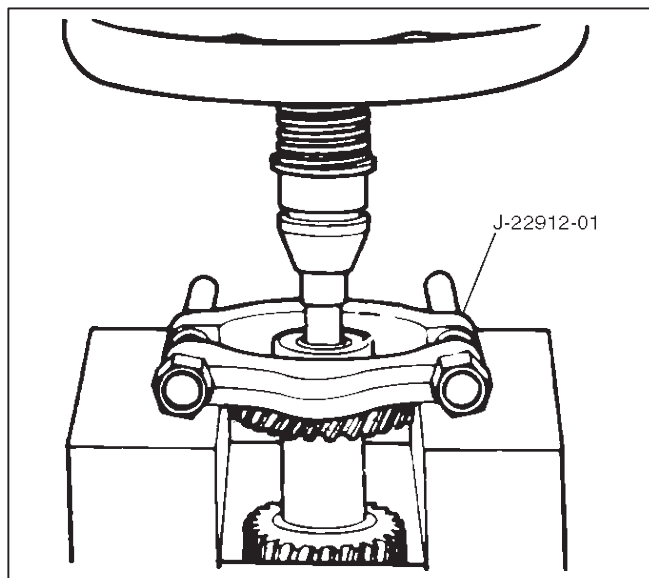


Legend

- (1) Springs
- (2) Sleeve
- (3) Clutch Hub
- (4) Inserts

14. Remove needle bearing(25) from mainshaft(26).
15. Remove bearing snap ring(27)

16. Use a bench press and the bearing remover J-22912-01 to remove the front roller bearing(28).



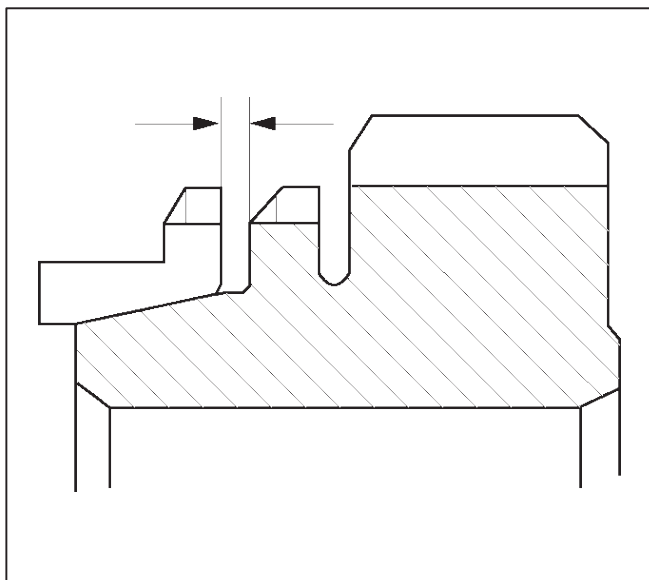
17. Remove center roller bearing(29) from counter gear shaft(30).

Inspection and Repair

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.

Block Ring and Dog Teeth Clearance

- Use a thickness gauge to measure the clearance between the block ring and the dog teeth.



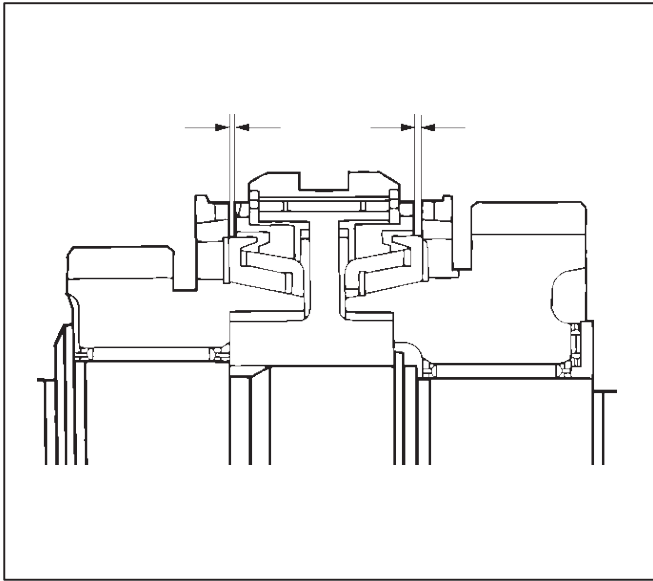
If the measured value exceeds the specified limit, the block ring must be replaced.

Block Ring and Dog Teeth Clearance

Standard	Limit
1.5 mm (0.059 in)	0.8 mm (0.032 in)

1st-2nd Synchronizer (3-CONE)

- Use a thickness gauge to measure the clearance between the block ring and the dog teeth.



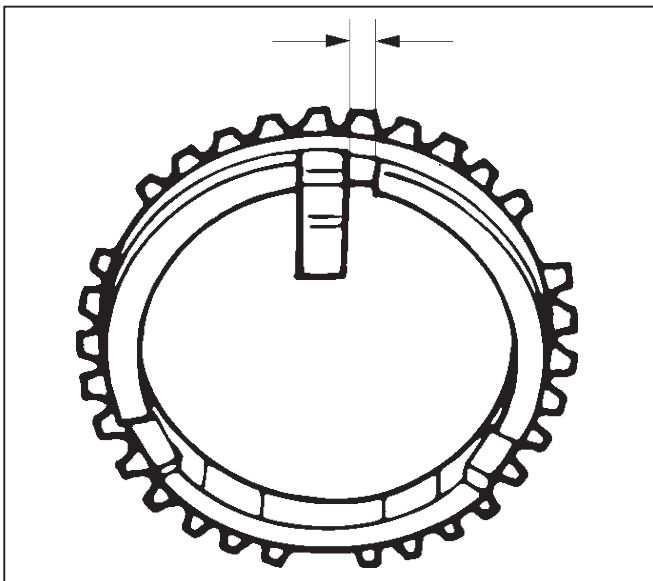
If the measured value exceeds the specified limit, the 1st-2nd synchronizer assembly must be replaced.

Block Ring and Dog Teeth Clearance

Standard	Limit
1.5 mm (0.059 in)	0.8 mm (0.032 in)

Block Ring and Insert Clearance

- Use a vernier caliper or thickness gauge to measure the clearance between the block ring and the insert.



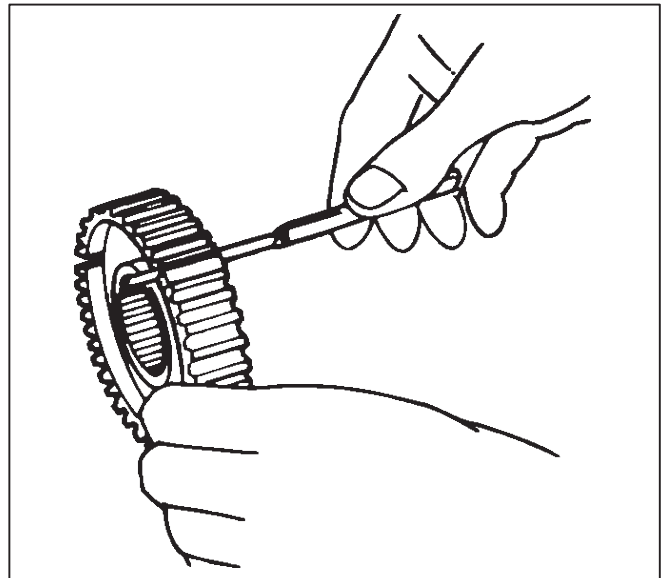
If the measured value exceeds the specified limit, the block ring and the insert must be replaced.

Block and Insert Clearance

	Standard	Limit
3rd-4th	3.46 – 3.74 mm (0.136 – 0.147 in)	4.0 mm (0.158 in)
1st-2nd	4.34 – 4.66 mm (0.171 – 0.183 in)	4.9 mm (0.193 in)
Rev-5th	3.59 – 3.91 mm (0.141 – 0.154 in)	4.1 mm (0.161 in)

Clutch Hub and Insert Clearance

- Use a thickness gauge to measure the clearance between the clutch hub and the insert.



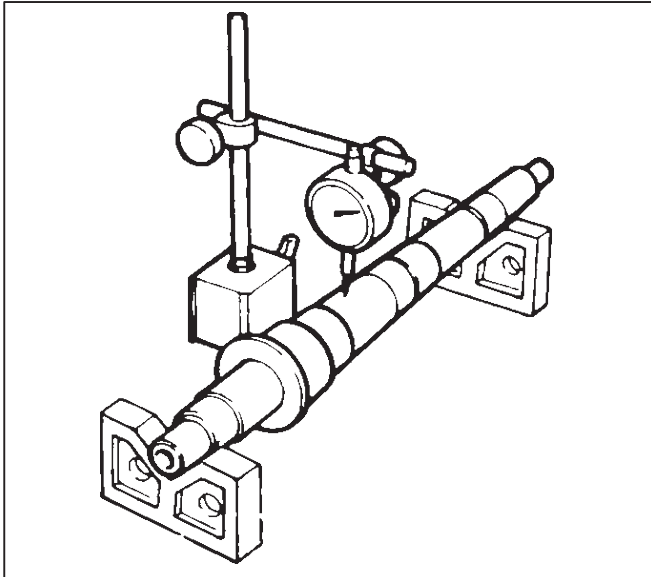
If the measured value exceeds the specified limit, the clutch hub and the insert must be replaced.

Clutch Hub and Insert Clearance

	Standard	Limit
3rd-4th	0.01 – 0.19 mm (0.0004 – 0.0075 in)	0.3 mm (0.012 in)
1st-2nd	0.09 – 0.31 mm (0.0035 – 0.0122 in)	0.4 mm (0.016 in)
Rev-5th		

Mainshaft Run-out

- Install the mainshaft to V-blocks.
- Use a dial indicator to measure the mainshaft central portion run-out.



226RS039

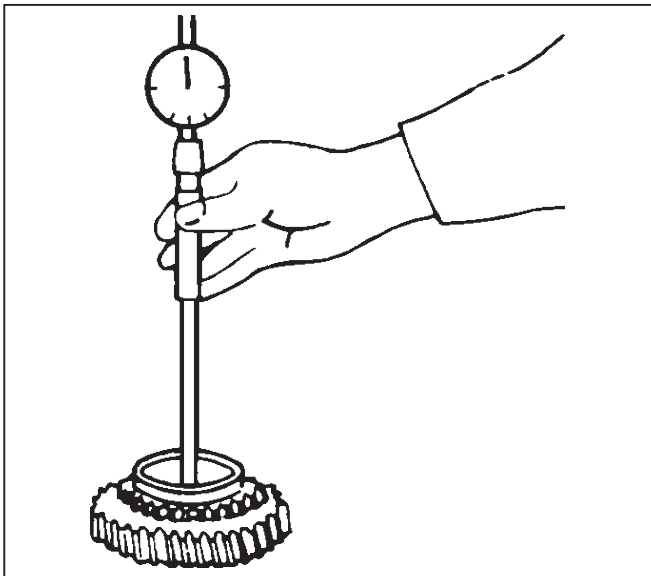
If the measured mainshaft run-out exceeds the specified limit, the mainshaft must be replaced.

Mainshaft Run-out

Limit: 0.05 mm (0.0020 in)

Gear Inside Diameter

- Use an inside dial indicator to measure the gear inside diameter.



226RS040

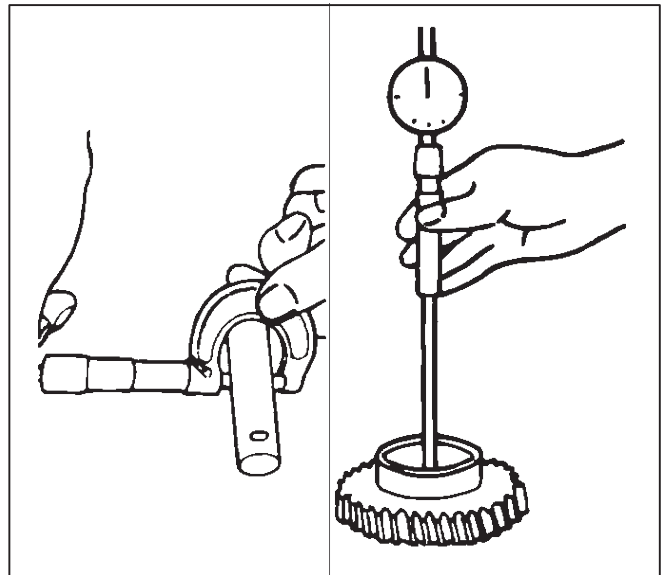
If the measured value is less than the specified limit, the gear must be replaced.

Gear Inside Diameter

	Standard	Limit
1st 3rd	45.000 – 45.013 mm (1.771 – 1.772 in)	45.100 mm (1.776 in)
2nd	52.000 – 52.013 mm (2.047 – 2.048 in)	52.100 mm (2.051 in)
Rev.	48.000 – 48.013 mm (1.889 – 1.890 in)	48.100 mm (1.894 in)
5th	32.000 – 32.013 mm (1.259 – 1.260 in)	32.100 mm (1.246 in)

Reverse Idler Gear and Idler Gear Shaft Clearance

- Use a micrometer to measure the idler gear shaft diameter.
- Use an inside dial indicator to measure the idler gear inside diameter.



226RS041

- Calculate the idler gear and idler gear shaft clearance.

Idler gear inside diameter - idler gear shaft diameter = idler gear and idler gear shaft clearance.

If the measured value exceeds the specified limit, the idler gear and/or the idler gear shaft must be replaced.

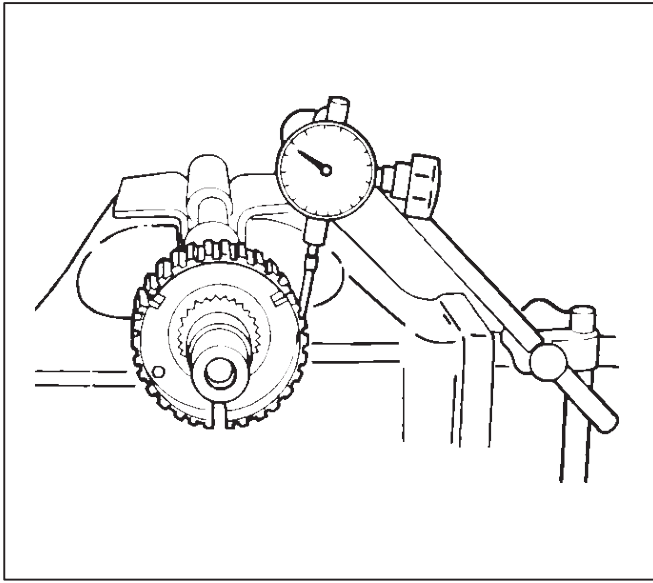
Idler Gear and Idler Gear Shaft Clearance

Standard: 0.041–0.074 mm (0.016–0.0029 in)

Limit: 0.150 mm (0.0059 in)

Clutch Hub Spline Play

- Set a dial indicator to the clutch hub to be measured.



226RS042

- Move the clutch hub as far as possible to both the right and the left.
Note the dial indicator reading.
If the measured value exceeds the specified limit, the clutch hub must be replaced.

Clutch Hub Spline Play

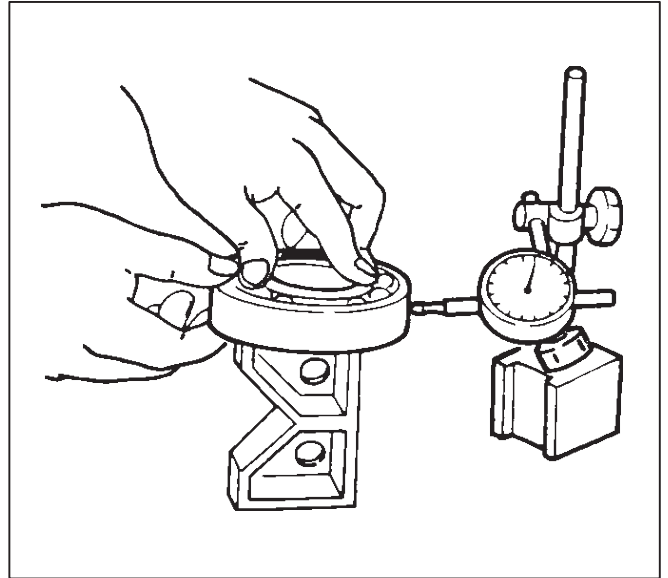
	Standard	Limit
1st-2nd	0 – 0.1 mm (0 – 0.004 in)	0.2 mm (0.008 in)
3rd-4th		
Rev. 5th	0 – 0.2 mm (0 – 0.008 in)	0.3 mm (0.012 in)

Ball Bearing Play

- Use a dial indicator to measure the ball bearing play.

Ball Bearing Play

Limit: 0.2 mm (0.008 in)

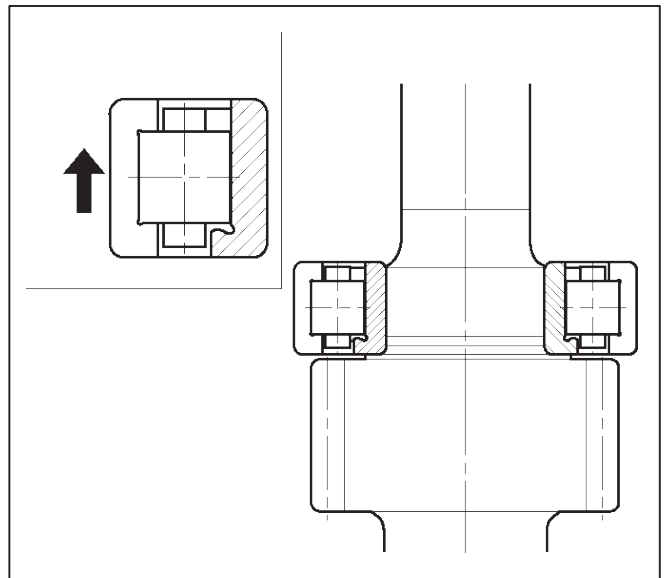


226RS043

Reassembly

- Install center roller bearing(29) to counter gear shaft(30).
 - Apply engine oil to the bearing inner and outer circumferences.
 - Install the roller bearing in the proper direction.

NOTE: Check that outer race moves only in the direction of arrow.

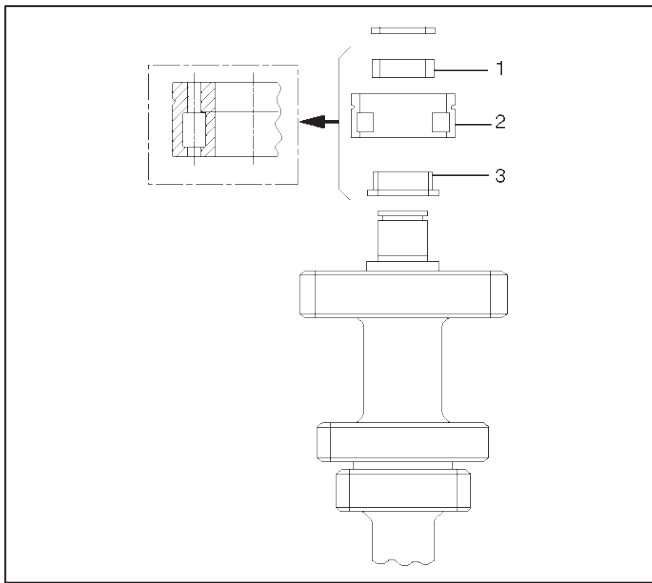


226RS044

- Install front roller bearing(28) by performing the following steps.
 - Use bearing installer to install the front roller bearing inner race to the counter gear shaft.
 - Install the outer race and roller assembly.
The snap ring groove must be facing the transmission front side.

7B-50 MANUAL TRANSMISSION

- Use bearing installer J-35283 to install the ring.



226RS045

Legend

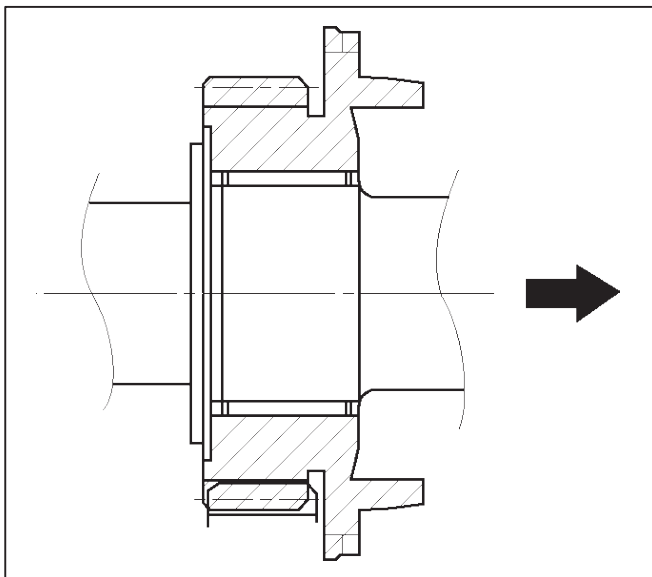
- (1) Ring
- (2) Outer Race and Roller Assembly
- (3) Inner Race

3. Install bearing snap ring(27) to mainshaft(26).

4. Apply engine oil to the needle bearing(25) and the 2nd gear thrust surfaces.

Install the needle bearing(25) and the 2nd gear(24) to the mainshaft.

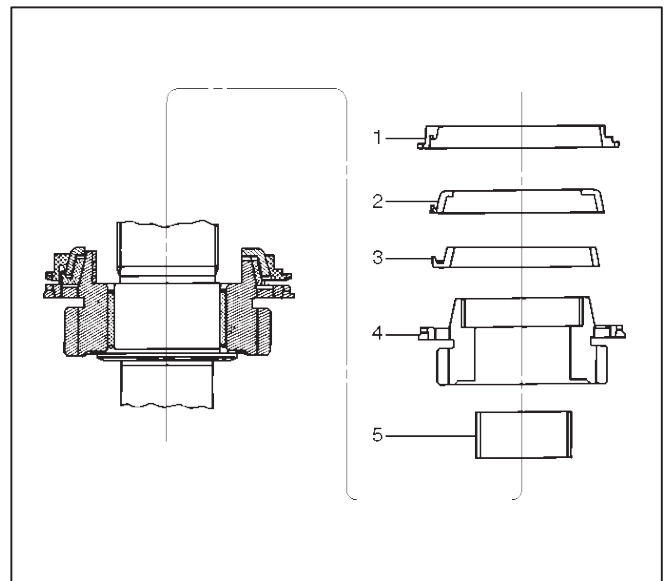
The 2nd gear dog teeth must be facing the transmission rear side.



226RS046

5. Assemble 2nd inside ring(23), 2nd outside ring(22), and 2nd block ring(21).

- Apply engine oil to the synchronizer ring friction surfaces.



226RS047

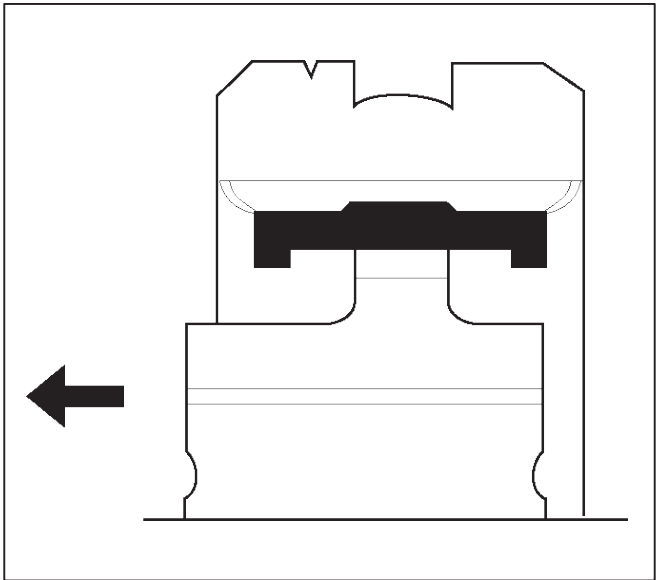
Legend

- (1) Block Ring
- (2) Outside Ring
- (3) Inside Ring
- (4) 2nd Gear
- (5) Needle Bearing

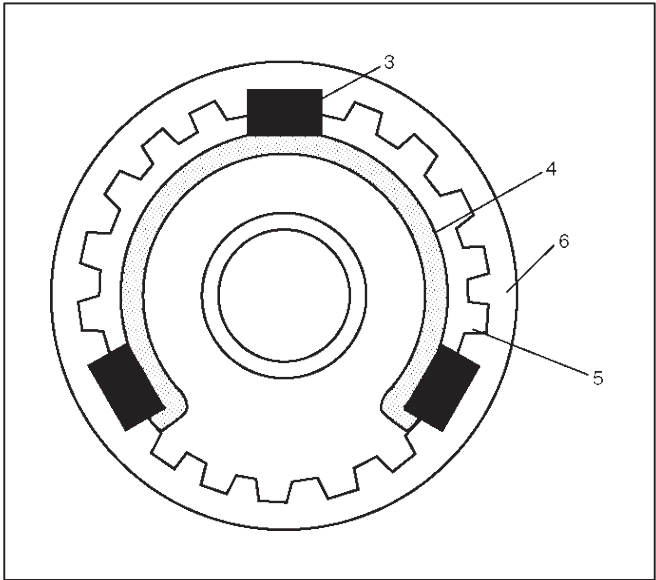
6. Assemble 1st-2nd synchronizer assembly by performing the following steps:

1. Check that the inserts(3) fit snugly into the block ring insert grooves.
2. Check that the inserts springs(4) are fitted to the inserts as shown in the illustration.
3. Check that the clutch hub(5) and the sleeve(6) slide smoothly.
4. Install the synchronizer assembly to the mainshaft.

The clutch hub face (with the heavy boss) must be facing the 2nd gear side.



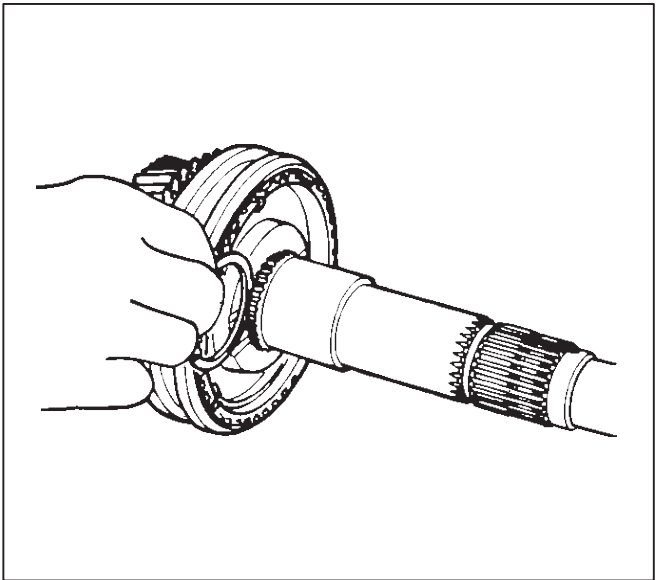
226RS048



226RS049

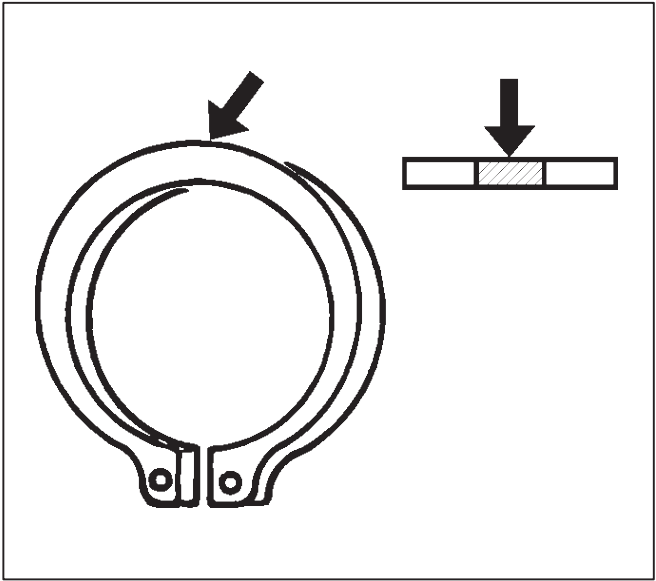
7. Install clutch hub snap ring(19) by performing the following steps:

- Select the snap ring which will provide the minimum clearance between the 1st-2nd clutch hub and the snap ring.



226RS050

There are three snap ring sizes available.
The snap rings are color coded to indicate their thickness.



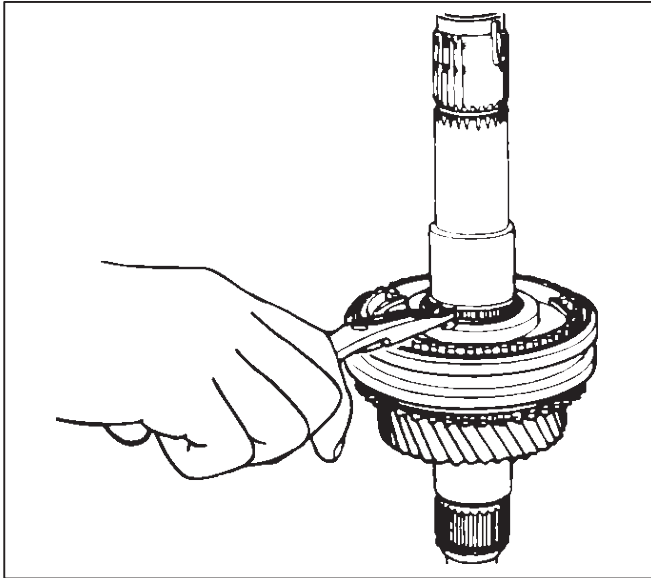
226RS021

Clutch Hub and Snap Ring Clearance
Standard: 0 – 0.1 mm (0 – 0.004 in)

Snap Ring Availability

Thickness	Color Coding
1.80 mm (0.071 in)	White
1.85 mm (0.073 in)	Yellow
1.90 mm (0.075 in)	Blue

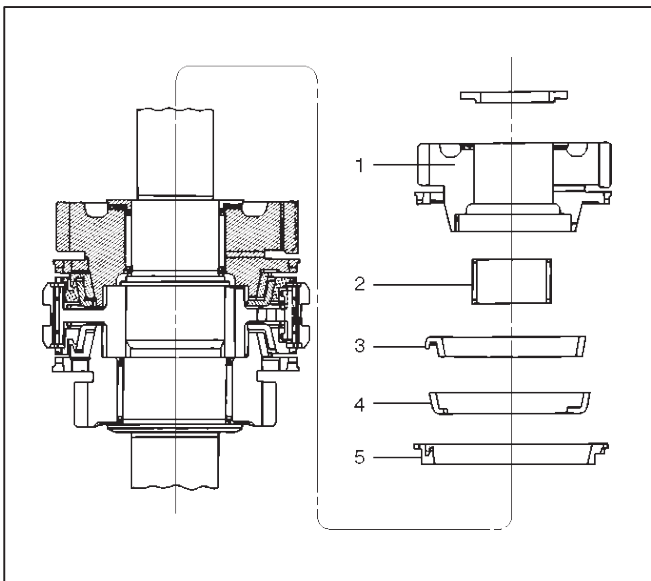
- Use a pair of snap ring pliers to install the snap ring to the mainshaft.
The snap ring must be fully inserted into the mainshaft snap ring groove.



226RS031

8. Install needle bearing(18), 1st block ring(17), 1st outside ring(16), 1st inside ring(15), and 1st gear(14).

- Apply engine oil to the needle bearing, 1st gear thrust surfaces and synchronizer ring friction surfaces.
- Install the needle bearing and the 1st gear to the mainshaft.
The 1st gear dog teeth must be facing the transmission front side.



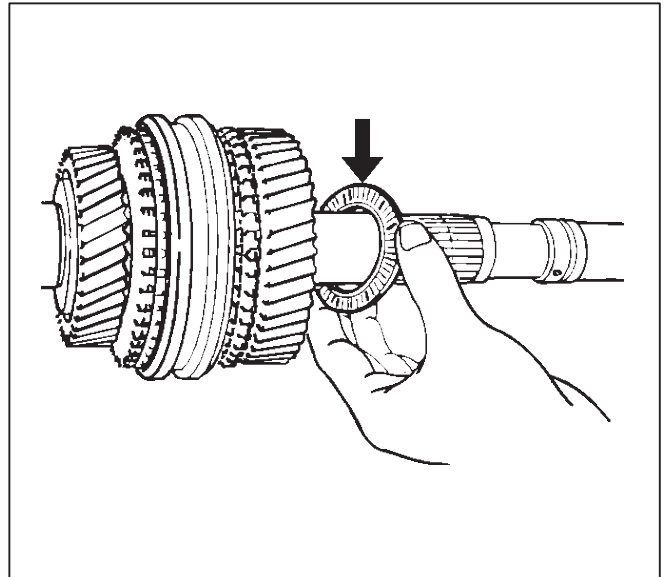
226RS053

Legend

- (1) 1st Gear
- (2) Needle Bearing
- (3) Inside Ring
- (4) Outside Ring
- (5) Block Ring

9. Install the 1st gear thrust bearing and the race(13) to the main shaft.

The thrust bearing side must be facing the transmission front side.



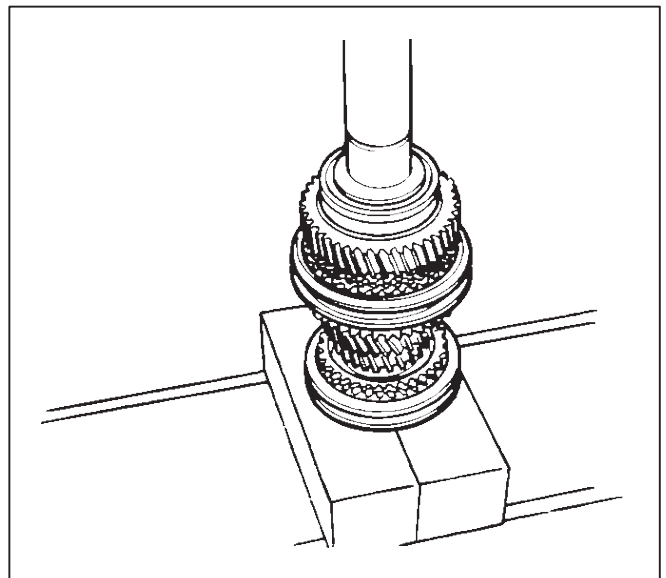
226RS054

10. Apply engine oil to the mainshaft ball bearing(12) and the mainshaft(26).

Install the ball bearing(12) and needle bearing collar(11) to the mainshaft(26).

The ball bearing snap ring groove must be facing the transmission rear side.

Use a bench press and installer J-6133-01 to slowly force the collar into place.

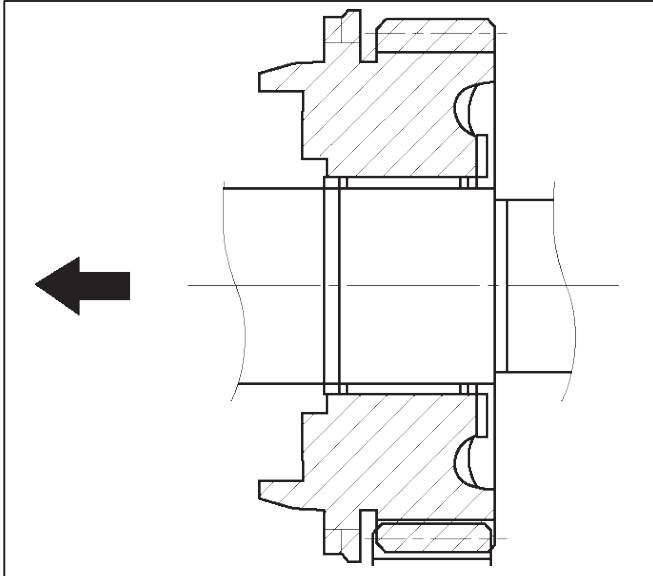


226RS055

11. Apply engine oil to the needle bearing and the 3rd gear thrust surfaces.

Install the needle bearing(10) and the 3rd gear(9) to the mainshaft.

The 3rd gear dog teeth must be facing the transmission front side.



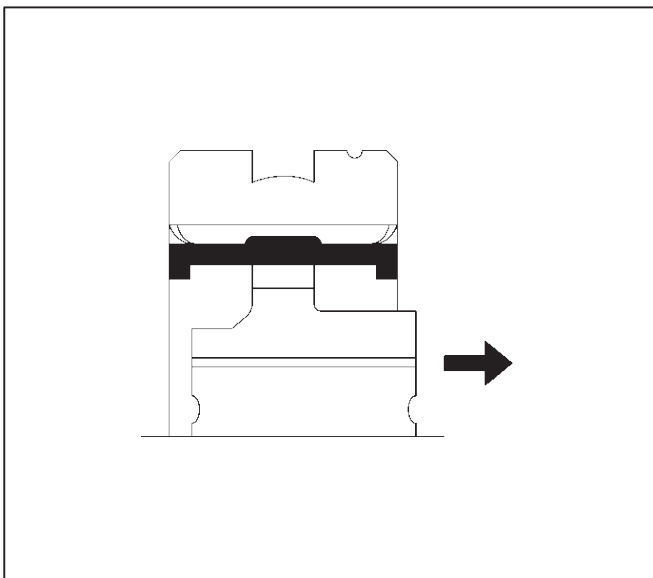
226RS056

12. Install 3rd block ring(8).

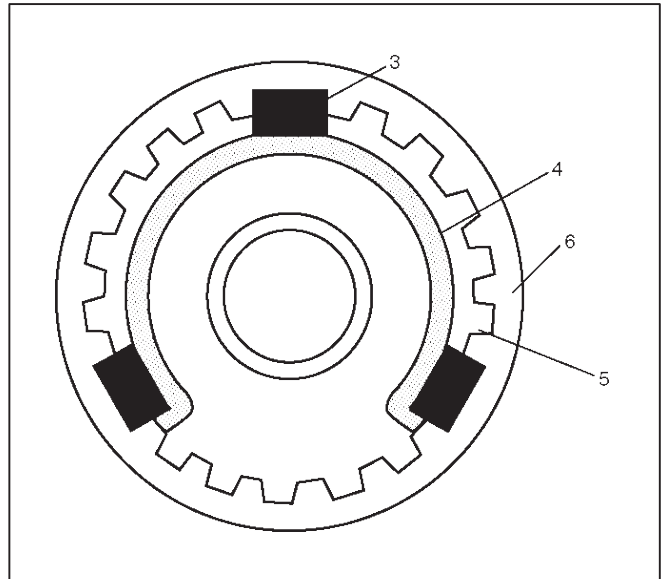
13. Check and install 3rd-4th synchronizer assembly(7) by the following steps:

1. Check that the inserts(3) fit snugly into the block ring insert grooves.
2. Check that the insert springs(4) are fitted to the inserts as shown in the illustration.
3. Check that the clutch hub(5) and the sleeve(6) slide smoothly.
4. Install the synchronizer assembly to the mainshaft.

The clutch hub face (with the heavy boss) must be facing the 3rd gear side.



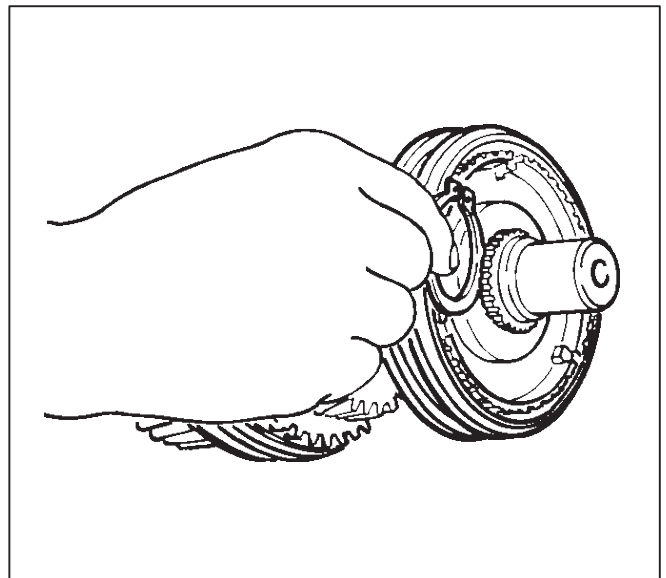
226RW221



226RS049

14. Select and install mainshaft snap ring(6) in the following way:

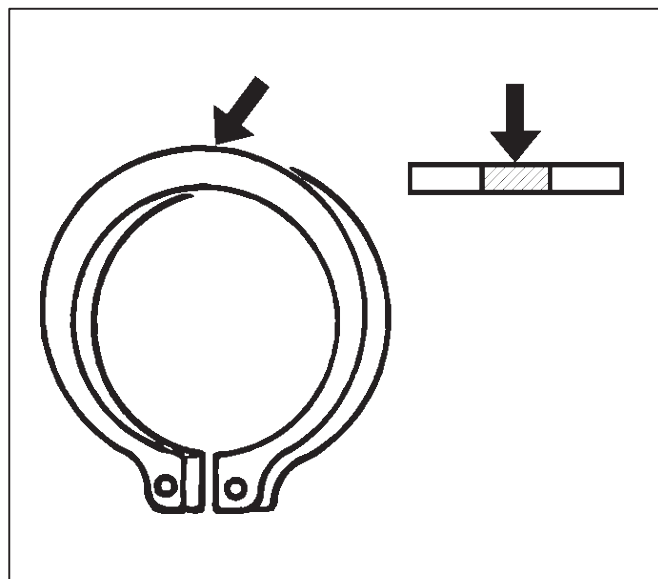
- Select the snap ring which will provide the minimum clearance between the 3rd-4th clutch hub and the snap ring.



226RS058

7B-54 MANUAL TRANSMISSION

There are three snap ring sizes available.
The snap rings are color coded to indicate their thickness.



226RS021

Clutch Hub and Snap Ring Clearance

Standard: 0 – 0.1 mm (0 – 0.004 in)

Snap Ring Availability

Thickness	Color Coding
1.80 mm (0.071 in)	White
1.85 mm (0.073 in)	Yellow
1.90 mm (0.075 in)	Blue

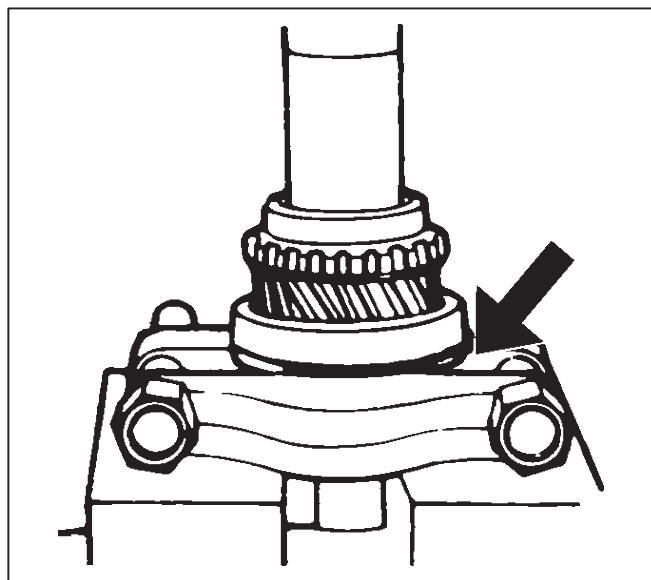
- Use a pair of snap ring pliers to install the snap ring to the mainshaft.

The snap ring must be fully inserted into the mainshaft snap ring groove.

15. Install top block ring(5).

16. Apply grease to the bearing inner and outer circumferences and install needle bearing(4).

17. Use a bench press to install the top gear shaft ball bearing(3) to the top gear shaft(2).



226RS059

The snap ring groove must be facing the transmission front side.

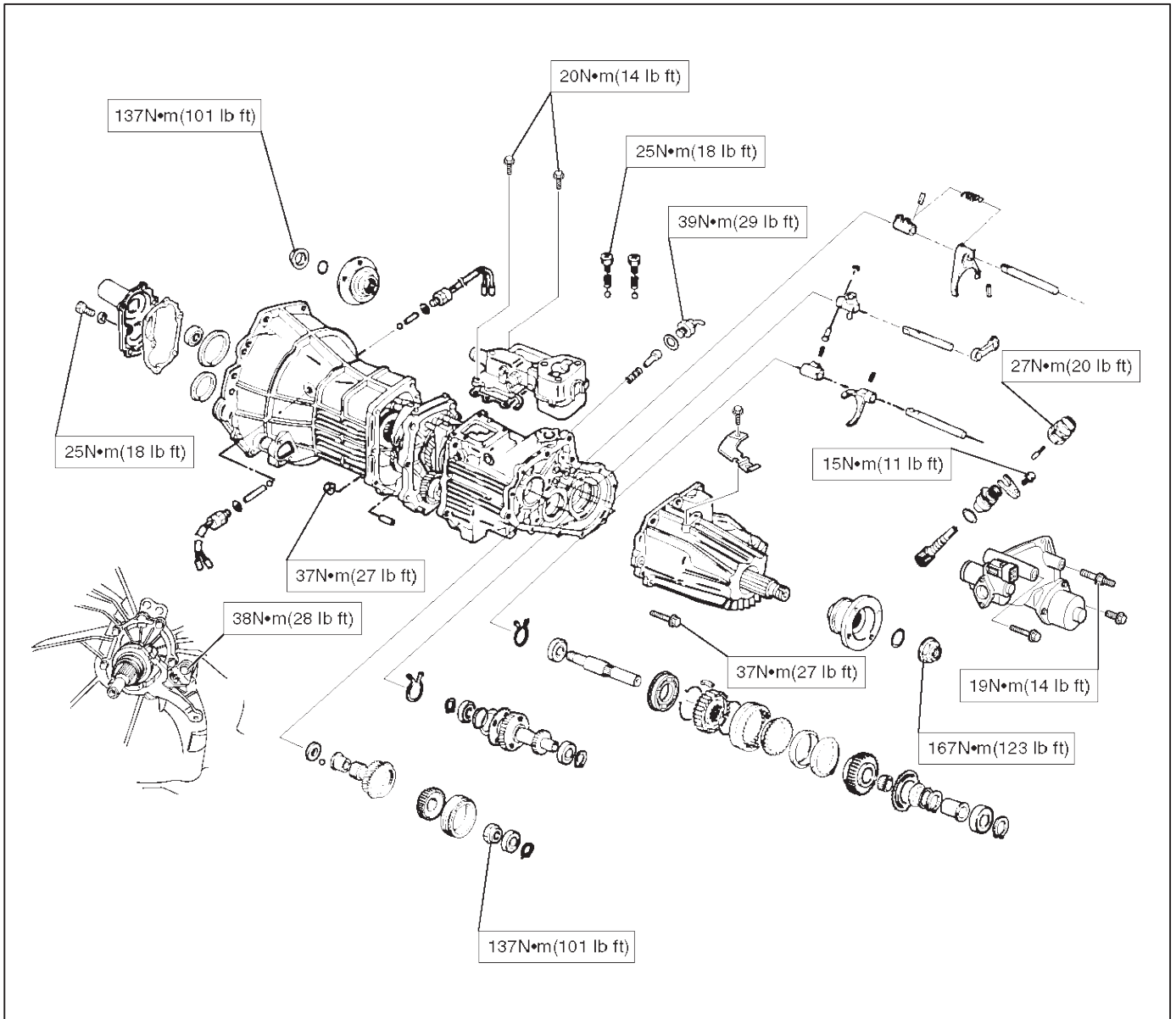
18. Use a pair of snap ring pliers to install the top gear shaft snap ring(1) to the bearing.

Main Data and Specifications

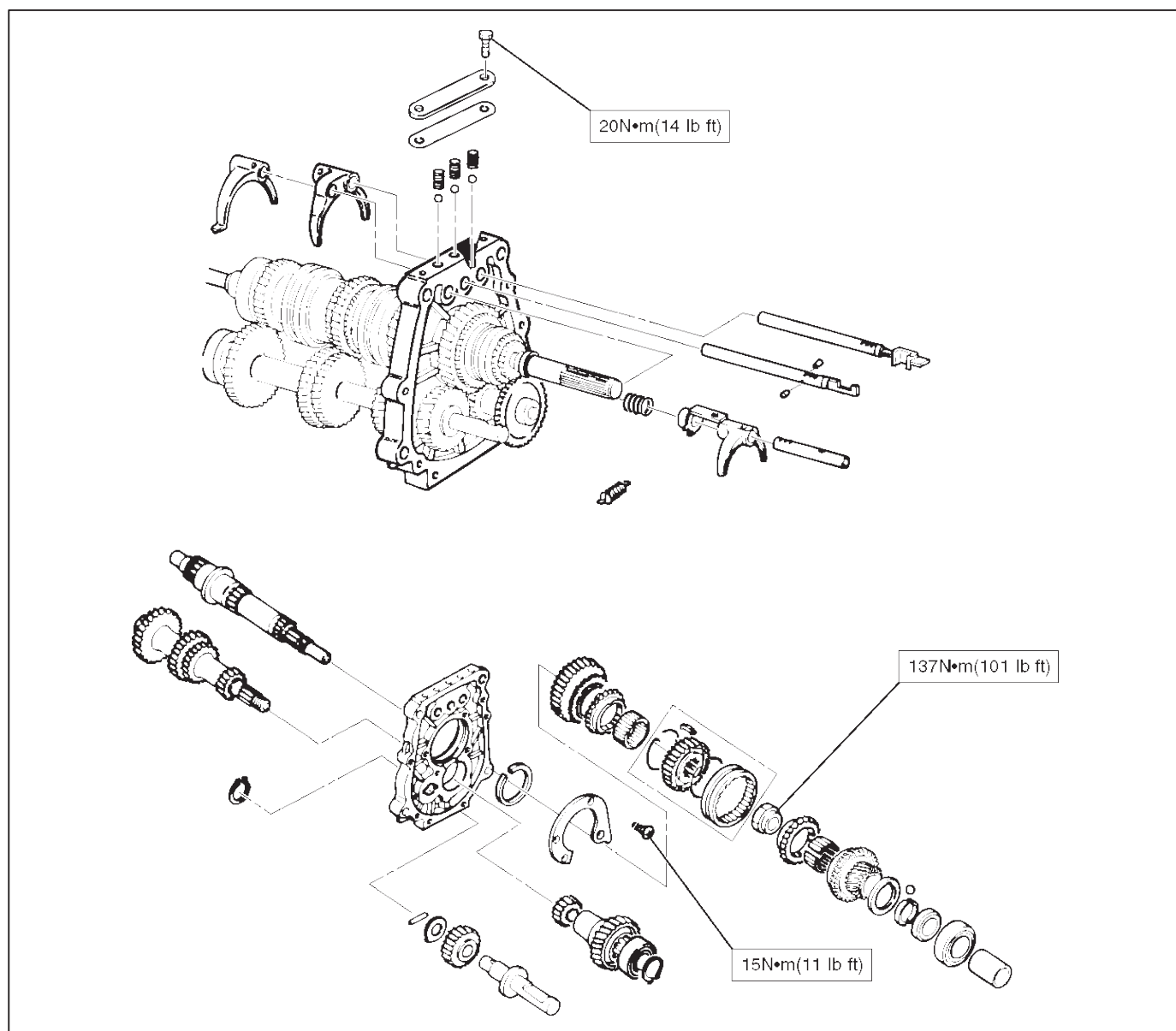
General Specifications

		4X2	4X4
Transmission type		Fully synchronized forward and reverse gears	
Transfer case		—	Synchronized type gears shifting between the 2- and 4-wheel drive mode. Constant mesh type gears between “low” and “high”
Control method		Remote control with the gear shift lever on the floor.	
Gear ratio: Transmission	1st	3.767	
	2nd	2.248	
	3rd	1.404	
	4th	1.000	
	5th	0.809	
	Rev.	3.873	
Gear ratio: Transfer	High	—	1.000
	Low	—	2.050
Transmission oil capacity		2.95 lit. (3.12 US qt)	
Transfer oil capacity		—	1.45 lit. (1.53 US qt)
Type of lubricant		Engine oil: Refer to the chart in “SECTION 0”	

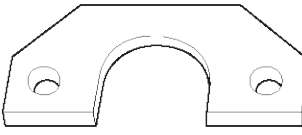
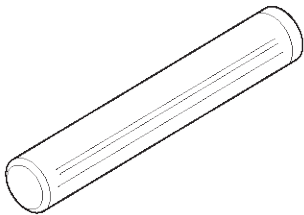
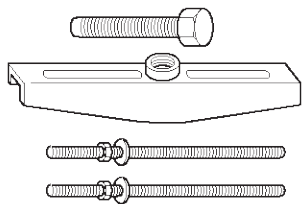
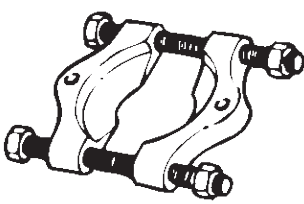
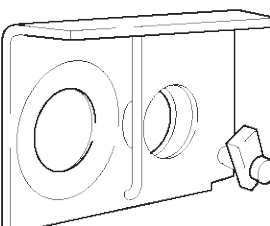
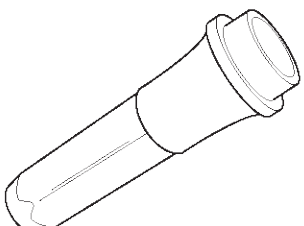
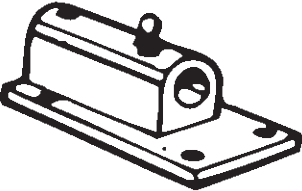
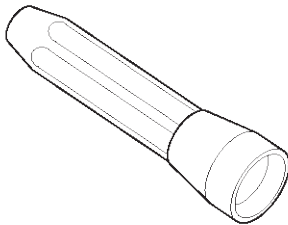
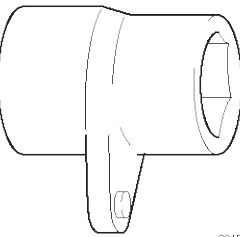
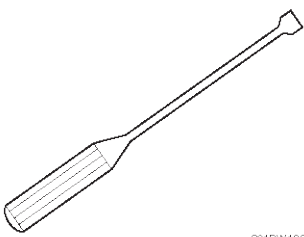
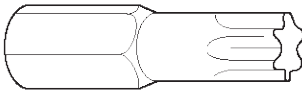
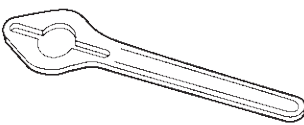
Torque Specifications (Cont'd)



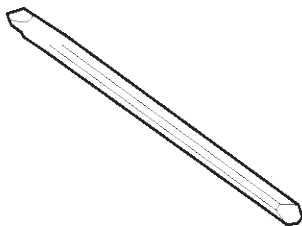
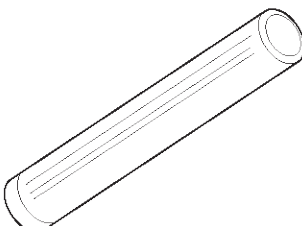
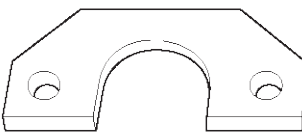
Torque Specifications (Cont'd)



Special Tools (MUA)

ILLUSTRATION	TOOL NO. TOOL NAME	ILLUSTRATION	TOOL NO. TOOL NAME
 901RW143	J-37222 Mainshaft collar remover	 901RW123	J-37223 Mainshaft end bearing installer
 901RW132	J-37487 Puller	 901RS229	J-22912-01 Bearing remover/installer
 901RW124	J-37224 Holding fixture	 901RW142	J-29769 Rear cover oil seal installer
 901RS213	J-3289-20 Holding fixture base	 901RW118	J-26540 Front cover oil seal installer
 901RW122	J-37219 Wrench	 901RW135	J-39207 Remover; Clutch release bearing
 901RW125	J-37225 Tork bit wrench (T-45)	 901RW071	J-8614-11 Flange holder

7B-60 MANUAL TRANSMISSION

ILLUSTRATION	TOOL NO. TOOL NAME
 901RS228	J-39209 Punch; end nut
 901RW120	J-35283 Counter shaft bearing installer
 901RW143	J-37217 Bearing remover

TRANSMISSION

CLUTCH

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Removal	7C-15	Main Data and Specifications	7C-30
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Service Precaution

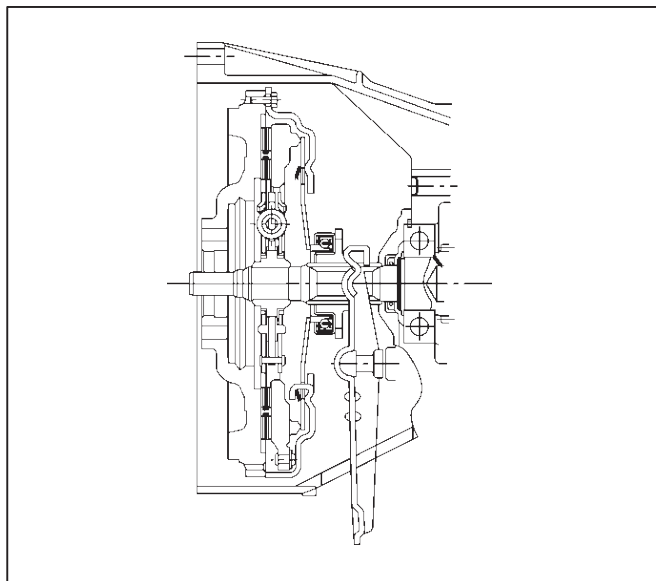
WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, 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

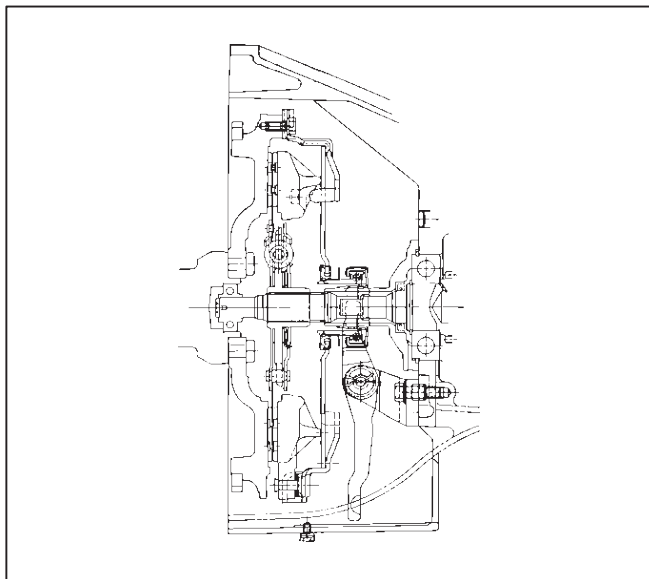
Clutch

Y22SE



A07RW035

6VD1



A07RW031

The clutch assembly consists of the pressure plate assembly and the driven plate assembly.

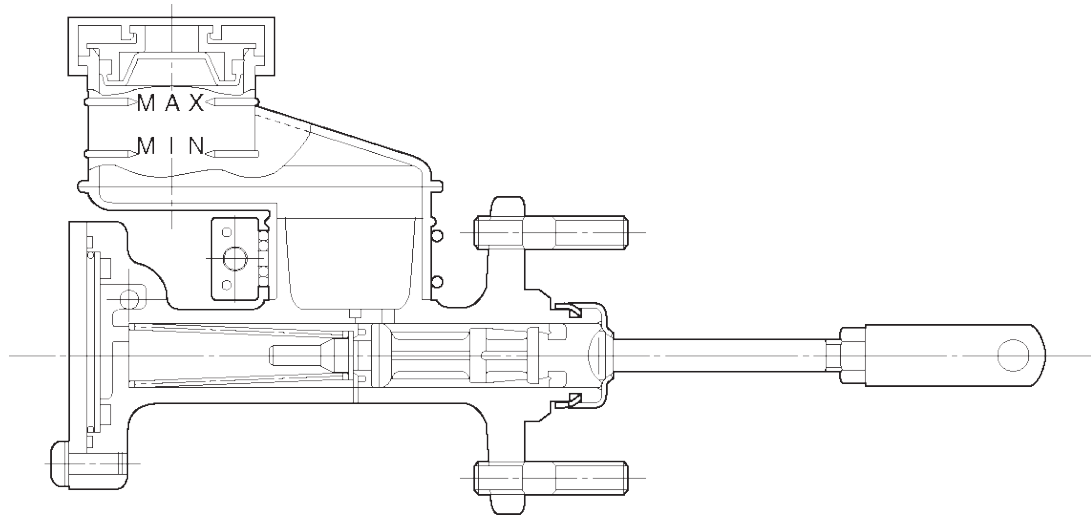
The clutch pedal is connected to the release bearing through the shift fork.

The driven plate assembly is installed between the flywheel and the pressure plate. Diaphragm spring pressure holds the driven plate against the flywheel and the pressure plate to provide the friction necessary to engage the clutch.

Depressing the clutch pedal moves the shift fork against the release bearing. The release bearing force overcomes the force of the diaphragm spring and separates the driven plate from the flywheel and pressure plate to disengage the clutch.

For 6VD1 (3.2L) engine model, the pull-type clutch is employed.

Master Cylinder

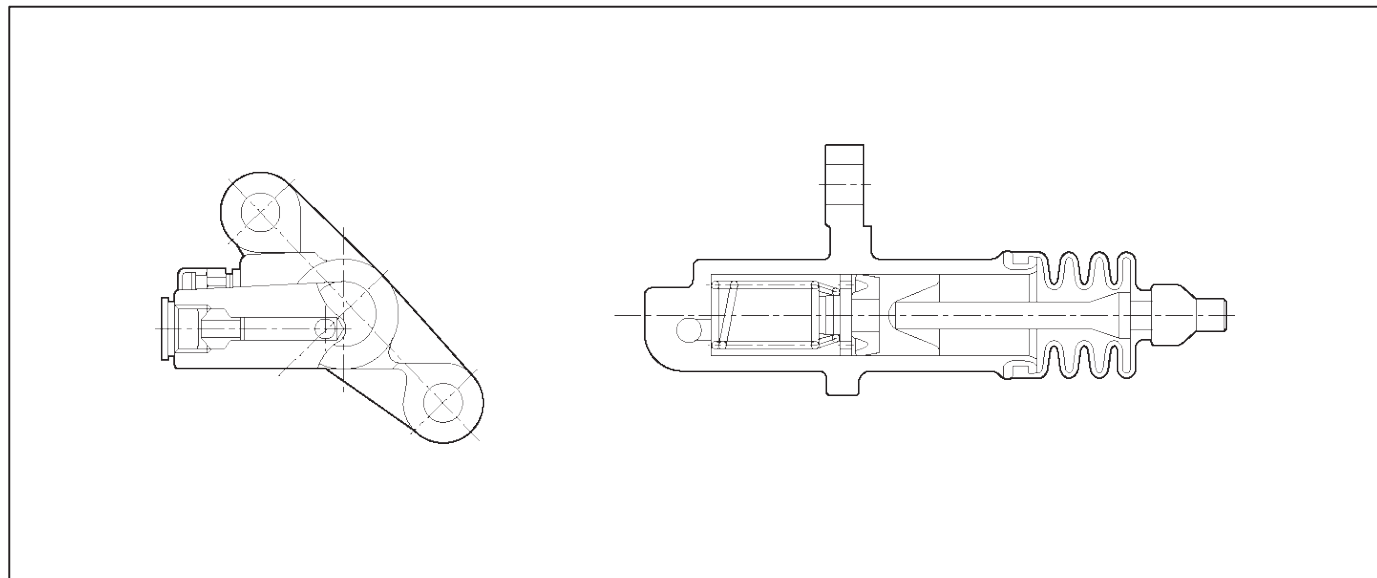


The master cylinder converts mechanical energy into hydraulic energy. Depressing the clutch pedal causes the push rod to move against the piston to close the return port.

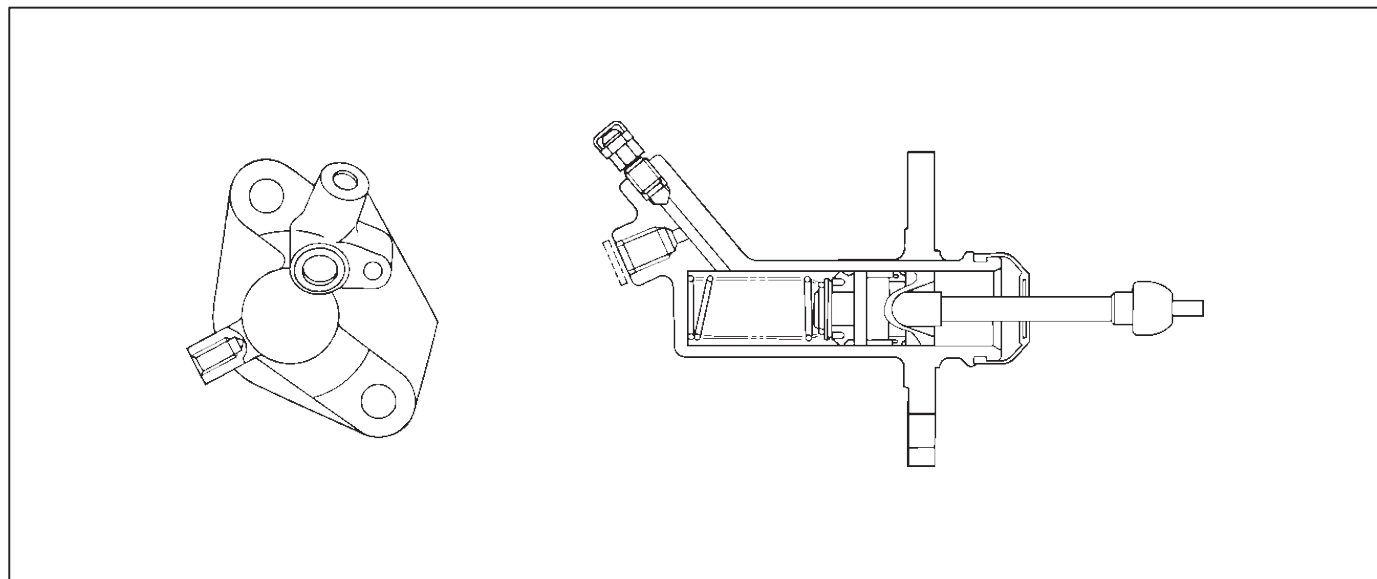
Clutch fluid is forced out of the master cylinder. Releasing the clutch pedal causes the return spring to force the piston back to its original position.

Slave Cylinder

Y22SE



6VD1

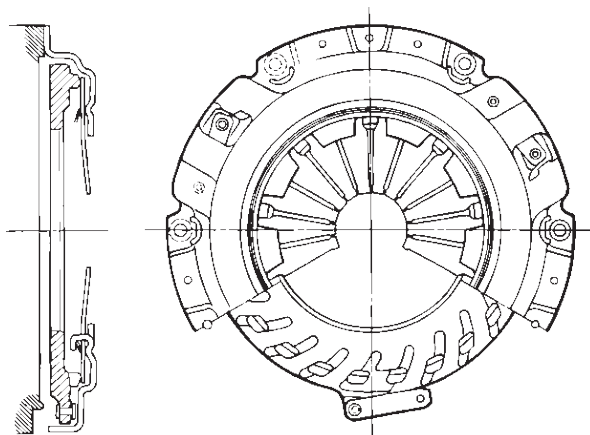


The slave cylinder converts hydraulic energy into mechanical energy. Hydraulic fluid supplied by the master cylinder moves the slave cylinder piston to

actuate the shift fork. The mechanical energy produced by the slave cylinder is directly proportional to the diameters of the master cylinder and the slave cylinder.

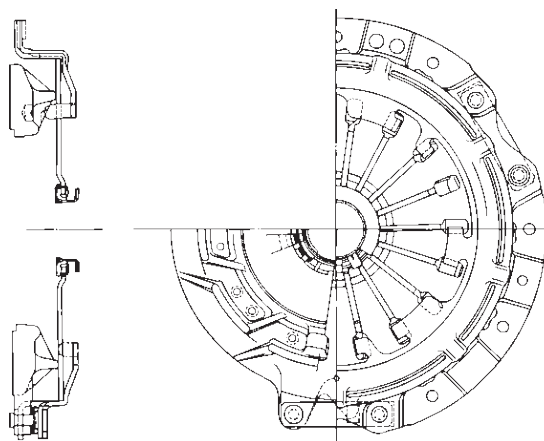
Pressure Plate Assembly

Y22SE



A07RW024

6VD1



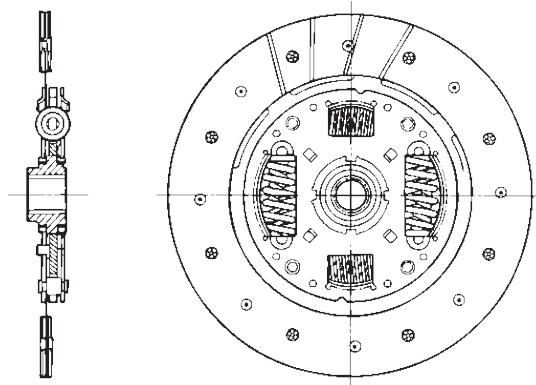
A07RW025

The pressure plate assembly consists of the clutch cover, the pressure plate with diaphragm spring.

Operating the clutch pedal causes the pressure plate to move in an axial direction to engage and disengage the clutch.

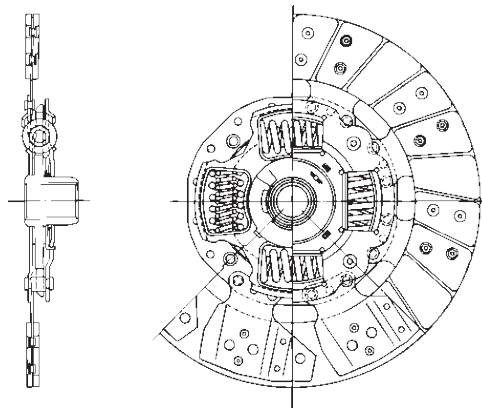
Driven Plate Assembly

Y22SE



A07RW026

6VD1



A07RW027

The driven plate assembly consists of the plate and the facing.

The plate consists of the clutch center, the cushioning plate, and the torsion springs.

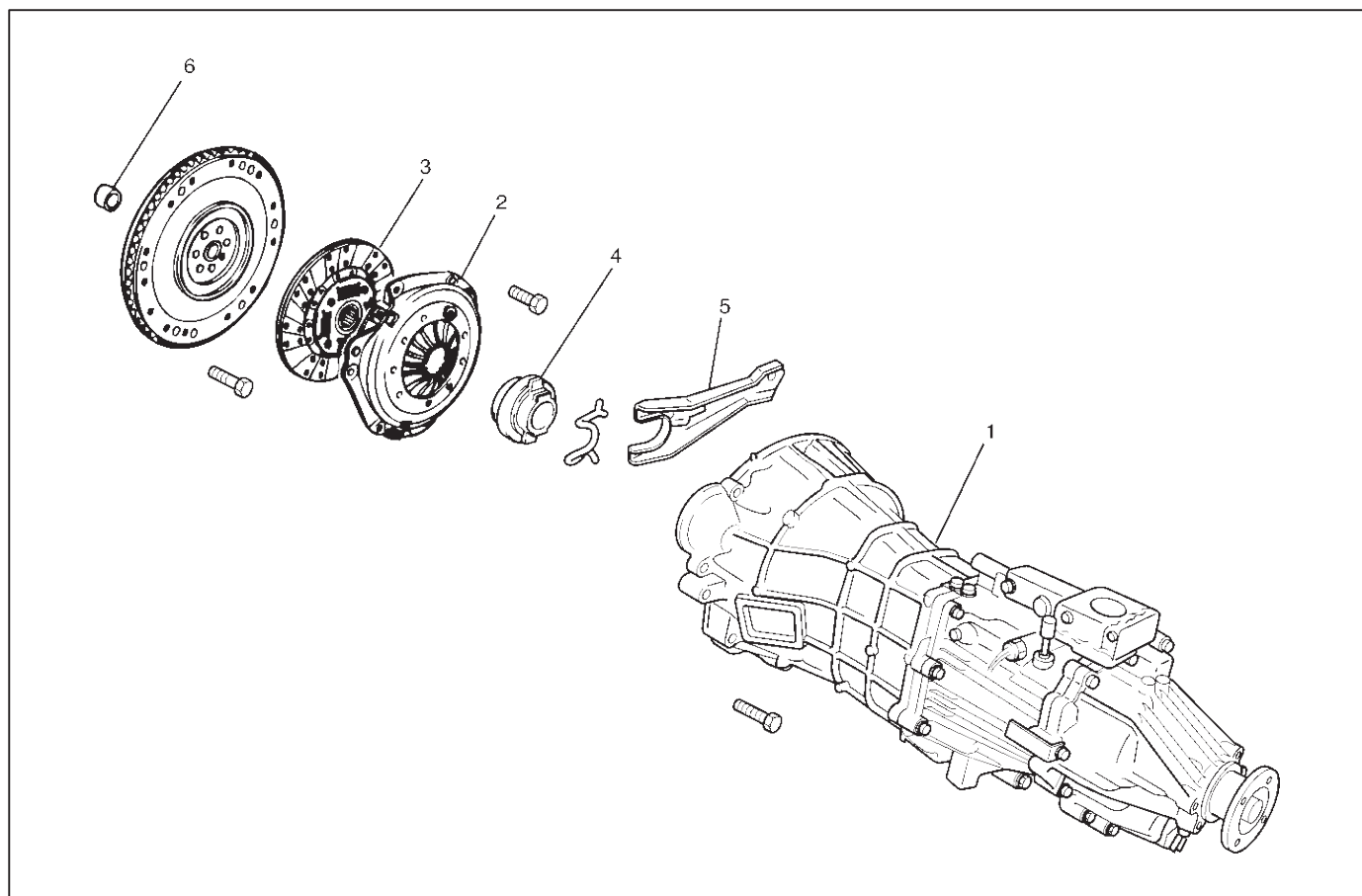
The facing is riveted to both sides of the cushioning plate. The cushioning plate provides a longer service life by minimizing wear and vibration at the clutch contact surfaces.

Diagnosis

Condition	Possible cause	Correction
Dragging	Air in circuit.	Bleed and check for damage.
	Driven plate worn or warped.	Replace.
	Clutch fork off the ball stud.	Install correctly and lubricate.
	Diaphragm spring weak or tip of fingers worn.	Replace.
	Driven plate sticking on splines.	Clean and free splines and lubricate with grease.
	Pilot bearing worn or damaged.	Replace.
	Master cylinder and slave cylinder seals worn.	Replace.
Slipping	Clutch facing worn.	Replace.
	Driven plate friction pads worn or oilsoaked.	Replace and check for leaks as needed.
	Diaphragm spring weak.	Replace pressure plate.
	Pressure plate or flywheel warped.	Replace.
	Master cylinder and slave cylinder seals worn.	Replace as needed.
Chattering	Clutch facing in poor contact or facing warped.	Replace.
	Surface of facing hardened.	Replace.
	Driven plate friction pads oil soaked.	Replace and check for leaks.
	Damper springs weakened or broken.	Replace.
	Rivets on clutch plate loosened.	Replace.
	Pressure plate or flywheel warped.	Replace as needed.
Rattling	Diaphragm spring weak.	Replace the pressure plate.
	Clutch fork loose or off the ball stud.	Replace the retaining spring or install the fork correctly.
	Driven plate springs weak or oil in the damper.	Replace and check for leaks as needed.
Release bearing noisy with the clutch engaged	Release bearing binding.	Clean, or replace if damaged, and lubricate.
	Clutch fork off the ball stud or loose spring tension.	Install correctly, and lubricate.
	Linkage return springs weak.	Replace.
Noisy	Release bearing worn or damaged.	Replace.
	Clutch fork off the ball stud.	Install correctly and lubricate.
	Pilot bearing loose.	Replace.
Pedal stays on the floor when disengaged	Release bearing binding.	Free up, or replace, and lubricate.
	Diaphragm spring weak.	Replace the pressure plate.
Pedal is hard to push	Hydraulic line blocked or crimped.	Clean out or replace.
	Master or slave cylinders binding.	Repair or replace as needed.
	Driven plate worn.	Replace.
Squeaking	Ball stud not lubricated or incorrectly lubricated.	Lubricate with high temperature grease.

Clutch Assembly (Y22SE)

Clutch Assembly (Y22SE) and Associated Parts



201RX003

Legend

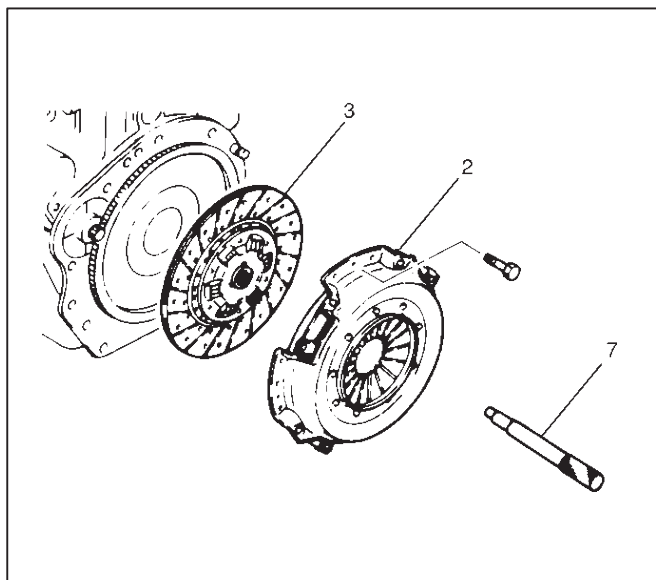
- (1) Transmission Assembly
- (2) Pressure Plate Assembly
- (3) Driven Plate Assembly

- (4) Release Bearing
- (5) Shift Fork
- (6) Crank Shaft Bearing

Removal

1. Remove transmission assembly, refer to "MANUAL TRANSMISSION" of Section 7B for "REMOVAL AND INSTALLATION" procedure.

2. Use the clutch pilot aligner (7) J-42877 to prevent the driven plate assembly from falling free.

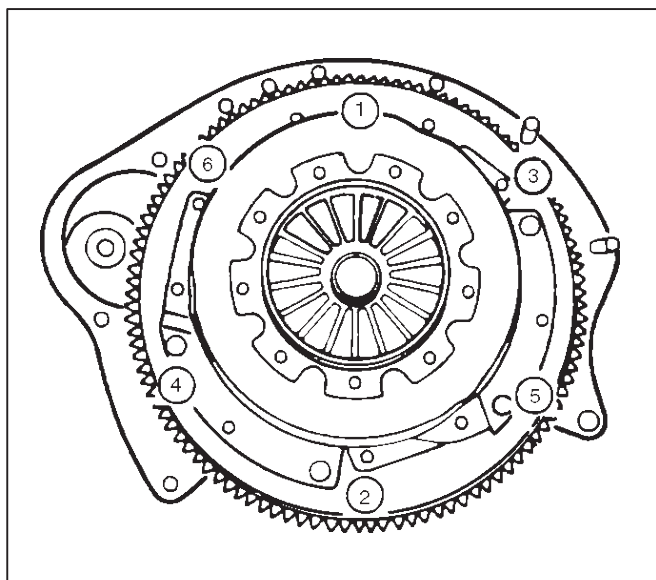


201RX002

Legend

- (3) Driven Plate Assembly
- (2) Pressure Plate Assembly
- (7) Pilot Aligner

3. Mark the flywheel, clutch cover and pressure plate (2) lug for alignment when installing.
4. Loosen the clutch cover bolts in the numerical order shown in the illustration.



201RS036

5. Remove pressure plate assembly (2) and driven plate assembly (3).

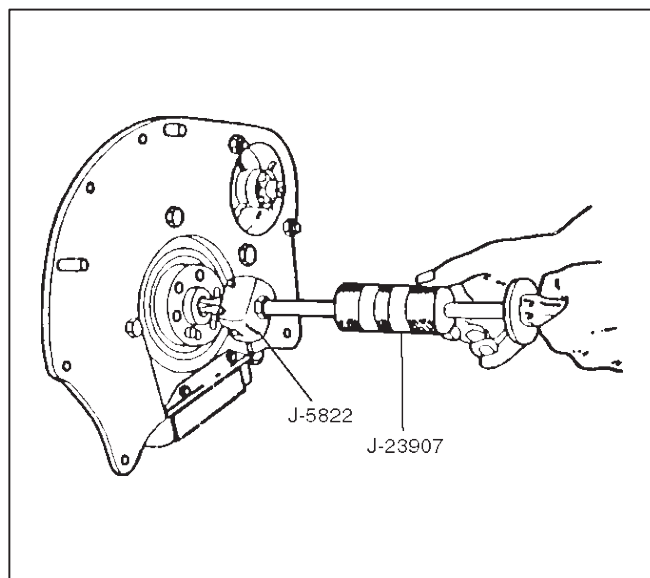
6. Remove release bearing (4).

NOTE: The release bearing is permanently packed with lubricant and should not be soaked in cleaning solvent, as this will dissolve the lubricant.

7. Remove shift fork.

- Do not remove crank shaft bearing (6) except for replacement.

Remove the crank shaft bearing (6) using remover J-5822 and sliding hammer J-23907.



015RS077

Inspection and Repair

Make necessary adjustments, repairs, and part replacements if wear, damage, or other problems are discovered during inspection.

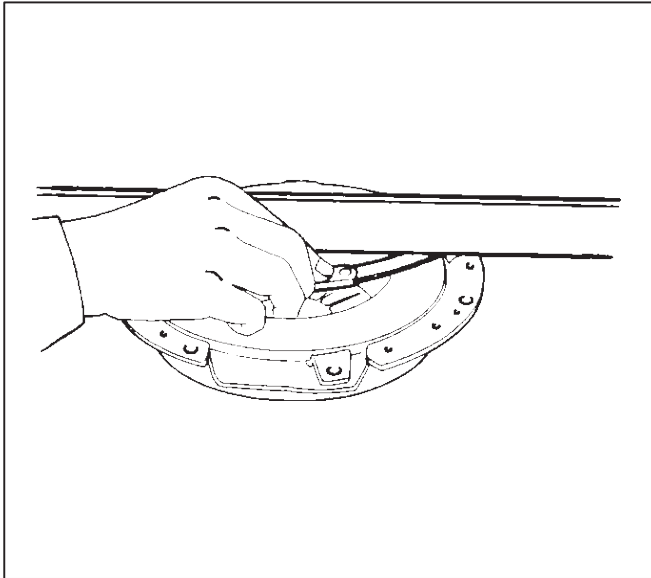
Pressure Plate Assembly

Visually inspect the pressure plate friction surface for excessive wear and heat cracks. If excessive wear or deep heat cracks are present, the pressure plate must be replaced.

7C-10 CLUTCH

Pressure Plate Warpage

Use a straight edge and a feeler gauge to measure the pressure plate friction surface flatness in four directions.



201RS038

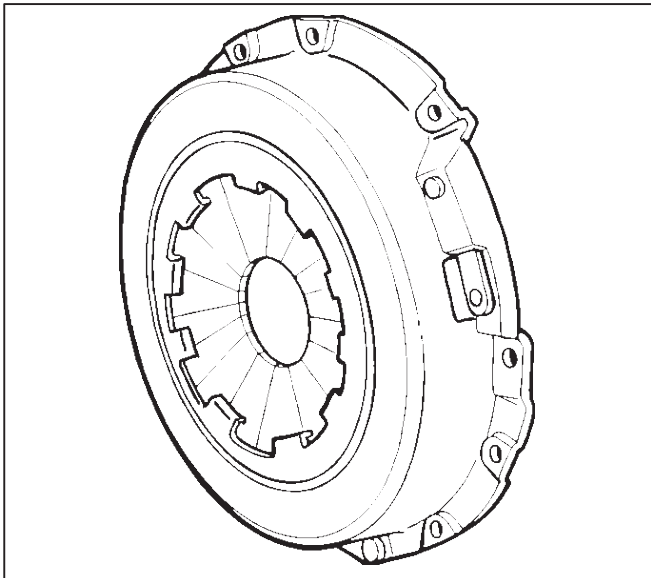
If any of the measured values exceed the specified limit, the pressure plate must be replaced.

Pressure Plate Warpage

Limit: 0.3mm (0.012in)

Clutch Cover

Visually inspect the entire clutch cover for excessive wear, cracking, and other damage. The clutch cover must be replaced if any of these conditions are present.



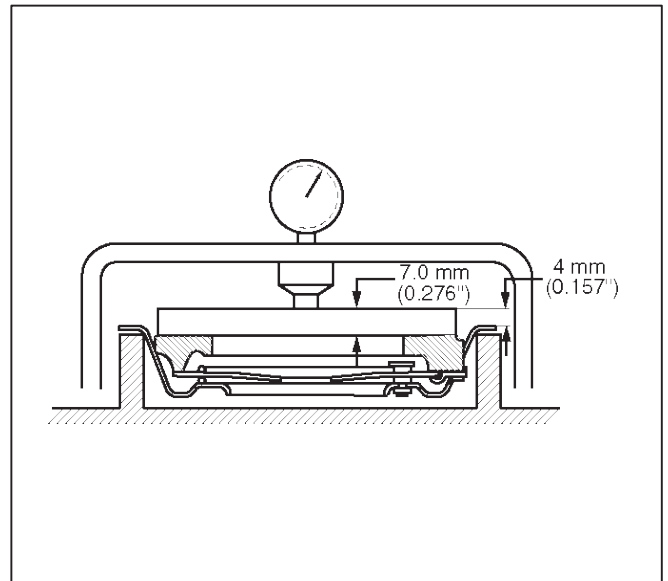
201RS039

Clutch Set Force

1. Invert the pressure plate assembly.
2. Place a new driven plate over the pressure plate. A metal sheet with thickness of 7.0mm (0.276in) may be used in place of the driven plate.
3. Compress the pressure plate assembly until the distance becomes 4mm (0.157in).
4. Note the pressure gauge reading.

Clutch Set Force

Standard: 5488N (1235lb)



201RY00003

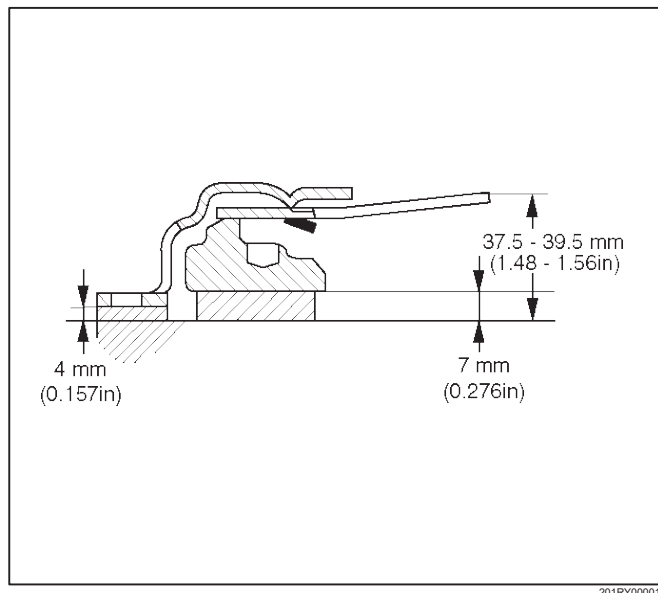
Diaphragm Spring Finger Height

1. Place a 7.0mm (0.276in) spacer beneath the pressure plate.
2. Fully compress the pressure plate and diaphragm spring.
There are two ways to do this:
 - a. Use a bench press to press down on the assembly from the top.
 - b. Tighten the fixing bolts.

3. Measure the spring finger height from base to spring tip.
If the measured value exceeds the specified limit, the pressure plate assembly must be replaced.

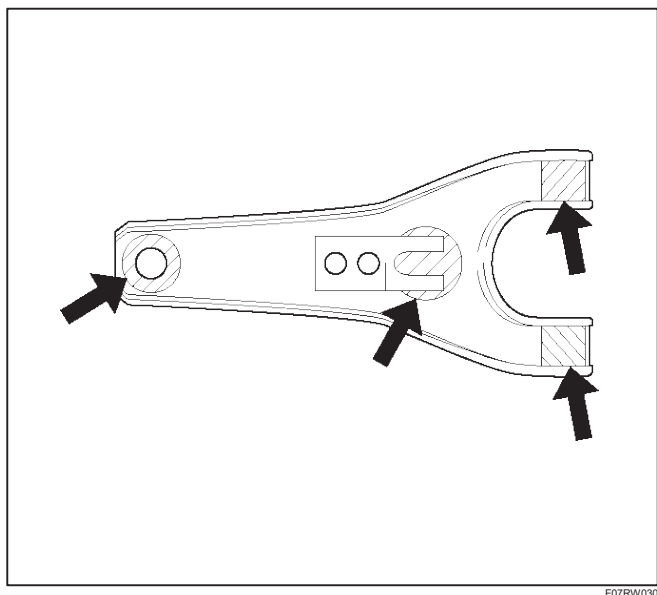
Spring Finger Height

Standard: 37.5 mm – 39.5 mm (1.48 in – 1.56 in)



Shift Fork

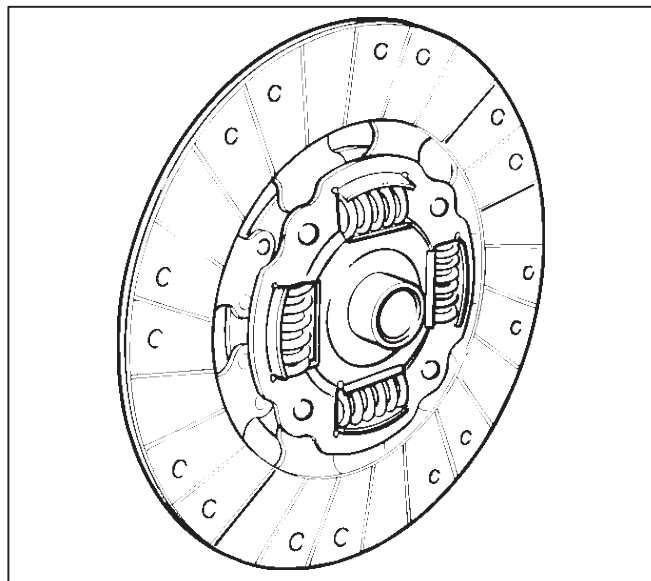
1. Visually inspect the surfaces of the shift fork making contact with the shift block.
2. Remove any minor stepping or abrasion from the shift block with an oil stone.
3. Apply molybdenum disulfide type grease to the areas as shown in the figure.



Driven Plate Assembly

1. Visually inspect the torsion spring for looseness, breakage, and weakening. If any of these conditions are discovered, the driven plate assembly must be replaced.

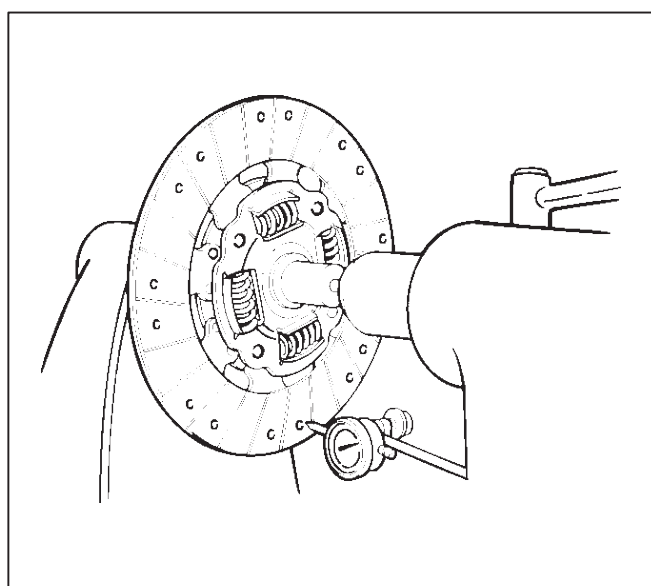
2. Visually inspect the facing surfaces for cracking and excessive scorching. Visually inspect the facing surfaces for the presence of oil or grease. If any of these conditions are discovered, the facing must be cleaned or replaced.



3. Check that the driven plate moves smoothly on the transmission top gear shaft spline.
Minor ridges on the top gear shaft spline may be removed with an oil stone.

Driven Plate Warpage

1. Insert the clutch pilot aligner J-42877 into the driven plate splined hub.
The clutch pilot aligner must be held perfectly horizontal.
2. Set a dial indicator to the driven plate outside circumference.



7C-12 CLUTCH

3. Slowly turn the driven plate. Read the dial indicator as you turn the driven plate.
If the measured value exceeds the specified limit, the driven plate assembly must be replaced.

Driven Plate Warpage

Standard: 0.7 mm (0.028 in)

Limit: 1.0 mm (0.039 in)

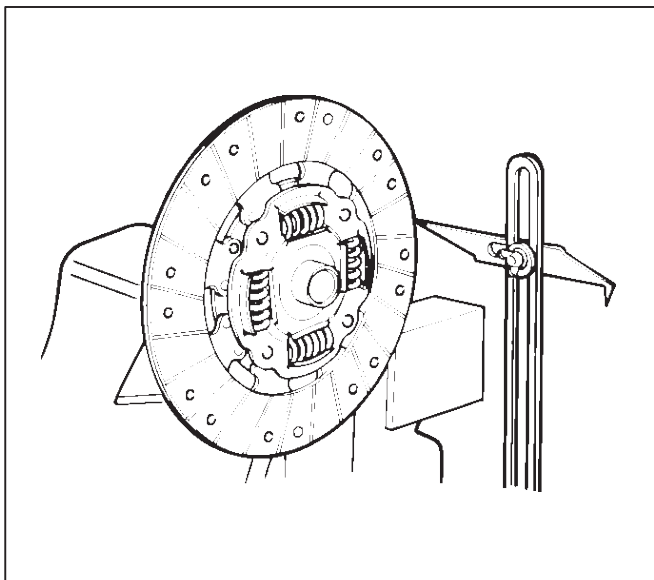
Driven Plate Splined Hub Spline Wear

1. Clean the driven plate splined hub.
2. Install the driven plate to the transmission top gear shaft spline.
3. Set a surface gauge to the driven plate outside circumference.
4. Slowly turn the driven plate counterclockwise. Measure the spline rotation play as you turn the driven plate.

Driven Plate Splined Hub Spline Wear

Standard: 0.5 mm (0.020 in)

Limit: 1.0 mm (0.039 in)



Rivet Head Depression

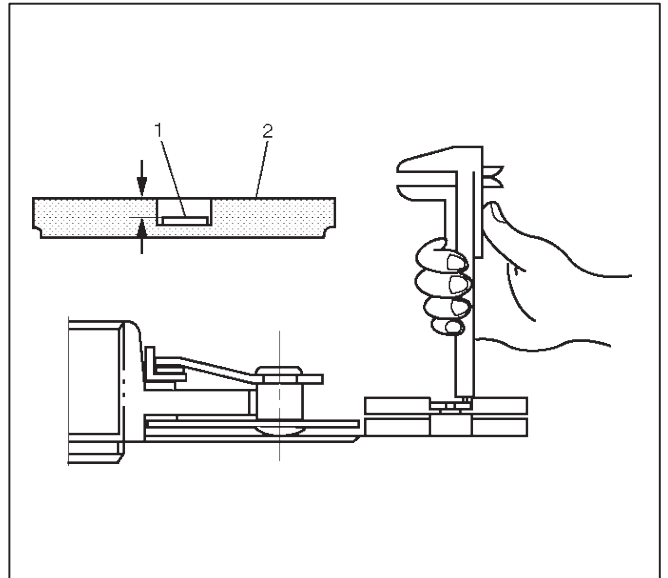
Use a depth gauge or a straight edge with steel rule to measure the rivet head depression (1) from the facing surface (2).

Be sure to measure the rivet head depression on both sides of the driven plate. If the measured value is less than the specified limit, the facing must be replaced.

Rivet Head Depression

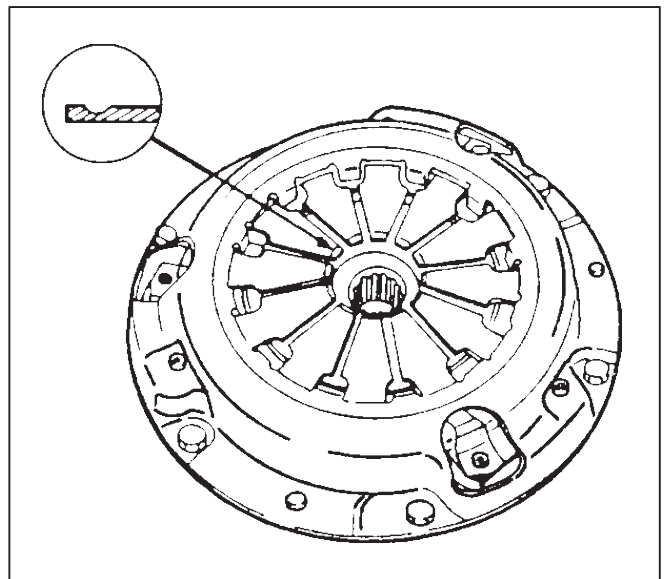
Standard: MIN 1.3 mm (0.051 in)

Limit: 0.2 mm (0.008 in)



Pressure Plate Assembly

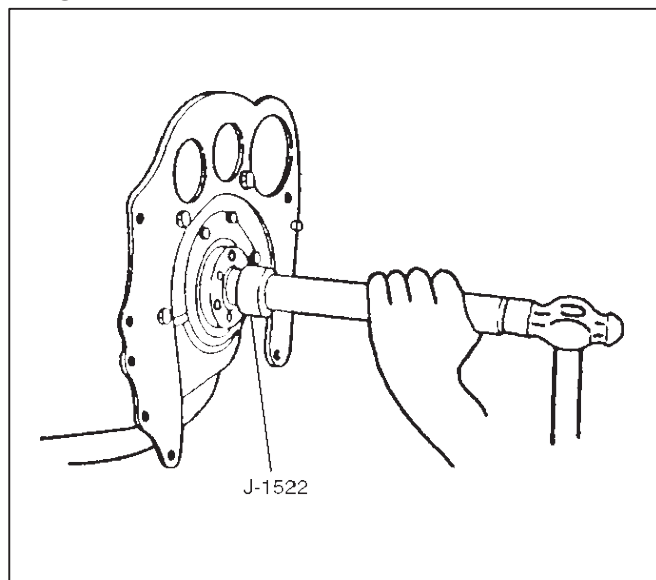
Check the cover for cracks and distortion, and the diaphragm spring for heat distortion, loosened rivets. Check the diaphragm spring for wear.



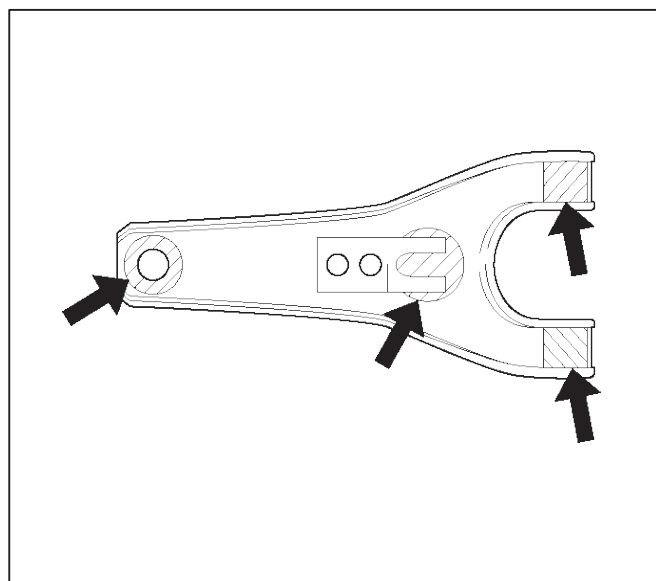
Installation

1. Clean and lubricate with grease.
2. Use installer J-1522 to install crankshaft bearing (6).

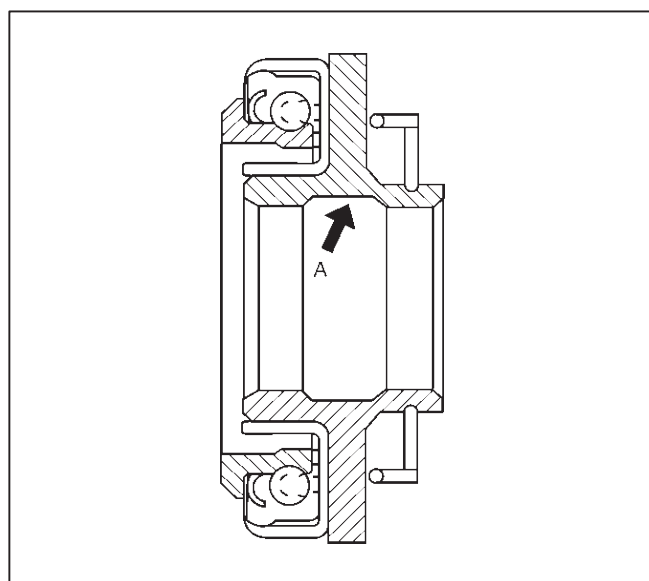
X22SE



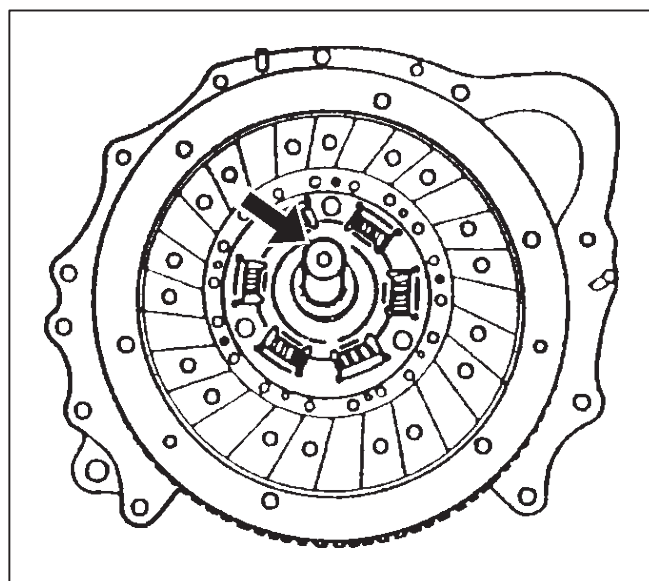
3. Apply molybdenum disulfide type grease to the areas as shown in the figure and install shift fork (5).



4. Pack the inside recess (A) of the release bearing with grease as shown in the figure.



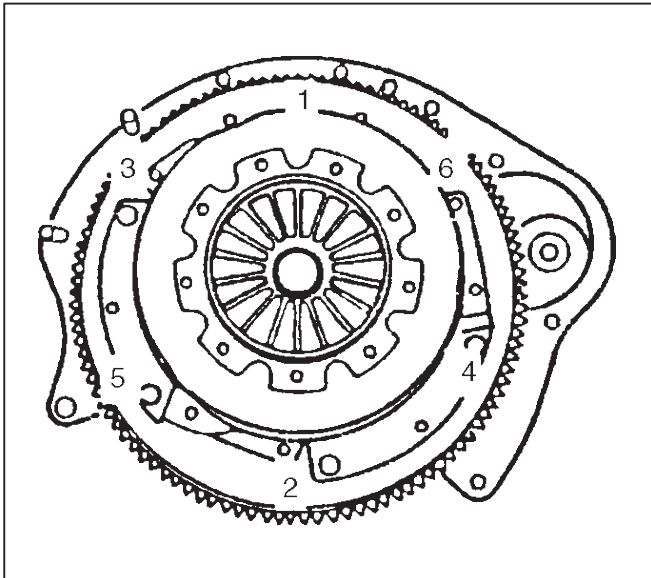
5. Install driven plate assembly by using aligner J-42877.



7C-14 CLUTCH

6. Tighten the bolts holding the pressure plate assembly (2) in the order shown in the figure.

Torque: 18N·m (13 lb ft)



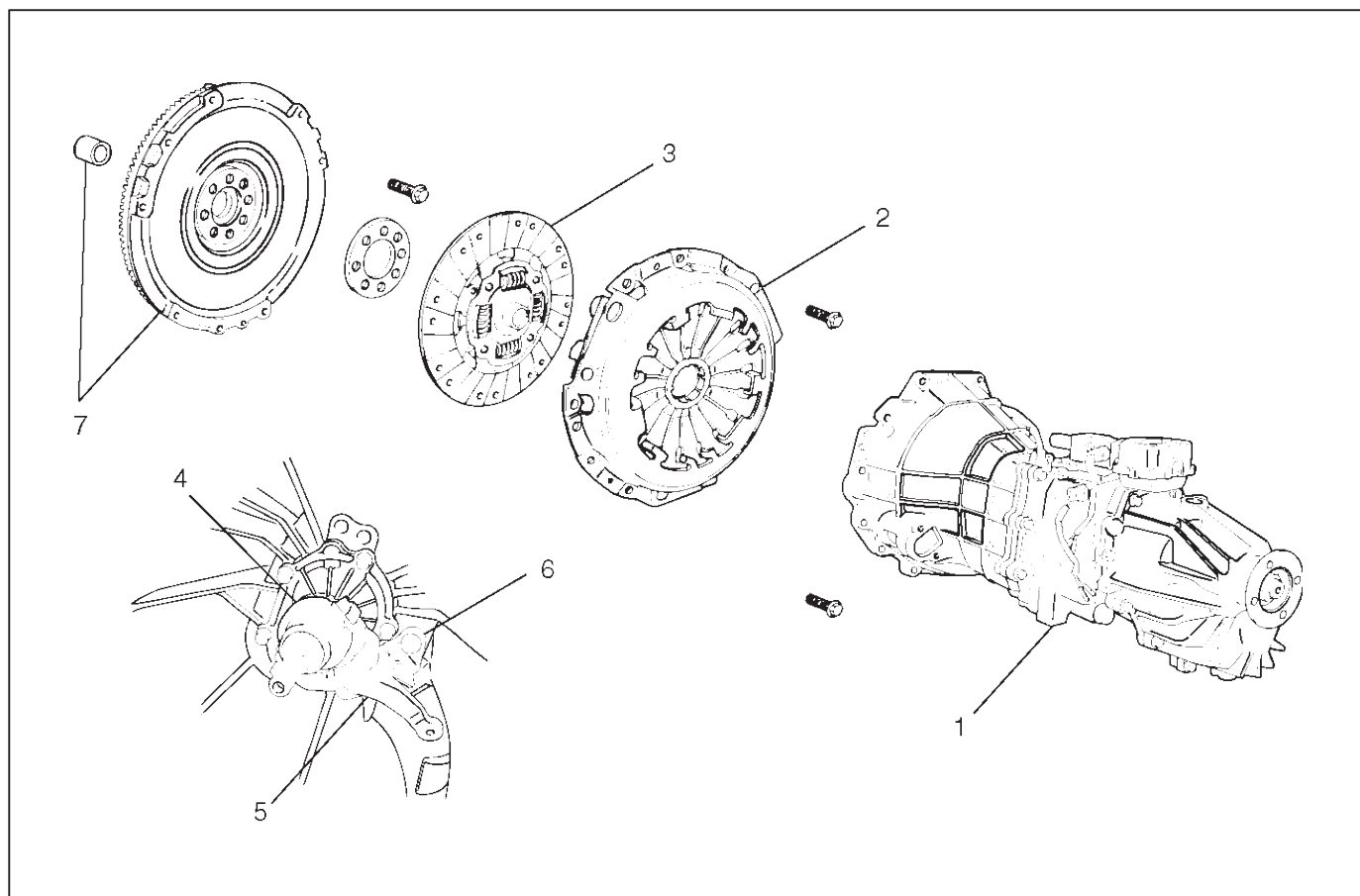
7. Remove the aligner.

NOTE: Do not strike the aligner with a hammer to remove it.

8. Install transmission assembly (1) to the engine. Refer to Transmission Installation in Manual Transmission section.

Clutch Assembly (6VD1)

Clutch Assembly (6VD1) and Associated Parts



201 RS023

Legend

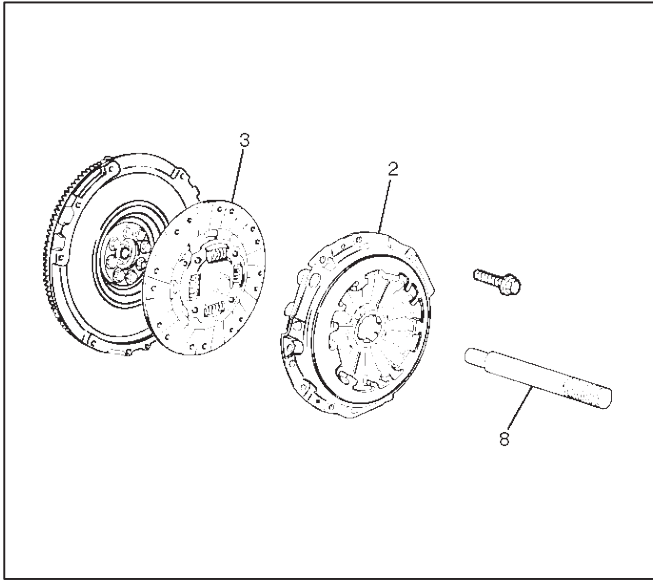
- | | |
|-----------------------------|--|
| (1) Transmission Assembly | (4) Release Bearing |
| (2) Pressure Plate Assembly | (5) Shift Fork |
| (3) Driven Plate Assembly | (6) Fulcrum Bridge |
| | (7) Flywheel Assembly and Crankshaft Bearing |

Removal

1. Refer to "MANUAL TRANSMISSION" of Section 7B for "REMOVAL AND INSTALLATION" procedure of transmission assembly (1).

7C-16 CLUTCH

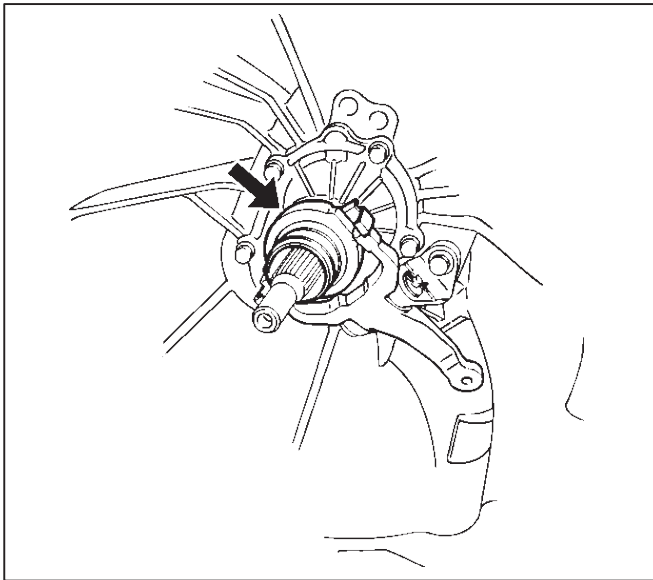
2. Use the pilot aligner J24547 to prevent the driven plate assembly (3) from falling free.



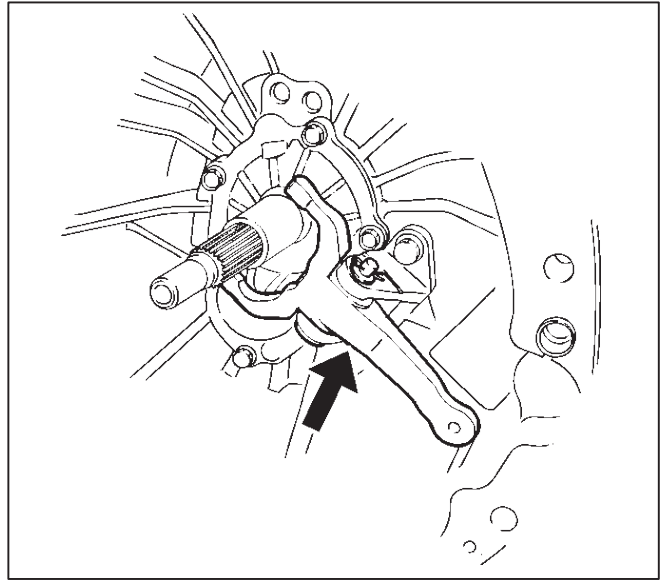
Legend

- (2) Pressure Plate Assembly
- (3) Driven Plate Assembly
- (8) Pilot Aligner

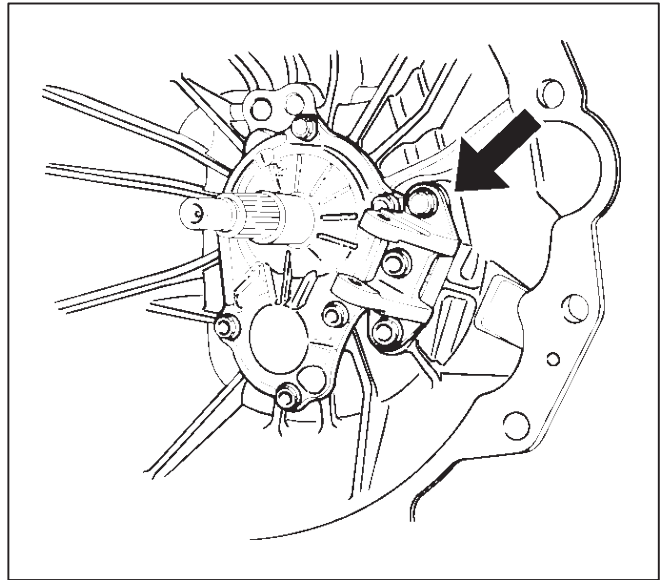
3. Mark the flywheel, clutch cover and pressure plate lug for alignment when installing.
4. Remove the release bearing (4) from the transmission case.



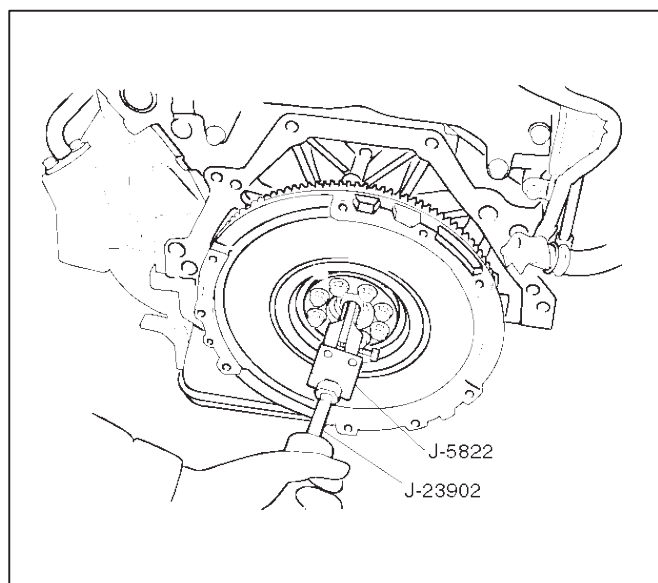
5. Remove the snap pin. Remove the shift fork pin and shift fork from the fulcrum bridge.



6. Remove the fulcrum bridge bolts. Remove the fulcrum bridge (6) from the transmission case.



- Do not remove crankshaft bearing (7) except for replacement.
- Use the remover J-5822 and sliding hammer J-23907 to remove the crankshaft bearing.



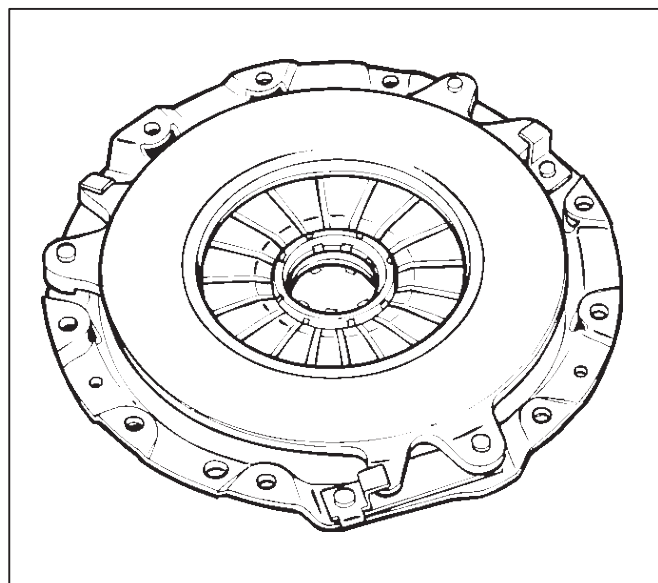
015RS045

Inspection and Repair

Make necessary correction or parts replacement if wear, damage, or any other abnormal condition are found through inspection.

Pressure Plate Assembly

- Visually check the pressure plate friction surface for excessive wear and heat cracks. If excessive wear or deep heat cracks are present, the pressure plate must be replaced.



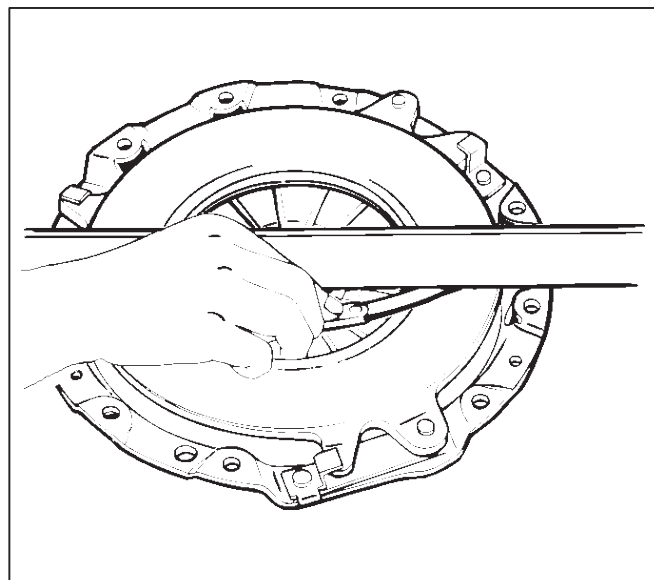
201RS002

Pressure Plate Warpage

- Use a straight edge and a feeler gauge to measure the pressure plate friction surface flatness in four directions. If any of the measured values exceed the specified limit, the pressure plate must be replaced.

Pressure Plate Warpage

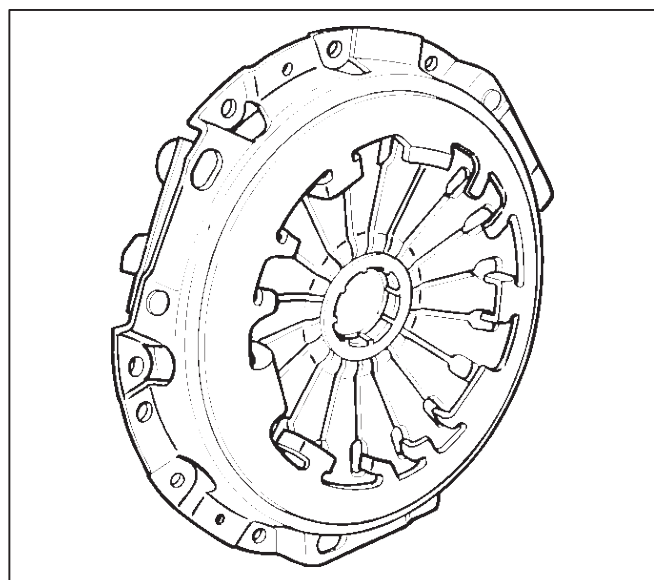
Limit: 0.3 mm (0.012 in)



201RS003

Clutch Cover

- Visually check the entire clutch cover for excessive wear, cracking, and other damage. The clutch cover must be replaced if any of these conditions are present.



201RS004

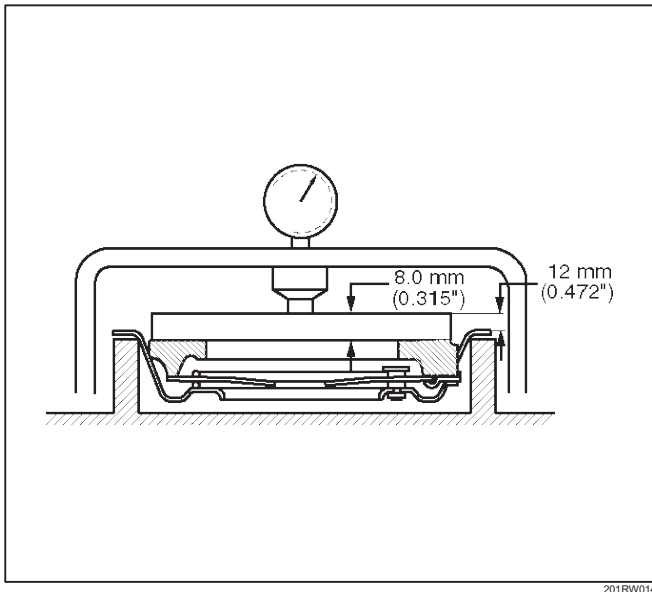
Clutch Set Force

1. Invert the pressure plate assembly.
2. Place a new driven plate over the pressure plate. A metal sheet with thickness of 8.0mm (0.315in) may be used in place of the driven plate.
3. Compress the pressure plate assembly until the distance becomes 12mm (0.472in).
4. Note the pressure gauge reading. If the measured value is less than the specified limit, the pressure plate assembly must be replaced.

Clutch Set Force

Standard: 7208N (1621lb)

Limit: 6669N (1499lb)



201RW014

Diaphragm Spring Finger Height

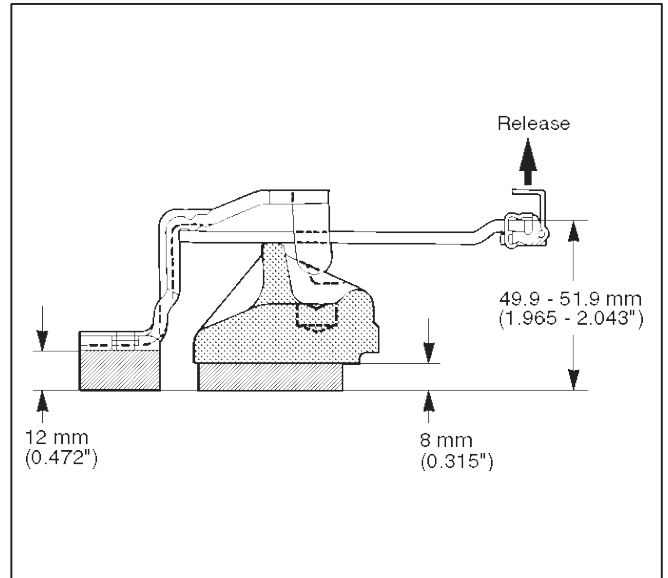
1. Place a new driven plate or a 8.0mm (0.315in) spacer beneath the pressure plate.
2. Fully compress the pressure plate and diaphragm spring.
There are two ways to do this:
 - a. Use a bench press to press down on the assembly from the top.
 - b. Tighten the fixing bolts.

NOTE: Preload on diaphragm spring finger must be 4998N (11-22lb) in direction of release, when clutch cover assembly is bolted to the flywheel.

3. Measure the spring height from base to spring tip. If the measured value exceeds the specified limit, the pressure plate assembly must be replaced.

Spring Finger Height

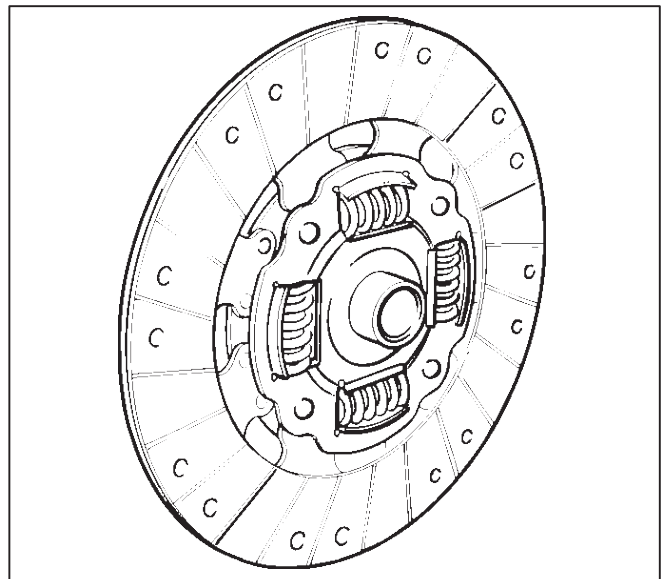
Standard: 49.9 – 51.9 mm (1.965– 2.043 in)



201RW016

Driven Plate Assembly

- Visually check the torsion spring for looseness, breakage, and weakening. If any of these conditions are discovered, the driven plate assembly must be replaced.
- Visually check the facing surfaces for cracking and excessive scorching. Visually inspect the facing surfaces for the presence of oil or grease. If any of these conditions are discovered, the facing must be cleaned or replaced.
- Check that the driven plate moves smoothly on the transmission top gear shaft spline. Minor ridges on the top gear shaft spline may be removed with an oil stone.



201RS007

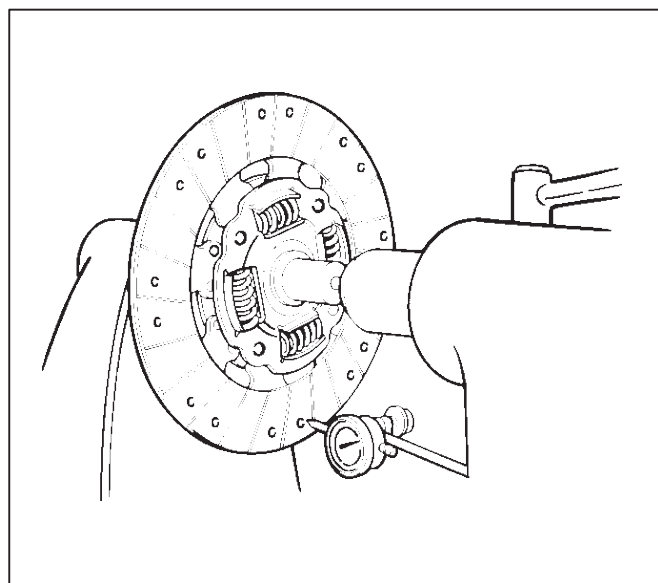
Driven Plate Warpage

1. Insert the clutch pilot aligner J-24547 into the driven plate splined hub. The clutch pilot aligner must be held perfectly horizontal.
2. Set a dial indicator to the driven plate outside circumference.
3. Slowly turn the driven plate. Read the dial indicator as you turn the driven plate. If the measured value exceeds the specified limit, the driven plate assembly must be replaced.

Driven Plate Warpage

Standard: 0.7mm (0.028in)

Limit: 1.0mm (0.039in)



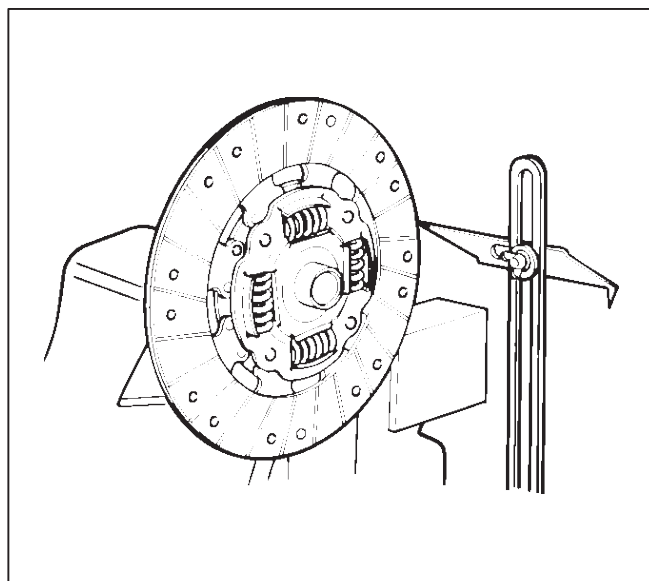
Driven Plate Splined Hub Spline Wear

1. Clean the driven plate splined hub.
2. Install the driven plate to the transmission top gear shaft spline.
3. Set a surface gauge to the driven plate outside circumference.
4. Slowly turn the driven plate counterclockwise. Measure the spline rotation play as you turn the driven plate. If the measured value exceeds the specified limit, the driven plate assembly must be replaced.

Driven Plate Warpage

Standard: 0.5mm (0.020in)

Limit: 1.0mm (0.039in)

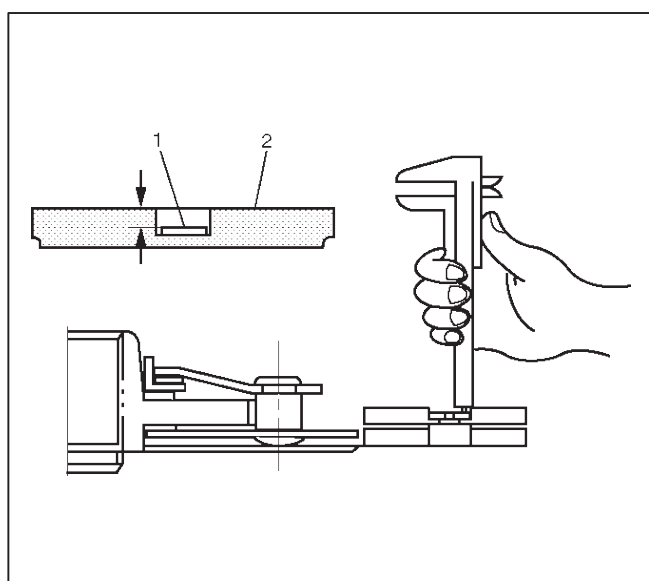


Rivet Head Depression

- Use a depth gauge or a straight edge with steel rule to measure the rivet head depression (1) from the facing surface (2).
- Be sure to measure the rivet head depression on both sides of the driven plate. If the measured value is less than the specified limit, the driven plate assembly must be replaced.

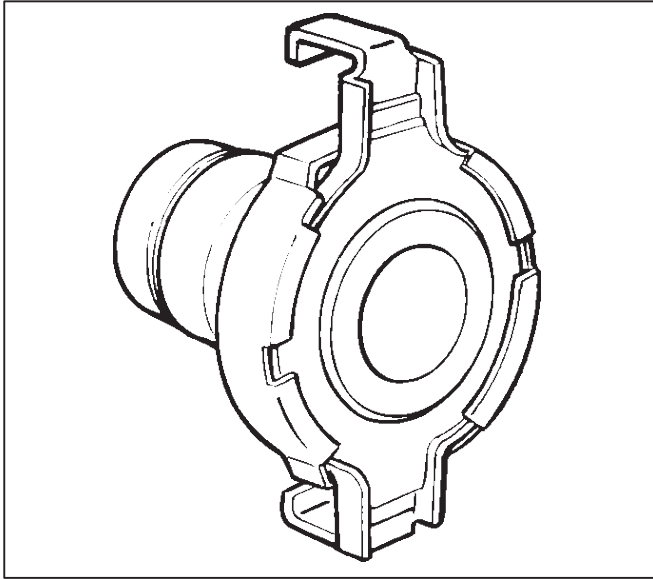
Rivet Head Depression

	Standard	Limit
Fly wheel side	1.2–1.8mm (0.047–0.071in)	0.2mm (0.008in)
Pressure plate side	1.6–2.2mm (0.062–0.087in)	



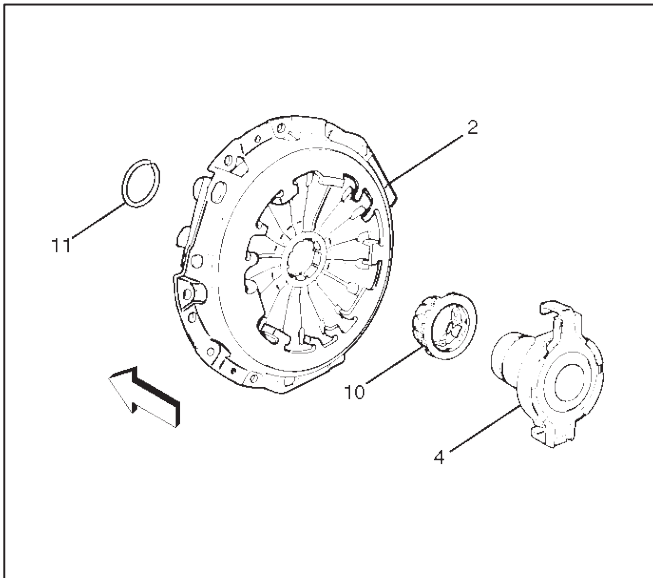
Release Bearing

- Visually check the release bearing for excessive play, noise and breakage. If any of these conditions are discovered, the release bearing must be replaced.



201RS011

- When replacing the release bearing (4), replace both the wedge collar (10) and wire ring (11) at the same time.



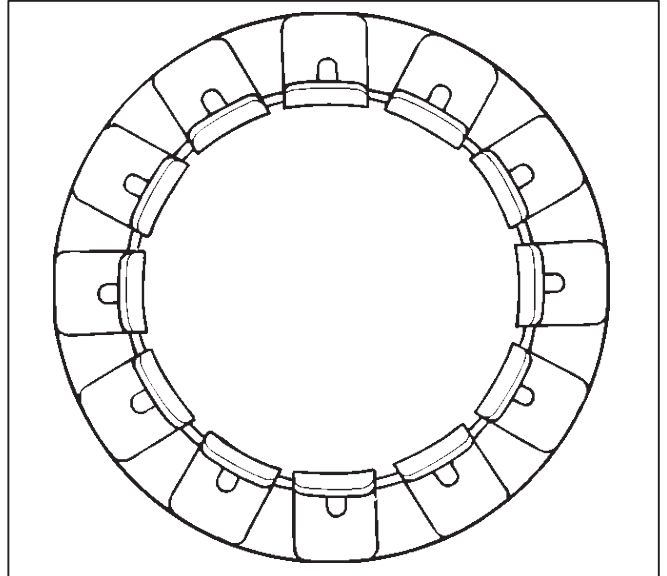
201RS012

Legend

- (2) Pressure Plate Assembly
- (4) Release Bearing
- (10) Wedge collar
- (11) Wire Ring

Wedge Collar (10)

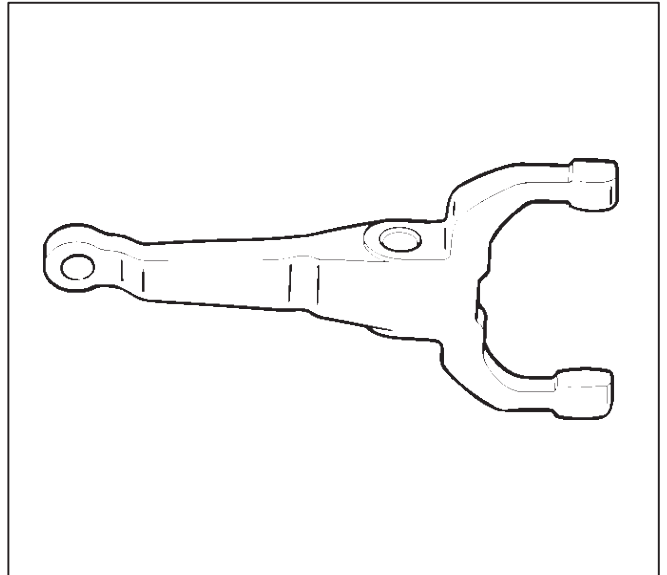
- Visually check the surfaces of the wedge collar making contact with the release bearing for excessive wear and damage.
- Replace exhibiting excessive wear or damage.



201RS013

Shift Fork

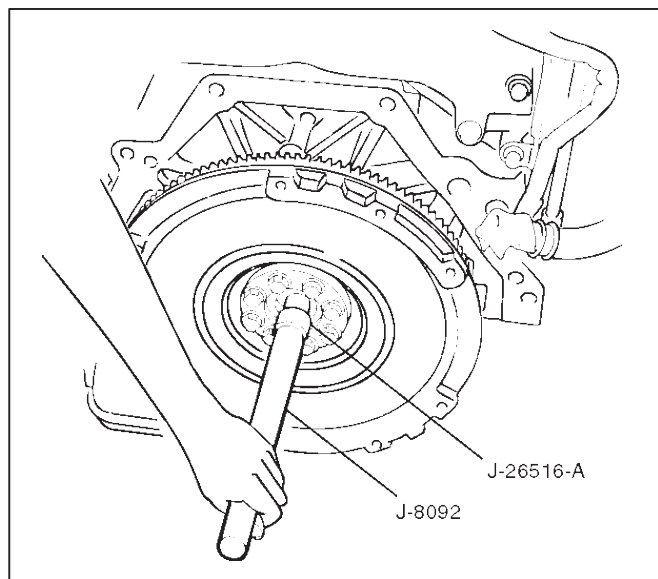
- Visually check the surfaces of the shift fork making contact with the release bearing for excessive wear and damage.
- Remove any minor stepping or abrasion from shift fork with an oil stone. Replace exhibiting excessive wear or damage.



201RS014

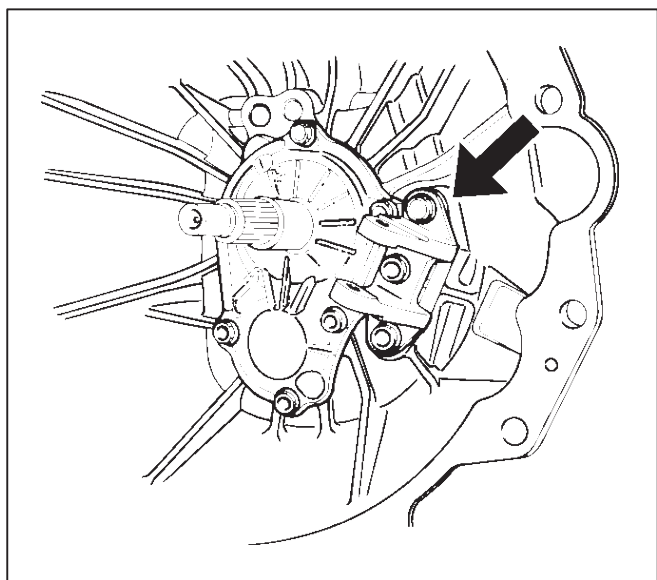
Installation

1. Clean and lubricate with grease.
2. Use the installer J-26516-A and driver handle J-8092 to install the crankshaft bearing (7).

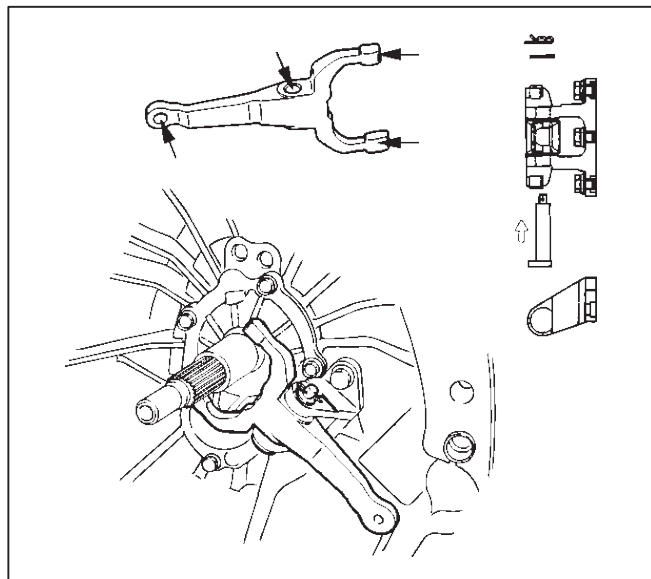


3. Install the fulcrum bridge (6) to the transmission case. Tighten three fulcrum bridge bolts to the specified torque.

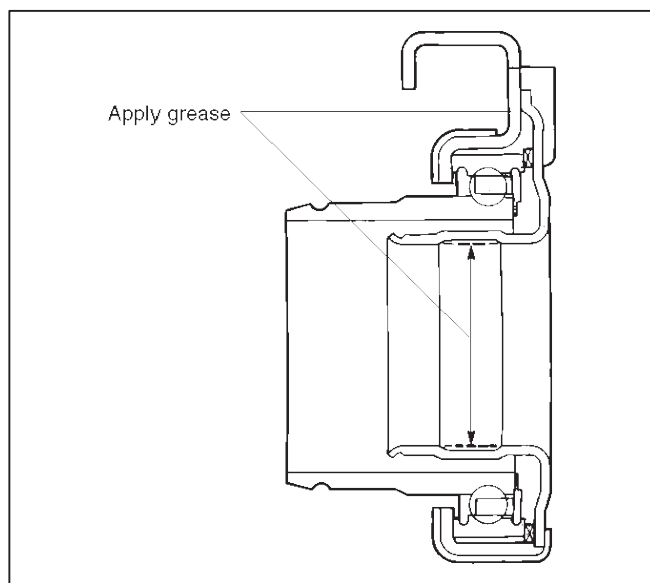
Torque: 38 N·m (28 lb ft)



4. Apply molybdenum disulfide type grease to the pin hole inner circumferences and thrust surfaces. Attach the shift fork (5) to the fulcrum bridge (6) and insert the pin from below of the fulcrum bridge. Install the washer and snap pin.



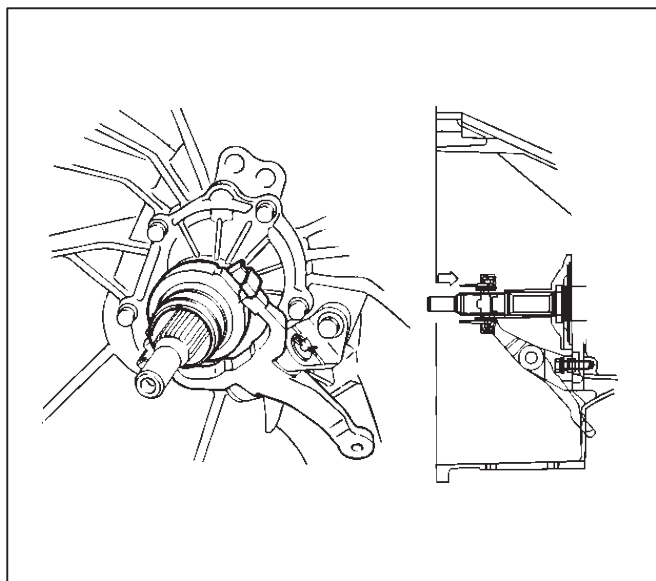
5. Apply molybdenum disulfide type grease to the areas shown in the figure.



- Install the release bearing (4) in the proper direction.

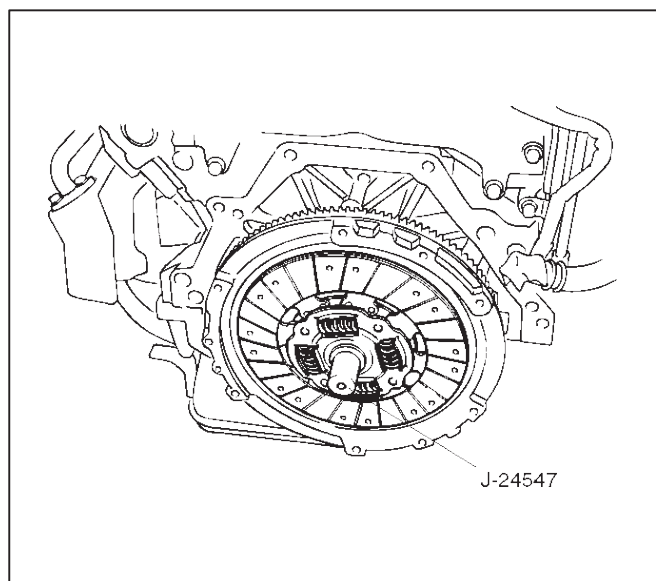
7C-22 CLUTCH

NOTE: Ensure release bearing is properly positioned during installation, as shown in the figure.



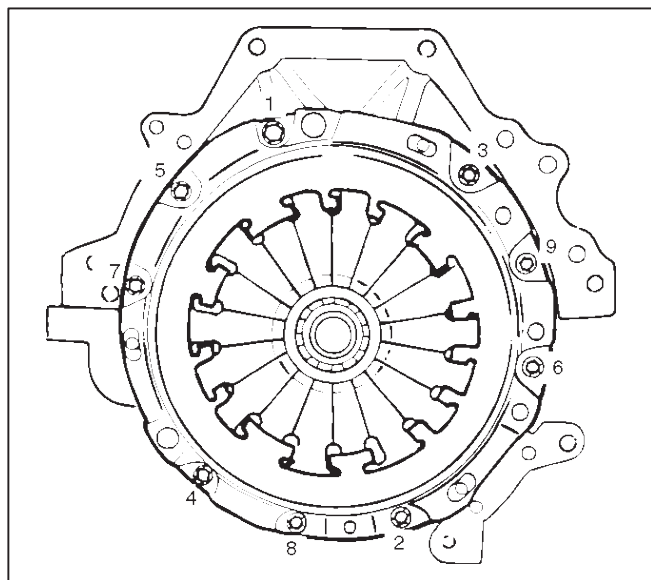
201RS019

6. Use the pilot aligner J-24547 to install the driven plate assembly (3).



201RS016

7. Tighten the bolts holding the pressure plate assembly (2) in the order shown in the figure.



201RS017

Torque: 18 N·m (13 lb ft)

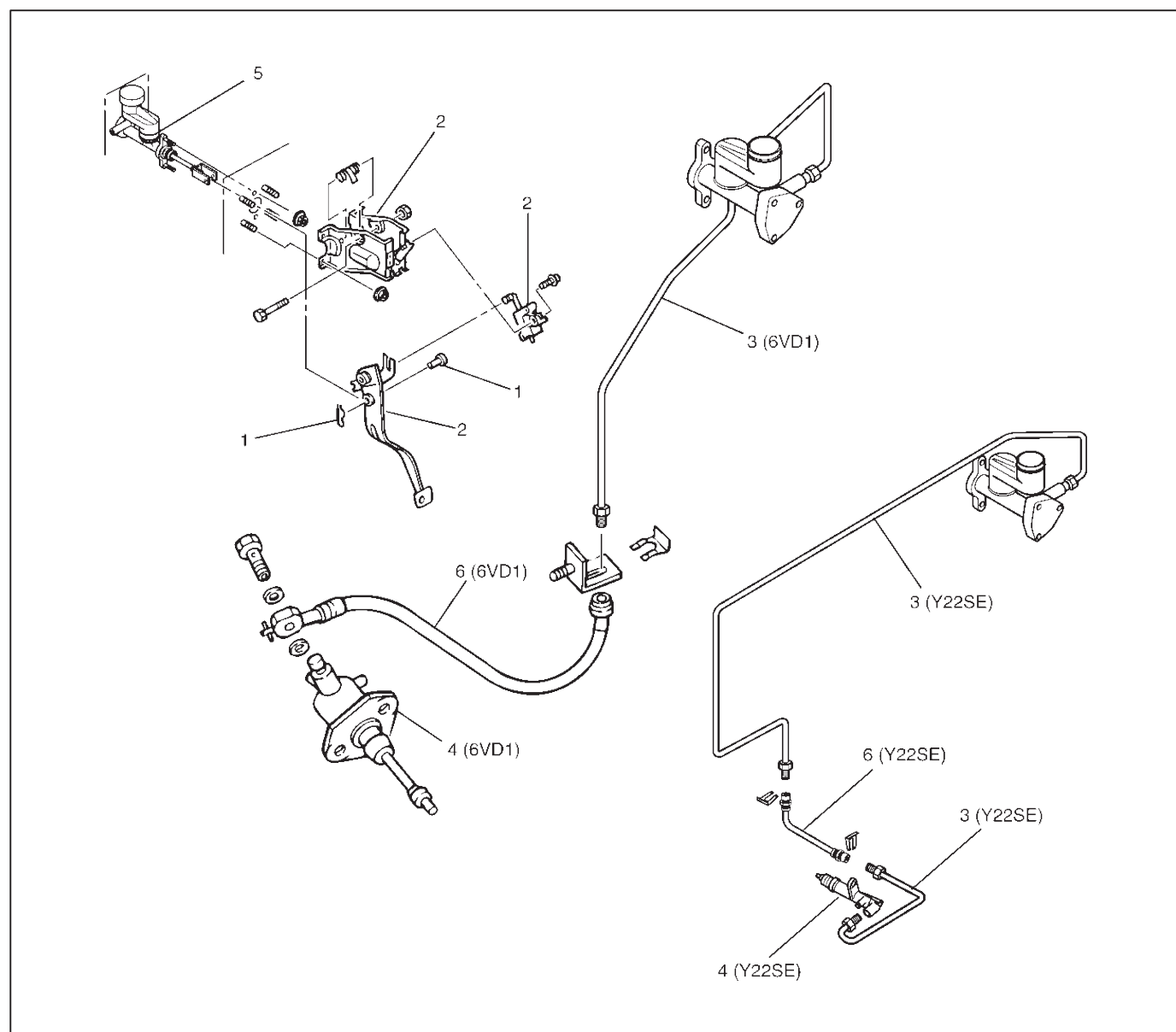
8. Remove the aligner.

NOTE: Do not strike the aligner with a hammer to remove it.

9. Install transmission assembly to the engine.

Clutch Control

Parts Location View



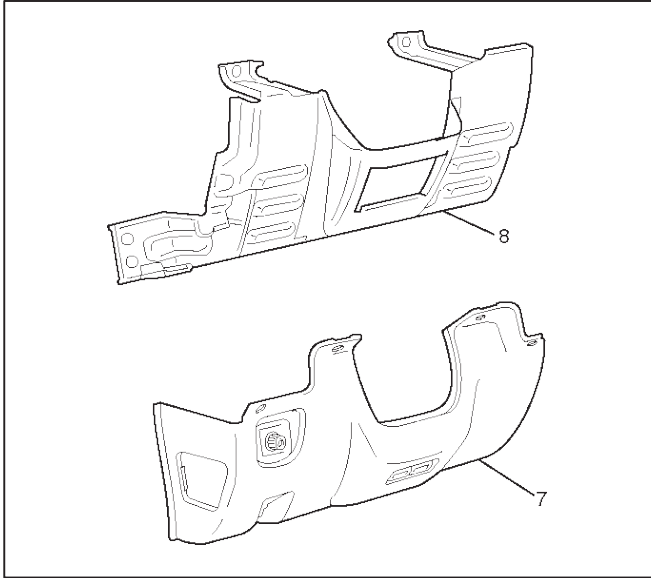
205R100002

Legend

- | | |
|-------------------------------|------------------------------|
| (1) Pin and Jaw Joint Pin | (4) Slave Cylinder Assembly |
| (2) Pedal Assembly and Switch | (5) Master Cylinder Assembly |
| (3) Oil Line Pipe | (6) Oil Line Hose |

Removal

1. Disconnect the ground battery cable.
2. Remove the instrument panel lower cover (7) and driver knee bolster panel assembly (8).



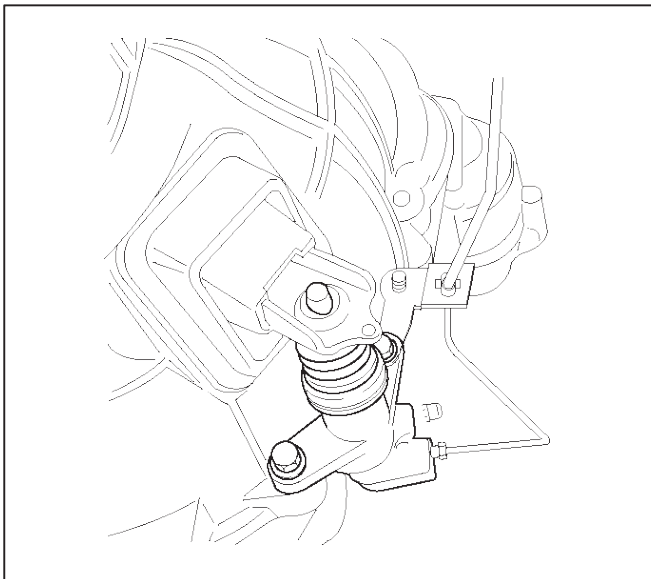
740RW023

Legend

- (7) Driver Lower Cover
- (8) Driver Knee Bolster Panel

3. Remove pin and jaw joint pin (1).
4. Remove pedal assembly and switch (2).
5. Remove oil line pipe (3).
6. Remove slave cylinder assembly (4).

Y22SE MUA



205RW001

7. Remove master cylinder assembly (5).
8. Remove oil line hose (6).

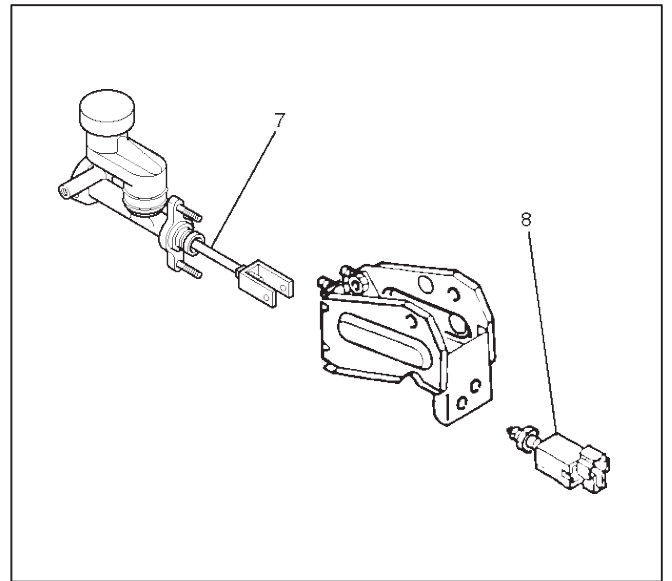
Inspection and Repair

Make necessary adjustments, repairs, and part replacements if wear, damage or other problems are discovered during inspection.

Installation

Clutch Pedal Adjustment

1. With clutch switch.
 1. Disconnect clutch switch connector.
 2. Loosen lock nut, then turn switch out until there is a gap between the switch plunger and clutch pedal.



208RW006

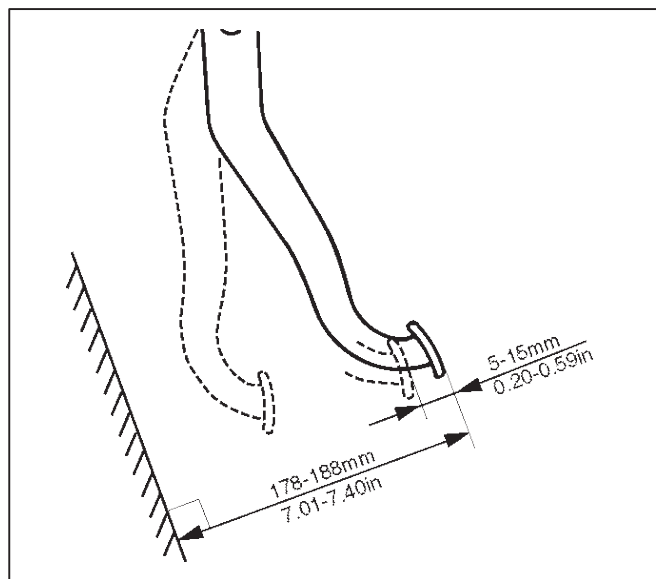
Legend

- (7) Push Rod
- (8) Clutch Switch

- Loosen clutch master cylinder push rod lock nut. Turn push rod by hand to set clutch pedal height to within specification. Tighten push rod lock nut.

Clutch Pedal Height

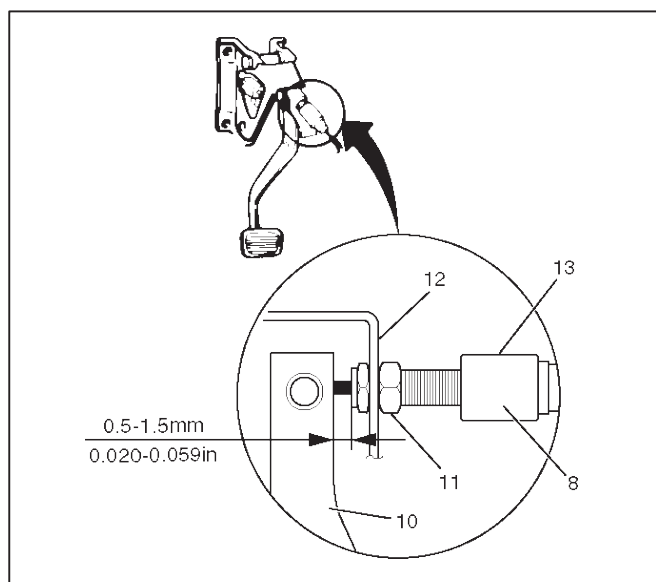
178 – 188 mm (7.01 – 7.40 in)



F07RW026

- With clutch switch.

- Turn the clutch switch until the switch bolt just touches the clutch pedal arm.
- Adjust clutch switch by backing it out half a turn, and measure the clearance between the clutch pedal arm and the clutch switch bolt end.



F07RW027

Legend

- (8) Clutch Switch
- (10) Clutch Pedal Arm
- (11) Lock Nut
- (12) Bracket
- (13) Back Out Switch 1/2 Turn

- Lock the lock nut.
- Connect clutch switch connector.

Clutch Switch and Clutch Pedal Clearance

0.5 – 1.5 mm (0.020 – 0.059 in)

- After adjusting the clutch pedal height, push the clutch pedal by hand to ensure the clutch pedal free play is within specification.

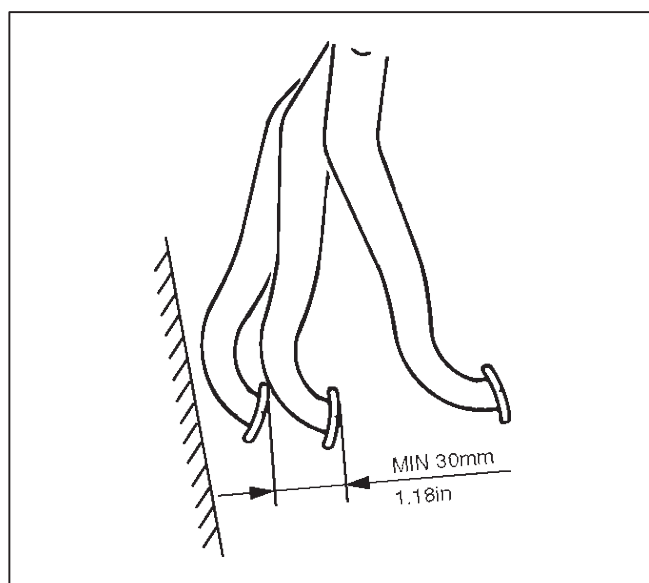
Pedal Free Play

5 – 15 mm (0.20 – 0.59 in)

- Perform clutch pedal engagement height inspection:
 - Operate the parking brake lever and block the wheels.
 - Start the engine, fully step on the clutch pedal slowly and move the shift lever 1st position.
 - With the engine idling, release the clutch pedal slowly and measure its stroke – just prior to its clutching position.

Clutch Pedal Engagement Height (H3)

MIN. 30 mm (1.18 in)



F07RW028

- If the measured value exceeds the specified limit, check the following points and repair if necessary:

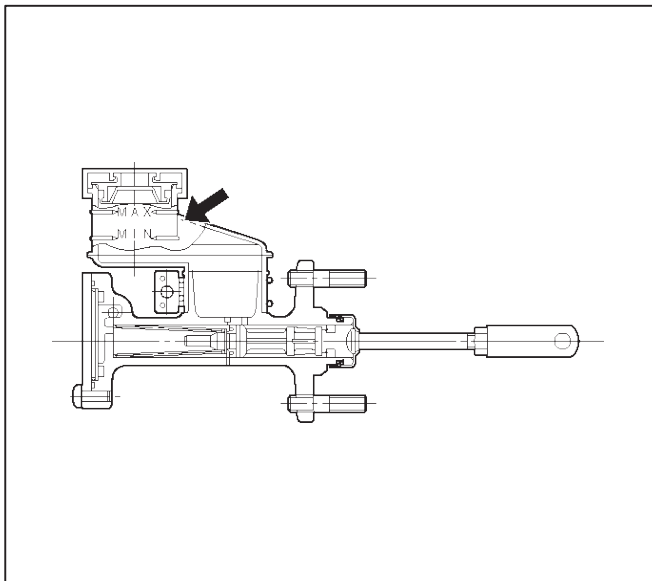
- Hydraulic circuit for fluid leakage or air in circuit.
- Clutch disc warped.
- Diaphragm spring weakened or tip of fingers worn.
- Driven plate sticking on sprines.
- Release bearing worn or damaged.
- Master cylinder and slave cylinder worn.

Torque

- Master cylinder to dash panel
16 N·m (12 lb ft)
- Clutch pedal to dash panel
15 N·m (11 lb ft)
- Master cylinder push rod to yoke
17 N·m (12 lb ft)
- Clutch pipe to master cylinder
16 N·m (12 lb ft)
- Clutch pipe to flex, hose
20 N·m (14 lb ft)
- Slave cylinder to case
43 N·m (32 lb ft)
- Slave cylinder bleeder screw
8 N·m (69 lb in)
- Clutch pipe to slave cylinder
20 N·m (14 lb ft)

Bleeding

1. Check the level of clutch fluid in the reservoir and replenish if necessary.

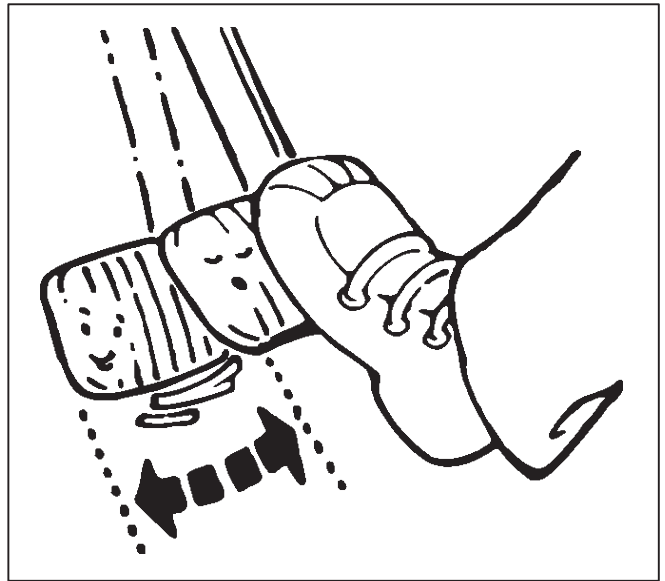


A07RW021

2. Bleeding the slave cylinder.

1. Remove the rubber cap from the bleeder screw and wipe clean. Connect a vinyl tube to the bleeder screw and insert the other end of the vinyl tube into a transparent container.

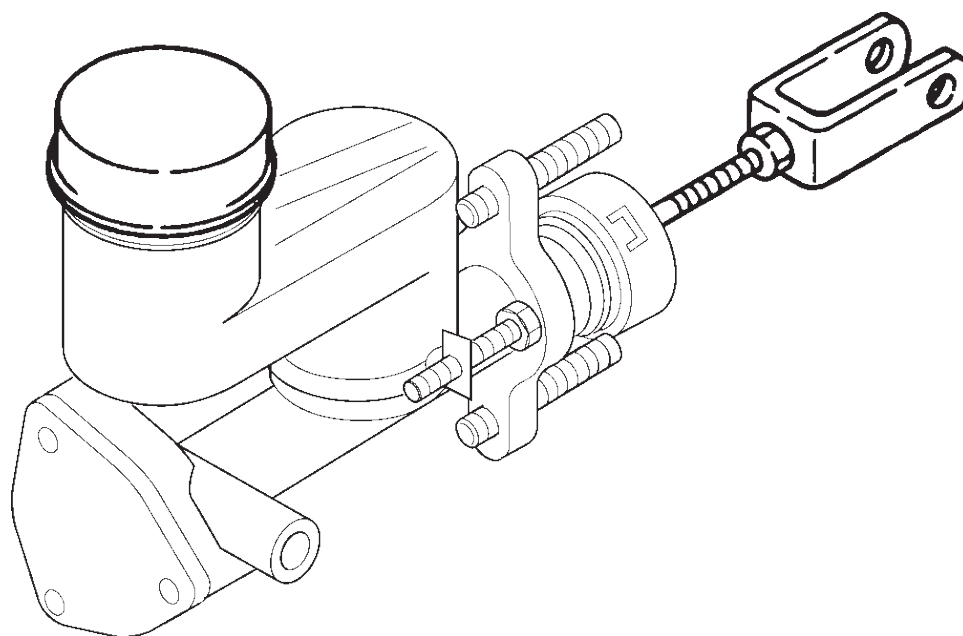
2. Pump the clutch pedal repeatedly and hold it depressed.



203RS005

3. Loosen the bleeder screw to release clutch fluid with air bubbles into the container, then tighten the bleeder screw immediately.
4. Release the clutch pedal carefully. Repeat the above operation until air bubbles disappear from the clutch fluid being pumped out into the container. During the bleeding operation, keep the clutch fluid reservoir filled to the specified level. Reinstall the rubber cap.

Master Cylinder

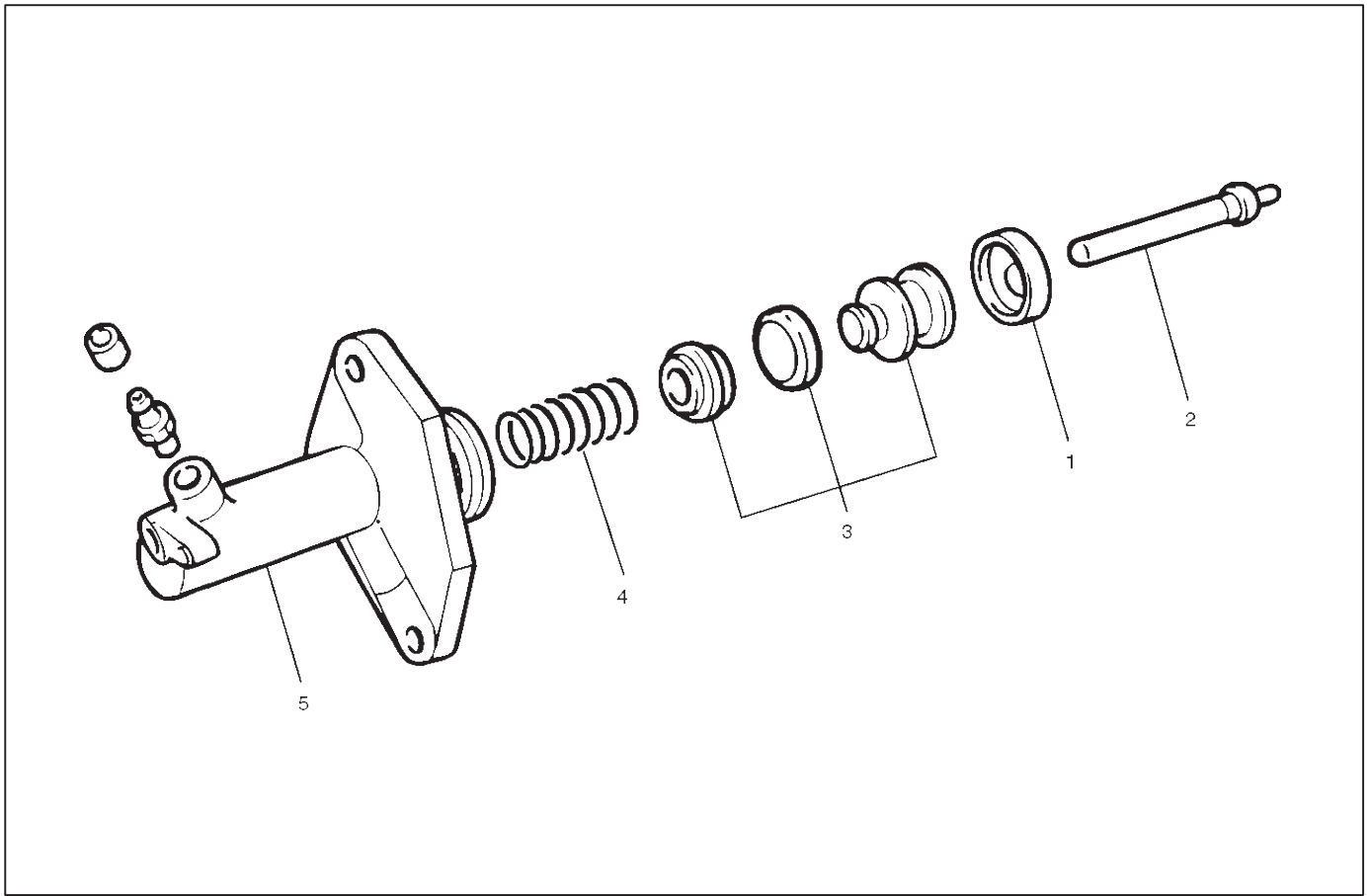


208FX001

NOTE: Disassembling and assembling the master cylinder is not approved.

Slave Cylinder

Disassembled View



206RS002

Legend

- | | |
|--------------|---------------------------|
| (1) Push Rod | (3) Piston and Piston Cup |
| (2) Boot | (4) Spring |
| | (5) Cylinder Body |

Disassembly

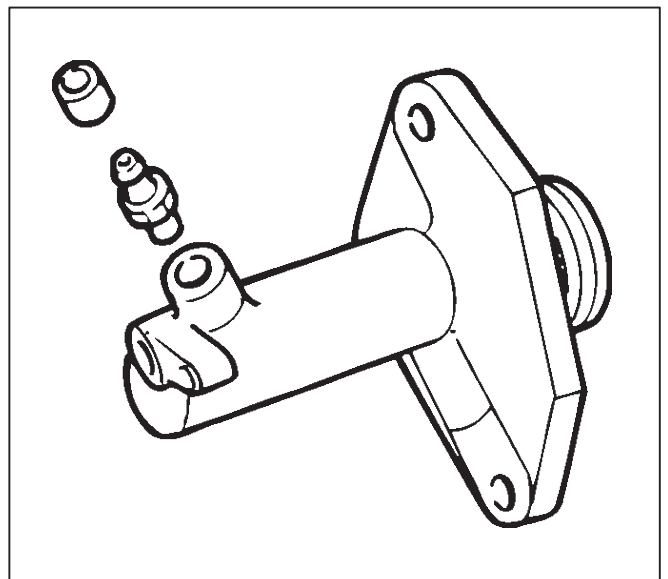
1. Disassemble boot (1), push rod (2), piston and piston cup (3), and spring (4) from cylinder body (5).

Inspection and Repair

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.

Cylinder Body

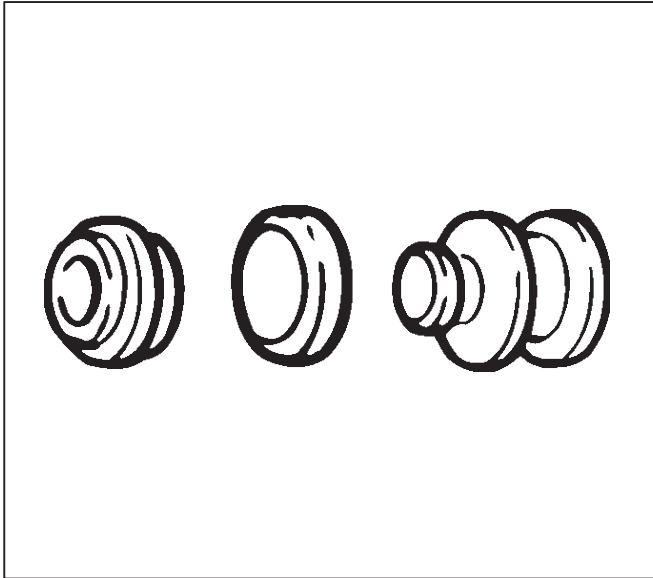
1. Clean the cylinder body.
2. Check the fluid return port for restrictions and clean it if necessary.



206RS003

Piston and Piston Cup

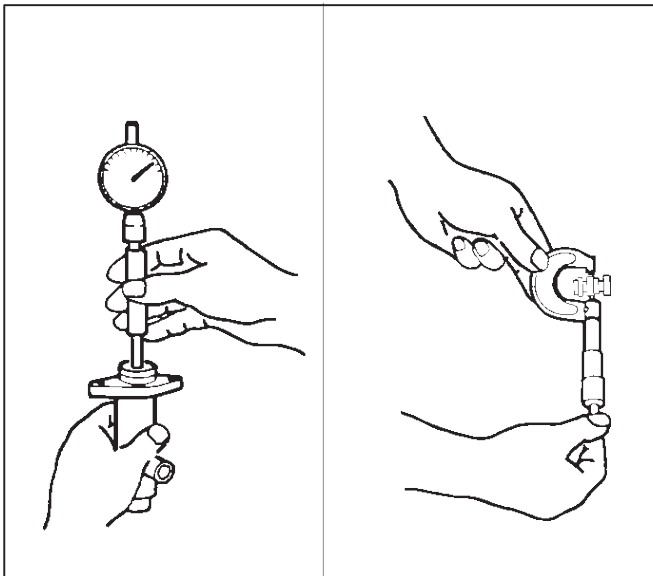
1. Visually inspect the disassembled piston and piston cup for excessive wear and damage.



206RS004

Replace the inner parts with new parts if necessary.

2. Measure the clearance between slave cylinder wall and piston.



206RS005

If the measured value exceeds the specified limit, the slave cylinder assembly must be replaced.

Standard: 0.07 mm (0.0028 in)

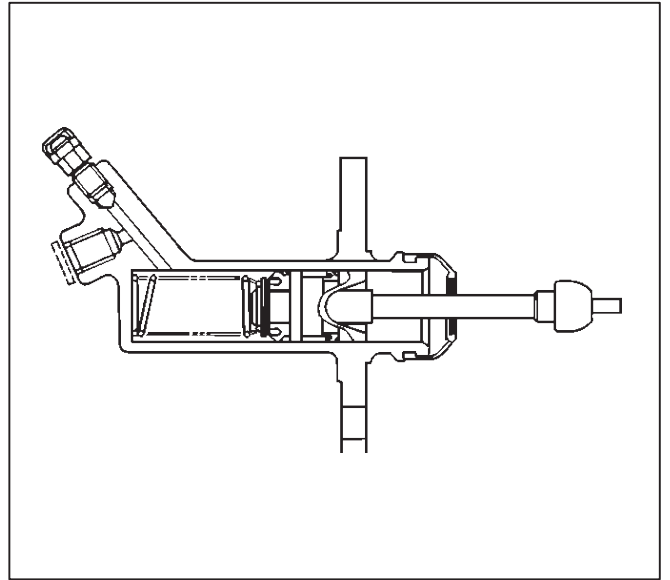
Limit: 0.15 mm (0.0059 in)

Reassembly

To reassemble, follow the disassembly steps in the reverse order, noting the following points:

Piston Assembly

1. Before installing the parts, apply a thin coat of rubber grease.
2. Install cup in groove in piston with the lip turned to the front of cylinder. Use care so as not to scratch the cylinder.



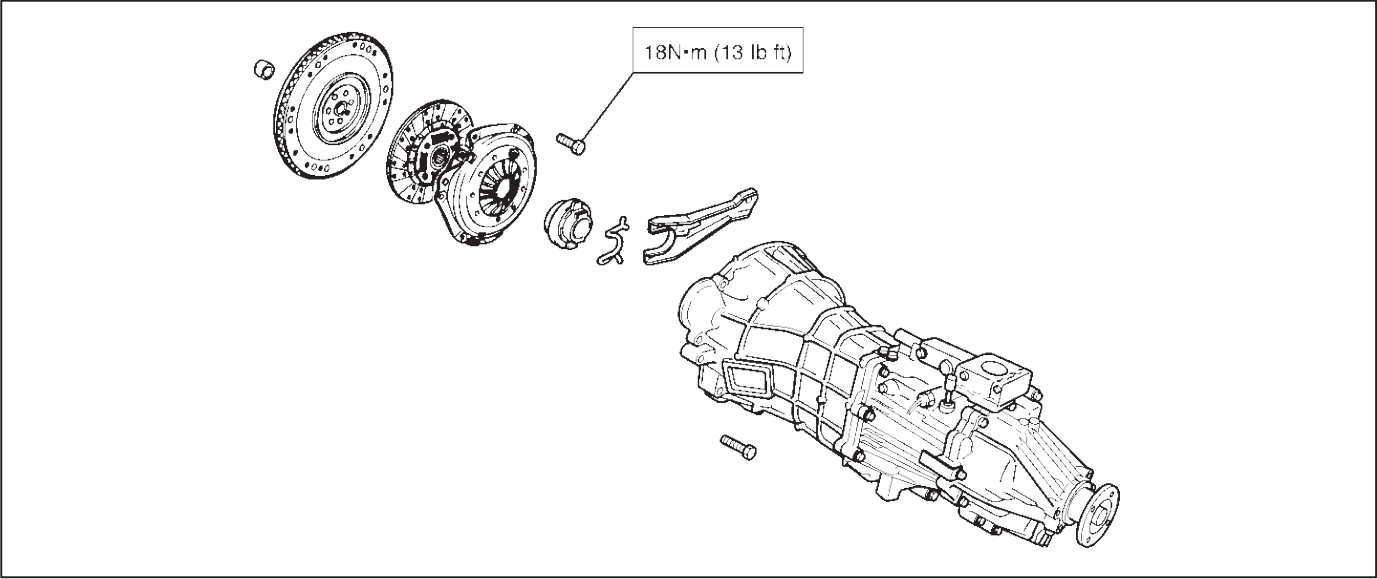
206RS006

7C-30 CLUTCH**Main Data and Specifications****General Specifications**

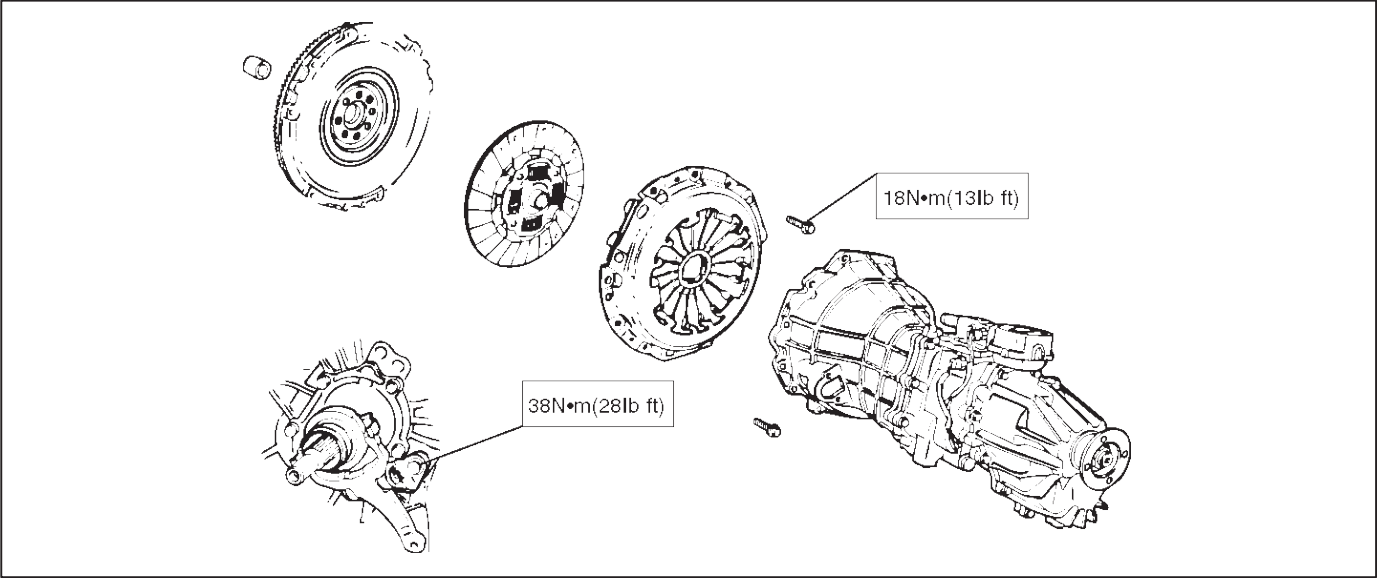
Engine	Y22SE	6VD1
Type	Dry single plate type with diaphragm spring	
Size	240 mm (9.45 in)	260 mm (10.24 in)
Pressure plate		
Outside diameter	299 mm (11.77 in)	332 mm (13.07 in)
Clamping force	5488 N (1235 lb)	7208 N (1621 lb)
Spring finger height	37.5 – 39.5 mm (1.476 – 1.555 in)	49.9 – 51.9 mm (1.965 – 2.043 in)
Driven plate		
Outside diameter × inside diameter	240 × 160 mm (9.45 × 6.30 in)	260 × 170 mm (10.24 × 6.70 in)
Thickness		
Clutch disengaged	7.3 mm (0.287 in)	8.6 mm (0.339 in)
Clutch engaged	7.0 mm (0.276 in)	8.0 mm (0.315 in)
Total friction area	251 × 2 cm ² (39 × 2 in ²)	304 × 2 cm ² (47 × 2 in ²)
Clutch control type	Hydraulic	
Clutch pedal free play	5 – 15 mm (0.20 – 0.59 in)	
Clutch pedal stroke	165.5 – 175.5 mm (6.52 – 6.91 in)	
Clutch pedal height	178 – 188 mm (7.01 – 7.40 in)	

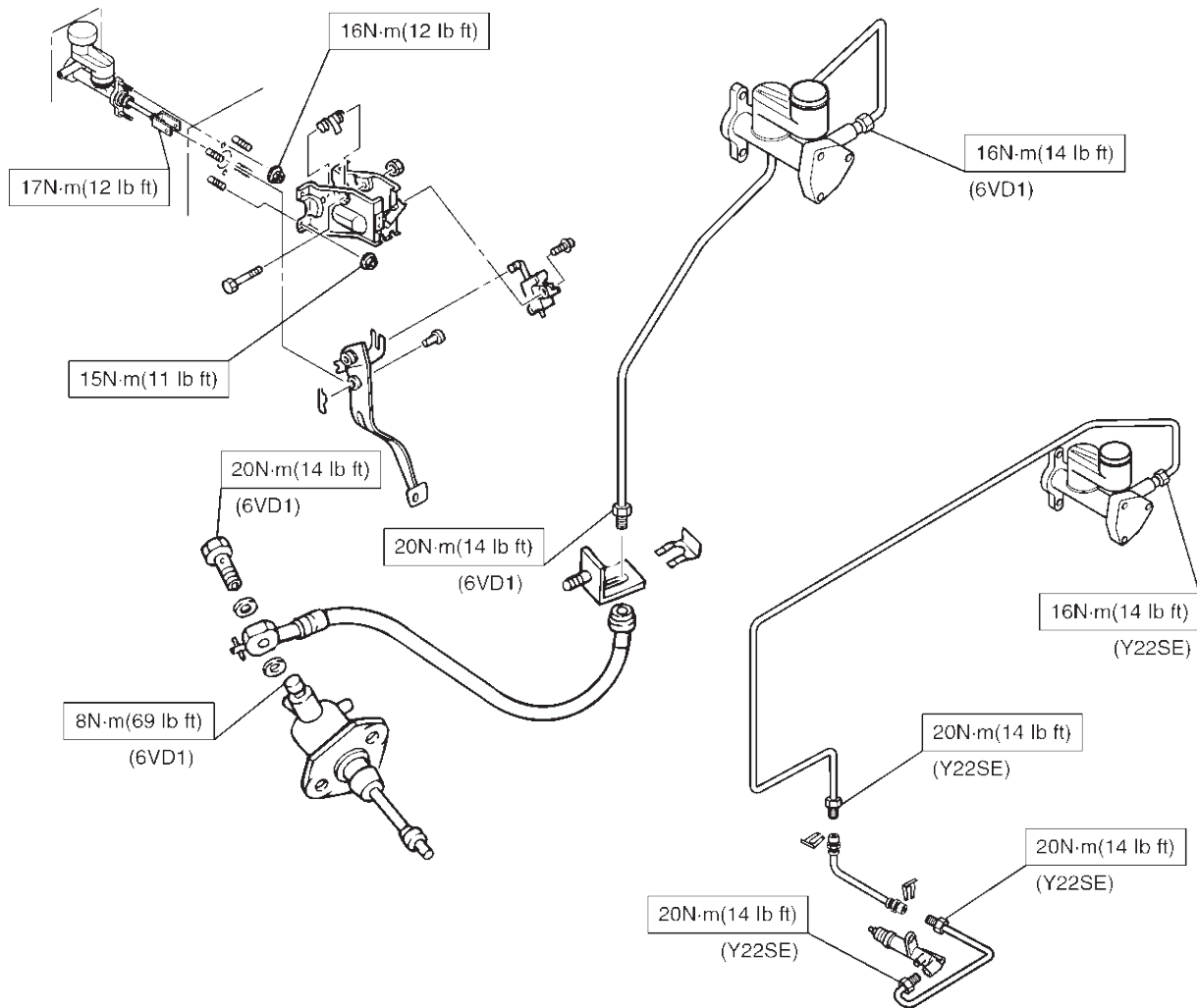
Torque Specifications

Y22SE



6VD1





Special Tools

ILLUSTRATION	PART NO. PART NAME
 901RW150	J-24547 Driven plate aligner (6VD1)
 901RW150	J-42877 Driven plate aligner (X22SE)
 901RT099	J-5822 and J-23907 Pilot bearing remover and Sliding hammer
 901RS214	J-22888 Bearing puller
 901RW151	J-2241-11 Adapter
 901RW152	J-26516-A Crankshaft pilot bearing installer (6VD1)

ILLUSTRATION	PART NO. PART NAME
 901RS241	J-1522 Crankshaft pilot bearing installer (X22SE)
 901RS241	J-8092 Driver handle