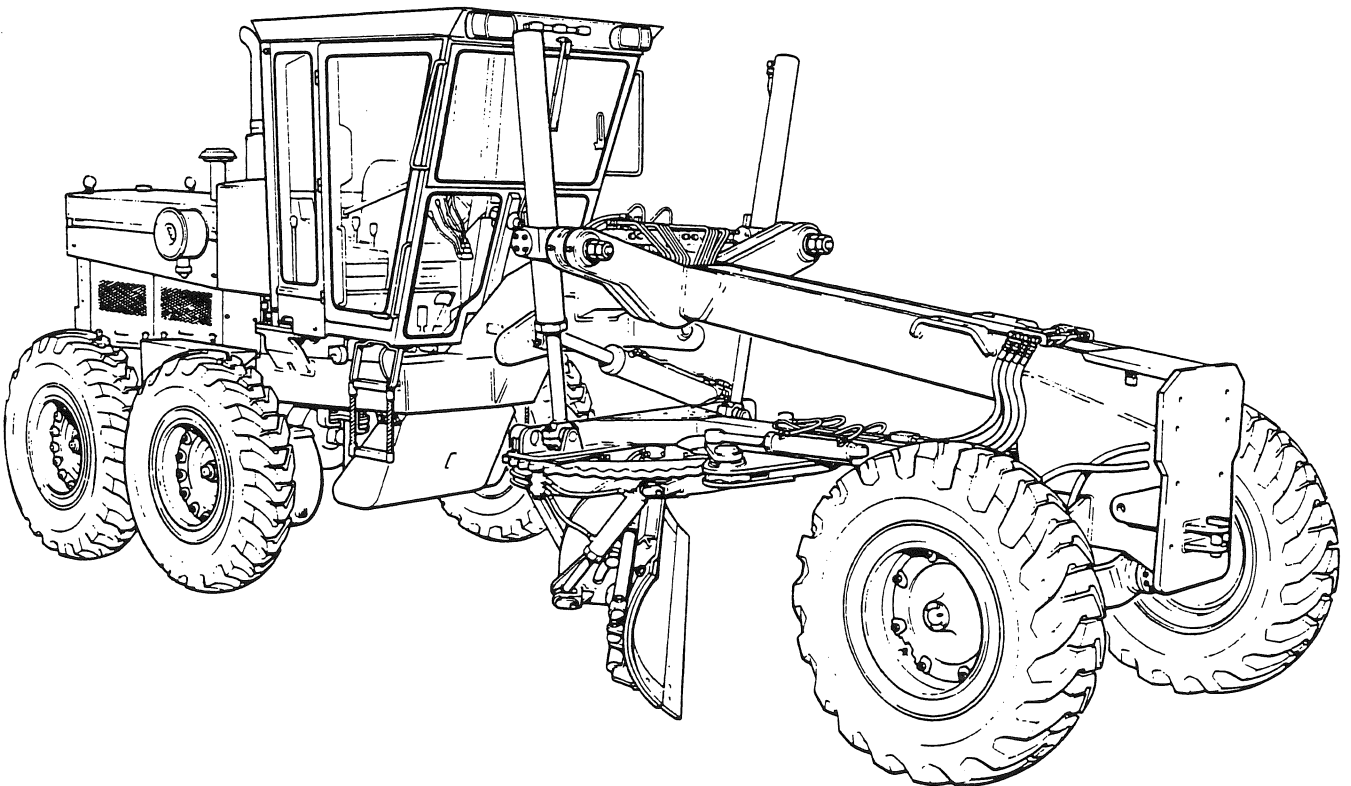


700 SERIES SHOP MANUAL

SECTION 11

**STANDARD
DOUBLE REDUCTION FINAL DRIVE**

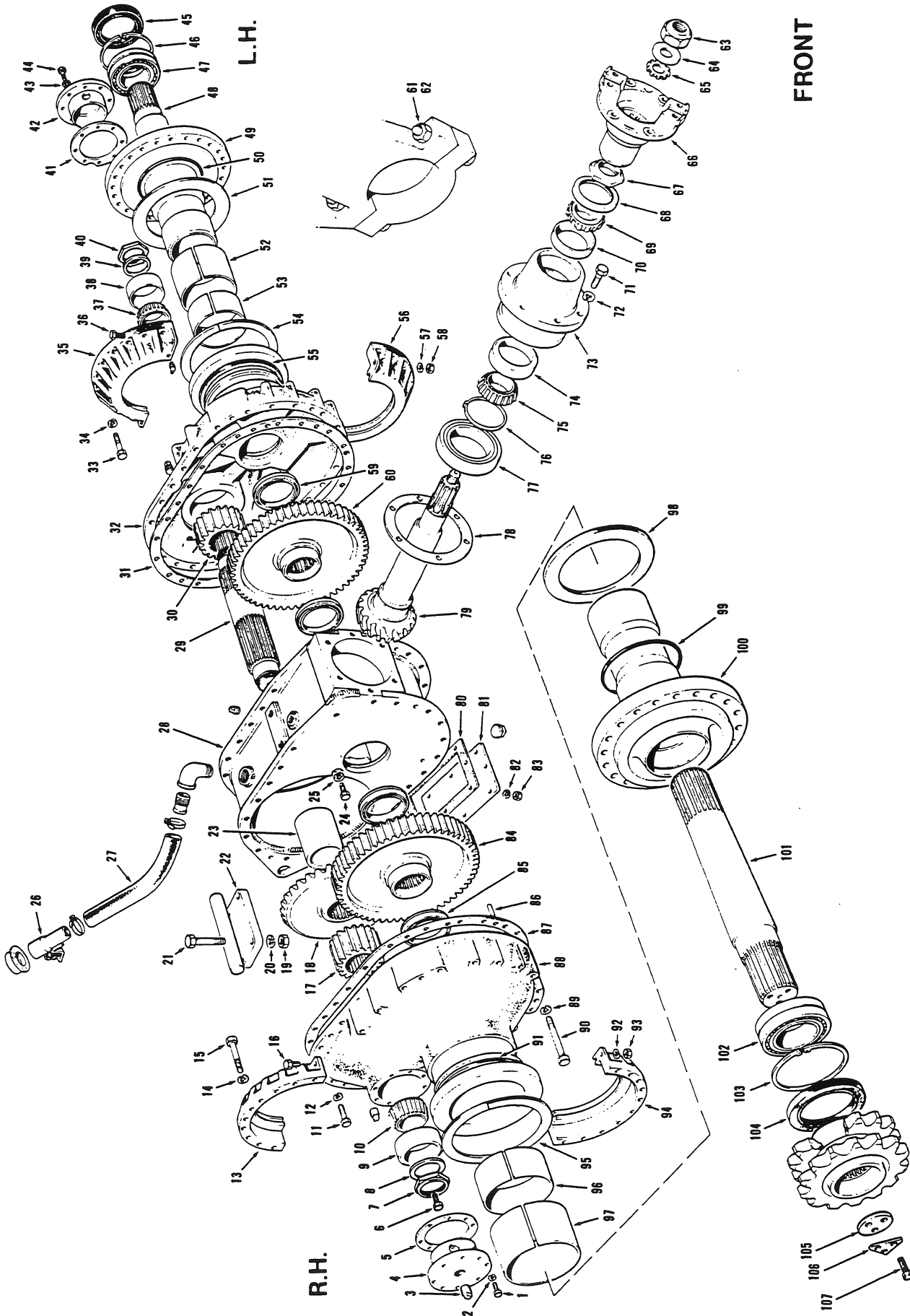
Applicable to graders S/N 16224, 16245 to 20324
U.S. S/N 2021-2 to 2658-2



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Item	Description	Item	Description	Item	Description
1	Capscrew	37	Bearing cone	73	Pinion cap
2	Lockwasher	38	Bearing cup	74	Bearing cup
3	Pipe plug	39	Bearing spacer	75	Bearing cone
4	Cross shaft right hand cap	40	Locknut	76	Snap ring
5	Shim pack	41	Shim pack	77	Bearing
6	Capscrew	42	Cross shaft left hand cap	78	Shim pack
7	Locknut	43	Lockwasher	79	Spiral pinion shaft
8	Bearing spacer	44	Capscrew	80	Gasket
9	Bearing cup	45	Oil seal	81	Cover plate
10	Bearing cone	46	Snap ring	82	Lockwasher
11	Capscrew	47	Bearing	83	Nut
12	Lockwasher	48	Drive axle	84	Bull gear
13	Half-ring	49	Flanged sleeve	85	Bearing
14	Lockwasher	50	O Ring	86	Dowel pin
15	Capscrew	51	Outer thrust plate	87	Gasket
16	Bolt	52	Outer bushing	88	Right hand side housing
17	Spur pinion	53	Inner bushing	89	Lockwasher
18	Spiral pinion gear	54	Inner thrust plate	90	Capscrew
19	Nut	55	"Uniring" seal	91	"Uniring" seal
20	Lockwasher	56	Half-ring	92	Lockwasher
21	Bolt	57	Lockwasher	93	Nut
22	Mounting plate	58	Nut	94	Half-ring
23	Spacer	59	Bearing	95	Inner thrust plate
24	Screw	60	Bull gear	96	Inner bushing
25	Lockwasher	61	Nut	97	Outer bushing
26	Breather pipe	62	Bolt	98	Outer thrust plate
27	Breather hose	63	Locknut	99	O Ring
28	Main case	64	Plain washer	100	Flanged sleeve
29	Cross shaft	65	Star washer	101	Drive axle
30	Spur pinion	66	Brake flange yoke	102	Bearing
31	Gasket	67	Locknut	103	Snap ring
32	Left hand side housing	68	Oil seal	104	Oil seal
33	Capscrew	69	Bearing cone	105	Sprocket retainer
34	Lockwasher	70	Bearing cup	106	Lockplate
35	Half-ring	71	Capscrew	107	Capscrew
36	Bolt	72	Lockwasher		

Key to Fig. 1

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STANDARD DOUBLE REDUCTION FINAL DRIVE

General



Make sure proper tools are available and in good working order. You will require a safe lifting device; blocks or proper stands; a build stand (if available); a hydraulic press; shop tools and some special tools listed in the front of this Shop Manual Section.



ALWAYS PUT THE GRADER IN THE SERVICE POSITION BEFORE ATTEMPTING ANY OVERHAUL, MAINTENANCE OR INSPECTION PROCEDURE.

THE SERVICE POSITION IS AS FOLLOWS:- PARK THE GRADER ON A LEVEL SURFACE AND FULLY LOWER THE MOLDBOARD AND ALL ATTACHMENTS. IF IT IS NECESSARY TO ADJUST OR SERVICE THE MOLDBOARD OR ATTACHMENTS IN A RAISED POSITION, SUPPORT THEM WITH PROPER STANDS OR BLOCKS. APPLY THE PARKING BRAKE. TURN THE IGNITION SWITCH TO THE "OFF" POSITION AND REMOVE THE KEY. OPERATE ALL HYDRAULIC CONTROLS TO ENSURE THAT NO ACCUMULATED PRESSURE REMAINS IN THE HYDRAULIC SYSTEM. INSTALL CHOCKS AT THE FRONT AND REAR WHEELS. TURN

THE ISOLATION SWITCH TO THE "OFF" POSITION. THE ISOLATION SWITCH IS LOCATED BEHIND THE ENGINE SIDE PANELS. ON ARTICULATED MACHINES, INSTALL THE LOCKING PINS ON BOTH SIDES OF THE HINGE. ALLOW THE ENGINE AND HYDRAULIC SYSTEM TO COOL BEFORE WORKING IN THESE AREAS.

THE GRADER IS READY FOR SERVICING.

NOTE

Weights, measures and tolerances are in Metric (SI), Imperial and U.S. quantities. International standards specify the comma to represent the decimal point in all Metric measurements.

Description

The standard double reduction final drive is used for gear reduction and changing power flow direction. The spiral pinion shaft transmits the power flow to the spiral pinion gear and two spur pinions splined to the cross shaft. Tapered roller bearings support the shaft.

The spur pinions mesh with bull gears which are supported by roller bearings. Each bull gear is splined to a drive axle which is supported at the outer end by a double-race, self-aligning roller bearing. The power flow is divided equally at the spur pinions and bull gears where it continues by way of the drive axles, sprockets and chains to the tandem stub axles and wheels.

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Description (Continued)

Two flanged sleeves transfer the machine weight between the final drive and tandem cases. The sleeves oscillate in two teflon-coated, steel-backed bronze bushings installed in both side housings. The flanged sleeves and tandem cases are held together by half-rings. The half-rings prevent side movement of the flanged sleeves in the bushings.

Refer to the Lubrication Specifications at the front of this Shop Manual for the recommended lubricants used in the standard double reduction final drive.

Cleaning and Inspection

Cleaning - Bearings and Small Parts



You are recommended to wear cotton gloves when handling bearings. This prevents transfer of skin acids and perspiration onto bearing races.

Immerse bearings and small parts into a cleaning solvent. You can use a hot tank system and a mild alkali solvent. Agitate the parts to remove all foreign matter.

Parts should remain in the solvent long enough to be thoroughly cleaned. In the hot tank system, heated parts help to evaporate the solvent and rinse water. Thoroughly rinse parts to remove all traces of dirt and solvent.

After rinsing, immediately dry the parts using moisture-free compressed air or lint-free rags. Make sure all oil passages are unblocked. **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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Cleaning and Inspection (Continued)

Inspection - Gaskets, Oil Seals, O Rings and Snap Rings

Replace all gaskets, oil seals, O rings and snap rings. Lubricant loss through a worn seal can cause expensive parts of the assembly to fail. Handle sealing components carefully, particularly when being installed. Cutting, scratching or curling of the seal lip seriously reduces efficiency.

Before installation, apply a thin coating of adhesive/sealant, Champion part number 19200, onto the outer diameter of the oil seal carrier. This ensures an oil-tight fit in the bore. Lubricate all oil seal lips and O rings with system oil.

Inspection - Gears and Shafts

If crack detection equipment is available, use the process to check parts. Examine teeth of all gears for wear, pitting, chipping, nicks, cracks and scores. If gear teeth show spots where the case hardening has worn through or cracked, replace the gear.

Small nicks can be removed using a appropriate grinding stone. Inspect shafts for signs of bent or twisted splines and replace any deformed axles.

Torque Guide

Fig. No.	Application	Torque Value		
		N.m	kgf.m	lbf.ft
Fig. No. 61	Spiral pinion shaft bearing outer race retaining screw	142	14,5	105
Fig. No. 68	Left and right hand side housing capscrews	271-305	28-31	200-225
Fig. No. 70	Cross shaft left hand cap capscrews	41-47,5	4-5	30-35
Fig. No. 75	Cross shaft left and right hand bearing cone locknut	678	69	500
Fig. No. 82	Cross shaft right hand cap capscrews	41-47,5	4-5	30-35
Fig. No. 99	Pinion cap capscrews	271-305	28-31	200-225
Fig. No. 112	Brake flange yoke locknut	305	31	225
Fig. No. 115	Half-ring to tandem case capscrews	271-305	28-31	200-225
Fig. No. 117	Sprocket retainer plate capscrews	271-305	28-31	200-225
Fig. No. 124	Hanger bracket half-clamp mounting nuts ...	1301,5	133	960
Fig. No. 124	Mounting plate nuts	380	39	280
Fig. No. 125	Drive shaft to brake flange yoke capscrews	271-305	28-31	200-225

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Adjustments

Fig. No.	Application	N.m	kgf.m	lbf.in.
Fig. No. 84	Cross shaft rolling torque	4,5 - 7,3	0,5 - 0,7	40 - 65
Fig. No. 90	Spiral pinion shaft assembly rolling torque		kg	lb
			6,8 - 15,8	15 - 35
Fig. No. 100	Spiral pinion and gear backlash		mm	in.
			0,203 - 0,406	.008 - .016

Special Tools

Fig. No.	Description	Part No.
Fig. No. 41	Deep-reach socket wrench	43004
Fig. No. 57	Spiral pinion shaft bearing outer race removal tool	18504
Fig. No. 62	Bull gear bearing outer race installation tool	33174
Fig. No. 64	Inner bushing installation tools	18512
		18513
Fig. No. 64	Outer bushing installation tools	18511
		18512
Fig. No. 78	Inner bushing installation tools	18512
		18513
Fig. No. 78	Outer bushing installation tools	18511
		18512
Fig. No. 86	Spiral pinion shaft bearing inner race installation tool	45261
Fig. No. 87	Pinion cap bearing cup installation tools	18507
		18508
		18509
		18510
Fig. No. 88	Spiral pinion shaft bearing cone installation tool	18518
Fig. No. 89	Deep-reach socket wrench	43004
Fig. No. 90	Deep-reach socket wrench	43004
Fig. No. 95	Spiral pinion shaft depth setting gauge	45294

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Final Drive - Removal

Fig. 2

Park the grader on level ground. Place the transmission mode lever in **Neutral**. Centralize the circle, draw-bar and moldboard assembly using the circle shift and blade lift cylinders.

Fig. 3.

Lower the moldboard onto wooden blocks. Shut down the engine and place the machine in the **Service Position**.

Fig. 4

Drain the final drive lubricating oil. Clean and install the magnetic drain plug.

Fig. 5

Drain the lubricating oil from both tandem cases. Clean and install the magnetic drain and long-reach plugs.

Fig. 6

Remove the breather pipe (26) and breather hose (27) from the frame.

Fig. 7

Disconnect the brake lines from the tee fittings on the frame. Plug the lines and fittings and wipe away any spilled brake fluid.

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STANDARD DOUBLE REDUCTION FINAL DRIVE

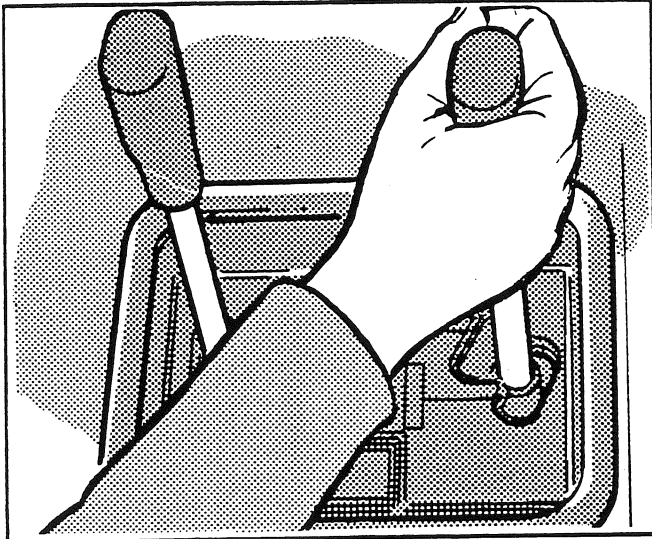


Fig. 2

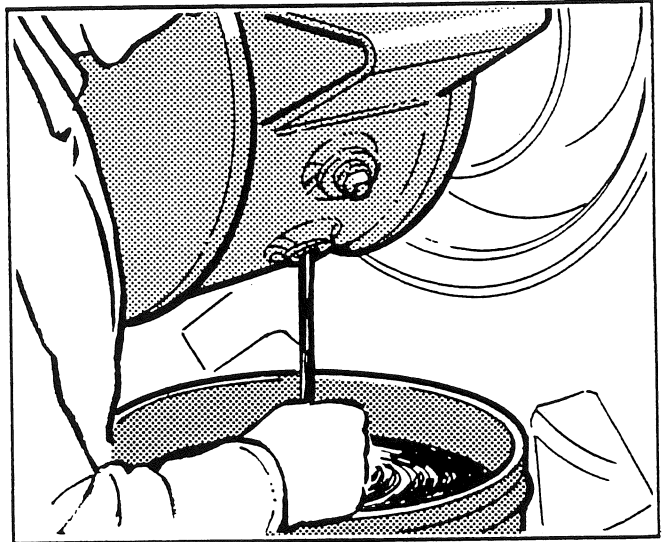


Fig. 5

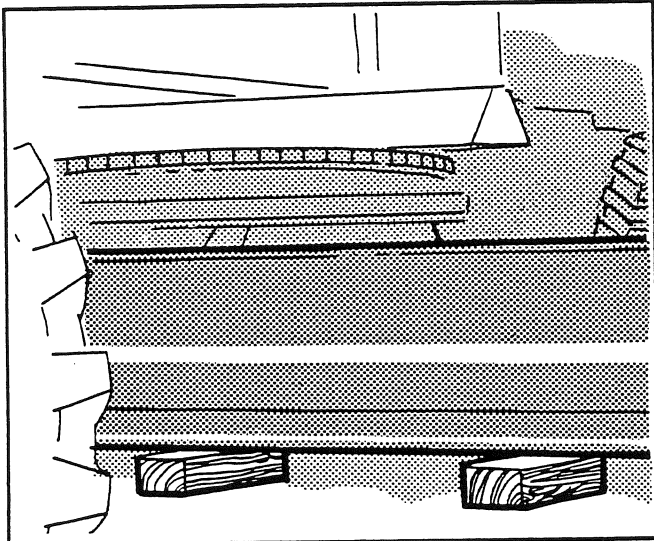


Fig. 3

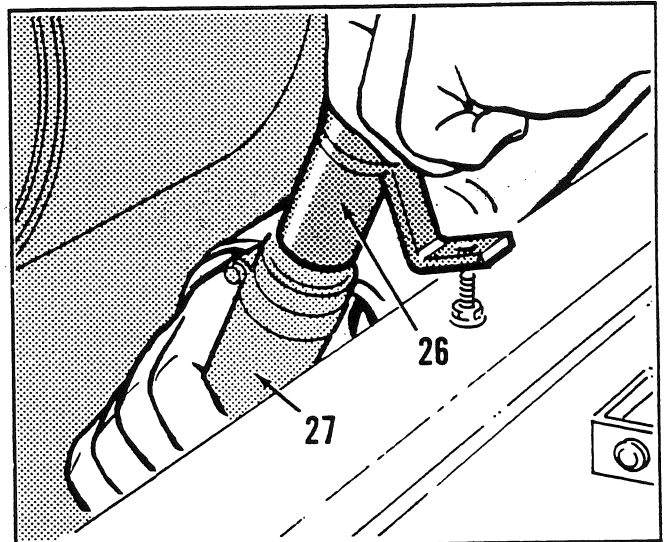


Fig. 6

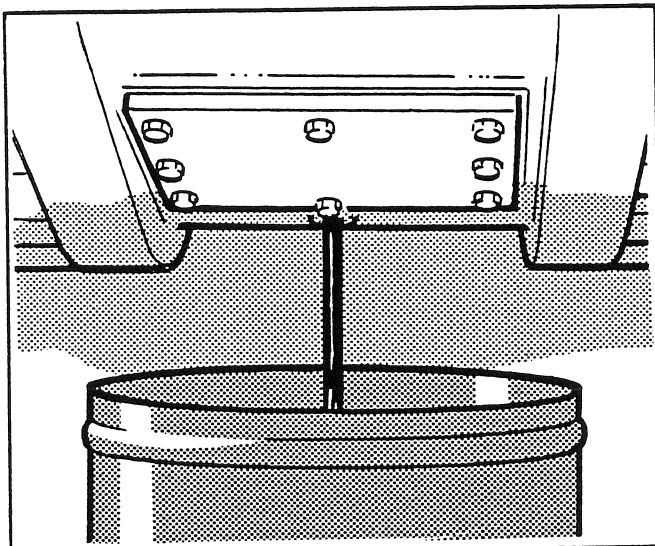


Fig. 4

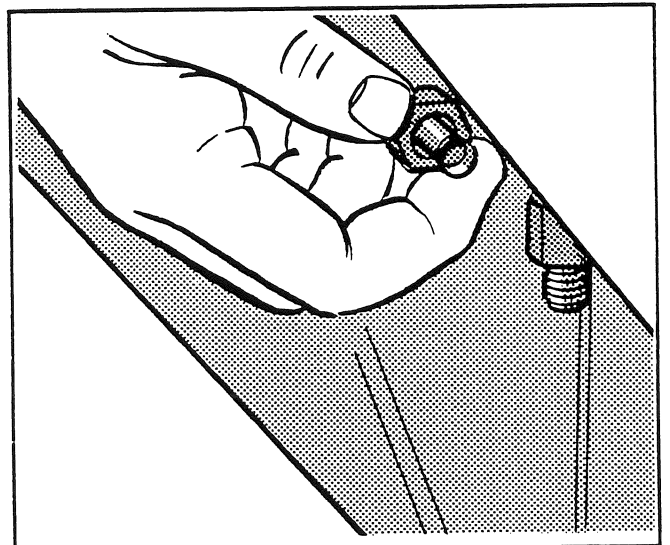


Fig. 7

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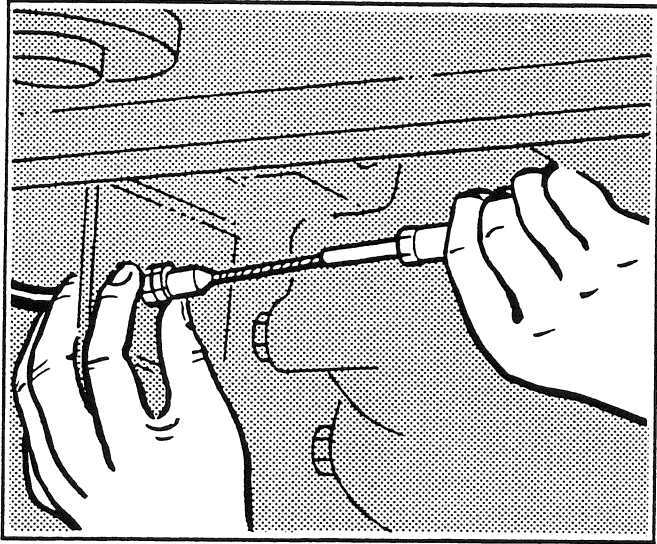


Fig. 8

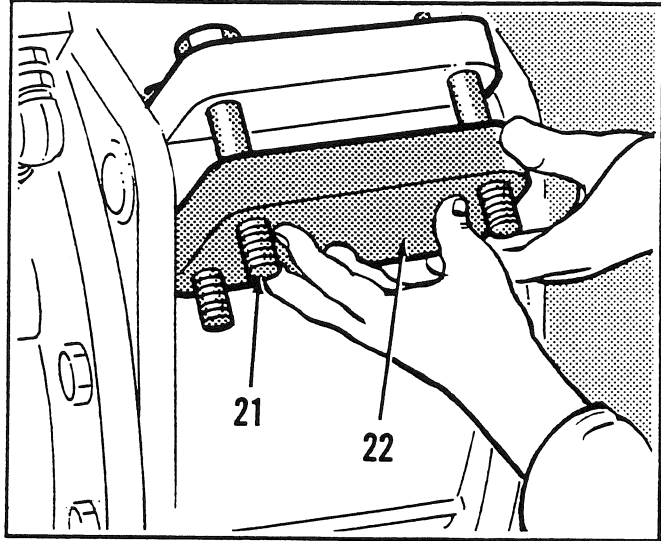


Fig. 11

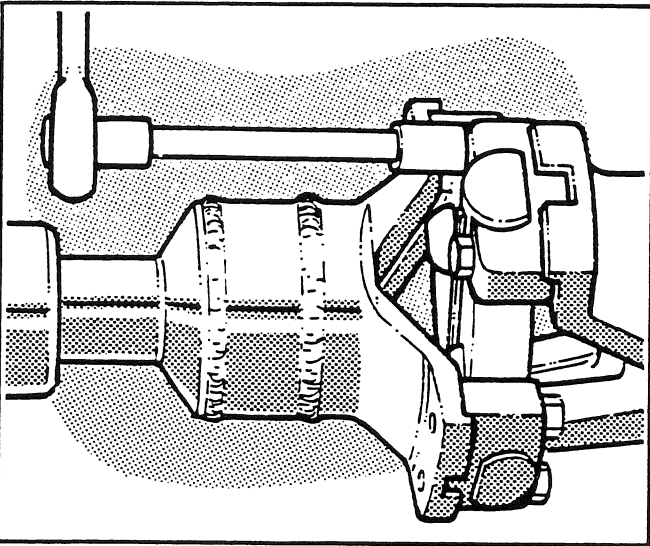


Fig. 9

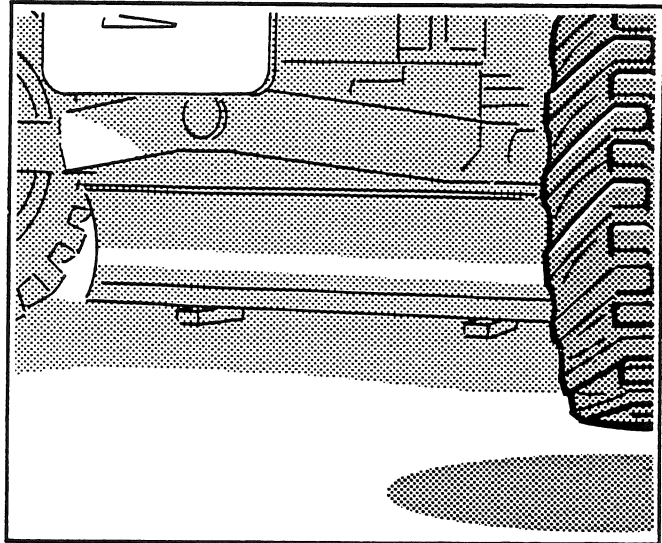


Fig. 12

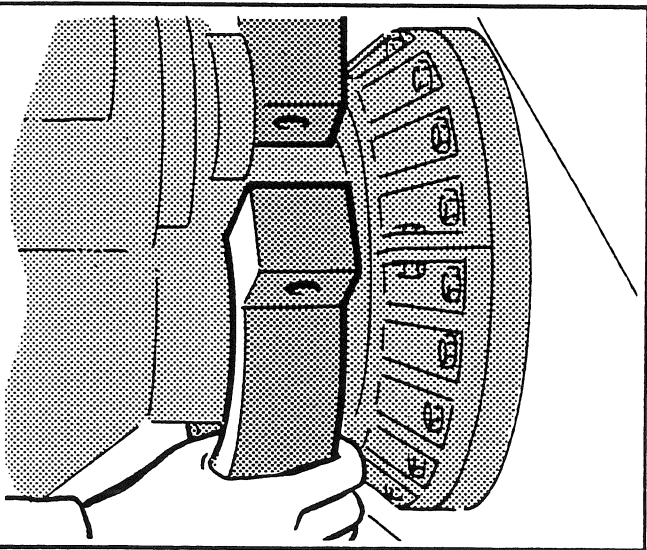


Fig. 10
Section 11
Page 7

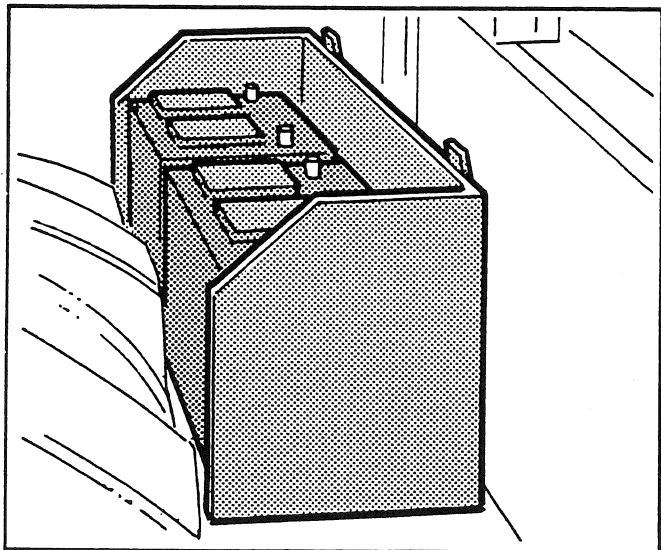


Fig. 13

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STANDARD DOUBLE REDUCTION FINAL DRIVE

Final Drive - Removal (Continued)

Fig. 8

Disconnect the parking brake cable. Remove the fender and the parking brake assembly.

Fig. 9

Disconnect the lower drive shaft from the brake flange yoke on the front of the final drive.

Fig. 10

Remove the nuts (61) and bolts (62) securing the final drive hanger bracket half-clamps. Identify the halves to ensure that you install them in the same locations during assembly.

Fig. 11

Remove the nuts (19), bolts (21) and lockwashers (20) and remove the mounting plate (22).

Fig. 12

Start the engine and raise the front wheels just off the ground using the moldboard. Shut down the engine.

Fig. 13

Disconnect the battery cables and remove the battery box.

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Final Drive - Removal (Continued)

Fig. 14

Attach the lifting device to the rear of the grader frame. Raise the frame until it is clear of the final drive assembly. On articulated models, **make sure** that the parking brake disc does not interfere with the mounting brackets.

Fig. 15

Roll the final drive and tandem assembly out from under the frame.

Fig. 16

Lower the frame onto a secure stand.

Fig. 17

Remove the capscrews retaining the tandem cover plates. Remove the plates and discard the gaskets. If gasket eliminator compound has been used, remove all traces of the sealant.

Fig. 18

Release the tabs and remove the capscrews (107), lockplate (106) and sprocket retainer (105) from the right hand tandem. Discard the lockplate.

Fig. 19

Remove the capscrews (15) and lockwashers (14) retaining the half-rings (13 and 94) to the tandem.

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STANDARD DOUBLE REDUCTION FINAL DRIVE

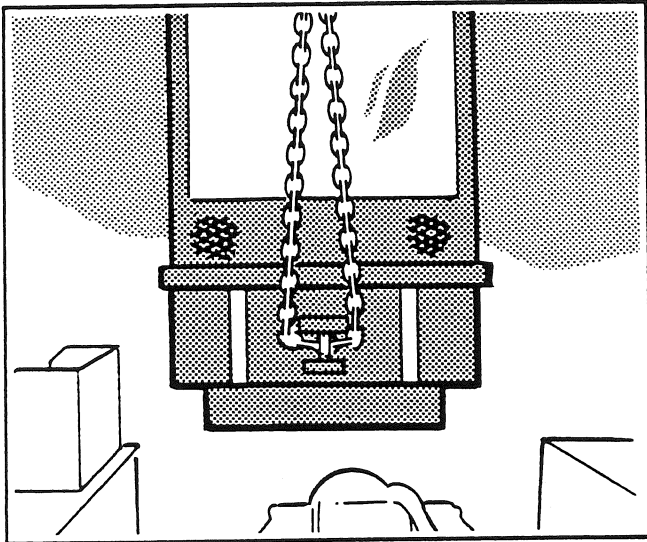


Fig. 14

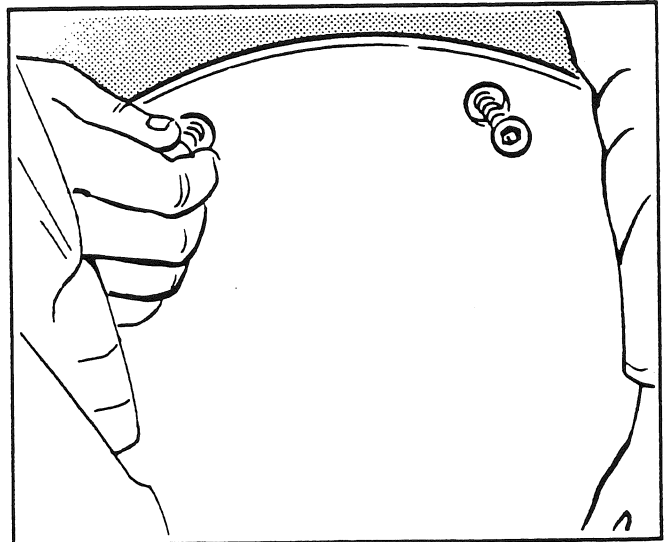


Fig. 17

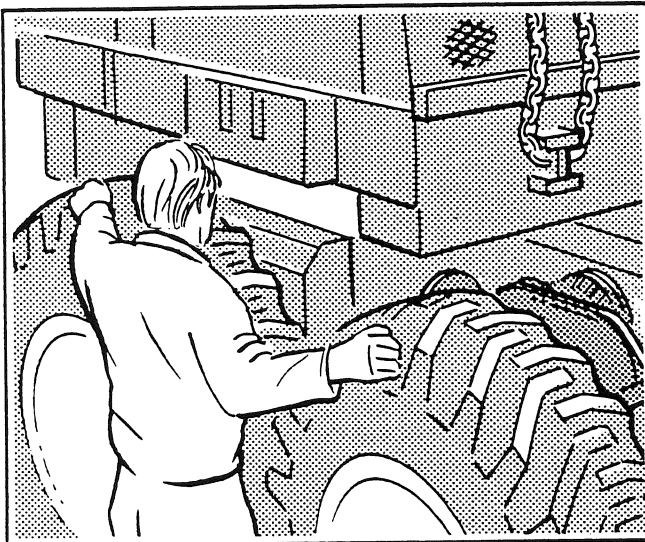


Fig. 15

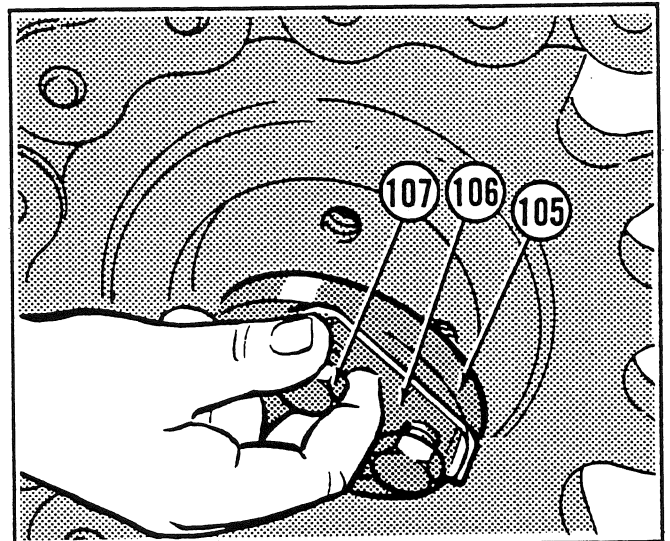


Fig. 18

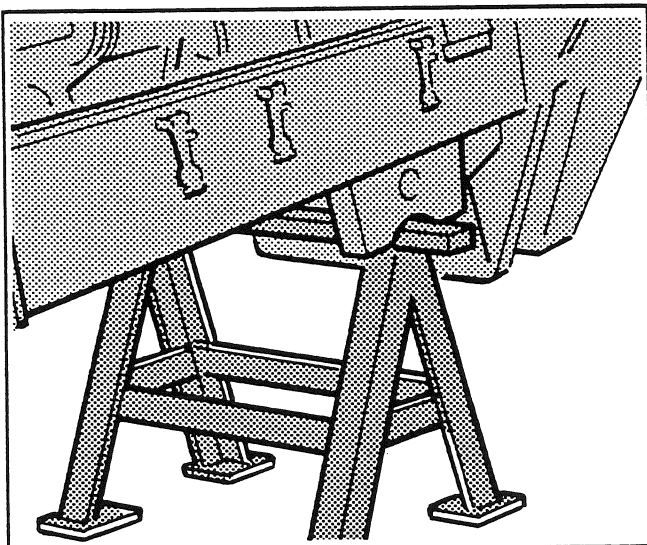


Fig. 16

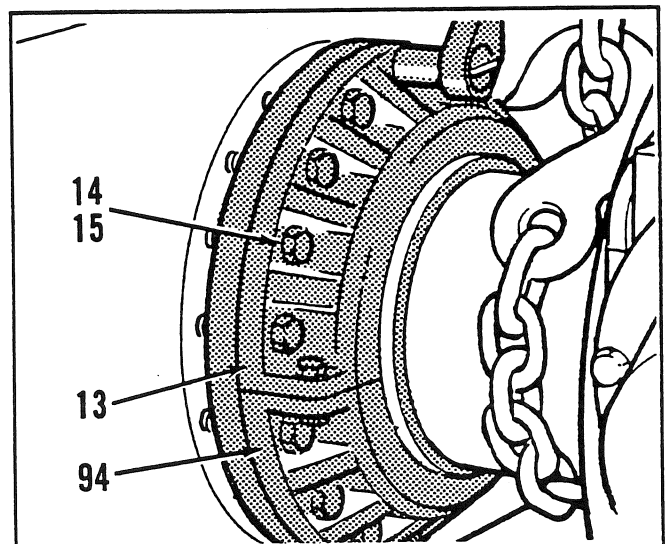


Fig. 19

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STANDARD DOUBLE REDUCTION FINAL DRIVE

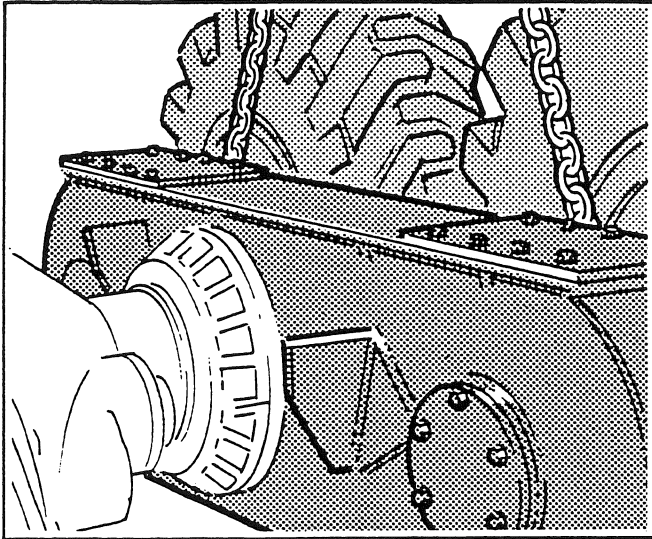


Fig. 20

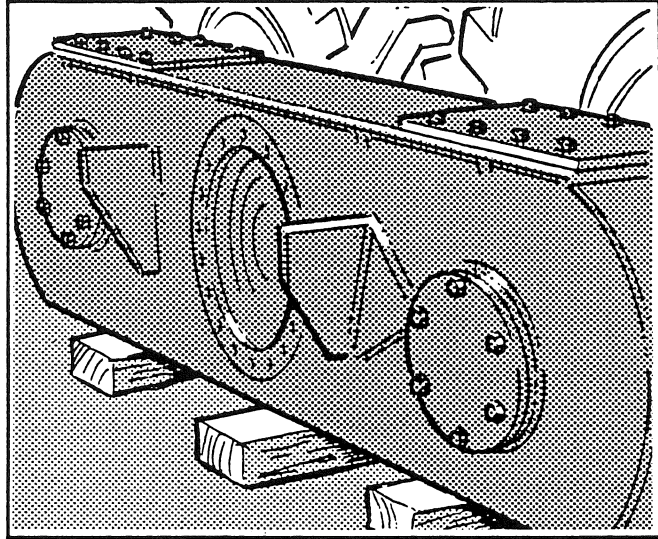


Fig. 23

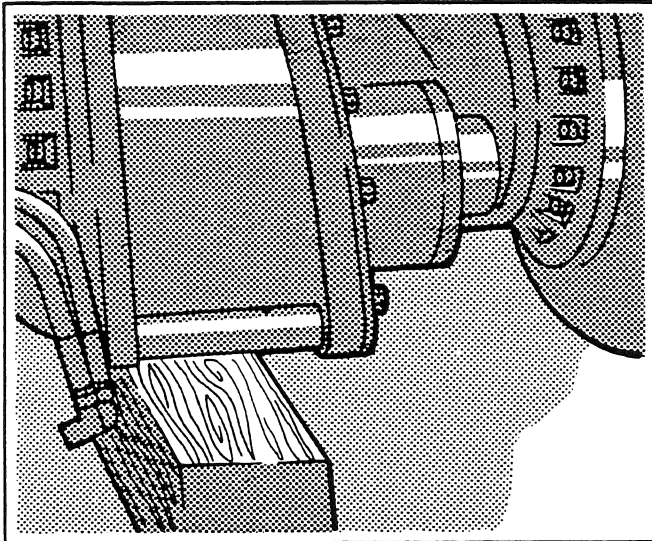


Fig. 21

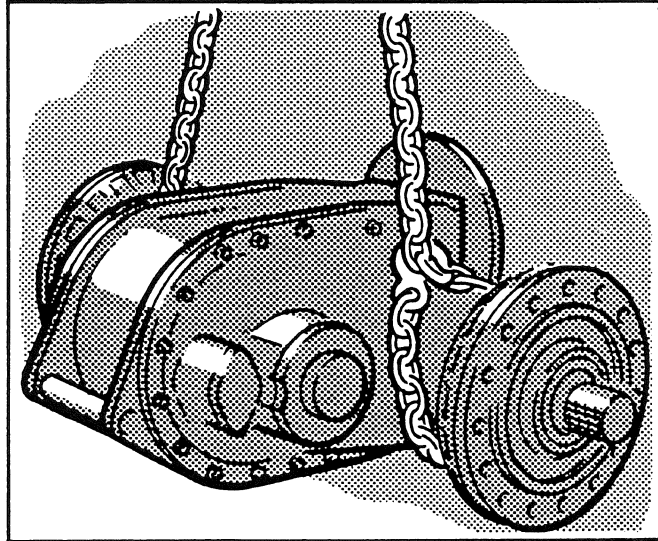


Fig. 24

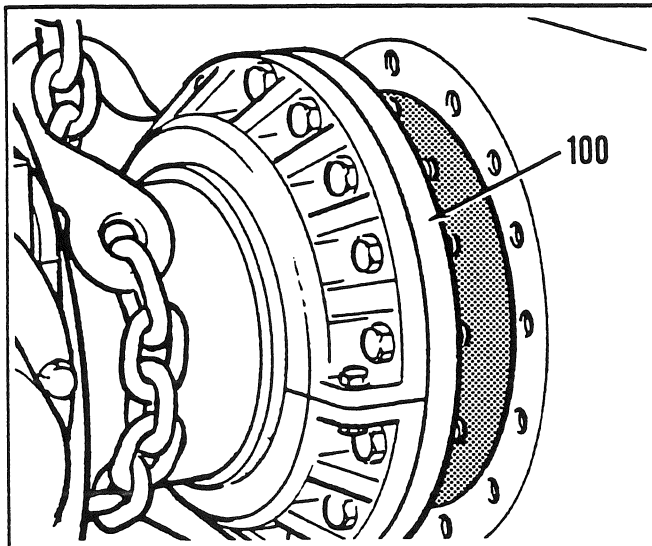


Fig. 22

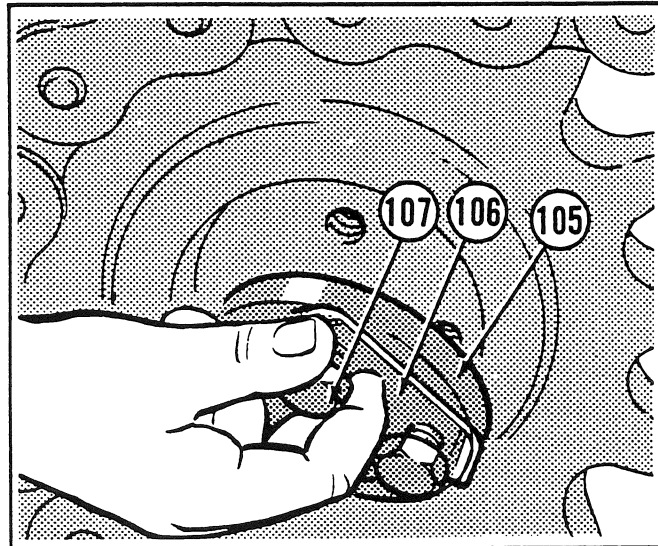


Fig. 25

700 SERIES SHOP MANUAL
STANDARD DOUBLE REDUCTION FINAL DRIVE

Final Drive - Removal (Continued)

Fig. 20

Attach the lifting device to the tandem case.

Fig. 23

Support the tandem case on proper blocks or stands.

Fig. 21

Support the weight of the final drive assembly on proper blocks.

Fig. 24

Attach the lifting device to the final drive assembly. Support the other tandem case on proper blocks or stands.

Fig. 22

Remove the tandem case from the final drive assembly using the lifting device. Make sure that the flanged sleeve (100) separates from the tandem case. Remove and discard the gasket. If gasket eliminator compound has been used, remove all traces of the sealant.

Fig. 25

Release the tabs and remove the capscrews (107), lockplate (106) and sprocket retainer (105) from the left hand tandem. Discard the lockplate. Remove the capscrews (33) and lockwashers (34) retaining the final drive assembly to the tandem case.

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Final Drive - Removal (Continued)

Fig. 26

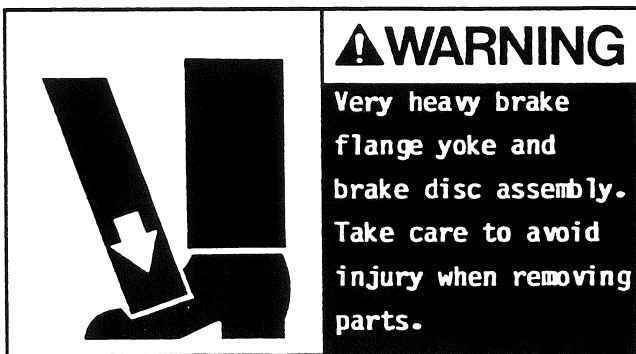
Remove the tandem case from the final drive assembly using the lifting device. Make sure that the flanged sleeve (49) separates from the tandem case. Remove and discard the gasket. If gasket eliminator compound has been used, remove all traces of the sealant.

Fig. 27

Although the final drive assembly may be overhauled on the floor, many procedures will be easier and faster by rotating the assembly in a build stand. If a stand is available, install the assembly using the lifting device.

Final Drive - Disassembly

Fig. 28



Remove the locknut (63) and washers (64 and 65). Inspect the locknut for possible re-use. Locknuts can normally be re-used twice from new. If in doubt, discard the part. Remove the brake flange yoke and brake disc assembly (66).

Fig. 29

Remove and discard the oil seal (104) from the flanged sleeve (100).

Fig. 30

Remove and discard the snap ring (103) from the flanged sleeve (100).

Fig. 31

Install a lifting eye in the end of the drive axle (101). Remove the drive axle and bearing assembly from the flanged sleeve (100) using the lifting device.

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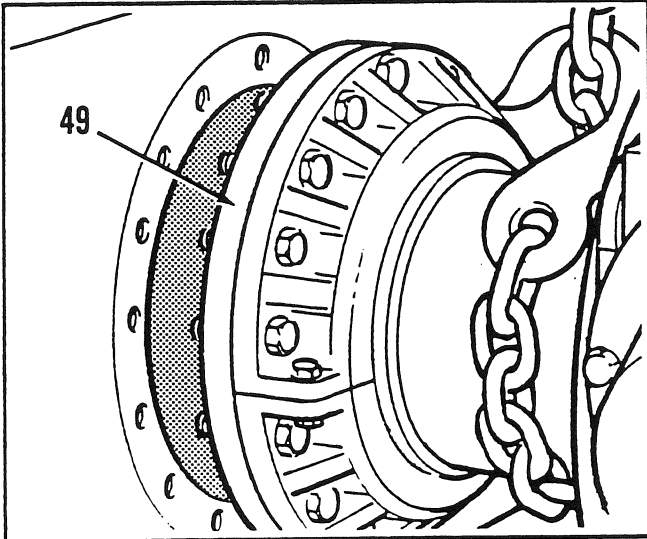


Fig. 26

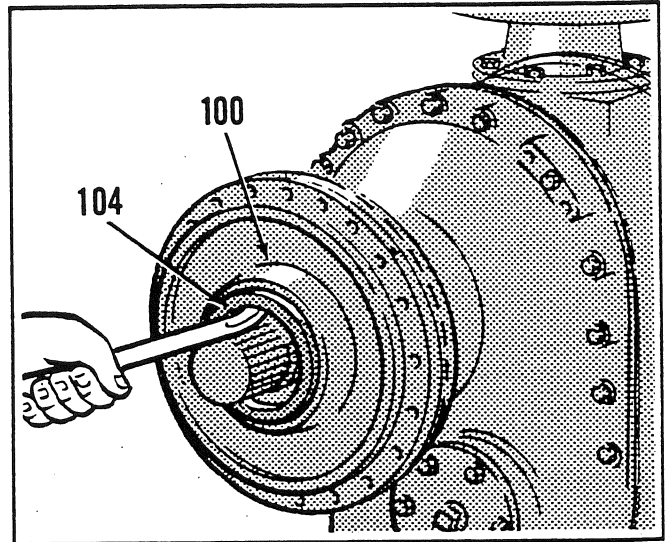


Fig. 29

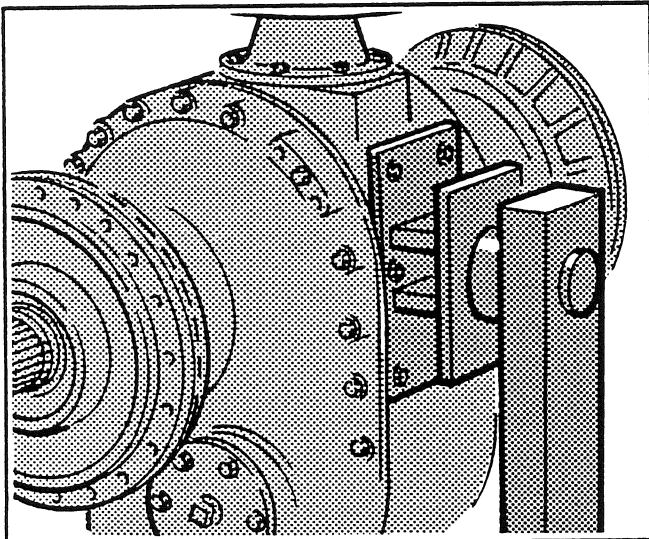


Fig. 27

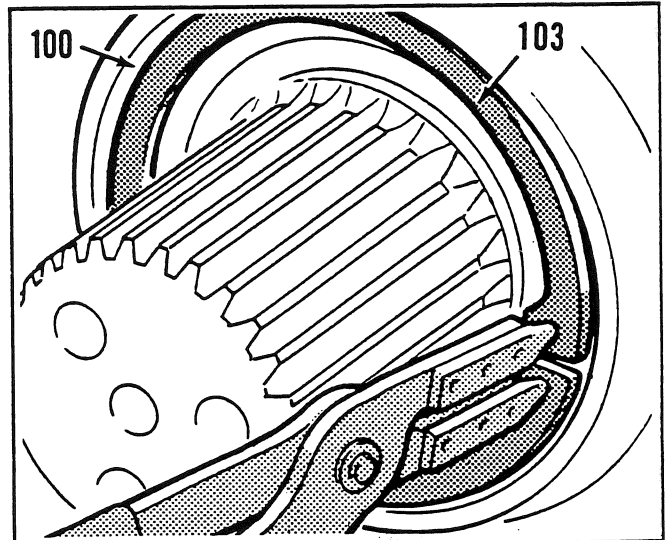


Fig. 30

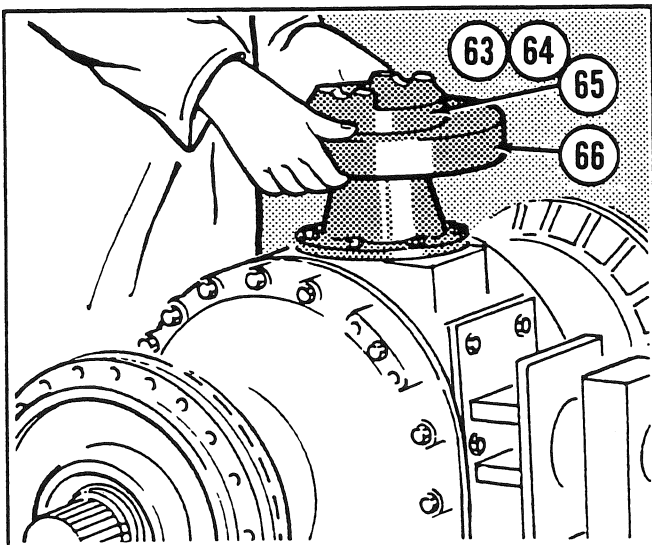


Fig. 28

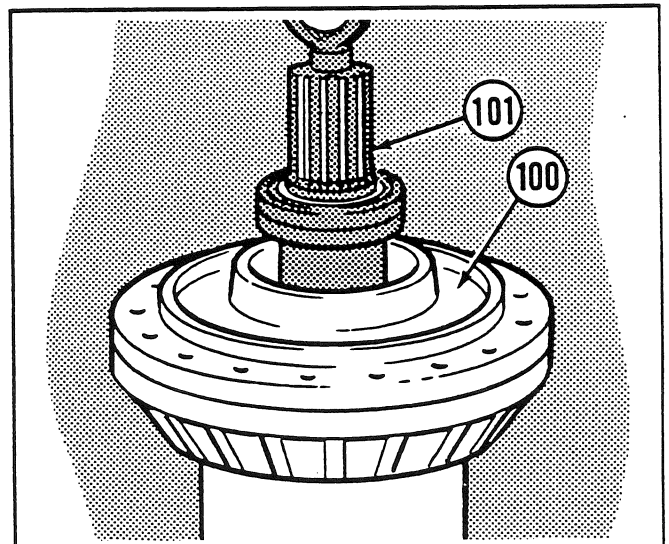


Fig. 31

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STANDARD DOUBLE REDUCTION FINAL DRIVE

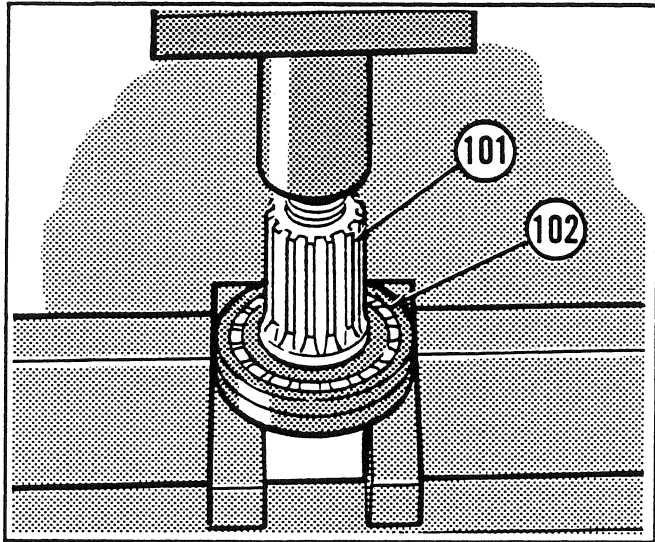


Fig. 32

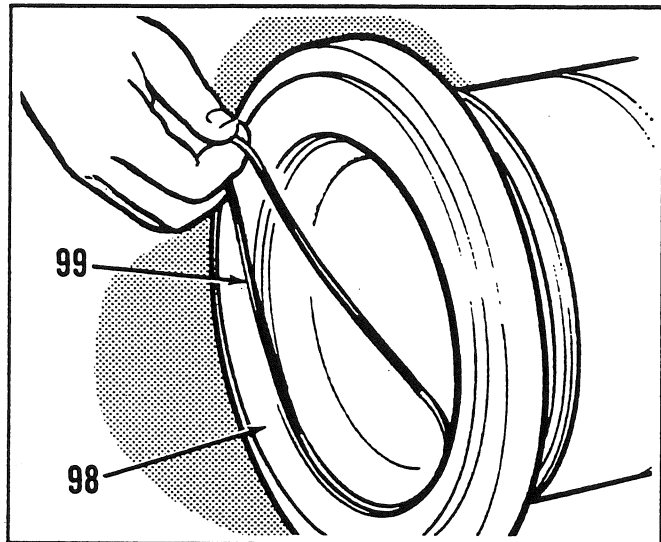


Fig. 35

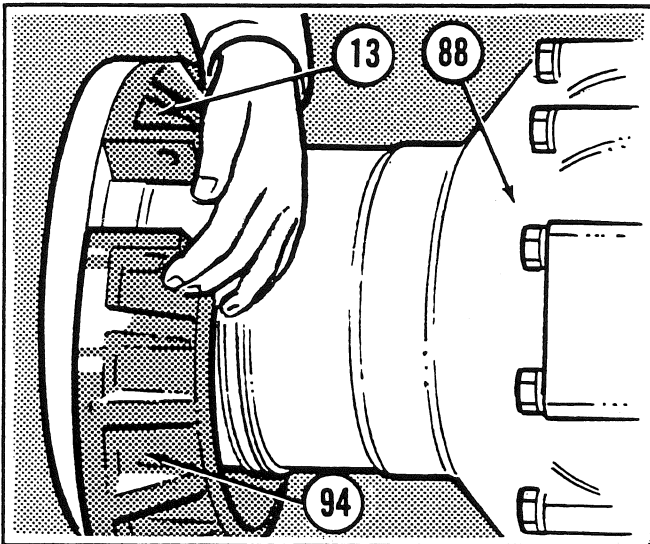


Fig. 33

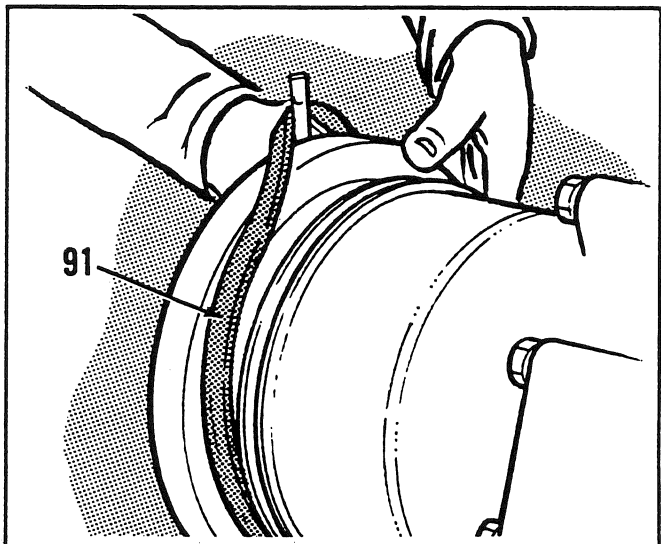


Fig. 36

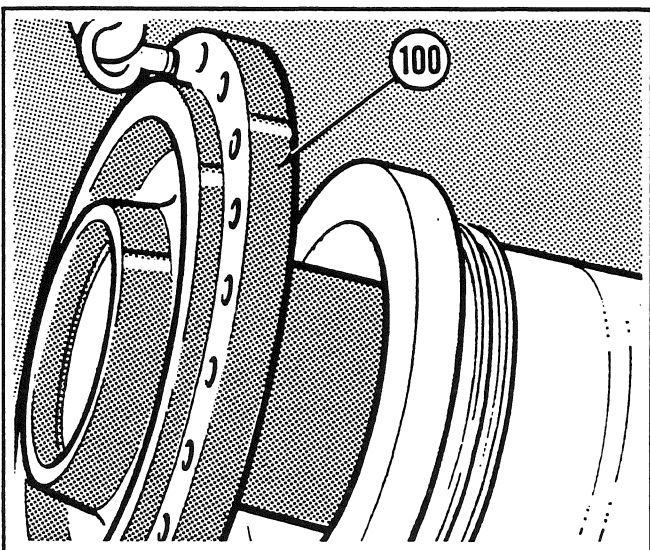


Fig. 34

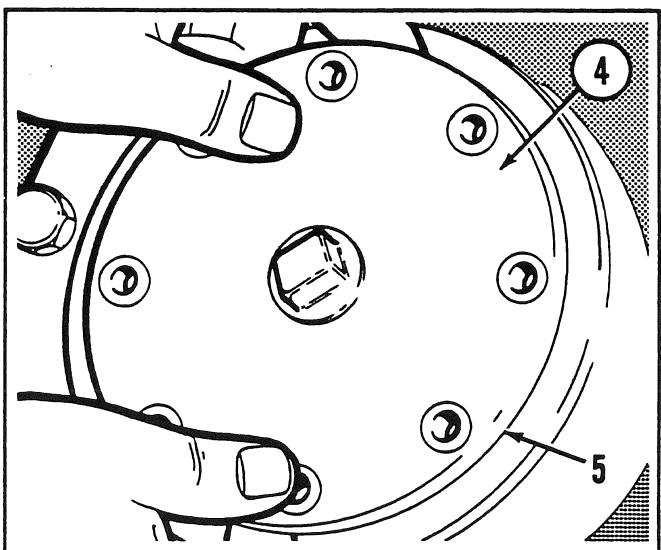


Fig. 37

700 SERIES SHOP MANUAL
STANDARD DOUBLE REDUCTION FINAL DRIVE

Final Drive - Disassembly (Continued)

Fig. 32

Remove the lifting eye from the end of the drive axle (101). Remove the bearing (102) from the drive axle using a hydraulic press.

Fig. 33

Remove the nuts (93), bolts (16) and lockwashers (92) securing the half-rings (13 and 94). Separate the half-rings and remove them from the side housing (88).

NOTE

The half-rings are a matched pair. Keep them temporarily bolted together during the overhaul process. Remove all traces of gasket sealant from the half-ring flanges.

Fig. 34

Install a lifting eye in the flanged sleeve (100). Remove the flanged sleeve using the lifting device. Remove all traces of gasket sealant from the flange.

Fig. 35

Remove and discard the inner thrust plate (95), outer thrust plate (98) and O ring (99).

Fig. 36

Remove the "Uniring" seal (91) using a pry bar. Discard the "Uniring" seal. Repeat the procedures from Fig. 29 to Fig. 36 and remove the drive axle and flanged sleeve parts from the left hand side.

Fig. 37

Remove the capscrews (1) and lockwashers (2) retaining the cross shaft right hand cap (4). Remove the cap and shim pack (5). Discard any damaged shims.

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Final Drive - Disassembly (Continued)

Fig. 38

Remove the nuts (83) and lockwashers (82) retaining the cover plate (81). Remove and discard the gasket (80).

Fig. 39

Remove the capscrews (71) and lockwashers (72) retaining the pinion cap (73). Install a lifting eye on the spiral pinion shaft (79). Remove the spiral pinion shaft and cap assembly using the lifting device. Remove the shim pack (78) and discard any damaged shims.

Fig. 40

Install the spiral pinion shaft and cap assembly in a vise with soft jaws. Remove and discard the oil seal (68).

Fig. 41

Remove the locknut (67) using **special tool, part number 43004**. Inspect the locknut for possible re-use. Locknuts can normally be re-used twice from new. If in doubt, discard the part.

Fig. 42

Remove the spiral pinion shaft (79) from the cap pinion (73) using a hydraulic press. **DO NOT** use a puller or hammer to remove the spiral pinion shaft. The pinion cap can be damaged.

Fig. 43

Remove the bearing cone (69). Remove the bearing cups (70 and 74) from the pinion cap (73) using a soft metal drift.

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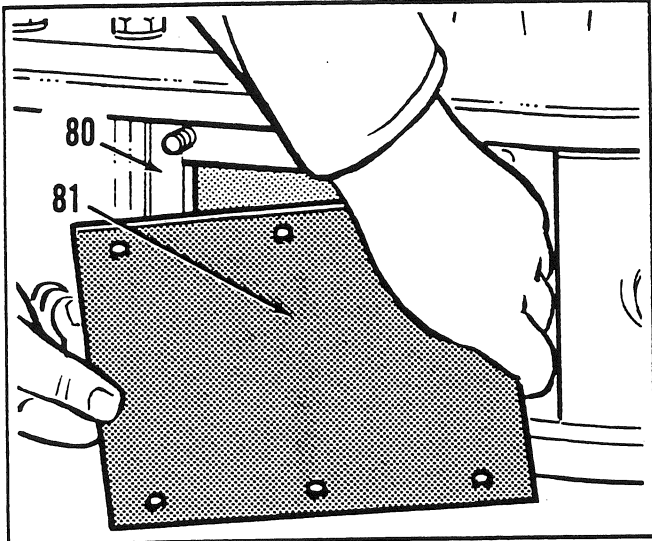


Fig. 38

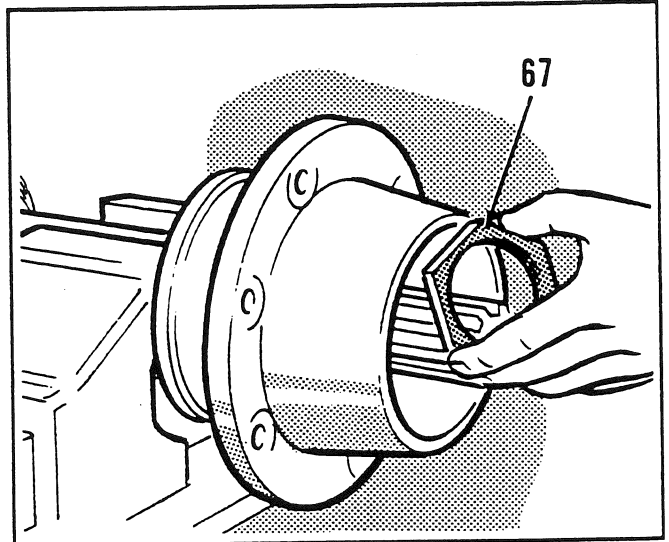


Fig. 41

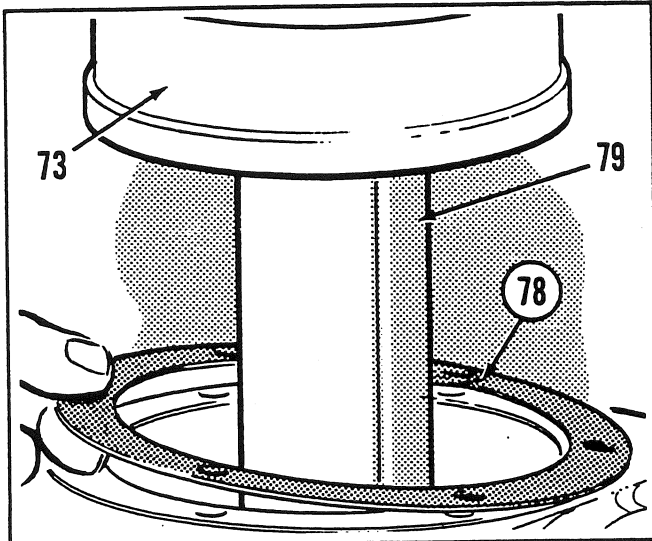


Fig. 39

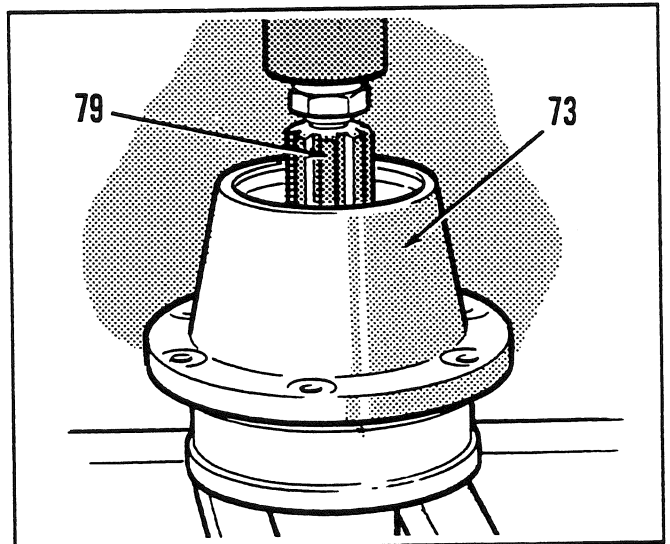


Fig. 42

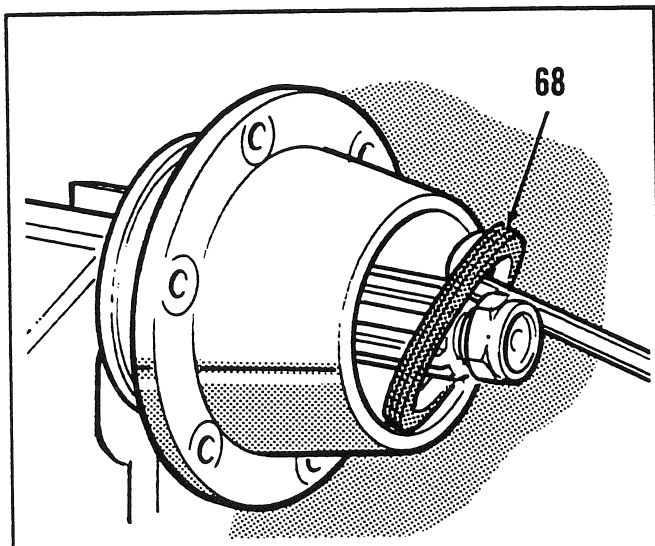


Fig. 40

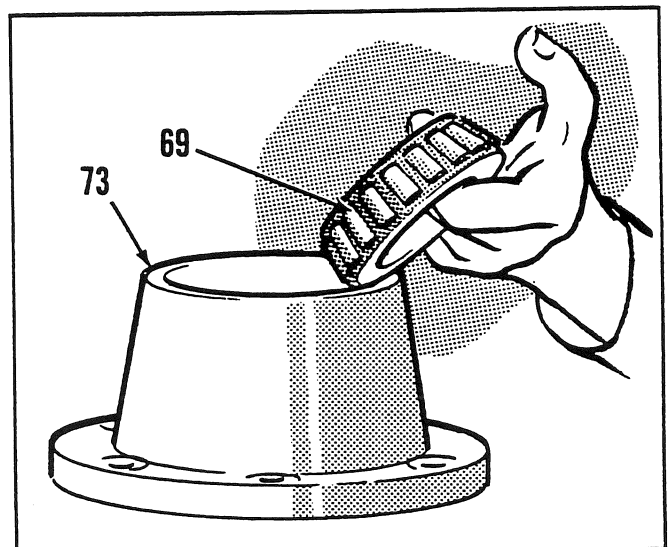


Fig. 43

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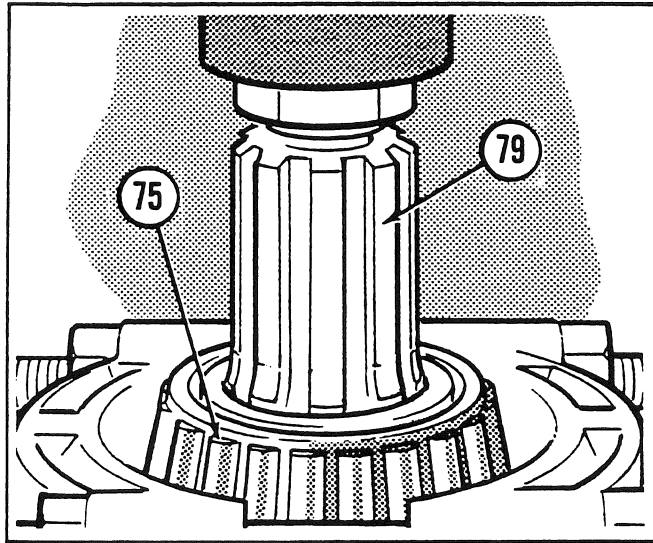


Fig. 44

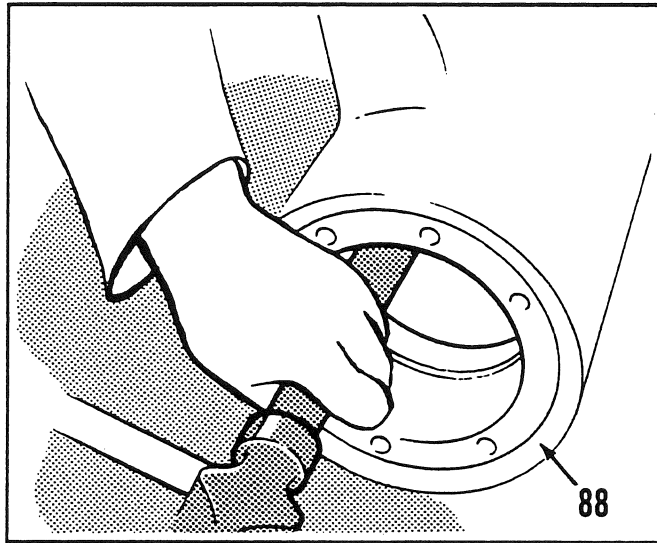


Fig. 47

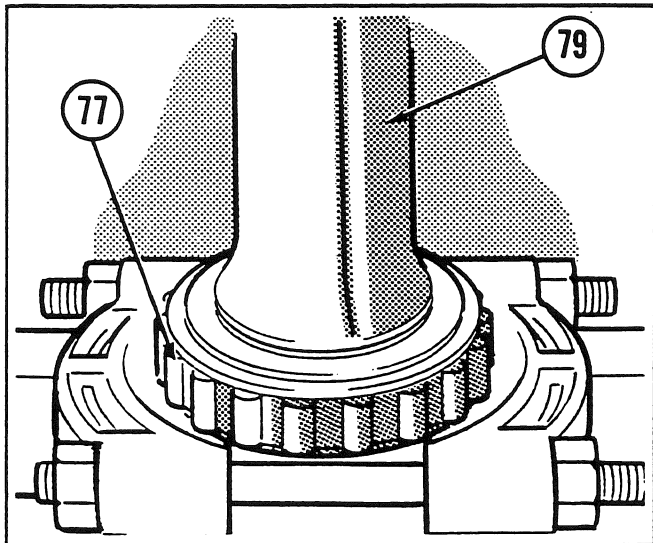


Fig. 45

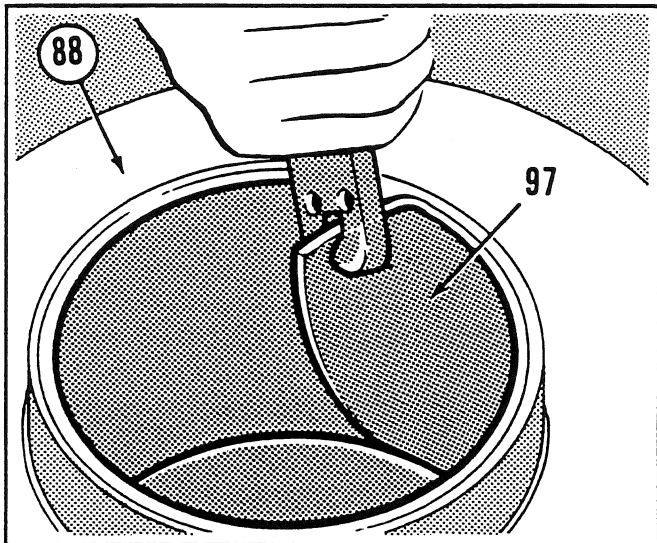


Fig. 48

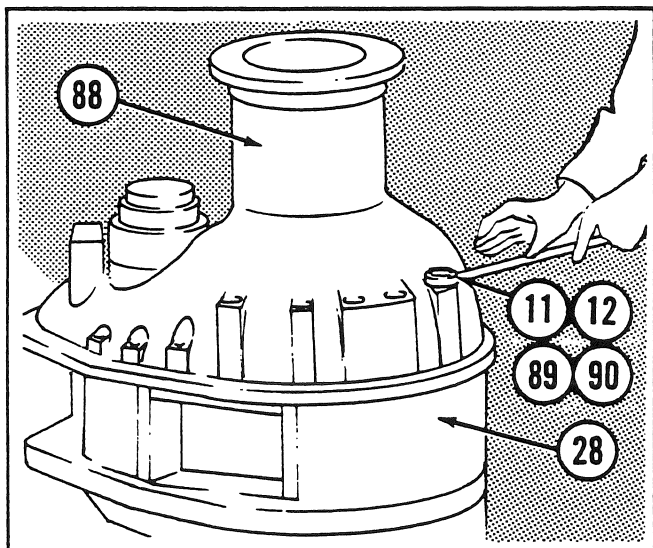


Fig. 46

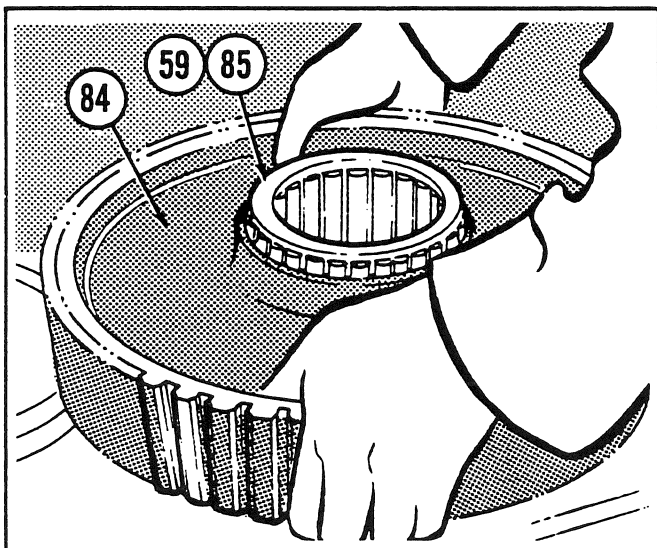


Fig. 49

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STANDARD DOUBLE REDUCTION FINAL DRIVE

Final Drive - Disassembly (Continued)

Fig. 44

Remove the bearing cone (75) from the spiral pinion shaft (79) using a hydraulic press and a bearing separating device.

Fig. 45

Remove and discard the snap ring (76). Remove the bearing inner race (77) from the spiral pinion shaft (79) using a hydraulic press and a bearing separating device.

Fig. 46

Remove the capscrews (11 and 90) and lockwashers (12 and 89) retaining the right hand side housing (88). Remove the side housing from the main case (28) using the lifting device. Remove and discard any traces of gasket (87) or gasket eliminator compound from the side housing and main case flanges.

Fig. 47

Remove the cross shaft bearing cup (9) and bull gear bearing outer race (85) from the side housing (88) using a soft metal drift.

Fig. 48

Pry up one corner of the outer bushing (97) using a chisel. Remove the bushing from the side housing (88). Repeat this procedure for the inner bushing (96).

Fig. 49



Remove the bull gear (84) from the main case (28). Remove the bearing inner races (59 and 85) from the bull gear hubs using a puller.

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Final Drive - Disassembly (Continued)

Fig. 50

Remove the cross shaft assembly from the main case (28) using the lifting device. Place the cross shaft assembly on a clean work bench in readiness for disassembly.

Fig. 51

Remove the locknuts (7 and 40) and bearing spacers (8 and 39) from both ends of the cross shaft (29). Inspect the locknuts for possible reuse. Locknuts can normally be re-used twice from new. If in doubt, discard the part. Remove the bearing cone (37) and spur pinion (30) from the cross shaft using a hydraulic press.

Fig. 52

Remove the bearing cone (10) and spur pinion (17) from the cross shaft (29) using a hydraulic press.

Fig. 53

Remove the spiral pinion gear (18) from the cross shaft (29) using a hydraulic press. Remove the spacer (23) from the cross shaft.

Fig. 54

Turn the final drive assembly over onto the left hand side. Remove the cap-screws (44) and lockwashers (43) retaining the cross shaft left hand cap (42). Remove the cap and shim pack (41). Discard any damaged shims.

Fig. 55

Repeat the procedures from Fig. 46 to Fig. 49 and remove the left hand side housing (32), bull gear (60) and related parts.

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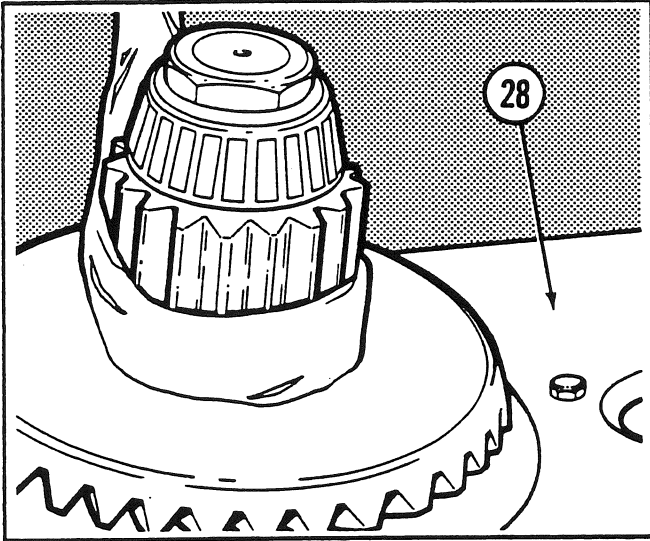


Fig. 50

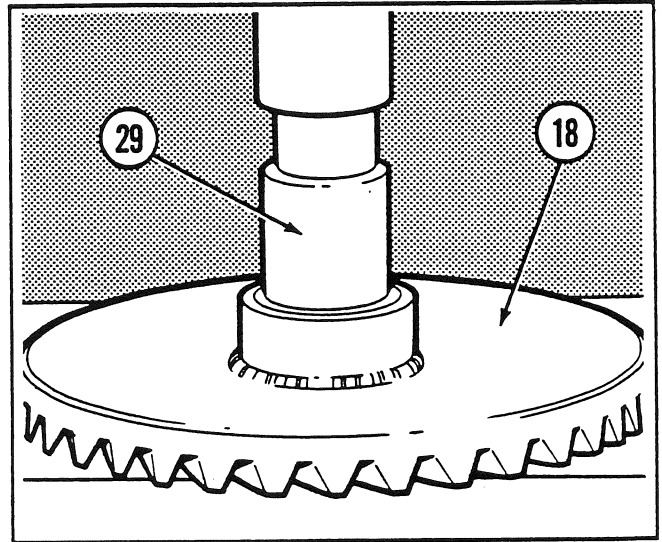


Fig. 53

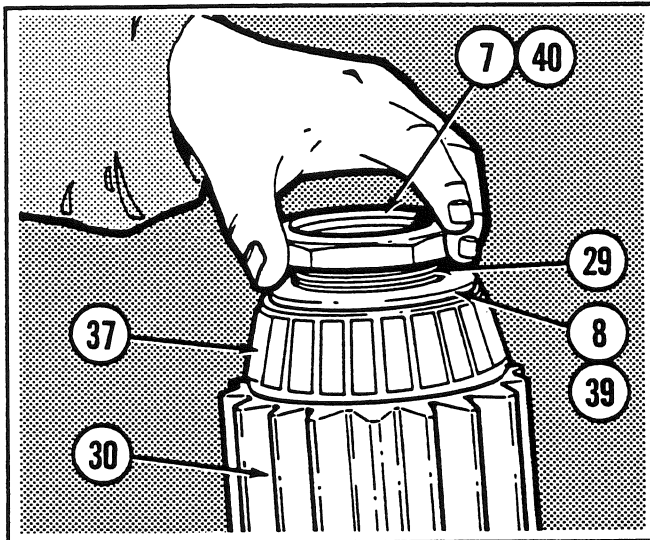


Fig. 51

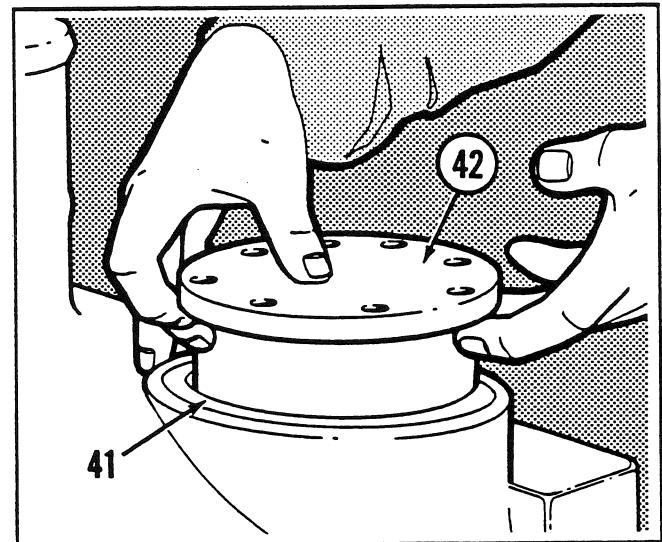


Fig. 54

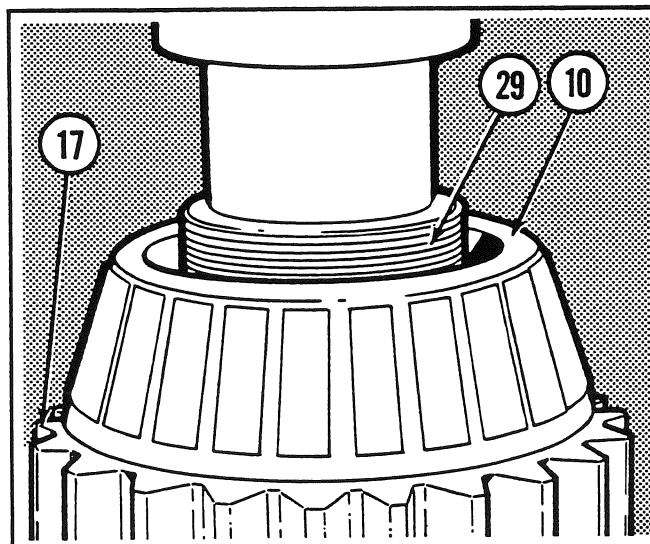


Fig. 52

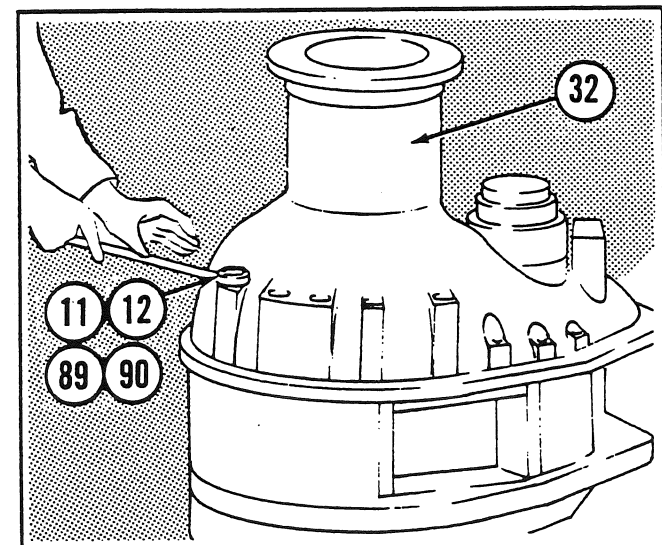


Fig. 55

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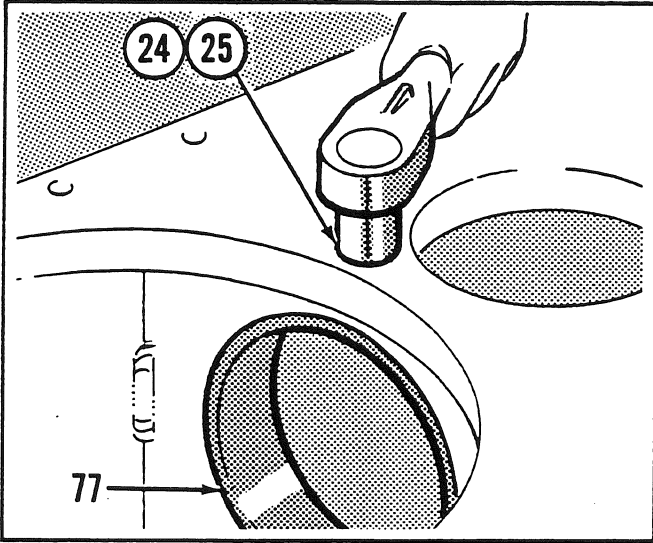


Fig. 56

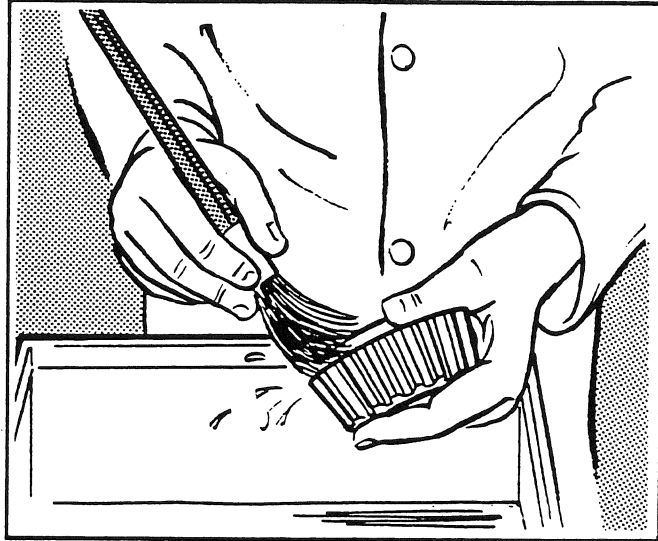


Fig. 59

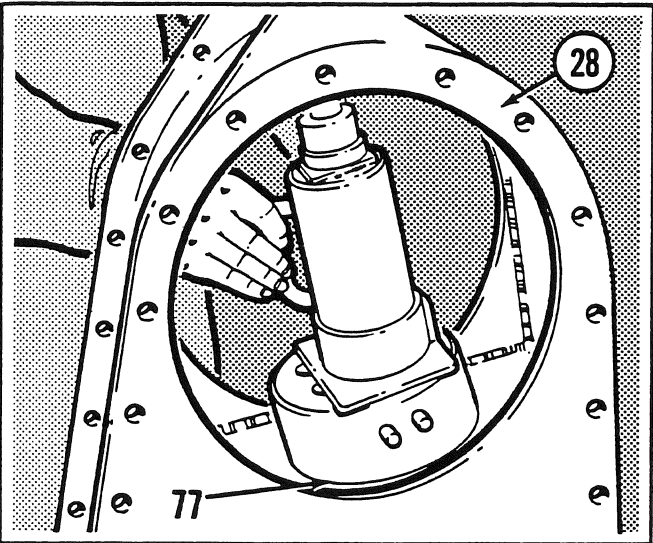


Fig. 57

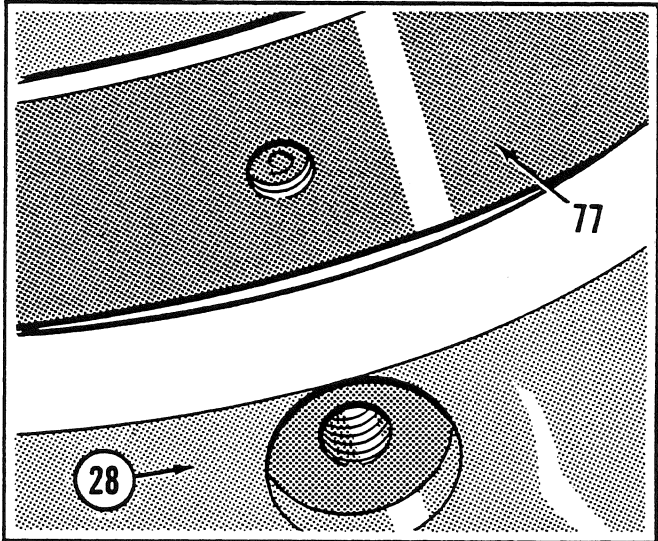


Fig. 60

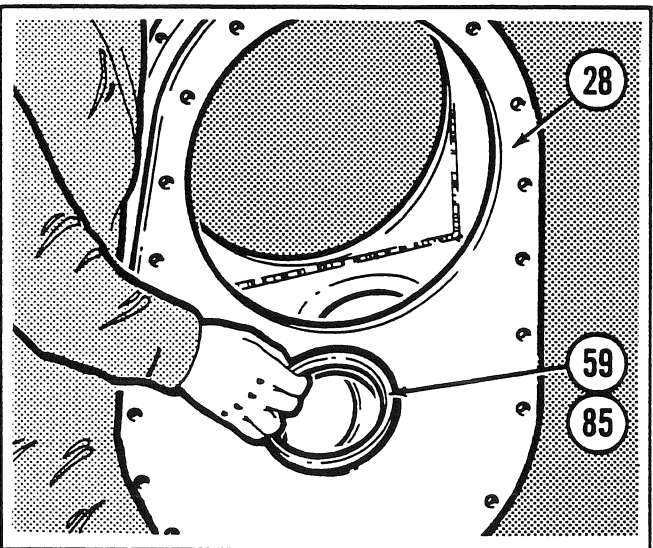


Fig. 58

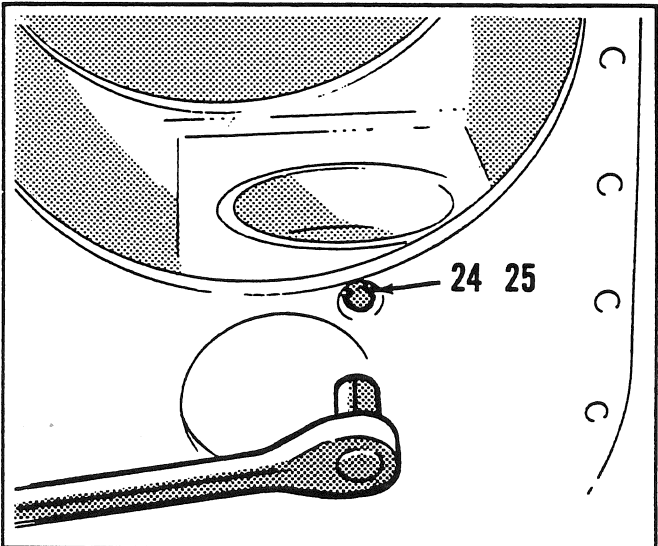


Fig. 61

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Final Drive - Disassembly (Continued)

Fig. 56

Remove the screw (24) and lockwasher (25) securing the spiral pinion shaft bearing outer race (77).

Fig. 57

Remove the bearing outer race (77) from the main case (28) using a hydraulic jack and the **special tool, part number 45261**.

Fig. 58

Remove the bull gear bearing outer races (59 and 85) from the main case (28) using a soft metal drift.

Fig. 59

Following disassembly of the final drive assembly, refer to **Cleaning and Inspection** on pages 2 and 3 of this Shop Manual Section. Thoroughly clean and inspect all parts before assembling the final drive.

Final Drive - Assembly

Fig. 60

Lubricate the spiral pinion shaft bearing outer race (77). Install the race in the main case (28) bore using a soft metal drift. Take care to align the dimple with the threaded hole.

Fig. 61

Install the screw (24) and lockwasher (25). Tighten the screw to the specified torque.

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Final Drive - Assembly (Continued)

Fig. 62

Lubricate the bull gear bearing outer races (59 and 85). Install the races in the main case (28) and side housing bores using **special tool, part number 33174**.

Fig. 65

Install a new gasket (31) on the main case (28). Check to see if the "extra" hole in the gasket aligns with the pry slot. If it aligns, turn the gasket over.

Fig. 63



Fig. 66

Lower the left hand side housing (32) onto the main case (28) using the lifting device. Take care when engaging the bull gear bearing inner and outer races.

Lubricate and install the bearing inner races (59 and 85) onto the bull gear (60) hubs. The bearings are easier to install when heated. Use only an oven or oil bath type heater and **DO NOT** exceed 121°C (250°F). Install the bull gear on the left hand side of the main case (28).

Fig. 64

Install a new inner bushing (53) and outer bushing (52) in the left hand side housing (32) using a hydraulic press and **special tools, part numbers 18511, 18512 and 18513**.

Fig. 67

If the dowel pins (86) were removed, use a soft metal drift to install new parts.

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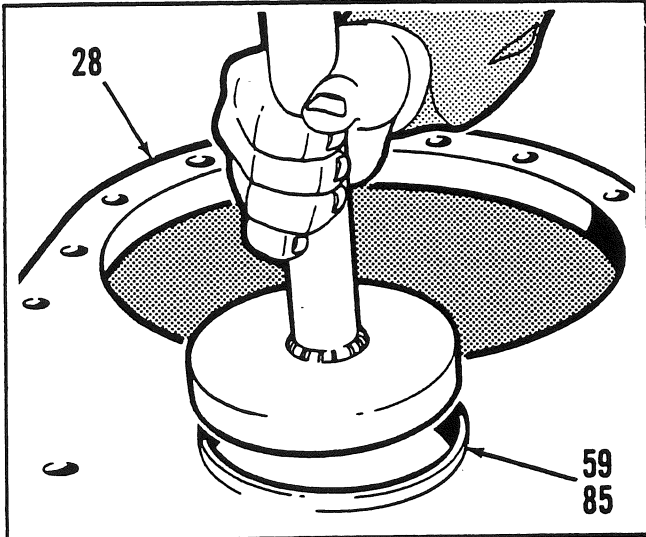


Fig. 62

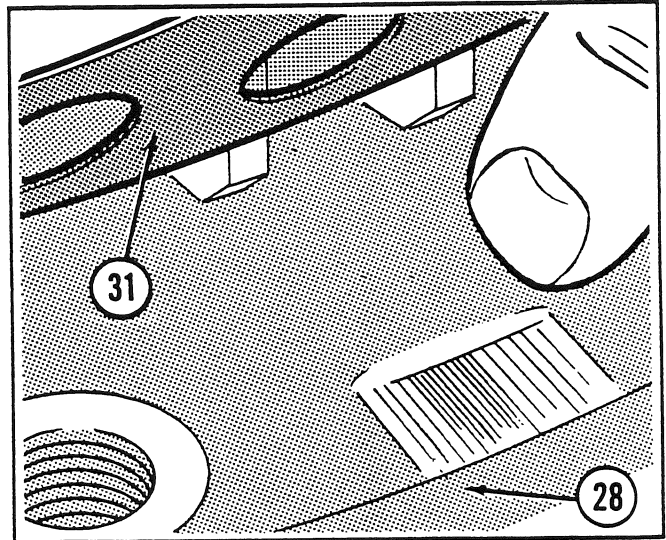


Fig. 65

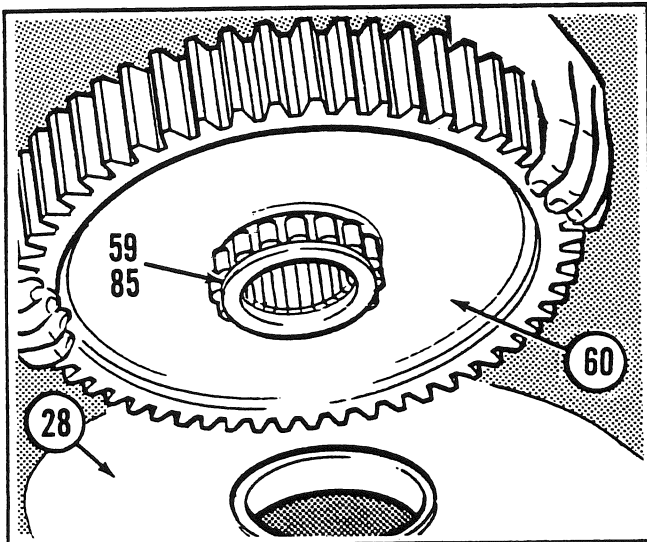


Fig. 63

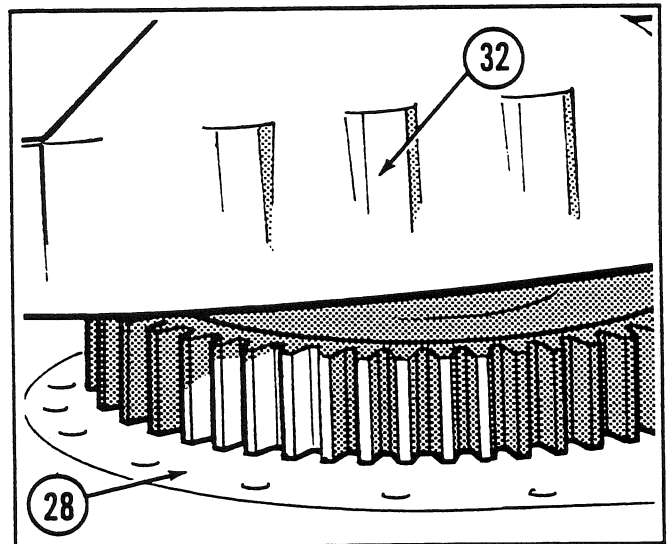


Fig. 66

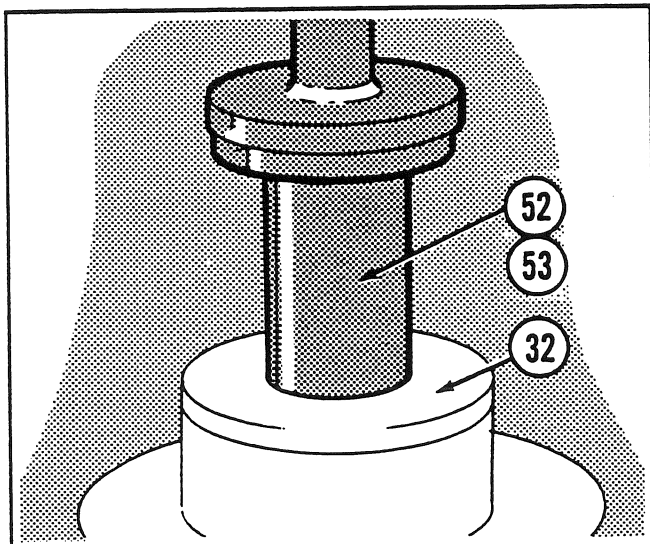


Fig. 64

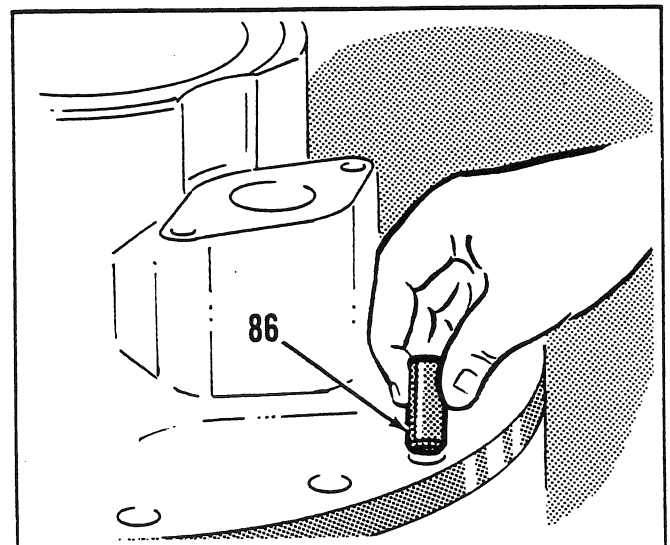


Fig. 67

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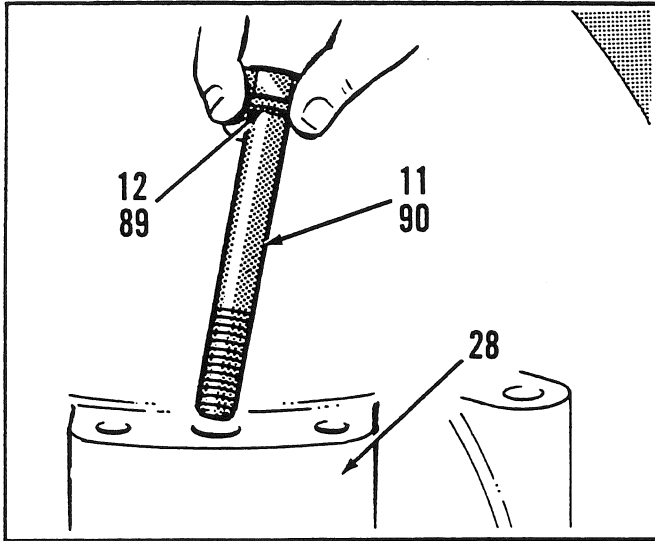


Fig. 68

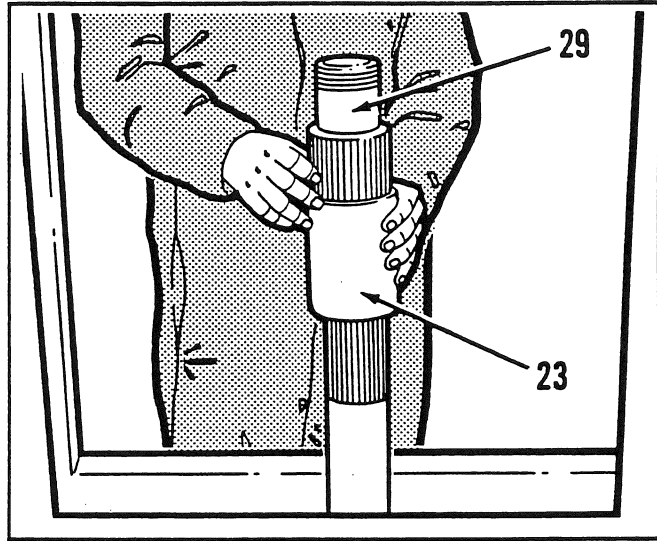


Fig. 71

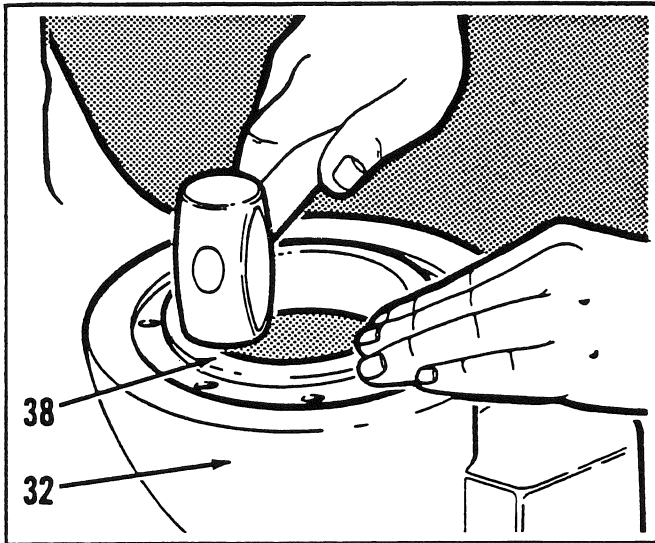


Fig. 69

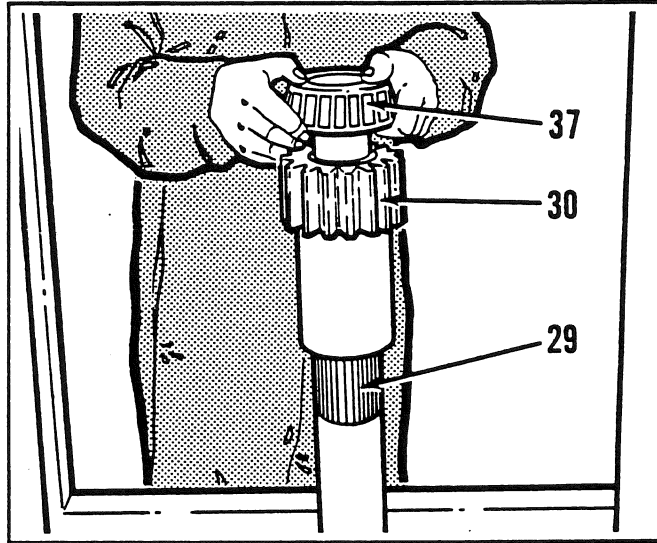


Fig. 72

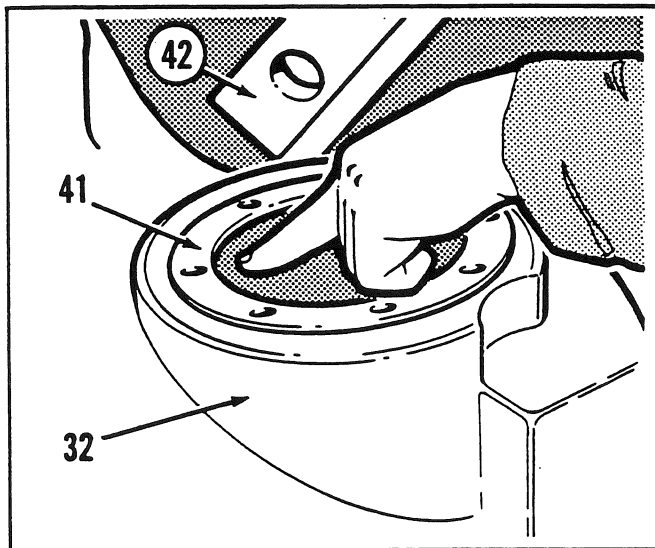


Fig. 70

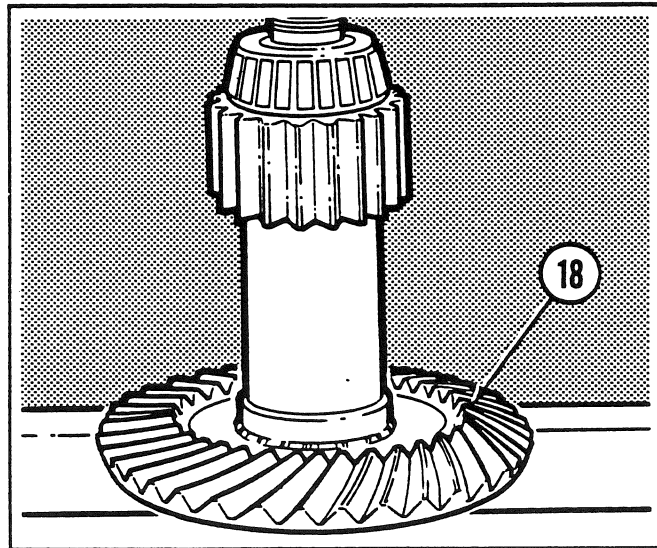


Fig. 73

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STANDARD DOUBLE REDUCTION FINAL DRIVE

Final Drive - Assembly (Continued)

Fig. 68

Install the capscrews (11 and 90) and lockwashers (12 and 89). Two capscrew holes open into the main case (28). Make sure you apply sealing compound, Champion part number 19167, onto the capscrew threads before installation. Tighten the capscrews to the specified torque.

Fig. 69

Lubricate the cross shaft bearing cup (38) and install into the side housing (32) using a soft metal hammer or drift.

Fig. 70

Assemble a shim pack (41) 1,27 mm (0.50 in.) thick and place it on the side housing (32). Install the cross shaft left hand cap (42). The hole in the cap should align with the upper lubrication port in the side housing. Install the capscrews (44) and lockwashers (43). Apply sealing compound, Champion part number 19167, onto the two forward capscrew threads. Tighten the capscrews to the specified torque.

Fig. 71

Apply anti-seize compound, Champion part number 30453, to all splines and tapered roller bearing journals. Place the cross shaft (29) on a clean work bench with the left hand (short splined) end up. Install the spacer (23).

Fig. 72

Install the spur pinion (30) on the cross shaft (29). Lubricate the bearing cone (37). Install the bearing cone using a hydraulic press and a soft metal tubular drift having the same diameter as the cone inner race. The bearing is easier to install when heated. Use only an oven or oil bath type heater and **DO NOT** exceed 121°C (250°F).

Fig. 73

Install the spiral pinion gear (18) with the teeth toward the spacer, onto the cross shaft (29).

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Final Drive - Assembly (Continued)

Fig. 74

Turn the cross shaft assembly over. Install the spur pinion (17) on the cross shaft (29). Lubricate the bearing cone (10). Install the bearing cone using a hydraulic press and a soft metal tubular drift having the same diameter as the cone inner race. The bearing is easier to install when heated. Use only an oven or oil bath type heater and **DO NOT** exceed 121°C (250°F).

Fig. 75

Install the bearing spacers (8 and 39) and locknuts (7 and 40), refer to text in Fig. 51. Tighten the locknuts to the specified torque.

Fig. 76

Lower the cross shaft assembly into the main case (28) using the lifting device. Make sure the spiral pinion gear teeth are pointing down.

Fig. 77



Lubricate and install the bearing inner races (59 and 85) onto the bull gear (84) hubs. The bearings are easier to install when heated. Use only an oven or oil bath type heater and **DO NOT** exceed 121°C (250°F). Install the bull gear on the left hand side of the main case (28).

Fig. 78

Install a new inner bushing (96) and outer bushing (97) in the right hand side housing (88) using a hydraulic press and special tools, part numbers 18511, 18512 and 18513.

Fig. 79

Install a new gasket (87) on the main case (28). Check to see if the "extra" hole in the gasket aligns with the pry slot. If it aligns, turn the gasket over.

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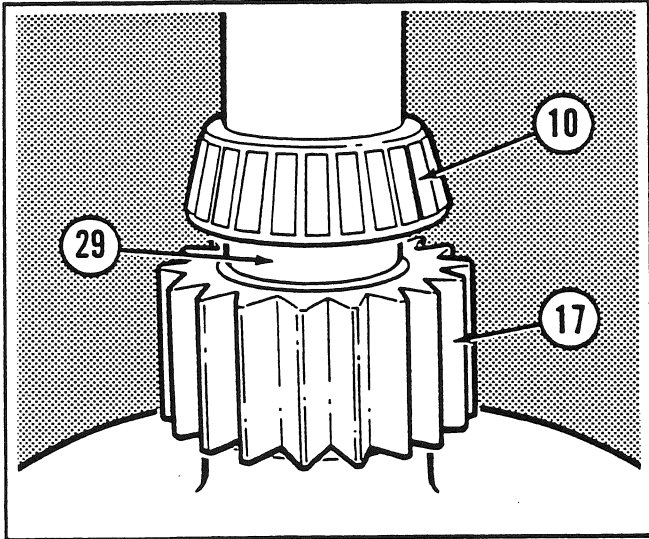


Fig. 74

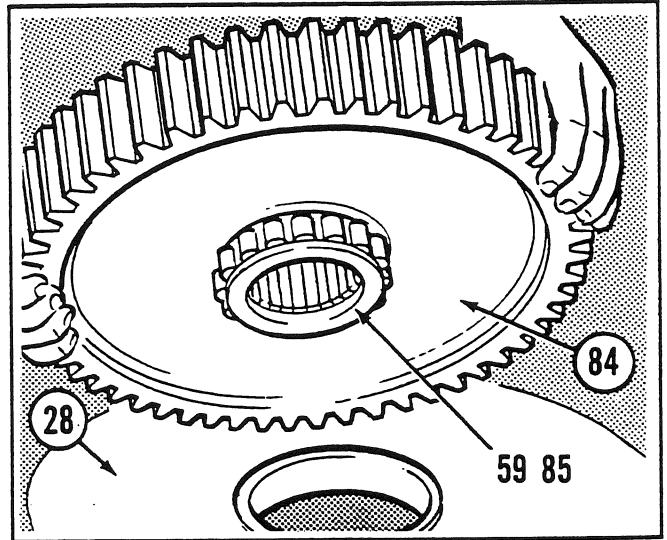


Fig. 77

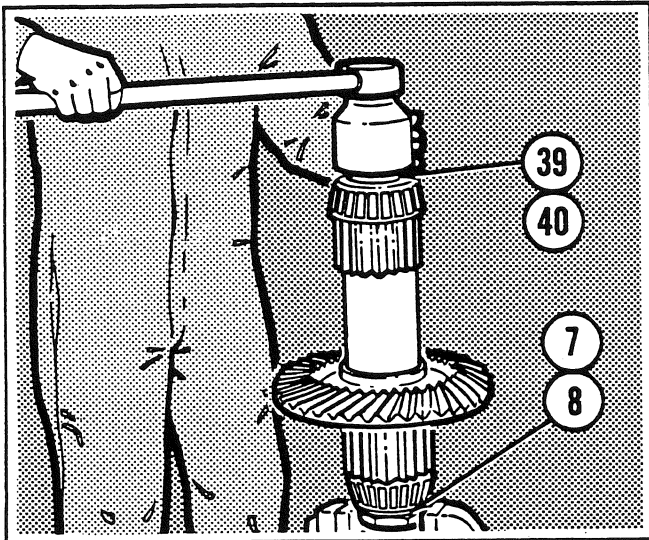


Fig. 75

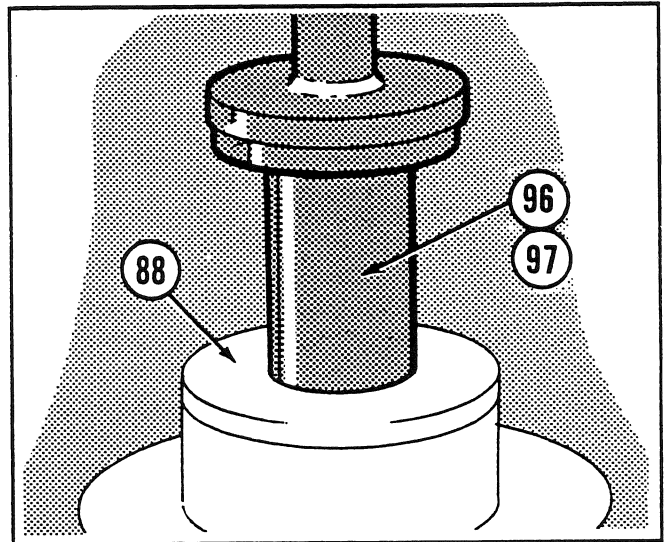


Fig. 78

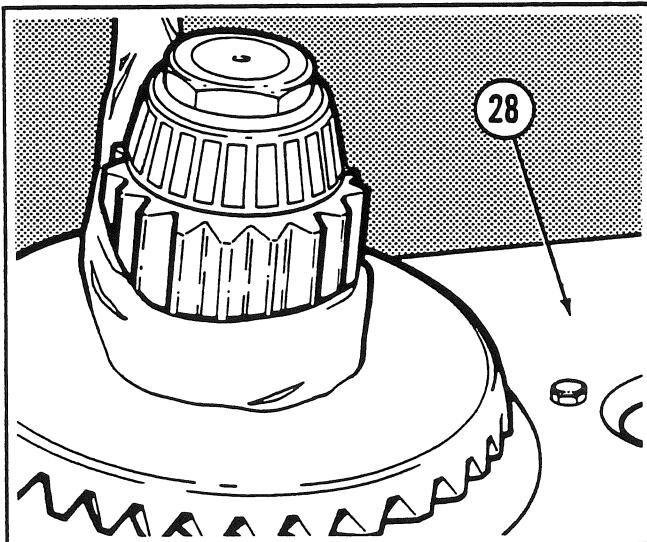


Fig. 76

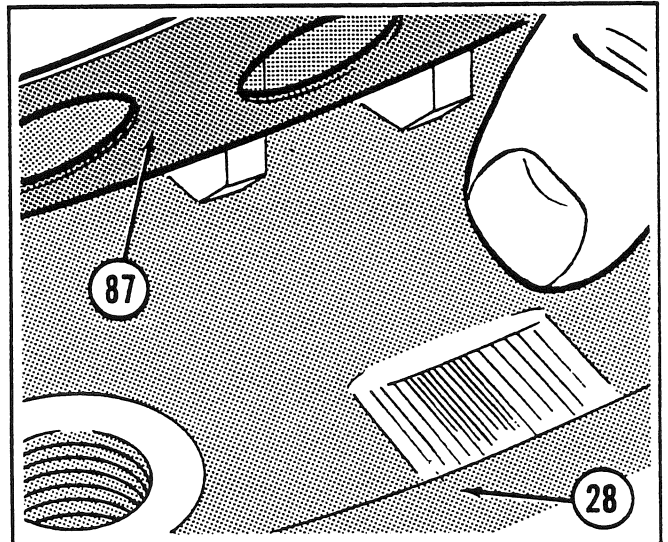


Fig. 79

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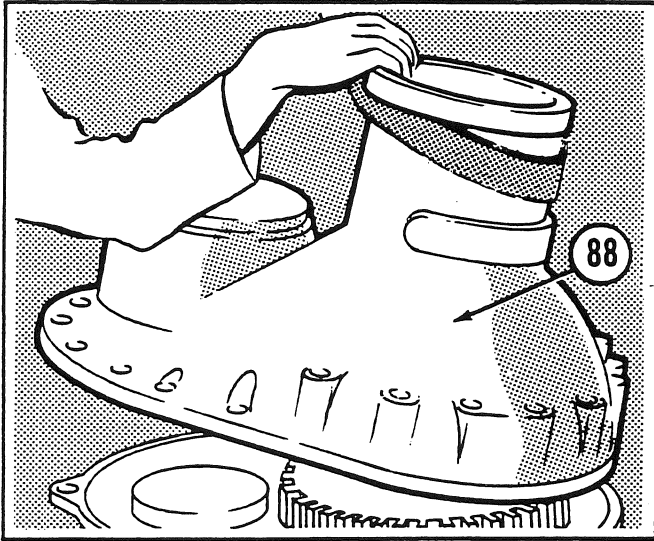


Fig. 80

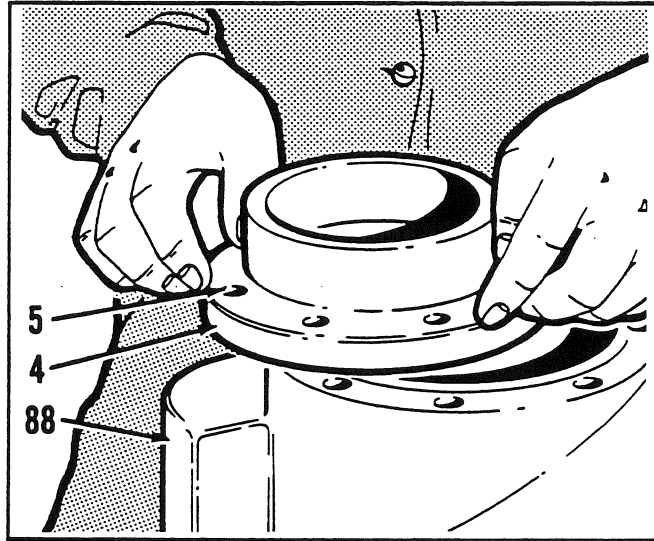


Fig. 83

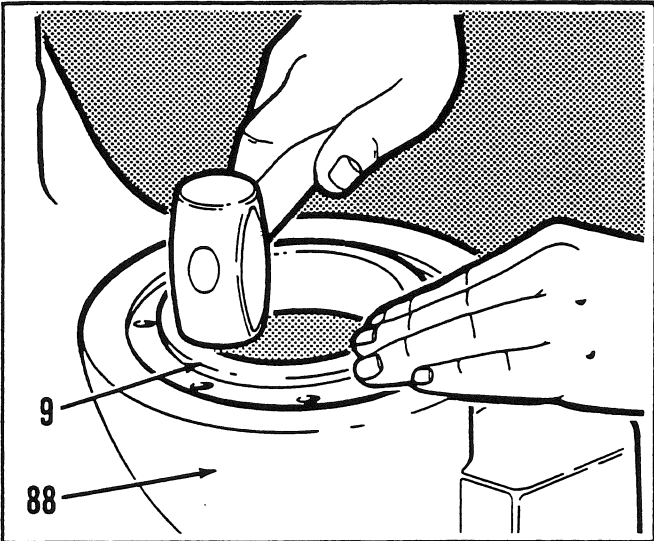


Fig. 81

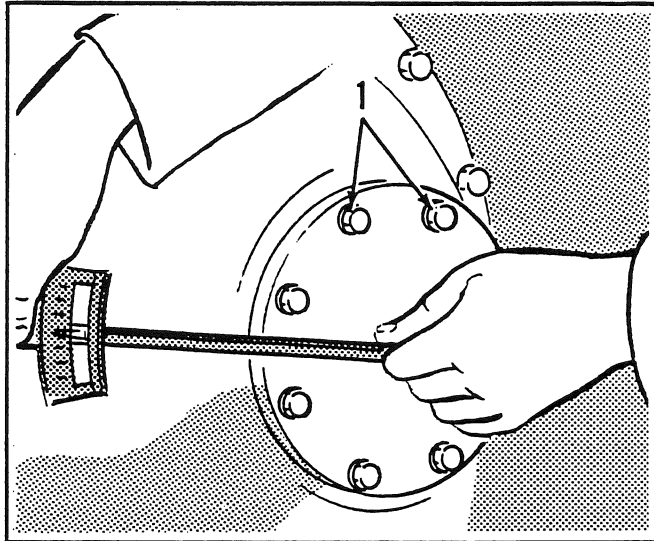


Fig. 84

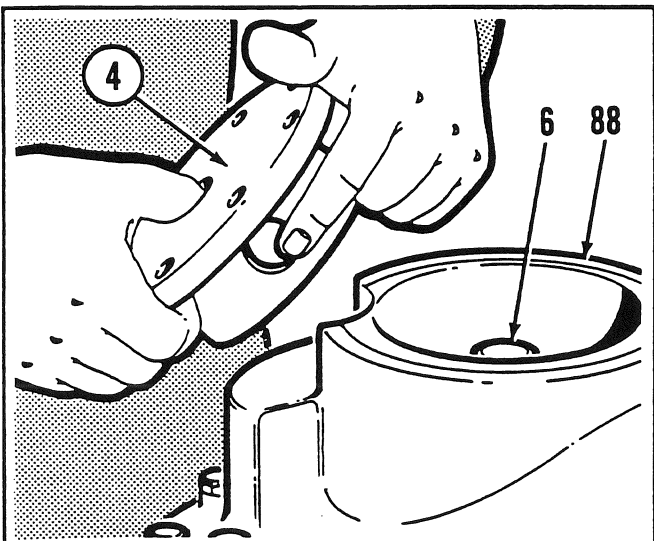


Fig. 82

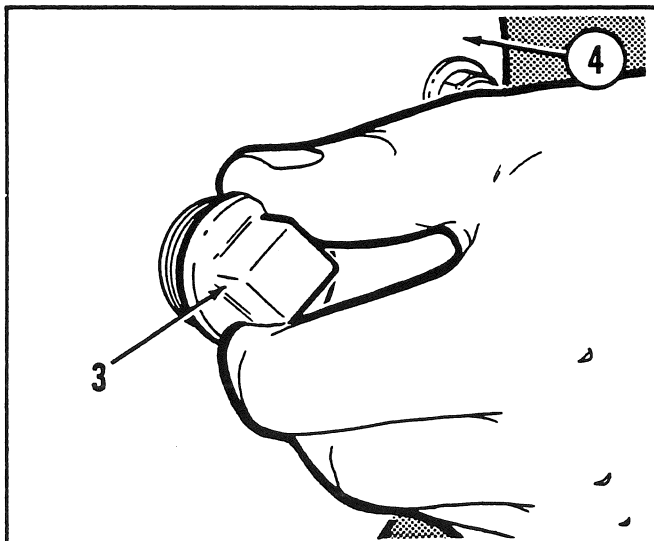


Fig. 85

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Final Drive - Assembly (Continued)

Fig. 80

Repeat the procedures from **Fig. 66** to **Fig. 68** and install the right hand side housing (88) and related parts.

Fig. 81

Lubricate the cross shaft bearing cup (9) and install into the side housing (88) using a soft metal hammer or drift.

Fig. 82

Install the cross shaft right hand cap (4) without the shim pack. The hole in the side of the cap aligns with the upper lubrication port in the side housing (88). Install the capscrews (1) and lockwashers (2). Remove the pipe plug (3). Install a torquemeter and engage with the capscrew head (6) on the cross shaft. Tighten the capscrews (1), while oscillating the cross shaft, until the rolling torque agrees with the adjustment specification listed in the front of this Shop Manual Section. Tighten the capscrews to the specified torque.

Fig. 83

Measure the gap between the cross shaft cap (4) and the side housing (88) machined surface in four places. Remove the cap. Assemble a shim pack (5) equal in thickness to this measurement. Install the shim pack; cross shaft cap; capscrews (1) and lockwashers (2). Tighten the capscrews to the specified torque.

Fig. 84

Install a torquemeter and engage with the capscrew head (6) on the cross shaft. Oscillate the cross shaft and check the rolling torque with the adjustment specification listed in the front of this Shop Manual Section. Add or remove shims (5) to agree with the specification. Apply sealing compound, Champion part number **19167**, onto the two forward capscrew (1) threads. Tighten the capscrews to the specified torque.

Fig. 85

Apply sealing compound, Champion part number **19167**, onto the pipe plug (3) threads. Install the plug in the cross shaft cap (4).

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Final Drive - Assembly (Continued)

Fig. 86

Apply adhesive/sealant, Champion part number **19200**, to the bearing surface of the spiral pinion shaft (79). Lubricate the inner bearing race (77). Install the race with the large radius towards the gear using a hydraulic press and the **special tool, part number 45261**. The bearing is easier to install when heated. Use only an oven or oil bath type heater and **DO NOT** exceed 121°C (250°F). Retain the bearing with a new snap ring (76).

Fig. 87

Lubricate the bearing cups (70 and 74) and install into the pinion cap (73) using a soft metal drift. You can also use a hydraulic press and **special tools, part numbers 18507, 18508, 18509 and 18510**. The cups are easier to install when chilled in a freezer or in dry ice.

Fig. 88

Lubricate the bearing cone (75) and install onto the spiral pinion shaft (79) using a hydraulic press and the **special tool, part number 18518**. The bearing is easier to install when heated. Use only an oven or oil bath type heater and **DO NOT** exceed 121°C (250°F). Make sure the cone abuts the shoulder on the shaft.

Fig. 89

Install the pinion cap (73) onto the spiral pinion shaft (79). Lubricate the bearing cone (69) and install onto the shaft using a hydraulic press and a soft metal tubular drift having the same diameter as the cone inner race. The bearing is easier to install when heated. Use only an oven or oil bath type heater and **DO NOT** exceed 121°C (250°F). Retain the bearing with the locknut (67) using the **special tool, part number 43004**. Refer to text for **Fig. 41**.

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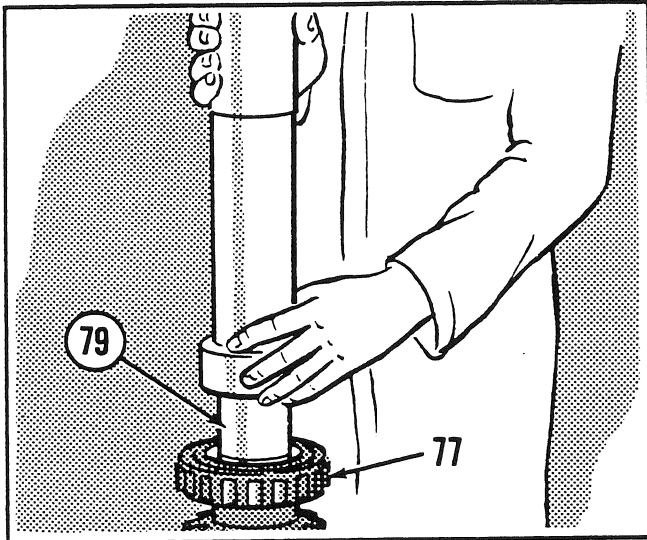


Fig. 86

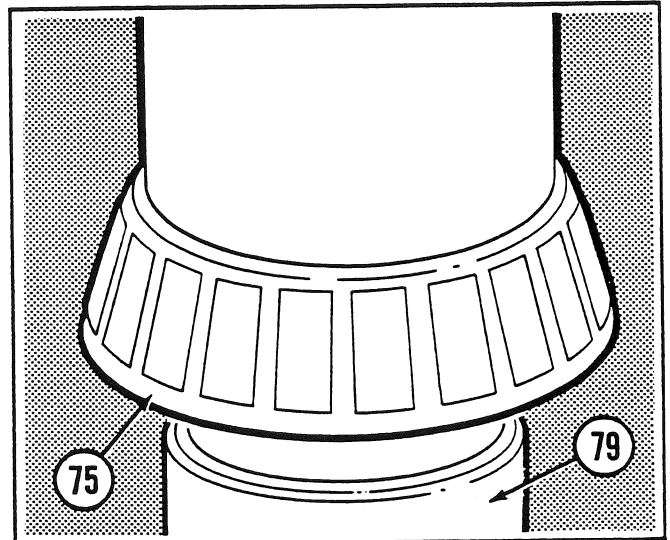


Fig. 88

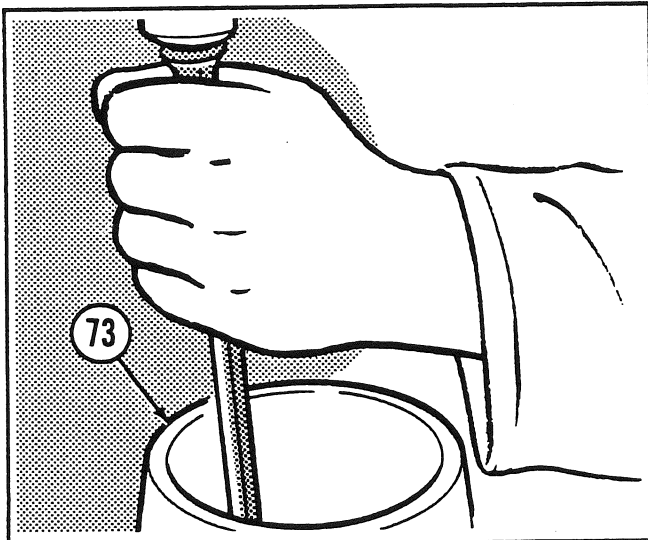


Fig. 87

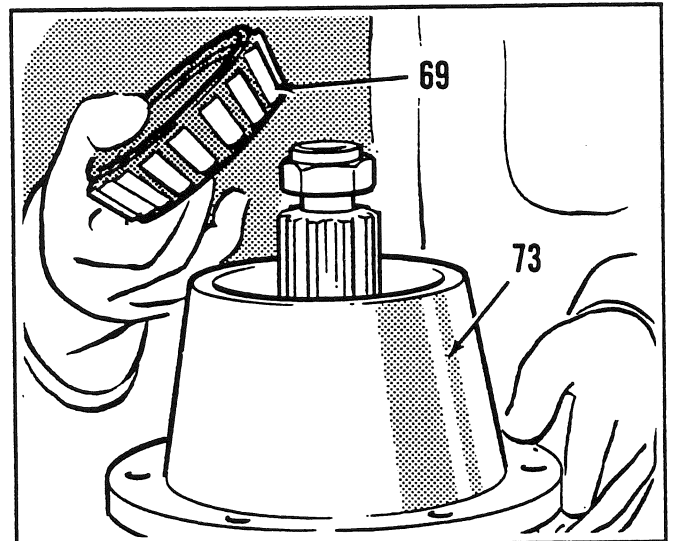


Fig. 89

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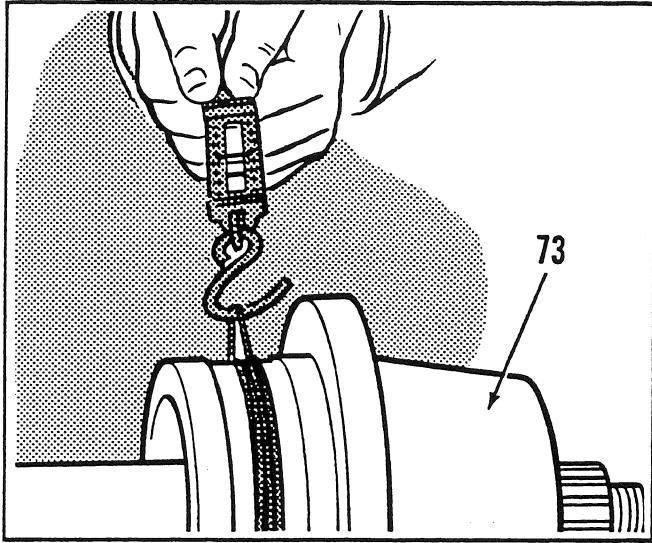


Fig. 90

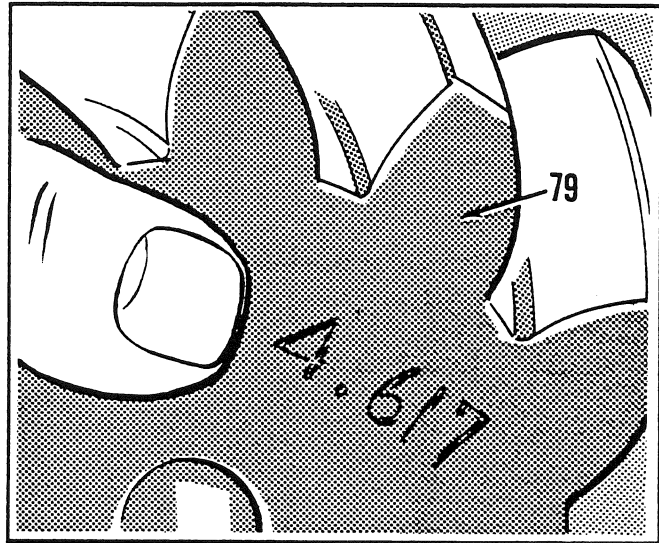


Fig. 93

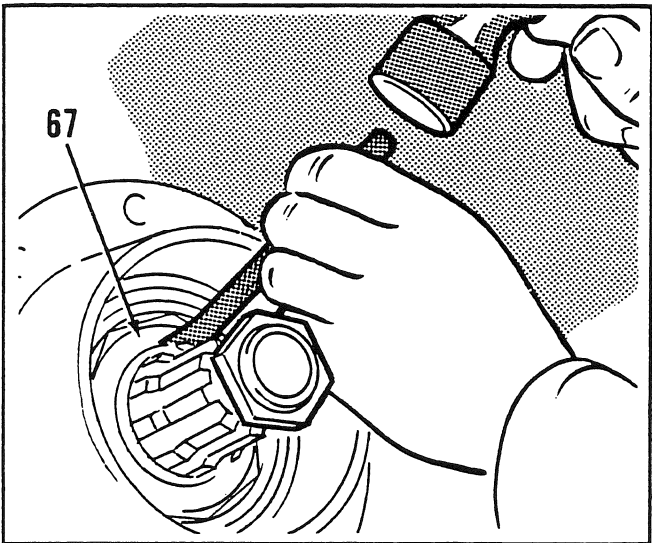


Fig. 91

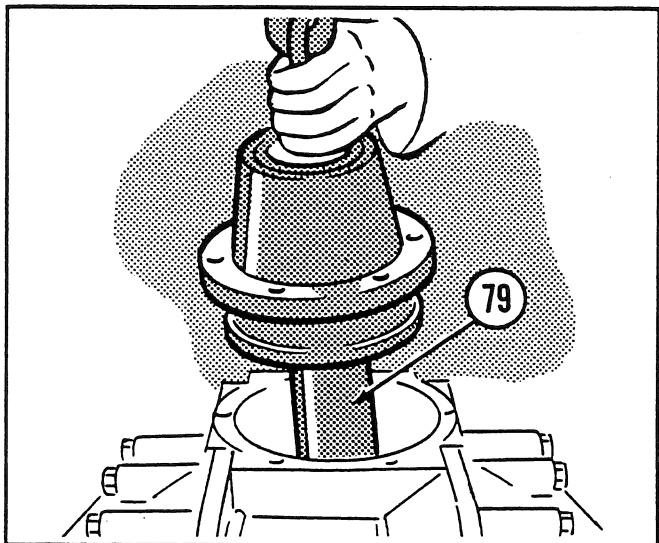


Fig. 94

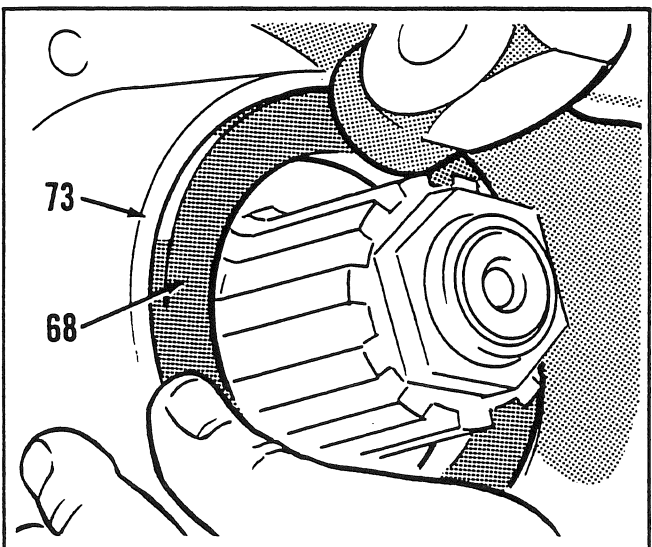


Fig. 92

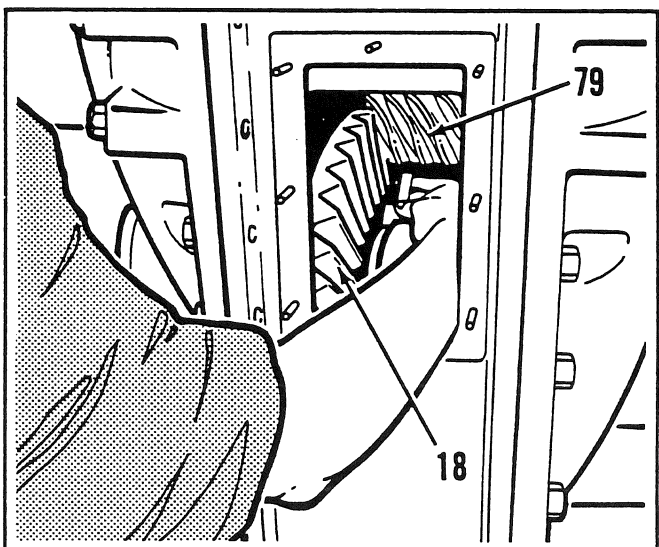


Fig. 95

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Final Drive - Assembly (Continued)

Fig. 90

Secure the spiral pinion shaft assembly in a vise with soft jaws. Tighten or loosen the locknut (67) using special tool, part number 43004. Wrap soft wire around the pinion cap (73) and attach a spring balance scale to the end of the wire. Pull the wire and adjust the locknut tightness until the assembly rolling torque agrees with the adjustment specification listed in the front of this Shop Manual Section.

Fig. 91

When the rolling torque is correctly adjusted, secure the locknut (67) by bending the raised portion into the spline hollows in four places.

Fig. 92

Apply a thin layer of sealant, Champion part number 19200 onto the outside diameter of a new oil seal (68). Install the oil seal in the pinion cap (73). Lubricate the seal lips with system oil.

Fig. 93

Record the pinion depth number etched on the face of the spiral pinion shaft (79). This number will be used to calculate the thickness of the shim pack (78) used under the pinion cap.

Fig. 94

Install a threaded lifting eye on the end of the spiral pinion shaft (79). Install the shaft using the lifting device. Align the oil drain hole with the horizontal center of the pinion shaft.

Fig. 95

Install the special tool, part number 45294, between the face of the spiral pinion shaft (79) and the machined shoulder of the spiral pinion gear (18).

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Final Drive - Assembly (Continued)

Fig. 96

Use feeler gauges to measure the gap between the pinion cap (73) and the machined surface of the main case (28) in at least four places. Calculate the average measurement.

Fig. 97

Compare the recorded pinion depth number with the design constant number **4.625**. If the depth number is **larger** than the constant number, **add the difference** to your gap measurement. If the depth number is **less** than the constant number, **subtract the difference** from your gap measurement. If the depth number and constant number are **equal**, use the gap measurement **as it is**.

Fig. 98

Remove the special tool. Remove the spiral pinion shaft assembly (79) using the lifting device.

Fig. 99

Assemble a shim pack (78) equal in thickness to the adjusted gap measurement. Re-install the spiral pinion shaft assembly; together with the shim pack. Install the capscrews (71) and lockwashers (72). Apply sealing compound, Champion part number **19167**, onto the two side capscrew threads. Tighten the capscrews to the specified torque.

Fig. 100

Install a dial indicator through the inspection hole, engaging the plunger onto the center of one of the spiral pinion gear teeth. Rotate the gear slightly and measure the backlash in at least four places; and compare with the adjustment specification listed in the front of this Shop Manual Section.

Fig. 101

To increase backlash, remove a shim or shims from the left hand side of the cross shaft and install them on the opposite side. Reverse this procedure to decrease backlash. **Remember**, if you take a shim from one side of the cross shaft, you **must** install it on the opposite side!

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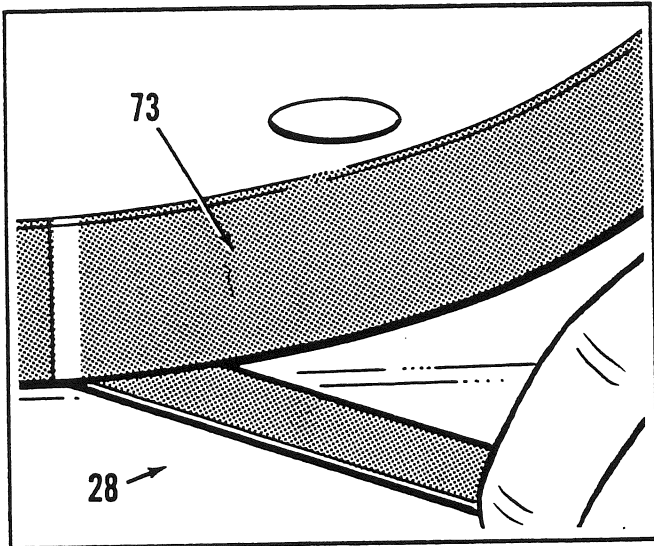


Fig. 96

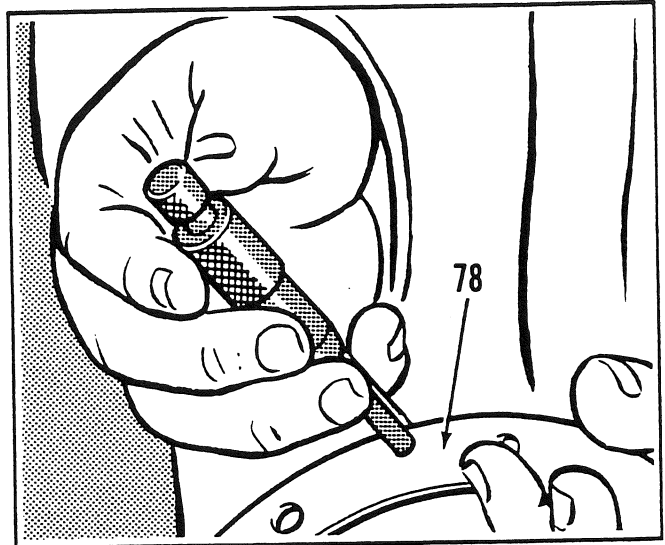


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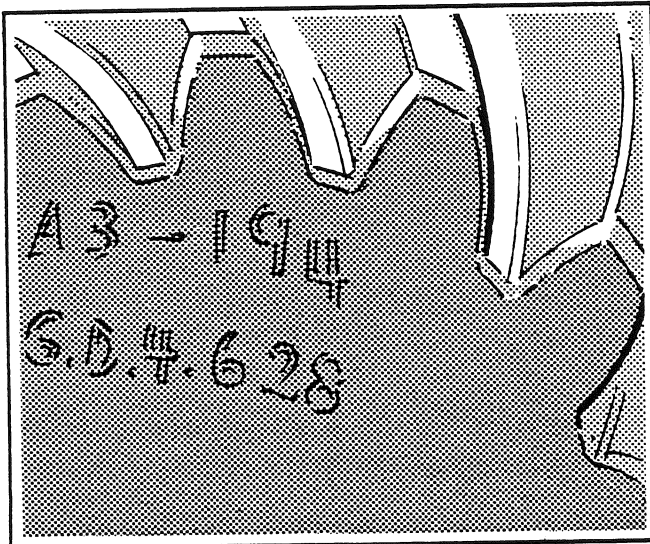


Fig. 97

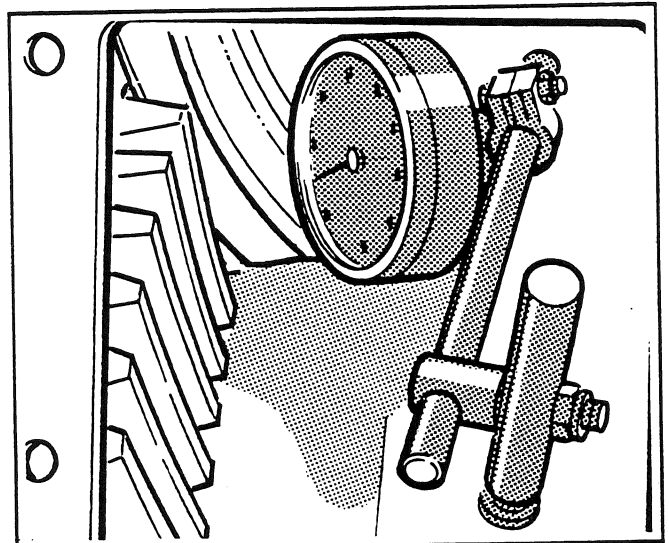


Fig. 100

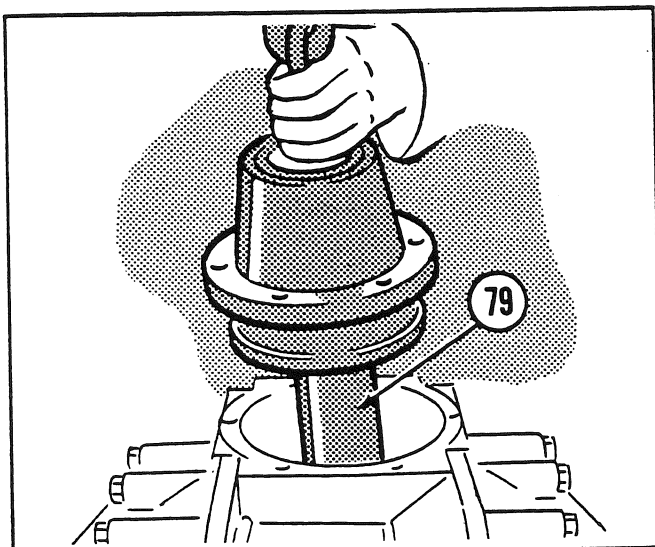


Fig. 98

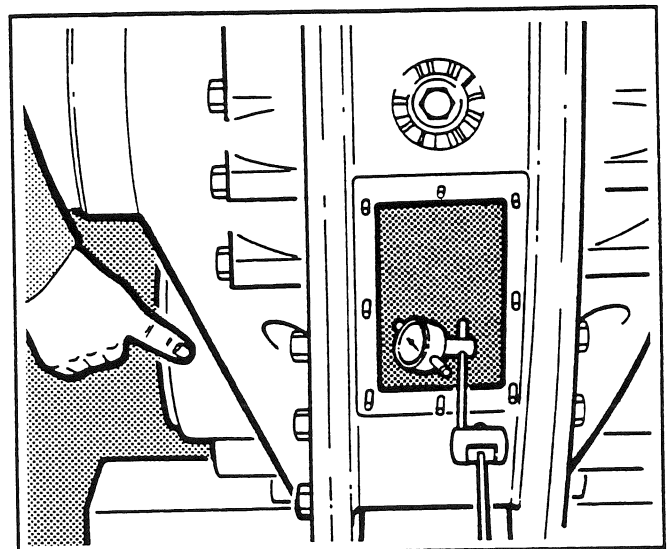


Fig. 101

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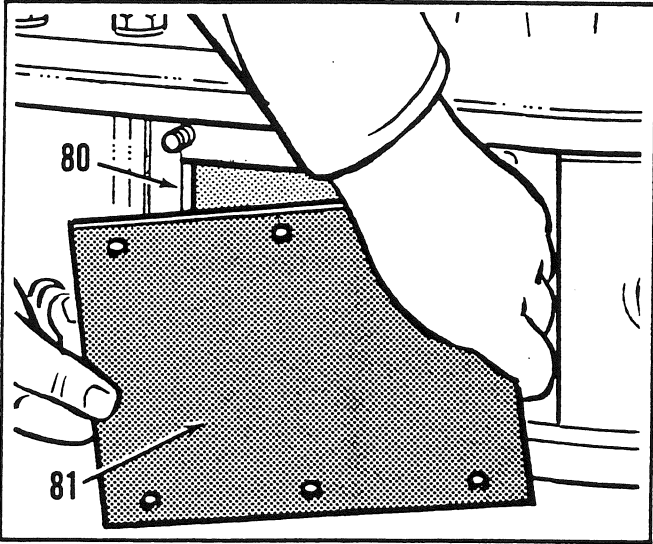


Fig. 102

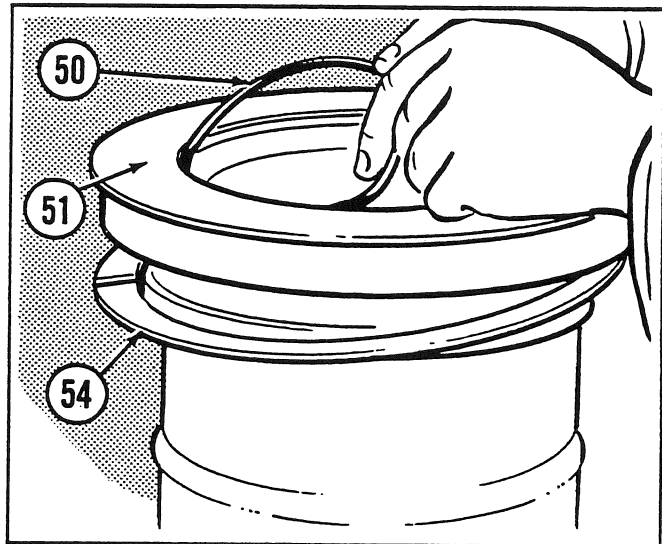


Fig. 105

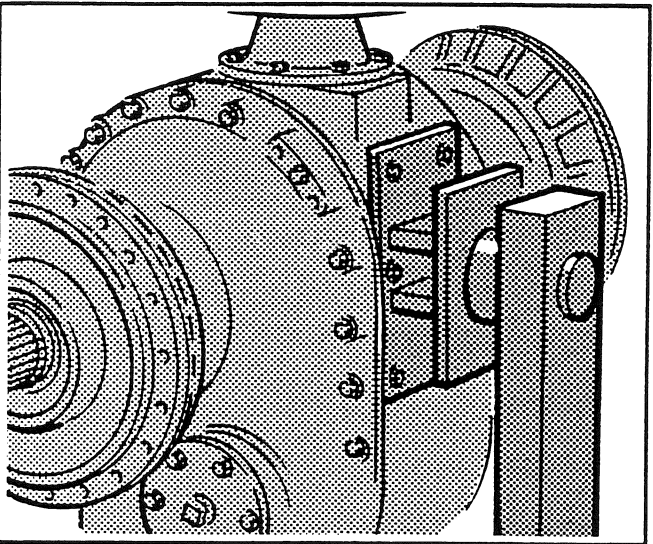


Fig. 103

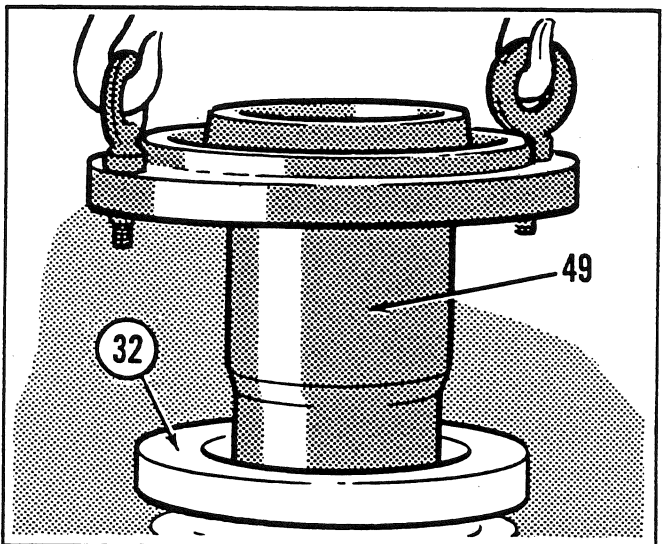


Fig. 106

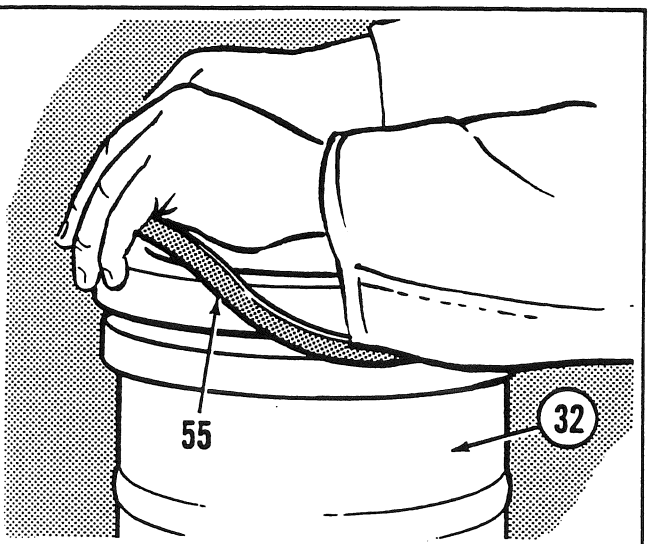


Fig. 104

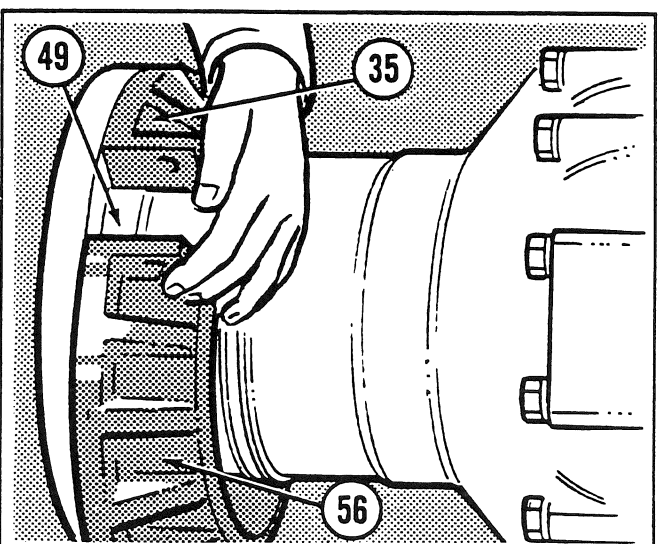


Fig. 107

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Final Drive - Assembly (Continued)

Fig. 102

Install the cover plate (81) and a new gasket (80), or apply gasket eliminator compound, Champion part number **25303**. Secure the cover plate with the nuts (83) and lockwashers (82).

Fig. 105

Lubricate and install a new inner thrust plate (54). Lubricate and install a new outer thrust plate (51). Lubricate and install a new O ring (50).

NOTE

Earlier models of this final drive were assembled without O rings. If you are working on one of the earlier models, Champion recommends that you install O rings to help prevent leakage at the flanged sleeves.

Fig. 103

Turn the final drive assembly onto the left hand side.

Fig. 106

Carefully lower the flanged sleeve (49) onto the side housing (32) using lifting eyes. Remove the eyes.

Fig. 104

Lubricate a new "Uniring" seal (55) and install it on the left hand side housing (32).

Fig. 107

Rotate the final drive 90 degrees. Apply gasket sealant Champion part number **37168**, onto the mating surfaces of the half-rings (35 and 56) and the inner face of the flange sleeve (49). Carefully install the half-rings over the "Uniring" seal. Secure the two halves with the nuts (58), bolts (36) and lockwashers (57). Install nuts and bolts to temporarily secure the half rings to the flanged sleeve.

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Final Drive - Assembly (Continued)

Fig. 108

Lubricate the bearing (47) and install onto the drive axle (48) using a hydraulic press. The bearing is easier to install when heated. Use only an oven or oil bath type heater and **DO NOT** exceed 121°C (250°F).

Fig. 109

Install a lifting eye in the end of the drive axle (48). Lower the drive axle assembly into the flanged sleeve (49) using the lifting device. Align the drive axle and bull gear hub splines. Retain the bearing with a new snap ring (46). Remove the lifting eye.

Fig. 110

Apply a thin layer of adhesive/sealant, Champion part number 19200 onto the outside diameter of a new oil seal (45). Install the oil seal in the flanged sleeve (49). Lubricate the seal lips with system oil.

Fig. 111

Repeat the procedures from Fig. 104 to Fig. 110 and install the right hand flanged sleeve (100) and related parts.

Fig. 112



Install the brake flange yoke and brake disc assembly (66). Install the star washer (65), plain washer (64) and locknut (63), refer to text in Fig. 28. Tighten the locknut to the specified torque.

Final Drive - Installation

Fig. 113

Before installing the final drive assembly to the tandem cases, install new gaskets or apply gasket eliminator compound, Champion part number 25303, to the flanged sleeve mounting surfaces.

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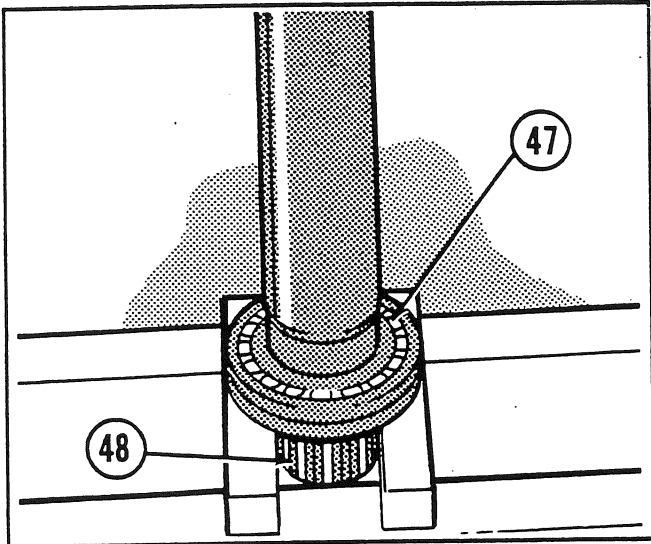


Fig. 108

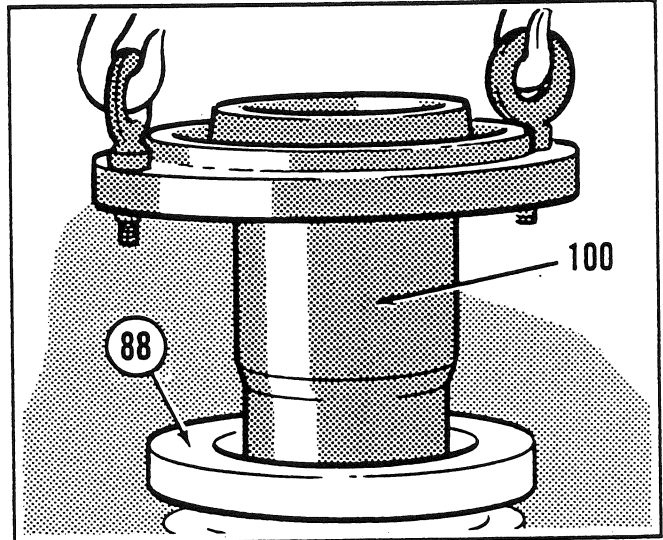


Fig. 111

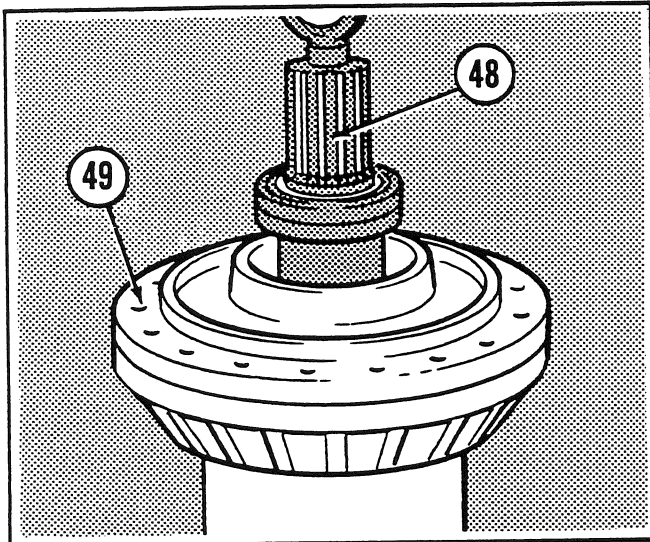


Fig. 109

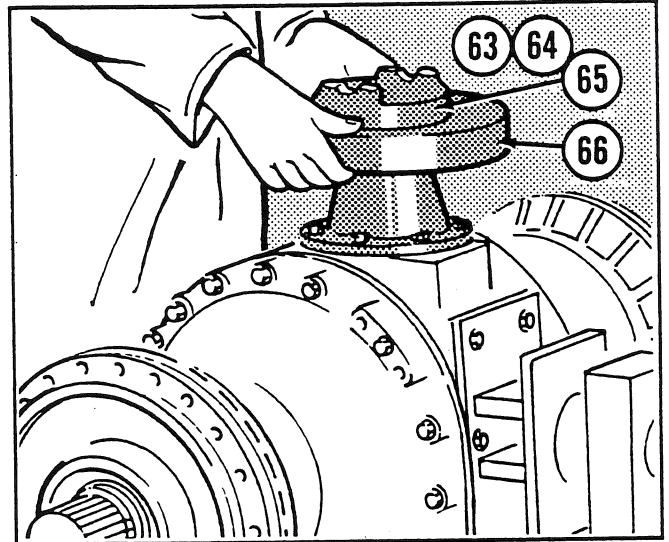


Fig. 112

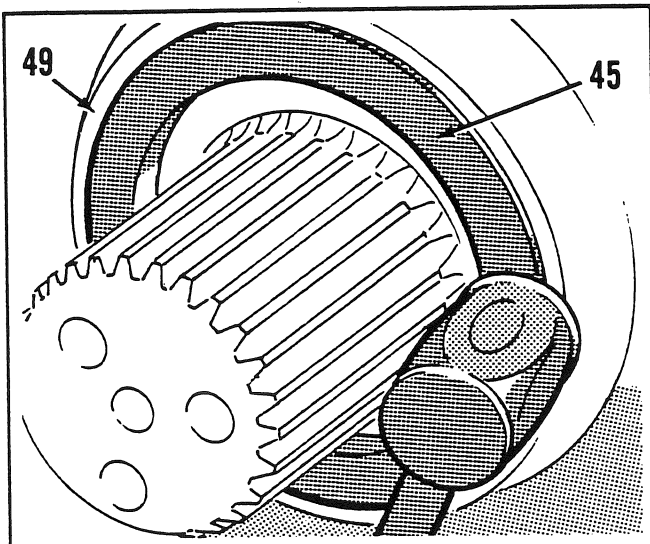


Fig. 110

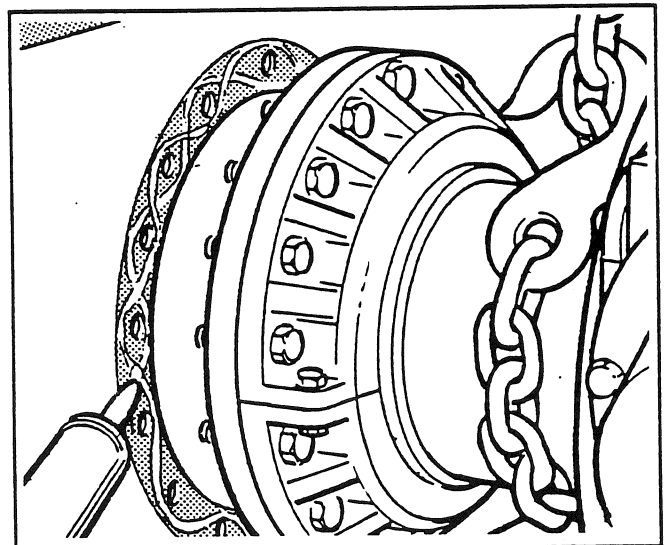


Fig. 113

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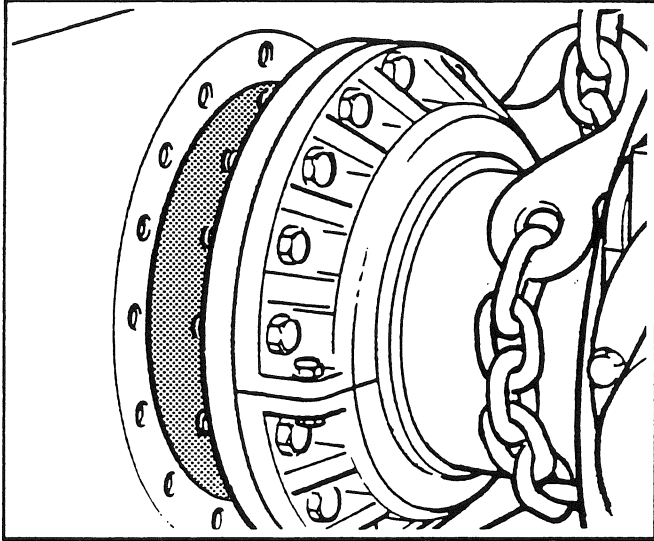


Fig. 114

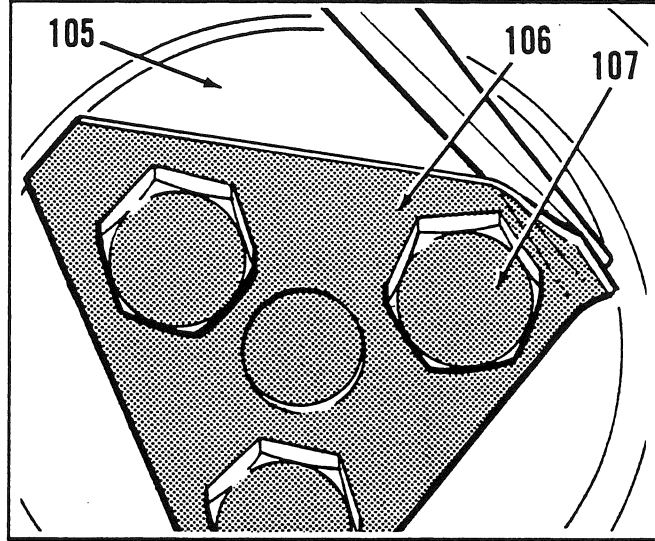


Fig. 117

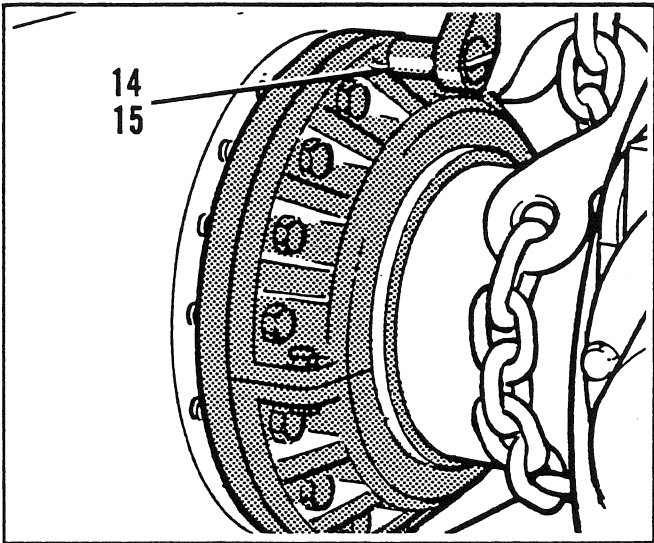


Fig. 115

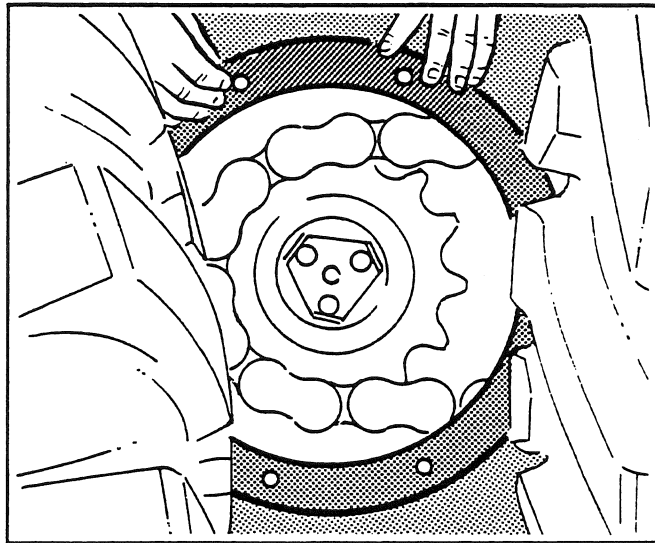


Fig. 118

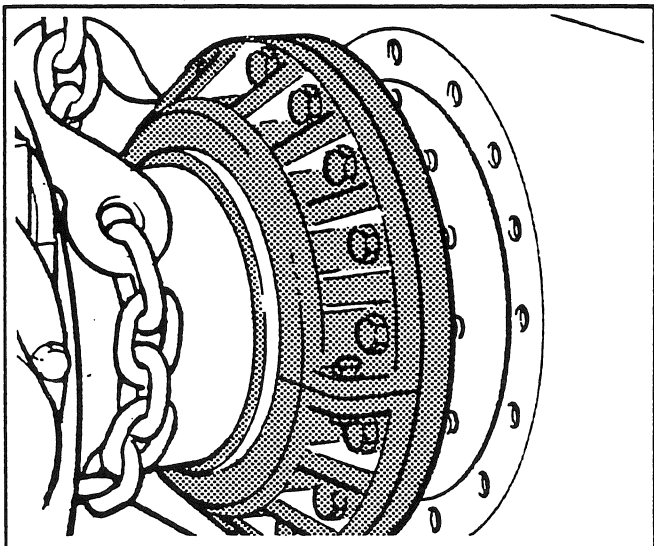


Fig. 116

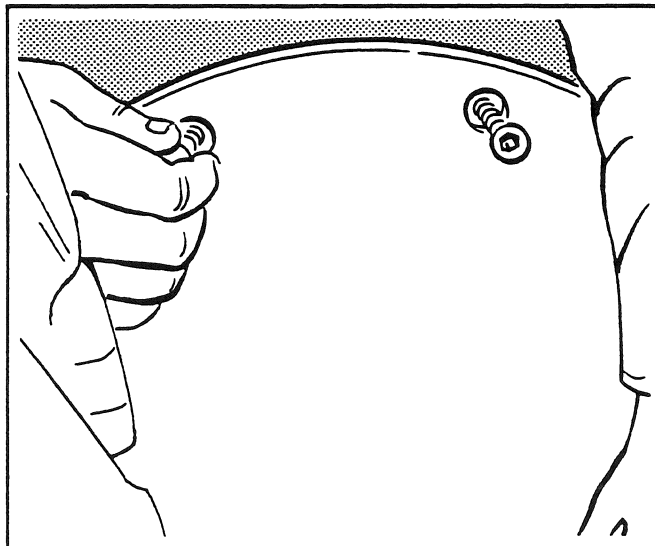


Fig. 119

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Final Drive - Installation (Continued)

Fig. 114

Remove the nuts and bolts, temporarily securing the half-rings to the flange sleeve, installed in **Fig. 107**. Install the final drive assembly onto one tandem using the lifting device. Make sure you align the drive axle and tandem sprocket splines. Take care not to damage the oil seal (45) when engaging the drive axle and sprocket.

Fig. 115

Install the capscrews (15) and lockwashers (14) that retain the half-rings to the tandem case. Tighten the capscrews to the specified torque.

Fig. 116

Support the weight of the final drive assembly on proper blocks or stands. Repeat the procedures from **Fig. 113** to **Fig. 115** and install the other tandem case.

Fig. 117

Install the sprocket retainer (105), new lockplate (106) and capscrews (107) for each drive sprocket. Tighten the capscrews to the specified torque. Bend the lockplate corner tabs to secure the capscrew heads.

Fig. 118

Install a new gasket or apply gasket eliminator compound, Champion part number **25303**, around the tandem cover plate opening.

Fig. 119

Install the tandem cover plates and fasten them with the capscrews. Remove the blocks supporting the final drive assembly.

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Final Drive - Installation (Continued)

Fig. 120

Raise the frame using the lifting device. Remove the stand.

Fig. 123

Install the hanger bracket half-clamps (be sure to check the matching identification marks). Retain with the nuts (61) and bolts (62), but **DO NOT** torque tighten.

Fig. 121

Roll the final drive and tandem assembly into position under the frame.

Fig. 124

Install the mounting plate (22) and retain with the nuts (19), bolts (21) and lockwashers (20). Tighten the nuts (61 and 19) to the specified torque.

Fig. 122

Carefully lower the frame onto the final drive assembly using the lifting device. On articulated models, **make sure** that the parking brake disc does not interfere with the mounting brackets.

Fig. 125

Re-connect the lower drive shaft to the final drive brake flange yoke. Tighten the capscrews to the specified torque.

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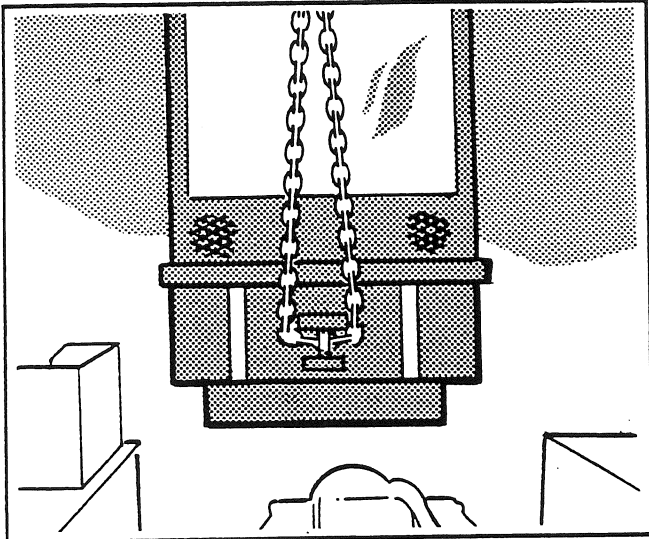


Fig. 120

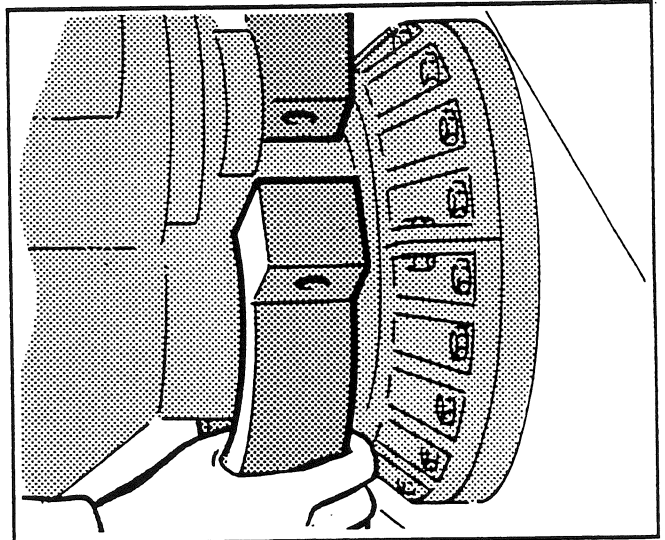


Fig. 123

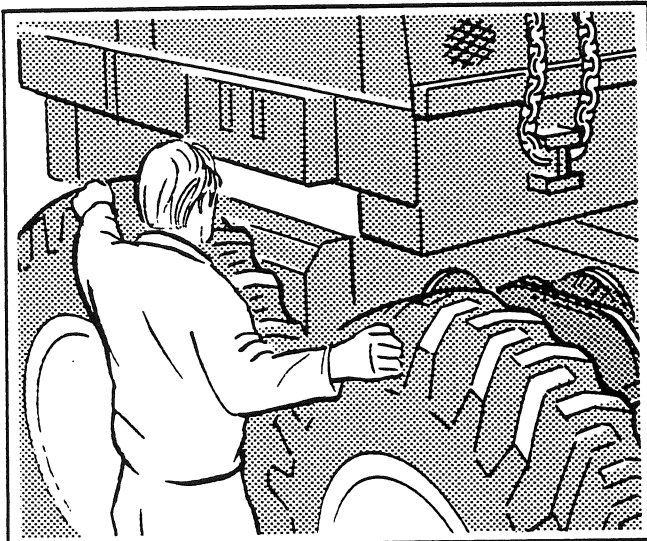


Fig. 121

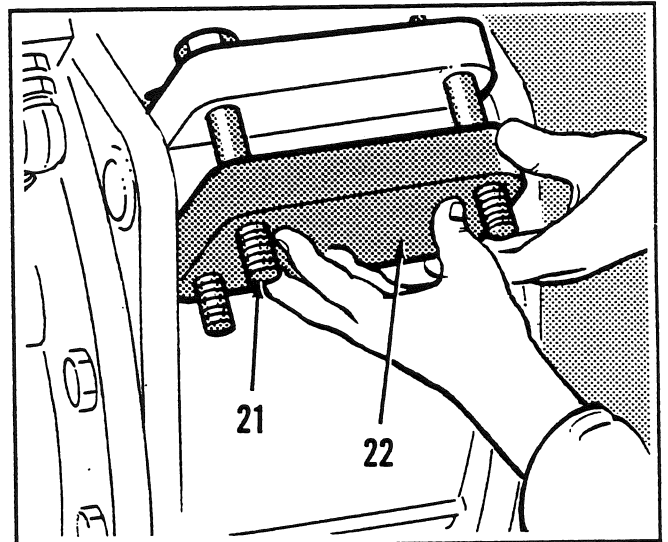


Fig. 124

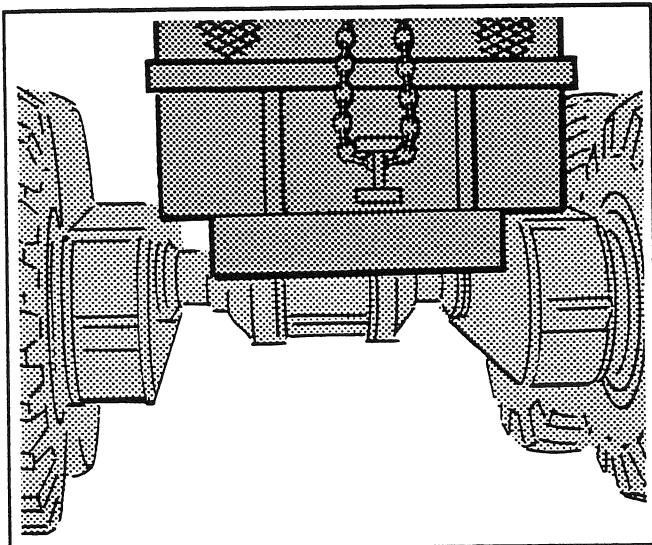


Fig. 122

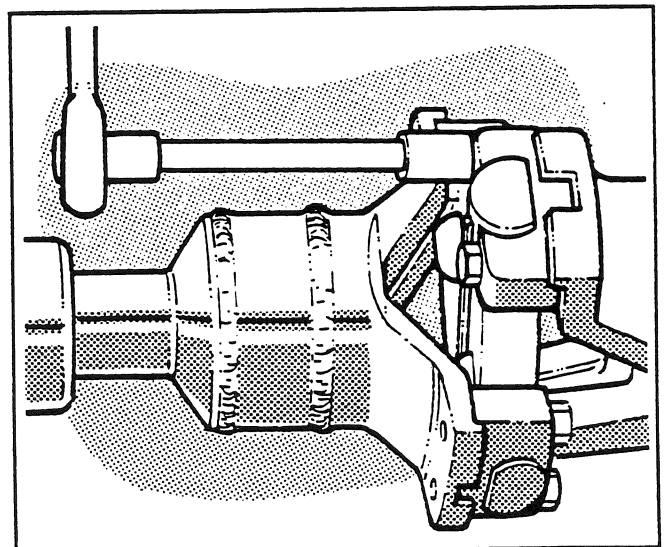


Fig. 125

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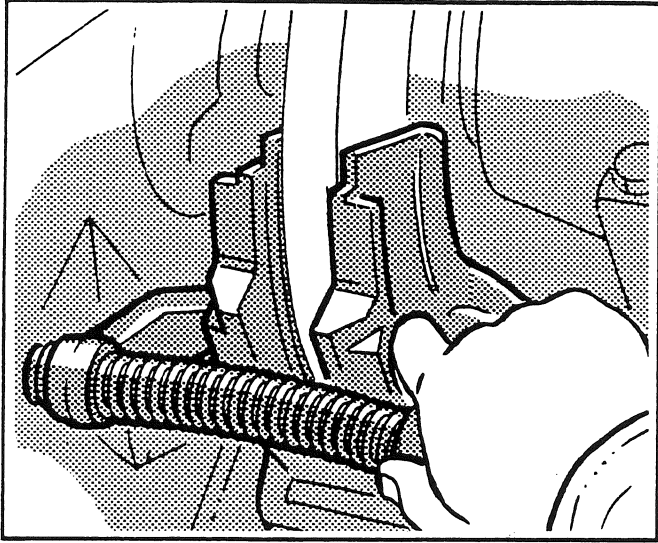


Fig. 126

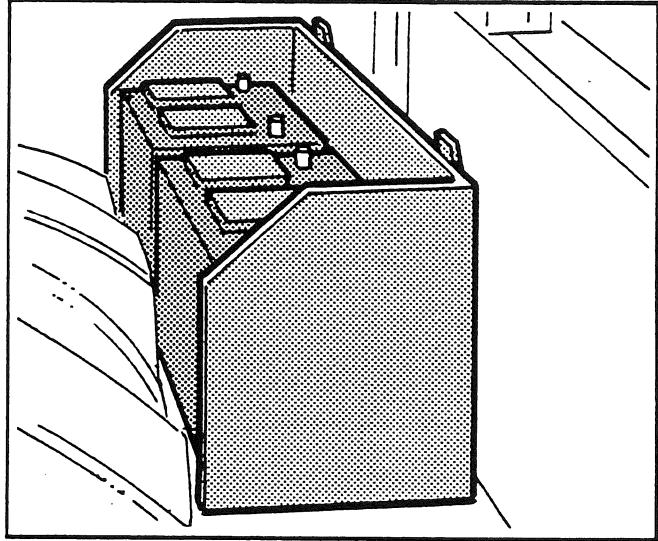


Fig. 129

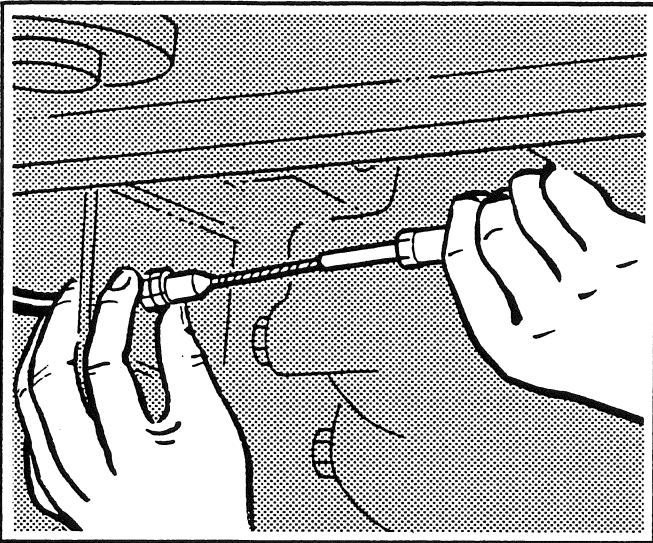


Fig. 127

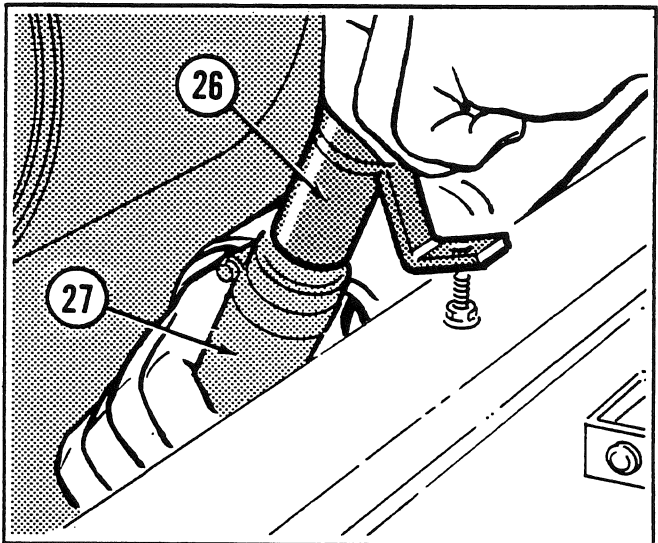


Fig. 130

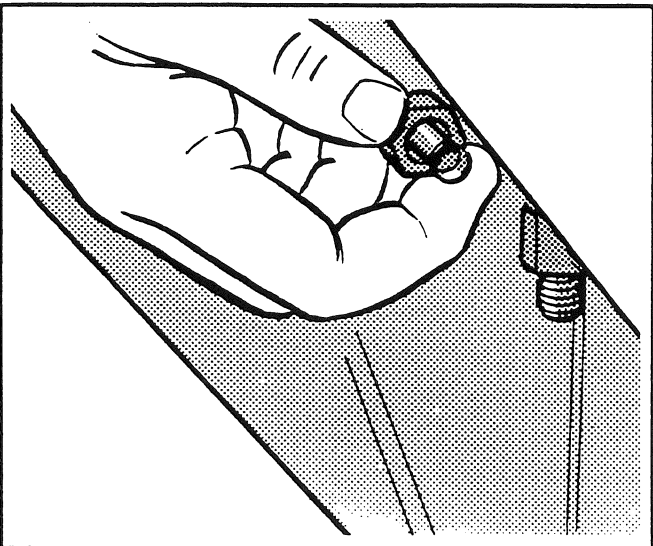


Fig. 128

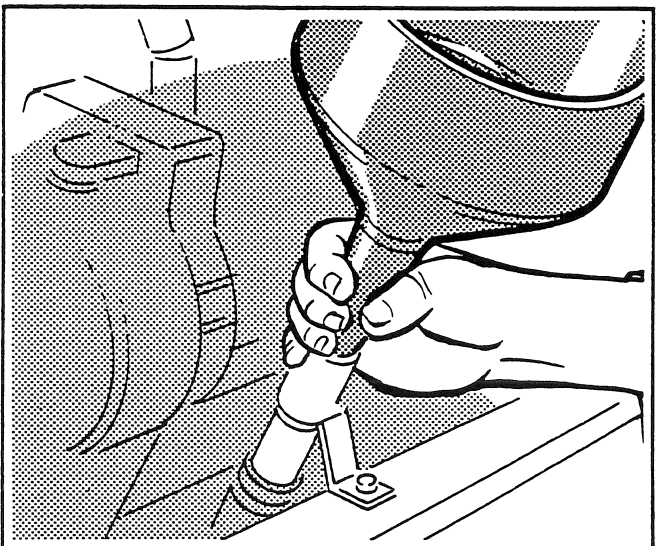


Fig. 131

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Final Drive - Installation (Continued)

Fig. 126

Install the parking brake assembly.

Fig. 129

Install the battery box and re-connect the battery cables to the proper terminals. Install the battery box cover.

Fig. 127

Re-connect the parking brake cable and adjust the brake shoe clearance. Install the parking brake fender.

Fig. 130

Install the breather hose (27) and breather pipe (26) on the frame.

Fig. 128

Re-connect the brake lines at the tee fittings on the frame. Make sure you wipe up any spilled fluid immediately.

Fig. 131

Fill the final drive assembly to the correct level using the lubricant recommended in the Lubrication Specifications at the front of this Shop Manual.

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Final Drive - Installation (Continued)

Fig. 132

Purge the brake hydraulic system as described in the appropriate section of this Shop Manual. Fill both tandem assemblies to the correct level using the lubricant recommended in the Lubrication Specifications at the front of this Shop Manual.

Fig. 133

Removal, overhaul and installation of the standard double reduction final drive is now complete. **Road test the grader to make sure that the final drive functions properly.** Check all connections for leaks and rectify where necessary.

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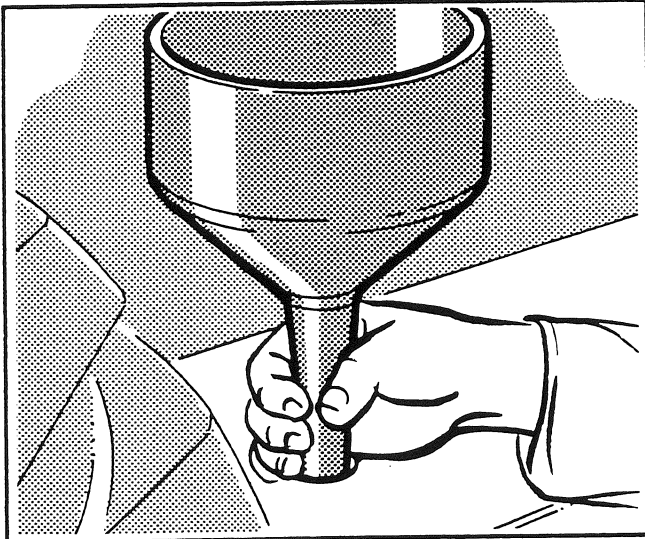


Fig. 132

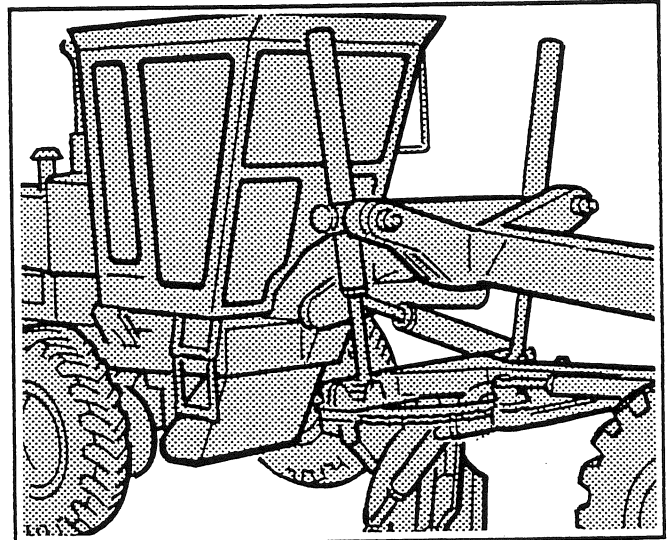


Fig. 133

