



SPICER[®]
Off-Highway Products

Service Manual

Powershift Transmission
32000 Air/Hydraulic or Mechanical
PTO Disconnect Supplement

TSM-0045
July 1990

Service Publications
I-77 at I-40, P.O. Box 1272
Statesville, NC 28677

FOREWORD

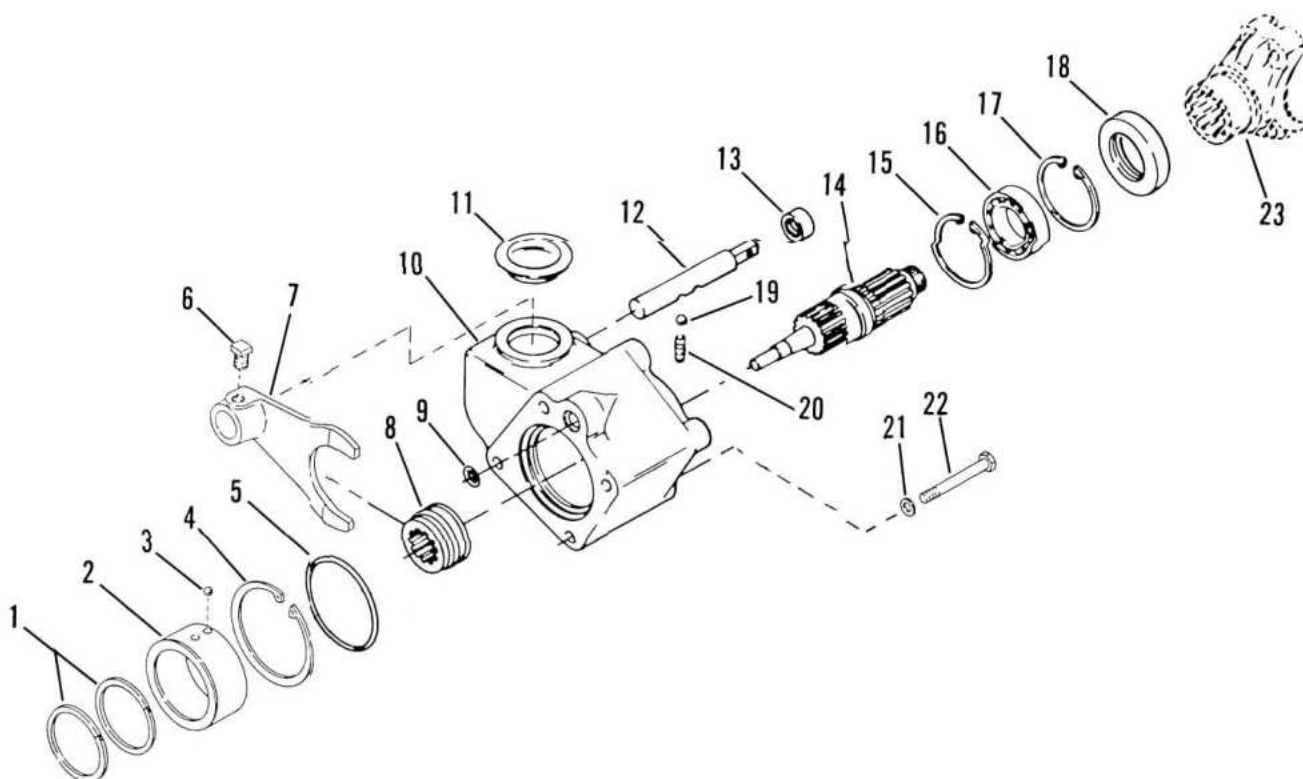
This manual has been prepared to provide the customer and the maintenance personnel with information and instructions on the maintenance and repair of the **CLARK** Power Shift Transmission.

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 Components International-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. Clark Components International does not warrant repair or replacement parts, nor failures resulting from the use thereof, which are not supplied by or approved by Clark Components International. **IMPORTANT: Always furnish the Distributor with the transmission serial and model number when ordering parts.**

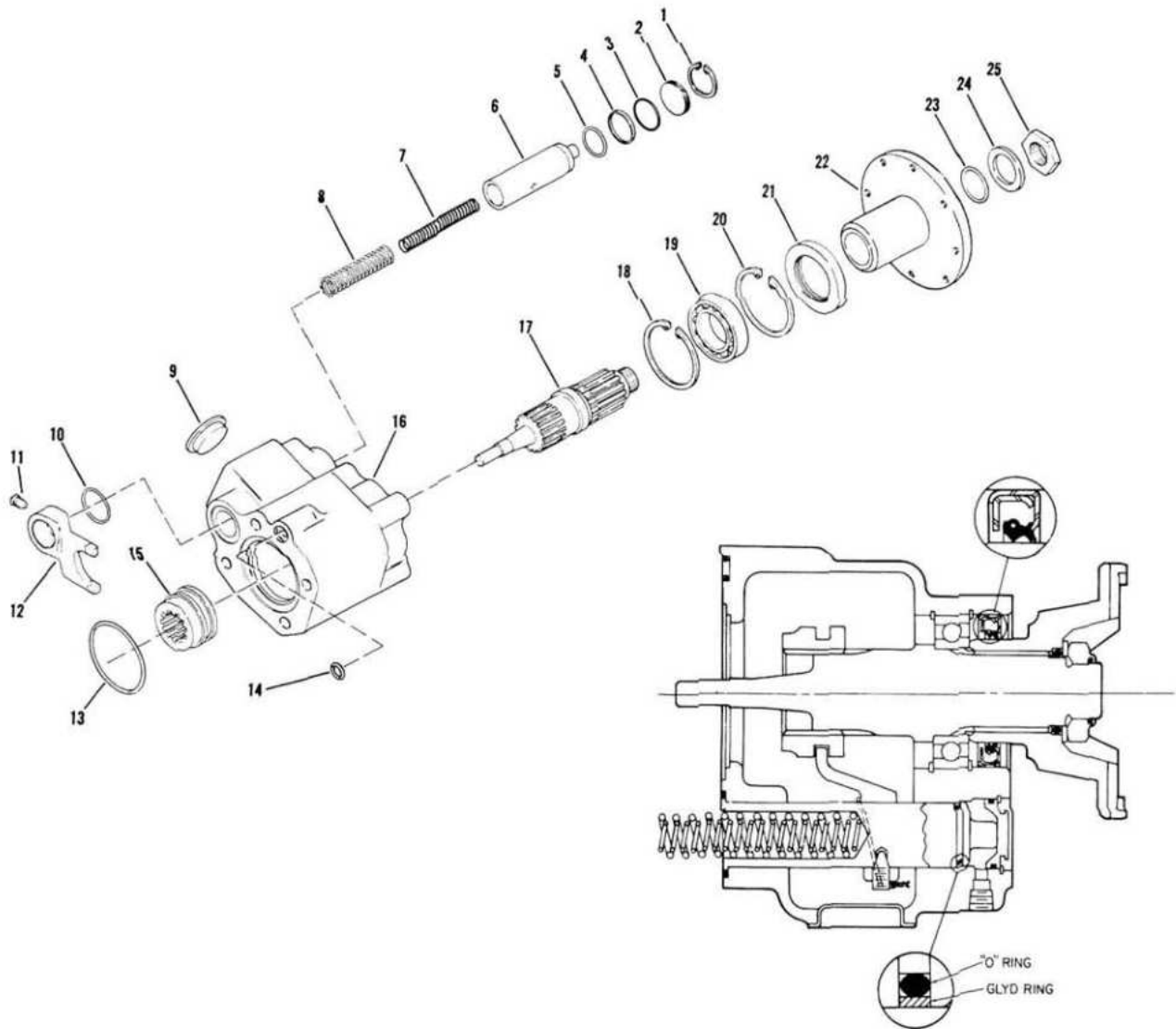
34000 MECHANICAL P.T.O. DISCONNECT



ITEM	DESCRIPTION	QTY
1	Piston Ring	2
2	Piston Ring Sleeve	1
3	Lock Ball	1
4	Piston Snap Ring	1
5	Housing "O" Ring	1
6	Shift Fork Lockscrew	1
7	Shift Fork	1
8	Shift Hub	1
9	Housing "O" Ring	1
10	Disconnect Housing	1
11	Disconnect Housing Plug	1
12	Shift Rail	1

ITEM	DESCRIPTION	QTY
13	Shift Rail Oil Seal	1
14	Disconnect Shaft	1
15	Bearing Retainer Ring	1
16	Bearing	1
17	Bearing Retainer Ring	1
18	Rear Bearing Oil Seal	1
19	Detent Ball	1
20	Detent Spring	1
21	Disconnect Housing Screw Lockwasher	4
22	Disconnect Housing Screw	4
23	Disconnect Flange	1

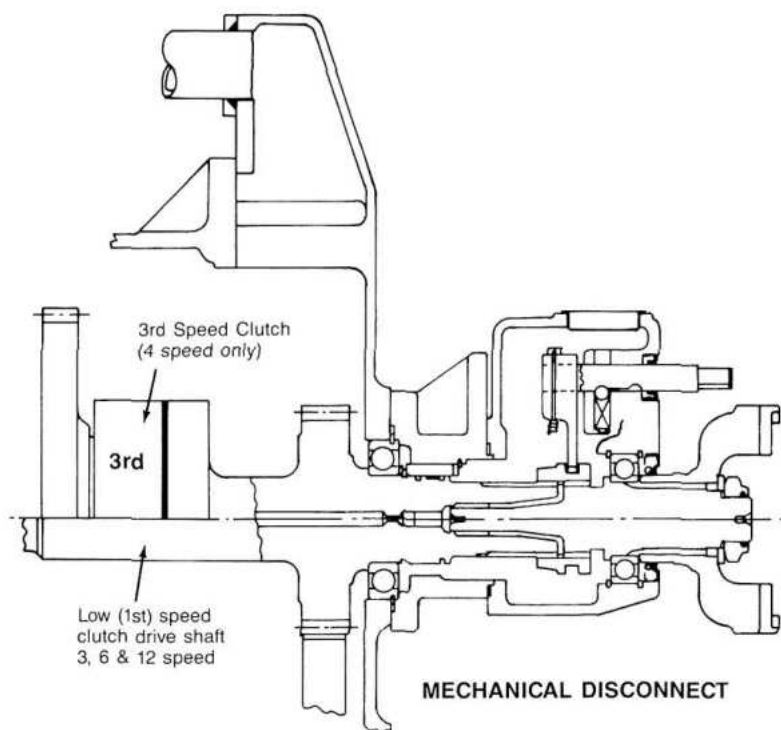
AIR OR HYDRAULIC ACTUATED P.T.O. DISCONNECT ASSEMBLY



ITEM	DESCRIPTION	QTY.
1	Bore Plug Retainer Ring	1
2	Disconnect Housing Bore Plug	1
3	Bore Plug "O" Ring	1
4	Piston Seal Glyd Ring	1
5	Piston "O" Ring	1
6	Actuator Piston	1
7	Actuator Piston Spring-Inner	1
8	Actuator Piston Spring-Outer	1
9	Disconnect Housing Plug	1
10	Disconnect Housing "O" Ring	1
11	Shift Fork Lockscrew	1
12	Shift Fork	1

ITEM	DESCRIPTION	QTY.
13	Disconnect Housing "O" Ring	1
14	Disconnect Housing "O" Ring	1
15	Shift Hub	1
16	Disconnect Housing	1
17	Disconnect Shaft	1
18	Bearing Retainer Ring	1
19	Bearing	1
20	Bearing Retainer Ring	1
21	Oil Seal	1
22	Output Flange	1
23	Flange "O" Ring	1
24	Flange Washer	1
25	Flange Nut	1

34000 P.T.O. DISCONNECT



All lead in chamfers for oil seals, piston rings and "O" rings must be smooth and free from burrs. Inspect as assembled.

Prelube before assembly, all piston ring grooves and "O" rings, with Multi-purpose grease Grade 2.

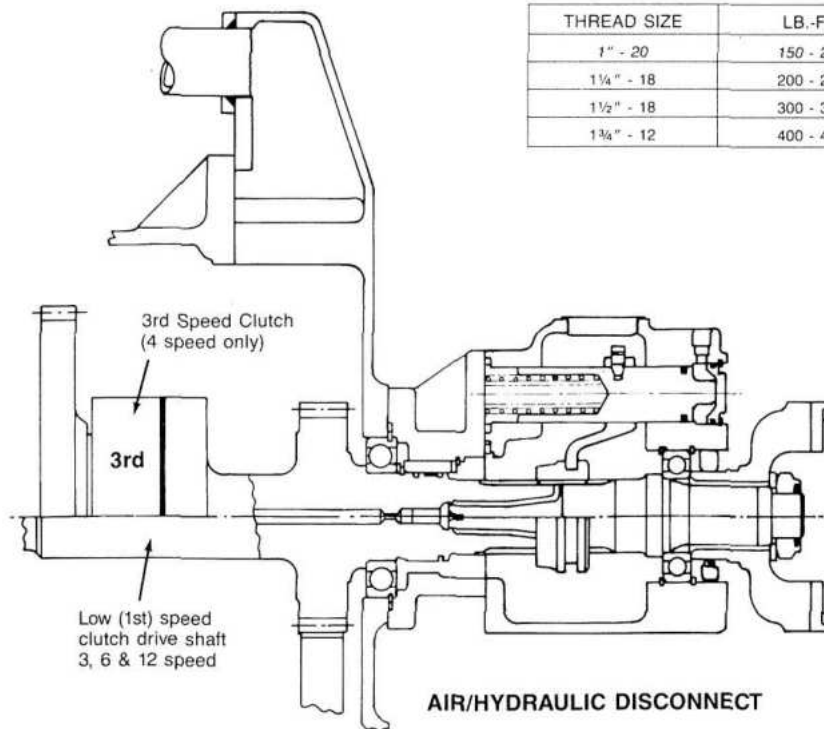
Apply thin coat of Loctite 638 (color green) to outside diameter of all oil seals, bore plugs and bores they are to be installed into, before assembly. Use extreme care not to allow sealant to come into contact with seal lip material.

If grease required for positioning gasket during assembly, use Multi-purpose grease Grade 2.

After assembly of parts using Loctite, there must not be any free or excess material which might enter the oil circuit. *Only use Loctite where specified.*

ELASTIC STOP NUT TORQUE

THREAD SIZE	LB.-FT.	[N·m]
1" - 20	150 - 200	[203,4 - 271,1]
1 1/4" - 18	200 - 250	[271,2 - 338,9]
1 1/2" - 18	300 - 350	[406,8 - 474,5]
1 3/4" - 12	400 - 450	[542,4 - 610,1]



34000 POWER SHIFT TRANSMISSION
AIR-HYDRAULIC OR MECHANICAL DISCONNECT
DISASSEMBLY AND REASSEMBLY PROCEDURE

For clarity the complete transmission was removed from the vehicle.

REMOVAL AND DISASSEMBLY OF THE MECHANICAL DISCONNECT

CAUTION: Cleanliness is of extreme importance and an absolute must in the repair and overhaul of this unit. Before attempting any repairs, the exterior of the unit must be thoroughly cleaned to prevent the possibility of dirt and foreign matter entering the mechanism.

REMOVAL
(Mechanical P.T.O. Disconnect)



Figure 1

Secure output flange to prevent turning. Remove flange nut, washer and "O" ring.

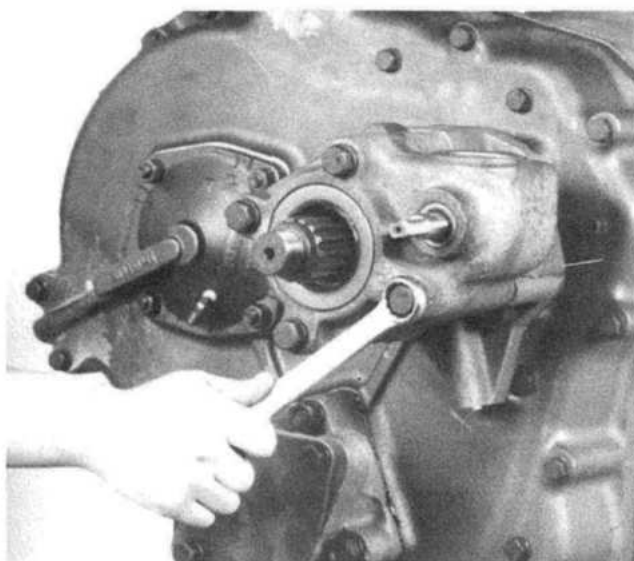


Figure 3

Remove disconnect assembly to adaptor bolts.



Figure 2

Remove flange.

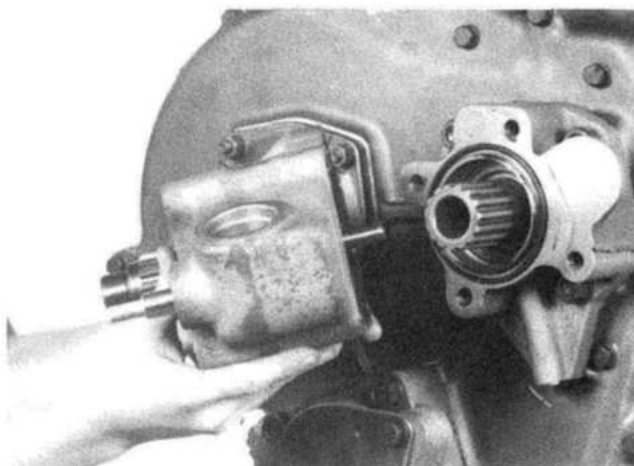


Figure 4

Remove disconnect assembly.

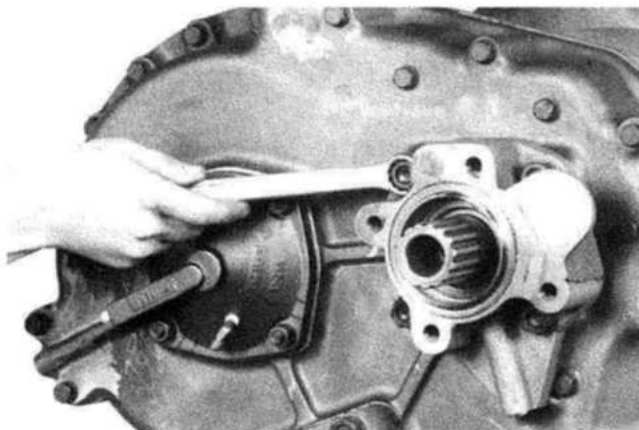


Figure 5

Remove disconnect adaptor stud nuts and washers.

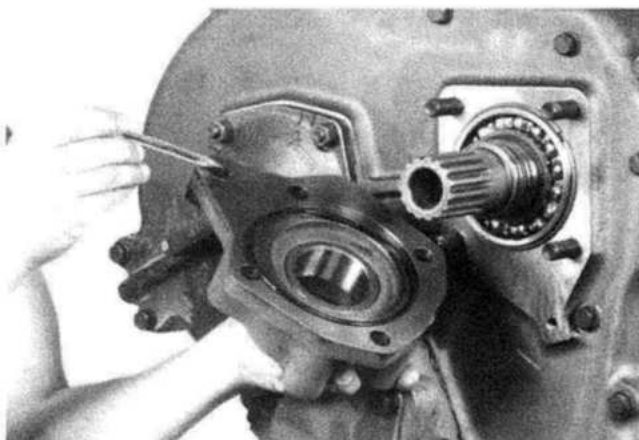


Figure 6

Remove adaptor and "O" rings.

MECHANICAL DISCONNECT DISASSEMBLY



Figure 7

Remove housing bore plug.

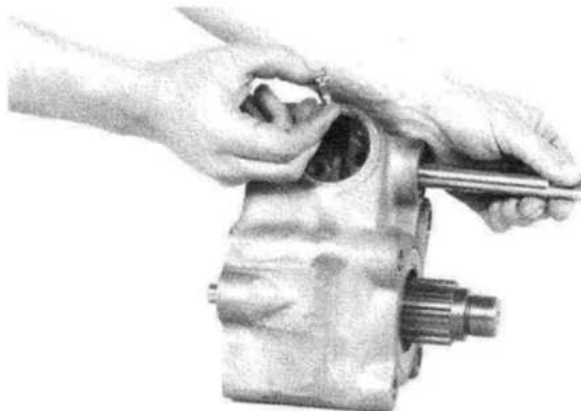


Figure 8

Remove shift fork lockwire lockwire. Remove lock screw and shift rail. **CAUTION:** Shift rail has a detent ball and spring under it, use caution when removing rail.

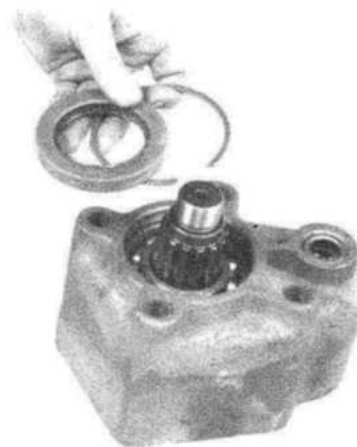


Figure 9

Remove disconnect shaft oil seal and shaft outer bearing retainer ring.

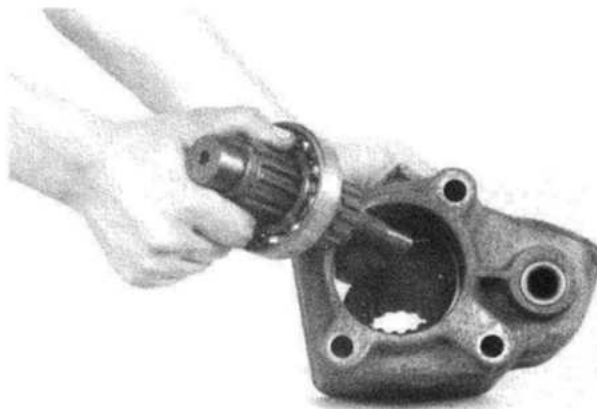


Figure 10

Remove shaft and bearing from housing.



Figure 11

Remove shift fork and shift hub.

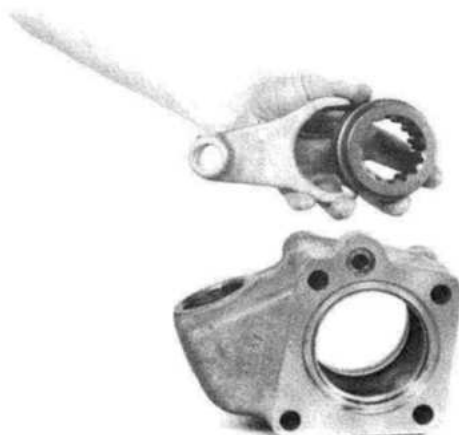


Figure 14

Position shift fork and shift hub in housing. **NOTE:** Long hub of shift fork and shift hub must go toward machined end of disconnect housing. (Machine end attaches to rear cover adaptor).

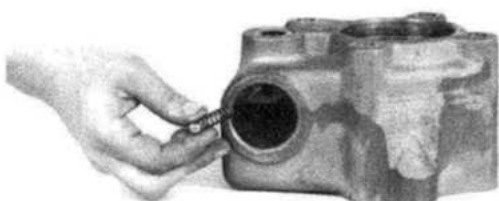


Figure 12

Remove shift rail detent ball and spring. Remove shift rail oil seal.

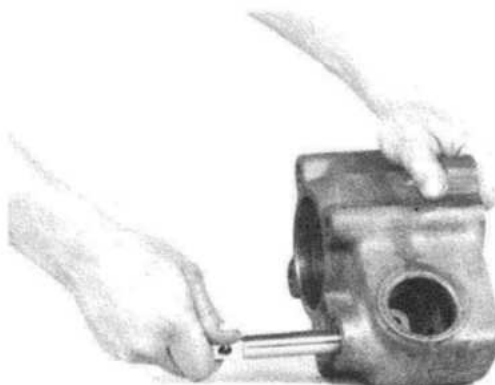


Figure 15

Depress detent ball and spring. Install shift rail in housing over detent ball and thru shift fork.

DISCONNECT REASSEMBLY

See cleaning and inspection page.



Figure 13

Position detent spring and ball in housing.

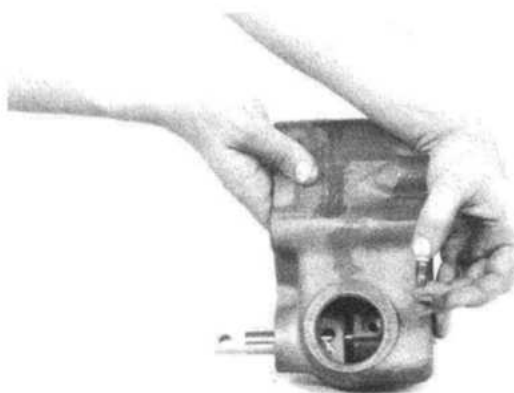


Figure 16

Install shift fork lock screw, tighten 7 to 10 ft. lbs. [10 - 14 N.m] torque. Lock wire to prevent loosening.

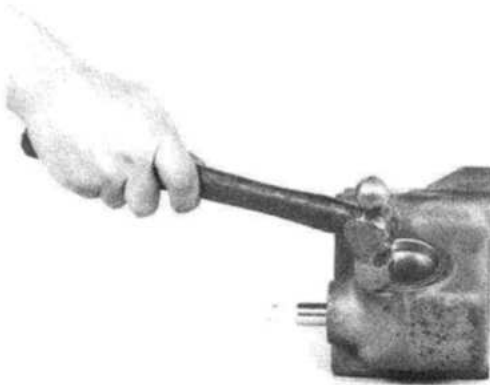


Figure 17

Apply a thin coat of Loctite #638 to outer diameter of housing bore plug. Tap bore plug in housing.

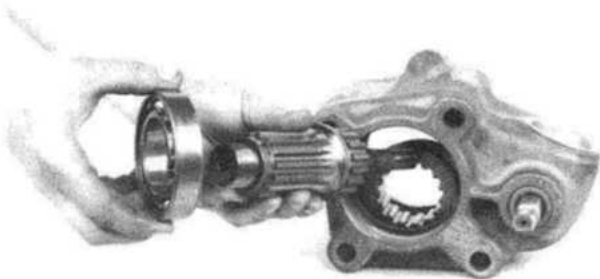


Figure 18

Press output bearing on disconnect shaft. Install shaft and bearing in housing and thru shift hub.

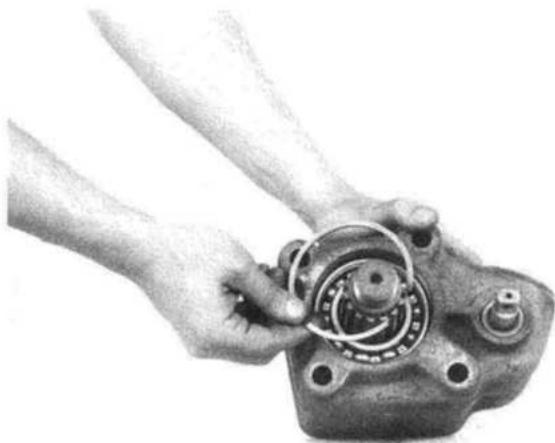


Figure 19

Install bearing retainer ring.

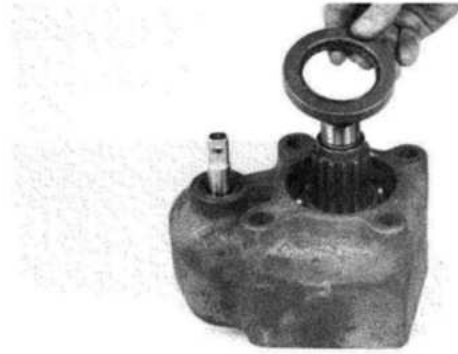


Figure 20

Apply a thin coat of Loctite #638 to the outer diameter of the output shaft oil seal. Press seal in housing with lip of seal in.



Figure 21

Apply a thin coat of Loctite #638 to the outer diameter of the shift rail oil seal. Press seal in housing with lip of seal in.

REMOVAL AND DISASSEMBLY OF THE AIR OR HYDRAULIC P.T.O. DISCONNECT

CAUTION: Cleanliness is of extreme importance and an absolute must in the repair and overhaul of this unit. Before attempting any repairs, the exterior of the unit must be thoroughly cleaned to prevent the possibility of dirt and foreign matter entering the mechanism.

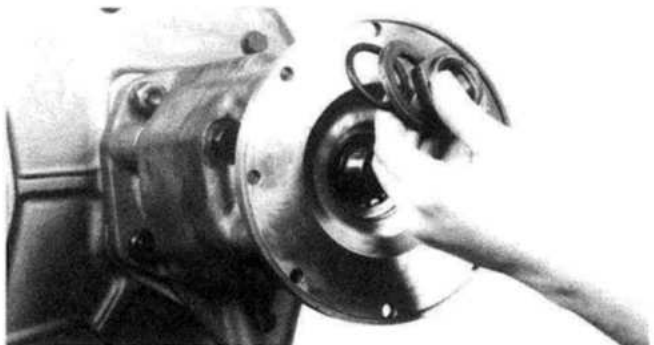


Figure 22

Secure output flange to prevent turning. Remove flange nut, washer and "O" ring.

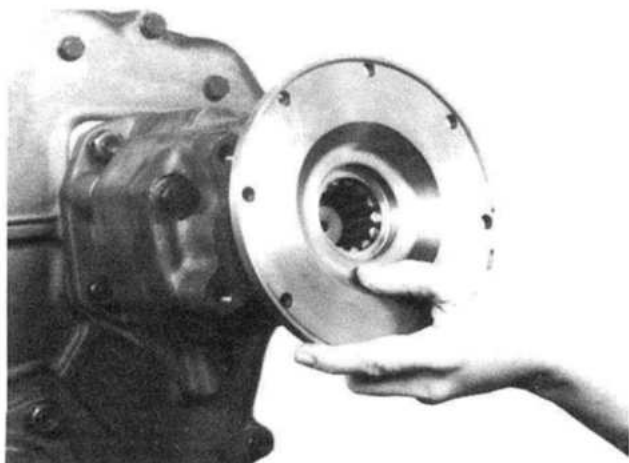


Figure 23

Remove output flange.

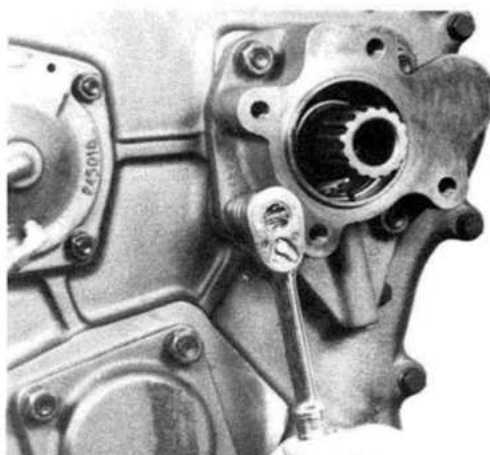


Figure 26

Remove disconnect to rear cover adaptor.

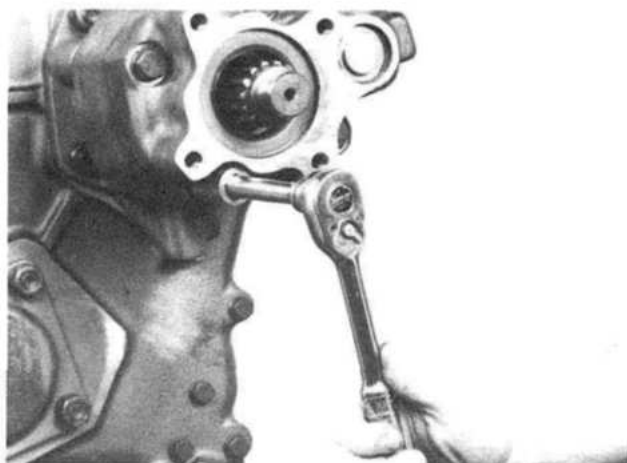


Figure 24

Remove disconnect assembly to adaptor bolts.

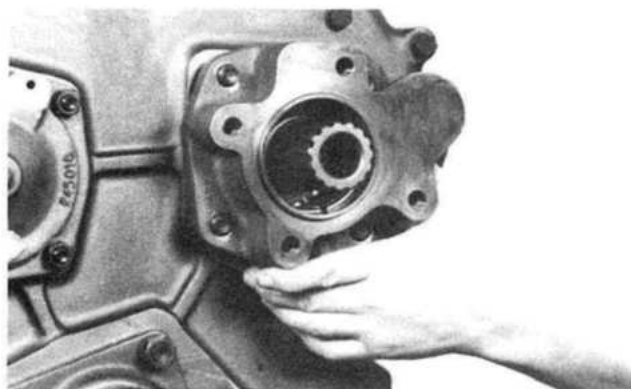


Figure 27

Remove adaptor. **NOTE:** If low speed (1st) drive shaft or 3rd speed clutch (on a 4 speed model) is to be removed for repairs refer to the appropriate maintenance and service manual for transmission rear cover removal.

AIR OR HYDRAULIC P.T.O. DISCONNECT DISASSEMBLY

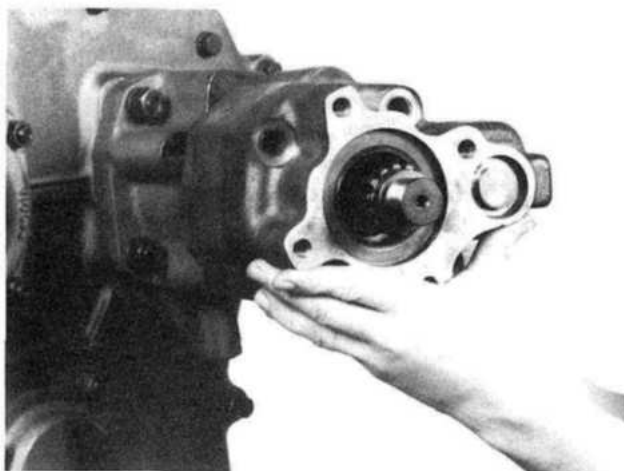


Figure 25

Remove disconnect assembly.



Figure 28

Remove the inner and outer actuator piston springs.



Figure 29
Remove piston bore plug retainer ring.

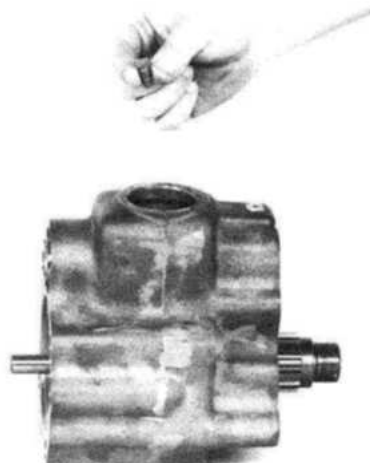


Figure 32
Remove shift fork lockscrew.



Figure 30
Remove piston bore plug and "O" ring.

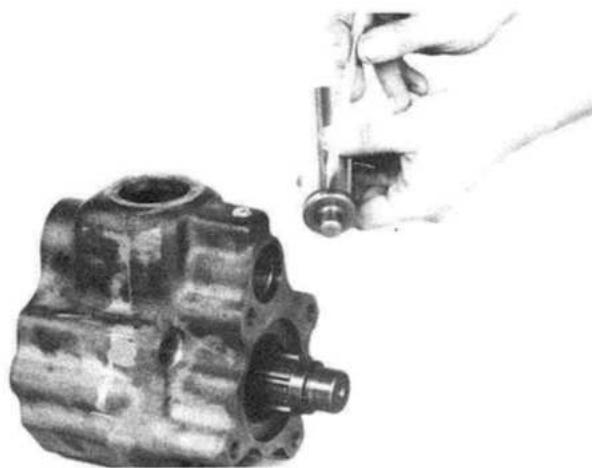


Figure 33
Remove actuator piston, "O" ring and glyd ring.

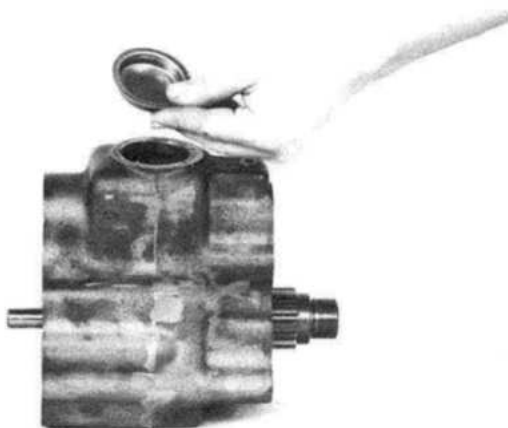


Figure 31
Remove housing bore plug.

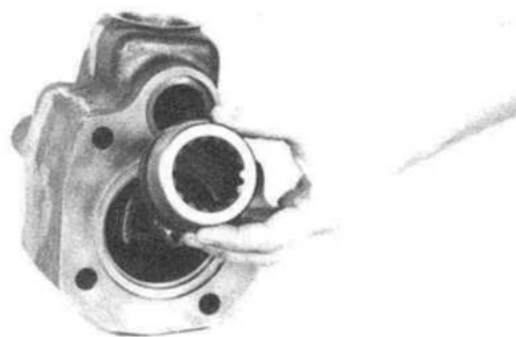


Figure 34
Remove shift hub.

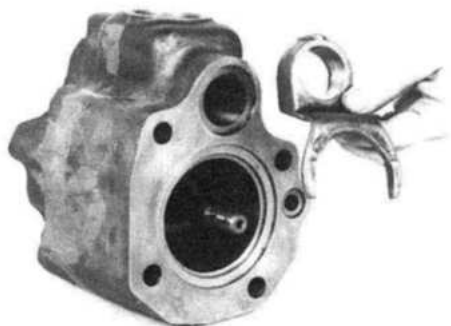


Figure 35

Remove shift fork.



Figure 38

Remove outer bearing retainer ring. Remove outer bearing.

DISCONNECT REASSEMBLY

See cleaning and inspection page.



Figure 36

Tap disconnect shaft on threaded end to remove from outer bearing and housing.

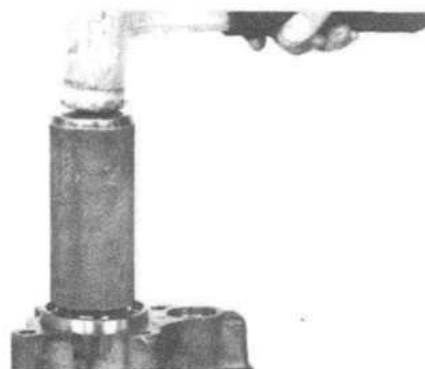


Figure 39

With outer bearing locating ring in position in disconnect housing, install outer bearing. Install bearing retainer ring.



Figure 37

The output oil seal must be destroyed by using a punch to drive thru the oil seal housing and picking the oil seal out of the disconnect housing.



Figure 40

Apply a light coat of Loctite #638 to the outer diameter of the output shaft oil seal. Press or tap seal in housing with lip of seal in.

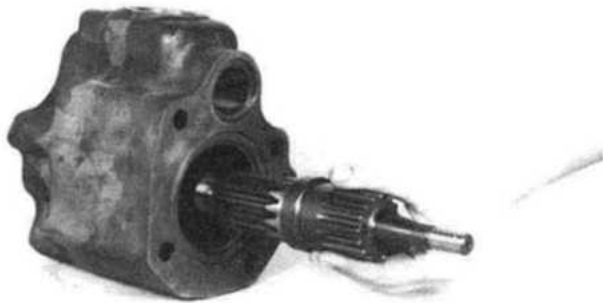


Figure 41

Position disconnect shaft in outer bearing and oil seal, use caution as not to damage oil seal. Tap shaft in bearing.



Figure 42

Position the shift fork and shift hub on shaft in housing.

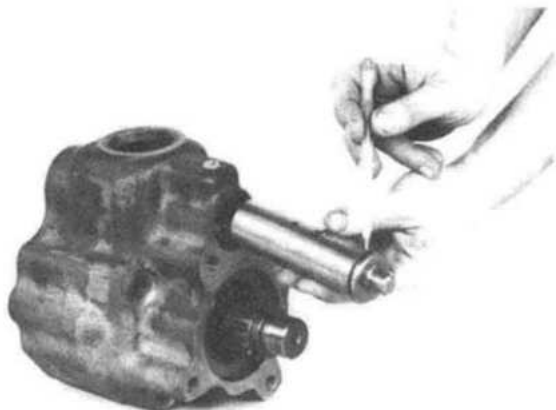


Figure 43

Position the "O" ring and glyd ring on the actuator piston. Install piston in disconnect housing. Align shift fork and insert piston thru fork. Push piston in housing using caution as not to damage glyd ring or "O" ring.

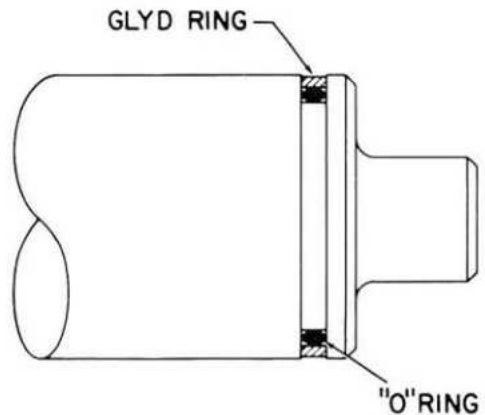


Figure 43A



Figure 44

Align hole in shift fork with hole in actuator piston. Install shift fork lockscrew and tighten 7 to 10 ft. lbs. [10 - 14 N.m] torque. Lock wire to prevent loosening.

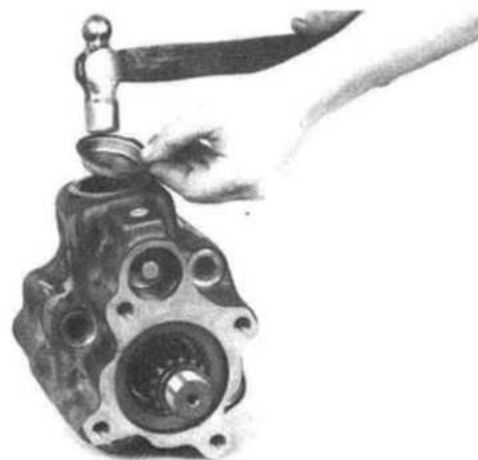


Figure 45

Apply a thin coat of Loctite #638 to the outer diameter of the housing bore plug. Tap plug in housing.

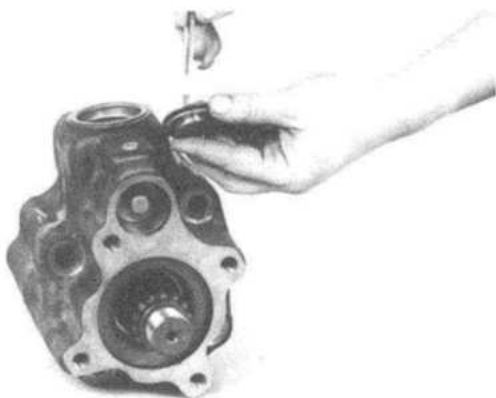


Figure 46

Position new "O" ring on housing bore plug. Install bore plug and "O" ring in housing.

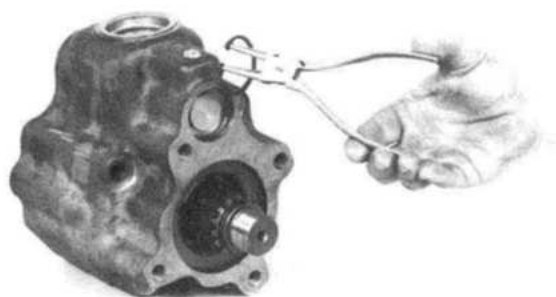


Figure 47

Install bore plug retainer ring.

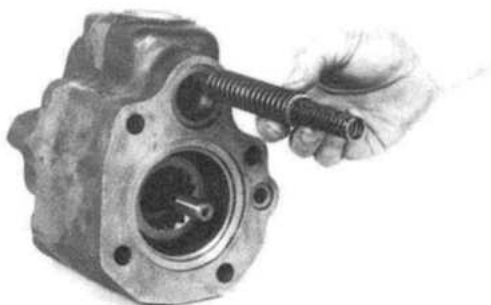


Figure 48

Position the inner and outer actuator springs in the actuator piston.

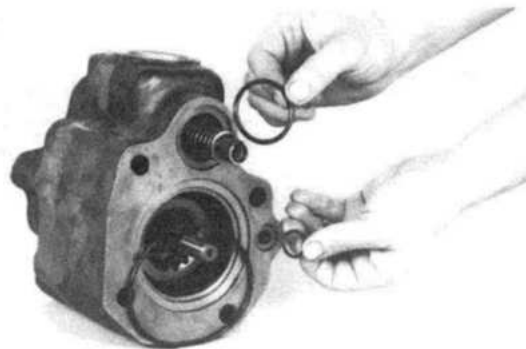


Figure 49

Position disconnect housing to rear cover adaptor "O" rings on housing. A light coat of grease will hold the "O" rings in position for reassembly on rear cover adaptor.

34000 4 SPEED WITH P.T.O. DISCONNECT

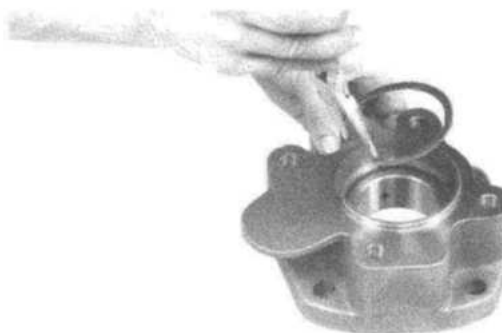


Figure 50

Remove oil sealing ring sleeve retainer ring from rear cover to P.T.O. adaptor.

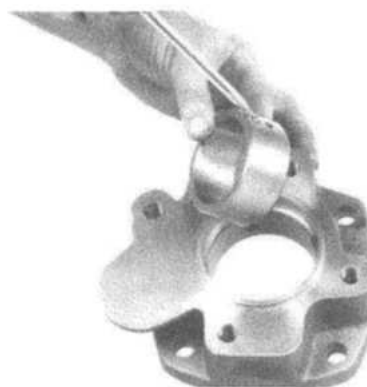


Figure 51

Remove sealing ring sleeve, use caution as not to lose sleeve to adaptor lockball.

NOTE: If P.T.O. 3rd speed clutch (on 4 speed models only) shaft is to be repaired or replaced, refer to the appropriate 4 speed maintenance and service manual for transmission rear cover and 3rd speed clutch removal and repair.

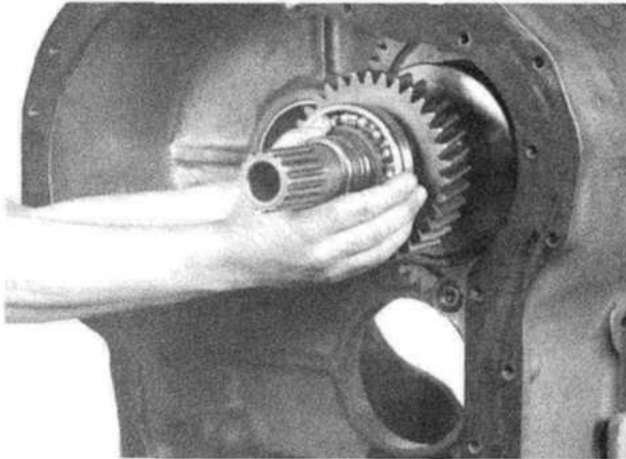


Figure 52
Remove 3rd speed clutch assembly.



Figure 53
Remove clutch shaft oil sealing rings.



Figure 54
Remove clutch shaft rear bearing retaining ring.



Figure 55
Remove rear bearing washer.



Figure 56
Remove rear bearing.



Figure 57
If P.T.O. shaft front bushing is to be replaced, remove bushing.

For 3rd Clutch Disassembly and Reassembly see appropriate 4 speed maintenance and service manual.

See cleaning and inspection page.



Figure 58

With 3rd speed clutch reassembled up to rear of clutch shaft, install a new front P.T.O. shaft bushing.



Figure 61

Install bearing retaining ring.

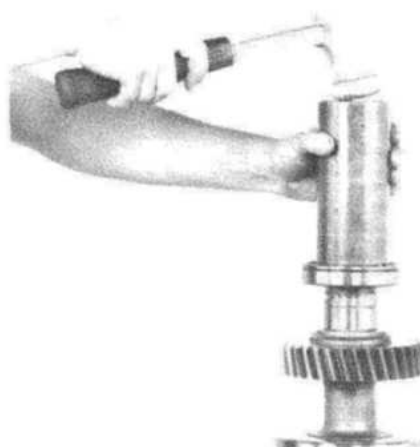


Figure 59

Install clutch shaft rear bearing. **NOTE:** Outer bearing locating ring groove must be up.



Figure 62

Install oil sealing rings. Lock sealing ring joint securely. Grease rings to stabilize in ring groove.



Figure 60

Position bearing washer on clutch shaft.

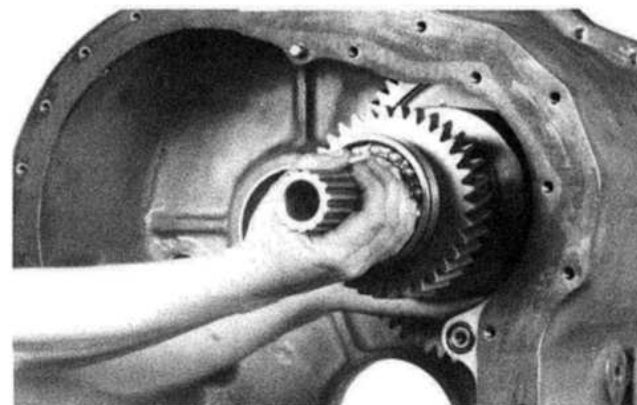


Figure 63

Position 3rd speed clutch assembly in transmission case. Refer to appropriate 4 speed manual for reassembly up to installing P.T.O. adaptor.



Figure 64

Position sealing ring sleeve lockball in sleeve, a light coat of grease will hold lockball in position. Align lockball with notch in P.T.O. adaptor. Press sleeve in adaptor.



Figure 65

Install sealing ring sleeve retainer ring.

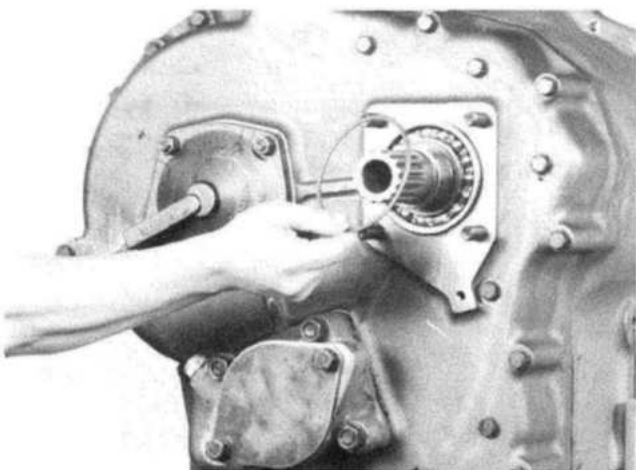


Figure 66

Install 3rd speed clutch rear bearing locating ring.

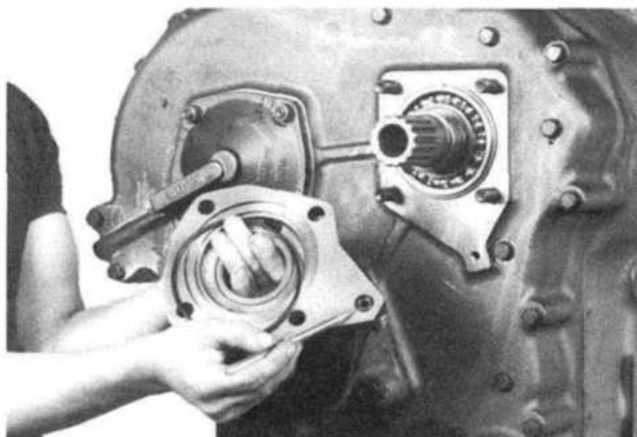


Figure 67

Position new "O" rings on the P.T.O. adaptor.



Figure 68

Position adaptor on studs, use caution as not to disrupt "O" rings. Install lockwashers and nuts. Tighten nuts in a criss cross sequence to specified torque. (See torque chart.)

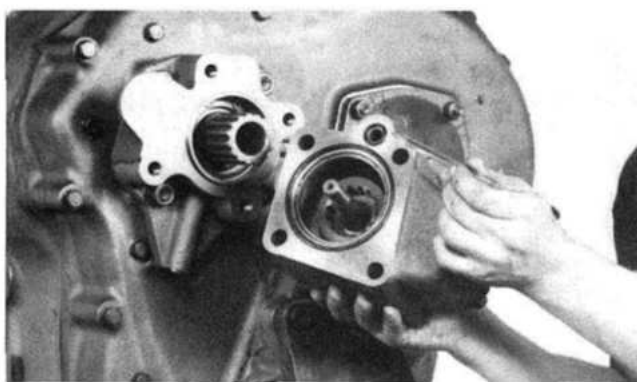


Figure 69

Position new "O" rings on disconnect housing. Install disconnect assembly on adaptor with bolts and lockwashers. **NOTE:** P.T.O. disconnect assembly may be mechanical, air or hydraulic.

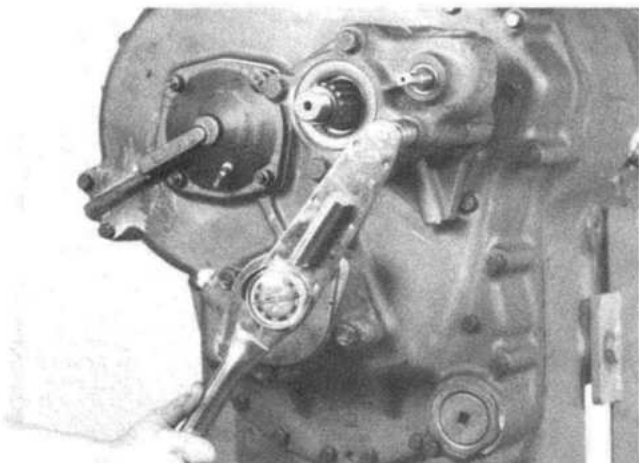


Figure 70

Tighten bolts to specified torque. (See torque chart.)

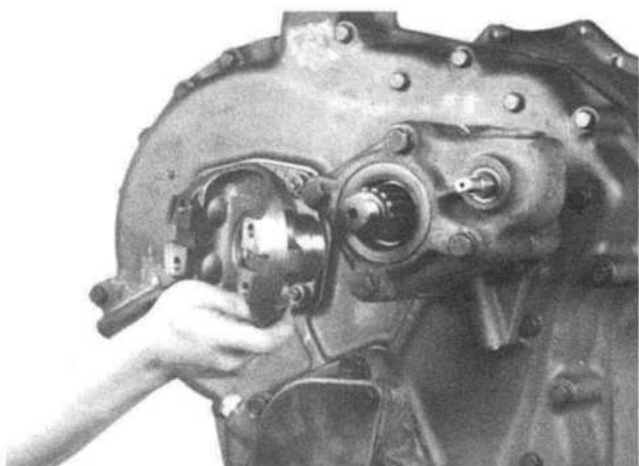


Figure 71

Position P.T.O. output flange on P.T.O. shaft.

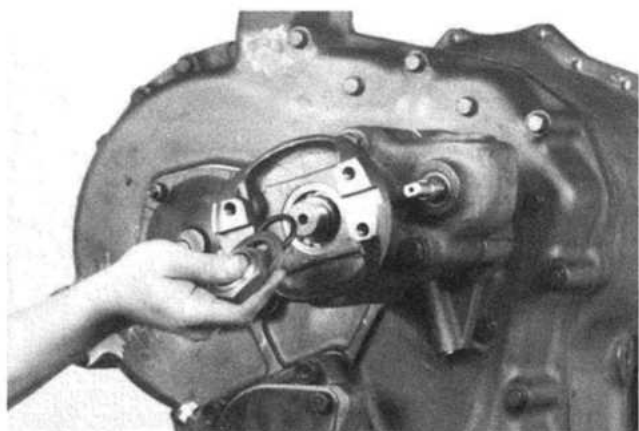


Figure 72

Install the flange "O" ring, washer and elastic stop nut on P.T.O. shaft.

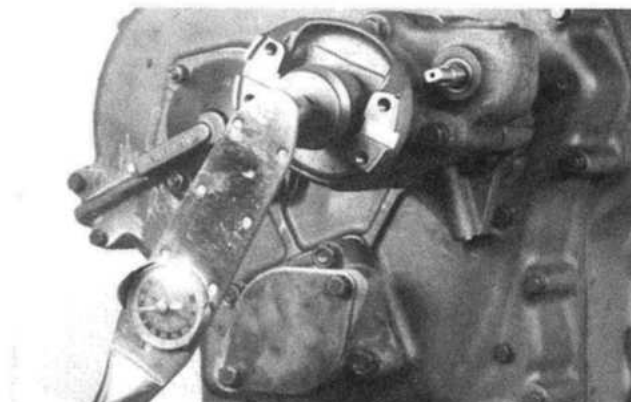


Figure 73

Secure P.T.O. output flange to prevent turning. Tighten flange nut to specified torque. (See elastic stop nut torque chart.)

NOTE: If P.T.O. drive shaft (low clutch drive shaft on 3, 6 and 12 speed models) is to be repaired or replaced, refer to the appropriate 3, 6 or 12 speed maintenance and service manual for transmission rear cover removal.

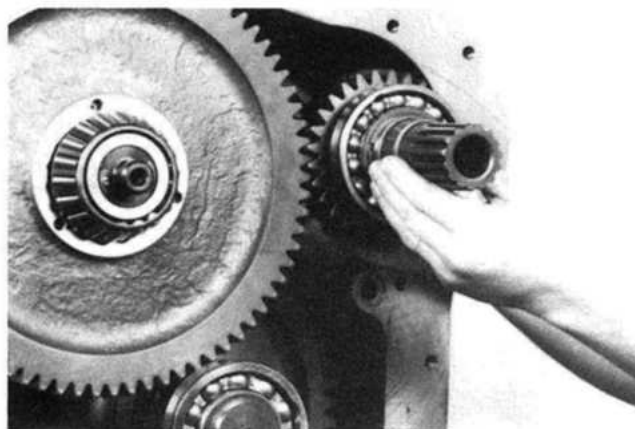


Figure 74

Remove low clutch drive shaft. (Also P.T.O. drive shaft.)



Figure 75

If P.T.O. shaft front bushing is to be replaced, remove bushing.



Figure 76

Remove drive shaft rear bearing retaining ring and washer.

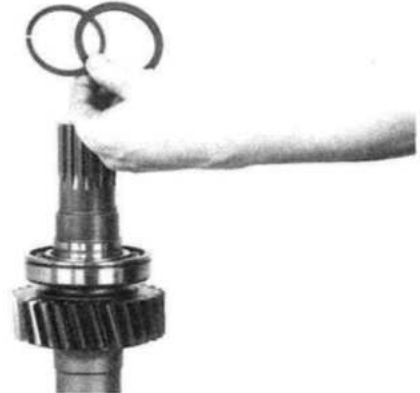


Figure 79

Install rear bearing washer and retaining ring.



Figure 77

Remove rear bearing.



Figure 80

If P.T.O. shaft front bushing was removed install new bushing.

DRIVE SHAFT REASSEMBLY

See cleaning and inspection page.



Figure 78

Install drive shaft rear bearing. **NOTE:** Outer bearing locating ring groove must be up.

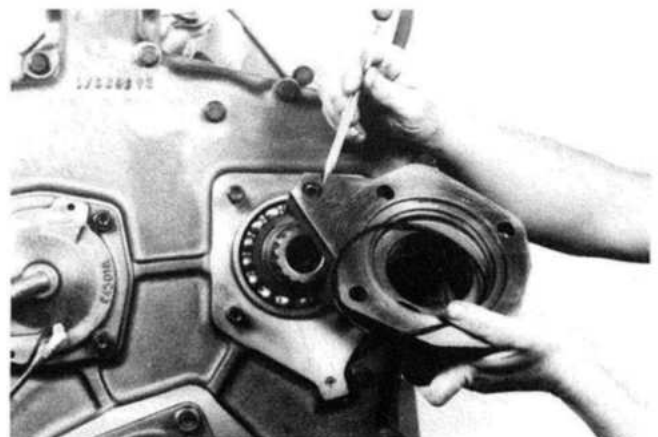


Figure 81

Position new "O" rings on P.T.O. adaptor. Install adaptor on studs.

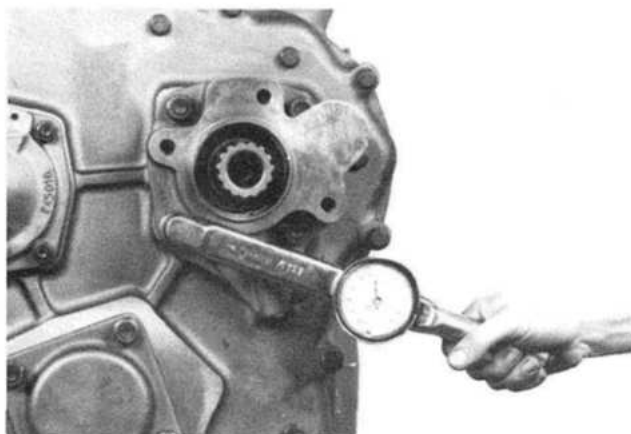


Figure 82

Install lockwashers and stud nuts. Tighten nuts to specified torque. (See torque chart.)

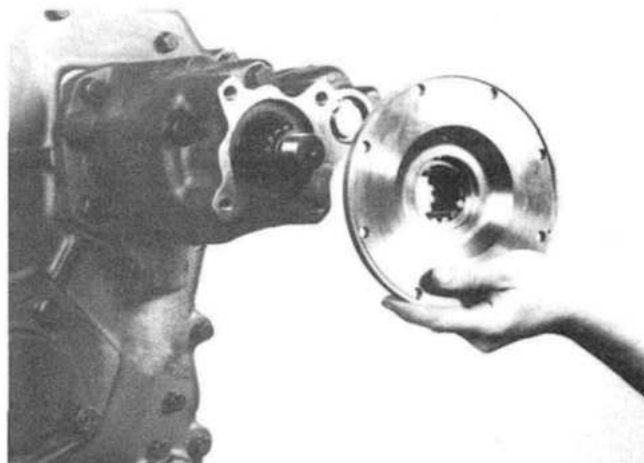


Figure 85

Position P.T.O. output flange on P.T.O. shaft.

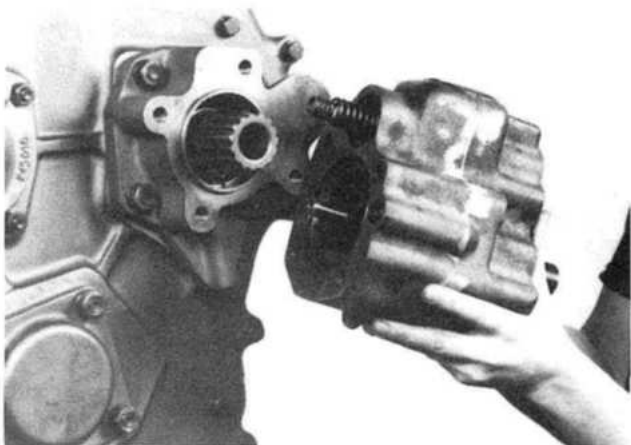


Figure 83

Position P.T.O. on adaptor (P.T.O. shown is air or hydraulic actuated) compress piston return springs against P.T.O. adaptor and install disconnect to adaptor bolts and washers.

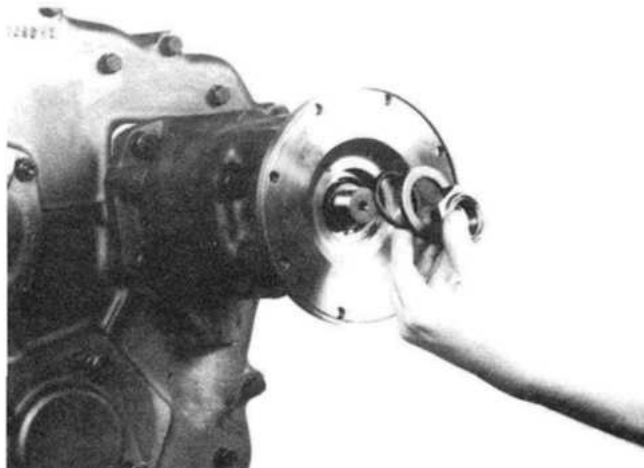


Figure 86

Install flange "O" ring, washer and elastic stop nut.

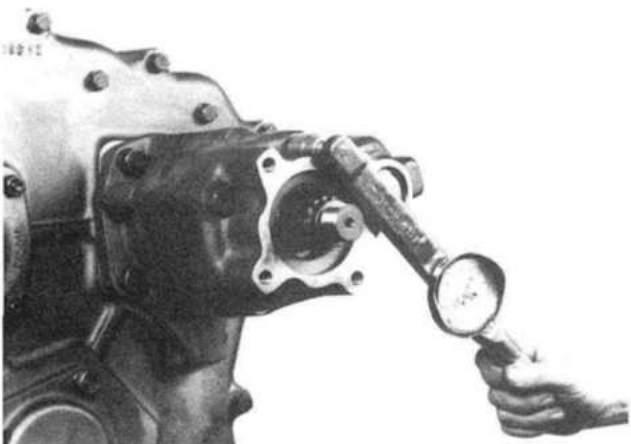


Figure 84

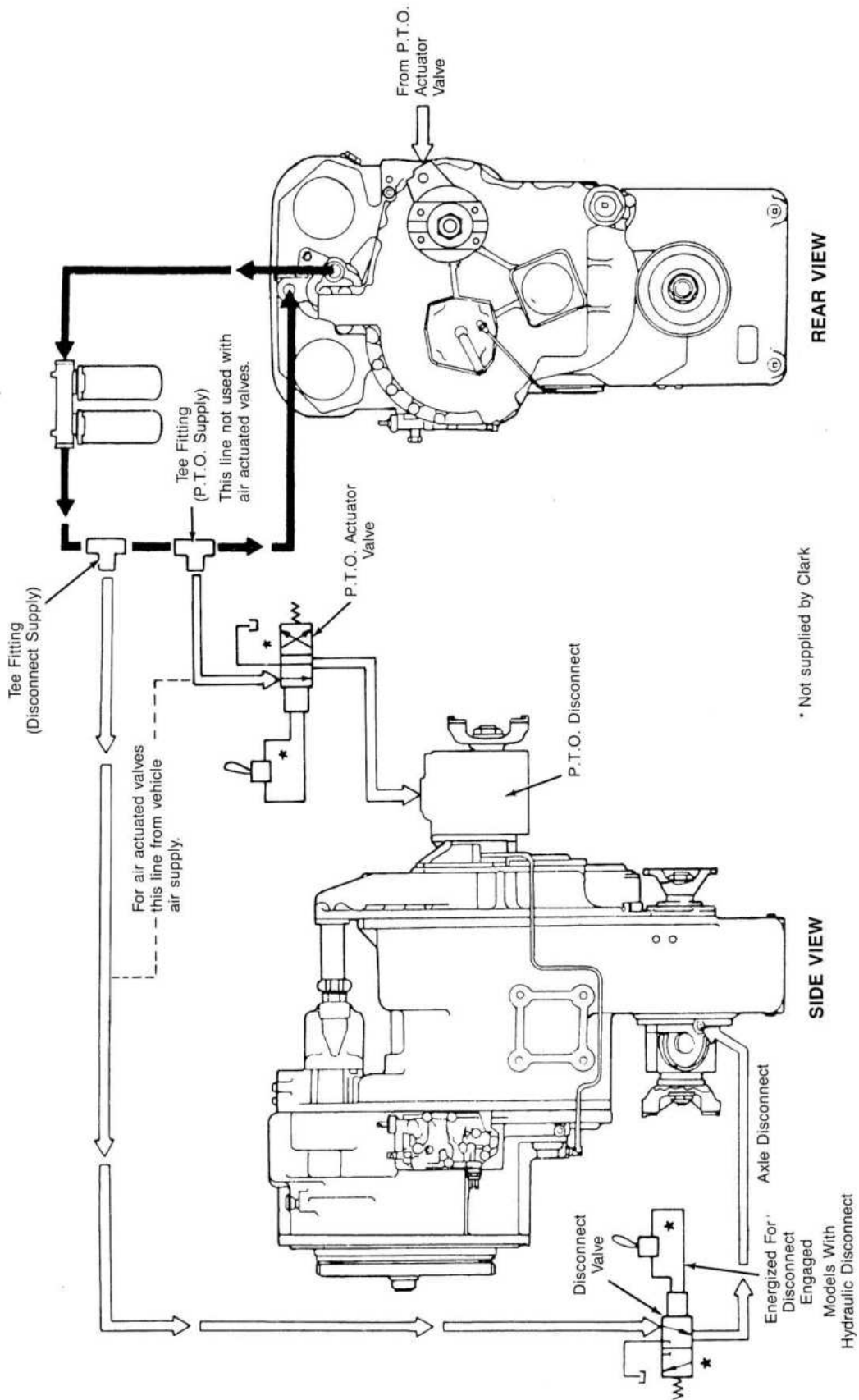
Tighten bolts to specified torque. (See torque chart.)



Figure 87

Secure P.T.O. output flange to prevent turning. Tighten flange nut to specified torque. (See elastic stop nut torque chart.)

HR34000 AIR/HYDRAULIC ACTUATED P.T.O. DISCONNECT EXTERNAL PLUMBING DIAGRAM



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.

Bearings

Remove bearings from cleaning fluid and strike flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning fluid to flush out particles. Repeat above operation until bearings are thoroughly clean. Dry bearings using moisture-free compressed air. Be careful to direct air stream across bearing to avoid spinning. Do not spin bearings when drying. Bearings may be rotated slowly by hand to facilitate drying process.

Housings

Clean interior and exterior of housings, bearing caps, etc., thoroughly. Cast parts may be cleaned in hot solution tanks with mild alkali solutions providing these parts do not have ground or polished surfaces. Parts should remain in solution long enough to be thoroughly cleaned and heated. This will aid the evaporation of the cleaning solution and rinse water. Parts cleaned in solution tanks must be thoroughly rinsed with clean water to remove all traces of alkali. Cast parts may also be cleaned with steam cleaner.

CAUTION: Care should be exercised to avoid inhalation of vapors and skin rashes when using alkali cleaners.

All parts cleaned must be thoroughly dried immediately by using moisture-free compressed air or soft, lintless absorbent wiping rags free of abrasive materials such as metal filings, contaminated oil or lapping compound.

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.

Bearings

Carefully inspect all rollers; cages and cups for wear, chipping or nicks to determine fitness of bearings for further use. Do not replace a bearing cone or cup individually without replacing the mating cup or cone at the same time. After inspection, dip bearings in Automatic Transmission Fluid and wrap in clean lintless cloth or paper to protect them until installed.

Oil Seals, Gaskets, Etc.

Replacement of spring load oil seals, "O" rings, metal sealing rings, gaskets and snap 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, scratching, or curling under of lip of seal seriously impairs its efficiency. When assembling new metal type sealing rings, same should be lubricated with coat of chassis grease to stabilize rings in their grooves for ease of assembly of mating members. Lubricate all "O" rings and seals with recommended type Transmission Fluid before assembly.


Gears and Shafts

If magna-flux process is available, use process to check parts. Examine teeth on all gears carefully for wear, pitting, chipping, nicks, cracks or scores. If gear teeth show spots where case hardening is worn through or cracked, replace with new gear. Small nicks may be removed with suitable hone. Inspect shafts and quills to make certain they are not sprung, bent, or splines twisted, and that shafts are true.


Housing, Covers, etc.

Inspect housings, covers and bearing caps to be certain they are thoroughly clean 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.

*Torque Specification for Lubricated
or Plated Screw Threads*

Grade 5 

NOM. SIZE	FINE THREAD		COARSE THREAD	
	LB-FT	[N·m]	LB-FT	[N·m]
.7500	223 - 245	[302 - 332]	200 - 220	[271 - 298]
.6250	128 - 141	[174 - 191]	113 - 124	[153 - 168]
.5625	91 - 100	[123,4 - 135,5]	82 - 90	[111,2 - 122,0]
.5000	64 - 70	[86,8 - 94,9]	57 - 63	[77,3 - 85,4]
.4375	41 - 45	[55,6 - 61,0]	37 - 41	[50,2 - 55,5]
.3750	26 - 29	[35,3 - 39,3]	23 - 25	[31,2 - 33,8]
.3125	16 - 20	[21,7 - 27,1]	12 - 16	[16,3 - 21,6]
.2500	9 - 11	[12,3 - 14,9]	8 - 10	[10,9 - 13,5]

Grade 8 

FINE THREAD		COARSE THREAD	
LB-FT	[N·m]	LB-FT	[N·m]
315 - 347	[427 - 470]	282 - 310	[382 - 420]
180 - 198	[244 - 268]	159 - 175	[216 - 237]
128 - 141	[173,6 - 191,1]	115 - 127	[156,0 - 172,2]
90 - 99	[122,1 - 134,2]	80 - 88	[108,5 - 119,3]
58 - 64	[78,7 - 86,7]	52 - 57	[70,6 - 77,2]
37 - 41	[50,2 - 55,5]	33 - 36	[44,8 - 48,8]
28 - 32	[38,0 - 43,3]	26 - 30	[35,3 - 40,6]
11 - 13	[15,0 - 17,6]	9 - 11	[12,3 - 14,9]

© Copyright 2010 Dana Holding Corporation
All content is subject to copyright by Dana and may not
be reproduced in whole or in part by any means,
electronic or otherwise, without prior written approval.
THIS INFORMATION IS NOT INTENDED FOR SALE OR
RESALE, AND THIS NOTICE MUST REMAIN ON ALL
COPIES.

For product inquiries or support,
visit www.dana.com or call 419-887-6445
For other service publications,
visit www.SpicerParts.com/literature.asp
For online service parts ordering,
visit www.SpicerParts.com/order.asp



SPICER®

Off-Highway Products