

1990 Hyundai Excel

1987-94 AUTOMATIC TRANSMISSIONS KM175, KM176 & KM177 Overhaul

1987-94 AUTOMATIC TRANSMISSIONS

KM175, KM176 & KM177 Overhaul

APPLICATION

TRANSMISSION APPLICATIONS

Model	(1) Labor Times R & I	(2) Labor Times Overhaul	Transaxle
Chrysler			
1989 Colt	3.8	8.9	KM176
1989 Summit	3.8	8.9	KM176
Hyundai			
1989 Sonata	3.8	8.9	KM175
1990-93 Sonata			
4-Cyl.	3.8	8.9	KM175
V6	4.6	8.9	KM177
1990-94 Excel	3.8	8.9	KM176
1991-92 Scoupe	N/A	N/A	KM176
1992 Elantra	3.8	8.9	KM176
1993-94 Elantra	3.8	8.9	KM175
1994 Sonata			
4-Cyl.	3.8	8.9	KM175
V6	4.6	8.9	KM177
Mitsubishi			
1987 Galant	N/A	N/A	KM175
1989 Galant	N/A	N/A	KM177
1989 Galant	N/A	N/A	KM175
1989 Sigma	N/A	N/A	KM175
1990-94 Precis	4.6	8.9	KM176
(1) Removal and installation of transmission from vehicle chassis			
(2) Bench overhaul time for transmission and differential. DOES NOT include removal and installation.			

IDENTIFICATION

Transaxle identification number may be stamped on transaxle housing. See **Fig. 1** . Transaxle identification number may be required when ordering replacement components.

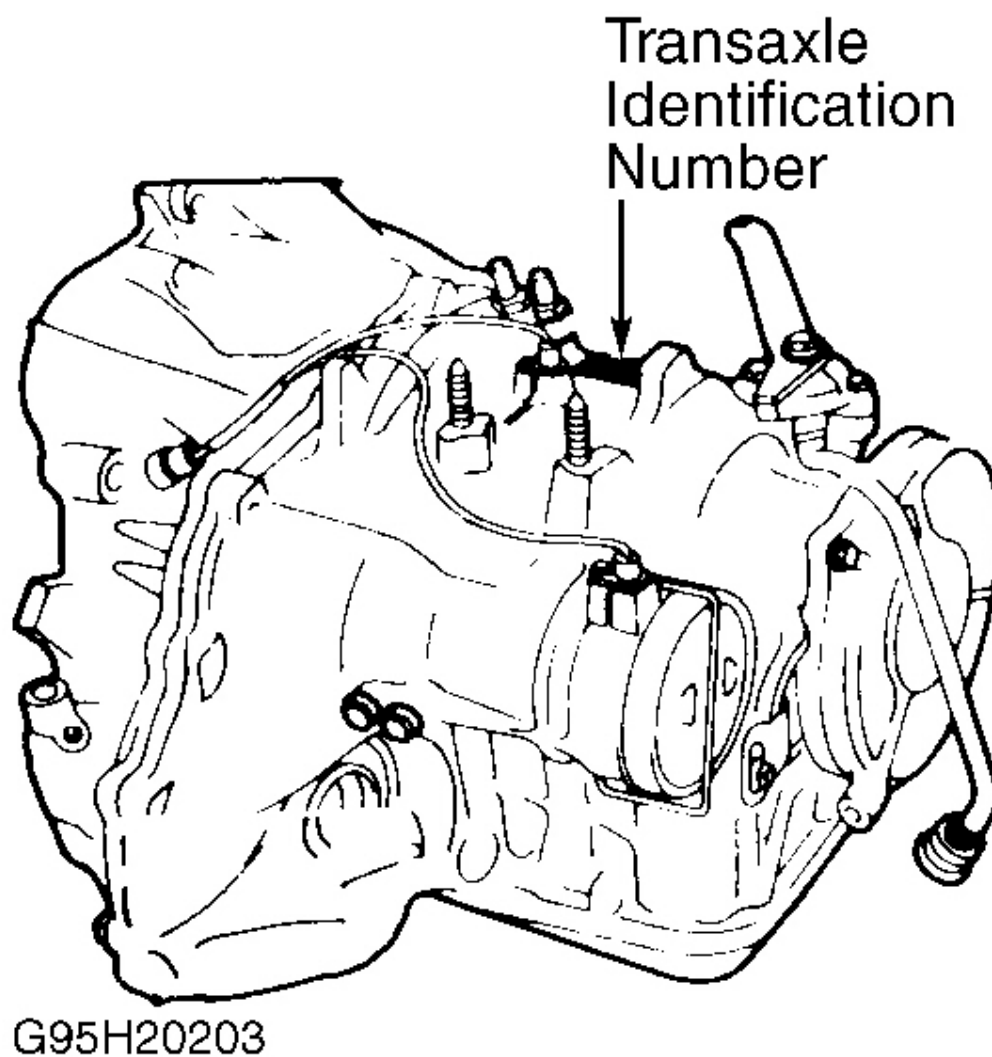


Fig. 1: Locating Transaxle Identification Number
Courtesy of HYUNDAI MOTOR CO.

DESCRIPTION

Automatic transaxle is electronically controlled and has 4 forward speeds and one reverse speed. Transaxle shifting is controlled by Transmission Control Module (TCM). On KM175 and KM176 models, damper clutch lock-up (torque converter lock-up) are controlled by Transmission Control Module (TCM). On KM177 models, damper clutch is not used.

On all models, electronic control system contains a fail-safe system in the event that an electronic component should malfunction. Fail-safe system will provide transaxle operation until malfunction is repaired. If failures exists in certain electronic components for a repeated number of times, transaxle may lock-up and remain in 2nd or 3rd gear. For more information about the fail-safe system, refer to the **AUTO TRANS DIAGNOSIS - KM175, KM176 & KM177** article in the AUTO TRANS DIAGNOSIS section.

OPERATION

Shift lever has 6 positions. When shift lever is moved, manual valve on valve body is moved. Shift lever also changes position of transaxle range switch, mounted on transaxle. Transaxle range switch delivers an input signal to TCM to indicate shift lever position.

The TCM controls transaxle shift points and hydraulic pressure to various friction elements. The TCM calculates proper shift points from input devices and transmits electrical signal to appropriate Shift Control Solenoid Valves (SCSV) and Pressure Control Solenoid Valve (PCSV), mounted on valve body assembly to control transaxle shifting. On KM175 and KM176 models, TCM controls damper clutch (torque converter lock-up) by operating Damper Clutch Control Solenoid Valve (DCCSV), located on valve body assembly.

On all models, an overdrive switch is mounted on shift lever. When overdrive switch is depressed to the ON position, transaxle will automatically upshift to overdrive and overdrive off indicator light on instrument panel will be off.

When overdrive switch is released to the OFF position, transaxle will not upshift to overdrive and overdrive off indicator light on instrument panel will come on.

A range switch is located on console, near shift lever. On 1993 Elantra models and 1993-94 Sonata models, range switch contains a PWR (power) mode and NORM (normal) mode. When range switch is depressed to PWR (power) mode, an input signal is delivered to TCM, and TCM changes shift points to provide maximum performance. When range switch is released to the NORM (normal) mode, an input signal is delivered to TCM, and TCM changes shift points to provide maximum fuel economy. When engine coolant temperature is less than 68°F (20°C), transaxle will remain in NORM (normal) mode even if range switch is in PWR (power) mode. When range switch is in NORM (normal) mode and vehicle speed exceeds 60 MPH, transaxle will not downshift when accelerator pedal is depressed. Range switch must be in PWR (power) mode for transaxle to downshift.

On all other models, range switch contains a ECON (economy) mode and NORM (normal) mode. When range switch is depressed to the NORM (normal) mode, an input signal is delivered to TCM, and TCM changes shift points to provide maximum performance. When range switch is released to the ECON (economy) mode, an input signal is delivered to TCM, and TCM changes shift points to provide maximum fuel economy. When engine coolant temperature is less than 68°F (20°C), transaxle will remain in ECON (economy) mode even if range switch is in NORM (normal) mode. When range switch is in ECON (economy) mode and vehicle speed exceeds 60 MPH, transaxle will not downshift when accelerator pedal is depressed. Range switch must be in NORM (normal) mode for transaxle to downshift.

On all models, TCM contains self-diagnostic system, which stores fault code if failure or problem exists in transaxle electronic control system. Fault codes may be retrieved to determine transaxle problem area. Fault code may be referred to as Diagnostic Trouble Code (DTC). For information on electronic transaxle components, refer to the **AUTO TRANS DIAGNOSIS - KM175, KM176 & KM177** article in the AUTO

TRANS DIAGNOSIS section.

Transaxle is equipped with shift and key interlock systems. Shift interlock system prevents shift lever from being moved from Park position unless brake pedal is depressed, ignition is on and release button on side of shift lever is depressed. In case of a malfunction, shift lever can be released by depressing release button.

On Elantra, Excel and Precis models, release button is located on front corner of console, near driver's side of shift lever on 1993 models. On 1994 models, release button is located below small cap on front corner of console, near driver's side of shift lever.

On Sonata models, release button is located on front corner of console, near driver's side of shift lever.

On all models, key interlock system prevents ignition key from being turned to LOCK position unless shift lever is in Park position. For additional information on shift and key interlock systems, see the **AUTO TRANS DIAGNOSIS - KM175, KM176 & KM177** article in the AUTO TRANS DIAGNOSIS section.

LUBRICATION & ADJUSTMENTS

See the appropriate TRANSMISSION SERVICING - A/T article in TRANSMISSION SERVICING section. Refer to the following menu:

- 1987-89 Galant, see: TRANSMISSION SERVICING - A/T
- 1989 Colt, see: TRANSMISSION SERVICING - A/T
- 1989 Sigma, see: TRANSMISSION SERVICING - A/T
- 1989 Summit, see: TRANSMISSION SERVICING - A/T
- 1990-94 Precis, see: TRANSMISSION SERVICING - A/T
- 1989-94 Sonata, see: **TRANSMISSION SERVICING - A/T**
- 1990-94 Excel, see: **TRANSMISSION SERVICING - A/T**
- 1991-92 Scoupe, see: **TRANSMISSION SERVICING - A/T**
- 1992-94 Elantra, see: **TRANSMISSION SERVICING - A/T**

ON-VEHICLE SERVICE

AXLE SHAFTS

See appropriate AXLE SHAFTS - FRONT article in the DRIVE AXLES section. Refer to the following menu:

- 1987-89 Galant: AXLE SHAFTS - FRONT
- 1989 Colt: AXLE SHAFTS - FRONT
- 1989 Sigma: AXLE SHAFTS - FRONT
- 1989 Summit: AXLE SHAFTS - FRONT
- 1990-94 Precis: AXLE SHAFTS - FRONT
- 1989-94 Sonata: **AXLE SHAFTS - FRONT**

- 1990-94 Excel: **AXLE SHAFTS - FRONT**
- 1991-92 Scoupe: **AXLE SHAFTS - FRONT**
- 1992-94 Elantra: **AXLE SHAFTS - FRONT**

LINE PRESSURE ADJUSTMENT

1. Remove valve body assembly. See **VALVE BODY ASSEMBLY R & I** under REMOVAL & INSTALLATION.
2. Rotate line pressure adjusting screw at regulator valve on valve body assembly to adjust line pressure. See **Fig. 2**.
3. Rotating line pressure adjusting screw clockwise one revolution decreases line pressure approximately 5.5 psi (.39 kg/cm²). Rotating line pressure adjusting screw counterclockwise one revolution increases line pressure approximately 5.5 psi (.39 kg/cm²). Standard line pressure is 126.5-129.4 psi (8.90-9.10 kg/cm²).
4. Install valve body assembly using proper procedure. See **VALVE BODY ASSEMBLY R & I** under REMOVAL & INSTALLATION. Fill transaxle with Mopar Plus-Type 7176 ATF. Recheck line pressure and adjust (if necessary).

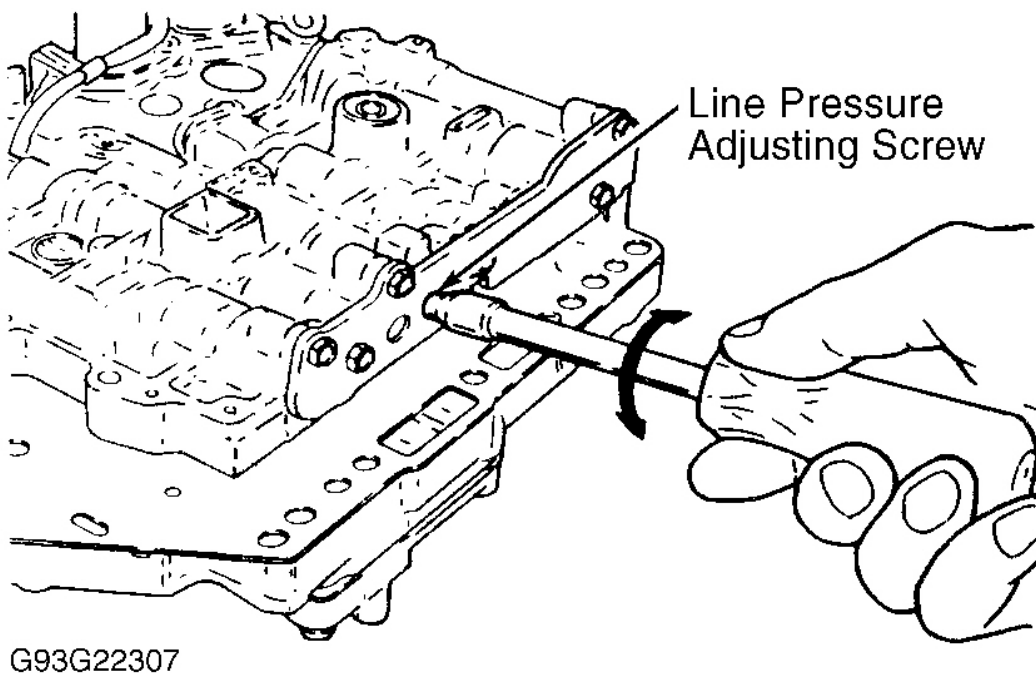


Fig. 2: Identifying Line Pressure Adjusting Screw
Courtesy of HYUNDAI MOTOR CO.

REDUCING PRESSURE ADJUSTMENT

1. Valve body assembly removal is not required for reducing pressure adjustment. Drain transaxle fluid. Remove bolts, oil pan, gasket and oil filter.

CAUTION: Note location of oil filter bolts, as bolts must be installed in correct location to prevent damaging lower valve body.

2. Rotate reducing pressure adjusting screw on valve body assembly to adjust reducing pressure. See **Fig. 3**.
3. Rotating reducing pressure adjusting screw clockwise one revolution decreases reducing pressure approximately 4.3 psi (.3 kg/cm²). Rotating reducing pressure adjusting screw counterclockwise one revolution increases reducing pressure approximately 4.3 psi (.3 kg/cm²). Standard reducing pressure is 59.7-62.5 psi (4.20-4.40 kg/cm²).
4. Install oil filter. Tighten oil filter bolts to specification. Using NEW gasket, install oil pan. Install and tighten oil pan bolts to specification.
5. Fill transaxle with Mopar Plus-Type 7176 ATF. Recheck reducing pressure and adjust (if necessary).

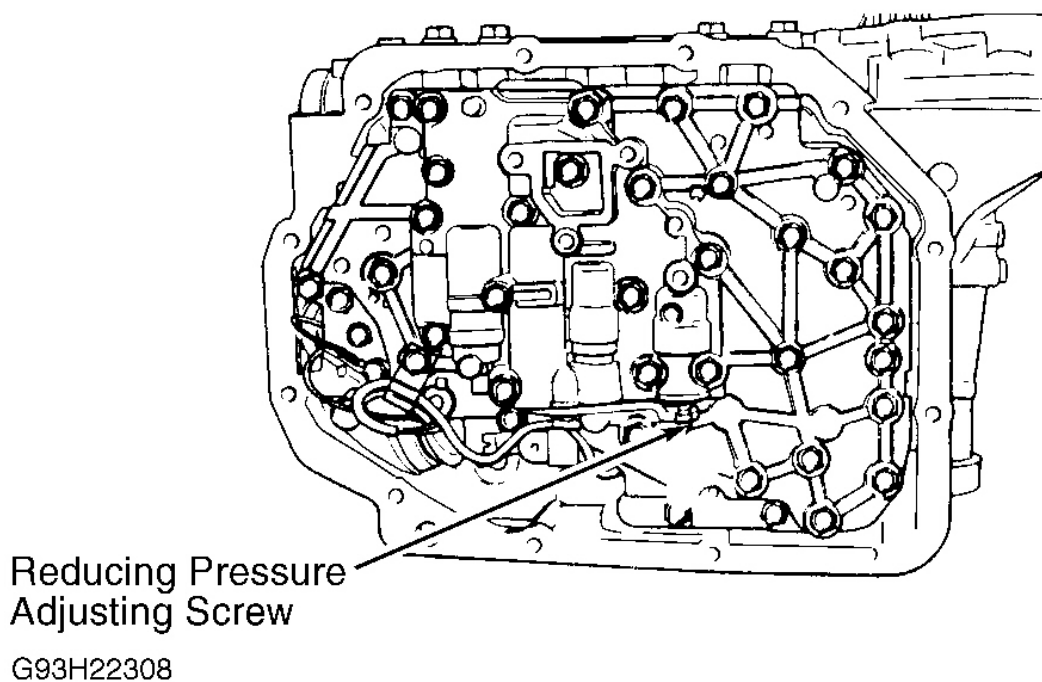


Fig. 3: Identifying Reducing Pressure Adjusting Screw
Courtesy of HYUNDAI MOTOR CO.

KICKDOWN SERVO ADJUSTMENT

1. Ensure area around kickdown servo area on side of transaxle is clean. See **Fig. 4**. Remove snap ring and

kickdown servo switch.

2. Loosen kickdown servo lock nut on kickdown servo adjusting screw. Using Kickdown Servo Socket "A" (09454-33101A), hold kickdown servo piston from rotating. See **Fig. 4**.
3. Using INCH-lb. torque wrench and Kickdown Servo Socket "B" (09454-33101B), tighten kickdown servo adjusting screw to 89 INCH. lbs. (10.0 N.m).
4. Loosen kickdown servo adjusting screw 2 full turns. Tighten kickdown servo adjusting screw to 44 INCH lbs. (5.0 N.m).
5. Loosen kickdown servo adjusting screw 2 - 2 1/4 turns. Hold kickdown servo piston and adjusting screw from rotating. Tighten kickdown servo lock nut to specification. See **TORQUE SPECIFICATIONS**. Using NEW "O" ring, install kickdown servo switch and snap ring.

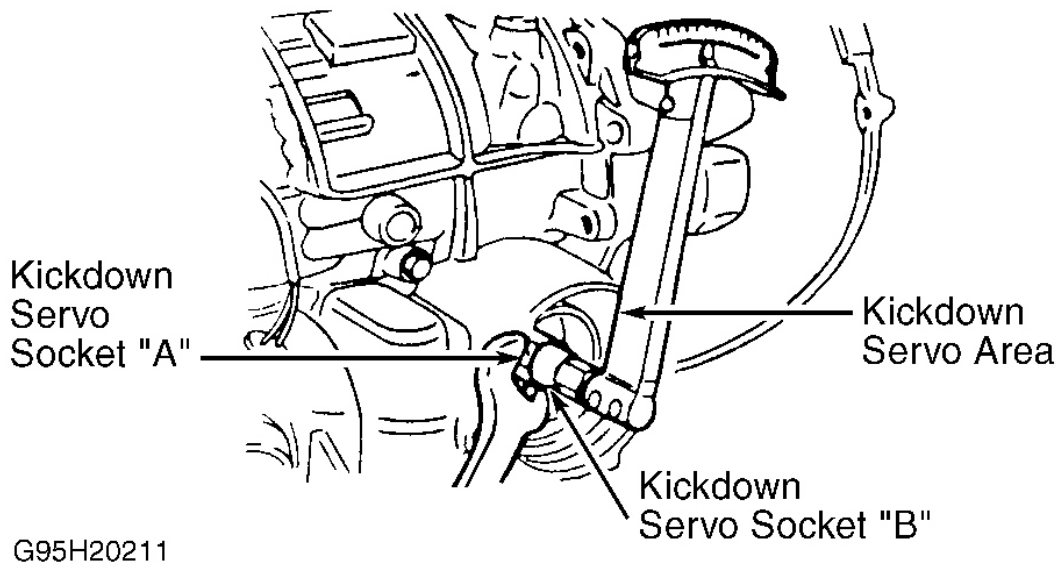


Fig. 4: Identifying & Adjusting Kickdown Servo
Courtesy of HYUNDAI MOTOR CO.

VALVE BODY ASSEMBLY

The valve body assembly may be serviced on the vehicle. Refer to **VALVE BODY ASSEMBLY R & I** under REMOVAL & INSTALLATION.

TROUBLE SHOOTING

TRANSAXLE ELECTRONIC CONTROL SYSTEM

See the **AUTO TRANS DIAGNOSIS - KM175, KM176 & KM177** article in the AUTO TRANS DIAGNOSIS section.

SYMPTOM DIAGNOSIS

Transaxle malfunctions may be caused by poor engine performance, improper adjustments or failure of hydraulic, mechanical or electronic components. Always begin by checking fluid level, fluid condition and cable adjustments. Perform road test to determine if problem has been corrected. If problem still exists, perform several tests on transaxle. See **TESTING** .

Damper Clutch Inoperative (Except KM177)

- Defective Accelerator Switch Or Improper Switch Adjustment
- Defective Damper Clutch Control Solenoid Valve Or Wiring
- Defective Ignition System Engine RPM Signal
- Defective Oil Temperature Sensor
- Defective Pulse Generator "A", "B" Or Wiring
- Defective TCM
- Defective Throttle Position Sensor Or Improper Adjustment
- Defective Torque Converter
- Malfunction In Valve Body Assembly

Engine Stalls With Transaxle In Neutral, Drive Or Reverse

- Incorrect Idle Speed
- Defective Damper Clutch Control Solenoid

Valve Or Wiring (Except KM177)

- Poor Engine Performance
- Malfunction In Valve Body Assembly

Excessive Vibration & Shock During All Upshifts

- Defective Front Clutch Or Piston
- Defective Ignition System Engine RPM Signal
- Defective Pulse Generator "A" Or Wiring
- Defective TCM
- Defective Throttle Position Sensor Or Improper Adjustment
- Malfunction In Valve Body Assembly
- Poor Engine Performance

Excessive Vibration & Shock During 1-2 Or 3-4 Upshift

- Defective End Clutch Or Piston
- Defective Ignition System Engine RPM Signal

- Defective Kickdown Band Or Kickdown Servo
- Defective Kickdown Servo Switch
- Defective Pulse Generator "A" Or Wiring
- Defective TCM
- Defective Throttle Position Sensor Or Improper Adjustment
- Improper Kickdown Servo Adjustment
- Malfunction In Valve Body Assembly
- Poor Engine Performance

Excess Vibration & Shock During 2-3 Upshift Or 4-3 Downshift

- Defective Front Clutch Or Piston
- Defective Ignition System Engine RPM Signal
- Defective Pulse Generator "A" Or Wiring
- Defective TCM
- Defective Throttle Position Sensor Or Improper Adjustment
- Malfunction In Valve Body Assembly
- Poor Engine Performance

Excess Vibration & Shock When Shifting From Drive To 2nd Gear Position

- Defective Ignition System Engine RPM Signal
- Defective Low-Reverse Brake Or Piston
- Defective Pulse Generator "A" Or Wiring
- Defective TCM
- Defective Throttle Position Sensor Or Improper Adjustment
- Malfunction In Valve Body Assembly
- Poor Engine Performance

Excess Vibration & Shock When Shifting Into Any Forward Gear Or Reverse

- Defective Accelerator Switch Or Improper Switch Adjustment
- Defective Front Clutch, Rear Clutch Or Piston
- Defective Low-Reverse Brake Or Piston
- Defective Or Improperly Adjusted Shift Cable
- Defective TCM
- Defective Throttle Position Sensor Or Improper Adjustment
- Defective Wiring, Transaxle Range Switch Or Switch Adjustment
- Incorrect Idle Speed
- Malfunction In Valve Body Assembly

Improper Shift Speeds

- Defective Pulse Generator "B" Or Wiring
- Defective TCM
- Defective Throttle Position Sensor Or Improper Adjustment
- Malfunction In Valve Body Assembly

Slips In Drive

- Defective Oil Pump
- Defective Or Improperly Adjusted Shift Cable
- Defective Overrunning Clutch
- Defective Pressure Control Solenoid Valve Or Wiring
- Defective Rear Clutch Or Piston
- Low Fluid Level
- Low Line Pressure
- Malfunction In Valve Body Assembly

Slips In Reverse

- Defective Front Clutch Or Piston
- Defective Front Clutch Retainer
- Defective Low-Reverse Brake Or Piston
- Defective Oil Pump
- Defective Or Improperly Adjusted Shift Cable
- Defective Pressure Control Solenoid Valve Or Wiring
- Low Fluid Level
- Low Line Pressure
- Malfunction In Valve Body Assembly
- "O" Ring Missing Between Valve Body Assembly & Transaxle Housing

Sudden Engine RPM Increase During Upshift

- Defective End Clutch Or Piston
- Defective Front Clutch Or Piston
- Defective Front Clutch Retainer
- Defective Ignition System Engine RPM Signal
- Defective Kickdown Band Or Kickdown Servo
- Defective Pressure Control Solenoid Valve Or Wiring
- Defective Pulse Generator "A" Or Wiring
- Defective Throttle Position Sensor Or Improper Adjustment

- Defective TCM
- Improper Kickdown Servo Adjustment
- Low Line Pressure
- Malfunction In Valve Body Assembly

Sudden Engine RPM Increase & Vibration During 3-2 Downshift

- Defective Front Clutch Retainer
- Defective Ignition System Engine RPM Signal
- Defective Kickdown Band Or Kickdown Servo
- Defective Kickdown Servo Switch
- Defective Oil Pump
- Defective Pressure Control Solenoid Valve Or Wiring
- Defective Pulse Generator "A" Or Wiring
- Defective TCM
- Defective Throttle Position Sensor Or Improper Adjustment
- Improper Kickdown Servo Adjustment
- Low Fluid Level
- Low Line Pressure
- Malfunction In Valve Body Assembly

Vehicle Moves In Park Or Neutral

- Defective Or Improperly Adjusted Shift Cable
- Defective Parking Mechanism
- Malfunction In Valve Body Assembly
- Defective Wiring, Transaxle Range Switch Or Switch Adjustment

Vehicle Starts Off Other Than 1st Gear

- Defective Accelerator Switch Or Improper Switch Adjustment
- Defective Or Improperly Adjusted Shift Cable
- Defective TCM
- Defective Wiring, Transaxle Range Switch Or Switch Adjustment
- Malfunction In Valve Body Assembly

Vehicle Will Not Move

- Defective Low-Reverse Brake Or Piston
- Defective Oil Pump
- Defective Or Improperly Adjusted Shift Cable

- Defective Pressure Control Solenoid Valve Or Wiring
- Defective Torque Converter
- Low Fluid Level
- Low Line Pressure
- Malfunction In Valve Body Assembly

Vehicle Will Not Move In Any Forward Gear

- Defective Oil Pump
- Defective Overrunning Clutch
- Defective Or Improperly Adjusted Shift Cable
- Defective Pressure Control Solenoid Valve Or Wiring
- Defective Rear Clutch Or Piston
- Defective Torque Converter
- Low Fluid Level
- Low Line Pressure
- Malfunction In Valve Body Assembly

Vehicle Will Not Move In Reverse

- Defective Front Clutch Or Piston
- Defective Front Clutch Retainer
- Defective Low-Reverse Brake Or Piston
- Defective Oil Pump
- Defective Or Improperly Adjusted Shift Cable
- Defective Pressure Control Solenoid Valve Or Wiring
- Defective Pulse Generator "B" Or Wiring
- Defective Torque Converter
- Low Fluid Level
- Low Line Pressure
- Malfunction In Valve Body Assembly
- "O" Ring Missing Between Valve Body Assembly & Transaxle Housing

Will Not Shift Into 4th Gear

- Defective End Clutch Or Piston
- Defective Front Clutch Retainer
- Defective Overdrive Switch
- Defective Pressure Control Solenoid Valve Or Wiring
- Defective TCM

- Defective Wiring, Transaxle Range Switch Or Switch Adjustment

Will Not Upshift From 2nd To 3rd Gear

- Defective Front Clutch Or Piston
- Defective Front Clutch Retainer
- Defective Pressure Control Solenoid Valve Or Wiring
- Defective TCM
- Malfunction In Valve Body Assembly

TESTING

ROAD TEST

1. Before road testing vehicle, ensure transaxle fluid level, fluid condition and shift cable adjustments have been checked and corrected (as necessary).
2. Road test vehicle and check for abnormal noise and clutch slippage. Specified clutch and brake are applied in designated gear. See **CLUTCH & BRAKE APPLICATION**.
3. Ensure upshift and downshift speeds are correct in relation to throttle opening, vehicle speed and position of range switch and overdrive switch. See **Fig. 5 -Fig. 6**. Range switch is located on console, near shift lever. Overdrive switch is mounted on shift lever.
4. Various test procedures given can be used to detect any slipping component and confirm proper operation of good components. Malfunction may be caused by leaking hydraulic circuits or sticking valves.
5. More testing is needed if the actual cause of a malfunction cannot be easily determined. Unless an obvious malfunction exists, **DO NOT** disassemble transaxle until hydraulic pressure tests have been performed.

CLUTCH & BRAKE APPLICATION

Shift Lever Position	(1) Elements In Use
"D" (Drive)	
1st Gear	Overrunning Clutch & Rear Clutch
2nd Gear	Kickdown Brake & Rear Clutch
3rd Gear	End Clutch, Front Clutch & Rear Clutch
4th Gear	End Clutch & Kickdown Brake
"2" (2nd Gear)	
1st Gear	Overrunning Clutch & Rear Clutch
2nd Gear	Kickdown Brake & Rear Clutch

1990 Hyundai Excel

1987-94 AUTOMATIC TRANSMISSIONS KM175, KM176 & KM177 Overhaul

"L" (Low) 1st Gear	Low-Reverse Brake & Rear Clutch
"R" (Reverse)	Front Clutch & Low-Reverse Brake
"N" (Neutral)	All Clutches & Brakes Released Or Ineffective
"P" (Park)	All Clutches & Brakes Released Or Ineffective

(1) Kickdown brake is the kickdown band.

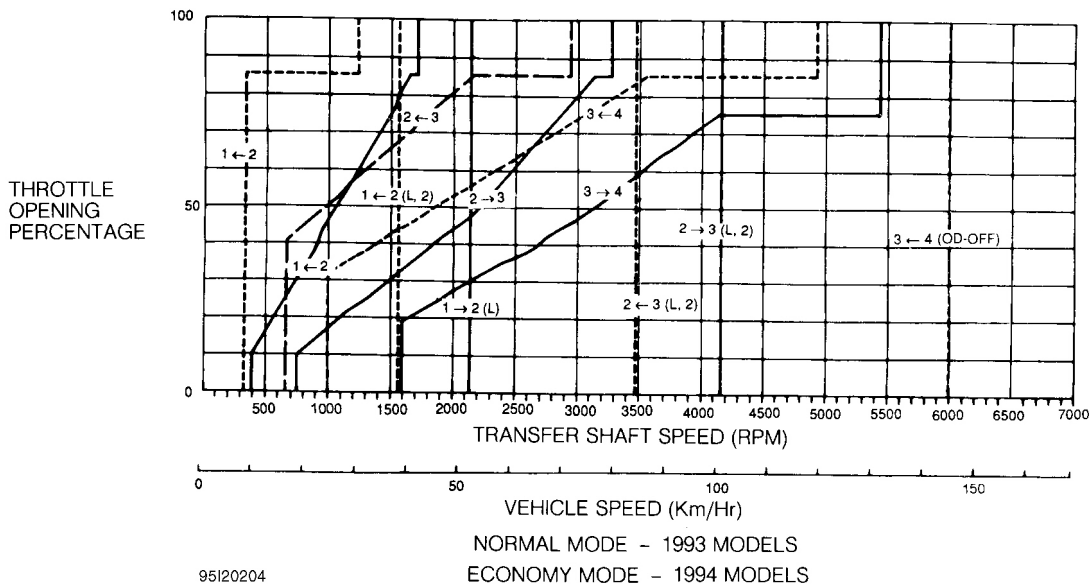
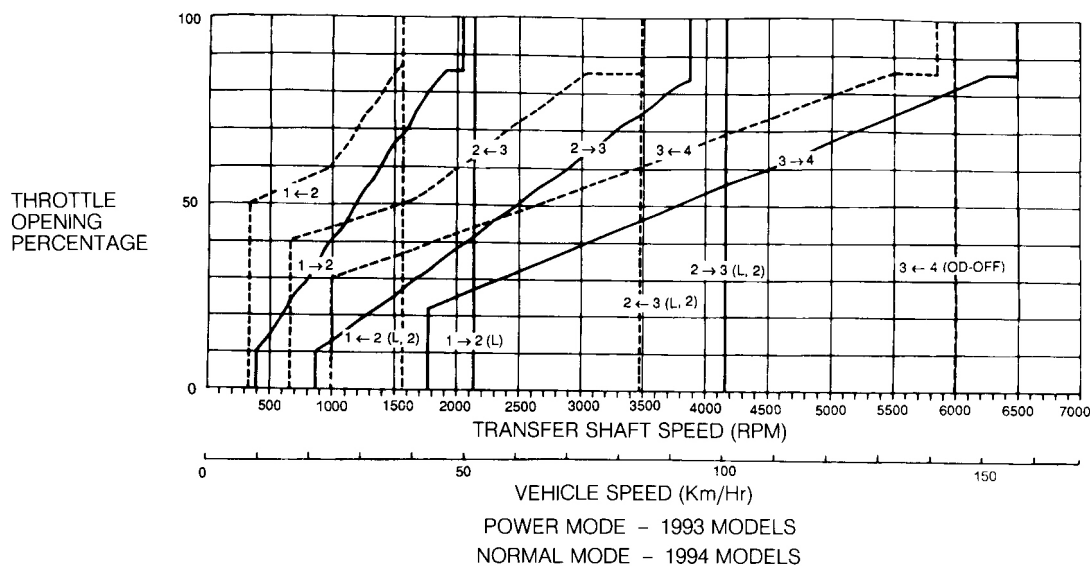
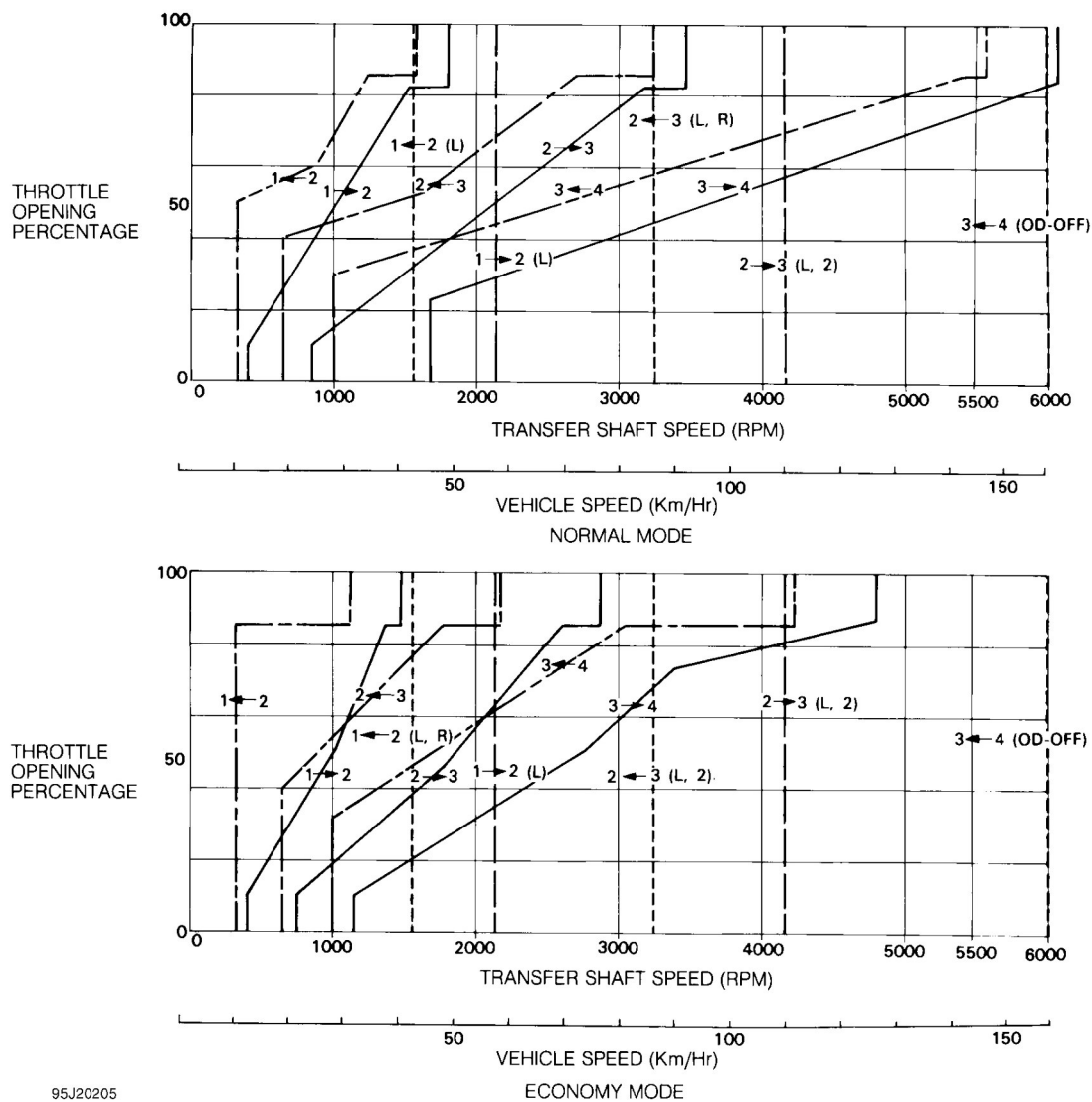


Fig. 5: Upshift & Downshift Speeds (Elantra)

1990 Hyundai Excel

1987-94 AUTOMATIC TRANSMISSIONS KM175, KM176 & KM177 Overhaul

Courtesy of HYUNDAI MOTOR CO.



95J20205

Fig. 6: Upshift & Downshift Speeds (1990-93 Excel & 1990-93 Precis)
Courtesy of HYUNDAI MOTOR CO.

1990 Hyundai Excel

1987-94 AUTOMATIC TRANSMISSIONS KM175, KM176 & KM177 Overhaul

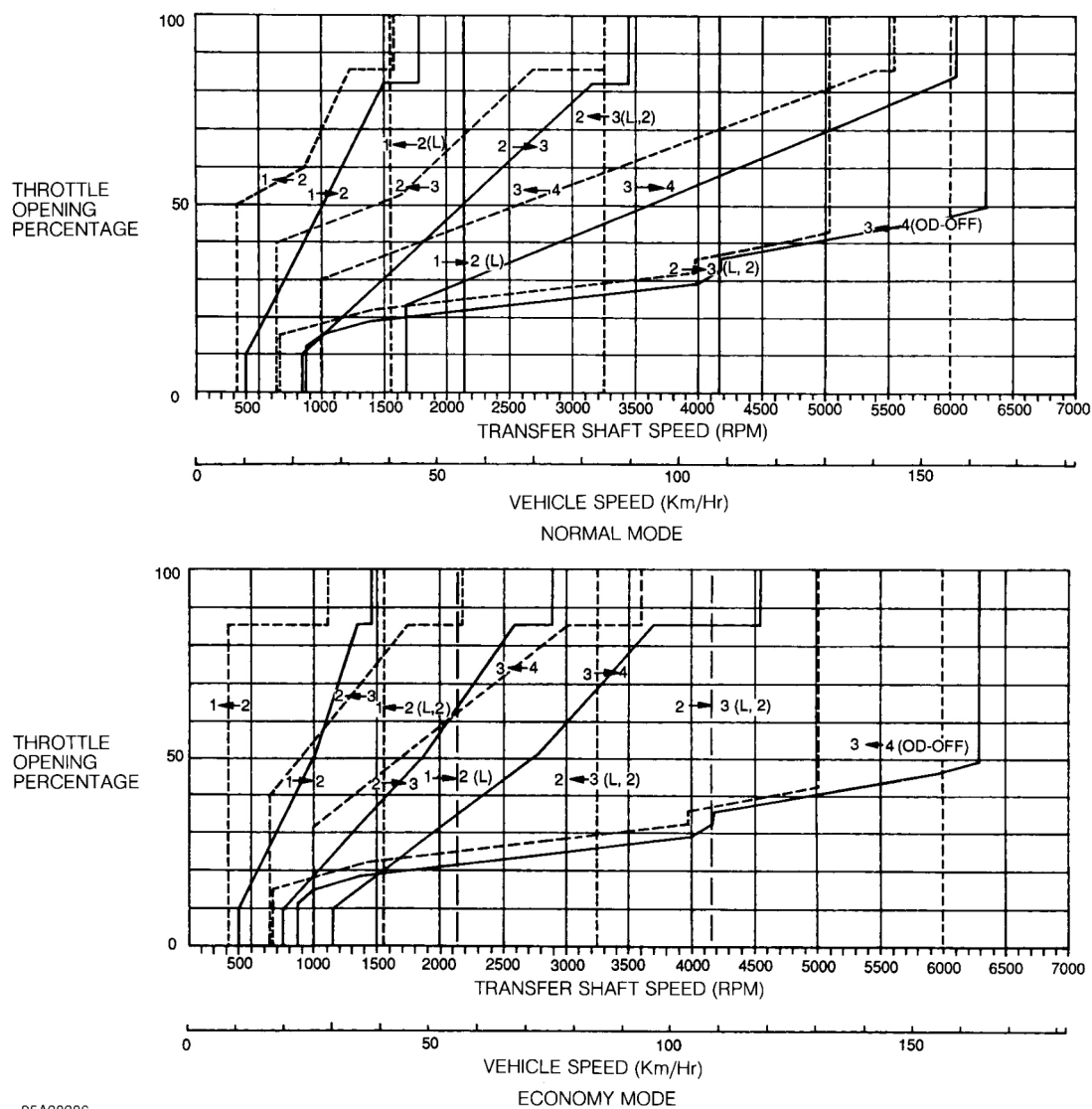
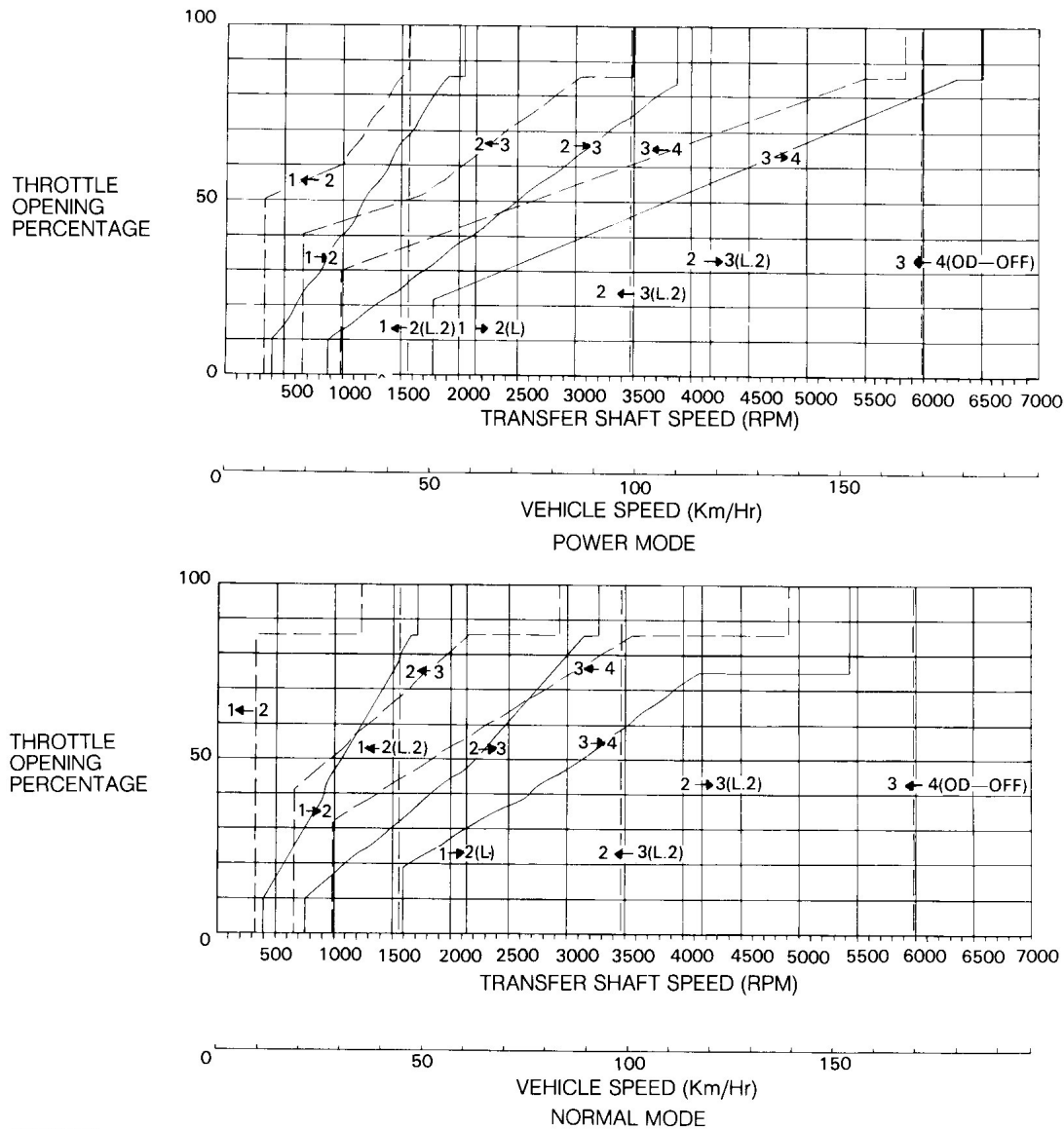


Fig. 7: Upshift & Downshift Speeds (1994 Excel & 1994 Precis)
Courtesy of HYUNDAI MOTOR CO.

1990 Hyundai Excel

1987-94 AUTOMATIC TRANSMISSIONS KM175, KM176 & KM177 Overhaul



G95B20207

Fig. 8: Upshift & Downshift Speeds (1989-94 Sonata W/4-Cylinder & KM175 Transaxle)
 Courtesy of HYUNDAI MOTOR CO.

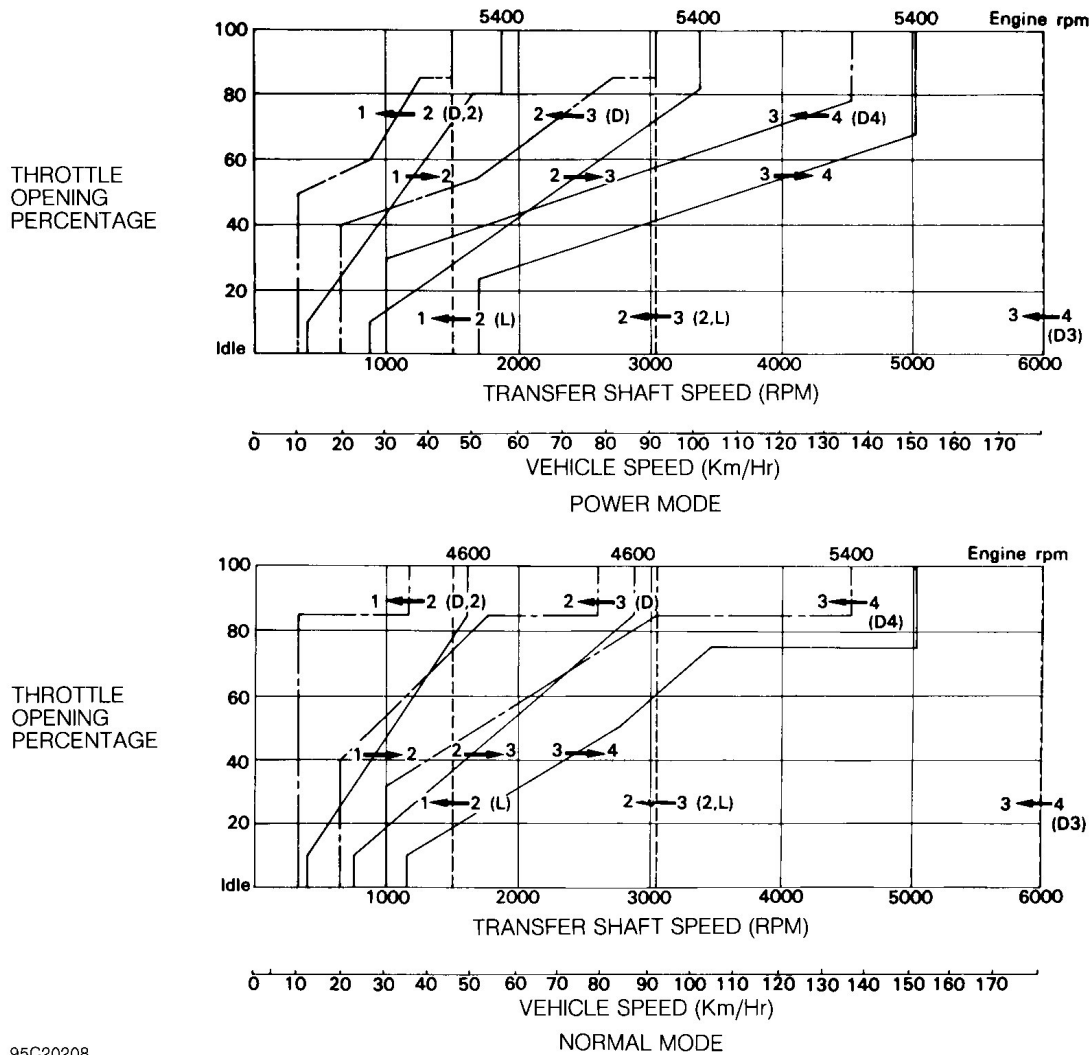


Fig. 9: Upshift & Downshift Speeds (1990-94 Sonata W/V6 & KM177 Transaxle)
Courtesy of HYUNDAI MOTOR CO.

TORQUE CONVERTER STALL SPEED TEST

CAUTION: DO NOT perform torque converter stall speed test for more than 5 seconds or transaxle may be damaged. If performing more than one torque converter stall speed test, place shift lever in "N" position. Operate engine at 1000 RPM for at least 2 minutes to cool transaxle before performing next test.

1. Apply parking brake. Block all wheels. Connect tachometer and start engine. Warm engine to normal operating temperature. Ensure transaxle fluid level is correct.
2. Place shift lever in "D" position. Fully depress brake pedal. Fully depress accelerator for no more than 5 seconds and note maximum engine speed. This is the torque converter stall speed.

1990 Hyundai Excel

1987-94 AUTOMATIC TRANSMISSIONS KM175, KM176 & KM177 Overhaul

3. Place shift lever in "N" position. Operate engine at 1000 RPM for at least 2 minutes to cool transaxle. Repeat test procedure with shift lever in "R" position.
4. Ensure torque converter stall speed is within specification. See **TORQUE CONVERTER STALL SPEED SPECIFICATIONS**.
5. If torque converter stall speed is not within specification, see **TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING**.
6. If torque converter stall speed exceeds specification, perform hydraulic pressure tests on transaxle. See **HYDRAULIC PRESSURE TEST** under TESTING.

TORQUE CONVERTER STALL SPEED SPECIFICATIONS

TORQUE CONVERTER STALL SPEED SPECIFICATIONS (CHRYSLER)

Application	Stall Speed RPM
1989 Colt	2000-2400
1989 Summit	2200-2800

TORQUE CONVERTER STALL SPEED SPECIFICATIONS (HYUNDAI)

Application	Stall Speed RPM
Elantra	
1992	2000-2400
1993-94	1800-2200
Excel	
1990-92	2000-2400
1993-94	2200-2800
Sonata	
1989-90	2000-2400
1991-92	2200-2800
1993-94 - 4-Cylinder With KM175	2200-2800
1993-94 - V6 With KM177	2200-2600
Scoupe	
1991	2000-2400
1992	2200-2800

TORQUE CONVERTER STALL SPEED SPECIFICATIONS (MITSUBISHI)

Application	Stall Speed RPM
Galant (1987-89)	1800-2800
Sigma (1989)	1800-2800
Precis	
1990	2000-2400
1991-94	2200-2800

TORQUE CONVERTER STALL SPEED TROUBLE SHOOTING

Stall Speed Test Results (RPM)	Probable Cause
High In "D"	Slipping Rear Clutch Or Overrunning Clutch
High In "R"	Slipping Front Clutch Or Low-Reverse Brake
Low In "D" & "R"	Engine Output Low Or Defective Torque Converter

HYDRAULIC PRESSURE TEST

1. Install tachometer. Warm engine to normal operating temperature. Ensure transaxle fluid level is correct. Apply parking brake. Block rear wheels. Raise and support vehicle so front wheels can rotate.
2. Reducing pressure, kickdown brake pressure, front clutch, end clutch, low-reverse brake and torque converter pressure are checked at specified pressure taps on transaxle. See **Fig. 10**.
3. Remove pressure tap plug. Install pressure gauge at appropriate pressure tap. Start and operate engine at specified RPM with shift lever in proper position in accordance with pressure being tested. See **Fig. 11**. Pressure should be within specification.
4. If pressure is not within specification, refer to **HYDRAULIC PRESSURE TEST TROUBLE SHOOTING**. If kickdown brake pressure or any clutch pressure is less than specified, line pressure adjustment may be required. See **LINE PRESSURE ADJUSTMENT** under ON-VEHICLE SERVICE.
5. If reducing pressure is not within specification, reducing pressure adjustment may be required. See **REDUCING PRESSURE ADJUSTMENT** under ON-VEHICLE SERVICE.
6. Shut engine off. Remove pressure gauge. Install and tighten pressure tap plug to specification. See **TORQUE SPECIFICATIONS**.

HYDRAULIC PRESSURE TEST TROUBLE SHOOTING

All Pressures Are Low Or High

Restricted main oil filter on valve body, improper line pressure adjustment, sticking regulator valve in valve body, loose valve body bolts, defective oil pump.

Improper Reducing Pressure

Improper line pressure adjustment, restricted "I" shaped oil filter on intermediate plate in valve body, improper reducing pressure adjustment, sticking reducing valve in valve body, loose valve body bolts.

Improper Kickdown Brake Pressure

Defective "D" rings or seal rings on kickdown servo piston or sleeve, loose valve body bolts, defective valve body.

Improper Front Clutch Pressure

Defective "D" rings or seal rings on kickdown servo piston or sleeve, loose valve body bolts, defective valve body, defective front clutch components.

Improper End Clutch Pressure

1990 Hyundai Excel

1987-94 AUTOMATIC TRANSMISSIONS KM175, KM176 & KM177 Overhaul

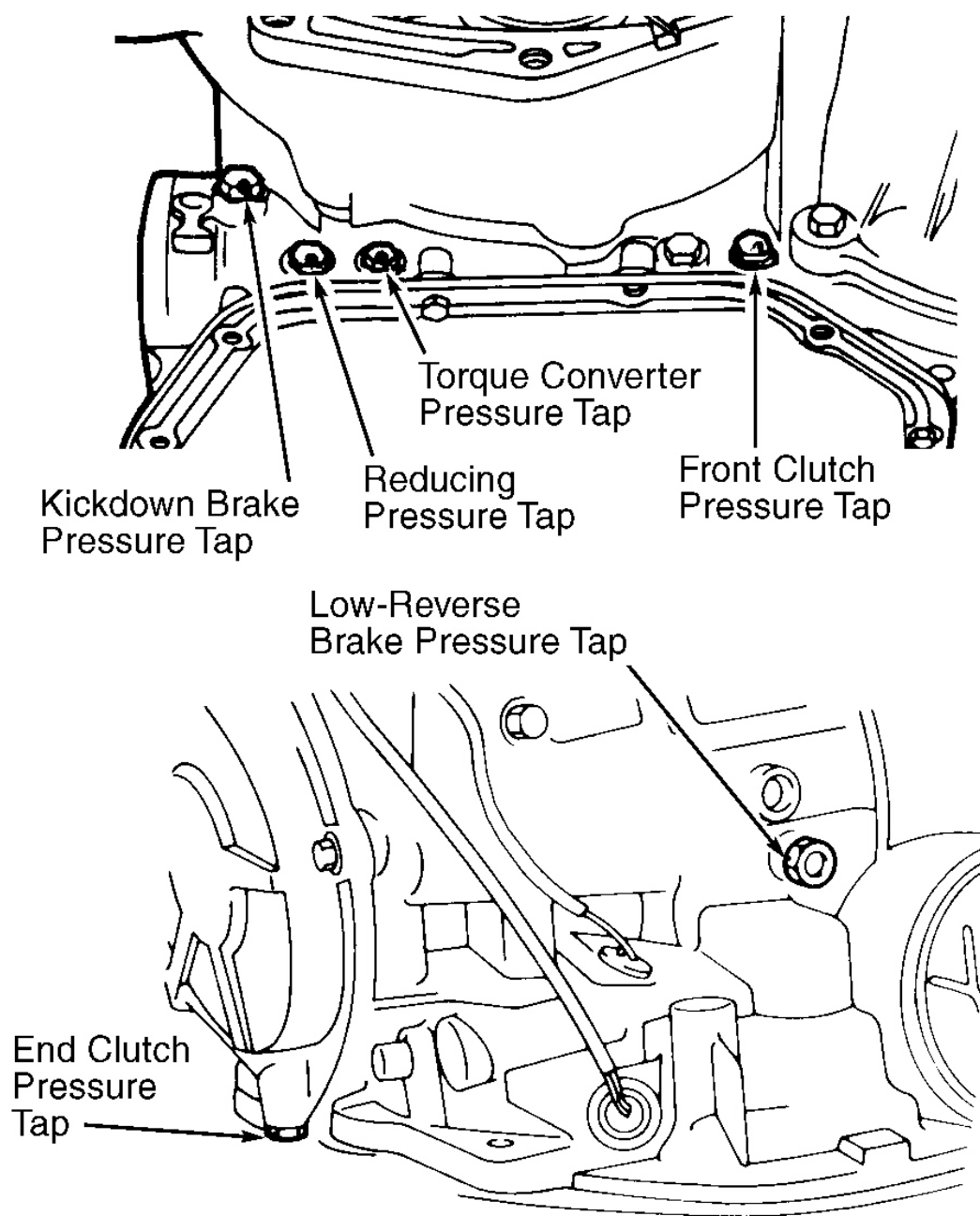
Defective "D" rings or seal rings on end clutch, loose valve body bolts, defective valve body.

Improper Low-Reverse Brake Pressure

The "O" ring between valve body & transaxle housing is missing, loose valve body bolts, defective valve body, defective "O" rings on low-reverse brake piston.

Improper Torque Converter Pressure

Sticking damper clutch control solenoid valve (except km177), restricted or leaking oil cooler, defective seal rings on input shaft, defective torque converter.



G95D20209

Fig. 10: Identifying Transaxle Pressure Taps
Courtesy of HYUNDAI MOTOR CO.

1990 Hyundai Excel

1987-94 AUTOMATIC TRANSMISSIONS KM175, KM176 & KM177 Overhaul

CONDITIONS					STANDARD OIL PRESSURE (PSI)						
No.	Selector Lever Position	Engine Speed RPM	Shift Position	Reducing Pressure	Kickdown Brake Pressure (application)	Kickdown Brake Pressure (release)	Front Clutch Pressure	Rear Clutch Pressure	End Clutch Pressure	Low Reverse Brake Pressure	Torque Converter Pressure
1	N	Idle	Neutral	51-68	----	----	----	----	----	----	*
2	D	Idle	2nd	51-68	14-30	----	----	104-118	----	----	*
3	D (OD SW On)	Approx. 2,500	4th	51-68	118-128	----	----	----	118-128	----	64-92
4	D (OD SW Off)	Approx. 2,500	3rd	51-68	118-128	118-128	118-128	118-128	118-128	---	64-92
5	2	Approx. 2,500	2nd	51-68	118-128	----	----	118-128	----	----	64-92
6	L	Approx. 1,000	1st	51-68	----	----	----	118-128	----	43-64	*
7	R	Approx 2,500 ----- 1,000	Reverse	51-68	----	233-318 ----- 213 or more	233-318 ----- 213 or more	----	----	233-319 ----- 213 or more	64-92

NOTE: --- Indicates pressure is less than 1.4 psi.
 OD SW ON: Overdrive switch is in ON position.
 OD SW OFF: Overdrive switch is in OFF position.
 * - Pressure is not standard.

G95G20210

Fig. 11: Hydraulic Pressure Test Specifications
 Courtesy of HYUNDAI MOTOR CO.

REMOVAL & INSTALLATION

ELECTRICAL COMPONENTS R & I

See the [AUTO TRANS DIAGNOSIS - KM175, KM176 & KM177](#) article.

TRANSAXLE R & I

See appropriate TRANSMISSION REMOVAL & INSTALLATION - A/T article in the AUTOMATIC TRANS SERVICING section. Refer to the following menu:

- 1987-89 Galant: TRANSMISSION REMOVAL & INSTALLATION - A/T
- 1989 Colt: TRANSMISSION REMOVAL & INSTALLATION - A/T
- 1989 Sigma: TRANSMISSION REMOVAL & INSTALLATION - A/T
- 1989 Summit: TRANSMISSION REMOVAL & INSTALLATION - A/T
- 1989-94 Sonata: **TRANSMISSION REMOVAL & INSTALLATION - A/T**
- 1990-94 Precis: TRANSMISSION REMOVAL & INSTALLATION - A/T

- 1990-94 Excel: **TRANSMISSION REMOVAL & INSTALLATION - A/T**
- 1991-92 Scoupe: **TRANSMISSION REMOVAL & INSTALLATION - A/T**
- 1992-94 Elantra: **TRANSMISSION REMOVAL & INSTALLATION - A/T**

VALVE BODY ASSEMBLY R & I

Removal

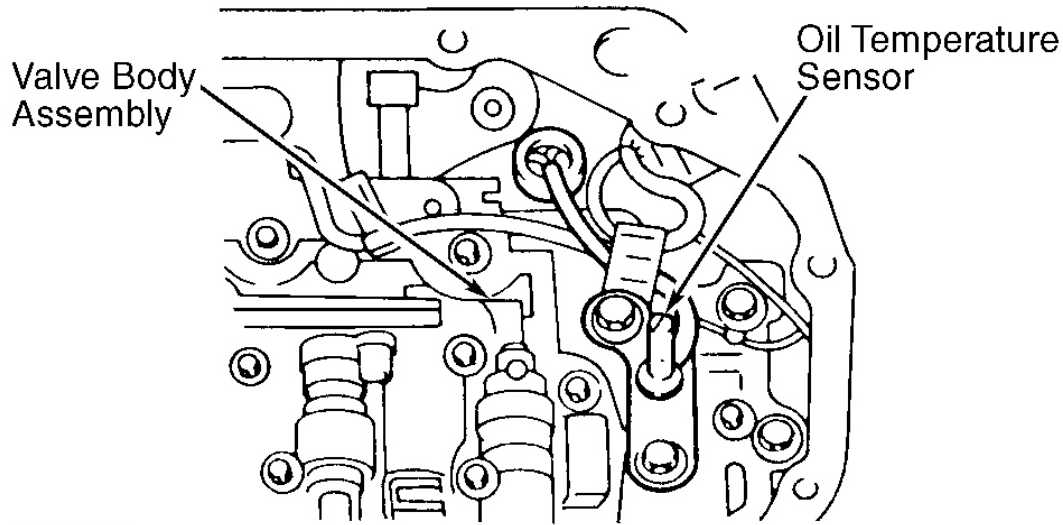
1. Drain transaxle fluid. Remove bolts, oil pan, gasket and oil filter.

CAUTION: Note location of oil filter bolts, as bolts must be installed in correct location to prevent damaging lower valve body.

2. Remove oil temperature sensor, located on bottom of valve body assembly. See **Fig. 12** .
3. Push tab inward on solenoid valve electrical connector grommet, located on transaxle housing, above oil pan area. Push solenoid valve electrical connector grommet out of transaxle housing so valve body assembly can be removed.
4. Note location of valve body assembly-to-transaxle housing bolts. Remove valve body assembly-to-transaxle housing bolts. Remove valve body assembly, using care not to allow manual valve to fall from valve body assembly.

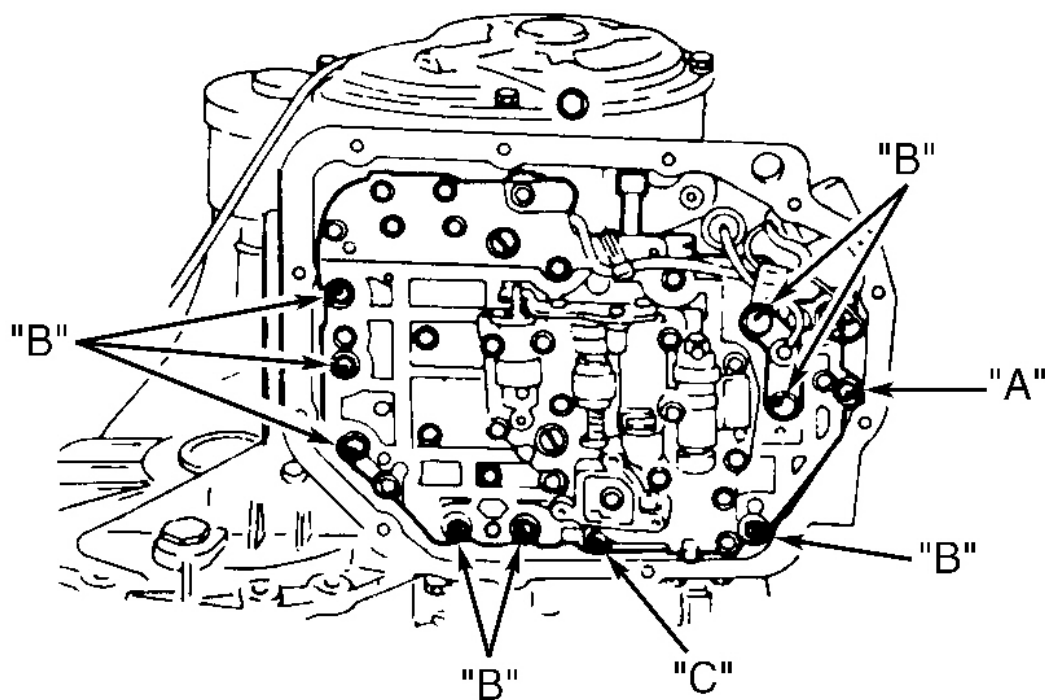
Installation

1. Install NEW "O" ring on upper surface of valve body assembly, where valve body seals against transaxle housing.
2. Install NEW "O" ring on solenoid valve electrical connector grommet where it seals against transaxle housing. Install valve body assembly and solenoid valve electrical connector grommet. Ensure pin on manual control shaft engages with manual valve on valve body assembly.
3. Ensure notch on solenoid valve electrical connector grommet is toward front of transaxle housing and wiring is properly routed.
4. Install oil temperature sensor and valve body assembly-to-transaxle housing bolts. Ensure proper length bolt is installed in correct location. See **Fig. 13** .
5. Tighten valve body assembly-to-transaxle housing bolts to specification. See **TORQUE SPECIFICATIONS** . Install oil filter. Tighten oil filter bolts to specification.
6. Ensure the 5 magnets are installed in 5 depression areas on oil pan. Using NEW gasket, install oil pan. Install and tighten oil pan bolts to specification. Fill transaxle with Mopar Plus-Type 7176 ATF.



95I20212

Fig. 12: Identifying Oil Temperature Sensor
Courtesy of HYUNDAI MOTOR CO.



Bolt "A" - .709" (18.00 mm)
Bolt "B" - .984" (25.00 mm)
Bolt "C" - 1.575" (40.00 mm)

95J20213

Fig. 13: Identifying Valve Body Assembly-To-Transaxle Housing Bolt Locations
Courtesy of HYUNDAI MOTOR CO.

TORQUE CONVERTER

NOTE: Torque converter is a sealed unit and cannot be disassembled. Replace torque converter if defective.

NOTE: For torque converter stall speed test, refer to the TORQUE CONVERTER STALL SPEED TEST under TESTING.

TRANSAXLE DISASSEMBLY

VALVE BODY ASSEMBLY & INTERNAL COMPONENTS

1. Remove torque converter. Using dial indicator, measure input shaft end play for reassembly reference.

Input shaft end play should be .012-.039" (.30-1.00 mm). This will indicate if thrust washer change is required.

2. Remove pulse generators, manual control lever and transaxle range switch from transaxle housing. See **Fig. 14** . Remove snap ring and kickdown servo switch. See **Fig. 14** .

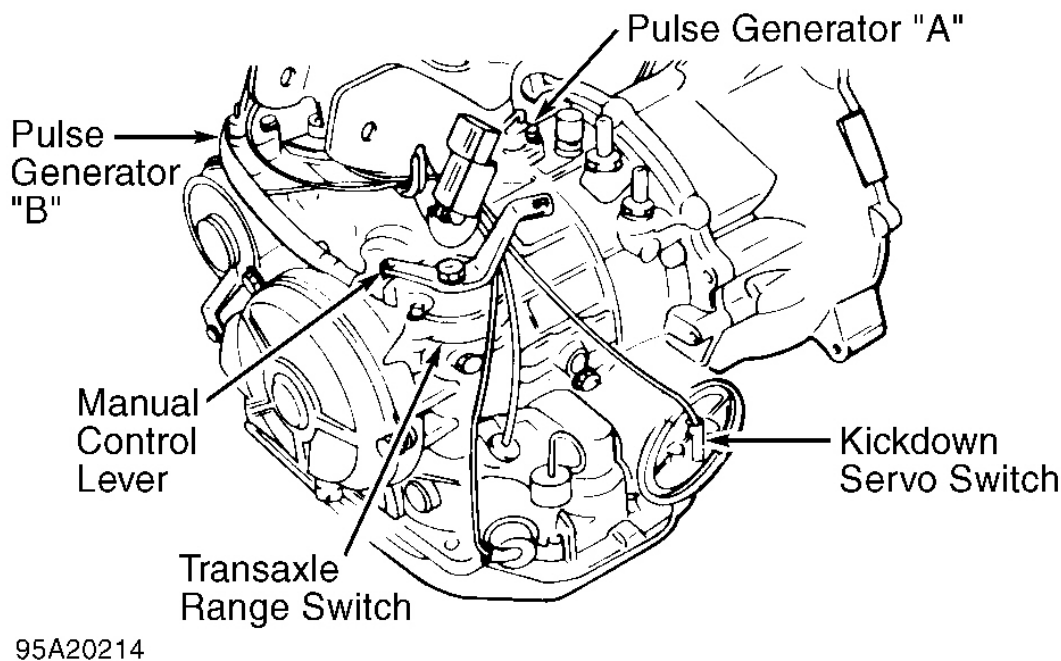
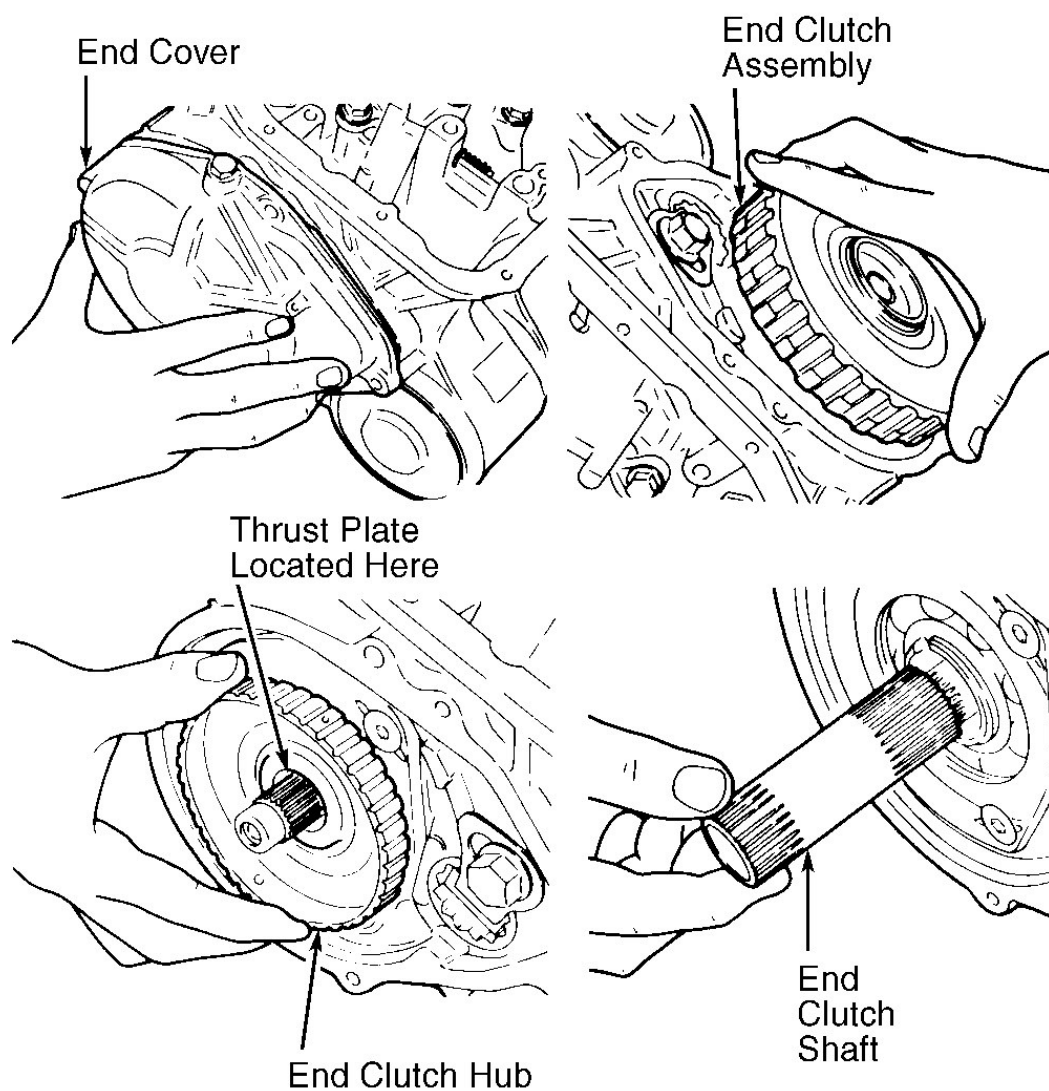


Fig. 14: Identifying Pulse Generators, Manual Control Lever, Transaxle Range Switch, & Kickdown Servo Switch
Courtesy of HYUNDAI MOTOR CO.

CAUTION: Note location of oil filter bolts, as bolts must be installed in correct location to prevent damaging lower valve body.

3. Remove bolts, oil pan, gasket and oil filter. Remove the oil temperature sensor, located on bottom of valve body assembly. See **Fig. 12** .
4. Push tab inward on solenoid valve electrical connector grommet, located on transaxle housing, above oil pan area. Push solenoid valve electrical connector grommet out of transaxle housing so valve body assembly can be removed.
5. Note location of valve body assembly-to-transaxle housing bolts. Remove valve body assembly-to-transaxle housing bolts. Remove valve body assembly, using care not to allow manual valve to fall from valve body assembly.
6. Remove bolts, end cover and end clutch assembly from end of transaxle housing. See **Fig. 15** . Remove thrust plate located at center of end clutch hub, end clutch hub and the thrust bearing. See **Fig. 15** .
7. Remove torque converter bolts and torque converter housing. See **Fig. 16** .



95B20215

Fig. 15: Removing & Installing End Cover, End Clutch Assembly Thrust Plate, End Clutch Hub & End Clutch Shaft

Courtesy of HYUNDAI MOTOR CO.

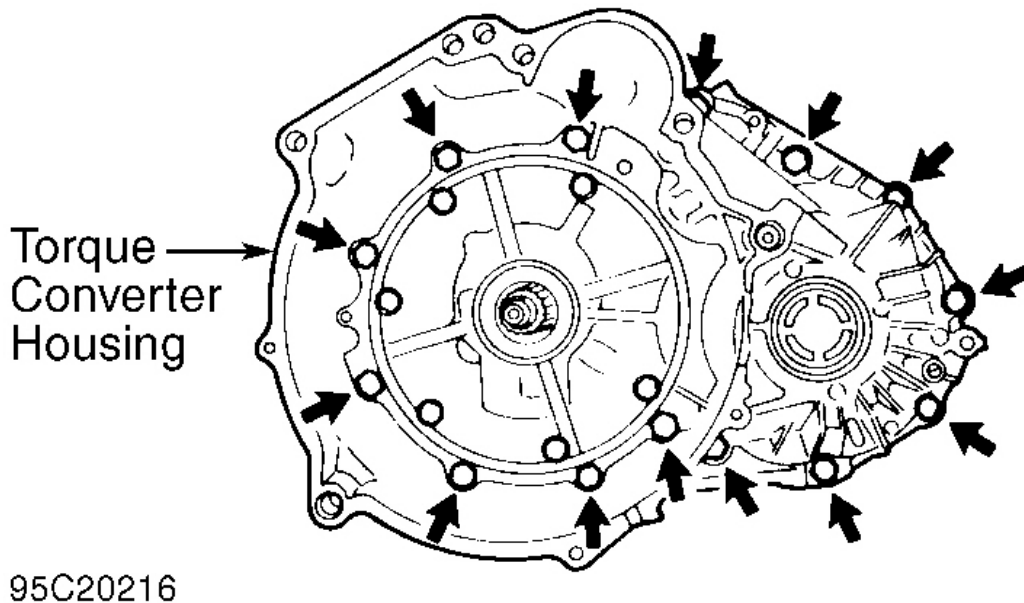


Fig. 16: Torque Converter Housing Bolts & Torque Converter Housing
 Courtesy of HYUNDAI MOTOR CO.

8. Remove oil pump-to-transaxle housing bolts. Thread 2 pull-out bolts in oil pump and gently tighten to press oil pump from transaxle housing. Lightly tap on oil pump with soft-faced hammer while tightening pull-out bolts during oil pump removal.
9. On KM177 models, remove differential assembly with bearings. On all other models, remove spacer, differential assembly with bearings. Spacer fits on top of bearing on differential assembly. See **Fig. 17**.
10. On all models, remove fiber thrust washer from front of input shaft. Lift upward on input shaft to remove front and rear clutch assemblies from transaxle housing. See **Fig. 17**.
11. Remove thrust bearing, located on front side of clutch hub. See **Fig. 17**. Remove clutch hub, thrust race and bearing. Remove kickdown drum and kickdown band.
12. Using spring compressor, compress kickdown servo spring on kickdown servo. Kickdown servo is located on side of transaxle housing. See **Fig. 4**. Release and remove spring compressor. Remove kickdown servo piston and spring.
13. Remove anchor rod for kickdown band from inside of transaxle housing. See **Fig. 17**. From inside transaxle housing, remove snap ring that retains center support in transaxle housing.
14. Attach Center Support Remover/Installer (09453-21310) on center support. See **Fig. 17**. Pull center support from transaxle housing.

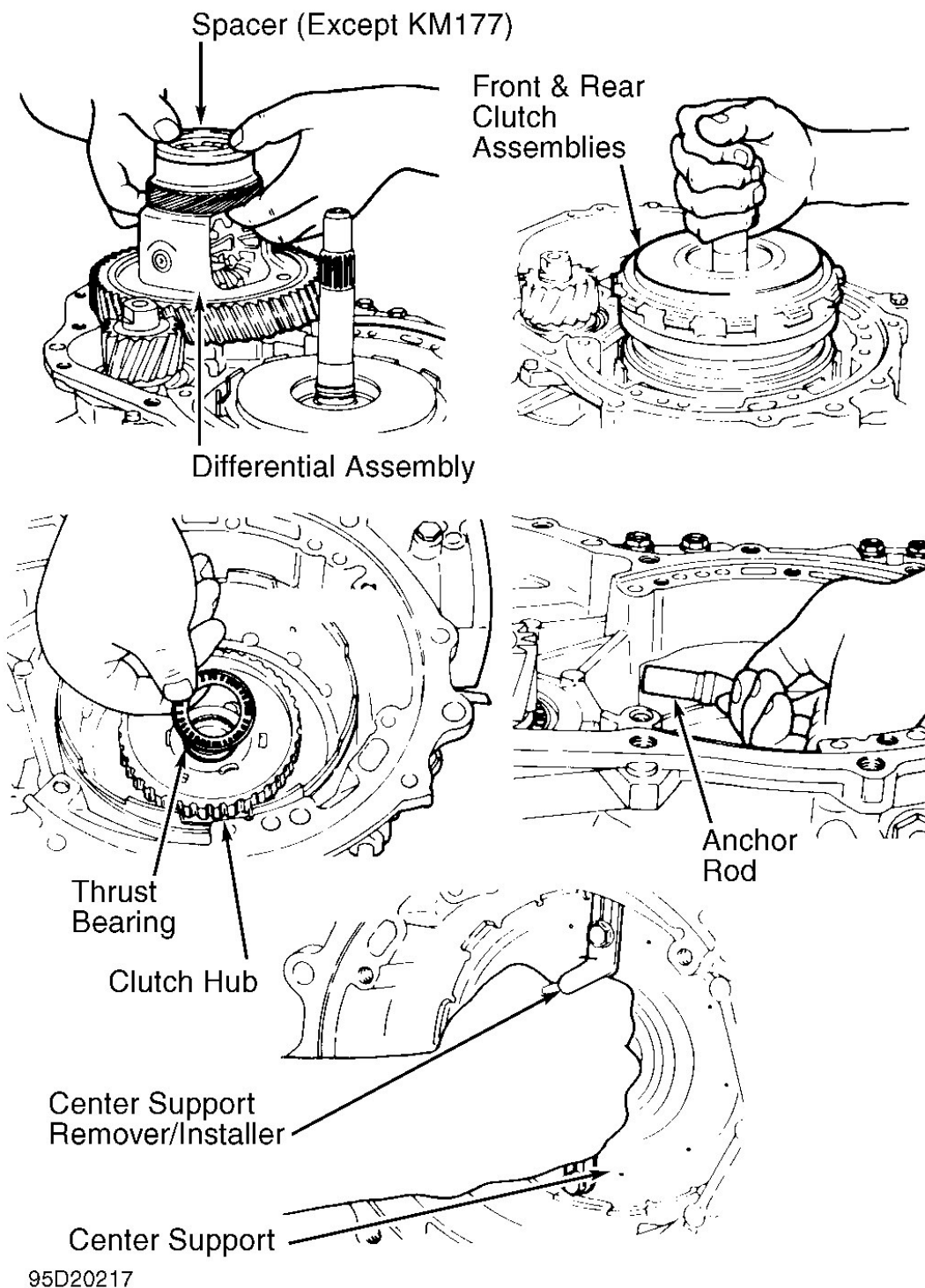
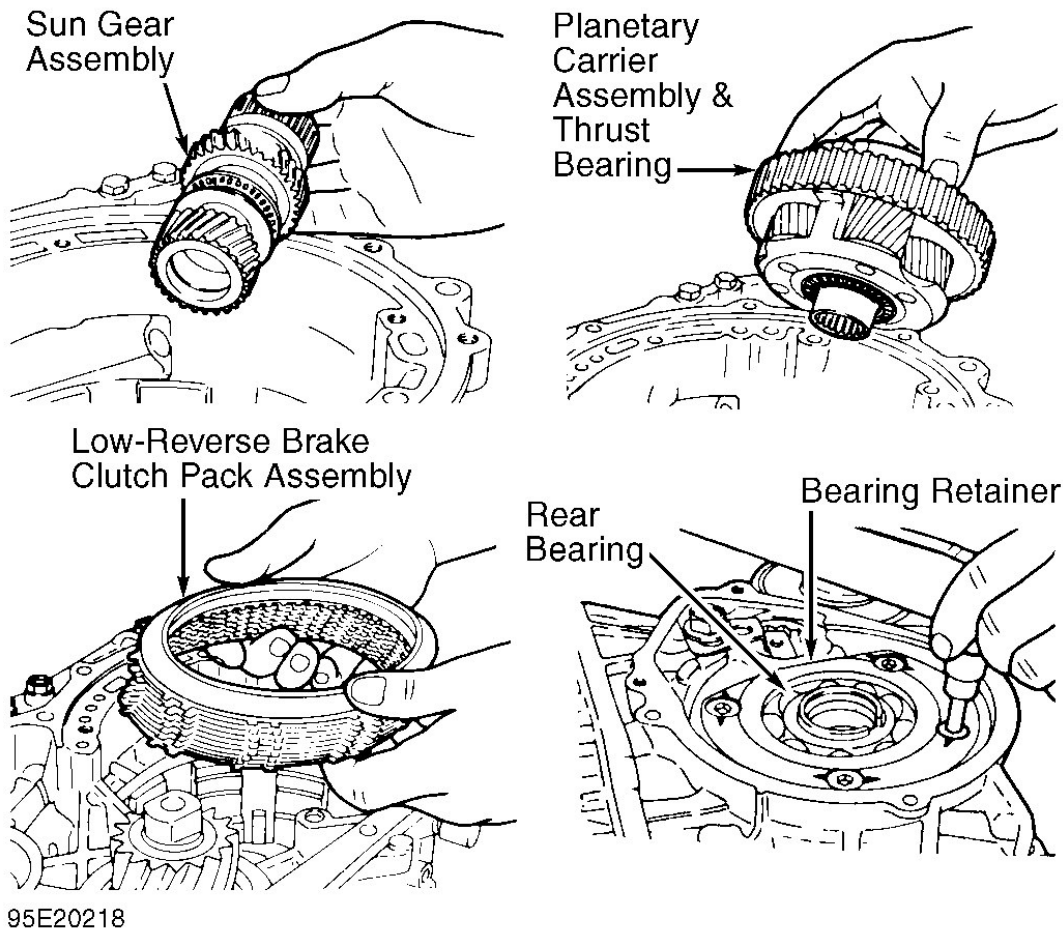


Fig. 17: Removing & Installing Differential Assembly, Front & Rear Clutch, Clutch Hub, Thrust Bearing, Anchor Rod & Center Support
 Courtesy of HYUNDAI MOTOR CO.

15. Remove sun gear assembly and planetary carrier assembly with thrust bearing. See **Fig. 18** . Remove low-reverse brake clutch pack assembly from transaxle housing. See **Fig. 18** .

NOTE: Low-reverse brake clutch pack assembly consists of wave spring, return spring, pressure plate, brake reaction plate, brake discs and brake plates. Note sequence of low-reverse brake clutch pack component installation for reassembly reference.

16. Using hammer and punch, lightly tap on heads of retaining screws for bearing retainer to loosen thread sealant on retaining screws. See **Fig. 12** . Remove retaining screws and bearing retainer.



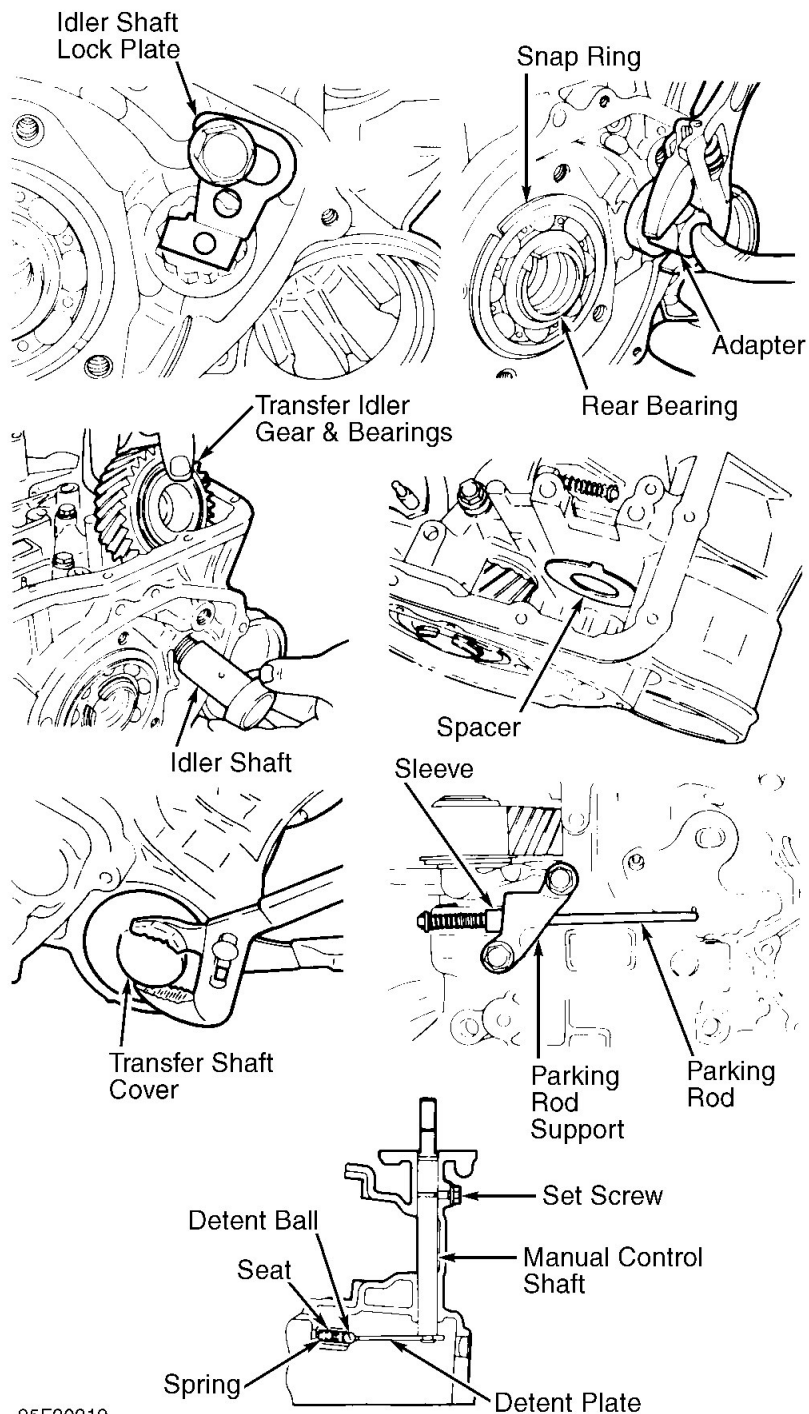
95E20218

Fig. 18: Removing & Installing Sun Gear Assembly, Planetary Carrier Assembly, Clutch Pack Assembly & Bearing Retainer
Courtesy of HYUNDAI MOTOR CO.

17. Remove bolt and idler shaft lock plate. See **Fig. 19** . Using Adapter (09545-21100), loosen idler shaft. See **Fig. 19** . Remove idler shaft, transfer idler gear with bearings and spacer from transaxle housing. See

Fig. 19 .

18. Remove snap ring from rear bearing. See **Fig. 19** . From inside transaxle housing, remove internal gear, output flange and transfer drive gear with rear bearing as an assembly.
19. Remove transfer shaft cover. See **Fig. 19** . Using hammer and chisel, loosen staked area on transfer shaft lock nut. Remove transfer shaft lock nut from transfer shaft. Transfer shaft lock nut contains left-hand threads.
20. Using hammer and brass drift, tap transfer shaft from transfer driven gear and transaxle housing. **DO NOT** loose spacer located on transfer shaft. Using press and bearing splitter, press bearing from transfer shaft or transfer driven gear (if necessary).
21. Remove bearing races for transfer shaft bearings from transaxle housing (if necessary). Remove bolts, parking brake rod support and parking brake rod. See **Fig. 19** . Remove set screw, manual control shaft, detent ball, seat and spring from transaxle housing. See **Fig. 19** .



95F20219

Fig. 19: Removing & Installing Idler Shaft, Transfer Idler Gear, Spacer, Rear Bearing Snap Ring, Transfer Shaft Cover, Parking Rod & Manual Control Shaft
 Courtesy of HYUNDAI MOTOR CO.

COMPONENT DISASSEMBLY & REASSEMBLY

OIL PUMP

Disassembly

1. Remove "O" ring from oil pump housing. Remove oil pump housing-to-reaction shaft support bolts. Remove reaction shaft support from oil pump housing. See **Fig. 20** .
2. Place reference marks on drive and driven gears for reassembly reference to ensure gears are installed in original direction. Remove drive and driven gears from oil pump housing.
3. Remove steel ball from oil pump housing. On all except KM177 models, remove snap ring and seal ring from drive gear. KM177 models **DO NOT** use seal ring and snap ring on drive gear.
4. On all models, remove seal rings from reaction shaft support. Remove oil seal from oil pump housing.

Cleaning & Inspection

1. Clean components with solvent and dry with compressed air. Inspect components for damage or signs of wear.
2. Install drive and driven gears in oil pump housing. Ensure gears rotate smoothly. Place straightedge on oil pump housing, above both gears.
3. Using feeler gauge, measure oil pump gear side clearance between each gear and straightedge. Replace oil pump if oil pump gear side clearance exceeds specification. See **OIL PUMP SIDE GEAR CLEARANCE SPECIFICATIONS** .

OIL PUMP SIDE GEAR CLEARANCE SPECIFICATIONS

Application	In. (mm)
Sonata	.0004-.0019 (.010-.048)
All Others	.0012-.0020 (.030-.050)

Reassembly

1. On all except KM177 models, install NEW seal ring in drive gear. Install snap ring in drive gear. On all models, coat all components with Mopar Plus-Type 7176 ATF.
2. Install drive and driven gears in oil pump housing. If installing original gears, ensure gears are installed in original positions using reference marks made during disassembly.
3. Install steel ball in the hole on the oil pump housing. See **Fig. 21** . Install NEW seal rings on reaction shaft support.
4. Install reaction shaft support on pump housing with oil pump housing-to-reaction shaft support bolts finger tight. Install Oil Pump Guide Pin (09452-21401) and Oil Pump Band (09452-21301) on assembled oil pump. See **Fig. 22** .
5. With oil pump band tightened, tighten the oil pump housing-to-reaction shaft support bolts to specification. Refer to **TORQUE SPECIFICATIONS** .
6. After tightening oil pump housing-to-reaction shaft support bolts, ensure pump gears rotate freely. Remove oil pump guide pin and oil pump band.
7. Lubricate seal lip of NEW oil seal with Mopar Plus-Type 7176 ATF and install in oil pump housing. Install NEW "O" ring on outside circumference of oil pump housing. Lubricate "O" ring with petroleum

jelly. Install NEW seal rings on reaction shaft support.

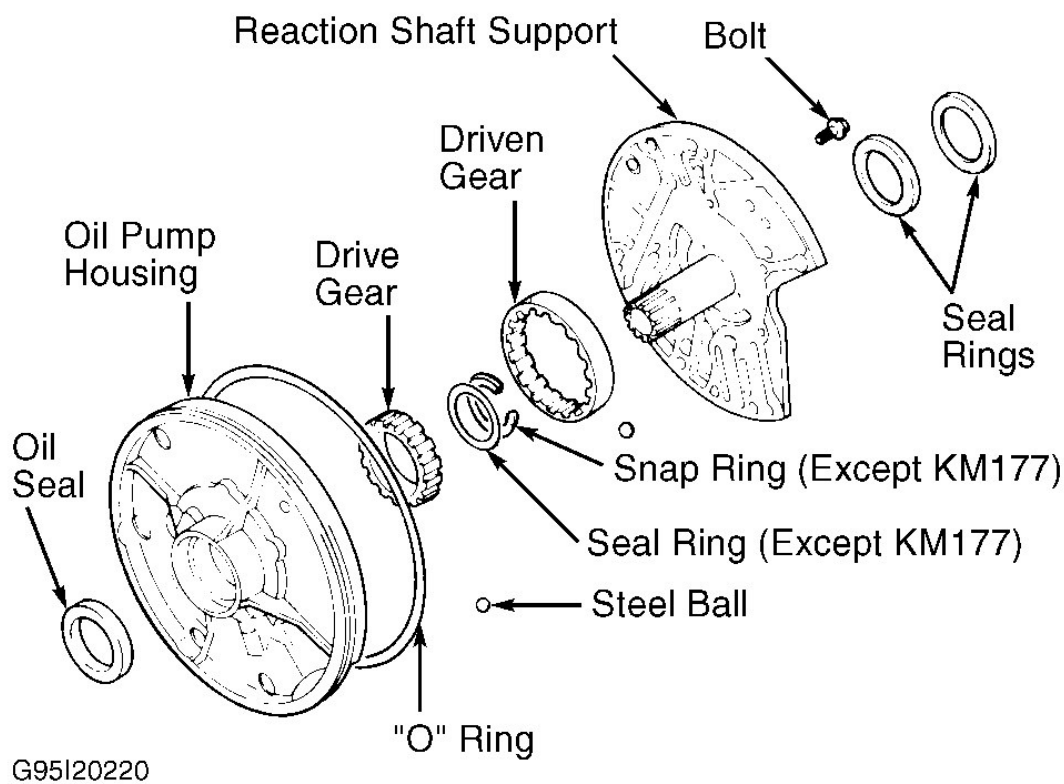
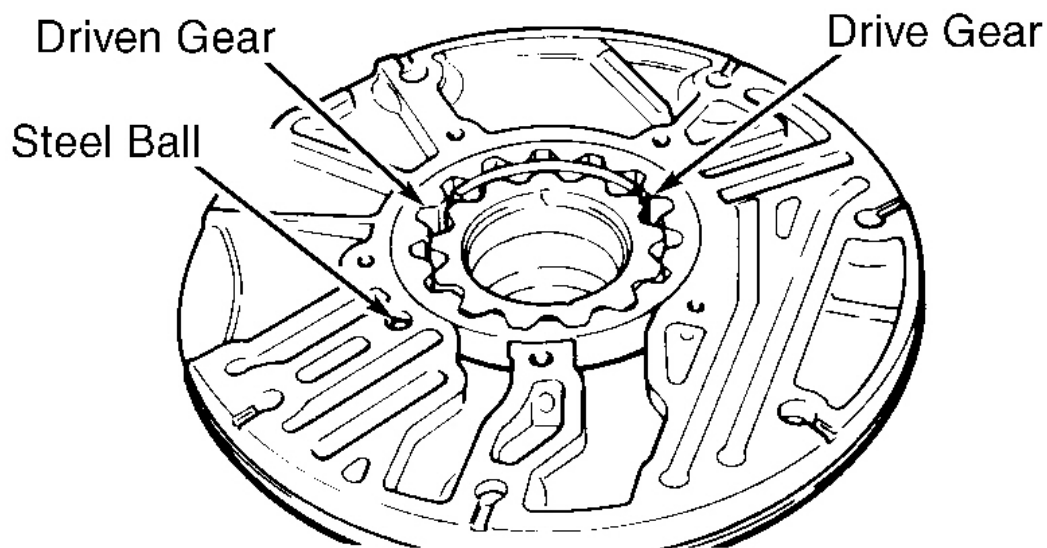
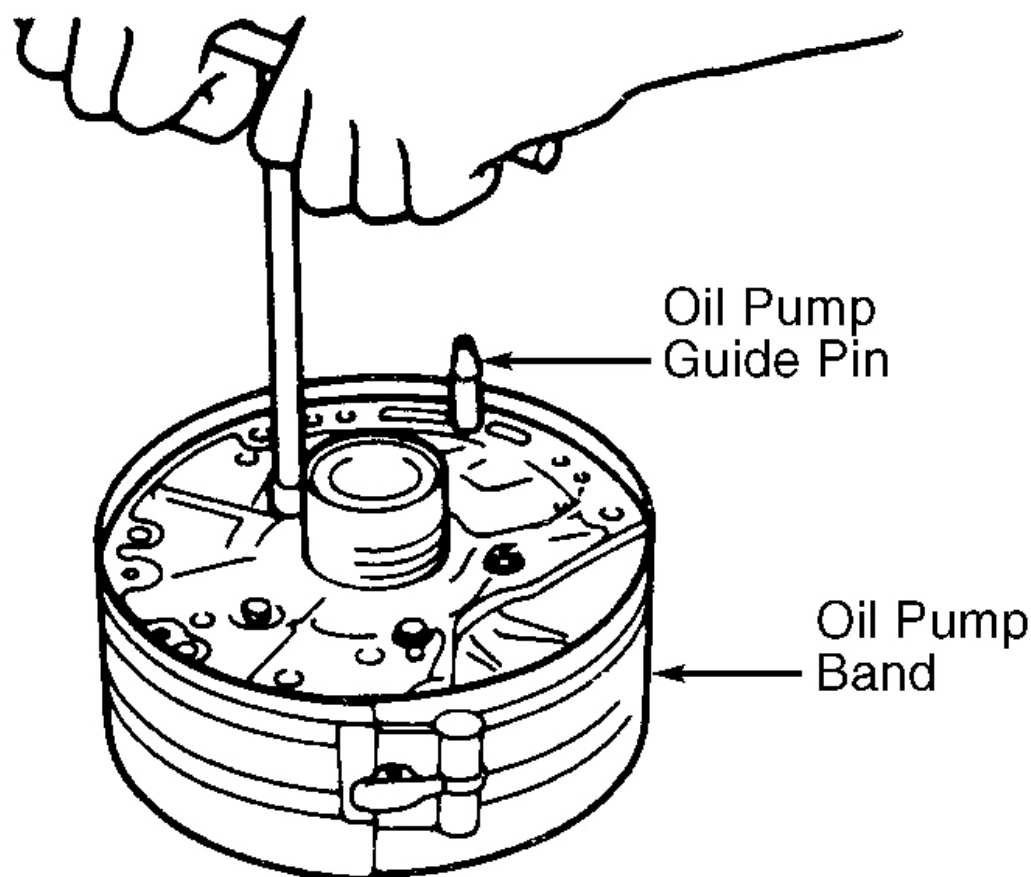


Fig. 20: Exploded View Of Typical Oil Pump
Courtesy of HYUNDAI MOTOR CO.



95J20221

Fig. 21: Installing Steel Ball In Oil Pump Housing
Courtesy of HYUNDAI MOTOR CO.



G93C22311

Fig. 22: Assembling Oil Pump
Courtesy of HYUNDAI MOTOR CO.

FRONT CLUTCH

Disassembly

1. Remove large snap ring, clutch plates and clutch discs from front clutch retainer. See **Fig. 23** . Note direction and number of clutch plates and clutch discs installation for reassembly reference, as different models may use different number of components.
2. Using spring compressor, compress return spring. Remove small snap ring from front clutch retainer. Remove spring compressor. Remove return spring and retainer.
3. Remove front clutch piston from front clutch retainer. Remove "D" rings from clutch piston and front clutch retainer.

Cleaning & Inspection

Clean metal components with solvent and dry with compressed air. Inspect components for damage and replace if necessary. Ensure no rough edges exist in "D" ring sealing areas.

Reassembly

1. Install NEW "D" ring on front clutch piston and front clutch retainer with rounded side of "D" ring facing outward, away from front clutch piston or front clutch retainer. Lubricate "D" rings with Mopar Plus-Type 7176 ATF.
2. Install front clutch piston in front clutch retainer. Use care not to damage "D" rings when installing front clutch piston. Install return spring and retainer.
3. Using spring compress, compress return spring. Install small snap ring to hold return spring on front clutch retainer. Remove spring compressor.

CAUTION: Ensure clutch discs are soaked in Mopar Plus-Type 7176 ATF for at least 2 hours before installing.

4. Coat all clutch plates and clutch discs with Mopar Plus-Type 7176 ATF. Alternately install clutch plates and clutch discs starting with clutch plate. If installing old clutch plates and clutch discs, ensure components are installed in original position and direction. Ensure original number of components are installed.
5. Install large snap ring on front clutch retainer. Lightly hold top clutch plate downward. Using feeler gauge, measure clearance between large snap ring and top clutch plate. This is the front clutch clearance.
6. Front clutch clearance should be within specification. See **FRONT CLUTCH CLEARANCE SPECIFICATIONS**. If front clutch clearance is not within specification, install different thickness large snap ring to obtain correct front clutch clearance. Consult parts department for available snap ring thickness.

FRONT CLUTCH CLEARANCE SPECIFICATIONS

Application	In. (mm)
Sonata	.028-.035 (.70-.90)
All Others	.016-.024 (.40-.60)

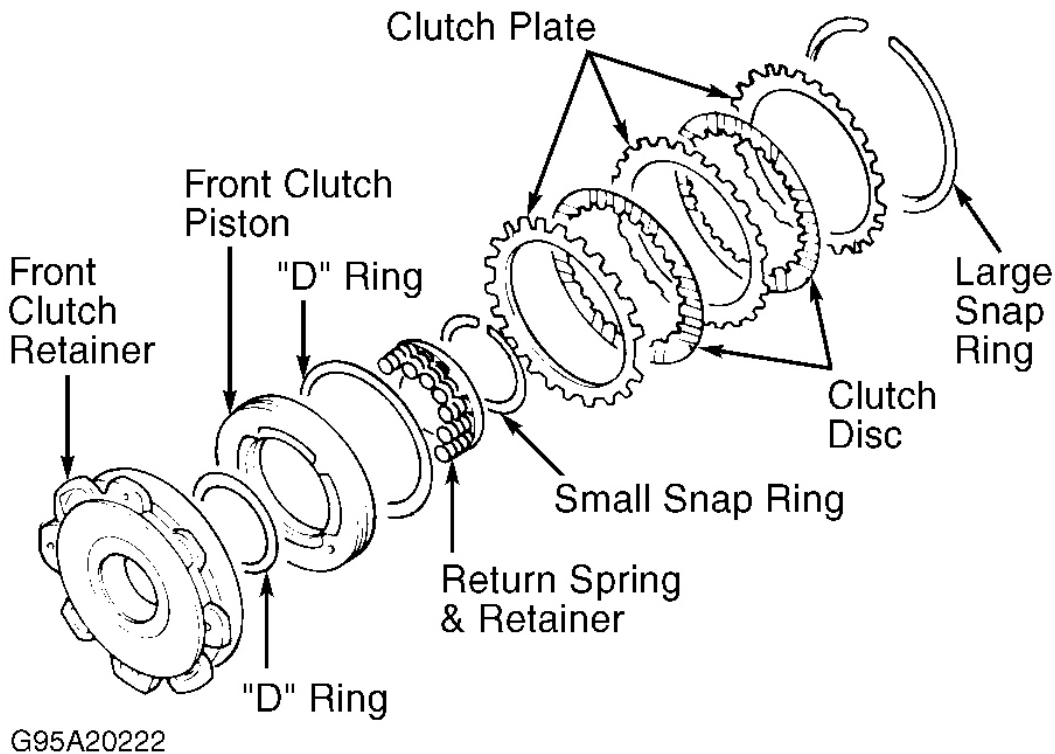


Fig. 23: Exploded View Of Typical Front Clutch
 Courtesy of HYUNDAI MOTOR CO.

FRONT & REAR CLUTCH END PLAY SNAP RINGS

Part No.	Color	Thickness In. (mm)
MD955630	None	.063 (1.60)
MD955631	Blue	.071 (1.80)
MD955632	Brown	.079 (2.00)
MD955633	None	.087 (2.20)
MD955634	Blue	.094 (2.40)
MD955635	Brown	.102 (2.60)
MD955636	None	.110 (2.80)
MD955637	Blue	.118 (3.00)

REAR CLUTCH

Disassembly

1. Remove small snap ring and thrust race. See **Fig. 24** . Remove input shaft from rear clutch retainer.
2. Remove large snap ring, clutch reaction plate, clutch discs, clutch plates and clutch pressure plate from

rear clutch retainer. See **Fig. 24** . Note direction and number of clutch plates and clutch discs installation for reassembly reference, as different models may use different number of components.

- Using spring compressor, compress return spring. Remove wave snap ring. Remove spring compressor. Note direction of return spring installation for reassembly reference. Remove return spring and rear clutch piston. Remove "D" rings from rear clutch piston.

Cleaning & Inspection

Clean metal components with solvent and dry with compressed air. Inspect components for damage. Replace components as required. Ensure no rough edges exist in "D" ring sealing areas.

Reassembly

- Install NEW "D" rings on rear clutch piston with rounded side of "D" ring facing outward, away from rear clutch piston. Lubricate "D" rings with Mopar Plus-Type 7176 ATF.
- Install rear clutch piston in rear clutch retainer. Use care not to damage "D" rings when installing rear clutch piston. Install return spring on rear clutch piston. Ensure return spring is facing correct direction. See **Fig. 24** .
- Compress return spring. Install wave snap ring. Ensure wave snap ring is fully seated in groove on rear clutch retainer.

CAUTION: Ensure clutch discs are soaked in Mopar Plus-Type 7176 ATF for at least 2 hours before installing.

- Coat all clutch plates and clutch discs with Mopar Plus-Type 7176 ATF. Install clutch pressure plate, clutch discs, clutch plates and clutch reaction plate in rear clutch retainer.
- If installing old clutch plates and clutch discs, ensure components are installed in original position and direction. Ensure original number of components are installed.
- Install large snap ring on rear clutch retainer. Lightly hold clutch reaction plate downward. Using feeler gauge, measure clearance between large snap ring and clutch reaction plate. This is the rear clutch clearance.
- Rear clutch clearance should be within specification. See **REAR CLUTCH CLEARANCE SPECIFICATIONS** . If rear clutch clearance is not within specification, install different thickness large snap ring to obtain correct rear clutch clearance. Consult parts department for available snap ring thickness.

REAR CLUTCH CLEARANCE SPECIFICATIONS

Application	In. (mm)
Elantra	.012-.020 (.30-.50)
Excel & Precis	
1993 Models	.012-.020 (.30-.50)
1994 Models	.016-.024 (.40-.60)
Sonata	.016-.024 (.40-.60)

8. Install input shaft in rear clutch retainer. Install thrust race and small snap ring. Install NEW sealing rings on input shaft.

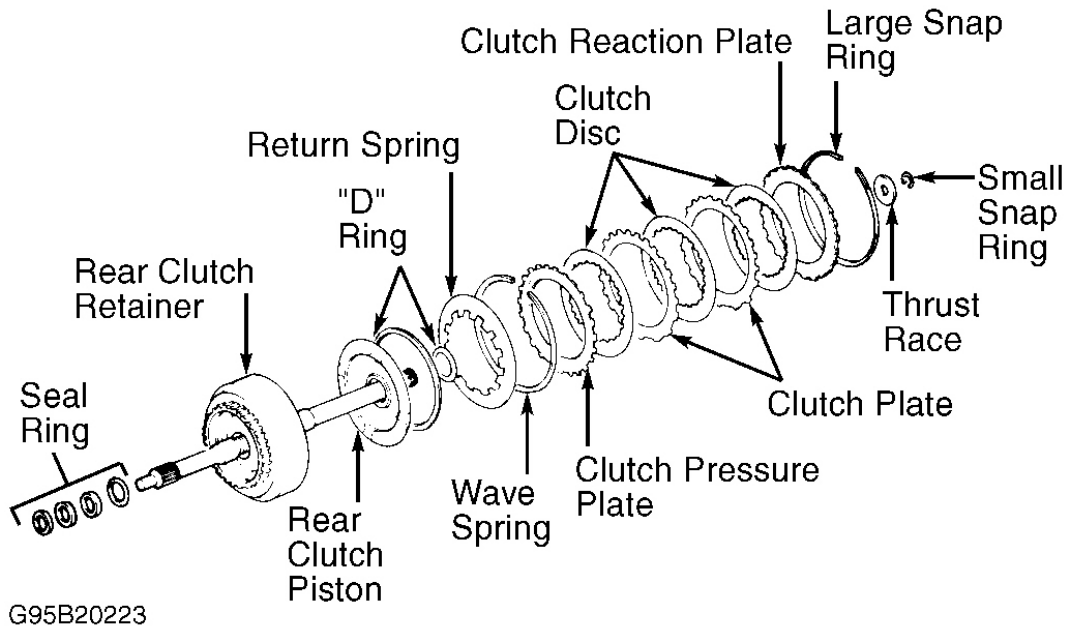


Fig. 24: Exploded View Of Typical Rear Clutch
Courtesy of HYUNDAI MOTOR CO.

FRONT & REAR CLUTCH END PLAY SNAP RINGS

Part No.	Color	Thickness In. (mm)
MD955630	None	.063 (1.60)
MD955631	Blue	.071 (1.80)
MD955632	Brown	.079 (2.00)
MD955633	None	.087 (2.20)
MD955634	Blue	.094 (2.40)
MD955635	Brown	.102 (2.60)
MD955636	None	.110 (2.80)
MD955637	Blue	.118 (3.00)

END CLUTCH

Disassembly

1. Remove large snap ring, clutch reaction plate, clutch discs and clutch plates from end clutch retainer. See **Fig. 25** . Note direction and number of clutch plates and clutch discs installation for reassembly reference, as different models may use different number of components.

2. Remove small snap ring and washer from inside of end clutch retainer. Note direction of return spring installation for reassembly reference. Remove return spring.
3. Remove clutch piston from end clutch retainer. It may be necessary to apply air pressure to oil passage on rear side of end clutch retainer for removal of clutch piston.
4. Remove "D" rings and oil seal from clutch piston. Remove seal ring and oil seal (if equipped) from end clutch retainer.

Cleaning & Inspection

Clean metal components with solvent and dry with compressed air. Inspect components for damage. Replace components as required. Ensure no rough edges exist in "D" ring or oil seal sealing areas.

Reassembly

1. Install NEW "D" rings and oil seal on clutch piston. Ensure rounded side of "D" ring is facing outward, away from clutch piston. Install NEW seal ring and oil seal (if equipped) on end clutch retainer.
2. Lubricate "D" ring, oil seals and seal ring with Mopar Plus-Type 7176 ATF. Install clutch piston in end clutch retainer. Use care not to damage "D" rings when installing clutch piston.
3. Install return spring and washer on clutch piston. Ensure return spring is facing correct direction. See **Fig. 25**.
4. Compress return spring. Install NEW small snap ring. Ensure small snap ring is fully seated in groove on end clutch retainer.

CAUTION: Ensure clutch discs are soaked in Mopar Plus-Type 7176 ATF for at least 2 hours before installing.

5. Coat all clutch plates and clutch discs with Mopar Plus-Type 7176 ATF. Alternately install clutch plates and clutch discs starting with clutch plate. If installing old clutch plates and clutch discs, ensure components are installed in original position and direction. Ensure original number of components are installed.
6. Install clutch reaction plate in end clutch retainer. Install large snap ring on end clutch retainer.
7. Lightly hold clutch reaction plate downward. Using feeler gauge, measure clearance between large snap ring and clutch reaction plate. This is the end clutch clearance.
8. End clutch clearance should be within specification. See **END CLUTCH CLEARANCE SPECIFICATIONS**.
9. If end clutch clearance is not within specification, install different thickness large snap ring to obtain correct end clutch clearance. Consult parts department for available snap ring thickness.

END CLUTCH CLEARANCE SPECIFICATIONS

Application	In. (mm)
Sonata V6 With KM177	.024-.033 (.60-.85)
All Others	.016-.026 (.40-.65)

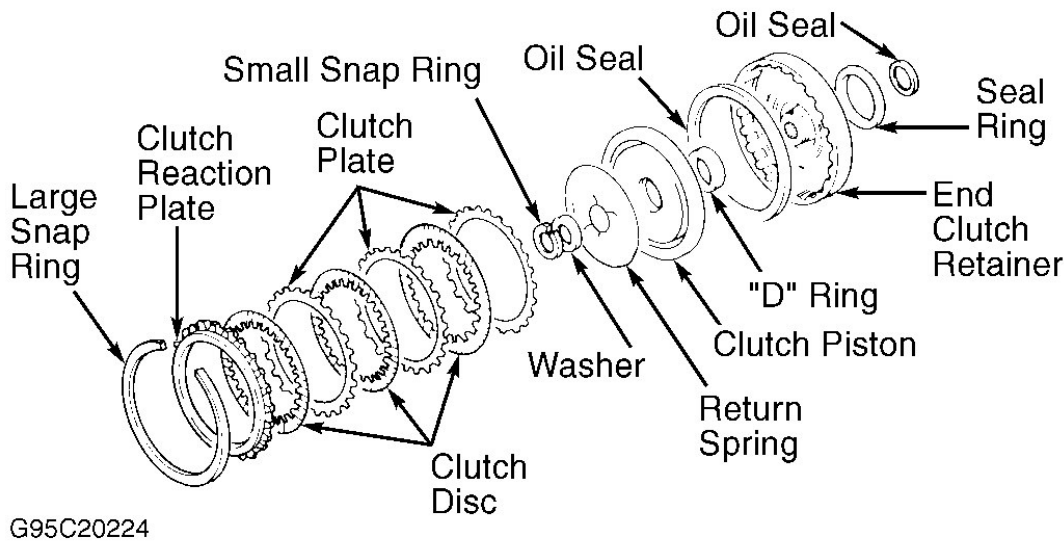


Fig. 25: Exploded View Of Typical End Clutch
 Courtesy of HYUNDAI MOTOR CO.

END CLUTCH END PLAY SNAP RINGS

Part No.	Color	Thickness In. (mm)
MD715800	White	.041 (1.05)
MD715801	Yellow	.051 (1.30)
MD715802	None	.061 (1.55)
MD715803	Green	.071 (1.80)
MD720849	Pink	.081 (2.05)

PLANETARY CARRIER ASSEMBLY

Disassembly

1. Bend lock plate tabs away from bolt head on overrunning clutch outer race-to planetary carrier assembly bolts. Remove overrunning clutch outer race-to planetary carrier assembly bolts.
2. Remove overrunning clutch outer race with overrunning clutch from planetary carrier assembly. See **Fig. 26**.
3. Remove overrunning clutch end plate, located between overrunning clutch and planetary carrier assembly. Remove pinion shaft from one short pinion.
4. Remove short pinion with spacer bushing and thrust washers. **DO NOT** allow rollers to fall from short pinion during removal.
5. Remove thrust bearing from center of planetary carrier assembly. Note direction of overrunning clutch installation in overrunning clutch outer race.
6. Remove overrunning clutch from overrunning clutch outer race, by pressing on overrunning clutch.

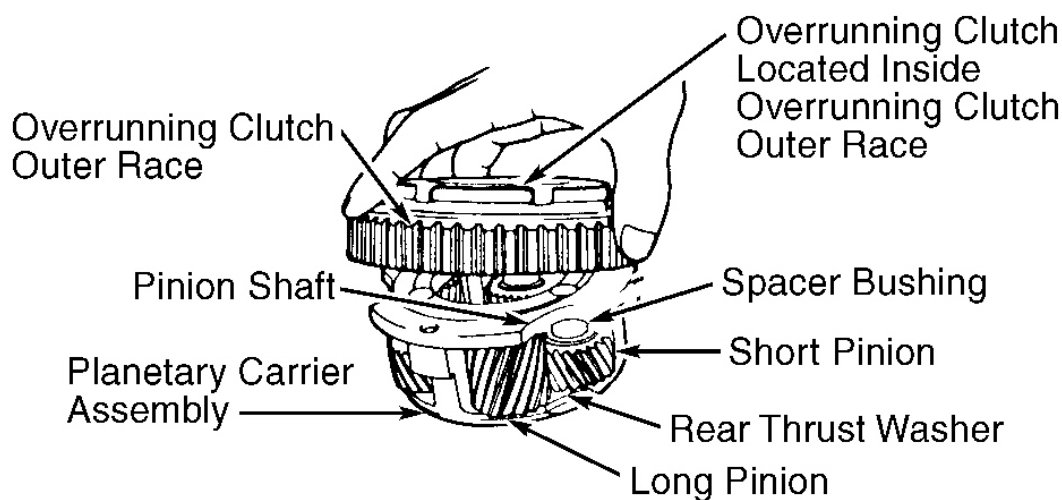
Remove overrunning clutch end plate from overrunning clutch outer race.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for damage. Replace components as required.

Reassembly

1. Install thrust bearing in center of planetary carrier assembly. Ensure thrust bearing is installed with rollers on thrust bearing facing upward, toward overrunning clutch outer race surface on planetary carrier assembly. Flat side should be facing toward hub (rear) side of planetary carrier assembly.
2. Apply petroleum jelly on inside of short pinion to hold rollers in place. Install short pinion, spacer bushing and thrust washers in planetary carrier assembly. Use care not to allow rollers to fall from short pinion.
3. Install pinion shaft in short pinion and thrust washers. Ensure flat side of pinion shaft aligns with flat area on rear thrust washer.
4. Install the overrunning clutch end plate on the inside of the overrunning clutch outer race. Press the overrunning clutch into overrunning clutch outer race. Make sure the arrow mark on the outside of the overrunning clutch is pointing upward. See **Fig. 27**.
5. Apply petroleum jelly on overrunning clutch end plate. Install overrunning clutch end plate on inside of overrunning clutch. Install overrunning clutch outer race with overrunning clutch on planetary carrier assembly.
6. Install and tighten the overrunning clutch outer race-to-planetary carrier assembly retaining bolts to specification. Refer to **TORQUE SPECIFICATIONS**. Bend the lock plate tabs against the bolt head on the overrunning clutch outer race-to-planetary carrier assembly bolts.



95D20225

Fig. 26: Planetary Carrier Assembly Components & Overrunning Clutch Outer Race
 Courtesy of HYUNDAI MOTOR CO.

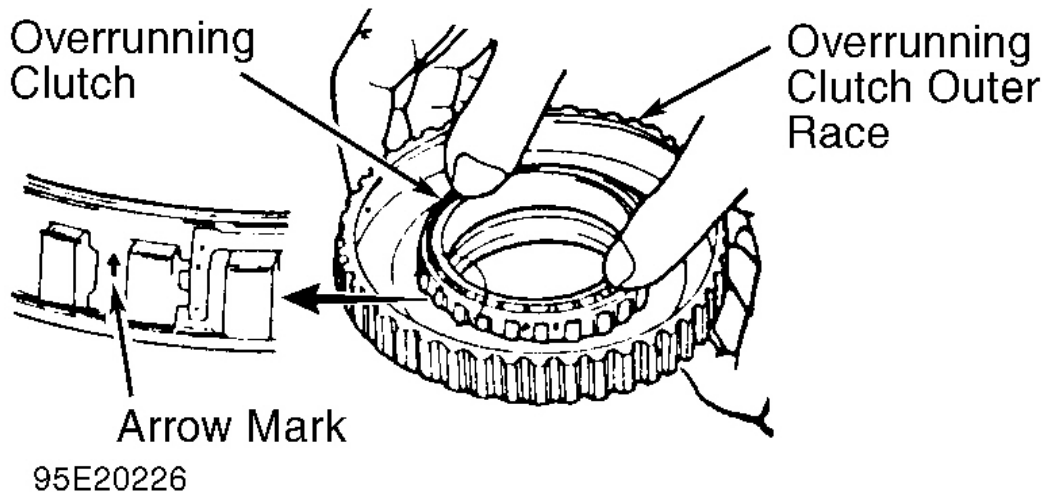


Fig. 27: Installing Overrunning Clutch
 Courtesy of HYUNDAI MOTOR CO.

INTERNAL GEAR, OUTPUT FLANGE & TRANSFER DRIVE GEAR

Disassembly

1. Remove small snap ring from rear of output flange. See **Fig. 28** . Using puller, pull outer bearing, transfer drive gear and inner bearing from output flange.
2. Remove large snap ring from internal gear. Separate output flange from internal gear.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for damage. Replace components as required. Output flange and transfer drive gear must be replaced as a set if damaged.

Reassembly

1. Install inner bearing and transfer drive gear on output flange. Ensure transfer drive gear is installed with groove on edge of gear facing upward, away from output flange. See **Fig. 29** .

CAUTION: Transfer drive gear must be installed with groove on edge of gear facing upward, away from output flange. See Fig. 29 .

2. Using hammer and bearing installer, drive inner bearing and transfer drive gear on output flange. Using

hammer and bearing installer, drive outer bearing on output flange.

3. Install the thickest small snap ring possible on output flange. Install output flange on internal gear. Install large snap ring.

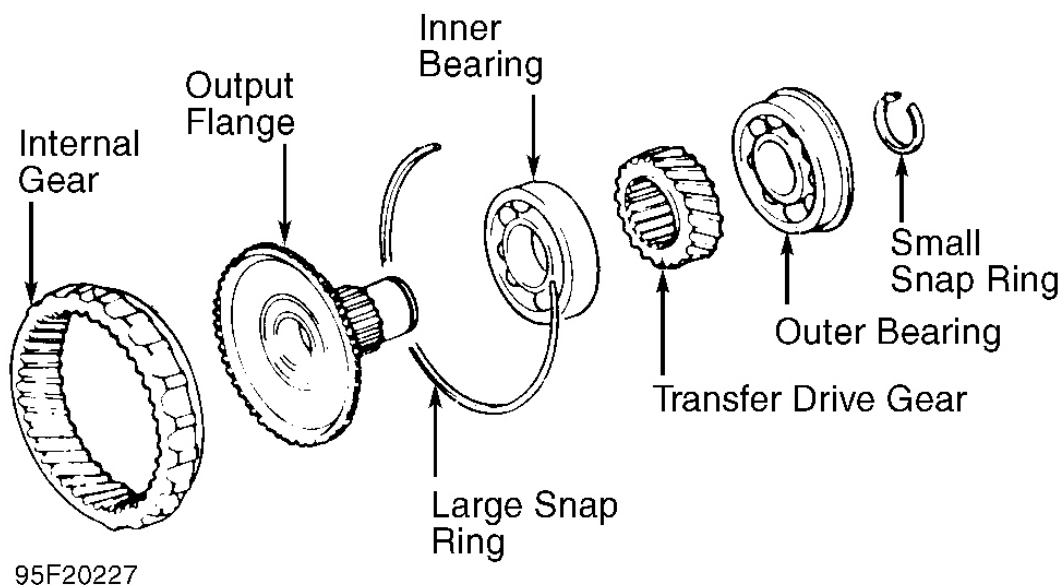
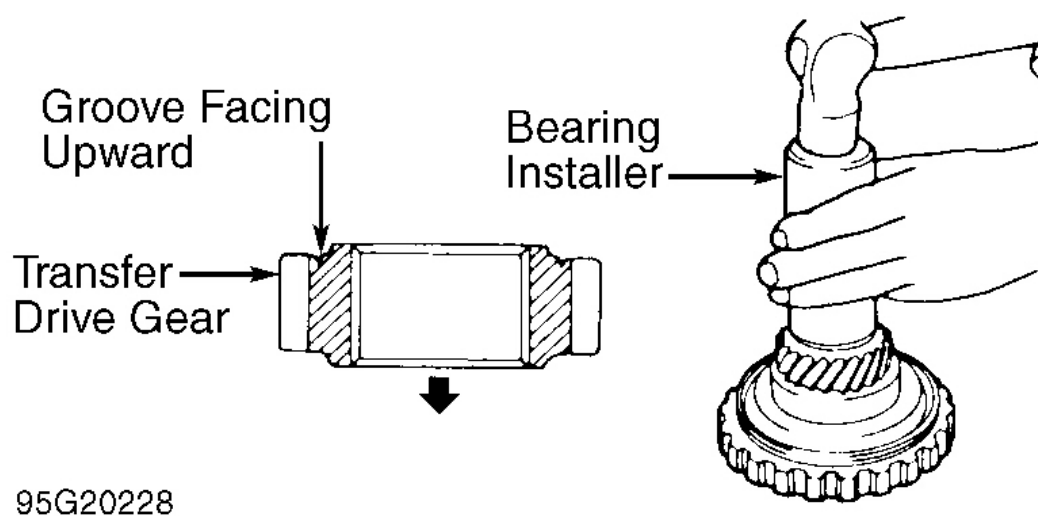


Fig. 28: Exploded View Of Internal Gear, Output Flange & Transfer Drive Gear
 Courtesy of HYUNDAI MOTOR CO.



1990 Hyundai Excel

1987-94 AUTOMATIC TRANSMISSIONS KM175, KM176 & KM177 Overhaul

Fig. 29: Installing Transfer Drive Gear
Courtesy of HYUNDAI MOTOR CO.**INTERNAL GEAR, OUTPUT FLANGE & TRANSFER DRIVE GEAR END PLAY SNAP RINGS**

Part No.	Color	Thickness In. (mm)
MD722538	None	.072 (1.82)
MD721014	Blue	.074 (1.88)
MD721015	Brown	.076 (1.94)
MD721016	None	.079 (2.00)
MD721017	Blue	.081 (2.06)
MD722539	Brown	.083 (2.12)

TRANSFER SHAFT**Disassembly & Reassembly**

If replacing bearing, using bearing splitter and press, press bearing from transfer shaft. To reassemble, use press to press NEW bearing on transfer shaft.

TRANSFER SHAFT END PLAY SPACERS

Part No.	Mark	Thickness In. (mm)
MD723160	20	.0472 (1.200)
MD723161	23	.0484 (1.230)
MD723162	26	.0496 (1.260)
MD723163	29	.0508 (1.290)
MD723164	32	.0520 (1.320)
MD723165	35	.0531 (1.350)
MD723166	38	.0543 (1.380)
MD723167	41	.0555 (1.410)
MD723168	44	.0567 (1.440)
MD723169	47	.0579 (1.470)
MD723170	50	.0591 (1.500)
MD723171	53	.0591 (1.530)
MD723172	56	.0591 (1.560)
MD723173	59	.0591 (1.590)
MD723174	62	.0591 (1.620)
MD723175	65	.0591 (1.650)
MD723176	68	.0591 (1.680)
MD723177	71	.0591 (1.710)
MD723178	74	.0591 (1.740)
MD723179	77	.0591 (1.770)
MD723180	80	.0591 (1.800)

DIFFERENTIAL ASSEMBLY

Disassembly

1. Remove ring gear bolts and ring gear. Remove and discard lock pin. Remove pinion shaft, pinion gears and thrust washers. See **Fig. 30** .
2. Remove side gears and spacers. Mark spacer location for reassembly reference. If replacing bearings, using press and bearing splitter, press bearings from differential case.

NOTE: **KM177 models uses tapered roller bearings on differential case. On all other models, ball bearings are used on differential case.**

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Inspect components for damage. Replace components as required.

Reassembly

1. Using press, press NEW bearings on differential case (if removed). Install side gears and spacers in differential case.

NOTE: **If original side gears and spacers are used, ensure components are installed in original location. If NEW side gears are used, install NEW spacers with thickness of .039" (1.00 mm).**

2. Install thrust washers on pinion gears. Install pinion gears and thrust washers in differential case. Rotate pinion gears to mesh with side gears. Install pinion shaft.
3. Using dial indicator, measure side gear backlash between side gear and pinion gear on both sides of the differential case. See **Fig. 31** .
4. Side gear backlash should be .0010-.0059" (.025-.150 mm) and should be the same on both sides. If side gear backlash is not within specification, install different thickness spacers on side gears.
5. On correct side gear backlash is obtained, install NEW lock pin in differential case. After installing lock pin, ensure distance from end of lock pin to surface on differential case is less than .118" (3.00 mm). This ensures full installation of lock pin.
6. Install ring gear on differential case. Apply Mopar Plus-Type 7176 ATF on threads of ring gear bolts. Install and tighten ring gear bolts in a crisscross pattern to specification. Refer to **TORQUE SPECIFICATIONS** .

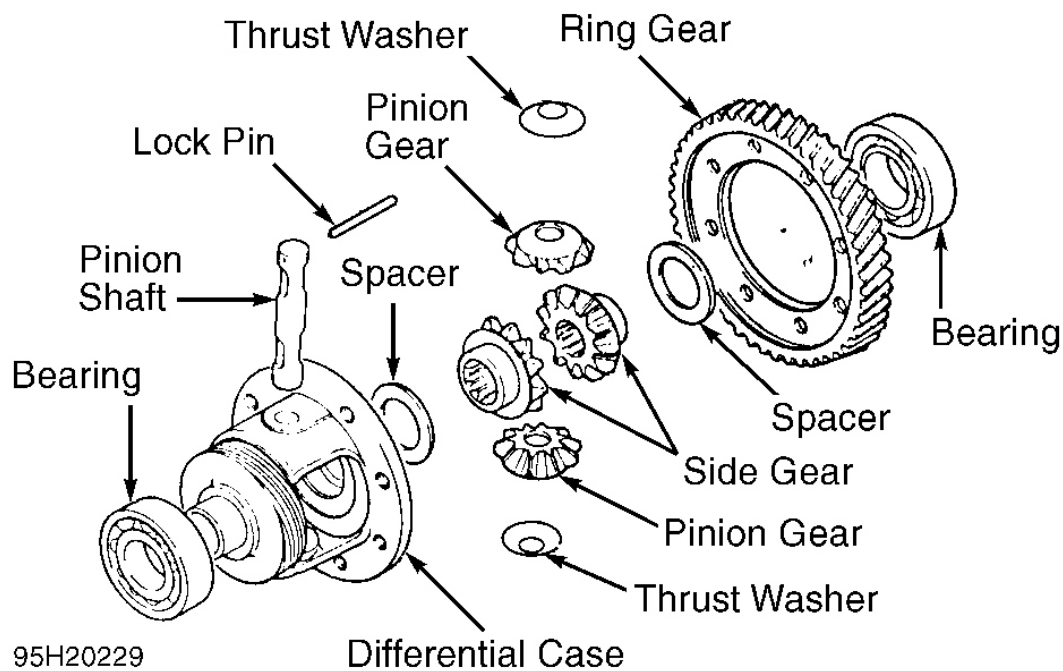


Fig. 30: Exploded View Of Typical Differential Assembly
 Courtesy of HYUNDAI MOTOR CO.

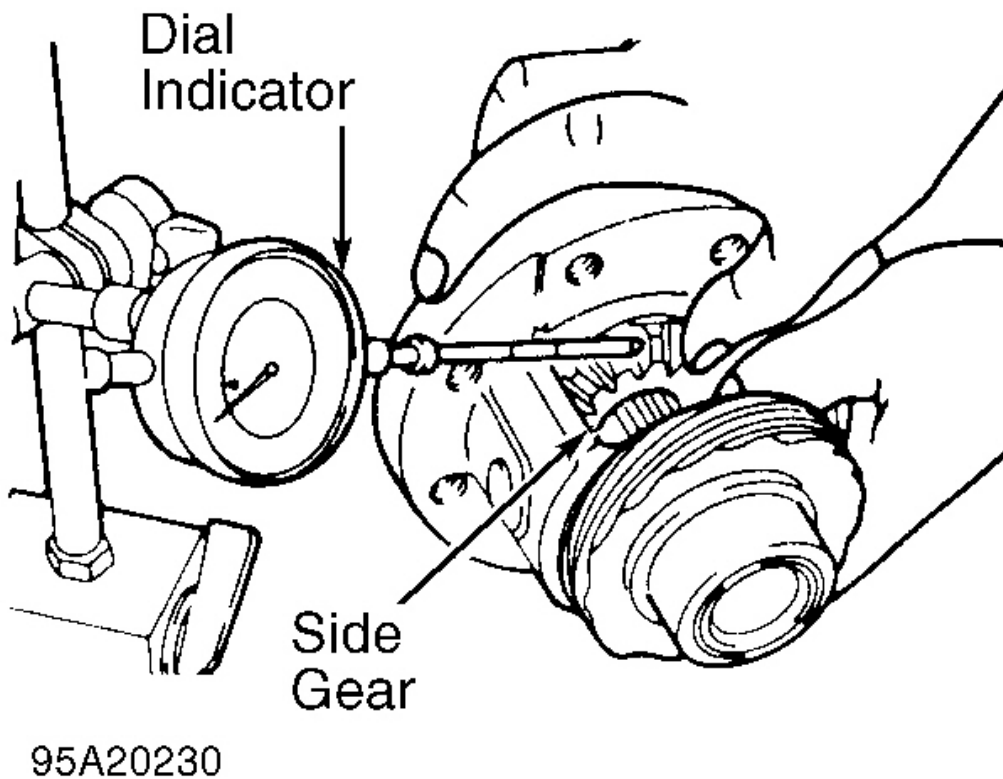


Fig. 31: Measuring Side Gear Backlash
 Courtesy of HYUNDAI MOTOR CO.

SIDE GEAR SPACERS

Part No.	Thickness In. (mm)
MA180862	.030-.032 (.75-.82)
MA180861	.032-.036 (.82-.92)
MA180860	.036-.040 (.92-1.00)
MA180875	.040-.043 (1.00-1.08)
MA180876	.043-.046 (1.08-1.16)

VALVE BODY ASSEMBLY

CAUTION: When disassembling valve body assembly, place components in order and mark spring locations for reassembly reference. DO NOT use force to remove components.

Disassembly

1. Remove bolts and all solenoid valves. See **Fig. 33** . On KM177 models, remove plate. See **Fig. 33** .
2. On all models, remove manual valve from valve body assembly. Remove valve stopper and clamp. Place valve body assembly with lower valve body facing upward. Remove bolts, lower valve body and lower separator plate from intermediate plate.
3. Remove relief spring, steel balls and "L" shaped oil filter from intermediate plate. See **Fig. 32** . Remove bolts, intermediate plate and upper separator plate from upper valve body. See **Fig. 33** .
4. Remove block and upper separator plate from intermediate plate. Note location of Teflon ball, steel balls and stopper plates in upper valve body. See **Fig. 32** .
5. Remove Teflon ball, steel balls and stopper plates from upper valve body. Disassemble components from upper and lower valve bodies. See **Fig. 33** .
6. Ensure front end cover on upper valve body is held downward when removing bolts to prevent line pressure adjusting screw and spring from popping out of upper valve body. Use care when removing components from valve bodies, as components may be under spring tension.

Cleaning & Inspection

Clean components with solvent and dry with compressed air. Ensure all valves slide freely in bore.

Reassembly

1. To reassemble, reverse disassembly procedure. Ensure all steel balls, Teflon ball, relief spring and "L" shaped oil filter are installed in correct location. See **Fig. 32** .
2. Use guide studs when assembling valve body assembly to ensure correct alignment of valve bodies. Tighten valve body bolts to specification. See **TORQUE SPECIFICATIONS** .

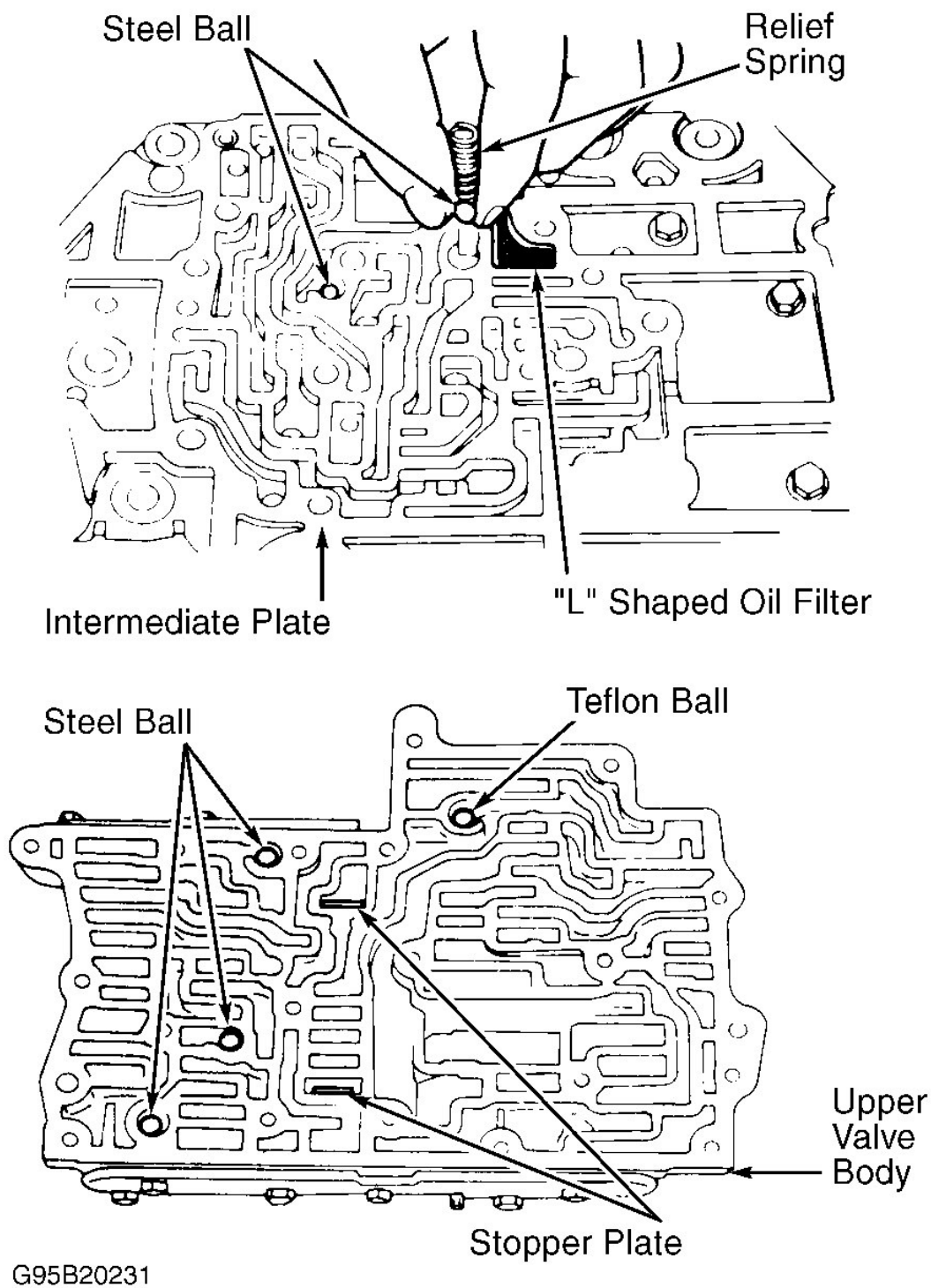


Fig. 32: Identifying Relief Spring, Steel Balls, Teflon Ball, "L" Shaped Oil Filter & Stopper Plate Locations

Courtesy of HYUNDAI MOTOR CO.

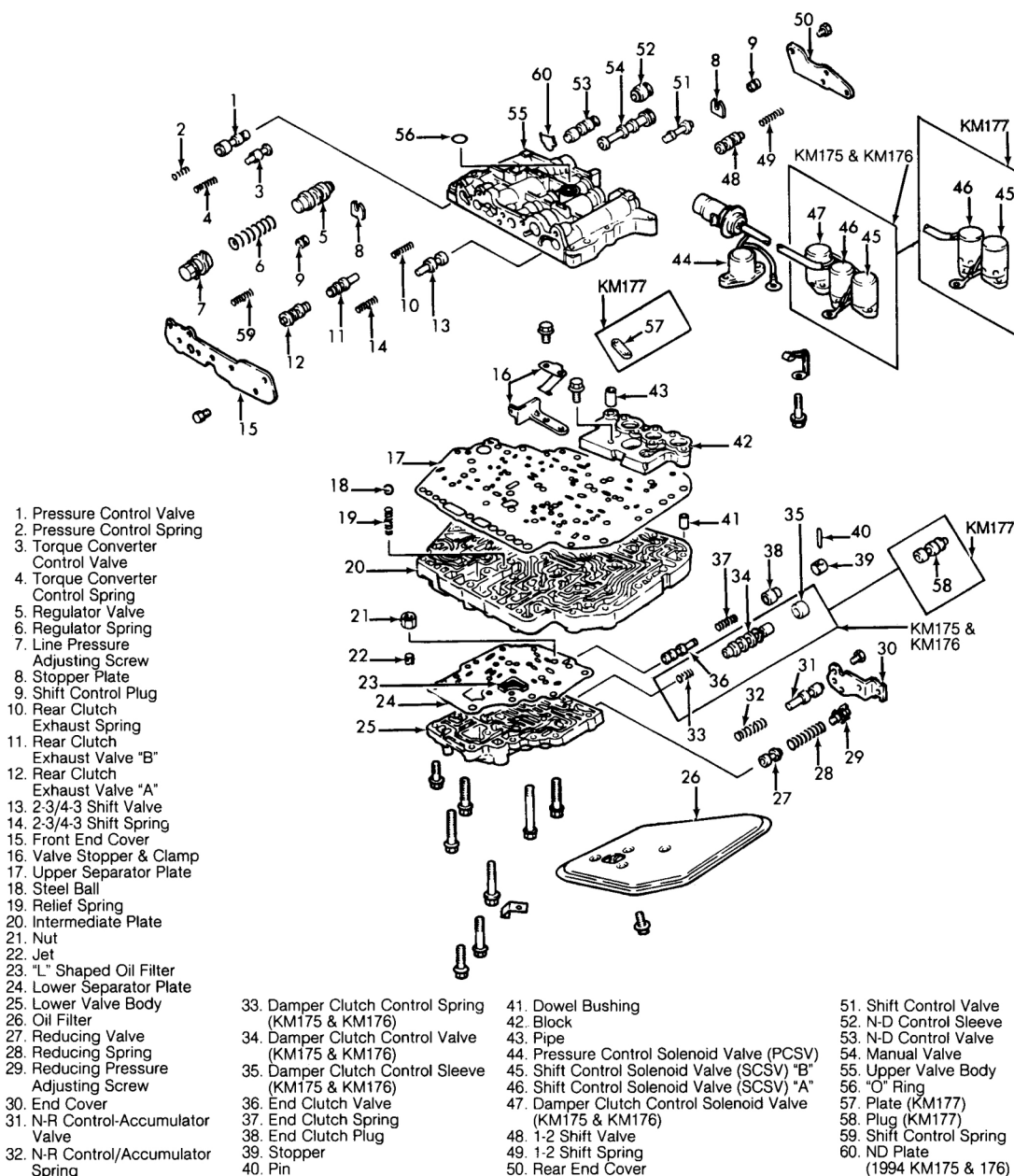


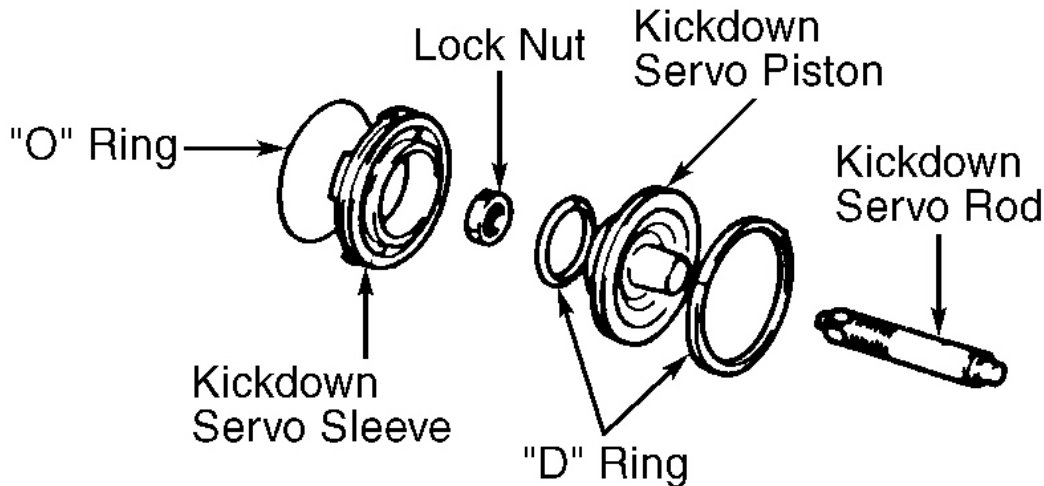
Fig. 33: Exploded View Of Valve Body Assembly
Courtesy of HYUNDAI MOTOR CO.

KICKDOWN SERVO

Disassembly & Reassembly

Disassemble kickdown servo components. See **Fig. 34** . To reassemble, reverse disassembly procedure using

NEW "O" ring and NEW "D" rings. Coat "O" ring and "D" rings with Mopar Plus-Type 7176 ATF.



95D20233

Fig. 34: Exploded View Of Kickdown Servo & Components
Courtesy of HYUNDAI MOTOR CO.

TRANSAXLE REASSEMBLY

VALVE BODY ASSEMBLY & INTERNAL COMPONENTS

NOTE: Coat all components with Mopar Plus-Type 7176 ATF before reassembly. Ensure clutch discs are soaked in Mopar Plus-Type 7176 ATF for at least 2 hours before installing. Apply petroleum jelly on all thrust bearings, thrust races and thrust washers before installing.

1. Low-reverse brake clearance must be check first before assembly of transaxle. Install low-reverse brake clutch pack which consists of brake reaction plate, brake discs and brake plates in transaxle housing. See **Fig. 35** .
2. Install pressure plate and return spring on low-reverse brake clutch pack. Ensure return spring is installed facing correct direction. See **Fig. 35** .
3. Apply petroleum jelly on wave spring and install on center support. **DO NOT** install "O" rings on center support at this time.
4. Attach Center Support Remover/Installer (09453-21310) on center support. See **Fig. 17** . Install center support in transaxle housing. Install snap ring that retains center support in transaxle housing.
5. Attach dial indicator on transaxle housing, so dial indicator stem contacts brake reaction plate at right angle from transfer idler shaft hole. See **Fig. 35** . Zero dial indicator.
6. Using air pump, apply air pressure on passage in transaxle housing and note reading on dial indicator. See

Fig. 36 . Reading obtained is the low-reverse brake clearance.

7. Low-reverse brake clearance should be within specification. See **LOW-REVERSE BRAKE CLEARANCE SPECIFICATIONS** .

LOW-REVERSE BRAKE CLEARANCE SPECIFICATIONS

Application	In. (mm)
Sonata	.0384-.0507 (.975-1.287)
All Others	.0307-.0430 (.780-1.090)

8. If low-reverse brake clearance is not within specification, install different thickness pressure plate to obtain correct clearance. Consult parts department for available pressure plate thickness. Remove dial indicator.

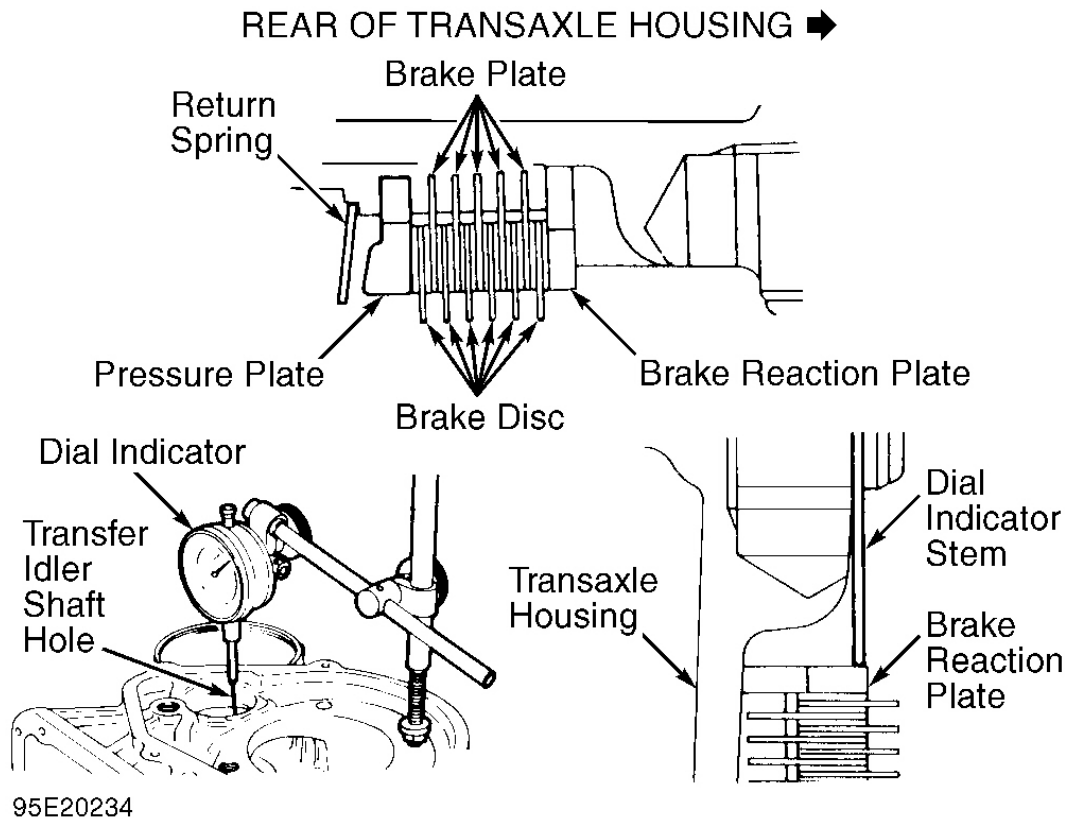


Fig. 35: Installing Low-Reverse Brake Components & Positioning Dial Indicator
Courtesy of HYUNDAI MOTOR CO.

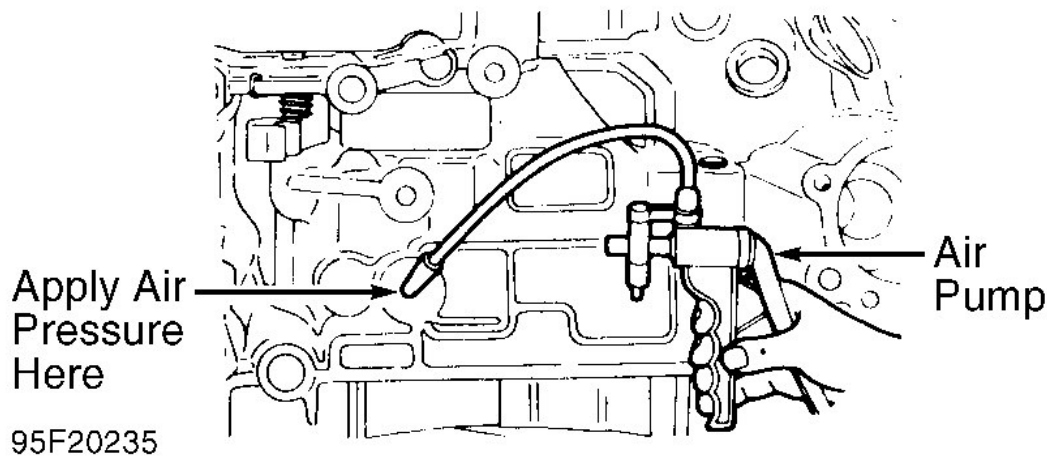


Fig. 36: Applying Air Pressure To Check Low-Reverse Brake Clearance
Courtesy of HYUNDAI MOTOR CO.

9. Once correct low-reverse brake clearance is obtained, remove center support, pressure plate, return spring and low-reverse brake clutch pack. Using hammer and bearing race installer, install bearing races for transfer shaft bearing in transaxle housing (if removed).
10. Install small NEW "O" ring on manual control shaft. **DO NOT** install larger "O" ring on manual control shaft before installing shaft, as "O" ring will interfere with hole for the set screw.
11. Install manual control shaft in transaxle case. Push manual control shaft inward, toward manual control lever. Install remaining NEW "O" ring on manual control shaft.
12. Pull manual control shaft back into transaxle housing to align with set screw. Install NEW gasket on set screw. Install and tighten set screw to specification. See **TORQUE SPECIFICATIONS**.
13. Install detent ball, seat and spring in transaxle housing. See **Fig. 19**. Install the parking brake rod and parking brake rod support. See **Fig. 19**. Tighten parking brake rod support bolts to specification.
14. Install transfer shaft with bearing in transaxle housing. Install Transfer Shaft Retainer (09455-21301) on transaxle housing to support transfer shaft. See **Fig. 37**.

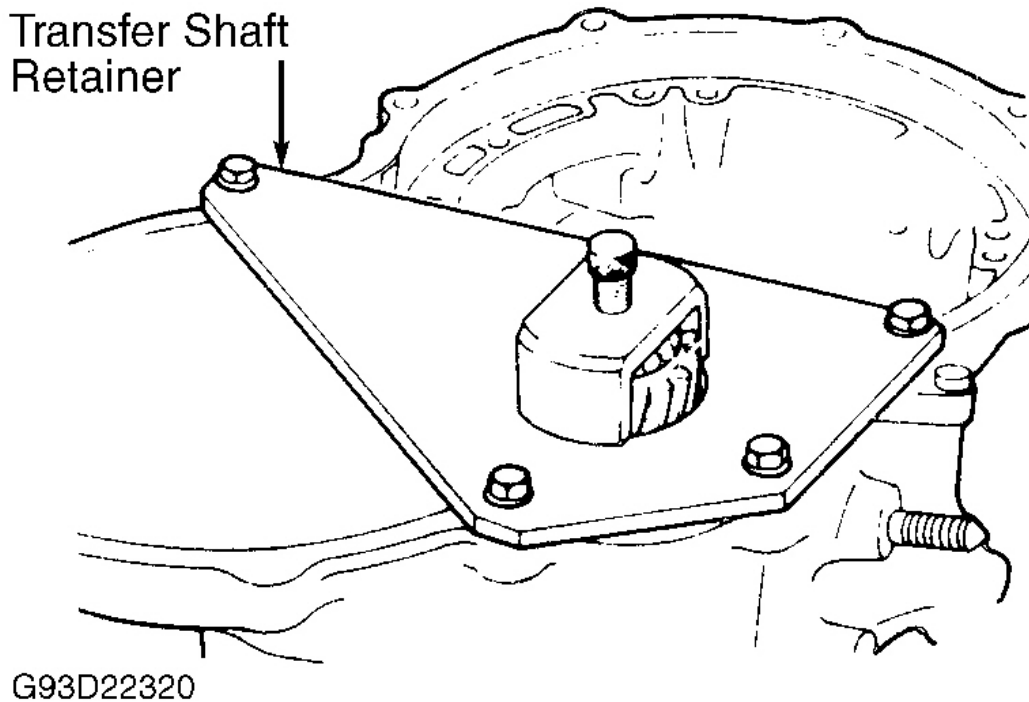
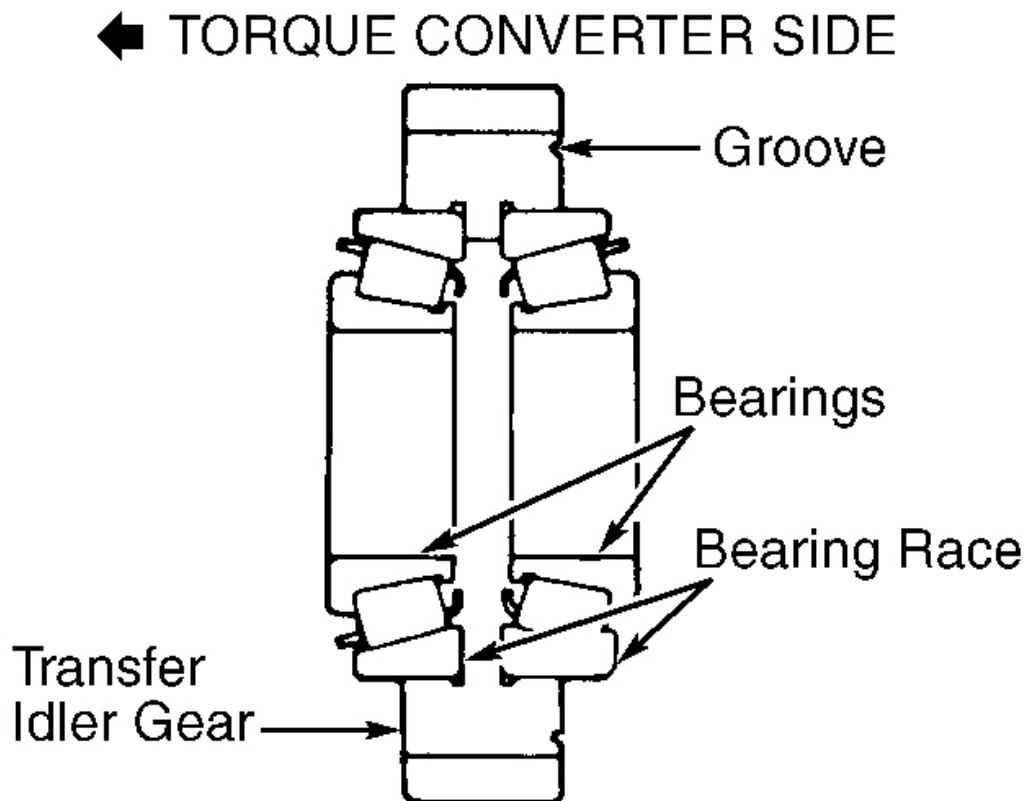


Fig. 37: Installing Transfer Shaft Retainer
 Courtesy of HYUNDAI MOTOR CO.

15. Install .0709" (1.800 mm) thick spacer on transfer shaft. Install transfer driven gear on transfer shaft. Using hammer and gear installer, tap transfer driven gear onto transfer shaft until gear is fully seated. Remove transfer shaft retainer.
16. Install and tighten transfer shaft lock nut to 148-170 ft. lbs. (201-231 N.m). Using dial indicator, check transfer shaft end play.
17. Transfer shaft end play should be 0-.0010 (0-.025 mm). If transfer shaft end play is not within specification, install different thickness spacer to obtain correct transfer shaft end play. Consult parts department for available spacer thickness.
18. Once correct transfer shaft end play is obtained, stake transfer shaft lock nut against transfer shaft. Install transfer shaft cover.
19. From inside transaxle housing, install internal gear, output flange and transfer drive gear with rear bearing as an assembly. Install snap ring on rear bearing. See **Fig. 19**.
20. Coat spacer for transfer idler gear with petroleum jelly and install in transaxle housing. See **Fig. 19**.
21. Install transfer idler gear with bearings in transaxle housing so groove on gear is away from torque converter side of transaxle housing. See **Fig. 38**.

CAUTION: Transfer idler gear must be installed in transaxle housing with groove on gear facing away from torque converter side of transaxle housing.

See **Fig. 38** .



G95G20236

Fig. 38: Installing Transfer Idler Gear
Courtesy of HYUNDAI MOTOR CO.

22. Install idler shaft in transaxle housing and transfer idler gear. Using Adapter (09545-21100), tighten the idler shaft. See **Fig. 19** .
23. Using INCH-lb. torque wrench and Adapter (09458-33001), measure transfer idler gear preload by rotating output flange. See **Fig. 39** .
24. Transfer idler gear preload should be within specification. See **TRANSFER IDLER GEAR PRELOAD** .

TRANSFER IDLER GEAR PRELOAD

Application	INCH lbs. (N.m)
Sonata	

4-Cylinder With KM175	7 (.8)
V6 With KM177	13 (1.5)
All Others	13 (1.5)

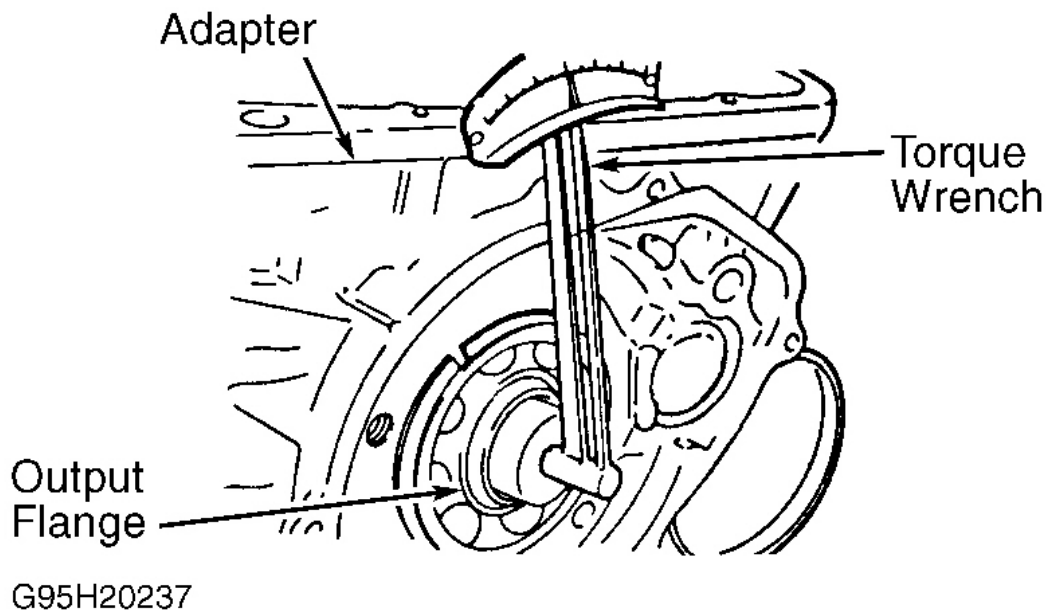
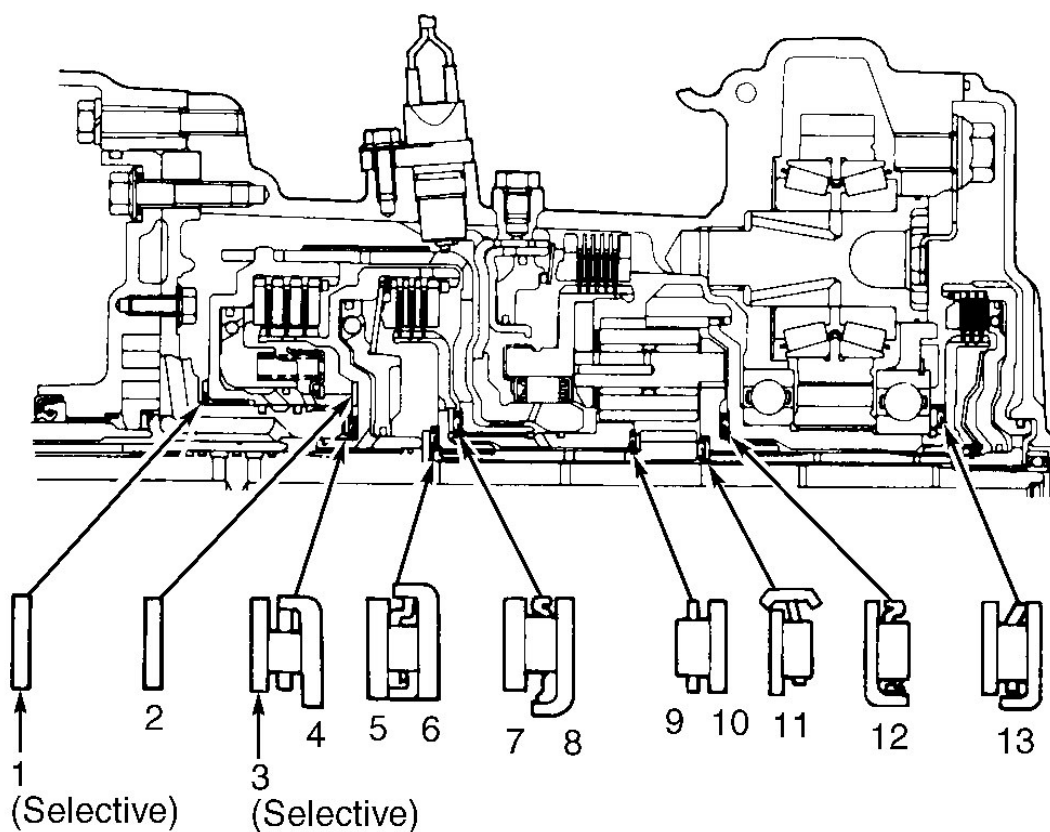


Fig. 39: Measuring Transfer Idler Gear Preload
 Courtesy of HYUNDAI MOTOR CO.

25. If transfer idler gear preload is not within specification, use adapter to tighten or loosen idler shaft to obtain correct preload. Install bolt and idler shaft lock plate. See **Fig. 19** .
26. Ensure idler shaft lock plate fits against idler shaft. Tighten idler shaft lock plate bolt to specification.
27. Install bearing retainer. See **Fig. 18** . Apply thread sealant on threads of bearing retainer screws. Install and tighten screws to specification. Using hammer and chisel, stake bearing retainer screws against bearing retainer.
28. Install thrust bearing No. 12 on rear of planetary carrier assembly. Ensure thrust bearing is installed in correct direction. See **Fig. 40** .



NOTE: If thrust race No. 3 is replaced with one of a different thickness, also replace thrust washer No. 1 between oil pump and front clutch.

G95I20238

Fig. 40: Identifying Thrust Bearing, Thrust Race & Thrust Washer Locations
Courtesy of HYUNDAI MOTOR CO.

29. Install planetary carrier assembly in transaxle housing. If assembling sun gear assembly, squeeze ends of seal ring together before installing on sun gear assembly. Install seal ring and snap ring on sun gear assembly.
30. Install thrust bearing No. 9 and thrust race No. 10 on forward sun gear. See **Fig. 41** . Assemble reverse sun gear and forward sun gear.

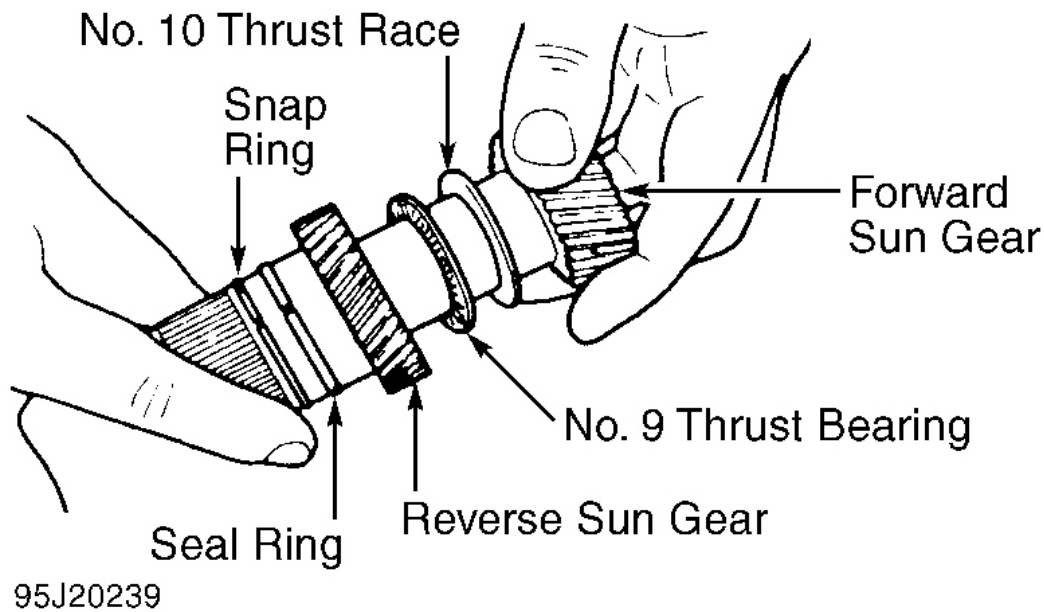


Fig. 41: Assembling Sun Gear Assembly
Courtesy of HYUNDAI MOTOR CO.

31. Install sun gear assembly in planetary carrier assembly. See **Fig. 18** . Install low-reverse brake clutch pack which consists of brake reaction plate, brake discs and brake plates in transaxle housing. See **Fig. 35** .
32. Install pressure plate and return spring on low-reverse brake clutch pack. Ensure return spring is installed facing correct direction. See **Fig. 35** .
33. Apply petroleum jelly on wave spring and install on center support. Install NEW "O" rings on center support. Coat "O" rings with Mopar Plus-Type 7176 ATF.
34. Using center support remover/installer, install center support in transaxle housing. Ensure wave spring stays properly positioned on center support.
35. Install snap ring that retains center support in transaxle housing so ends of snap ring align with hole in transaxle case for pulse generator "A". See **Fig. 42** .

CAUTION: Ensure ends of snap ring align with hole in transaxle case for pulse generator "A".

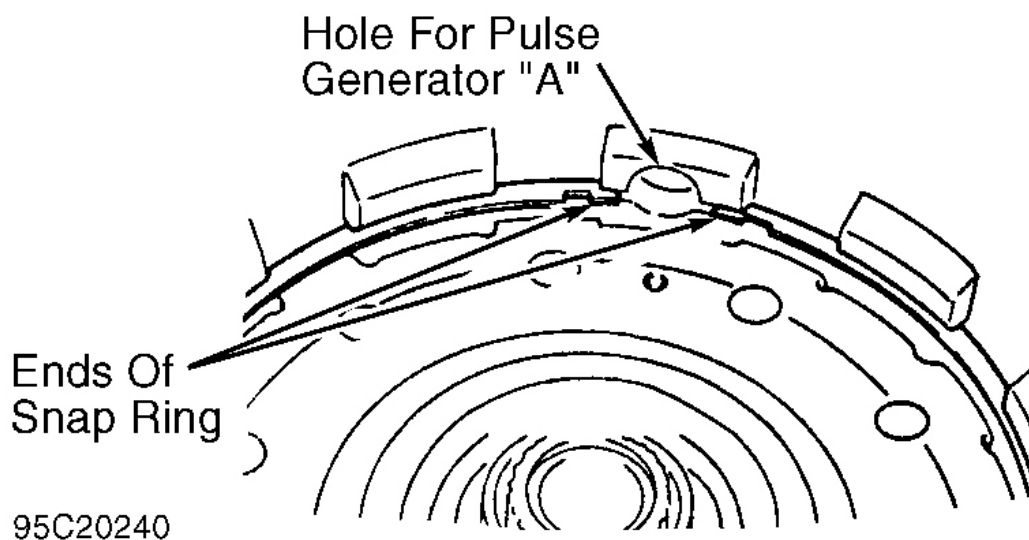


Fig. 42: Installing Snap Ring For Center Support
 Courtesy of HYUNDAI MOTOR CO.

36. Install anchor rod for kickdown band in transaxle housing. See **Fig. 17** . Install NEW "O" ring and NEW "D" rings on kickdown servo assembly. See **Fig. 34** .
37. Install kickdown servo assembly with spring in transaxle housing. Using spring compressor, depress kickdown servo and install snap ring. Remove spring compressor.
38. Install kickdown band so end of band engages with anchor rod and kickdown servo rod on kickdown servo. Install kickdown drum so splines on drum engage with sun gear assembly.
39. Tighten kickdown servo adjusting screw to hold kickdown band in place. Install thrust bearing No. 8 on center of kickdown drum. Ensure thrust bearing is installed in correct direction. See **Fig. 40** .
40. Install thrust race No. 7 on rear of clutch hub. Install clutch hub. Ensure clutch hub fully engages splines on sun gear assembly.
41. Install thrust bearing on front of the clutch hub. See **Fig. 17** . Install thrust washer No. 2 and thrust bearing No. 4 on shaft end at front side of rear clutch. Install rear clutch assembly on front clutch assembly. Ensure clutch assemblies are fully engaged.
42. Install front and rear clutch assemblies in transaxle housing. See **Fig. 17** . Install differential assembly in transaxle housing.
43. Install thrust race No. 3 (metal race) on front clutch assembly. Install thrust washer No. 1 (fiber washer) on rear of oil pump.
44. Install guide studs for oil pump alignment in transaxle case. Install NEW gasket for oil pump in transaxle housing. **DO NOT** install NEW "O" ring on outside of oil pump housing at this time.
45. Install oil pump. Ensure thrust washer No. 1 remains in place on oil pump during installation. Remove guide studs. Install and tighten oil pump-to-transaxle housing bolts to specification.
46. Using dial indicator, measure input shaft end play. Input shaft end play should be .012-.039" (.30-1.00

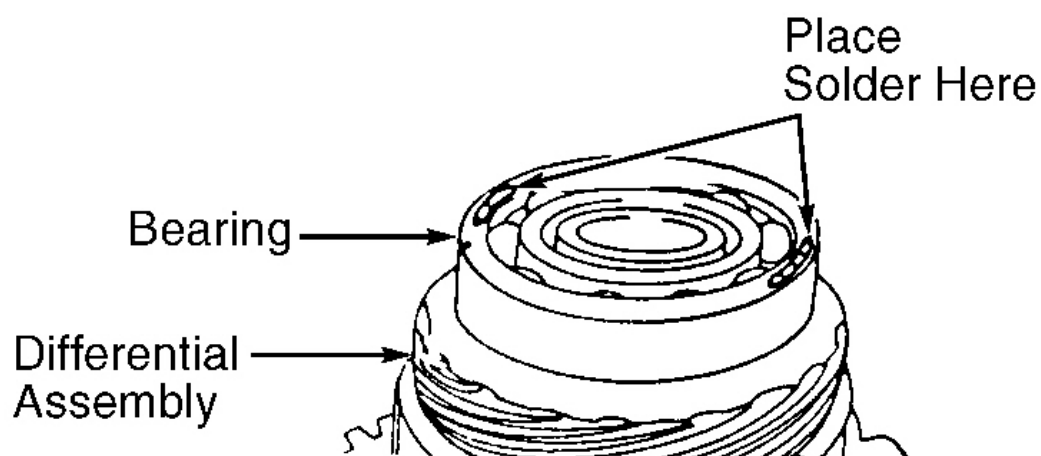
mm). If input shaft end play is not within specification, install different thickness thrust race No. 3. When selecting thrust race No. 3, select appropriate thrust washer No. 1 to be used with thrust race No. 3. Refer to **THRUST WASHER & THRUST RACE SELECTION**.

NOTE: If thrust race No. 3 is replaced with one of different thickness, also replace thrust washer No. 1 between oil pump and front clutch to obtain correct input shaft end play.

THRUST WASHER & THRUST RACE SELECTION

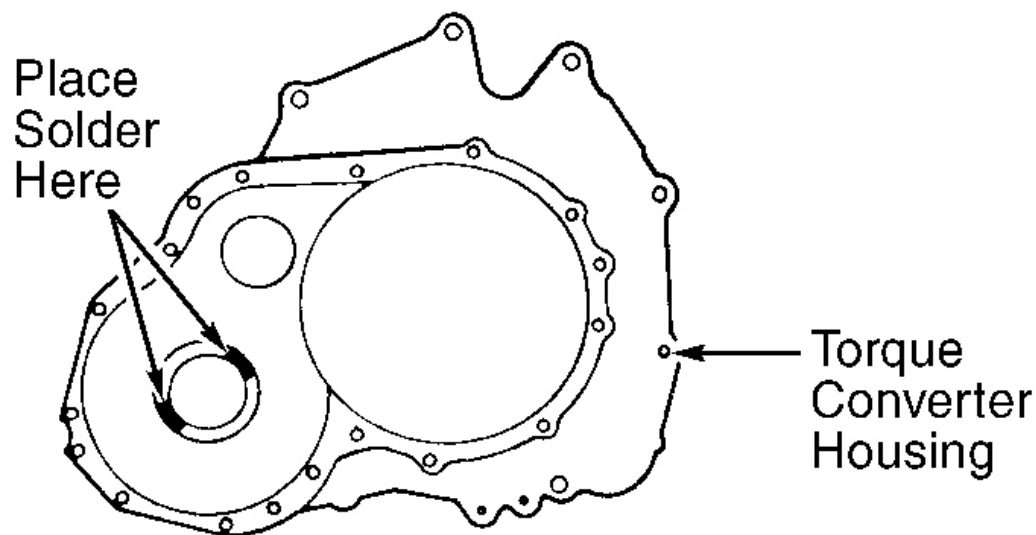
Washer No. 1 Thickness: In. (mm)	Race No. 3 Thickness: In. (mm)
.055 (1.40)	.039 (1.00)
.055 (1.40)	.047 (1.20)
.071 (1.80)	.055 (1.40)
.071 (1.80)	.063 (1.60)
.087 (2.20)	.071 (1.80)
.087 (2.20)	.079 (2.00)
.102 (2.60)	.087 (2.20)
.102 (2.60)	.095 (2.40)

47. Once correct input shaft end play is obtained, remove oil pump. Install NEW "O" ring on outside of oil pump housing. Reinstall oil pump. Tighten bolts to specifications.
48. On KM175 and KM176 models, place 2 pieces of solder .39" (10.0 mm) long and .12" (3.0 mm) in diameter at 2 places on bearing on differential assembly. See **Fig. 43 -Fig. 44**.
49. On KM177 models, remove bearing race for differential assembly bearing and spacer from torque converter housing. Place 2 pieces of solder .39" (10.0 mm) long and .12" (3.0 mm) in diameter at 2 places on torque converter housing. See **Fig. 43 -Fig. 44**. Install bearing race in torque converter housing.



95D20241

Fig. 43: Installing Solder For Checking Differential Bearing Preload
Courtesy of HYUNDAI MOTOR CO.



95E20242

Fig. 44: Installing Solder For Checking Differential Bearing Preload
Courtesy of HYUNDAI MOTOR CO.

50. On KM175 and KM176 models, install NEW gasket on transaxle housing. On KM177 models, **DO NOT** install rubber-coated metal gasket on transaxle housing.
51. On all models, install torque converter housing on transaxle housing. Install and tighten torque converter housing bolts to 14-17 ft. lbs. (19-23 N.m). Remove bolts, torque converter housing and gasket (KM175 and KM176 models).
52. On KM175 and KM176 models, remove solder from bearing on differential assembly. Using micrometer, measure thickness of solder. Using solder thickness, determine required spacer thickness. Spacer should be .0031-.0051" (.080-.130 mm) thicker than the solder to provide proper differential bearing preload.
53. Install selected spacer on bearing on differential assembly. See **Fig. 17** . Apply silicone sealant on torque converter housing-to-transaxle housing sealing surfaces.
54. Install NEW gasket on transaxle housing. Install torque converter housing on transaxle housing. Install and tighten torque converter housing bolts to specification.
55. On KM177 models, remove bearing race and solder from torque converter housing. Using micrometer, measure thickness of solder and rubber-coated metal gasket.
56. Add thickness of rubber-coated metal gasket to the solder thickness. Spacer should be .0031-.0051" (.080-.130 mm) thicker than the total thickness of solder and rubber-coated metal gasket to provide proper differential bearing preload.
57. Install selected spacer in torque converter housing. Install bearing race in torque converter housing.
58. Apply silicone sealant on torque converter housing-to-transaxle housing sealing surfaces. Install NEW rubber-coated metal gasket on transaxle housing.
59. Install torque converter housing on transaxle housing. Install and tighten torque converter housing bolts to specification. See **TORQUE SPECIFICATIONS** .
60. On all models, install end clutch shaft with long splines on the shaft toward oil pump end of transaxle housing. See **Fig. 15** .

CAUTION: Ensure long splines on end clutch shaft are toward oil pump end of transaxle housing. Short splines should be toward rear of transaxle housing.

61. Install thrust washer on end clutch assembly so thrust washer faces the return spring on end clutch assembly. Install end clutch hub in end clutch assembly. Ensure end clutch hub aligns with splines on clutch discs on end clutch assembly.
62. Install thrust bearing No. 13 on rear of end clutch hub. Ensure thrust bearing is installed in correct direction. See **Fig. 40** . Install end clutch assembly.
63. Install NEW "O" ring and NEW "D" ring on end cover. Coat "O" ring and "D" rings with Mopar Plus-Type 7176 ATF. Ensure "O" ring and "D" ring are not twisted.
64. Align bolt holes in end cover with bolt holes in transaxle housing and install end cover. Bolt holes must be aligned before installing end cover. If end cover is rotated once installed, "O" ring or "D" ring may be damaged.
65. Install and tighten end cover bolts to specification. Install NEW "O" ring on upper surface of valve body assembly, where valve body seals against transaxle housing.
66. Install NEW "O" ring on solenoid valve electrical connector grommet where it seals against transaxle housing. Install valve body assembly and solenoid valve electrical connector grommet. Ensure pin on

manual control shaft engages with manual valve on valve body assembly.

67. Ensure notch on solenoid valve electrical connector grommet is toward front of transaxle housing and wiring is properly routed.
68. Install oil temperature sensor and valve body assembly-to-transaxle housing bolts. Ensure proper length bolt is installed in correct location. See **Fig. 13**.
69. Tighten valve body assembly-to-transaxle housing bolts to specification. Install oil filter. Tighten oil filter bolts to specification.
70. Ensure the 5 magnets are installed in 5 depression areas on oil pan. Using NEW gasket, install oil pan. Install and tighten oil pan bolts to specification.
71. Using NEW "D" ring, install kickdown servo switch and snap ring. See **Fig. 14**. Install transaxle range switch. To adjust range switch, see **AUTO TRANS DIAGNOSIS - KM175, KM176 & KM177** article in the AUTO TRANS DIAGNOSIS section.
72. Install pulse generators. Install and tighten pulse generator bolts to specification. Lubricate torque converter surface (where converter slides into oil pump) with Mopar Plus-Type 7176 ATF. Install torque converter.
73. To ensure torque converter is fully seated, measure distance from front of ring gear surface to mounting surface on torque converter housing. Distance should be approximately .472" (12.00 mm) if torque converter is fully seated.
74. If distance is incorrect, remove torque converter and check alignment of torque converter with oil pump drive. Adjust kickdown servo. See **KICKDOWN SERVO ADJUSTMENT** under ON-VEHICLE SERVICE.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Bearing Retainer Screw	13-16 (18-22)
Drain Plug	22-26 (30-35)
Idler Shaft Lock Plate Bolt	35-44 (47-60)
Kickdown Servo Lock Nut	18-24 (24-33)
Oil Pump-To-Transaxle Housing Bolt	11-16 (15-22)
Overrun Clutch Outer Race-To-Planetary Carrier Bolt	18-25 (24-34)
Parking Brake Rod Support Bolt	15-20 (20-27)
Ring Gear Bolt ⁽¹⁾	96-103 (130-140)
Transfer Shaft Lock Nut	148-170 (201-231)
Torque Converter Housing Bolt	14-17 (19-23)
	INCH Lbs. (N.m)
End Cover Bolt	35-53 (4.0-6.0)
Oil Filter Bolt	44-62 (5.0-7.0)
Oil Pan Bolt	89-106 (10.0-12.0)
Oil Pump Housing-To-Reaction Shaft Mount Bolt	89-106 (10.0-12.0)
Pressure Tap Plug	71-89 (8.0-10.0)

1990 Hyundai Excel

1987-94 AUTOMATIC TRANSMISSIONS KM175, KM176 & KM177 Overhaul

Pulse Generator Bolt	89-106 (10.0-12.0)
Set Screw	71-89 (8.0-10.0)
Transaxle Range Switch Bolt	89-106 (10.0-12.0)
Valve Body Assembly-To-Transaxle Housing Bolt	89-106 (10.0-12.0)
Valve Body Bolt	35-53 (4.0-6.0)

(1) Tighten bolts in crisscross pattern to specification.

TRANSAXLE SPECIFICATIONS

TRANSAXLE SPECIFICATIONS

Application	In. (mm)
Clutch Clearance - End Clutch	
Sonata V6 W/KM177	.024-.033 (.60-.85)
All Others	.016-.026 (.40-.65)
Clutch Clearance - Front Clutch	
Sonata	.028-.035 (.70-.90)
All Others	.016-.024 (.40-.60)
Clutch Clearance - Rear Clutch	
Elantra	.012-.020 (.30-.50)
Excel & Precis - 1993 Models	.012-.020 (.30-.50)
Excel & Precis - 1994 Models	.016-.024 (.40-.60)
Sonata	.016-.024 (.40-.60)
Differential Side Gear Backlash	.0010-.0059 (.025-.150)
Input Shaft End Play	.012-.039 (.30-1.00)
Low-Reverse Brake Clearance	
Sonata	.0384-.0507 (.975-1.287)
All Others	.0307-.0430 (.780-1.090)
Oil Pump Gear Side Clearance	
Sonata	.0004-.0019 (.010-.048)
All Others	.0012-.0020 (.030-.050)
Transfer Idler Gear Preload	
Sonata 4-Cylinder With KM175	7 (.8)
Sonata V6 With KM177	13 (1.5)
All Others	13 (1.5)
Transfer Shaft End Play	0-.0010 (0-.025)

WIRING DIAGRAMS

See the [AUTO TRANS DIAGNOSIS - KM175, KM176 & KM177](#) article in the AUTO TRANS DIAGNOSIS section.

TECHNICAL SERVICE BULLETINS

DELAYED FORWARD GEAR ENGAGEMENT

ATRA Technical Service Bulletin 263 (1994)

Some vehicles with KM series transaxles may exhibit a delayed forward gear engagement. Delayed forward gear engagement may be caused by improper assembly of rear clutch retainer on the input shaft. Rear clutch retainer may use 3 slots (flat area in spline area) which must be aligned with the 3 slots (flat area in spline area). If areas are not aligned, this may result in a delayed forward gear engagement.

ENGINE RPM INCREASE & HARSH GEAR, ENGAGEMENT WHEN SHIFTING INTO GEAR

Hyundai Technical Service Bulletin 93-40-017 (October 1993)

Some vehicles with KM series transaxles may exhibit a slight increase in engine RPM for 4-6 seconds. Vehicle will also exhibit a minor harshness when shifting into gear after vehicle has been setting for a long period, such as overnight. On KM175 and KM176 models, this condition may be caused by a damaged seal ring on drive gear in the oil pump. On KM177 models, this condition may be caused by improper machining or damaged area on drive gear-to-reduction shaft support surface on oil pump.

HARSH COAST DOWNSHIFTS

ATRA Technical Service Bulletin 288 (1995)

Some vehicles with KM series transaxles may exhibit a harsh coast downshift. Harsh coast downshift may be caused by an improperly adjusted accelerator switch. For accelerator switch adjustment procedure see **AUTO TRANS DIAGNOSIS - KM175, KM176 & KM177** in AUTO TRANS DIAGNOSIS.

INTERMITTENT SLIPPAGE IN 4TH GEAR

Hyundai Technical Service Bulletin 93-04-011 (august 1993)

Some 1993 Hyundai models may exhibit transaxle clutch slippage in 4th gear (overdrive) with no trouble codes existing. Problem may be caused by the pipe being pushed too far into the block or upper valve body, causing a restriction in the fluid flow, causing partial clutch application. Pipe is located on the block, and fits between the block and upper valve body. See **Fig. 33**. Problem may also be caused by sticking end clutch valve or defective end clutch. To check for problem causes, perform the following:

1. Check end clutch pressure. See **HYDRAULIC PRESSURE TEST** under TESTING. If no clutch pressure exists, or pressure is low, remove valve body assembly. Check for proper positioning of the pipe, located on the block, and fits between the block and upper valve body. See **Fig. 33**.
2. If pipe is properly positioned, check for sticking end clutch valve and spring in valve body assembly. If valve is sticking, clean valve and recheck operation.
3. If end clutch valve operation is okay, remove end clutch. Using air pressure, check end clutch operation. Replace end clutch components as necessary.

NO REVERSE GEAR OR BINDS IN REVERSE**ATRA Technical Service Bulletin 224 (1994)**

Some vehicles with KM series transaxles may exhibit no Reverse or binds in Reverse. If this problem exists, perform the following procedure.

1. To determine if problem is a mechanical or hydraulic failure, get the vehicle to bind in Reverse. Shut engine off with shift lever still in Reverse. Not if vehicle can be pushed back and forth in both directions.
2. If vehicle moves back and forth in both directions, this indicates a hydraulic failure. Hydraulic failure may be caused by defective components or sticking valves in valve body assembly. If valves are not sticking and valve body components are okay, oil pump and seal rings on input shaft may be defective.
3. If vehicle moves in only one direction, either kickdown band or kickdown servo may be mechanically applied, or snap ring in transaxle housing for center support is contacting the kickdown drum. Snap ring may contact kickdown drum if ends of snap ring are not aligned with hole in transaxle case for pulse generator "A". See **Fig. 42** . When pulse generator is installed, snap ring is pressed against kickdown drum.
4. If vehicle will not move in either direction, remove valve body assembly and check for problem with parking brake rod. Ensure crimp areas on parking brake rod, near the sleeve and spring, are okay. Sleeve is located on parking brake rod. See **Fig. 19** . If crimp areas are worn, this may allow sleeve on parking brake rod to exceed proper travel distance. This allows shift lever to be moved, but sleeve may remain engaged with the parking pawl.

POOR 1-2 UPSHIFT QUALITY OR HARSH SHIFTS**Hyundai Technical Service Bulletin 94-40-010 (August 1994)**

Some 1990-94 Hyundai Excel, Elantra and Sonata models may exhibit poor 1-2 upshift quality or harsh shifting after 15,000 to 20,000 miles. Conditions may be caused by damaged kickdown servo components or scratches in kickdown servo bore. Remove kickdown servo from transaxle. Disassemble kickdown servo and check components. See **KICKDOWN SERVO** under COMPONENT DISASSEMBLY & REASSEMBLY. Repair damaged components and reverse disassembly procedure using **NEW** "O" ring and **NEW** "D" rings. Coat "O" ring and "D" rings with Mopar Plus-Type 7176 ATF. Adjust kickdown servo. See **KICKDOWN SERVO ADJUSTMENT** under ON-VEHICLE SERVICE.

STICKING DAMPER CLUTCH CONTROL VALVE**Hyundai Technical Service Bulletin 93-04-015 (September 1993)**

On some Excel models, damper clutch control valve may bind bore on lower valve body. Binding of damper clutch control valve may be caused by installing improper length oil filter bolts. If too long a bolt is installed in position "C", bolt will bottom in lower valve body, causing an out-of-round condition on the bore in lower valve body. See **Fig. 45** . Bolt length for positions "A" and "B" should be .87" (22.0 mm) and bolt length for positions "C" and "D" should be .63" (16.0mm).

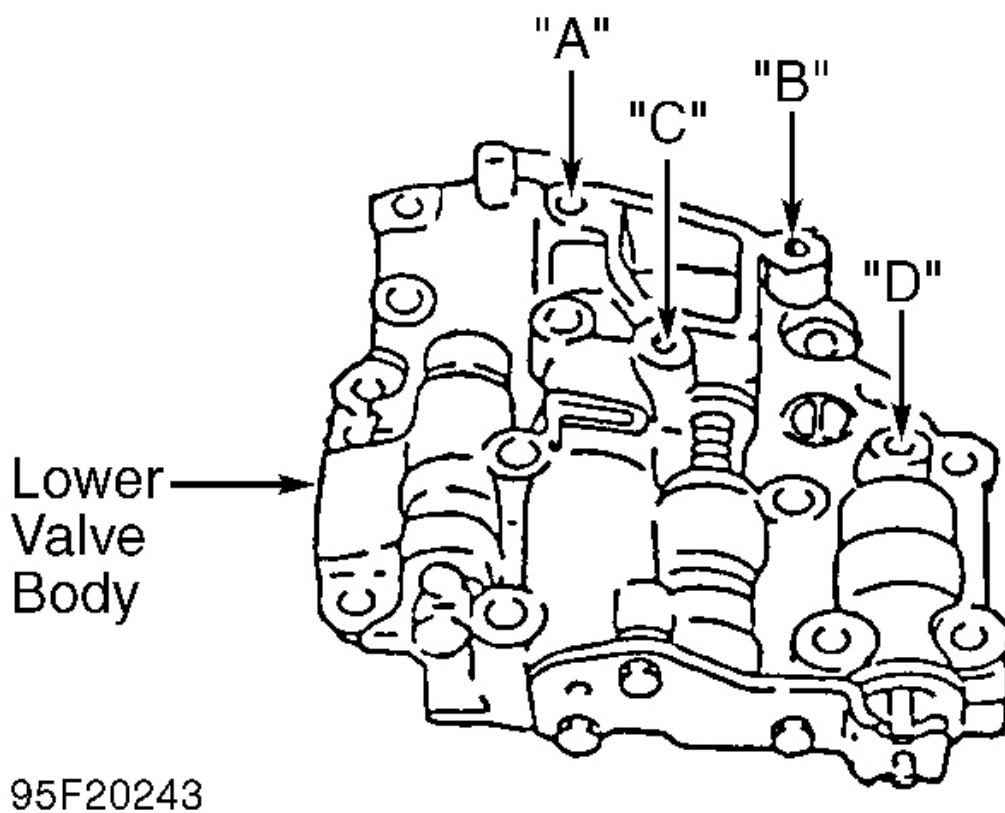


Fig. 45: Identifying Oil Filter Bolt Locations
 Courtesy of HYUNDAI MOTOR CO.

TRANSAXLE WHINING NOISE

Mitsubishi Technical Bulletin 94-23-001 (January 1994)

Some 1990-93 Precis models with vehicle build date prior to November 14, 1992 may exhibit whining noise from transaxle. To reduce whining noise, gear tooth depth on transfer drive gear, transfer idler gear and transfer driven gear was modified from 6.6mm to 7.2 mm. Following gears must be installed to correct transaxle whining noise:

REPLACEMENT GEAR SPECIFICATIONS

Application	Part No.
Transfer Drive Gear Kit	45810-34111
Transfer Idler Gear	45735-34111
Transfer Driven Gear	45720-36501