

SECTION 17

OIL DISC BRAKES

GRADER SERIAL NUMBERS
Models 710 thru 740A: 21134 & UP, excluding 21225
Models 750 thru 780A: 21386 & UP

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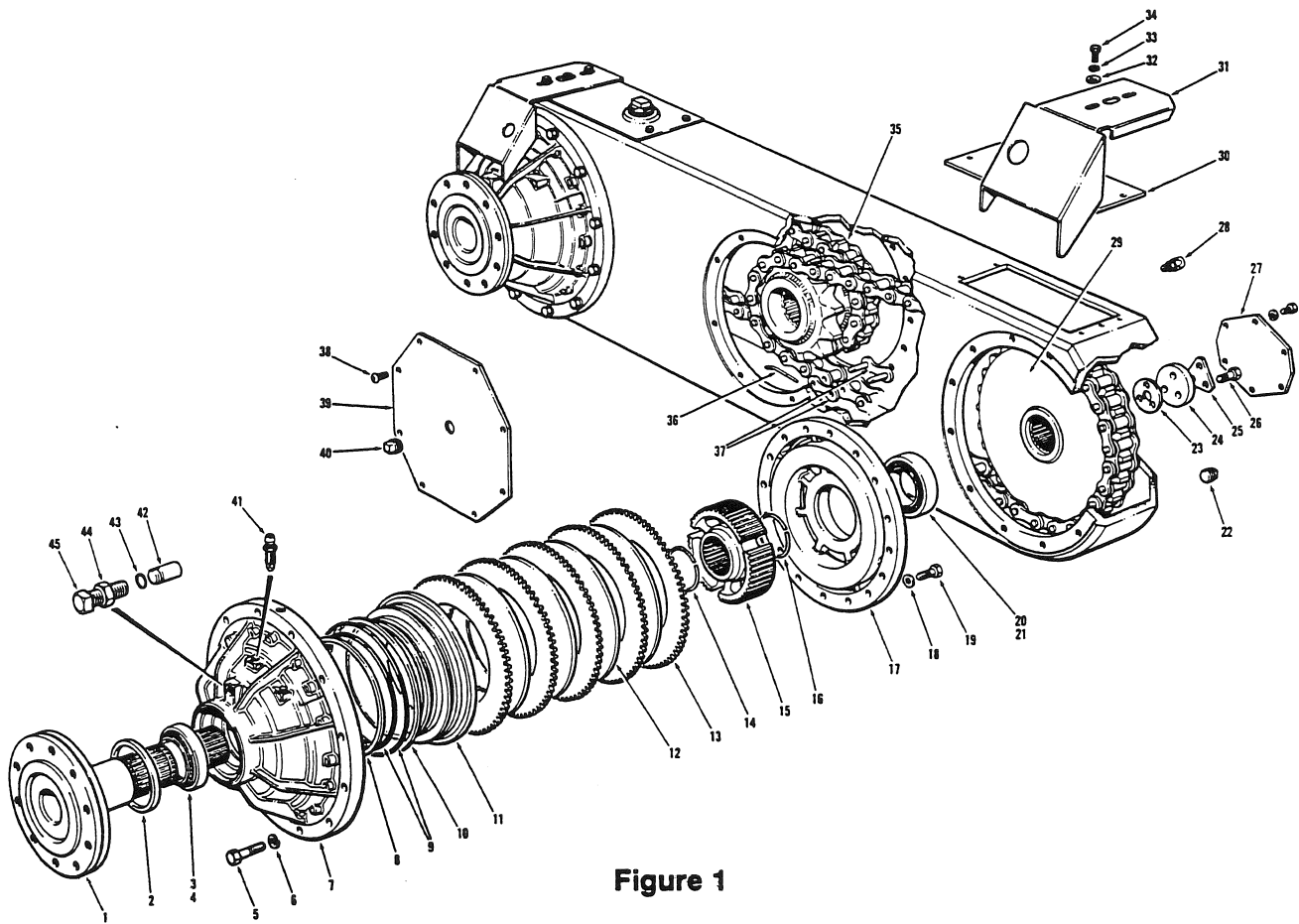


Figure 1

KEY TO FIGURE 1

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1.	AXLE SHAFT	24.	RETAINER PLATE
2.	OIL SEAL	25.	TAB WASHER
3.	OUTBOARD BEARING CUP	26.	RETAINER PLATE CAPSCREWS
4.	OUTBOARD BEARING CONE	27.	COVER
5.	BRAKE HOUSING MOUNTING BOLTS	28.	BREATHER
6.	LOCKWASHERS	29.	SPROCKET
7.	BRAKE HOUSING	30.	INSPECTION COVER
8.	INNER BACK-UP RING	31.	BRAKE LINE SHIELD
9.	O-RINGS	32.	FLATWASHERS
10.	OUTER BACK-UP RING	33.	LOCKWASHERS
11.	PISTON	34.	CAPSCREWS
12.	FRICITION DISCS	35.	TANDEM DRIVE CHAIN
13.	REACTION PLATES	36.	CONNECTOR PIN
14.	OUTER SNAP RING	37.	CONNECTOR LINK
15.	HUB	38.	SIDE COVER PLATE CAPSCREWS
16.	INNER SNAP RING	39.	SIDE COVER PLATE
17.	BACK-UP PLATE	40.	OIL LEVEL CHECK PLUG
18.	HARDENED WASHERS	41.	BLEEDER SCREW
19.	BACK-UP PLATE RETAINING BOLTS	42.	ADJUSTING PIN
20.	INBOARD BEARING CUP	43.	O-RING
21.	INBOARD BEARING CONE	44.	JAM NUT
22.	TANDEM DRAIN PLUG	45.	PISTON TRAVEL LIMITING SCREW
23.	SHIM PACK		

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Specifications

Bolt Torque Specifications

	Imperial	Metric
1. Sprocket Retaining Bolts	200 ft.lbs	270 N.m
2. Cover Plate	23 ft.lbs	32 N.m
3. Inspection Cover	23 ft.lbs	32 N.m

Use diagonal tightening pattern for the following:

4. Brake Housing to Tandem	170 ft.lbs	230 N.m
5. Wheel to Axle Bolts	480 ft.lbs	650 N.m
6. Back-up Plate to Brake Housing	100 ft.lbs	135 N.m

Use Loctite 515, Champion P/N 25303, as gasket material to seal the brake housing to the tandem and to seal the threads of the attaching bolts.

Use an RTV Silicone Sealant, Champion P/N 56247, as a gasket material to seal the side cover plate and the inspection covers.

Testing and Adjustments

Bearing Preload Adjustment

Rolling torque of housing without discs and plates installed:

12 - 15 ft.lbs 16.25 - 20 N.m

Piston Travel Adjustment

With Discs and Plates in the clamped position, turn piston travel limiting screw in (item - 45) in the exploded view) until it touches the piston and turn it out 1.5 turns.

Friction Disc Thickness

New	0.133" - 0.139"	3.38 - 3.53 mm
Min.	0.103"	2.62 mm (Grooves Gone)

Reaction Plate Thickness

New	0.120" - 0.125"	3.05 - 3.18 mm
Min.	0.115"	2.92 mm

NOTE: Quantity of discs and plates in the Brake Units differ between grader models.

Grader Model	Qty. Friction Discs	Qty. Reaction Plates
710/710A	3	4
720/720A	4	5
730/730-A	4	5
740/740A	5	6
750/750A	5	6
780/780A	5	6

IMPORTANT: The axle shafts and back-up plates used in the brake units differ between grader models. Refer to the parts manual when ordering these components.

Cleaning and Inspection

Cleaning - General



WARNING

Alkali cleaning solvents and vapors are extremely harmful and can cause serious injury to eyes, lungs and skin. Always wear protective clothing, goggles and respirator. Use utmost care when handling chemicals.



CAUTION

You are recommended to wear cotton gloves when handling bearings. This prevents skin acids and perspiration contaminating the races and rolling elements.

Immerse small parts and machined components into a mild alkali cleaning solvent. Agitate the parts to remove all foreign matter.

Parts should remain in the solvent long enough to be thoroughly cleaned and heated. This will help evaporate the solvent and rinse water. Thoroughly rinse parts to remove all traces of cleaning solvent.

Cleaning - Bearings

After rinsing, immediately dry the parts using moisture-free compressed air. Lint-free, uncontaminated wiping rags can be used.

Immerse bearings in cleaning solvent. Rinse the cleaned bearings and dry with moisture-free compressed air while rotating them **slowly** by hand. **DO NOT** spin bearings when drying. Lubricate all bearings with system oil; wrap in clean, lint-free cloth or paper and store in a cool, dry place.

Inspection - General

A careful and thorough inspection of all parts is extremely important. Replace all parts showing indications of wear or damage.

Inspection - Bearings

Carefully inspect all rollers, cages and cups for wear, nicks or chipping. When replacing bearings, **ALWAYS** install new mating cups and cones. After inspection, lubricate all bearings with system oil; wrap in clean, lint-free cloth or paper and store in a cool, dry place.

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Principles of Operation

The Champion Oil Disc Brake System consists of the brake units, a hydraulic brake booster with an integral back-up electric pump, a master cylinder with reservoir and hydraulic brake lines.

The booster is supplied by its own hydraulic pump mounted on the side of the engine. The booster pump is the smallest unit in the pump assembly.

The hydraulic brake booster multiplies the force of the pressed brake pedal and transfers it to the master cylinder. Refer to Section 16 for information about the master cylinder and booster assembly.

The oil disc brake units are supplied with apply fluid from the dual circuit master cylinder. Each of the two outlet ports on the master cylinder use a "T" fitting, connected to flexible brake hoses that divide the apply fluid in a diagonal pattern to the four brake units.

The apply fluid enters the brake unit at the top of the brake housing. In the piston chamber, the fluid moves the piston away from the "piston travel limiting screw" toward the friction disc and reaction plate assembly. As the piston compresses the discs and plates together, the tandem oil is forced out of the friction disc grooves. Braking action results as the friction discs contact the reaction plates.

The friction discs are splined to a hub that is splined to the axle shaft. The wheel and tire assembly is bolted to the axle shaft.

To release the brakes, lift your foot from the brake pedal. The apply fluid pressure will vent to the master cylinder reservoir. The grooves in the rotating friction discs allow the tandem oil to pass between the friction discs and the stationary reaction plates. This allows the plates and discs to separate slightly moving the piston toward the "piston travel limiting screw". Once the piston releases its clamping force, the discs, hub, axle, wheel and tire rotate freely.

Refer to the LUBRICATION SPECIFICATIONS on pages iv and v at the front of this SHOP MANUAL for tandem oil and apply fluid capacities and specifications.

NOTE: *Always place the grader in the service position before attempting any overhaul maintenance or inspection procedure.*

Refer to the SERVICE POSITION procedure on page ii in the front of the shop manual.

To do the following procedures, you will need to start the engine several times. Be sure it is safe to start the engine each time. Remember to remove the keys after you shut the engine off.



WARNING

USE ONLY petroleum base fluid in the brake reservoir. Other fluids may cause brake failure. Severe personal injury or death could result.

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Removal

Fig. 2

Turn the isolation switch to the "ON" position. Start the engine. Lower the moldboard onto blocks to raise the desired tandem. Place adequate blocks under the tandem, then lower the tandem onto the supports. Stop the engine. Apply the hand brake. Turn the isolation switch to the "OFF" position.

NOTE: *It may be necessary to loosen the wheel retaining bolts before raising the tandem. DO NOT remove bolts at this stage.*

Fig. 3

Place a container under the tandem drain plug (22). Remove the plug and drain the lubricating oil. Clean and reinstall the drain plug.

Fig. 4

Remove the wheel retaining bolts and the wheels.

Fig. 5

Remove the capscrews (34), lockwashers (33), and flat washers (32) securing the cover plates (30) and brake line shields (31). Remove the cover plates and brake line shields. (Ref. Fig. 1).

Fig. 6

Remove the tandem side cover plate (27).

Fig. 7

Working through the inspection port on top of tandem, turn the sprocket (29) and drive chain (35) until the connector link (37) is accessible. Remove cotter pins (if applicable) and connector link from the chain.

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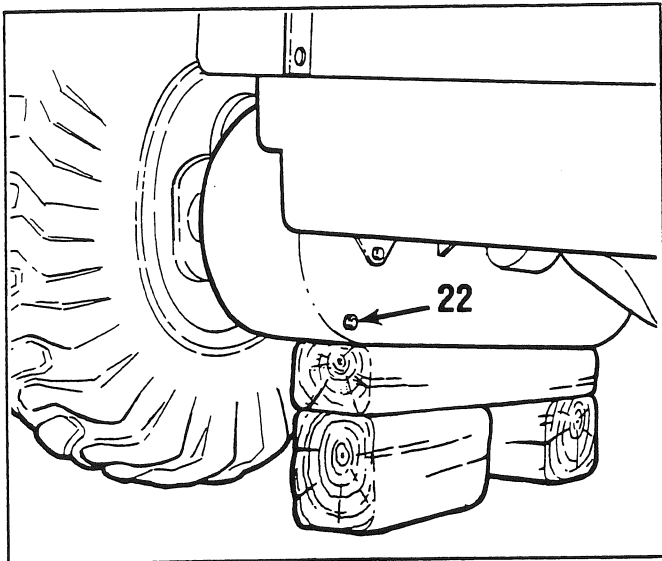


Fig. 2

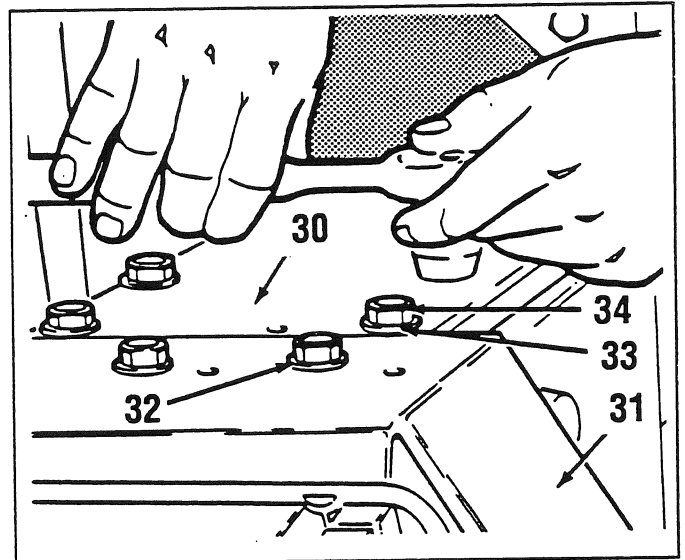


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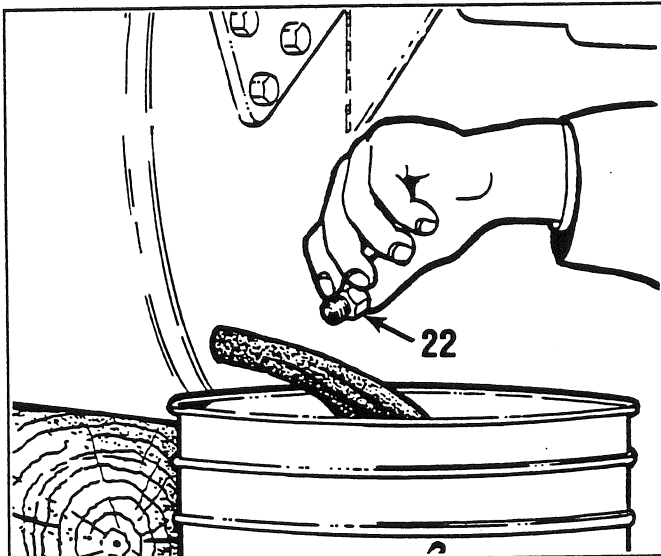


Fig. 3

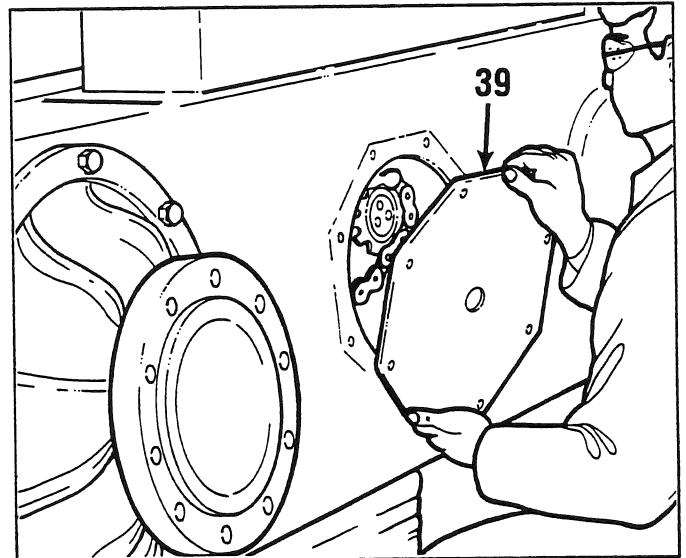


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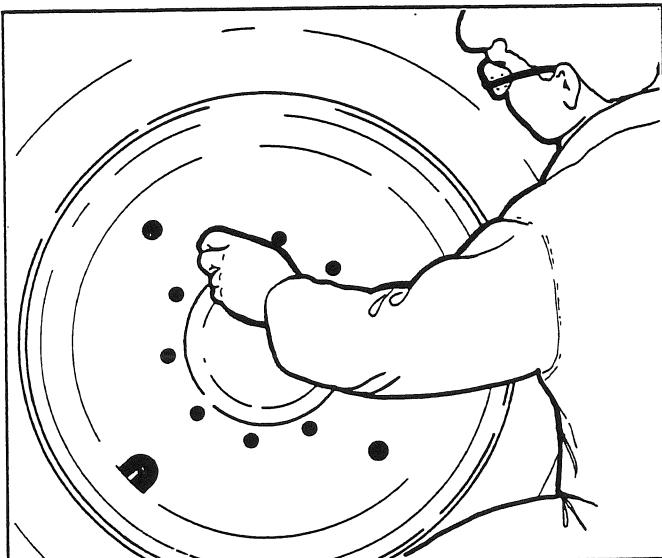


Fig. 4
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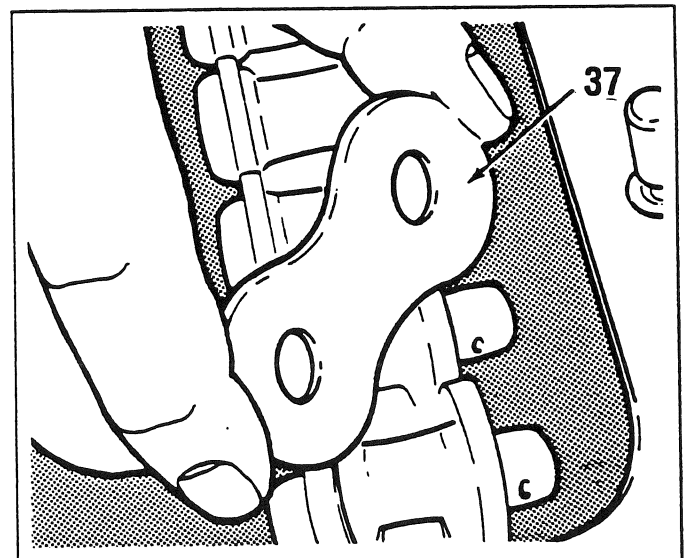


Fig. 7

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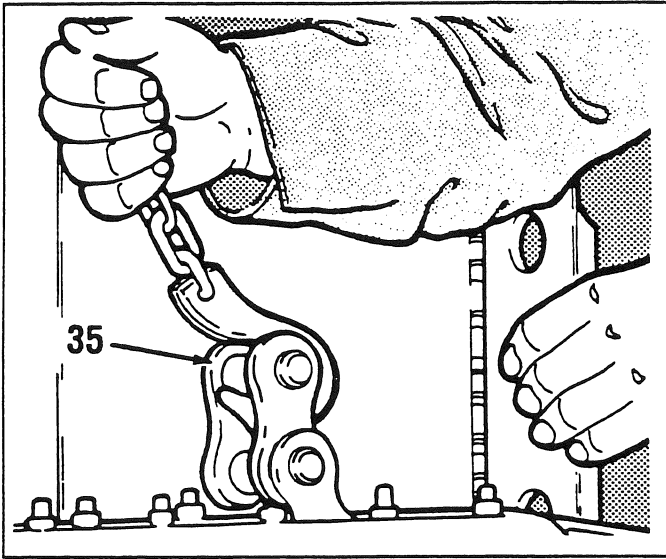


Fig. 8

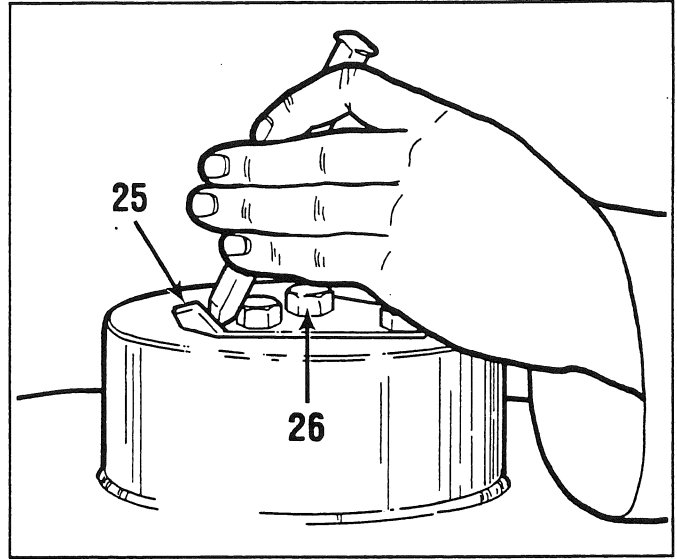


Fig. 11

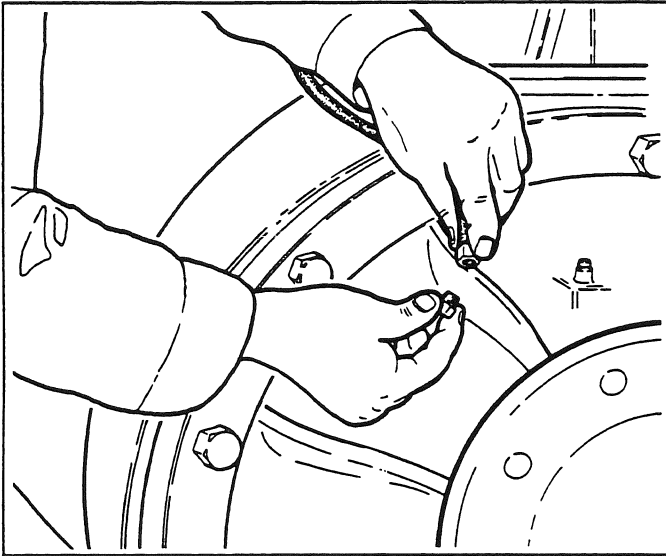


Fig. 9

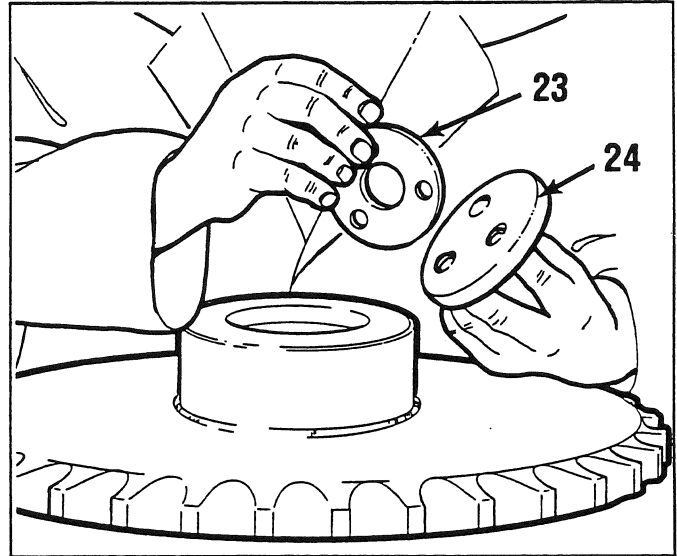


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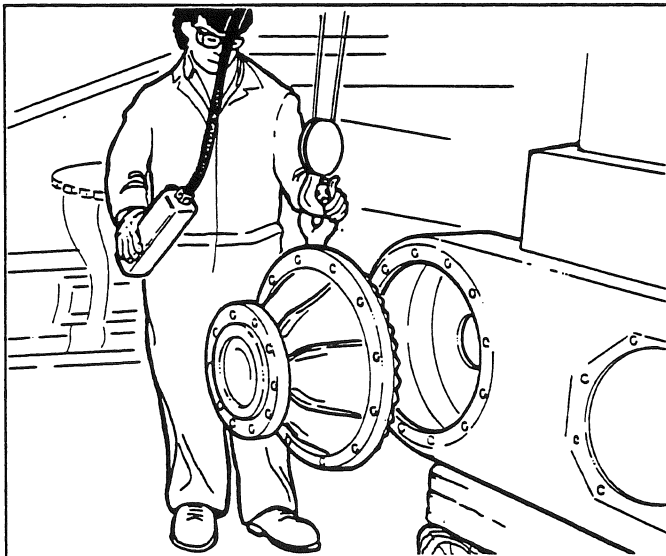


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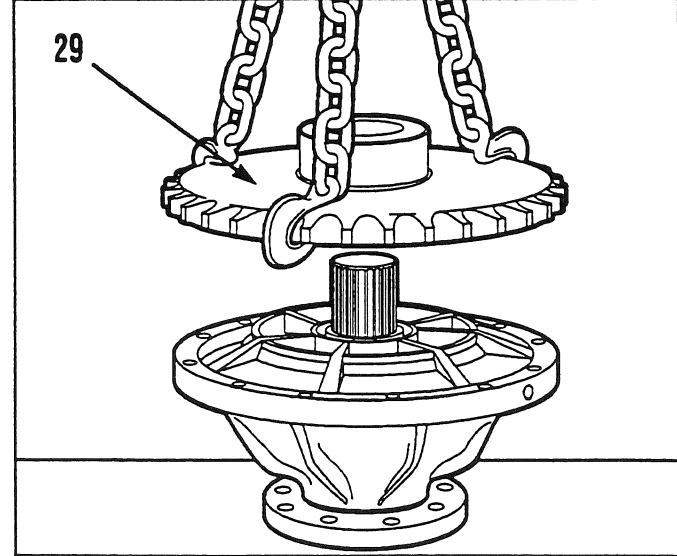


Fig. 13

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Fig. 8

Using a safe lifting device, remove the tandem drive chains (35) through the inspection port.

Fig. 9

Remove the brake line and plug the open port of the brake line to prevent contamination.

Fig. 10

Attach a safe lifting device. Remove the brake housing mounting bolts (5) and lockwashers (6). Remove the brake assembly from the tandem.

Disassembly

Fig. 11

Place the unit, with the wheel mounting flange down, onto a level work surface. Bend back the tabs of the tab washers (25).

Fig. 12

Remove the capscrews, the tab washer (25), the retain-er plate (24) and the shims (23). Keep the original shims for reinstallation.

Fig. 13

Remove the sprocket (29) using a safe lifting device. Note the proper orientation of the sprocket flange for reassembly.

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Fig. 14

Remove the back-up plate retaining bolts (19) and hardened washers (18). Install a puller assembly. Remove the inboard bearing cone (21) and back-up plate, (17). Inspect the bearing cone for damage.

Fig. 17

Remove the hub (15) from the axle shaft (1).

Fig. 15

Place the back-up plate (17) in a press and remove the inboard bearing cup (21).

Fig. 18

Remove the friction discs (12) and the reaction plates, (13) from the brake housing (7). Be sure to keep them in order. Inspect each plate and disc as you remove them.

Fig. 16

Remove the inner snap ring (16) from the axle shaft (1).

Fig. 19

Using a safe lifting device, remove the brake housing (7) from the axle shaft (1).

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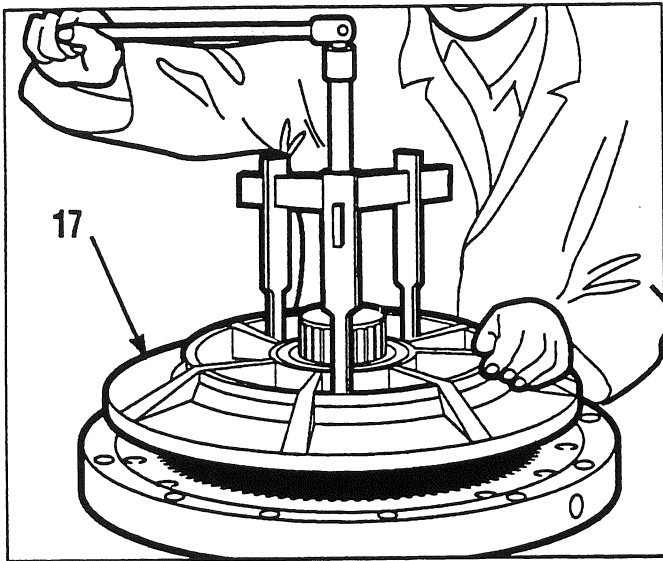


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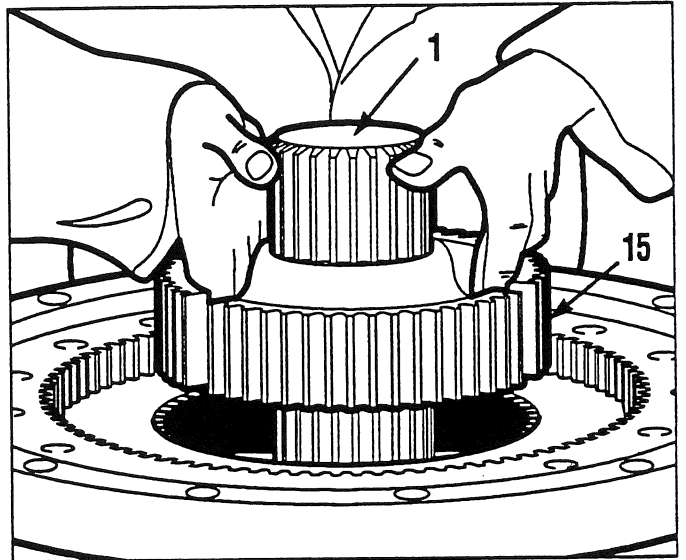


Fig. 17

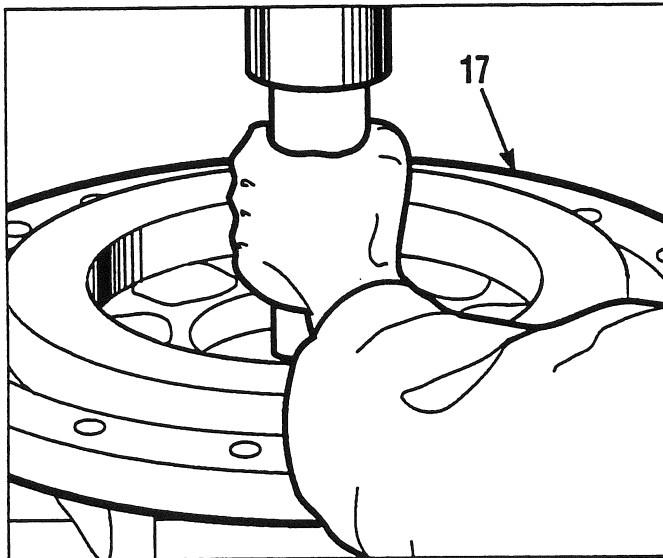


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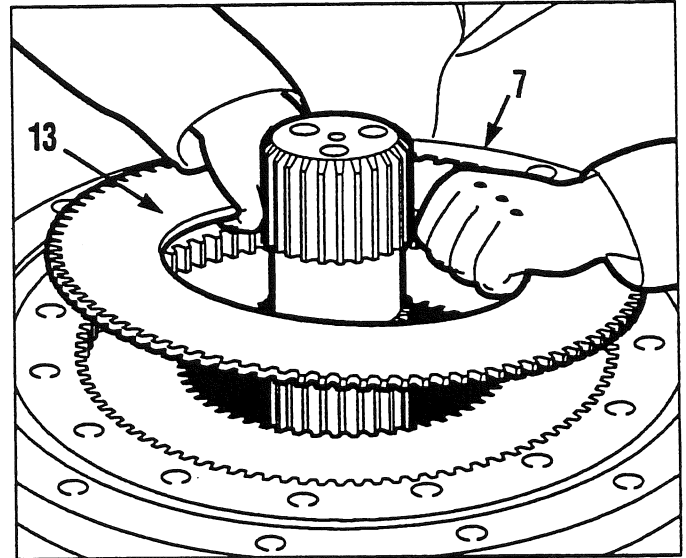


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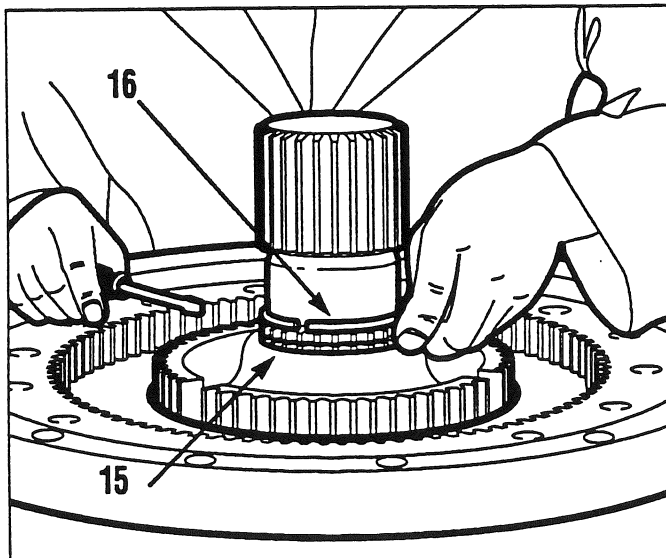


Fig. 16
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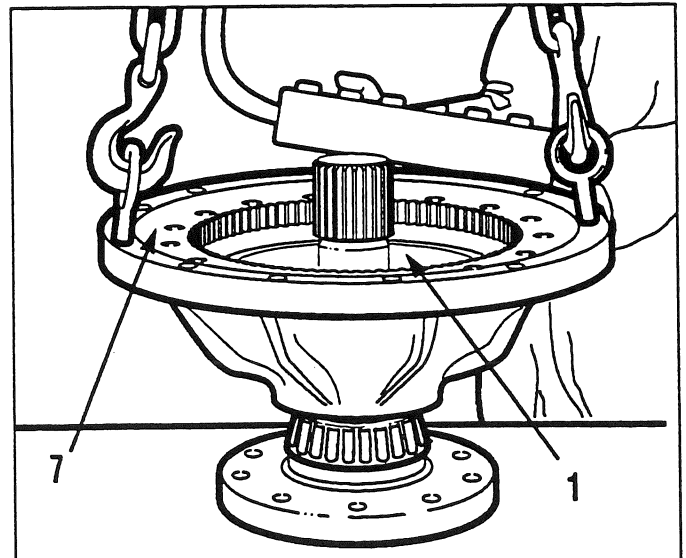


Fig. 19

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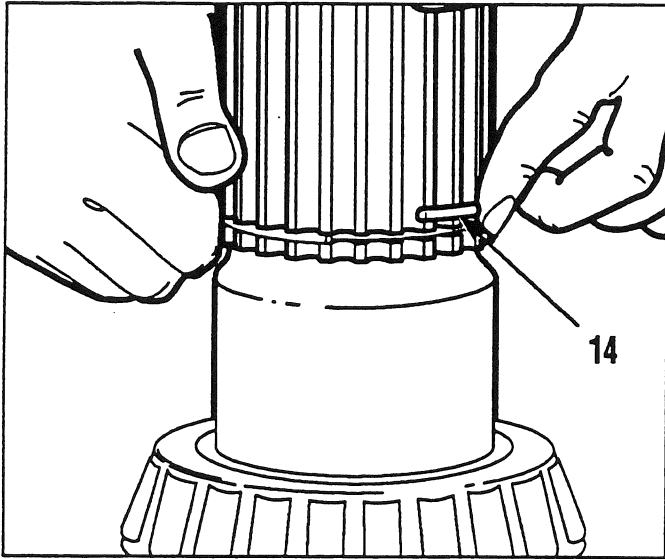


Fig. 20

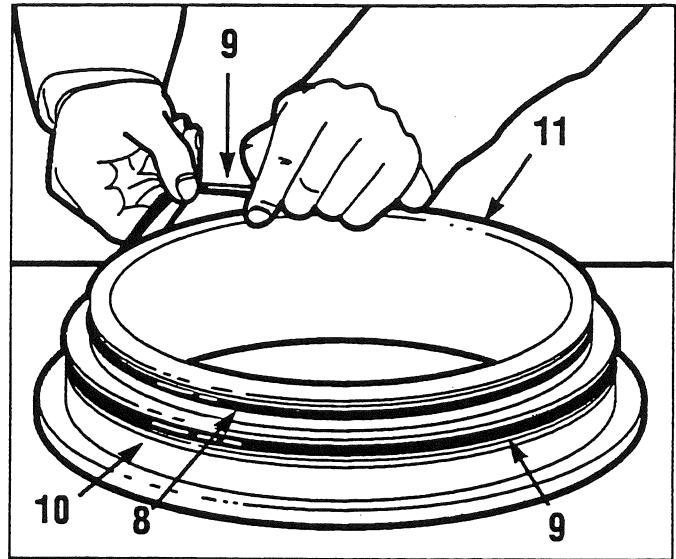


Fig. 23

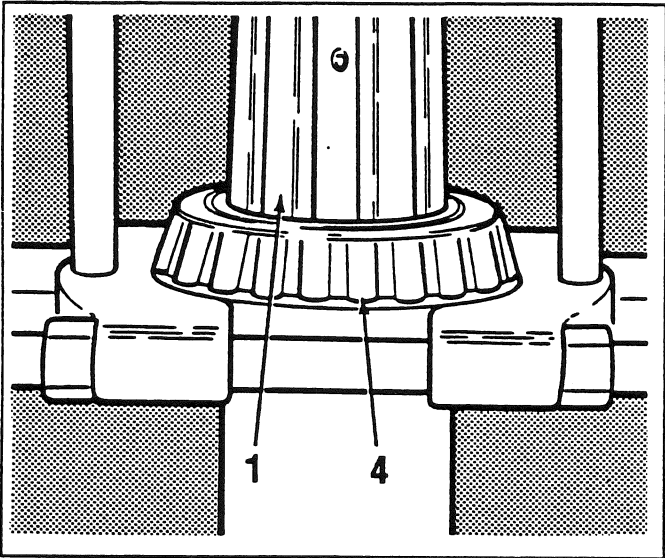


Fig. 21

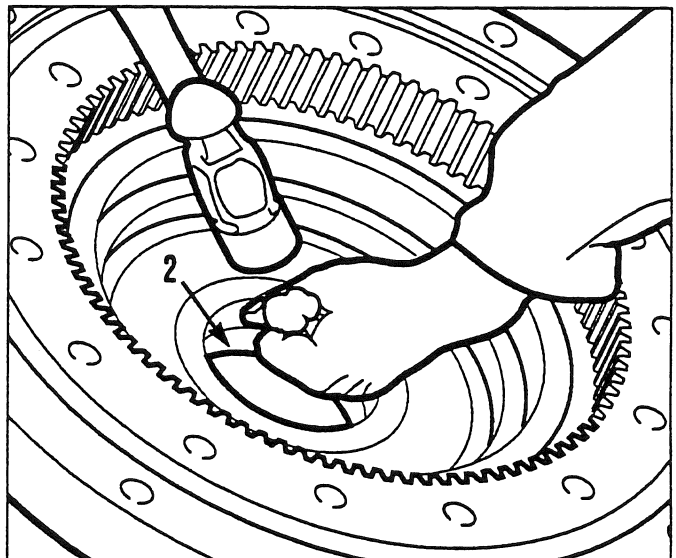


Fig. 24

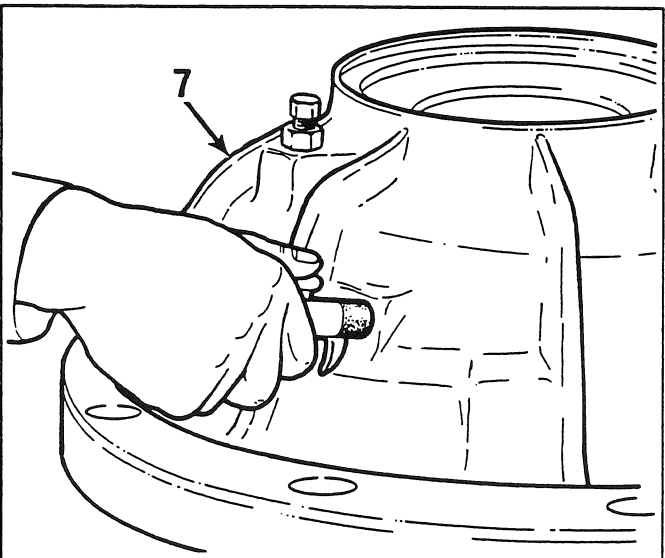


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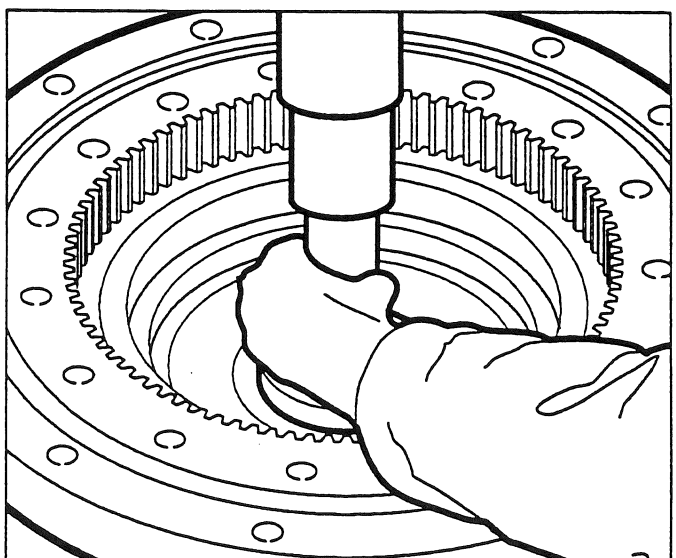


Fig. 25

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Fig. 20

Remove the outer wire snap ring (14) from the axle shaft (1).

Fig. 23

Remove and discard the "O"Rings (9) and backup rings (8, 10) from the piston (11).

Fig. 21

Use a puller to remove the outboard bearing cone (4) from the axle shaft. Inspect the bearing for damage. Remove and discard dust shield from shaft if applicable.

Fig. 24

Use a hammer and punch to remove the oil seal (2).

Fig. 22

Place the brake housing (7) with the large opening down, on a sturdy level work surface. Using a rubber tipped air nozzle, carefully apply shop air pressure until the piston (11) releases from the bore.

Fig. 25

Place the housing (7) in a press. Remove the outboard bearing cup (3).

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Fig. 26

Remove the adjusting pin (42) and discard the "O" Ring (43).

Fig. 29

Use a press to replace the outboard bearing cone (4) and the oil seal (2) in the brake housing (7).

Fig. 27

Clean and inspect all components including the brake housing (7). DO NOT use solvent to clean the friction discs. Replace any components that show signs of wear or damage.

Fig. 30

Lubricate and install a new "O"Ring (43) on the adjusting pin (42). Install the pin into the brake housing (7) in hole indicated.

Reassembly

Fig. 28

Remove any nicks and burrs from the piston (11) and the inside of the brake housing. Give special attention to the chamfered edges and openings of the oil passages.

Fig. 31

Lubricate and install new "O"Rings (9) and backup rings (8, 10) on the piston (11). The back-up rings are to be to the outside and the "O"Rings to the inside.

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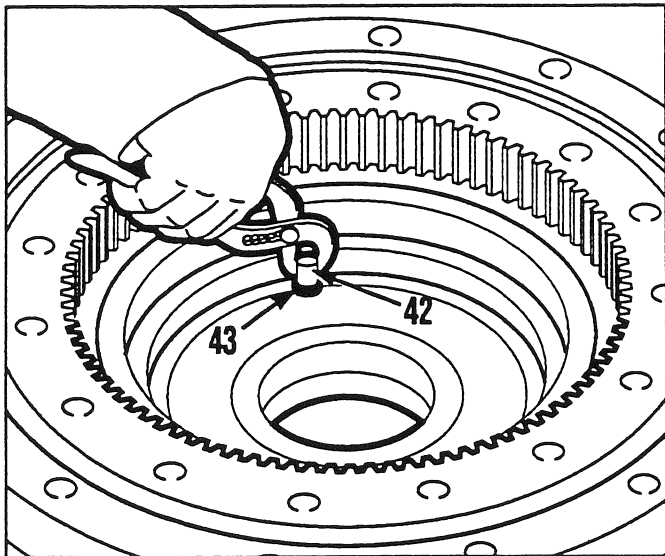


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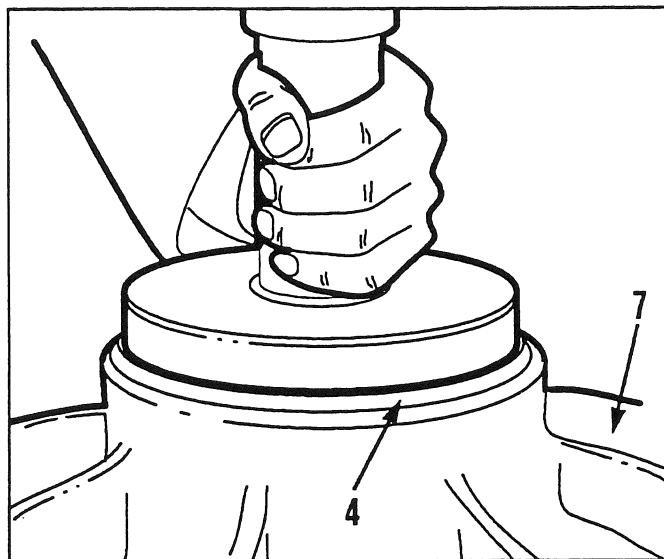


Fig. 29

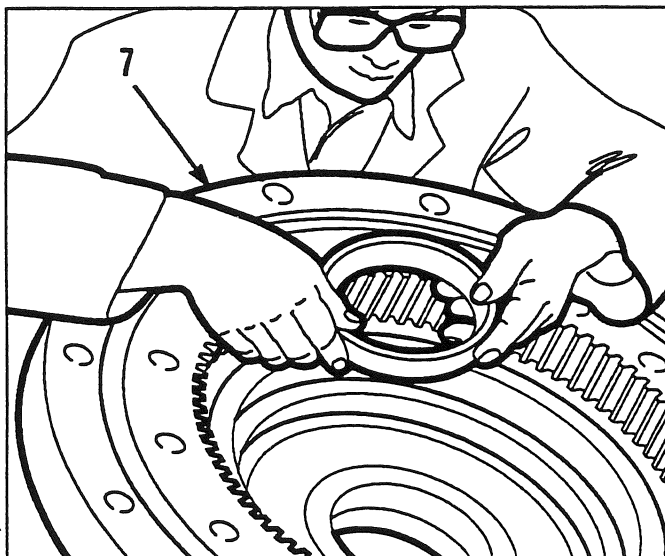


Fig. 27

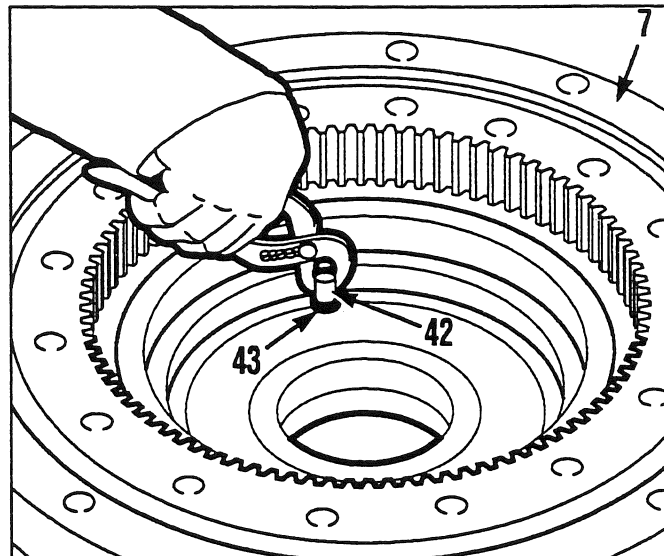


Fig. 30



Fig. 28

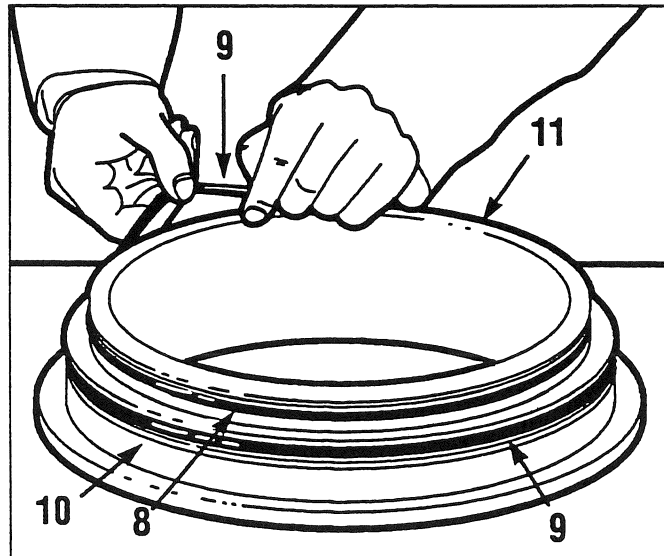


Fig. 31

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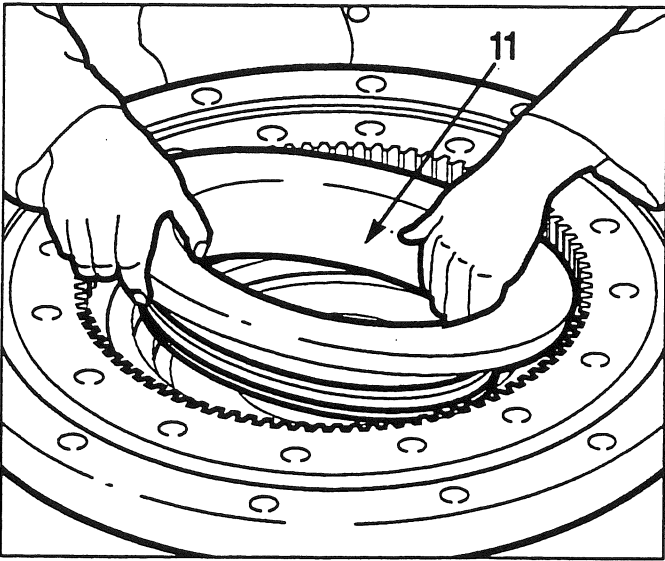


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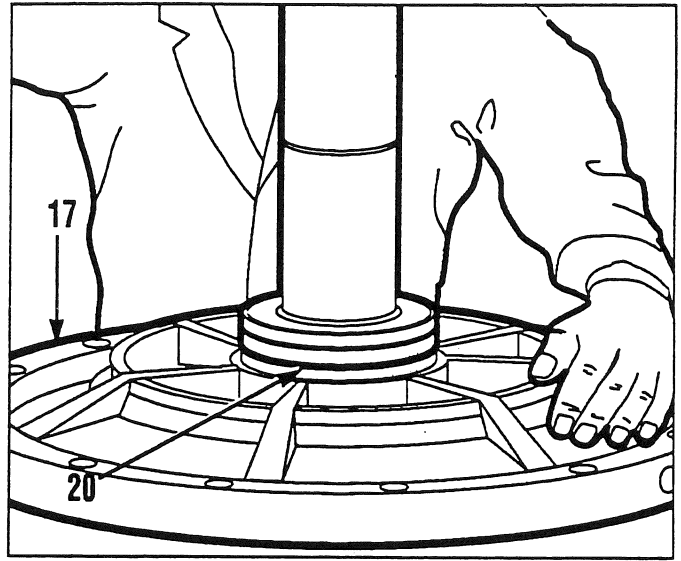


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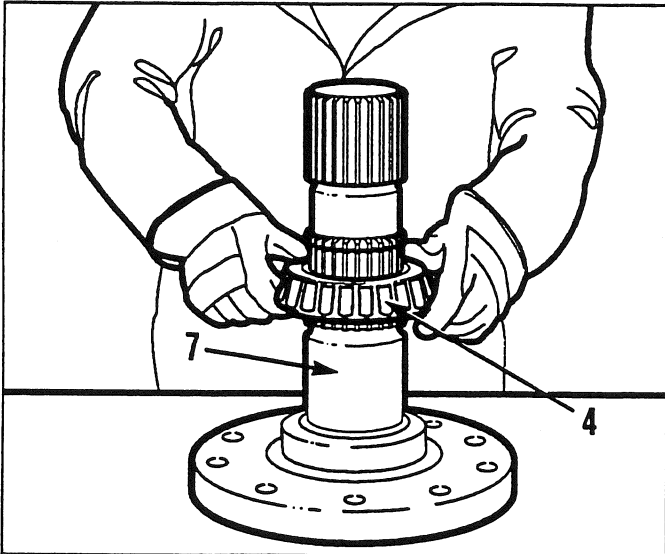


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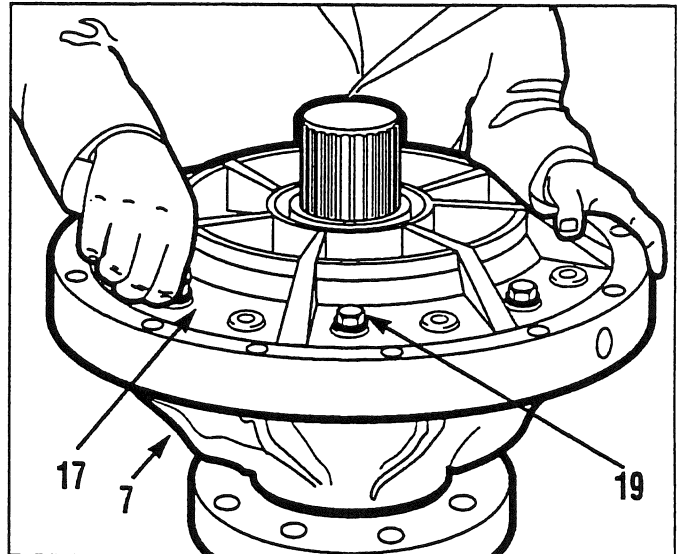


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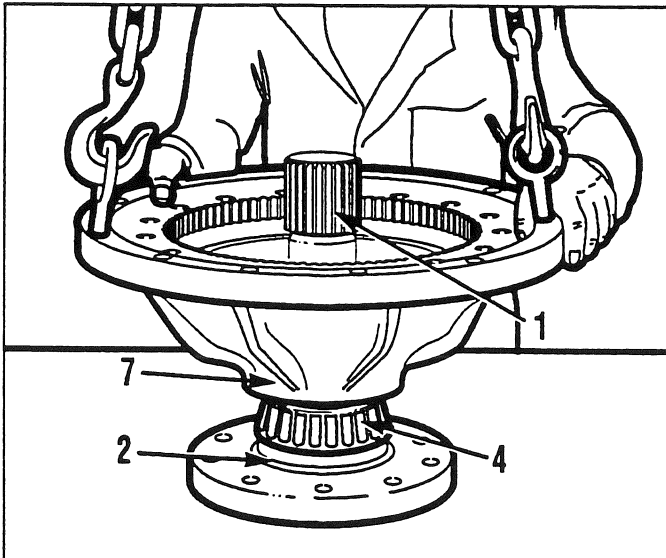


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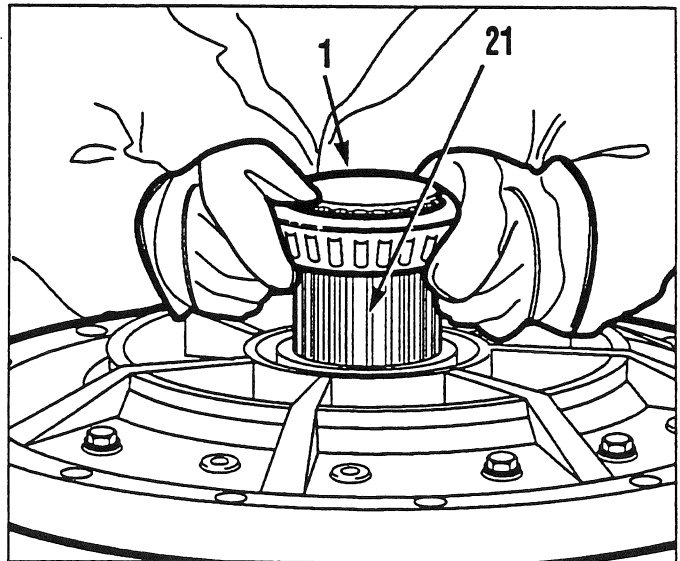


Fig. 37

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Fig. 32

Install the piston (11) in the piston bore. Both the piston and the bore must be lubricated with oil.

Fig. 35

Place the back-up plate (17) in a press and install the inboard bearing cup (20).

Fig. 33

Stand the axle on its wheel flange end. If applicable, install a new dust seal. Heat the outboard bearing cone (4) evenly. For example, use an oil immersion heater. Do not heat above 300°F (149°C). Install it on the axle shaft (1). Be sure to lubricate the bearing with oil.

Fig. 36

To set the bearing pre-load, install the backup plate (17) on the brake housing (7) and install 6 retaining bolts (19).

Fig. 34

Use a safe lifting device to lower the brake housing (7) onto the axle shaft (1). Be sure not to damage the oil seal (2) or bearing (3, 4) while lowering brake housing onto axle shaft.

Fig. 37

Heat the inboard bearing cone (21) evenly. Do not heat above 300°F (149°C). Install it on the axle shaft (1). Lubricate the bearing with oil.

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Fig. 38

Torque the six retaining bolts (19) to the recommended torque .

Fig. 41

Tighten the bolts (26) in 50 ft.lb. increments to the recommended torque. Rotate the housing (7) during the tightening process to seat the bearings properly.

Fig. 39

Using a safe lifting device, install the sprocket (29) on the shaft (1).

Fig. 42

Use a dial torque wrench to read the rolling torque of the housing (7). If the rolling torque is below the specification, remove shims from the shim pack (23). If the rolling torque is higher than the specification, add shims until the rolling torque is correct. The bearing pre-load is then established.

Fig. 40

Install the original shims (23), retainer plate (24), and bolts (26).

Fig. 43

Remove the bolts, retaining plate (24) and shims. Be sure to keep this exact shim pack (23) for final assembly.

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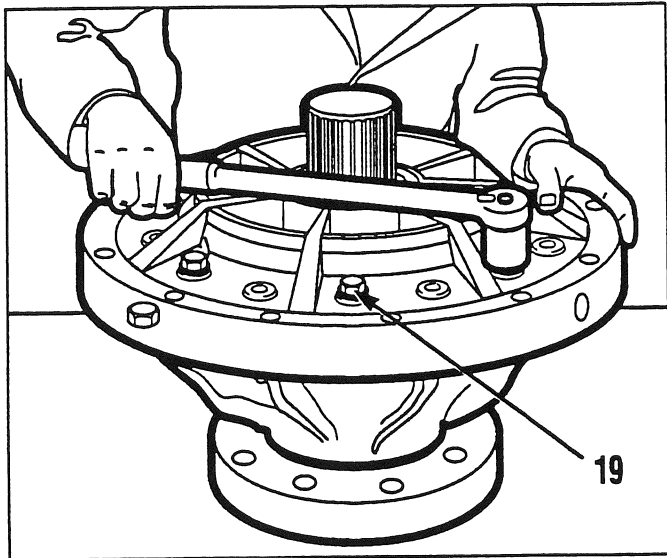


Fig. 38

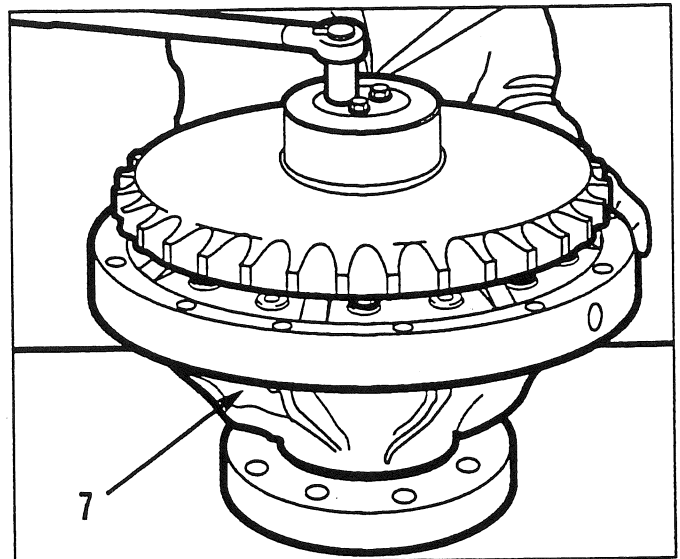


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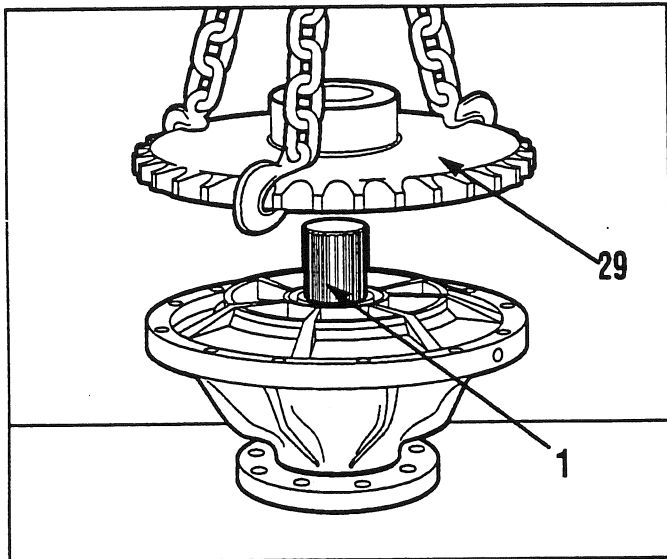


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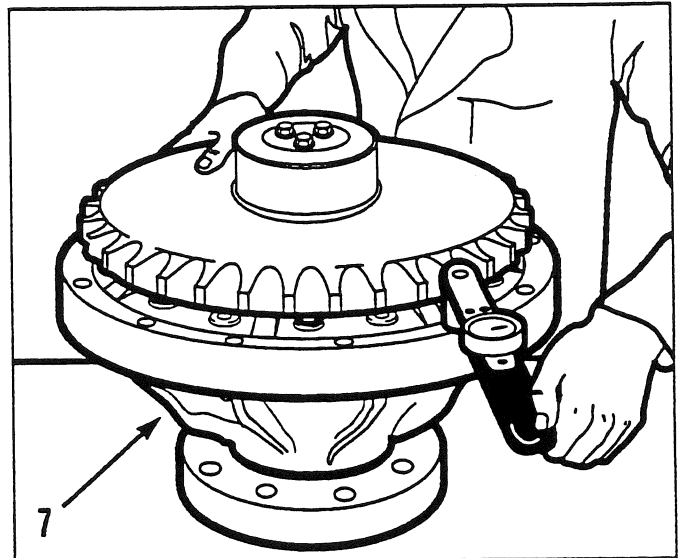


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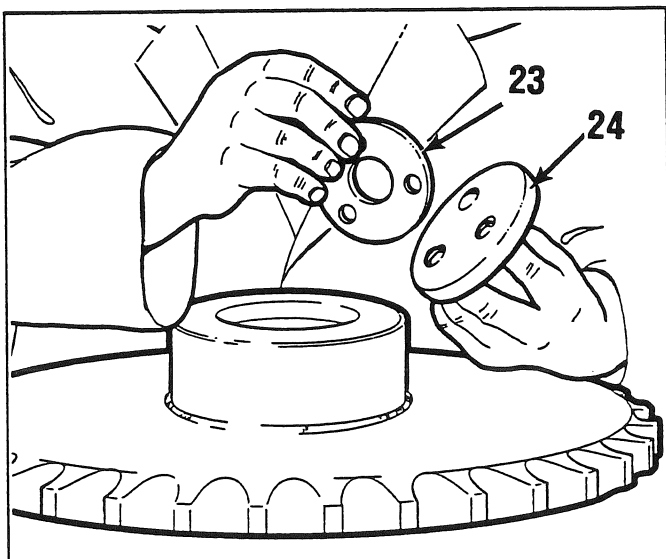


Fig. 40

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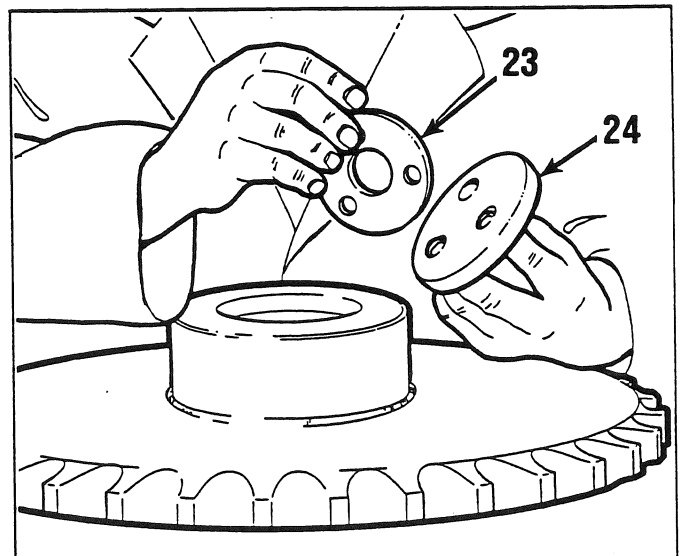


Fig. 43

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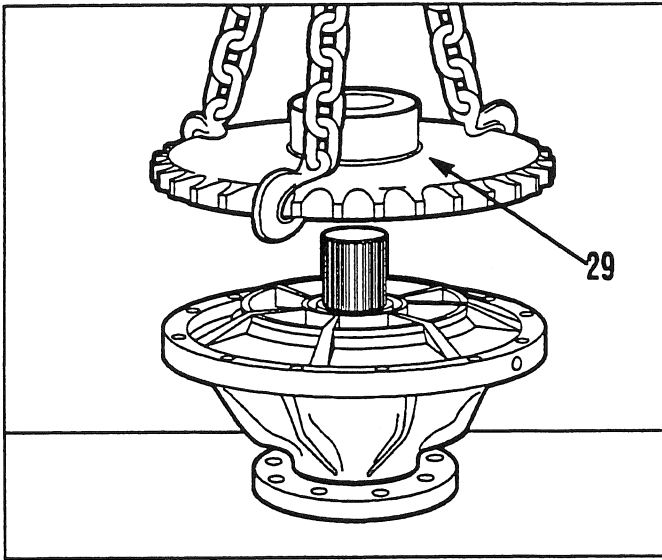


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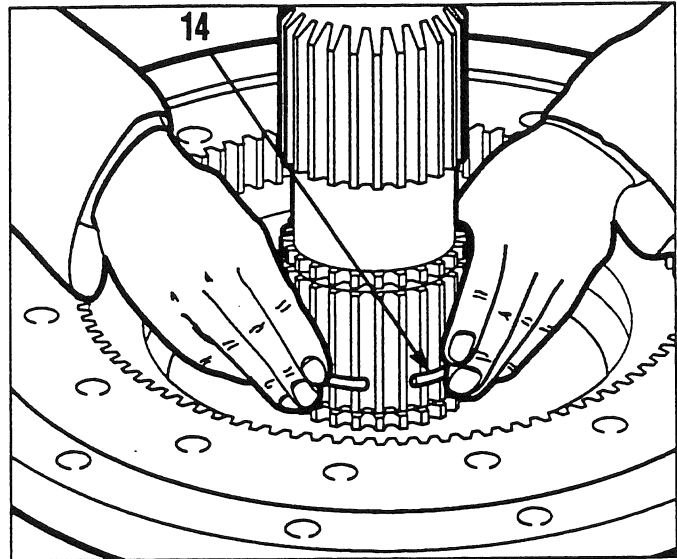


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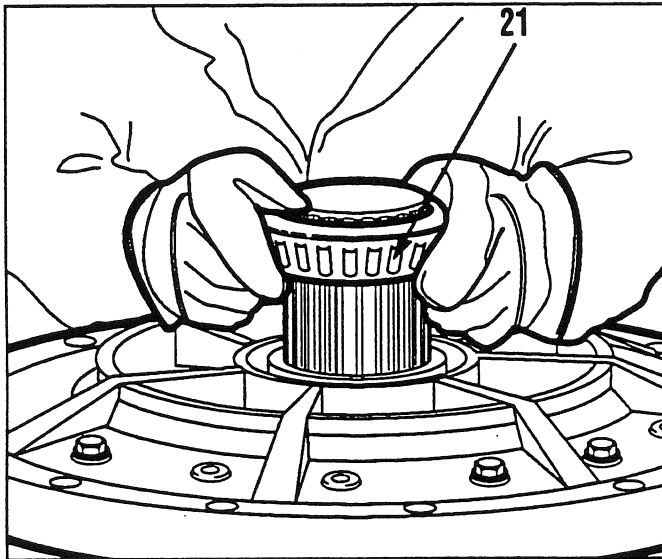


Fig. 45

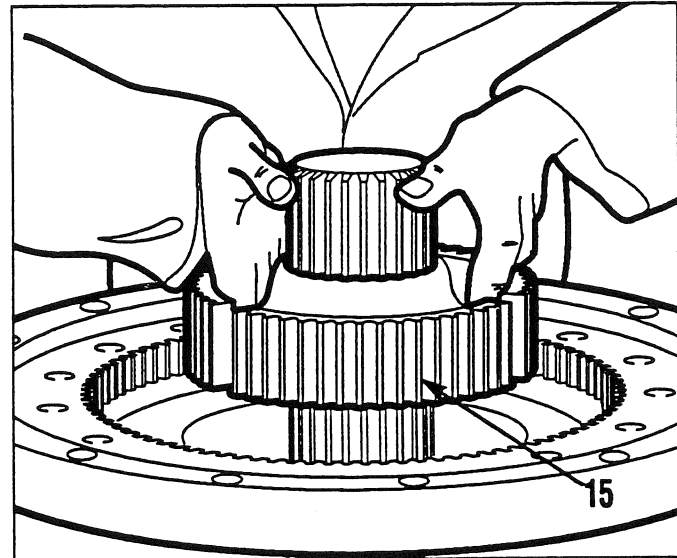


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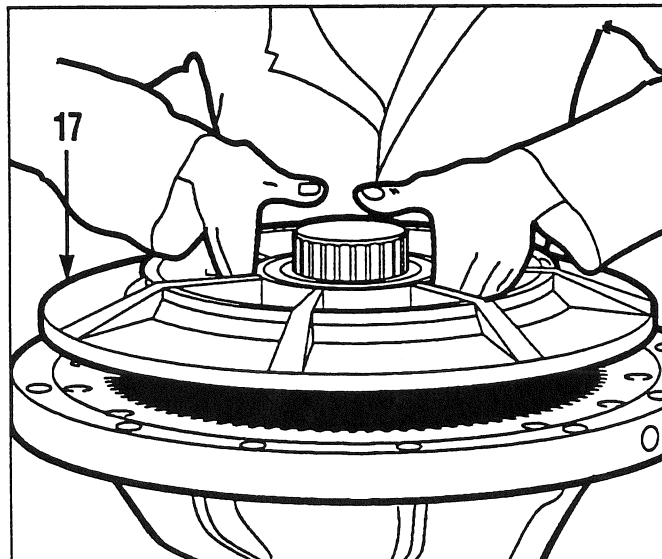


Fig. 46

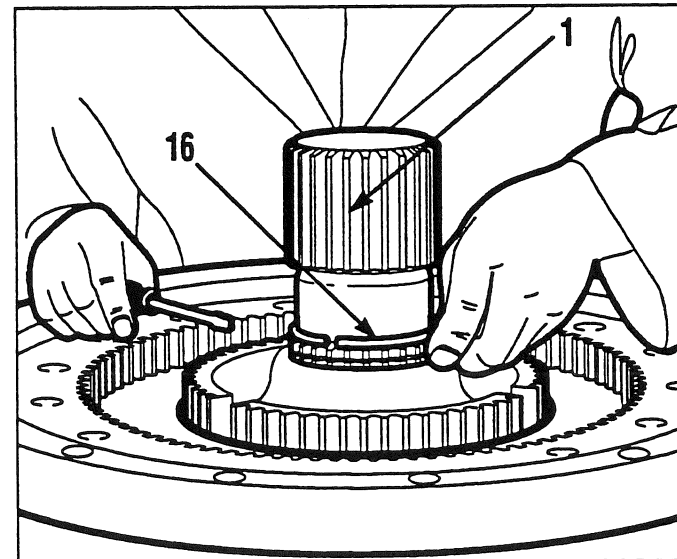


Fig. 49

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Fig. 44

Remove the sprocket (29).

Fig. 47

Install the outer snap ring (14).

Fig. 45

Remove the inboard bearing cone (21).

Fig. 48

Install the hub (15).

Fig. 46

Remove the back-up plate (17).

Fig. 49

Install the inner snap ring (16) onto the axle shaft (1).

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Fig. 50

Install a reaction plate (13) first, followed by a friction disc. Install the remainder of the reaction plates and friction discs, alternating discs and plates. You must finish with a reaction plate. Be sure to use the correct number of reaction plates and friction discs. All models use the same part number friction discs and reaction plates. However, the brake units differ in the number of discs and plates with the corresponding back-up plates. See page 17-4 for the proper number of reaction plates and friction discs required for the particular grader you are working on.

Fig. 51

Install the back-up plate (17), hardened washers (18) and the retaining bolts (19).

Fig. 52

Heat the inboard bearing cone (21) evenly. Do not heat above 300°F (149°C). Install it on the axle shaft (1).

Fig. 53

Tighten the backup plate capscrews to the recommended torque.

Fig. 54

Install the sprocket (29). Make sure the flange is oriented in the original position.

Fig. 55

Install the shim pack (23) developed during the bearing pre-load setting procedure described in Fig. 42. Install the retainer plate (24), the tabwasher (25), and the capscrews (26).

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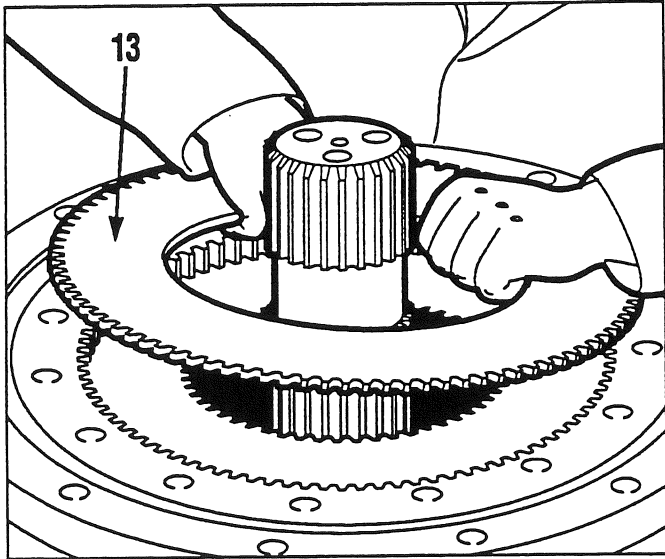


Fig. 50

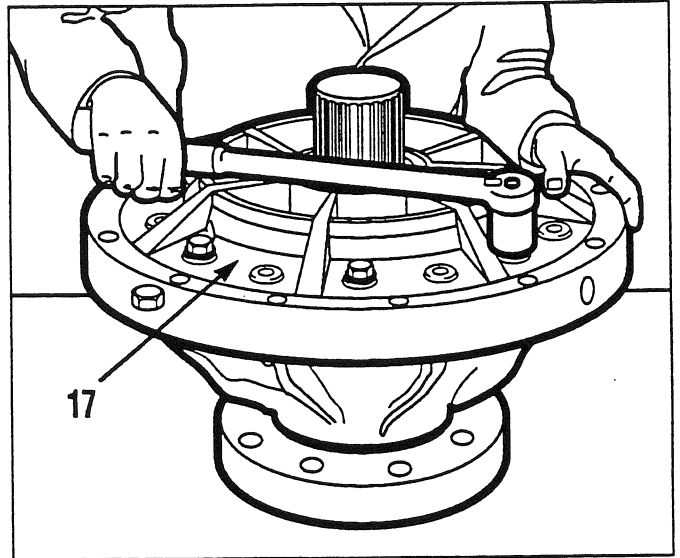


Fig. 53

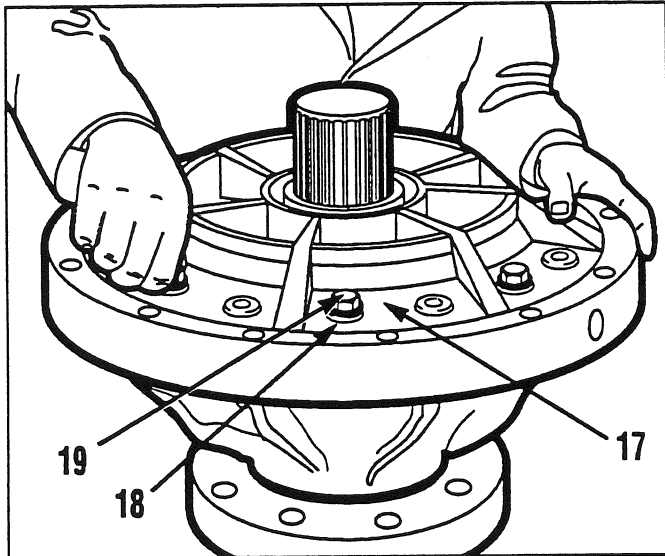


Fig. 51

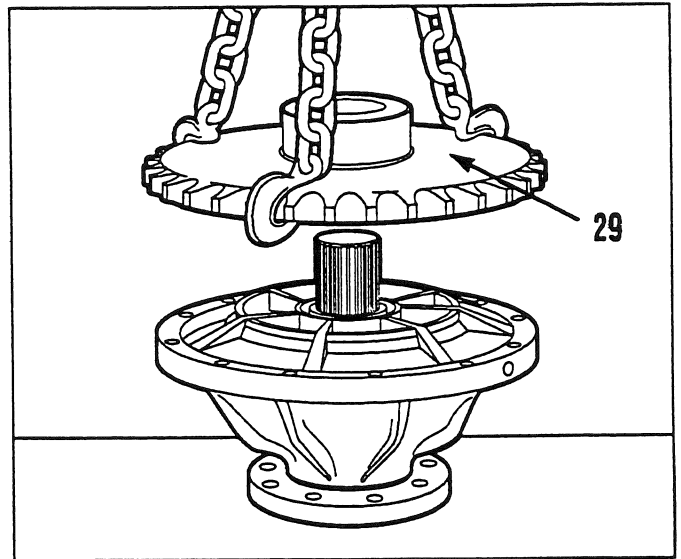


Fig. 54

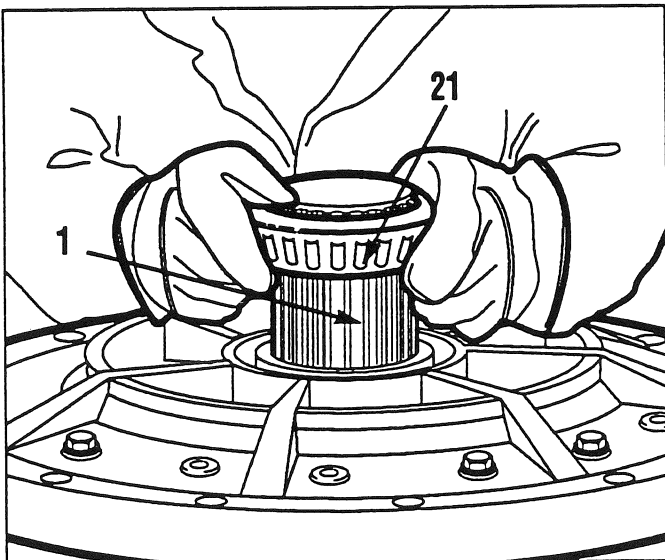


Fig. 52

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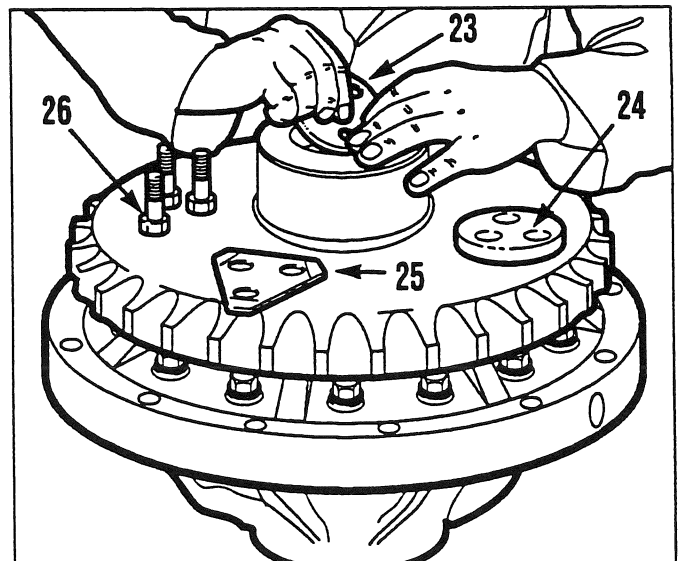


Fig. 55

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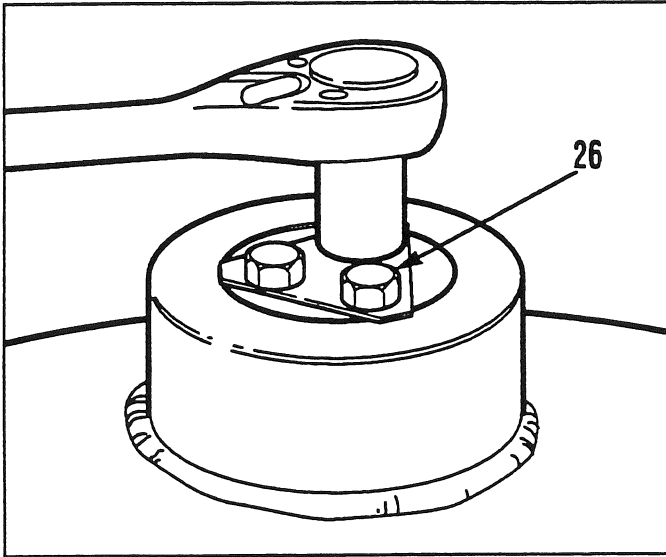


Fig. 56

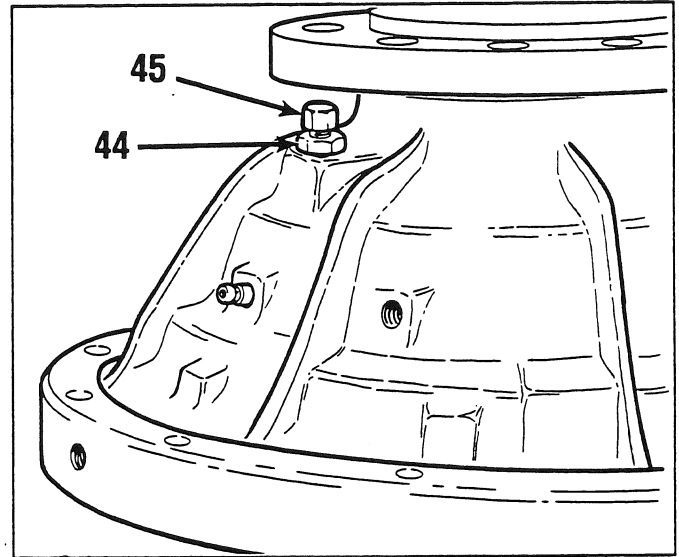


Fig. 59

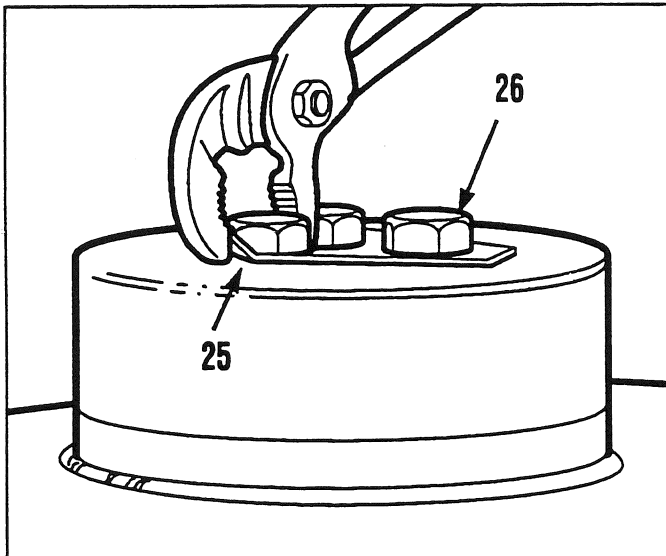


Fig. 57

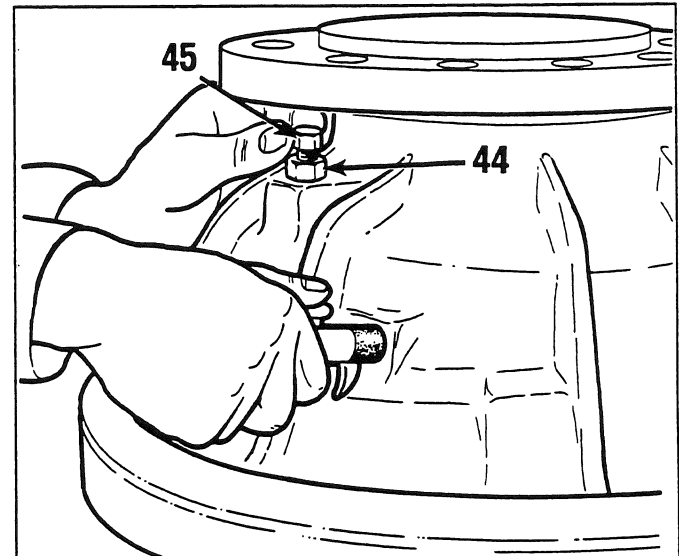


Fig. 60

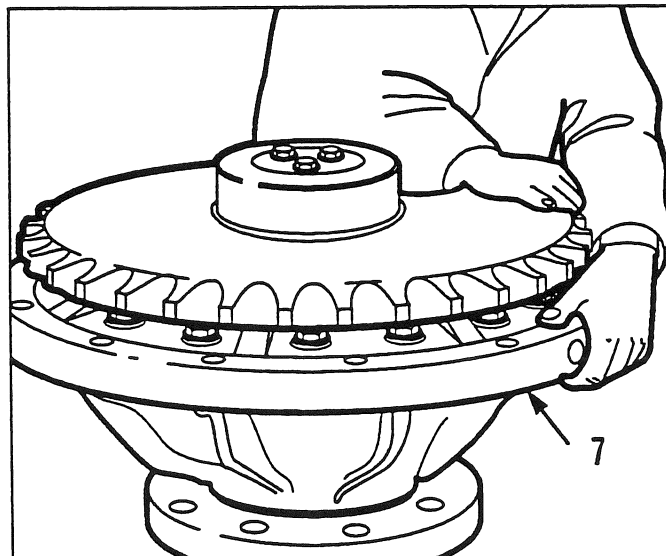


Fig. 58

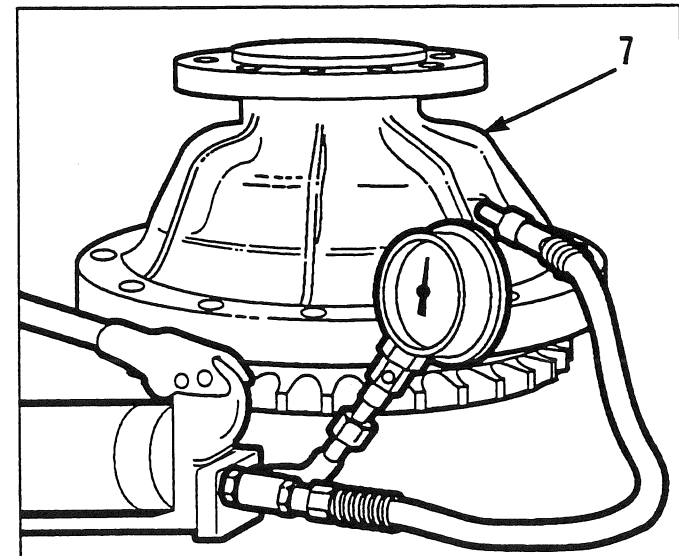


Fig. 61

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Fig. 56

Tighten the capscrews (26) in 50 ft.lb increments to the recommended torque .

Fig. 57

Bend the tabwasher (25) to lock the capscrews (26) in place.

Fig. 58

Rotate the brake housing (7) to insure that it rotates freely, and that nothing jammed during final assembly.

Bench adjustment

Fig. 59

To adjust the piston travel, assemble the jam nut (44) and piston travel limiting screw (45). Start them into the adjusting hole in the brake housing (7).

Fig. 60

Using a rubber tipped air nozzle, apply shop air pressure to the brake line port on the brake housing (7) to move the discs into the clamped position. With air pressure applied, turn the piston travel limiting screw (45) inwards, until it touches the back of the piston. Turn the adjusting screw outwards the recommended amount and tighten the jam nut.

Fig. 61

Pressure test the assembly. Install a pressure hand pump to the brake line port on the brake housing (7). Apply 100 P.S.I. (690 kPa) and check the assembly for leaks. Increase the pressure to 3,000 P.S.I. (20,700 kPa), and again check for leaks. After the setting and the pressure testing, the unit is ready for reinstallation into the tandem.

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Installation

Fig. 62

Remove all traces of silicone from tandem openings.
Remove any oil or dirt with solvent.

Fig. 65

Apply a Champion approved locking compound and install the capscrews (34) and lockwashers. Torque the capscrews to the recommended torque .

Fig. 63

Make sure all mating surfaces are clean. Apply silicone sealant to the tandem opening. Silicone should be applied to both sides of the bolt holes.

Fig. 66

Install the tandem drive chain (35) into the tandem.

Fig. 64

Attach an eye bolt to the threaded hole in the brake housing mounting flange. Use a safe lifting device, to position the brake unit in the tandem. Make sure the threaded hole is at the top.

Fig. 67

Install the connector link (37) and secure it with the connector pin (36).

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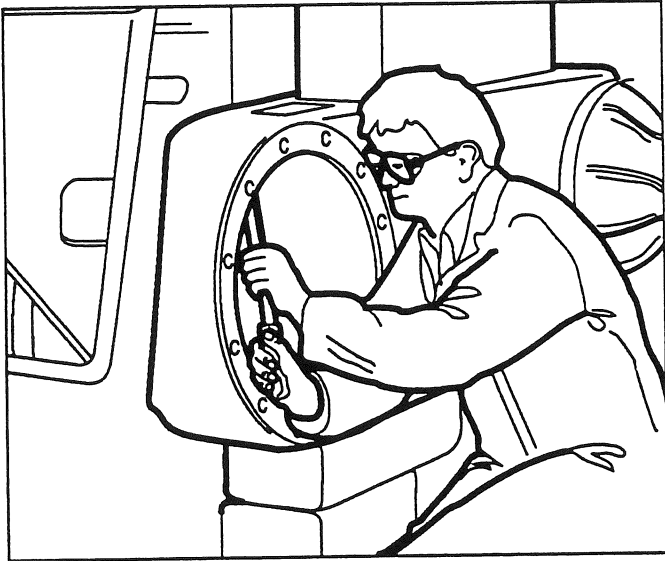


Fig. 62

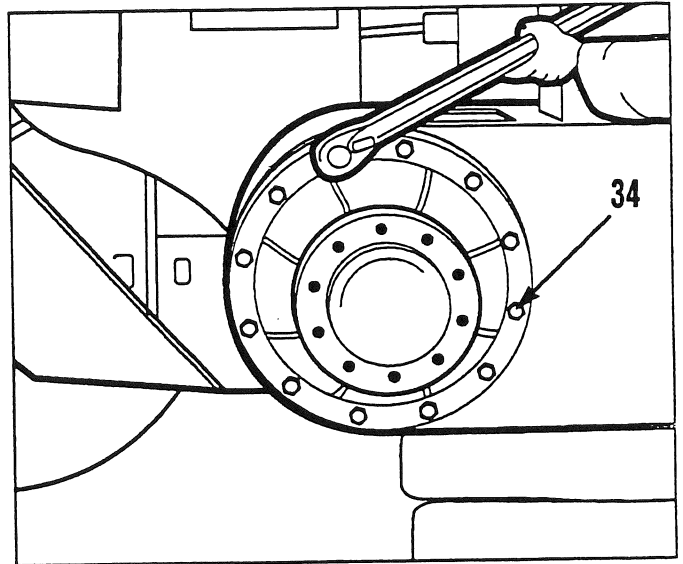


Fig. 65

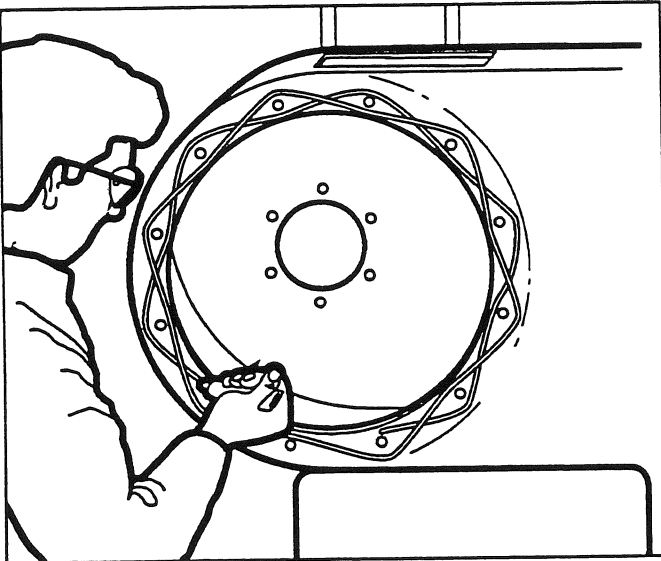


Fig. 63

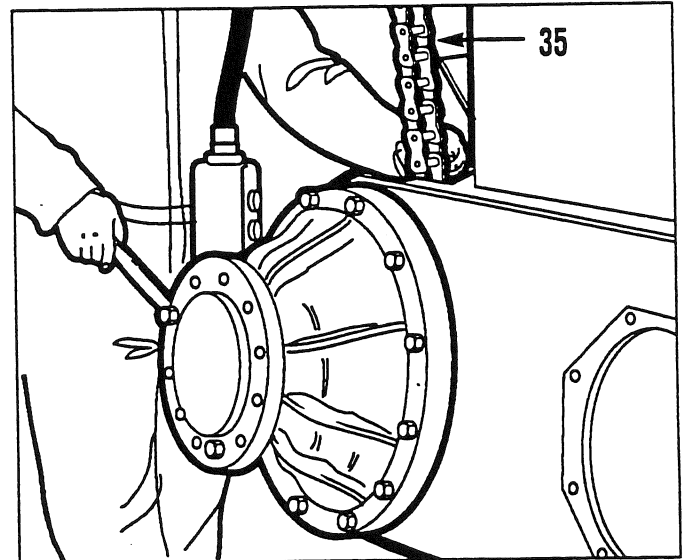


Fig. 66

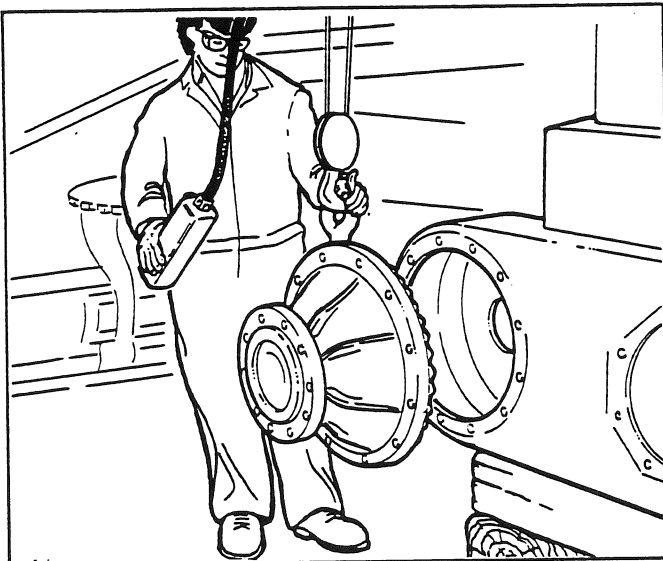


Fig. 64
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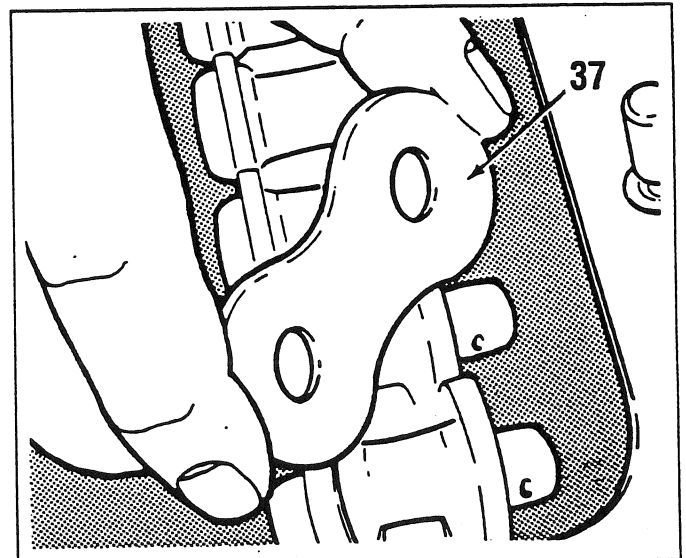


Fig. 67

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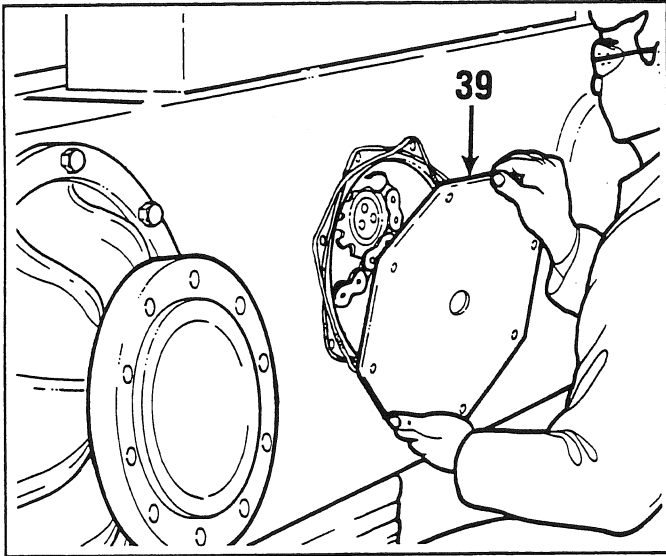


Fig. 68

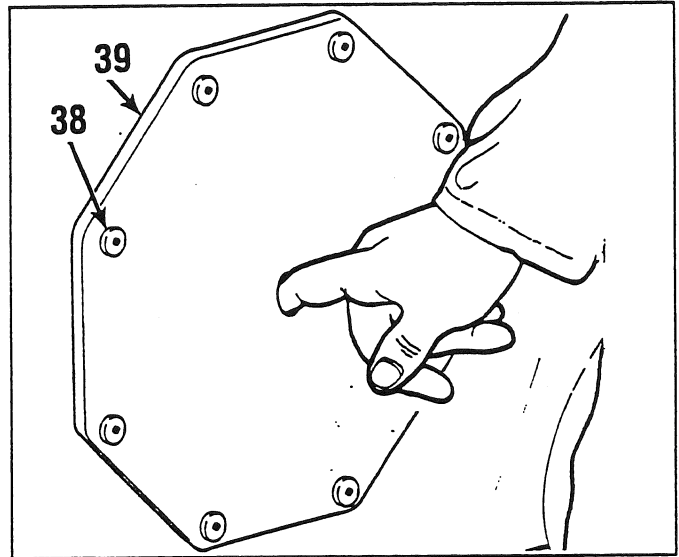


Fig. 71

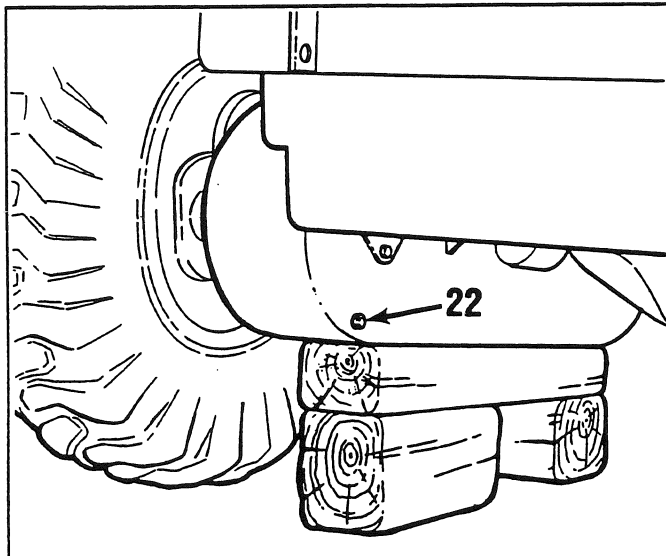


Fig. 69

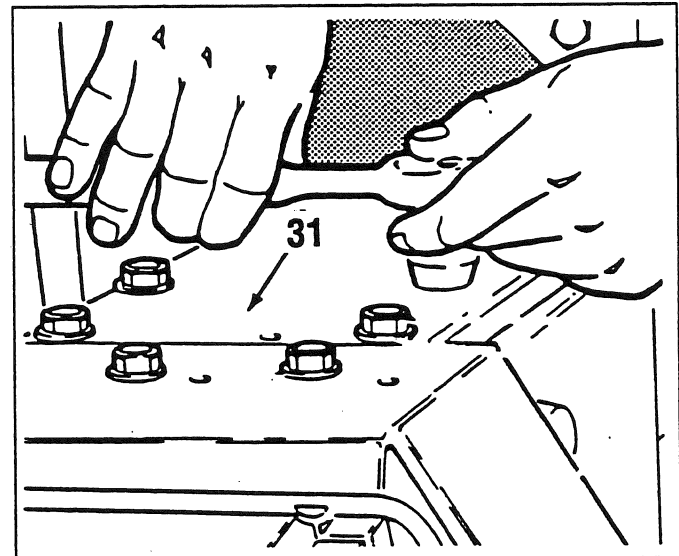


Fig. 72



Fig. 70

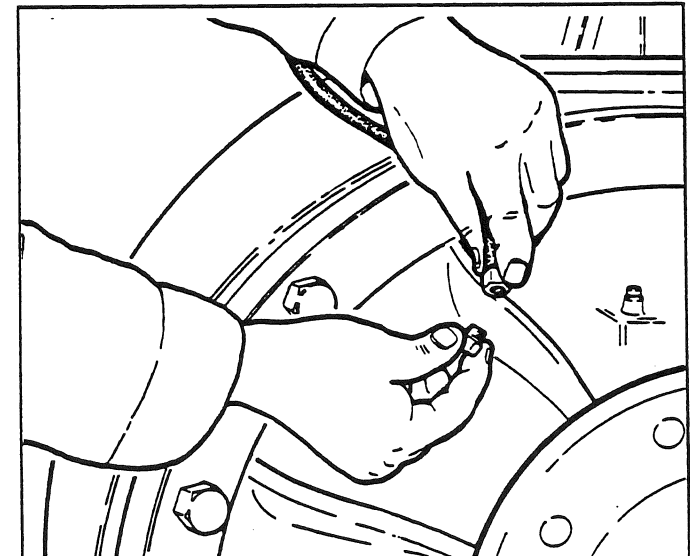


Fig. 73

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Fig. 68

Apply silicone sealant to the tandem side opening and side cover plate (39). Install the side cover plate, and torque the capscrews (38) to the recommended torque.

Fig. 71

Check the oil level in the side coverplate (39) by removing the oil level check plug (40).

Fig. 69

Tighten the tandem drain plug (22).

Fig. 72

Apply silicone to the inspection openings and covers. Install the inspection covers (30).

Fig. 70

Fill the tandem with the recommended oil.

Fig. 73

Connect the brake line to the brake unit. Install the brake guard.

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Fig. 74

Install the wheel using the proper retaining bolts.

Tighten the wheel bolts to the recommended torque. Use a diagonal tightening pattern.

Turn the isolation switch to the "ON" position. Start the engine. Lower the moldboard to raise the tandem. Remove the supports. Raise the moldboard to lower the machine onto its wheels. Shut off the engine and return the isolation switch to the "OFF" position.

With the grader parked on a level surface, check the tandem oil level as described in Fig. 71. Adjust oil level if necessary.

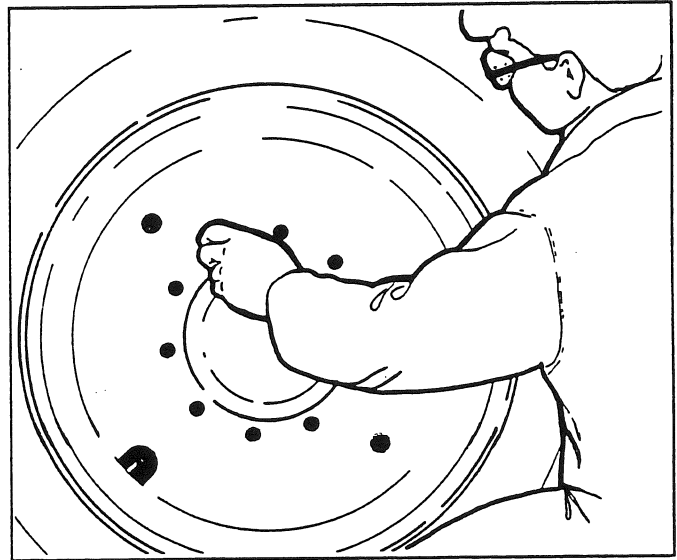


Fig. 74

Bleeding the Brakes

The final procedure is the bleeding of the brakes. See the procedure outlined in the shop manual.