

FUNK

SERVICE BULLETIN

Page 1 of 2

#100-4
2-1-77

Rev. "A"
12-8-77

SUBJECT: LUBRICATIONS RECOMMENDATIONS SERIES 1000, 1500, 1700 AND 4000
SHIFT-O-MATIC TRANSMISSIONS (POWERSHIFT)

LUBRICANT TYPE:

Commercial Powershift Transmissions
Prevailing Ambient Temperature

Above -10°F.

Below -10°F.

Above 32°F.

Military Transmissions
Prevailing Ambient Temperature

Above -10°F.

0 F. to -65°F.

Recommended Oil Specification

Hydraulic Transmission Fluid, Type C-3
(except grade 30).

Hydraulic Transmission Fluid, Type C-3
(except grade 30). Auxiliary preheat
required to raise temperature in the sump
to a temperature above -10°F.

Hydraulic Transmission Fluid Type C-3, or
Type C-3 Grade 30.

MIL-L-2104 Grade 10 to latest specification
or Hydraulic Transmission Fluid Type C-3.
MIL-L-10295 to latest specification.

NOTE: If auxiliary preheating equipment
is available and the sump temperature
can be raised to -10°F., it is
recommended that MIL-L-2104 Grade 10 oil
be used. When changing to oil of
different grade, thoroughly flush system
with grade oil to be used before refilling

CAUTION: Do not use MIL-L-10295 when the
ambient temperature is consistently above
-10°F.

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1211 W. 12th STREET COFFEYVILLE, KANSAS 67337 (316) 251-3400

Page 2 of 2

#100-4

2-1-77

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12-8-77

LUBRICANT AND OIL FILTER CHANGE INTERVALS:

Time:

- 20 Hours New or overhauled unit drained and refilled with new fluid.
(Do not use a flushing fluid but grade of oil used to refill.)
- 250 Hours Operation in severe dust, sand, or in underground environment.
- 375 Hours Operation in normal off-highway conditions, rapid changes in
ambient or unit temperature, or in the presence of chemical
fumes.
- 500 Hours Operation in clean environment. (Hard surface roads, minimum
dust, etc.)

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TABLE OF CONTENTS

	PAGE No.
PARTS ORDERING INSTRUCTIONS	1, 2, 3
DESCRIPTION	4
SERVICE AND OIL RECOMMENDATIONS	5
BOLT TORQUE SPECIFICATIONS	6
TROUBLE SHOOTING	7
CONTROL VALVE, FUNCTION AND PRESSURE CHECK	13
CONVERTER INSTALLATION, REMOTE FILTER AND HEAT EXCHANGER DATA	14
CLUTCH AND STAGE LOCATIONS	15,16,17
OIL FLOW CIRCUIT 9 5/8 DROP	18,19
OIL FLOW CIRCUIT 18 5/8 DROP	20,21
SPECIAL TOOLS	22
CONVERTER, 11 3/4	23
CONVERTER, 12 3/4	32
CONTROL VALVE, 3-SPEED	40
CONTROL VALVE, 4-SPEED	47
CONTROL VALVE WITH FEATHERING IN LO GEAR	49
BRAKE CUTOFF VALVE	54
PRIMARY PUMP WITH TRANSMISSION MOUNTED OIL FILTER	57
PRIMARY PUMP WITH AUXILIARY DRIVE	64
FRONT COVER ASSEMBLY.	72
CLUTCH STACK ASSEMBLY	86
MAIN CASE, 9 5/8 DROP	105
BRAKE, DRUM TYPE.	114
MAIN CASE, 18 5/8 DROP	118
HI-LO RANGE SHIFT	119
OUTPUT BEARING RETAINER SHIM ADJUSTMENT	130-132
CONVERTER, MIDSHIP MOUNTED	134

PARTS ORDERING INSTRUCTIONS

SHOULD REPAIR PARTS BE REQUIRED, PLEASE SPECIFY THE MODEL, SPECIFICATION, AND SERIAL NUMBERS OF YOUR UNIT AS WELL AS THE NAME AND NUMBER OF THE PARTS ACCOMPANYING YOUR PURCHASE ORDER.

THIS INFORMATION TAG IS ATTACHED TO YOUR UNIT.

Funk

SHIFT-O-MATIC

MODEL

SPEC

SERIAL

MANUFACTURED BY
FUNK MANUFACTURING CO.
COFFEYVILLE, KANSAS U.S.A.

YOU MAY WRITE TO:

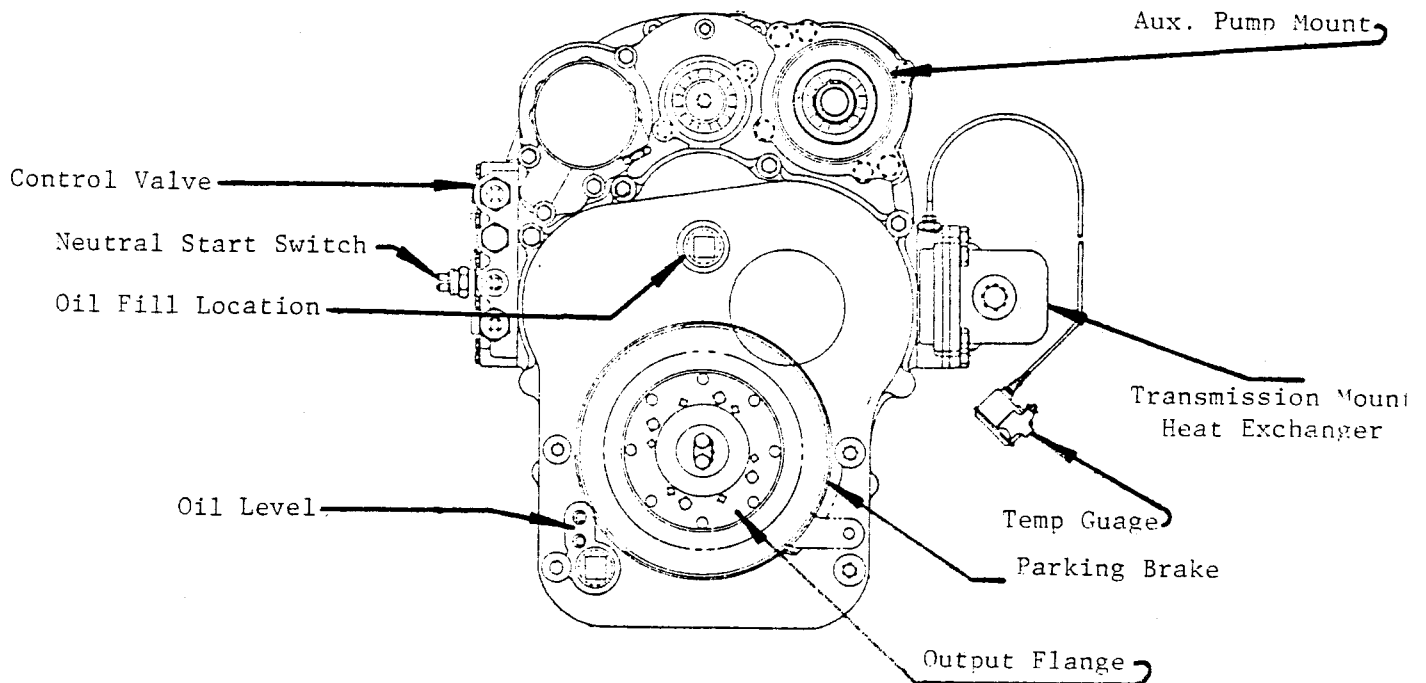
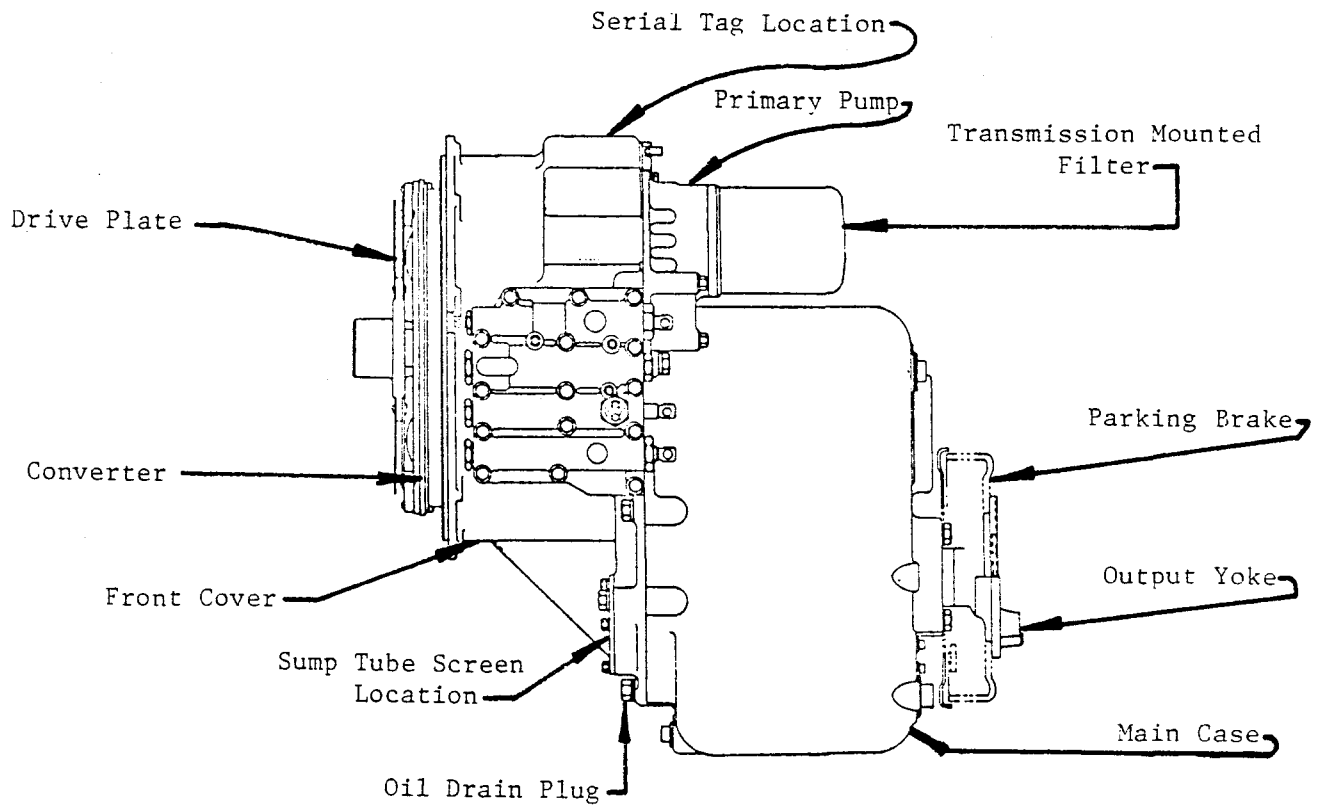
FUNK MANUFACTURING CO.
ATTN. PARTS DEPARTMENT PLANT #2
1211 W. 12th STREET
COFFEYVILLE, KANSAS 67337

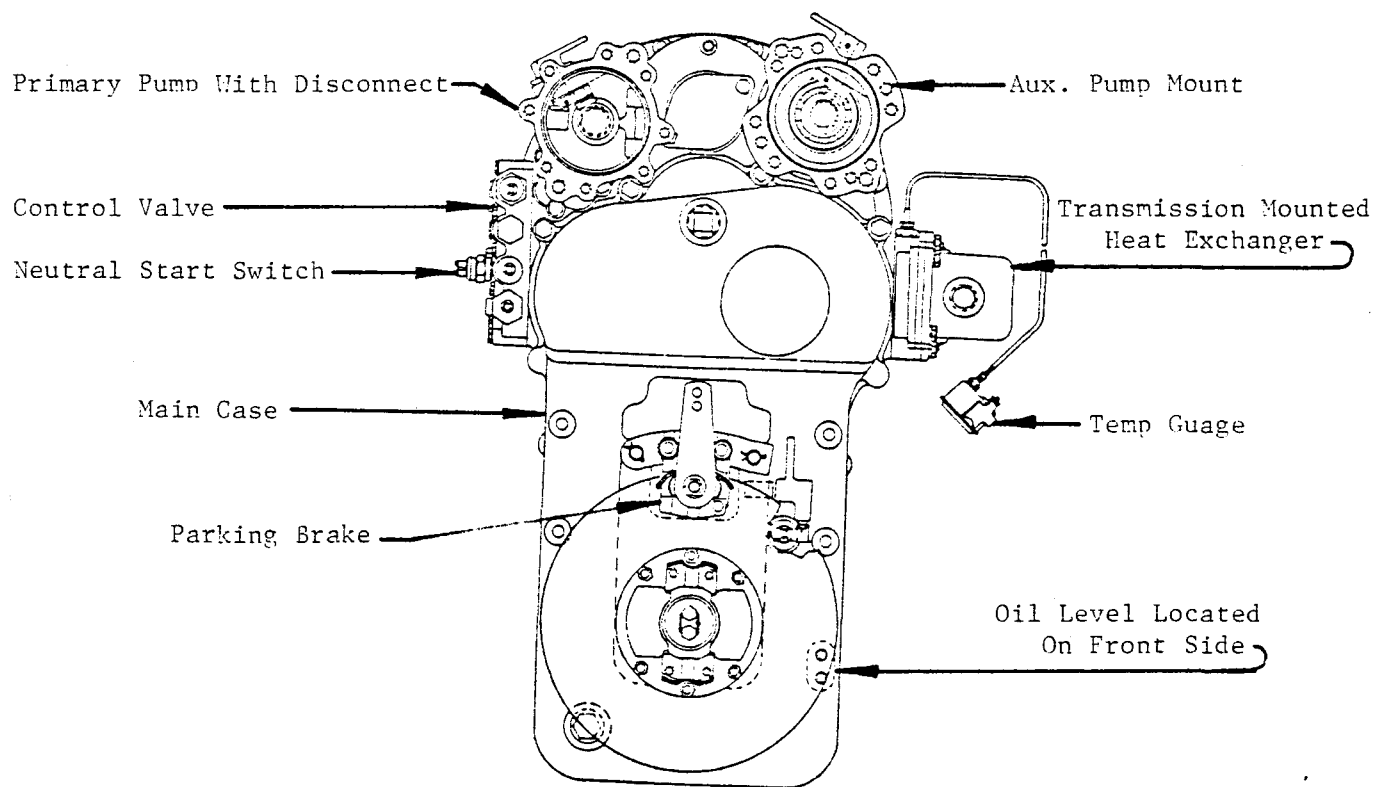
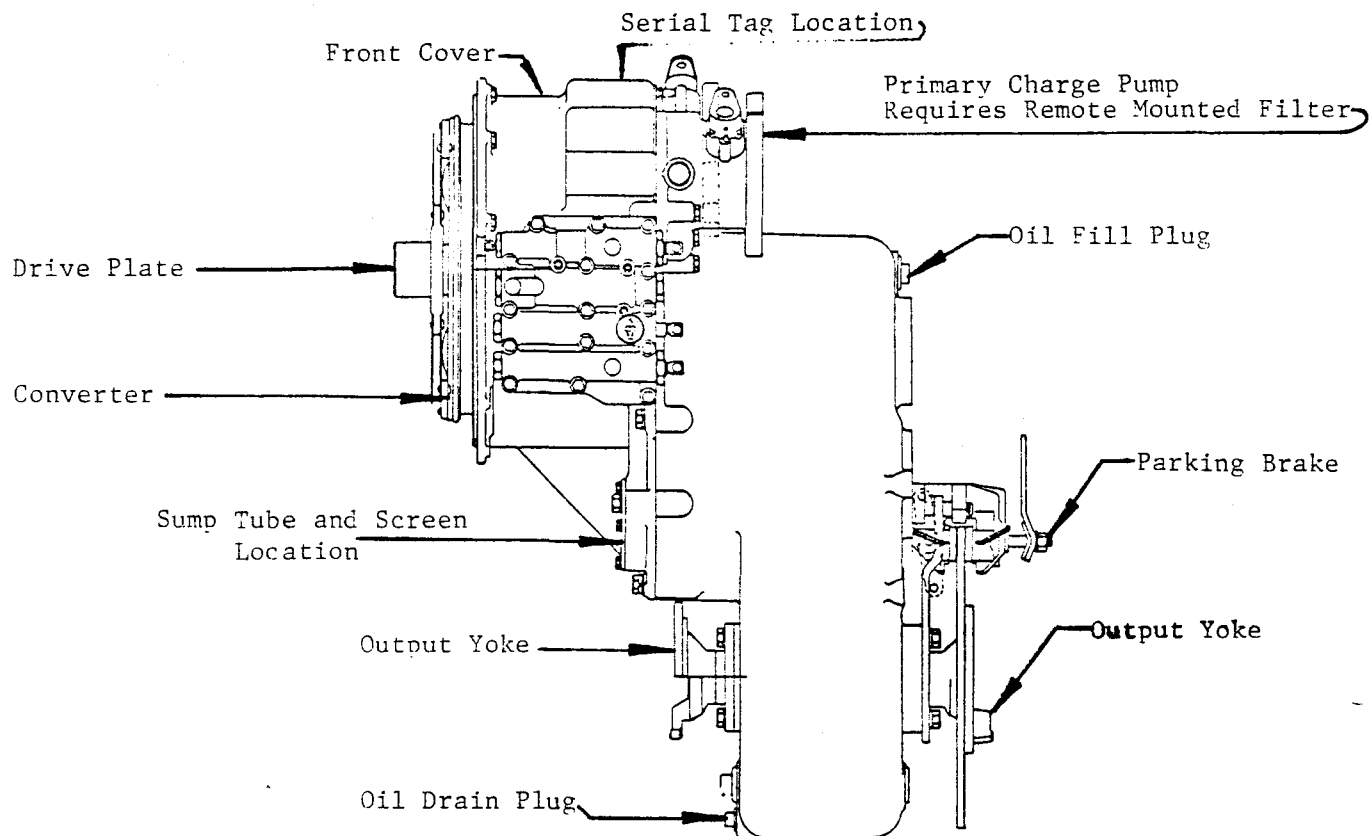
OR TELEPHONE

AREA CODE (316) 251-7500
ASK FOR PARTS DEPARTMENT.

OR TWX 910-740-1908

THANK YOU
THE FUNK MFG. CO.
DIV. OF GARDNER-DENVER





SERIES 1000 SHIFT-O-MATIC™ DRIVE

DESCRIPTION

The Series 1000 Shift-O-Matic™ Drive is a forward and reverse transmission, with the option of 2, 3, 4 or 6 speeds in either direction. Forward motion, reverse motion, and the four speeds are obtained through the use of hydraulically actuated multiple disc clutches. These clutches are power absorbing members that can be engaged at full engine power. Shifting under full engine power makes this model a full power shift for the forward and reverse motion in all four speeds.

The clutches in this unit are hydraulically applied and spring released. Because the clutches are hydraulically controlled, there is automatic compensation for normal wear, which eliminates the need for adjustment. Each clutch uses eleven semi metallic friction plates, and eleven polished steel reaction plates, except for the high gear clutch that uses eight of each plate.

The power from the engine is transmitted to the Shift-O-Matic™ through a torque converter. The use of the torque converter has two distinct advantages, one is the converter is essentially a fluid drive, there being no direct mechanical connection through it. This feature creates a very smooth and shock free drive eliminating engine stalling and lugging. A second advantage is that the converter multiplies torque during heavy pull-down loads. When loads are light the converter transmits the engine power directly at almost engine speed, and there is no torque multiplication. The net result is an action like a transmission, with infinitely variable and automatic speed ratios. The need for shifting gears, although present, is greatly reduced.

OPERATION

Like all mechanical equipment, the Shift-O-Matic™ Drive will need attention and servicing. Routine checks will help prevent down time. The operator can aid in preventative maintenance by reporting weak or borderline malfunctions.

Because the unit operates "in" oil and "by" oil, most of the maintenance is concerned with oil replenishment and oil cleanliness. The type of service and operating conditions shall determine the maintenance interval. However as previously stated, it is especially important that the oil be kept clean.

RULES OF OPERATION

1. Check oil level daily, with engine at idle speed and Shift-O-Matic™ in neutral. Make sure the area around oil level check plug is clean before removing plug.
2. The Shift-O-Matic™ should always be in the neutral position before starting engine, or when the vehicle is parked and the engine is running.
3. If the vehicle is to be towed, it will be necessary to run the engine at idle speed to lubricate the clutches.
4. If the oil temperature guage, which is the converter oil out temperature, rises above 250° or the warning light comes on, stop the vehicle immediately. Shift to neutral and run the engine at 1000-1200 R.P.M. The temperature should drop rapidly to the engine water temperature. If the temperature does not drop, trouble is indicated. The trouble should be determined before the vehicle is operated again. Overheating generally occurs due to working in too high of a gear ratio. Shifting to a lower gear will help eliminate overheating.
5. Do not shut off engine when unit is overheating.

SERVICE

1. When servicing the unit for the first time after vehicle installation and/or after repair, the unit is filled as follows:

- A. Fill the unit with 5 gallons of the recommended lubricant.
- B. Start engine and run at idle speed to let the hydraulic system charge.
- C. With the engine at idle speed, finish filling unit to full level. This will take approximately 3 quarts.

* The oil level is always checked with the engine running at idle speed and the Shift-O-Matic in neutral.

2. Lubrication Recommendations, Series 1000 Shift-O-Matic Transmissions. (powershift)

LUBRICANT TYPE: Any oil which meets Allison type C2 or C3 Hydraulic Transmission Fluid specifications.

or

Dexron Automatic Transmission Fluid I

NOTE: Dexron II is not approved for usage. Refer to the GM approval number to distinguish Dexron from Dexron II. A letter "B" prefix indicated Dexron, a letter "C" or "D" prefix indicates Dexron II.

LUBRICATION GRADE: Weather Temperature

If the fluid temperature is below -10°F (-23°C) an external heat source must be used to raise the fluid temperature to -10°F

3. It is recommended the oil and oil filter be changed whenever the oil shows traces of contamination, or the effects of high operating temperature evidenced by discoloration or strong odor.

If the oil in the system has become contaminated with metal particles, all the components of the system (oil lines, oil pump, oil filter, control valve, clutches, converter, heat exchanger) must be thoroughly cleaned. Generally this means a tear down of the unit. The metal particles in the oil is evidence of failure of some part.

LUBRICANT CHANGE INTERVALS:

TIME:

20 Hours New or overhauled unit drained and refilled with new fluid. (do not use a flushing fluid.)

250 Hours Operation in severe dust, sand, or in underground environment.

375 Hours Operation in normal off-highway conditions, rapid changes in ambient or unit temperature, or in the presence of chemical fumes.

500 Hours- Operation in clean environment. (Hard surface roads, minimum dust, etc.)

4. When changing the oil, the dirty oil should be drained while the unit is warm, examining for contamination as described above.
5. Keep all controls properly lubricated.
6. If the radiator on the vehicle is drained for winter storage, the heat exchanger on the Shift-O-Matic must also be drained.

BOLT-TORQUE SPECIFICATIONS
S.A.E. GRADE 5

BOLT SIZE	LOAD	TORQUE
$\frac{1}{4}$ -20	2,000 lbs.	8 ft. lbs.
$\frac{1}{4}$ -28	2,300 lbs.	10 ft. lbs.
5/16-18	3,350 lbs.	17 ft. lbs.
5/16-24	3,700 lbs.	19 ft. lbs.
3/8-16	4,950 lbs.	30 ft. lbs.
3/8-24	5,600 lbs.	35 ft. lbs.
7/16-14	6,800 lbs.	50 ft. lbs.
7/16-20	7,550 lbs.	55 ft. lbs.
$\frac{1}{2}$ -13	9,050 lbs.	75 ft. lbs.
$\frac{1}{2}$ -20	10,200 lbs.	85 ft. lbs.
9/16-12	11,600 lbs.	110 ft. lbs.
9/16-18	13,000 lbs.	120 ft. lbs.
5/8-11	14,500 lbs.	150 ft. lbs.
5/8-18	16,300 lbs.	170 ft. lbs.
3/4-10	21,300 lbs.	270 ft. lbs.
3/4-16	23,800 lbs.	300 ft. lbs.
7/8-9	29,500 lbs.	430 ft. lbs.
7/8-14	32,400 lbs.	475 ft. lbs.
1" -8	38,000 lbs.	645 ft. lbs.
1" -12	42,300 lbs.	705 ft. lbs.
1" -14	43,300 lbs.	720 ft. lbs.

MODEL 1000
POWER SHIFT
TROUBLE SHOOTING

PROBLEM

POSSIBLE CAUSE

REMEDY

1. Erratic oil pressure

- A. Low oil level
- B. Oil strainer cover gasket not sealing
- C. Oil sump tube cracked
- D. "O" ring on sump tube not sealing.
- E. Oil passage cover plate leaking

- A. Add oil to proper level.
- B. Replace gasket
- C. Replace oil sump tube and clean screen.
- D. Replace "O" ring and cover gasket.
- E. Refer to page 74 for installation.

2. Excessive oil pressure at high speeds.

- A. Sticking main regulator valve
- B. Faulty spring
- C. Main regulator valve orifice plugged.

- A. Check main regulator for contamination and clean orifice
- B. Change spring
- C. Clean orifice hole in main regulator valve.

PROBLEM

3. Low oil pressure in all gears

POSSIBLE CAUSE

- A. Sticking main regulator valve.
- B. Oil pressure set too low
- C. Faulty main regulator valve spring
- D. Control valve body cracked.
- E. Primary pump defective
- F. "O" ring on primary pump mount defective.

REMEDY

- A. Check main regulator valve spring.
- B. Add adjusting washers (see page 42+51)
- C. Replace Spring
- D. Replace control valve body.
- E. Replace pump.
- F. Replace "O" ring.

∞

4. Low oil pressure in one gear but alright in other gears.

- A. Broken seal ring on input end of clutch weld assembly piston shaft.
- B. Outer or inner piston seal not sealing.

- A. Replace seal ring.
- B. Replace piston seals.

PROBLEM

5. Low converter Pressure

POSSIBLE CAUSE

- A. Converter bypass valve defective.
- B. Converter hub seal ring not sealing.

REMEDY

- A. Inspect converter bypass valve. Replace if necessary.
- B. Replace seal ring.

6. Remote filter oil lines blow-out.

- A. Hose bends too sharp in routing.
- B. Defective hose.
- C. Low pressure hose.
- D. Hoses not connected correctly.
- E. Main Regulator Valve orifice plugged.

- A. Re-route hoses.
- B. Replace hose.
- C. Use high pressure hose.
- D. Connect hose correctly.
- E. Clean main regulator valve orifice.

PROBLEM

7. Clutch pressure does not return to normal after clutch.

POSSIBLE CAUSE

- A. Excessive internal leakage to clutch.
- B. Main regulator valve spring weak.
- C. Accumulator spring too strong.
- D. Primary pump defective

REMEDY

- A. Complete tear down of transmission to inspect clutches.
- B. Replace main regulator spring.
- C. Replace spring.
- D. Replace primary pump.

8. Clutch does not release when brake cut-off valve is activated.

- A. No brake line pressure
- B. Brake cut-off piston sticking.

- A. Check brake system
- B. Inspect and replace if necessary.

PROBLEM

POSSIBLE CAUSE

REMEDY

9. Clutch does not release when feathering valve is activated

A. Feathering stem not pulled to full travel.

B. Feathering valve sticking
C. Feathering valve spring too strong.

A. Adjust linkage

B. Clean valve.
C. Replace spring

10. Excessive noise at engine idle.

A. Primary pump defective
B. Excessive back-lash in gear train.

A. Replace pump
B. Replace bearings and inspect for defective gears.

11. Excessive gear noise at high speed. (R.P.M.)

A. Same as item #10

A. Same as item #10

12. Transmission mounted filter blows out or "O" ring on filter blows out.

A. Orifice on main regulator valve plugged.

B. "O" ring faulty.

A. Clean orifice on main regulator valve.

B. Replace filter.

PROBLEM

POSSIBLE CAUSE

REMEDY

13. Blows oil out of breather
on top of transmission

A. Converter seal ring broken.

A. Remove converter and
install new seal ring.

14. Transmission Overheating

A. Converter stalling
B. Oil level too high
C. Engine overheating
D. Water lines defective on
heat exchanger
E. Heat exchanger dirty
F. Low clutch oil pressure

A. Shift to lower gear
B. Drain to proper level
C. Check engine coolant
D. Replace water lines

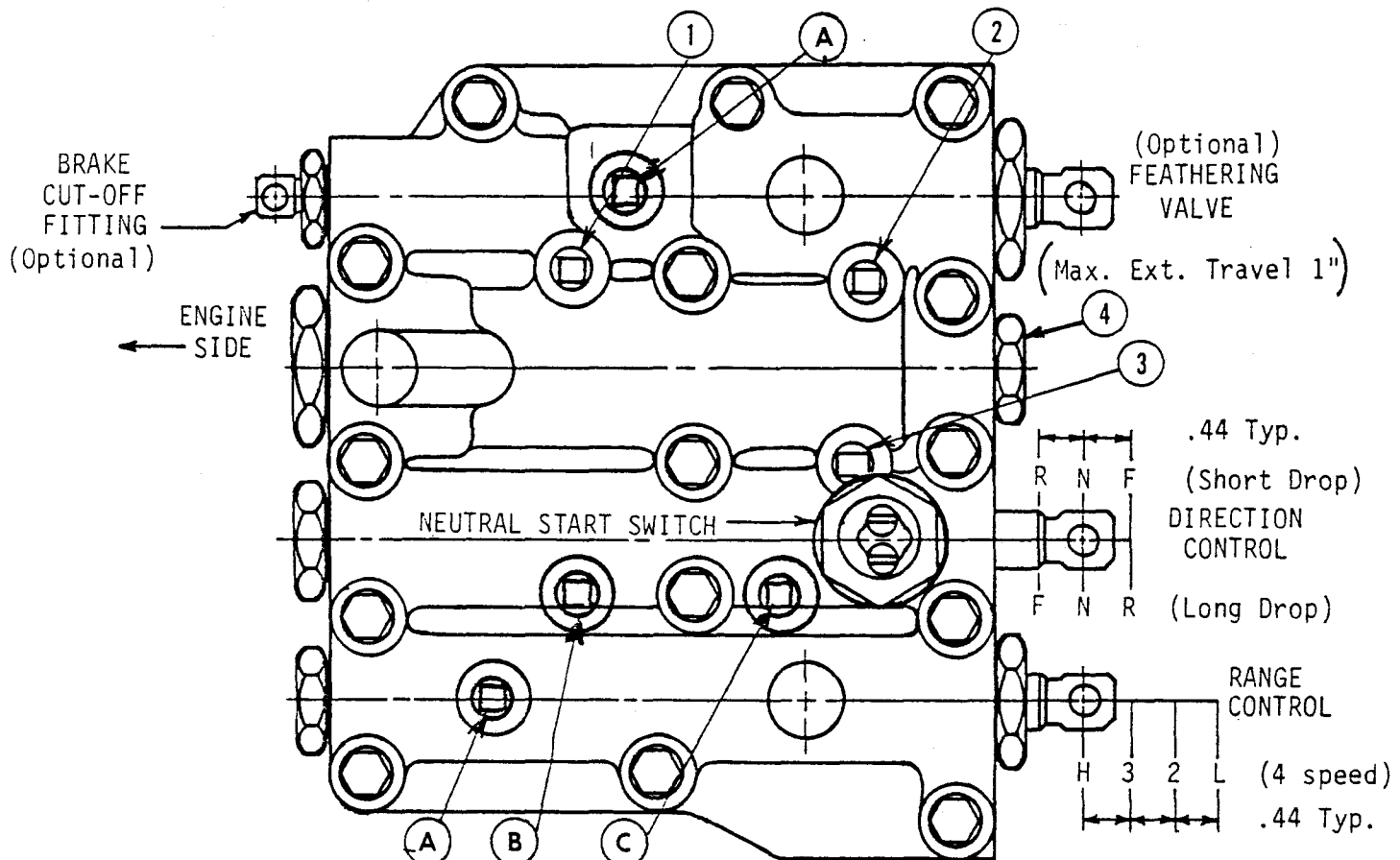
E. Flush and clean heat exchanger
F. Check clutch oil pressure

15. Transmission pressures check
okay, but unit has no power

A. Converter sprag clutch jammed
B. Converter sprag clutch installed
wrong.

A. Disassemble converter and inspect
B. See pages 26 & 36 for proper
installation

1000 SERIES SHIFT-O-MATIC
CONTROL VALVE, FUNCTION
AND PRESSURE CHECK



THE PRESSURE CHECKS ARE TO BE MADE WITH THE TRANS. OIL TEMP. AT 100° TO 140°

STEP 1 CLUTCH PRESSURE

- A. Install a 200 P.S.I. gauge in Port #1.
- B. Run engine at approx. 2000 R.P.M.
- C. Engage each speed clutch forward and reverse, the clutch pressure should be within the span of 155 to 180 P.S.I. for all clutches.
- D. If all clutches have low pressure, the pressure regulator valve should be checked, and adjusted if necessary.
 1. Remove cap Ref. #4 and remove the pressure regulator valve, dowel pin, and spring.
 2. Check valve to be sure it works freely in the valve body.
 3. The pressure can be raised by adding the #4001651 spacer ring, as required, on the end of the valve next to the spring.

STEP 2 CONVERTER CHARGE PRESSURE

- A. Install a 100 P.S.I. Gauge in Port #3.
- B. Run engine at approx. 2000 R.P.M.
- C. The pressure should be within the span of 40 to 70 P.S.I.

STEP 3 FEATHERING VALVE - IF USED

- A. Install a 200 P.S.I. Gauge in Port #1.
- B. Run engine at approx. 2000 R.P.M.
- C. Pull stem to full out position (1"), clutch pressure should be between 5 to 7½ P.S.I.

STEP 4 BRAKE CUTOFF VALVE - IF USED

- A. Install a 200 P.S.I. Gauge in Port #1.
- B. Run engine at approx. 2000 R.P.M.
- C. Apply 325-375 P.S.I. to cut off valve, clutch pressure should be between 5 to 7½ P.S.I.

PORTS "A" External plumbing ports for feathering in low gear only.

PORT "B" Reverse warning switch for short ((5/8) drop)

PORT "C" Reverse warning switch for long (18 5/8) drop.

NOTE: Ports "B" & "C" may change due to axle rotation.

CONVERTER INSTALLATION FOR ALL SERIES 1000 SHIFT-O-MATICS

All 1000 series are shipped with a small parts bag attached to the unit with a copy of this memo and the following parts included.

1. The following parts are for attaching the drive plate assembly to the engine flywheel.
8 each F10030-12 Capscrew (3/8-16 x 3/4" hex. head H.T.)
2. The following group is for attaching the converter to the drive plate assembly .
Group #40121191—supplied with the 11 3/4"
8 each F11004-20NY Capscrew (5/16 N.F. x 1 1/4" Socket head H.T.)
8 each 4012121 Washer, Half Round (11/16" Dia. x 1/4" thick)

CONVERTER INSTALLATION INSTRUCTIONS

1. Remove drive plate assembly and converter from unit by pulling straight out.
2. Attach drive plate assembly to the engine flywheel using capscrew and lockwashers provided in parts bag. Refer to No. 1.
3. Attach converter to the drive plate assembly using the socket head capscrews and the half round washers provided in the parts bag. Refer to No. 2. The half round washer is used under the head of the socket head capscrew.
4. Center the converter hub gear seal ring in its groove, grease will help hold ring in position.
5. Align unit with converter and mate together.

NOTE: To aid in installation, the stator support tube spline, the input shaft spline, and converter hub gear seal ring should be lightly greased.

REMOTE OIL FILTER AND HEAT EXCHANGER INSTALLATION DATA

HEAT EXCHANGER DATA

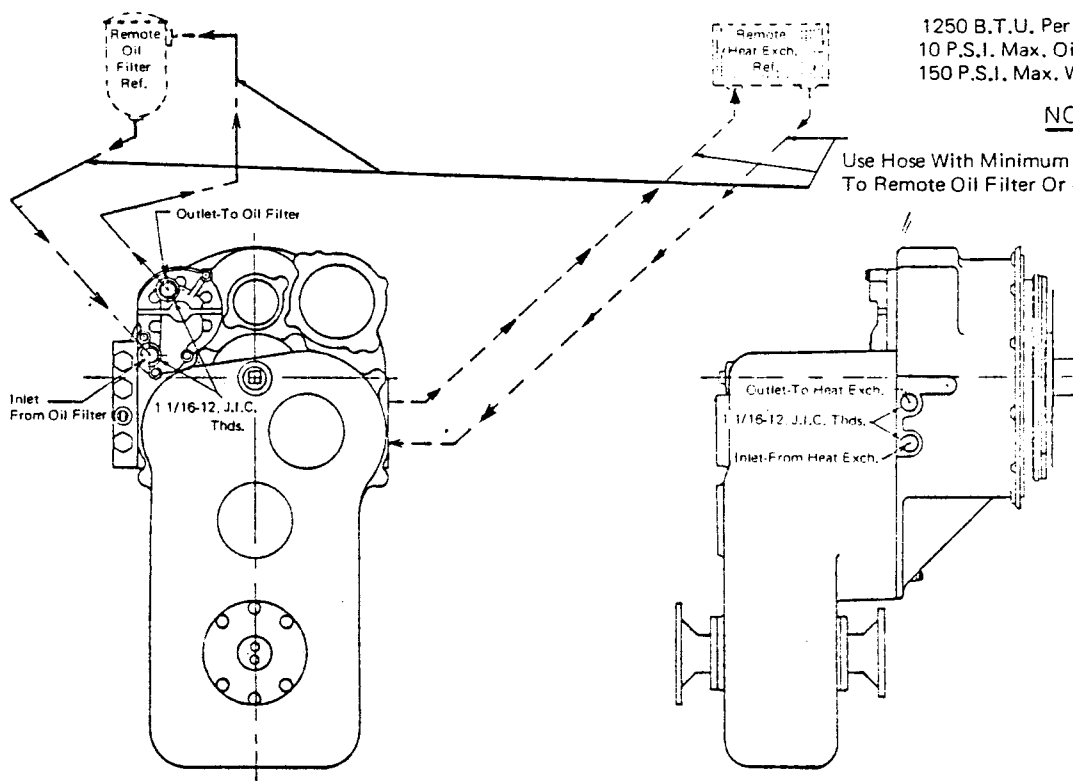
1250 B.T.U. Per Min./100 H.P. Disipation Required.
10 P.S.I. Max. Oil Press. Drop Across Heat Exchanger.
150 P.S.I. Max. Working Press.

NOTE:

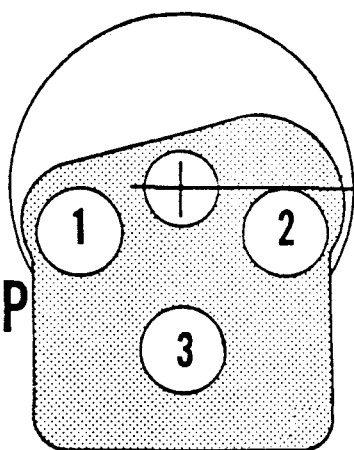
Use Hose With Minimum I.D. of 3/4" When Connecting To Remote Oil Filter Or Heat Exchanger.

OIL FILTER DATA

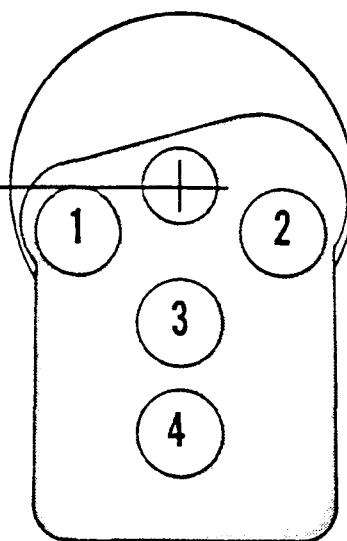
25-40 Micron Filtration Req.
5 P.S.I. Max. Press. Drop Across Filter With Clean Element.
20 G.P.M. Flow Capacity.
250 P.S.I. Min. Press. Capacity.
25 P.S.I. Min. Bypass Relief Valve Required In Filter.



SHORT DROP
(9⁵/₈)

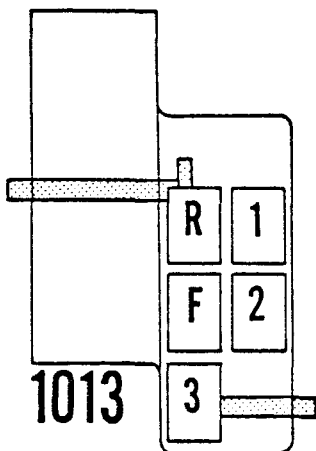


INPUT
REAR VIEW

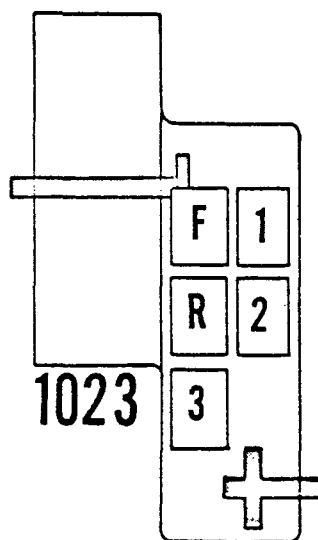


LONG DROP
(18⁵/₈)

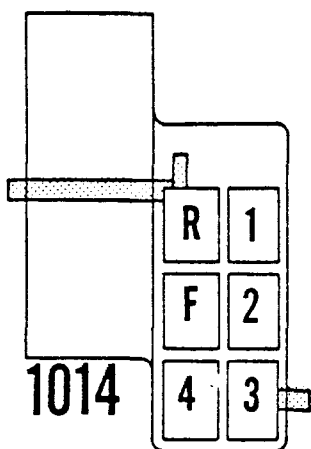
ENGINE
SIDE



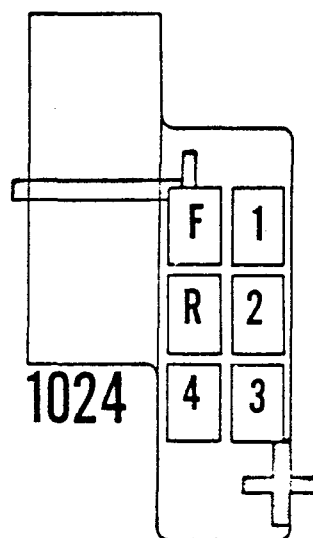
ENGINE
SIDE

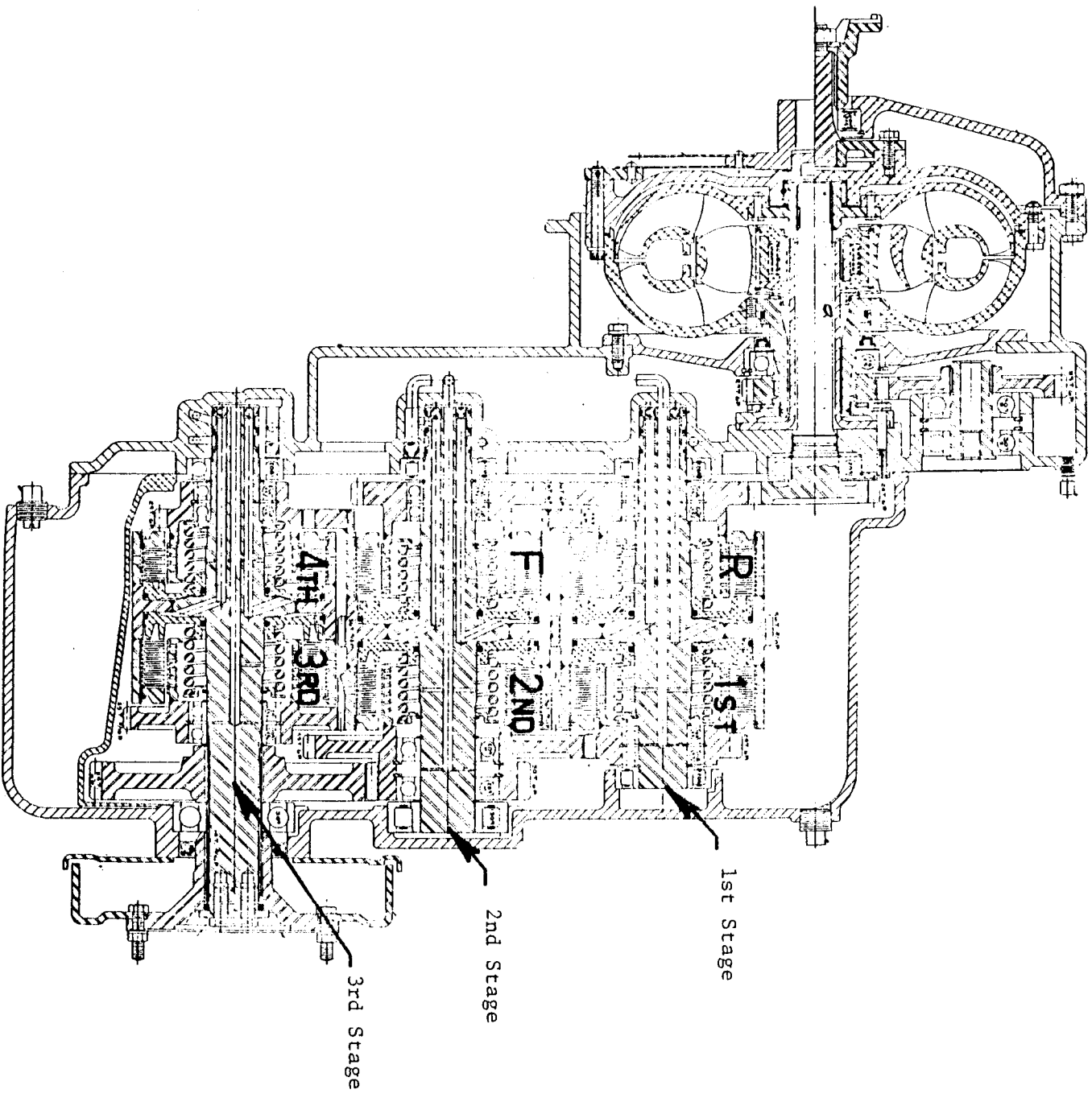


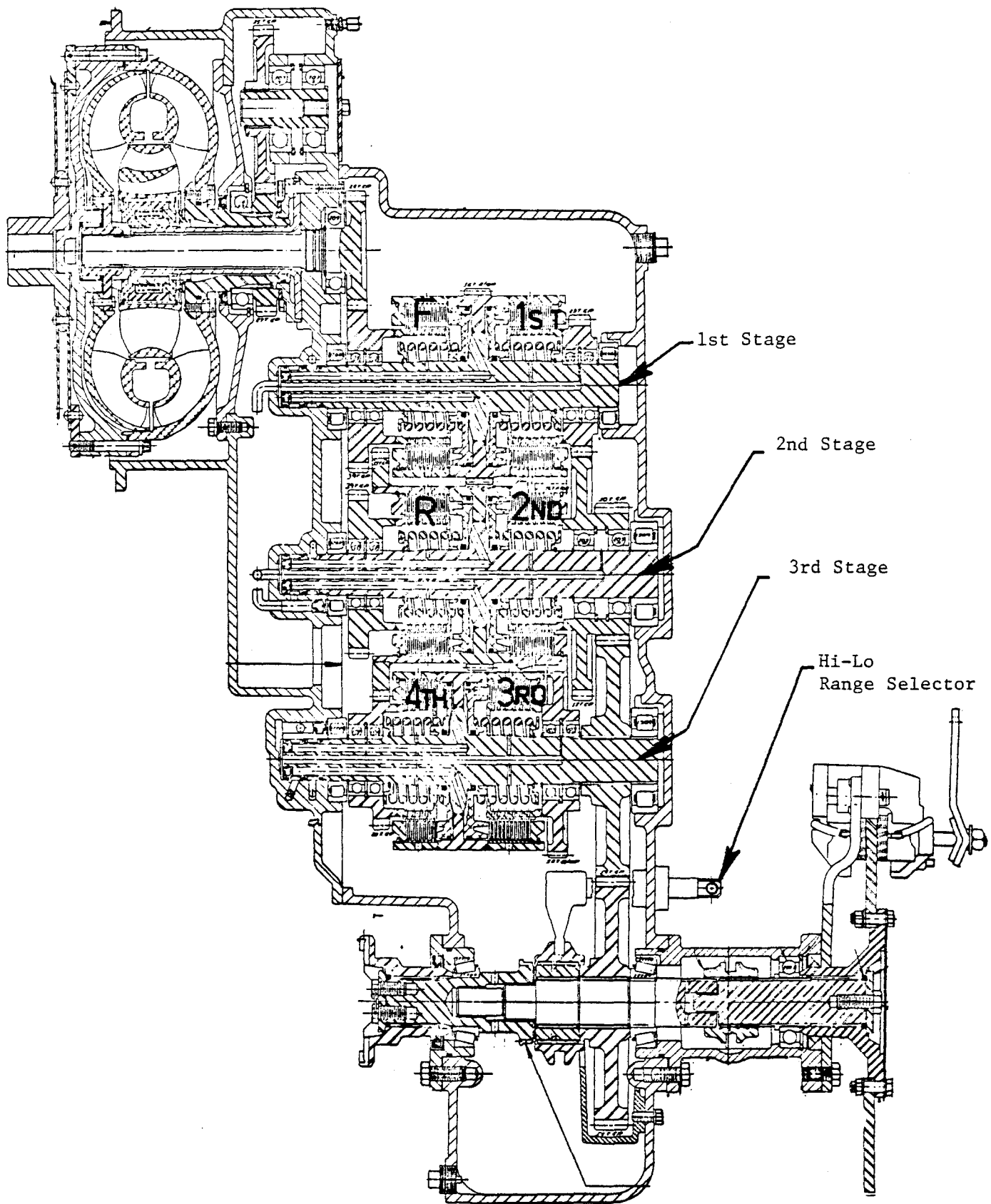
ENGINE
SIDE

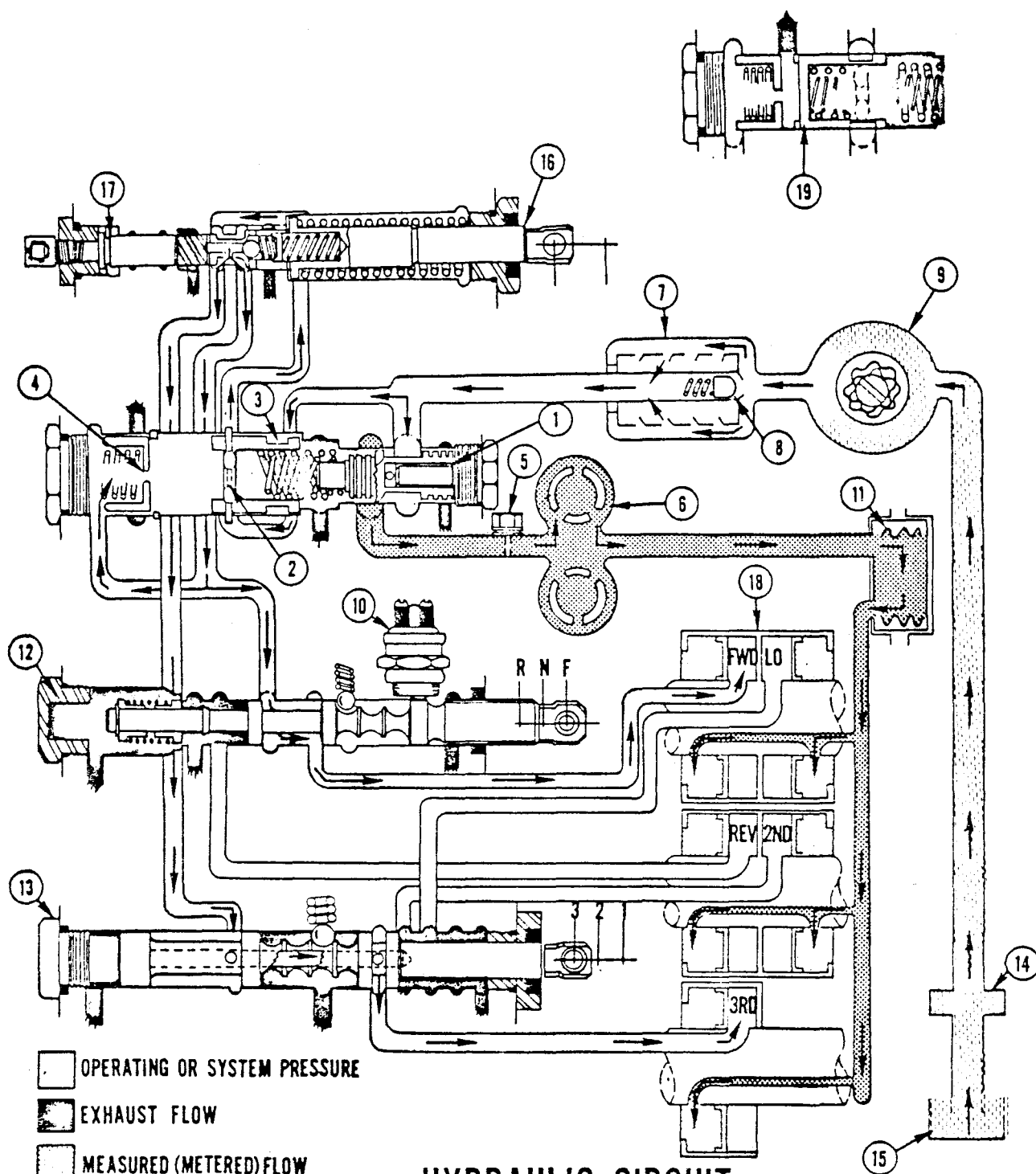


ENGINE
SIDE







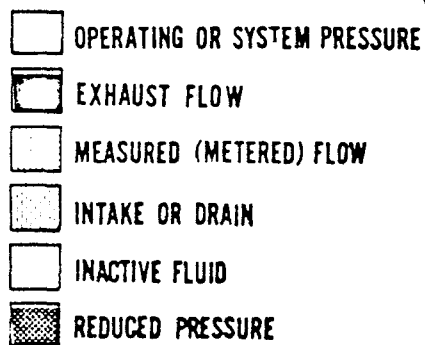


-  OPERATING OR SYSTEM PRESSURE
-  EXHAUST FLOW
-  MEASURED (METERED) FLOW
-  INTAKE OR DRAIN
-  INACTIVE FLUID
-  REDUCED PRESSURE

HYDRAULIC CIRCUIT
MODEL 1013
RANGE : FORWARD - THIRD

MODEL 1013
HYDRAULIC CIRCUIT
3 SPEED, 9 5/8 DROP
RANGE: FORWARD-THIRD

1. Main Pressure Regulator
2. Main Orifice
3. By-Pass Orifice
4. Modulator Orifice
5. Converter By-Pass Valve 80 PSI
6. Converter
7. Filter
8. Filter By-Pass Valve
9. Pump
10. Neutral Starter Switch
11. Heat Exchanger
12. Directional Control Valve
13. Range Control Valve
14. Screen
15. Sump
16. Feathering Valve
17. Brake Cut-Off
18. Clutches
19. Modulator Valve-By Pass Position



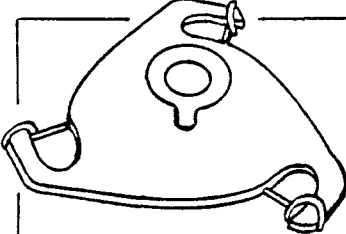
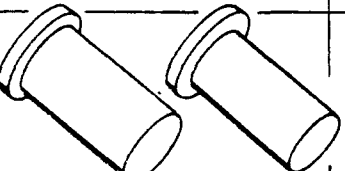
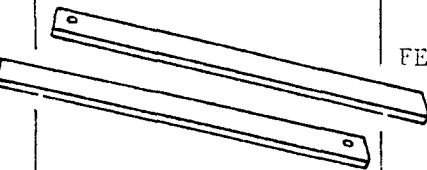
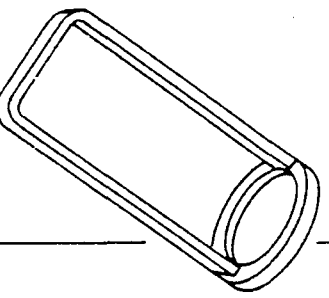
RANGE : REVERSE - HIGH

MODEL 1024
HYDRAULIC CIRCUIT
4 SPEED, 18 5/8 DROP
RANGE: REVERSE-HIGH

1. Main Pressure Regulator
2. Main Orifice
3. By-Pass Orifice
4. Modulator Orifice
5. Converter By-Pass Valve 80 PSI
6. Converter
7. Filter
8. Filter By-Pass Valve
9. Pump
10. Neutral Starter Switch
11. Heat Exchanger
12. Directional Control Valve
13. Range Control Valve
14. Screen
15. Sump
16. Feathering Valve
17. Brake Cut-Off
18. Clutches
19. Modulator Valve-By Pass Position

SPECIAL SERVICE TOOLS
FOR
FUNK 1000 SERIES TRANSMISSIONS

The following special service tools are used when overhauling any Funk 1000 Series Transmission. Use of these tools will reduce overhaul time and avoid damage to costly parts and components.

	FES-508-1	CLUTCH PACK LIFTING TOOL...This tool is used to remove and install the clutch packs from the main transmission housing.
	FES-508-3 FES-508-4	BEARING DRIVERS...Used to install bearings on clutch pack shafts.
	FES-508-5	ALIGNMENT BAR SET...This set of bars is used to align the gears and clutch packs during bearing installation.
	FES-508-6	CLUTCH SPRING COMPRESSOR TOOL...Used to disassemble and assemble clutch release springs from Funk series 1000 transmissions.
NOT ILLUSTRATED	FES-508-7	LIFTING BRACKET...This lifting bracket attaches to the transmission case to aid in the removal and installation of the transmission assembly from the vehicle.

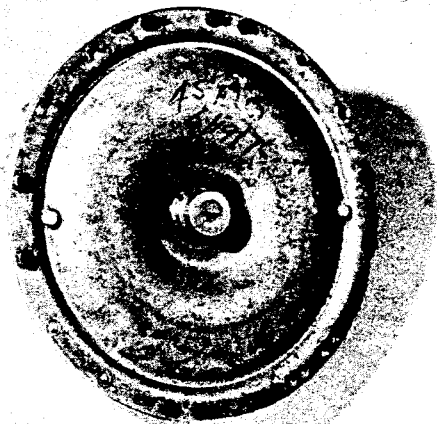


Fig. 1.

Assembly instructions for the 11 3/4 inch converter will be from Fig 2 thru Fig. 25.

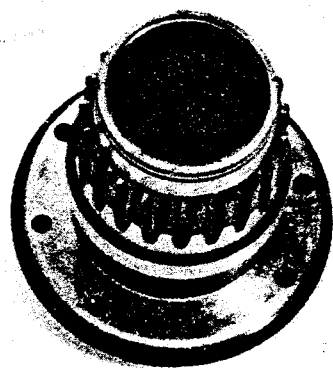


Fig 2

This is the torque converter hub.

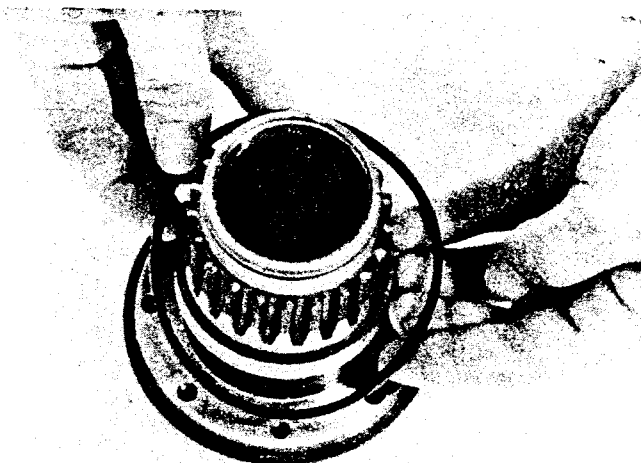


Fig 3.

Install the rubber gasket around the base of the hub.



Fig 4.

Install the cast iron seal ring on the hub.

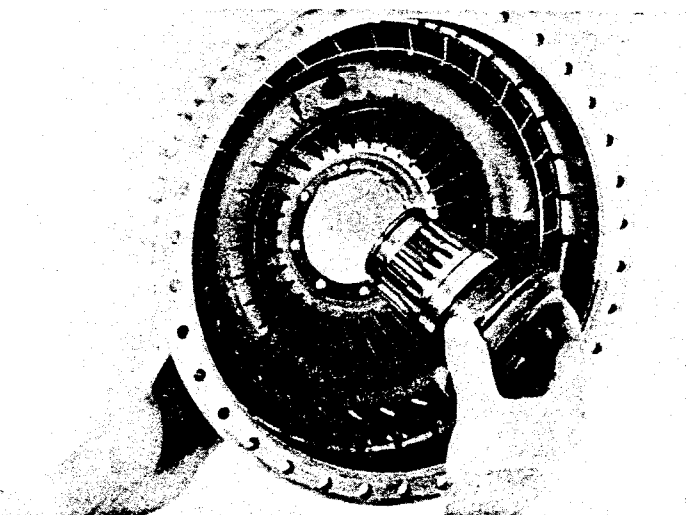


Fig 5.

Place the hub in the impeller assembly.

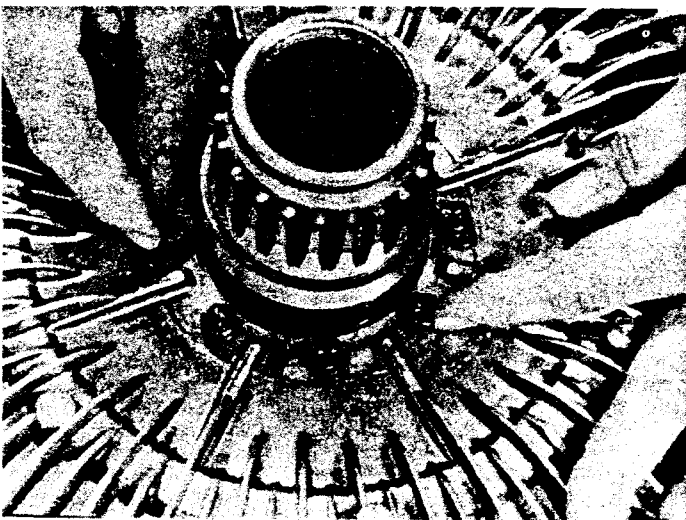


Fig 6.

Install the capscrews and lock washers around the hub.

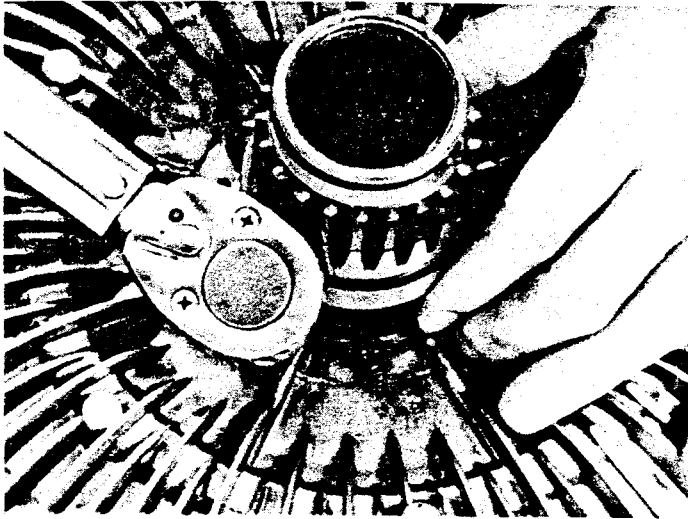


Fig 7.

Torque the capscrews to 8 ft. lbs.
Reference S.A.E. grade #5 torque
valve chart.

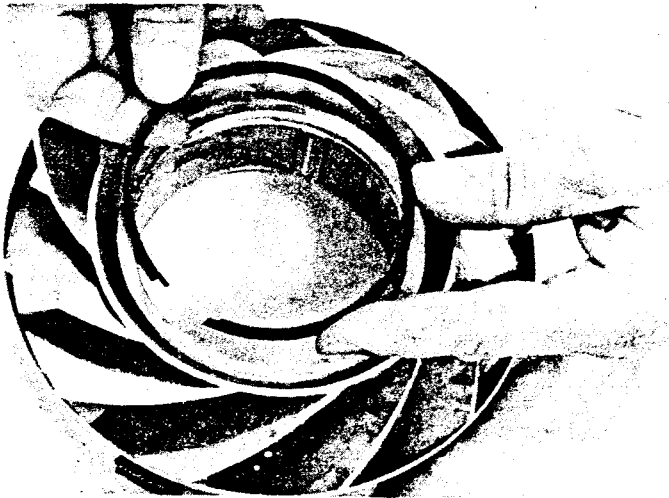


Fig. 8

Install the snap ring in the back
side of the stator.

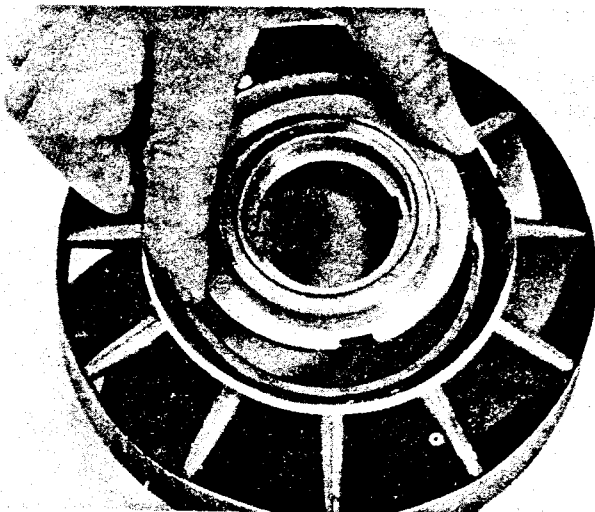


Fig 9.

Turn the stator over so that the
side marked "front" is up and
install the bottom stator thrust
washer.

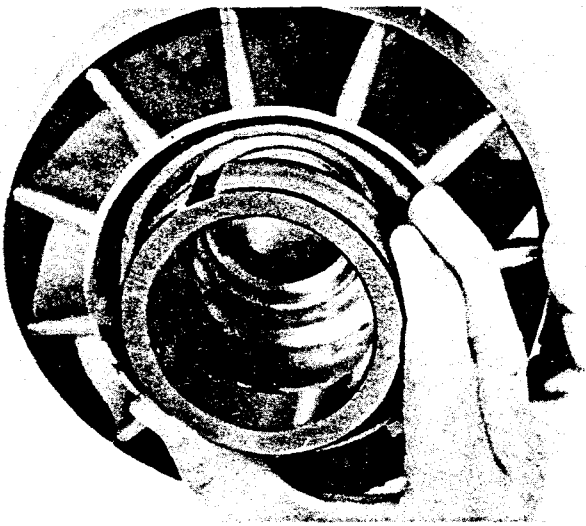


Fig. 10

Install the outer race.

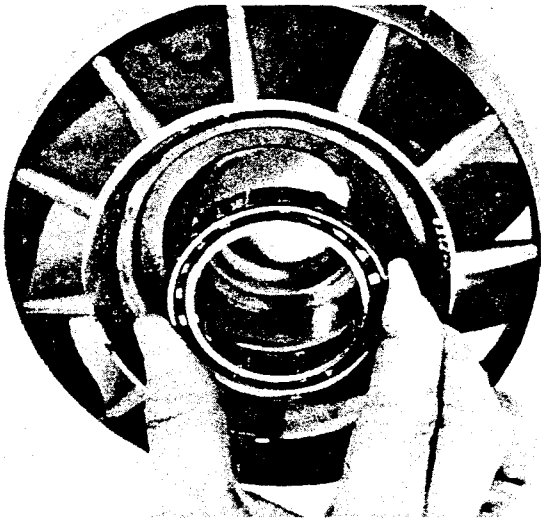


Fig. 11

Install the sprag with the flanged edge facing up.

Note: The sprag clutch will turn in a counter-clockwise direction.



Fig. 12

Install the inner race with the spline end up as shown.



Fig.13

Install the top stator thrust washer.

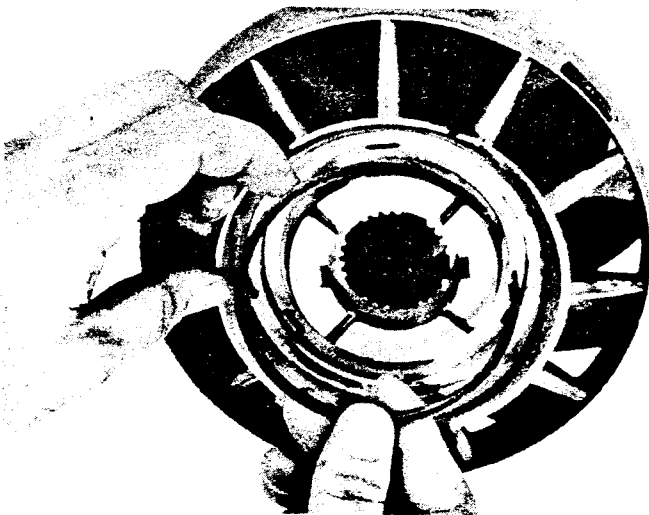


Fig. 14

Install the top snap ring.

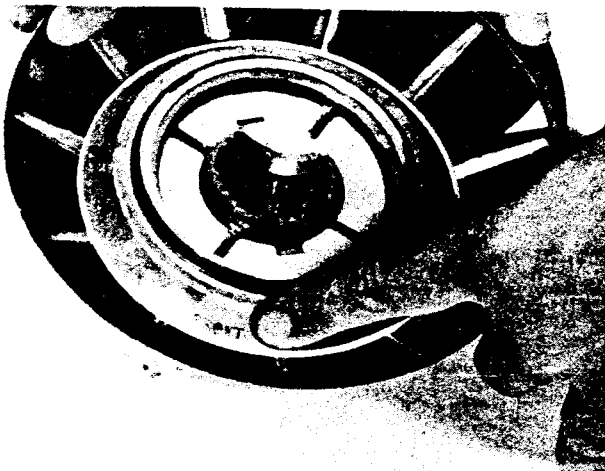


Fig. 15

Notice the "front" marked on this side of the stator assembly. This will install away from the impeller.



Fig. 16.

Install the bottom thrust washer.



Fig. 17

Place the stator assembly in the impeller assembly and install the top thrust washer.

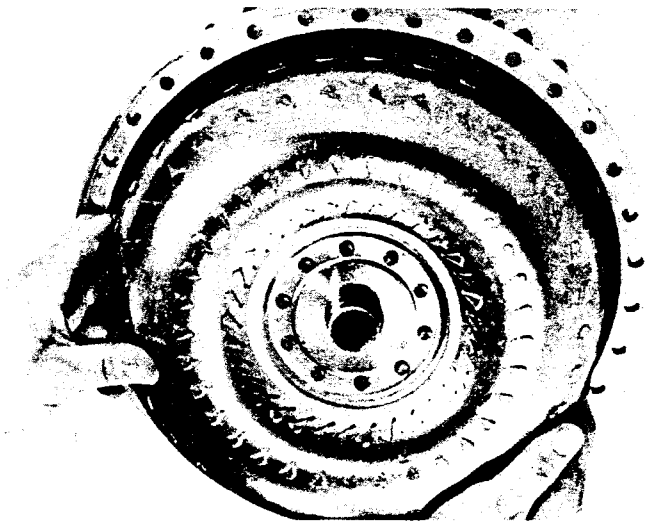


Fig. 18

Install the turbine assembly.



Fig. 19

Place the thrust washer on the turbine hub.

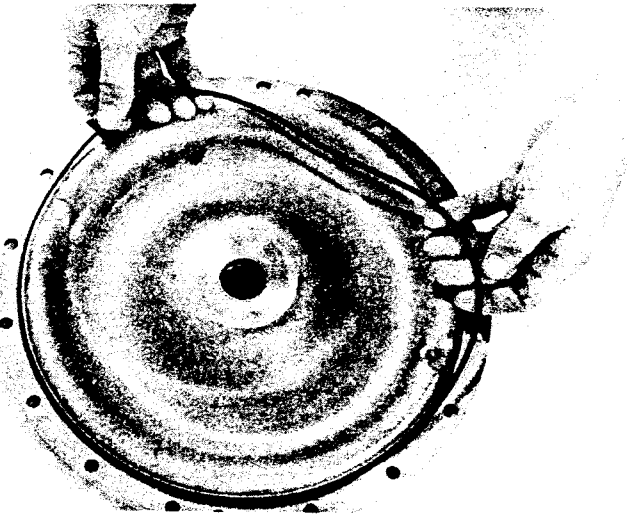


Fig. 20

Install the "O"ring on the front cover.

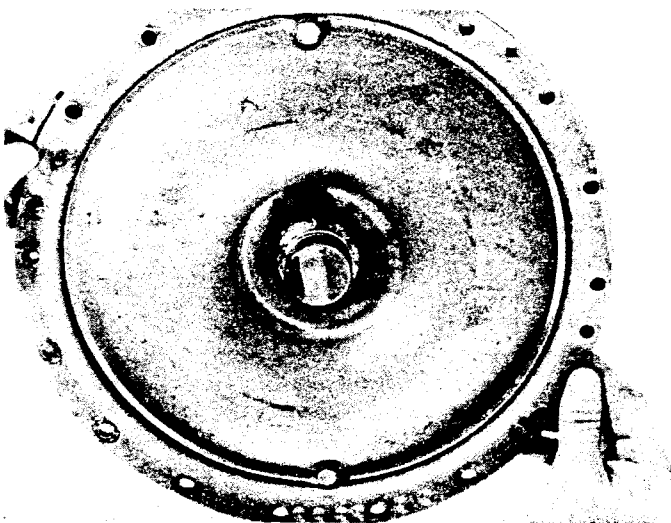


Fig. 21

Place the front cover on the impeller assembly.

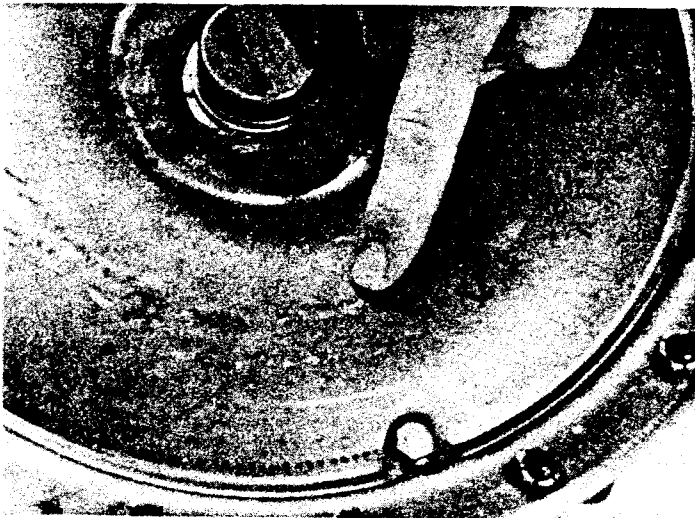


Fig. 22

Notice the mark stamped on the front cover.

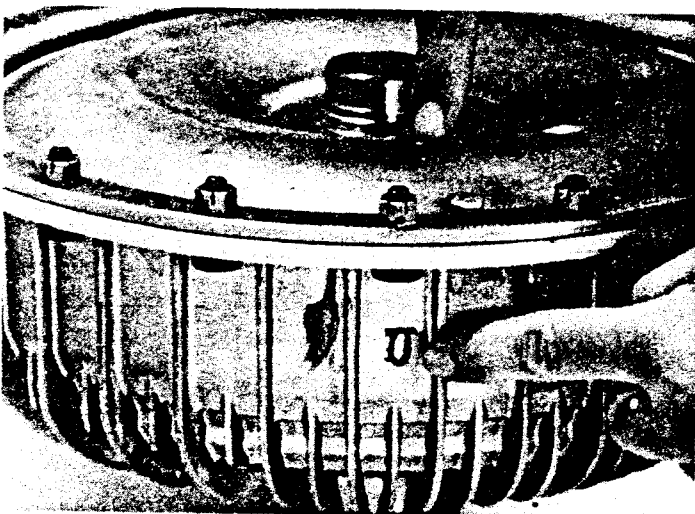


Fig. 23

Notice the balance mark on the impeller assembly. It must be lined up with the balance mark on the front cover.

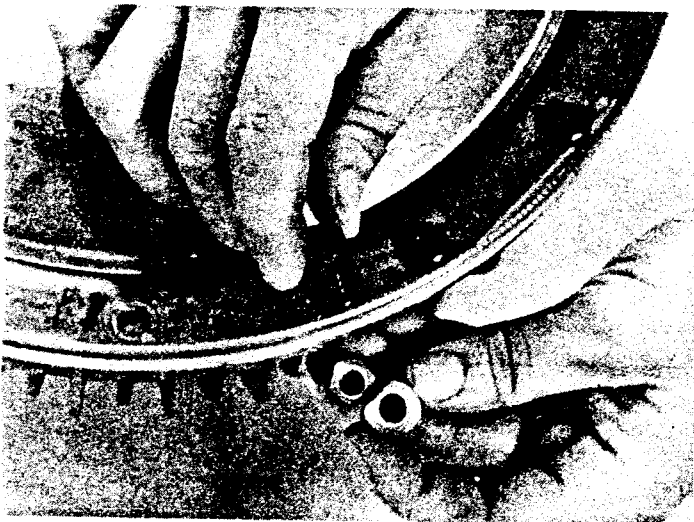


Fig. 24

Install the capscrews in the front cover. This is done in a certain pattern. Begin by installing two capscrews, one on each side of the drain plug in the front cover. Then skip two holes and install three capscrews. Skip two holes and install two capscrews, one on each side of the other drain plug. Then skip two holes and install three capscrews.

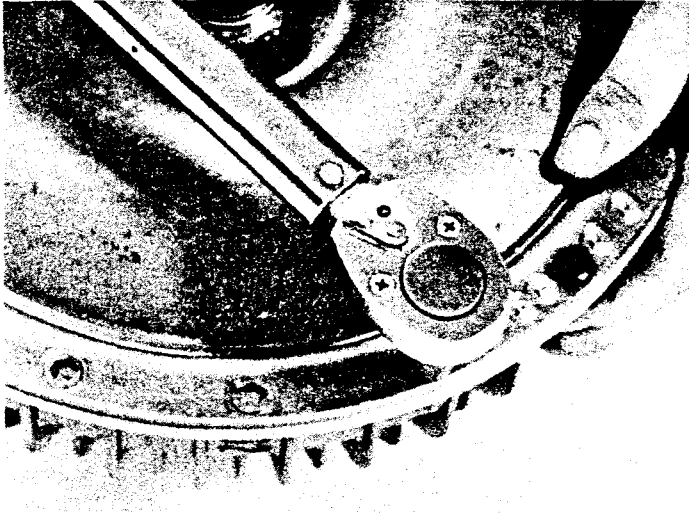


Fig. 25

Torque the capscrews at 22 ft. lbs. Reference S.A.E. grade #5 torque valve chart.

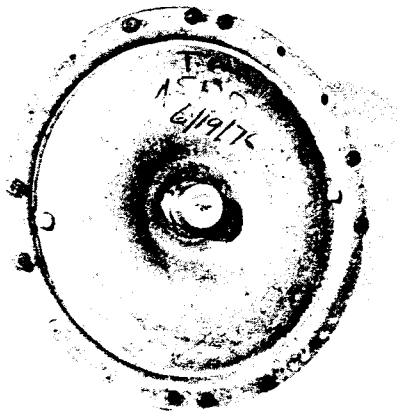


Fig. 26

This completes the assembly procedure for the 11 3/4 inch converter.

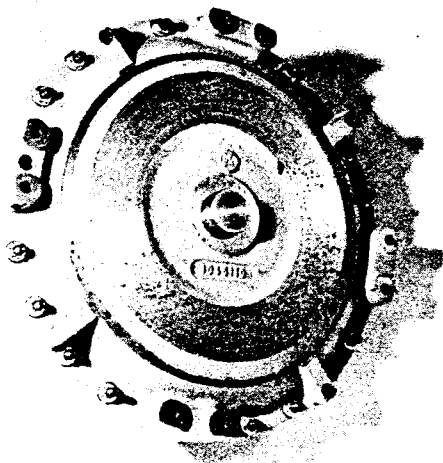


Fig. 27

These are the assembly instructions for the 12 3/4 inch torque converter from figure #28 thru figure #50.

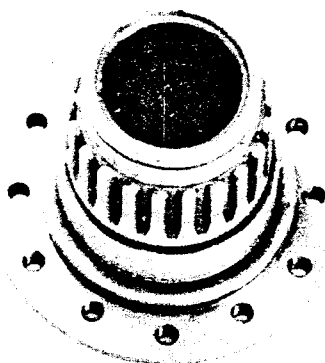


Fig. 28

This is the torque converter hub.

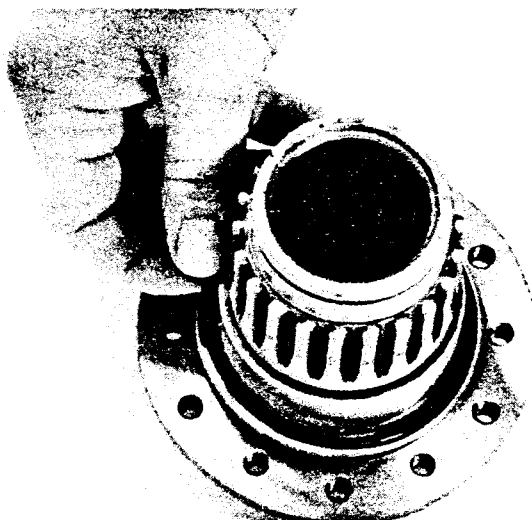


Fig. 29

Install the "O"ring on the converter hub.



Fig. 30

Install the cast iron seal ring on the hub being careful not to break it.

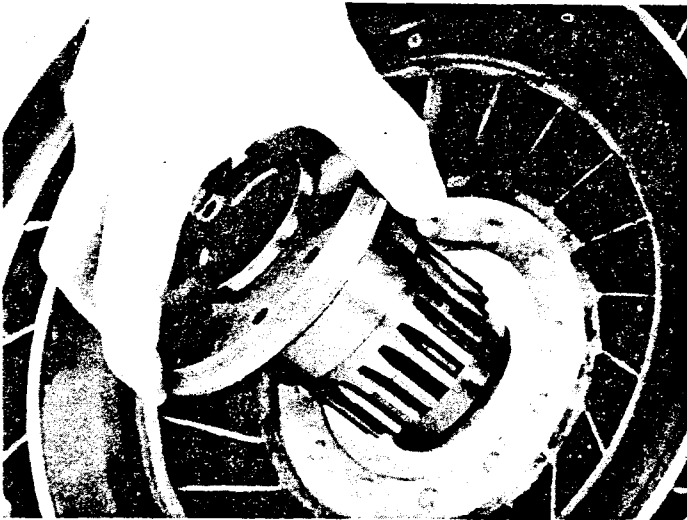


Fig. 31

Place the converter hub in the impeller assembly as shown.

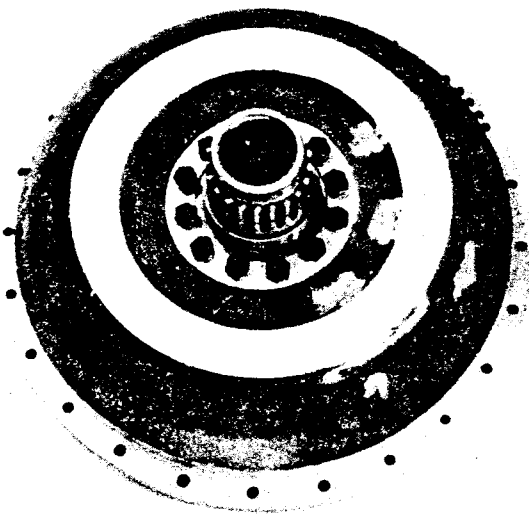


Fig. 32

Align the hub in the impeller assembly and install the dynaseal washers and capscrews.

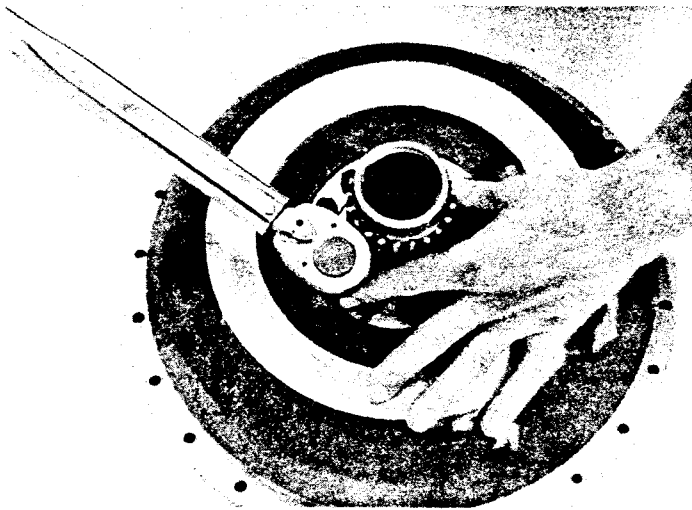


Fig. 33

Torque the capscrews to 17 ft. lbs. Use mechanics wire to safety wire the capscrews in pairs using a figure 8 pattern.



Fig. 34

Turn the impeller over. Install the thrust bearing and washer on the hub surface as shown.



Fig. 35

Install the snap ring in the back side of the stator as shown.

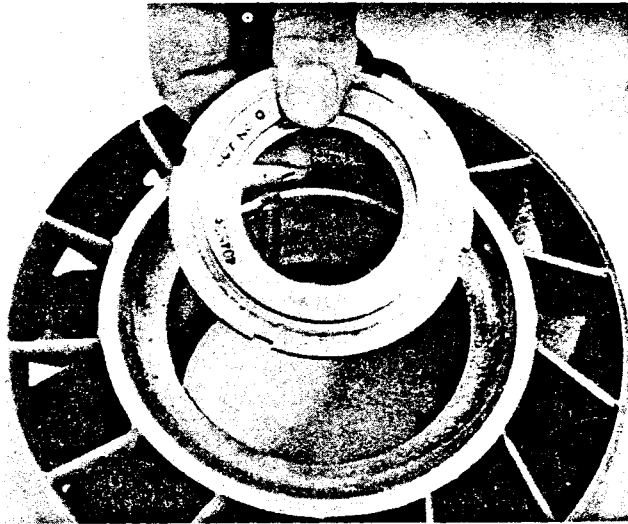


Fig. 36

Turn the stator over with the side marked "FRONT" facing up and install the rear stator thrust washer.

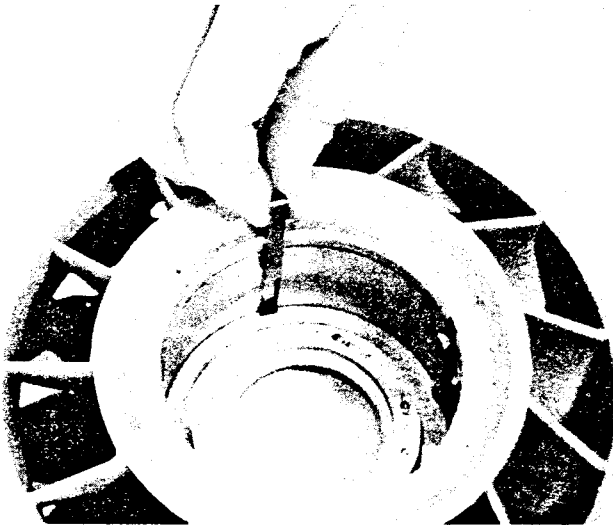


Fig. 37

Install the four keys in the stator assembly as shown.



Fig. 38

Install the outer race over-run cam as shown.

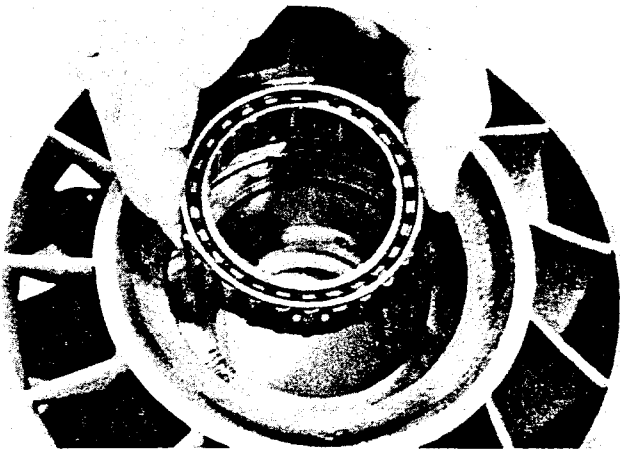


Fig 39

Install the sprag clutch assembly with the shouldered side up, retainer springs down.

NOTE: The clutch must turn in a counter clockwise direction during installation.



Fig. 40

Install the inner race as shown.



Fig. 41

Install the front stator thrust washer.

NOTE: Put the front stator thrust washer in position in the stator with the "F" on the thrust washer in alignment with the "F" on the stator.

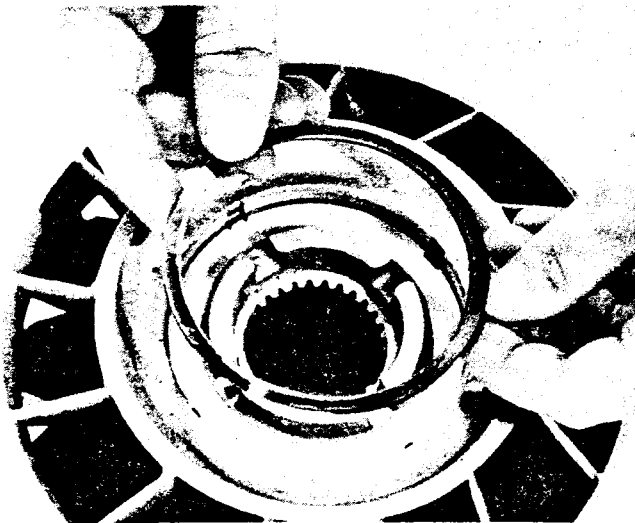


Fig. 42

Install the top snap ring in the stator as shown.



Fig. 43

Install the stator assembly in the impeller assembly with the "F" on the stator up. (Away from the impeller)

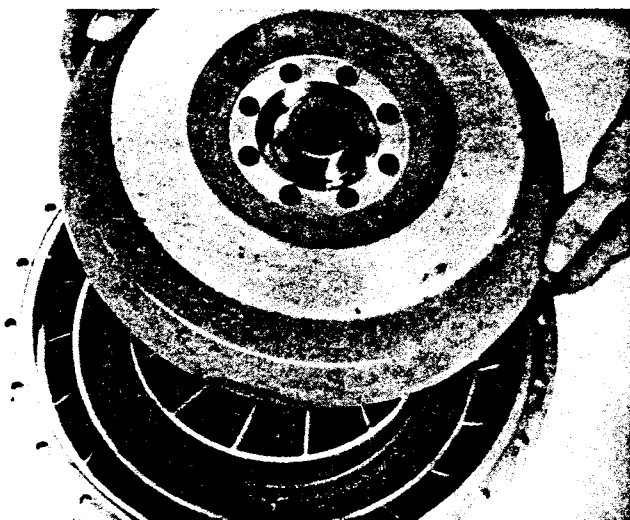


Fig. 44

Install the turbine in the impeller as shown.

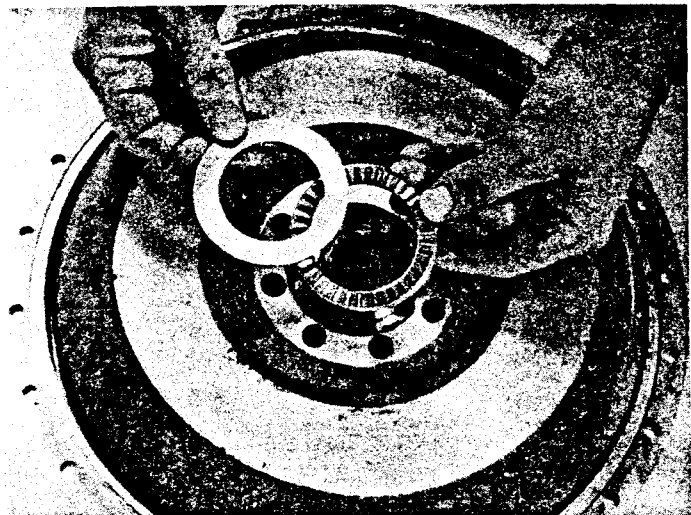


Fig. 45

Place the thrust bearing and washer over the turbine as shown.

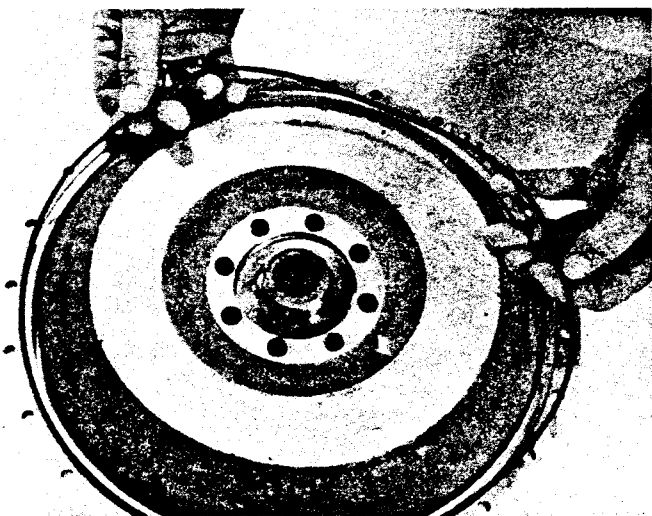


Fig. 46

Apply a clean coating grease on the "O"ring and install on the impeller assembly as shown.

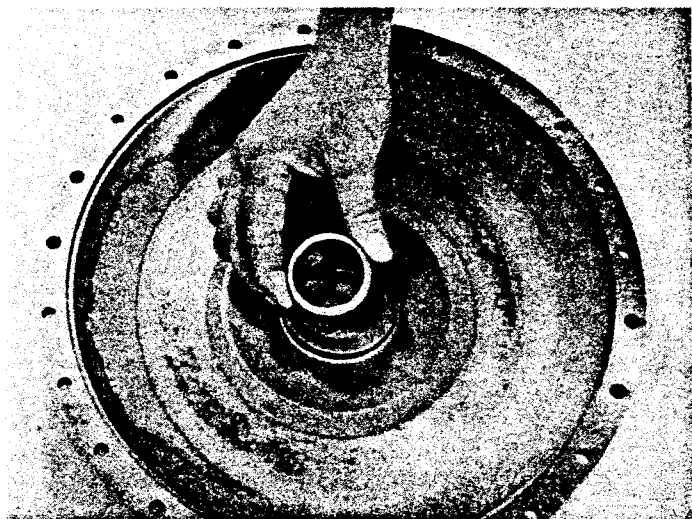


Fig. 47

Press the cage roller bearing into the front cover.

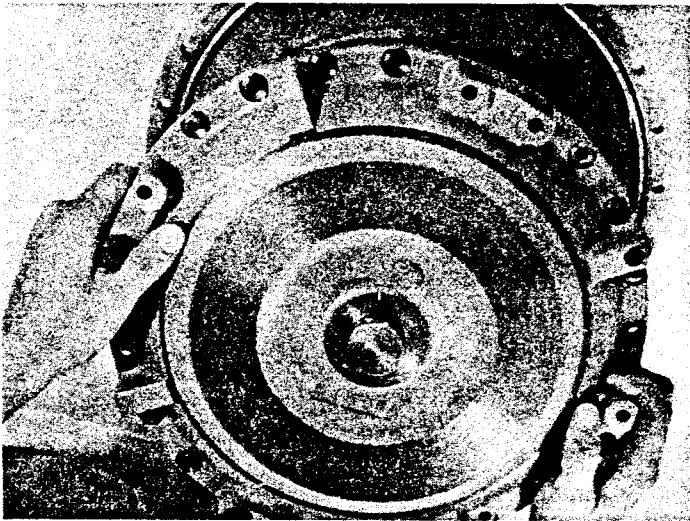


Fig. 48

Place the front cover on the impeller assembly.

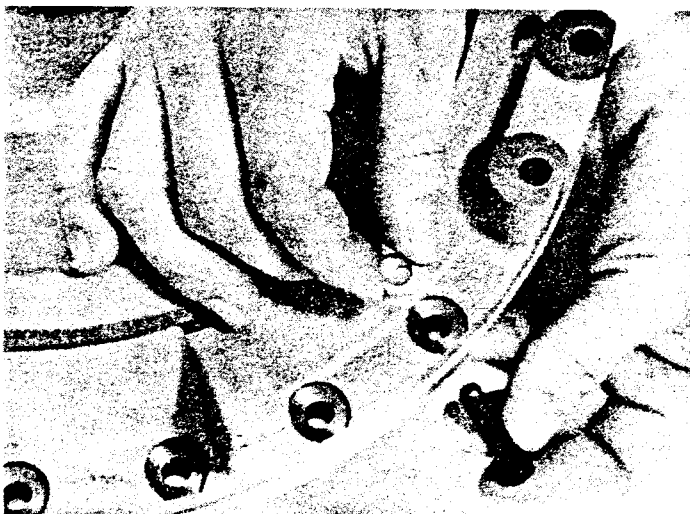


Fig. 49

Align the front cover with the impeller and install the capscrews and locking nuts.

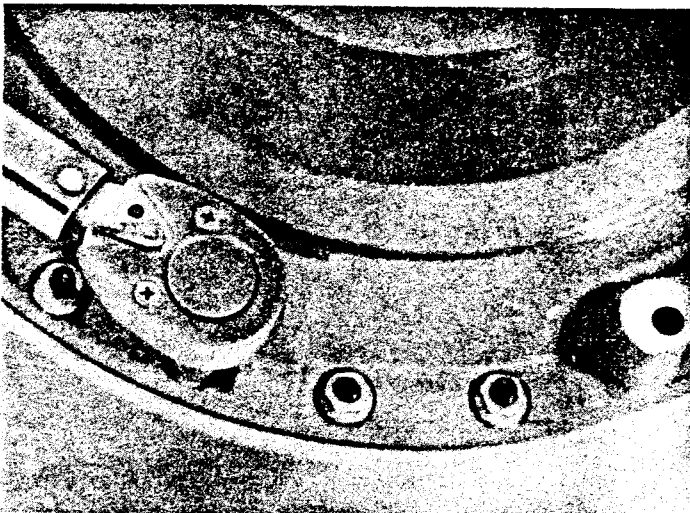


Fig. 50

Torque the locking nuts to 22 ft. lbs.

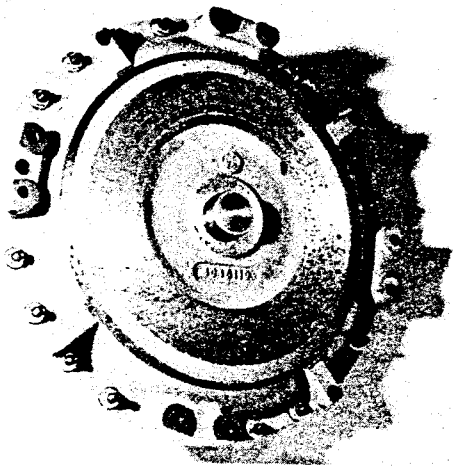


Fig. 51

This completes the assembly of the 12 3/4 inch torque converter.

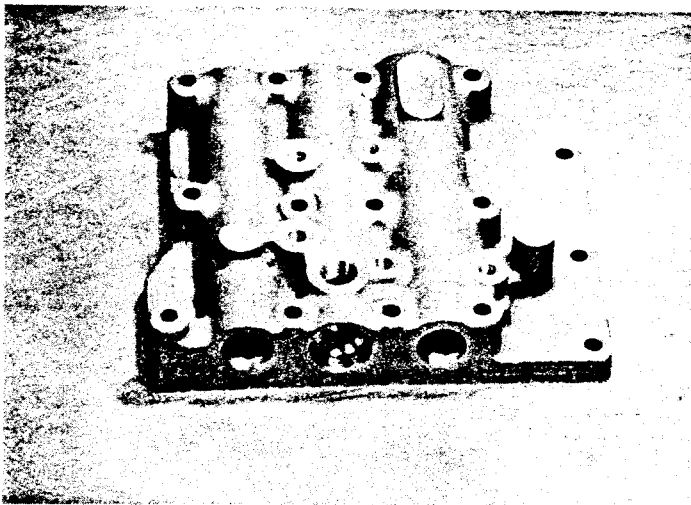


Fig. 52

This is a three position valve body ready for assembly. Assembly instructions will be from figure #52 thru figure #76.

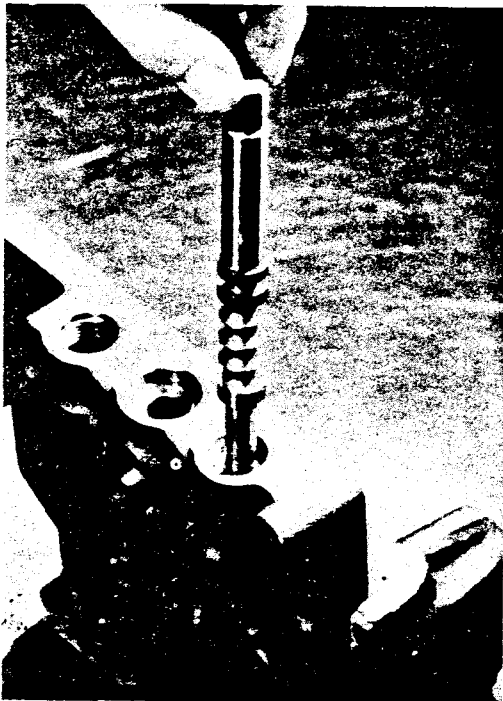


Fig. 53

Place the three position valve body in a clean vise as shown. Be careful not to over tighten the vise jaws, as this may damage the valve body. Install the speed control stem in the bottom bore with the linkage eye looking up.

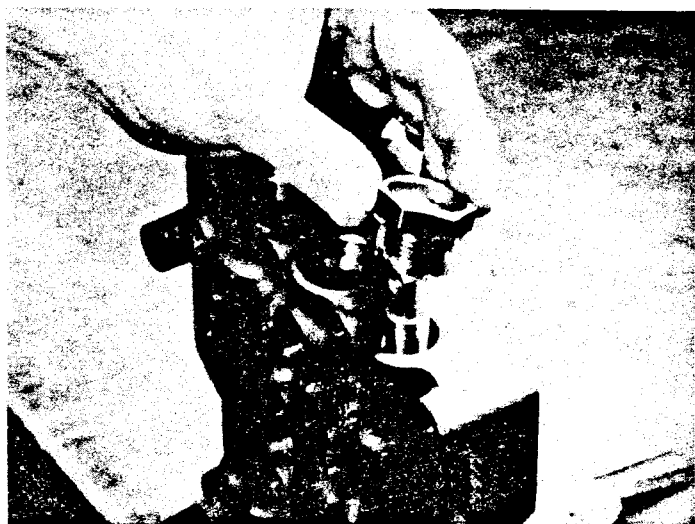


Fig. 54

Install the speed control stem plug with the "O"ring and tighten.

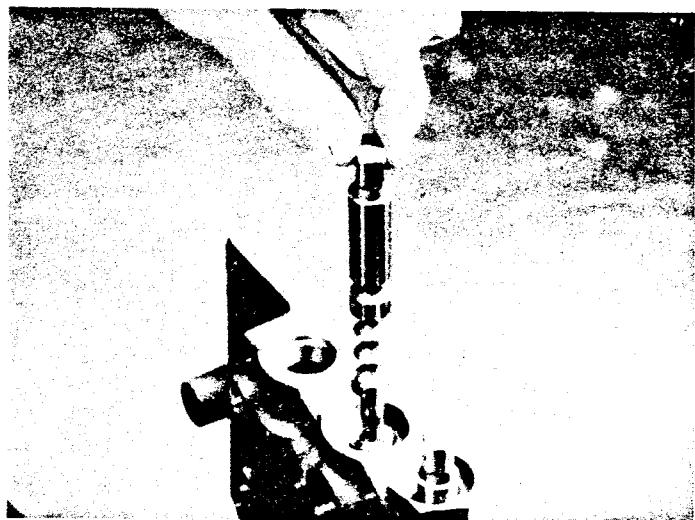


Fig. 55

Install the directional control stem in the middle bore with the linkage eye looking up.

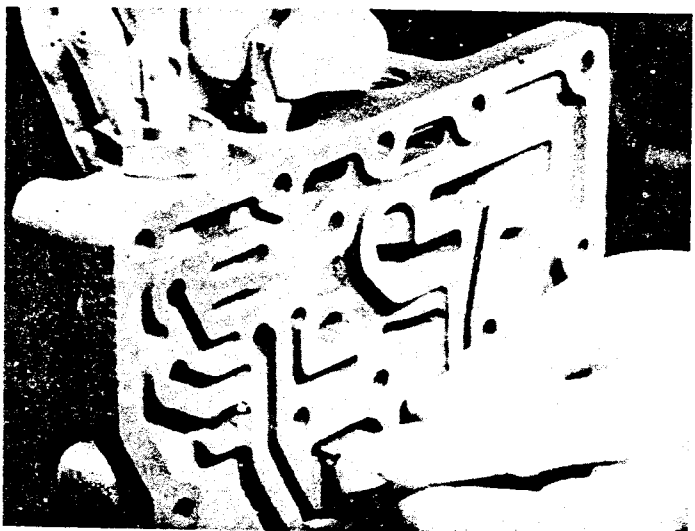


Fig. 56

Pull up slightly on the directional control valve stem. Install the roll pin in the drilled hole located on the back side of the valve body as shown.



Fig. 57

Install the accumulator spring in the top bore.



Fig. 58

Install the main regulator valve as shown.

Note: To raise or lower the oil pressure on the unit, install the adjusting washers on the end of the regulator valve between the main regulator valve and the regulator valve spring.

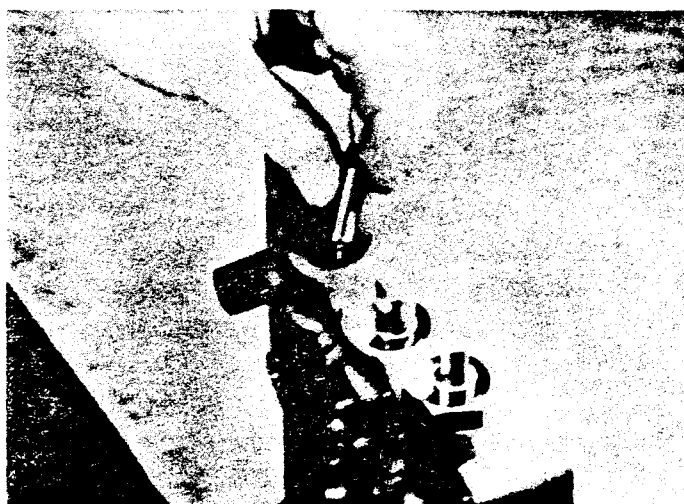


Fig. 59

Install the dowell pin in the main regulator valve as shown.

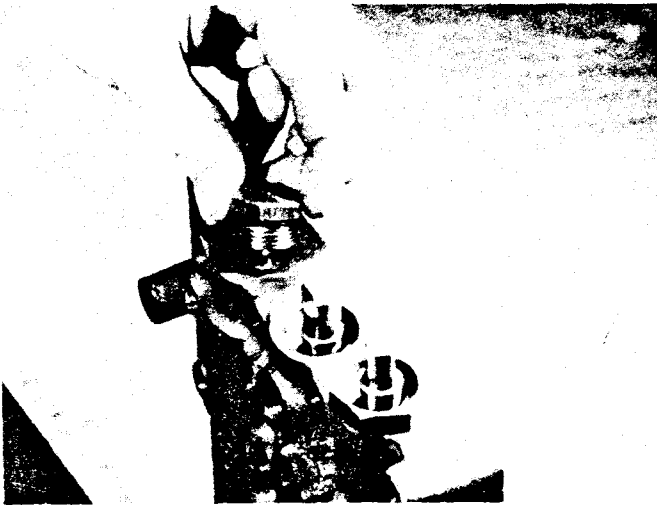


Fig. 60

Install the plug with the "O"ring and tighten.

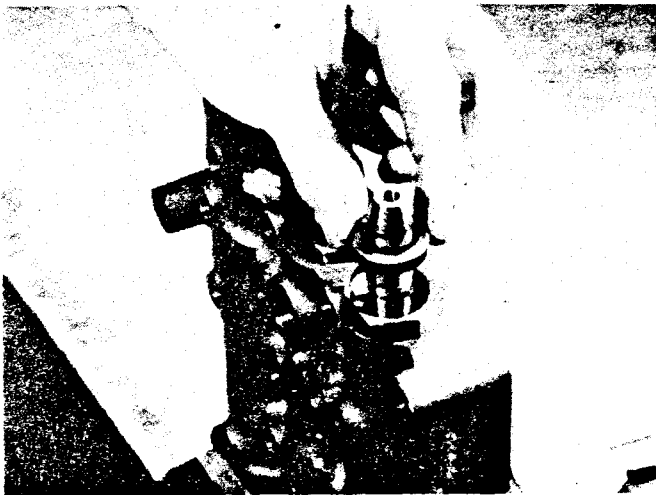


Fig. 61

Use a good type of seal driver and install the oil on the control stem and directional stem with the seal lip down.

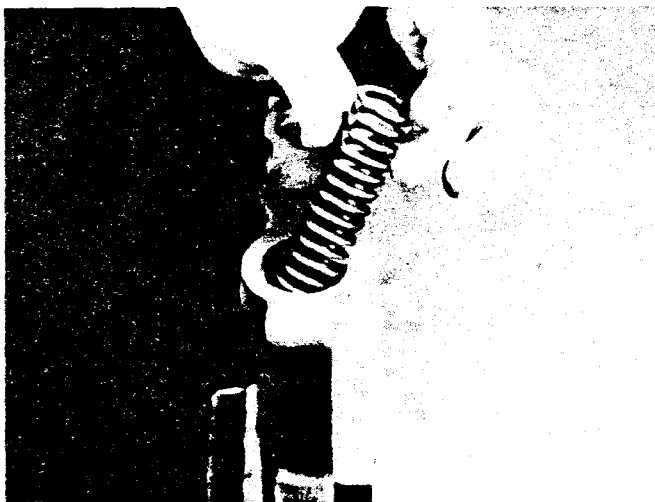


Fig. 62

Turn the valve over and install the accumulator spring in the top bore as shown.

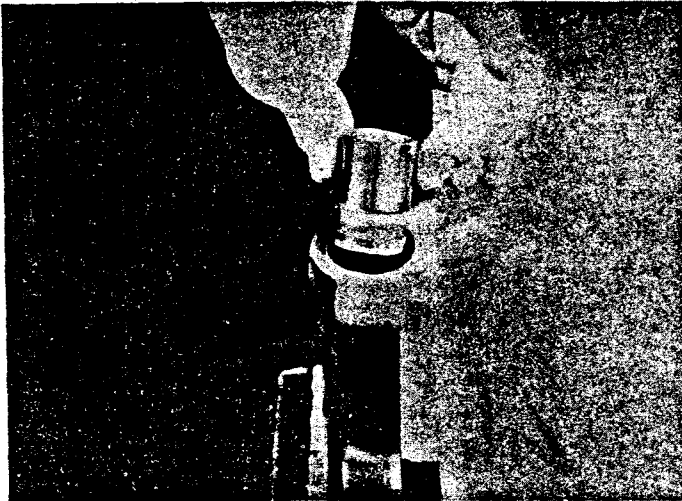


Fig. 63

Install the modulator valve next to the accumulator spring as shown.

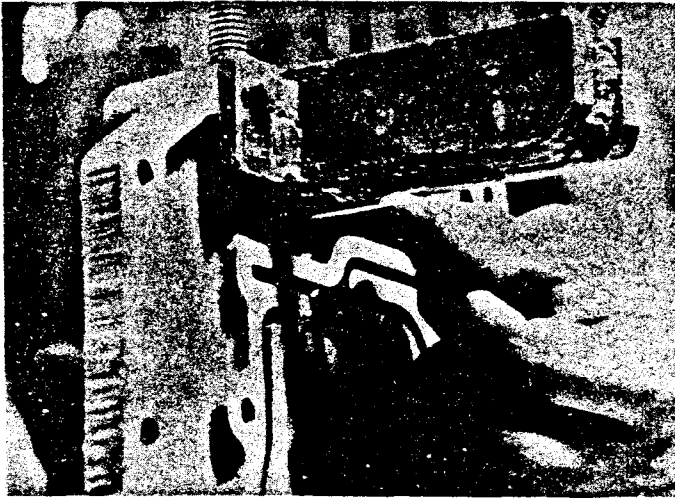


Fig. 64

Depress the modulator valve and install the accumulator spring. Install the pin on the back side of the valve as shown.



Fig. 65

Install the dump valve as shown.



Fig. 66

Install the dump valve spring.



Fig. 67

Install the dump valve plug with an "O"ring and tighten.



Fig. 68

Install an "O"ring on the plug and install on the other bore and tighten plug.



Fig. 69

Remove the valve from the vise and lay on a flat clean surface. Install 1/8" N.P.T. plugs.

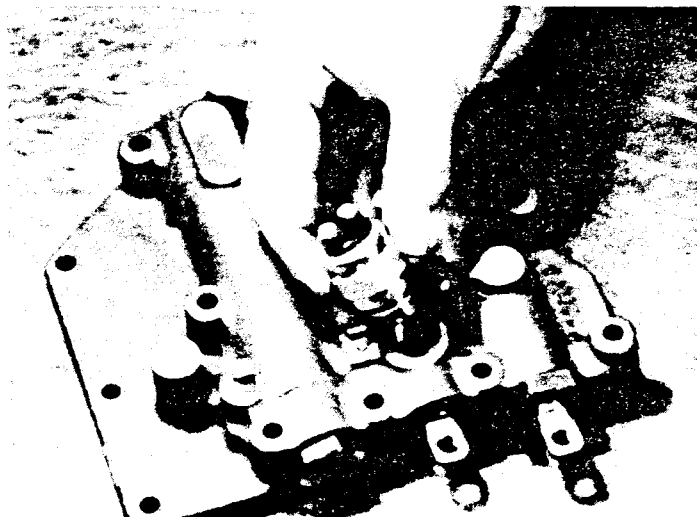


Fig. 70

Install the neutral safety switch in the large tapped hole. Be careful not to over tighten.

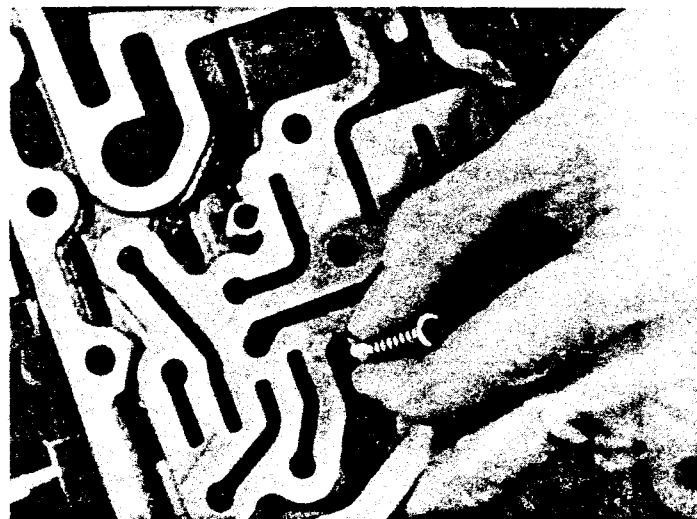


Fig. 71

Before installation onto the transmission, install two 3/8" balls and springs as shown.

NOTE: The valve must only be removed or installed as the transmission sits in the mounted position. If done otherwise, the balls and springs will fall inside of the transmission and a complete disassembly will be necessary.

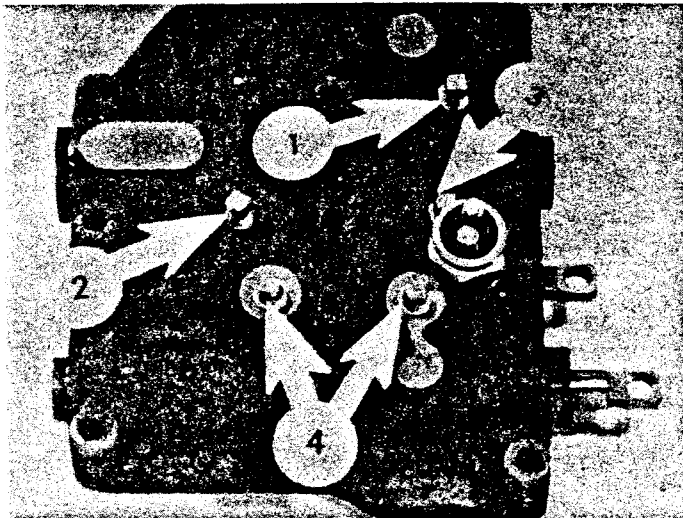


Fig. 72

This is the assembled valve in the mounted position, showing the pressure check points.

1. Primary Pump
2. Clutch Pack
3. Converter Pressure
4. Reverse Warning Switch Plug

Plug usage will depend on axle rotation.

NOTE: This completes the assembly of the three position control valve.

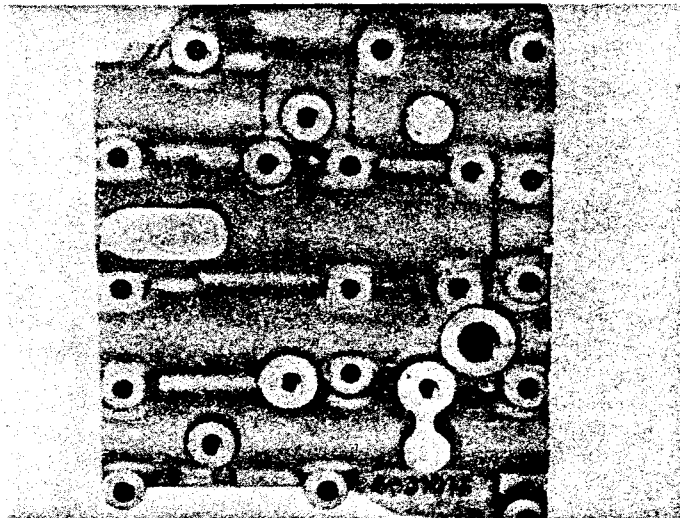


Fig. 73

This is the four position control valve with feathering in low gear only, ready for assembly. Assembly instructions will be from figure #77 thru figure #96.

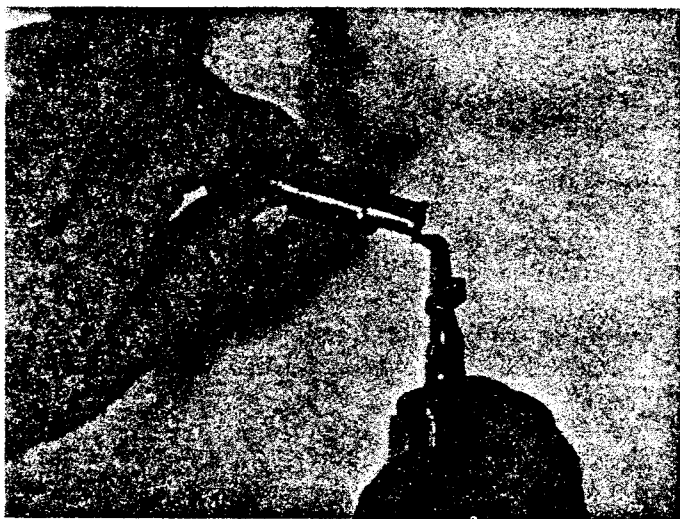


Fig. 74

Install the spacer and snap ring on the directional stem as shown.

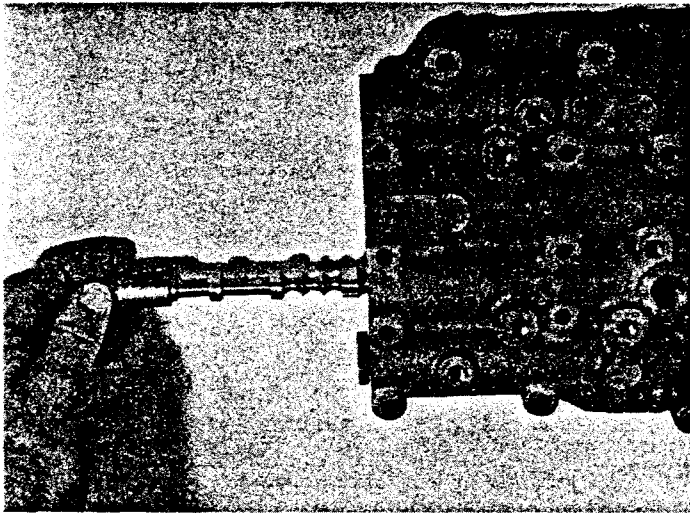


Fig. 75

Lay the valve flat on a clean surface with the top of the valve facing away from you. Install the plug with an "O"ring in the lower left hand bore. Install the directional control stem in the second bore from the bottom on the left hand side. Install a plug with an "O"ring.

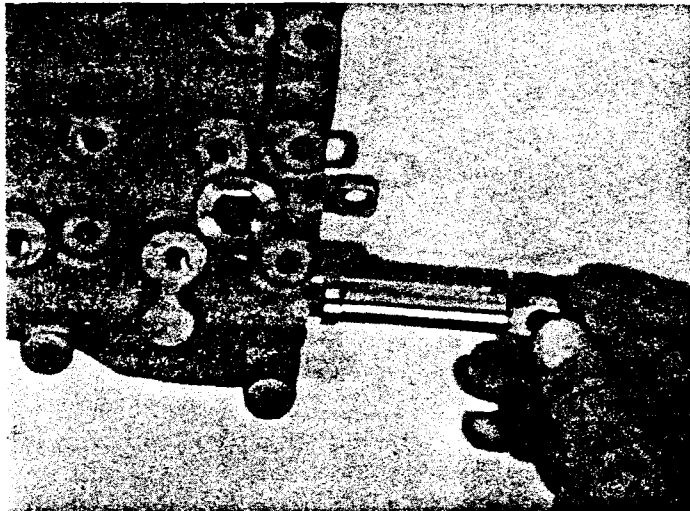


Fig. 76

Install the speed control stem in the lower right hand bore as shown.

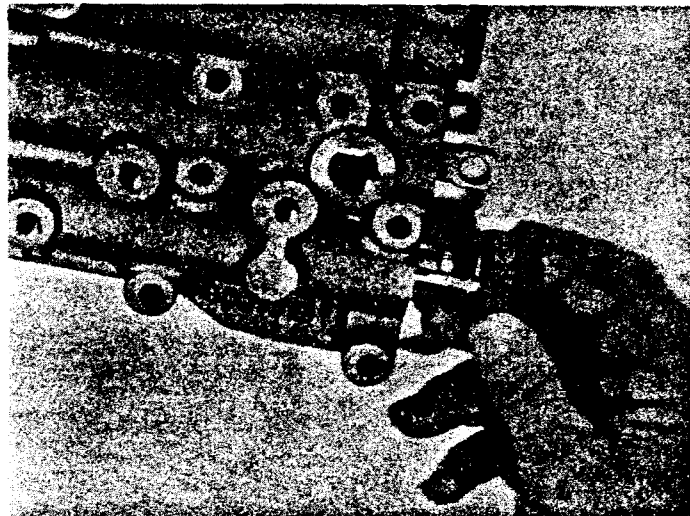


Fig. 77

Install the plug with an "O"ring.

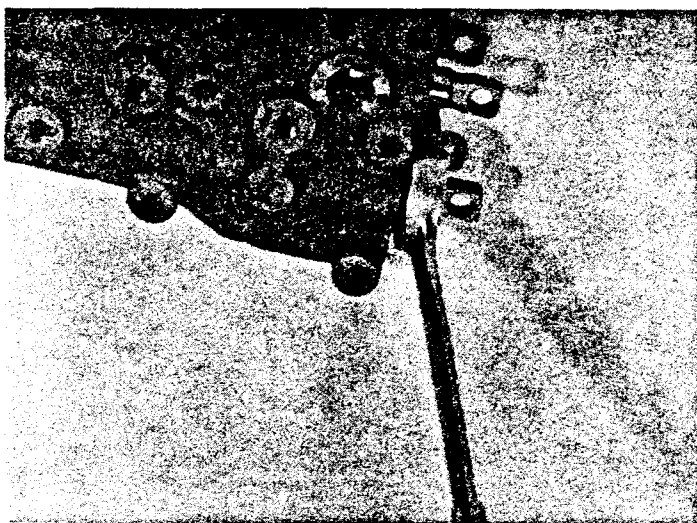


Fig. 78

Tighten the plug as shown.

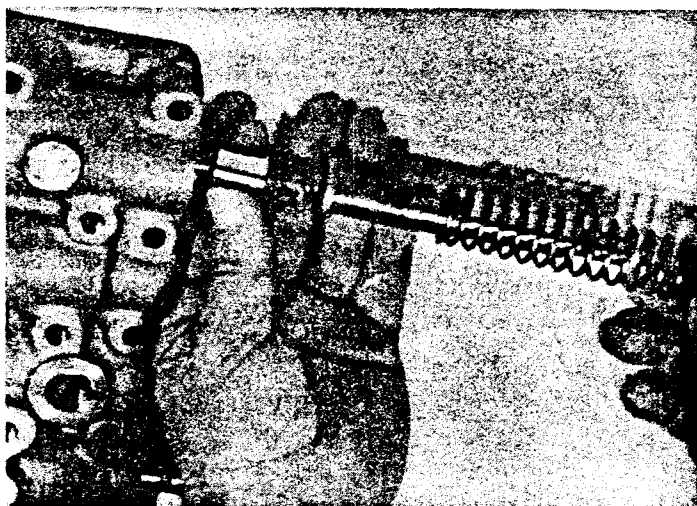


Fig. 79

Install the assembled feathering valve, feathering spring, and return feathering spring and stem as shown.

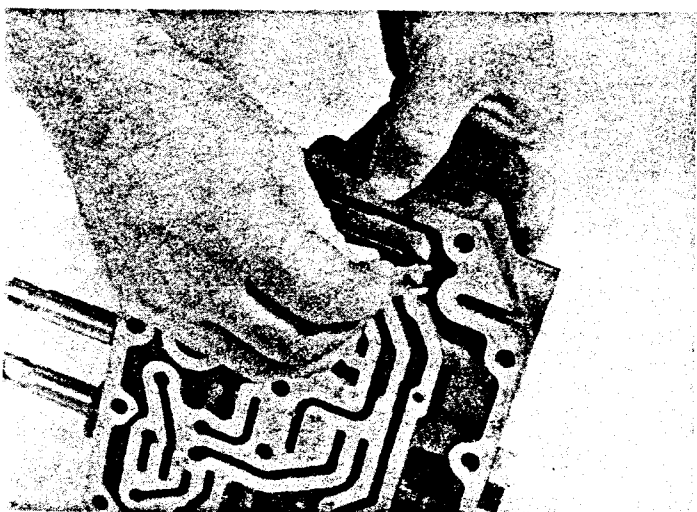


Fig. 80

Install the clip in the slot on the back side of the valve as shown.

NOTE: Apply a good grade of grease to the clip before installing. This will aid in keeping the clip from falling out before installation on the unit. For added safety, recheck clip before final installation.

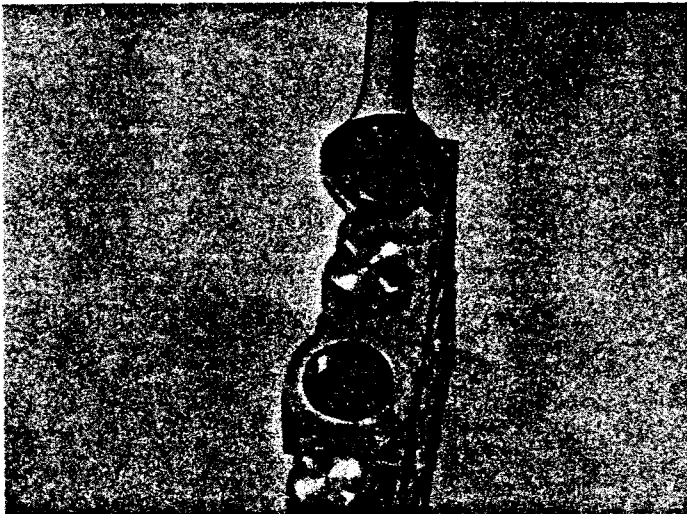


Fig. 81

Install "O"rings on the plugs.
Install the plugs and tighten
as shown.

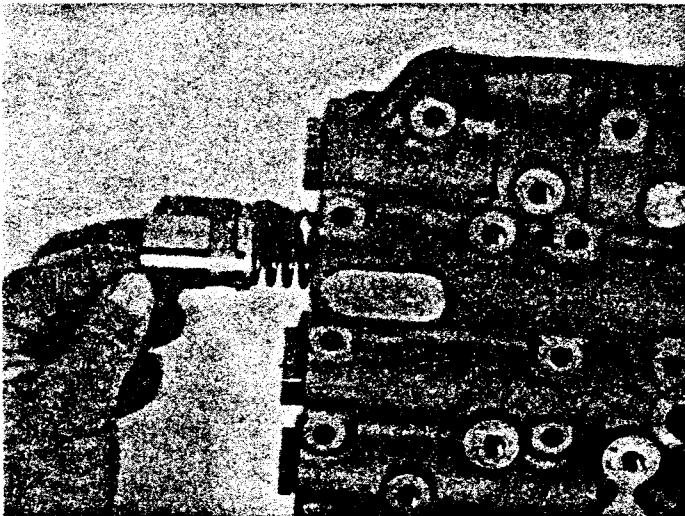


Fig. 82

Install the modulator spring and
valve as shown.



Fig. 83

Depress the modulator spring and
valve. Install the pin in the
back side of the valve as shown.



Fig. 84

Install the dump valve and spring as shown.

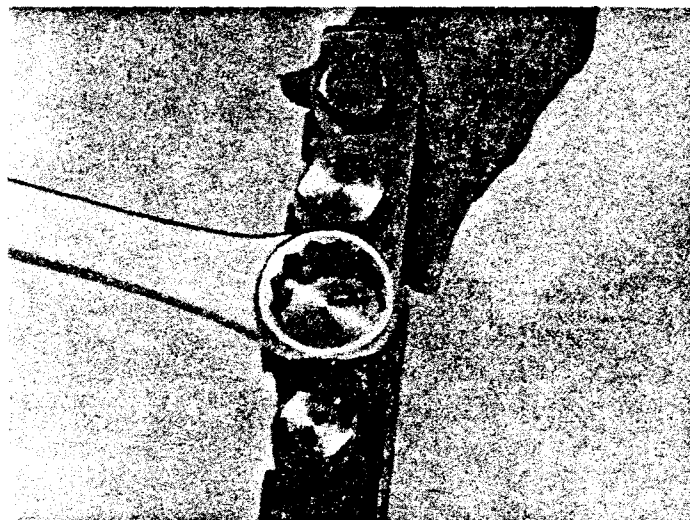


Fig. 85

Install an "O"ring on the dump valve plug and tighten.

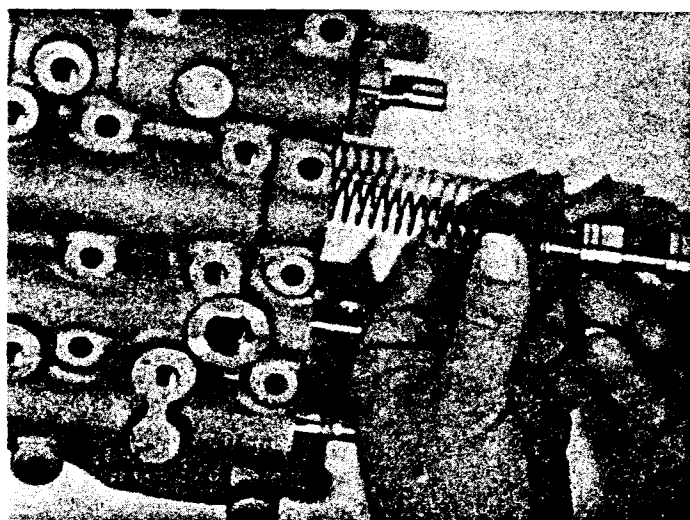


Fig. 86

Install the main regulator spring and valve as shown with the dowell pin in the main regulator valve.

NOTE: To raise or lower the oil pressure on the unit, install the adjusting washers on the end of the valve, between the main regulator valve and the regulator valve spring.

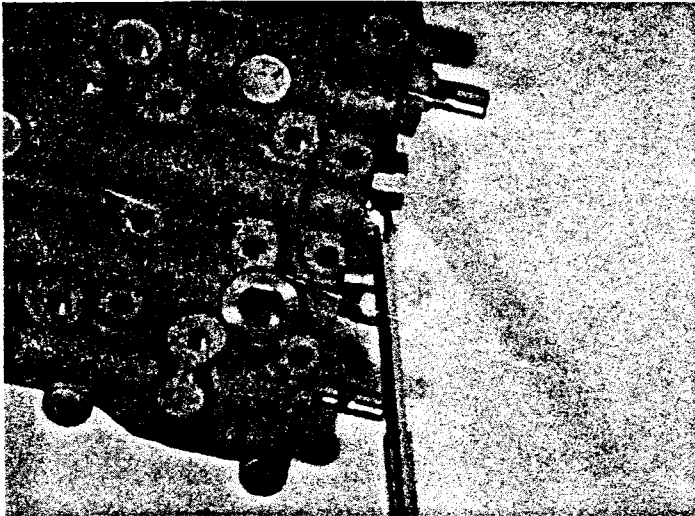


Fig. 87

Install an "O"ring on the regulator plug and tighten as shown.

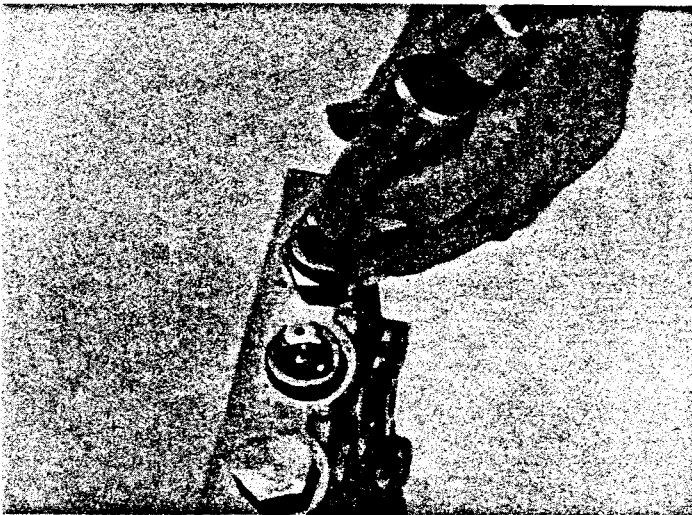


Fig. 88

Turn the valve over. Use a good seal driver and install the oil seal on the control stem and the directional stem with the seal lip pointed down.

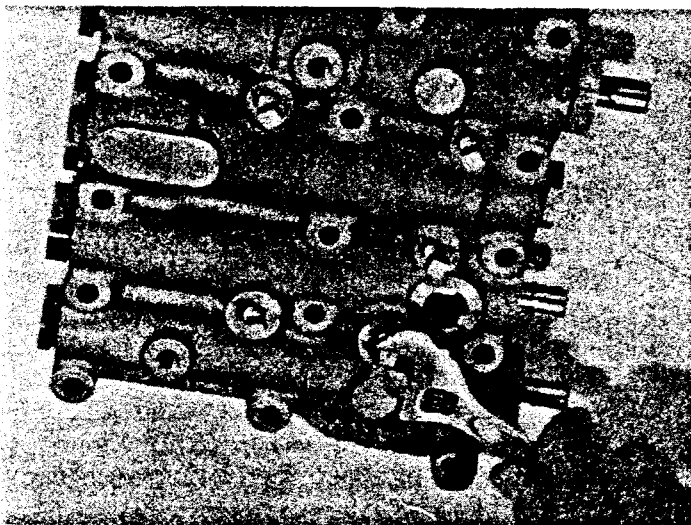


Fig. 89

Install the 1/8" N.P.T. plugs and tighten. (See Photo)

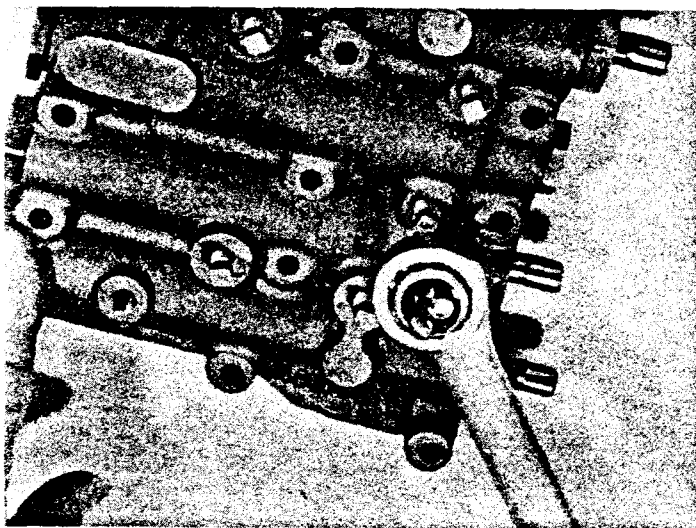


Fig. 90

Install the neutral safety switch. Be careful not to over tighten and damage the switch.

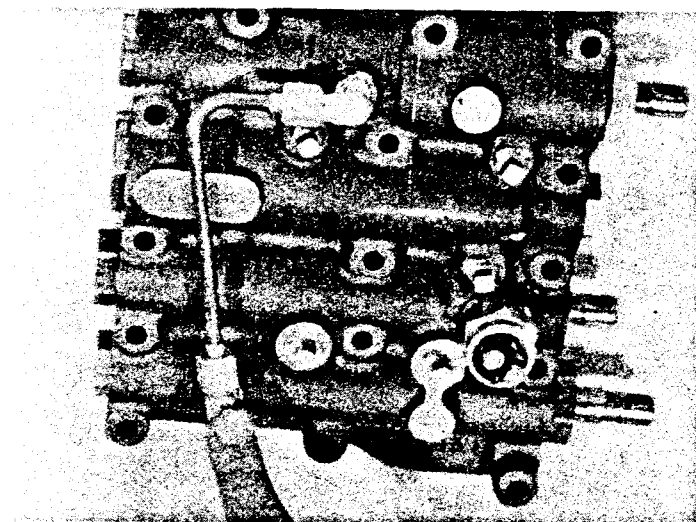


Fig. 91

Install the two ninety degree elbows and the assembled oil tube as shown.

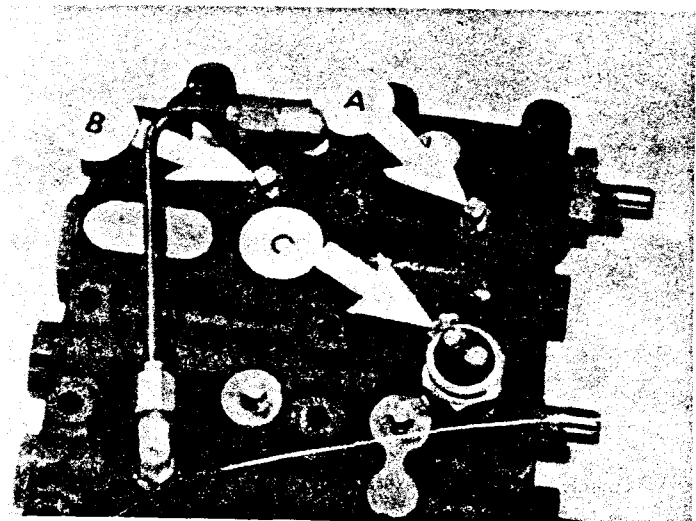


Fig. 92

This is the assembled four position control valve with feathering in low gear only showing the oil pressure check points.

- A. Primary Pump
- B. Clutch Pack
- C. Converter

NOTE: This is the assembly for the brake cutoff valve, from figure #97 thru figure #105.



Fig. 93

Install the two "O" rings inside the brake chamber as shown. Be sure the "O" rings are seated in the bore grooves.

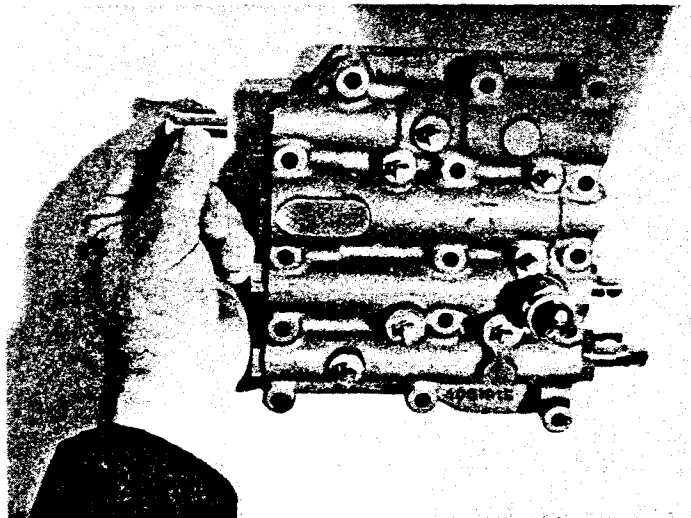


Fig. 94

Install the brake cutoff valve as shown.

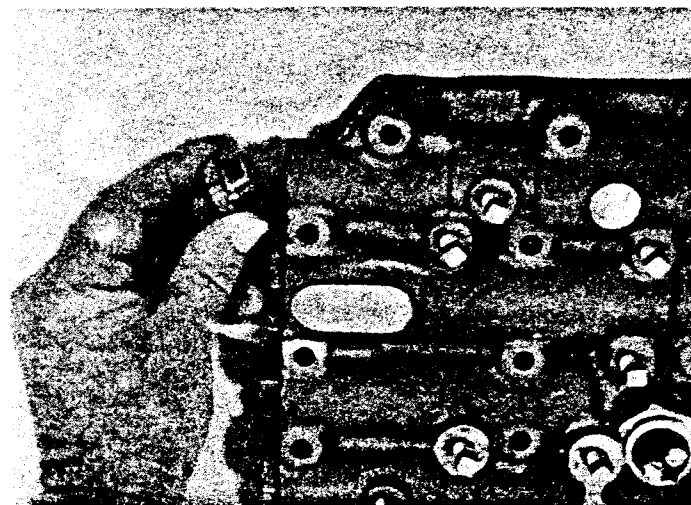


Fig. 95

Install the plug with an "O" ring and tighten.

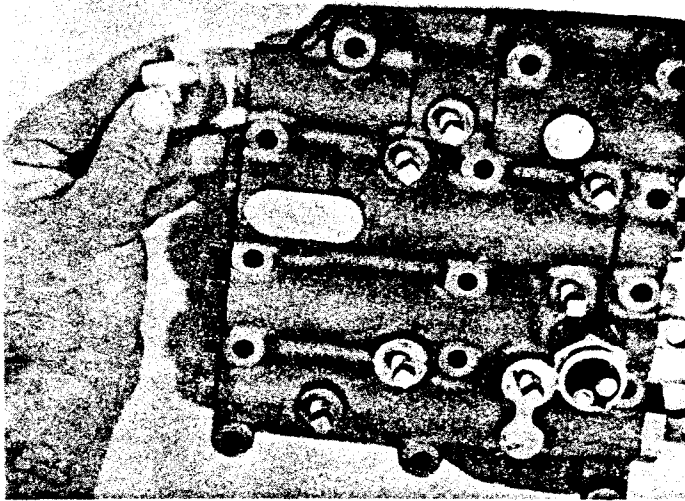


Fig. 96

Install the 90° street elbow and tighten

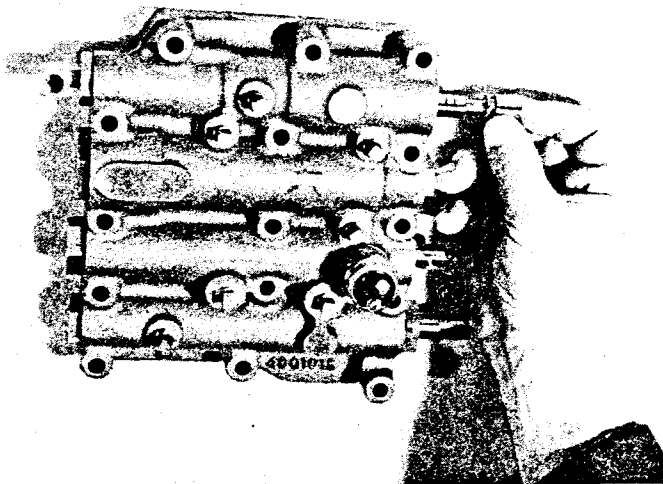


Fig. 97

Install the assembled pressure regulator valve as shown.

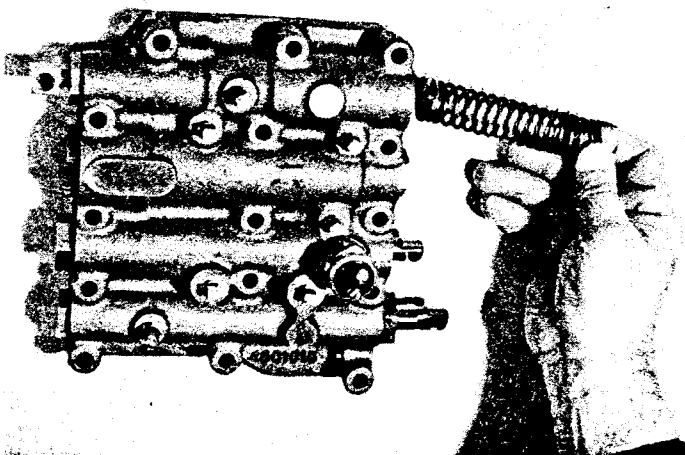


Fig. 98

Install the guide and return spring as shown.

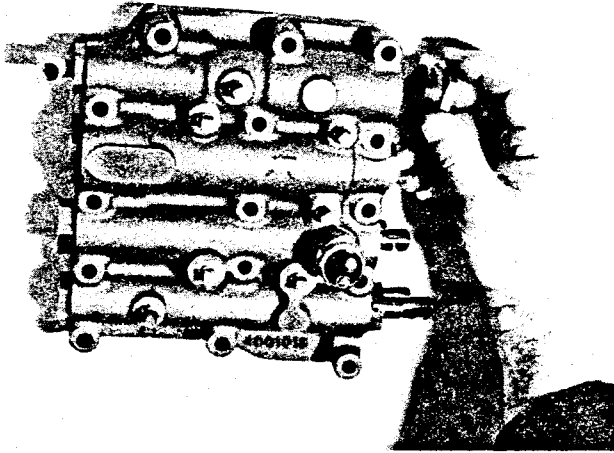


Fig. 99

Install the spring retainer plug with an "O"ring.

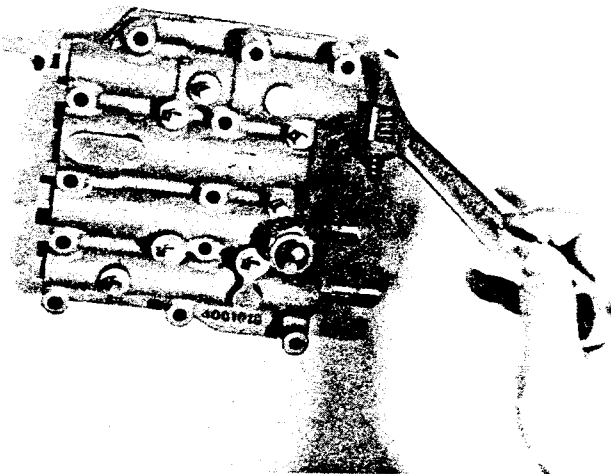


Fig. 100

Tighten the spring retainer plug as shown.

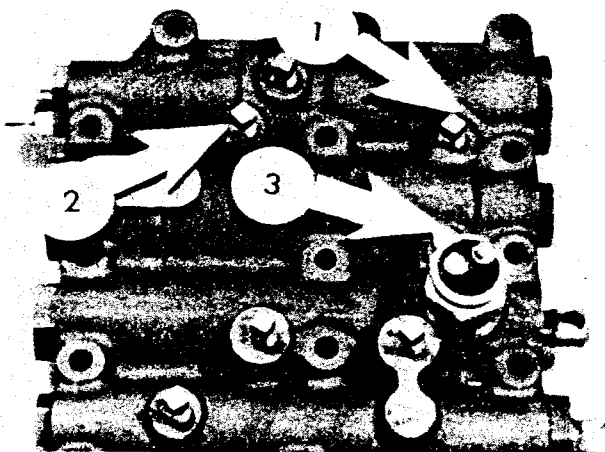


Fig. 101

This is the assembled valve with the brake cutoff showing the pressure check points.

1. Primary Pump
2. Clutch Pack
3. Converter

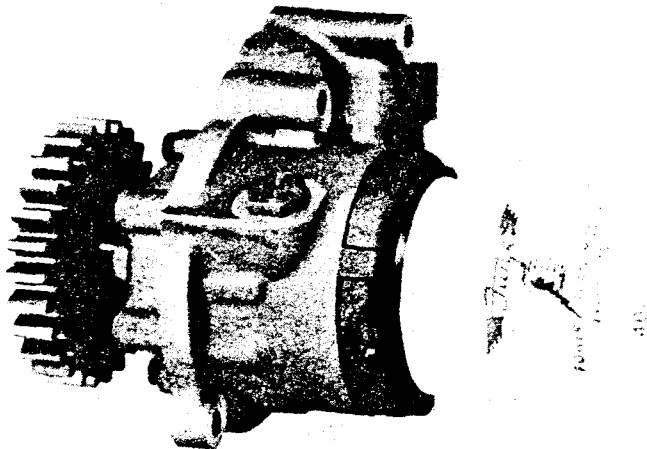


Fig. 102

This is the Transmission mounted pump. Assembly instructions will be from figure 103 thru figure 121.

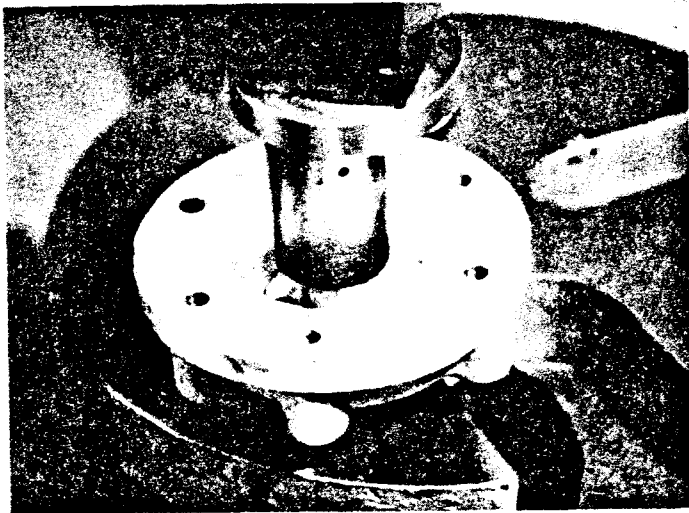


Fig. 103

Press the bushing into the retainer. Be careful not to damage the bushing.

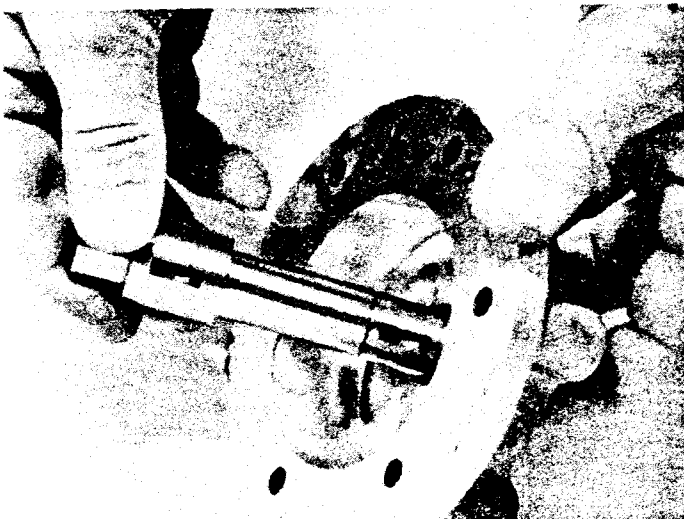


Fig. 104

Install the pump drive shaft into the retainer.

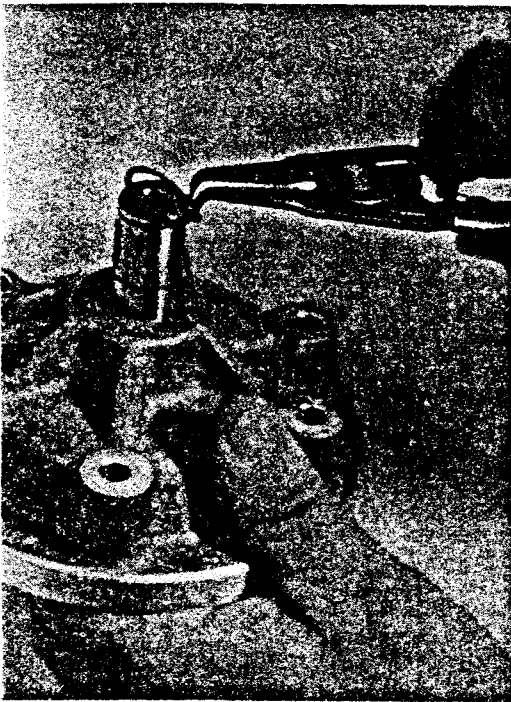


Fig. 105

Install the inner snap ring onto the pump drive shaft.



Fig. 106

Insert the woodruff key into the pump drive shaft. It may be necessary to tap the key slightly with a hammer to insure the woodruff key is seated into the shaft.

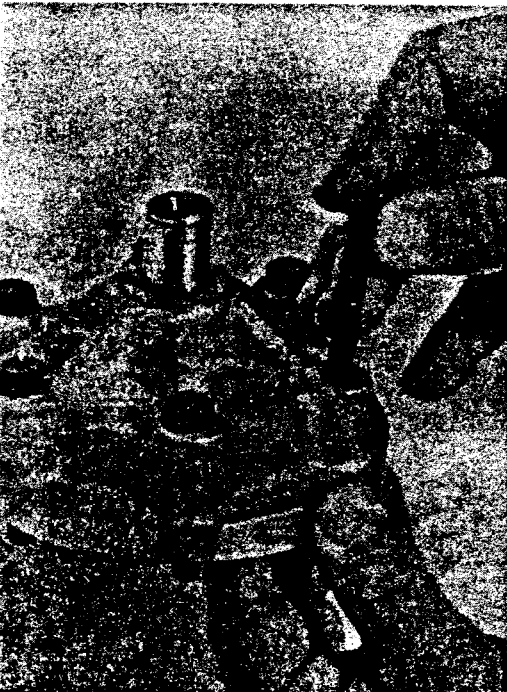


Fig. 107

Insert the mounting capscrews into the retainer before gear is installed.

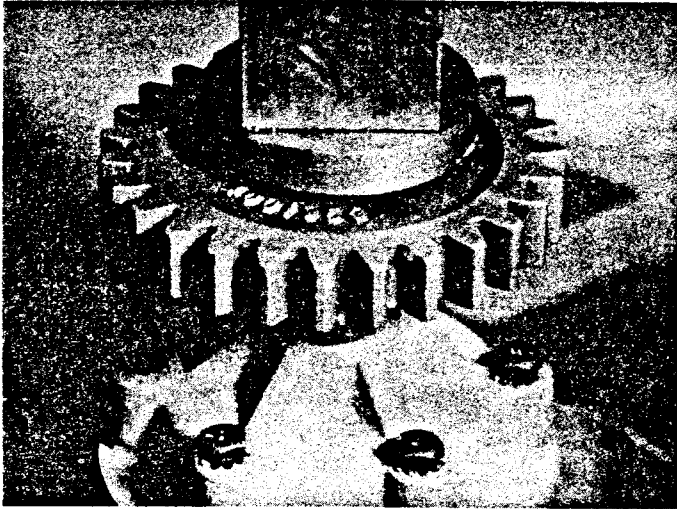


Fig. 108

Align the pump drive gear on pump drive shaft. Make certain the key way in the drive gear is aligned with the woodruff key on the drive shaft. Press gear onto the shaft, seating the gear down onto the inner snap ring.

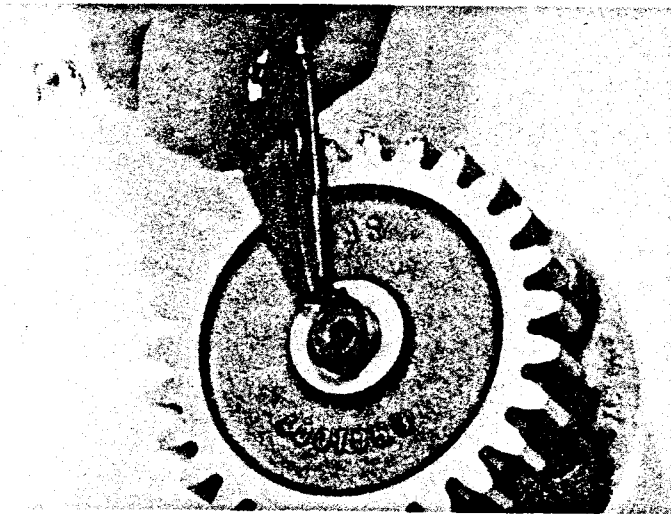


Fig. 109

Install the outer snap ring on the pump drive shaft.

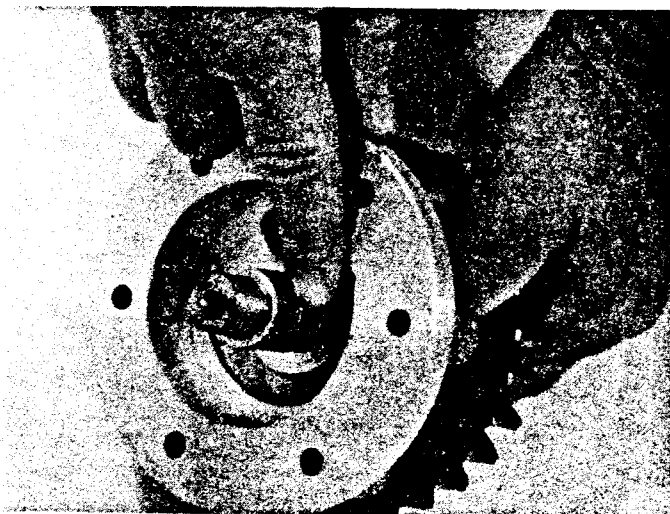


Fig. 110

Install the woodruff key on the drive shaft inside of retainer for geroter.

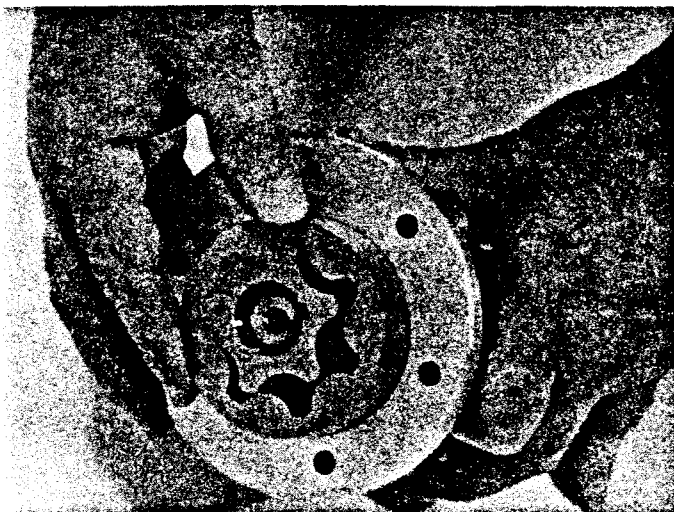


Fig. 111

Align the geroter with the woodruff key and install on shaft.

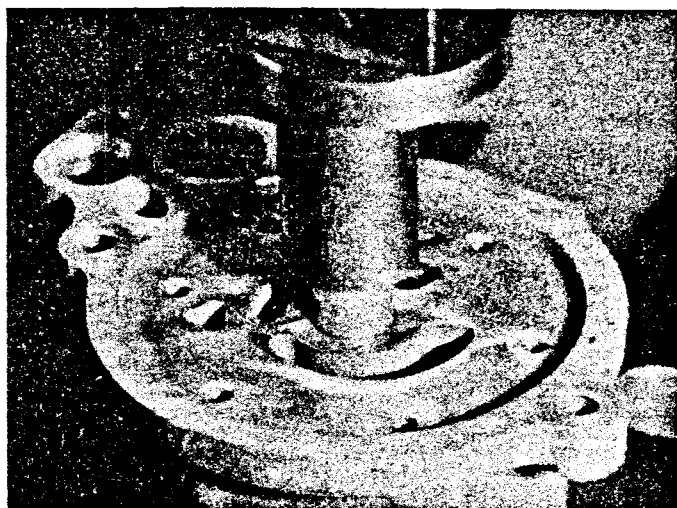


Fig. 112

Press the bushing onto the oil filter manifold being careful not to damage the bushing.

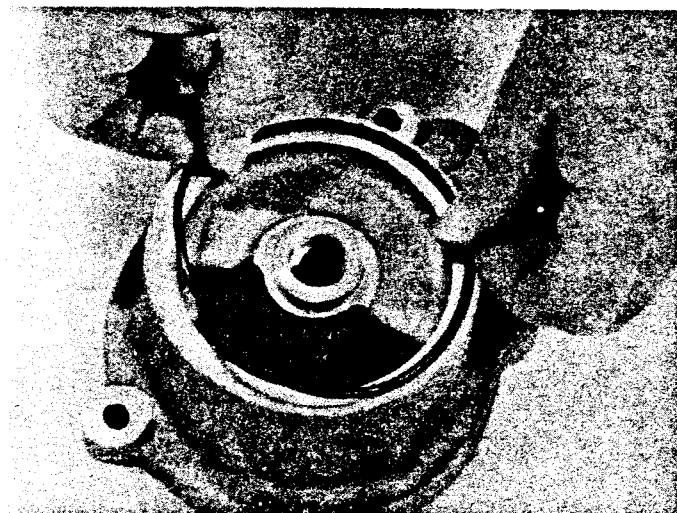


Fig. 113

Turn the oil filter manifold over and install the "O"ring.

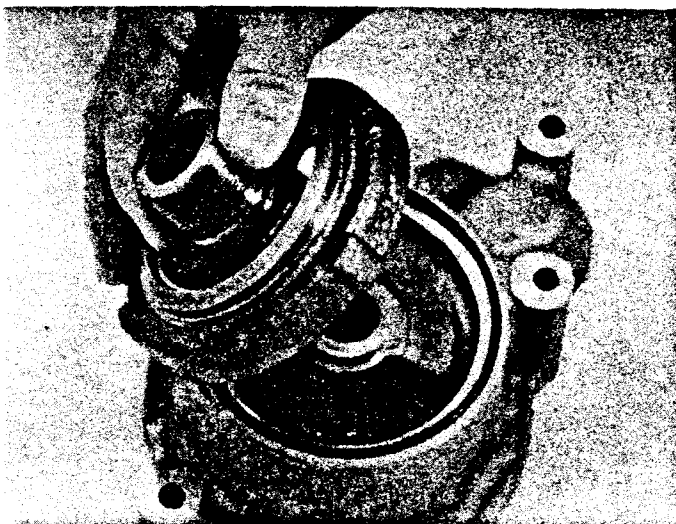


Fig. 114

Install filter spin on the adapter plate and tighteh.

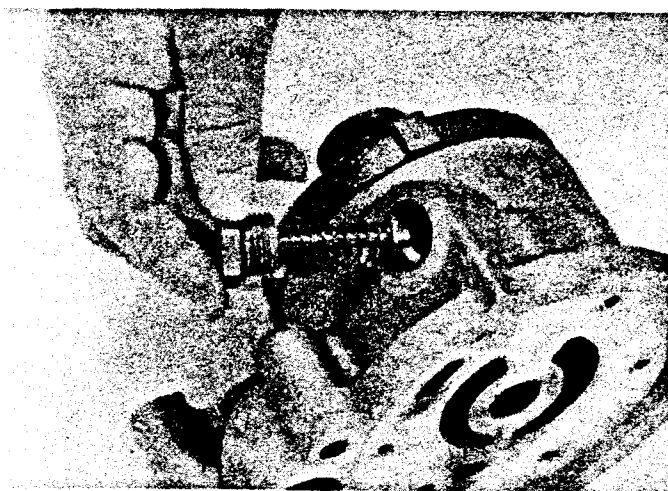


Fig. 115

Install the "O"ring on the filter bypass valve, install and tighten.

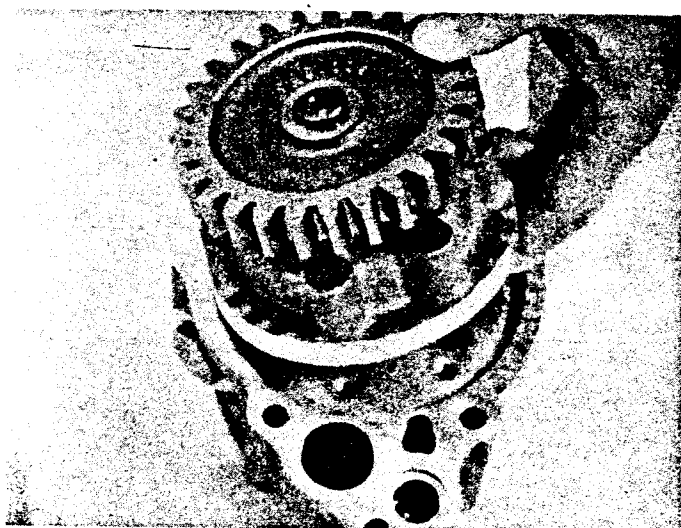


Fig. 116

Align the bolts and install the retainer onto the oil filter manifold. Make sure the retainer seats into the manifold.

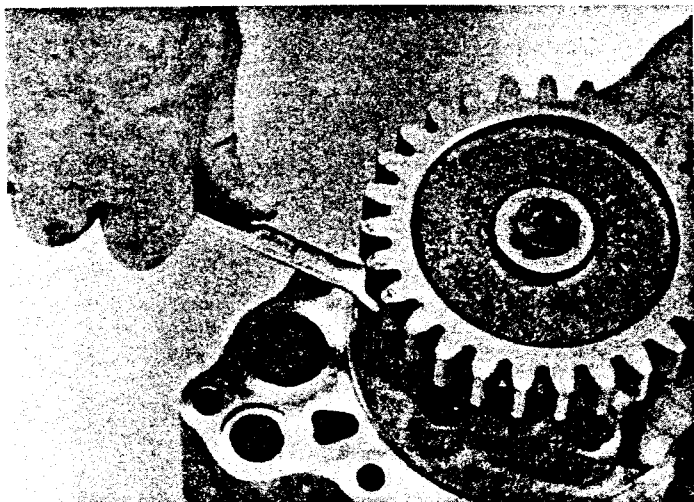


Fig. 117

Tighten the capscrews using a criss cross pattern. This will insure the retainer is seated into the oil filter manifold.

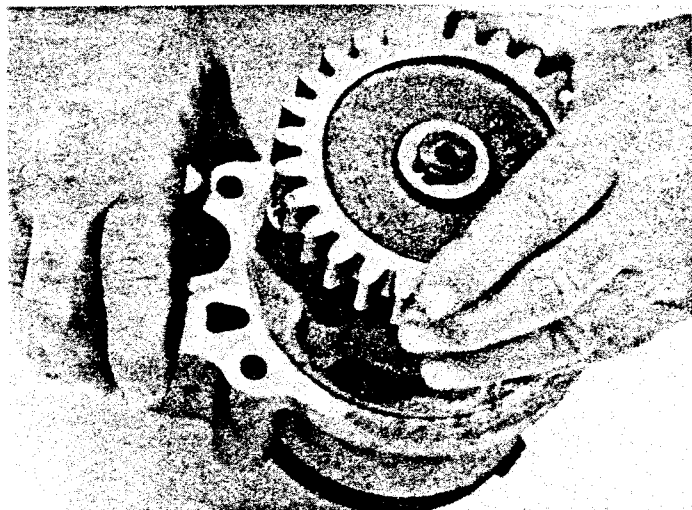


Fig. 118

After the capscrews are tightened, rotate the pump drive gear to be sure the pump will rotate freely.

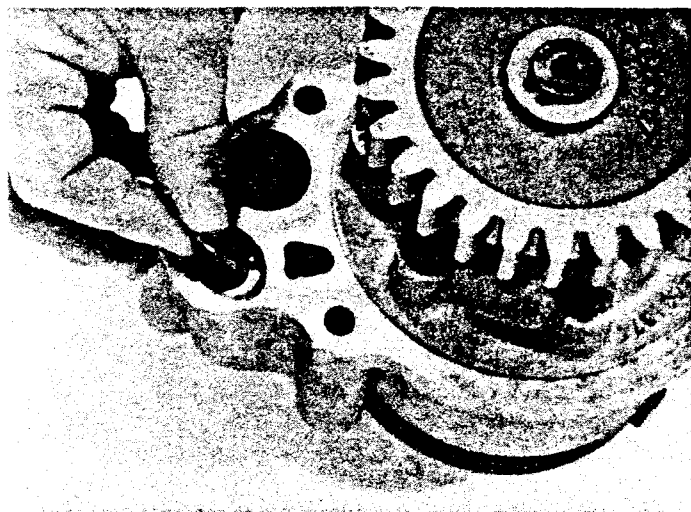


Fig. 119

Apply a flim of clean grease on the "O"ring and install into the pump drive intake port.

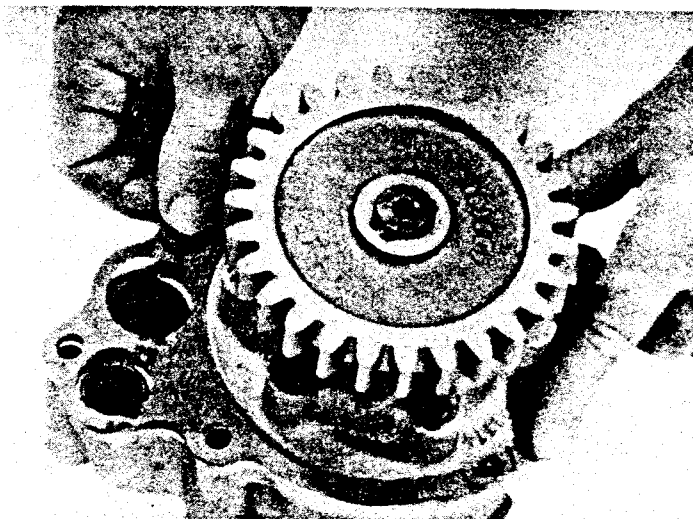


Fig. 120

Apply a light film of grease on the manifold gasket and install.

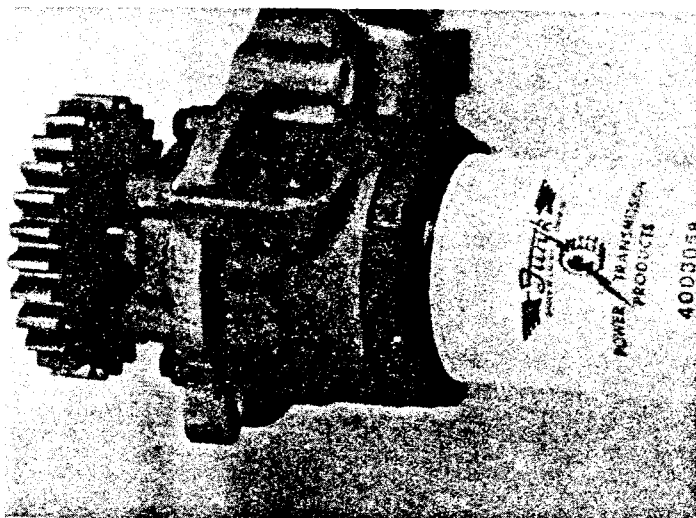


Fig. 121

This is the completed assembled transmission mounted pump with the spin on filter.

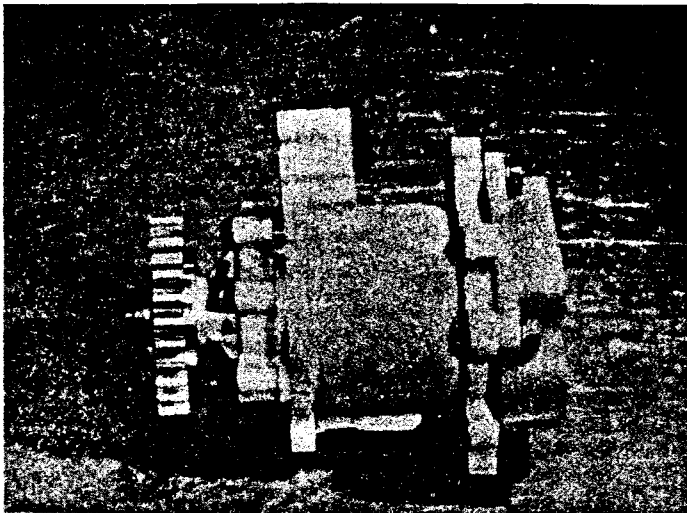


Fig. 122

Assembly instructions for the primary pump with auxiliary drive will be from figure 123 thru figure 145.

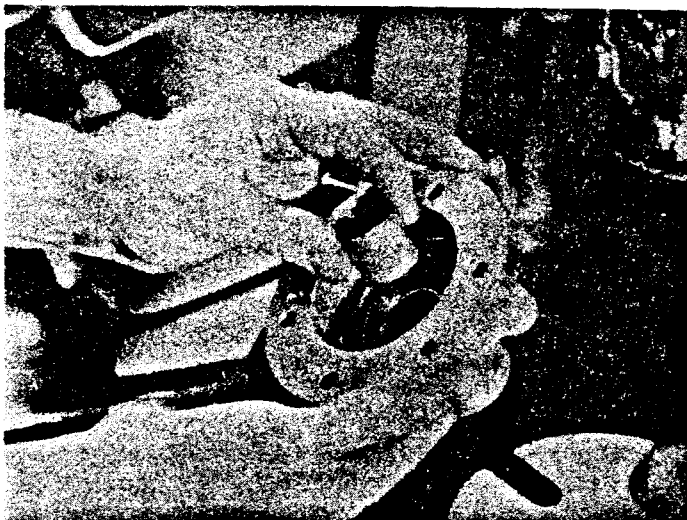


Fig. 123

Install the bushing in the pump retainer.



Fig. 124

Press the bushing into the retainer. Be careful not to damage the bushing.

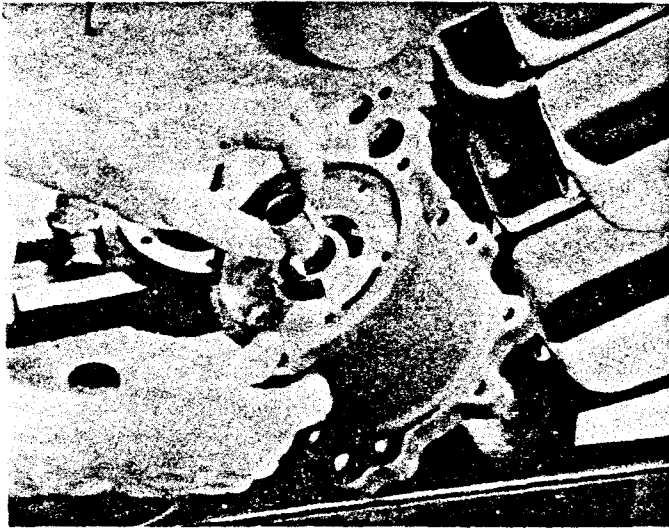


Fig. 125

Install the bushing in the main housing.

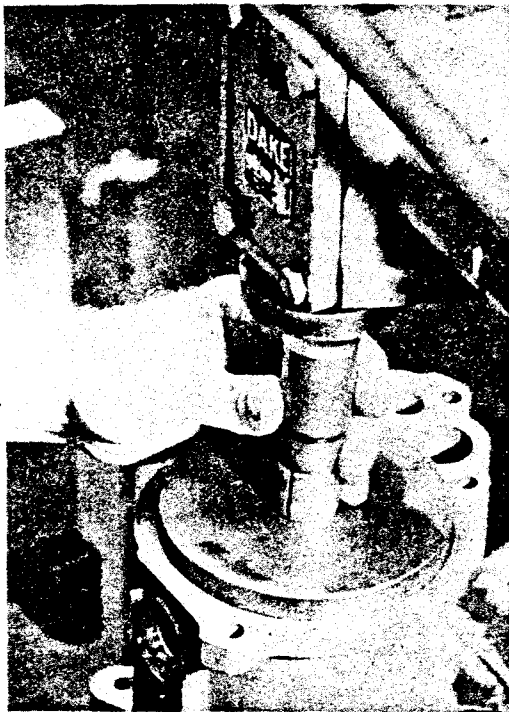


Fig. 126

Press the bushing into the main housing. Be careful not to damage the bushing.



Fig. 127

Install the thrust washer on the drive shaft.



Fig.128

Install the drive shaft with the thrust washer as shown.

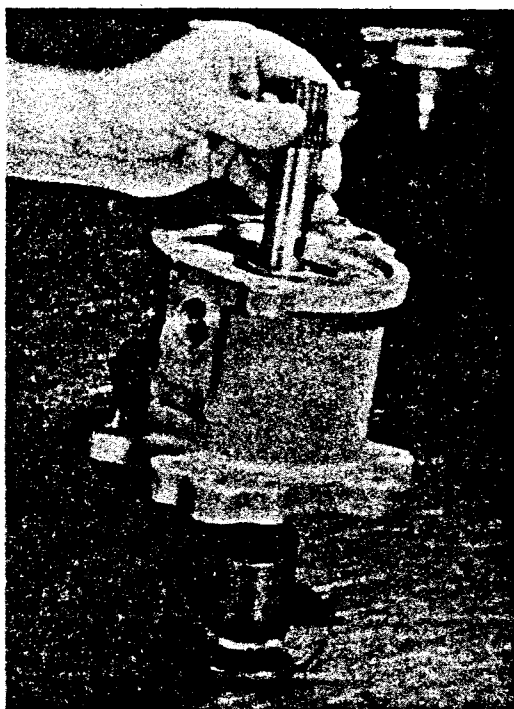


Fig.129

Set the main housing with the drive shaft installed, on a spacer block as shown. This will hold the shaft in place during assembly.

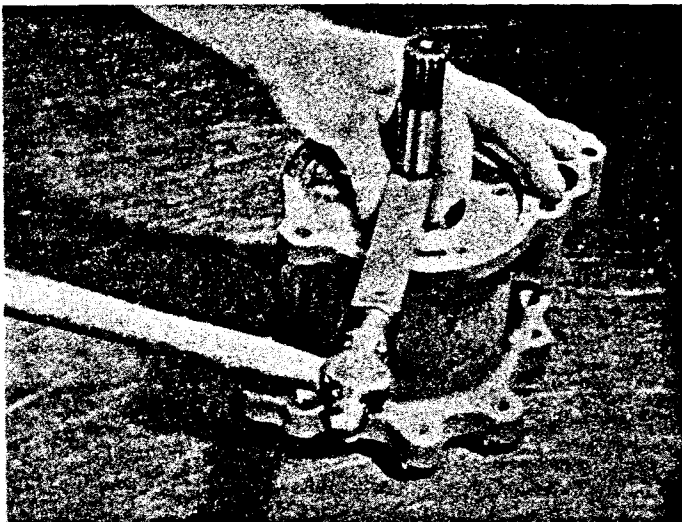


Fig. 130

Place the woodruff key in the shaft and drive the key in the shaft as shown.

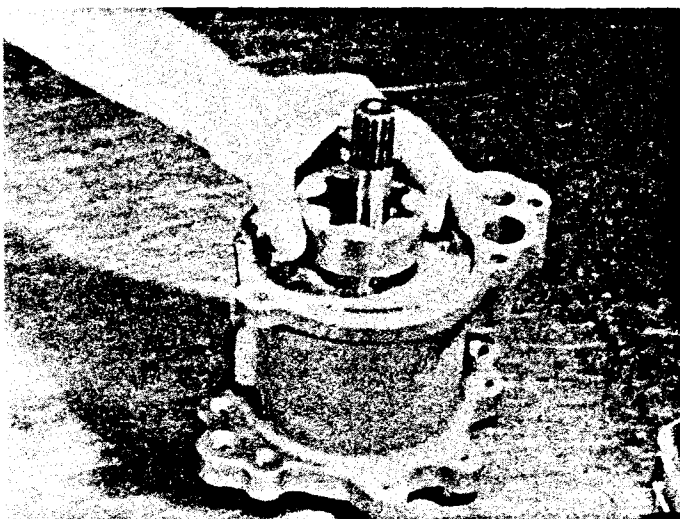


Fig. 131

Align the geroter with the woodruff key and install on shaft as shown.

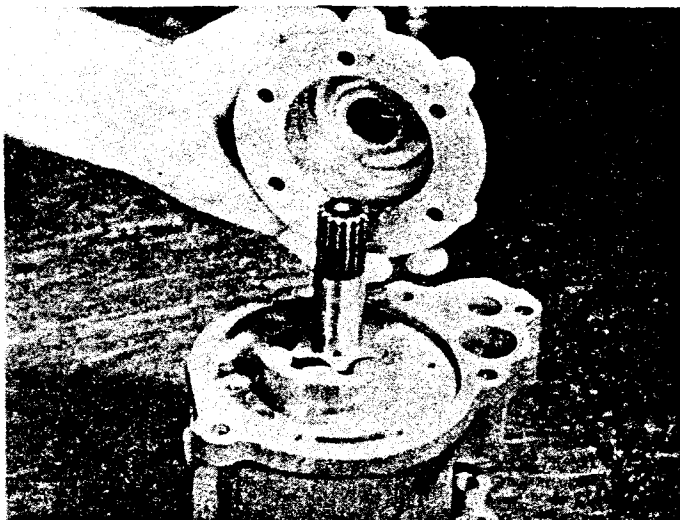


Fig. 132

Install the pump retainer on the main housing.

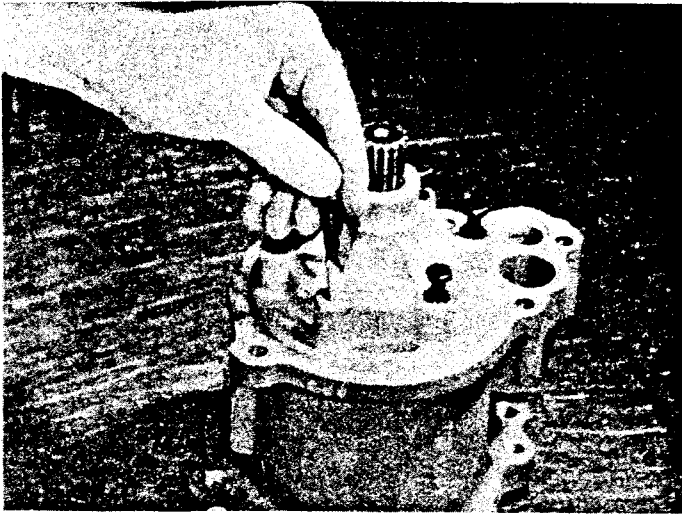


Fig. 133

Align the bolt holes. Apply teflon thread sealer on the capscrews and tighten.

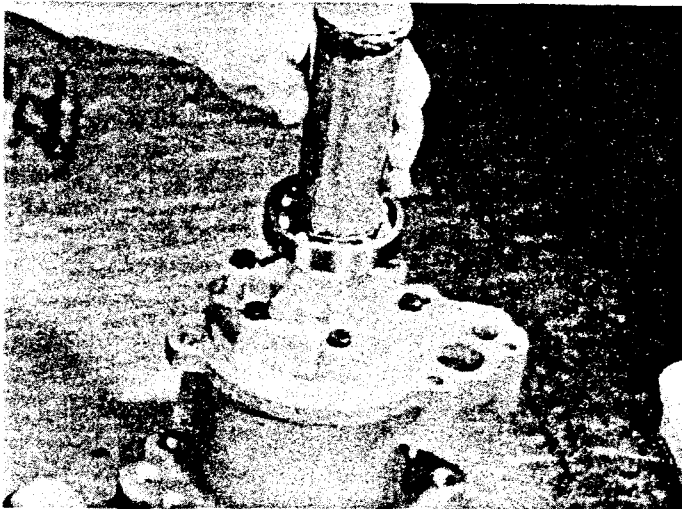


Fig. 134

Install the bearing on the retainer and drive the bearing down.

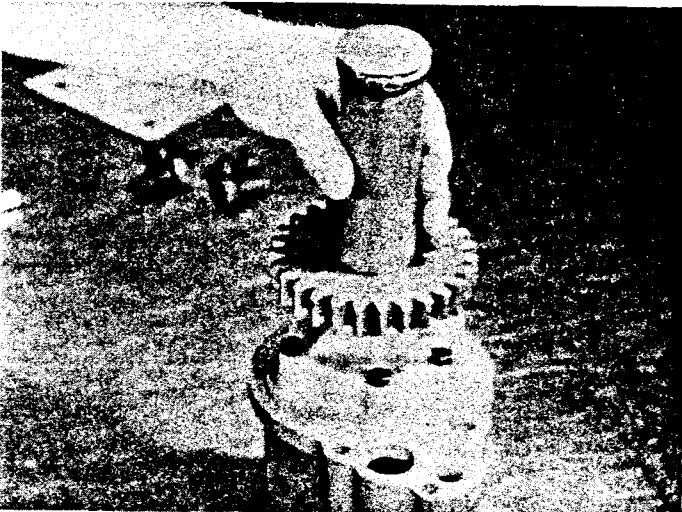


Fig. 135

Align the drive gear and press onto the bearing as shown.



Fig. 136

Install the snap ring on the shaft as shown.

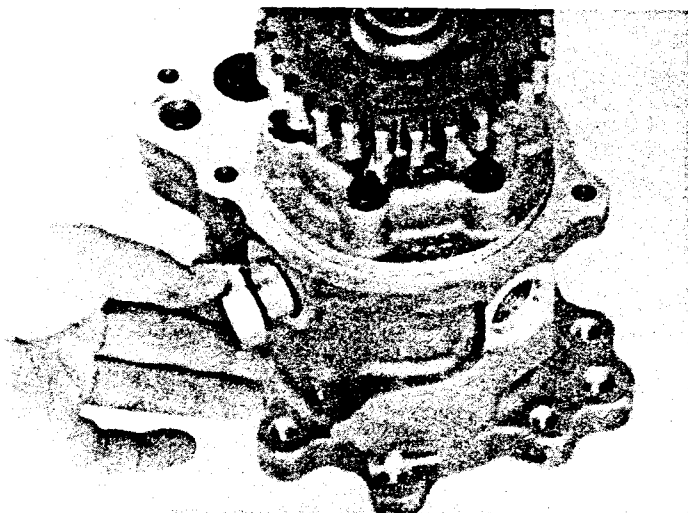


Fig. 137

Install the plug with the "O"ring in the pump bore as shown. Tighten the plug.

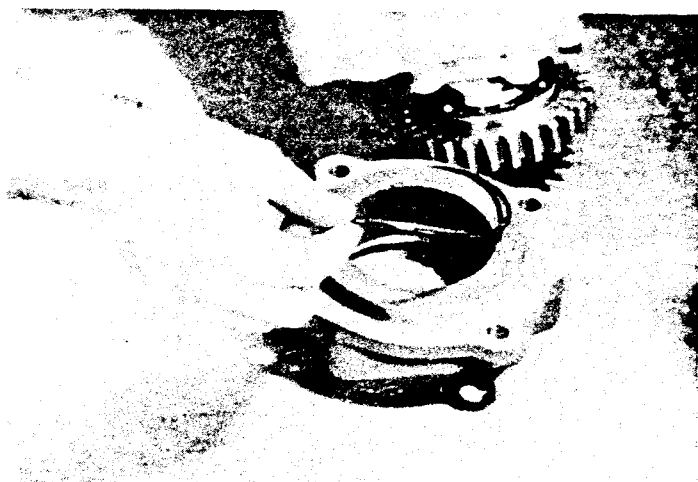


Fig. 138

Install the "O"ring on the pump adapter plate.

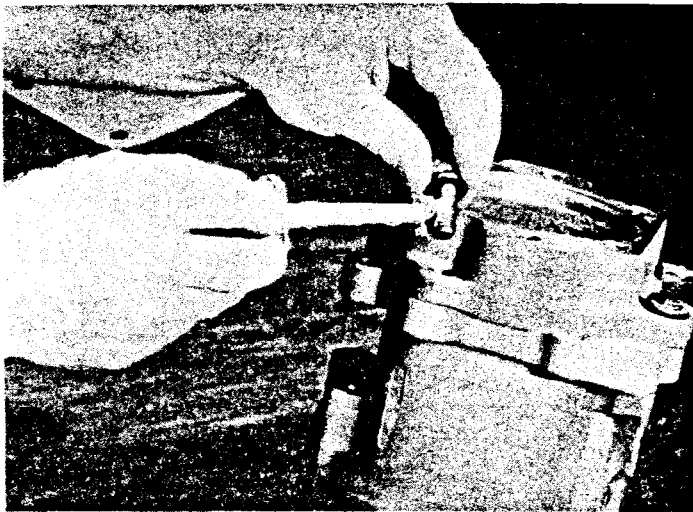


Fig. 139

Install the adapter plate onto the main housing. Align the bolts holes. Apply teflon thread sealer to the capscrews. Install and tighten.

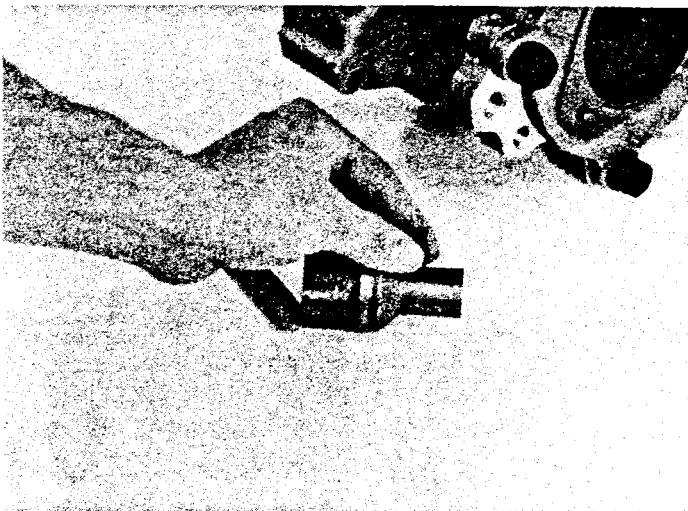


Fig. 140

Install the roll pin in the pump coupling shaft as shown.

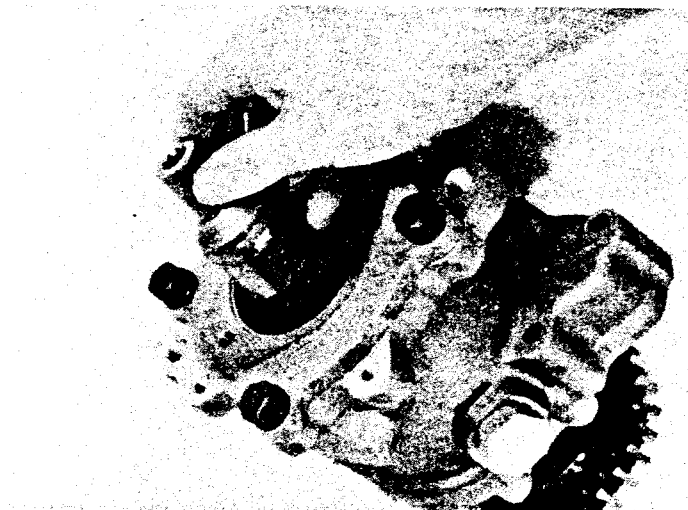


Fig. 141

Install the pump coupling shaft as shown.

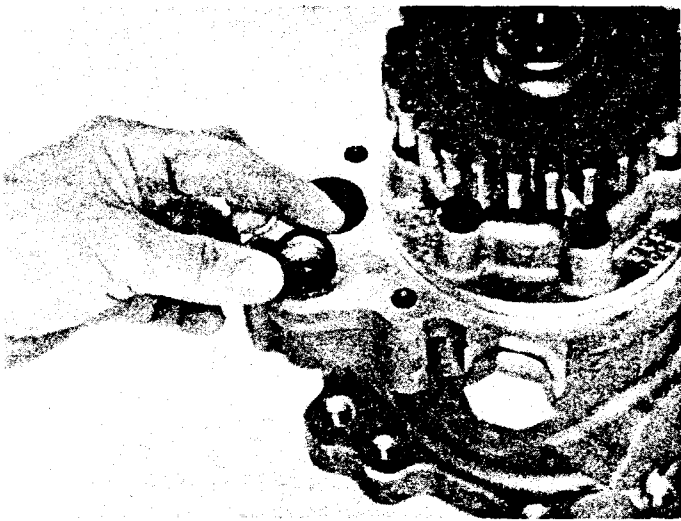


Fig. 142

Turn the pump over. Apply a thin coat of clean grease on the "O"ring and install as shown.

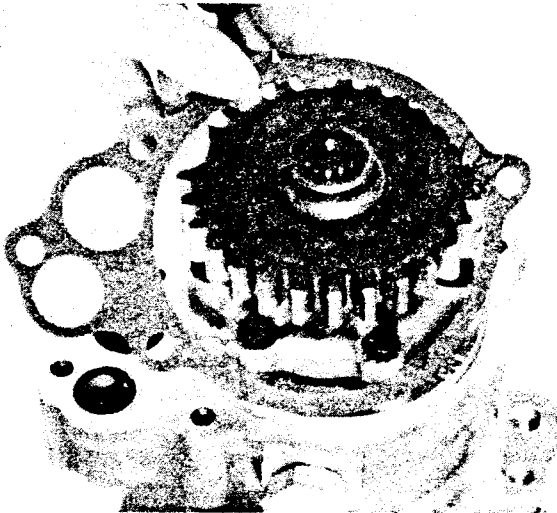


Fig. 143

Install the gasket dry as shown.

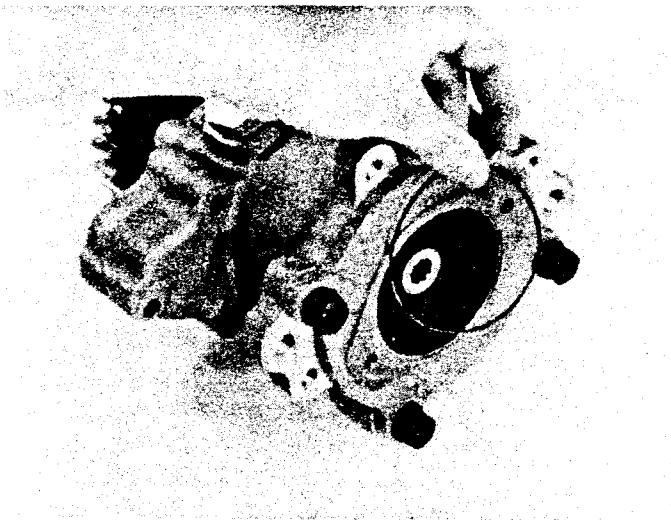


Fig. 144

After the pump is installed onto the transmission, install the "O"ring in place as shown, between the primary and auxiliary pump.

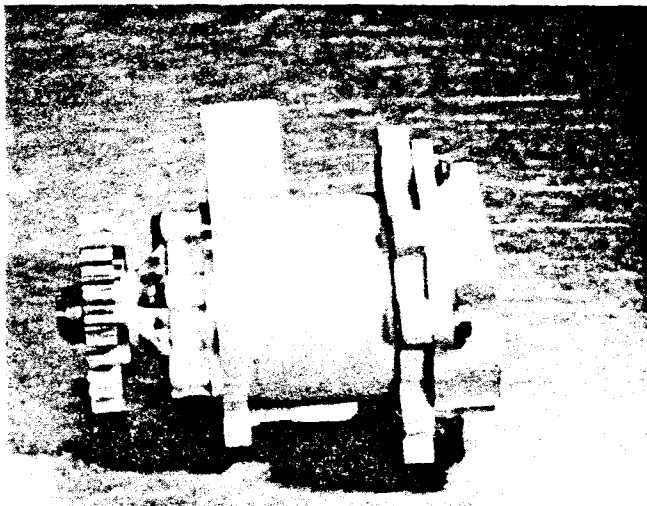


Fig. 145

This is the complete assembled primary pump with auxiliary drive.

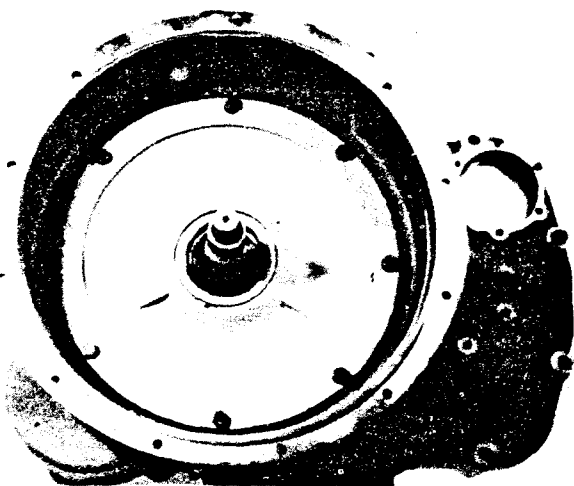


Fig. 146

This is the front cover ready for assembly. Assembly instructions will be from figure 147 thru 183.

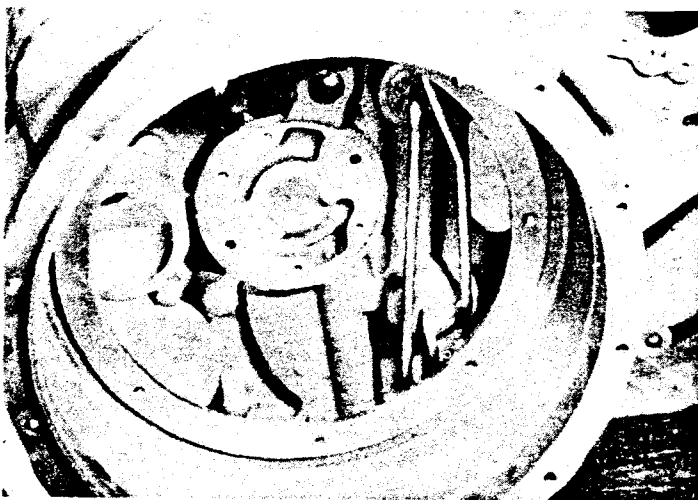


Fig. 147

The front cover is used on the 9" short drop, the long 18" drop and also the midship mounted transmission.

NOTE: The oil tubes are not a repairable item and should not be removed at any time. To do so will ruin the front cover.



Fig. 148

Turn the front cover over with the flywheel housing down. Install the converter regulator bypass valve in the 1" N.P.T. hole.

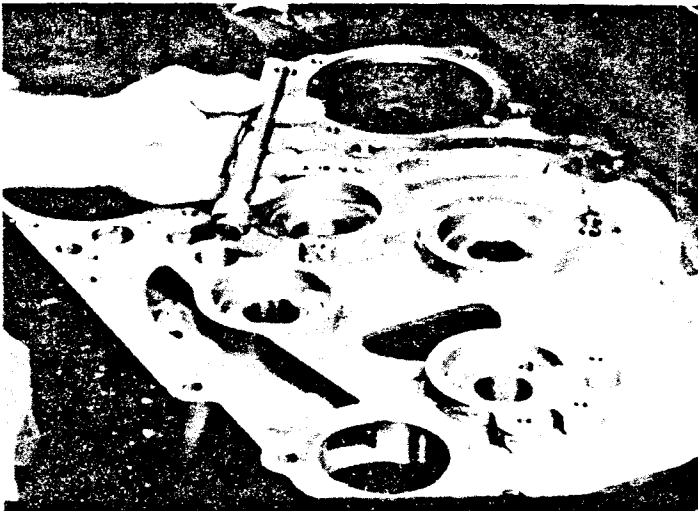


Fig. 149

Use bearing driver that fits the shoulder of the converter regulator bypass valve. Make certain when seating the valve not to damage it. It will drive in with a hammer.



Fig. 150

Apply a small amount of thread sealer on the 1" N.P.T. hex plug. Install and tighten.

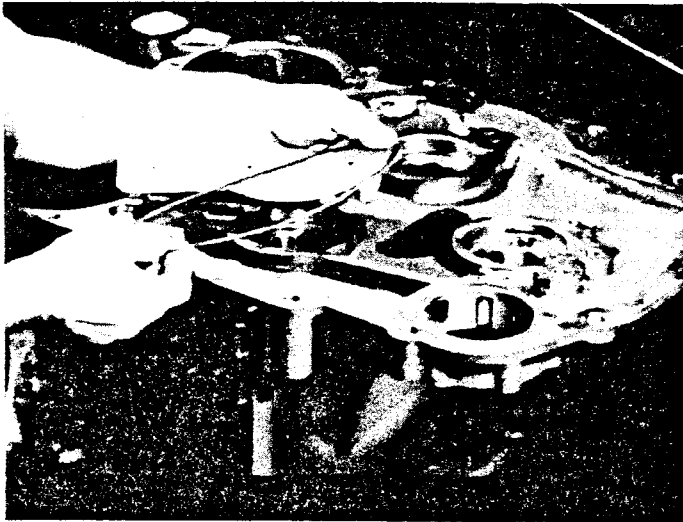


Fig. 151

Apply a good grade of grease on the "O"ring and install on the oil passage cover plate.

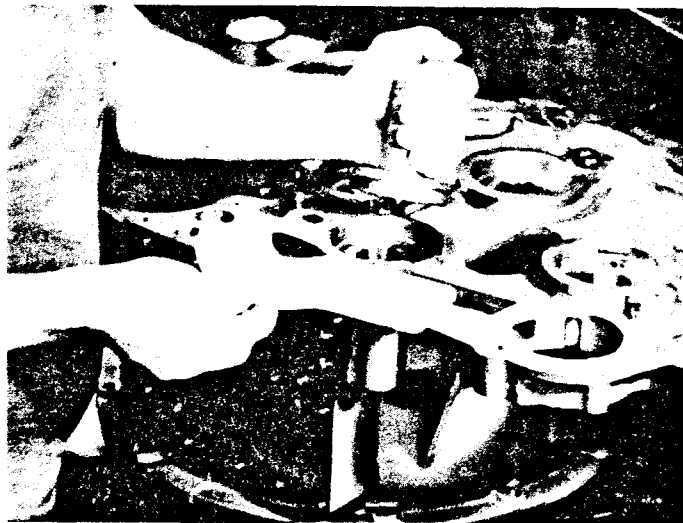


Fig. 152

When installing the oil passage cover plate, make certain the plate and "O"ring do not interfere with the bearing race hole.



Fig. 153

Apply thread sealer on the flat socket hex-headed capscrews and tighten. Make sure the "O"ring is in the groove on the oil passage plate.



Fig. 154

Install the bearing cups.



Fig. 155

Drive the bearing cups in the front cover. Be careful no to damage the bearing cups.



Fig. 156

Install the snap ring retainer in the auxiliary pump shaft bearing hole.

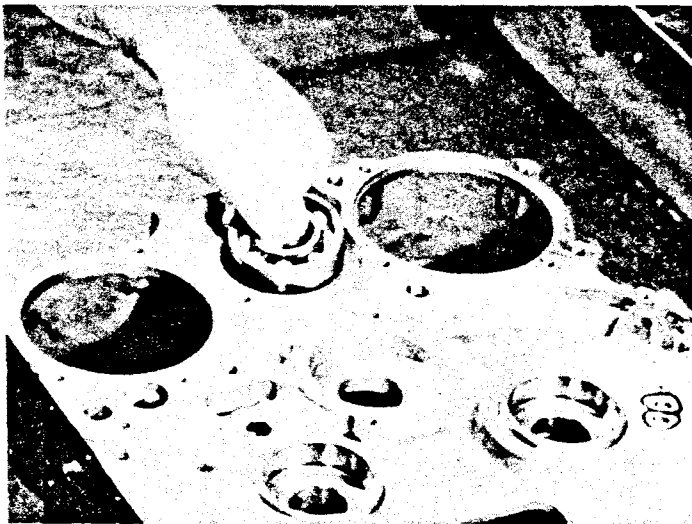


Fig. 157

Install the auxiliary pump shaft bearing.



Fig. 158

Use a good type of bearing driver and drive in the auxiliary pump shaft bearing.

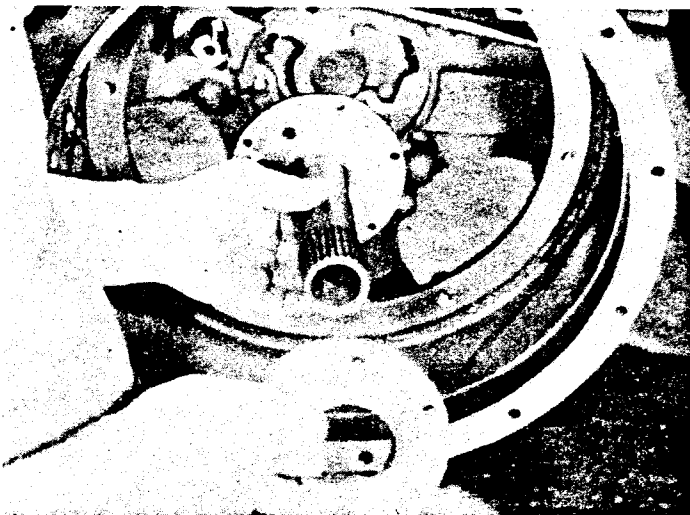


Fig. 159

Install the stator tube and cover plate. The stator tube and cover plate will only line up with the bolt holes one way. Torque the capscrews to 17 ft. lbs.

NOTE: See SAE grade 5 torque chart.