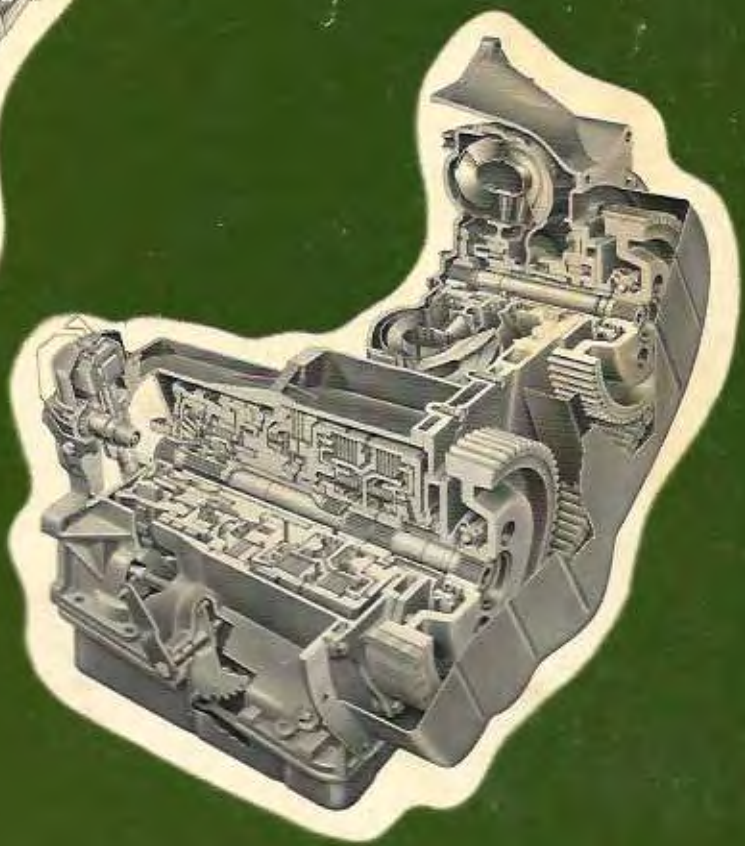
Systematic Trouble Shooting

400



425

Hydra-matic

Hydra-matic
400 & 425
SYSTEMATIC TROUBLE SHOOTING

FOREWORD

This Systematic Trouble Shooting booklet describes the necessary service procedures involved in the proper diagnosis and correction of the most common Hydra-matic model 400 and 425 transmission malfunctions.

Service Department
Hydra-matic Division
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INDEX

PROBLEM

INTRODUCTION

The low percent of Turbo Hydra-matic transmission problems in the field has not provided the average service man with a steady flow of units to work on; and in some cases, there have been long periods of time between the training course and the first transmission malfunction he is required to diagnose.

Systematic transmission trouble shooting the Hydra-matic way is designed for field service personnel who have had a minimum amount of training or experience in working on the Turbo Hydra-matic transmission. It will be valuable to a service organization from service writers and road testers to the mechanic who performs the repair operation.

This trouble shooting program is not intended to take the place of the Turbo Hydra-matic training course. It is intended to supplement it by making available to you a practical method and systematic approach to solving transmission malfunctions with the information that can be gained by oil pressure checks which can be made without a road test.

Internal oil leaks within the transmission that are fed through an orifice or orifices will **not** show up on an oil pressure check as **low** pressure; however, by following the Trouble Shooting Charts and with the information gained from the pressure checks, you will be led to the possible cause or causes of the malfunction and the corrective action.

PRELIMINARY CHECKING PROCEDURE
(Page 5)

"Preliminary Checking Procedure" has the normal oil pressure ranges under specific conditions listed. All of these can be made without a road test. Deviations from the normal oil pressure ranges are indicators to specific areas and causes of transmission malfunctions. But like working a jig-saw puzzle, in order to finish the picture, you need all the pieces. In this case you need all the pressure readings the chart lists and they can be made in the shop and do not require a road test.

In the majority of malfunctions this information will be required in order to efficiently diagnose the malfunction. If the customer complaint is unknown other than it just doesn't work right, the **preliminary oil pressure check** will be necessary to aid you in determining if a malfunction exists and in what area to look for the cause. However, an important and often overlooked aspect of diagnosis is precise determination of the customer's complaint. For this purpose, a short ride with the customer will often prove beneficial. It may be found that the condition the customer wants corrected is standard and should not be altered.

When the malfunction or complaint is known you can proceed to the Trouble Shooting Chart or Charts that cover the specific condition. In some instances you may correct the condition in the first few steps of the chart; in others, it will require that the pressure check be performed in order to lead you in the right direction to remedy the malfunction.

The first step when searching for the cause of a malfunction is to check the Transmission Oil Level; the procedure is outlined on Page 18.

The second step when searching for the cause of a malfunction is to check the Outside Manual Linkage; refer to Page 18.

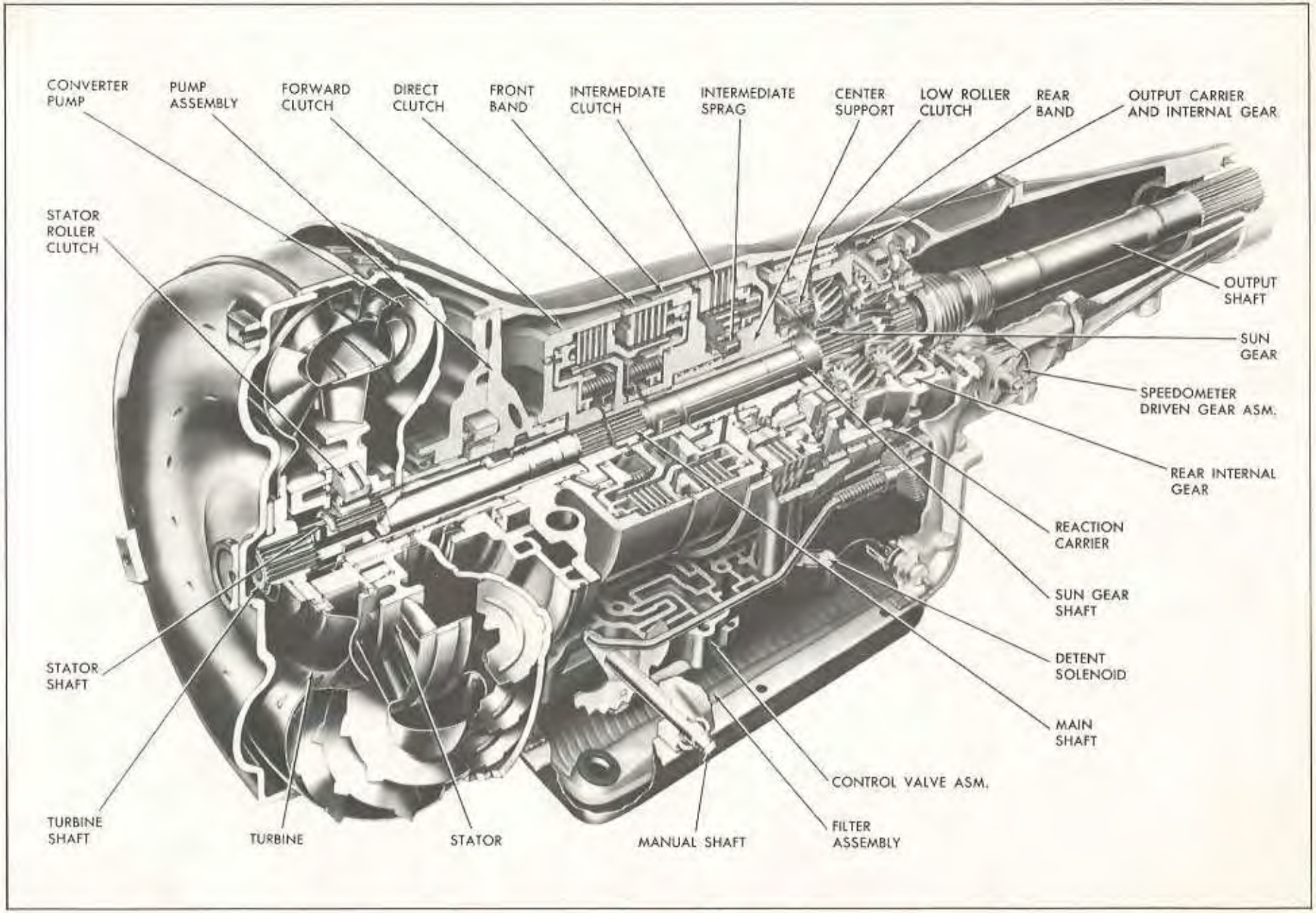
If discrepancies are found in these first two steps, they should be corrected and the vehicle road tested to see if the malfunction has been corrected.

If no discrepancies are found, or if after correcting discrepancies the malfunction still exists, the next step of the procedure is to take the oil pressure checks.

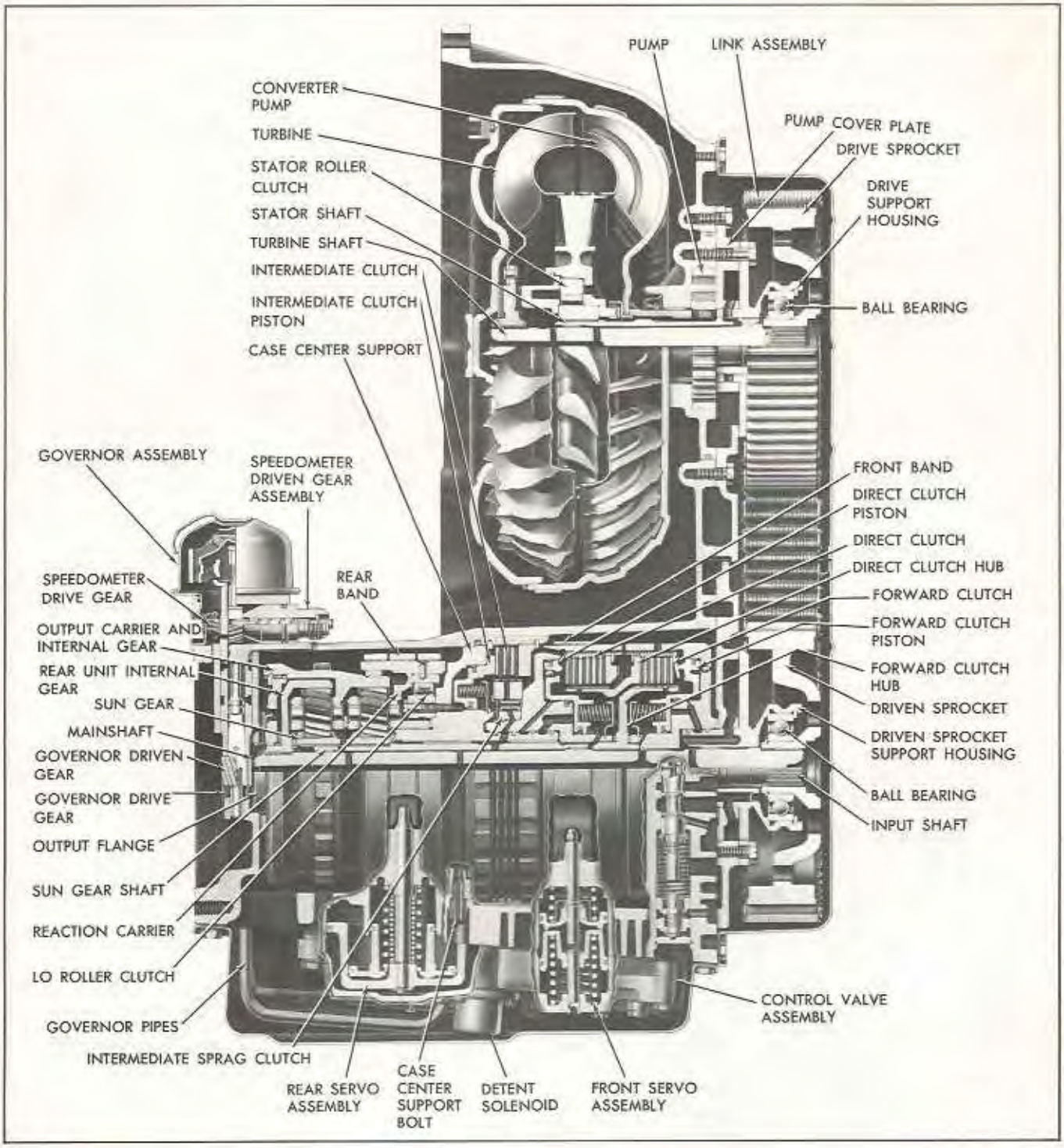
Install the pressure gauge and proceed to follow the steps on the Preliminary Checking Procedure Chart and record the pressures and compare them with the normal pressures provided for each condition on Page 5.

If the malfunction is unknown and a road test can be made, (See Page 7) it can be combined with the Preliminary Checking Procedure. If a road test can **not** be made, and the complaint is delayed or no upshifts, and high pressures are recorded on the pressure checks, the electrical connector should be disconnected from the transmission and oil pressures rechecked. Normal pressures on recheck indicate that the cause of the malfunction is in the electrical circuit to the transmission, such as shorted downshift switch or wires, or crossed wires of variable stator transmissions (stator and detent).

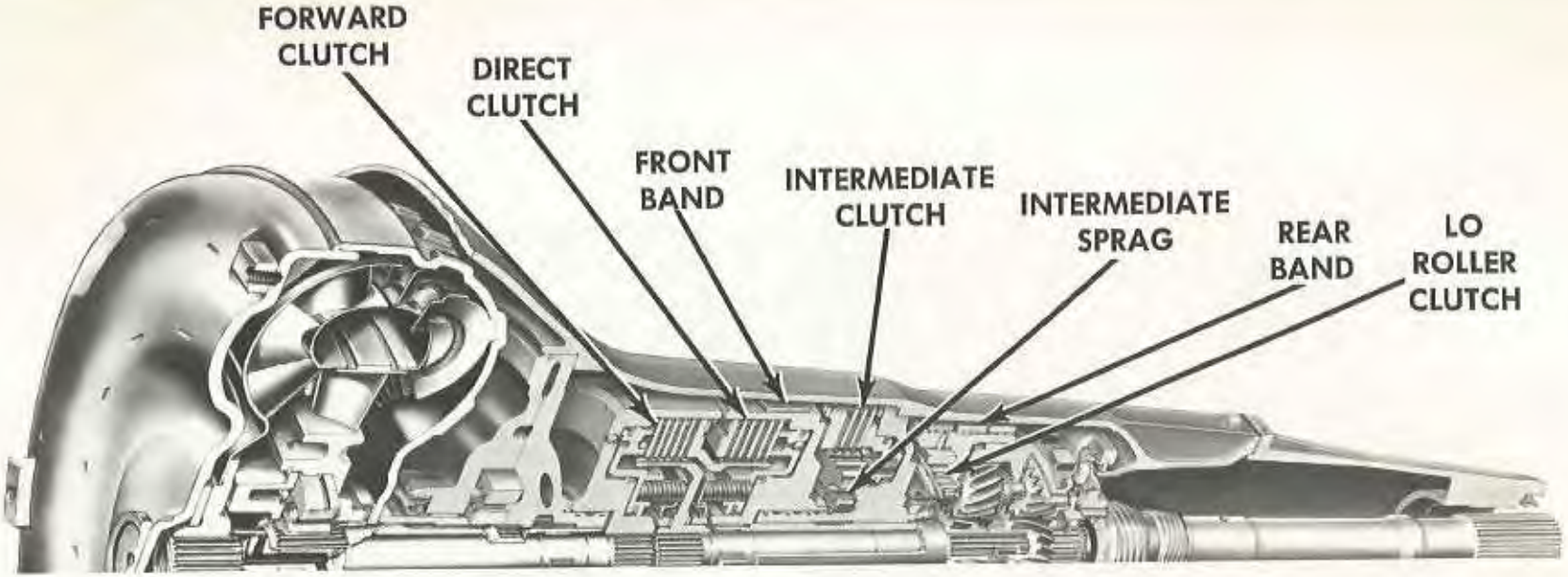
With the information you have obtained through the Preliminary Checking Procedure, and Road Test, if it was required, you can now apply it to the chart or charts in the Systematic Trouble Shooting guide that fits the malfunction.



MODEL "400" TURBO HYDRA-MATIC CUTAWAY (TYPICAL)



MODEL "425" TURBO HYDRA-MATIC TRANSMISSION CUTAWAY (TYPICAL)



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

CLUTCH, BAND, INTERMEDIATE SPRAG & LO ROLLER CLUTCH APPLICATION CHART

(RANGE REFERENCE CHART)

PRELIMINARY CHECKING PROCEDURE

CHECK TRANS OIL LEVEL
SEE PAGE 18

CHECK OUTSIDE MANUAL LINKAGE AND CORRECT **SEE PAGE 18**

CHECK ENGINE TUNE

INSTALL OIL PRESSURE GAGE

CAUTION: TOTAL RUNNING TIME FOR THIS COMBINATION NOT TO EXCEED 2 MINUTES.

CONNECT VACUUM GAGE TO MODULATOR LINE & TACHOMETER TO ENGINE

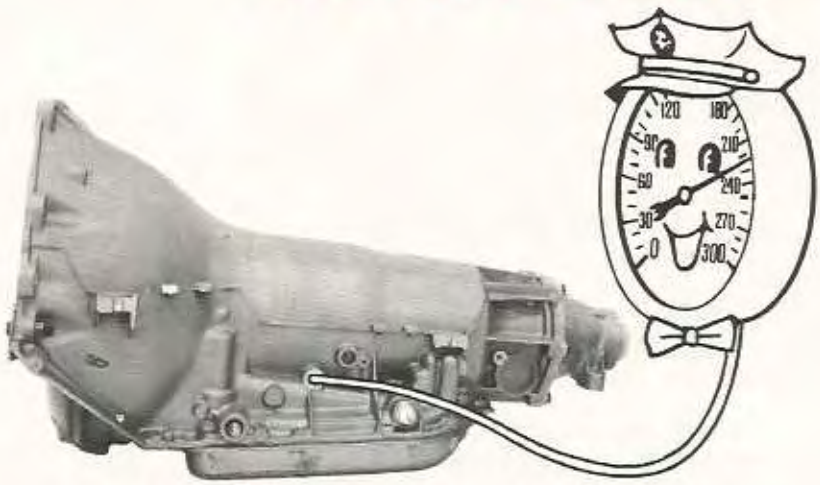
CHECK OIL PRESSURES IN FOLLOWING MANNER		
RANGE	**OIL PRESSURE**	**NORMAL P.S.I.**
DRIVE—BRAKES APPLIED ENGINE AT 1000 RPM		60 TO 90
SUPER OR LO—BRAKES APPLIED ENGINE AT 1000 RPM		135 TO 160
REVERSE—BRAKES APPLIED ENGINE AT 1000 RPM		95 TO 150
NEUTRAL—BRAKES APPLIED ENGINE AT 1000 RPM		55 TO 70
DRIVE IDLE WHEELS ON SET ENGINE IDLE TO GROUND. SPECIFICATIONS		60 TO 85
DRIVE—30 MPH CLOSED THROTTLE OR ON HOIST*		55 TO 70

*THE DRIVE—30 MPH CLOSED THROTTLE PRESSURE READING MAY BE TAKEN DURING A ROAD TEST OR:

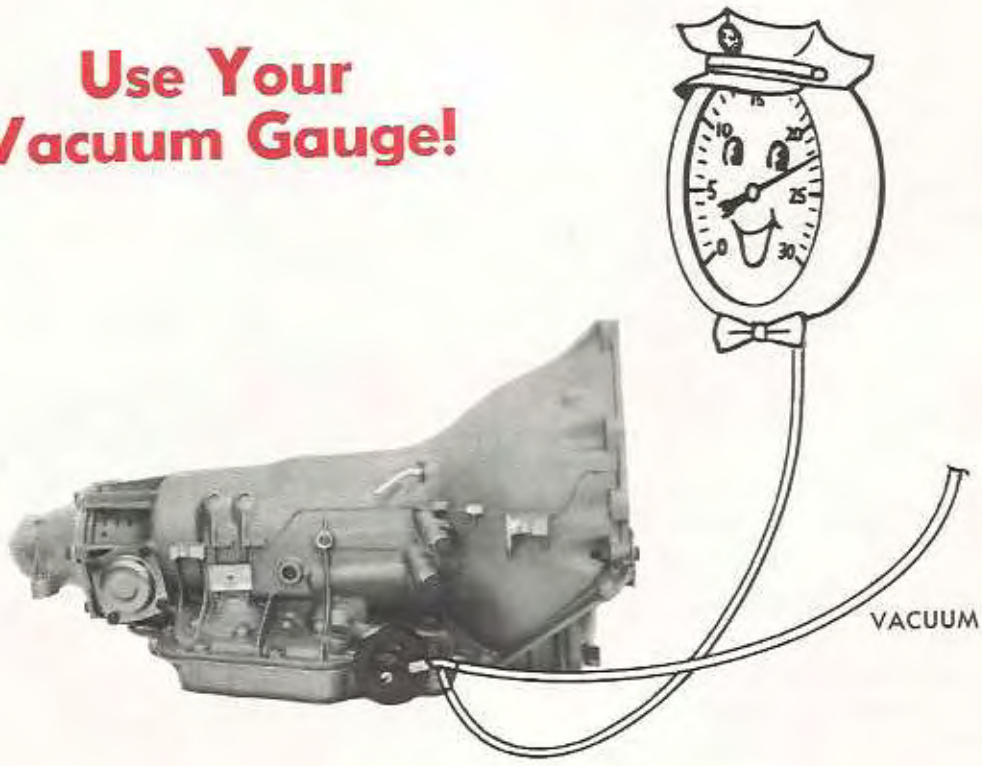
1. VEHICLE ON HOIST—DRIVING WHEELS OFF GROUND, FOOT OFF BRAKE, IN DRIVE RANGE.
2. Engine 2000 RPM.
3. CLOSE THROTTLE (FOOT OFF ACCELERATOR) AND TAKE PRESSURE READING ENGINE 2000-1200 RPM.

NOTE: WITH CLOSED THROTTLE AND DRIVING WHEELS OFF THE GROUND, ENGINE RPM WILL DROP RAPIDLY. PRESSURE READING MUST BE TAKEN WITHIN RPM'S INDICATED AND WITH CLOSED THROTTLE.

Use Your Oil Pressure Gauge!



Use Your Vacuum Gauge!



Check All Shifts In The Following Manner:

DRIVE RANGE:

Position selector lever in DRIVE RANGE and accelerate the vehicle from O MPH. A 1-2 and 2-3 shift should occur at all throttle openings. (The shift points will vary with the throttle opening). As the vehicle decreases in speed to 0 MPH, the 3-2 and 2-1 shifts should occur.

INTERMEDIATE RANGE:

Position the selector lever in INTERMEDIATE RANGE and accelerate the vehicle from 0 MPH. A 1-2 shift should occur at all throttle openings. (No 2-3 shift can be obtained in this range). The 1-2 shift point will vary with throttle opening. As the vehicle decreases in speed to 0 MPH, a 2-1 shift should occur. NOTE: The 1-2 shift in INTERMEDIATE RANGE is somewhat firmer than in DRIVE RANGE. This is normal.

LO RANGE:

Position the selector lever in LO RANGE and accelerate the vehicle from 0 MPH. No upshift should occur in this range, except in some vehicles which have a high numerical axle ratio and/or high engine RPM.

2ND GEAR — OVERRUN BRAKING:

Position the selector lever in DRIVE RANGE, and with the vehicle speed at approximately 35 MPH, move the selector lever to INTERMEDIATE RANGE. The transmission should downshift to 2nd. An increase in engine RPM and an engine braking effect should be noticed. Line pressure should change from approximately 70 PSI to approximately 150 PSI in 2nd.

1ST GEAR — OVERRUN BRAKING:

Position the selector lever in INTERMEDIATE RANGE at approximately 30 to 40 MPH, with throttle closed, move the selector lever to Lo. A 2-1 downshift should occur in the speed range of approximately 40 to 20 MPH, depending on axle ratio and valve body calibration. The 2-1 downshift at closed throttle will be accompanied by increased engine RPM and an engine braking effect should be noticed. Line pressure should be approximately 150 PSI. Stop vehicle.

REVERSE RANGE:

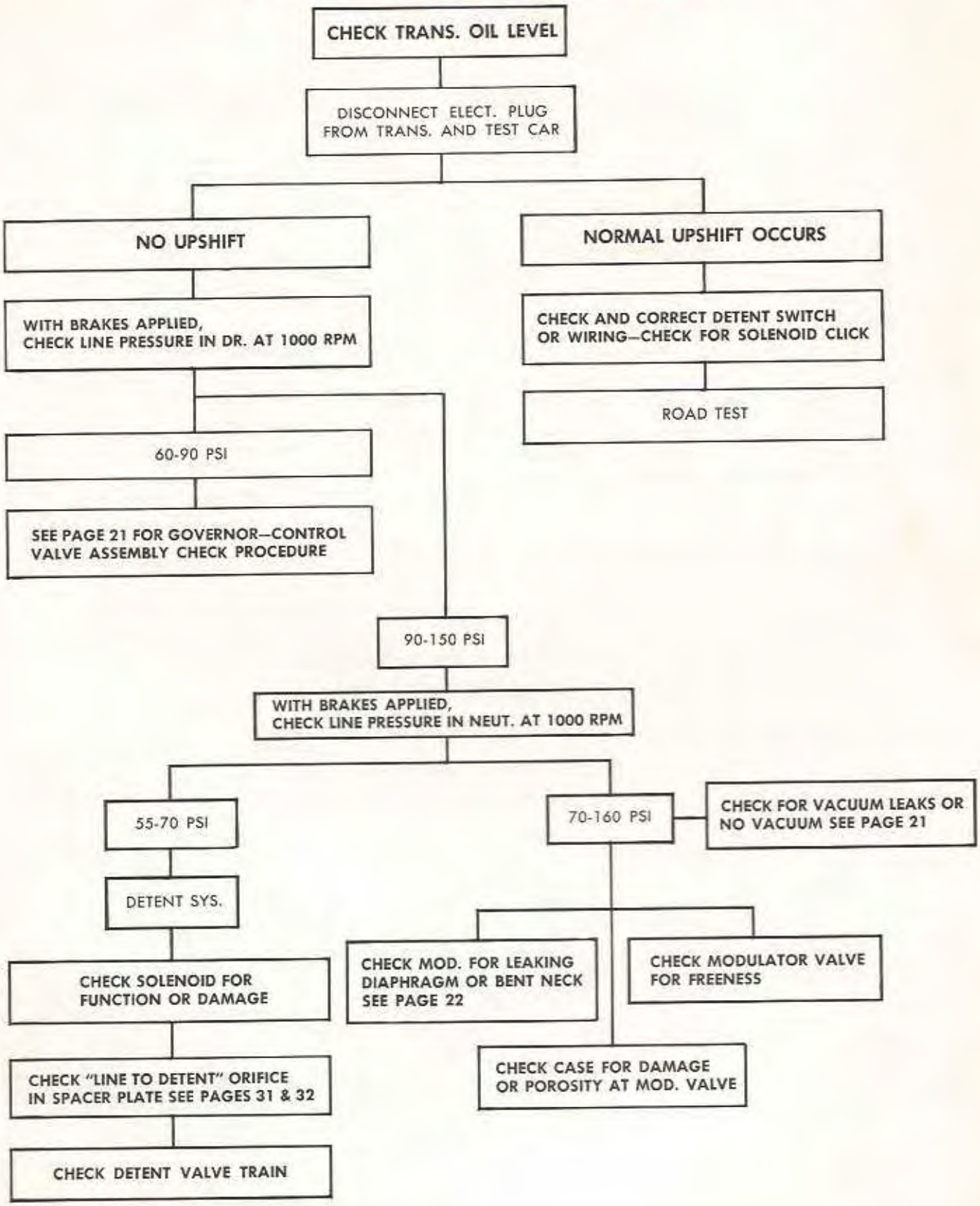
Position the selector lever in REVERSE POSITION and check for reverse operation.

TRANSMISSION MALFUNCTION RELATED TO OIL PRESSURE

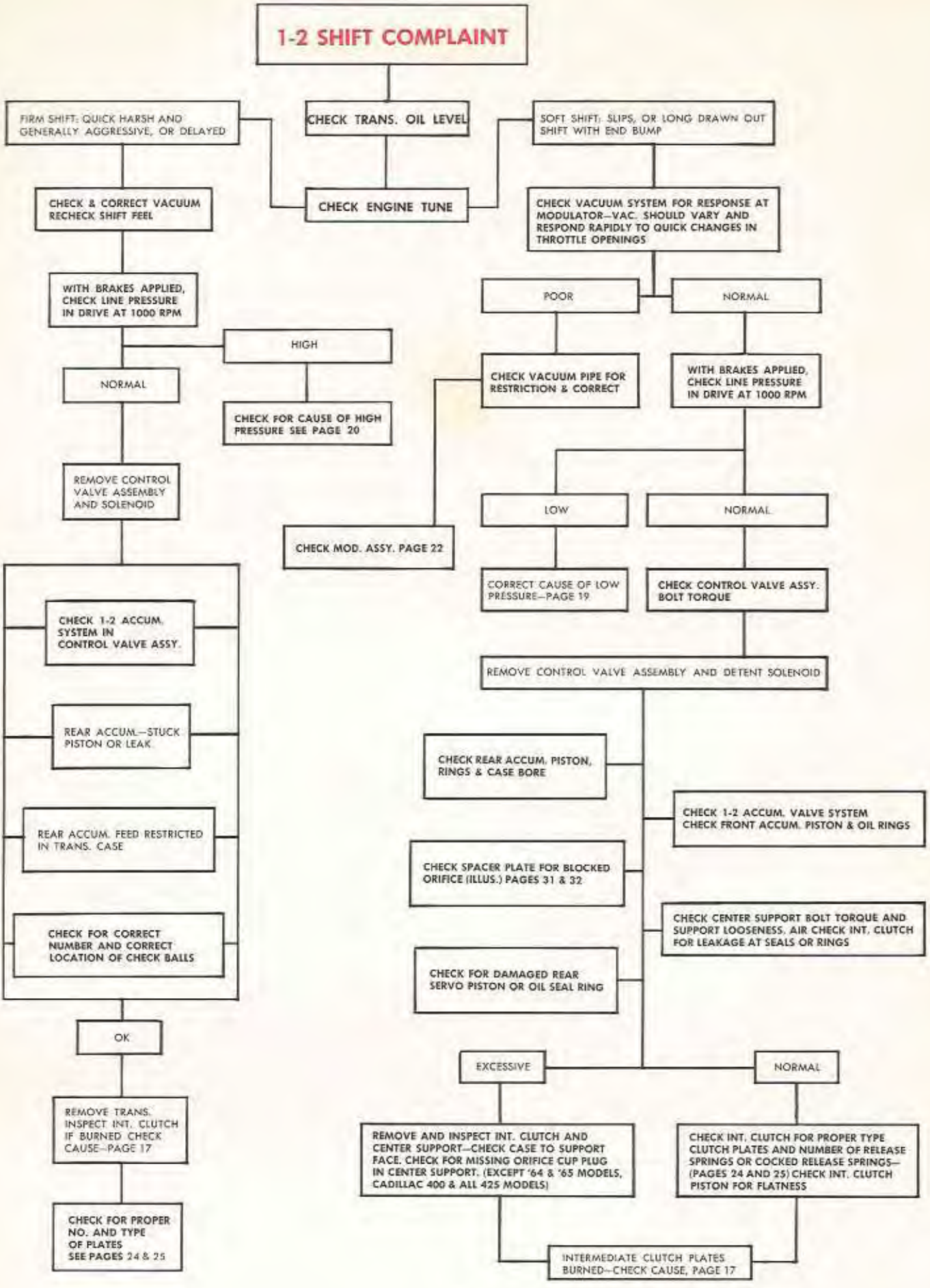
MALFUNCTION	DRIVE BRAKES APPLIED 1000 RPM	REVERSE BRAKES APPLIED 1000 RPM	SUPER OR LO BRAKES APPLIED 1000 RPM	NEUTRAL BRAKES APPLIED 1000 RPM	DRIVE 30 MPH CLOSED THROTTLE	DRIVE IDLE	PRESSURE DROP OCCURS WHILE ENGINE RPM INCREASES FROM 1000 TO 3000 RPM WHEELS FREE TO MOVE**	POSSIBLE CAUSE OF MALFUNCTION
	OIL PRESSURE	OIL PRESSURE	OIL PRESSURE	OIL PRESSURE	OIL PRESSURE	OIL PRESSURE		
NO 1-2 UPSHIFT AND/OR DELAYED UPSHIFT	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	DROP	MALFUNCTION IN CONTROL VALVE ASSY.
	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NO DROP	MALFUNCTION IN GOVERNOR OR GOVERNOR FEED SYSTEM
	HIGH	NORMAL	NORMAL	NORMAL	HIGH	—	—	MALFUNCTION IN DETENT SYSTEM
	HIGH	HIGH	NORMAL	HIGH	—	—	—	MALFUNCTION IN MODULATOR OR VACUUM FEED SYSTEM TO MODULATOR
SLIPPING—REVERSE	NORMAL	LOW	NORMAL	NORMAL	NORMAL	—	—	OIL LEAK IN FEED SYSTEM TO THE DIRECT CLUTCH
SLIPPING—1ST GEAR	LOW	NORMAL	LOW TO NORMAL	NORMAL	LOW TO NORMAL	—	—	OIL LEAK IN FEED SYSTEM TO THE FORWARD CLUTCH
DOWNSHIFT WITH ZERO THROTTLE AND NO ENGINE BRAKING IN DRIVE	*NORMAL	NORMAL	NORMAL	NORMAL	HIGH	HIGH	—	STATOR AND DETENT WIRES SWITCHED

* 1966 CADILLAC WITH BRAKES APPLIED WILL SHOW HIGH IF STATOR AND DETENT WIRES ARE SWITCHED.
** DRIVE RANGE, VACUUM LINE DISCONNECTED TO MODULATOR

NO 1-2 UPSHIFT AND/OR DELAYED UPSHIFT OR 1-2 & 2-3 UPSHIFT—FULL THROTTLE ONLY



1-2 SHIFT COMPLAINT



2-3 SHIFT COMPLAINT

CHECK TRANS. OIL LEVEL

CHECK ENGINE TUNE

FIRM SHIFT; QUICK HARSH AND GENERALLY AGGRESSIVE

WITH BRAKES APPLIED, CHECK LINE PRESSURE IN DRIVE AT 1000 RPM

NORMAL

REMOVE CONTROL VALVE ASSEMBLY

FRONT ACCUM. PISTON STUCK--ACCUM. SPRING BROKEN OR MISSING*

CHECK CONTROL VALVE ASSY. DRILLED HOLE TO ACCUM.

AIR CHECK DIRECT CLUTCH FOR LEAK TO OUTER AREA OF CLUTCH PISTON. LEAK COULD BE AT CENTER PISTON SEAL--2ND RING ON CENTER SUPPORT OR DAMAGED SUPPORT

HIGH

CHECK CAUSE OF HIGH PRESSURE PAGE 20

SOFT SHIFT; SLIPS, OR EXTENDED TIME DURING SHIFT WITH END BUMP

WITH BRAKES APPLIED, CHECK LINE PRESSURE IN DRIVE AT 1000 RPM

NORMAL

REMOVE CONTROL VALVE ASSEMBLY CAREFULLY

CHECK SPACER PLATE FOR DAMAGE, BLOCKED DIR. CLUTCH FEED ORIFICE OR MISPOSITIONED GASKET.

CHECK FOR BROKEN OR MISSING FRONT SERVO SPRING OR LEAK AT SERVO PIN

AIR CHECK DIR. CL. FOR EXCESSIVE LEAK

REMOVE TRANS. INSPECT FOR LEAK-CASE TO CENTER SUPPORT, BROKEN, UNDERSIZE OIL RINGS, DAMAGED, MISSING PISTON SEALS.

CHECK CONTROL VALVE ASSY. FOR DAMAGED OR LEAKY PASSAGES STUCK VALVES

REMOVE TRANS. INSPECT DIR. CL. FOR PROPER NO. & TYPE OF CLUTCH PLATES, PAGES 24 & 25

LOW

CORRECT CAUSE OF LOW PRESSURE PAGE 19

* MODEL 400-69 "CY" DOES NOT USE A FRONT ACCUM. SPRING.

1ST & 2ND SPEEDS ONLY, NO 2-3

--CONTROL VALVE ASSY.-- STUCK 2-3 VALVE, GASKETS MISPOSITIONED OR LEAKING

--DIRECT CLUTCH BURNED-- CHECK CAUSE--PAGE 17

--IMPROPER VACUUM-- CHECK CAUSE, PAGE 21

NO DETENT DOWNSHIFTS

LIGHT ON

--DETENT SOLENOID-- DEFECTIVE CONNECTIONS, INOPERATIVE SHORTED WIRE, OPEN WIRE, VALVE STUCK, ORIFICE PLUGGED

--CONTROL VALVE ASSY.-- CHECK DETENT VALVE TRAIN-- SEE PAGES 29 & 30

VEHICLE ON LIFT, IGNITION ON (ENGINE NOT OPERATING)

DISCONNECT ELECT. PLUG FROM TRANS.-- CONNECT TEST LIGHT TO "DETENT" TERMINAL OF DISCONNECTED WIRE HARNESS-- SEE ILLUSTRATION BELOW

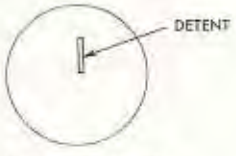
DEPRESS ACCELERATOR FULLY

LIGHT OFF

--DETENT SWITCH--
1. MALADJUSTED--REFER TO CAR MFG. SERVICE MANUALS FOR ADJUSTMENT PROCEDURES
2. DEFECTIVE SWITCH, CONNECTIONS, FUSE, SHORTED WIRE*

* SHORTED SOLENOID WIRE CAN CAUSE FUSE TO BLOW.

PLUG USED ON VARIABLE STATOR TRANS.



PLUG USED ON FIXED STATOR TRANS.

NO DRIVE IN DRIVE RANGE

CHECK TRANS. OIL LEVEL SEE PAGE 18

CHECK OUTSIDE MANUAL LINKAGE & CORRECT SEE PAGE 18

WITH BRAKES APPLIED, CHECK LINE PRESSURE IN DRIVE AT 1000 R.P.M.

NORMAL

—PUMP ASSY—
FORWARD CLUTCH FEED PASSAGE NOT DRILLED OR RESTRICTED

—FORWARD CLUTCH BURNED— CHECK CAUSE—SEE PAGE 17

CHECK LO ROLLER CLUTCH OR LO SPRAG CLUTCH FOR DAMAGE OR LO SPRAG INSTALLED BACKWARDS

LOW

CORRECT CAUSE OF LOW PRESSURE—SEE PAGE 19

NO REVERSE OR SLIPS IN REVERSE

CHECK TRANS. OIL LEVEL—PAGE 18

CHECK OUTSIDE MANUAL LINKAGE & CORRECT— PAGE 18

WITH BRAKES APPLIED, CHECK LINE PRESSURE IN REVERSE AT 1000 RPM

NORMAL

CONTROL VALVE ASSEMBLY
1. 2-3 Valve Train Stuck Open (This Will Also Cause A 1-3 Upshift In Drive Range)
2. Reverse Feed Passage—Cross Channel Leak, Porosity In Case Or Valve Body Passage, Gaskets leaking.

REAR SERVO & ACCUMULATOR
1. Servo Piston Seal Ring Damaged or Missing.
2. Short Band Apply Pin (This May Also Cause No Overrun Braking Or Slips In Overrun Braking—Lo Range)
   Refer To Shop Manual For Pin Selection
3. Defective Rear Servo Piston or Bore.

FORWARD CLUTCH
Clutch Does Not Release (Will also cause Drive in Neutral)

DIRECT CLUTCH BURNED CHECK CAUSE—PAGE 17

REAR BAND
Broken, Burned, Loose Lining, Apply Pin or Anchor Pins Not Engaged.

CENTER SUPPORT
OIL SEAL RINGS OR GROOVES DAMAGED OR WORN

LOW

CORRECT CAUSE—PAGE 19

NO ENGINE BRAKING—INTERMEDIATE RANGE—SECOND GEAR

—FRONT SERVO & ACCUMULATOR—
OIL RINGS AND/OR BORES LEAKING OR FRONT SERVO PISTON COCKED OR STUCK

—FRONT BAND—
BROKEN, BURNED (CHECK FOR CAUSE), NOT ENGAGED ON ANCHOR PIN AND/OR SERVO PIN.

NO ENGINE BRAKING— LO RANGE—1ST GEAR

—CASE ASSEMBLY—
LO—REVERSE CHECK BALL MISPOSITIONED OR MISSING. CASE DAMAGED AT LO—REVERSE CHECK BALL AREA.

—REAR SERVO—
OIL SEAL RING, BORE OR PISTON DAMAGED REAR BAND APPLY PIN SHORT, IMPROPERLY ASSEMBLED

—REAR BAND—
BROKEN, BURNED (CHECK FOR CAUSE), NOT ENGAGED ON ANCHOR PINS AND/OR SERVO PIN.

DRIVE IN NEUTRAL

CHECK OUTSIDE MANUAL LINKAGE & CORRECT PAGE 18

—INTERNAL LINKAGE—
MANUAL VALVE DISCONNECTED OR END BROKEN, INSIDE DETENT LEVER PIN BROKEN.

—PUMP ASSEMBLY—
TRANS. LUBE PRESSURE LEAKING INTO FORWARD CLUTCH APPLY PASSAGE.

—FORWARD CLUTCH—
BURNED PLATES—CHECK CAUSE—PAGE 17

INCORRECT CLUTCH PLATE USAGE—
SEE PAGES 24 & 25

WON'T HOLD IN PARK OR WON'T RELEASE FROM PARK

CHECK OUTSIDE MANUAL LINKAGE & CORRECT, PAGE 18

—INTERNAL LINKAGE—

1. Parking Brake Rod Assy. (Check Actuator For Chamfer)
2. Parking Pawl Broken, Chamfer Omitted.
3. Parking Brake Bracket Loose, Burr Or Rough Edges, or Incorrectly Installed.
4. Parking Pawl Return Spring Missing, Broken or Incorrectly Hooked.

CAUTION: BEFORE CHECKING TRANSMISSION FOR WHAT IS BELIEVED TO BE "TRANS. NOISE," MAKE CERTAIN THE NOISE IS NOT FROM THE WATER PUMP, ALTERNATOR, AIR CONDITIONER, POWER STEERING, ETC. THESE COMPONENTS CAN BE ISOLATED BY REMOVING THE PROPER BELT AND RUNNING THE ENGINE NOT MORE THAN TWO MINUTES AT ONE TIME.

TRANSMISSION NOISY

PARK, NEUTRAL & ALL DRIVING RANGES

—PUMP CAVITATION—
OIL LEVEL LOW (SEE PAGE 18)
PLUGGED OR RESTRICTED FILTER.*
WRONG FILTER (SEE PAGE 26)
INTAKE PIPE "O" RING DAMAGED.
INTAKE PIPE SPLIT, POROSITY IN CASE INTAKE PIPE BORE.
WATER IN OIL.
POROSITY OR VOIDS AT TRANS. CASE (PUMP FACE) INTAKE PORT.
PUMP TO CASE GASKET OFF LOCATION.

—PUMP ASSEMBLY—
GEARS DAMAGED, OR DEFECTIVE,
DRIVING GEAR ASSEMBLED BACKWARDS.
CRESCENT INTERFERENCE.
BUZZING NOISE—ORIFICE CUP PLUG IN PRESSURE REGULATOR DAMAGED OR MISSING.
SEAL RINGS DAMAGED OR WORN.

—CONVERTER—
LOOSE BOLTS (CONVERTER TO FLYWHEEL)
CONVERTER DAMAGE.

DURING ACCELERATION—ANY GEAR

TRANSMISSION OR COOLER LINES GROUNDED TO UNDERBODY.
MOTOR MOUNTS LOOSE OR BROKEN.

425 MODEL ONLY—DRIVE LINK ASSEMBLY, WORN OR DAMAGED, MAY SOUND LIKE POPCORN POPPING.

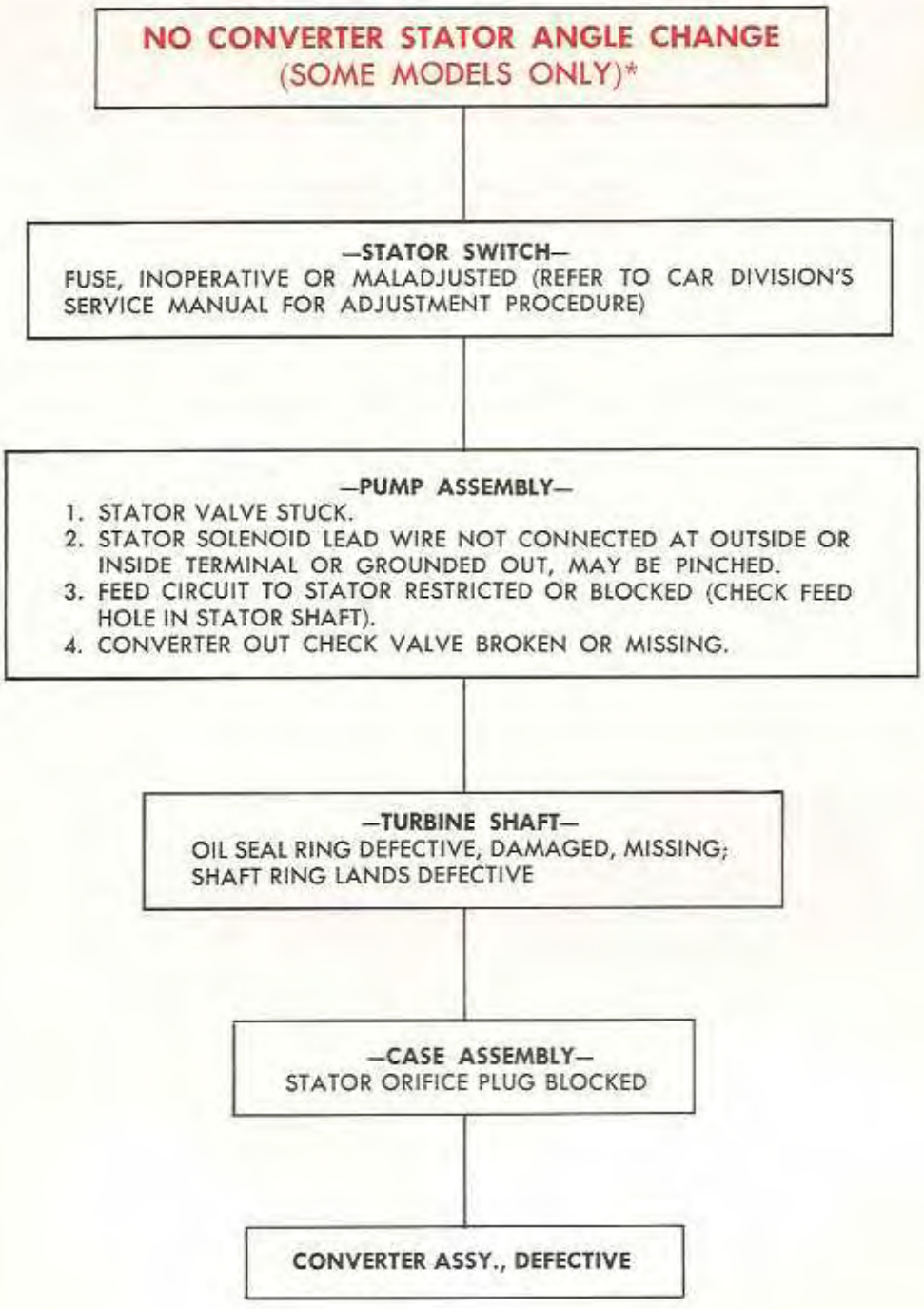
SQUEAL AT LOW VEHICLE SPEEDS

SPEEDOMETER DRIVEN GEAR SHAFT SEAL—SEAL REQUIRES LUBRICATION OR REPLACEMENT.

FIRST, SECOND OR REVERSE ONLY

—PLANETARY GEAR SET—
GEARS OR THRUST BEARINGS DAMAGED.
FRONT INTERNAL GEAR RING DAMAGED.

* There is no approved way of checking or cleaning the filter. If the filter is suspected of being plugged or restricted, it must be replaced.



* 1965—Cadillac-AA, All Buick, All Oldsmobile
1966—Cadillac-AA, All Buick, All Oldsmobile, Rolls Royce
1967—Cadillac-AA-AJ, All Buick, All Oldsmobile, Rolls Royce

CAUSES OF OIL LEAKS

1. **TRANSMISSION OIL PAN LEAKS**
   - A. ATTACHING BOLTS NOT CORRECTLY TORQUED.
   - B. IMPROPERLY INSTALLED OR DAMAGED PAN GASKET.
   - C. OIL PAN GASKET MOUNTING FACE NOT FLAT.

2. **CASE EXTENSION LEAK**
   - A. ATTACHING BOLTS NOT CORRECTLY TORQUED.
   - B. REAR SEAL ASSEMBLY—DAMAGED OR IMPROPERLY INSTALLED. (PROPELLER SHAFT YOKE DAMAGED).
   - C. GASKET OR SEAL—(EXTENSION TO CASE) DAMAGED OR IMPROPERLY INSTALLED.
   - D. POROUS CASTING.

3. **CASE LEAK**
   - A. FILLER PIPE "O" RING SEAL DAMAGED OR MISSING; MISPOSITION OF FILLER PIPE BRACKET TO ENGINE—"LOADING" ONE SIDE OF THE "O" RING.
   - B. MODULATOR ASSEMBLY "O" RING SEAL—DAMAGED OR IMPROPERLY INSTALLED.
   - C. CONNECTOR "O" RING SEAL—DAMAGED OR IMPROPERLY INSTALLED.
   - D. GOVERNOR COVER, GASKET AND BOLTS—DAMAGED, LOOSE; CASE FACE DAMAGED OR POROSITY.
   - E. LEAK AT SPEEDOMETER DRIVEN GEAR HOUSING OR SEAL. LEAK AT SPEEDO HOLE PLUG.
   - F. MANUAL SHAFT SEAL—DAMAGED, IMPROPERLY INSTALLED.
   - G. LINE PRESSURE TAP PLUG—STRIPPED, SHY SEALER COMPOUND.
   - H. VENT PIPE (REFER TO ITEM 5).
   - I. POROUS CASE, OR CRACKED AT PRESSURE PLUG BOSS.

4. **FRONT END LEAK**
   - A. FRONT SEAL—DAMAGED (CHECK CONVERTER NECK FOR NICKS, ETC., ALSO FOR PUMP BUSHING MOVED FORWARD) GARTER SPRING MISSING.
   - B. PUMP ATTACHING BOLTS, AND SEALS—DAMAGED, MISSING, BOLTS LOOSE.
   - C. CONVERTER—LEAK IN WELD.
   - D. PUMP "O" RING SEAL—DAMAGED. (ALSO CHECK PUMP OIL RING GROOVE AND CASE BORE).
   - E. POROUS CASTING (PUMP OR CASE).
   - F. PUMP—DRAIN BACK HOLE NOT OPEN.

5. **OIL COMES OUT VENT PIPE**
   - A. TRANSMISSION OVER-FILLED—SEE PAGE 18.
   - B. WATER IN OIL.
   - C. FILTER "O" RING DAMAGED OR IMPROPERLY ASSEMBLED CAUSING OIL TO FOAM.
   - D. FOREIGN MATERIAL BETWEEN PUMP AND CASE OR BETWEEN PUMP COVER AND BODY, OR VARIABLE STATOR SOLENOID SCREWS TOO LONG—HOLDING PUMP HALVES APART.
   - F. CASE—POROUS, PUMP FACE IMPROPERLY MACHINED.
   - E. PUMP—SHY OF STOCK, POROUS.
   - G. PUMP TO CASE GASKET MISPOSITIONED.
   - H. PUMP BREATHER HOLE BLOCKED OR MISSING. (SEE PAGES 36 & 37).
   - I. HOLE IN INTAKE PIPE.

6. **OIL COOLER LINES**
   - A. CONNECTIONS AT RADIATOR LOOSE OR STRIPPED.
   - B. CONNECTIONS AT CASE LOOSE OR STRIPPED.

7. **MODULATOR ASSY.**
   - A. DIAPHRAGM DEFECTIVE (SEE PAGE 22)

CAUSES OF BURNED CLUTCH PLATES

1. **FORWARD CLUTCH**
   - A. CHECK BALL IN CLUTCH HOUSING DAMAGED, STUCK OR MISSING.
   - B. CLUTCH PISTON CRACKED, SEALS DAMAGED OR MISSING.
   - C. LOW LINE PRESSURE (SEE PAGE 19).
   - D. MANUAL VALVE MISPOSITIONED (SEE PAGE 18).
   - E. RESTRICTED OIL FEED TO FORWARD CLUTCH (EXAMPLES: CLUTCH HOUSING TO INNER AND OUTER AREAS NOT DRILLED, RESTRICTED OR POROSITY IN PUMP).
   - F. PUMP COVER OIL SEAL RINGS MISSING, BROKEN OR UNDERSIZE; RING GROOVE OVERSIZE.
   - G. CASE VALVE BODY FACE NOT FLAT OR POROSITY BETWEEN CHANNELS.
   - H. MANUAL VALVE BENT AND CENTER LAND NOT GROUND PROPERLY.
2. **INTERMEDIATE CLUTCH**
   - A. CONSTANT BLEED ORIFICE IN CENTER SUPPORT MISSING (EXCLUDING ALL '64 & '65 MODELS, CADILLAC 400 AND ALL 425) (SEE PAGE 35).
   - B. REAR ACCUMULATOR PISTON OIL RING, DAMAGED OR MISSING.
   - C. 1-2 ACCUMULATOR VALVE STUCK IN CONTROL VALVE ASSEMBLY.
   - D. INTERMEDIATE CLUTCH PISTON SEALS DAMAGED OR MISSING.
   - E. CENTER SUPPORT BOLT LOOSE.
   - F. LOW LINE PRESSURE (SEE PAGE 19).
   - G. INTERMEDIATE CLUTCH PLUG IN CASE MISSING. (SEE PAGE 35).
   - H. CASE VALVE BODY FACE NOT FLAT OR POROSITY BETWEEN CHANNELS.
   - I. MANUAL VALVE BENT AND CENTER LAND NOT GROUND PROPERLY.
3. **DIRECT CLUTCH**
   - A. RESTRICTED ORIFICE IN VACUUM LINE TO MODULATOR (POOR VACUUM RESPONSE).
   - B. CHECK BALL IN DIRECT CLUTCH PISTON DAMAGED, STUCK OR MISSING.
   - C. DEFECTIVE MODULATOR BELLOWS (SEE PAGE 22).
   - D. CENTER SUPPORT BOLT LOOSE. (BOLT MAY BE TIGHT IN SUPPORT BUT NOT HOLDING SUPPORT TIGHT TO CASE).
   - E. CENTER SUPPORT OIL RINGS OR GROOVES DAMAGED OR MISSING.
   - F. CLUTCH PISTON SEALS DAMAGED OR MISSING.
   - G. FRONT AND REAR SERVO PISTONS AND SEALS DAMAGED.
   - H. MANUAL VALVE BENT AND CENTER LAND NOT CLEANED UP.
   - I. CASE VALVE BODY FACE NOT FLAT OR POROSITY BETWEEN CHANNELS.
   - J. INTERMEDIATE SPRAG CLUTCH INSTALLED BACKWARDS.

NOTE: IF DIRECT CLUTCH PLATES AND FRONT BAND ARE BURNED, CHECK MANUAL LINKAGE (SEE PAGE 18).

NOTE: BURNED CLUTCH PLATES CAN BE CAUSED BY INCORRECT USAGE OF CLUTCH PLATES (SEE PAGES 24 AND 25). ALSO, ANTI-FREEZE IN TRANSMISSION FLUID CAN CAUSE SEVERE DAMAGE, SUCH AS LARGE PIECES OF COMPOSITION CLUTCH PLATE MATERIAL PEELING OFF.

CHECKING TRANSMISSION OIL LEVEL

1. ENGINE RUNNING.
2. VEHICLE ON LEVEL SURFACE.
3. BRAKES APPLIED
4. MOVE LEVER THROUGH ALL RANGES.
5. PLACE TRANSMISSION IN "PARK."
6. CHECK OIL LEVEL.
7. IF OIL IS LOW, CHECK FOR POSSIBLE CAUSES—REFER TO PAGE 16

THE OIL LEVEL SHOULD BE BETWEEN THE "ADD" AND "FULL" MARKS AT NORMAL OPERATING TEMPERATURE (170°F.). THIS TEMPERATURE IS OBTAINED AFTER AT LEAST 15 MILES OF EXPRESSWAY DRIVING OR EQUIVALENT CITY DRIVING. ALSO, AT NORMAL OPERATING TEMPERATURE, THE OIL WILL HEAT THE GAUGE END OF THE DIP STICK TO A DEGREE WHERE THE AVERAGE PERSON CAN NOT GRASP IT FIRMLY WITH HIS BARE HAND WITHOUT DISCOMFORT.

IF THE TRANSMISSION IS NOT AT OPERATING TEMPERATURE, THE OIL LEVEL SHOULD BE APPROXIMATELY ¼" BELOW THE "ADD" MARK WITH THE OIL AT APPROXIMATELY 75° F. (ROOM TEMPERATURE.) IF THE OIL LEVEL IS CORRECTLY ESTABLISHED AT ROOM TEMPERATURE (75°F), IT SHOULD BE AT THE "FULL" MARK ON THE DIP STICK WHEN THE TRANSMISSION REACHES NORMAL OPERATING TEMPERATURE (170°F.).

CAUTION: DO NOT OVERFILL TRANSMISSION, AS THIS WILL CAUSE FOAMING AND LOSS OF OIL THROUGH THE VENT PIPE.

MANUAL LINKAGE ADJUSTMENT

THE TRANSMISSION MANUAL LINKAGE MUST BE ADJUSTED SO THAT THE POINTER ON THE INDICATOR QUADRANT AND LINKAGE DETENTS OR STOPS CORRESPONDS WITH THE TRANSMISSION INSIDE DETENT LEVER DETENTS. IF THE LINKAGE IS NOT ADJUSTED PROPERLY, AN INTERNAL LEAK COULD OCCUR AT THE MANUAL VALVE WHICH COULD CAUSE A CLUTCH AND/OR FRONT BAND FAILURE.
REFER TO THE CAR DIVISION SHOP MANUAL FOR MANUAL LINKAGE ADJUSTMENT PROCEDURE.

NOTE: IF A MANUAL LINKAGE ADJUSTMENT IS MADE, THE ASSOCIATED NEUTRAL SAFETY SWITCH (MODELS 1964 THRU 1969) SHOULD BE ADJUSTED, IF NECESSARY. THE NEUTRAL SAFETY SWITCH SHOULD BE ADJUSTED SO THAT THE ENGINE WILL START IN "PARK" AND "NEUTRAL" POSITIONS ONLY, WITH THE SELECTOR LEVER IN THE "PARK" POSITION, THE PARKING PAWL SHOULD FREELY ENGAGE AND PREVENT THE VEHICLE FROM ROLLING.

NOTE: THE "CP" MODEL TRANSMISSION WHICH IS USED IN ONE TON TRUCKS DOES NOT CONTAIN THE "PARK" MECHANISM.

CAUSE OF LOW LINE PRESSURE

1. **LOW TRANSMISSION OIL LEVEL.**

2. **MODULATOR ASSEMBLY—SEE PAGE 22.**

3. **FILTER**
   - A. BLOCKED OR RESTRICTED.*
   - B. "O" RING ON INTAKE PIPE AND/OR GROMMET OMITTED OR DAMAGED.
   - C. SPLIT OR LEAKING INTAKE PIPE.
   - D. WRONG FILTER ASSEMBLY—SEE PAGE 26.

4. **PUMP**
   - A. PRESSURE REGULATOR OR BOOST VALVE STUCK.
   - B. GEAR CLEARANCE, DAMAGED, WORN (PUMP WILL BECOME DAMAGED IF DRIVE GEAR IS INSTALLED BACKWARDS, OR IF CONVERTER PILOT DOES NOT ENTER CRANKSHAFT FREELY).
   - C. PRESSURE REGULATOR SPRING, TOO WEAK.
   - D. NOT ENOUGH SPACERS IN PRESSURE REGULATOR.
   - E. PUMP TO CASE GASKET MISPOSITIONED.
   - F. DEFECTIVE PUMP BODY AND/OR COVER.
   - G. MISMATCH PUMP COVER/PUMP BODY—SEE PAGE 27.

5. **INTERNAL CIRCUIT LEAKS.**
   - A. FORWARD CLUTCH LEAK (PRESSURE NORMAL IN NEUTRAL AND REVERSE—PRESSURE LOW IN DRIVE).
     1. CHECK PUMP RINGS.
     2. CHECK FORWARD CLUTCH SEALS.
   - B. DIRECT CLUTCH LEAK (PRESSURE NORMAL IN NEUTRAL, LOW, INT. AND DRIVE—PRESSURE LOW IN REVERSE).
     1. CHECK CENTER SUPPORT OIL SEAL RINGS.
     2. CHECK DIRECT CLUTCH OUTER SEAL FOR DAMAGE.
     3. CHECK REAR SERVO AND FRONT ACCUM. PISTONS AND RINGS FOR DAMAGE OR MISSING.

6. **CASE ASSEMBLY**
   - A. POROSITY IN INTAKE BORE AREA.
   - B. CHECK CASE FOR INTERMEDIATE CLUTCH PLUG LEAK OR BLOWN OUT.—SEE PAGE 35
   - C. LO-REVERSE CHECK BALL MISPOSITIONED OR MISSING (THIS WILL CAUSE NO REVERSE AND NO OVERRUN BRAKING IN LO RANGE).

* THERE IS NO APPROVED WAY FOR CHECKING OR CLEANING THE FILTER. IF THE FILTER IS SUSPECTED OF BEING PLUGGED OR RESTRICTED, IT MUST BE REPLACED.

CAUSES OF HIGH LINE PRESSURE

1. **VACUUM LEAK**
   - A. FULL LEAK, VACUUM LINE DISCONNECTED.
   - B. PARTIAL LEAK IN LINE FROM ENGINE TO MODULATOR.
   - C. IMPROPER ENGINE VACUUM.
   - D. VACUUM OPERATED ACCESSORY LEAK. (HOSES, VACUUM ADVANCE, ETC.)

2. **DAMAGED MODULATOR**
   - A. STUCK VALVE.
   - B. WATER IN MODULATOR.
   - C. NOT OPERATING PROPERLY.—SEE PAGE 22.

3. **DETENT SYSTEM**
   - A. DETENT SWITCH ACTUATED (PLUNGER STUCK) OR SHORTED.
   - B. DETENT WIRING SHORTED.
   - C. DETENT SOLENOID STUCK OPEN.
   - D. DETENT FEED ORIFICE IN SPACER PLATE BLOCKED.SEE PAGES 31 & 32
   - E. DETENT SOLENOID LOOSE.
   - F. DETENT VALVE BORE PLUG DAMAGED.
   - G. DETENT REG. VALVE PIN SHORT.

4. **PUMP**
   - A. PRESSURE REG. AND/OR BOOST VALVE STUCK.
   - B. INCORRECT PRESSURE REG. SPRING.
   - C. TOO MANY PRESSURE REG. VALVE SPACERS.
   - D. PUMP CASTING BAD.
   - E. PRESSURE BOOST VALVE INSTALLED BACKWARDS OR DEFECTIVE.
   - F. ALUMINUM BORE PLUG HAS HOLE OR OTHERWISE DEFECTIVE.
   - G. PRESSURE BOOST BUSHING BROKEN OR OTHERWISE DEFECTIVE.

5. **CONTROL VALVE ASSEMBLY**
   - A. CONTROL VALVE ASSY. TO SPACER GASKET OFF LOCATION.
   - B. GASKETS INSTALLED IN REVERSE ORDER.

CAUSES OF IMPROPER VACUUM AT MODULATOR

1. **ENGINE**
   - A. TUNE UP
   - B. LOOSE VACUUM FITTINGS
   - C. VACUUM OPERATED ACCESSORY LEAK (HOSES, VACUUM ADVANCE, ETC).

2. **VACUUM LINE TO MODULATOR**
   - A. LEAK
   - B. LOOSE FITTING
   - C. RESTRICTED ORIFICE, OR INCORRECT ORIFICE SIZE.
   - D. CARBON BUILD UP AT MOD. VAC. FITTING
   - E. PINCHED LINE
   - F. GREASE IN PIPE (NO OR DELAYED UPSHIFT-COLD)

CONTROL VALVE ASSEMBLY—GOVERNOR LINE PRESSURE CHECK

1. **INSTALL LINE PRESSURE GAGE**

2. **DISCONNECT VACUUM LINE TO MODULATOR.**

3. **WITH CAR ON HOIST (REAR WHEELS, OFF GROUND), FOOT OFF BRAKE, IN DRIVE, CHECK LINE PRESSURE AT 1000 RPM.**

4. **SLOWLY INCREASE ENGINE RPM TO 3000 RPM AND DETERMINE IF A LINE PRESSURE DROP OCCURS (7 PSI OR MORE).**

5. **IF PRESSURE DROP OCCURS, DISASSEMBLE, CLEAN AND INSPECT CONTROL VALUE ASSEMBLY.**

6. **IF NO PRESSURE DROP OCCURS:**
   - A. INSPECT GOVERNOR
     1. STUCK VALVE.
     2. WEIGHT FREENESS.
     3. RESTRICTED ORIFICE IN GOVERNOR VALVE.
   - B. GOVERNOR FEED SYSTEM
     1. CHECK SCREEN IN CONTROL VALVE ASSEMBLY.
     2. CHECK FOR RESTRICTIONS IN GOVERNOR PIPE.

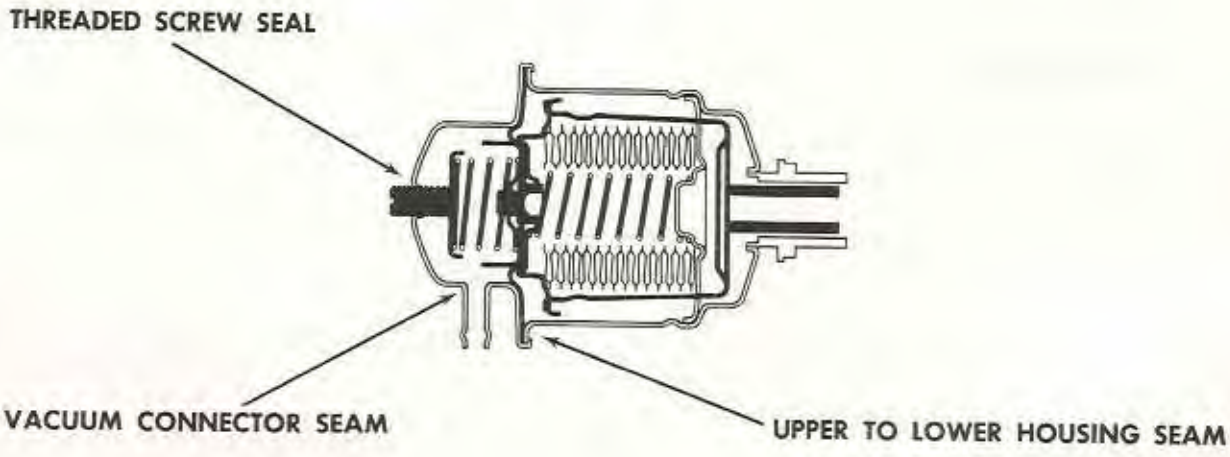
MODULATOR ASSEMBLY DIAGNOSIS PROCEDURE

AFTER THOROUGH INVESTIGATION OF FIELD RETURNED MODULATOR ASSEMBLIES, IT HAS BEEN FOUND THAT OVER 50% OF THE PARTS RETURNED AS DEFECTIVE WERE GOOD. FOR THIS REASON, THE FOLLOWING PROCEDURE IS RECOMMENDED FOR CHECKING TURBO HYDRA-MATIC MODULATOR ASSEMBLIES IN THE FIELD BEFORE REPLACEMENT IS ACCOMPLISHED.

1. **VACUUM DIAPHRAGM LEAK CHECK**
   INSERT A PIPE CLEANER INTO THE VACUUM CONNECTOR PIPE AS FAR AS POSSIBLE AND CHECK FOR THE PRESENCE OF TRANSMISSION OIL. IF OIL IS FOUND, REPLACE THE MODULATOR. TRANSMISSION OIL MAY BE LOST THROUGH DIAPHRAGM AND BURNED IN ENGINE.
   NOTE: GASOLINE OR WATER VAPOR MAY SETTLE IN THE VACUUM SIDE OF THE MODULATOR. IF THIS IS FOUND **WITHOUT** THE PRESENCE OF OIL THE MODULATOR SHOULD **NOT** BE CHANGED.

2. **ATMOSPHERIC LEAK CHECK**
   APPLY A LIBERAL COATING OF SOAP BUBBLE SOLUTION (OBTAINABLE AT A 5c-10c STORE) TO THE VACUUM CONNECTOR PIPE SEAM, THE CRIMPED UPPER TO LOWER HOUSING SEAM, AND THE THREADED SCREW SEAL. USING A SHORT PIECE OF RUBBER TUBING, APPLY AIR PRESSURE TO THE VACUUM PIPE BY BLOWING INTO THE TUBE AND OBSERVE FOR LEAK BUBBLES. IF BUBBLES APPEAR, REPLACE THE MODULATOR.

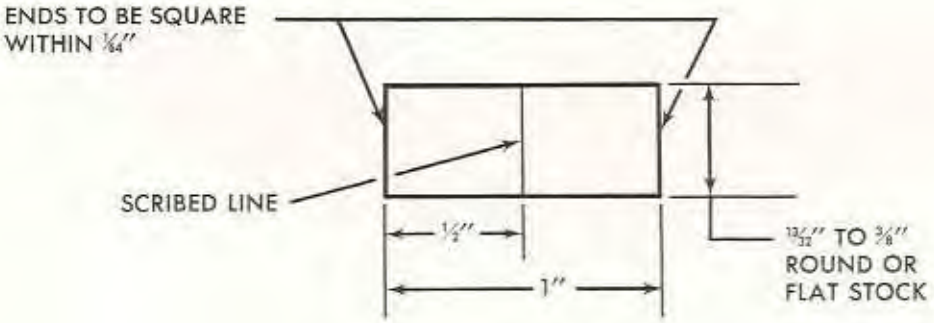
   NOTE: DO NOT USE ANY METHOD OTHER THAN HUMAN LUNG POWER FOR APPLYING AIR PRESSURE, AS PRESSURES OVER 6 PSI MAY DAMAGE THE MODULATOR.



MODULATOR ASSEMBLY DIAGNOSIS PROCEDURE (CONT.)

3. **BELLOWS COMPARISON CHECK**
   USING A COMPARISON GAGE, AS SHOWN IN SKETCH BELOW, COMPARE THE LOAD OF A KNOWN GOOD HYDRA-MATIC MODULATOR WITH THE ASSEMBLY IN QUESTION.

   A. INSTALL THE MODULATOR THAT IS KNOWN TO BE ACCEPTABLE ON EITHER END OF THE GAGE.
   B. INSTALL THE MODULATOR IN QUESTION ON THE OPPOSITE END OF THE GAGE.
   C. HOLDING THE MODULATORS IN A HORIZONTAL POSITION BRING THEM TOGETHER UNDER PRESSURE UNTIL EITHER MODULATOR SLEEVE END **JUST TOUCHES** THE LINE IN THE CENTER OF THE GAGE. THE GAP BETWEEN THE OPPOSITE MODULATOR SLEEVE END AND THE GAGE LINE SHOULD THEN BE 1/16" OR LESS. IF THE DISTANCE IS GREATER THAN THIS AMOUNT, THE MODULATOR IN QUESTION SHOULD BE REPLACED.



4. **SLEEVE ALIGNMENT CHECK**
   ROLL THE MAIN BODY OF THE MODULATOR ON A FLAT SURFACE AND OBSERVE THE SLEEVE FOR CONCENTRICITY TO THE CAN. IF THE SLEEVE IS CONCENTRIC AND THE PLUNGER IS FREE, THE MODULATOR IS ACCEPTABLE.

ONCE THE MODULATOR ASSEMBLY PASSES ALL OF THE ABOVE TESTS, IT IS AN ACCEPTABLE PART AND SHOULD BE RE-USED.

400 TURBO HYDRA-MATIC CLUTCH PLATE USAGE

PART NAME			FLAT STEEL CLUTCH PLATES								WAVED STEEL CLUTCH PLATES								PLATE ASS'Y CLUTCH COMPOSITION								PISTON RELEASE SPRINGS							
CLUTCH ASS'Y	MODEL YEAR		64	65	66	67	68	69	70	71	64	65	66	67	68	69	70	71	64	65	66	67	68	69	70	71	64	65	66	67	68	69	70	71
FORWARD CLUTCH	ALL MODELS		–	4	4	4	B4	B4			5	1	1	1	1	1			5	5	5	5	5	5			16	16	16	16	16	16		
	EXCEPT	KK KL KM KJ	–	3	3	3	B3	B3			–	1	1	1	1	1			–	4	4	4	4	4			–	16	16	16	16	16		
		BU	–	3	4	4	B4	B4			5	1	1	1	1	1			5	4	5	5	5	5			16	16	16	16	16	16		
DIRECT CLUTCH (C)	ALL MODELS		–	–	–	4	4	4			5	5	5	1	1	1			5	5	5	5	5	5			16	16	16	16	16	16		
	EXCEPT	BU	–	–	–	4	4	4			5	4	5	1	1	1			5	4	5	5	5	5			16	16	16	16	16	16		
		WOG OW	–	–	–	5	6	6			–	–	–	–	–	–			–	–	–	5	6	6			–	–	–	16	16	16		
		PQ BB PS PZ	–	–	–	A5	5	5			–	–	–	–	–	–			–	–	–	5	5	5			–	–	–	16	16	16		
		AA OK OL OB AB	–	–	–	4	5	5			–	5	5	1	1	1			–	5	5	5	6	6			–	16	16	16	16	16		
		KL KM	–	–	–	3	3	3			–	–	4	1	1	1			–	–	4	4	4	4			–	–	16	16	16	16		
		KJ KK	–	–	–	4	4	4			–	5	5	1	1	1			–	5	5	5	5	5			–	16	16	16	16	16		
		RR	–	–	–	4	4	4			–	–	5	1	1	1			–	–	5	5	5	5			–	–	16	16	16	16		
		CM	–	–	–	–	3	–			–	–	–	–	1	–			–	–	–	–	4	–			–	–	–	–	16	–		
		CY CX OH	–	–	–	–	6	6			–	–	–	–	–	–			–	–	–	–	6	6			–	–	–	–	16	16		
INTERMEDIATE CLUTCH	ALL MODELS		3	3	2	2	2	2			–	–	1	1	1	1			3	3	3	3	3	3			12	12	3	3	D3	F3		
	EXCEPT	OW CY BB CX OH	–	–	–	–	E3	3			–	–	–	–	–	–			–	–	–	–	3	3			–	–	–	–	3	3		

MODEL YEAR	1964	1965	1966	1967	1968	1969	1970	1971
CENTER SUPPORT ORIFICE	NO	NO	YES EXPT. CAD	YES EXPT. CAD	YES EXPT. CAD.	YES EXPT. CAD.		

NOTES:

– NOT APPLICABLE

A. IN EARLY PQ '67 PRODUCTION 1 WAVED PLATE WAS USED IN THE DIRECT CLUTCH. FOR SERVICE REPLACE WITH .0915 FLAT STEEL PLATE.

B. STEEL PLATE THICKNESS IN HI TORQUE MODELS (AA, AB, OB, OH, OL, OK) is .0915"—ALL OTHERS .0775".

C. FLAT STEEL CLUTCH PLATES .0915" THICK.

D. IN LATE '68, CADILLAC BEGAN USING 12 SPRINGS. FOR SERVICE REPLACE 3 SPRINGS WITH 12.

E. IN EARLY OW '68 PRODUCTION 1 WAVED PLATE WAS USED IN THE INTERMEDIATE CLUTCH. FOR SERVICE REPLACE WITH .0990" FLAT STEEL PLATE.

F. 12 USED IN '69 CADILLAC MODELS.

425 TURBO HYDRA-MATIC CLUTCH PLATE USAGE

PART NAME		FLAT STEEL CLUTCH PLATE								WAVED STEEL CLUTCH PLATE								PLATE ASS'Y CLUTCH COMPOSITION								PISTON RELEASE SPRINGS							
CLUTCH ASS'Y	MODEL YEAR	66	67	68	69	70	71	72	73	66	67	68	69	70	71	72	73	66	67	68	69	70	71	72	73	66	67	68	69	70	71	72	73
FORWARD CLUTCH	ALL MODELS	5	5	5	5					A1	A1	A1	A1					5	5	5	5					16	16	16	16				
	EXCEPT																																
DIRECT CLUTCH	ALL MODELS	5	5	5	5					A1	A1	B1	B1					5	5	6	6					16	16	16	16				
	EXCEPT																																
INTERMEDIATE CLUTCH	ALL MODELS	3	3	3	3					–	–	–	–					3	3	3	3					12	12	12	12				
	EXCEPT																																

MODEL YEAR	1966	1967	1968	1969	1970	1971	1972	1973
CENTER SUPPORT ORIFICE	NO	NO	NO	NO				

NOTES:

— NOT APPLICABLE.

A. CLUTCH PLATE DISHED, .0540" THICK.

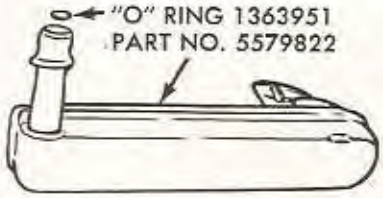
B. DIRECT CLUTCH WAVED PLATE .0605" THICK. ALL FORWARD AND DIRECT CLUTCH FLAT STEEL PLATES ARE .0915" THICK.

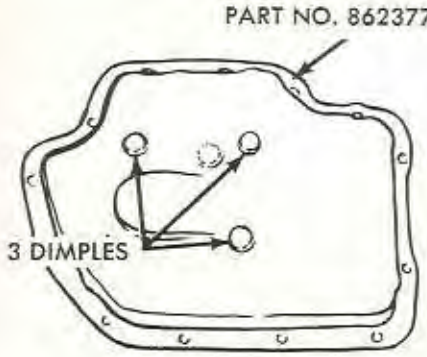
FIRST & SECOND TYPE TURBO HYDRAMATIC "400" FILTERS & OIL PANS

CAUTION: WHEN SERVICE REPLACEMENT OF THE FILTER ASSEMBLY AND/OR PAN IS REQUIRED, THEY MUST BE USED IN THE FOLLOWING COMBINATIONS **ONLY:**

COMBINATION 1

FIRST TYPE FILTER (CONTAINS A BY-PASS VALVE) 1964-65-66 AND EARLY 1967

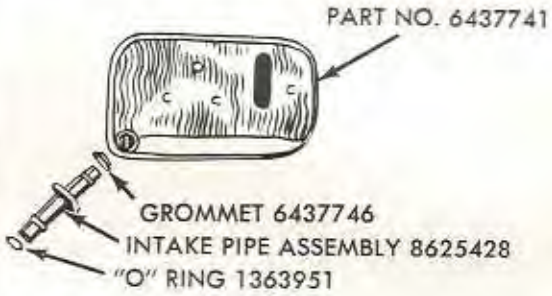


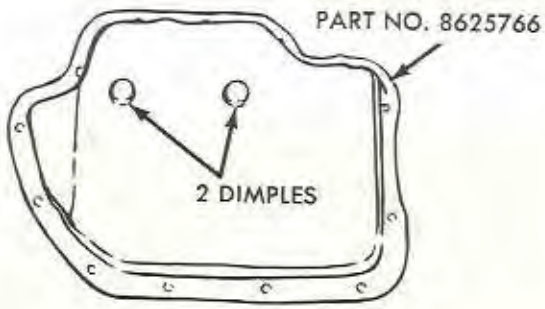


FIRST TYPE PAN

COMBINATION 2

SECOND TYPE FILTER (NO BY-PASS VALVE) LATE 1967 AND AFTER





SECOND TYPE PAN

* PART NUMBER 8623777 USED IN 1964 MODEL CADILLAC.

MODEL "425" FILTER

THERE ARE TWO TYPES OF FILTERS (EARLY AND LATE) USED IN THE MODEL "425" TRANSMISSIONS. THE EARLY TYPE FILTER, PART NUMBER 6435766, CONTAINS A BY-PASS VALVE. THE LATE TYPE FILTER, PART NUMBER 6438301, IS THE FULL FLOW DESIGN AND DOES **NOT** CONTAIN A BY-PASS VALVE. THESE TWO FILTERS ARE INTERCHANGEABLE, HOWEVER, IT IS SUGGESTED THAT STOCK ON HAND OF THE EARLY TYPE FILTER BE DEPLETED ON 1966 THRU 1968 MODEL TRANSMISSIONS.

MODEL "400" OR "425"

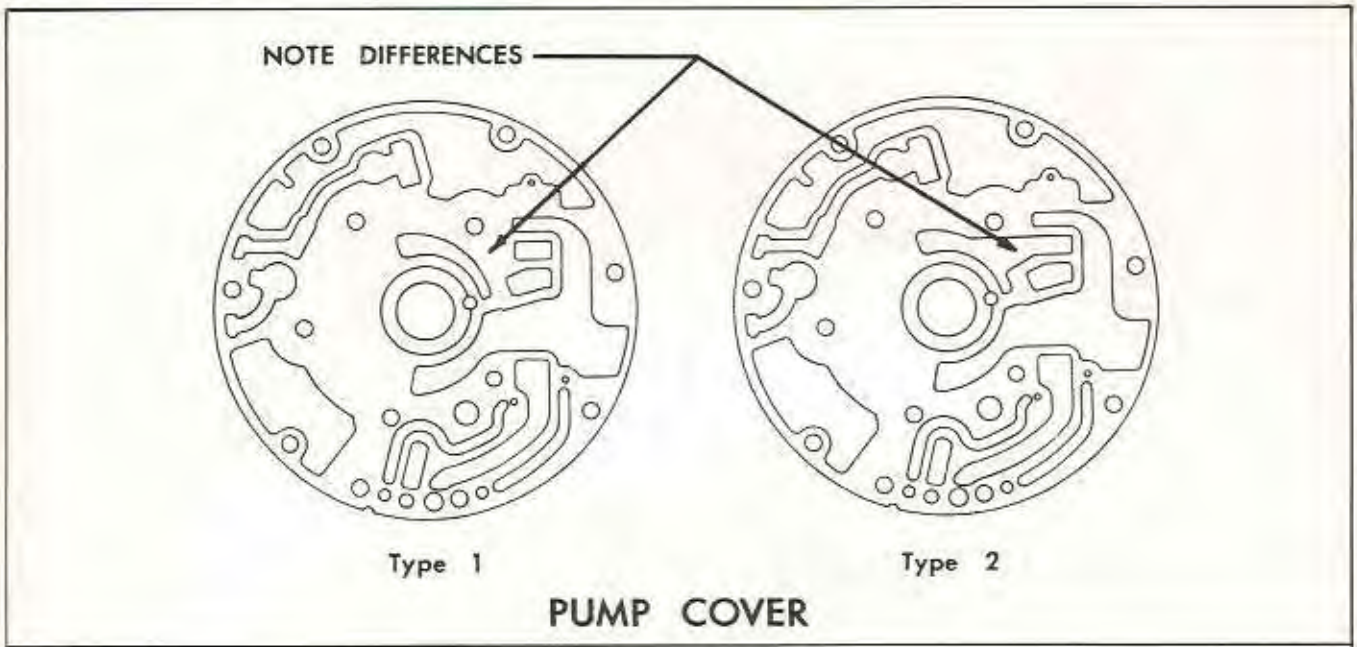
IF THE TRANSMISSION IS EQUIPPED WITH THE FILTER WHICH DOES **NOT** CONTAIN A BY-PASS VALVE, IT WILL NOT BE NECESSARY TO REPLACE THE CONVERTER, (UNLESS DEFECTIVE) IN THE EVENT OF A TRANSMISSION FAILURE THAT GENERATES DEBRIS OR SEDIMENT.

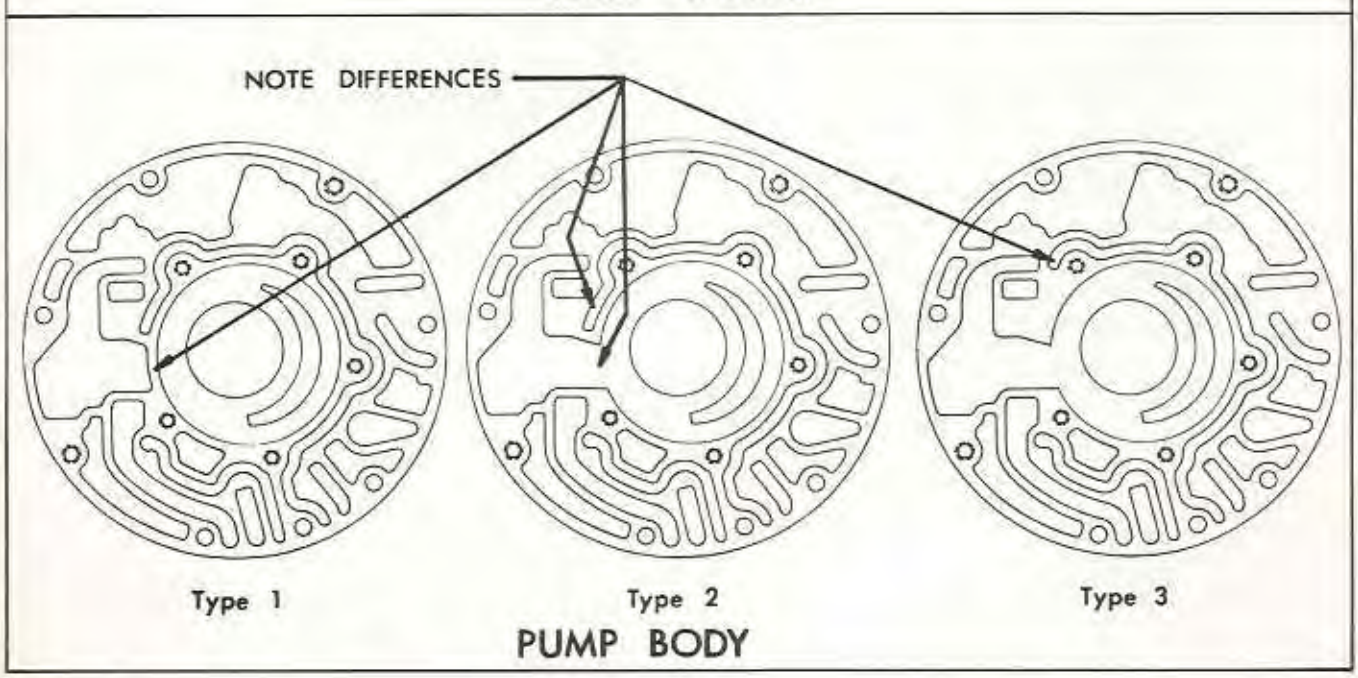
THM "400" PUMP BODY & COVER USAGE—FIXED STATOR

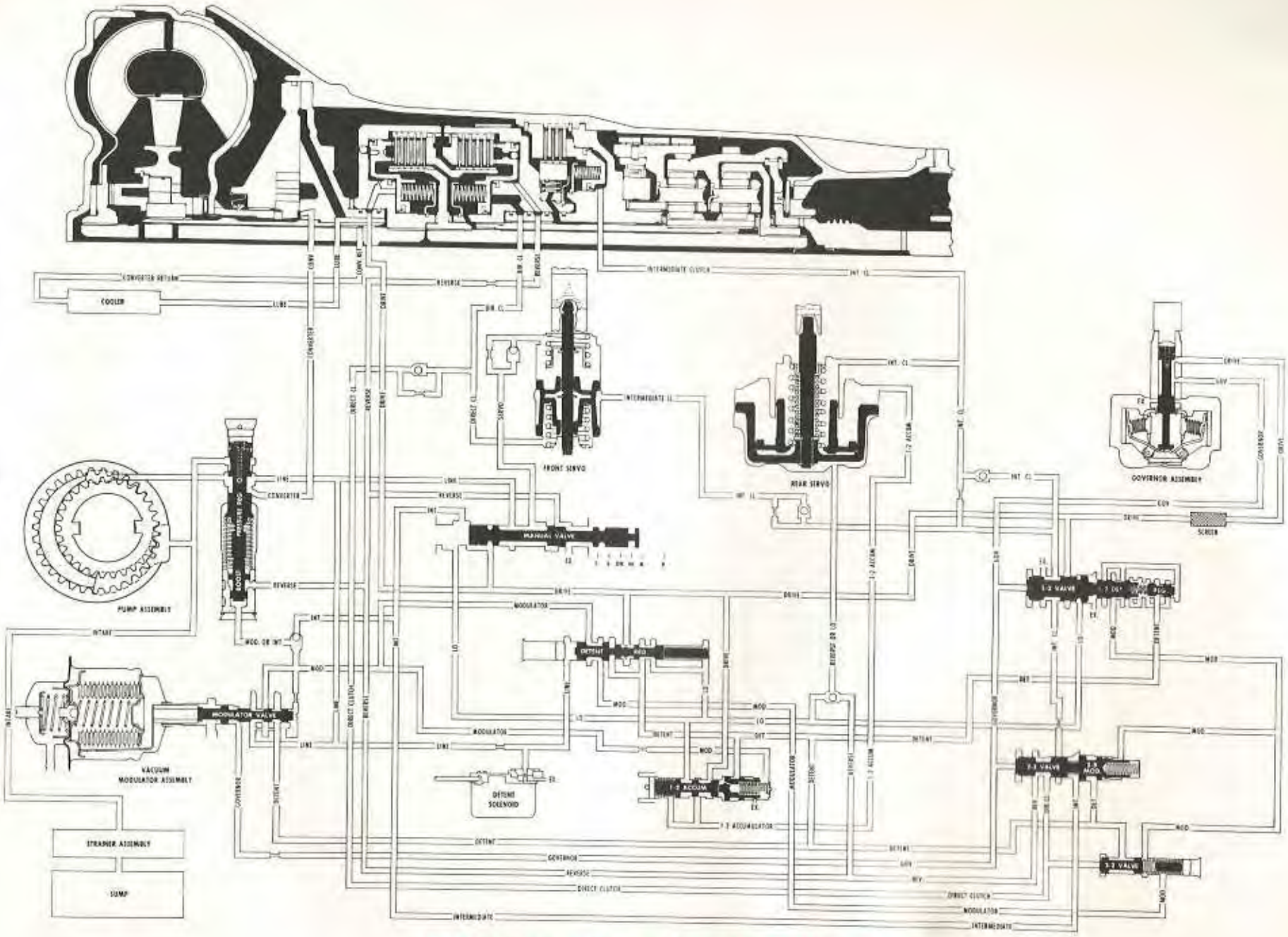
CAUTION: WHEN SERVICE REPLACEMENT IS REQUIRED OF THE **FIXED STATOR** TURBO HYDRA-MATIC "400" PUMP COVER AND/OR PUMP BODY, THEY **MUST** BE USED IN THE FOLLOWING COMBINATIONS **ONLY:** (SEE ILLUSTRATIONS.)

COMBINATION 1 PUMP COVER, TYPE 1, MAY BE USED WITH PUMP BODY, TYPE 1, TYPE 2, OR TYPE 3.

COMBINATION 2 PUMP COVER, TYPE 2, **MAY ONLY** BE USED WITH PUMP BODY, TYPE 3, DUE TO THE CHANGES IN OIL PASSAGES.

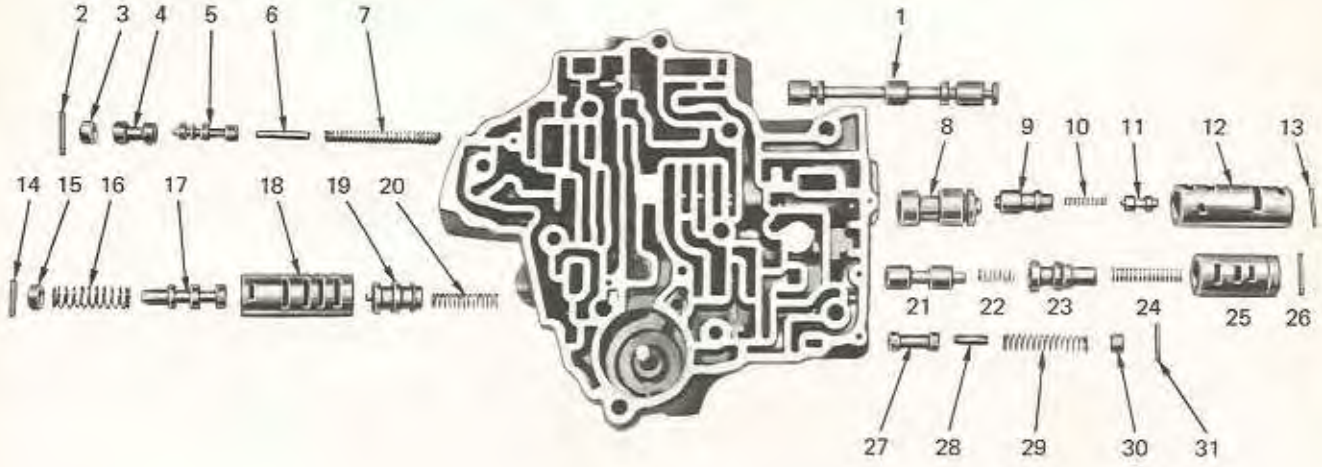






TYPICAL OIL FLOW DIAGRAM—FIXED STATOR
(VALVES IN NEUTRAL POSITION)

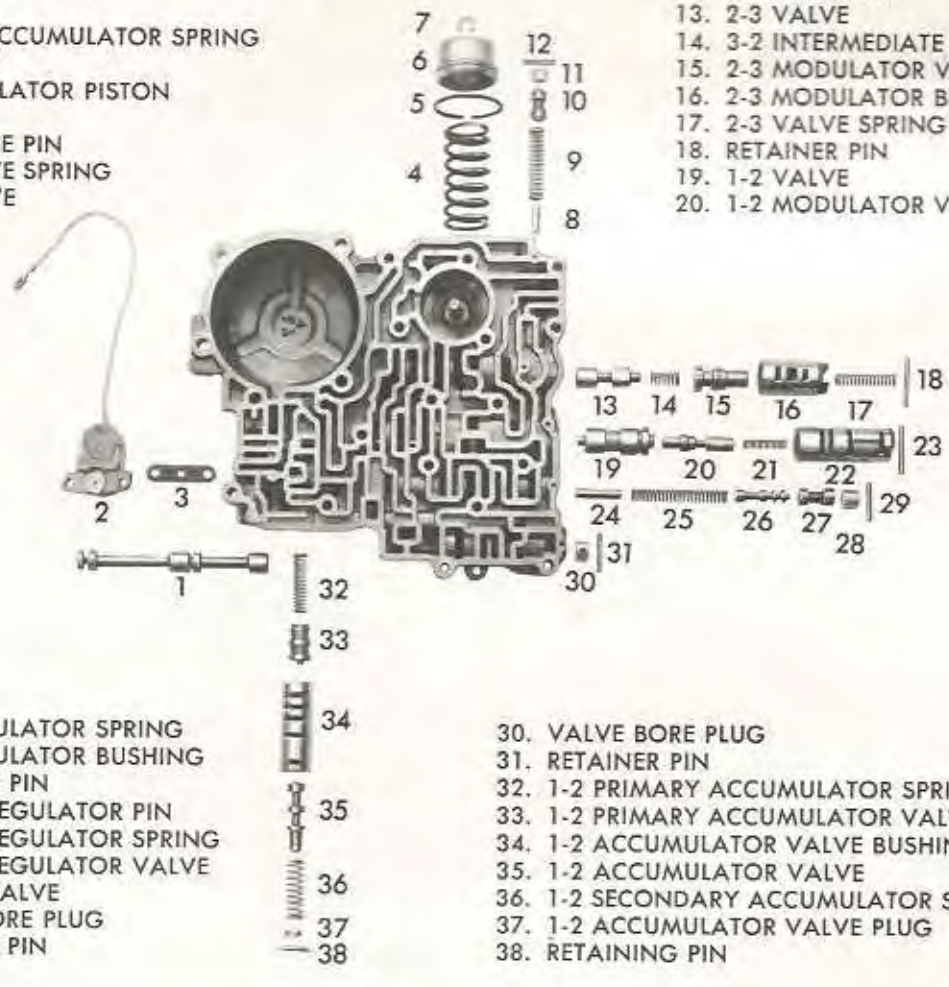
TYPICAL THM 400 VALVE BODY ASSEMBLY



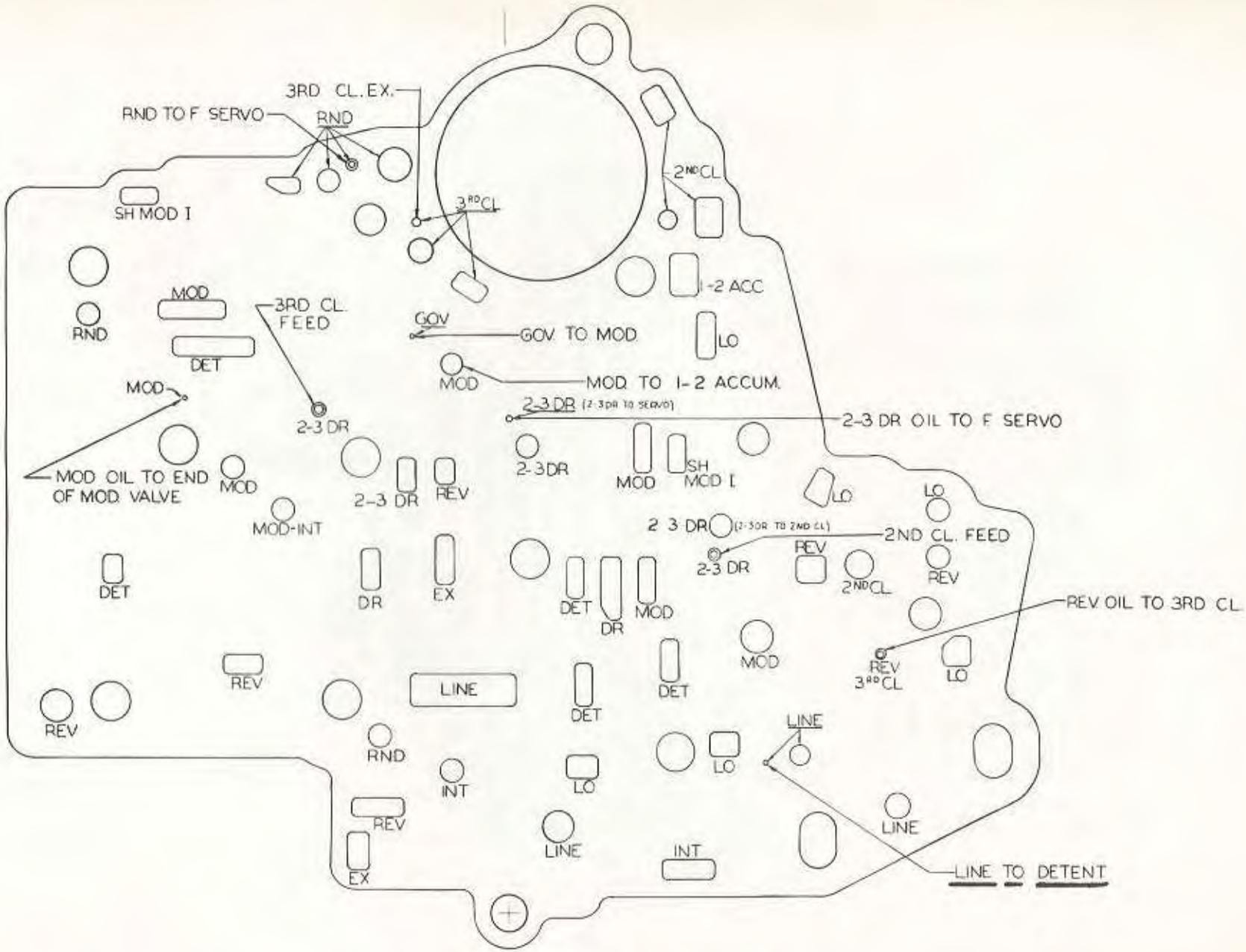
1. Manual Valve
2. Retaining Pin
3. Bore Plug
4. Detent Valve
5. Detent Regulator Valve
6. Spacer Pin
7. Detent Regulator Spring
8. 1-2 Shift Valve
9. 1-2 Detent Valve
10. 1-2 Regulator Spring
11. 1-2 Regulator Valve
12. 1-2 Modulator Bushing
13. Retaining Pin
14. Grooved Retaining Pin
15. Bore Plug
16. 1-2 Accumulator Secondary Spring
17. 1-2 Accumulator Secondary Valve
18. 1-2 Accumulator Bushing
19. 1-2 Primary Accumulator Valve
20. 1-2 Accumulator Primary Spring
21. 2-3 Shift Valve
22. 3-2 Intermediate Spring
23. 2-3 Modulator Valve
24. 2-3 Valve Spring
25. 2-3 Modulator Bushing
26. Retaining Pin
27. 3-2 Valve
28. Spacer Pin
29. 3-2 Valve Spring
30. Bore Plug
31. Retaining Pin

NOTE: THE TRANSMISSION THAT YOU ARE WORKING ON MAY OR MAY NOT CONTAIN A CONTROL VALVE ASSEMBLY WITH SPRINGS, VALVES, ETC., LIKE THIS PICTURE. THEREFORE, IT IS IMPERATIVE THAT YOU REFER TO THE SERVICE MANUAL AND/OR SERVICE BULLETINS PERTAINING TO THE TRANSMISSION BEING WORKED ON.

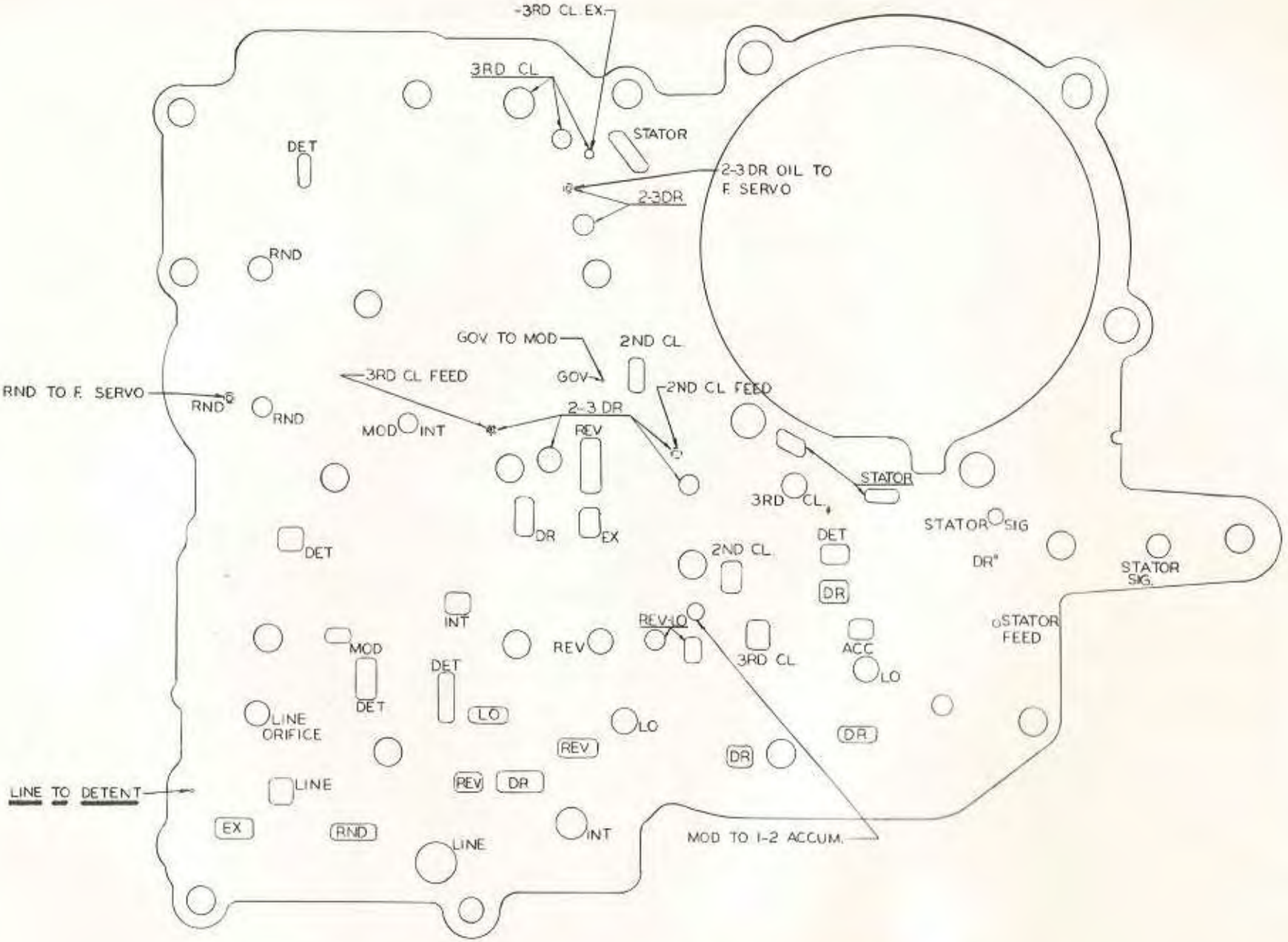
TYPICAL THM 425 VALVE BODY ASSEMBLY



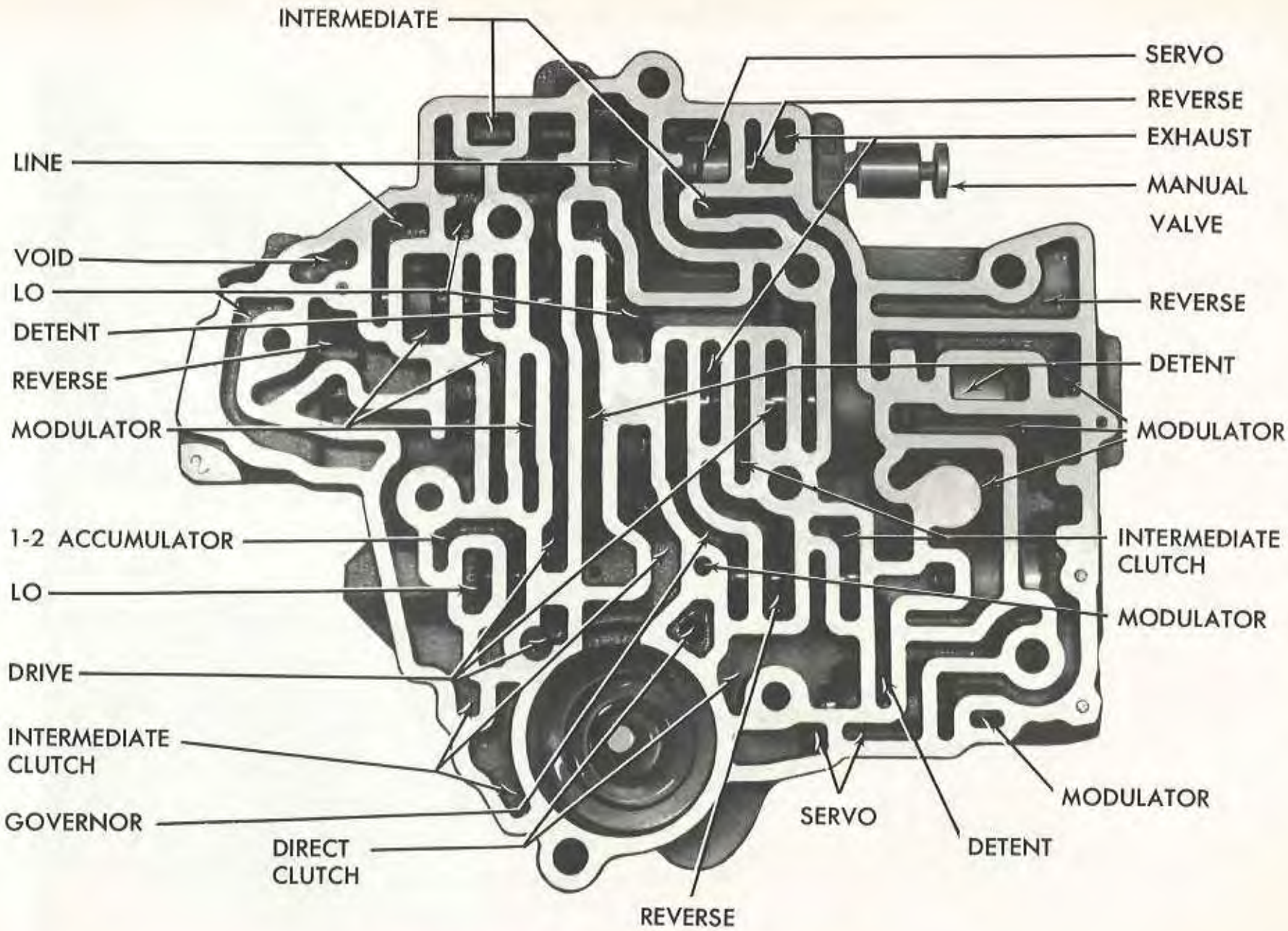
NOTE: THE TRANSMISSION THAT YOU ARE WORKING ON MAY OR MAY NOT CONTAIN A CONTROL VALVE ASSEMBLY WITH SPRINGS, VALVES, ETC., LIKE THIS PICTURE. THEREFORE, IT IS IMPERATIVE THAT YOU REFER TO THE SERVICE MANUAL AND/OR SERVICE BULLETINS PERTAINING TO THE TRANSMISSION BEING WORKED ON.



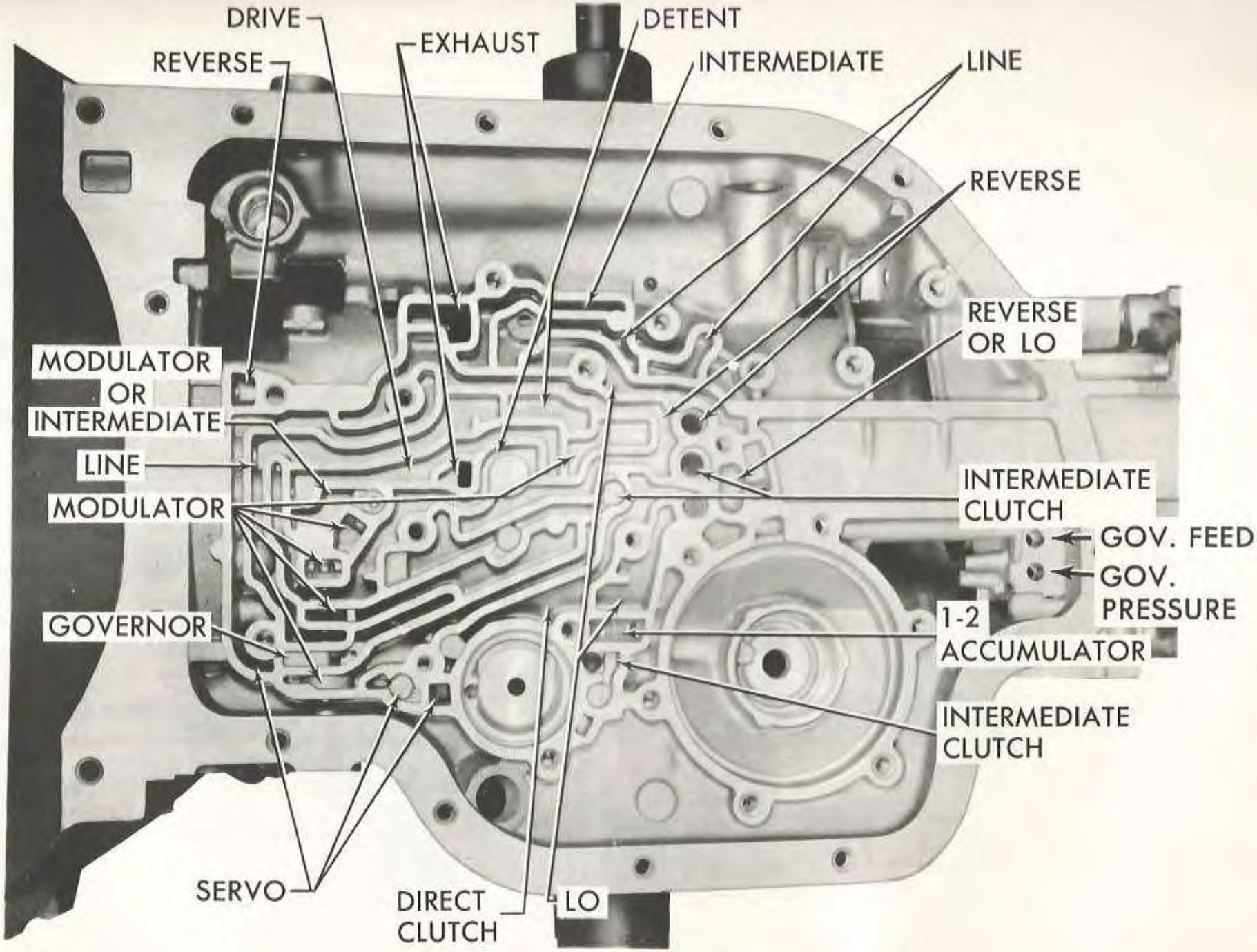
400 SPACER-CONTROL VALVE ASSY. (TYPICAL)



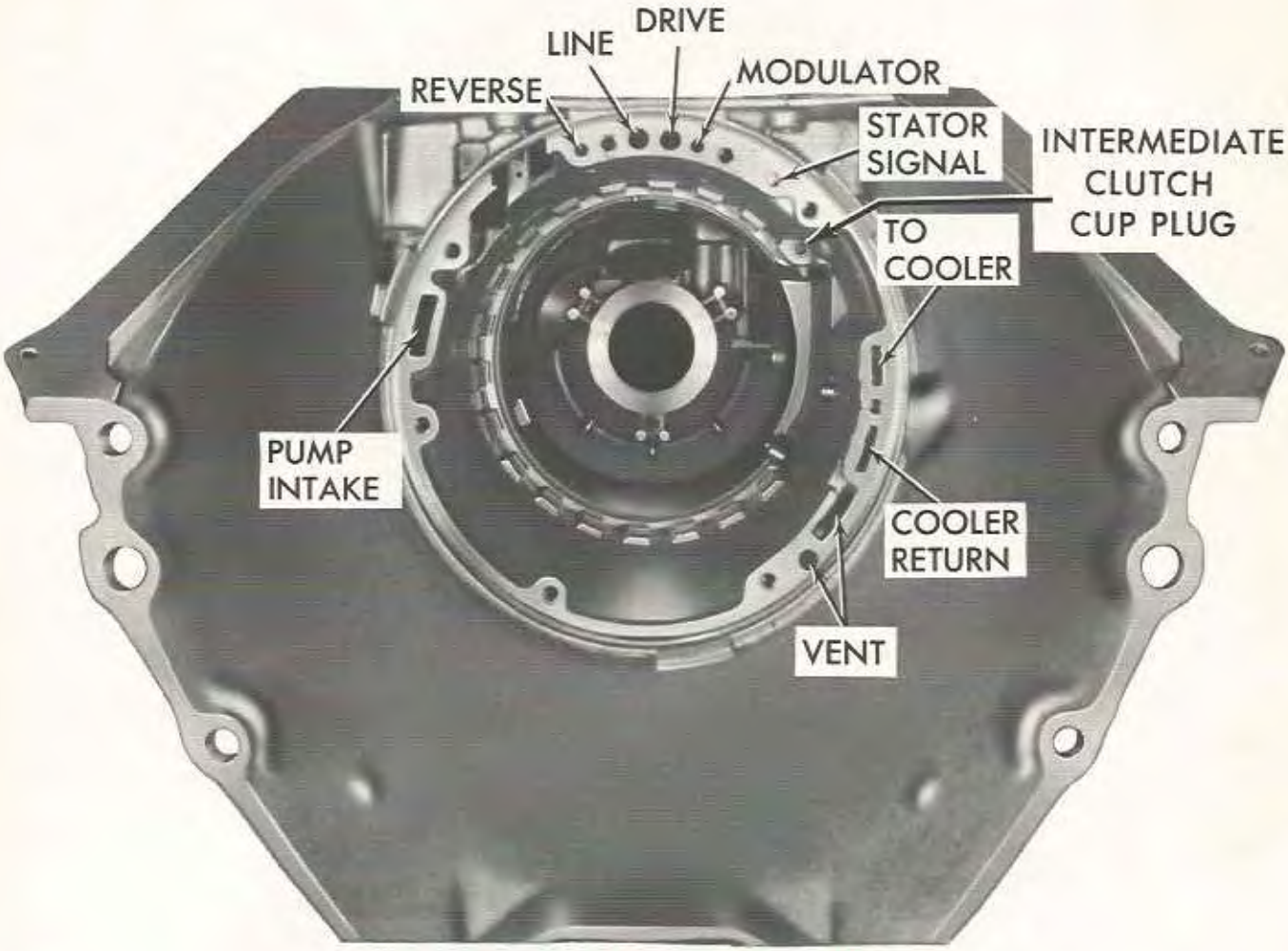
425 SPACER-CONTROL VALVE ASSY. (TYPICAL)



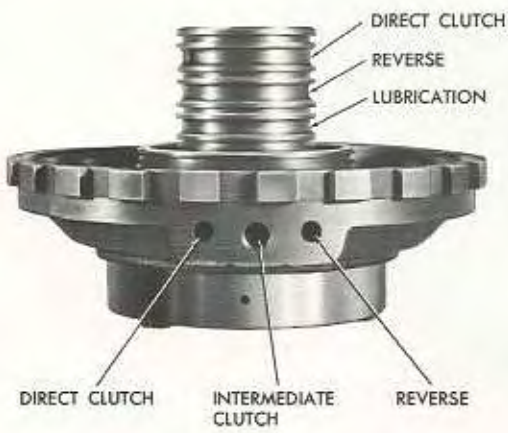
TYPICAL CONTROL VALVE BODY—MODEL 400



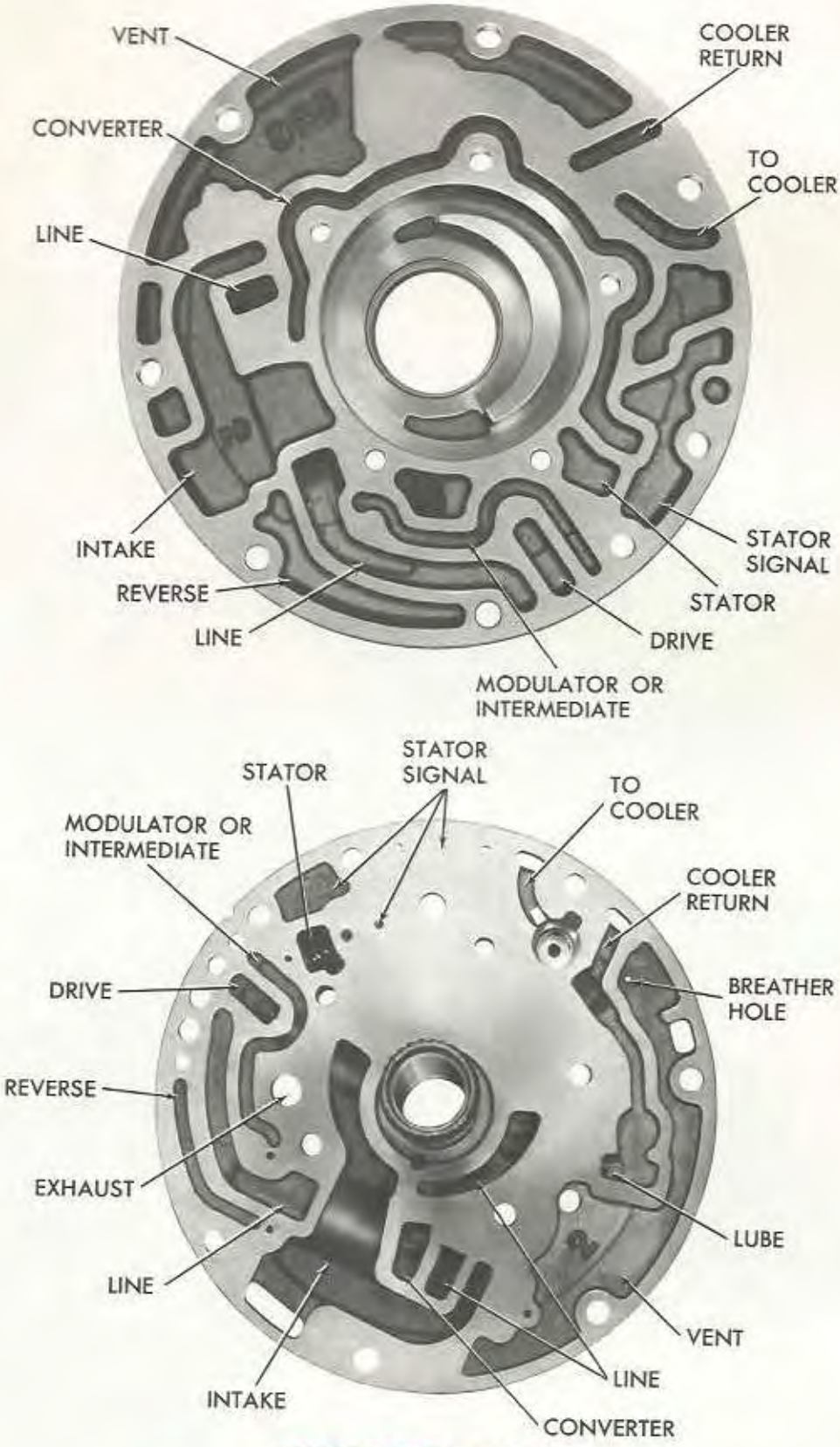
CASE PASSAGES—MODEL 400



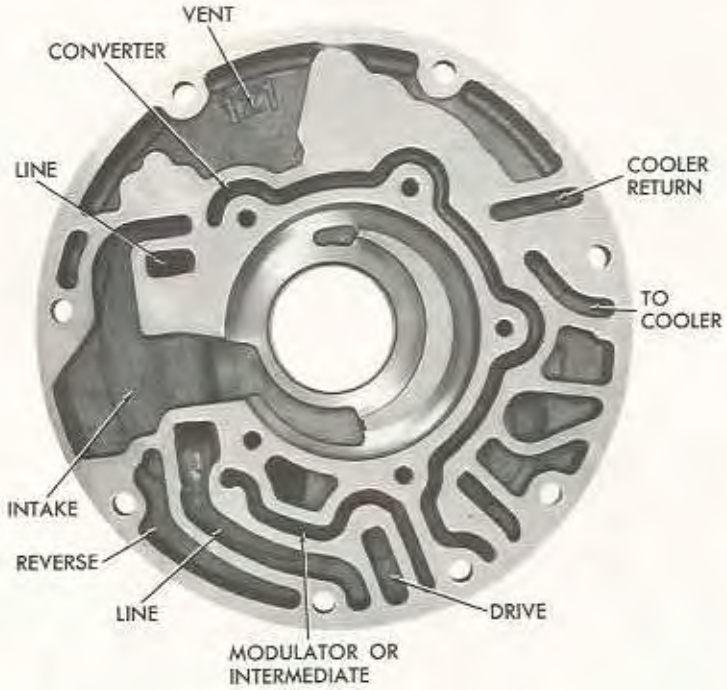
CASE PASSAGES—MODEL 400

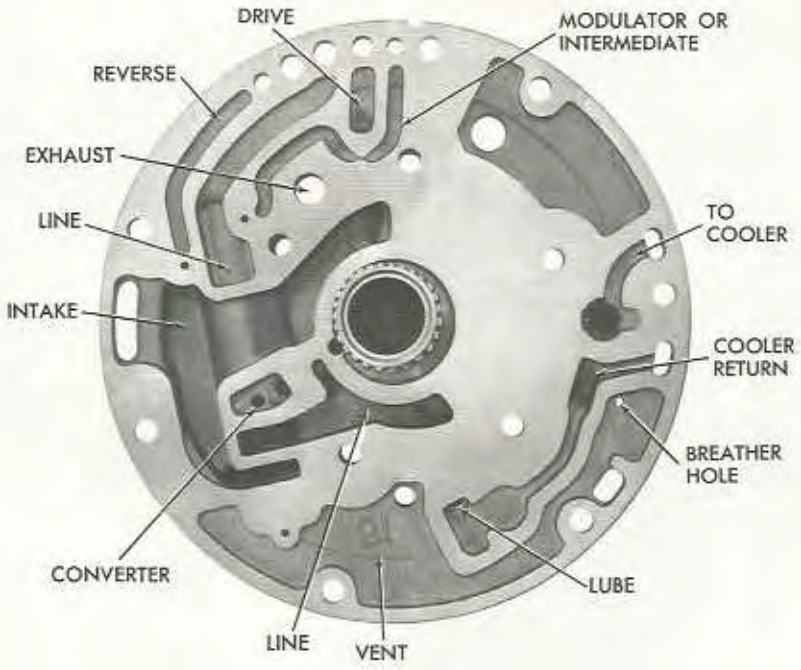


CENTER SUPPORT



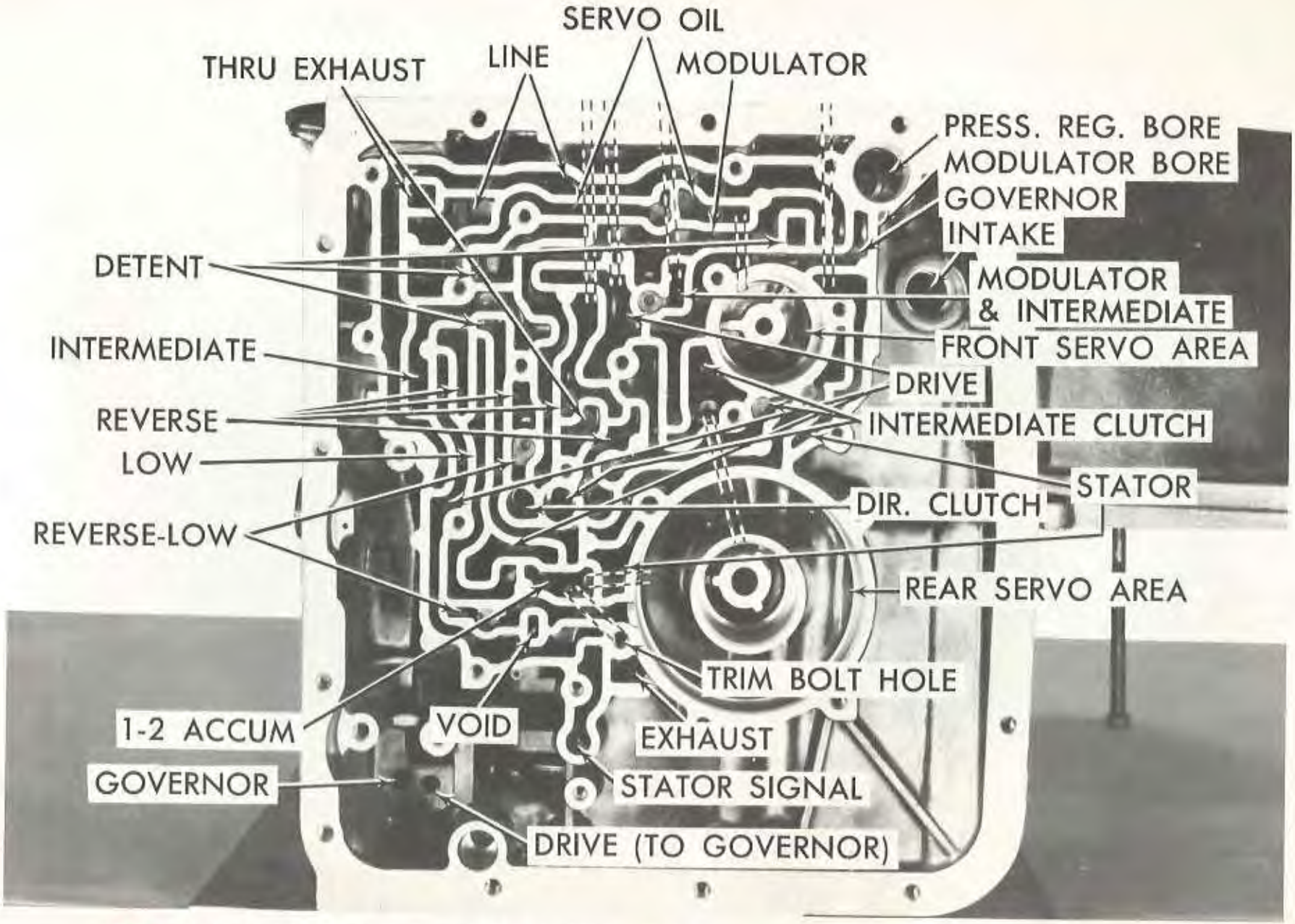
PUMP BODY & COVER
(VARIABLE STATOR TYPE CONVERTER)





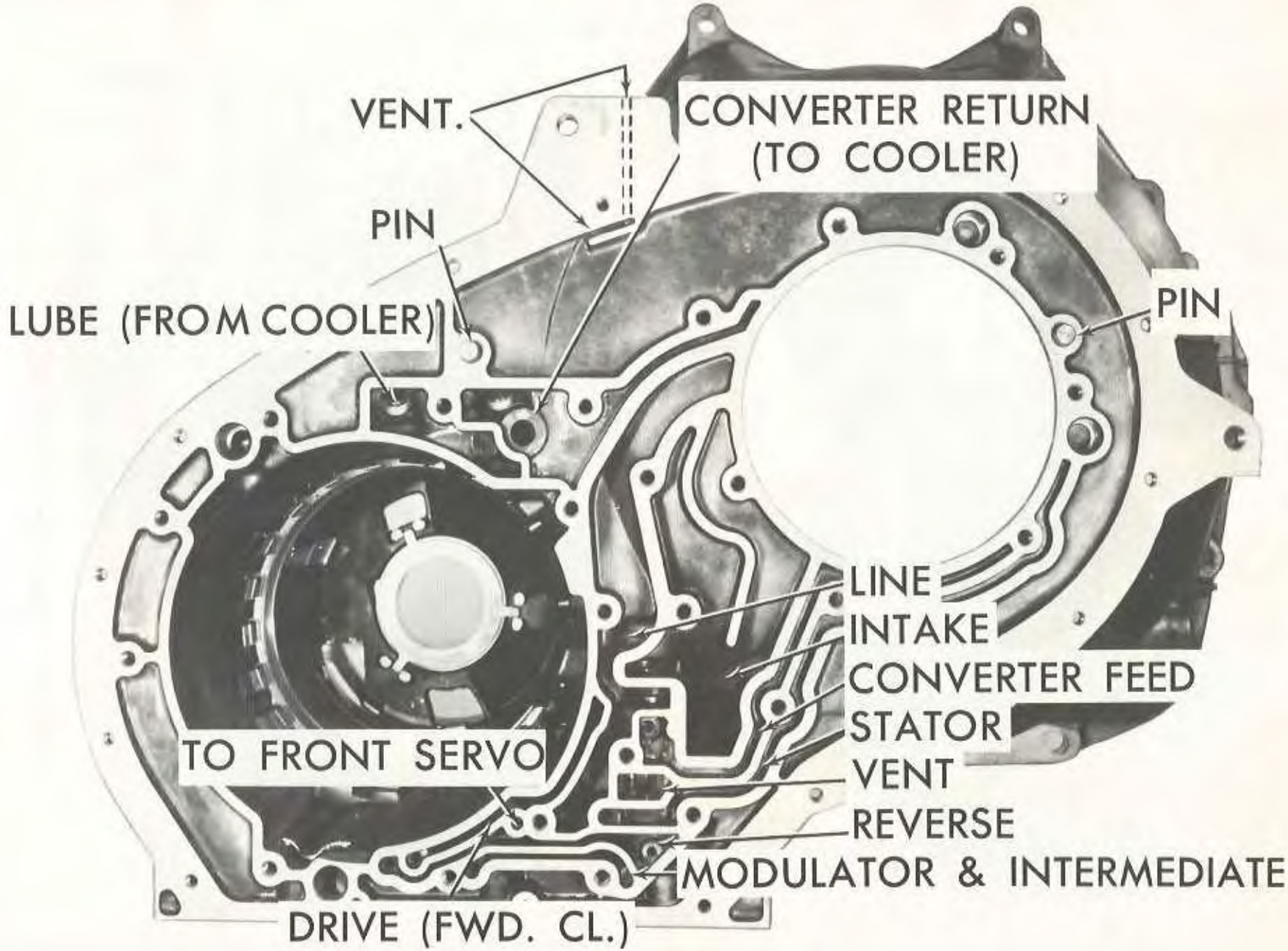
PUMP BODY & COVER
(FIXED STATOR TYPE CONVERTER)

NOTE: SEE PAGE 27 FOR PROPER PUMP BODY AND/OR PUMP COVER USAGE — FIXED STATOR TURBO HYDRA-MATIC "400" TRANSMISSIONS.



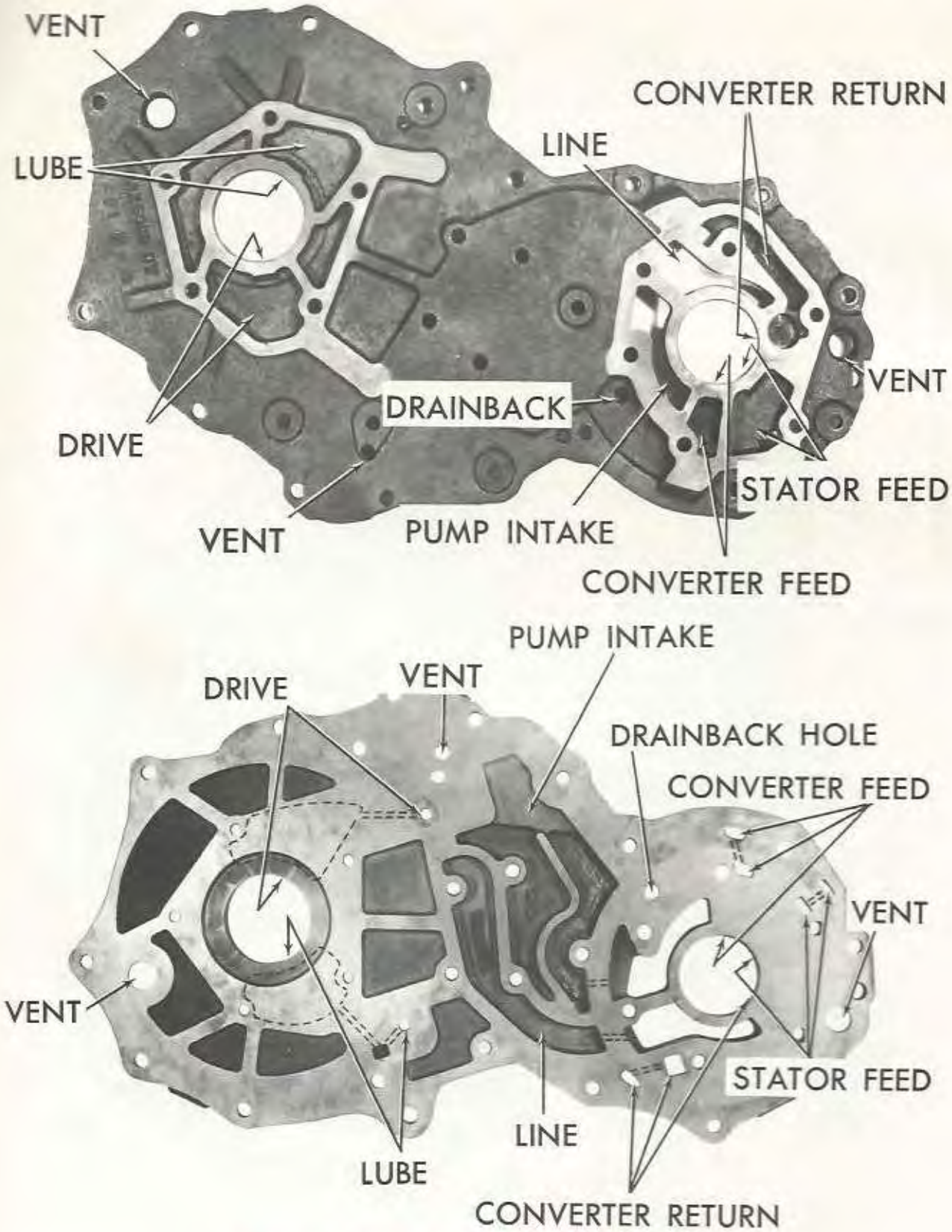
NOTE: STATOR PASSAGES VOID IN ALL MODELS AFTER 1967.

CASE PASSAGES-MODEL 425



NOTE: STATOR PASSAGES VOID IN ALL MODELS AFTER 1967.

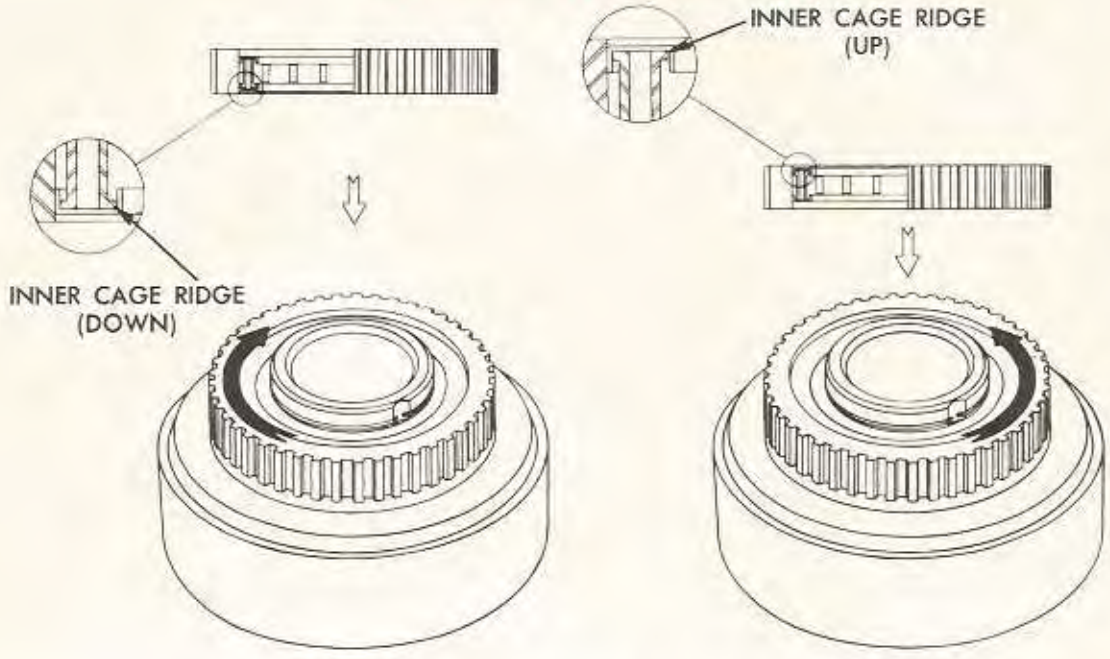
CASE PASSAGES-MODEL 425



MODEL 425-PUMP COVER PLATE

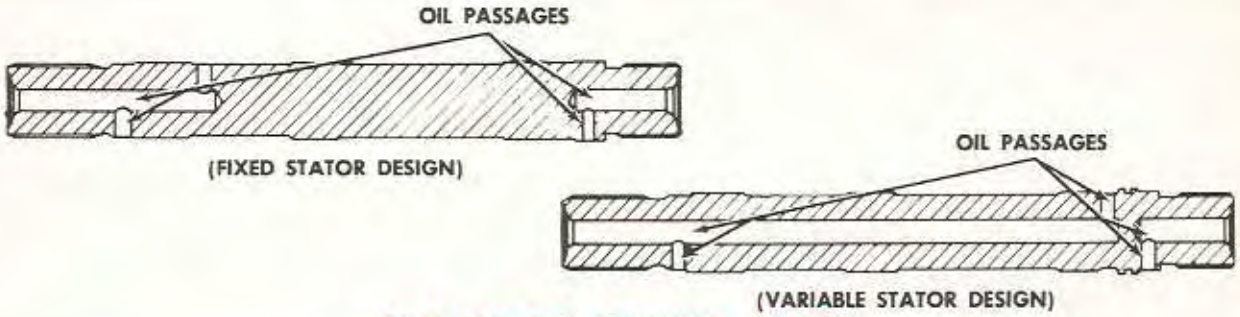
NOTE: STATOR PASSAGES VOID IN ALL MODELS AFTER 1967.

INTERMEDIATE SPRAG CLUTCH

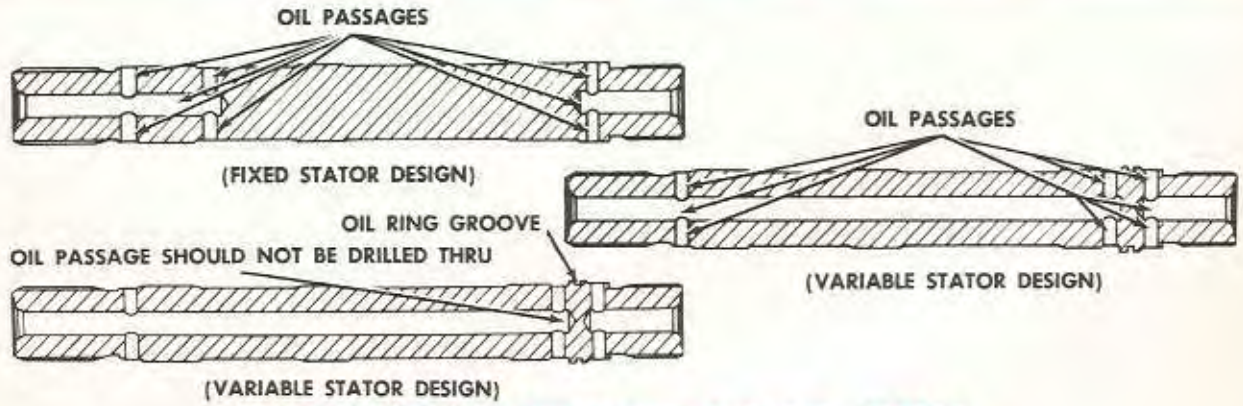


400 THM 425 THM

CORRECT OUTER RACE ROTATION



1966 MODEL TURBINE SHAFTS



1967 MODEL AND LATER TURBINE SHAFTS