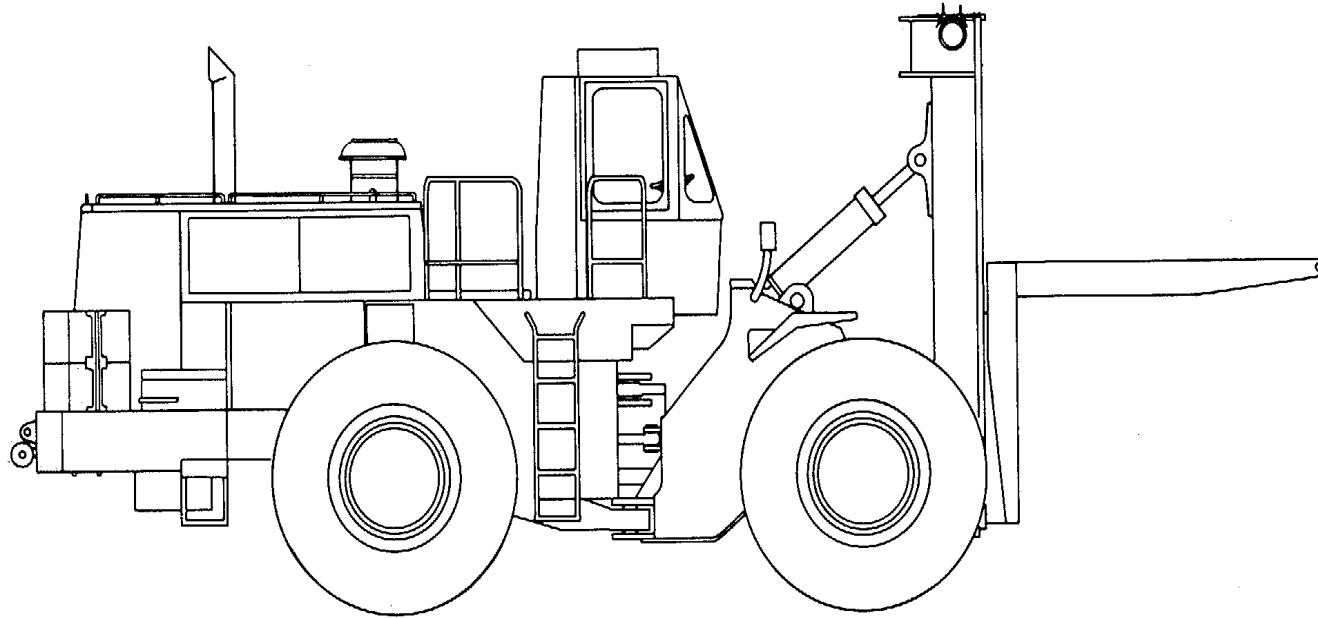


This copy is a reprint which includes current pages from Change 1.

TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL



**TRUCK, CONTAINER HANDLER
ROUGH TERRAIN, 50,000 LB CAPACITY
DED, PT, NSN 3930-01-082-3758
WITH TOPHANDLER(S)**

**POWER TRAIN MAINTENANCE
INSTRUCTIONS
PAGE 4-1**

**BRAKE SYSTEM AND WHEEL
MAINTENANCE INSTRUCTIONS
PAGE 5-1**

**STEERING SYSTEM
STEERING SYSTEMS
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**HYDRAULIC SYSTEM
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**BODY AND CAB 5
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**TOPHANDLER MAINTENANCE
INSTRUCTIONS
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CHANGE

NO. 1

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D.C., 14 AUGUST 1989

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

**TRUCK, CONTAINER HANDLER: ROUGH TERRAIN
50,000 LB CAPACITY, DED, PT
NSN 3930-01-082-3758 WITH TOPHANDLER(S)**

TM 10-3930-641-34-2, 30 October 1981, is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin of the page and by a vertical bar adjacent to the TA number.

Remove pages

i and "ii"
4-309 and 4-310
5-1 and 5-2
5-79 through 5-92
7-71 and 7-72
7-75 and 7-76
A-1 and A-2
B-31(B-4 Blank)
INDEX-7 and INDEX-8
INDEX-11 through INDEX-14

Insert pages

i/(ii Blank)
4-309 and 4-310
5-1 and 5-2
5-91 and 5-92
7-71 and 7-72
7-75 and 7-76
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INDEX-11 through INDEX-14

3. File this change sheet in front of the publication for reference purposes.

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Technical Manual

No. 10-3930-641-34-2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 30 October 1981

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL
TRUCK, CONTAINER HANDLER: ROUGH TERRAIN 50,000 LB
CAPACITY, DED, PT, NSN 3930-01-082-3758 WITH TOPHANDLER(S)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (*Recommended Changes to Publications and Blank Forms*), or DA Form 2028-2, located in the back of this manual, direct to: Commander, U.S. Army Tank-Automotive Command, ATTN: AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

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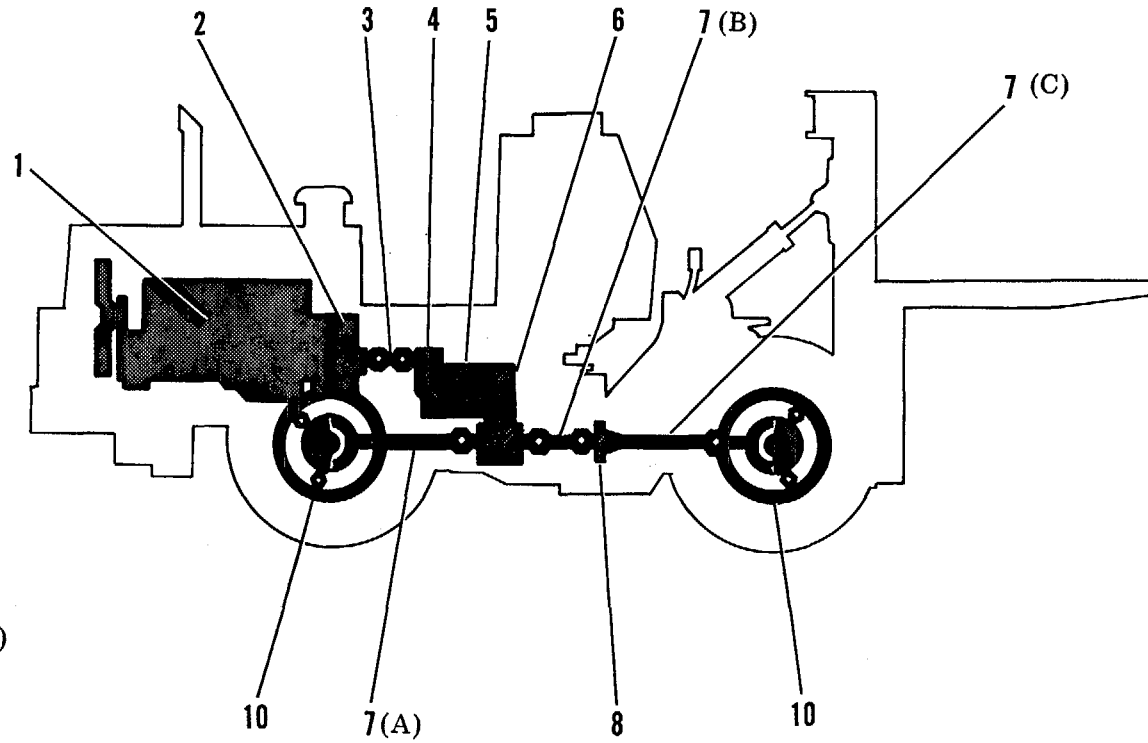
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Section I. GENERAL**DRIVE SYSTEM DESCRIPTION****(Sheet 1 of 2)**

1. DIESEL ENGINE. All power for the various components of the drive system originates from the engine. The engine, an eight cylinder V four cycle, is liquid cooled. The electrical system is a 24 volt negative ground with an alternator for recharging. Lubrication is supplied from a camshaft driven oil pump. Engine power is transferred from the engine flywheel to the torque converter.
2. TORQUE CONVERTER. The torque converter hydraulically increases the torque from the engine. The converter transfers the engine power to the drive train through a hydraulically activated clutch.
3. UPPER DRIVE SHAFT. Transmits the power from the torque converter to the input transfer gears. A universal joint is used at both ends of a short shaft. These universal joints enable slight movements between the torque converter and the input transfer gears.
4. INPUT TRANSFER GEARS. A system of gears between torque converter and transmission. The output gear of the transfer gears turns the input shaft of the transmission.
5. TRANSMISSION. A hydraulically activated (semi-automatic) type. The transmission has four speed ranges FORWARD and four speed ranges in REVERSE. Both speed and direction are manually selected. The transmission output shaft drives the input shaft of the output transfer gears.
6. OUTPUT TRANSFER GEARS. A system of gears at the output side of the transmission which transmits power from the transmission to the drive shafts. Two universal joints connect the output transfer gears to the front and rear drive shafts.
7. DRIVE SHAFTS. Three are used as a way of transmitting power from the:
 - A. Output transfer gears to the rear differential.
 - B. Output transfer gears to the bearing cage.
 - C. Bearing cage to the front differential.Shafts A and B have universals attached on both ends. Shaft B has one universal on the end that goes to the front differential. On the end towards the bearing cage is a splined slip joint.
8. BEARING CAGE. Provides support where the two forward drive shafts are joined together. The universal joint of one shaft and the splined slip joint of the other shaft are joined and supported here. While this connection transmits the power between the drive shafts it is also required for the vehicles articulated steering system.
9. DIFFERENTIAL. A gear arrangement which changes the direction of power 90°. Transferring the power from the drive shafts to the axle shafts it can divide the power between the left and the right shafts. Dividing the power enables the outside wheel to turn faster than the inside wheel while making a turn. This vehicle is equipped with a front and rear differential, both functioning in the same way.
10. FINAL DRIVE. A final gear arrangement causing speed reduction and torque increase in the drive train. The power from the axle shaft is changed in the final drive through the use of three planetary gears revolving around a centered drive gear, then transmitted to the road wheel. The vehicle has four final drives, one in each wheel.

Go on to Sheet 2



(9) Differentials (not shown)

End
4-3

TA099229

TRANSMISSION OIL SYSTEM DESCRIPTION

(Sheet 1 of 2)

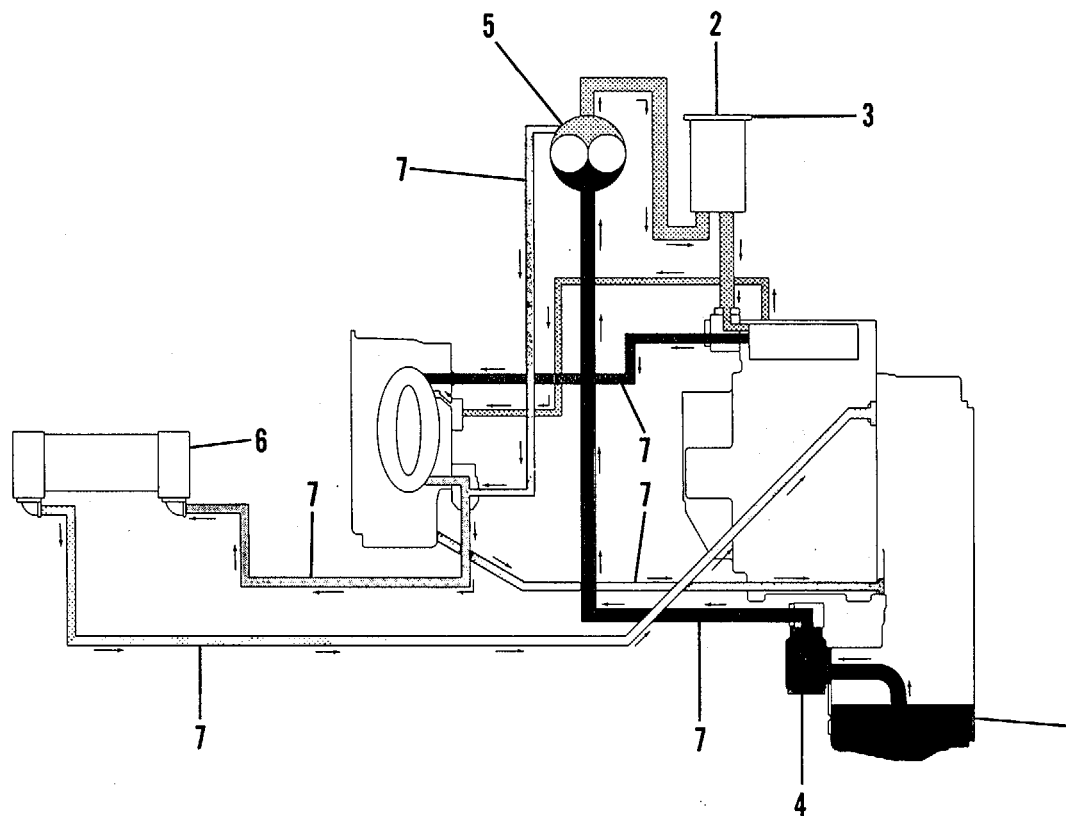
Transmission oil system consists of:

1. Oil reservoir
2. Oil filter
3. Filter bypass switch
4. Magnetic screen
5. Oil pump
6. Oil cooler
7. Connecting lines

1. **OIL RESERVOIR.** The lower portion of the output transfer gear case. A drain plug is located in the bottom of the case for draining transmission system oil.
2. **OIL FILTER.** The filter is located in the compartment behind the cab. It removes debris from the hydraulic oil. A bypass valve allows oil to flow if the filter becomes obstructed.

3. **FILTER BYPASS SWITCH.** Activates a warning light informing the operator the filter is obstructed.
4. **MAGNETIC SCREEN.** Removes metal particles and other debris before the oil goes to the oil pump. The screen is fastened to the output transfer gear case.
5. **OIL PUMP.** A gear-type pump, driven by the engine. Oil is pulled from the reservoir, through the magnetic screen and pumped to the oil filter.
6. **OIL COOLER.** Removes heat from the transmission system oil. High temperature oil comes from the torque converter and passes through the oil cooler. The heat of the oil is transferred to the engine cooling system, and the cooled oil returns to the transmission.
7. **CONNECTING LINES.** Carry oil to and from the oil filter and oil cooler.

Go on to Sheet 2



- 1. Oil reservoir
- 2. Oil filter
- 3. Filter bypass switch
- 4. Magnetic screen
- 5. Oil pump
- 6. Oil cooler
- 7. Connecting lines

Section II. TORQUE CONVERTER

TORQUE CONVERTER MAINTENANCE

This section covers maintenance of the torque converter for direct support and general support maintenance personnel:

- a. Torque converter

LIST OF TASKS**(Sheet 1 of 1)**

TASK NO	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Torque converter removal.	4-7	2-49
2	Torque converter installation.	4-12	None
3	Torque converter disassembly.	4-17	2-49
4	Torque converter assembly.	4-27	None

TORQUE CONVERTER REMOVAL

(Sheet 1 of 5)

This task covers: Removal of torque converter.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Identification tags for hoses.

Troubleshooting Reference

Page 2-49

Equipment Condition

Engine off.

Torque converter cooled.

Shipping link installed.

Special Tools

None

Personnel Required

Two mechanics.

References

Hood removal/installation,
 TM 10-3930-641-20.
 Crankcase guard removal/installation,
 TM 10-3930-641-20.
 Shipping link removal/installation,
 TM 10-3930-641-20.
 Steering and brake pump removal/
 installation, page 6-52
 Transmission oil pump removal page 4-179.
 Implement pump removal/installation,
 page 7-5

General Safety Instructions

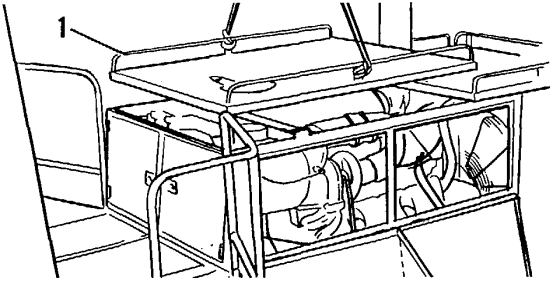
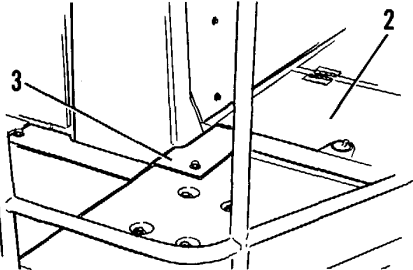
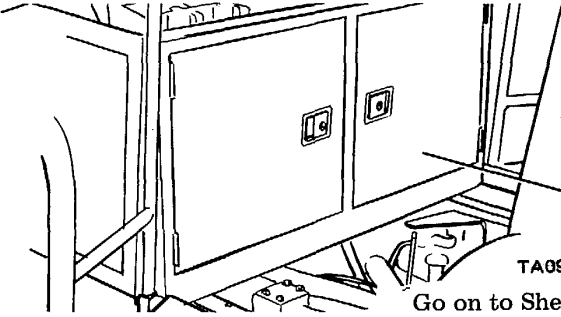
Block front and rear tires.

Main disconnect switch OFF

Go on to Sheet 2

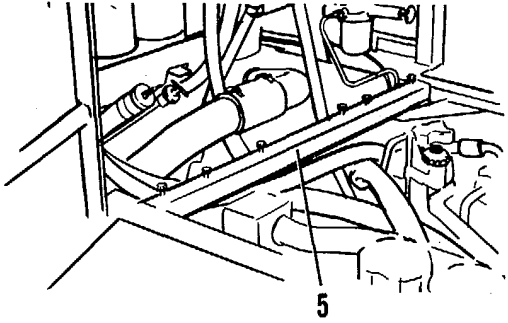
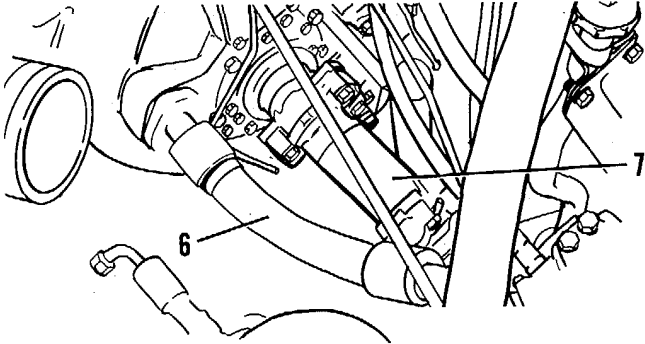
TORQUE CONVERTER REMOVAL (CONT)

(Sheet 2 of 5)

LOCATION/ITEM	ACTION	REMARKS
NOTE		
<p>Tag all lines, hoses and harnesses before disconnecting.</p>		
1. Oil line	<p>Disconnect an oil line at bottom of torque converter and drain oil into suitable container.</p>	
2. Precleaner lid	<p>Remove from air cleaner assembly.</p>	
3. Front hood (1)	<p>a. Disconnect latches. b. Fasten hoist and remove. Hood is 124 lb. (56 Kg).</p>	
4. Left and right covers (3) at bottom of roll over protective structure	<p>Remove.</p>	
5. Door and frame assembly (2) cap-screws	<p>Remove.</p>	 <p style="text-align: right;">TA099231 Go on to Sheet 3</p>
6. Door and frame assembly (2)	<p>Fasten hoist to unit and remove. Unit is 160 lb. (73 Kg).</p>	
7. Access door assembly (4) capscrews	<p>Remove.</p>	
8. Access door assembly (4)	<p>Fasten hoist to access door assembly and remove. Assembly is 55 lb. (25 Kg).</p>	

TORQUE CONVERTER REMOVAL (CONT)

(Sheet 3 of 5)

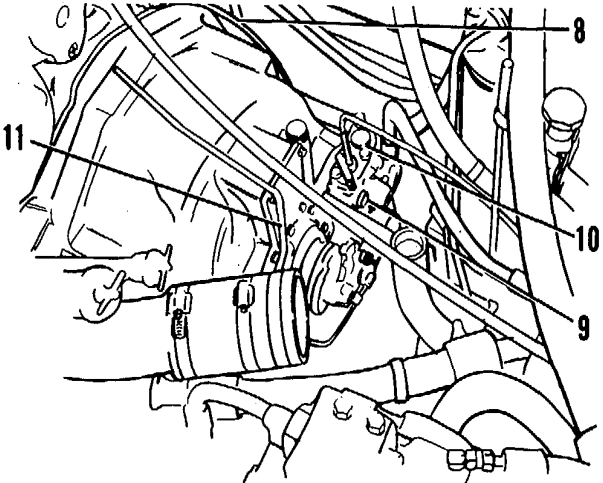
LOCATION/ITEM	ACTION	REMARKS
9. Channel assembly (5) capscrews	Remove.	 <p>See page 6-52.</p> <p>See page 4-179.</p> <p>See page 7-5.</p>
10. Channel assembly (5)	Remove.	
11. Steering and brake pump	Remove.	
12. Transmission oil pump	Remove.	
13. Implement pump	Remove.	
14. Hose assembly (6)	Remove.	
15. Drive shaft (7)	Remove. (See TM 10-3930-641-20)	

TA0992324-9

Go on to Sheet 4

TORQUE CONVERTER REMOVAL (CONT)

(Sheet 4 of 5)

LOCATION/ITEM	ACTION	REMARKS
16. Wiring harness (8)	Disconnect.	
17. Capscrews (9) and sequence and pressure control valve (10)	Remove. (See page 4-202)	
18. Tube assembly (11)	Remove.	
19. Wiring harness (8) relief valve.	Disconnect from torque converter outlet relief valve.	
20. Three capscrews that secure outlet relief valve	Remove. Remove outlet relief valve. (See page 4-225)	
21. Governor control cable assembly (12)	a. Disconnect from governor on engine. b. Move away from engine. c. Disconnect from transmission housing.	
22. Crankcase guards	Remove.	

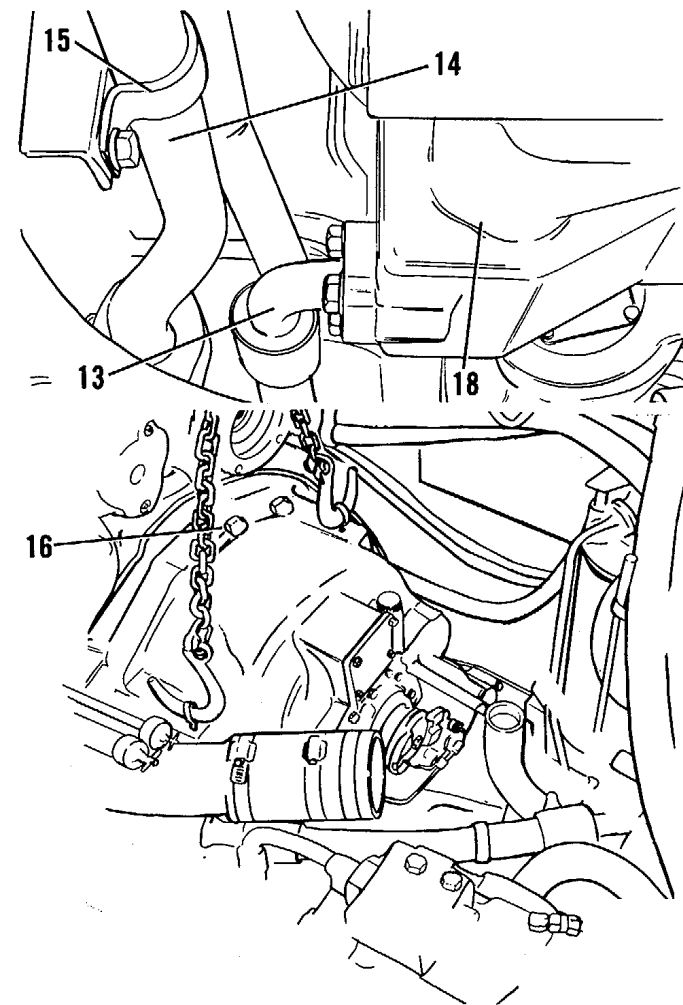
TA099233

Go on to Sheet 5

TORQUE CONVERTER REMOVAL (CONT)

(Sheet 5 of 5)

LOCATION/ITEM	ACTION	REMARKS
23. Hose assembly (13)	Disconnect from torque converter.	
24. Four capscrews	Remove from tube assembly (14) at the engine cooler.	
25. Clamp (15)	Loosen and move tube assembly (14) away from torque converter.	
26. Two 1/2-13NC forged eyebolts	Install in cover of torque converter, as shown.	
27. Torque converter	Fasten hoist.	
28. 11 capscrews (16)	Remove.	
29. Two capscrews	a. Use as forcing screws to loosen the torque converter from the flywheel housing.	
	b. Tighten evenly until torque converter is loose.	
30. Sleeve (18)	Remove lock.	
31. Torque converter	a. Pull out of the flywheel housing and make sure the sleeve at location (18) is free.	
	b. Remove. Converter is 443 lb. (201 Kg).	



TA099234

End
4-11

TORQUE CONVERTER INSTALLATION

This task covers: Installation of torque converter.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF.

Shipping link installed

Special Tools

None

Personnel Required

Two mechanics

References

LO 10-3930-641-12
 Crankcase guard removal/ installation
 TM 10-3930-641-20.
 Shipping link removal/installation.
 TM 10-3930-641-20.
 Transmission oil pump installation, page 4-184.
 Steering and brake pump removal/installation,
 page 6-52.
 Implement sump removal/installation, page 7-5.

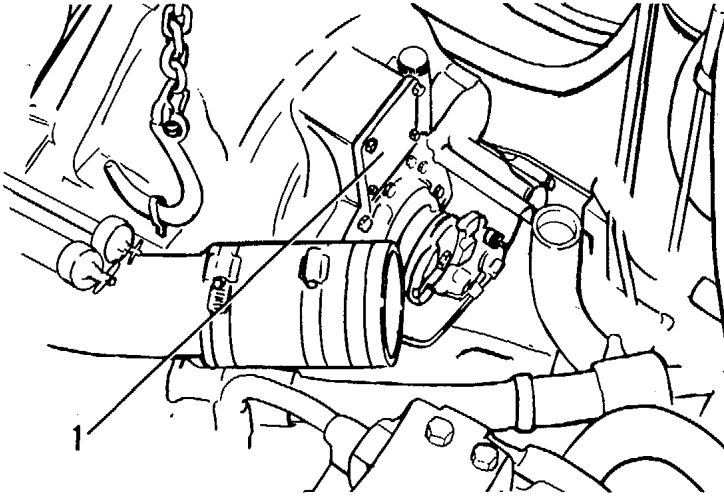
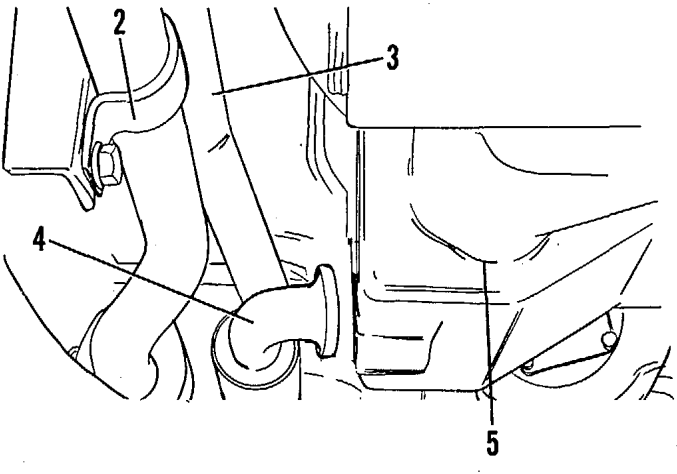
General Safety Instructions

Block front and rear tires.
 Main disconnect switch OFF.

Go on to Sheet 2

TORQUE CONVERTER INSTALLATION (CONT)

(Sheet 2 of 5)

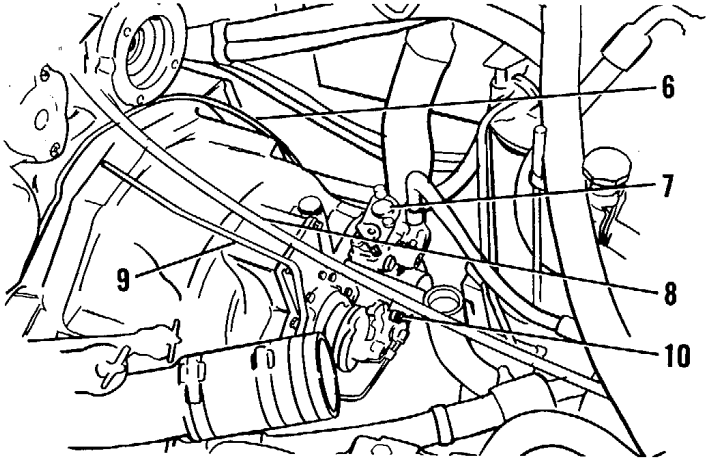
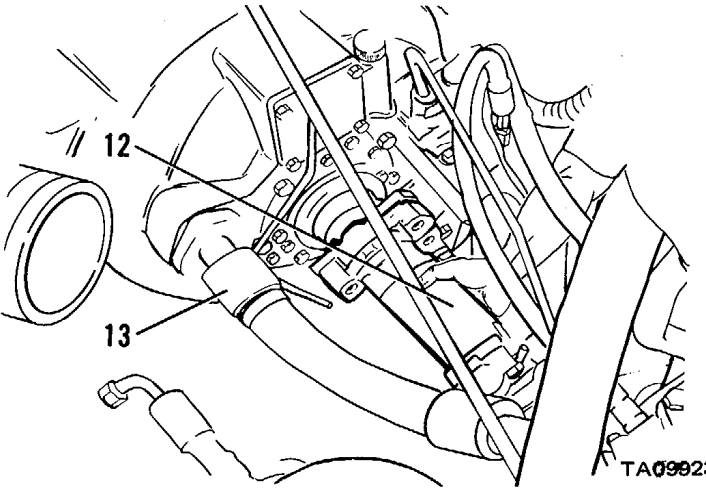
LOCATION/ITEM	ACTION	REMARKS
1. Torque converter	a. Install two 1/2-13NC eyebolts.	
	b. Fasten hoist and position torque converter in the machine.	
2. Sleeve (5)	Make sure sleeve (5) is in alignment with torque converter and flywheel housing before torque converter is pushed into position in flywheel housing.	
3. Torque converter	Push torque converter into flywheel housing.	
4. Cover	If teeth in flywheel are not in alignment with teeth on housing for converter, then remove cover (1) and turn shaft in converter until teeth are in alignment and converter is in position.	
5. Flywheel housing	Install 11 capscrews that hold torque converter to flywheel housing.	
6. Sleeve (5)	Install lock, capscrew, and lockwasher to hold sleeve (5) in place.	
7. Tube assembly (3)	Put tube assembly (3) in position and install capscrews that hold it at engine cooler.	
8. Clamp (2)	Install.	
9. Hose assembly (4)	Connect to torque converter.	
10. Crankcase guards	Install crankcase guards.	TA099235

See TM 10-3930-641-20.

**Go on to Sheet 3
4-13**

TORQUE CONVERTER INSTALLATION (CONT)

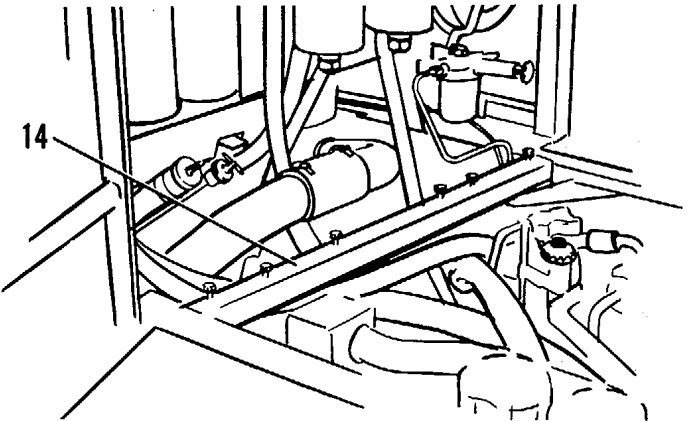
(Sheet 3 of 5)

LOCATION/ITEM	ACTION	REMARKS
11. Torque converter outlet relief valve (10)	Install. (See page 4-225)	
12. Tube assembly (3)	Connect to valve.	
13. Tube assembly (9)	Install.	
14. Wiring harness (6)	Connect.	
15. Sequence and pressure control valve (7)	Install. (See page 4-202)	
16. Wiring harness (6)	Connect to valve.	
17. Cable assembly (8)	Connect to engine governor.	
18. Hose assembly (13)	Install.	
19. Upper drive shaft (12)	Install with capscrews that hold it. Torque bolts to 90-110 lb. ft. (122-149 N.m). (See TM 10-3930-641-20.)	

Go on to Sheet 4

TORQUE CONVERTER INSTALLATION (CONT)

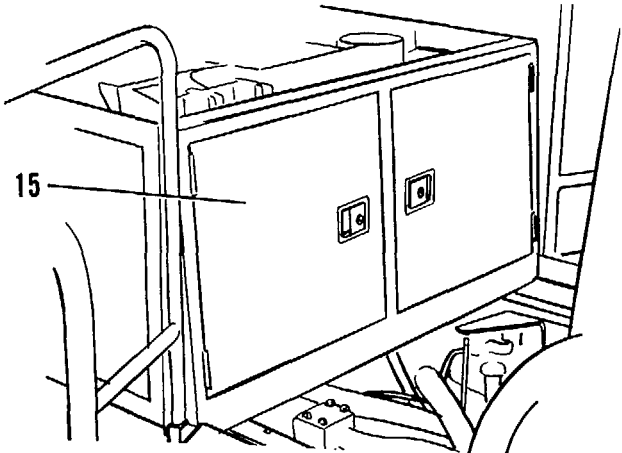
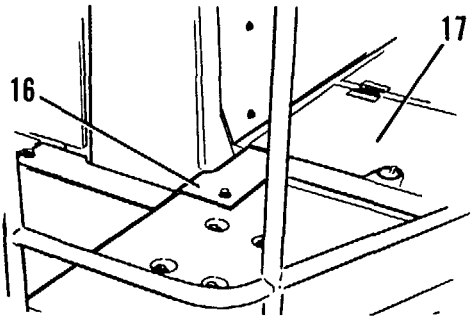
(Sheet 4 of 5)

LOCATION/ITEM	ACTION	REMARKS
20. Implement pump	Install.	
21. Transmission oil pump	Install.	See page 7-5.
22. Steering and brake pump	Install.	See page 4-184.
23. Side access panel	Install.	See page 6-52.
24. Channel assembly (14)	Install and secure with capscrews.	 <p>TA099237</p>

Go on to Sheet 5

TORQUE CONVERTER INSTALLATION (CONT)

(Sheet 5 of 5)

LOCATION/ITEM	ACTION	REMARKS
25. Frame and door assemblies (15)	a. Fasten hoist and install over transmission. b. Secure with capscrews.	
26. Right and left covers (16) at bottom of roll-over protective structure	Install.	
27. Access door assembly (17) over rear of cab	Install.	
28. Hood	Fasten hoist and install.	See TM 10-3930-641-20.
29. Precleaner lid	Install on air cleaner assembly.	
30. Oil	Fill transmission to correct level.	Refer to LO 10-3930-641-12. TA099238

**End
4-16**

TORQUE CONVERTER DISASSEMBLY

(Sheet 1 of 10)

This task covers: Disassembly of torque converter.

INITIAL SETUPTest Equipment

None

Materials/Parts

Wood blocking.

Troubleshooting Reference

Page 2-49

Equipment Condition

Torque converter removed from vehicle.

Special Tools

None

Personnel Required

One mechanic

References

Torque converter removal, page 4-7.

General Safety Instructions

Place piece parts in clean area.

Go on to Sheet 2

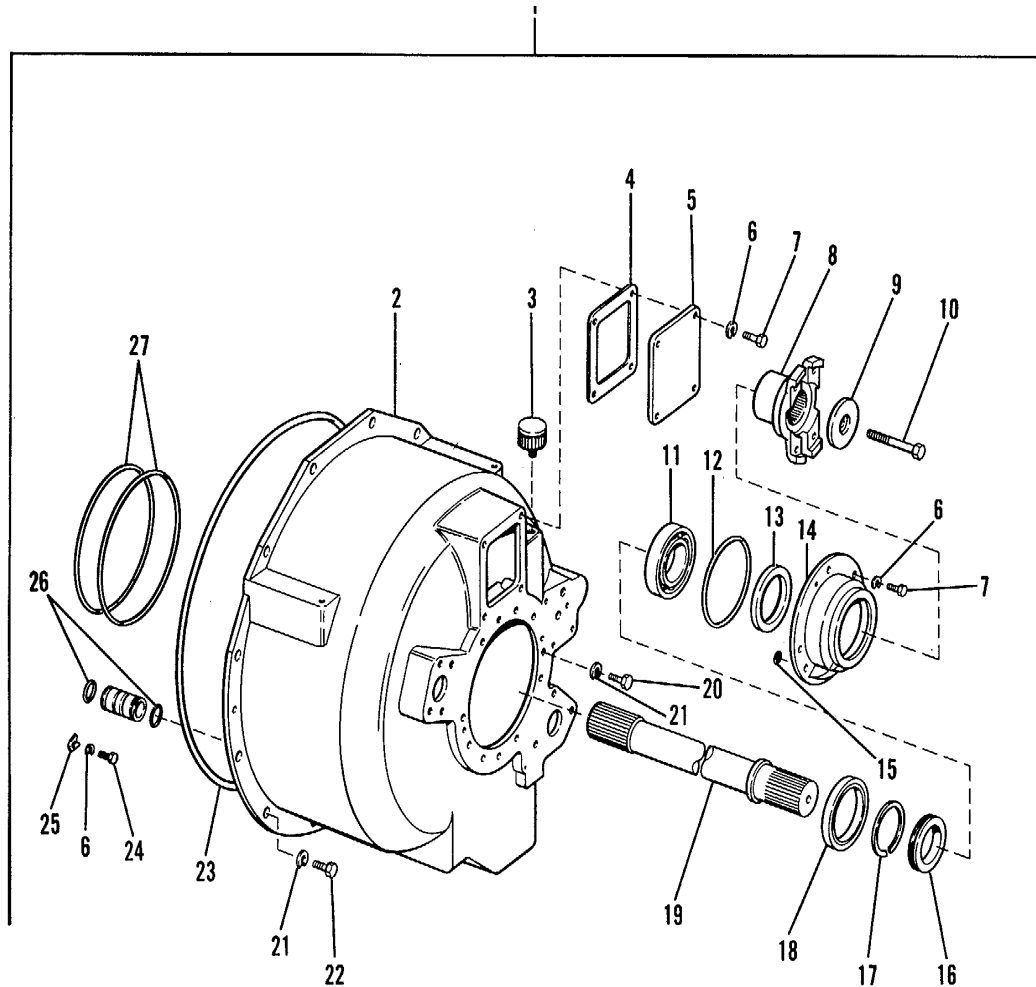
TORQUE CONVERTER INSTALLATION (CONT)

(Sheet 2 of 5)

LOCATION/ITEM	ACTION	REMARKS
1. Torque converter	Set on wood blocks.	
2. Eleven cover capscrews (20) and lockwashers (21)	Remove.	
3. Two 1/2-13NC forged eyebolts	Install in cover (2).	
4. Cover (2)	Fasten hoist and remove. Cover weighs 160 lbs. (73 Kg.).	
5. Capscrew (10), retainer (9), yoke (8)	Remove from end of shaft.	
6. Two seals (13)	Remove from carrier assembly.	
7. Six capscrews (7) and lockwashers (6)	Remove.	
8. Shaft (19) and carrier (14)	Remove as unit.	
Go on to Sheet 3		

TORQUE CONVERTER DISASSEMBLY (CONT)

1. Torque Converter Group
2. Torque Converter Cover
3. Breather
4. Gasket
5. Cover
6. Lockwasher
7. Capscrew
8. Yoke
9. Retainer
10. Capscrew
11. Ball Bearing
12. Preformed Packing
13. Lip Type Seal
14. Bearing Carrier
15. Preformed Packing
16. Seal Ring Carrier
17. Metal Ring
18. Rear Sleeve
19. Center Shaft
20. Capscrew
21. Lockwasher
22. Capscrew
23. Preformed Packing
24. Capscrew
25. Bearing Carrier Lock
26. Preformed Packing
27. Preformed Packing



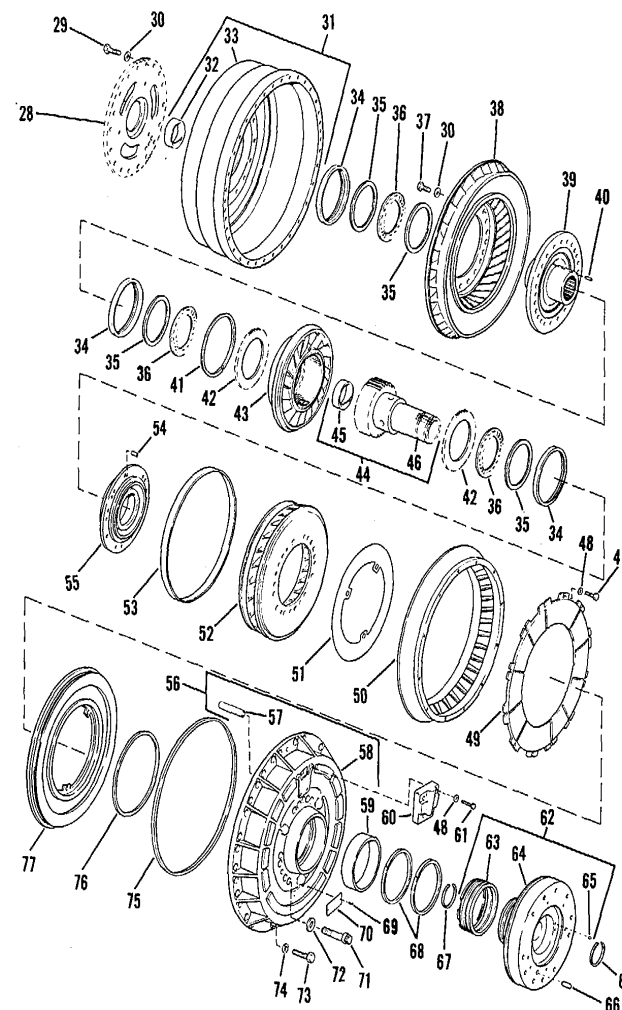
TA099239

Go on to Sheet 4

TORQUE CONVERTER DISASSEMBLY (CONT)

- 28. Drive Spider
- 29. Capscrew
- 30. Washer
- 31. Rotating Housing Assembly
- 32. Bearing
- 33. Housing
- 34. Thrust Bearing Retainer
- 35. Thrust Bearing Retainer
- 36. Thrust Bearing Roller
- 37. Capscrew
- 38. Converter Turbine
- 40. Thrust Race Lock Pin
- 41. Retaining Ring
- 42. Plate
- 43. Converter Stator
- 44. Stator Carrier Assembly
- 45. Sleeve Bearing
- 46. Stator Carrier
- 47. Capscrew
- 48. Washer
- 49. Clutch Disc Assembly
- 50. Converter Outer Impeller
- 51. Reaction Plate
- 52. Converter Impeller
- 53. Plastic Ring
- 54. Pin
- 55. Impeller Hub

- 56. Clutch Housing Assembly
- 57. Pin
- 58. Housing
- 59. Sleeve Bearing
- 60. Sleeve Bearing
- 61. Capscrew
- 62. Carrier Assembly
- 63. Ring Carrier
- 64. Bearing Carrier
- 65. Cup Plug
- 67. External Retaining Ring
- 68. Seal Ring
- 69. Screw
- 70. Name Plate
- 71. Capscrew
- 72. Washer
- 73. Capscrew
- 74. Washer
- 75. Seal Ring
- 76. Seal Ring
- 77. Clutch Piston



TA099240

Go on to Sheet 5

TORQUE CONVERTER INSTALLATION (CONT)

(Sheet 5 of 10)

LOCATION/ITEM	ACTION	REMARKS
9. Preformed packing (12) and (15)	a. Remove from carrier. b. Replace packing if damaged. c.	
10. Shaft (19)	Remove from carrier with arbor press.	
11. Seal ring carrier (16) and sleeve (18)	Remove from carrier.	
12. Ring (17)	Remove from carrier (16).	
13. Bearing (11)	Remove from carrier (14).	
14. Lip type seal (13)	Remove from carrier (14).	
15. External retaining ring (67) and carrier assembly (62)	Remove from torque converter group.	
	Go on to Sheet 6	
	4-21	

TORQUE CONVERTER INSTALLATION (CONT)

(Sheet 6 of 10)

LOCATION/ITEM	ACTION	REMARKS
16. Two rings (68)	Remove from carrier assembly (62).	
17. Pin (66) that holds carrier (63) in position on carrier assembly (62)	Remove.	
18. Carrier (63)	Remove from carrier assembly.	
19. Six capscrews (71) and washers (72), thirty-six capscrews (73) and washers (74)	Remove.	
20. Housing assembly (58)	<div style="border: 1px solid black; padding: 2px; text-align: center; margin: 0 auto;"> CAUTION </div> <p>Do not let piston fall out of housing assembly when housing assembly is removed.</p> <p>Fasten hoist and remove from converter group. Housing assembly weighs 72 lb. (33 Kg).</p>	

Go on to Sheet 7

TORQUE CONVERTER INSTALLATION (CONT)

(Sheet 7 OF 10)

LOCATION/ITEM	ACTION	REMARKS
21. Piston (77)	Remove from housing assembly.	
22. Ring (75)	Remove from piston (77).	
23. Ring (76)	Remove from housing assembly (58).	
24. Sleeve (59)	Remove from housing assembly (58) with puller.	
25. Capscrews (47) and washer (48)	Remove.	
26. Disc assembly (49) and plate (51) from converter group.	Remove.	
	Go on to Sheet 8	
	4-23	

TORQUE CONVERTER INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
NOTE		
Keep disc assembly and plate together when they are removed from torque converter.		
27. Two 3/8-16NC forged eyebolts	<ul style="list-style-type: none"> a. Install in impeller. b. Fasten hoist to eyebolts. 	
28. Impeller (52) and hub (55)	Remove as a unit. Impeller and hub weigh 22 lb. (10 Kg).	
29. Plastic ring (53)	Remove from impeller.	
30. Two retainers (34) and (35) and	Remove. roller assembly (36)	
31. Impeller (50)	Remove from housing (33).	
Go on to Sheet 9		
4-24		

TORQUE CONVERTER INSTALLATION (CONT)

(Sheet 9 of 10)

LOCATION/ITEM	ACTION	REMARKS
32. Stator (46) and carrier assembly (44)	Remove as unit.	
33. Ring (41)	Remove.	
34. Stator (46)	Remove from carrier assembly.	
35. Plate (42)	Remove from stator.	
36. Bearing (45)	Remove from carrier assembly (44).	
37. Two retainers (34) (35) and roller assembly (36)	Remove from hub (39).	
	Go on to Sheet 10	
	4-25	

TORQUE CONVERTER INSTALLATION (CONT)

(Sheet 10 of 10)

LOCATION/ITEM	ACTION	REMARKS
38. Turbine (38) and hub (39)	Remove from housing (33) as unit.	
39. Capscrews (37) and washers (30)	Remove.	
40. Turbine (38)	Remove from hub (39).	
41. Two retainers (35) and roller assembly (36)	Remove from housing (33).	
42. Housing (33)	Turn housing over.	
43. Capscrews (29), washers (30), and drive spider (28)	Remove from housing.	
44. Bearing (32)	Remove from drive spider.	
	End 4-26	

TORQUE CONVERTER ASSEMBLY

(Sheet 1 of 15)

This task covers: Assembly of the torque converter.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Engine OFF.

Special Tools

None

Personnel Required

One mechanic

References

LO 10-3930-641-12

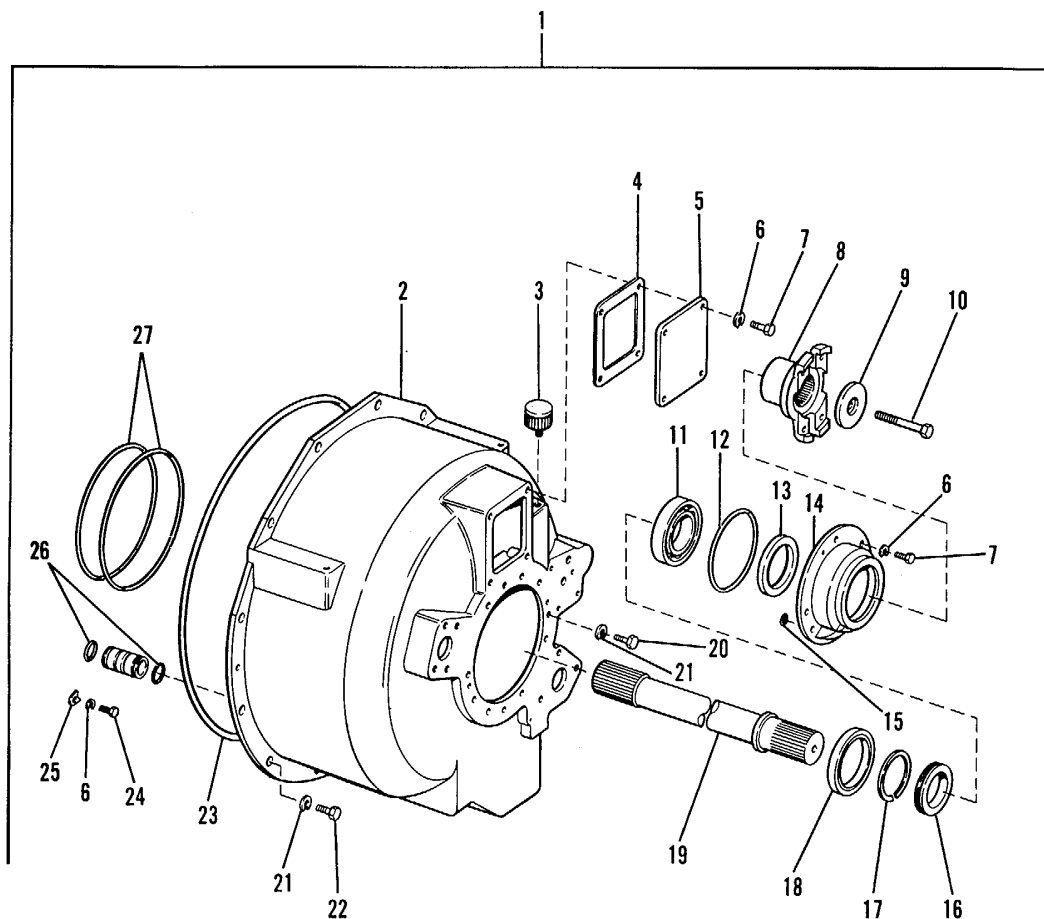
Torque converter removal, page 4-7.

Torque converter disassembly, page 4-17.

General Safety Instructions

Make sure piece parts are clean of all grit and dirt.

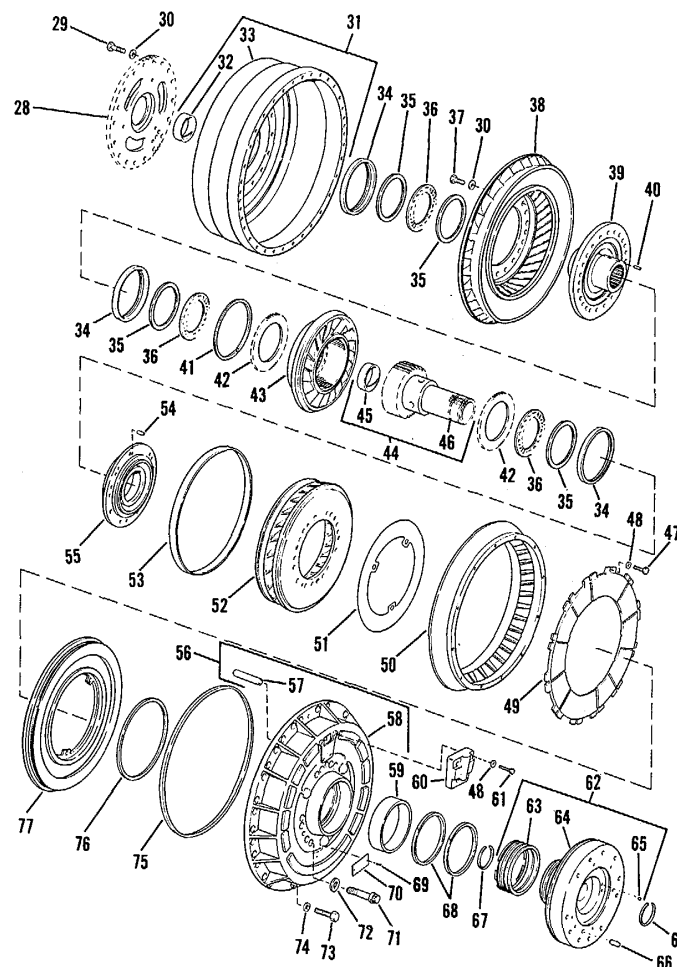
1. Torque Converter Assembly
2. Torque Converter Cover
3. Breather
4. Gasket
5. Cover
6. Lockwasher
7. Capscrew
8. Yoke
9. Retainer
10. Capscrew
11. Ball Bearing
12. Performed Packing
13. Lip Type Seal
14. Bearing Carrier
15. Performed Packing
16. Seal Ring Carrier
17. Metal Ring
18. Wear Sleeve
19. Carrier Shaft
20. Capscrew
21. Lockwasher
22. Capscrew
23. Performed Packing
24. Capscrew
25. Bearing Carrier Lock
26. Performed Packing
27. Performed Packing



Go on to Sheet 3

TA099241

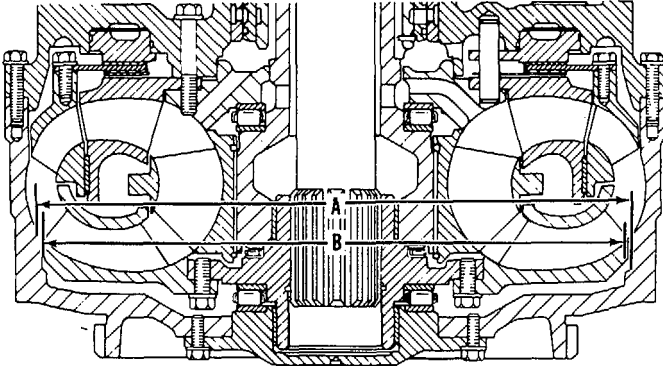
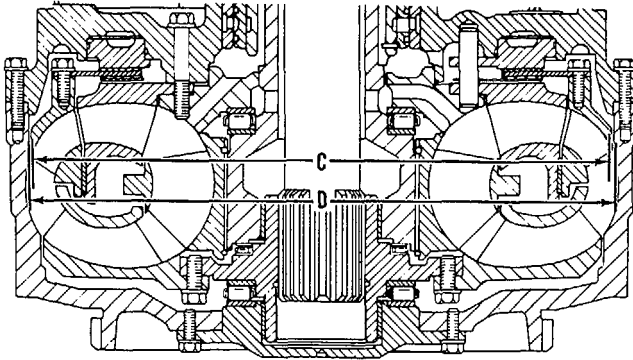
- | | |
|-------------------------------|-----------------------------|
| 28. Drive Spider | 56. Clutch Housing Assembly |
| 29. Capscrew | 57. Pin |
| 30. Washer | 58. Housing |
| 31. Rotating Housing Assembly | 59. Sleeve Bearing |
| 32. Bearing | 60. Cover |
| 33. Housing | 61. Capscrew |
| 34. Thrust Bearing Retainer | 62. Carrier Assembly |
| 35. Thrust Bearing Retainer | 63. Ring Carrier |
| 36. Thrust Bearing Roller | 64. Bearing Carrier |
| 37. Capscrew | 65. Cup Plug |
| 38. Converter Turbine | 66. Pin |
| 39. Turbine Hub | 67. External Retaining Ring |
| 40. Thrust Race Lock Pin | 68. Seal Ring |
| 41. Retaining Ring | 69. Screw |
| 42. Plate | 70. Name Plate |
| 43. Converter Stator | 71. Capscrew |
| 44. Stator Carrier Assembly | 72. Washer |
| 45. Sleeve Bearing | 73. Capscrew |
| 46. Stator Carrier | 74. Washer |
| 47. Capscrew | 75. Seal Ring |
| 48. Washer | 76. Seal Ring |
| 49. Clutch Disc Assembly | 77. Clutch Piston |
| 50. Converter Outer Impeller | |
| 51. Reaction Plate | |
| 52. Converter Impeller | |
| 53. Plastic Ring | |
| 54. Pin | |
| 55. Impeller Hub | |



TA099242

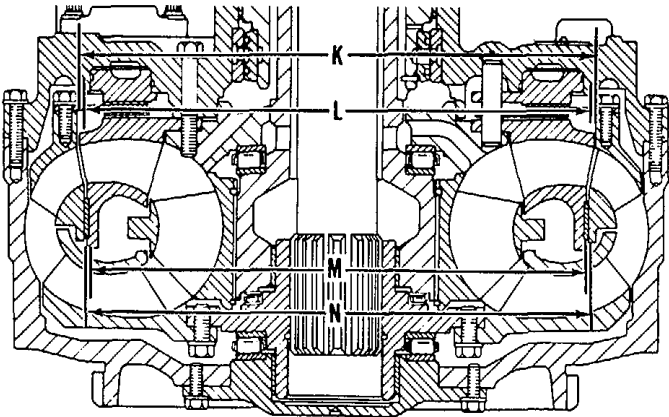
TA099242

Go on to Sheet 4
4-29

LOCATION/ITEM	ACTION	REMARKS
<p>1. Turbine (38) and converter housing (33)</p>	<p style="text-align: center;">NOTE</p> <p>Be sure all parts are clean before assembly.</p> <p>Check clearance between turbine and converter housing.</p> <p style="text-align: center;">NOTE</p> <p>Difference between inside diameter of housing (A) and outside diameter of turbine (B) must be at least .070 - .110 in. (1.78 - 2.80 mm) but no more than 0.135 in. (3.43 mm). Check in several locations.</p>	
<p>2. Outer impeller (50) and converter housing (33).</p>	<p>Check clearance between outer impeller and converter housing.</p> <p style="text-align: center;">NOTE</p> <p>Difference between inside diameter of the housing (D) and outside diameter of the outer impeller (C) must be at least .077 - 0.103 in. (1.96 - 2.62 mm) but no more than 0.135 in. (3.43 mm). Check in several locations.</p>	

Go on to Sheet 5
4-30

TORQUE CONVERTER ASSEMBLY (CONT)

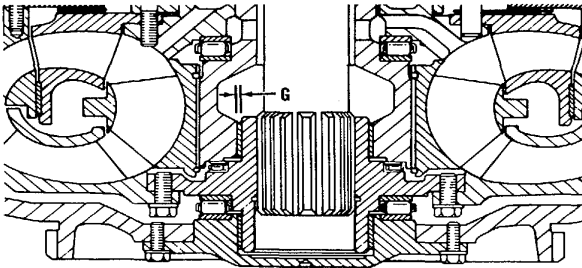
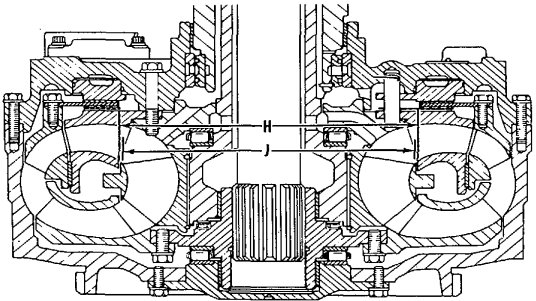
LOCATION/ITEM	ACTION	REMARKS
3. Bearing (32)	Install in cover assembly with driver. Be sure bearing is flush with outside surface of cover assembly.	
4. Drive spider (28)	a. Install in housing. b. Secure with capscrews (29) and washers (30), torqued to 77-85 lb. ft. (11-12.3 N.m).	
5. Housing (33)	Turn housing over.	
6. Two retainers (35) and roller assembly (36)	Install.	
7. Turbine (38) and stator (43)	a. Check clearance between turbine and stator.	
<p style="text-align: center;">NOTE</p> <p>Difference between diameter of turbine (F) and diameter of stator (E) must be at least 0.022 - 0.042 in. (0.56 - 1.6 mm) but no more than 0.048 in. (1.22 mm). Check in several locations.</p>		

**Go on to Sheet 6
4-31**

TA099244

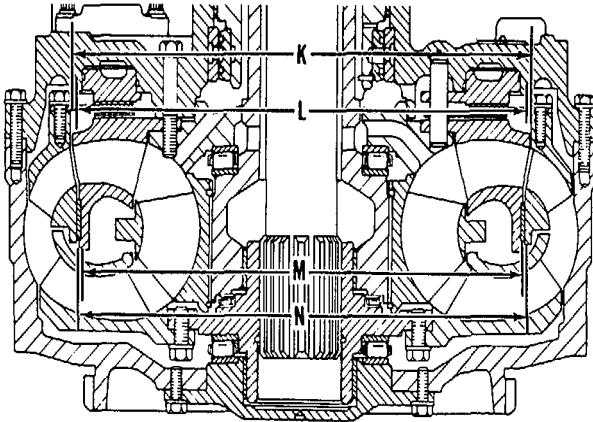
LOCATION/ITEM	ACTION	REMARKS
8. Turbine (38)	Put in position over hub (39).	
9. Twenty capscrews (37) and washers (30)	Install and tighten to a torque of 34-38 lb. ft. (45-51 N-m).	
10. Turbine (38) and hub (39)	Put in position in housing (33).	
11. Two retainers (34) and (35), roller assembly (36)	Install on hub (39) as shown.	
12. Bearing (45)	Install in carrier assembly (46) with driver. Be sure bearing is flush with counterbore in carrier assembly.	

Go on to Sheet 7
4-32

LOCATION/ITEM	ACTION	REMARKS
<p>13. Carrier (46) hub (39)</p>	<p>Check clearance between carrier and hub.</p> <p>NOTE</p> <p>Clearance (G) must be 0.0028 - 0.0068 in. (0.071 - 0.173 mm). If clearance is not within limits, then replace bearing between carrier and hub.</p>	
<p>14. Stator (43) and inner impeller (52)</p>	<p>Check clearance between stator and inner impeller.</p> <p>NOTE</p> <p>Difference between diameter of the stator (J) and diameter of the inner impeller (H) must be at least 0.022 - 0.042 in. (0.56 - 1.06 mm) but no more than 0.0048 in. (1.22 mm).</p>	

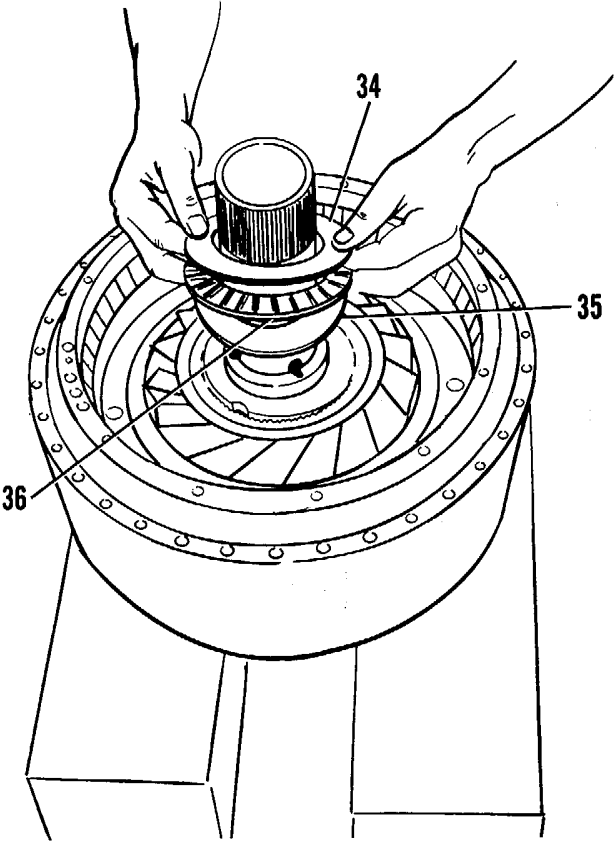
Go on to Sheet 8
4-33

TA099245

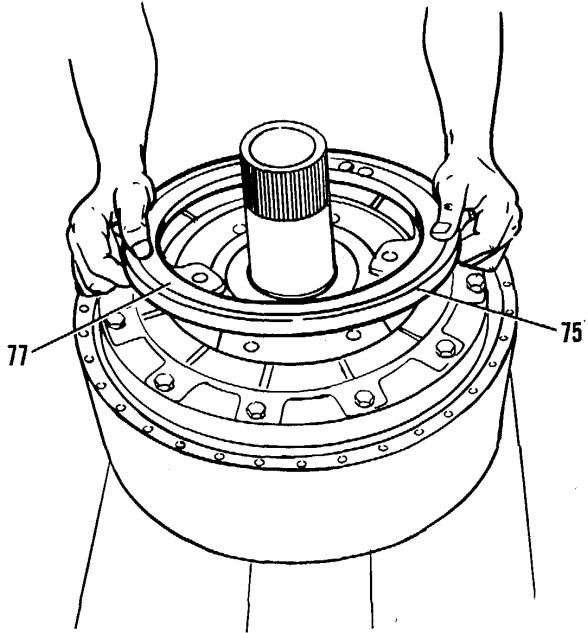
LOCATION/ITEM	ACTION	REMARKS
15. Stator (43)	Install in carrier.	
16. Stator ring (41)	Install.	
17. Carrier (44) and stator (43)	Install in housing (33).	
18. Outer impeller (50) and inner impeller (52)	Check clearance between outer impeller and inner impeller.	 <p>The difference between dimensions (K) and (L) must be at least 0.035 - 0.055 in. (0.64 - 1.40 mm), but no more than 0.60 in. (1.52 mm). Check in several locations.</p> <p>The difference between the diameter of the outer impeller (N) and the diameter of the inner impeller (M) must be at least .049 - .065 in. (1.25 - 1.65 mm) but no more than .086 in. (2.18 mm). Check in several locations.</p>

Go on to Sheet 9
4-34

TA099246

LOCATION/ITEM	ACTION	REMARKS	
19. Impeller (50)	Install in housing (33).		
20. Two retainers (34) and (35) and roller assembly (36)	Install.		
21. Hub (55)	Install.		
22. Ring (53)	Install on impeller (52).		
23. Impeller (52)	a. Install in outer impeller (50). b. Make sure dowel holes of hub align with holes in impeller.		
24. Plate (51)	a. Install. b. Make sure holes in plate (51) align with holes in impeller (52). c. Install.		

Go on to Sheet 10
4-35

LOCATION/ITEM	ACTION	REMARKS
25. Disc assembly (49)	Install.	
26. Twelve capscrews (47) and washers (48).	Install. Tighten bolts to a torque of 19-21 lb. ft. (26-28 N-m).	
27. Teflon seal (75) on piston (77)	a. Install as shown at right. b. Put piston (77) in position on disc assembly (49).	
28. Bearing (59)	a. Install in housing (58) using a driver. b. Bearing (59) must be flush with outside surface of housing (58).	
29. Teflon seals (76)	Install in housing (58).	

NOTE

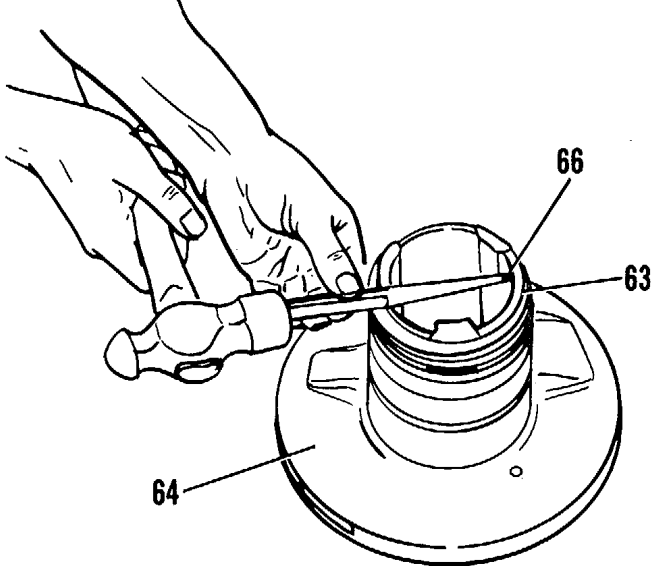
Be sure holes in piston align with holes in disc.

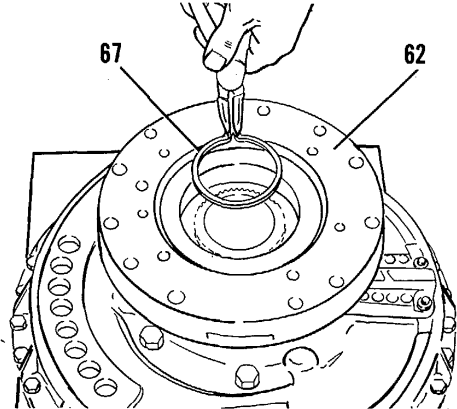
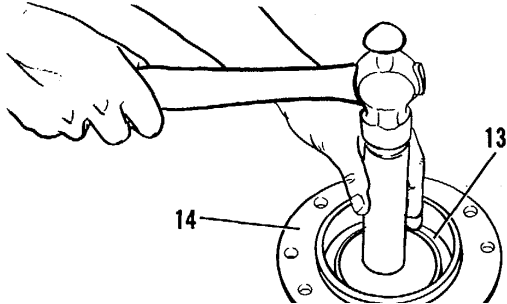
Go on to Sheet 11
4-36

TA099248

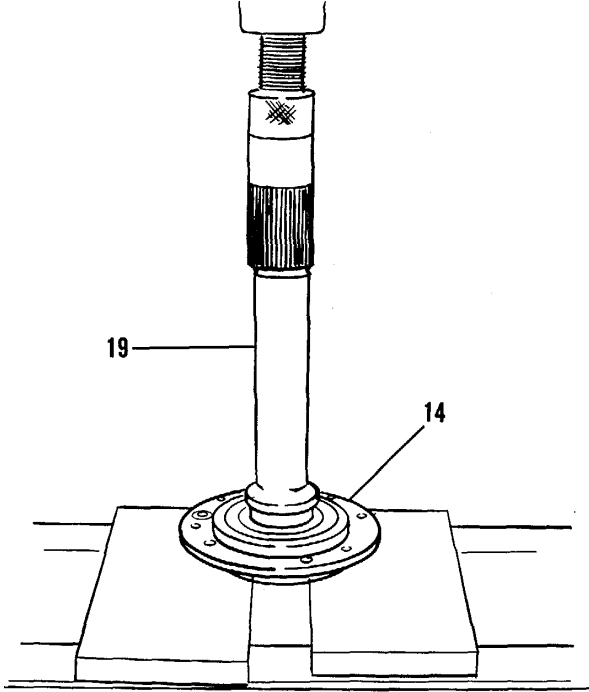
LOCATION/ITEM	ACTION	REMARKS
30. Two guide pins (66)	Install in housing (58).	
31. Housing (58)	a. Fasten to hoist. b. Put in position on converter.	
NOTE		
Be sure pins (66) in housing (58) go through piston plate and into impeller.		
32. Six capscrews (71) and washers (72) that secure clutch housing to impeller	Install and tighten to a torque of 80-90 lb. ft. (108-122 N·m).	
33. Thirty-six capscrews (73) and washers (74) that secure clutch housing to converter housing.	Install and tighten to a torque of 34-38 lb. ft. (43-49 N·m).	

Go on to Sheet 12

LOCATION/ITEM	ACTION	REMARKS
34. Ring carrier (63)	a. Heat to no more than 2750F (135°C) b. Install in bearing carrier (64).	
35. Pin (66)	Install as shown to secure carrier (63).	
36. Two seals (68)	Install on carrier (63).	
37. Carrier assembly (62)	Install in torque converter housing (58).	
<p>Go on to Sheet 13 4-38</p>		

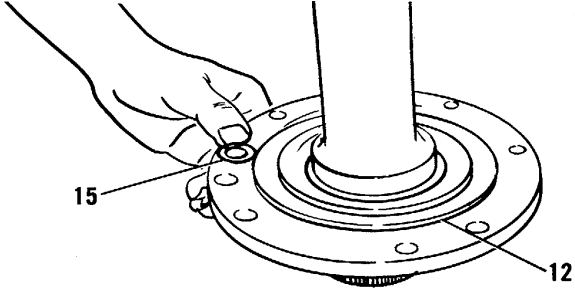
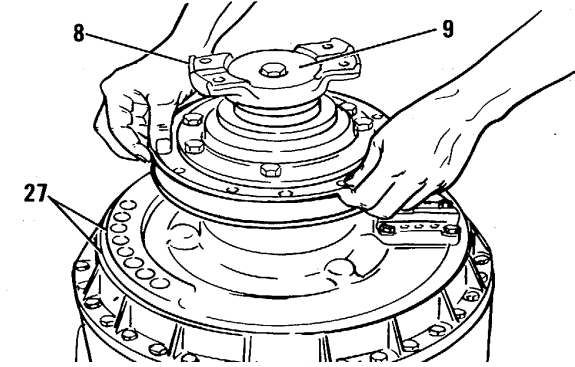
LOCATION/ITEM	ACTION	REMARKS
<p>38. Snap ring (67)</p>	<p>Install to secure carrier assembly (62).</p>	
<p>39. Lip type seal (13)</p>	<p>a. Install in carrier (14) with driver. b. Install with lip toward inside of carrier as shown. c. Install until it contacts counterbore in carrier.</p>	
<p>40. Bearing (11) and sleeve (18)</p>	<p>Install in carrier (14).</p>	<p style="text-align: right;">TA099250</p>

Go on to Sheet 14
4-39

LOCATION/ITEM	ACTION	REMARKS
41. Ring (17)	Install in carrier (14).	
42. Carrier seal ring (16)	Install in carrier (14).	
43. Shaft (19)	Install in carrier (14) with arbor press as shown at right.	

Go on to Sheet 15
4-40

TA099251

LOCATION/ITEM	ACTION	REMARKS
44. Large preformed packing (12) and small performed packing (15)	Install in carrier.	
45. Shaft (19) and carrier	a. Install in torque converter. b. Install capscrews (7) and lockwashers (6) to secure unit.	
46. Two performed packing (27)	Install on carrier assembly (62).	
47. Yoke (8), retainer (9) and canscrew (10)	a. Install on end of shaft. b. Tighten yoke capscrew to a torque of 80-90 lb. ft. (109-121 N-m).	
48. Cover (2)	a. Fasten to hoist. b. Put in position over torque converter.	
49. Eleven cover capscrews (22) and lockwashers (21)	Install.	

End
4-41

TA099252

Section III. TRANSMISSION

TRANSMISSION MAINTENANCE INSTRUCTIONS

This section covers maintenance of these transmission components for direct support and general support maintenance personnel.

- a. Transmission
- b. Input gears
- c. Output gears
- d. Transmission controls

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Transmission and transfer assembly removal.	4-43	None
2	Transmission and transfer assembly installation.	4-56	None
3	Transmission disassembly.	4-68	2-44, 2-49, 2-50, 2-52
4	Transmission assembly.	4-88	None
5	Transfer gear assembly (input and output) removal.	4-119	2-42
6	Transfer gear assembly (input and output) installation.	4-122	None
7	Transfer gear assembly (input) disassembly.	4-124	2-42, 2-49
8	Transfer gear assembly (input) assembly.	4-129	None
9	Transfer gears bearing adjustment (input).	4-136	2-42
10	Transfer gear assembly (output) disassembly.	4-138	2-44, 2-49
11	Transfer gear assembly (output) assembly	4-146	None
12	Transfer gear assembly bearing adjustment (output)	4-155	2-44
13	Transmission hydraulic controls removal/ installation	4-157	None
14	Transmission hydraulic controls disassembly.	4-164	None
15	Transmission hydraulic controls assembly.	4-171	None

This task covers: Removal of transmission and transfer assembly.

INITIAL SETUP

Test Equipment Reference

None

Materials/Parts

Tags for identification.

Troubleshooting

None

Equipment Condition

Engine cooled.

Oil drained from transmission and transfer gears.

Special Tools

None

Personnel Required.

Two mechanics

Shipping link installed.

References

LO 10-3930-641-12

Replacing oil in transmission and transfer gears, TM10-3930-641-20.

Drive shafts removal/installation, TM10-3930-641-20.

Brake accumulator removal/installation, page 5-5.

Brake control valve group removal/installation, page 5-26.

Shipping link removal/installation, TM 10-3930-641-20.

General Safety Instructions

Tires are blocked.

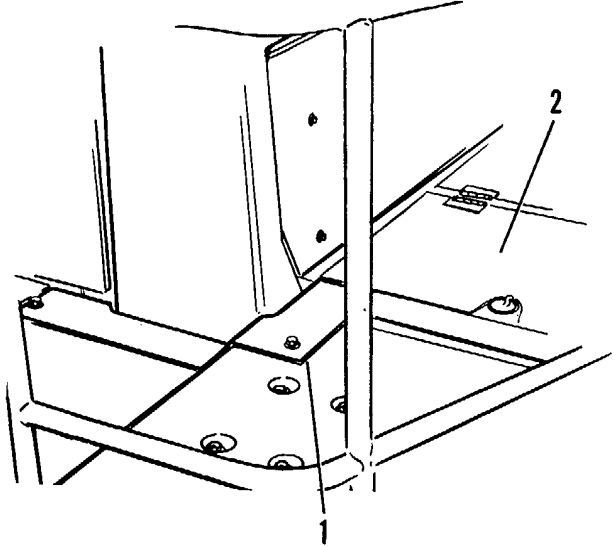
Main disconnect switch

OFF.

Hood removal/installation, TM 10-3930-641-20.

Transmission control lock, removal/installation, page 4-210.

Go on to Sheet 2 4-43

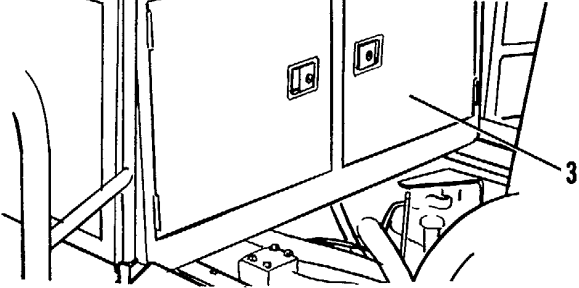
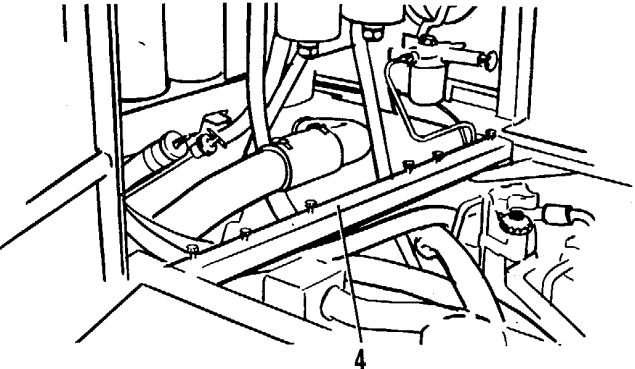
LOCATION/ITEM	ACTION	REMARKS
1. Oil	Drain from transmission and transfer gears at bottom of output transfer gear case.	Refer to TM 10-3930-641-20.
2. Hydraulic oil	Drain oil from hydraulic tank.	Refer to TM 10-3930-641-20.
3. Precleaner lid	a. Loosen screw. b. Remove from air cleaner assembly.	
4. Engine access panels	Open.	
5. Hood	Fasten hoist and remove. Hood weighs 124 lb. (56 Kg). (See TM 10-3930-641-20.)	
6. Access panels (1) at base of roll-over protective unit	Remove.	
7. Capscrews from door and frame assembly (2)	Remove.	
8. Hoist	Attach to door and frame assembly. Weight of assembly is 160 lb. (72.6 Kg).	
9. Door and frame assembly (2)	Remove.	

Go on to Sheet 3
4-44

TA099253

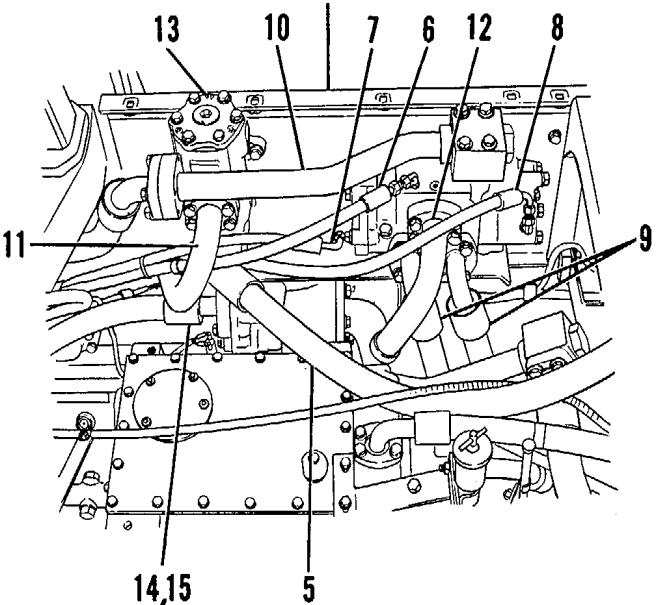
TRANSMISSION AND TRANSFER ASSEMBLY REMOVAL (CONT)

(Sheet 3 of 13)

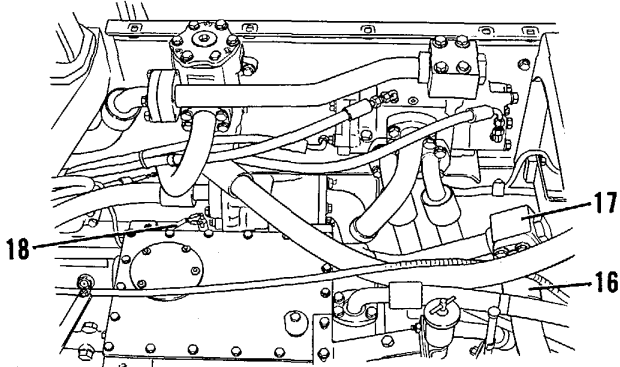
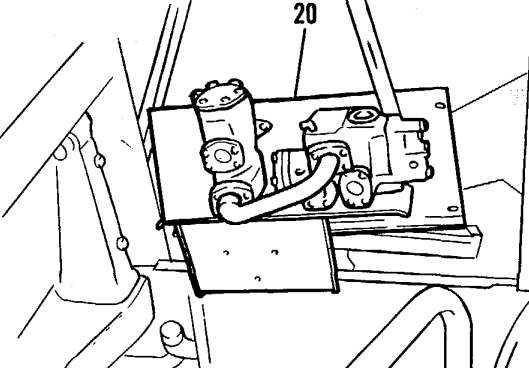
LOCATION/ITEM	ACTION	REMARKS
10. Access door assembly (3) capscrews, nuts and washers	Remove.	
11. Hoist	Attach to door assembly. Weight of door is 55 lb. (25 Kg).	
12. Access door assembly (3)	Remove.	
13. Channel assembly (4) capscrews and washers	Remove.	
14. Channel assembly (4)	Remove.	
<p style="text-align: center;">NOTE</p> <p>Tag all hoses and tubes when they are removed. Cap or plug openings. Secure any hoses disconnected but not removed away from the transmission.</p>		
<p>Go on to Sheet 3</p>		<p>TA099254</p>
<p>4-45</p>		

TRANSMISSION AND TRANSFER ASSEMBLY REMOVAL (CONT)

(Sheet 4 of 13)

LOCATION/ITEM	ACTION	REMARKS
15. Hydraulic supply hose (5)	Tag and remove from hydraulic pump and filter.	<p style="text-align: center;">FILTER AND STEERING PANEL</p> 
16. Three pilot hose assemblies (6, 7 and 8)	Tag and disconnect from steering control valve.	
17. Two steering cylinder hoses (9) valve.	Tag and disconnect from steering control valve.	
18. Oil return tube assembly (10)	Tag and remove.	
19. Filter inlet tube (11)	a. Tag and disconnect at both ends b. Remove.	
20. Supplemental steering tube (12)	a. Tag and disconnect at both ends. b. Remove.	
21. Access panel transmission compartment, right hand side of vehicle	Remove for access to steering panel mounting capscrew.	
22. Filter assembly (13)	a. Remove capscrews and washers. b. Remove from panel assembly.	
23. Supplemental steering tubes, (14 and 15) and hose (15A)	Tag and disconnect at lower end of hoses.	

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
24. Wire to supplemental steering flow switch (18)	a. Tag. b. Disconnect.	
25. Supplemental steering supply hose (16)	a. Tag and disconnect from manifold (17). b. Remove.	
26. Handrail assembly for clearance.	Remove from right side of vehicle if required	
27. Hoist	Attach to filter and steering valve panel (20) assembly. Weight of panel is 185 lb. (84 Kg).	
28. Capscrews (21) securing panel assembly to frame	Remove.	
29. Filter and steering valve panel assembly (20)	a. Lift slowly and carefully to clear frame and transmission. b. Lift until supplemental steering hoses (14 and 15) and 15A capscrews can be reached.	

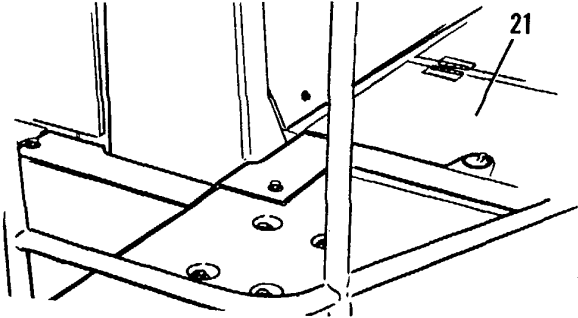
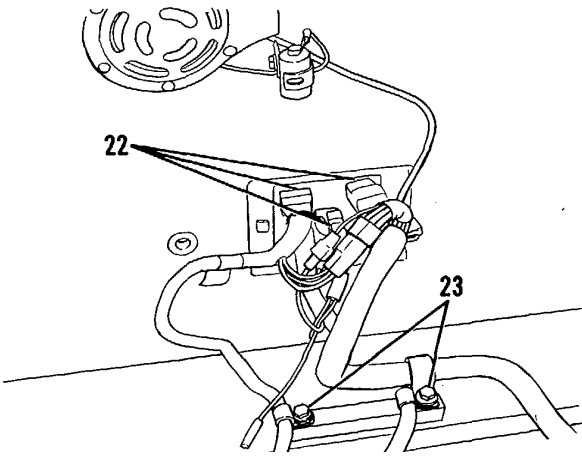
See page 4-46 for art illustration.

TA099256

Go on to Sheet 6

TRANSMISSION AND TRANSFER ASSEMBLY REMOVAL (CONT)

(Sheet 6 of 13)

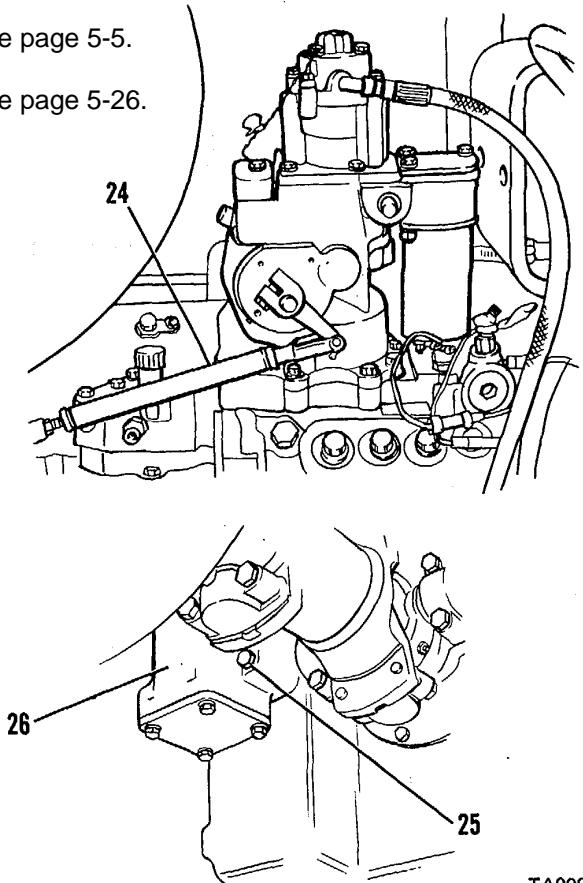
LOCATION/ITEM	ACTION	REMARKS
30. Supplemental steering hoses (14 and 15) and 15A	Tag and disconnect from diverter valve	
31. Filter and steering valve panel assembly (20)	Remove from vehicle.	
32. Access panel at rear of roll-over structure (21)	Remove.	
33. Connectors (22) at back of cab	Tag and disconnect two connectors.	
34. Capscrews and clips (23) securing wiring harness to frame	Remove.	

Go on to Sheet 7

TA099257

TRANSMISSION AND TRANSFER ASSEMBLY REMOVAL (CONT)

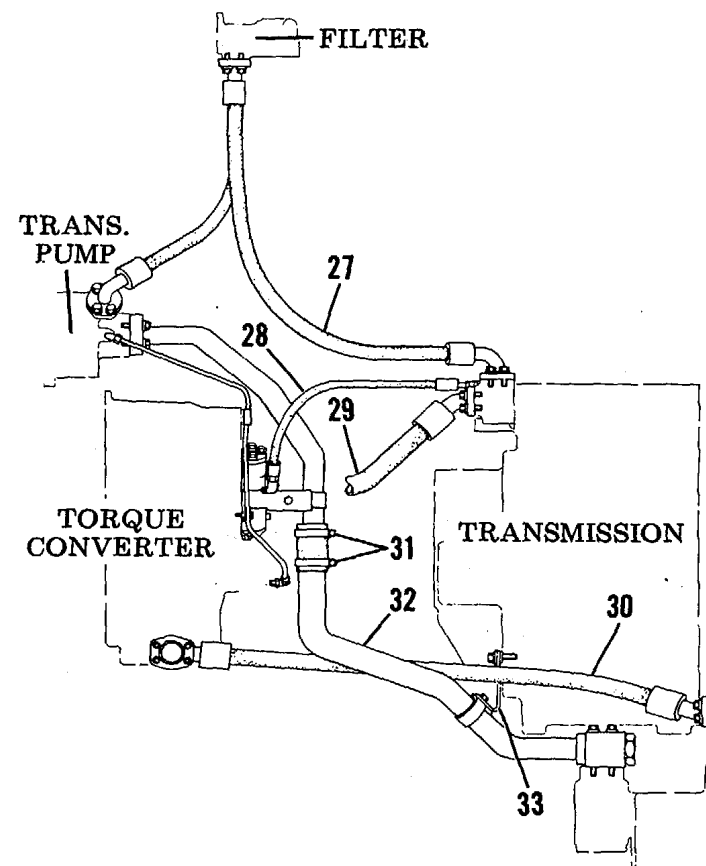
(Sheet 7 of 13)

LOCATION/ITEM	ACTION	REMARKS
35. Brake accumulator	Remove.	
36. Brake control valve group	Remove.	See page 5-5.
37. Governor control cable (24)	a. Disconnect from governor. b. Remove clamp securing cable to engine bracket and transmission. c. Move away from transmission.	See page 5-26.
38. Three capscrews (25) and screen assembly (26)	Remove.	

Go on to Sheet 8
4-49

TA099258

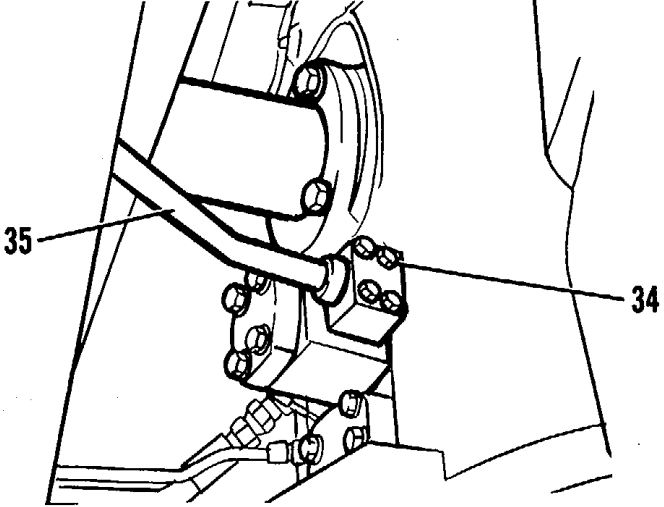
LOCATION/ITEM	ACTION
39. Transmission oil filter hose assembly (27)	a. Tag and disconnect at transmission. b. Secure away from transmission.
40. Transmission to torque converter hose assemblies (28 and 29)	a. Tag and disconnect at transmission. b. Secure away from transmission.
41. Hose assembly (30) from torque converter to output transfer gear assembly	Tag and disconnect at output transfer gear assembly.
NOTE Access for removal from bottom of vehicle.	
42. Hose clamps (31) on transmission oil pump supply line (32)	Loosen.
43. Bracket (33) securing supply line to transmission	Remove.
44. Supply line (32)	Tag and remove.



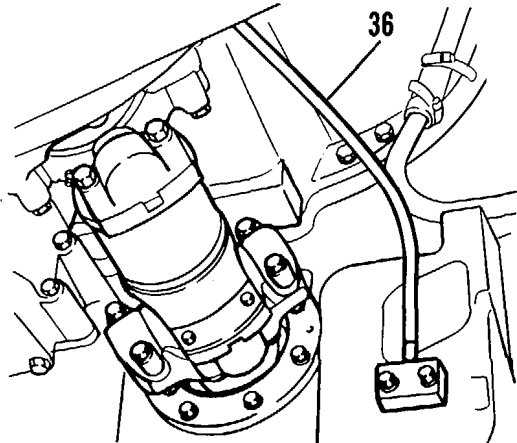
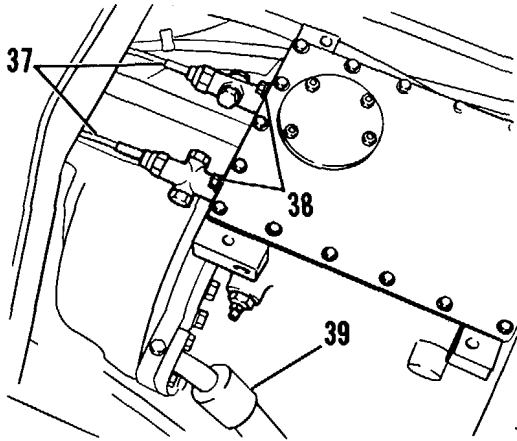
TA099259

Go on to Sheet 9
4-50

TRANSMISSION AND TRANSFER ASSEMBLY REMOVAL (CONT)

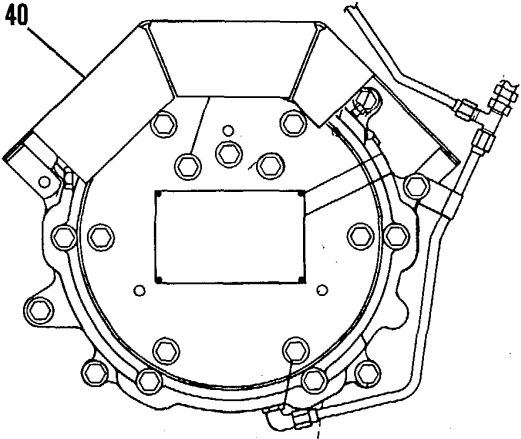
LOCATION/ITEM	ACTION	REMARKS
45. Capscrews (34)	Remove.	
46. Tube assembly (35) (Right side of vehicle hydraulic tank)	a. Remove bracket clamp and hose clamp. b. Tag and remove tube.	
47. Upper drive shaft (between torque converter and transmission)	Remove.	Refer to TM 10-3930-641-20.
48. Lower rear drive shaft (between transfer gearcase and rear differential)	Remove.	Refer to TM 10-3930-641-20.
49. Lower center drive shaft	Remove.	Refer to TM 10-3930-641-20.
Go on to Sheet 10		TA099260
4-51		

TRANSMISSION AND TRANSFER ASSEMBLY REMOVAL (CONT)

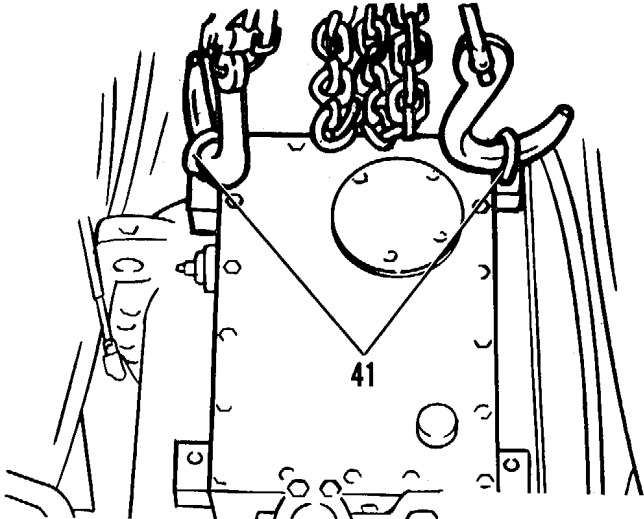
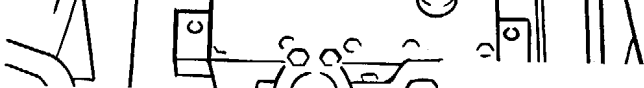
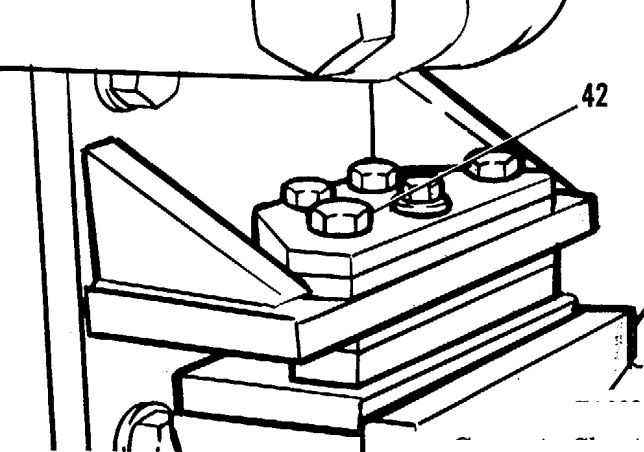
LOCATION/ITEM	ACTION	REMARKS
50. Transmission plunger assembly (36) (access from under vehicle)	Remove. Remove from bracket securing to gearcase.	
51. Transmission control lock assembly	Remove.	See page 4-210.
52. Transmission control cables (37)	a. Remove two capscrews (38). b. Separate ring on cable from spool in transmission hydraulic control valve.	
53. Hose assembly 39	Tag and disconnect.	TA099261 TA099261

Go on to Sheet 11

TRANSMISSION AND TRANSFER ASSEMBLY REMOVAL (CONT)

LOCATION/ITEM	ACTION	REMARKS
54. Guard assembly (40) over parking brake	Remove.	 <p>Go on to Sheet 12</p> <p>4-53</p> <p>TA099262</p>

TRANSMISSION AND TRANSFER ASSEMBLY REMOVAL (CONT)

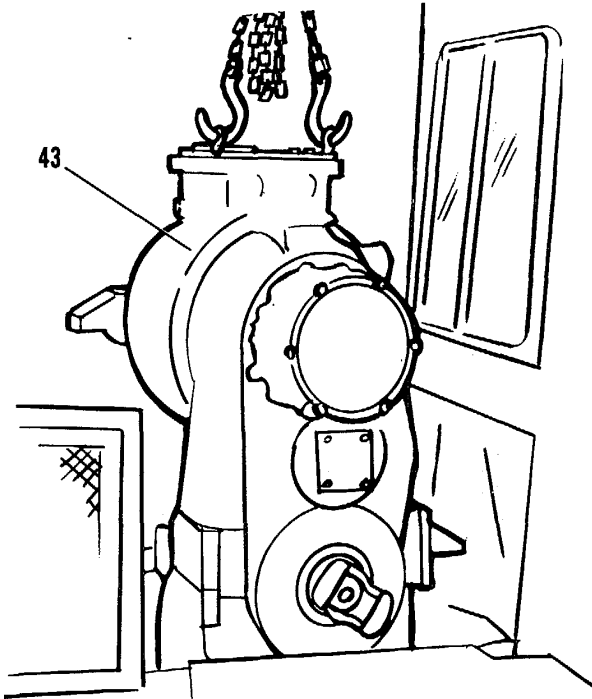
LOCATION/ITEM	ACTION	REMARKS
55. Two 5/8-11NC forged eyebolts (41)	Install in top of transmission as shown.	
56. Hoist	Attach. Weight of transmission and transfer assembly is 2836 lb. (1286 Kg).	
57. Capscrews (42) that hold transmission and transfer assembly to main frame	Remove.	

NOTE

Lift transmission and remove remaining capscrews.

Go on to Sheet 13
4-54

TRANSMISSION AND TRANSFER ASSEMBLY REMOVAL (CONT)

LOCATION/ITEM	ACTION	REMARKS
58. Transmission	Lift transmission about 2 in. (50.8 mm).	
59. Bracket assemblies that hold transfer assembly to frame on both sides	Remove from vehicle.	
60. Cables, wire harnesses, and hydraulic lines	Make sure all are out of the way before removing transmission.	
61. Transmission and transfer assembly (43)	Remove.	

End

4-55

TA099264

TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION

(Sheet 1 of 12)

This task covers: Installation of transmission and transfer assembly.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required.

Troubleshooting Reference

None

Equipment Condition

Transmission and transfer gears removed.

Shipping link installed.

Special Tools

None

Personnel Required

Two mechanics

References

LO 10-3930-641-12
Transmission and transfer assembly removal,
page 4-43.

Hood removal/installation,
TM 10-3930-641-20.

Shipping link removal/installation,
TM 10-3930-641-20.

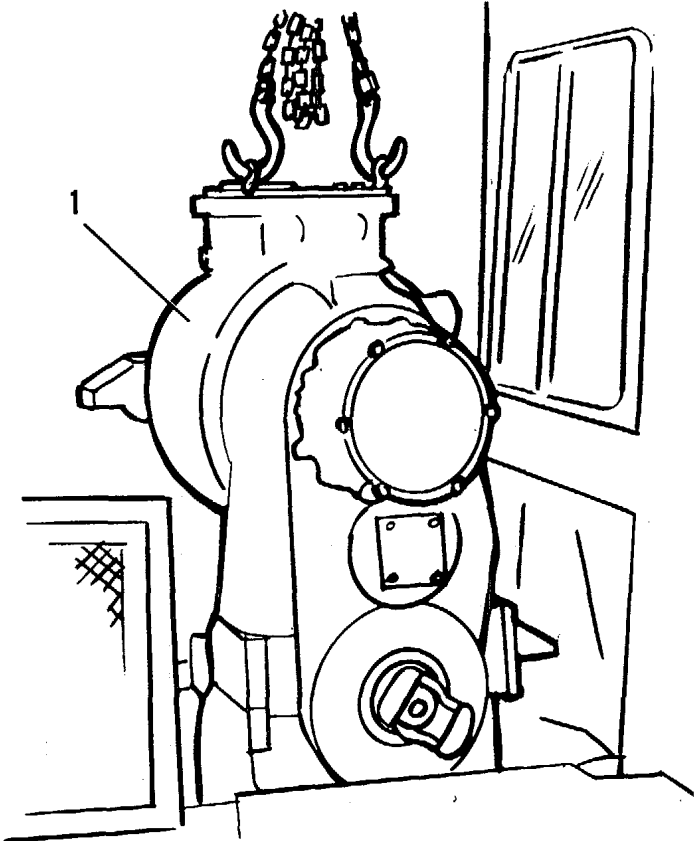
General Safety Instructions

Block front and rear tires.
Main disconnect switch OFF.

Go on to Sheet 2

TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

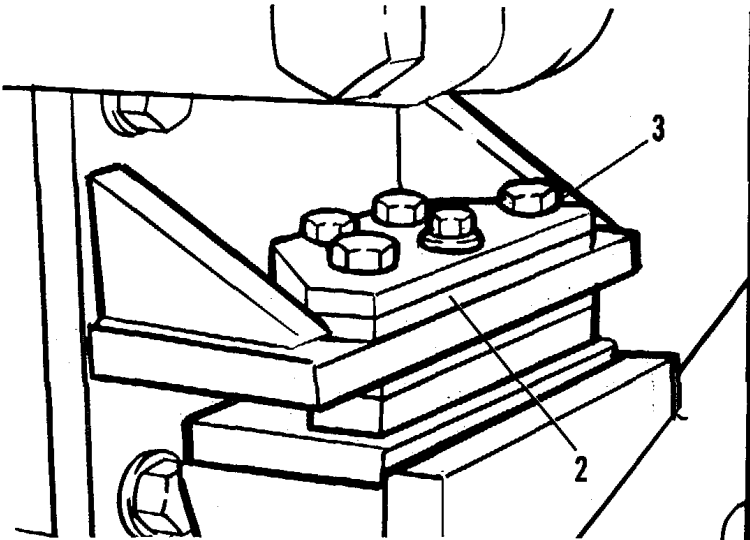
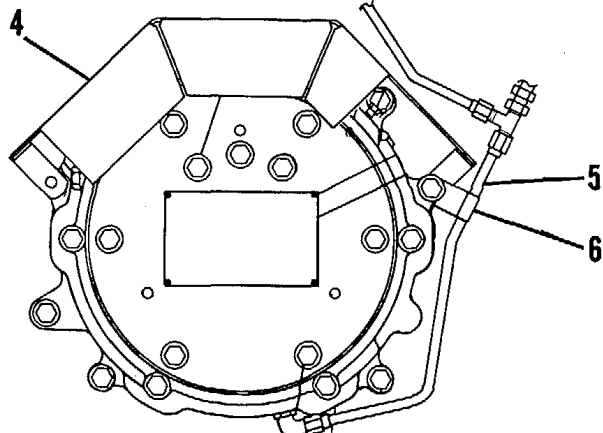
(Sheet 2 of 12)

LOCATION/ITEM	ACTION	REMARKS
1. Transmission and transfer assembly (1)	Fasten hoist.	
2. Hydraulic lines and electric wires	Be sure all are out of the way of transmission. Lower unit (1) into machine.	
3. Transmission and transfer assembly	Lower until bracket assembly (2) can be installed on transfer gear case.	

Go on to Sheet 3

TA099265

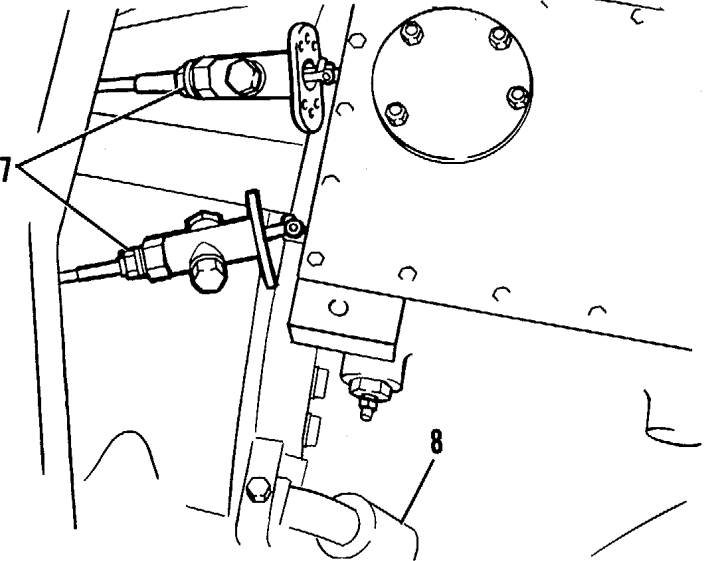
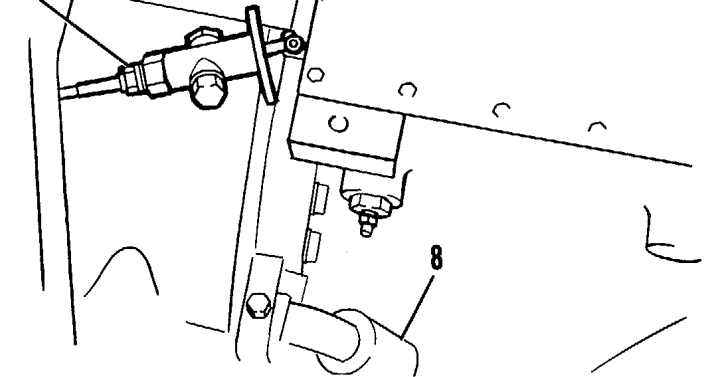
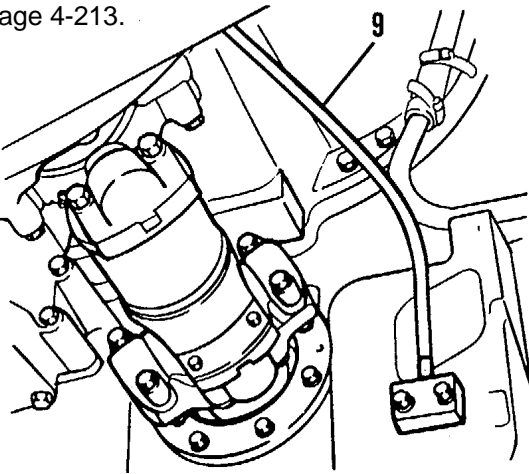
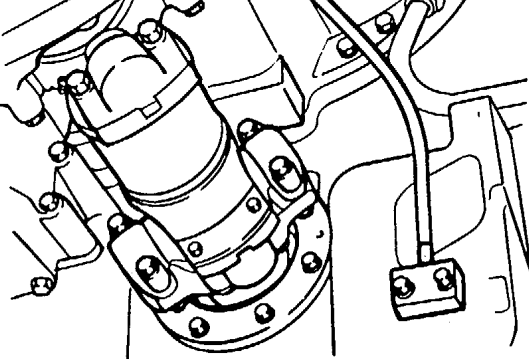
TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
4. Capscrews (3) that hold transmission and transfer gears to main frame	Install.	
5. Guard assembly (4)	Install over parking brake.	
6. Tube assembly (5) that connects parking brake to parking brake valve	Install.	
7. Clip (6) that holds tube assembly to guard assembly	Install.	

Go on to Sheet 4

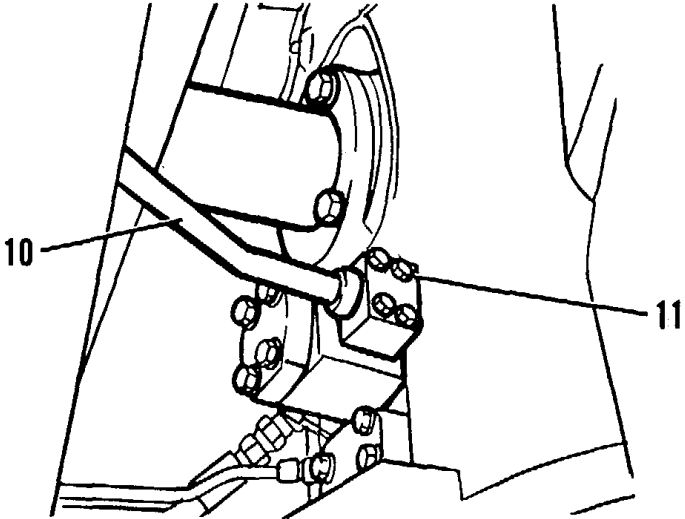
TA099266

TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
8. Transmission hydraulic control cable assemblies (7)	a. Install ring on cable to spool on hydraulic control valve. b. Secure with capscrews.	
9. Hydraulic hose assembly (8) that connects transmission oil cooler to transfer gear case	Install.	
10. Transmission control lock assembly	Install.	<p>See page 4-213.</p> 
11. Transmission plunger assembly (9)	Install. Install bracket securing to gearcase.	

Go on to Sheet 5
4-59

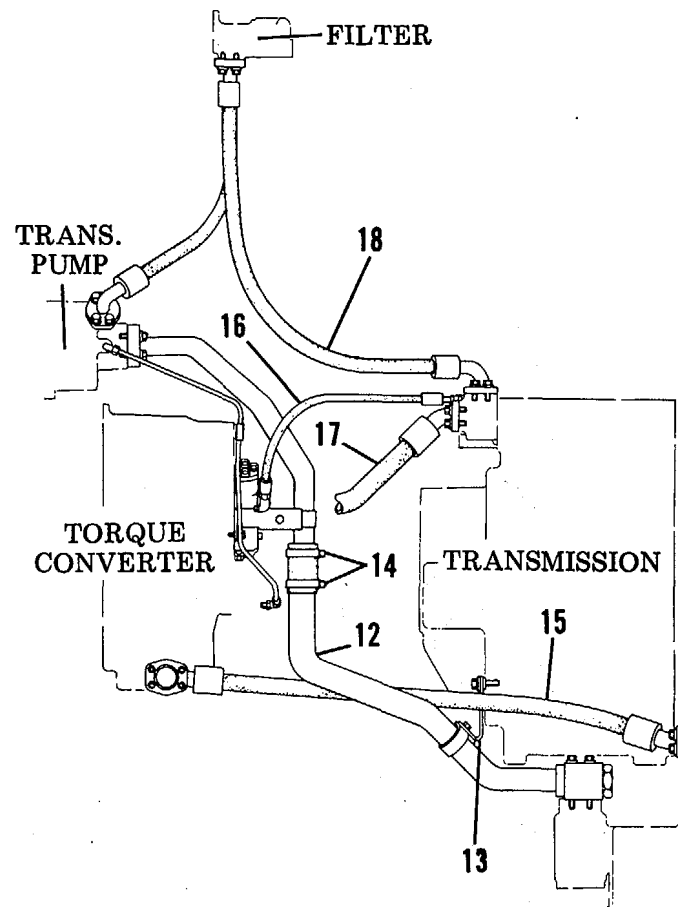
TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
12. Lower center drive shaft	Install.	Refer to TM 10-3930-641-20.
13. Lower rear drive shaft (between transfer gearcase and rear differential)	Install.	Refer to TM 10-3930-641-20.
14. Upper drive shaft (between torque converter and transmission)	Install.	Refer to TM 10-3930-641-20.
15. Tube assembly (10) (Right side of vehicle hydraulic tank)	a. Install and secure bracket clamp and hose clamp. b. Secure with capscrew (11).	

Go on to Sheet 6

TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

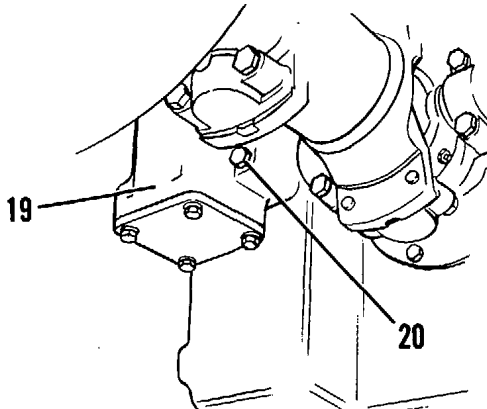
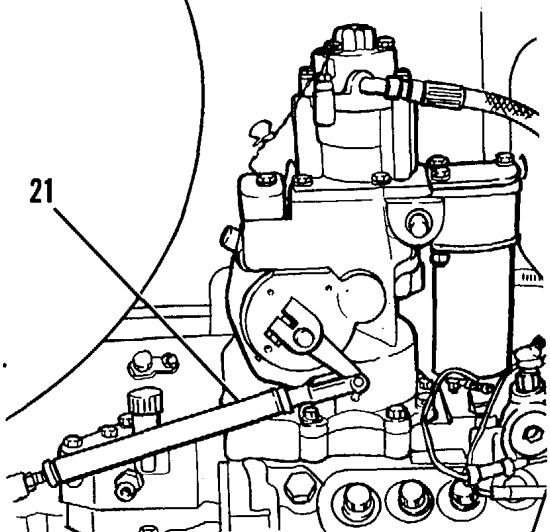
LOCATION/ITEM	ACTION	REMARKS
16. Supply line (12)	Install.	
17. Bracket (13) securing supply line to transmission	Install.	
18. Hose clamps (14) on transmission oil pump supply line (12)	Install.	
19. Hose assembly (15) from torque converter to output transfer gear assembly	Connect to output transfer gear assembly.	
20. Transmission to torque converter hose assemblies (16 and 17)	Connect to transmission.	
21. Transmission oil filter hose assembly (18)	Connect to transmission.	



Go on to Sheet 7

TA099269


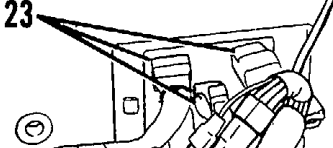
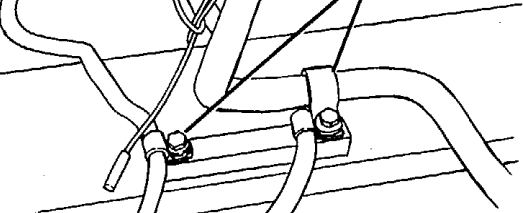
TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
22. Screen assembly (19)	a. Install. b. Secure with three capscrews (20).	
23. Governor control cable (21)	a. Connect to governor. b. Secure to engine bracket and transmission with clamps.	 <p>See page 5-26.</p> <p>See page 5-5.</p>
24. Brake control valve group	Install.	
25. Brake accumulator	Install.	

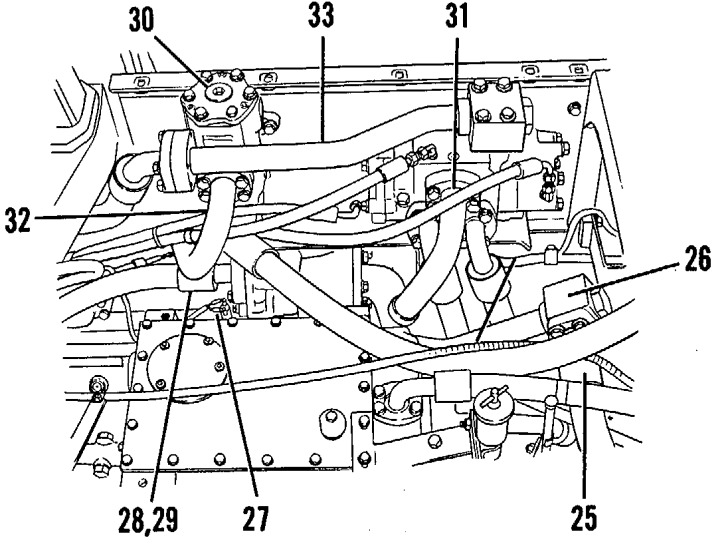
Go on to Sheet 8

TA099270

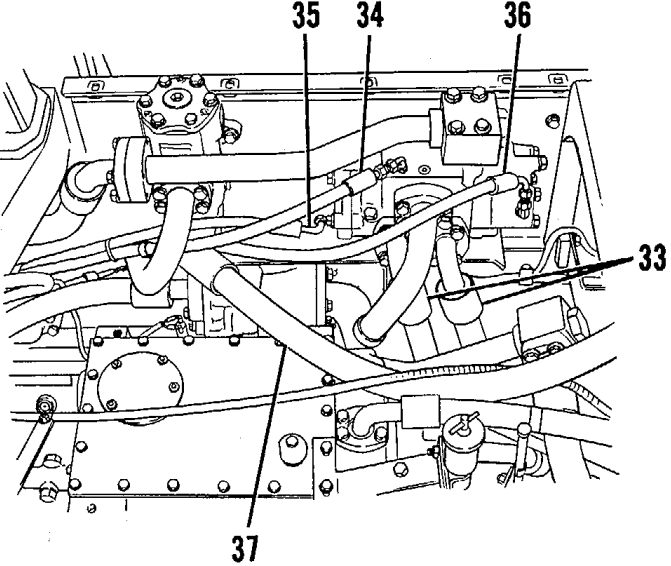
TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

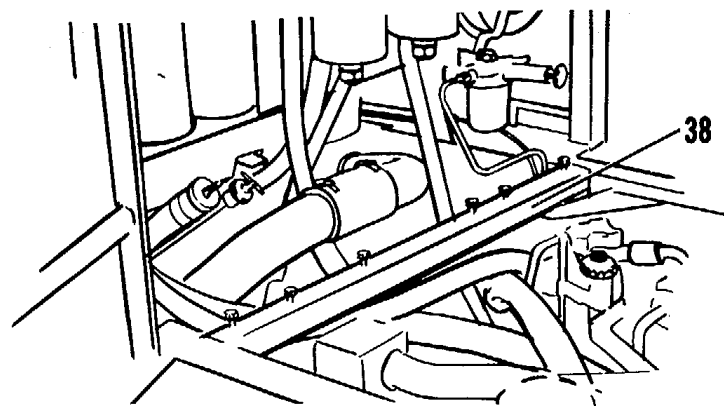
LOCATION/ITEM	ACTION	REMARKS
26. Capscrews and clips (22) securing wiring harness to frame at back of cab	Install.	
27. Connectors (23)	Connect.	
28. Filter and steering valve panel assembly (24)	a. Attach hoist. b. Make sure harnesses and hoses are out of the way. c. Lower into position. d. Secure with capscrews.	

TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
29. Supplemental steering supply hose (25)	Connect to manifold (26).	
30. Wire to supplemental steering flow switch (27)	Connect.	
31. Supplemental steering tubes (28 and 29)	Connect at lower ends. a. Install to panel assembly. b. Secure with capscrews and washers.	
33. Supplemental steering tube (31)	Install.	
34. Filter inlet tube (32)	Install.	
35. Oil return tube assembly (33)	Install.	
<p>Go on to Sheet 10</p>		<p>TA099272</p>
<p>4-64</p>		

TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

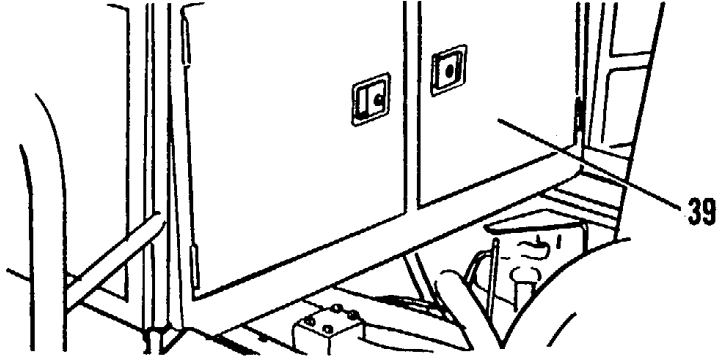
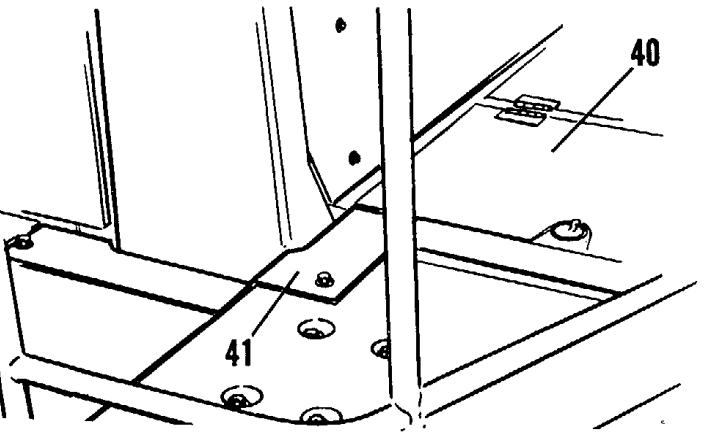
LOCATION/ITEM	ACTION	REMARKS
36. Two steering cylinder hoses (33)	Connect to steering control valve.	
37. Three pilot hose assemblies (34, 35 and 36)	Connect to steering control valve.	
38. Hydraulic supply hose (37)	Install to hydraulic pump and filter.	
39. Channel assembly (38)	a. Install. b. Secure with capscrews and lockwashers.	
40. Handrail assembly	Install to right side of vehicle, if removed.	



Go on to Sheet 11

TA099273

TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
41. Access door assembly (39) 55 lb. (25 kg).	a. Attach hoist. Weight of door is b. Lower into position. c. Secure with capscrews, nuts and washers.	
42. Door and frame assembly (40) assembly is 160 lb. (72.6 kg).	a. Attach hoist. Weight of door and frame b. Lower into position. c. Secure with capscrews.	
43. Access panels (41) at base of roll-over protective unit	Install.	
44. Hood	Install.	

Go on to Sheet 12

TA099274

TRANSMISSION AND TRANSFER ASSEMBLY INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
45. Precleaner lid	Install.	Refer to TM 10-3930-641-20.
46. Oil	Fill transmission and hydraulic tank to correct level.	Refer to LO 10-3930-641-12.
47. Access doors and panels	Close.	
	End	
	4-67	

This task covers: Disassembly of the transmission.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Wood blocking.

Troubleshooting Reference

Pages 2-44, 2-49, 2-50, 2-52

Equipment Condition

Transmission removed from vehicle.
Transmission hydraulic controls removed from transmission.

Special Tools

None

Personnel Required

Two mechanics

References

Transmission and transfer assembly removal; page 4-43.

Transmission hydraulic controls removal/installation, page 4-157.

General Safety Instructions

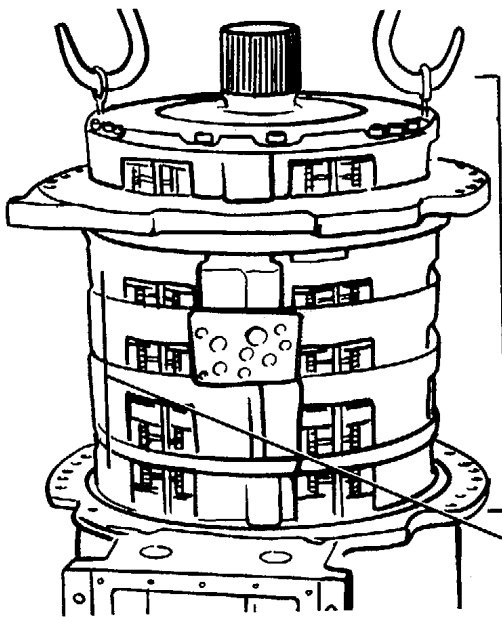
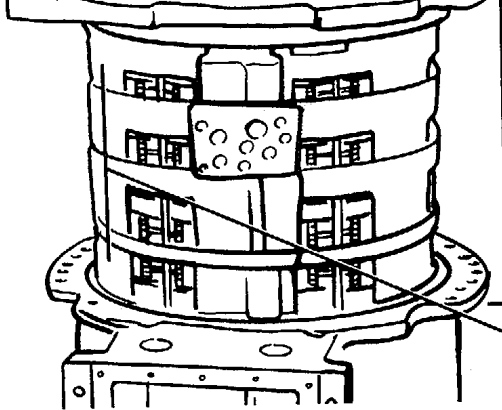
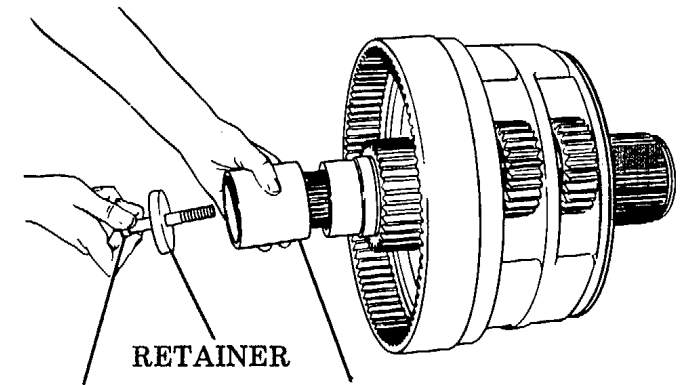
Transmission on blocks and level

Go on to Sheet 2

TRANSMISSION DESASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
	<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">CAUTION</div> <p>As transmission is disassembled, use a parts rack to keep plates and disc assemblies in same order in which they were removed. This is necessary because clutch plates or disc assemblies can be used again only in their original location. Failure to follow this practice can cause excessive wear and possible failure of transmission.</p> <p>Put on wood blocks with output end up as shown.</p> <p>a. Remove. b. Use two of the capscrews as shown to force the planetary group from the case.</p> <p style="text-align: center;">Go on to Sheet 3</p> <p style="text-align: center;">4-69</p>	<div style="text-align: center;"> </div> <p style="text-align: right;">TA099275</p>

TRANSMISSION DISASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p>3. Planetary group</p>	<p>a. Attach hoist as shown. b. Remove and set on wood blocks with output end up.</p> <p style="text-align: center;">NOTE</p> <p>Planetary group weighs 1100 lbs. (499 Kg).</p>	
<p>4. Clutch housings</p> <p>5.</p>	<p>Using a grease pencil, draw a line across the four clutch housings. This will make correct installation of the housings easier.</p>	
<p>5. Tooling (sleeve, capscrew, retainer)</p>	<p>Install on end of shaft assembly as shown. This is to hold parts on the assembly when it is removed.</p>	

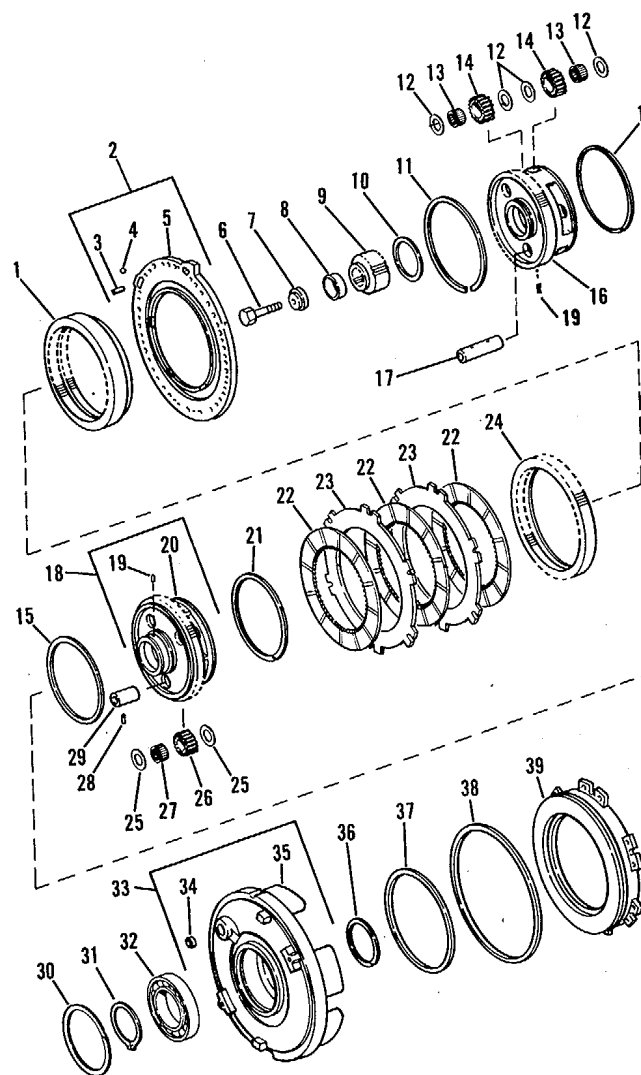
Go on to Sheet 4
4-70

TA099276

TA099276

Planetary Group

- | | |
|-------------------------------------|--------------------------------|
| 1. Ring Gear | 28. Spring Pin |
| 2. Plate Assembly | 29. Planet Shaft |
| 3. Pin | 30. Internal Retaining Ring |
| 4. Ball | 31. Retaining Ring |
| 5. Center Plate | 32. Special Ball Bearing |
| 6. Capscrew | 33. Clutch Housing Assembly |
| 7. Retainer Plate | 34. Cup Plug |
| 8. Spacer | 35. Clutch Housing No. 1 |
| 9. Sun Gear | 36. Metal Seal Ring |
| 10. Metal Seal Ring | 37. Internal Plastic Seal Ring |
| 11. Lock Ring | 38. External Plastic Seal Ring |
| 12. Washer | 39. Clutch Piston |
| 13. Caged Roller Bearing Assembly | |
| 14. Planet Gear | |
| 15. Metal Seal Ring | |
| 16. Planet Carrier | |
| 17. Planet Shaft | |
| 18. Carrier Assembly | |
| 19. Pin | |
| 20. Planet Carrier | |
| 21. Metal Seal Ring | |
| 22. Disc Assembly | |
| 23. Clutch Plate | |
| 24. Ring Gear | |
| 25. Washer | |
| 26. Planet Gear | |
| 27. Special Roller Bearing Assembly | |



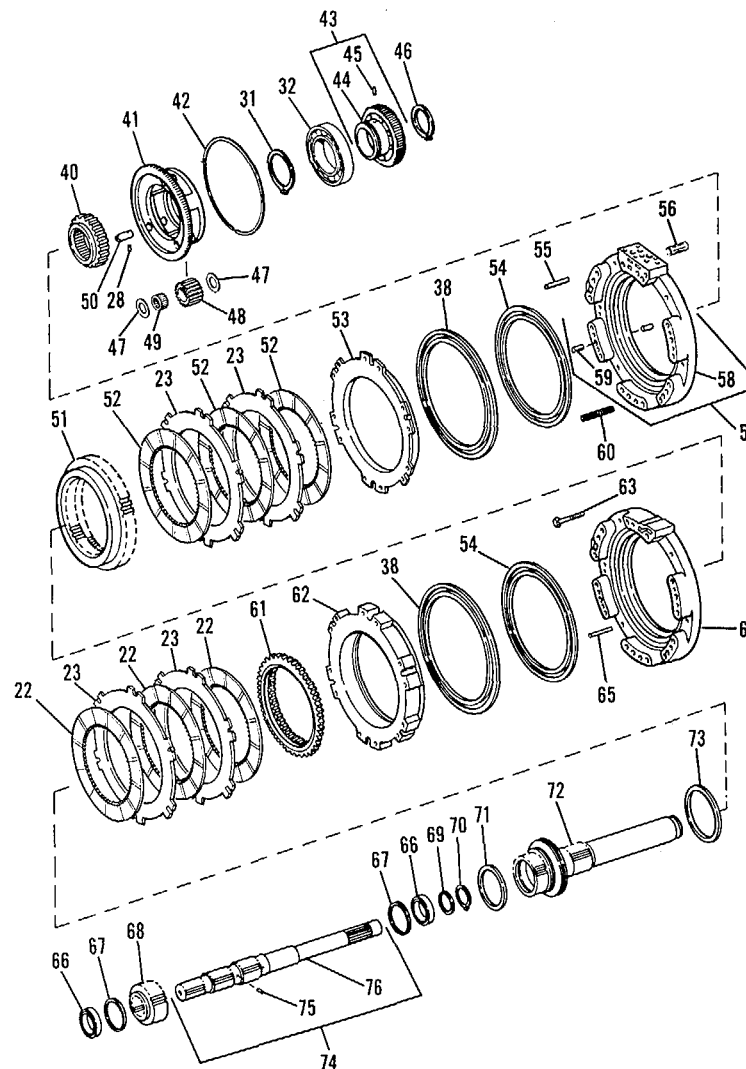
TA099277

Go on to Sheet 5
4-71

TA099277

Planetary Group

- | | |
|-----------------------------------|------------------------------|
| 40. Sun Gear | 66. Special Ball Bearing |
| 41. Planet Carrier | 67. Internal Retaining Ring |
| 42. Lock Ring | 68. Sun Gear |
| 43. Hub Assembly | 69. Spacer |
| 44. Hub | 70. External Retaining Ring |
| 45. Pin | 71. Metal Seal Ring |
| 46. Snap Ring | 72. Output Shaft Assembly |
| 47. Washer | 73. Metal Seal Ring |
| 48. Planet Gear | 74. Input Shaft Assembly |
| 49. Caged Roller Bearing Assembly | 75. Pin |
| 50. Planet Shaft | 76. Transmission Input Shaft |
| 51. Ring Gear | |
| 52. Disc Assembly | |
| 53. Clutch Piston | |
| 54. Metal Seal Ring | |
| 55. Reaction Pin | |
| 56. Bolt Damper | |
| 57. Housing Assembly | |
| 58. Clutch Housing No. 3 | |
| 59. Pin | |
| 60. Spring | |
| 61. Ring Gear | |
| 62. Clutch Piston | |
| 63. Capscrew | |
| 64. Clutch Housing No. 2 | |
| 65. Reaction Dowel | |



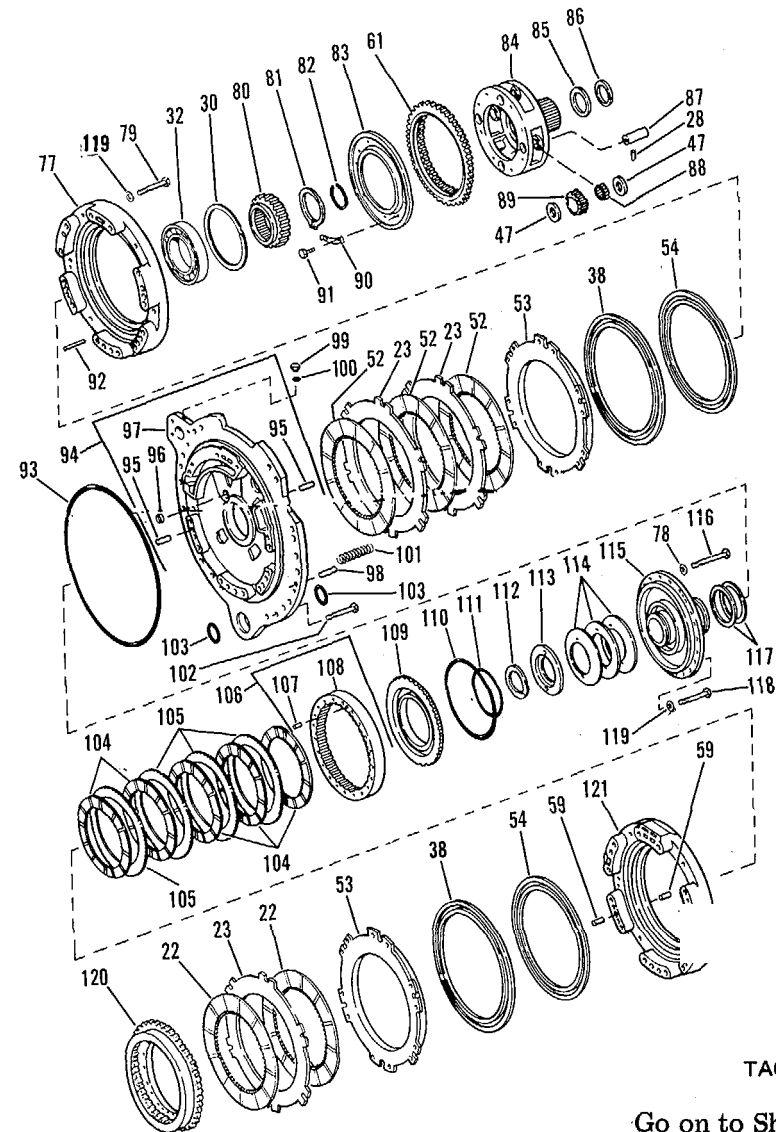
Go on to Sheet 6

TA099278

TRANSMISSION DISASSEMBLY (CONT)

Planetary Group

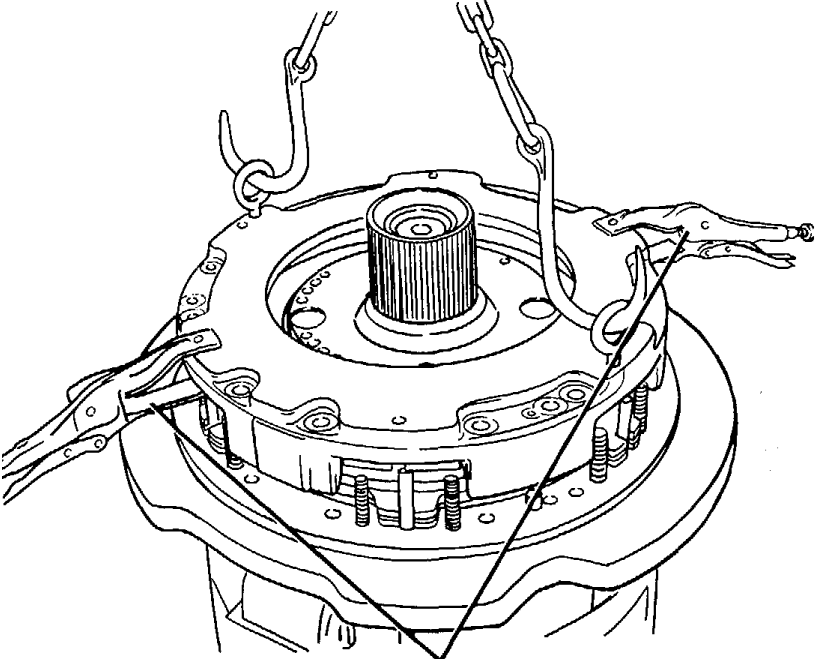
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|------|-------------------------|------|
| 77. | Clutch Housing No. 6 | 105. |
| 78. | Washer | 106. |
| 79. | Capscrew | 107. |
| 80. | Sun Gear | 108. |
| 81. | External Retaining Ring | 109. |
| 82. | Lock Ring | 110. |
| 83. | Slinger | 111. |
| 84. | Planet Carrier | 112. |
| 85. | Spacer | 113. |
| 86. | Retaining-Ring | 114. |
| 87. | Planet Shaft | 115. |
| 88. | Caged Roller Bearing | 116. |
| 89. | Planet Gear | 117. |
| 90. | Lockwasher | 118. |
| 91. | Capscrew | 119. |
| 92. | Reaction Dowel | 120. |
| 93. | Preformed Packing | 121. |
| 94. | Manifold Assembly | |
| 95. | Pin | |
| 96. | Cup Plug | |
| 97. | Manifold | |
| 98. | Pin | |
| 99. | Plug | |
| 100. | Preformed Packing | |
| 101. | Spring | |
| 102. | Capscrew | |
| 103. | Preformed Packing | |
| 104. | Clutch Disc Assembly | |



TA099279

Go on to Sheet 7

TRANSMISSION DISASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
6. Twenty capscrews (79) and washers (119)	Remove. (See sheet 8 for illustration)	
7. No. 6 clutch housing (77)	a. Use clamping tools to hold piston in No. 6 clutch housing as shown. b. Attach hoist as shown. c. Remove.	
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Housing weighs 68 lb. (31 Kg).</p>		
8. Piston (53)	Remove from housing.	
9. Two seal rings (38) and (54)	Remove from piston (53).	
10. Springs (101)	Remove.	
11. Three disc assemblies (52) and two plates (23)	Remove from housing.	
12. Pins (98)	Remove from manifold (97).	

CLAMPING TOOLS

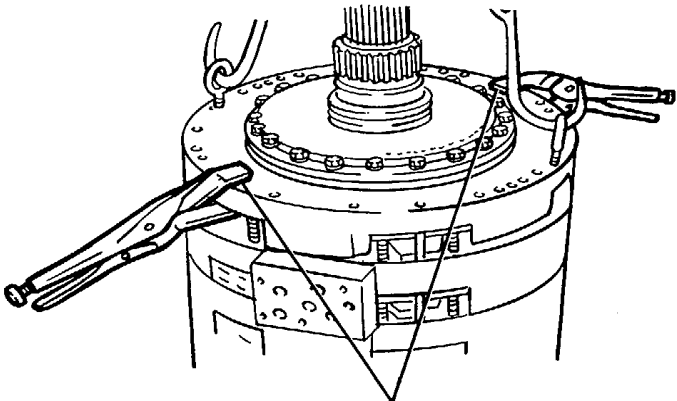
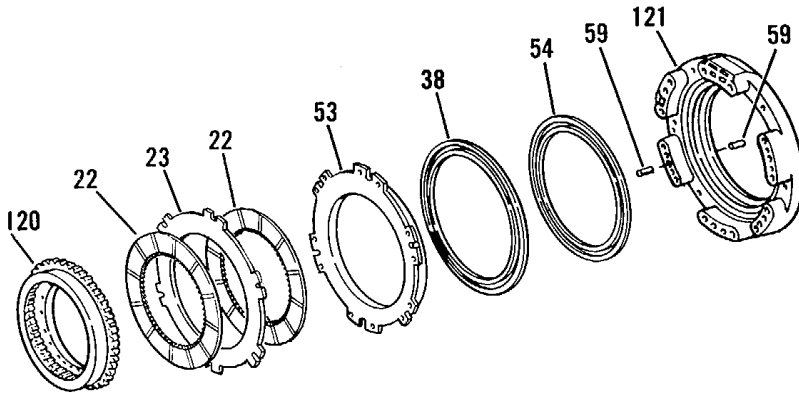
TA099280

Go on to Sheet 8

LOCATION/ITEM	ACTION	REMARKS
13. Retaining ring (86)	Remove from shaft assembly.	
14. Ring gear (61)	Remove from carrier.	
15. Manifold assembly (94)	a. Install two eyebolts. b. Fasten to hoist. c. Remove. d. Set upside down on wood blocks.	
16. Preformed packing (103) and preformed packing (93)	Remove and discard.	
17. Manifold assembly (94)	Turn over.	
18. Bearing (32) and retaining ring (30)	Remove.	

TA099281

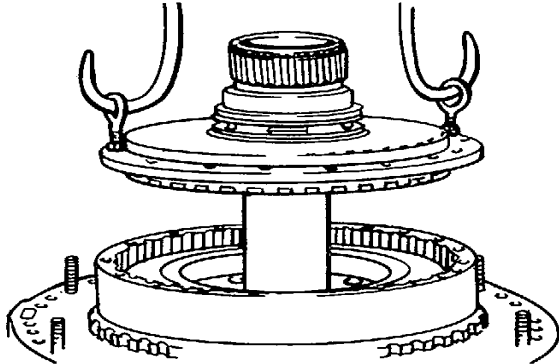
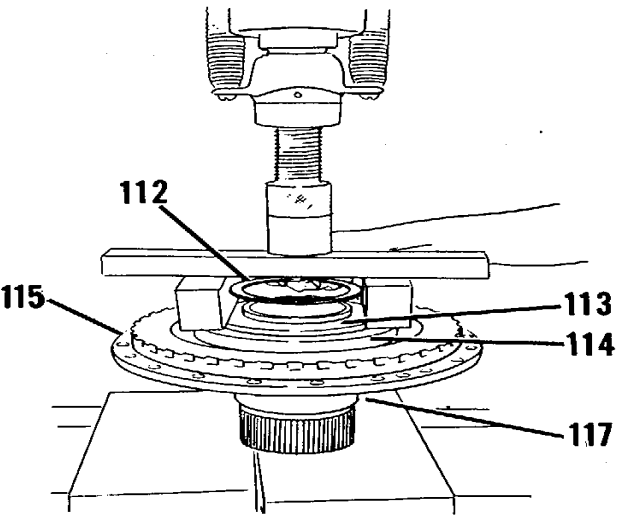
Go on to Sheet 9

LOCATION/ITEM	ACTION	REMARKS
19. No. 4 clutch housing (121)	a. Use clamping tools to hold piston (53) in No. 4 clutch housing as shown. b. Attach hoist as shown. c. Remove.	
NOTE Housing weighs 60 lb. (27 Kg).		CLAMPING TOOLS
20. Piston (53)	Remove.	
21. Two seal rings (38) and (54)	Remove.	
22. Two disc assemblies (22) and one plate (23)	Remove.	
23. Lock ring (82)	Remove from input shaft assembly (74). (See sheet 6 for location.)	

TA099282

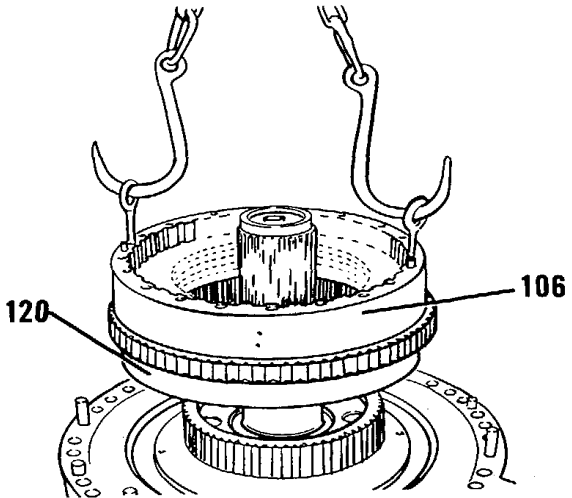
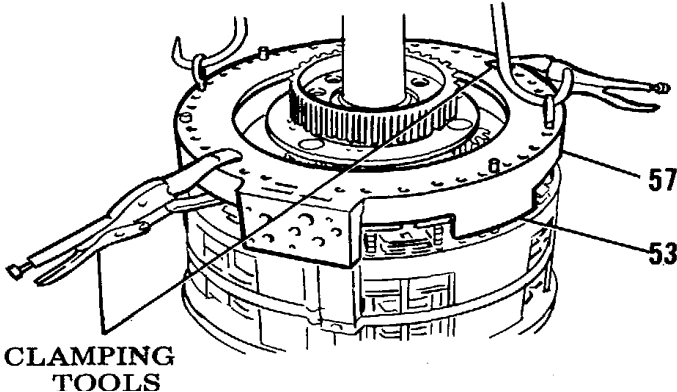
Go on to Sheet 10

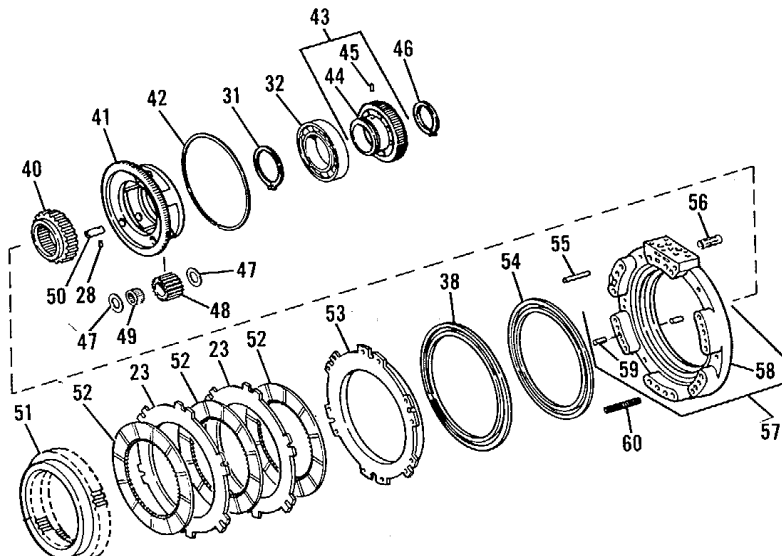
TRANSMISSION DISASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
24. Twenty capscrews (116 and 118) and washers (78 and 119)	Remove from housing assembly (115).	
25. Housing assembly (115)	<p>a. Attach hoist as shown.</p> <p>b. Remove.</p> <p style="text-align: center;">NOTE</p> <p>Assembly weighs 44 lb. (20 Kg).</p> <p>c. Place in press as shown.</p> <p>d. Force retainer plate (113) until retainer ring</p> <p>e. Release plate.</p> <p>f. Remove plate and three disc springs (114).</p>	
26. Two seal rings (117)	Remove from housing assembly (115).	
27. Two seal rings (110) and (111)	Remove and discard. (See sheet 6 for location.)	

TA099283

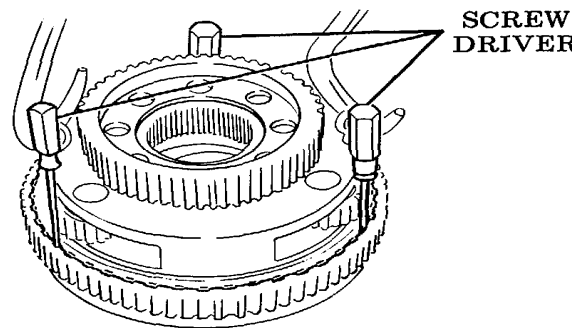
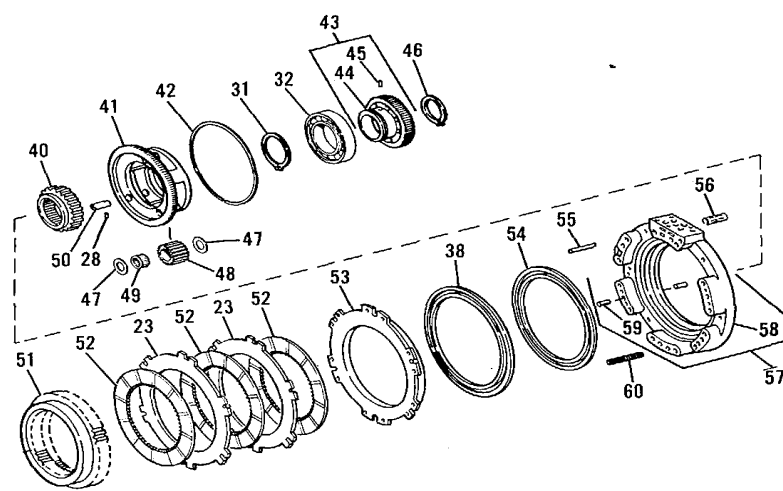
Go on to Sheet 11

LOCATION/ITEM	ACTION	REMARKS
28. Housing assembly (106) and ring gear (120)	a. Install two 3/8"--16NC x 5" eyebolts through housing assembly into ring gear as shown. b. Attach hoist as shown. c. Remove.	
29. Five discs (104) and four plates (105)	Remove.	
30. Piston (53)	Use clamping tools to hold piston in No. 3 clutch housing (57).	
31. No. 3 clutch housing (57)	a. Attach hoist. b. Remove.	
NOTE Unit weighs 60 lb. (27 Kg).	NOTE Housing weighs 89 lb. (40 Kg).	

LOCATION/ITEM	ACTION	REMARKS
32. Clutch piston (53)	Remove from clutch housing (57).	
33. Two seal rings (54) and (38)	Remove from piston (53).	
34. Springs (60)	Remove from clutch housing (57).	
35. Three disc assemblies (52) and two plates (23) of No. 3 clutch housing.	Remove from clutch housing (57).	
36. Snap ring (46)	Remove.	
37. Planet carrier (41)	<p>a. Install two 3/8"-16NC forged eyebolts</p> <p>b. Attach hoist.</p> <p>c. Remove.</p>	
<p style="text-align: center;">NOTE</p> <p>Carrier weighs 62 lb. (28.12 Kg).</p>		

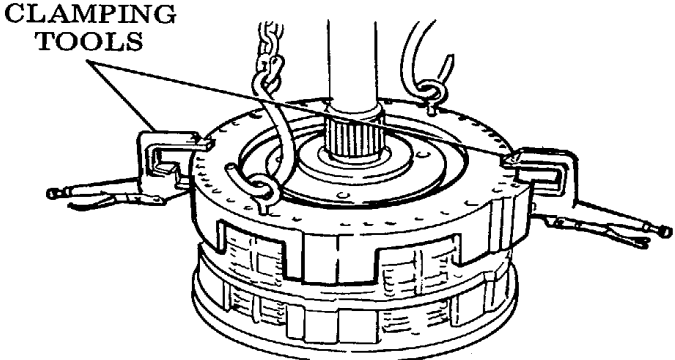
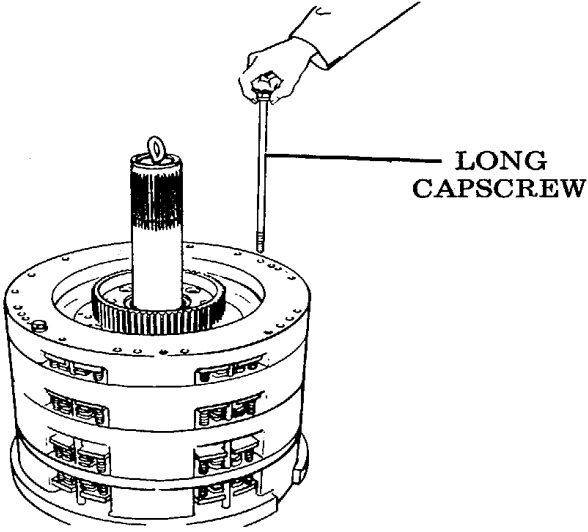
TA099285

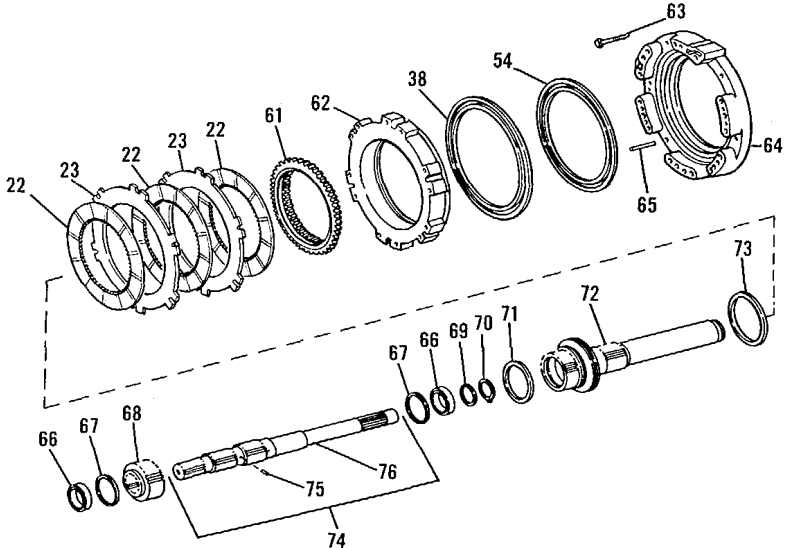
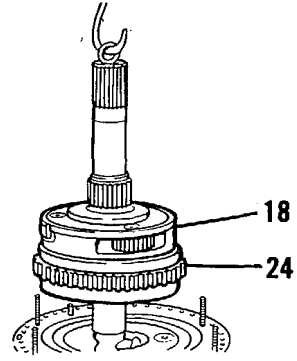
Go on to Sheet 13

LOCATION/ITEM	ACTION	REMARKS
38. Ring gear (51) and planet carrier (41)	a. Install three screwdrivers between ring gear and carrier. b. Pry lock ring (42) away from ring gear until ring gear drops off carrier.	
39. Retainer ring (31)	Remove.	
10. Hub assembly (4-3)	Remove.	
41. Bearing (32)	Remove from planet carrier (41).	
42. Spring pins (28)	Remove by driving pins into shaft (50) with a hammer and punch.	
43. Shafts (50)	Remove.	

TA099286

Go on to Sheet 14

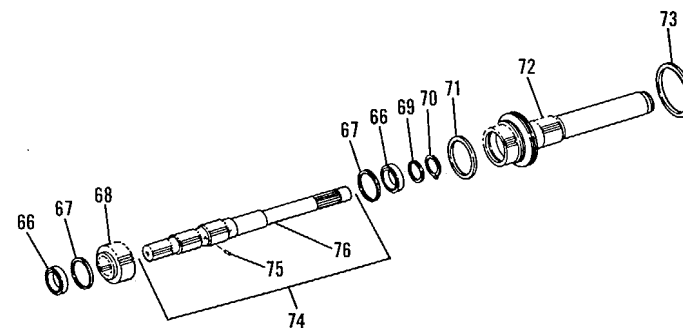
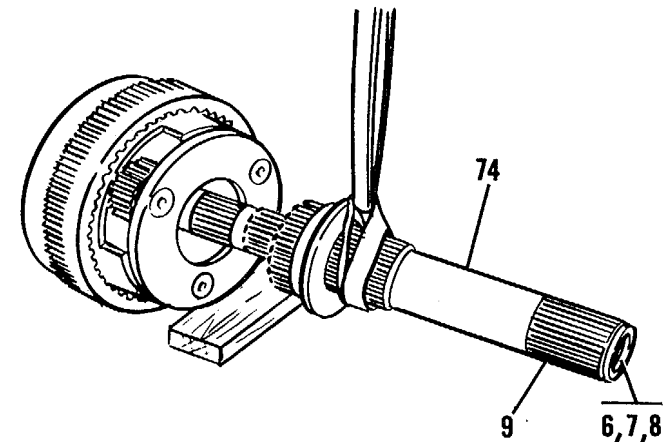
LOCATION/ITEM	ACTION	REMARKS
44. Planet gears (48) and washers (47)	Remove from planet carrier (41).	 <p>CLAMPING TOOLS</p>
45. Roller bearing (49)	Remove from each planet gear (48).	
46. Sun gear (40)	Remove.	
47. Piston (62)	Use clamping tools to hold piston in No. 2 clutch housing (64).	
48. No. 2 clutch housing (64)	<p>NOTE</p> <p>There are two long capscrews on the No. 2 clutch housing that bolt into the forward clutch housing.</p> <p>a. Attach hoist as shown.</p> <p>b. Remove.</p>	 <p>LONG CAPSCREW</p>

LOCATION/ITEM	ACTION	REMARKS
49. Piston (62)	Remove.	
50. Two seal rings (54) and (38)	Remove.	
51. Three disc assemblies (22) and two plates (23) of No. 2 clutch housing	Remove.	
52. Input shaft assembly (74)	<p>a. Install a 1/2"-13NC forged eyebolt in the end of shaft assembly.</p> <p>b. Attach hoist as shown.</p> <p>c. Remove with carrier (18) and ring gear</p>	
	<p style="text-align: center;">NOTE</p> <p>Unit weighs 160 lb. (72.57 Kg).</p>	
53. Tooling (sleeve, capscrew, retainer) installed in Step 5.	Remove.	

TA099288

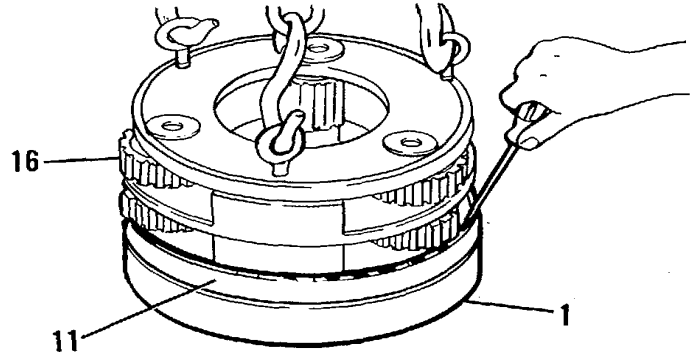
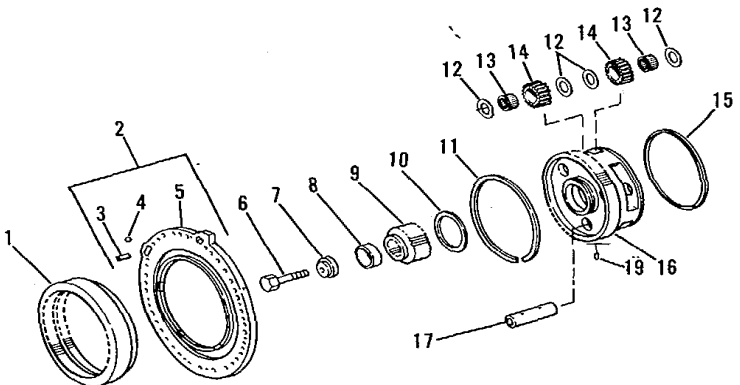
Go on to Sheet 16

LOCATION/ITEM	ACTION
54. Input shaft assembly (with carrier	Set in horizontal position on wood blocks. and ring gear attached)
55. Capscrew (6), retainer plate (7) and spacer (8)	Remove from end of input shaft assembly (74).
56. Sun gear (9)	Remove from end of input shaft assembly.
57. Input shaft assembly (74)	a. Attach hoist. b. Remove from ring gear and carrier.
NOTE	
Assembly weighs 62 lb. (28 Kg).	
58. Retaining ring (67)	Remove.
59. Input shaft assembly (74)	Remove from output shaft (72).
60. Retaining ring (70), spacer (69) and bearing (66)	Remove from input shaft (76).
61. Two seal rings (71) and (73) on output shaft carrier	Remove.



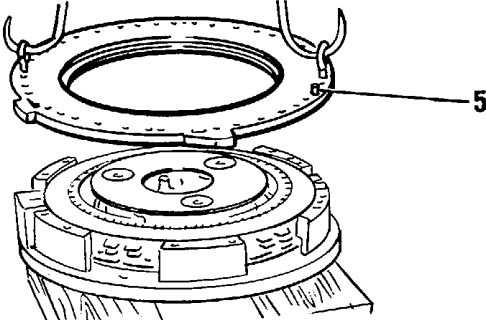
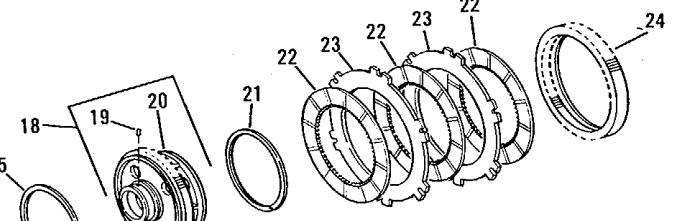
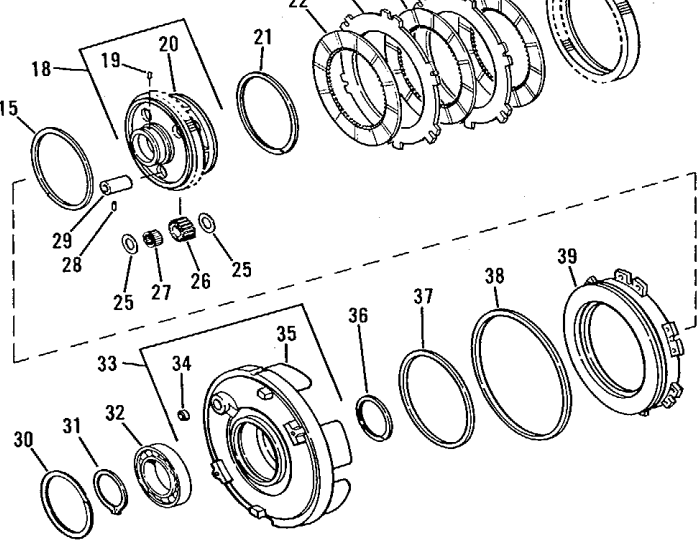
TA099289

Go on to Sheet 17

LOCATION/ITEM	ACTION	REMARKS
62. Planet carrier (16) and ring gear (1)	a. Install three 3/8-16NC eyebolts. b. Attach hoist as shown. c. Using two screwdrivers, pry lock ring (11) away from ring gear (1) until ring gear drops away from carrier.	
63. Seal rings (15)	Remove from carrier.	
64. Pins (19)	Remove by driving into shafts (17) using a hammer and punch.	
65. Shafts (17)	Remove. Remove pins (19) from shafts (17).	
66. Planet gears (14) and washers (12)	Remove from carrier (16).	
67. Roller bearings (13)	Remove from gears (14).	
68. Six pins (3)	Remove from plate assembly.	

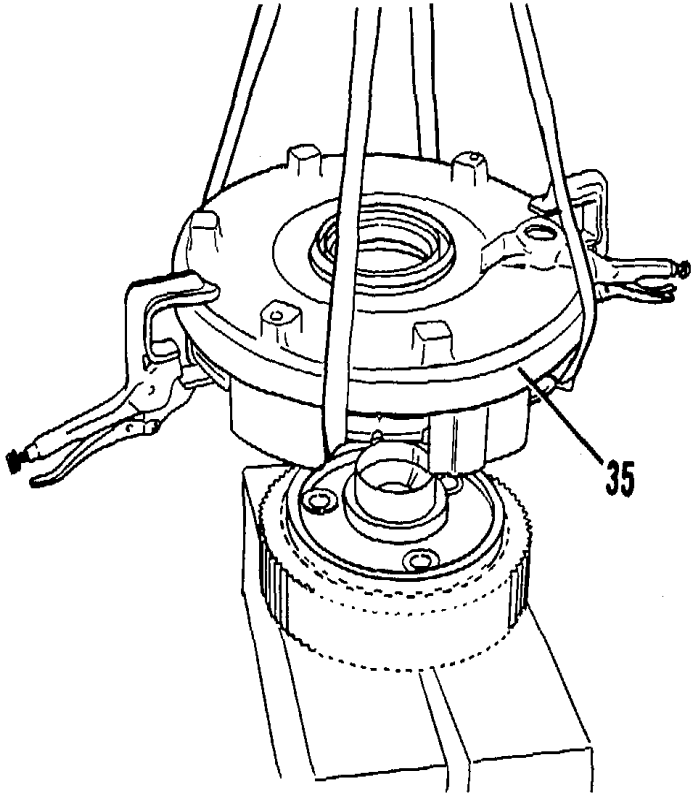
TA099290

Go on to Sheet 18

LOCATION/ITEM	ACTION	REMARKS
69. Center plate (5)	<p>a. Install two 1/2-13NC eyebolts the plate assembly.</p> <p>b. Attach hoist.</p> <p>c. Remove.</p> <p style="text-align: center;">NOTE</p> <p>Assembly weighs 30 lb. (14 Kg).</p>	
70. Three disc assemblies (22) and two plates (23)	Remove from No. 1 clutch housing (35).	
71. Piston (39)	Use clamping tools to hold piston in No. 1 clutch housing (35) as shown.	

TA099291

Go on to Sheet 19

LOCATION/ITEM	ACTION	REMARKS
72. No. 1 clutch housing (35)	<ul style="list-style-type: none"> a. Set upside down on wood blocks. b. Remove retaining ring (31) that secures housing to its carrier. c. Separate No. 1 clutch housing (35) from its carrier using clamping tools as shown. Housing weighs 120 lb. (54 Kg). 	 <p style="text-align: right;">TA099292</p> <p style="text-align: right;">Go on to Sheet 20</p>

LOCATION/ITEM	ACTION	REMARKS
73. Seal ring (36) and bearing (32)	Remove.	
74. No. 1 clutch housing (35)	Turn over.	
75. Piston (39)	Remove from housing (35).	
76. Seal rings (37) and (38)	Remove from piston (39).	
77. Ring gear (24)	Remove from carrier.	
78. Seal rings (21)	Remove from carrier.	
79. Spring pins (28)	Remove by driving into shafts (29) using a hammer and punch.	
80. Planet shafts (29)	Remove. Remove pins (28) from shafts (29).	
81. Planet gears (26) and washers (25)	Remove.	
82. Roller bearings (27)	Remove from planet gears (26).	

TA099293

End

TRANSMISSION DISASSEMBLY (CONT)

This task covers: Assembly of the transmission.

INITIAL SETUP

Test Equipment

Test nozzle and source of air
100-150 psi (690-1035 kPa)

Materials/Parts

As required.

Troubleshooting Reference

None

Equipment Condition

Transmission disassembled.

Special Tools

None

Personnel Required

Two mechanics

References

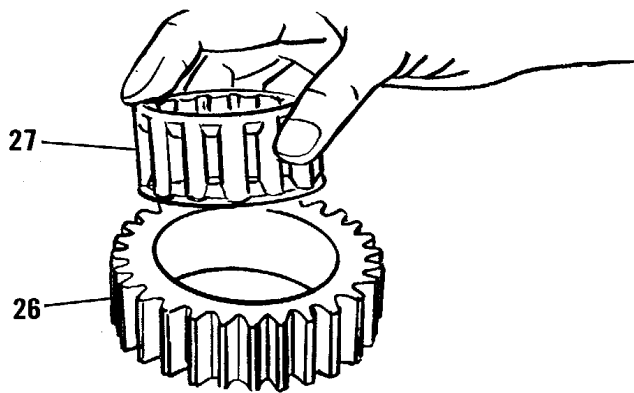
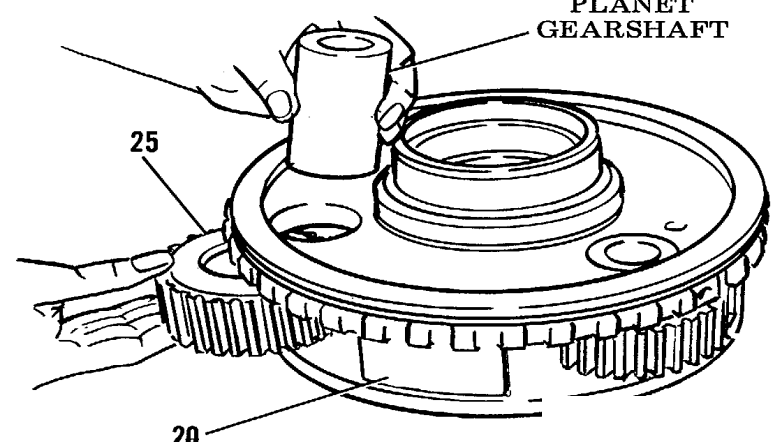
Transmission hydraulic controls removal/
installation, page 4-157.

Transmission disassembly, page 4-68.

General Safety Instructions

None

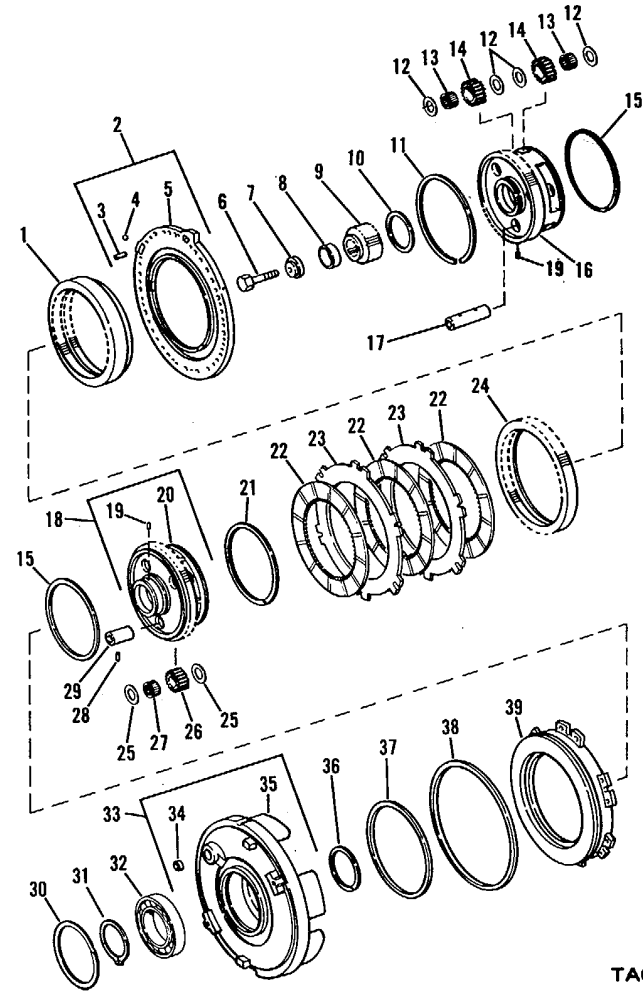
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<ol style="list-style-type: none"> 1. Three roller bearings (27) 2. Washer (25) 3. Planet gear assemblies (bearing, washer, gear) 4. Planet shafts (29)Install. 	<p style="text-align: center;">NOTE</p> <p>Be sure all transmission parts are clean and coated with fresh hydraulic oil before assembly.</p> <ol style="list-style-type: none"> a. Lubricate with clean hydraulic oil. b. Install in the three planet gears (26) of No. 1 clutch. <p>Install on both sides of each planet gear.</p> <p>Install in planet carrier (20). washer, gear)</p>	 <p style="text-align: right;">PLANET GEARSHAFT</p>
	<p style="text-align: center;">NOTE</p> <p>Be sure pin hole in each shaft aligns with hole in carrier.</p>	 <p style="text-align: right;">Go on to Sheet 3</p> <p style="text-align: right;">TA099294</p> <p style="text-align: right;">Go on to Sheet 3</p>

Planetary Group

- 1. Ring Gear
- 2. Plate Assembly
- 3. Pin
- 4. Ball
- 5. Center Plate
- 6. Capscrew
- 7. Retainer Plate
- 8. Spacer
- 9. Sun Gear
- 10. Metal Seal Ring
- 11. Lock Ring
- 12. Washer
- 13. Caged Roller Bearing Assembly
- 14. Planet Gear
- 15. Metal Seal Ring
- 16. Planet Carrier
- 17. Planet Shaft
- 18. Carrier Assembly
- 19. Pin
- 20. Planet Carrier
- 21. Metal Seal Ring
- 22. Disc Assembly
- 23. Clutch Plate
- 24. Ring Gear
- 25. Washer
- 26. Planet Gear
- 27. Special Roller Bearing Assembly

- 28. Spring Pin
- 29. Planet Shaft
- 30. Internal Retaining Ring
- 31. Retaining Ring
- 32. Special Ball Bearing
- 33. Clutch Housing Assembly
- 34. Cup Plug
- 35. Clutch Housing No. 1
- 36. Metal Seal Ring
- 37. Internal Plastic Seal Ring
- 38. External Plastic Seal Ring
- 39. Clutch Piston



TA099295

TA099295

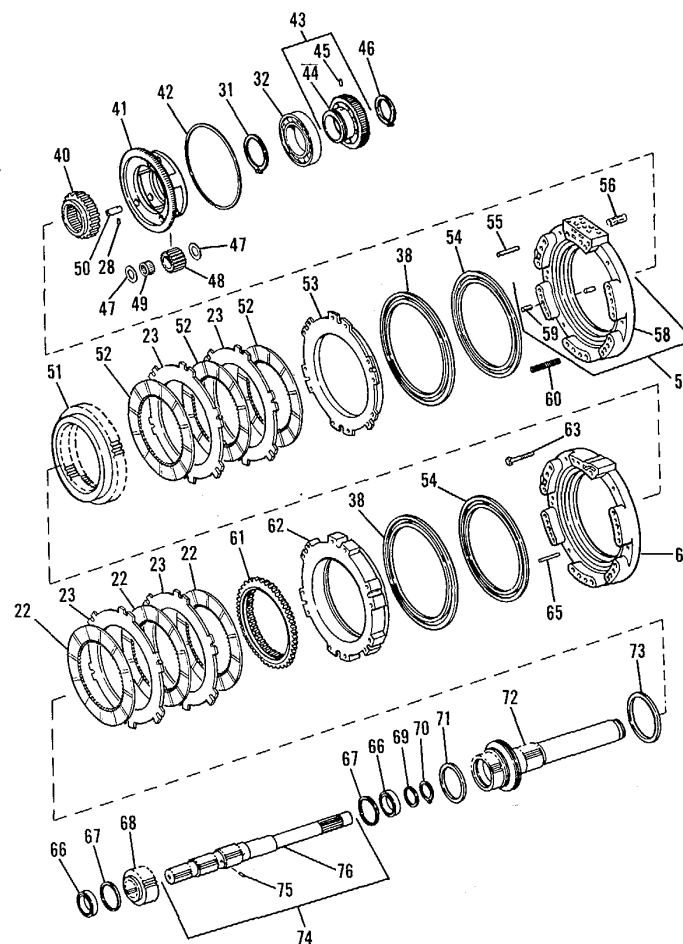
Go on to Sheet 4

TRANSMISSION ASSEMBLY (CONT)

Planetary Group

- 40. Sun Gear
- 41. Planet Carrier
- 42. Lock Ring
- 43. Hub Assembly
- 44. Hub
- 45. Pin
- 46. Snap Ring
- 47. Washer
- 48. Planet Gear
- 49. Caged Roller Bearing Assembly
- 50. Planet Shaft
- 51. Ring Gear
- 52. Disc Assembly
- 53. Clutch Piston
- 54. Metal Seal Ring
- 55. Reaction Pin
- 56. Bolt Damper
- 57. Housing Assembly
- 58. Clutch Housing No. 3
- 59. Pin
- 60. Spring
- 61. Ring Gear
- 62. Clutch Piston
- 63. Capscrew
- 64. Clutch Housing No. 2
- 65. Reaction Dowel

- 66. Special Ball Bearing
- 67. Internal Retaining Ring
- 68. Sun Gear
- 69. Spacer
- 70. External Retaining Ring
- 71. Metal Seal Ring
- 72. Output Shaft Assembly
- 73. Metal Seal Ring
- 74. Input Shaft Assembly
- 75. Pin
- 76. Transmission Input Shaft

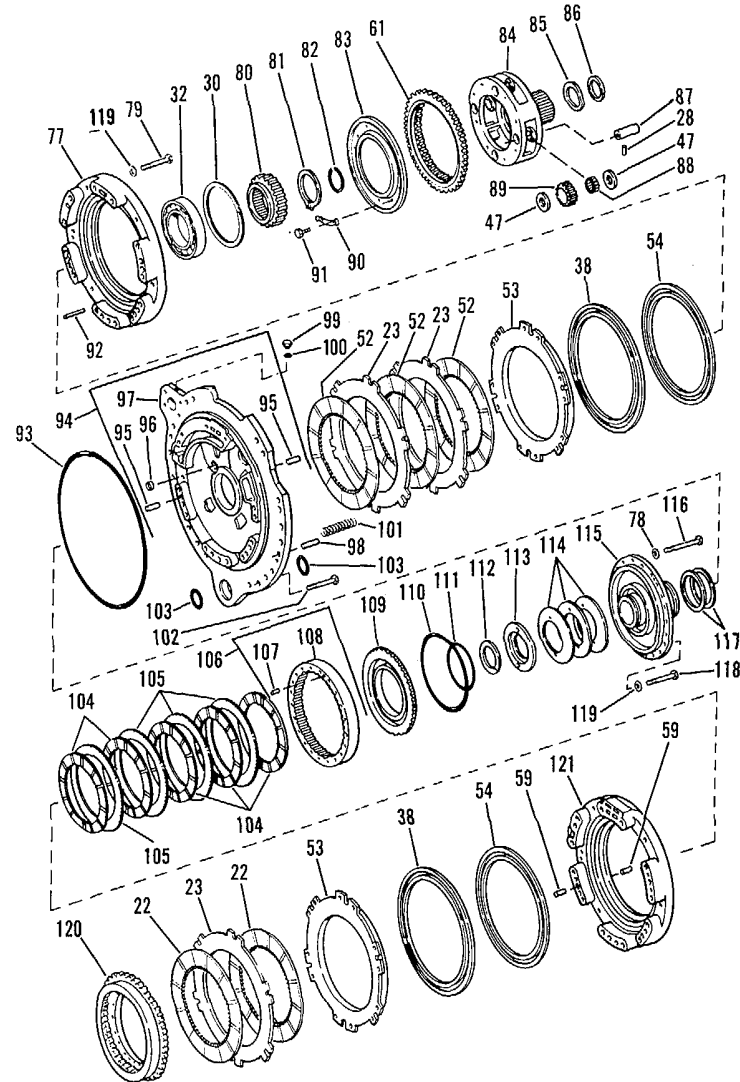


TA099296

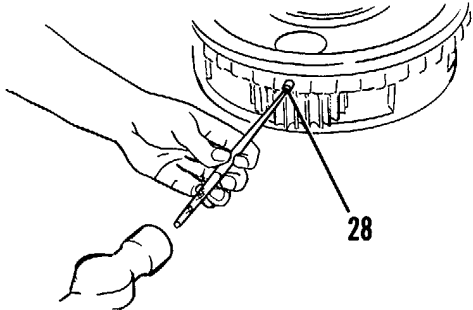
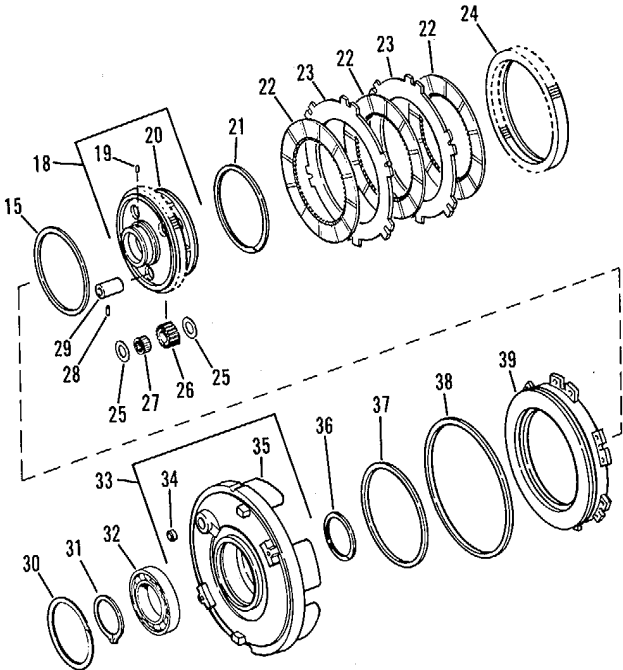
Go on to Sheet 5

Planetary Group

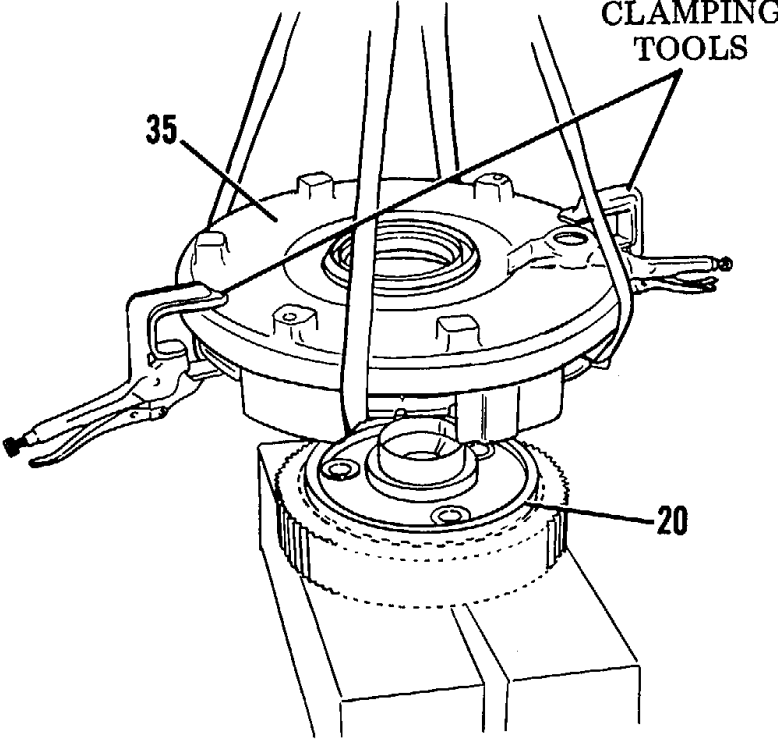
- | | |
|-----------------------------|---------------------------------|
| 77. Clutch Housing No. 6 | 105. Clutch Plate |
| 78. Washer | 106. Housing Assembly |
| 79. Capscrew | 107. Pin |
| 80. Sun Gear | 108. Rotating Housing |
| 81. External Retaining Ring | 109. Clutch Piston |
| 82. Lock Ring | 110. External Plastic Seal Ring |
| 83. Slinger | 111. Internal Plastic Seal Ring |
| 84. Planet Carrier | 112. External Retaining Ring |
| 85. Spacer | 113. Retainer Plate |
| 86. Retaining Ring | 114. Cored Disc Spring |
| 87. Planet Shaft | 115. Housing Assembly |
| 88. Caged Roller Bearing | 116. Capscrew |
| 89. Planet Gear | 117. Seal Ring |
| 90. Lockwasher | 118. Capscrew |
| 91. Capscrew | 119. Washer |
| 92. Reaction Dowel | 120. Ring Gear |
| 93. Preformed Packing | 121. Clutch Housing No. 4 |
| 94. Manifold Assembly | |
| 95. Pin | |
| 96. Cup Plug | |
| 97. Manifold | |
| 98. Pin | |
| 99. Plug | |
| 100. Preformed Packing | |
| 101. Spring | |
| 102. Capscrew | |
| 103. Preformed Packing | |
| 104. Clutch Disc Assembly | |



TRANSMISSION ASSEMBLY (CONT)

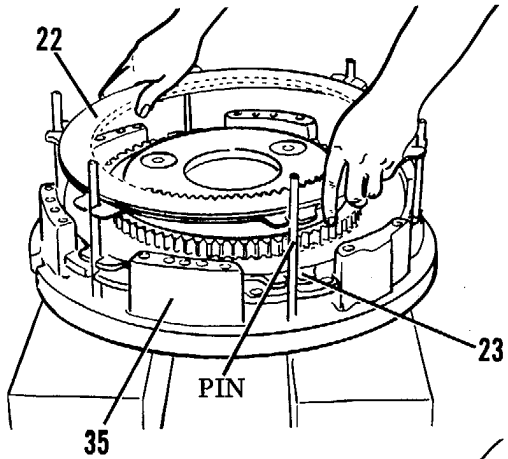
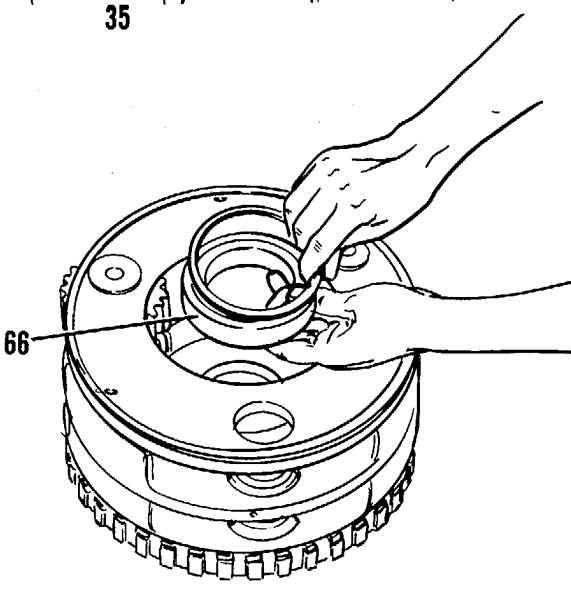
LOCATION/ITEM	ACTION	REMARKS
5. Spring pins (28)	Install each until it is flush with outside surface of carrier.	
6. Seal rings (36), (15) and (21)	Install.	
7. Ring gear (24)	Install on carrier.	
8. Bearing (32)	Install in No. 1 clutch housing (35).	
<p style="text-align: center;">NOTE</p> <p>Be sure bearing is in contact with counter-bore in clutch housing.</p>		
9. Internal retaining ring (30)	Install.	
10. Seals (37) and (38)	Install in piston (39).	
<p style="text-align: center;">NOTE</p> <p>Install seals so oil groove and sealing edge will be toward inside of No. 1 clutch housing (35).</p>		

TA099298
Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS	
11. Clean oil	Put on seals (37) and (38).		
12. Piston (39)	Install in No. 1 clutch housing (35).		
	NOTE		
	Be sure oil groove and sealing edge will be toward inside of No. 1 clutch housing (35).		
13. Clutch housing No. 1 (35)	<p>a. Use suitable clamping tools to hold piston in clutch housing.</p> <p>b. Turn housing upside down and attach hoist.</p> <p>c. Put housing in position on planet carrier (20) as shown at right.</p>	 <p style="text-align: right;">CLAMPING TOOLS</p> <p style="position: absolute; left: 650px; top: 270px;">35</p> <p style="position: absolute; left: 890px; top: 510px;">20</p>	
	NOTE		
	Be sure the bearing groove in the clutch housing aligns with the pin in the carrier.		
14. Retaining ring (31)	Install to secure clutch housing (35) to planet carrier (20).		
15. Clutch housing/carrier assembly	Turn assembly over and place on wooden blocks.		

TA099299
Go on to Sheet 8

TRANSMISSION ASSEMBLY (CONT)

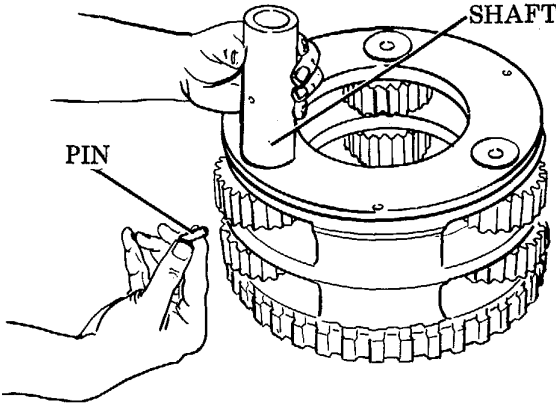
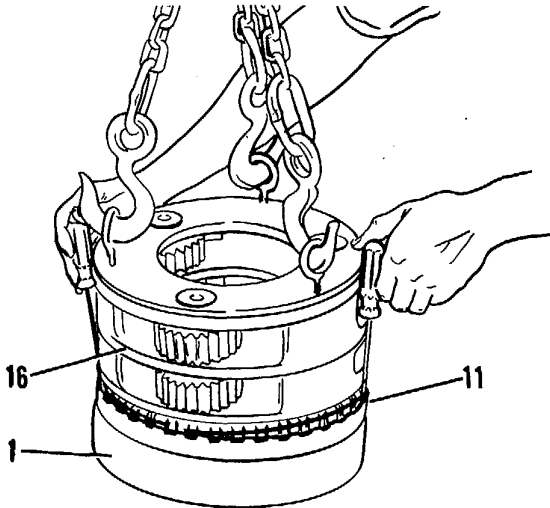
LOCATION/ITEM	ACTION	REMARKS
16. Six pins (shown at right)	Install in clutch housing (35).	
17. Three disc assemblies (22) and two clutch plates (23)	a. Lubricate with clean oil. b. Install as shown, beginning with a disc assembly (22).	
18. Plate assembly (2)	Install onto clutch housing (35). NOTE Be sure oil hole in plate is aligned with oil hole in clutch housing.	
19. Bearing (66)	Install in carrier of No. 2 clutch housing as shown. NOTE Be sure bearing is installed with groove facing up.	

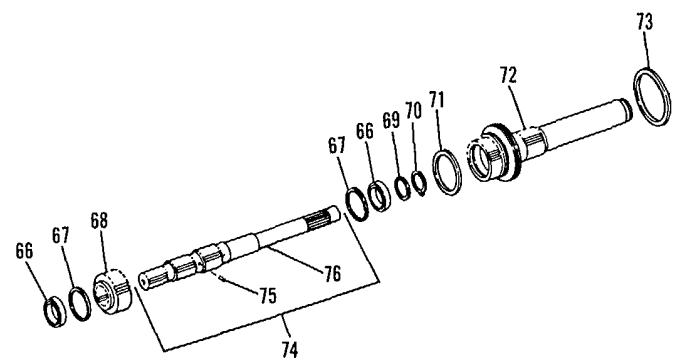
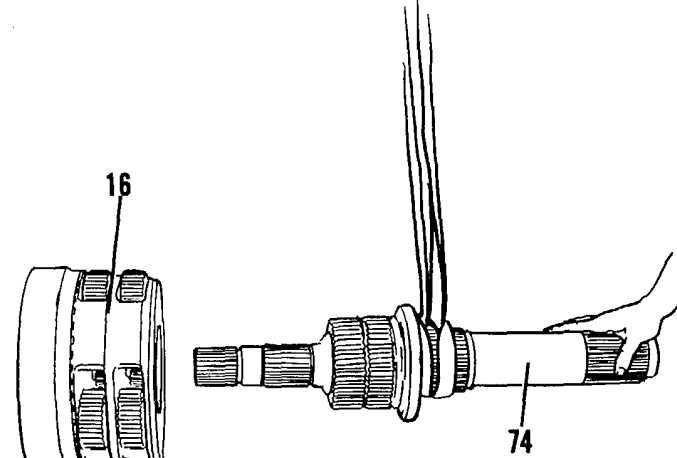
TA099300
Go on to Sheet 9

LOCATION/ITEM	ACTION	REMARKS
20. Internal retaining ring (67)	Install.	
21. Roller bearings (13)	a. Lubricate with clean oil. b. Install in six planet gears (14) of No. 2 clutch housing.	
22. Washer (12)	Install on both sides of each planet gear.	
23. Planet gear assemblies (bearing, washer, gear)	Install in planet carrier (16).	
24. Planet shafts (17)	Install.	
	NOTE Be sure pin hole in each shaft aligns with hole in carrier.	

TA099301
Go on to Sheet 10

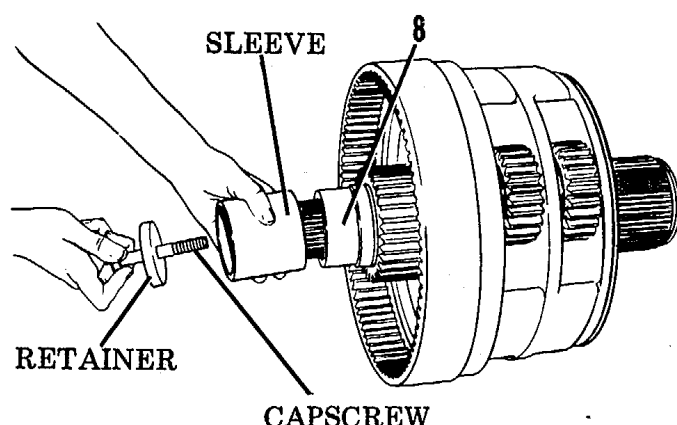
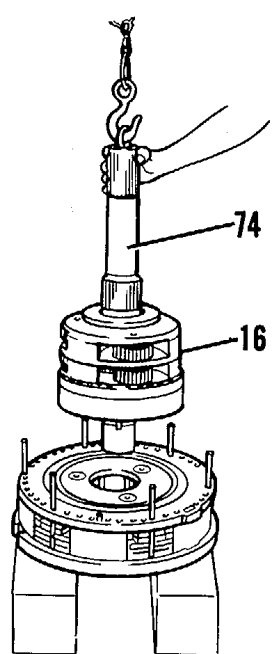
TRANSMISSION ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
25. Pins (shown at right)	Install each until it is flush with outside surface of carrier.	
26. Lock ring (11)	Install on planet carrier (16).	
27. Planet carrier (16)	<p>a. Attach hoist as shown.</p> <p>b. Lift and position on ring gear (1).</p> <p>c. Using two screwdrivers, slightly compress lock ring (11) as shown.</p> <p>d. Slide carrier into ring gear until lock ring (11) engages with groove in gear.</p>	
28. Bearing (66)	<p>Install on shaft (76).</p> <p style="text-align: center;">NOTE</p> <p>Be sure notch in bearing aligns with pin (75) in shaft assembly.</p>	

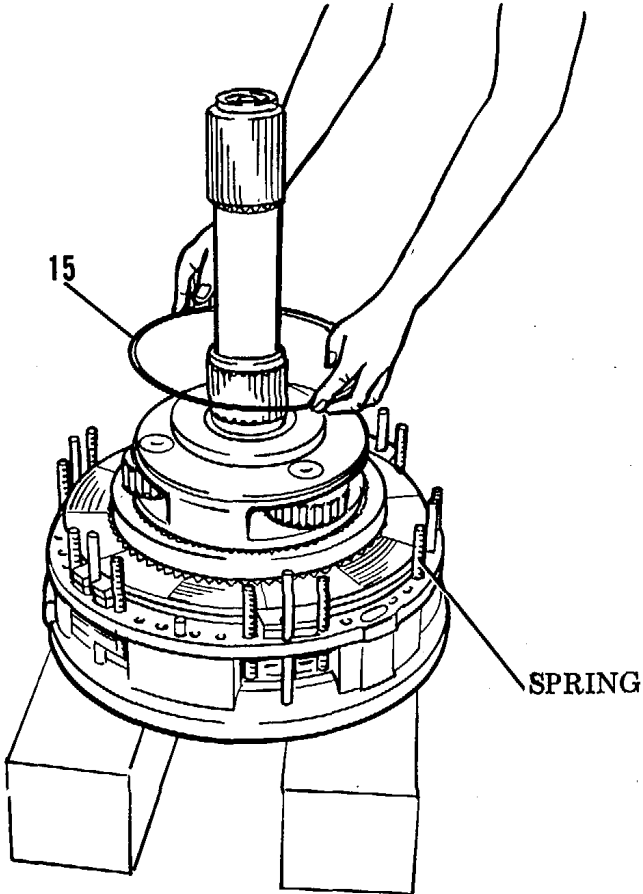
LOCATION/ITEM	ACTION	REMARKS
29. Spacer (69) and snap ring (70)	Install on input shaft (76).	
30. Input shaft (76)	Slide into output shaft (72).	
31. Metal seal ring (71)	Install on output shaft (72).	
32. Sun gear (68)	Install on input shaft (76).	
33. Seal rings (71) and (73)	a. Install. b. Lubricate with clean hydraulic fluid.	
34. Input shaft assembly (74) b.	a. Attach hoist as shown. b. Install in planet carrier (16) of No. 2 clutch housing.	

TA099303
Go on to Sheet 12

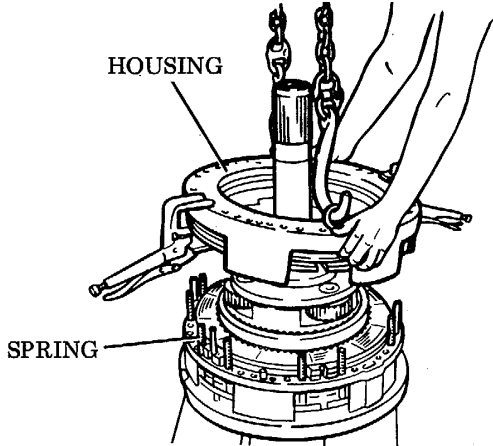
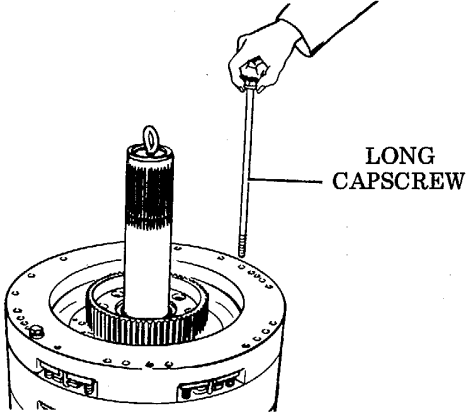
TRANSMISSION ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
35. Sun gear (9)	Install on end of input shaft (76).	
36. Spacer (8)	Install.	
37. Tooling (sleeve, retainer, capscrew)	Install as shown to hold carrier on input shaft assembly (74).	
38. Input shaft assembly (74) and planet carrier (16)	Position as shown in No. 1 clutch housing carrier.	
39. Ring gear (61)	Install on planet carrier (16).	
40. Three disc assemblies (22) and two clutch plates (23)	a. Lubricate with clean oil. b. Install, beginning with a disc assembly (22)	

TRANSMISSION ASSEMBLY (CONT)

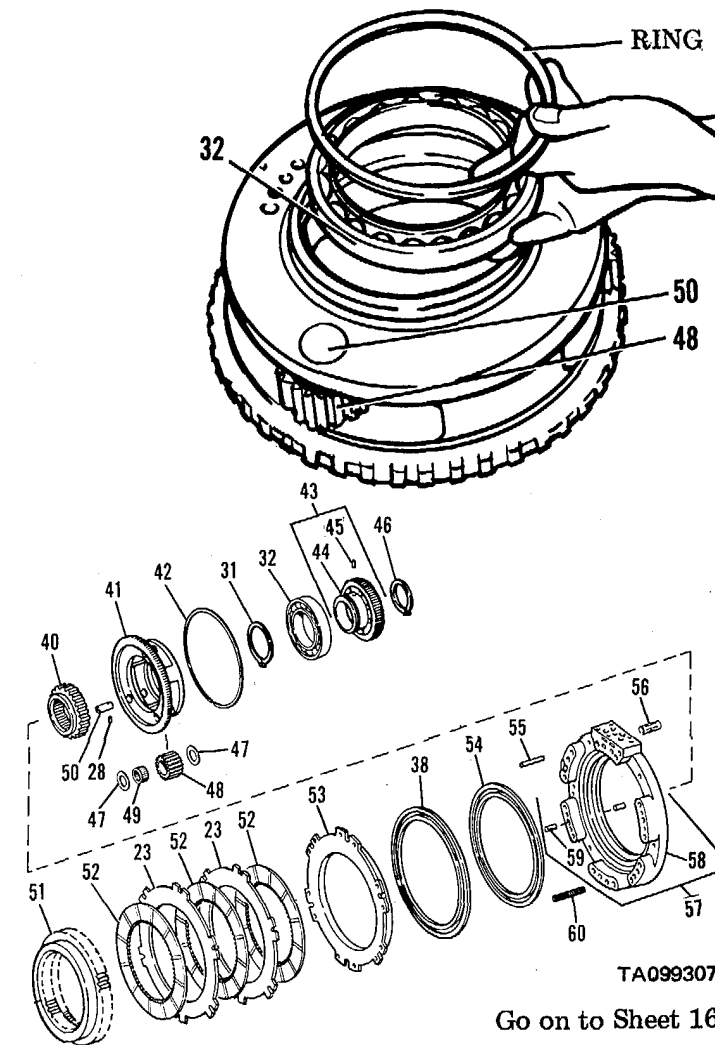
LOCATION/ITEM	ACTION	REMARKS
41. Twelve springs (shown at right)	Install.	
42. Seal ring (15)	a. Install on carrier. b. Lubricate with clean oil.	
43. Two seal rings (37) and (38)	a. Install on piston (62) so that oil groove and sealing edge will face toward inside of housing. b. Lubricate with clean hydraulic fluid.	
44. Piston (62)	Install in No. 2 clutch housing (64).	
45. Clutch housing No. 2 (64)	a. Use clamping tools to hold piston in clutch housing. b. Attach hoist.	

TRANSMISSION ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p>45. Clutch housing No. 2 (cont)</p>	<p>c. Position housing on dowels, springs and plate assembly as shown at right.</p> <p style="text-align: center;">NOTE</p> <p>Be sure grease pencil mark on outside of No. 1 housing aligns with mark on outside of No. 2 housing, and the 12 springs are in their bores in the piston of No. 2 housing.</p> <p>d. Install long capscrews. Tighten to a torque of 65-85 lb. ft. (102-115 N-m).</p>	
<p>46. Sun gear (40)</p>	<p>Install onto output shaft (72).</p>	
<p>47. Bearing (32)</p>	<p>Install in No. 5 clutch housing planet carrier (41).</p>	

TA099306
Go on to Sheet 15

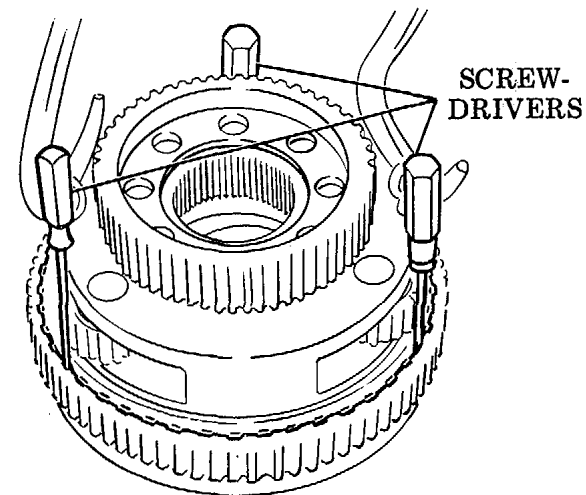
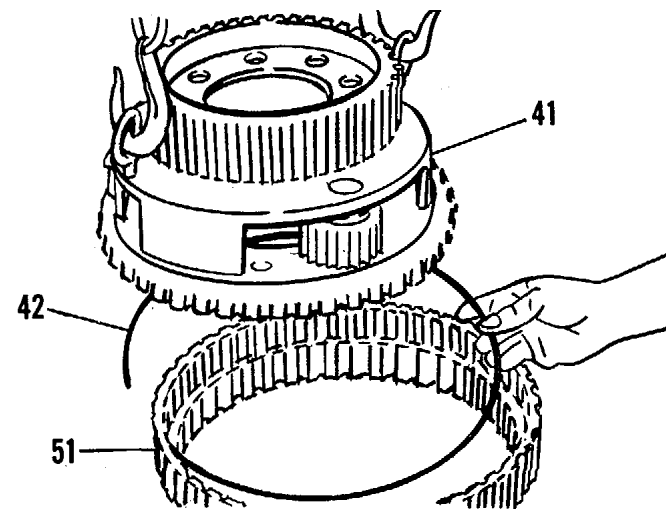
LOCATION/ITEM	ACTION
48. Ring (shown at right)	Install to secure bearing.
49. Three roller bearings (49)	a. Lubricate with clean oil. b. Install in planet gears (48) of planet carrier (41).
50. Washer (47)	Install on both sides of each planet gear.
51. Planet gear assemblies (bearing, washer, gear)	Install in carrier.
52. Planet shafts (50)	Install. <p style="text-align: center;">NOTE</p> Be sure pin hole in each shaft aligns with hole in carrier.
53. Spring pins (28)	Install each until it is flush with outside surface of carrier.
54. Pin (45)	Install in hub (44).



TA099307
Go on to Sheet 16

TA099307
Go on to Sheet 16

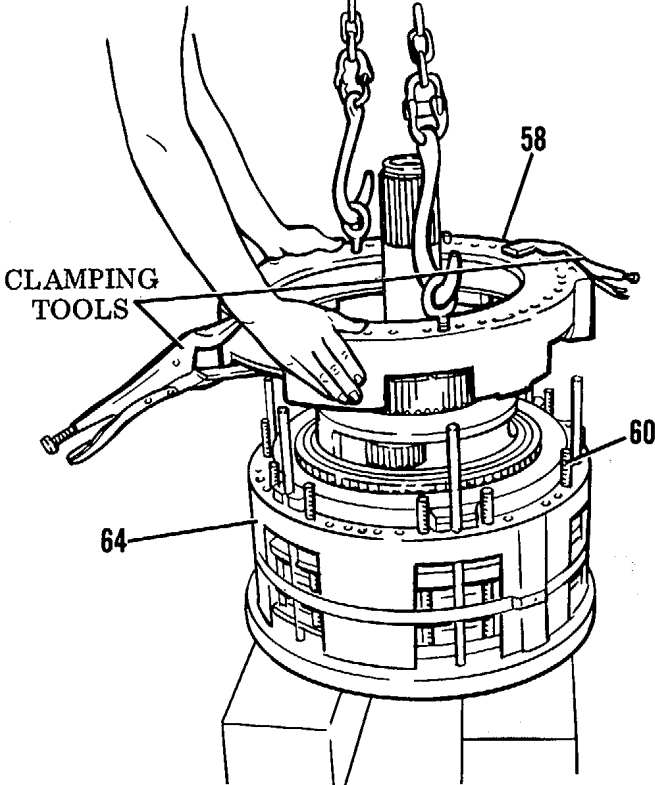
LOCATION/ITEM	ACTION	REMARKS
55. Hub assembly (43)	Install on planet carrier (41).	
	<p style="text-align: center;">NOTE</p>	
	Be sure pin in hub assembly engages with notch in bearing.	
56. Retaining ring (31)	Install to secure hub assembly.	
57. Lock ring (42)	Install on carrier (41).	
58. Carrier	a. Attach hoist as shown.	
	b. Lower into ring gear (51).	
	<p style="text-align: center;">NOTE</p>	
	Use screwdrivers to compress ring (42) as carrier is being installed. Be sure ring engages groove in ring gear.	
	c. Install carrier/ring gear assembly in No. 2 clutch housing.	



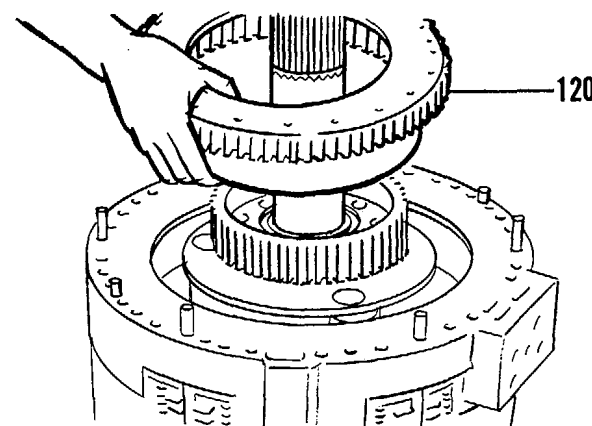
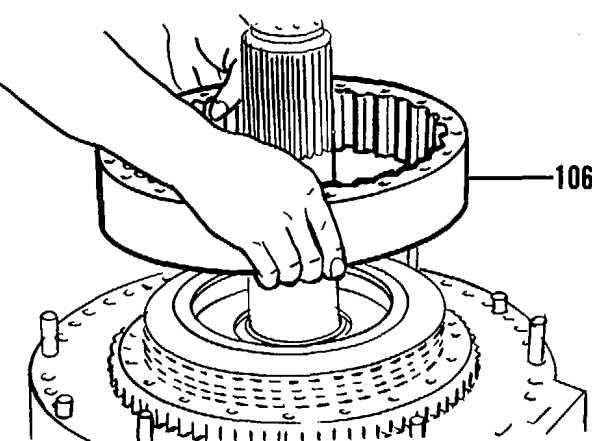
TRANSMISSION ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
59. Snap ring (46)	Install to secure carrier/ring groove assembly.	
60. Six reaction pins (55)	Install.	
61. Three disc assemblies (52) and two clutch plates (23)	a. Lubricate with clean oil. b. Install as shown, beginning with a disc assembly.	
62. Two seal rings (38) and (54)	a. Install on piston (53) of No. 3 clutch piston housing (58).	
<p style="text-align: center;">NOTE</p> Be sure oil groove and sealing edge are toward inside of housing. b. Lubricate with clean hydraulic fluid.		

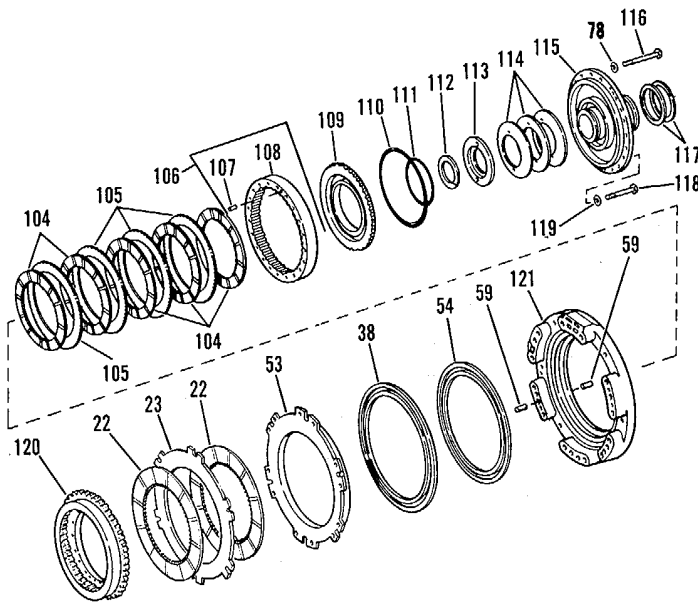
TA099309
Go on to Sheet 18

LOCATION/ITEM	ACTION	REMARKS
63. Clutch piston (53)	a. Install in No. 3 clutch housing (58). b. Using clamping tools hold piston in clutch housing (58).	
64. Twelve springs (60)	Install in No. 2 clutch housing (64).	
65. No. 3 clutch housing (58)	a. Attach hoist as shown. b. Lower into position on No. 2 clutch housing (64) as shown.	
	NOTE	
	Be sure the 12 springs slip into the bores of the piston in the No. 3 clutch housing as it is lowered.	

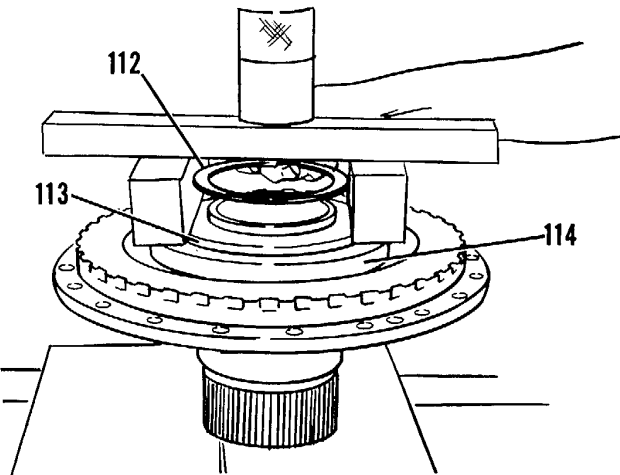
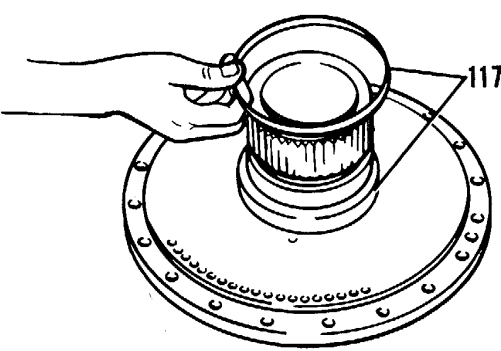
TA099310
Go on to Sheet 19

LOCATION/ITEM	ACTION	REMARKS
66. Ring gear (120)	Install.	
67. Five clutch disc assemblies (104) and four clutch plates (105)	a. Lubricate with clean oil. b. Install, beginning with a disc assembly.	
68. Housing assembly (106)	Install over disc assemblies and plates.	

TA099311
Go on to Sheet 20

LOCATION/ITEM	ACTION	REMARKS
69. Two seal ring (110) and (111)	<p>a. Install on piston (109) No. 5 clutch piston housing (115).</p> <p style="text-align: center;">NOTE</p> <p>Be sure oil grooves and sealing edges are toward inside of housing (106).</p> <p>b. Lubricate with clean oil.</p>	
70. Three disc springs (114)	<p>a. Install first spring with outside diameter of spring in contact with housing assembly.</p> <p>b. Install next two springs with outside diameter of springs in contact with each other.</p>	
71. Retainer plate (113) the three springs.	<p>Place in position on housing assembly over the three springs.</p>	

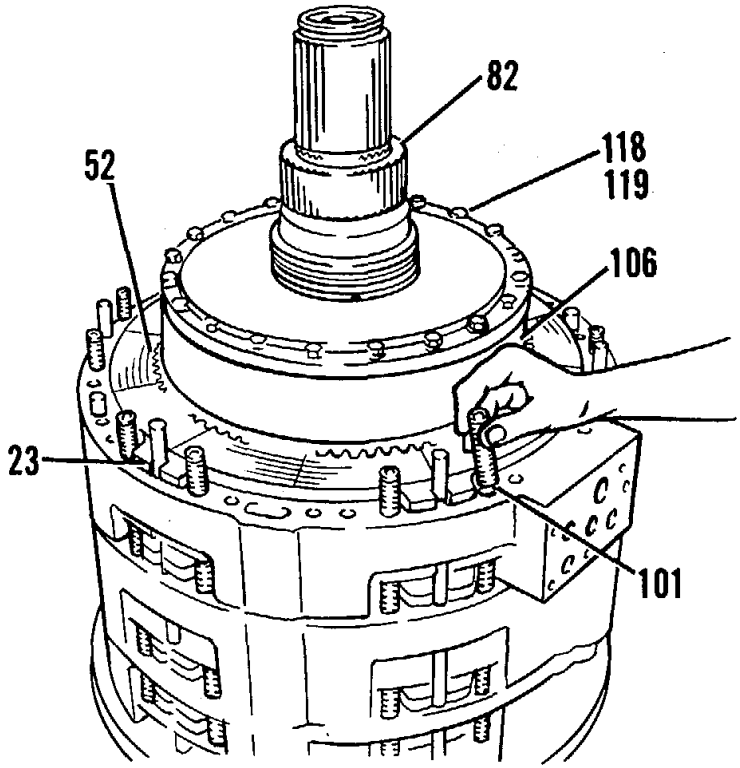
TA099312
Go on to Sheet 21

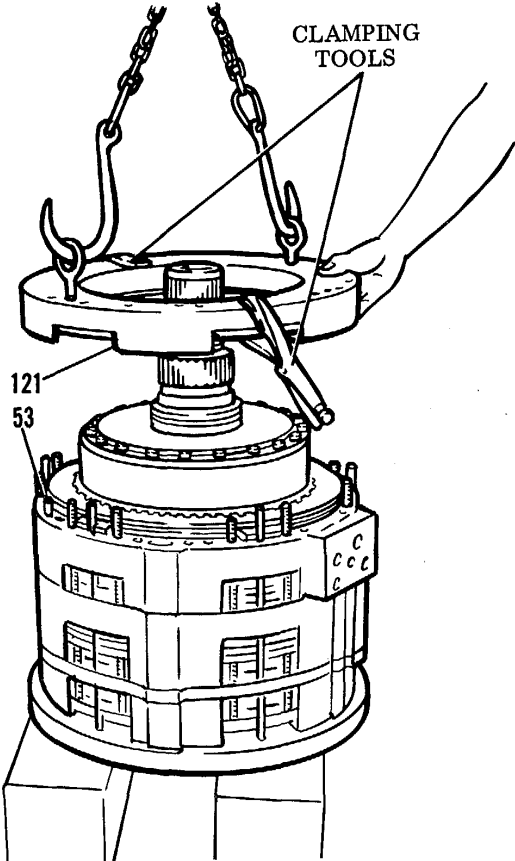
LOCATION/ITEM	ACTION	REMARKS
72. Three springs (114)	With an arbor press, compress as shown at right until retaining ring (112) can be installed over retainer plate (113).	
73. Two seal rings (117)	a. Install on carrier of housing assembly (115) as shown. b. Lubricate with clean hydraulic fluid.	
74. Housing assembly (115)	a. Attach hoist. b. Install in housing assembly (106).	
75. Twenty capscrews (118) and washers (119)	Install as shown on Sheet 22. Tighten to a torque of 27-37 lb. ft. (36-50 N-m).	

TA099313

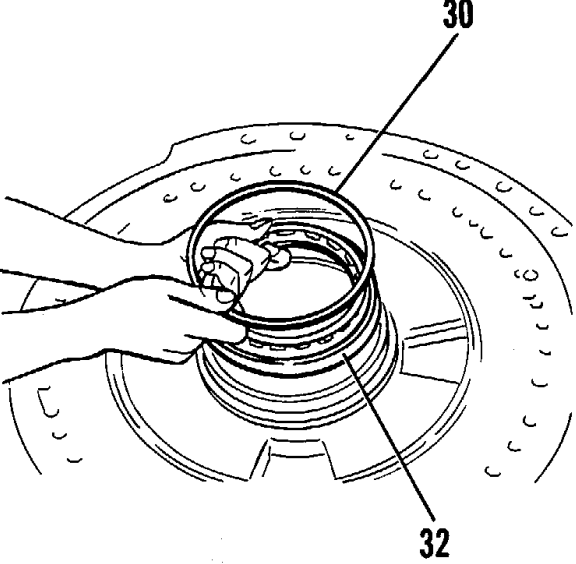
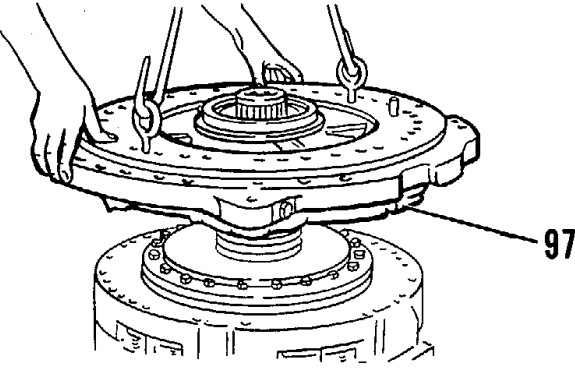
TA099313
Go on to Sheet 22

TRANSMISSION ASSEMBLY (CONT)

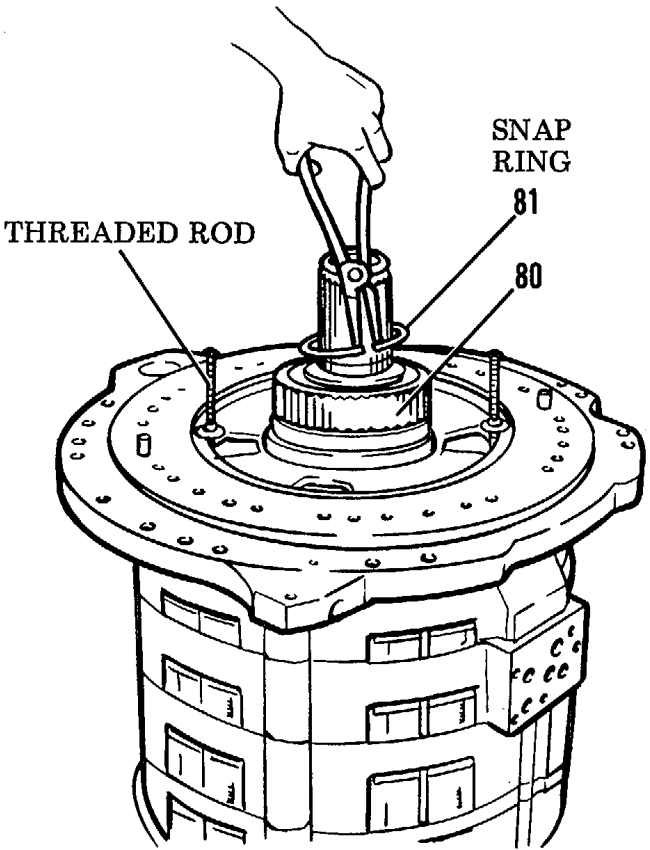
LOCATION/ITEM	ACTION	REMARKS
76. Lock ring (82)	Install.	
77. Two disc assemblies (52) and one clutch plate (23)	a. Lubricate with clean oil. b. Install, beginning with a disc assembly.	
78. Twelve springs (101) (shown at right)	Install.	
79. Two seal rings (38) and (54).	a. Install on clutch piston (53) of No. 4 clutch housing (121).	
<p style="text-align: center;">NOTE</p> <p>Be sure to install seals so that oil groove and sealing edges face toward inside of No. 4 clutch housing.</p>		
b. Lubricate with clean hydraulic fluid.		<p style="text-align: right;">TA099314 Go on to Sheet 23</p>
<p>4-109</p>		

LOCATION/ITEM	ACTION	REMARKS
80. Clutch piston (53)	a. Install in No. 4 clutch housing (121). b. Using clamping tools, hold piston in clutch housing.	
81: No. 4 clutch housing	a. Attach hoist as shown. b. Install on No. 3 clutch housing as shown. <p style="text-align: center;">NOTE</p> Be sure grease pencil mark on outside of No. 3 housing aligns with mark on outside of No. 4 housing, and the 12 springs are in their bores in the piston of No. 4 housing.	

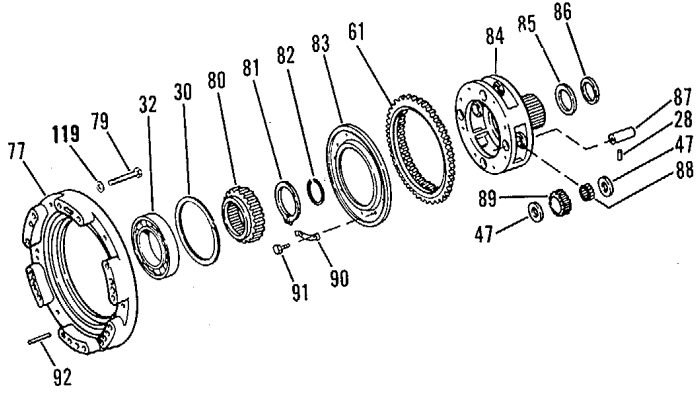
TRANSMISSION ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
82. Bearing (32)	Install in manifold assembly until it makes contact with counterbore in manifold assembly.	
83. Retaining ring (30)	<p style="text-align: center;">NOTE</p> Notch on inner race must face downward. Install.	
84. Small preformed packing (103) and large preformed packing (93)	a. Install in manifold assembly (97) as shown. b. Lubricate with clean oil.	
85. Manifold assembly (97)	a. Attach hoist as shown. b. Install on No. 4 clutch housing. <p style="text-align: center;">NOTE</p> Be sure notch in bearing aligns with pin in shaft assembly before manifold assembly is lowered all the way. c. Turn No. 5 clutch housing (115) until two of the capscrews (118) align with openings in the manifold assembly.	

TA099316
Go on to Sheet 25

LOCATION/ITEM	ACTION	REMARKS
85. Manifold assembly (cont)	<p>d. Remove the two capscrews that are aligned with the openings.</p> <p>e. Install two threaded rods (3/8"-16NC x 8") into the two capscrew holes as shown at right.</p> <p>f. Install two large flat washers and nuts on the rods.</p> <p style="text-align: center;">NOTE</p> <p>Before the nuts are tightened, be sure the notch in the bearing aligns with the dowel in the shaft assembly.</p>	
86. Sun gear (80)	Install over shaft.	
87. Snap ring (81)	<p>Install in groove above sun gear on shaft assembly.</p> <p style="text-align: center;">NOTE</p> <p>It may be necessary to tighten nuts further (Step 85 f., above) to expose groove.</p>	

TA099317
Go on to Sheet 26

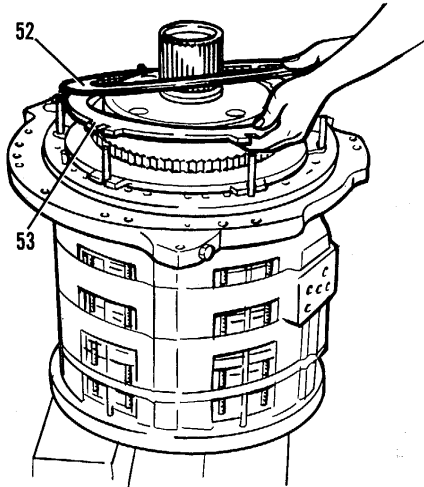
LOCATION/ITEM	ACTION	REMARKS
88. Rods, flat washers, nuts	a. Replace with the two original capscrews. b. Tighten the two capscrews to a torque of 27 to 37 lb. ft. (37 to 51 N-m).	 <p style="text-align: right;">TA099318</p>
89. Two roller bearings (88)	a. Lubricate with clean hydraulic fluid. b. Install in each of the four planet gears (89) of the planet carrier (84).	
90. Washers (47)	Install on both sides of each planet gear (89).	
91. Planet gear assemblies (bearing washer, gear)	Install in planet carrier (84).	
92. Planet shafts (87)	Install in planet gears.	
<p style="text-align: center;">NOTE</p> Be sure pin hole in each shaft aligns with hole in carrier.		

Go on to Sheet 27

LOCATION/ITEM	ACTION	REMARKS
93. Spring (28)	Install each until it is flush with the outside surface of the carrier.	
94. Slinger (83)	Position as shown on planet carrier (84) and secure carrier (84) and secure with the cap-screws (91) and lockwashers (90).	
95. Planet carrier (84)	a. Attach hoist. b. Install in position on the transmission.	
96. Spacer (85) and retaining ring (86)	Install.	
97. Ring gear (61)	Install on carrier (84).	
98. Six reaction dowels (92)	Install in manifold.	

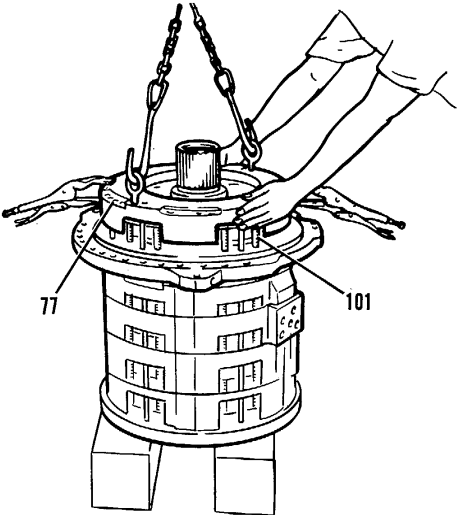
TA099319

Go on to Sheet 28

LOCATION/ITEM	ACTION	REMARKS
99. Three disc assemblies (52) and two clutch plates (23)	a. Lubricate with clean oil. b. Install as shown, beginning with a disc assembly.	
100. Two seal rings (38) and (54)	a. Install on clutch piston (53). <p style="text-align: center;">NOTE</p> Be sure oil grooves and sealing edges face toward inside of housing. b. Lubricate with clean oil.	

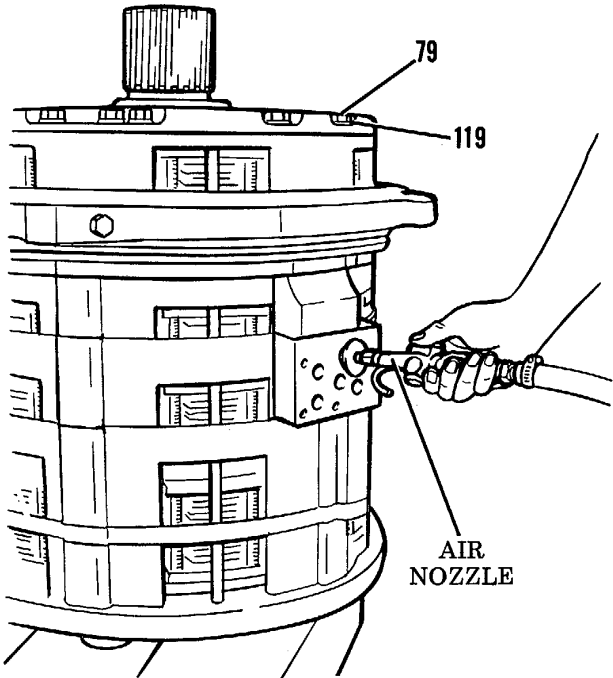
TA099320

Go on to Sheet 29

LOCATION/ITEM	ACTION	REMARKS
101. Clutch piston (53)	a. Install in No. 6 clutch housing (77). b. Use clamping tools to hold piston in housing.	
102. Twelve springs (101)	Install in manifold assembly.	
103. Clutch housing No. 6 (77)	a. Attach hoist as shown. b. Put in position on manifold assembly as shown at right.	
<p style="text-align: center;">NOTE</p> <p>Be sure grease pencil mark on outside of No. 6 housing aligns with mark on manifold assembly and the twelve springs (101) are in their bores in the piston of No. 6 housing.</p>		

TA099321

Go on to Sheet 30

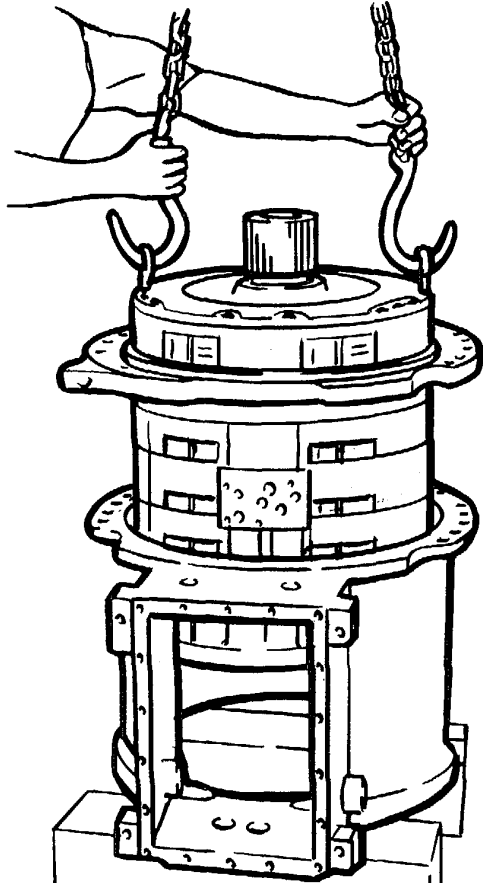
LOCATION/ITEM	ACTION	REMARKS
104. Capscrews (79) and washers (119)	Install and tighten to a torque of 65-85 lb. ft. (88-116 N-m).	 <p>TA099322</p> <p>Go on to Sheet 31</p>
105. Tooling (sleeve, retainer, capscrew)	Remove from end of shaft assembly (See Step 37).	
106. Capscrew (6) and retainer plate (7)	Install in end of shaft assembly.	
107. Pistons	<p>Check for correct operation:</p> <ul style="list-style-type: none"> a. Blow air under pressure of 100-150 psi (690-1035 kPa) into each of the five oil passages as shown. b. Check that each piston will move at least .12 to .15 in. (3.0 to 6.4 mm). c. If any of the pistons do not move the correct distance, insert a small amount of clean oil into that passage and recheck with compressed air. d. If any or all pistons still do not operate correctly, transmission must be disassembled to check condition of pistons and seals. 	

TA099322

Go on to Sheet 31

Go on to Sheet 31

TRANSMISSION ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p>108. Transmission assembly</p>	<p>a. Attach hoist as shown.</p> <p>b. Lower assembly into transmission case as shown.</p> <p style="text-align: center;">NOTE</p> <p>Support case on wooden blocks.</p> <p>c. Secure assembly to case with the two capscrews. Tighten the capscrews to a torque of 65-85 lb. ft. (101.7-115.3 N-m).</p> <p>d. Turn transmission on its side so that opening for the transmission hydraulic controls faces up.</p>	 <p style="text-align: right;">TA099323</p>
<p>109. Transmission hydraulic controls</p>	<p>Install into transmission case.</p>	<p>See Transmission Hydraulic Controls Removal/Installation, page 4-157.</p> <p style="text-align: right;">End</p>

TRANSFER GEAR ASSEMBLY (INPUT AND OUTPUT) REMOVAL

(Sheet 1 of 3)

This task covers: Separation of transfer gear assembly (input and output) from transmission.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Wooden blocking.

Troubleshooting Reference

Page 2-42

Equipment Condition

Transmission and transfer assembly are removed.

Special Tools

None

Personnel Required

One mechanic

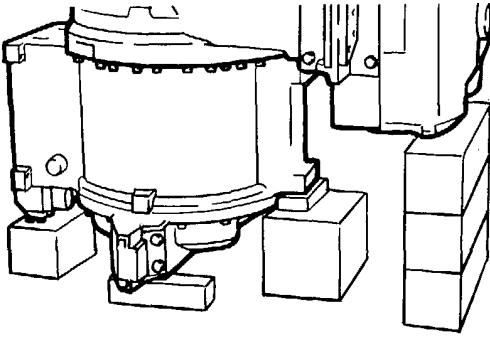
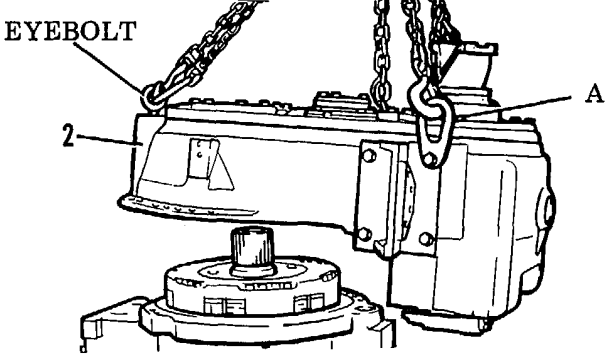
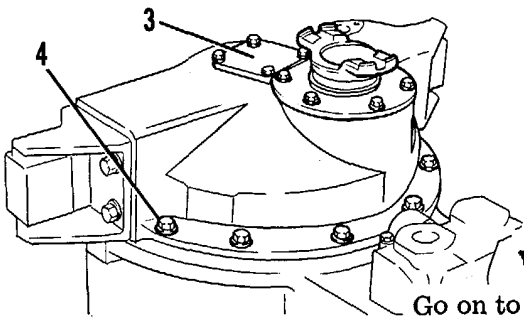
References

Transmission and transfer assembly removal, page 4-43.

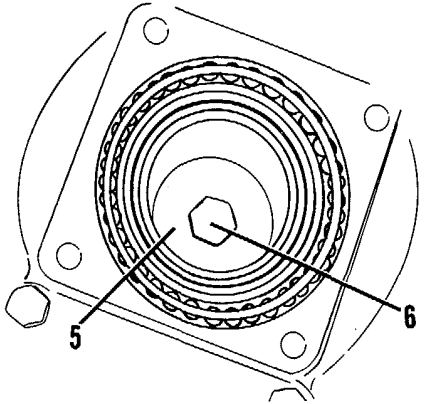
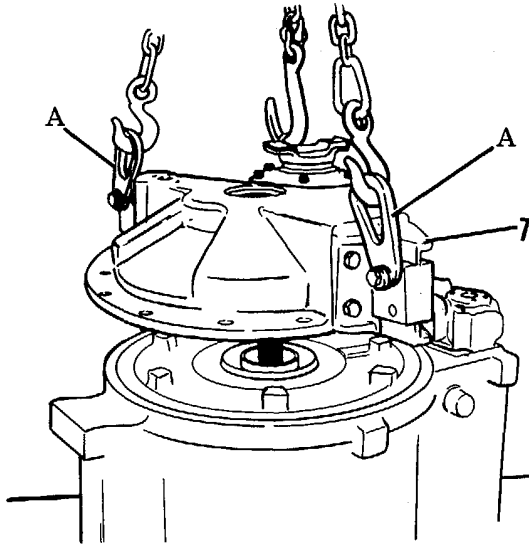
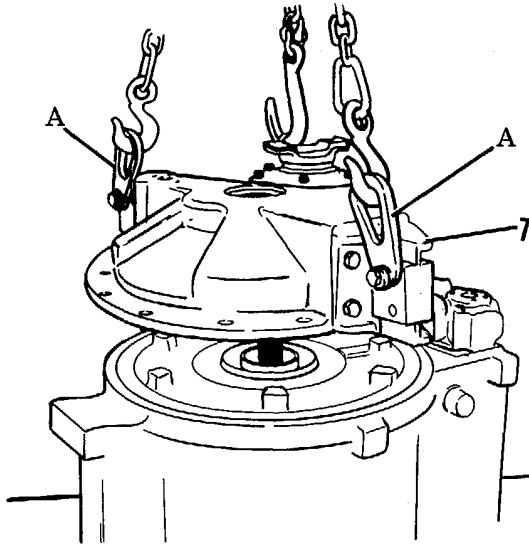
General Safety Instructions

Transmission and transfer assembly on blocks and level.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Transmission and transfer assembly	Put on wood blocks, as shown.	
2. Capscrews (1) that hold output transfer assembly to transmission	Remove.	
3. Lifting brackets (A)	Attach to bracket assemblies on transfer gear case assembly, as shown.	
4. 5/8-11NC eyebolt	Install in opposite end of transfer gear case assembly.	
5. Output transfer gear case assembly (2)	Attach hoist as shown and remove. Unit weighs 1080 lb. (490 Kg).	
6. Preformed packing between output transfer gear case and transmission	Discard and replace with new packing.	
7. Transmission	Use hoist to turn over. Transmission weighs 1510 lb. (685 Kg).	
8. 12 capscrews (4)	Remove from transmission case.	
9. Cover (3)	Remove.	

TA099324
Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
10. Capscrews (6) and plate (5) under cover (3)	Remove.	
11. Lifting brackets (A)	Attach to input transfer gear assembly (7) as shown.	
12. 3/8-16NC eyebolt	Install in input transfer gear case.	
13. Input transfer gear assembly.	Fasten hoist and remove from transmission. Input gear assembly weighs 246 lb. (112 Kg).	
14. Preformed packing between input transfer gear case and transmission	Discard and replace with new packing.	 <p>TA098325</p> <p>End</p>

TRANSFER GEAR ASSEMBLY (INPUT AND OUTPUT) INSTALLATION

(Sheet 1 of 2)

This task covers: Installation of transfer gear assembly (input and output) to transmission.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Performed packing.
Wooden blocking

Troubleshooting Reference

None

Equipment Condition

Transmission and transfer gear assembly are removed from vehicle.

Special Tools

None

Personnel Required

One mechanic

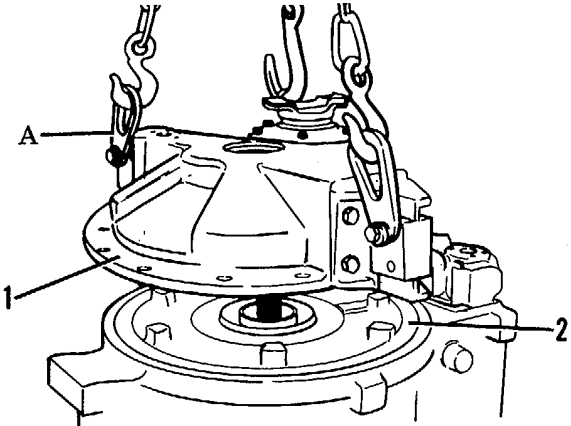
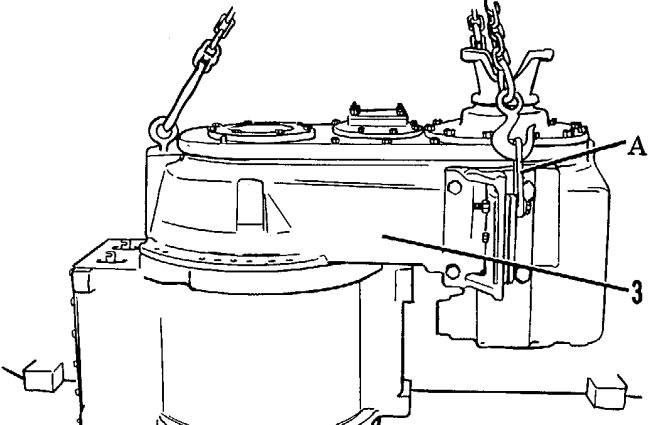
References

Transmission and transfer assembly removal, page 4-43.
Transfer gear assembly removal, page 4-119.
Transfer gear assembly installation, page 4-122.

General Safety Instructions

None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Preformed packing (2)	Install new packing. Put clean oil on seal.	
2. Lifting brackets (A), 3/8-16NC	Attach to input gear assembly (1) as shown. eyebolt, and hoist	
3. Input gear assembly (1)	Position unit on transmission as shown.	
4. Capscrew and plate	Install in end of input shaft.	
5. 12 capscrews that hold input gear assembly to transmission	Install.	
6. Transmission	Use hoist to turn over. Put on wooden blocks.	
7. Preformed packing between output transfer gear assembly and transmission	Install new packing. Put clean oil on seal.	
8. Lifting brackets (A), 5/8-11INC eyebolt and hoist.	a. Attach to output transfer gear assembly (3) as shown. b. Position unit on transmission.	
9. Capscrews that hold output gear assembly to transmission	Install.	
10. Transmission and transfer gear assembly	Install.	

See procedure on page 4-56.

TA099326

End

TRANSFER GEAR ASSEMBLY (INPUT) DISASSEMBLY

This task covers: Disassembly of transfer gear assembly (input).

INITIAL SETUP

Test Equipment

None

Materials/Parts

Wooden Blocking

Troubleshooting Reference

Pages 2-42, 2-49

Equipment Condition

Transfer gear assembly (input and output) removed from transmission.

Special Tools

None

Personnel Required

One mechanic

References

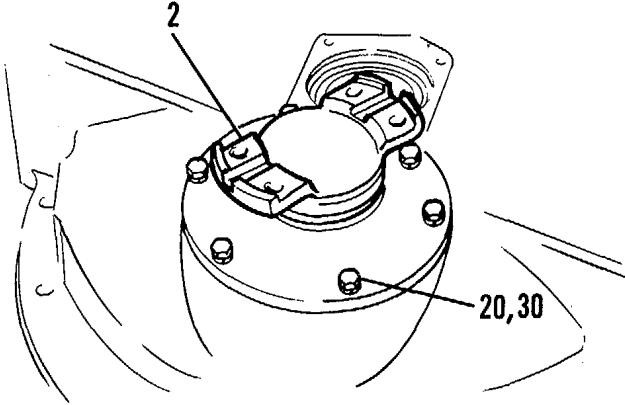
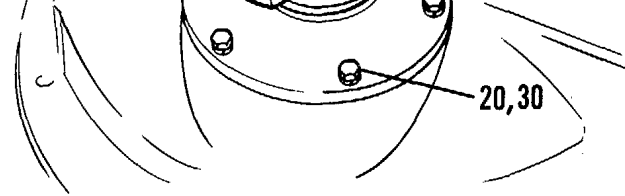
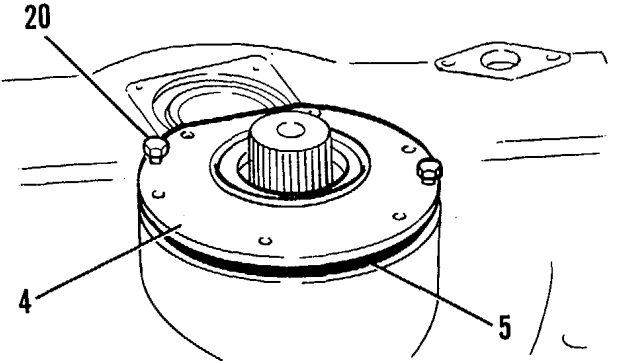
Transfer gear assembly removal,
Page 4-119.

General Safety Instructions

None

Go on to Sheet 2

TRANSFER GEAR ASSEMBLY (INPUT) DISASSEMBLY (CONT)

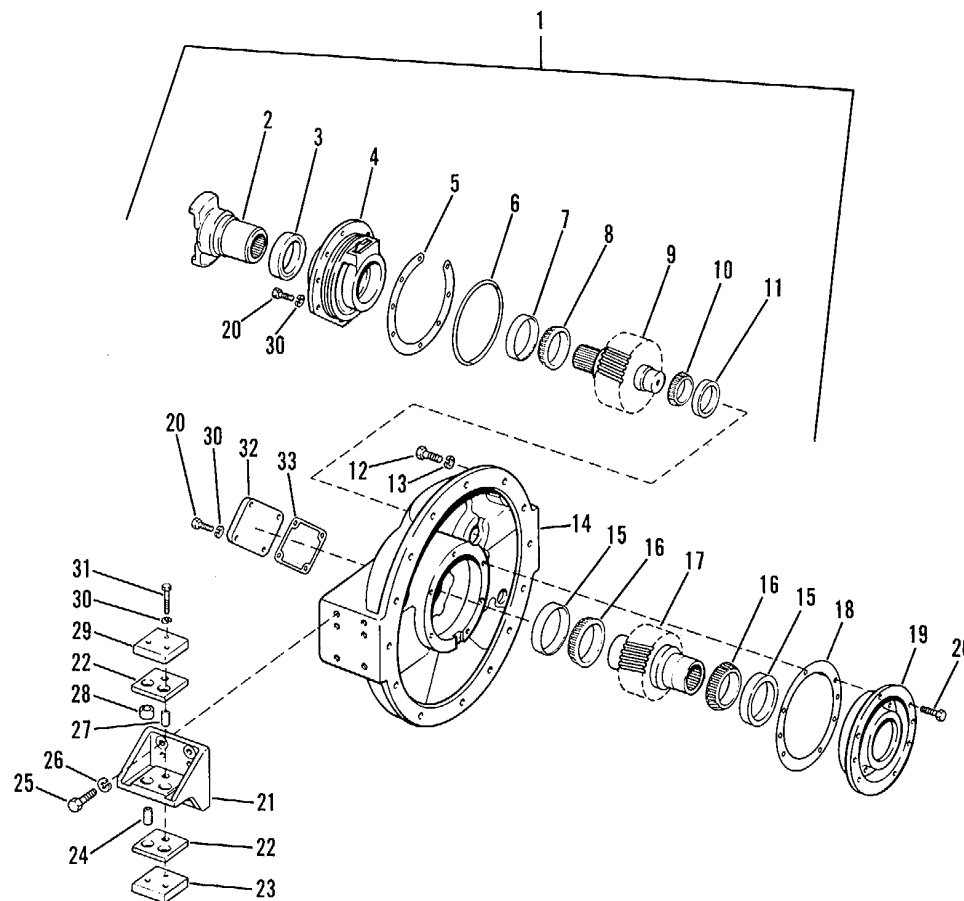
LOCATION/ITEM	ACTION	REMARKS
1. Input transfer gear assembly (1)	Put on wood blocks.	
2. Yoke assembly (2)	Remove.	
3. Six capscrews (20) and lockwashers (30) from bearing cage (4)	Remove.	
4. Two capscrews (20)	a. Install in threaded holes in the bearing cage (4), use as forcing screws to loosen bearing cage (4). b. Tighten evenly until cage (4) is loose.	
5. Cage (4) and shims (5)	Remove.	
6. Preformed packing (6)	Discard.	
7. Seal (3)	Remove.	

TA099327

Go on to Sheet 3

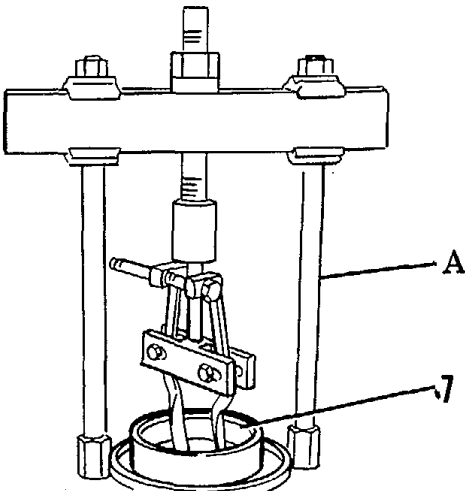
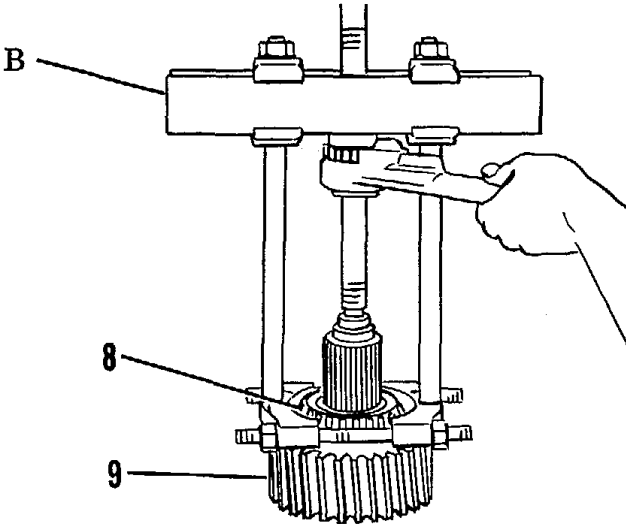
TRANSFER GEAR ASSEMBLY (INPUT) DISASSEMBLY
(CONT)

1. Input Transfer Case Gear Group
2. Yoke Assembly
3. Lip Seal
4. Cage
5. Shim Pack
6. Preformed Packing
7. Tapered Roller Bearing Cup
8. Tapered Roller Bearing Cone
9. Input Transfer Driver Gear
10. Tapered Roller Bearing Cone
11. Tapered Roller Bearing Cup
12. Capscrew
13. Lockwasher
14. Input Transfer Case
15. Tapered Roller Bearing Cup
16. Tapered Roller Bearing Cone
17. Transfer Input Driven Gear
18. Shim Pack
19. Bearing Cage
20. Capscrew
21. Assembly Mounting Bracket
22. Upper Pad
23. Lower Plate
24. Sleeve
25. Capscrew
26. Lockwasher
27. Sleeve
28. Sleeve
29. Upper Plate
30. Lockwasher
31. Capscrew
32. Gasket
33. Plate



TA099328

Go on to Sheet 4

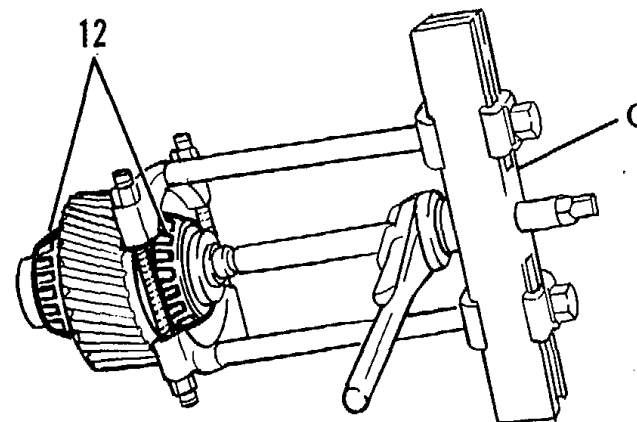
LOCATION/ITEM	ACTION	REMARKS
8. Bearing cup (7)	Remove with bearing puller (A).	 <p>The diagram shows a bearing puller (A) mounted on a horizontal bar. The puller's arms are positioned around a bearing cup (7) which is mounted on a shaft. The puller is being used to pull the cup off the shaft.</p>
9. Driver gear (9)	Remove from case (14).	
10. Bearing cones (8) and (10)	Remove from drive gear (9) with bearing puller (B).	
11. Bearing cup (11)	Remove from case (14) with bearing puller.	 <p>The diagram shows a bearing puller (B) mounted on a horizontal bar. The puller's arms are positioned around a driver gear (9) which has bearing cones (8) mounted on it. A hand is shown operating the puller to remove the cones from the gear.</p>

TA099329

Go on to Sheet 5

TRANSFER GEAR ASSEMBLY (INPUT) DISASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
12. Transfer gear case (14)	Turn case over.	
13. Six capscrews (20)	Remove from bearing cage (19).	
14. Two capscrews (20)	a. Use as forcing screws to loosen cage.	
	b. Tighten screws evenly until cage is loose.	
15. Cage (19) and shims (18)	Remove.	
16. Bearing cup (15)	Remove from bearing cage (19) with bearing puller.	
17. Driven gear (17)	Remove from case (14).	
18. Two bearing cones (16)	Remove from driven gear with bearing puller (C).	
19. Driven gear bearing cup (15)	Remove from case with bearing puller.	



TA099330

End

TRANSFER GEAR ASSEMBLY (INPUT) ASSEMBLY(Sheet 1 of 7)

This task covers: Assembly of transfer gears (input).

INITIAL SETUP

Test Equipment

Dial indicator

Feeler gage

Materials/Parts

Shims

Troubleshooting Reference

None

Equipment Condition

Input gears disassembled, ready for reassembly.

Special Tools

None

Personnel Required

One mechanic

References

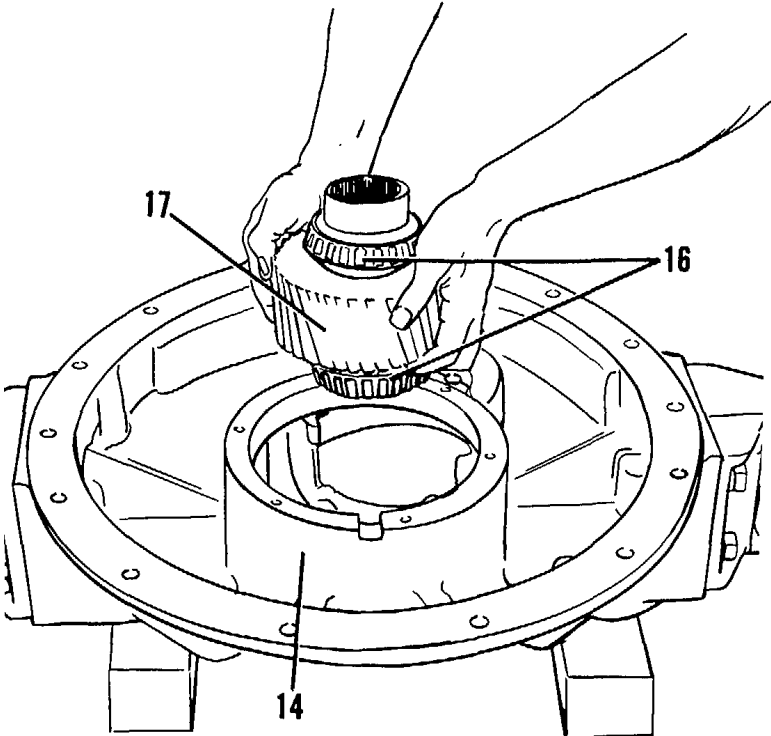
Input transfer gears bearing adjustment, page 4-136.

Transfer gear assembly (input) disassembly, page 4-124.

General Safety Instructions

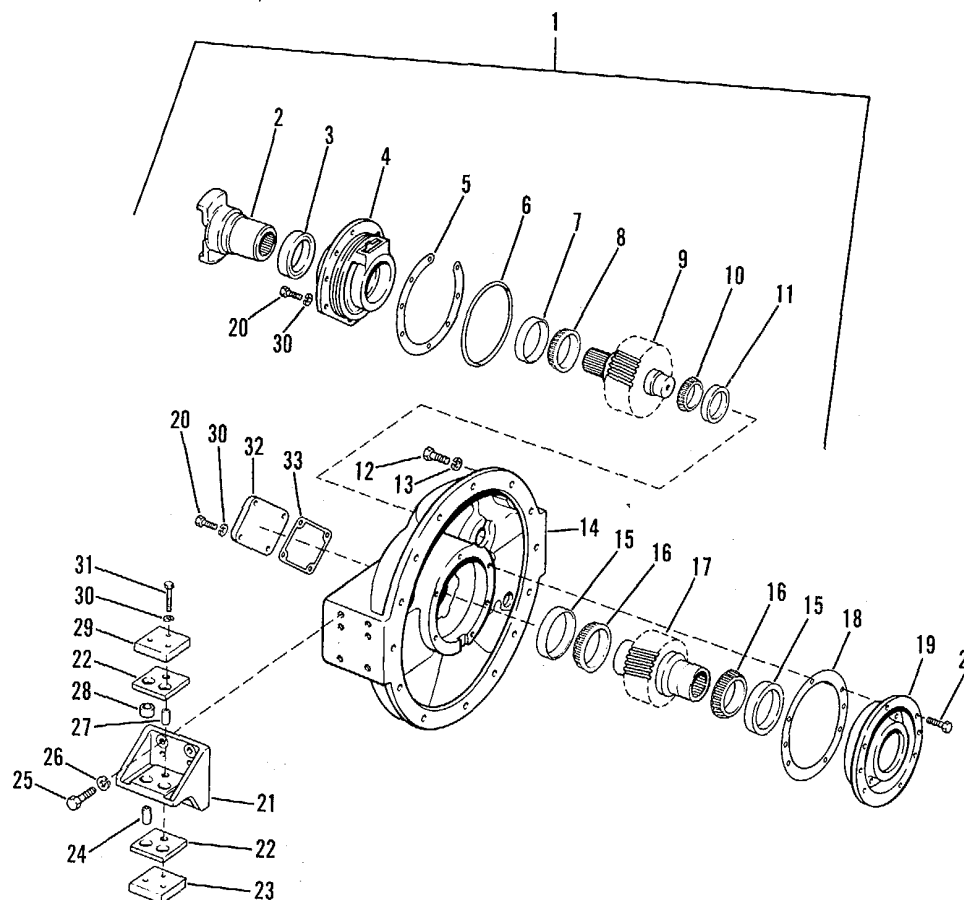
None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Bearing cup (15)	Lower temperature and install in center of case (14).	
<p style="text-align: center;">NOTE</p> <p>Be sure back of bearing is flush with counterbore in case.</p>		
2. Two bearing cones (16)	<p>a. Heat to maximum of 2750F (1350C).</p> <p>b. Install on driven gear (17).</p>	
3. Driven gear (17)	Install in case (14) as shown.	
4. Bearing cup (15)	Lower temperature of cup and install in cage (19).	
<p style="text-align: center;">NOTE</p> <p>Be sure bearing cup bottoms in counterbore in cage.</p>		

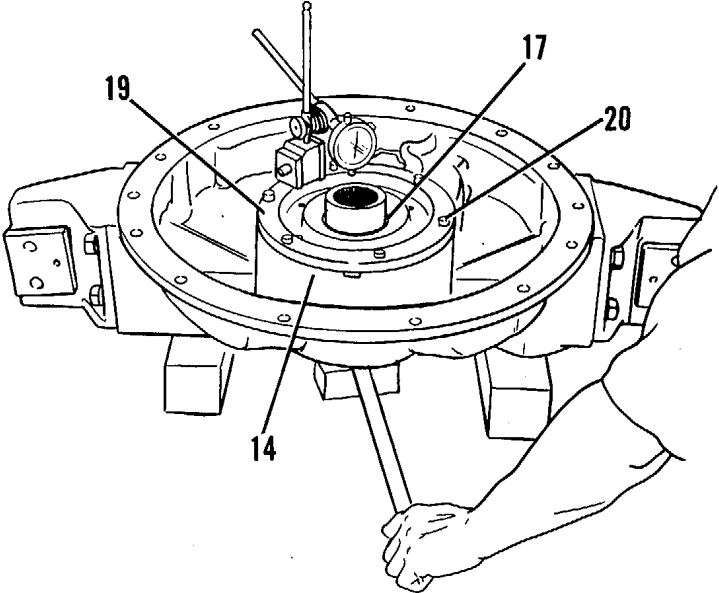
TRANSFER GEAR ASSEMBLY (INPUT) ASSEMBLY (CONT)(Sheet 3 of 7)

1. Input Transfer Case Gear Assembly
2. Yoke Assembly
3. Lip Seal
4. Cage
5. Shim Pack
6. Preformed Packing
7. Tapered Roller Bearing Cup
8. Tapered Roller Bearing Cone
9. Input Transfer Driver Gear
10. Tapered Roller Bearing Cone
11. Tapered Roller Bearing Cup
12. Capscrew
13. Lockwasher
14. Input Transfer Case
15. Tapered Roller Bearing Cup
16. Tapered Roller Bearing Cone
17. Transfer Input Driven Gear
18. Shim Pack
19. Bearing Cage
20. Capscrew
21. Assembly Mounting Bracket
22. Upper Pad
23. Lower Plate
24. Sleeve
25. Capscrew
26. Lockwasher
27. Sleeve
28. Sleeve
29. Upper Plate
30. Lockwasher
31. Capscrew
32. Gasket
33. Plate



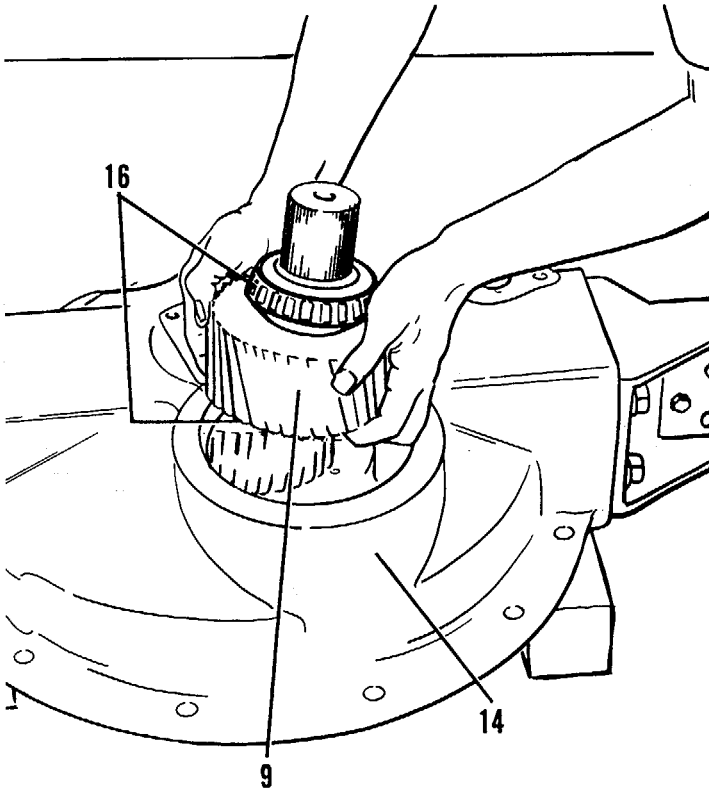
TA099332

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
5. Cage (19)	<p>a. Install on case (14) and secure with cap-screws (20) tightened finger tight.</p> <p>b. Install dial indicator on cage (19) as shown.</p> <p style="text-align: center;">NOTE</p> <p>Indicator stem should touch surface of driven gear.</p> <p>c. Tighten the six capscrews (20) evenly until end play of driven gear is .004-.008 in. (0.10-0.21 mm). (Move driven gear up and down to check end play.)</p> <p>d. Measure gap between cage (19) and case (14) with a feeler gage.</p> <p>e. Install the correct thickness of shims (18) under cage (19) that eliminate gaps between case and cage.</p> <p>f. Recheck end play. Add or remove shims until end play measures .004 to .008 in. (0.10 to 0.21 mm).</p> <p>g. Remove dial indicator.</p>	 <p>See Bearing Adjustment, page 4-136.</p>

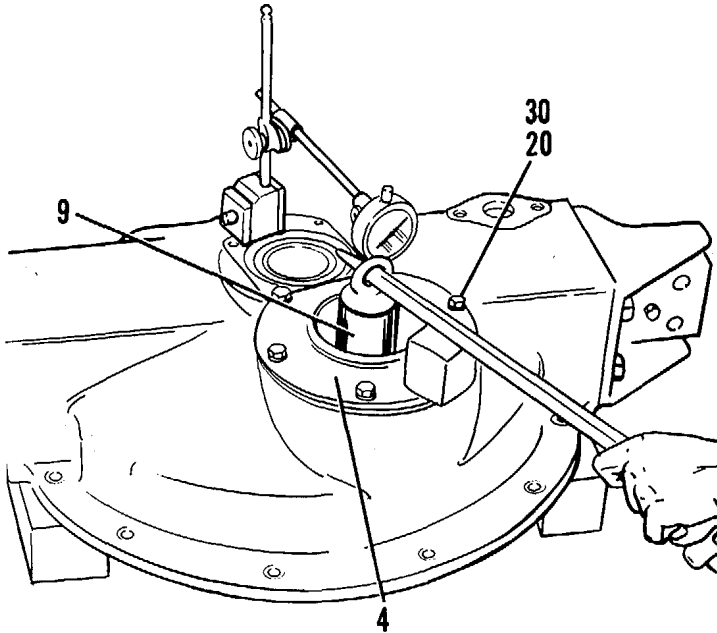
TA099333

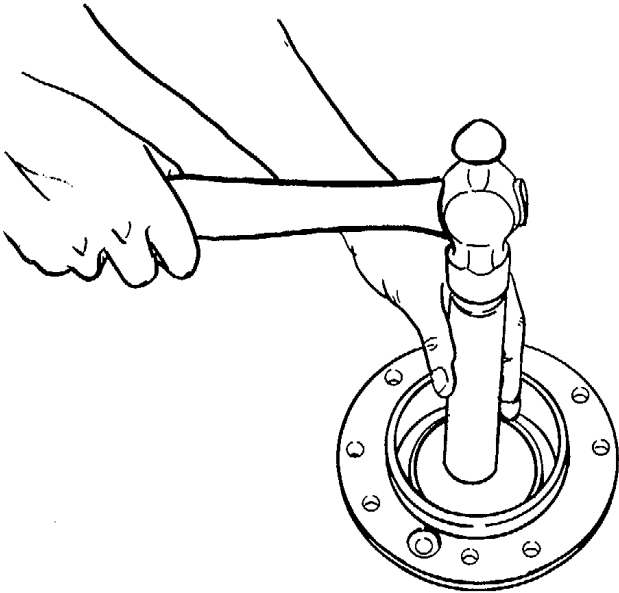
Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
6. Bearing cones (16)	a. Heat to maximum of 2750F (1350C). b. Install on drive gear (9).	
7. Case (14)	Turn case over.	
8. Bearing cup (11)	Lower temperature and install in case (14).	
9. Drive gear (9)	Install in case (14) as shown.	
10. Bearing cup (7)	Lower temperature and install in case (4).	

TA099334

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
11. Cage (4)	<p>a. Install and secure with capscrews (20) and lockwashers (30).</p> <p>b. Install dial indicator on case (14) as shown.</p> <p style="text-align: center;">NOTE</p> <p>Indicator stem should contact surface of drive gear.</p> <p>c. Tighten the six capscrews evenly until end play of the drive gear is .004 to .008 in. (0.10 to 0.21 mm). (Move the drive gear up and down to check end play.)</p> <p>d. Measure gap between cage (4) and case (14) with a feeler gage.</p> <p>e. Install the correct thickness of shims (5) under cage (4) that will eliminate gap between case and cage.</p> <p>f. Recheck end play. Add or remove shims until end play measures .004 to .008 in. (0.10 to 0.21 mm).</p> <p>g. Remove dial indicator.</p> <p>h. Remove cage.</p> <p style="text-align: center;">4-134</p>	 <p style="text-align: right;">TA099335 Go on to Sheet 7</p>

LOCATION/ITEM	ACTION	REMARKS	
12. Lip type seal (3)	Using suitable driver, install in cage as shown.		
	NOTE		
	Back of seal must be flush with counterbore in cage and lip of seal must point away from cage surface.		
13. Preformed packing (6)	Install on cage (4).		
14. Lip type seal (3)	Coat with clean oil.		
15. Cage (4)	Install and secure with capscrews (20) and lockwashers (30).		
16. Yoke assembly (2)	Install.		

TA099336

End

TRANSFER GEARS BEARING ADJUSTMENT (INPUT)

(Sheet 1 of 2)

This task covers: Adjusting the bearing in the input transfer gears.

INITIAL SETUP

Test Equipment

Dial indicator

Feeler gage

Materials/Parts

Shims

Troubleshooting Reference

Page 2-42

Equipment Condition

Transfer gears (input) assembled.

Special Tools

None

Personnel Required

One mechanic

References

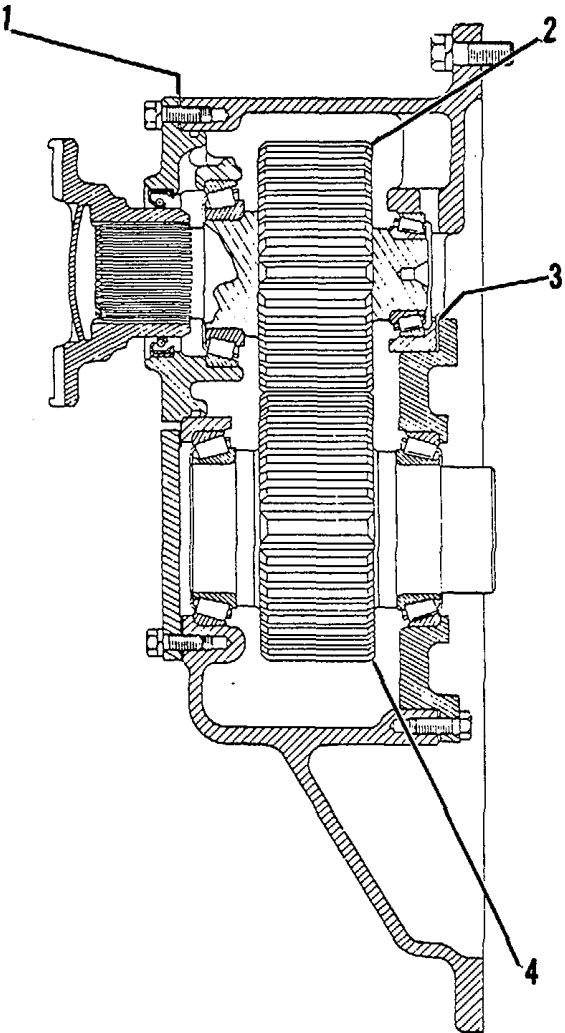
Transfer gears (input) assembly,
page 4-129.

General Safety Instructions

None

Go on to Sheet 2

TRANSFER GEARS BEARING ADJUSTMENT (INPUT) (Cont)

LOCATION/ITEM	ACTION	REMARKS
1. Shims (1)	Install as many as necessary so that the end play of the gear (2) is .003 to .006 in. (0.08 to 0.15 mm).	
2. Shims (3)	Install as many as necessary so that the end play of the gear (4) is 0.003 to 0.006 in. (0.08 to 0.15 mm).	
	See Assembly of Transfer Gears (input) page 4-129.	

TA099337
End

TRANSFER GEAR ASSEMBLY (OUTPUT) DISASSEMBLY(Sheet 1 of 8)

This task covers: Disassembly of output transfer gears.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Wooden blocking

Troubleshooting Reference

Pages 2-44, 2-49

Equipment Condition

Transfer gear assembly (output) removed from vehicle.

Special Tools

None

Personnel Required

One mechanic

References

Transfer gears (input and output) removal, page 4-119.

General Safety Instructions

None

Go on to Sheet 2

TRANSFER GEAR ASSEMBLY (OUTPUT) DISASSEMBLY (CONT)

(Sheet 2 of 8)

LOCATION/ITEM	ACTION	REMARKS
1.	Output transfer gear assembly	Position on wood blocks.
2.	Yoke assembly (17), bearing cage (19)	
3.	Eleven capscrews (46) (47) and washers (22)	
4.	Yoke (50) b. Remove yoke with output shaft (68) and cage (45) attached. <p style="text-align: center;">NOTE</p> Unit weighs 210 lb. (95 Kg).	
6.	Capscrew (53) and retainer (52)	
7.	Preformed packing (51)	Remove.
8.	Yoke (50)	Remove.

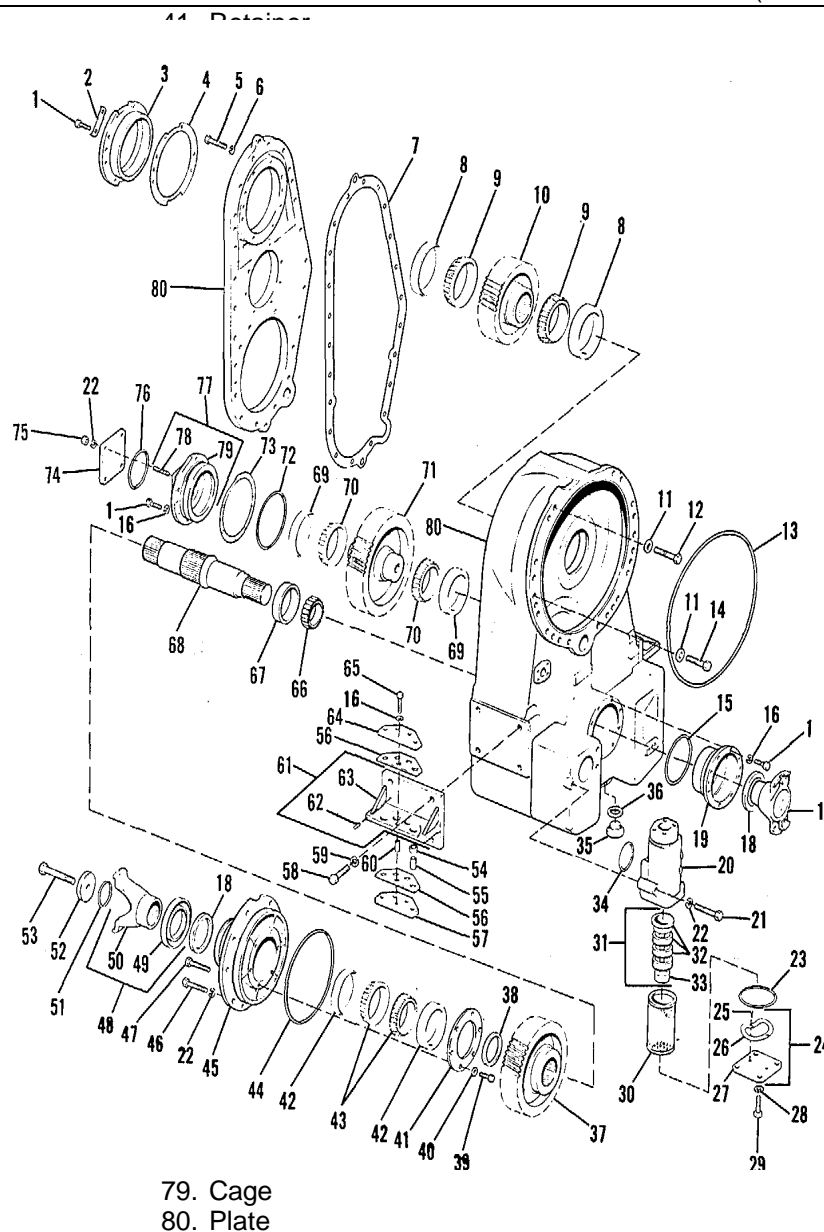
TA099338

Go on to Sheet 3

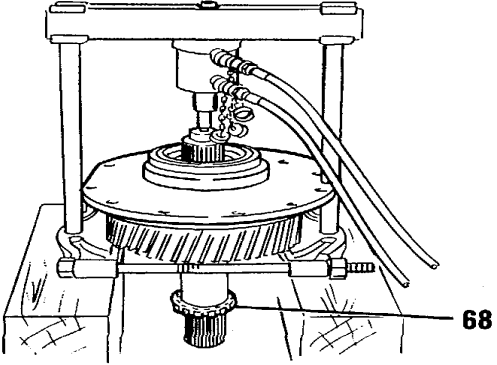
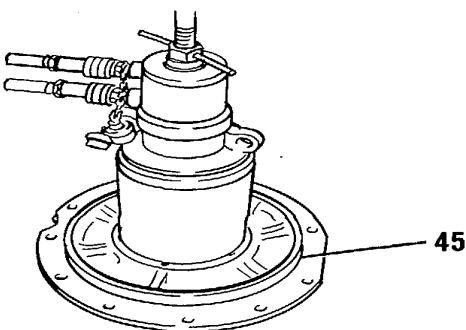
TRANSFER GEAR ASSEMBLY (OUTPUT) DISASSEMBLY (CONT)

(Sheet 3 of 8)

- 1. Capscrew
- 2. Lock Nut
- 3. Bearing Cage
- 4. Shim Pack
- 5. Capscrew
- 6. Lockwasher
- 7. Gasket
- 8. Bearing Cup
- 9. Bearing Cone
- 10. Output Gear
- 11. Washer
- 12. Capscrew
- 13. Preformed Packing
- 14. Capscrew
- 15. Preformed Packing
- 16. Lockwasher
- 17. Yoke Assembly
- 18. Lip Type Seal
- 19. Bearing Cage
- 20. Housing
- 21. Capscrew
- 22. Lockwasher
- 23. Preformed Packing
- 24. Plate Assembly
- 25. Self Tapping Screw
- 26. Washer
- 27. Plate
- 28. Lockwasher
- 29. Capscrew
- 30. Suction Screen
- 31. Tube
- 32. Magnet
- 33. Tube
- 34. Preformed Packing
- 35. Drain Plug
- 36. Gasket
- 37. Output Transfer Gear
- 38. Spacer
- 39. Capscrew
- 40. Lockwasher



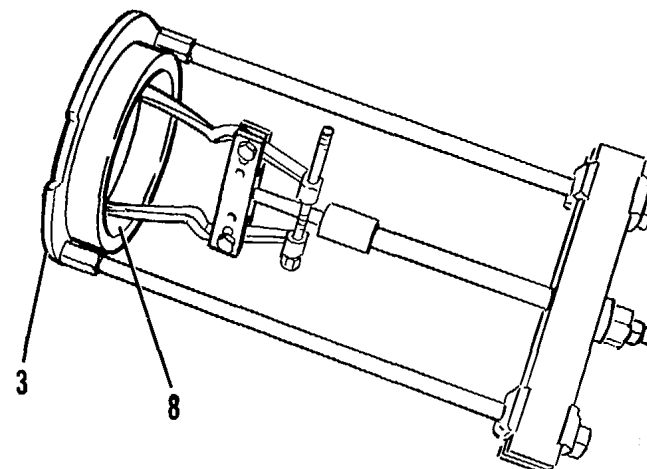
79. Cage
80. Plate

LOCATION/ITEM	ACTION	REMARKS
9.	Output shaft (68)	Press from cage assembly as shown.
10.	Large preformed packing (44)	
11.	Lip type seal (49)	
12.	Cage (45)	
13.	Capscrews (39), lockwasher (40), and retainer (41)	
14.	Two bearing cones (43) and bearing cup (42)	
15.	Opposite bearing cup (42)	
16.	Race (67) and roller bearing Assembly	

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Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
17.	Capscrews (1) and lock nuts (2) that secure cage (3)	Rc
18.	Two of capscrews (11) screws opposite each other in blind holes in cage (3). (Tighten evenly until cage is loose.)	U:
19.	Cage (3) and shims (4)	Rc
20.	Cup (8)	Rc
21.	Capscrews (1) and lockwashers (16) that secure cage (79)	Rc
22.	Two capscrews (1) transfer gear case.	U:
23.	Cage (79) and shims (73)	Remove from gear case.
24. (16) and cover (74)	Four hex nuts (75), lockwasher	Remove.
25.	Preformed packing (76)	Remove from under cover (74) and discard.
26.	Bearing cup (69)	Remove from cage with puller.

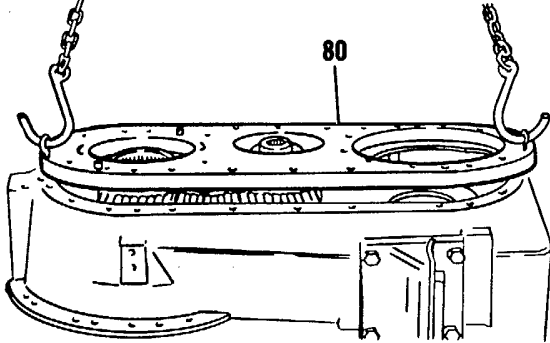
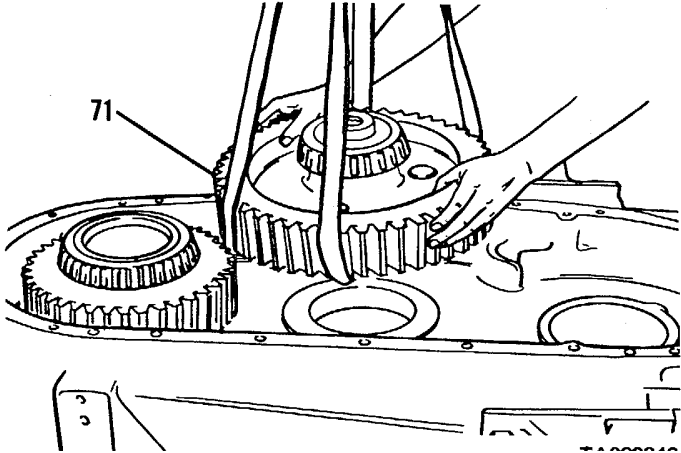


TA099341

Go on to Sheet 6

TRANSFER GEAR ASSEMBLY (OUTPUT) DISASSEMBLY (CONT)

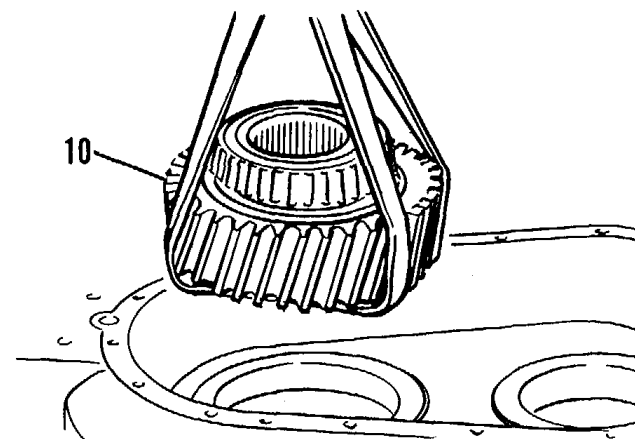
(Sheet 6 of 8)

LOCATION/ITEM	ACTION	REMARKS
27. Remove from gear case.	Capscrews (5) and lockwashers (16) that hold plate (80) to transfer gear case	
28. a. Remove.	Plate (80) Attach hoist. b. <p style="text-align: center;">NOTE</p> Plate weighs 97 lb. (44 Kg).	
29. Remove and discard.	Transfer gear case gasket (7)	
30. a.	Gear (71) Attach hoist as shown.	
b.	Remove. <p style="text-align: center;">NOTE</p> Gear weighs 85 lb. (30 Kg).	
31.	Two bearing cones (70)	Remove from idler gear (71) with puller.

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Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
32.	Gear (10)	a. Attach hoist
b.	Remove from gear case.	
	<p>NOTE</p> <p>Gear weighs 65 lb. (29 Kg).</p>	
33.	Two bearing cones (9)	Rc
34.	Two gear case bearing cups (8)	Rc
35.	Gear case	Tu
36.	Preformed packing (13)	Rc
37.	Eight capscrews (1) and lockwashers (16)	Rc
38.	Two capscrews (1)	Us
39.	Cage (19)	Remove from gear case.
40.	Preformed packing (15)	Remove from cage (19) and discard.

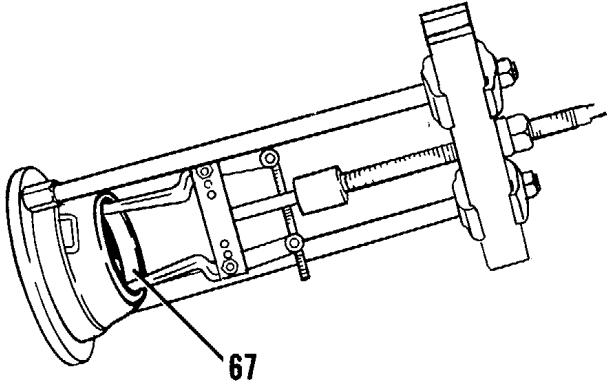
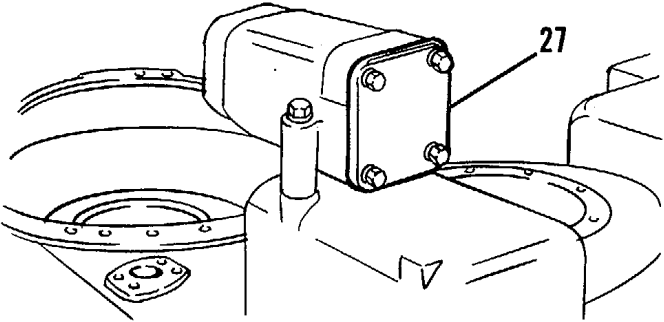


TA099343

Go on to Sheet 8

TRANSFER GEAR ASSEMBLY (OUTPUT) DISASSEMBLY (CONT)

(Sheet 8 of 8)

LOCATION/ITEM	ACTION	REMARKS
41.	Lip type seal (18)	Rc
42.	Bearing race (67)	Rc
43.	Plate assembly (27), preformed packing (23), screen (30) and tube assembly (31)	<p>Rc</p>  

TA099344

End

TRANSFER GEAR ASSEMBLY (OUTPUT) ASSEMBLY

(Sheet 1 of 9)

This task covers: Assembly of output transfer gears.

INITIAL SETUP

Test Equipment

Dial indicator
Feeler gage

Materials/Parts

GAA grease

Troubleshooting Reference

None

Equipment Condition

Output transfer gears disassembled.

Special Tools

None

Personnel Required

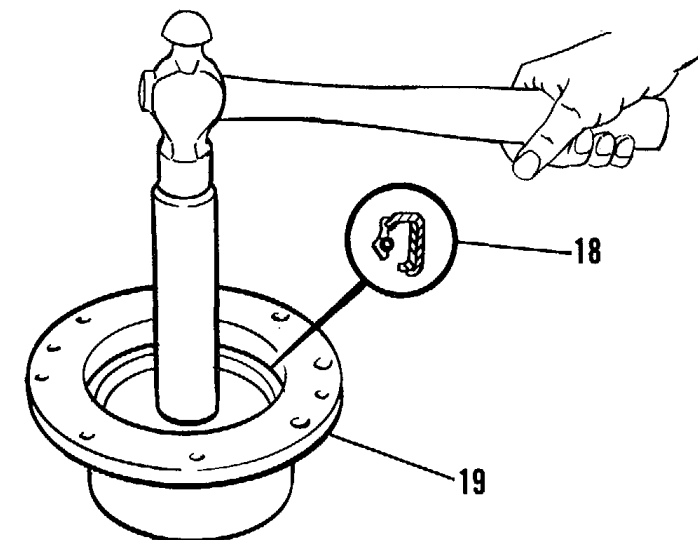
One mechanic

References

Transfer gear assembly (output) disassembly, None
page 4-138.

General Safety Instructions

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1.	Tube assembly magnets (32) and screen (30)	Clean thoroughly
2.	Tube assembly (31) and screen (30)	In
3.	Preformed packing (23) and plate assembly (24)	In
4.	Bearing cup (69) bearing cage (19).	Lc
5.	Lip type seal (18) NOTE Install so back of bearing contacts counter-bore and bearing lip points toward inside of cage. b.	a.  c.

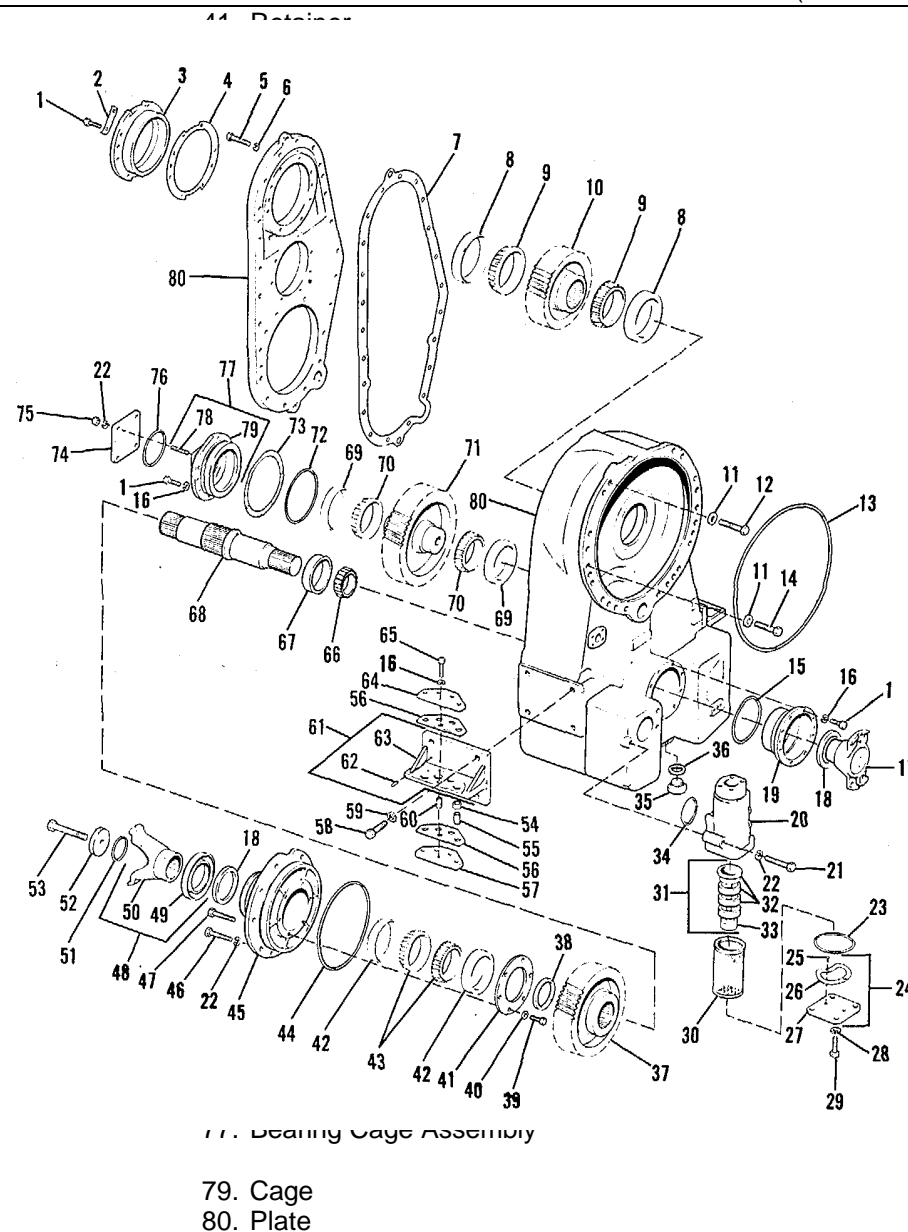
TA099345

Go on to Sheet 3

TRANSFER GEAR ASSEMBLY (OUTPUT) ASSEMBLY (CONT)

(Sheet 3 of 9)

- 1. Capscrew
- 2. Lock Nut
- 3. Bearing Cage
- 4. Shim Pack
- 5. Capscrew
- 6. Lockwasher
- 7. Gasket
- 8. Bearing Cup
- 9. Bearing Cone
- 10. Output Gear
- 11. Washer
- 12. Capscrew
- 13. Preformed Packing
- 14. Capscrew
- 15. Preformed Packing
- 16. Lockwasher
- 17. Yoke Assembly
- 18. Lip Type Seal
- 19. Bearing Cage
- 20. Housing
- 21. Capscrew
- 22. Lockwasher
- 23. Preformed Packing
- 24. Plate Assembly
- 25. Self Tapping Screw
- 26. Washer
- 27. Plate
- 28. Lockwasher
- 29. Capscrew
- 30. Suction Screen
- 31. Tube
- 32. Magnet
- 33. Tube
- 34. Preformed Packing
- 35. Drain Plug
- 36. Gasket
- 37. Output Transfer Gear
- 38. Spacer
- 39. Capscrew
- 40. Lockwasher

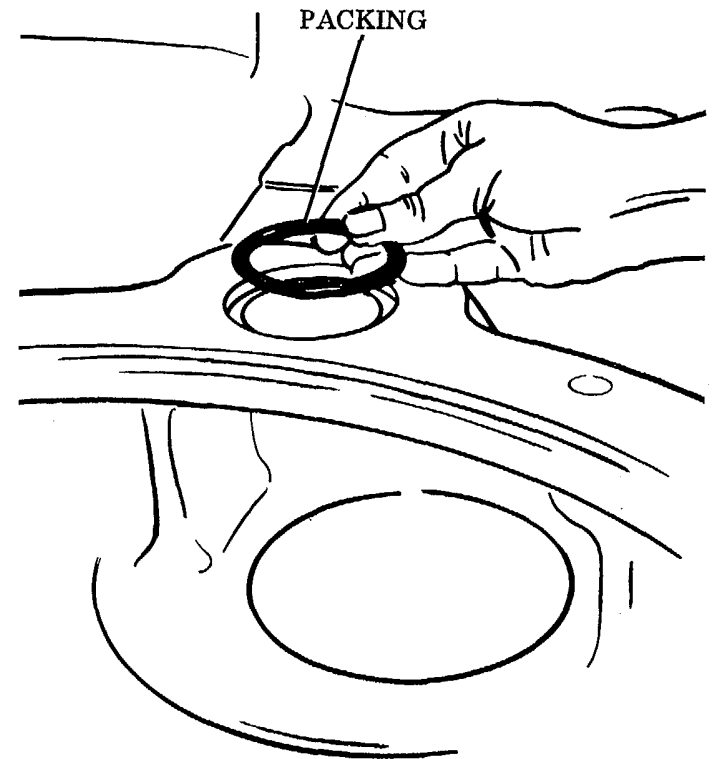


Go on to Sheet 4

TRANSFER GEAR ASSEMBLY (OUTPUT) ASSEMBLY (CONT)

(Sheet 4 of 9)

LOCATION/ITEM	ACTION	REMARKS
6.	Preformed packing (15)	In
7.	Bearing cage (19)	a.
	b.	Se (1
8.	Transfer gear case	Tu
9.	Small preformed packing	In
10.	Bearing cups (8) and (69) case.	Lc
11.	Two bearings (9)	a.
	b.	In
12. Gear (10)	a. Attach hoist.	
	b.	In



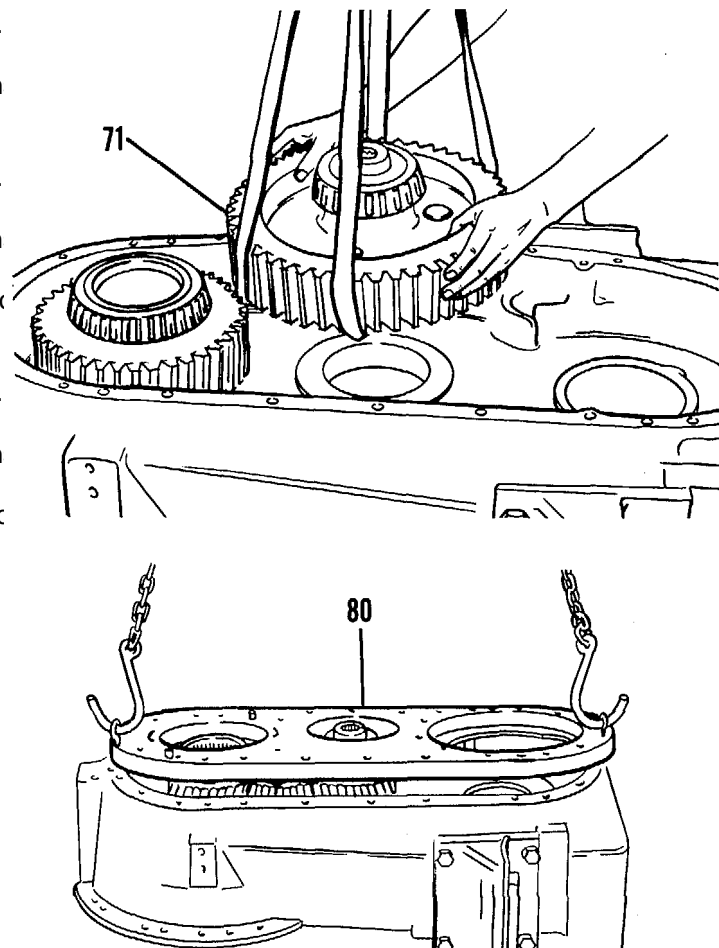
TA099347

Go on to Sheet 5

TRANSFER GEAR ASSEMBLY (OUTPUT ASSEMBLY (CONT))

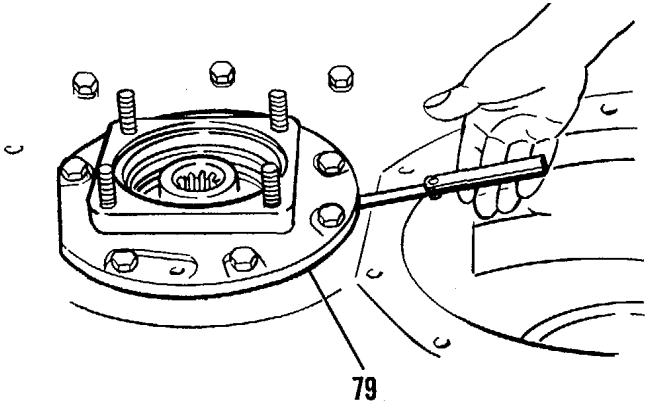
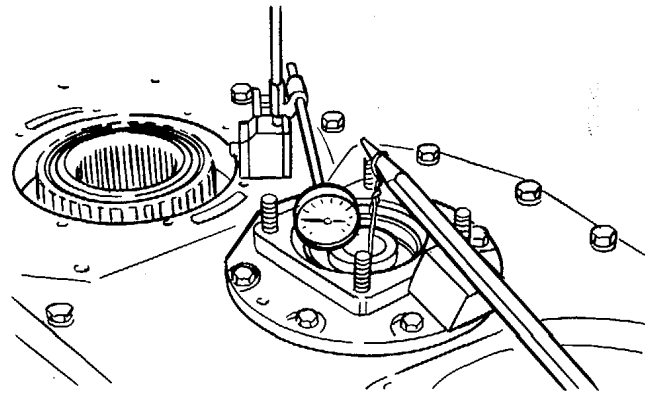
(Sheet 5 of 9)

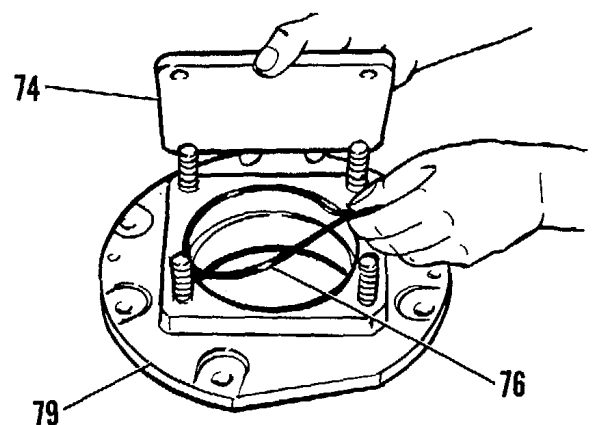
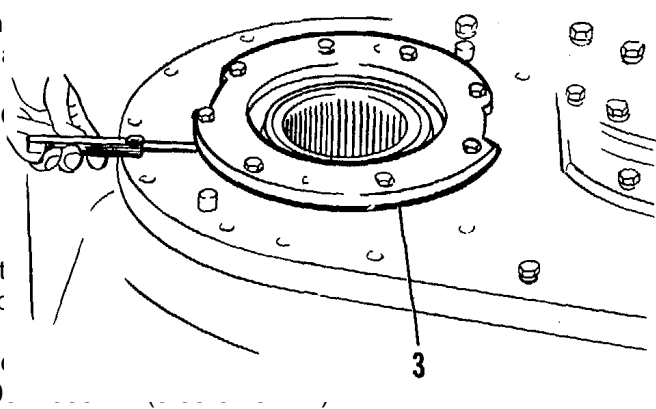
LOCATION/ITEM	ACTION	REMARKS
13.	Two bearings (70)	a.
	b.	In
14.	Gear (71)	a.
	b.	In
15.	New gasket (7)	Pc
16.	Plate (80)	a.
	b.	In
17.	Bearing cup (69) (79).	Lc



TA099348

Go on to Sheet 6

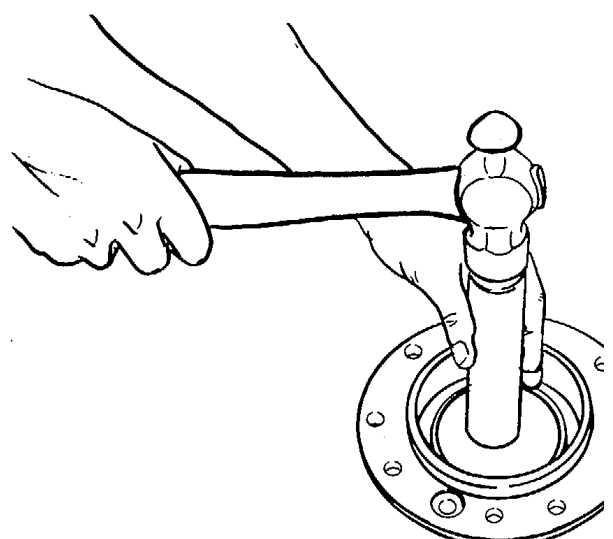
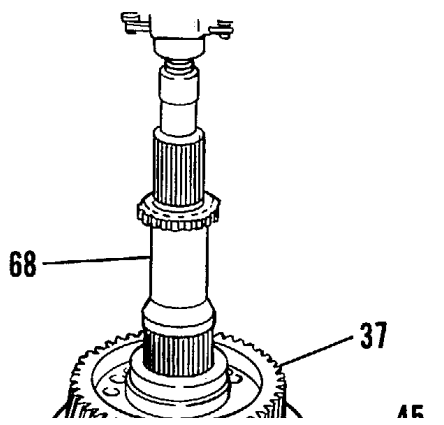
LOCATION/ITEM	ACTION	REMARKS
<p>18.</p>	<p>Cage (79)</p> <p>NOTE</p> <p>For now, do not install shims (73) or preformed packing (72) behind cage.</p> <p>b.</p> <p>c.</p> <p>d.</p> <p>e.</p> <p>NOTE</p> <p>Indicator stem should contact top surface of gear (71).</p> <p>f.</p> <p>g.</p> <p>h.</p> <p>i.</p>	<p>a.</p>  <p>79</p> <p>S W U C R o l c I n d i A g</p>  <p>Remove or install shims until end play is .002-.006 in. (0.05-0.15 mm).</p> <p>When correct thickness of shims is obtained, install preformed packing (72) behind cage.</p> <p>Install cage and secure with the capscrews (1) and washers (16).</p>

LOCATION/ITEM	ACTION	REMARKS
19. 20. 21. 22.	Preformed packing (76) Cover (74) Bearing cup (8) (3). Cage (3)	Install on cage (70) In Lo a. 
	<p style="text-align: center;">NOTE</p> For now, do not install shims (4) behind cage. b. c. d. e. Indicator stem should contact top surface of gear (37). f. g. h.	Se U: ca Re of at In di: Ni  At up Re .0 When correct thickness of shims is obtained, install locks (2) under capscrews (1).

TA099350
 Go on to Sheet 8

TRANSFER GEAR ASSEMBLY (OUTPUT) ASSEMBLY (CONT)

(Sheet 8 of 9)

LOCATION/ITEM	ACTION	REMARKS
23.	Roller assembly (66) b.	a. Heat to maximum of 2750F (1350C) In:
24.	Two bearing cups (42) and cones (43) install in cage (45).	Lc
25.	Retainer (41) of 3545 lb. ft. (48-60 N-m).	In:
26.	Lip type seal (18) NOTE Install so back of bearing contacts counterbore and bearing lip points forward inside of cage.	Us 
27.	Cage (45), spacer (38), gear (37)	Us
28.	Dirt guard (49).	In: 

TRANSFER GEAR ASSEMBLY (OUTPUT) ASSEMBLY (CONT)

(Sheet 9 of 9)

LOCATION/ITEM	ACTION	REMARKS
29.	Yoke (50), preformed packing (51), retainer (52), capscrew (53) b.	<p>a.</p> <p>Ti</p> <p>lb</p>
30.	Large preformed packing (44)	In
31.	Lip type seal	Co
32.	Yoke (50), cage (45) and output shaft (68) assembly b. c.	<p>a.</p> <p>Pe</p> <p>Se</p> <p>(4</p>
33.		<p>Yc</p>

TA099352
End

This task covers: Adjusting the bearing of the output transfer gears.

INITIAL SETUP

Test Equipment

Dial indicator

Feeler gage

Materials/Parts

Shims

Troubleshooting Reference

Page 2-44

Equipment Condition

Transfer gears removed.

Special Tools

None

Personnel Required

One mechanic

References

Transfer gears (output) assembly, see page 4-146.

General Safety Instructions

None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1.	Shims (1) is .002 to .006 in. (0.05 to 0.15 mm)	In
2.	Shims (3) is .002 to .004 in. (0.05 to 0.10 mm)	In
3.	Capscrew (5) (425 to 515 N·m).	Ti
4.	Capscrew (6) (48 to 62 N·m).	Ti
<p style="text-align: center;">NOTE</p> <p>Before oil seal is installed, put Liquid Gasket Material on seal bore surface in case and let dry. Do not put Liquid Gasket Material on seal case.</p> <p>Put same type lubricant used in gear case on lip of seal before seal is installed.</p>		

TA099353

End

TRANSMISSION HYDRAULIC CONTROLS REMOVAL/INSTALLATION

(Sheet 1 of 7)

This task covers: Removal and installation of transmission hydraulic controls.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Transmission installed or transmission removed from vehicle and on a rebuild stand.

Special Tools

None

Personnel Required

One mechanic

References

Transmission control lock removal, page 4-210.

Transmission and transfer assembly removal, page 4-43.

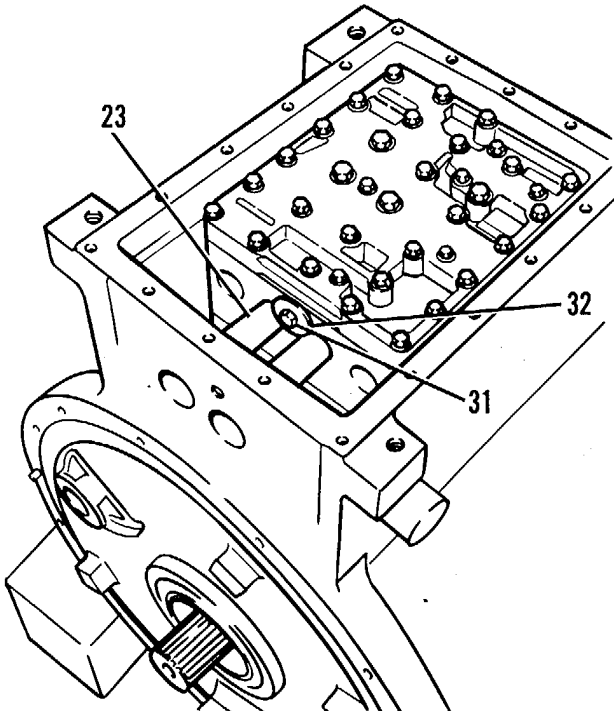
General Safety Instructions

Keep dirt out of controls.

Go on to Sheet 2

TRANSMISSION HYDRAULIC CONTROLS REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 7)

LOCATION/ITEM	ACTION	REMARKS	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>			
1.	Transmission control lock (vehicle).	Remove (only if transmission is installed in See page 4-210	
2. Remove from case (10).	Capscrews (7), lockwashers (2) and cover assembly (5)		
3. Remove from case (10).	Cover assembly gasket (8)		
4. Remove from manifold (15).	Three manifold capscrews (18) and lockwasher (2)		
5. Remove from case (10).	Manifold (15)		
6. Remove from valve assembly.	Capscrew (31) and washer (32)		
7. Remove from transmission and valve assembly.	Two sleeves (23)		
8.	Preformed packings (22)		Replace.

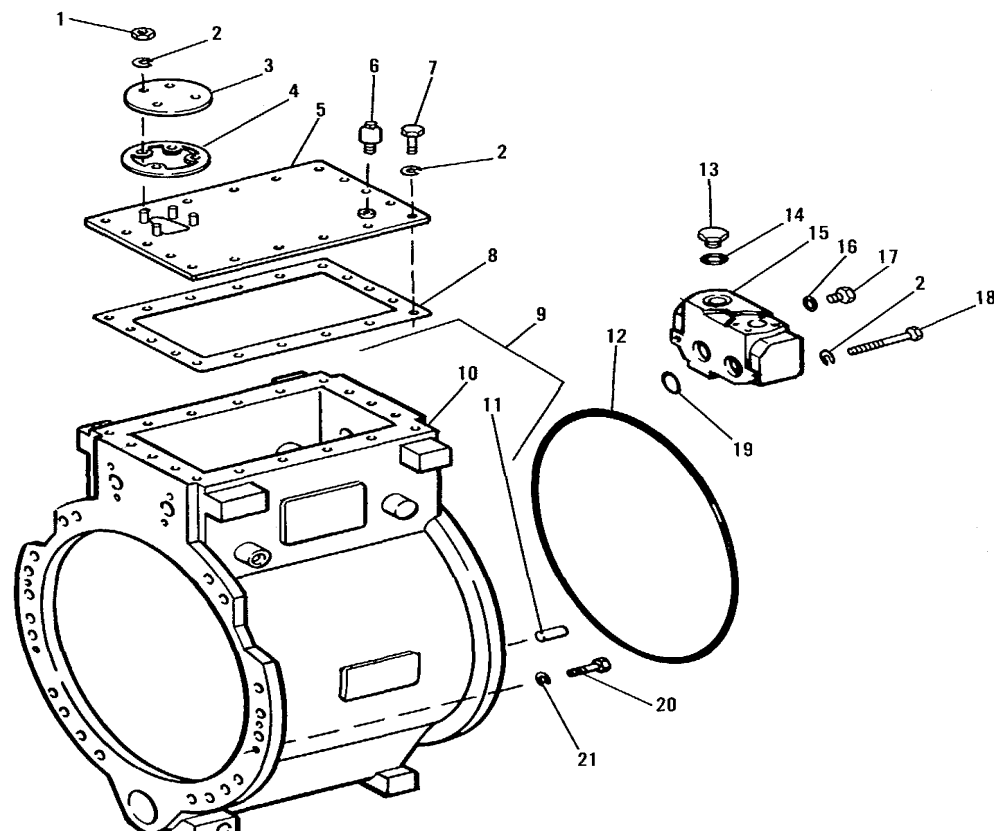
TA099354

Go on to Sheet 3

TRANSMISSION HYDRAULIC CONTROLS REMOVAL/INSTALLATION (CONT)

(Sheet 3 of 7)

- 1. Hex Nut
- 2. Lockwasher
- 3. Cover
- 4. Gasket
- 5. Transmission Cover Assembly
- 6. Breather
- 7. Capscrew
- 8. Transmission Cover Gasket
- 9. Transmission Case Assembly
- 10. Case Pin
- 11. Preformed Packing
- 12. Plug
- 13. Preformed Packing
- 14. Manifold
- 15. Preformed Packing
- 16. Plug
- 17. Capscrew
- 18. Preformed Packing
- 19. Capscrew
- 20. Preformed Packing
- 21. Lockwasher



TA099355

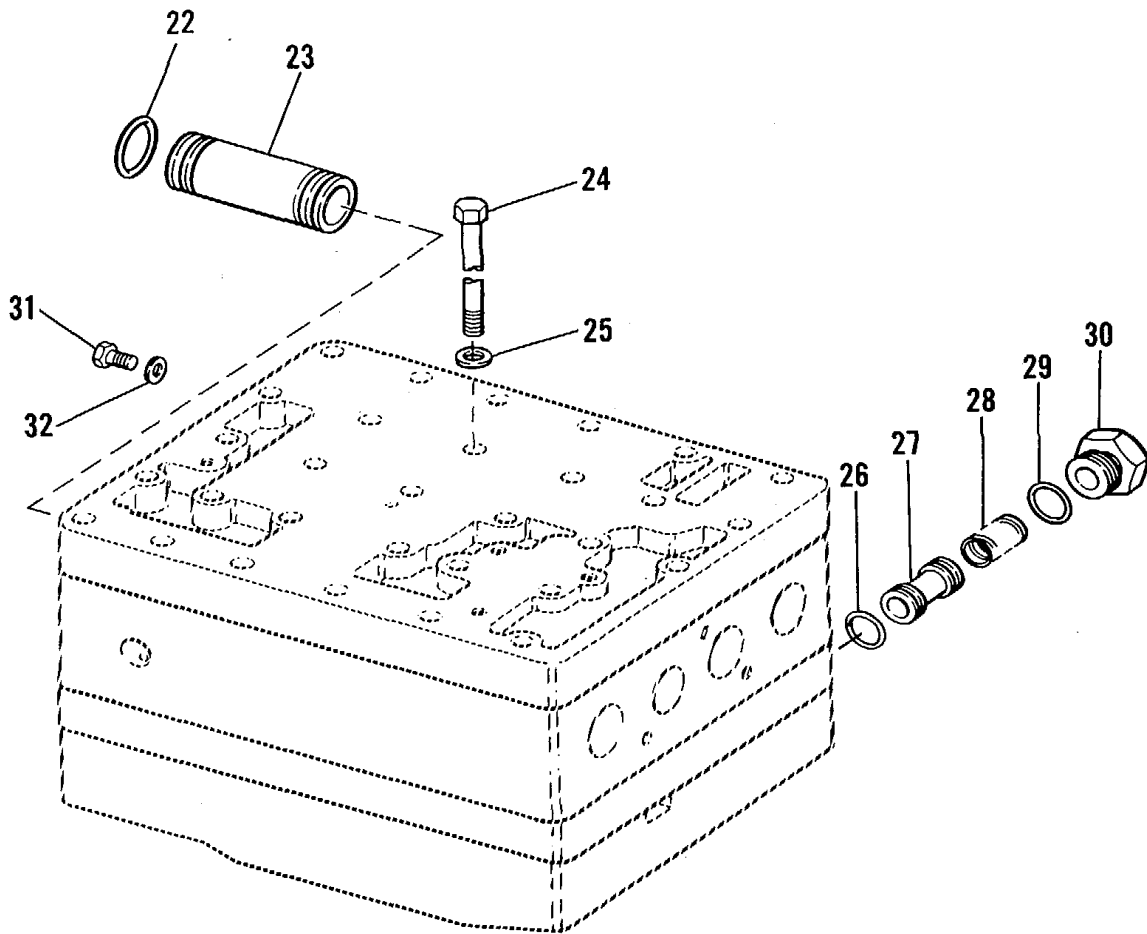
Go on to Sheet 4

TRANSMISSION HYDRAULIC CONTROLS REMOVAL/INSTALLATION (CONT)

(Sheet 4 of 7)

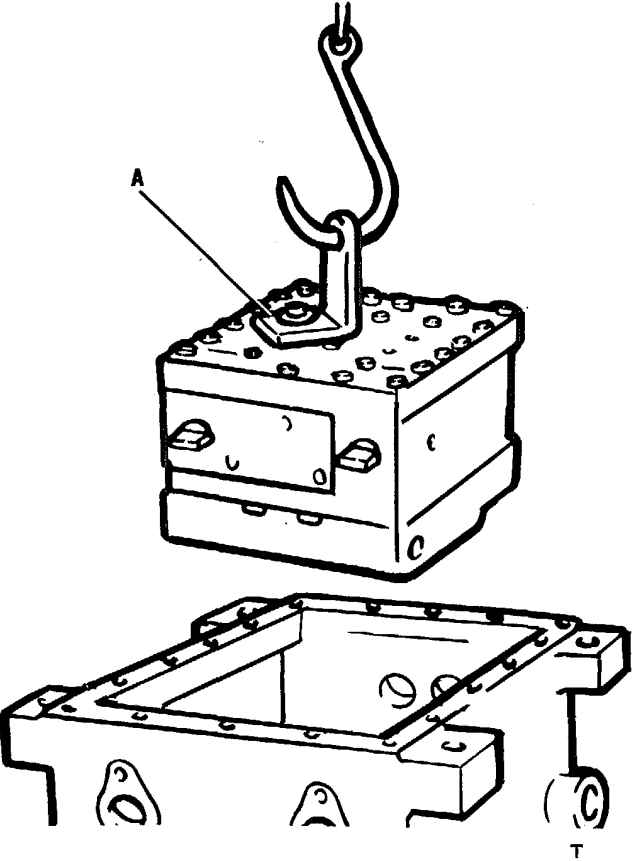
- 22.
- 23.
- 24.
- 25.
- 26.
- 27.
- 28.
- 29.
- 30.
- 31.
- 32.
- 33.

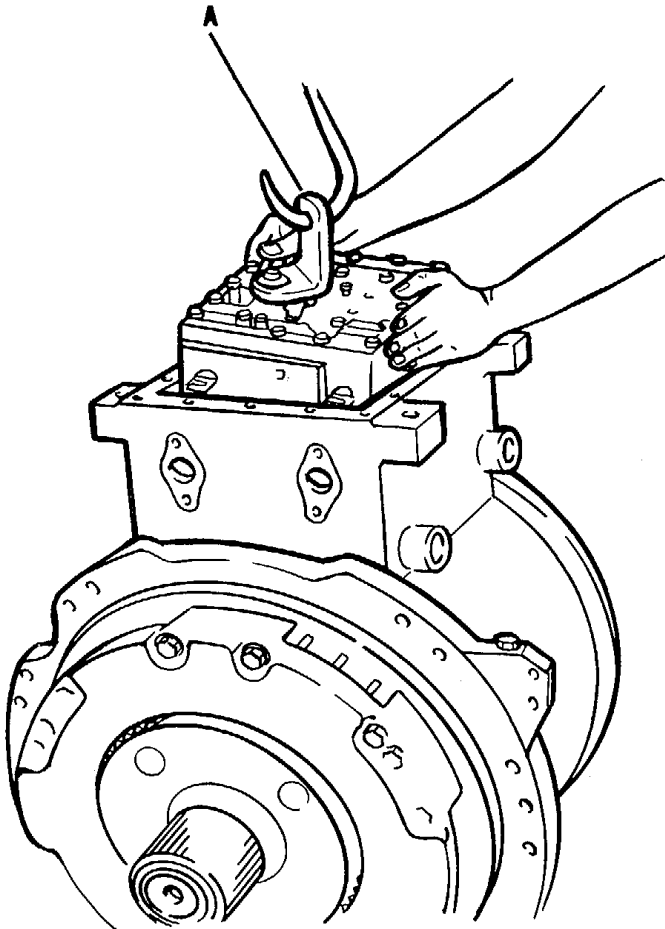
Preformed Packing



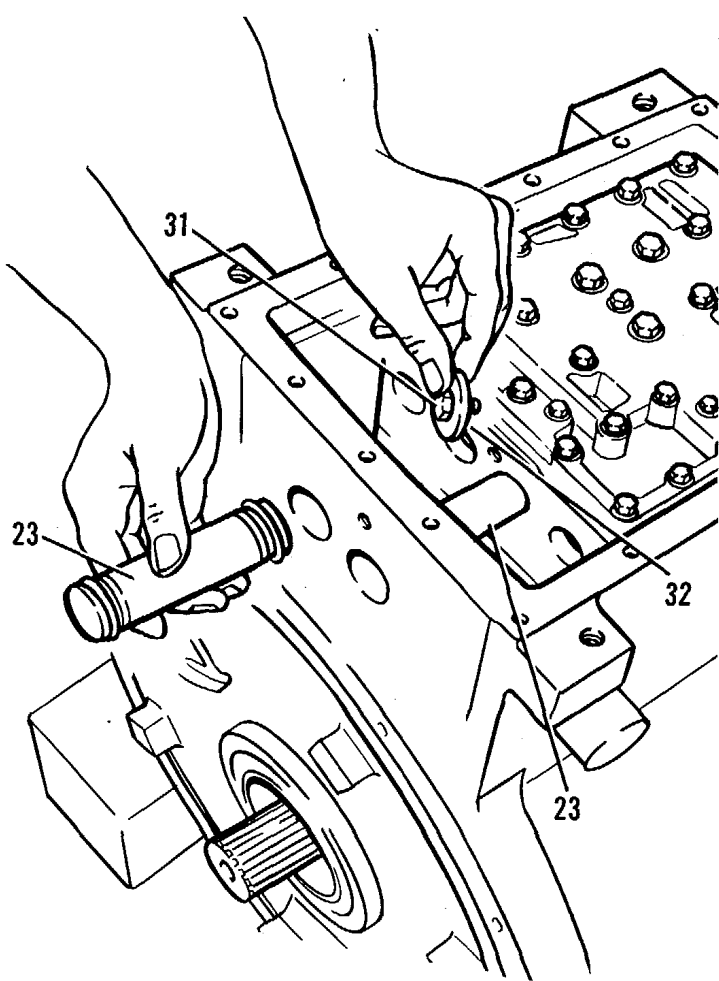
TA099356

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
<p>9. Plug (30), spring (28) and sleeve (27), preformed packing (26) and (29)</p>	<p>Remove from transmission case.</p>	
	<p style="text-align: center;">NOTE</p> <p>To remove sleeve (27) it may be necessary to thread in a 3/8 inch eyebolt.</p>	
<p>10. Preformed packings (26) and (29)</p>	<p>Replace if necessary.</p>	
<p>11. Four hydraulic control capscrews (24), and washer (25)</p>	<p>Remove.</p>	
<p>12. Lifting bracket (A)</p>	<p>Attach to hydraulic controls as shown.</p>	
<p>13. Hydraulic controls</p>	<p>Attach hoist as shown and remove from case, Hydraulic controls are 88 lb. (40 Kg).</p>	

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center; border: 1px solid black; display: inline-block; padding: 2px;">INSTALLATION</p> <ol style="list-style-type: none"> 1. Lifting bracket (A) and hoist 2. Transmission hydraulic controls 3. Preformed packing (26) and (29) 4. Sleeve (27), spring (28), and plug (30) 	<p>Attach to transmission hydraulic control as shown.</p> <ol style="list-style-type: none"> a. Position in transmission. b. Secure with capscrews. Tighten to a torque of 32-38 lb. ft. (44-52 N-m). <p>Install on sleeve (27). Lubricate with clean oil.</p> <p>Install in transmission case and transmission hydraulic controls.</p>	

TA099358
Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS	
5. Preformed packing (22)	a. Install on sleeves (23).		
	b. Lubricate with clean oil.		
6. Sleeves (23) into hydraulic controls.	Install through transmission case (10) and		
7. Capscrew (31) and washer (32)	Install to hold sleeves.		
8. Cover assembly (5)	a. Install with new gasket (8).		
	b. Secure with capscrews (7) and lock-washers (2).		
9. Preformed packing (19)	Install in manifold (15).		
10. Manifold (15)	Install on transmission case (10).		

TA099359

End

This task covers: Disassembly of transmission hydraulic controls.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Transmission hydraulic controls removed.

Special Tools

None

Personnel Required

One mechanic

References

Transmission hydraulic controls removal/
installation, page 4-157.

General Safety Instructions

Be careful when removing retainer (19)
because of spring tension.

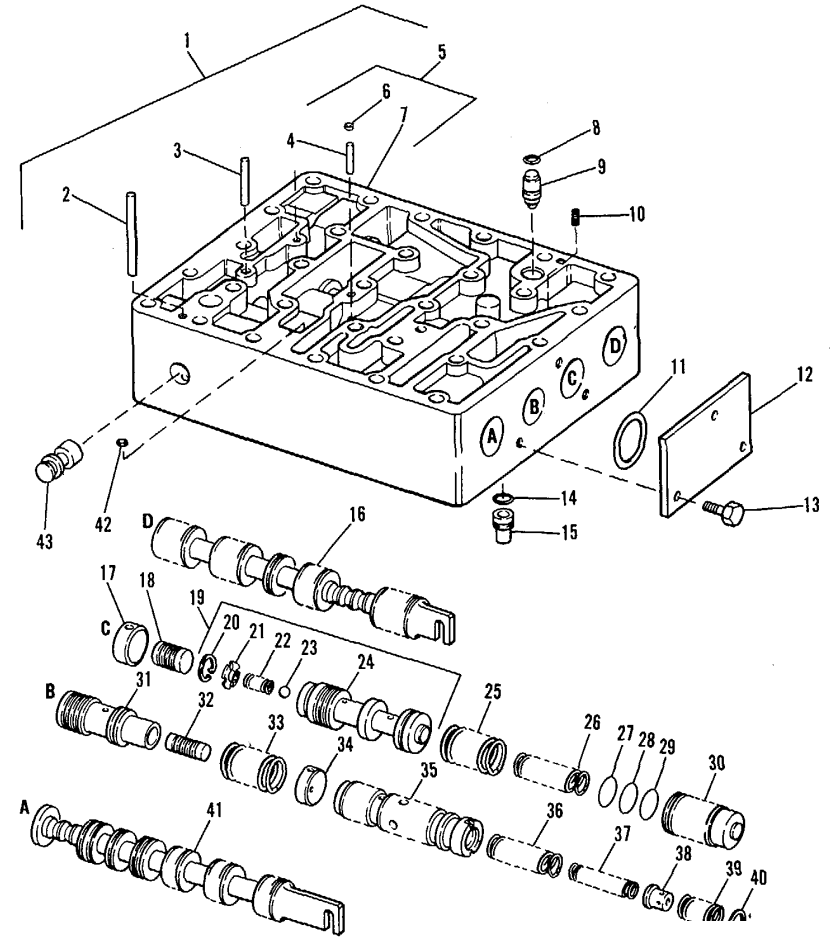
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. 26 capscrews (44) and washers (45)	Remove.	
2. Manifold (54), valve group (46), plate (53), and manifold (51)	Separate.	
3. Selector and pressure control valve group (7)	Disassemble.	
4. Two detent assemblies (9)	Remove.	
5. Preformed packing (8)	Remove from detents.	
6. Pin (2) and stop (43)	Remove from valve body.	
7. Direction selector spool (41)	Remove from valve body.	
8. Two detent assemblies (9)	Remove.	
9. Packing preformed (8)	Remove from detents.	
10. Pin (2) and stop (43)	Remove from valve body.	

Go on to Sheet 3

TRANSMISSION HYDRAULIC CONTROLS DISASSEMBLY

- | | |
|---------------------------|------------------------------|
| 1. Control Valve | 23. Ball |
| 2. Pin | 24. Relief Spool |
| 3. Pin | 25. Spring |
| 4. Pin | 26. Spring |
| 5. Body Assembly | 27. Spacer |
| 6. Plug | 28. Spacer |
| 7. Pressure Selector Body | 29. Spacer |
| 8. Preformed Packing | 30. Piston |
| 9. Detent Assembly | 31. Ratio Spool |
| 10. Setscrew | 32. Slug |
| 11. Preformed Packing | 33. Spring |
| 12. Cover | 34. Stop |
| 13. Capscrew | 35. Safety Spool |
| 14. Preformed Packing | 36. Spring |
| 15. Orifice Screen | 37. Spring |
| 16. Speed Selector Spool | 38. Retainer |
| 17. Stop | 39. Spring |
| 18. Slug | 40. Retainer Ring |
| 19. Relief Spool Assembly | 41. Direction Selector Spool |
| 20. Retainer Ring | 42. Cup Plug |
| 21. Retainer | 43. Stop |
| 22. Spring | |

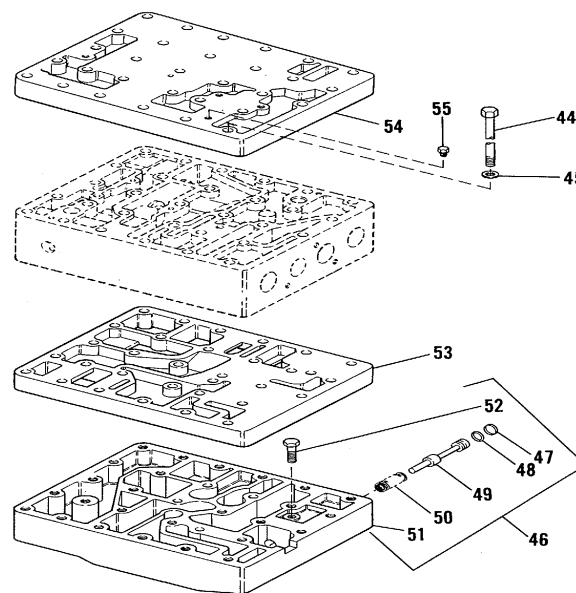


GO ON TO SHEET 4

TA099360

Go on to Sheet 4

- 44. Capscrew
- 45. Washer
- 46. Neutralizer Valve Group
- 47. Seal Ring
- 48. Preformed Packing
- 49. Spool
- 50. Spring
- 51. Manifold
- 52. Capscrew
- 53. Divider Plate
- 54. Manifold
- 55. Plug



TA099361

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
11. Speed selector spool (16)	Remove from valve body.	
12. Capscrews (13) and cover (12)	Remove.	
13. Preformed packing (11) in cover	Replace.	
14. Piston (30), spring (26), and spring (25)	Remove from valve body.	
15. Spacers (27), (28), and (29)	Remove from piston (30).	
16. Valve relief spool assembly (19)	Remove from valve body.	
17. Slug (18)	Remove from relief spool assembly.	
18. Retainer ring (20), retainer (21), spring (22), and ball (23)	Remove from relief spool (24).	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
19. Spring (39) and safety spool (35)	Remove. <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: center;">WARNING</div> Retainer (38) has tension on it from springs behind it. Hold retainer in position when removing ring (40).	
20. Retainer ring (40), retainer (38), and two springs (36) and (37) from safety spool (35)	Remove.	
21. Pin (4)	Remove from valve body.	
22. Valve ratio spool (31) and spring (33)	Remove from valve body.	
23. Slug (32)	Remove from valve spool.	

Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
24. Two pins (3) and two stops (17) and (34)	Remove from valve body.	
25. Divider plate (53)	Remove from neutralizer valve.	
26. Neutralizer valve group (46)	Disassemble.	
27. Capscrew (52), spring (50), and valve spool (49)	Remove from valve body.	
28. Seal ring (47) and preformed packing (48)	Remove from valve spool.	

End

This task covers: Assembly of transmission hydraulic controls

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Make sure all parts of transmission hydraulic control valves are clean. Put clean oil on all parts before valves are assembled.

Special Tools

None

Personnel Required

One mechanic

References

Transmission hydraulic controls removal/ installation, page 4-157.

General Safety Instructions

Keep dirt and grit away from clean parts.

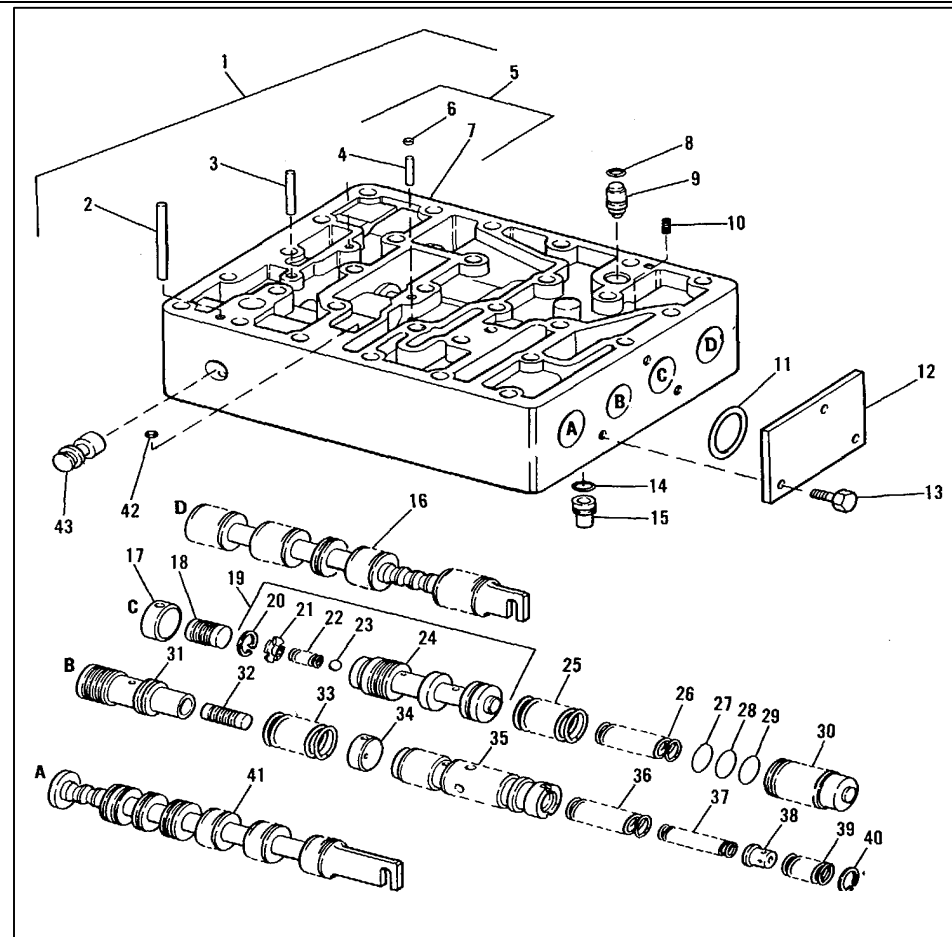
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Neutralizer valve group (46)	Assemble.	
2. New seal ring (47) and preformed packing (48)	Install on valve spool (49).	
3. Spring (50) and valve spool (49)	Install in valve body.	
4. Valve spool (49)	Push into valve body until capscrew (52) can be installed behind and on valve spool.	
5. Capscrew (52)	Tighten to a torque of 19-25 lb. ft. (25-34 N.m).	
6. Divider plate (53)	Position on neutralizer valve.	
7. Selector and pressure control valve group	Assemble.	

Go on to Sheet 3

TRANSMISSION HYDRAULIC CONTROLS ASSEMBLY (CONT)

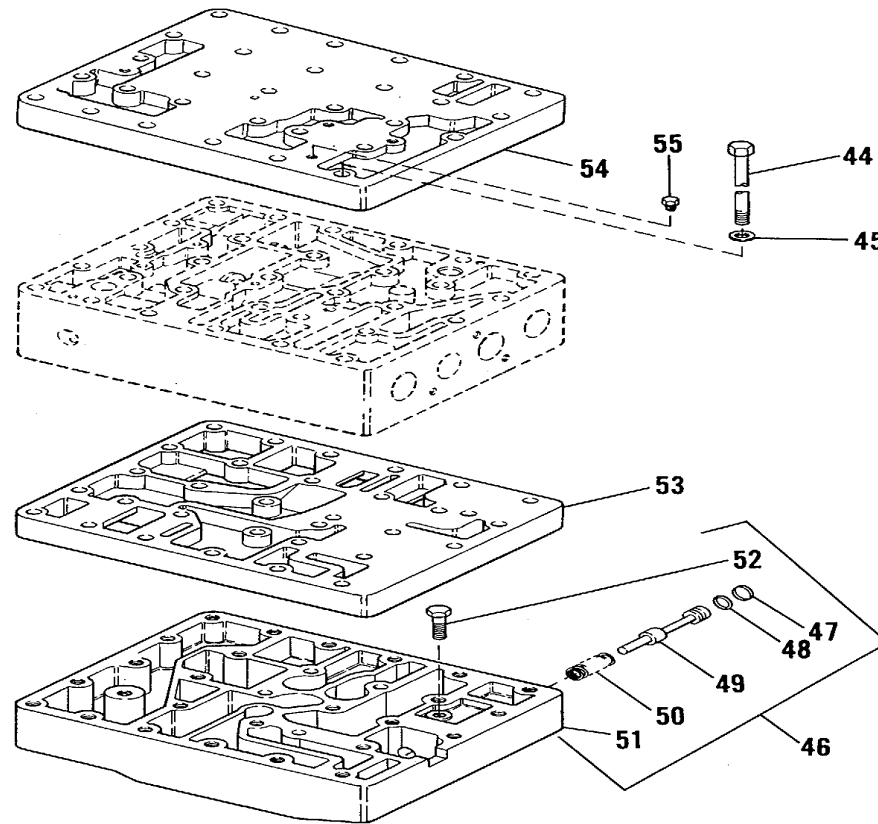
- | | |
|---------------------------|------------------------------|
| 1. Control Valve | 23. Ball |
| 2. Pin | 24. Relief Spool |
| 3. Pin | 25. Spring |
| 4. Pin | 26. Spring |
| 5. Body Assembly | 27. Spacer |
| 6. Plug | 28. Spacer |
| 7. Pressure Selector Body | 29. Spacer |
| 8. Preformed Packing | 30. Piston |
| 9. Detent Assembly | 31. Ratio Spool |
| 10. Setscrew | 32. Slug |
| 11. Preformed Packing | 33. Spring |
| 12. Cover | 34. Stop |
| 13. Capscrew | 35. Safety Spool |
| 14. Preformed Packing | 36. Spring |
| 15. Orifice Screen | 37. Spring |
| 16. Speed Selector Spool | 38. Retainer |
| 17. Stop | 39. Spring |
| 18. Slug | 40. Retainer Ring |
| 19. Relief Spool Assembly | 41. Direction Selector Spool |
| 20. Retainer Ring | 42. Cup Plug |
| 21. Retainer | 43. Stop |
| 22. Spring | |



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Go on to Sheet 4

- 44. Capscrew
- 45. Washer
- 46. Neutralizer Valve Group
- 47. Seal Ring
- 48. Preformed Packing
- 49. Spool
- 50. Spring
- 51. Manifold
- 52. Capscrew
- 53. Divider Plate
- 54. Manifold
- 55. Plug



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Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
8. Two stops (17) and (34)	a. Install in center parts of valve body. b. Make sure holes in stops and valve bodies are aligned.	
9. Two pins (3)	Install to hold stops.	
10. Slug (32)	Install in ratio spool (31).	
11. Spring (33) and safety spool (35)	Install in valve body.	
12. Pin (4)	Install to hold valve spool and spring.	
13. Safety spool (35)	Turn around.	
14. Two springs (36) and (37) and retainer (38)	Install in safety spool (35).	
15. Retainer (38)	Push into valve spool, and install snap ring.	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
16. Safety spool (35) and spring (39)	Install in valve body.	
17. Ball (23), spring (22), retainer (21), and retainer ring (20)	Install in spool (24).	
18. Relief spool assembly (19)	Install in valve body.	
19. Spacers (27), (28), and (29)	Install in piston (30).	
20. Spring (25), spring (26), and piston (30)	Install in valve body.	
21. Cover (12)	Install. Secure with capscrews (13). Tighten to a torque of 19-25 lb. ft. (26-34 N-m).	
22. Speed selector spool (16)	Install in valve body as shown.	
23. Stop and pin (3)	Install to hold valve spool.	

Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
24. Detent assembly (9) and preformed packing (8)	Install in valve body as shown.	
25. Direction selector spool (41)	Install in valve body as shown.	
26. Stop (43) and pin (2)	Install to hold direction selector spool (41).	
27. Detent assembly	Install in bore in valve body.	
28. Selector and pressure control valve group (7)	Position on divider plate (53).	
29. Transmission hydraulic control valve capscrews (44) and washers (45)	Tighten capscrews to a torque of 19-25 lb. ft. (26-34 N m).	
30. Transmission hydraulic controls	Install.	See Transmission Hydraulic Controls/Installation Removal, page 4-157.

End

Section IV. OIL SYSTEM**TRANSMISSION LUBRICATION MAINTENANCE INSTRUCTIONS**

This section covers maintenance of these transmission components for direct support and general support.

- a. Transmission oil pump
- b. Transmission oil cooler

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Transmission oil pump removal.	4-179	2-41
2	Transmission oil pump installation.	4-184	None
3	Transmission oil lines removal/installation.	4-187	2-47
4	Transmission oil pump disassembly.	4-189	2-47, 2-48, 2-49
5	Transmission oil pump assembly.	4-192	None
6	Transmission oil cooler removal/installation.	4-197	2-41

This task covers: Removal of transmission oil pump.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-41

Equipment Condition

Engine off and cool.

Shipping link installed.

Special Tools

None

Personnel Required

Two mechanics

References

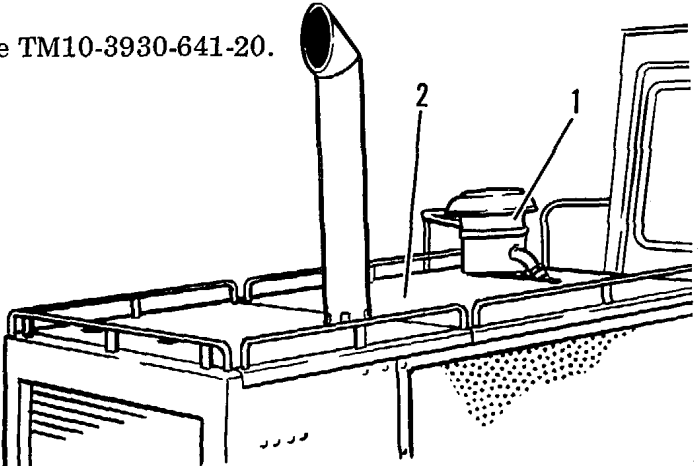
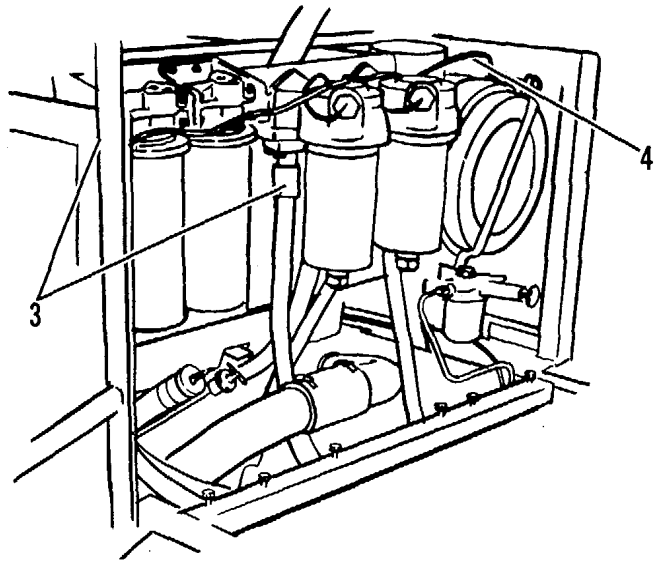
Hood removal/installation,
TM 10-3930-641-20.

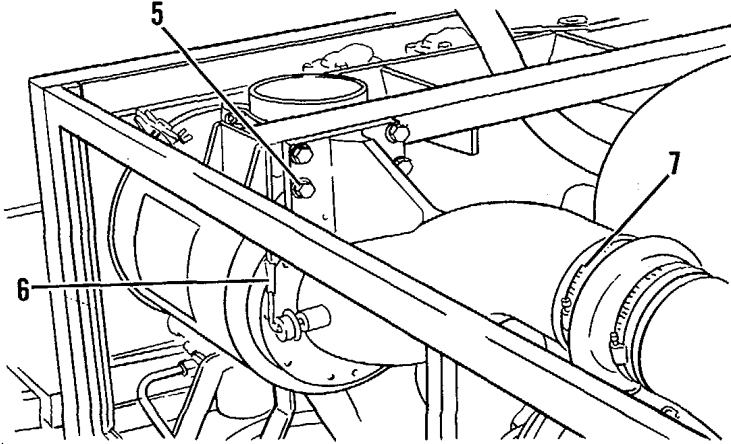
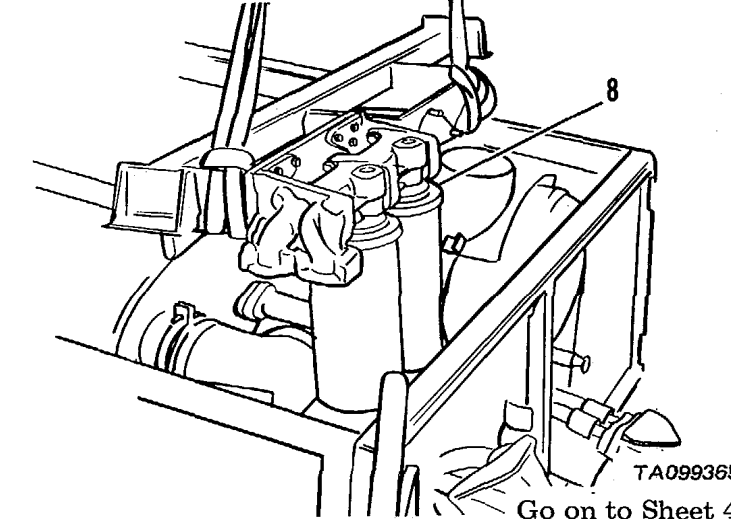
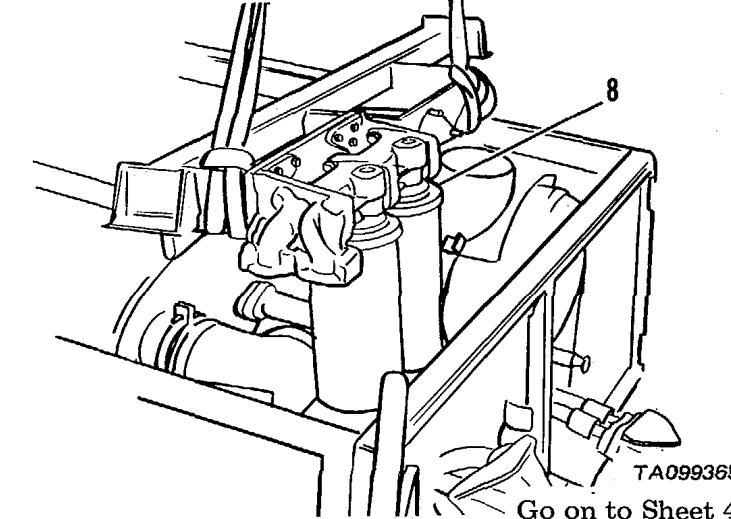
Shipping link removal/
installation, TM 10-3930-641-20.

General Safety Instructions

Avoid contact with hot oil.
Main disconnect switch OFF.

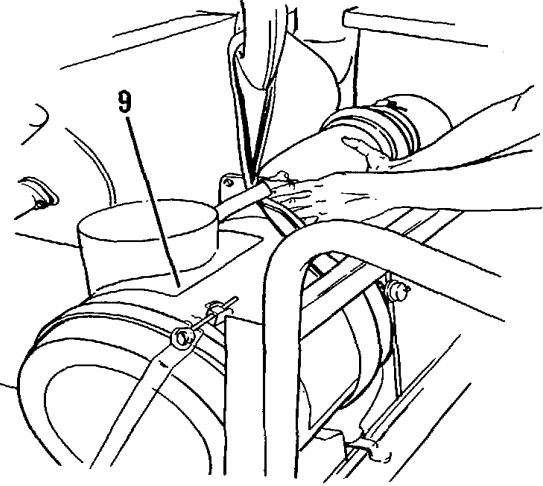
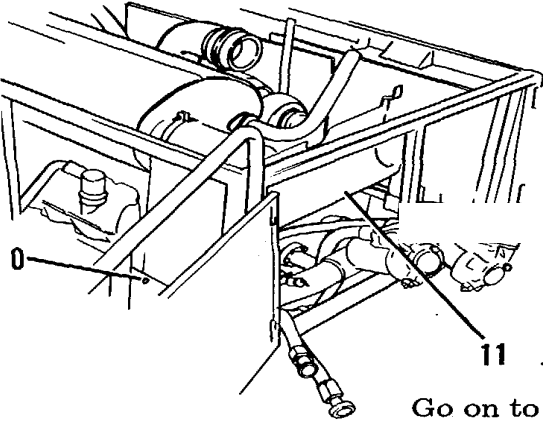
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Precleaner lid (1) and hood (2)	Remove. Hood weighs 96 lb. (43.5 Kg).	<p>See TM10-3930-641-20.</p>  
2. Door assemblies	Open door assemblies to filters.	
3. Hydraulic lines (3)	<p>a. Put identification on lines for proper installation.</p> <p>b. Disconnect from oil filter base and cap.</p>	
4. Harness (4)	Tag and disconnect wires for sending units for transmission oil filter and pilot systems oil filter.	

LOCATION/ITEM	ACTION	REMARKS
5. Filter bases	a. Remove six capscrews that hold transmission and pilot systems oil filter bases in position. b. Do not disconnect hydraulic lines from bases. c. Put filters and bases on floor plates.	
6. Air cleaner housing	Remove four capscrews (5) that secure housing to filter base frame.	
7. Air cleaner indicator sending unit	Disconnect wire (6) from unit.	
8. Clamp (7)	Loosen.	
9. Filter group (8)	a. Remove four capscrews that hold filter group in position. b. Remove three capscrews that hold heat shield to filter group. c. Attach hoist to group (8) and remove it. Weight of group is 100 lb. (45.4 Kg).	 <p style="text-align: right;">TA099365 Go on to Sheet 4</p>

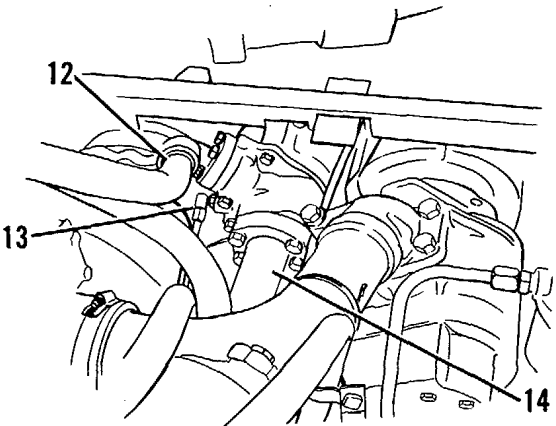
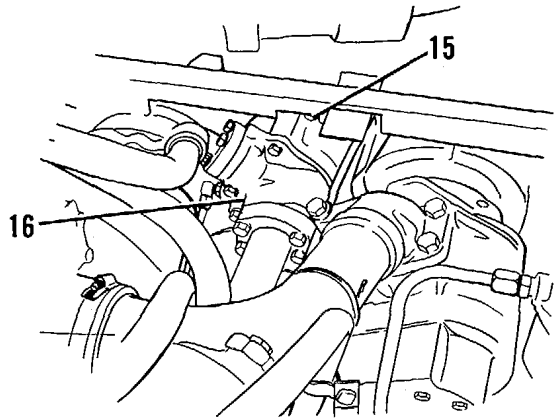
TA099365

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
10. Air cleaner housing (9)	a. Attach hoist to air cleaner housing as shown. b. Remove air cleaner housing. Weight of housing is 50 lbs. (22.7 Kg).	
11. Heat shield (11)	a. Remove two capscrews (10). b. Remove shield.	 <p>TA099366</p> <p>Go on to Sheet 5</p>

TA099366

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
12. Hose (12)	Tag and disconnect from side of pump.	 
13. Tube assembly (14)	Tag and disconnect from pump.	
14. Tube assembly (13)	a. Loosen clamp on other end of tube assembly. b. Move tube assembly away from pump.	
15. Transmission oil pump (16)	Tag and disconnect from pump.	
15. Transmission oil pump (16)	a. Remove capscrews (15) that hold pump in position. b. Remove transmission oil pump (16). Discard gasket.	

TA099367

End

This task covers: Installation of transmission oil pump.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Engine OFF.
Shipping link installed.
Hood removed.

Special Tools

None

Personnel Required

One mechanic

References

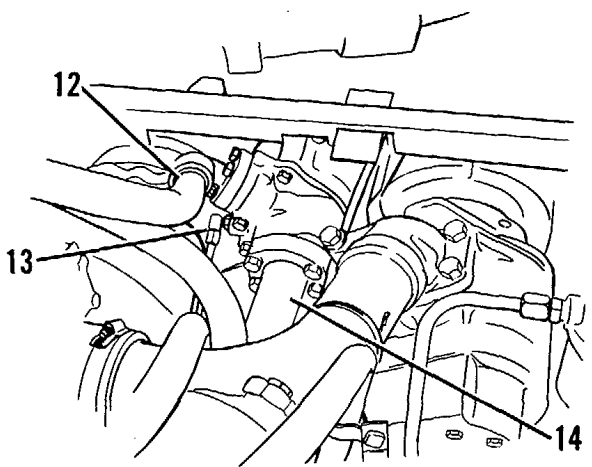
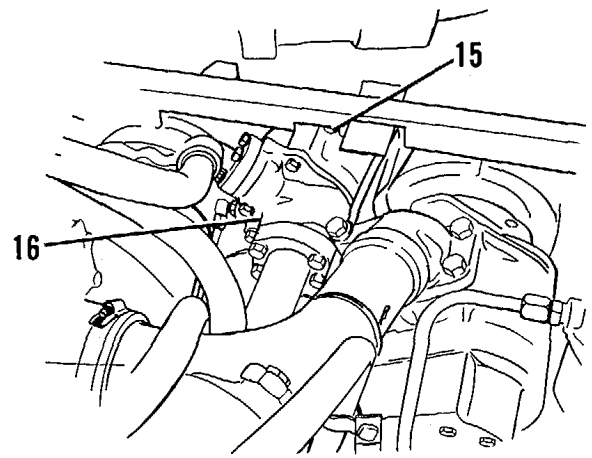
Hood removal/installation,
TM 10-3930-641-20.

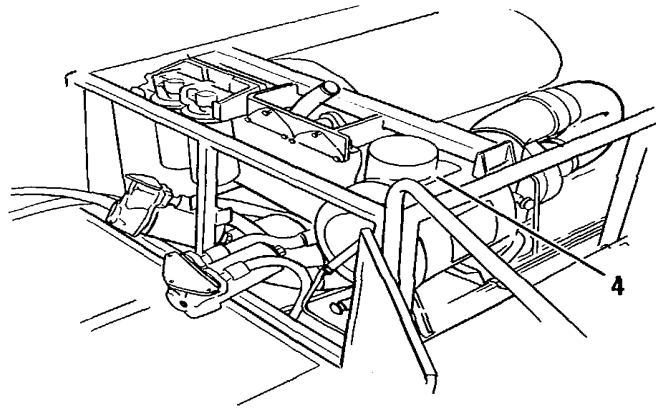
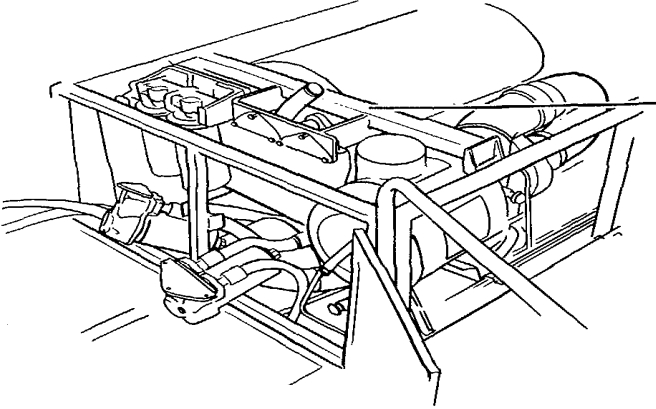
Air cleaner/precleaner removal/
installation, TM 10-3930-641-20.

General Safety Instructions

Keep dirt and grit away from clean parts.
Main disconnect switch OFF.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS	
1. Transmission oil pump gasket in position in pump drive.	a. Put transmission oil pump and new	 <p>Diagram 1 shows the transmission oil pump assembly. Callout 12 points to the top of the pump housing. Callout 13 points to a hose connected to the rear of the pump. Callout 14 points to a clamp on the side of the pump.</p>	
	b. Install capscrews that hold it.		
2. Tube assembly (1)	a. Connect tube assembly (1) to rear of pump.		
	b. Tighten clamp on the other end of tube assembly.		
3. Tube assembly (2)	Connect to pump.		
4. Hose (3)	Connect hose to side of pump.		
5. Heat shield	a. Install.	 <p>Diagram 2 shows the transmission oil pump assembly with a heat shield installed. Callout 15 points to the heat shield. Callout 16 points to a hose connected to the side of the pump.</p>	
	b. Secure with two capscrews.		

LOCATION/ITEM	ACTION	REMARKS
6. Air cleaner housing (4)	Attach hoist to air cleaner housing (4) and install it on the engine.	
7. Filter group (5)	<p>a. Attach hoist to filter group (5) and install it. Filter group weighs 100 lb. (45 Kg).</p> <p>b. Install four capscrews that hold filter frame in position.</p> <p>c. Install transmission and pilot system oil filters to filter base frame.</p> <p>d. Install four capscrews that hold air cleaner housing to filter base frame.</p>	
8. Air cleaner indicator line	Connect to sending unit on air cleaner housing.	
9. Two sending unit wires for oil filters	Connect.	
10. Engine oil filter hydraulic lines	Connect.	
11. Hood	Attach hoist to hood and install it on machine. Install precleaner lid.	

TA099369

End

TRANSMISSION OIL LINES REMOVAL/INSTALLTION

(Sheet 1 of 2)

This task covers: Removal/installation of transmission oil lines group.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required
Buckets or container to hold oil

Troubleshooting Reference

Page 2-47

Equipment Condition

Engine OFF
System cooled

Special Tools

None

Personnel Required

One mechanic

References

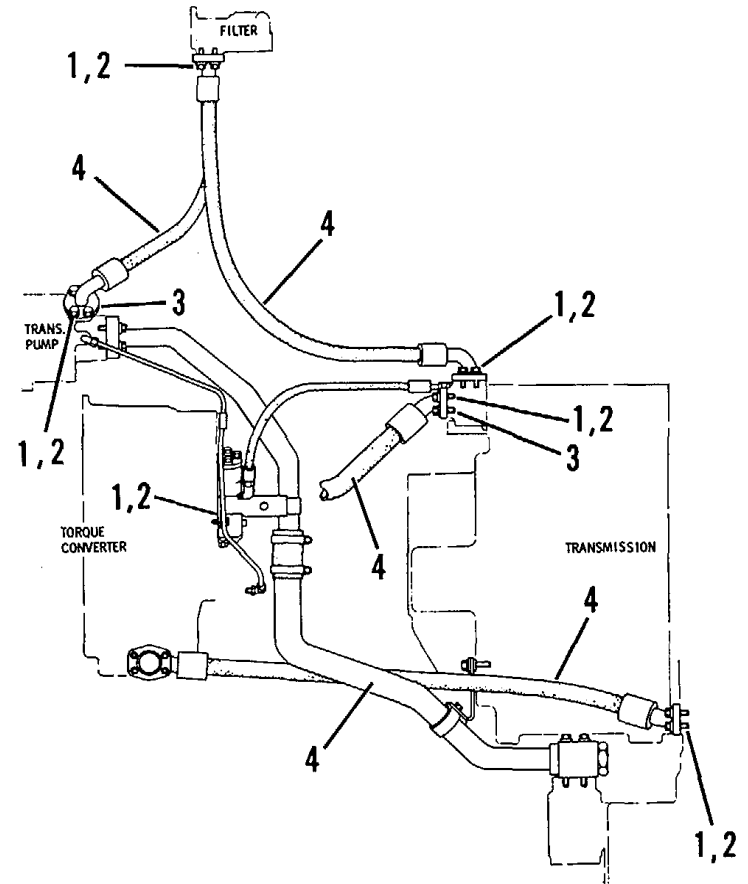
None

General Safety Instructions

Be sure oil has cooled.
Hot oil causes burns.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Transmission	Drain.	
2. Capscrews (1) and washers (2)	Remove from both ends of oil line.	
3. Gasket (3)	Discard.	
4. Line (4)	Remove.	
INSTALLATION		
1. New gasket (3)	Spread a light layer of transmission oil on gasket before installing.	
2. Gasket (3) and flange of oil line	Place in position.	
3. Capscrews (1) and washers (2)	Install.	
4. Transmission	Fill.	



See LO 10-3930-641-12.

TA172253
End

TRANSMISSION OIL PUMP DISASSEMBLY

(Sheet 1 of 3)

This task covers: Disassembly of transmission oil pump.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Pages 2-47, 2-48, 2-49

Equipment Condition

Transmission oil pump (with adapter)
removed from vehicle.

Special Tools

None

Personnel Required

One mechanic

References

Transmission oil pump removal, page 4-179.
hydraulic components.

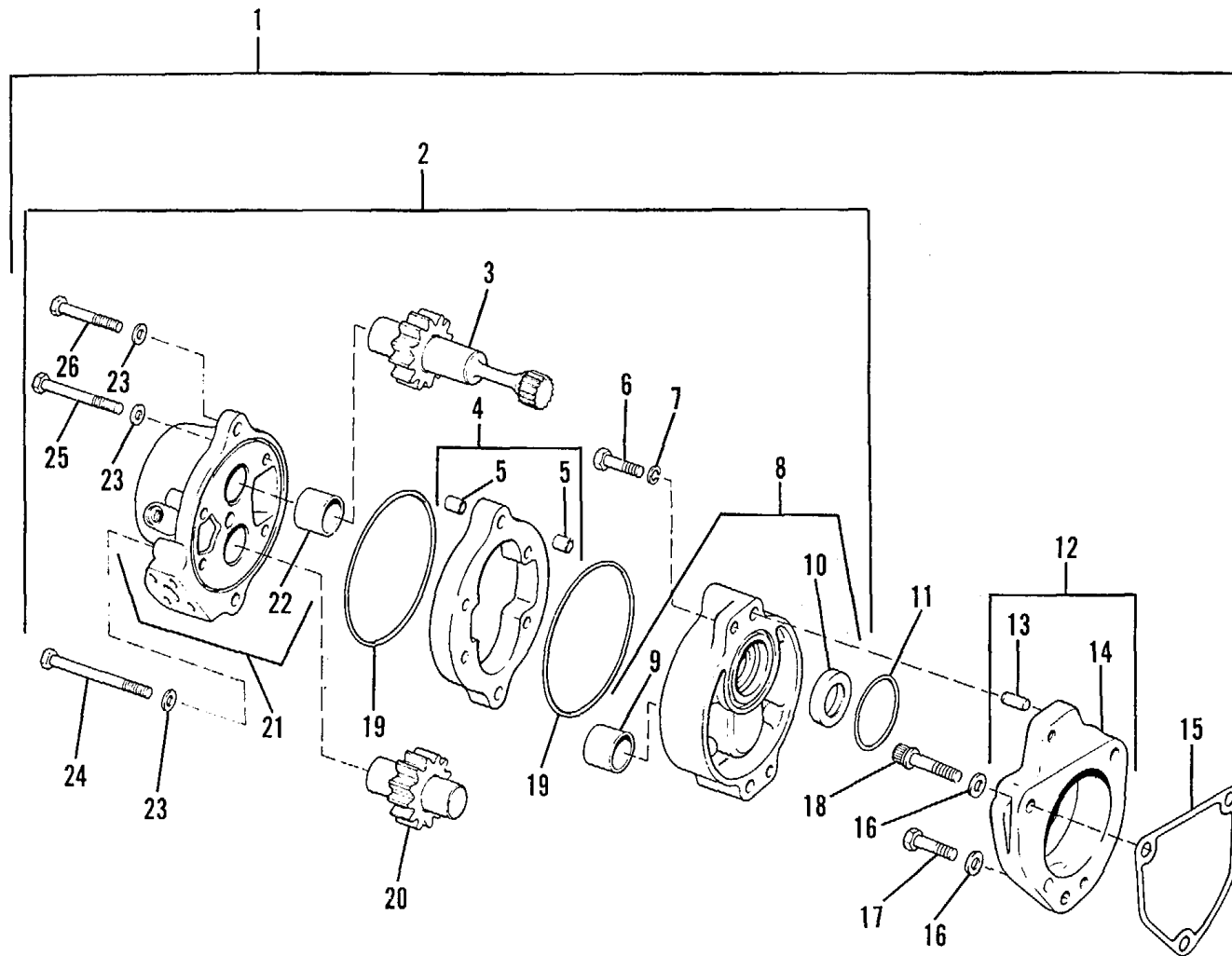
General Safety Instructions

Use clean area when disassembling

Go on to Sheet 2

TRANSMISSION OIL PUMP DISASSEMBLY (CONT)

1. Basic Oil Pump
2. Oil Pump Assembly
3. Oil Pump Drive Gear Assembly
4. Oil Pump Body Assembly
5. Pin
6. Capscrew
7. Lockwasher
8. Oil Pump Cover Assembly
9. Sleeve Bearing
10. Seal
11. Preformed Packing
12. Adapter Assembly
13. Pin
14. Body
15. Gasket
16. Washer
17. Capscrew
18. Capscrew
19. Preformed Packing,
20. Oil Pump Idler Gear Assembly
21. Oil Pump Manifold Assembly
22. Sleeve Bearing
23. Washer
24. Capscrew
25. Capscrew
26. Capscrew



TA099371
Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
1. Four long capscrews (24) and washers (23)	Remove from pump.	
2. Transmission oil pump group (1)	Set on end with adapter (12) facing up.	
3. Capscrews (6) and lockwashers (7)	Remove from pump.	
4. Adapter assembly (12)	Remove from pump.	
5. Two short capscrews (26) and washers (23)	Remove from pump.	
6. Cover assembly (8)	Remove.	
7. Preformed packing (11)	Remove from cover assembly (8).	
8. Seal (10) and two bearings (9)	Remove from cover assembly (8).	
9. Drive gear assembly (3)	Remove.	
10. Idler gear assembly (20)	Remove.	
11. Body assembly	Remove from manifold assembly (21).	
12. Preformed packing (19)	Remove from manifold assembly (21).	
	4-191	

End

TRANSMISSION OIL PUMP ASSEMBLY

This task covers: Assembly of transmission oil pump.

INITIAL SETUP

Test Equipment

One inch depth micrometer

Materials/Parts

As required.

Troubleshooting Reference

None

Equipment Condition

Oil pump disassembled.

Special Tools

None

Personnel Required

One mechanic

References

Specifications, page 2-69.

General Safety Instructions

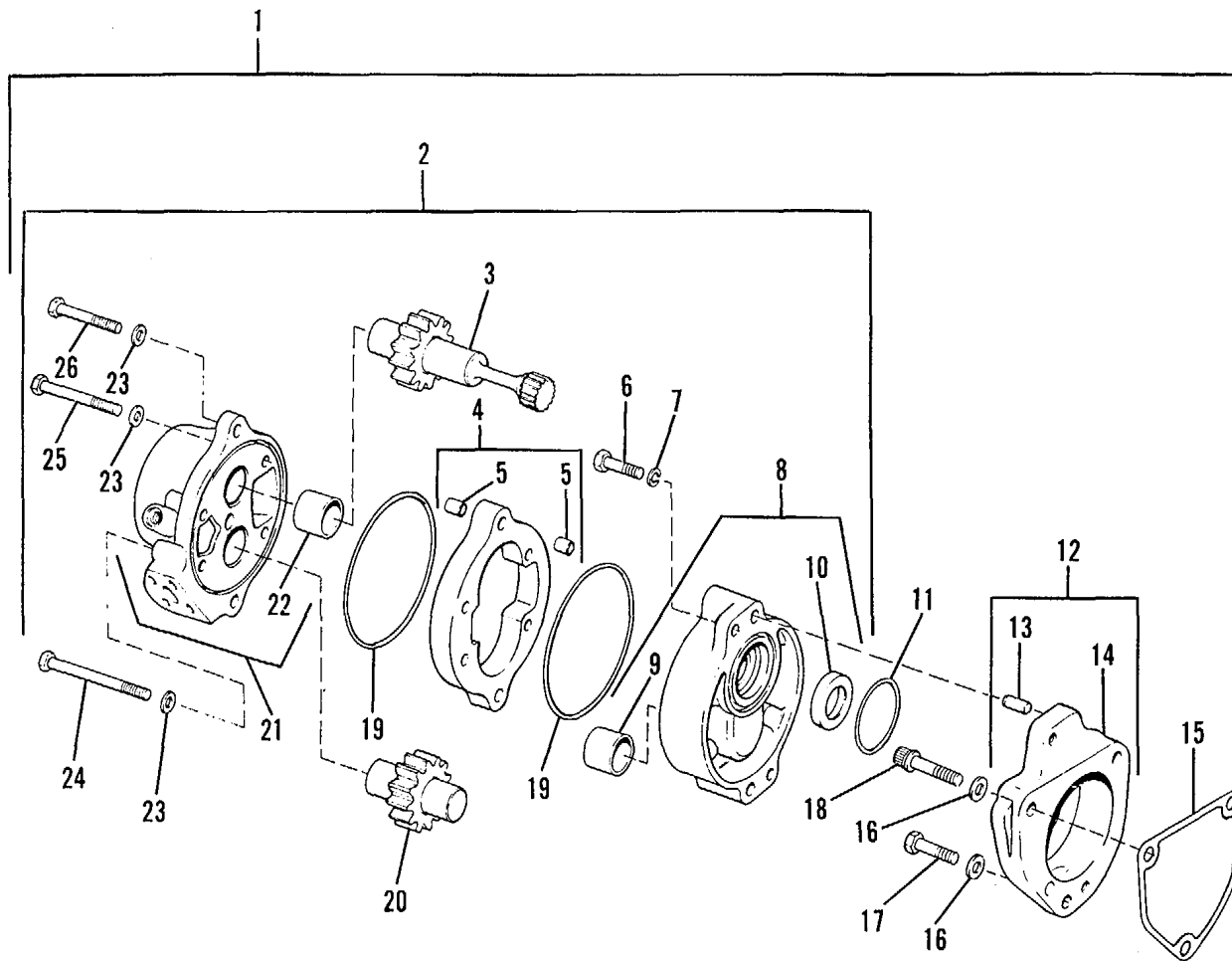
Keep dirt and grit away from clean parts.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>1. Two sleeve bearings (22)</p>	<p style="text-align: center;">NOTE</p> <p>Be sure all parts are clean and coated with SAE 30 oil before assembly.</p> <p>a. Install in oil pump manifold (21) until bearings are 0.062 in. (1.57 mm) below machined surface of manifold.</p>	
	<p style="text-align: center;">NOTE</p> <p>Bearing seams should be 15° - 45° from centerline through bearing bores and should face toward oil outlet port in manifold.</p> <p>b. Check that bearing bore is within specifications.</p>	<p>See Specifications, page 2-69.</p>
<p>2. Preformed packing (19)</p>	<p>Install in oil pump manifold (21).</p>	
<p>3. Body assembly (4)</p>	<p>Put in position on manifold assembly (21).</p>	
<p>4. Idler gear assembly (20) and drive gear assembly (3)</p> <p>b.</p>	<p>a. Install in manifold and body.</p>	
	<p>Check gear clearance.</p>	<p>See Specifications, page 2-69.</p>

Go on to Sheet 3

1. Basic Oil Pump
2. Oil Pump Assembly
3. Oil Pump Drive Gear Assembly
4. Oil Pump Body Assembly
5. Pin
6. Capscrew
7. Lockwasher
8. Oil Pump Cover Assembly
9. Sleeve Bearing
10. Seal
11. Preformed Packing
12. Adapter Assembly
13. Pin
14. Body
15. Gasket
16. Washer
17. Capscrew
18. Capscrew
19. Preformed Packing
20. Oil Pump Idler Gear Assembly
21. Oil Pump Manifold Assembly
22. Sleeve Bearing
23. Washer
24. Capscrew
25. Capscrew
26. Capscrew



TA099372
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<p>5. Two sleeve bearings (9)</p>	<p>a. Install in cover (8) until bearings are 0.062 in. (1.57 mm) below machined surface of cover.</p> <p style="text-align: center;">NOTE</p> <p>Bearing seams should be 150 - 450 from centerline through bearing bores and should face toward oil outlet in cover.</p> <p>b. Check that bearing bore is within specifications.</p>	<p>See Specifications, page 2-69.</p>
<p>6. Cover (8)</p>	<p>a. Turn over.</p> <p>b. Install seal (10).</p> <p style="text-align: center;">NOTE</p> <p>Install seal until it makes contact with counterbore in cover assembly. Lip of seal must point toward splined end of drive gear.</p> <p>c. Coat lip of seal with clean SAE 30 oil.</p>	
<p>7. Preformed packing (19)</p>	<p>Install in body assembly (4).</p>	

LOCATION/ITEM	ACTION	REMARKS
8. Cover assembly (8)	<ul style="list-style-type: none"> a. Put in position on body assembly. b. Install two short capscrews (26) and washers (23). c. Install preformed packing (11). 	
9. Four long capscrews (24) and washers (238)	Install in pump.	
10. Adaptor assembly (12)	<ul style="list-style-type: none"> a. Install on cover (8). b. Secure with capscrews (6) and washer (7). 	

4-196

End

TRANSMISSION OIL COOLER REMOVAL/INSTALLATION

(Sheet 1 of 4)

This task covers: Replacement of transmission oil cooler.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-41

Equipment Condition

Front crankcase guard removed.

Coolant drained from cooling system.

Oil drained from transmission oil cooler.

Special Tools

None

Personnel Required

One mechanic

References

Crankcase guard removal
TM 10-3930-641-20.

LO 10-3930-641-12.

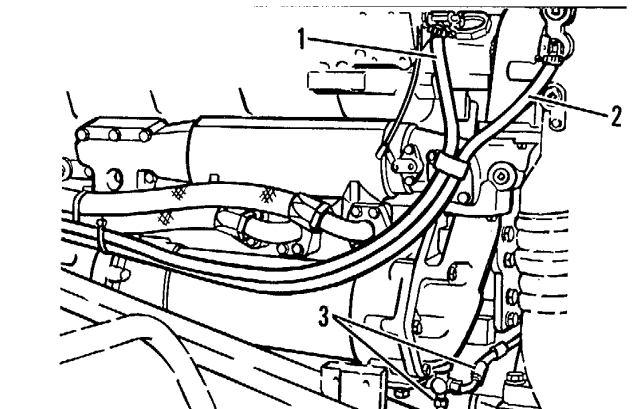

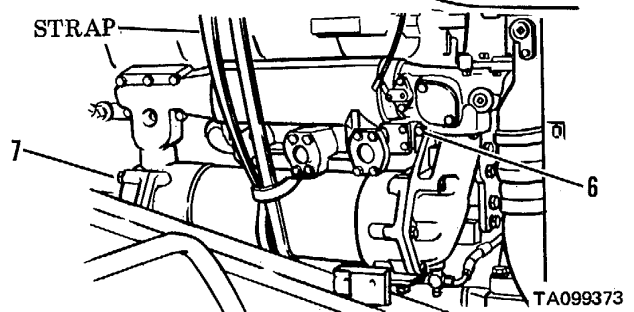
Cooling system maintenance,
TM 10-3930-641-20.

Transmission maintenance,
TM 10-3930-641-20.

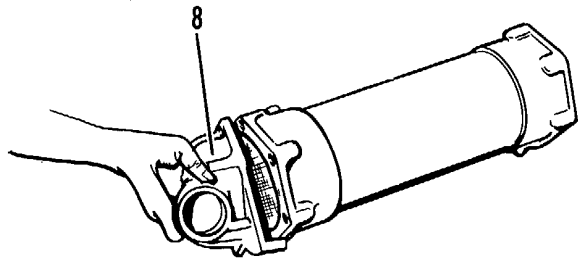
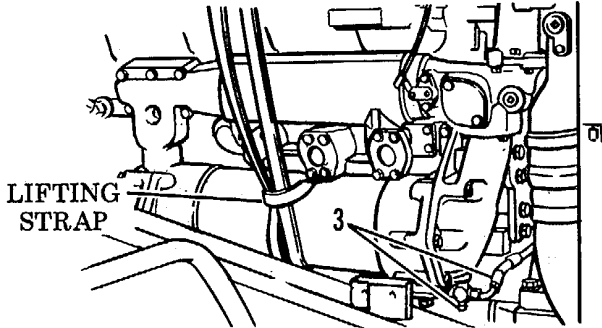

General Safety Instructions

Avoid contact with hot coolant. Hot
coolant will cause burns.

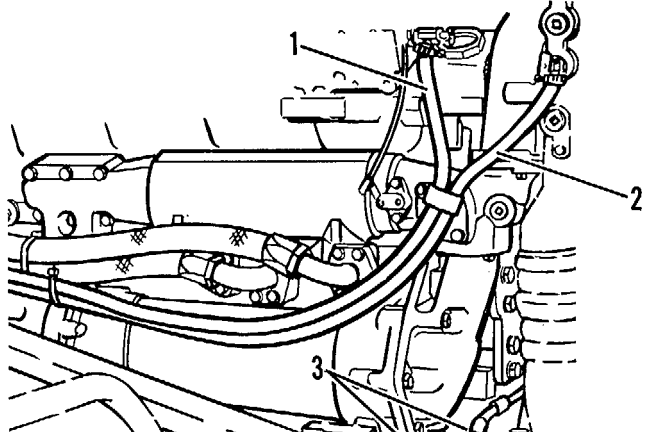
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div>		
1. Two heater hoses (1) and (2)	Disconnect from engine.	
2. Two hose assemblies (3)	Disconnect from transmission oil cooler.	
3. Oil lines clamp	Remove.	
4. Oil lines (4) and (5) at bottom of transmission oil cooler.	Remove.	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">CAUTION</div>		
	Weight of transmission oil cooler is 82 lbs. Use hoist to lift out.	
5. Hoist	Attach to oil cooler. Wrap lifting strap around cooler as shown.	
6. Six capscrews (7) that hold transmission oil cooler to elbow	Remove.	
7. Two bolts (6) that hold elbow to engine	Remove.	

TA099373
Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
8. Transmission oil cooler	Remove.	
9. Water elbow (8)	Remove.	
10. Tube bundles	Clean by passing a .125 in (3.2 mm) rod through each tube.	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">INSTALLATION</div>		
1. Water elbow (8)	Install on transmission oil cooler with new O-ring seal.	
2. Hoist	Attach to transmission oil cooler.	
3. Transmission oil cooler	Put in position and install bolts to hold it to engine and water cooler.	
4. Oil lines (4) and (5)	Connect to bottom of transmission oil cooler.	
5. Clamp to hold oil lines to engine	Install.	
6. Hose assemblies (3)	Connect to fitting.	

TA099374
Go on to sheet 4

LOCATION/ITEM	ACTION	REMARKS
7. Two heater hose assemblies (1) and (2)	Connect.	
8. Cooling system	Fill with coolant to the specified level.	See TM 10-3930-641-20.
9. Transmission oil	Fill to specified level.	See LO 10-3930-641-12, TM 10-3930-641-20.
10. Front crankcase guard	Install.	See TM 10-3930-641-20.

TA099375
END

Section V. CONTROL VALVES AND CONTROL LOCKS**TRANSMISSION CONTROL VALVE AND CONTROL LOCKS MAINTENANCE INSTRUCTIONS**

This section covers maintenance of these transmission components for direct support and general support maintenance personnel:

- a. Sequence and pressure control valve
- b. Transmission control lock
- c. Torque converter outlet relief valve

LIST OF TASKS

(Sheet 1 of 1)

TASK NO	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Sequence and pressure control valve removal installation.	4-202	2-45, 2-49
2	Sequence and pressure control valve disassembly/assembly.	4-205	2-47, 2-48, 2-49
3	Transmission control lock removal.	4-210	2-45
4	Transmission control lock installation.	4-213	None
5	Transmission control lock disassembly.	4-217	2-45, 2-46
6	Transmission control lock assembly.	4-221	2-46
7	Torque converter outlet relief valve removal installation.	4-225	2-41
8	Torque converter outlet relief valve disassembly/assembly.	4-228	2-49
9	Torque converter outlet relief valve adjustment.	4-231	2-48, 2-49
10	Transmission control lock bench test.	4-234	2-45
11	Sequence valve test.	4-237	2-47, 2-48
	4-201		

SEQUENCE AND PRESSURE CONTROL VALVE REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal of sequence and pressure control valve.

INITIAL SETUP

Test Equipment

None As required

Materials/Parts

Page 2-49

Troubleshooting Reference

Equipment Condition

Engine OFF.

Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

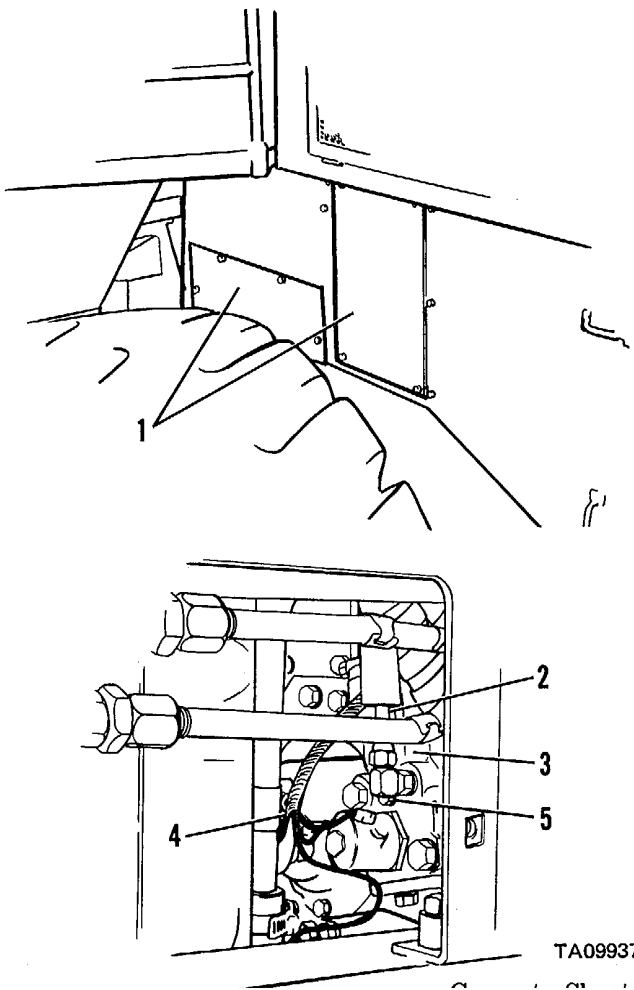
References

Shipping link removal/installation,
TM 10-3930-641-20.

General Safety Instructions

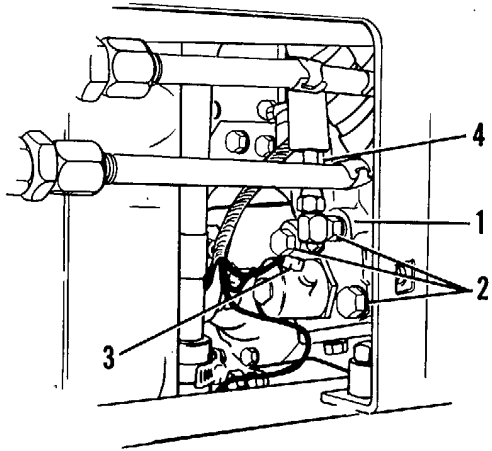
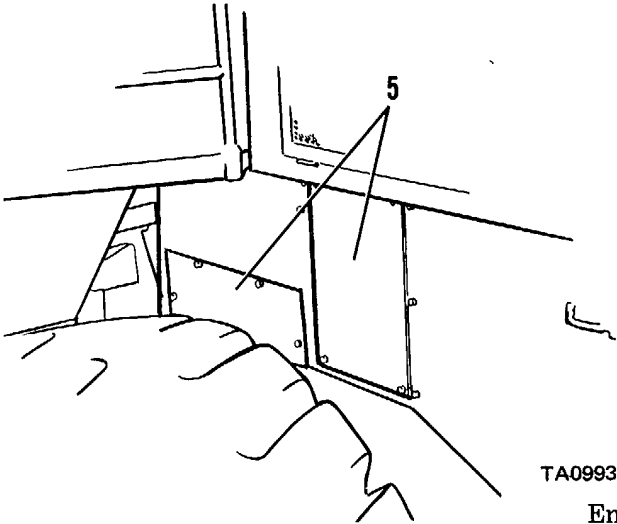
Tires blocked.

Main disconnect switch off.

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">REMOVAL</div>		
1. Two panels (1)	Remove from left side of vehicle.	
2. Hose assembly (2)	Disconnect from sequence and pressure control valve (3). Cap or plug opening.	
3. Wire (4)	Disconnect from valve (3).	
4. Three capscrews (5) that secure valve (3)	Remove.	
5. Sequence and pressure control valve (3)	Remove.	

TA099376

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
1. Sequence and pressure control valve	Put valve (1) in position on rear of torque converter.	
2. Three capscrews (2)	Install to secure valve.	
3. Wire (3)	Connect to valve.	
4. Hose assembly (4)	Connect to valve.	
5. Two panels (5)	Install.	

TA099377
End

TA099377
END

SEQUENCE AND PRESSURE CONTROL VALVE DISASSEMBLY/ASSEMBLY

(Sheet 1 of 5)

This task covers: Disassembly and assembly of sequence and pressure control valve.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required.

Troubleshooting Reference

Pages 2-47, 2-48, 2-49

Equipment Condition

Sequence and pressure control valve removed from vehicle.

Special Tools

None

Personnel Required

One mechanic

References

Sequence and pressure control valve removal/installation, page 4-202.

General Safety Instructions

None

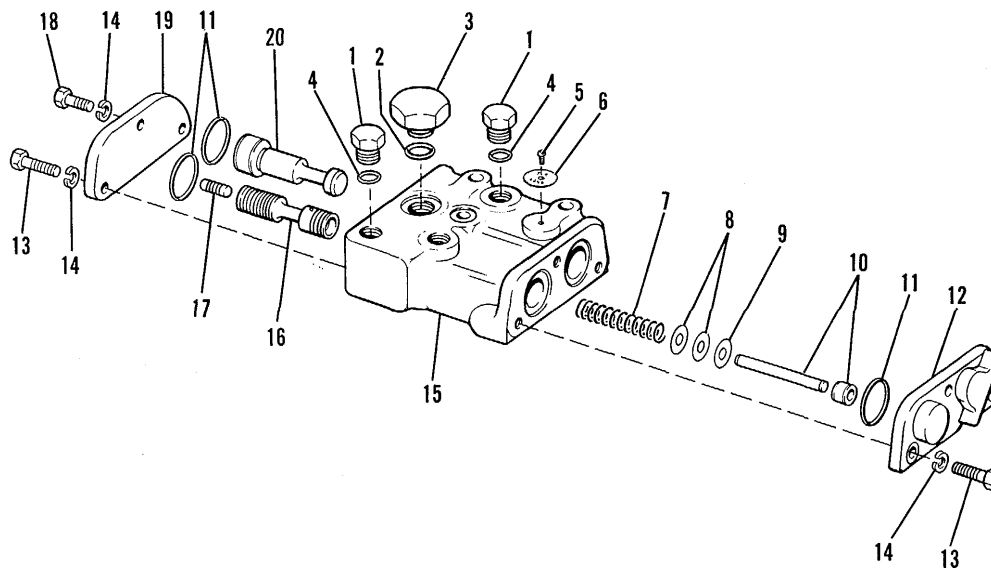
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
1. Capscrews (13), lockwashers (14), cover (12)	Remove.	
2. Stop assembly (10), spring (7) and spacers (8, 9)	Remove from valve body.	
3. Plug (3) and preformed packing (2)	Remove.	
4. Capscrews (13 and 18), lockwasher (14), and cover (19)	Remove from valve body.	
5. Two valve spools (20) and (16)	Remove from valve body (15).	
6. Valve slug (17)	Remove from spool (16).	
7. Preformed packing (11)	Replace.	

Go on to Sheet 3

Power Train Oil Lines Group

1. Plug
2. Preformed Packing
3. Plug
4. Preformed Packing
5. Screw
6. Identification Plate
7. Spring
8. Spacer
9. Spacer
10. Stop Assembly
11. Preformed Packing
12. Cover
13. Capscrew
14. Lockwasher
15. Control Valve Body
16. Sequence Spool
17. Reducing Valve Slug
18. Capscrew
19. Cover
20. Spool



TA099378
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">ASSEMBLY</div> <p>1. Sequence and pressure control valve free of dirt before assembling.</p> <p>2. Valve slug (17)</p> <p>3. Valve spools (20) and (16)</p> <p>4. Preformed packing (11)</p> <p>5. Cover (19) and lockwashers (14).</p>	<p>a. Be sure all parts of valve are clean and</p> <p>b. Put clean oil on all parts.</p> <p>Install in valve spool.</p> <p>Install in valve body.</p> <p>Install in valve body.</p> <p>Install and secure with capscrews (13) and (18)</p>	

LOCATION/ITEM	ACTION	REMARKS
6. Spacers (8) and (9)	Install on stop assembly (10).	
7. Spring (7) and stop assembly (10)	Install in valve body (15).	
8. Preformed packing (11)	Install in valve body (15).	
9. Cover (12)	Install and secure with capscrews.	
10. Plug (3) and preformed packing (2)	Install in valve body (15).	
11. Sequence and pressure control valve	Install.	See page 4-202.

This task covers: Removal of transmission lock.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Tags for marking lines.

Troubleshooting Reference

Page 2-45

Equipment Condition

Engine OFF.
Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

References

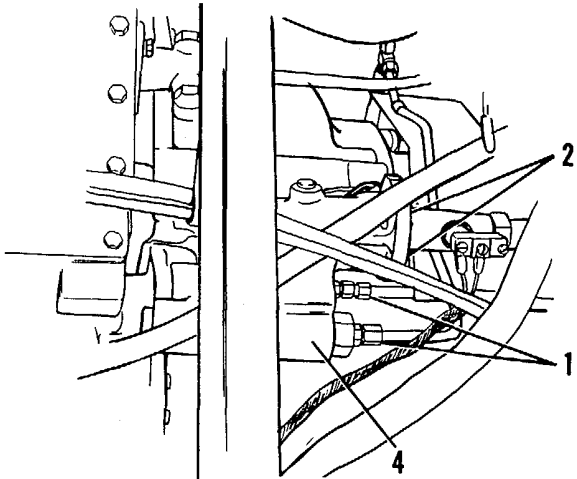
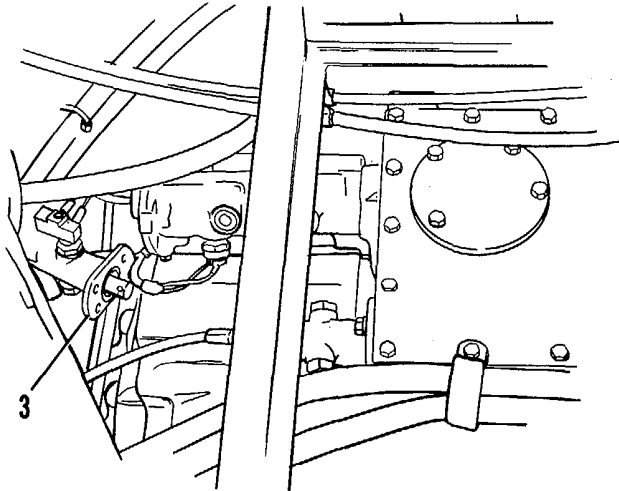
Shipping link removal/installation,
TM 10-3930-641-20.

General Safety Instructions

Tires blocked.
Main disconnect switch OFF.

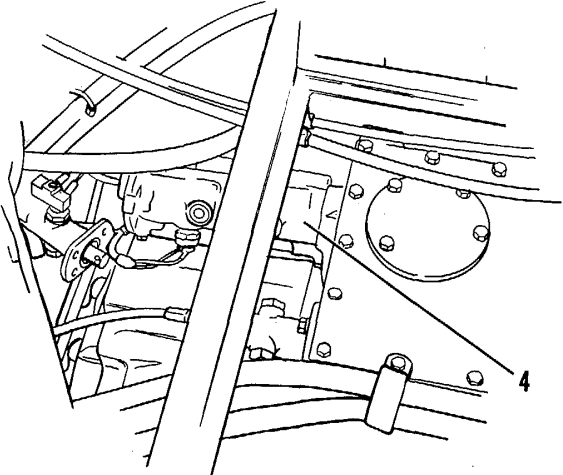
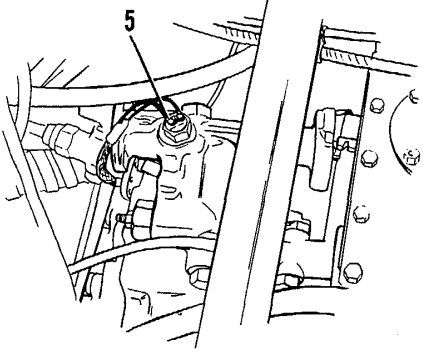
Go on to Sheet 2

TRANSMISSION CONTROL LOCK REMOVAL (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1. Door assemblies above transmission	Open.	
2. Floor panel at rear of cab	Remove.	
3. Two tube assemblies (1) lock (4). Cap or plug opening.	Tag and disconnect from transmission control	
4. Two capscrews (2)	Remove.	
5. Transmission control lever	Put in reverse position.	
	NOTE	
	Face of bracket must be vertical to slide.	
36. Bracket (3)	Slide off transmission control lock.	
	NOTE	
	Make sure bracket is perfectly vertical when sliding off.	

TA099379
Go on to Sheet 3

TRANSMISSION CONTROL LOCK REMOVAL (CONT)

LOCATION/ITEM	ACTION	REMARKS
7. Capscrews that hold transmission control lock (4) to transmission	Remove.	
8. Transmission control lock (4)	<p>a. Position so wires (5) can be disconnected.</p> <p>b. Put identification on wires for later installation.</p> <p>c. Remove.</p>	

TRANSMISSION CONTROL LOCK INSTALLATION

(Sheet 1 of 4)

This task covers: Installation of transmission control lock.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required.

Troubleshooting Reference

None

Equipment Condition

Transmission control lock removed.
Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

References

Transmission control lock removal,
page 4-210.

Speed control linkage adjustment,
TM 10-3930-641-20.

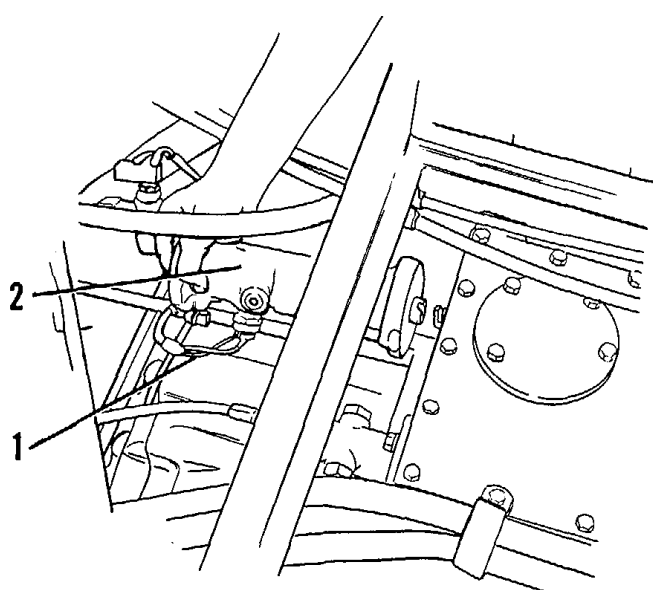
Shipping link removal/installations,
TM 10-3930-641-20.

General Safety Instructions

Main disconnect switch OFF until wires
are connected.

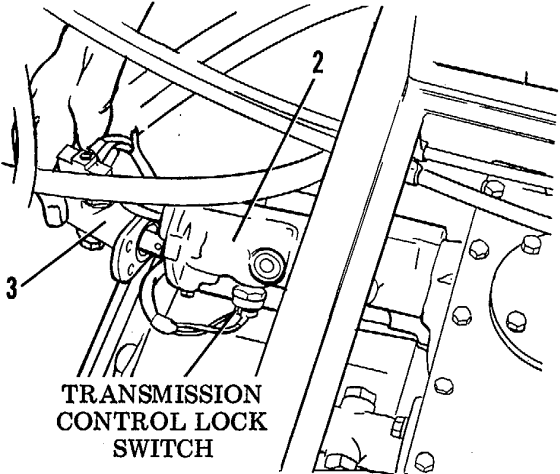
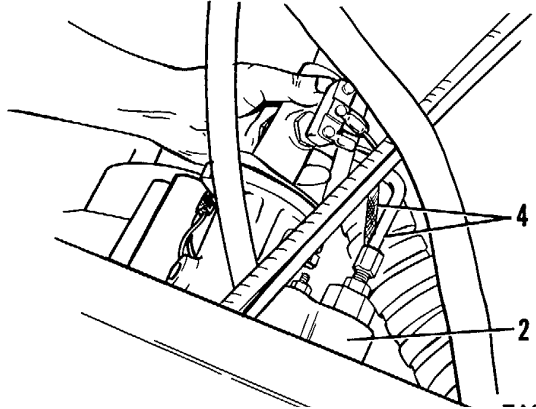
Tires blocked.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>1. Transmission control lock (2)</p>	<p>a. Position on transmission.</p> <p>b. Make sure rail in control lock engages direction selector valve spool in transmission hydraulic controls.</p> <p>c. Secure with capscrews.</p>	
<p>2. Wires (1)</p>	<p>Connect to switch on transmission control lock.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">CAUTION</div> <p>a. Make sure direction selector valve spool in transmission hydraulic controls moves freely after transmission control lock is installed.</p> <p>b. If valve spool does not move freely, remove cover over transmission hydraulic controls.</p> <p>c. Loosen four capscrews that hold transmission hydraulic controls in position.</p> <p>d. Move valve group until direction selector valve spool is free to move with the rail in transmission control lock. Tighten the valve group capscrews to a torque of 32-38 lb. ft. (44-52 N-m).</p>	

TA099381
Go on to Sheet 3

TRANSMISSION CONTROL LOCK INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
3. Bracket (3)	a. Slide against transmission control lock (2). b. Secure with capscrews. c. Be sure direction selector valve spool moves freely with rail in transmission control lock.	
4. Two tube assemblies (4)	Connect to transmission control lock (2).	
5. Speed control linkage	Adjust. See TM10-3930-641-20.	
6. Transmission control lock switch	Adjust. See page 4-216.	
7. Parking brake	Put in engaged position.	
8. Main disconnect switch	Turn to ON position.	
9. Ignition switch	Turn to ON position.	
10. Transmission control lever	Put in REVERSE position.	
11. Locknut on transmission control lock switch	Loosen.	

TA099382
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
12. Transmission control lock switch	a. Turn in until horn behind seat in operator's cab makes sound. b. Turn switch in one more turn and tighten locknut. c. Horn must still make sound.	
13. Transmission control lever must not make sound.	a. Put in NEUTRAL position. Horn now b. Put in FORWARD position. Horn must not make sound.	
14. Ignition switch	Turn OFF.	
15. Floor panel at rear of cab	Install.	

TRANSMISSION CONTROL LOCK DISASSEMBLY

(Sheet 1 of 4)

This task covers: Disassembly of transmission control lock.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Pages 2-45, 2-46

Equipment Condition

Transmission control lock removed.

Special Tools

None

Personnel Required

One mechanic

References

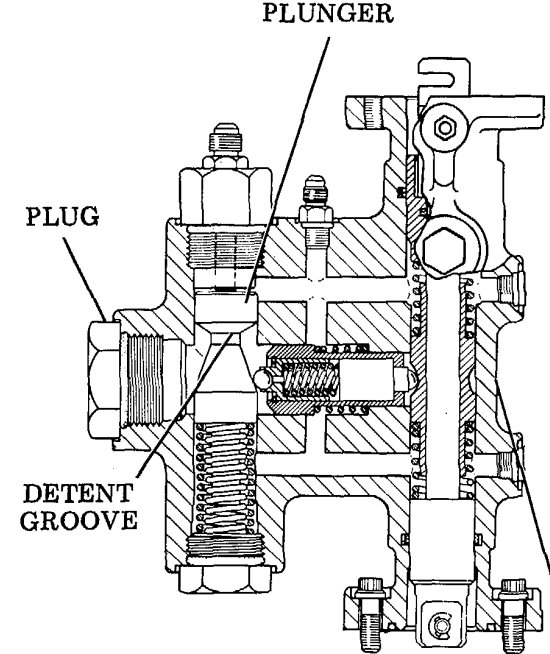
Transmission control lock removal,
see page 4-210.

General Safety Instructions

Keep dirt away from clean parts.

Go on to Sheet 2

4)

LOCATION/ITEM	ACTION	REMARKS
1. Switch assembly (19)	Remove from transmission control lock.	
2. Two plugs (1) and (36), and preformed packings (2) and (13)	Remove.	
3. Cylinder (14) and preformed packing (13)	Remove from housing.	
4. Connector (17), piston (15), and preformed packing (16)	Remove from cylinder.	
5. Plunger (12)	Position so that detent groove in plunger appears in center of bore for plug (1) as shown.	

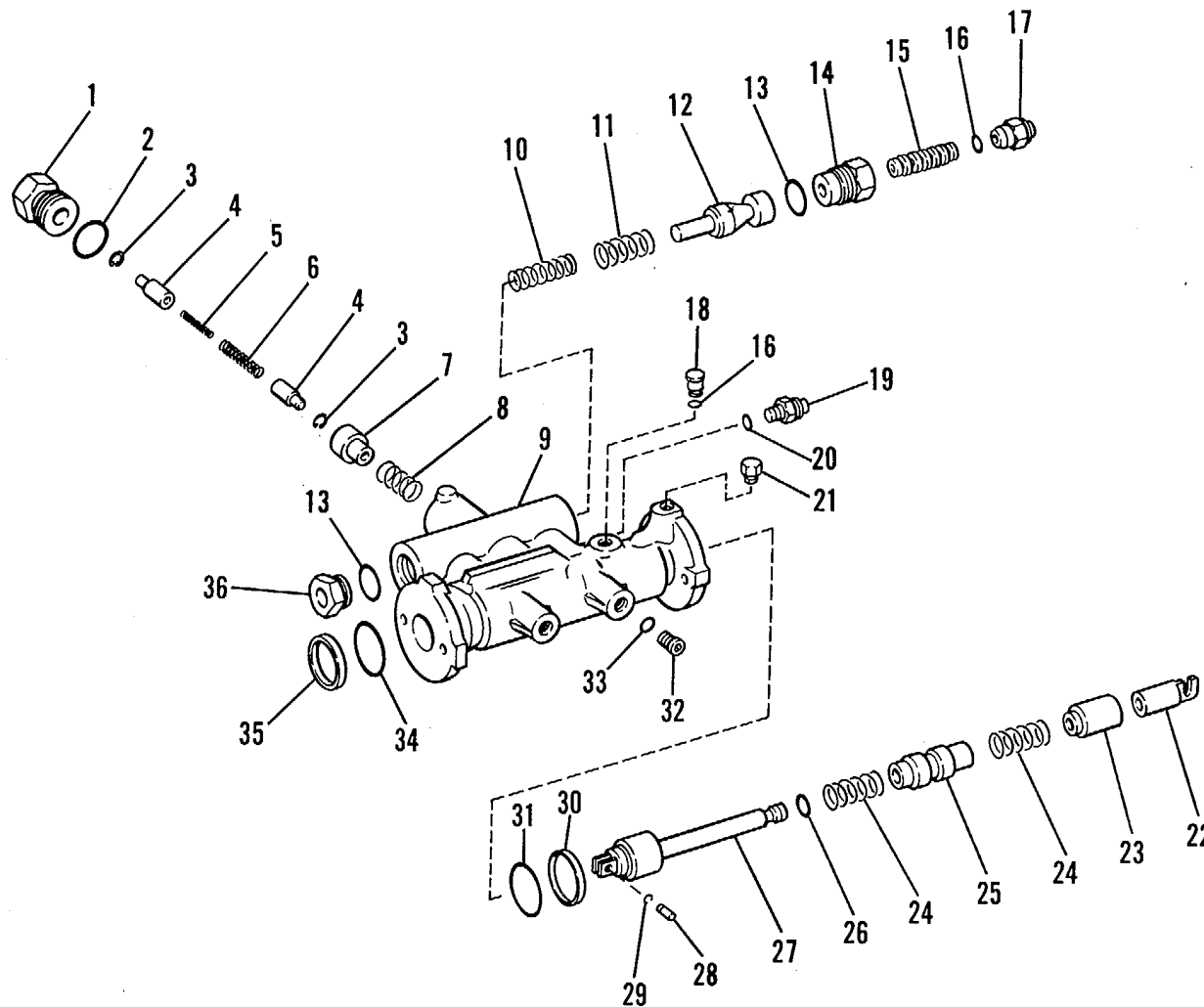
TRANSMISSION CONTROL LOCK

TA099383
Go on to Sheet 3

TRANSMISSION CONTROL LOCK DISASSEMBLY (CONT)

(Sheet 3 of 4)

1. Plug
2. Preformed Packing
3. Ring
4. Plunger Assembly
5. Spring
6. Spring
7. Sleeve
8. Spring
9. Housing
10. Spring
11. Spring
12. Plunger
13. Preformed Packing
14. Cylinder
15. Piston
16. Preformed Packing
17. Connector
18. Plug
19. Switch Assembly
20. Preformed Packing
21. Filter
22. Nut
23. Sleeve
24. Spring
25. Sleeve
26. Preformed Packing
27. Rail
28. Pin
29. Ring
30. Preformed Packing
31. Preformed Packing
32. Plug
33. Preformed Packing
34. Preformed Packing
35. Preformed Packing
36. Plug



TA099384
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
6. Plunger assembly (4)	Push into detent groove of plunger (12) to allow removal of rail assembly (22 thru 29).	
7. Rail assembly (22 thru 29)	Remove.	
8. Plunger (12), plunger assembly group (3 thru 8)	Remove.	
9. Ring (29) and pin (28)	Remove from end of rail (27).	
10. Springs (24), sleeve (25), sleeve (23), nut (22)	Remove from rail.	
11. Seal (26) in sleeve (23)	Discard if damaged.	
12. Ring (3)	Remove from sleeve (7).	
13. Two plunger assemblies (4) and springs (5) and (6)	Remove from sleeve (7).	
14. Preformed packings (2), (13), (16), (30), (31), (33), (34), (35)	Discard if damaged.	

End

TRANSMISSION CONTROL LOCK ASSEMBLY

(Sheet 1 of 4)

This task covers. Assembly of transmission control lock.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Refer to page 4-234.

Troubleshooting Reference

Page 2-46

Equipment Condition

Transmission control lock disassembled.

Special Tools

None

Personnel Required

One mechanic

References

Transmission control lock disassembly,
page 4-217.

General Safety Instructions

Keep clean parts away from dirt.

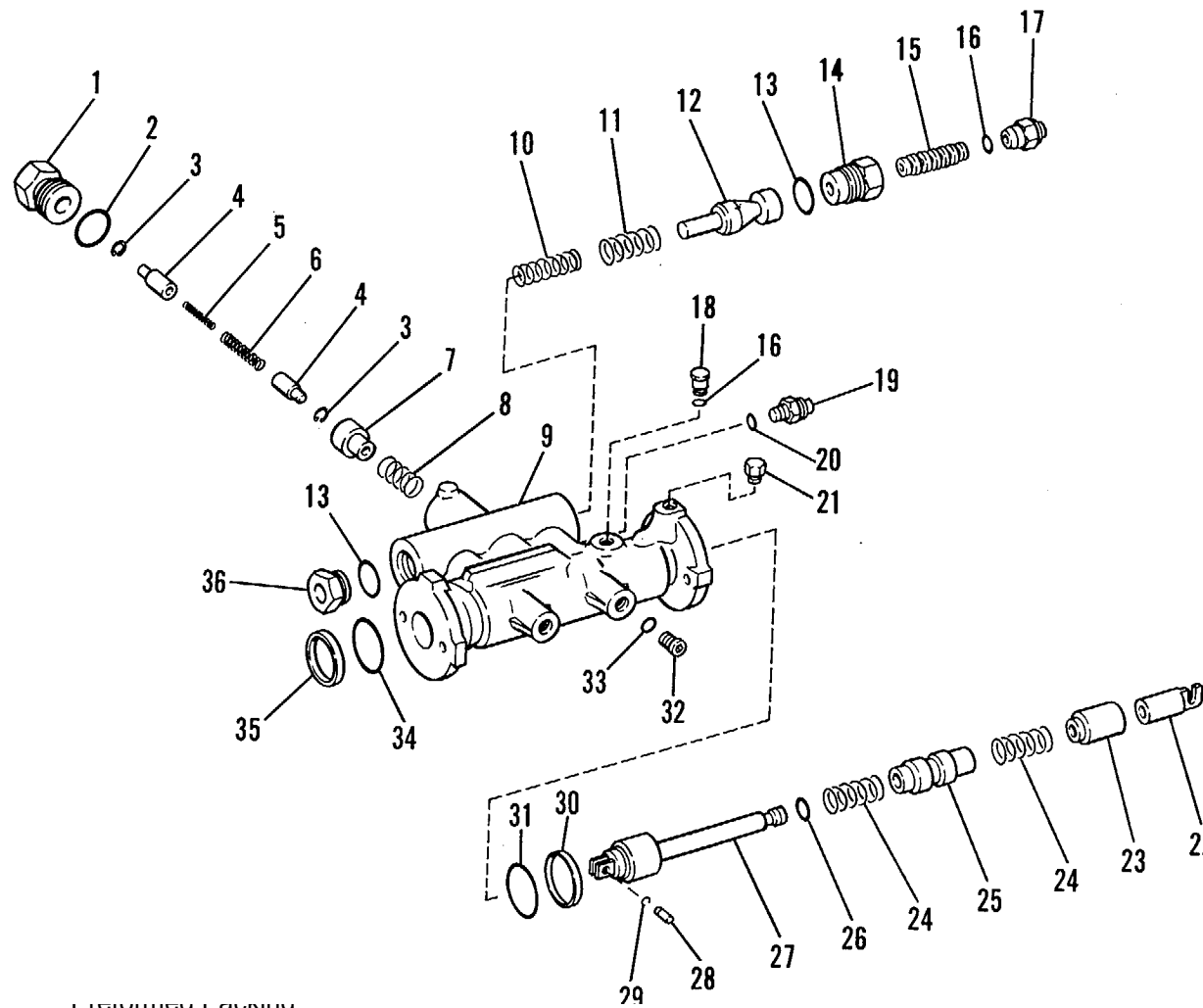
LOCATION/ITEM	ACTION	REMARKS
NOTE		
Be sure all parts are clean and coated with fresh hydraulic oil before assembly.		
1.	Ring (3)	Install in sleeve (7).
2.	Plunger assembly (4), spring (6), spring (5) and plunger assembly (4)	a. Install in sleeve (7).
	b.	Secure with second ring (3).
3.	Seal (26)	Install in sleeve (23).
4.	Spring (24), sleeve (25), spring (24) and sleeve (23)	Install on rail (27).
5.	Nut (22) lb. ft. (55-85 N-m).	Install on rail. Tighten to a torque of 41-63
6.	Pin (28) and retaining ring (29) pliers.	Install in end of rail with retaining ring
7. Preformed packings (30) and (31) for rail assembly	Install in housing (9).	

Go on to Sheet 3

TRANSMISSION CONTROL LOCK ASSEMBLY (CONT)

(Sheet 3 of 4)

- 1.
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- 36.



Retained Packing Plug

TRANSMISSION CONTROL LOCK ASSEMBLY (CONT)

(Sheet 4 of 4)

LOCATION/ITEM	ACTION	REMARKS
8.	Rail assembly	Install in housing (9).
9.	Spring (8) and sleeve assembly (7)	Install in housing (9).
10.	Spring (10), spring (11) and plunger (12)	Install in housing (9).
11.	Piston (15) in cylinder (14)	Install in housing (9).
12.	Cylinder (14)	Install in housing (9).
13.	Connector (17)	Install in cylinder (14).
14.	Two plugs (1) and (36), preformed packings (2) and (13)	Install in housing (9).
15.	Switch assembly (19)	Install in housing (9).

TORQUE CONVERTER OUTLET RELIEF VALVE REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal and installation of torque converter outlet relief valve.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Tags to mark hoses.

Troubleshooting Reference

Page 2-41

Equipment Condition

Engine off and cooled.

Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

References

Shipping link removal/installation,
TM 10-3930-641-20.

General Safety Instructions

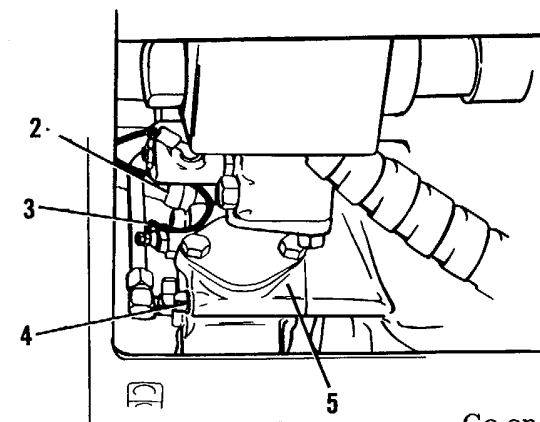
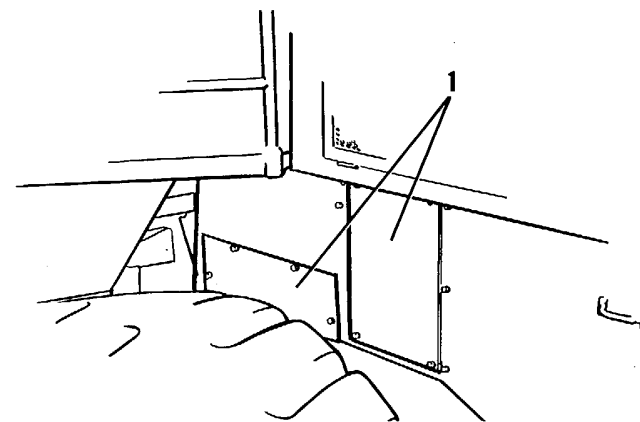
Avoid contact with hot oil.

Main disconnect switch OFF

TORQUE CONVERTER OUTLET RELIEF VALVE REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1.	Two panels (1)	R
2.	Tube assembly at bottom of relief valve	T: V:
3.	Tube assembly (2)	T:
4.	Wire (3)	D
5.	Three capscrews (4) and torque converter outlet relief valve (5).	R

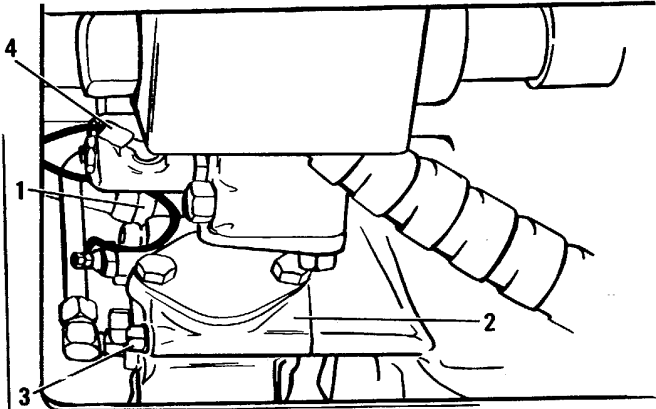
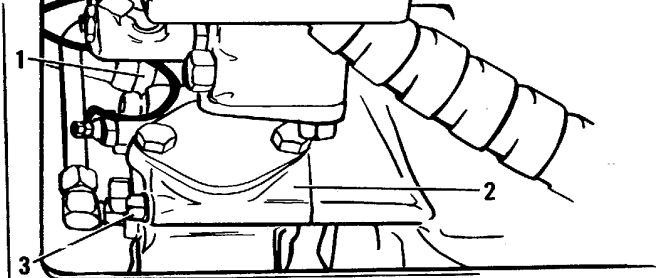
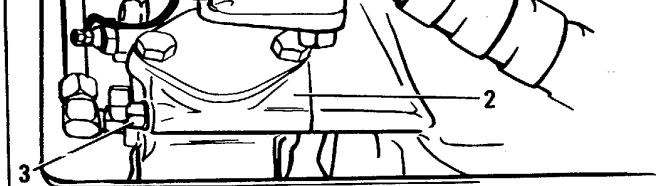

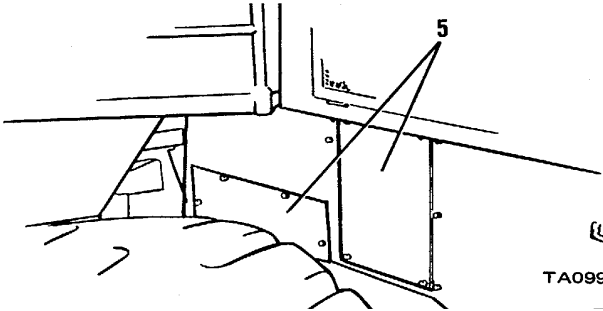


TA099386

Go on to Sheet 3

TORQUE CONVERTER OUTLET RELIEF VALVE REMOVAL/INSTALLATION (CONT)

(Sheet 3 of 3)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
1.	Torque converter outlet relief valve (2) b.	a. 
2.	Wire (4)	S 
3.	Tube assembly at bottom of relief valve.	C 
4.	Tube assembly (1)	C 
5.	Two panels (5).	C 

TA099387

End

TORQUE CONVERTER OUTLET RELIEF VALVE DISASSEMBLY/ASSEMBLY

(Sheet 1 of 3)

This task covers: Disassembly/assembly of torque converter outlet relief valve.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-49

Equipment Condition

Torque converter outlet relief valve removed.

Special Tools

None

Personnel Required

One mechanic

References

Torque converter outlet relief valve removal/installation, page 4-225.

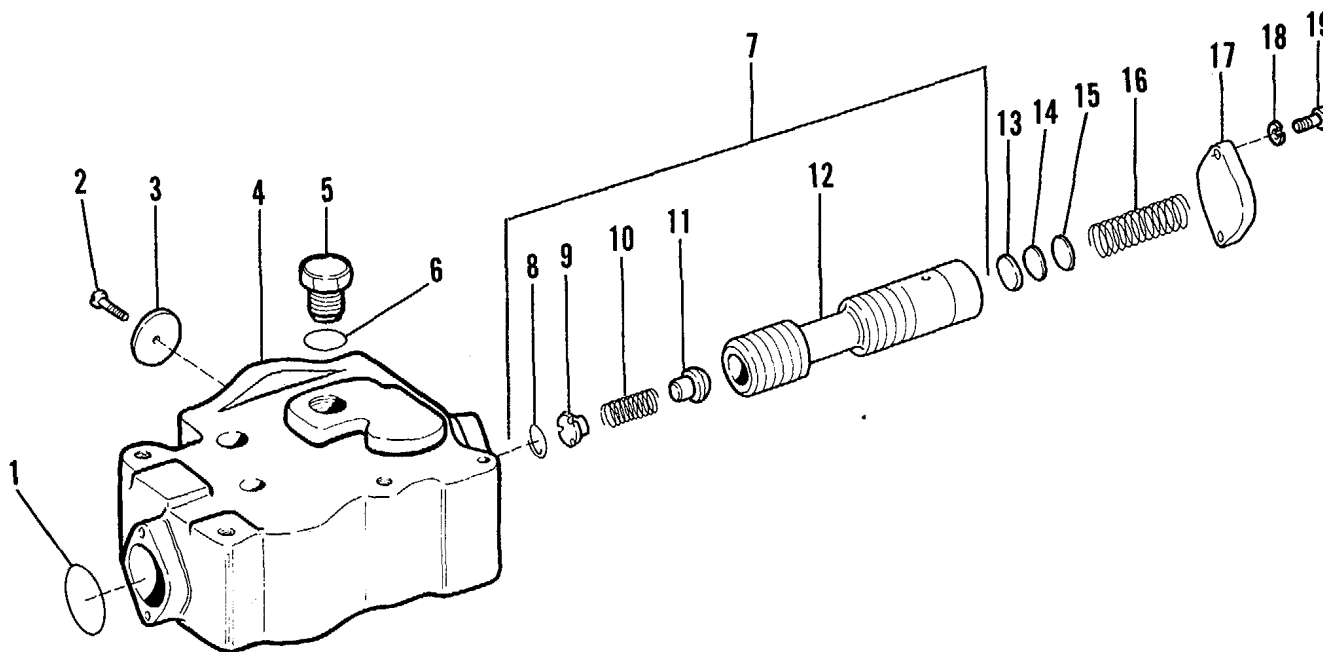
General Safety Instructions

None

TORQUE CONVERTER OUTLET RELIEF VALVE DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 2 of 3)

- 1.
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- 19.



TORQUE CONVERTER OUTLET RELIEF VALVE DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 3 of 3)

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY		
1.	Capscrew (19) and lockwasher (18)	Remove from body (4).
2.	Covers (17) and preformed packing (1)	Remove from both ends of body (4).
3.	Spring (16) and spacers (13), (14), (15)	Remove.
4.	Spool assembly (7)	Remove.
5.	Retaining ring (8) retainer (9), spring(10) and poppet (11)	Remove from valve spool (12).
6.	Plug (5) and preformed packing (6)	Remove from body (4).
ASSEMBLY		
1.	Plug (5) and preformed packing (6).	Install in valve body (4).
2.	Poppet (11) spring (10), retainer (9), and retaining ring (8)	Install in spool (12).
3.	Spool assembly (7)	Install in body (4).
4.	Spacers (13) (14), (15) and spring (16)	Install.
5.	Covers (17) and preformed packing (1)	Position on both ends of body (4).
6.	Capscrew (19) and lockwasher (18)	Install.

TORQUE CONVERTER OUTLET RELIEF VALVE ADJUSTMENT

(Sheet 1 of 3)

This task covers: Adjustment of torque converter outlet relief valve.

INITIAL SETUP

Test Equipment

Pressure Gage (0-100 psi)
(0-690 kPa)

Materials/Parts

Spacers

Troubleshooting Reference

Pages 2-48, 2-49

Equipment Condition

As stated in procedure

Special Tools

None

Personnel Required

Two mechanics

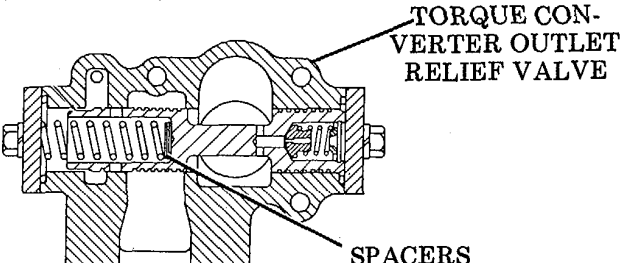
References

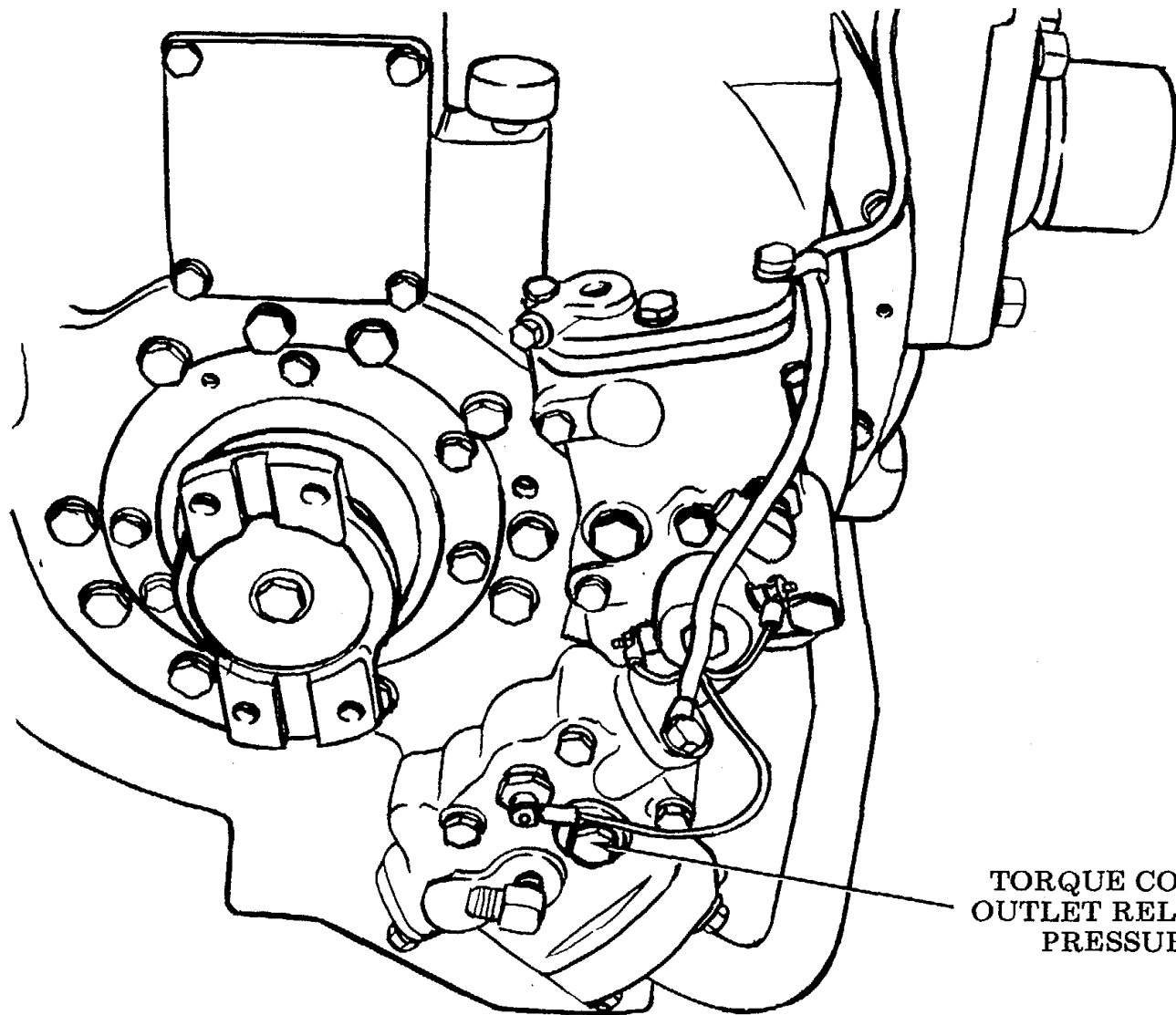
Torque converter outlet relief valve
disassembly/assembly, page 4-228.

General Safety Instructions

Go on to Sheet 2

TORQUE CONVERTER OUTLET RELIEF VALVE ADJUSTMENT (CONT)

LOCATION/ITEM	ACTION	REMARKS																								
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">TEST</div> 1.	Gage (0-100 psi - 0-690 kPa) tap.	<p style="text-align: center;">NOTE</p> <p>Correct pressure at outlet relief valve tap is 55-65 psi (379-453 kPa).</p>  <p>Pressure change valve by removal or addition of one spacer</p> <table border="1"> <thead> <tr> <th rowspan="2">Spacer Part No.</th> <th colspan="2">Thickness</th> <th colspan="2">Change in</th> </tr> <tr> <th>psi</th> <th>kPa</th> <th>psi</th> <th>kPa</th> </tr> </thead> <tbody> <tr> <td>5M9622</td> <td>.062</td> <td>1.58</td> <td>4.53</td> <td>0.32 (31.2)</td> </tr> <tr> <td>5M9624</td> <td>.010</td> <td>0.25</td> <td>.73</td> <td>0.05 (5.0)</td> </tr> <tr> <td>5M9623</td> <td>.036</td> <td>0.91</td> <td>2.64</td> <td>0.19 (18.2)</td> </tr> </tbody> </table>	Spacer Part No.	Thickness		Change in		psi	kPa	psi	kPa	5M9622	.062	1.58	4.53	0.32 (31.2)	5M9624	.010	0.25	.73	0.05 (5.0)	5M9623	.036	0.91	2.64	0.19 (18.2)
	Spacer Part No.			Thickness		Change in																				
			psi	kPa	psi	kPa																				
	5M9622		.062	1.58	4.53	0.32 (31.2)																				
	5M9624		.010	0.25	.73	0.05 (5.0)																				
	5M9623		.036	0.91	2.64	0.19 (18.2)																				
2. Engine	3. Brakes	In																								
4. Speed selection lever	5. Engine	St																								
6. Gage	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">ADJUST</div> 1. Spacers correct pressure. (See chart at right.)	Er																								
		PI																								
		Di																								
		Ol																								
		Ac																								



TORQUE CONVERTER
OUTLET RELIEF VALVE
PRESSURE TAP

TRANSMISSION CONTROL LOCK BENCH TEST

(Sheet 1 of 3)

This task covers: Bench testing transmission control lock.

INITIAL SETUP

Test Equipment

One 0-650 psi (45.7 Kg/cm²)
pressure gage

Hydraulic lines and fittings

Transmission oil supply

Materials/Parts

None

Troubleshooting Reference

Page 2-45

Equipment Condition

Transmission control lock removed from
vehicle.

Special Tools

None One mechanic

Personnel Required

References

Transmission control lock removal, page 4-210. Test in a clean area.

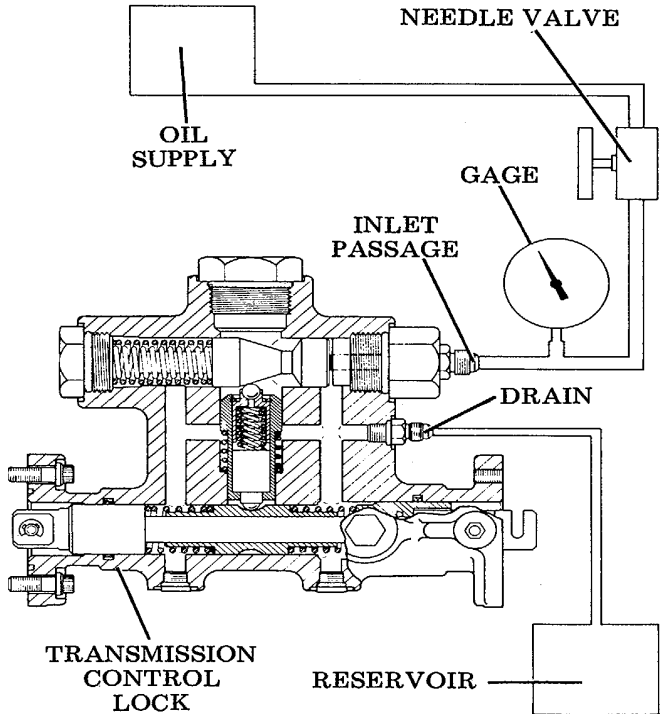
Transmission oil pump specifications,
page 2-69.

General Safety Instructions

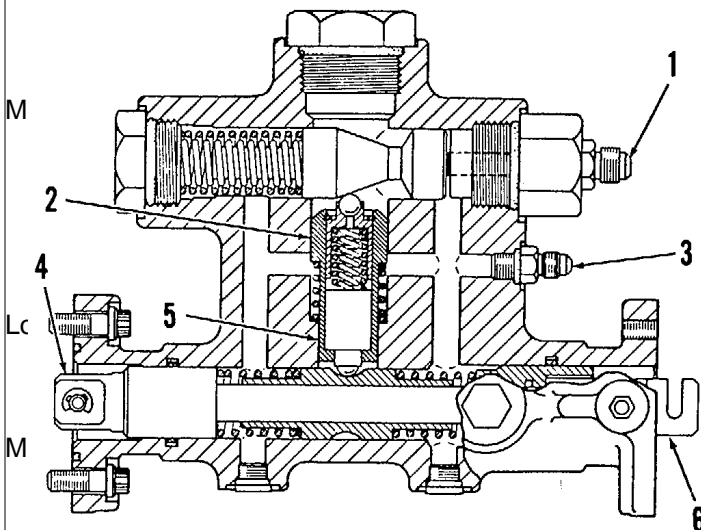
Go on to Sheet 2

TRANSMISSION CONTROL LOCK BENCH TEST

(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
<p>1. Find a source of supply that will provide</p>	<p>Pressure oil 650 psi (45.7 Kg/cm²). A transmission test bench is satisfactory.</p>	
<p>2. Connect as shown at right.</p>	<p>Gage, needle valve, and lines</p>	
<p>3. Open slowly.</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">NOTE</div> <p>Because the flow needed for this test is low, be sure the length of the lines used is kept to a minimum so pressure differences (drops) are kept to a minimum.</p> <p>Needle valve</p>	

LOCATION/ITEM	ACTION	REMARKS
4.	Pressure of approximately 650 psi (45.7 Kg/cm ²)	Send into passage (1)
5.	Shift rail (4) amount of resistance and with a pressure of 650 psi (45.7 Kg/cm ²) in passage (1). When the rail is released, it must stay in that position.	M
6.	Pressure into passage (1) cm ²)	Lc
7.	Shift rail (4) of the springs for detent (5) and sleeve (2), with a pressure of 400 psi (28.1 Kg/cm ²) in passage (1). When the shift rail is released, it must be returned to its NEUTRAL position by the force of the springs.	M



TRANSMISSION CONTROL LOCK

- 1. Inlet passage for brake pressure oil.
- 2. Sleeve.
- 3. Drain passage.
- 4. Rail (connected to direction selection spool).
- 5. Detent.
- 6. Nut (connected to direction cable from cab).

TA099392
End

SEQUENCE VALVE TEST

(Sheet 1 of 4)

This task covers: Test for sequence and control valve.

INITIAL SETUP

Test Equipment

Materials/Parts

Troubleshooting Reference

Two 0-600 psi (0-42.2 Kg/cm²) pressure gages None

Pages 2-47, 2-48

Needle valve

Hydraulic lines and fittings

Equipment Condition

Transmission oil supply at 400 psi (28.1 Kg/cm²)

Sequence valve removed from vehicle.

Fabricated plate (see Sheet 2)

Special Tools

Personnel Required

None

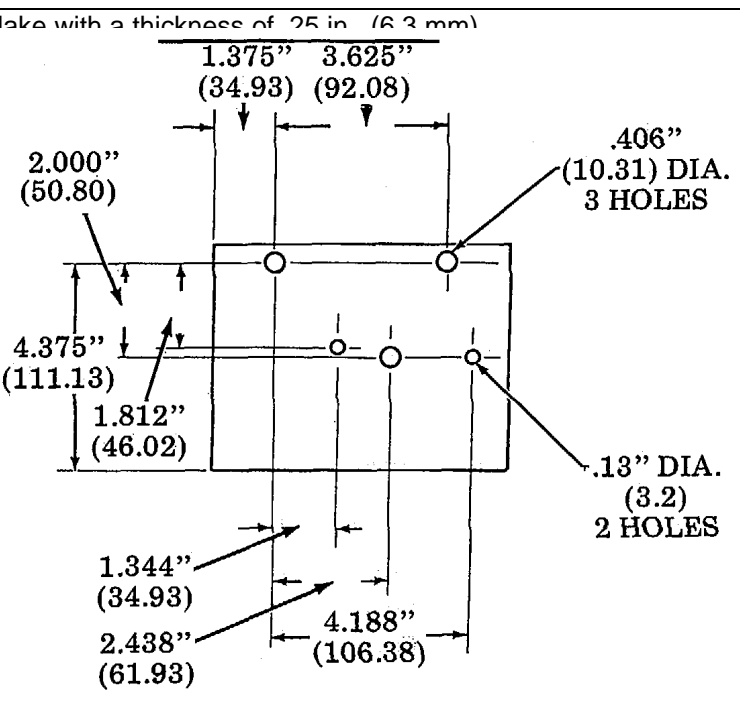
One mechanic

References

General Safety Instructions

Sequence and pressure control valve removal/installation, page 4-202.

Test in a clean area.

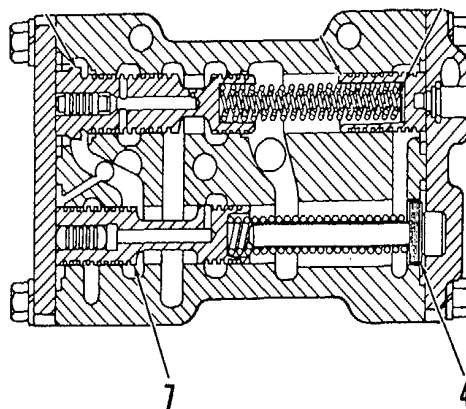
LOCATION/ITEM	ACTION	REMARKS
1.	Plate like the one shown in the illustration	Make with a thickness of .25 in. (6.3 mm)
2.	Preformed packings body.	lr
3.	Plate, made in Step 1 so the .13 in. (3.2 mm) holes in the plate align with the two bleed holes in the valve body. Secure the plate to the valve with bolts and nuts.	P  <p>The diagram shows a rectangular plate with the following dimensions and features: - Total width: 4.188" (106.38 mm) - Total height: 4.375" (111.13 mm) - Thickness: .25 in. (6.3 mm) - Top edge: 1.375" (34.93 mm) from left edge to center of first hole; 3.625" (92.08 mm) from center of first hole to right edge. - Left edge: 2.000" (50.80 mm) from top edge to center of first hole; 4.375" (111.13 mm) from top edge to center of second hole. - Right edge: .13" (3.2 mm) diameter holes. - Bottom edge: 1.344" (34.93 mm) from left edge to center of first hole; 2.438" (61.93 mm) from left edge to center of second hole. - Hole specifications: .406" (10.31 mm) diameter, 3 holes; .13" (3.2 mm) diameter, 2 holes. - Title: FABRICATED PLATE INCHES (MM)</p>
4.	Get a supply source of pressure oil that can give 400 psi (28.1 Kg/cm ²) of pressure	Fr st fr
5.	Two 0 to 600 psi (0 to 42.4 Kg/cm ²) pressure gages, lines, fittings and needle valve	lr NOTE Because the flow needed for this test is normally low, be sure the length of the lines used is kept at a minimum so pressure differences (drops) are kept at a minimum. See Sheet 3 for connection.

LOCATION/ITEM	ACTION	REMARKS
6.	Oil supply	A
7.	Needle valve (2) is 200 psi (14.1 Kg/cm ²). Gage (3) must read 0 psi, (0 Kg/cm ²) (0 kPa).	S
8.	Valve (2) sure read on gage (5), at a rate of 10 psi (0.7 Kg/cm ²) at a time.	C
9. pressure (6)	Sequence valve (7) when the pressure gage (5) is 265 to 275 psi (18.1 to 19.3 Kg/cm ²). This will allow oil to flow through a passage in valve body to gage (3). At this time, gage (3) will indicate the pressure read on gage (5).	V
SCHEMATIC OF TEST PROCEDURE	<p style="text-align: center;">NOTE</p> <p>If the needles of the pressure gages move back and forth (flutter) while the test is performed, loosen the fitting on gage (3) so there is a small amount of leakage.</p>	<p>1. Oil Supply 2. Needle Valve 3. Gage 4. Shims 5. Gage 6. Body of sequence and pressure control valve 7. Sequence valve</p>

LOCATION/ITEM	ACTION	REMARKS
---------------	--------	---------

9.	Sequence valve (cont) 275 psi (18.1 to 19.3 Kg/cm ²), add or remove shims (4) until the pressure is correct. One shim will change pressure approximately 4 psi (0.3 Kg/cm ²).	If sequence valve (7) does not open at 265 to
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PRESSURE CHANGE TO VALVES BY REMOVAL OR ADDITION OF ONE SPACER					
Spacer Part No.	Thickness		Change In		Where used
	in	mm	psi	kg/cm ² (kPa)	
8S6214	.016	0.40	4	0.3 (27.6)	Sequence valve (7)
8S6215	.036	0.91	8	0.6 (55.1)	



TA099395
END

Section VI. FRONT AXLE

FRONT AXLE MAINTENANCE INSTRUCTIONS

This section covers maintenance of these front axle components for direct support and general support maintenance personnel:

- a. Front differential and bevel gear
- b. Drive axles
- c. Final drive planet carrier

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Front differential and bevel gear removal.	4-242	2-43, 2-44
2	Front differential and bevel gear installation.	4-246	None
3	Drive axles removal/installation.	4-250	None
4	Final drive planet carriers removal/ installation.	4-254	2-43, 2-44
5	Final drive planet carriers disassembly/assembly	4-259	2-43

FRONT DIFFERENTIAL AND BEVEL GEAR REMOVAL

(Sheet 1 of 4)

This task covers: Removal of front differential and bevel gear.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Container to catch oil.
Wooden blocks.

Troubleshooting Reference

Pages 2-43, 2-44

Equipment Condition

Engine off and cooled.
Shipping link installed.

Special Tools

None

Personnel Required

Two mechanics

References

Drive axles removal/installation, page 4-250.
Drive shaft removal, TM 10-3930-641-20.
Shipping link removal/installation,
TM 10-3930-641-20.

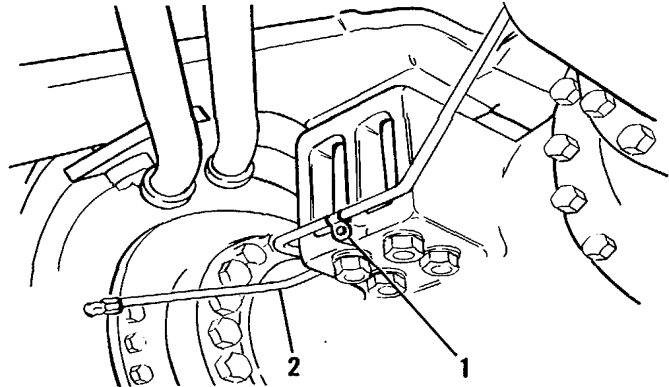
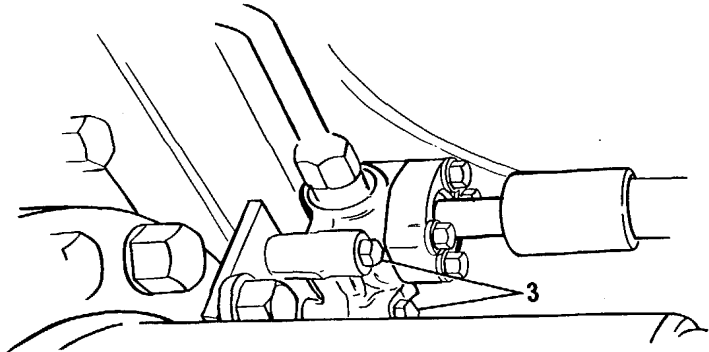
General Safety Instructions

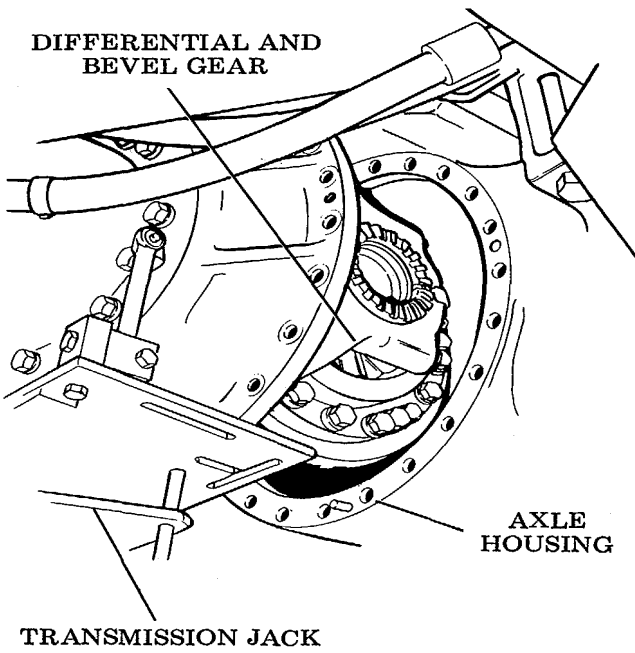
Tires blocked.
Jack stands must be used.
Keep clear of mast.

LOCATION/ITEM	ACTION	REMARKS
1. 250.	Drive axles	Remove. See Drive Axles Removal/Installation, page 4-
2.	Main drive shaft group	Remove. See TM10-3930-641-20.
3.	Oil Drain from front axle housing.	
4. Mast	<div style="border: 1px solid black; padding: 2px; text-align: center; margin: 0 auto; width: fit-content;">WARNING</div> <p>Keep all personnel except operator away from vehicle when mast is used to lift front end.</p> <p>a. Lower until it rests on wood blocks placed on ground.</p> <p>b. Continue lowering mast until vehicle front wheels are about 9 in. (22.9 cm) off ground.</p> <p>c. Put jack stands under vehicle.</p> <p>d. Place wood blocks under front tires.</p> <div style="border: 1px solid black; padding: 2px; text-align: center; margin: 0 auto; width: fit-content;">WARNING I</div> <p>Block both sides of rear tires to prevent vehicle movement.</p>	

FRONT DIFFERENTIAL AND BEVEL GEAR REMOVAL (CONT)

(Sheet 3 of 4)

LOCATION/ITEM	ACTION	REMARKS
5.	Brake tube assembly (2) b.	a. Disconnect from wheel R to
6.	Two capscrews (3) that secure hydraulic lines to differential	R to
7.	Differential and bevel gear <div style="border: 1px solid black; padding: 2px; display: inline-block;">NOTE</div> Put a piece of bar stock between bottom of carrier assembly and surface of floor jack. This will keep carrier assembly off floor jack for easier removal of the differential from the axle housing.	At 
8.	Capscrews and washers	R to
9.	Two 3/4-10NC forcing screws	Ti  VIEW FROM UNDER MACHINE TA099396

LOCATION/ITEM	ACTION	REMARKS
<p>10.</p>	<div style="border: 1px solid black; width: fit-content; margin: 0 auto; padding: 2px;">NOTE</div> <p>Differential and bevel gear weigh 1180 lb. (535 Kg).</p> <p>Differential and bevel gear</p> <p>b.</p>	 <p>a. hc</p> <p>Le ve</p>

4-245

TA099397
End

FRONT DIFFERENTIAL AND BEVEL GEAR INSTALLATION

(Sheet 1 of 4)

This task covers: Installation of front differential and bevel gear.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Wooden blocks

Troubleshooting Reference

None

Equipment Condition

Front differential and bevel gear removed.

Special Tools

None

Personnel Required

Two mechanics

References

LO 10-3930-641-12.

Drive axles removal/installation, page 4-250.

Bleed brake system, TM 10-3930-641-20.

Drive shafts removal/installation,
TM 10-3930-641-20.

General Safety Instructions

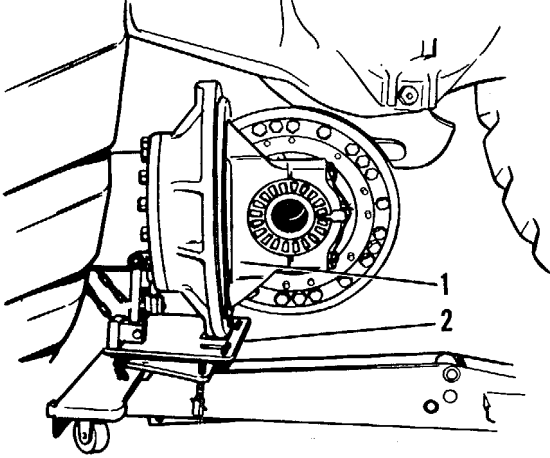
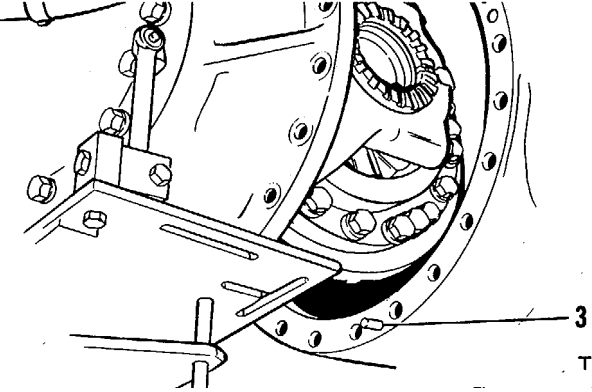
Tires blocked.

Jack stands must be used.

Keep clear of mast.

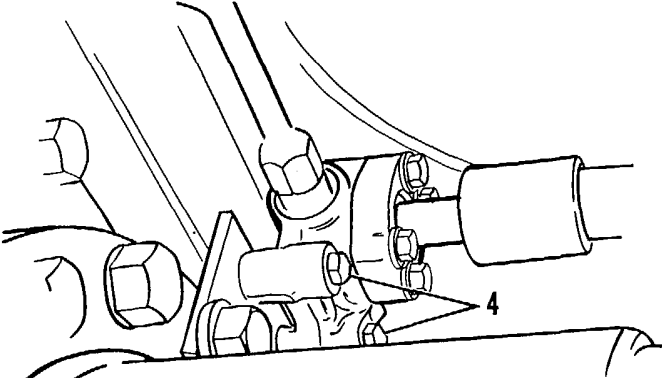
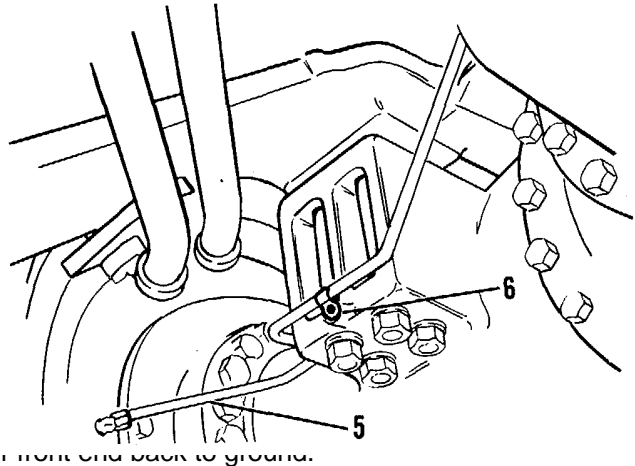
FRONT DIFFERENTIAL AND BEVEL GEAR INSTALLATION (CONT)

(Sheet 2 of 4)

LOCATION/ITEM	ACTION	REMARKS
<p>1.</p> <p>This</p>	<p>Differential and bevel gear (1)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">NOTE</div> <p>Put a piece of bar stock between bottom of carrier assembly and surface of floor jack.</p> <p>will keep carrier assembly off floor jack for easier installation on to axle housing.</p> <p>b.</p> <p>c.</p> <p>d.</p> <p>e.</p> <p>f.</p> <p>g.</p>	<p>a. Fasten to transmission floor jack (2)</p>   <p>In di Ri ur M al Pt In se hc Ri</p> <p>3</p> <p>TA099398</p>

TA099398
Go on to Sheet 3

FRONT DIFFERENTIAL AND BEVEL GEAR INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
2.	Hydraulic lines and manifold that attach to differential b.	a. Install. Se
3. Brake tube assembly (5)	a. Connect to wheel. b.	In to 
4. Brake system	Remove air (bleed).	VIEW FROM UNDER MACHINE See TM10-3930-641-20.
5. Mast	a. b. <div style="border: 1px solid black; padding: 2px; display: inline-block; margin: 5px 0;">WARNING</div> Keep away from vehicle when mast is used to raise and/or lower front end. c. d.	Po Ro  Lo is ur Lower front end back to ground.

LOCATION/ITEM	ACTION	REMARKS
6.	Oil Fill front axle housing to correct level with, the specified oil.	See LO 10-3930-641-12.
7.	Main drive shaft group	Install. See TM10-3930-641-20.
8.	Drive axles	Install. See Drive Axles Removal/Installation, page 4-250.

End

DRIVE AXLES REMOVAL/INSTALLATION

(Sheet 1 of 4)

Removal and installation of drive axles.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Vehicle moved until final drive drain plug is at the bottom. Oil drained from the final drive.
Install shipping link.

Special Tools

Axle installation tool, FT 1280
(See Appendix C)

Personnel Required

One mechanic

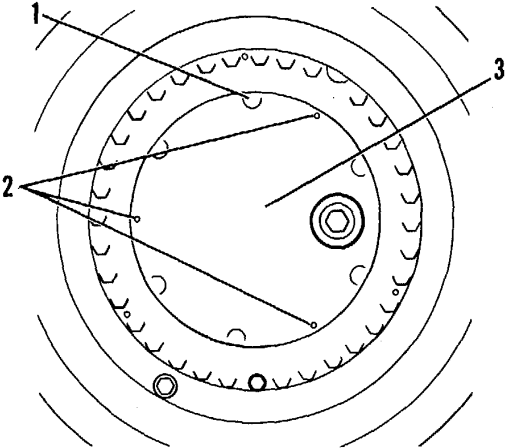
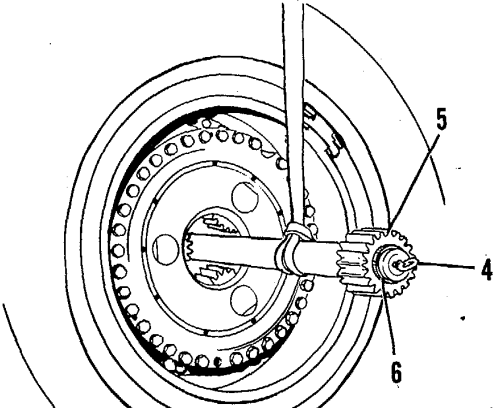
References

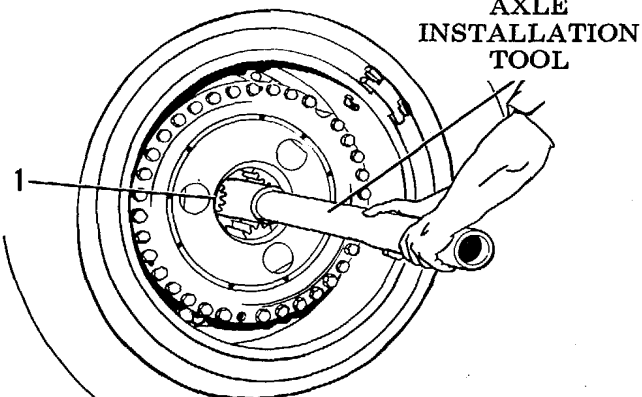
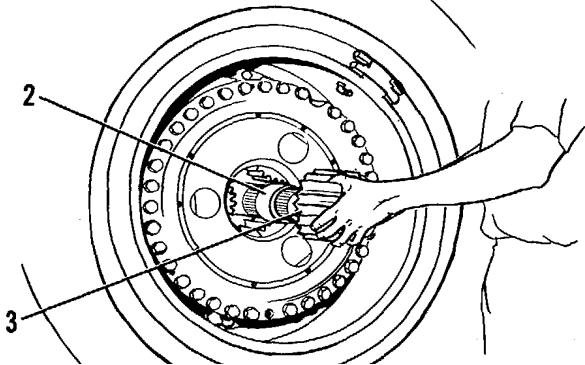
LO 10-3930-641-12.

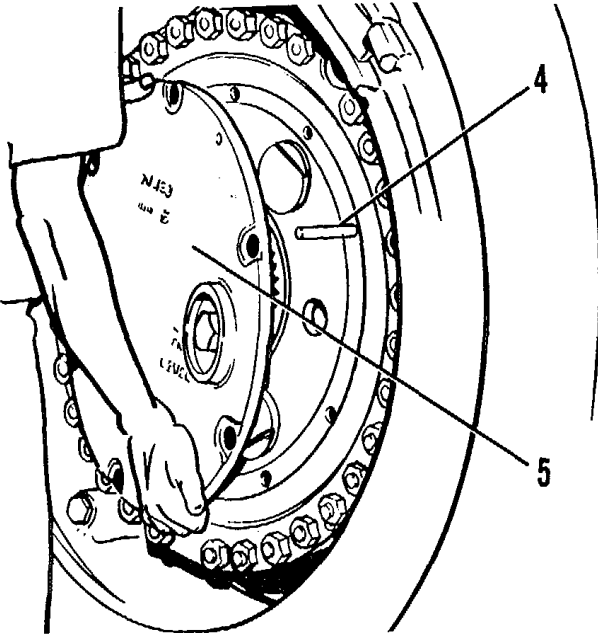
Shipping link removal/installation,
TM 10-3930-641-20.

General Safety Instructions

Tires blocked.

LOCATION/ITEM	ACTION	REMARKS	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>			
1. Capscrew (1)	Remove from cover. Install a 1/2-13NC 4.6 in. (10-14 cm) long guide pin in bolt hole.		
2. Remaining five capscrews (1)	Remove.		
3. Three capscrews (2)	Use as forcing bolts to loosen cover (3).		
4. Cover and seal	NOTE Weight of cover is 40 lb. (18 Kg).		
	Remove.		
5. 7/16 NC forged eyebolt (4)	a. Install in end of axle. b. Pull axle out of housing until a hoist can be attached.		
6. Axle (5)	Remove.		
	NOTE Weight of axle is 135 lb. (61.2 Kg).		
	Remove.		
	4-251	TA099400 Go on to Sheet 3	

LOCATION/ITEM	ACTION	REMARKS
<p>7. Retaining ring, gear (6) spacer</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">INSTALLATION</div>	<p>Remove from axle shaft.</p> <p>NOTE</p> <p>Clean axles before installation.</p>	
<p>1. Drive axle (1)</p>	<p>a. Place in position in final drive.</p> <p>b. Use axle installation tool to align spline at bevel gear.</p> <p>c. Push into place.</p>	
<p>2. Spacer (2), gear (3) and retaining ring</p>	<p>Install on axle.</p> <p>NOTE</p> <p>It may be necessary to move the vehicle to align the drive axle gear with the final drive gears.</p>	

LOCATION/ITEM	ACTION	REMARKS
3. Two 1/2-3 NC guide pins (4)	Install in carrier.	
4. New seal	Install on cover.	
5. Cover (5)	Install. Install capscrews.	
6. Final drive	Add oil.	<p>See LO 10-3930-641-12.</p>

FINAL DRIVE PLANET CARRIERS REMOVAL/INSTALLATION

This task covers: Removal and installation of final drive planet carriers.

INITIAL SETUP

Test Equipment
None

Materials/Parts
As required

Troubleshooting Reference
Pages 2-43, 2-44

Equipment Condition

Drive axles removed.
Shipping link installed.

Special Tools

None

Personnel Required

Two mechanics

References

LO 10-3930-641-20.

Drive axles removal/installation, page 4-250.

Shipping link removal/installation,
TM 10-3930-641-20.

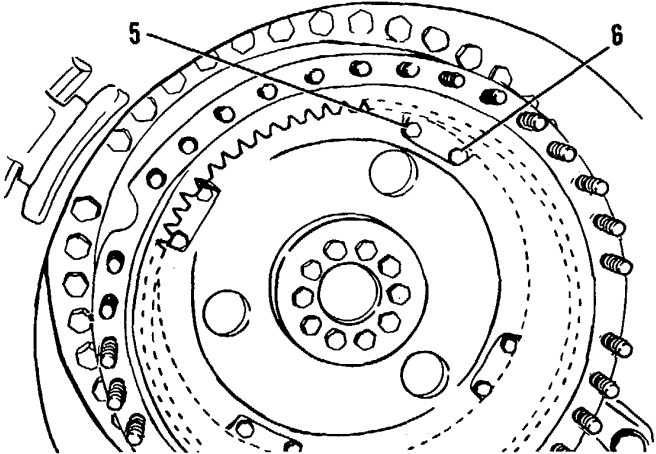
General Safety Instructions

Tires blocked.

Go on to Sheet 2

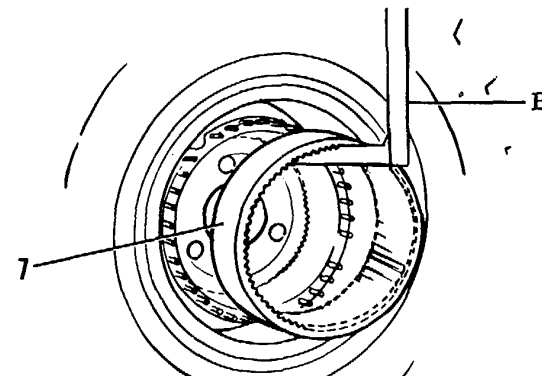
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">REMOVAL</div>		
1. Bracket (A)	Attach to carrier (4).	
2. Thirty-four nuts (1) and washers	Remove.	
3. Hoist	Attach to bracket (A) on carrier (4).	
4. Drain plug (2)	Remove.	
5. Three 1/2-13 NC forcing screws (3)	Install in carrier. Tighten evenly, one turn at a time, until carrier is loose. After carrier is loose, remove forcing screws.	
6. Axle	Install gear end of axle in carrier. The axle will help hold the carrier in position.	
7. Carrier (4)	Remove.	
	NOTE	
	Weight of carrier is 295 lb. (133.8 Kg).	

FINAL DRIVE PLANET CARRIERS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
8. Retainers	Bend away from capscrew heads.	
9. Capscrews (5)	Remove.	
10. Retainers (6)	Remove.	
11. Lifting bracket (B)	Place in position with hoist.	
12. Ring gear (7)	Remove using lifting bracket.	

NOTE

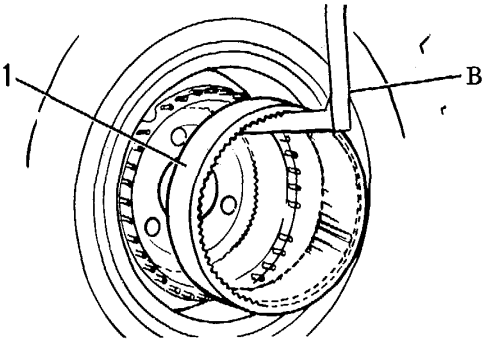
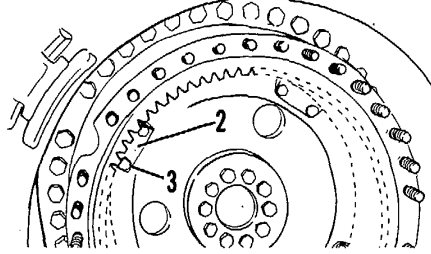
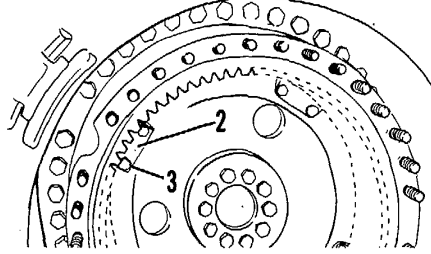
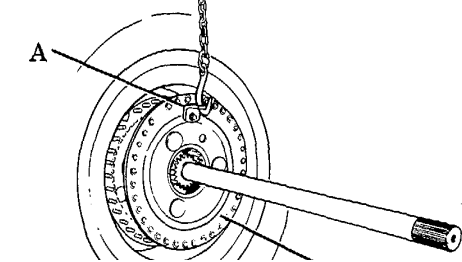
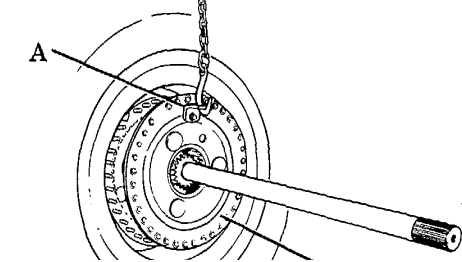
Weight of ring gear is 110 lb. (50 Kg).



TA099404

Go on to Sheet 4

FINAL DRIVE PLANET CARRIERS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
1. Lifting bracket (B) and hoist	Use to place ring gear (1) in position in wheel.	
2. Retainers (2)	Install.	
3. Capscrews (3)	Install. Bend locks over to prevent capscrew heads from turning.	
4. Bracket (A)	Attach to carrier (4).	
5. Drive axle	Insert gear end into carrier and use to position carrier when lifting it into position in the ring gear.	

TA099405

Go on to Sheet 5

FINAL DRIVE PLANET CARRIERS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
6. Drive axle	Attach hoist and remove after carrier is installed.	
7. Thirty-four nuts and washers	Install. NOTE Tighten nuts to a torque of 335 to 445 lb. ft. (454-607.3 N-m).	
8. Drain plug	Install.	
9. Drive axles	Install.	See page 4-250.
10. Final drive	Add oil.	See LO10-3930-641-12.

End

This task covers: Disassembly and assembly of final drive planet carriers.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required.

Troubleshooting Reference

Page 2-43.

Equipment Condition

Final drive planet carriers removed.

Special Tools

None

Personnel Required

One mechanic

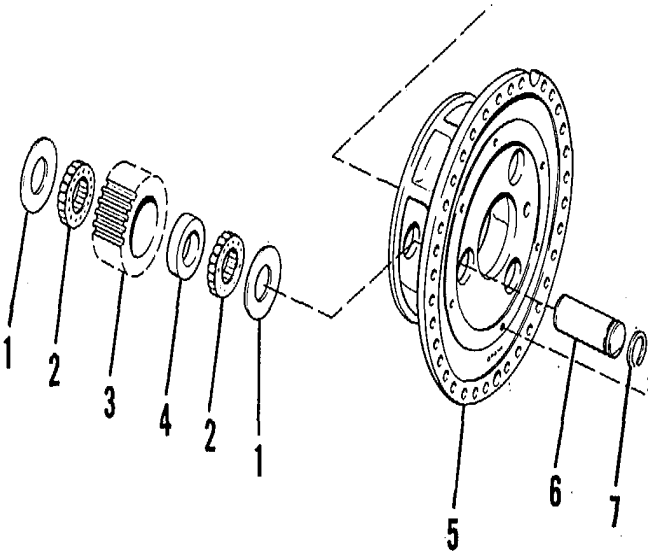
References

Final drive planet carriers removal/ installation, page 4-254.

General Safety Instructions

None.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">DISASSEMBLY</div>		
<p>1. Three planet shafts (6)</p>	<p>Remove from carrier (5).</p>	
	<p>NOTE Shafts can be removed from bottom of carrier by removing retaining rings (7).</p>	
<p>(1) 2. Three gears (3) and six washers</p>	<p>a. Remove from carrier (5). b. Discard washers if damaged.</p>	
<p>(4) 3. Two bearings (2) and one spacer</p>	<p>Remove from each gear (3).</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">ASSEMBLY</div>		
<p>1. Two bearings (2) and spacer (4)</p>	<p>Install in each gear.</p>	
	<p>NOTE Spacer goes between bearings.</p>	
		<div style="text-align: center;">  </div> <div style="margin-top: 20px;"> <p>1. Washer 2. Roller Bearing Assembly 3. Planet Gear 4. Spacer 5. Planet Carrier 6. Planet Shaft 7. Retaining Ring</p> </div>

FINAL DRIVE PLANET CARRIERS REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p>2. Three gears (3) and six washer (1)</p>	<p>a. Install a washer on both sides of each gear. b. Install gears (and washers) in carrier (5).</p>	
<p>3. Shafts (6) and retaining rings (7)</p>	<p>Install in carrier (5).</p>	
<p>4. Shafts (6)</p>	<p>Turn until flat side of shafts are toward outside of carrier.</p>	

Section VII. REAR AXLE

REAR AXLE MAINTENANCE INSTRUCTIONS

This section covers maintenance of these rear axle components for direct support and general support maintenance personnel:

- a. Rear differential, bevel gear, and front support
- b. Differential and bevel gear
- c. Rear support

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Rear differential, bevel gear, and front support removal.	4-263	2-43, 2-44
2	Rear differential, bevel gear, and front support installation.	4-267	None
3	Differential and bevel gear disassembly.	4-271	2-43, 2-44
4	Differential and bevel gear assembly.	4-278	None
5	Differential and bevel gear adjustment.	4-289	2-43
6	Front and rear support disassembly/assembly.	4-296	None

REAR DIFFERENTIAL, BEVEL GEAR AND FRONT SUPPORT REMOVAL

This task covers: Removal of rear differential, bevel gear and front support.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Container to catch oil.

Troubleshooting Reference

Pages 2-43, 2-44

Equipment Condition

Engine OFF.
Shipping link installed.

Special Tools

None

Personnel Required

Two mechanics

References

Crankcase guard removal,
TM 10-3930-641-20

Drive axles removal/installation, page 4-250.

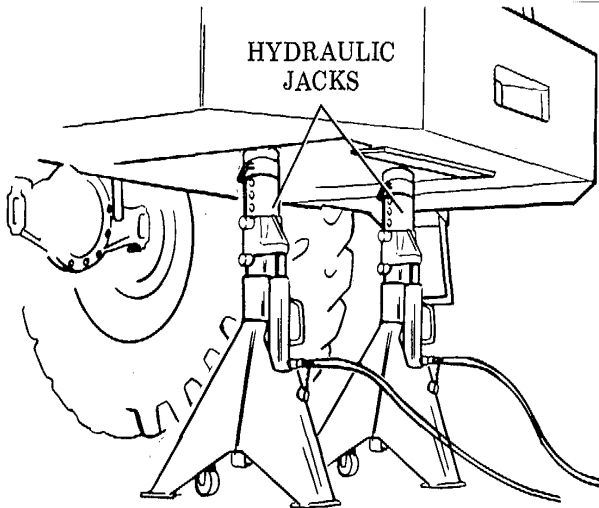
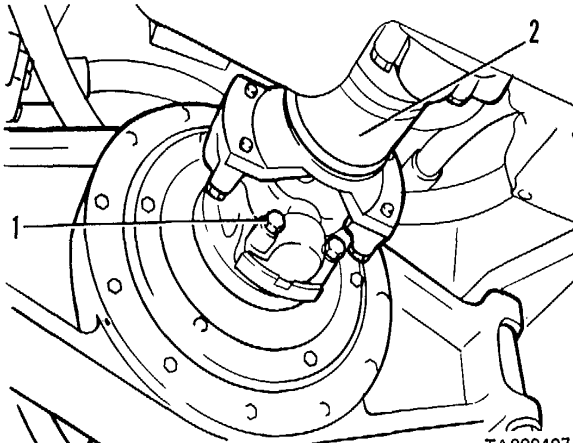
Drive shaft removal, TM 10-3930-641-20.

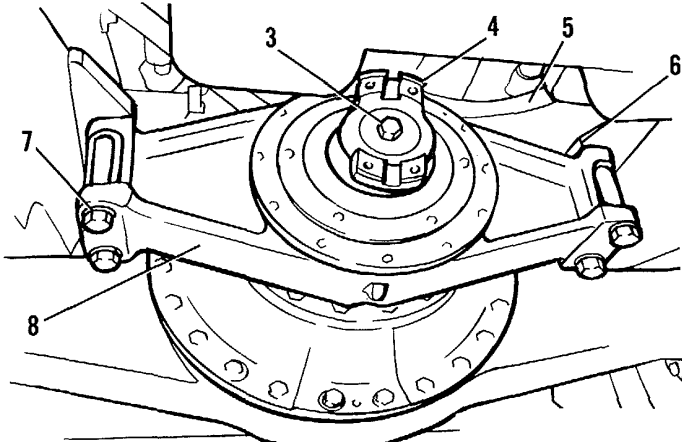
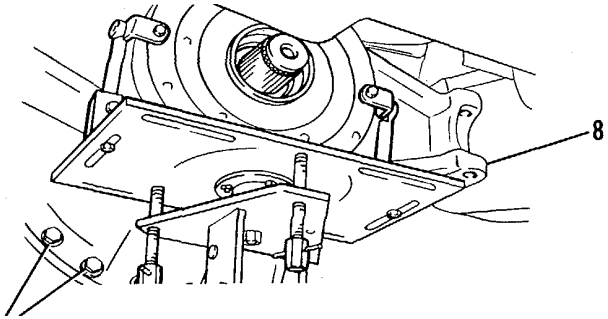
Shipping link removal/installation,
TM 10-3930-641-20.

General Safety Instructions

Jack stands must be used and tires
blocked.

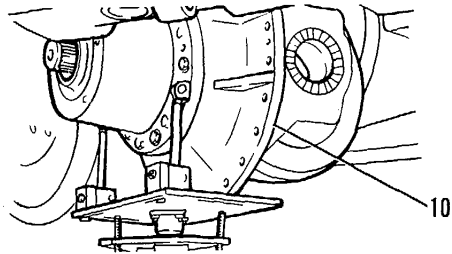
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Hydraulic jacks	a. Position under vehicle as shown. b. Lift vehicle until full weight is just supported by jacks. (But not so much that wheels are off ground).	
2. Crankcase guards	Remove. (See TM 10-3930-641-20.)	
3. Drive axles	Remove. (See page 4-250.) -	
4. Oil	Drain from rear axle housing.	
5. Capscrews (1)	Remove.	
6. Drive shaft (2)	Remove. (See TM 10-3930-641-20.)	
	<p style="text-align: center;">NOTE</p> Drive shaft weighs 55 lb. (25 Kg).	

LOCATION/ITEM	ACTION	REMARKS	
7. Tube assembly (5)	Disconnect from grease fitting on top of support.		
8. Capscrew (3), retainer and yoke assembly (4)	Remove.		
9. Four capscrews (6)	Remove from hydraulic hose junction blocks on each side of frame. Eight capscrews each.		
10. Four capscrews (7) and nuts	Remove.		
	NOTE		
	Support assembly weighs 225 lb. (102 Kg).		
11. Support assembly (8)	a. Attach floor jack. b. Remove.		
12. Preformed packing	Remove and discard.		
13. Bearing	Remove.		

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Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<p>14. Twenty-four capscrews that secure differential (9)</p>	<p>Remove.</p>	
<p>15. Rear differential and bevel gear (10) shown.</p>	<p>a. Attach transmission floor jack as</p> <p>b. Install two 3/4-10 NC forcing screws in differential.</p> <p>c. Tighten forcing screws evenly until differential comes loose from axle housing.</p> <p>d. Pull differential as far as possible from axle housing and turn it clockwise.</p> <p>e. Raise the vehicle until the wheels are about 9 in. (228.6 mm) off the ground.</p> <p style="text-align: center;">NOTE</p> <p>Differential and bevel gear weigh 915 lb. (415 Kg).</p> <p>f. Remove differential and bevel gear from under vehicle.</p>	

TA099409

End

REAR DIFFERENTIAL, BEVEL GEAR AND FRONT SUPPORT INSTALLATION

(Sheet 1 of 4)

This task covers: Installation of rear differential, bevel gear and front support installation.

INITIAL SETUP

Test Equipment

None

Materials/Parts

SAE 90 oil.

Troubleshooting Reference

None

Equipment Condition

Support on jacks, 9 in. (228.6 mm) clearance between tire and ground. Shipping link installed.

Special Tools

None

Personnel Required

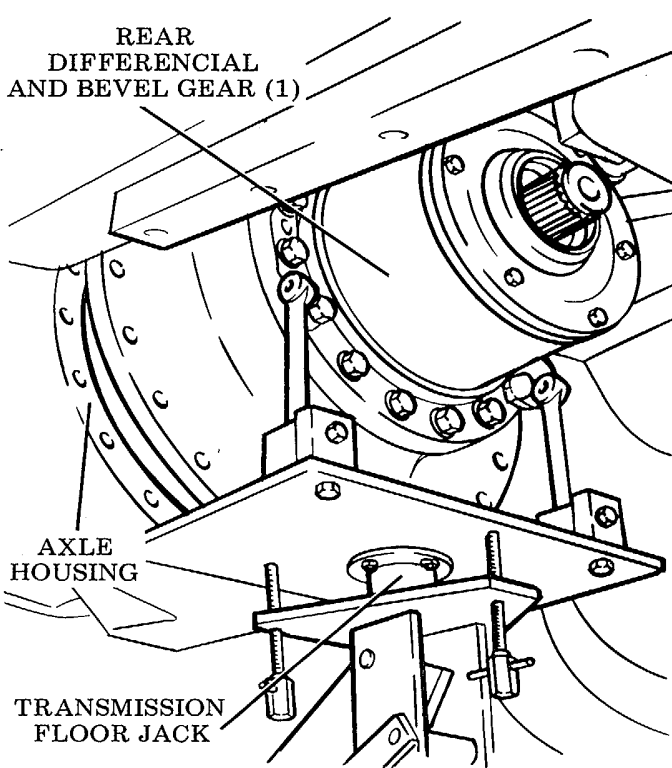
Two mechanics

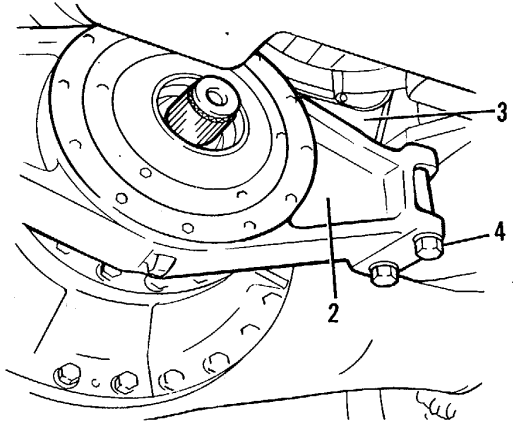
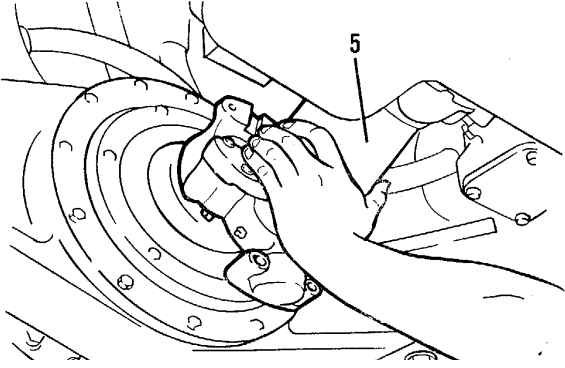
References

LO 10-3930-641-12.
 Drive axles removal/installation, page 4-250.
 Crankcase guard removal/installation, TM 10-3930-641-20.
 Shipping link removal/installation, TM 10-3930-641-20.

General Safety Instructions

Jack stands must be used and front tires blocked.

LOCATION/ITEM	ACTION	REMARKS
<p>1. Rear differential and bevel gear (1) shown.</p>	<p>a. Attach transmission floor jack as shown.</p>	
<p>b. Position differential in axle housing.</p>	<p>Install.</p>	
<p>2. Twenty-four capscrews that secure differential to axle housing</p>	<p>Install.</p>	
<p>3. Hydraulic jacks</p>	<p>Lower the two hydraulic jacks that support rear of vehicle just until wheels contact ground.</p>	
<p>4. Preformed packings, bearing</p>	<p>Install in front support (2). Put a light coat of grease on packings and bearings.</p>	

LOCATION/ITEM	ACTION	REMARKS
<p>5. Front support (2)</p>	<p>a. Attach to floor jack.</p> <p>b. Place in position on differential as shown.</p> <p>c. Install four capscrews (4) and nuts that secure it.</p> <p style="text-align: center;">NOTE</p> <p>Tighten capscrews to a torque of 750-900 lb. ft. (1007 to 2118 N-m).</p>	
<p>6. Two junction blocks (3)</p>	<p>Connect to main frame on machine.</p>	
<p>7. Tube assembly</p>	<p>Connect to grease fitting on support.</p>	
<p>8. Drive shaft (5) and capscrews</p>	<p>Install shaft (5) and capscrews that hold it.</p>	

TA099411

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
8. Drive shaft and capscrews (cont)	<p style="text-align: center;">NOTE</p> <p>Tighten capscrews to a torque of 90-110 lb. ft. (123 to 148 N-m).</p>	
9. Oil	Fill differential to correct level with SAE 90.	See LO 10-3930-741-12.
10. Drive axles	Install.	See Drive Axles Removal/Installation, page 4-250.
11. Crankcase guards	Install.	See Crankcase Guard Installation, TM 10-3930-641-20.

DIFFERENTIAL AND BEVEL GEAR DISASSEMBLY

(Sheet 1 of 7)

This task covers: Disassembly of front or rear differential and bevel gear.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Repair stand as required.

Troubleshooting Reference

Pages 2-43, 2-44.

Equipment Condition

Differential and bevel gear removed from vehicle.

Special Tools

None

Personnel Required

One mechanic

References

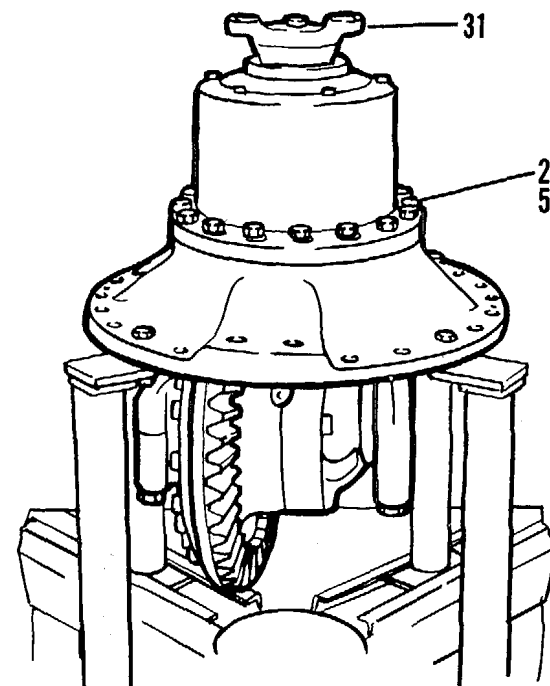
Differential and bevel gear removal; front, pages 4-242, rear, page 4-263.

General Safety Instructions

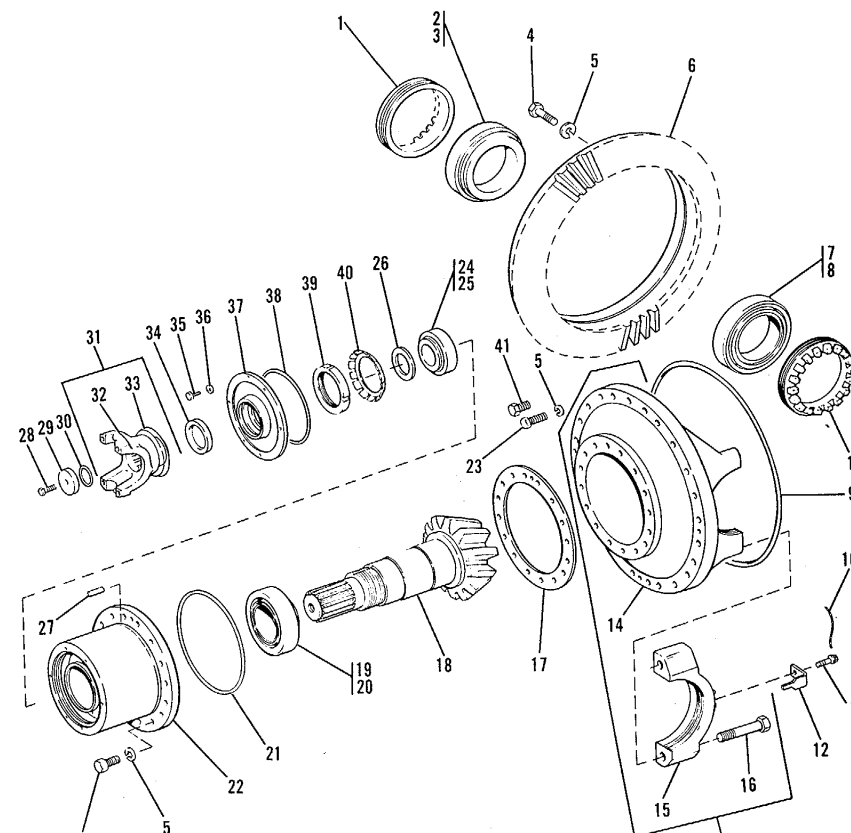
Differential must be set on suitable surface.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Differential and bevel gear	Position on repair stand as shown.	
2. Capscrews (23), washers (5)	Remove.	
3. Yoke assembly (31)	a. Fasten to hoist.	
	NOTE	
	Unit weighs 280 lb. (127 Kg).	
	b. Remove with housing (22) attached.	
	c. Set on suitable work surface.	
4. Shims (17) under housing	Remove.	
5. Capscrew (28), retainer (29), preformed packings (30), yoke assembly (31)	Remove from pinion shaft.	
6. Capscrews (35), lockwashers (36)	Remove.	
7. Retainer (37), O-ring	Remove.	
	NOTE	
	Discard O-ring if damaged.	



- | | |
|-----------------------------------|-----------------------|
| 1. Ring | 29. Retainer |
| 2. Tapered Roller Bearing Cone | 30. Preformed Packing |
| 3. Tapered Roller Bearing Cup | 31. Yoke Assembly |
| 4. Capscrew | 32. Yoke |
| 5. Washer | 33. Guard |
| 6. Differential Ring Gear | 34. Lip Type Seal |
| 7. Tapered Roller Bearing Cup | 35. Capscrew |
| 8. Tapered Roller Bearing Cone | 36. Lockwasher |
| 9. Preformed Packing | 37. Retainer |
| 10. Lock Wire | 38. Packing Preformed |
| 11. Capscrew | 39. Bearing Lock Nut |
| 12. Bearing Lock | 40. Bearing Nut Lock |
| 13. Differential Carrier Assembly | 41. Capscrew |
| 14. Carrier | |
| 15. Bearing Cap | |
| 16. Capscrew | |
| 17. Shim Pack | |
| 18. Bevel Pinion Shaft | |
| 19. Tapered Roller Bearing Cone | |
| 20. Tapered Roller Bearing Cup | |
| 21. Preformed Packing | |
| 22. Bearing Support Housing | |
| 23. Capscrew | |
| 24. Cone | |
| 25. Tapered Roller Bearing Cup | |
| 26. Washer | |
| 27. Pin | |
| 28. Capscrew | |

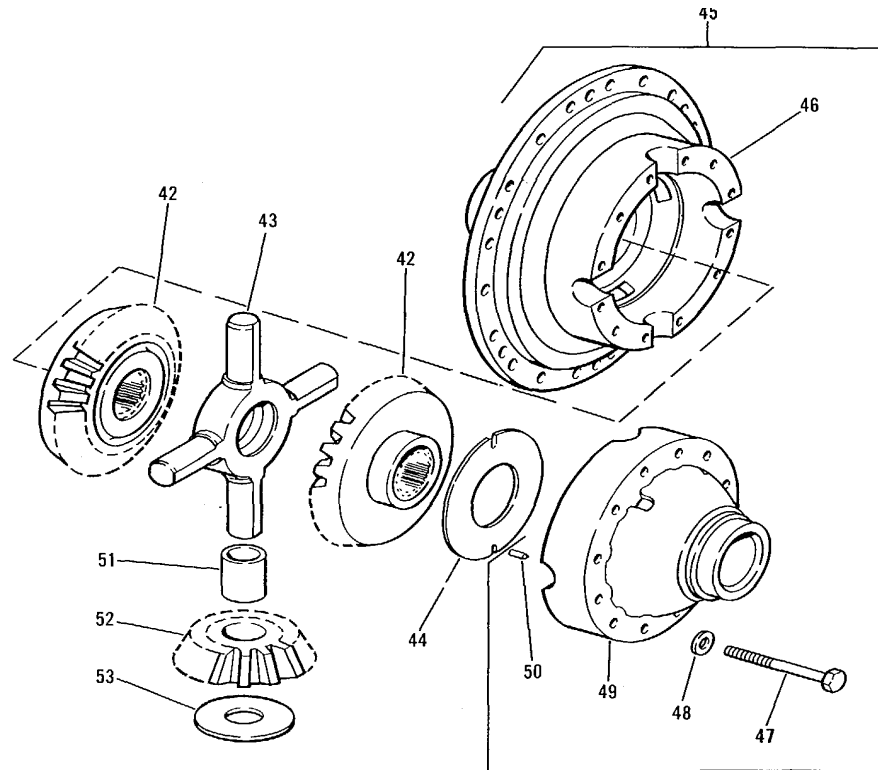


TA099413

Go on to Sheet 4

Differential Gear Group

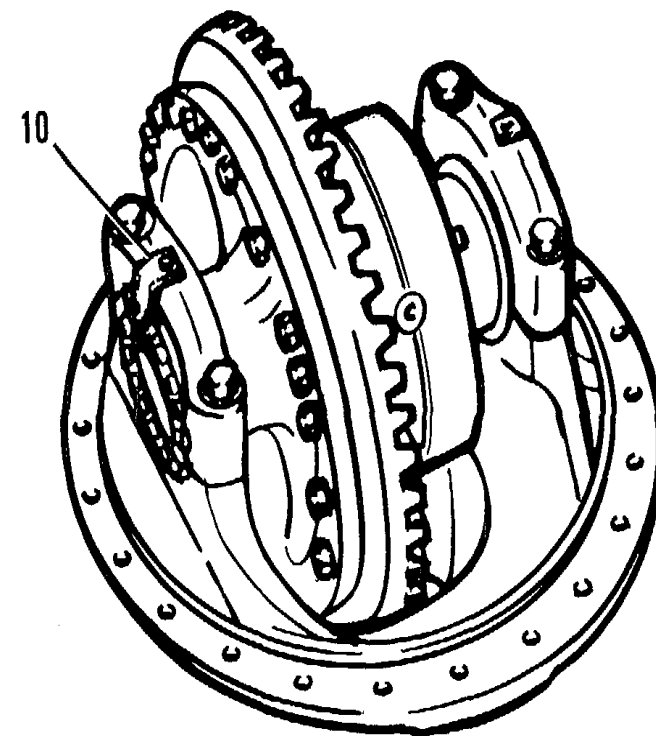
- 42. Differential Bevel Gear
- 43. Spider
- 44. Washer
- 45. Differential Case Assembly
- 46. Case Flange Half
- 47. Capscrew
- 48. Washer
- 49. Case Plain Half
- 50. Pin
- 51. Sleeve Bearing
- 52. Differential Bevel Pinion
- 53. Washer



TA099414

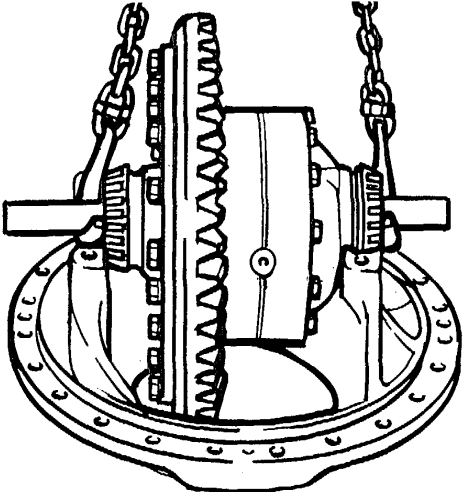
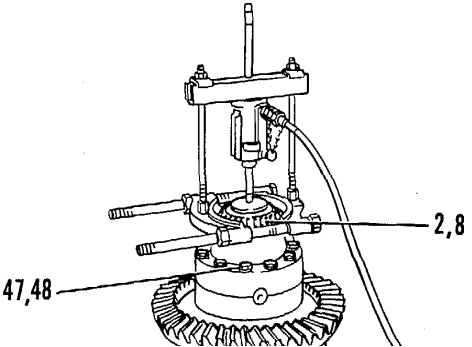
Go on to Sheet 5

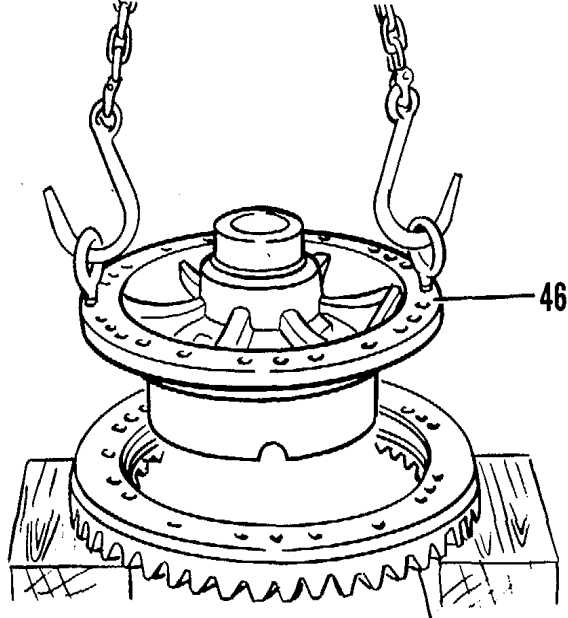
LOCATION/ITEM	ACTION	REMARKS
8. Lip type seal (34)	Remove from retainer.	
9. Nut (39), lock (40), and washer (26)	Remove.	
10. Housing (22)	Place on wood blocks.	
11. Pinion shaft (18)	Using suitable press, remove from housing.	
12. Bearing cone (24) and two bearing cups (25)	Remove from housing.	
13. Bearing cone (19), bearing cup (20)	Remove from pinion shaft.	
14. Differential and bevel gear	Position on repair stand as shown.	
15. Lock wire (10)	Remove.	
16. Bearing caps (15)	a. Mark with scribe or grease pencil to insure correct installation later.	
	NOTE	
	Bearing caps must be installed in exact same location.	
	b. Remove.	



TA099415

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
17. Differential	<p>a. Install pipe through differential as shown. b. Attach hoist to pipe.</p> <p style="text-align: center;">NOTE</p> <p>Differential weighs 370 lb. (167.8 Kg). c. Remove differential from carrier assembly.</p>	
18. Bearing cones (2) and (8)	Remove from each side of differential.	
19. Capscrews (47) and washers (48)	Remove.	
20. Case plain half (49) and case flange half (46) pencil.	<p>a. To insure correct alignment later, mark line across joint with scribe or grease pencil.</p> <p>b. Remove case plain half (49).</p>	

LOCATION/ITEM	ACTION	REMARKS	
21. Washer (44), gear (42)	Remove.		
22. Spider (43) and bevel pinions (52)	Remove from case assembly.		
23. Gear bevel (42) and washer (44)	Remove from case assembly.		
24. Washers (53), pinions (52), and bearings (51)	Remove from spider (43).		
25. Capscrews (4), washers (5)	Remove		
26. Case flange half (46)	a. Attach hoist.		
	NOTE		
	Case assembly weighs 130 lb. (59 Kg).		
	4-277		

TA099417

End

This task covers: Assembly of differential and bevel gear.

NOTE

Adjustments must be made at the same time you perform this procedure. See Differential and Bevel Gear Adjustment, page 4-289.

INITIAL SETUP

Test Equipment

Materials/Parts

Troubleshooting Reference

Dial indicator

None

None

Equipment Condition

Differential and bevel gear disassembled.

Special Tools

Personnel Required

None

One mechanic

References

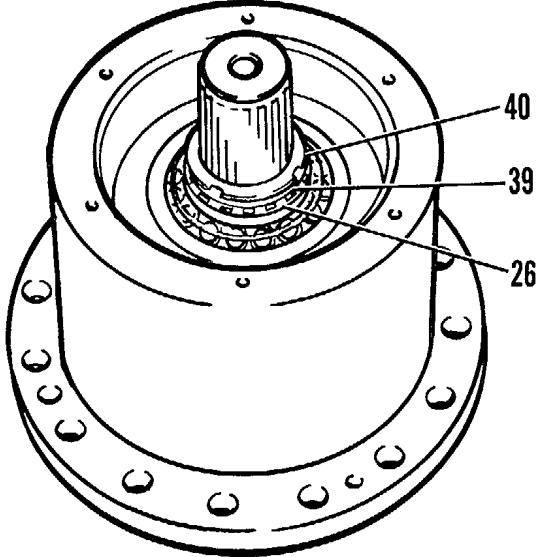
Differential and bevel gear disassembly, page 4-276.

Adjustment of differential and bevel gear, page 4-289.

General Safety Instructions

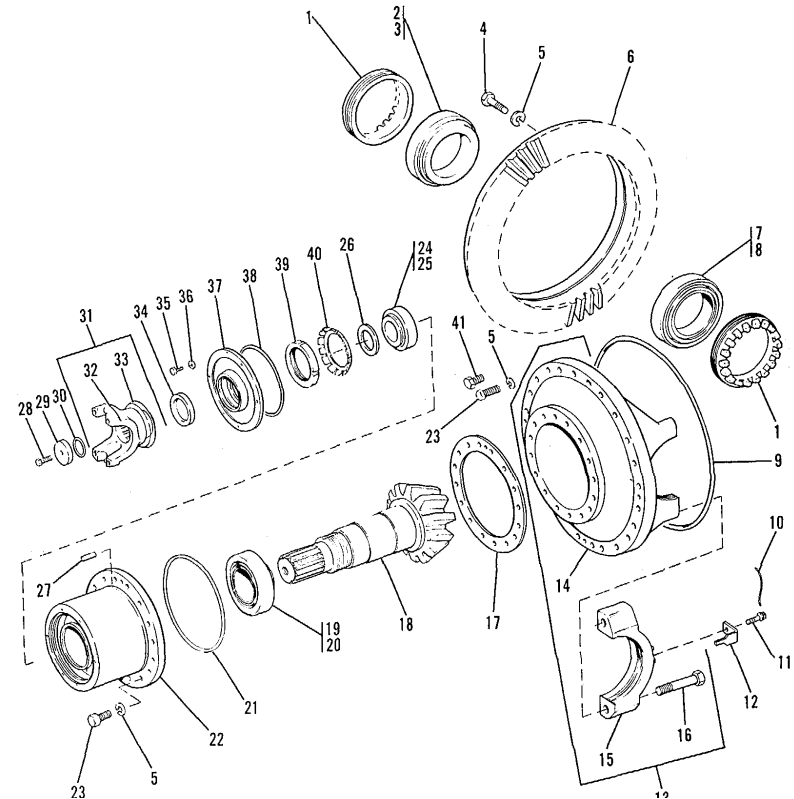
Work must be done on suitable surface.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS	
1. Two bearing cups (20) and (25)	Install in housing (22).		
2. Inner bearing cone (19)	Heat cone to maximum of 2750F (1350C) and install on pinion shaft (18). <div style="border: 1px solid black; padding: 2px; display: inline-block; margin: 5px 0;">CAUTION</div> Be sure cone is against shoulder of shaft.		
3. Housing (22)	Install over pinion shaft (18).		
4. Outer bearing cone (24) install on pinion shaft.	Heat to maximum of 2750F (1350C) and		
5. Washer (26), lock (40), and nut (39)	Install as shown.		
6. Pinion shaft (18)	Adjust end play.		See Differential and bevel gear adjustment, page 4-289.
	4-279		TA099418 Go on to Sheet 3

Differential Gear Group

- | | |
|-----------------------------------|-----------------------|
| 1. Ring | 29. Retainer |
| 2. Tapered Roller Bearing Cone | 30. Preformed Packing |
| 3. Tapered Roller Bearing Cup | 31. Yoke Assembly |
| 4. Capscrew | 32. Yoke |
| 5. Washer | 33. Guard |
| 6. Differential Ring Gear | 34. Lip Type Seal |
| 7. Tapered Roller Bearing Cup | 35. Capscrew |
| 8. Tapered Roller Bearing Cone | 36. Lockwasher |
| 9. Preformed Packing | 37. Retainer |
| 10. Lock Wire | 38. Packing Preformed |
| 11. Capscrew | 39. Bearing Lock Nut |
| 12. Bearing Lock | 40. Bearing Nut Lock |
| 13. Differential Carrier Assembly | 41. Capscrew |
| 14. Carrier | |
| 15. Bearing Cap | |
| 16. Capscrew | |
| 17. Shim Pack | |
| 18. Bevel Pinion Shaft | |
| 19. Tapered Roller Bearing Cone | |
| 20. Tapered Roller Bearing Cup | |
| 21. Preformed Packing | |
| 22. Bearing Support Housing | |
| 23. Capscrew | |
| 24. Cone | |
| 25. Tapered Roller Bearing Cup | |
| 26. Washer | |
| 27. Pin | |
| 28. Capscrew | |



TA099419

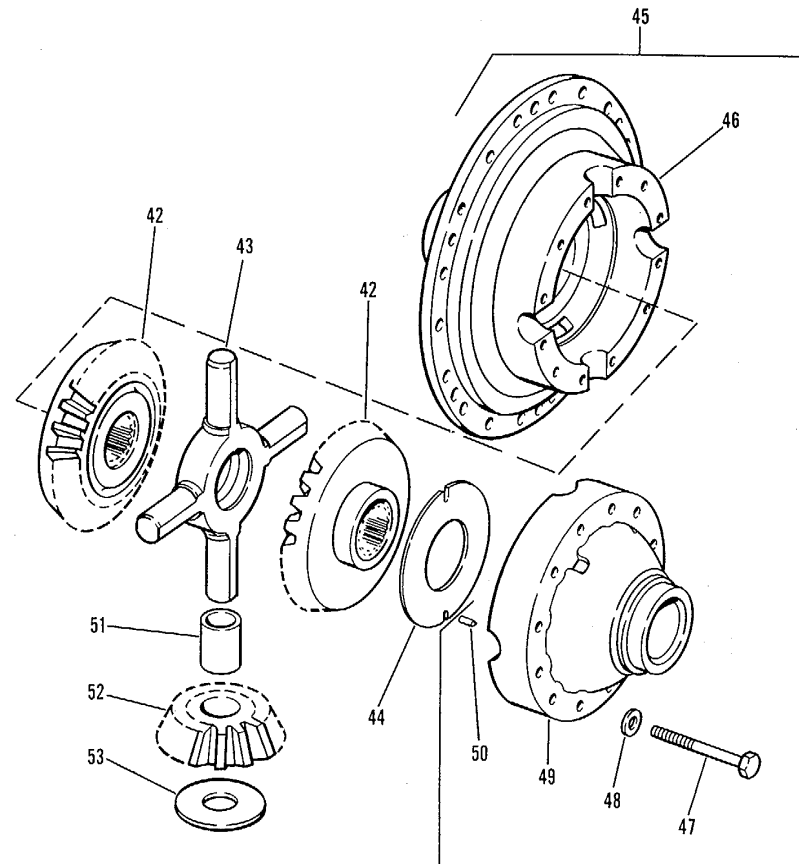
Go on to Sheet 4

DIFFERENTIAL AND BEVEL GEAR ASSEMBLY (CONT)

(Sheet 4 of 11)

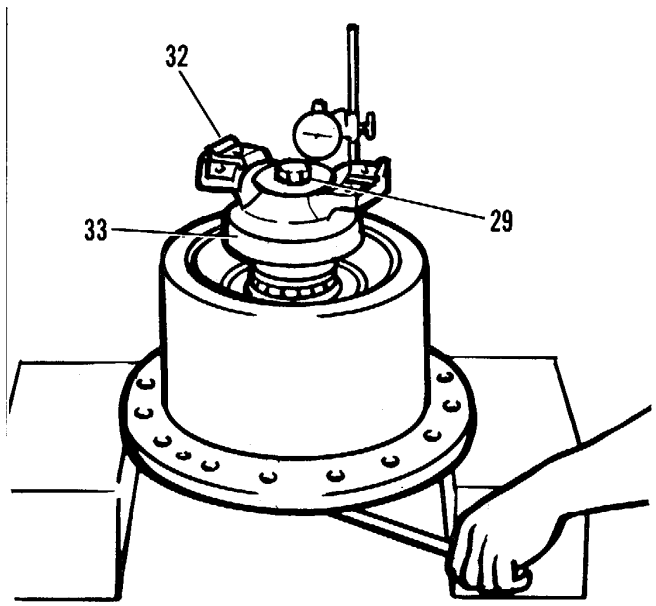
Differential Gear Group

- 42. Differential Bevel Gear
- 43. Spider
- 44. Washer
- 45. Differential Case Assembly
- 46. Case Flange Half
- 47. Capscrew
- 48. Washer
- 49. Case Plain Half
- 50. Pin
- 51. Sleeve Bearing
- 52. Differential Bevel Pinion
- 53. Washer



TA099420

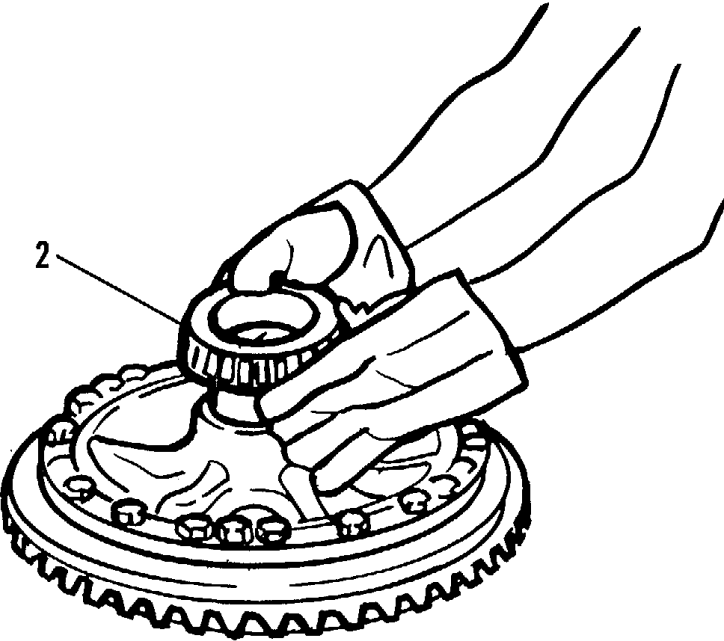
Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
7. Guard (33), yoke (32), retainer (29), preformed packing (30), capscrew (28)	Install and adjust (page 4-289).	
8. Lock (40)	When end play is set, bend tab on lock (40) into notch in nut (39).	
9. Guard (33), yoke (32), packing (30), retainer (29), capscrew (28)	Remove.	
10. Lip type seal	Install in retainer using suitable seal driver.	
<p>NOTE</p> <p>Install seal with lip toward inside of retainer. Seal should just contact surface of counterbore in retainer.</p>		
<p>4-282</p>		

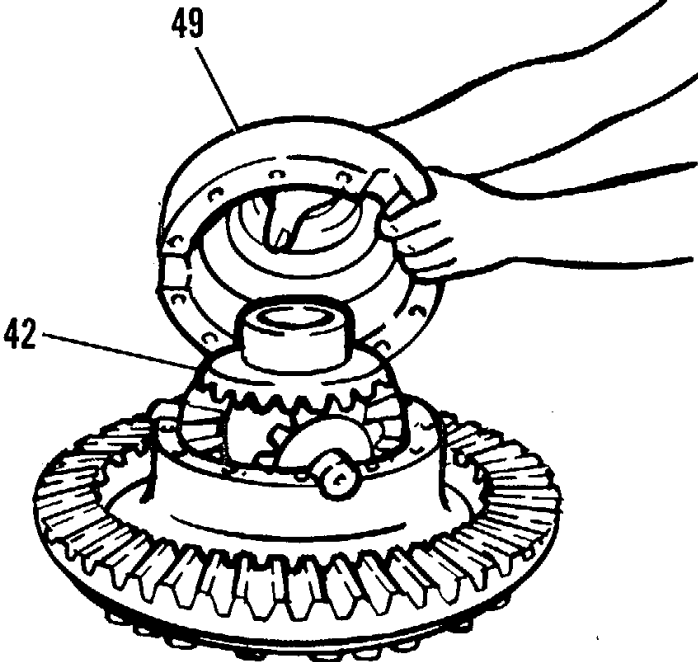
TA099421

Go on to Sheet 6

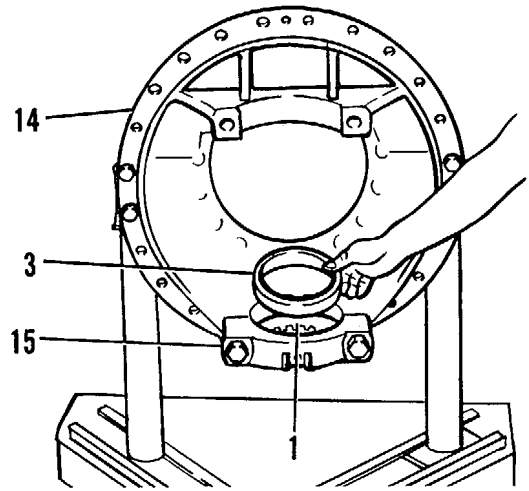
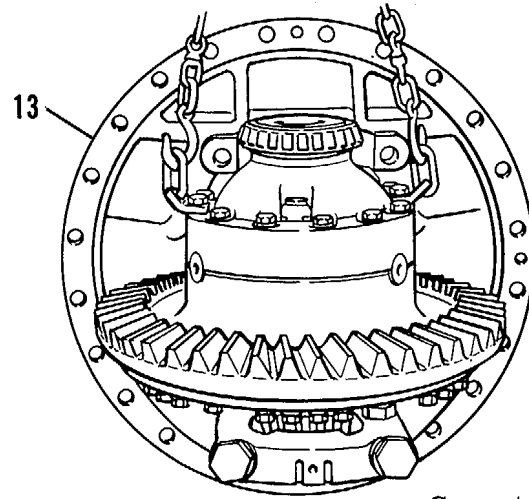
LOCATION/ITEM	ACTION	REMARKS
11. Preformed packing between housing (22) and retainer (37)	Install.	
12. Retainer (37)	Install on housing and secure with capscrews (35).	
13. Guard (33), yoke (32), packing (30) retainer (29), capscrew (28)	a. Install. b. Tighten capscrew (28) to a torque of 265 + 35 lb. ft. (359.3 + 47.5 N-m).	
14. Case flange half (46)	a. Fasten to hoist. b. Put in position on ring gear (6).	
15. Washers (5), capscrews (4)	a. Coat threads of capscrews and face of washers with clean oil. b. Install to secure case to ring gear. c. Tighten capscrews to a torque of 350 + 35 lb. ft. (474.5 + 47.5 N-m).	

LOCATION/ITEM	ACTION	REMARKS
16. Bearing cone (2)	a. Heat to maximum of 2750F (1350C). b. Install on case assembly as shown.	
17. Case (45) and gear (6) assembly	Turn assembly over.	
18. Washer (44)	Install in case (46). <p style="text-align: center;">NOTE</p> Washer oil groove should face upward. Holes in washer must align with pins in case assembly.	
19. Gear	Install on washer (44).	
20. Four bearings (51), pinions (52) and washers (53)	Install on spider (43).	

Go on to Sheet 8

LOCATION/ITEM	ACTION	REMARKS
21. Washer (44)	a. Put GAA general purpose grease on side of washer without oil groove. b. Position washer in case plain half (49) with oil groove side facing up.	
22. Gear (42)	Install on spider assembly.	
23. Case plain half (49)	Install on case assembly as shown. NOTE Be sure mark on housing aligns with mark on case.	
24. Capscrews (47)	Install to secure housing to case assembly. Tighten each to a torque of 175 to 225 lb. ft. (238 to 304 N-m).	
25. Bearing cone (8)	a. Heat to maximum of 2750F (1350C). b. Install on case plain half (49).	

Go on to Sheet 9

LOCATION/ITEM	ACTION	REMARKS
26. Carrier assembly (14)	Position on repair stand as shown.	
27. Bearing cap (15), adjusting ring (1) and bearing cup (3)	Install. <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">CAUTION</div> Be sure cap is in correct position.	
28. Adjusting ring (1)	Turn ring clockwise five turns. That will provide for initial bearing preload adjustment. (See Differential and Bevel Gear Adjustment, page 4-289.)	
29. Differential assembly	a. Attach hoist. b. Position in carrier assembly (13) as shown. NOTE Be sure tapered roller bearing on differential is properly seated in bearing cup attached to carrier.	<p style="text-align: right;">TA099424 Go on to Sheet 10</p>

LOCATION/ITEM	ACTION	REMARKS
30. Bearing cup (7) bearing cap (15), adjusting ring (1)	Install on upper bearing cone of differential.	
31. Two 3/4-10 NC guide pins	Install in housing (22) side of carrier assembly.	
32. Shims (17)	Install. <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: center;">CAUTION</div> Use the exact thickness of shims specified on the bevel pinion shaft. If incorrect shims are used, differential cannot be adjusted properly.	
33. Preformed packing (21)	Install in housing (22).	
34. Housing (22) assembly	a. Attach hoist. b. Using the two guide pins for alignment, install on carrier assembly.	

Go on to Sheet 11

LOCATION/ITEM	ACTION	REMARKS
35. Capscrews (23) and washers (5)	Install to secure housing (22) to carrier assembly (13).	
36. Differential and bevel gear	Perform adjustments.	See Adjustment of Differential and Bevel Gear, page 4-289.
37. Lock wire (10)	<ul style="list-style-type: none"> a. Install through bolts that hold bearing caps in position. b. Install through lock that holds adjusting rings in position. 	

DIFFERENTIAL AND BEVEL GEAR ADJUSTMENT(Sheet 1 of 7)

This task covers: Adjustment of differential and bevel gears.

INITIAL SETUP

Test Equipment

Feeler gage

Dial indicator

Materials/Parts

Shims

Troubleshooting Reference

Page 2-43

Equipment Condition

Differential and bevel gears assembled and installed on vehicle or on stand.

Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

References

Differential and bevel gears assembly, see page 4-278.

Shipping link removal/installation, TM 10-3930-641-20.

General Safety Instructions

Tires blocked.

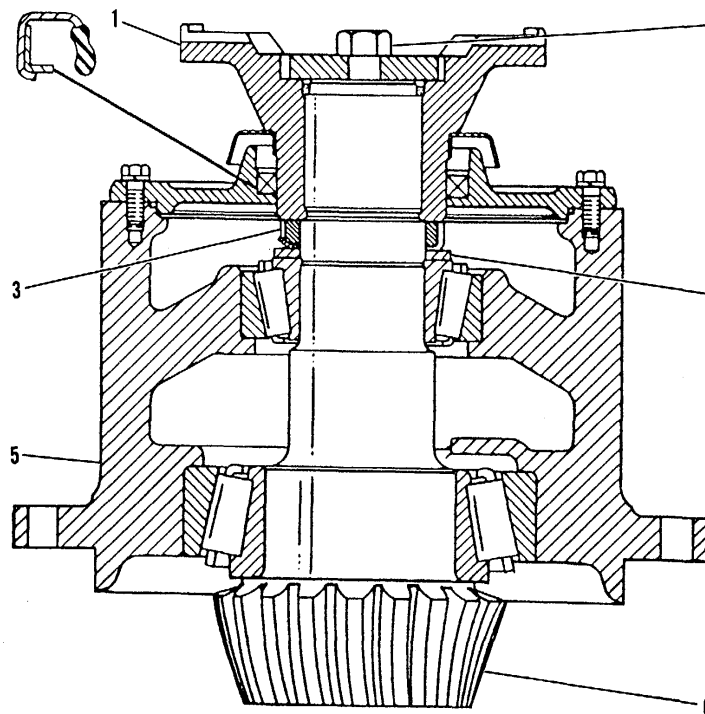
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
1. Pinion (6)	a. Install in housing (5) complete with bearings. b. Install washer (4), lock and locknut (3). c. Tighten locknut until play of pinion is approximately .012 in. (0.30 mm).	
2. Yoke assembly (1)	Install against locknut (3).	
3. Retainer and capscrew (2)	Install and torque to 230 to 300 lb. ft. (315 to 405 N-m).	
4. Bevel pinion shaft (6)	a. Check end play again.NOTE b. With yoke, retainer, and capscrew (2) installed end play is .002 to .005 in. (0.05 to 0.13 mm).	If end play is not correct, remove yoke assembly and adjust nut (3). Then repeat steps 2 thru 4.
5. Differential	Assemble with teeth of the ring gear toward the TOP. (As shown in illustration).	

Go on to Sheet 3

DIFFERENTIAL AND BEVEL GEAR ADJUSTMENT (CONT)(Sheet 3 of 7)

1. Yoke Assembly
2. Capscrew
3. Locknut
4. Washer
5. Housing
6. Bevel Pinion Shaft



TA099425

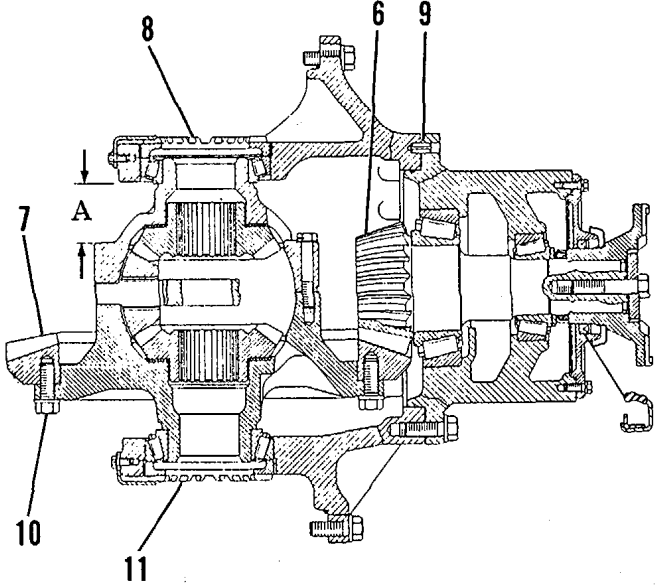
Go on to Sheet 4

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
6. Adjustment ring (8)	Do not tighten.	
7. Adjustment ring (11)	Tighten until the amount of backlash (free movement) between ring gear (7) and pinion (6) is $.014 + .005$ in. ($0.36 + 0.13$ mm).	
8. Adjustment ring (8)	<p>a. Tighten while turning ring gear (7). Tighten until a small amount of resistance is needed to turn ring gear.</p> <p>b. Install a dial indicator so that the tip of the indicator is in contact with upper bearing cap.</p> <p>c. Tighten adjustment ring (8) until distance "A" increases by $.018 + .002$ in. ($0.46 + 0.05$ mm).</p>	<p style="text-align: center;">NOTE</p> <p>An increase in distance "A" will give the preload for the bearings.</p>

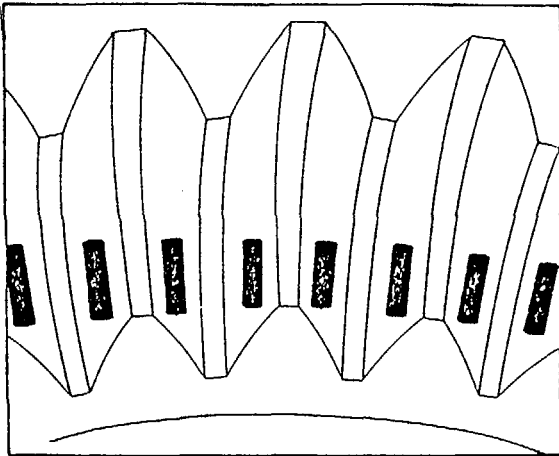
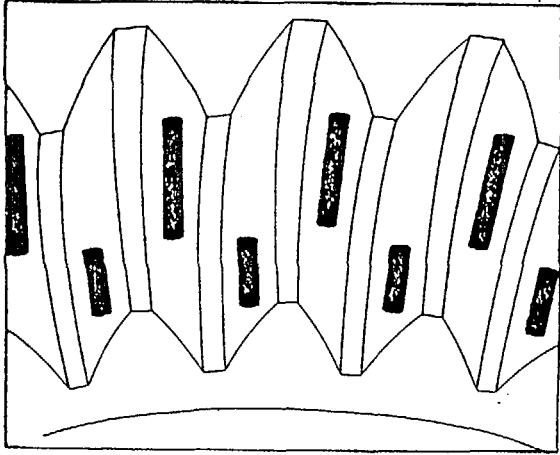
TA099426

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
<p>9. Ring Gear (7)</p>	<p>a. Measure the backlash between the pinion and ring gear. The backlash must be $.014 \pm .005$ (0.36 ± 0.13 mm).</p> <p>b. If the backlash is too much, loosen adjustment ring (8) and tighten adjustment ring (11) the same amount.</p> <p>c. If the backlash is not enough, loosen adjustment ring (11) and tighten adjustment ring (8) the same amount.</p>	 <p>D if ferential bearing preload will not change if you loosen one ring and then tighten the other ring the same amount.</p> <p>NOTE</p>
<p>10. Capscrews (10)</p>	<p>Lubricate threads and tighten to a torque of 315 to 385 lb. ft. (425 to 515 N-m).</p>	

TA099427

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
<p>11. Tooth contact</p>	<p>a. After the backlash and preload adjustments have been made, the tooth contact between pinion (6) and ring gear (7) must be checked, as follows:</p> <ol style="list-style-type: none"> (1) Put a small amount of Prussian blue, red lead, or paint on the teeth of ring gear (7). (2) Turn pinion (6) in both directions. (3) The correct area of tooth contact starts near the inside end of the teeth of ring gear (7) and goes a maximum of 50 percent down the length of the teeth. See Illustration A for the correct area of tooth contact. <p>b. If the area of tooth contact looks like Illustration B, use the procedure that follows:</p> <ol style="list-style-type: none"> (1) Add some of shims (9). (2) Do Step 6 thru 10 again. (3) Do Step 11 again to check the area of tooth contact. 	<div style="text-align: center;">  <p>ILLUSTRATION A</p> </div> <div style="text-align: center;">  <p>ILLUSTRATION B</p> </div>

TA099428

Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
<p>11. Tooth contact (Cont.)</p>	<p>If the area of tooth contact looks like Illustration C, use the procedure that follows:</p> <ol style="list-style-type: none"> a. Remove some of shims (9). b. Do Steps 6 thru 10 again. c. Do Step 11 again to check the area of tooth contact. 	<div> </div> <p>ILLUSTRATION C</p> <div style="border: 1px solid black; padding: 5px;"> <p>Always make sure the backlash adjustment is correct before an adjustment is made to the area of tooth contact. Several adjustments to the backlash and tooth contact may be necessary to get the correct adjustments.</p> </div>
<p>12. Capscrews (12)</p>	<p>Tighten to a torque of 175 to 225 lb. ft. (235 to 305 N-m).</p>	<div> </div> <p>TA099429</p> <p>End</p>

FRONT AND REAR SUPPORT DISASSEMBLY/ASSEMBLY

(Sheet 1 of 9)

This task covers: Disassembly and assembly of the front and rear support.

INITIAL SETUP

Test Equipment
None As required

Materials/Parts
None

Troubleshooting Reference

Equipment Condition
Shipping link installed.

Rear crankcase guard removed.

Drive axles removed.

Special Tools
None

Personnel Required
Two mechanics

References
LO 10-3901-641-12.

Crankcase guard removal,
TM 10-3930-641-20.

Drive axle removal/installation, page 4-250.

Shipping link removal/installation,
TM 10-3930-641-20.

General Safety Instructions
Tires blocked.

Go on to Sheet 2

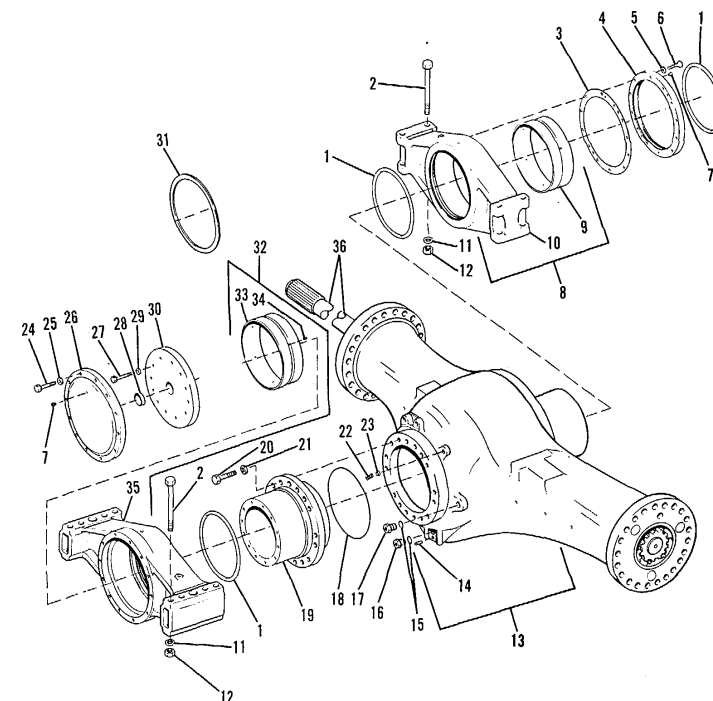
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">DISASSEMBLY</div>		
1. Wheels	Block both front wheels to prevent vehicle movement.	
2. Oil	Drain from plug (16).	See LO 10-3930-641-12.
3. Hydraulic jacks	<ul style="list-style-type: none"> a. Place under vehicle. b. Lift rear of vehicle until jacks just support vehicle weight (but not so much that tires are lifted off ground). c. Install lock pins in jacks. 	
4. Engine oil drain hose	Remove.	
5. Capscrew (24), washers (25) and cover (26) and gasket	Remove from rear support (35).	
6. Bearing (31)	Remove from rear support (35).	
7. Capscrews (27), washers (29) and plate (30)Go on to Sheet 3	Remove from rear support (35).	

Go on to Sheet 3

FRONT AND REAR SUPPORT DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 3 of 9)

- | | |
|------------------------------------|------------------------------------|
| 1. Preformed Packing | 19. Cover |
| 2. Capscrew | 20. Capscrew |
| 3. Gasket | 21. Washer |
| 4. Bearing Retainer | 22. Pressure Relief Fitting |
| 5. Washer | 23. Pipe Reducing Bushing |
| 6. Capscrew | 24. Capscrew |
| 7. Fitting | 25. Washer |
| 8. Front Trunnion Support Assembly | 26. Cover |
| 9. Sleeve Bearing | 27. Capscrew |
| 10. Front Support | 28. Plug |
| 11. Flat Washer | 29. Washer |
| 12. Hex Nut | 30. Plate |
| 13. Axle Housing Assembly | 31. Thrust Bearing |
| 14. Spring Pin | 32. Rear Trunnion Support Assembly |
| 15. Preformed Packing | 33. Sleeve Bearing |
| 16. Plug | 34. Pin |
| 17. Plug | 35. Rear Support |
| 18. Preformed Packing | 36. Axle Shaft |



TA099430
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
8. Bearing (31)	Remove from rear support (35).	
9. Tube assembly	Remove from grease fitting on rear support.	
10. Capscrews (2), washers (11) and nuts (12) that secure rear support (35)	Remove from rear support (35).	
11. Washers (11) and nuts (12) that secure front support (10)	Remove from front support (10).	

CAUTION

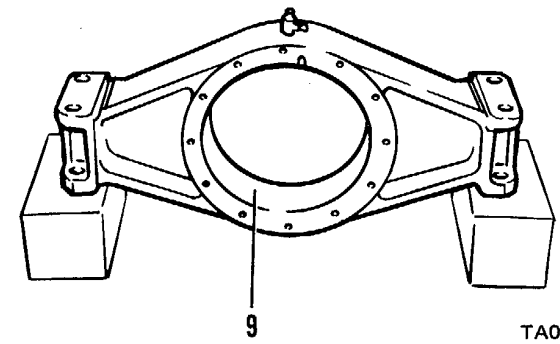
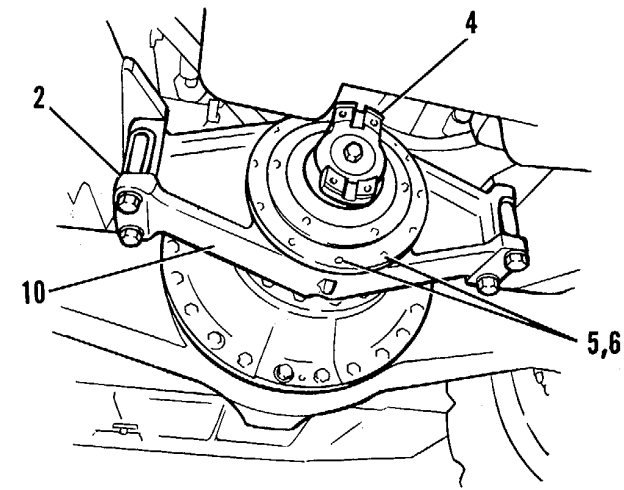
Do not remove capscrews (2) that secure front support (10).

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
12. Rear support (35)	<ul style="list-style-type: none"> a. Attach to a floor jack. b. Raise rear of vehicle with the two hydraulic jacks (See Step 3) until pins in the top of the support are free of vehicle frame. c. Remove rear support. 	
13. Preformed packing (1)	Replace.	
14. Bearing (33)	Replace if damaged.	
15. Capscrews (20) and washers (21)	Remove from cover (19).	
16. Cover (19)	<ul style="list-style-type: none"> a. Attach to floor jack. b. Use two 7/8-9NC capscrews as forcing screws to loosen cover. <p style="text-align: center;">NOTE</p> <p>Cover weighs 140 lb. (64 Kg).</p> <ul style="list-style-type: none"> c. Remove cover from axle housing (13). 	
17. Preformed packing (18)	Replace.	

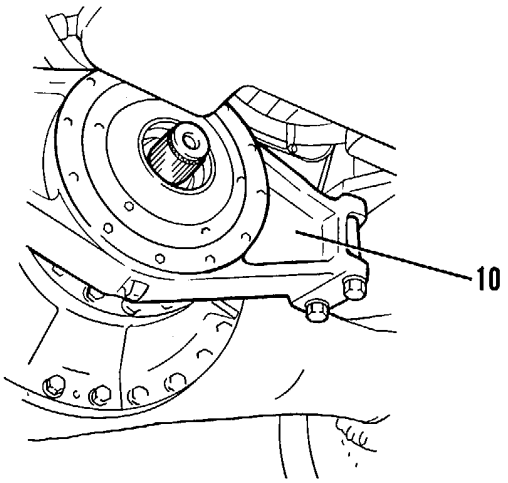
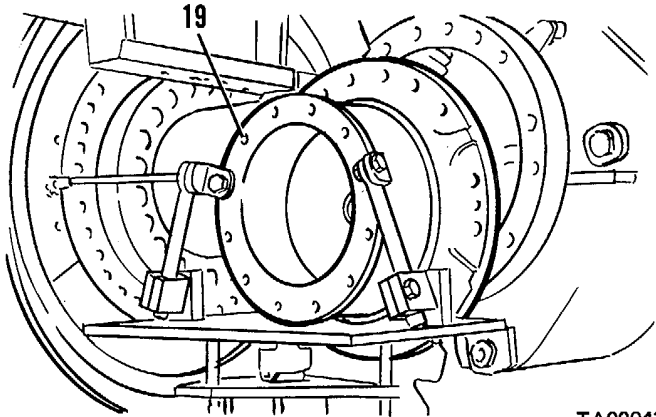
Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
18. Yoke	Remove.	
19. Four capscrews (2) and nuts	Remove from front support (10).	
	NOTE	
		Support assembly weighs 225 lb. (102 Kg).
20. Support assembly (10)	a. Attach to floor jack. b. Remove.	
21. Preformed packing (1)	Discard.	
22. Canscrews (6) and washers (5), bearing retainer (4)	Remove.	
23. Bearing (9)Remove		



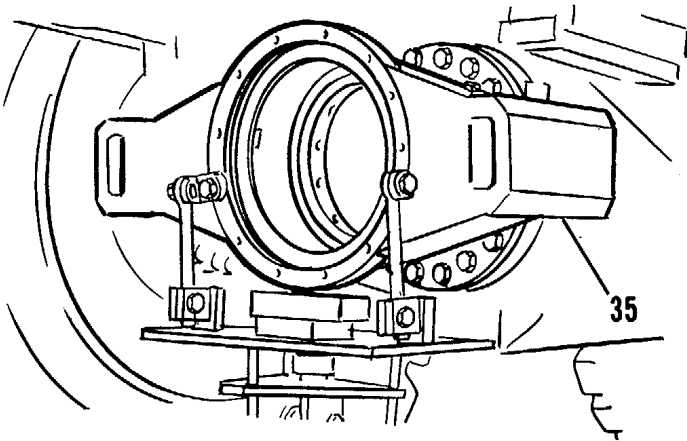
TA099431

Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>		
<p>1. Preformed packings (1), bearing (9), and bearing retainer (4)</p>	<p>Install in front support (10). Put a light coat of grease on packings and bearings.</p>	
<p>2. Front support (10)</p>	<p>a. Attach to floor jack. b. Place in position on differential as shown. c. Install four capscrews (2) and nuts that secure it.</p> <p style="text-align: center;">NOTE</p> <p>Tighten capscrews to a torque of 750-900 lb. ft. (1007 to 2118 N-m).</p>	
<p>3. Preformed packing (18)</p>	<p>Install. Grease lightly.</p>	
<p>4. Cover (19)</p>	<p>a. Attach to floor jack. b. Position against rear axle housing. c. Secure with capscrews (20) and washers (21). d. Tighten capscrews (20) to a torque of 315-385 lb. ft. (425-525 N-m).</p>	
<p>5. Bearing (33)</p>	<p>Replace if damaged. Install in rear support (35).</p>	

TA099432

Go on to Sheet 8

LOCATION/ITEM	ACTION	REMARKS
6. Preformed packing (1)	Replace.	
7. Rear support (35)	a. Attach to floor jack. b. Position against cover (19). c. Lower vehicle so that pins in rear support engage holes in vehicle frame.	
8. Capscrews (2), washers (11) and nuts (12) that secure rear support.	a. Install. b. Tighten capscrews to a torque of 750 lb. ft. (1007 to 1218 N-m).	
9. Capscrews (2), washers (11) and nuts (12) that secure front support	a. Install. b. Tighten nuts to a torque of 750-900 lb. ft. (1007-1218 N-m).	
10. Tube assembly	Connect to grease fitting.	
11. Bearing (31)	Install.	
12. Plate (30)	Install.	
13. Capscrews (27) and washers (29)	Install.	
14. Bearing (31)	Install.	

TA099433

Go on to Sheet 9

LOCATION/ITEM	ACTION	REMARKS
15. Gasket and cover (26)	Install.	
16. Capscrews (24) and washers (25)	Install.	
17. Oil drain hose	Install.	
18. Oil	Fill rear differential to correct level with oil.	Refer to LO 10-3930-641-12.
19. Crankcase guard	Install.	See TM 10-3930-641-20.
20. Drive axles	Install.	See page 4-250.

End

Section VIII. DRIVE SHAFTS

DRIVE SHAFTS MAINTENANCE INSTRUCTIONS

This section covers maintenance of these drive shaft components for direct support maintenance personnel:

- a. Drive shaft
- b. Bearing cage adjustment

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Upper drive shaft disassembly/assembly.	4-306	2-42
2	Lower drive shaft disassembly/assembly.	4-308	2-42
3	Bearing cage adjustment.	4-323	2-42

UPPER DRIVE SHAFT DISASSEMBLY/ASSEMBLY

(Sheet 1 of 2)

This task covers: Disassembly and assembly of the upper drive shaft.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-42

Equipment Condition

Drive shaft removed

Special Tools

None

Personnel Required

One mechanic

References

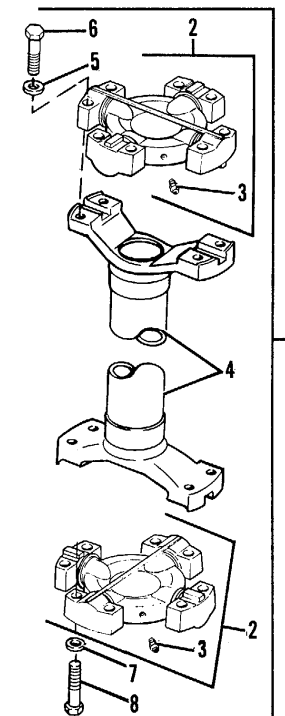
Drive shaft removal, TM 10-3930-641-20.

General Safety Instructions

None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
1. Capscrews (6), (8) and washers (5), (7)	Remove.	1. Drive shaft assembly
2. Spiders (2)	Remove from tube (4).	2. Spider
3. Lubrication fittings (3)	Remove from spiders (2).	3. Fitting
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>		
1. Lubrication fittings (3)	Install in spiders (2).	4. Tube
2. Spiders (2)	Position on tube (4).	5. Washer
3. Capscrews (6), (8) and washers (5), (7)	Install and tighten to a torque of 90 to 110 lb. ft. (122 to 149 N-m).	6. Capscrew 7. Washer 8. Capscrew



TA099434
End

LOWER DRIVE SHAFTS DISASSEMBLY/ASSEMBLY

(Sheet 1 of 15)

This task covers: Disassembly and assembly of drive shafts.

INITIAL SETUP

Test Equipment

Depth micrometer

Micrometer

Feeler gage

Materials/Parts

(20) seal assemblies

(1) seal

(2) seals

(1) seal

(2) shim packs

(1) shim

(1) shim

Troubleshooting Reference

Page 2-42

Equipment Condition

Drive shafts removed from vehicle.

Special Tools

None

Personnel Required

Two mechanics

References

Drive shaft removal, TM10-3930-641-20.

General Safety Instructions

None.

Go on to Sheet 2

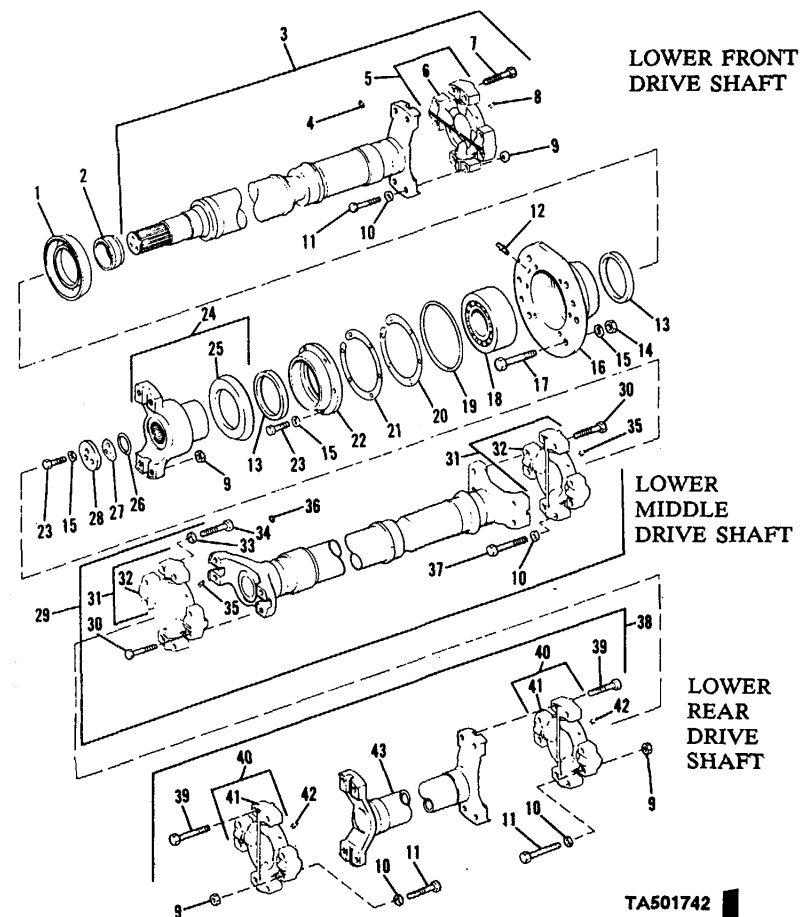
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 2px solid black; padding: 5px; margin-bottom: 10px;"> LOWER FRONT DRIVE SHAFT DISASSEMBLY </div> <p>1. Front shaft group</p> <p>2. Three capscrews (23) and washers (15)</p> <p>3. Retainer (28)</p>	<p>Block up shaft.</p> <div style="border: 2px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> CAUTION </div> <p>Put a small block under the shaft group. This will keep the splined shaft from falling out of the shaft tube during disassembly.</p> <p>Remove.</p> <p> a.Remove. b. Inspect for damage (cracks, nicks, warping). c. Replace if necessary. </p> <p style="text-align: center;">4-309</p>	<p style="text-align: right;">Go on to Sheet 3</p>

DRIVE SHAFTS DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 3 of 15)

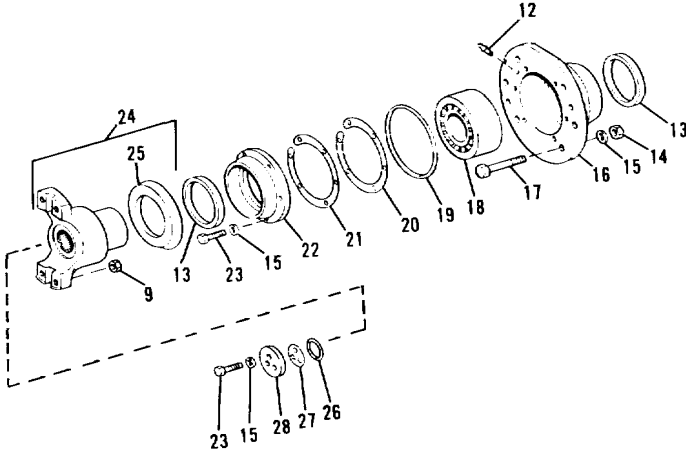
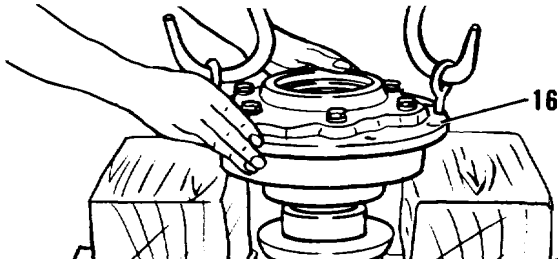
Main Drive Shaft Group

- | | |
|--------------------------------|---------------------------------|
| 1. Guard | 27. Shim Pack |
| 2. Spacer | 28. Retainer |
| 3. Joint Group | 29. Universal Joint Group |
| 4. Grease Fitting | 30. Capscrew |
| 5. Spider and Bearing Assembly | 31. Spider and Bearing Assembly |
| 6. Seal Assembly | 32. Seal Assembly |
| 7. Capscrew | 33. Washer |
| 8. Grease Fitting | 34. Capscrew |
| 9. Hex Nut | 35. Grease Fitting |
| 10. Washer | 36. Grease Fitting |
| 11. Capscrew | 37. Capscrew |
| 12. Grease Fitting | 38. Universal Joint Group |
| 13. Lip Type Seal | 39. Capscrew |
| 14. Hex Nut | 40. Spider and Bearing Assembly |
| 15. Washer | 41. Seal Assembly |
| 16. Bearing Cage | 42. Grease Fitting |
| 17. Capscrew | 43. Tube |
| 18. Spherical Roller Bearing | |
| 19. Preformed Packing | |
| 20. Shim | |
| 21. Shim | |
| 22. Bearing Retainer | |
| 23. Capscrew | |
| 24. Yoke Assembly | |
| 25. Guard | |
| 26. Preformed Packing | |

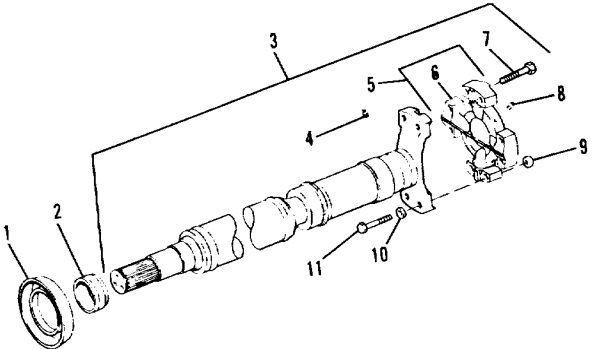


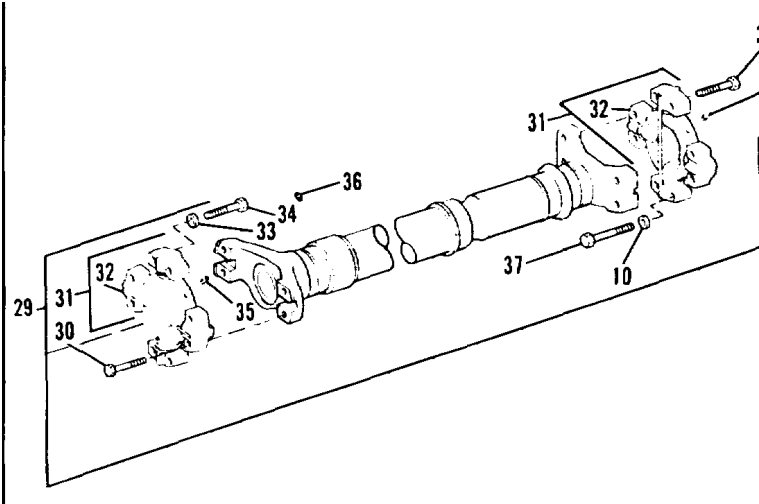
TA501742

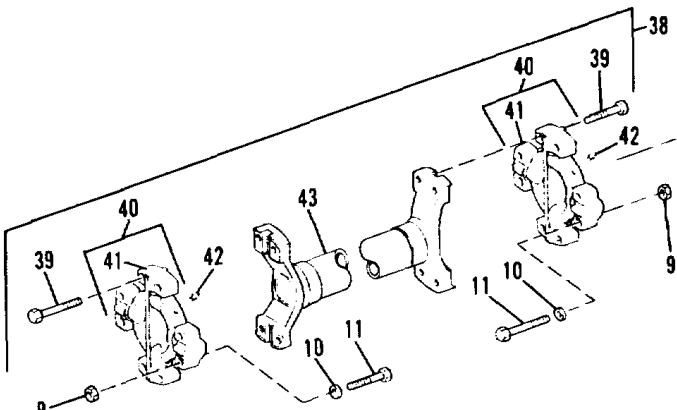
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
4. Shim pack (27)	Remove and discard.	
5. Preformed packing (26)	Remove and discard.	
6. Yoke assembly (24) and dirt guard (25)	a. Remove. b. Inspect for cracks, bends, warps, etc. c. Replace if necessary.	
7. Bearing cage (16)	a. Remove capscrews and nuts. b. Insert 2 guide bolts. c. Insert forcing screws and pull cage from shaft. d. Use hoist to pull cage from shaft. Weight of cage is 471 lbs. (213.6 Kg).	

LOCATION/ITEM	ACTION	REMARKS
8. Six capscrews (23) and washers (15)	Remove.	
9. Bearing cage retainer (22)	a. Remove from bearing cage. b. Inspect for cracks, dents, and distortion. c. Replace if necessary.	
10. Shims (21) and (20)	a. Inspect for damage. b. Remove if necessary, discard. c. Replace if damaged.	
11. Lip type seal (13)	Remove from retainer and discard.	
12. Bearing (18)	a. Remove from cage. b. Inspect for cracks, nicks, distortion, and rough turning action. c. Replace if necessary.	
13. Preformed packing (19)	Remove from cage and discard.	Go on to Sheet 6

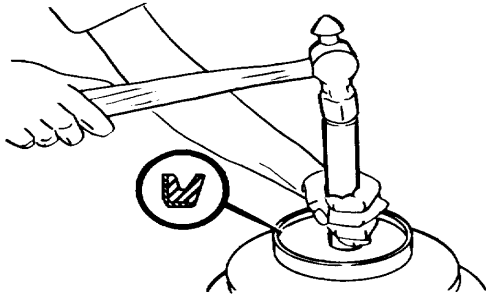
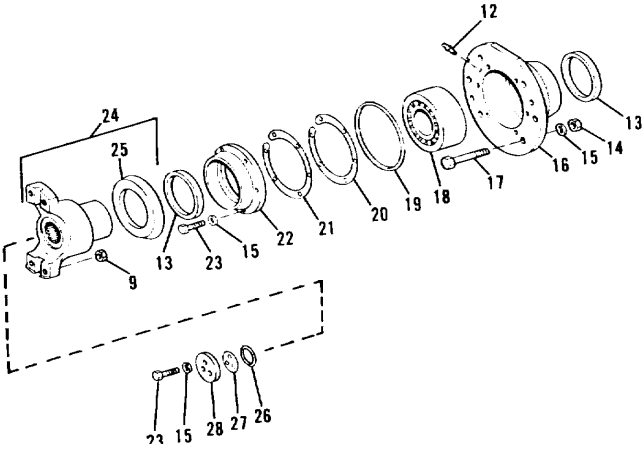
LOCATION/ITEM	ACTION	REMARKS
14. Guard (1) and spacer (2)	a. Remove from shaft (use a soft faced hammer if necessary). b. Inspect for cracks, nicks, dents, distortion, etc. c. Replace if necessary.	
15. Four capscrews (7) (on spider of front shaft)	Remove.	
16. Spider (5)	a. Remove from shaft. b. Inspect spider for cracks, distortion, sloppy bearing action, etc.	
Replace if necessary.	NOTE	
WARNING	Spider must be replaced as unit.	
	Shaft weighs 90 lbs. (40.8 Kg). Use jack.	
	4-313	TA099437 Go on to Sheet 7

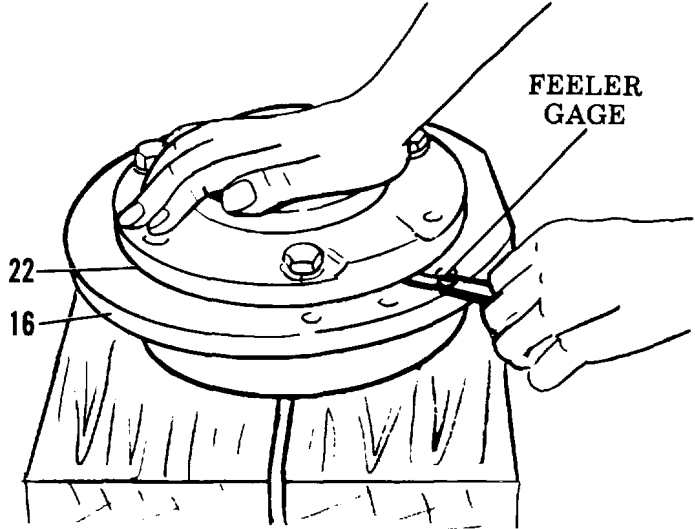
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content;">LOWER MIDDLE DRIVE SHAFT DISASSEMBLY</div>		
<p>1. Four capscrews (30) on front spider of middle shaft piece</p> <p>2. Front spider (31)</p>	<p>Remove.</p> <ol style="list-style-type: none"> a. Remove from shaft. b. Inspect spider for cracks, distortion, sloppy bearing action, etc. c. Replace if necessary. <p>NOTE Spider must be replaced as unit.</p>	 <p>The diagram shows an exploded view of a drive shaft assembly. It includes a central shaft (36) with a yoke (31) at each end. The yokes are connected to spider arms (32) which are mounted on bearings (33). The spider arms are secured with capscrews (30). Other components shown include a nut (10), a lock washer (37), and a bearing cap (35). A reference number 29 is also present near the front yoke.</p>
<p>3. Four capscrews (30) on back spider of middle shaft piece.</p> <p>4. Back spider (31)</p> <p>Replace if necessary.</p>	<ol style="list-style-type: none"> a. Remove from shaft. b. Inspect spider for cracks, distortion, sloppy bearing action, etc. <p>NOTE Spider must be replaced as unit.</p>	
<p>WARNING</p>	<p>NOTE Shaft's weight is 90 lbs. (40.8 Kg). Use jack.</p>	<p style="text-align: right;">TA099438 Go on to Sheet 8</p>

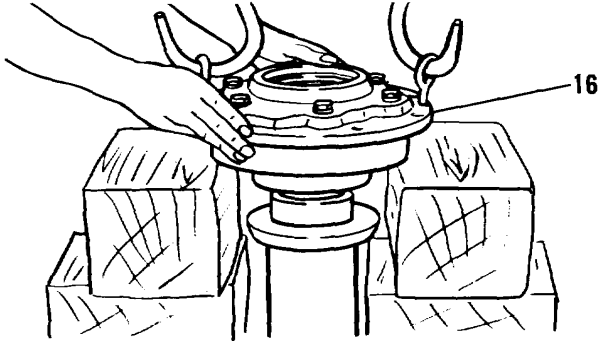
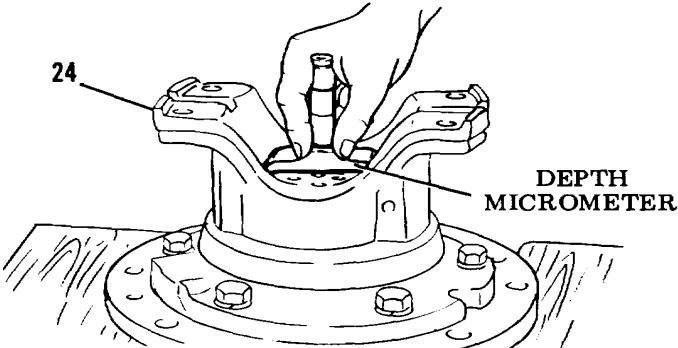
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content;">LOWER REAR DRIVE SHAFT DISASSEMBLY</div>		
<p>1. Four capscrews (39) on front spider of rear shaft piece</p>	<p>Remove.</p>	
<p>2. Front spider (40)</p>	<p>a. Remove from shaft. b. Inspect spider for cracks, distortion, sloppy bearing action, etc. c. Replace if necessary.</p> <p style="text-align: center;">NOTE Spider must be replaced as unit.</p>	
<p>3. Four capscrews (39) on back spider of rear shaft piece.</p>	<p>Remove.</p>	
<p>4. Back spider (40)</p>	<p>a. Remove from shaft. b. Inspect spider for cracks, distortion, sloppy bearing action, etc. c. Replace if necessary.</p> <p style="text-align: center;">NOTE Spider must be replaced as unit.</p> <p style="text-align: center;">NOTE Shaft's weight is 90 lbs. (40.8 Kg). Use jack.</p>	

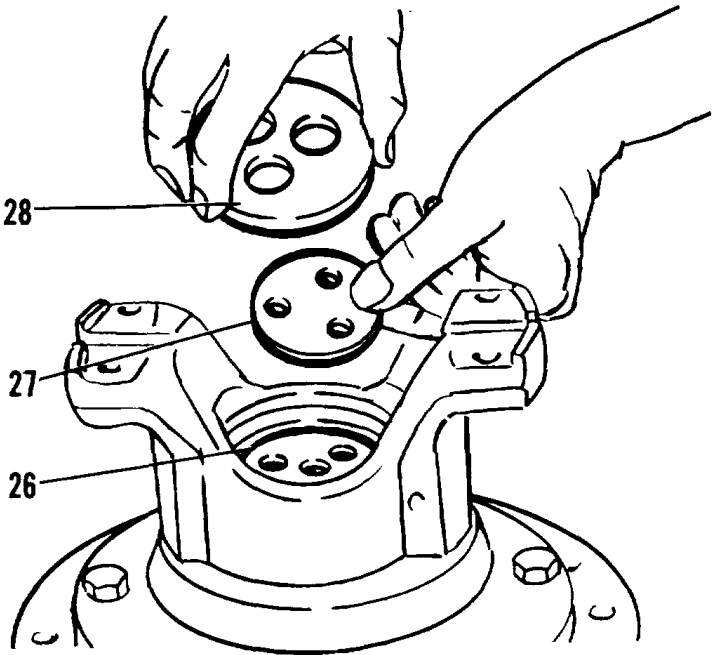
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content;">LOWER FRONT DRIVE SHAFT ASSEMBLY</div>		
1. Yoke of front shaft	Align spider assembly (5) on yoke.	
2. Four capscrews (7)	Install. Tighten to a torque of 90 to 110 lb. ft. (122 to 149 N-m).	
3. Guard (1)	Install on splined end of front shaft.	
4. Spacer (2)	Install on splined end of front shaft.	
5. Frontshaft	Block up shaft with splined end pointing up.	
6. Bearing cage (16)	Lay on flat surface with flanged opening face down.	

TA099440
Go on to Sheet 10

LOCATION/ITEM	ACTION	REMARKS
7. Seal (13)	a. Install in cage using suitable seal driver. Seal must contact counterbore in cage. Seal lip must face away from cage.	
8. Bearing (18)	Install in flanged side of cage.	
9. Bearing cage retainer (22)	Align on cage without seal or shims.	
10. Three of six capscrews (23)	a. Install, evenly spaced. Tighten evenly to a torque of 65 to 85 lb. ft. (88 to 115 N'm). b. Loosen capscrews. c. Tighten capscrews again, finger tight only.	

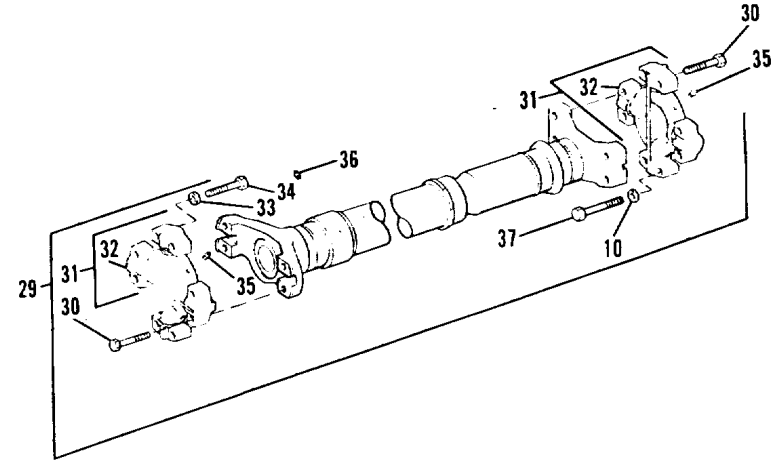
LOCATION/ITEM	ACTION	REMARKS
11. Clearance between retainer (22) and cage (16)	<ul style="list-style-type: none"> a. Measure clearance with feeler gage. b. Record this measurement. 	
12. Bearing cage retainer (22)	Remove from cage.	
13. Seal (13)	<ul style="list-style-type: none"> a. Install in retainer with suitable seal driver. Seal must contact counterbore in retainer. Seal lip must face away from retainer. b. Coat lip of seal with GAA grease. 	
14. Preformed packing (19)	Install in cage.	
15. Shim(s) (21) and (20)	<ul style="list-style-type: none"> a. Recall clearance measured in Step 11. b. Add shim(s) to measure .002 in. (0.05 mm) less than clearance in Step 11. c. Align shim(s) on cage. d. Align bearing cage retainer on shim(s). 	

LOCATION/ITEM	ACTION	REMARKS
16. Six capscrews (23) and washers (15)	Install. Tighten evenly to a torque of 65 to 85 lb. ft. (88 to 115 N•m).	
17. Bearing cage assembly (16)	Lower bearing cage onto splined end of front shaft.	
18. Yoke (24)	Install on top of bearing cage.	
19. Retainer (28)	Align on shaft without seal or shims.	
20. Three capscrews (23)	a. Install without washers. Tighten to a torque of 50 to 70 lb. (68 to 95 N•m). b. Remove capscrews and retainer.	
21. Spacing of yoke (24) and splined shaft	a. Using depth micrometer as shown at right, measure distance between end of shaft and inner face of yoke. b. Record this measurement.	

LOCATION/ITEM	ACTION	REMARKS
22. Preformed packing (26)	Install in yoke.	
23. Shim(s) (27)	<p>a. Recall thickness measured in Step 21.</p> <p>b. Install shim(s) to be from .002 to .004 in. (0.05 to 0.11 mm) thinner than the thickness measured in Step 21.</p> <p>c. Place this shim pack on end of front shaft. Align holes.</p>	
24. Retainer (28)	Place over shim pack. Align holes.	
25. Three capscrews (23) and washers (15)	Install. Tighten to a torque of 90 to 110 lb. ft. (122 to 149 N•m).	
	4-320	

TA099444
Go on to Sheet 14

LOCATION/ITEM	ACTION	REMARKS
<p>LOWER MIDDLE DRIVE SHAFT ASSEMBLY</p>		
<p>1. Front yoke of middle shaft and front spider (31)</p>	<p>Align spider on yoke.</p>	
<p>2. Four capscrews (30)</p>	<p>Install. Tighten to a torque of 90 to 110 lb. ft. (122 to 149 N•m).</p>	
<p>3. Back yoke of middle shaft and back spider (31)</p>	<p>Align spider on yoke.</p>	
<p>4. Four capscrews (30)</p>	<p>Install. Tighten to a torque of 90 to 110 lb. ft. (122 to 149 N•m).</p>	



TA099445
Go on to Sheet 15

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> LOWER REAR DRIVE SHAFT ASSEMBLY </div>		
1. Front yoke of rear shaft and front spider (40)	Align spider on yoke.	
2. Four capscrews (39)	Install. Tighten to a torque of 90 to 110 lb. ft. (122 to 149 N•m).	
3. Back yoke of rear shaft and back spider (40)	Align spider on yoke.	
4. Four capscrews (39)	Install. Tighten to a torque of 90 to 110 lb. ft. (122 to 149 N•m).	

BEARING CAGE ADJUSTMENT

This task covers: Adjusting the drive shaft bearing cage.

INITIAL SETUP

Test Equipment

Feeler gage

Micrometer

Steel rule

None

Materials/Parts

Shims

Troubleshooting Reference

Page 2-42

Equipment Condition

Engine OFF.

Yoke assembly removed.

Special Tools

None

Personnel Required

One mechanic

References

LO 10-3930-641-12.

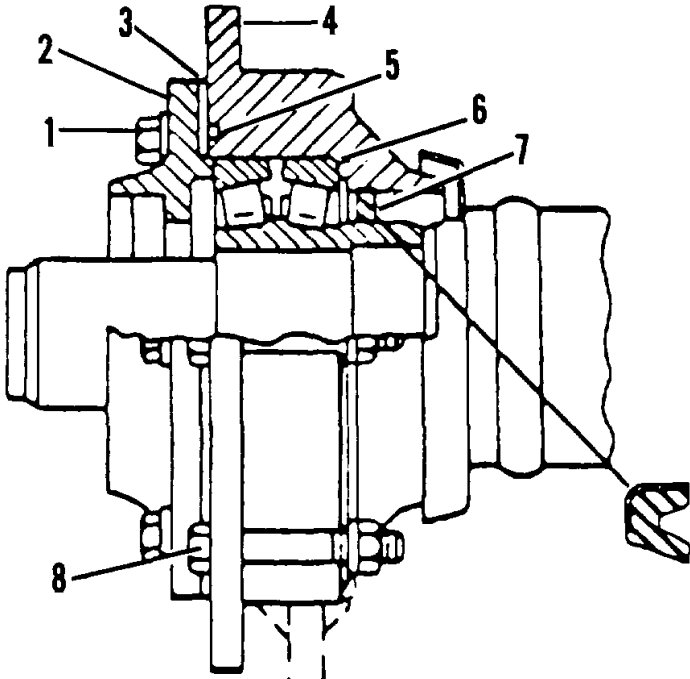
Drive shaft removal/installation,
TM10-3930-641-20.

General Safety Instructions

Tires blocked.

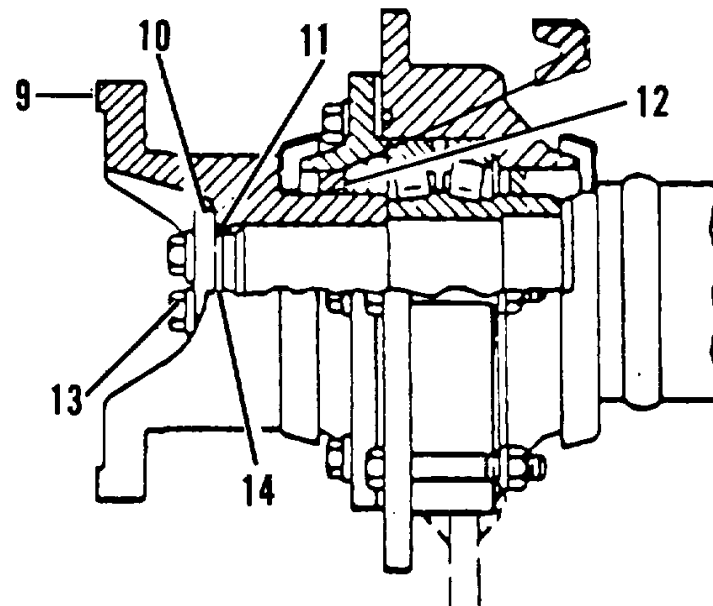
Go on to Sheet 2

BEARING CAGE ADJUSTMENT

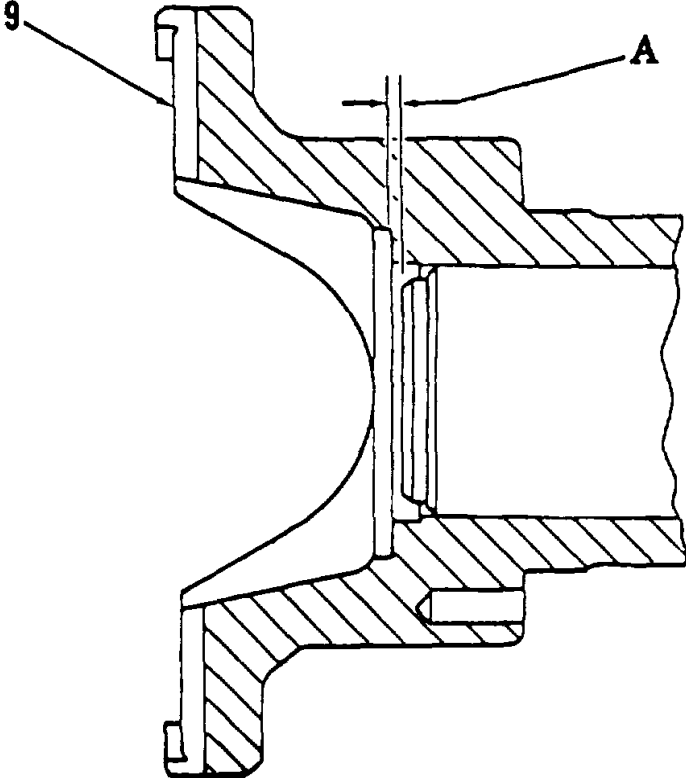
LOCATION/ITEM	ACTION	REMARKS
1. Seal (7)	a. Install in bearing cage (4). b. Grease seal with a small amount of grease. c. Put cage (4) in position on frame.	
2. Capscrews (8)	Install, with washers and nuts.	
3. Bearing (6)	Install in cage (4).	
4. Retainer (2)	Put into position on cage (4) without seal (5) and shims (3).	
5. Capscrews (1)	a. Install three without washers and an equal distance apart. b. Tighten evenly to a torque of 65 to 85 lb. ft. (86 to 114 N-m). c. Loosen. d. Tighten again to finger tight. e. Measure gap between retainer (2) and cage (4) with a feeler gage. Record the distance.	

BEARING CAGE ADJUSTMENT

LOCATION/ITEM	ACTION	REMARKS
6. Seal (5)	Install in cage (4). Put a small amount of grease on seal.	
7. Shims (3)	Install enough shims so their thickness is .002 in. (0.05 mm) less than the gap in Step 5, Section e.	
8. Retainer (2)	Install with capscrews (1) and washers. Tighten capscrews (1) to a torque of 65 to 85 lb. ft. (86 to 114 N-m).	
9. Seal (12)	a. Put small amount of grease on the lip. b. Install.	
10. Yoke assembly (9)	Install on shaft.	
11. Retainer (10)	Install on shaft without seal (11) and shims (14).	
12. Capscrews (13)	a. Install without washers and tighten to a torque of 50 to 70 lb. ft. (66 to 94 N-m).	



BEARING CAGE ADJUSTMENT

LOCATION/ITEM	ACTION	REMARKS
12. Capscrews (cont.)	b. Remove capscrews.	
13. Seal (11)	c. Measure distance (A). Record distance.	
14. Shims (14)	Install.	
15. Retainer (10)	Install enough so that their thickness is $.003 \pm .001$ in. ($0.08 + 0.03$ mm) less than distance (A).	
15. Retainer (10)	a. Install using capscrews (13) and washers.	
15. Retainer (10)	b. Tighten capscrews to a torque of 90 to 110 lb. ft. (121 to 149 N•m).	

CHAPTER 5

BRAKE SYSTEM AND WHEEL BEARING ADJUSTMENT INSTRUCTIONS

	Page		Page		
Section I	General	5-2	Section V	Wheel Bearing Adjustment	5-91
II	Accumulator	5-4	VI	Brake Lines and Fittings	5-97
	Brake Accumulator Removal/Installation.....	5-5		Brake Lines Removal/Installation.....	5-98
	Accumulator Disassembly/Assembly.....	5-9			
	Accumulator Charging Valve Removal/ Disassembly Assembly[Installation	5-14			
	Accumulator Charging	5-21			
III	Brakes and Control Valves.....	5-25			
	Brake Control Valve Group Removal/Installation	5-26			
	Brake Control Valve Disassembly/Assembly	5-31			
	Wheel Brake Assemblies Removal/Installation	5-38			
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	Parking Brake Control Valve Removal/ Installation	5-61			
	Parking Brake Control Valve Disassembly/ Assembly.....	5-63			
	Parking Brake Removal/Installation	5-68			
	Parking Brake Disassembly	5-71			
	Parking Brake Assembly	5-75			

BRAKE SYSTEM

(Sheet 1 of 2)

1. **HYDRAULIC OIL TANK.** The storage reservoir for all of the hydraulic oil used in the machine except for the transmission and torque converter. An inlet strainer provides filtering when adding or replacing oil to the tank. Also, a filter is built into the tank for filtering all of the oil returning from the hydraulic system. Oil is pumped from the tank through the braking components and re- turned back to the tank.
2. **HYDRAULIC OIL LINES.** Serve as passages for the pressurized oil to operate the different braking components.
3. **HYDRAULIC PUMP.** The hydraulic pump serves two systems, steering and braking. It is a positive displacement gear type pump driven by the engine. The smaller section of the pump supplies high pressure oil to operate the brake system. Oil is pumped from the hydraulic tank to the accumulator charging valve and distributed to the system.
4. **ACCUMULATOR CHARGING VALVE.** Distributes flow of oil, from pump, to brake and hydraulic oil cooler control systems. Contains a check valve and a pressure relief valve. Check valve keeps pressure in accumulator in a constant range of 1950 PSI (137.1 kg/cm²) maximum to 1450 PSI (101.9 kg/cm²) minimum. Pressure relief valve controls maximum oil pressure in accumulator if accumulator charging valve malfunctions.
5. **ACCUMULATOR.** Located below the left hand service door. It has a sealed piston which divides the accumulator into two chambers. The upper chamber contains dry nitrogen gas. Pumping oil into the lower chamber moves the piston up compressing the gas. The charging valve limits the gas compression to 1950 PSI. Pushing either brake pedal releases the oil under pressure and allows it to activate the brake control valve.
6. **BRAKE CONTROL VALVE.** Controls the amount of high pressure oil from the accumulator to the wheel brakes. Changing the position of either pedal will increase or decrease the oil pressure at the wheel. As a brake pedal is applied, oil pressure at each wheel brake is increased, slowing or stopping the wheel. As the pedal is released the oil pressure at each wheel is released and the oil is returned to the oil tank.
7. **TRANSMISSION NEUTRALIZER CONTROL VALVE.** Controls hydraulic oil pressure which disengages the transmission as the left brake pedal is depressed. This provides full engine power to the hydraulic systems as the vehicle is braking or stopped. The valve is designed so when the brake pedal is released the transmission engages slightly before the brakes are released.
8. **SERVICE BRAKES.** Oil pressure activated disc-type brakes are at all four wheels. Operating in the final drive housing oil keeps them cool. As a brake pedal is applied it allows pressurized oil from the brake control valve to push a piston against a set of plates and discs. The discs rotate with the wheel and the plates are stationary. Friction between the plates and discs slows or stops the turning wheel. Releasing the brake pedal allows the pressurized oil to return to the oil tank. The friction between the plates and discs is eliminated and the wheels are permitted to turn freely.
9. **EMERGENCY AND PARKING BRAKE.** Located on the transfer gear case housing. A disc-type brake with stationary plates and rotating discs. Spring pressure applies the brake which stops the transfer gear shaft. The brake is released by oil pressure from the accumulator tank.

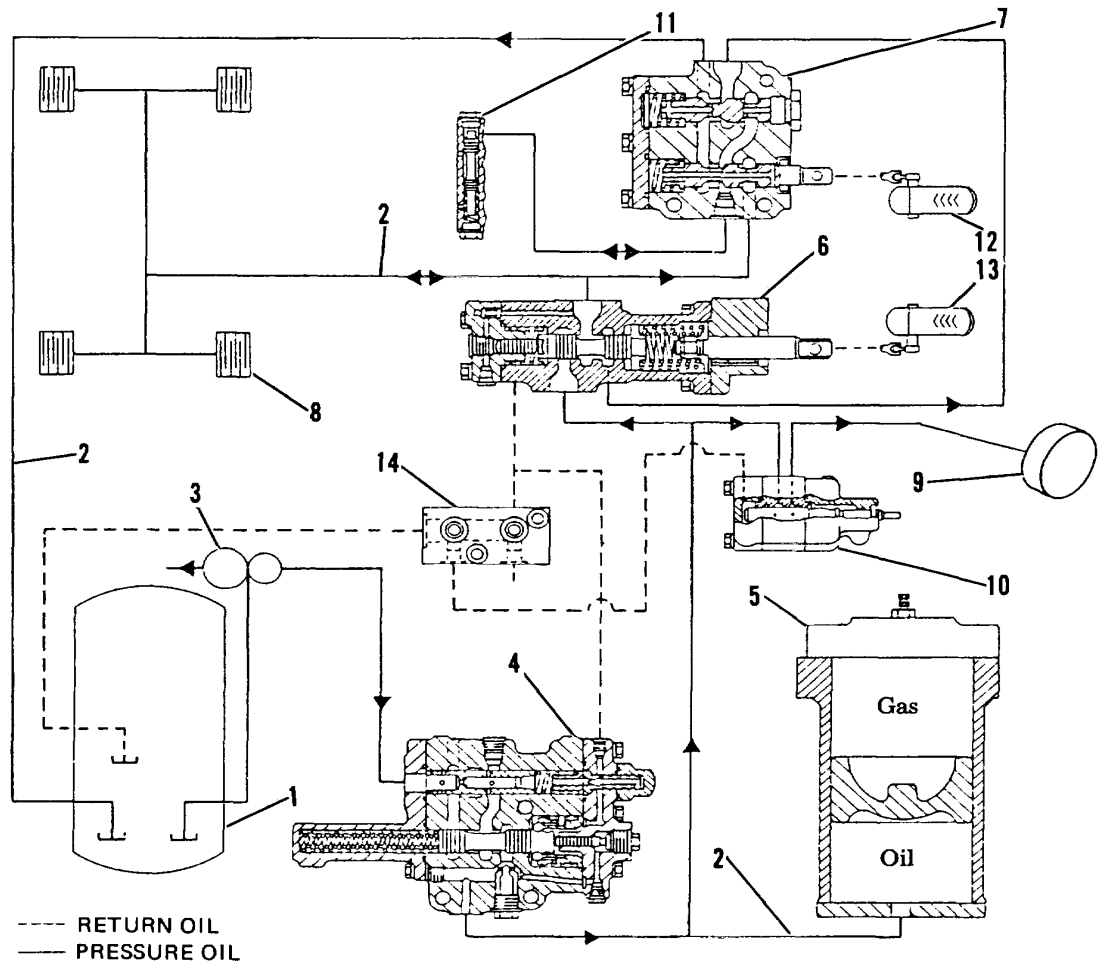
NOTE

If, due to a malfunction in accumulator charging circuit, pressure drops below 700 PSI (49.2 kg/cm²), the emergency brake will automatically be activated.

10. **EMERGENCY AND PARKING BRAKE CONTROL VALVE.** Controls oil flow to the emergency and parking brake. Valve is normally activated by the operator. Pulling out on the parking brake control knob releases oil pressure and activates the brake. Pushing the knob in hydraulically releases the brake by removing the spring tension holding the plates and discs together. The parking brake control is on the right side of the steering column.

BRAKE SYSTEM

(Sheet 2 of 2)



- 1. Hydraulic oil tank
- 2. Oil lines
- 3. Pump
- 4. Accumulator control valve with relief valve
- 5. Accumulator
- 6. Brake control valve
- 7. Transmission neutralizer control valve
- 8. Service brakes
- 9. Emergency and parking brake
- 10. Emergency and parking brake control valve
- 11. Transmission valve
- 12. Left brake pedal
- 13. Right brake pedal
- 14. Junction block

--- RETURN OIL
 ——— PRESSURE OIL

TA098912
 End

Section II. ACCUMULATOR

BRAKE ACCUMULATOR MAINTENANCE INSTRUCTIONS

This section covers maintenance of these brake components for direct support maintenance personnel:

- a. Brake accumulator
- b. Accumulator charging valve
and also instructions for changing the accumulator

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Brake accumulator removal/installation.	5-5	2-59
2	Accumulator disassembly/assembly.	5-9	2-59
3	Accumulator charging valve removal/ disassembly/assembly/installation.	5-14	2-60
4	Accumulator charging	5-21	2-59

End

BRAKE ACCUMULATOR REMOVAL/INSTALLATION

(Sheet 1 of 4)

This task covers: Removal and installation of brake accumulator.

INITIAL SETUPTest Equipment

None

Materials/Parts

Dry nitrogen gas

Troubleshooting Reference

Page 2-59

Equipment Condition

Engine cool.

Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

References

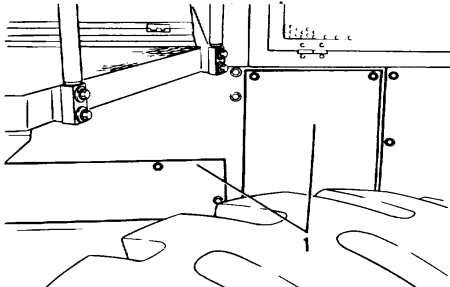
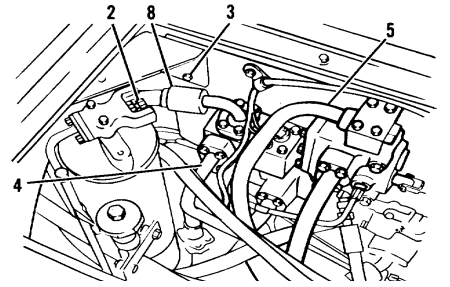
Brake testing, TM 10-3930-641-10
 Accumulator charging, page 5-21.

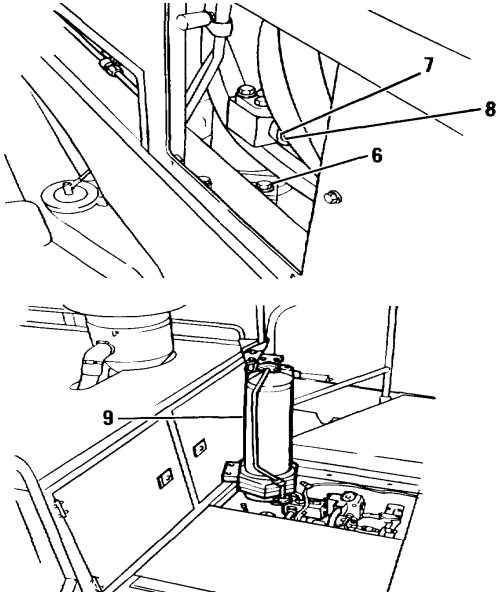
General Safety Instructions

Test brakes before driving.

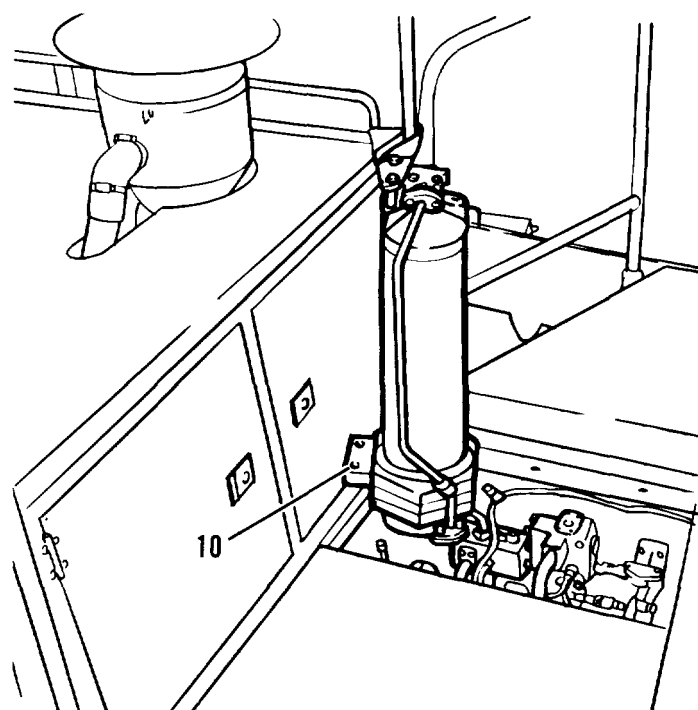
Relieve all pressure in brake system before
 any lines are disconnected from
 accumulator.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</p>	<p style="border: 1px solid black; padding: 2px; display: inline-block;">WARNING</p>	
	<p>Make sure all pressure in brake system is released before any lines are disconnected from brake accumulator.</p>	
<p>1. Two panels (1)</p>	<p>Remove from left side of machine.</p>	
<p>2. Floor plate above brake accumulator</p>	<p>Open and move away from accumulator.</p>	
<p>3. Charging valve cap nut (2)</p>	<p>a. Remove.</p>	
	<p>b. Turn valve 1/2 turn to relieve accumulator pressure.</p>	
<p>4. Three capscrews (3) that secure</p>	<p>Remove.</p>	
	<p>accumulator bracket at top</p>	
<p>5. Hydraulic line (4)</p>	<p>a. Disconnect from accumulator.</p>	
	<p>b. Cap or plug opening.</p>	
<p>6. Tube assembly (5)a. Remove.</p>		
	<p>b. Cap or plug openings.</p>	
<p>7. Three eyebolts</p>	<p>Fasten to bracket at top of accumulator.</p>	

LOCATION/ITEM	ACTION	REMARKS
8. Two capscrews (6) at bottom of accumulator	Remove.	
9. Clip that secures heater hose on transmission	Remove.	
10. Hydraulic line (7) on steering and brake pump	a. Disconnect to allow clearance for removing accumulator. b. Cap or plug openings.	
11. Hydraulic line (8) for rear brakes at brake control valve manifold	a. Disconnect to allow clearance for removing accumulator. b. Cap or plug opening.	
12. Brake accumulator (9)	a. Remove. b. Accumulator is 160 lb. (72 Kg). c. Accumulator must be moved around hydraulic lines and other components to remove.	

TA098914
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
<ol style="list-style-type: none"> 1. Hoist 2. Holes (10) 3. Brake accumulator 	<p>Fasten to brake accumulator. Position as shown.</p> <ol style="list-style-type: none"> a. Lower into vehicle. b. Move some hoses and lines as accumulator is put into position. 	
<ol style="list-style-type: none"> 4. Two capscrews that secure accumulator bottom 6. Three capscrews that secure accumulator at top 	<p>Install.</p> <ol style="list-style-type: none"> a. Install. b. Remove hoist. 	
<ol style="list-style-type: none"> 6. Hydraulic line (4) 7. Hydraulic line on steering and brake pump 8. Hydraulic line for rear brakes at brake control valve manifold 9. Clip that secures heater hose on transmission 10. Tube assembly (5) 11. Two panels over left side of machine 12. Accumulator 	<p>Connect to accumulator. Tighten.</p> <p>Tighten.</p> <p>Install.</p> <p>Install.</p> <p>Install.</p> <p>Charge with dry nitrogen gas.</p>	

TA098915

See accumulator charging, page 5-21.

End

ACCUMULATOR DISASSEMBLY/ASSEMBLY

(Sheet 1 of 5)

This task covers: Repair of brake system pressure accumulator.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-59

Equipment Condition

Accumulator removed from vehicle.

Special Tools

None

Personnel Required

One mechanic

References

Brake accumulator removal/
installation, page 5-5

General Safety Instructions

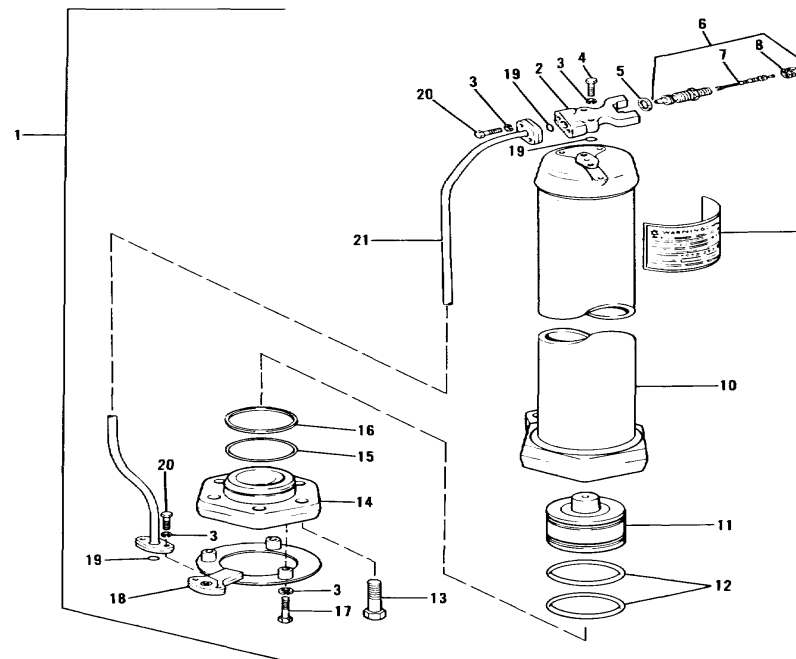
Open valve assembly (6)
Slowly to release gas
pressure.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; display: inline-block; padding: 2px;">DISASSEMBLY</div>		
1. Top bracket to hold accumulator in vehicle.	Remove.	
2. Valve assembly (6)	Open a little at a time to release nitrogen gas pressure slowly.	
3. Tube assembly (21)	Disconnect at manifold.	
4. Manifold (2)	Remove.	
5. Seal in manifold	Remove.	
6. Capscrews (20) and lockwasher (3)	Remove.	
7. Tube assembly (21)	Remove.	
8. Capscrews (17) and lockwashers (3)	Remove.	
9. Cover assembly (18)	Remove.	
10. Capscrews (13)	Remove.	
	5-10	

Go on to Sheet 3

1. Accumulator assembly
2. Manifold
3. Ockwasher
4. Capscrew
5. Washer
6. Valve assembly
7. Valve core
8. Cap
9. Warning plate
10. Accumulator assembly
11. Piston
12. Seal assembly
13. Capscrew
14. Head
15. Preformed packing
16. Back up ring
17. Capscrew
18. Cover assembly
19. Rectangular seal
20. Capscrew
21. Tube assembly



TA098916
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
11. Head (14)	Remove.	
12. Preformed packing (15) and backup ring (16)	Remove from head.	
13. Piston (11)	Remove using a slide hammer puller.	
14. Seal assemblies (12)	Remove from piston.	
ASSEMBLY	NOTE	
1. Seal assemblies (12)	Install.	
2. Piston (11)	Put in position in accumulator.	
3. Piston (11)	Push into bottom of accumulator using a slide hammer puller.	
4. Preformed packing (15) and back-up ring (16)	Install on head (14).	Go on to Sheet 5
	5-12	

LOCATION/ITEM	ACTION	REMARKS
5. Head assembly (14)	Install two 7/8 NC guide pins in accumulator. Put hydraulic oil on seals and put head assembly (14) in position.	
6. Capscrews (13)	Install.	
	NOTE	
	Tighten head capscrews (13) to a torque of 675 lb. ft. to 725 lb. ft. (915 N•m to 983 N•m).	
7. Cover assembly (18)	Install.	
8. Manifold (2)	Install.	
9. Tube assembly (21)	Install.	
10. Top bracket that holds accumulator in vehicle	Install.	
	5-13	End

ACCUMULATOR CHARGING VALVE REMOVAL/DISASSEMBLY/ASSEMBLY/INSTALLATION

This task covers: Removal, disassembly, assembly and installation of accumulator charging valve.

INITIAL SETUPTest Equipment

None

Materials/Parts

Preformed packing

Troubleshooting Reference

page 2-60

Equipment Condition

Engine OFF

Shipping link installed.

Special Tools

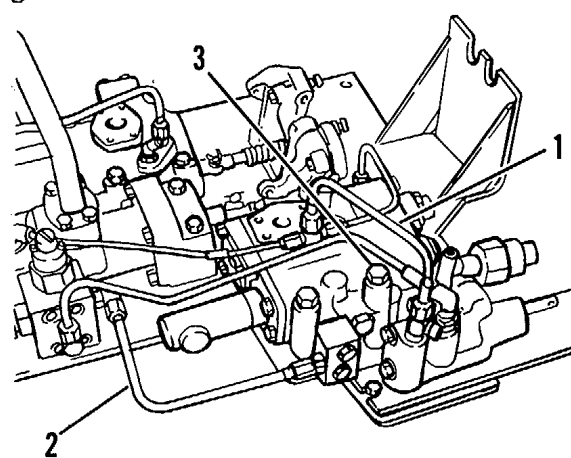
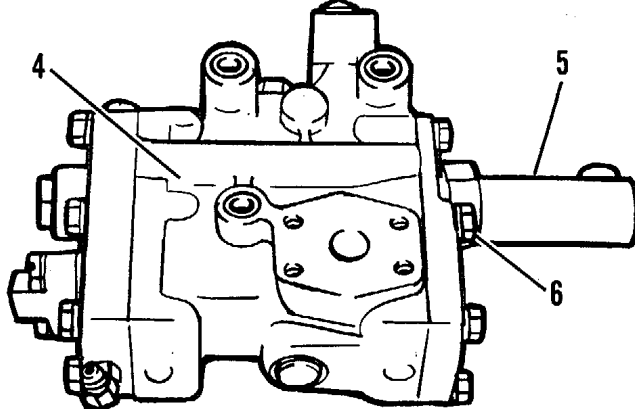
None

Personnel Required

One mechanic

ReferencesBrake valve group removal/
installation, page 5-26.General Safety InstructionsHousing (5) is under tension from springs
behind it. Do not remove all housing
capscrews at once.

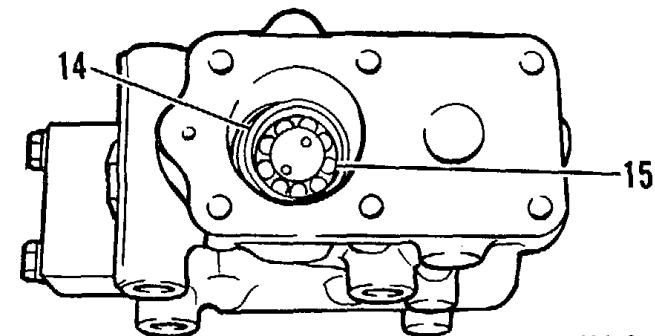
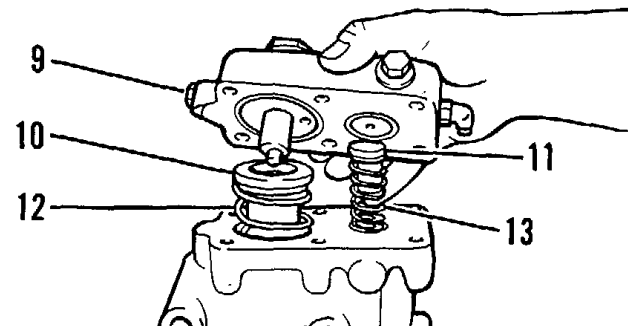
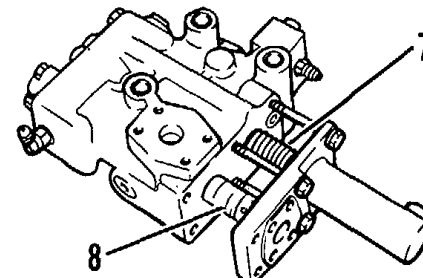
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">REMOVAL</div> <p>Brake control valve group</p> <p>2. Tube assembly (2)</p> <p>3. Tube assembly (1)</p> <p>4. Three capscrews (3) that secure accumulator charging valve to plate assembly</p> <p>5. Accumulator charging valve (4)</p>	<p>Remove.</p> <p>a. Disconnect from manifold on bottom of accumulator charging valve.</p> <p>b. Cap or plug openings.</p> <p>a. Disconnect at tee fitting.</p> <p>b. Cap or plug openings.</p> <p>Remove.</p> <p>Remove from plate assembly.</p>	<p>See page 5-26.</p> 
<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">DISASSEMBLY</div> <p>1. Capscrews (6)</p>	<div style="border: 1px solid black; padding: 2px; text-align: center; margin-bottom: 10px;">WARNING</div> <p>Housing (5) is under tension from springs behind it. Do not remove all housing cap-screws at once.</p> <p>a. Remove except for two.</p> <p>b. Install longer capscrews or two 3/8-16 NC forcing screws with nuts in body. Do not force screws too far into housing.</p> <p>c. Remove two remaining capscrews.</p>	

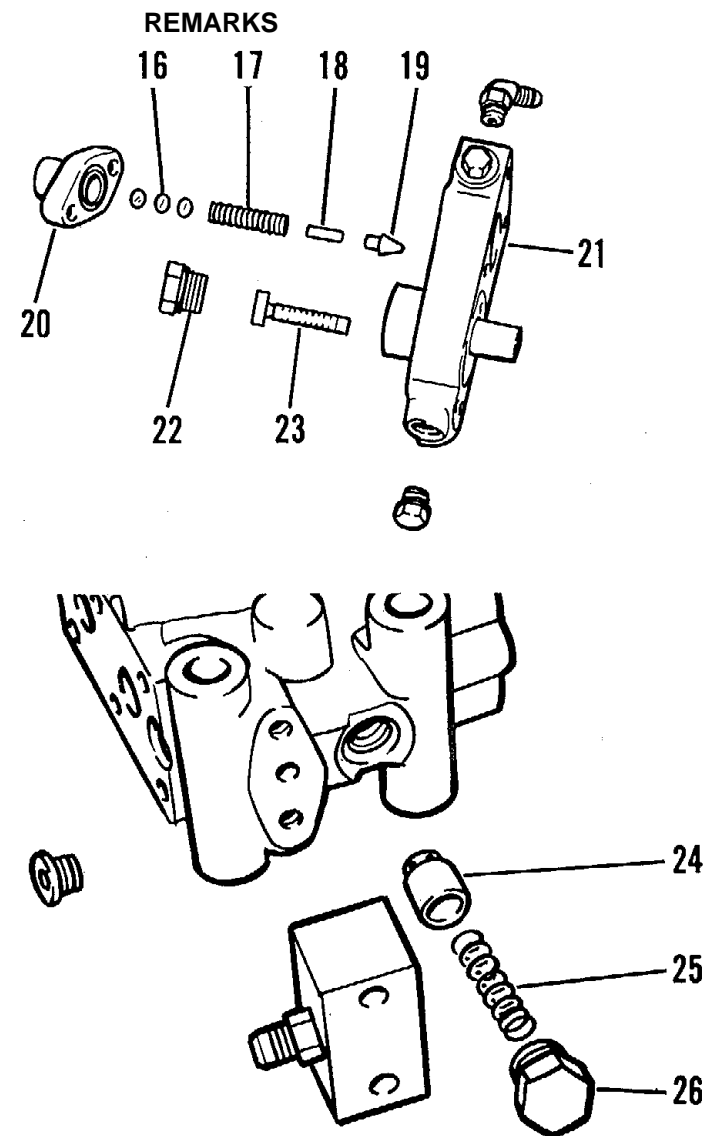
TA098917
Go on to Sheet 3

LOCATION/ITEM	ACTION
1. Capscrews (6) (Cont) screws	d. Loosen longer capscrews or forcing evenly to relieve spring tension.
2. Housing, two springs (7) and stem (8)	e. Housing (5) must be approximately 3.5 in. (8.9 cm) from body to release tension. a. Remove from body. b. Remove plug from stem (8).
3. Shims	Remove from housing.
4. Capscrews that secure body group (9)	Remove.
5. Body group (9),retainer (10) and spring (12)	Remove from body.
6. Shims	Remove from retainer (10).
7. Spacer (11) and spring (13)	Remove from body.
8. Retainer (14),capscrews (15) and washers	Remove from body.
9. Charging valve stem	Remove from body.

REMARKS



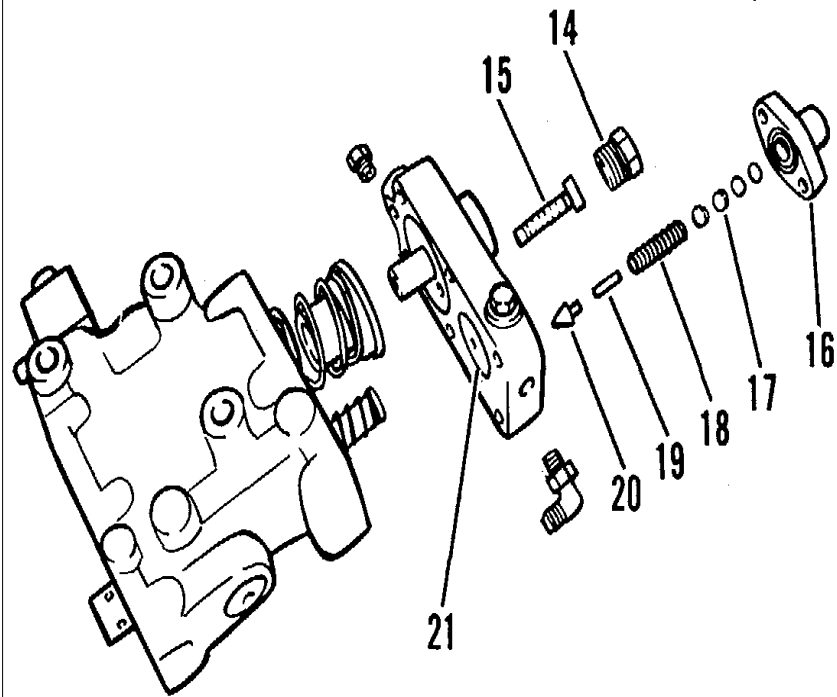
LOCATION/ITEM	ACTION
10. Capscrews that secure retainer (20)	Remove.
11. Retainer preformed packing	Remove.
12. Shims (16)	Remove from retainer.
13. Spring (17),rod (18),and valve (19)	Remove from body group.
14. Plug (22)	a. Remove.
	b. Discard seal.
15. Piston (23)	Remove from body group.
16. Seat (21)	Discard.
17. Plug (26)	a. Remove.
	b. Discard preformed packing.
18. Spring (25) and valve (24)	Remove from body.



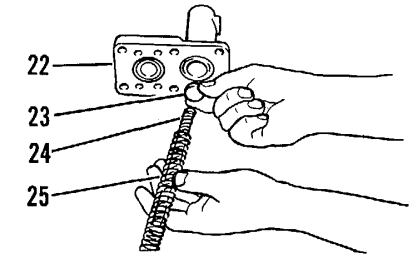
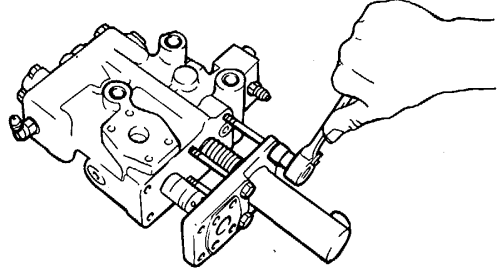
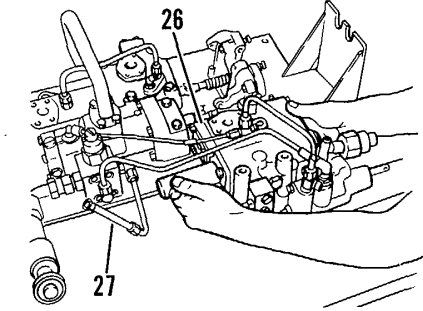
TA098919
Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>	<p>NOTE Make sure all parts of accumulator charging valve are clean. Lubricate all parts of valve with clean hydraulic oil.</p>	
1. Stem (1)	<p>a. Install plug. b. Tighten plug to a torque of 18-22 lb. ft. (24-30 N-m).</p>	
2. Stem (1) and stem (2)	<p>Install in valve body.</p>	
3. Valve (3),spring (4) and plug (5)	<p>a. Install in valve body. b. Tighten plug to a torque of 47-53 lb. ft. (64-72 N-m).</p>	
4. Spring (6) and spacer (7)	<p>Install in valve body.</p>	
5. Washer (10),balls (11),retainer (12) and spring (13)	<p>Install in valve body.</p>	
6. Shims (8)	<p>Install on retainer (9).</p>	
7. Retainer (9)	<p>Install in valve body.</p>	

LOCATION/ITEM	ACTION	REMARKS
8. Seat (21)	Replace.	
9. Piston (15) and plug (14)	a. Install in body group. b. Tighten plug to a torque of 47-53 lb. ft. (64-72 N-m).	
10. Valve (20),rod (19) and spring (18)	Install in body group.	
11. Shims (17)	Install in retainer (16).	
12. Retainer	Install on body group.	
13. Body group	Position on valve body and fasten with capscrews.	



TA098921
Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
14. Shims (23)	Install in housing (22).	
16. Springs (24) and (26)	Slide into housing.	
16. Housing (22)	a. Position on valve body.	
	b. Install longer capscrews or two 3/8"-16 NC forcing screws. Tighten until original capscrews can be installed.	
	c. Secure with capscrews.	
INSTALLATION	a. Position on plate assembly.	
1. Accumulator charging valve (26)		
2. Tube assembly (27)	Connect to manifold on bottom of accumulator charging valve.	
3. Tube assembly from fitting on body group of accumulator charging valve to tee fitting	Install.	
4. Brake control valve group	Install. See page 5-26.	

ACCUMULATOR CHARGING

(Sheet 1 of 4)

This task covers: Charging the brake accumulator.

INITIAL SETUP

Test Equipment

Nitrogen charging equipment

Materials/Parts

Source of dry nitrogen

Troubleshooting Reference

Page 2-59

Equipment Condition

Engine OFF.

Accumulator may be either in or out of vehicle.

Special Tools

None

Personnel Required

One mechanic

References

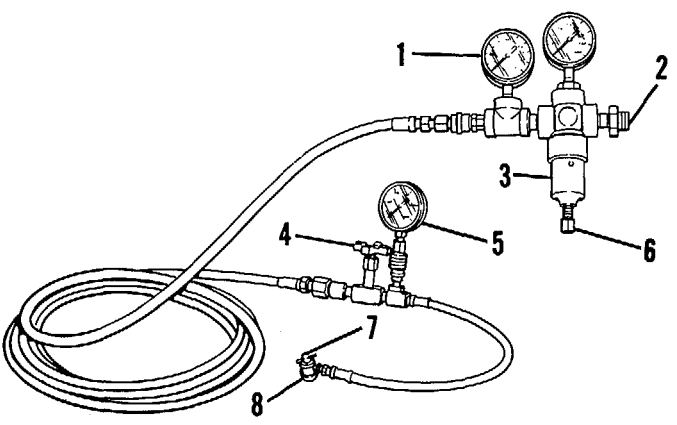
Accumulator removal/installation, page 5-5.

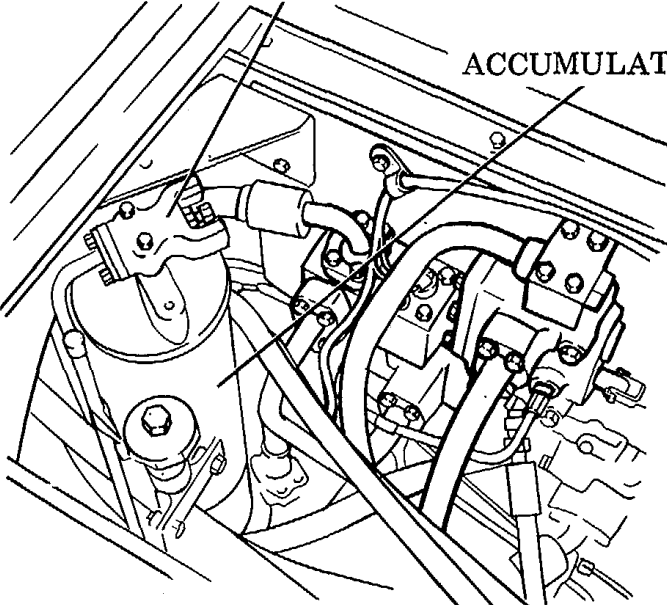
General Safety Instructions

Proceed with caution at all times when using pressurized gas.

Be sure hoses are firmly attached to valve connections.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS																																																								
<ol style="list-style-type: none"> 1. Cap 2. Chuck (8) 3. Accumulator valve 4. Gage (5) 	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p>Proceed with caution at all times when using pressurized gas.</p> <p>Remove from accumulator valve assembly.</p> <p>Install on accumulator valve (see Sheet 4).</p> <p>Open.</p> <p>Use to check the nitrogen pressure in accumulators.</p>																																																									
<ol style="list-style-type: none"> 5. Valve (7) 	<p style="text-align: center;">NOTE</p> <p>Check ambient temperature and use chart at right to determine true pressure in accumulator.</p> <p>Turn clockwise to end of travel. Check ambient temperature and gage (5) pressure. Use chart at right to determine actual accumulator pressure.</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center;">CHARGING PRESSURE AND TEMPERATURE RELATIONSHIP FOR THE ACCUMULATOR</th> </tr> <tr> <th colspan="2" style="text-align: center;">Ambient Temperature</th> <th colspan="2" style="text-align: center;">800 psi (5500 kPa) Pressure*</th> </tr> <tr> <th style="text-align: center;">°F</th> <th style="text-align: center;">°C</th> <th style="text-align: center;">psi</th> <th style="text-align: center;">kPa</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">20</td><td style="text-align: center;">-7</td><td style="text-align: center;">725</td><td style="text-align: center;">5000</td></tr> <tr><td style="text-align: center;">30</td><td style="text-align: center;">-1</td><td style="text-align: center;">740</td><td style="text-align: center;">5105</td></tr> <tr><td style="text-align: center;">40</td><td style="text-align: center;">4</td><td style="text-align: center;">755</td><td style="text-align: center;">5235</td></tr> <tr><td style="text-align: center;">50</td><td style="text-align: center;">10</td><td style="text-align: center;">770</td><td style="text-align: center;">5340</td></tr> <tr><td style="text-align: center;">60</td><td style="text-align: center;">16</td><td style="text-align: center;">785</td><td style="text-align: center;">5420</td></tr> <tr><td style="text-align: center;">70</td><td style="text-align: center;">21</td><td style="text-align: center;">800</td><td style="text-align: center;">5500</td></tr> <tr><td style="text-align: center;">80</td><td style="text-align: center;">27</td><td style="text-align: center;">815</td><td style="text-align: center;">5605</td></tr> <tr><td style="text-align: center;">90</td><td style="text-align: center;">32</td><td style="text-align: center;">830</td><td style="text-align: center;">5735</td></tr> <tr><td style="text-align: center;">100</td><td style="text-align: center;">38</td><td style="text-align: center;">845</td><td style="text-align: center;">5840</td></tr> <tr><td style="text-align: center;">110</td><td style="text-align: center;">43</td><td style="text-align: center;">860</td><td style="text-align: center;">5920</td></tr> <tr><td style="text-align: center;">120</td><td style="text-align: center;">49</td><td style="text-align: center;">875</td><td style="text-align: center;">6000</td></tr> </tbody> </table> <p>*+ 10 psi (70 kPa) allowable tolerance on normal pressure. Every 100F (12.20C) equals 15 psi (105 kPa) change.</p>	CHARGING PRESSURE AND TEMPERATURE RELATIONSHIP FOR THE ACCUMULATOR				Ambient Temperature		800 psi (5500 kPa) Pressure*		°F	°C	psi	kPa	20	-7	725	5000	30	-1	740	5105	40	4	755	5235	50	10	770	5340	60	16	785	5420	70	21	800	5500	80	27	815	5605	90	32	830	5735	100	38	845	5840	110	43	860	5920	120	49	875	6000
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120	49	875	6000																																																							

LOCATION/ITEM	ACTION	REMARKS
6. Connection (2)	Attach to nitrogen tanks.	<p style="text-align: center;">ACCUMULATOR VALVE</p>  <p style="text-align: right;">ACCUMULATOR</p>
7. Valve (4)	<p style="text-align: center;">WARNING</p> <p>Be sure hose is firmly attached to valve (4). Close.</p>	
8. Valve on nitrogen tank	Open.	
9. Adjustment screw (6) on regulator	Turn until gage (1) reads 800 psi.	
10. Valve (4)	<p>NOTE Be sure to adjust for ambient temperature, using chart on sheet 2.</p> <p>Open slowly. Leave valve open and charge accumulator until gage (5) reads 800 psi.</p>	
		<p style="text-align: center;">NOTE</p> <p>Correct pressure of nitrogen charge in accumulator is 800 psi (5500 kPa) at 70°F (21°C).</p>

TA098924
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
11. Valve (4)	Close. Check adjusted pressure on gage (5).	<p>NOTE Open and close valve (4) at least two more times to be certain you have charged the accumulator to the correct adjusted pressure.</p>
12. Valve (4)	Be certain valve is closed.	
13. Valve on nitrogen tank	Close.	
14. Valve (7)	Turn counterclockwise to end of travel.	
15. Accumulator valve	Close.	
16. Chuck (8)	Remove.	
<div style="border: 1px solid black; display: inline-block; padding: 2px 10px; margin: 0 auto;">CAUTION</div> <p>A low nitrogen charge can cause early pump failure because of short cycle times between the cut-in and cut-out operations of the accumulator charging valve.</p>		

Section III. BRAKES AND CONTROL VALVES

BRAKE MAINTENANCE INSTRUCTIONS

This section covers maintenance of these brake components for direct support maintenance personnel:

- a. Brake control valve group
- b. Wheel brake assemblies
- c. Brake control valve

LIST OF TASKS

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Brake control valve group removal/installation.	5-26	2-60
2	Brake control valve disassembly/assembly	5-31	2-60
3	Wheel brake assemblies removal/installation.	5-38	2-59
4	Wheel and brake assemblies disassembly	5-44	2-59
5	Wheel and brake assemblies assembly	5-51	2-59

BRAKE CONTROL VALVE GROUP REMOVAL/INSTALLATION

(Sheet 1 of 5)

This task covers: Removal and installation of brake control valve group.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Brake control valve group

Troubleshooting Reference

Page 2-60

Equipment Condition

Brake pressure relieved.

Engine OFF.
Shipping link installed.

Special Tools

None

Personnel Required

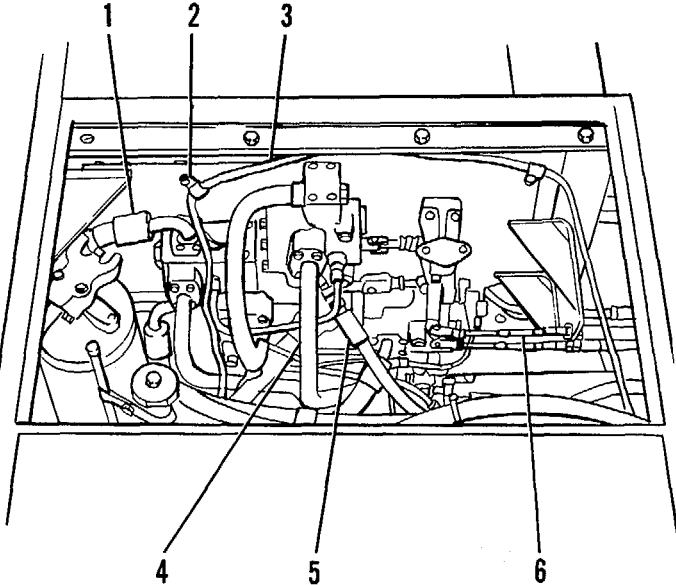
One mechanic

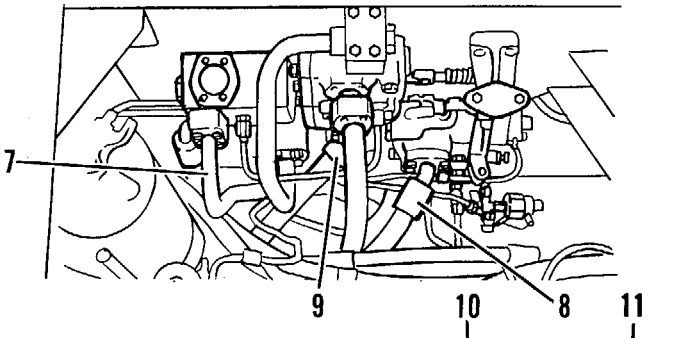
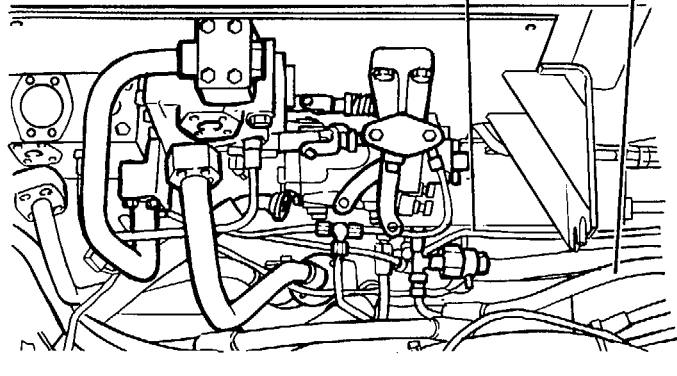
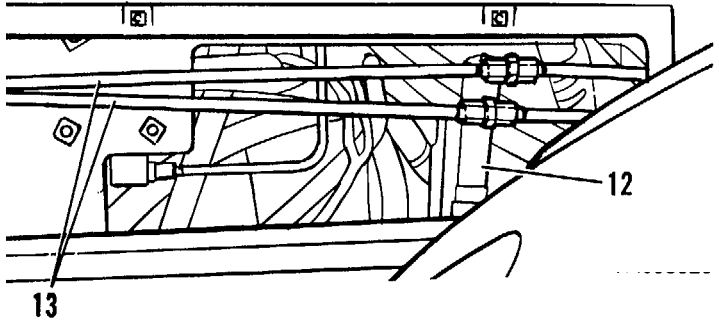
References

Shipping Link Removal/
Installation, TM 10-3930-641-20

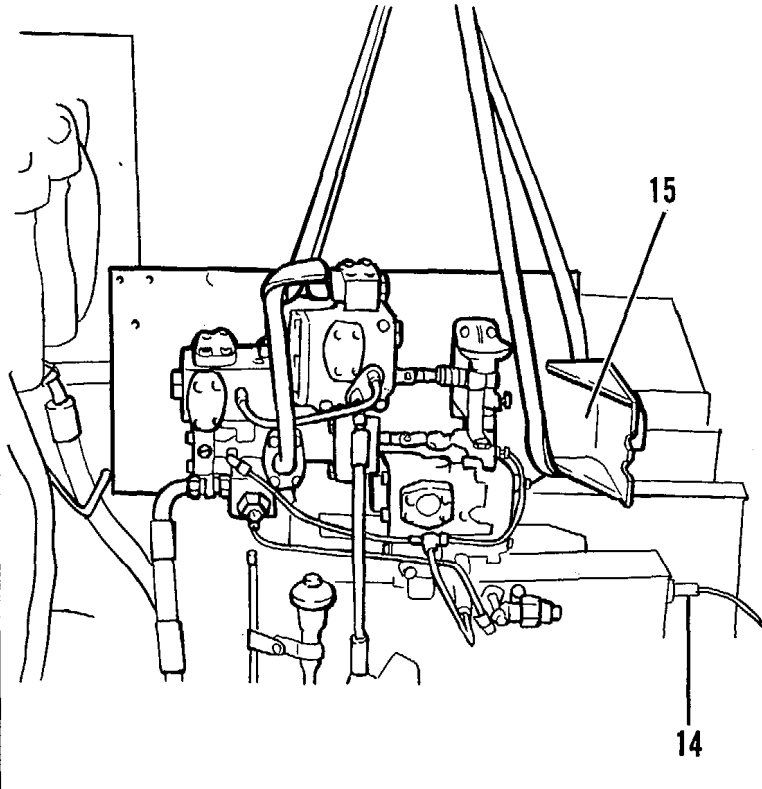
General Safety Instructions

Make sure all pressure in brake system
is released before any lines are dis-
connected.

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <ol style="list-style-type: none"> 1. Door assembly over brake control valve group. 2. Two clips (2) from plate assembly 3. Wire harness (3) 4. Line (1) 5. Tube assembly (4) and line (5) 6. Two brake control cables (6) 	<p style="text-align: center;">NOTE</p> <p>Valves for brake system can be removed separately or as a unit.</p> <p>Open.</p> <p style="text-align: center;">WARNING</p> <p>Make sure all pressure in brake system is released before any lines are disconnected. Remove.</p> <ol style="list-style-type: none"> a. Disconnect at low brake pressure switch, stop light switch and parking brake switch. b. Tag wires for identification later. <p style="text-align: center;">CAUTION</p> <p>Put identification on all hydraulic lines for correct installation of lines for brake control valve group. Cap or plug all openings and lines to keep dirt out of the system.</p> <p>Disconnect from manifold.</p> <p>Disconnect from neutralizer valve.</p> <ol style="list-style-type: none"> a. Remove cotter pin and clevis pin. b. Disconnect from levers. <p style="text-align: center;">NOTE</p> <p>It may be necessary to press the brake pedal to allow removal of the clevis pin.</p> <ol style="list-style-type: none"> c. Disconnect from mounting bracket. 	 <p>The diagram shows a top-down view of the brake control valve group assembly. It is a complex mechanical assembly with various hydraulic lines, hoses, and electrical wires. Six numbered callouts point to specific components: 1 points to a line on the left; 2 points to a clip on the top plate; 3 points to a wire harness; 4 points to a tube assembly; 5 points to a line; and 6 points to two brake control cables on the right side.</p>

LOCATION/ITEM	ACTION	REMARKS
7. Tube assembly (7)	Disconnect from manifold.	
8. Oil inlet line (9) and oil outlet line (8)	Disconnect from accumulator charging valve.	
9. Tube assembly (10) and line (11)	Disconnect from parking brake valve.	
10. Left side access panel	Remove.	
11. Brake accumulator	Relieve pressure: a. Remove valve nut. b. Turn valve 1/2 turn to allow pressure to escape.	
12. Line (12)	Disconnect from brake accumulator.	
13. Tube assemblies (13)	Remove.	
14. Parking brake cable (14)	a. Remove cotter pin and clevis pin to disconnect from parking brake valve. b. Remove from bracket.	

TA098926
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
15. Hoist	Fasten to brake control valve group.	
16. Brake control valve mounting capscrews	Remove.	
17. Brake control valve group (15)	a. Remove from vehicle. b. Group is 160 lb. (73 Kg).	
INSTALLATION		
1. Hoist	a. Fasten to brake control valve group. b. Lower unit until cable assembly can be connected to parking brake valve. c. Lower unit into position and secure with four capscrews.	
CAUTION		
Make sure all hydraulic lines and tube assemblies can be moved into position at brake control valve group.		

LOCATION/ITEM	ACTION	REMARKS
2. Tube assembly (4) and line (5)	Connect to neutralizer valve.	
3. Line (1) for rear brakes	Connect to manifold.	
4. Tube assembly (7) for front brakes	Connect to manifold.	
5. Line (12)	Connect to brake accumulator.	
6. Left guard panel	Install.	
7. Tube assembly (10) and line (11)	Connect to parking brake valve.	
8. Two cable assemblies (6) for brakes	Connect to two levers and plate assembly.	
9. Oil inlet line (9) and oil outlet line (8)	Connect to accumulator charging valve.	
10. Wire harness (3)	a. Connect to sending units under brake control valve and on upper manifold. b. Position on plate assembly and secure with clips.	
11. Brake accumulator	Charge with dry nitrogen gas.	See page 5-21.
12. All valves and cable assemblies in brake control valve group	Adjust.	See TM 10-3930-641-20

This task covers: Disassembly and assembly of brake control valve.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-60

Equipment Condition

Brake control valve group removed.

Special Tools

None

Personnel Required

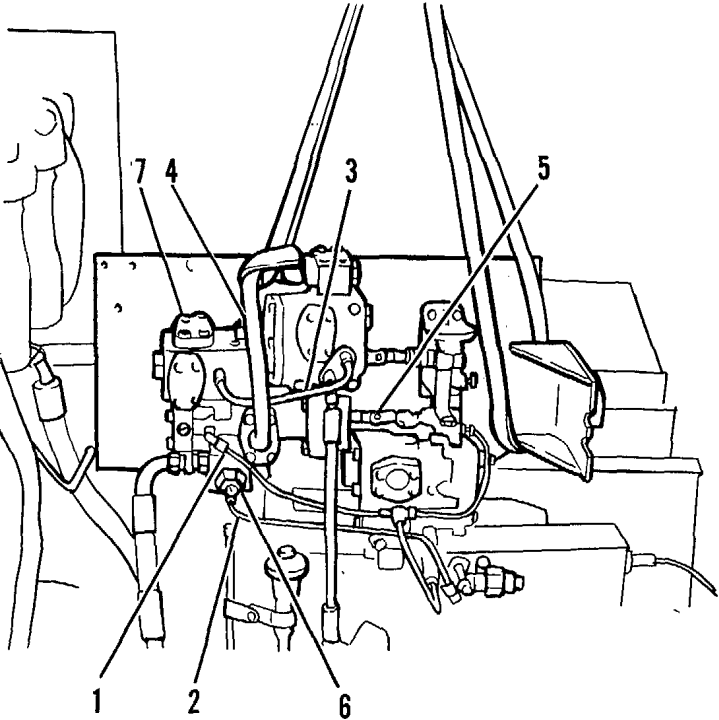
One mechanic

References

Brake control valve group removal/
installation, page 5-26

General Safety Instructions

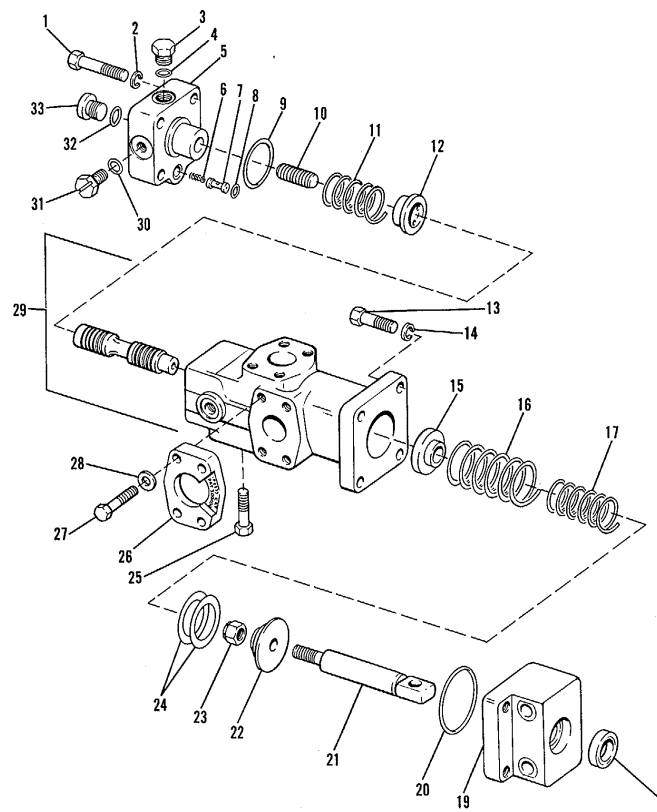
None

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY		
1. Tube assemblies (1 and 2)	Disconnect from manifolds on brake control valve.	
2. Tube assembly (3)	Disconnect from upper manifold on brake control valve.	
3. Tube assembly (4)	Remove.	
4. Brake control valve	Remove cotter pin and clevis pin (5) from cable assembly.	
5. Capscrews (13) and washers (14) that secure brake control valve	Remove. See sheet 3 for art.	
6. Capscrews (27) that secure upper and lower manifold	Remove. See sheet 3 for art.	
7. Manifolds (6 and 7)	Remove.	

TA098928
Go on to Sheet 3

- 1. Capscrew
- 2. Lockwasher
- 3. Plug
- 4. Packing
- 5. Cover
- 6. Spring
- 7. Orifice
- 8. Packing
- 9. Packing
- 10. Piston
- 11. Spring
- 12. Retainer
- 13. Capscrew
- 14. Washer
- 15. Retainer
- 16. Spring
- 17. Spring
- 18. Seal
- 19. Retainer
- 20. Packing
- 21. Stem
- 22. Retainer
- 23. Nut
- 24. Shim
- 25. Capscrew
- 26. Flange
- 27. Capscrew
- 28. Washer

- 29. Valve group
- 30. Packing
- 31. Plug
- 32. Packing
- 33. Plug



TA098929
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
8. Four capscrews (13) washers (14), and retainer (19)	Remove from valve group.	
9. Shims (24)	Remove from retainer (19).	
10. Nut (23),retainer (22) and valve stem (21)	Remove from retainer (19).	
11. Packing (20)	Replace.	
12. Seal (18)	Remove from retainer (19).	
13. Springs (16) and (17)	Remove from valve body.	
14. Retainer (15)	Remove from valve body.	
15. Four capscrews (1),washers (2) that secure cover (5)	Remove.	
16. Cover (5)	Remove.	
17. Piston (10)	Remove from cover (5).	

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
18. Spring (6),orifice (7) and packing (8)	Remove from cover (5).	
19. Spring (11),retainer (12),stem (29), packing (9)	Remove.	
ASSEMBLY	NOTE	
1. Stem (29),retainer (12) and spring (11)	Install in valve body (29).	
2. Piston (10)	Install in cover (5).	
3. Spring (6),orifice (7) and packing (8)	Install in cover (5).	
4. Cover (5),and packing (9)	a. Position on valve body. b. Secure with four capscrews (1),and lockwashers (2).	
5. Retainer (15),large spring (16) and small spring (17)	Install in valve body.	

LOCATION/ITEM	ACTION	REMARKS
6. Lip type seal (18)	Install on retainer (19) with suitable driver. <p style="text-align: center;">NOTE</p> Lip of seal must face inside of retainer.	
7. Valve stem (21)	Install in retainer (19).	
8. Retainer (22)	Install on valve stem (21).	
9. Nut (23)	Install on valve stem and tighten to a torque 32-38 lb. ft. (44-52 N-m).	
10. Shims (24)	Install.	
11. Packing (20)	Replace.	
12. Retainer (19), four capscrews (13), and washers (14)	Install on valve body.	
13. Upper and lower manifolds (6 and 7)	Install on brake control valve.	See sheet 2 for art.

LOCATION/ITEM	ACTION	REMARKS
14. Brake control valve	Position on plate and secure with capscrews.	
15. Tube assembly (4)	Connect to manifold.	
16. Stem of control valve	Position in rod end and install clevis pin and cotter pin (5).	
17. Tube assembly (3)	Connect to upper manifold.	
18. Tube assemblies (1 and 2)	Install.	
19. Brake control valve group	Install.	See page 5-26.

This task covers: Removal and installation of wheel brake assemblies.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-59

Equipment Condition

Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

References

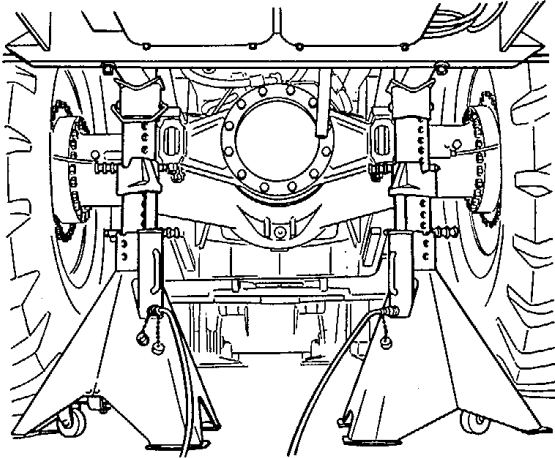
Shipping link installation/removal,
TM 10-3930-641-20

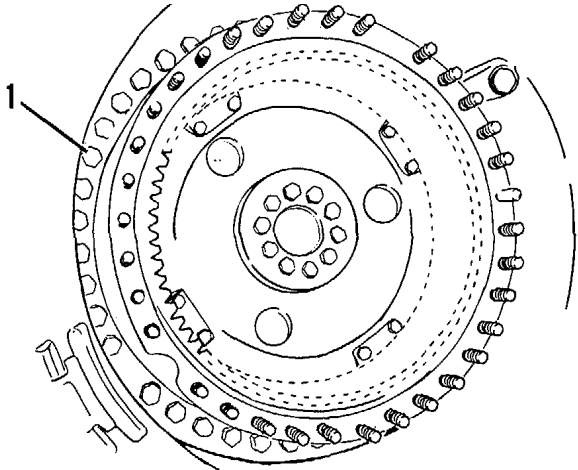
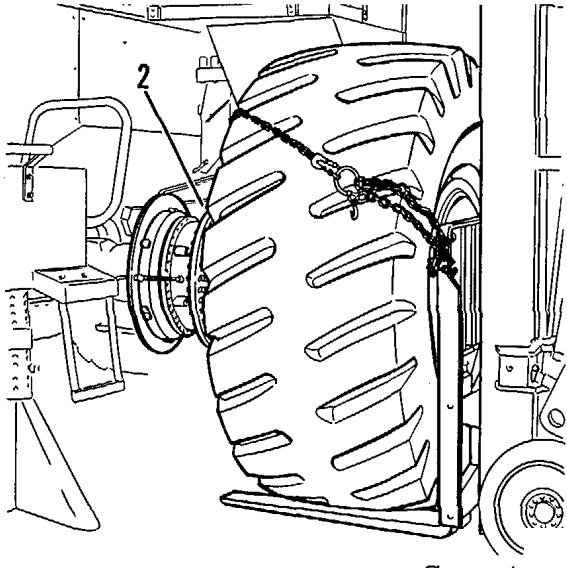
Tire and rim removal/installation,
pages 5-80 and 5-82.

Crankcase guard removal/installation,
TM 10-3930-641-20

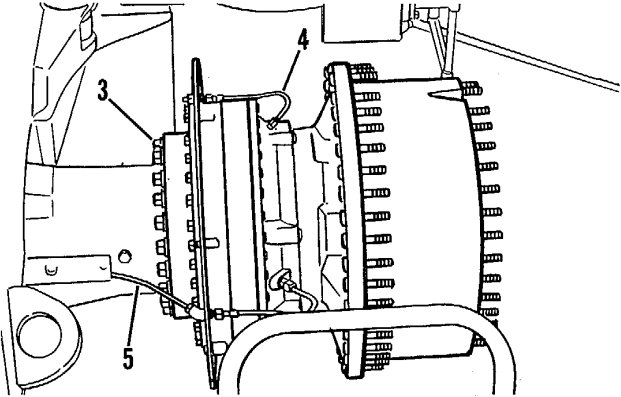
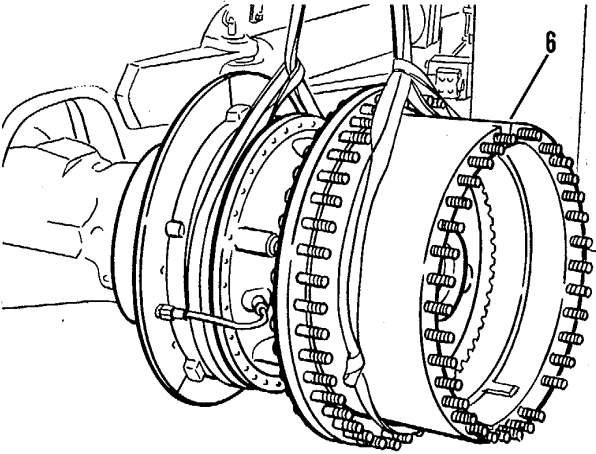
General Safety Instructions

None

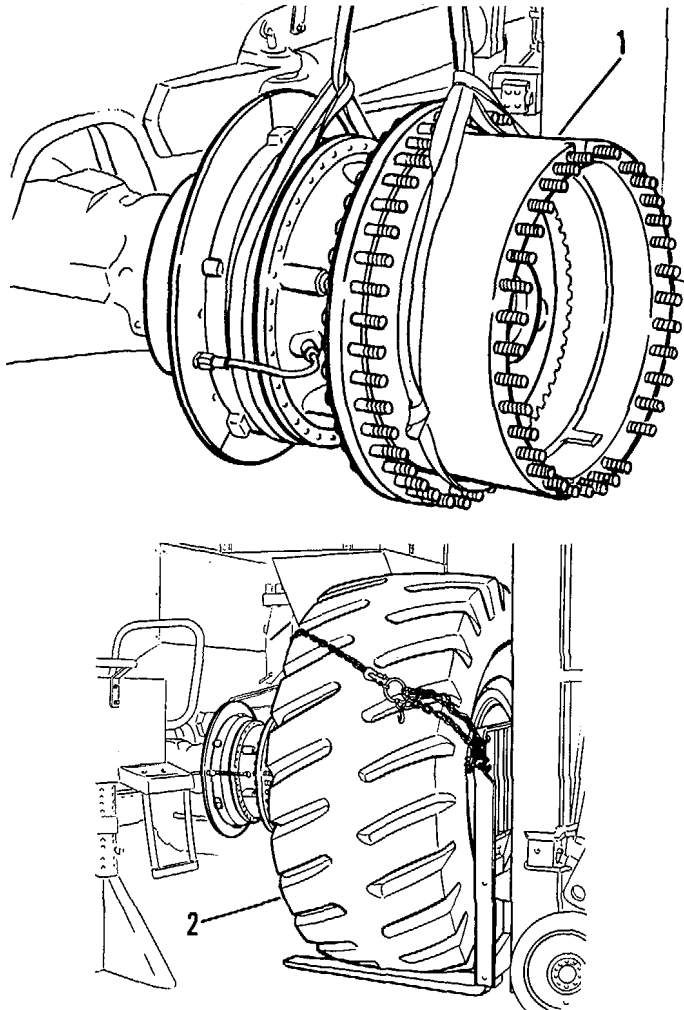
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div>		<p>See TM 10-3930-641-20 See page 4-254</p>
<p>1. Crankcase guards</p>	<p>Remove.</p>	
<p>2. Final drive planet carriers</p>	<p>Remove.</p>	
<p>NOTE</p> <p>Removal procedures for front and back assemblies are basically the same. The only difference is in the tooling used to lift the vehicle.</p>		
<p>3. Parking brake</p>	<p>Engage.</p>	
<p>4. Wood blocks</p>	<p>Place in front of front tires.</p>	
<p>5. Lifting rear of machine</p>	<p>a. Put jacks under rear main frame as shown. b. Lift machine until tires are off floor.</p>	
<p>6. Lift front of machine</p>	<p>a. Put wood block behind rear tires. b. Put jacks under front main frame. c. Lift machine until tires are off floor.</p>	
		<p>See Remove Tires and rims, Page 5-80.</p>

LOCATION/ITEM	ACTION	REMARKS
7. Nuts (1) and washers	Remove those holding tire and rim to wheel assembly.	
8. Tire and rim	<p>a. Remove using lift truck.</p> <p>b. Put forks under tire (2) and rim.</p> <p>c. Fasten chain to tire and rim and remove (3000 lb.-1361 Kg.).</p>	

TA098931
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
10. Tube assembly (4)	Remove.	
11. Brake oil supply tube assembly (5)	Disconnect.	
12. Wheel and wheel brake assembly	<p>a. Fasten hoist to wheel assembly and wheel brake assembly.</p> <p>b. Remove nuts (3) and washers that hold unit in place.</p>	
13. Wheel and wheel brake assembly	Remove as a unit (6) (1500 lb.-680.4 Kg.).	

TA098932
Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> <li>1. Wheel assembly and wheel brake assembly <li>2. Washers and nuts <li>3. Brake supply tube assembly <li>4. Tire (2) and rim 	<p>Fasten hoist to assemblies. Put unit (1) into position on axle housing. Make sure brake tube assemblies aline with each other.</p> <p>Install.</p> <p>Install tube assembly to remove air (bleed) from brake system.</p> <ol style="list-style-type: none"> <li>a. Install on wheel assembly with a lift truck. <li>b. Install nuts and washers holding unit in place. Tighten nuts to a torque of 315-385 lb. ft. (425-515 N-). 	

TA098933
Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
5. Lower machine to floor	Use hydraulic jacks.	
6. Final drive planet carriers	Install.	See page 4-254.
7. Crankcase guards	Install.	See TM 10-3930-641-20.

This task covers: Disassembly of wheel and brake assemblies.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-59

Equipment Condition

Wheel brake assemblies removed.

Special Tools

None

Personnel Required

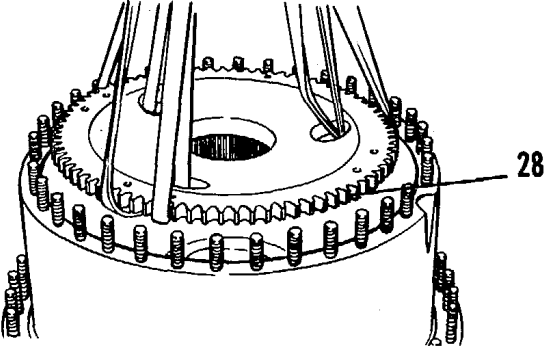
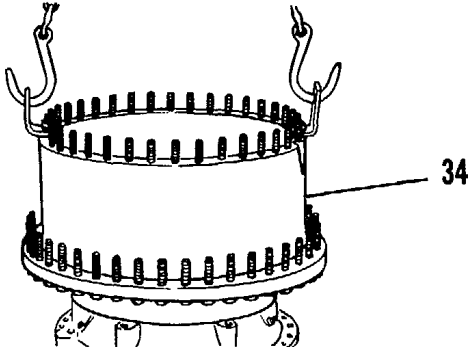
Two mechanics

References

Wheel brake assemblies removal/
Installation, page 5-38.

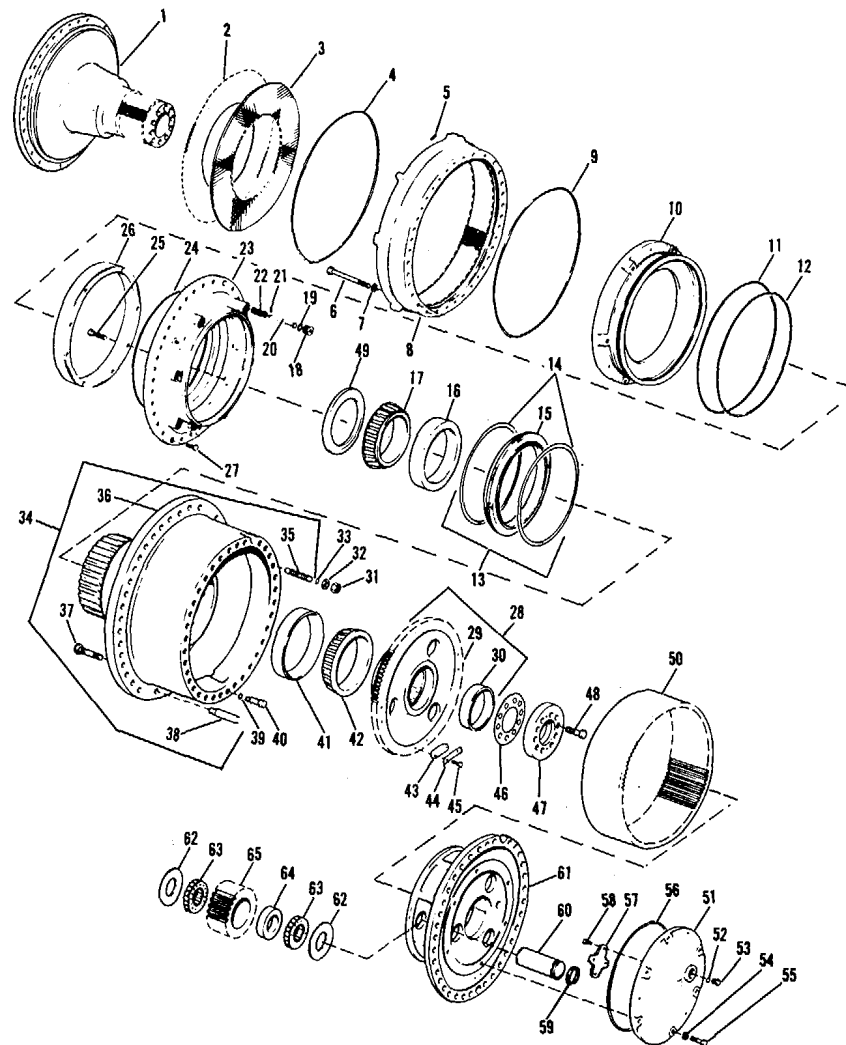
General Safety Instructions

None

LOCATION/ITEM	ACTION	REMARKS
1. Wheel and brake assemblies	Position as unit on large end of spindle (1).	
2. Capscrews (48), ring (47) and shims (46)	Remove from small end of spindle (1).	
3. Hub assembly (28)	<p>a. Fasten to hoist as shown.</p> <p>b. Remove from spindle (1).</p>	
4. Bearing (42) and bushing (30)	Remove from hub (29).	
5. Wheel assembly (34)	<p>a. Fasten to hoist as shown.</p> <p>b. Remove from spindle (1).</p>	
	<p>NOTE</p> <p>Hub assembly weighs 100 lb. (45.4 kg).</p> <p>Wheel assembly weighs 590 lb. (267.6 kg).</p>	

WHEEL AND BRAKE ASSEMBLY DISASSEMBLY (CONT)

- | | |
|---------------------------------|---------------------------------|
| 1. Wheel spindle | 34. Wheel assembly |
| 2. Outer plate | 35. Stud |
| 3. Friction disc | 36. Wheel |
| 4. Preformed packing | 37. Stud |
| 5. Pin | 38. Dowel |
| 6. Capscrew | 39. Preformed packing |
| 7. Washer | 40. Plug |
| 8. Brake disc housing | 41. Tapered roller bearing cup |
| 9. Preformed packing | 42. Tapered roller bearing cone |
| 10. Piston | 43. Retainer |
| 11. D-ring packing | 44. Nut lock |
| 12. D-ring packing | 45. Capscrew |
| 13. Duo cone seal group | 46. Shim |
| 14. Toric sealing ring | 47. Ring |
| 15. Ring seal | 48. Capscrew |
| 16. Tapered roller bearing cup | 49. Spacer |
| 17. Tapered roller bearing cone | 50. Ring gear |
| 18. Plug | 51. Cover |
| 19. Preformed packing | 52. Preformed packing |
| 20. Spring guide | 53. Plug |
| 21. Pin | 54. Lockwasher |
| 22. Piston return spring | 55. Capscrew |
| 23. Brake piston housing | 56. Preformed packing |
| 24. Preformed packing | 57. Plate |
| 25. Capscrew | 58. Capscrew |
| 26. Sleeve | 59. Retaining ring |
| 27. Capscrew | 60. Planet shaft |
| 28. Hub assembly | 61. Planet carrier |
| 29. Intermediate gear hub | 62. Washer |
| 30. Bushing | 63. Roller bearing assembly |
| 31. Hex nut | 64. Spacer |
| 32. Washer | 65. Planet gear |
| 33. Preformed packing | |

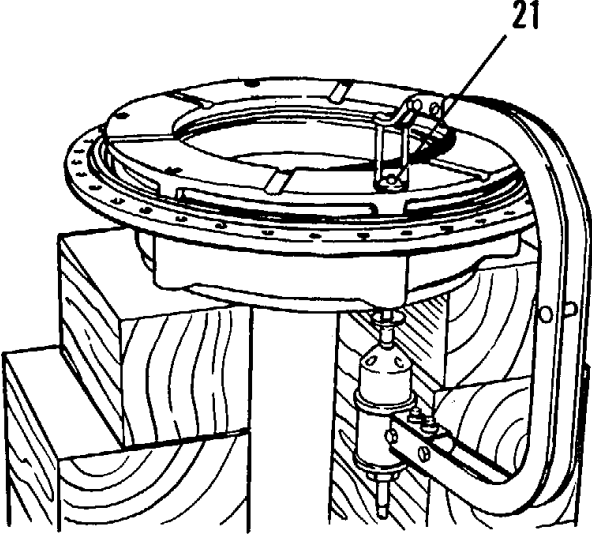


WHEEL AND BRAKE ASSEMBLIES DISASSEMBLY (CONT)

(Sheet 4 of 7)

LOCATION/ITEM	ACTION	REMARKS
6. Duo-cone seals (13)	a. Remove from wheel assembly. b. Put identification on seals for correct installation later.	
7. Two bearing cups (41)	Remove from wheel assembly (34).	
8. Capscrews (48) that hold brake to spindle	Remove.	
9. Capscrews that hold housing (23) to housing (8)	Remove.	
10. Brake line (tube assembly)	Remove.	
11. Housing assembly (23)	a. Fasten to hoist. b. Remove from spindle (1).	
<p style="text-align: center;">NOTE</p> Housing weighs 180 lb. (81.6 kg).		

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
12. Six plugs (18) and preformed packings (19)	Remove from housing (23).	
13. Housing assembly (23)	Turn over and put on wood blocks.	
14. Six guides (20), pins (21), return springs (22)	a. Install a 2" x .75" (50.8 mm long x 19.1 mm dia.) piece of bar stock in guide bore. b. Install valve compressor around bore. c. Compress spring (22) until pin (21) can be removed. d. Remove valve compressor. e. Remove guide (20) and spring (22) from guide bore.	 <p>TA098936 Go on to Sheet 6</p>

LOCATION/ITEM	ACTION	REMARKS
15. Piston (10)	a. Install three 3/8"-16 NC forcing screws in piston (10). b. Tighten screws evenly until piston is loose in housing. c. Remove piston. NOTE Piston weighs 49 lb. (22 kg).	
16. Preformed packings (11) and (12)	Replace.	
17. Eight capscrews (25) and sleeve (26)	Remove from housing.	
18. Preformed packing (24)	Remove and discard.	
19. Bearing (17) and spacer (49)	Remove from spindle (1).	

Go on to Sheet 7

WHEEL AND BRAKE ASSEMBLIES DISASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
20. Eight plates (2) and seven discs (3)	Remove from housing (8)	
21. Housing (8)	a. Fasten to hoist. b. Remove from spindle. <p style="text-align: center;">NOTE Housing weighs 144 lb. (65.3 kg).</p>	
22. Preformed packing (4)	Remove and discard.	

End

This task covers: Assembly of wheel and brake assemblies.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-59

Equipment Condition

Wheel brake assemblies removed.

Special Tools

None

Personnel Required

One mechanic

References

Wheel brake assemblies removal/
installation, Page 5-38.

Wheel bearing adjustment, page 5-91.

General Safety Instructions

None

Go on to Sheet 2

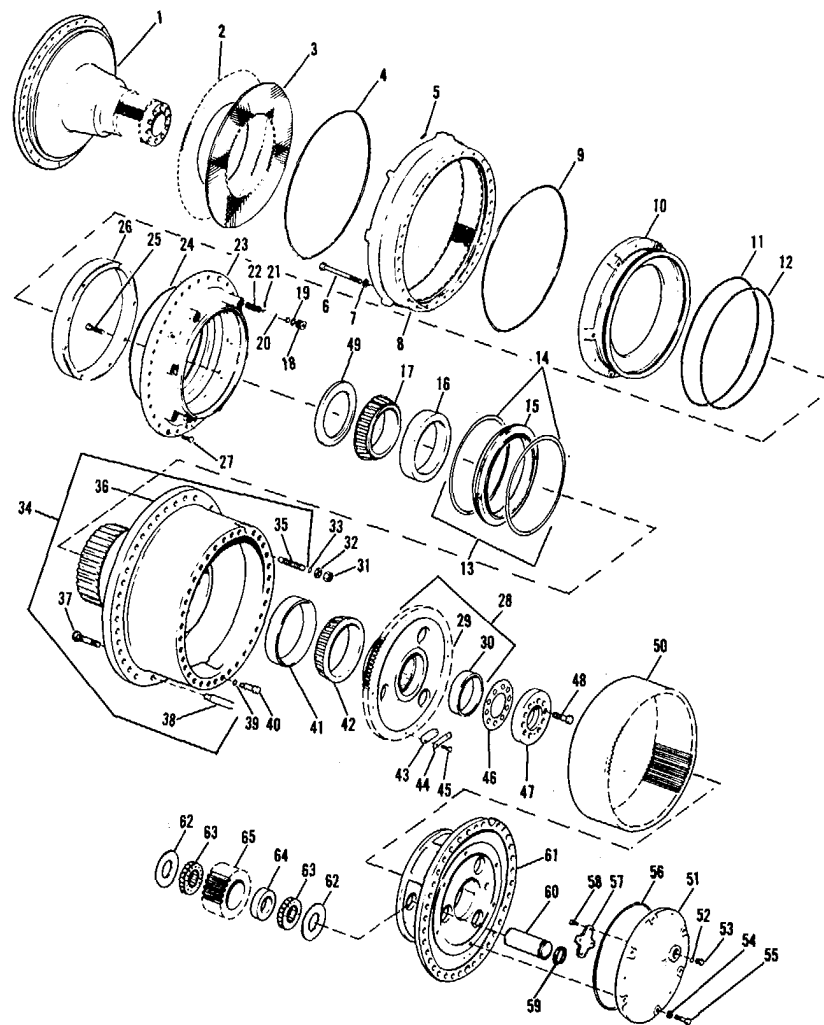
LOCATION/ITEM	ACTION	REMARKS
<p>1. Bearing (42)</p>	<p>a. Heat to maximum temperature of 275°F (135°C).</p> <p>b. Install on hub (29).</p> <p style="text-align: center;">NOTE</p> <p>Be sure bearing contacts shoulder of hub.</p>	
<p>2. Hub (29)</p>	<p>Turn over.</p>	
<p>3. Bushing (30)</p>	<p>a. Lower temperature of bushing.</p> <p>b. Install in hub (29).</p> <p style="text-align: center;">NOTE</p> <p>Be sure edge of bushing lies flush or below top of bushing bore.</p> <p style="text-align: center;">5-52</p>	

Go on to Sheet 3

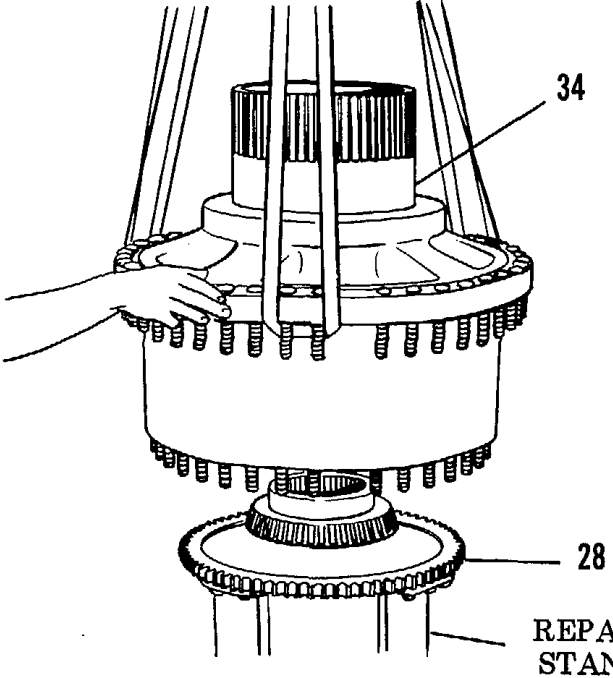
WHEEL AND BRAKE ASSEMBLIES ASSEMBLY (CONT)

(Sheet 3 of 9)

- | | |
|---------------------------------|---------------------------------|
| 1. Wheel spindle | 34. Wheel assembly |
| 2. Outer plate | 35. Stud |
| 3. friction disc | 36. Wheel |
| 4. Preformed packing | 37. Stud |
| 5. Pin | 38. Dowel |
| 6. Capscrew | 39. Preformed packing |
| 7. Washer | 40. Plug |
| 8. Brake disc housing | 41. Tapered roller bearing cup |
| 9. Preformed packing | 42. Tapered roller bearing cone |
| 10. Piston | 43. Retainer |
| 11. Preformed packing | 44. Nut lock |
| 12. Preformed packing | 46. Capscrew |
| 13. Duo cone seal group | 46. Shim |
| 14. Toric sealing ring | 47. Ring |
| 15. Ring seal | 48. Capscrew |
| 16. Tapered roller bearing cup | 49. Spacer |
| 17. Tapered roller bearing cone | 50. Ring gear |
| 18. Plug | 51. Cover |
| 19. Preformed packing | 52. Preformed packing |
| 20. Spring guide | 53. Plug |
| 21. Pin | 54. Lockwasher |
| 22. Piston return spring | 55. Capscrew |
| 23. Brake piston housing | 56. Preformed packing |
| 24. Preformed packing | 57. Plate |
| 25. Capscrew | 58. Capscrew |
| 26. Sleeve | 59. Retaining ring |
| 27. Capscrew | 60. Planet shaft |
| 28. Hub assembly | 61. Planet carrier |
| 29. Intermediate gear hub | 62. Washer |
| 30. Bushing | 63. Roller bearing assembly |
| 31. Hex nut | 64. Spacer |
| 32. Washer | 65. Planet gear |
| 33. Preformed packing | |



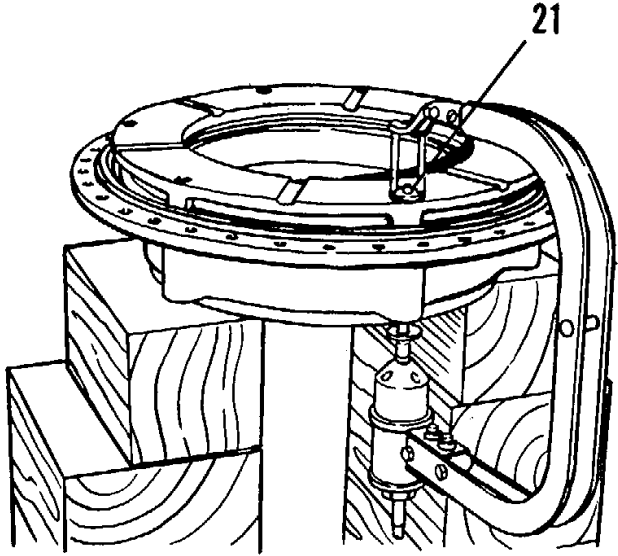
TA098937
Go on to sheet 4

LOCATION/ITEM	ACTION	REMARKS
4. Wheel assembly (34)	Turn over.	
5. Bearing cup (16)	Lower temperature of cup and install in wheel assembly (34).	
	<p style="text-align: center;">NOTE</p> <p>Be sure bottom of cup is flush with counter-bore in assembly.</p>	
6. Hub assembly (28)	Fasten to repair stand as shown.	
7. Wheel assembly (34)	<p>a. Fasten to hoist.</p> <p>b. Position over hub assembly.</p>	 <p style="text-align: right;">REPAIR STAND</p>

TA098938
Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
8. Preformed packing (12)	a. Install in sleeve (26). b. Coat with clean oil.	
9. Sleeve (26)	a. Install. b. Secure with eight capscrews (25).	
10. Preformed packing (11)	a. Install in piston (10). b. Coat with clean oil.	
11. Piston (10)	Install. <p style="text-align: center;">NOTE</p> Using soft faced hammer, tap piston to be sure it is completely installed in housing.	
12. Spring (22)	Slide over guide (20).	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
13. Each spring (22) and guide (20)	a. Install in housing (23). b. Using a valve compressor and piece of bar stock 2" long x .75" dia. (50.8 mm x 19.1 mm), compress guide until pin (21) can be installed.	
14. Preformed packing (24)	Install in housing (23).	
15. Housing (23)	Turn over.	
16. Six plugs (18)	Install.	
17. Duo-cone seals (13)	a. Thoroughly clean and dry all seals and seal contact surfaces in housing (23) and wheel assembly (34). b. Coat seals with clean. SAE 30 oil. c. Using suitable tooling install seal in housing (23).	

TA098939
Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
18. Brake housing (23)	<p>d. Use same tool to install seal in wheel assembly (34).</p> <p>a. Fasten to hoist.</p> <p>b. Put in position on wheel assembly (34).</p> <p style="text-align: center;">NOTE</p> <p>Do not damage Duo-Cone seals when brake housing is put into position.</p>	
19. Eight plates (2) and seven discs (3)	<p>Install.</p> <p style="text-align: center;">NOTE</p> <p>Start with a plate and end with a plate.</p>	
20. Two 1/2-13 NC x 10 guide pins	<p>Install in housing (23).</p> <p style="text-align: center;">5-57</p>	

Go on to Sheet 8

LOCATION/ITEM	ACTION	REMARKS
21. Housing (16)	a. Fasten to hoist.	
b.	Lower housing over guide pins, plates and discs.	
	NOTE	
	Be sure tabs in plates engage with grooves in housing.	
22. Two guide pins	Remove from housing (23).	
23. Two capscrews that secure housing (8) to housing (23)	Install.	
24. Spacer (49) and bearing (17)	Install on spindle.	

Go on to Sheet 9

WHEEL AND BRAKE ASSEMBLIES ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
25. Preformed packing (4)	Install on spindle (1).	
26. Spindle (1)	a. Fasten to hoist. b. Lower into position in wheel and brake assembly.	
27. Capscrews (6) that secure spindle (1) to housing (8)	Install.	
28. Ring (47) and six capscrews (48)	Install.	
29. Wheel and brake assemblies	a. Fasten to hoist. b. Remove from repair stand.	
30. Wheel bearings	Adjust.	See page 5-91.

Section IV. PARKING BRAKE:

PARKING BRAKE MAINTENANCE INSTRUCTIONS

This section covers maintenance of these brake components for direct support maintenance personnel:

- a. Parking brake control valve
- b. Parking brake

LIST OF TASKS

(Sheet 1 of 1)

TASK NO	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Parking brake control valve removal installation.	5-61	2-62
2	Parking brake control valve disassembly assembly.	5-63	2-62
3	Parking brake removal/installation.	5-68	2-63
4	Parking brake disassembly.	5-71	2-63
5	Parking brake assembly.	5-75	2-63
	5-60		

PARKING BRAKE CONTROL VALVE REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal/installation of parking brake control valve.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-62

Equipment Condition

Brake control valve group removed.

Special Tools

None

Personnel Required

One mechanic

References

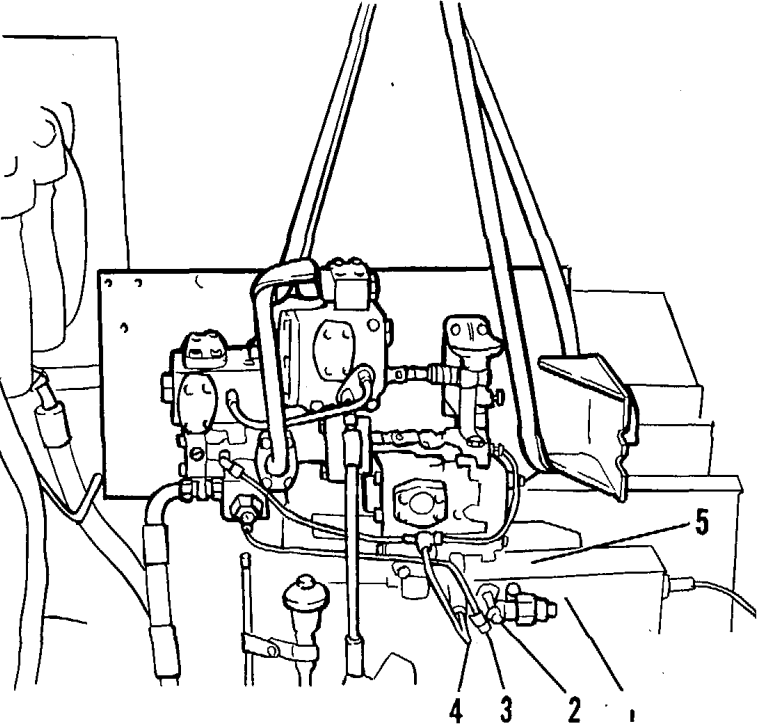
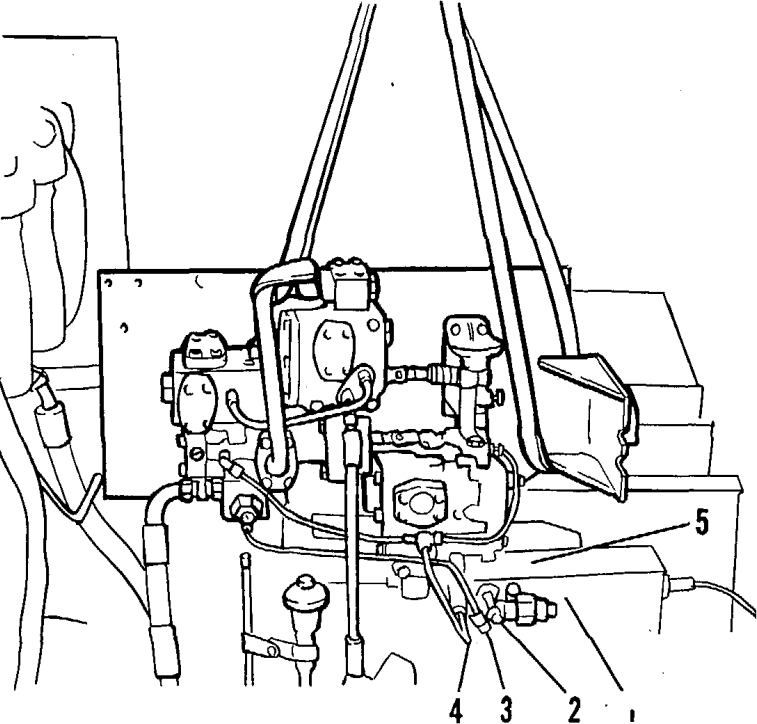
Brake control valve group removal/
installation, page 5-26.

General Safety Instructions

None

Go on to Sheet 2

PARKING BRAKE CONTROL VALVE REMOVAL/INSTRUCTION

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Brake control valve group	Remove.	See page 5-26.
2. Cotter pin and clevis pin (1)	a. Remove. b. Disconnect parking brake linkage from control valve.	
3. Brake lines (2, 3 and 4)	a. Disconnect from control valve. b. Cap or plug opening.	
4. Capscrews (5)	a. Remove. b. Remove control valve from bracket.	
INSTALLATION		
1. Parking brake control valve	Position on bracket.	
2. Capscrews (5)	Install to secure control valve.	
3. Brake lines (2, 3.and 4)	Connect.	
4. Parking brake linkage	a. Position on control valve. b. Secure with cotter pin and clevis pin (1).	
5. Brake control valve group	Install.	See page 5-26.

This task covers: Disassembly/assembly of parking brake control valve.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-62

Equipment Condition

Brake control valve group removed.

Parking brake control valve removed.

Special Tools

None

Personnel Required

One mechanic

References

Brake control valve group removal/
installation, page 5-26.

General Safety Instructions

None

Go on to Sheet 2

PARKING BRAKE CONTROL VALVE DISASSEMBLY/ASSEMBLY(CONT)

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY		
1. Three capscrews that secure parking brake valve to bracket	Remove.	
2. Parking brake valve	Remove from bracket.	
3. Switch and adapter	Remove from parking brake valve.	
4. Nut and eye	Remove from valve stem (10).	
5. Two capscrews (1)	Remove.	
6. Cover (3) and body (9)	Remove.	
7. Teflon seal (7) and preformed packing (8) behind it	Remove and discard.	
8. Preformed packings (5) and (4)	Remove and discard	
9. Stem (10) and cover (17)	Remove.	
10. Plug (12) and preformed packing	Remove from end of stem (10)	

LOCATION/ITEM	ACTION	REMARKS
11. Snap ring (14) and seal (15)	Remove from cover.	
12. Preformed packing (16) in cover	Remove and discard.	
13. Plug (19), spring and plunger	Remove from cover.	
14. Preformed packing (18) on plug	Remove and discard.	
ASSEMBLY	<p>NOTE</p> <p>Be sure all parts of parking brake valve are clean. Lubricate all parts with clean hydraulic oil.</p>	
1. Preformed packing (16) inside of cover (17)	Replace.	
2. Lip type seal (15)	Install in cover with tooling until seal contacts counterbore. Lip is toward inside of cover.	
3. Snap ring (14)	Install over seal.	

Go on to Sheet 5

PARKING BRAKE CONTROL VALVE DISASSEMBLY/ASSEMBLY(CONT)

LOCATION/ITEM	ACTION	REMARKS
4. Preformed packing (8) and teflon seal (7)	Install in valve body (9).	
5. Preformed packing (5)	Install.	
6. Plug (12) and seal (11)	a. Install in end of stem (10). b. Tighten plug to a torque of 7-11 lb. ft. (9-15 N-m).	
7. Stem (10)	Install in cover (17).	
8. Valve body (9) and cover (3)	a. Position on cover (17). b. Secure with two capscrews.	
9. Switch and adapter	Install on parking brake valve.	
10. Locknut and eye	Install on stem.	
11. Plunger, spring and plug (19)	Install in cover.	
12. Parking brake valve	a. Position on bracket. b. Secure with capscrews.	
13. Brake valve and bracket	a. Position on plate assembly. b. Secure with nuts.	

End

PARKING BRAKE REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal of parking brake.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-63

Equipment Condition

Transmission and transfer gears removed.

Special Tools

None

Personnel Required

Two mechanics

References

Transmission and transfer assembly removal/installation, pages 4-43 and 4-56.

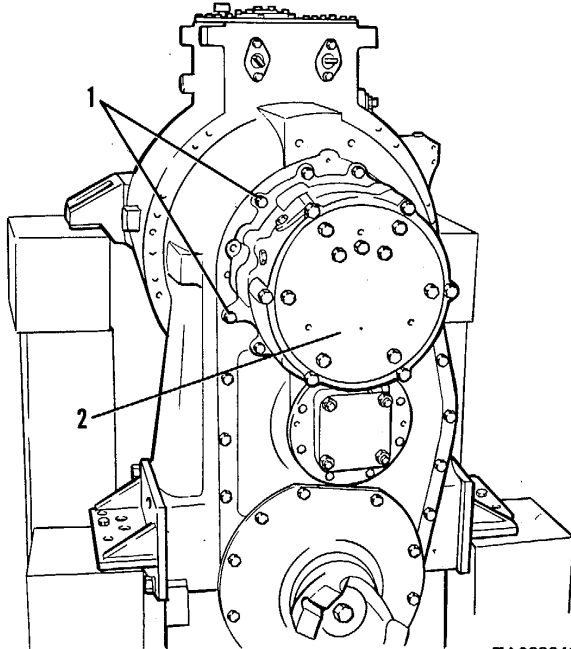
General Safety Instructions

Block wheels.

Go on to Sheet 2

PARKING BRAKE REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1. Transmission and transfer gears	Remove. NOTE It is necessary to remove the transmission and transfer gears for the removal of the parking brake.	S 
2. Parking brake guard	Remove.	
3. Capscrews (1) securing parking brake to transfer gear case	Remove.	
4. Parking brake (2)	Fasten hoist and remove. Parking brake weighs 200 lb. (91 Kg).	
5. Preformed packing in parking brake cage	Replace if damaged.	

TA098942
Go on to Sheet 3

PARKING BRAKE REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">INSTALLATION</div> <p>1. Parking brake (2)</p> <p>2. Capscrews (1) securing parking brake to transfer gear case</p> <p>3. Transmission and transfer gears</p>	<p>Fasten hoist and put in position on transfer gear case.</p> <p>Install.</p> <p>Install.</p> <p style="text-align: center;">5-70</p>	<p>See page 4-56.</p> <p style="text-align: right;">END</p>

This task covers: Disassembly of parking brake components.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-63.

Equipment Condition

Parking brake removed from vehicle.

Special Tools

None

Personnel Required

One mechanic

References

Removal of parking brake, page 5-68

General Safety Instructions

Remove housing capscrews slowly and evenly to release spring tension.

Go on to Sheet 2

PARKING BRAKE DISASSEMBLY (CONT)

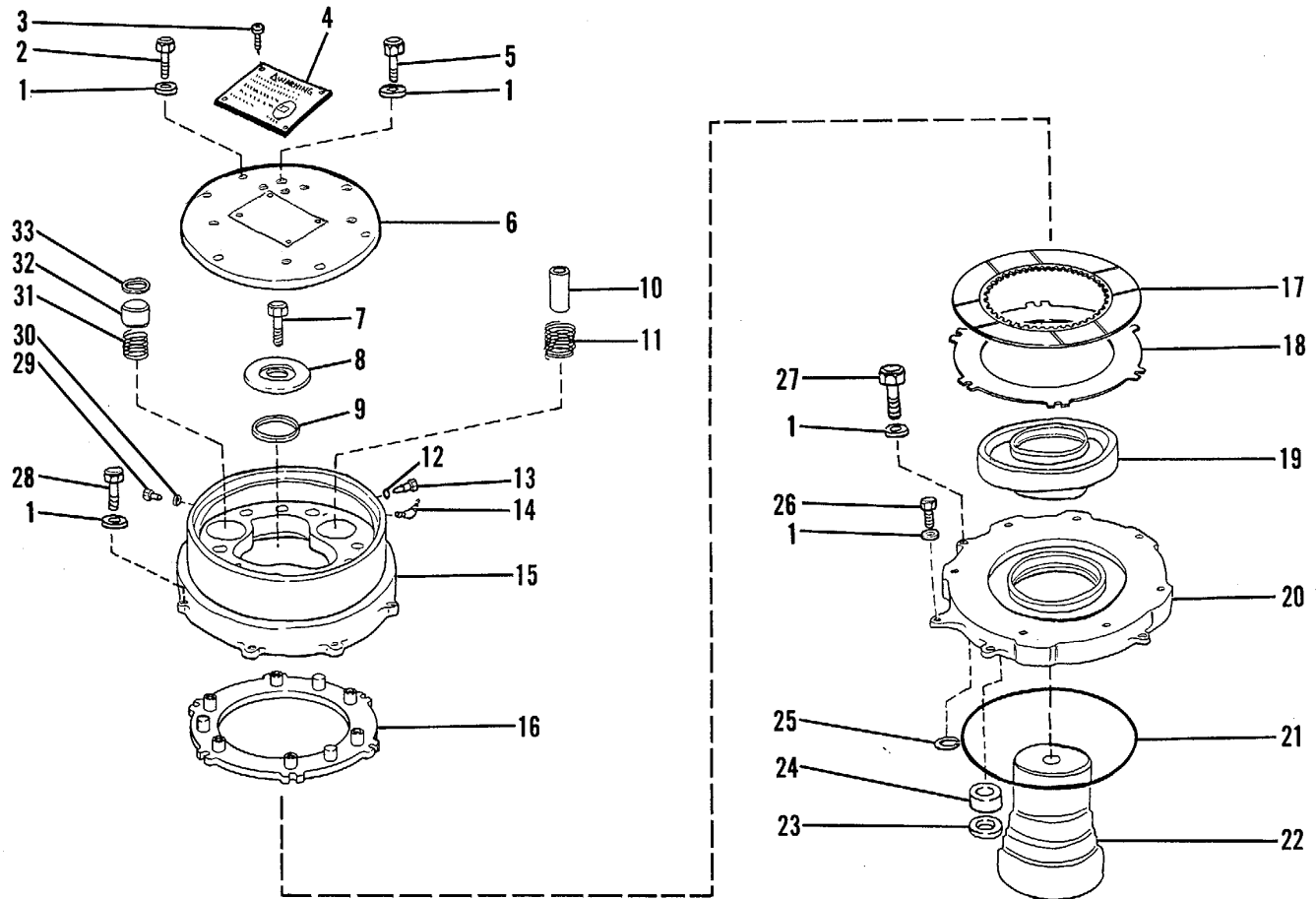
LOCATION/ITEM	ACTION	REMARKS
1. Parking brake	a. Remove. b. Place on two wood blocks.	See page 5-68.
2. Six capscrews (2), washers and plate (6)	Remove from housing assembly (15).	
3. 3/8-16 NC forged eyebolt	Install in piston (32).	
4. Piston (32)	Pull out of bore in housing assembly.	
5. Spring (31) and preformed packing (33)	Remove from bore.	
6. Other two pistons, springs, and preformed packings	Remove from housing assembly.	
7. Spacer (10)	Remove from housing assembly.	
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div>	
	Remove capscrews (28) slowly and evenly to release tension from springs behind housing assembly (15).	
8. Housing assembly (15)	Remove from parking brake.	
	NOTE Mark top side of parking brake.	
	5-72	

Go on to Sheet 3

PARKING BRAKE DISASSEMBLY (CONT)

(Sheet 3 of 4)

1. Washer
2. Capscrew
3. Screw
4. Warning plate
5. Capscrew
6. Retaining plate
7. Capscrew
8. Retainer
9. Preformed packing
10. Spacer
11. Spring
12. Ball
13. Bleeder screw
14. Grease fitting
15. Housing assembly
16. Pressure plate
17. Brake disc assembly
18. Clutch plate
19. Hub
20. Bearing cage
21. Preformed packing
22. Brake shaft
23. Lip type seal
24. Ball bearing
25. Retaining ring
26. Capscrew
27. Capscrew
28. Capscrew
29. Plug
30. Preformed packing
31. Spring
32. Piston
33. Preformed packing



TA098943
Go on to Sheet 4

PARKING BRAKE DISASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
9. Springs (11)	Remove from plate.	
10. Plate (16)	Remove.	
11. Three plates (18) and four disc assemblies (17)	Remove.	
12. Capscrew (7) and retainer (8)	Remove from shaft.	
13. Hub (19)	Remove from shaft.	
14. Shaft (22)	Remove from bottom side of cage (20).	
15. Seal (23), ring (25), and bearing (24)	Remove from cage (20).	
		End

PARKING BRAKE ASSEMBLY

(Sheet 1 of 4)

This task covers: Assembly of parking brake.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Wooden blocks

Troubleshooting Reference

Page 2-63

Equipment Condition

Parking brake disassembled;
components clean and dry.

Special Tools

None

Personnel Required

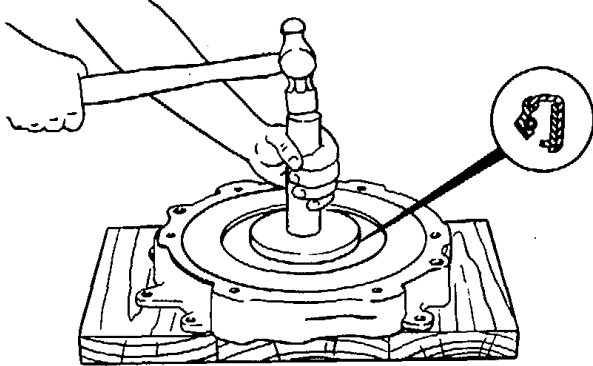
One mechanic

References

Parking brake disassembly, page 5-71

General Safety Instructions

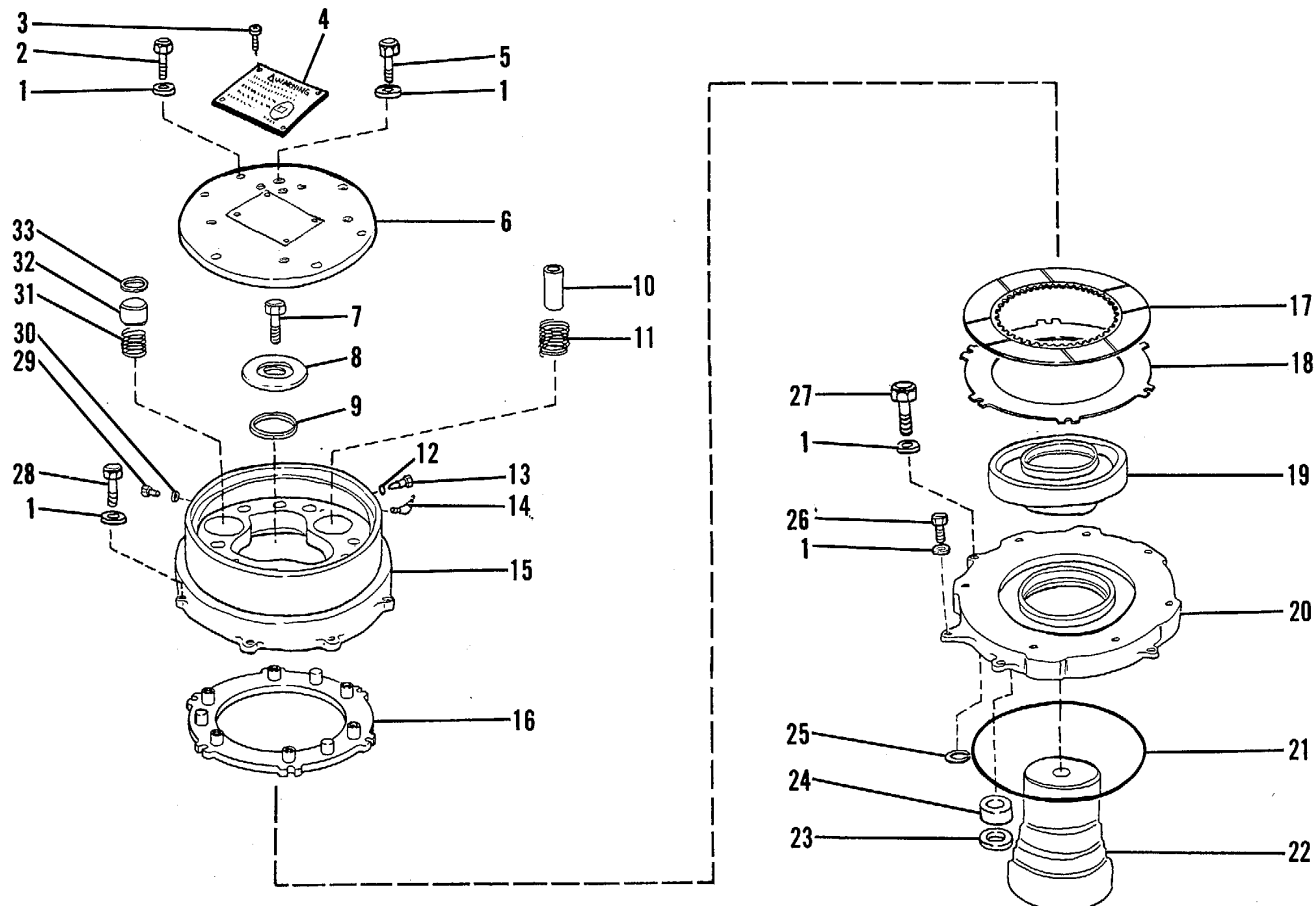
None

LOCATION/ITEM	ACTION	REMARKS
1. Parking brake cage (20)	Place on two wood blocks.	
2. Bearing (24)	Install in cage (20) until it makes contact with counterbore.	
3. Ring (25)	Install ring that holds bearing in position.	
4. Lip type seal (23)	a. Install in cage.	
	b. Install seal until it makes contact with counterbore and with lip as shown.	
5. Shaft (22)	Install from bottom of cage.	
6. Hub (19)	Install over shaft.	
7. Preformed packing (9)	Install in end of shaft.	
8. Retainer (8)	Install capscrew that holds it. Tighten to a torque of 80-90 lb. ft. (109-121 N-m).	
9. Four disc assemblies (17) and three plates (18)	Install. Start with disc assembly and alternate a plate with a disc.	

PARKING BRAKE ASSEMBLY (CONT)

(Sheet 3 of 4)

1. Washer
2. Capscrew
3. Screw
4. Warning plate
5. Capscrew
6. Retaining plate
7. Capscrew
8. Retainer
9. Preformed packing
10. Spacer
11. Spring
12. Ball
13. Bleeder screw
14. Grease fitting
15. Housing assembly
16. Pressure plate
17. Brake disc assembly
18. Clutch plate
19. Hub
20. Bearing cage
21. Preformed packing
22. Brake shaft
23. Lip type seal
24. Ball bearing
25. Retaining ring
26. Capscrew
27. Capscrew
28. Capscrew
29. Plug
30. Preformed packing
31. Spring
32. Piston
33. Preformed packing



PARKING BRAKE ASSEMBLY (CONT)

(Sheet 4 of 4)

LOCATION/ITEM	ACTION	REMARKS
10. Large plate (16) and springs (11)	Install.	
11. Housing assembly (15)	Install with capscrews (28) and washers (1).	
12. Preformed packing (33)	Install in bores of housing assembly (15).	
13. Spring (31) and piston (32)	Install.	
14. Remaining two pistons, springs and preformed packing	Install in bores of housing assembly.	
15. Plate (6)	a. Install on housing assembly.	
	b. Secure with capscrews (2).	
16. Parking brake	Install.	See page 5-68.

End

WHEEL BEARINGS ADJUSTMENT

(Sheet 1 of 6)

This task covers: Adjusting the wheel bearings both on and off the vehicle.

INITIAL SETUP

Test Equipment

Micrometer

Depth micrometer

Materials/Parts

Shims

Troubleshooting Reference

Page 2-59.

Equipment Condition

Wheel assembly either on or off the vehicle.

Shipping link installed

Special Tools

None

Personnel Required

One mechanic

References

Wheel brake assemblies removal/ installation, page 5-38.

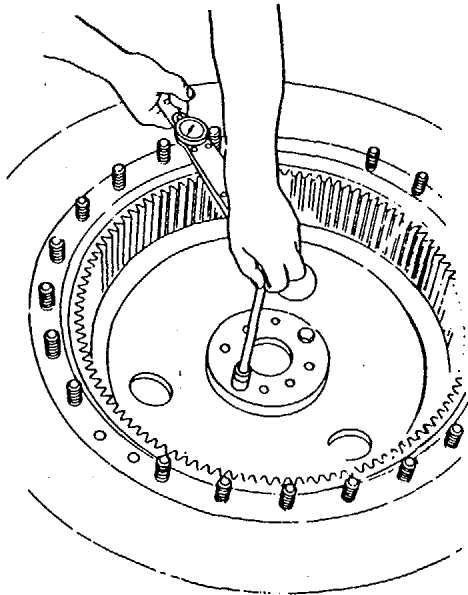
General Safety Instructions

Tires blocked.

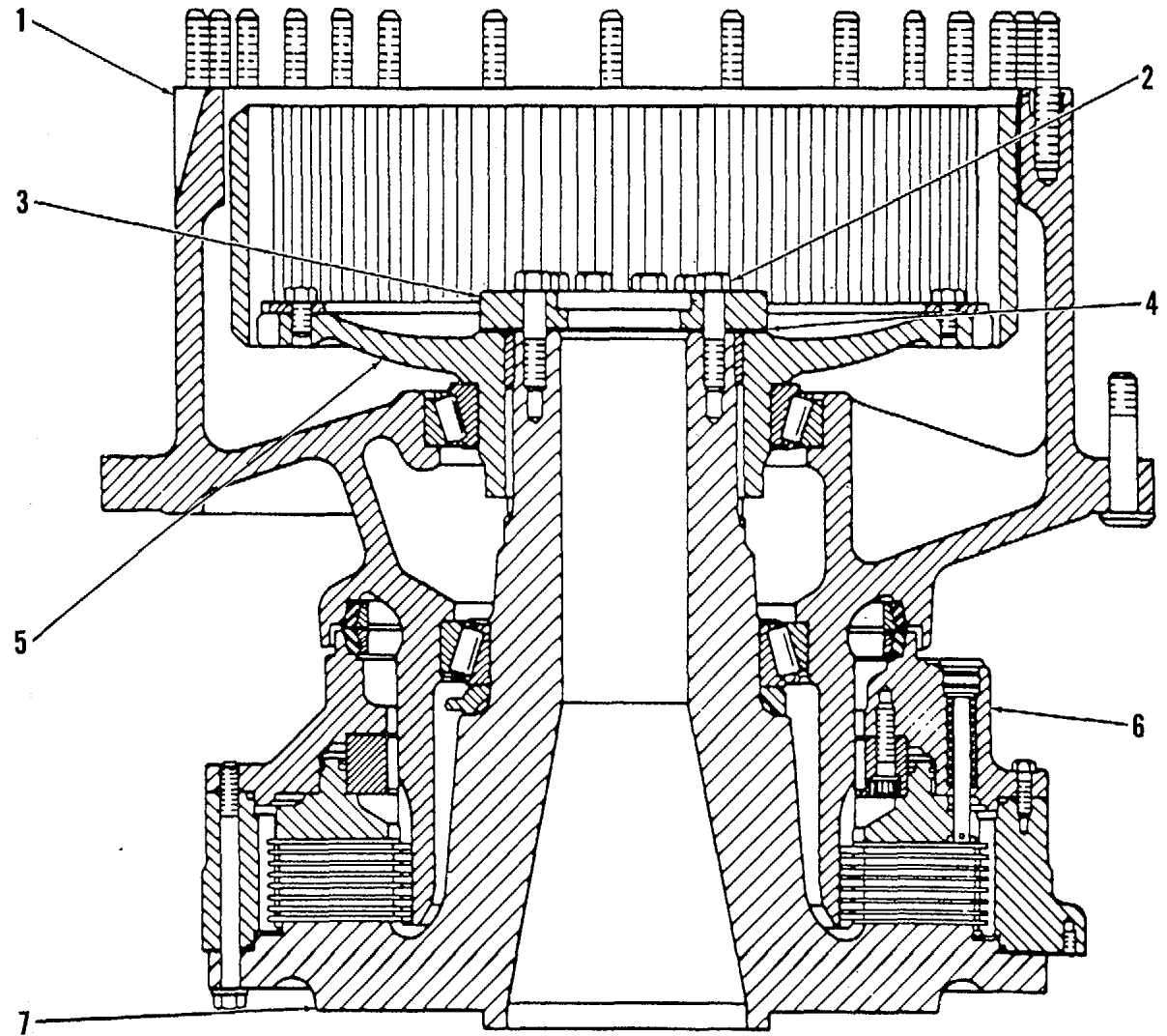
Change 1 5-91

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> ADJUSTMENT PROCEDURE (OFF THE VEHICLE) </div> <ol style="list-style-type: none"> <li>1. Spindle housing (7) <li>2. Brake group (6), bearings, wheel assembly (1), and hub (5) <li>3. Ring (3) <li>4. Capscrews (2) <li>5. Wheel assembly (1) to 55 to 75 lb. <li>6. Capscrews (2) and ring (3) <li>7. Distance between end of spindle housing (7) and hub (5). 	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px; text-align: center;"> NOTE </div> <p>These adjustments start with sections of the equipment off the vehicle.</p> <p>Place on a support with small end up.</p> <p>Assemble on spindle housing (7).</p> <p>Install without shims (4).</p> <p>Install five so that there are even spaces between them.</p> <p>While turning by hand torque capscrews (2) to 55 to 75 lb. (76 to 104 N-m).</p> <p>Remove.</p> <p>Measure at three different locations and find the average.</p>	<p>To find average add the three distances and divide the sum by three.</p>



TYPICAL EXAMPLE



WHEEL BEARINGS ADJUSTMENT (CONT)

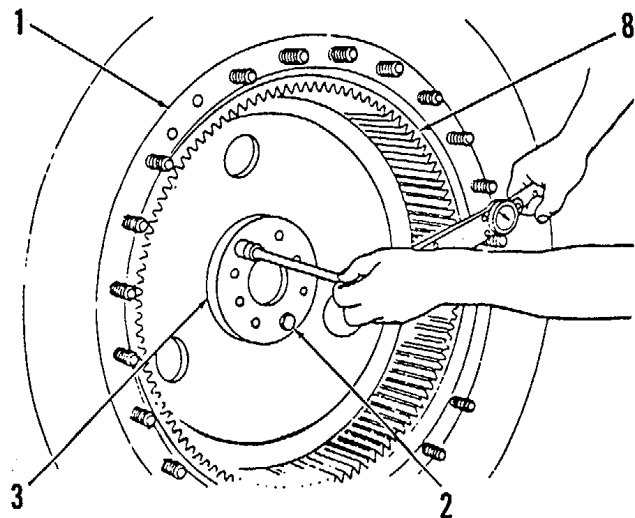
(Sheet 4 of 6)

LOCATION/ITEM	ACTION	REMARKS
8. Shims (4)	Install enough so that the thickness is .005 in. (0.13 mm) less than the distance in step no. 7.	
9. Ring (3)	a. Install with capscrews (2). b. Tighten capscrews evenly to a torque of 180 to 220 lb. ft. (245 to 305 N-m).	
ADJUSTMENT PROCEDURE (ON THE VEHICLE)	<p style="text-align: center;">NOTE</p> These adjustments start with sections of the equipment on the vehicle.	
1. Wheel assembly (1) and bearings	Put on spindle housing (7).	
2. Hub (5) and ring gear (8)	Install.	
3. Ring (3) without shims	Install.	
4. Two capscrews	a. Install so that they are opposite each other. b. While turning wheel by hand, tighten evenly to a torque of 35 to 45 lb. ft. (48 to 62 N-m).	

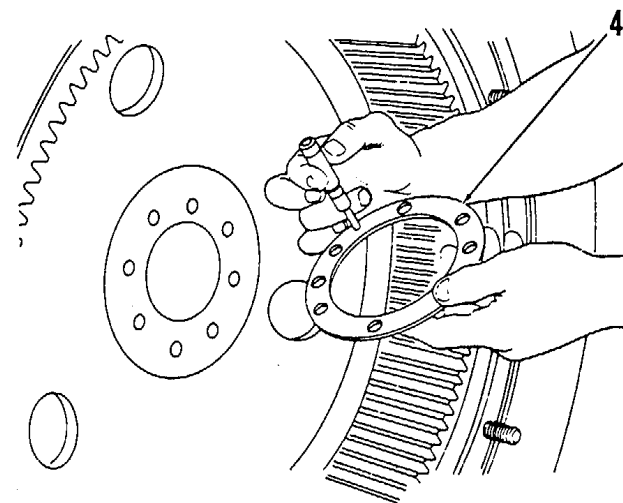
WHEEL BEARINGS ADJUSTMENT (CONT)

(Sheet 5 of 6)

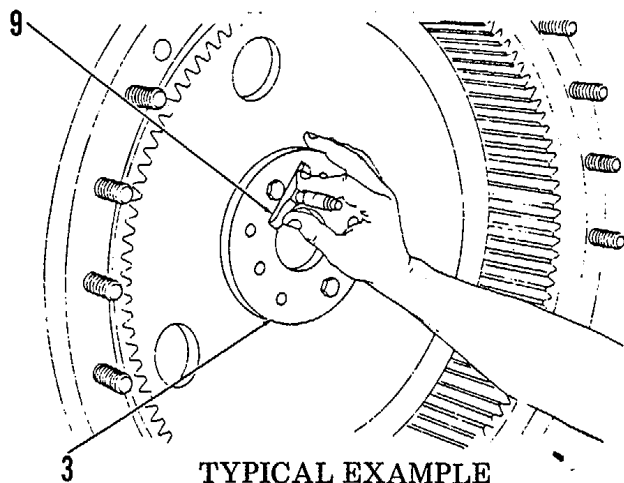
LOCATION/ITEM	ACTION	REMARKS
5. Depth micrometer (9)	Measure through the small holes in ring (3). Find the average depth.	Average depth equals the sum of the three measurements divided by three.
6. Outside micrometer (10)	a. Measure through the small holes in ring (3). Find the average depth. b. Find the difference of the two average measurements. The difference is the gap between the end of the spindle housing (7) and the ring (3).	
7. Ring (3)	Remove. Install enough shims (4) to be .001 in. (0.03 mm) less than the gap found in step 6.	
8. Ring (3) and capscrews (2)	Install. Tighten capscrews evenly to a torque of 180 to 220 lb. ft. (245 to 295 N-m).	



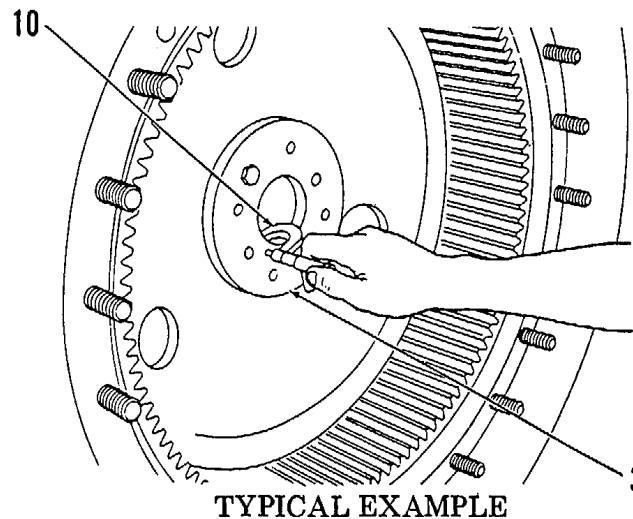
TYPICAL EXAMPLE



TYPICAL EXAMPLE



TYPICAL EXAMPLE



TYPICAL EXAMPLE

Section VI. BRAKE LINES AND FITTINGS

BRAKE LINES MAINTENANCE INSTRUCTIONS

This section covers maintenance of brake lines and parking brake lines for direct support and general support maintenance personnel.

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Brake lines removal/installation.	5-98	2-59

BRAKE LINES REMOVAL/INSTALLATION

(Sheet 1 of 4)

This task covers: Removal/installation of brake lines.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Containers to catch oil

Troubleshooting Reference

Page 2-59

Equipment Condition

Engine OFF

Wheels blocked

System cooled

Special Tools

None

Personnel Required

One mechanic

References

None

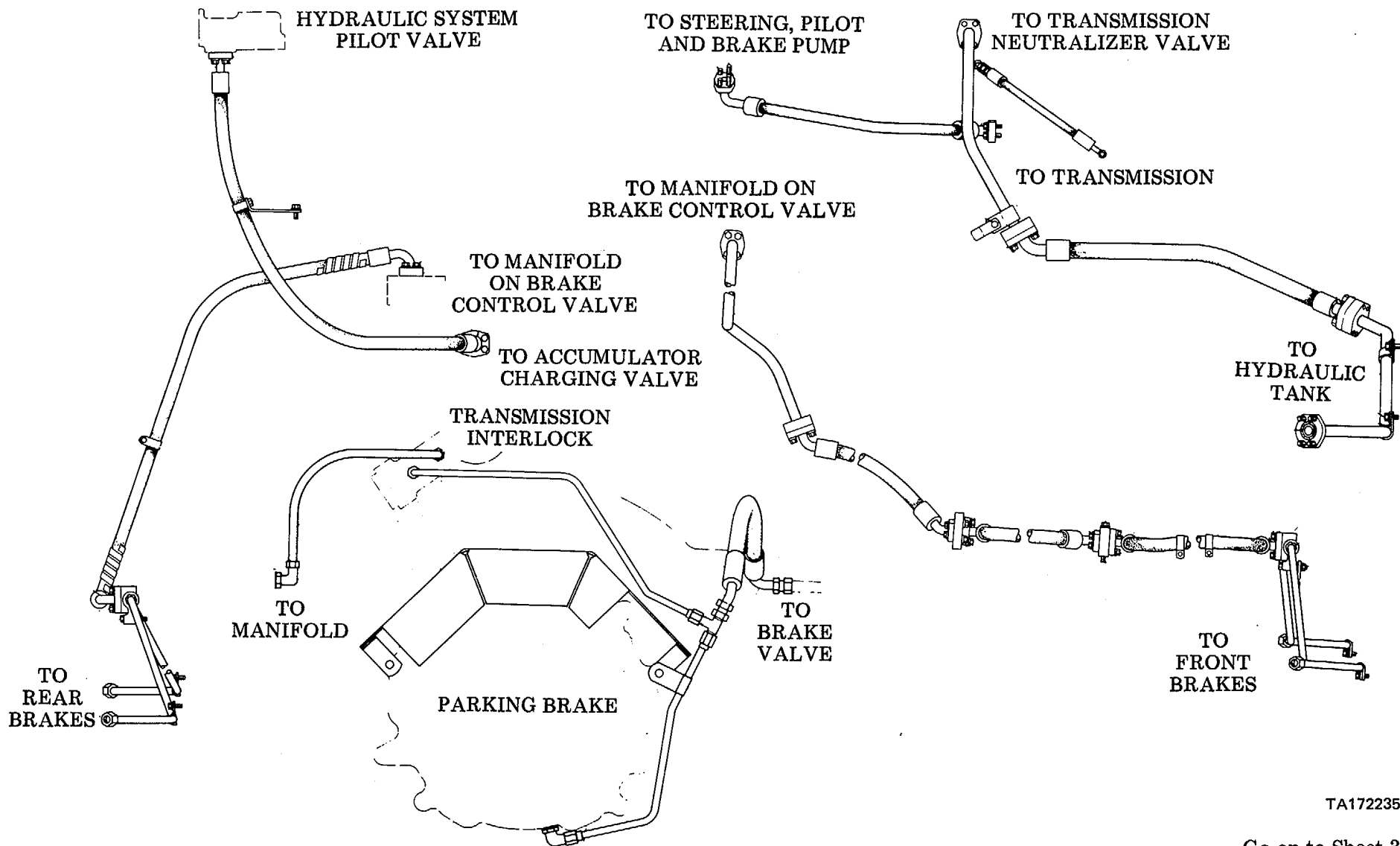
General Safety Instructions

Allow system to cool.

Hot oil causes burns.

BRAKE LINES REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 4)



LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>	NOTE	NOTE
	Cap or plug openings as lines are removed. Tag to identify location.	See page 5-99 for illustration.
1. Transmission	Drain.	See TM 10-3930-641-20.
2. Capscrews and washers	Remove at both ends of line.	
3. Preformed packing	Remove and discard.	
	NOTE	
	Some of the hoses and tubing have brackets and clips supporting them. Remove capscrews, washers and nuts and remove.	
4. Tube fittings	Disconnect and remove line.	

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> <li>1. Metal tube lines <li>2. Preformed packings in hose flanges <li>3. Flanges 	<p>Install new preformed packing. Reconnect fittings.</p> <p>Use new preformed packings. Coat with oil and place into flange.</p> <p>Place into position and secure with capscrews and washers.</p> <p style="text-align: center;">NOTE</p> <p>If any brackets or clips were removed, reinstall in the correct location.</p>	

CHAPTER 6

STEERING SYSTEM MAINTENANCE INSTRUCTION

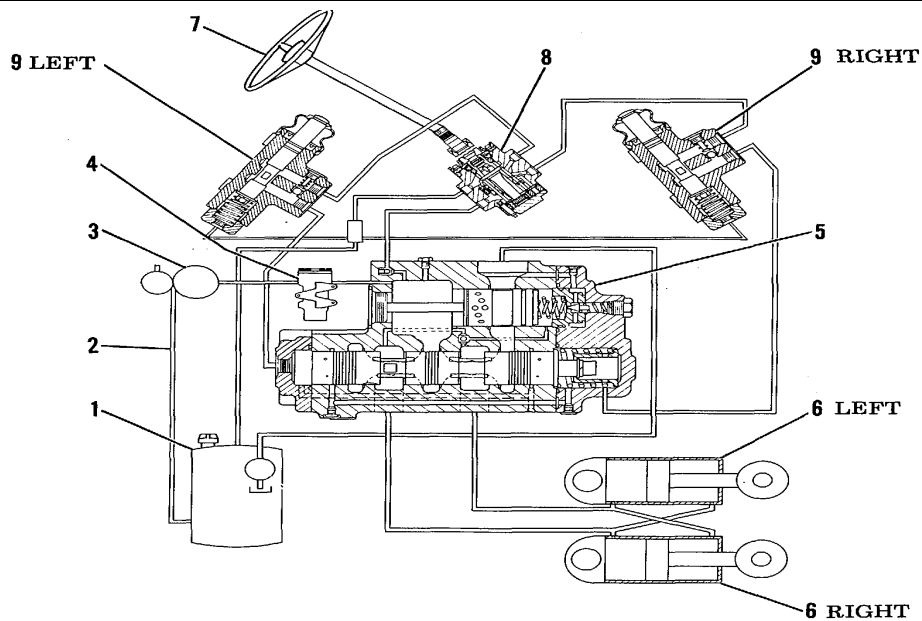
	Page
Section I	
General.....	6-2
II	
Steering Components.....	6-6
Neutralizer Valve Removal/Installation.....	6-7
Neutralizer Valve Disassembly/Assembly	6-10
Hand Metering Unit Removal/Installation	6-14
Hand Metering Unit Disassembly/Assembly.....	6-18
Steering Control Valve Removal/Installation	6-24
Steering Control Valve Disassembly/Assembly.....	6-28
Articulated Hitch Disassembly/Assembly	6-36
Hydraulic (Steering and Brake) Pump Removal/Installation	6-52
Hydraulic (Steering and Brake) Pump Disassembly/Assembly.....	6-61
Supplemental Steering Pump Removal/Installation	6-71
Supplemental Steering Pump Disassembly/Assembly.....	6-74
Steering Cylinders Removal/Installation.....	6-79
Steering Cylinders Disassembly/Assembly	6-85
Steering Lines Removal/Installation	6-91
Supplemental Steering Lines Removal/Installation	6-94
Tee Test Procedure for Steering System	6-97

Section I. GENERAL

STEERING SYSTEM

(Sheet 1 of 4)

1. Hydraulic oil tank
2. Hydraulic oil lines
3. Hydraulic pump
4. Filter
5. Steering control valve
6. Steering cylinders
7. Steering wheel and column
8. Hand metering unit
9. Neutralizer valves



STEERING SYSTEM SCHEMATIC

TA098953
Go on to Sheet 2

Steering system can be divided into two groups: steering group and supplemental steering group.

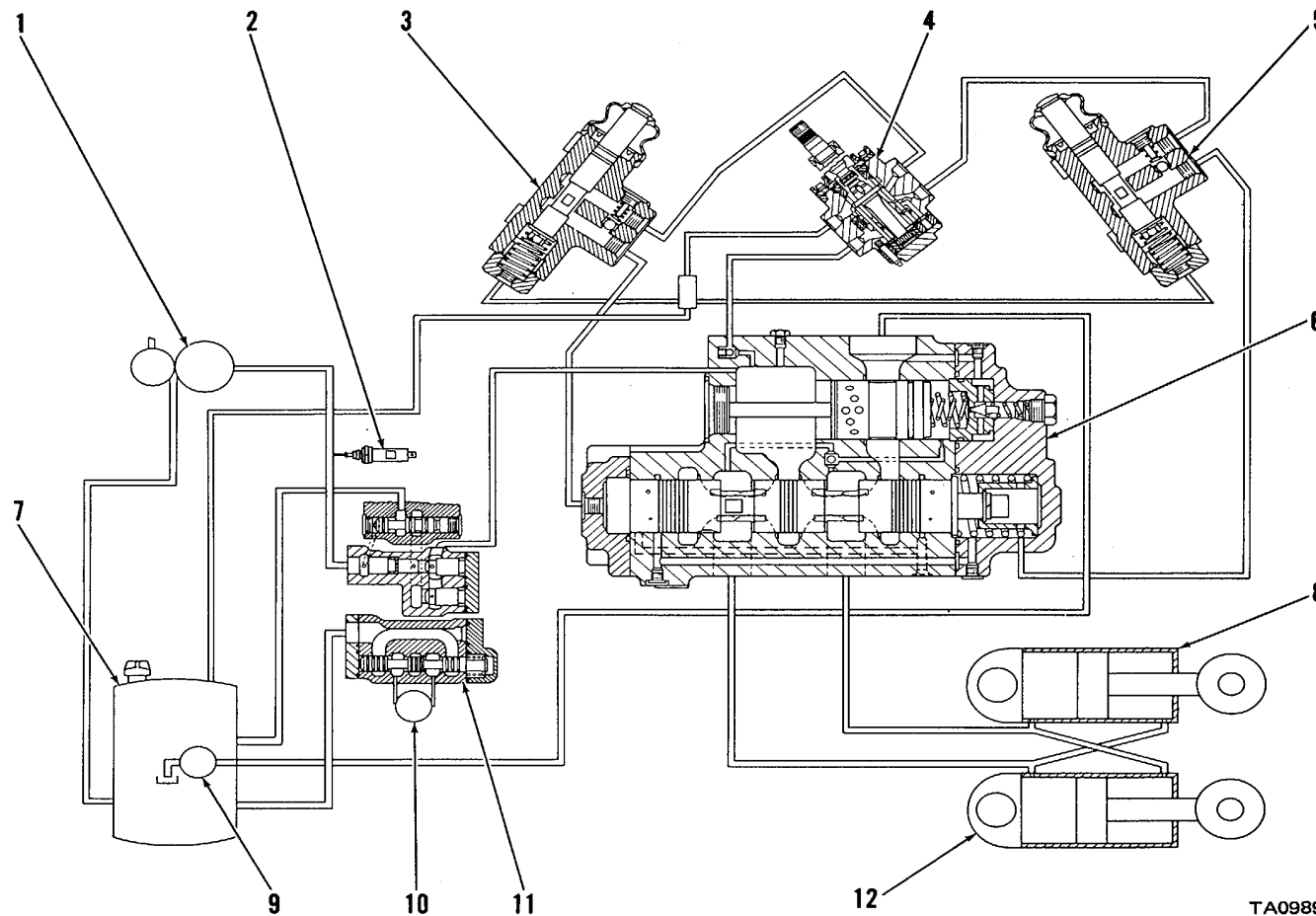
1. **HYDRAULIC OIL TANK.** The storage reservoir for all of the hydraulic oil used in the machine except for the transmission and torque converter. An inlet strainer provides filtering when adding or replacing oil to the tank. Also, a filter is built into the tank for filtering all of the oil returning from the hydraulic system. Oil is pumped from the tank through the steering components and re- turned back to the tank.
2. **HYDRAULIC OIL LINES.** Serves as passages for the pressurized oil to operate the different steering components.
3. **HYDRAULIC PUMP.** The hydraulic pump serves two systems, steering and braking. A positive displacement gear type pump driven by the engine. The larger section of the pump supplies high pressure oil to operate the steering system. The oil is drawn from the oil tank and pumped through the steering system and returned to the tank.
4. **FILTER.** Protects the system in the event of a pump failure. It is a replaceable screen type.
5. **STEERING CONTROL VALVE.** Directs high pressure oil to the front of one cylinder and to the rear of the opposite cylinder. Direction of the steering wheel will determine which cylinder is pressurized in the front or rear. The control valve is hydraulically activated by the hand metering unit.
6. **STEERING CYLINDERS (2).** Are activated by the high pressure oil from the control valve. A left turn will cause the left cylinder to shorten and the right cylinder to lengthen. The changing lengths of these cylinder causes the vehicle to turn.
7. **STEERING WHEEL AND COLUMN.** Adjustable to eight different positions. Seven of the positions are for operator comfort, while the eighth and most forward is for storing and locking the wheel when not in use. Pushing the wheel into the store position also moves the transmission control lever to NEUTRAL.
8. **HAND METERING UNIT (HMU).** Attached to the steering wheel with a shaft. It is a small hydraulic pump which meters and directs oil into the steering control valve as the wheel is turned.
9. **NEUTRALIZER VALVES (2).** Stops the flow of pilot oil to the steering control valve at the end of a complete turn in either direction. This stops the steering action before the machine turns against the frame stops. The valves are normally open, allowing flow through them.

Go on to Sheet 3

SUPPLEMENTAL STEERING SYSTEM

(Sheet 3 of 4)

1. Hydraulic pump (large section is primary steering pump)
2. Flow switch
3. Left neutralizer valve
4. Hand metering unit (HMU)
5. Right neutralizer valve
6. Steering control valve
7. Hydraulic tank
8. Left steering cylinder
9. Filter
10. Supplemental steering pump
11. Diverter valve
12. Right steering cylinder



6-4

TA098954

Go on to Sheet 4

The supplemental steering system has two purposes:

To give an oil supply for the steering system if there is a failure of the primary system or if the engine stops when the machine is moving.

To add oil to the primary oil flow when the engine rpm is less than 1170 to 1300 rpm and the machine is moving.

10. SUPPLEMENTAL STEERING PUMP. A ground driven, gear type pump. Ground driven means that the pump turns as long as the machine moves. The pump gets its power from the output transfer gears of the transmission. Its function is to supply oil to the steering system when there is a failure of the primary pump or when the engine stops and the machine is still moving. It also adds oil to the primary oil flow when the engine is turning at less than 1170 to 1300 rpm and the machine is moving. The oil supply is from the same tank as the primary pump.

11. **DIVERTER VALVE.** Senses the pressure and controls the flow direction of the oil from the primary and supplemental pumps.
12. **FLOW SWITCH.** Electrically operates an instrument light to warn the operator the primary pump system has failed.

Section II. STEERING COMPONENTS

STEERING MAINTENANCE INSTRUCTIONS

This section covers maintenance of these steering components for direct support and general support maintenance personnel:

- a. Neutralizer valve
- b. Hand metering unit
- c. Steering control valve
- d. Articulated hitch
- e. Steering and brake pump
- f. Steering cylinders

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Neutralizer valve removal/installation.	6-7	2-55
2	Neutralizer valve disassembly/assembly.	6-10	2-55
3	Hand metering unit removal/installation.	6-14	2-53
4	Hand metering unit disassembly/assembly.	6-18	2-53
5	Steering control valve removal/installation.	6-24	2-54
6	Steering control valve disassembly/assembly.	6-28	2-53
7	Articulated hitch disassembly/assembly.	6-36	None
8	Hydraulic (steering and brake) pump removal/ installation.	6-52	2-54
9	Hydraulic (steering and brake) pump disassembly/assembly.	6-61	2-54
10	Supplemental steering pump removal/installation.	6-71	None
11	Supplemental steering pump disassembly/assembly.	6-74	None
12	Steering cylinders removal/installation.	6-79	2-56
13	Steering cylinders disassembly/assembly.	6-85	2-56
14	Steering lines removal/installation.	6-91	2-53
15	Supplemental steering lines removal/installation.	6-94	2-53
16	Tee test procedures for steering system.	6-97	2-56

NEUTRALIZER VALVE REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Replacement of neutralizer valve.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Tags

Troubleshooting Reference

Page 2-55

Equipment Condition

Pressure relieved on hydraulic system.

Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

References

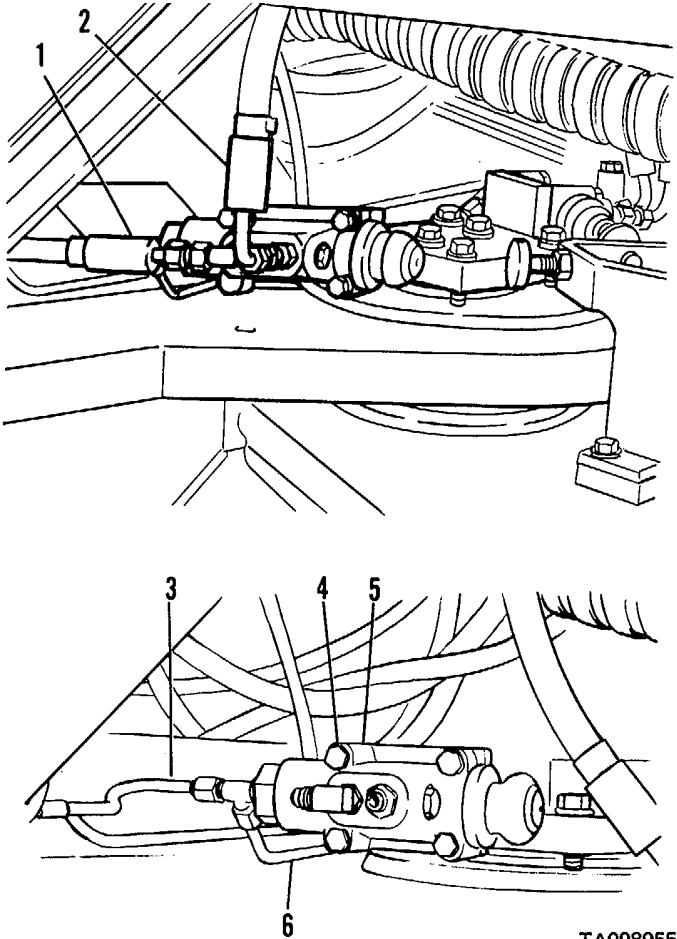
Shipping Link
Removal/Installation,
TM 10-3930-641-20

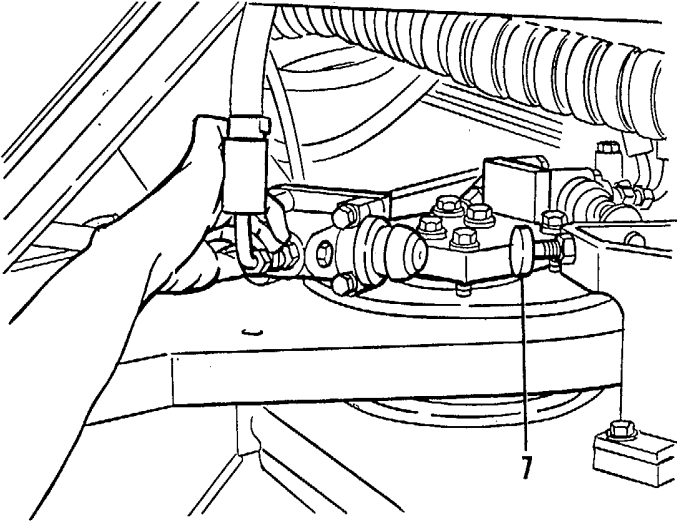
General Safety Instructions

Tires blocked.

NEUTRALIZER VALVE REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 3)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	NOTE	 <p style="text-align: right;">TA098956 End</p>
1. Oil outlet line (1)	Tag and disconnect.	
2. Oil inlet line (2)	Tag and disconnect.	
3. Lines (3) and (6) on drain port (right side only)	Tag and disconnect.	
4. Four capscrews (4) that hold neutralizer valve (5) in position	Remove.	
5. Neutralizer valve (5)	Remove.	

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">INSTALLATION</div>		
1. Neutralizer valve (6)	Place in position on bracket and install cap-screw (4).	
2. Lines (3) and (6) (right side only)	Connect to drain port.	
3. Oil inlet line (2)	Connect.	
4. Oil outlet line (1)	Connect.	
5. Striker (7)	Adjust.	

See TM10-3930-641-20

TA098956
End

NEUTRALIZER VALVE DISASSEMBLY/ASSEMBLY

(Sheet 1 of 4)

This task covers: Repair of neutralizer valve.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-55

Equipment Condition

Neutralizer valve removed.

Special Tools

None

Personnel Required

One mechanic

References

Neutralizer Valve Removal/Installation,
page 6-7

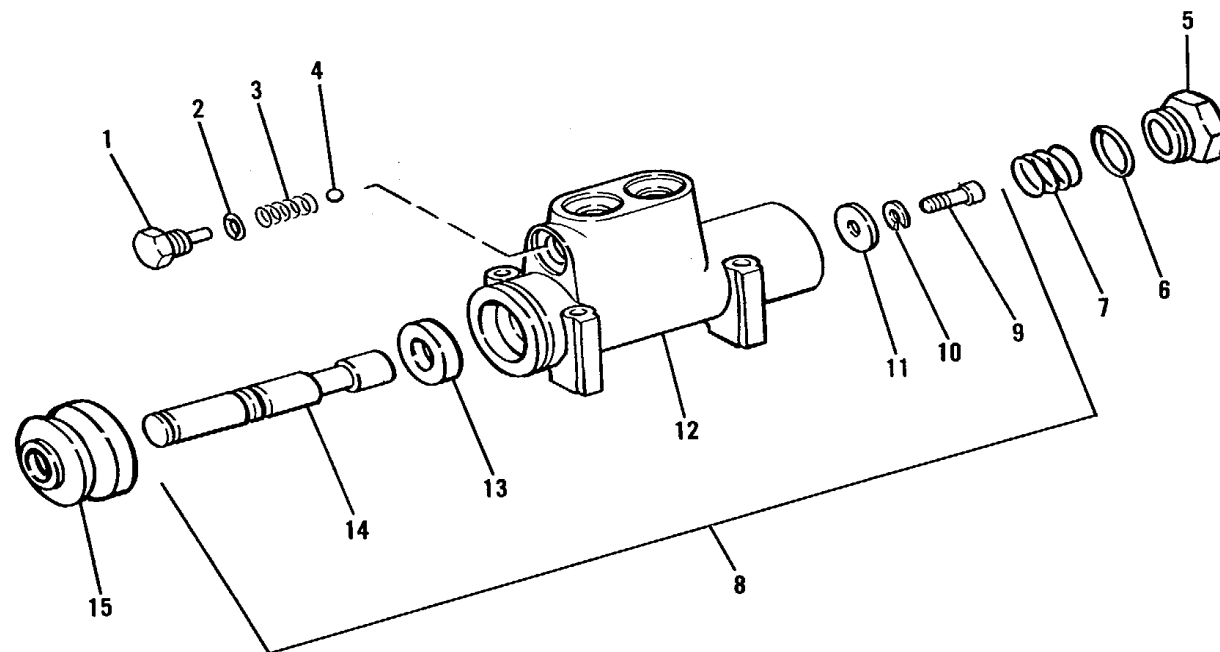
General Safety Instructions

Put parts in a clean area.

NEUTRALIZER VALVE DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 2 of 4)

1. Plug Assembly
2. Preformed Packing
3. Spring
4. Ball
5. Plug
6. Preformed Packing
7. Spring
8. Valve Group
9. Capscrew
10. Lockwasher
11. Washer
12. Valve Body
13. Lip Type Seal
14. Valve Stem
15. Boot



6-11

TA098957
Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
1. Plug assembly (1)	Remove from body (12).	
2. Spring (3)	Remove.	
3. Ball (4)	Remove.	
4. Preformed packing (2)	Remove from plug assembly (1).	
5. Boot (15)	Remove.	
6. Plug (S)	Remove.	
7. Preformed packing (6)	Remove from plug assembly (5).	
8. Spring (7)	Remove from body (12).	
9. Stem (14)	Remove.	
10. Lip seal (13)	Remove from body (12).	

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>		
1. Lip seal (13)	Install using a seal driver.	
	NOTE	
	Install seal until it makes contact with counter-bore in body. Lip of seal must be toward inside of body.	
2. Stem (14)	Install in body.	
3. Spring (7)	Install.	
4. Plug (5)	Install.	
5. Boot (15)	Install.	
6. Ball (4)	Install.	
7. Spring (3)	Install.	
8. Plug assembly (1) and preformed packing (2)	Install.	

HAND METERING UNIT REMOVAL/INSTALLATION

(Sheet 1 of 4)

This task covers: Replacement of hand metering unit.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Tags.

Troubleshooting Reference

Page 2-53

Equipment Condition

Pressure relieved from hydraulic system.

Shipping link installed.

Special Tools

None

Personnel Required

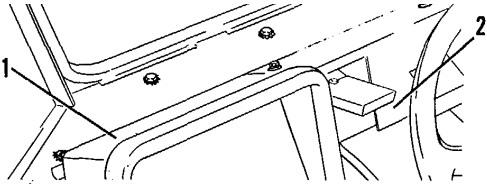
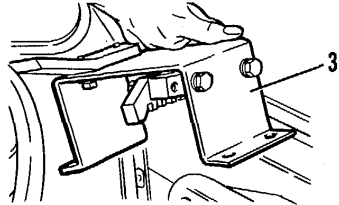
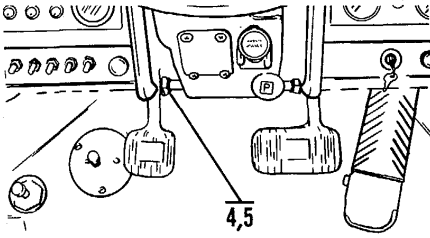
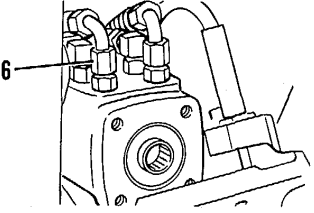
One mechanic

References

Shipping Link
Removal/Installation,
TM 10-3930-641-20

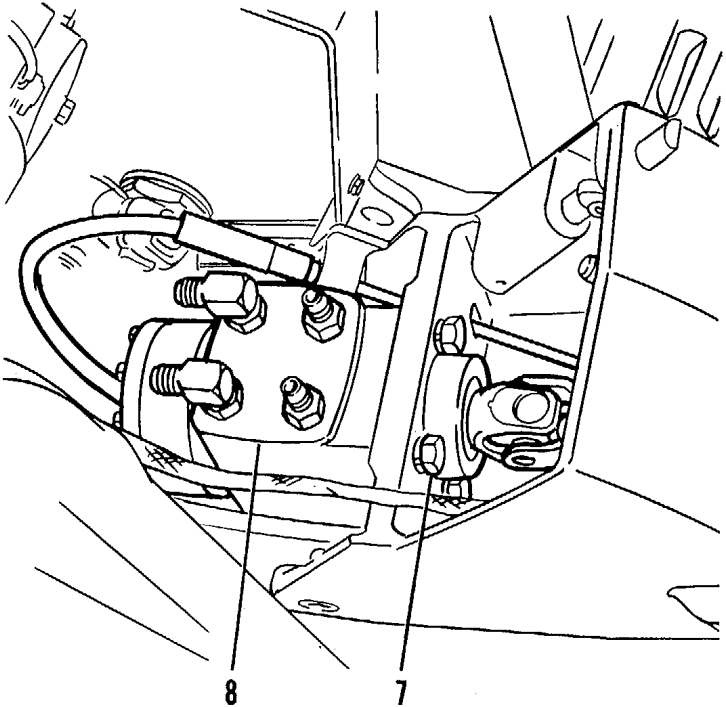
General Safety Instructions

Tires blocked.

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div>		
1. Plates (1) and (2)	Remove.	
2. Detent block (3)	a. Remove by removing four detent block capscrews and washers.	
b.	Remove shims.	
3. Nuts (5)	a. Remove outer nuts.	
b.	Loosen inner nuts to end of threads.	
c.	Slide pins (4) out.	
4. Four hydraulic lines (6)	Disconnect and identify.	
		

TA098958

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
5. Four capscrews (7)	Remove.	
6. Hand metering unit (8)	Remove.	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">INSTALLATION</div>		
1. Hand metering unit (8)	Place in position.	
<p style="text-align: center;">NOTE</p> <p>Engage splines of drive with shaft assembly.</p>		
2. Four capscrews (7)	Install.	
3. Four hydraulic lines (2)	Connect.	<p style="text-align: right;">TA098959</p> <p style="text-align: right;">Go on to Sheet 4</p>

LOCATION/ITEM	ACTION	REMARKS
4. Pins (4) washers.	Install in steering column with nuts (4) and	
5. Detent block (3) b.	a. Install shims. Install four capscrews and washers.	
6. Plates (1) and (2)	Install.	
	6-17	

END

This task covers: Repair of hand metering unit.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

Page 2-53

Troubleshooting Reference

Equipment Condition

Hand metering unit removed from steering column.

Special Tools

None One mechanic

Personnel Required

References

Hand Metering Unit Removal/Installation, page 6-14

General Safety Instructions

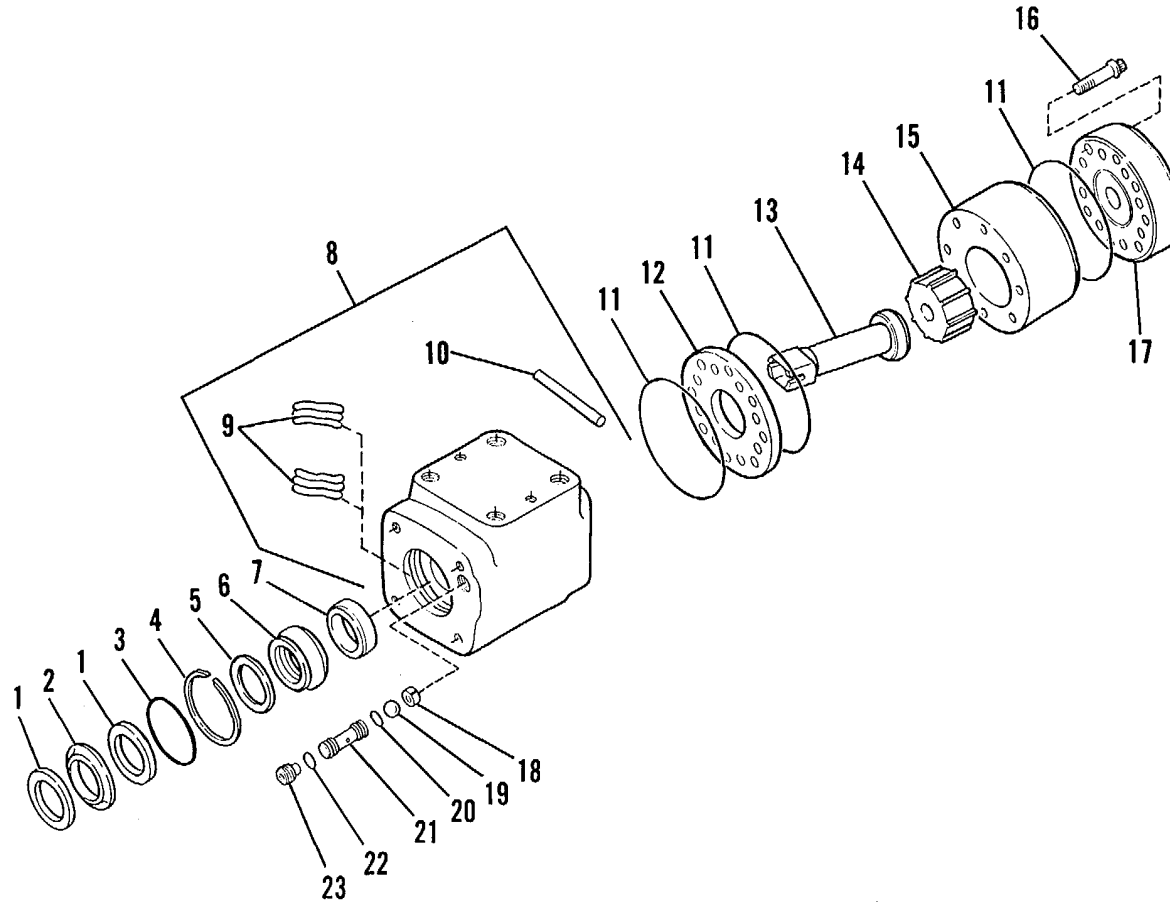
Release hydraulic oil pressure.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1. Retaining ring (4)	Remove from body assembly.	
2. Bushing (6)	Remove from body assembly.	
3. Seals (5) and (7)	Remove from bushing (2).	
4. Two races (1) and bearing (2)	Remove from body.	
5. Preformed packing seal (3)	Remove from body.	
6. Seven capscrews (16)	Remove.	
7. Cap (17)	Remove.	
8. Gerotor assembly (15)	Remove.	
9. Spacer (14)	Remove.	
10. Spacer (12)	Remove.	
11. Drive (13)	Remove.	

Go on to Sheet 3

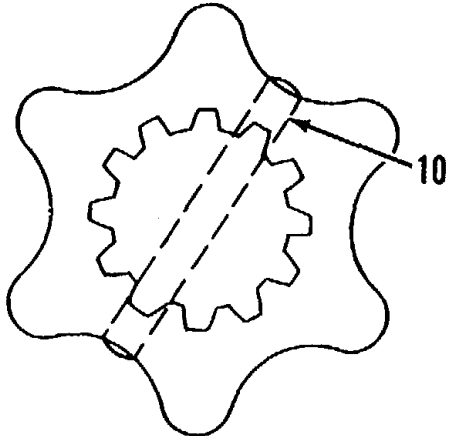
1. Race
2. Needle Thrust Bearing
3. Preformed Packing
4. Internal Retaining Ring
5. Lip Type Seal
6. Seal Gland Bushing
7. Quad Ring Seal
8. Body Assembly
9. Centering Springs
10. Pin
11. Preformed Packing
12. Spacer
13. Control End Drive (Spool)
14. Spacer
15. Gerotor Assembly
16. Capscrew
17. Cap
18. Check Ball Retainer (Clip)
19. Ball
20. Preformed Packing
21. Seat (Sleeve)
22. Preformed Packing
23. Socket Set Screw



TA098960

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
12. Sleeve and spool assembly	Remove.	
13. Pin (10)	Remove from sleeve and spool assembly.	
14. Spool (13)	Remove from sleeve.	
15. Six springs (9)	Remove from spool (13).	
16. Hydraulic connection	Remove from right port of body assembly.	
17. Clip (18) and ball (19)	Remove from right port.	

LOCATION/ITEM	ACTION	REMARKS	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>			
1. Ball (19) and clip (18)	Install in body assembly.		
2. Hydraulic connection	Install in right port.		
3. Six springs (9)	Install in spool (13).		
4. Sleeve	Slide in position over spool (13).	 <p>The diagram shows a cross-section of a gerotor assembly. It features a central gear with eight teeth meshing with an outer gear with ten teeth. A dashed line represents the shaft. A pin, labeled '10', is shown passing through the mesh area, likely to align the gears. The entire assembly is housed within a body with a six-lobed outer profile.</p>	
5. Pin (10) that holds spool (13) to sleeve	Install.		
6. Sleeve and spool assembly	Install in body.		
7. Spacer (12)	Put in position on body.		
8. Drive assembly	Install in body.		
9. Gerotor assembly (15)	Install.		
<p style="text-align: center;">NOTE</p> <p>Be sure gear in the gerotor assembly is aligned with pin (10) of sleeve assembly as shown.</p>			

LOCATION/ITEM	ACTION	REMARKS
10. Spacer (14)	Install.	
11. Cap (17)	Install using seven capscrews (16).	
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Tighten capscrews to a torque of 18-24 lb. ft. (24-33 N.m).</p>		
12. Preformed packing (3)	Install in body.	
13. Two races (1) and bearing (2)	Install.	
14. Lip seal (7)	Install in bushing (6) with a seal driver.	
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Seal must make contact with counterbore in bushing and lip must be toward outside of hand metering unit.</p>		
15. Bushing (6)	Install.	
16. Retaining ring (4)	Install.	

STEERING CONTROL VALVE REMOVAL/INSTALLATION

(Sheet 1 of 4)

This task covers: Replacement of steering control valve.

INITIAL SETUP

Test Equipment

None Tags and caps for hydraulic lines

Materials/Parts

Page 2-54

Troubleshooting Reference

Equipment Condition

Hydraulic system pressure relieved.

Panels opened.

Shipping link installed.

Special Tools

None One mechanic

Personnel Required

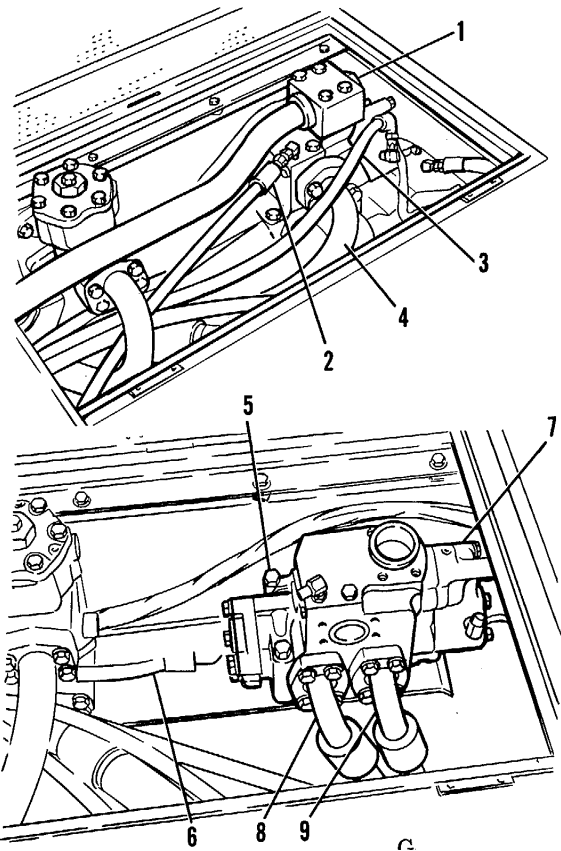
References

Shipping Link
Removal/Installation,
TM 10-3930-641-20

General Safety Instructions

Tires blocked.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">REMOVAL</div> <p>Tag and cap hydraulic lines as they are removed.</p>	<p>NOTE</p>	
1. Oil return tube assembly (1)	Disconnect from steering control valve.	
2. Oil supply hose (2) for hand metering unit	Disconnect.	
3. Hose (3) from right turn pilot port	Disconnect.	
4. Tube assembly (4)	Disconnect.	
5. Hose (6) from left turn pilot port	Disconnect.	
6. Hose (8) for left turn port	Disconnect.	
-		<p style="text-align: right;">TA098962</p> <p style="text-align: right;">Go on to Sheet 3</p>

LOCATION/ITEM	ACTION	REMARKS
7. Hose (9) for left hand port	Disconnect at lower end of hose.	
8. Steering valve (7)	Fasten hoist.	
9. Three capscrews (5)	Remove.	
10. Steering valve (7)	Remove from vehicle.	
<p>NOTE</p> <p>Steering valve weighs 85 lb (38.6 Kg).</p>		
11. Hose (9) of valve.	Disconnect at steering valve to allow removal	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">INSTALLATION I</div>		
1. Steering valve (7)	Fasten hoist and put in position.	
2. Capscrews (5)	Install.	

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
3. Hose (8)	Connect to left turn port.	
4. Hose (9)	Connect to right turn port.	
5. Hose (6)	Connect to left turn pilot port.	
6. Tube assembly (4)	Connect.	
7. Hose (3)	Connect to right turn pilot port.	
8. Oil return tube assembly (1)	Connect.	
9. Oil supply hose (2)	Connect.	

This task covers: Disassembly/assembly of steering control valve.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

Page 2-53

Troubleshooting Reference

Equipment Condition

Steering control valve removed from vehicle.

Special Tools

None One mechanic

Personnel Required

References

Steering Control Valve Removal/Installation,
page 6-24

General Safety Instructions

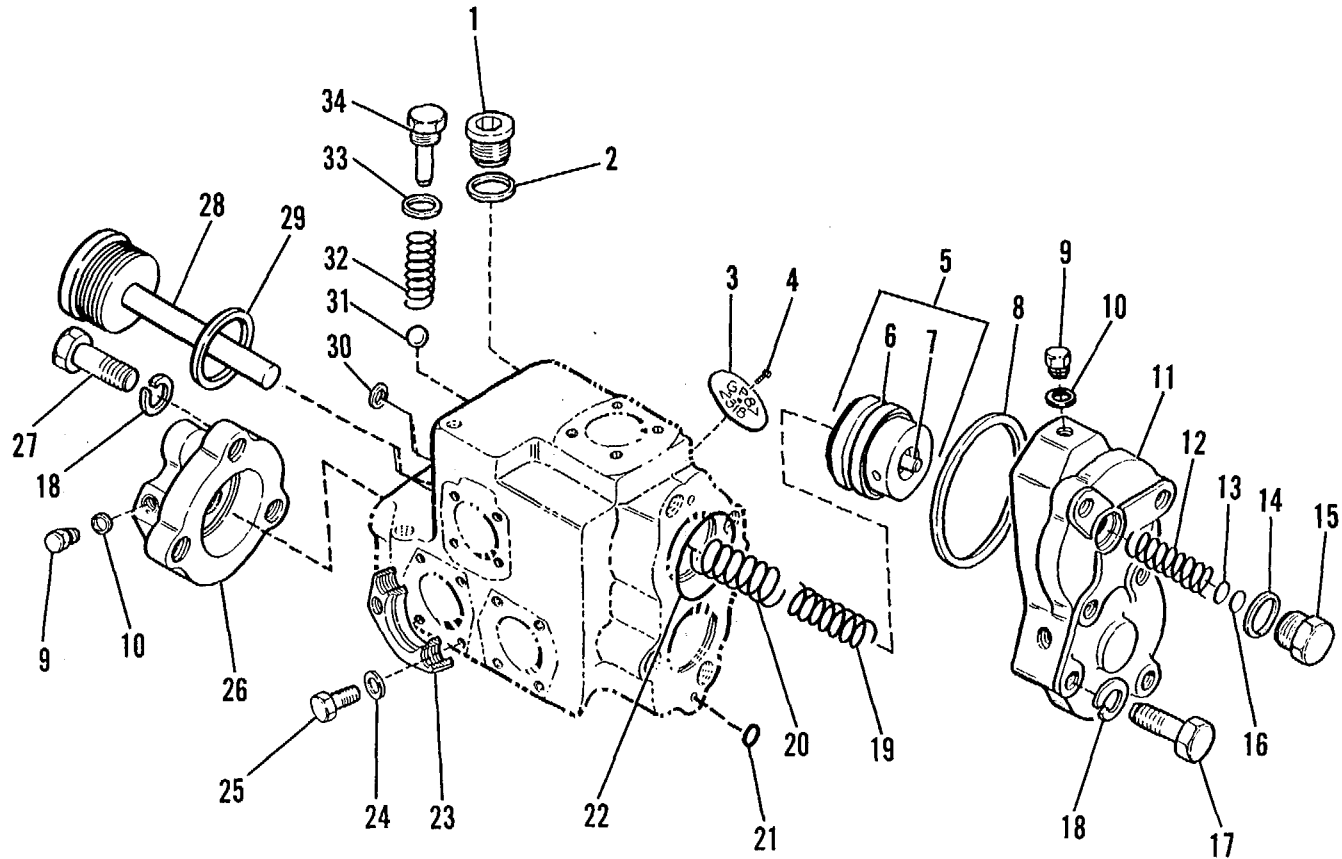
None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; display: inline-block; padding: 2px;">DISASSEMBLY</div>		
1. Plug (15)	Remove from cover (11).	
2. Packing (14) and shims (13) and (16)	Remove from plug (15).	
3. Spring (12)	Remove from cover (11).	
4. Valve (7)	Remove from pilot seat (6).	
5. Capscrew (17) that holds cover (11) in position.	Remove.	
6. Seat (6)	Remove from cover.	
7. Packings (22)	Remove from cover.	
8. Spring (19)	Remove from body (35).	
9. Spring (20)	Remove.	
10. Valve (45)	Remove.	
11. Valve stem assembly (48 thru 56)	Remove.	

Go on to Sheet 3

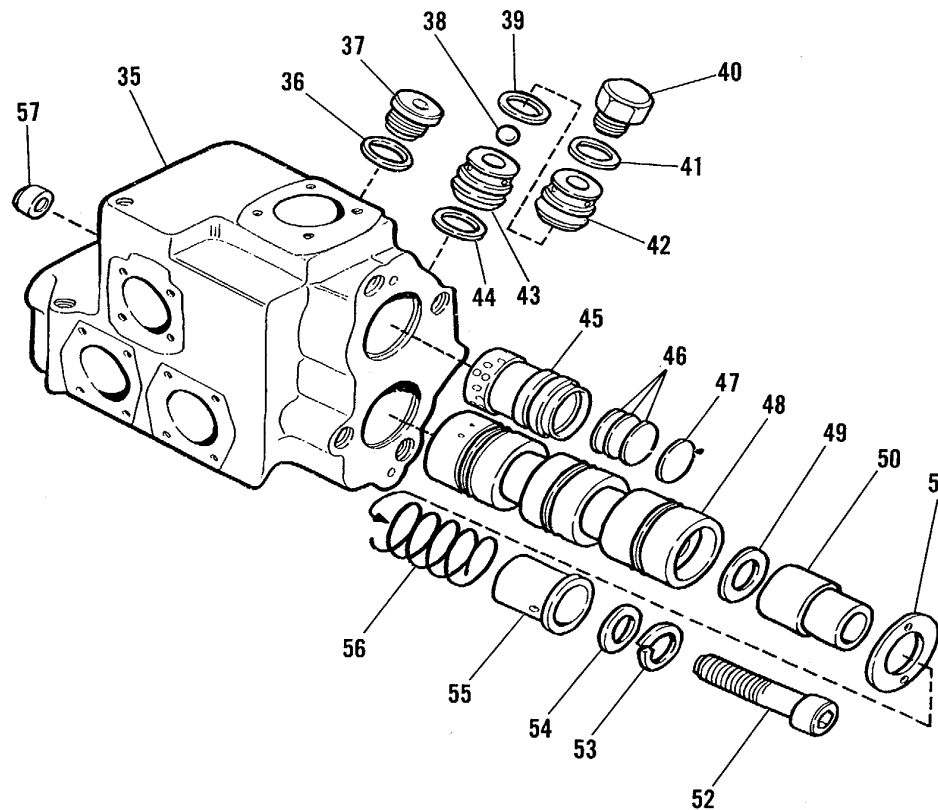
- 1. Plug
- 2. Packing
- 3. Identification Plate
- 4. Machine Screw
- 5. Valve Assembly
- 6. Pilot Seat
- 7. Valve
- 8. Packing
- 9. Plug
- 10. Packing
- 11. Cover
- 12. Spring
- 13. Shim
- 14. Packing
- 15. Plug
- 16. Shim
- 17. Capscrew
- 18. Lockwasher
- 19. Spring
- 20. Spring
- 21. Packing
- 22. Packing
- 23. Half Flange
- 24. Washer
- 25. Capscrew
- 26. Cover
- 27. Capscrew
- 28. Stop Assembly
- 29. Packing
- 30. Packing
- 31. Ball
- 32. Spring
- 33. Packing
- 34. Plug Assembly



TA098963

Go on to Sheet 4

- 35. Steering Valve Body
- 36. Packing
- 37. Plug
- 38. Ball
- 39. Packing
- 40. Plug
- 41. Packing
- 42. Seat
- 43. Seat
- 44. Packing
- 45. Valve
- 46. Spacer
- 47. Spacer
- 48. Valve Stem
- 49. Shim
- 50. Retainer
- 51. Spacer
- 52. Socket Head Screw
- 53. Lockwasher
- 54. Washer
- 55. Retainer
- 56. Spring
- 57. Seat



TA098964

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
12. Valve stem assembly (48 thru 56)	Disassemble as follows:	
a. Screw (52), lockwasher (53), washer (54)	Remove.	
b. Retainer (55), spring (56), and spacer (51)	Remove.	
c. Retainer (50) and shims (49)	Remove from valve stem (48).	
13. Plug (40) and packing (41)	Remove from valve body (35).	
14. Ball resolver valve (38, 39, 42, 43, 44)	Remove.	
15. Stop assembly (28)	Remove from valve body (35).	
16. Plug assembly (34)	Remove.	
17. Check valve (31 thru 33)	Remove.	
18. Capscrews (27)	Remove.	
19. Cover (26)	Remove.	
20. Plug (9) and preformed packing (10)	Remove from cover (26).	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>	<p>NOTE</p>	
	Clean all parts.	
1. Check valve; ball (31), spring (32) plug assembly (33) and (34)	Install in valve body (35).	
2. Stop assembly (28) and packing (29)	Install in valve body (35).	
3. Preformed packing (10) and plug (9)	Install in cover (26).	
4. Cover (26)	Place on body (36).	
5. Capscrews (27) and lockwashers (18)	Install.	
6. Ball resolver valve assembly (38, 39, 42, 43, 44)	Install.	
7. Plug (40) and preformed packing (41)	Install.	
	6-33	Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
8. Valve stem assembly	Assemble as follows:	
a. Shims (49)	Put in valve stem (48).	
b. Retainer (50), spacer (51), spring (56), and retainer (55)	Assemble and put in position.	
c. Washer (54), lockwasher (53), and screw (52)	Assemble and install in valve stem (48).	
9. Valve stem assembly	Install in body (35).	
10. Valve (45)	Install.	
11. Spacers (46)	Install.	
12. Spring (20)	Install.	
13. Spring (19)	Install.	
14. Preformed packings (22) and (21)	Install in cover (11).	
15. Seat (6)	Install.	
16. Cover (11)	Place in position on valve body (35).	

Go on to Sheet

LOCATION/ITEM	ACTION	REMARKS
17. Capscrews (T7) and lockwashers (18)	Install.	
18. Valve (7)	Install.	
19. Spring (12) and shims (13) and (16)	Install.	
20. Plug (15) and packing (14)	Install.	
	6-35	End

ARTICULATED HITCH DISASSEMBLY/ASSEMBLY

This task covers: Disassembly and assembly of articulated hitch component.

INITIAL SETUP

Test Equipment

Feeler gage

Materials/Parts

Tags and wires

Troubleshooting Reference

None

Equipment Condition

Relieve pressure in hydraulic system.

Vehicle must be on a level smooth surface,
preferably concrete.

Special Tools

None Four mechanics

Personnel Required
Mast lowered.

Tilt cylinders fully extended.

References

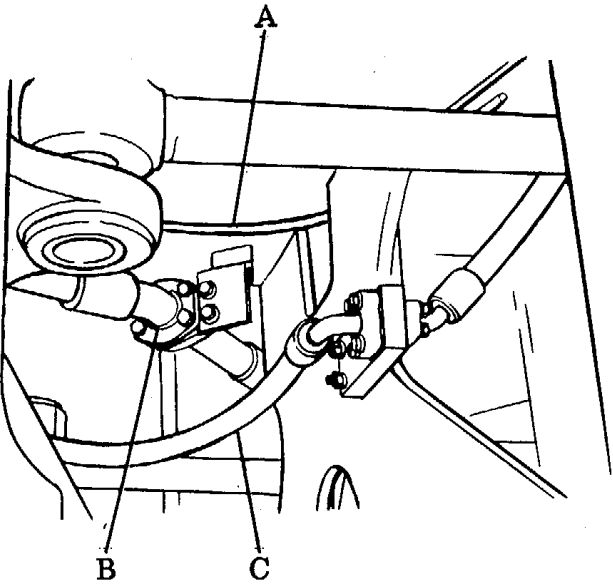
Driveshaft Removal, page 4-305

Steering Cylinder Removal, page 6-79

General Safety Instructions

Put wood blocks in front of and behind all
four tires.

Go on to Sheet 2

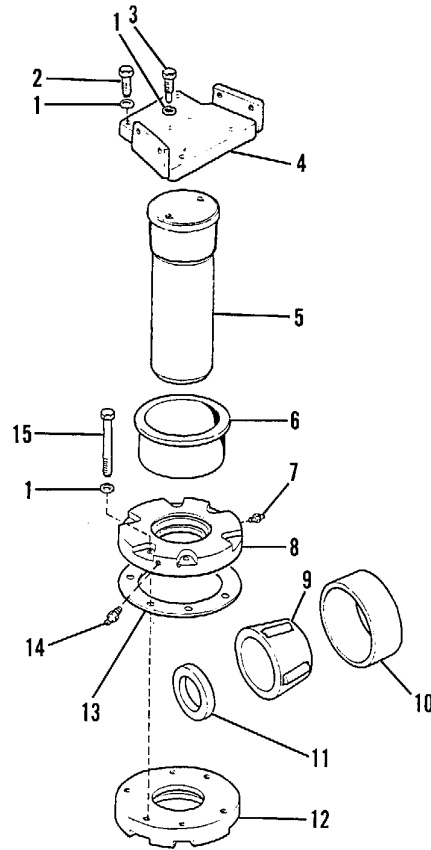
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
1. Shipping link	Install.	
2. Lower middle drive shaft	Remove.	See TM 10-3930-641-20
3. Rod ends of steering cylinder	Disconnect.	See page 6-79.
4. Wiring harness (A)	Remove clip, disconnect and identify	
5. Hydraulic oil return line (B)	Tag, disconnect, and cap.	
6. Front brake hydraulic line (C)	Tag, disconnect, and cap.	

TA098965

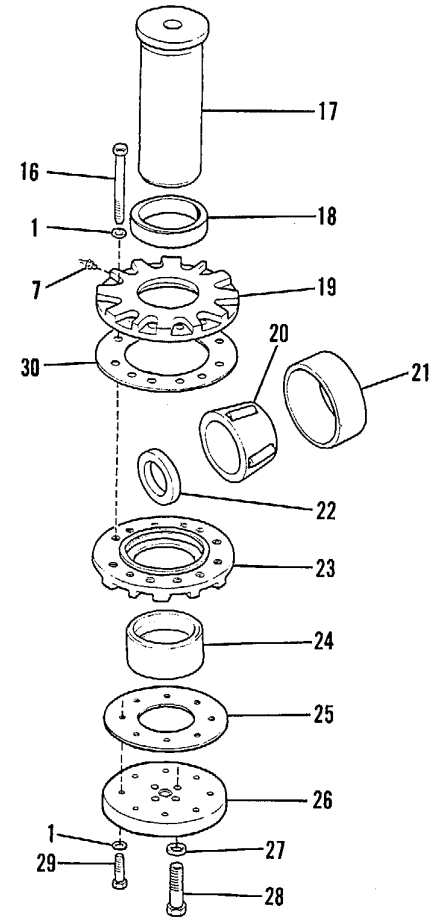
Go on to Sheet 3

ARTICULATED HITCH DISASSEMBLY/ASSEMBLY (CONT)

1. Washer
2. Capscrew
3. Capscrew
4. Cover Assembly
5. Pin
6. Collar
7. Grease Fitting
8. Cap
9. Tapered Roller Bearing Cone
10. Tapered Roller Bearing Cup
11. Lip Type Seal
12. Cap
13. Shim Pack
14. Pressure Relief Fitting
15. Capscrew
16. Capscrew
17. Pin
18. Spacer
19. Cap
20. Tapered Roller Bearing Cone
21. Tapered Roller Bearing Cup
22. Lip Type Seal
23. Cap
24. Spacer
25. Shim Pack
26. Lockplate
27. Hardened lockwasher
28. Capscrew
29. Capscrew
30. Shim



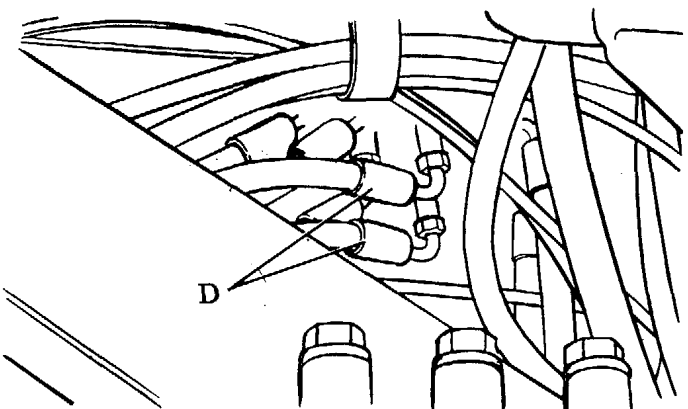
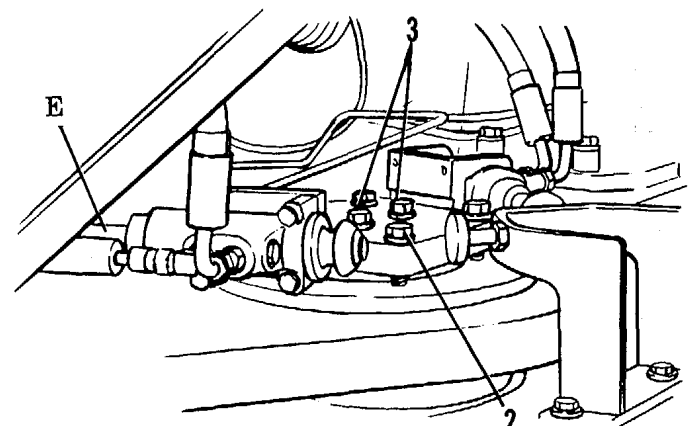
UPPER



LOWER

TA098966

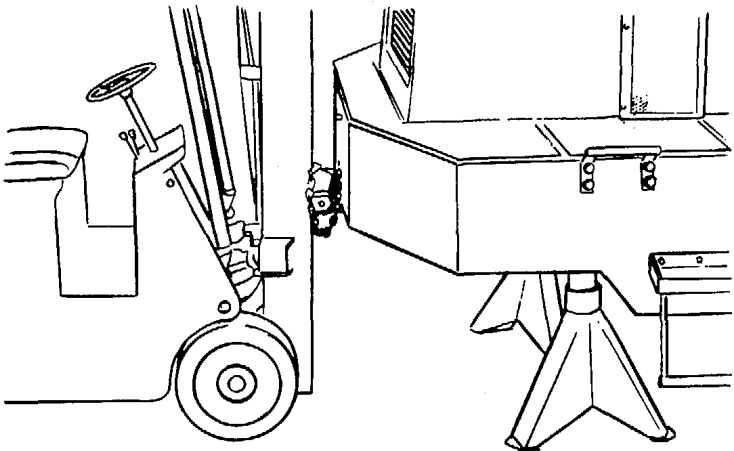
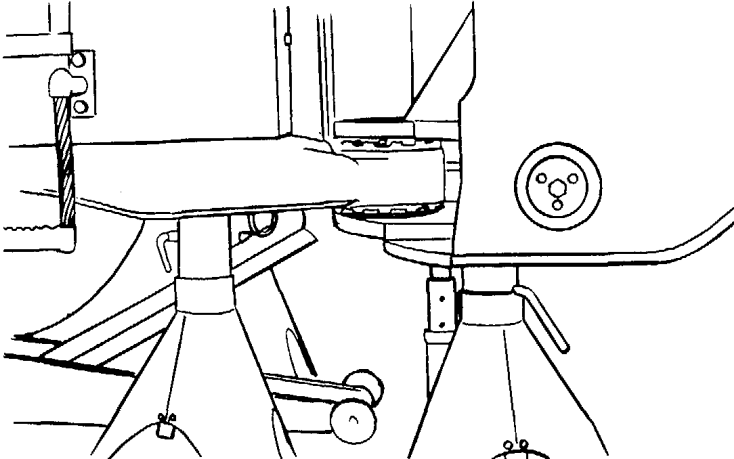
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<p>7. Eight hydraulic lines (D) for brake control valve</p> <p>Tag and disconnect lines at valves.</p>	<p>Tag, disconnect, and cap.</p> <p>NOTE</p>	
<p>8. Two capscrews (3), and washers (1) that hold upper pin (5)</p> <p>Do not remove cover until pin is loose.</p>	<p>Remove.</p> <p>WARNING</p>	
<p>9. Four capscrews (2) and washers (1) that hold cover assembly (4) in position</p>	<p>Loosen, but do not remove. Do not exceed 1/4 inch.</p>	
<p>10. Steering neutralizer valve hydraulic lines (E)</p> <p>If necessary, tag and remove any additional lines that block access to hoses.</p>	<p>Tag, disconnect, and cap.</p> <p>NOTE</p>	

TA098967

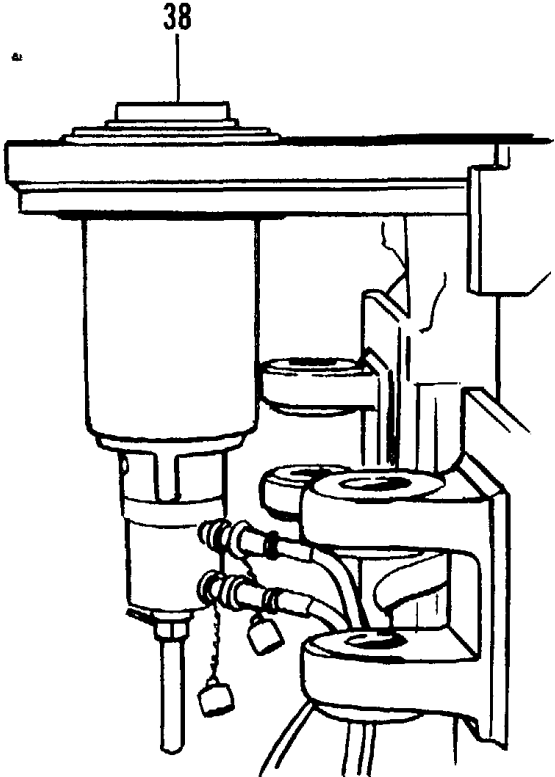
Go on to Sheet 5

ARTICULATED HITCH DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
11. Capscrews (29) and capscrews (28)	Remove.	
12. Lower lock plate (26)	Remove.	
13. Rear main frame vehicle, in position under forward extreme points of vehicle rear main frame.	Put vehicle jacks, of sufficient capacity to lift vehicle, in position under forward extreme points of vehicle rear main frame.	
NOTE Mast should be tilted forward, in lowest position and immobilized.	NOTE Fasten and immobilize to a suitable vehicle.	
14. Rear main frame (No less than 10,000 lbs. lifting capacity.)	Fasten and immobilize to a suitable vehicle. NOTE Vehicle should be of sufficient size for lifting, pulling, and pushing front assembly of RTCH.	
15. Front main frame shown.	Put jacks under rear of front main frame as shown.	<p>TA098968</p> <p>Go on to Sheet 6</p>

LOCATION/ITEM	ACTION	REMARKS
16. Rear of RTCH jacks. This will help loosen top pivot pin.	Move up and down with vehicle and floor	
Do not remove cover assembly of top pivot pin until pivot pin is loosened.	<div style="border: 1px solid black; padding: 5px; display: inline-block;">WARNING</div>	
17. Top pivot pin (5)	Loosen with a hydraulic jack.	
18. Cover assembly (4) and pivot pin (5)	Remove.	
Pin weighs 35 lbs (14 kg).	NOTE	
19. Lower pivot pin (17)	Remove using a hydraulic puller.	
Weight of pin is 48 lbs. (22 kg).	NOTE	
20. Spacer (24)	Remove, using puller.	

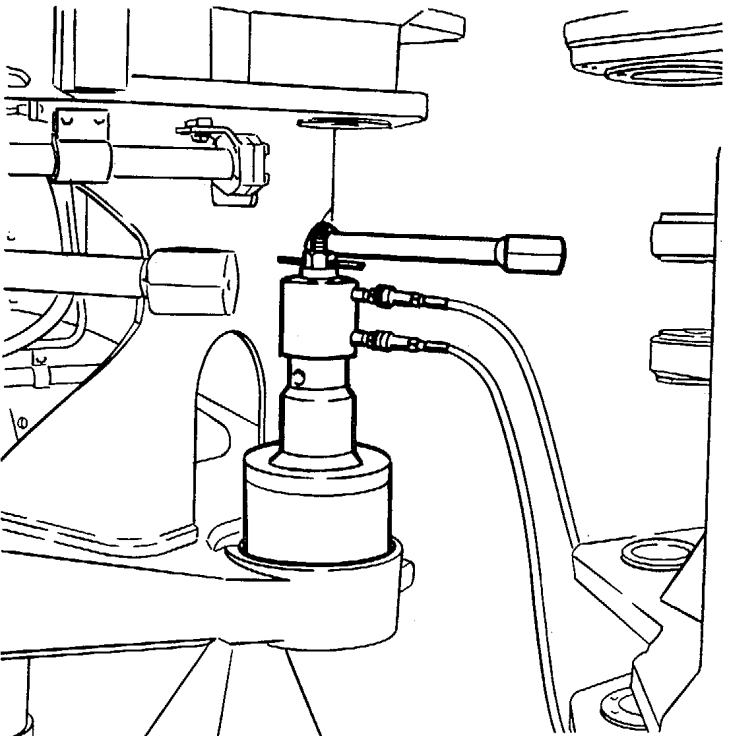
Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS	
	<div style="border: 1px solid black; padding: 5px; display: inline-block;">CAUTION</div>		
<p>You must disconnect shipping link at this time.</p>			
<p>21. Front main frame and supports vehicle. Move supports and floor jack at same time.</p>	<p>Move away from rear frame using suitable</p>		
<p>22. Capscrews (15), bearing cap (8), lower bearing cap (12) and shim pack (13)</p>	<p>Remove from upper pivot joint.</p>		
<p>23. Seals (11)</p>	<p>Remove from upper and lower bearing caps.</p>		
<p>24. Lower top center joint sets of bearing cups and cones will be removed at same time.</p>	<p>Put hydraulic puller in position as shown. Both</p>		
<p>25. Adapter (38)</p>	<p>Install step.</p>		
<p>26. Bearing cups (21) and cones (20) on front frame</p>	<p>Fasten hoist and remove.</p>		

TA098969

Go on to Sheet 8

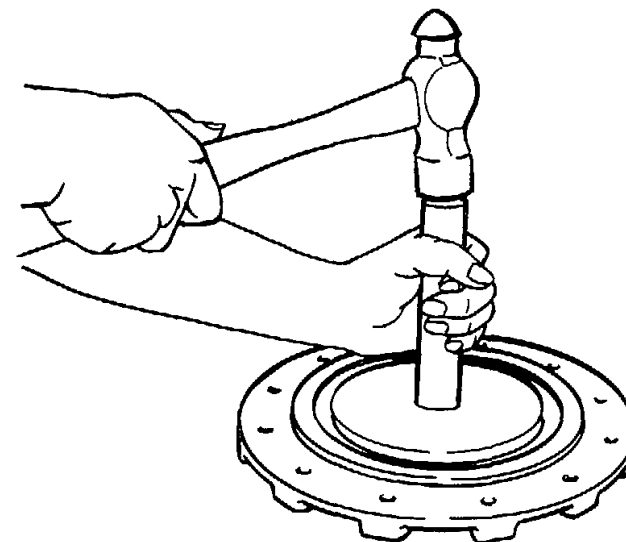
ARTICULATED HITCH DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
27. Collar (6) frame. Use a hydraulic puller.	Remove from upper pivot joint of rear main	
28. Spacer (18)	Remove from lower pivot joint.	
29. Capscrews (16)	Remove from lower pivot joint.	
30. Upper bearing cap (19)	Remove.	
31. Lower bearing cap (23)	Remove.	
32. Shim pack (25)	Remove.	
33. Lip seals (22)	Remove from bearing cap (19) and (23).	
34. Lower bearing cone (20), and upper bearing cone (20), and upper bearing cup (21).	Using hydraulic puller, remove as one unit.	
35. Lower bearing cup (21) hydraulic puller as shown.	Remove through top of lower pivot joint with	

TA098970

Go on to Sheet 9

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>		
1. Seal (22) joint using a seal installation tool and hammer as shown.	Install in upper bearing cup (21) of lower pivot joint.	
<p style="text-align: center;">NOTE</p> Install seal so lip is toward outside of bearing cap and makes contact with counterbore.		
2. Other seal (22) joint.	Install in lower bearing cup (21) of lower pivot joint.	
<p style="text-align: center;">NOTE</p> Install seal until it makes contact with counterbore. Lip of seal must be toward inside of cap.		
3. Lower cap (23)	Install in lower pivot joint.	
4. Lower bearing cup (21) (-32.1 to -430C) and install in the bore.	Lower temperature to -900 to -110°F	
5. Installation sleeve	Use to make bearing cup contact lower cap.	
6. Two bearing cones (20)	Install in bore of lower pivot joint.	

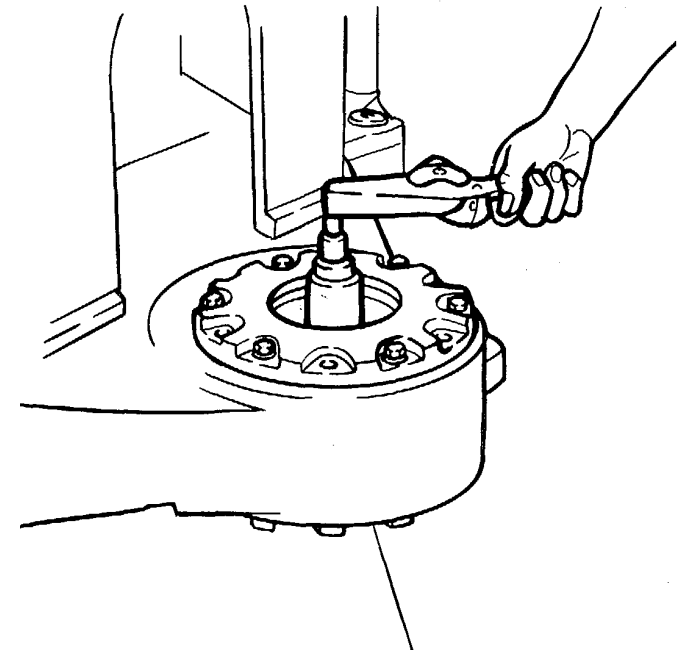


TA098671

Go on to Sheet 10

ARTICULATED HITCH DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
7. Upper bearing cup (21) (-32 to -430C) and install in bore.	Lower temperature to -900 to -110°F	
8. Bearing driver	Use to make bearing cup contact bearing cone.	
9. Shims (25)	Install original amount.	
10. Upper cap (19)	Install.	
11. Six capscrews (16) evenly.	Install an equal distance apart and tighten	
12. Stud, nut and adapter torque wrench to check amount of torque needed to turn bearing cones.	Connect to bearing cones as shown. Use a	
<p style="text-align: center;">NOTE</p> <p>The amount of torque must not be less than 80 lb. in. (9 N-m) or more than 400 lb. in. (45 N-m). Remove or install shims (25) until you have the correct amount of torque.</p>		



TA098972

Go on to Sheet 11

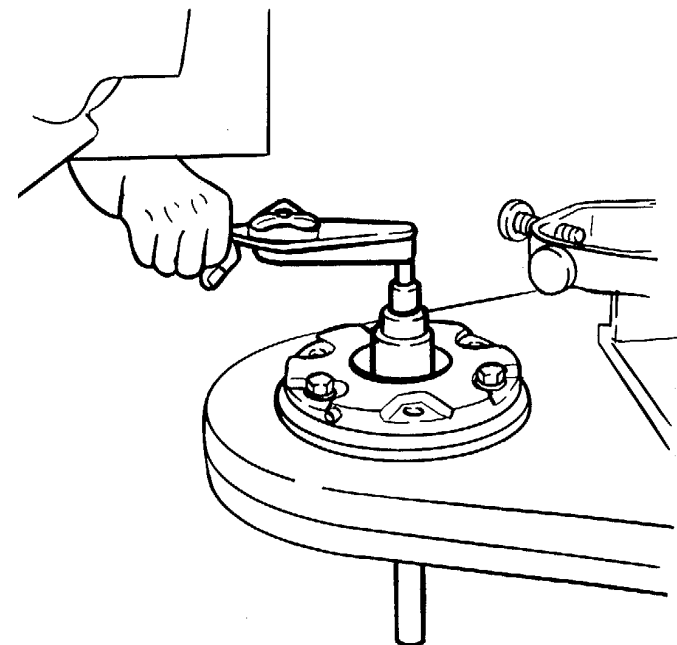
ARTICULATED HITCH DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
13. Spacer (18) the joint.	Install in lower pivot joint from the bottom of	
14. Upper collar (6) (-32 to -430C) and install.	Lower temperature to -900F to -1100F	
15. Lower cap (26)	Install in bore of front upper pivot joint.	
16. Three capscrews (29) and tighten evenly.	Install in lower cap an equal distance apart	
17. Bearing cup (21) (-32 to -430C) and install in bore.	Lower temperature to -900F to -110°F	
18. Bearing driver	Use to make bearing cup (8) contact cap.	
19. Two bearing cones (20)	Install in bore.	

Go on to Sheet 12

ARTICULATED HITCH DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
20. Upper bearing cup (10) (-32.1 to -430C) and install in upper pivot joint.	Lower temperature to -900F to -110°F	
21. Bearing driver cone.	Use to make bearing cup (10) contact bearing	
22. Shims (13)	Install original amount.	
23. Cap (8)	Install.	
24. Three capscrews (15) and tighten evenly.	Install in upper cap an equal distance apart	
25. Caps (12) and (8) bearing cones.	Remove. Install nuts and sleeve, as shown, on	
26. Caps (12) and (8)	Install.	
27. Capscrews (15)	Install.	
28. Bearing cones (20)	Check amount of torque needed to turn bearings using a torque wrench as shown.	



TA098973

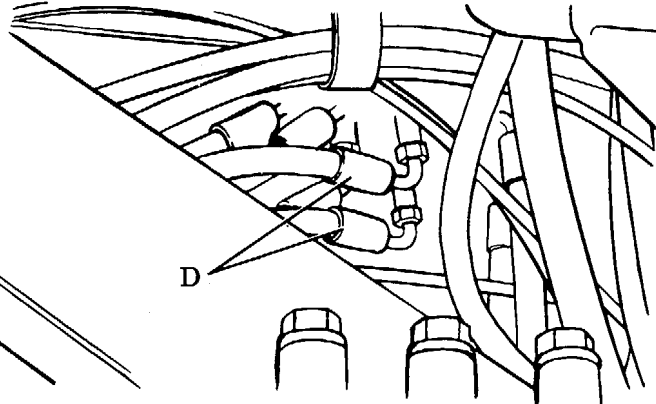
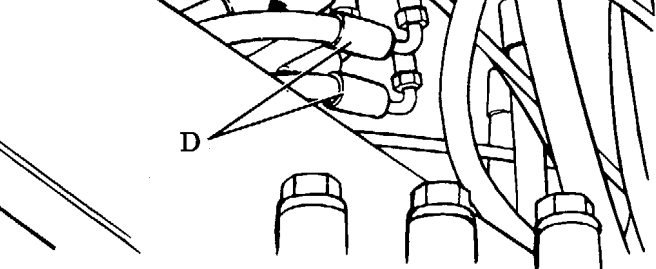

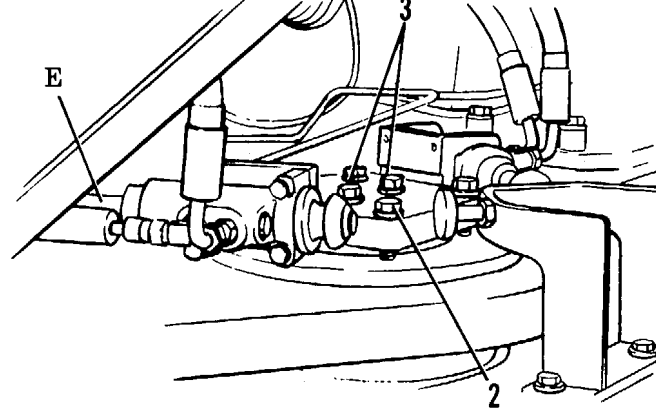
Go on to Sheet 13

LOCATION/ITEM	ACTION	REMARKS
	<p style="text-align: center;">NOTE</p> <p>The amount of torque must not be less than 80 lb. in. (9 N-m) or more than 400 lb. (45 N-m). Remove or install shims until you have the correct amount of torque.</p>	
<p>29. Two caps (8) and (12) and installation tooling</p>	<p>Remove.</p>	
<p>30. Seals (11) Install in caps (8) and (12).</p>		
<p>c</p>	<p style="text-align: center;">NOTE</p> <p>Install seal until it makes contact with counterbore. Lips of seals must be toward inside of caps.</p>	
<p>31. Caps (9) and (11)</p>	<p>Install again.</p>	
<p>32. Capscrews (15)</p>	<p>Install all capscrews and tighten evenly.</p>	

Go on to Sheet 14

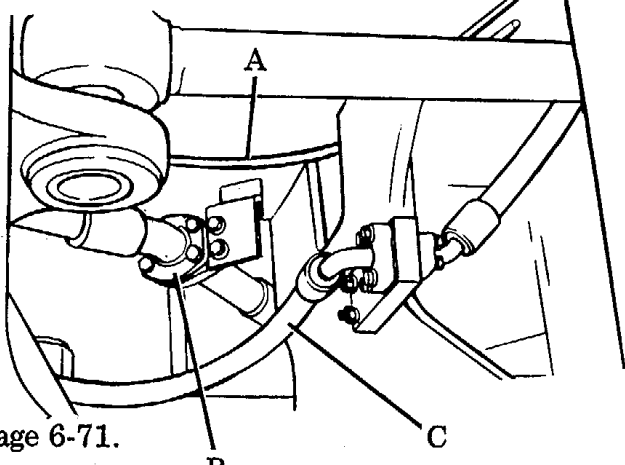
LOCATION/ITEM	ACTION	REMARKS
33. Hydraulic jack	Put in position under rear of front main frame.	
34. Front main frame	Position in articulated joint.	
35. Pin (17)	Install in lower pivot.	
36. Pin (5)	Place in position in upper pivot joint.	
37. Retainer (4) 2-1/2 inch long capscrews align holes in re- tainer with holes in top of pin (5).	Place into position one pin (5). Using three	
38. Pin (5)	Install.	
39. Shipping link	Connect.	
Vehicle used for positioning front main frame may be removed at this time.	<p style="text-align: center;">NOTE See TM 10-3930-641-20.</p>	
40. Long capscrews (installed in step 37)	Remove and install original capscrews (2).	
41. Capscrews (2) a. b. c. d. e.	<p>Torque in sequence:</p> <p>Tighten to a torque of 65 lb. ft. to 85 lb. ft. (88-115.2 N.m).</p> <p>Hit joint until torque is less than 40 lb. ft. (54.2 N.m).</p> <p>Tighten to a torque of 65 lb. ft. to 85 lb. ft. (88-115.2 N.m).</p> <p>Hit joint until torque is less than 60 lb. ft. 81.3 N.m).</p> <p>Tighten to a torque of 65 lb. ft. to 85 lb. ft. (88-115.2 N.m).</p>	

Go on to Sheet 15

LOCATION/ITEM	ACTION	REMARKS
42. Spacer (24)	Install in lower pivot joint with bevel up.	
43. Pin (17) holes in frame.	Use jacks to align holes in bottom of pin with	
44. Plate (26)	Put in position under rear of front main frame.	
45. Four capscrews (28)	Install.	
46. Plate (26) feeler gage. Remove plate and install same thickness of shims.	Measure distance between plate and frame with	
47. Plate (26) and four capscrews (28)	Install.	
48. Pin (17) aligned with holes in frame.	Turn with hydraulic jack until four holes are	
49. Four capscrews (29)	Install.	
50. Hydraulic line (E)	Connect to neutralizer valve.	
51. Eight hydraulic lines (D)	Connect to pilot control valve.	

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Go on to Sheet 16

LOCATION/ITEM	ACTION	REMARKS
52. Wiring harness (A)	Connect.	 <p>see page 6-71.</p>
53. Hydraulic oil return line (B)	Connect.	
54. Hydraulic brake line (C)	Connect.	
55. Steering cylinders rod ends	Install.	
56. Lower middle driveshaft	Install.	
<p style="text-align: center;">NOTE</p> <p>Tighten capscrews to a torque of 90 lb. ft. to 110 lb. ft. (122-149 N.m).</p>		
57. Brake system	Bleed air.	See TM 10-3930-641-20

TA098975

End

HYDRAULIC (STEERING AND BRAKE) PUMP REMOVAL/INSTALLATION

(Sheet 1 of 9)

This task covers: Replacement of steering and brake pump

INITIAL SETUP

Test Equipment

None Tags

Materials/Parts

Page 2-54

Troubleshooting Reference

Equipment Condition

Engine off

Hydraulic oil cooled

Shipping link installed

Special Tools

None One mechanic

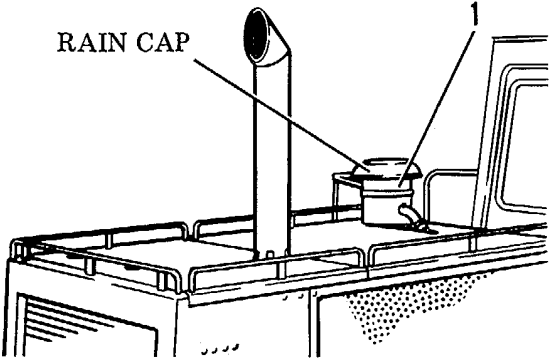
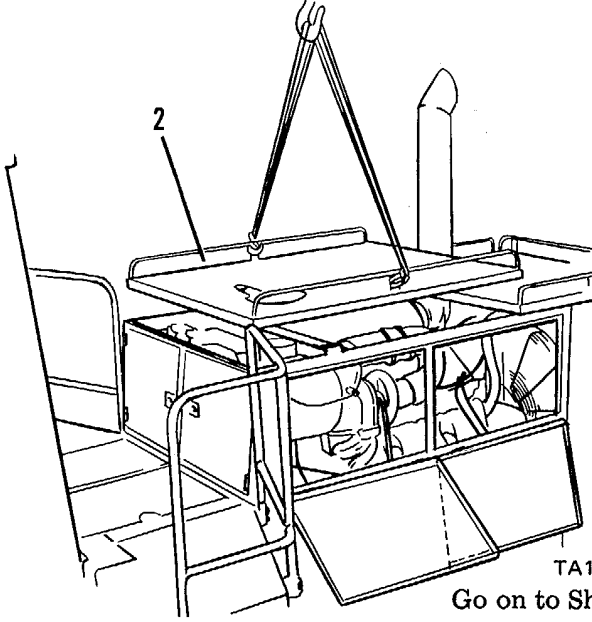
Personnel Required

References

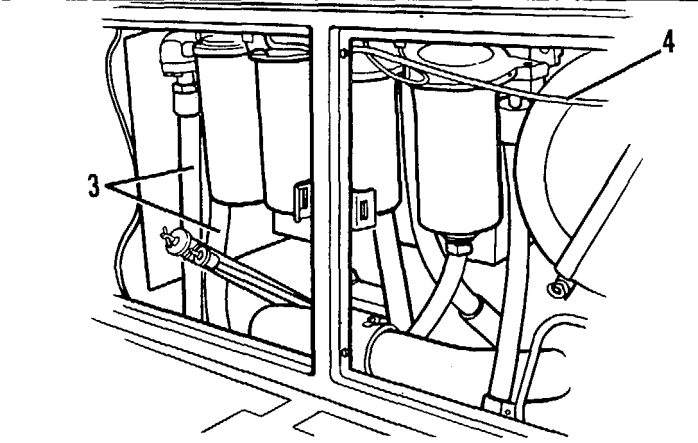
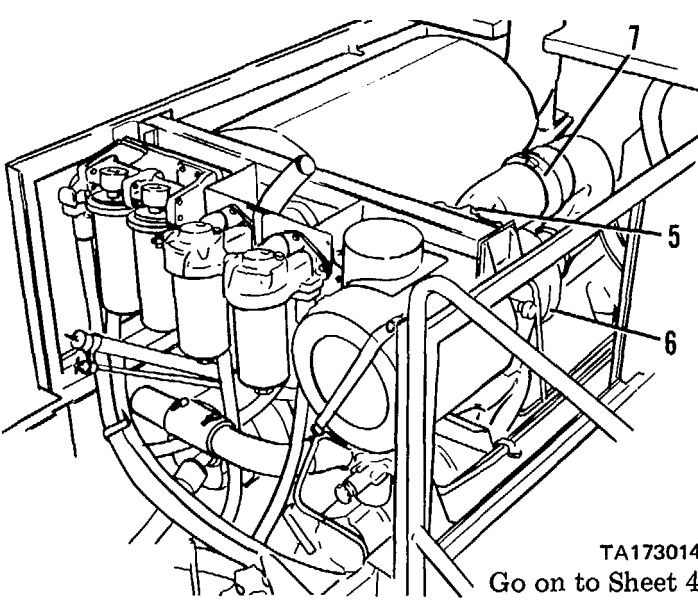
Shipping link removal/installation, None
TM 10-3930-641-20

General Safety Instructions

Go on to Sheet 2

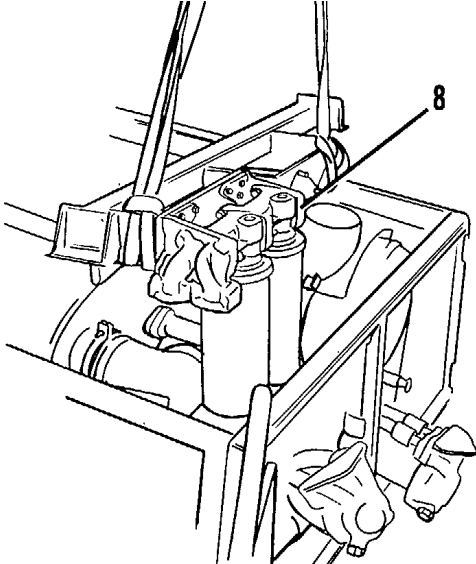
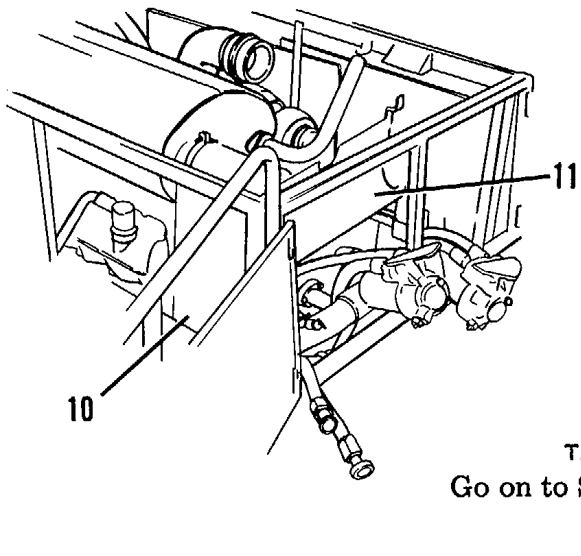
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1. Precleaner (1)	Remove.	
2. Hood (2)	Attach hoist as shown and remove.	
<p style="text-align: center;">Weight of hood is 96 lb. (43.5 Kg).</p>	<p>NOTE</p>	
3. Door assemblies at rear of engine	Open.	

HYDRAULIC (STEERING AND BRAKE) PUMP REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
4. Hydraulic lines (3)	Tag and disconnect from oil filter base.	
5. Wire harness (4)	Disconnect from sending unit.	
6. Six capscrews (5)	Remove from filter bases.	
<p style="text-align: center;">NOTE</p> <p>Do not disconnect hydraulic lines from the bases. Place the filters and bases on the floor plates.</p>		
7. Wire (6)	Disconnect from sending unit.	
8. Clamp (7)	Loosen.	

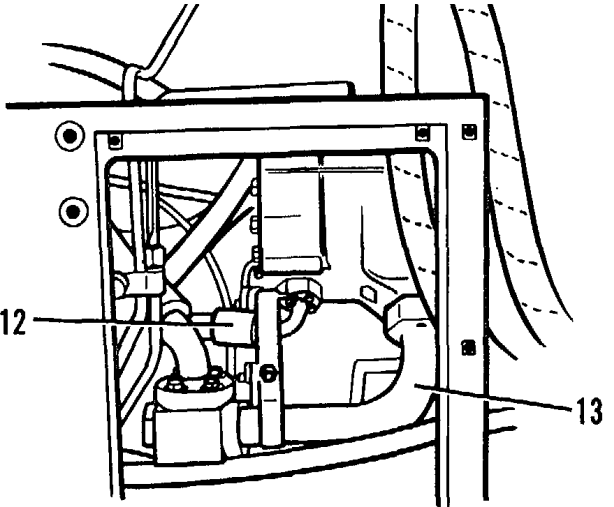
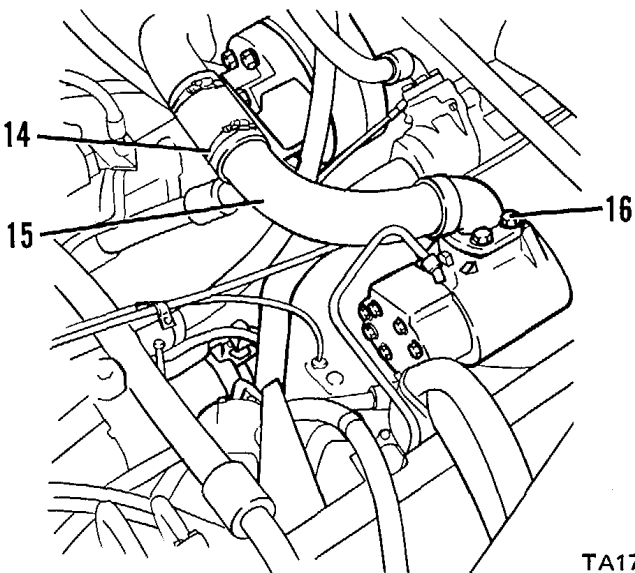
TA173014
Go on to Sheet 4

HYDRAULIC (STEERING AND BRAKE) PUMP REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
9. Four capscrews that secure filter group (8) and three capscrews for heat shield.	Remove.	
10. Filter group (8) Weight of filter group is 100 lb. (45.4 Kg).	Attach hoist as shown and remove. NOTE	
11. Air cleaner housing Weight of housing is 50 lb. (22.7 Kg).	Attach hoist and remove. NOTE	
12. Heat shield (11)	Remove two capscrews (10).	

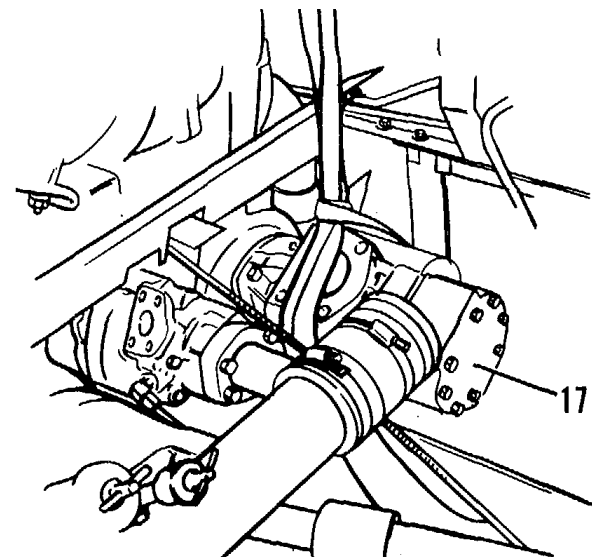
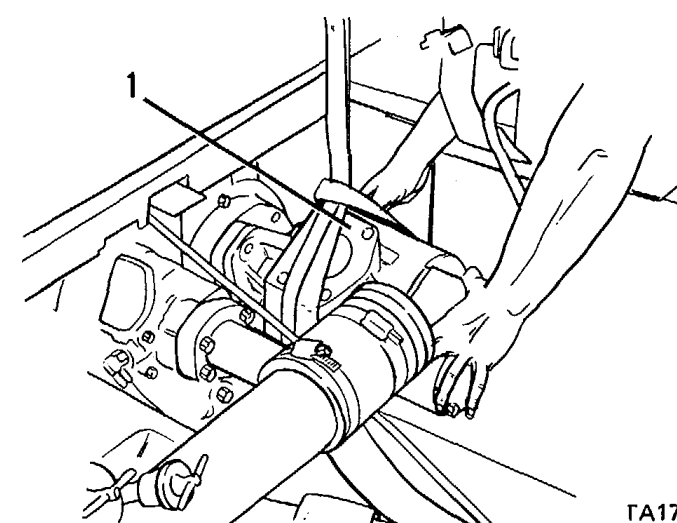
TA173015
Go on to Sheet 5

HYDRAULIC (STEERING AND BRAKE) PUMP REMOVAL/INSTALLATION (CONT)

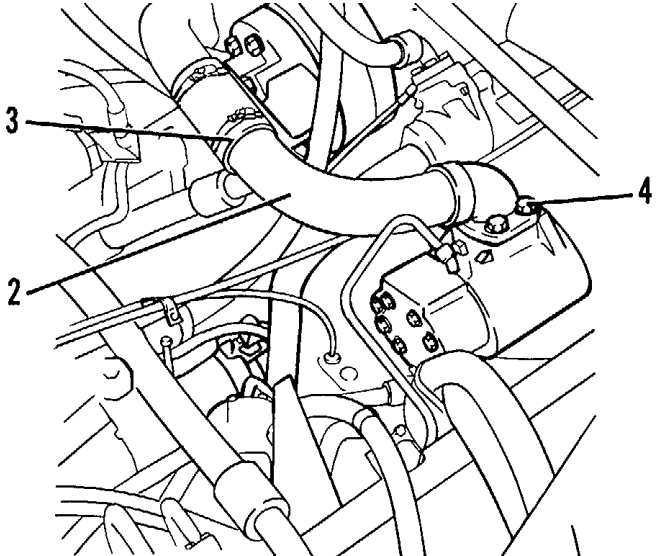
LOCATION/ITEM	ACTION	REMARKS
13. Two panels on left side of engine	Remove.	 <p>The diagram shows a perspective view of the hydraulic pump assembly. Two panels, labeled 12 and 13, are shown being removed from the left side of the engine compartment. Panel 12 is a vertical panel, and panel 13 is a larger, curved panel that covers the side of the pump housing.</p>
14. Hydraulic lines (12) and (13)	Remove from bottom of pump.	
15. Clamp (14)	Loosen.	
16. Four capscrews (16)	Remove from pump.	
17. Tube assembly (15)	Remove from pump.	
		 <p>The diagram shows a close-up view of the hydraulic pump assembly. A clamp, labeled 14, is shown being loosened from the bottom of the pump. Four capscrews, labeled 16, are shown being removed from the pump housing. A tube assembly, labeled 15, is shown being removed from the pump.</p>

TA173016
Go on to Sheet 6

HYDRAULIC (STEERING AND BRAKE) PUMP REMOVAL/INSTALLATION (CONT)

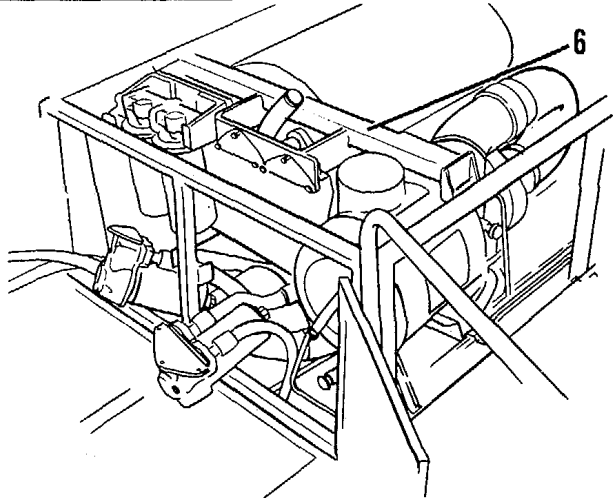
LOCATION/ITEM	ACTION	REMARKS
<p>18. Pump (17)</p> <p>securing pump and remove pump (17).</p> <p>Be careful not to damage the splined drive shaft when pump is removed.</p> <p>INSTALLATION</p>	<p>Attach hoist as shown. Remove four capscrews securing pump and remove pump (17).</p> <p>CAUTION</p>	
<p>1. Pump (1)</p> <p>rear of engine.</p> <p>Be careful not to damage the splined drive shaft of pump when installing pump.</p>	<p>Attach hoist and place into position in the rear of engine.</p> <p>CAUTION</p>	 <p>TA173017 Go on to Sheet 7</p>

HYDRAULIC (STEERING AND BRAKE) PUMP REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
2. Tube (2) (4).	Reinstall on pump and secure with capscrews	
3. Clamps (3)	Tighten.	
4. Hydraulic lines (5)	Install.	
5. Upper and lower left side panels and heat shield	Install.	

TA173018
Go on to Sheet 8

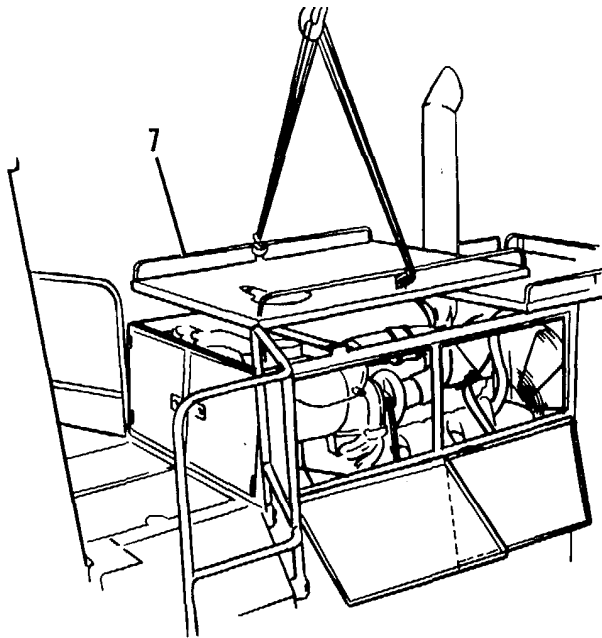
HYDRAULIC (STEERING AND BRAKE) PUMP REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
6. Air cleaner housing	Attach hoist and install.	
7. Filter group (6)	Attach hoist and install.	
8. Transmission and pilot system filters	Install.	
9. Air cleaner housing	Install four capscrews.	
10. Air cleaner indicator	Reconnect wire to sending unit.	
11. Transmission and pilot system oil filter indicator.	Reconnect wire to sending unit.	

TA173019

Go on to Sheet 9

HYDRAULIC (STEERING AND BRAKE) PUMP REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
12. Engine oil filters	Reconnect the two hydraulic lines.	
13. Hood (7)	Attach hoist and reinstall.	
14. Precleaner	Install.	

TA173020

End

HYDRAULIC (STERING AND BRAKE) PUMP DISASSEMBLY/ASSEMBLY(Sheet 1 of 10)

This task covers: Repair of steering and brake hydraulic pump.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

Page 2-54

Troubleshooting Reference

Equipment Condition

Hydraulic pump removed.

Shipping link installed.

Special Tools

None One mechanic

Personnel Required

References

Hydraulic pump removal/installation, None
page 6-52

Shipping link removal/installation,
TM 10-3930-641-20

General Safety Instructions

Go on to Sheet 2

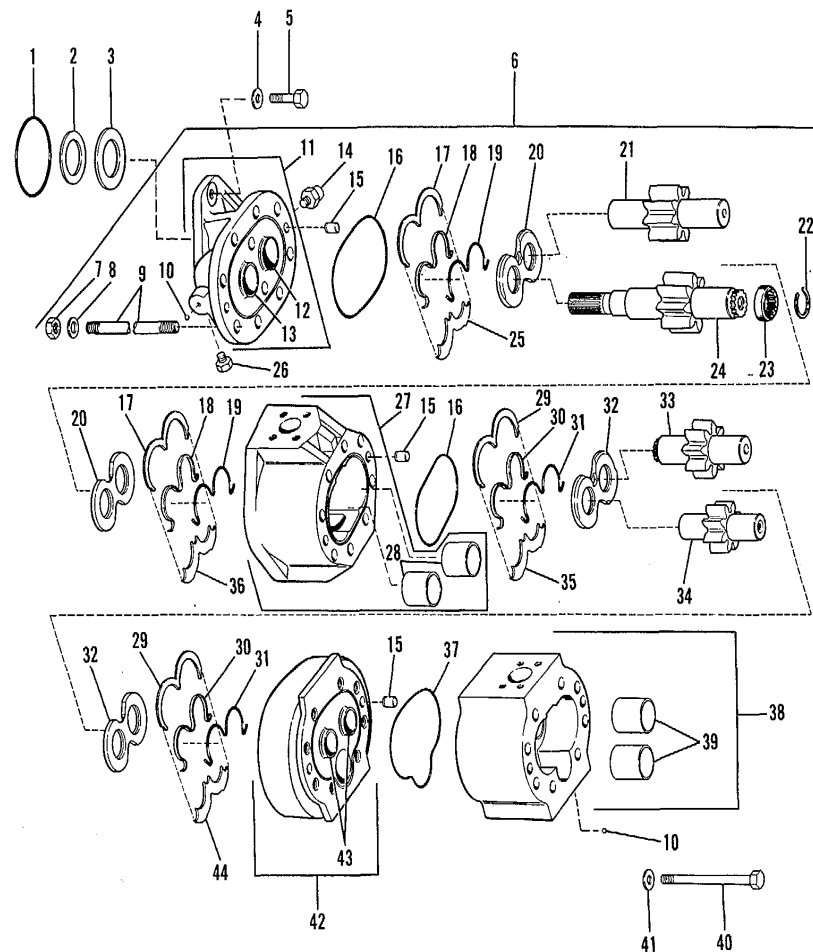
HYDRAULIC (STEERING AND BRAKE) PUMP DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">DISASSEMBLY</div>	<div style="border: 2px solid black; padding: 5px; width: fit-content; margin: 0 auto;">CAUTION</div>	
	<p>Lay out parts in the order of disassembly. Do not mix parts.</p>	<p>Clean outside of pump.</p>
<p>1. Capscrew (40) and washer (41) that hold steering section to brake section</p>	<p>Remove.</p>	
<p>2. Packing (37) in steering section</p>	<p>Remove.</p>	
<p>3. Isolation plate (44)</p>	<p>Remove.</p>	
<p>4. Retaining ring (29)</p>	<p>Remove.</p>	
<p>5. Packing (31)</p>	<p>Remove.</p>	
<p>6. Back-up ring (30)</p>	<p>Remove.</p>	
<p>7. Drive gear (33)</p>	<p>Remove with pressure plate (32).</p>	
<p>8. Pressure plate (32)</p>	<p>Remove from drive gear.</p>	
<p>9. Idler gear (34)</p>	<p>Remove.</p>	
	<p>6-62</p>	
		<p>Go on to Sheet 3</p>

HYDRAULIC (STEERING AND BRAKE) PUMP DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 3 of 10)

- | | |
|-----------------------|-----------------------|
| 1. Lip type seal | 36. Isolation plate |
| 2. Spacer | 37. Preformed packing |
| 3. Lip type seal | 38. Body assembly |
| 4. Washer | 39. Bushing |
| 5. Capscrew | 40. Capscrew |
| 6. Pump assembly | 41. Washer |
| 7. Nut 42. | Body assembly |
| 8. Washer | 43. Bushing |
| 9. Stud 44. | Isolation plate |
| 10. Ball | |
| 11. Body assembly | |
| 12. Bushing | |
| 13. Bushing | |
| 14. Relief valve | |
| 15. Guide pin | |
| 16. Preformed packing | |
| 17. Retaining ring | |
| 18. Back-up ring | |
| 19. Preformed packing | |
| 20. Pressure plate | |
| 21. Idler gear | |
| 22. Snap ring | |
| 23. Splined coupling | |
| 24. Drive gear | |
| 25. Isolation plate | |
| 26. Capscrew | |
| 27. Body assembly | |
| 28. Bushings | |
| 29. Retaining ring | |
| 30. Back-up ring | |
| 31. Preformed packing | |
| 32. Pressure plates | |
| 33. Drive gear | |
| 34. Idler gear | |
| 35. Isolation plate | |



TA098976

Go on to Sheet 4

HYDRAULIC (STEERING AND BRAKE) PUMP DISASSEMBLY/ASSEMBLY (CONT)

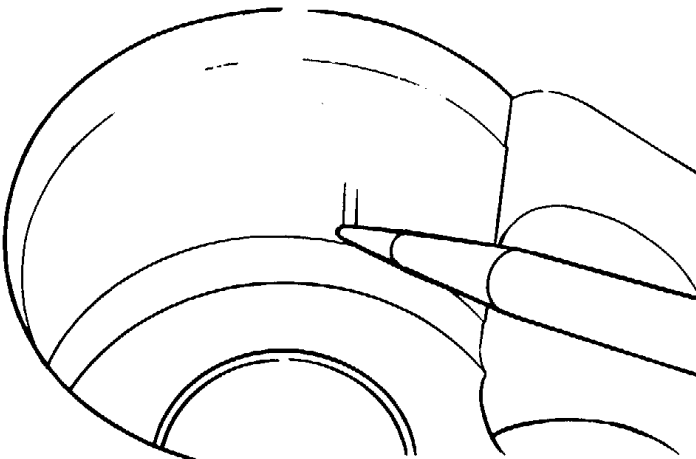
LOCATION/ITEM	ACTION	REMARKS
10. Pressure plate (32)	Remove.	
11. Isolation plate (35)	Remove.	
12. Retaining ring (29)	Remove.	
13. Packing (31)	Remove.	
14. Back-up ring (30)	Remove.	
15. Nuts that hold body assembly (11) in plate	Remove.	
16. Body assembly (11)	Remove.	
17. Packing (16) in body assembly (11)	Remove.	
18. Two lip seals (1) and (3) and spacer (2)	Remove from seal retainer.	
19. Isolation plate (25)	Remove from brake pump body.	
20. Retaining ring (17)	Remove.	
21. Packing (19)	Remove.	

Go on to Sheet 5

HYDRAULIC (STEERING AND BRAKE) PUMP DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
22. Back-up ring (18)	Remove.	
23. Drive gear (24)	Remove with pressure plate (20).	
24. Pressure plate (20)	Remove from drive gear.	
25. Idler gear (21)	Remove.	
26. Pressure plate (20)	Remove from pump.	
27. Isolation plate (36)	Remove.	
28. Retaining ring (17)	Remove.	
29. Packing (19)	Remove.	
30. Back-up ring (18)	Remove.	
31. Body (27) to end of stud. With mallet tap nut and slide body out.	Remove from housing. Reinstall one nut flush stud. Remove	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS	
32. Preformed packing (16)	Remove from housing.		
33. Splined coupling (23)	Remove from housing.		
<p>ASSEMBLY</p> <p>If grooves in the bore are deeper than 0.015 in. (0.381 mm), in either the steering or brake pump, replace the body and gears.</p>	<p>NOTE</p> <p>Clean all parts.</p>		
1. Splined coupling (23)	<p>Install in housing.</p> <p>NOTE</p> <p>Replace snap ring (22) if necessary.</p>		<p>INSPECT FOR GROOVES</p>
2. Preformed packing (16)	Install.		
3. Body assembly (27)	Place in position.		

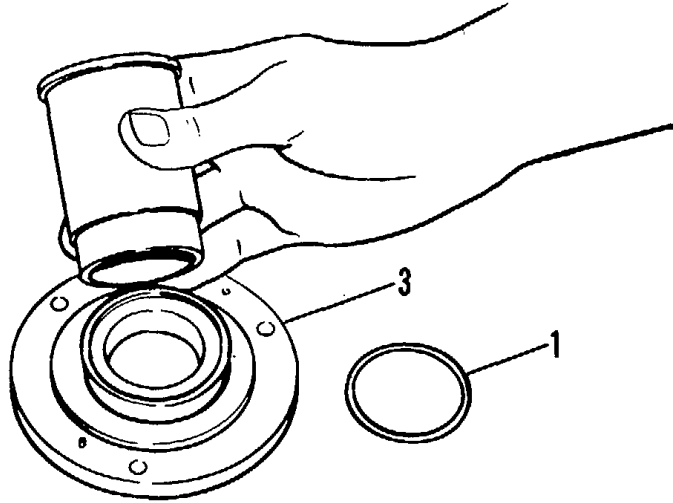
TA098977

Go on to Sheet 7

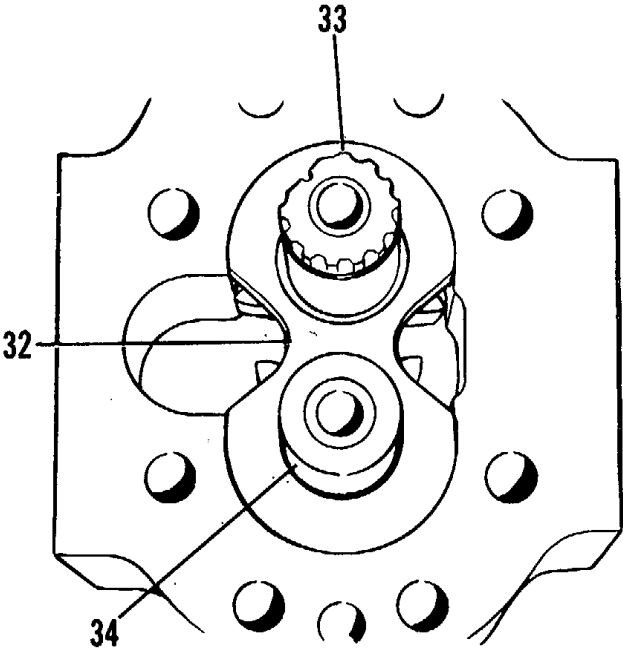
HYDRAULIC (STEERING AND BRAKE) PUMP DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
4. Isolation plate (36)	Install into body (27). NOTE Isolation plate must be installed on inlet side of pump with trap slot (machined notch) toward the outlet of pump body.	
5. Back-up ring (18)	Install.	
6. Packing (19)	Install.	
7. Ring retainer (17)	Install.	
8. Pressure plate (20)	NOTE Ring retainer must be installed on inlet side of pump body. Seals must be installed on pressure side of pump.	
9. Drive gear (24)	Install.	
10. Idler gear (21)	Install.	

Go on to Sheet 8

LOCATION/ITEM	ACTION	REMARKS	
11. Pressure plate (20) Pressure plate must be installed with machined notch (trap slot) toward outlet side of pump and bronze side toward gears.	Install on gears. NOTE		
12. Isolation plate (25)	Install on inlet side of pump.		
13. Back-up ring (18)	Install.		
14. Packing (19)	Install.		
15. Ring retainer (17)	Install beveled side up.		
16. O-ring (16)	Install in flange (6).		
17. Body assembly (11)	Position on pump body and install nuts.		
NOTE Tighten nuts to a torque of 165 lb. ft. to 185 lb. ft. (223.7-250.8 N.m).			
18. Lip seals (3) and (1) and spacer (2)	Install in flange with a seal driver.		
NOTE Install outside seal with lip toward outside of pump.			

HYDRAULIC (STEERING AND BRAKE) PUMP DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
19. Isolation plate (35) 20. Back-up ring (30)	Install on inlet side of pump body (38). Install.	
21. Packing (31) 22. Ring retainer (29)	Install. Install.	
23. Pressure plate (32) Put in position.	<p style="text-align: center;">NOTE</p> Radius of ring retainer (9) must be toward bottom of pump body.	
24. Drive gear (33) Install in pump body.	<p style="text-align: center;">NOTE</p> Install pressure plate with bronze side toward gears. Machined notch (trap slot) must be toward outlet side of pump.	
25. Idler gear (34)	<p style="text-align: center;">NOTE</p> Outlet side of pump body facing away. Drive gear goes in left side.	
26. Isolation plate (32)	Install.	
27. Back-up ring (30)	Install in pump body.	

TA098979

Go on to Sheet 10

LOCATION/ITEM	ACTION	REMARKS
28. Packing (31)	Install.	
29. Ring retainer (44)	Install.	
30. Packing (37)	Install in pump housing.	
31. Brake pump	Place in position on steering pump (27).	
	<p style="text-align: center;">NOTE</p> <p>Turning spline will align both drive gears.</p>	
32. Nuts (7) and studs (9), capscrews (40) and washers	Install.	
	<p style="text-align: center;">NOTE</p> <p>Tighten capscrews to a torque of 80 lb. ft. to 90 lb. ft. (108.5-122 N.m).</p>	
	<p>6-70</p>	

End

SUPPLEMENTAL STEERING PUMP REMOVAL/INSTALLATION(Sheet 1 of 3)

This task covers: Removal/installation of supplemental steering pump.

INITIAL SETUP

Test Equipment

None As required

Materials/Parts

None

Troubleshooting Reference

Equipment Condition

Engine OFF

Special Tools

None One mechanic

Personnel Required

References

Lower driveshaft, middle piece removal/installation, TM 10-3930-641-20.

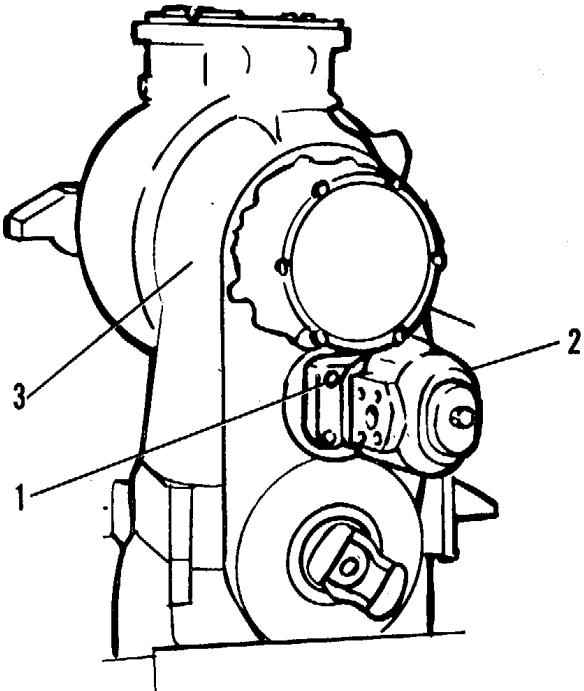
General Safety Instructions

Main disconnect switch OFF

Shipping link installed

Go on to Sheet 2

SUPPLEMENTAL STEERING PUMP REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p>REMOVAL</p> <p>It is necessary to remove the lower driveshaft middle piece for better access to the supplemental steering pump.</p>	<p>NOTE</p>	
<p>1. Lower driveshaft, middle piece</p>	<p>Remove</p>	<p>See TM 10-3930-641-20</p>
<p>2. Inlet and outlet lines openings.</p>	<p>Disconnect. Tag lines and cap or plug</p>	
<p>3. Capscrews (1) and washers securing supplemental steering pump (2) to output transfer gear case (3)</p>	<p>Remove.</p>	
<p>4. Supplemental steering pump (2)</p>	<p>Remove.</p>	

TA 172239

Go on to Sheet 3

SUPPLEMENTAL STEERING PUMP REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p>INSTALLATION</p>		
<p>1. Supplemental steering pump (2)</p> <p>Be careful lining up the splines on the drive- Be careful lining up the splines on the drive- shaft with the pump drive.</p>	<p>Place in position on output transfer case (3).</p> <p>CAUTION </p>	
<p>2. Capscrews (1) and washers</p>	<p>Install.</p>	
<p>3. Inlet and outlet lines</p>	<p>Install.</p>	
<p>4. Lower driveshaft, middle piece</p>	<p>Install.</p>	<p>See TM 10-3930-641-20.</p>
	<p style="text-align: center;">6-73</p>	<p style="text-align: right;">End</p>

SUPPLEMENTAL STEERING PUMP DISASSEMBLY/ASSEMBLY**(Sheet 1 of 5)**

This task covers: Disassembly/assembly of supplemental steering pump.

INITIAL SETUPTest Equipment

None As required

Materials/Parts

None

Troubleshooting ReferenceEquipment Condition

Supplemental steering pump removed
from vehicle.

Special Tools

None One mechanic

Personnel RequiredReferences

Supplemental steering pump removal/
installation, page 6-71.

General Safety Instructions

Go on to Sheet 2

SUPPLEMENTAL STEERING PUMP DISASSEMBLY/ASSEMBLY (CONT)

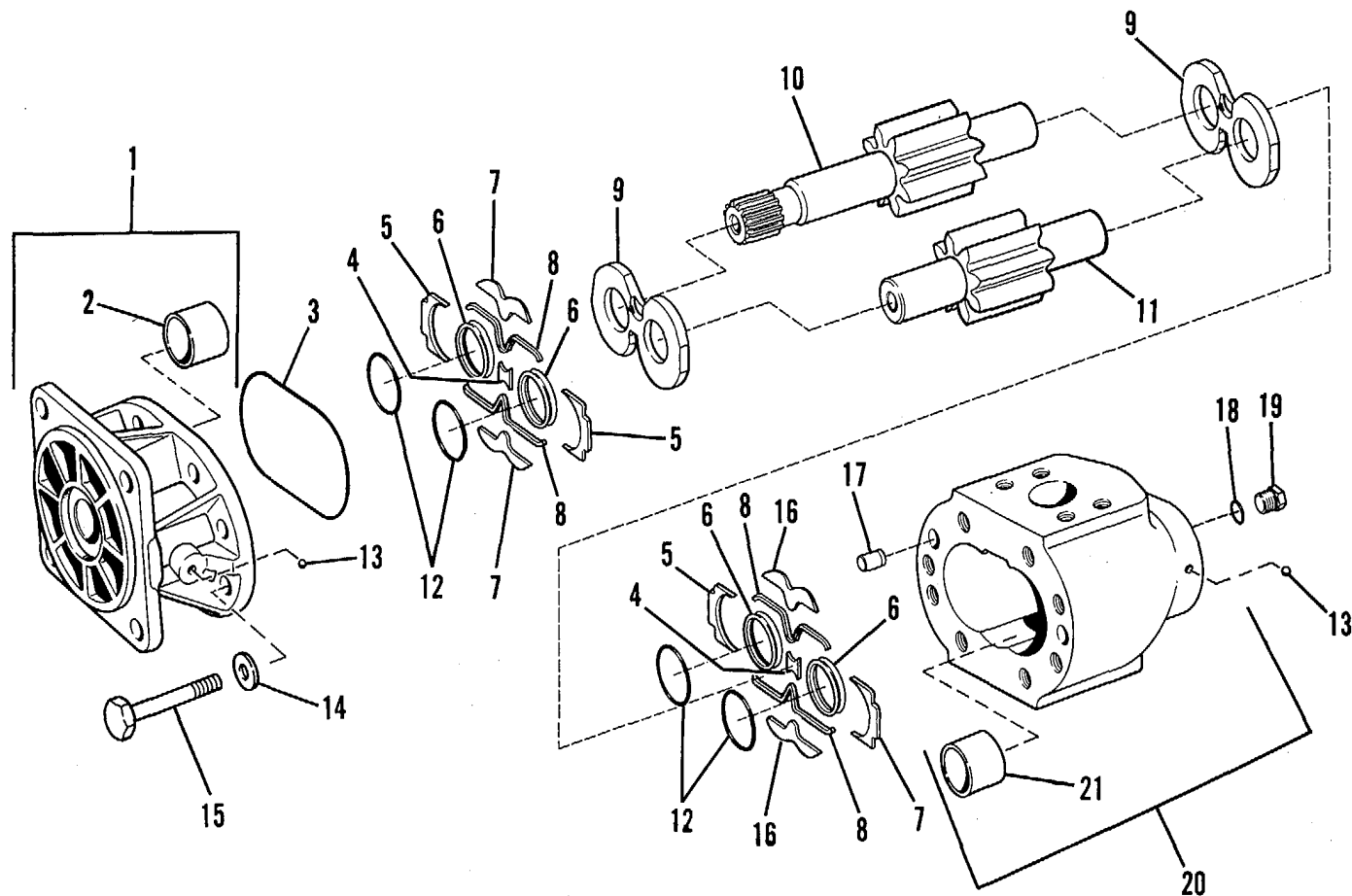
(Sheet 2 of 5)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">DISASSEMBLY</div> <p>Lay out parts in the order of disassembly. Do not mix parts.</p> <ol style="list-style-type: none"> <li>1. Capscrews (15) and washers (14) <li>2. Body assembly (1) <li>3. Preformed packing (3) <li>4. Spacers (7) and retainer (5) <li>5. Retainer (8) and spacers (4) <li>6. Seals (6) and preformed packing (12) <li>7. Drive gear (10) <li>8. Pressure plate (9) <li>9. Idler gear (11) <li>10. Pressure plate (9) 	<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">CAUTION</div> <p>Remove.</p> <p>Separate from housing (20).</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Slip off end of shafts (10) and (11).</p> <p>Remove with pressure plate (9).</p> <p>Remove from drive gear (10).</p> <p>Remove from housing.</p> <p>Remove from housing.</p>	

SUPPLEMENTAL STEERING PUMP DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 3 of 5)

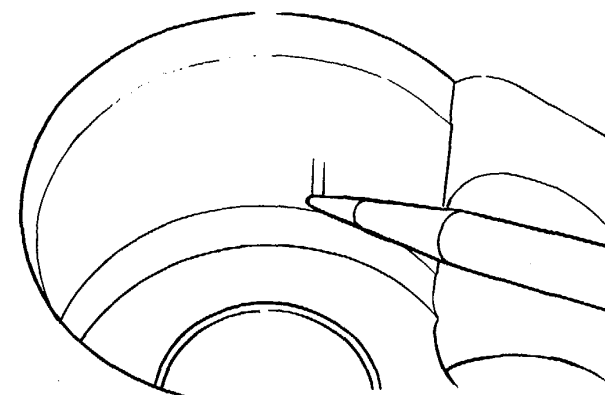
1. Body assembly
2. Bushing
3. Preformed packing
4. Spacer
5. Retainer
6. Seal
7. Spacer
8. Retainer
9. Pressure plate
10. Drive gear
11. Idler gear
12. Preformed packing
13. Ball
14. Washer
15. Capscrew
16. Spacer
17. Dowel
18. Preformed packing
19. Plug
20. Housing
21. Bushing



SUPPLEMENTAL STEERING PUMP DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 4 of 5)

LOCATION/ITEM	ACTION	REMARKS
11. Spacers (7) and retainers (5)	Remove.	
12. Retainers (8) and spacers (4)	Remove.	
13. Seals (6) and preformed packing (12)	Remove.	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>	NOTE	
If grooves in the bore are deeper than 0.015 in. (0.381 mm), replace the body and gears.	Clean all parts.	
1. Seals (6) and preformed packing (12)	Assemble and install in bottom of housing.	
2. Spacers (7, 4) and retainers (5, 8)	Assemble around seals in bottom of housing.	
3. Pressure plate (9)	Install.	
NOTE Install pressure plate with machined notch (trap slot) toward outlet side of pump and bronze side toward the gears.	NOTE	
4. Idler gear (11) and drive gear (10)	Install.	
NOTE Outlet side of pump body facing away. Drive gear goes in left side.	NOTE	
5. Pressure plate (9)	Install.	
NOTE Pressure plate must be installed with machined notch (trap slot) toward outlet side of pump and bronze side toward gears.	NOTE	



INSPECT FOR GROOVES

TA 172241
Go on to Sheet 5

SUPPLEMENTAL STEERING PUMP DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 5 of 5)

LOCATION/ITEM	ACTION	REMARKS
6. Seals (6) and preformed packing (12)	Slip over ends of shafts (10) and (11).	
7. Drive gear (10) turn freely.	Turn by hand a few rotations to be sure gears	
8. Preformed packing (3)	Install in groove in body assembly (1).	
9. Body assembly (1)	Position on housing (20).	
10. Capscrews (15) and washers (14)	Install.	
Tighten capscrews to a torque of 90 lb. ft. (108.5-122 N-m).	NOTE 80 lb. ft. to	

STEERING CYLINDERS REMOVAL/INSTALLATION

(Sheet 1 of 6)

This task covers: Replacement of steering cylinders.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

Page 2-56

Troubleshooting Reference

Equipment Condition

Engine off.

Hydraulic oil cooled.

Shipping link installed.

Special Tools

None Two mechanics

Personnel Required

References

Shipping link removal/installation,
TM 10-3930-641-20

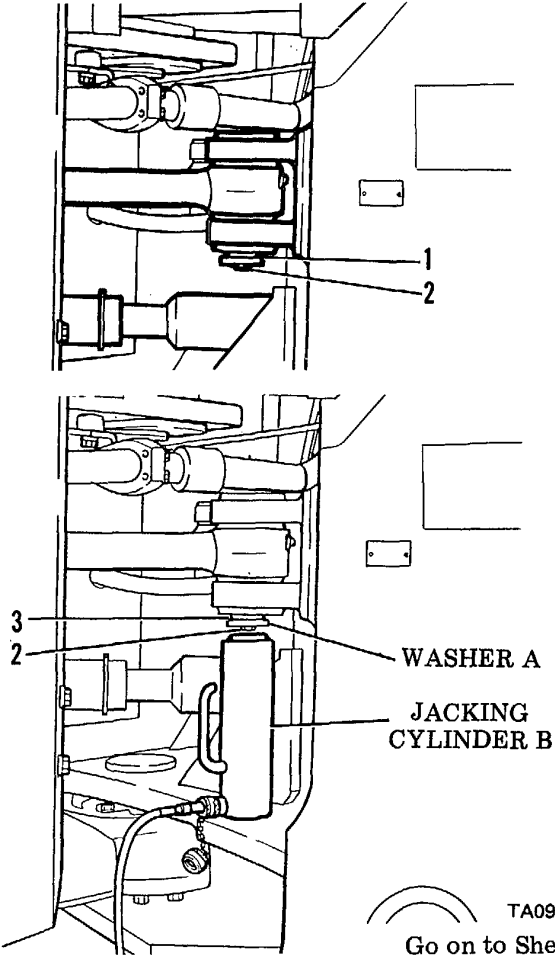
General Safety Instructions

Tires blocked.

Go on to Sheet 2

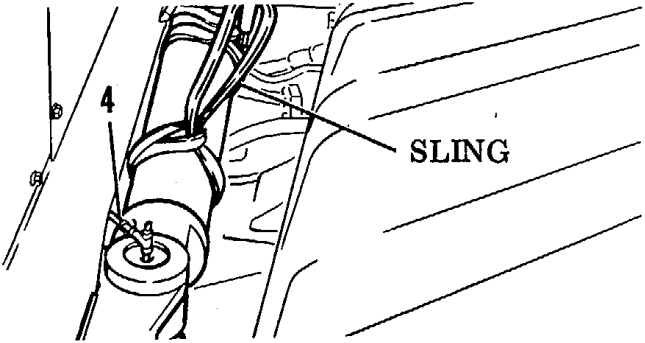
STEERING CYLINDERS REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 6)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>Shipping link must be connected before working at center of machine.</p> <ol style="list-style-type: none"> 1. Shipping link 2. Capscrew (2) 3. Washer (1) 4. Tool Install as follows: <ol style="list-style-type: none"> a. Washer (A) b. Capscrew (2) c. Jacking cylinder (B) 5. Steering cylinder rod end retaining pin 	<p style="text-align: center;">WARNING</p> <p>Install. See TM 10-3930-641-20.</p> <p>Remove.</p> <p>Remove.</p> <ol style="list-style-type: none"> a. Place on pin. b. Install in pin (3). c. Install under pin, against capscrew. <p>Force out, using jacking cylinder.</p>	 <p style="text-align: right;">TA098980 Go on to Sheet 3</p> <p style="text-align: right;">TA098981</p>

STEERING CYLINDERS REMOVAL/INSTALLATION (CONT)

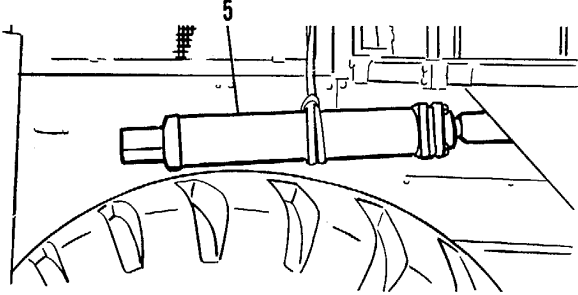
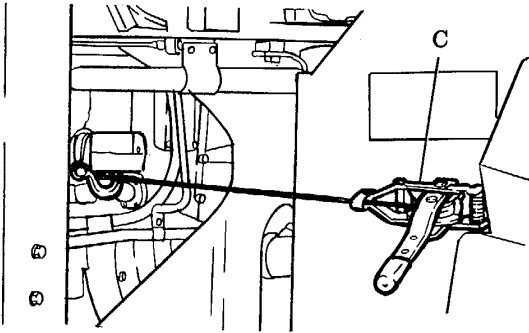
(Sheet 3 of 6)

LOCATION/ITEM	ACTION	REMARKS
6. Vehicle b.	a. Start engine and turn steering wheel until rod is positioned all the way into cylinder. Shut off engine.	
7. Hydraulic lines at steering cylinder keep dirt out.	Tag and disconnect. Use plugs in openings to	
8. Steering cylinder	Fasten hoist and sling.	
9. Lubrication line (4)	Disconnect from steering cylinder.	
10. Capscrew and washer installed in step 4	Remove from cylinder end retaining pin.	
11. Tool Install as follows: a. Washer (A) b. Capscrews (2) c. Jacking cylinder (B)	a. Place on pin. b. Install in pin (3). c. Install under pin, against capscrew.	

TA098981
Go on to Sheet 4

STEERING CYLINDERS REMOVAL/INSTALLATION (CONT)

(Sheet 4 of 6)

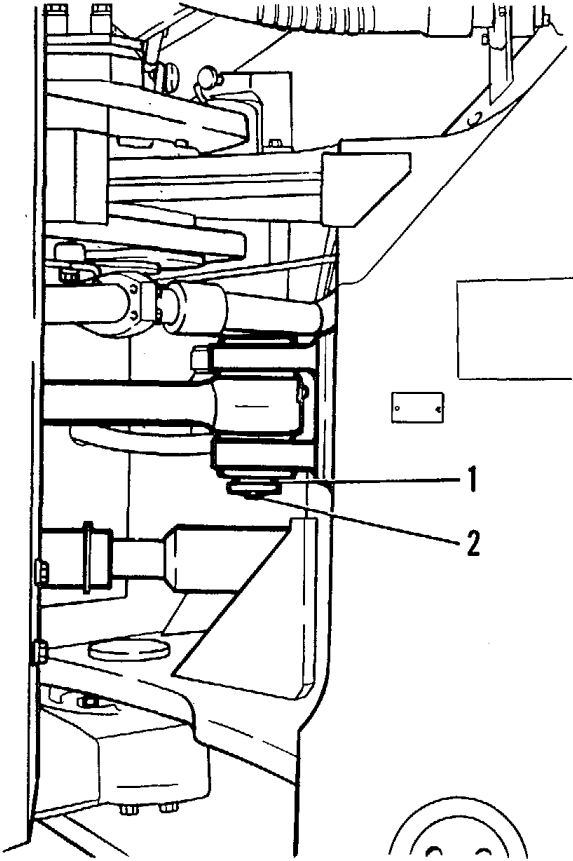
LOCATION/ITEM	ACTION	REMARKS
12. Cylinder end retaining pin	Force out, using jacking cylinder.	
13. Steering cylinder (5)	Remove.	
	NOTE	
	Weight of cylinder is 168 lb. (76.2 kg).	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">INSTALLATION</div>		
1. Steering cylinder (5)	Fasten hoist and move into position.	
2. Ratchet puller (C) cylinder forward until cylinder end retaining pin can be installed.	Fasten to rod end of steering cylinder. Pull	

TA098982

TA098992
Go on to Sheet 5

STEERING CYLINDERS REMOVAL/INSTALLATION (CONT)

(Sheet 5 of 6)

LOCATION/ITEM	ACTION	REMARKS
3. Washer and capscrew not tighten.	Install in retaining pin at cylinder end, but d	
4. Lubrication line (4)	Install. See sheet 3.	
5. Hydraulic lines at steering cylinder	Connect.	
6. Vehicle end pin can be installed.	Start engine and turn steering wheel until roc	
7. Washer (1) and capscrew (2)	Install in retaining pin at rod end.	
8. Capscrews at rod end and cylinder end	Tighten as follows:	
a. Tighten to a torque of 230 lb. ft. to 300 lb. ft. (311.8-406.7 N•m).		
b. Hit tapered ends of pins with a hammer until torque is less than 140 lb. ft. (189.8 N•m).		

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Go on to Sheet 6

STEERING CYLINDERS REMOVAL/INSTALLATION (CONT)

(Sheet 6 of 6)

LOCATION/ITEM	ACTION	REMARKS
8. Capscrews (cont)	c. Tighten again to 230 lb. ft. to 300 lb. ft. (311.8-406.7 N•m) of torque.	
d. Hit tapered end of pins with a hammer	until torque is less than 210 lb. ft. (284.7 N•m).	
e. Tighten again to a torque of 230 lb. ft. to	300 lb. ft. (311.8-406.7 N•m).	

End

STEERING CYLINDERS DISASSEMBLY/ASSEMBLY

(Sheet 1 of 6)

This task covers: Repair of steering cylinders.

INITIAL SETUP**Test Equipment**

None Teflon seal

Materials/Parts

Page 2-56

Troubleshooting Reference**Equipment Condition**

Steering cylinder removed from vehicle.

Special Tools

None One mechanic

Personnel Required**References**

Steering Cylinder Removal/Installation, Place parts in a clean area.
page 6-79.

General Safety Instructions

STEERING CYLINDERS DISASSEMBLY/ASSEMBLY (CONT)

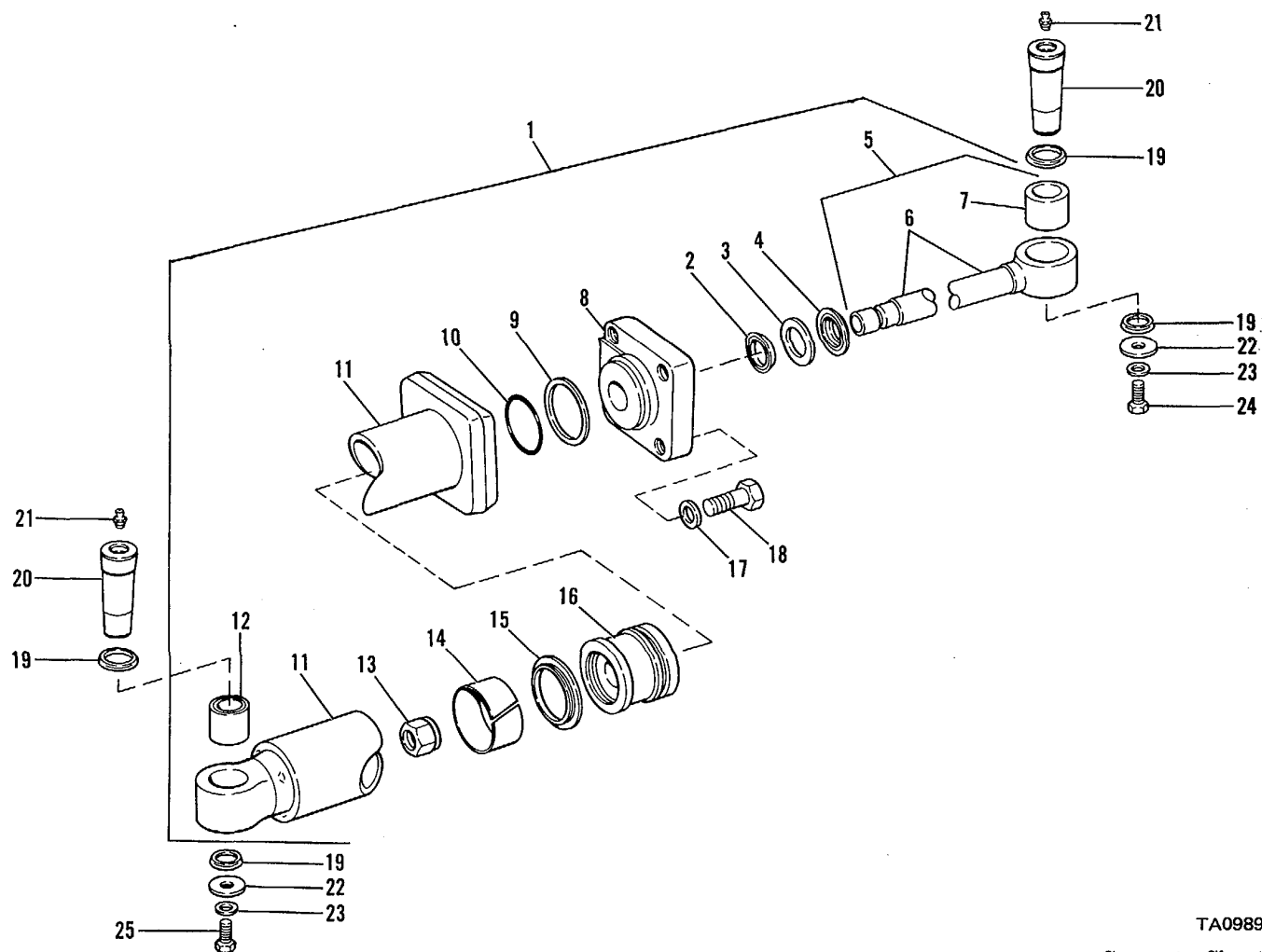
(Sheet 2 of 6)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; display: inline-block; padding: 2px;">DISASSEMBLY</div>		
1. Cylinder (1)	Put in position on repair stand.	
2. Cylinder (1)	Move piston rod (6) to fully extended position.	
3. Piston rod (6)	Support rod (6) securely.	
	NOTE	
	Eye of rod should be held rigid.	
4. Four capscrews (18) and washer (17)	Remove.	
5. Rod (6) and piston assembly (16)	Pull out of cylinder (11).	
6. Nut (13) socket.	Remove from rod using torque multiplier and	
7. Piston (16)	Remove from rod.	

STEERING CYLINDERS DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 3 of 6)

1. Cylinder group
2. Ring seal
3. U cup seal
4. Lip type seal
5. Rod assembly
6. Piston rod
7. Sleeve bearing
8. Head
9. Backup ring
10. Preformed packing
11. Cylinder assembly
12. Sleeve bearing
13. Self-locking nut
14. Wear ring
15. Seal assembly
16. Piston
17. Hardened washer
18. Capscrew
19. Lip type seal
20. Pin
21. Hydraulic grease fitting
22. Washer
23. Hardened washer
24. Capscrew
25. Capscrew



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Go on to Sheet 4

STEERING CYLINDERS DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 4 of 6)

LOCATION/ITEM	ACTION	REMARKS
8. Ring (14)	Remove from piston (16).	
9. Seal assembly (15)	Remove.	
10. Head (8)	Pull off rod (6).	
11. Packing (10)	Remove from head.	
12. Ring (9)	Remove from head.	
13. Seals (2), (3) and (4)	Remove from head.	
14. Seals (19)	Remove from cylinder and rod ends.	
15. Bearings (12) and (7)	Remove from cylinder using bearing puller.	

STEERING CYLINDERS DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 5 of 6)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>		
1. Three seals (2), (3), and (4) seal must have lip toward inside of cylinder. Outside seal must have lip toward outside of cylinder. Install outside seal with seal driver until it makes contact with counterbore in head.	Install in head (8), position inside seal. Center	
2. Ring (9)	Install on head.	
3. Packing (10)	Install on head.	
4. Cylinder (11)	Install four 3/4-10 NC guide bolts in cylinder.	
5. Head (8)	Install on rod.	
6. Seal guide	Install on rod.	
7. Head (8) rod (6).	Put clean hydraulic oil on seal lips. Push onto	
8. Ring (14)	Install on piston (16).	
9. Seal assembly (15)	Install.	

Go on to Sheet 6

STEERING CYLINDERS DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 6 of 6)

LOCATION/ITEM	ACTION	REMARKS
10. Piston (16)	Install on rod (6).	
11. Nut (13)	a. Install.	
	b. Tighten using a torque multiplier.	
	<p>NOTE</p> <p>Torque nut to 1440 lb. ft. to 1760 lb. ft. (1950 to 2390 N-m).</p>	
12. Piston (16) cylinder.	Use a piston compressor to push piston into	
13. Capscrews (18) head and cylinder.	Remove guide bolts. Install four capscrews in	
14. Cylinder end bearings (12) and (7)	Install, using a hydraulic press.	
	<p>NOTE</p> <p>Bearing must be 0.32 in. (8.13 mm) below outside surface of cylinder. Inside diameter of bearings must be 2.2523 to 2.2583 in. (57.21-57.36 mm) after installation.</p>	
15. Two seals (19)	Install one seal on each side of cylinder bearing, using a seal driver. Install seals 0.06 in. (1.52 mm) below surface of cylinder, with lip of seal toward outside.	

End

STEERING LINES REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal and installation of steering lines.

INITIAL SETUP

Test Equipment

None Container to drain oil into

Materials/Parts

Page 2-53

Troubleshooting Reference

Equipment Condition

Engine OFF.
All electrical accessories off.
Steering system drained.

Special Tools

None One mechanic

Personnel Required

References

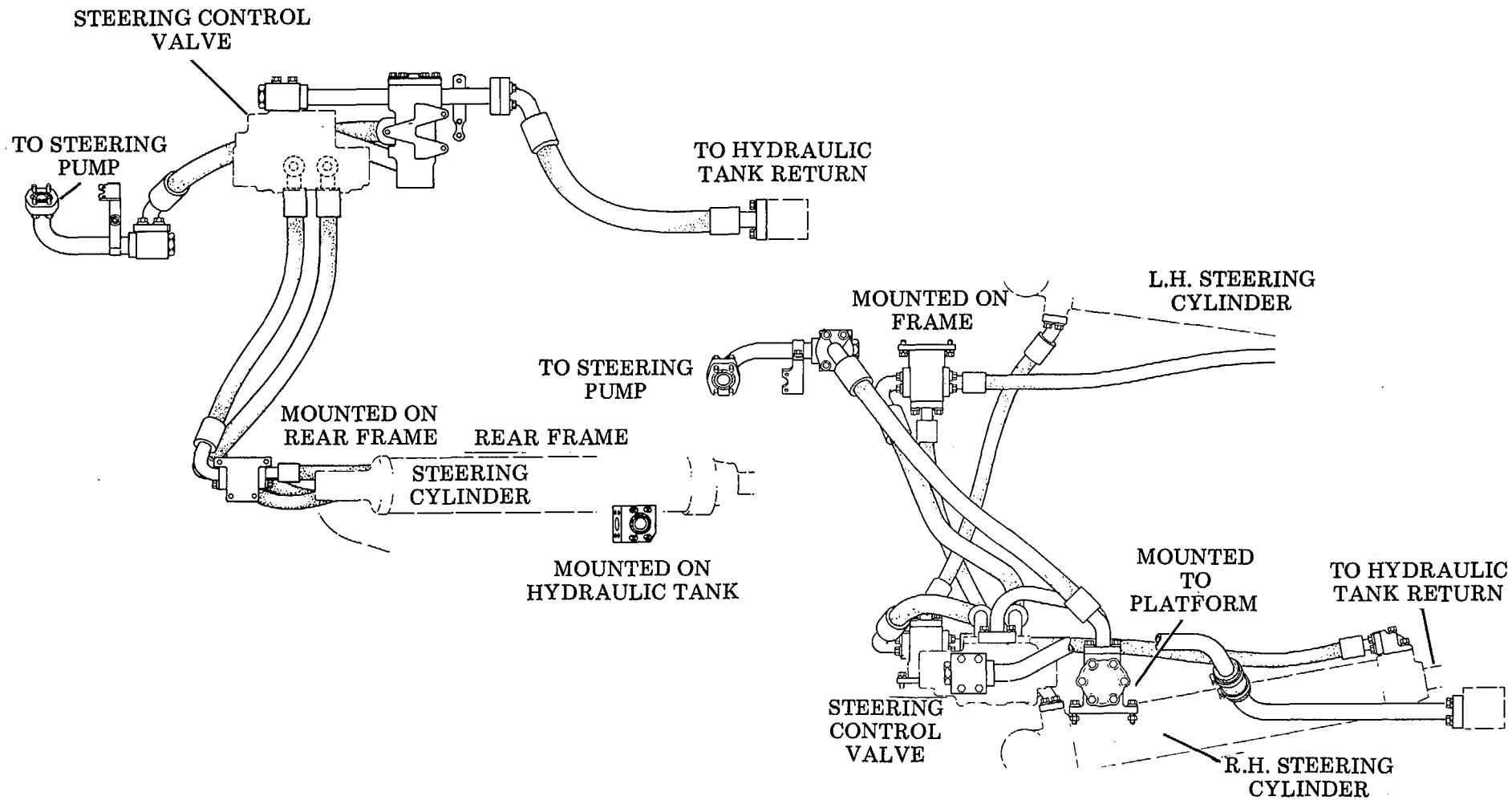
None

General Safety Instructions

None

Go on to Sheet 2

STEERING LINES REMOVAL/INSTALLATION (CONT)



TA 172251

Go on to Sheet 3

STEERING LINES REMOVAL/INSTALLATION (CONT)

(Sheet 3 of 3)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Capscrews and washers securing flanges	Remove.	NOTE
2. Preformed packing	Tag hoses and lines to identify location. Cap or plug Remove and discard.	
3. Clips and brackets	a. Remove capscrews, washers and nuts. b. Remove brackets and clips.	
4. Hose and tube assemblies	Remove.	
INSTALLATION		
1. Preformed packing	Oil new packing and position into flanges.	
2. Hose and tube assemblies	Place in correct position on vehicle.	
3. Capscrews and washers and washers.	Secure flanges and assemblies with capscrews	
4. Clips and brackets	Reinstall in correct position.	

End

SUPPLEMENTAL STEERING LINES REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal and installation of supplemental steering lines.

INITIAL SETUP

Test Equipment

None Container to drain oil into

Materials/Parts

Page 2-53

Troubleshooting Reference

Equipment Condition

Engine OFF.
All electrical accessories off.
Steering system drained.

Special Tools

None One mechanic

Personnel Required

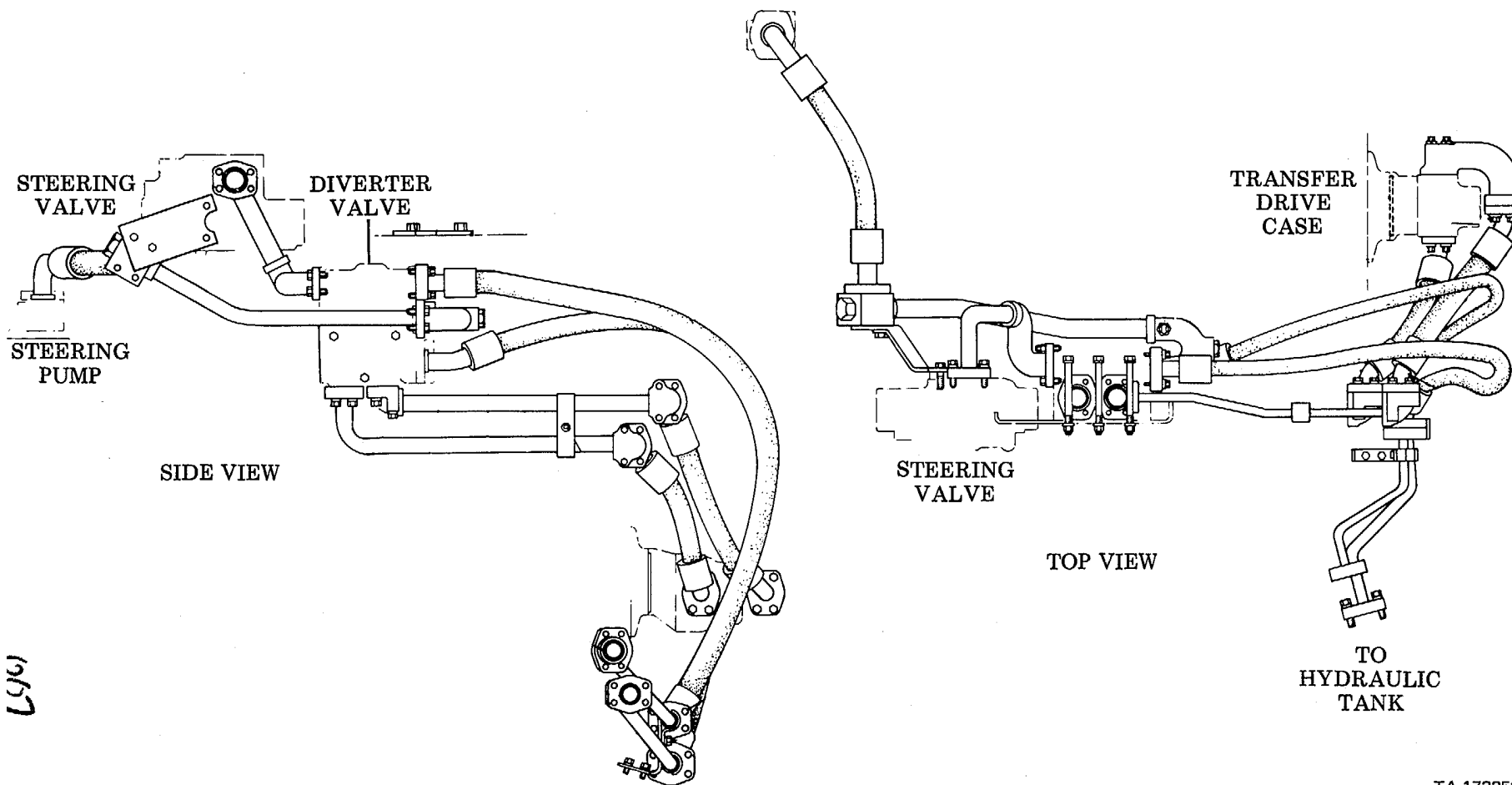
References

None

General Safety Instructions

None

SUPPLEMENTAL STEERING LINES REMOVAL/INSTALLATION (CONT)



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TA 172252

Go on to Sheet 3

SUPPLEMENTAL STEERING LINES REMOVAL/INSTALLATION (CONT)

(Sheet 3 of 3)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Capscrews and washers securing flanges	Remove. Tag lines to identify location on the vehicle. Cap or plug openings.	NOTE
2. Preformed packing	Remove and discard.	
3. Clips and brackets b. Remove brackets and clips.	a. Remove capscrews, washers and nuts.	
4. Hose and tube assemblies	Remove.	
INSTALLATION		
1. Preformed packing	Oil new packing and position into flanges.	
2. Hose and tube assemblies	Place in correct position on vehicle.	
3. Capscrews and washers and washers.	Secure flanges and assemblies with capscrews	
4. Clips and brackets	Reinstall in correct position.	

TEE TEST PROCEDURE FOR STEERING SYSTEM

(Sheet 1 of 24)

This task covers: Tee test procedure for steering system.

INITIAL SETUP

Test Equipment

Flow meter assembly equipped with manual load valve

Tachometer

Materials/Parts

Hydraulic lines and fittings

Shipping link installed

Troubleshooting Reference

Page 2-56

Equipment Condition

Special Tools

None Two mechanics

Personnel Required

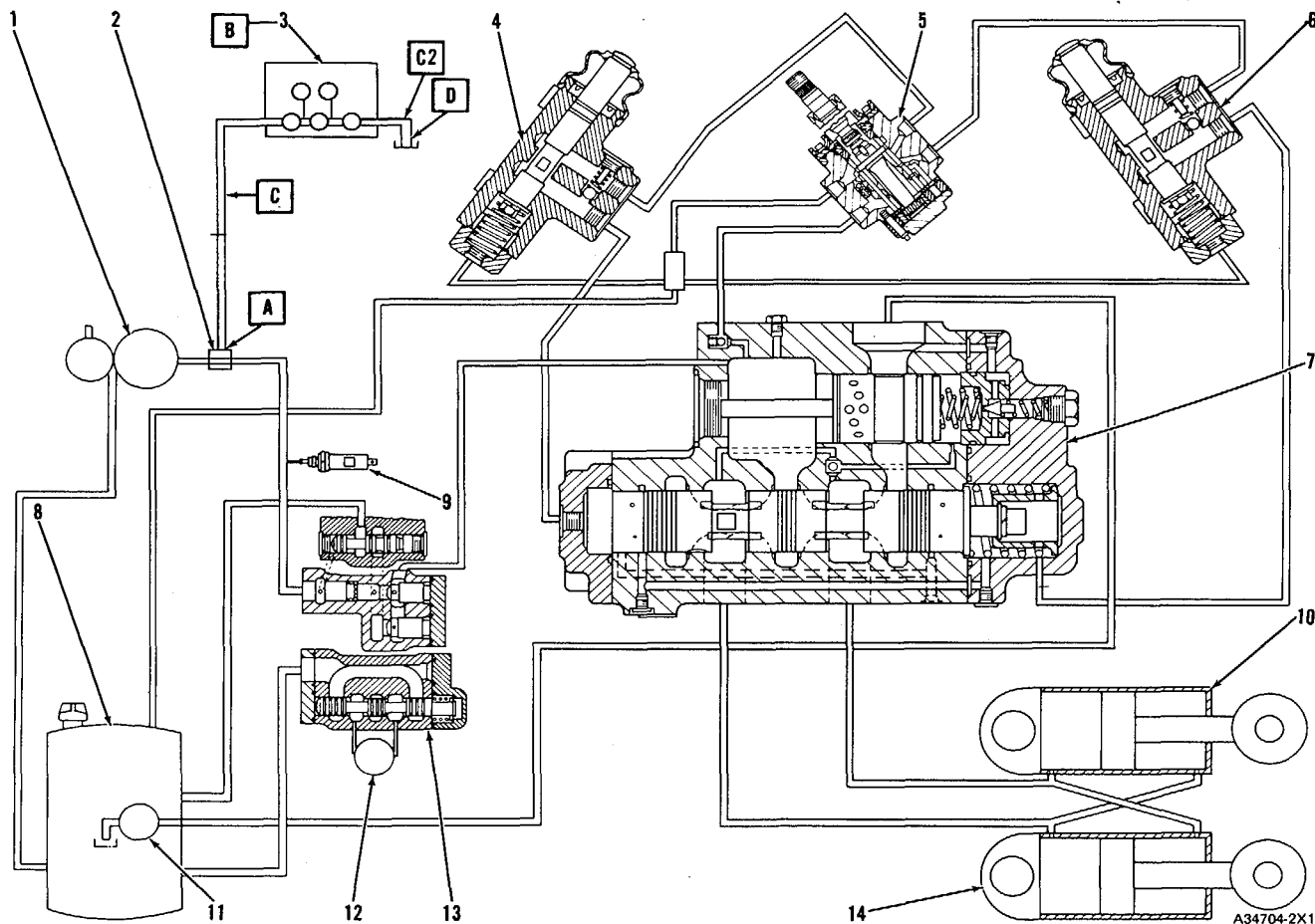
References

Shipping Link Removal/Installation,
TM 10-3930-641-20

General Safety Instructions

Make sure that all connections are tight.

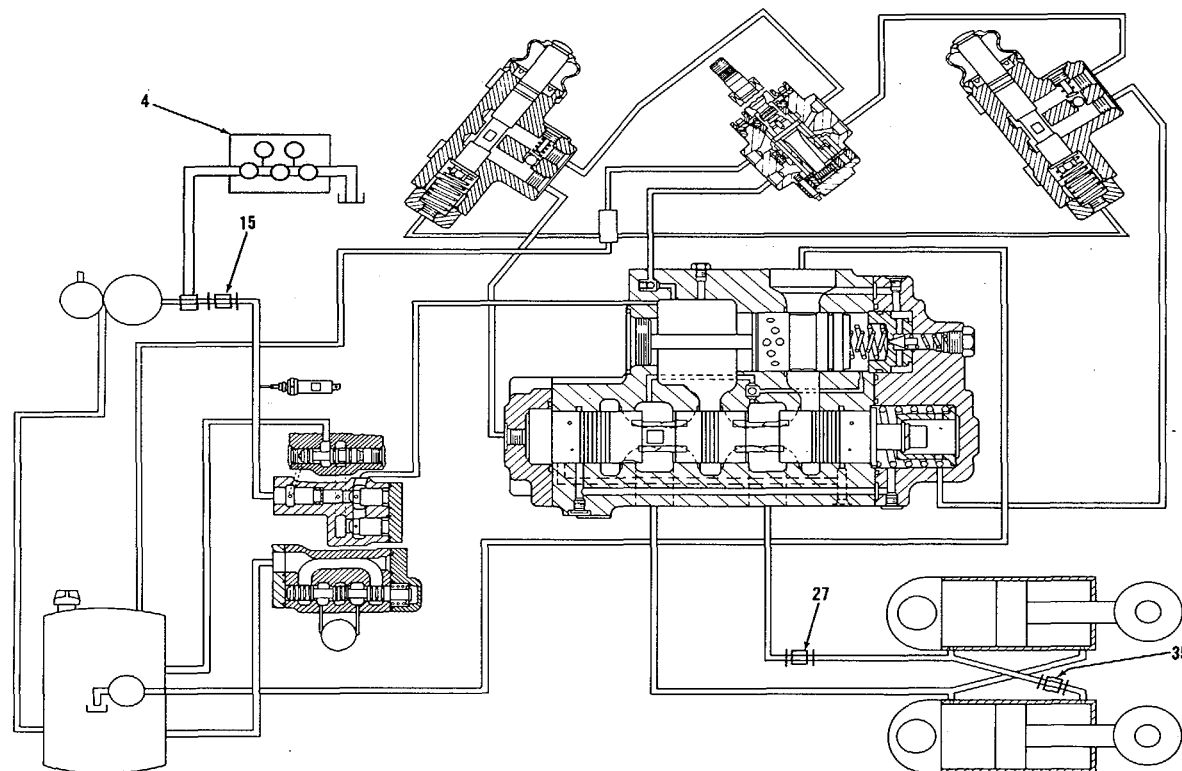
Test equipment must be capable of withstanding pressures higher than 3000 psi (20,700 kPa).



TA098985

SCHEMATIC OF STEERING SYSTEM WITH FLOW METER INSTALLED

1. Pump (large section is steering pump). 2. Combination Tee Tap and Pressure Tap. 3. Flow Meter. 4. Neutral valve (left side). 5. Hand Metering Unit (HMU). 6. Neutralizer valve (right side). 7. Steering control valve. 8. Hydraulic tank. 9. Flow switch. 10. Steering cylinder (left side). 11. Filter. 12. Pump for Supplemental Steering. 13. Diverter valve. 14. Steering cylinder (right side).



STEERING SYSTEM TESTS

TEST	COMPONENTS IN EACH TEST	DESIRED FLOW
4	Steering System test	77 U.S. gpm
15	Pump (Steering, Pilot and Brakes, Large Section)	81 U.S. gpm
27	Pump (Steering, Pilot and Brakes, Large Section) and Steering Valve	78 U.S. gpm
35	Pump (Steering, Pilot and Brakes, Large Section) Steering Valve and Left Cylinder	77 to 78 U.S. gpm

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 4 of 24)

CHART A. SYSTEM TEST

Test Name	Maximum Pressure Relief Valve Setting	System Oil Temperature (Start)	System Base Flow Rate	Lift LOWER Flow Rate	Lift RAISE Flow Rate	System Oil Temperature (End)
Test Number	1	2	3	4	5	6
Control Lever Position	Steer Right	Steer Right	Steer Right	Steer Right	Steer Left	Steer Right
Mast Position	Fully Lowered	Fully Lowered	Fully Lowered	Fully Lowered	Fully Lowered	Fully
Engine Speed	2000 RPM	Any Speed	2000 RPM	2000 RPM	2000 RPM	Any Speed
System Test Pressure	Maximum	0-100 PSI	100 PSI	1000 PSI	1000 PSI	0-100 PSI
Test Data	2500 ±75 PSI	150 ±6 OF	90.0 GPM	77.0 GPM	77.0 GPM	150 ±5 °F
Flow Differential				(3-4) 13.0 GPM	(3-5) 13.0 GPM	
Percent Flow Loss				(3-4) x 100 3 15%	(3-5) x 100 3 15%	

NOTE: Connect shipping link before tests are made.

Go on to Sheet 5

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

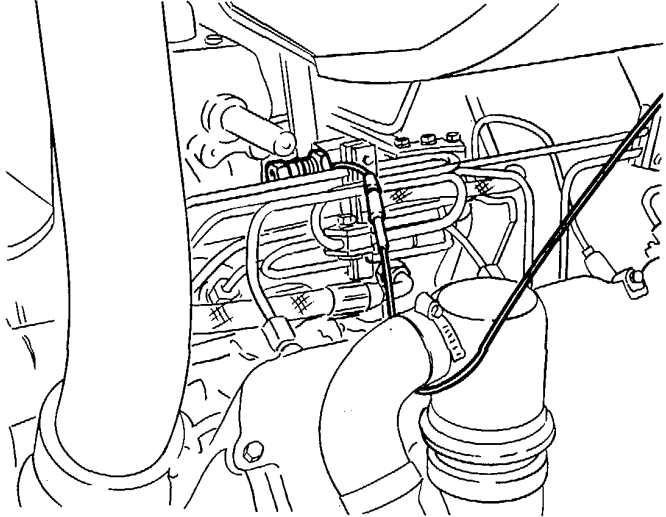
(Sheet 5 of 24)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center; border: 1px solid black; padding: 2px;">EQUIPMENT INSTALLATION</p> <p>1. Engine</p> <p>2. MastStart.</p> <p>3. Engine</p> <p>4. Hydraulic tank cap</p> <p>Do not install adapter in pump supply line with engine running. Injury to personnel can result.</p> <p>5. Plug (A) for tee test in pump supply line.</p> <p>Install adapter as quickly as possible to prevent oil loss.</p>	<p>Remove to relieve pressure. Install cap.</p> <p>Lower completely.</p> <p>Stop.</p> <p>WARNING </p> <p>Remove and install correct adapter.</p> <p>NOTE</p>	<p>See diagram on sheet 2.</p>

Go on to Sheet 6

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 6 of 24)

LOCATION/ITEM	ACTION	REMARKS
6. Return line assembly (D) and pump supply line adapter (C)	Connect to flow meter (B).	
7. a. Tachometer generator	Install.	
b. Tachometer drive	Install.	
c. Cable for tachometer on flow meter.	Install between generator and input connection	
8. Shipping link	Install. See TM 10-3930-641-20.	
PREPARATION OF SYSTEM FOR TEST		
1. Manual load valve on the flow meter	Open fully.	
2. Steering wheel	Turn continuously.	
3. Engine	Run at test rpm. See chart on sheet 4.	

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Go on to Sheet 7

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TM 10-3930-641-34-2

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 7 of 24)

LOCATION/ITEM	ACTION	REMARKS
4. Manual load valve on flow meter 1000 psi (703 kgs/sq. meter).	Close valve slowly until pressure goes up to	

5. Oil temperature Observe. When oil temperature reaches 100°F (37.70C), close load valve slowly until pressure is 1500 psi (1054.5 kgs/sq. meter).

6. Shipping link Remove when oil temperature is 1600F Refer to TM 10-3930-641-20.
 (71.50C).

7. Steering cylinders Move several times through full cylinder travel until oil is 1500F (660C) throughout system.

8. Shipping link Install. Refer to TM 10-3930-641-20.

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">TEST 1 </p> <p style="text-align: center;">MAXIMUM PRESSURE RELIEF VALVE SETTING</p> <p>1. Manual load valve on flow meter</p> <p>2. Engine</p> <p>3. Manual load valve</p> <p>4. Steering relief valve</p>	<p style="text-align: center;">NOTE</p> <p>Turn steering wheel continuously through the test. Record all test data.</p> <p>Open all the way.</p> <p>Maintain at 2000 rpm.</p> <p>Slowly close until oil flow through meter stops. Record the pressure.</p> <p>Maximum pressure must be no higher than 2575 lb. psi (1810 kgs/sq. meter).</p> <p style="text-align: center;">CAUTION</p> <p>Manual load valve must be opened slowly before turning steering wheel back to center. This will prevent damage to the pressure gage.</p> <p style="text-align: center;">6-104</p>	<p style="text-align: center;">See page 6-28.</p> <p style="text-align: right;">Go on to Sheet 9</p>

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 9 of 24)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 10px;">TEST 2</div> <p>TEMPERATURE</p> <ol style="list-style-type: none"> 1. Manual load valve on flow meter 2. Steering wheel 3. Engine 4. Oil temperature 	<p>Open all the way.</p> <p>Turn continuously.</p> <p>Run at any speed.</p> <p>Record. You will compare this temperature with a temperature reading taken at the end of this series of tests.</p>	

Go on to Sheet 10

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">TEST 3</div>		
SYSTEM BASE FLOW RATE		
1. Manual load valve	Open all the way.	
2. Steering wheel	Turn continuously.	
3. Engine	Run at 2000 rpm.	
4. System pressure	Should be approximately 100 psi (70.3 kgs/sq. meter).	
6. Flow rate	Record. You will use this figure to compare tests 4 and 5.	

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 11 of 24)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; display: inline-block; padding: 2px;">TEST 4</div> LEAKAGE RATES 1. Steering wheel 2. Engine 3. Manual load on flow meter 4. Flow rate 5. Flow differential	Turn continuously to the right. Run at 2000 rpm. Close valve slowly clockwise until you have a pressure of 1000 psi (703 kgs/sq. meter). Record. Calculate. Find the flow differential by subtracting the flow rate for this test from the base flow rate, (test 3). Find the percentage of flow loss by dividing the base flow rate (test 3) by the flow differential of this test.	

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 12 of 24)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">TEST 5</div>		
LEAKAGE RATES		
1. Steering wheel	Turn continuously to the left.	
2. Engine	Run at 2000 rpm.	
3. Manual load valve on flow meter	Close valve <u>slowly clockwise</u> until you have a pressure of 1000 psi (703 kgs/sq. meter).	
4. Flow rate	Record.	
5. Flow differential	Calculate. Find the <u>flow differential</u> by subtracting the flow rate for this test from the base flow rate, (test 3). Find the percentage of flow loss by dividing the <u>base flow rate</u> (test 3) by the flow differential of this test.	

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
TEST 6		
SYSTEM OIL TEMPERATURE		
1. Manual load valve on flow meter	Open all the way.	
2. Steering wheel	Turn continuously.	
3. Engine	Run at any speed.	
4. Oil temperature	Record. Compare oil temperatures from test 2 and this test. Temperature from test 2 must be 145°F to 155°F (63°-69°C). Test 6 results must be within 100F (12.2°C) of test 2.	
5. Temperature difference:		
a. Test 6 is higher	For each 100F (12.2°C) difference, subtract 0.5 gallons per pump cartridge from leakage rate.	
b. Test 6 is lower	For each 100F (12.2°C) difference add 0.5 gallons per pump cartridge to leakage rate.	

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

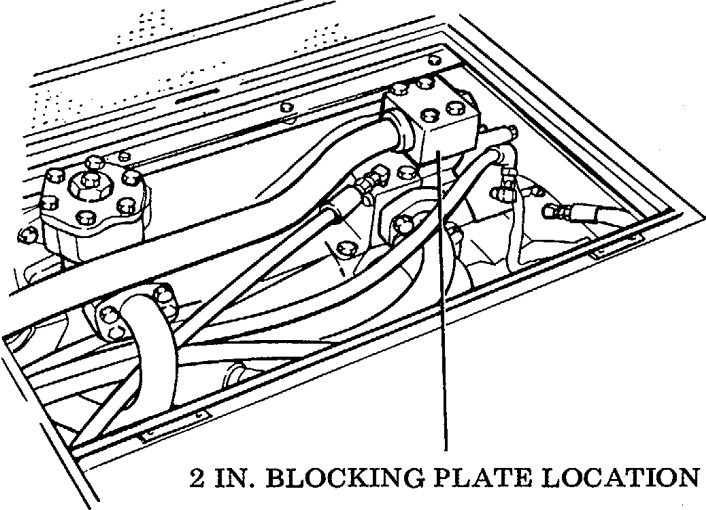
Compare the data from tests 7, 8, 9, 10, with this chart. The figures given on the chart represent maximum performance.

CHART B. PUMP TEST

Test Name	Full Speed Pump Flow		Half Speed Pump Flow		Pump Test For Aeration And/Or Cavitation							
	Low Pressure	High Pressure	Low Pressure	High Pressure	Varied Speeds — Constant Pressure							
	7	8	9	10	11	12	13	14	15	16	17	18
Test Number	7	8	9	10	11	12	13	14	15	16	17	18
Engine Speed	2000 RPM	2000 RPM	1000 RPM	1000 RPM	600 RPM	800 RPM	1000 RPM	1200 RPM	1400 RPM	1600 RPM	1800 RPM	2000 RPM
Pump Test Pressure	100 PSI	1000 PSI	100 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI
Oil Temperature	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F
Test Data	<u>90.0</u> GPM	<u>81.0</u> GPM	<u>45.0</u> GPM	<u>35.0</u> GPM	<u>17.0</u> GPM	<u>26.0</u> GPM	<u>35.0</u> GPM	<u>44.0</u> GPM	<u>54.0</u> GPM	<u>63.0</u> GPM	<u>72.0</u> GPM	<u>81.0</u> GPM
Flow Differential		(7-8) <u>9.0*</u> GPM		(9-10) <u>10.0*</u> GPM	(11-12) <u>9.0</u> GPM	(12-13) <u>9.0</u> GPM	(13-14) <u>9.0</u> GPM	(14-15) <u>10.0</u> GPM	(15-16) <u>9.0</u> GPM	(16-17) <u>9.0</u> GPM	(17-18) <u>9.0</u> GPM	
Percent Flow Loss		(14-15)x100 14 10%										

* Flow differential for Test 10 is normally more than the flow differential for Test 8 on gear-type pumps.

NOTE: Block steering valve return line to tank to do pump tests.

LOCATION/ITEM	ACTION	REMARKS
	<p>This test is used to find the efficiency of the hydraulic pump. Install a Blocking Plate Assembly in the pressure line from the hydraulic pump, or in the return line on the control valve. This prevents oil from going through the system. All pump flow now goes through the flow meter.</p> <p style="text-align: center;">WARNING</p> <p>Open the manual load valve on the flow meter fully before starting the diesel engine. The relief valve is not part of the circuit for the Pump Test. If the pressure gets too high, it is possible to cause injury to personnel or damage to equipment.</p> <p style="text-align: center;">CAUTION</p> <p>Immediately after stopping the diesel engine, remove the Blocking Plate Assembly from the pressure line for the pump or the return line on the control valve on larger machines. This will prevent any possible damage later.</p>	 <p style="text-align: center;">2 IN. BLOCKING PLATE LOCATION</p>

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 16 of 24)

LOCATION/ITEM	ACTION	REMARKS
TEST 7		
PUMP FLOW AT LOW PRESSURE		
1. Manual load valve on flow meter	Open all the way.	
2. Engine	Start and run at 2000 rpm.	
3. Manual load valve	Open slowly until you get 100 psi (70.3 kgs/sq. meter).	
4. Oil temperature	Record.	
5. Flow rate (gpm)	Record.	
TEST 8		
PUMP FLOW AT HIGH PRESSURE		
1. Engine	Run at 2000 rpm.	
2. Manual load valve on flow meter sq.	Close slowly to get 1000 psi (703 kgs/meter).	
3. Oil temperature	Record.	
4. Flow rate (gpm)	Record.	

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 17 of 24)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">TEST 9</div>		
<p>PUMP FLOW AT LOW PRESSURE (1/2 TEST RPM)</p>		
<p>1. Engine</p>	<p>Run at 1000 rpm.</p>	
<p>2. Manual load valve on flow meter</p>	<p>Open slowly to get 100 psi (70.3 kgs/sq. meter).</p>	
<p>3. Oil temperature</p>	<p>Record.</p>	
<p>4. Flow rate (gpm)</p>	<p>Record.</p>	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">TEST 10</div>		
<p>PUMP FLOW AT HIGH PRESSURE (1/2 TEST RPM)</p>		
<p>1. Engine</p>	<p>Run at 1000 rpm.</p>	
<p>2. Manual load valve on flow meter</p>	<p>Close slowly to get 1000 psi (703 kgs/sq. meter).</p>	
<p>3. Oil temperature</p>	<p>Record.</p>	
<p>4. Flow rate (gpm)</p>	<p>Record.</p>	

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-bottom: 10px;">TESTS 11 THRU 18</div> <p>PUMP AERATION AND CAVITATION</p> <ol style="list-style-type: none"> 1. Manual load valve on flow meter 2. Engine 3. Oil temperature 4. Flow rate (gpm) 	<p>NOTE</p> <p>These eight (8) tests are similar, except for the engine rpms. Run the engine (step 2) according to the list under REMARKS.</p> <p>Open all the way before starting engine.</p> <p>Start and run at (see list).</p> <p>Record for each test.</p> <p>Record for each test.</p> <p style="text-align: center;">NOTE</p> <p>Chart B also gives the data for each test.</p>	<p>TEST 11 — 1600 rpm TEST 12 — 800 rpm TEST 13 — 1000 rpm TEST 14 — 1200 rpm TEST 15 — 1400 rpm TEST 16 — 1600 rpm TEST 17 — 1800 rpm TEST 18 — 2000 rpm</p>

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

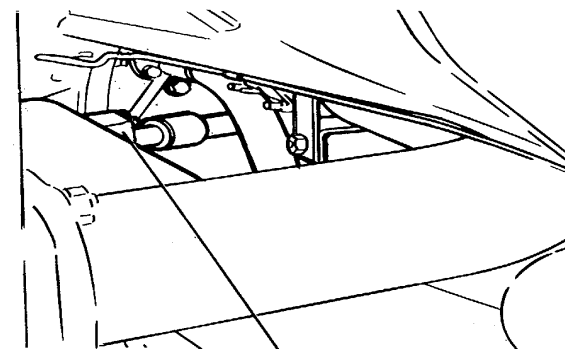
Make a comparison of the test data with the data on Chart C for the specific test. The information on Chart C is the maximum for best performance.

CHART C. BLOCKED CYLINDER TESTS

Test Name	System Oil Temperature (Start)	Steer Right Flow Rate	Steer Left Flow Rate	System Oil Temperature (End)	System Oil Temperature (Start)	Steer Right Flow Rate	System Oil Temperature (End)
Test Number	19	20	21	22	23	24	25
Control Lever Position	Steer Right	Steer Right	Steer Left	Steer Left	Steer Right	Steer Right	Steer Right
Engine Speed	Any Speed	2000 RPM	2000 RPM	Any Speed	Any Speed	2000 RPM	Any Speed
System Test Pressure	0-100 PSI	1000 PSI	1000 PSI	0-100 PSI	0-100 PSI	1000 PSI	0-100 PSI
Test Data	150 ±5 °F	<u>78.0</u> GPM	<u>78.0</u> GPM	150 ±5 °F	150 ±5 °F	<u>77.0-78.0</u> GPM	150 ±5 °F
Cylinder Leakage Rate		(20-4) <u>1.0</u> GPM	(21-5) <u>1.0</u> GPM		Right Cylinder Leakage	(24-4) <u>0-1.0</u> GPM	
Control Valve Group		(15-20) <u>3.0</u> GPM	(15-21) <u>3.0</u> GPM		Left Cylinder Leakage	(20-24) <u>1.0-0</u> GPM	

NOTE: Install shipping link before tests are made.

Blocking Plate Assemblies or Caps and Plugs can be put in each of the cylinders lines. For best accuracy, do these tests with the oil temperature approximately 150°F (66°C) (near the oil temperature for the System Tests and pump Test).



BLOCKING LOCATION FOR STEERING CYLINDERS

WARNING

Install the shipping link. Lower the mast to the ground. Move the steering wheel from RIGHT TURN to LEFT TURN several times to release any pressure oil in the cylinder lines. All pressure in the lines must be released or injury to personnel and damage to equipment can result while loosening the lines to install or remove the plate assemblies.

TA098989
Go on to Sheet 20

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 20 of 24)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">TEST 19</p> <p>TEMPERATURE</p> <ol style="list-style-type: none"> 1. Steering wheel 2. Engine 3. Oil temperature 	<p>Turn to. right continuously.</p> <p>Run at any rpm.</p> <p>Record.</p>	
<p style="text-align: center;">TESTS 20 AND 21</p> <p>LEAKAGE RATES</p> <ol style="list-style-type: none"> 1. Manual load valve on flow meter 2. Steering wheel 3. Engine 4. Manual load valve 5. Flow rate (gpm) 	<p style="text-align: center;">NOTE</p> <p>Tests 20 and 21 are the same except one is for left turn and the other for right turn.</p> <p>Open all the way.</p> <p>Turn to the right (or left).</p> <p>Run at 2000 rpm.</p> <p>Close slowly until you get 1000 psi (703 kgs/sq. meter). Record. Do this for both tests. Go on to Sheet 21</p>	<p>See chart C, page 6-115.</p>

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 21 of 24)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">TEST 22</div> <p>TEMPERATURE</p> <ol style="list-style-type: none"> 1. Steering wheel 2. Engine 3. Oil temperature 	<p>Turn to right.</p> <p>Run at any rpm with system pressure at 0 to 100 psi (70.3 kgs/sq. meter).</p> <p>Record.</p> <p style="text-align: center;">NOTE</p> <p>Find the leakage rate of the cylinders and the leakage rate of the control valves. Use the test information from the System Tests, Pump Test and Blocked Cylinder Tests.</p> <p>Example: Find the leakage rates in the RIGHT TURN position.</p> <p>Test 8: flow rate of the pump only.</p> <p>Test 20: flow rate of pump and control valve.</p> <p>Test 4: flow rate of pump, control valve and cylinders.</p> <p>The system components tested in Tests 8 and 20 are the same except for the control valve. Then the difference in flow rates must be the leakage in the control valve. (Subtract the information for Test 20 from the test information for Test 8.</p>	

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 22 of 24)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">TEST 23</p> <p>TEMPERATURE</p> <ol style="list-style-type: none"> 1. Manual load valve on flow meter 2. Engine 3. Oil temperature 	<p>The system components tested in Tests 20 and 4 are, the same except for the cylinders. Then the difference in flow rates must be the leakage in the cylinders. (Subtract the test information for Test 4 from the test information for Test 20).</p> <p style="text-align: center;">NOTE</p> <p>If the Blocked Cylinder Tests give an indication of leakage that is too high in one or more of the cylinders, do the Blocked Cylinder Tests for the Right Side. For best accuracy, turn the steering wheel through several cycles to get the temperature of the oil in the cylinders the same as the temperature of the oil in the hydraulic tank. Make the temperature of the complete system 1500F (660C). Put a Blocking Plate Assembly in the rod end of the right steering cylinder.</p> <ol style="list-style-type: none"> Open all the way. Start and run at any rpm. Record. 	

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 23 of 24)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">TEST 24</div>		
STEER RIGHT FLOW RATE		
1. Manual load valve on flow meter	Open all the way.	
2. Engine	Run at 2000 rpm.	
3. Manual load valve	Close slowly until you get 1000 psi (703 kgs/sq. meter).	
4. Flow rate (gpm)	Record.	
<div style="background-color: black; width: 80px; height: 20px; margin: 0 auto;"></div>		
TEMPERATURE		
1. Manual load valve on flow meter	Open all the way.	
2. Engine	Run at any rpm.	
3. Steering wheel	Turn to the right.	
4. Oil temperature	Record.	

TEE TEST PROCEDURE FOR STEERING SYSTEM (CONT)

(Sheet 24 of 24)

LOCATION/ITEM	ACTION	REMARKS
	<p style="text-align: center;">NOTE</p> <p>Find the leakage rates for the right and left cylinders. Use the test information from System Test, Pump Test and Blocked Cylinder Tests.</p> <p>Example: Find the leakage rate for the steering cylinders.</p> <p>Test 20: flow rate of pump and control valve.</p> <p>Test 24: flow rate of pump, control valve and left side cylinder.</p> <p>Test 4: flow rate of pump, control valve and both cylinders.</p> <p>The system components tested in Tests 20 and 24 are the same except for the left side cylinder. The difference in flow rates must be the leakage in the left side cylinder (subtract the test information for Test 24 from the test information for Test 20).</p> <p>The system components tested in Tests 24 and 4 are the same except for the right side cylinder. The difference in flow rates must be the leakage in the right side cylinder (subtract the test information for Test 4 from the test information for Test 24). Make a comparison of the test values with the values on Chart C.</p>	

CHAPTER 7

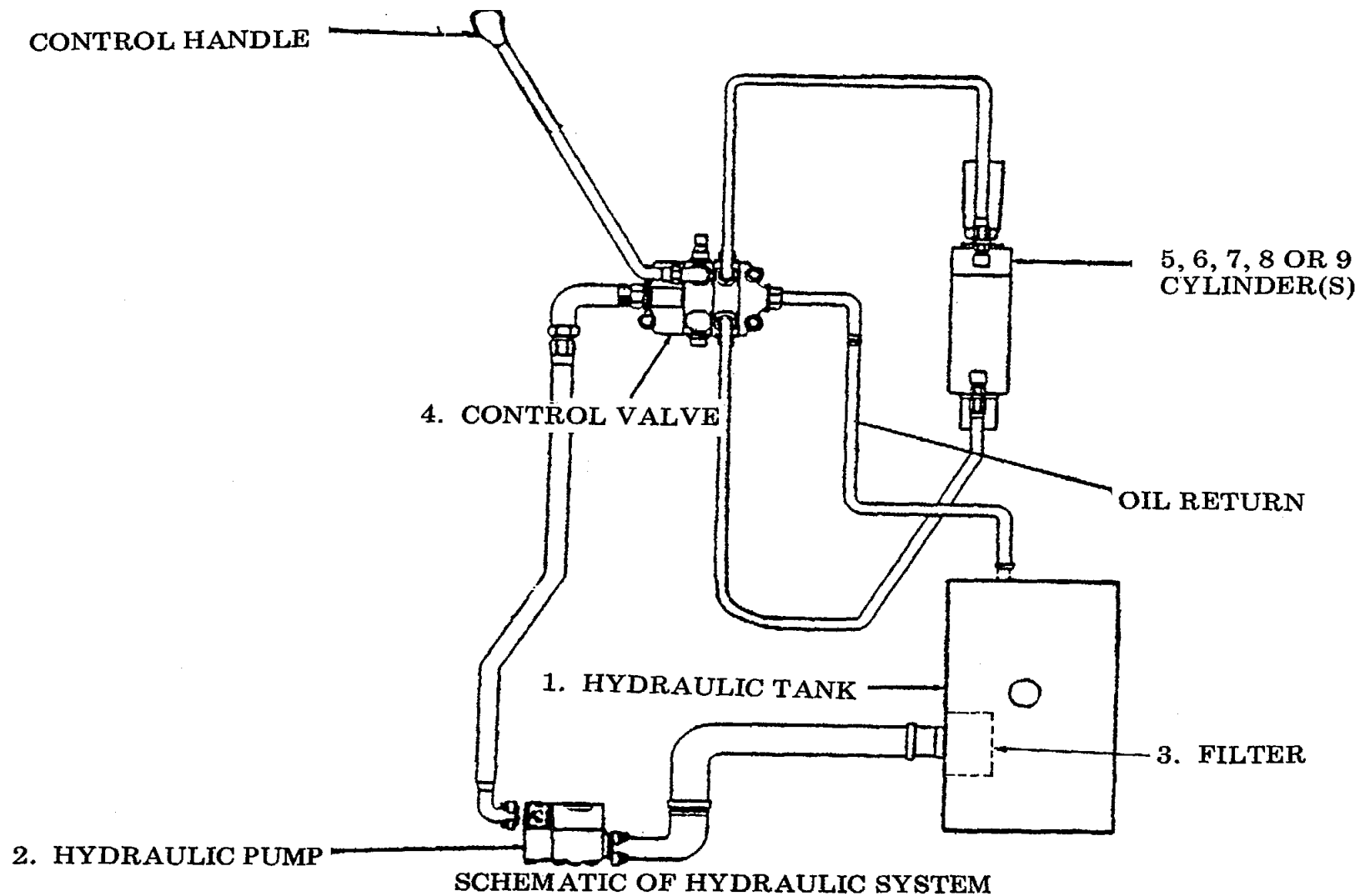
HYDRAULIC SYSTEM MAINTENANCE

	Page		Page		
Section I	General.....	7-2	Section III	Mast Components	7-70
II.	Hydraulic Lift System Components.....	7-4		Mast Removal/Installation	7-71
	Hydraulic Pump Removal/Installation	7-5		Mast Disassembly/Assembly	7-76
	Hydraulic Pump Disassembly/Assembly	7-13		Fork Assembly Removal/Installation.....	7-87
	Hydraulic Oil Cooler Oil Lines Removal/ Installation.....	7-20		Carriage Removal/Installation	7-91
	Hydraulic Oil Cooler Removal/Installation	7-22		Carriage Assembly Disassembly/Assembly	7-94
	Hydraulic Tank Removal/Installation	7-27		Side Tilt Cylinder Removal/installation	7-101
	Hydraulic Tank Disassembly/Assembly	7-29		Side Shift Cylinder Removal/Installation.....	7-104
	Hydraulic Control Lines and Fittings Removal/Installation.....	7-42		Side Shift/Tilt Cylinders Disassembly/Assembly	7-107
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	Tilt Cylinder Disassembly/Assembly	7-54		Tee Test Procedure for Hydraulic System	7-124
	Tilt Cylinder Bearings Removal/Installation	7-61			
	Lift Cylinder Removal/Installation	7-63			
	Lift Cylinder Disassembly/Assembly	7-66			

Section I. GENERAL

HYDRAULIC SYSTEM

(Sheet 1 of 2)



MAST HYDRAULIC SYSTEM**(Sheet 2 of 2)**

High pressure mast hydraulic system consists of:

1. Hydraulic tank
2. Hydraulic pump
3. Filter
4. Control valves
5. Lift cylinder
6. Tilt cylinders
7. Side shift cylinder
8. Side tilt cylinders
9. Container lock cylinder(s)

Oil flows from hydraulic tank (1) to hydraulic pump (2) then to control valve (4). The control levers are moved to let oil go through the control valve to lift cylinder (5), tilt cylinders (6), side shift cylinder (7), side tilt cylinder (8) or container lock cylinders (9). Oil returns from the cylinders through the control valve and back to the tank.

1. **HYDRAULIC TANK.** The storage reservoir for all of the hydraulic oil used in the machine except for the transmission and torque converter. Equipped with an inlet strainer for filtering oil when added. A filter is built into the tank for filtering oil returning from the hydraulic system. A sensor is also in the tank to monitor the oil temperature.

2. **HYDRAULIC PUMP.** A gear type, driven by the engine. Supplies oil to the control valve for distribution to the hydraulic system.

3. **FILTER.** Protects the system in the event of a pump failure. It is a replaceable screen type.

4. **CONTROL VALVE.** Directs high pressure oil to hydraulic cylinders, depending on the position of one of the five control handles. The five control valves activate the mast up and down, tilt forward and back, slide shift left and right, slide tilt, and the container locks. All valves contain an oil pressure relief valve to return extra oil pressure back to the hydraulic tank when the mast is fully tilted, fully raised, fully shifted or fully rotated.

5. **LIFT CYLINDER.** A ram type which moves up by hydraulic oil pressure and moves down by gravity. The extended part of the cylinder is completely filled with oil. As the lift cylinder is extended it pushes up on a crosshead. This crosshead is connected to the mast with a set of wheels and chains. The chains lift the mast at twice the lift cylinder rate.

6. **TILT CYLINDERS (2).** Double acting cylinders which extend by hydraulic pressure and retract by hydraulic pressure. Control the forward-backward tilt angle of the mast. Total movement is 17 degrees;

7. **SIDE SHIFT CYLINDER.** A double acting cylinder which controls the side shift of the forks and tophandler with respect to the center line of the vehicle. Total movement from left to right is 24 inches.

8. **SIDE TILT CYLINDER.** A double acting cylinder which rotates the forks and tophandler. Total movement is 10 degrees.

9. **CONTAINER LOCK CYLINDERS.** Double acting cylinders which lock or unlock the container. On the 20 ft tophandler there is one cylinder; on the 35 ft and 40 ft there are two.

End

Section II. HYDRAULIC LIFT SYSTEM COMPONENTS

HYDRAULIC LIFT COMPONENTS MAINTENANCE INSTRUCTIONS

This section covers maintenance of these hydraulic components for direct support and general support maintenance personnel:

- a. Hydraulic pump
- b. Hydraulic cooler
- c. Hydraulic tank
- d. Hydraulic control valve
- e. Tilt cylinders
- f. Lift cylinder

LIST OF TASKS

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Hydraulic pump removal/installation.	7-5	2-28, 2-29
2	Hydraulic pump assembly/disassembly.	7-13	2-28, 2-29, 2-30, 2-32
3	Hydraulic oil cooler oil lines removal/installation.	7-20	2-26
4	Hydraulic oil cooler removal/installation.	7-22	None
5	Hydraulic tank removal/installation.	7-27	None
6	Hydraulic tank disassembly/assembly.	7-29	None
7	Hydraulic control lines and fittings removal/installation.	7-42	None
8	Hydraulic control valve disassembly/assembly.	7-44	2-28, 2-29, 2-30, 2-31, 2-33
9	Tilt cylinder removal/installation.	7-50	None
10	Tilt cylinder assembly/disassembly.	7-54	2-29, 2-30, 2-35
11	Tilt cylinder bearings removal/installation.	7-61	None
12	Lift cylinder removal/installation.	7-63	None
13	Lift cylinder disassembly/assembly.	7-66	2-29, 2-30

HYDRAULIC PUMP REMOVAL/INSTALLATION**(Sheet 1 of 8)**

This task covers: Replacement of hydraulic implement pump.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-28, 2-29

Equipment Condition

Relieve pressure on hydraulic tank.
 Oil cooled.
 Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

References

Precleaner Lid and Hood Removal/
 Installation, TM 10-3930-641-20.
 Shipping Link Removal/Installation,
 TM 10-3930-641-20.
 Air Cleaner Removal/Installation,
 TM 10-3930-641-20.

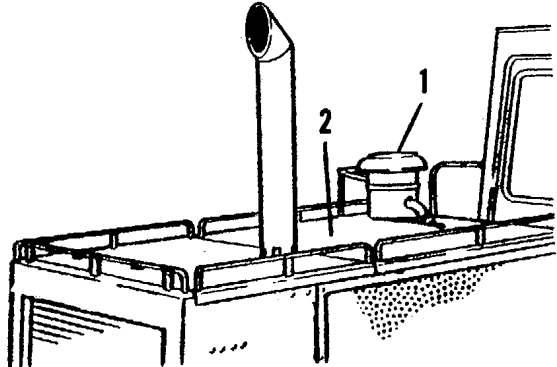
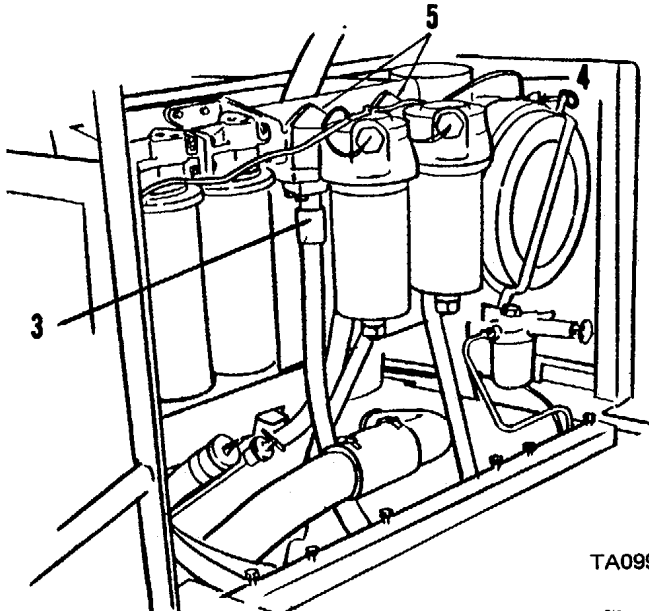
General Safety Instructions

Hot oil causes burns.

Go on to Sheet 2

HYDRAULIC PUMP REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 8)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1. Precleaner lid (1) and hood (2)	Remove. See TM 10-3930-641-20.	
2. Door assemblies at rear of engine	Open.	
3. Hydraulic lines (3)	Tag and disconnect from oil filter base and cap.	
4. Wires for sending units of transmission and brake system oil filters.	Disconnect from harness (4) and identify.	
5. Six capscrews (5) that hold bases for brake and transmission oil filters	Remove.	

NOTE

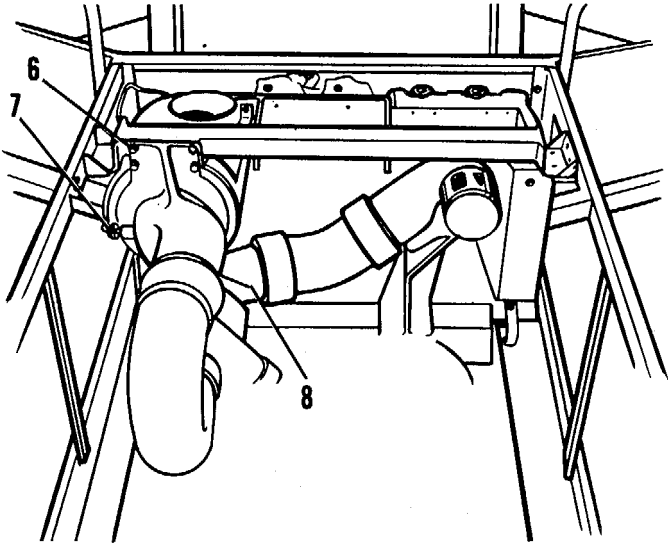
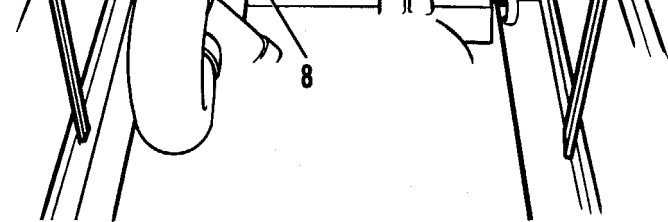
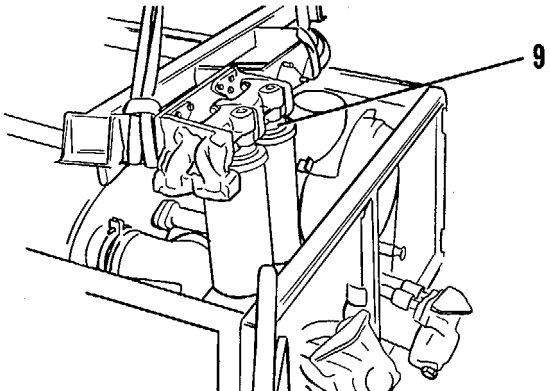
Do not disconnect hydraulic lines from the filter bases. Place filters and bases on floor plates.

TA099152

TA099153
Go on to Sheet 4

HYDRAULIC PUMP REMOVAL/INSTALLATION (CONT)

(Sheet 3 of 8)

LOCATION/ITEM	ACTION	REMARKS
6. Four capscrews (6) that hold air cleaner housing to filter base frame	Remove.	
7. Wire (7) for sending unit of air cleaner indicator.	Disconnect and identify.	
8. Clamp (8)	Loosen.	
9. Filter group (9)	Remove by following:	
a. Four position capscrews	Remove.	
b. Three heatshield capscrews	Remove.	
c. Filter group	Fasten hoist and remove.	

NOTE

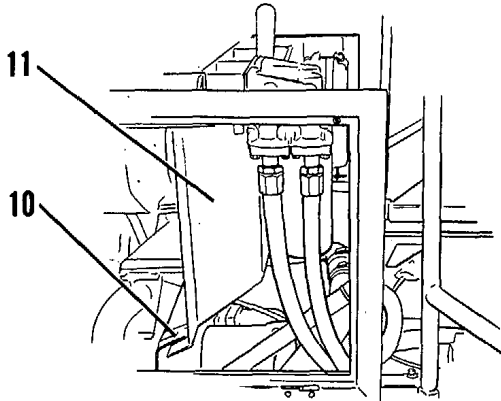
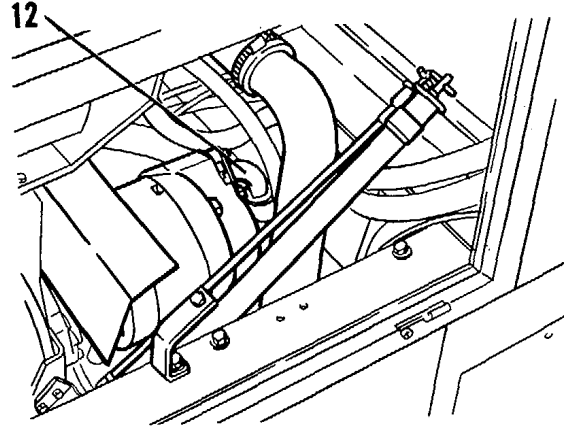
Filter group assembly weighs 100 lbs. (45.4 kg).

TA099153

TA099153
Go on to Sheet 4

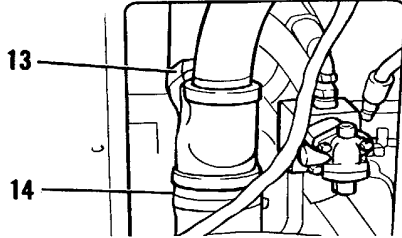
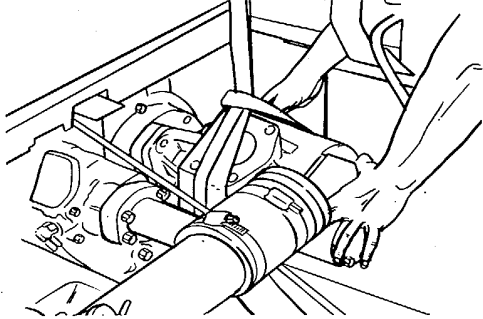
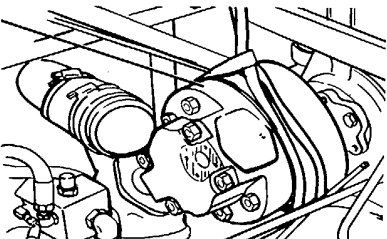
HYDRAULIC PUMP REMOVAL/INSTALLATION (CONT)

(Sheet 4-of 8)

LOCATION/ITEM	ACTION	REMARKS
10. Air cleaner housing	Fasten hoist and remove.	
11. Two capscrews (10)	Remove.	
12. Heat shield (11)	Remove.	
13. Panels from right side of engine	Remove.	
14. Hydraulic line (12)	Disconnect from pump and identify.	

HYDRAULIC PUMP REMOVAL/INSTALLATION (CONT)

(Sheet 5 of 8)

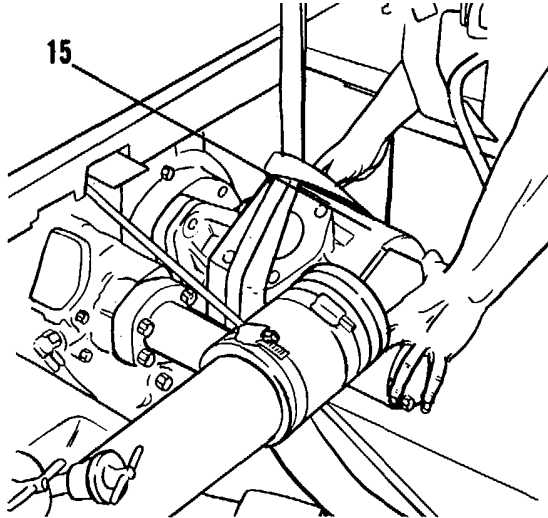
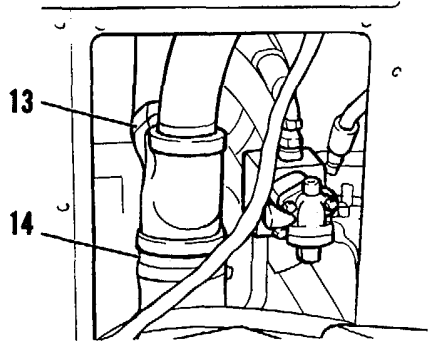
LOCATION/ITEM	ACTION	REMARKS
15. Lower right side panel.	Remove.	
16. Four capscrews (13)	Remove.	
17. Oil supply line (pump discharge line)	Disconnect.	
18. Clamp (14)	Loosen.	
19. Hydraulic pump	Fasten hoist.	
20. Capscrews that hold pump to rear of engine	Remove.	
21. Clamp below elbow on supply line	Tighten.	
22. Pump (16)	Pull away from engine and remove.	
<p>NOTE</p> <p>Pump weighs 110 lbs. (49.9 kg).</p>		

TA099155
Go on to Sheet 6

TA099155
Go on to Sheet 6

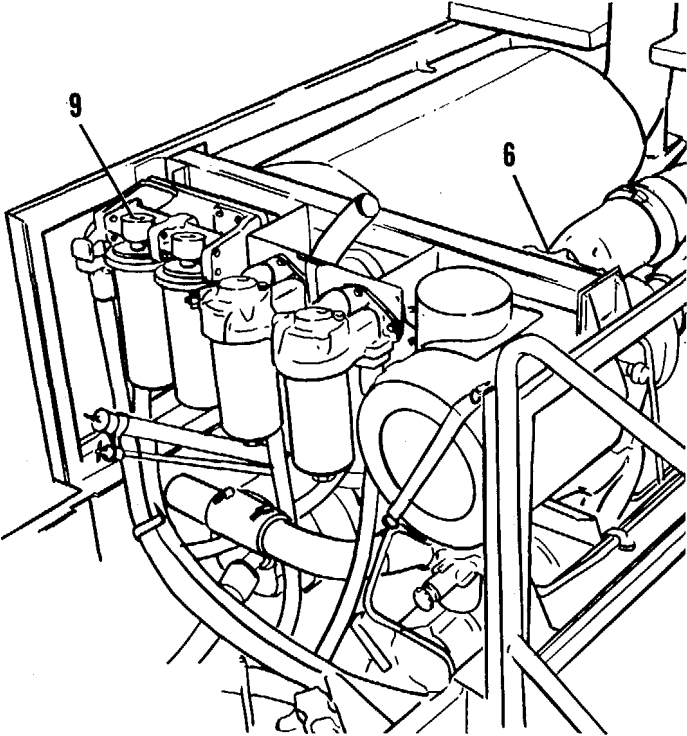
HYDRAULIC PUMP REMOVAL/INSTALLATION (CONT)

(Sheet 6 of 8)

LOCATION/ITEM	ACTION	REMARKS
<p>INSTALLATION</p> <p>1. Pump (15)</p>	<p>Fasten hoist and place in position at rear of engine.</p> <div style="border: 1px solid black; padding: 2px; text-align: center; width: fit-content; margin: 10px auto;">CAUTION</div> <p>Be careful not to damage the splines on shaft.</p>	
<p>2. Capscrews that hold pump to rear of engine</p>	<p>Install.</p>	
<p>3. Clamp (14)</p>	<p>Tighten.</p>	
<p>4. Four capscrews (13) that hold supply line (pump discharge line) to bottom of pump.</p>	<p>Install.</p>	

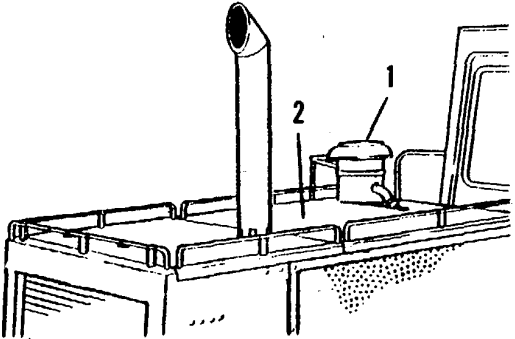
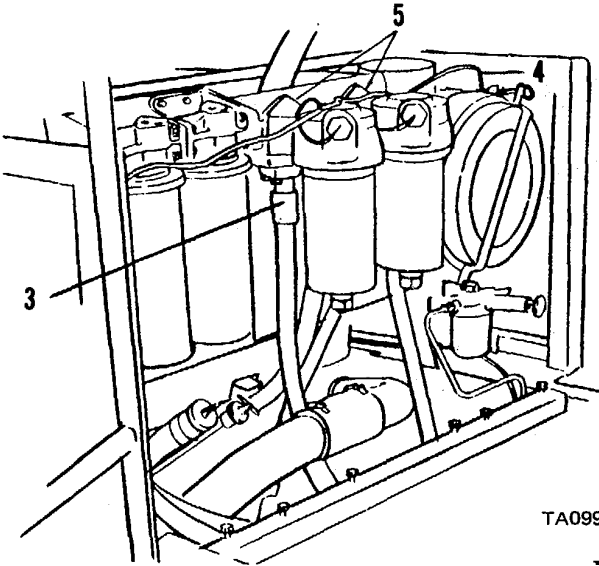
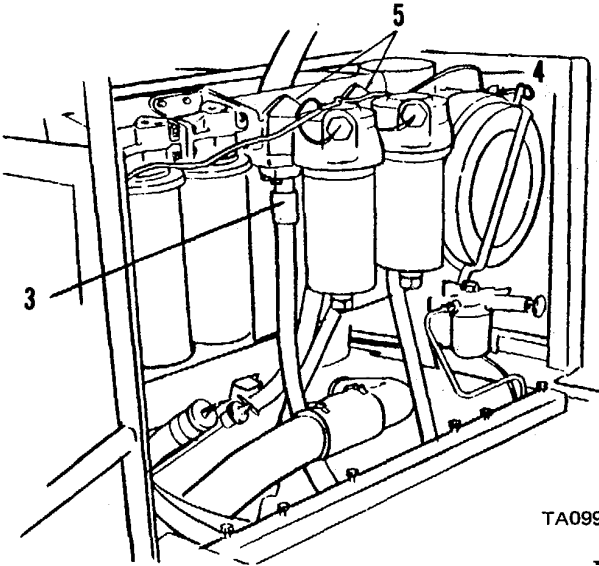
HYDRAULIC PUMP REMOVAL/INSTALLATION (CONT)

(Sheet 7 of 8)

LOCATION/ITEM	ACTION	REMARKS
5. Clamp below elbow on supply line	Tighten.	
6. Hydraulic line (12)	Connect to rear of pump.	
7. Heat shield (11)	Place in position.	
8. Cap screws (10) to hold heat shield	Install.	
9. Air cleaner housing	Fasten hoist and install.	
10. Filter group (9)	Install by following:	
a. Filter group (9)	Fasten hoist and place in position.	
b. Three heat shield cap screws	Install.	
c. Four position cap screws	Install.	
11. Transmission and pilot filter systems filters	Install in filter base.	
12. Four cap screws (6) that hold air cleaner housing to filter base frame	Install.	

HYDRAULIC PUMP REMOVAL/INSTALLATION (CONT)

(Sheet 8 of 8)

LOCATION/ITEM	ACTION	REMARKS
13. Clamp (8)	Tighten.	
14. Wire (7) for sending unit of air cleaner indicator.	Connect.	
15. Six capscrews that hold bases for pilot and transmission oil filters	Install.	
16. Wires for sending units of transmission and pilot system oil filters	Connect.	
17. Hydraulic lines (3)	Connect to oil filter base.	
18. Precleaner lid (1) and hood (2)	Install. (See TM 10-3930-641-20.)	
19. Engine side panels	Install.	
20. Door assemblies at rear of engine	Close.	

TA099152

TA099152
End

HYDRAULIC PUMP ASSEMBLY/DISASSEMBLY**(Sheet 1 of 7)**

This task covers: Repair of hydraulic implement pumps.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-28, 2-29, 2-30, 2-32

Equipment Condition

Hydraulic pump removed.

Special Tools

None

Personnel Required

One mechanic

References

Hydraulic Pump Removal/Installation, page 7-5.

General Safety Instructions

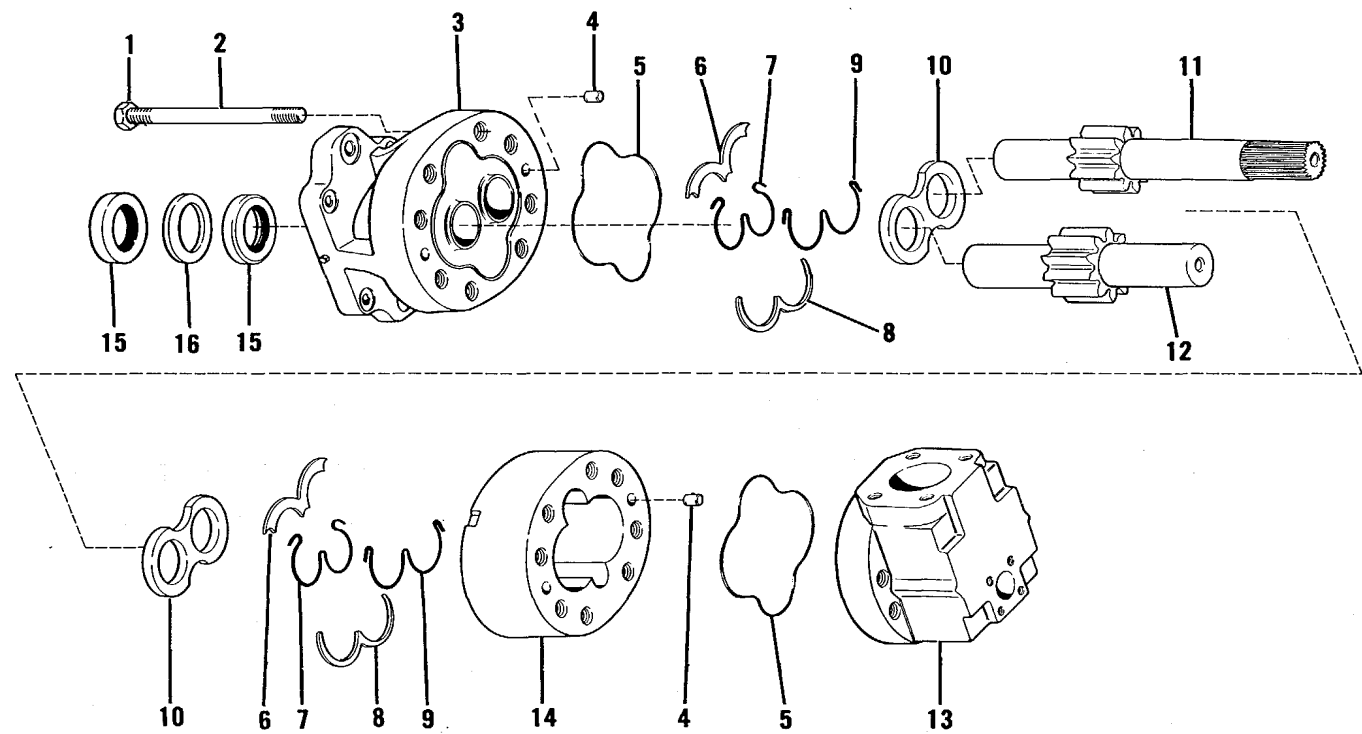
Place parts in a clean area.

HYDRAULIC PUMP ASSEMBLY/DISASSEMBLY (CONT)

(Sheet 2 of 7)

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY	NOTE	
Clean outside of pump before disassembly.		
1. Eight nuts (1)	Remove four (2), loosen four (1).	
2. Pump	Place on end opposite the drive shaft.	
3. Four Nuts (1)	Remove.	
4. Casting (3)	Remove.	
5. O-ring seal (6)	Remove from casting.	
6. Two lip seals (15) and spacer ring (16)	Remove from casting.	
7. Ring retainer (8)	Remove.	
8. Back-up ring (7)	Remove.	
9. Packing (9)	Remove.	
10. Isolation plate (6)	Remove.	

- 1. Nut
- 2. Stud
- 3. Casting
- 4. Dowel
- B. O-ring seal
- 6. Isolation plate
- 7. Backup ring
- 8. Ring retainer
- 9. Preformed packing
- 10. Pressure plate
- 11. Drive gear
- 12. Idler gear
- 13. Cover plate
- 14. Gear plate (pump body)
- 15. Lip type seal
- 16. Spacer



TA099158
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
11. Body (14) and pressure plate	Remove as a unit from cover plate..	
12. Pressure plate (10)	Remove from gear plate.	
13. Drive gear (11)	Remove from cover plate.	
14. Idler Gear (12)	Remove from cover plate.	
15. O-ring seal (5)	Remove from cover plate.	
16. Pressure plate (10)	Remove from cover plate.	
17. Isolation plate (6)	Remove.	
18. Back-up ring (7)	Remove.	
19. O-ring seal (5)	Remove.	
20. Ring retainer (8)	Remove.	
ASSEMBLY	NOTE	
Clean all parts before assembly.	If grooves (4) in the bore are deeper than .015 in. (0.381 mm), replace body (5), and gears.	
1. O-ring (6)	Install In cover plate.	

TA098977
Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
2. Body (14) Make sure you place wide opening over the inlet port in cover plate.	Install on cover plate. NOTE	
3. Isolation plate (6)	Install on inlet side of pump.	
4. Back-up ring (7)	Install.	
5. Packing (9)	Install.	
6. Ring retainer (8)	Install.	
7. Pressure plate (10)	Install.	
Pressure plate must be installed with the notch up. Bronze surface must be toward gears.	NOTE	
8. Drive gear (11)	Install.	
9. Idler gear (12)	Install.	
10. Pressure plate (10)	Install.	
Pressure plate must be installed with notch down. Bronze surface must be toward gears.	NOTE	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
11. Isolation plate (6)	Install.	
12. Back-up ring (7)	Install.	
13. Packing (9)	Install.	
14. Ring retainer (8)	Install.	
15. Seal (15)	Install.	
<p style="text-align: center;">NOTE</p> <p>Using suitable drive plate and handle, install seal until it makes contact with counterbore in casting. Lip of seal must be toward inside of pump.</p>		
16. Spacer ring (16)	Install.	
17. Seal (15)	Install.	

Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
	<p style="text-align: center;">NOTE</p> <p>Using suitable drive plate and handle, install seal until it makes contact with spacer ring. Lip of seal must be toward inside of pump.</p>	
18. Casting (3)	Place in position on gear plate housing.	
19. Four nuts (1)	Install.	
	<p style="text-align: center;">NOTE</p> <p>Place pump on small wooden blocks to allow the studs in the casting to go through cover plate without moving inside parts of pump out of position.</p>	
20. Four nuts (1)	Install.	
	<p style="text-align: center;">NOTE</p> <p>Use an arbor press to hold pump in position while torquing nuts.</p> <p>Tighten nuts to a torque of 280 to 320 lb. ft. (379.6-433.9 N-m).</p>	

End

HYDRAULIC OIL COOLER OIL LINES REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal and installation of hydraulic oil cooler oil lines.

INITIAL SETUP

Test Equipment

None Container to catch
oil remaining in lines

Materials/Parts

Page 2-26

Troubleshooting Reference

Equipment Condition

Engine shut off
Hydraulic oil cooler drained

Special Tools

None One mechanic

Personnel Required

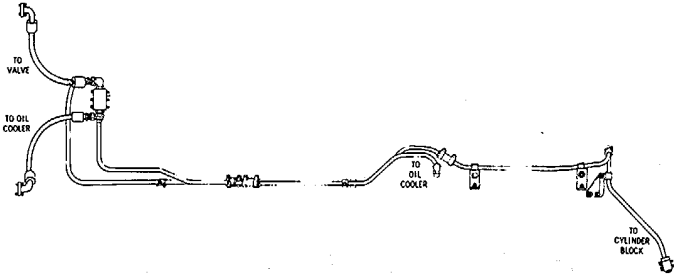
References

None

General Safety Instructions

None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> 1. Capscrews and washers securing flanges 2. Hose assemblies 3. Tube assemblies 4. Clips and brackets brackets. Remove tube assemblies. 	<p>Remove.</p> <p>Remove and discard preformed packing.</p> <p>Disconnect connectors. Loosen hose clamps.</p> <p>Remove capscrews and nuts securing clips and</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Clips and brackets and tube assemblies 2. Tube connectors clamps. 3. Hose assemblies position into flanges. Position hose assemblies and secure with capscrews and washers. 	<p>Position clips and brackets onto tube assemblies. Position tube assemblies.</p> <p>Connect tube connectors and secure hose</p> <p>Lubricate new preformed packing with oil and</p>	<p style="text-align: right;">TA172254 END</p>

This task covers: Replacement of hydraulic oil cooler.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

None

Troubleshooting Reference

Equipment Condition

Rear hood and crankcase guard removed.

Oil drained from hydraulic tank and system.

Coolant drained from system.

Special Tools

None One mechanic

Personnel Required

References

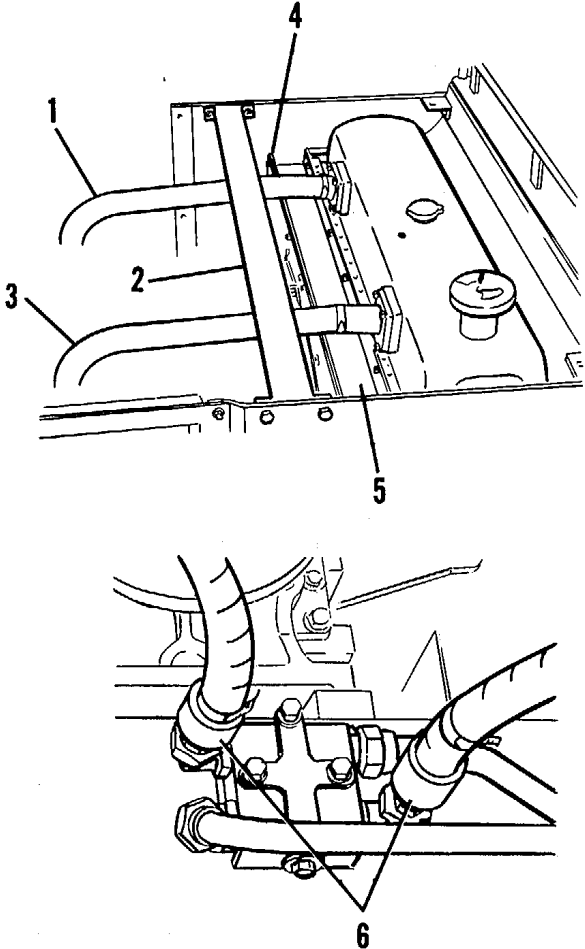
LO 10-3930-641-12

Rear hood removal/installation,
TM 10-3930-641-20.
Crankcase guard removal/installation,
TM 10-3930-641-20.

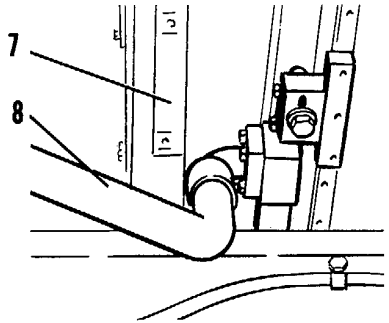
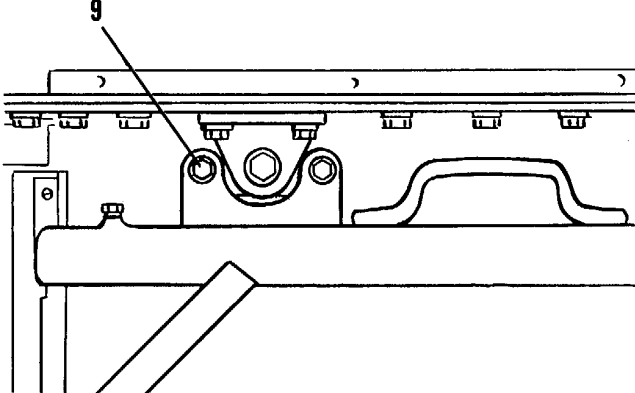
General Safety Instructions

Be careful not to damage radiator when moving cooler.

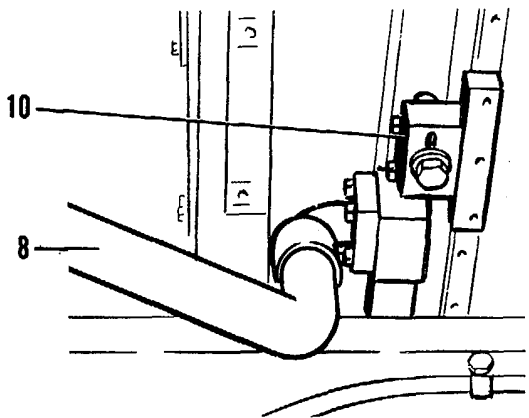
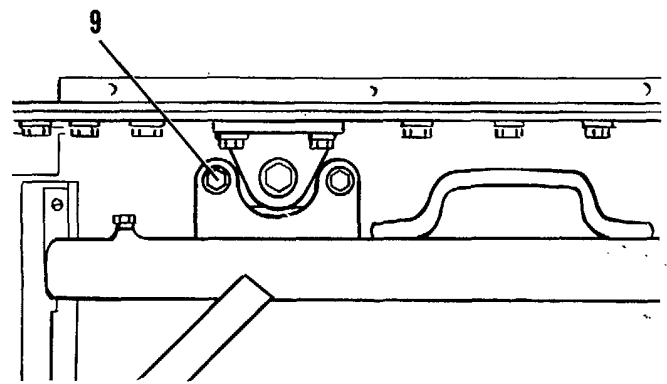
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>REMOVAL</p> <p>CAUTION</p> <p>Hydraulic oil cooler weighs 134 lbs. Use hoist of suitable lifting capacity to lift it.</p> <p>Do not cause damage to hydraulic oil cooler or radiator core assembly when replacing.</p> <ol style="list-style-type: none"> <li>1. Channel assembly (2) <li>2. Tube assemblies (1) and (3) <li>3. Bolts (4) and shield assembly (5) <li>4. Hydraulic hoses (6) 	<p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Disconnect from oil cooler bypass valve.</p>	

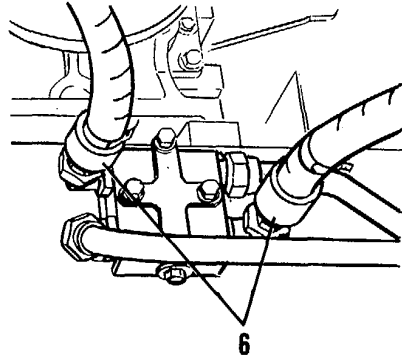
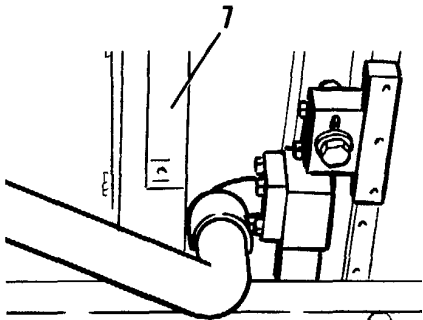
Go on to Sheet 3
TA099159

LOCATION/ITEM	ACTION	REMARKS
5. Two shield assemblies (7)	Remove from bottom of radiator.	
6. Hydraulic hose (8) cooler.	Disconnect from bottom of hydraulic oil	
7. Four capscrews (9) that hold top of oil cooler in position.	Remove from supports.	
8. Hydraulic oil cooler lift handles	Fasten hoist	

TA099160
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
9. Four capscrews (10) that hold bottom of hydraulic oil cooler in position	Remove.	
10. Hydraulic oil cooler <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">INSTALLATION</div>	Remove.	
1. Hydraulic oil cooler	Fasten hoist and put in position.	
2. Four capscrews (10) that hold bottom of cooler in position.	Install.	
3. Hydraulic hose (8)	Install at bottom of hydraulic oil cooler.	
4. Four capscrews (9) that hold top of cooler in position.	Install.	

TA099161
Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
5. Two hydraulic hoses (6)	Install in oil cooler bypass line.	
6. Two shield assemblies (7)	Install at bottom of radiator.	
7. Shield assembly (5) and bolts (4)	Install.	
8. Two tube assemblies (1) and (3)	Install.	
A9. Channel assembly (2)	Install.	See TM 10-3930-641-20.
10. Cooling system	Fill with coolant.	See TM 10-3930-641-20.
11. Rear hood and crankcase guard	Install.	

TA099162
END

This task covers: The removal and installation of the hydraulic tank.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

None

Troubleshooting Reference

Equipment Condition

Engine OFF

Hydraulic tank drained.

Hydraulic tank shield removed.

Remove right side platform.
Shipping link installed.

Special Tools

None Two mechanics

Personnel Required

References

Replacing hydraulic oil, LO 10-3930-641-12.

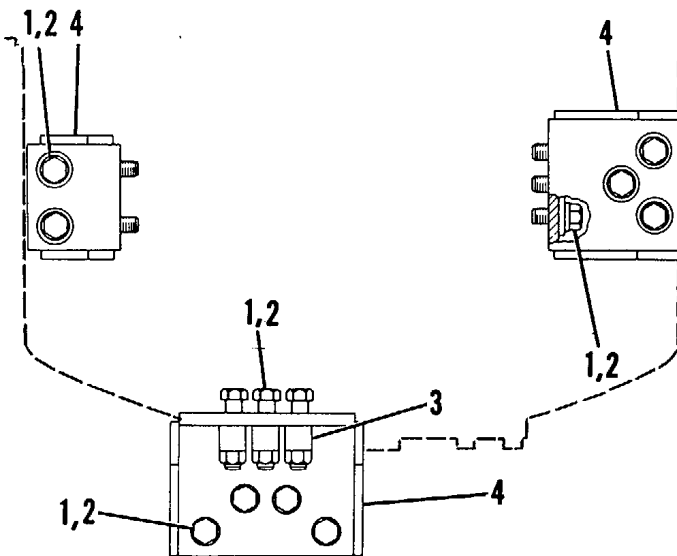
Platform removal/installation, page 8-39.
(shield and platform).

Shipping Link Removal/Installation,
TM 10-3930-641-20.

General Safety Instructions

Tires blocked.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div> <ol style="list-style-type: none"> 1. Strap <ol style="list-style-type: none"> a. Loop around hydraulic tank. b. Fasten to hoist. 2. Capscrews (1), washers (2) and spacers (3) 3. Hydraulic tank 	<ol style="list-style-type: none"> a. Loop around hydraulic tank. b. Fasten to hoist. <p>Remove from brackets (4).</p> <p>Lower to ground.</p> <p>NOTE</p> <p>Hydraulic tank weighs 750 lbs. (239 kg)</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Strap <ol style="list-style-type: none"> a. Loop around hydraulic tank. b. Fasten to hoist. 2. Hydraulic tank 3. Capscrews (1), washers (2) and spacers (3) 	<ol style="list-style-type: none"> a. Loop around hydraulic tank. b. Fasten to hoist. <p>Lift into position.</p> <p>Use to fasten hydraulic tank brackets (4) to frame.</p>	<p>See Torque Limits Chart, page D-1</p> <p style="text-align: right;">TA099163 END</p>

This task covers: Disassembly and assembly of the hydraulic tank.

INITIAL SETUP

Test Equipment

None As required

Materials/Parts

None

Troubleshooting Reference

Equipment Condition

Hydraulic tank removed from vehicle.

Special Tools

None One mechanic

Personnel Required

References

Hydraulic tank removal/installation, page 7-27.

General Safety Instructions

None

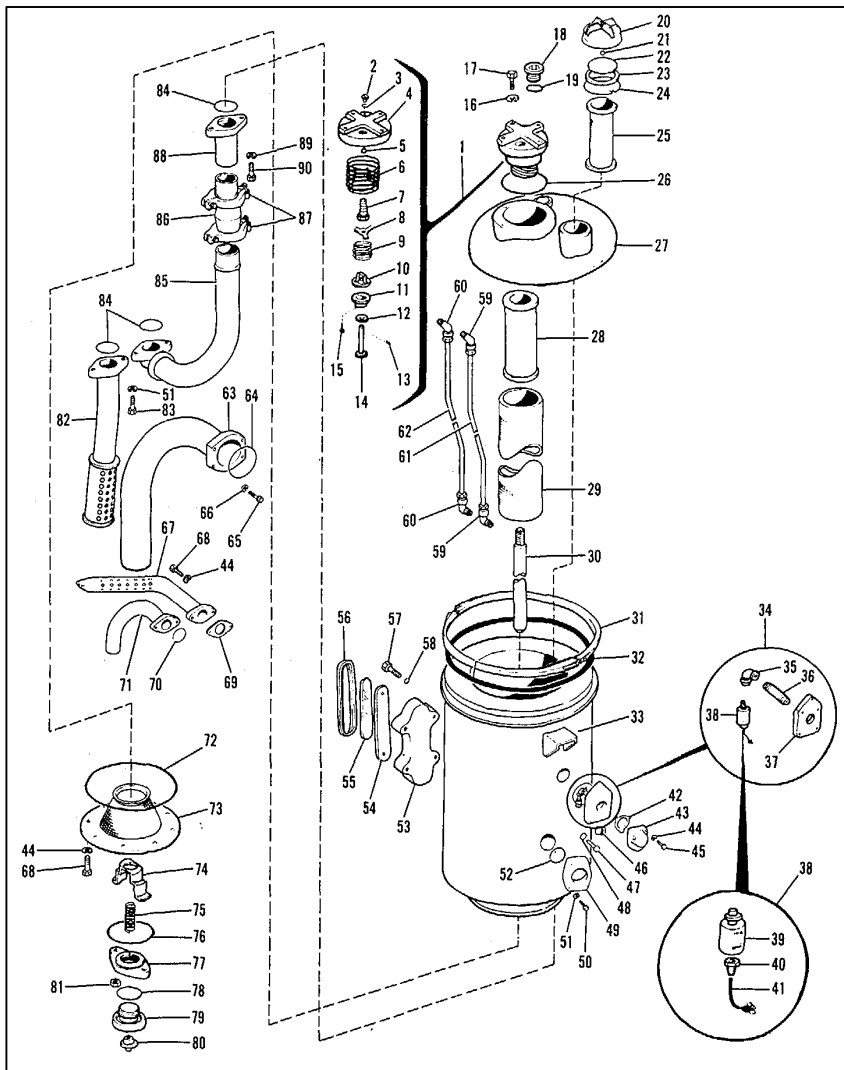
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
1. Capscrew (17) and lockwasher (16)	Remove from access cover (1).	
2. Access cover (1)	Remove.	
3. Access cover (1) a. Plug (2) and preformed packing (3)	Disassemble. Remove.	
b. Pin (13) (10), spring (9), housing (11), capscrew (15) and washer (12).	Remove from shaft (14). Then remove retainer	
c. Capscrew (7) and ball (5) from cover (4).	Remove and remove retainer (8), spring (6),	
4. Filter element (28)	Remove.	
5. Preformed packing (26)	Remove.	
6. Cap (20)	Remove.	
7. Cap (20)	Disassemble.	

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
7. Cap (20 (Cont) a. Retaining ring (24)	Remove.	
b. Ball (21), plate (22), and gasket (23)	Will come out.	
8. Strainer assembly (25)	Remove.	
9. Coupling (31)	Remove.	
10. Head assembly (27) and preformed packing (32)	Remove.	
11. Elbows (60) and (59)	Remove by:	
a.	Loosen and remove retaining nuts on tubes (61) and (62).	
b.	Unscrew elbows.	
12. Capscrew (83) and lockwasher (51)	Remove.	
13. Tube assembly (82) and preformed packing (84)	Remove.	

Go on to Sheet 4



- | | | |
|-------------------|-----------------------|-----------------------|
| Access cover | 19. Preformed packing | 55. Glass, sight |
| Plug | 20. Cap | 56. Preformed packing |
| Preformed packing | 21. Ball | 57. Capscrew |
| Cover | 22. Plate | 58. Preformed packing |
| Ball | 23. Gasket | 59. Elbow |
| Spring | 24. Retaining ring | 60. Elbow |
| Capscrew | 25. Strainer assembly | 61. Tube |
| Retainer | 26. Preformed packing | 62. Tube |
| Spring | 27. Head assembly | 63. Tube assembly |
| Retainer | 28. Filter element | 64. Preformed packing |
| Housing | 29. Screen assembly | 65. Capscrew |
| Washer | 30. Rod | 66. Lockwasher |
| Pin | 31. Coupling | 67. Tube assembly |
| Shaft | 32. Preformed packing | 68. Capscrew |
| Capscrew | 33. Tank assembly | 69. Gasket |
| Washer | 34. Switch assembly | 70. Preformed packing |
| Capscrew | 35. Elbow | 71. Tube assembly |
| Plug | 36. Nipple | 72. Preformed packing |
| | 37. Flange | 73. Cover assembly |
| | 38. Switch assembly | 74. Guide |
| | 39. Sensing unit | 75. Spring |
| | 40. Nipple | 76. Preformed packing |
| | 41. Wire | 77. Flange |
| | 42. Gasket | 78. Preformed packing |
| | 43. Cover | 79. Plug, drain |
| | 44. Washer | 80. Valve |
| | 45. Capscrew | 81. Nut |
| | 46. Plug | 82. Tube assembly |
| | 47. Capscrew | 83. Capscrew |
| | 48. Washer | 84. Preformed packing |
| | 49. Cover | 85. Tube assembly |
| | 50. Capscrew | 86. Joint assembly |
| | 51. Lockwasher | 87. Clamps |
| | 52. Preformed packing | 88. Tube |
| | 53. Cover | |
| 54. Plate | 89. Washer | |
| | 90. Capscrew | |

LOCATION/ITEM	ACTION	REMARKS
14. Clamps (87) on joint assembly (86)	Loosen.	
15. Capscrews securing tube assembly (85) to bottom of screen assembly (29)	Remove.	
16. Tube assembly (85) and preformed packing (84)	Remove.	
17. Capscrew (90) and lockwasher (89)	Remove.	
18. Tube (88) and preformed packing (84) (87), as a unit.	Remove with joint assembly (86) and clamps	
19. Capscrews (68) and washers (44) at bottom of hydraulic tank	Remove.	
20. Cover assembly (73) and preformed packing (72)	Remove.	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
21. Cover assembly (73)	Disassemble.	
a. Plug (79) and valve (80)	Unscrew and remove.	
b. Preformed packing (78)	Remove.	
c. Nuts (81)	Remove.	
d. Flange (77) and preformed packing (76)	Remove.	
e. Spring (75) and guide (74)	Will come out.	
22. Tube assembly (71) and preformed packing (70)	Remove retaining capscrews (not shown) and remove.	
23. Capscrew (68) and washer (44)	Remove.	
24. Tube assembly (67) and gasket (69)	Remove.	
25. Capscrews (65) and lockwashers (66)	Remove.	

Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
26. Tube assembly (63) and preformed packing (64)	Remove.	
27. Elbows (60) and (59) at bottom of screen assembly (29)	Remove by:	
a. (61) and (62).	Loosen and remove retaining nuts on tubes	
b.	Unscrew elbows.	
28. Capscrew (57) and preformed packing (58)	Remove.	
29. Cover (53)	Remove.	
30. Plate (54), sight glass (55), and preformed packing (56)	Remove from cover (53).	
31. Capscrew (50) and lockwasher (51)	Remove.	
32. Cover (49) and preformed packing (52)	Remove.	
33. Capscrew (47) and washer (48)	Remove.	
34. Switch assembly (34)	Remove.	

Go on to Sheet 8

LOCATION/ITEM	ACTION	REMARKS
35. Switch assembly (34) a. Capscrew (45) and washer (44) b. Cover (43) and gasket (42) be removed.) c. Nipple (36) d. Elbow (35) e. Switch assembly (38) f. Switch assembly (38) nipple (40) from sensing unit (39) and separating from wire (41).	Disassemble. Remove. Remove from flange (37). (Plug (46) may also be removed.) Unscrew from flange (37). Unscrew from nipple (36). Unscrew from elbow (35). May be disassembled further by unscrewing nipple (40) from sensing unit (39) and separating from wire (41).	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">ASSEMBLY</div>		
1. Wire (41) a. b.	Insert into nipple (40). Screw nipple (41) into sensing unit (39). Switch assembly (38) is screwed into elbow (35).	

Go on to Sheet 9

LOCATION/ITEM	ACTION	REMARKS
2. Switch assembly (34)	Assemble.	
a. Elbow (35)	Screw onto nipple (36).	
b. Nipple (36)	Screw into flange (37).	
c. Cover (43) and gasket (42)	Place in position on switch assembly (34).	
d. Capscrews (45) with washers (44)	Install.	
3. Switch assembly (34)	Place in position on tank assembly (33).	
4. Capscrews (47) and washers (48)	Install.	
5. Cover (49) and preformed packing (52)	Place in position on tank assembly (33).	
6. Capscrews (50) and washers (51)	Install.	
7. Plate (54), sight glass (55), and preformed packing (56)	Install in cover (53).	
8. Cover (53)	Place in position on tank assembly (33).	

Go on to Sheet 10

LOCATION/ITEM	ACTION	REMARKS
9. Capscrews (57) and preformed packings (58)	Install.	
10. Elbows (60) and (59) a. b.	Install at bottom of screen assembly by: Screw elbows into screen assembly. Use retaining nuts and fasten tubes (61) and (62) to elbows (60) and (59).	
11. Tube assembly (63) and preformed packing (64)	Place in position.	
12. Capscrews (65) and lockwashers (66)	Install.	
13. Tube assembly (67) and gasket (69)	Place in position.	
14. Capscrew (68) and washer (44)	Install.	
15. Tube assembly (71) and preformed packing (70)	Place in position and install retaining capscrews (not shown).	

Go on to Sheet 11

LOCATION/ITEM	ACTION	REMARKS
16. Cover assembly (73)	Assemble.	
a. Spring (75) and guide (74)	Place in position.	
b. Flange (77) and preformed packing (76)	Place in position and secure with nuts (81).	
c. Cover assembly (73) and preformed packing (72) (44).	Place in position on bottom of tank and secure with capscrews (68) and lockwashers	
d. Plug (79) with preformed packing (78) and valve (80)	Screw into bottom of cover assembly (73).	
17. Tube (88) and preformed packing (84) lockwasher (89).	Install on cover (27) using capscrew (90) and	
18. Joint assembly (86) and clamps (87)	Install on tube (88).	
19. Tube assembly (85) screen assembly (29) with preformed packing (84).	Place in position in joint assembly (86) and on	
20. Capscrews securing tube assembly (85) to bottom of screen assembly	Install and tighten.	

Go on to Sheet 12

LOCATION/ITEM	ACTION	REMARKS
21. Clamps (87)	Tighten.	
22. Tube assembly (82) and preformed packing (84)	Place in position on bottom of screen assembly.	
23. Capscrews (83) and lockwasher (51)	Install.	
24. Elbows (60) and (59) a. assembly (27).	Install by: Screw elbows into fitting in head	
b.	Screw retaining nuts on tubes (61) and (62) onto elbows.	
25. Head assembly (27) and preformed packing (32)	Place in position on tank assembly (33).	
26. Coupling (31)	Install.	
27. Strainer assembly (25)	Install.	
28. Cap (20)	Assemble.	
a. Ball (21), plate (22), and gasket (23)	Place in position in cap (20).	
b. Retaining ring (24)	Install.	

Go on to Sheet 13

LOCATION/ITEM	ACTION	REMARKS
29. Cap (20)	Install in head assembly (27).	
30. Access cover (1)	Assemble.	
a. Retainer (8), spring (6) and ball (5)	Install in cover (4) and secure with capscrew (7).	
b. Washer (12), capscrew (15), housing (11), spring (9) and retainer (10)	Assemble on shaft (14) and secure with pin (13) in cover assembly (4).	
31. Access cover (1) and preformed packing (26)	Place in position on head assembly (27).	
32. Capscrew (17) and lockwasher (16)	Install.	
33 Plug (2) and preformed packing (3)	Install in access cover (1).	

End

HYDRAULIC LINES AND FITTINGS REMOVAL/INSTALLATION

(Sheet 1 of 2)

This task covers: Removal/installation of hydraulic lines and fittings.

INITIAL SETUP

Test Equipment

None Containers to catch oil

Materials/Parts

Page 2-30'

Troubleshooting Reference

Equipment Condition

Engine OFF

System cooled

Mast lowered to end of travel

Special Tools

None One mechanic

Personnel Required

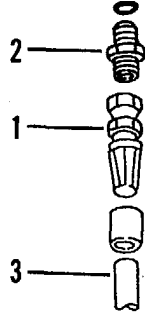
References

None
Hot oil causes burns.

General Safety Instructions

Allow system to cool.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
<p>1. Hydraulic tank</p>	<p>Drain.</p>	<p>See TM 10-3930-641-20</p>
<p style="text-align: center;">NOTE</p> <p>Tag hydraulic lines to identify location. Cap or plug all openings to prevent dirt from entering hydraulic system.</p>		
<p>2. Fitting (1)</p>	<p>Loosen and unscrew from nipple (2).</p>	
<p>3. Line (3)</p>	<p>Remove.</p>	
<p>I INSTALLATION I</p>		
<p>1. Line (3) Place in position.</p>		
<p>2. Fitting (1)</p>	<p>Install on nipple (2).</p>	<p>HYDRAULIC LINE FITTING (TYPICAL)</p>
<p>3. Hydraulic tank</p>	<p>Fill.</p>	
<p>4. MastBleed.</p>	<p>See LO 10-3930-614-12</p>	
	<p>See TM 10-3930-641-20.</p>	

This task covers: Disassembly/assembly of the hydraulic control valve.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

Page 2-28, 2-29, 2-30, 2-31, 2-33

Troubleshooting Reference

Equipment Condition

Hydraulic valve removed

Special Tools

None One mechanic

Personnel Required

References

Hydraulic Control
Valve Removal/Installation,
TM 10-3930-641-20.

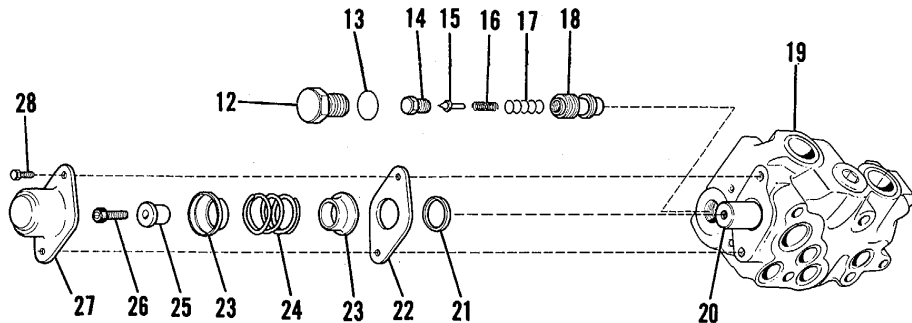
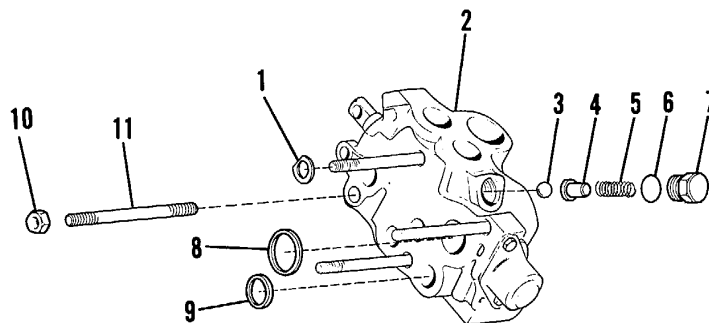
General Safety Instructions

Place parts in a clean area.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
	<p style="text-align: center;">NOTE</p> <p>The disassembly/assembly procedure for each of the five valves is identical.</p>	
<p>1. Elbows and o-ring seals</p>	<p>Mark, identify and remove.</p>	
<p>2. Four nuts (10)</p>	<p>Remove. Separate valve bodies.</p>	
<p>3. Preformed packing (8) and (9) and shim (1)</p>	<p>Remove.</p>	
<p>4. Cap (27)</p>	<p>Remove.</p>	
<p>5. Valve plunger</p>	<p>Remove.</p>	

- 1. Shim
- 2. Body
- 3. Ball
- 4. Guide
- 5. Spring
- 6. Preformed packing
- 7. Plug
- 8. Preformed packing
- 9. Preformed packing
- 10. Nut
- 11. Stud
- 12. Plug



- 13. O-ring seal
- 14. Capscrew
- 15. Shims
- 16. Plunger
- 17. Spring
- 18. Body
- 19. Body
- 20. Plunger
- 21. O-ring seal
- 22. Retainer
- 23. Retainer
- 24. Spring
- 25. Guide
- 26. Screw
- 27. Cover
- 28. Capscrew

HYDRAULIC CONTROL VALVE DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
	<p>NOTE</p> <p>Keep valve plunger assemblies with the valve bodies they were in.</p>	
	<p>NOTE</p> <p>Spring is compressed.</p>	
<p>6. Screw (26)</p>	<p>Remove.</p>	
<p>7. Guide (25), spring retainer (23), spring (24), spring retainer (23), retainer (22), O-ring seal (21)</p>	<p>Remove from plunger (20).</p>	
<p>8. O-ring seal at opposite end of valve body.</p>	<p>Remove and replace, if damaged.</p>	
<p>9. Plug (12)</p>	<p>Remove.</p>	
<p>10. Capscrew (14), shims (15), plunger (16), spring (17)</p>	<p>Remove from valve body (18).</p>	

HYDRAULIC CONTROL VALVE DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
11. Plug (7)	Remove.	
12. Preformed packing (6), spring (5), guide (4), and ball (3)	Remove.	
<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">ASSEMBLY</div>		
1. Ball (3), guide (4), and spring (5)	Install.	
2. Plug (7)	Install.	
3. Spring (17), plunger (16), shims (15), and capscrew (14)	Install in relief valve body (18).	
4. Relief valve assembly	Install.	

LOCATION/ITEM	ACTION	REMARKS
5. O-ring seal (6)	Install on plug (7).	
6. Plug (7)	Install.	
7. O-ring seal (21)	Install on plunger (20).	
8. Retainer (22)	Install on plunger (20).	
9. Spring retainer (23), spring (24), spring retainer (23), guide (25), screw (26)	Install on plunger (20).	
10. Plunger assembly (20)	Install.	
11. Cover (27)	Install.	
12. Preformed packing (8) and (9)	Install.	
13. Shim (1)	Install.	
14. Four nuts (10)	Install.	

This task covers: Replacement of tilt cylinders.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Relieve pressure on hydraulic tank.

Special Tools

None

Personnel Required

One mechanic

References

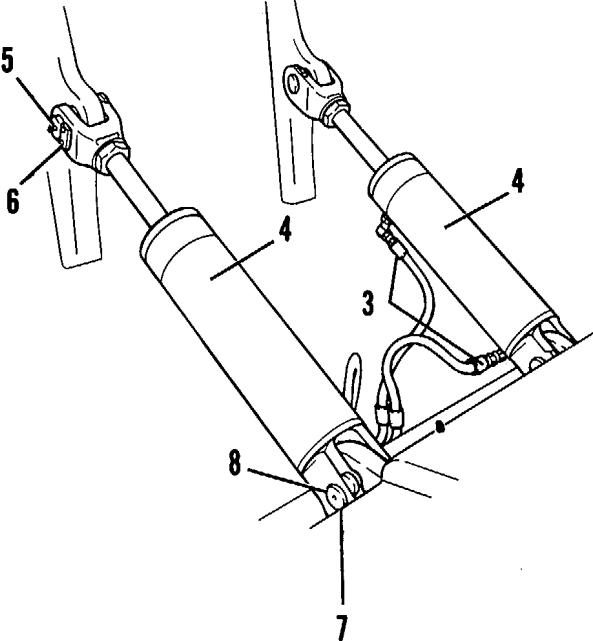
None

General Safety Instructions

Care should be taken so cylinder doesn't fall.

Go on to Sheet 2

TILT CYLINDER REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">REMOVAL</div> <p>Do not remove both cylinders at one time unless the mast is properly blocked and held stationary.</p> <ol style="list-style-type: none"> <li>1. Two hydraulic lines (3) <li>2. Tilt cylinder (4) <li>3. Two capscrews <li>4. Retainer (6) <li>5. Pin (5) <li>6. Retainer (7) <li>7. Two capscrews <li>8. Pin (8) <li>9. Tilt cylinder (4) 	<div style="border: 1px solid black; padding: 2px; margin-bottom: 10px;">WARNING</div> <p>Disconnect, cap and identify.</p> <p>Fasten hoist.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p> <p>Remove.</p>	

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Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center; margin: 0;">INSTALLATION</p> </div> <ol style="list-style-type: none"> <li>1. Tilt cylinder (4) <li>2. Pin (8) <li>3. Retainer (7) <li>4. Two capscrews <li>5. Pin (5) <li>6. Retainer (6) <li>7. Two capscrews <li>8. Two hydraulic lines (3) 	<p>Fasten hoist and lift into position.</p> <p>Install.</p> <p>Install.</p> <p>Install.</p> <p>Install.</p> <p>Install.</p> <p>Install.</p> <p>Uncap and connect.</p>	<div style="text-align: right;"> </div>

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This task covers: Disassembly and assembly of the tilt cylinder.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

Page 2-29, 2-30, 2-35.

Equipment Condition

Tilt cylinder removed.

Special Tools

None

Personnel Required

One mechanic

References

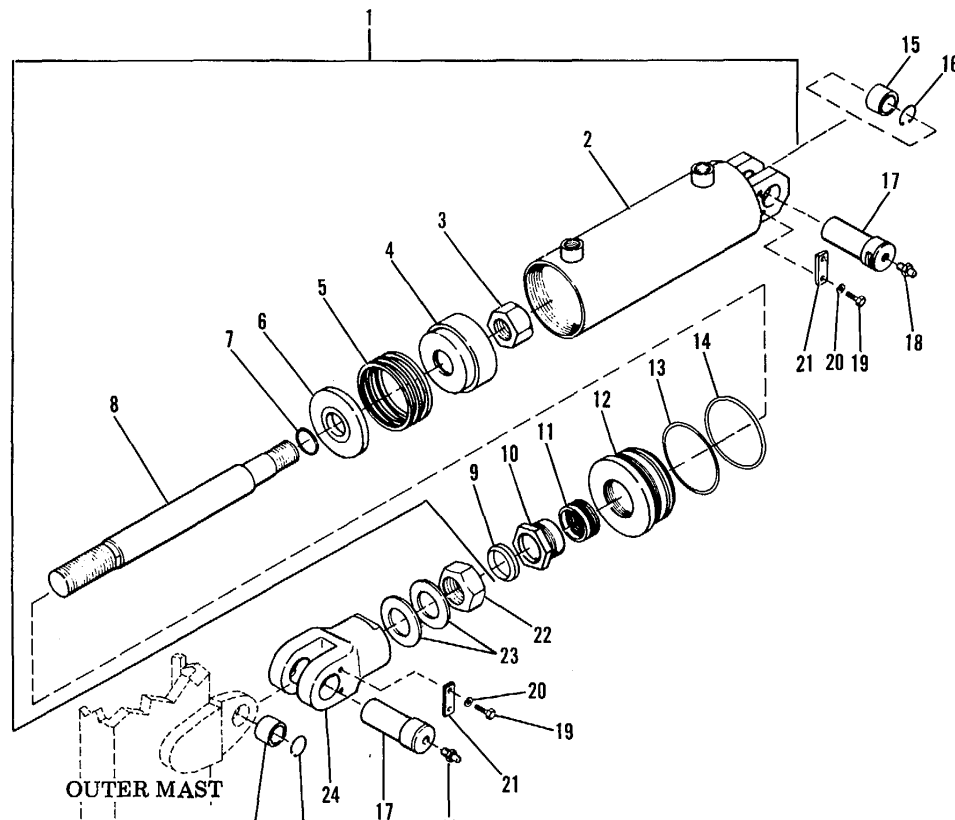
Tilt Cylinder Removal/Installation, page 7-50.

General Safety Instructions

Place parts in a clean area.

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">DISASSEMBLY</div> <ol style="list-style-type: none"> 1. Tilt cylinder 2. Tilt cylinder 3. Rod (8) 4. Nut (10) 5. Cap (12) 6. Cylinder 7. Piston nut (3) socket. <p>Hold rod (8) stationary with tool while removing piston nut (3).</p>	<p>Secure to repair stand.</p> <p>Move rod (8) to fully extended position.</p> <p>Put support under rod and fasten strap.</p> <p>Loosen.</p> <p>Loosen.</p> <p>Pull away from rod assembly with repair stand.</p> <p>Remove, using torque multiplier, adapter, and</p> <p>NOTE</p>	

1. Cylinder group
2. Cylinder
3. Piston lock nut
4. Piston
5. Packing ring
6. Spacer
7. Preformed packing
8. Cylinder piston rod
9. Wiper ring
10. Packing guide nut
11. Packing
12. End cap
13. Back-up ring
14. Preformed packing
15. Bearing
16. Retaining ring
17. Pin
18. Gease fitting
19. Capscrew
20. Washer
21. Pin retainer
22. Locknut
23. Tilt cylinder washer
24. Clevis



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Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
8. Piston (4)	Remove.	
9. Spacer (6)	Remove.	
10. Cap (12)	Remove.	
11. Nut (10)	Remove.	
12. Preformed packing (7)	Remove.	
13. Three packing rings (5)	Remove.	
14. Packing (11)	Remove from inside cap (12).	
15. Preformed packing (14) and back-up ring (13)	Remove from cap.	
16. Wiper ring (9)	Remove from nut (10).	

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">ASSEMBLY</p>	NOTE	
<p>Clean all parts.</p>		
<p>1. Wiper ring (9)</p>	<p>Install in nut (10).</p>	
<p>2. Back-up ring (13)</p>	<p>Install on cap (12).</p>	
<p>3. Preformed packing (14)</p>	<p>NOTE Back-up ring (13) must be installed with curved (concave) surface toward the preformed packing (14).</p>	
<p>4. Packing (11)</p>	<p>Install on cap (12).</p>	
<p>5. Preformed packing (7)</p>	<p>Install on piston (4).</p>	
<p>6. Three packing rings (5)</p>	<p>Install on piston (4).</p>	

LOCATION/ITEM	ACTION	REMARKS
7. Nut (10)	Put on rod.4	
8. Cap (12)	Put on rod.	
9. Spacer (6)	Put on rod.	
10. Piston (4)	Put on rod.	
11. Nut (3) adapter and socket. Use tool to hold rod.	Install and tighten with torque multiplier,	
Tighten nut to a torque of 2225 lb. ft. to 2275 lb. ft. (3016.7-3084.5 N-m).	NOTE	
12. Cylinder (2)	Install over rod assembly.	
Grease piston, spacer, and cap with general purpose grease before installation.	NOTE	

TILT CYLINDER DISASSEMBLY/ASSEMBLY (CONT)

LOCATION/ITEM	ACTION	REMARKS
13. Cap (12)	Place in position and tighten, using tooling. NOTE Extend rod when installing cap.	
14. Nut (10)	Install, using tool.	
15. Tilt cylinder	Remove from repair stand.	

This task covers: Replacement of tilt cylinder bearings.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Tilt cylinder removed.

Special Tools

None

Personnel Required

One mechanic

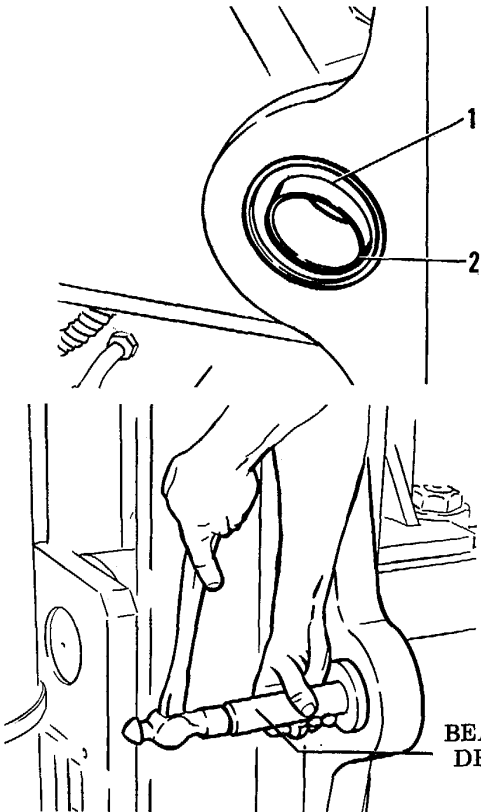
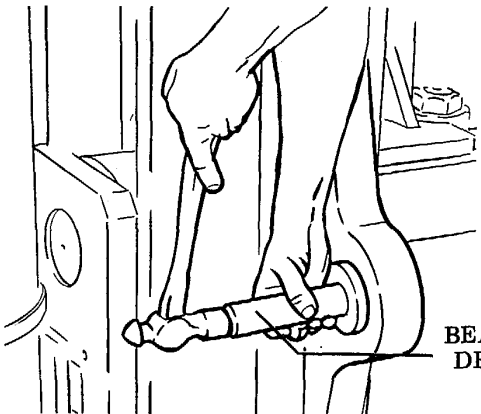
References

Tilt Cylinder Removal/Installation, page 7-50.

General Safety Instructions

Wear eye protection.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>1. Retaining ring (1)</p> <p>2. Bearing (2) a bearing driver.</p>	<p>Remove from mast/vehicle frame.</p> <p>Remove from mast/vehicle frame, using</p>	
<p style="text-align: center;">INSTALLATION</p> <p>Clean all parts.</p> <p>1. Bearing (2) frame, using suitable driver.</p> <p>2. Retaining ring (1)</p>	<p>NOTE</p> <p>Install against counterbore in mast/vehicle</p> <p>Install in mast/vehicle frame.</p>	

TA099169

End

LIFT CYLINDER REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Replacement of the lift cylinder.

INITIAL SETUP

Test Equipment

None Caps for hydraulic lines

Materials/Parts

None

Troubleshooting Reference

Equipment Condition

Carriage and lift chains removed.

Special Tools

None Two mechanics

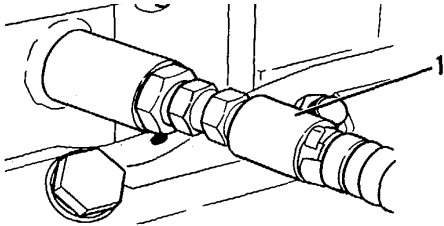
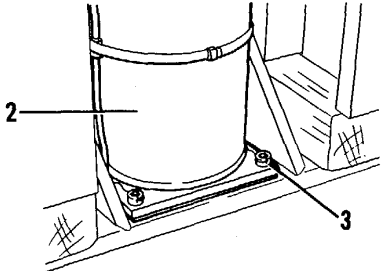
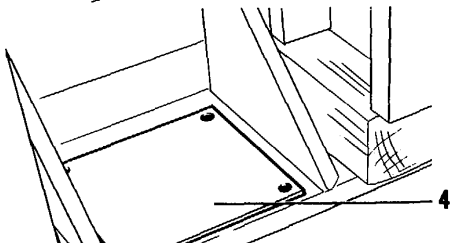
Personnel Required

References

Mast Lift Chains Removal/Installation, Tires blocked.
page 7-118.
Carriage Removal/Installation,
page 7-91.

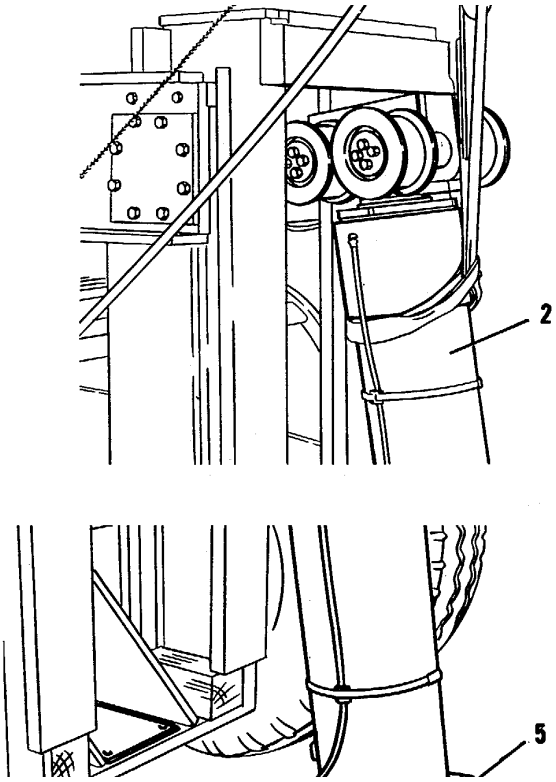
General Safety Instructions

Cylinder may swing when removed.

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p>		
<p>1. Hydraulic oil line (1)</p>	<p>Disconnect at coupling and cap.</p>	
<p>2. Lift cylinder (2)</p>	<p>Fasten hoist.</p>	
<p>3. Four capscrews (3)</p>	<p>Remove.</p>	
<p>4. Lift cylinder (2)</p>	<p>Remove.</p>	
<p>NOTE Lift cylinder weighs 2400 lbs. (1088.6 kg). Watch out for any swing.</p>		
<p>5. Pad (4)</p>	<p>Remove.</p>	

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Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> <li>1. Pad (4) <li>2. Lift cylinder (2) <ol style="list-style-type: none"> <li>b. Place cylinder in position. <li>3. Base (5) <li>4. Four capscrews (3) <li>5. Hydraulic oil line (1) 	<p>Place in position.</p> <p>a. Fasten hoist.</p> <p>Push into position.</p> <p>Install.</p> <p>Uncap and connect.</p>	 <p>TA099171</p> <p>End</p>

This task covers: The disassembly and assembly of the lift cylinder.

INITIAL SETUP

Test Equipment

None As required

Materials/Parts

Page 2-29, 2-30

Troubleshooting Reference

Equipment Condition

Lift cylinder removed.

Special Tools

None One mechanic.

Personnel Required

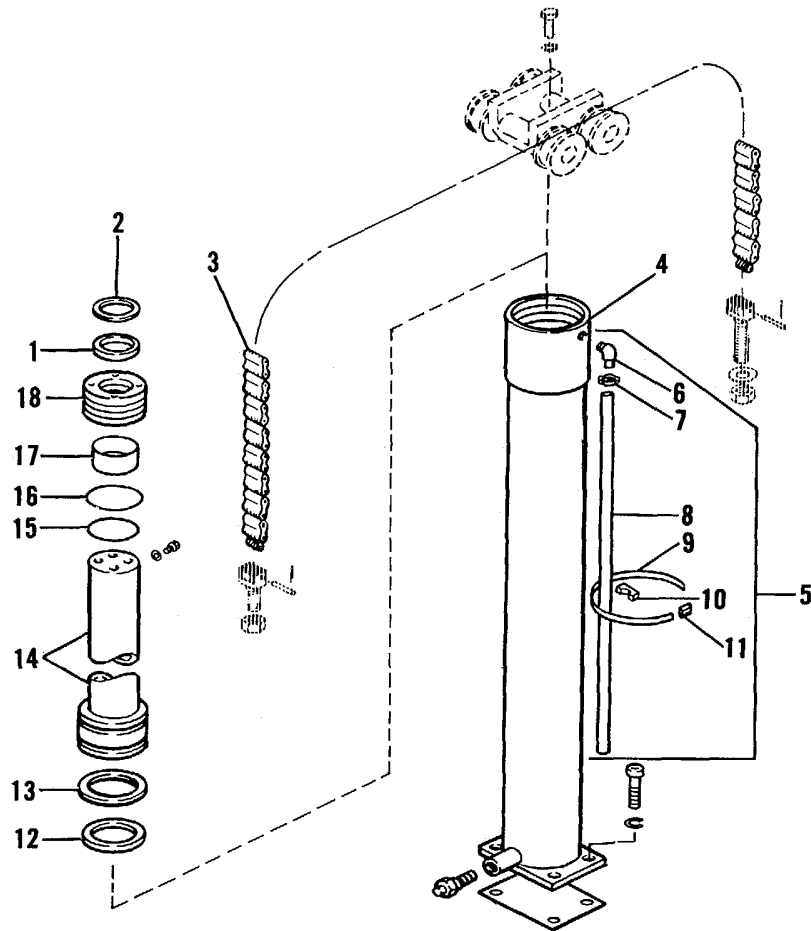
References

Lift Cylinder Removal/Installation, None
page 7-63.

General Safety Instructions

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
1. Rod head (18)	Remove.	
2. Preformed packing (15), seals (1) (2) and rings (16) (17)	Remove from rod head (18).	
3. Rod assembly (14)	Remove from tube assembly (4).	
4. Ring (12) and seal (13)	Remove from rod assembly (14).	
5. Clip (11)	Remove.	
6. Strap (9) and spacer (10)	Remove.	
7. Hose (8), clamp (7) and adapter (6)	Remove from tube assembly (4).	



1. Seal, rod packing
2. Seal, rod wiper
3. Chain assembly
4. Tube assembly
5. Overflow hose
6. Hose adapter
7. Hose clamp
8. Hose
9. Strap
10. Spacer
11. Clip
12. Rod wear ring
13. Seal assembly
14. Rod assembly
15. Preformed packing
16. Ring
17. Rod wear ring

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">ASSEMBLY</div>		
1. Adapter (6), clamp (7) and hose (8)	Install on tube assembly (4).	
2. Spacer (10) and strap (9)	Install.	
3. Clip (11)	Install.	
4. Ring (12) and seal (13)	Install on rod assembly (14).	
5. Rod assembly (14)	Install in tube assembly (4).	
6. Rings (16) (17), seals (1) (2) and preformed packing (15)	Install on rod head (18).	
7. Rod head (18)	Install in tube assembly (4).	

Section III. MAST COMPONENTS

MAST COMPONENTS MAINTENANCE INSTRUCTIONS

This section covers maintenance of these mast components for direct support maintenance personnel:

- a. Mast
- b. Fork assembly
- c. Carriage
- d. Side tilt cylinder
- e. Side shift cylinder
- f. Mast hydraulic lines
- g. Mast lift lines

In addition, this section contains the hydraulic system TEE TESTS.

LIST OF TASKS

(Sheet 1 of 1)

TASK NO. (PAGE)	TASK	TROUBLESHOOTING	REF (PAGE)	REF
1	Mast removal/installation.		7-71	None
29	2 Mast disassembly/assembly.		7-76	2-28, 2-
3	Fork assembly removal/installation.		7-87	None
4	Carriage removal/installation.		7-91	None
29	5 Carriage assembly disassembly/assembly		7-94	2-28, 2-
6	Side tilt cylinder removal/installation.		7-101	None
7	Side shift cylinder removal/installation.		7-104	None
8	Side shift/tilt cylinders disassembly/assembly.		7-107	2-40
9	Mast hydraulic lines removal/installation.		7-111	None
10	Mast lift chains removal/installation.		7-118	None
11	Tee test procedure for hydraulic system.		7-124	2-36

MAST REMOVAL/INSTALLATION

(Sheet 1 of 5)

This task covers: Removal and installation of the mast.

INITIAL SETUP

Test Equipment

None Tags and wire

Materials/Parts

None

Troubleshooting Reference

Equipment Condition

Fork assembly removed.
 Side tilt cylinder removed.
 Side shift cylinder removed.
 Mast lowered.
 Vehicle on level ground with brake set.
 Shipping link installed.

Special Tools

Wrench, Torque, 3/4" Sq. Drive,
 NSN 5120-00-221-7983
 Wrench, Torque,
 NSN 5120-00-008-3632

Personnel Required

Two mechanics.

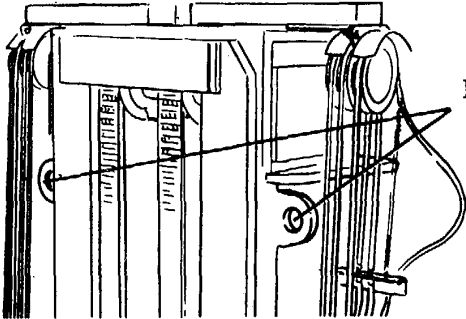
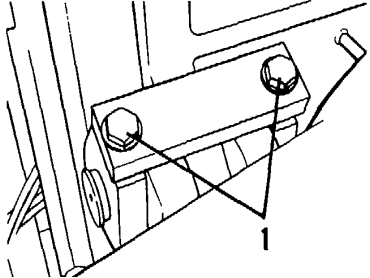
References

General Safety Instructions

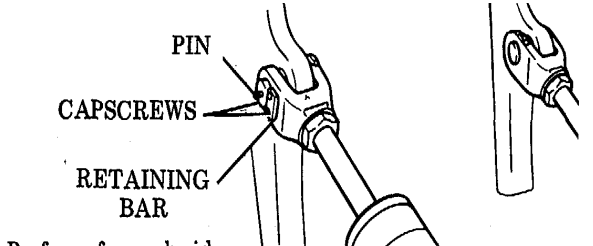
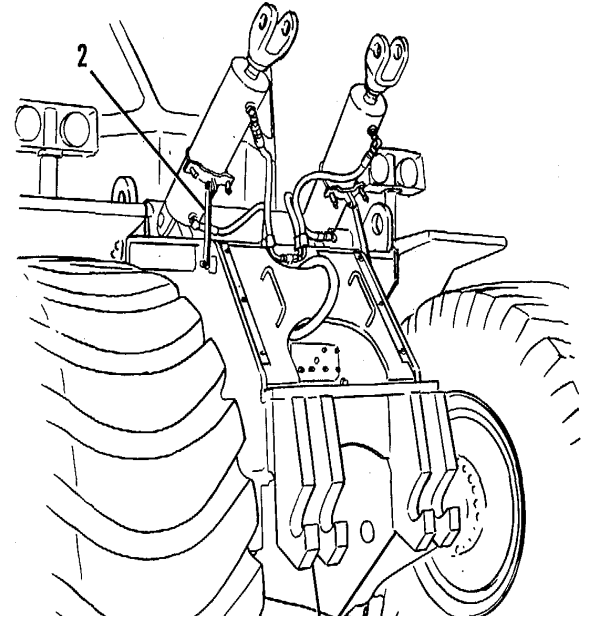
Fork Assembly Removal/Installation, page 7-87
 Side Tilt Cylinder Removal/Installation,
 page 7-101.
 Side Shift Cylinder Removal/Installation,
 page 7-104.
 Shipping Link Removal/Installation,
 TM 10-3930-641-20.

Never use fingers to push pins out.
 Persons should NEVER be under mast.
 Tires blocked.

MAST REMOVAL/INSTALLATION (CONT)

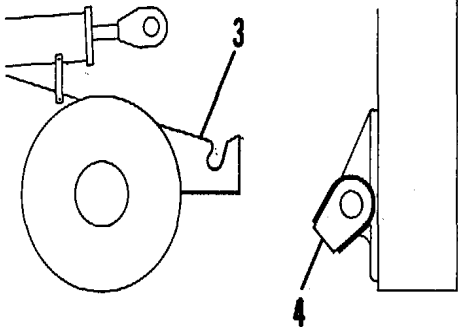
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">REMOVAL</div> <p>1. Hose assemblies</p> <p>2. Mast assembly</p> <p> b. Pull chains tight but do not lift.</p> <p> c. Under vehicle, remove capscrews (1) that secure eyes (retaining) on each side of mast.</p> <p style="text-align: center;">NOTE</p> <p>At this point mast is resting on "J" hooks (3).</p>	<p>Tag and disconnect.</p> <p>a. Secure hoist to lifting eyes with chains.</p>	<p>Hoses are located between tilt cylinders.</p> <div>  <p style="text-align: right;">LIFTING EYES</p> </div> <div>  <p style="text-align: center;">1</p> </div> <p style="text-align: right;">TA099173</p> <p style="text-align: right;">Go on to sheet 3</p>

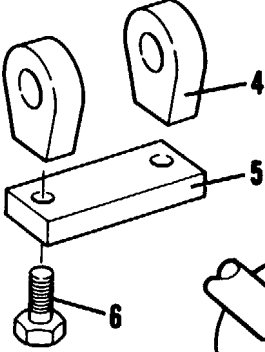
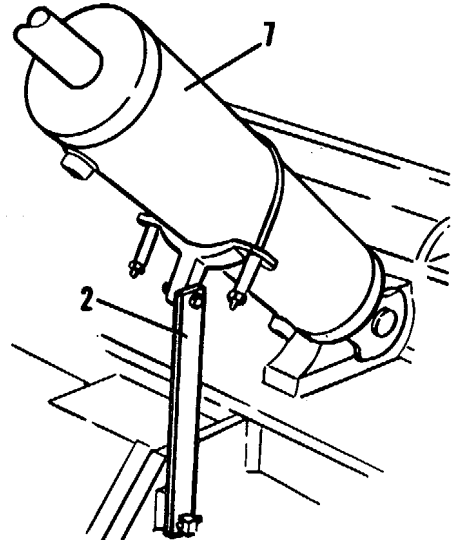
MAST REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p>3. Tilt cylinders</p> <p>b. Remove two capscrews.</p> <p>c. Remove retaining plate.</p>	<p style="text-align: center;">WARNING</p> <p>Hoist must be secured to mast. Use appropriate equipment to keep mast from falling forward.</p> <p>a. Install shipping support (2).</p>	 <p>PIN CAPSCREWS RETAINING BAR</p> <p>Perform for each side.</p>
<p>d. Remove pin.</p> <p>4. Mast assembly proper blocking. Mast should lie down flat.</p>	<p style="text-align: center;">WARNING</p> <p>Use appropriate tool to remove pins. Never use fingers.</p> <p>Lift up and off "J" hooks (3) and place on proper blocking. Mast should lie down flat.</p>	 <p>2</p>

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Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION I		
1. Shims, wear pads, and sliding blocks	Check for wear and replace if worn thin.	
2. Mast	<p>a. Lift to upright position.</p> <p>b. Guide to "J" hooks (3) and have eyes (4) on either side of "J" hooks.</p> <p>c. Lift mast up onto "J" hooks.</p>	<p>Worn thin to the point where metal starts to wear metal in the same general area of wear pads, shims, or sliding blocks. Weight of mast and carriage is 15,000 lbs. (6800 kg).</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div>	<p>Use appropriate safety equipment to secure mast from falling forward</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div>	<p>Never place any part of your body under mast.</p>	<p>Pins should be totally into retaining eyes with little overhang, if any at all.</p>
		<p>Pins must be set down all the way into the "J" hooks.</p>
		<p style="text-align: right;">TA099175</p>
		<p style="text-align: right;">Go on go sheet 4 of 5</p>
	<p style="text-align: center;">7-74</p>	

LOCATION/ITEM	ACTION	REMARKS
<p>d.</p>	<p>Install two capscrews (6) and retainer plate (5) onto eyes (4) and torque capscrews.</p>	<p>Tighten capscrews to a torque of 1000 ± 130 ft. lbs. (1356 ± 176 N•m).</p>
<p>3. Tilt cylinder (6)</p>	<p>a. Align bearing and install pin.</p>	
<p>b.</p>	<p>Do the same for other side.</p>	
<p>Groove in pin is for retainer plate to fit into.</p>	<p style="text-align: center;">NOTE</p>	
<p>c.</p>	<p>Install two capscrews and retainer plate. Do the same for each side.</p>	
<p>d.</p>	<p>Remove shipping support (2).</p>	
<p>4. Hose assemblies</p>	<p>Connect.</p>	

TA099176

End

This task covers: The disassembly and assembly of the mast.

INITIAL SETUP

Test Equipment

None Wooden blocks

Materials/Parts

Page 2-28, 2-29

Troubleshooting Reference

Mast removed and laid flat on level surface.
Lift cylinder removed.

Equipment Condition

Special Tools

None Two mechanics.

Personnel Required

References

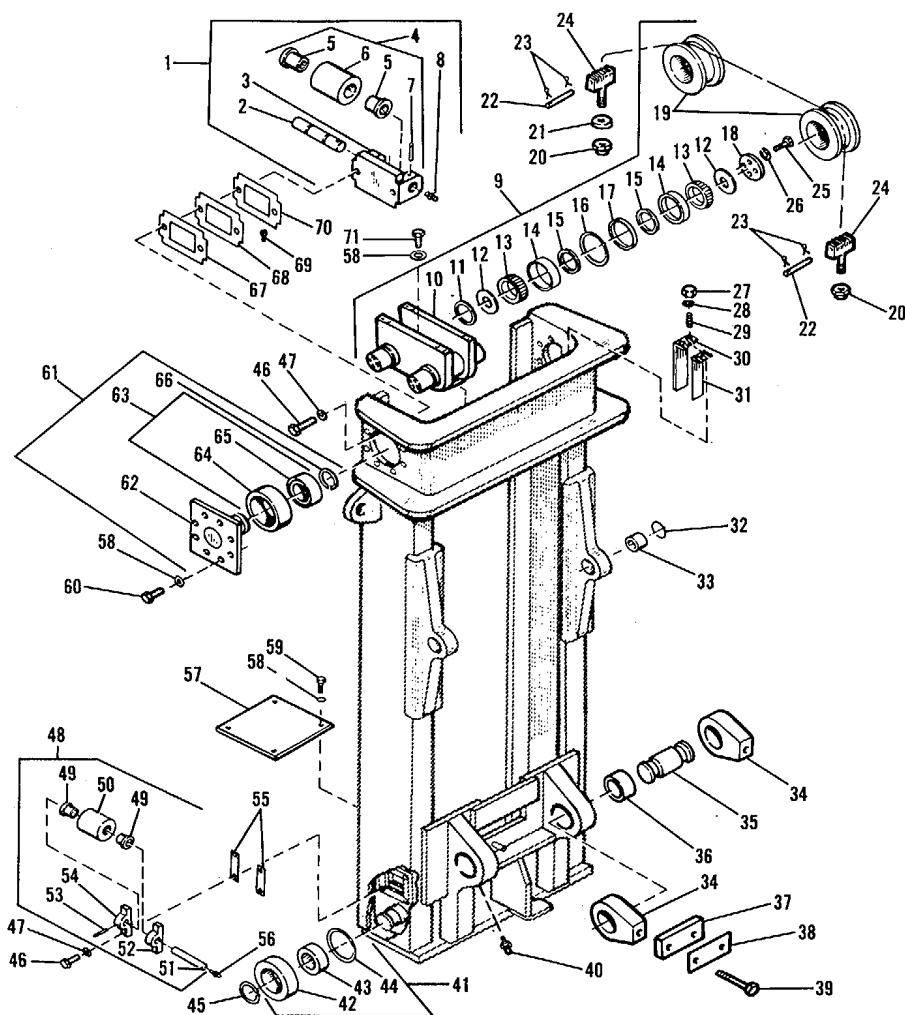
Mast Removal/Installation, page 7-71 None

Lift Cylinder Removal/Installation, page 7-63.

General Safety Instructions

Go on to Sheet 2

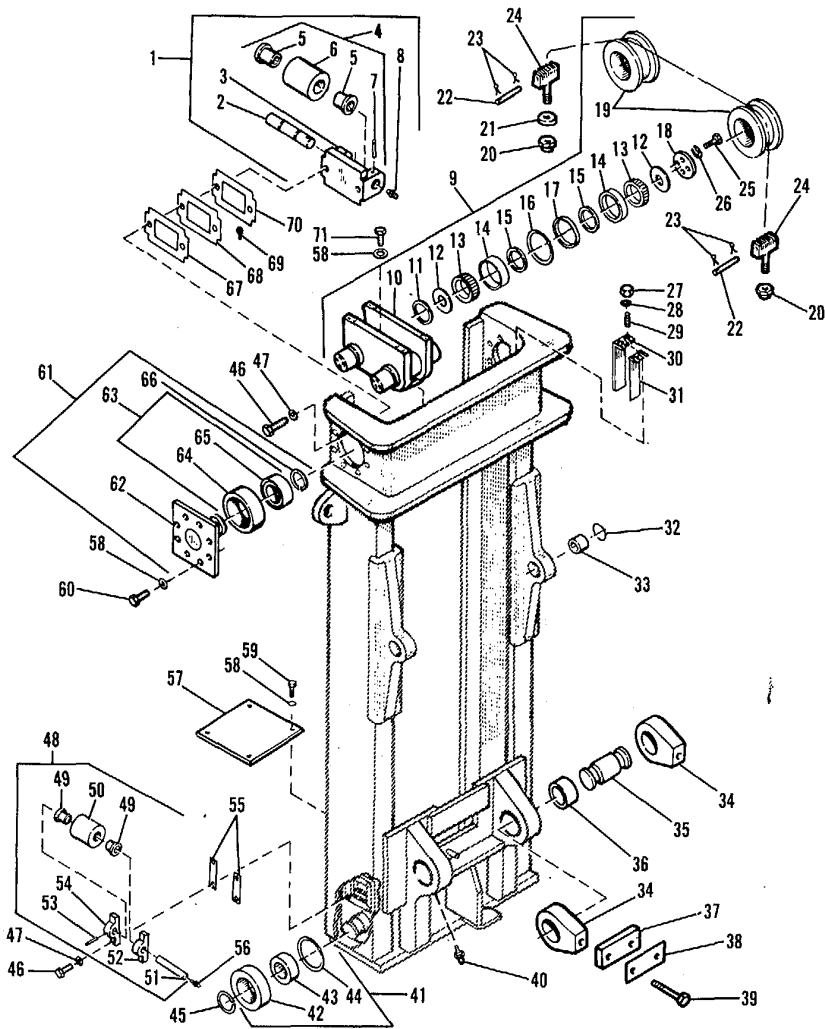
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
1. Inner mast extended.	Pull with lift truck and chain until fully	
2. Capscrews (46) and washers (47) that secure upper side roller assemblies (1) and shims (67) (68) (70)	Remove.	
3. Upper side roller assemblies (1) <ul style="list-style-type: none"> b. c. d. 	<ul style="list-style-type: none"> a. Remove pin (7). Remove shaft (2) and roller assembly (4). Remove fitting (8) from block (3). Remove bearings (5) from roller (6). 	
4. Capscrews (60) and washers (58)	Remove.	



- | | | | |
|-----|----------------------------|-----|-------------------|
| 1. | Upper side roller assembly | 21. | Washer, spherical |
| 2. | Shaft | 22. | Pin |
| 3. | Block | 23. | Cotter pin |
| 4. | Roller assembly | 24. | Anchor screw |
| 5. | Bearing | 25. | Capscrew |
| 6. | Roller | 26. | Washer |
| 7. | Pin 27. | 27. | Nut |
| 8. | Fitting | 28. | Washer |
| 9. | Sheave assembly | 29. | Stud |
| 10. | Crosshead | 30. | Wear pad |
| 11. | Ring 31. | 31. | Shim |
| 12. | Spacer | 32. | Ring |
| 13. | Ball bearing | 33. | Bushing |
| 14. | Cup 34. | 34. | Eye |
| 15. | Spacer' | 35. | Pin |
| 16. | Seal 36. | 36. | Bushing |
| 17. | Cap 37. | 37. | Bar |
| 18. | Retainer | 38. | Shim |
| 19. | Sheave | 39. | Capscrew |
| 20. | Nut 40. | 40. | Fitting |

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Go on to Sheet 4



- 41. Lower guide roller assembly
- 42. Roller
- 43. Bearing
- 44. Ring
- 45. Ring
- 46. Capscrew
- 47. Washer
- 48. Lower side roller assembly
- 49. Bearing
- 50. Roller
- 51. Shaft
- 52. Pillow block
- 53. Pin
- 54. Pillow block
- 55. Shim
- 56. Fitting
- 57. Plate
- 58. Washer
- 59. Capscrew
- 60. Capscrew
- 61. Upper guide roller assembly
- 62. Shaft
- 63. Roller assembly
- 64. Roller
- 65. Bearing
- 66. Ring
- 67. Shim
- 68. Shim
- 69. Capscrew
- 70. Shim
- 71. Capscrew

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Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
5. Upper guide roller assemblies (61) b. c. d.	a. Remove from outer mast. Remove ring (66). Remove roller assembly (63) from shaft (62). Press bearing (65) from roller (64).	Use 7 in. (17.8 cm) diameter plate.
6. Wooden blocks	Put in position to support inner mast.	
7. Inner mast	Pull from outer mast.	
8. Rings (45)	Remove.	
9. Lower guide roller assemblies (41) b. c.	a. Remove. Remove ring (44). Press bearing (43) from roller (42).	
10. Capscrews (46) and washers (47)	Remove.	

Go on to Sheet 6

MAST DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 6 of 11)

LOCATION/ITEM	ACTION	REMARKS
11. Lower side roller assemblies (48) and shims (55) b. c.	a. Remove from inner mast. Remove block (54), bearings (49) and roller (50) from shaft (51). Remove block (52) and fitting (56) from shaft (51).	
12. Ring (32)	Remove.	
13. Bushing (33)	Remove.	
14. Fitting (40)	Remove.	
15. Nuts (27) and washers (28)	Remove.	
16. Sheave assembly (9)	Remove from lift cylinder.	
17. Capscrews (25) and washers (26)	Remove.	
18. Retainer (18), sheaves (19) and outer bearing (13)	Remove from crosshead (10).	

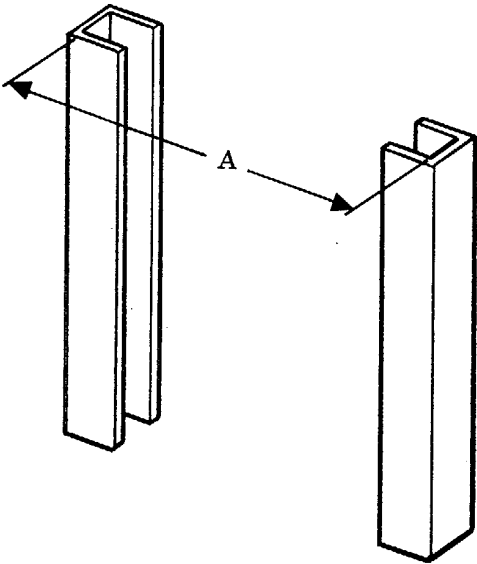
Go on to Sheet 7

MAST DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 7 of 11)

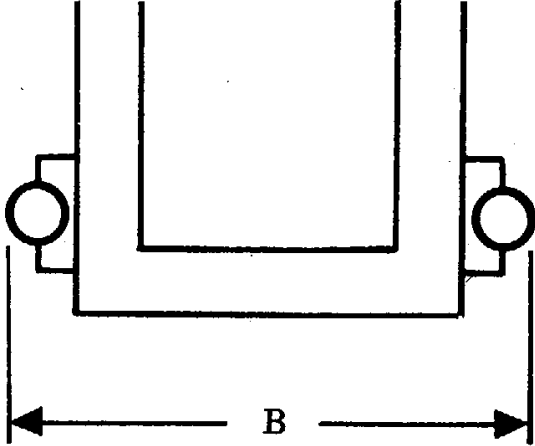
LOCATION/ITEM	ACTION	REMARKS
19. Cups (14), spacer (15), seal (16) and cap (17)	Remove from sheaves, if necessary.	
20. Inner bearing (12) and ring (11)	Remove.	
ASSEMBLY		
1. Inner bearing (12) and ring (11)	Install.	
2. Cups (14), spacer (15), seal (16) and cap (17)	Install.	
3. Outer bearing (13), sheaves (19) and retainer (18)	Install on crosshead.	
4. Washers (26) and capscrews (25)	Install.	
5. Sheave assembly (9) washers (58).	Secure to lift cylinder with capscrews (71) and	

Go on to Sheet 8

LOCATION/ITEM	ACTION	REMARKS
6. Fitting (40)	Install.	
7. Bushing (33)	Install.	
8. Ring (32)	Install.	
9. Lower side roller assemblies (48)	a. Install block (52) and fitting (56) on shaft (51).	
b.	Install bearings (49), roller (50) and block (54) on shaft (51).	
c.	Loosely secure assemblies (48) to inner mast. Use no shims (55).	
10. Outer mast side rails.	Measure narrowest distance (A) between	

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Go on to Sheet 9

LOCATION/ITEM	ACTION	REMARKS
<p>11. Inner mast</p> <p>b.</p> <p>12. Shims (55) is between .010 and .062 in. (0.25 to 1.57 mm).</p>	<p>a. Measure distance (B) between lower side rollers (where rollers contact side rails of outer mast).</p> <p>b. Subtract distance B from distance A.</p> <p>Install under blocks (52) (54) until B minus A</p>	
<p>The shims should be divided so there is an equal thickness on either side of the mast.</p>	<p style="text-align: center;">NOTE</p>	
<p>13. Bearing (43)</p>	<p>Install in roller (42).</p>	
<p>14. Ring (44)</p>	<p>Install.</p>	
<p>15. Lower guide roller assembly (41) (45).</p>	<p>Install on inner mast and secure with ring</p>	
<p>16. Inner mast</p> <p>b.</p>	<p>a. Fasten strap and hoist to lower end and put lift truck in position under upper end.</p> <p>b. Install in outer mast.</p>	

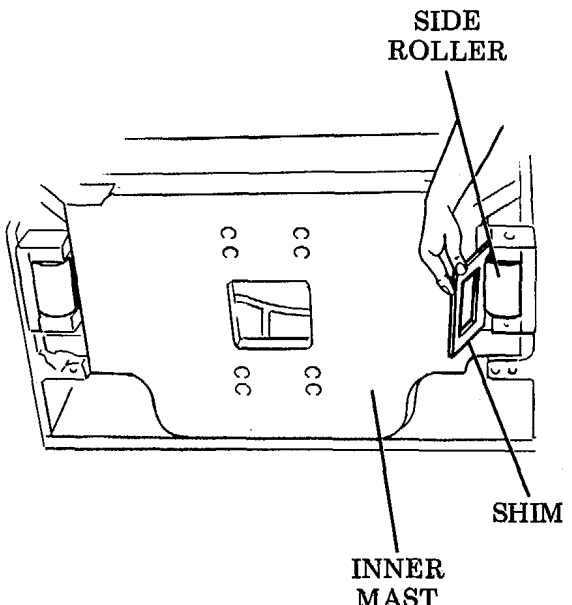
TA099180

Go on to Sheet 10

LOCATION/ITEM	ACTION	REMARKS
17. Bearing (65)	Press into roller (64).	Use 7 in. (17.8 cm) diameter plate.
18. Roller assembly (63)	Install on shaft (62).	
19. Ring (66)	Install.	
20. Upper guide roller assemblies (61)	Install on outer mast.	
21. Capscrews (60) and washers (58)	Install.	
22. Shims (31) and wear pads (30)	a. Install on both sides of mast. b. Check clearance between inner mast and wear pad. c. Add or remove shims to get clearance of .00 to .06 in. (0.0 to 1.5 mm).	<p>The diagram illustrates a hand holding a feeler gage against the inner mast and a wear pad. The inner mast is a vertical structure, and the wear pad is a rectangular block. The feeler gage is used to measure the gap between them. Labels with leader lines point to the 'INNER MAST', 'WEAR PAD', and 'FEELER GAGE'.</p>
23. Washers (28) and nut (27)	Install.	
24. Bearings (5)	Install in rollers (6).	
25. Fittings (8)	Install in blocks (3).	

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Go on to Sheet 11

LOCATION/ITEM	ACTION	REMARKS
26. Shafts (2) and roller assemblies (4)	Install in blocks (3).	
27. Pin (7)	Install.	
28. Upper side roller assemblies (1) (67) (68) (70).	Install on outer mast without the shims	
29. Inner mast b.	a. Move over to one side of outer mast. Measure clearance between mast and rollers.	
30. Shim (67) (68) (70) clearance between inner mast and side rollers is .010 to .062 in. (0.25 to 1.57 mm).	Install behind upper side rollers (1) until	
The shims should be divided so there is an equal thickness on either side of the mast.	NOTE	

TA099182

End

FORK ASSEMBLY REMOVAL/INSTALLATION

(Sheet 1 of 4)

This task covers: Removal and installation of the fork assembly.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

None

Troubleshooting Reference

Equipment Condition

Engine off
Mast blocked

Special Tools

None

Personnel Required

One mechanic.

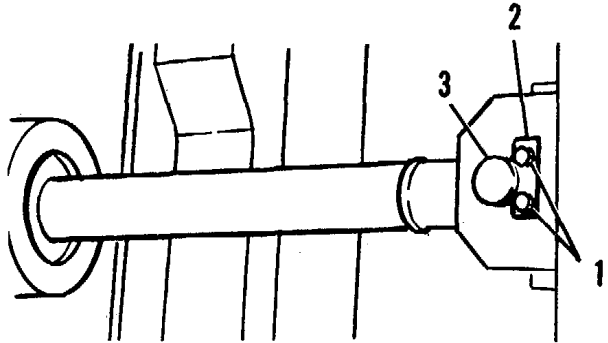
References

None

General Safety Instructions

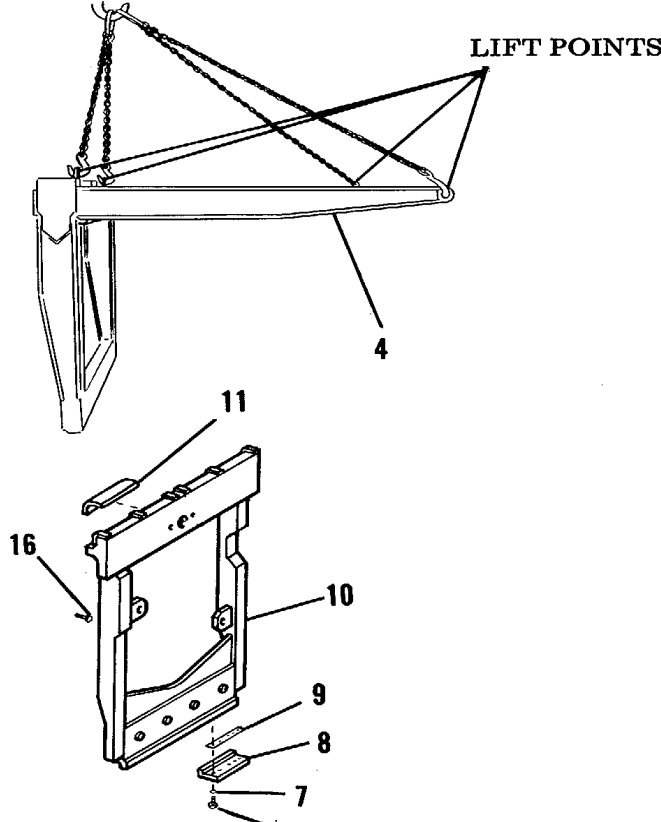
Do not stand under forks.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>1. Side shift cylinder</p> <p style="padding-left: 40px;">b.</p> <p style="padding-left: 40px;">c.</p> <p>Use a drift to push pins out. Never use your fingers.</p> <p style="padding-left: 40px;">d. Remove pin (3).</p>	<p>a. Remove capscrews (1) that secure rod end retainer plate (2).</p> <p>Remove retainer plate (2).</p> <p>Lash cylinder to carriage.</p> <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">WARNING</div>	

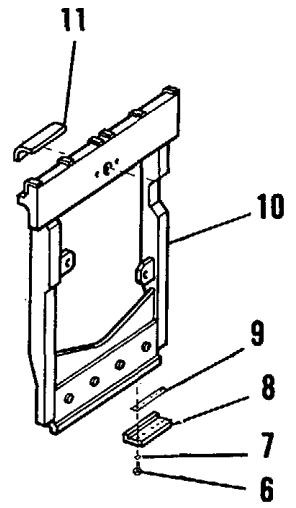
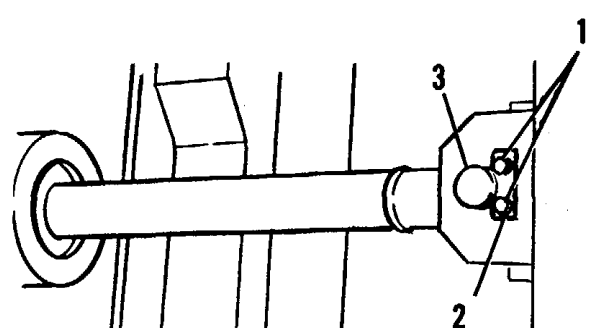
TA099183

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<p>2. Fork assembly (4)</p> <p>b.</p> <p>c.</p> <p>d.</p> <p>e.</p>	<p>a. Attach hoist at four lift points.</p> <p>Remove the five capscrews (6) and washers (7) that secure right and left bar assemblies (8) and shims (9).</p> <p>Remove each bar assembly and shim.</p> <p>Hoist fork assembly up and away from carriage tilt assembly (10).</p> <p>Remove "L" shaped plastic wear pads (11).</p>	 <p>The top diagram illustrates the fork assembly (4) being lifted by a hoist. Four chains are attached to the top of the fork assembly at points labeled 'LIFT POINTS'. The bottom diagram shows the carriage tilt assembly (10) with various components labeled: 11 (L-shaped plastic wear pads), 16 (right bar assembly), 9 (shims), 8 (left bar assembly), and 7 (capscrews and washers).</p>

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Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">INSTALLATION</div>		
<p>1. Five "L" shaped plastic wear pads (11)</p>	<p>Install on carriage tilt assembly (10).</p>	
<p>2. Fork assembly (4)</p> <p style="padding-left: 20px;">b.</p>	<p>a. Attach to hoist.</p> <p>b. Put into position on wear pads (11).</p>	
<p>3. Right and left bar assemblies (8) and shims (9)</p>	<p>Attach each to carriage tilt assembly (10), the five capscrews (6) and washers (7).</p>	
<p>4. Side shift cylinder</p> <p style="padding-left: 20px;">b.</p>	<p>a. Position rod end in fork assembly retainer and install pin (3).</p> <p>b. Install retainer plate (2).</p> <p>c. Install two capscrews (1).</p>	

TA099185

End

This task covers: Removal and installation of the carriage.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

None

Troubleshooting Reference

Equipment Condition

Fork assembly removed.
 Side shift cylinder removed.
 Side tilt cylinder removed.
 Shipping link installed.

Special Tools

None One mechanic.

Personnel Required

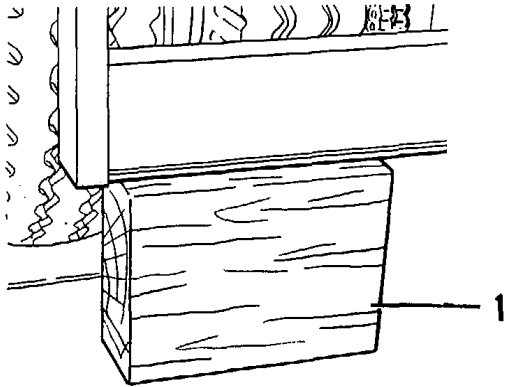
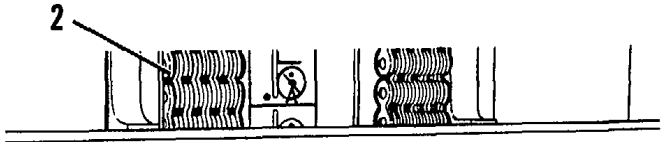
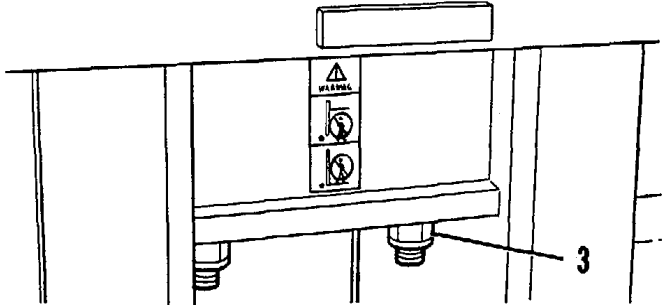
References

Fork Assembly Removal/Installation, page 7-87
 Side Shift Cylinder Removal/Installation,
 page 7-104.
 Side Tilt Cylinder Removal/Installation,
 page 7-101.

General Safety Instructions

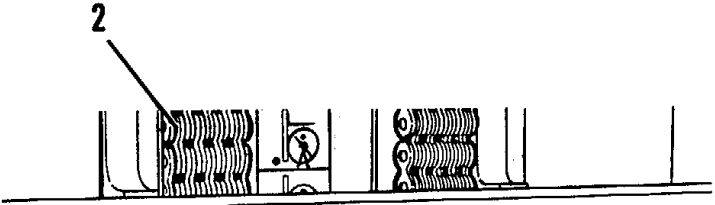
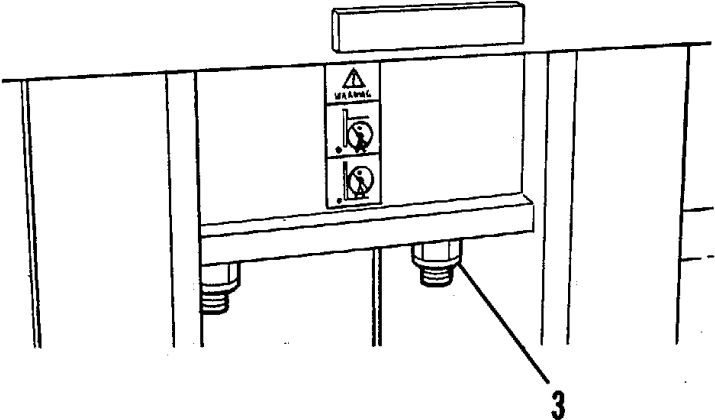
Tires blocked.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>REMOVAL</p>		
<p>1. Carriage assembly</p> <p>b.</p> <p>c.</p>	<p>a. Raise 1-2 feet.</p> <p>Position wood block (1) under each end.</p> <p>Lower onto blocks.</p>	
<p>2. Lift chains (2)</p> <p>b.</p>	<p>a. Remove two nuts (3) and washers.</p> <p>Separate from carriage assembly.</p>	
<p>3. Carriage assembly</p>	<p>Fasten securely to hoist.</p>	
<p>4. Mast Raise until carriage assembly can be removed.</p>		
<p>5. Carriage assembly</p>	<p>Remove.</p>	

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Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
<p>1. Carriage assembly</p> <p style="padding-left: 20px;">b. wood blocks).</p>	<p>a. Fasten securely to hoist.</p> <p>Put in position inside inner mast (and on</p>	
<p>2. MastLower over carriage.</p>		
<p>3. Lift chains (2) washers.</p>	<p>Attach to carriage with the two nuts and</p>	
<p>4. Wood blocks</p>	<p>Remove.</p>	

TA099187

End

This task covers: Disassembly and assembly of the carriage.

INITIAL SETUP

Test Equipment

None As required

Materials/Parts

Pages 2-28, 2-29

Troubleshooting Reference

Equipment Condition

Carriage assembly removed from mast.

Special Tools

None One mechanic.

Personnel Required

References

Carriage Removal/Installation, page 7-91.

General Safety Instructions

None

Go on to Sheet 2

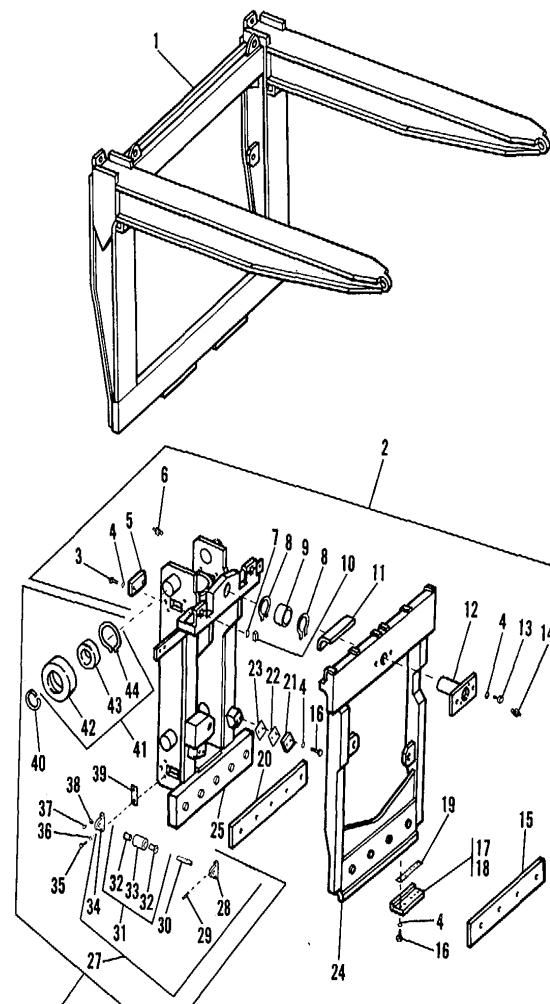
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
1. Bolts (16) and washers (4)	Remove.	
2. Bar (21) and shims (22) (23)	Remove from bracket assembly (25).	
3. Two capscrews (13)	Remove from shaft assembly (12).	
4. Shaft assembly (12), bearing (9) and rings (8)	Remove.	
5. Tilt assembly (24)	Remove.	
6. Wear plate (15)	Remove from tilt assembly (24).	
7. Wear plate (20)	Remove from bracket assembly (25).	

Go on to Sheet 3

CARRIAGE ASSEMBLY DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 3 of 7)

- | | |
|------------------------------|---------------------------|
| 1. Fork Assembly | 32. Roller Bearing |
| 2. Attachment Mounting Group | 33. Carriage Guide Roller |
| 3. Bolt 34. | Pillow Block |
| 4. Washer | 35. Capscrew |
| 5. Bar 36. | Lockwasher |
| 6. Fitting | 37. Fitting |
| 7. Shim | 38. Elbow |
| 8. Ring 39. | Shim |
| 9. Bearing | 40. Ring |
| 10. Bar 41. | Roller Assembly |
| 11. Slide Block | 42. Roller |
| 12. Shaft Assembly | 43. Ball Bearing |
| 13. Capscrew | 44. Ring |
| 14. Fitting | |
| 15. Plate | |
| 16. Bolt | |
| 17. Bar Assembly, LH | |
| 18. Bar Assembly, RH | |
| 19. Shim | |
| 20. Plate | |
| 21. Bar | |
| 22. Shim | |
| 23. Shim | |
| 24. Tilt Assembly | |
| 25. Roller Bracket Assembly | |
| 26. Carriage Mounting Group | |
| 27. Side Roller Assembly | |
| 28. Pillow Block | |
| 29. Spring Pin | |
| 30. Shaft | |
| 31. Roller Assembly | |



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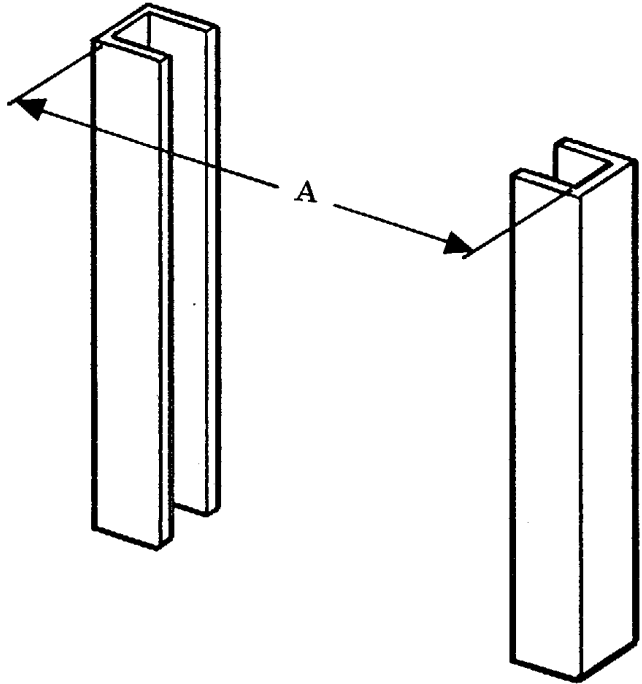
Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
8. Four guide roller assemblies (41) b. c. d.	a. Remove ring (40). Remove from bracket assembly (25). Remove ring (44). Press bearing (43) from each roller (42).	Use 7 in. (17.8 cm) diameter plate.
9. Capscrews (35) and lockwashers (36)	Remove.	
10. Four side roller assemblies (27) b. c. d. e.	a. Remove from bracket assembly (25). Remove fitting (37) and elbow (38) from shaft (30). Remove pillow block (34) and roller assembly (31) from shaft (30). If necessary, remove bearing (32) from roller (33). Remove pillow block (28) from shaft (30).	
11. Bars (5) and (10)	Remove from bracket assembly (25).	

Go on to Sheet 5

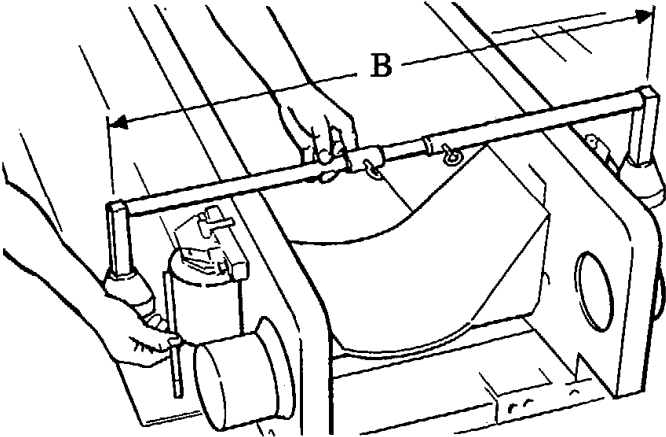
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>		
1. Bars (5) and (10)	Install on bracket assembly (25).	
2. Bearing (43)	Install in each roller (42).	
3. Ring (44)	Install in each roller assembly (41).	
4. Four roller assemblies (41)	Install on bracket assembly (25).	
5. Ring (40)	Install in each roller assembly (41).	
6. Wear plate (20)	Install on bracket assembly (25).	
7. Bearing (32)	Install in each roller (33).	
8. Pillow block (28)	Install on each roller shaft (30).	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
9. Roller assembly (31) and pillow block (34)	Install on each roller shaft (30).	
10. Fitting (37) and elbow (34)	Install on each roller shaft (30).	
11. Capscrews (35) and lockwashers (36)	Install through pillow blocks (28) (34).	
12. Inner mast surface of side rails.	Measure narrowest distance (A) between inside	

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Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
<p>13. Side roller assemblies (27)</p> <p>b.</p> <p>c.</p>	<p>a. Install without shims on inner mast.</p> <p>Measure distance (B) between outside surface of each pair of side rollers.</p> <p>Subtract distance B from A.</p>	
<p>14. Shims (39) B minus A is between .010 to .059 in. (0.25 to 1.50 mm).</p> <p>NOTE</p> <p>Divide shims so that an equal thickness is installed on each side of carriage.</p>	<p>Add under each pair of roller assemblies until</p>	

TA099190

End

SIDE TILT CYLINDER REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal and installation of side tilt cylinder.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

None

Troubleshooting Reference

Equipment Condition

Engine off
Shipping link installed
Mast lowered

Special Tools

None One mechanic

Personnel Required

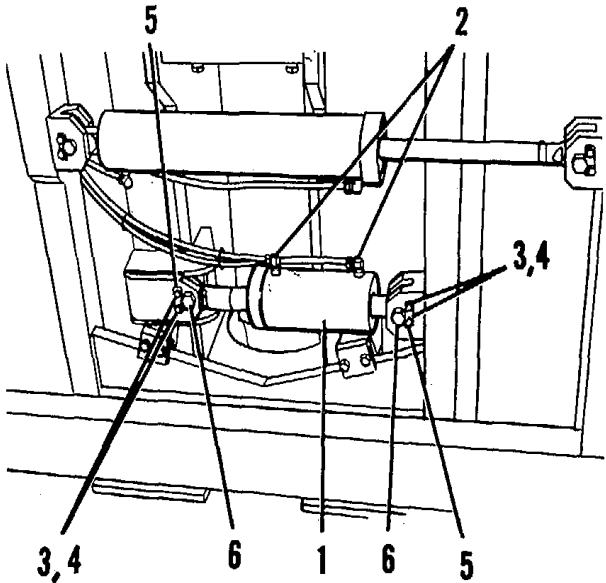
References

Shipping Link Removal/Installation,

General Safety Instructions

Tires blocked.
TM 10-3930-641-20.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1. Side tilt cylinder (1)	a. Fully retract rod.	
b.	Fasten to hoist.	
2. Two hydraulic lines (2)	a. Tag and disconnect.	
b.	Cap open ends.	
3. Two capscrews (3) and washers (4) that secure each retainer (5)	Remove.	
<p style="text-align: center;">Use proper tools, never use fingers to push pins out.</p>	<div style="border: 1px solid black; padding: 5px; display: inline-block;">WARNING</div>	
4. Pins (6)	Remove.	

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Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>	NOTE	
<p>The rod end of the tilt cylinder attaches to the carriage bracket assembly. The barrel end attaches to the carriage tilt assembly.</p>		
<p>1. Side tilt cylinder (1)</p> <p style="padding-left: 40px;">b.</p>	<p>a. Fasten to hoist.</p> <p>b. Put in position.</p>	
<p>2. Two hydraulic lines (2)</p>	<p>Remove caps and connect.</p>	
<p>3. Pins (6)</p>	<p>Install.</p>	
<p>4. Capscrews (3), washers (4), and retainers (5)</p>	<p>Install.</p>	

End

SIDE SHIFT CYLINDER REMOVAL/INSTALLATION

(Sheet 1 of 3)

This task covers: Removal and installation of the side shift cylinder.

INITIAL SETUP

Test Equipment

None None

Materials/Parts

None

Troubleshooting Reference

Engine off
Shipping link installed
Mast lowered

Equipment Condition

Special Tools

None One mechanic.

Personnel Required

References

Shipping Link Removal/Installation,

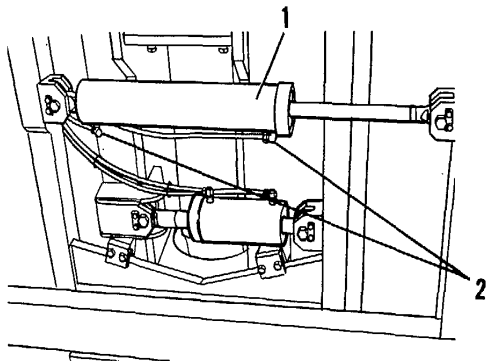
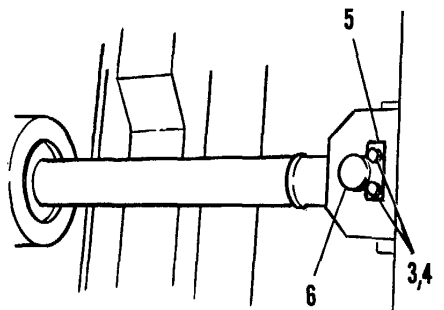
General Safety Instructions

Use proper tools, never use fingers to
TM 10-3930-641-20.

push pins out.

Tires blocked

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">REMOVAL</p> <p>1. Side shift cylinder (1)</p> <p style="padding-left: 20px;">b.</p> <p>2. Two hydraulic lines (2)</p> <p style="padding-left: 20px;">b.</p> <p>3. Two capscrews (3) and washers (4) that secure each retainer (5)</p> <p style="padding-left: 20px;">Use proper tools, never use fingers to push pins out.</p>	<p>a. Fully retract rod.</p> <p>b. Fasten to hoist.</p> <p>a. Tag and disconnect.</p> <p>b. Cap or plug open lines.</p> <p>Remove.</p> <p>WARNING </p>	 

LOCATION/ITEM	ACTION	REMARKS
4. Pins (6)	Remove.	
<p>INSTALLATION</p>	<p>NOTE</p>	
<p>The rod end of the shift cylinder attaches to the fork assembly. The barrel end attaches to the carriage tilt assembly.</p>		
1. Side shift cylinder (1) b.	a. Fasten to hoist. Put in position.	
2. Two hydraulic lines (2)	Remove caps and connect.	
3. Pins (6)	Install.	
4. Capscrews (3), washers (4), retainers (5)	Install.	

End

This task covers: The disassembly and assembly of the side shift and side tilt cylinders.

INITIAL SETUPTest Equipment

None None

Materials/Parts

Page 2-40

Troubleshooting ReferenceEquipment Condition

Side shift cylinder removed.
Side tilt cylinder removed.

Special Tools

None One mechanic.

Personnel RequiredReferences

Side Tilt Cylinder Removal/Installation, page 7-101.
Side Shift Cylinder Removal/Installation,
page 7-104.

General Safety Instructions

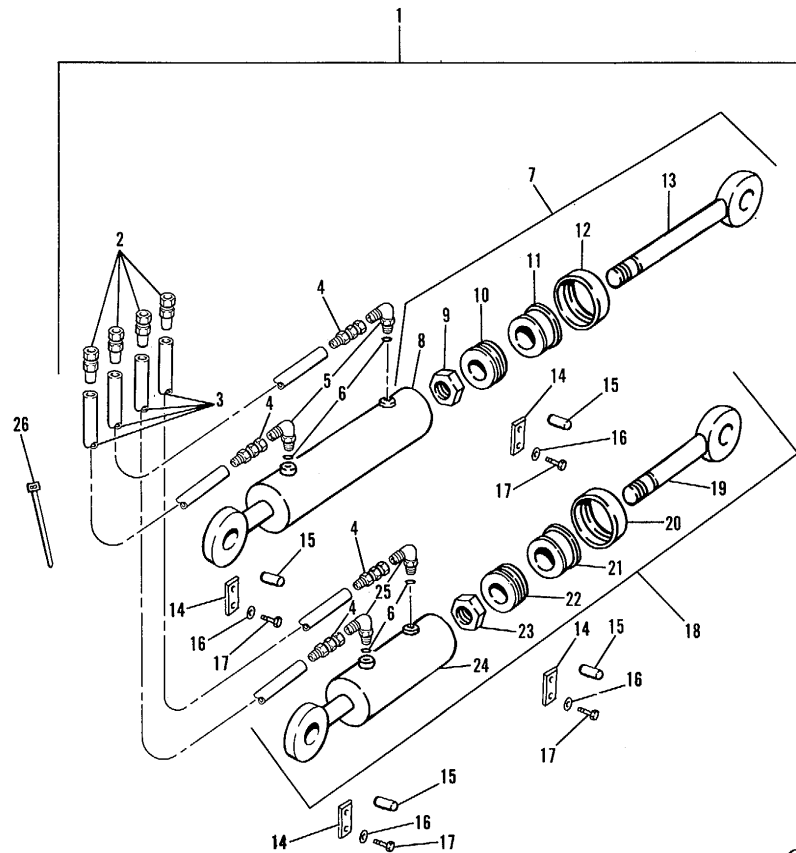
None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>DISASSEMBLY</p> <p>The following is disassembly/assembly of the side shift cylinder. This procedure is identical to that for the side tilt cylinder.</p>	<p>NOTE</p>	
<p>1. Side shift cylinder (7)</p> <p style="padding-left: 40px;">b.</p>	<p>a. Put in position on repair stand.</p> <p>Fully extend rod (13).</p>	
<p>2. Rod (13)</p> <p style="padding-left: 40px;">b.</p>	<p>a. Place support under rod.</p> <p>Secure rod to stand.</p>	
<p>3. Collar (12)</p>	<p>Remove.</p>	
<p>4. Rod (13)</p>	<p>Pull from barrel assembly (8).</p>	
<p>5. Nut (9) multiplier.</p>	<p>Remove from rod (13) using torque</p>	
<p>6. Piston (10), gland-(11)</p>	<p>Remove from rod (13).</p>	
<p>7. Elbows (5), preformed packings (6)</p>	<p>Remove from barrel assembly (8).</p>	

Go on to Sheet 3

1. Liner, attachment secondary
2. Coupling
3. Hose
4. Fitting
5. Elbow
6. Preformed packing
7. Cylinder group (side shift)
8. Barrel assembly
9. Nut
10. Piston
11. Gland
12. Collar
13. Rod
14. Retainer
15. Pin
16. Washer
17. Capscrew
18. Cylinder group (side tilt)
19. Rod assembly
20. Collar
21. Gland
22. Piston
23. Nut
24. Barrel assembly
25. Elbow
26. Tie



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Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>		
1. Elbows (5), preformed packings (6)	Install on barrel assembly (8).	
2. Collar (12), gland (11), piston (10)	Install on rod (13).	
3. Nut (9)	Install on rod.	
4. Rod (13) and attached parts	Install in barrel assembly (8).	
5. Collar (12) securely.	Thread onto barrel assembly (8) and tighten	

End

MAST HYDRAULIC LINES REMOVAL/INSTALLATION

This task covers: The removal and installation of the mast hydraulic lines.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Hydraulic lines disconnected and capped at side shift, side tilt and container lock cylinders.

Special Tools

None

Personnel Required

One mechanic.

References

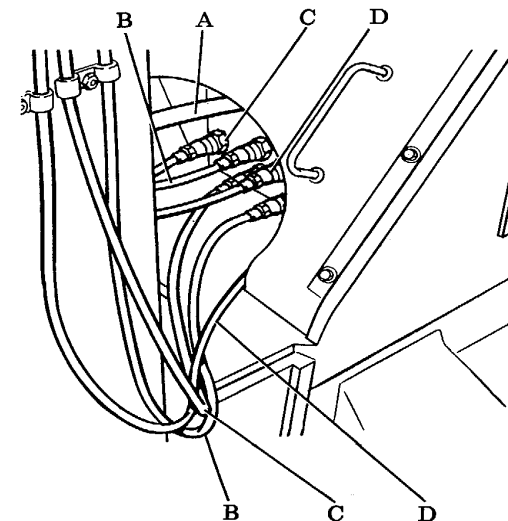
Side Shift Cylinder Removal/Installation
page 7-104.
Side Tilt Cylinder Removal/Installation,
page 7-101.
Container Cylinder, page 9-4

General Safety Instructions

None

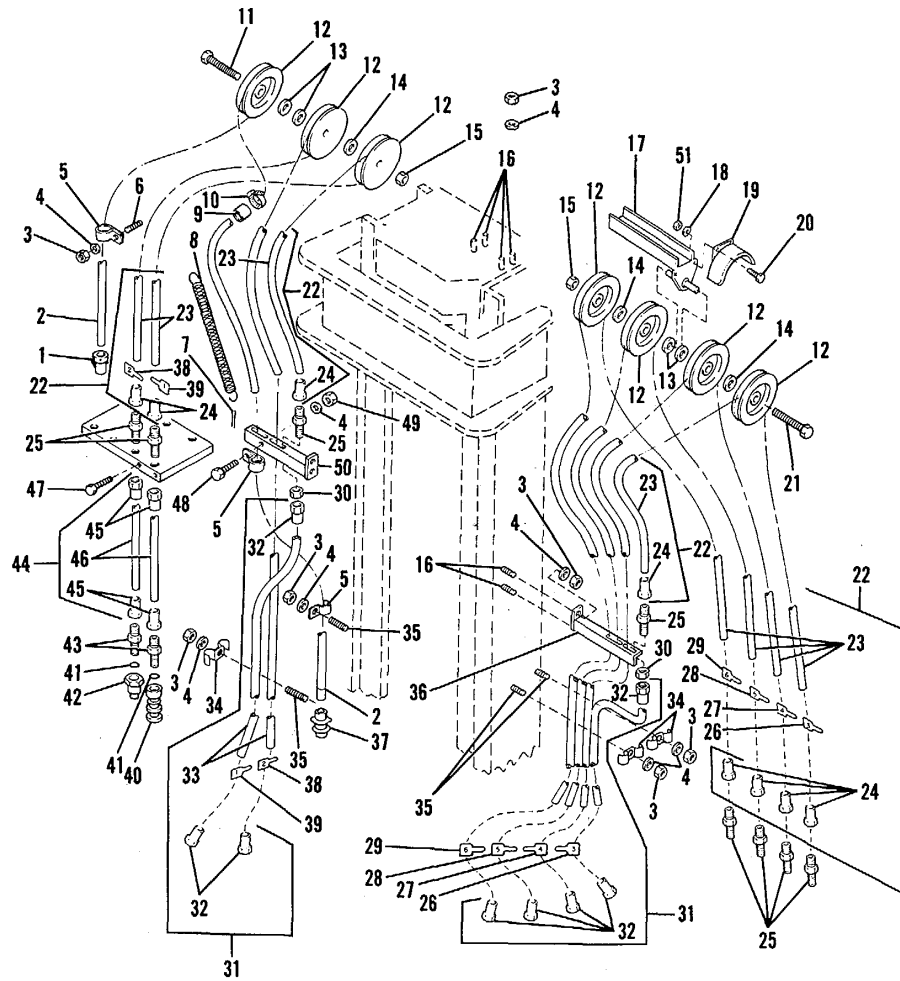
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1. Lift cylinder hydraulic line (A) at base of mast	Disconnect and cap.	
2. Side shift cylinder hydraulic lines at vehicle (B)	Disconnect and cap.	
3. Side tilt cylinder hydraulic lines at vehicle (C)	Disconnect and cap.	
4. Container lock cylinder hydraulic lines at vehicle (D)	Disconnect and cap.	
5. Eight nuts (3) and washers (4) that secure brackets (17)	Remove.	
6. Brackets (17)	Remove.	
7. Nuts (3) and washers (4) that secure brackets (36) (50) and clamps (5) (34)	Remove.	
8. Brackets (36) (50) and clamps (5) (34)	Remove.	



TA099194

Go on to Sheet 3



- Fitting
- Hose
- Nut 34.
- Washer
- Clamp
- Stud 37.
- Spring
- Spring
- Collar
- Clamp
- Bolt 42.
- Idler pulley
- Washer
- Spacer
- Nut 46.
- Stud 47.
- Bracket
- Washer
- Guard
- Bolt 51.
- Bolt
- Hose assembly
- Hose
- Coupling
- Union, bulkhead
- Tag
- Tag
- Tag
- Tag
- Locknut
- Hose assembly
- 32. Coupling
- 33. Hose
- Clamp
- 35. Stud
- 36. Bracket
- Plug
- 38. Tag
- 39. Tag
- 40. Fitting
- 41. Preformed packing
- Fitting
- 43. Fitting
- 44. Hose assembly
- 45. Coupling
- Hose
- Capscrew
- 48. Capscrew
- 49. Nut
- 50. Bracket
- Nut

LOCATION/ITEM	ACTION	REMARKS
9. Nut (49) and capscrew (48) that secure clamp (5)	Remove.	
10. Capscrews (20)	Remove.	
11. Guards (19)	Remove.	
12. Capscrews (21) (11) and nuts (15)	Remove.	
13. Pulleys (12) and spacers (14)	Remove.	
14. Hose assemblies (22) (31) (44)	Disassemble as necessary.	

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
1. Hose assemblies (22) (31) (44)	Assemble.	
2. Pulleys (12), spacers (14) and capscrews (11) (21)	Install on brackets (17).	
3. Nuts (15)	Install.	
4. Brackets (17) b.	a. Position on studs (16). Secure with washers (4) and nuts (3).	

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
5. Guards (19)	Install and secure with capscrews (20).	
6. Brackets (36) (50) and clamps (5) (34)	a. Insert hydraulic lines.	
b.	Secure to mast with nuts (3) and washers (4).	
7. Clamp (5)	a. Insert hydraulic line.	
b.	Secure to mast with capscrew (48) and nut (49).	
8. Container lock cylinder hydraulic lines (D)	Remove cap and connect.	

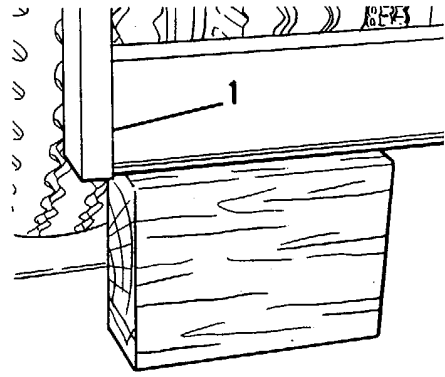
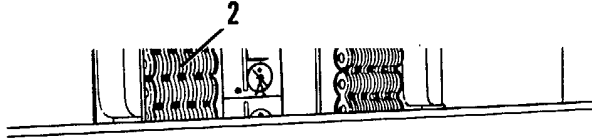
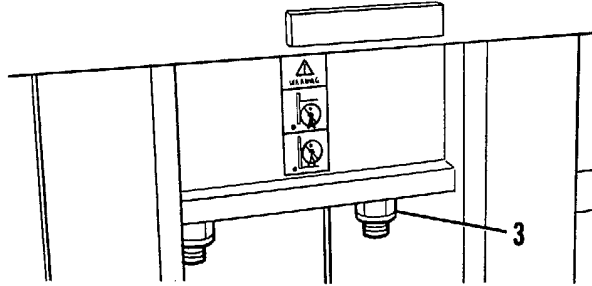
Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
9. Side tilt cylinder hydraulic lines (C)	Remove cap and connect.	
10. Side shift cylinder hydraulic lines (B)	Remove cap and connect.	
11. Lift cylinder hydraulic line (A) at base of mast	Remove cap and connect.	

End

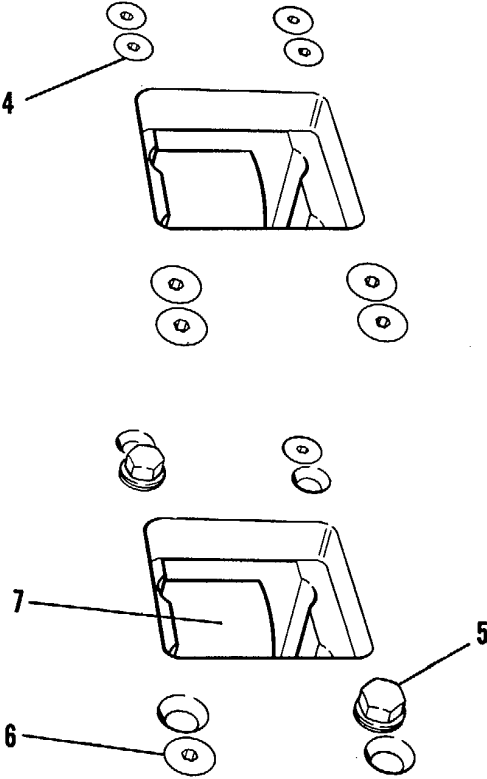
LOCATION/ITEM	ACTION	REMARKS
This task covers: Replacement of mast lift chains.		
<u>INITIAL SETUP</u>		
Test Equipment	<u>Materials/Parts</u>	<u>Troubleshooting Reference</u>
None None	None	
	<u>Equipment Condition</u>	
	Mast lowered.	
<u>Special Tools</u>	<u>Personnel Required</u>	
None Two mechanics		
<u>References</u>	<u>General Safety Instructions</u>	
None dropping.	Chains should be properly secured from	

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
<p>1. Carriage (1) end.</p> <p style="margin-left: 40px;">This is to relieve tension on both chains. Check by wiggling chains.</p>	<p>Lower until it rests on wood blocks at each end.</p> <p style="text-align: center;">NOTE</p>	
<p>2. Two nuts (3), spacers and washers</p>	<p>Remove.</p>	
<p>3. Chains (2)</p>	<p>Pull up to remove from carriage.</p>	
<p>4. Mast.</p> <p style="margin-left: 20px;">b.</p> <p style="margin-left: 20px;">c.</p>	<p>Raise approximately 6.0 in. (15.2 cm).</p> <p>Insert wood block to support inner mast.</p> <p>Lower mast.</p>	
		


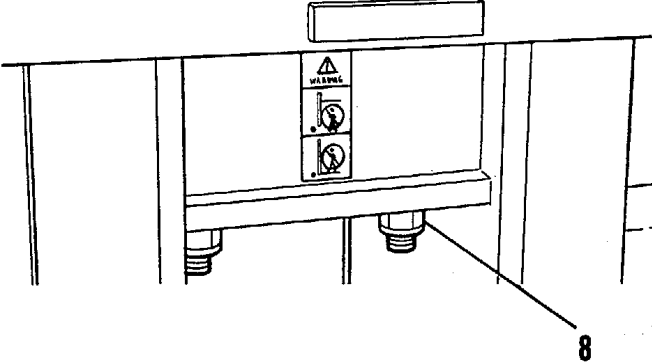
TA099196

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<p>The weight of the crosshead will not permit removal of all eight of the mounting capscrews at one time.</p> <p>5. Capscrews (4) of access hole.</p> <p>6. Two 3/4"-10 NC capscrews and washers (5)</p> <p>7. Capscrews (6)</p> <p>8. Capscrews and washers (5)</p> <p>9. Crosshead (7)</p>	<p>NOTE</p> <p>Remove six of eight, leaving one on each side</p> <p>Install.</p> <p>Remove.</p> <p>Remove.</p> <p>Lower with lift cylinder.</p>	

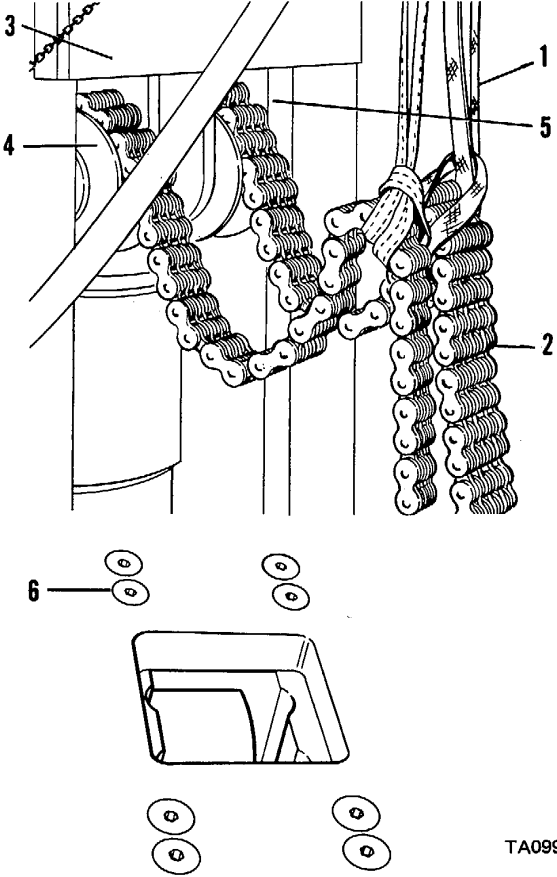
TA099197

Go on to Sheet 4

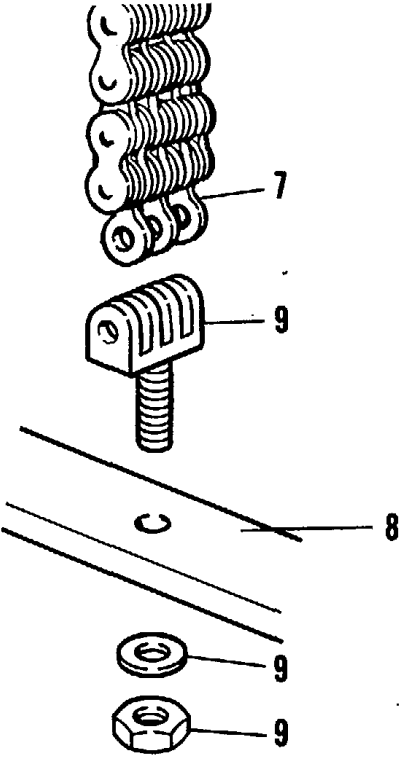
LOCATION/ITEM	ACTION	REMARKS
10. Lifting straps	Fasten to lift chains near top front of mast.	
11. Nuts (8)	Remove.	
Lift chain weighs 130 lb. (59 kg).	NOTE	
12. Lift chains	Remove.	

TA099198

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">INSTALLATION</div> <ol style="list-style-type: none"> 1. Lifting straps (1) 2. Lift chains (2) <ol style="list-style-type: none"> b. Put over sheaves (4) from front of mast. c. Insert chain ends (5) in mast. 3. Nuts Install on chain ends at mast. 4. Crosshead 5. Flat head screws (6) 	<p>Fasten to chains.</p> <ol style="list-style-type: none"> a. Lift up to crosshead (3) with a hoist. <p>Raise up to top of inner mast.</p> <p>Install in top of mast.</p>	 <p style="text-align: right;">TA099199</p>

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
6. Lift chains (7)	Install ends in carriage (8).	
7. Retainers, washers and nuts (9)	Install on chain ends.	
8. Carriage	Lift and remove wood blocks.	

TA099200

End

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM

This task covers: Tee test procedure for hydraulic system.

INITIAL SETUP

Test Equipment

Flow meter assembly equipped
with manual load valve
Tachometer drive

Materials/Parts

Hydraulic lines and fittings

Troubleshooting Reference

Page 2-36

Equipment Condition

Follow test procedure.

Special Tools

None Two mechanics

Personnel Required

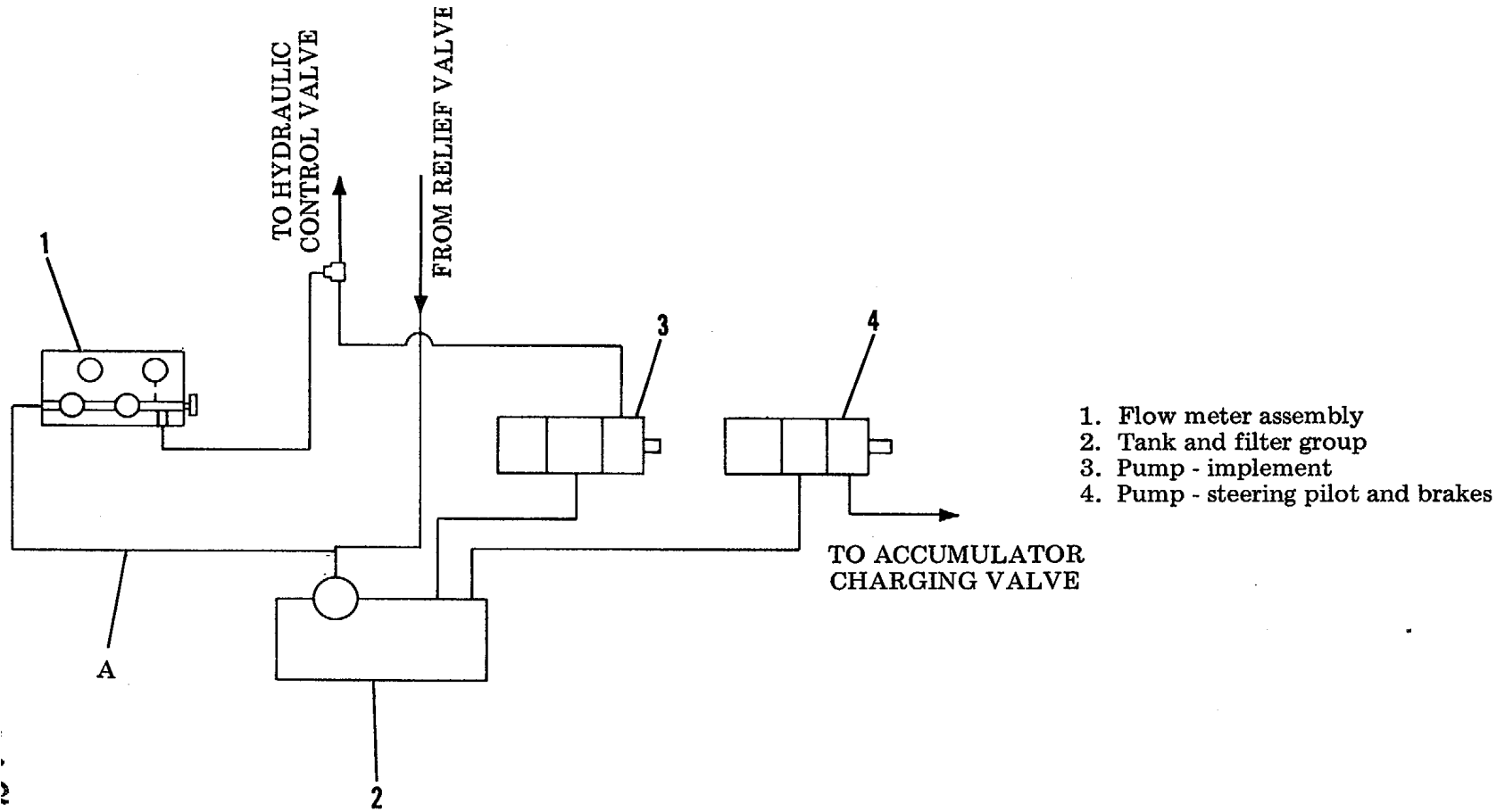
References

None

General Safety Instructions

Test equipment must be capable of
withstanding pressures higher than
3000 psi (20,700 kPa).

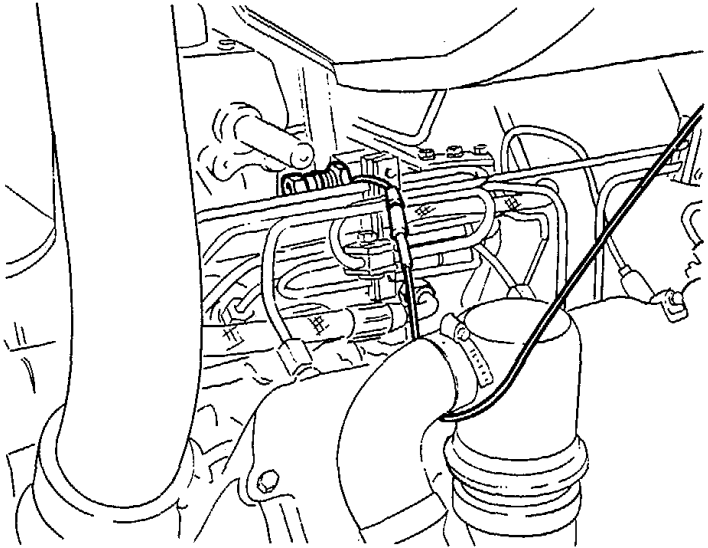
Go on to Sheet 2



SCHMATIC OF HYDRAULIC SYSTEM WITH FLOW METER INSTALLED

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">EQUIPMENT INSTALLATION</div>		
1. Engine	Stop.	
2. Hydraulic tank cap	Open to release pressure. Install.	
3. MastLift approximately 5 ft. Tilt all the way forward. Lower to ground.		
4. Pump suction line (A)	Remove plug for tee test and install adapter.	See diagram on sheet 2.
<p style="text-align: center;">WARNING</p> <p style="text-align: center;">Do not install adapter with engine running.</p>	<div style="border: 1px solid black; padding: 2px; display: inline-block; margin: 0 auto;">WARNING</div>	
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Install adapter as quickly as possible to prevent oil loss.</p>		
5. Return line assembly	Connect to return line (B).	See diagram on sheet 2.
6. Adapter and return line assembly	Connect to flow meter.	

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
7. Tachometer generator	Install. Use correct drive.	
8. Cable input connection for the tachometer, on the flow meter.	Install between tachometer generator and the flow meter.	
PREPARATION OF SYSTEM FOR TEST		
1. Manual load valve on the flow meter	Open all the way.	
2. Engine	Start.	
3. Lift control lever	Move to lower position.	

TA099202

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
4. Engine	Run at 2000 rpm.	
5. Manual load valve 1000 psi (703 kgs/sq. meter).	Close slowly until system pressure rises to	
6. Manual load valve close load valve slowly, until system pressure rises to 1500 psi (1054.5 kgs/sq. meter).	When oil temperature reaches 1000F (37.70C),	
7. Oil temperature cycle the mast through lift and tilt cycles until the system oil goes down to 150°F (660C).	close load valve slowly, until system pressure rises to 1500 psi (1054.5 kgs/sq. meter). When temperature reaches 1600F (710C),	

Go on to Sheet 6

CHART A

SYSTEM TEST 2000 RPM										
Test Name	Maximum Pressure Relief Valve Setting	System Oil Temperature (Start)	System Base Flow Rate	Lift LOWER Flow Rate	Lift RAISE Flow Rate	Tilt TILTBACK Flow Rate	Tilt FORWARD Flow Rate	System Oil Temperature (End)	Lift Circuit Drift Comparison	Tilt Circuit Drift Comparison
Test Number	1	2	3	4	5	6	7	8	9	10
Control Lever Position	Lift LOWER	Lift LOWER	Lift LOWER	Lift LOWER	Lift RAISE	Tilt TILTBACK	Tilt FORWARD	Lift RAISE	Lift 1. HOLD 2. RAISE	Tilt 1. HOLD 2. TILTBACK
Mast Position	Fully Lowered	Fully Lowered	Fully Lowered	Fully Lowered	Fully Raised	Full Tiltback	Full Forward	Forks Horizontal	Mast Level	Mast Level
Engine Speed	2000 RPM	Any Speed	2000 RPM	2000 RPM	2000 RPM	2000 RPM	2000 RPM	Any Speed	Low Idle or Stopped	Low Idle or Stopped
System Test Pressure	Maximum	0-100 PSI	100 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	0-100	0 PSI	0 PSI
Test Data	3000 <u>+50</u> PSI	150 <u>+5</u> °F	126 GPM	107 GPM	107 GPM	107 GPM	107 GPM	150 <u>+5</u> °F	<u>RAISE</u> Drift M S Than HOLD Drift Rate	<u>TILTBACK</u> M S Than HOLD Drift Rate
Flow Differential				(3-4) 19 GPM	(3-5) 19 GPM	(3-6) 19 GPM	(3-7) 19 GPM			
Percent Flow Loss				$\frac{(3-4) \times 100}{3}$ 15%	$\frac{(3-5) \times 100}{3}$ 15%	$\frac{(3-6) \times 100}{3}$ 15%	$\frac{(3-7) \times 100}{3}$ 15%			

SYSTEM TEST

Go on to Sheet 7

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT

SYSTEM TEST 700 RPM

CHART A-1

Test Name	Maximum Pressure Relief Valve Setting	System Oil Temperature (Start)	System Base Flow Rate	Lift LOWER Flow Rate	Lift RAISE Flow Rate	Tilt TILTBACK Flow Rate	Tilt FORWARD Flow Rate	System Oil Temperature (End)	Lift Circuit Drift Comparison	Tilt Circuit Drift Comparison
Test Number	1	2	3	4	5	6	7	8	9	10
Control Lever Position	Lift LOWER	Lift LOWER	Lift LOWER	Lift LOWER	Lift RAISE	Tilt TILTBACK	Tilt FORWARD	Lift RAISE	Lift 1. HOLD 2. RAISE	Tilt 1. HOLD 2. TILTBACK
Mast Position	Fully Lowered	Fully Lowered	Fully Lowered	Fully Lowered	Fully Raised	Full Tiltback	Full Forward	Forks Horizontal	Mast Level	Mast Level
Engine Speed	700 RPM	Any Speed	700 RPM	700 RPM	700 RPM	700 RPM	700 RPM	Any Speed	Low Idle or Stopped	Low Idle or Stopped
System Test Pressure	Maximum	0-100 PSI	100 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	0-100	0 PSI	0 PSI
Test Data	<u>2600</u> +200 PSI	<u>150</u> +5 °F	<u>42</u> GPM	<u>22</u> GPM	<u>22</u> GPM	<u>22</u> GPM	<u>22</u> GPM	<u>150</u> +5 °F	<u>RAISE DRIFT</u> M S Than HOLD Drift Rate	<u>RAISE DRIFT</u> M S Than HOLD Drift Rate
Flow Differential				(3-4) <u>20</u> GPM	(3-5) <u>20</u> GPM	(3-6) <u>20</u> GPM	(3-7) <u>20</u> GPM			
Percent Flow Loss				$\frac{(3-4) \times 100}{3}$ ____%	$\frac{(3-5) \times 100}{3}$ ____%	$\frac{(3-6) \times 100}{3}$ ____%	$\frac{(3-7) \times 100}{3}$ ____%			

NOTE: Flow differential on gear pump is normally higher at low pump speed. Test data readings shown are minimum expected on worn system.

SYSTEM TEST

Go on to Sheet 8

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">SYSTEM TEST</div> <p>These tests must be done in two steps: one time at 2000 rpm (Chart A) and once at 700 rpm (Chart A-1).</p> <p>Best test results happen when system oil temperature is 1450F to 1550F (630C to 690C).</p> <p><u>TEST 1</u></p> <p>MAXIMUM PRESSURE RELIEF VALVE SETTING</p> <ol style="list-style-type: none"> 1. Manual load valve 2. Lift control lever 3. Engine 4. Manual load valve 5. System pressure be approximately 3000 psi (2109 kgs/sq. meter). 	<p style="text-align: center;">NOTE</p> <ol style="list-style-type: none"> 1. Open all the way. 2. Put in lower position. 3. Run at 2000 (700) rpm. 4. Close slowly until oil flow through meter stops. 5. Record. Relief valve maximum pressure must be approximately 3000 psi (2109 kgs/sq. meter). 	<p>To change relief valve setting, see TM 10-3930-641-20.</p> <p style="text-align: right; margin-top: 100px;">Go on to Sheet 9</p>

LOCATION/ITEM	ACTION	REMARKS
<p>Open load valve slowly before control lever is moved to HOLD, to prevent damage to the equipment. <u>TEST 2</u> SYSTEM OIL TEMPERATURE</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">CAUTION</div>	
<p>1. Manual load valve</p> <p>2. Lift control lever</p> <p>3. Oil temperature</p>	<p>Open all the way.</p> <p>Put in LOWER position.</p> <p>Record.</p>	
<p><u>TEST 3</u> SYSTEM BASE FLOW RATE</p> <p>1. Manual load valve</p> <p>2. Lift control lever</p> <p>3. Engine</p>	<p>Open all the way.</p> <p>Put in LOWER position.</p> <p>Run at 2000 (700) rpm.</p>	

Go on to Sheet 10

LOCATION/ITEM	ACTION	REMARKS
4. Oil pressure meter).	Must be down to at least 100 psi (70.3 kgs/sq.	
5. Oil flow rate (gpm)	Record.	
NOTE		
<p>The base flow rate of the system must be the same as the low pressure flow of the hydraulic pump. Because there will be minimum leakage in the control valves, lines and cylinder packings at 100 psi (70.3 kgs/sq. meter), the base flow rate can be used to find the flow differential (flow loss) in Tests 4 through 7.</p>		
<p>Keep system constant under each test condition.</p>		
<p><u>TESTS 4 THRU 7</u></p>		
<p>LEAKAGE RATES</p>		
1. Control levers	Operate in each position.	
2. Engine	Run at 2000 (700) rpm.	
3. Manual control valve kgs/sq. meter).	Close until system pressure is 1000 psi (703	
4. Oil flow rate	Record for each test.	

Go on to Sheet 11

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;">TEST 8 TEMPERATURE</p> <p>1. Manual load valve</p> <p>2. Lift control lever</p> <p>3. Oil temperature</p>	<p style="text-align: center;">NOTE</p> <p>The flow differential for each test (4 through 7) is found by subtracting the flow rate for each test from the base flow rate (Test 3). The percent of flow loss for each test (4 through 7) is found by dividing the flow differential for each test by the base flow rate (Test 3) and multiplying by 100.</p> <p>Open all the way.</p> <p>Put in RAISE position.</p> <p>Record.</p> <p style="text-align: center;">NOTE</p> <p>Make a comparison of the oil temperatures from Tests 2 and 8. Test 2 must be 1450 to 1550F (710C to 660C) and Test 8 must be within 100F (12.20C) of Test 2. For each 100F higher difference (Test 8 higher than Test 2), subtract .5 gallon per pump cartridge from the leakage rate. For each 10°F (12.20C) lower difference, add .5 gallon per pump cartridge to the leakage rate.</p>	

Go on to Sheet 12

TEE TEST PROCEDURE FOR DYDRAULIC SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
<u>TEST 9</u>		
VISUAL DRIFT TEST - LIFT CIRCUIT		
1. Fork assembly	Raise bottom of assembly 5 ft. off ground.	
2. Lift control lever	Place in HOLD position.	
3. Manual load valve	Open all the way.	
4. Engine	Stop.	
5. Mast	Watch for downward drift.	
6. Lift control lever	Place in RAISE position.	
7. Mast	Watch for downward drift.	
NOTE		
<p>If the drift in the RAISE position is more than the drift in the HOLD position circle the "M" in the Test Data Box. If the drift in the RAISE position is the same or less than in the HOLD position circle the "S" in the Test Data Box.</p>		
7-135		

Go on to Sheet 13

LOCATION/ITEM	ACTION	REMARKS
<u>TEST 10</u>		
VISUAL DRIFT TEST - TILT CIRCUIT		
1. Fork assembly	Raise bottom of assembly 6 ft. off ground.	
2. Mast	Tilt back all the way.	
3. Tilt lever	Place in HOLD position.	
4. Manual load valve	Open all the way.	
5. Engine	Stop.	
6. Mast	Watch for forward drift.	
7. Tilt lever	Put in TILTBACK position.	
8. Mast	Watch for forward drift.	
<p>NOTE</p> <p>If the drift in the TILTBACK position is more than the drift in the HOLD position circle the "M" in the Test Data Box. If the drift in the TILTBACK position is the same or less than in the HOLD position circle the "S" in the Test Data Box.</p>		

Go on to Sheet 14

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content;">PUMP TESTS</div>	<p style="text-align: center;">NOTE</p> <p>Make a comparison of the test data on Charts A and A-1. The percent of flow loss on Chart A-1 is the maximum for best performance.</p> <p>Components that are worn, or do not work correctly, are found by their flow differential (loss) and percent of flow loss or lower system efficiency. System values for new and rebuilt machines must not be more than shown in the system tests shown on Charts A and A-1.</p> <p>If the flow loss is acceptable in one or more circuits, the tests for the pump and/or the blocked cylinders must be done.</p> <p>These tests are used to find the efficiency of the hydraulic pump. Install a Blocking Plate Assembly in the pressure line from the hydraulic pump. This prevents the oil from going through the system. All of the pump flow now goes through the flow meter.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">WARNING</div> <p>Open the load valve on the flow meter fully before engine is started. The main relief valve is not a part of the circuit for the pump test. If the pressure gets too high, it is possible to cause injury to personnel or damage to equipment.</p>	

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

CHART B

Test Name	Full Speed Pump Flow		Half Speed Pump Flow		Pump Test For Aeration And/Or Cavitation							
	Low Pressure	High Pressure	Low Pressure	High Pressure	Varied Speeds — Constant Pressure							
Test Number	11	12	13	14	15	16	17	18	19	20	21	22
Engine Speed	2000 RPM	2000 RPM	1000 RPM	1000 RPM	600 RPM	800 RPM	1000 RPM	1200 RPM	1400 RPM	1600 RPM	1800 RPM	2000 RPM
Pump Test Pressure	100 PSI	1000 PSI	100 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI
Oil Temperature	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F	150 ±5 °F
Test Data	126 GPM	113 GPM	63 GPM	48 GPM	22 GPM	35 GPM	48 GPM	61 GPM	74 GPM	87 GPM	100 GPM	113 GPM
Flow Differential		13* GPM		15* GPM	13 GPM	13 GPM	13 GPM	13 GPM	13 GPM	13 GPM	13 GPM	
Percent Flow Loss		10%										

*Flow differential for Test 14 is normally more than the flow differential for Test 12 on gear type pump.

PUMP TEST

Go on to Sheet 16

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">PUMP TEST</div>		
<u>TEST 11</u>		
PUMP FLOW AT LOW PRESSURE		
1. Manual load valve	Open all the way.	
2. Engine	Start and run at 2000 rpm.	
3. Manual load valve	Close slowly to get 100 psi (70.3 kgs/sq. meter) system pressure.	
4. Oil temperature	Record.	
5. Flow rate (gpm)	Record.	
<u>TEST 12</u>		
PUMP FLOW AT HIGH PRESSURE		
1. Engine	Run at 2000 rpm.	
2. Manual load valve	Close slowly until you get 1000 psi (703 kgs/sq. meter) system pressure.	

Go on to Sheet 17

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
3. Oil temperature	Record.	
4. Flow rate (gpm)	Record.	
<u>TEST 13</u>		
PUMP FLOW AT LOW PRESSURE		
1. Engine	Run at 1000 rpm.	
2. Manual load valve	Open slowly until you get 100 psi (70.3 kgs/sq. meter).	
3. Oil temperature	Record.	
4. Flow rate (gpm)	Record.	
<u>TEST 14</u>		
PUMP FLOW AT HIGHI PRESSURE		
1. Engine	Run at 1000 rpm.	
2. Manual load valve	Close slowly to get 1000 psi (703 kgs/sq. meter).	
3. Oil temperature	Record.	

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p>3. Manual load valve</p>	<p>Close valve slowly until you get 1000 psi (703 kgs/sq. meter).</p> <p style="text-align: center;">NOTE</p> <p>At each rpm change you will need to adjust the manual control valve.</p>	
<p>4. Oil temperature</p>	<p>Record.</p>	
<p>5. Flow rate (gpm)</p>	<p>Record.</p> <p style="text-align: center;">CAUTION</p> <p>Immediately after the engine is stopped, remove the Blocking Plate Assembly from the pressure line for the pump to prevent any possible damage later.</p> <p style="text-align: center;">7-142</p>	

Go on to Sheet 20

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

(Sheet 20 of 27)

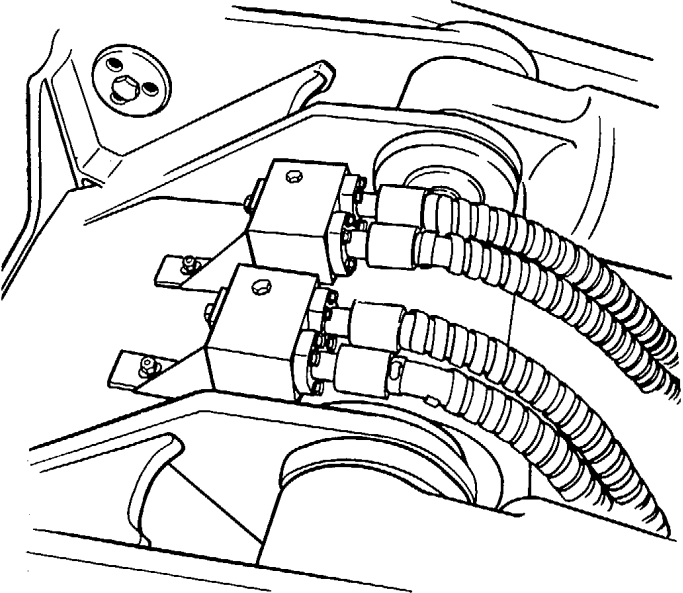
CHART C

All Cylinders Blocked							Right Cylinder Blocked			
Test Name	System Oil Temperature (Start)	Lift LOWER Flow Rate	Lift RAISE Flow Rate	Tilt TILTBACK Flow Rate	Tilt FORWARD Flow Rate	Auxiliary Circuits	System Oil Temperature (End)	System Oil Temperature (Start)	Tilt TILTBACK Flow Rate	System Oil Temperature (End)
Test Number	23	24	25	26	27	28	29	30	31	32
Control Lever Position	Lift LOWER	Lift LOWER	Lift RAISE	Tilt TILTBACK	Tilt FORWARD	All Movements	Lift LOWER	Lift LOWER	Tilt TILTBACK	Lift LOWER
Engine Speed	Any Speed	2000 RPM	2000 RPM	2000 RPM	2000 RPM	2000 RPM	Any Speed	Any Speed	2000 RPM	Any Speed
System Test Pressure	0-100 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	1000 PSI	0-100 PSI	0-100 PSI	1000 PSI	0-100 PSI
Test Data	150 +5 °F	108 GPM	108 GPM	108 GPM	108 GPM	108 GPM	150 +5 °F	150 ±5 °F	107-108 GPM	150 ±5 °F
Cylinder Leakage Rate		1.0 GPM	1.0 GPM	1.0 GPM	1.0 GPM	1.0 GPM		Right Cylinder Leakage	0-1.0 GPM	
Control Valve Group Leakage		5.0 GPM	5.0 GPM	5.0 GPM	5.0 GPM	5.0 GPM		Left Cylinder Leakage	1.0-0 GPM	

BLOCKED CYLINDERS TEST

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

(Sheet 21 of 27)

LOCATION/ITEM	ACTION	REMARKS
<p>BLOCKED CYLINDERS TESTS</p> <p>TEST 23</p> <ol style="list-style-type: none"> 1. Control levers 2. Manual load valve 	<p style="text-align: center;">NOTE</p> <p>If the System Tests and Pump Test give an indication of leakage in the control valves and/or cylinders that is not acceptable, do the Blocked Cylinder Tests.</p> <p>Blocking Plate Assemblies can be put in each of the cylinder lines. For best accuracy, do these tests with the oil temperature approximately 1500F (660C) (near the oil temperature for the System Tests and Pump Test).</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p style="text-align: center;">WARNING</p> </div> <p>Lower all implements to the ground. Move the control levers through OPERATE and HOLD positions to release any pressure oil in the cylinder lines. All pressure in the lines must be released or injury to personnel and damage to equipment can result when the lines are loosened to install or remove the plate assemblies. The implements can move and pressure oil can be released.</p> <ol style="list-style-type: none"> Put in HOLD position. Open all the way. 	 <p style="text-align: right;">Go on to Sheet 22</p>

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
3. Engine	Start and run at any rpm.	
4. Control lever	Put in LOWER position.	
5. Oil temperature	Record.	
<p><u>TESTS 24 TIHRU 28</u></p> <p>LEAKAGE RATES</p>	<p>NOTE</p> <p>All these tests are the same except for the position of the control levers. Run these tests following the same procedure for each of the control lever positions.</p>	
1. Cylinder lines	Block as needed.	
2. Manual load valve	Open all the way.	
3. Control lever	Move to position.	
4. Engine	Run at 2000 rpm.	
5. Manual load valve	Slowly close to get 1000 psi (703 kgs/sq. meter).	
6. Flow rate (gpm)	Record for each test.	
	7-145	

Go on to Sheet 23

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;"><u>TEST 29</u></p> <p style="text-align: center;">TEMPERATURE</p> <p>1. Forks</p> <p>2. Engine</p> <p>3. Manual load valve</p> <p>4. Oil temperature</p>	<p>Lower.</p> <p>Run at any rpm.</p> <p>Open until you get 100 psi (70.3 kgs/sq. meter) to 0 psi pressure.</p> <p>Record.</p> <p style="text-align: center;">NOTE</p> <p>Find the leakage rate of the cylinders and the leakage rate of the control valves. Use the test information from the System Tests, Pump Test and Blocked Cylinder Tests.</p> <p>Example: Find the leakage rates of the lift circuit in the LOWER position.</p> <p>Test 12: flow rate of the pump only.</p> <p>Test 24: flow rate of pump and control valves.</p> <p>Test 4: flow rate of pump, control valve and cylinders.</p>	

Go on to Sheet 24

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
	<p>The system components tested in Tests 12 and 24 are the same except for the control valves. So the difference in flow rates must be the leakage in the control valves in the circuit. Subtract the test information for Test 24 from the test information for Test 12.</p> <p>The system components tested in Tests 24 and 4 are the same except for the cylinders. So the difference in flow rates must be the leakage in the cylinders in the circuit. Subtract the test information for Test 4 from the test information for Test 24.</p> <p>Compare the test data with the data on Chart C for the specific test. The information on Chart C is the maximum for best performance.</p> <p style="text-align: center;">NOTE</p> <p>Right Side Cylinders Blocked</p> <p>If the Blocked Cylinder tests give an indication of leakage that is too high in one or more of the cylinders, do the Blocked Cylinder Tests for the Right Side. For best accuracy, operate all controls through several cycles to get the temperature of the oil in the cylinders the same as the temperature of the oil in the hydraulic tank. Make the temperature of the complete system 1500F (660C).</p> <p>Lower all implements to the ground. Stop the engine. Move the control levers through OPERATE and HOLD positions to release any</p>	

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

(Sheet 25 of 27)

LOCATION/ITEM	ACTION	REMARKS
<p style="text-align: center;"><u>TEST 30</u></p> <p style="text-align: center;">TEMPERATURE</p> <p>1. Manual load valve</p> <p>2. Engine</p> <p>3. Control lever</p> <p>4. Oil temperature</p>	<p>oil pressure. Put the control levers in HOLD position. Open the filler cap for the hydraulic tank to release any tank pressure and close the cap. Use the Blocking Plate Assemblies, to block the head end of the right tilt cylinder and the rod end of each auxiliary cylinder as needed.</p> <p>Open fully.</p> <p>Start and run at any rpm.</p> <p>Move to LOWER position.</p> <p>Record.</p>	
<p style="text-align: center;"><u>TEST 31</u></p> <p style="text-align: center;">TILT TILTBACK FLOW RATE</p> <p>1. Control lever</p> <p>2. Engine</p>	<p>Move to TILTBACK position</p> <p>Run at 2000 rpm.</p>	<p style="text-align: right;">Go on to Sheet 26</p>

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
3. Manual control valve	Close slowly until you get 1000 psi (703 kgs/sq. meter).	
4. Flow rate (gpm)	Record.	
<u>TEST 32</u>		
TEMPERATURE		
1. Manual load valve	Open fully.	
2. Engine	Run at any rpm.	
3. Control lever	Move to LOWER position.	
4. Oil temperature	Record.	
<div style="border: 1px solid black; display: inline-block; padding: 2px 10px;">WARNING</div>		
<p>All pressure in the lines must be released or injury to personnel and damage to equipment can result when the lines are loosened to install or remove plate assemblies. The implements can move and pressure oil can be released.</p>		
<p>7-149</p>		

Go on to Sheet 27

TEE TEST PROCEDURE FOR HYDRAULIC SYSTEM (CONT)

LOCATION/ITEM	ACTION	REMARKS
	<p style="text-align: center;">NOTE</p> <p>Find the leakage rates for the right and left cylinders. Use the test information from System Test, Pump Test and Blocked Cylinder Tests.</p> <p>Example: Find the leakage rate for the lift cylinders.</p> <p>Test 24: flow rate of pump and control valves.</p> <p>Test 31: flow rate of pump, control valves, and left side cylinder.</p> <p>Test 4: flow rate of pump, control valves, and both cylinders.</p> <p>The system components tested in Tests 24 and 81 are the same except for the left side cylinder. So the difference in flow rates must be the leakage in the left side cylinder. Subtract the test information for Test 31, from the test information for Test 24.</p> <p>The system components tested in Tests 31 and 4 are the same except for the right side cylinder. So the difference in flow rates must be the leakage in the right side cylinder. Subtract the test information for Test 4 from the test information for Test 31. Make a comparison of the test values with the values on Chart C.</p>	<p style="text-align: right;">End</p>

CHAPTER 8

BODY AND CAB MAINTENANCE INSTRUCTIONS

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Rear Bumper Removal/Installation.....	8-42
Fuel Tank Removal/Installation	8-48
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Section I. CAB AND ROLLOVER PROTECTIVE STRUCTURE (ROPS)

CAB AND ROPS MAINTENANCE INSTRUCTIONS

This section covers maintenance of these components for direct support and general support maintenance personnel:

- a. Cab
 - b. ROPS
-

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Cab removal/installation.	8-3	None
2	Rollover protective structure removal/installation	8-11	None

CAB REMOVAL/INSTALLATION

(Sheet 1 of 8)

This task covers: Removing and installing the cab.

INITIAL SETUP

Test Equipment

None

Materials/Parts

Tags and wires

Troubleshooting Reference

None

Equipment Condition

Engine off.

Shipping link installed.

Special Tools

None

Personnel Required

Two mechanics

References

ROPS Removal/Installation, page 8-11
 Shipping Link Removal/Installation,
 TM 10-3930-641-20.
 Seat Removal/Installation, TM 10-
 3930-641-20
 Windshield Wiper Removal/Installation,
 TM 10-3930-641-20

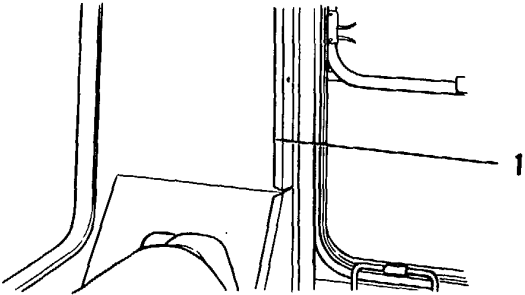
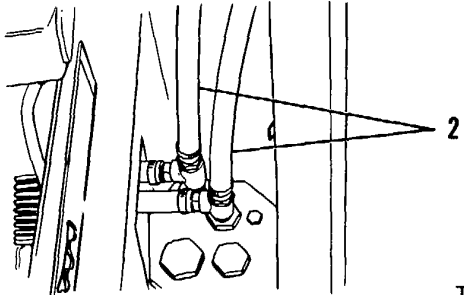
General Safety Instructions

Tires blocked.

Go on to Sheet 2

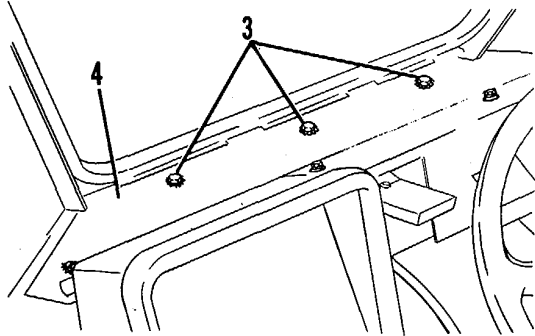
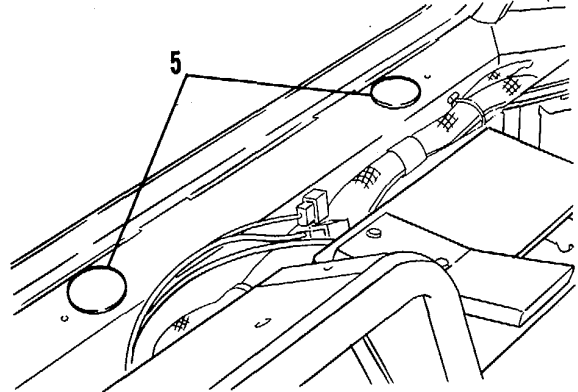
CAB REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 8)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">REMOVAL</div> <ol style="list-style-type: none"> <li>1. Roll-over protection structure <li>2. Heater lines 	<p>Remove ROPS.</p> <ol style="list-style-type: none"> <li>a. Remove upper panel (1) inside cab and panel below it. <li>b. Disconnect and tag heater lines (2). 	<p>See page 8-11.</p>   <p>TA099205</p> <p>Go on to Sheet 3</p>

CAB REMOVAL/INSTALLATION (CONT)

(Sheet 3 of 8)

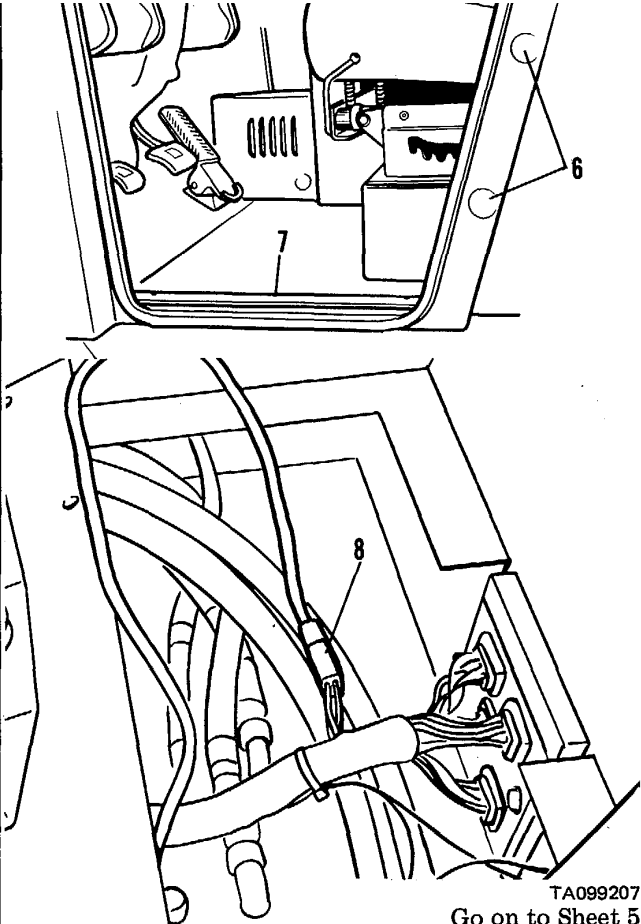
LOCATION/ITEM	ACTION	REMARKS
3. Capscrews	<p>a. Remove capscrews (3) and panel (4).</p> <p>b. Remove 12 caps (5) from around ledges of cab.</p> <p>c. Remove capscrews, nuts, and washers that are under the caps.</p> <p>d. Open window on right side of cab and remove cap.</p> <p>e. Remove capscrew, nut, and washer from under cap.</p> <p>f. Open cab door and remove two caps (6).</p> <p>g. Remove capscrews from underneath caps.</p>	 

TA099206

Go on to Sheet 4


CAB REMOVAL/INSTALLATION (CONT)

(Sheet 4 of 8)

LOCATION/ITEM	ACTION	REMARKS
3. Capscrews (cont)	<p>h. Remove three capscrews and cover (7).</p> <p>i. Remove capscrews and washers from underneath cover (7).</p> <p>j. Remove capscrews that hold seat down. Move seat forward. Find the wiring harness underneath the seat. Disconnect harness at connector (8). (Refer to TM 10-3930-641-20 for seat removal.)</p>	 <p>TA099207 Go on to Sheet 5</p>
4. Front windshield wiper	<p>Remove wiper arm and blade. (See TM 10-3930-641-20.)</p>	
5. Cab	<p>a. Install four 1/2-13NC forged eyebolts on top of cab.</p>	

CAB REMOVAL/INSTALLATION (CONT)

(Sheet 5 of 8)

LOCATION/ITEM	ACTION	REMARKS
<p>5. Cab (cont)</p>	<p>b. Fasten sling to eyebolts and lift cab. Be sure cab clears steering wheel.</p> <p>c. Move cab away from the vehicle and place on ground.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Cab weighs 750 lb. (343 kg).</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">INSTALLATION I</div> <p>1. Cab</p>	<p>a. Install four 1/2-13NC forged eyebolts on top of cab. Fasten a hoist to eyebolts.</p> <p>b. Lift the cab over the steering wheel and into position. Lower cab on to three guide pins.</p>	<p style="text-align: right;">TA099208</p> <p style="text-align: right;">Go on to Sheet 6</p>

CAB REMOVAL/INSTALLATION (CONT)

(Sheet 6 of 8)

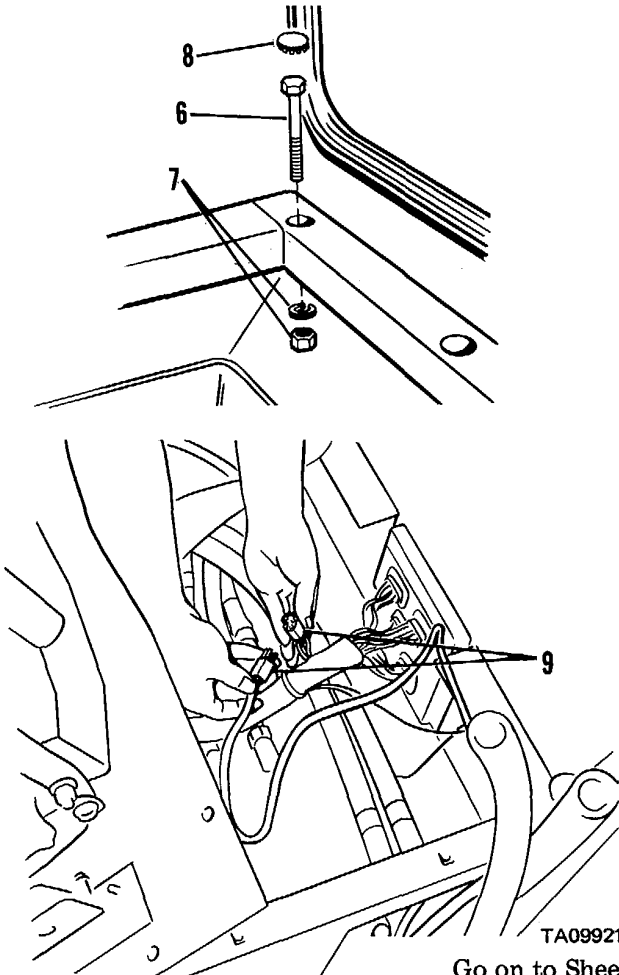
LOCATION/ITEM	ACTION	REMARKS
1. Cab (Cont)	<p>c. Install one capscrew and washer at bottom and inside of door frame (4).</p> <p>d. Install two capscrews (2) and washers in the back panel on the outside of door frame.</p> <p>e. Using three screws, install plate at bottom of door frame (4). Install caps over two holes (3) in door frame.</p> <p>f. Install capscrew and lockwasher in hole under window. Install cap (5) in hole.</p>	

TA099709

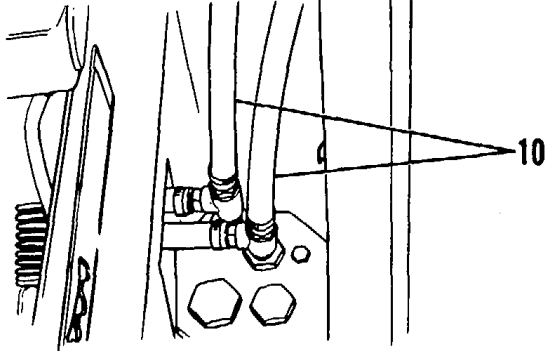
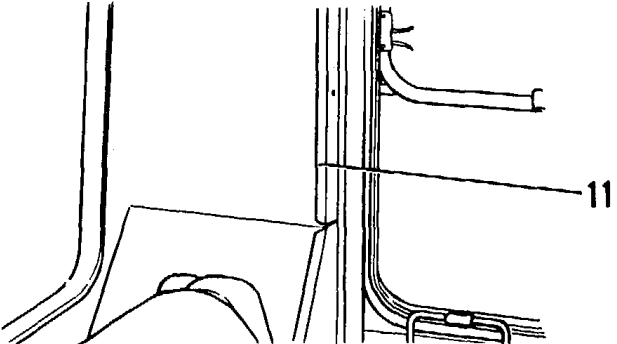
Go on to Sheet 7

CAB REMOVAL/INSTALLATION (CONT)

(Sheet 7 of 8)

LOCATION/ITEM	ACTION	REMARKS
<p>1. Cab (Cont)</p>	<p>g. Install ten capscrews (6), lockwashers and nuts (7) in front and rear ledges of cab.</p> <p>h. Move seat into position. Install capscrews and washers.</p> <p>i. Install caps (8) over all capscrews</p> <p>j. Using five capscrews, install panel below front window.</p>	
<p>2. Wire harness</p>	<p>Pull wire harness through seat platform opening and connect the connectors (9).</p>	
<p>3. Seat</p>	<p>Install. (See TM 10-3930-641-20.)</p>	<p>TA099210 Go on to Sheet 8</p>

CAB REMOVAL/INSTALLATION (CONT)

LOCATION/ITEM	ACTION	REMARKS
4. Heater lines	a. Connect heater lines (10) to the correct fittings.	
5. Front windshield wiper	b. Install panels (11). Install wiper arm and blade.	
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">ROPS weighs 2500 lb. (1125 kg).</p>		
6. ROPS	Install ROPS.	

See page 8-11

TA099211

End

ROLL-OVER PROTECTIVE STRUCTURE REMOVAL/INSTALLATION

(Sheet 1 of 7)

This task covers: Removal and installation of Roll-Over Protective Structure (ROPS).

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF
Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

References

None

Shipping Link Removal/Installation,
TM 10-3930-641-20

General Safety Instructions

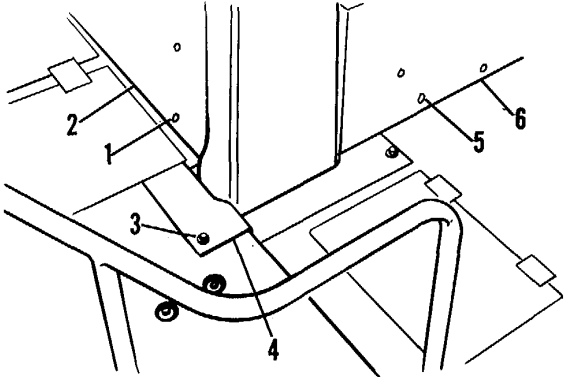
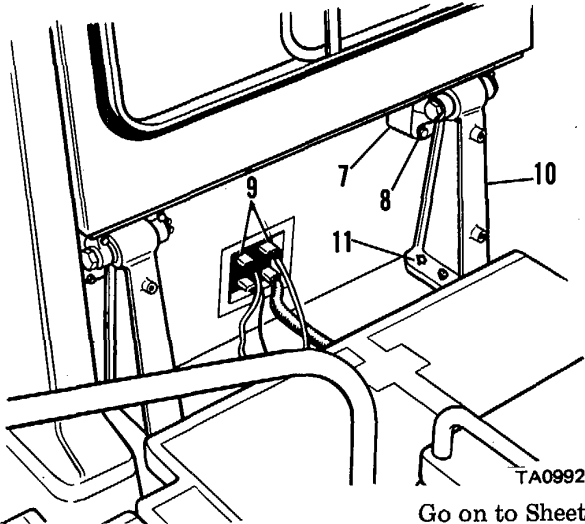
Hold steel plates when the support
assembly capscrews are removed.

Tires blocked.

Go on to Sheet 2

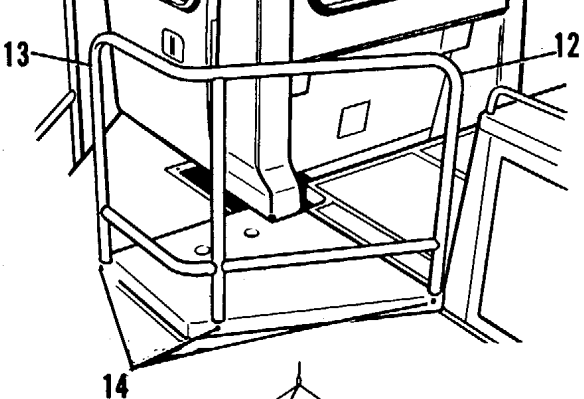

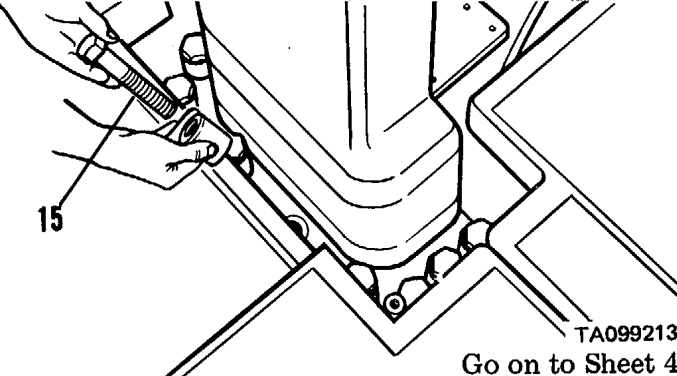
ROLL-OVER PROTECTIVE STRUCTURE REMOVAL/INSTALLATION (CONT)

(Sheet 2 of 7)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL	CAUTION	
1. Covers and panels	<p>When capscrews are removed, steel plates will fall.</p> <ol style="list-style-type: none"> a. Remove capscrews (1) and rear panel (2). b. Remove capscrews (3) and cover (4). c. Remove nine capscrews (5) and right side panel (6). 	
2. Supports (10)	<ol style="list-style-type: none"> a. Holding steel plate in location (7), remove capscrews (8). b. Remove steel plate. c. Remove capscrews (11) at bottom of supports (10). d. Remove cable held in place with capscrews (8) at both the bottom and top of right support (10). e. Remove support (10). f. Disconnect wiring harness at terminals (9). 	 <p style="text-align: right;">TA099212 Go on to Sheet 3</p>

ROLL-OVER PROTECTIVE STRUCTURE REMOVAL/INSTALLATION (CONT)

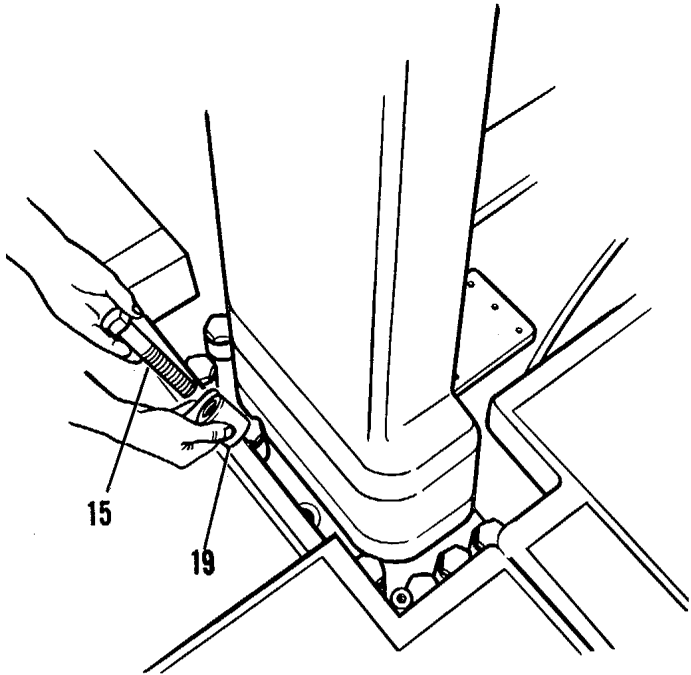
(Sheet 3 of 7)

LOCATION/ITEM	ACTION	REMARKS
3. Handrail (12)	a. Remove capscrews (14). b. Remove handrail (12, 13).	 <p>Diagram 1: Shows a side view of the ROPS structure with a handrail (12) and a vertical post (13). A capscrew (14) is shown being removed from the handrail.</p>
4. Roll-Over protection system (ROPS)	a. Install three 5/8-11INC forged eyebolts in top holes of the ROPS. b. Attach ratchet assembly to front eyebolt and a chain to the rear two eyebolts. c. Fasten a ratchet assembly and chain to a hoist.	 <p>Diagram 2: Shows a top-down view of the ROPS structure with three eyebolts installed in the top holes.</p>
5. Capscrews (15) and spacers	Remove ten (20 total) from each side of ROPS.	 <p>Diagram 3: Shows a close-up view of a hand using a tool to remove a capscrew (15) from the ROPS structure.</p> <p>TA099213 Go on to Sheet 4</p>

ROLL-OVER PROTECTIVE STRUCTURE REMOVAL/INSTALLATION (CONT)

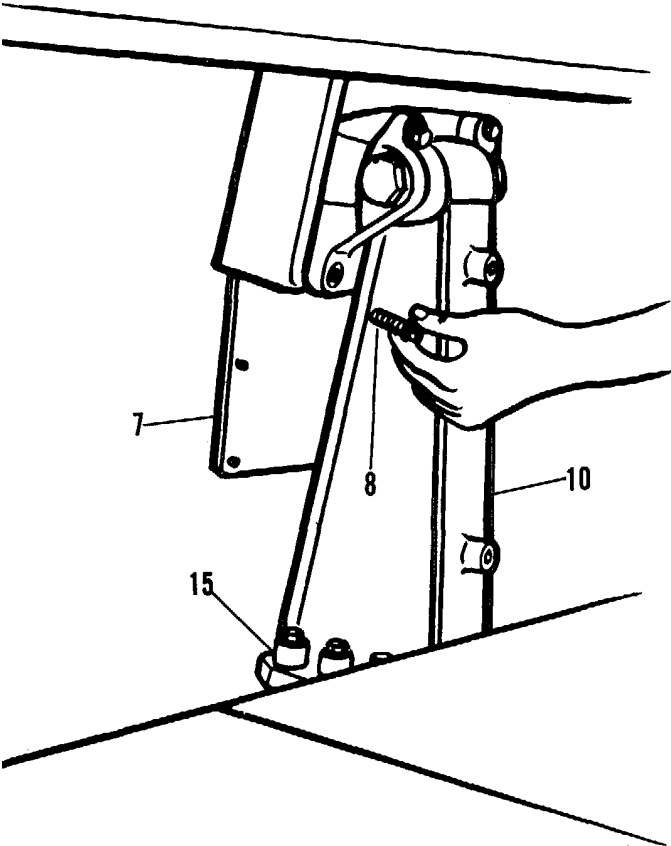
(Sheet 4 of 7)

LOCATION/ITEM	ACTION	REMARKS
<p>6. ROPS</p>	<p style="text-align: center;">NOTE</p> <p>Make sure cab door is open before ROPS is removed.</p> <p>a. Lift slowly so ROPS (18) will clear the plenum chamber (17) and rear platform (16).</p> <p>b. Pull ROPS (18) back so it will clear cab. Move ROPS sideways until it may be lowered to ground.</p> <p style="text-align: center;">NOTE</p> <p>ROPS weighs 2500 lb. (1125 kg).</p>	<p>The diagram shows a side view of a vehicle cab. The ROPS structure, labeled 18, is a large, boxy protective enclosure. It is being moved away from the cab. The plenum chamber, labeled 17, is the upper part of the cab's front structure. The rear platform, labeled 16, is the base of the cab. The ROPS structure is shown in a position where it is being pulled back and away from the cab, as indicated by the arrows and the text in the adjacent column.</p>
<p>INSTALLATION</p> <p>1. ROPS</p>	<p>a. Install three 5/8-11NC forged eyebolts in top of ROPS.</p> <p>b. Attach ratchet assembly to front eyebolt and a chain to the rear eyebolt.</p>	<p style="text-align: right;">Go on to Sheet 5</p>

LOCATION/ITEM	ACTION	REMARKS
<p>2. Capscrews (15)</p>	<p>c. Fasten ratchet assembly and chain to a hoist.</p> <p>NOTE</p> <p>Make sure cab door is in the open position.</p> <p>d. Lift ROPS (18) into position. Make sure that there is enough clearance between ROPS (18) and the plenum chamber (17).</p> <p>Install capscrews (15) and spacers (19). Tighten capscrews and remove ratchet assembly chain, and hoist.</p>	

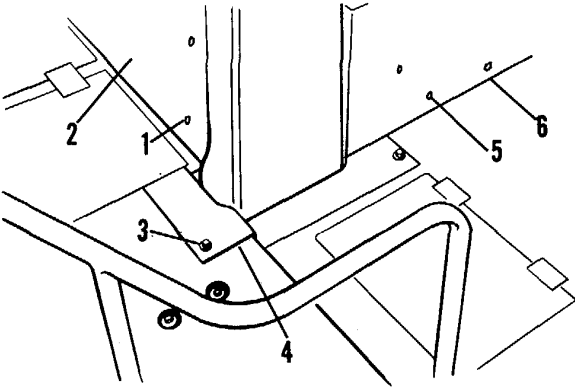
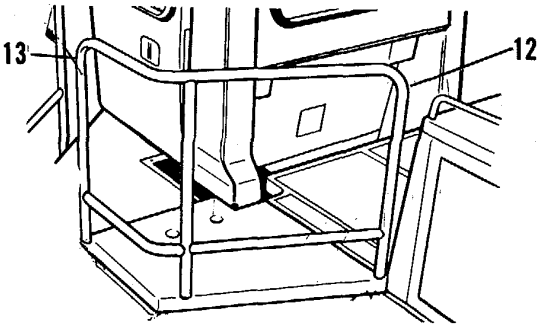
TA099215

Go on to Sheet 6

LOCATION/ITEM	ACTION	REMARKS
3. Support assemblies	<ul style="list-style-type: none"> a. Install support assemblies (10). b. Install capscrews, lockwashers, and spacers (15). c. Install plate (7) behind support (10) in grooved slot behind cab. d. Install capscrew (8) and lockwasher to hold plate in place. 	
4. Ground wire	Install at top and bottom of support (10).	
5. Capscrews (8 and 15)	<ul style="list-style-type: none"> a. Torque the 1 inch capscrews to 560 to 720 lb. ft. (775 to 975 N m). b. Torque 1-1/8 inch capscrews to 700 to 900 lb. ft. (950 to 1250 N m). 	
<p>NOTE</p> <p>Terminals are color coded and must be connected to the proper color.</p>		
6. Wiring harness	Connect wiring harness to the back of cab.	

TA099216

Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
7. Panels and covers	a. Install right side panel (6) and rear panel (2) b. Install capscrews (1, 6). c. Install cover (4) with capscrews (3).	
8. Handrail	Install handrails (12, 13).	

TA099217

End

Section II. CAB COMPONENTS

MAINTENANCE INSTRUCTIONS

This task covers: Maintenance of operator comfort item components for direct support maintenance personnel:

- a. Cab heater
- b. Cab windows and glass
- c. Cab door

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Cab heater disassembly/assembly.	8-19	None
2	Cab window, right side, removal/installation.	8-28	None
3	Cab window glass removal/installation.	8-31	None
4	Cab door disassembly/assembly.	8-34	None

CAB HEATER DISASSEMBLY/ASSEMBLY

(Sheet 1 of 9)

This task covers: Disassembly and assembly of the cab heater.

INITIAL SETUP

Test Equipment

Ohmmeter

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Heater removed from cab.

Special Tools

None

Personnel Required

One mechanic

References

None

Heater Removal/Installation,
TM 10-3930-641-20

General Safety Instructions

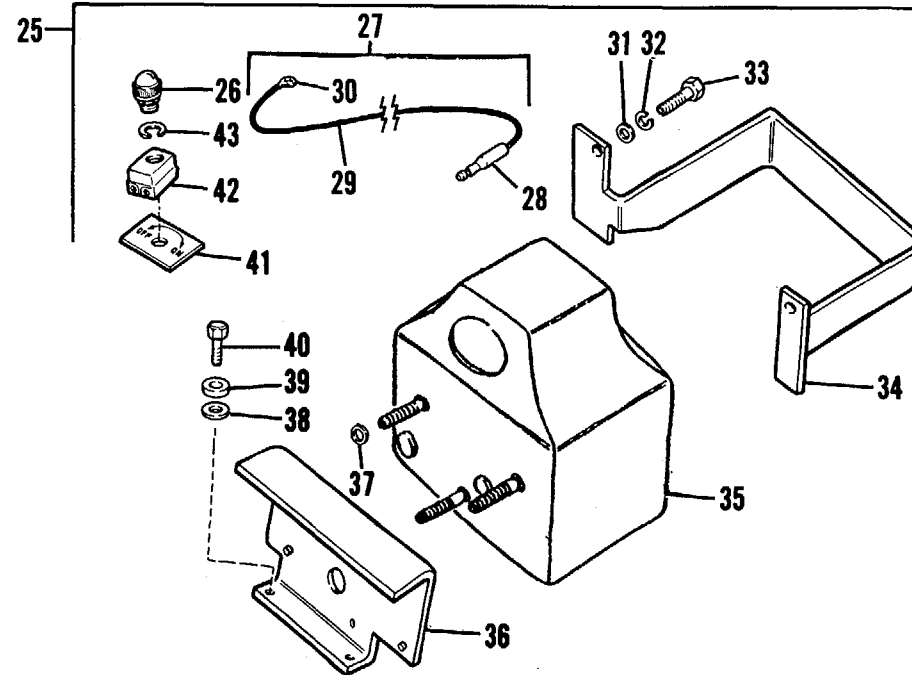
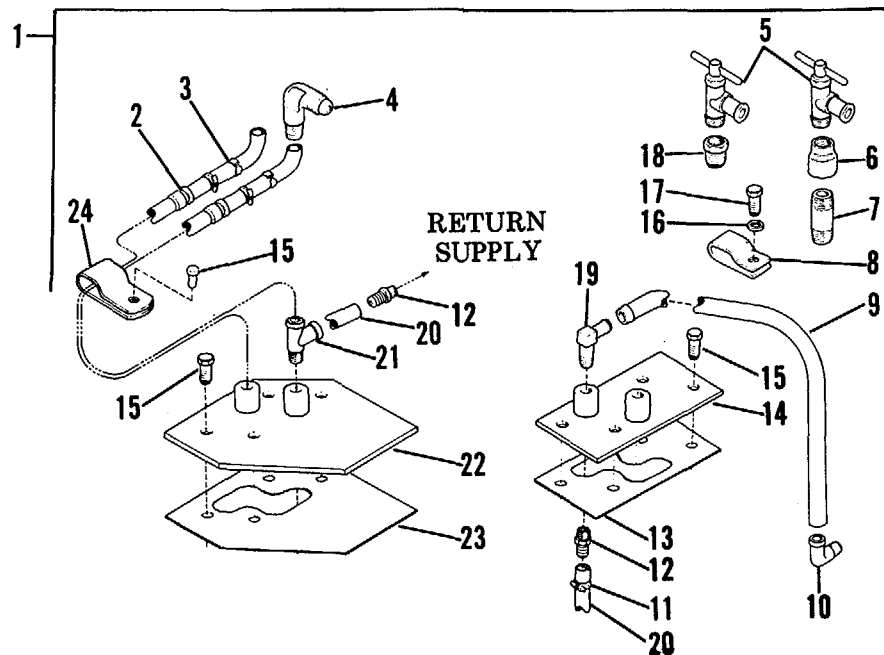
Heater should be cooled.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY I		
1. Two small capscrews and bracket	Remove.	
2. Three nuts, (55) washers, (57), and lockwashers (56)	Remove.	
3. Plate assembly (36)	a. Remove. b. Check for cracks, dents, distortion. c. Replace as needed.	
4. Three washers behind bracket (not pictured)	Remove.	
5. Valve with elbow (5)	a. Remove from heater core. b. Remove valve from elbow. c. Check for plugged orifices, cracks, and distortion. d. Replace all seals. e. Replace valve or elbow as needed.	

CAB HEATER DISASSEMBLY/ASSEMBLY (CONT)

(Sheet 3 of 9)



Heater Lines

- | | |
|-----------------------|--------------------|
| 1. Heater lines group | 13. Gasket |
| 2. Tube assembly. | 14. Plate assembly |
| 3. Tag | 15. Capscrew |
| 4. Elbow | 16. Washer |
| 5. Valve | 17. Capscrew |
| 6. Coupling | 18. Bushing |
| 7. Nipple | 19. Fitting |
| 8. Clip | 20. Hose |
| 9. Tube | 21. Tee |
| 10. Elbow | 22. Plate assembly |
| 11. Clamp | 23. Gasket |
| 12. Connector | 24. Clip |

Cab Heater Group

- | | |
|----------------------|--------------------|
| 25. Cab heater group | 35. Heater group |
| 26. Heater switch | 36. Plate assembly |
| 27. Wire assembly | 37. Washer |
| 28. Connector | 38. Washer |
| 29. Wire | 39. Washer |
| 30. Terminal | 40. Capscrew |
| 31. Washer | 41. Plate |
| 32. Lockwasher | 42. Switch |
| 33. Capscrew | 43. Lockwasher |
| 34. Plate | |

TA099218

Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
<p>Heater Group</p> <p>44. Heater group 45. Bracket 46. Spacer 47. Grommet 48. Washer 49. Nut 50. Channel 51. Motor</p>	<p>52. Fan 53. Channel 54. Plate assembly 55. Nut 56. Lockwasher 57. Washer 58. Core</p>	

TA099219

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
6. Fitting (7)	Remove from heater core.	
7. Four sheet metal screws	Remove.	
8. Ground wire	<ul style="list-style-type: none"> a. Disconnect. b. Check for breaks in the wire, also for frayed or broken insulation. c. Replace as needed. 	
9. Plate assembly (54)	<ul style="list-style-type: none"> a. Remove. b. Check for cracks, dents, distortion. c. Replace as needed. 	
10. Four sheet metal screws	Remove.	
11. heater core (58)	<ul style="list-style-type: none"> a. Remove. b. Check for crushed fins, cracks, and distortion. c. Replace as needed. 	

LOCATION/ITEM	ACTION	REMARKS
12. Channel (53)	<ul style="list-style-type: none"> a. Remove from housing. b. Check for cracks, dents, distortion. c. Replace as needed. 	
13. Set screw	Remove from fan (52).	
14. Fan (52)	<ul style="list-style-type: none"> a. Remove from motor shaft. b. Check for cracks, dents, distortion. c. Replace as needed. 	
15. Two nuts and washers	Remove from motor screw posts.	
16. Motor (51)	<ul style="list-style-type: none"> a. Remove from housing. b. Check shaft for smooth turning action with hand. c. Check motor for cracks, dents, nicks or burs on shaft, distortion, etc. d. Check continuity of windings with an ohm meter. Connect meter probes to the two motor lead wires. Meter should register near zero resistance. e. Replace as needed. 	

Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
17. Washers (48), grommet (47), spacers (46) and one bracket (45)	Remove from motor.	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> ASSEMBLY </div>		
1. Bracket (45)	Install on screw posts of heater motor.	
2. Two spacers (46)	Install on screw posts.	
3. Two washers (48) and grommets (47)	Install on screw posts.	
4. Motor assembly	Position inside heater group (35) with screw posts through holes.	
5. Two nuts (49)	Install on screw posts.	
6. Wires from motor	Push through hole in top of housing (35).	

LOCATION/ITEM	ACTION	REMARKS
7. Fan (52)	Install on motor shaft.	
8. Setscrew	Tighten.	
9. Channel (53)	Install in housing (35).	
10. Heater core (58)	Install in housing (365).	
11. Four screws that secure fan shroud and heater core to housing	Install in housing (35).	
12. Mounting plate (54)	Position on housing.	
13. Four screws that secure mounting plate to housing	Install. (Connect ground wire with one of these screws).	

LOCATION/ITEM	ACTION	REMARKS
14. Elbow (4)	Install on inlet opening.	
15. Fitting (7)	Install on outlet opening.	
16. Valve (5)	Install on elbow.	
17. Three washers plate (54),	Install one washer on each post of mounting	
18. Plate assembly (36)	Install on mounting plate.	
19. Three flat washers (57), lock- washers (56), and nuts (55)	Install.	
20. Base plate (34)	Position over heater assembly.	
21. Two capscrews (33) and washers (31 and 32)	Install in base plate.	

This task covers: Removal and installation of right side window.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Window open.

Special Tools

None

Personnel Required

One mechanic

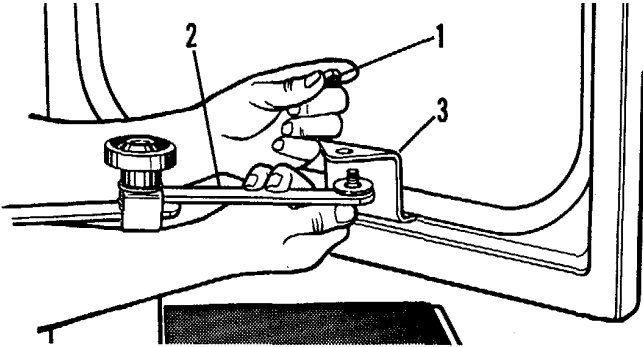
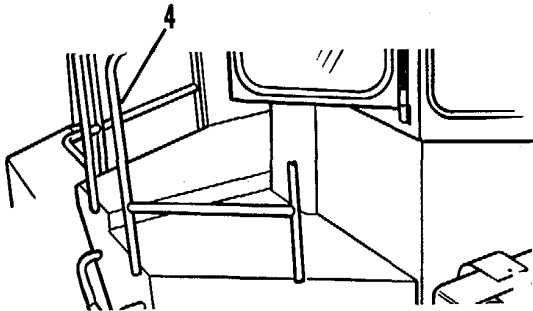
References

Handrail Removal/Installation,
TM 10-3930-641-20

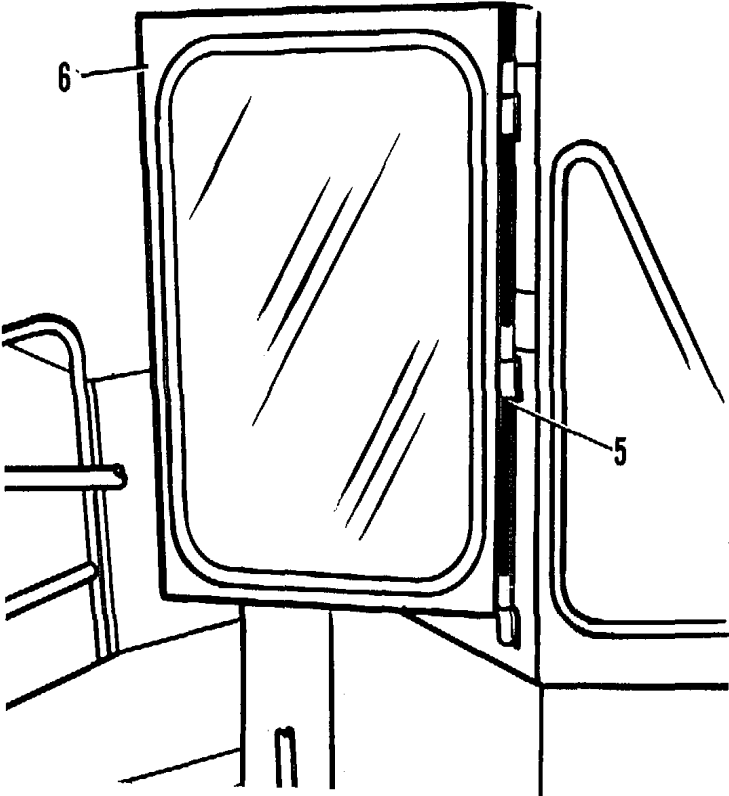
General Safety Instructions

Don't use hoist for window.

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">REMOVAL</div> <p>1. Handle arm (2)</p>	<p>a. Remove nut (1) from top and bottom of handle arms (2).</p> <p>b. Remove handle arms (2) from brackets (3).</p>	
<p>2. Handrail (4)</p>	<p>Remove handrail (4) on right side of the vehicle. (See TM 10-3930-641-20.)</p>	

TA099220

LOCATION/ITEM	ACTION	REMARKS
<p>3. Window frame (6)</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">INSTALLATION</div>	<p>a. Remove nut (5) from stud on hinge in middle of window.</p> <p>b. Push window out to 900 angle with the cab.</p> <p>c. Lift window frame up and out of the hinges on the cab.</p>	 <p>The diagram shows a side view of a cab window. A rectangular window frame, labeled '6', is mounted on a vertical hinge mechanism. A nut, labeled '5', is shown on a stud of the middle hinge. The window is shown in a slightly open position, tilted away from the cab body. The cab body structure, including a handrail and other components, is partially visible in the background.</p>
<p>1. Window frame (6)</p>	<p>a. Slide frame down into hinges.</p> <p>b. Install nut (5) on stud of middle hinge.</p>	
<p>2. Handle arms (2)</p>	<p>a. Install top and bottom handle arms (2) into window brackets (3).</p>	
<p>3. Handrail (4)</p>	<p>Install on right side of body.</p>	

See TM 10-3930-641-20

TA099221

End

This task covers: Removing and installing all cab window glass.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine off.

Sliding window glass assemblies are removed.

Shipping link installed.

Special Tools

None

Personnel Required

One mechanic

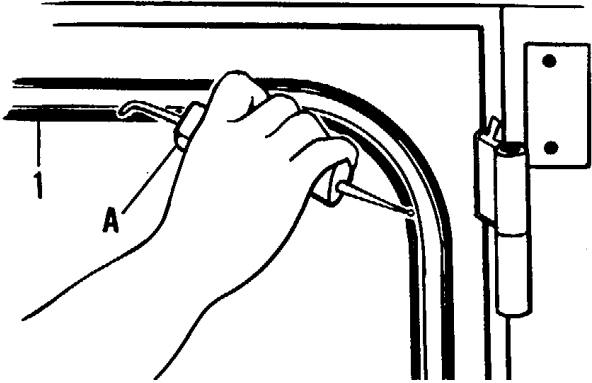
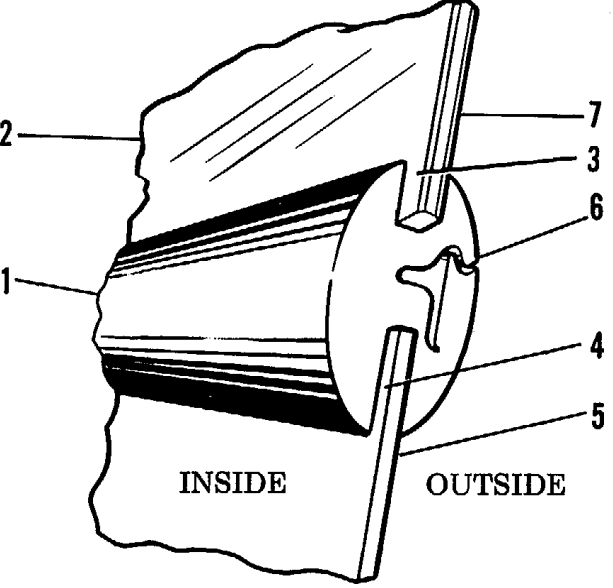
References

Shipping Link Removal/Installation,
TM 10-3930-641-20.
Windshield Wiper Removal/Installation,
TM 10-3930-641-20.

General Safety Instructions

Use thick gloves to remove damaged glass.

Go on to Sheet 2

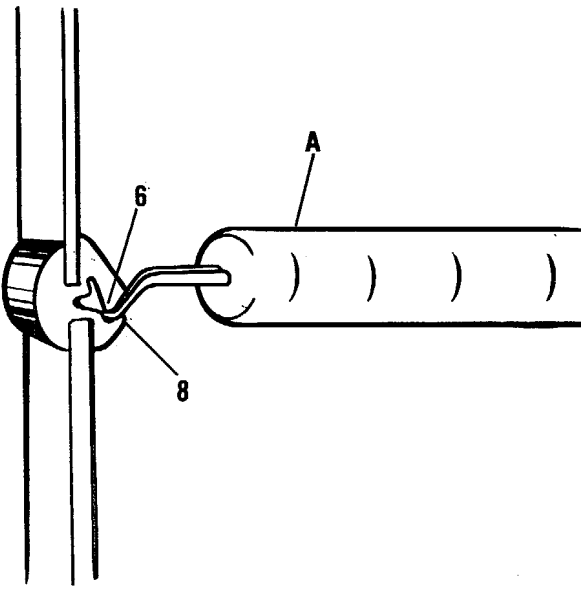
LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">REMOVAL</div>	<p>1. Seal</p>	<p>NOTE Remove windshield wiper and arm. See TM 10-3930-641-20.</p> <ol style="list-style-type: none"> a. Place seal installation tool (A) between two locking lips (6) of seal (1). b. Move tool (A) along seal pulling locking lip out and away from cab. c. Move the tool (A) completely around seal.
<p>2. Glass (2)</p>	<p>Remove glass from seal.</p>	
<p>3. Seal (1)</p>	<p>Remove seal from opening in panel.</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">INSTALLATION</div>	<p>1. Seal (1)</p>	<ol style="list-style-type: none"> a. Install groove (4) of seal (1) over edge of panel (5) with locking lip (6) toward outside of cab and nearer the glass (7) than the panel. b. Install seal (1) all around edge of opening. Cut seal so end will extend past the starting point by .125 in. (3.18 mm) per foot. This will make a tight waterproof seal. c. Push ends together.

TA099222

Go on to Sheet 3

CAB WINDOW GLASS REMOVAL/INSTALLATION (CONT)

(Sheet 3 of 3)

LOCATION/ITEM	ACTION	REMARKS
2. Glass (2)	<ul style="list-style-type: none"> a. Place glass down into groove (3) as far as possible without forcing. b. Adjust glass into place. 	
3. Seal	<ul style="list-style-type: none"> a. Place soap and water solution on locking lip (6). b. Place curved end of seal insertion tool (A) into groove (8) at some point opposite the starting point. c. Move tool (A) along groove (8) all around edge of window. Glass is now in place. 	

TA099223

End

This task covers: Disassembly and assembly for cab door.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine off.

Door on or off vehicle.

Special Tools

None

Personnel Required

One mechanic

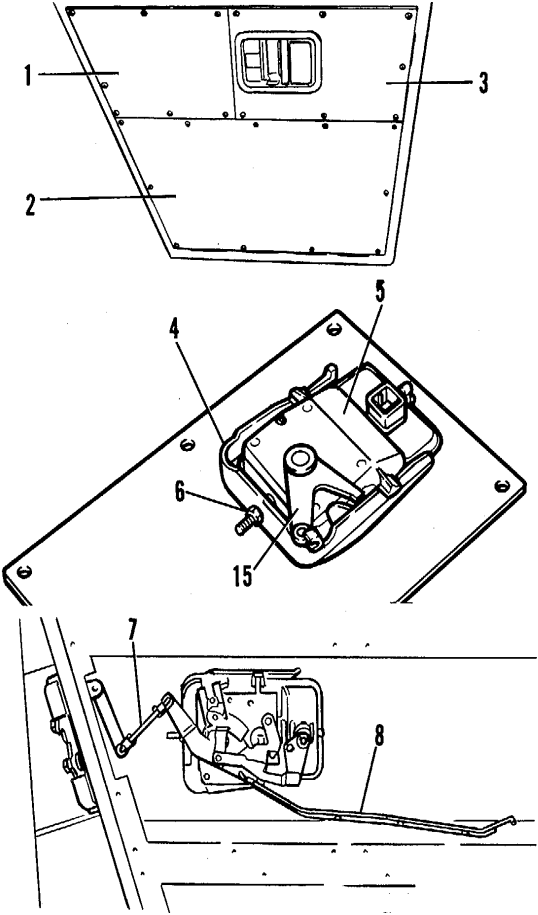
References

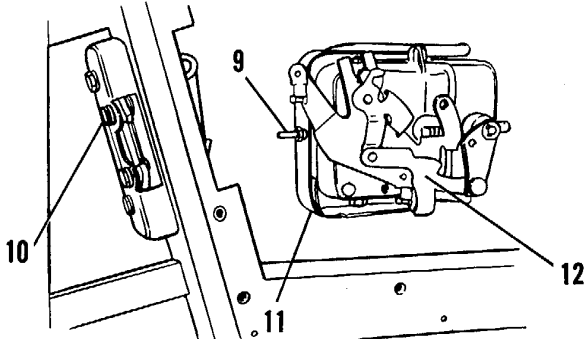
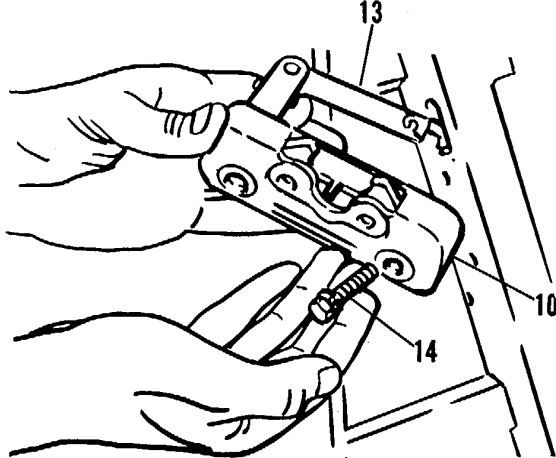
Cab Window Glass Removal/Installation,
page 8-31.

General Safety Instructions

None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">DISASSEMBLY</div>	<ol style="list-style-type: none"> <li>1. Panels (1), (2), (3) <ol style="list-style-type: none"> <li>a. Remove from inside of door, and disconnect rod (8) behind panel from lever (15). <li>b. Remove insulation from bottom of door. <li>2. Handle assembly (5) <ol style="list-style-type: none"> <li>a. Remove hex nut (6). <li>b. Slide bracket (4) off panel (3). <li>c. Remove handle assembly (5). <li>d. Loosen clips on outside door handle. Remove rods (7) and (8). 	

LOCATION/ITEM	ACTION	REMARKS
<p>3. Door latch (10)</p>	<p>e. Remove nut (9) from outside handle assembly (12).</p> <p>f. Remove retaining bracket (11).</p> <p>g. Remove handle assembly from outside of door.</p> <p>a. Remove four capscrews and lockwashers (14).</p> <p>b. Remove latch (10).</p> <p style="text-align: center;">NOTE</p> <p>To remove glass from door, see page 8-31, Cab Window Glass Removal and Installation.</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">ASSEMBLY</div> <p>1. Door latch</p>	<p>a. Install door latch (10), with lever (13) installed through hole.</p> <p>b. Install four bolts and lockwashers (14).</p>	

LOCATION/ITEM	ACTION	REMARKS
<p>2. Handle assembly</p>	<p>a. Install outside handle assembly (12) from outside.</p> <p>b. Install retaining bracket (11).</p> <p>c. Install nut (9) to hold retaining bracket.</p> <p>d. Install two rods (7) and (8) with clips.</p> <p>e. Install inside door handle (5) to panel (3).</p> <p>f. Install retaining bracket (4) with nut (6).</p> <p>g. Connect rod (8) to lever (15). Install inside panel (3) with seven screws.</p>	
<p>3. Panel</p>	<p>a. Install upper panel (1).</p> <p>b. Install insulation and lower panel (2).</p> <p style="text-align: center;">NOTE</p> <p>To install glass, see page 8-31, Cab Window Glass Removal and Installation.</p>	<p style="text-align: right;">TA099226</p> <p style="text-align: right;">End</p>

Section III. BODY AND PLATFORM

BODY MAINTENANCE INSTRUCTIONS

(Sheet 1 of 1)

This task covers repair of body components and general metal repair.

LIST OF TASKS

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Right platform removal/installation.	8-39	None
2	Rear bumper removal/installation.	8-42	None
3	Fuel tank removal/installation.	8-48	None
4	Fuel tank disassembly/assembly.	8-51	None
5	Battery box removal/installation	8-54	None
6	General metal repair.	8-58	None

This task covers: Removal and installation of the platform and guard over the hydraulic tank.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Ladders and grabirons removed.
Platform hand rails removed.

Special Tools

None

Personnel Required

Two mechanics

References

Ladder and grabiron removal/installation,
TM 10-3930-641-20.

Platform hand rails removal/installation,
TM 10-3930-641-20.

General Safety Instructions

None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin-bottom: 10px;">REMOVAL</div>		
1. Platform tread (2)	Remove capscrews (1) washers (3) and plate (5).	
2. Capscrews (15) and washers (14)	Remove.	
3. Hydraulic tank shield (13)	Remove.	
	NOTE Weight of shield is 110 pounds (50 kg).	
4. Hoist	Fasten to right side platform (10).	
5. Capscrews holding platform (10) to support channels	Remove.	
6. Platform (10)	Lift free of support channels and remove.	

TA099227

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
1. Platform (10)	Lift into position.	
2. Capscrews for platform	Install.	
3. Hydraulic tank shield (13)	Lift into position.	
4. Capscrews (15) for shield	Install.	
5. Platform treads (2)	Install.	

REAR BUMPER REMOVAL/INSTALLATION

(Sheet 1 of 6)

This task covers: Removal and installation of the rear bumper.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Engine OFF

Special Tools

None

Personnel Required

Two mechanics

References

Battery removal/installation, TM 10-3930-641-20

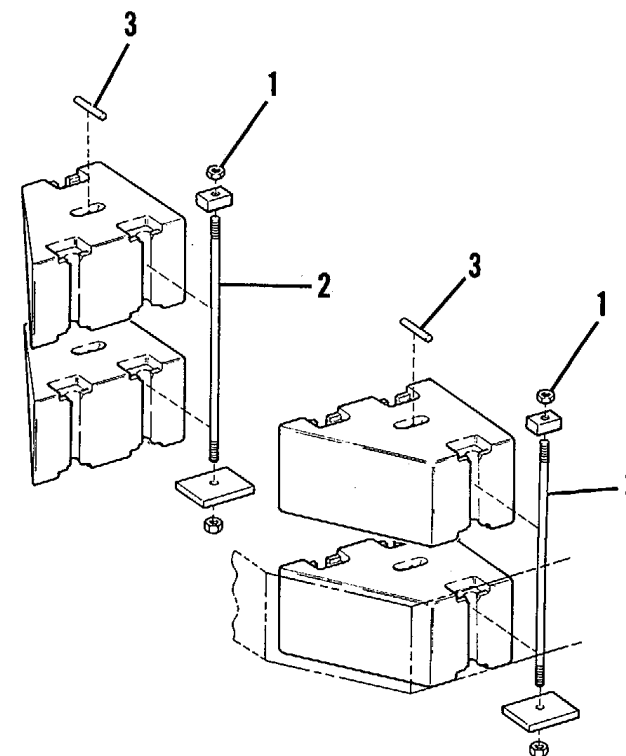
Battery cable removal/repair/installation,
TM 10-3930-641-20

General Safety Instructions

Main disconnect switch OFF.

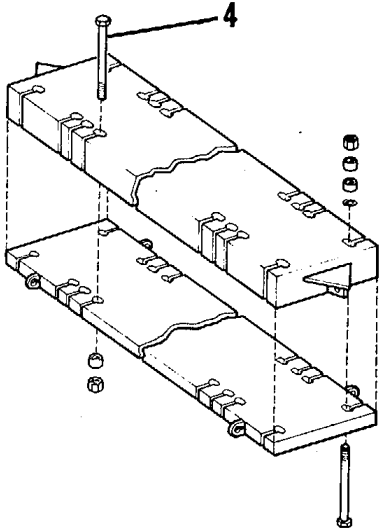
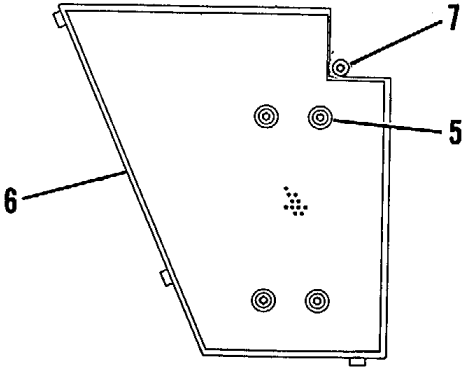
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 5px; display: inline-block;">REMOVAL</div>	<p>1. Capscrews holding grab irons rear fender and steps</p>	<p>Remove.</p>
<p>2. Batteries</p>	<p>Disconnect cables and remove. See TM 10-3930-641-20.</p>	
<p>3. Battery box</p>	<p>Remove retaining capscrews and remove battery box.</p>	
<p>4. Nut (1) and plate</p>	<p>Remove three, each set of weights.</p>	
<p>5. Threaded rod (2), nut and plate</p>	<p>Remove three, each set of weights.</p>	
<p>6. Hoist</p>	<p>Fasten to pin (3) and lift counterweight from vehicle.</p>	
	<p>NOTE</p>	
		<p>There are four (4) counterweights on the top of the bumper. Each counterweight weighs 3600 pounds (1633 kg).</p>



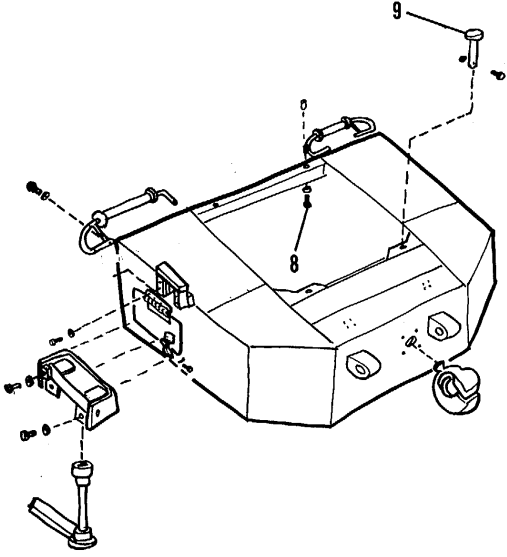
TA098789

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
7. Bottom counterweights	Support with jacks.	
8. Capscrews (4) nuts and washers	Remove. Use jacks to lower counterweight.	
9. Capscrews and spacers (5) for bumper platforms (6)	Remove.	
	<p style="text-align: center;">NOTE</p> <p>When capscrews are removed, lift platform free of lug (7).</p>	 <p style="text-align: center;">TOP VIEW</p>

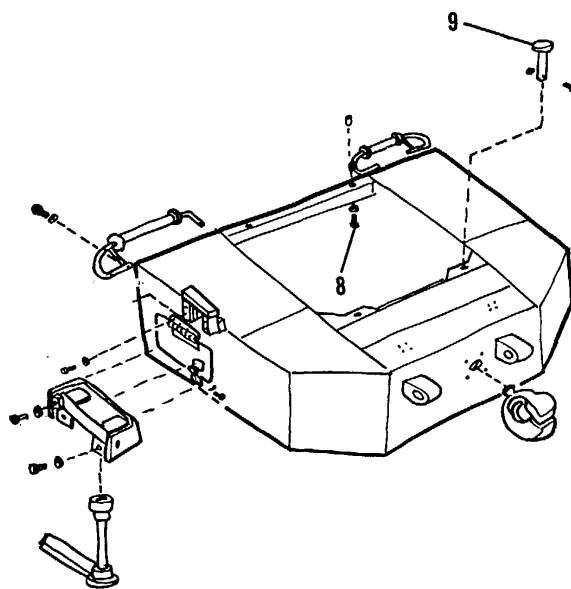
TA098790
Go on to Sheet 4

REAR BUMPER REMOVAL/INSTALLATION (CONT)
6)

LOCATION/ITEM	ACTION	REMARKS
10. Rear bumper	Support with jacks NOTE Bumper weighs 2550 pounds (1159 kg).	
11. Capscrews (8) and pins (9) attaching bumper assembly to vehicle	Remove.	
12. Bumper	Lower to ground.	

TA098791
Go on to Sheet 5

REAR BUMPER REMOVAL/INSTALLATION (CONT)
6)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
1. Rear bumper	Lift into position, using jacks.	
2. Capscrews (8) and pins (9)	Install.	
3. Bumper platforms (6)	Place in position.	
4. Capscrews and spacers (5)	Install.	
5. Bottom counterweights	Lift into position, using jacks.	
6. Capscrews (4) and nuts and washers	Install.	
7. Top counterweights	Place in position on the bumper platforms.	
8. Nuts (1), plates and threaded rods (2)	Install.	

Go on to Sheet 6

REAR BUMPER REMOVAL/INSTALLATION (CONT)
6)

LOCATION/ITEM	ACTION	REMARKS
9. Battery box	Put in position and install capscrews and washers.	
10. Batteries	Install.	See TM 10-3930-641-20.
11. Battery cables	Install.	See TM 10-3930-641-20.
12. Grab irons, rear fenders and steps	Install using capscrews and washers.	See TM 10-3930-641-20.
	8-47	

End

FUEL TANK REMOVAL/INSTALLATION
3)

This task covers: Removal and installation of fuel tank.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Fuel tank drained

Special Tools

None

Personnel Required

One mechanic

References

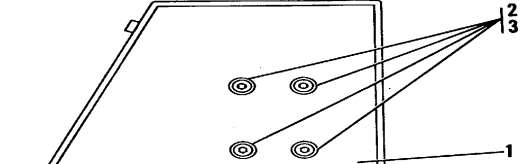
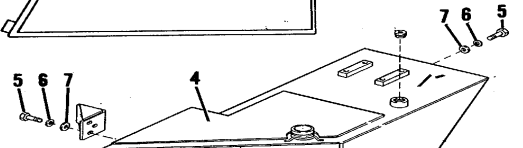

None

General Safety Instructions

None

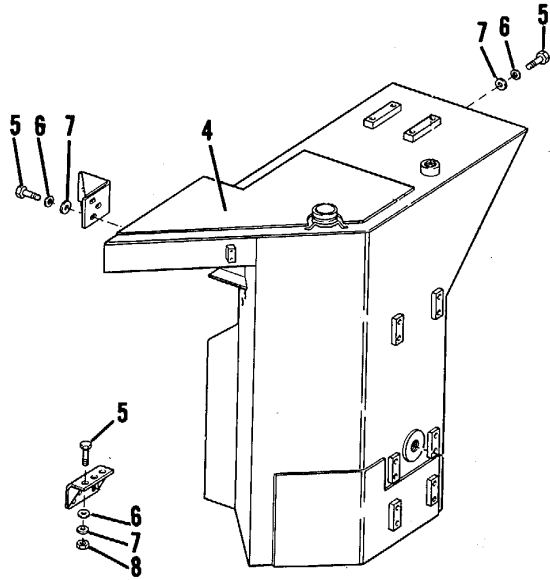
Go on to Sheet 2

3)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">REMOVAL</div>		
1. Handrails	Remove.	
2. Left rear fender (1)	a. Remove four capscrews (2) and spacers (3). b. Remove fender (1).	
3. Hoist	Attach slings to tank (4) and hoist. Put a slight strain on hoist.	
4. Tank mounting bolts.	Remove capscrews (5), washers (6), (7) and nuts (8). Remove tank.	
5. Ladder	a. Remove capscrews securing ladder. b. Remove ladder.	

TA172244
Go on to Sheet 3

FUEL TANK REMOVAL/INSTALLATION (CONT)
3)

LOCATION/ITEM	ACTION	REMARKS
INSTALLATION		
1. Hoist	a. Attach slings to tank and hoist. b. Position tank onto vehicle.	
2. Tank mounting bolts	Secure with capscrews (5), washers (6), (7) and nuts (8).	
3. Ladder	Reinstall.	
4. Left rear fender	Reinstall.	
5. Handrails	Reinstall.	

FUEL TANK REMOVAL/INSTALLATION
3)

This task covers: The disassembly and assembly of fuel tank.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Fuel tank drained and removed
from vehicle

Special Tools

None

Personnel Required

One mechanic

References

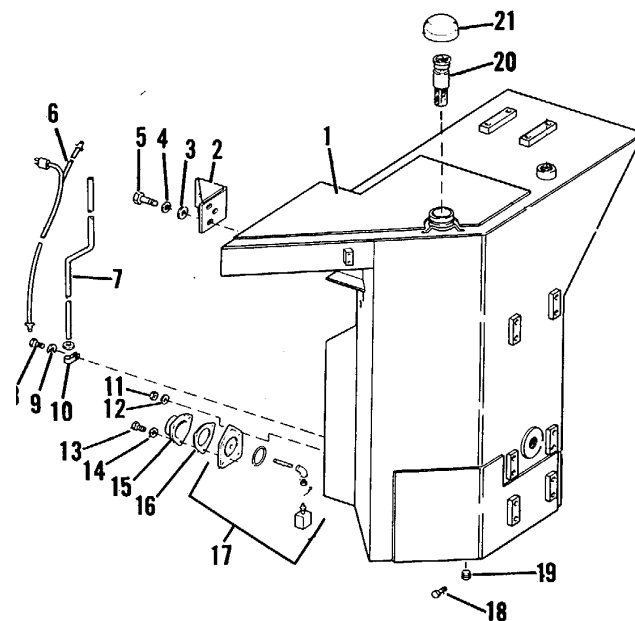
General metal repair, page 8-58

General Safety Instructions

None

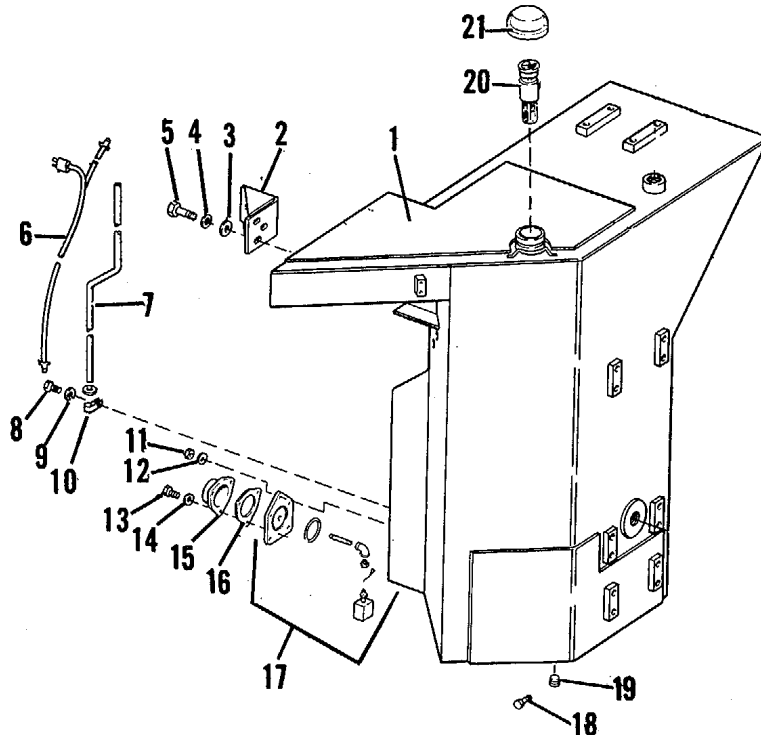
Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
DISASSEMBLY		
1. Bracket (2)	a. Remove capscrews (5) washers (3) and (4). b. Remove bracket.	
2. Wire harness (6)	Disconnect from switches (17) and remove.	
3. Tube (7)	a. Remove capscrews (8) and lock washers (9). b. Remove tube.	
4. Switch assemblies (17)	a. Remove six nuts (11) and washers (12). b. Remove switch assemblies (17).	
5. Cap assembly (21)	Remove.	
6. Strainer (20)	Remove.	



TA172246
Go on to Sheet 3

FUEL TANK REMOVAL/INSTALLATION (CONT)
3)

LOCATION/ITEM	ACTION	REMARKS
ASSEMBLY		
1. Strainer (20)	Install.	
2. Cap assembly (21)	Install.	
3. Switch assemblies (17).	Install. Use new preformed packing and gasket.	
4. Tube (7)	a. Position on tank. b. Secure with capscrew (8), washer (9) and clip (10).	
5. Wire harness (6)	a. Install into tube (7). b. Connect to switch assemblies (17).	
6. Bracket (2)	Install.	

BATTERY BOX REMOVAL/INSTALLATION
4)

This task covers: Removal and installation of battery boxes.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

Page 2-3

Equipment Condition

Engine off, key switch off and all electrical accessories off.

Special Tools

None

Personnel Required

Two mechanics

References

None

General Safety Instructions

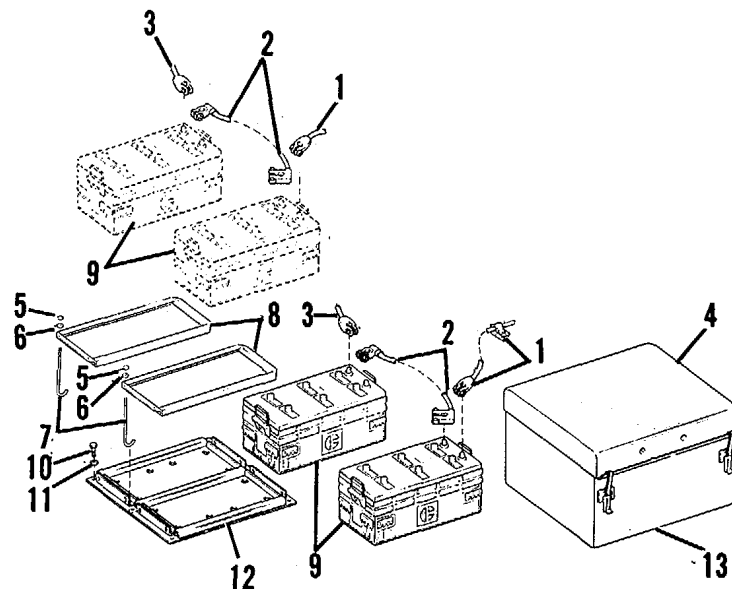
Be careful not to cause an arc or spark near the battery.

Go on to Sheet 2

BATTERY BOX REMOVAL/INSTALLATION (CONT)

4)

LOCATION/ITEM	ACTION	REMARKS
REMOVAL		
1. Battery box	Open cover (4).	
2. Battery cable (1)	Remove cable (1) from negative (-) post first.	
3. Battery cable (2)	Remove cable (2) from negative (-) post first and positive (+) post second.	
4. Battery cable (3)	Remove cable (3) from positive (+) post last.	
5. Battery hold down (8)	Remove nut (5) and washer (6) from hold down bolt (7). Remove hold down (8).	
6. Batteries (9)	Remove.	
7. Tray assembly (12)	Remove capscrew (10) and washer (11). Remove tray assembly.	
8. Battery box (13)	Remove.	



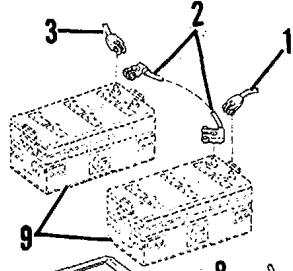
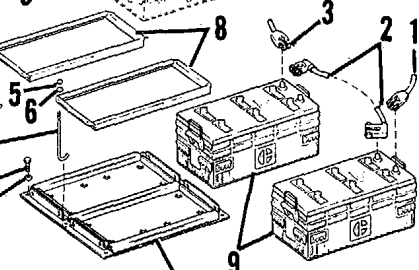
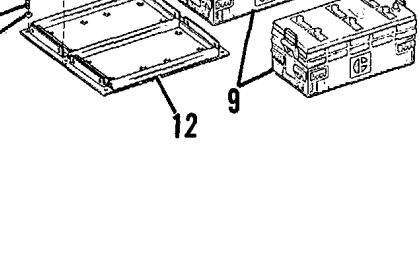
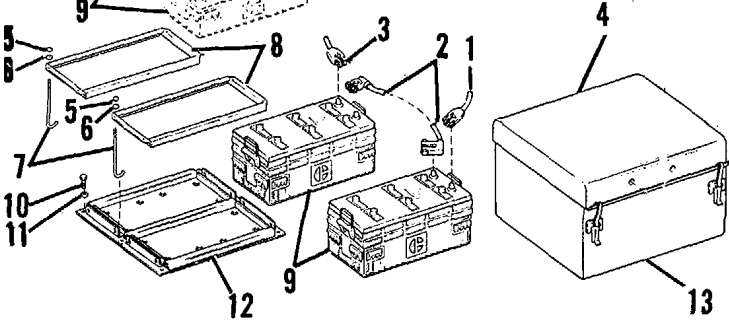
TA172248
Go on to Sheet 3

BATTERY BOX REMOVAL/INSTALLATION (CONT)
4)

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>		
<p>1. Battery box (13)</p>	<p>a. Position battery box onto rear bumper.</p>	
	<p>b. Aline holes in bottom of box with holes in top of bumper.</p>	
<p>2. Tray assembly (12)</p>	<p>a. Position tray into battery box.</p> <p>b. Aline holes in tray assembly with holes in box and bumper.</p> <p>c. Secure with capscrews (10) and washers (11).</p>	
<p>3. Batteries (9)</p>	<p>Position batteries into tray assemblies.</p>	
<p>4. Battery hold down (8)</p>	<p>a. Engage hook of hold down bolt (7) into tray assembly.</p> <p>b. Place the hold down assembly (8) over battery and hold down bolt.</p> <p>c. Secure with nut (5) and washer (6).</p>	
	<p style="text-align: center;">8-56</p>	

BATTERY BOX REMOVAL/INSTALLATION (CONT)

4)

LOCATION/ITEM	ACTION	REMARKS
	<p style="text-align: center;">NOTE</p> <p>Do not over tighten hold down bolts. Damage to the battery could result.</p>	
5. Battery cable (3)	<p>Install cable onto positive (+) post.</p>	
	<p style="text-align: center;">NOTE</p> <p>Do not pound terminals onto terminal posts, this would damage the battery.</p>	
6. Battery cable (2)	<p>Install onto positive (+) post first and negative (-) post second.</p>	
7. Battery cable (1)	<p>Install onto negative (-) post.</p>	
8. Battery box (13)	<p>Close cover and secure with latches.</p>	

GENERAL METAL REPAIR
2)

This task covers: All metal repair.

INITIAL SETUP

Test Equipment

None

Materials/Parts

See FM 43-2

Troubleshooting Reference

None

Equipment Condition

See FM 43-2.

Special Tools

See FM 43-2

Personnel Required

One mechanic

References

FM 43-2

General Safety Instructions

See FM 43-2

Go on to Sheet 2

CHAPTER 9

TOPHANDLER
MAINTENANCE INSTRUCTIONS

Page

Tophandler	9-3
Container lock cylinder.....	9-16
Force limiter	9-21
Twistlock adjustment	9-24

TOPHANDLER MAINTENANCE INSTRUCTIONS

This section covers maintenance of these tophandler components for direct support and general support personnel:

- a. Tophandler
- b. Container Lock Cylinder
- c. Twistlock

LIST OF TASKS

(Sheet 1 of 1)

TASK NO.	TASK	REF (PAGE)	TROUBLESHOOTING REF (PAGE)
1	Tophandler disassembly/assembly	9-3	None
2	Container lock cylinder disassembly/assembly	9-16	None
3	Force limiter disassembly/assembly	9-21	None
4	Twistlock adjustment	9-24	None
		9-2	

End

TOPHANDLER DISASSEMBLY/ASSEMBLY(Sheet 1 of 13)

This task covers: Disassembly and assembly of tophandler.

NOTE

This procedure applies to the 40 ft, 35 ft and 20 ft tophandlers. The only difference is that the 20 ft tophandler has only one container lock cylinder while the 35 ft and 40 ft tophandlers have two.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Tophandler removed from vehicle

Special Tools

None

Personnel Required

One mechanic.

References

Removing and Installing the Tophandler, TM10-3930-641-10.

General Safety Instructions

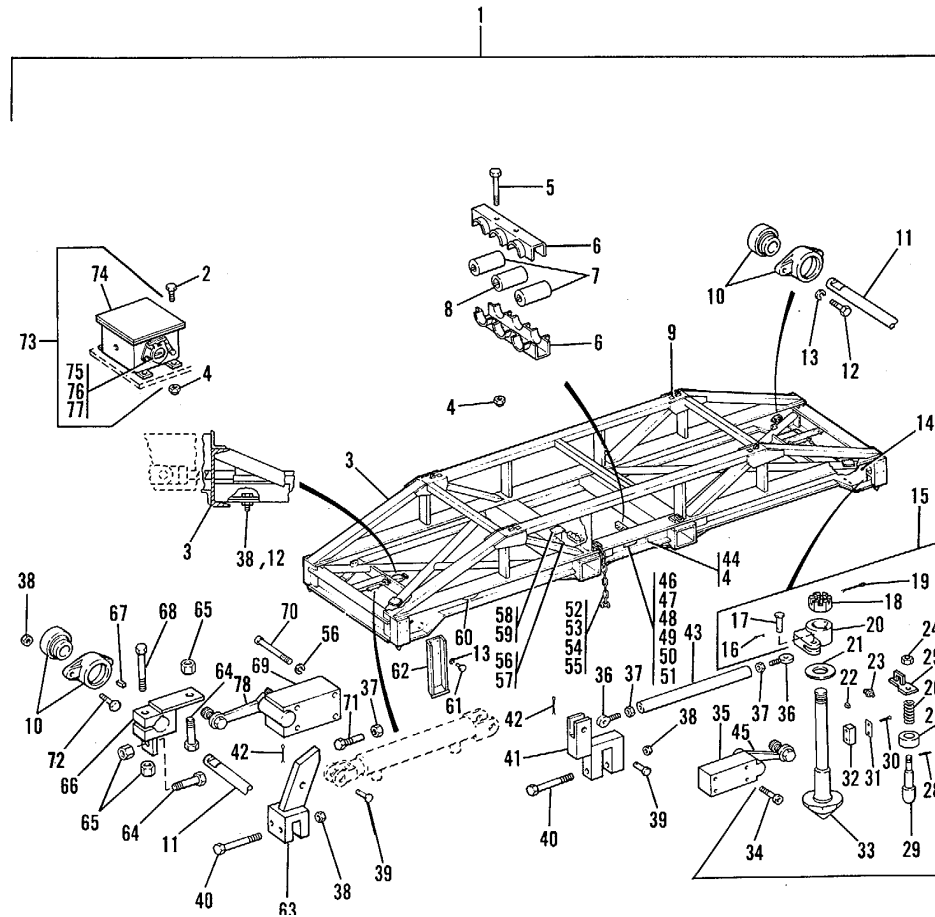
None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
1. Container lock cylinder (78)	a. Tag and remove hydraulic lines. b. Plug open lines. c. Remove front and rear clevis pins (39). d. Remove cylinder.	
2. Force limiter assembly	a. Remove capscrews (12) and nuts (38). b. Remove force limiter assembly from frame assembly (3).	
3. Control rod limit switch (69)	a. Disconnect wiring at limit switch. b. Remove capscrews (70) and lockwashers (56). c. Remove limit switch.	

TOPHANDLER DISASSEMBLY/ASSEMBLY (CONT)

1. Tophandler assembly
2. Capscrew
3. Frame assembly
4. Nut
5. Capscrew
6. Bracket
7. Rubber bushing
8. Rubber bushing
9. Plate
10. Bearing
11. Control rod
12. Capscrew
13. Lockwasher
14. Grommet
15. Twistlock assembly
16. Cotter pin
17. Clevis pin
18. Nut, slotted
19. Cotter pin
20. Connecting lever
21. Washer
22. Key
23. Fitting
24. Nut
25. Plunger bracket
26. Spring
27. Bushing
28. Socket set screw
29. Plunger
30. Screw
31. Plate
32. Slide block
33. Bayonet
34. Capscrew, socket head
35. Switch
36. Clevis
37. Jam nut



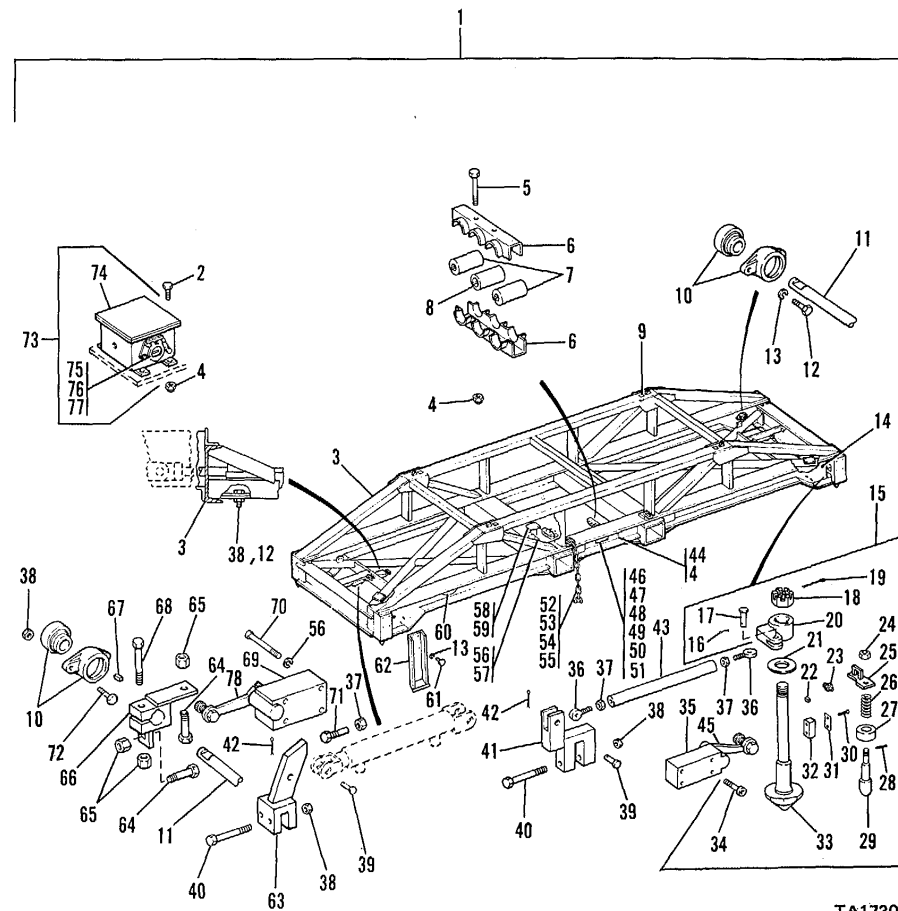
TA17301

TA173011
Go on to Sheet 4

TOPHANDLER DISASSEMBLY/ASSEMBLY (CONT)
13)

- 38. Nut
- 39. Clevis pin
- 40. Capscrew
- 41. Twistlock actuator
- 42. Cotter pin
- 43. Actuator rod
- 44. Decal
- 45. Lever
- 46. Decal
- 47. Decal
- 48. Decal
- 49. Decal
- 50. Decal
- 51. Decal
- 52. Shackle assembly
- 53. Chain
- 54. Shackle
- 55. Master link
- 56. Lockwasher
- 57. Bolt
- 58. Nut
- 59. Bolt
- 60. Decal
- 61. Capscrew
- 62. Guide arm
- 63. Control arm
- 64. Capscrew
- 65. Nut
- 66. Lever
- 67. Key
- 68. Capscrew
- 69. Limit switch
- 70. Capscrew, socket head
- 71. Capscrew
- 72. Capscrew
- 73. Junction box assembly
- 74. Junction box

- 75. Electrical socket
- 76. Capscrew
- 77. Stop nut
- 78. Lever



TA17301

TA173012
Go on to Sheet 5

TOPHANDLER DISASSEMBLY/ASSEMBLY (CONT)
13)

LOCATION/ITEM	ACTION	REMARKS
4. Capscrews (2) and nuts (4) that	Remove. secure junction box (74)	
5. Junction box (74)	a. Disconnect wiring. b. Remove.	
6. Capscrews (5) and nuts (4) that	Remove. secure brackets (6)	
7. Brackets (6) and bushings (7) (8)	Remove.	
8. Electrical cable and hydraulic lines	Remove.	
9. Capscrews (12) and lockwashers (13) that secure bearings (10)	Remove.	
10. Bearings (10)	Pull away from frame assembly.	
11. Capscrews (40) and nuts (38) that secure control rod (11) to twistlock actuators (41)	Remove.	

Go on to Sheet 6

TOPHANDLER DISASSEMBLY/ASSEMBLY (CONT)
13)

LOCATION/ITEM	ACTION	REMARKS
12. Capscrews (40) and nuts (38) that secure control rod (11) to control arm (63)	Remove.	
13. Capscrews (68) and nuts (65) that secure control rod (11) to lever (66)	Remove.	
14. Lever (66)	Move to side to uncover key (67).	
15. Cotter pins (42) (16) that secure actuator rod clevis pins (39) (17)	Remove.	
16. Clevis pins (39) (17)	Remove.	
17. Actuator rod (43)	Remove.	

Go on to Sheet 7

LOCATION/ITEM	ACTION	REMARKS
	NOTE	
	As control rod is pulled from frame assembly, be sure to remove loose bearings (10), lever (66) and control arm (62).	
18. Control rod (11)	Remove from frame assembly (3).	
19. Capscrews (61) and lockwashers (13) that secure guide bars (62)	Remove.	
20. Guide bars (62)	Remove.	
	9-9	

Go on to Sheet 8

TOPHANDLER DISASSEMBLY/ASSEMBLY (CONT)
13)

LOCATION/ITEM	ACTION	REMARKS
21. Capscrews (34) that secure bayonet limit switches (35)	Remove.	
22. Bayonet limit switches (35)	a. Disconnect wiring. b. Remove switches.	
23. Cotter pin (19) that secures slotted nut (18)	Remove.	
24. Slotted nut (18)	Remove.	

Go on to Sheet 9

TOPHANDLER DISASSEMBLY/ASSEMBLY (CONT)
13)

LOCATION/ITEM	ACTION	REMARKS
25. Bayonet (33), washer (21) and connecting lever (20)	Remove.	
26. Nut (24) that secures plunger (29)	Remove.	
27. Plunger (29) and spring (26)	Remove.	
28. Bushing (27)	Remove.	
29. Bracket (25)	Remove.	
30. Screw (30), plate (31) and slide block (32)	Remove.	
ASSEMBLY		
1. Slide block (32), plate (31) and screw (30)	Install.	
2. Bracket (25)	Install.	
3. Bushing (27)	Install.	

Go on to Sheet 10

LOCATION/ITEM	ACTION	REMARKS
4. Spring (26) and plunger (29)	Install.	
5. Nut (24) that secures plunger (29)	Install.	
6. Bayonet (33), washer (21) and connecting lever (20)	Install.	
7. Slotted nut (18)	Install.	
8. Cotter pin (19) that secures slotted nut (18)	Install.	
9. Guide bars (62)	Fasten to frame assembly with capscrews (61) and lockwashers (13).	
10. Control rod (11)	<p style="text-align: center;">NOTE</p> <p>Leave bearings (10), control arm (63) and lever (66) loose until control rod (11) is fully installed.</p> <p>a. Insert rod tip into inboard side of frame assembly (3).</p> <p>b. Install bearings (10), control arm (63) and lever (66) on rod.</p> <p>c. Insert rod into other half of frame assembly (3).</p> <p>d. Install bearings (10) on rod.</p> <p>e. Fully install rod.</p>	

Go on to Sheet 11

LOCATION/ITEM	ACTION	REMARKS
11. Twistlock actuators (41)	Install on each end of control rod (11) and secure with capscrews (40) and nuts (38).	
12. Bearings (10)	Secure to frame assembly (3) with capscrews (12) and lockwashers (13).	
13. Lever (66)	Secure to control rod (11) with capscrews (68) and nuts (65).	
14. Control arm (63)	Secure to control rod (11) with capscrew (40) and nut (38).	
15. Force limiter assembly	Secure to frame assembly with capscrews (12) and nuts (38).	
16. Container lock cylinder	<ul style="list-style-type: none"> a. Position cylinder between force limiter and control arm (63). b. Insert clevis pins (39) and secure with cotter pins (42). c. Unplug and connect the two hydraulic lines. 	

LOCATION/ITEM	ACTION	REMARKS
17. Clevis (36)	Install in each end of actuator rods (43).	
18. Actuator rods (43)	Position between connecting levers (20) and twistlock actuators (41) and insert clevis pins (39) (17).	
19. Cotter pins (16) (42)	Install.	
20. Lever (66)	Secure to control rod (11) with capscrews (68) and nuts (65).	
21. Control rod limit switch (69)	<ul style="list-style-type: none"> a. Secure to frame assembly (3) with capscrews (70) and lockwashers (56). b. Connect wiring. 	

Go on to Sheet 13

LOCATION/ITEM	ACTION	REMARKS
22. Bayonet limit switches (35)	a. Secure to frame assembly (3) with capscrews (34). b. Connect wiring.	
23. Junction boxes (74)	Secure to frame assembly with capscrews (2) and nuts (4).	
24. Electrical cable and hydraulic lines	Insert in bushings (7) (8).	
25. Bushings (7) (8)	Install in bracket (6) and secure with capscrews (5).	

CONTAINER LOCK CYLINDER DISASSEMBLY/ASSEMBLY

(Sheet 1 of 5)

This task covers: Disassembly and assembly of container lock cylinder.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Container lock cylinder removed.

Special Tools

None

Personnel Required

One mechanic

References

Tophandler disassembly,
page 9-3.

General Safety Instructions

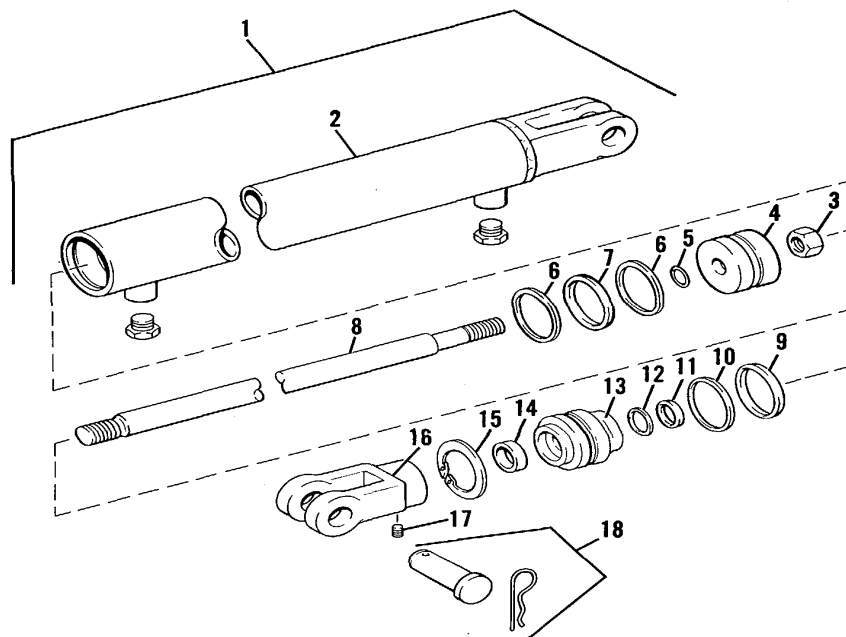
None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">DISASSEMBLY</div>		
1. Cylinder body assembly (2)	Secure to repair stand.	
2. Ring (15)	Remove from cylinder body.	
3. Rod (8) and attached parts	Pull from cylinder body assembly (2).	
4. Clevis (16), ring (15) and cylinder head (13)	Remove from rod (8).	
5. Preformed packings (9) (11) and backup rings (10) (12)	Remove from cylinder head (13).	

Go on to Sheet 3

1. Container lock cylinder assembly
2. Cylinder body assembly
3. Locknut
4. Piston
5. Preformed packing
6. Preformed packing
7. Backup ring
8. Rod
9. Preformed packing
10. Backup ring
11. Preformed packing
12. Backup ring
13. Cylinder head
14. Rod wiper
15. Ring
16. Clevis
17. Setscrew
18. Clevis pin assembly



Go on to Sheet 4

LOCATION/ITEM	ACTION	REMARKS
6. Locknut (3)	Remove from rod (8).	
7. Piston (4)	Remove from rod (8).	
8. Preformed packings (5) (6) and backup ring (7)	Remove from piston (4).	
ASSEMBLY		
1. Backup ring (7) and preformed packings (5) (6)	Install on piston (4).	
2. Piston (4)	Install on rod (8).	
3. Locknut (3)	Install.	See Torque limits chart, page D-1

Go on to Sheet 5

LOCATION/ITEM	ACTION	REMARKS
4. Backup rings (10) (12) and preformed packings (9) (11)	Install on cylinder head (13).	
5. Cylinder head (13), ring (15) and clevis (16)	Install on rod (8). NOTE Lubricate packings (6) (7) (9) (10) on cylinder head (13) and piston (4) with hydraulic oil before installing in cylinder body.	
6. Rod (8) and attached parts	Install in cylinder body assembly (2).	
7. Ring (15)	Install in cylinder body. NOTE Make sure that ring (15) is seated in the groove in cylinder body.	

This task covers: Disassembly/assembly of the force limiter.

NOTE

This procedure applies to force limiter on 40 ft, 35 ft and 20 ft tophandlers.

INITIAL SETUP

Test Equipment

None

Materials/Parts

As required

Troubleshooting Reference

None

Equipment Condition

Force limiter removed from tophandler

Special Tools

None

Personnel Required

One mechanic

References

Tophandler disassembly/assembly,
page 9-3.

General Safety Instructions

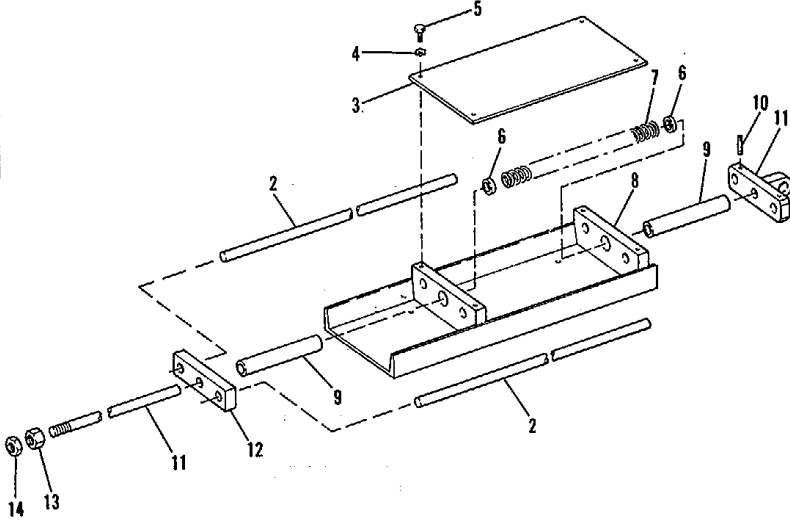
None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<div style="border: 1px solid black; padding: 2px; display: inline-block;">ASSEMBLY</div>	<ol style="list-style-type: none"> 1. Cover (3) washers (4). 2. Clevis (11) 	
<ol style="list-style-type: none"> 3. Guide rods (2) 	<p style="text-align: center;">NOTE</p> <p>Other spacer (9), washers (6) and springs (7) will also be removed at the same time.</p> <ol style="list-style-type: none"> a. Drive pins (10) out of clevis (11). b. Remove guide rods. 	
<div style="border: 1px solid black; padding: 2px; display: inline-block;">INSTALLATION</div>	<ol style="list-style-type: none"> 1. Guide rods(2) <ol style="list-style-type: none"> a. Install in clevis (11). b. Align holes in rods and clevis. c. Secure with pins (10). 	

TA172236

Go on to Sheet 3

LOCATION/ITEM	ACTION	REMARKS
<p>2. Clevis (11)</p>	<p>a. Place one spacer (9) onto clevis rod.</p> <p>b. Install clevis (11) into spring mount (8).</p> <p>c. Place one washer (6), four springs (7) and other washer (6) onto clevis rod.</p>	
<p>3. Rod holder (12)</p>	<p>a. Place other spacer (9) and rod holder (12) onto clevis rod.</p> <p>b. Secure with nuts (13) and (14).</p> <p style="text-align: center;">NOTE</p> <p>Tighten nut (13) just enough to remove all lengthwise slack in the assembly, grease guide rods (2) and sliding parts for 6 inches of travel on either side of rod guides.</p>	

TA172237

End

TWISTLOCK ADJUSTMENT

(Sheet 1 of 2)

This task covers: Adjustment of twistlock.

NOTE

This procedure applies to the 40 ft, 35 ft and 20 ft tophandlers.

INITIAL SETUP

Test Equipment

None

Materials/Parts

None

Troubleshooting Reference

None

Equipment Condition

Twistlock assembled into tophandler

Special Tools

None

Personnel Required

One mechanic

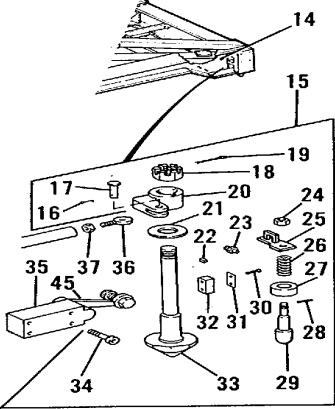
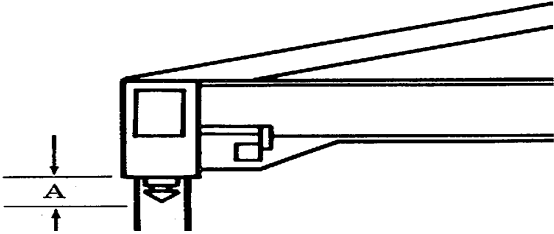
References

Tophandler disassembly, page 9-3.

General Safety Instructions

None

Go on to Sheet 2

LOCATION/ITEM	ACTION	REMARKS
<p>Adjust bayonet (33)</p>	<p>a. Remove cotter pin (19).</p> <p>b. Adjust nut (18) to achieve 4-1/8" (101.7 mm) to 4-5/8" (102.2 mm) at "A."</p> <p>c. Align nearest slot in nut (18) with hole in bayonet (33).</p> <p>d. Install new cotter pin (19).</p> <p style="text-align: center;">NOTE</p> <p>Always use a new cotter pin when replacing. For best operation all four bayonets on top handler should be adjusted to the same dimension at "A."</p>	 

TA172238

End

APPENDIX A

REFERENCES

A-1. PUBLICATION INDEXES AND GENERAL REFERENCES

Indexes should be consulted frequently for latest changes or revisions of references given in this appendix and for new publications relating to material covered in this publication.

- a. Military Publication Indexes
 - Consolidated Index of Army Publication and FormsDA PAM 25-30
 - Index of Graphic Training Aids and Devices DAM 310-5
- b. General References
 - First Aid for Soldiers.....FM 21-11

A-2. FORMS

Refer to DA PAM 738-750, The Army Maintenance Management System (TAMMS), for instructions on the use of maintenance forms pertaining to the material.

A-3. OTHER PUBLICATIONS

The following publications contain information pertinent to the major item material and associated equipment.

- a. Vehicle
 - Lubrication Order, Truck, Container Handler: Rough Terrain, 50,000 lb. CapacityLO 10-3930-641-12
 - Operator's Manual, Truck, Container Handler: Rough Terrain, 50,000 lb. Capacity..... TM 10-3930-641-10
 - Organizational Maintenance Manual, Truck, Container Handler: Rough Terrain, 50,000 lb. Capacity TM 10-3930-641-20
 - Organizational Maintenance Repair Parts and Special Tools List for Truck, Container Handler: Rough Terrain, 50,000 lb. CapacityTM 10-3930-641-20P
 - Direct Support and General Support Maintenance Repair Parts and Special Tools List for Truck, Container Handler: Rough Terrain, 50,000 lb. Capacity TM 10-3930-641-34P
- b. Camouflage
 - CamouflageFM 5-20
 - Color, Marking and Camouflage Painting of Military Vehicles, Construction Equipment and Materials Handling Equipment.....TB 43-0209

APPENDIX A
REFERENCES (CONT)

A-3. OTHER PUBLICATIONS (CONT)

- c. Decontamination
 Chemical, Biological, and Radiological (CBR) Decontamination..... TM 3-220

- d. General
 Basic Cold Weather Manual..... FM 31-70
 Manual for Wheeled Vehicle Driver FM 21-305
 Northern Operations..... FM 31-71
 Operation and Maintenance of Ordnance Material in Cold Weather (0°F to -65°F) FM 9-207
 Procedures for Destruction of Equipment to Prevent Enemy Use TM 750-244-3
 Military Traffic Management Command's Transportability Review..... TR 80-1-19A

- e. Maintenance and Repair
 Organizational Care, Maintenance and Repair of Pneumatic Tires and Inner Tubes..... TM 9-2610-200-20
 Operator's, Organizational, Direct Support and General Support Maintenance Manual for Lead-Acid Storage Batteries TM 9-6140-200-14
 Description, Use, Bonding Techniques, and Properties of Adhesives TB ORD 1032
 Inspection, Care, Maintenance of Antifriction Bearings..... TM 9-214
 Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems TB 750-651
 Materials Used for Cleaning, Preserving, Abrading, and Cementing Ordnance Material and Related Materials
 Including Chemicals TM 9-247
 Welding Theory and Application..... TM 9-237
 Non-Aeronautical Equipment Army Oil Analysis Program (AOAP)..... TB 43-0210

- f. Administrative Storage
 Administrative Storage of Equipment TM 740-90-1

Change 1 A-2

APPENDIX B
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the Rough Terrain Container Handler. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

EXPLANATION OF COLUMNS

- | | | |
|-----|-----------------------|--|
| (1) | ITEM NUMBER | This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 2, App. C"). |
| (2) | LEVEL | This column identifies the lowest level of maintenance that requires the listed item.

<div style="display: flex; justify-content: space-between;"> C - Operator/Crew F - Direct Support Maintenance </div> <div style="display: flex; justify-content: space-between;"> O - Organizational Maintenance H - General Support Maintenance </div> |
| (3) | NATIONAL STOCK NUMBER | This is the National stock number assigned to the item; use it to request or requisition the item. |
| (4) | DESCRIPTION | Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable. |
| (5) | U/M (Unit of Measure) | Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements. |

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	O,F,H	6850-00-181-7929	Antifreeze, Type I MIL-A-46153 (81349)	gal
2	O,F,H	6850-00-941-5054	Cleaning Compound, Solvent FED SPEC O-C-1889, 5 gal can	gal
3	O,F,H	9150-00-935-1017	GAA Grease, Auto/Artillery (4 oz cartridge) MIL-G-10924 (81349)	ea
4	O,F,H	9150-00-190-0904	GAA Grease, Auto/Artillery MIL-G-10924 (81349)	lb
5	O,F,H	9150-00-905-9100	GO Lubricating Oil, Grade 80 MIL-L-2105 (81349)	gal
6	O,F,H	9150-00-257-5440	GO Lubricating Oil, Subzero MILL-10324 (81349)	gal
7	O,F,H	9150-00-181-9858	Lubricating Oil, Engine OE 30 MIL-L-2104 (81349)	gal
8	O,F,H	9150-00-404-2372	Lubricating Oil, Engine OE 5 MIL-L-2104 (81349)	gal
8	O,F,H	9150-00-186-6668	Lubricating Oil, Engine OE 10 MIL-12104 (81349)	gal
9	O,F,H	9150-00-935-9807	OH T, Hydraulic Fluid, Petroleum Base MIL-H-6083 (81349)	qt

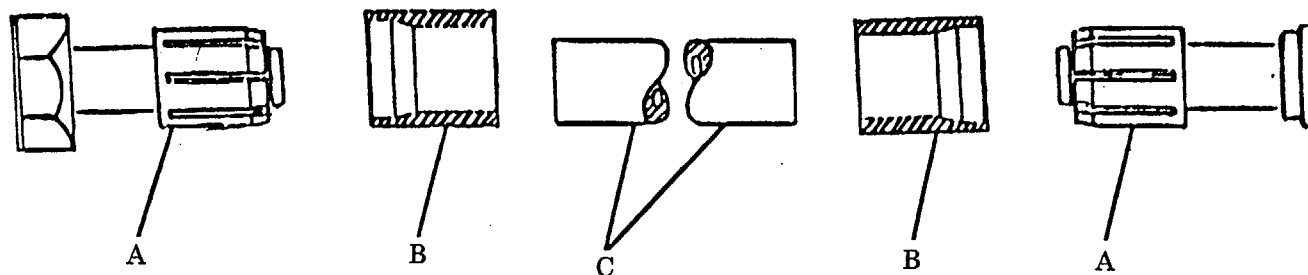
Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
10	O,F,H	8030-00-965-2438	Sealing Compound, Paste, 60 ft roll MILS-11030 (81349)	ft
11	O,F,H	8135-00-551-1245	Tape, Adhesive PPPT60 (81348)	yd
12	O,F,H	8010-00-297-0560	Enamel, Alkyd, Lusterless OD MIL-E-5556 (81349)	gal
13	O,F,H	8010-00-598-5936	Enamel, Semigloss OD, 12 oz can (pressurized) TTE8485 (81348)	ea
14	O,F,H	9140-00-180-6084	Fuel Oil, Diesel: DF2 VV-F-80D (81348)	gal
15	O,F,H	6810-00-356-4936	Distilled Water, Technical: 5 gal bottle	gal
16	C,O,F,H	7920-00-205-1711	Rag, Wiping: Cotton, Class 2. Grade B, 50 lb bundle DDD-R-30 (81348)	lb
17	O,F,H	6850-00-281-1985	Dry Cleaning Solvent (SD-2), 1 gal can P-D-680 (81348)	gal
18	O,F,H	7930-00-249-8036 P-D-220 (81348)	Detergent, General Purpose: 5 lb box	lb
19	O,F,H	6810-00-264-6618	Sodium Bicarbonate, Technical: 1 lb box	lb
20	F	--	Antiseize Compound 5P3931 (11083)	

APPENDIX C
ILLUSTRATED LIST OF MANUFACTURED ITEMS

MANUFACTURED HOSES

(Sheet 1 of 5)



- A. Stem Assy - Assembly may have nuts on the ends or may be attached with flanges. Stem assemblies will be listed as one per end.
- B. Sleeve Assy - Sleeves will be listed as one per end.
- C. Hose - Hoses listed are in bulk length.

Hose Assy No.	Bulk Hose No.	Hose Length	Sleeve No (Qty)	Stem Assy No. (Qty)
3V0188	5P0181	22 in. (0.56 m)	3S7252 (2)	3S8503 (1) 8S3918 (1)
3V0189	5P0181	25 in. (0.64 m)	3S7252 (2)	3S8503 (1) 8S3918 (1)
2V3785	5P0180	35 in. (0.89 m)	3S7166 (2)	5S3049 (1) 9S9724 (1)

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Go on to Sheet 2

MANUFACTURED HOSES (CONT)

(Sheet 2 of 5)

Hose Assy No.	Bulk Hose No.	Hose Length	Sleeve No. (Qty)	Stem Assy No. (Qty)
2V5040	5P0182	43 in. (1.1 m)	3S7116 (2)	5S3779 (1) 3S8570 (1)
2V2934	5P0181	22 in. (0.56 m)	3S7252 (2)	7S0570 (1) 7S0575 (1)
2V5043	5P0181	44 in. (1.12 m)	3S7252 (2)	7S0570 (1) 7S0575 (1)
3V0730	5P0178	25 in. (0.64 m)	4S5414 (2)	8S6417 (2)
2V5038	5P0182	17 in. (0.43 m)	3S7116 (2)	5S3779 (1) 3S8570 (1)
2V2931	5P0182	43 in. (1.1 m)	3S7116 (2)	5S3777 (1) 3S8568 (1)
3V0849	5P0178	19.7 in. (0.5 m)	4S5414 (2)	8S6393 (1) 1P9919 (1)
4V8370	5P0180	32.31 in. (0.82 m)	3S7166 (2)	3S8360 (1) 7S1712 (1)
3V7899	5P0180	53.15 in. (1.4 m)	3S7166 (2)	3S8363 (2)
2V7967	5P0178	12 in. (0.3 m)	4S5414 (2)	8S6393 (1) 8S6417 (1)
2V2180	5P0181	28.35 in. (0.72 m)	3S7252 (2)	7S0570 (1) 7S0574 (1)
2V2176	5P0180	39.76 in. (1.01 m)	3S7166 (2)	8S4591 (1) 3S8360 (1)

Go on to Sheet 3

MANUFACTURED HOSES-(CONT)

(Sheet 3 of 5)

Hose Assy No.	Bulk Hose No.	Hose Length	Sleeve No. (Qty)	Stem Assy No. (Qty)
2V2179	5P0180	37.01 in. (0.94 m)	3S7166 (2)	3S8363 (1) 3S8360 (1)
2V2178	5P0180	64.17 in. (1.63 m)	3S7166 (2)	3S8363 (1) 7S1712 (1)
2V7966	5P0180	53.98 in. (1.37 m)	3S7166 (2)	5S3049 (1) 5S5287 (1)
2V9298	5P0178	69.68 in. (1.77 m)	4S5414 (2)	8S6417(1) 8S6393 (1)
2V9301	5P0178	28 in. (0.7 m)	4S5414 (2)	8S6393 (1) 8S6417 (1)
2V9302	5P0178	36 in. (0.9 m)	4S5414 (2)	3S8496 (1)
2V9299	5P0178	75.2 in. (1.91 m)	4S5414 (2)	8S6417 (2)
2V6758	5P0181	42.5 in. (1.08 m)	3S7252 (2)	3S8496 (1) 7S0570 (1)
2V2109	5P0182	30 in. (0.76 m)	3S7116 (2)	7S1707 (1) 5S3777 (1)
2V6760	5P0181	32 in. (0.81 m)	3S7252 (2)	3S8498 (1) 7S0570 (1)
2V2986	5P0183	18.5 in. (0.4 7 m)	3S8330 (2)	7S9370 (1) 7S8439 (1)

Go on to Sheet 4

MANUFACTURED HOSES (CONT)

(Sheet 4 of 5)

Hose Assy No.	Bulk Hose No.	Hose Length	Sleeve No. (Qty)	Stem Assy No. (Qty)
3V2660	5P0183	17.3 in. (0.44 m)	3S8330 (2)	3S9331 (1) 3S9329 (1)
3V2661	5P0183	11.8 in. (0.3 m)	3S8330 (2)	3S9331 (1) 3S9330 (1)
2V2979	5P0183	55.9 in. (1.42 m)	3S8330 (2)	3S9327 (1) 5P3229 (1)
2V2988	5P0182	57.5 in. (1.46 m)	3S7116 (2)	7S1074 (1) 8S8957 (1)
538128	5P6624	92 in. (2.34 m)		690478 (2)
538129	5P6624	90 in. (2.29 m)		690478 (2)
538127	5P6624	76 in. (1.93 m)		690478 (2)
5R4516	5P0180	28 in. (0.71 m)	3S7166 (2)	8S6389 (1) 8S3759 (1)
5R4545	5P0180	25 in. (0.64 m)	3S7166 (2)	8S6389 (1) 8S3759 (1)
5R4514	5P0180	8 in. (2.24 m)	3S7166 (2)	8S6389 (1) 8S3759 (1)
5R4532	5P0181	89.4 in. (2.27 m)	3S7252 (2)	8S3918 (2)
5R4508	5P0181	25.6 in. (0.65 m)	3S7252 (2)	8S3918 (1) 8K5114 (1)

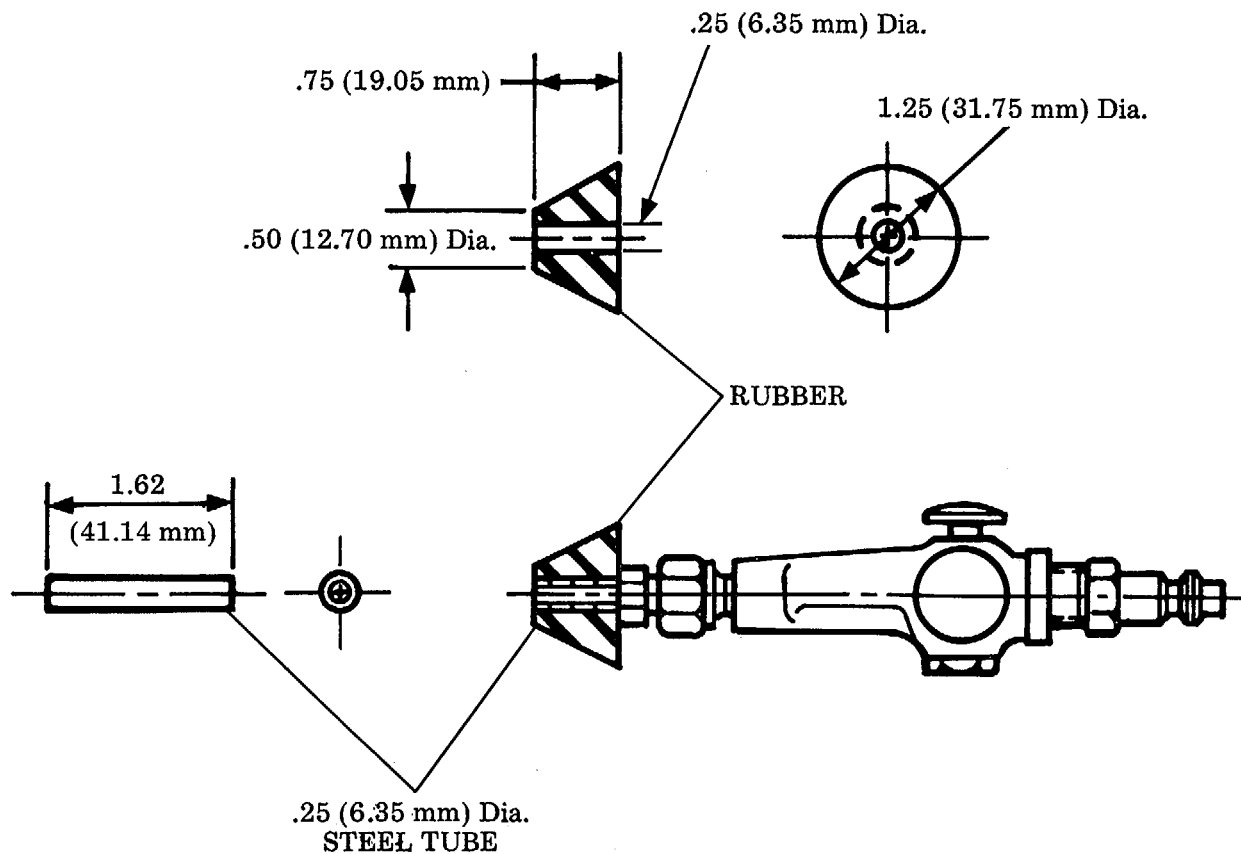
Go on to Sheet 5

MANUFACTURED HOSES (CONT)

(Sheet 5 of 5)

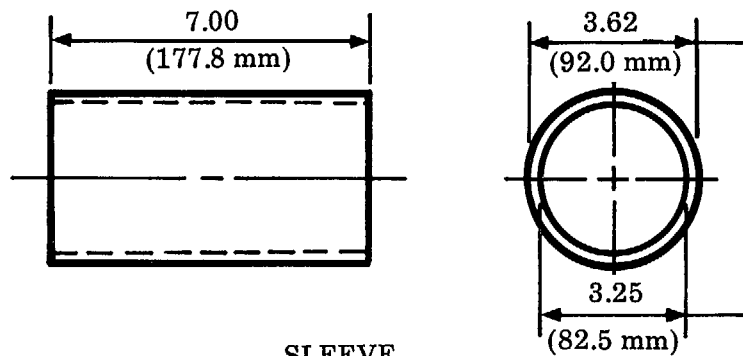
Hose Assy No.	Bulk Hose No.	Hose Length	Sleeve No. (Qty)	Stem Assy No. (Qty)
5R4511	5P0179	100 in. (2.54 m)	3S8606 (2)	8S4055 (2)
5R4509	5P0179	100 in. (2.54 m)	3S8606 (2)	8S6391 (1) 8S4055 (1)
5R4512	5P0179	100 in. (2.54 m)	3S8606 (2)	8S6391 (1) 8S4055 (1)
5R4523	5P0181	42.5 in. (1.08 m)	3S7252 (2)	2P1411 (1) 8S3918 (1)
5R4497	5P0740	193 in. (4.9 m)	3S7116 (2)	2P0988 (2)
5R4501	5P0180	24 in. (0.61 m)	3S7166 (2)	8S6389 (2)

End



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End

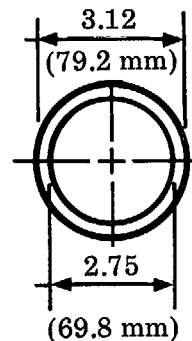
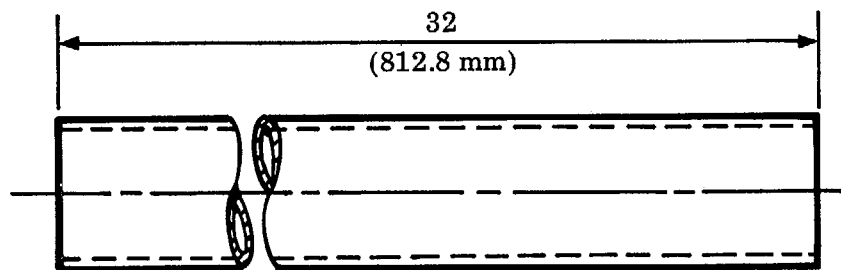


NOTE

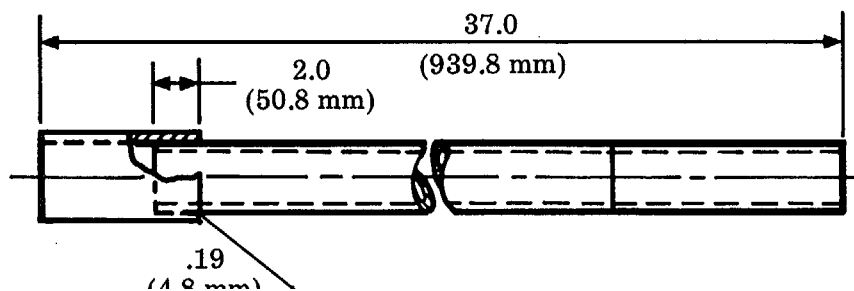
Break all sharp corners.

MATERIAL

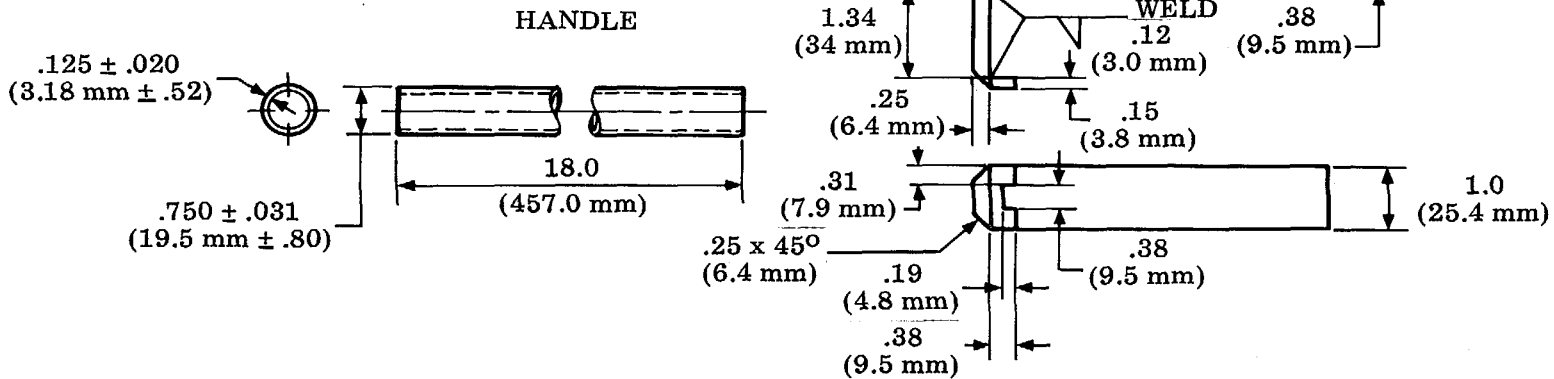
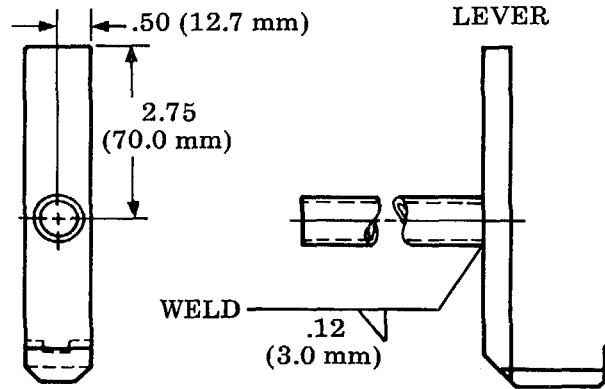
SAE1025 ROUND TUBING



HANDLE




MATERIAL
SAE1020 STEEL




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End

THREAD DIAMETER		STANDARD TORQUE	
inches	millimeters	lb. ft.	N·m*
<p>Standard thread</p> 		<p>Use these torques for bolts and nuts with standard threads (conversions are approximate).</p>	
1/4	6.35	9 ± 3	12 ± 4
5/16	7.94	18 ± 5	25 ± 7
3/8	9.53	32 ± 5	45 ± 7
7/16	11.11	50 ± 10	70 ± 15
1/2	12.70	75 ± 10	100 ± 15
9/16	14.29	110 ± 15	150 ± 20
5/8	15.88	150 ± 20	200 ± 25
3/4	19.05	265 ± 35	360 ± 50
7/8	22.23	420 ± 60	570 ± 80
1	25.40	640 ± 80	875 ± 100
1 1/8	28.58	800 ± 100	1100 ± 150
1 1/4	31.75	1000 ± 120	1350 ± 175
1 3/8	34.93	1200 ± 150	1600 ± 200
1 1/2	38.10	1500 ± 200	2000 ± 275
<p>Use these torques for bolts and nuts on hydraulic valve bodies.</p>			
5/16	7.94	13 ± 2	20 ± 3
3/8	9.53	24 ± 2	35 ± 3
7/16	11.11	39 ± 2	50 ± 3
1/2	12.70	60 ± 3	80 ± 4
5/8	15.88	118 ± 4	160 ± 6

*1 newton meter (N-m) is approximately the same as 0.1 mkg.

Go on to Sheet 2

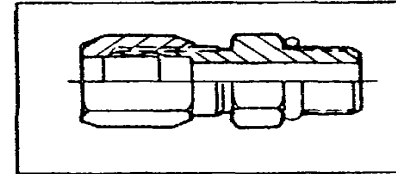
THREAD DIAMETER		STANDARD TORQUE	
inches	millimeters	lb. ft.	N·m*
 <p>Taperlock stud</p>		Use these torques for studs with Taperlock threads.	
1/4	6.35	5 ± 2	7 ± 3
5/16	7.94	10 ± 3	15 ± 5
3/8	9.53	20 ± 3	30 ± 5
7/16	11.11	30 ± 5	40 ± 10
1/2	12.70	40 ± 5	55 ± 10
9/16	14.29	60 ± 10	80 ± 15
5/8	15.88	75 ± 10	100 ± 15
3/4	19.05	110 ± 15	150 ± 20
7/8	22.23	170 ± 20	230 ± 30
1	25.40	260 ± 30	350 ± 40
1 1/8	28.58	320 ± 30	400 ± 40
1 1/4	31.75	400 ± 40	550 ± 50
1 3/8	34.93	480 ± 40	650 ± 50
1 1/2	38.10	550 ± 50	750 ± 70

*1 newton meter (N-m) is approximately the same as 0.1 mkg.

Go on to Sheet 3

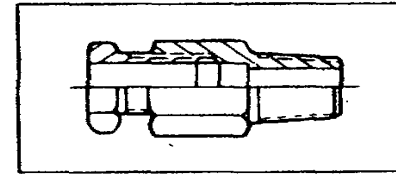
Ermeto Tube Fittings

Put nut and sleeve over the tube with head or shoulder end of sleeve next to nut. Push tube into counterbore of fitting body as far as possible. Turn nut clockwise until sleeve holds tube and prevents movement. Tighten the nut 1 1/4 turns more to seat sleeve and give a locking action. When necessary to assemble again, put sleeve over tube and tighten nut until a sudden increase in torque is felt. Then tighten 1/6 to 1/3 turn more to seat the sleeve.



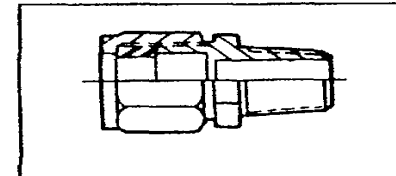
Flex Fittings

Put nut and sleeve over tubing and push tube into counterbore of fitting body as far as possible. Tighten the nut until it is against the hex part of the fitting body.



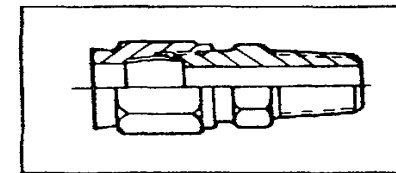
Hi Duty (shear sleeve) Tube Fittings

After tube has been put through the nut and makes contact against the tube shoulder in the fitting body, turn the nut with a wrench until a small decrease in torque is felt. This is an indication that the sleeve has been broken off of the nut. Hold the tube to prevent turning and tighten the nut 1 and 1/2 turns.



Hi Seal Fittings

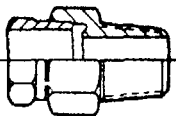
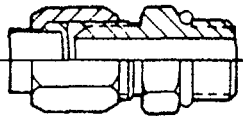
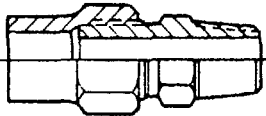
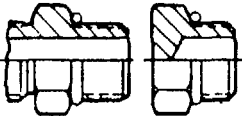
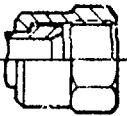
Put nut and sleeve over the tubing with the short heavy end of the sleeve facing the end of tubing. Put the tube end against the counterbore in the body of the fitting and tighten until nut is over the last thread on the body. The remainder of space is used whenever the fitting is removed and installed again.



Go on to Sheet 4

NOTE

The torques shown in the chart that follows are to be used on the nut part of 370 Flared, 450 Flared and Inverted Flared fittings (when used with steel tubing), O-ring plugs, O-ring fittings and swivel nuts when used in applications to 3000 psi (210.9 kg/cm²) (20700 kPa).

		 INVERTED 45° FLARED					 37° FLARED					 45° FLARED					 O-RING FITTING - PLUG		 SWIVEL NUTS	
TUBE SIZE (O.D.)	mm	3.18	4.78	6.35	7.92	9.52	TUBE SIZE (O.D.)	mm	12.70	15.88	19.05	22.22	25.40	31.75	38.10	50.80				
	in.	.125	.188	.250	.312	.375		in.	.500	.625	.750	.875	1.000	1.250	1.500	2.000				
THREAD SIZE (in.)		5/16	3/8	7/16	1/2	9/16 5/8	THREAD SIZE (in.)		3/4	7/8	1 1/16	1 3/16 1 1/4	1 5/16	1 5/8	1 7/8	2 1/2				
TORQUE N·m		5 ±1	9 ±1	16 ±2	18 ±2	21 ±2	TORQUE N·m		40 ±7	55 ±7	75 ±7	90 ±7	110 ±7	135 ±15	160 ±15	310 ±30				
TORQUE lb.in.		45 ±10	80 ±10	145 ±20	155 ±20	190 ±20	TORQUE lb.ft.		30 ±5	40 ±5	55 ±5	65 ±5	80 ±5	100 ±10	120 ±10	230 ±20				

Go on to Sheet 5

ENGINE SPECIAL TORQUE VALUES

(Sheet 5 of 11)

1. Upper drive shaft at torque converter - capscrews	90-110 lb. ft. (122-150 N m)
2. Fan belt adjustment rod nuts	95-125 lb. ft. (129-169 N-m)
3. Engine oil pump drive gear capscrew	35-45 lb. ft. (47-61 N m)
4. Cylinder head capscrews	315-345 lb. ft. (427-467 N m)
5. Rocker shaft capscrews	315-345 lb. ft. (427-467 N m)
6. Cylinder head housing capscrew	27-37 lb. ft. (36-50 N m)
7. Cylinder head 3/8" capscrews	27-37 lb. ft. (36-50 N m)
8. Exhaust manifold capscrews	17-23 lb. ft. (23-31 N m)
9. Valve cover base capscrews	13-23 lb. ft. (17-31 N m)
10. Fuel line nuts	25-35 lb. ft. (34-48 N m)
11. Cylinder lines crossbar capscrews	65-75 lb. ft. (85-105 N m)
12. Connecting rod nuts	54-66 lb. ft. (73-89 N m)
13. Crankshaft main bearing cap capscrews	180-200 lb. ft. (244-272 N m)

Go on to Sheet 6

FUEL SYSTEM SPECIAL TORQUE VALUES

(Sheet 6 of 11)

1. Fuel injection pump bushing	140-160 lb. ft. (190-218 N m)
2. Fuel lines nuts	25-35 lb. ft. (32-48 N-m)
3. Fuel injection valve nut	50-60 lb. ft. (34-46 N m)
4. Fuel transfer pump driveshaft gear nut	17-27 lb. ft. (24-36 N m)
5. Fuel transfer pump plug	24-30 lb. ft. (32-40 N m)
6. Turbocharger capscrew	36-44 lb. ft. (44-49 N m)

COOLING SYSTEM SPECIAL TORQUE VALUES

1. Water pump impeller nut	26-30 lb. ft. (36-42 N m)
----------------------------	---------------------------

DRIVE SHAFT SPECIAL TORQUE VALUES

1. Drive shaft spider capscrews	90-110 lb. ft. (122-149 N m)
2. Yoke retainer capscrews	65-85 lb. ft. (88-115 N m)

Go on to Sheet 7

DIFFERENTIAL AND BEVEL GEAR SPECIAL TORQUE VALUES

(Sheet 7 of 11)

1. Differential yoke retaining capscrew	230-300 lb. ft. (312-407 N m)
2. Differential case flange capscrews	315-385 lb. ft. (427-523 N m)
3. Differential housing and case assembly capscrews	175-225 lb. ft. (238-304 N m)
4. Rear axle support cover capscrews	315-385 lb. ft. (425-525 N m)
5. Rear and front support main capscrews	750-900 lb. ft. (1007-1218 N m)

BRAKE ASSEMBLIES SPECIAL TORQUE VALUES

1. Parking brake control valve plug	7-11 lb. ft. (9-15 N m)
2. Accumulator head capscrews	675-725 lb. ft. (915-983 N m)
3. Parking brake retainer capscrew	80-90 lb. ft. (109-121 N m)
4. Control valve stem nut	32-38 lb. ft. (44-52 N m)
5. Accumulator charging valve stem plug	18-22 lb. ft. (24-30 N m)

Go on to Sheet 8

 BRAKE ASSEMBLIES SPECIAL TORQUE VALUES (CONT)

(Sheet 8 of 11)

- | | |
|---|---------------------------|
| 6. Accumulator charging valve plug | 47-53 lb. ft. (64-72 N m) |
| 7. Accumulator charging valve piston plug | 47-53 lb. ft. (64-72 N m) |

 WHEELS SPECIAL TORQUE VALUES

- | | |
|-----------------------------|-------------------------------|
| 1. Tire and rim nuts | 340-440 lb. ft. (460-596 N m) |
| 2. Wheel assembly capscrews | 55-75 lb. ft. (74-102 N m) |

 STEERING SYSTEM SPECIAL TORQUE VALUES

- | | |
|---|---------------------------------------|
| 1. Hand metering unit cap capscrews | 18-24 lb. ft. (24.4-32.5 N m) |
| 2. Steering cylinder retaining pin capscrews | 230-300 lb. ft. (311.8-406.7 N m) |
| 3. Articulated hitch cover assembly capscrews | 65-85 lb. ft. (88.1-115.2 N m) |
| 4. Hydraulic pump nuts | 165-185 lb. ft. (223.7-250.8 N m) |
| 5. Hydraulic pump seal retainer screws | 13 lb. ft. (16.3 N m) |
| 6. Hydraulic pump capscrews | 80-90 lb. ft. (108.5-122 N m) |
| 7. Steering cylinder piston nut | 1440-1760 lb. ft. (1952.4-2386.2 N m) |

Go on to Sheet 9

BODY, CAP, HOOD AND HULL SPECIAL TORQUE VALUES

(Sheet 9 of 11)

- | | |
|---|--------------------------------|
| 1. ROPS one inch capscrews | 560-720 lb. ft. (775-975 N m) |
| 2. ROPS one and one-eighth inch capscrews | 400-700 lb. ft. (950-1250 N m) |

HYDRAULIC SYSTEM SPECIAL TORQUE VALUES

- | | |
|-----------------------------|---------------------------------------|
| 1. Hydraulic pump nuts | 280-320 lb. ft. (379.6-426.9 N m) |
| 2. Tilt cylinder piston nut | 2225-2275 lb. ft. (3016.7-3084.5 N m) |

TRANSMISSION SPECIAL TORQUE VALUES

- | | |
|--|-----------------------------|
| 1. Torque converter drive spider capscrews | 77-85 lb. ft. (106-116 N m) |
| 2. Turbine capscrews | 77-85 lb. ft. (106-116 N m) |
| 3. Disc assembly capscrews | 19-21 lb. ft. (26-28 N m) |
| 4. Clutch housing capscrews | 34-38 lb. ft. (43-49 N m) |

Go on to Sheet 10

5. Torque converter yoke capscrew	80-90 lb. ft. (109-121 N m)
6. Transmission carrier housing assembly capscrews	27-37 lb. ft. (36-50 N m)
7. Planet carrier capscrews	27-37 lb. ft. (37-51 N m)
8. Clutch housing capscrews	65-85 lb. ft. (88-116 N m)
9. Transmission housing capscrews	65-85 lb. ft. (88-116 N m)
10. Transmission hydraulic controls capscrews	32-38 lb. ft. (44-52 Nom)
11. Transmission controls manifold capscrew	19-25 lb. ft. (25-34 N m)
12. Transmission controls cover capscrews	19-25 lb. ft. (26-34 N m)
13. Transmission control valve capscrews	19-25 lb. ft. (26-34 N m)
14. Drive shaft capscrews	90-110 lb. ft. (128-149 N m)
15. Bearing cage retainer capscrews	35-45 lb. ft. (48-60 N m)
16. Output transfer gears yoke capscrew	315-385 lb. ft. (426-522 N m)

Go on to Sheet 11

17. Final drive planet carrier cover nuts	335-445 lb. ft. (454.2-603.3 N m)
18. Transmission control lock rail nut	41-63 lb. ft. (55-85 N m)
19. Transmission control-cap capscrews	32-38 lb. ft. (44-52 N m)
20. Sequence and pressure control valve control cable capscrew	19-25 lb. ft. (36-44 N m)

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