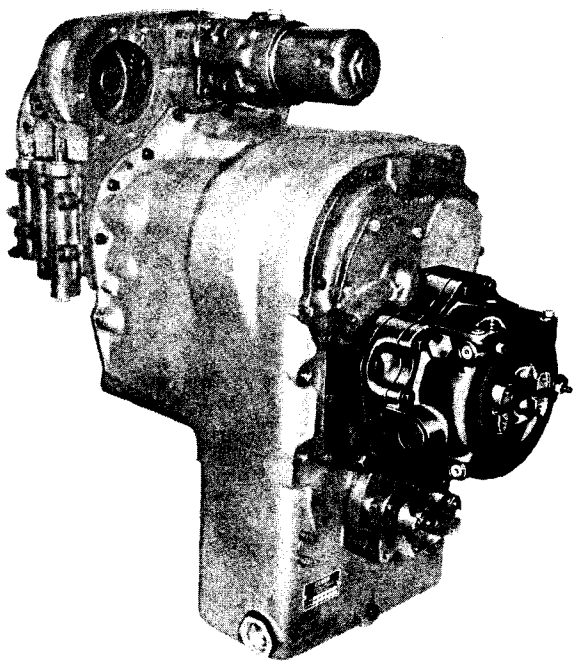
CLARK

TRANSMISSION

MAINTENANCE
&
SERVICE MANUAL



28000 SERIES
TRANSMISSION MOUNTED HYDRAULIC BRAKE

CLARK Components Division

SMS-HB280 REV. 8-81

FOREWORD

This manual has been prepared to provide the customer and the maintenance personnel with information and instructions on the maintenance and repair of the **CLARK** Power Shift Transmission.

Extreme care has been exercised in the design, selection of materials and manufacturing of these units. The slight outlay in personal attention and cost required to provide regular and proper lubrication, inspection at stated intervals, and such adjustments as may be indicated will be reimbursed many times in low cost operation and trouble free service.

In order to become familiar with the various parts of the transmission, its principal of operation, trouble shooting and adjustments, it is urged that the mechanic study the instructions in this manual carefully and use it as a reference when performing maintenance and repair operations.

Whenever repair or replacement of component parts is required, only Clark-approved parts as listed in the applicable parts manual should be used. Use of "will-fit" or non-approved parts may endanger proper operation and performance of the equipment. The Clark Equipment Company does not warrant repair or replacement parts, nor failures resulting from the use thereof, which are not supplied by or approved by the Clark Equipment Company. IMPORTANT: **Always furnish the Distributor with the transmission serial and model number when ordering parts.**

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FUNCTION OF THE TRANSMISSION MOUNTED HYDRAULIC BRAKE

The transmission mounted hydraulic brake is designed for the most part to be used on rough terrain vehicles. The hydraulic brake mounted on the transmission is used as the main braking source in log skidder applications where wheel brakes are not practical.

The transmission mounted hydraulic brake consists of an internally splined housing bolted to an adaptor plate that is bolted directly to the transmission case. A brake disc hub is splined to the idler shaft and also has splines on the outer diameter. This hub is free to turn until brake pressure is applied.

Steel discs with splines on the outer diameter are alternated with frictional discs having splines on the inner diameter.

The steel disc splined in the brake housing cannot turn, but are free to move in or out. The frictional discs splined to the hub on the idler shaft may turn in either direction or may increase or decrease in speed depending on the operator's discretion. The frictional discs are also free to move in or out.

The brake system has a positive displacement of fluid from the master cylinder to the three brake actuating pistons.

The cooling of the clutch disc brake is accomplished by return oil from the cooler plumbed to the brake disc compartment with a tee fitting.

When the brake is applied, pressure behind the pistons forces a heavy end plate to overcome the return spring pressure. The steel discs (splined in the stationary housing) are compressed against the friction discs (splined on and turning with the idler shaft). As more brake pressure is applied the discs are compressed tighter until the idler shaft is stopped. The output shaft which is geared directly to the idler shaft is also stopped.

As the brake is engaged, brake pressure overcomes a spring loaded brake valve spool and moves the brake spool open allowing a 70% volume of return oil to cool the brake discs. The volume of return oil remaining is directed to the lube distributor and is sufficient to cool and lube the transmission.

When the brake is released, return springs push the end plate and pistons to a neutral position allowing the inner and outer discs to separate. The friction disc and idler shaft is now free to turn.

When the brake is disengaged the spring loaded brake valve spool is closed allowing a 20% volume of return oil to cool the brake disc, the remaining oil is directed to the lube distributor.

The transmission mounted hydraulic brake can also be used as a parking brake. It is actuated by a hand brake lever and linkage to a shaft on the side of the brake housing. The shaft is connected internally to a yoke. When the hand brake lever is set, the yoke presses against the heavy end plate and compresses the inner and outer clutch brake discs, thus making the idler shaft immobile.

When the hand brake lever is released the yoke moves away from the end plate allowing the return springs to move the end plate away from the discs. The friction disc and idler shaft is now free to turn.

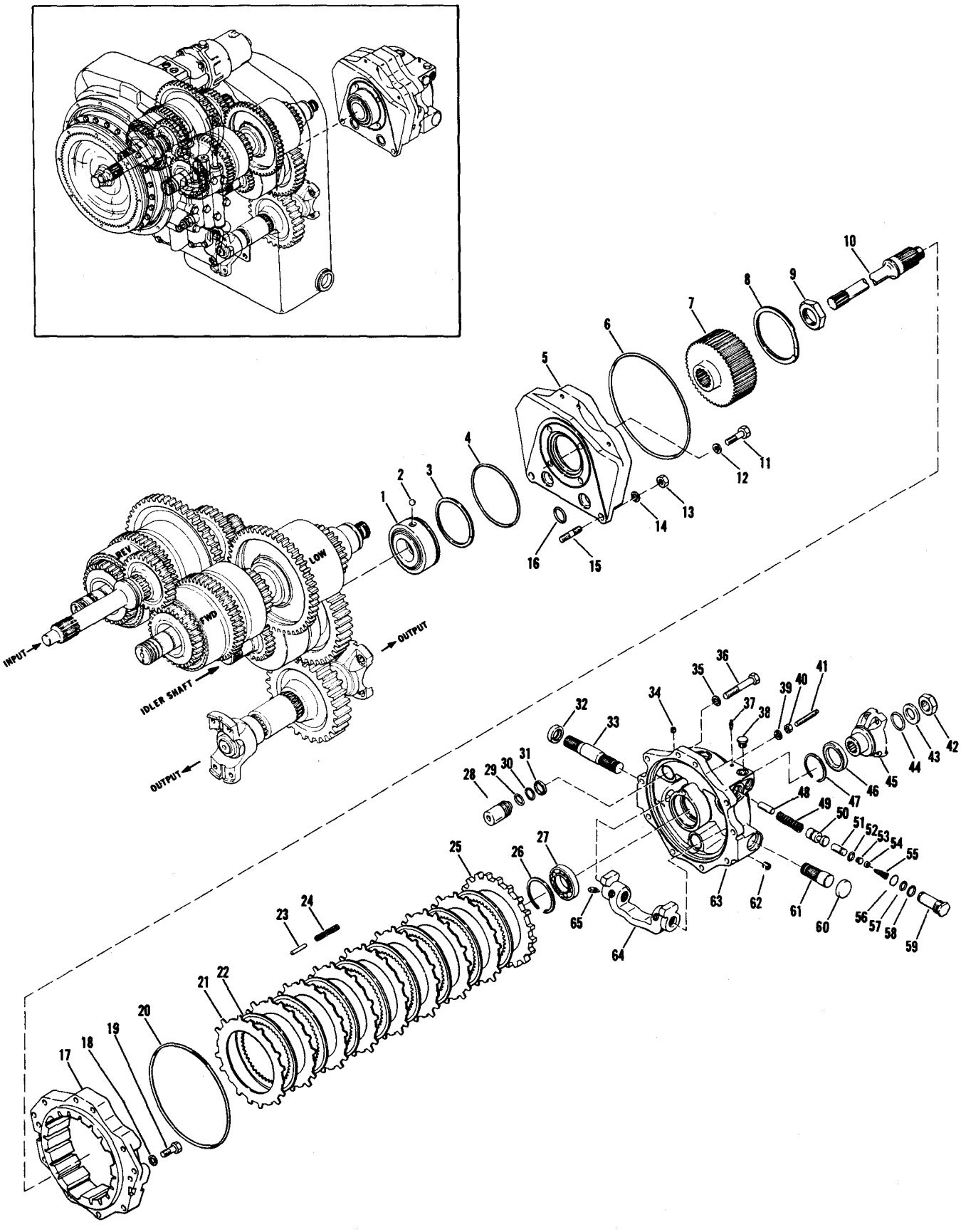


FIGURE A
28000 SERIES TRANSMISSION MOUNTED HYDRAULIC BRAKE
(WITH UNIDIRECTIONAL P.T.O.)

28000 SERIES TRANSMISSION MOUNTED HYDRAULIC BRAKE (WITH UNIDIRECTIONAL P.T.O.)

Item	Description	Qty.
1	Idler Shaft Rear Bearing	1
2	Rear Bearing Lock Ball	1
3	Rear Bearing Locating Ring	1
4	Brake Housing Adaptor O-Ring	1
5	Brake Housing Adaptor	1
6	Brake Disc Housing to Adaptor O-Ring	1
7	Brake Disc Hub	1
8	Oil Baffle Ring	1
9	Disc Hub Retainer Nut	1
10	P.T.O. Shaft	1
11	Adaptor to Transmission Case Place Bolt	4
12	Adaptor to Transmission Case Place Bolt Lockwasher	4
13	Adaptor to Transmission Case Stud Nut	2
14	Adaptor to Transmission Case Stud Nut Lockwasher	2
15	Adaptor to Transmission Case Stud	2
16	Adaptor to Case O-Ring	2
17	Brake Disc Housing	1
18	Brake Disc Housing to Adaptor Bolt Lockwasher	2
19	Brake Disc Housing to Adaptor Bolt	2
20	Brake Cover to Disc Housing O-Ring	1
21	Brake Outer Disc	8
22	Brake Inner Disc	8
23	Return Spring Pin	6
24	Return Spring	6
25	End Plate	1
26	P.T.O. Shaft Rear Bearing Retainer Ring	1
27	P.T.O. Shaft Rear Bearing	1
28	Brake Piston	3
29	Piston O-Ring	3
30	Piston O-Ring	3
31	Piston Glyd Ring	3
32	Brake Operating Shaft Oil Seal	1
33	Brake Operating Shaft	1
34	Brake Housing Plug	1
35	Brake Cover to Disc Housing Bolt Lockwasher	10
36	Brake Cover to Disc Housing Bolt	10
37	Bleeder Screw	1
38	Brake Housing Plug	2
39	Brake Adjusting Screw Sealing Washer	1
40	Brake Adjusting Screw Lock Nut	1
41	Brake Adjusting Screw	1
42	P.T.O. Flange Nut	1
43	P.T.O. Flange Washer	1
44	P.T.O. Flange O-Ring	1
45	P.T.O. Flange	1
46	P.T.O. Flange Oil Seal	1
47	Oil Seal Locating Ring	1
48	Brake Valve Stop	1
49	Brake Valve Spring	1
50	Brake Valve Spool	1
51	Brake Valve Piston	1
52	Brake Valve Piston O-Ring	1
53	Sealing Cup	1
54	Spring Retainer Pin	1
55	Balance Spring	1
56	Piston Housing O-Ring	1
57	Piston Housing O-Ring	1
58	Piston Housing O-Ring	1
59	Piston Housing	1
60	Brake Housing Bore Plug	1
61	Brake Yoke Stub Shaft	1
62	Brake Housing Plug	1
63	Hydraulic Brake Cover	1
64	Brake Yoke	1
65	Brake Yoke Lock Screw	2

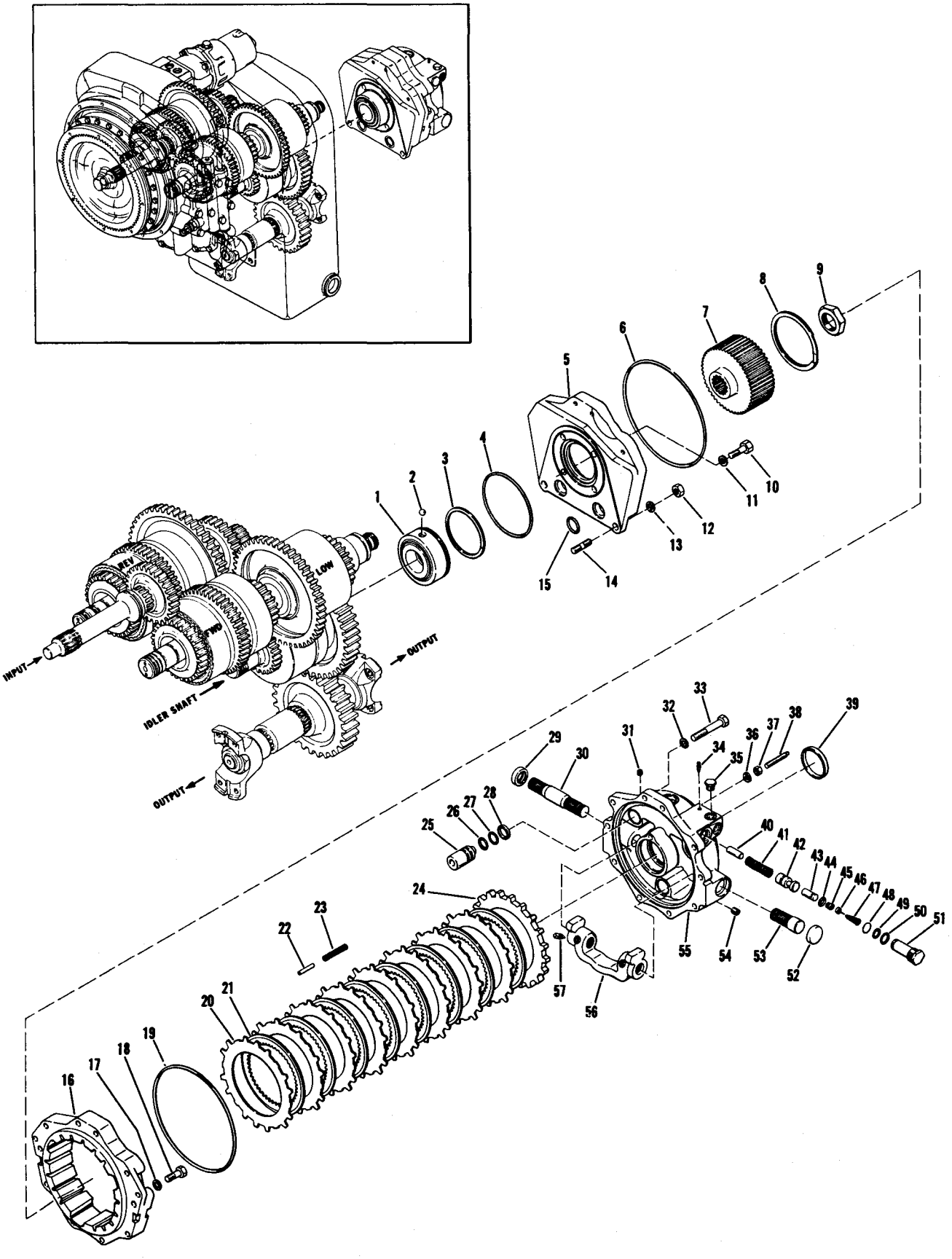


FIGURE B
28000 SERIES TRANSMISSION MOUNTED HYDRAULIC BRAKE
(LESS UNIDIRECTIONAL P.T.O.)

MAINTENANCE AND SERVICE

The instructions contained herein cover the disassembly and reassembly of the transmission mounted hydraulic brake. The unit shown has been removed from the machine and the brake is to be completely overhauled. If clearance will allow the brake can be repaired in the machine.

The brake assembly shown is a unit without unidirectional power take off. If a P.T.O. was used it is not necessary to remove the companion flange unless the hydraulic brake cover and valve assembly is to be replaced.

DISASSEMBLY

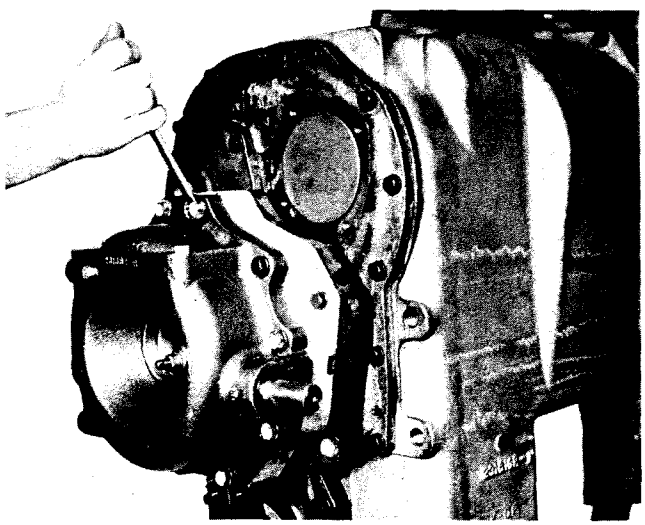


Figure 1
Remove the brake cover bolts evenly around the brake cover as the return springs will push the cover away from the disc housing.

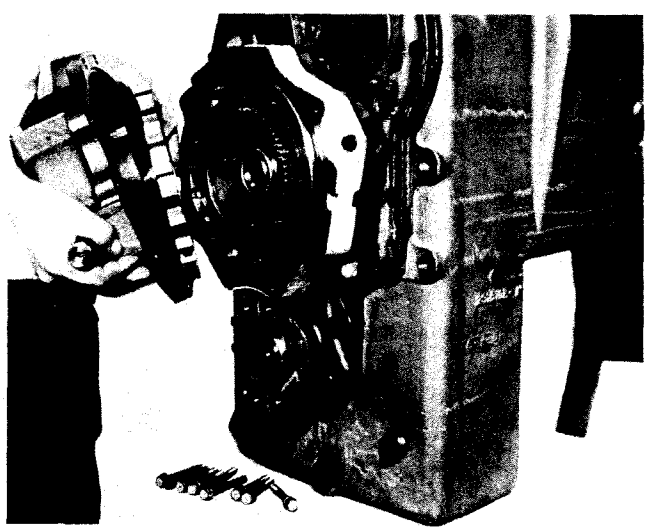


Figure 2
Remove brake cover assembly and end plate from disc housing.

NOTE: If P.T.O. is used pull cover straight out to remove P.T.O. shaft from idler shaft.

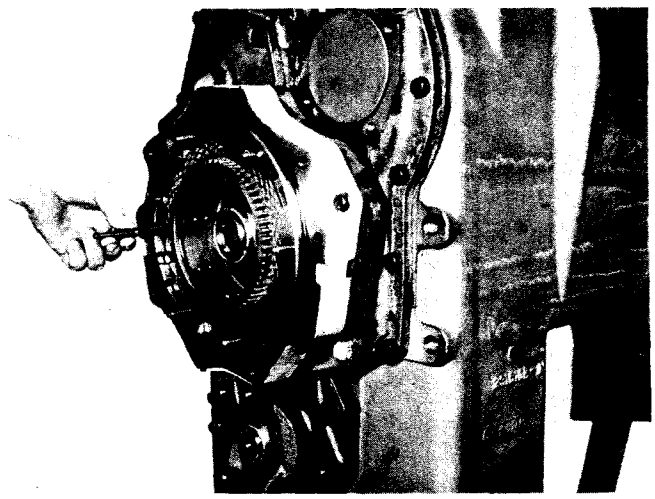


Figure 3
Remove return springs and pins from disc housing.

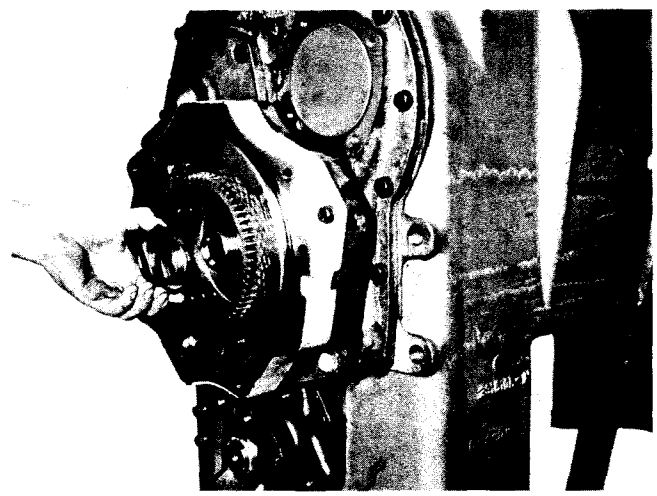


Figure 4
Secure output shaft to prevent turning and remove disc hub nut.

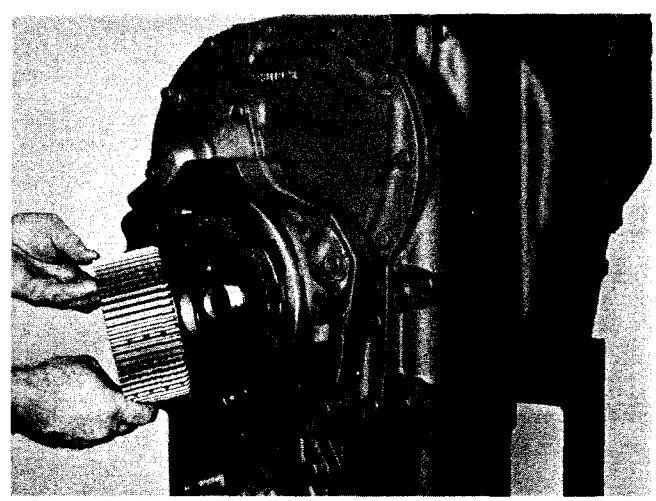


Figure 5
Remove disc hub.

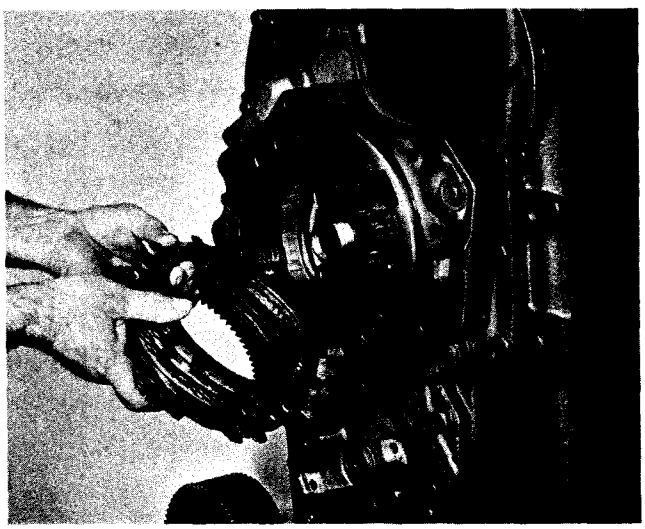


Figure 6
Remove the inner and outer brake disc.

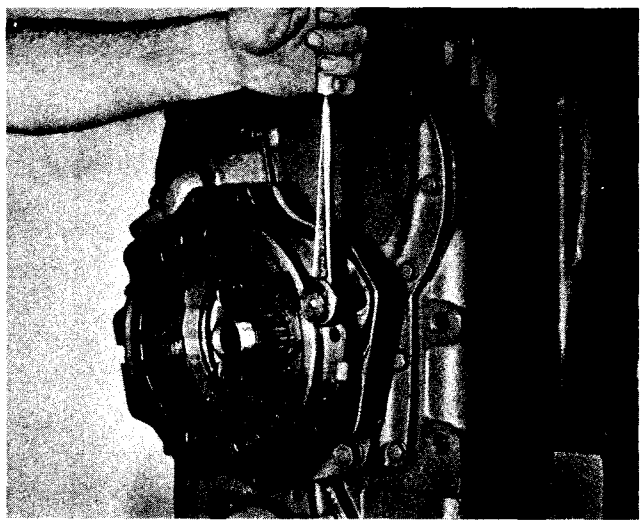


Figure 7
Remove the disc housing to adaptor plate bolts.

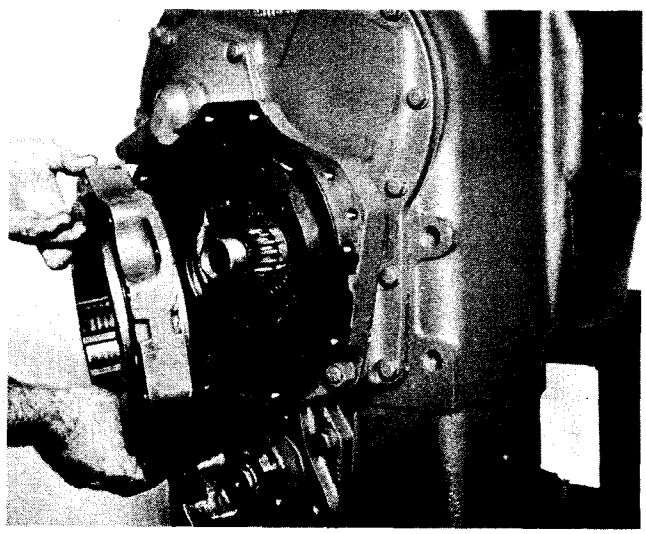


Figure 8
Remove disc housing.

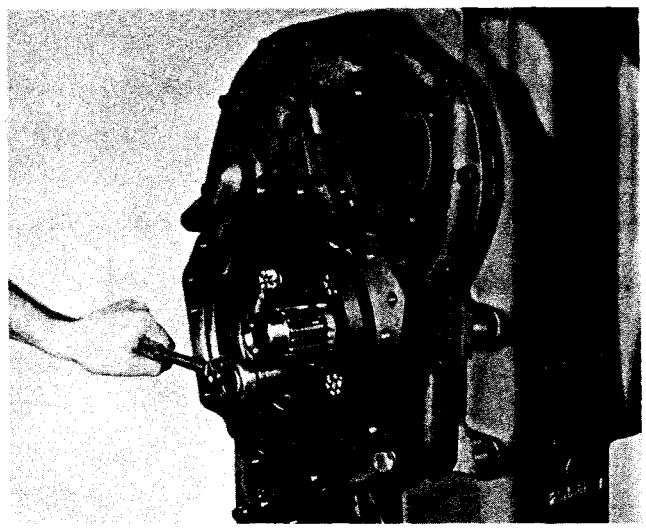


Figure 9
Remove the brake housing adaptor plate place bolts, and lower hole stud nuts and washers. (See page 8 for brake adaptor update.

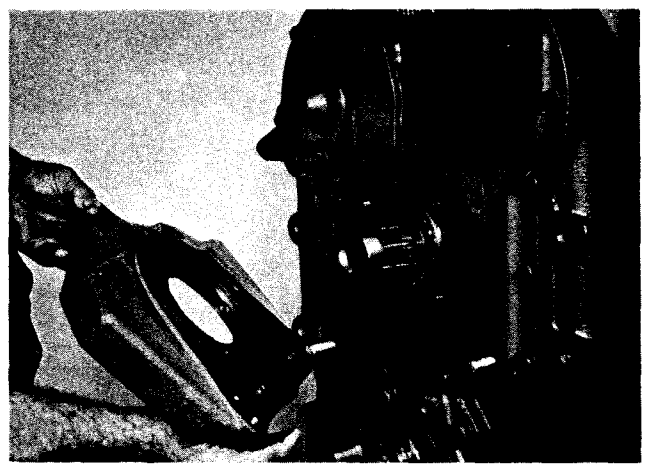


Figure 10
Remove adaptor plate.

CLEANING AND INSPECTION

CLEANING

Clean all parts thoroughly using solvent type cleaning fluid. It is recommended that parts be immersed in cleaning fluid and moved up and down slowly until all old lubricant and foreign material is dissolved and parts are thoroughly cleaned.

CAUTION: Care should be exercised to avoid skin rashes, fire hazards and inhalation of vapors when using solvent type cleaners.

INSPECTION

The importance of careful and thorough inspection of all parts cannot be overstressed. Replacement of all parts

showing indication of wear or stress will eliminate costly and avoidable failures at a later date.

Housing, Covers, etc.
Inspect housings, covers and bearing caps to be certain they are thoroughly cleaned and that mating surfaces, bearing bores, etc., are free from nicks or burrs. Check all parts carefully for evidence of cracks or condition which would cause subsequent oil leaks or failures.

O-Rings
Replacement of O-Rings is more economical when unit is disassembled than premature overhaul to replace these parts at a future time. Further loss of lubricant through a worn seal may result in failure of other more expensive parts of the assembly. Sealing members should be handled carefully, particularly when being installed. Cutting or scratching, seriously impairs its efficiency. Lubricate all O-Rings and seals with recommended type Automatic Transmission Fluid before assembly.

When cleaning and replacing parts in the hydraulic brake cover and valve assembly refer to Figure A for Location and sequence of parts.

REASSEMBLY

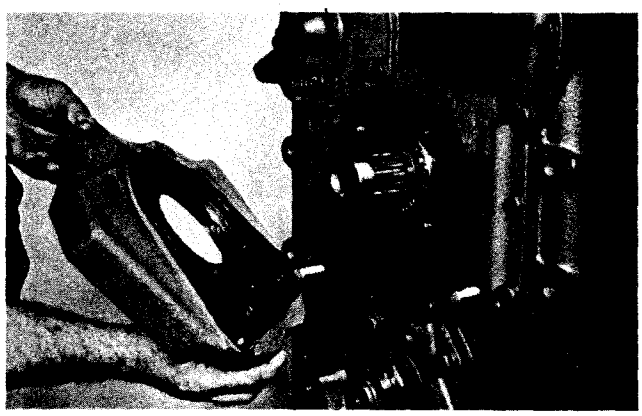


Figure 11
Using new O-Rings, position brake housing adaptor on transmission.

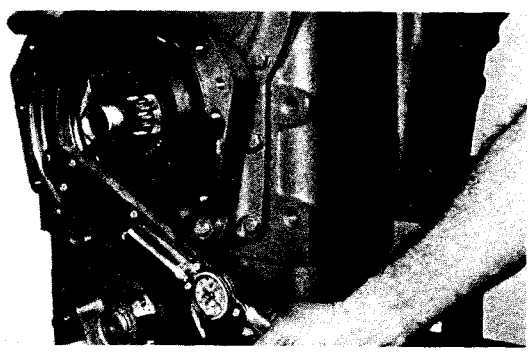


Figure 12
Install adaptor to transmission place bolts and washers (Qty. 4 each). Install stud nuts and washers (Qty. 2 each). Tighten place bolts 115 to 127 ft.-lbs. Torque [15,9—17,5 mm] tighten stud nuts 180 to 198 ft.-lbs. torque [24,9—27,3 mm].

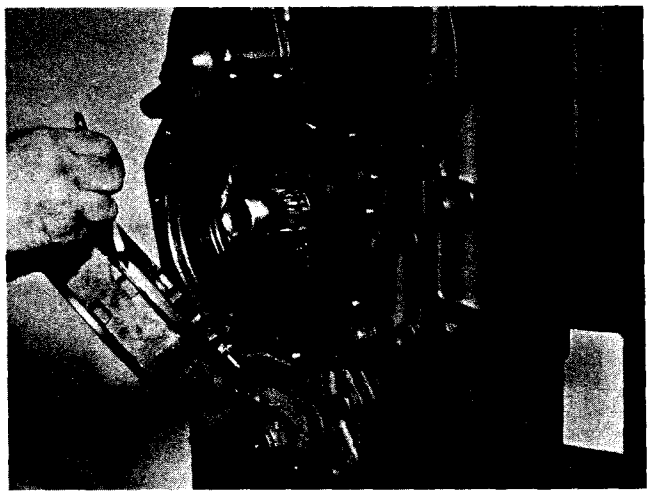


Figure 13
Install a new brake disc housing O-Ring and position disc housing on adaptor.

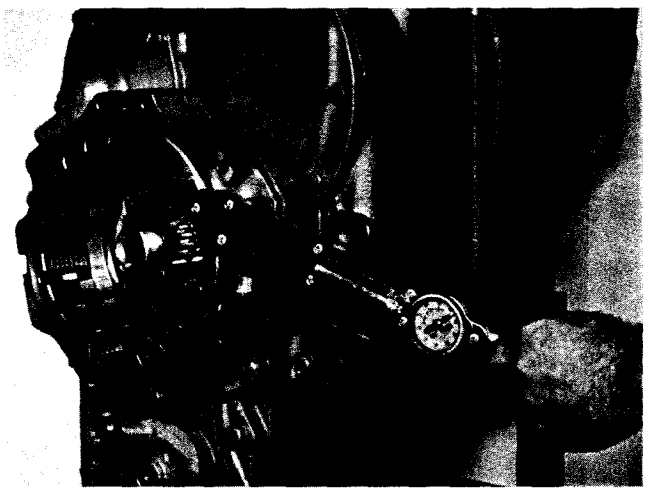


Figure 14
Install disc housing to adaptor bolts and tighten 37 to 41 ft.-lbs. torque [5,1—5,6 mm].

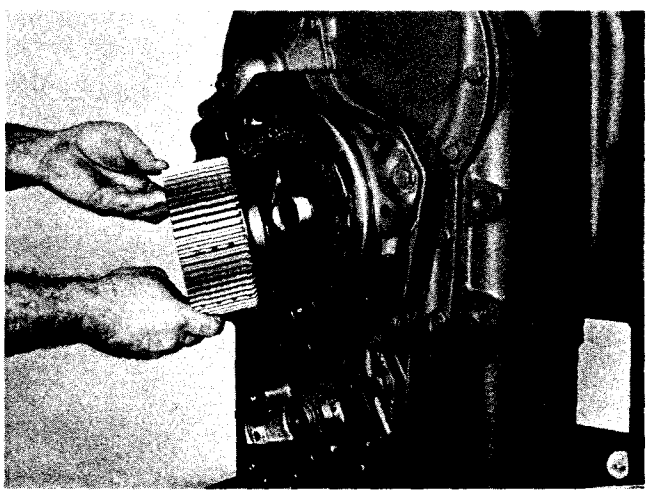


Figure 15
Align brake disc hub splines with idler shaft splines and install disc hub and disc hub nut.

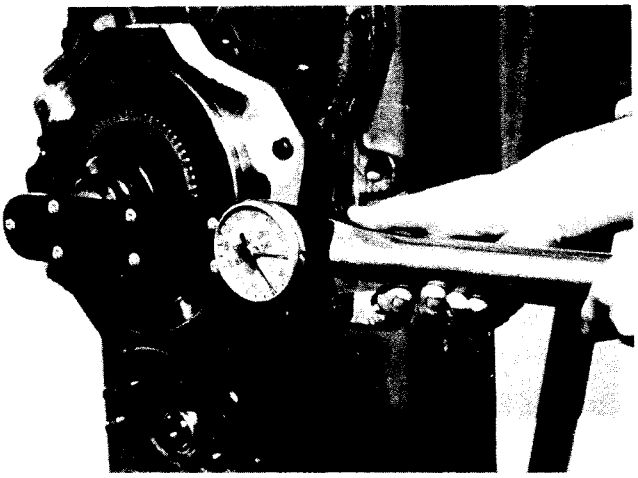


Figure 16

Block output shaft and tighten disc hub nut 250 to 300 ft.-lbs. torque [34,6–41,4 mm].

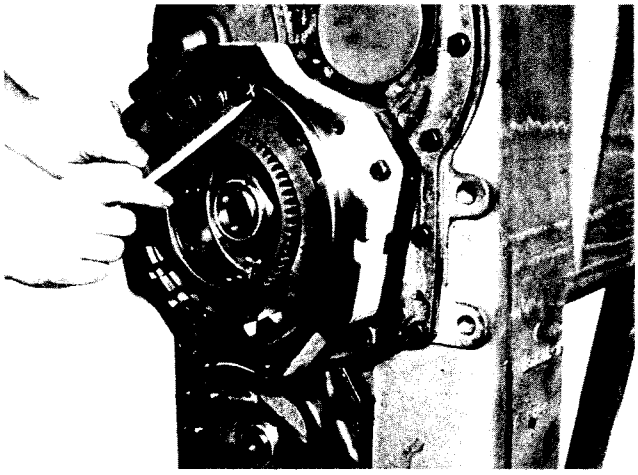


Figure 17

Install one steel disc (splined on the outer diameter) into disc housing. A mark (x) was made on the disc housing in a space between a two spline section and a three spline section.

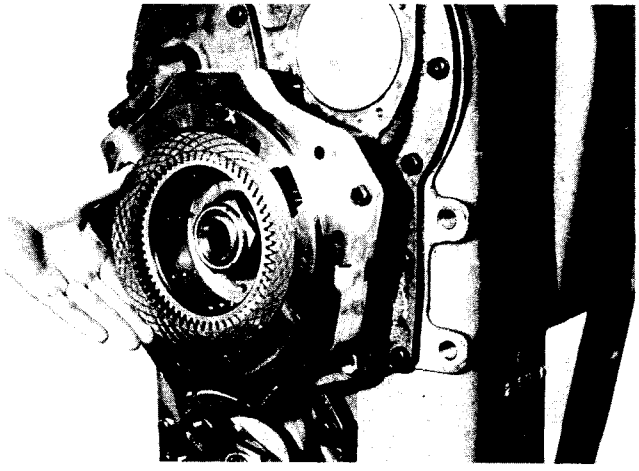


Figure 18

Install one frictional disc (splines on the inner diameter) against first steel disc.

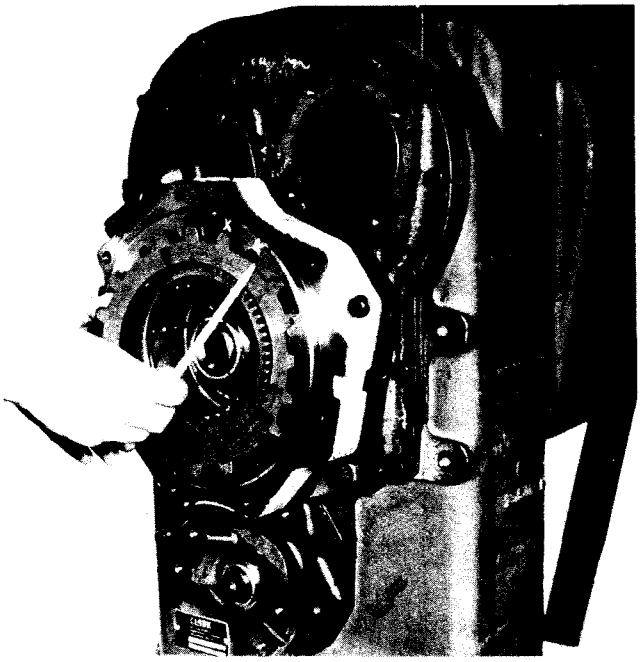


Figure 19

Move the second steel disc one spline to the right. This misaligns the first steel disc and the second steel disc by one spline. Another mark (x) was made and this mark must be used during the remainder of the assembly. This marked area and five other places will allow passage for the six return springs with the springs bottoming on the teeth of the first steel disc. Alternate friction and steel discs being certain the splines on each steel disc are aligned with the splines on the previous steel disc.

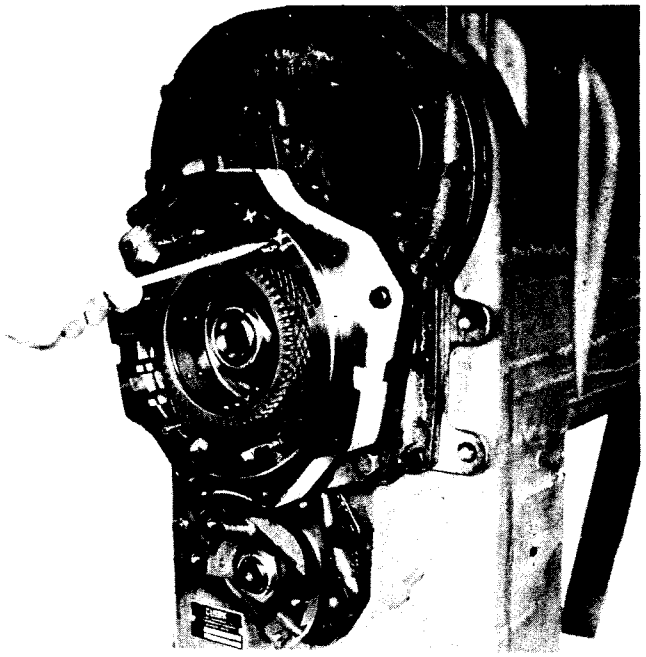


Figure 20

Figure 20 shows the return springs and pins in the spring passages.

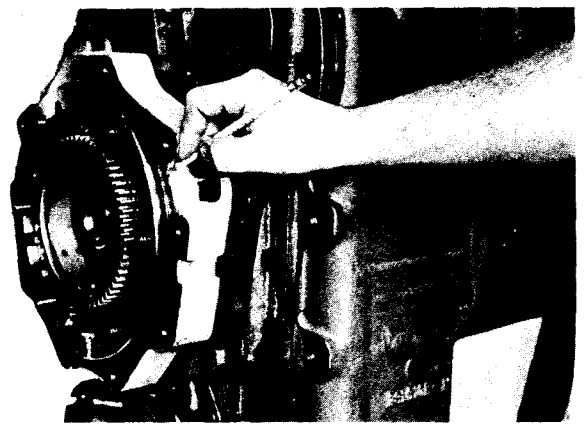


Figure 21

Position a new O-Ring as shown on the brake disc housing.

NOTE: Before installing the brake end cover, loosen the brake adjusting screw jam nut and turn adjusting screw out two or three turns.

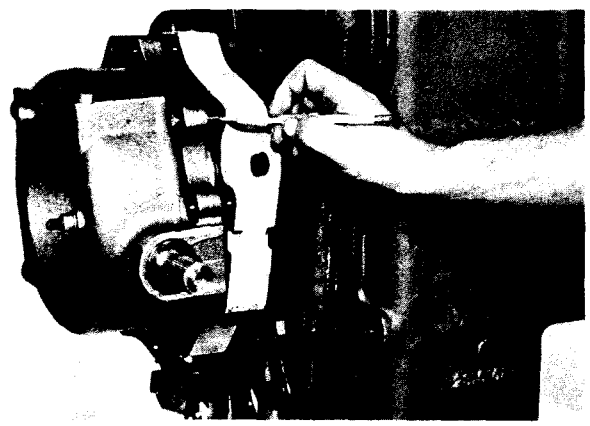


Figure 22

A guide pin located at the two top corners will assist in aligning the heavy end plate and brake valve and end cover on the disc housing. Install cover to disc housing bolts and tighten evenly being certain splines on the outer diameter of the end plate are aligned with the splines in the disc housing.

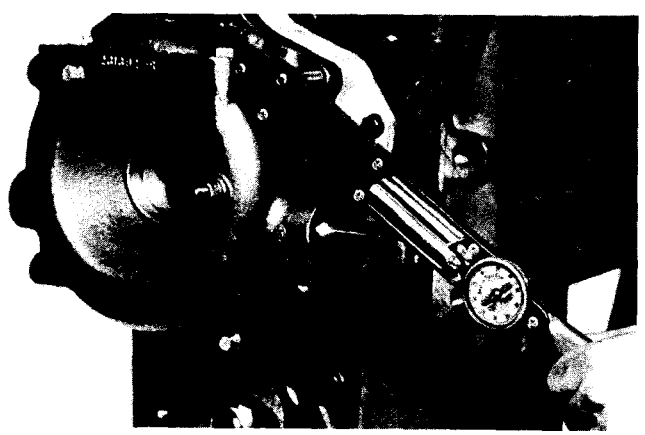


Figure 23

Remove guide pins, install upper corner bolts, tighten all brake valve and end cover bolts 37 to 41 ft.-lbs. torque [5,1–5,6 mm].

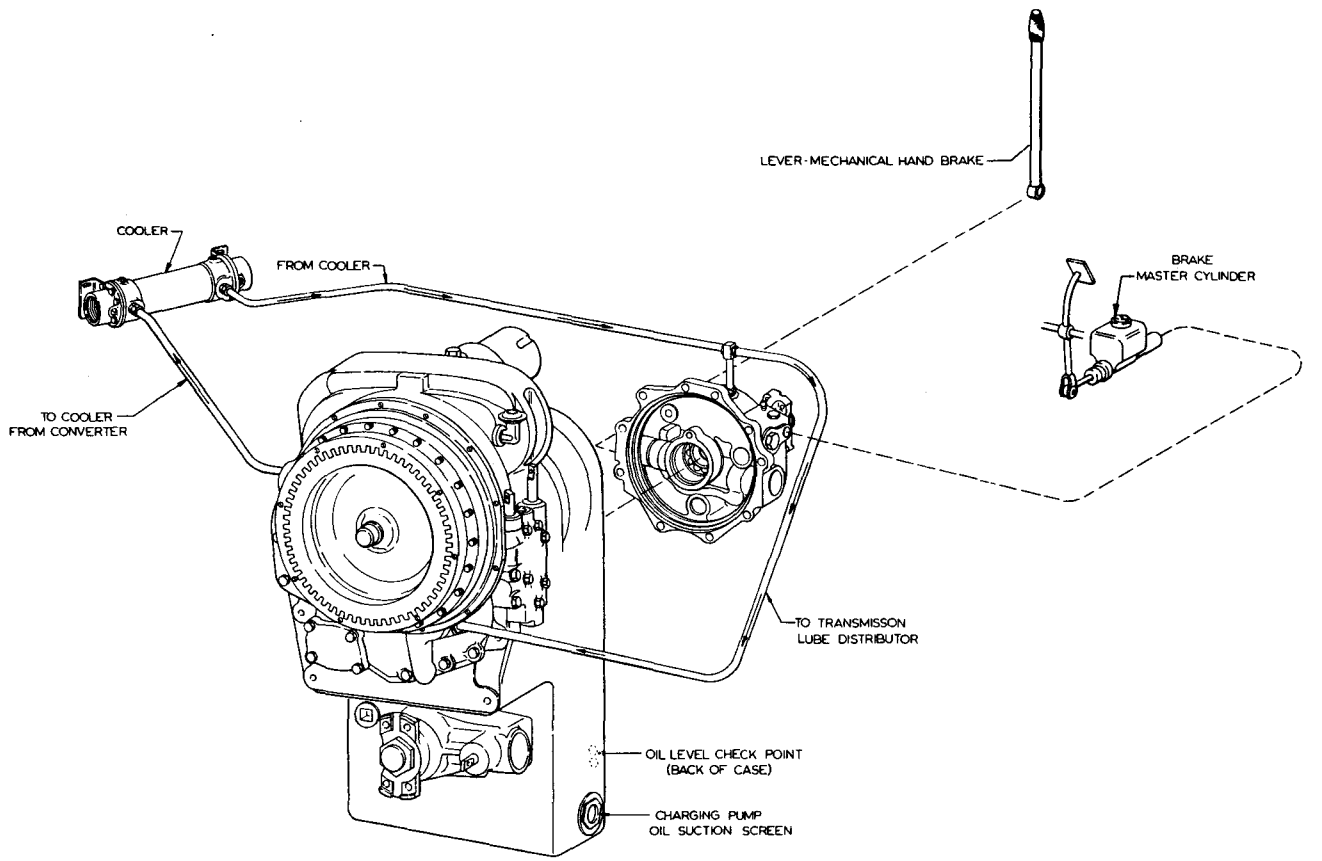
TROUBLESHOOTING

If the transmission mounted hydraulic brake does not function properly a number of points can be checked to determine the maulfunction.

1. Is the master cylinder full of the proper fluid? (See section on types of fluid used with the transmission mounted hydraulic brake.)
2. Is the brake adjusted properly? (See below for proper brake adjustment.)
3. When used as a parking brake is the linkage between the hand brake lever and the brake arm on the side of the brake housing adjusted properly, if so, again is the brake adjusted properly? (See below).

BRAKE ADJUSTMENT

1. Loosen brake adjusting screw jam nut.
2. Disconnect linkage from brake lever arm to parking brake. (Brake lever arm end only.)
3. Apply pressure by turning brake arm until springs and clutch brake plate clearance is removed and brake assembly is locked up.
4. Turn brake adjusting screw until tight against brake yoke.
5. Back screw out 1 to 1½ turns or .062 to .093 clearance [1,6–2,4 mm].
6. Hold adjusting screw from turning and tighten jam nut.
7. Connect parking brake linkage to brake lever arm.



TRANSMISSION MOUNTED HYDRAULIC BRAKE LUBE SPECIFICATIONS

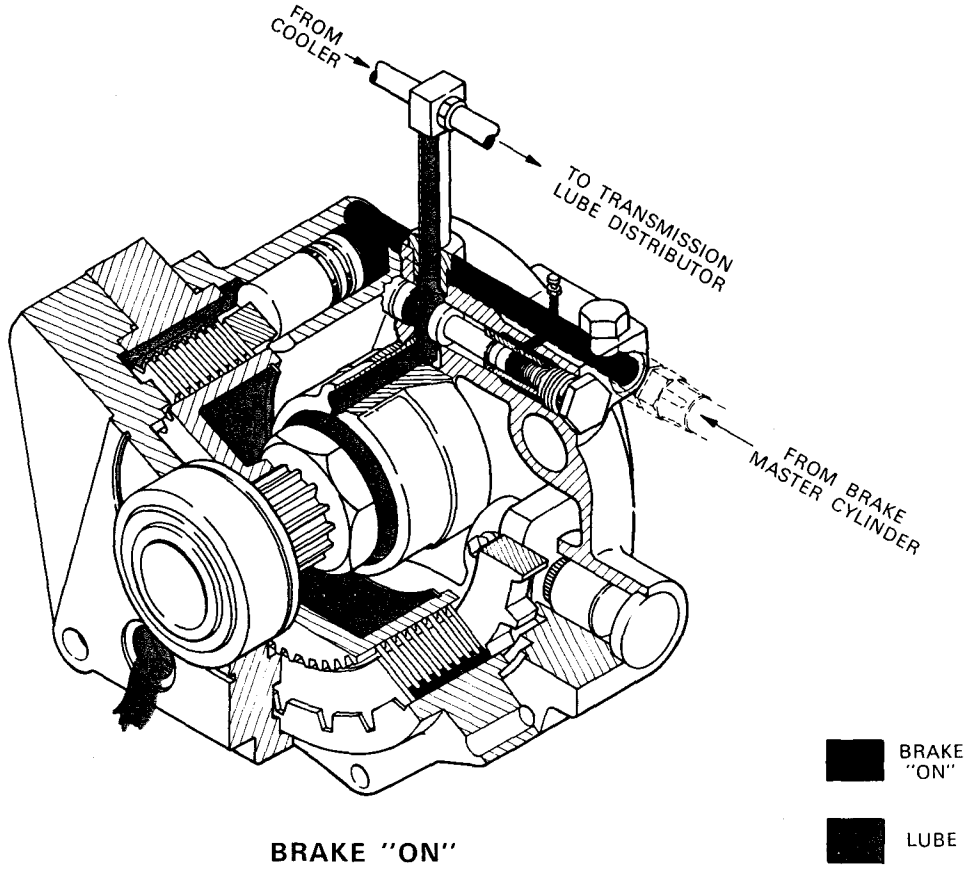
Three types of fluid are approved for use in the transmission mounted hydraulic brake master cylinder.

1. Type A Suffix "A" Automatic Transmission Fluid.
2. *Dexron Automatic Transmission Fluid.
3. C^2 Hydraulic Fluid (for use above 0°F.)

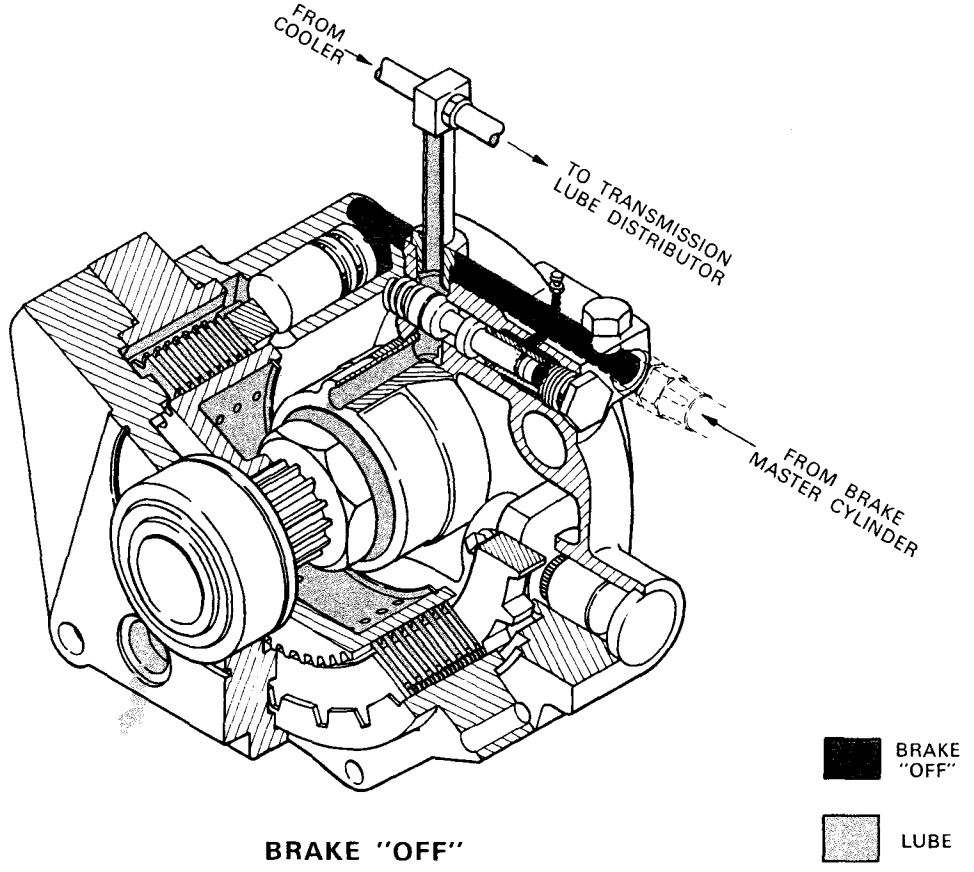
NOTE: *When one of these fluids have been selected for the transmission the same fluid is to be used in the master cylinder which applies the transmission mounted hydraulic brake.*

When using the transmission brake in conjunction with wheel brakes a separate system must be used to operate the wheel brakes.

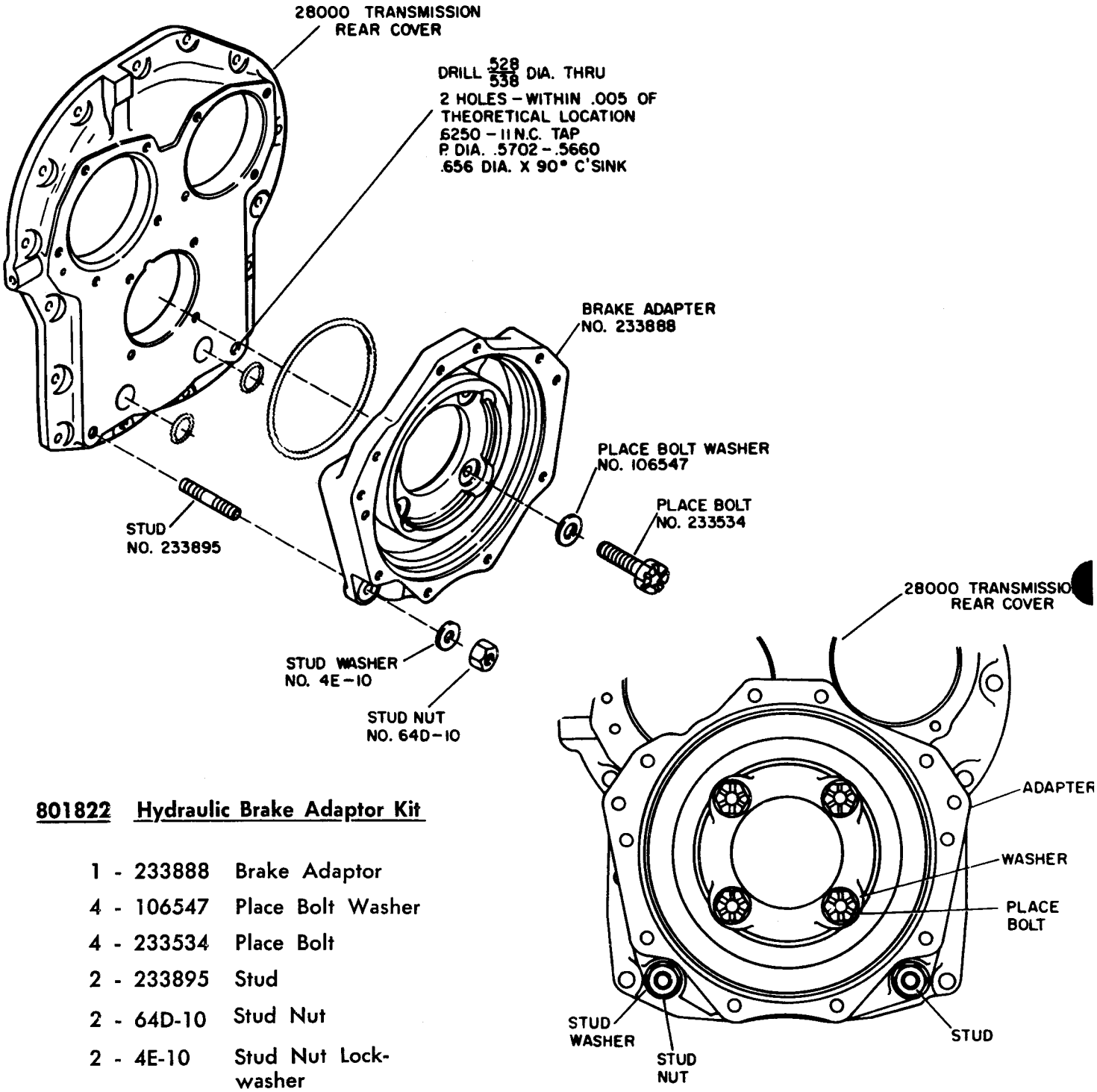
*DEXRON is a registered trademark of General Motor Corporation.



BRAKE "ON"



BRAKE "OFF"



801822 Hydraulic Brake Adaptor Kit

1 -	233888	Brake Adaptor
4 -	106547	Place Bolt Washer
4 -	233534	Place Bolt
2 -	233895	Stud
2 -	64D-10	Stud Nut
2 -	4E-10	Stud Nut Lock-washer
1 -	801832	Adaptor Kit Instruction Sheet

When replacing the hydraulic brake adaptor on the 28000 series transmission the following procedure must be followed:

Refer to applicable maintenance manual for rear cover removal.

Drill and tap two lower brake adaptor attaching holes as shown in diagram.

Clean rear cover.

Reinstall rear cover as explained in maintenance manual.

Install two studs as shown.

Install new brake adaptor O-rings and brake adaptor.

Install place bolts and washers, tighten bolts 115 to 127 ft.-lbs, torque [15,9—17,5 mm].

Install stud nut washers and stud nuts. Tighten nuts 180 to 198 ft.-lbs. torque [24,9—27,3 mm].

Reassemble hydraulic brake as explained in the maintenance and service manual supplement.