



**CHRYSLER**  
**42RH (A500)**  
**46RH (A518)**  
**47RH(A618)**

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## INTRODUCTION

### **42RH (A500) - 46RH (A518) - 47RH (A618)**

We wish to thank the Chrysler Corporation for the information and illustrations that have made this booklet possible. The A500 (42RH) (A999 Family) and A518 (46RH) (A727 Family) are both rear wheel drive transmissions with the overdrive section incorporated in the extension housing, and first made their appearance in 1988. The A500, beginning at start of production, was designed with a new electronic controlled 3-4 shift and electronic controlled converter clutch. The A518 however only recieved the electronic controlled 3-4 shift and in 1992 recieved the electronic controlled converter clutch. The A500 and A518 transmissions are found in the Dakota, Pick-up Trucks, Ramchargers, Vans and Ram-50 vehicles. In the Ram-50's, the transmission is reffered to as the R4AC1 for 2WD versions and the V4AC1 for 4WD applications.

A larger version of the A518 (46RH), known as the A618 (47RH), which basically has more clutch plates for increased torque carrying capacity, was introduced in 1994 and is found behind 5.9L Cummins diesel engines and the 8.0L pickup trucks.

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### UPDATE INFORMATION

In 1992 Chrysler changed the model designation for their automatic transmissions. The designations covered in this manual that have changed are the A500 to the 40RH for light duty applications. The A500 to the 42RH for standard duty applications. The A518 to the 46RH for heavy duty applications and the A618 to the 47RH for super duty applications.

The first digit indicates the number of forward speeds, the second digit indicates the torque capacity, the third digit indicates the type of drive ("R" = Rear Wheel Drive) and the fourth digit indicates hydraulic operation.

The gear ratios for the 40 and 42 RH are: 1st = 2.74:1; 2nd = 1.54:1; 3rd = 1.00:1; 4th = 0.69:1. The gear ratios for the 46 and 47RH are: 1st = 2.45:1; 2nd = 1.45:1; 3rd = 1.00:1; 4th = 0.69:1.

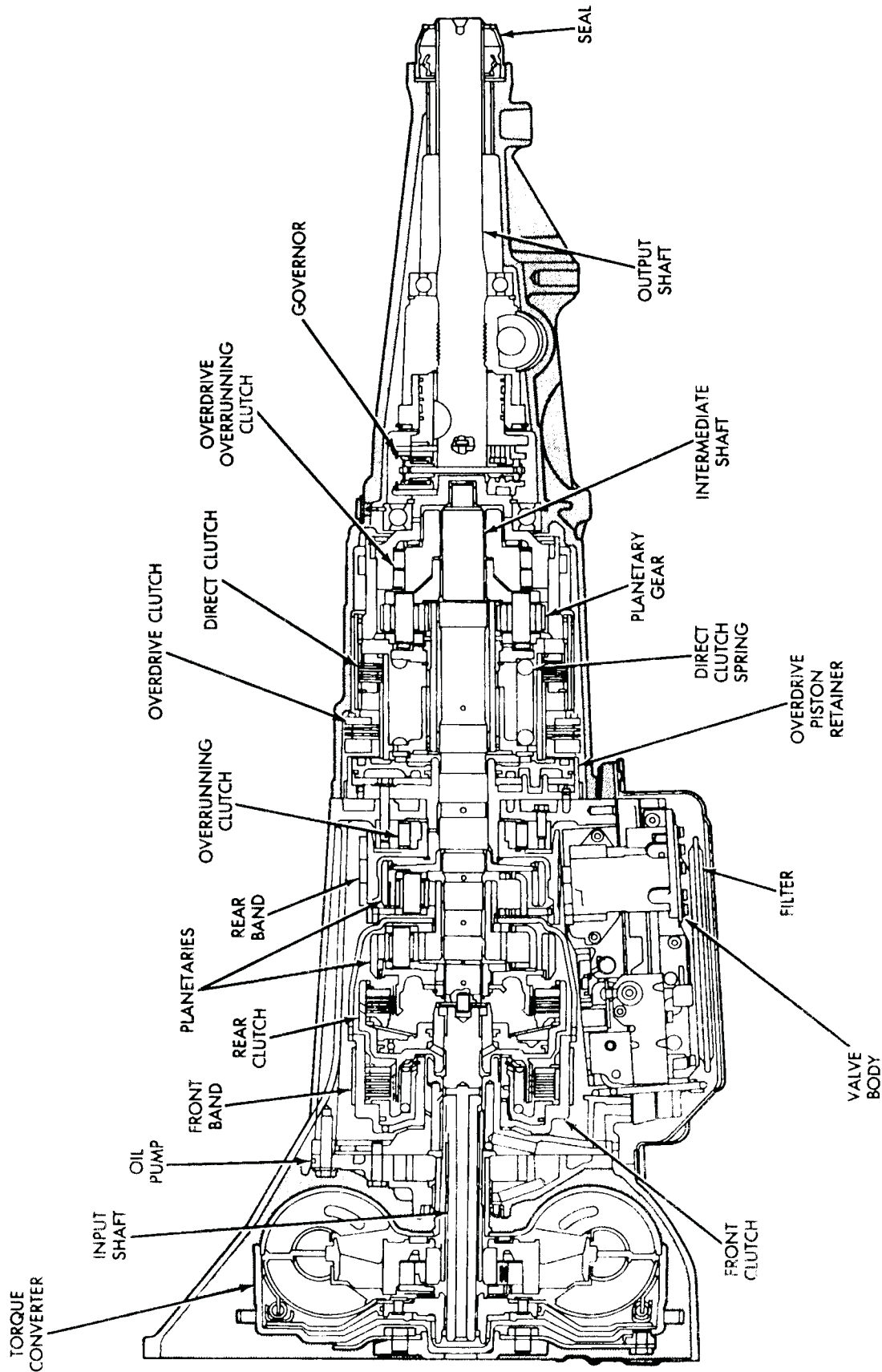
These transmissions are all dual unit designs meaning the main unit is a three speed transmission with an overdrive unit attached to it which is contained in the extension housing.

Speeds 1 through 3 are hydraulically controlled with 4th speed being controlled by computer. Fourth gear is controlled by a manually operated switch in the drivers compartment which will cancel or enable overdrive. Converter clutch operation was provided in the A500 from the beginning while the larger units did not receive converter clutch until the 1992 model year. Converter clutch is also computer controlled and converter clutch engagement in overdrive is controlled by sensor inputs to the PCM.

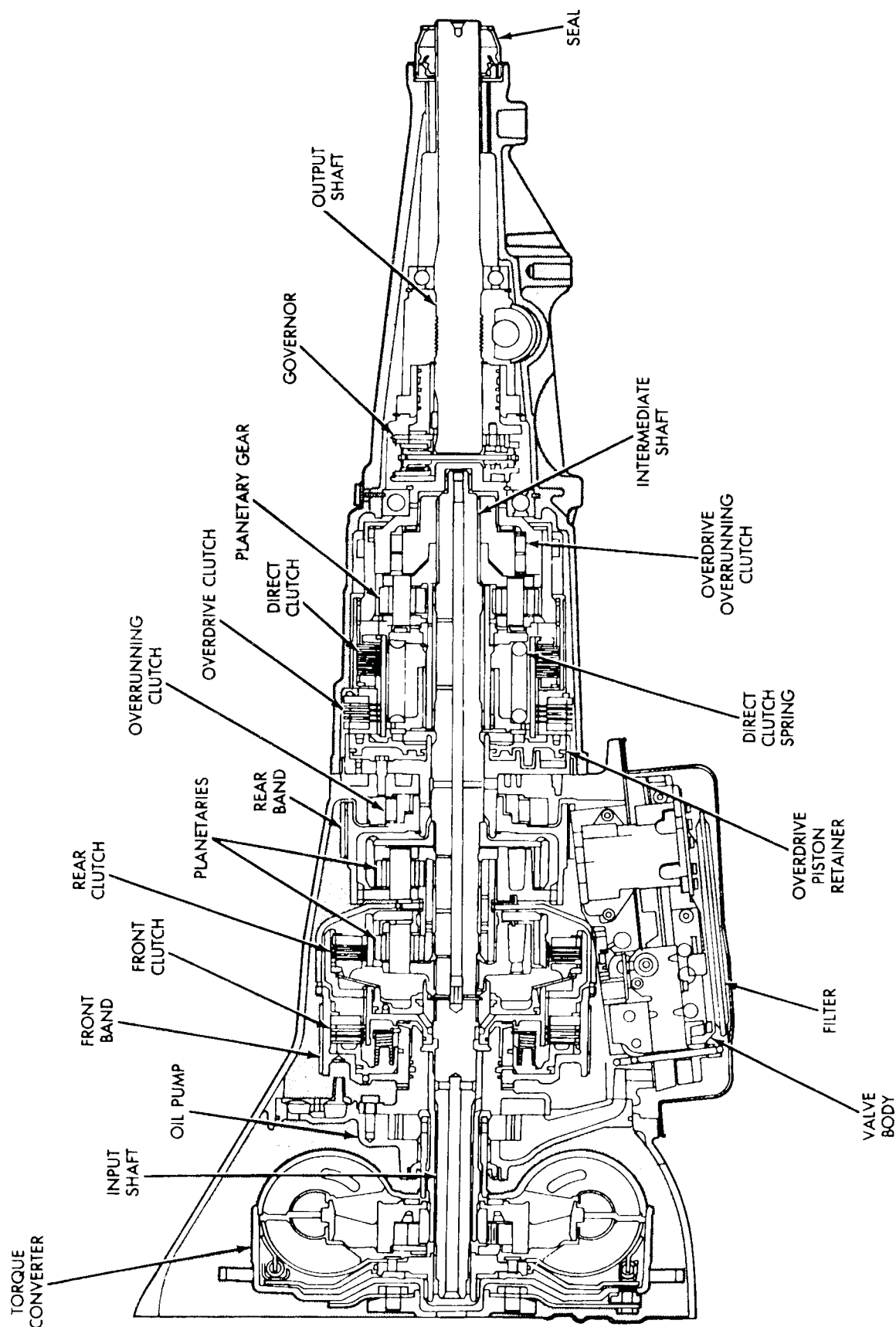
In third gear above 25 mph and in fourth gear above 50 mph, sensor inputs to the PCM that determine clutch engagement and 3-4 shift timing are: coolant temperature sensor (must be above 60° F); engine rpm sensor; vehicle speed sensor; throttle position sensor and map sensor.

The information contained in this manual is for teardown and assembly only and although the information contained here was gathered from sources known to be reliable, accuracy is not guaranteed by A.T.S.G.

We thank Chrysler Corporation for the illustrations and information that made this manual possible.



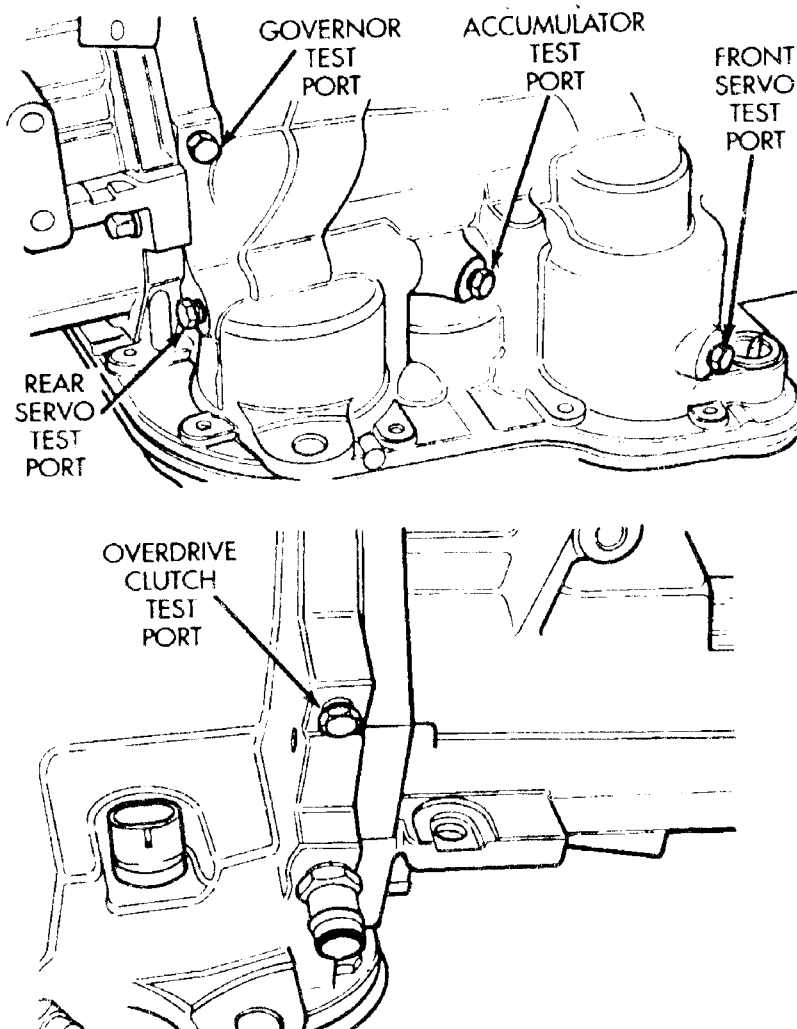
*42RH Transmission And Overdrive Unit*



46RH/47RH Transmission And Overdrive Unit

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## PRESSURE TESTING



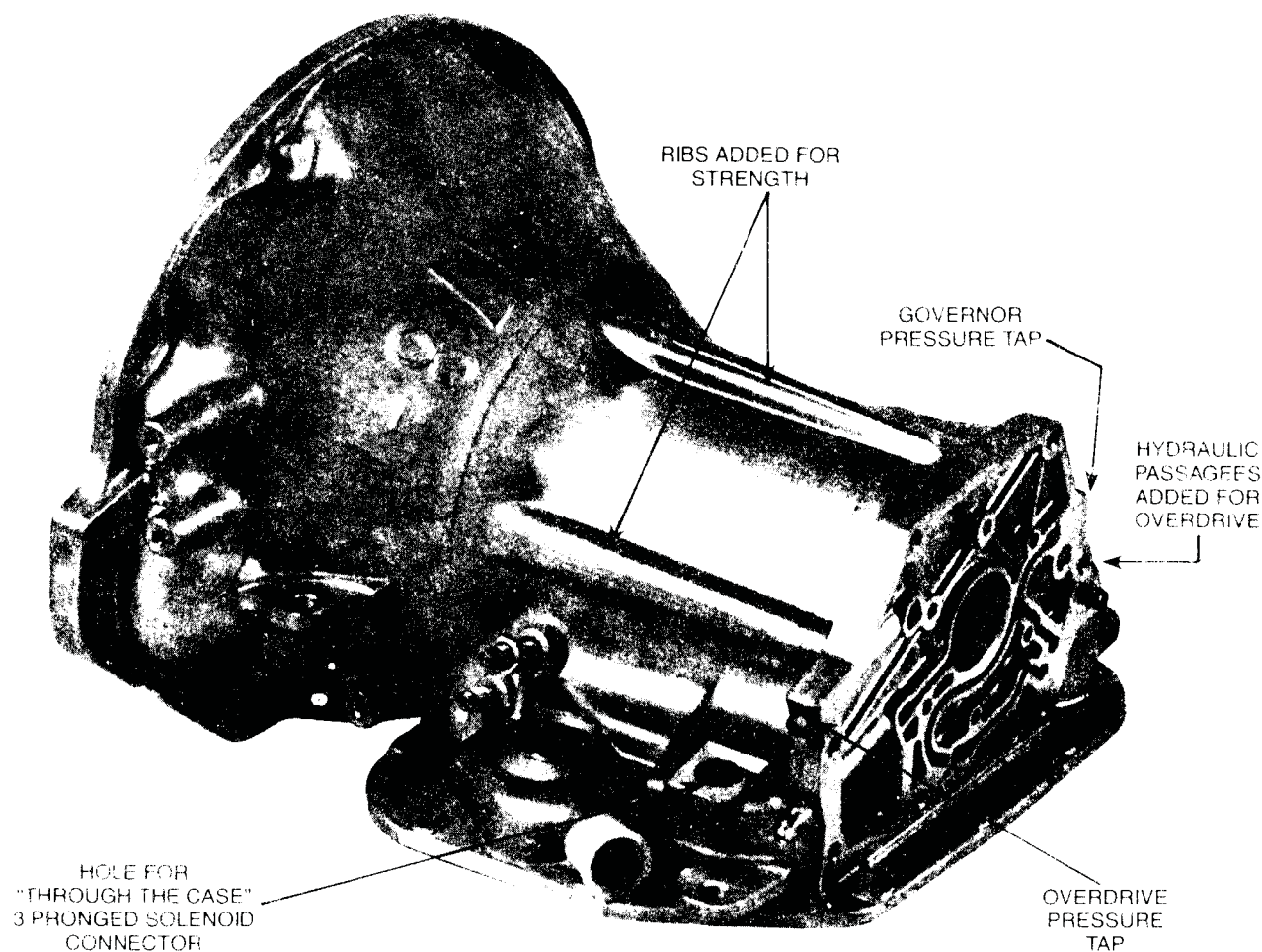
PRESSURE PORT	MINIMUM PSI	MAXIMUM PSI
REAR SERVO	145-175	230-280
ACCUMULATOR	54-60	90-96
GOVERNOR	0 @ IDLE	1PSI PER 1MPH
OVERDRIVE	68-72	90-120

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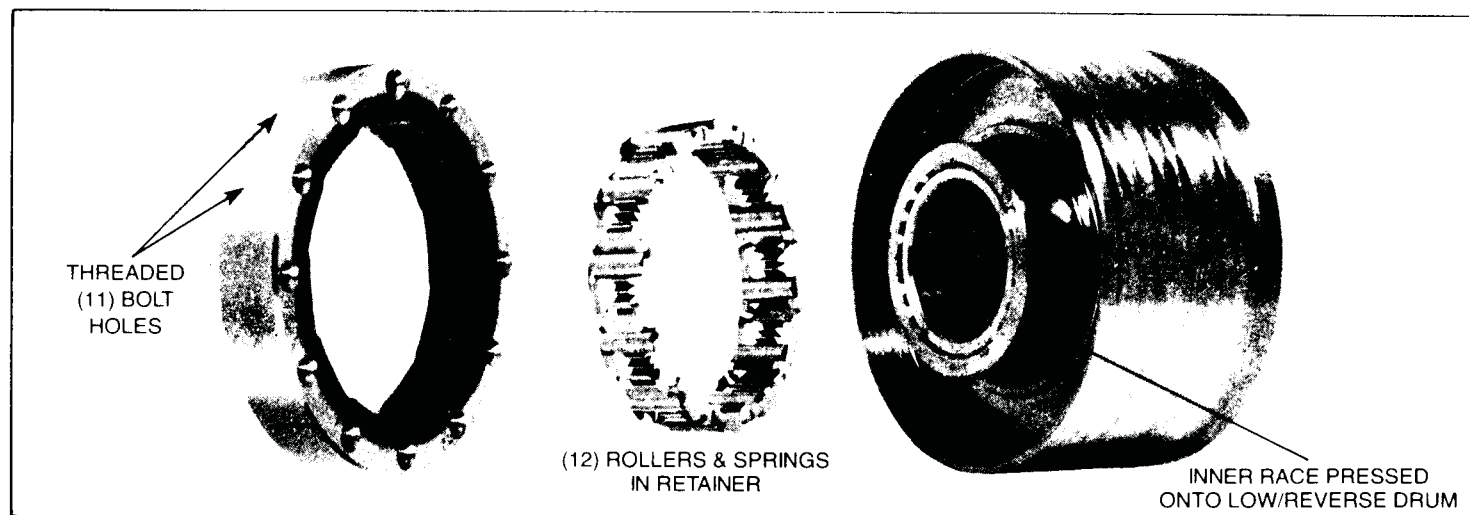
## ALTERED TRANSMISSION COMPONENTS

This section will cover the components in the basic transmission that were changed to accommodate the overdrive unit.



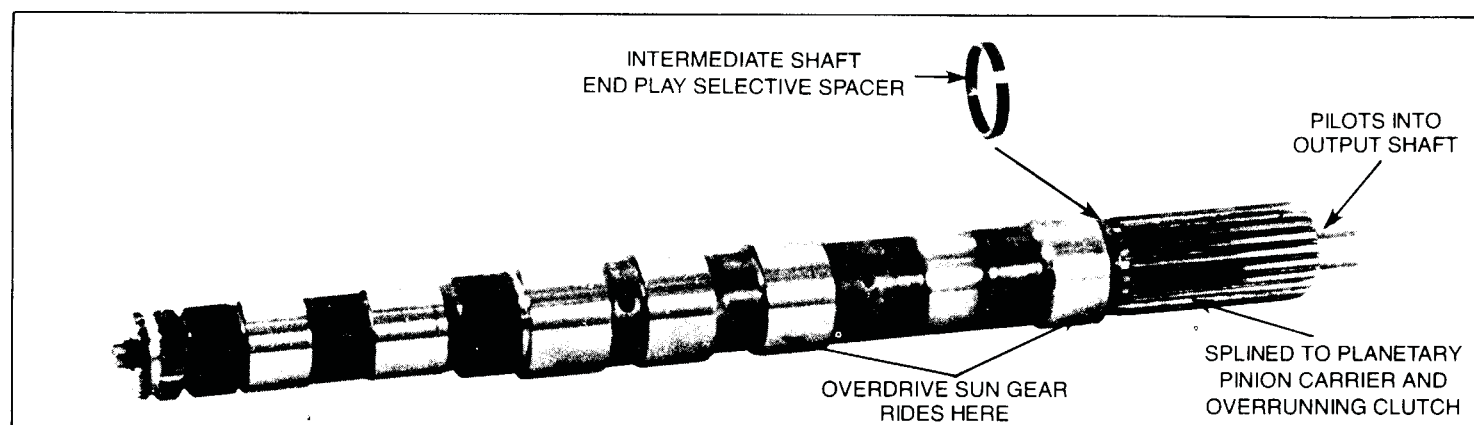
**CASE.** The transmission case has been increased in strength in several areas. The case now has ribs on the top and both sides to improve its rigidity. The back face of the case has changed because of the hydraulic circuits needed to operate the overdrive clutch piston. The mounting

surface for the overdrive housing is larger and has a different bolt hole configuration. Overdrive and governor pressure taps are located in the rear of the case for diagnostic purposes. There is a hole on the left side of the case for the valve body, three pronged, solenoid connector to mount.



**OVERRUNNING CLUTCH:** A new overrunning clutch incorporates a spring and roller assembly with 12 rollers instead of 10. The new overrunning clutch cam has a feature that prevents the rollers from crushing the springs in the event of roller spit-back. Eleven bolts retain the cam into the

case. Five bolts are short and pass only through the case. The other six bolts pass through the overdrive piston retainer and the case. The overrunning clutch inner race is pressed onto the reverse drum and then machined to better control run-out. The unthreaded hole in the cam is located at the 7 o'clock position, looking from the rear.



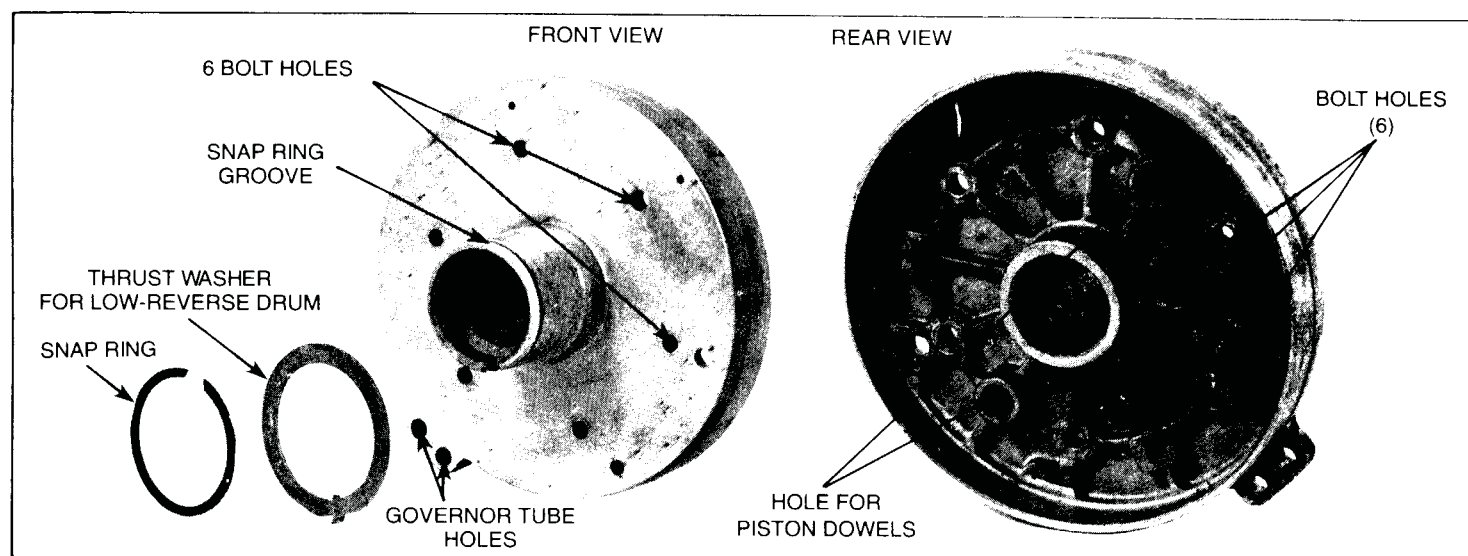
**OUTPUT SHAFT:** The output shaft is referred to as the intermediate shaft in the A-500. The back end has been modified so it splines with the overdrive planetary pinion carrier and overrunning clutch inner race. The shaft has been shortened, and no longer has the governor mounted on it. Other modifications include removal of the speedometer pinion gear drive, and the mounting surface for the output shaft bearing. The rear part of the intermediate shaft pilots in the output shaft.

The center of the intermediate shaft is drilled for lubrication. The lubrication is fed through the

intermediate shaft support, through cross drilled holes to the center of the shaft. From there the oil goes forward and lubricates the transmission planetary gear set. The oil that flows rearward lubricates the overdrive sun gear and the **output shaft** bushing the intermediate shaft pilots in. An orifice is pressed into the rear of the intermediate shaft to control oil flow.

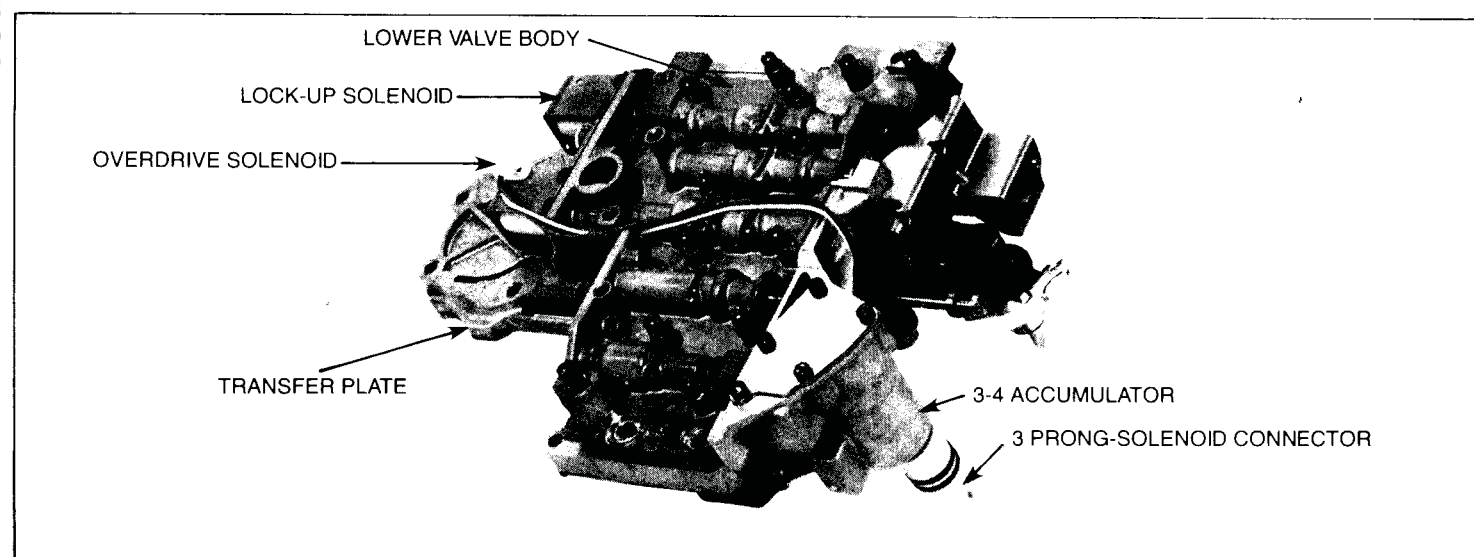
Intermediate shaft end play is adjusted with one of four selective spacers. The selective spacer fits over the rear splines of the intermediate shaft and up against a shoulder.





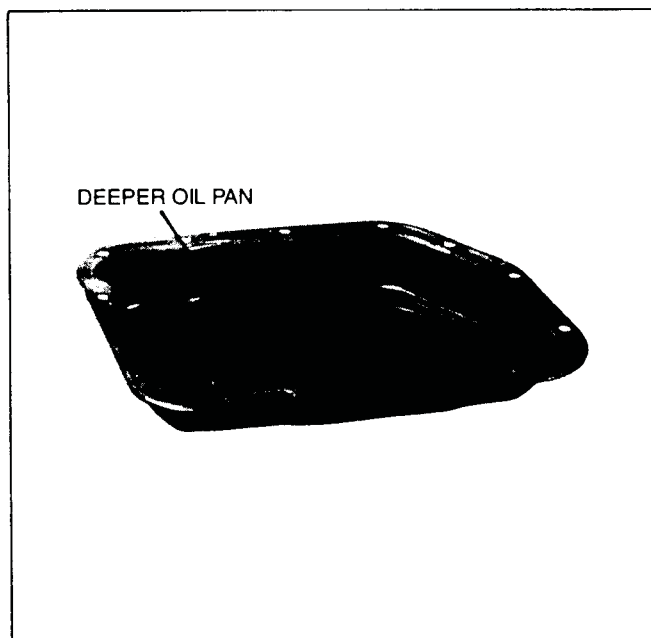
**OUTPUT SHAFT SUPPORT:** The most noticeable change of the output shaft support (**now called the OVERDRIVE PISTON RETAINER**) is the size. Where the governor assembly used to be located is now a piston bore for the overrunning clutch piston. The front end of the support has a groove that retains a snap ring that holds a thrust

washer and the low-reverse drum in place. This was done to prevent any fore and aft movement of the low and reverse drum with the redesigned overrunning clutch. On the back, lower right side of retainer is a support for the governor pressure tubes.

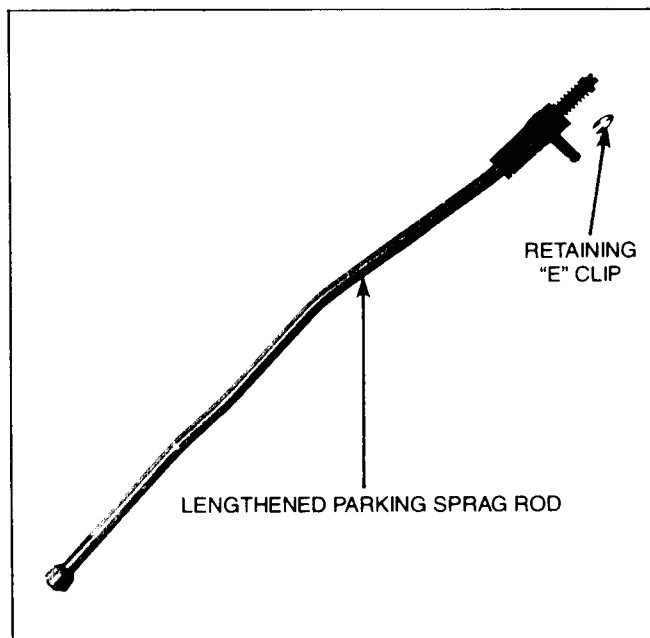


**VALVE BODY:** The valve body transfer plate has been modified so the lower valve body housing can be mounted to it. The lower valve body includes five valves and, an attaching accumulator assembly. Two, SMEC controlled, solenoids are mounted on the lower valve body. One solenoid controls the lock-up torque converter, while the

second solenoid operates the overdrive unit. A, through the case, three pin connector connects the solenoids to the SMEC. The center pin is battery feed, the forward pin is the overdrive solenoid, and the rear pin is the torque converter lock-up solenoid. The SMEC controls the solenoid ground for operation.



**OIL PAN:** A new deeper oil pan was required to provide room for the added valve body controls.

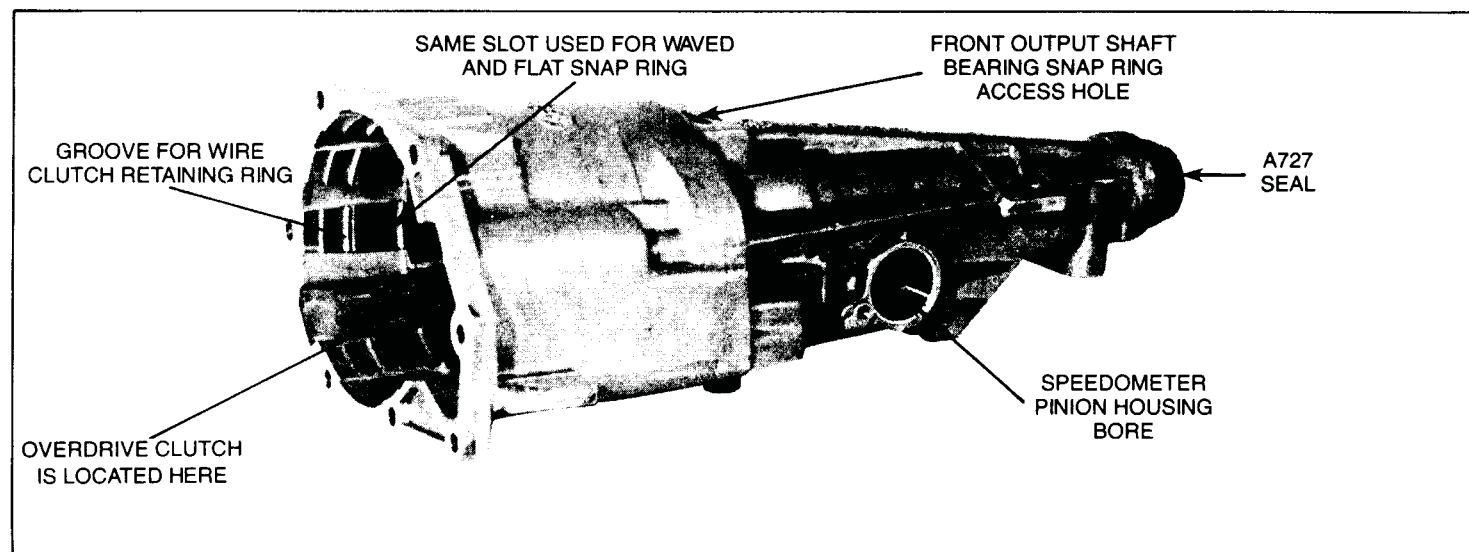


**PARKING SPRAG ROD:** The park mechanism has been moved rearward in the overdrive housing. As a result, the parking sprag rod assembly has been lengthened. The park gear is integral with the annulus gear.

## OVERDRIVE COMPONENTS

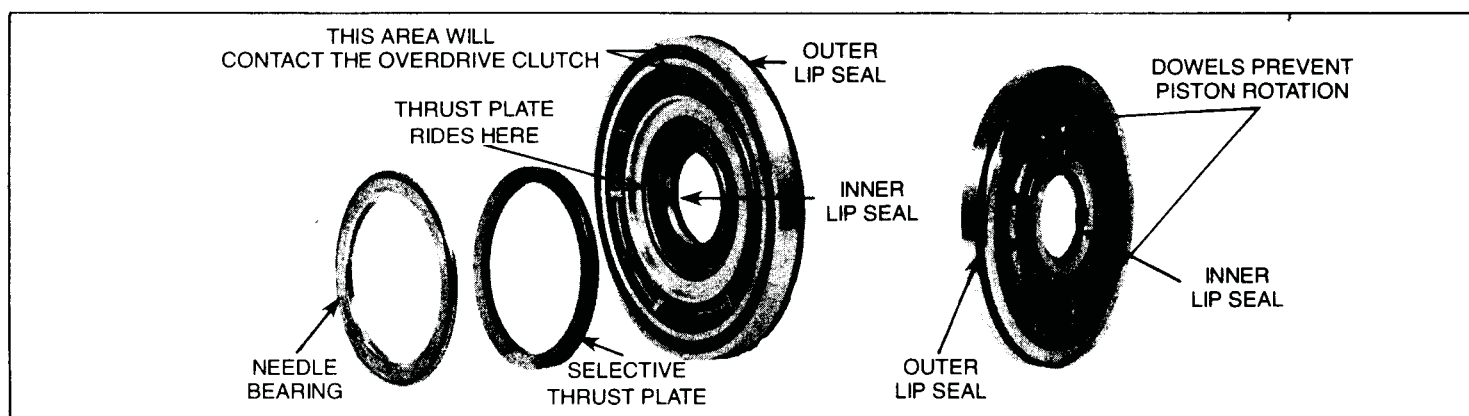
The overdrive component section is intended to familiarize you with all the new overdrive compo-

nents. A brief explanation of the component's purpose, and how it operates, should help you understand how the parts interrelate.



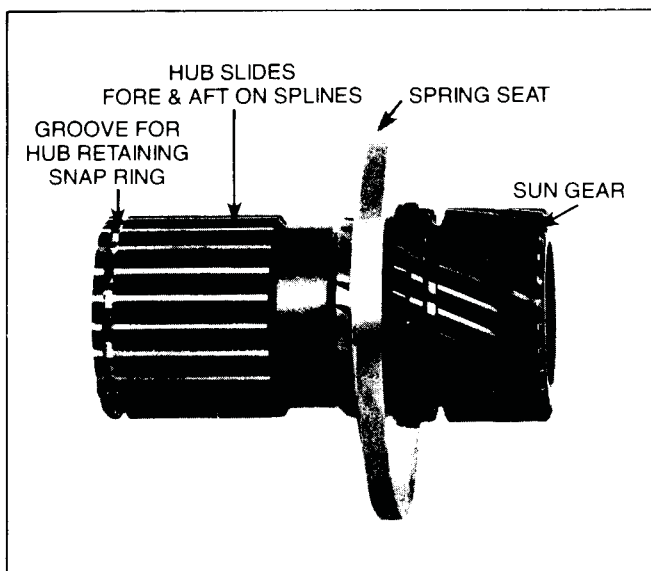
**OVERDRIVE CASE:** The overdrive case is a lightweight cast aluminum, one piece housing. The rear most part of the housing retains an oil seal and bushing, both seal and bushing are from the A-727 transmission. The left side of the hous-

ing has a bore to mount the speedometer pinion housing assembly. The parking pawl, reaction plug, etc. is located in the housing slightly forward of where the governor will be located.

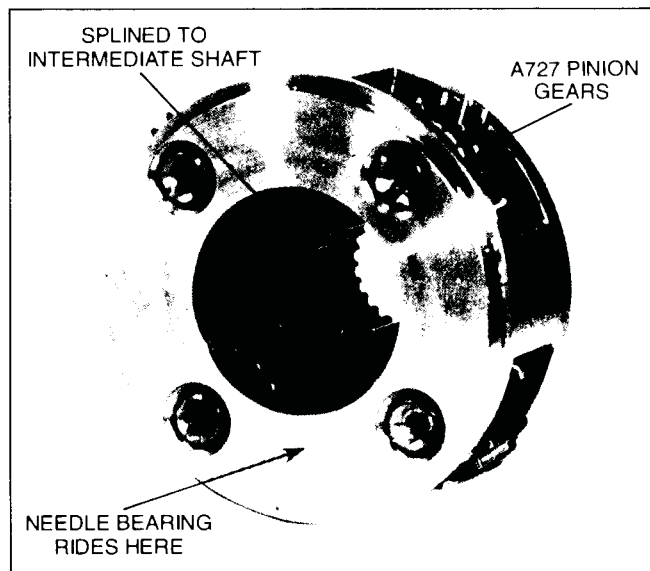


**OVERDRIVE PISTON:** The overdrive piston is located inside the O/D piston retainer. The piston seals to the retainer using two lip seals. There are no rotating seal rings and, there is no pressurized oil in the overdrive housing for the clutches. Two anti-rotating dowels on the piston prevent the piston from turning in the retainer.

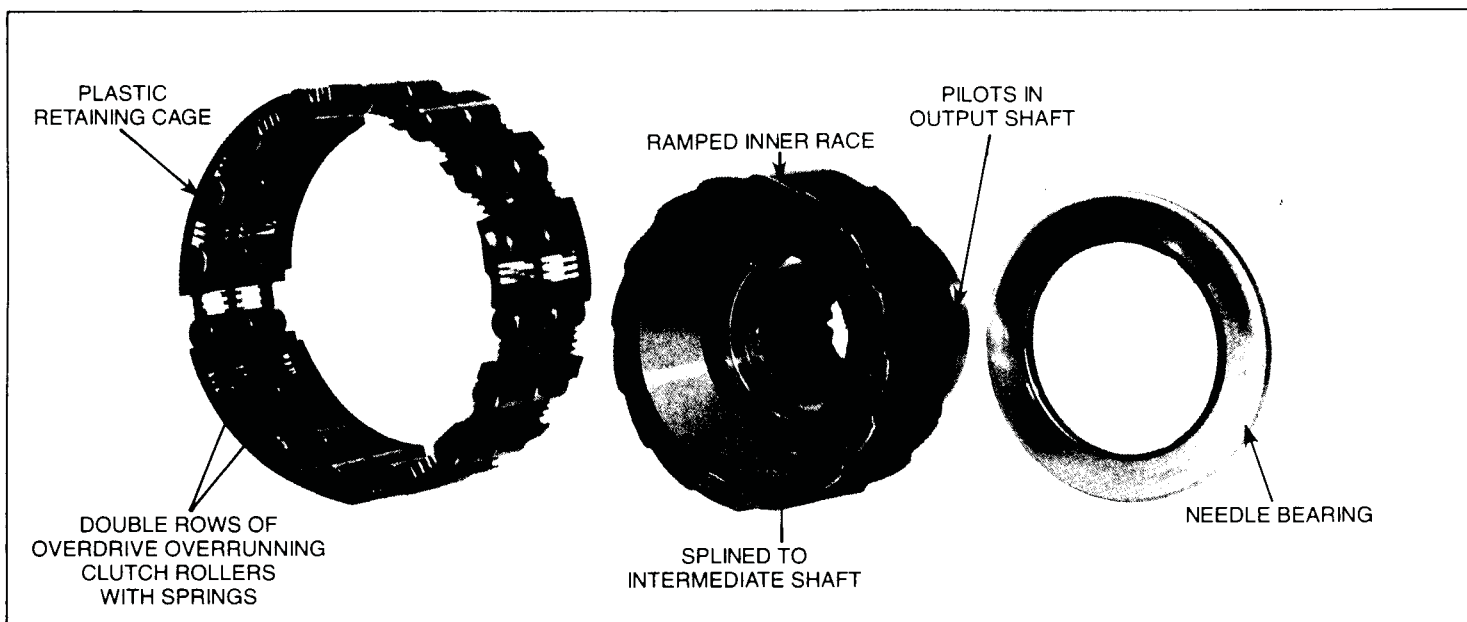
When the piston is hydraulically pressurized it releases the spring applied direct clutch and, applies the overdrive clutch. A selective thrust plate is located on the back side of the piston to insure proper clutch release/apply timing. A needle bearing is located between the spacer and direct clutch spring sliding hub to prevent damage from occurring between the stationary piston, and the rotating hub.



**OVERDRIVE SUN GEAR:** The sun gear rides on the intermediate shaft with the rear most part of the gear meshing with the planetary gears. The forward portion of the sun gear is splined to the sliding hub. The sun gear will be turned for direct drive and held for overdrive.

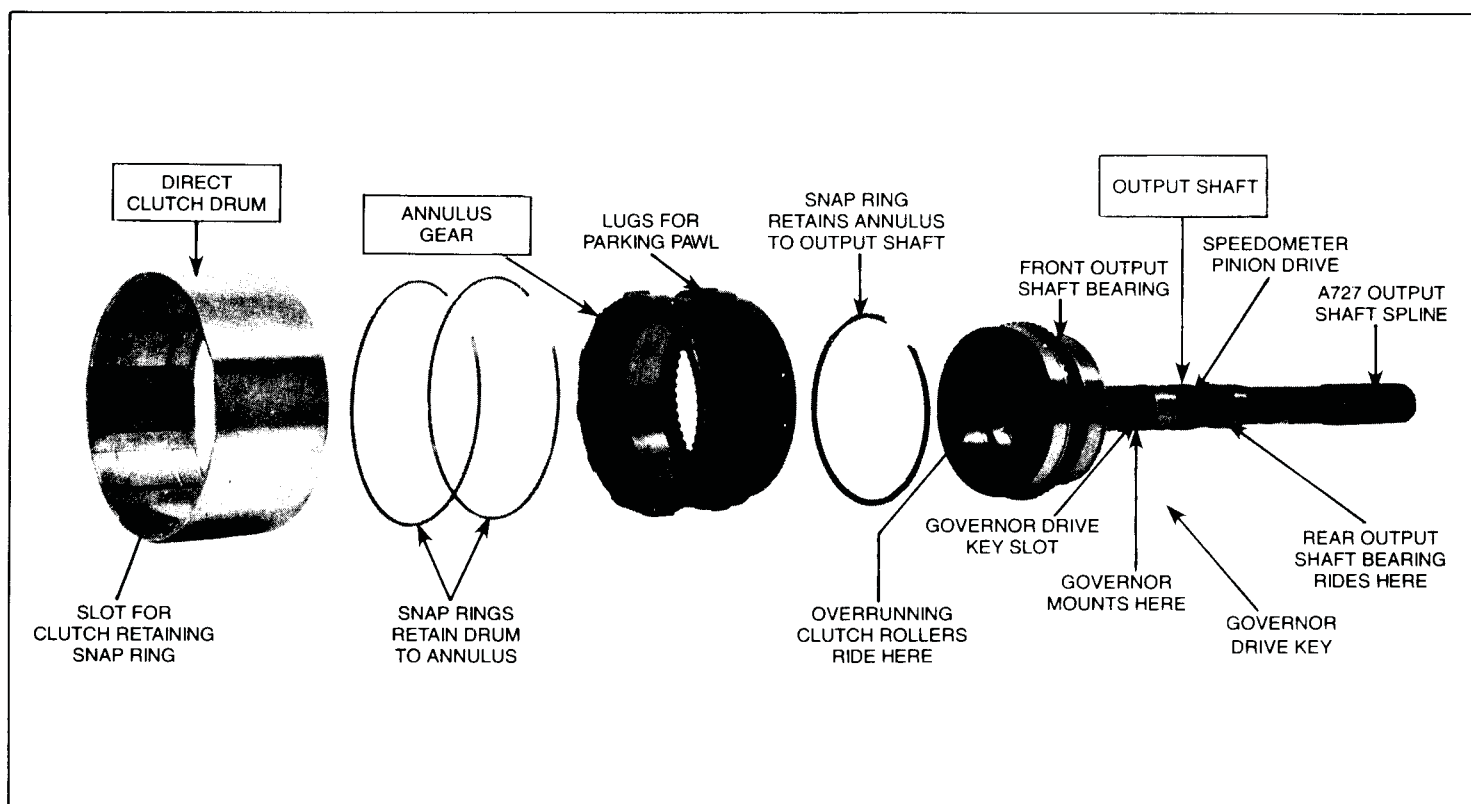


**OVERDRIVE PLANETARY PINION ASSEMBLY:** The planet carrier is splined to the intermediate shaft. The planetary gears utilize A727 pinions and produce an overdrive ratio of .69 to 1.



**OVERDRIVE OVERRUNNING CLUTCH INNER RACE AND ROLLER ASSEMBLY:** The inner race of the overrunning clutch is splined to the intermediate shaft. Around the outside of the inner race rides a double set of rollers for a one-way mechanical clutch. The overrunning clutch is used to allow a smooth shift from direct to overdrive.

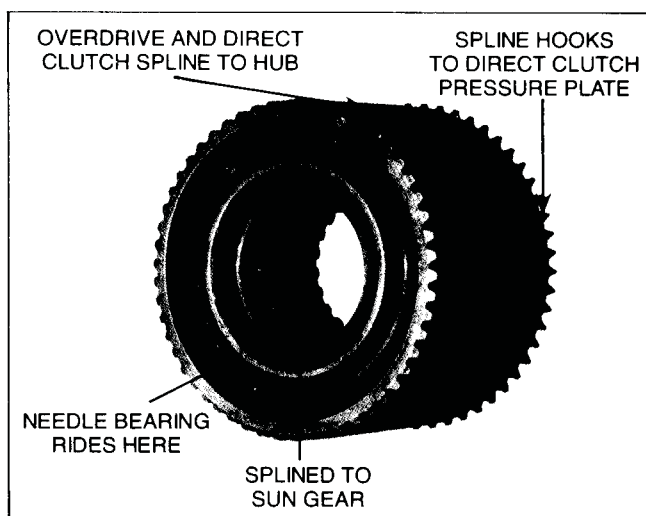
The rollers ride on small ramps on the inner race of the overrunning clutch assembly. When the inner race turns in the counter clockwise direction the rollers climb the ramped surface and lock the inner race to the output shaft. If the inner race turns in the clockwise direction the rollers will roll off the ramp and free-wheel.



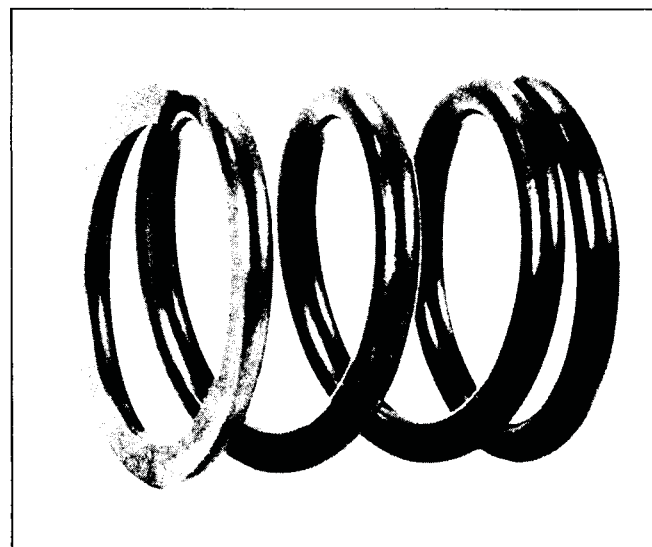
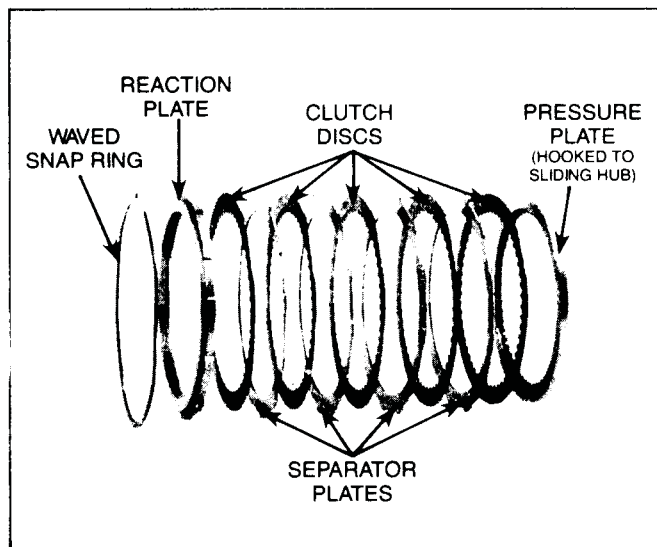
**DIRECT CLUTCH DRUM:** The direct clutch drum is splined to the annulus gear and held in place using two snap rings. The direct clutch plates are splined to the inside of the drum, and held in place with a snap ring.

**OVERDRIVE ANNULUS GEAR:** The annulus gear is an internal gear that will mesh with the gears of the planetary carrier. The annulus is splined to the output shaft and held in place using a snap ring. Lugs around the outside of the annulus are used to lock the output shaft in park.

**OUTPUT SHAFT:** The output shaft rides in two ball bearings. The forward ball bearing will control the output shaft end play and, handle the axial loads from the drive train. The output shaft yoke spline is the same as an A727. The output shaft uses a key to prevent the governor from spinning on the output shaft.

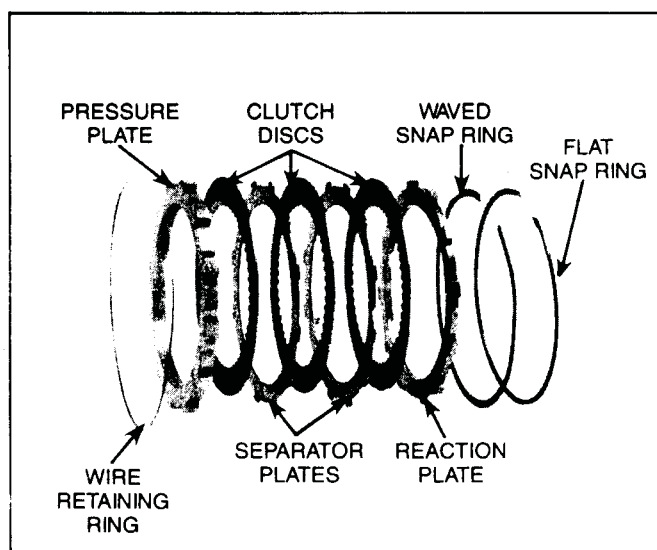


**SLIDING HUB:** This sliding hub is splined to the front of the sun gear, and held in place with a snap ring. The hub is used to apply the direct clutch using spring tension, and it will release the clutch using hydraulic force from the overdrive piston. The direct clutch and, the overdrive clutch are both splined to the hub. When the direct clutch is applied it will turn the hub for direct drive. When the overdrive clutch is applied it will hold the hub from turning, causing overdrive.



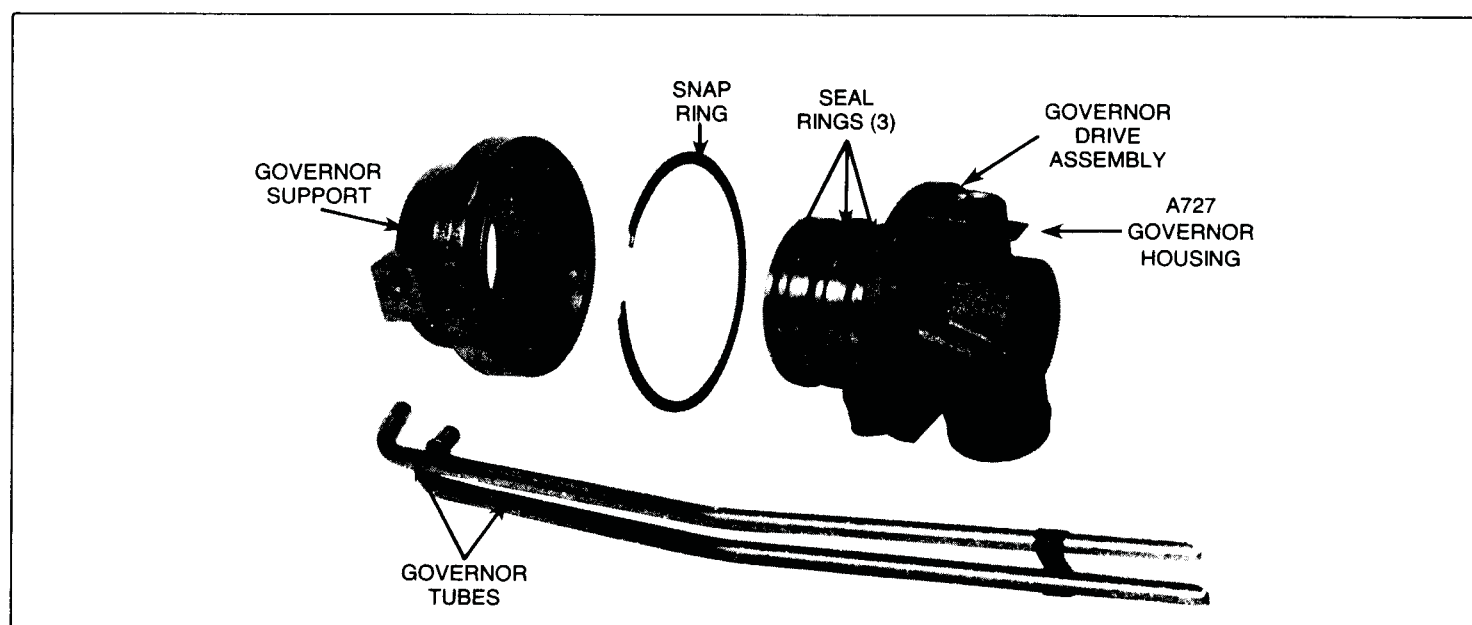
**DIRECT CLUTCH:** The direct clutch pack is splined internally to the sliding hub, and externally to the direct clutch drum. As mentioned earlier, this clutch is applied with spring tension, and released with hydraulic force.

**DIRECT CLUTCH SPRING:** This heavy duty spring is located inside the sliding hub and its primary purpose is to apply the direct clutch through the sliding hub. Caution must be used when compressing this spring while removing or installing it in the gear train assembly. The direct clutch spring has a load of 800 pounds when installed.



**OVERDRIVE CLUTCH:** The overdrive clutch is splined externally to the overdrive case, and internally to the sliding hub. A wire ring retains the overdrive clutch pack in the housing. This clutch is applied with the overdrive piston. When applied, the clutch holds the sliding hub from turning, as mentioned earlier.





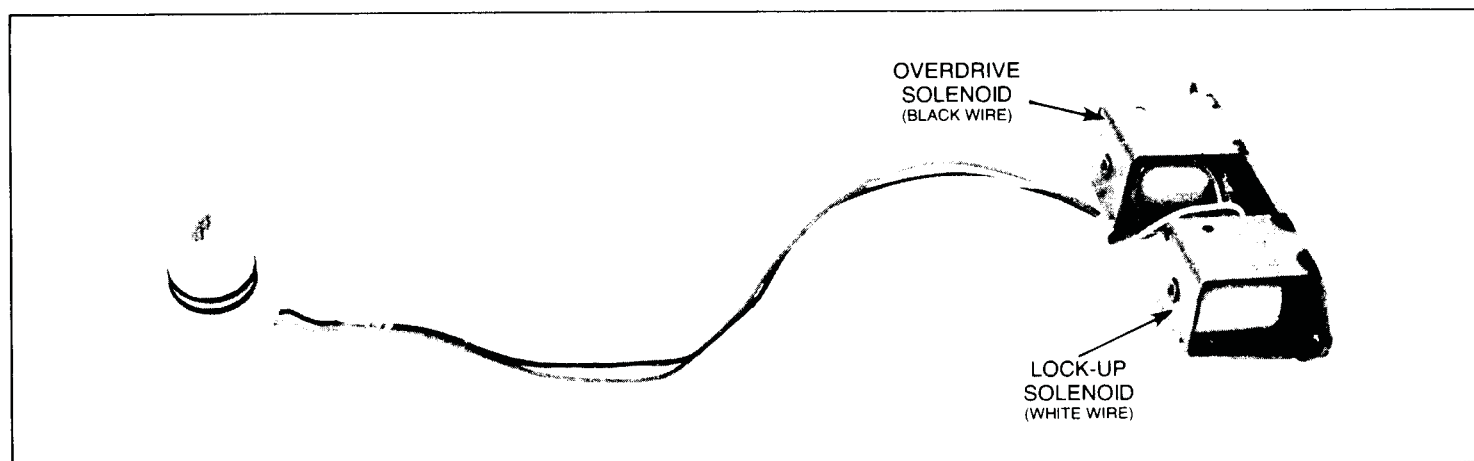
**GOVERNOR DRIVE ASSEMBLY:** The governor is located on the overdrive output shaft, as previously mentioned. The cast aluminum housing, governor valve, and weights are from the A727 transmission. There are now three seal rings on the governor drive.

**GOVERNOR SUPPORT:** The governor support is connected to the transmission case by two slip fit tubes. Line pressure is fed through one tube and, governor pressure is returned through the other tube. The governor support is held in the overdrive housing with a snap ring.

## ELECTRONIC CONTROL COMPONENTS

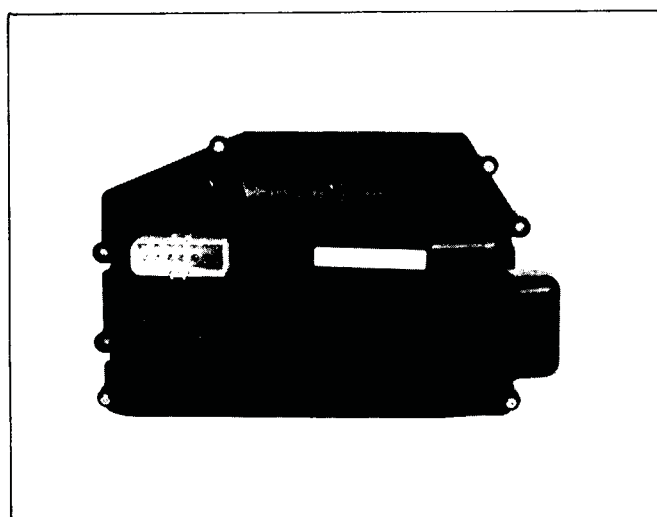
The shifting of the overdrive unit is controlled by the SMEC (engine computer). In this next part all

the electronic components and their operation will be explained.

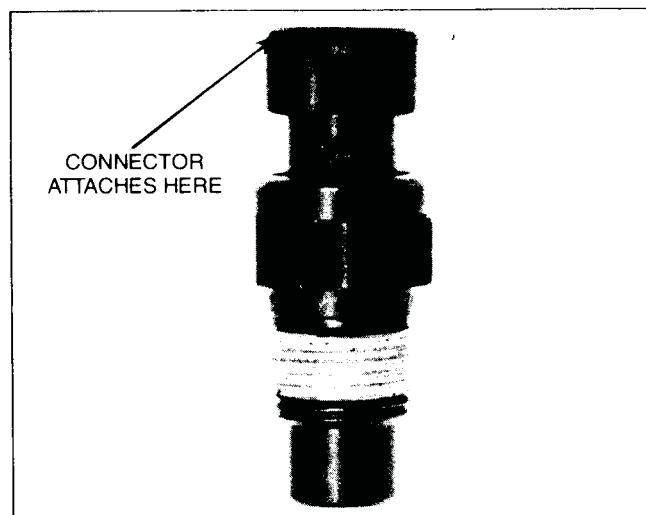


**OVERDRIVE SOLENOID:** The overdrive solenoid is coupled with the torque converter solenoid and mounted to the lower valve body. The two solenoids share a common three pin connector that is mounted so it passes through the case. The overdrive solenoid is designed to control third

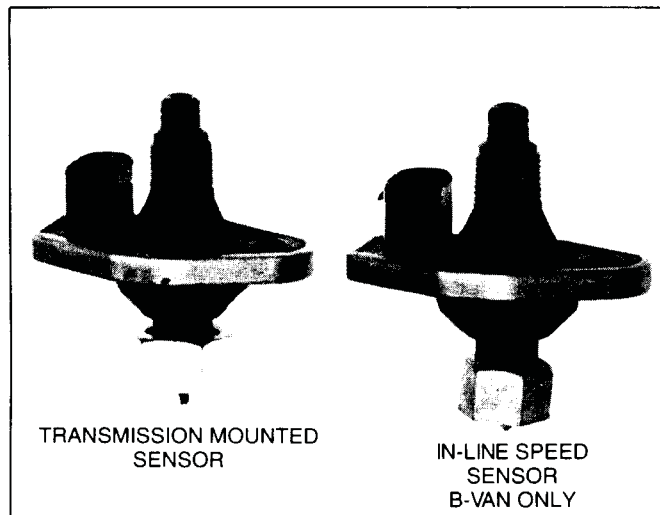
gear line pressure in the overdrive circuit. The solenoid is normally open, when not energized, to vent line pressure at the end of the 3-4 shift valve. After the criteria for overdrive has been met the solenoid is energized closed, causing overdrive to occur.



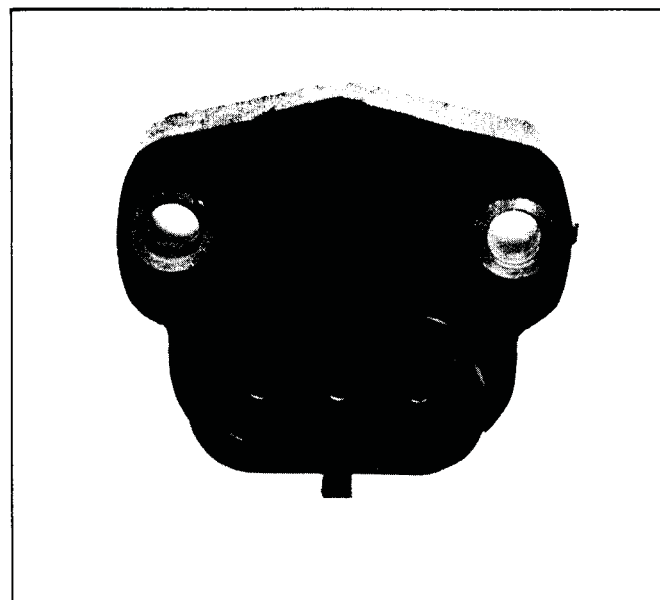
**SMEC (ENGINE CONTROLLER):** The SMEC has the added responsibility of controlling the ground circuit to activate, or deactivate, the overdrive solenoid. The SMEC uses already existing engine and vehicle sensors to determine the proper overdrive up-shift and down-shift points.



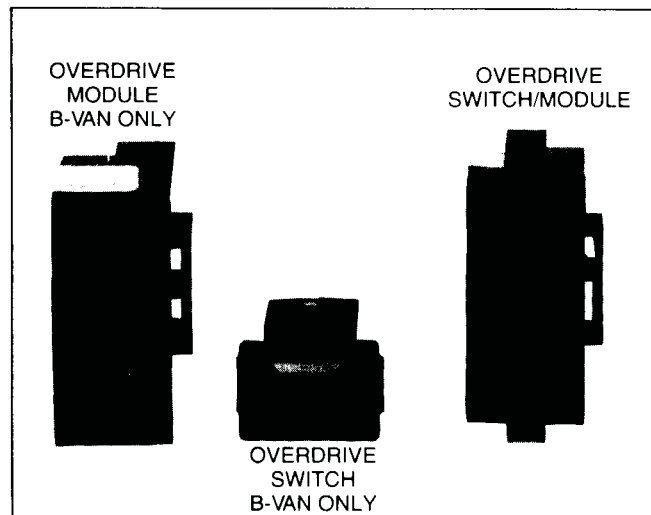
**COOLANT TEMPERATURE SENSOR:** One of the criteria for overdrive is the engine temperature must be at least 65°F. The temperature sensor is located in the intake manifold.



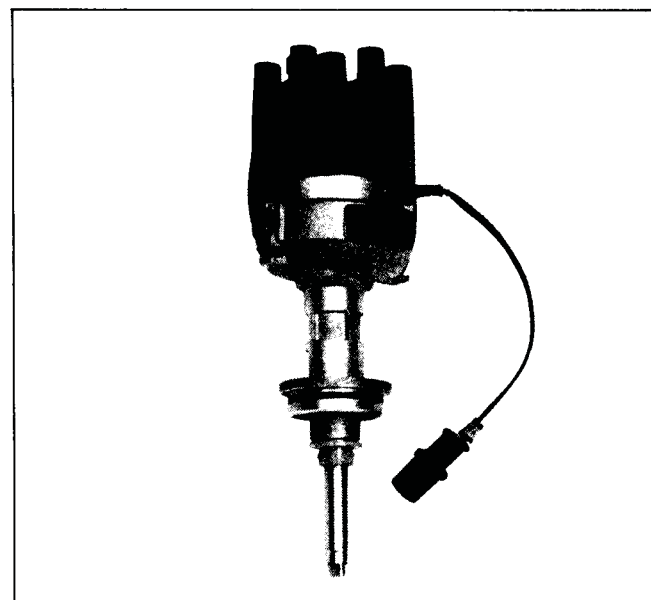
**VEHICLE SPEED/DISTANCE SENSOR:** The vehicle must be traveling a minimum speed of approximately 25 m.p.h. before the transmission can upshift to overdrive. The vehicle speed sensor is located on the speedometer pinion housing, or in the case of our B-van's, in-line.



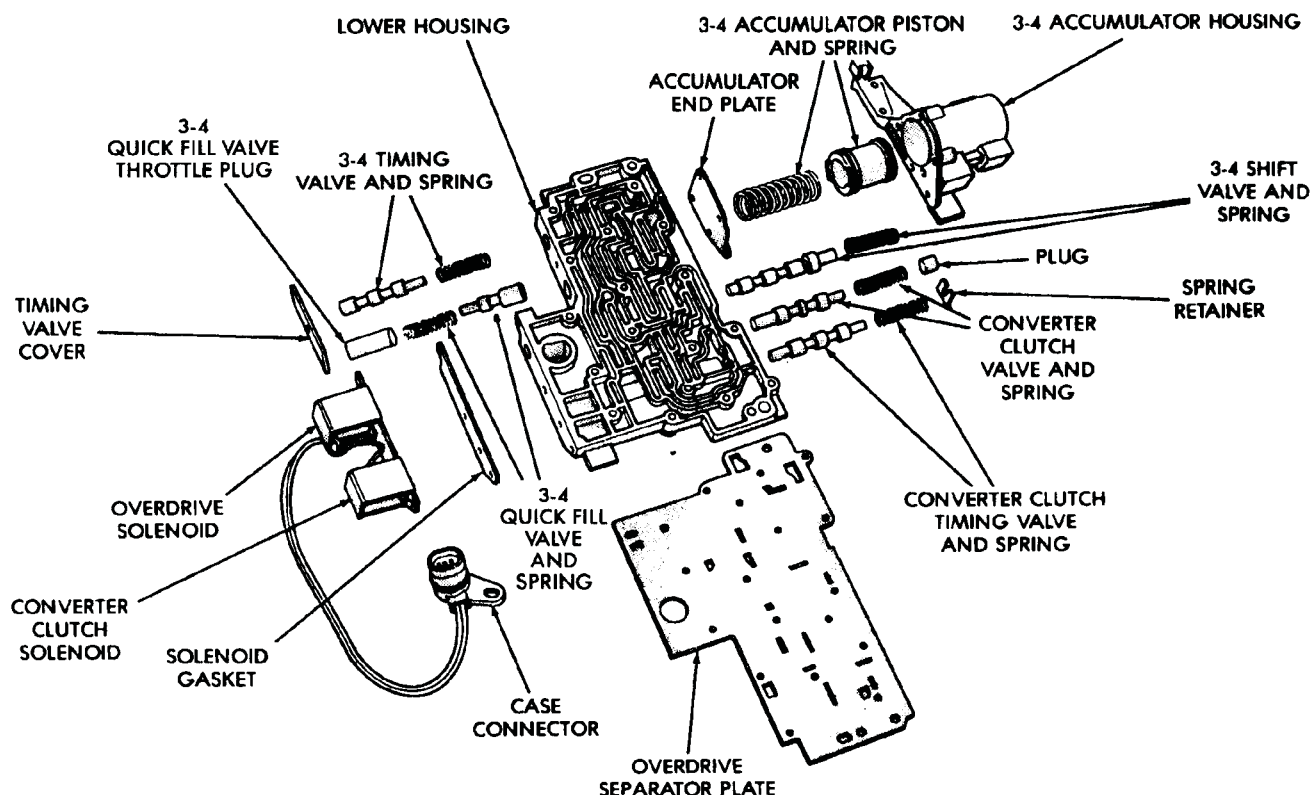
**THROTTLE POSITION SENSOR (TPS):** The input from this sensor is compared against the engine speed to help determine when to engage, and disengage the overdrive. This sensor is located on the throttle body.



**OVERDRIVE SWITCH:** The SMEC electronically looks at the overdrive switch to see if it's on, or off. If the switch is turned on to override the overdrive function, the upshift will not take place. The switch is located on the instrument panel, and has an indicator light to indicate when the overdrive is turned off. The B-van overdrive module is located on the steer column support bracket.



**ENGINE SPEED SIGNAL:** The engine speed signal comes from the distributor pick-up in the distributor. The engine speed signal is compared to the TPS signal to determine engagement and disengagement of the overdrive, as was mentioned earlier. This signal is also compared to the vehicle speed sensor to verify the transmission is in third gear before shifting to overdrive.



## HYDRAULIC CONTROL COMPONENTS

It was necessary to add hydraulic controls to operate the overdrive unit. This was accomplished by using a Lower Valve Body and a separate Accumulator assembly. The lockup body on the top side of the valve body has been eliminated along with its slip fit tube. The lock-up valve was moved to the lower valve housing, and the fail-safe was eliminated. A lock-up timing valve replaces the fail-safe, and is located in the lower housing.

**LOWER VALVE BODY:** The lower valve body houses five valves and, as previously mentioned, is attached to the bottom side of the existing valve body assembly. The valves located in the lower valve body housing are:

**3-4 Shift Valve** - this valve is held in the downshifted position by a spring. When the overdrive solenoid is energized, it closes and allows third gear line pressure to build up on the end of the valve, causing it to upshift.

**3-4 Timing Valve** - this valve prevents a 4-2 downshift from occurring. The 3-4 timing valve

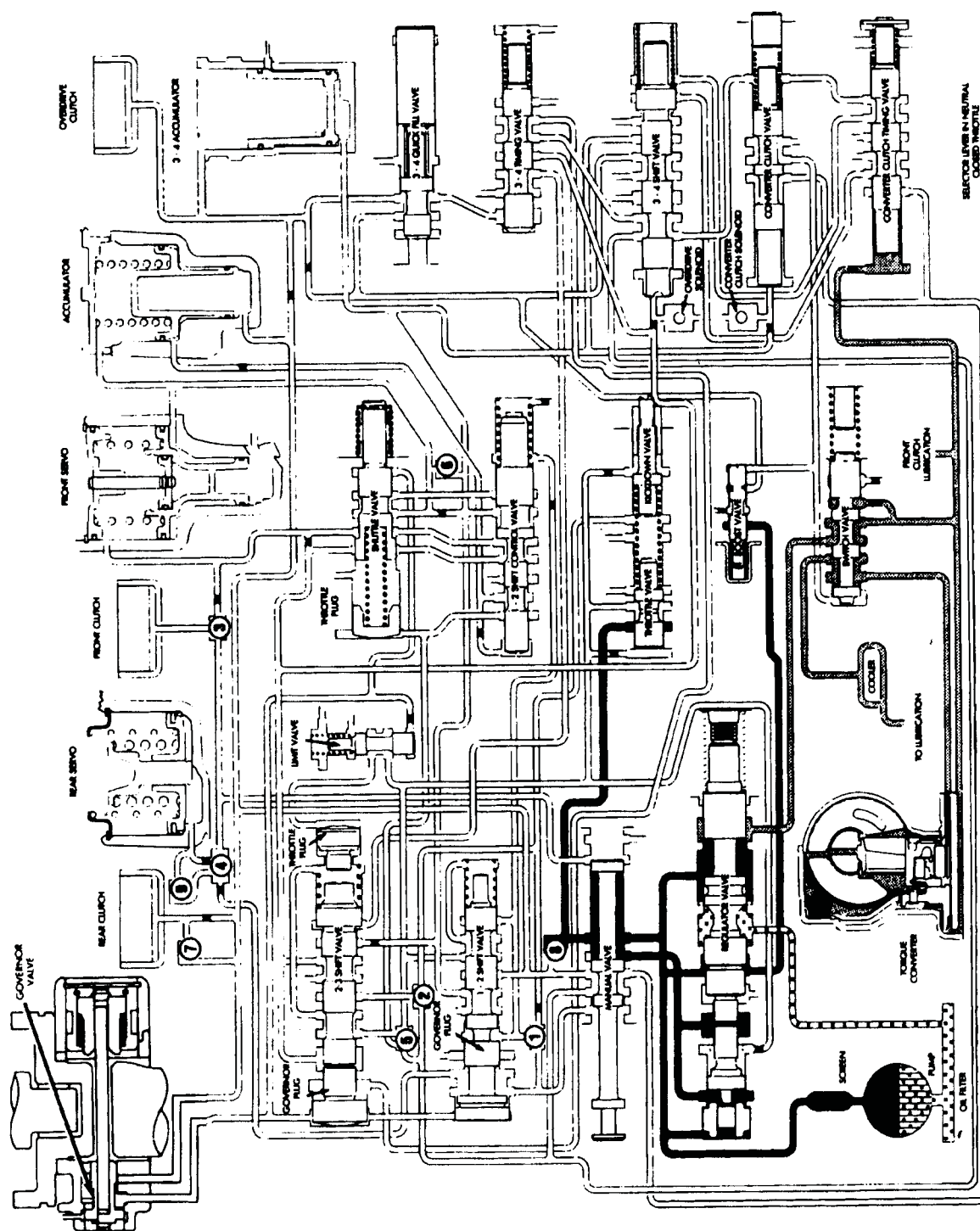
causes any 4-2 downshift to occur sequentially. The 4-3 downshift will be followed by the 3-2 downshift.

**3-4 Shuttle Valve** - this valve operates much like the 2-3 shuttle valve. It controls the overdrive clutch capacity during downshifts and lift-foot upshifts.

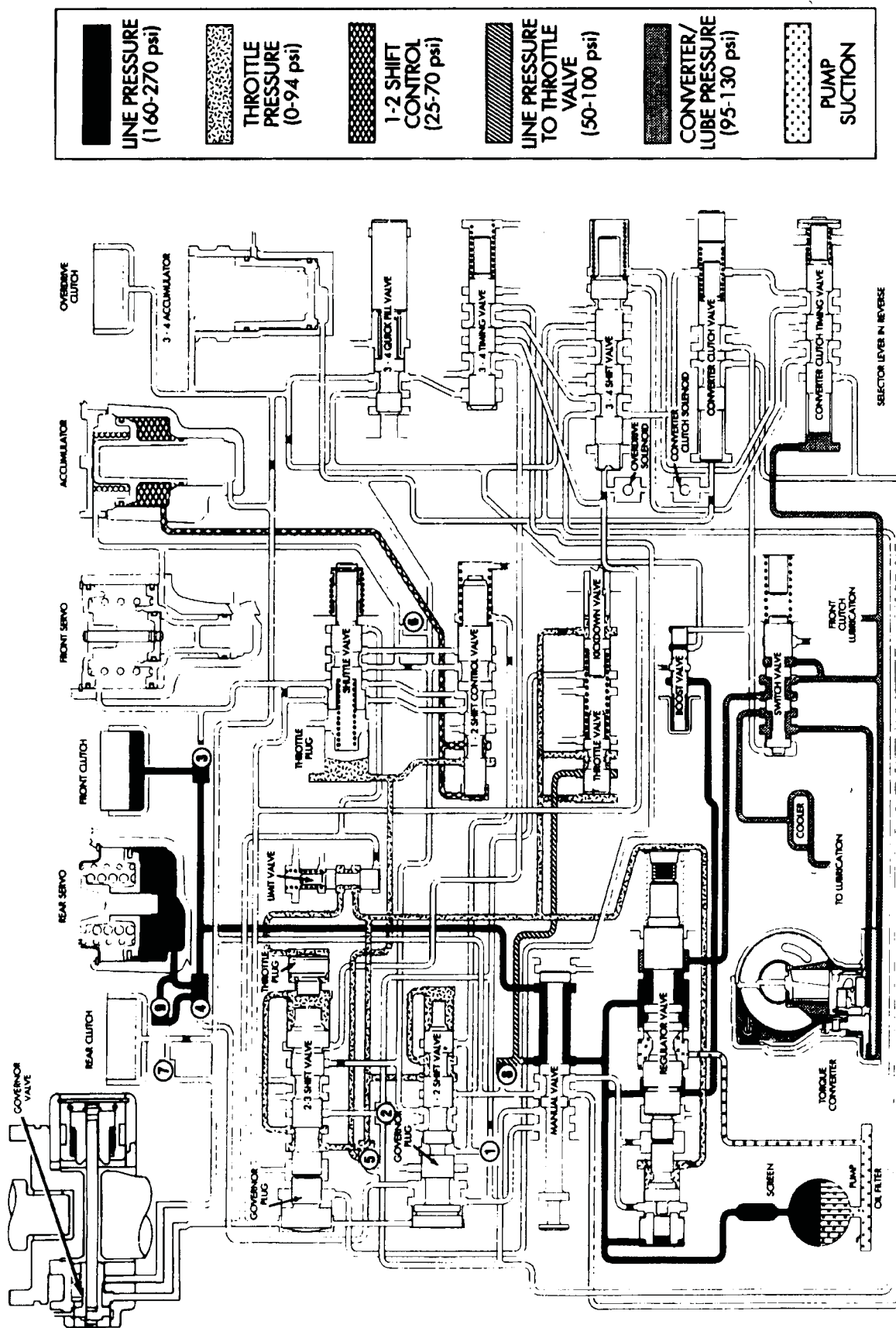
**Lockup Valve** - this valve operates similar to the 3-4 shift valve, a spring holds the valve downshifted until the lock-up solenoid is energized. The lock-up solenoid is supplied with 2nd gear line pressure. The SMEC allows lockup only in overdrive gear.

**Lockup Timing Valve** - this valve insures that the lockup torque converter is disengaged before any 4-3 downshift occurs. This valve does the job the fail-safe use to do.

**3-4 ACCUMULATOR:** The 3-4 accumulator is attached to the side of the lower valve body. The accumulator provides a balance pressure to control application of the overdrive clutch for better shift quality.

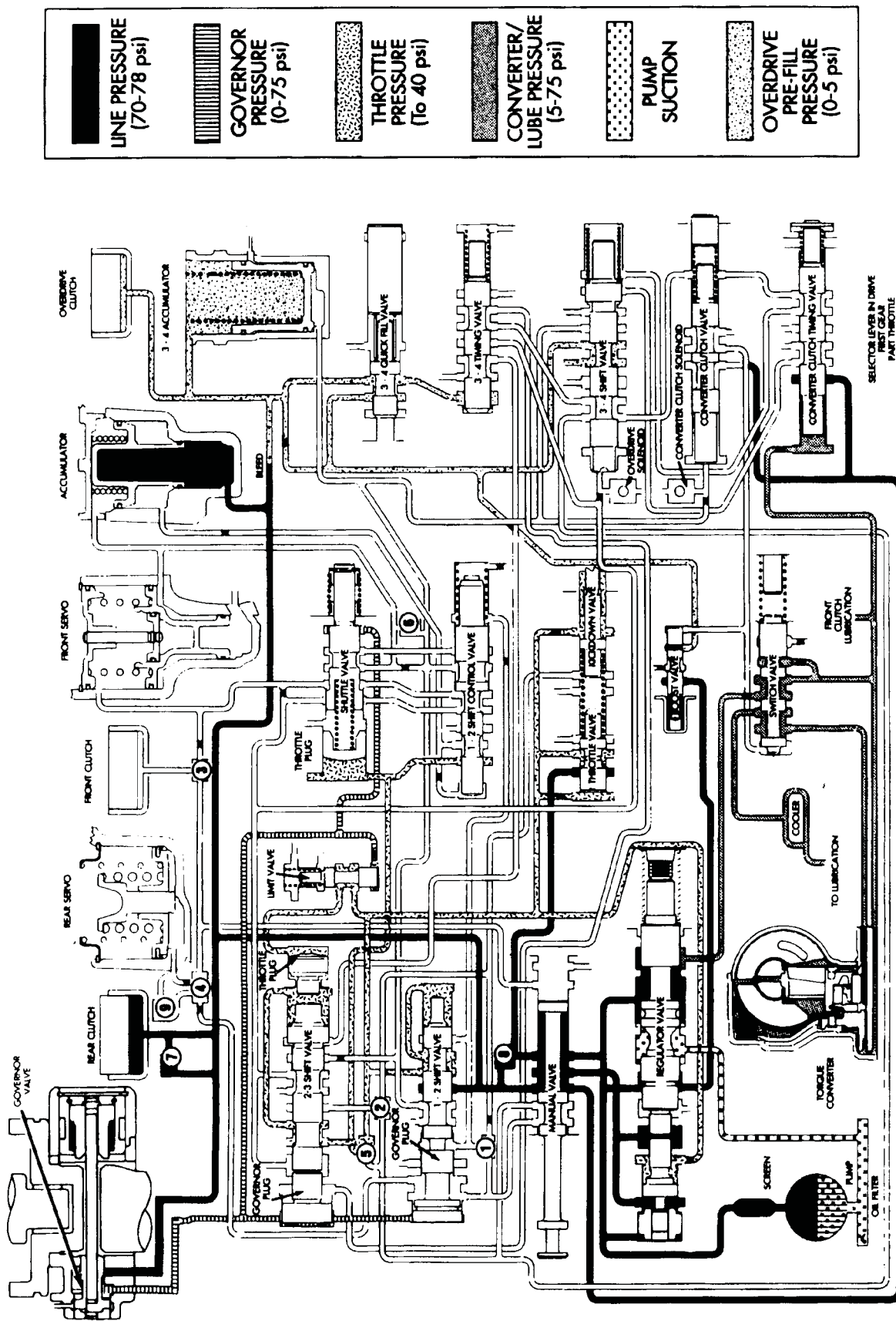


## HYDRAULIC FLOW IN REVERSE (42RH/46RH/47RH)





## HYDRAULIC FLOW IN D FIRST GEAR (42RH/46RH/47RH)





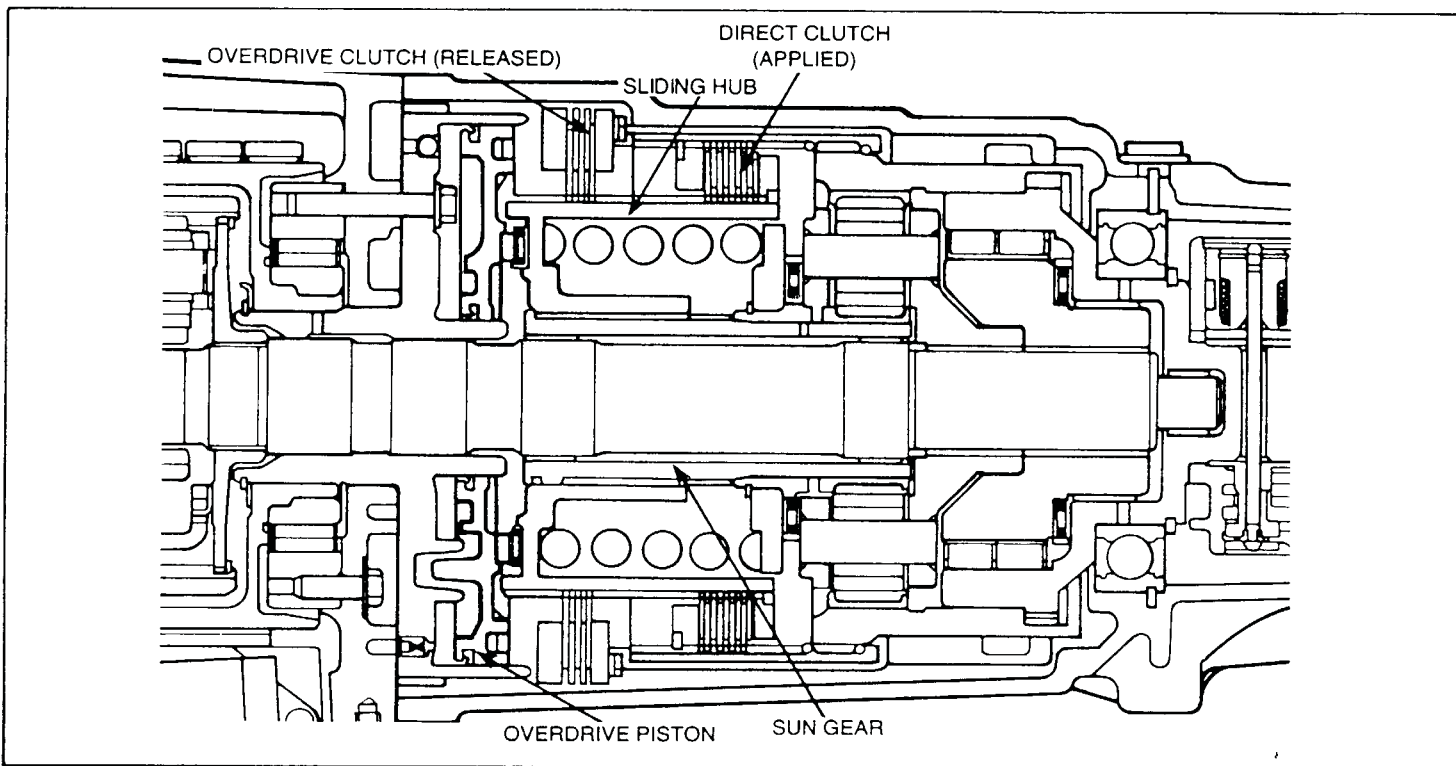




## CLUTCH OPERATION

Two multiple disc clutches and an overrunning clutch is used in the overdrive unit. The multiple disc clutches are the direct clutch, which is spring

applied, and the overdrive clutch which is hydraulically applied. A single piston is used to control both the multiple disc clutches.



**THE DIRECT CLUTCH** is normally applied, even when the vehicle is turned off! This is done using a large spring. Looking at the illustration you will notice the spring is seated on a thrust plate. The spring is constantly pushing forward on the sliding hub, which is splined to the overdrive sun gear. Keep in mind that the hub and sun gear are splined together, so if the hub is turned the sun gear must turn, and, if the hub is held stationary the sun gear is stationary.

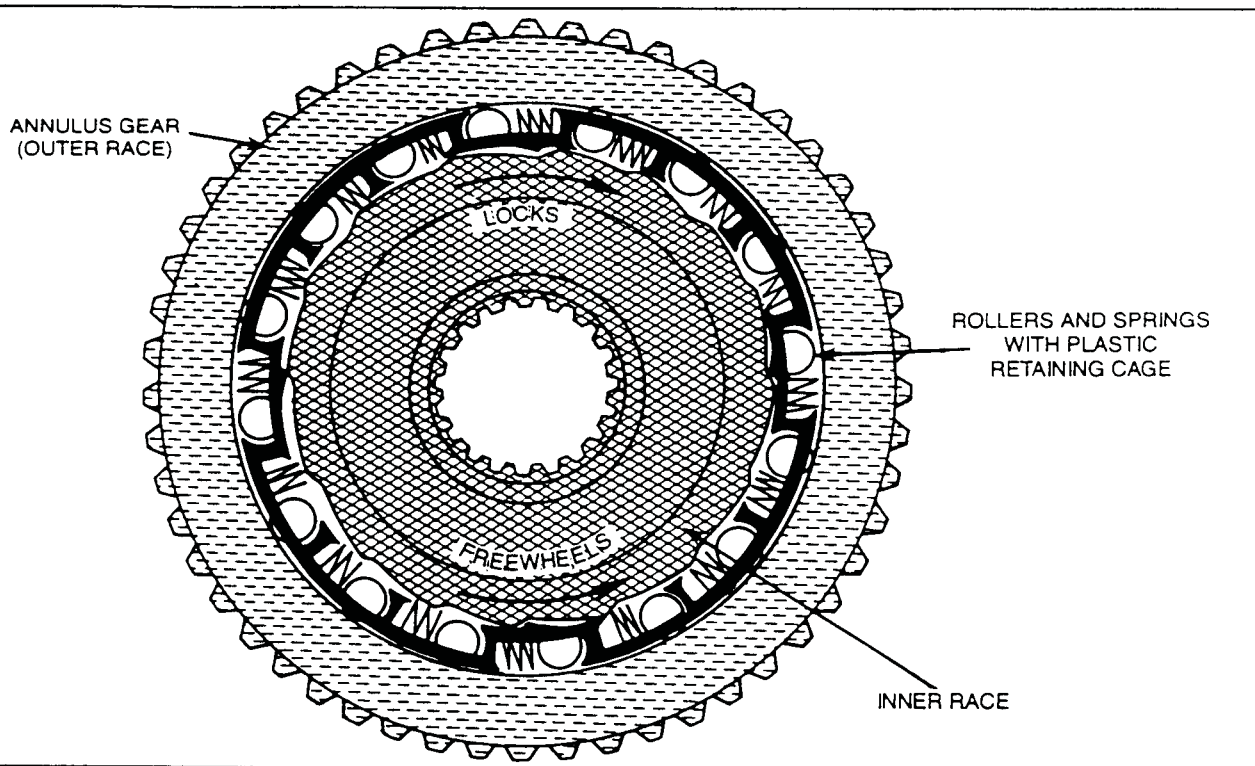
The outside, rear most part of the hub hooks to the rear pressure plate of the direct clutch. The hub will constantly push forward compressing, or applying the clutch. The direct clutch is held in

place with a snap ring on the inside of the direct clutch drum. With this clutch applied, it forces the overdrive sun gear and, the clutch drum, to turn at the same speed causing direct drive.

To release the direct clutch, the pressurized overdrive piston must push against the hub, overcoming the spring tension. When this happens the hub will slide rearward and disengage the direct clutch. With the direct clutch disengaged the overdrive sun gear and the clutch drum are allowed to turn at different speeds.

The direct clutch is used for 1st, 2nd, 3rd, and reverse gears.



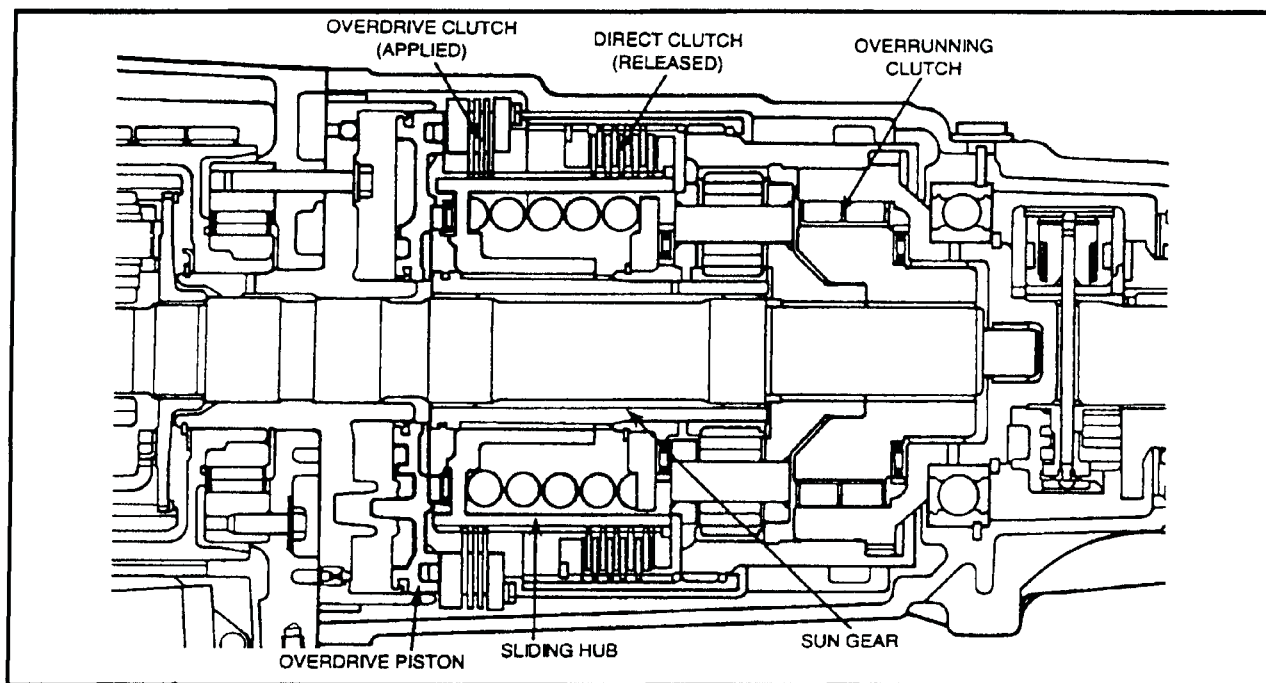


**THE OVERDRIVE OVERRUNNING CLUTCH** acts as a coupler between the intermediate shaft and the output shaft.

There is a short span of time when the direct clutch is released and the overdrive clutch is not yet engaged. This span of time is called underlap. During this underlap time, when neither of the clutches are applied, the engine speed would normally flare-up before the overdrive clutch en-

gaged. To avoid this, the overrunning clutch remains engaged until the overdrive clutch is applied. When the overdrive clutch is applied, the overrunning clutch, automatically, starts to overrun and freewheel. The moment the overdrive clutch disengages during a downshift, the overrunning clutch will instantly engage again. This overrunning clutch is engaged only in 1st, 2nd, and 3rd gears. It will freewheel in overdrive and reverse.





THE OVERDRIVE CLUTCH is normally not applied. The clutch is splined to the overdrive housing and the sliding hub. The purpose of the clutch is to hold the sun gear, through the sliding hub, when it's applied. That's all it does! The only time this clutch is engaged is in overdrive.

The overdrive clutch is applied hydraulically through the overdrive piston. When the apply pressure is released the piston is returned using the spring tension behind the sliding hub.

## CLUTCH AND BAND APPLICATION CHART

SHIFT LEVER POSITION	TRANSMISSION CLUTCHES AND BANDS					OVERDRIVE CLUTCHES		
	FRONT CLUTCH	FRONT BAND	REAR CLUTCH	REAR BAND	OVERRUN. CLUTCH	OVERDRIVE CLUTCH	DIRECT CLUTCH	OVERRUN SPRAG
Reverse	X			X			X	
Drive Range								
First			X		X		X	X
Second		X	X				X	X
Third	X		X				X	X
Fourth	X		X			X		
2-Range (Manual) Second		X	X		X		X	X
1-Range (Manual Low)			X	X	X		X	X

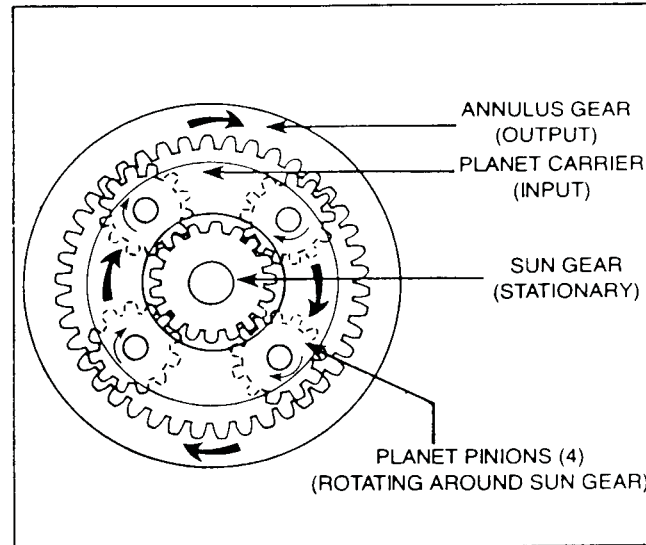
## GEARTRAIN OPERATION

The overdrive geartrain consists of a sun gear, planetary gear set, and an annulus gear. The key to the operation of this geartrain is what is done with the sun gear.

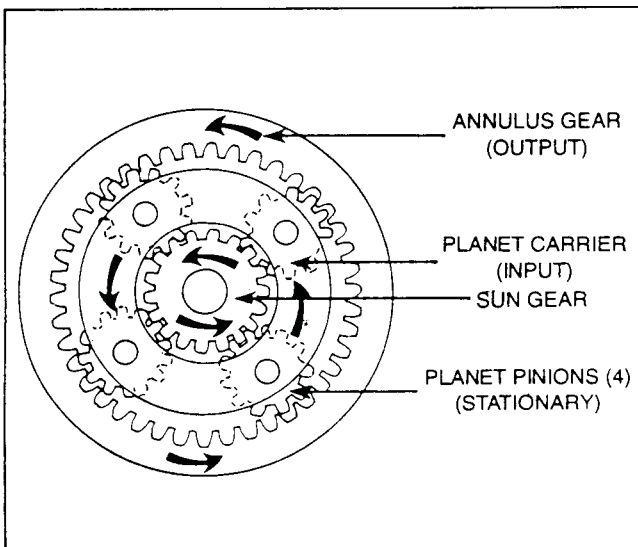
Three things you should keep in mind about the geartrain are;

- 1) The sun gear is splined to the sliding hub and will either be held or turned, depending on which clutch is applied.
- 2) The planetary gear set is splined to the intermediate shaft. All the input power to the overdrive unit will come through the planetary gears.
- 3) The annulus gear is splined to the output shaft. All output power must pass through the annulus gear.

The geartrain is used in two different ways to give direct drive and overdrive ratios.



**OVERDRIVE-** This second condition shows the sun gear being held stationary. The planetary carrier is being turned by the intermediate shaft, causing the planetary pinions to walk around the stationary sun gear. The rotating planet pinions will drive the annulus gear at a faster rate of speed than the input speed. This ratio is .69 to 1, and is referred to as overdrive.

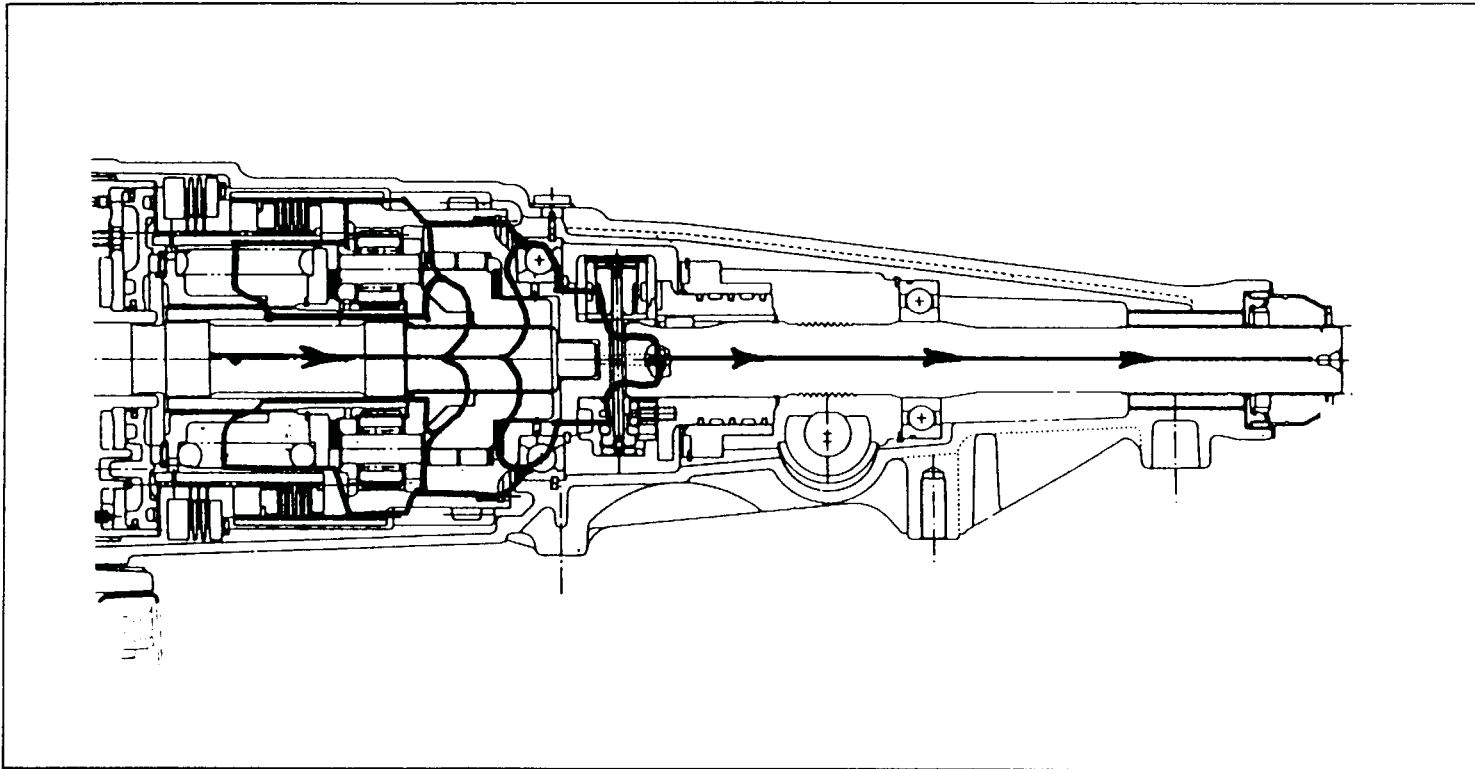


**DIRECT-** This first condition shows the sun gear, planetary gears, and the annulus gears all rotating as one unit. This is accomplished by locking the sun gear and the annulus gear together, through the sliding hub and direct clutch.

## POWER FLOW

There will be three different power flows through the overdrive assembly. Direct power flow is used while in 1st, 2nd, and 3rd gear. Overdrive power

flow is used while in 4th gear, and another direct power flow in reverse. The power flow for reverse is slightly different than the one used in 1st, 2nd, and 3rd.

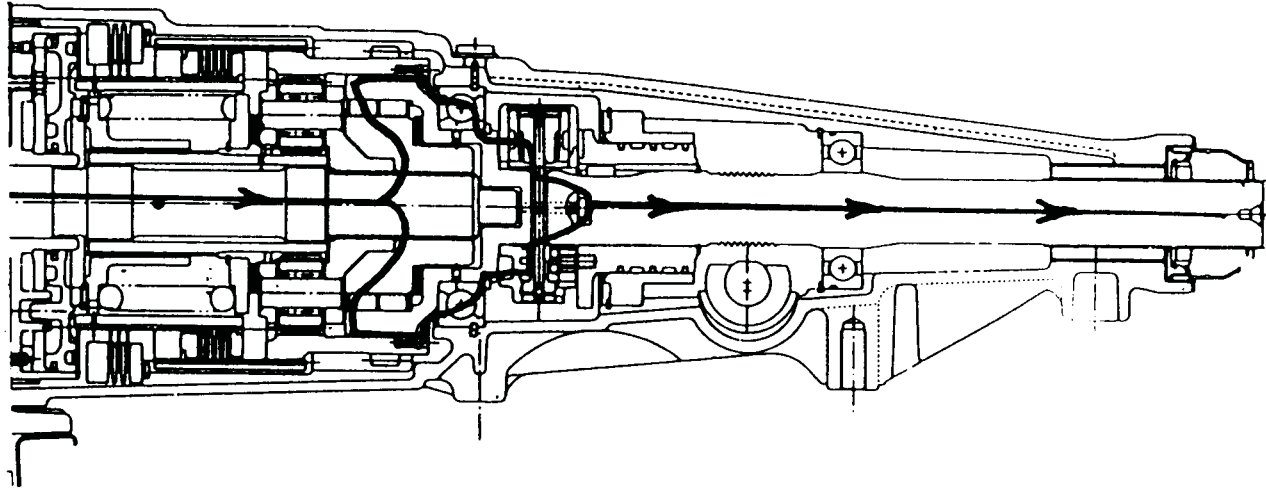


**DIRECT (FORWARD)-** The transmission must be in a forward gear, and the overdrive unit will have the overdrive clutch disengaged. Both the direct clutch and the overdrive overrunning clutch will be engaged.

Input power will come through the intermediate shaft and split, going into the overrunning clutch and the planetary carrier. The power goes through the overrunning clutch inner race, rollers, and directly into the output shaft.

The power flow that goes into the planetary carrier splits again at the pinion. One path goes outward and into the annulus gear which is splined to the output shaft. The other path it takes through the pinion, goes inward into the sun gear, through the hub, and the direct clutch. It will continue into direct clutch drum, the annulus gear, and into the output shaft.

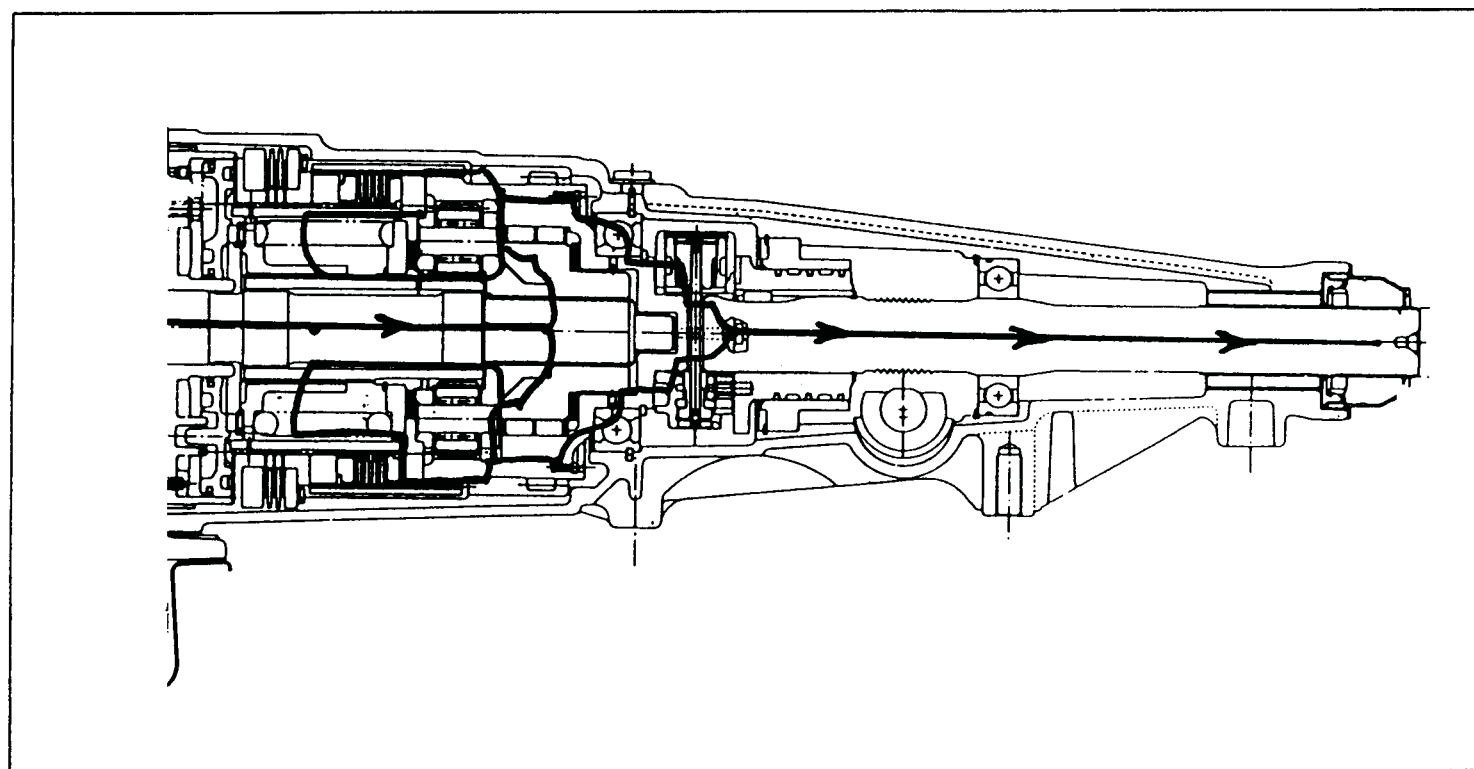
During the 3-4 upshift there is a moment when the direct clutch is released and the overdrive clutch is not yet engaged. The power flow during this brief period goes through the overdrive overrunning clutch.



**OVERDRIVE-** The transmission must be in third gear, and the overdrive unit will have the overdrive clutch engaged. The direct clutch and the overrunning clutch will both be disengaged.

Input power coming through the intermediate shaft will go into the planetary carrier. Because the sun gear is being held by the overdrive clutch, through

the hub, the planetary pinion gears will walk around the sun gear. The planetary pinions will then drive the annulus gear at a faster rate of speed than what the intermediate shaft is turning. The power flow went from the planetary pinions, through the annulus gear, and into the output shaft.



**REVERSE** - The power flow for reverse will be similar to the direct power flow explained earlier. The only difference will be that there is no power flow through the overrunning clutch. The overrunning clutch will freewheel in the reverse direction.

The overdrive clutch is disengaged, while the direct clutch is engaged.

The power coming through the intermediate shaft will go through the planetary carrier and split at the planetary pinion gears. Some of the power will go through the sun gear, the sliding hub, and into the direct clutch. From the direct clutch it will go through the direct clutch drum, the annulus gear, and into the output shaft. The other route the power will take goes through the planetary pinion, the annulus gear, and into the output shaft.



### DIAGNOSTIC TIPS

The following information is intended to be used only as helpful information to help the technician diagnose the A500 overdrive unit. Refer to the Service Manual for detailed diagnostic procedures.

In this section a part will be listed and then what the symptoms of the parts are, when they fail. The list will start with clutches, then gear train components, hydraulic components, and end with electronic components.

**DIRECT CLUTCH:** If the direct clutch failed, the transmission would not have reverse. In drive the overdrive overrunning clutch would engage so forward could be obtained. One problem with this would be that every time the driver let off the gas while the transmission selector was in D2, and upshifted to 2nd, the vehicle would coast freely. The driver would not experience engine braking.

**OVERDRIVE CLUTCH:** When the overdrive clutch fails it will either slip when shifting into fourth gear or it will not go into fourth gear at all. If there is no shift into fourth gear you can verify if the transmission has attempted the shift to fourth by doing the following check. Drive the vehicle under the conditions that should allow the transmission to be in fourth. While driving take your foot off the gas. If the vehicle has no engine braking and coasts freely, the overdrive clutch has failed.

**OVERDRIVE OVERRUNNING CLUTCH:** About the only time a technician will be able to tell if the overrunning clutch is failed is when the transmission shifts from 3rd to 4th, the engine speed will flair. If the overrunning clutch failed so it was always locked, the transmission would lock up and stop the vehicle when it attempted a 3-4 upshift. The transmission would also lock in reverse.

**SLIDING HUB:** A failed sliding hub could act like a Direct Clutch failure. See Direct Clutch.

**OVERDRIVE PISTON SELECTIVE THRUST PLATE:** If the selective thrust plate is too thick it could delay the 3-4 upshift. If the selective thrust plate is too thin it will cause a condition where the

direct clutch is not fully disengaged before the overdrive clutch starts to engage. This condition will actually slow the vehicle down somewhat, during this shift period, and cause premature clutch failure.

**OVERDRIVE SUN GEAR:** The only time the sun gear would make noise, if it was failed, would be in 4th gear overdrive. It's the only time the gears are rotating within each other.

**PLANETARY GEAR SET:** See Overdrive Sun Gear.

**ANNULUS GEAR:** See Overdrive Sun Gear.

**OUTPUT SHAFT BALL BEARINGS:** Both the front and rear ball bearings turn anytime the output shaft turns. If either of the bearings are bad they will get louder with vehicle speed.

**OVERDRIVE NEEDLE BEARINGS:** The three needle bearings in the overdrive unit turn only when the transmission is in 4th gear. If the bearings fail, they will only make noise in 4th.

**OVERDRIVE PISTON AND LIP SEALS:** If the piston or lip seals failed, causing hydraulic pressure loss, it could cause the direct and overdrive clutches to fail. The first place it would show up would be during the shift into 4th gear. Third gear would appear to be operating properly because of the overrunning clutch.

**OVERDRIVE SOLENOID:** If the solenoid fails so it stays open, the transmission will never upshift into 4th gear. If it fails closed, the transmission will upshift from 2nd directly into 4th gear. Check for fault code.

**ENGINE SPEED SIGNAL:** If there is no engine speed signal, the transmission will not shift into 4th gear. Then again the engine will not run without this signal. Check for fault code.

**SPEED/DISTANCE SENSOR:** If the speed/distance signal is lost, the transmission will not shift to 4th gear. Check for fault code.





## Technical Service Information

**COOLANT SENSOR:** If the coolant sensor fails, the SMEC automatically puts in a bogus temperature signal of 100 degrees. Since the SMEC thinks it's seeing 100 degrees engine temperature, the transmission will upshift to 4th gear. If the coolant sensor failed to where it was telling the SMEC the engine temperature was below 65 degrees (the SMEC may not recognize a partial failure) then the upshift to 4th would not take place. Check for fault code.

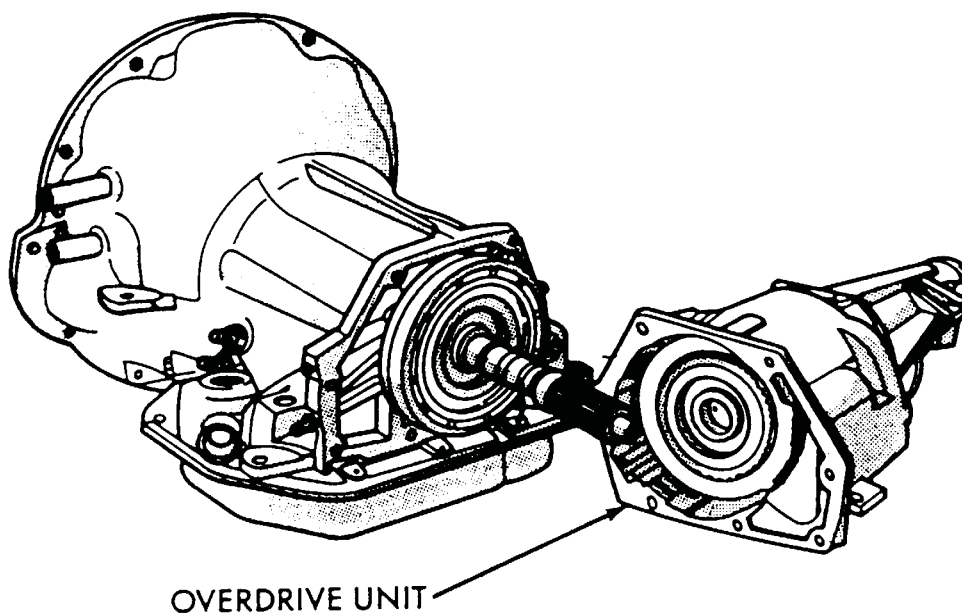
**THROTTLE POSITION SENSOR (TPS):** If the TPS failed, the SMEC would use the signal from the MAP sensor in its place. The overdrive operation would be very erratic because of this. Check for fault code.

**O/D SWITCH/MODULE:** The switch could fail in two different ways. First it could fail so it gives the SMEC the signal to override overdrive and it would not upshift to 4th gear. Secondly it could fail so the transmission would always upshift to 4th gear regardless of the switch position.

**SMEC:** There is the possibility the SMEC could fail and never allow 4th gear to engage. Check for fault codes.

**NOTICE:** Many of the electronic component failures will store a fault code in the SMEC and can be observed with the use of a DRB II. Use the POWERTRAIN DIAGNOSTIC TEST PROCEDURES BOOK to properly diagnose the electronic operation of the A500 transmission.

## A-500 4-SPEED OVERDRIVE AUTOMATIC TRANSMISSION



**Fig. 1—A-500-4-Speed Overdrive Transmission**

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).

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.

## AUTOMATIC TRANSMISSION SERVICE GROUP



## Technical Service Information

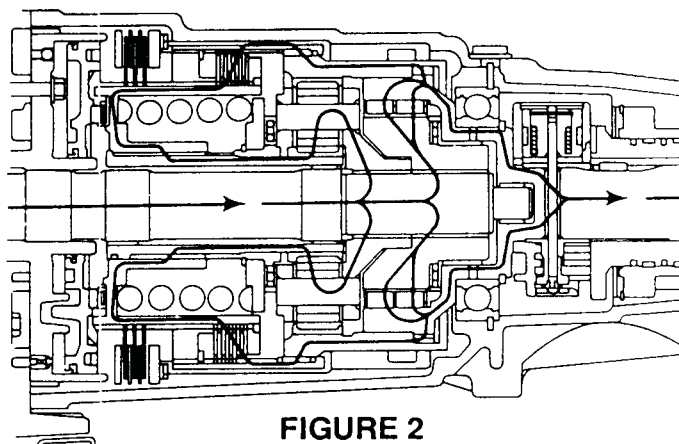
There is an overdrive off switch located on the instrument panel. The switch is marked O/D OFF and incorporates a pilot light to indicate when the switch has been activated. When activated, the switch will prevent shifts into overdrive and lockup. This is desirable when towing, driving in hilly terrain, 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.

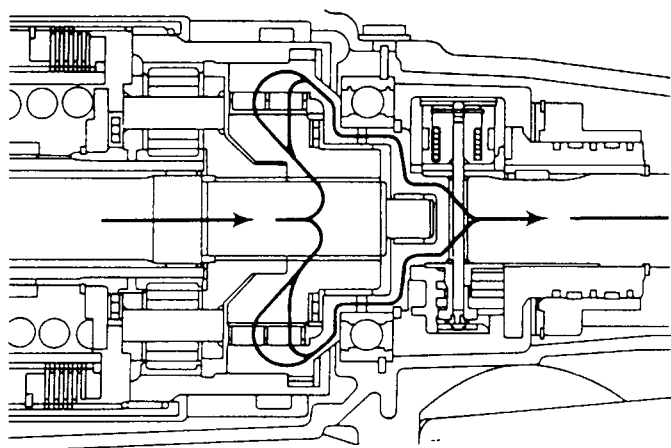
### A500 Power Flow

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).

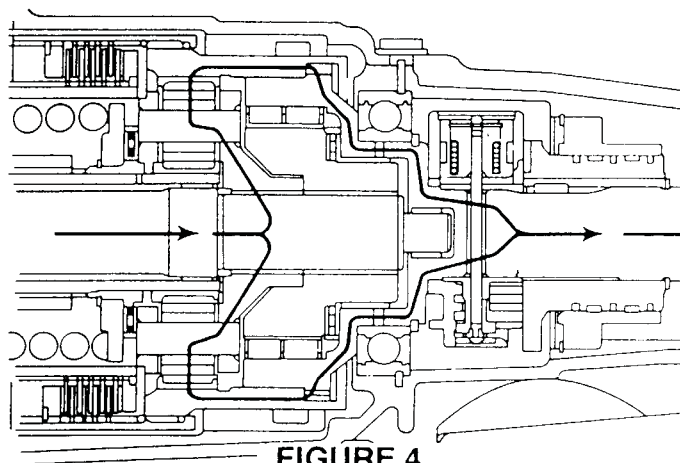


**FIGURE 2**

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**

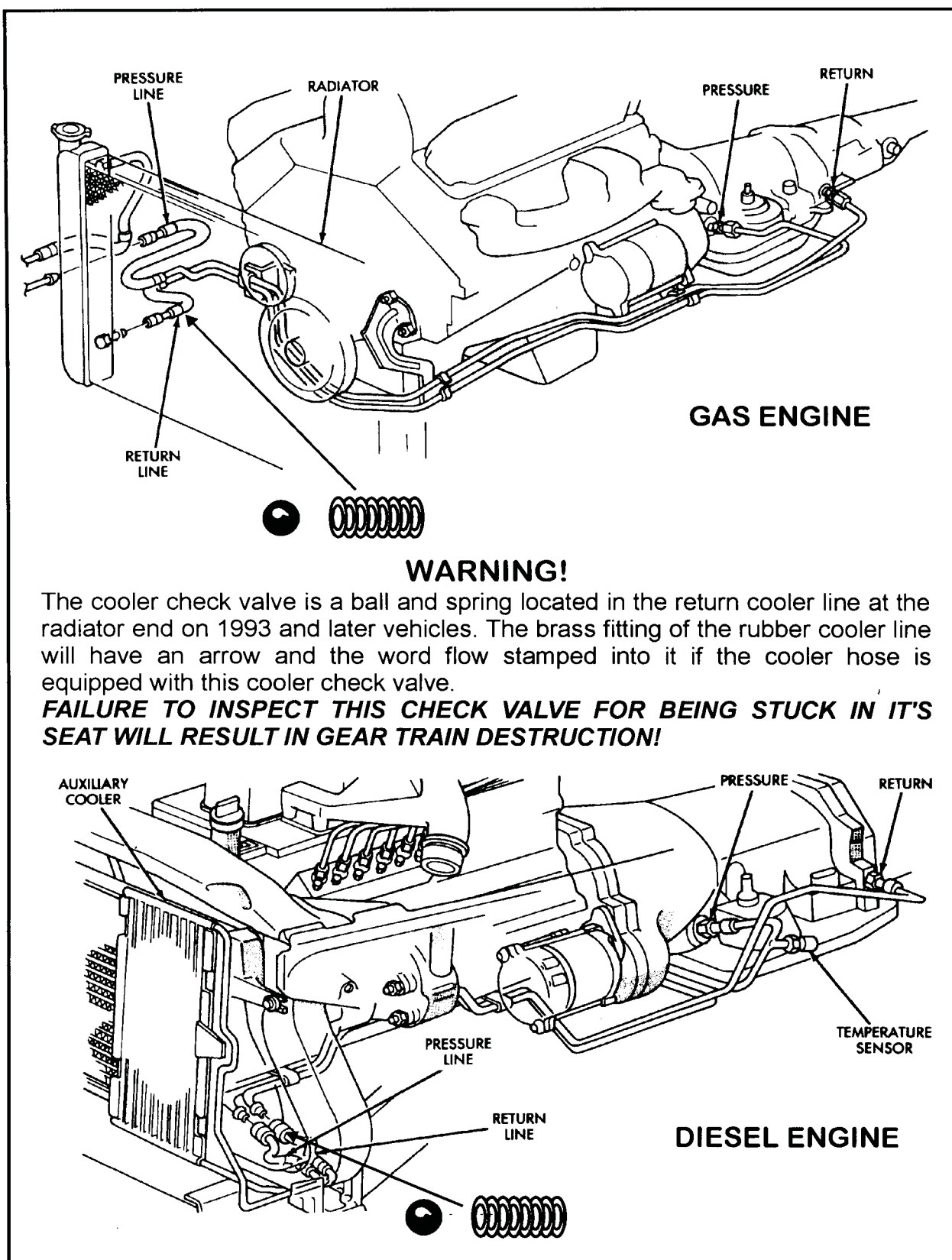


**FIGURE 4**

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.

## COOLING SYSTEM



### WARNING!

The cooler check valve is a ball and spring located in the return cooler line at the radiator end on 1993 and later vehicles. The brass fitting of the rubber cooler line will have an arrow and the word flow stamped into it if the cooler hose is equipped with this cooler check valve.

**FAILURE TO INSPECT THIS CHECK VALVE FOR BEING STUCK IN IT'S SEAT WILL RESULT IN GEAR TRAIN DESTRUCTION!**



## Technical Service Information

### OVERDRIVE DIAGNOSIS

#### Condition

#### Possible Cause

- |  |  |
|--|--|
| ● No Reverse or Slips in "R".                        | ● Failed Direct Clutch <ul style="list-style-type: none"><li>- Overdrive Spring Lost Load</li><li>- Wrong Overdrive Piston Bearing Spacer Selected</li></ul> |
| ● No Overdrive Shift                                 | ● Blown Fuse   |
|  | ● Faulty Overdrive Solenoid  |
|  | ● Faulty Wiring or Connectors  |
|  | ● Faulty Overdrive Off Switch  |
|  | ● Faulty SMEC  |
|  | ● Failed Overdrive Clutch <ul style="list-style-type: none"><li>- Wrong Overdrive Piston Bearing Spacer Selected</li><li>- Low Overdrive Pressure</li></ul>  |
|  | ● 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 <ul style="list-style-type: none"><li>- Bent</li><li>- Loose Fit</li></ul>  |
|  | ● Governor Seal Rings Broken or Worn   |

AUTOMATIC TRANSMISSION SERVICE GROUP





## Technical Service Information

### OVERDRIVE DIAGNOSIS - CONT'D.

#### Condition

- Noisy

#### Possible Cause

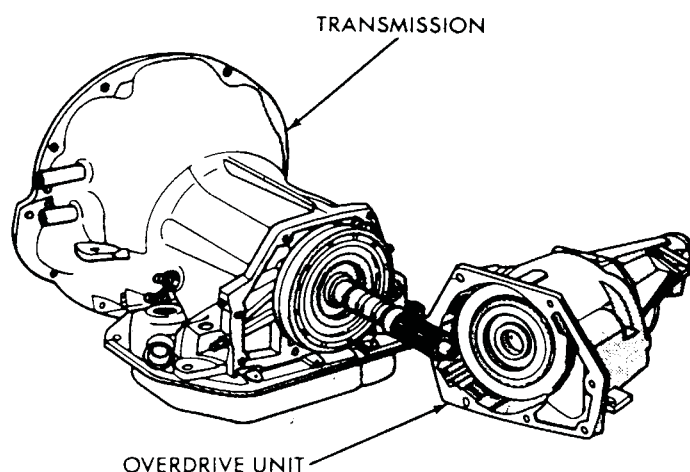
- Failed Overdrive Piston Bearing
- Failed Gear Train Needle Thrust Bearings
- Failed Overdrive Planetary
- Failed Overdrive Overrunning Clutch



## A-500 4-SPEED OVERDRIVE AUTOMATIC TRANSMISSION

### GENERAL INFORMATION

The front portion of the A-500 4-speed overdrive automatic transmission is a modified A-998 three-speed LoadFlite automatic transmission. The rear unit, or overdrive unit, replaces the extension housing and provides an overdrive gear with a gear ratio of .69 to 1 (Fig. 1).



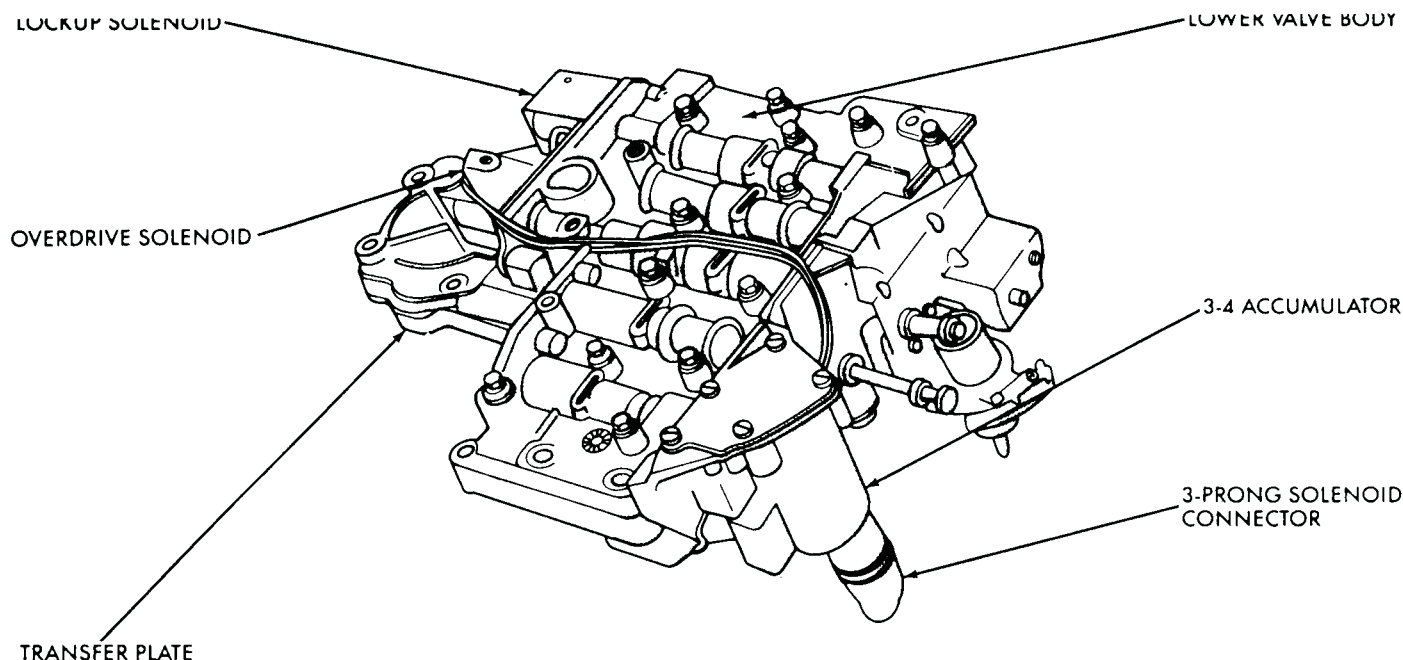
**Fig. 1—A-500-4-Speed Overdrive Transmission**

The first three gear ratios of the A-500 give the same gear ratios and torque capacity that was offered in the three-speed LoadFlite transmission. The addition of the fourth gear overdrive to the LoadFlite gives the added features of increased fuel economy, prolonged engine life and, less engine noise at cruising speed.

The overdrive unit is designed to withstand up to 400 foot-pounds of torque. Because of the high loads and the long periods of time that can be spent in overdrive, all the thrust bearings are needle bearings. The overdrive has added approximately 50 pounds of weight and 6 1/2 inches of length to the A-999 transmission.

Fourth gear (overdrive) is electronically controlled and hydraulically activated. A variety of sensor inputs are fed to the SMEC (single module engine controller) which controls a solenoid mounted on the valve body. The solenoid will energize and close a vent, allowing a 3-4 upshift. The SMEC also controls the operation of the lockup torque converter using many of the same sensor inputs.

A lockup torque converter, which is electronically controlled and hydraulically activated, will also be used with this transmission. Fourth gear



**Fig. 2—A-500 Valve Body**

(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.

The steering column shift selector remains at 6 positions. Overdrive will be engaged automatically in Drive. A separate Overdrive OFF switch will be located on the instrument panel. This switch will override the SMEC and shift out of overdrive and prevent further shifts into overdrive. If the Overdrive OFF switch is activated again the automatic operation is restored. The switch has an indicator light when the overdrive is turned off. The switch also resets on key-off so that the automatic overdrive feature is restored.

The use of fault codes helps to diagnose the electronic components used to operate the overdrive and lockup torque converter.

Other features in conjunction with this unit include:

- (1) The output shaft of the three-speed section is now the intermediate shaft.
- (2) The three-speed section rear drum is retained on the support with a snap ring.
- (3) The governor and speedometer drive have been relocated to the rear of the output shaft.
- (4) The overdrive case now contains two output shaft bearings.
- (5) There are no rotating seal rings or pressur-

ized 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.

(6) Governor pressure and overdrive pressure taps are provided in the rear of the transmission case for in-vehicle transmission pressure testing.

(7) The valve body is 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 (overdrive) gear, the lockup solenoid, lockup valve, and lockup timing valve accomplish the hydraulics to lock the converter turbine to the torque converter housing.

(8) 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.

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

(10) All closed throttle 3-4 upshifts will occur at 25-28 mph, regardless of axle ratio.

(11) All closed throttle 4-3 downshifts will occur at 25 mph, regardless of axle ratio.

(12) No 3-4 upshift can be achieved, regardless of vehicle speed, if throttle opening is greater than 70% approximately.



## DIAGNOSIS

### Condition

- (1) No reverse or slips in reverse.
- (2) No overdrive shift.
- (3) Runaway overdrive shift.
- (4) Overdrive shift occurs immediately after 2-3 shift.
- (5) Excessively delayed overdrive shift.
- (6) No 4-3 downshift.
- (7) No 4-3 downshift with overdrive off switch.
- (8) Torque converter locks up in 2nd and 3rd gears.
- (9) Harsh shifts 1-2, 2-3, & 3-2.
- (10) Low governor pressure.
- (11) Noisy.

### Possible Cause

- (1) Failed direct clutch
  - (a) Overdrive spring lost load.
  - (b) Wrong overdrive piston bearing spacer selected.
- (2) Blown fuse
  - (a) Faulty overdrive solenoid.
  - (b) Faulty wiring or connectors.
  - (c) Faulty overdrive off switch.
  - (d) Faulty SMEC.
  - (e) Failed Overdrive Clutch.
    - Wrong overdrive piston bearing spacer selected.
    - Low overdrive pressure.
  - (f) Lower valve body malfunction.
- (3) Failed overdrive overrunning clutch.
- (4) Faulty overdrive solenoid - not venting.
  - (a) Lower valve body malfunction.
  - (b) Faulty wiring.
  - (c) Faulty SMEC.
- (5) Incorrect overdrive piston bearing spacer.
  - (a) Faulty sensor.
- (6) Faulty lockup solenoid - not venting.
  - (a) Lower valve body malfunction.
  - (b) Faulty wiring.
  - (c) Faulty SMEC.
- (7) Faulty overdrive off switch.
  - (a) Faulty SMEC.
  - (b) Faulty lockup solenoid - not venting.
  - (c) Faulty wiring.
- (8) Faulty lockup solenoid - not venting.
- (9) Faulty lockup solenoid - not venting.
- (10) Leaking governor tubes:
  - (a) Bent.
  - (b) Loose fit.
  - (c) Governor seal rings broken or worn.
- (11) Failed overdrive piston bearing.
  - (a) Failed gear train needle thrust bearings.
  - (b) Failed overdrive planetary.
  - (c) Failed overdrive overrunning clutch.

## TEARDOWN & ASSEMBLY

### FRONT SECTION

#### TRANSMISSION AND CONVERTER REMOVAL

**Remove Transfer Case (if so equipped). Refer to "Transfer Case Removal" for procedure.**

(1) The transmission and torque converter must be removed as an assembly; otherwise, the torque converter drive plate, pump bushing, or oil seal may be damaged. The drive plate will not support a load; therefore, none of the weight of the transmission should be allowed to rest on the plate during removal.

(2) Disconnect negative (ground) cable from the battery for safety.

(3) Some models require that the exhaust system be dropped for clearance, (see Group 11).

(4) Remove engine to transmission struts, if so equipped.

(5) Remove cooler lines at Transmission.

(6) Remove starter motor and cooler line bracket.

(7) Remove torque converter access cover.

(8) Loosen oil pan bolts, tap the pan to break it loose allowing fluid to drain.

(9) Reinstall pan.

(10) Mark torque converter and drive plate to aid in reassembly. The crankshaft flange bolt circle, inner and outer circle of holes in the drive plate, and the four tapped holes in front face of the torque converter all have one hole offset so these parts will be installed in the original position. This maintains balance of the engine and torque converter.

(11) Rotate engine clockwise with socket wrench on vibration dampener bolt to position the bolts attaching torque converter to drive plate, and remove bolts.

(12) Mark parts for reassembly then disconnect propeller shaft at rear universal joint. Carefully pull shaft assembly out of the extension housing.

(13) Disconnect wire connector from the back-up lamp and neutral starting switch and lockup solenoid wiring connector.

(14) Disconnect gearshift rod and torque shaft assembly from transmission.

**When it is necessary to disassemble linkage rods from levers that use plastic grommets as retainers, the grommets should be replaced with new ones.** Use a prying tool to force rod from grommet in lever, then cut away old grommet. Use pliers to snap new grommet into lever and rod into grommet.

(15) Disconnect throttle rod from lever at the left side of transmission. Remove linkage bellcrank from transmission, if so equipped.

(16) Remove oil filler tube and speedometer cable.

(17) Install engine support fixture, Tool C-3487-A with frame hooks or a suitable substitute, that will support rear of the engine (Fig. 1).

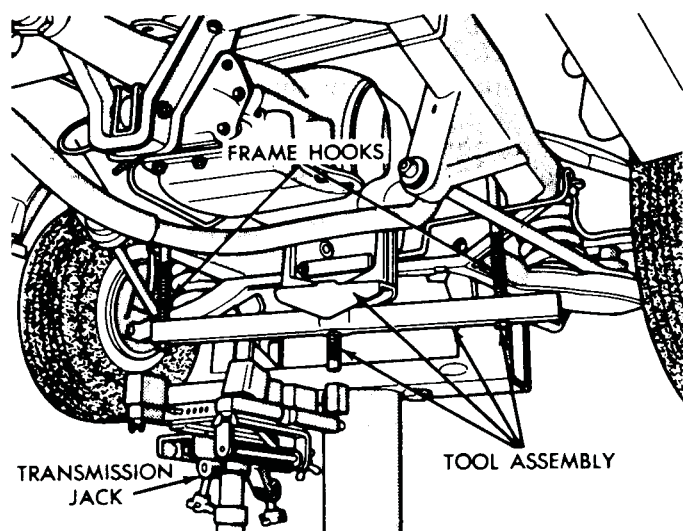
(18) Raise transmission slightly with service jack to relieve load on the supports.

(19) Remove bolts securing transmission mount to crossmember and crossmember to frame, then remove crossmember.

(20) Remove all bell housing bolts.

(21) Carefully work transmission and torque converter assembly rearward off engine block dowels and disengage torque converter hub from end of crankshaft. **Attach a small C-clamp to edge of bell housing to hold torque converter in place during transmission removal.**

(22) Lower transmission and remove assembly from under the vehicle.



**Fig. 1—Engine Support Fixture (Typical)**

(23) To remove torque converter assembly; remove C-clamp from edge of bell housing, then carefully slide assembly out of the transmission.

## OIL COOLER AND TUBES FLUSHING (See "Diagnosis and Tests")

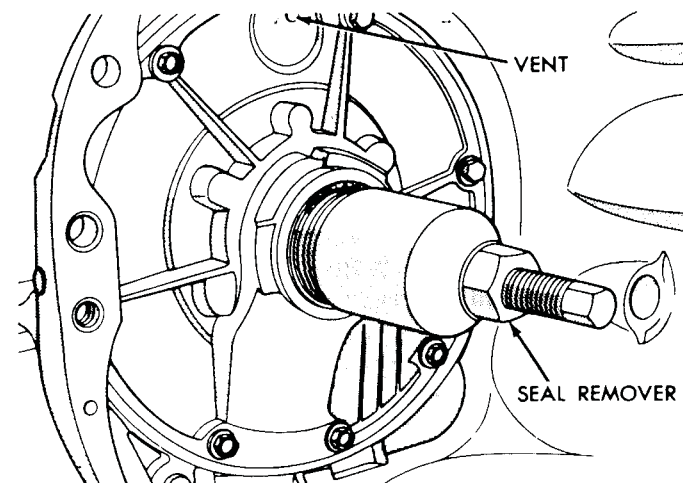
### PUMP OIL SEAL

#### Replacement

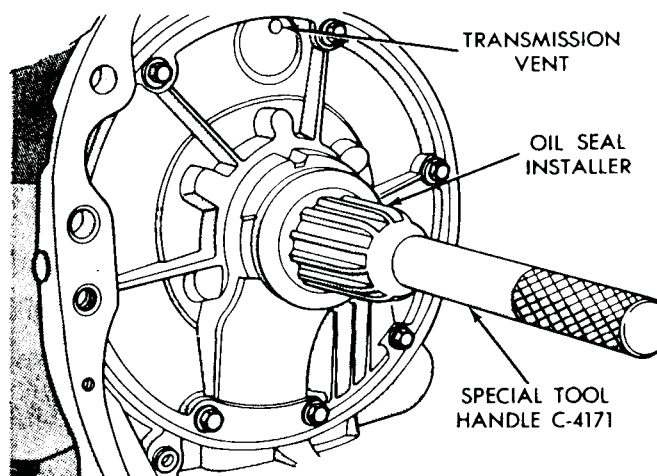
The pump oil seal can be replaced without removing pump and reaction shaft support assembly from the transmission case.

(1) Screw seal remover Tool C-3981 into seal (Fig. 2), then tighten screw portion of tool to withdraw the seal.

(2) To install a new seal, place seal in opening of the pump housing (lip side facing inward). Using Tool C-4193 and handle Tool C-4171, drive seal into housing until tool bottoms (Fig. 3).



**Fig. 2—Remove Pump Oil Seal**



**Fig. 3—Install Pump Seal**

## DISASSEMBLY—SUBASSEMBLY REMOVAL

Prior to removing any transmission subassemblies, plug all openings and thoroughly clean exterior of the unit, preferably by steam. Cleanliness through entire disassembly and assembly cannot be overemphasized. When disassembling, each part should be washed in a suitable solvent, then dried by compressed air. **Do not wipe parts with shop towels.** All mating surfaces in the transmission are accurately machined; therefore, careful handling of parts must be exercised to avoid nicks or burrs.

### Input Shaft End Play

Measuring input shaft end play before disassembly will usually indicate when a thrust washer change is required, (except when major parts are replaced). The thrust washer is located between input and output shafts on A-998 transmissions.

(1) Attach a dial indicator to transmission bell housing with its plunger seated against end of input shaft (Fig. 4).

Move input shaft in and out to obtain end play reading. End play specifications are .022 to .091 inch.

(2) Record indicator reading for reference when reassembling the transmission.

### Oil Pan

(1) Place transmission assembly in repair stand, Tool C-3750-A (Fig. 5).

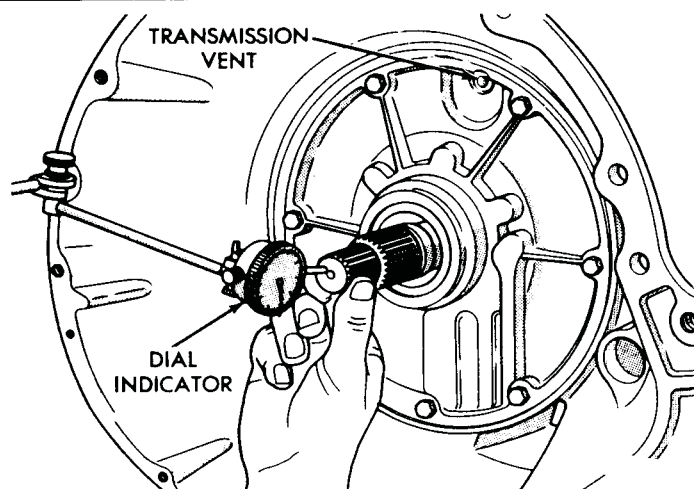
(2) Remove oil pan bolts and remove oil pan and gasket.

### Valve Body Assembly

(1) Loosen clamp bolts and remove throttle and gearshift levers from the transmission.

(2) Remove back-up lamp/neutral start switch.





**Fig. 4—Measuring Input Shaft End Play**

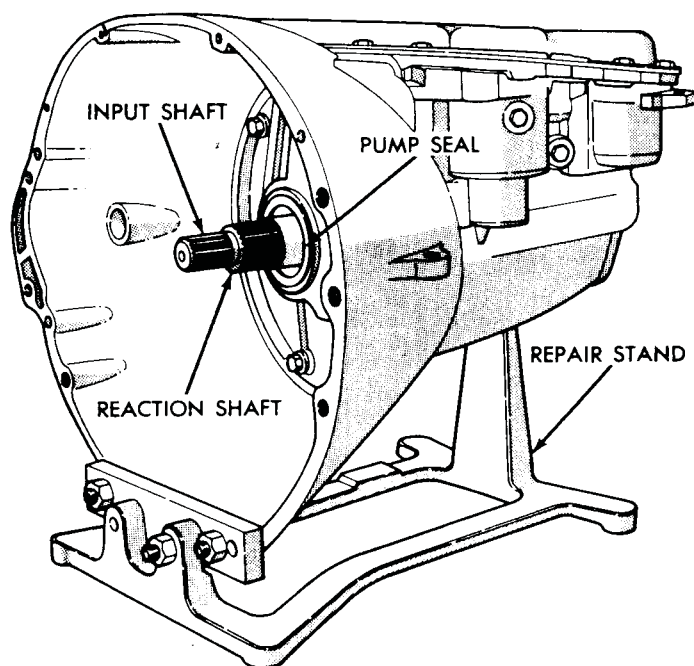
- (3) Disconnect lockup solenoid wire from wiring connector at rear of transmission case.
- (4) Remove the 10 hex-head valve body to transmission bolts. Remove E-clip securing parking lock rod to the valve body manual lever.
- (5) While lifting valve body upward out of transmission case, disconnect parking lock rod from the lever.

## Accumulator Piston and Spring

- (1) Lift spring off accumulator piston and withdraw piston from the case.

## Extension Housing (or Adapter on 4WD)

Before removing extension housing, pull parking lock rod forward out of the case. Rotate out-



**Fig. 5—Transmission in Repair Stand**

put shaft, if necessary, to align parking gear and sprag to permit knob on end of control rod to pass the sprag.

- (1) Remove speedometer pinion and adapter assembly.
- (2) Remove extension housing to transmission bolts.
- (3) Remove screws, plate, and gasket from bottom of extension housing mounting pad. Spread large snap ring from output shaft bearing. With snap ring spread as far as possible carefully tap extension housing off the output shaft and bearing.
- (4) Using snap ring pliers, remove output shaft bearing rear snap ring. Remove bearing from shaft.
- (5) On 4WD vehicles, use Tool L-4450 inverted with Handle C-4171 to drive out bearing from adapter, if necessary.

## Governor and Support

- (1) Carefully pry snap ring from weight end of governor valve shaft. Slide valve and shaft assembly out of the governor body.
- (2) Remove snap ring from behind governor body, then slide governor body and support assembly off the output shaft.

## Oil Pump and Reaction Shaft Support

- (1) Tighten front band adjusting screw until band is tight on front clutch retainer. This prevents clutch retainer from coming out with pump which might cause unnecessary damage to the clutches.
- (2) Remove oil pump housing retaining bolts.
- (3) Attach Tool C-3752 to pump housing flange, (Fig. 6), in threaded holes in the flange.
- (4) Bump outward evenly with the two "knocker weights" to withdraw pump and reaction shaft support assembly from the case.

## Front Band and Front Clutch

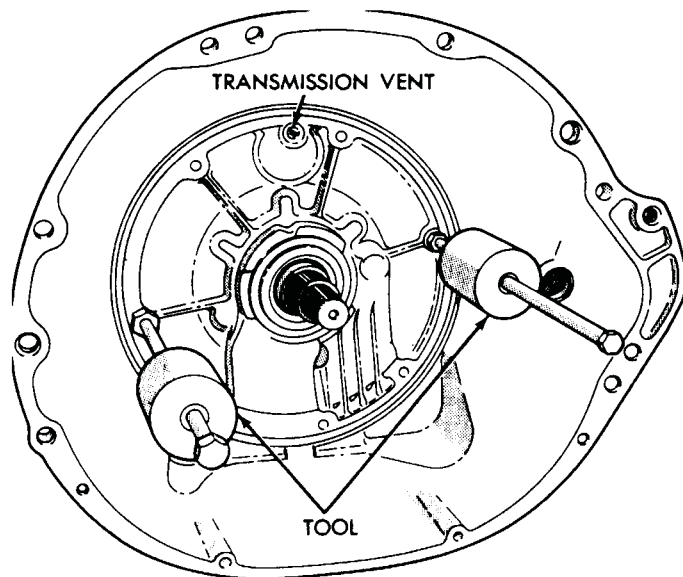
- (1) Loosen front band adjuster, remove band strut and slide band out of the case.
- (2) Slide front clutch assembly out of the case.

## Input Shaft and Rear Clutch

- (1) Grasp input shaft, and slide input shaft and rear clutch assembly out of the case.
- Be careful not to lose thrust washer located between rear end of input shaft and forward end of the output shaft.

## Planetary Gear Assemblies, Sun Gear, and Driving Shell

- (1) While supporting output shaft and driving shell, carefully slide assembly forward and out through the case.



**Fig. 6—Remove Oil Pump**

Be very careful not to damage ground surfaces on output shaft during removal.

## **Rear Band and Low-Reverse Drum**

(1) Loosen band adjusting screw, then remove band and low-reverse drum.

## **Overrunning Clutch**

(1) Note position of overrunning clutch rollers and springs before disassembly, to assist in reassembly.

(2) Carefully slide out clutch hub and remove rollers and springs.

## **Kickdown Servo (Front)**

(1) Compress kickdown servo spring by using engine valve spring compressor Tool C-3422A, remove snap ring (Fig. 7).

(2) Remove rod guide, spring and piston assembly from the case. Be careful not to damage piston rod or guide during removal.

(3) Withdraw piston from the transmission case.

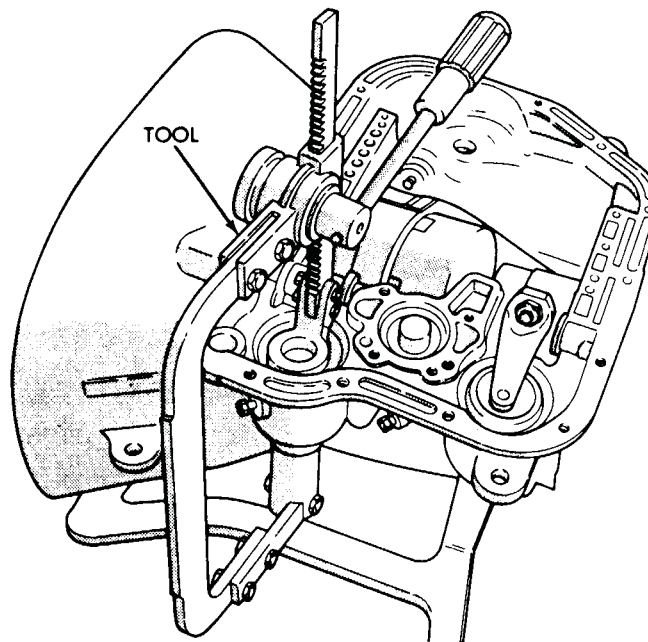
## **Low-Reverse Servo (Rear)**

(1) Compress low and reverse servo piston spring by using engine valve spring compressor Tool C-3422A, then remove the snap ring.

(2) Remove spring retainer, spring, and servo piston and plug assembly from the case.

## **RECONDITION SUBASSEMBLIES**

The following procedures cover disassembly, inspection, repair, and assembly of each subassembly as removed from the transmission.



**Fig. 7—Compress Kickdown Servo Spring**

Heli-Coil inserts are recommended for repairing damaged, stripped or worn threads in aluminum parts.

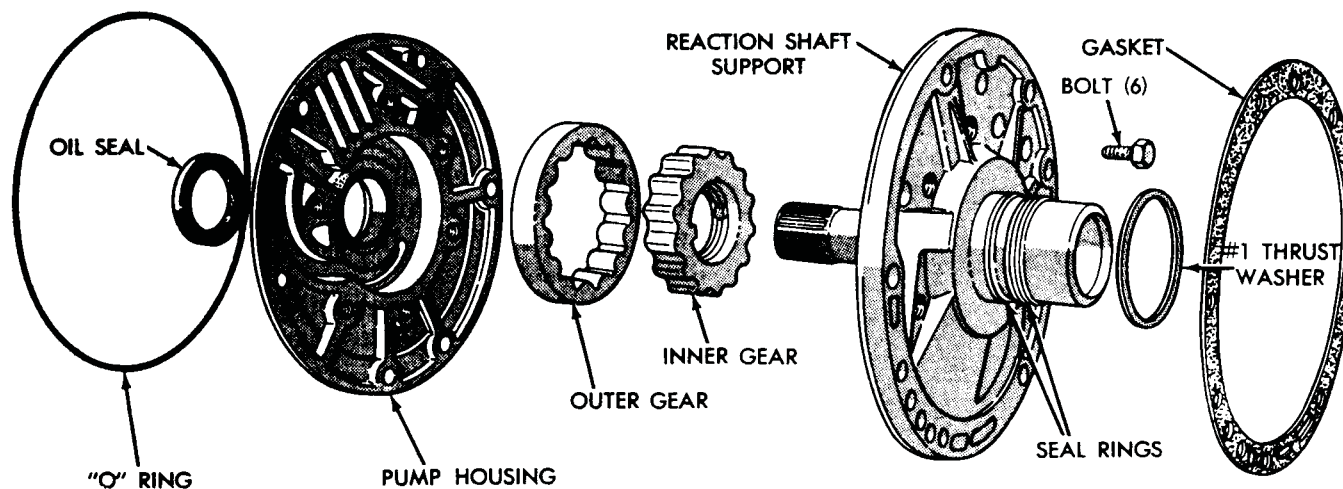
Presized service bushings are available for replacement for most all bushings in the Load-Flite transmissions. The two bushings in sun gear are not serviced because of the low cost of sun gear assembly. If bushings are found worn or scored, they should be replaced as outlined in the following reconditioning procedures.

The bushing replacement tools listed by "SP" numbers are part of Tool Kit C-3887B.

The use of crocus cloth is permissible where necessary, providing it is used carefully. When used on valves, use extreme care to avoid rounding off the sharp edges. The sharp edge is vitally important to this type of valve. Sharp edges prevent dirt and foreign matter from getting between the valve and body, thus reducing possibility of sticking. When it becomes necessary to recondition transmission, and vehicle has accumulated considerable mileage, install new seal rings on parts requiring their usage. Coat each part with automatic transmission fluid during assembly.

## **OIL PUMP AND REACTION SHAFT SUPPORT**

Due to the lockup torque converter, it is important that the oil pump be within the clearance limits as specified. Also note that the oil pump bushing should be replaced in any overhaul.



**Fig. 8—Oil Pump and Reaction Shaft Support**

## Disassembly

Figure 9 shows the oil pump and reaction shaft support disassembled.

- (1) Remove bolts from rear side of reaction shaft support and lift support off the pump.
- (2) Remove rubber seal ring from pump body flange.
- (3) Drive out oil seal with a blunt punch.

## Inspection

Inspect interlocking seal rings (Fig. 8) on reaction shaft support for wear or broken locks, make sure they turn freely in the grooves. Seal rings have to be removed to allow clearance for #1 thrust washer removal or installation. Inspect front clutch piston retainer to reaction shaft support thrust washer for wear. Washer thickness should be .061 to .063 inch, replace if necessary. Inspect machined surfaces on pump body and reaction shaft support for nicks and burrs. Inspect pump body and reaction shaft support bushings for wear or scores. Inspect pump gears for scoring or pitting. With gears cleaned and installed in pump body, place a straightedge across face of gears and pump body. Use a feeler gauge to measure clearance between straightedge and face of gears. Clearance limits are from .001 to .0025 inch. Also, measure rotor tip clearance between inner and outer rotor teeth. Clearance limits are from .0045 to .0095 inch. Clearance between outer gears and its bore in oil pump body should be .0035 to .0075 inch.

## Pump Bushing Replacement

- (1) Place pump housing (seal face down) on a smooth, firm surface.
- (2) Place removing head, Tool SP-3551 in bushing and install handle Tool C-4171 in the removing head (Fig. 10).

- (3) Drive bushing straight down and out of pump housing bore. Be careful not to cock tool in the bore.

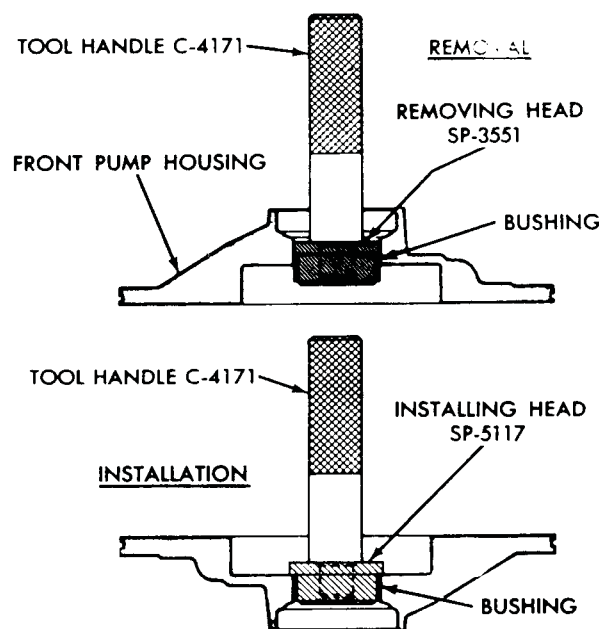
- (4) Position new bushing on installing head Tool SP-5117.

- (5) With pump housing on a smooth, clean surface, start bushing and installing head in the bushing bore. Install handle in the installing head (Fig. 10).

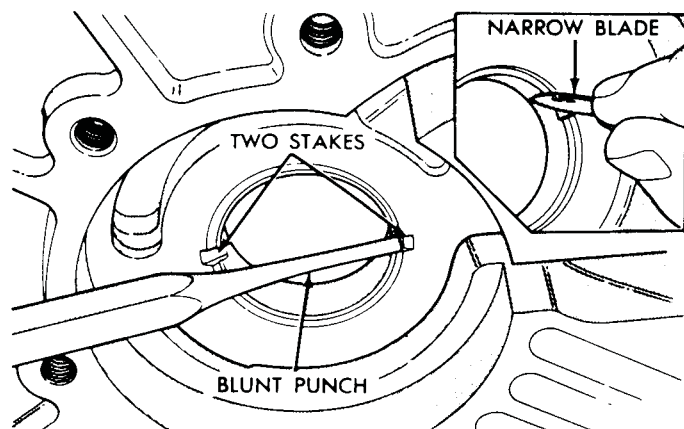
- (6) Drive bushing into housing until tool bottoms in the pump cavity. Be careful not to cock tool during installation.

- (7) Stake bushing in place by using a blunt punch or similar tool (Fig. 10). A gentle tap at each stake slot location will suffice.

- (8) Using a narrow-bladed knife, or similar tool, remove high points or burrs around staked area



**Fig. 9—Replacing Pump Bushing**



**Fig. 10—Stake Pump Bushing**

(Fig. 10). Do not use a file or similar tool that will remove more metal than is necessary.

## Reaction Shaft Bushing Replacement

In case of a reaction shaft bushing failure, always inspect the support for wear from the input shaft seal ring lands. If worn or grooved, replace support assembly.

(1) Assemble remover Tool SP-5324, cup Tool SP-3633, and hex-nut Tool SP-1191 (Fig. 11).

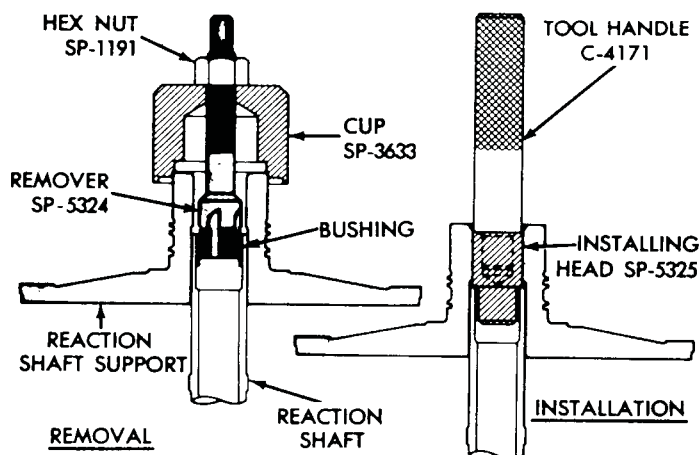
Do not clamp any part of reaction shaft or support in a vise.

(2) With cup held firmly against reaction shaft, thread remover into bushing as far as possible by hand.

(3) Using a wrench, screw remover into bushing 3 to 4 additional turns to firmly engage threads in the bushing.

(4) Turn hex nut down against cup to pull bushing from reaction shaft. Thoroughly clean reaction shaft to remove chips made by remover threads.

(5) Lightly grip bushing in a vise or with pliers



**Fig. 11—Replacing Reaction Shaft Bushing**

and back tool out of the bushing. Be careful not to damage threads on bushing remover.

(6) Slide a new bushing on installing head Tool SP-5325, and start them in the bore of reaction shaft (Fig. 11).

(7) Support reaction shaft upright on a clean smooth surface and install handle Tool C-4171 in installing head. Drive bushing into the shaft until tool bottoms.

(8) Thoroughly clean reaction shaft support assembly before installation.

## Assembly

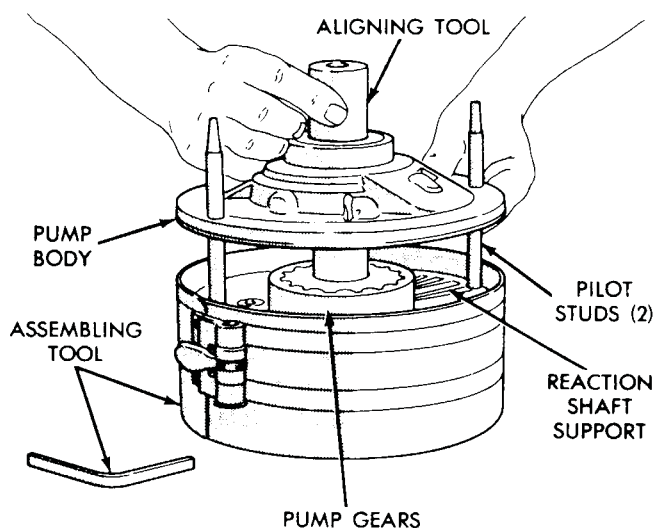
(1) Place reaction shaft support in assembling Tool C-3759, with hub of support and tool resting on a smooth, flat surface bench (Fig. 12). Screw two pilot studs Tool C-3283A into threaded holes of reaction shaft support flange.

(2) Assemble and place pump gears in center of the support.

(3) Lower pump body over the pilot studs, insert Tool C-3756 through pump body and engage pump inner gear. Rotate the pump gears with tool to center gears in pump body, then with pump body firm against reaction shaft support, tighten clamping tool securely.

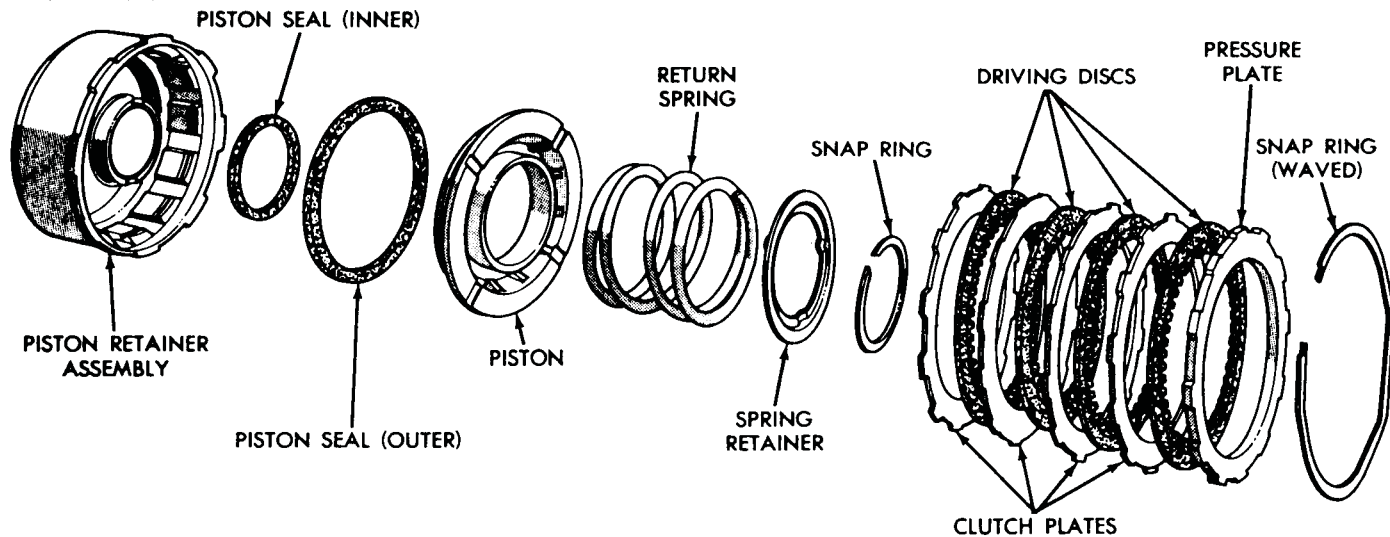
(4) Invert pump and reaction shaft support assembly with clamping tool intact. Install support to pump body bolts and tighten to 175 in. lbs. (20 N·m). Remove clamping tool, pilot studs, and gear alignment tool.

(5) Place a new oil seal in opening of pump housing (lip of seal facing inward). Using Tool C-4193 and Tool C-4171, drive seal into housing until tool bottoms.



**Fig. 12—Assemble Pump and Reaction Shaft Support**





**Fig. 13—Front Clutch**

## FRONT CLUTCH

### Disassembly

Figure 13 shows a disassembled view of the front clutch assembly.

(1) Remove large waved snap ring that secures pressure plate in the clutch piston retainer. Lift pressure plate and clutch plates out of the retainer.

(2) Install compressor Tool C-3575A, over piston spring retainer (Fig. 14). Compress spring and remove snap ring, then slowly release tool until spring retainer is free of the hub. Remove tool, retainer, and spring.

(3) Invert clutch retainer assembly and bump it on a wooden block to remove the piston. Remove seals from the piston and clutch retainer hub.

### Inspection

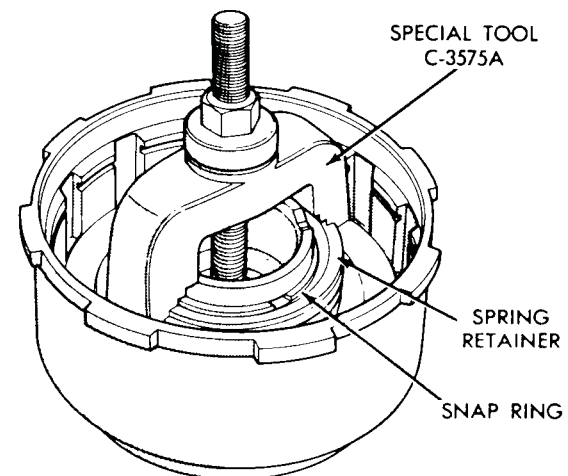
Inspect plates and discs for flatness. They must not be warped or cone shaped.

Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surfaces for burning, scoring or damaged driving lugs. Replace if necessary.

Inspect steel plate lug grooves in clutch retainer for smooth surfaces; plates must travel freely in grooves. Inspect band contacting sur-

face on clutch retainer for scores, the contact surface should be protected from damage during disassembly and handling. Note ball check in clutch retainer, make sure ball moves freely. Inspect piston seal surfaces in clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing of seals. Inspect clutch retainer inner bore surface for wear from reaction shaft support seal rings. Inspect clutch retainer bushing for wear or scores.

Inspect inside bore of piston for score marks, if light, remove with crocus cloth. Inspect seal grooves for nicks and burrs. Inspect seals for deterioration, wear, and hardness. Inspect piston spring, retainer and snap ring for distortion.



**Fig. 14—Front Clutch Spring Retaining Snap Ring**

## Front Clutch Retainer Bushing Replacement

(1) Lay clutch retainer (open end down) on a clean, smooth surface and place removing head Tool SP-3627 in the bushing (Fig. 15). Install handle Tool C-4171 in removing head.

(2) Drive bushing straight down and out of clutch retainer bore. Be careful not to cock tool in the bore.

(3) Lay clutch retainer (open end up) on a clean, smooth surface. Slide a new bushing on installing head Tool SP-3626, and start them in clutch retainer bore.

(4) Install handle in installing head. Drive bushing into clutch retainer until tool bottoms.

(5) Thoroughly clean clutch retainer before assembly and installation.

## Assembly

(1) Lubricate and install inner seal on hub of clutch retainer. Make sure lip of seal faces down and is properly seated in the groove (Fig. 13).

(2) Install outer seal on the clutch piston, with lip of seal toward bottom of clutch retainer. Apply a coating of wax type lubricant or Door Ease to outer edge of seals and press seal to bottom of its groove around piston diameter for easier installation of piston assembly. Place piston assembly in retainer and carefully seat piston in bottom of retainer.

(3) Place spring on piston hub and position spring retainer and snap ring on the spring. Compress spring with Tool C-3575A (Fig. 14), and seat snap ring in hub groove. Remove compressor tool.

(4) Lubricate all clutch plates, install one steel plate followed by a lined plate (disc) until the number given in specifications is installed. Install pressure plate and snap ring. Make sure snap ring is properly seated.

(5) Insert a feeler gauge between pressure plate and waved snap ring to measure maximum clearance where snap ring is waved away from pressure plate (Fig. 16). See "Specifications" for allowed clearance.

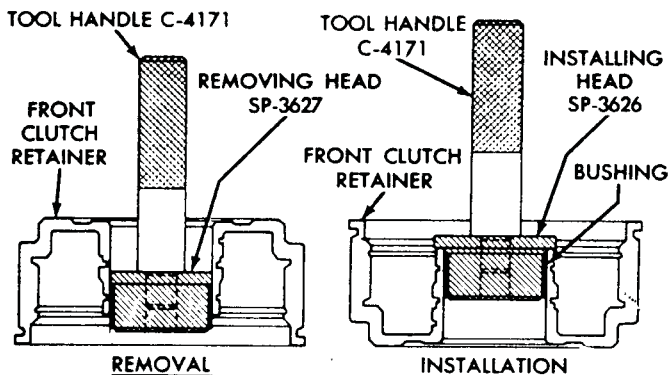


Fig. 15—Replace Front Clutch Retainer Bushing

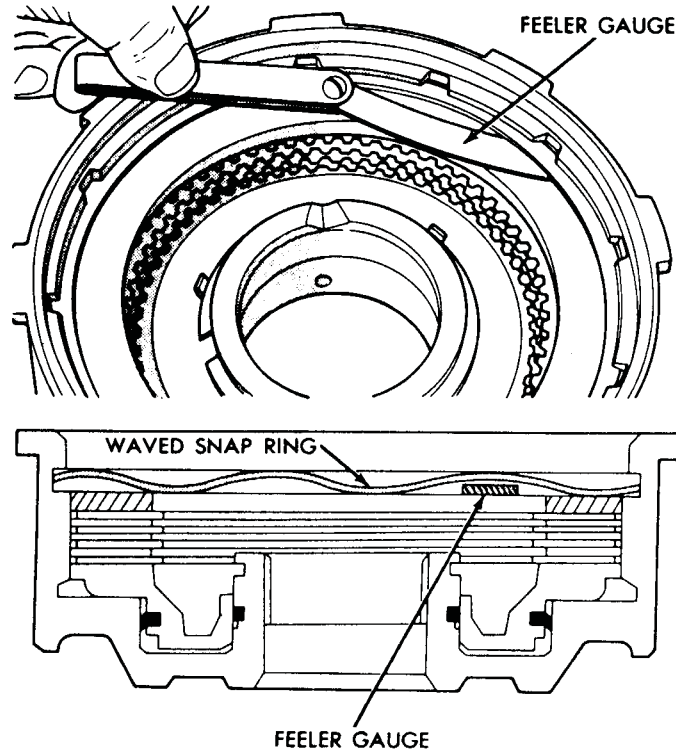


Fig. 16—Measure Front Clutch Plate Clearance

## REAR CLUTCH

### Disassembly

Figure 17 shows a disassembled view of the rear clutch assembly.

(1) Remove large selective snap ring that secures pressure plate in clutch piston retainer. Lift pressure plate, clutch plates, and inner pressure plate out of the retainer.

(2) Carefully pry one end of wave spring out of its groove in clutch retainer, then remove wave spring and clutch piston spring.

(3) Invert clutch piston retainer assembly and bump it on a wooden block to remove piston. Remove seals from piston.

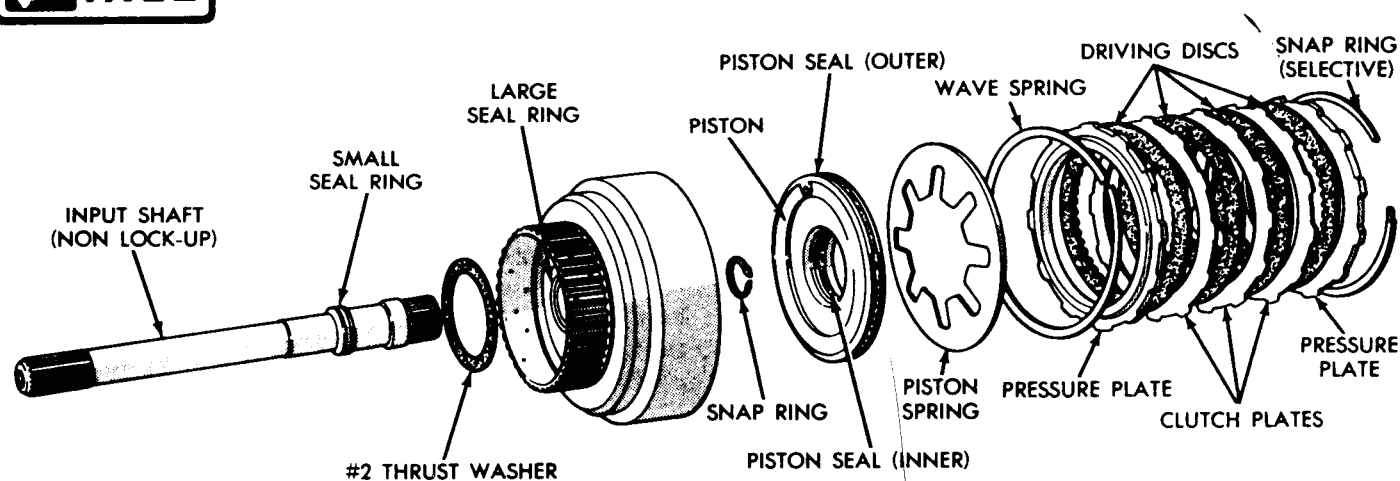
(4) If necessary, remove snap ring and press input shaft from piston retainer.

### Inspection

Inspect facing material on all driving discs. Replace discs that are charred, glazed or heavily pitted. Discs should also be replaced if they show evidence of material flaking off or if facing material can be scraped off easily. Inspect driving disc splines for wear or other damage. Inspect steel plate and pressure plate surface for burning, scoring or damaged driving lugs. Replace if necessary. Inspect plates and discs for flatness, they must not be warped or cone-shaped.

Inspect steel plate lug grooves in clutch retainer for smooth surfaces; plates must travel





**Fig. 17—Rear Clutch**

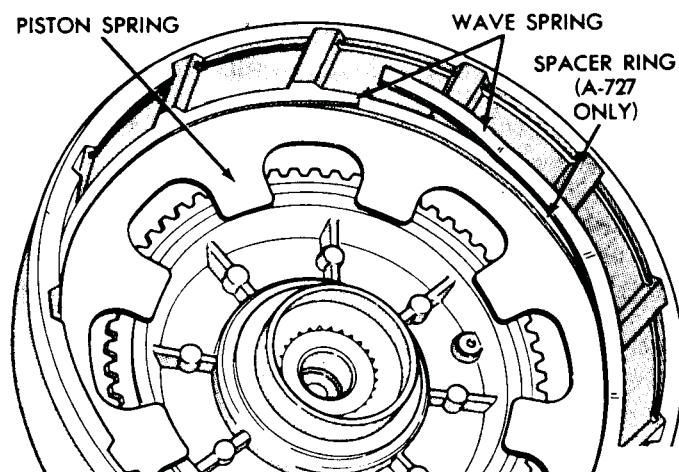
freely in the grooves. Note ball check in clutch retainer, make sure ball moves freely. Inspect seal rings surfaces in clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing of the seals. Inspect neoprene seal rings for deterioration, wear and hardness. Inspect piston spring and wave spring for distortion or breakage.

Inspect teflon and/or cast iron seal rings on input shaft for wear (Fig. 17). If required, replacement rings will be cast iron hooked-joint type. Do not remove rings unless conditions warrant. Inspect rear clutch to front clutch #2 thrust washer for wear. Washer thickness should be .061 to .063 inch, replace if necessary.

## Assembly

(1) If removed, press input shaft into piston retainer and install snap ring.

(2) Lubricate and install inner and outer seals



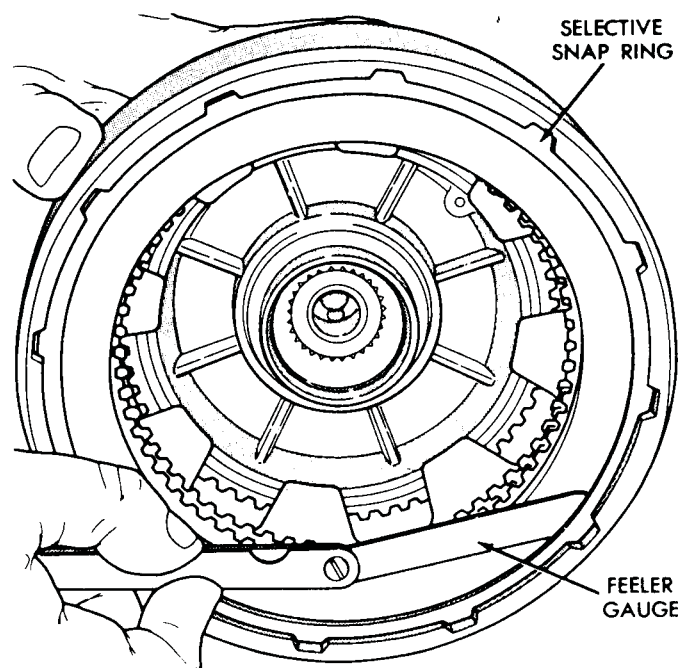
**Fig. 18—Installing Rear Clutch Spring**

on clutch piston. Make sure seal lips face toward input shaft, and seals are properly seated in piston grooves (Fig. 17).

(3) Place piston assembly in retainer and, with a twisting motion, seat piston in bottom of retainer.

(4) Place clutch piston spring on top of piston in clutch retainer. Start one end of wave spring in retainer groove (Fig. 18), then progressively push or tap spring into place making sure it is fully seated in the groove.

(5) Install inner pressure plate in clutch retainer with raised portion of plate resting on the spring.



**Fig. 19—Measure Rear Clutch Plate Clearance**

(6) Lubricate all clutch plates, install one lined disc followed by a steel plate until all plates are installed. Install outer pressure plate and selective snap ring.

(7) Measure rear clutch plate clearance by having an assistant press down firmly on outer pressure plate, then insert a feeler gauge between the plate and snap ring (Fig. 19).

See "Specifications" for allowed clearance. If necessary, install a new snap ring of proper thickness to obtain specified clearance. Low limit clearance is desirable. **Rear clutch plate clearance is very important in obtaining proper clutch operation. Clearance can be adjusted by the use of various thickness outer snap rings. Snap rings are available in .060, .076, and .098 inch thickness.**

(8) Grease cupped side of #3 thrust plate and install cupped side over input shaft.

## PLANETARY GEAR TRAIN

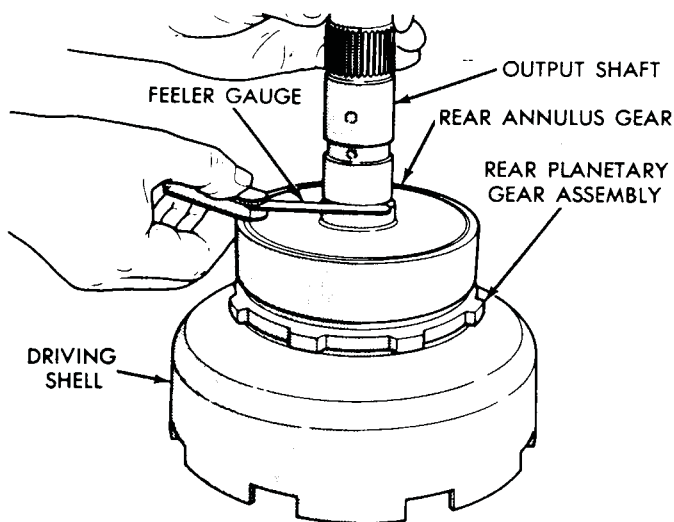
### End Play

Measure end play of planetary gear assemblies, sun gear and driving shell before removing these parts from output shaft. Stand assembly upright with forward end of output shaft on a wooden block, so that all parts will move forward against selective snap ring at front of shaft. Insert a feeler gauge between rear annulus gear support hub and shoulder on output shaft. (Fig. 20). The clearance should be .005 to .048 inch. If clearance exceeds specifications, replace thrust washers and/or necessary parts.

### Disassembly (Fig. 21)

(1) Remove selective #3 thrust washer from forward end of output shaft.

(2) Remove selective snap ring from forward



**Fig. 20—Measure End Play of Planetary Gear Train**

end of output shaft, then slide front planetary assembly off the shaft.

(3) Remove snap ring and #4 thrust washer from forward hub of front planetary gear assembly, slide front annulus gear and support off planetary gear assembly. Remove #5 thrust washer from front side of planetary gear assembly. Remove #6 thrust washer from rear side of planetary gear assembly. If necessary, remove snap ring from front of annulus gear to separate support from annulus gear.

(4) Slide sun gear, driving shell, and rear planetary assembly off the output shaft.

(5) Lift sun gear and driving shell off rear planetary assembly. Remove snap ring and #8 thrust plate from sun gear (rear side of driving shell). Slide sun gear out of driving shell, and remove spacer (Fig. 21), and #7 thrust plate from opposite end of sun gear, if necessary.

(6) Remove #9 thrust washer from forward side of rear planetary assembly and remove planetary gear assembly from rear annulus gear. Remove #10 thrust washer from rear side of planetary assembly. If necessary, remove snap ring from rear of annulus gear to separate support from annulus gear.

### Inspection

Inspect bearing surfaces on output shaft for nicks, burrs, scores or other damage. Light scratches, small nicks or burrs can be removed with crocus cloth or a fine stone. Inspect speedometer drive gear for any nicks or burrs, and remove with a sharp-edged stone. Make sure all oil passages in shaft are open and clean.

Inspect bushings in sun gear for wear or scores, replace sun gear assembly if bushings are damaged. Inspect all thrust washers for wear and scores, replace if damaged or worn below specifications. Inspect thrust faces of planetary gear carriers for wear, scores or other damage, replace as required. Inspect planetary gear carrier for cracks and pinions for broken or worn gear teeth, and for broken pinion shaft welds. Inspect annulus gear and driving gear teeth for damage. Replace distorted lock rings.

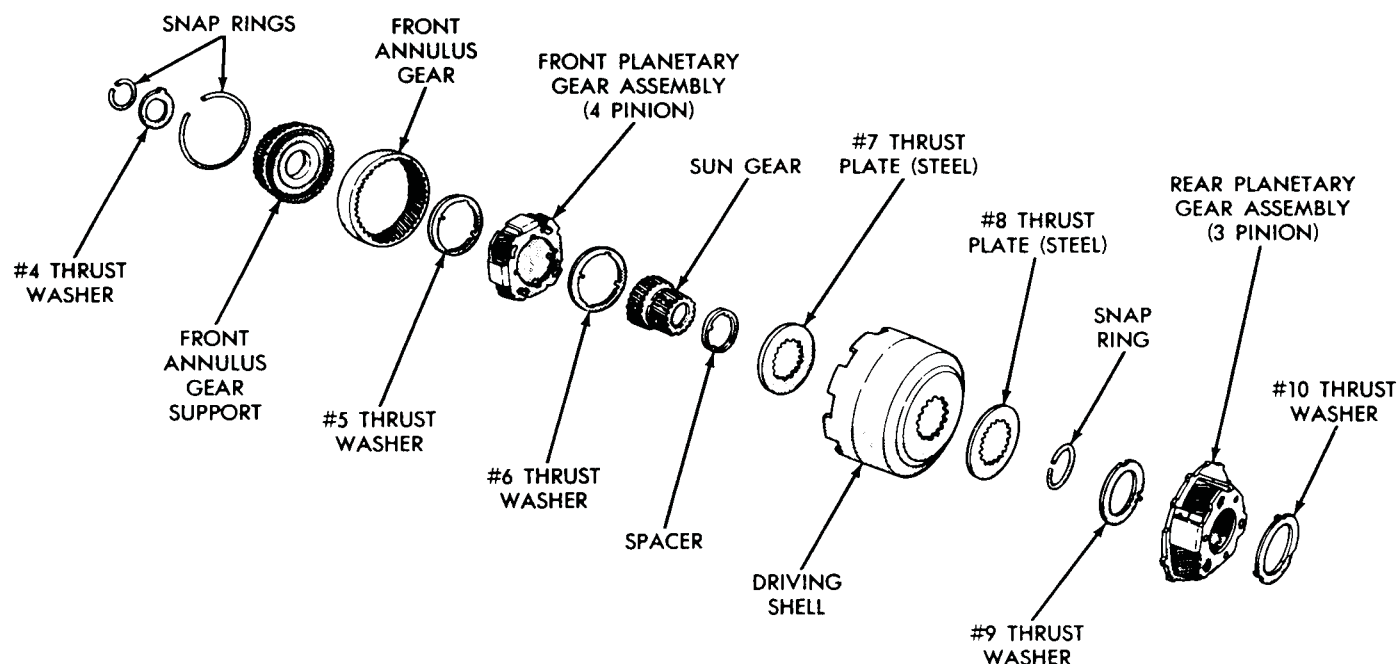
### Assembly

Refer to Figure 21 for parts reference.

(1) Place rear annulus gear support in annulus gear and install snap ring.

(2) Position #10 thrust washer on rear side of rear planetary gear assembly and install in rear annulus gear. Install #9 thrust washer on front side of rear planetary gear assembly.

(3) Insert output shaft in rear opening of rear annulus gear. Carefully work shaft through an-



**Fig. 21—Planetary Gear Train**

nulus gear support and planetary gear assembly. Make sure shaft splines are fully engaged in splines of annulus gear support.

(4) Install #7 thrust plate and spacer on wide-ratio transmissions (Fig. 21) on one end of sun gear. Insert sun gear through front side of driving shell, install #8 thrust plate and snap ring.

(5) Carefully slide driving shell and sun gear assembly on the output shaft, engaging sun gear teeth with rear planetary pinion teeth.

(6) Place front annulus gear support in the annulus gear and install snap ring.

(7) Position #5 thrust washer on front side of front planetary gear assembly. Position front planetary gear assembly in front annulus gear, place #4 thrust washer over planetary gear assembly hub and install snap ring. Position #6 thrust washer on rear side of planetary gear assembly.

(8) Carefully work front planetary and annulus gear assembly on output shaft, meshing planetary pinions with sun gear teeth.

(9) With all components properly positioned, install selective snap ring on front end of output shaft. Remeasure end play of the assembly. **The clearance can be adjusted by the use of various thickness snap rings. Snap rings are available in .042, .064, and .084 inch thickness.**

## OVERRUNNING CLUTCH

### Inspection

Inspect clutch rollers for smooth, round surfaces, they must be free of flat spots and chipped

edges. Inspect roller contacting surfaces in the cam and race for brinelling. Inspect roller springs for distortion, wear or other damage.

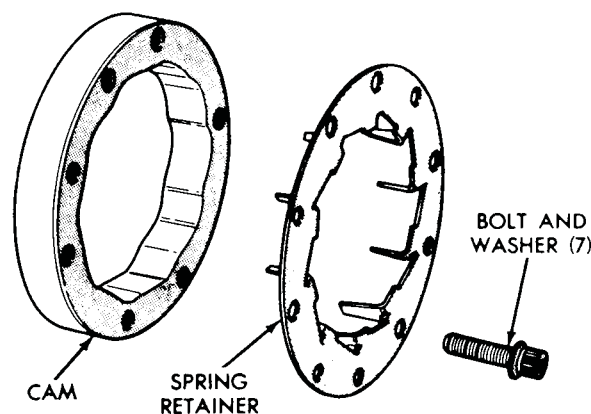
### Overrunning Clutch Cam Replacement

If overrunning clutch cam or spring retainer are found damaged, they can be replaced with a service replacement cam, spring retainer, and retaining bolts (Fig. 22).

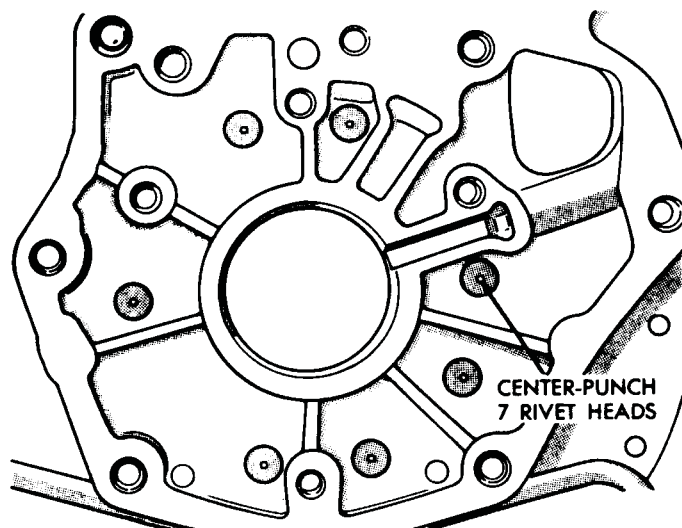
The service parts are retained in the case with bolts instead of rivets. To install, proceed as follows:

(1) Remove four bolts securing output shaft support to rear of the transmission case. Tap support rearward out of the case with a soft-faced hammer.

(2) Center punch the rivets exactly in center of



**Fig. 22—Overrunning Clutch Service Replacement**



**Fig. 23—Center Punch Rivet Heads**

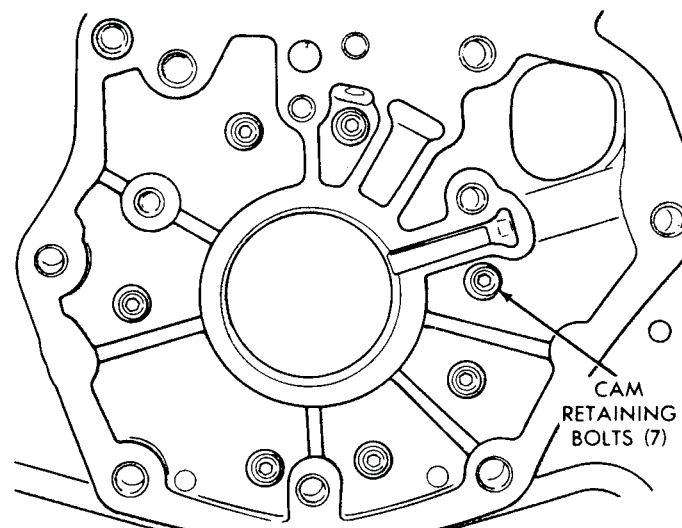
each rivet head (Fig. 23).

(3) Drill through each rivet head with a 3/8 inch drill. Be careful not to drill into the transmission case. Chip off rivet heads with a small chisel, then drive rivets and cam from the case with a blunt punch of proper size.

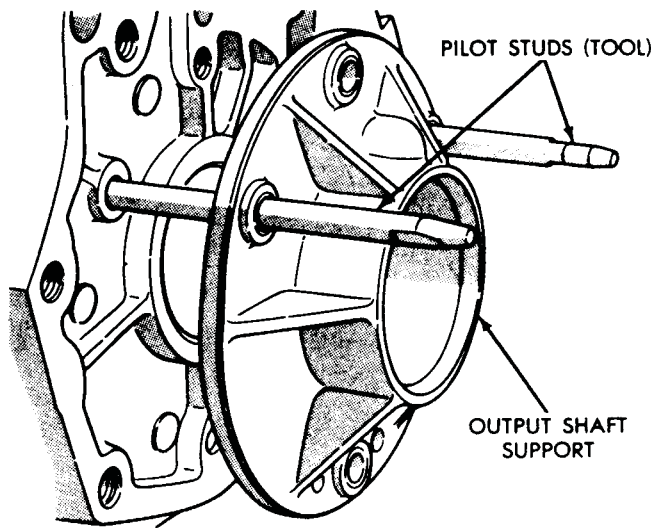
(4) Carefully enlarge rivet holes in the case with a 17/64 inch drill. Remove all chips and foreign matter from the case, make sure cam area is free of chips and burrs.

(5) To install, position cam and roller spring retainer in the case. Align cam bolt holes with holes in the case, then thread all seven retaining bolt and washer assemblies into cam a few turns. The cone washers must be installed so inner diameter is coned toward the bolt head (Fig. 24).

(6) Tap cam firmly into the case if necessary. Draw retaining bolts down evenly, then tighten to 100 in. lbs. (11 N·m).



**Fig. 24—Cam Retaining Bolts**



**Fig. 25—Install Output Shaft Support**

(7) Screw two pilot studs Tool C-3288-B into the case (Fig. 25). Position support over the pilot studs, and tap it firmly into the case with a soft-faced hammer.

(8) Remove pilot studs, install bolts and tighten to 150 in. lbs. (17 N·m).

## KICKDOWN SERVO AND BAND

### Disassembly

Disassemble controlled load servo piston by removing small snap ring from servo piston. Then remove washer, spring and piston rod assembly from servo piston.

### Inspection

Inspect piston and guide seal rings for wear, and make sure they turn freely in the grooves. It is not necessary to remove seal rings unless conditions warrant. Inspect piston for cracks, burrs, scores and wear. Inspect piston bore in the case for scores or other damage. Inspect fit of guide on piston rod. Inspect piston spring for distortion.

For controlled load servo, inspect bore in piston and O-ring on piston rod.

Inspect band lining for wear and bond of lining to the band. Inspect lining for black burn marks, glazing, non-uniform wear pattern and flaking. If lining is worn so grooves are not visible at ends or any portion of the bands, replace the band. Inspect band for distortion or cracked ends.

### Assembly

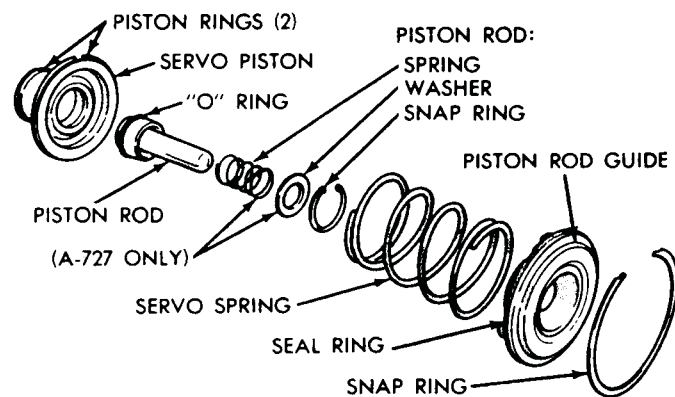
Assemble controlled load servo piston as follows (Fig. 26).

- (1) Grease O-ring and install piston rod.
- (2) Install piston rod into servo piston.





## Technical Service Information



**Fig. 26—Kickdown Servo**

(3) Install spring, flat washer and snap ring to complete the assembly.

### LOW-REVERSE SERVO AND BAND

#### Disassembly

(1) Remove snap ring from piston and remove the piston plug and cushion spring (Fig. 27).

#### Inspection

Inspect seal for deterioration, wear and hardness. Inspect piston and piston plug for cracks, burrs, scores and wear; piston plug must operate freely in the piston. Inspect piston bore in the case for scores or other damage. Inspect springs for distortion.

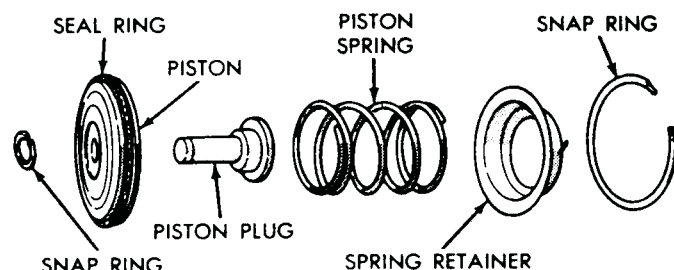
Inspect band lining for wear and bond of lining to the band. If lining is worn so grooves are not visible at ends or any portion of the band, replace the band. Inspect band for distortion or cracked ends.

#### Assembly

(1) Lubricate and insert piston plug and cushion spring in the piston, and secure with snap ring.

### ASSEMBLY—SUBASSEMBLY INSTALLATION

The assembly procedures given here include installation of subassemblies in the transmission



**Fig. 27—Low-Reverse Servo**

case and adjusting input shaft end play. **Do not use force to assemble mating parts.** If parts do not assemble freely, investigate the cause, and correct the trouble before proceeding with assembly procedures. Always use new gaskets during assembly operations.

Use only automatic transmission fluid to lubricate transmission parts during assembly.

#### Overrunning Clutch

(1) With transmission case in an upright position, insert clutch hub inside the cam. Install overrunning clutch rollers and springs.

#### Double-wrap Low-Reverse Band (Figs. 28 and 29)

(1) Push band reaction pin (with new O-ring) into case flush with gasket surface.

(2) Place band into case resting two lugs against band reaction pin.

(3) Install low-reverse drum into overrunning clutch and band.

(4) Install operating lever with pivot pin flush in case and adjusting screw touching center lug on band.

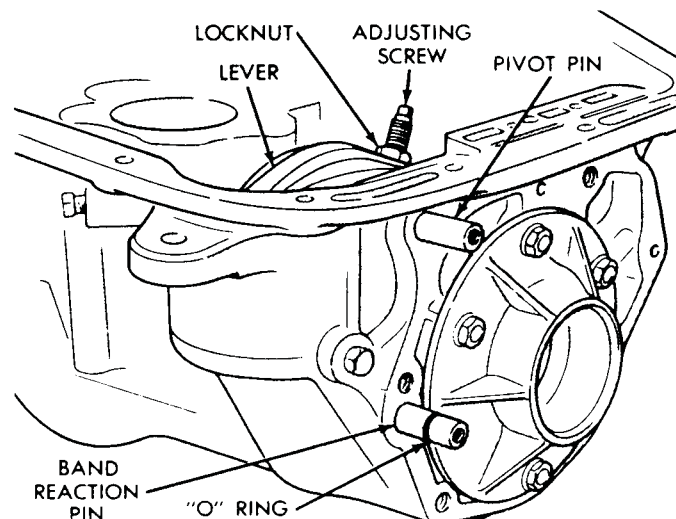
#### Kickdown Servo (Fig. 26)

(1) Carefully push servo piston assembly into the case bore. Install spring, guide, and snap ring.

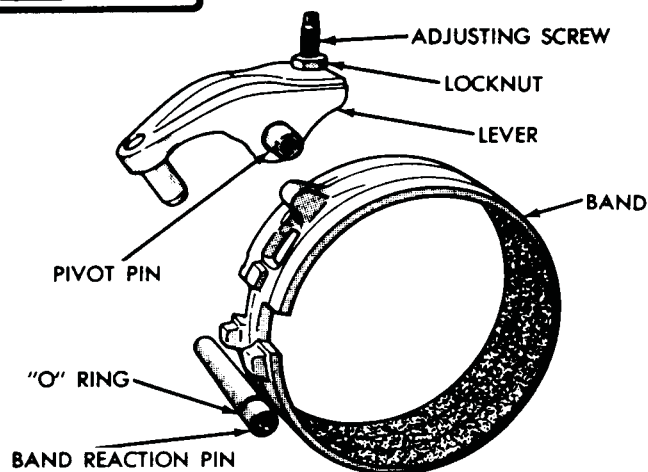
(2) Compress kickdown servo spring by using engine valve spring compressor Tool C-3422-A, then install snap ring.

#### Planetary Gear Assemblies, Sun Gear, and Driving Shell

(1) While supporting assembly in the case, insert output shaft through rear support. Carefully work assembly rearward engaging rear planetary carrier lugs into low-reverse drum slots.



**Fig. 28—Double-Wrap Band Linkage**



**Fig. 29—Double-Wrap Band and Linkage**

Be very careful not to damage ground surfaces on output shaft during installation.

## Front and Rear Clutch Assemblies

The front and rear clutches, front band, oil pump and reaction shaft support are more easily installed with transmission in an upright position.

One method to support transmission, is outlined in Steps (1) and (2).

(1) Cut a 3-1/2 inch (89 mm) diameter hole in a bench, in the end of a small oil drum, or a large wooden box strong enough to support transmission. Cut or file notches at edge of the 3-1/2 inch (89 mm) hole so output shaft support will fit and lay flat in the hole.

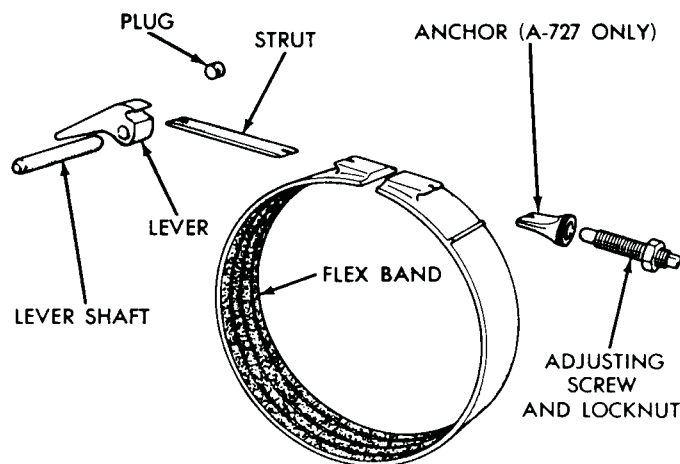
(2) Carefully insert output shaft into hole to support the transmission upright, with its weight resting on flange of the output shaft support.

(3) Apply a light coat of grease to selective thrust washer and install washer on front end of the output shaft. Apply a light coat of grease to input shaft thrust plate and install over input shaft. If input shaft end play was not within specifications (.022 to .091 inch), when tested before disassembly, replace thrust washer with one of proper thickness. Refer to thrust washer number 3 in "Specifications" for sizes available.

(4) Align front clutch plate inner splines, and place assembly in position on the rear clutch. Make sure front clutch plate splines are fully engaged on rear clutch splines.

(5) Align rear clutch plate inner splines, grasp input shaft and lower the two clutch assemblies into the transmission case.

(6) Carefully work clutch assemblies in a circular motion to engage rear clutch splines over splines of front annulus gear. Make sure front clutch drive lugs are fully engaged in slots in the driving shell.



**Fig. 30—Kickdown Band and Linkage**

## Kickdown Band (Fig. 30)

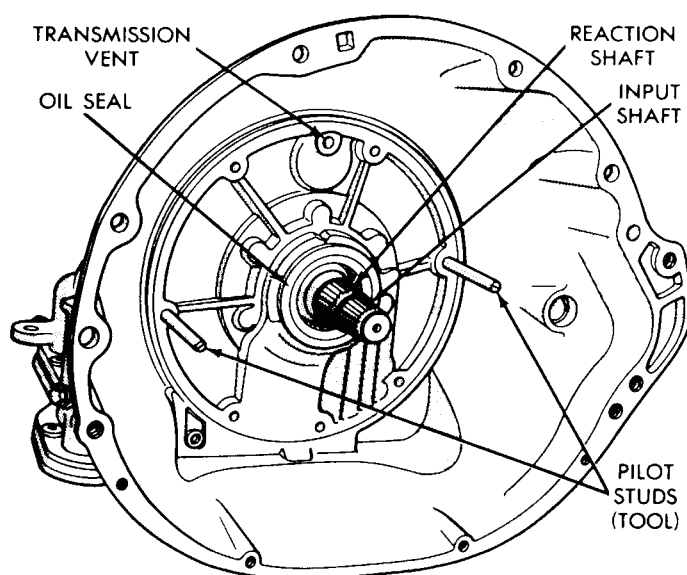
- (1) Slide band over front clutch assembly.
- (2) Install band strut, screw in adjuster just enough to hold strut and anchor in place.

## Oil Pump and Reaction Shaft Support

If difficulty was encountered in removing pump assembly due to an exceptionally tight fit in the case, it may be necessary to expand the case with heat during pump installation. Using a suitable heat lamp, heat the case in area of pump for a few minutes prior to installing pump and reaction shaft support assembly.

Install number one thrust washer on reaction shaft support hub (Fig. 8).

- (1) Screw two pilot studs Tool C-3288-B in pump opening in the case (Fig. 31). Install a new gasket over the pilot studs.



**Fig. 31—Installing Oil Pump**



(2) Place a new rubber seal ring in the groove on outer flange of pump housing. Make sure seal ring is not twisted. Coat seal ring with grease for easy installation.

(3) Install pump assembly in the case; tap it lightly with a soft mallet, if necessary. Remove pilot studs, install bolts and snug down evenly.

Rotate input and output shafts to see if any binding exists, then tighten bolts to 175 in. lbs. (20 N·m). Check shafts again for free rotation.

(4) Adjust both bands as described in "Maintenance and Adjustments" Section.

## Governor and Support

(1) Position support and governor body assembly on the output shaft. Align assembly so governor valve shaft hole in governor body aligns with hole in output shaft, then slide assembly into place. Install snap ring behind the governor body. Tighten body to support self-locking bolts to 95 in. lbs. (11 N·m).

(2) Place governor valve on valve shaft, insert assembly into body and through governor weights. Install valve shaft retaining snap ring.

## Output Shaft Bearing and Extension Housing (or Adapter on 4WD Vehicles)

(1) Install bearing on shaft with its outer race ring groove toward front. Press or tap bearing tight against shoulder, then install rear snap ring.

(2) On 4WD vehicles, use door-ease lubricant on output shaft bearing O-ring. Drive the bearing into adapter using Tool C-4203 inverted with Handle C-4171.

(3) Place a new extension housing gasket on the transmission case. Position output shaft bearing retaining snap ring as far as possible then carefully tap extension housing (or adapter) into place. Make sure snap ring is fully seated in the bearing groove.

(4) Install and tighten extension housing (or adapter) bolts to 32 ft. lbs. (43 N·m).

(5) Install gasket, plate, and two screws on bottom of extension housing mounting pad.

Measure input shaft end play as described under "Disassembly—Subassembly Removal." Correct if necessary (Fig. 4).

## Valve Body Assembly and Accumulator Piston

(1) Make sure combination back-up lamp/neutral start switch is not installed in transmission case.

(2) Place valve body manual lever in low position to move parking rod to rear position.

(3) Use a screwdriver to push park sprag into engagement with parking gear, turning output shaft to verify engagement. This will allow "knob"



**Fig. 32—Accumulator Piston and Spring**

on end of parking rod to move past the sprag as valve body is installed.

(4) Install accumulator piston in the transmission case (Fig. 32).

(5) Place valve body in position, working park rod through opening and past sprag. Install retaining bolts finger tight.

(6) With neutral starting switch installed, place manual lever in the neutral position. Shift valve body, if necessary, to center neutral finger over the neutral switch plunger. Snug bolts down evenly, then tighten to 105 in. lbs. (12 N·m).

(7) Connect lockup solenoid wire to wiring connector at rear of transmission case.

(8) Install gearshift lever and tighten clamp bolt. Check lever shaft for binding in the case by moving lever through all detent positions. If binding exists, loosen valve body bolts and realign.

(9) Make sure throttle shaft seal is in place, then install flat washer and throttle lever and tighten the clamp bolt.

(10) Position the round magnet over the bump in the front, right hand corner of the oil pan.

(11) Install oil pan, and a new gasket.

# "ADJUSTMENT SECTION"

## BAND ADJUSTMENTS

### FRONT BAND

Tighten adjusting screw to 72 in.lbs.

Back off adjusting screw exactly 2 turns.

While holding adjusting screw, torque locking nut to 35 ft.lb.

### REAR BAND

Tighten adjusting screw to 72 in.lbs.

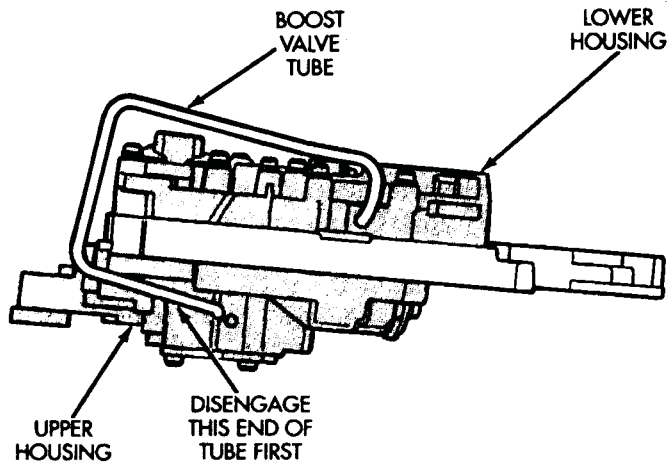
Back off adjusting screw exactly as follows:

42RH (A500) = 4 turns.

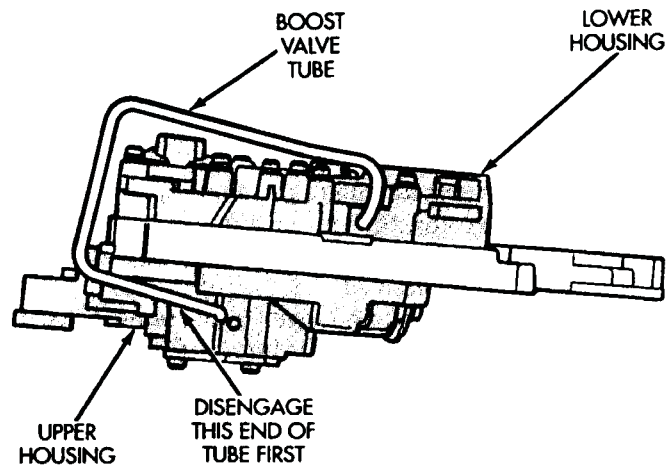
46RH/47RH (A518/A618) = 2 turns.

While holding adjusting screw, torque locking nut to 35 ft.lb.

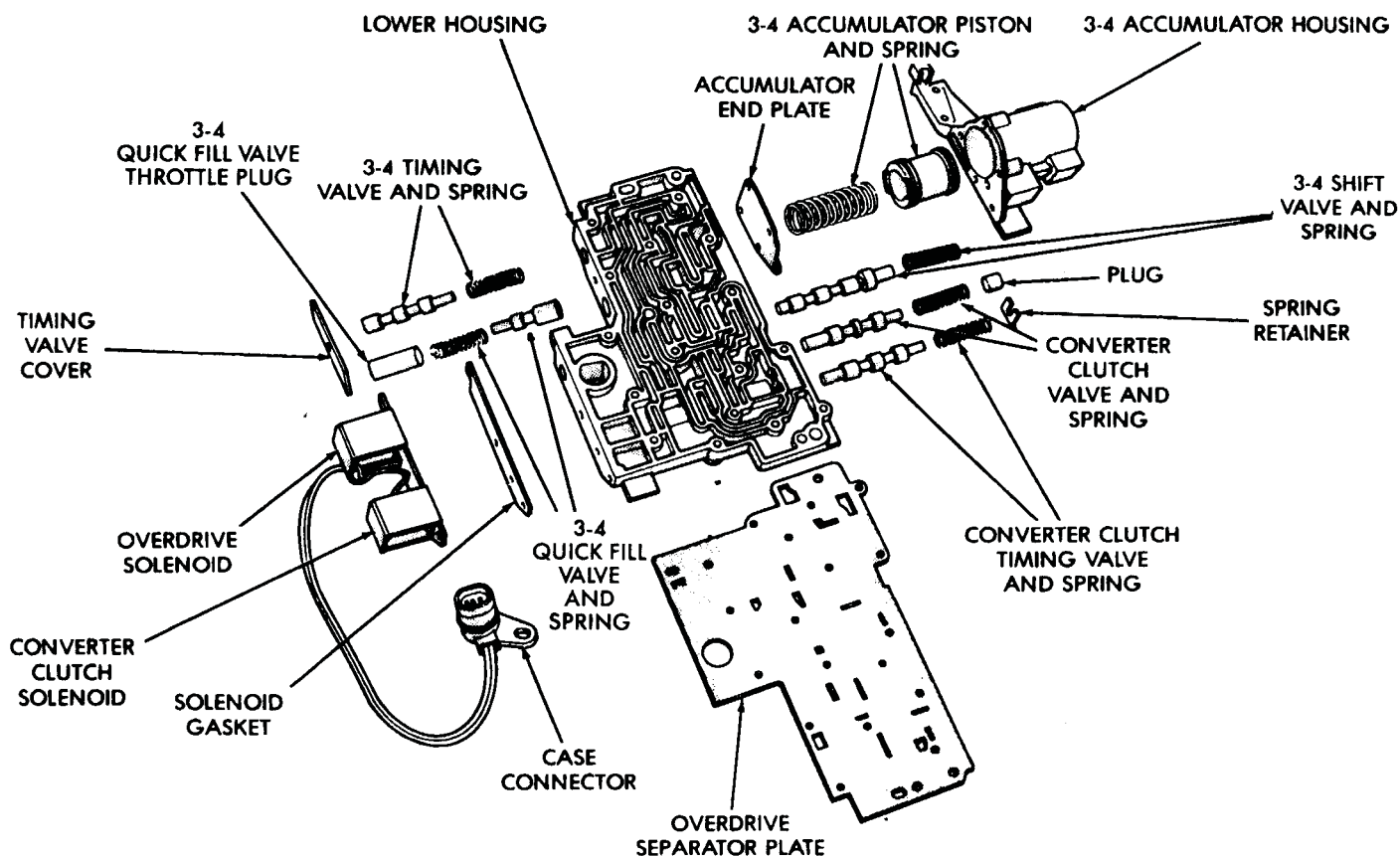
## VALVE BODY A500 (42RH)



**Fig. 34 Boost Valve Tube Removal**



**Fig. 35 Boost Valve Tube Removal**



**Fig. 36 Lower Housing Shift Valves And Springs**

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## VALVE BODY A500 (42RH)

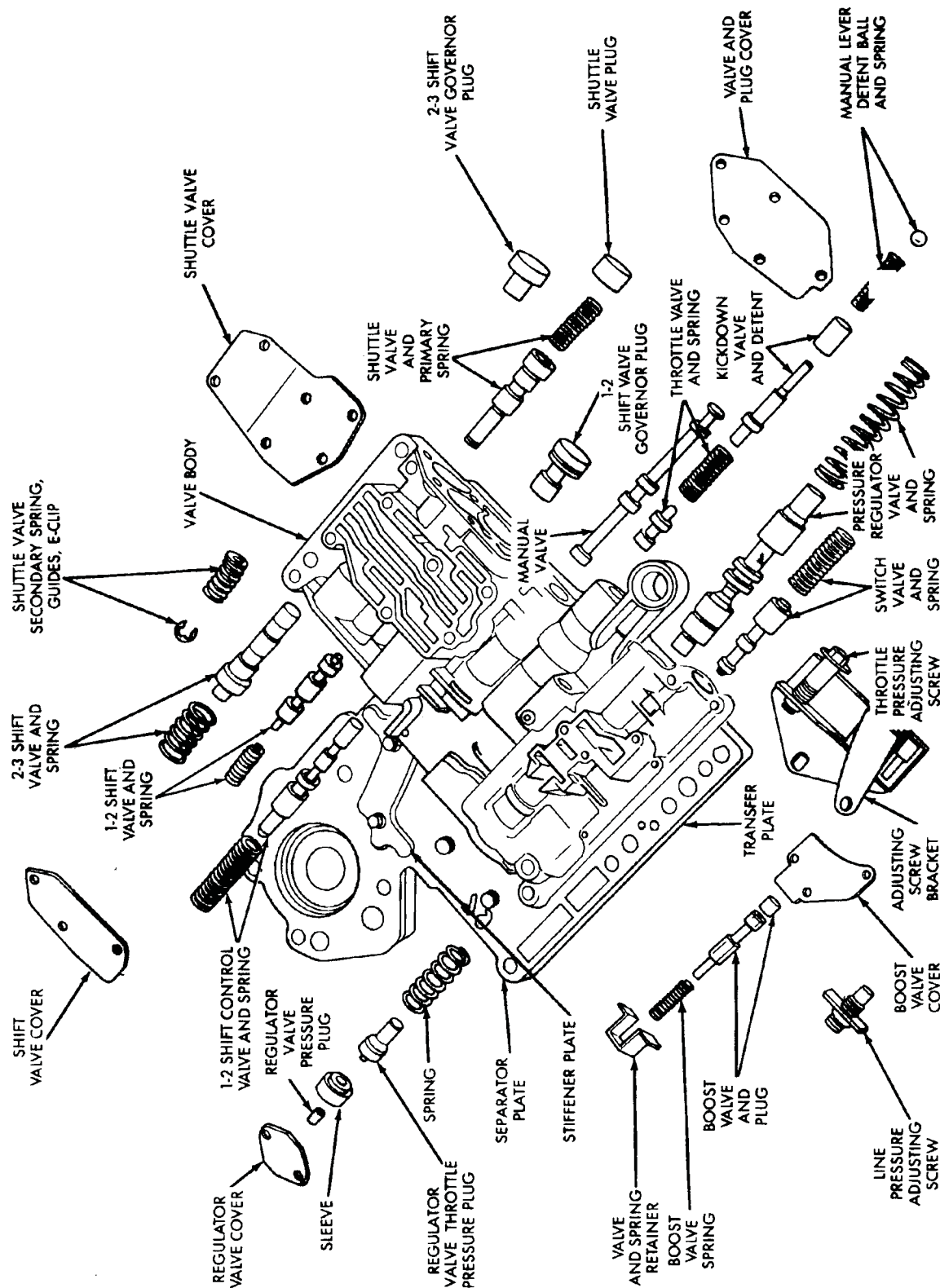
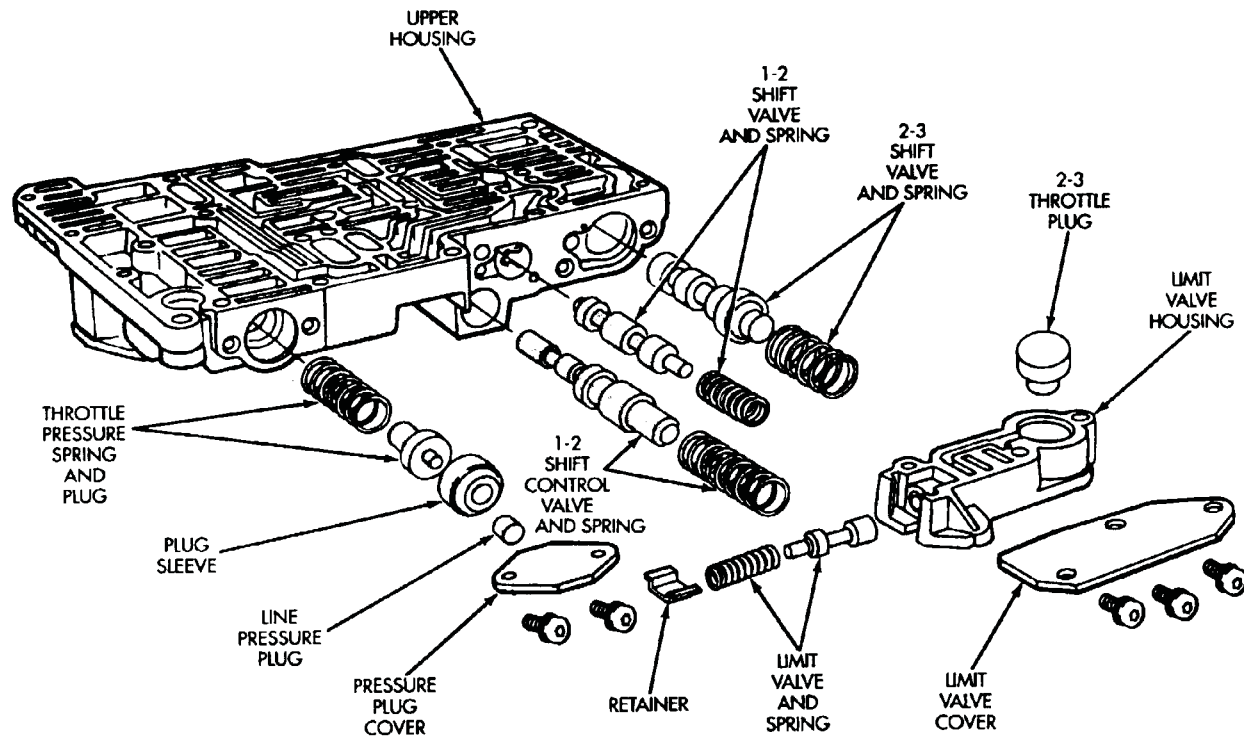


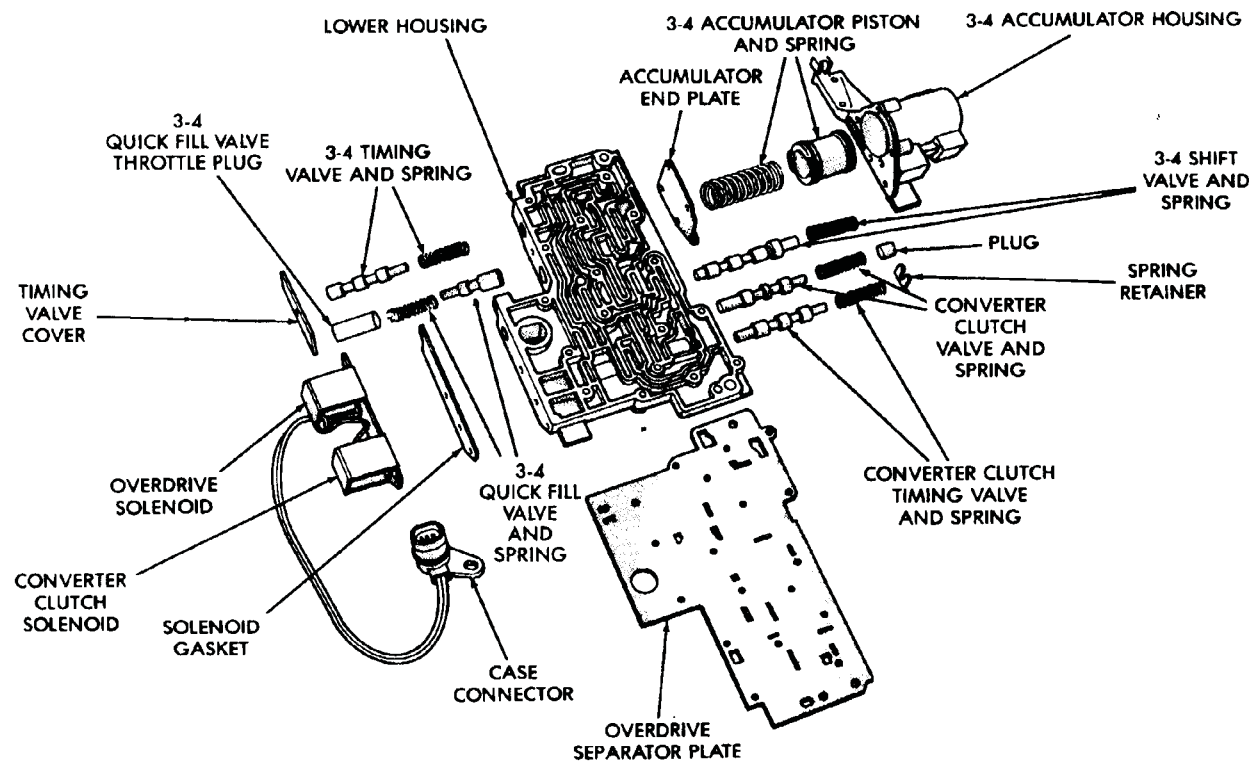
Fig. 37 Upper Housing Components



## VALVE BODY A518 (46RH) A618 (47RH)



**Fig. 38 Upper Housing Shift Valves And Pressure Plugs**



**Fig. 39 Lower Housing Shift Valves And Springs**

## AUTOMATIC TRANSMISSION SERVICE GROUP

## VALVE BODY A518 (46RH) A618 (47RH)

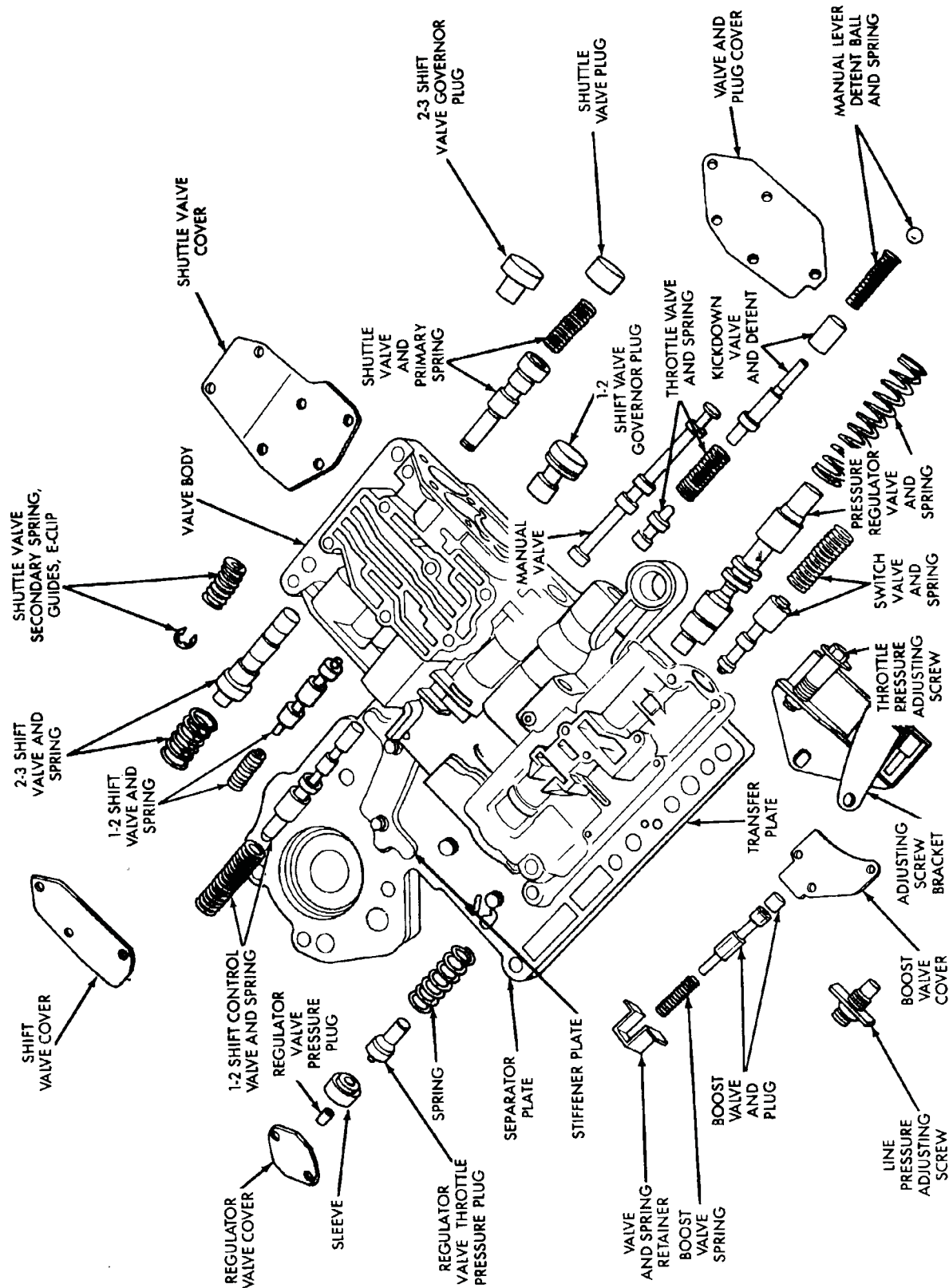
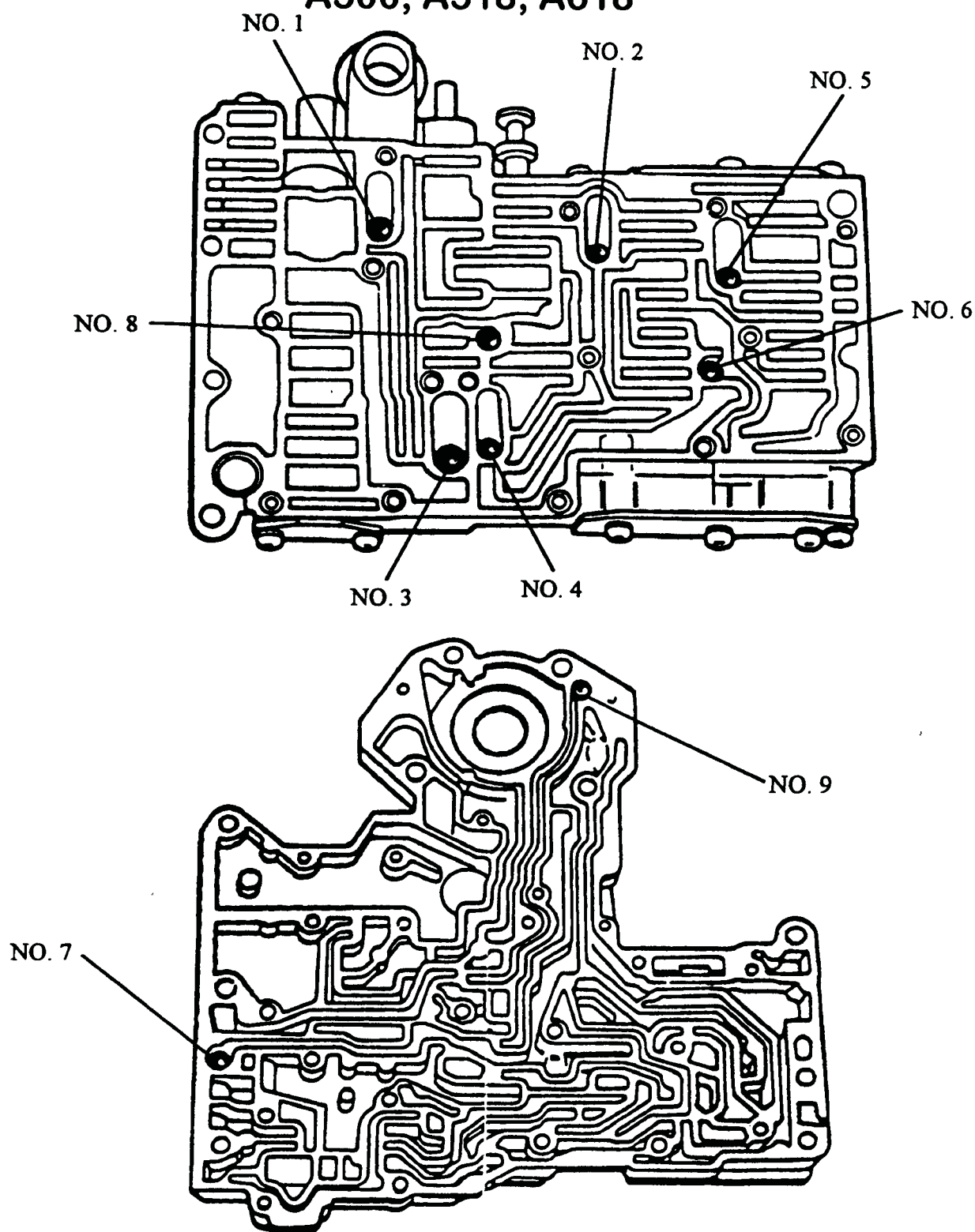


Fig. 40 Upper Housing Components

## VALVE BODY CHECK BALL LOCATIONS A500, A518, A618



**Fig. 41 Check Ball Locations**

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## VALVE BODY CHECK BALL FUNCTIONS A500, A518, A618

### BALL SIZE DESCRIPTION

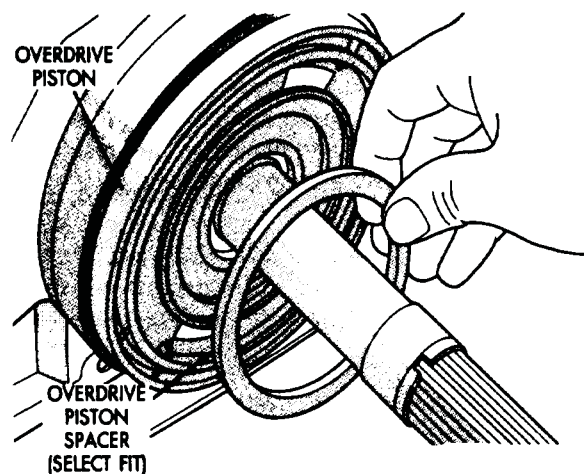
1	1/4" STEEL	A) Checkball NO. 1 forces line pressure behind the 1-2 shift control valve and both the 1-2 and 2-3 governor plugs to prevent an upshift into 2nd and/or 3rd gear when the selector lever is placed into Manual Low. B) Checkball NO. 1 directs throttle pressure behind the 1-2 shift control valve and blocks the passage to the 1-2 governor plug in order to inhibit a 3-1 downshift during a forced 3-2 downshift when the vehicle is above the calibrated speed.
2	1/4" STEEL	A) Checkball NO. 2 forces line pressure behind the 2-3 shift valve to prevent a 2-3 upshift when the selector lever is placed in Manual 2nd. B) Checkball NO. 2 blocks the manual 2nd circuit and directs throttle pressure to the 2-3 shift valve during a 3-2 forced downshift.
3	11/32" STEEL	A) Checkball NO. 3 blocks front (Direct) clutch oil (after a 2-3 upshift) from entering the reverse band circuit and allows front (Direct) clutch oil to enter the intermediate band release circuit. B) When the selector lever is placed into Reverse, Checkball NO. 3 blocks the intermediate band release circuit and allows reverse oil to apply the front (Direct) clutch.
4	1/4" STEEL	A) Checkball NO. 4 blocks rear band apply pressure from entering the front (Direct) clutch circuit when the selector lever is placed into Manual Low. B) Checkball NO. 4 blocks the manual low circuit and directs line pressure to the rear band when the selector lever is placed into Reverse
5	1/4" STEEL	A) Checkball NO. 5 blocks the manual 2nd circuit and directs throttle pressure to back side of both shift valves and the shuttle valve when the selector lever is placed in either Drive or Reverse. B) Checkball NO. 5 blocks the throttle pressure circuit and directs line pressure to back side of the 2-3 shift valve, to prevent a 2-3 upshift, when the selector lever is placed in Man. 2.
6	1/4" STEEL	A) Checkball NO. 6 forces intermediate band apply oil through an orifice to apply the intermediate band and stroke the 1-2 accumulator on a 1-2 upshift.
7	1/4" STEEL	A) Checkball NO. 7 forces rear (Forward) clutch apply oil through an orifice for a smooth garage shift into any forward range.
8	1/4" STEEL	A) Checkball NO. 8 blocks line pressure from entering the rear (Forward) clutch circuit when the selector lever is placed in either Park, Reverse or Neutral.
9	1/4" STEEL	A) Checkball NO. 9 forces rear band apply oil through an orifice for a smooth reverse band engagement when the selector lever is placed in either Manual Low or Reverse.

*Fig. 42 Check Ball Functions*

## A500 (42RH/A518 (46RH/A618 (47RH) OVERDRIVE SECTION

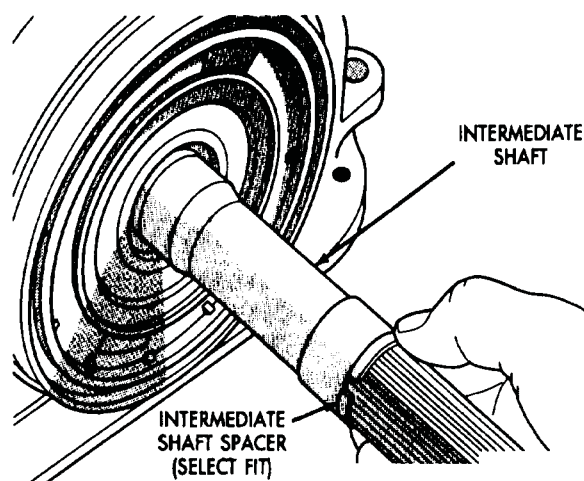
### OVERDRIVE UNIT DISASSEMBLY

(1) Remove overdrive piston thrust plate (Fig. 1). Retain thrust plate. It is a select fit part and can be reused.



**Fig. 1 Overdrive Piston Thrust Plate Removal/Installation**

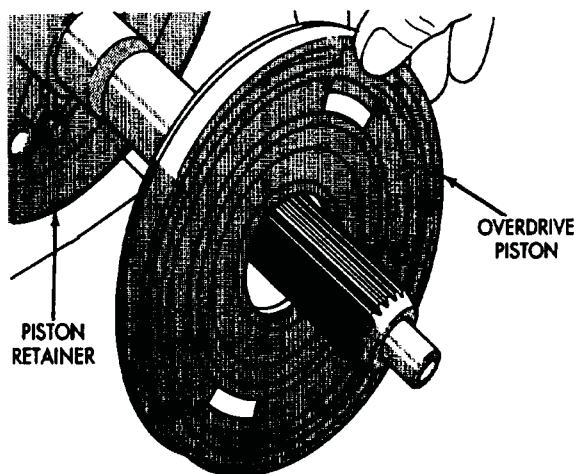
(2) Remove intermediate shaft spacer (Fig. 2). Retain spacer. It is a select fit part and can be reused.



**Fig. 2 Intermediate Shaft Spacer Location**

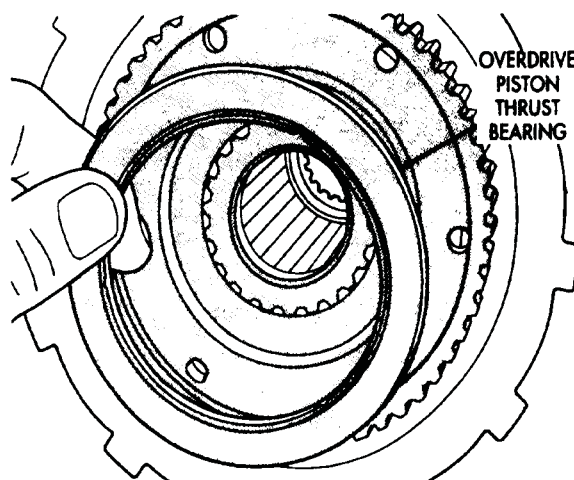
(3) Remove overdrive piston from retainer (Fig. 3).

(4) Remove overdrive piston thrust bearing from



**Fig. 3 Removing Overdrive Piston**

direct clutch hub (Fig. 4).



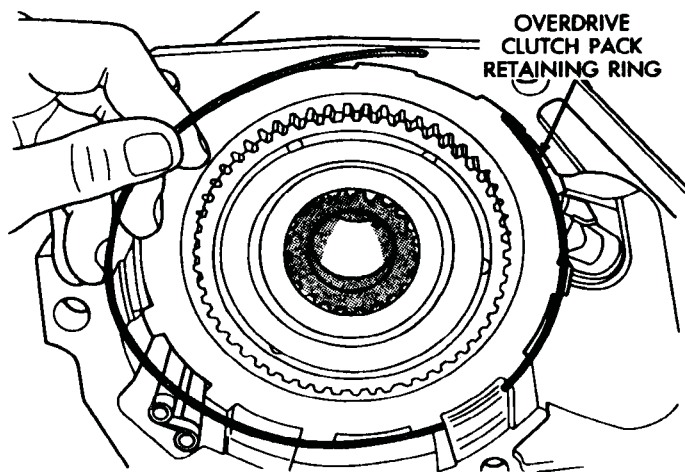
**Fig. 4 Overdrive Piston Thrust Bearing Removal**

(5) Remove overdrive clutch pack retaining ring (Fig. 5).

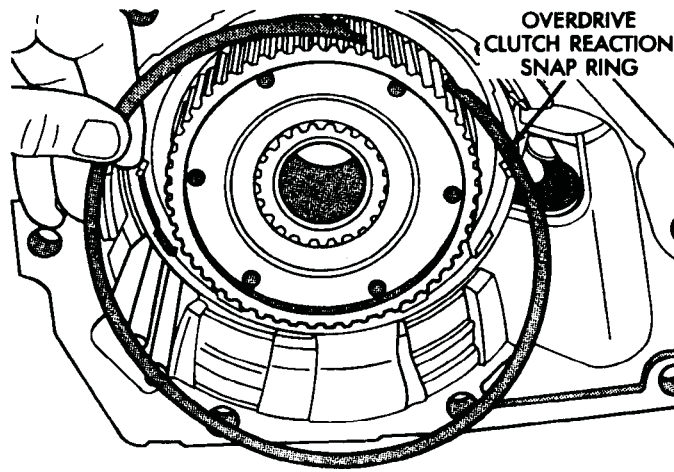
(6) Remove overdrive clutch pack (Fig. 6). Note that thickest plate is positioned at rear of clutch pack.

(7) Remove overdrive clutch wave spring (Fig. 7).

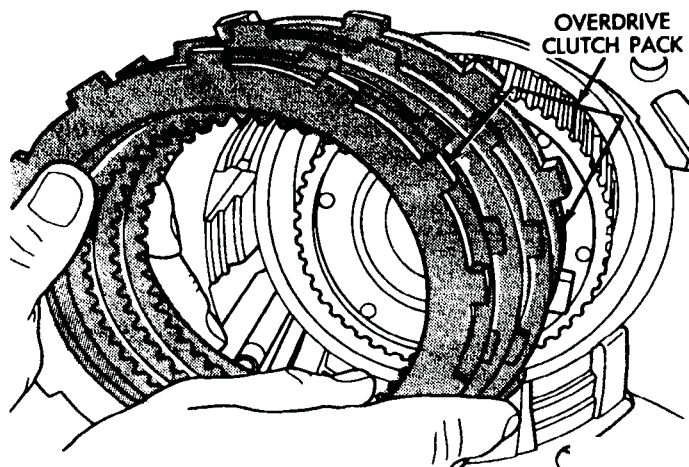
(8) Remove overdrive clutch reaction snap ring (Fig. 8). Note that snap ring is located in same groove as wave spring.



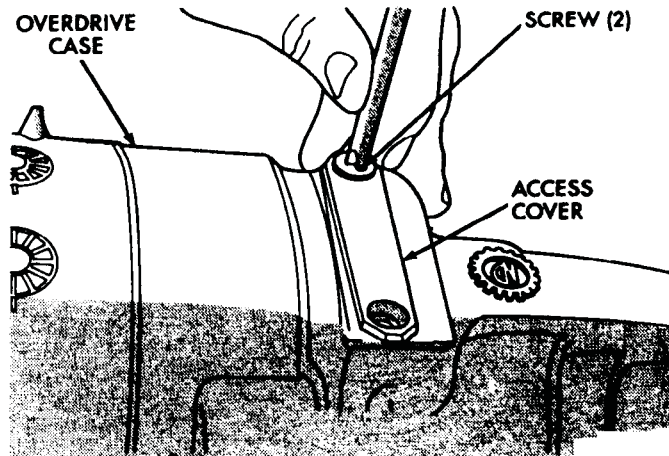
**Fig. 5 Overdrive Clutch Pack Retaining Ring Removal**



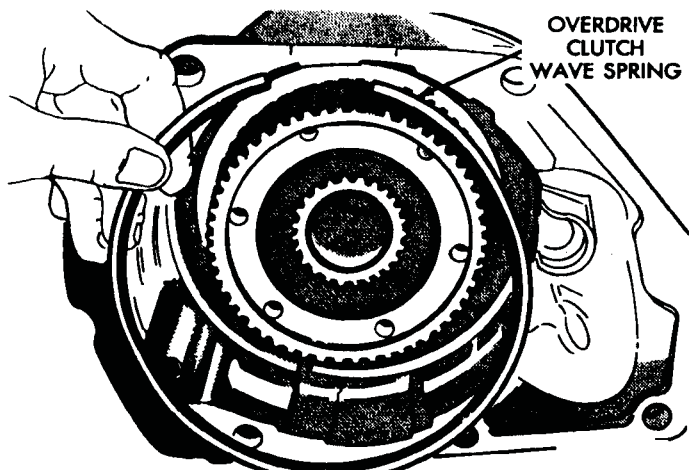
**Fig. 8 Overdrive Clutch Reaction Snap Ring Removal**



**Fig. 6 Overdrive Clutch Pack Removal**



**Fig. 9 Locating Ring Access Cover Removal**

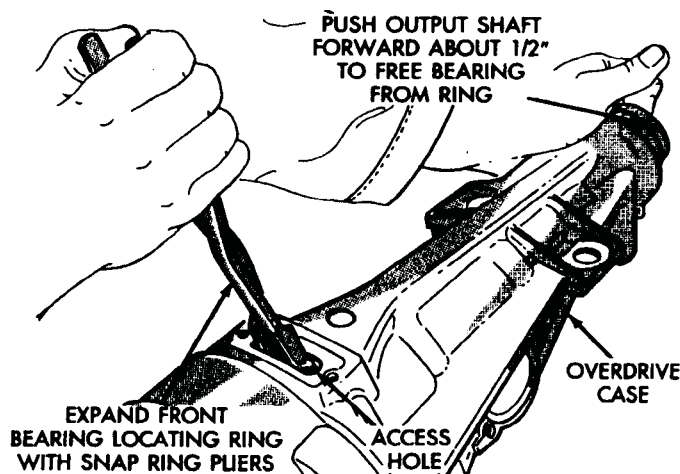


**Fig. 7 Overdrive Clutch Wave Spring Removal**

(9) Remove access cover and gasket from case (Fig. 9). Cover provides access to output shaft front bearing locating ring.

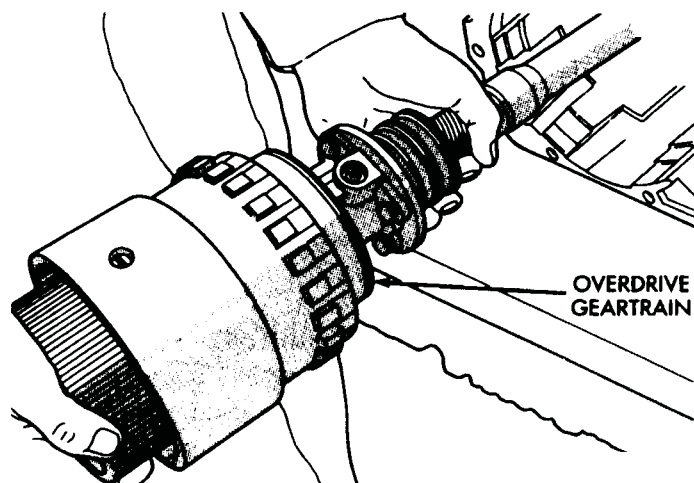
(10) Expand output shaft bearing snap ring with

snap ring pliers. Then push output shaft forward to release shaft front bearing from locating ring (Fig. 10).



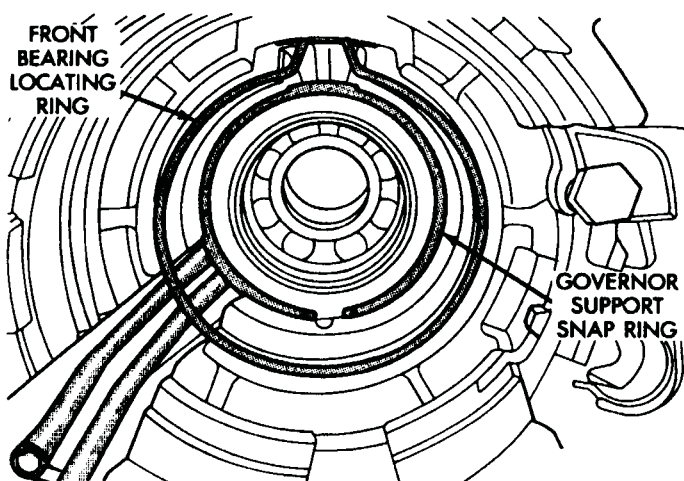
**Fig. 10 Releasing Shaft Front Bearing From Locating Ring**

- (11) Remove geartrain assembly from housing (Fig. 11). Set geartrain aside.



**Fig. 11 Overdrive Geartrain Removal**

- (12) Remove output shaft front bearing locating ring and governor support snap ring (Fig. 12).



**Fig. 12 Front Bearing Locating Ring And Governor Support Snap Ring Location**

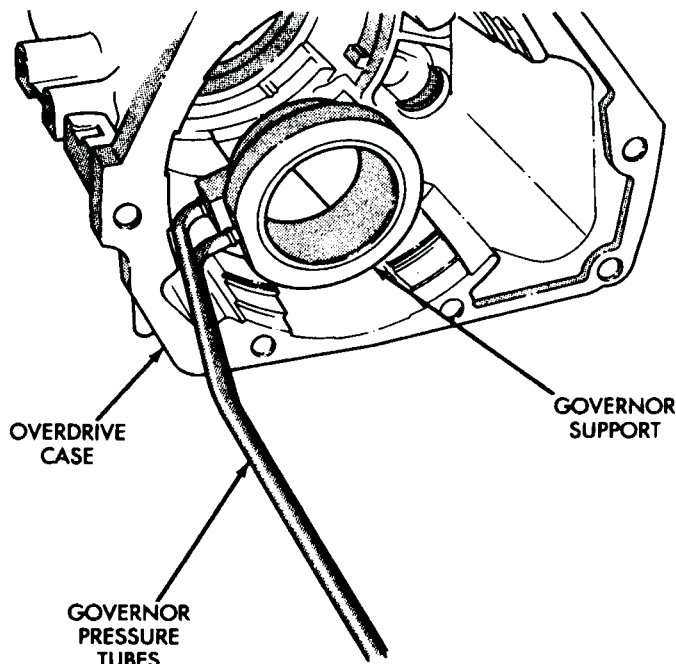
- (13) Remove governor support and tube assembly from case (Fig. 13).

- (14) Remove park pawl retaining bolt and reaction plug snap ring (Fig. 14). Compress snap ring only enough to remove it. Snap ring can be distorted if overcompressed.

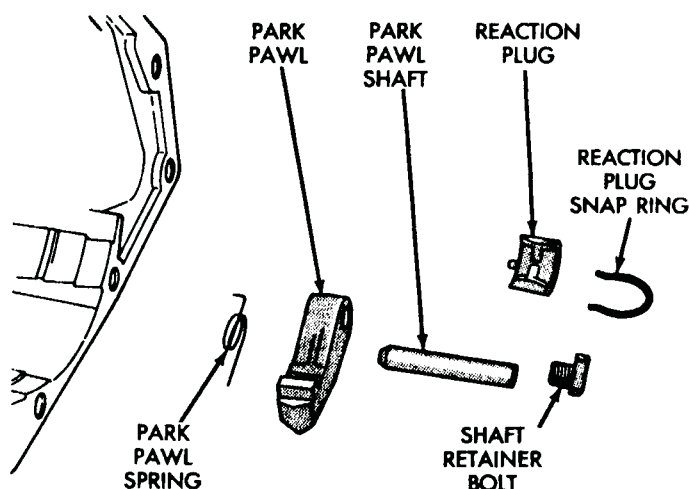
- (15) Remove park pawl shaft, park pawl, pawl spring and reaction plug (Fig. 14).

- (16) Remove output shaft rear bearing snap ring (Fig. 15). Remove snap ring with long jaw internal type snap ring pliers. Or, rotate snap ring until one end is adjacent to notch in case. Then unseat ring with extra long flat blade screwdriver.

- (17) Remove rear bearing by tapping overdrive case on wood block to dislodge bearing.



**Fig. 13 Governor Support And Tube Assembly Removal**



**Fig. 14 Park Lock Component Removal**

## OVERDRIVE GEARTRAIN DISASSEMBLY

- (1) Remove E-clip from one end of governor valve shaft and remove shaft and valve (Fig. 16).

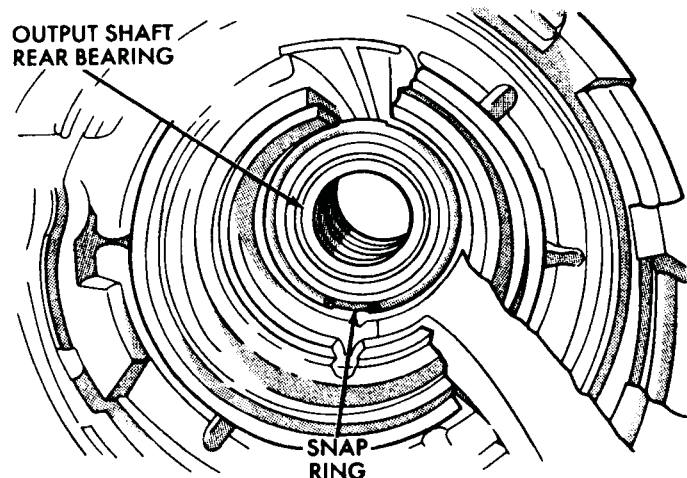
- (2) Remove governor snap ring (fig. 17).

- (3) Remove governor body and drive as assembly (Fig. 18). Set assembly aside for disassembly, inspection, and overhaul. Refer to Governor Overhaul procedures.

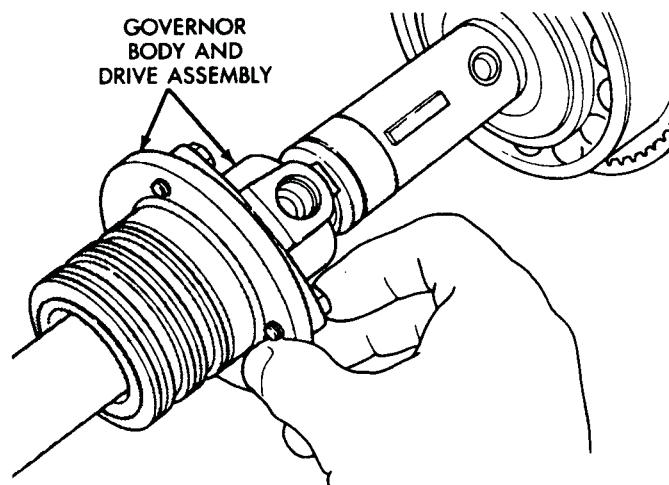
- (4) Remove governor drive key (Fig. 19).

- (5) Remove output shaft front bearing snap ring (Fig. 20).

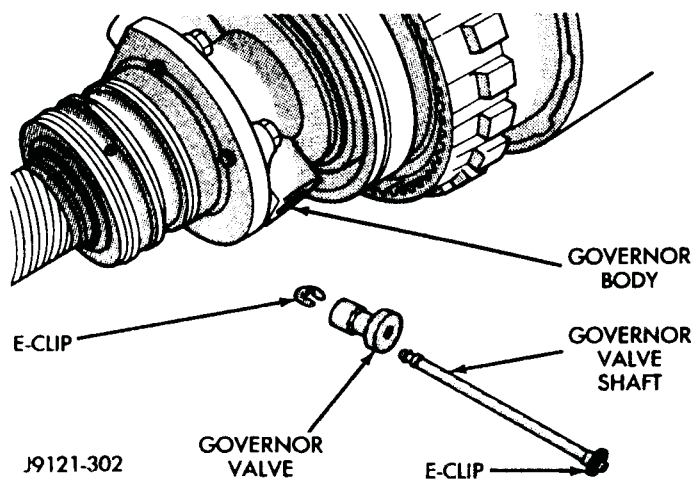




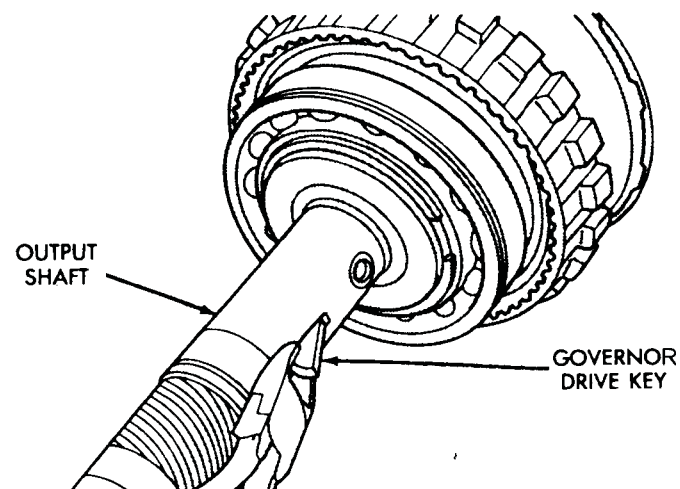
**Fig. 15 Output Shaft Rear Bearing And Snap Ring Location**



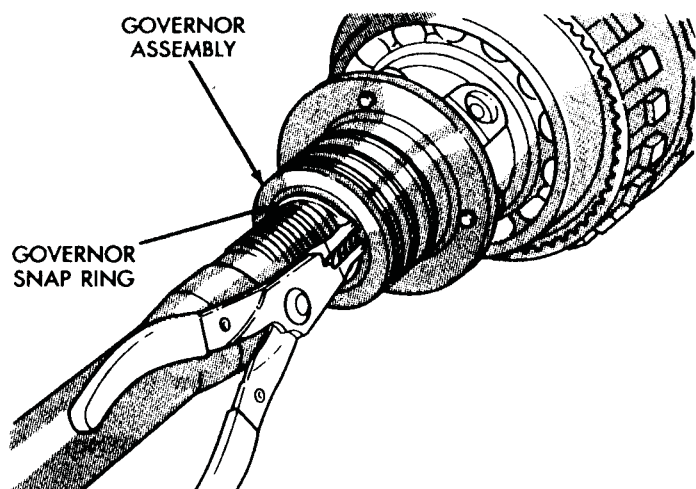
**Fig. 18 Governor Body And Drive Assembly Removal**



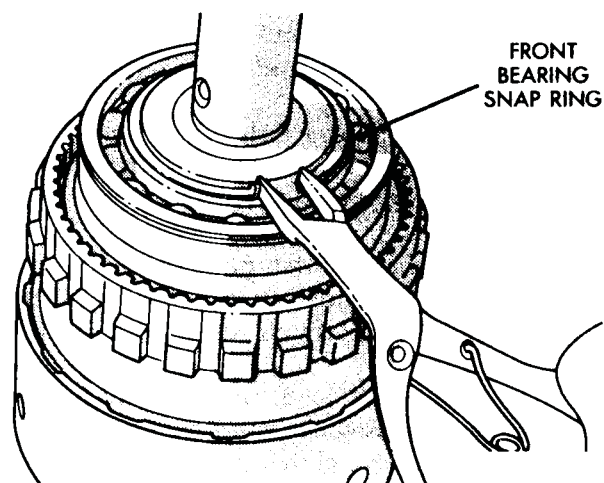
**Fig. 16 Governor Valve And Shaft Removal/Installation**



**Fig. 19 Governor Drive Key Removal**

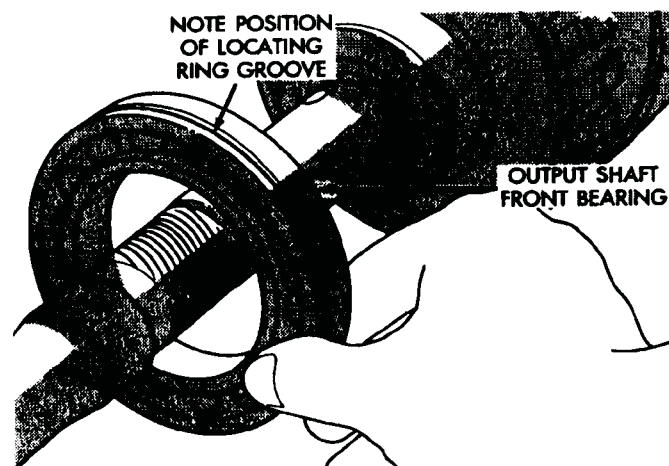


**Fig. 17 Removing/Installing Governor Snap Ring**



**Fig. 20 Front Bearing Snap Ring Removal**

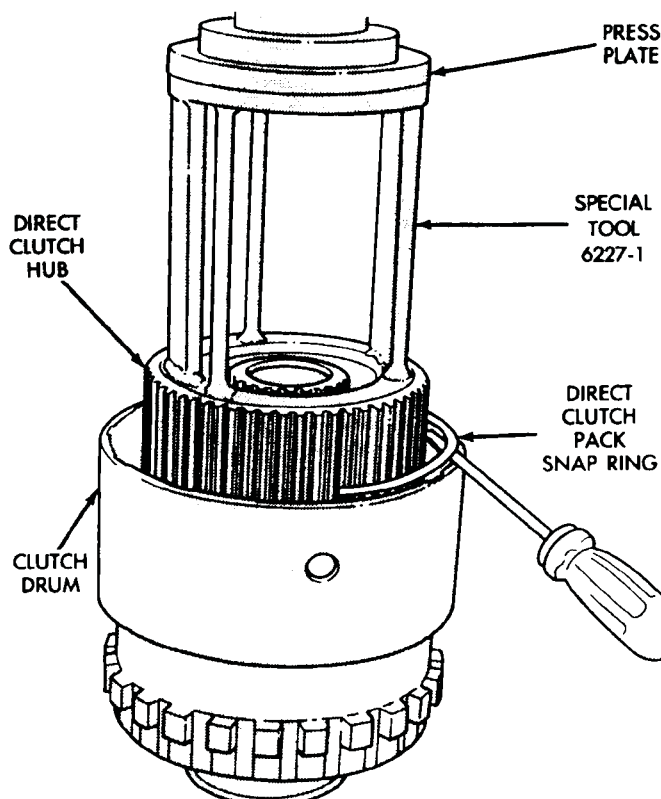
- (6) Remove front bearing from output shaft (Fig. 21).



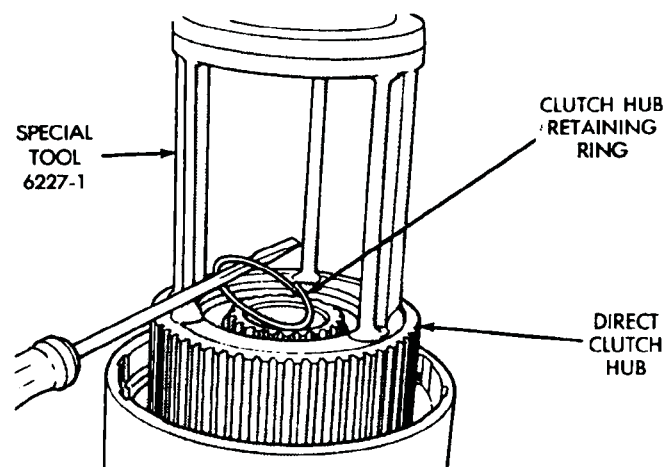
**Fig. 21 Output Shaft Front Bearing Removal**

**WARNING: THE NEXT STEP IN GEARTRAIN DISASSEMBLY INVOLVES COMPRESSING THE DIRECT CLUTCH SPRING. IT IS EXTREMELY IMPORTANT THAT PROPER EQUIPMENT BE USED TO COMPRESS THE SPRING AS SPRING FORCE IS APPROXIMATELY 830 POUNDS. USE SPRING COMPRESSOR TOOL 6227-1 AND A HYDRAULIC SHOP PRESS WITH A MINIMUM RAM TRAVEL OF 5-6 INCHES. THE PRESS MUST ALSO HAVE A BED THAT CAN BE ADJUSTED UP OR DOWN AS REQUIRED. RELEASE CLUTCH SPRING TENSION SLOWLY AND COMPLETELY TO AVOID PERSONAL INJURY.**

- (7) Mount geartrain in shop press
- (8) Position Compressor Tool 6227-1 on clutch hub (Fig. 22). Support output shaft flange with steel press plates as shown and center assembly under press ram.
- (9) Apply press pressure slowly. Compress hub and spring far enough to expose clutch hub retaining ring and relieve spring pressure on clutch pack snap ring (Fig. 22).
- (10) Remove direct clutch pack snap ring first (Fig. 22).
- (11) Remove direct clutch hub retaining ring (Fig. 23).
- (12) Release press load on clutch spring **slowly and completely**. Remove press tools and geartrain.
- (13) Remove direct clutch pack from hub (Fig. 24).
- (14) Remove direct clutch hub and spring (Fig. 25).
- (15) Remove sun gear and spring plate, planetary thrust bearing and planetary gear (Fig. 26).
- (16) Remove overrunning clutch assembly with expanding type snap ring pliers (Fig. 27). Insert pliers



**Fig. 22 Direct Clutch Pack Snap Ring Removal**

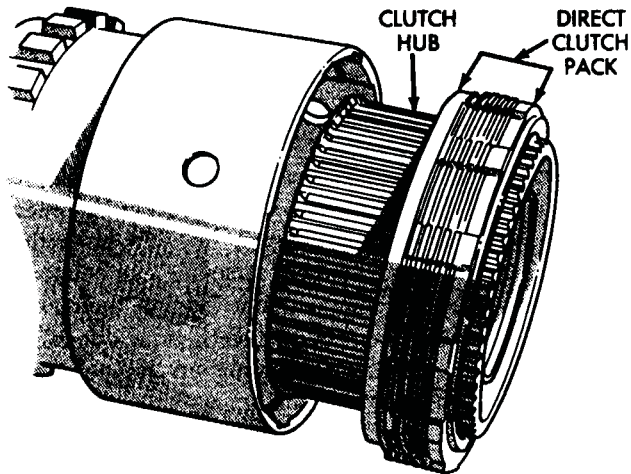


**Fig. 23 Direct Clutch Hub Retaining Ring Removal**

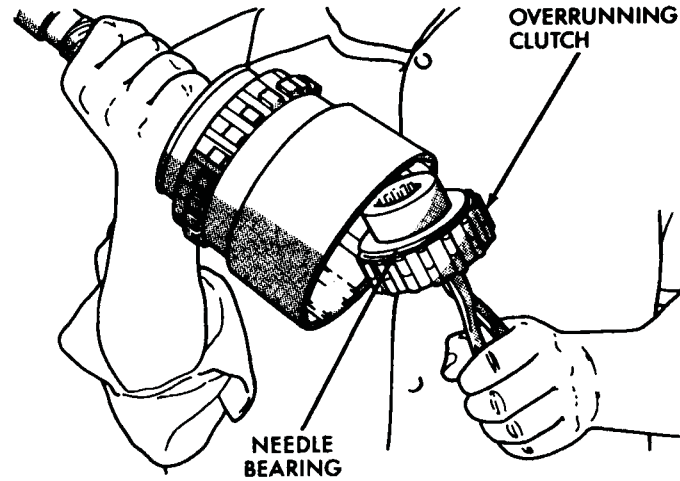
into clutch hub. Expand pliers to grip hub splines and remove clutch with counterclockwise, twisting motion.

- (17) Remove thrust bearing from overrunning clutch hub (Fig. 28).
- (18) Remove overrunning clutch from hub (Fig. 28).

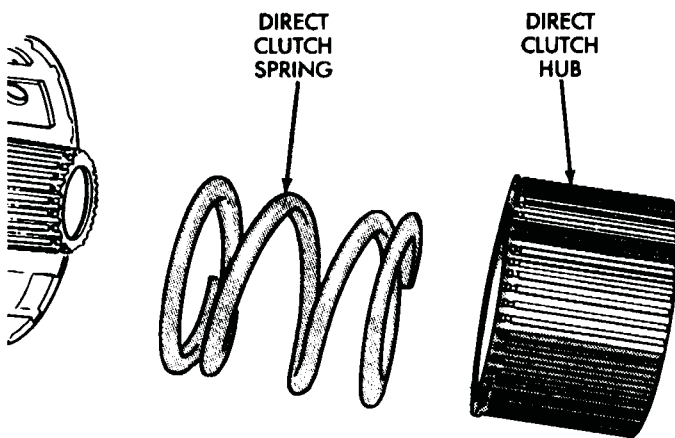




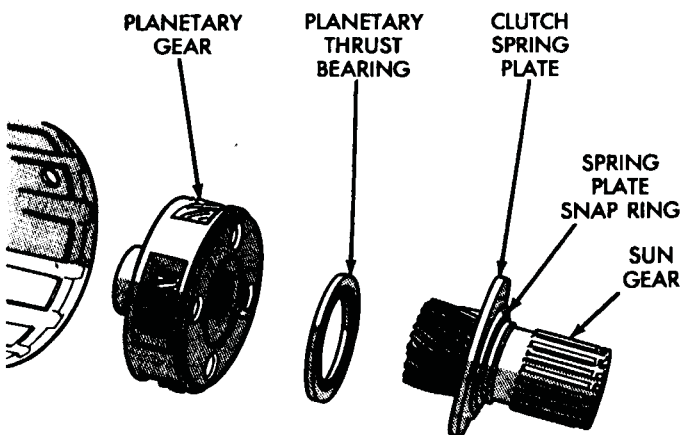
**Fig. 24 Direct Clutch Pack Removal**



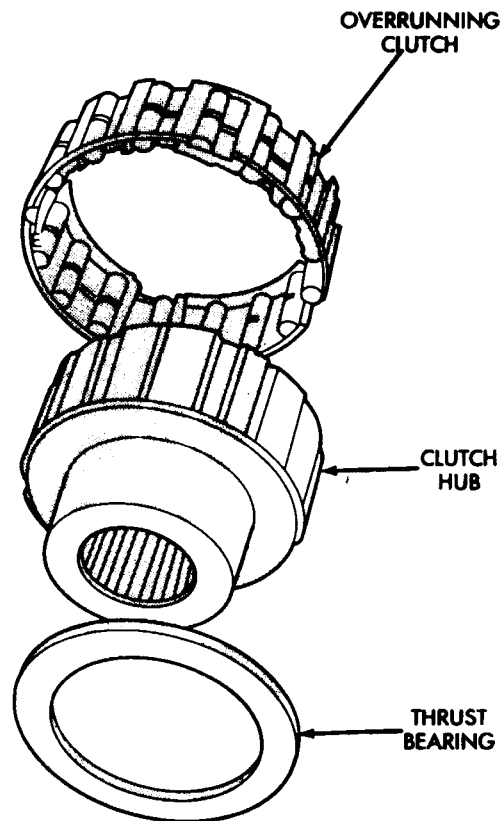
**Fig. 27 Overrunning Clutch Removal**



**Fig. 25 Direct Clutch Hub And Spring Removal**

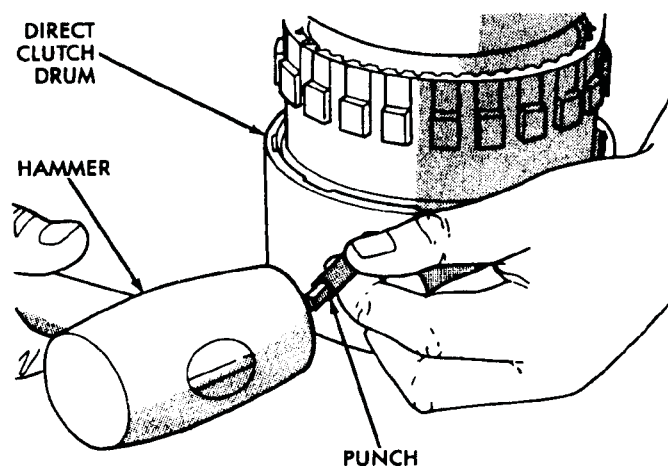


**Fig. 26 Sun Gear, Thrust Bearing And Planetary Gear Removal**



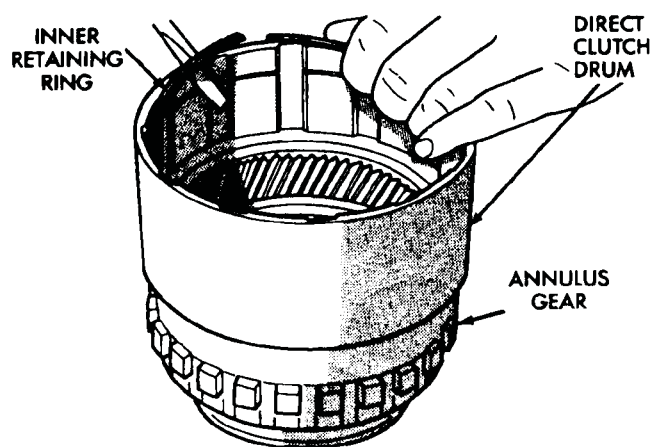
**Fig. 28 Overrunning Clutch Components**

(19) Mark position of annulus gear and direct clutch drum for assembly alignment reference (Fig. 29). Use small center punch or scribe to make alignment marks.



**Fig. 29 Marking Direct Clutch Drum And Annulus Gear For Assembly Alignment**

(20) Remove direct clutch drum rear retaining ring (Fig. 30).



**Fig. 30 Removing Clutch Drum Inner Retaining Ring**

(21) Remove direct clutch drum outer retaining ring (Fig. 31).

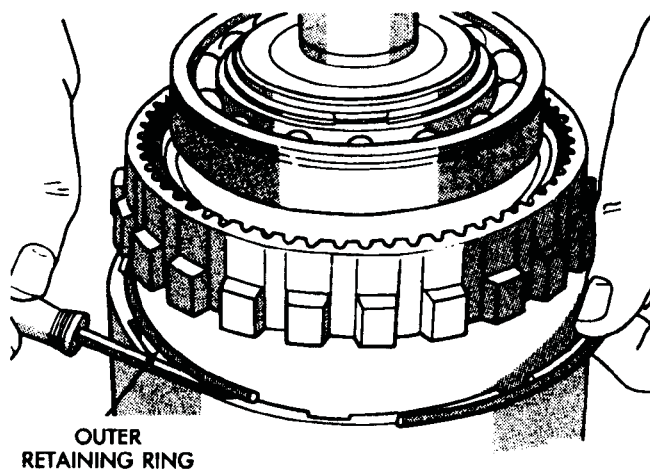
(22) Mark annulus gear and output shaft for assembly alignment reference (Fig. 32).

(23) Remove annulus gear from output shaft (Fig. 33). Use rawhide or plastic mallet to tap gear off shaft.

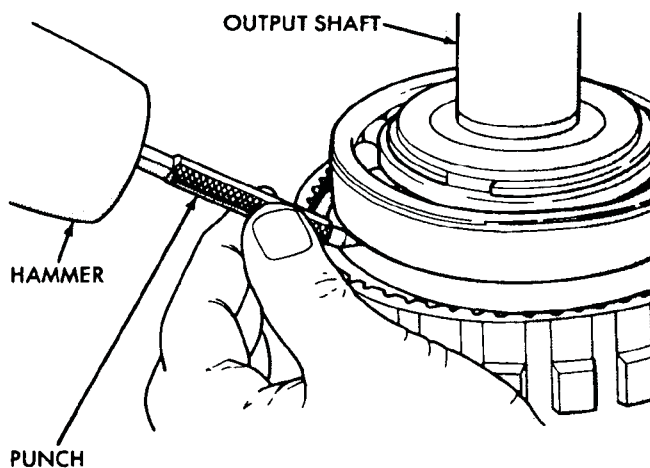
(24) Remove output shaft front bearing if not previously removed.

## OVERDRIVE COMPONENT CLEANING AND INSPECTION

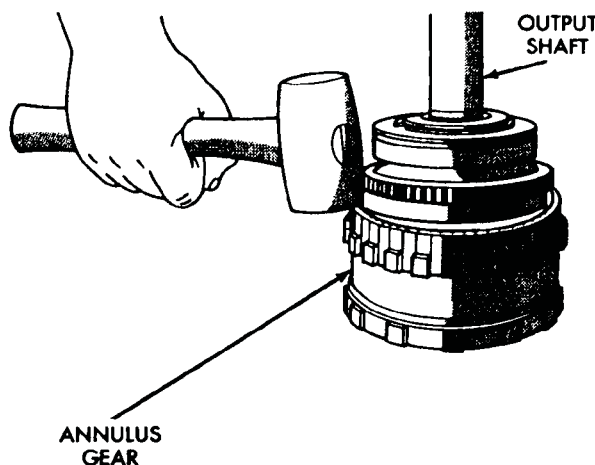
Clean the geartrain (Fig. 34) and case components (Fig. 35) with solvent. Dry all parts except the bearings with compressed air. Allow bearings to air dry.



**Fig. 31 Clutch Drum Outer Retaining Ring Removal**



**Fig. 32 Marking Annulus Gear And Output Shaft For Assembly Alignment**



**Fig. 33 Annulus Gear Removal**

Do not use shop towels for wiping parts dry unless the towels are made from a lint-free material. A suf-

ficient quantity of lint (from shop towels, cloths, rags, etc.) could plug the transmission filter and fluid passages.

Discard the old case gasket and seals. Do not attempt to salvage these parts. They are not reusable. Replace any of the overdrive unit snap rings if distorted or damaged.

Minor nicks or scratches on components can be smoothed with crocus cloth. However, do not attempt to reduce severe scoring on any components with abrasive materials. Replace severely scored components; do not try to salvage them.

Check condition of the park lock components and the overdrive case (Fig. 36).

Replace the case if cracked, scored, or damaged. Replace the park lock pawl, plug, or spring if worn or damaged. Be sure the bullet at the end of the park lock rod is in good condition. Replace the rod if the bullet is worn or the rod itself is bent or distorted. Do not attempt to straighten the rod.

Check the bushings in the overdrive case. Replace the bushings if severely scored or worn. Also replace the case seal if loose, distorted, or damaged.

Examine the overdrive and direct clutch discs and plates (Fig. 34). Replace the discs if the facing is worn, severely scored, or burned and flaking off. Replace the clutch plates if worn, heavily scored, or cracked. Check the lugs on the clutch plates for wear.

The plates should slide freely in the drum. Replace the plates or drum if binding occurs.

Check condition of the annulus gear, direct clutch hub, clutch drum and clutch spring (Fig. 34). Replace the gear, hub and drum if worn or damaged. Replace the spring if collapsed, distorted, or cracked.

Be sure the splines and lugs on the gear, drum and hub are in good condition. The clutch plates and discs should slide freely in these components.

Inspect the thrust bearings and spring plate (Fig. 34). Replace the plate if worn or scored. Replace the bearings if rough, noisy, brinnelled, or worn.

Inspect the planetary gear assembly and the sun gear and bushings (Fig. 34). If either the sun gear or the bushings are damaged, replace the gear and bushings as an assembly. The gear and bushings are not serviced separately.

The planetary carrier and pinions must be in good condition. Also be sure the pinion pins are secure and in good condition. Replace the carrier if worn or damaged.

Inspect the overrunning clutch and race. The race surface should be smooth and free of scores. Replace the overrunning clutch assembly or the race if either assembly is worn or damaged in any way.

Inspect the output shaft and governor components (Fig. 36). Replace the shaft pilot bushing and inner

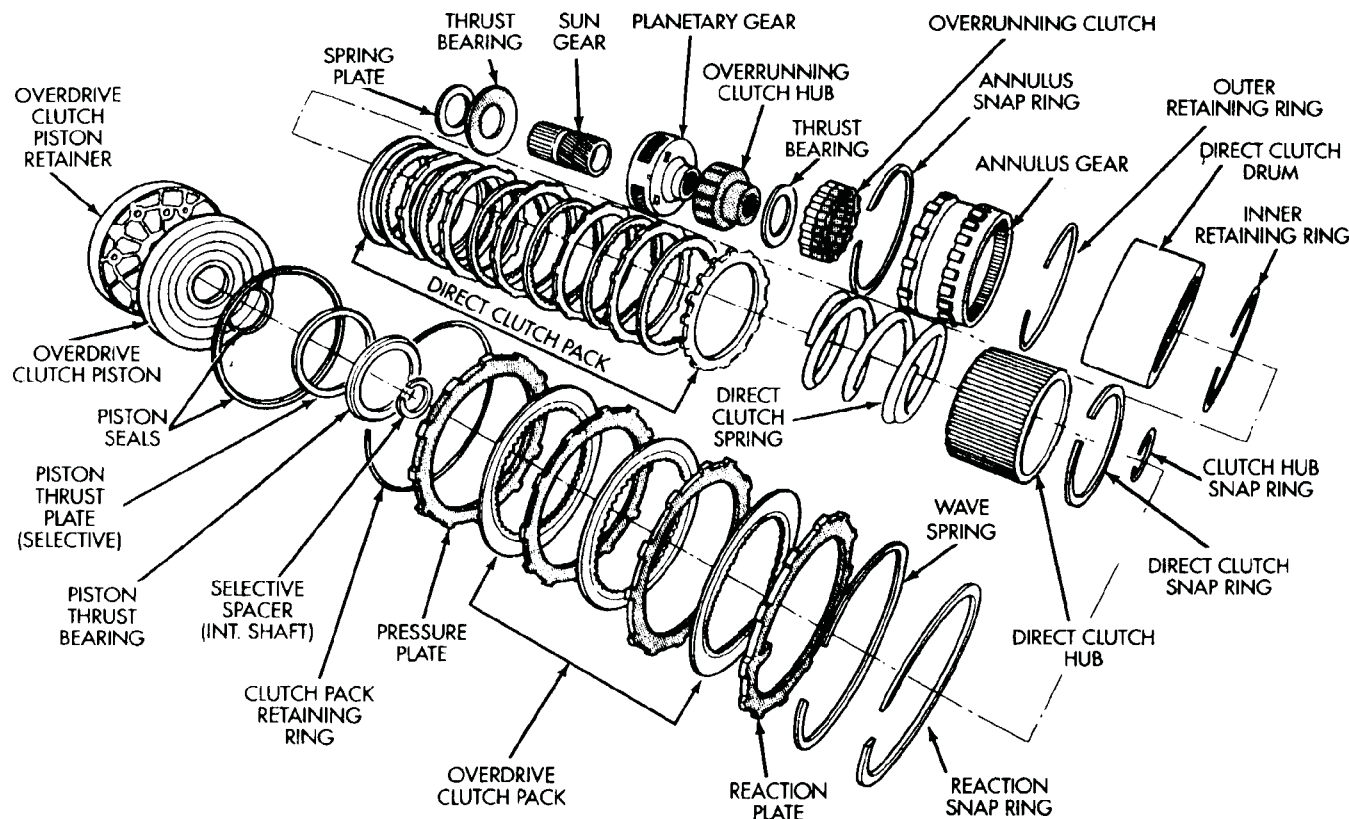
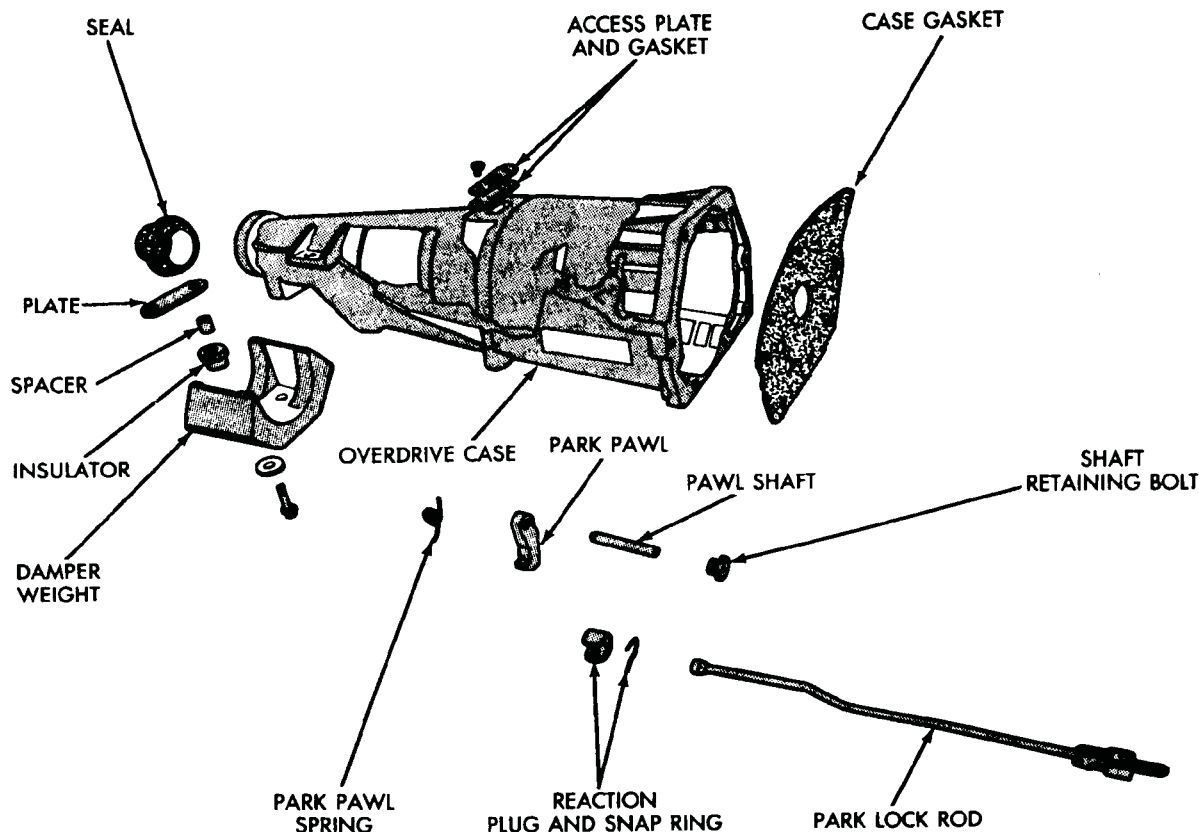


Fig. 34 Overdrive Geartrain Components (42RH Shown)



**Fig. 35 Overdrive Case And Park Lock Components**

bushing if damaged. Replace either shaft bearing if rough or noisy. Replace the bearing snap rings if distorted or cracked.

Check the machined surfaces on the output shaft. These surfaces should be clean and smooth. Very minor nicks or scratches can be smoothed with crocus cloth. Replace the shaft if worn, scored or damaged in any way.

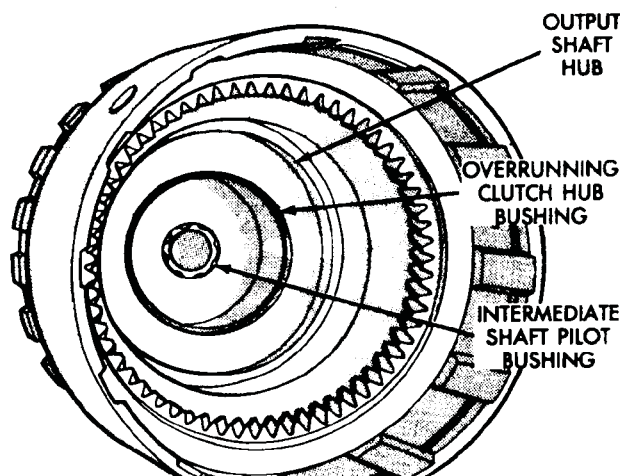
Inspect the output shaft bushings (Fig. 36). The small bushing is the intermediate shaft pilot bushing. The large bushing is the overrunning clutch hub bushing. Replace either bushing if scored, pitted, cracked, or worn.

The bushings can be removed with blind hole puller tools such as Snap-On set CG40CB for small bushings and set CG46 for large bushings. New bushings can be installed with tools from an all purpose installer kit such as the Snap-On A257 bushing driver set.

## GOVERNOR OVERHAUL

42RH/46RH models have an aluminum governor weight assembly. 47RH models have a brass/bronze alloy weight assembly. A 3-stage assembly is used in all except the diesel version of the 47RH.

The 3-stage governor weight assembly consists of an outer weight, a smaller weight spring, an inner weight, and a new intermediate weight. The sleeve-

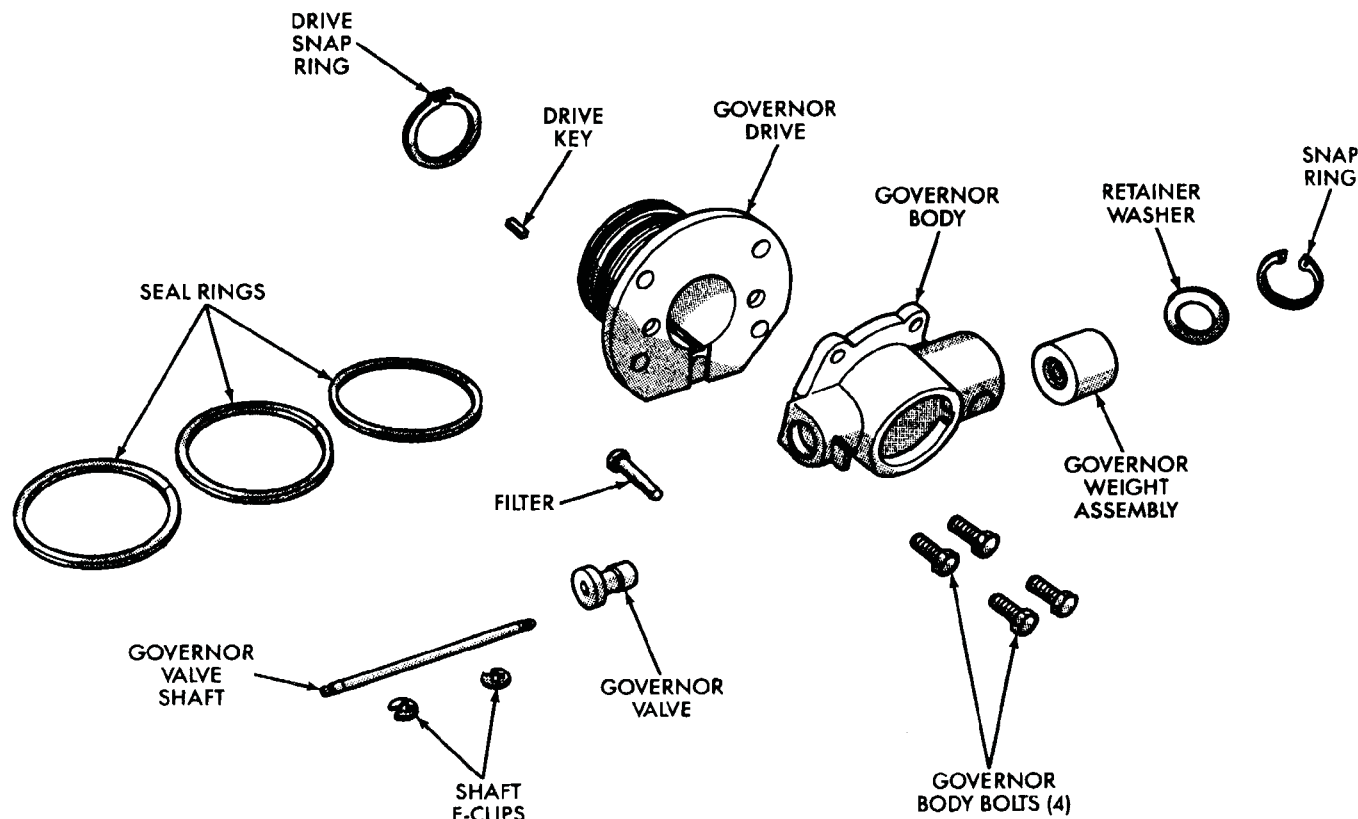


**Fig. 36 Output Shaft Bushing Location**

like intermediate weight fits inside the outer weight, and the inner weight now fits inside the new intermediate weight.

The governor body is different. A retainer washer was added to help secure the outer weight in the bore; the washer backs up the original snap ring which is still used. The new governor body has a slightly longer governor weight bore.





**Fig. 37 Governor Components**

## GOVERNOR DISASSEMBLY

- (1) Remove snap ring and washer that retain governor weight assembly in governor body (Fig. 38).
- (2) Remove governor weight assembly from governor body.
- (3) Note position of governor body on drive.
- (4) Clamp edge of governor drive in vise and loosen governor body bolts.
- (5) Remove bolts attaching governor body to drive.
- (6) Remove governor body (Fig. 40).
- (7) Remove filter from governor drive. Note position of filter for assembly reference (Fig. 40).
- (8) Disassemble governor weight:
  - (a) On 2-stage, remove snap ring and inner weight and spring. On 3-stage, slide intermediate weight from outer weight.
  - (b) Position intermediate weight on suitable size socket (Fig. 41).
  - (c) Press inner weight downward with nutdriver or similar tool (Fig. 41). Then remove inner weight snap ring with Plier Tool 6823 (Fig. 41).

## Governor Inspection

Check operation of the governor valve, weights and shaft. The valves and weights should slide freely in the governor body.

Check the governor drive seal rings. Replace the seal rings only if they exhibit wear or damage. Be sure the seal ring grooves in the drive are in good condition as well.

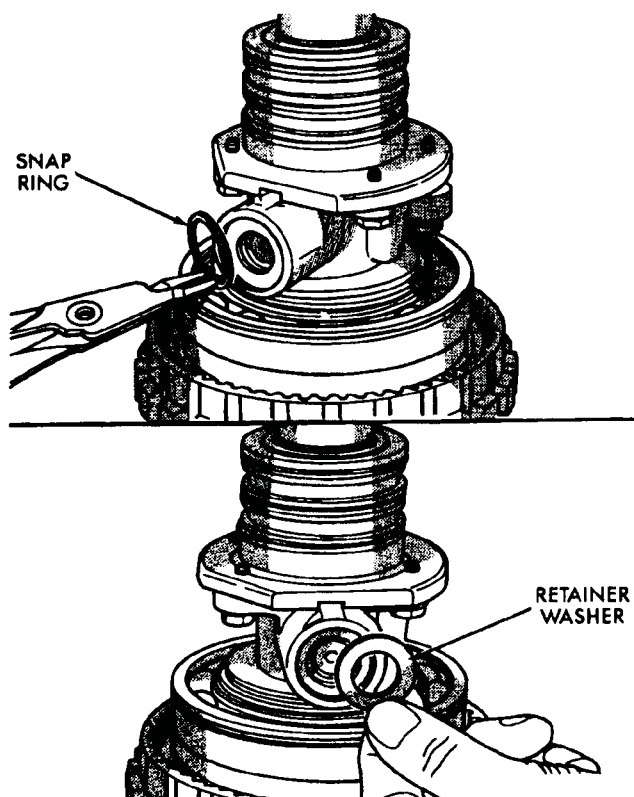
Inspect the governor support and oil pressure tubes. The tubes must not be pinched, kinked, collapsed, or distorted. Blow them out with compressed air to clear them. The tubes are designed to be a slip fit in the piston retainer boss. Do not modify the tube ends in an effort to make them fit tighter. **Both tubes are an integral part of the support. Do not attempt to remove them. Replace the support and oil tubes as an assembly if either part is damaged.**

Check condition of the governor snap rings. Replace any snap ring that appears bent or distorted, or condition is doubtful.

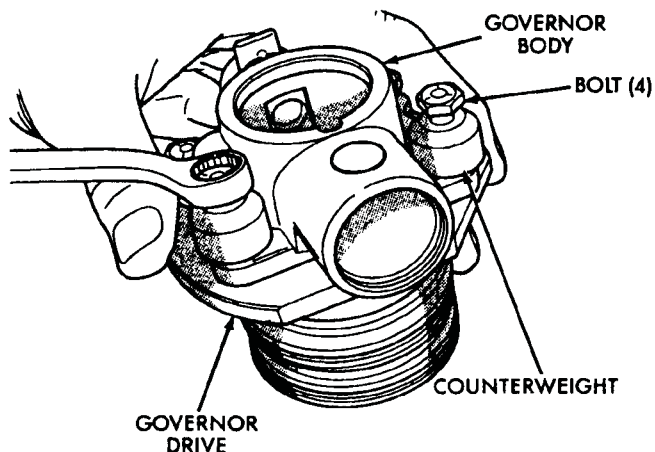
Inspect the governor body for damage. Replace it if cracked, or if the bores are worn.

## GOVERNOR ASSEMBLY

- (1) Lubricate governor components with Mopar ATF Plus transmission fluid during assembly.
- (2) Install new seal rings on governor drive as follows:
  - (a) Compress (squeeze) each seal over center before installation (Fig. 42). This action provides tighter ring fit on drive.



**Fig. 38 Governor Weight Retainer Washer And Snap Ring Removal**

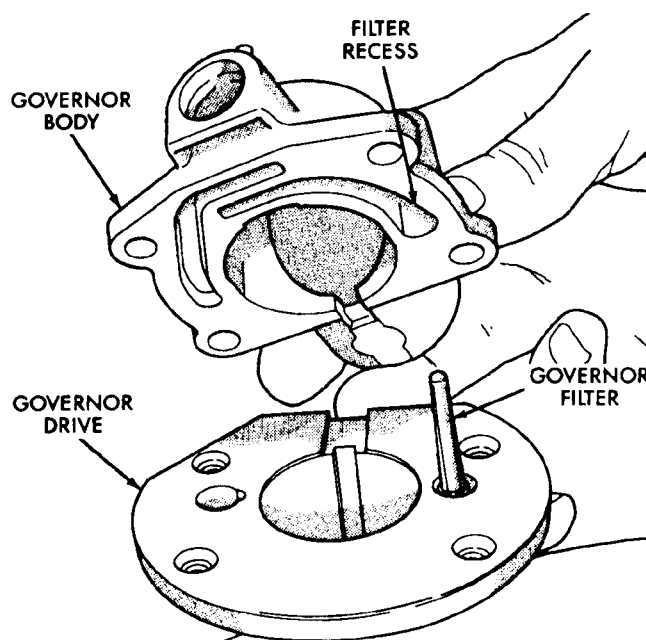


**Fig. 39 Governor Body Attaching Bolts And Spacer Removal**

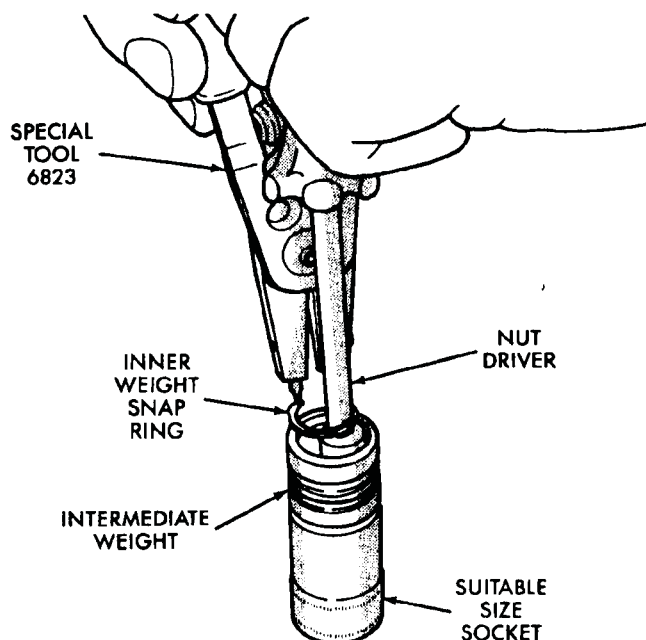
(b) Carefully work a seal into each groove of drive. Avoid overspreading seals during installation to ensure tight fit.

(c) Verify that diagonally cut ring ends are properly interlocked (Fig. 43).

(2) Insert filter in governor drive. Filter goes in hole to right of key slot as shown in Figure 40.



**Fig. 40 Governor Body And Filter Position (On Drive)**



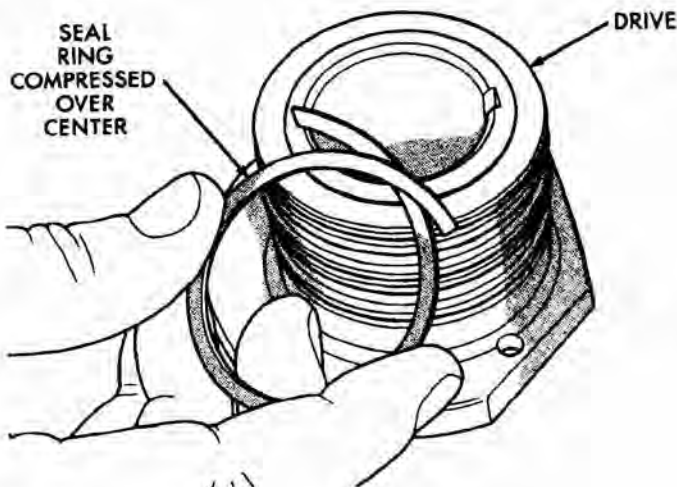
**Fig. 41 Inner Weight Snap Ring Removal/Installation**

(3) Align and position governor body on drive. Be sure filter is seated in recess in governor body (Fig. 40).

(4) Install and tighten governor body bolts snug but not to specified torque at this time.

(5) Assemble governor weight components (Fig. 44). Be very sure outer, intermediate and inner weights are clean. **Set weight assembly aside temporarily. Assembly will not be installed until after governor drive is seated on output shaft.**

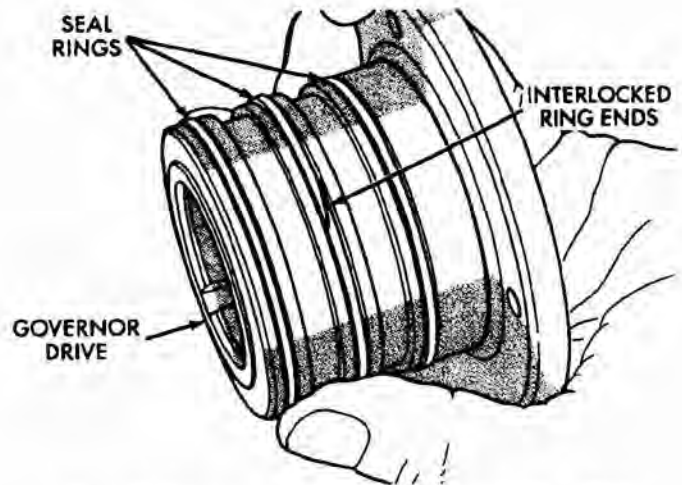




**Fig. 42 Compressing Seal Rings**

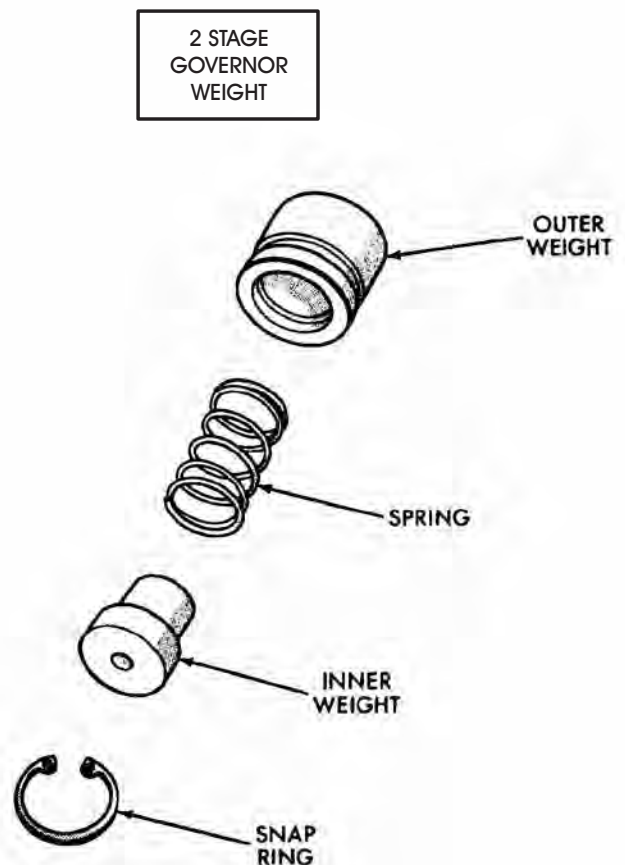
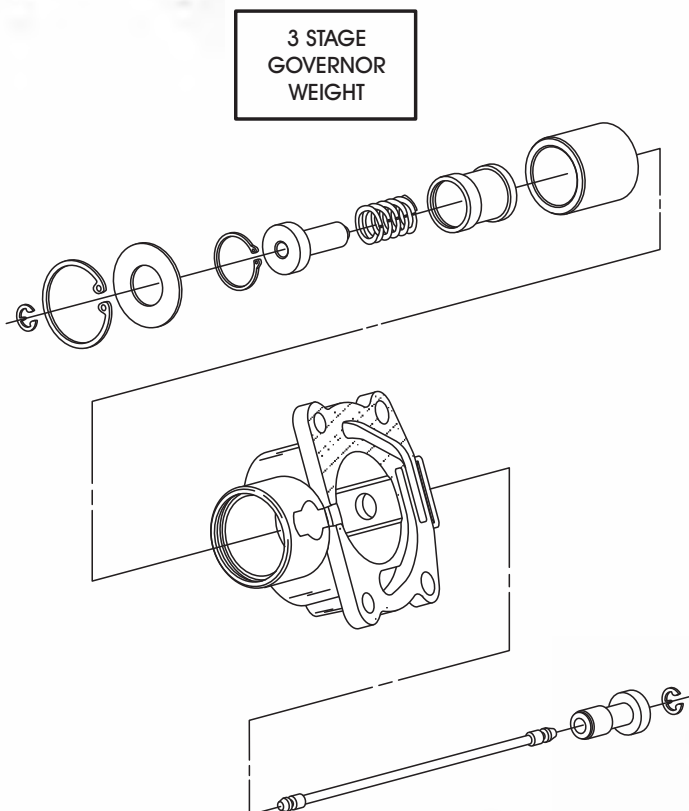
## DIRECT CLUTCH AND GEARTRAIN ASSEMBLY

- (1) Soak direct clutch and overdrive clutch discs in Mopar ATF Plus before installation. Also lubricate geartrain components with ATF Plus during reassembly.
- (2) Install new pilot bushing and clutch hub bushing in output shaft if necessary (Fig. 45). Lubricate new (or old) bushings with petroleum jelly.
- (3) Install front bearing and bearing snap ring on output shaft (Fig. 45)



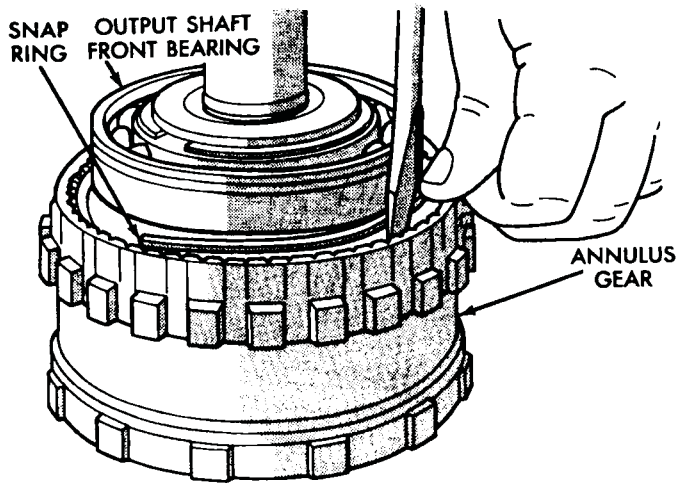
**Fig. 43 Governor Drive Seal Ring Installation**

- (4) Align and install annulus gear on output shaft (Fig. 45).
- (5) Install annulus snap ring (Fig. 45).
- (6) Align and install clutch drum on annulus gear (Fig. 46). Be sure drum is engaged in annulus gear lugs.
- (7) Install clutch drum outer retaining ring (Fig. 46).
- (8) Slide clutch drum forward and install inner retaining ring (Fig. 47).

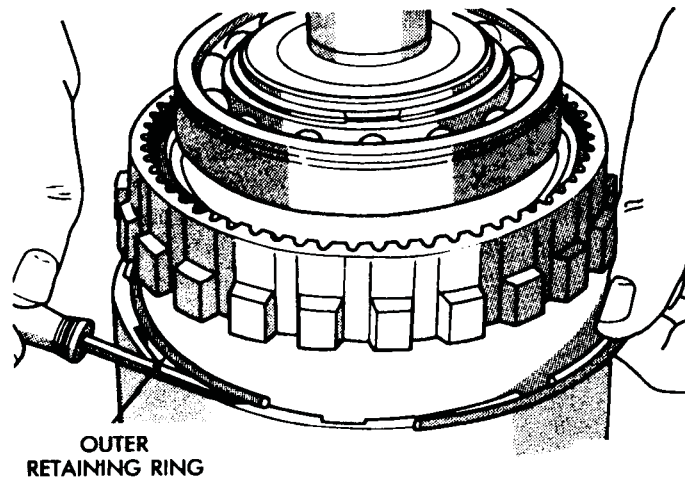


**Fig. 44 Governor Weight Components**

**AUTOMATIC TRANSMISSION SERVICE GROUP**



**Fig. 45 Annulus Gear And Snap Ring Installation**



**Fig. 46 Clutch Drum And Outer Retaining Ring Installation**

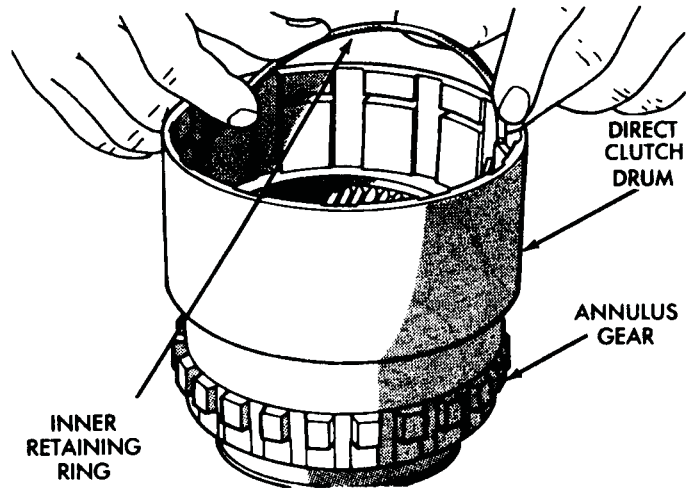
(9) Install overrunning clutch on hub (Fig. 48). **Note that clutch only fits one way. Shoulder on clutch should seat in small recess at edge of hub.**

(10) Install thrust bearing on overrunning clutch hub (Fig. 49). Use petroleum jelly to hold bearing in place during installation. **Bearing fits one way only. Be sure bearing is seated squarely against hub. Reposition bearing if it does not seat squarely.**

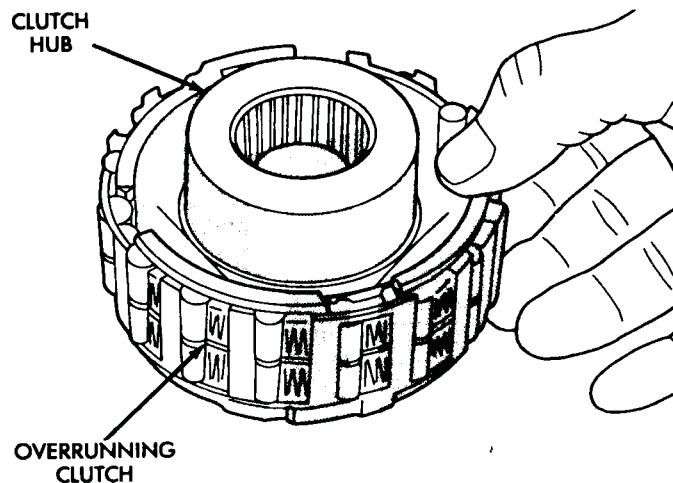
(11) Install overrunning clutch (Fig. 50). Insert snap ring pliers in hub splines. Expand pliers to grip hub. Then install assembly with counterclockwise, twisting motion.

(12) Install planetary gear in annulus gear (Fig. 51). **Be sure planetary pinions are fully seated in annulus gear before proceeding.**

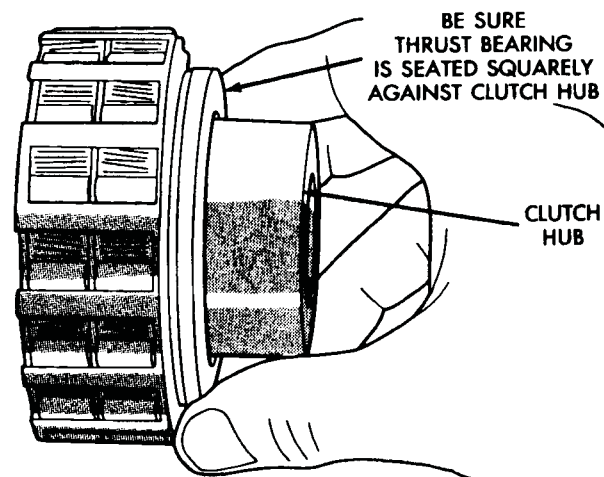
(13) Install direct clutch spring plate on sun gear. Then secure plate to sun gear with snap ring (Fig. 52). Shoulder side of plate should face outward and toward front.



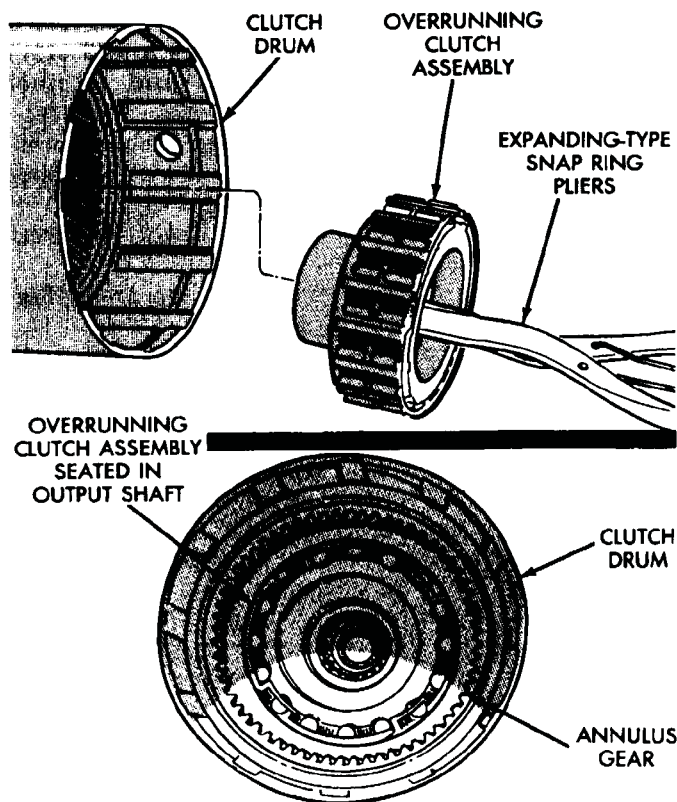
**Fig. 47 Clutch Drum Inner Retaining Ring Installation**



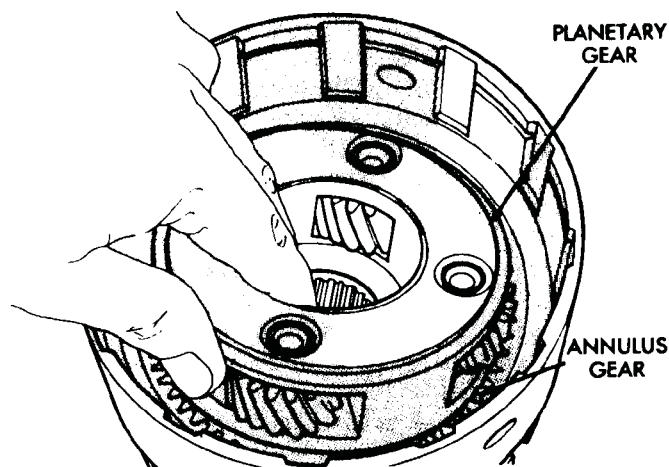
**Fig. 48 Assembling Overrunning Clutch And Hub**



**Fig. 49 Overrunning Clutch Thrust Bearing Installation**



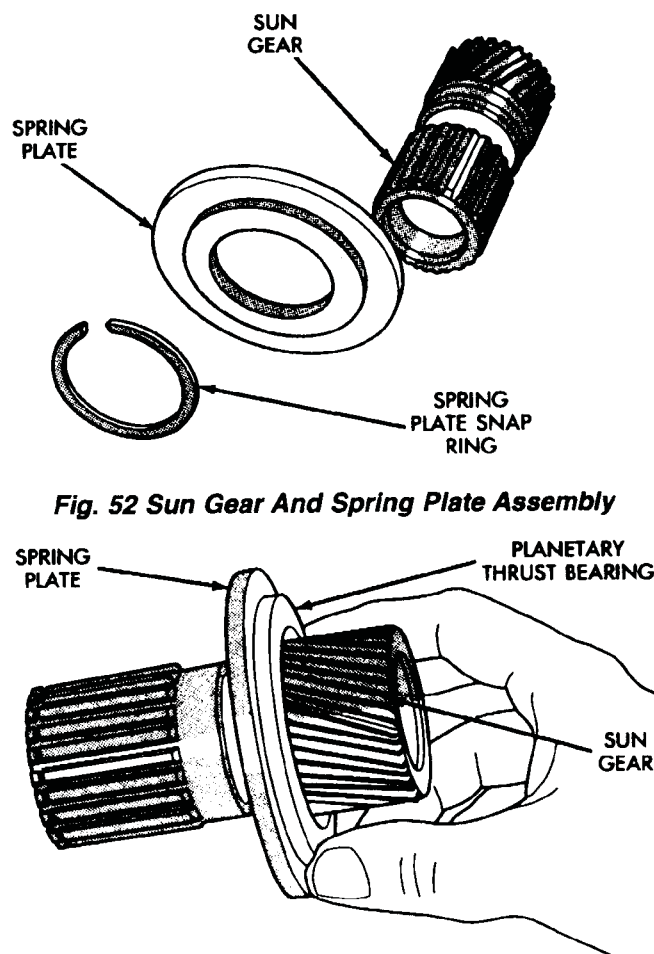
**Fig. 50 Overrunning Clutch Installation**



**Fig. 51 Planetary Gear Installation**

(14) Coat planetary thrust bearing and bearing contact surface of spring plate with petroleum jelly. This will help hold bearing in place during installation.

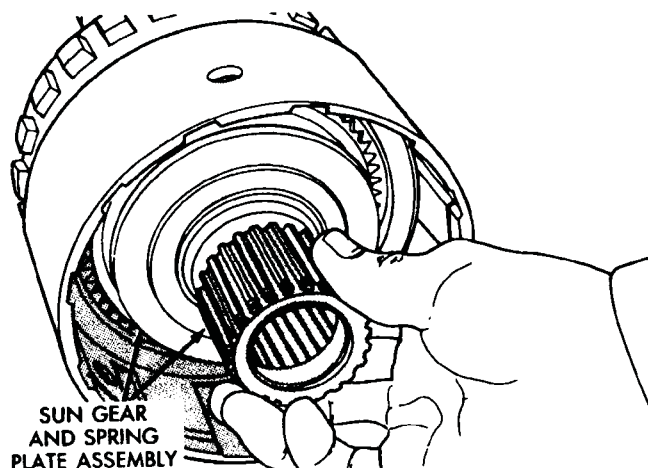
(15) Install planetary thrust bearing on sun gear (Fig. 53). Slide bearing onto gear and seat it against spring plate as shown. **Bearing fits one way only. If it does not seat squarely against spring plate, remove and reposition bearing.**



**Fig. 52 Sun Gear And Spring Plate Assembly**

**Fig. 53 Planetary Thrust Bearing Installation**

(16) Install assembled sun gear, spring plate and thrust bearing (Fig. 54). Be sure sun gear and thrust bearing are fully seated before proceeding.



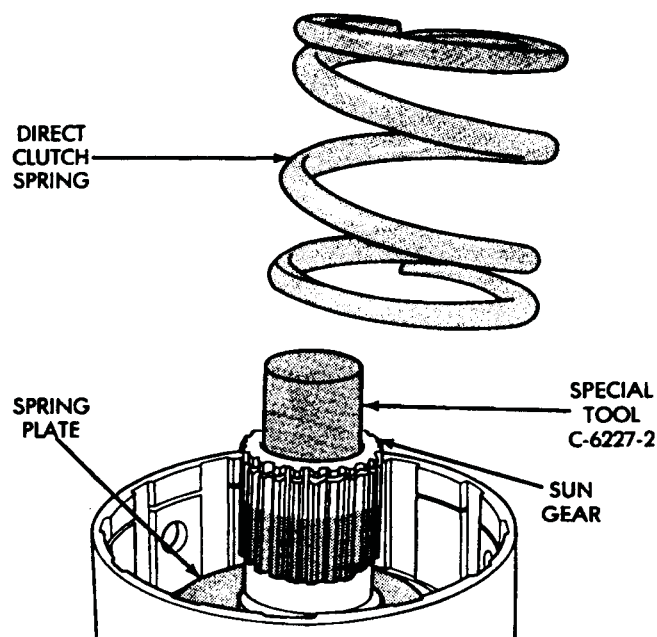
**Fig. 54 Sun Gear Installation**

(17) Align splines in hubs of planetary gear and overrunning clutch with Alignment Tool 6227-2 (Fig.



55). Insert tool through sun gear and into splines of both hubs. Be sure alignment tool is fully seated before proceeding.

(18) Install direct clutch spring. Be sure spring is properly seated on spring plate (Fig. 55).



**Fig. 55 Direct Clutch Spring Installation**

(19) Assemble direct clutch pack for installation on hub (Fig. 56).

(20) Install direct clutch reaction plate on clutch hub. **Note that one side of reaction plate is counterbored. Be sure this side faces rearward. Splines at rear of hub are raised slightly and counterbore in plate fits over these splines. Plate should be flush with this end of hub (Fig. 57).**

(21) Install remainder of direct clutch components as follows:

(a) Install first clutch disc on reaction plate followed by a steel plate.

(b) Alternately install remaining clutch discs and steel plates until required number of discs and

plates are installed. **42RH requires 6 discs and 5 steel plates. 46RH requires 8 discs and 7 steel plates. 47RH requires 9 discs and 8 steel plates (Fig. 56).**

(c) Last clutch pack item installed is clutch pressure plate. Be sure plate is installed with shoulder side of plate facing upward (Fig. 58).

(22) Install clutch hub and clutch pack on direct clutch spring (Fig. 59).

(23) Mount geartrain assembly in shop press (Fig. 60)

**WARNING: THE NEXT STEP IN GEARTRAIN ASSEMBLY INVOLVES COMPRESSING THE DIRECT CLUTCH HUB AND SPRING. IT IS EXTREMELY IMPORTANT THAT PROPER EQUIPMENT BE USED TO COMPRESS THE SPRING AS SPRING FORCE IS APPROXIMATELY 800 POUNDS. USE SPRING COMPRESSOR TOOL C-6227-1 AND A HYDRAULIC-TYPE SHOP PRESS WITH A MINIMUM RAM TRAVEL OF 5-6 INCHES. THE PRESS MUST ALSO HAVE A BED THAT CAN BE ADJUSTED UP OR DOWN AS REQUIRED. RELEASE CLUTCH SPRING TENSION SLOWLY AND COMPLETELY TO AVOID PERSONAL INJURY.**

(24) Position Compressor Tool 6227-2 on clutch hub (Fig. 60).

(25) Slide direct clutch pack upwards on hub (Fig. 60). Slide pack upward and set it partially on edge of hub and compressor tool as shown in Figure 60.

(26) Slowly compress clutch hub and spring (Fig. 61). Compress spring and hub only enough to expose ring grooves for clutch pack snap ring and clutch hub retaining ring.

(27) Realign clutch pack on hub and seat clutch discs and plates in clutch drum (Fig. 61).

(28) Install direct clutch pack snap ring (Fig. 62). **Be very sure snap ring is fully seated in clutch drum ring groove.**

(29) Install clutch hub retaining ring (Fig. 63). **Be very sure retaining ring is fully seated in sun gear ring groove.**

(30) Slowly release press ram, remove compressor tools and remove geartrain assembly.

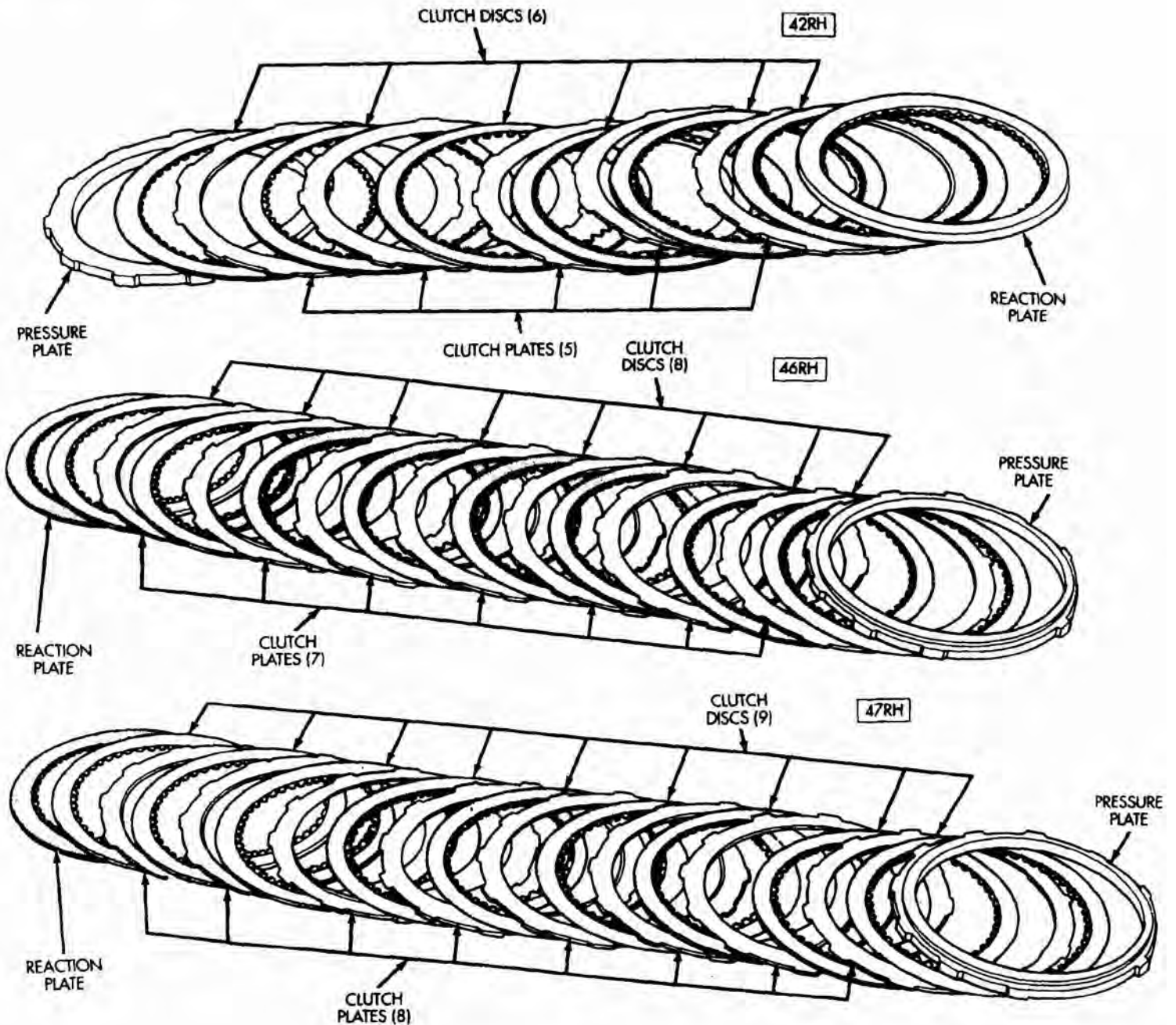
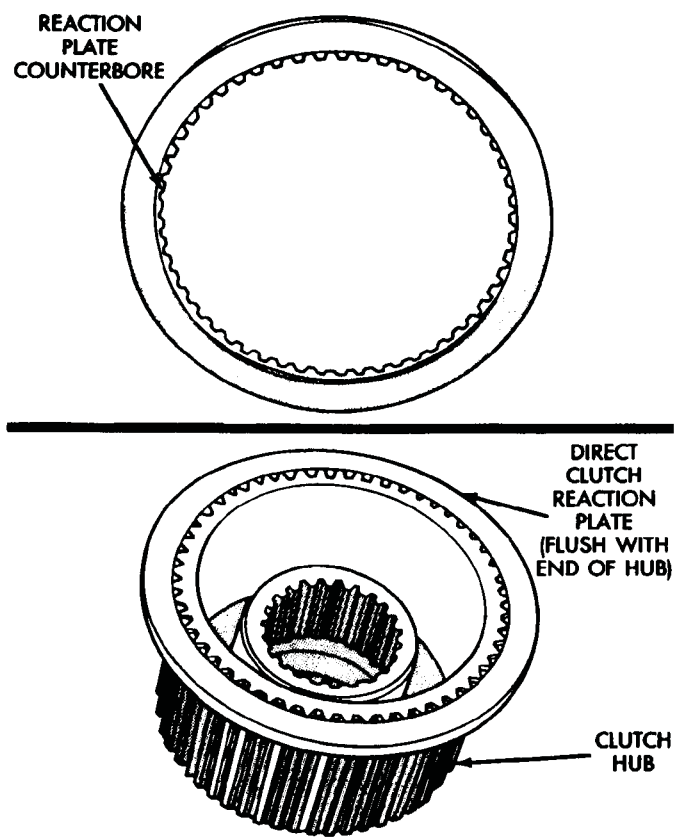


Fig. 56 Direct Clutch Pack Components

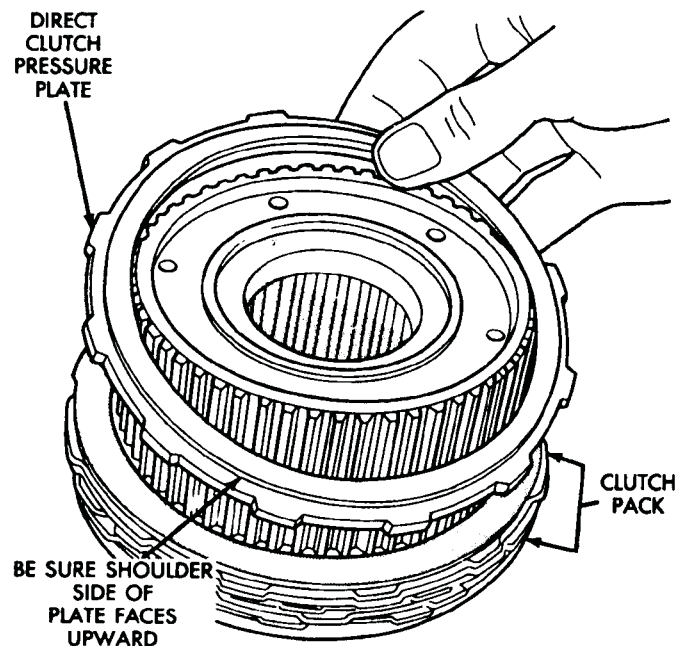
**SPECIAL NOTE:**

Refer to Page 86 through Page 90 for proper identification and usage of the Overdrive-Direct clutch plates for this unit.

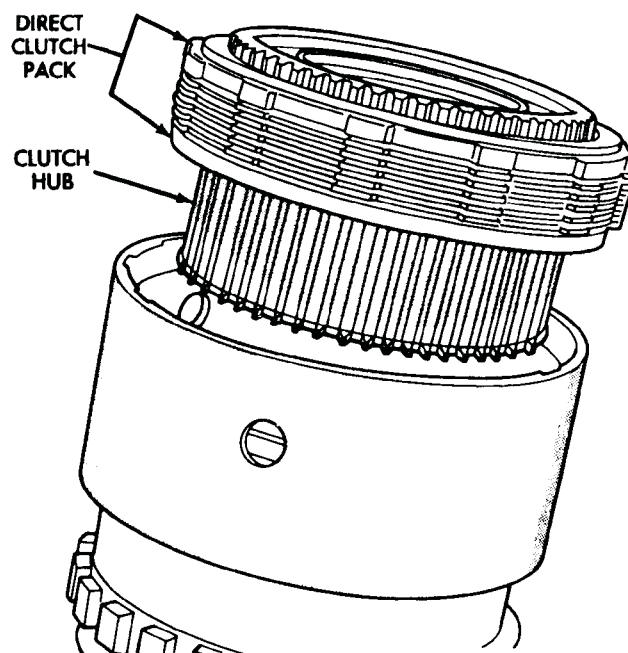




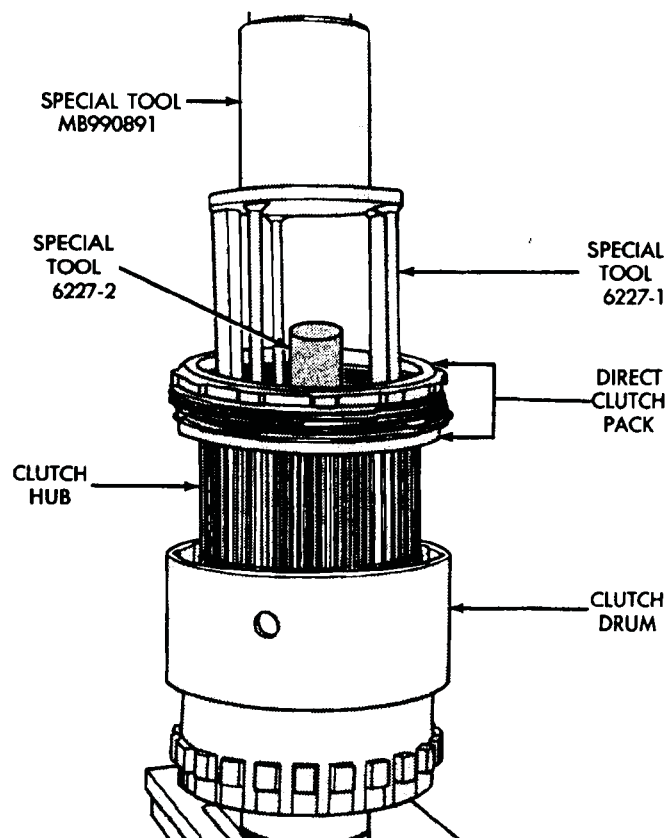
**Fig. 57 Correct Position Of Direct Clutch Reaction Plate**



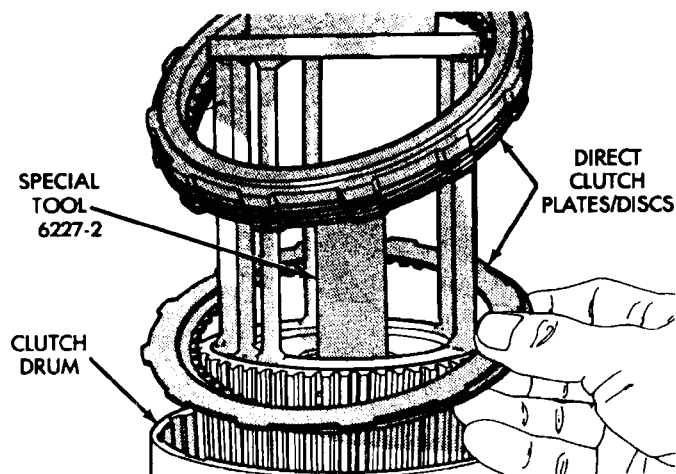
**Fig. 58 Correct Position Of Direct Clutch Pressure Plate**



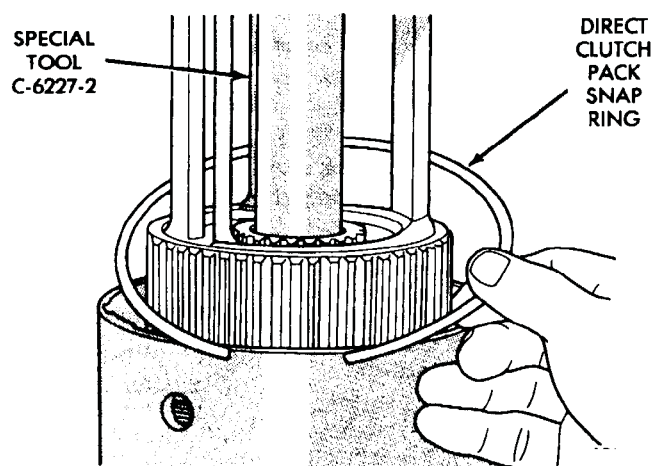
**Fig. 59 Installing Assembled Direct Clutch Pack And Hub**



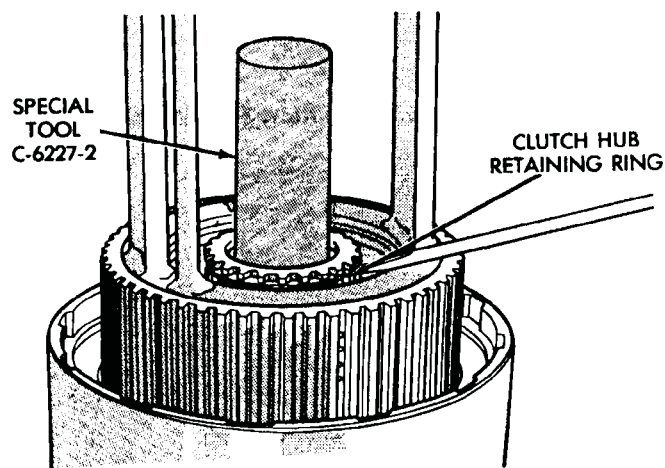
**Fig. 60 Mounting Geartrain Assembly In Shop Press**



**Fig. 61 Seating Clutch Pack In Drum**



**Fig. 62 Direct Clutch Pack Snap Ring Installation**

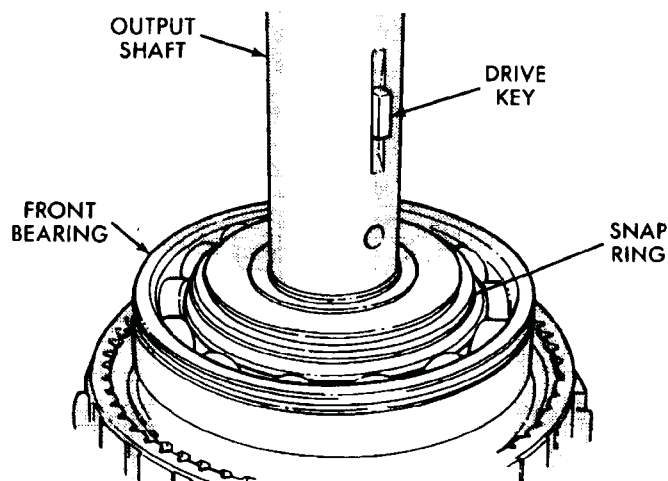


**Fig. 63 Clutch Hub Retaining Ring Installation**

## OVERDRIVE GEARTRAIN AND CASE ASSEMBLY

(1) Install front bearing and snap ring on output shaft (Fig. 64). Be sure locating ring groove in bearing is toward rear of shaft. Otherwise, housing locating ring and bearing ring groove will not align. Remove and reposition bearing if necessary.

(2) Install governor drive key in output shaft (Fig. 64). Use petroleum jelly to hold key in place if necessary.

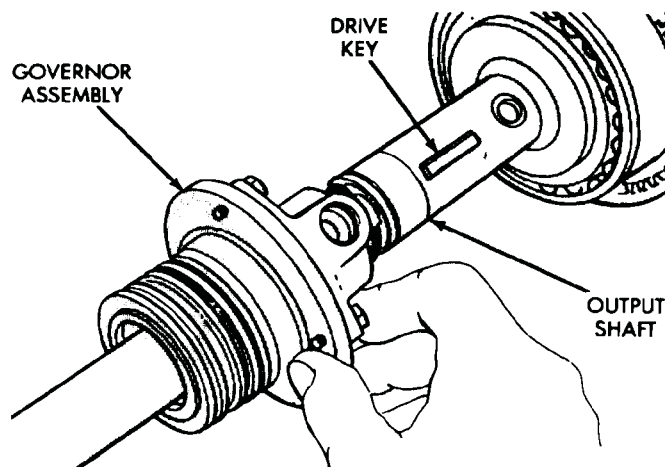


**Fig. 64 Front Bearing And Drive Key Installation**

(3) Install governor body and drive assembly on output shaft as follows (Fig. 65).

(a) Be sure drive key is fully engaged in shaft drive slot.

(b) Align key with slot in governor drive and slide drive assembly into place. To avoid displacing drive key, reach through weight opening in governor body with fingers and guide key into place.



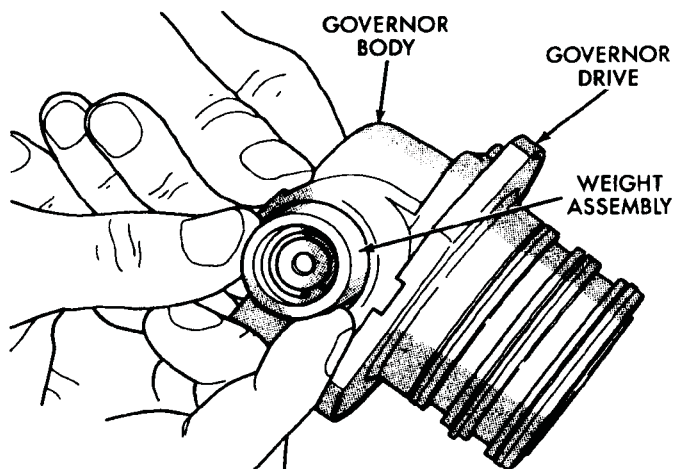
**Fig. 65 Governor Assembly Installation**

(4) Install governor weight assembly in governor body (Fig. 66).

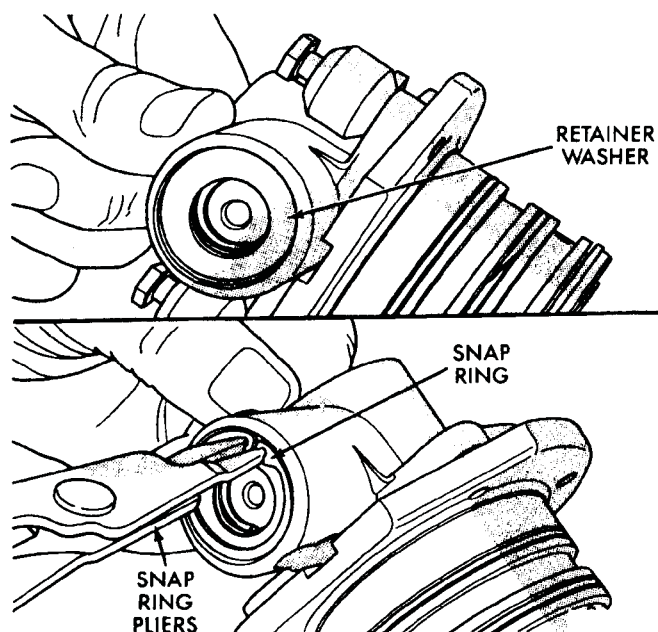
(5) Install retainer washer and snap ring that secure governor weight assembly in governor body (Fig. 67).

(6) Verify that governor valve shaft bores in governor body and output shaft are aligned.

(7) Install governor valve in body bore. Large diameter end of valve faces outward. Then install governor valve shaft and secure it with E-clips.



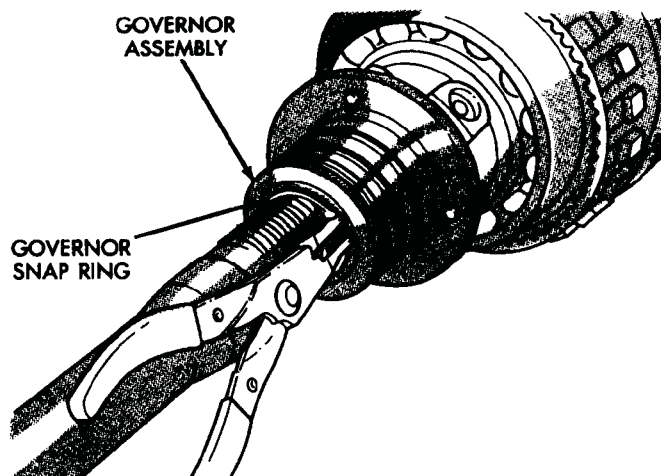
**Fig. 66 Installing Governor Weight Assembly**



**Fig. 67 Governor Weight Retainer Washer And Snap Ring Installation**

**CAUTION:** Be very sure the E-clips are fully seated in the shaft grooves and that the rounded sides of the clips are facing outward. Otherwise, the clips will pop off the shaft causing a governor failure.

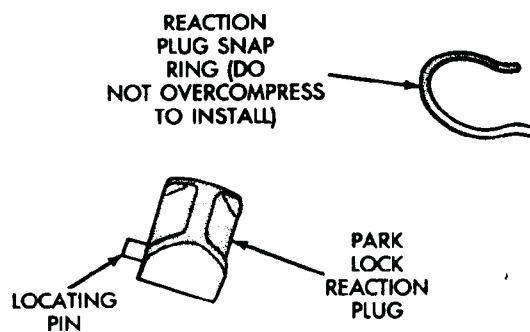
- (8) Install governor assembly snap ring (Fig. 68).
- (9) Tighten governor body attaching bolts to 11 N·m (8 ft. lbs.) torque.
- (10) Install output shaft rear bearing in case and install bearing snap ring. Be sure snap ring is fully seated.
- (11) Position park pawl and spring in case and install park pawl shaft (Fig. 14). Verify that spring end is hooked to pawl and straight end of spring
- (12) Install pawl shaft retaining bolt. Tighten bolt to 27 N·m (20 ft. lbs.) torque.



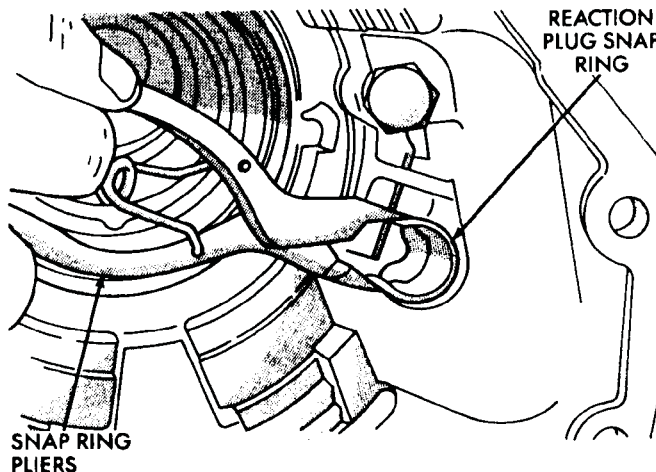
**Fig. 68 Governor Snap Ring Installation**

(13) Install park lock reaction plug. Note that plug has locating pin at rear (Fig. 69). Be sure pin is seated in hole in case before installing snap ring.

(14) Install reaction plug snap ring (Fig. 70). Compress snap ring only enough for installation; do not distort it.

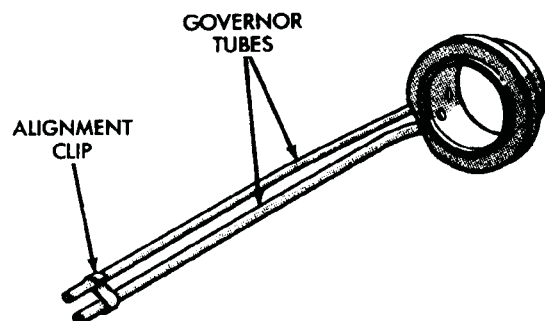


**Fig. 69 Reaction Plug Locating Pin And Snap Ring**



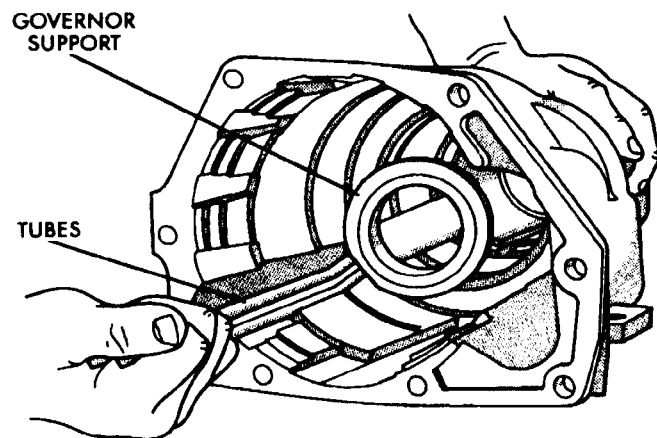
**Fig. 70 Reaction Plug And Snap Ring Installation**

(15) Install alignment clip on governor tubes (Fig. 71). Slide clip up against shoulder on each tube.



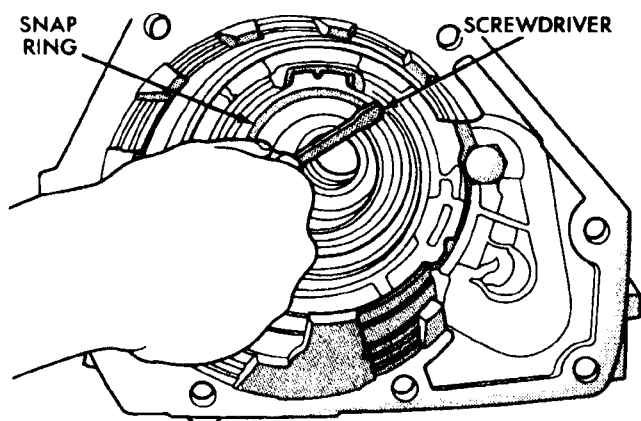
**Fig. 71 Positioning Governor Tube Alignment Clip**

(16) Install governor support and pressure tubes in case (Fig. 72).



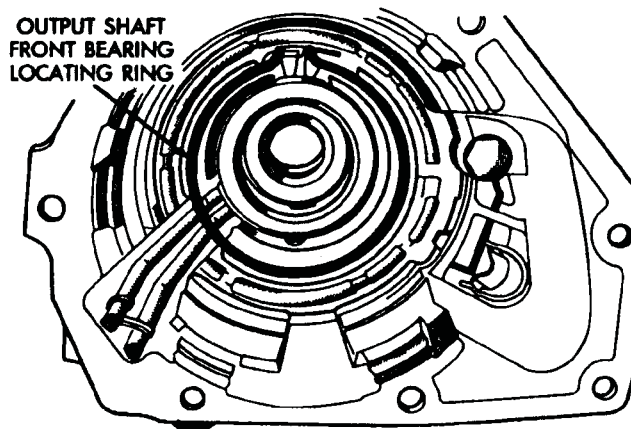
**Fig. 72 Governor Support And Pressure Tube Installation**

(17) Install governor support snap ring (Fig. 73).



**Fig. 73 Governor Support Snap Ring Installation**

(18) Install output shaft front bearing locating ring in case (Fig. 74).

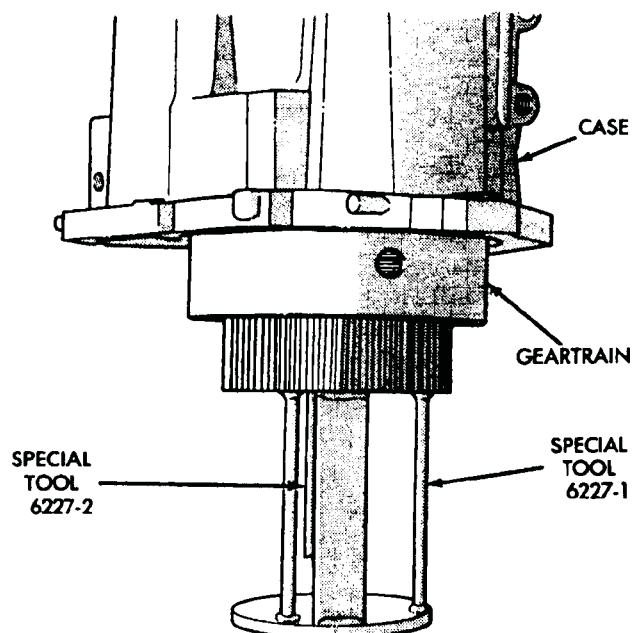


**Fig. 74 Front Bearing Locating Ring Installation**

(19) Support geartrain on Tool 6227-1 (Fig. 75). Be sure tool is securely seated in clutch hub.

(20) Install overdrive unit case over geartrain (Fig. 75).

(21) Expand front bearing locating ring with snap ring pliers. Then slide case downward until locating ring locks in bearing groove and release snap ring.



**Fig. 75 Positioning Overdrive Case On Geartrain**

(22) Install locating ring access plate and gasket in overdrive unit case (Fig. 9).





## Technical Service Information

### CHRYSLER A500, A518, A618 SERIES OVERDRIVE CLUTCH AND OD/DIRECT CLUTCH IDENTIFICATION AND USAGE BY MODEL

#### ***Overdrive Clutch Identification And Proper Assembly***

Refer to Figure 1 for the proper assembly procedure and identification of the Overdrive Clutch components for all models. Notice that the first design clutch stack is not recommended, and there are two snap rings that go in first, one being flat and one being waved.

#### ***OD/Direct Clutch Identification And Proper Assembly***

It is very easy to incorrectly assemble the Overdrive Direct Clutch pack. There are two different thickness of the steel plates and two different thickness of the pressure plates used in the OD/Direct clutch pack. Not being aware of the differences will allow you to mis-assemble this clutch pack. Follow the steps below and refer to Figures 2, 3, and 4, to correctly identify which design level you are working with, and properly assemble this critical drum. If a mis-assembly occurs here it will create no reverse or bind-up on 3-4 shift.

***Step No. 1*** - Identify which design level pressure plate that you are using by measuring the thickness of the "Lug Area". The 1st design level pressure plate will measure approximately .215" in thickness and the 2nd design level pressure plate will measure approximately .085" in thickness, as shown in Figure 2.

***Step No. 2*** - Identify which design level steel plates that you are using by measuring the thickness. The 1st design level steel plates will measure approximately .070" in thickness and the 2nd design level steel plates will measure approximately .055" in thickness, as shown in Figure 2.

***Step No. 3 - If all First Design steels and pressure plate are being used,*** refer to the chart in Figure 3 to identify the OD Direct clutch housing that you have, as well as the number of steel plates and lined plates for that housing.

***If all Second Design steels and pressure plate are being used,*** refer to the chart in Figure 4 to identify the OD Direct clutch housing that you have, as well as the number of steel plates and lined plates for that housing.

***SPECIAL NOTE: "Always" use the special tools and procedures to measure and determine the correct thickness Overdrive Piston Shim that your set-up requires. An incorrect shim selection may also cause, no reverse or tie-up on 3-4 shift.***

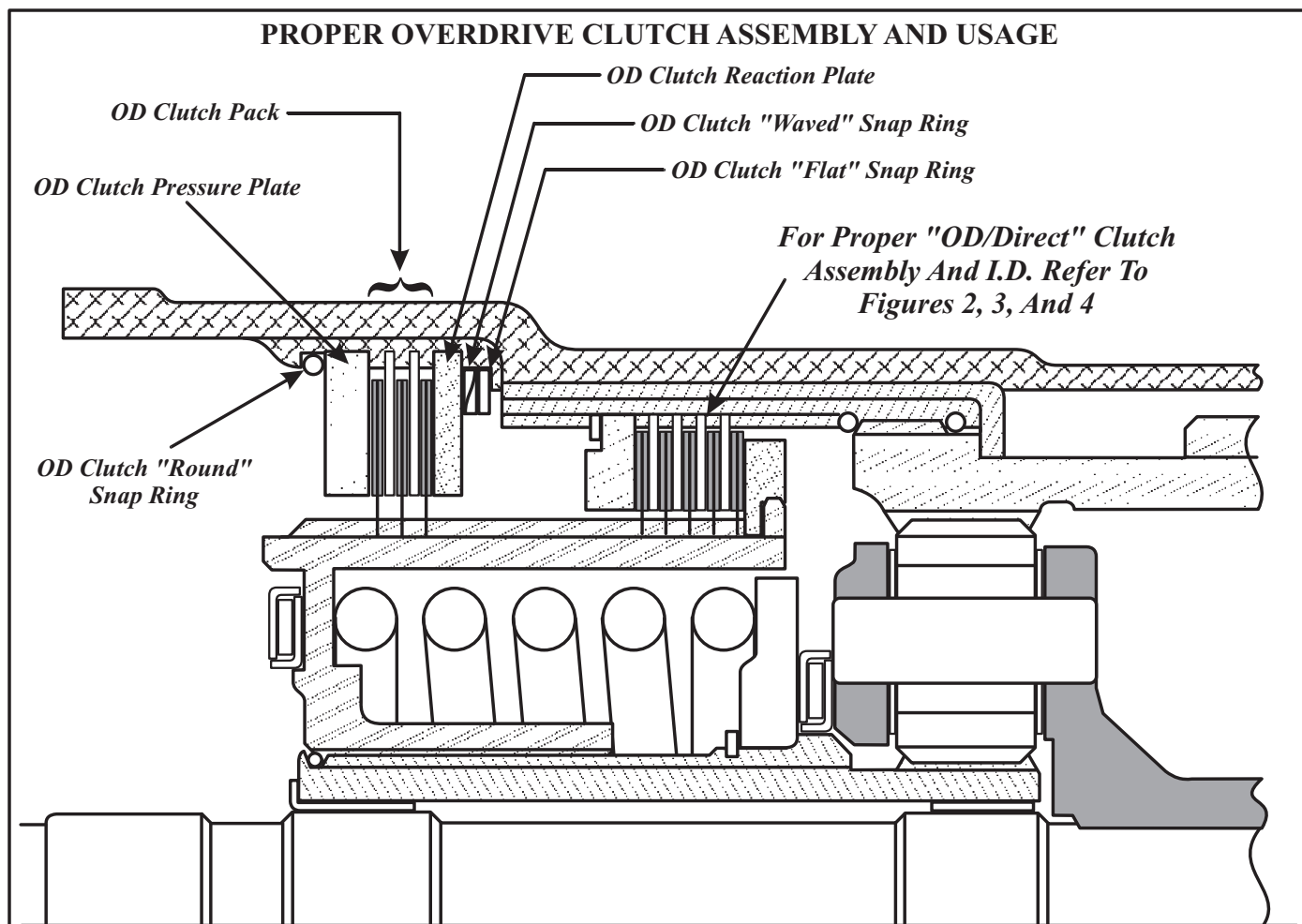
#### **SERVICE INFORMATION:**

OD/Direct Pressure Plate (1st Design .215" Thick) .....	4461031
OD/Direct Steel Plate (1st Design .070" Thick) .....	4461054
OD/Direct Pressure Plate (2nd Design .085" Thick) .....	4461183
OD/Direct Steel Plate (2nd Design .055" Thick) .....	4864053

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**OVERDRIVE CLUTCH USAGE CHART**

<i>Illustration Number</i>	<i>MODEL</i>	<i>REACTION PLATE</i>	<i>STEEL PLATES</i>	<i>FRICTION PLATES</i>	<i>PRESSURE PLATE</i>
1	A500, Early Version	Thick-.376"	1	2	Thick-.376"
2	A500, Later Version	Thin-.215"	2	3	Thick-.376"
3	A518, Except Diesel Engine	Thin-.215"	3	4	Thin-.215"
4	A518, With Diesel Engine	Thin-.215"	5	5	None **
4	A618, All Models	Thin-.215"	5	5	None **

**\*\* Normal Steel Plate Serves As Pressure Plate**

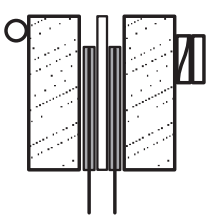
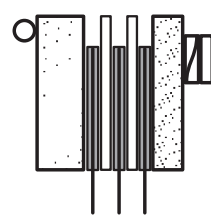
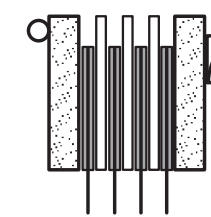
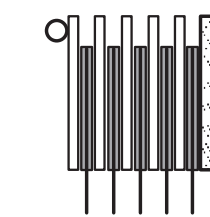
<p><b>Illustration No. 1</b></p>  <p><b>"Not Recommended"</b></p>	<p><b>Illustration No. 2</b></p> 	<p><b>Illustration No. 3</b></p> 	<p><b>Illustration No. 4</b></p>  <p>Copyright © 2000 ATSG</p>
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Figure 82

## CHRYSLER A500, A518, A618 SERIES TRANSMISSIONS OD/DIRECT CLUTCH I.D. AND USAGE

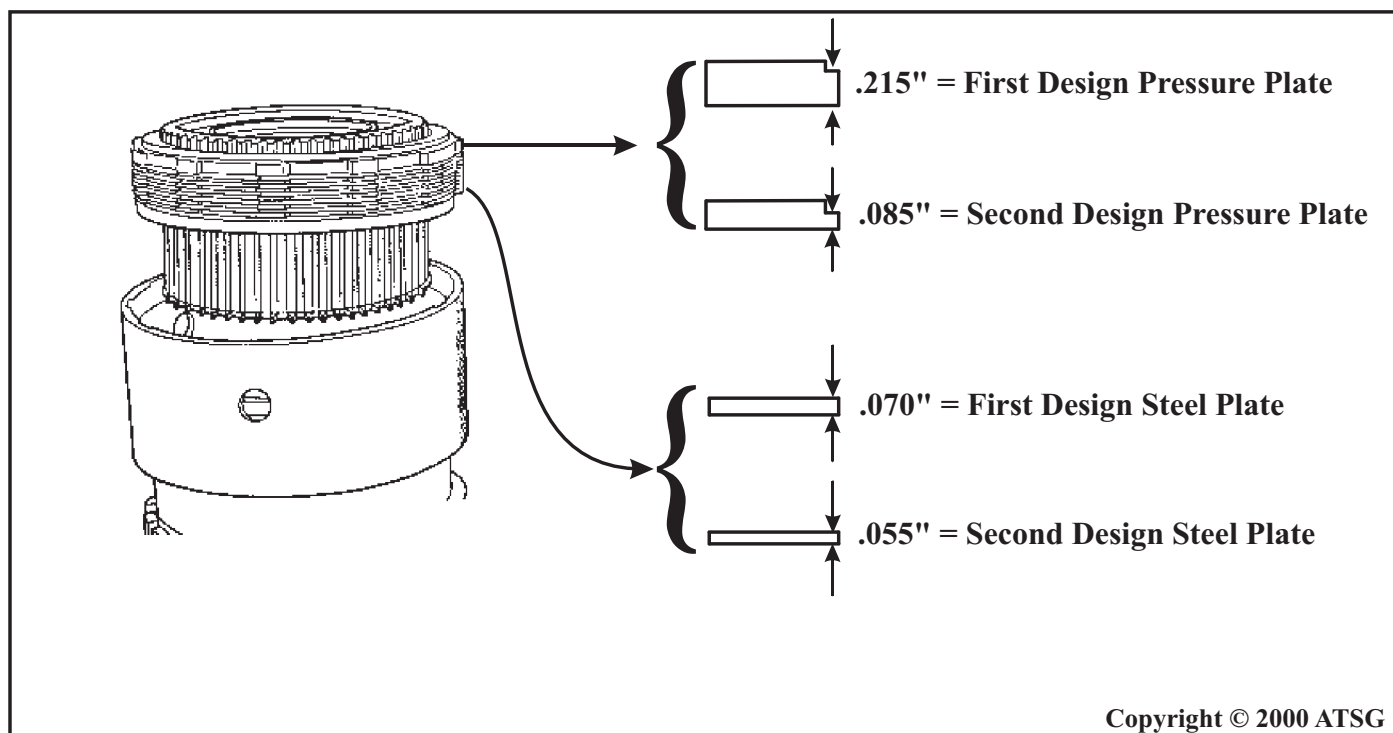
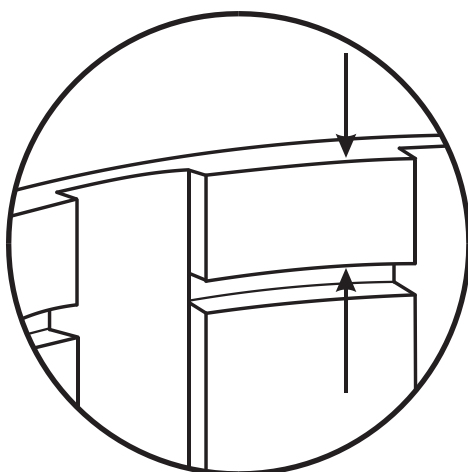


Figure 83

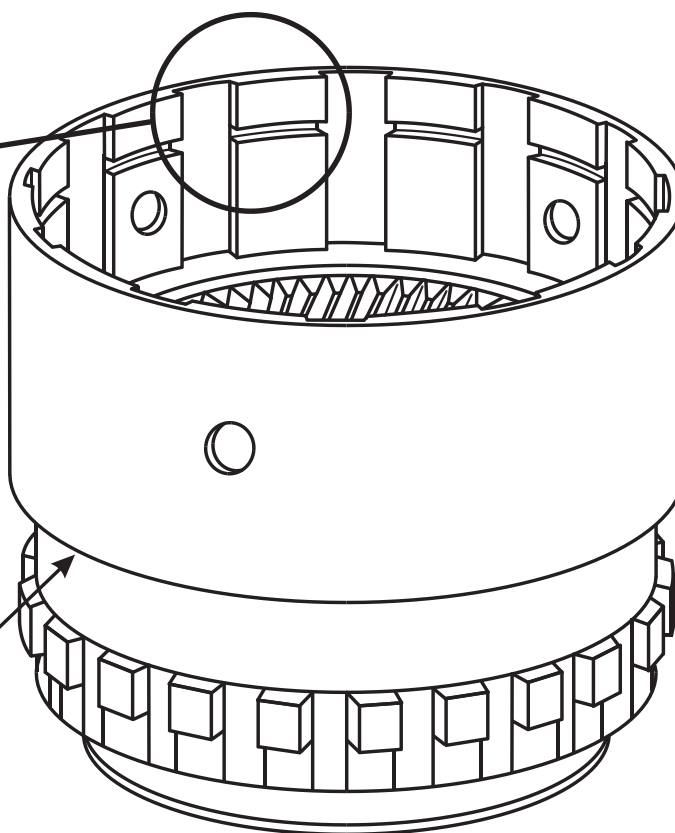
## CHRYSLER A500, A518, A618 SERIES TRANSMISSIONS OD/DIRECT CLUTCH I.D. AND USAGE

There are currently four different Overdrive/Direct clutch housings dependent on the engine size and the transmission model you are working on. If it becomes necessary to replace the drum, measure the distance between the top of snap ring groove and the top of the housing, as shown below, and use the chart below to determine the amount of friction plates and steel plates for the model you are working on. Choosing the wrong amount may create a tie-up on the 3-4 shift, or a no reverse condition. ***The number of lined and steel plates in this chart, are based upon FIRST DESIGN PARTS.***

TRANSMISSION	LINED	STEEL	MEASUREMENT
A500 (40RH) 3.9L	5	4	.485"
A500 (42RH) 5.2L	6	5	.350"
A518/A618	8	7	.100"



***MEASURE THE DISTANCE BETWEEN  
TOP OF THE DRUM AND TOP OF THE  
SNAP RING GROOVE AS SHOWN***



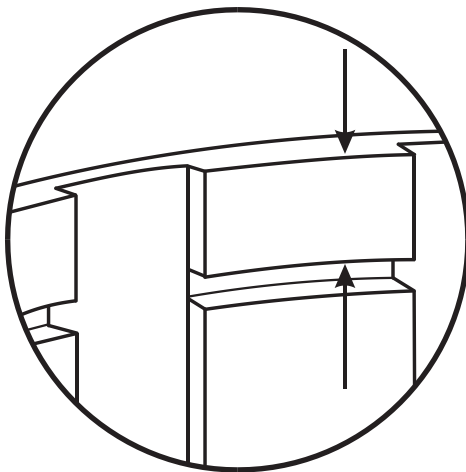
**OVERDRIVE/DIRECT CLUTCH HOUSING**

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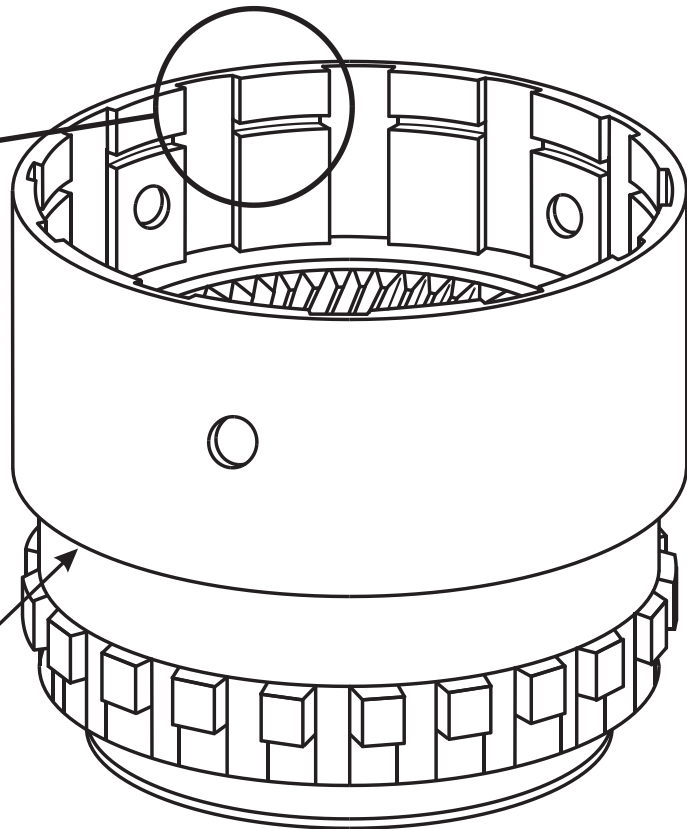
## CHRYSLER A500, A518, A618 SERIES TRANSMISSIONS OD/DIRECT CLUTCH I.D. AND USAGE

There are currently four different Overdrive/Direct clutch housings dependent on the engine size and the transmission model you are working on. If it becomes necessary to replace the drum, measure the distance between the top of snap ring groove and the top of the housing, as shown below, and use the chart below to determine the amount of friction plates and steel plates for the model you are working on. Choosing the wrong amount may create a tie-up on the 3-4 shift, or a no reverse condition. ***The number of lined and steel plates in this chart, are based upon SECOND DESIGN PARTS.***

TRANSMISSION	LINED	STEEL	MEASUREMENT
A500 (40RH) 3.9L	6	5	.485"
A500 (42RH) 5.2L	8	7	.350"
A518/A618	10	9	.100"



***MEASURE THE DISTANCE BETWEEN  
TOP OF THE DRUM AND TOP OF THE  
SNAP RING GROOVE AS SHOWN***



**OVERDRIVE/DIRECT CLUTCH HOUSING**

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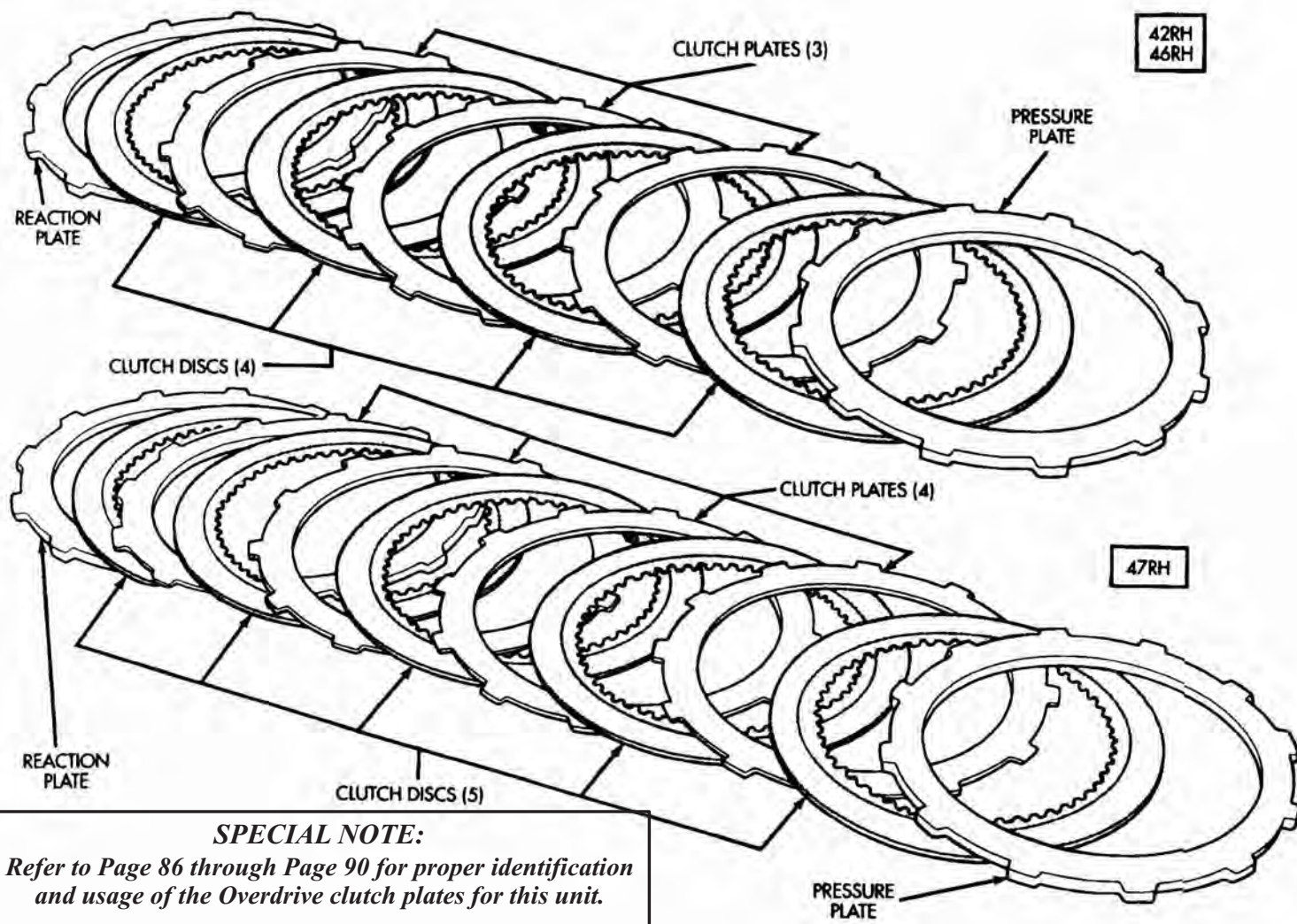


Fig. 76 Overdrive Clutch Pack Components

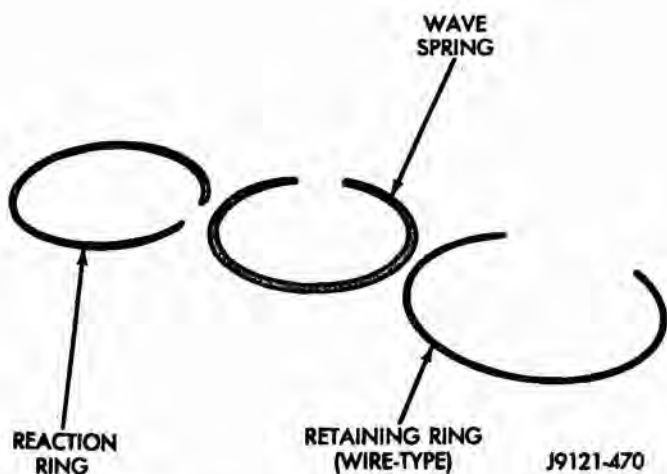


Fig. 77 Overdrive Clutch Ring Identification

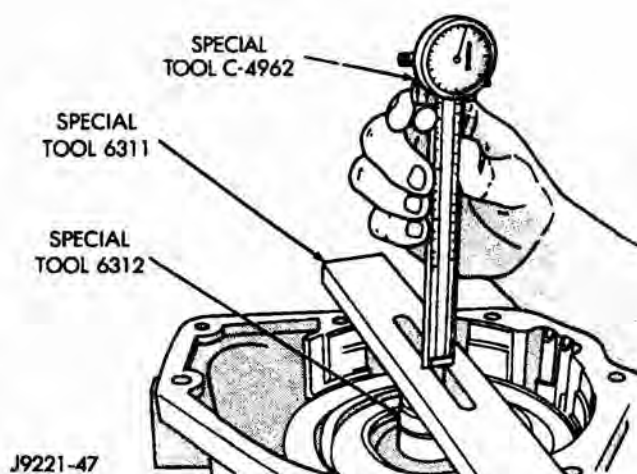


Fig. 78 Shaft End Play Measurement



## OVERDRIVE CLUTCH INSTALLATION AND ADJUSTMENT

- (1) Verify clutch pack before proceeding (Fig. 76).
  - 42RH/46RH require 4 clutch discs, 3 steel plates, 1 reaction plate and 1 pressure plate
  - 47RH requires 5 clutch discs, 4 steel plates, 1 reaction plate and 1 pressure plate.

(2) Install overdrive clutch components as follows:

(a) Install reaction ring first. Reaction ring is flat with notched ends (Fig. 77).

(b) Install wave spring on top of reaction ring. **Reaction ring and wave ring both fit in same ring groove.** Use screwdriver to seat each ring securely in groove.

(c) Install reaction plate (Fig. 76).

(d) Install first clutch disc followed by first clutch plate.

(e) Install remaining clutch discs and plates in same order.

(f) Install clutch pack pressure plate (Fig. 77).

(g) Install clutch pack wire-type retaining ring (Fig. 77).

(3) Place overdrive unit in vertical position and mount unit in vise or in workbench with appropriate size mounting hole cut into it. Be sure unit is facing upward for access to direct clutch hub.

(4) Determine correct thickness **intermediate shaft spacer** as follows:

(a) Insert Special Tool 6312 through sun gear, planetary gear and into pilot bushing in output shaft. Be sure tool bottoms against planetary shoulder.

(b) Position Gauge Tool 6311 across face of overdrive case (Fig. 78). Then position Dial Caliper C-4962 over gauge tool.

(c) Extend sliding scale of dial caliper downward through gauge tool slot until scale contacts end of Gauge Alignment Tool 6312. Lock scale in place. Remove dial caliper tool and note distance measured (Fig. 78.)

(d) Select proper thickness end play spacer from spacer chart based on distance measured (Fig. 79).

(e) Remove Gauge Alignment Tool 6312.

(5) Determine correct thickness **overdrive piston thrust plate** as follows:

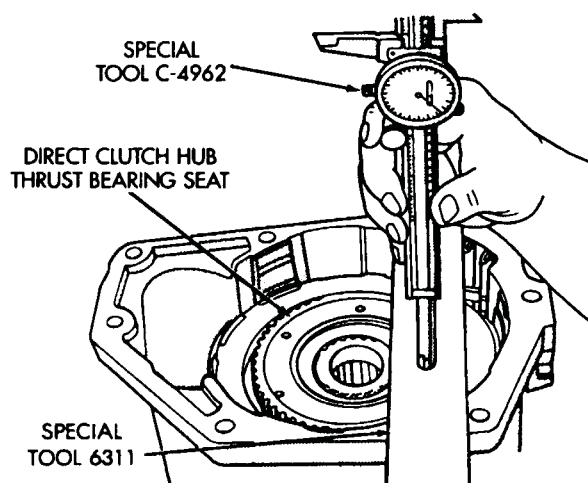
(a) Position Gauge Tool 6311 across face of overdrive case. Then position Dial Caliper C-4962 over gauge tool (Fig. 80).

(b) Measure distance to clutch hub thrust bearing seat at four points 90° apart. Then average measurements by adding them and dividing by 4.

(c) Select and install required thrust plate from information in thrust plate chart (Fig. 81).

End Play Measurement (Inches)	Spacer Thickness (Inches)
.7336 - .7505	.158 - .159
.7506 - .7675	.175 - .176
.7676 - .7855	.193 - .194
.7856 - .8011	.211 - .212

**Fig. 79 Intermediate Shaft End Play Spacer Selection**



**Fig. 80 Overdrive Piston Thrust Plate Measurement**

End Play Measurement (Inches)	Spacer Thickness (Inches)
1.7500 - 1.7649	.108 - .110
1.7650 - 1.7799	.123 - .125
1.7800 - 1.7949	.138 - .140
1.7950 - 1.8099	.153 - .155
1.8100 - 1.8249	.168 - .170
1.8250 - 1.8399	.183 - .185
1.8400 - 1.8549	.198 - .200
1.8550 - 1.8699	.213 - .215
1.8700 - 1.8849	.228 - .230
1.8850 - 1.8999	.243 - .245

**Fig. 81 Overdrive Piston Thrust Plate Selection**

(6) Leave Alignment Tool 6227-2 in place. Tool will keep planetary and clutch hub splines in alignment until overdrive unit is ready for installation on transmission.