INDEX

AUTOMATIC TRANSMISSION SERVICE GROUP

1989
SEMINAR

TRANSMISSION TECHNOLOGY SIMPLIFIED

This booklet has compiled an introduction to the new CHRYSLER A-500 overdrive read drive automatic transmission, the new A-604 automatic overdrive transaxle and the FORD E40D truck automatic overdrive transmission.

In answer to the many requests for power flow of the different Domestic and Foreign automatic transmissions we have covered the most common units. These charts show what components are on in the different drive ranges. This should be of great help in diagnosing transmission malfunctions.

We have added a section showing the cooler flow from the transmission, the outlet side to the cooler, and the return line fitting in the transmission.

A thought: It might be helpful to arrange transmission problems as follows:

COMPLAINT . . . . . or problem
CAUSE . . . . . the part or condition creating the problem
CORRECTION . . . . what is needed to be done to fix the problem

Keep in mind you have the need to be able to diagnose whether the transmission problem is ELECTRICAL – HYDRAULIC – MECHANICAL if it is not the computer . . . again we welcome you.

ROBERT D. CHERRNAY
Technical Director

DALE ENGLAND
Field Service Consultant

AUTOMATIC TRANSMISSION SERVICE GROUP
9200 South Dadeland Blvd.
Suite 114
Miami, Florida 33156

BRYCO HAS THE MOST COMPLETE UPDATED LINE OF QUALITY TRANSMISSION PARTS AND KITS FOR FOREIGN AND DOMESTIC CARS!

BRYCO'S New Bands are made with the finest friction material available in the United States!

Priced at, or below the cost of a rebuilt band, without a core charge. Bands are available for all popular American applications, plus a complete line of foreign bands. We now have the AXOD Ford Taurus/Sable transmission band, and coming soon, the GM THM-440-T4.

BRYCO Filters utilize the best felt filter material in the United States!

We are the only QUALITY alternative to the OEM supply. Our newest additions are the GM THM-440-T4, THM-325-4L, Ford C-5 Truck 4x4, FIOD 4x4, AXOD, ATX, and Mazda filters 626, 929, MX-6, also used in the Ford N4A Probe.

BRYCO offers a complete line of Friction Plates for Japanese, German and Domestic Applications.

All manufactured to the highest standards of OEM materials and specifications.

BRYCO Bushings utilize the best bronze and babbit materials.

Manufactured to exacting OEM specifications.

BRYCO Kits for Foreign Cars contain all the right components!

Our correct sizes assure a correct fit! And remember, BRYCO Kits contain only BRYCO components, GUARANTEED for QUALITY and problem-free performance.

Ask your Distributor for the newest BRYCO catalog!

Contains all the newest updates! Everything you need to get the job done.

BRYCO

...PROVEN THE BEST!

BY CARFEL INC.

7495 N.W. 48TH STREET, MIAMI, FL 33166 • PHONE: (305) 592-2760 • TELEX: 153982 • FAX: (305) 592-7543

OVERHAUL KITS • GASKET SETS • SEALING RINGS • CLUTCH PLATES • FILTERS • BUSHINGS • BANDS • SEALS • SOLD THROUGH DISTRIBUTORS ONLY.

CHRYSLER A-500

This bulletin provides a description of the A500 four-speed automatic overdrive transmission as well as diagnosis and repair procedures to service this transmission --- initially released for use on the subject model vehicles.

The front portion of this unit is a modified A999 three-speed loadflite automatic transmission. The rear unit, or overdrive, replaces the extension housing and provides a fourth gear with an economy gear ratio (.69 to 1.0) (Figure 1).

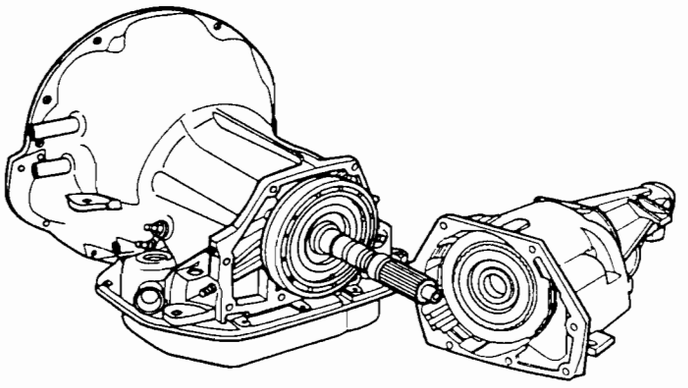


FIGURE 1

A lockup torque converter which is electronically controlled and hydraulically activated, will also be used with this transmission. Fourth gear (overdrive) and lockup will only occur during certain conditions determined by the SMEC (Single Module Engine Controller).

When the vehicle is traveling in third gear over 25 miles per hour, the SMEC uses the following information to allow the shift: The SMEC checks the coolant sensor signal for a 60-degree fahrenheit minimum temperature. It also checks the engine speed sensor, the vehicle speed sensor, the throttle position sensor, and the map sensor.

There is an overdrive off switch located on the instrument panel. The switch is marked O/D OFF and incorporates a pilot light to indicate when the switch has been activated. When activated, the switch will prevent shifts into overdrive and lockup. This is desirable when towing, driving in hilly terrain, or any other driving conditions that make overdrive unsuitable. Activating the switch again will restore the automatic overdrive operation. The switch will reset for operation when the key is turned off.

Other features in conjunction with this unit include:

- The output shaft of the three-speed section will now be referred to as the intermediate shaft.
- The three-speed section rear drum is retained on the support with a snap ring.
- The governor and speedometer drive have been relocated to the rear of the output shaft.
- The overdrive case now contains two output shaft bearings. One is the output shaft front bearing, and the other is the output shaft rear bearing.
- There are no rotating seal rings or pressurized oil for the overdrive and direct clutches in the overdrive housing. The governor is the only component receiving pressurized oil through slip-fit tubes. Pressurized oil for the overdrive lubrication circuit is supplied through the intermediate shaft.
- Governor pressure and overdrive pressure taps are provided in the rear of the main case for in-vehicle transmission pressure testing.
- The valve body has been modified by adding several new valves. There's an overdrive solenoid, a 3-4 shift valve, a 3-4 timing valve, a 3-4 accumulator, and a 3-4 shuttle valve. Once in fourth gear, the lockup solenoid, lockup valve, and lockup timing valve accomplish the hydraulics to lock the converter turbine to the torque converter housing.
- The direct drive and overdrive gear ratios are supplied by a third planetary gear set, a direct clutch, an overdrive clutch, and an overrunning clutch. A very strong spring, rated at up to 800 pounds (5,516 KPA), holds the sun gear to the annulus for direct drive. For coasting or reverse gear, power flows only through the direct clutch.

A500 Power Flow

In third gear, the power flow comes off the intermediate shaft simultaneously into the planet carrier and the overrunning clutch. From the carrier, the power flows into the sun gear, then to the inner sliding hub splines. The direct clutch holds the sliding hub to the direct clutch drum under spring pressure. The drum engages directly with the annulus for a one-to-one ratio. The annulus is splined directly to the output shaft (Figure 2).

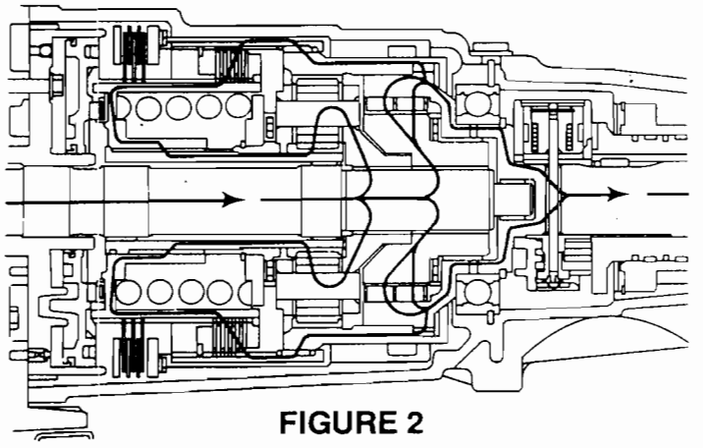


FIGURE 2

The overrunning clutch carries the power flow during the shift into fourth gear. When the SMEC energizes the overdrive solenoid, the third gear line pressure starts to move the overdrive piston rearward. The piston pushes the sliding hub and begins to compress the direct clutch spring. Now, with spring pressure relieved, the direct clutch is disengaged. Power flows only through the overrunning clutch (Figure 3).

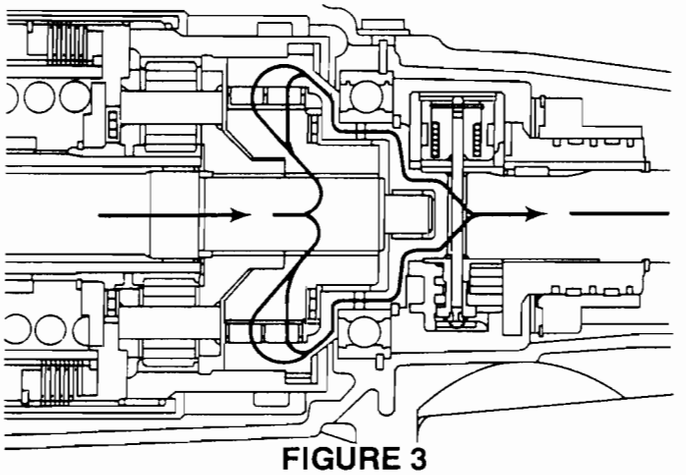


FIGURE 3

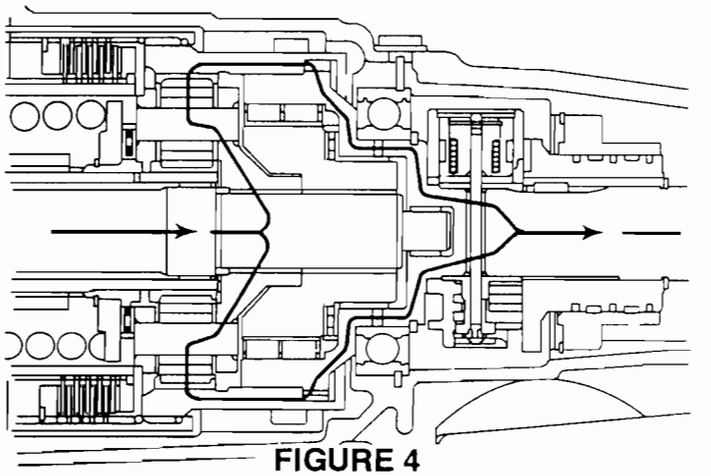


FIGURE 4

As the sliding hub is forced further rearward, the overdrive clutch engages, stopping the sliding hub and sun gear and hold them to the overdrive case. As power enters the planet carrier, its gears move around the stationary sun gear and the engine can now turn less for one revolution of the output shaft (Figure 4).

The lockup torque converter is also controlled by the SMEC. Once in fourth gear, the SMEC signals the lockup solenoid to close where the existing pressure builds to move the lockup valve. The lockup valve directs pressure to the torque converter where the turbine is clamped to the spinning torque converter housing. This eliminates any slipping normally attributed to automatic transmissions.

The lockup timing valve releases the torque converter to normal operation prior to the 4-3 downshift.

Additional A-500 Information

- All closed throttle 3-4 upshifts will occur at 25-28 mph, regardless of axle ratio.
- All closed throttle 4-3 downshifts will occur at 25 mph, regardless of axle ratio.
- No 3-4 upshift can be achieved, regardless of vehicle speed, if throttle opening is greater than 70% approximately.

ELEMENTS IN USE AT EACH POSITION OF THE SELECTOR LEVER

LEVER POSITION	A500 OVER-DRIVE	START SAFETY	PARKING SPRAG	TRANSMISSION						OVERDRIVE		
				CLUTCHES				BANDS		CLUTCHES		
				FRONT	REAR	O'RUNNING	LOCKUP	K/D FRONT	REVERSE/REAR	O/D	O'RUNNING	DIRECT
P-Park		X	X									
R-Reverse	2.21			X					X			X
O-Drive												
First	2.74				X	X					X	X
Second	1.54				X			X			X	X
Third	1.00			X	X		X				X	X
O/D	.69			X	X		X			X		X
2-Second												
First	2.74				X	X					X	X
Second	1.54				X			X			X	X
1-Low	2.74				X	X			X		X	X

OVERDRIVE DIAGNOSIS

Condition	Possible Cause
• No Reverse or Slips in "R".	• Failed Direct Clutch - Overdrive Spring Lost Load - Wrong Overdrive Piston Bearing Spacer Selected
• No Overdrive Shift	• Blown Fuse • Faulty Overdrive Solenoid • Faulty Wiring or Connectors • Faulty Overdrive Off Switch • Faulty SMEC • Failed Overdrive Clutch - Wrong Overdrive Piston Bearing Spacer Selected - Low Overdrive Pressure • Lower Valve Body Malfunction
• Runaway Overdrive Shift	• Failed Overdrive Overrunning Clutch
• Overdrive Shift Occurs Immediately Every 2-3 Shift	• Faulty Overdrive Solenoid - Not Venting • Lower Valve Body Malfunction • Faulty Wiring • Faulty SMEC
• Excessively Delayed Overdrive Shift	• Incorrect Overdrive Piston Bearing Spacer • Faulty Sensor
• No 4-3 Downshift	• Faulty Lockup Solenoid - Not Venting • Lower Valve Body Malfunction • Faulty Wiring • Faulty SMEC
• No 4-3 Downshift With Overdrive Off Switch	• Faulty Overdrive Off Switch • Faulty SMEC • Faulty Lockup Solenoid - Not Venting • Faulty Wiring
• Torque Converter Locks Up In 2nd and 3rd Gears	• Faulty Lockup Solenoid - Not Venting
• Harsh Shifts 1-2, 2-3, & 3-2	• Faulty Lockup Solenoid - Not Venting
• Low Governor Pressure	• Leaking Governor Tubes - Bent - Loose Fit • Governor Seal Rings Broken or Worn

OVERDRIVE DIAGNOSIS - CONT'D.

Condition	Possible Cause
• Noisy	• Failed Overdrive Piston Bearing • Failed Gear Train Needle Thrust Bearings • Failed Overdrive Planetary • Failed Overdrive Overrunning Clutch

REPAIR PROCEDURE

Removal

This procedure involves removal, disassembly and assembly of the A500 transmission overdrive unit.

Before raising the vehicle, place the gear shift selector in park.

1. To start the overdrive removal, remove the transmission oil pan, remove the gasket, drain the oil and, using a new gasket, reinstall the pan. If there is a failure within the overdrive unit or if the fluid is contaminated, then remove the entire transmission. If the diagnosis indicates clutch or governor problems only, then remove only the overdrive unit.

2. Index the drive shaft universal joint to the pinion yoke for proper orientation during reassembly. Then remove the drive shaft (Figure 5).

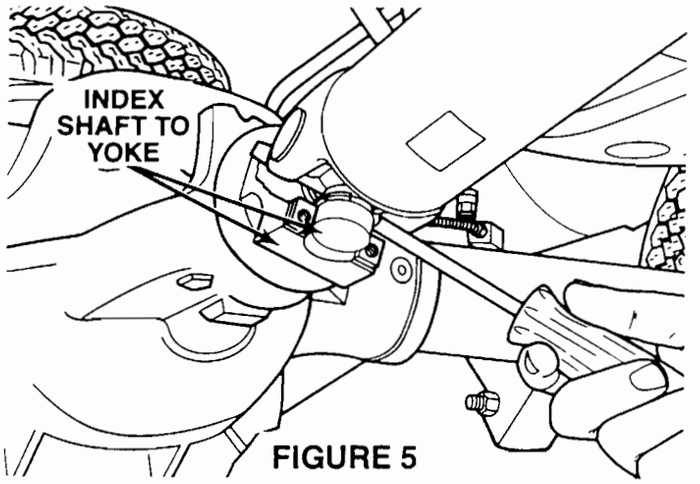


FIGURE 5

3. Using a transmission jack, support the transmission and raise it enough to remove the crossmember. Mark the position of the crossmember for exact reassembly.

4. Remove the speedometer cable.

5. Remove the seven bolts securing the overdrive to the transmission (Figure 6).

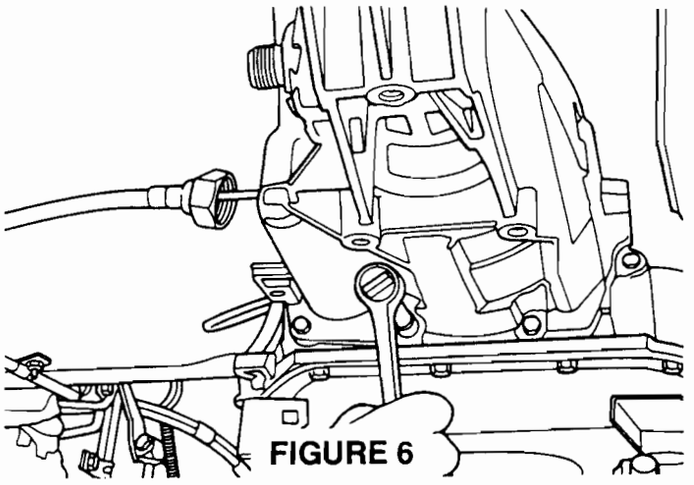


FIGURE 6

6. Very carefully pull the unit off of the intermediate shaft. A bearing and a select spacer may be either on the overdrive piston on the rear of the main case, on the sliding hub, or on the intermediate shaft.

   NOTE: ONCE THE OVERDRIVE UNIT IS PULLED BACK APPROXIMATELY 1" IT IS FREE TO FALL IF IT IS UNSUPPORTED.

7. Place several clean shop towels on a bench.

   Tip the unit so that any excess oil drains. Watch for any sign of abnormal wear, such as clutch material or metal fragments in the oil.

Disassembly

1. Remove the overdrive clutch wire retaining ring, then pull out the alternating metal and friction clutch components. Note that the heaviest metal plate is placed in the front of the clutch pack. This is the pressure plate (Figure 7).

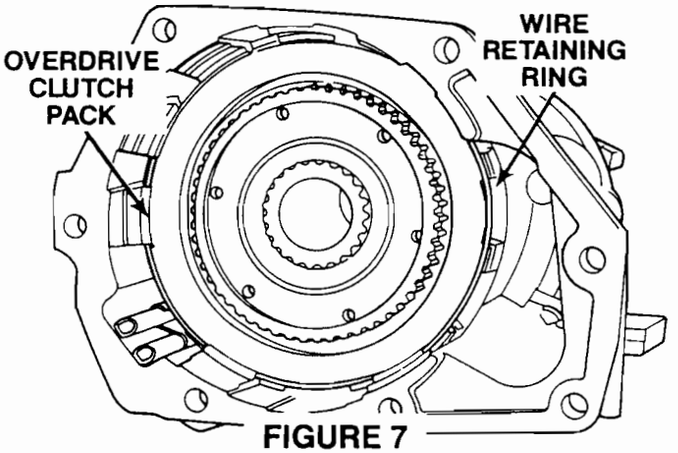


FIGURE 7

2. Take a close look at each clutch component for signs of wear. Replace if necessary (Figure 8).

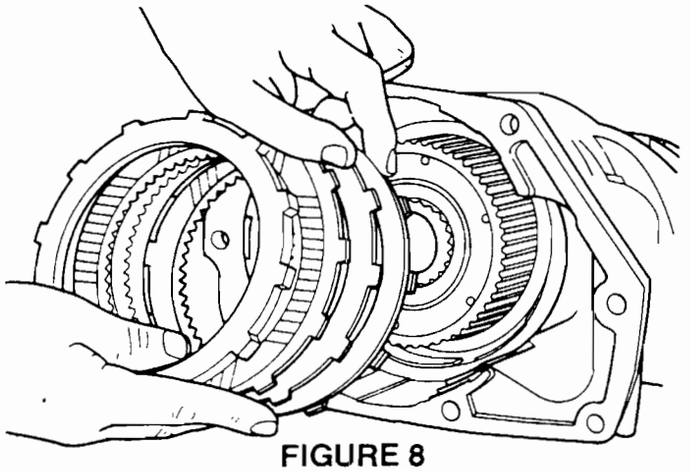


FIGURE 8

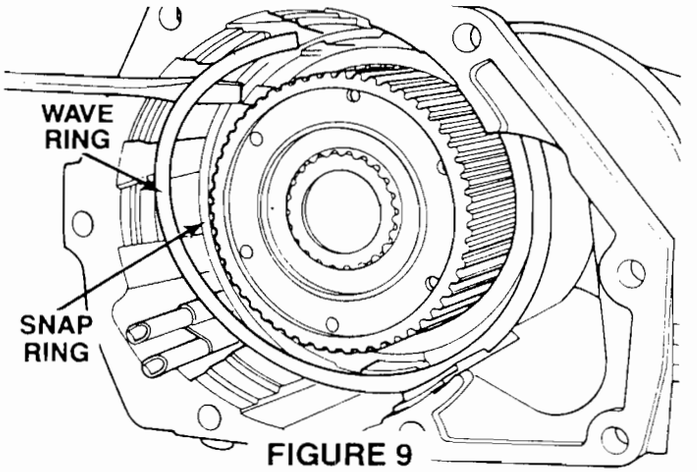


FIGURE 9

3. Next, take out the wave ring. This special ring acts as a cushion to absorb the shock when the overdrive clutch engages (Figure 9).

   In the same groove, there is another large flat snap ring to be removed (Figure 10).

4. Unscrew the two Phillips screws and remove the access plate from the top of the case (Figure 11). The snap ring holds the output shaft front bearing in place.

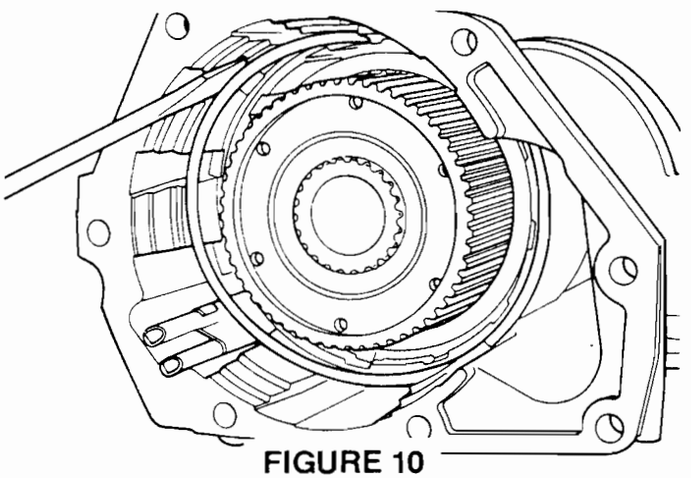


FIGURE 10

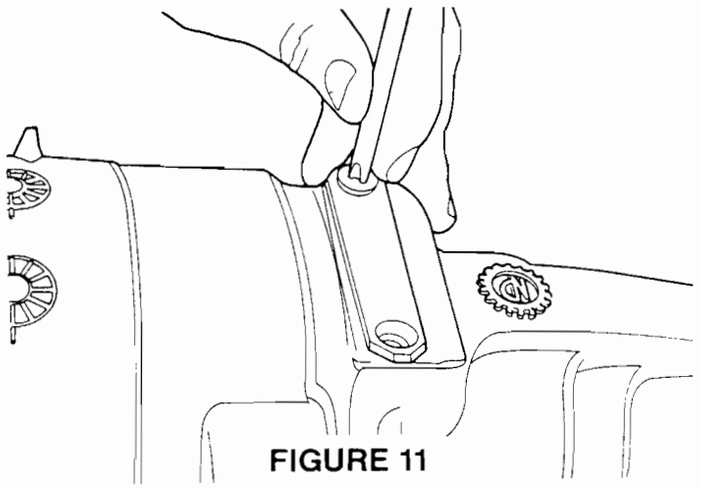


FIGURE 11

5. Because the entire case must be inverted to remove the gear train, insert the alignment tool (Miller special tool C-6227-2) into the sun gear. After seating it (Figure 12), invert the case on the alignment tool (Figure 13). Use expanding snap ring pliers to expand the output shaft front bearing snap ring and carefully lift the case off the gear train.

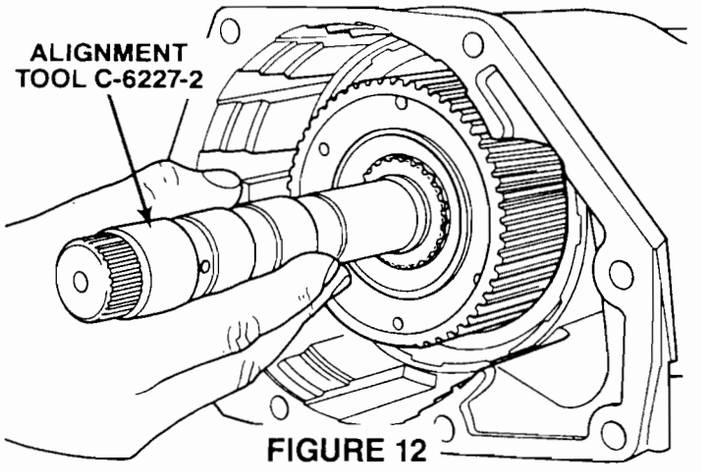


FIGURE 12

6. Remove governor retaining snap ring. Remove the governor and shaft key (Figure 14). This will prevent damaging the governor when the direct clutch spring is compressed in the arbor press. Set the gear train aside and continue disassembly of the case components.

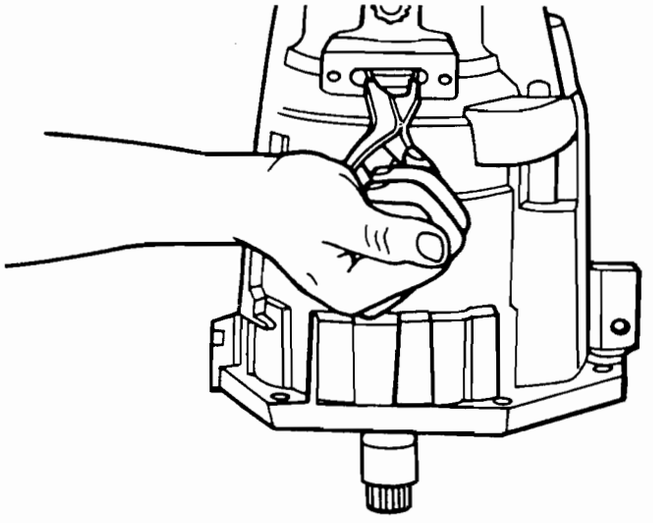


FIGURE 13

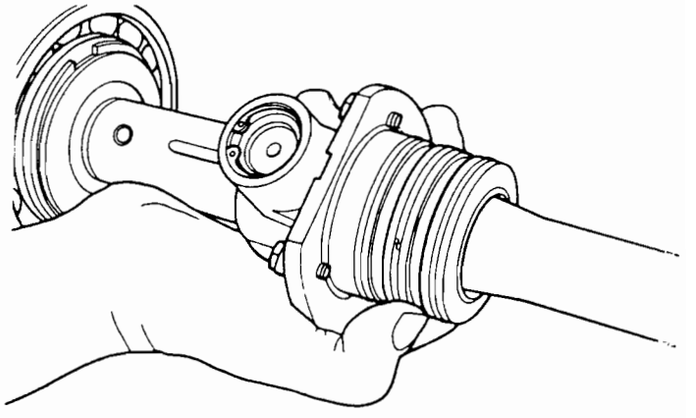


FIGURE 14

7. Remove the output shaft front bearing snap ring (Figure 15), then remove the governor support snap ring. Take the governor support with slip-fit tubes out of the case (Figure 16).

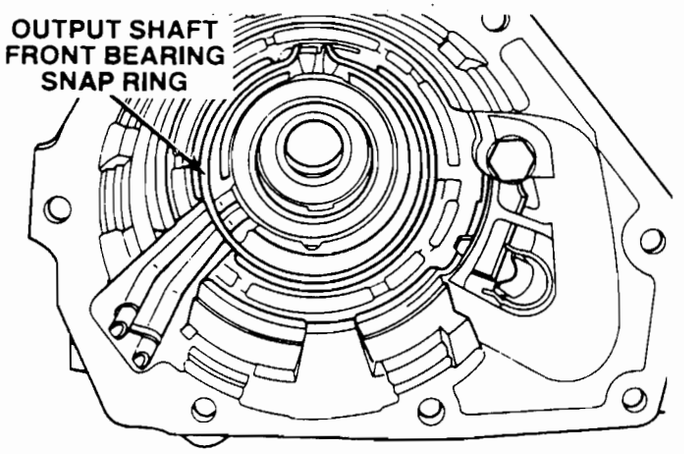


FIGURE 15

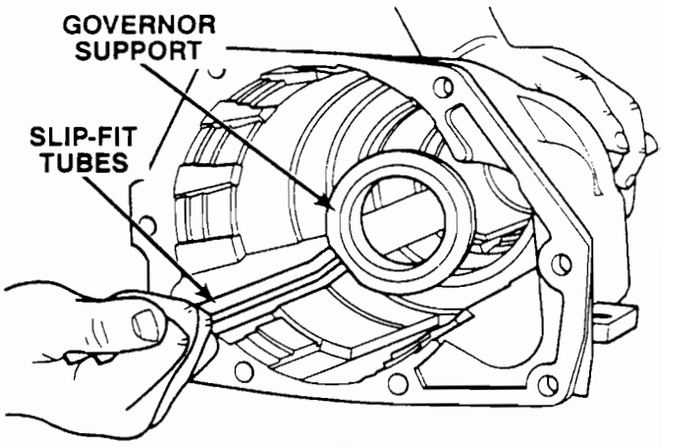


FIGURE 16

8. Using locking snap ring pliers, remove the output shaft rear bearing snap ring (Figure 17).

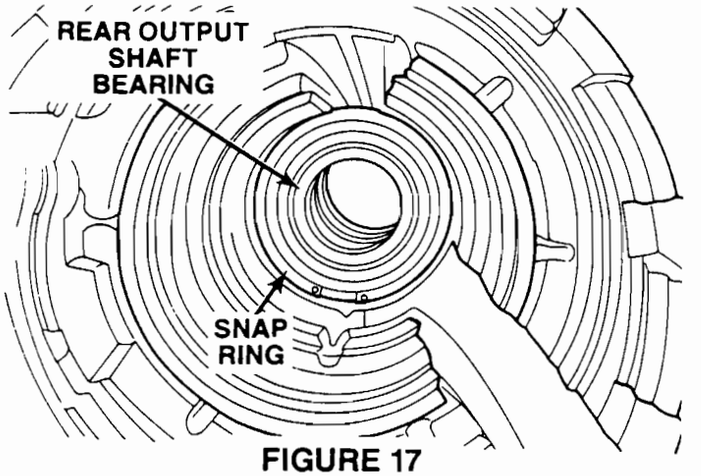


FIGURE 17

Now, by tapping the case downward on the bench, the bearing should drop out.

9. To remove the parking mechanism, first remove the reaction plug snap ring (Figure 18). Care should be taken to compress the snap ring only enough to allow its removal.

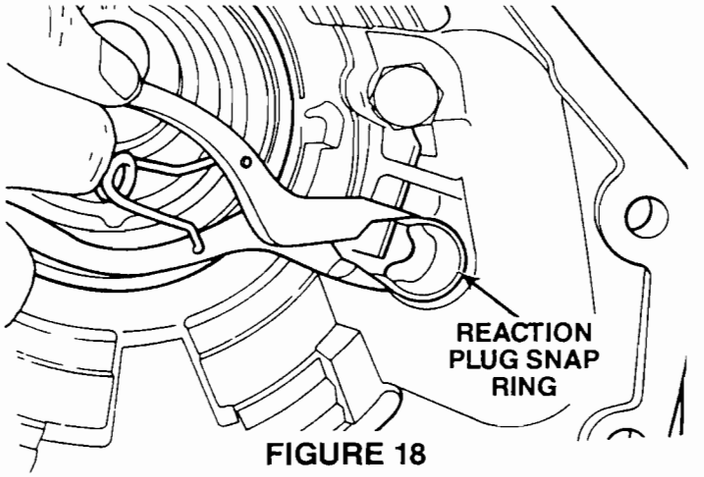


FIGURE 18

Next, unscrew the bolt securing the dowel and parking pawl (Figure 19). Now, another light tap to the case on the bench will cause the dowel, the parking pawl, and the reaction plug to drop out on the bench (Figure 20).

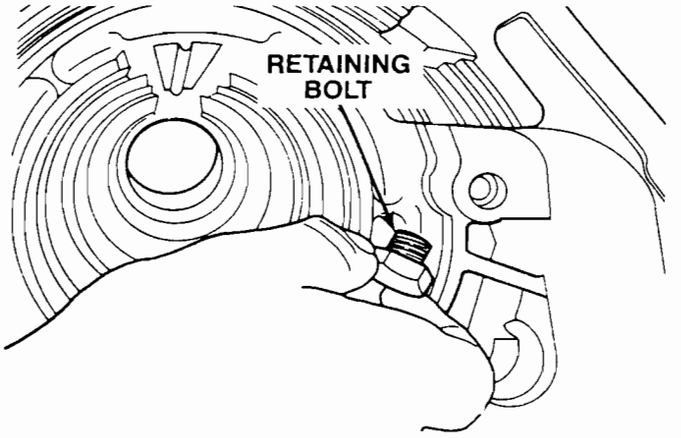


FIGURE 19

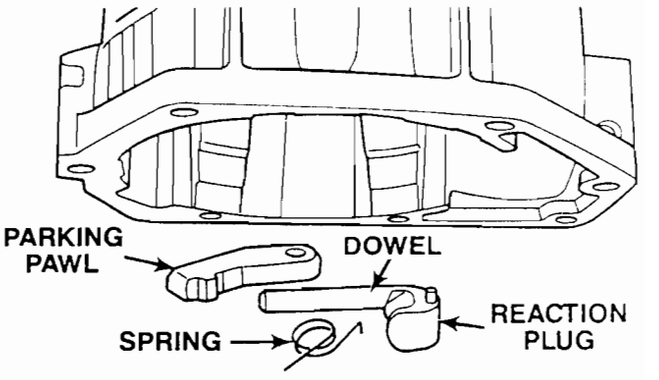


FIGURE 20

10. At the rear of the case, a standard A-727 rear transmission bushing and seal are used at the output shaft. Now that the case is disassembled you may continue disassembly of the gear train.

11. It is very important that you use a press capable of three inches of travel to compress the direct clutch spring. A press must have the three-inch travel required to perform this critical step safely. **The spring exerts over 800 pounds of force on the sliding hub. Spring tension must be released slowly and completely to avoid personal injury.**

12. Place the output shaft in a fixture that will support the output shaft flange. With the assembly properly supported in the press, place the special tool, C-6227-1, in place (Figure 21). Have a helper operate the press to compress the direct clutch spring.

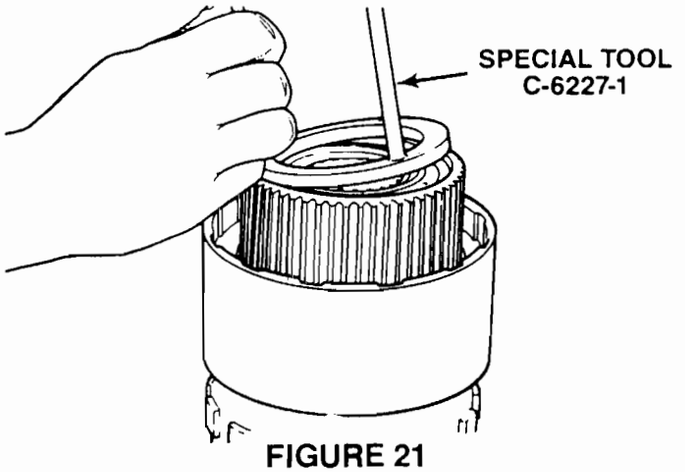


FIGURE 21

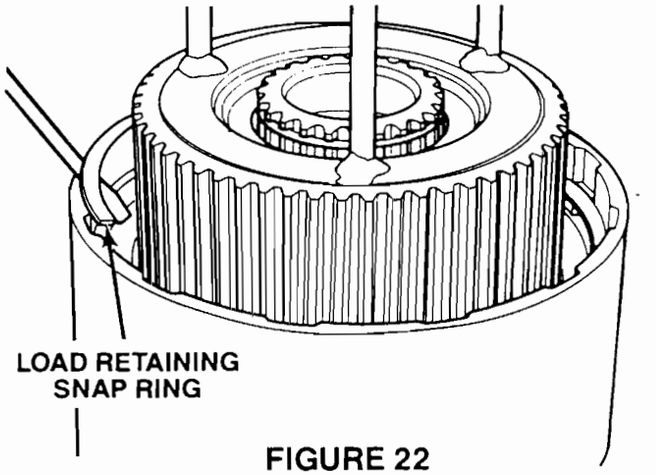


FIGURE 22

13. When the hub is compressed, you will now be able to safely remove the large load-retaining ring (Figure 22), and the small load-retaining safety ring (Figure 23). When your helper unloads the press, the direct clutch spring tension is relieved. The rest of the unit can be disassembled.

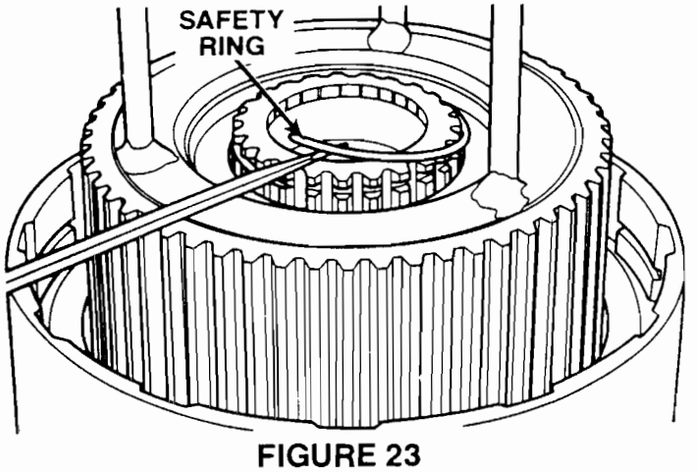


FIGURE 23

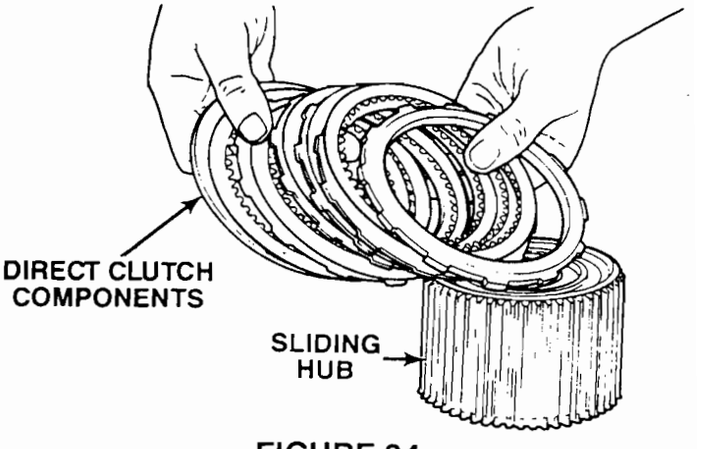


FIGURE 24

14. Remove the sliding hub with the direct clutch on it. Remove the components of the clutch from the hub and inspect them one at a time (Figure 24).

15. Next, remove the direct clutch spring, the sun gear, a needle bearing pack and the planet carrier (Figure 25).

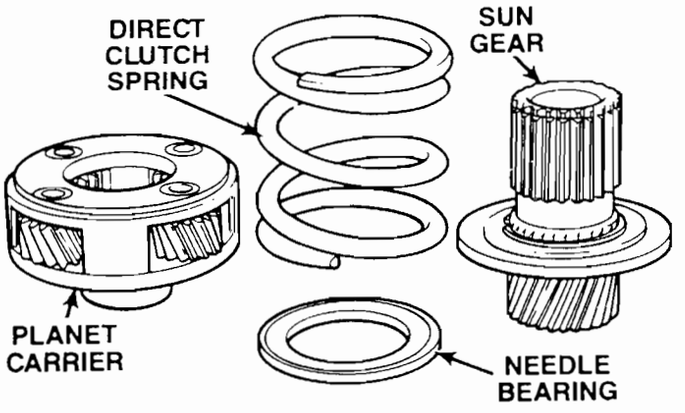


FIGURE 25

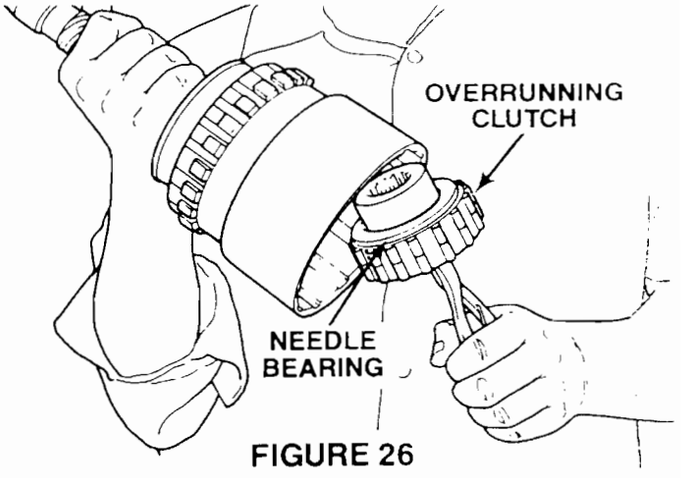


FIGURE 26

16. Next, to remove the overrunning clutch, invert the assembly and, with expanding snap ring pliers, reach into the inner splines of the clutch. You can remove the overrunning clutch intact with a quick counterclockwise twist (Figure 26). Also remove the needle bearing.

17. Mark the direct clutch drum and the annulus for exact reassembly (Figure 27).

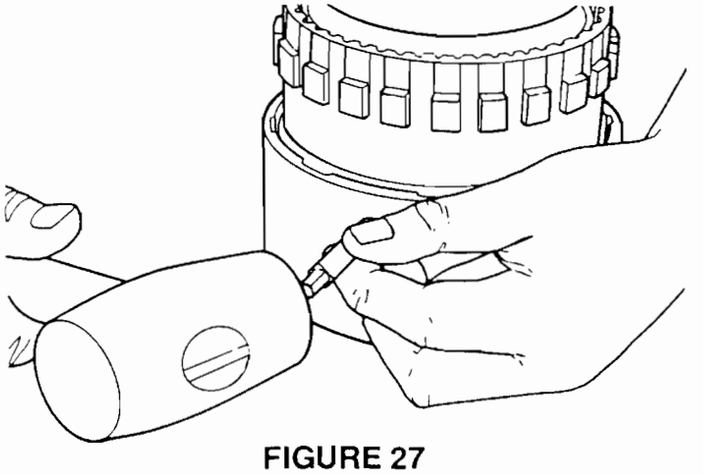


FIGURE 27

18. Two wire retaining rings secure the direct clutch drum to the annulus. Remove the inner one first (Figure 28), then the one behind the rear of the drum (Figure 29). Now slide the drum from the annulus.

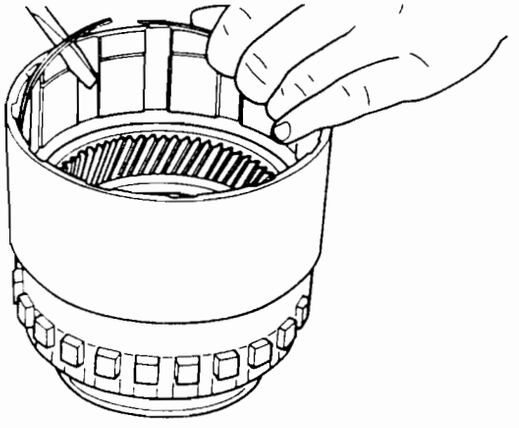


FIGURE 28

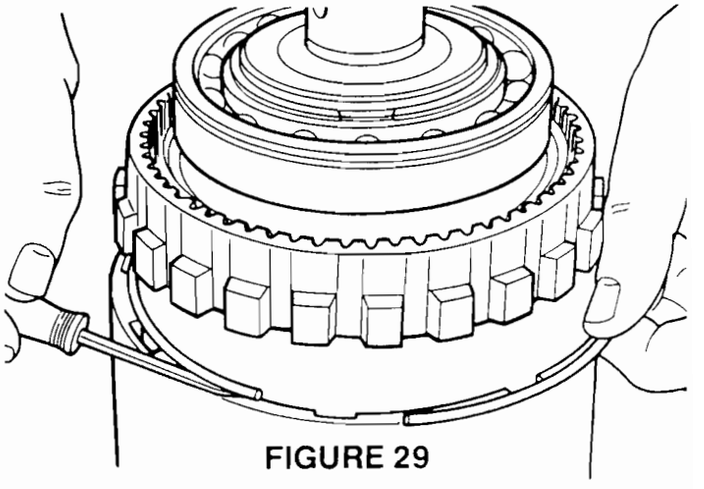


FIGURE 29

19. Mark the annulus and the output shaft for exact reassembly (Figure 30).

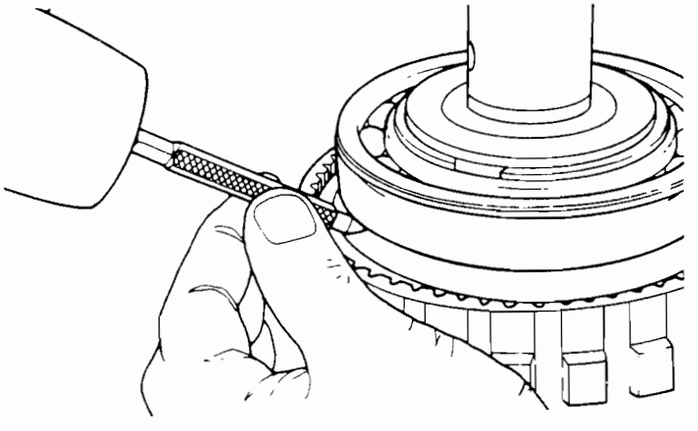


FIGURE 30

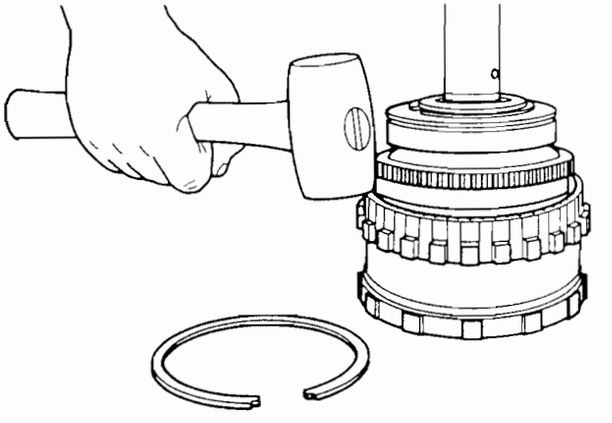


FIGURE 31

20. To remove the annulus (one snap ring secures it to the output shaft) a light tap with a soft mallet will pop it off the shaft (Figure 31). Now the only component left is the output shaft front bearing which is a slip fit on the shaft.

Assembly

1. Before assembling, clean all the parts and dry them with compressed air. Never clean or dry parts with shop towels as lint deposits could plug oil filter.

   To assemble the overdrive unit, align the mating marks, then insert the shaft through the back of the annulus and secure it with the snap ring (Figure 32).

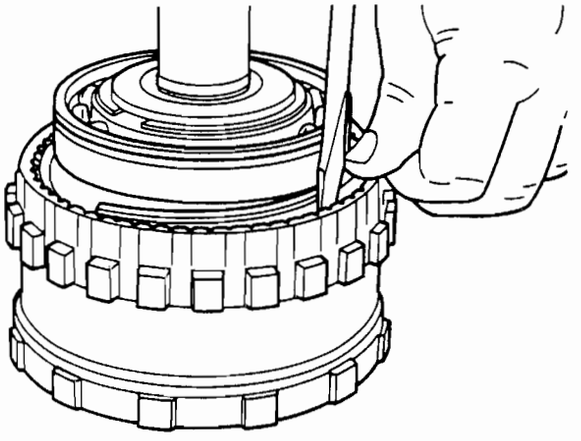


FIGURE 32

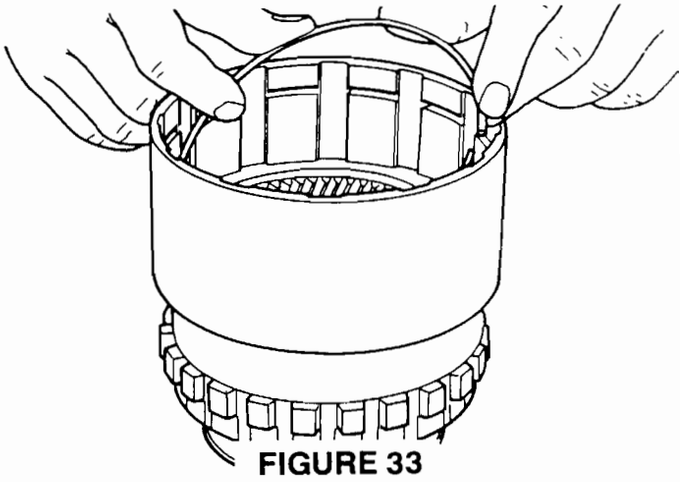


FIGURE 33

2. Next, set the direct clutch drum face down and align the other set of mating marks. Insert the annulus lugs into the slots inside the drum. Install the rear wire retaining ring first. Then invert the assembly. Slide the drum forward to expose the retaining ring groove. Then install the front wire retaining ring to secure the drum (Figure 33).

3. Hold the overrunning clutch upside down with expanding snap ring pliers. Place the needle bearing against the back face of the clutch. Now, hold the shaft assembly upside down, and with an upward counterclockwise twisting motion, install the overrunning clutch.

Continued . . .

4. Carefully set the carrier assembly into the annulus (Figure 34) and align the splines using special tool C-6227-2 (Figure 35).

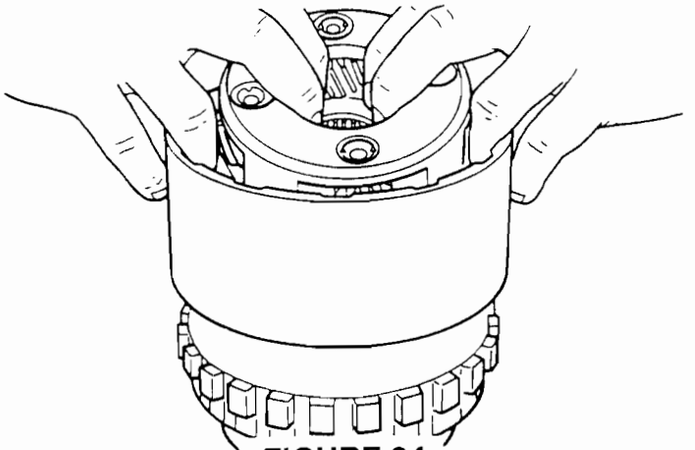


FIGURE 34

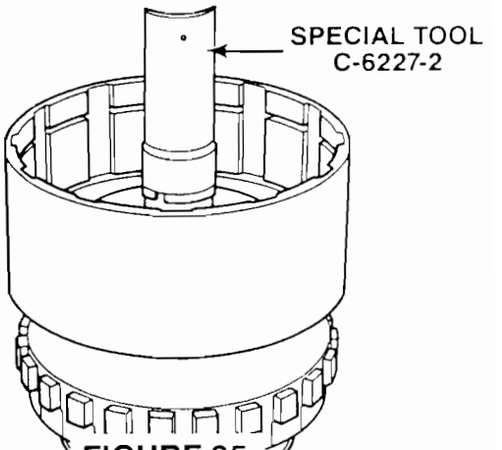


FIGURE 35

5. Set the needle bearing in place, remove the tool, and install the sun gear (Figure 36). Set the spring on the sun gear, then place the sliding hub on the spring. Reinstall the alignment tool and install the direct clutch plates one at a time on the hub.

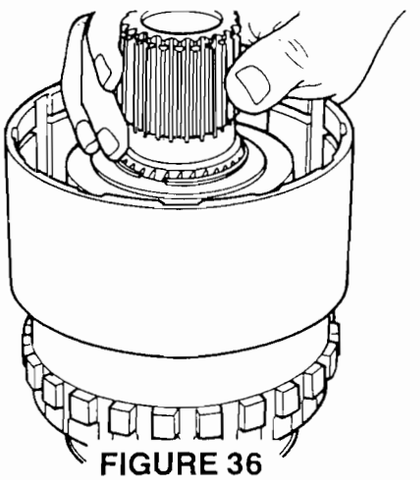


FIGURE 36

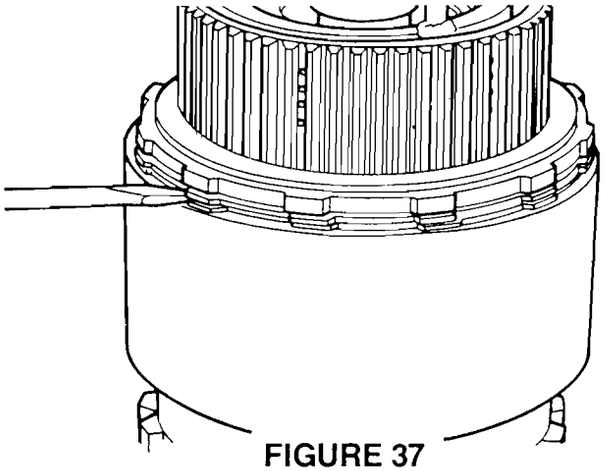


FIGURE 37

6. This step involves compressing the direct clutch spring with the arbor press. Set special tool, C-6227-1, on the hub and compress the spring. Remember, you'll need a helper to operate the press because, as the spring is compressed, you must slide the clutch plates into their grooves and down the hub (Figure 37.) Then install the large load-retaining snap ring, seating it firmly with a large screwdriver (Figure 38). Now install the safety ring (Figure 39). Slowly release the press, ensuring that the load-retaining rings are properly seated. Install governor and snap ring.

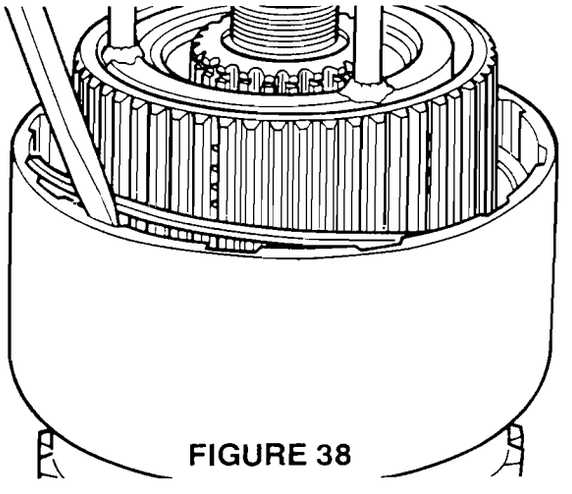


FIGURE 38

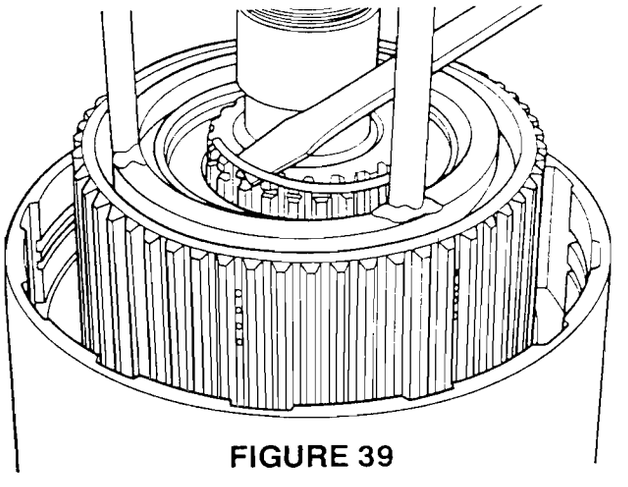


FIGURE 39

7. Set the gear train aside, with special alignment tool still in place, then reassemble the parking mechanism into the case.

8. Install the dowel, parking pawl and spring back into the case (Figure 40). Then reinstall the retaining bolt and torque it to 20 foot-pounds (27 N·m). Next, position the reaction plug in place and secure it with its snap ring. Use care to squeeze the snap ring only enough to install it.

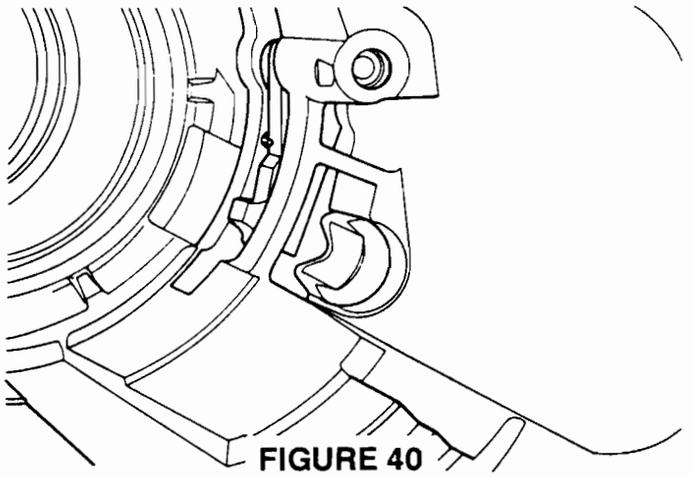


FIGURE 40

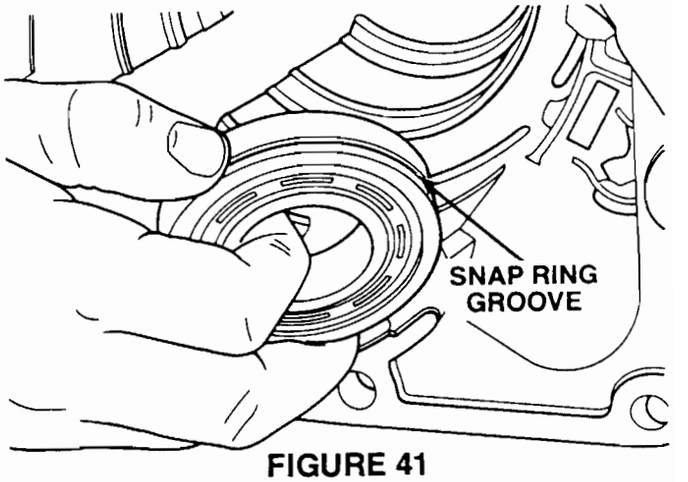


FIGURE 41

9. Set the output shaft rear bearing in the case, ensuring that the groove is toward the front of the case (Figure 41).

10. Then install the governor support (Figure 42) and secure it with its snap ring into the overdrive housing (Figure 43).

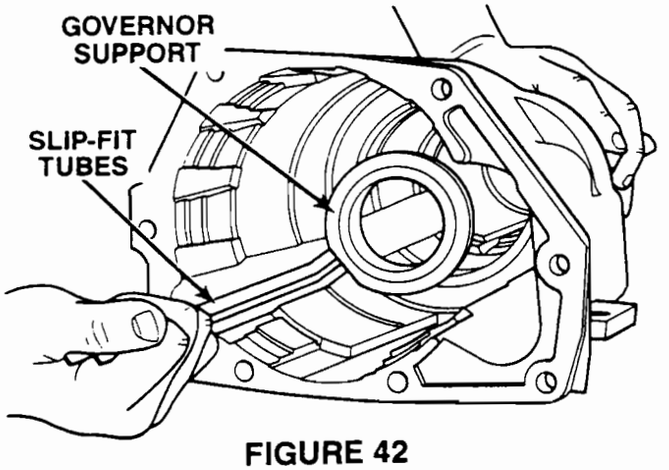


FIGURE 42

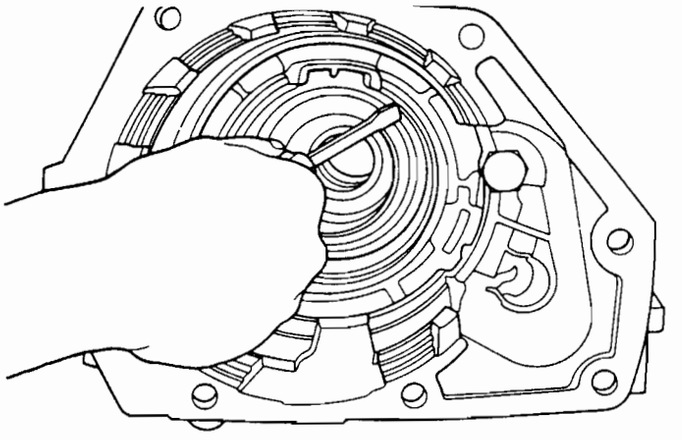


FIGURE 43

11. Install the output shaft front bearing snap ring in the case. Make sure the alignment tool is reinstalled in the gear train. Invert the gear train and slip the case over the shaft.

12. Expand the snap ring and slip the case down until the ring locks in the bearing groove. Release the snap ring.

13. After reinstalling the access plate and gasket, install the flat snap ring. Use a large screwdriver to be sure that it's seated properly. Then reinstall the wave ring (Figure 44) using the same seating technique.

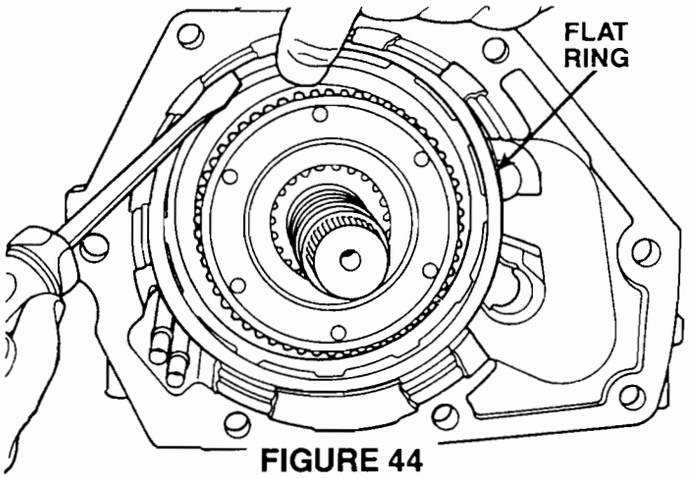


FIGURE 44

14. One by one, install the overdrive clutch plates, be certain to put the thickest plate in last (Figure 45).

15. Position the overdrive unit vertically in a large vise. To determine the proper intermediate shaft spacer thickness, insert special tool (C-6312) through the sun gear. Be sure that the tool bottoms against the carrier spline shoulder. Position special tool (C-6311) across overdrive case face. Using dial caliper tool (C-4962), positioned over tool C-6311, measure distance to the top of tool C-6312 (Figure 46).

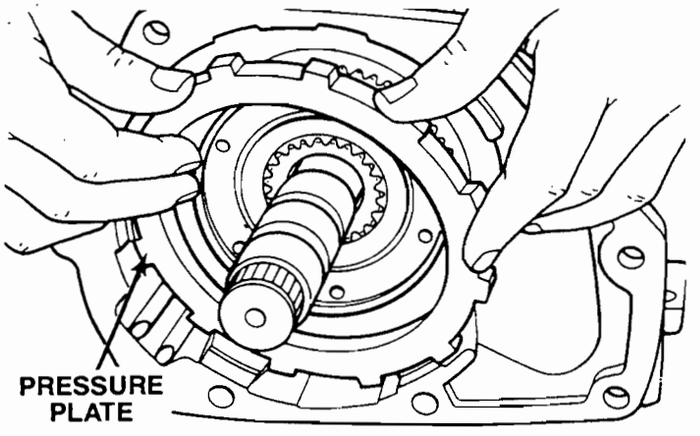


FIGURE 45

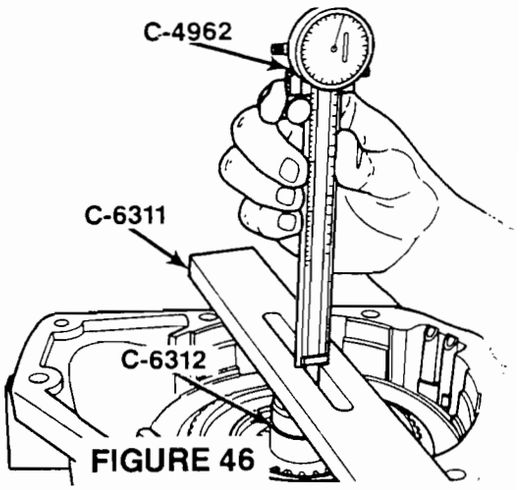


FIGURE 46

Using this measurement, select the proper thickness spacer from the chart.

Intermediate Shaft Spacer Chart

Measurement (Inches)	Use Spacer No.	Spacer Thickness (Inches)
.7336-.7505	4431916	.159-.158
.7506-.7675	4431917	.176-.175
.7676-.7855	4431918	.194-.193
.7856-.8011	4431919	.212-.211

16. To determine the proper shim thickness for the overdrive piston: Position special tool, C-6311, across overdrive case face. Then using dial caliper tool (C-4962) positioned over tool C-6311, measure distance to the sliding hub bearing seat (Figure 47).

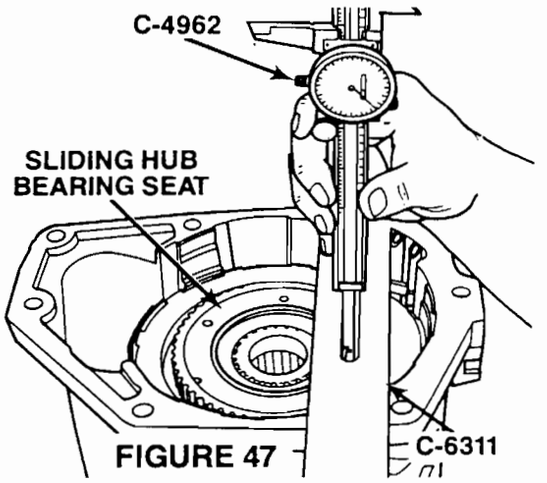


FIGURE 47

This measurement should be taken at four locations 90° apart. Add all measurements together and divide by four (4). Using this measurement, select the proper thickness shim from the chart.

Overdrive Piston Shim Chart

Measurement (Inches)	Use Shim No.	Shim Thickness (Inches)
1.7500-1.7649	4431730	.108-.110
1.7650-1.7799	4431585	.123-.125
1.7800-1.7949	4431731	.138-.140
1.7950-1.8099	4431586	.153-.155
1.8100-1.8249	4431732	.168-.170
1.8250-1.8399	4431587	.183-.185
1.8400-1.8549	4431733	.198-.200
1.8550-1.8699	4431588	.213-.215
1.8700-1.8849	4431734	.228-.230
1.8850-1.8999	4431590	.243-.245

Installation

1. Before installing the overdrive unit, it will be necessary to cut out the old gasket. Using a sharp knife, cut out the old gasket around the piston (Figure 48). Place the old gasket on the new one for a template and trim the new gasket to fit.

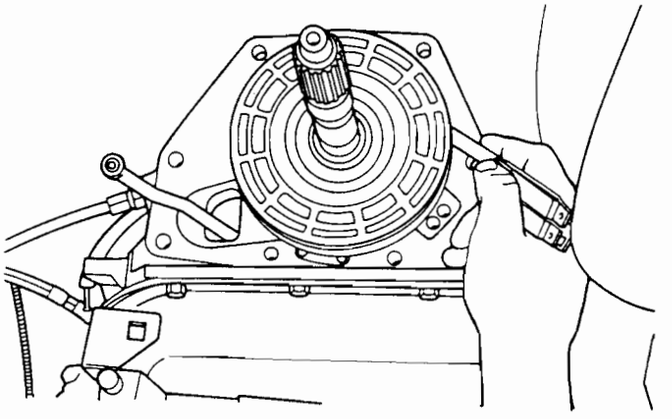


FIGURE 48

2. Place the new gasket in place on the rear of the main case. Install the spacer selected in Step 15 of the Assembly Procedure on the intermediate shaft.

3. Place the shim selected in Step 16 of the Assembly Procedure in position over the piston on the main portion of the transmission. Install the sliding hub bearing over the intermediate shaft, against the sliding hub.

   NOTE: THE SHOULDER ON THE INSIDE DIAMETER OF THE BEARING MUST FACE FORWARD.

   A small amount of petroleum jelly can be used to hold the shim and bearing in position.

4. Carefully lift the overdrive unit and slide it onto the intermediate shaft. Insert parking rod into reaction plug. **Extreme care must be used not to tilt the unit as this could cause the carrier and overrunning clutch splines to rotate out of alignment. If this happens, it will be necessary to remove the overdrive unit and align them with tool C-6227-2**. Align the slip-fit tubes and push the unit forward until it touches the main case.

5. Install the seven attaching bolts. Tighten in a crisscross pattern to 25 foot-pounds (34 N·m).

6. Install the crossmember, speedometer cable and drive shaft using marks made at disassembly.

7. Refill to proper level with Mopar ATF Plus (Automatic Transmission Fluid - Type 7176) or equivalent.

TRANSMISSION - AXLE - TIRE AVAILABILITY

	Tires	Axle Ratios 3.9L Eng.	Axle Ratios 5.2L Eng.
B150	P195/75R15 Min. P235/75R15 Max.	3.9L Only	3.55 Std. 3.91 Opt.
B250	P225/75R15 Min. P235/75R15 Max.	3.9L Only	3.55 Std. 3.91 Opt.
B350		N/A	3.9 4.1 Opt.
N1	P185/75R14 LT 215	3.55 3.91 Opt.	N/A
N5	P195/75R15 P235/75R15	3.55	N/A

A500 FLUID CAPACITY

	Quarts	Liters
A500 - With 3.9L or 5.2L Engine	10.2	9.6

CHRYSLER A-604

ELECTRONIC, FOUR-SPEED AUTOMATIC TRANSAXLE

Features and Benefits: An all-new, electronically-controlled, four-speed automatic transaxle is available with the 3.0 L V-6 engine in New Yorker, New Yorker Landau, Dynasty, Spirit ES, Acclaim LX, Caravan LE, all Grand Caravan models, Voyager LE, and all Grand Voyager models.

The customer will find this all-new transaxle to be very smooth and unobtrusive while providing reduced noise, improved highway fuel economy, faster and smoother response, and improved shift quality.

The transaxle provides faster acceleration in conjunction with a 3.43:1 final drive ratio, a ratio 6% to 23% higher than the ratio used with previous three-speed transmissions. When the transmission shifts to fourth gear, which is overdrive, the overall ratio drops to 2.36:1 to provide quieter operation. To provide good fuel economy in conjunction with the lower overall ratio, the torque converter locks in fourth gear, thereby eliminating slippage.

Shifts are very smooth due to fully adaptive electronic control which senses the speed changes between components within the gear train as shifts occur and adjusts hydraulic pressure as needed. This control method contrasts sharply with conventional automatic transmissions which shift by applying hydraulic pressure through orifices and mechanical accumulators based on a predetermined set of assumptions about engine output and friction material characteristics.

Chrysler Motors' use of **fully-adaptive electronic transmission controls** in its new four-speed automatic transaxle

A unique feature of electronic control is partial lock up of the torque converter which produces a smooth transition to full lock up. The speed differential between the input and output shafts of the transmission prior to lock up is typically 250 rpm. Partial lock up brings that differential into the range of 50-100 rpm, then completes the lock up. Adaptive control can do this because it can sense the speed differential and apply just enough pressure to the lock-up clutch to achieve the small slippage. After partial lock-up is achieved, pressure is increased incrementally until full lock-up is complete.

The electronic adaptive controls provide kick-down shifts with a smoothness that is unmatched by any previous unit, and in so doing, make the powertrain feel more responsive without increasing harshness. Being adaptive, these controls inherently compensate for changes in engine or friction element torque and provide good, consistent shift quality for the life of the transmission.

ELECTRONIC FOUR-SPEED AUTOMATIC TRANSAXLE

Function: The transmission provides forward ratios of 2.84, 1.57, 1.0, and 0.69 with lockup available in 4th gear; the Reverse ratio is 2.21. The shift quadrant has six positions: P, R, N, OD, D, and L. The OD position is actually a "D" inside an "O" to indicate overdrive operation. When OD is selected, the transmission shifts normally through all four speeds. It is recommended for most driving. The D position is used for hilly or mountainous driving. When D is selected, the transmission uses only 1st, 2nd, and 3rd gears. When operating in D or L positions torque converter lock-up occurs in third gear for improved transmission cooling when towing trailers on steep grades. If high engine coolant temperature occurs, the torque converter will also lock up in 2nd gear. The L position provides maximum engine braking for descending steep grades. Unlike most current transmissions, up-shifts are provided to 2nd or 3rd at peak engine speeds if the accelerator is depressed. This provides engine over-speed protection and maximum performance.

Description: The electronic controls make the transmission unique in a number of ways. First, the adaptive controls are used to significantly reduce complexity. Relative to today's three-speed unit, the new transaxle requires no additional gearing, one less overrunning clutch, and only one more friction element. It has 20 fewer part numbers than today's three-speed unit. The resulting compactness allows the new four-speed transaxle to package in the same vehicles and with the same ground clearance as the three-speed unit and the lockup torque converter is similar to the one used in other front-wheel drive units. Torque capacity for future vehicles and engines has been assured by using larger gearing throughout than in the present three-speed transaxle; yet it weighs only 5.9 kg (13 pounds) more and is only 13 mm (0.5 in.) longer. For manufacturing simplification, the planetary gears are the same diameter and length and have the same number of teeth as those used in our three-speed rear-drive passenger car unit. Also, the engine-to-differential center line dimension has been preserved, simplifying installation in existing vehicles.

ELECTRONIC FOUR-SPEED AUTOMATIC TRANSAXLE AND FINAL DRIVE

The transmission uses only clutches to change ratios. Clutches provide smooth, consistent shifts whereas bands, which are used in some transmissions, are harder to control and less consistent.

Actuation and release of the clutches is controlled by ball-type solenoid valves, which were chosen for maximum reliability in the transmission operating environment. Moreover, the solenoids operate the valves directly without any intermediate element--

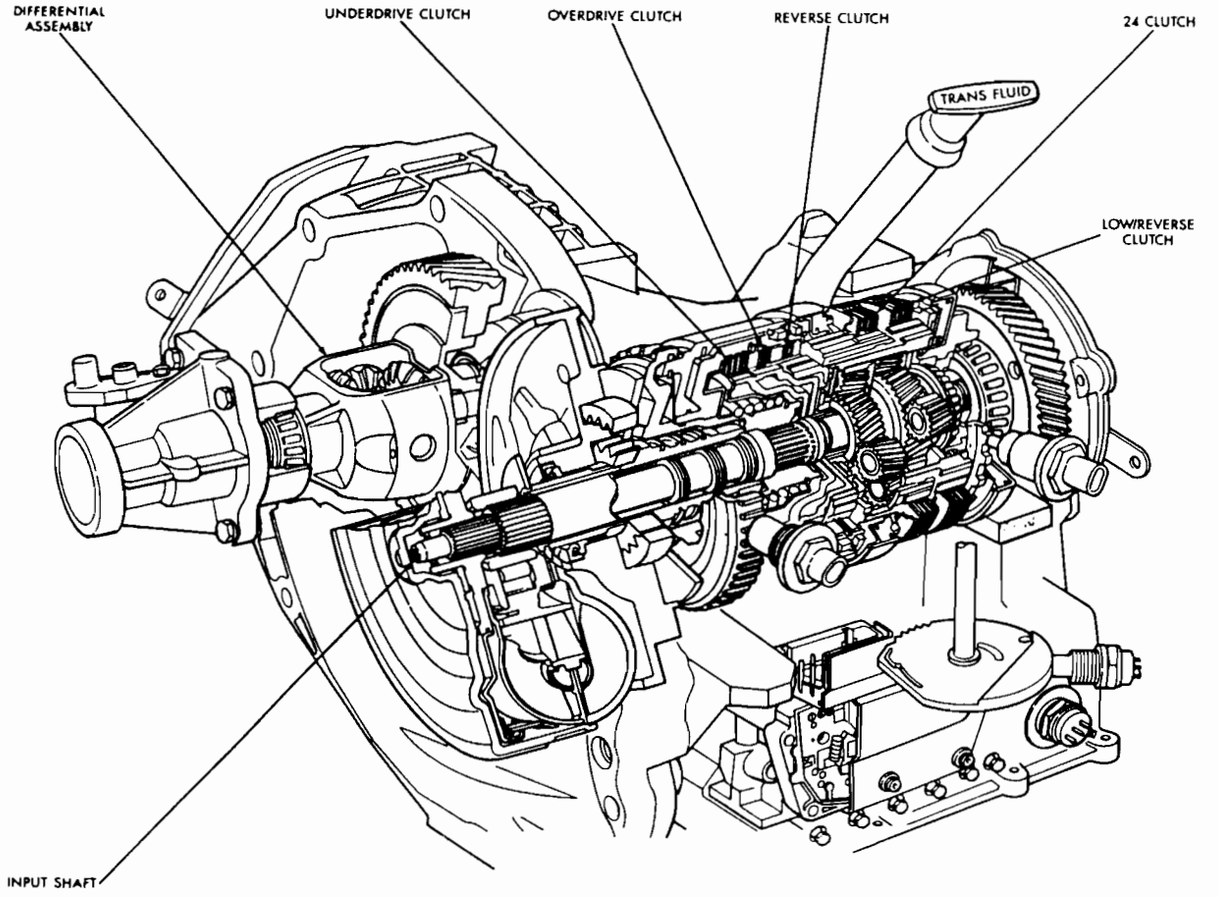
Further simplification is achieved through a unique logic-controlled switching valve which permits one solenoid to control the application of two friction elements. Any selection of 2nd, 3rd, or 4th gear elements causes this valve to

release Low Gear. A failure cannot reselect it. When a shift to Low Gear is appropriate, the logic first determines that no malfunctions exist, then a specific sequence of solenoid commands is used to shift the valve and again select Low Gear.

The control electronics are located underhood in a potted, die cast aluminum housing with a sealed, 40-way connector. On New Yorker, and New Yorker Landau, Dynasty, Spirit and Acclaim, the control computer is located on the right fender side shield. On Caravan and Voyager it is located on the right side of the dash panel.

The transmission control computer for the Dodge Caravan and Plymouth Voyager includes control logic to protect the transmission from overheating. In trailer towing situations where the vehicle is operated in "D" which does not permit a shift to overdrive, the torque converter will lock up in 2nd as well as 3rd gear if the coolant temperature becomes moderately high. This reduces transmission heat rejection by reducing torque converter slippage and reduces engine heat rejection by lowering engine speed.

Through the use of SMD's (surface mount devices) and ASIC's (application-specific integrated circuits), the controller size was minimized. The electrical power requirements of the control system have been minimized by using switch-mode, current-controlled solenoid drivers and an efficient CMOS (complementary metal-oxide semi-conductor) microprocessor. These features combine to provide a state-of-the-art control system for the transmission.



Because the A-604 has fully adaptive electronic controls, it provides superb performance with a relatively simple mechanical design. For example, there are no bands and no low-gear overrunning clutch.

Compared with typical competitive four-speed automatic transaxles, the A-604 has substantially fewer parts. Because of its compact design, it can be used in the same applications as the three-speed automatic transaxle.

INPUT CLUTCH ASSEMBLY

The three input clutches that supply input power through the transaxle are contained in the input clutch assembly (Fig. 1). These are the underdrive clutch, the over-

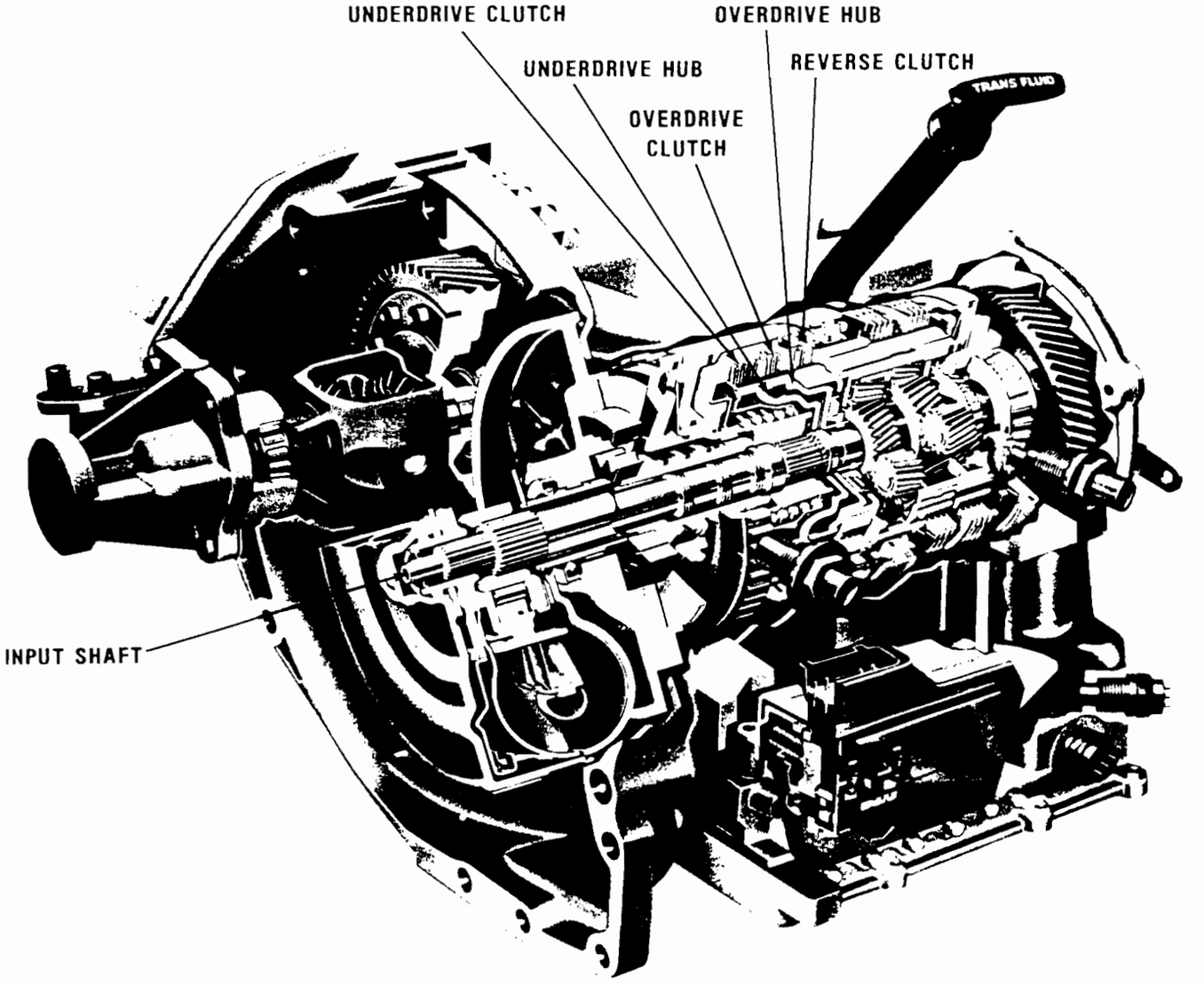


Fig. 1 — The input clutch assembly includes the input shaft, the overdrive hub and the underdrive hub, as well as the three input clutches.

drive clutch and the reverse clutch. The input clutch assembly also includes the input shaft, the overdrive hub and the underdrive hub.

TWO-FOUR CLUTCH AND LOW-REVERSE CLUTCH
In addition to the three input clutches, there are two other clutches: the two-four clutch and the low-reverse clutch (Fig. 2). These are splined to the case and provide reaction torque by holding various components.

OTHER COMPONENTS
Other major components of the A-604 transaxle include the planetary gear sets, the front annulus/rear carrier assembly and the rear annulus/front carrier assembly.

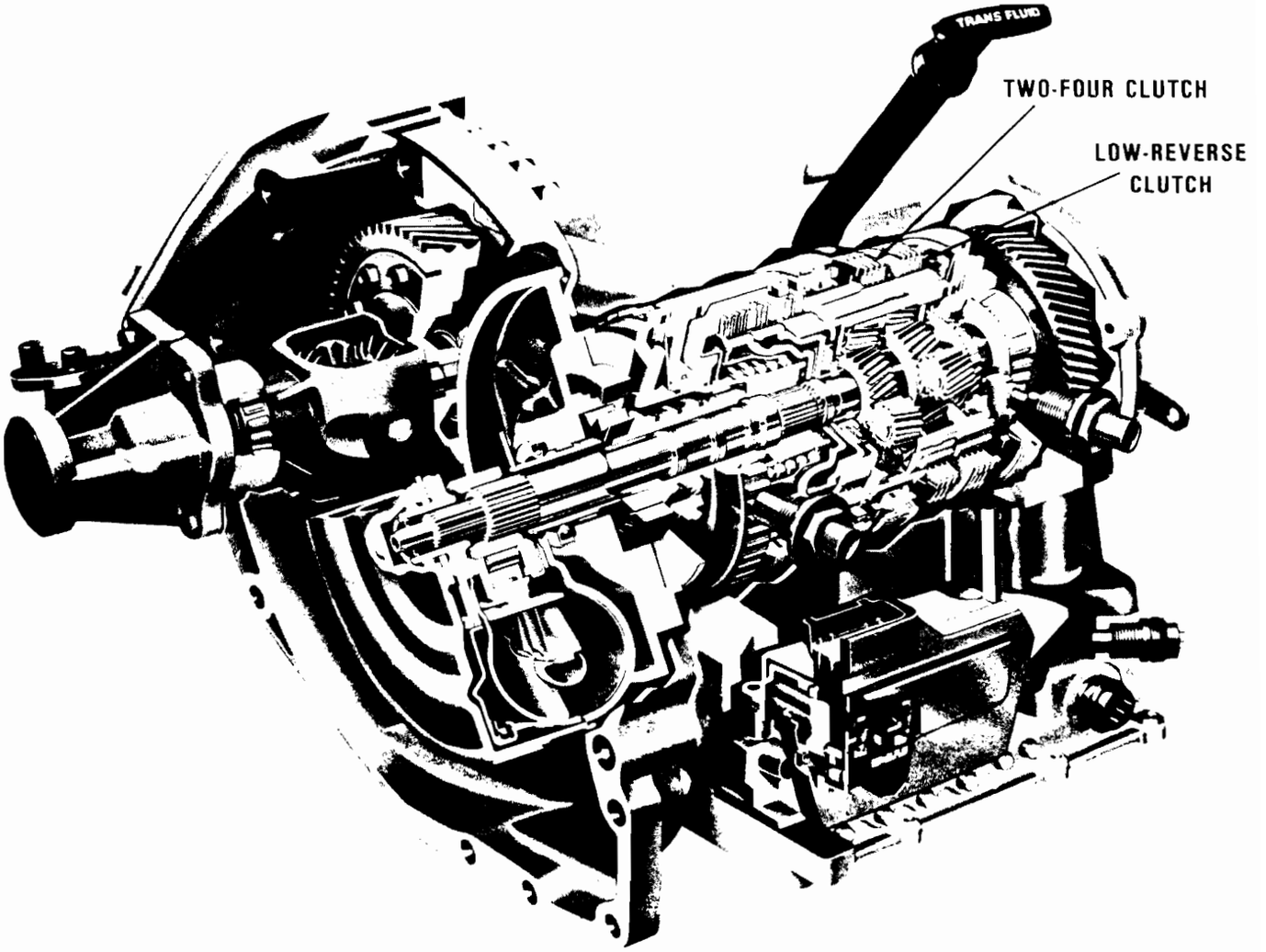
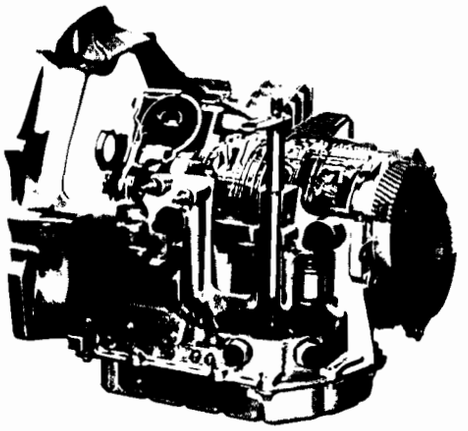


Fig. 2 — The low-reverse and two-four clutches provide reaction torque by holding various elements of the planetary and carrier assemblies.



The elements in use chart (Fig. 3) shows mechanical elements are involved in the transaxle power flow in each gear.

NEUTRAL/PARK

In neutral or park, there is no power flow through the transaxle — none of the input clutches are applied. However, the low-reverse clutch (Fig. 4) is applied to supply reaction torque in preparation for a shift into drive or reverse.

ELEMENTS IN USE / SHIFT LEVER POSITION	Start Safety	Park Sprag	CLUTCHES: Underdrive	Overdrive	Reverse	2/4	Low/Reverse
P — PARK	X	X					X
R — REVERSE					X		X
N — NEUTRAL	X						X
OD — OVERDRIVE First			X				X
Second			X			X	
Direct			X	X			
Overdrive				X		X	
D — DRIVE* First			X				X
Second			X			X	
Direct			X	X			
L — LOW* First			X				X
Second			X			X	
Direct			X	X			

*Vehicle upshift and downshift speeds are increased when in these selector positions.

Fig. 3 — This chart shows the A-604 elements in use in each gear.

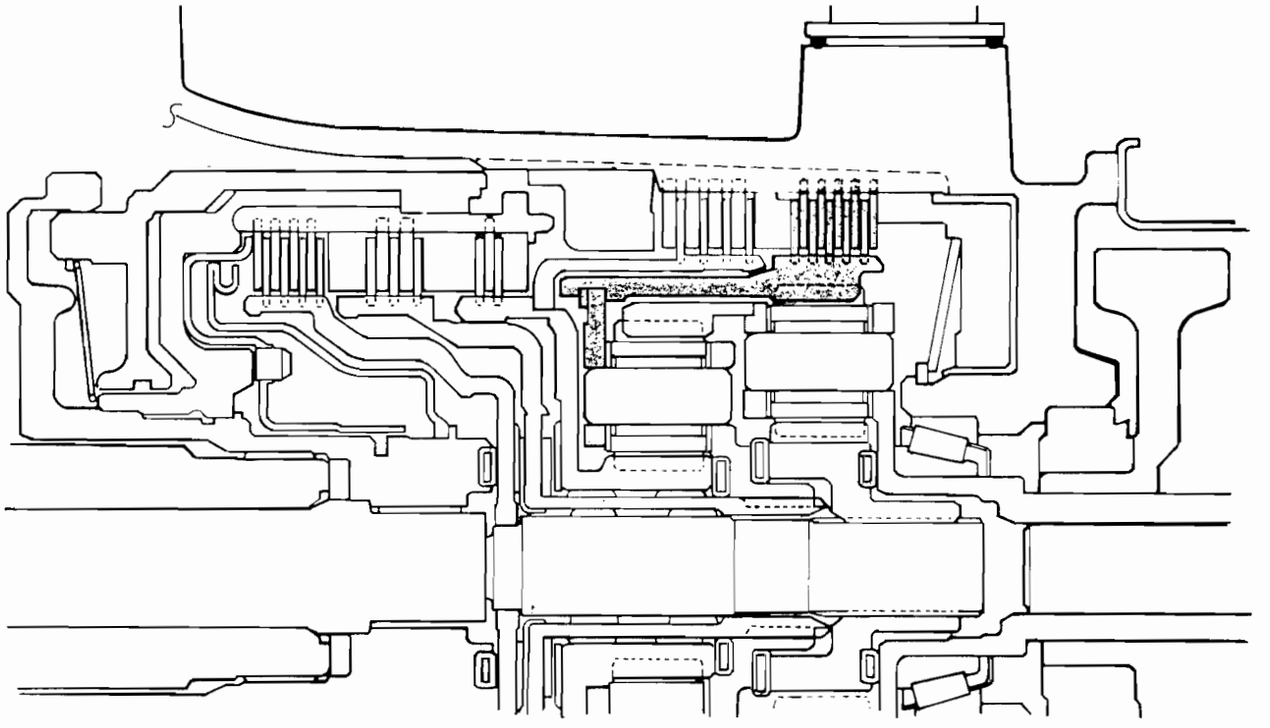


Fig. 4 — In neutral or park, there is no power flow through the transaxle.

LOW GEAR

In low gear, the ratio is 2.84:1. Torque input is through the underdrive clutch to the underdrive hub assembly, which turns the rear sun gear. The low-reverse clutch is applied to hold the rear annulus/front carrier assembly. The rear sun gear drives the pinions around the stationary rear annulus, causing the rear carrier to rotate and provide output torque (Fig. 5). In this gear, the rest of the planetary set is freewheeling.

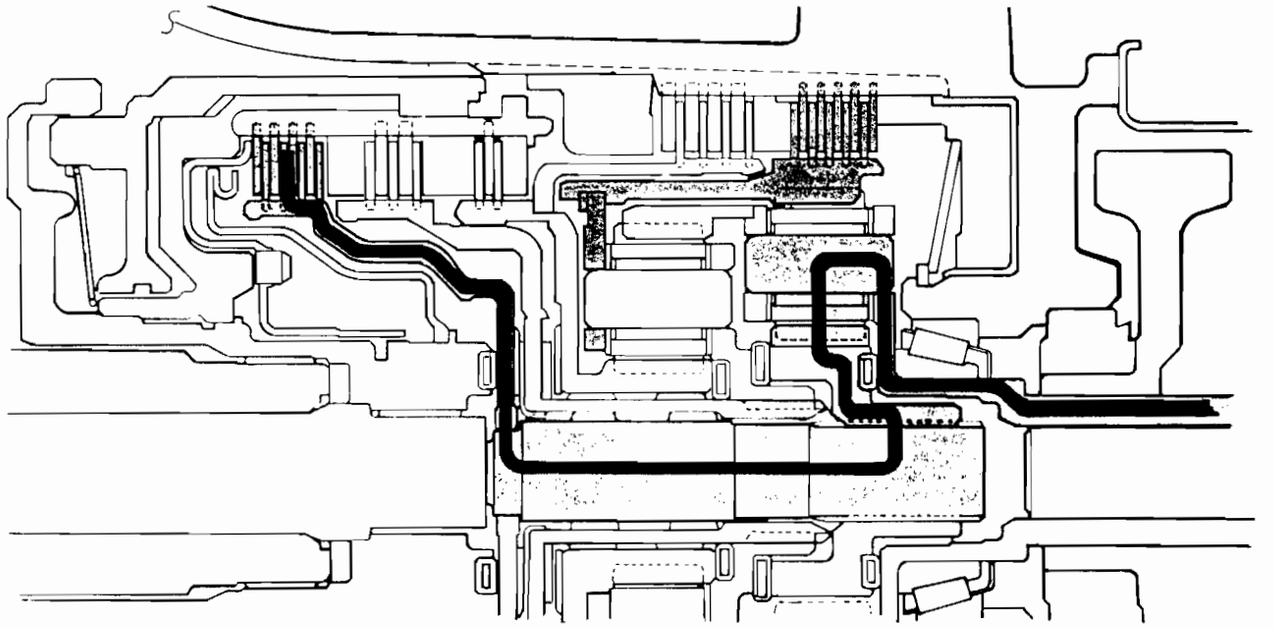


Fig. 5 — Power flow in low gear.

SECOND GEAR

In second gear, the ratio is 1.57:1. This ratio is achieved by having both planetary gear sets contribute to torque multiplication (Fig. 6). As in low gear, torque input is through the underdrive clutch to the rear sun gear. The two-four clutch is also applied, holding the front sun gear stationary. The rotating rear sun gear turns the rear pinions. The rotating rear pinions transmit torque to the rear annulus/front carrier assembly while the front pinions rotate around the stationary front sun gear. This transmits torque to the front annulus/rear carrier assembly, which provides the output torque.

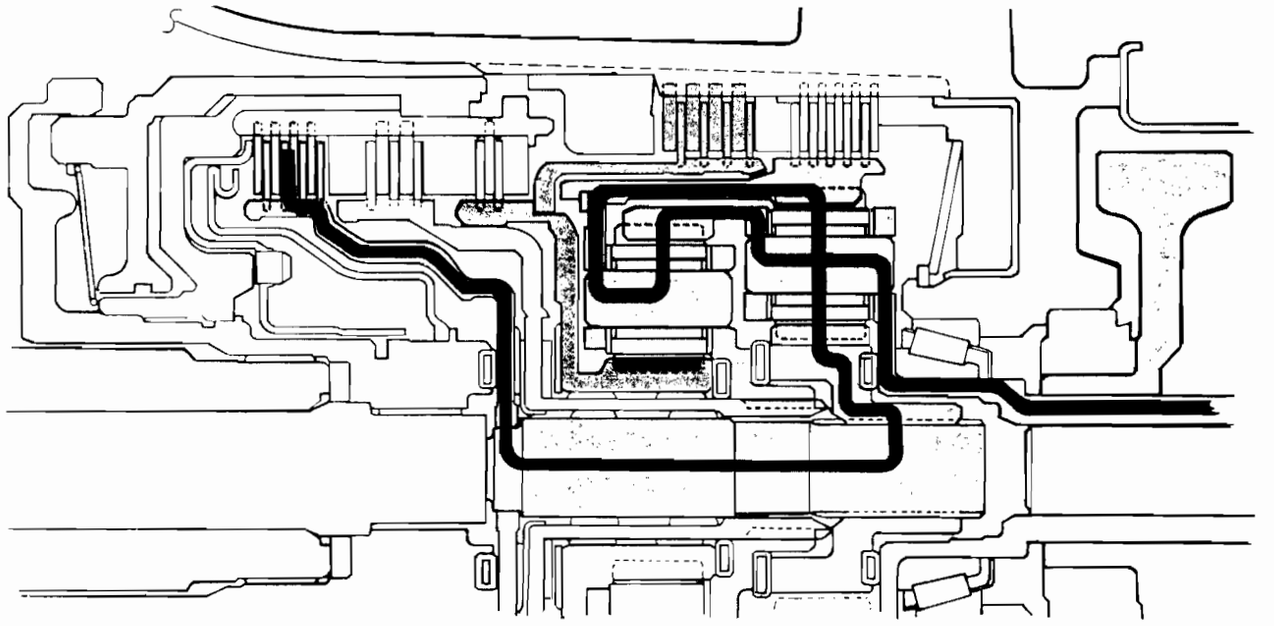


Fig. 6 — Power flow in second gear.

THIRD GEAR

In third gear, the ratio is one to one. Two input clutches — the underdrive clutch and the overdrive clutch — are applied to provide input torque (Fig. 7). The underdrive clutch rotates the rear sun gear while the overdrive clutch rotates the front carrier/rear annulus assembly. In effect, this locks the entire planetary gear set so that it rotates as a unit.

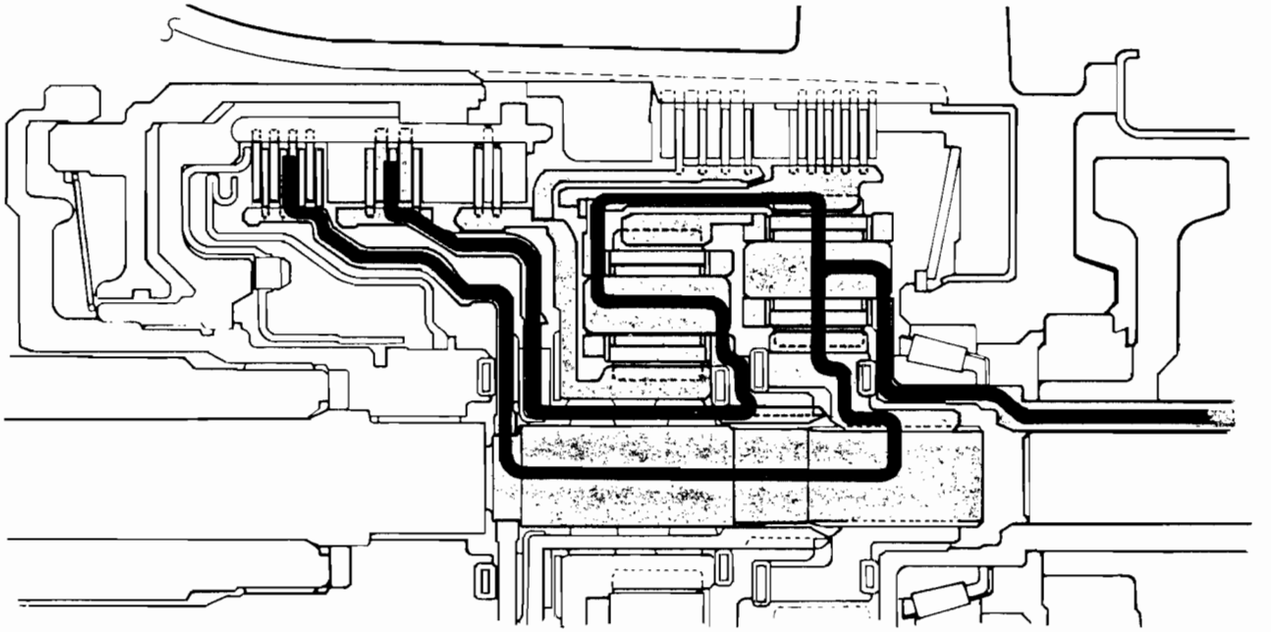


Fig. 7 — Power flow in third gear.

FOURTH GEAR

In fourth gear, which is overdrive, the ratio is 0.69:1. This means that output speed is greater than input speed. Input is through the overdrive clutch while the two-four clutch is applied to hold the front sun gear (Fig. 8). As the front carrier rotates, it causes the pinions to "walk around" the stationary front sun gear and turn the front annulus/rear carrier assembly, which provides output.

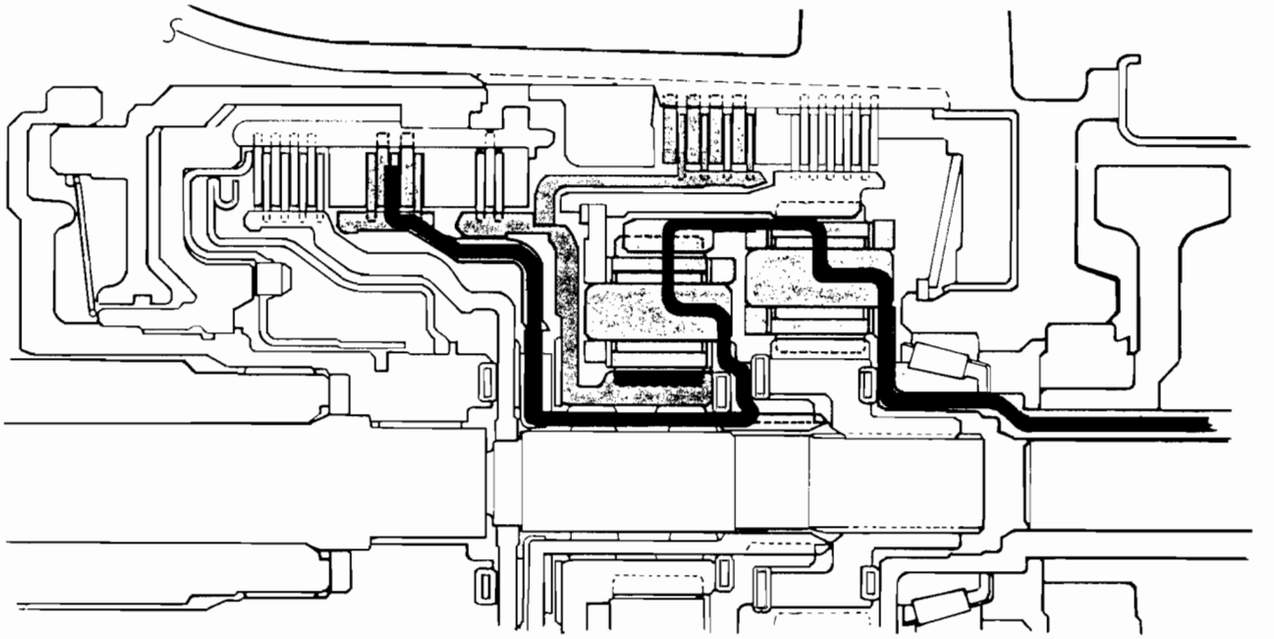


Fig. 8 — Power flow in fourth gear.

REVERSE

In reverse, the ratio is −2.21:1. Input is through the reverse clutch, which drives the front sun gear (Fig. 9). The low-reverse clutch is applied to hold the front carrier/rear annulus stationary. The front sun gear rotates the front pinions, which in turn rotate the front annulus/rear carrier assembly — providing output in the reverse direction.

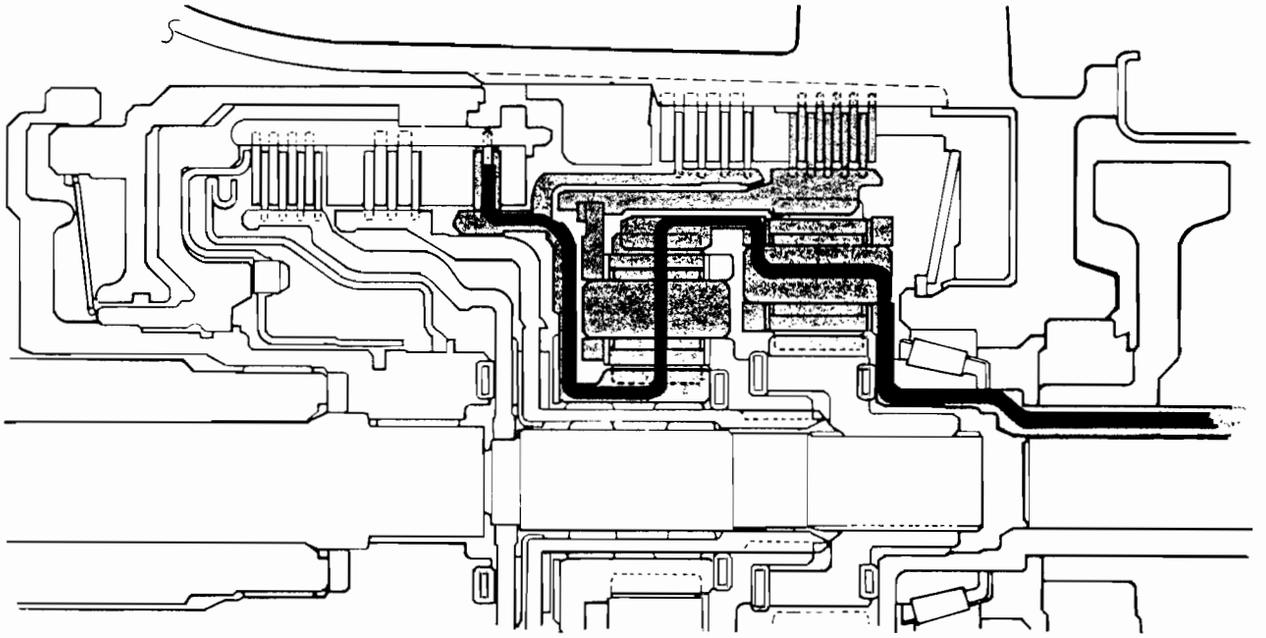
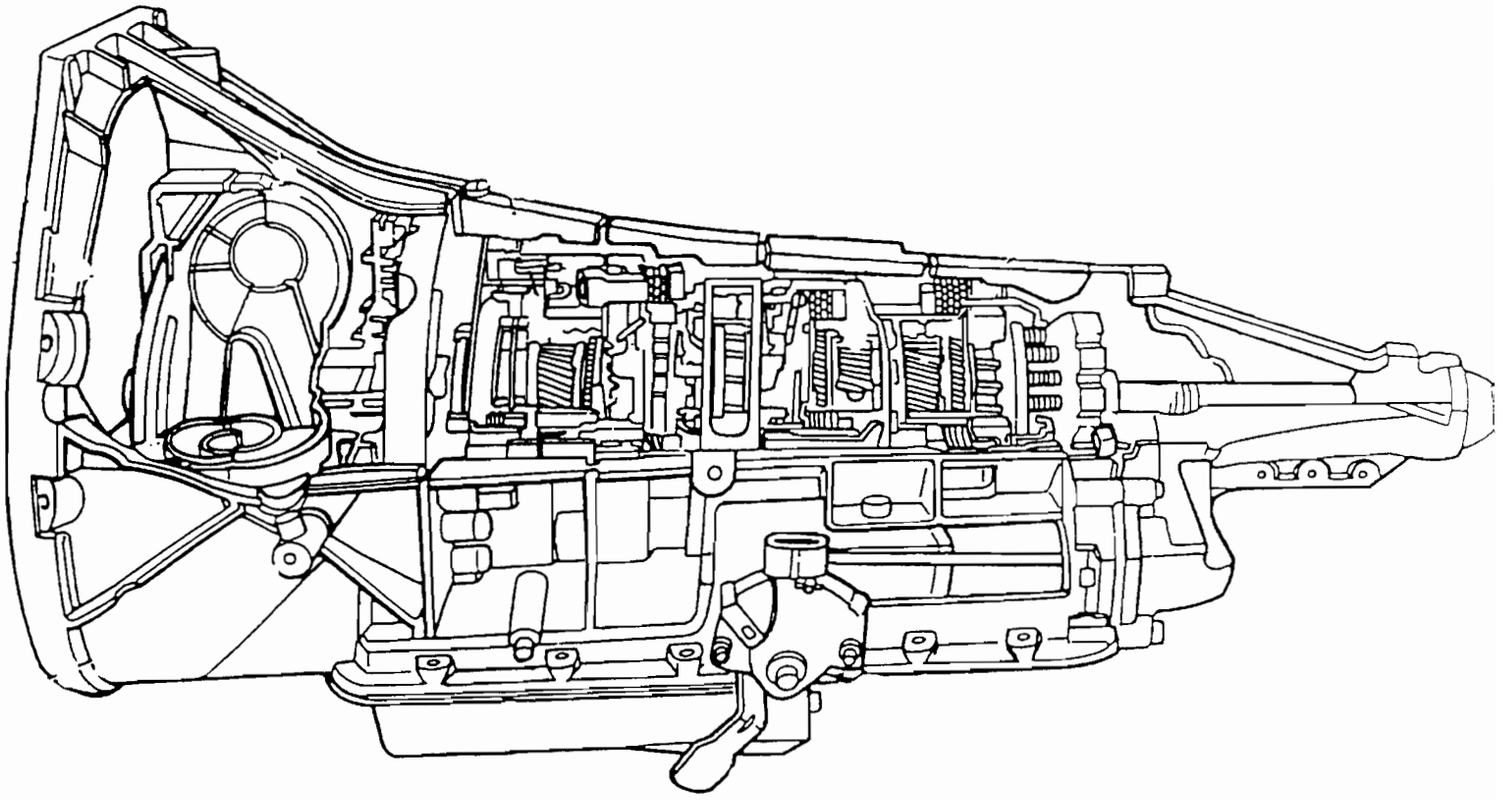


Fig. 9 — Power flow in reverse gear.

FORD
E4OD



E4OD Automatic Transmission

The E4OD Transmission is a fully, automatic, electronically controlled, four-speed unit with a three element locking torque converter. The main operating components of the E4OD transmission include a converter clutch, six multiple-disc friction clutches, one band, two sprag one-way clutches and a roller one-way clutch which provide for the desired function of three planetary gear sets.

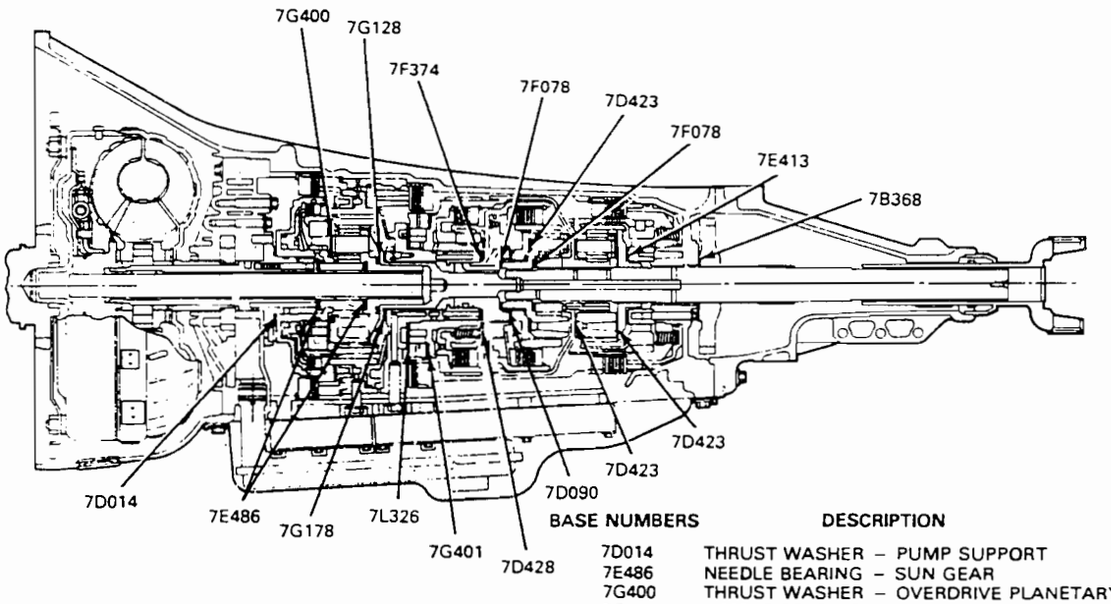
Transmission gear selection in the Ⓓ range and converter clutch operation is controlled by the EEC-IV control system. Operating conditions are relayed to EEC-IV by various sensors throughout the vehicle. The EEC-IV compares these conditions with electronically stored parameters and logically determines the state that the transmission should operate at.

In the Ⓓ range, automatic operation of all four gears is possible. The Overdrive Cancel Switch, located on the vehicle's dashboard, disables overdrive operation and enables automatic operation through the first three gears.

Manual gear selection is available in the 1 and 2 range. Second gear is commanded when the gear selector is in the 2 range and when downshifted into the 1 range at speeds above approximately 56 Km/h (35 mph) (for diesel 48 Km/h (30 mph). First gear is commanded in the 1 range at startups and when downshifted into 1 range below approximately 56 Km/h (35 mph) (for diesel 48 Km/h (30 mph).

NOTE: Any reference to Intermediate Brake Drum and Direct Clutch Cylinder are one and the same.

Thrust Washer and Needle Bearing locations



BASE NUMBERS	DESCRIPTION
7D014	THRUST WASHER – PUMP SUPPORT
7E486	NEEDLE BEARING – SUN GEAR
7G400	THRUST WASHER – OVERDRIVE PLANETARY CARRIER
7G128	NEEDLE BEARING – CENTER SHAFT
7G178	NEEDLE BEARING – CENTER SUPPORT
7L326	THRUST WASHER – CENTER SUPPORT
7G401	THRUST WASHER – INTERMEDIATE ONE-WAY CLUTCH
7D428	THRUST WASHER – INTERMEDIATE BRAKE DRUM
7F374	NEEDLE BEARING – FORWARD CLUTCH (PLASTIC) CYLINDER
7F078	NEEDLE BEARING – SUN GEAR
7D090	THRUST WASHER – FORWARD CLUTCH HUB
7D423	THRUST WASHER – PLANETARY CARRIER
7E413	NEEDLE BEARING – OUTPUT SHAFT HUB
7B368	THRUST WASHER – OUTPUT SHAFT

E4OD AUTOMATIC TRANSMISSION

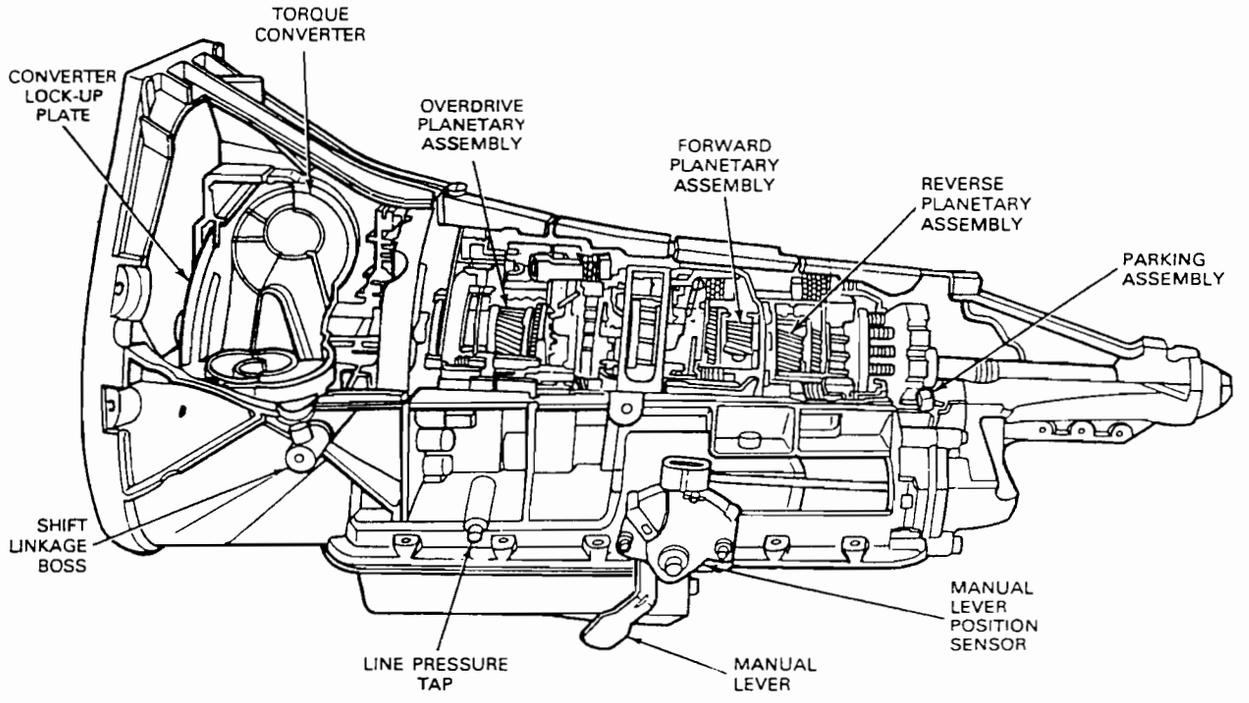
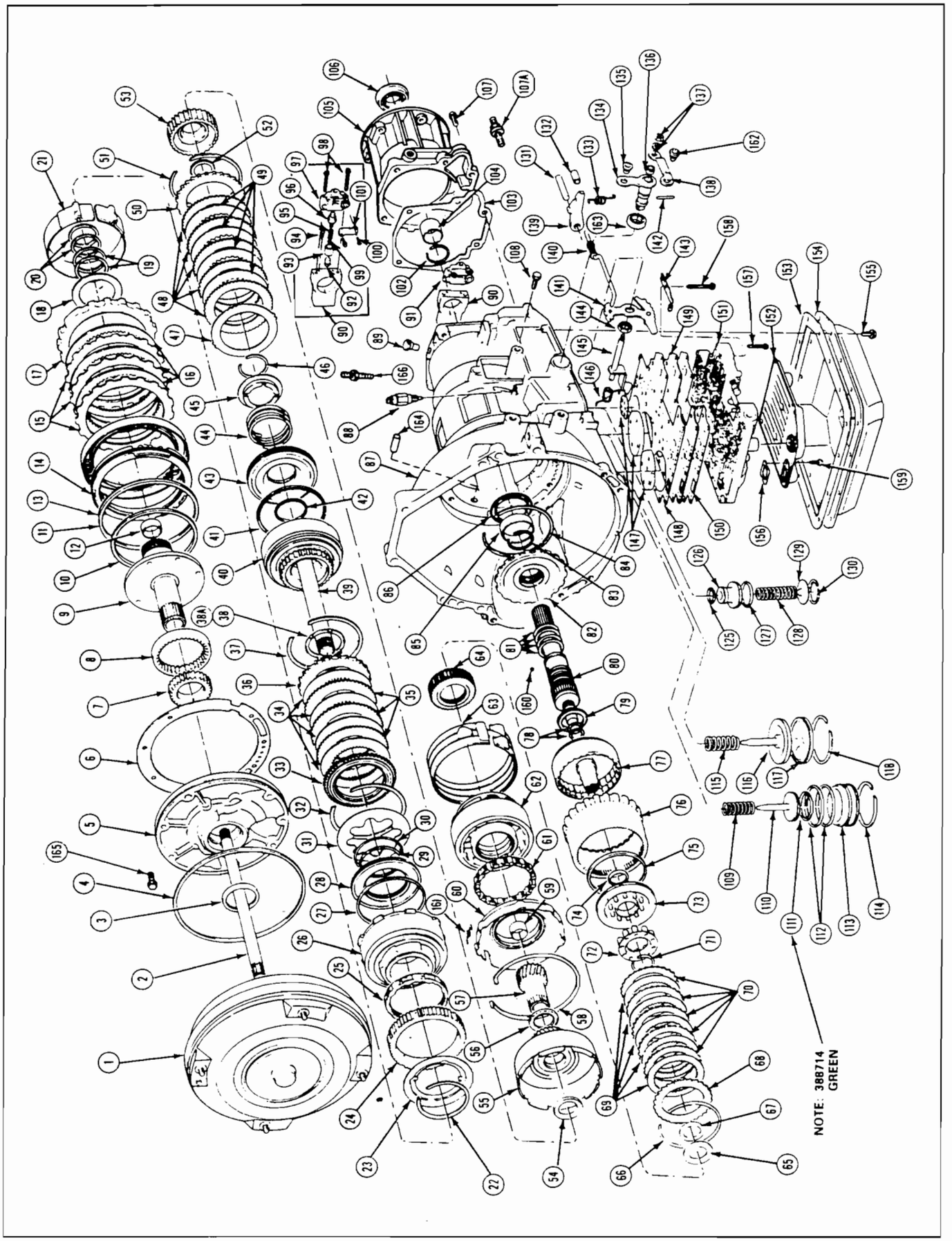


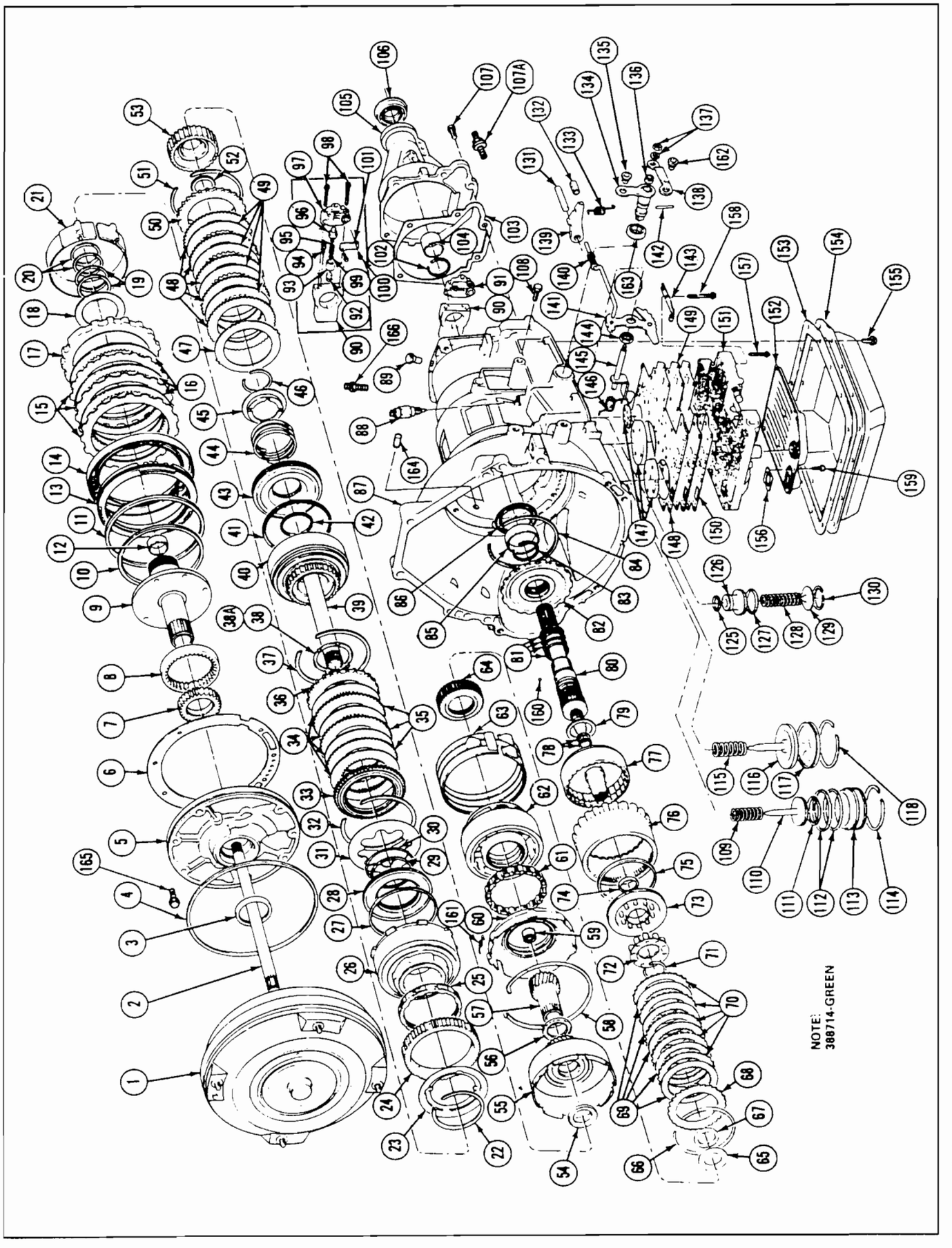
Chart No.	Part No.	Description
1	7902	Torque converter
2	7F208	Direct drive shaft
3	7A248	Front pump seal
4	7D441	Front pump "O" ring
5	7A103	Front pump body
6	7A136	Front pump gasket
7	7C010	Front pump drive gear
8	7C011	Front pump driven gear
9	7A108	Stator support — front pump
10	7F225	Interm. clutch piston inner lip seal
11	7F224	Interm. clutch piston outer lip seal
12	7B258	Front pump bushing
13	7E005	Interm. clutch piston
14	7F222	Interm. clutch piston return springs & retainer
15	7F220	Interm. clutch external spline steel plates (sel.)
16	7F219	Interm. clutch internal spline friction plates
17	7F226	Interm. clutch pressure plate
18	7D014	#1 thrust washer (front pump) selective
19	7F275	Stator support seal rings (rev. clutch) #1 and #2
20	7F276	Stator support seal rings (fwd. clutch) #3 and #4
21	7F196	Overdrive band
22	389790-S	Interm. OWC retaining snap
23	7F262	Interm. OWC retaining plate
24	7F221	Interm. OWC outer race
25	7F271	Interm. one-way clutch assy.
26	7F215	Reverse clutch drum
27	7D403	Reverse clutch piston seal (outer)
28	7E079	Reverse clutch piston
29	7D404	Reverse clutch piston seal (inner)
30	7D256	Thrust ring
31	7D405	Reverse clutch piston return spring
32	7D406	Retaining snap ring
33	7B066	Reverse clutch front pressure plate
34	7E311	Reverse clutch internal spline friction plate
35	7B442	Reverse clutch external spline steel plate
36	7F278	Forward and reverse clutch pressure plate
37	7D483	Reverse clutch retaining ring (sel.)
38	7D076	#2 thrust washer (rev. clutch)①
38A	7A166	#2 Needle bearing (rev. clutch)①
39	7F212	Turbine shaft
40	7F207	Forward clutch cylinder & turbine shaft
41	7F227	Forward clutch piston seal (outer)
42	7F228	Forward clutch piston seal (inner)
43	7L140	Forward clutch piston
44	7F230	Forward clutch piston return spring
45	7F229	Return spring retainer
46	388099	Retaining snap ring
47	7E085	Waved spring
48	7B442	Forward clutch external spline steel plate
49	7E311	Forward & reverse clutch internal spline friction plate
50	7F278	Forward & reverse clutch pressure plate
51	7D483	Retaining snap ring (selective)
52	7G040	#3 needle bearing (fwd. clutch)
53	7D051	Forward clutch hub
54	7F244	#4 needle bearing
55	7A019	Reverse sun gear & drive shell assy.
56	7F244	#5 needle bearing
57	7A399	Forward sun gear
58	388501	Center support retaining ring
59	7F209	Forward sun gear precision bushing
60	7C363	Center support planetary
61	7504	Planetary OWC cage spring & roller assy.
62	7A398	Planetary assy.
63	7D095	Reverse band
64	7F236	Direct clutch hub
65	7F243	#7 needle bearing (direct clutch inner)
66	388065-6-7-8	Retaining snap ring (selective)
67	7F237	Thrust spacer
68	7B477	Direct clutch pressure plate
69	7E313	Direct clutch internal spline plates
70	7F238	Direct clutch external spline plates
71	388104	Retaining snap ring
72	7F235	Return spring & retainer
73	7F254	Direct clutch piston
74	7F234	Direct clutch piston seal (inner)
75	7C000	Direct clutch piston seal (outer)
76	7A153	Ring gear & park gear
77	7F283	Direct cylinder
78	7F284	Output shaft small (2) Teflon seal rings (direct clutch) #5 and #6
79	7F240	#8 needle bearing (direct clutch outer)
80	7060	Output shaft
81	7F273	Output shaft large (4) steel seal rings #7, #8, #9, #10
82	7D164	Output shaft hub
83	97713	Retaining snap ring (O.P.S. hub to O.P.S.)
84	7C122	Retaining snap ring (O.P.S. hub to ring gear)
85	7E110	Rear case bushing
86	7F242	#9 needle bearing (rear case)
87	7005	Case assy.
88	7A247	Neutral start switch
89	7034	Vent cap
90	7A189	Governor counterweight
91	70063	Body assy. — governor
92	7A303	Plug governor
93	7A304	Sleeve governor
94	7E242	Screen assy. — gov. oil
95	7A302	Spring gov. valve
96	7C054	Valve governor
97	7A300	Body governor
98	N800273	Bolt (governor body to counterweight)
99	7A305	Clip — governor spring retainer
100	N800274	Bolt (governor cover to governor body)
101	7A301	Cover — governor valve body
102	388104	Retaining snap ring (governor assy. to O.P.S.)
103	7086	Extension housing gasket
104	7A034	Extension housing bushing
105	7A039	Extension housing
106	7052	Extension housing seal
107	N803747-S100	Bolt (ext. hsg. to case) M6-12.5 x 30 (6 req'd)
107A	N803352-S100	Stud (ext. hsg. to case) M8-1.25 x 54 (2 req'd holes 1 and 6)②
108	376649	Pipe plug — 1/8-27 dry seal
109	7F201	Overdrive servo piston return spring
110	7F200	Overdrive servo piston
111	See Note	Overdrive servo piston seal
112	388515-S100	Overdrive servo cover seal rings
113	7F204	Overdrive servo cover
114	388216	Retaining snap ring (O/D servo to case)
115	7D031	Reverse servo piston return spring
116	7D030	Reverse servo piston (selective)
117	7D281	Reverse servo cover
118	388215	Retaining snap ring (rev. servo to case)
125	7F250	2-3 accumulator valve seal (small)
126	7F251	2-3 accumulator valve
127	7F249	2-3 accumulator valve seal (large)
128	7F285	2-3 accumulator valve return spring
129	7F252	2-3 accumulator cover
130	388492	Retaining snap ring (2-3 accum. to case)
131	7D071	Park pawl shaft
132	7D419	Guide cup
133	7D070	Park pawl return spring
134	7F338	Manual lever
135	7341	Grommet
136	7F337	Throttle lever oil seal
137	N62004-S51	Attaching nut & lock washer — M8 x 1.25
138	7F291	Throttle lever (outer)
139	7A441	Park pawl
140	7A232	Park pawl actuating rod
141	7A115	Manual lever (inner)
142	7B210	Roll pin — 1/8 x 0.95 grooved
143	7E332	Detent spring
144	N800287-S51	Attaching nut (manual LVR) — M14 x 1.5 HEX
145	7F290	Throttle lever (inner)
146	7F292	Throttle torsion spring
147	7F282	Valve body reinforcement plate
148	7C155	Separator plate gasket (upper)
149	7A008	Separator plate
150	7D100	Separator plate gasket (lower)
151	7A100	Valve body (main control)
152	7F003	Filter & grommet assy. - oil pan
153	7A191	Oil pan gasket
154	7A264	Oil pan
155	390233-S2	Bolt (oil pan to case) — M8 x 1.25 x 15 (17 req'd)
156	7E062	Oil filter gasket
157	N605775-S	Bolt (valve body to case) — M6-1.0 x 30 (8 req'd).
158	N606022-S	Bolt (valve body to case) — M6-1.0 x 40 (17 req'd)
159	N605772-S	Bolt (screen to valve body) — M6-1.0 x 16 (3 req'd)
160	353351-S	Ball (governor drive)
161	7F277	Spring (anti clunk)
162	7F434	Grommet
163	7B498	Oil seal assy. Manual lever
164	—	Overdrive anchor-pin — not serviced
165	N605789-S100	Bolts (front pump to case — 7 req'd)
166	N804799-S100	Connector assy. (cooler line) 5/16 tube x 1/4 external pipe

① Some Applications
② Sealant Coated

Automatic Overdrive Transmission—AOD—Exploded View—4x2 Vehicles

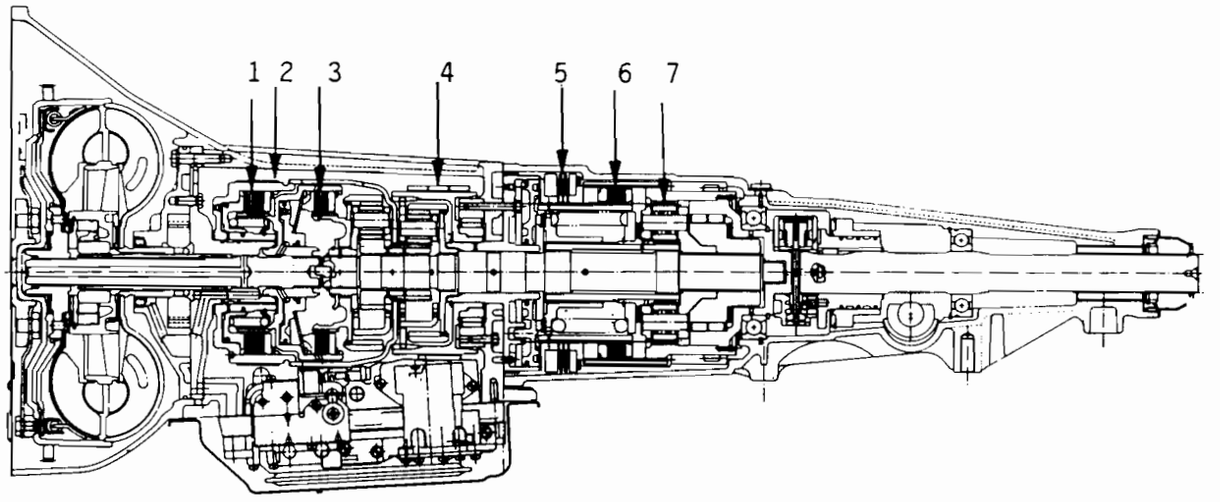


Automatic Overdrive Transmission—Nomenclature



Automatic Overdrive Transmission—AOD—Exploded View 4x4 Vehicles

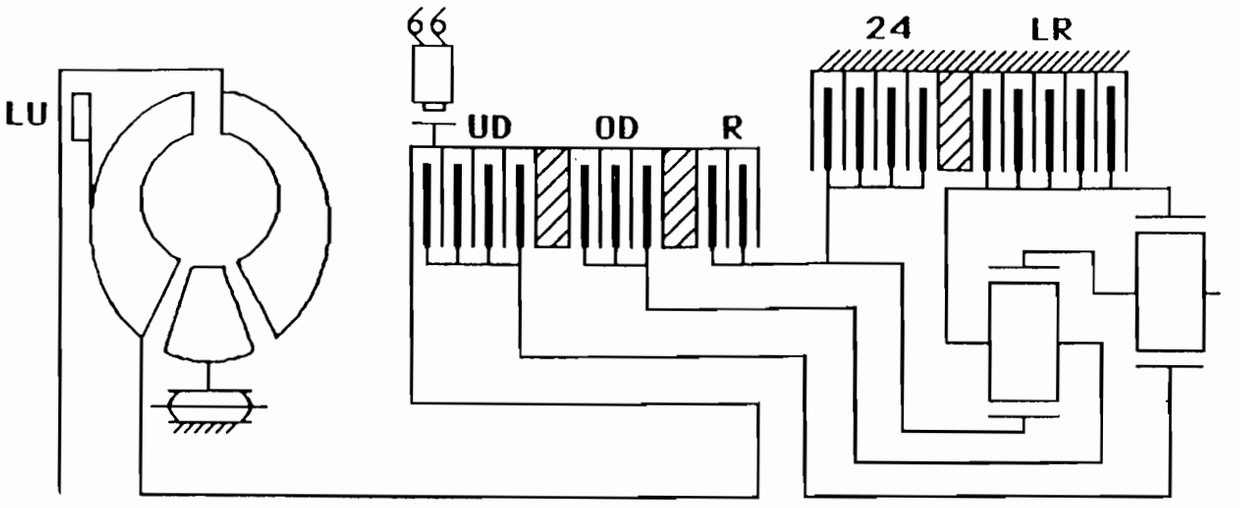
CHRYSLER A-500



1. FRONT CLUTCH
2. KICKDOWN BAND
3. REAR CLUTCH
4. REVERSE BAND
5. OVERDRIVE CLUTCH
6. DIRECT CLUTCH
7. OVERRUN CLUTCH

LEVER POSITION	A500 OVER-DRIVE	START SAFETY	PARKING SPRAG	TRANSMISSION						OVERDRIVE		
				CLUTCHES				BANDS		CLUTCHES		
				FRONT	REAR	O'RUNNING	LOCKUP	K/D FRONT	REVERSE/REAR	O/D	O'RUNNING	DIRECT
P-Park		X	X									
R-Reverse	2.21			X					X			X
O-Drive												
First	2.74				X	X					X	X
Second	1.54				X			X			X	X
Third	1.00			X	X		X				X	X
O/D	.69			X	X		X			X		X
2-Second												
First	2.74				X	X					X	X
Second	1.54				X			X			X	X
1-Low	2.74				X	X			X		X	X

CHRYSLER A-604

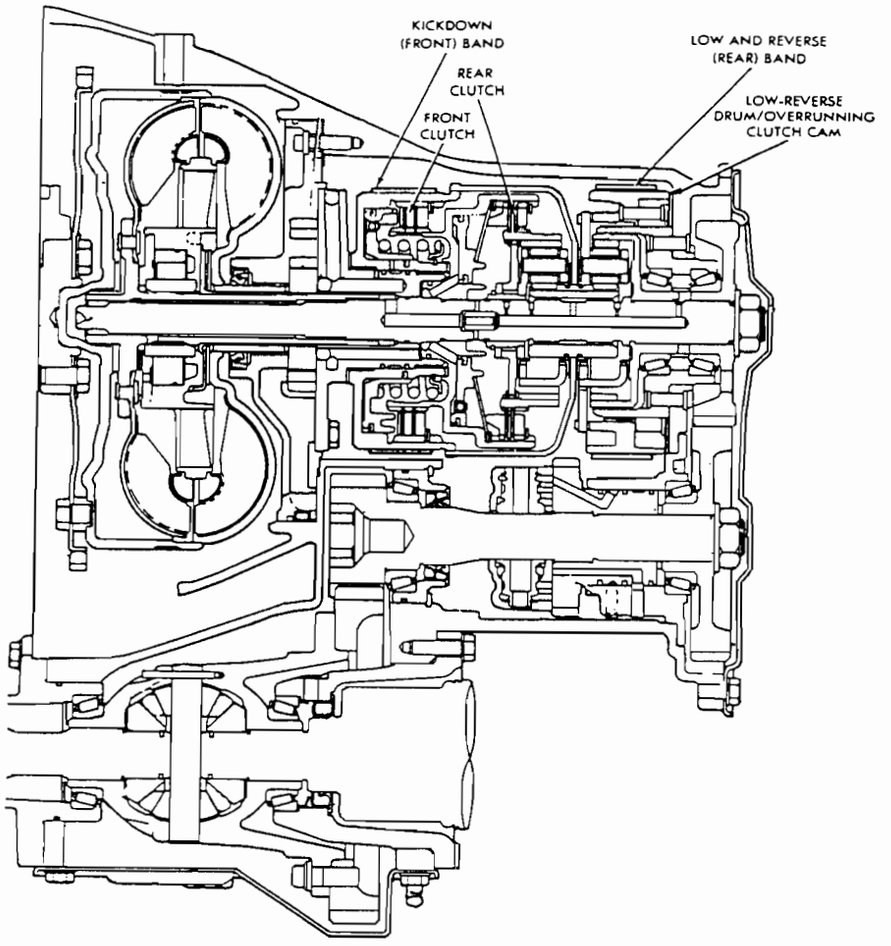


A604 4-SPEED EATX

UD=UNDERDRIVE CLUTCH
OD=OVERDRIVE CLUTCH
R =REVERSE CLUTCH
24=2-4 CLUTCH
LR=LOW REVERSE CLUTCH
LU=LOCKUP CLUTCH

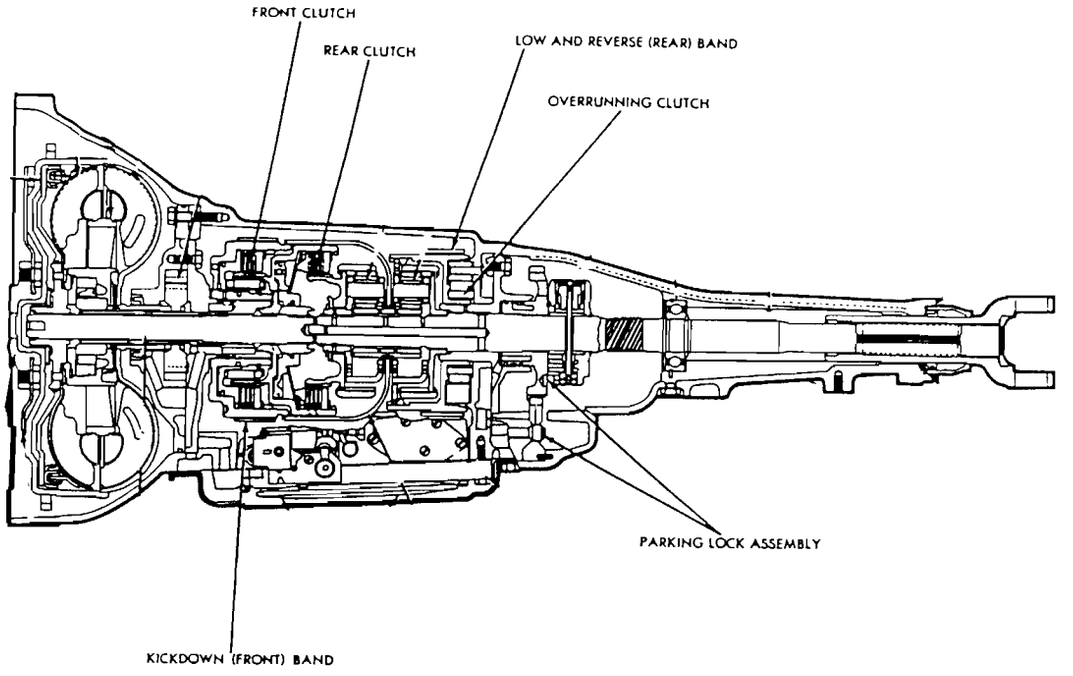
GEAR	TORQUE RATIO	CLUTCHES APPLIED
REVERSE	2.21	R , LR
NEUTRAL	-	LR
FIRST	2.84	UD,LR
SECOND	1.57	UD,24
DIRECT	1.00	UD,OD
OVERDRIVE	0.69	OD,24

CHRYSLER A-670



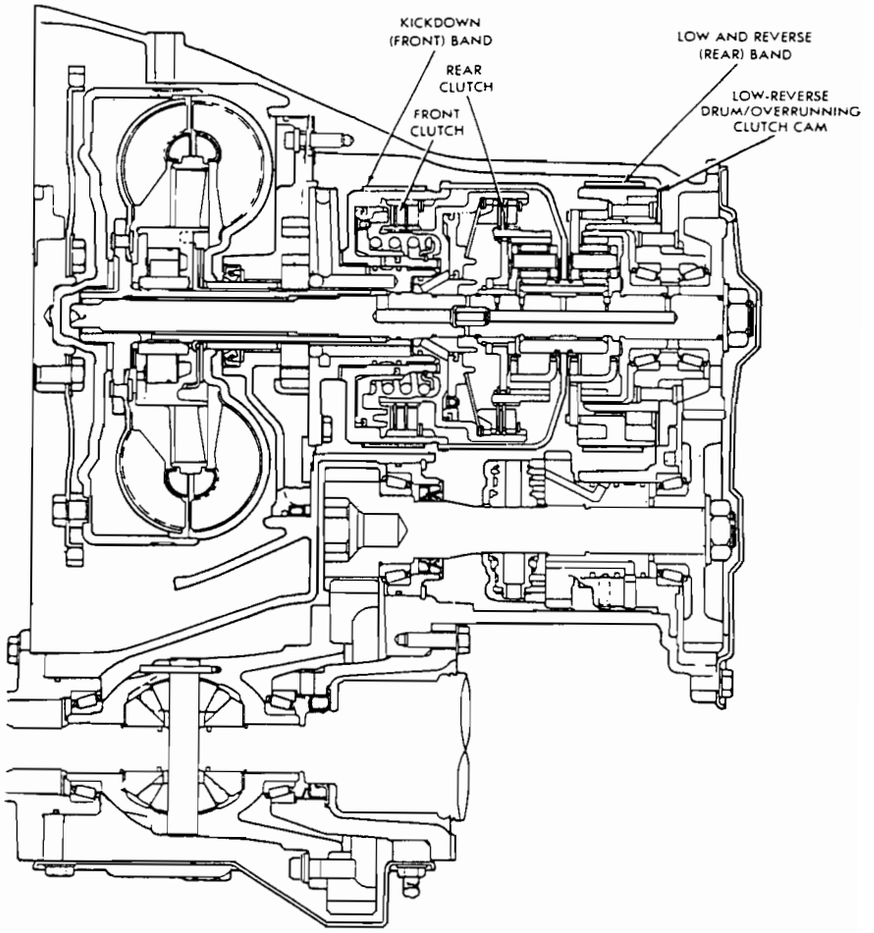
RANGE	DIRECT CLUTCH	FORWARD CLUTCH	ROLLER CLUTCH	KICK-DOWN BAND	LOW-REV BAND
REV	ON				ON
D 1ST		ON	ON		
D 2ND		ON		ON	
D 3RD	ON	ON			
S 1ST		ON	ON		
S 2ND		ON		ON	
LOW		ON			ON

CHRYSLER A-999



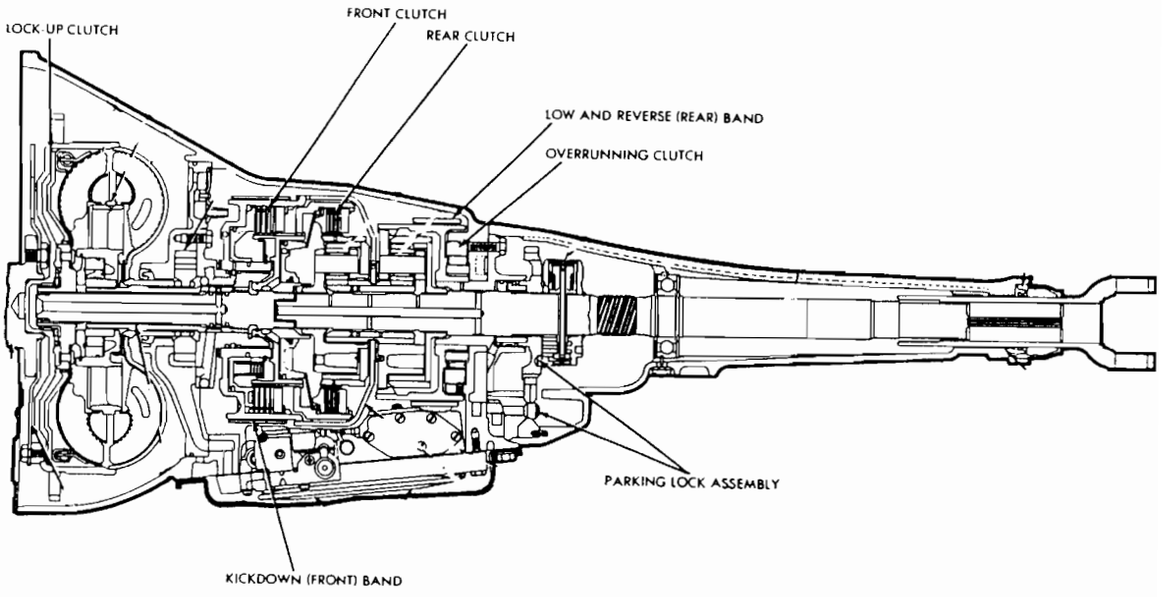
RANGE	DIRECT CLUTCH	FORWARD CLUTCH	ROLLER CLUTCH	KICK-DOWN BAND	LOW-REV BAND
REV	ON				ON
D 1ST		ON	ON		
D 2ND		ON		ON	
D 3RD	ON	ON			
S 1ST		ON	ON		
S 2ND		ON		ON	
LOW		ON			ON

CHRYSLER A-404



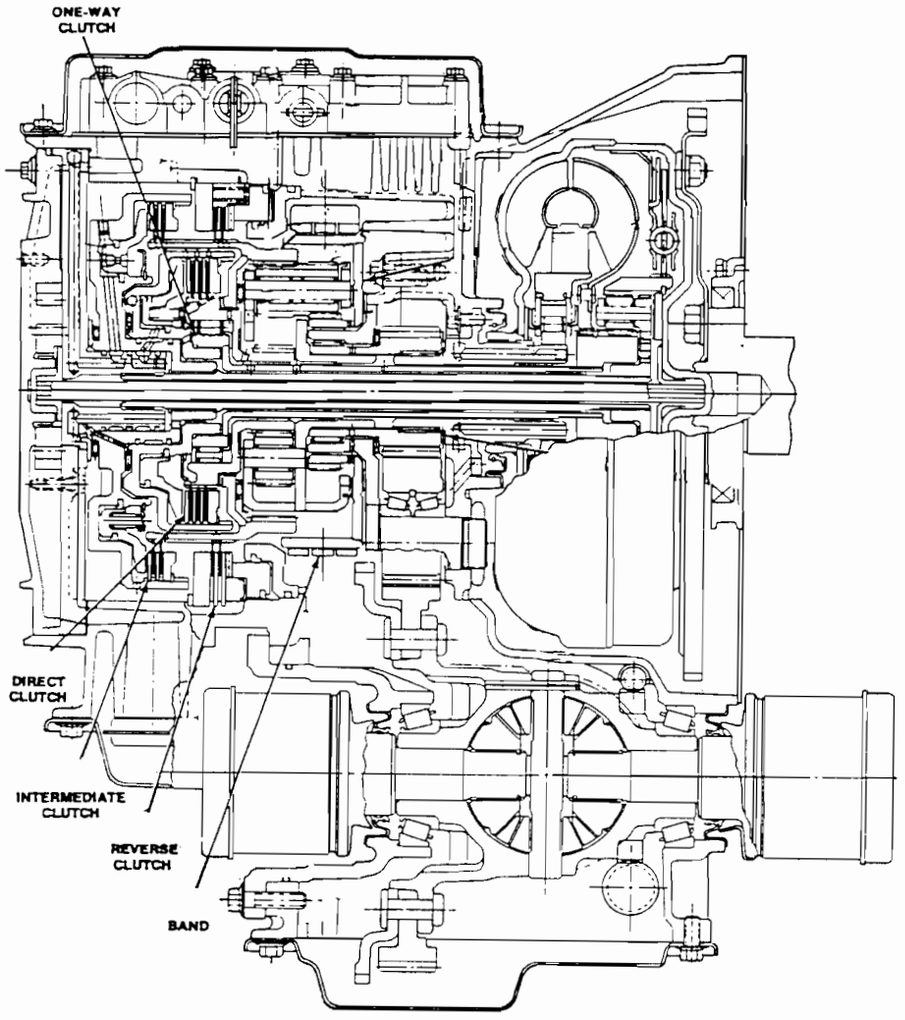
Lever Position	Clutches: Front	Clutches: Rear	Clutches: Over-running	Bands (Kickdown) Front	Bands (Low-Rev.) Rear
P—PARK					
R—REVERSE	X				X
N—NEUTRAL					
D—DRIVE					
First		X	X		
Second		X		X	
Direct	X	X			
2—SECOND					
First		X	X		
Second		X		X	
1—LOW (First)		X			X

CHRYSLER A-727



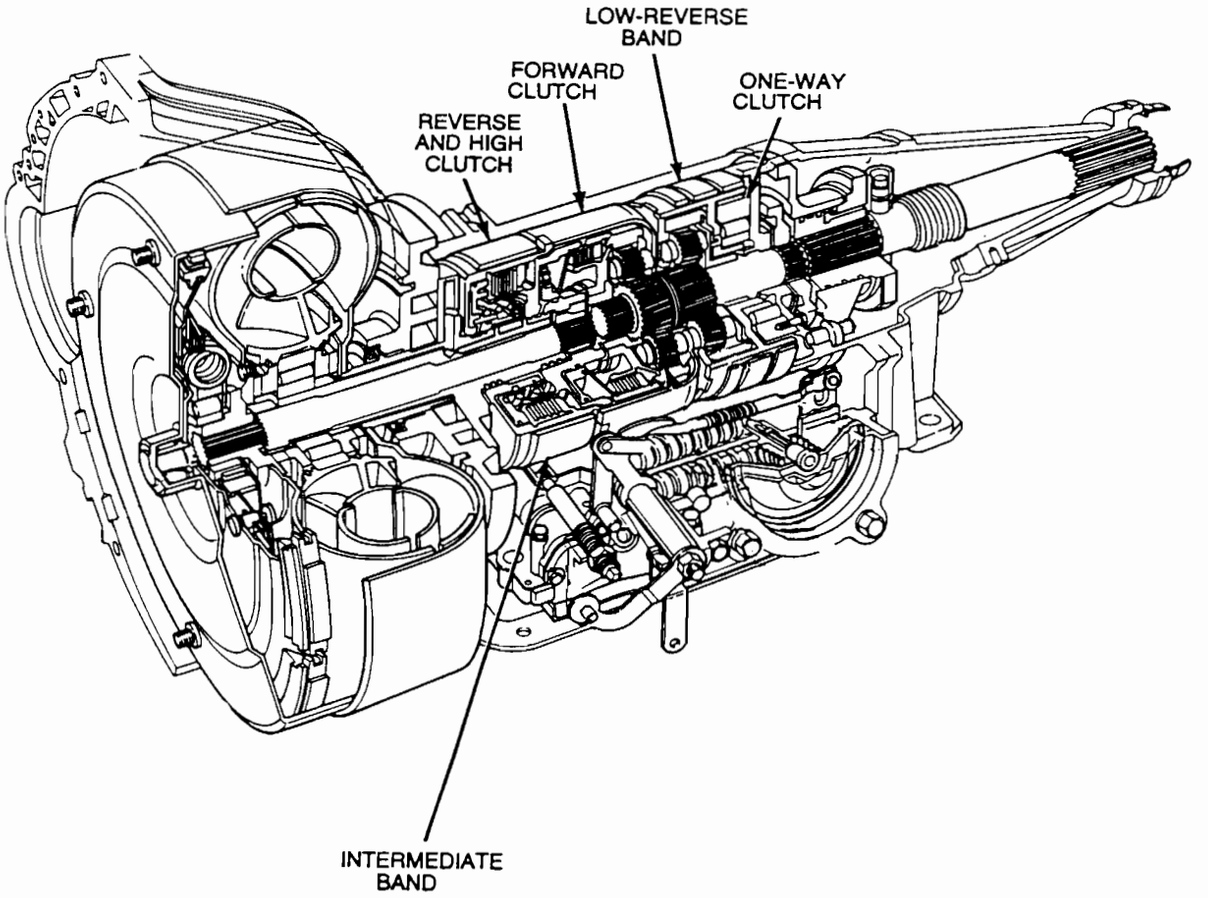
Lever Position	Clutches			Bands	
	Front	Rear	Over-running	(Kickdown) Front	(Low-Rev.) Rear
P—PARK					
R—REVERSE	X				X
N—NEUTRAL					
D—DRIVE					
First		X	X		
Second		X		X	
Direct	X	X			
2—SECOND					
First		X	X		
Second		X		X	
1—LOW (First)		X			X

FORD ATX



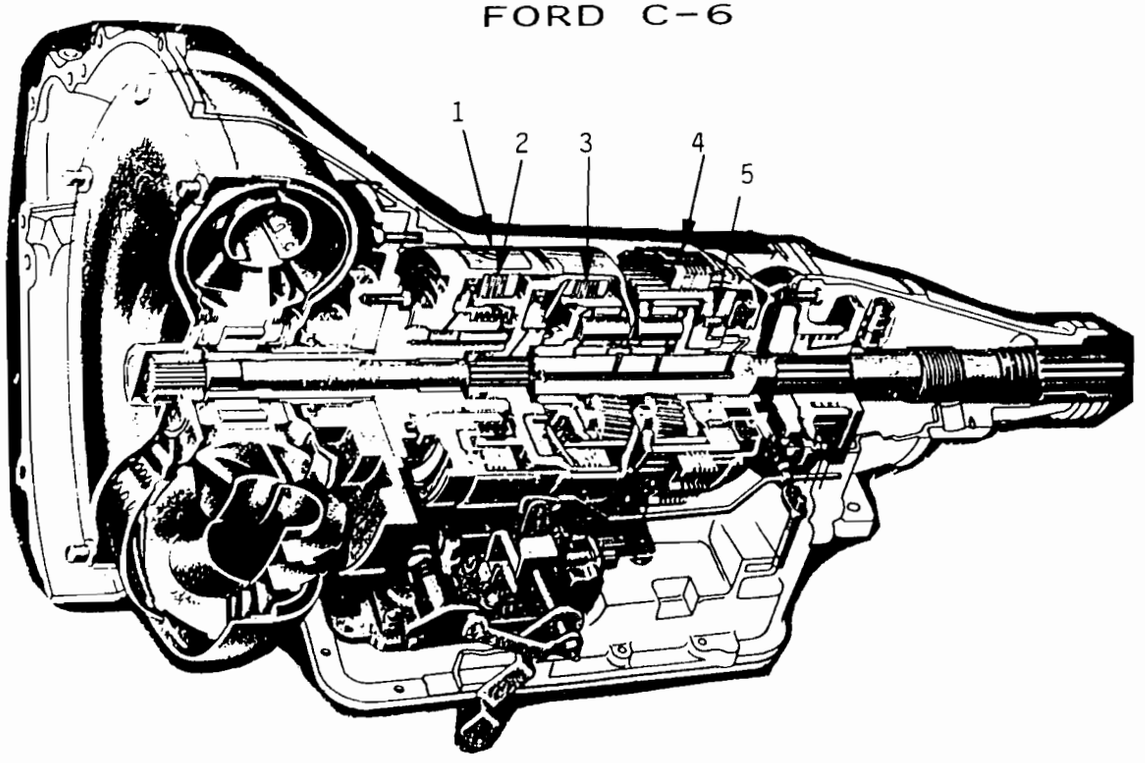
Gear	Band	Direct Clutch	Intermediate Clutch	Reverse Clutch	Intermediate One-Way Clutch
1st Gear Manual Low	Applied	Applied			Holding
2nd Gear Manual Low	Applied		Applied		
1st Gear (Drive)	Applied				Holding
2nd Gear (Drive)	Applied		Applied		
3rd Gear (Drive)		Applied	Applied		
Reverse (R)		Applied		Applied	Holding
Neutral (N)					Holding
Park (P)					Holding

FORD C-5



Gear	Reverse and High Clutch	Forward Clutch	One-Way Clutch	Intermediate Band	Low-Reverse Band
1st (D Range)		Applied	Applied		
1st (1 Range)		Applied			Applied
2nd		Applied		Applied	
3rd	Applied	Applied			
Reverse	Applied				Applied

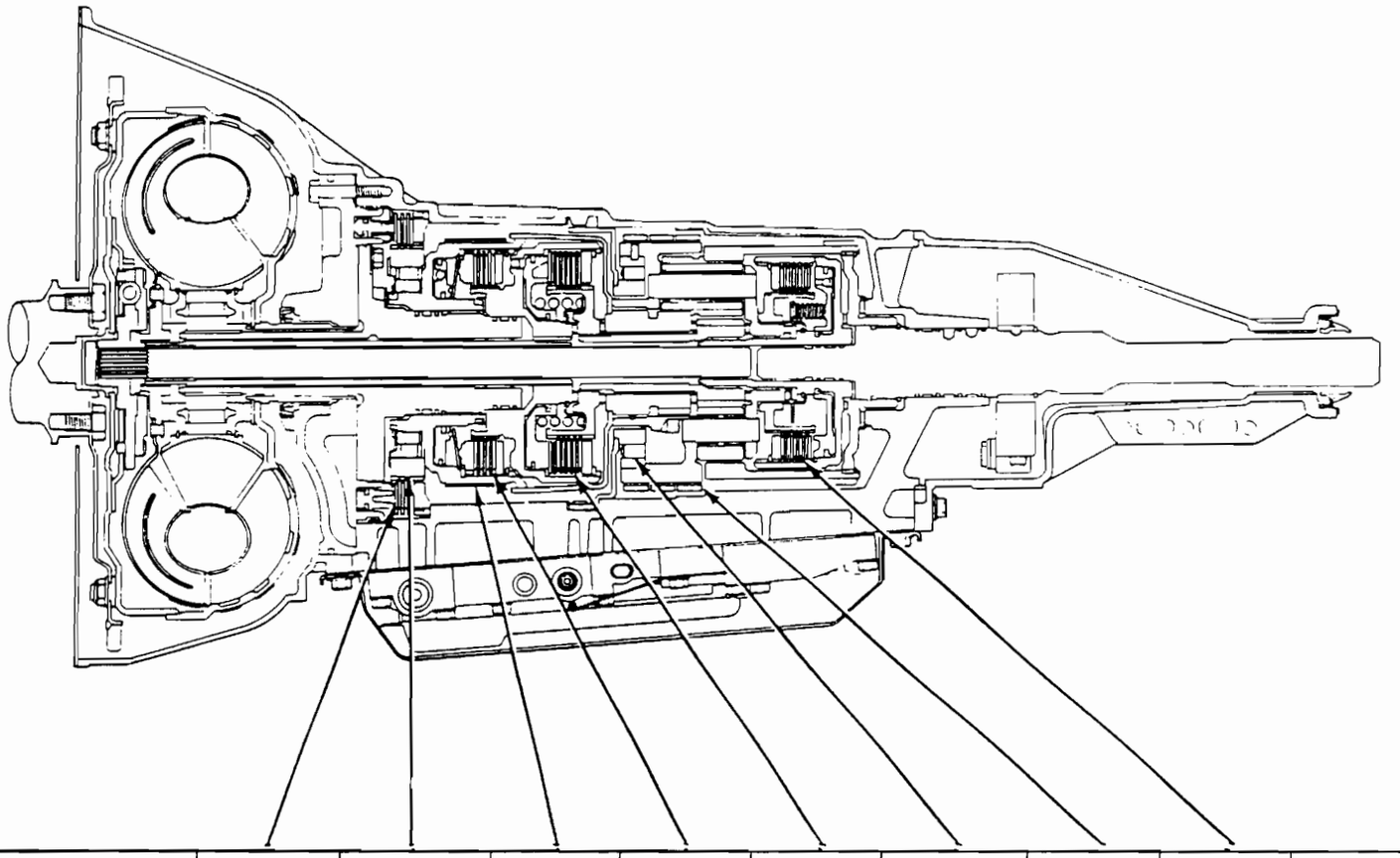
FORD C-6



1. INTERMEDIATE BAND
2. REV/HIGH CLUTCH
3. FORWARD CLUTCH
4. LOW/REV CLUTCH
5. ONE-WAY CLUTCH

RANGE	FORWARD CLUTCH	REV/HIGH CLUTCH	LOW/REV CLUTCH	INTERMEDIATE BAND	ONE-WAY CLUTCH
D 1	ON				HOLDING
D 2	ON			ON	
D 3	ON	ON			
LOW	ON		ON		
REV		ON	ON		

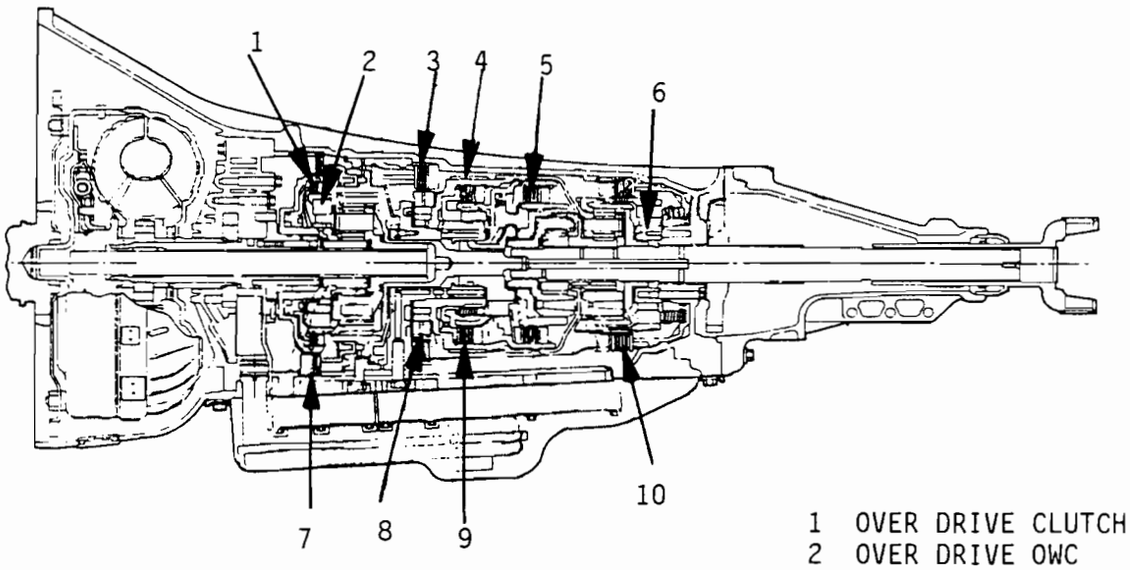
FORD AOD



Gear	Intermediate Friction Clutch	Intermediate Roller Clutch	Overdrive Band	Reverse Clutch	Forward Clutch	Planetary (Low) One-Way Clutch	Low and Reverse Band	Direct Clutch
1 Range Low					APPLIED	HOLDING	APPLIED	
O/D and 3 Range Low					APPLIED	HOLDING		
Second (Intermediate)	APPLIED	HOLDING			APPLIED	OVERRUNS		
Third (Direct)	APPLIED	OVERRUNS			APPLIED	OVERRUNS		APPLIED
Fourth (Overdrive)	APPLIED		APPLIED			OVERRUNS		APPLIED
Reverse				APPLIED			APPLIED	

*Not including torque converter reduction in 1st, Second and Reverse.

FORD E4OD

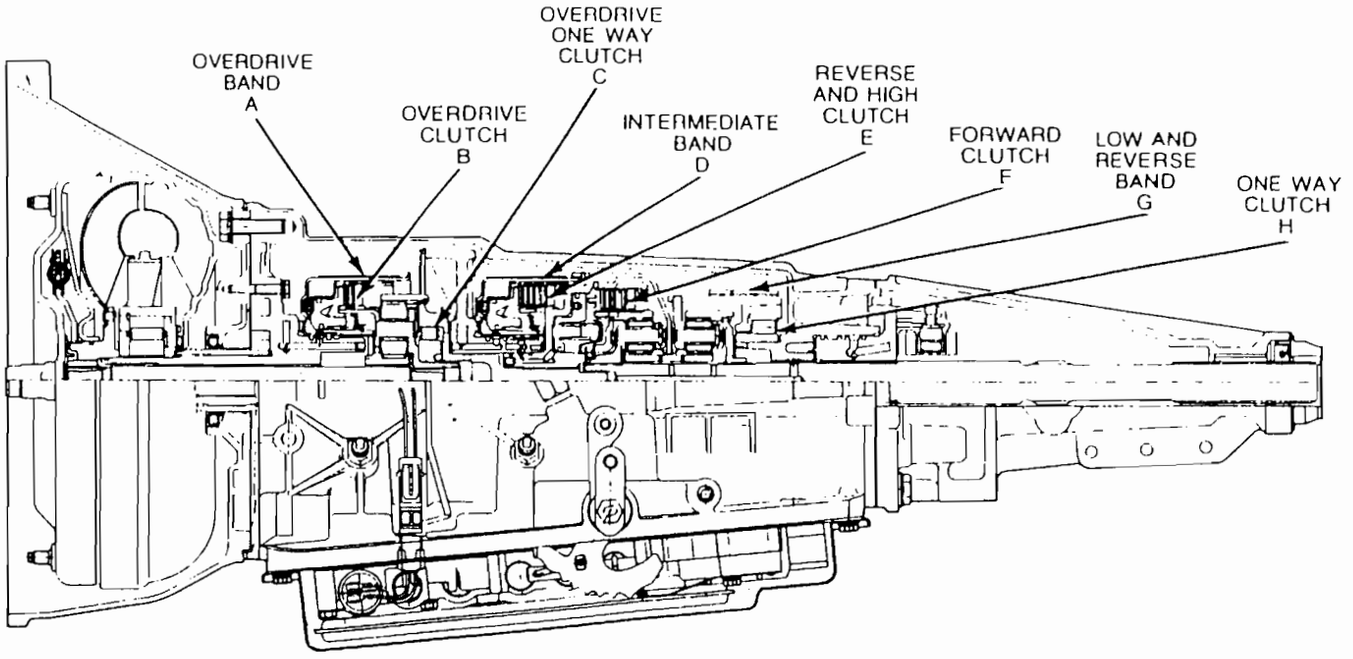


1 OVER DRIVE CLUTCH
2 OVER DRIVE OWC
3 INTERMEDIATE CLUTCH
4 BAND
5 FORWARD CLUTCH
6 LOW/REVERSE OWC
7 COAST CLUTCH
8 INTERMEDIATE OWC
9 DIRECT CLUTCH
10 REVERSE CLUTCH

Gear	Friction Elements							One-Way Clutch					
								Drive			Coast		
	Coast	Inter-mediate	Direct	Forward	Reverse	Over-Drive	Band	O/D OWC	Inter-mediate OWC	Low Reverse OWC	O/D OWC	Inter-mediate OWC	Low Reverse OWC
	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑧	⑨	⑩
Ⓓ first	*			apply				hold		hold	o/r*		o/r
Ⓓ second	*	apply		apply				hold	hold	o/r	o/r*	o/r	o/r
Ⓓ third	*	apply	apply	apply				hold	o/r	o/r	o/r*	o/r	o/r
Ⓓ fourth		apply	apply	apply		apply		o/r	o/r	o/r	o/r	o/r	o/r
1	apply			apply	apply								
2	apply	apply		apply			apply			o/r			o/r
Reverse	apply		apply		apply				o/r			o/r	

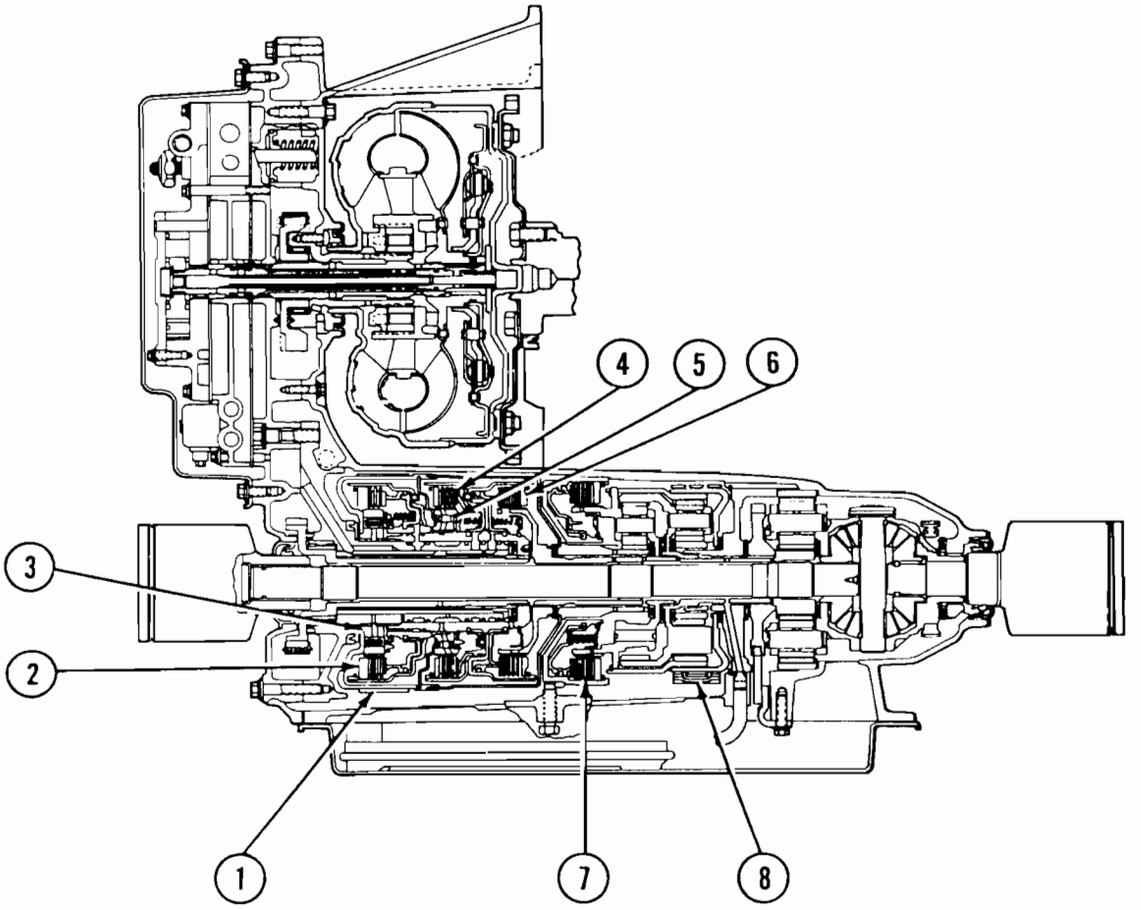
O/D — Overdrive
OWC — One-Way Clutch
O/R — Overrunning
*In D Range with the Overdrive Cancel Switch pressed, the coast clutch is applied and the O/D one-way clutch is bypassed.

FORD A4LD



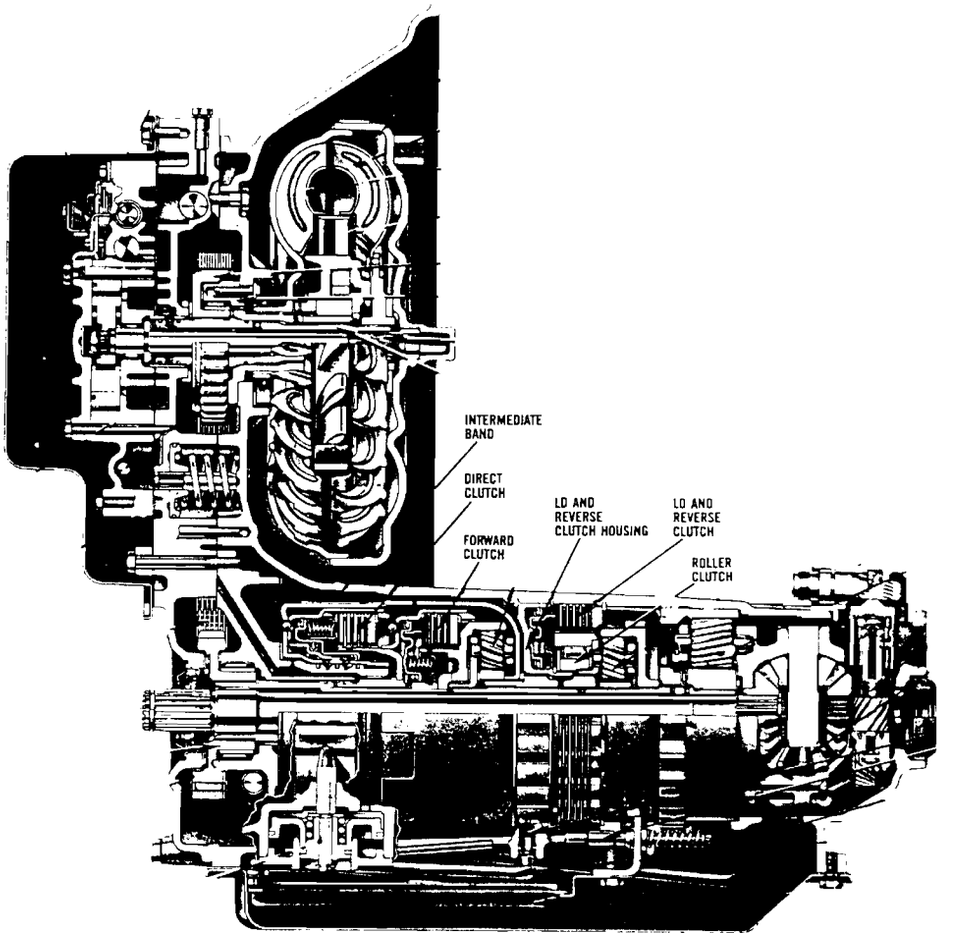
GEAR	OVER-DRIVE BAND A	OVER-DRIVE CLUTCH B	OVER-DRIVE ONE WAY CLUTCH C	INTERMEDIATE BAND D	REVERSE AND HIGH CLUTCH E	FORWARD CLUTCH F	LOW AND REVERSE BAND G	ONE WAY CLUTCH H	GEAR RATIO
1 — MANUAL FIRST GEAR (LOW)		APPLIED	HOLDING			APPLIED	APPLIED	HOLDING	2.47:1
2 — MANUAL SECOND GEAR		APPLIED	HOLDING	APPLIED		APPLIED			1.47:1
D — DRIVE AUTO. — 1ST. GEAR		APPLIED	HOLDING			APPLIED		HOLDING	2.47:1
Ⓓ— O/D AUTO. — 1ST. GEAR			HOLDING			APPLIED		HOLDING	2.47:1
D — DRIVE AUTO. — 2ND. GEAR		APPLIED	HOLDING	APPLIED		APPLIED			1.47:1
Ⓓ— O/D AUTO. — 2ND. GEAR			HOLDING	APPLIED		APPLIED			1.47:1
D — DRIVE AUTO. — 3RD. GEAR		APPLIED	HOLDING		APPLIED	APPLIED			1.0:1
Ⓓ— O/D AUTO. — 3RD. GEAR			HOLDING		APPLIED	APPLIED			1.0:1
Ⓓ— OVERDRIVE AUTOMATIC FOURTH GEAR	APPLIED				APPLIED	APPLIED			0.75:1
REVERSE		APPLIED	HOLDING		APPLIED		APPLIED		2.1:1

FORD AXOD



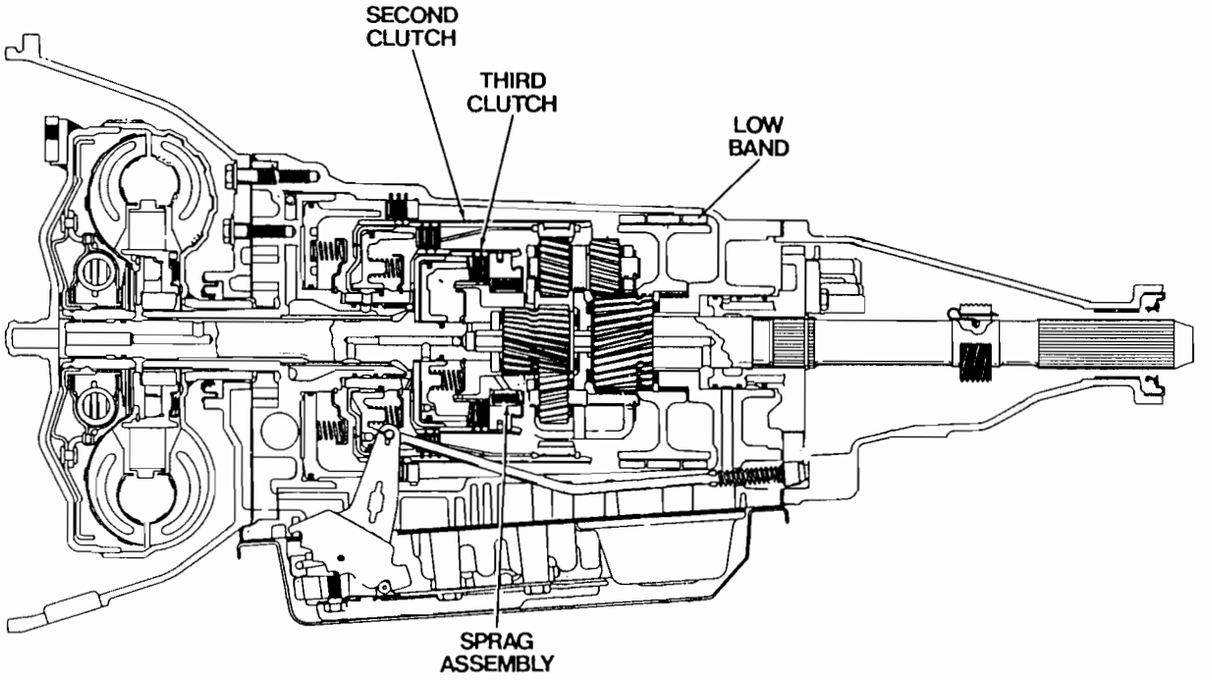
GEAR	OVER-DRIVE BAND ①	FOR-WARD CLUTCH ②	LOW ONE-WAY CLUTCH ③	DIRECT CLUTCH ④	DIRECT ONE-WAY CLUTCH ⑤	INTER-MEDIATE CLUTCH ⑥	REV CLUTCH ⑦	LOW INTER. BAND ⑧	RATIO
MANUAL LOW		APPLIED	HOLD	APPLIED				APPLIED	2.77:1
DRIVE 1st GEAR		APPLIED	HOLD					APPLIED	2.77:1
DRIVE 2nd GEAR		APPLIED	O/R			APPLIED		APPLIED	1.543:1
DRIVE 3rd GEAR		APPLIED		APPLIED	HOLD	APPLIED			1.000:1
DRIVE 4th GEAR	APPLIED			APPLIED	O/R	APPLIED			.694:1
REVERSE		APPLIED	HOLD				APPLIED		2.263:1

GM 125-C



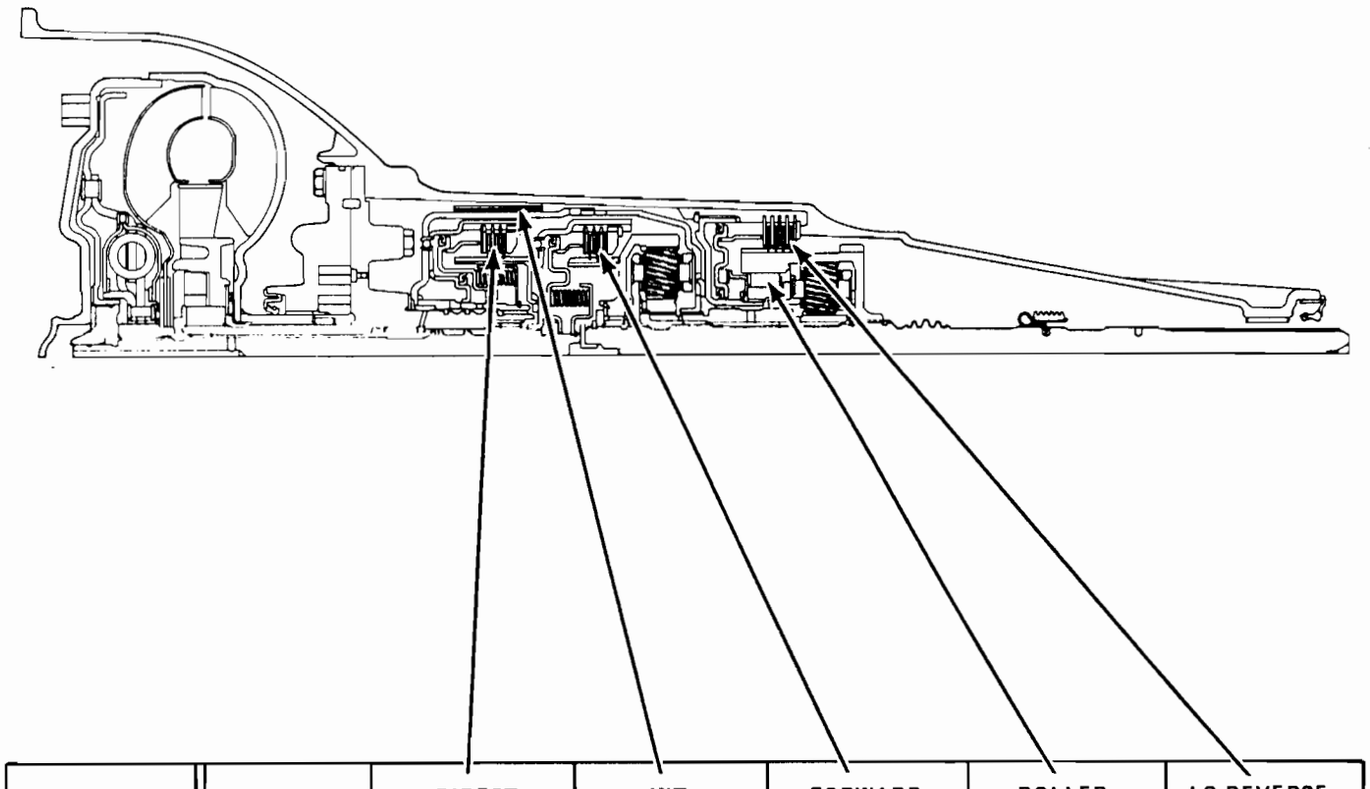
RANGE REFERENCE CHART						
RANGE	GEAR	DIRECT CLUTCH	INTERMEDIATE BAND	FORWARD CLUTCH	ROLLER CLUTCH	LO - REVERSE CLUTCH
PARK - NEUT.						
DRIVE	FIRST SECOND THIRD	 APPLIED	 APPLIED	APPLIED APPLIED APPLIED	HOLDING	
INTERMEDIATE	FIRST SECOND		 APPLIED	APPLIED APPLIED	HOLDING	
LO	FIRST			APPLIED	HOLDING	APPLIED
REVERSE		APPLIED				APPLIED

GM 180-C



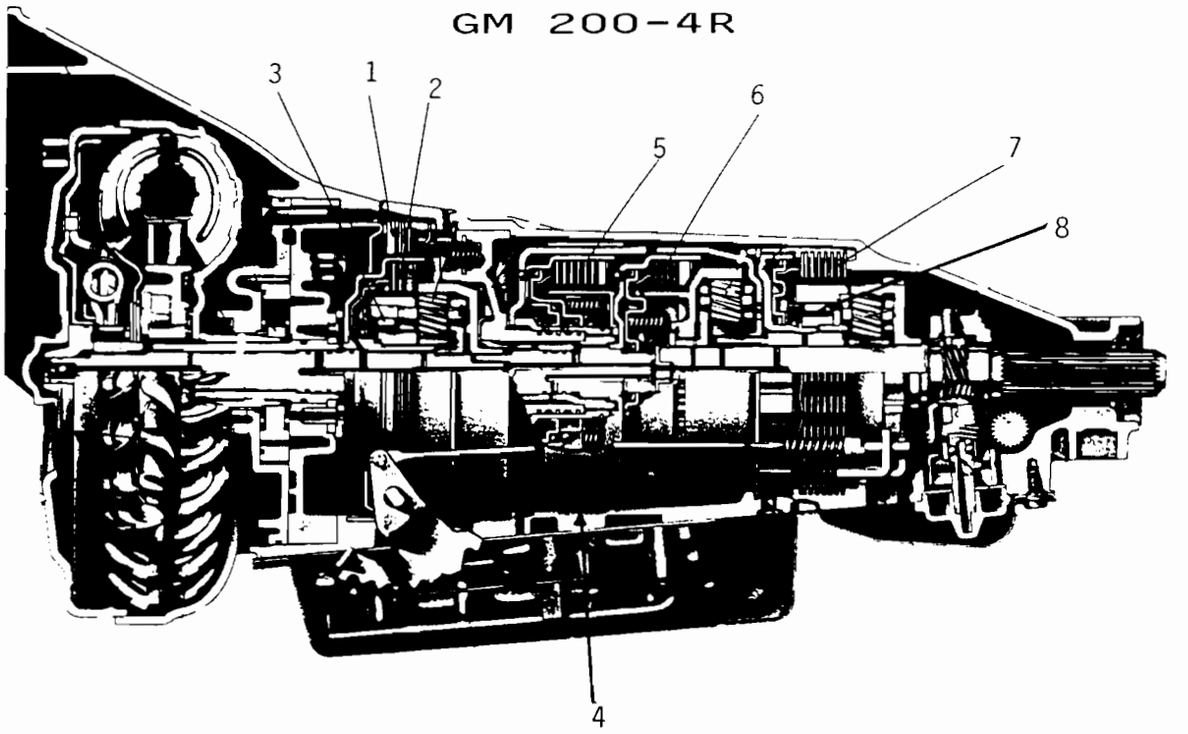
		REVERSE CLUTCH	SECOND CLUTCH	THIRD CLUTCH	LOW BAND	SPRAG
A.	NEUTRAL/PARK	Released	Released	Released	Released	Locked
B.	DRIVE RANGE, First Gear	Released	Released	Released	Applied	Locked
C.	L_1 RANGE	Released	Released	Applied	Applied	Locked
D.	DRIVE RANGE, Second Gear	Released	Applied	Released	Applied	Overrunning
E.	L_2 RANGE	Released	Applied	Released	Applied	Overrunning
F.	DRIVE RANGE, Third Gear	Released	Applied	Applied	Released	Locked
G.	REVERSE RANGE	Applied	Released	Applied	Released	Locked

GM 200-C



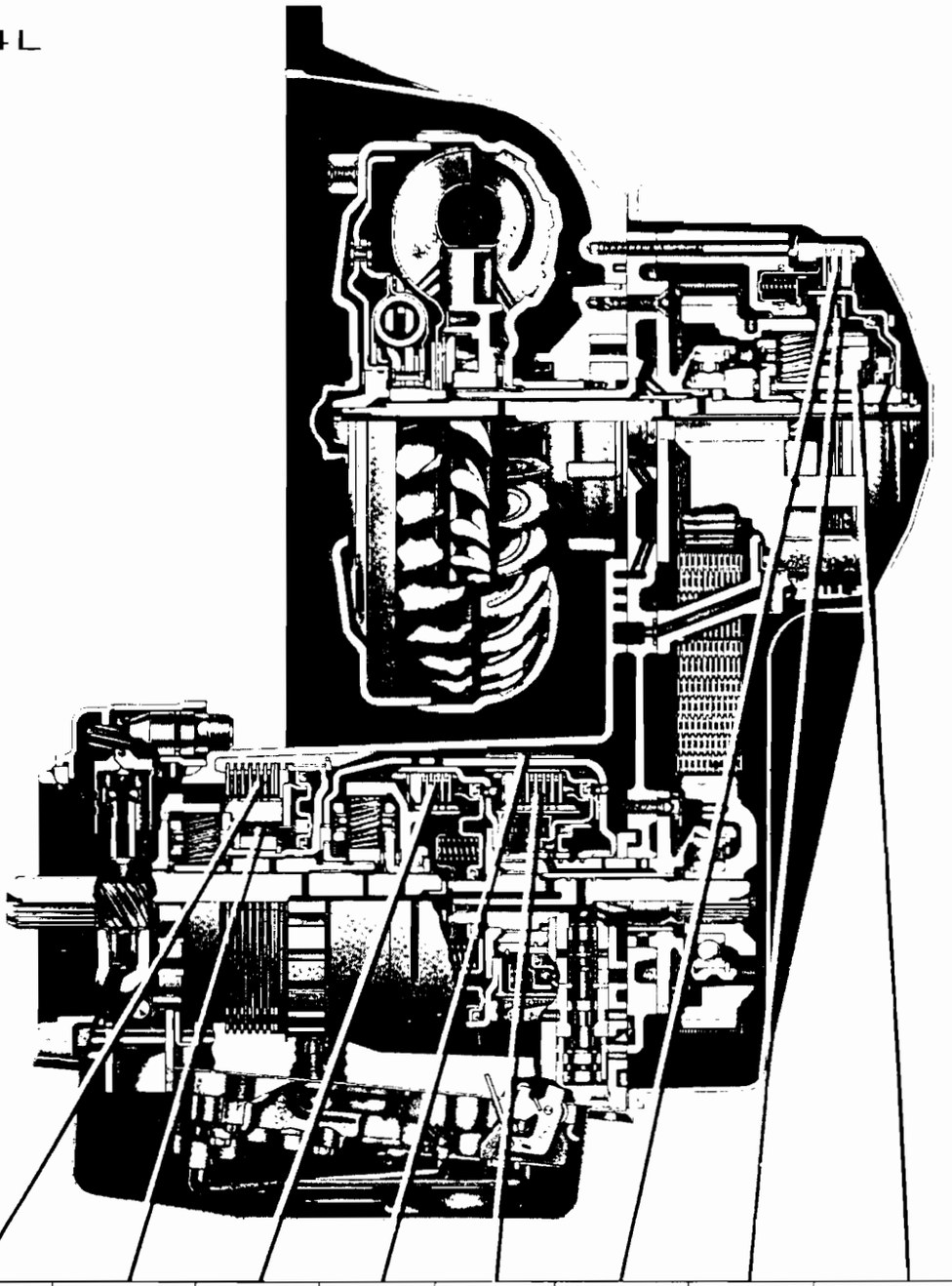
RANGE	GEAR	DIRECT CLUTCH	INT. BAND	FORWARD CLUTCH	ROLLER CLUTCH	LO-REVERSE CLUTCH
PARK-NEUT.						
DRIVE	FIRST			APPLIED	HOLDING	
	SECOND		APPLIED	APPLIED		
	THIRD	APPLIED		APPLIED		
INT.	FIRST			APPLIED	HOLDING	
	SECOND		APPLIED	APPLIED		
LO	FIRST			APPLIED	HOLDING	APPLIED
	SECOND		APPLIED	APPLIED		
REV.		APPLIED				APPLIED

GM 200-4R



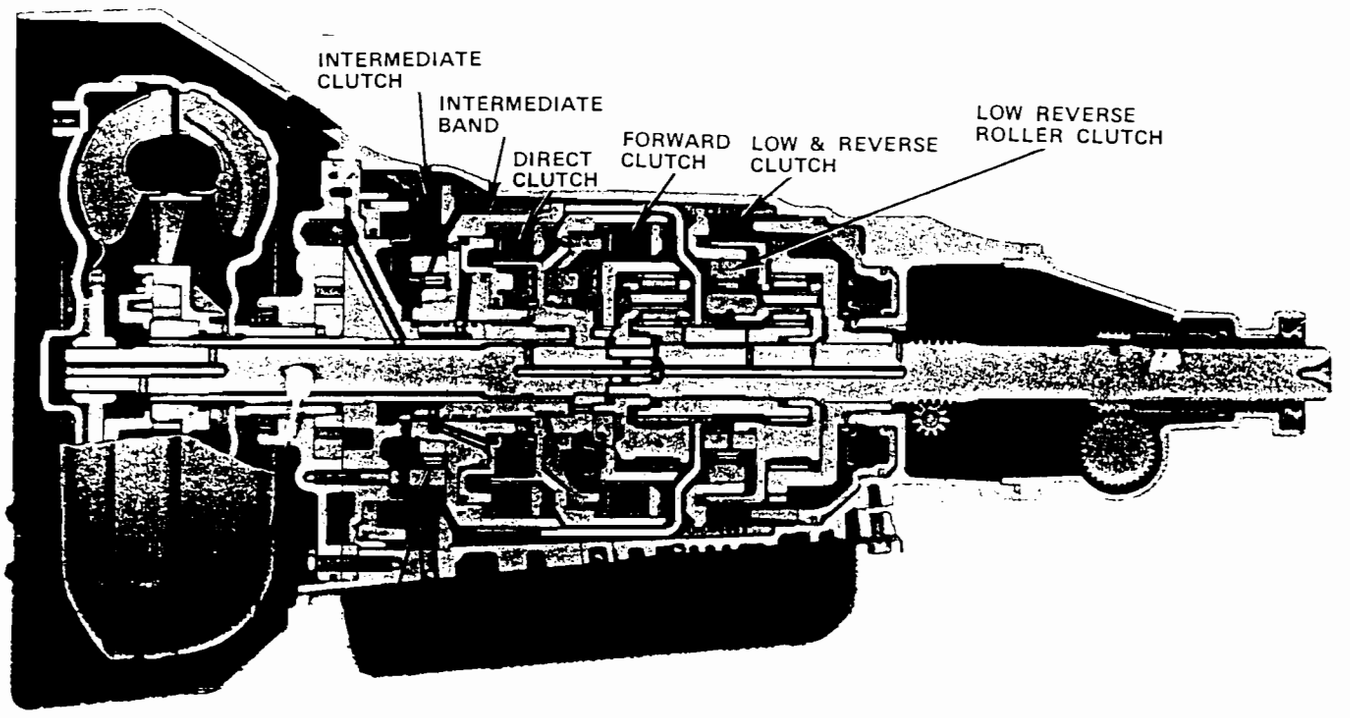
	1	2	3	4	5	6	7	8
	FOURTH CLUTCH	OVERRUN CLUTCH	OVERDRIVE ROLLER CLUTCH	INTER-MEDIATE BAND	DIRECT CLUTCH	FORWARD CLUTCH	LOW REVERSE CLUTCH	LOW ROLLER CLUTCH
OD 1			ON			ON		ON
OD 2			ON	ON	ON			
OD 3			ON		ON	ON		
OD 4	ON				ON	ON		
OR 1			ON			ON		ON
OR 2			ON	ON	ON			
OR 3		ON	ON		ON	ON		
S 1			ON			ON		ON
S 2		ON	ON	ON		ON		
L 1		ON	ON			ON	ON	ON
REV			ON		ON		ON	

GM 325-4L

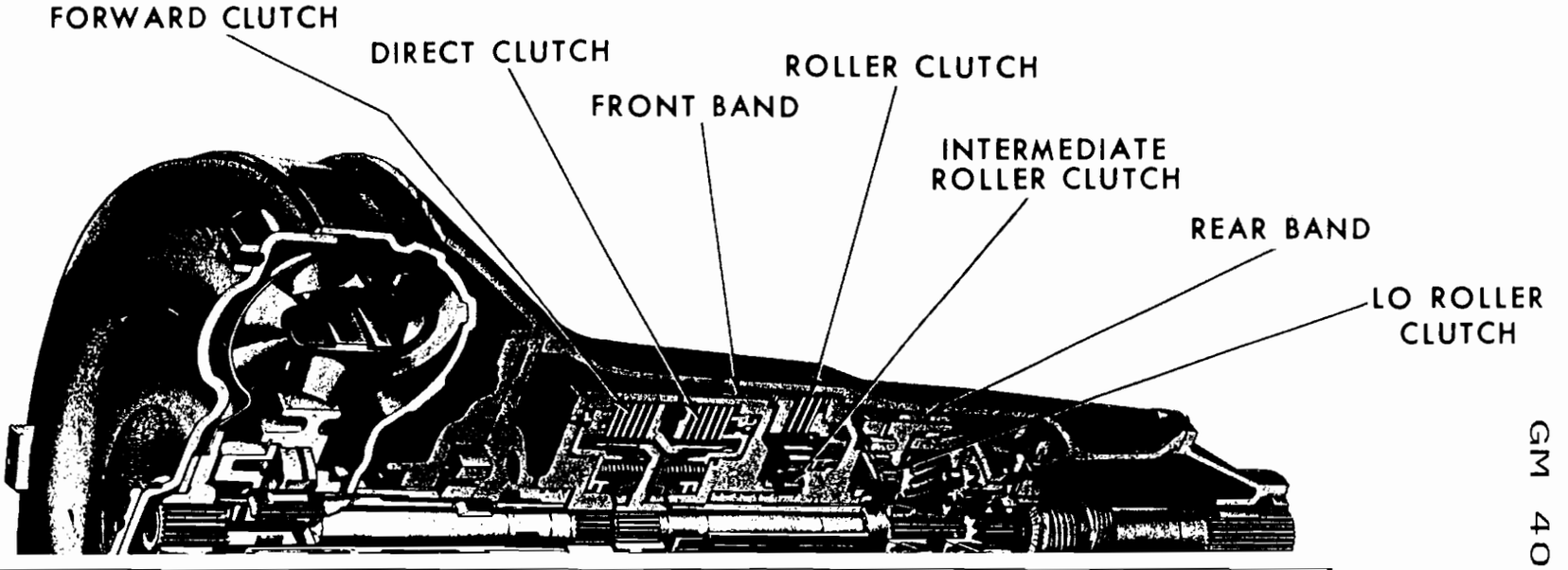


RANGE / GEAR		LO-REVERSE CLUTCH	LO-ROLLER CLUTCH	FORWARD CLUTCH	INT. BAND	DIRECT CLUTCH	4TH CLUTCH	OVERRUN CLUTCH	OVERDRIVE ROLLER CLUTCH
PARK									
REVERSE		APPLIED				APPLIED			HOLDING
NEUTRAL									HOLDING
DRIVE 4	1ST		HOLDING	APPLIED					
	2ND			APPLIED	APPLIED				HOLDING
	3RD			APPLIED		APPLIED			HOLDING
	4TH			APPLIED		APPLIED	APPLIED		
DRIVE 3	1ST		HOLDING	APPLIED				APPLIED	
	2ND			APPLIED	APPLIED			APPLIED	
	3RD			APPLIED		APPLIED		APPLIED	
DRIVE 2	1ST		HOLDING	APPLIED				APPLIED	
	2ND			APPLIED	APPLIED			APPLIED	
LO	1ST	APPLIED		APPLIED				APPLIED	

GM 350-C



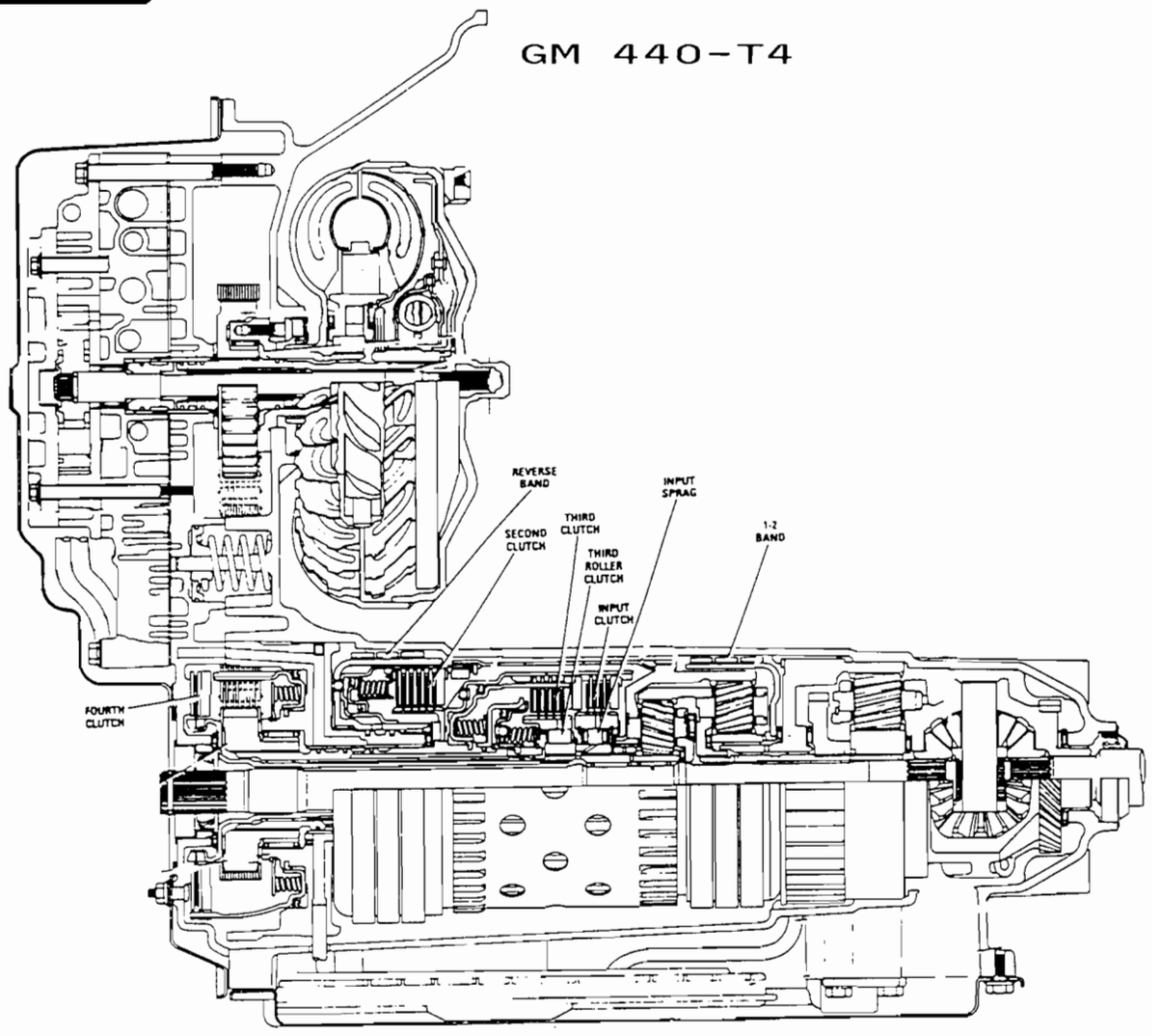
RANGE	LOW ONE-WAY CLUTCH	FORWARD CLUTCH	REVERSE HIGH CLUTCH	INTERMED CLUTCH	INTERMED BAND	LOW REVERSE CLUTCH	INTERMEAD ONE-WAY CLUTCH
DR 1	ON	ON					
DR 2		ON		ON			ON
DR 3		ON	ON	ON			
LOW 2		ON		ON	ON		ON
LOW 1	ON	ON				ON	
REV			ON			ON	



GM 400

RANGE	GEAR	FORWARD CLUTCH	DIRECT CLUTCH	FRONT BAND	INT. CLUTCH	INT. ROLLER CLUTCH	LO ROLLER CLUTCH	REAR BAND
PARK–NEUT.		OFF	OFF	OFF	OFF	INEFFECTIVE	INEFFECTIVE	OFF
DRIVE	FIRST	ON	OFF	OFF	OFF	INEFFECTIVE	EFFECTIVE	OFF
	SECOND	ON	OFF	OFF	ON	EFFECTIVE	INEFFECTIVE	OFF
	THIRD	ON	ON	OFF	ON	INEFFECTIVE	INEFFECTIVE	OFF
INT.	FIRST	ON	OFF	OFF	OFF	INEFFECTIVE	EFFECTIVE	OFF
	SECOND	ON	OFF	ON	ON	EFFECTIVE	INEFFECTIVE	OFF
LO	FIRST	ON	OFF	OFF	OFF	INEFFECTIVE	EFFECTIVE	ON
	SECOND	ON	OFF	ON	ON	EFFECTIVE	INEFFECTIVE	OFF
REV.		OFF	ON	OFF	OFF	INEFFECTIVE	INEFFECTIVE	ON

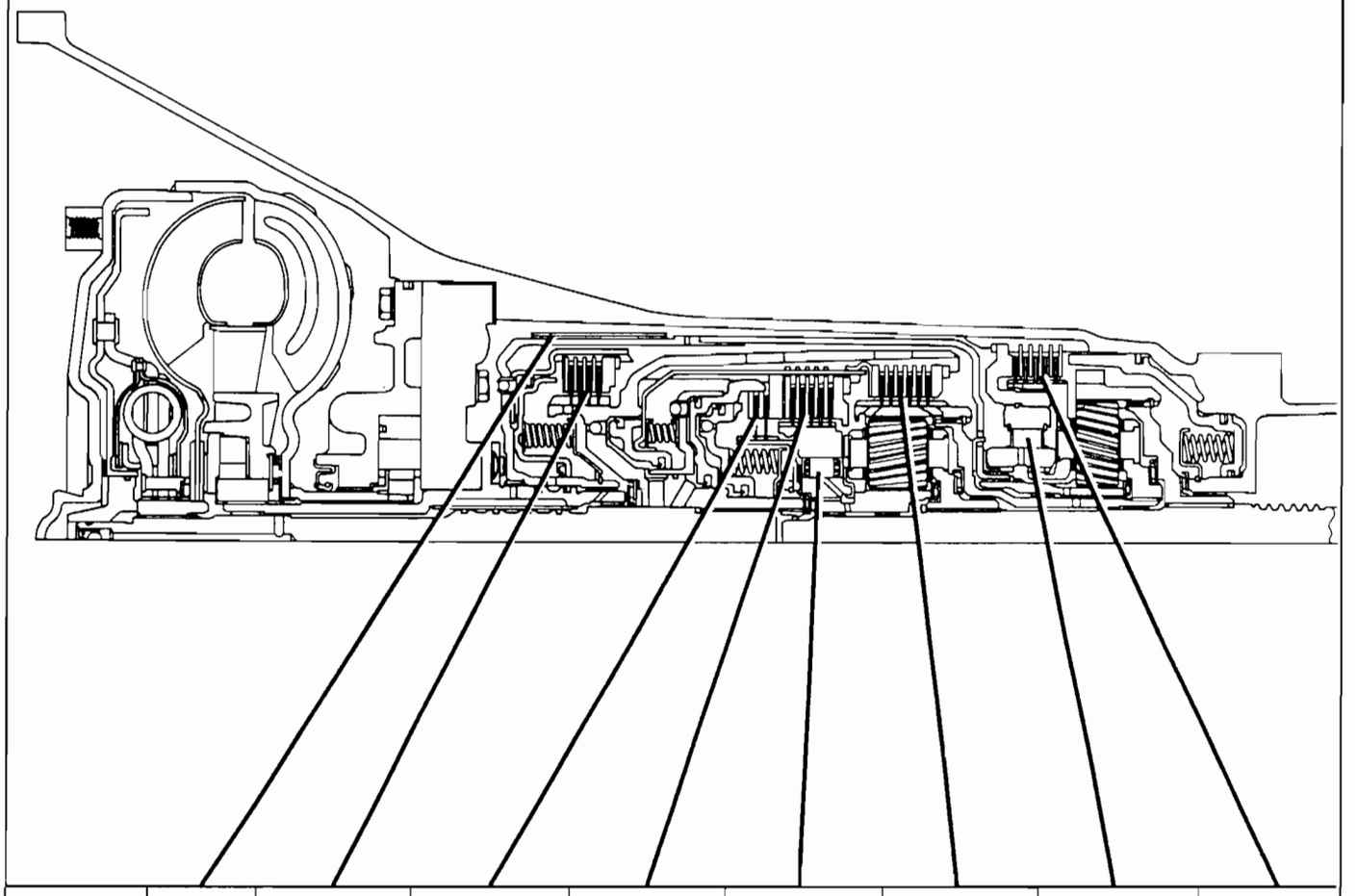
GM 440-T4



RANGE		4TH CLUTCH	REVERSE BAND	2ND CLUTCH	3RD CLUTCH	3RD ROLLER CLUTCH	INPUT CLUTCH	INPUT SPRAG	1-2 BAND
NEUTRAL PARK							*	*	
DRIVE	1						ON	HOLD	ON
	2			ON			*	OVER-RUNNING	ON
	3			ON	ON	HOLD	OFF		
	4	ON		ON	*	OVER-RUNNING			
MANUAL	3			ON	ON	HOLD	ON	HOLD	
	2			ON			*	OVER-RUNNING	ON
	1				ON	HOLD	ON	HOLD	ON
REVERSE			ON				ON	HOLD	

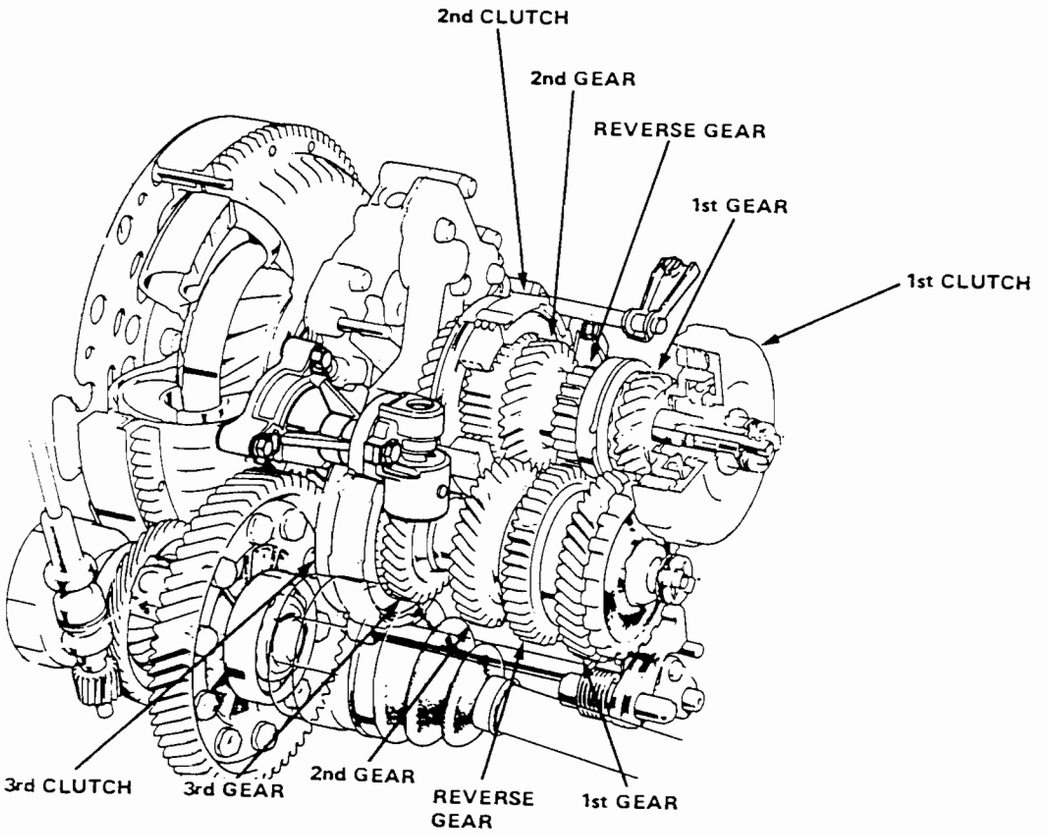
* APPLIED BUT NOT EFFECTIVE

GM 700-R4



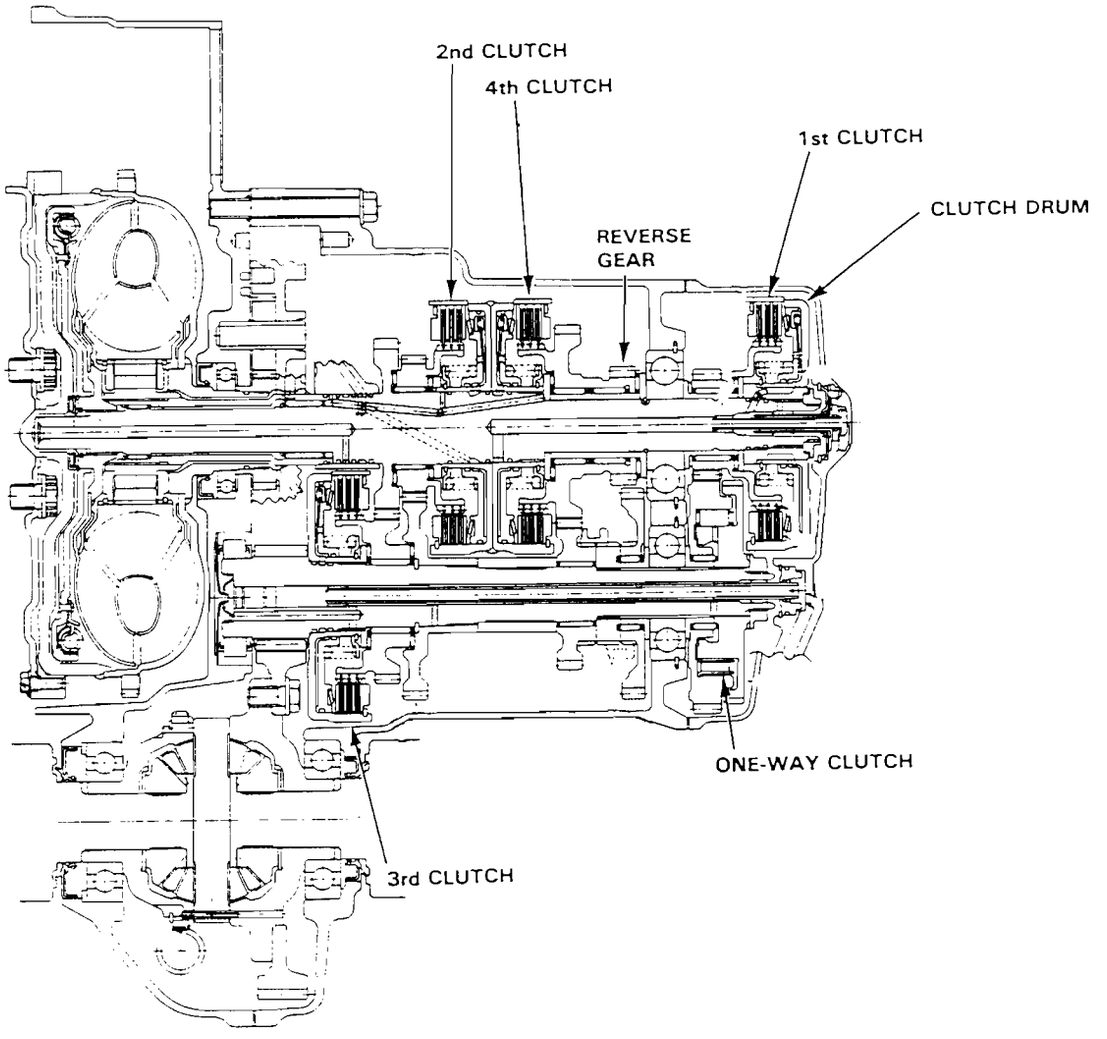
GEAR RANGE	2-4 BAND	REVERSE INPUT CLUTCH	OVERRUN CLUTCH	FORWARD CLUTCH	FORWARD SPRAG CL. ASSEMBLY	3-4 CLUTCH	LO ROLLER CLUTCH	LO-REV. CLUTCH
1ST DR4				ON	ON		ON	
2ND DR4	ON			ON	ON			
3RD DR4				ON	ON	ON		
4TH DR4	ON			ON		ON		
3RD DR3			ON	ON	ON	ON		
2ND DR2	ON		ON	ON	ON			
1ST LO			ON	ON	ON		ON	ON
REV.		ON						ON

HONDA 3 SPEED



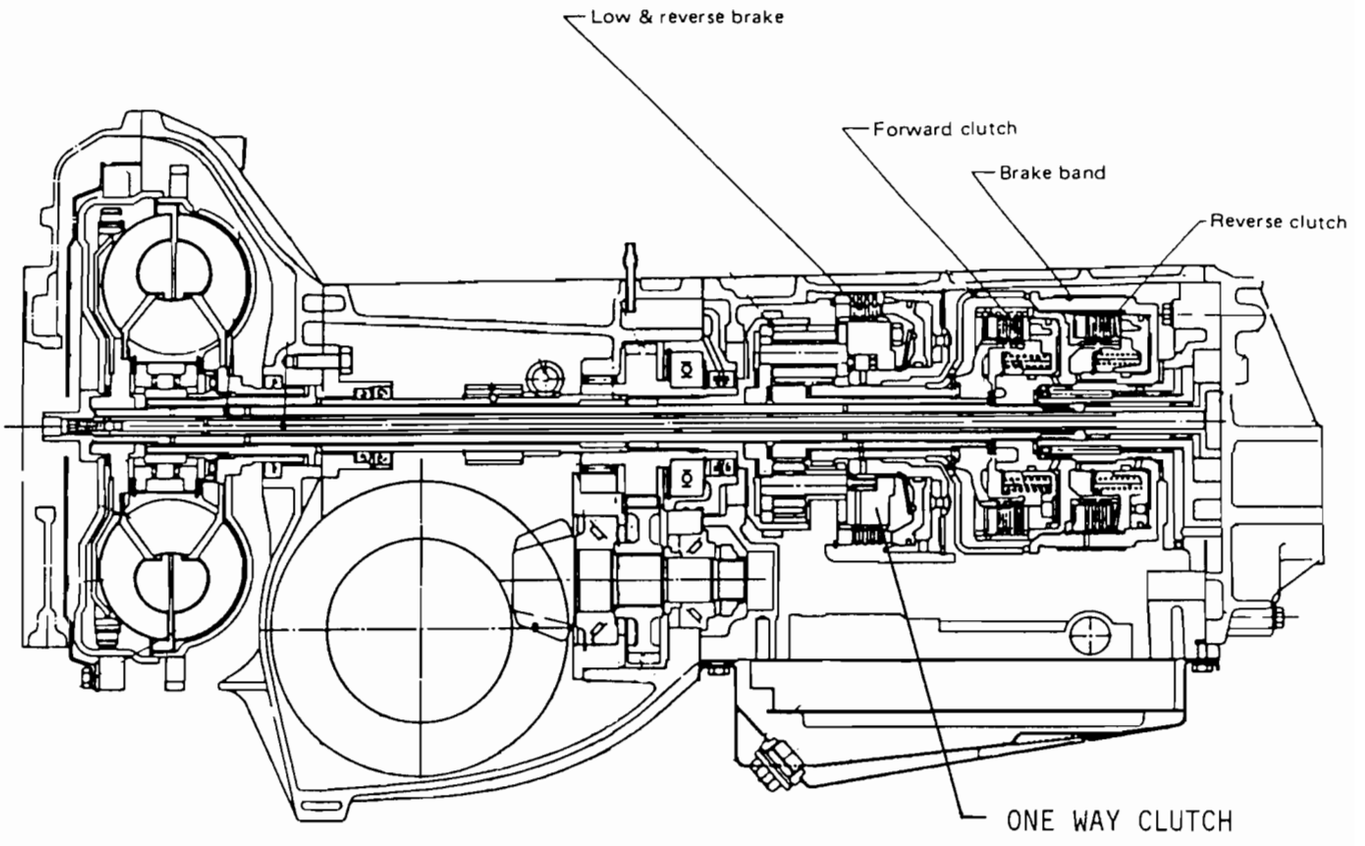
GEAR	1ST CLUTCH	2ND CLUTCH	3RD CLUTCH	SERVO
PARK/NEUTRAL				
DRIVE 1	APPLIED			
DRIVE 2		APPLIED		
DRIVE 3			APPLIED	
REVERSE		APPLIED		APPLIED

HONDA 4 SPEED



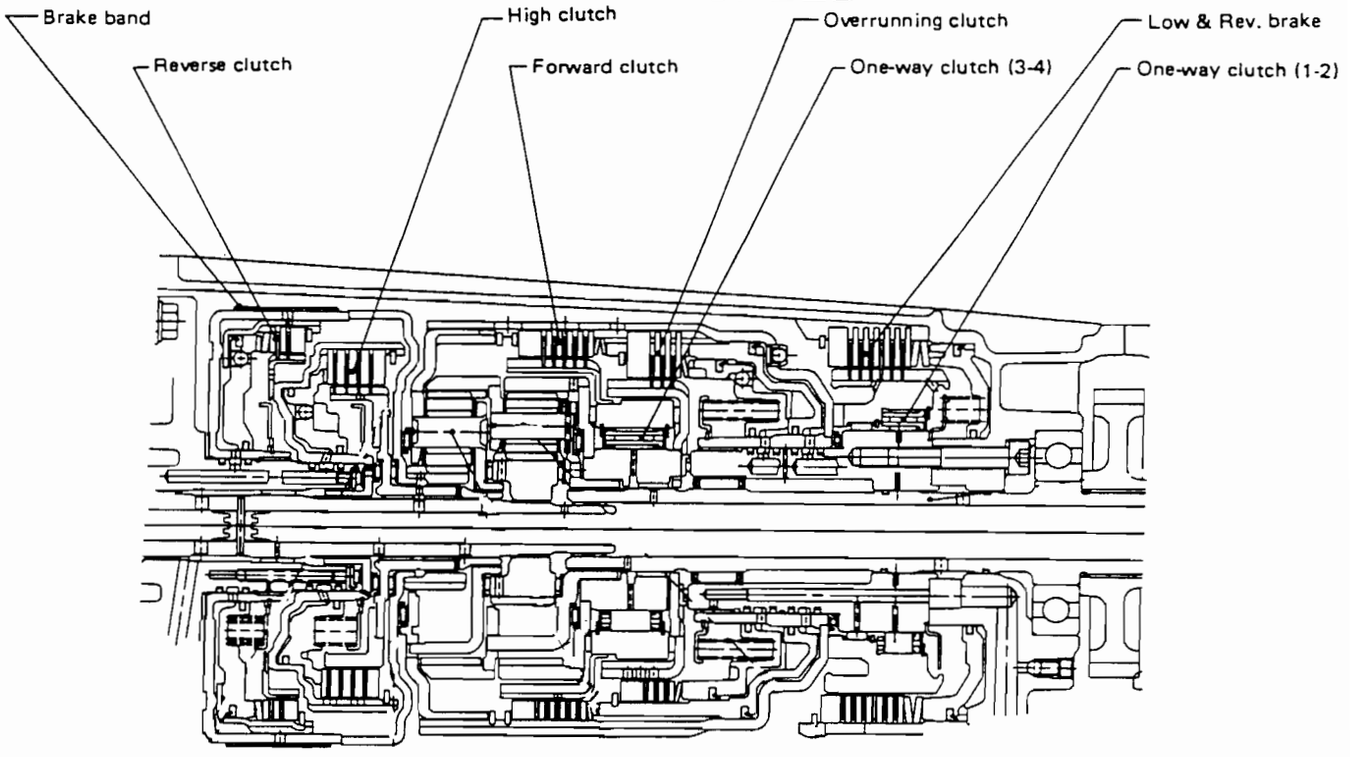
GEAR SELECTED	1ST CLUTCH	2ND CLUTCH	3RD CLUTCH	4TH CLUTCH	SERVO
PARK/NEUTRAL					
DRIVE 1	APPLIED				
DRIVE 2		APPLIED			
DRIVE 3			APPLIED		
DRIVE 4				APPLIED	
MANUAL 2		APPLIED			
REVERSE				APPLIED	APPLIED

SUBARU 3 SPEED



Range	Gear	Clutch		Low & Reverse brake B_1	Brake band B_2	One-way clutch C_3
		Forward C_1	Reverse C_2			
P	Parking			○		
R	Reverse		○	○		
N	Neutral					
D	1st	○				○
	2nd	○			○	
	3rd	○	○			
2	2nd (locked)	○			○	
1	2nd	○			○	
	1st	○		○		

SUBARU 4 SPEED

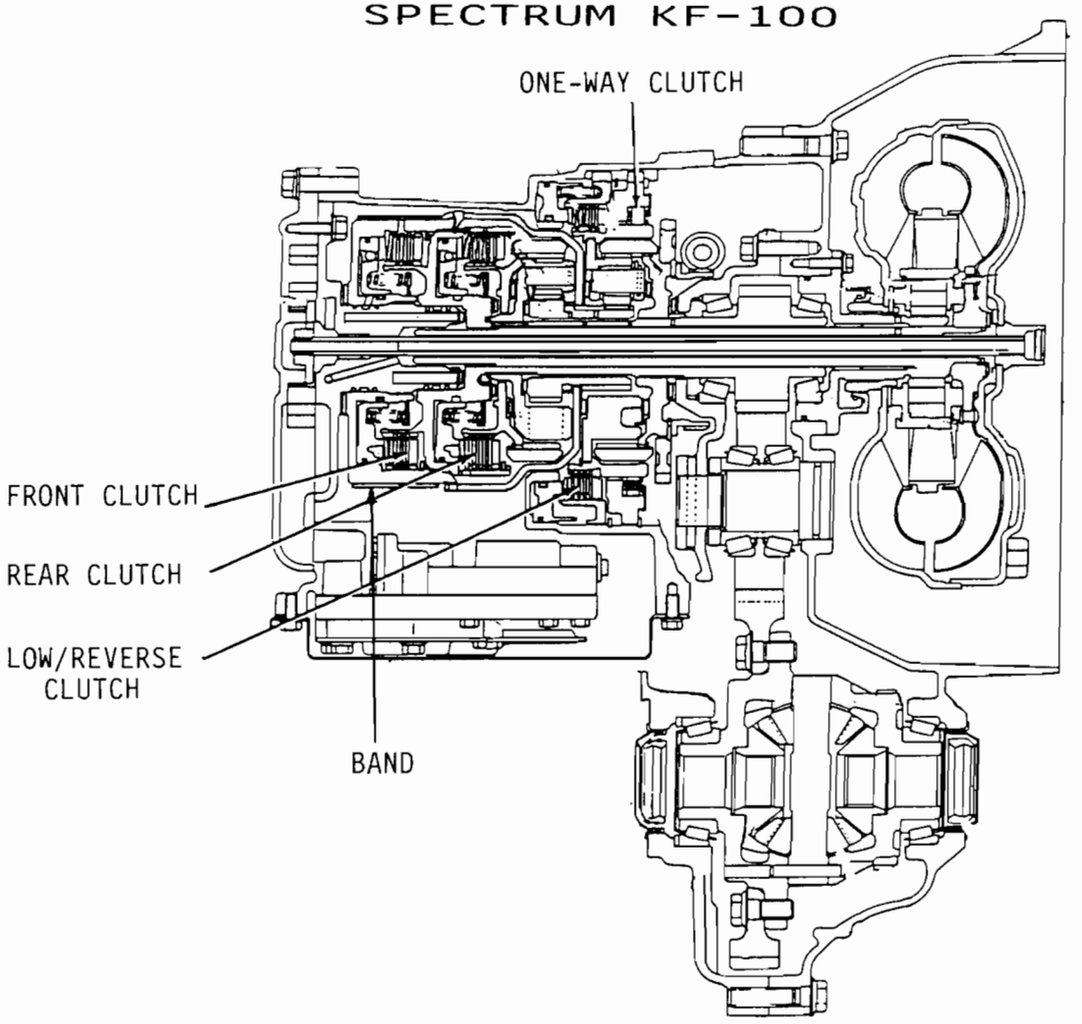


Switchbutton handling			Selector lever operation												
1st HOLD			2			3			D				N	R	P
3RD	2ND	1ST	3RD	2ND	1ST	3RD	2ND	1ST	4TH	3RD	2ND	1ST				
	*1	*1		*1										○		Rev./C
	○			○			○		○		○					B/B
○			○			○			○	○						High/C
○	○	○	○	○	○	○	○	○	○	○	○	○				FWD/C
○	○	○	○	○	○	○	○	○		○	○	○				OWC (3-4)
○	○	○	○	○	○	○	○	○								OVR/C
		○			○									○		Lo / Rev./B
								○*2				○				OWC (1-2)

Only when selector lever is in "2" and 1st hold button is ON.

*1: For prevention of over-revolution
*2: Engine brake ineffective

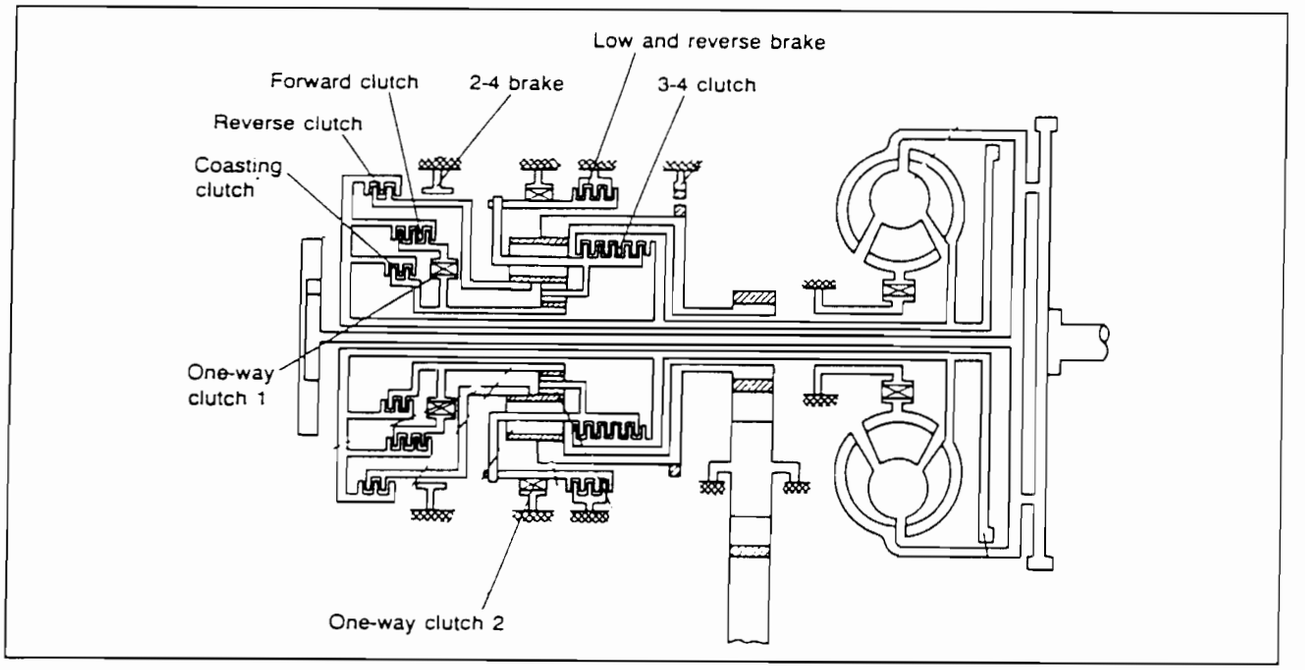
SPECTRUM KF-100



Shift Position		Clutch		Low and Reverse Brake	Band Servo		One-way Clutch
		Front	Rear		Operation	Release	
P				o			
R		o		o		x	
N							
D	1st		o				o
	2nd		o		o		
	3rd	o	o		x	x	
2nd			o		o		
1	2nd		o		o		
	1st		o	o			

MAZDA 4 SPEED

OPERATION OF COMPONENTS

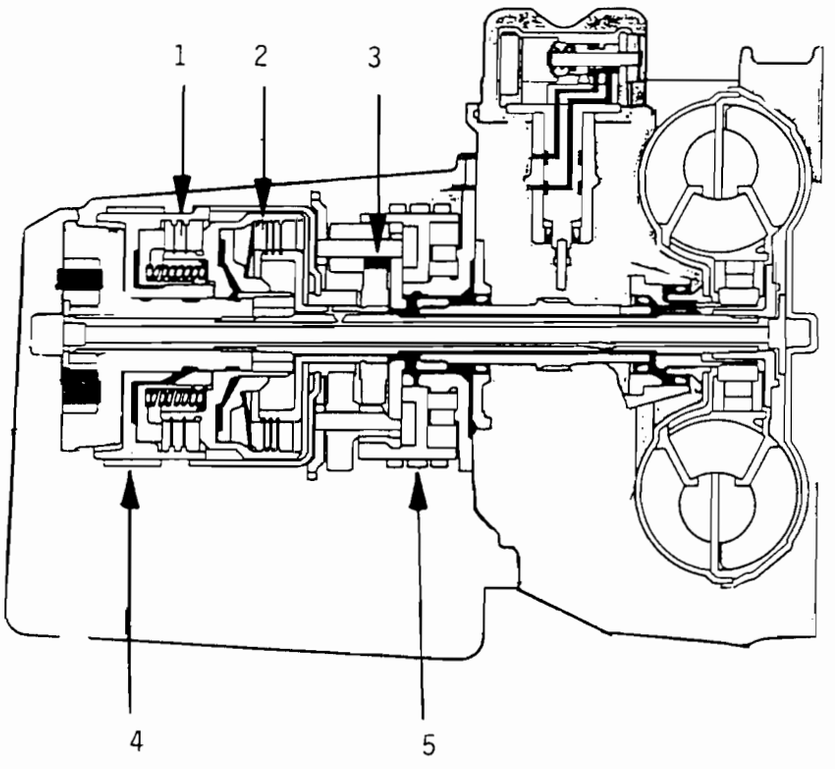


Operation Table (G4A-HL)

Range	Gear	Operation elements									
		Engine braking effect	Forward clutch	Coasting clutch	3-4 clutch	Reverse clutch	2-4 brake		Low & reverse brake	One-way clutch 1	One-way clutch 2
							Applied	Released			
P	—	—									
R	—	Yes				○			○		
N	—	—									
D	1st	No	○							○	○
	2nd	No	○				○			○	
	3rd	Yes	○	○	○		⊗	○		○	
	OD	Yes	◎		○		○				
2	2nd	Yes	○	○			○			○	
1	1st	Yes	○	○				○	○	○	
	2nd	Yes	○	○			○			○	

⊗ : Indicates fluid pressure to servo but band not applied due to pressure difference in servo.
◎ : Indicates that it does not function to transmit power.

VOKSWAGON 003 / 010

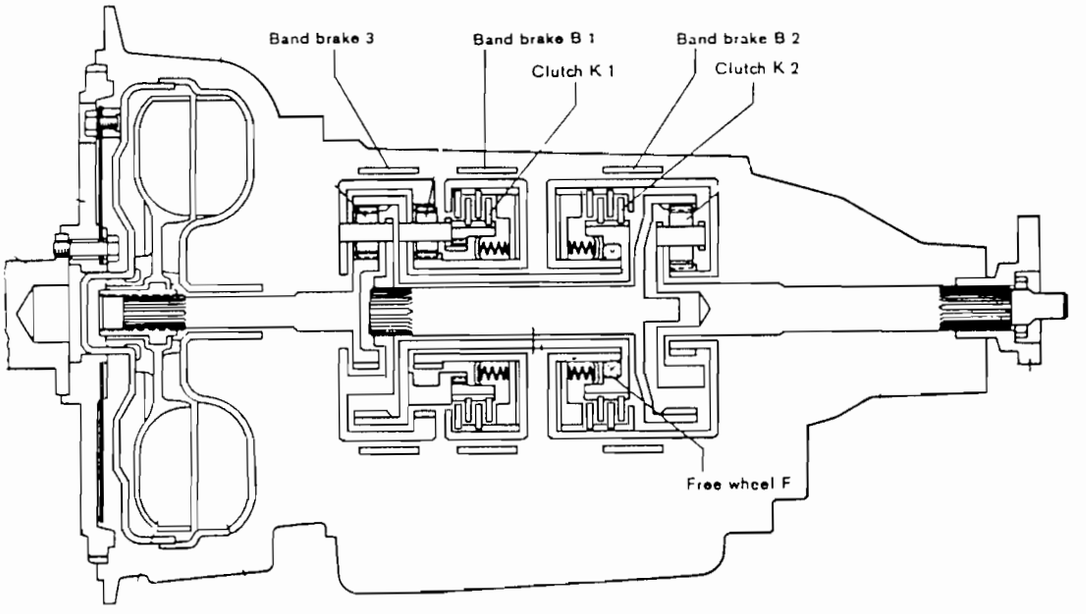


1 DIRECT/REVERSE CLUTCH
2 FORWARD CLUTCH
3 ONE-WAY CLUTCH
4 INTERMEDIATE BRAKE
5 1ST / REVERSE BRAKE

RANGE	LOW/REV BAND	INT. BAND	FORARD CLUTCH	DIRECT CLUTCH	ONE-WAY CLUTCH
D 1ST			ON		HOLDING
D 2ND		ON	ON		
D 3RD			ON	ON	
S 1ST			ON		HOLDING
S 2ND		ON	ON		
LOW	ON		ON		
REV	ON			ON	

NOTE: THE LOW/REVERSE BAND HAS BEEN ELIMINATED AND A CLUTCH SUBSTITUTED IN THE 010 SERIES.

MERCEDES 722.1 / 722.2

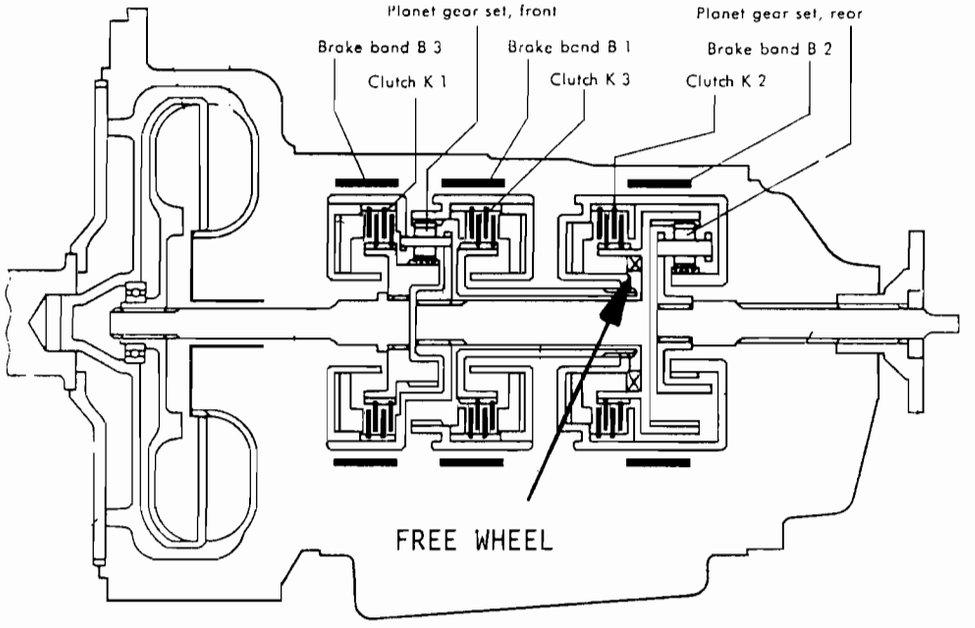


Gear	B 1	K 1	B 2	K 2	B 3	F
1			x			x
2	x		x			
3		x	x			
4		x		x		
R					x	x

MERCEDES DB TRANSMISSION

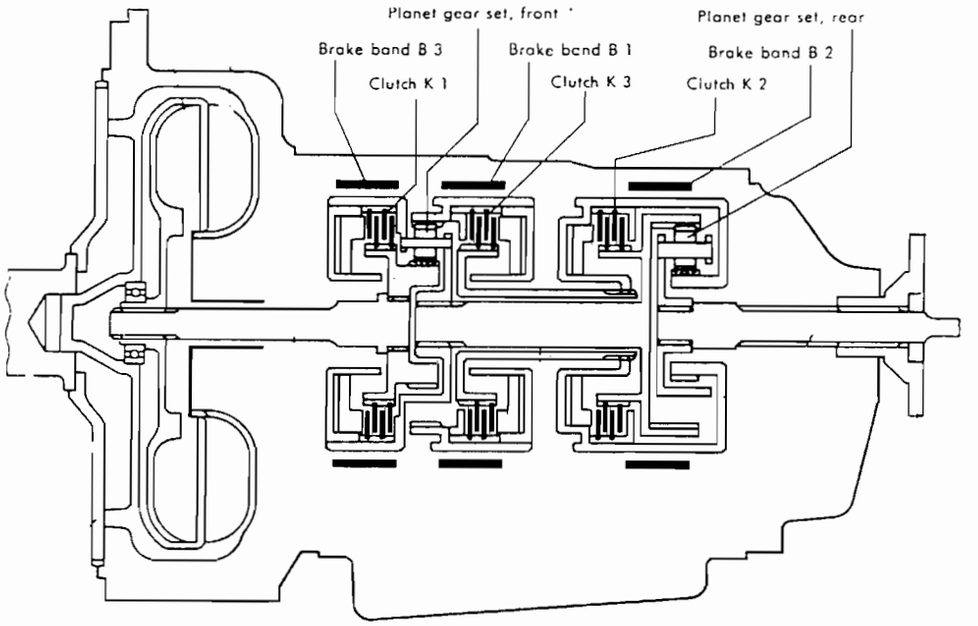
SOLENOID CONTROL

MODEL 600 ONLY



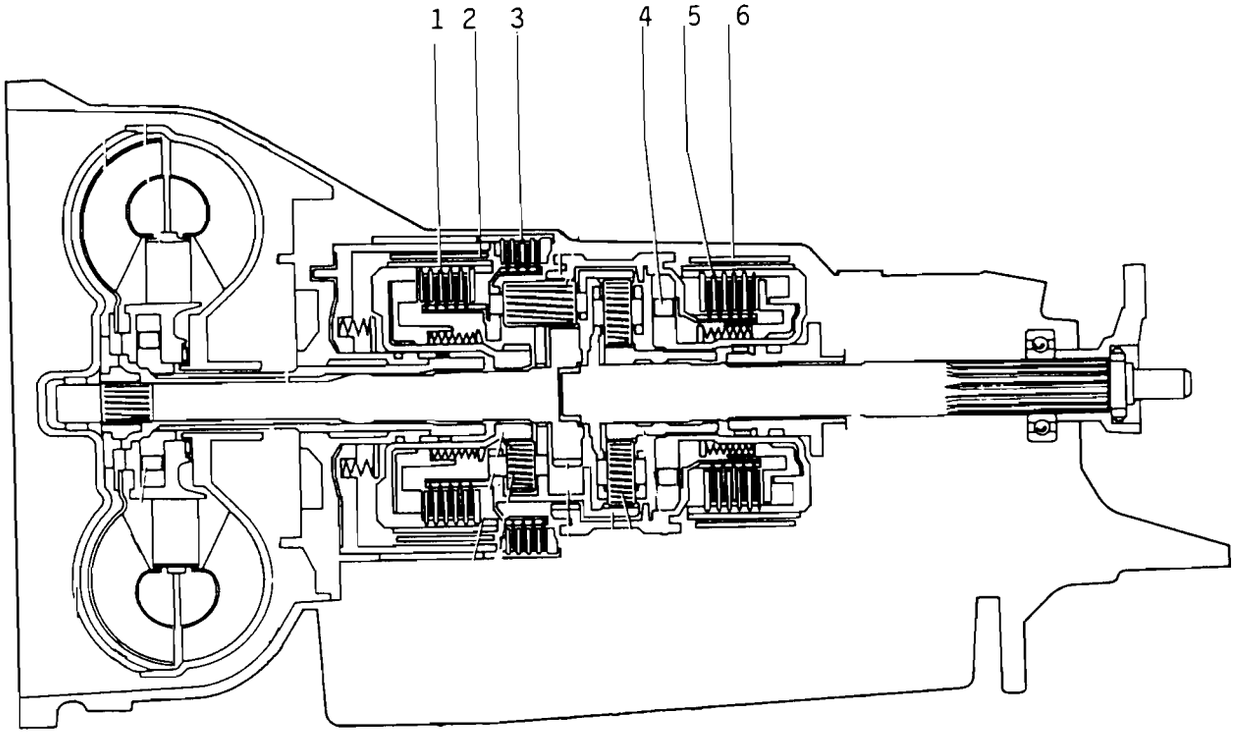
RANGE	K1 CLUTCH	K2 CLUTCH	K3 CLUTCH	B1 BAND	B2 BAND	B3 BAND	FREE WHEEL
1ST				ON	ON		
2ND		ON		ON			
3RD	ON				ON		
4TH	ON	ON					
REV						ON	HOLDING

MERCEDES DB TRANSMISSION



RANGE	K1 CLUTCH	K2 CLUTCH	K3 CLUTCH	B1 BAND	B2 BAND	B3 BAND
1ST				ON	ON	
2ND		ON		ON		
3RD	ON				ON	
4TH	ON	ON				
REV			ON			ON

MERCEDES 722.3 / 722..4

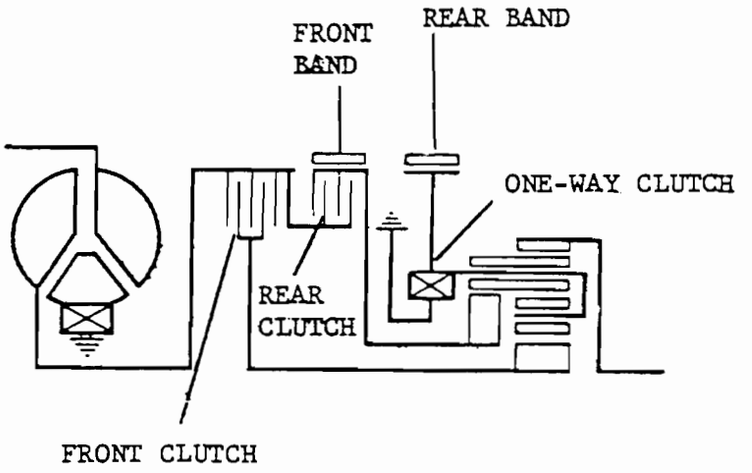


1 CLUTCH K-1
2 BAND B-1
3 BRAKE B-3
4 ONE WAY CLUTCH F
5 CLUTCH K-2
6 BAND B-2

Speed	B 1	B 2	B 3	K 1	K 2	F	Reduction
1		X			(X)	X	3 68
2	X	X					2 41
3		X		X			1 44
4				X	X		1
R			X		(X)	X	5 14

(X) K 2 bridges the one-way clutch during deceleration (coasting)

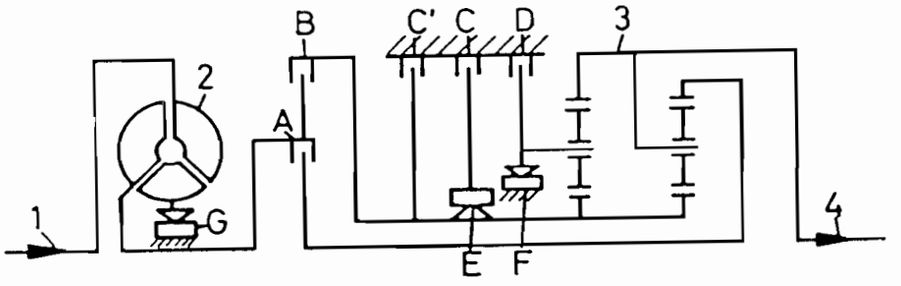
BW 65-66



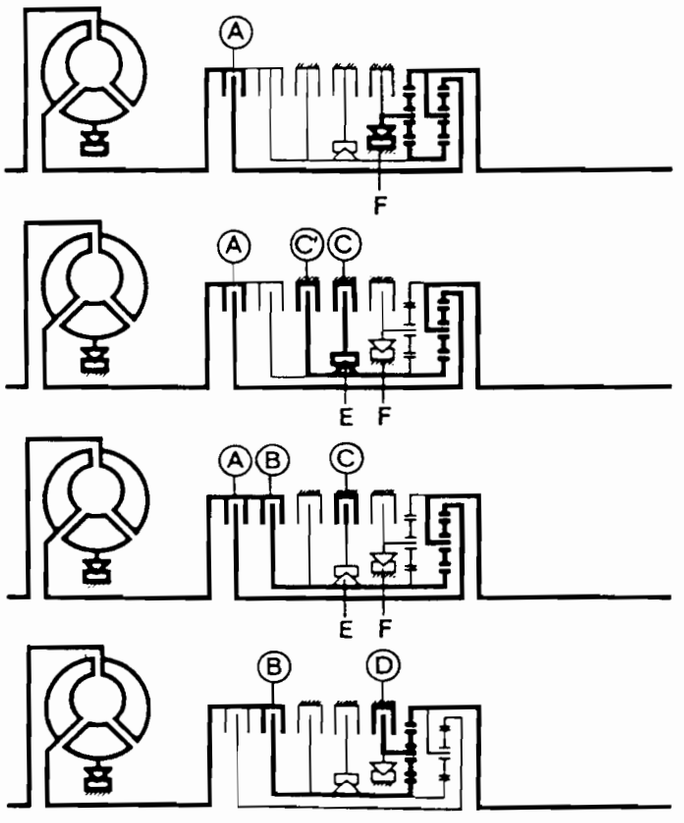
	FC	RC	FB	RB	1-way clutch
1 (first gear)	●			●	
D (first gear)	●				●
2 & D (sec. gear)	●		●		
D (third gear)	●	●			
R (reverse gear)		●		●	
*P (park)				●	

* When engine running

POWER FLOW 3HP22



Layout of Transmission 3 HP–22:
1 Input
2 Torque converter
3 Planet gear set
4 Output



Power Flow Diagrams for 3 HP–22

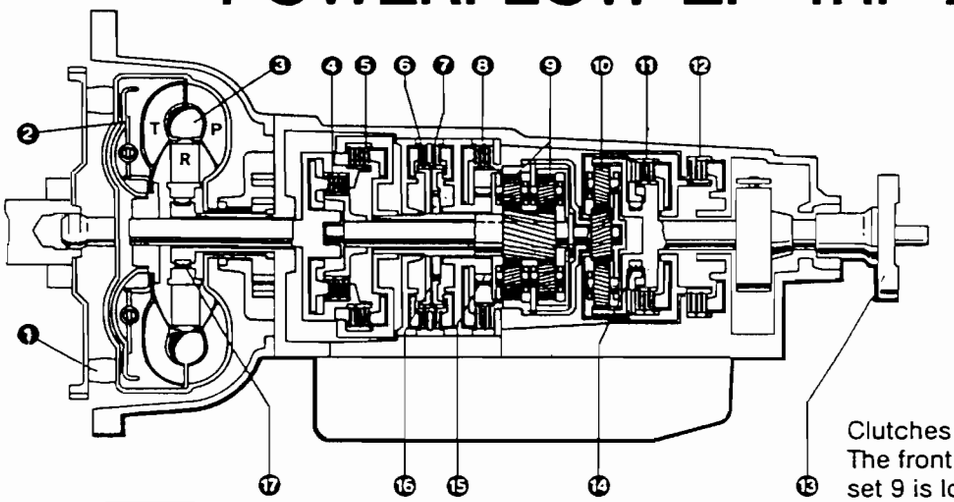
1st Gear
Clutch A is engaged.
Planet gear carrier bears on one-way clutch F during acceleration and is cancelled while coasting. With selector lever in position 1 clutch D also engages in 1st gear, so that engine braking force can be utilized.

2nd Gear
Clutches A, C' and C are engaged.
One-way clutch F is cancelled.
Hollow shaft is fixed with sun gear.

3rd Gear
Clutches A, B and C are engaged.
One-way clutches E and F are cancelled.
The entire set of planet gears turns as an unit at a ratio of 1 : 1.

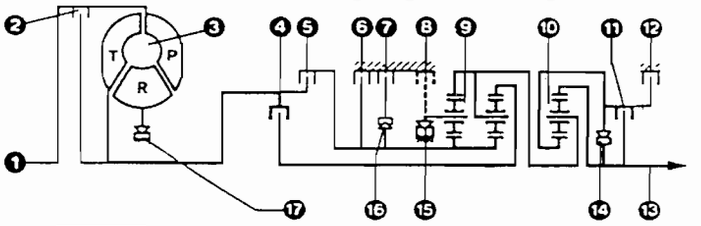
Reverse Gear
Clutches B and D are engaged.
The output shaft's direction of rotation is reversed by way of the locked planet gear carrier. Power flow is 1st, 2nd, 3rd and reverse gears by way of emphasized parts.

POWERFLOW ZF 4HP 22

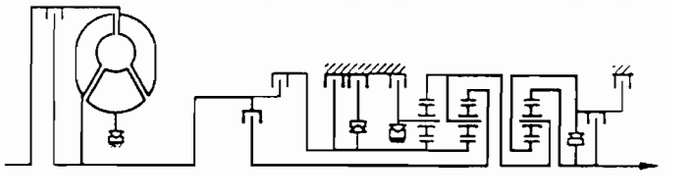


Clutches 4 and 11 are engaged. The front planet gear carrier of gear set 9 is locked against the housing through freewheel 15 when the engine is pulling, but is overrun when the engine is coasting. Epicyclic gear set 10 rotates as a solid block, with the front planet gear carrier. In addition, in selector lever position 1 and in speed range 1, clutch 8 is engaged to permit engine braking.

1. Gang

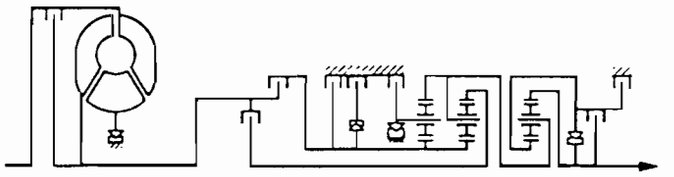


2. Gang



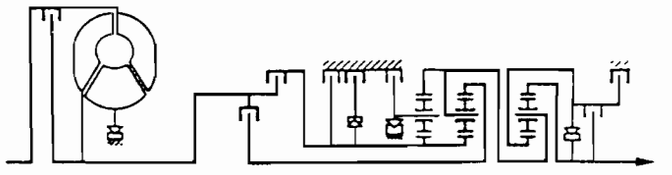
Clutches 4,6,7 and 11 are engaged. Freewheel 15 overruns. The hollow shaft with the sun wheel of epicyclic gear set 9 is locked. Epicyclic gear set 10 also rotates, as a solid block.

3. Gang



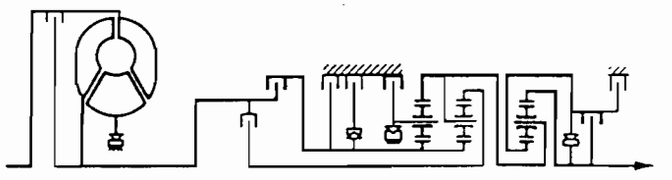
Clutches 4,5,7 and 11 are engaged. Freewheels 15 and 16 are overrun. Epicyclic gear sets 9 and 10 rotate as a solid block at a ratio of 1:1.

4. Gang



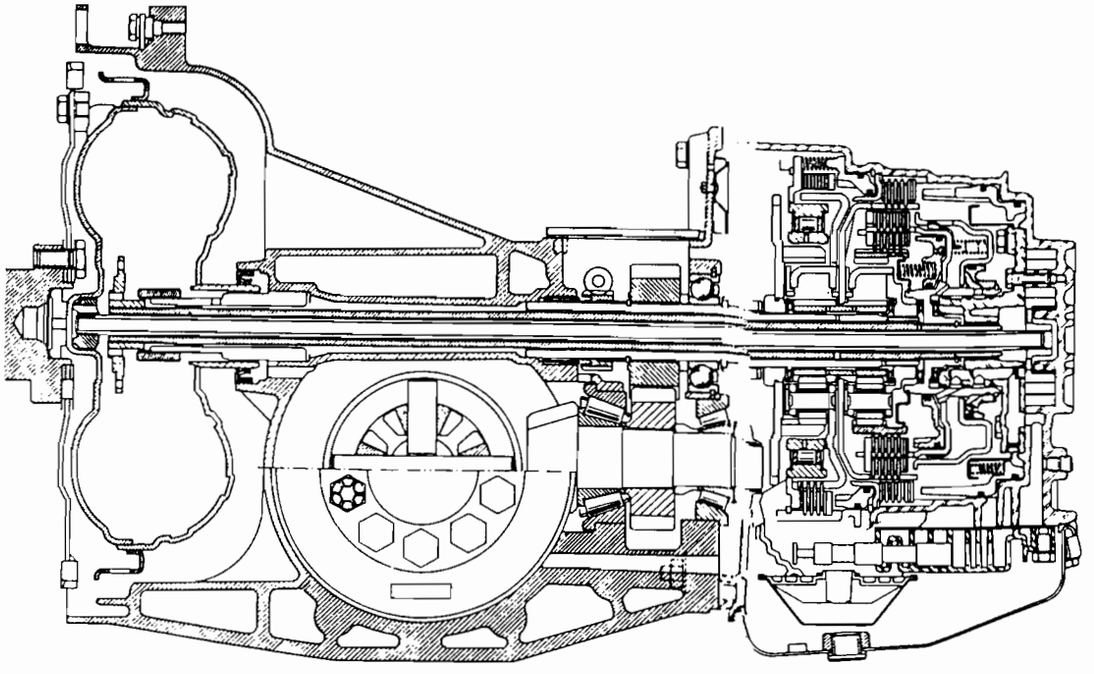
Clutches 4,5,7 and 12 are engaged. Freewheels 14, 15 and 16 are overrun. Epicyclic gear set 9 rotates as a solid block. The hollow shaft with the sun wheel of epicyclic gear set 10 is locked. Above a predetermined road speed, clutch 2 locks torque converter 3 solid to prevent slip.

R.Gang



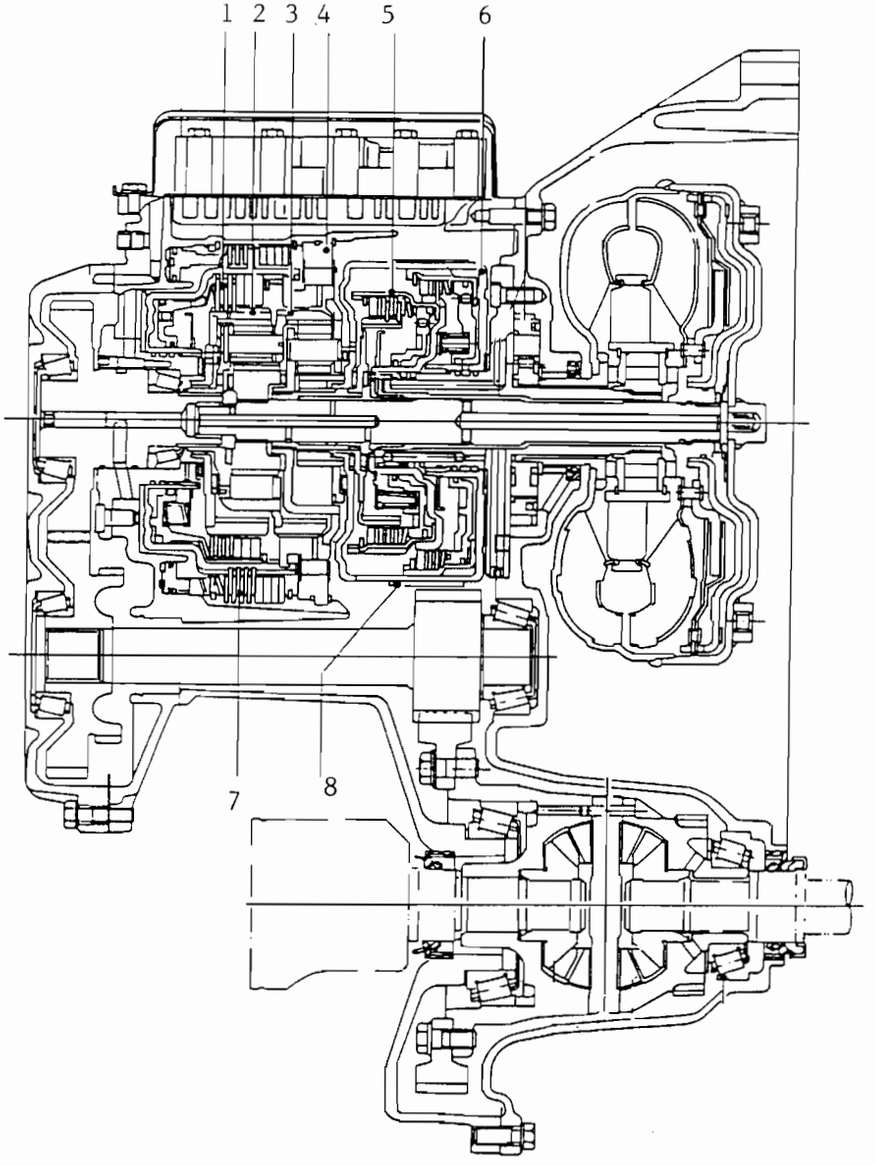
Clutches 5,8 and 11 are engaged. Since the front planet gear carrier of epicyclic gear set 9 is locked, the direction of output-shaft rotation is reversed. Epicyclic gear set 10 also rotates, as a solid block.

RENAULT MB1-MJ3



Selector lever position		RL	E1	E2	F1	F2	EL1	EL2
P								X
R				X	X			X
N								X
A	1	X	X					X
	2		X			X	X	X
	3		X	X				
2nd HOLD			X			X	X	X
1st HOLD			X		X			X

RL = Freewheel
E1 = Clutch 1
E2 = Clutch 2
F1 = Brake 1
F2 = Brake 2
EL1 = Solenoid valve 1
EL2 = Solenoid valve 2



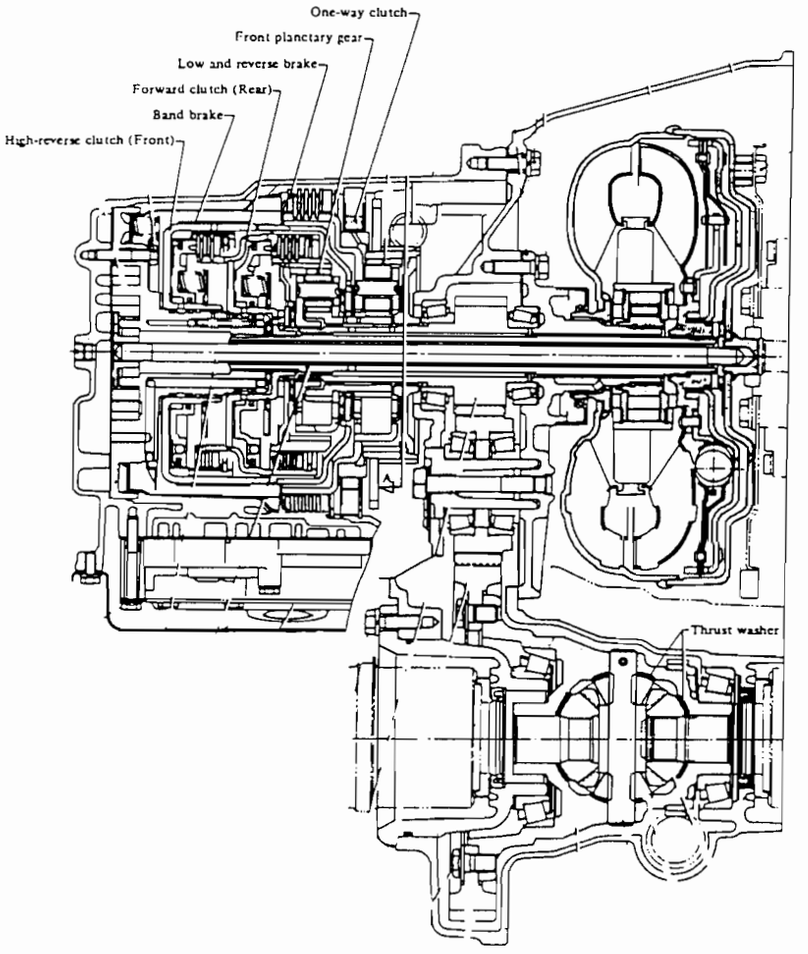
NISSAN RL4F02A

1 LOW CLUTCH
2 REAR PLANETARY
3 FRONT PLANETARY
4 ONE-WAY CLUTCH
5 HIGH CLUTCH
6 REVERSE CLUTCH
7 LOW/REVERSE BRAKE
8 BAND BRAKE

RL4F02A

Range		Gear ratio	Reverse clutch	High clutch	Low clutch	Band servo		Low & reverse brake	One-way clutch	Parking pawl	Lock-up
						Operation	Release				
Park		–								on	
Reverse		2.272	on					on			
Neutral		–									
Drive	D_1 Low	2.785			on				on		
	D_2 Second	1.545			on	on					
	D_3 Top (3rd)	1.000		on	on	(on)	on				
	D_4 O.D. (4th)	0.694		on		on					on
2	2_1 Low	2.785			on				on		
	2_2 Second	1.545			on	on					
1	1_1 Low	2.785			on			on	on		
	1_2 Second	1.545			on	on					

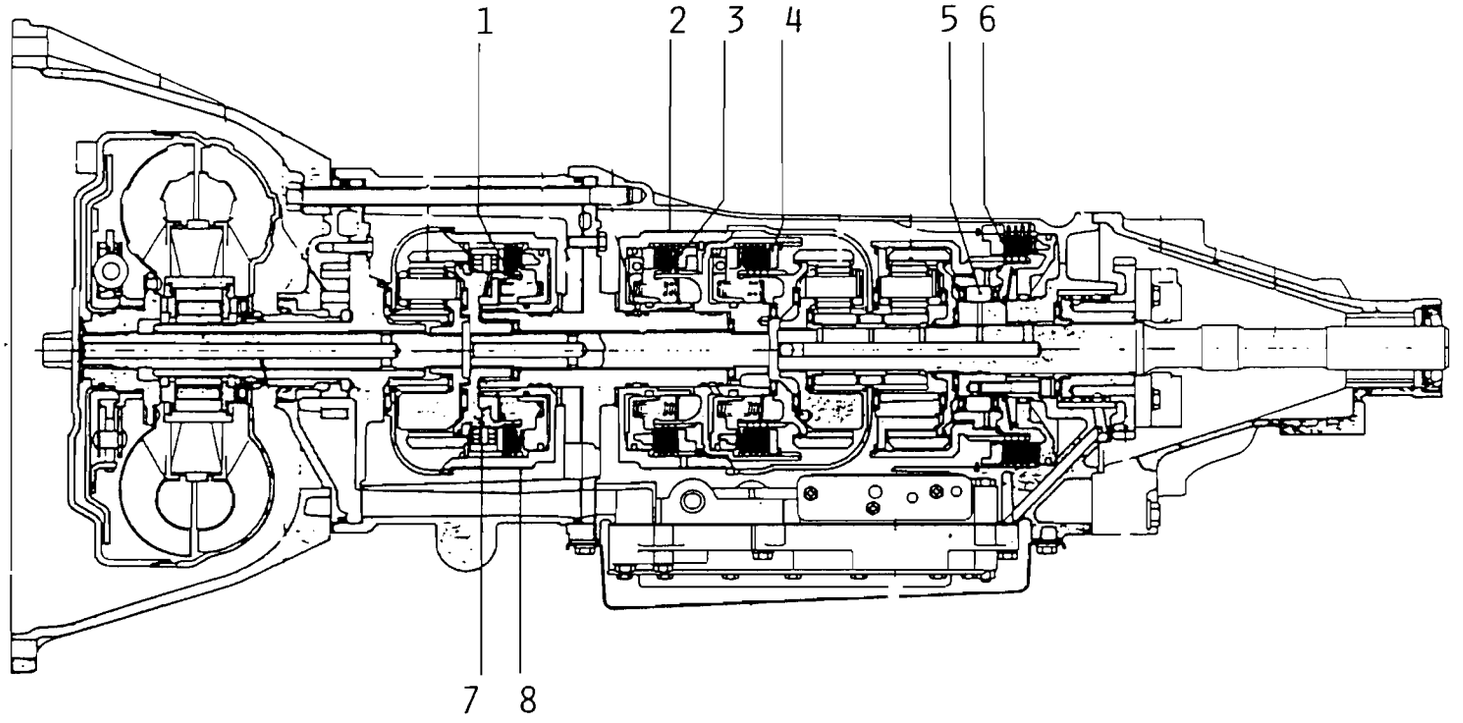
NISSAN RL3F01A



Range		Gear ratio	Clutch		Low & reverse brake	Lock-up	Band servo		One-way clutch	Parking pawl
			High-reverse clutch (Front)	Forward clutch (Rear)			Operation	Release		
Park										on
Reverse		2.364	on		on					
Neutral										
Drive	D_1 Low	2.826		on					on	
	D_2 Second	1.543		on			on			
	D_3 Top (3rd)	1.000	on	on		on	(on)	on		
2	2_1 Low	2.826		on					on	
	2_2 Second	1.543		on			on			
1	1_1 Low	2.826		on	on				on	
	1_2 Second	1.543		on			on			

The low & reverse brake is applied in "1_1" range to prevent free wheeling when coasting and allows engine braking.

NISSAN L4N72B

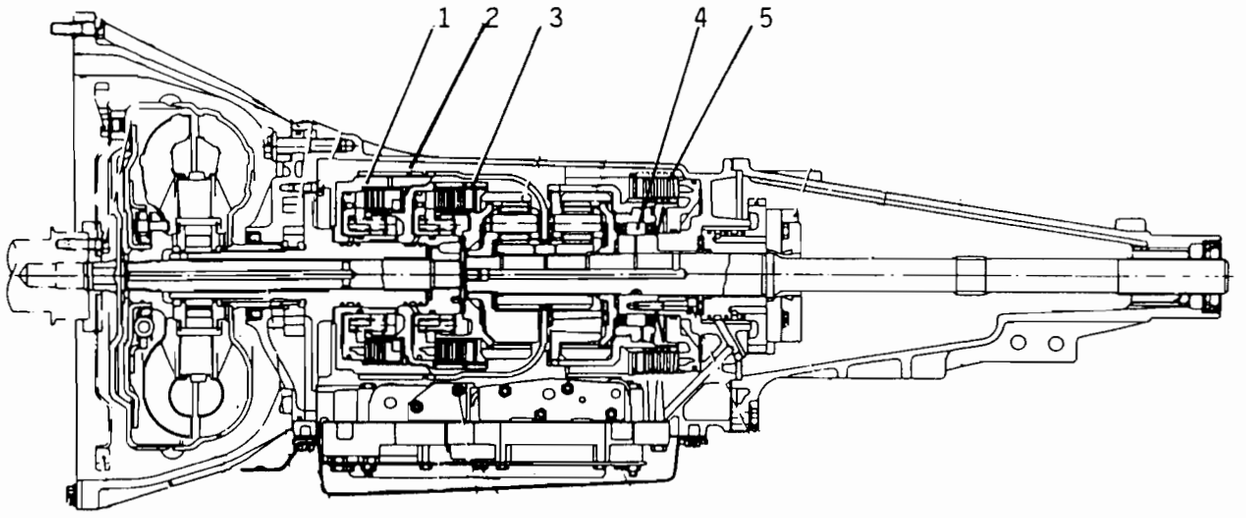


Range		Direct clutch	O.D. band servo		High-reverse clutch (Front)	Forward clutch (Rear)	Low & reverse brake	2nd band servo		One-way clutch	Parking pawl
			Apply	Release				Apply	Release		
Park		ON	(ON)	ON			ON				ON
Reverse		ON	(ON)	ON	ON		ON		ON		
Neutral		ON	(ON)	ON							
D	D_1 (Low)	ON	(ON)	ON		ON				ON	
	D_2 (Second)	ON	(ON)	ON		ON		ON			
	D_3 (Top)	ON	(ON)	ON	ON	ON		(ON)	ON		
	D_4 (O.D.)		ON		ON	ON		(ON)	ON		
2	Second	ON	(ON)	ON		ON		ON			
1	1_2 (Second)	ON	(ON)	ON		ON		ON			
	1_1 (Low)	ON	(ON)	ON		ON	ON			ON	

The low & reverse brake is applied in "1_1" range to prevent free wheeling when coasting and allows engine braking.

1 DIRECT CLUTCH
2 2ND BAND
3 FORWARD CLUTH
4 REAR CLUTCH
5 ONE-WAY CLUTCH
6 LOW/REVERSE CLUTCH
7 O/D ONE WAY CLUTCH
8 O/D BAND

NISSAN RL371B

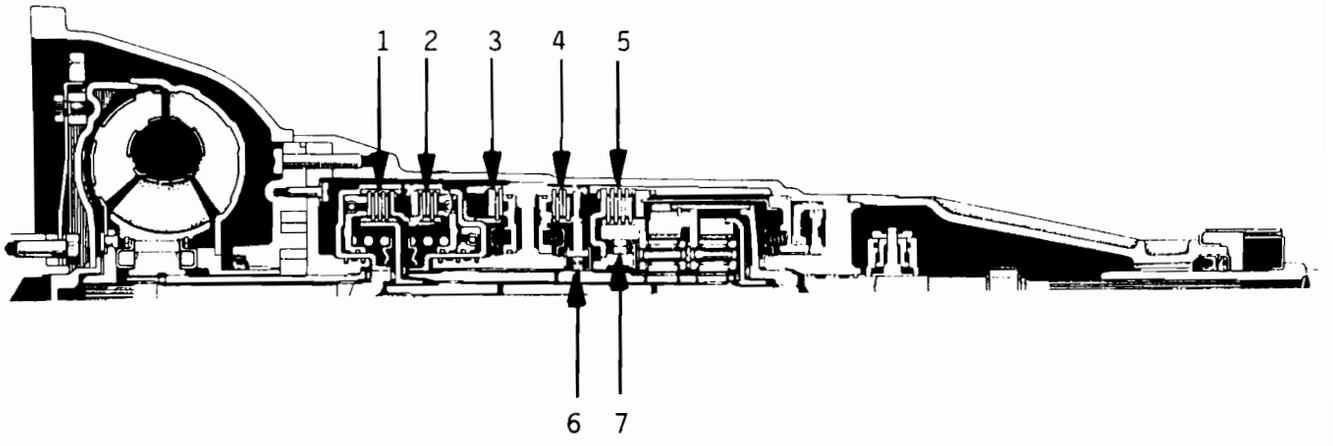


1 HIGH/REVERSE CLUTCH
2 BAND BRAKE
3 FORWARD CLUTCH
4 ONE-WAY CLUTCH
5 LOW/REVERSE BAND

Range			Gear ratio	Clutch		Low & reverse brake	Lock-up	Band servo		One way clutch	Parking pawl
				High-reverse (Front)	Forward (Rear)			Operation	Release		
Park						on					on
Reverse			2.182	on		on			on		
Neutral											
Drive	D1	Low	2.458		on					on	
	D2	Second	1.458		on			on			
	D3	Top	1.000	on	on		on	(on)	on		
2		Second	1.458		on			on			
1	1_2	Second	1.458		on			on			
	1_1	Low	2.458		on	on					

The low & reverse brake is applied in "1_1" range to prevent free wheeling when coasting and allows engine braking.

TOYOTA A-40

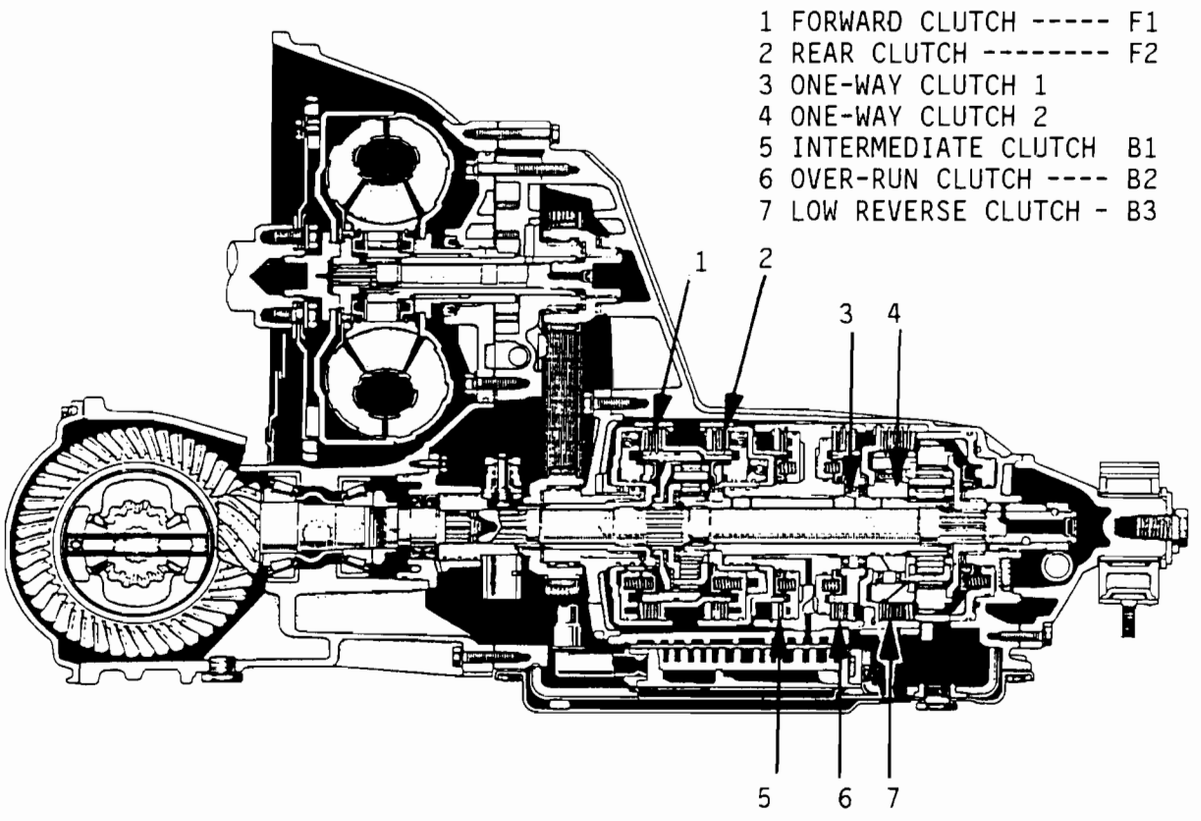


Shift Lever Position	Gear	C_1	C_2		B_1	B_2	B_3		F_1	F_2
			I.P.	O.P.			I.P.	O.P.		
P	Neutral							○		
R	Reverse		○	○			○	○		
N	Neutral									
D & 2	First	○								○
D	Second	○				○			○	
D	Third	○	○			○				
2	Second	○			△	○			○	
L	First	○					△ only for 4M	△		○

1 C_1 : Front clutch
2 C_2 : Rear clutch
3 B_1 : Brake No.1
4 B_2 : Brake No.2
5 B_3 : Brake No.3
6 F_1 : One-way clutch No.1
7 F_2 : One-way clutch No.2
O.P. : Outer piston
I.P. : Inner piston

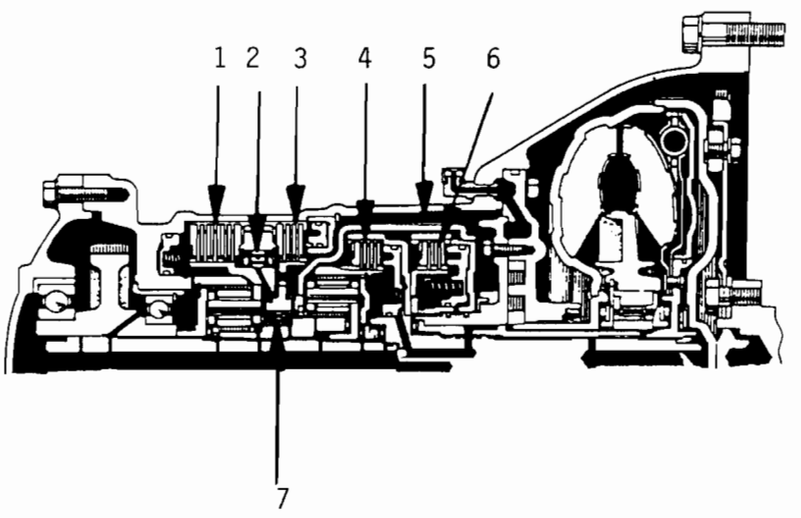
Note: △ indicates operation when braking by engine

TOYOTA A-55



RANGE	FORWARD CLUTCH	REAR CLUTCH	ONE-WAY CLUTCH-1	ONE-WAY CLUTCH-2	OVER-RUN CLUTCH	INTERMED CLUTCH	LOW-REV CLUTCH
REV		ON					ON
D 1ST	ON			HOLD			
D 2ND	ON		HOLD		ON		
D 3RD	ON	ON			ON		
S 1ST	ON			HOLD			
S 2ND	ON			HOLD	ON	ON	
LOW	ON			HOLD			ON

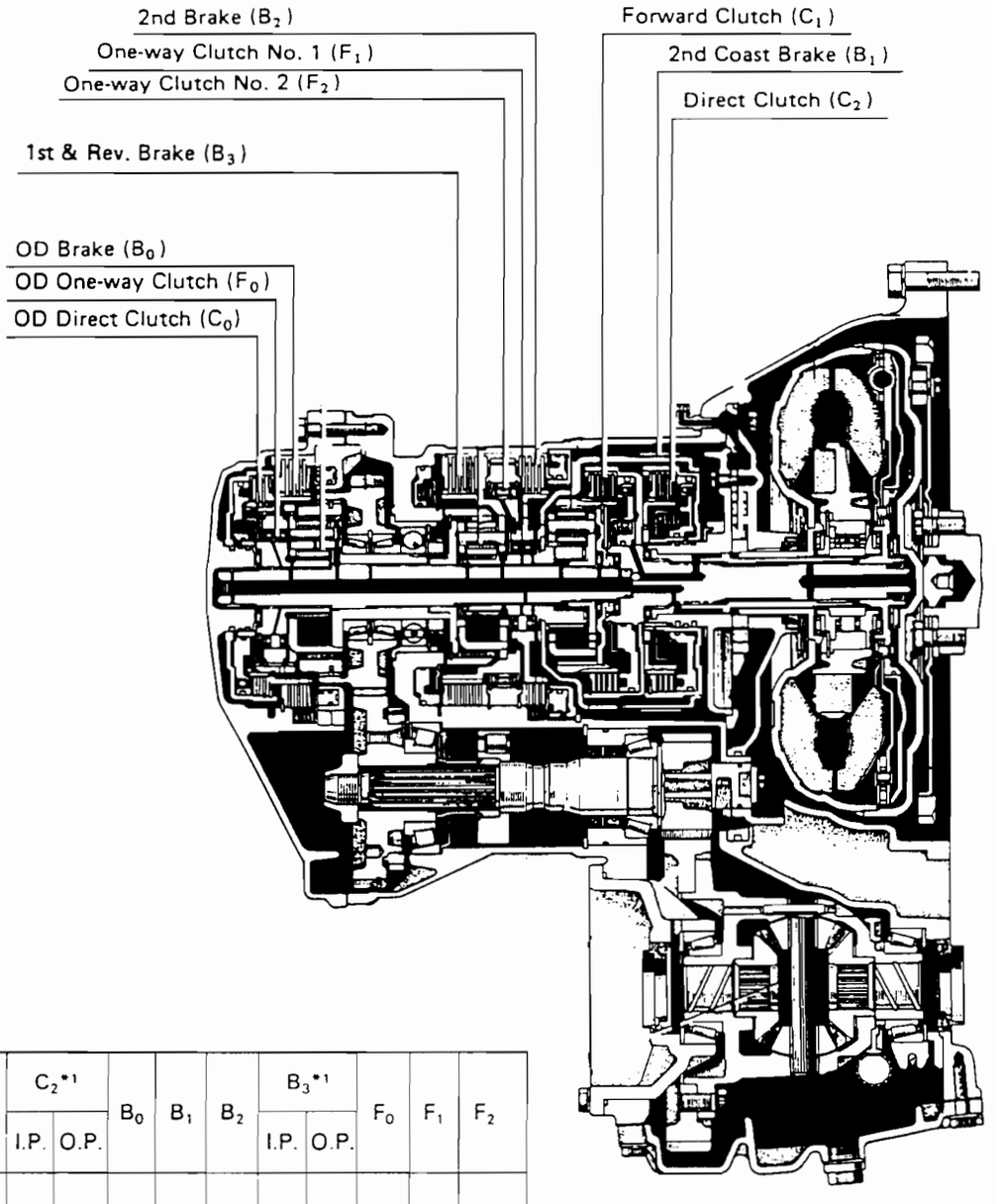
TOYOTA A-130



1 B3 1ST & REV BRAKE
2 F2 ONE-WAY CLUTCH #2
3 B2 2ND BRAKE
4 C1 FORWARD CLUTCH
5 B1 COAST BRAKE
6 C2 DIRECT CLUTCH
7 F1 ONW-WAY CLUTCH #1

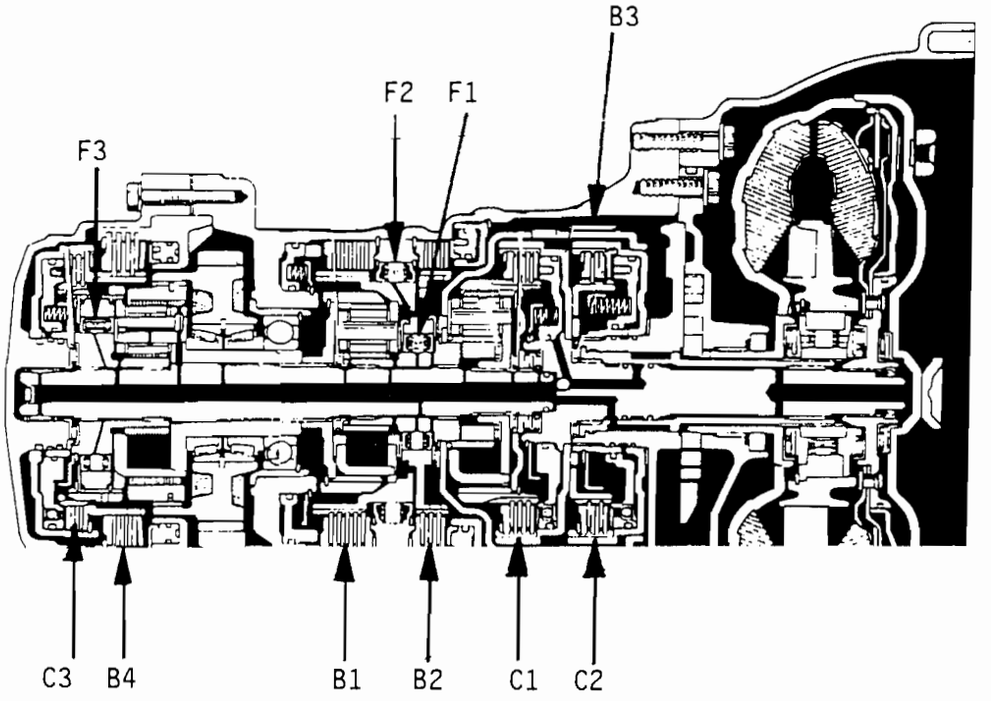
SHIFT POSITION	GEAR	C_1	C_2	B_1	B_2	B_3	F_1	F_2
P	PARKING							
R	REVERSE		○			○		
N	NEUTRAL							
D, 2	FIRST	○						○
D	SECOND	○			○		○	
D	THIRD	○	○		○			
2	SECOND	○		○	○		○	
L	FIRST	○				○		○
—	FINAL							

TOYOTA A-140



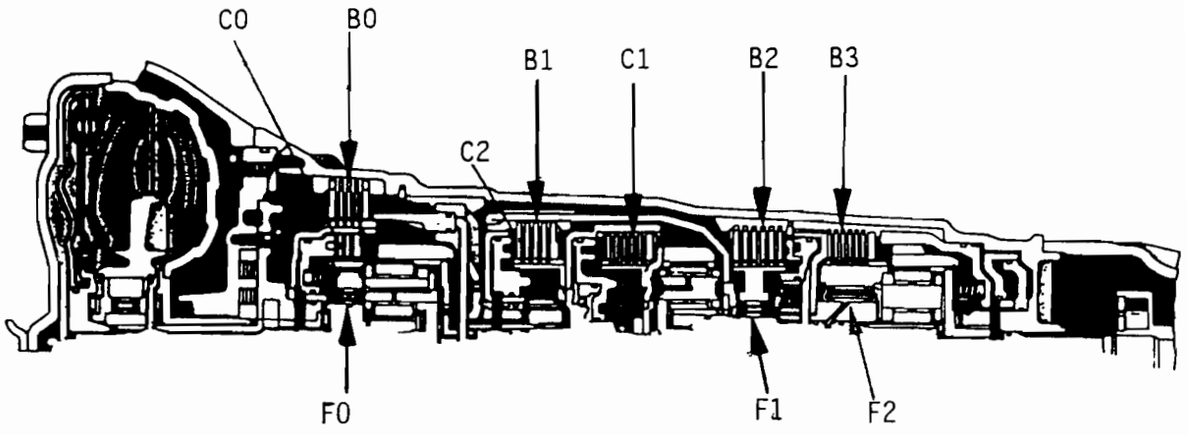
SELECTOR POSITION \ OPERATING ELEMENT		C_0	C_1	C_2*1		B_0	B_1	B_2	B_3*1		F_0	F_1	F_2
				I.P.	O.P.				I.P.	O.P.			
P	Parking	●											
R	Reverse	●		●	●				●	●	●*3		
N	Neutral	●											
D	1st	●	●								●		●
	2nd	●	●					●			●	●	
	3rd	●	●		●			●			●		
	OD		●		●	●		●					
2 (S)	1st	●	●								●		●
	2nd	●	●				●	●			●	●	
	3rd*2	●	●		●			●			●		
L	1st	●	●						●	●	●		●
	2nd*2	●	●				●	●			●	●	

TOYOTA A-240



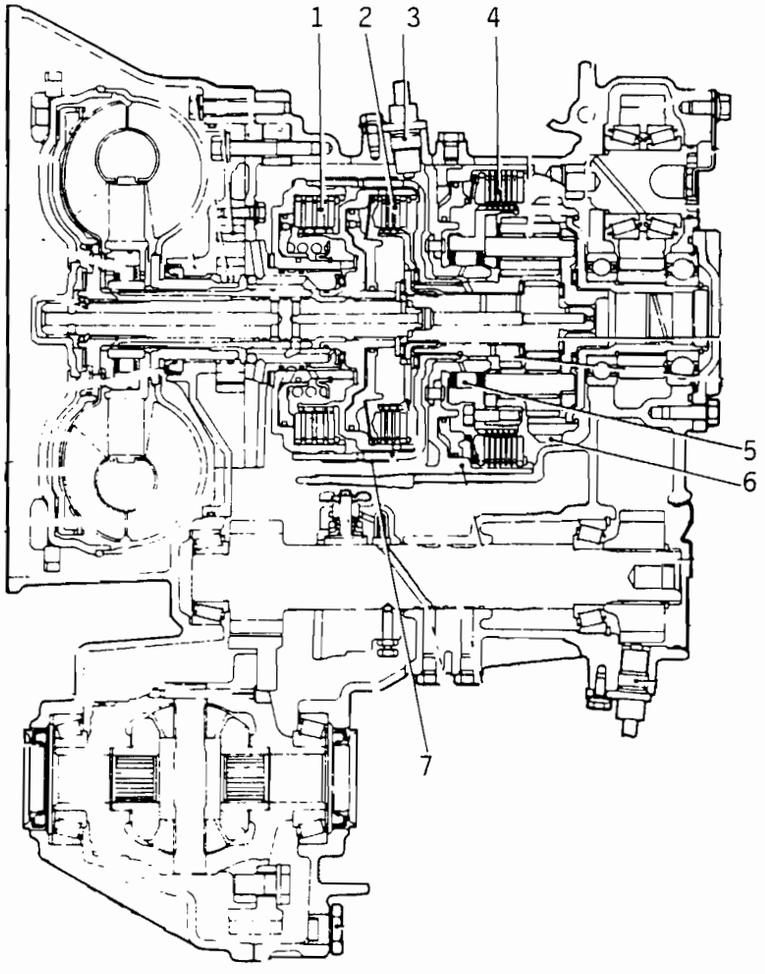
Shift lever position	Gear position	C_1	C_2	C_3	B_1	B_2	B_3	B_4	F_1	F_2	F_3
P	Parking							O			
R	Reverse		O				O	O			
N	Neutral							O			
D	1st	O						O		O	O
	2nd	O				O		O	O		O
	3rd	O	O			O		O			O
	OD	O	O	O		O					
2	1st	O						O		O	O
	2nd	O			O	O		O	O		O
L	1st	O					O	O		O	O

TOYOTA A-340



RANGE	C0	C1	C2	B0	B1	B2	B3	F0	F1	F2
REV	ON		C2				B3	ON		
D 1	ON	ON						ON		ON
D 2	ON	ON				ON				
D 3	ON	ON	ON			ON		ON	ON	
D 4		ON	ON	ON		ON		ON		
S 1	ON	ON						ON		ON
S 2	ON	ON			ON	ON		ON		
S 3	ON	ON	ON			ON		ON		
LOW	ON	ON					ON	ON		ON

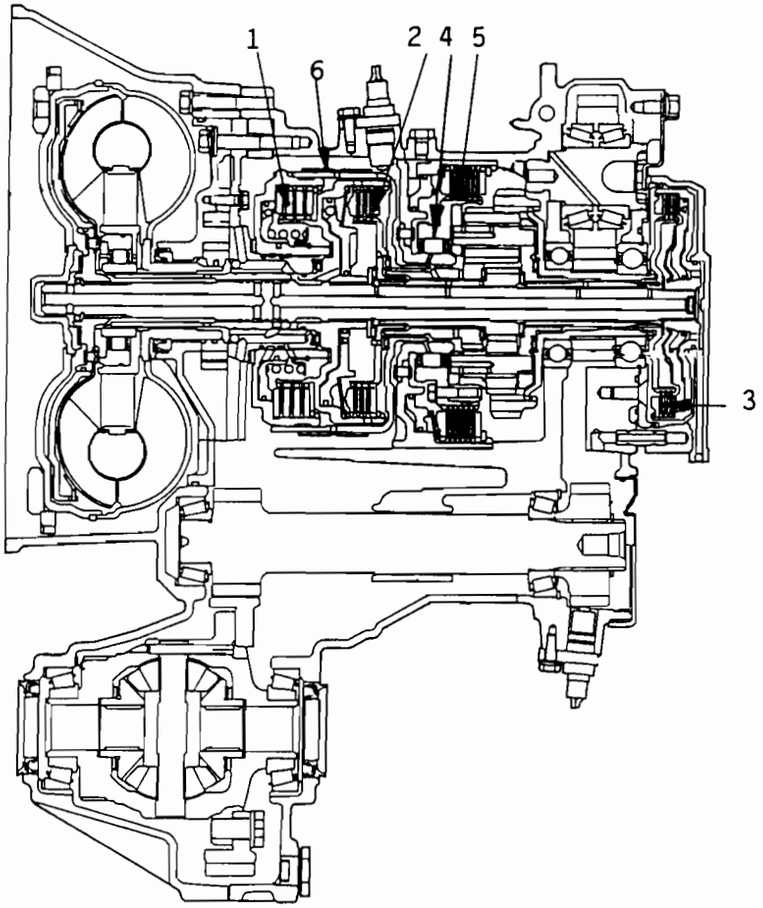
MITSUBISHI KM-171



1 FORWARD CLUTCH
2 REAR CLUTCH
3 PULSE GENERATOR
4 LOW/REVERSE BRAKE
5 ONE-WAY CLUTCH
6 PARKIBG SPRAG
7 KICKDOWN BAND

Lever position	Gear ratio	Engine starting	Parking sprag	Front clutch	Rear clutch	One-way clutch	Kickdown band	Low-reverse brake
P – PARKING		○	○					
R – REVERSE	2.502			○				○
N – NEUTRAL		○						
D – DRIVE								
First	3.273				○	○		
Second	1.818				○		○	
Third	1.150			○	○			
2 – SECOND								
First	3.273				○	○		
Second	1.818				○		○	
L – LOCK-UP (First)	3.273				○			○

MITSUBISHI KM-175

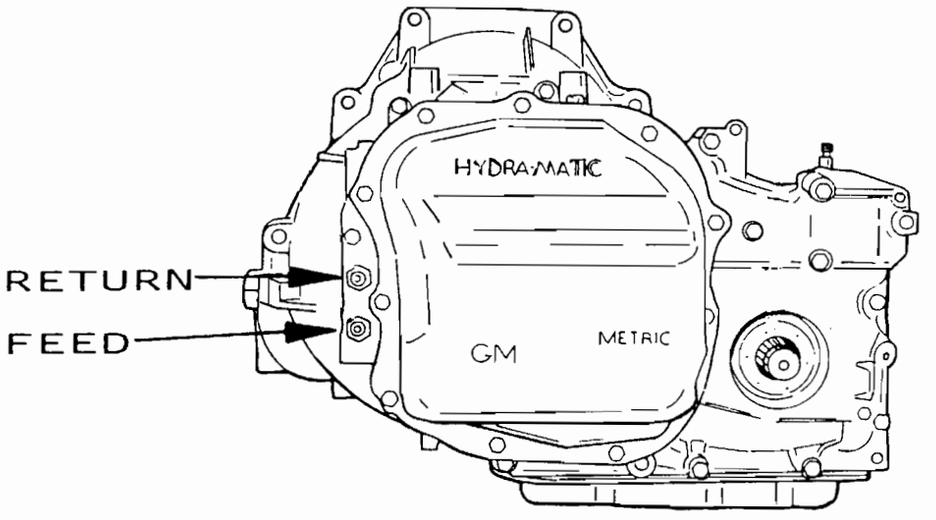


1. FRONT CLUTCH
2. REAR CLUTCH
3. END CLUTCH
4. ONE-WAY CLUTCH
5. LOW-REV CLUTCH
6. KICK DOWN BAND

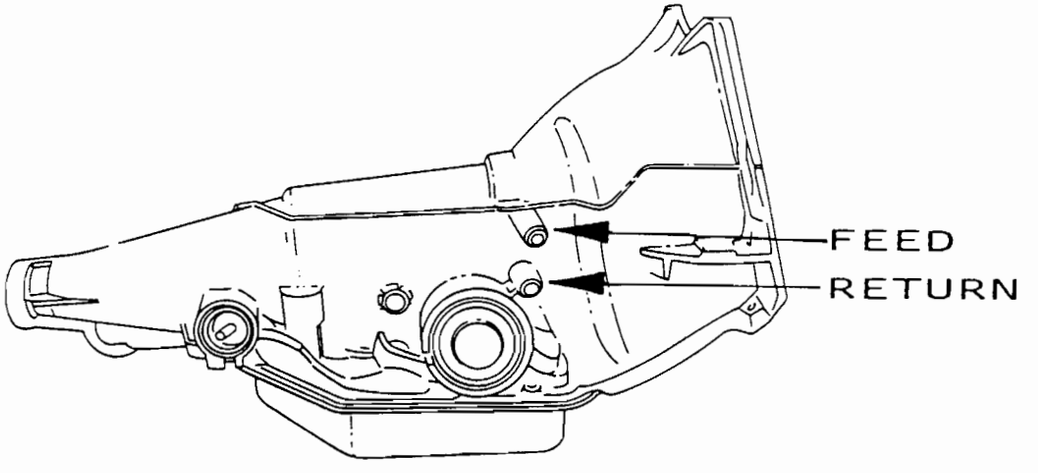
RANGE	FRONT CLUTCH	REAR CLUTCH	END CLUTCH	ONE-WAY CLUTCH	LOW/REV CLUTCH	KICKDOWN BAND
D 1		ON		ON		
D 2		ON				ON
D 3	ON	ON	ON			
D 4			ON			ON
S 1		ON		ON		
S 2		ON				ON
LOW		ON				ON
REV	ON				ON	

NOTE: CONVERTER CLUTCH CAN APPLY IN SECOND, THIRD AND FORTH.

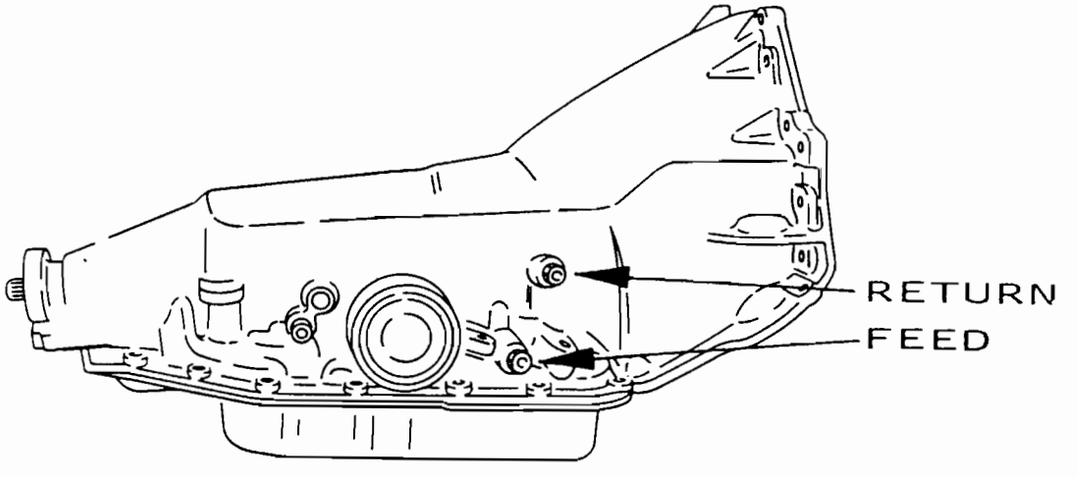
GM COOLER LINE INFORMATION



125-C



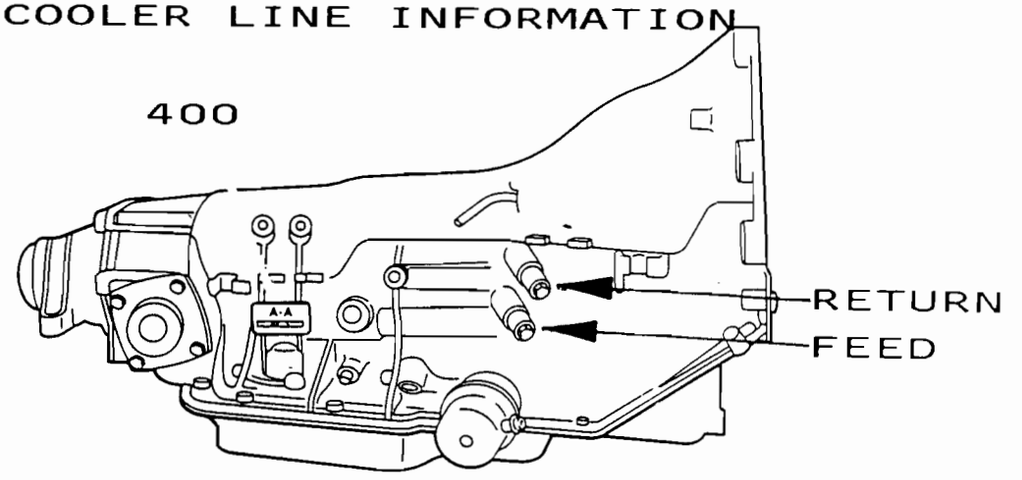
200-C



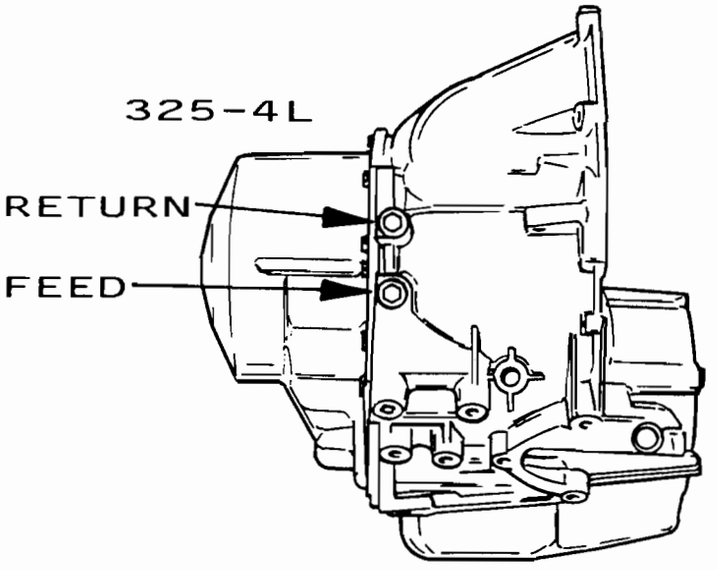
200-4R

GM COOLER LINE INFORMATION

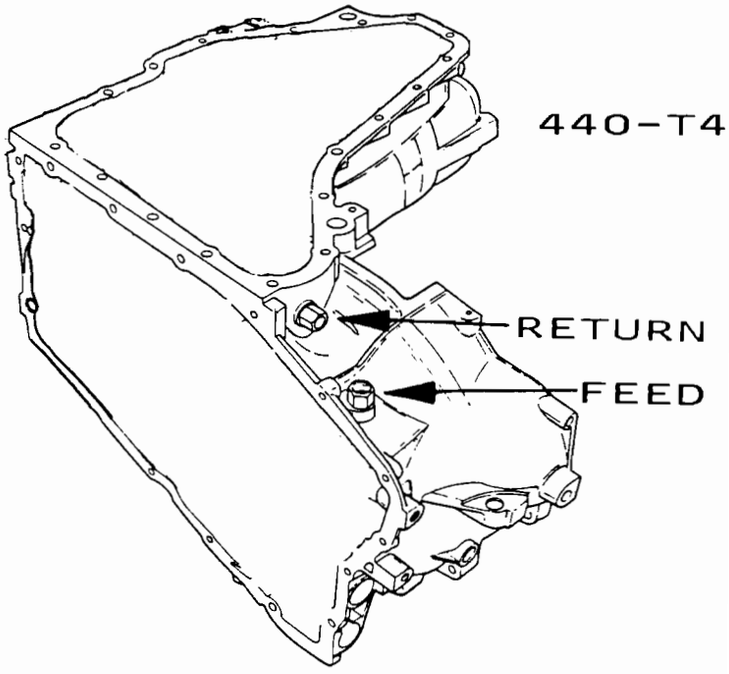
400



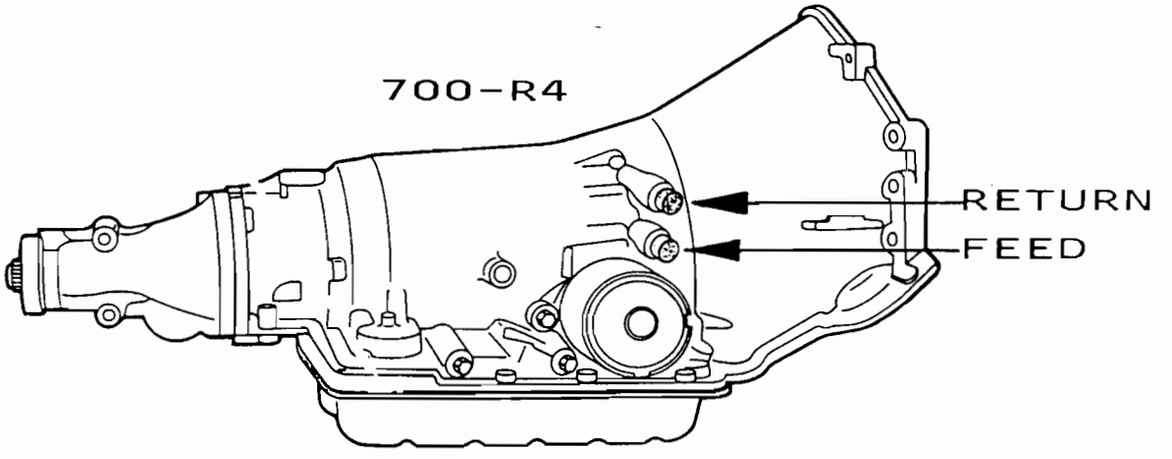
325-4L



440-T4

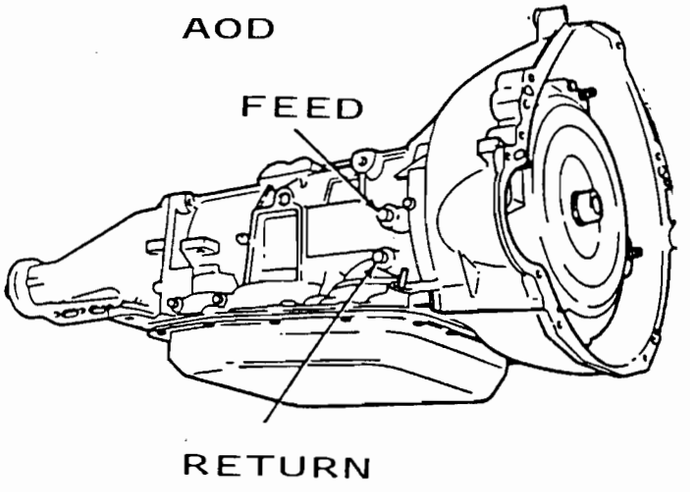


700-R4

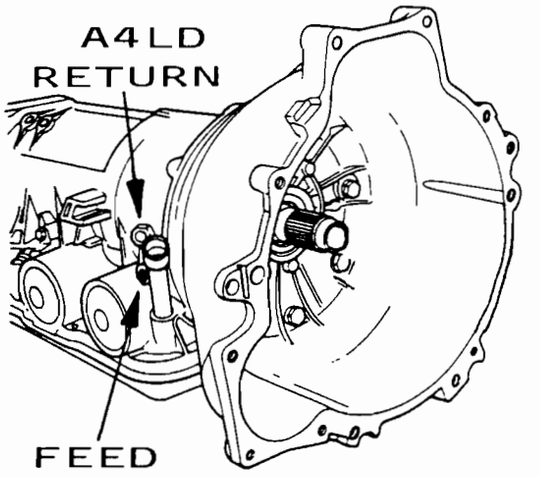


FORD COOLER LINE INFORMATION

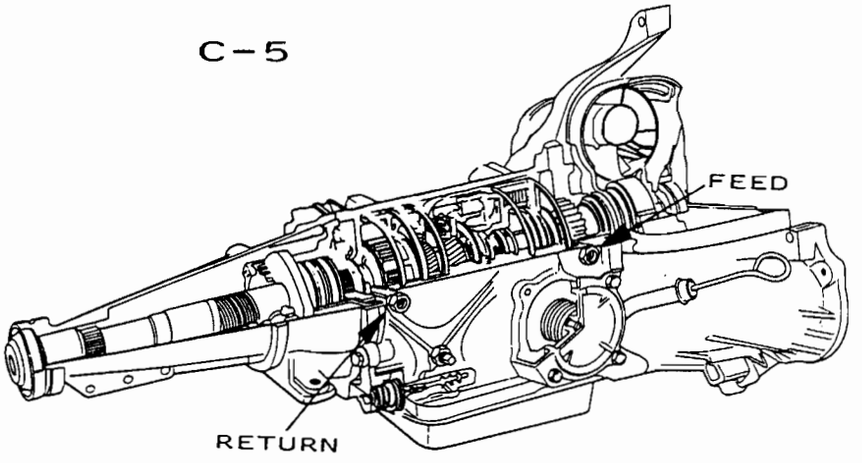
AOD



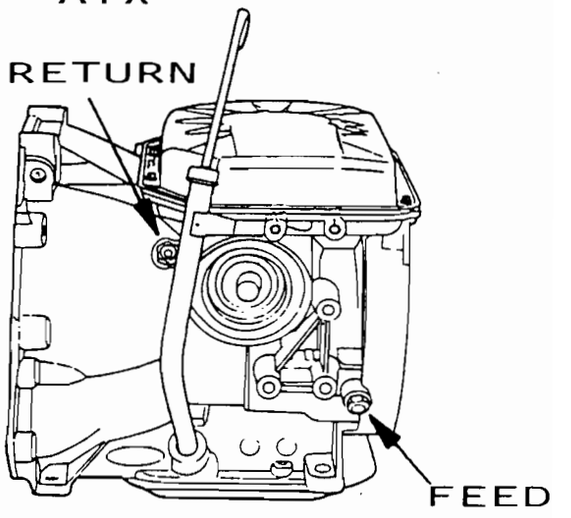
A4LD



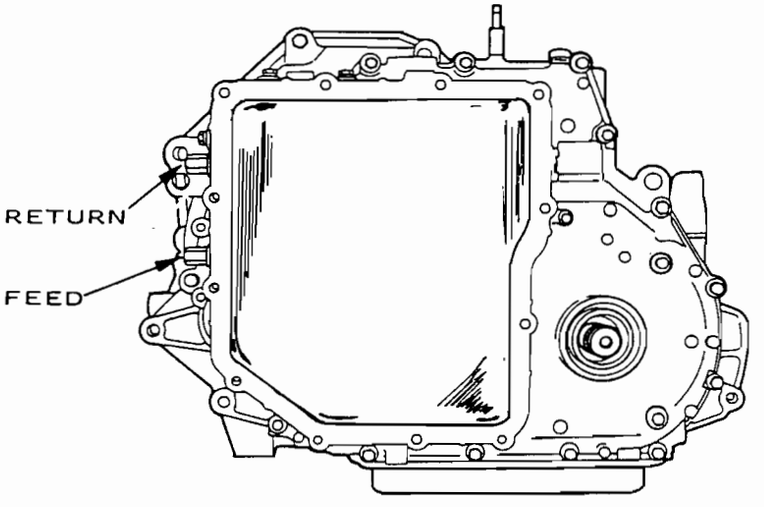
C-5



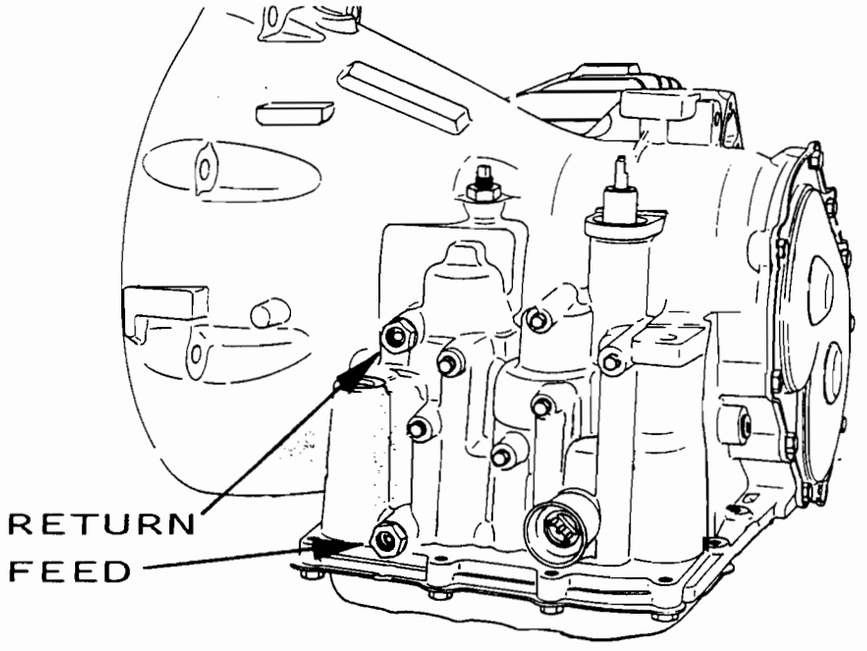
ATX



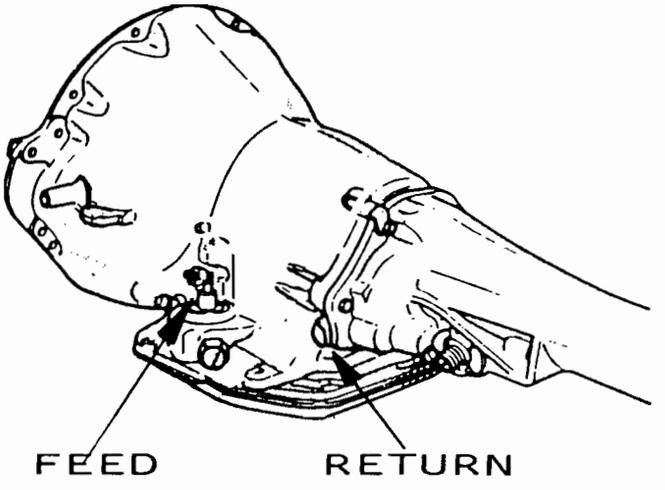
AXOD



CHRYSLER COOLER LINE INFORMATION



A404/413/415/470
A-670



A-727/A-904/A-999

L4N71B

COMPLAINT: Transmission shifts into O.D. regardless of O.D. control switch position.

CAUSE: The cause may be the small "O" ring missing, or mis-installed in the groove of the O.D. cancel solenoid. The small "O" ring goes BEHIND the O.D. cancel solenoid, as shown in Figure 1, and seals against the bottom of the case bore (See Figure 1).

CORRECTION: Install "O" ring in proper location as shown in Figure 1.

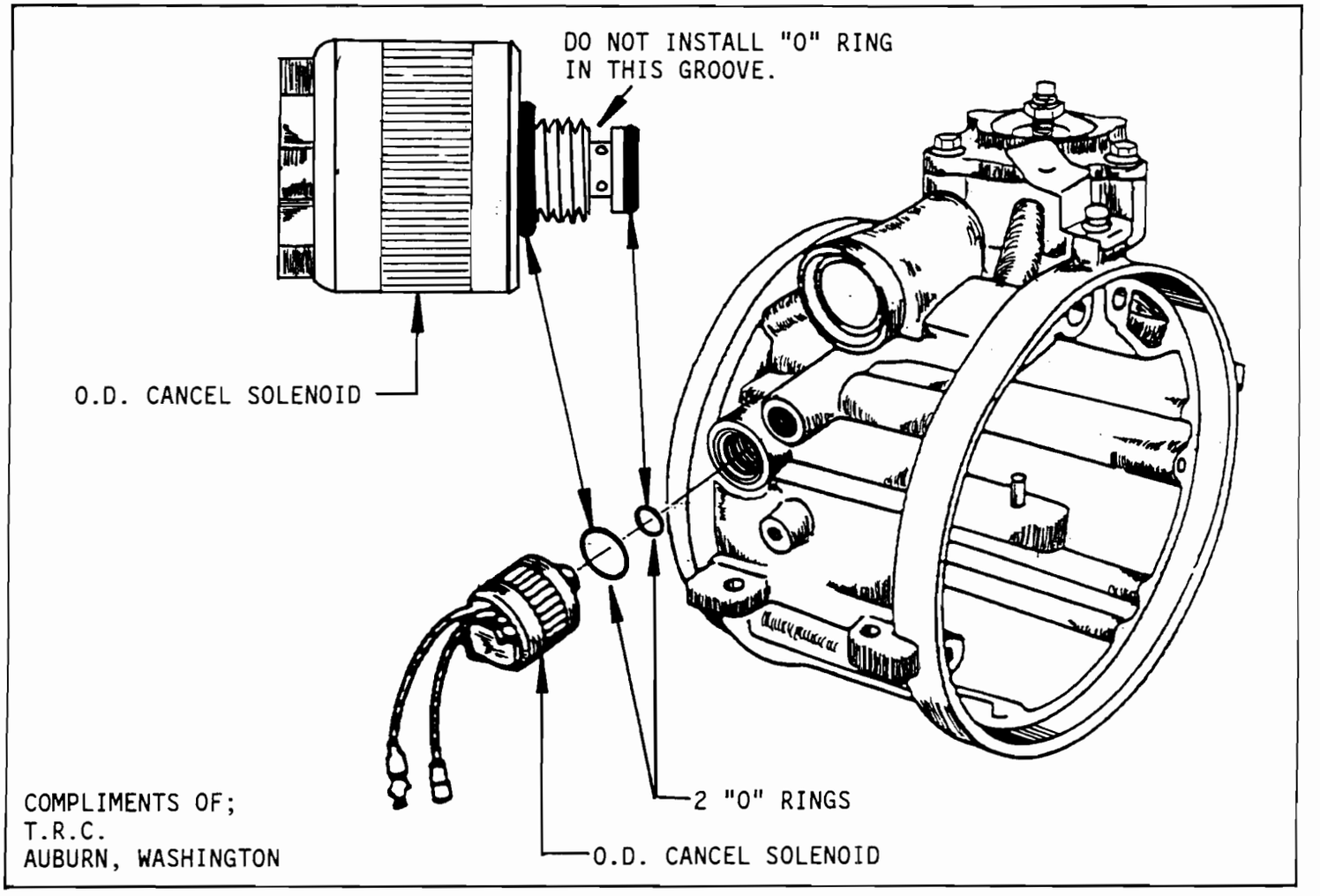


Figure 1

A43DL AND A44DL
HARSH 1-2 SHIFT

COMPLAINT: Harsh 1-2 shift at all throttle positions.

CAUSE: Viton check ball missing, or off location.

CORRECTION: Install check ball in proper location (See Figure 1).

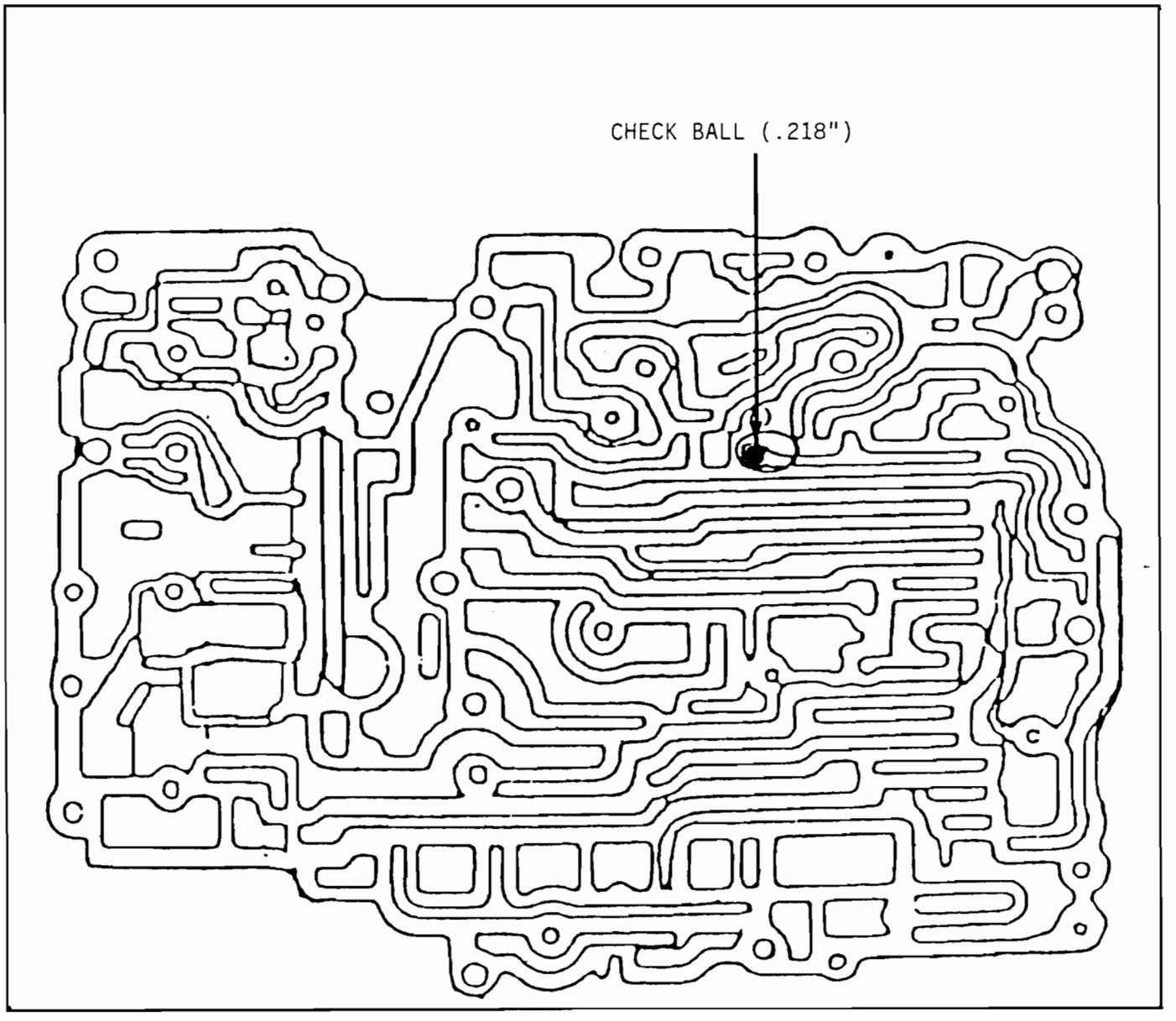


Figure 1