CHAMPION®
MOTOR GRADERS

A Company within the Volvo Construction Equipment Group

Manual de Taller
Manuel D'Atelier
Shop Manual

CHAMPION
MOTOR GRADERS

700 Series
SHOP MANUAL

Introduction

The purpose of this Shop Manual is to detail disassembly and assembly procedures when overhauling Champion 700 Series motor graders equipped with model 8400 transmissions.

The Shop Manual applies to graders having Canadian serial numbers **16224**, **16245** and up. U.S. serial numbers **2021-2** to **2658-2**.

The step-by-step sequence provides a comprehensive and progressive method of servicing. Separate sections deal with each main area and begin at the front of the grader.

THINK SAFETY FIRST! Always put the grader in the **SERVICE POSITION**, described on page ii, before attempting any overhaul, maintenance or inspection procedure.

Safety warning symbols and instructions are included where there is a risk of either damage to the grader or injury to service personnel. It is important to use extreme care during these particular operations.

For the best performance from your grader, use only specified recommended lubricants and genuine CHAMPION spare parts.

Champion Road Machinery reserves the right to modify its products by changing any specification without notice.

In case of difficulty in obtaining Parts or Service for your motor grader, please contact Champion Road Machinery, Goderich, Ontario, Canada.

Telephone: 519-524-2601
Telefax: 519-524-5175 or 519-524-5185 or 519-524-4411
Telex: 069-55175 CHAMPARTS GDCH

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TITLE **SECTION**

Service Position

Before making any service, maintenance or inspection procedure, the grader must be placed in the SERVICE POSITION.

1. Park the grader on a level surface.
2. Place the transmission in NEUTRAL and apply the hand brake.
3. Lower the moldboard and all attachments to the ground. Do not apply down-pressure.
4. Shut down the engine.
5. If the grader is an articulated model, install both articulation locking pins.
6. Install chocks at the front and rear tandem wheels. Wedge the chocks in place.
7. Relieve residual hydraulic pressure by operating all control levers.
8. Some hydraulic circuits may contain lock valves. Operating the control levers in these circuits will not relieve residual hydraulic pressure. Such pressure must be relieved by loosening a fitting or electrically activating the solenoid valve. Wear face and eye protection. Danger of spraying oil!
9. Fasten a "DO NOT OPERATE" or similar warning tag on the steering wheel.
10. Remove and retain the ignition key.
11. Turn the battery isolation switch to the "OFF" position.
12. If the service procedure includes welding, you must disconnect the following items:
    a) The negative battery cable(s).
    b) Positve battery cable(s).
    c) Main power supply harness at the transmission controller.
    d) Transmission wiring harness at the transmission controller.
    e) Alternator wiring harness.

    Connect the arc-welder ground cable adjacent to the work area. Install the battery box cover(s). After completing your welding procedure, connect items a) through e) in the reverse order. Ensure to connect the negative battery cable(s) last.
13. Allow the engine and hydraulic system to cool before working in these areas.
14. Be aware of other service personnel in your work area.

Torque Guide

Fastener Thread Size (Coarse and Fine)	SAE Grade 5 Fastener			SAE Grade 8 Fastener		
	N.m	kgf.m	lbf.in.	N.m	kgf.m	lbf.in.
4-40	0,68	0,07	6	1,02	0,10	9
4-48	0,79	0,08	7	1,13	0,11	10
6-32	1,35	0,14	12	1,92	0,19	17
6-40	1,47	0,15	13	2,15	0,22	19
8-32	2,48	0,25	22	3,50	0,36	31
8-36	2,60	0,26	23	3,61	0,37	32
10-24	3,61	0,37	32	5,08	0,52	45
10-32	4,07	0,41	36	5,76	0,59	51
						lbf.ft
1/4-20	8,47	0,86	75	12,20	1,24	9
1/4-28	9,72	0,99	86	13,56	1,38	10
			lbf.ft			
5/16-18	17,62	1,80	13	24,40	2,49	18
5/16-24	18,98	1,93	14	27,12	2,76	20
3/8-16	31,18	3,18	23	47,45	4,84	35
3/8-24	33,89	3,46	25	47,45	4,84	35
7/16-14	47,45	4,84	35	75,57	7,60	55
7/16-20	54,23	5,53	40	81,35	8,29	60
1/2-13	75,92	7,74	56	108,46	11,06	80
1/2-20	88,13	8,99	65	122,02	12,44	90
9/16-12	108,46	11,06	80	149,14	15,21	110
9/16-18	122,02	12,44	90	176,26	17,97	130
5/8-11	149,14	15,21	110	230,49	23,50	170
5/8-18	176,26	17,97	130	244,05	24,89	180
3/4-10	271,16	27,65	200	379,63	38,71	280
3/4-16	298,28	30,42	220	433,86	44,24	320
7/8-9	433,86	44,24	320	623,68	63,60	460
7/8-14	488,09	49,77	360	677,91	69,13	500
1-8	650,79	66,36	480	921,96	94,01	680
1-12	718,58	73,27	530	1003,31	102,30	740
1-14	732,14	74,66	540	1030,42	105,07	760
1-1/8-7	813,49	82,95	600	1301,59	132,72	960
1-1/8-12	894,84	91,25	660	1464,28	149,31	1080
1-1/4-7	1138,89	116,13	840	1843,91	188,03	1360
1-1/4-12	1247,35	127,19	920	2033,73	207,38	1500
1-3/8-6	1491,40	152,08	1100	2413,36	246,09	1780
1-3/8-12	1708,33	174,20	1260	2765,87	282,04	2040
1-1/2-6	1979,50	201,85	1460	3199,73	326,28	2360
1-1/2-12	2182,87	222,59	1610	3606,48	367,76	2660

700 Series Lubrication Specifications

Application/ Fluid Code	Capacity	Lubricant Change Interval (see note)	Filter Change Interval	Fluid Type	Air Temperature Range During Fill Period
Hydraulic system - HO	42 US gal 159 L	1000 hr	First 100 hr then 500 hr	Hydraulic Oil*	● SAE 10W, ISO Grade 32 / Dexron®II ATF
All Wheel Drive hydraulic system - HO	10 US gal 38 L	2000 hr	First 100 hr then 1000 hr	Hydraulic Oil*	● SAE 10W, ISO Grade 32 / Dexron®II ATF
Tandems - drum brakes - HO	8.5 US gal 32 L (each side)	2000 hr	-	Hydraulic Oil	● SAE 10W, ISO Grade 32 / Dexron®II ATF
Tandems - oil disc brakes - UTHF	26.5 US gal 100 L (each side)	1500 hr	-	Universal Tractor Hydraulic Fluid for Wet Disc Brakes	● SAE 10W, ISO Grade 32
Front wheel bearings	-	500 hr	Multi-Purpose Grease Extreme Pressure Lithium Soap Base		● NLGI EP2 FRONT WHEEL BEARINGS
All grease fittings - MPG	Until grease seeps from joint	-			NLGI EP0 or EP1 / ● NLGI EP2
All Wheel Drive pump drive gearbox - GO	0.3 US gal 1,0 L	First 100 hr then 1000 hr	-	Hypoid Gear Oil - API GL-5 MIL-L-2105C	SAE 85W-140 / ● SAE 80W-90 / SAE 75W-90
All Wheel Drive planetary reduction unit - GO	0.4 US gal 1,5 L (each side)	First 100 hr then1000 hr	-	Hypoid Gear Oil - API GL-5 MIL-L-2105C	SAE 85W-140 / ● SAE 80W-90 / SAE 75W-90
Final drive - single reduction lock/ unlock differential - GO	6 US gal 23 L	First 100 hr then 1000 hr	-	Hypoid Gear Oil - API GL-5 MIL-L-2105C	SAE 85W-90 / ● SAE 80W-90 / SAE 75W-90
Final drive - double reduction lock/ unlock differential - GO	9 US gal 34 L	First 100 hr then 2000 hr	-	Hypoid Gear Oil - API GL-5 MIL-L-2105C	SAE 85W-90 / ● SAE 80W-90 / SAE 75W-90
Drum brake/clutch fluid - MVBF	-	1 year	-	Motor Vehicle Brake Fluid	● SAE J 1703, DOT 3, ISO 4925
Transmission - EO	14 US gal 53 L	1000 hr	First 100 hr then 500 hr	Premium Quality Engine Oil* API CD/CE qualified to Allison C-3 and TO-2 specifications	SAE 30 / ● SAE 10W / SAE 5W-20 / SAE 0W-30

°C	-40	-30	-20	-10	0	10	20	30	40	50
°F	-40	-22	-4	14	32	50	68	86	104	122

● Standard factory fill *See Cold Weather Operation

NOTE: Service intervals are based on: 250 hours or 1 month, whichever comes first
500 hours or 3 months, whichever comes first
1000 hours or 6 months, whichever comes first
2000 hours or 12 months, whichever comes first

NLGI = National Lubricating Grease Institute
API = American Petroleum Institute
Consult your Champion Distributor for alternative lubricants
Refer to engine manual for engine lubricants

Cold Weather Operation

Lubricant Requirements for Transmission and Hydraulic Systems

When operating in temperatures below -20° C (-4° F), you can use the recommended oils provided the following conditions are met:

a) Before start up, the oil is preheated to a temperature above the minimum value for the indicated oil and viscosity range.

b) The operating temperature stays above the minimum value in the applicable range.

Failure to comply with these requirements may result in a malfunction or reduced life of the transmission or hydraulic components.

Cold Weather Start Up Procedure

If oil in the hydraulic circuit is cold, hydraulic functions may move slowly. Do not attempt grader operations until the hydraulic oil is warmed up. If you do not follow the proper warm up procedure, hydraulic pump damage may result.

1. Run the engine at approximately 1000 rpm for five minutes. Do not put load on the hydraulic system.
2. Cycle all hydraulic cylinders through their working range several times until the hydraulic functions operate normally.
3. The grader is now ready to operate under load.

CHAMPION MOTOR GRADERS

CIRCULATE TO:
PARTS MANAGER _____
SALES MANAGER _____
RETURN TO:
SERVICE MANAGER _____

10 August 1992

PRODUCT SUPPORT BULLETIN NO. 583

SUBJECT: New Clutch Master Cylinder Fluid

Champion Motor Graders no longer use DOT Brake Fluid in the clutch disengaging circuit beginning with S/N 22543 except for grader S/N 22548. The revised circuit uses **mineral based fluid** in the clutch master cylinder to disengage the clutch. Mineral based fluid is now used in the clutch master cylinder as well as the service brakes master cylinder.

Along with the fluid change, the following improvements will help you identify the new system:

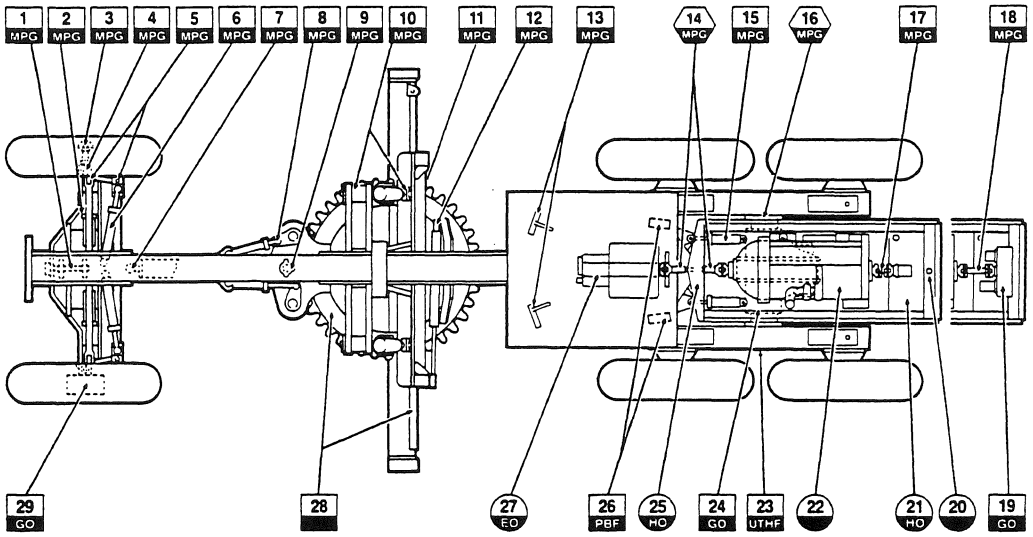
1. The clutch pedal effort is reduced by 50%.
2. The clutch pedal height reduced by 5cm (2.0"). This permits pressing the clutch pedal with the operators heel remaining on the cab floor.
3. The new slave cylinder has larger greaseable rod eyes, stronger rod guide, spring loaded lip seals and rubber bellows to keep contamination out.

When a positive identification of the mineral based fluid clutch master cylinder is made, use only a MINERAL based oil to replenish the reservoir. DO NOT USE DOT 3 BRAKE FLUID. In areas where temperatures never fall bellow -18°C or 0°F, use 10W hydraulic fluid. In areas where temperatures below -18°C are experienced, Champion specifies the following fluids for use in the clutch master cylinder:

-Champion P/N 58440 apply fluid
-Esso Univs N Arctic
-Shell Tellus T15
-Aero Shell Fluid 4

A copy of the lubrication chart reflecting the new clutch master cylinder fluid is printed on the back of this bulletin.

LUBRICATION CHART



MPG - Multi Purpose Grease
GO - Gear Oil
HO - Hydraulic Oil
PBF - Petroleum Base Fluid
UTHF - Universal Tractor Hydraulic Fluid
EO - Engine Oil
Check Daily
Check Weekly
Check Monthly

Champion recommends increasing the greasing frequency in extremely dusty or wet conditions, or if dry joints are apparent.

GREASE POINTS - MPG

1. **Pivot Pin** - Two fittings, weekly
2. **Leaning Wheel Cylinder** - Two fittings each side, weekly
3. **Wheel Bearings** - One fitting each side with EP2 grade only, weekly
4. **Knuckle Pivot Pin and King Pin** - Four fittings each side, weekly
5. **Drag Link/Pivot Block/Tie Bar** - **Standard** - Five fittings, weekly **Heavy Duty** - Nine fittings, weekly
6. **Steering Cylinder** - Two fittings each side, weekly
7. **Drawbar Ball Stud** - One fitting, weekly
8. **Circle Turn Cylinder and Crank** - Three fittings each side, weekly
9. **Circle Turn Valve** - One fitting, weekly
10. **Blade Lift System** - **Fixed Point** - Two fittings each side, weekly **Moveable Point** - Nine fittings, weekly
11. **Blade Tilt Cylinder/Tilt Quadrant** **Standard** - Two fittings each side, weekly **Heavy Duty** - Three fittings each side, weekly
12. **Circle Shift Cylinder** - One fitting each end, weekly
13. **Brake and Clutch Pedal Shafts** One fitting each shaft, weekly
14. **Upper and Lower Drive Shafts** Three fittings each shaft, monthly
15. **Articulation Cylinder** - Two fittings each side, weekly
16. **Tandem Sleeve Thrust Plate** - One fitting each side, monthly
17. **Hydraulic Pump Drive Shaft** - Two fittings, weekly
18. **A.W.D. Pump Drive Shaft** Three fittings, weekly

FLUID LEVELS & LUBRICANTS

19. **A.W.D. Pump Drive Gearbox** - GO - check level weekly
20. **Coolant** - See appropriate Engine Operation and Maintenance Manual - check level daily
21. **Hydraulic Oil Reservoir** - HO - check level daily
22. **Engine** - See appropriate Engine Operation and Maintenance Manual - check level daily
23. **Tandems** - UTHF - Suitable for wet disc brake applications - check level weekly
24. **Final Drives** - GO - check level weekly
25. **A.W.D. Hydraulic Reservoir** - HO - check level daily
26. **Oil Disc Brake & Clutch Reservoir** - PBF - check level weekly

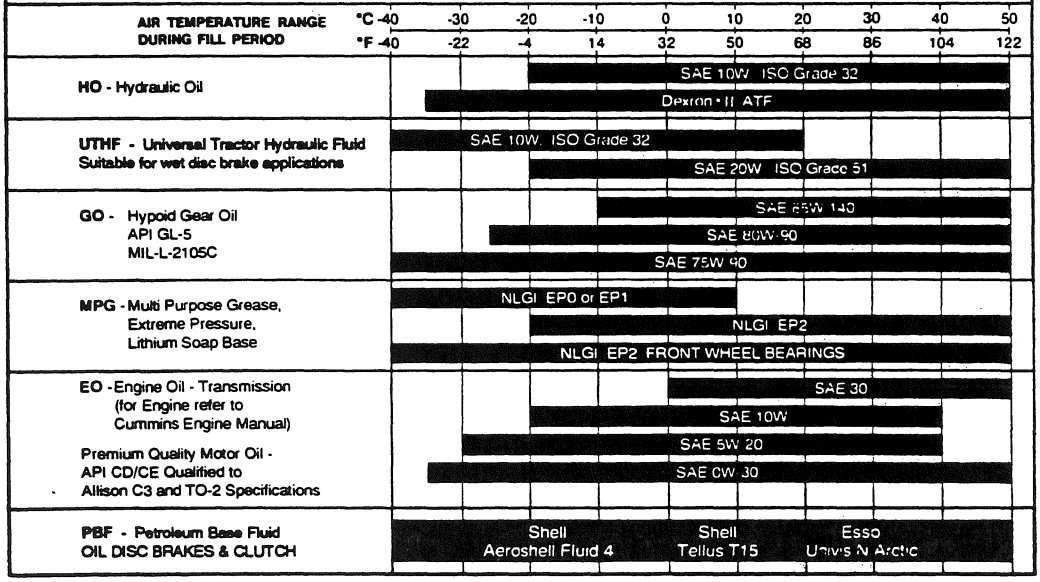
⚠WARNING

INCORRECT FLUID WILL CAUSE BRAKE FAILURE. SEVERE PERSONAL INJURY OR DEATH COULD RESULT

27. **Transmission** - EO - check level daily - warm oil at idle and transmission in neutral
28. **Circle Top; Clamp and Guide Bearing Surfaces; Moldboard Upper and Lower Slide Rails** Every week or more often as required, wash with diesel fuel - lubricate with:
    1) Diesel fuel, or
    2) A light coating of Champion graphite spray, P/N 300CL moistened with diesel fuel, or
    3) A light coating of MPG
    Keep these bearing surfaces clean.
29. **A.W.D. Planetary Hub** - GO - check level weekly

Refer to 700 SERIES GRADER Operator's Manual for detailed information

LUBRICANT SPECIFICATIONS



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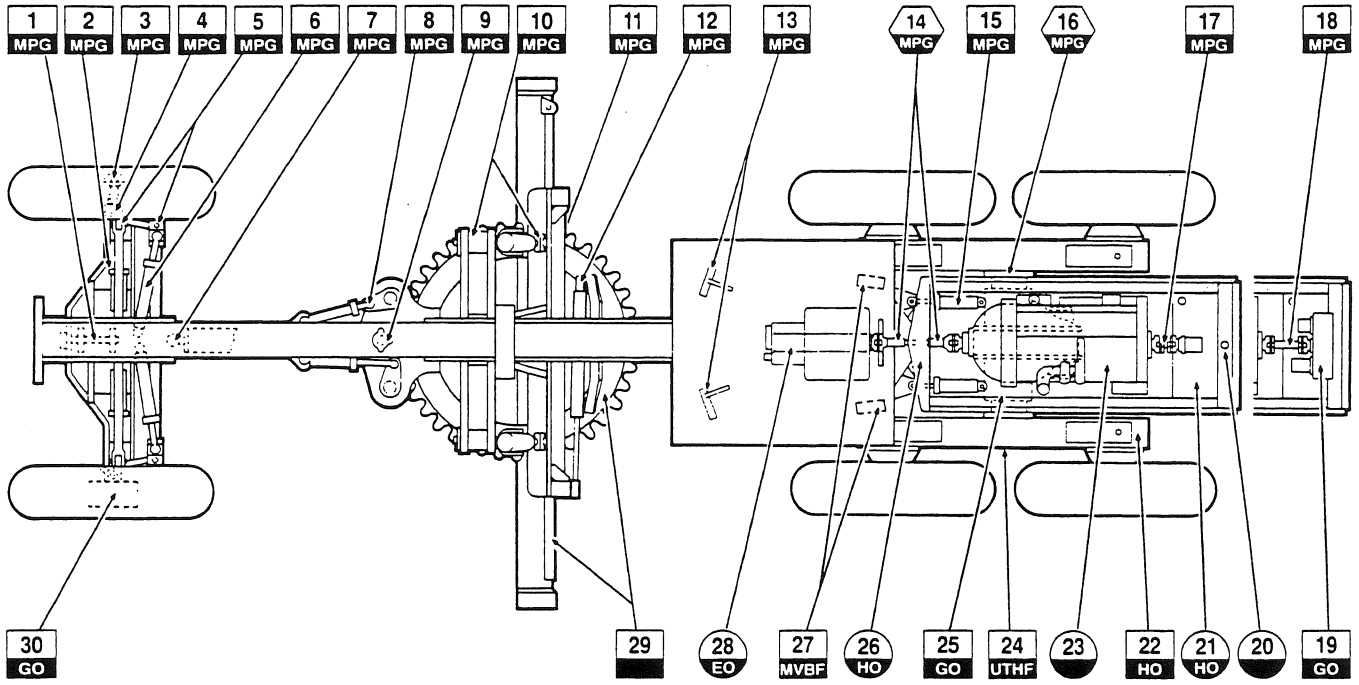
700 Series Lubrication Chart



MPG - Multi-Purpose Grease	**MVBF** - Motor Vehicle Brake Fluid	Check Daily	Check Monthly
GO - Gear Oil	**UTHF** - Universal Tractor Hydraulic Fluid	Check Weekly	
HO - Hydraulic Oil	**EO** - Engine Oil		

Key to Lubrication Points

GREASE POINTS - MPG

1. **Pivot Pin** - Two fittings, weekly
2. **Leaning Wheel Cylinder** - Two fittings each side, weekly
3. **Wheel Bearings** - One fitting each side with EP2 grade only, weekly
4. **Knuckle Pivot Pin and King Pin** - Four fittings each side, weekly
5. **Drag Link/Pivot Block/Tie Bar** - **Standard** - Five fittings, weekly **Heavy Duty** - Nine fittings, weekly
6. **Steering Cylinder** - Two fittings each side, weekly
7. **Drawbar Ball Stud** - One fitting, weekly
8. **Circle Turn Cylinder and Crank** - Three fittings each side, weekly
9. **Circle Turn Valve** - One fitting, weekly
10. **Blade Lift System - Fixed Point** - Two fittings each side, weekly **Moveable Point** - Nine fittings, weekly
11. **Blade Tilt Cylinder/Tilt Quadrant or Manual Link** - **Standard** - Two fittings each side, weekly **Heavy Duty** - Three fittings each side, weekly
12. **Circle Shift Cylinder** - One fitting each end, weekly
13. **Brake and Clutch Pedal Shafts** One fitting each, weekly
14. **Upper and Lower Drive Shafts** Three fittings each shaft, monthly
15. **Articulation Cylinder** - Two fittings each side, weekly
16. **Tandem Sleeve Thrust Plate** - One fitting each side, monthly
17. **Hydraulic Pump Drive Shaft** - Two fittings, weekly
18. **A.W.D. Pump Drive Shaft** Three fittings, weekly

FLUID LEVELS & LUBRICANTS

19. **A.W.D. Pump Drive Gearbox** GO - check level weekly
20. **Coolant** - See appropriate Engine Operation and Maintenance Manual - check level daily
21. **Hydraulic Oil Reservoir** - HO - check level daily
22. **Tandems** - HO - All models with drum brakes - check level weekly
23. **Engine** - See appropriate Engine Operation and Maintenance Manual - check level daily
24. **Tandems** - UTHF - All models with oil disc brakes (wet brakes) - check level weekly
25. **Final Drives** - GO - check level weekly
26. **A.W.D. Hydraulic Reservoir** - HO check level daily
27. **Drum Brake and Clutch Reservoirs** MVBF - check level weekly
28. **Transmission** - EO - check level daily - warm oil at idle and transmission in neutral
29. **Circle Top; Clamp and Guide Bearing Surfaces; Moldboard Upper and Lower Slide Rails** Every week or more often as required, wash with diesel fuel - lubricate with:
    1) Diesel fuel, or
    2) A light coating of Champion graphite spray, P/N 300CL moistened with diesel fuel, or
    3) A light coating of MPG

    Keep these bearing surfaces clean.
30. **A.W.D. Planetary Hub** - GO - check level weekly

Champion recommends increasing the greasing frequency in extremely dusty or wet conditions; also if dry joints are apparent.

Special Tools

Champion recommends the use of the following special tools. Order from your Champion Distributor.

Assembly	Section Ref. No.	Tool P/N and Description
Front Axle	1	18516 - Socket wrench - wheel 37116 - Installation drift - steering and leaning wheel cylinders and the tie bar bearings 37117 - Installation drift - pivot block bearing cups 37118 - Installation drift - radius arm bearing cones
Engine Clutches	7	5629 - Clutch Repair Pilot Shaft 45567 - Rivet Tool - Long solid anvil
8400 Transmission	8	29858 - Bearing shim tool 29859 - Deep-reach socket wrench
Lock/Unlock Differential Final Drive	10	18511 18512 — Outer bushing installation tools 18512 18513 — Inner bushing installation tools 43004 - Deep-reach socket wrench 45006 - Shift rail oil seal installation tool 45007 - Drive axle and bearing assembly installation drift
Standard Double Reduction Final Drive	11	18504 - Spiral pinion shaft bearing outer race removal tool 18505 - Spiral pinion shaft bearing cone installation tool 18507 18508 18509 18510 — Pinion cap bearing cup installation tools 18511 18512 — Outer bushing installation tools 18512 18513 — Inner bushing installation tools 33174 - Bull gear bearing outer race installation tool 43004 - Deep-reach socket wrench 45261 - Spiral pinion shaft bearing race installation tool 45294 - Spiral pinion shaft depth setting gauge
Standard Brakes and Tandems	12	377 - Brake adjusting wrench 5726 - Rear wheel puller plate 5727 - Rear wheel puller screw
Oil Disc Brakes and Tandems	13	5726 - Rear wheel puller plate 5727 - Rear wheel puller screw

SECTION 1
FRONT AXLE

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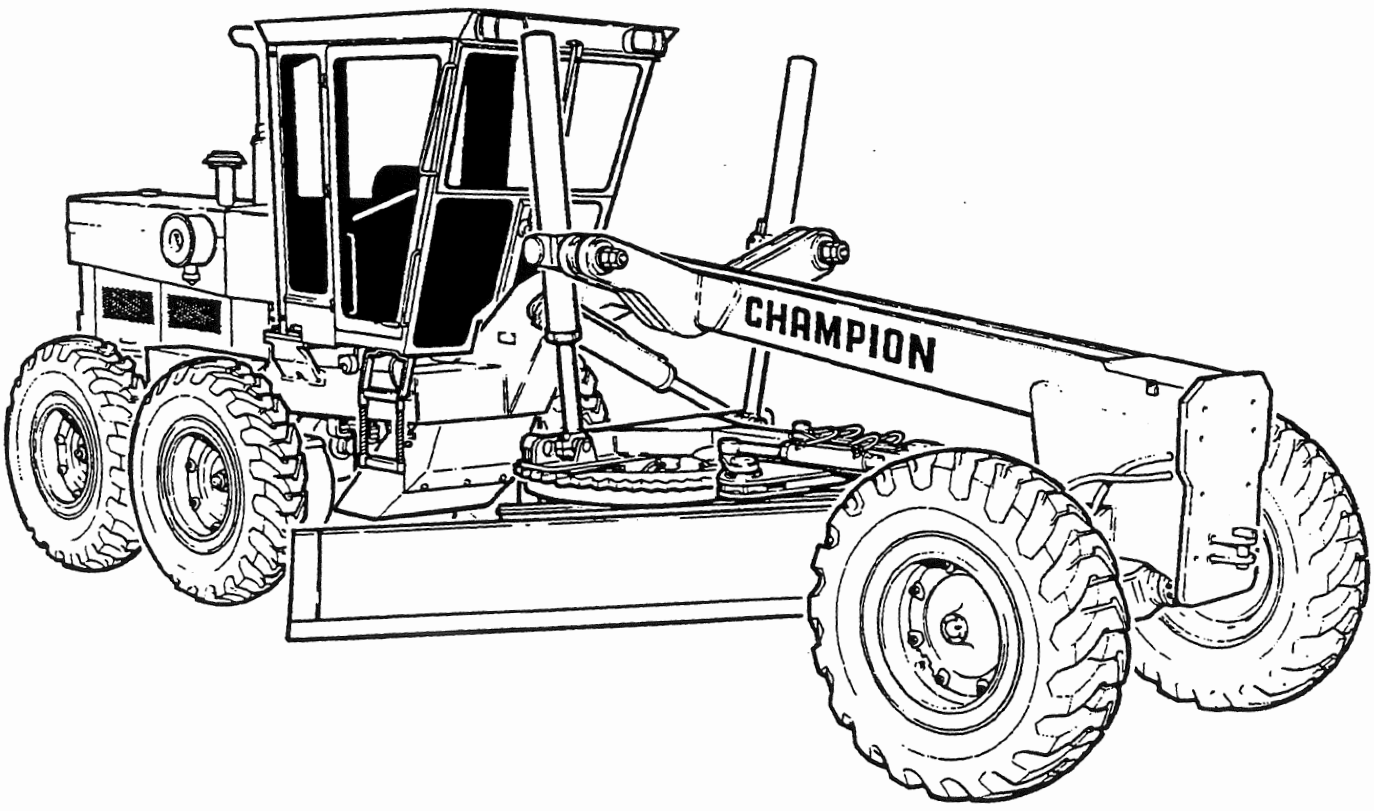

FRONT AXLE

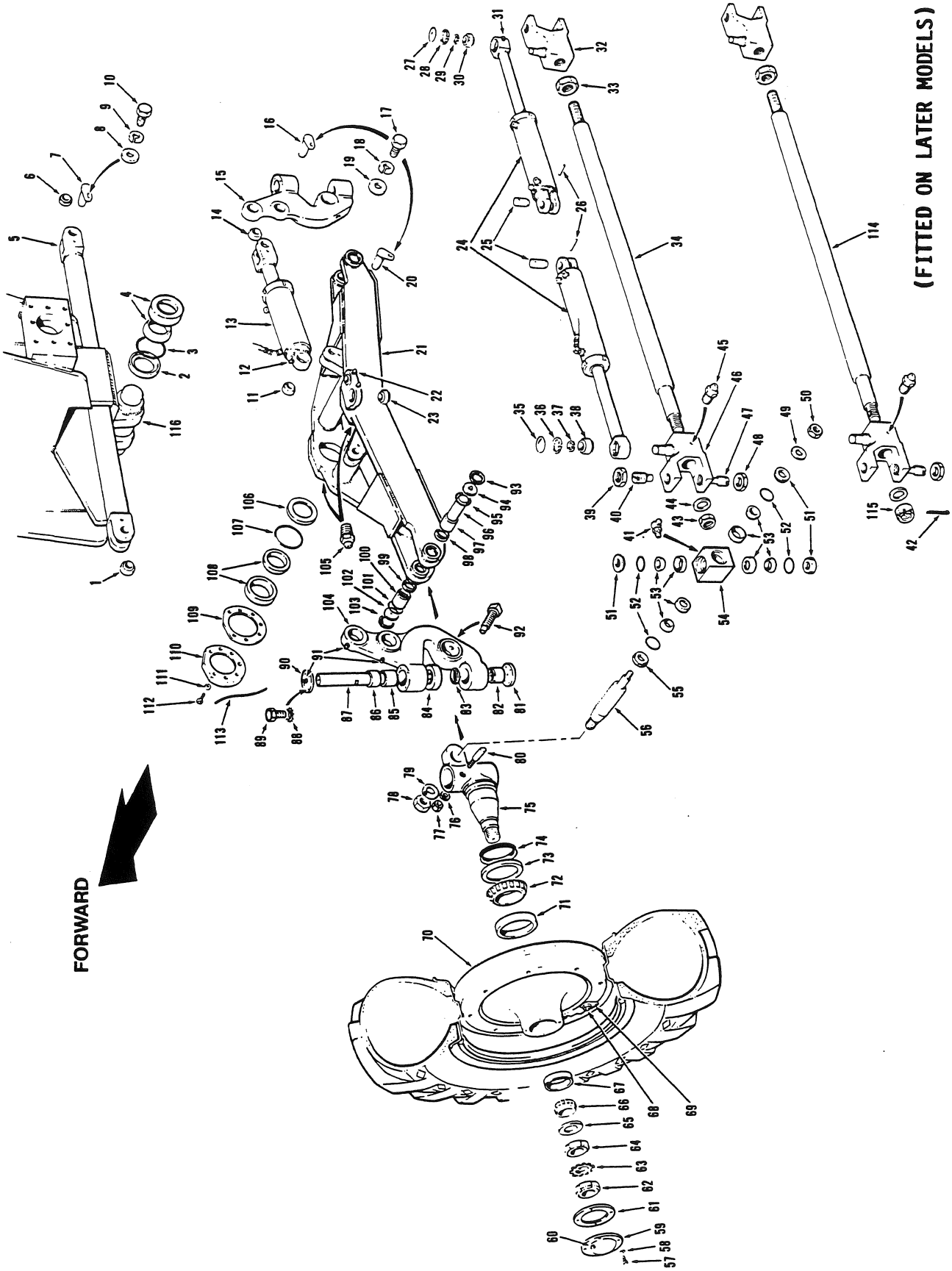

Fig. 1

Item	Description	Item	Description	Item	Description
1	Radial spherical brg.	40	Adjustment pin	79	Lockwasher
2	Back-up washer	41	Grease fitting	80	Key pin
3	O-ring	42	Cotter pin	81	Pin cap
4	Thrust bearing	43	Locknut	82	Needle bearing
5	Tie bar	44	Washer	83	Oil seal
6	Radial spherical brg.	45	Grease fitting	84	Thrust bearing
7	Bearing pin	46	Yoke - L.H.	85	Needle bearing
8	Flatwasher	47	Adjustment pin	86	Needle bearing
9	Lockwasher	48	Hex. jam nut	87	King pin
10	Hex. head capscrew	49	Flatwasher	88	Starwasher
11	Radial spherical brg.	50	Locknut	89	Machine screw
12	Grease fitting	51	Bearing retainer	90	Pin cap
13	Leaning wheel cylinder	52	O-ring	91	Grease fittings
14	Radial spherical brg.	53	Angular contact bearing	92	Set screw
15	Knuckle - R.H.	54	Pivot block	93	Snap ring
16	Bearing pin	55	Bearing retainer	94	Pin cap
17	Hex. head capscrews	56	Radius arm	95	O-ring
18	Lockwasher	57	Hex. head capscrews	96	Pivot pin
19	Flatwasher	58	Lockwasher	97	Needle bearing
20	Bearing pin	59	Hub cap	98	Oil seal
21	Axle frame	60	Grease fitting	99	Oil seal
22	Grease fitting	61	Gasket	100	Needle bearing
23	Radial bearing	62	Locknut - outer	101	O-ring
24	Steering cylinders	63	Lockwasher	102	Pin cap
25	Pivot pins	64	Locknut - inner	103	Snap ring
26	Roll pins	65	Washer - wheel bearing	104	Knuckle - L.H.
27	Expansion plug	66	Cone - outer bearing	105	Grease fittings
28	Snap ring	67	Cup - outer bearing	106	Back-up washer
29	Snap ring	68	Wheel nut	107	O-ring
30	Radial bearing	69	Rim clamps	108	Thrust bearing
31	Grease fitting	70	Front wheel	109	Shims
32	Yoke - R.H.	71	Cup - inner bearing	110	Pivot cap - Axle
33	Hex. jam nut	72	Cone - inner bearing	111	Lockwasher
34	Drag link	73	Back-up ring	112	Hex. head capscrews
35	Expansion plug	74	V ring seal	113	Lockwire
36	Snap ring	75	Spindle - L.H.	114	Drag link
37	Snap ring	76	Lockwasher	115	Castellated hex. nut
38	Radial bearing	77	Hex. nut	116	Axle pivot pin
39	Hex. jam nut	78	Hex. nut		

Key to Fig. 1

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General

Before starting any service procedure, make sure the work area is clean and safe. A clean work area will reduce the chances of foreign matter entering the front axle components causing damage. For a complete overhaul you will require a suitable lifting device, blocks and safety stands, four different installation drifts and a jack.

Discard all oil seals, O rings, snap rings, and gaskets. Inspect all bearings for signs of wear or damage. Clean all useable bearings and machined surfaces to remove old lubricant and foreign matter. Inspect the hydraulic cylinders for leaks or damage. A damaged scraper ring may score a cylinder rod, faulty O-rings will cause cylinder leakage. Refer to the 700 Series Parts Manual when ordering replacement parts. Refer to Lubrication Specifications detailed in the front of this manual for the recommended hydraulic oil and grease lubricants.

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

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 ADEQUATE 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 appear in Metric (SI), Imperial and U.S. quantities. Following the internationally accepted standard, the decimal point is denoted by a comma in all Metric measurements.

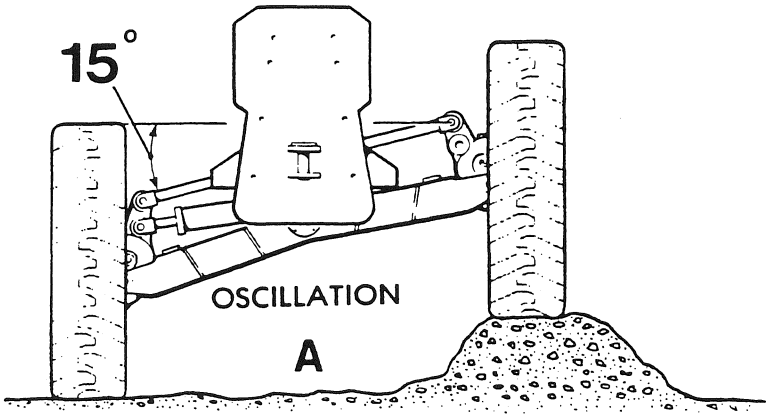
Description and Operation

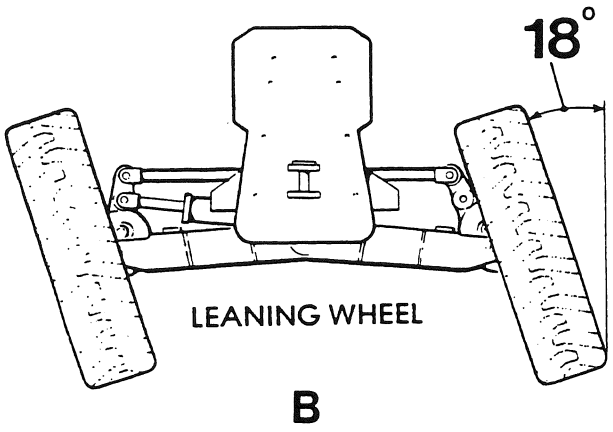
The major components of the front axle include the axle frame, leaning wheel knuckle and spindle assemblies, associated linkages and hydraulic cylinders. These components interact to perform the oscillation, wheel lean and steering functions.

The axle assembly is mounted to the main frame of the grader through the axle pivot and bearings. This design allows the axle to oscillate 15° from a level position (Fig. 2-A). The oscillating axle permits the front wheels to travel over uneven surfaces while transferring a minimum of motion to the main frame.

Wheel lean is achieved by one or two hydraulic cylinders acting on the leaning wheel knuckles. The knuckles are connected by a tie bar which ensures that knuckle movement is synchronized. The front wheels can lean a maximum of 18° to either side of a position perpendicular to the axle frame (Fig. 2-B). Front wheel lean may be used to offset loads on the moldboard, to decrease the turning radius of the machine and to improve stability when traversing a grade by maintaining the wheels in a vertical position.

The steering system is fully hydraulic. Twin steering cylinders act on the drag link assembly causing the spindles to pivot simultaneously (Fig. 2-C). Hydraulic flow is directed to the cylinders by the steering control unit operated by the steering wheel.





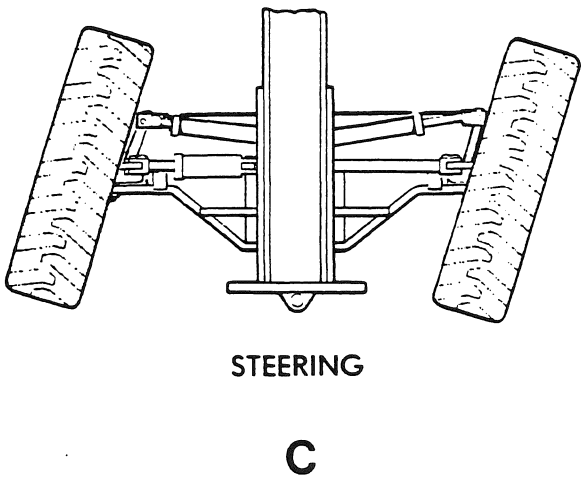


Fig. 2

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.

Cleaning and Inspection (continued)

Inspection - Oil Seals, O-Rings and Snap Rings

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

Apply a thin coating of 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 before installation.

Torque Guide

Application	Torque Value		
	N.m	**kgf.m**	**lbf.ft**
Rim Clamp Nuts	203	21	150
Spindle Outer Locknut	271 to 305	28 to 31	200 to 225

Special Tools

The following tools are recommended when overhauling the front axle. The tools help you to remove and install precision-machined parts.

Part Number	Description
18516	Socket wrench - wheel bearing locknut
37116	Installation drift - steering and leaning wheel cylinders and the tie bar bearings
37117	Installation drift - pivot block bearing cups
37118	Installation drift - radius arm bearing cones

Troubleshooting

Problem	Cause	Remedy
Excessive tire wear.	Incorrect toe-in adjustment.	Adjust toe-in.
	Physical damage.	Inspect the axle for physical damage, such as a bent tie rod or worn spindle and knuckle bearings. Repair or replace defective components as necessary.
Wheel shimmy.	Incorrect wheel bearing tension.	Disassemble and inspect the wheel bearing for wear or damage. Adjust the wheel bearing tension.
	Incorrect bearing tension in the pivot block.	Disassemble and inspect the pivot block bearings for wear or damage. Adjust the bearing tension in the pivot block.
	Loose yoke on drag link.	Inspect the left hand yoke and tighten the locknuts if necessary.
	Loose radius arm.	Inspect the radius arms and tighten the locknuts if necessary.
	Worn or damaged bearings in the knuckle or spindle.	Disassemble and inspect the knuckle and kingpin bearings for wear or damage. Replace bearings if necessary.

Troubleshooting (continued)

Problem	Cause	Remedy
Wheel shimmy (cont'd)	Steering system malfunction	Refer to hydraulics section for possible hydraulic malfunction.
Wheels lean when the machine is not in operation.	Worn seal components in the leaning wheel cylinder(s).	Disassemble and inspect the cylinders for worn or damaged components. Replace defective components as necessary.
	Malfunction in the counterbalance valve.	Disassemble and inspect the counterbalance valve for wear or damage. Repair or replace the valve as necessary.
Wheels will not lean.	Physical damage.	Inspect the axle frame, knuckle pivot pin and related components for physical damage. Repair or replace defective components.
	Leaning wheel system malfunction.	Refer to hydraulics section for possible hydrualic malfunction.
Front end bounce.	Incorrect tire inflation	Inflate tires to the correct pressure (see Operator's Manual).
	Incorrect rim installation.	Loosen the wheelnuts and retighten them in a diagonal pattern to the recommended torque.

Disassembly

WARNING

DO NOT WORK ON A MACHINE SUPPORTED ONLY BY THE MOLDBOARD OR BY INADEQUATE STANDS OR BLOCKS. HYDRAULIC FAILURE UNDER THESE CONDITIONS CAN RESULT IN PROPERTY DAMAGE AND PERSONAL INJURY.

Fig. 3
Begin disassembly by loosening the rim clamp nuts (68) on the wheel (70).

Fig. 4
Operate the moldboard to lift the front wheels off the ground. Lower the grader onto a stand under the front plate. Ensure that the tires are just touching the ground. Then remove the nuts (68), clamps (69) and remove the tire and rim, being careful of the axle, it may pivot upwards.

Fig. 5
Attach a safety lifting device to a wheel stud. Then, remove the capscrews (57), washers (58) and hubcaps (59). Discard the gasket (61).

NOTE

Disassembly and reassembly for the left and right-hand components of the front axle will be the same unless otherwise noted.

Fig. 6
Using a hammer and drift, bend back the tabs on the lockwasher (63). Remove the outer locknut (62), lockwasher (63), inner locknut (64) and the wheel bearing washer (65). Pull the wheel out slightly on the spindle and remove the outer bearing cone (66). Remove the wheel (70) from the spindle (75), being careful of the axle, it may pivot upwards.

Fig. 7
From the wheel, remove the back-up ring (73) and the inner bearing cone (72). Discard the back-up ring.

Fig. 8
Using a hammer and a drift, remove the inner (71) and outer bearing cup (67). Remove the old grease, clean and inspect the wheel for signs of damage and wear.

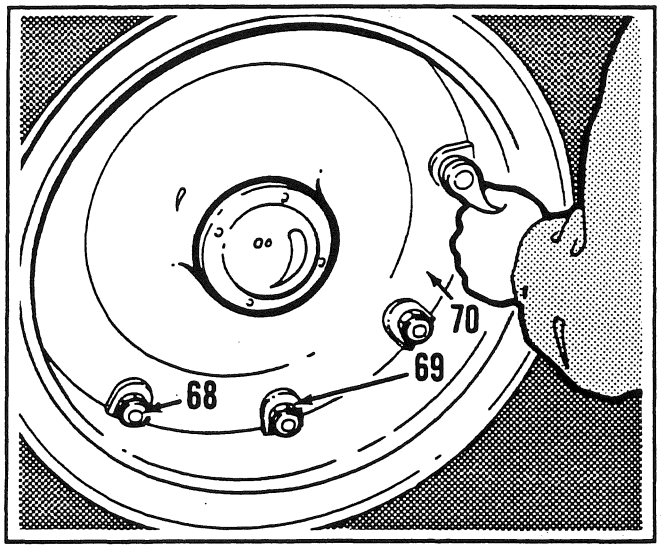


Fig. 3

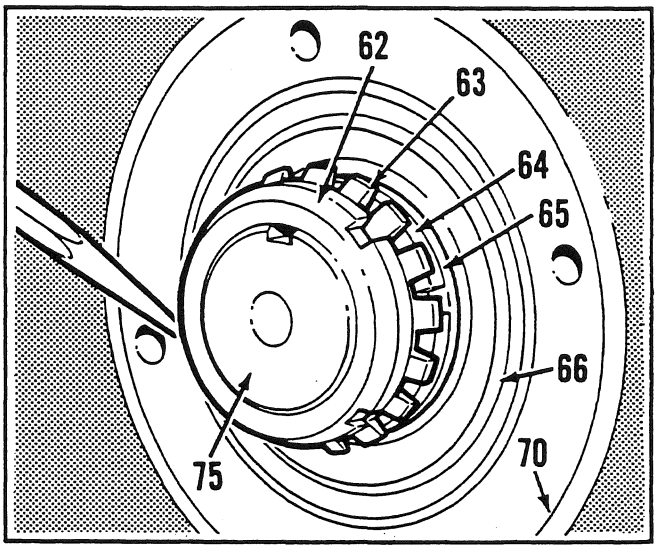


Fig. 6

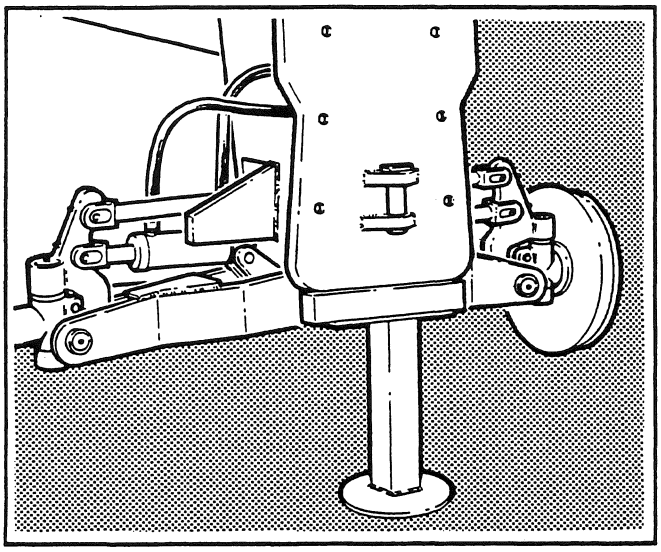


Fig. 4

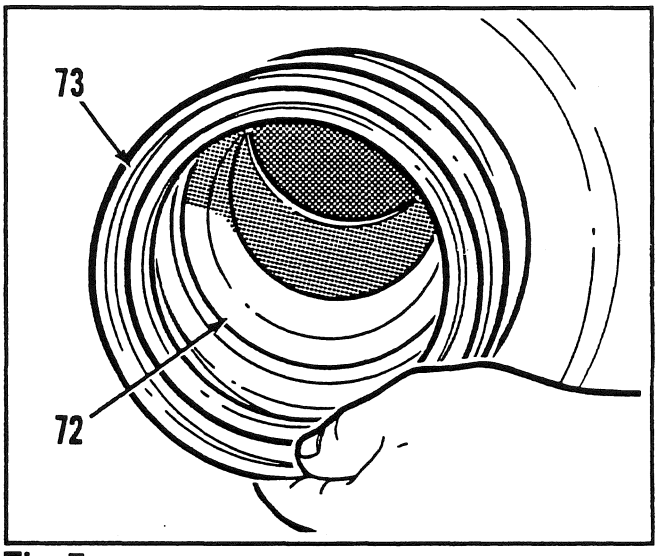


Fig. 7

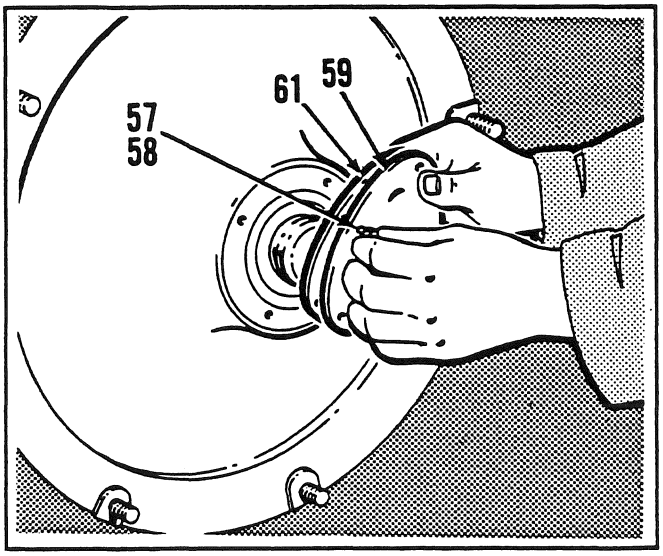


Fig. 5

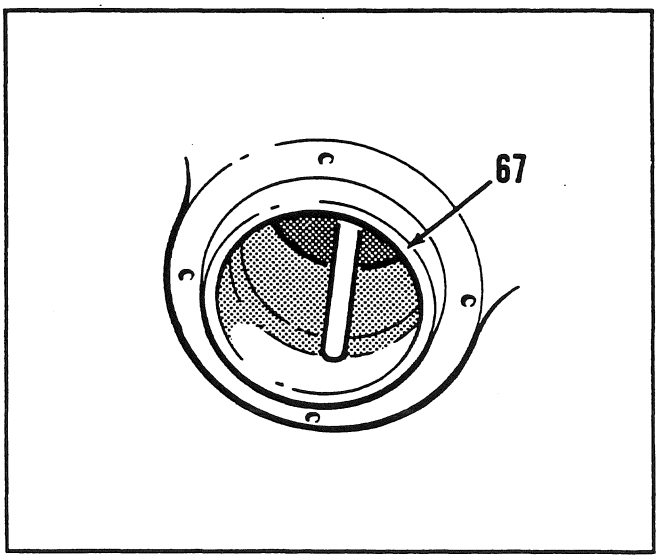


Fig. 8

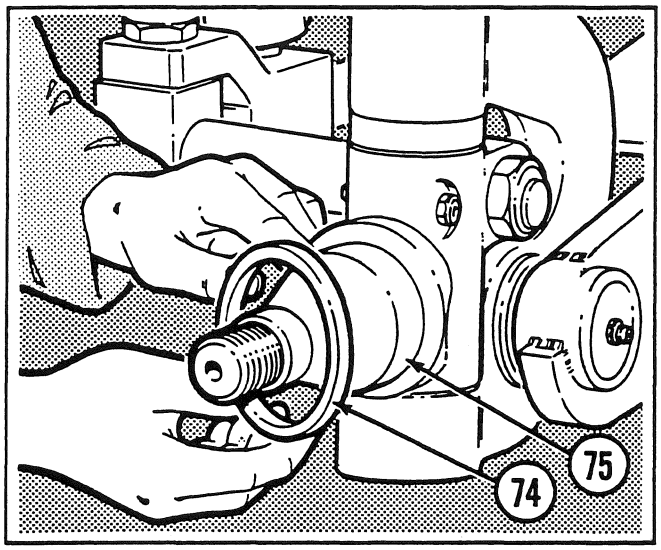
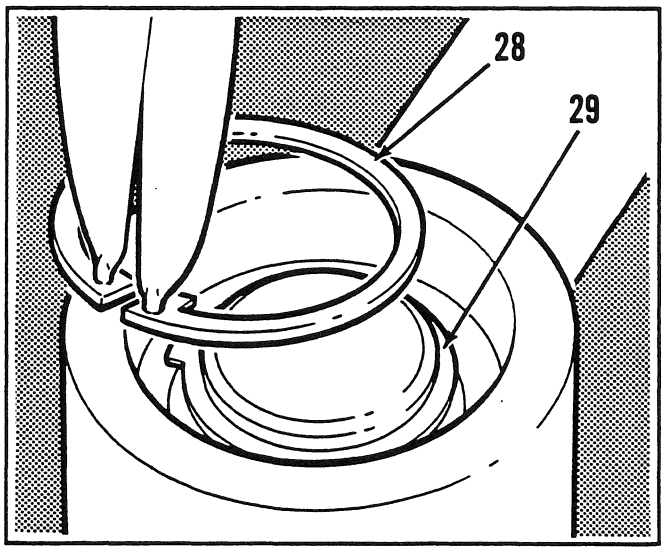


Fig. 9



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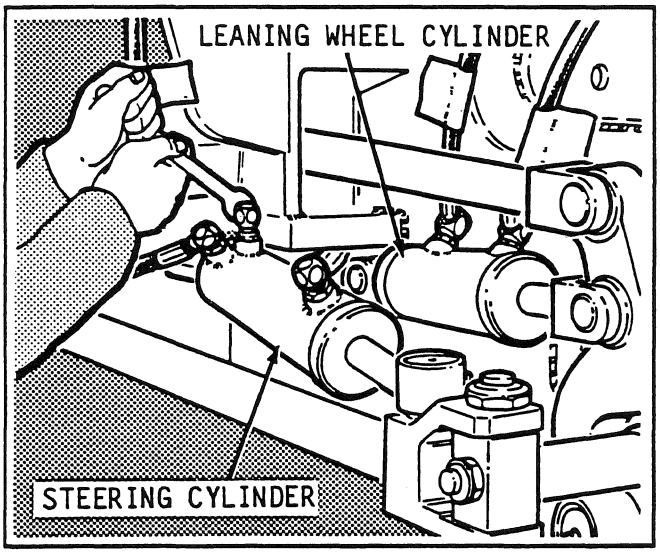


Fig. 10

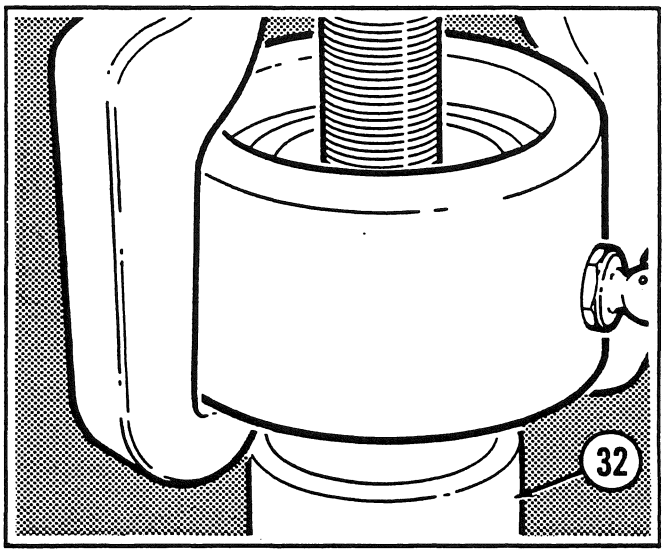


Fig. 13

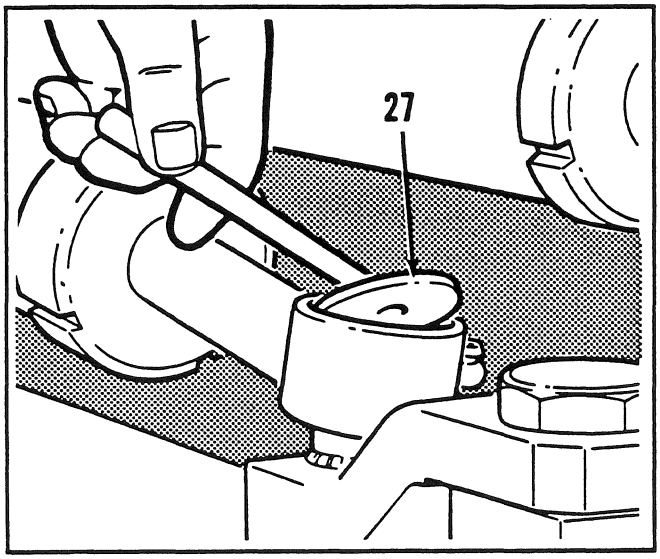


Fig. 11

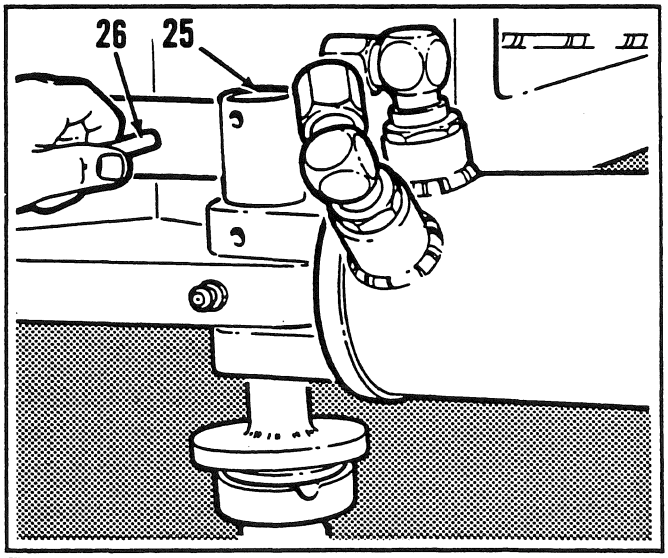


Fig. 14

Disassembly (continued)

Fig. 9
Remove and discard the V-ring seal (74) from the spindle (75).

Fig. 10

WARNING

WEAR EYE PROTECTION WHEN DISCONNECTING HOSES. RESIDUAL PRESSURE MAY REMAIN IN THE HYDRAULIC SYSTEM CAUSED BY THE LOCK VALVE.

To avoid confusion during reassembly, identify the hydraulic hoses for the leaning (13) and steering cylinders (24) and disconnect the hoses from the cylinders.

NOTE

Cap or plug all hoses and fittings to prevent contamination of the hydraulic system.

Fig. 11
To remove the steering cylinder, remove and discard the expansion plug (27) at the rod end.

Fig. 12
Remove and discard the two snap rings (28), (29) found at the rod end of the steering cylinder.

Fig. 13
Using a puller, remove the rod end of the steering cylinder from the pivot stud of the yoke (32).

Fig. 14
At the base end of the steering cylinder, remove the roll pin (26) from the pivot pin (25). Using a jack to force the pivot pin (25) up and out of the anchor lug, you then can remove the cylinder and place it on a clean work bench.

Disassembly (continued)

Fig. 15
Remove the radial bearing (30) from the rod end. Note the lip in the bottom of the bore of the rod end which permits removal and installation from one direction. Examine the bearing for signs of damage or wear.

Fig. 16
To remove the drag link, support the drag link with a lifting device. Remove the nuts (50) retaining the pivot blocks (54) to the radius arms (56).

Fig. 17
Remove the flatwasher (49), bearing retainer (51), and O-ring (52).

Fig. 18
Pull the pivot blocks (54) from the radius arms (56) and remove the outer contact bearing (53). The opposite contact bearing (53) and bearing retainer (51) will remain on the radius arm.

Fig. 19
Lift the drag link (34) away from the axle and place it on the workbench. Secure the right hand yoke (32) in a vise and remove both the top (39) and bottom jam nuts (48).

Fig. 20
Unscrew both the adjuster pins (40), (47) and remove the pivot block.

NOTE

Repeat these procedures to remove the pivot block from the left hand yoke.

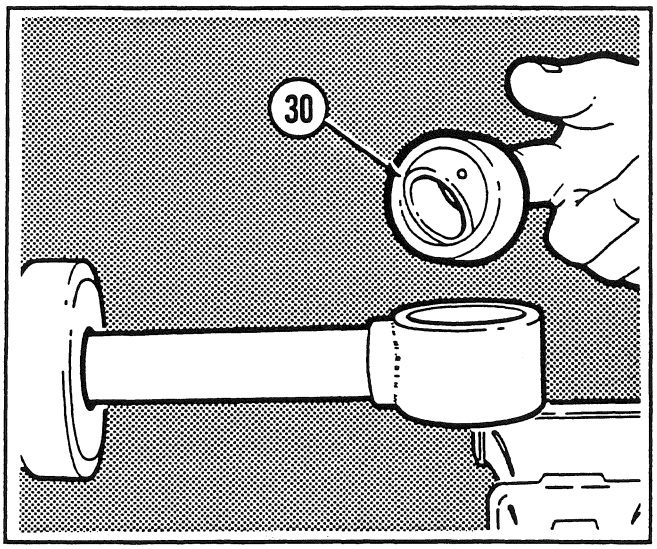


Fig. 15

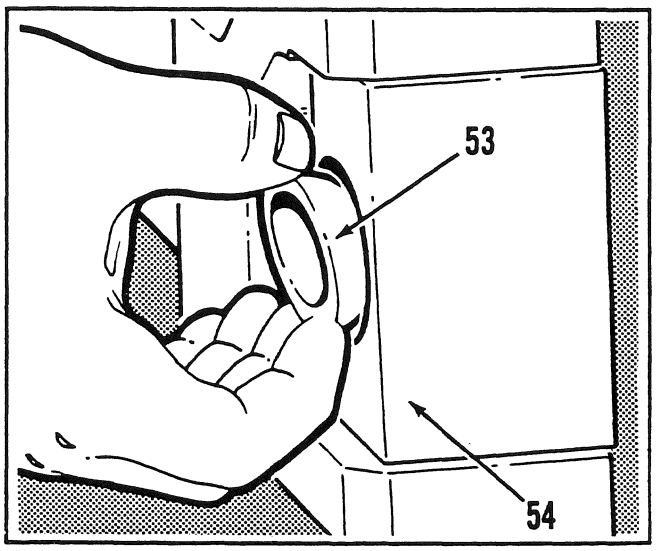


Fig. 18

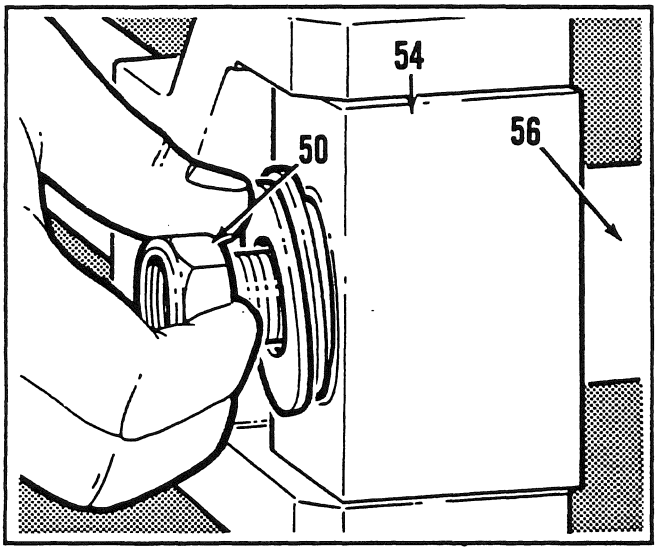


Fig. 16

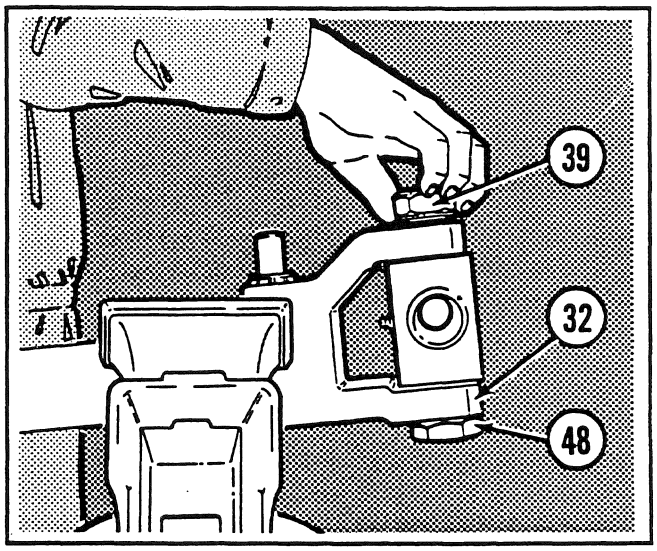


Fig. 19

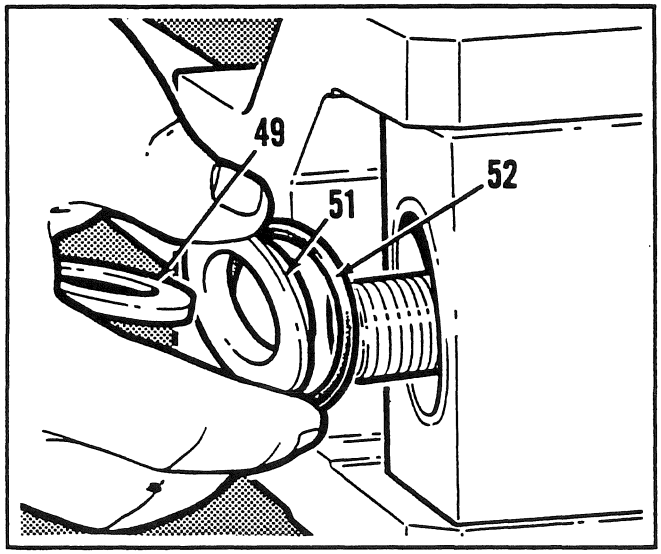


Fig. 17

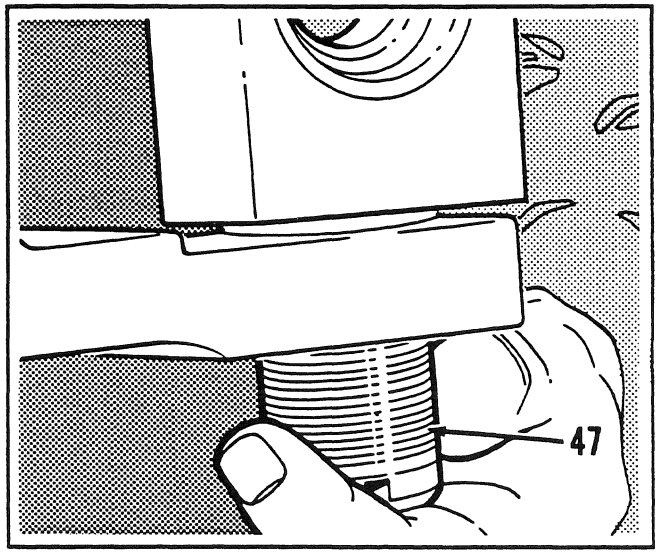


Fig. 20

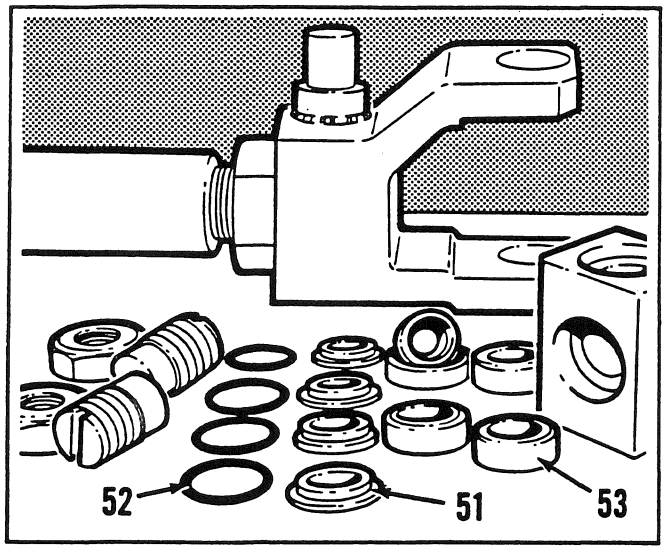


Fig. 21

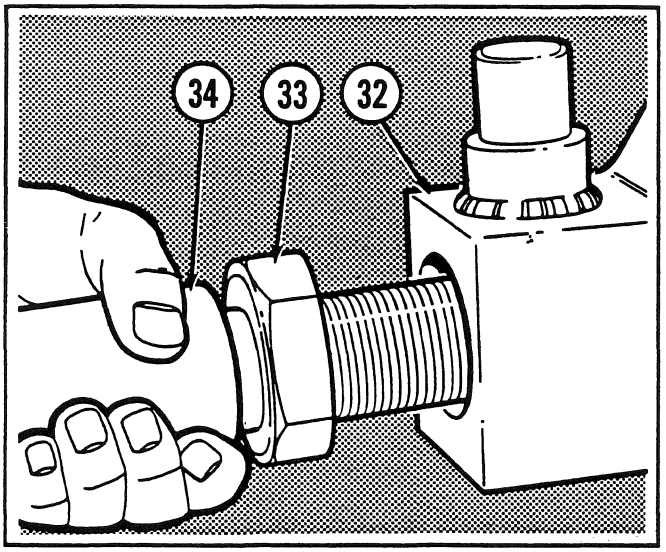
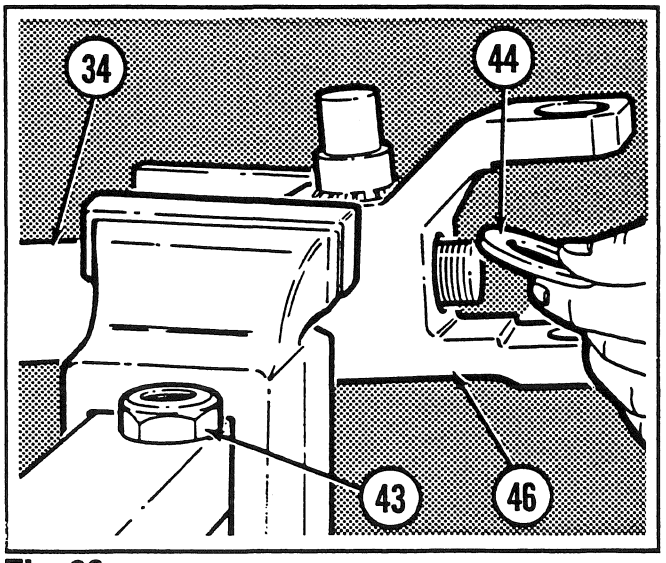


Fig. 22



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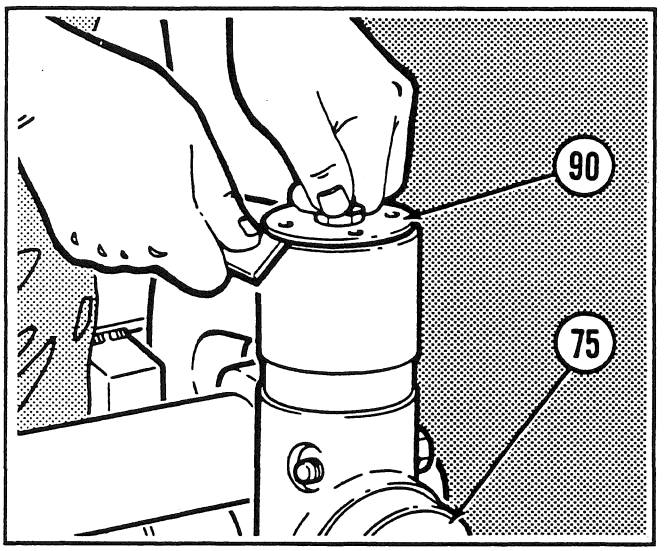


Fig. 24

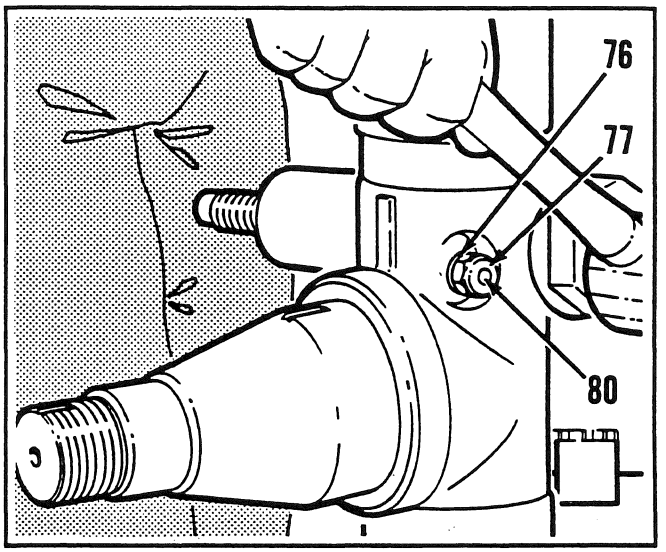


Fig. 25

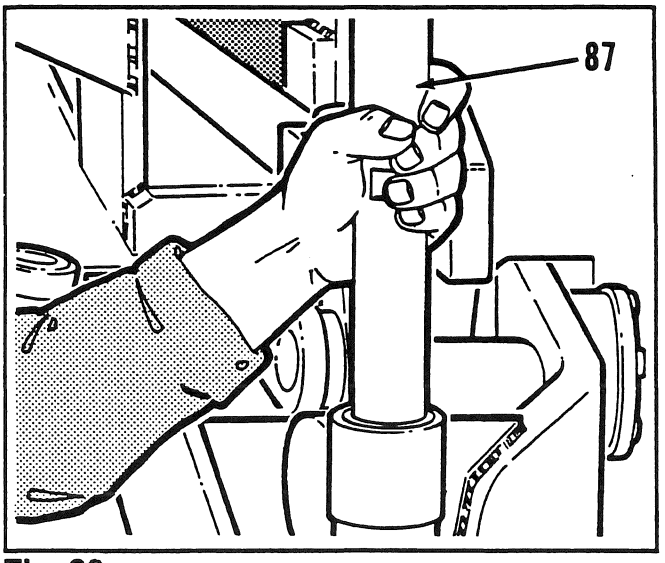


Fig. 26

Disassembly (continued)

Fig. 21
To disassemble the pivot blocks, remove the bearing retainers (51), remove and discard the O-rings (52), remove the angular contact bearings (53). Remove the contact bearing cups (53) pressed into the pivot block by using a hammer and small drift.

NOTE

Clean and inspect the pivot block and all pivot block components. Replace any parts that show signs of damage or wear. Discard all O-rings.

Fig. 22
Place the right hand yoke (32) in a vise and loosen the lock nut (33). Unscrew the drag link (34) from the yoke (32).

Fig. 23
Place the left hand yoke (46) in a vise and remove the lock nut (43) and flatwasher (44). Pull the drag link (34) out of the yoke (46).

NOTE

On later models the drag link is secured by a castellated hex. nut and a cotter pin.

Fig. 24
To remove the spindle (75) from the axle, remove the upper (90) and lower king pin caps (81).

Fig. 25
Back off the nut (77) retaining the key pin (80), strike the nut with a soft faced hammer to loosen the key pin. Remove the nut, lockwasher (76) and pull out the key pin.

Fig. 26
Using a jack and a drift, press out the king pin (87). Place the king pin (87) in a freezer or dry ice. Freezing will make reinstallation of the king pin much easier.

Disassembly (continued)

Fig. 27
Remove the spindle assembly (75) and thrust bearing (84).

Fig. 28
Place the spindle assembly in a vise and back off the nut (78) and lockwasher (79). Strike the nut to force the tapered end of the radius arm from the spindle (75). When the radius arm is loose, remove the nut, lockwasher and the radius arm (56).

Fig. 29
Reinstall the nut (50) onto the end of the radius arm to protect the threads. Use a bearing puller to press off the bearing retainer. Remove the nut, angular contact bearing cone (53) and retainer (55).

Fig. 30
To disconnect the tie bar (5), support the steering knuckle (104) and remove the hex. head capscrews (10), lockwasher (9), flatwasher (8) retaining the bearing pins (7). Force the pins out with a hammer and drift.

NOTE

Repeat these procedures to remove the bearing pins from both ends of the leaning wheel cylinder (13).

Fig. 31
Remove the cylinder from the axle and place it on a workbench. Using a hammer and a drift, remove the radial spherical bearing (30) from the leaning wheel cylinder base end.

Fig. 32
Using a hammer and a drift, remove the two needle bearings (85), (86) from the top of the steering knuckle (104).

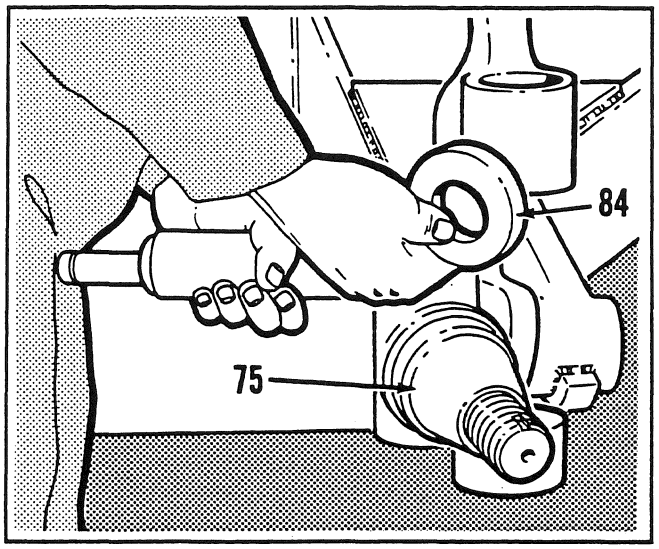


Fig. 27

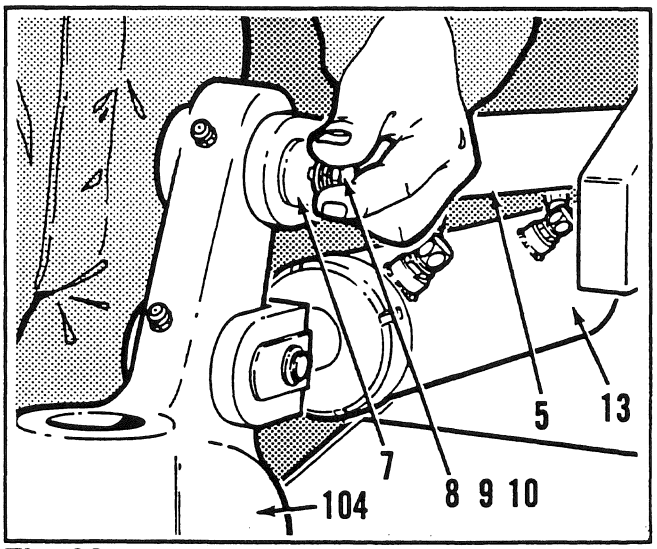


Fig. 30

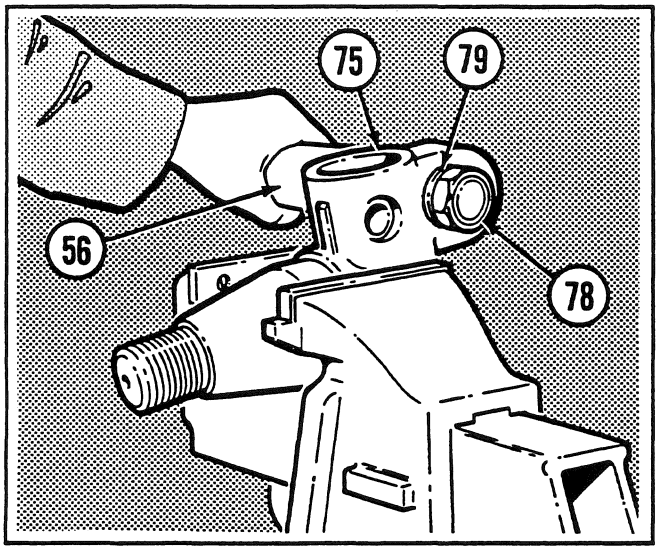


Fig. 28

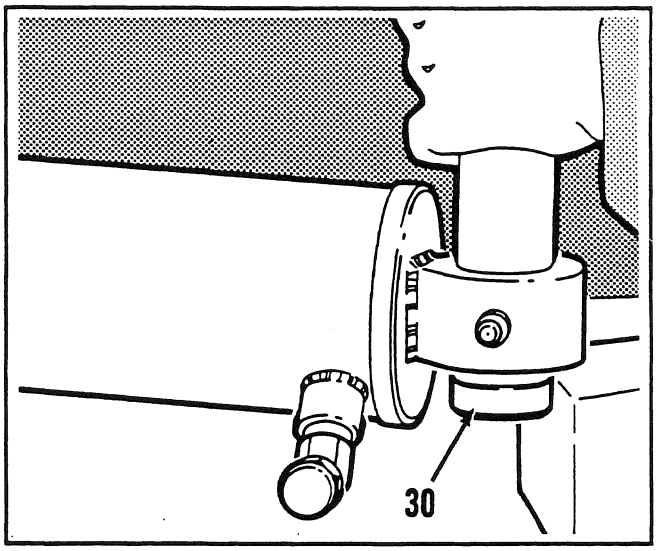


Fig. 31

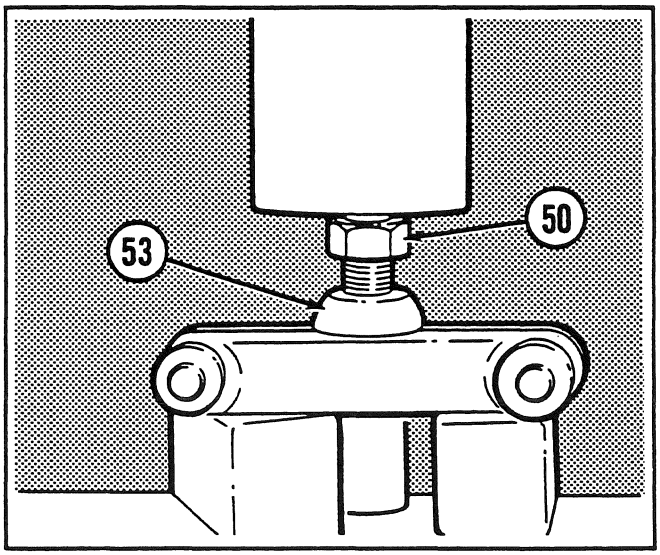


Fig. 29

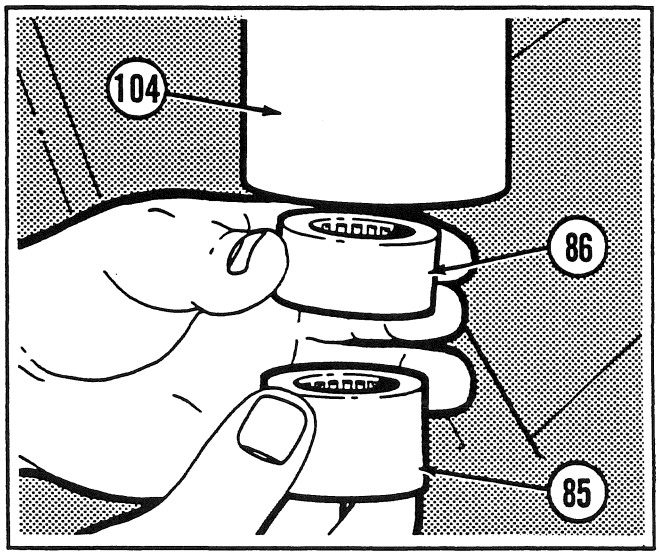


Fig. 32

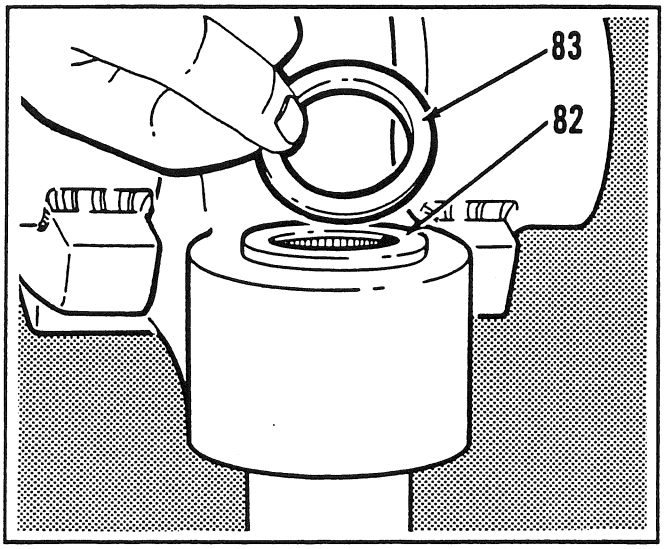


Fig. 33

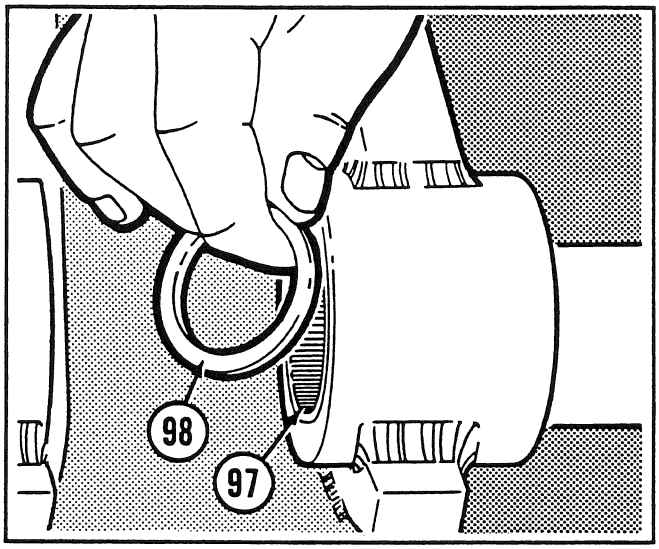


Fig. 36

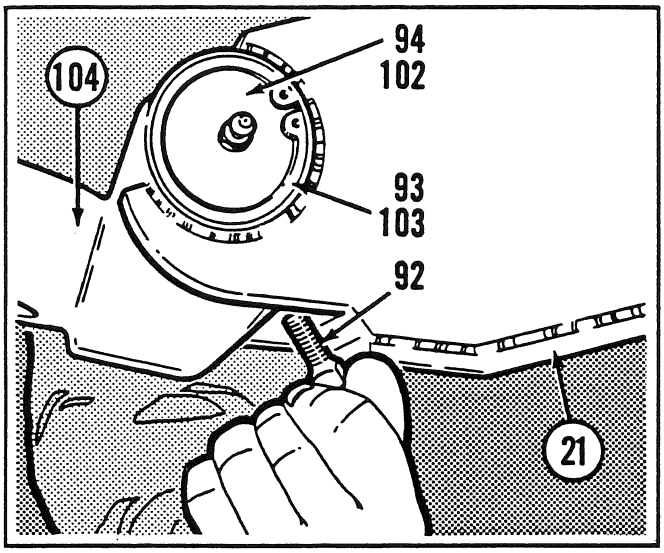


Fig. 34

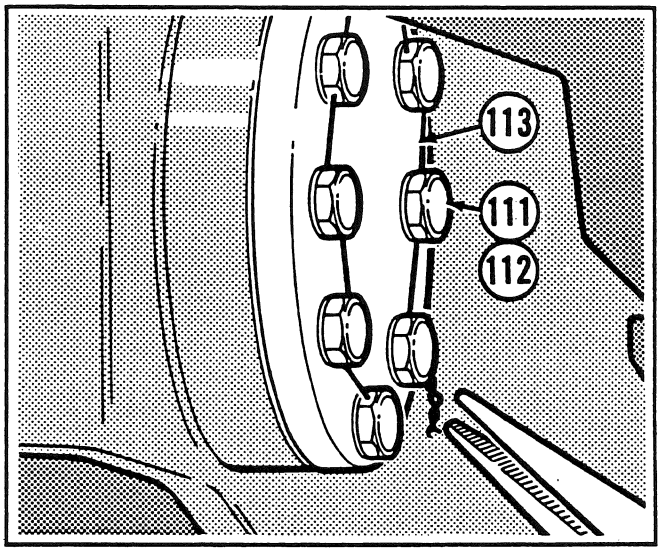


Fig. 37

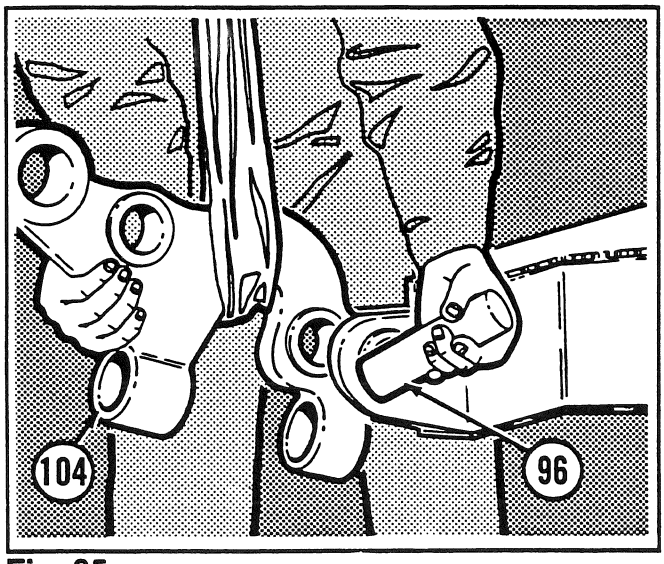


Fig. 35

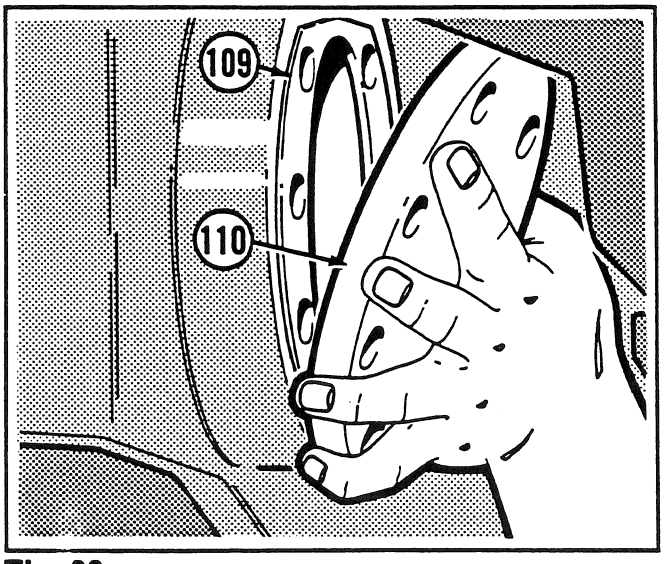


Fig. 38

Disassembly (continued)

Fig. 33
Using a jack and drift, press out the oil seal (83) and single needle bearing (82) from the bottom bore of the steering knuckle.

Fig. 34
To remove the steering knuckle (104) from the axle (21), remove the set screw (92) retaining the knuckle pivot pin. Remove the snap rings (93), (103) and pin caps (94), (102).

Fig. 35
Attach a safe lifting device to the steering knuckle (104) and force the pivot pin (96) out of the axle pads to remove the knuckle.

Fig. 36
Using a hammer and a drift, remove the oil seals (98), (99) and the needle bearings (97), (100) from the axle pads.

Fig. 37
Support the weight of the axle frame with a safe lifting device. Remove the lockwire (113), capscrews (112) and the lockwashers (111) from the pivot pin cap.

Fig. 38
Remove the axle pivot pin cap (110) and the shims (109) from the axle pivot pin.

Disassembly (continued)

Fig. 39
Remove any excess grease from the thrust bearing. Force the front axle (21) back and remove the thrust bearing cup (108) and the O-ring (107). Using a bearing puller, remove the thrust bearing cone (108) and backup washer (106) from the pivot pin.

NOTE

Lower the rear of the axle frame until it is below the pivot pin. Pull the axle frame forward. When the axle clears the front portion of the pivot pin, lower the axle to the ground.

Fig. 40
Remove the thrust bearing cup (4) and the O-ring (3) from the axle frame (21).

Fig. 41
Using a puller, remove the rear thrust bearing cone (4) and back-up washer (2) from the axle pivot pin.

Fig. 42
Using a hammer and drift, remove the spherical plain bearings (23) from the steering cylinder anchor lugs. Removal of the bearings is possible only from below, because of the anchor lug bores have a lower internal lip.

Reassembly

Before assembling any components, make a thorough inspection of all bearings and pins for signs of corrosion or wear. Grease the spherical bearings before installing the bearing pins to ensure that the grease grooves are aligned with the grease fittings.

Fig. 43
Use a hammer and installation drift (**special tool No. 37116**) to install the spherical plain bearings (23) into the front axle.

NOTE

The bearings can only be installed from the top of the anchor lug bores, because of the lower internal lip.

Fig. 44
Using a hammer and a drift, install the thrust bearing cup (4) into the axle frame (21).

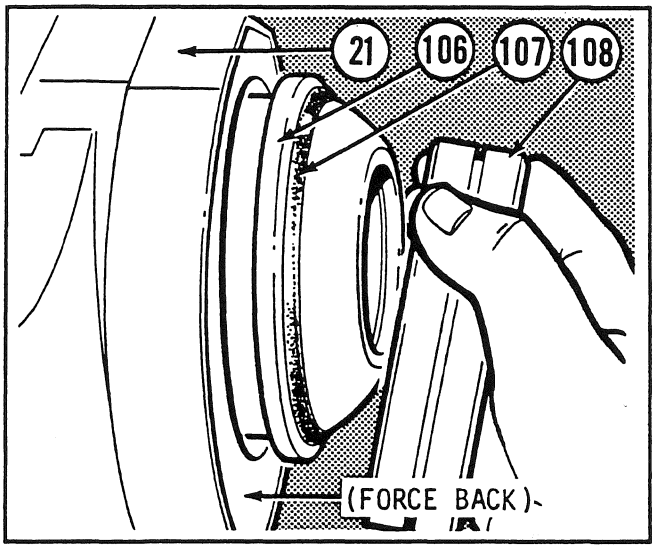


Fig. 39

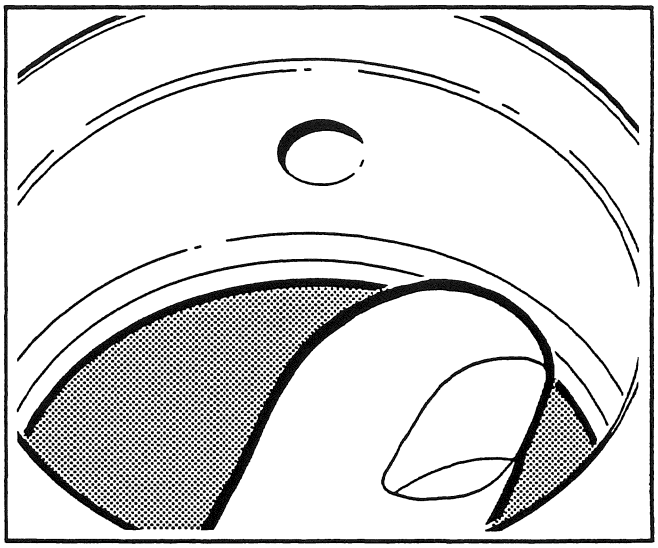
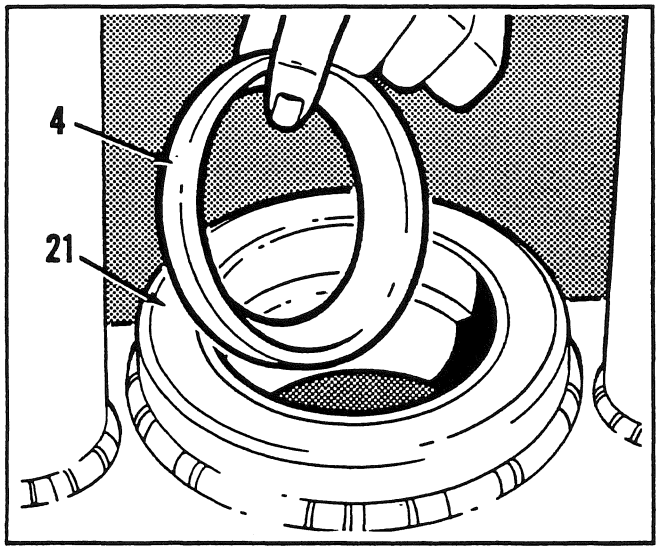


Fig. 42



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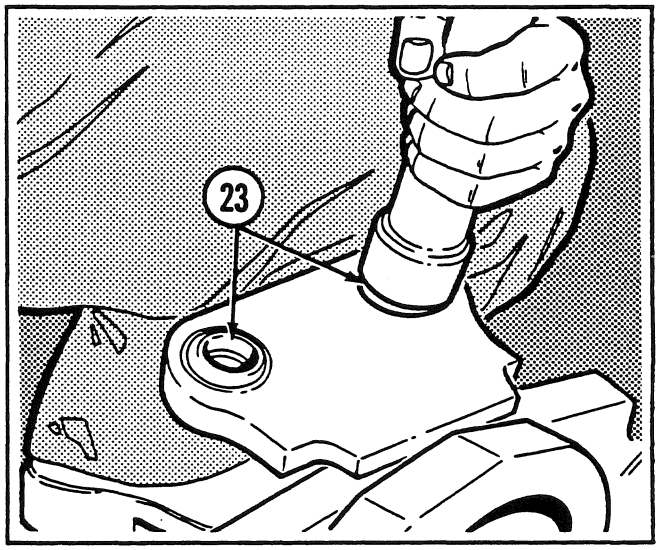


Fig. 43

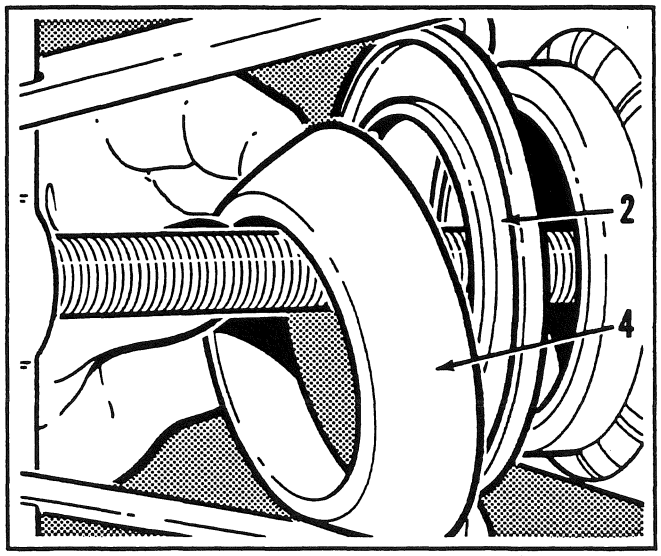


Fig. 41

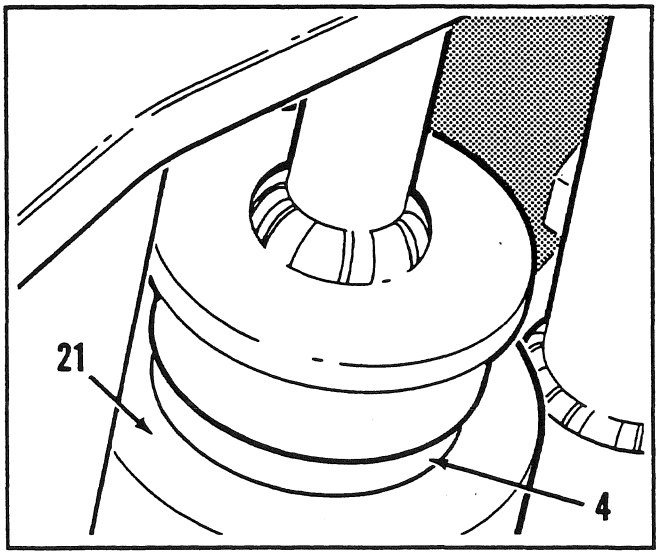
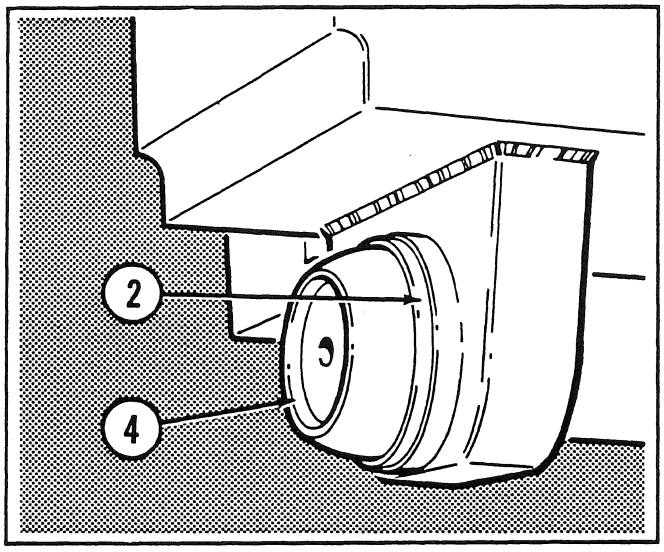


Fig. 44



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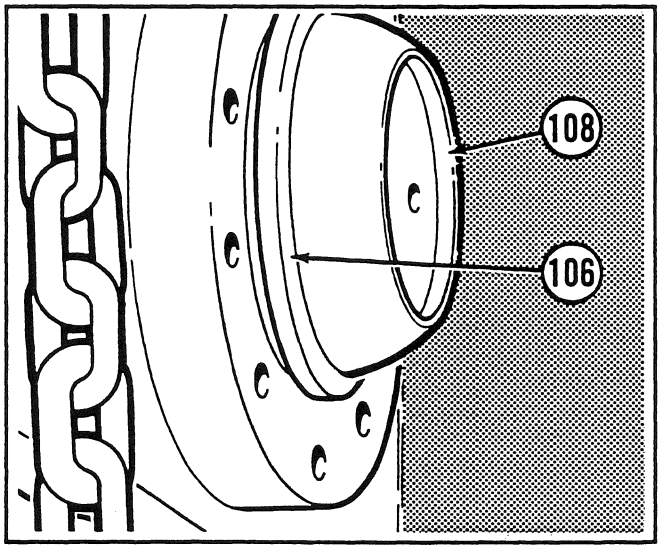
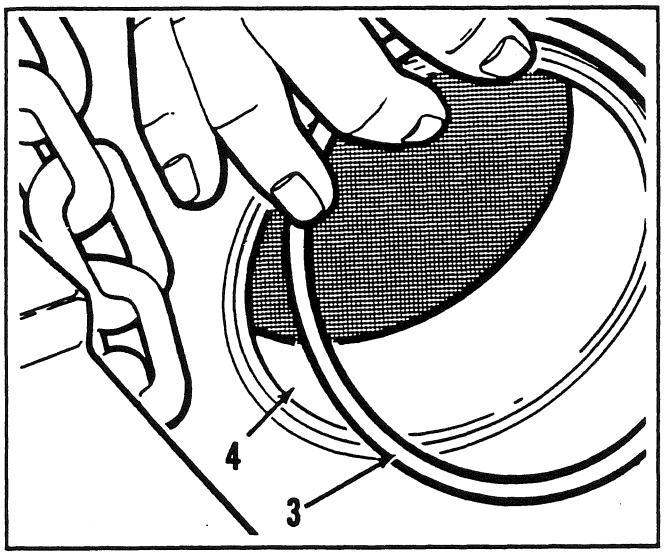


Fig. 48



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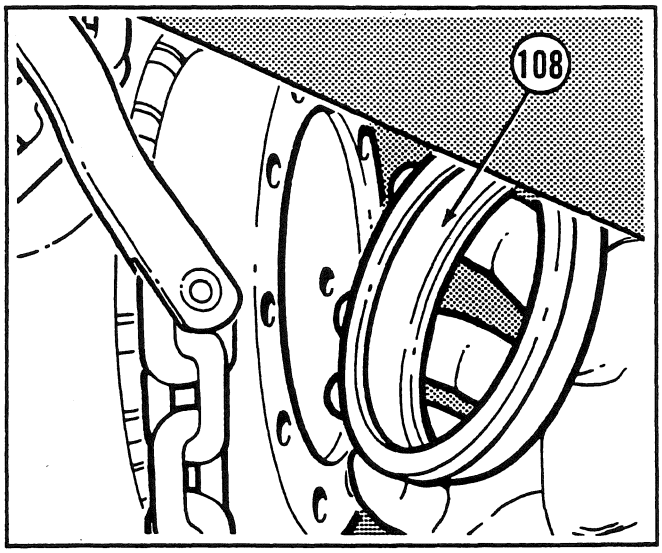


Fig. 49

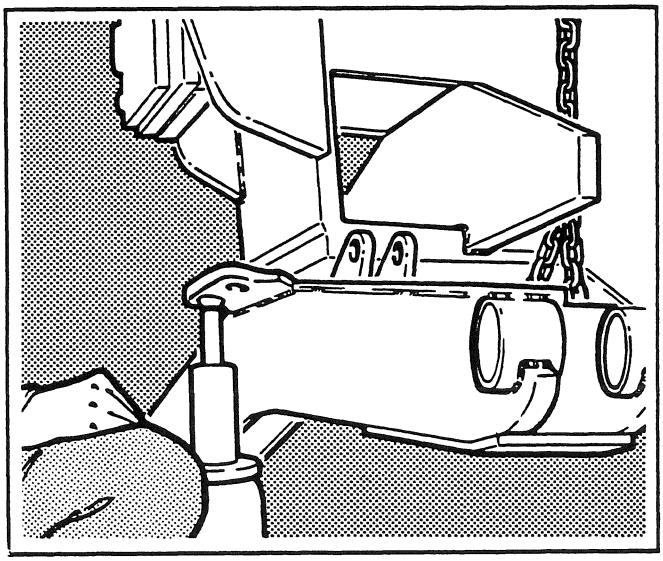


Fig. 47

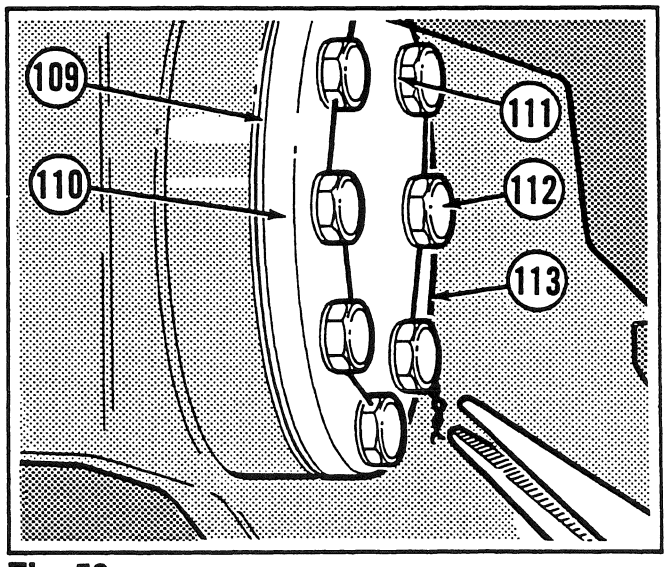


Fig. 50

Reassembly (continued)

Fig. 45
Install the back-up washer (2). Heat the rear thrust bearing cone (4) in an oven or oil bath type heater to 121°C (250°F) maximum. **DO NOT** use an induction heater. Install the cone onto the pivot pin.

Fig. 46
Apply grease to the cup of the pivot bearing (4), lubricate and install a new O-ring (3) into the axle frame.

Fig. 47
Using a safe lifting device to raise the axle frame, position the front bearing bore over the pivot pin. Pull the frame as far back as possible. Using a jack, raise the back of the axle frame until the rear cup is aligned with the rear cone bearing.

Fig. 48
Install the back-up washer (106) onto the front pivot pin. Heat the front thrust bearing cone (108) in an oven or oil bath type heater to 121°C (250°) maximum. **DO NOT** use an induction heater. Install the cone onto the front pivot pin. Maneuver the axle frame (21) ahead so the rear thrust bearing cup and cone are engaged. Lubricate and install a new O-ring on the front thrust bearing.

Fig. 49
Install the front thrust bearing cup (108).

Fig. 50
Install the pivot cap (110) without any shims, tighten the capscrews (112) with lock washers (111) evenly until the axle stays in place when moved and released. Using a feeler gauge, measure the space between the axle pivot cap (110) and the axle frame (21). Four measurements are required, mathematically average the four measurements. This will allow you to determine the number of shims you will need. Install the shim pack (109), axle pivot cap and tighten the capscrews and lockwashers in a diagonal sequence to the recommended torque. Install a new lockwire (113) to secure the capscrews.

Reassembly (continued)

Fig. 51
Before installing the steering knuckles onto the axle, use a hammer and the appropriate drift to seat new needle bearings (97), (100) and install new oil seals (98), (99) into the axle pads. Apply a generous amount of grease to each bearing.

Fig. 52
Place the steering knuckle (104) in a press and use the appropriate drift to install new needle bearings (82), (85) in the upper and lower bosses of the knuckle. Also install a new oil seal (83) at the inner lower face of the knuckle boss with the seal lip facing the spindle.

Fig. 53
Use a safe lifting device to position the knuckle (104) between the axle pads (21). Make sure to align the slot in the knuckle pivot pin (96) with the set screw (92) when installing the pin.

Fig. 54
Apply thread locking compound, Champion part number **27528** to the set screw (92). Install the set screw and secure the pin (96) in position. Check to ensure that the pin pivots freely on the needle bearings.

Fig. 55
Lubricate and install new O-rings (95), (101).

Fig. 56
Install the pin caps (94), (102) and new snap rings (93), (103). Grease the pivot and axle pad needle bearings.

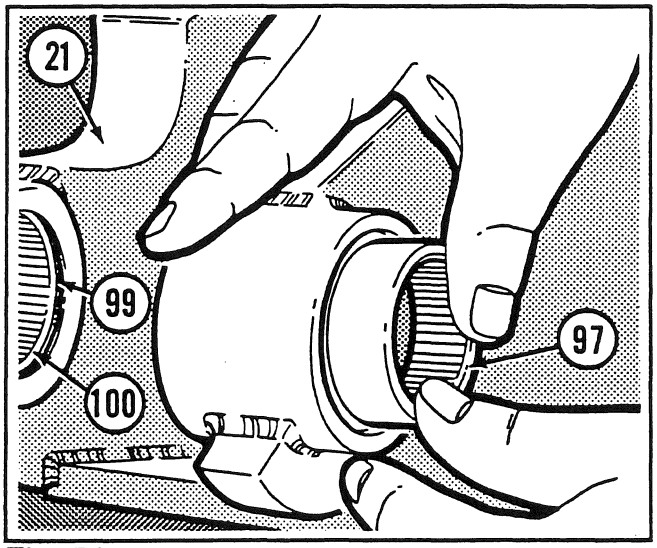


Fig. 51

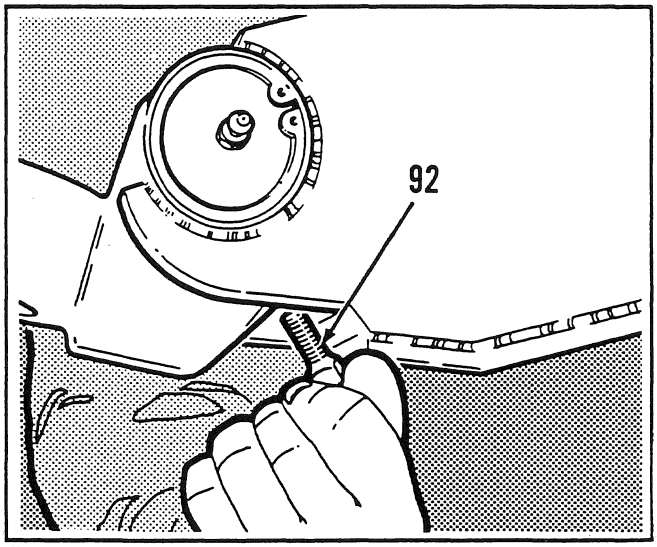


Fig. 54

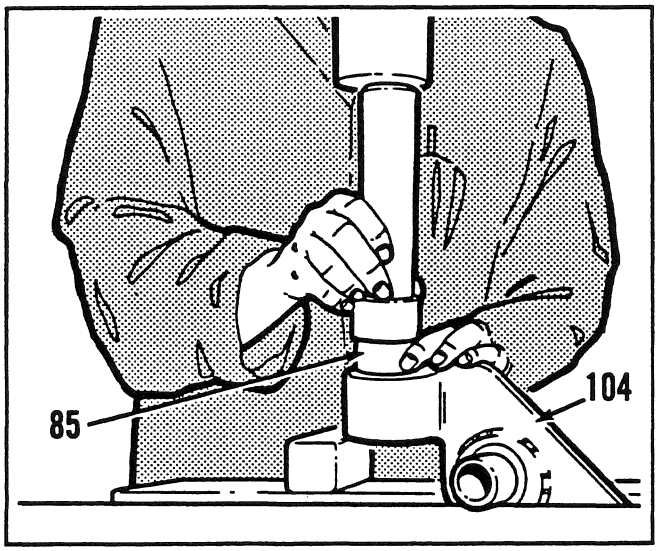


Fig. 52

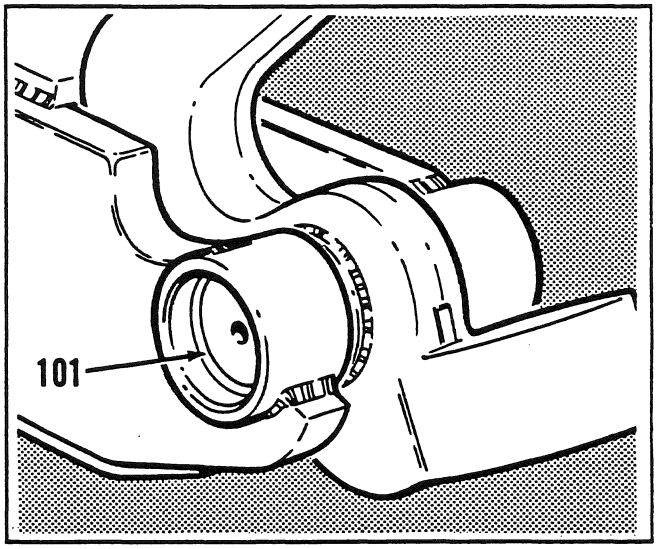


Fig. 55

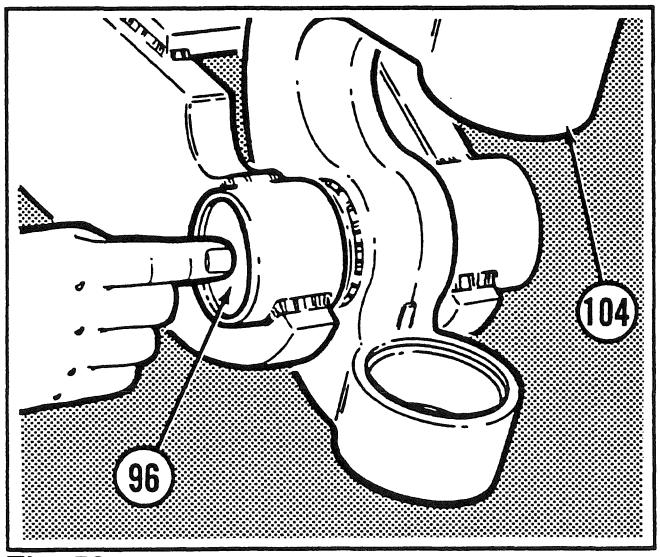


Fig. 53

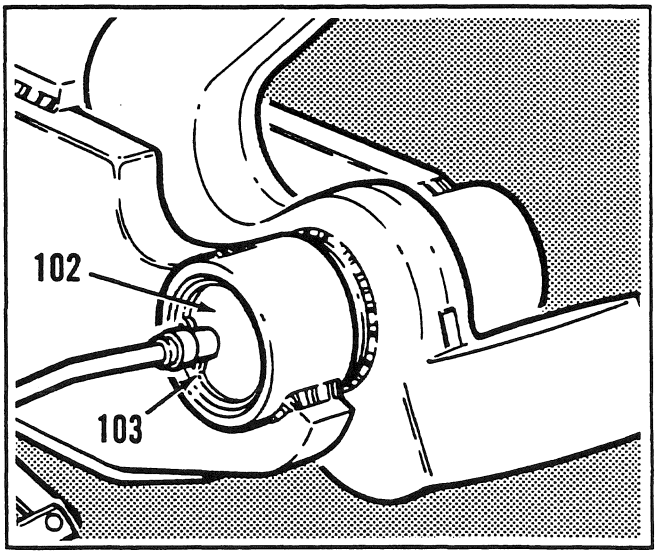


Fig. 56

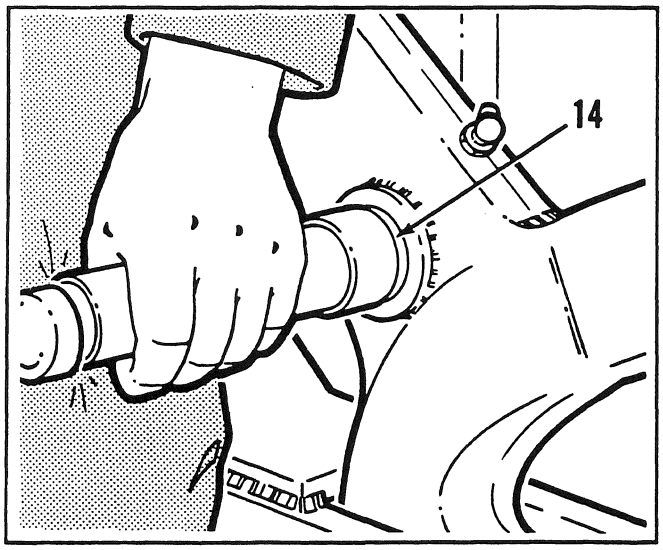


Fig. 57

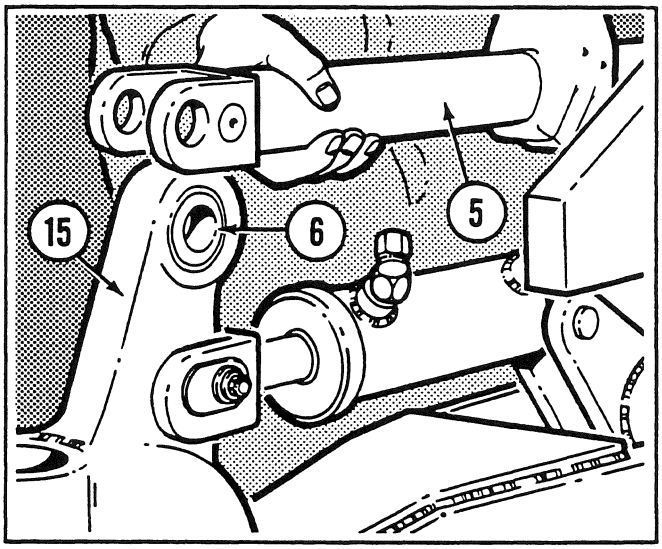
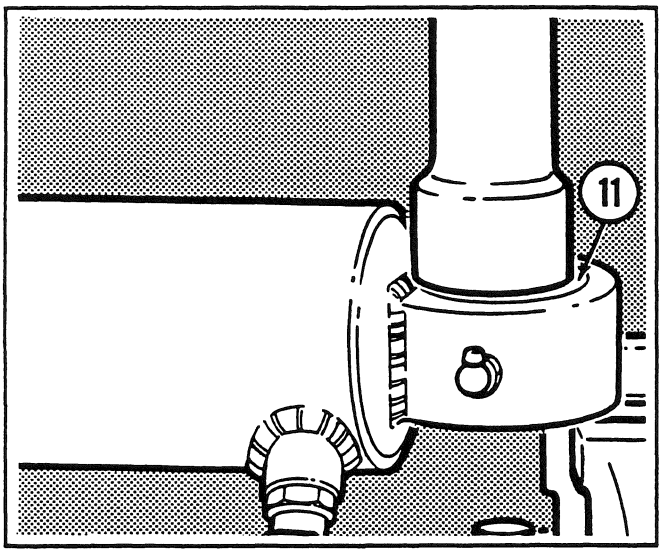


Fig. 60



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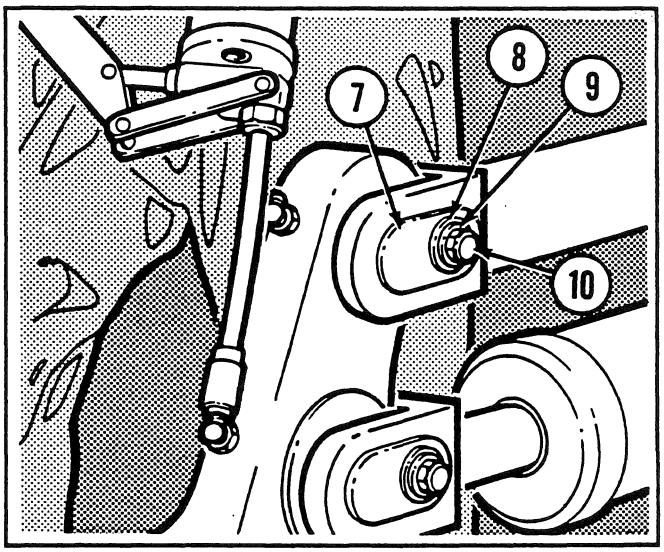


Fig. 61

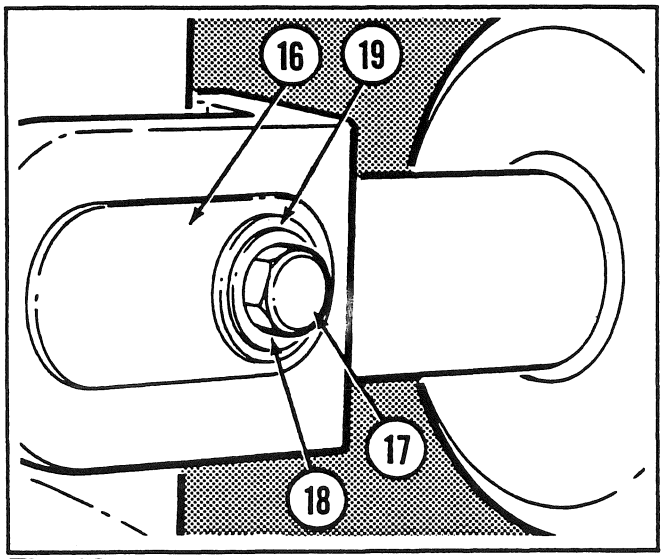


Fig. 59

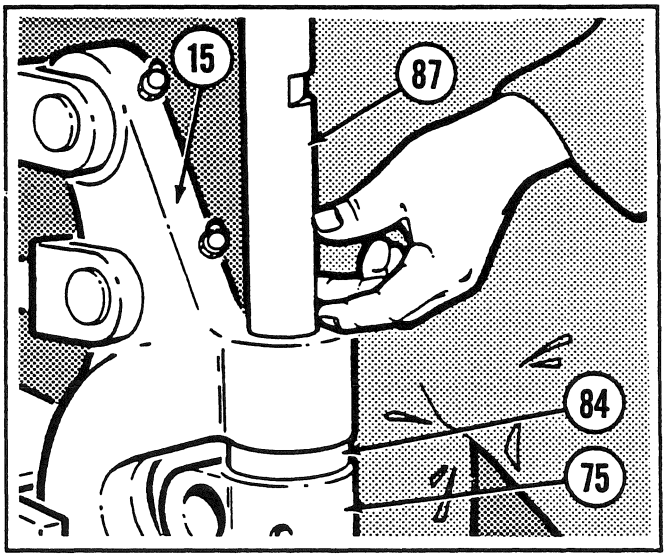


Fig. 62

Reassembly (continued)

Fig. 57
Using a hammer and an installation drift (**special tool No. 37116**), install the radial spherical bearing (14) into the leaning wheel cylinder knuckle bore.

Fig. 58
On the workbench, grease the spherical plain bearing (11) for the leaning wheel cylinder and install it with a hammer and an installation drift (**special tool No. 37116**) into the base end on the wheel cylinder.

Fig. 59
Mount the leaning wheel cylinder onto the axle frame and install the bearing pins (16), (20). Install the flatwasher (19), lockwasher (18) and tighten the capscrews (17) to retain the bearing pins.

Fig. 60
Install the spherical plain bearing (6) into the upper bore of the steering knuckle (15). Mount the tie bar (5) and install the bearing pins (7).

Fig. 61
Secure the bearing pins (7) with a flatwashers (8), lockwashers (9) and capscrews (10). Apply grease into both the tie bar and leaning wheel cylinder grease fittings.

Fig. 62
Install the spindle (75) and thrust bearing (84) into the steering knuckle (15). Remove the king pin (87) from the freezer or dry ice and install it. Make sure to align the slot on the king pin with the key pin (80) hole in the spindle.

Reassembly (continued)

Fig. 63
Retain the king pin in position by installing the key pin (80) with the flat side against the slot of the king pin (87). Tap the key pin into place and secure it with a lockwasher (76) and nut (77).

Fig. 64
Apply silicone sealant to the top pin cap (90) and bottom pin cap (81). Install and secure the caps with star washers (88) and capscrews (89). Apply grease into both pin cap grease fittings.

Fig. 65
To assemble the drag link (34), secure the left end of the drag link in a vise and slide the left hand yoke (46) onto it, install the flatwasher (44) and locknut (43). Tighten the locknut until it is snug against the yoke. Ensure that the yoke can still rotate.

NOTE

On later models the drag link is secured by a castellated hex. nut and a cotter pi

Fig. 66
Place the other end of the drag link (34) in a vise and thread the right hand yoke (32) as close to its original position as possible.

Fig. 67
To assemble the pivot blocks (54) begin by installing the angular contact bearing cups (53) using an installation drift (**special tool No. 37117**). Lubricate the contact bearing cup and cones (53) and install them. Install the O-rings (52), and the O-ring retainers (51). Make sure that the O-rings are properly seated.

Fig. 68
Now install the pivot blocks (54) with the grease fittings facing the yokes and secure them with the adjusting pins (40), (47) and jam nuts (39), (48). Install the jam nuts loosely.

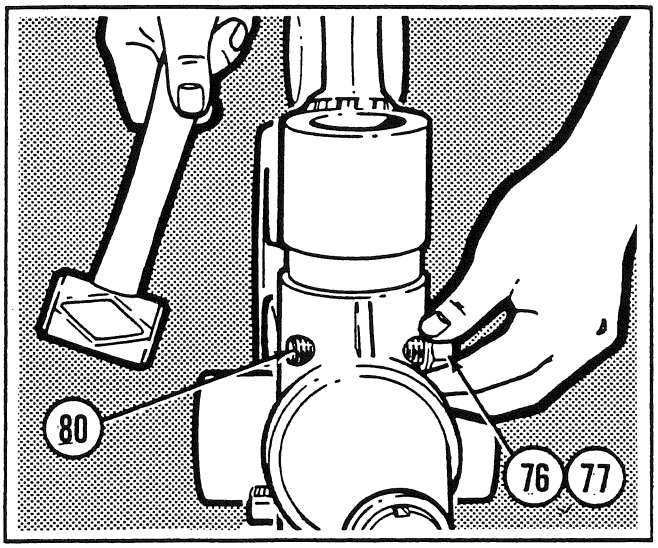


Fig. 63

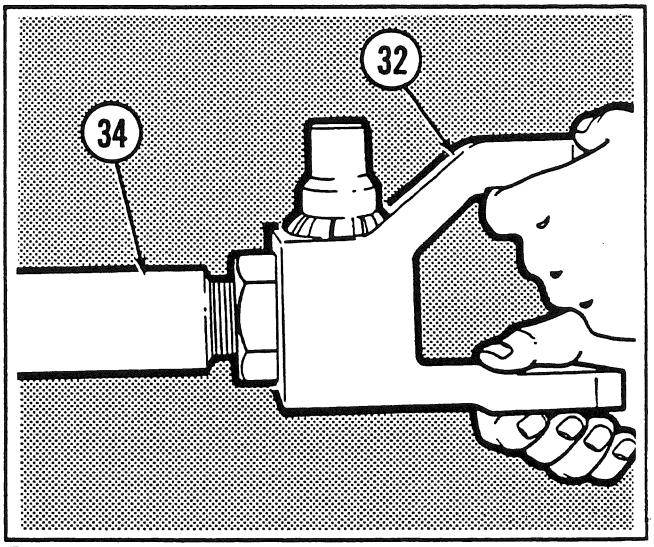


Fig. 66

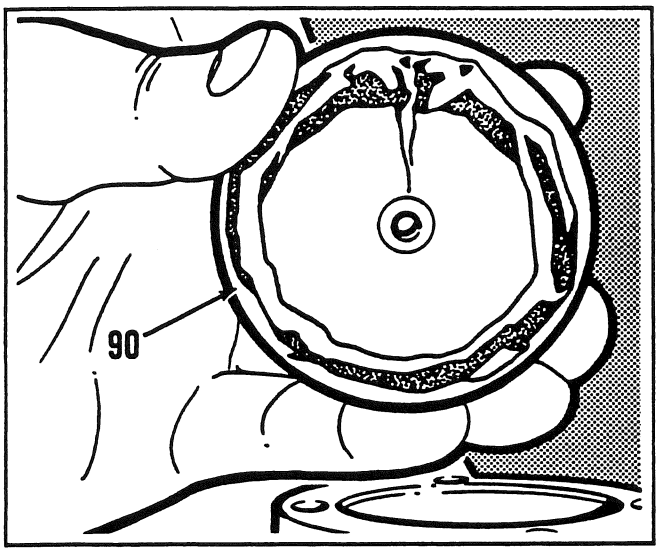
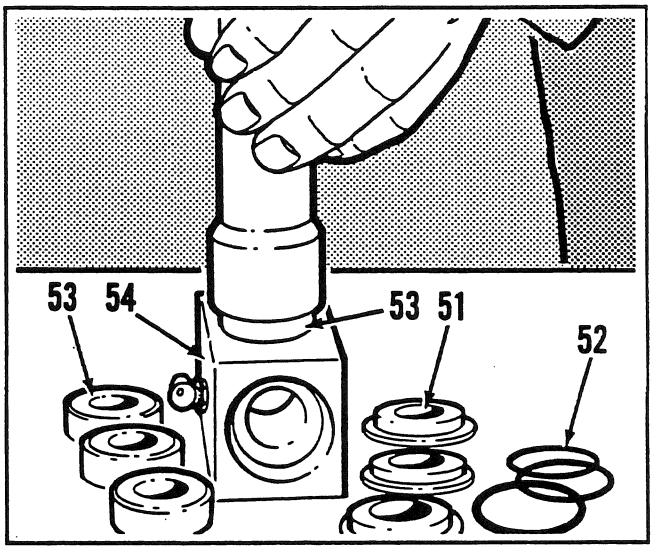


Fig. 64



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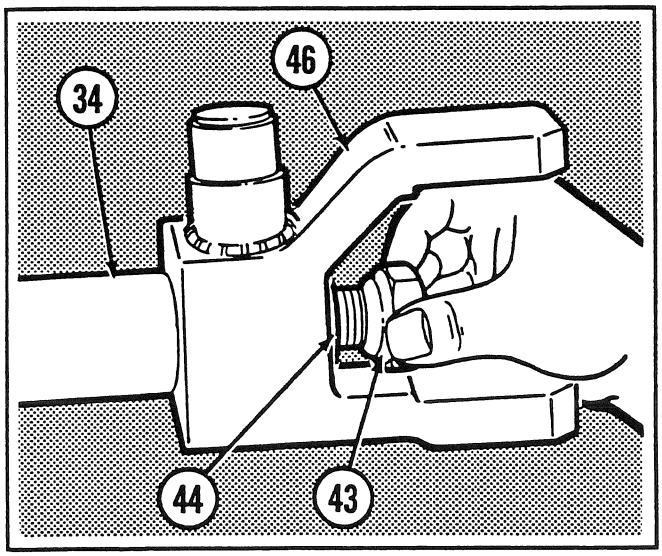

Fig. 65

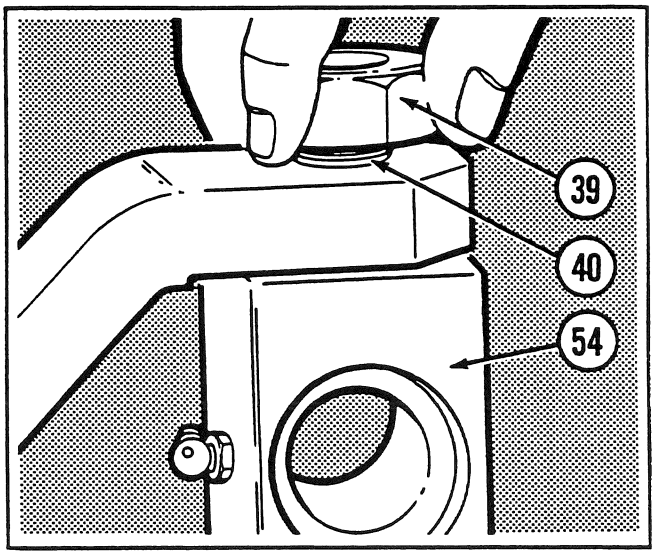

Fig. 68

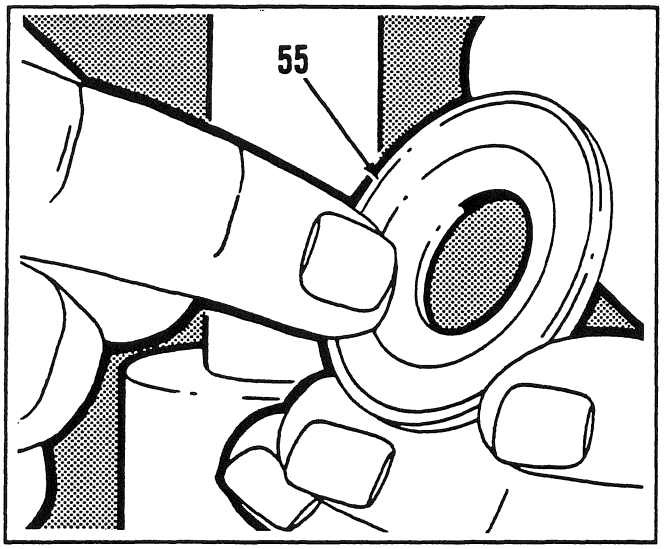

Fig. 69

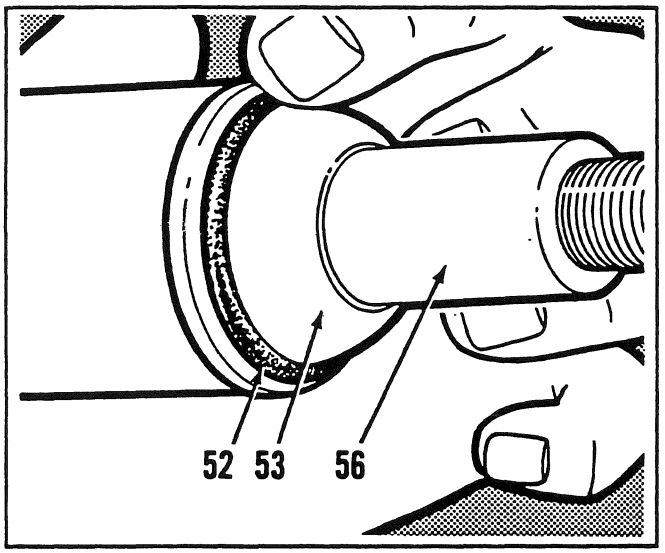

Fig. 70

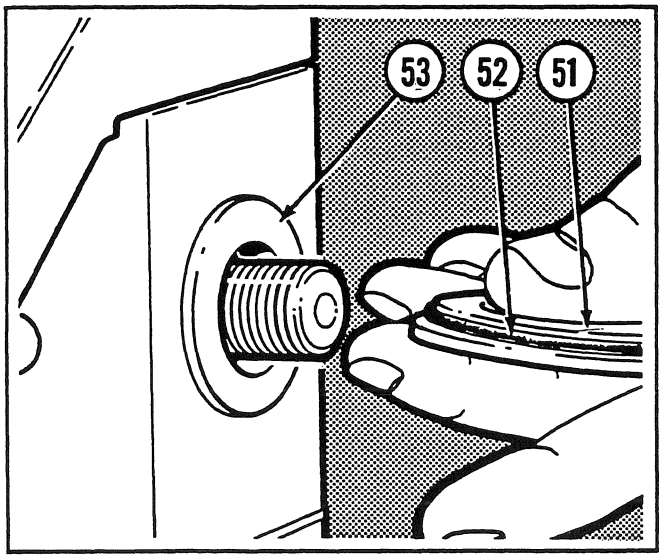

Fig. 71

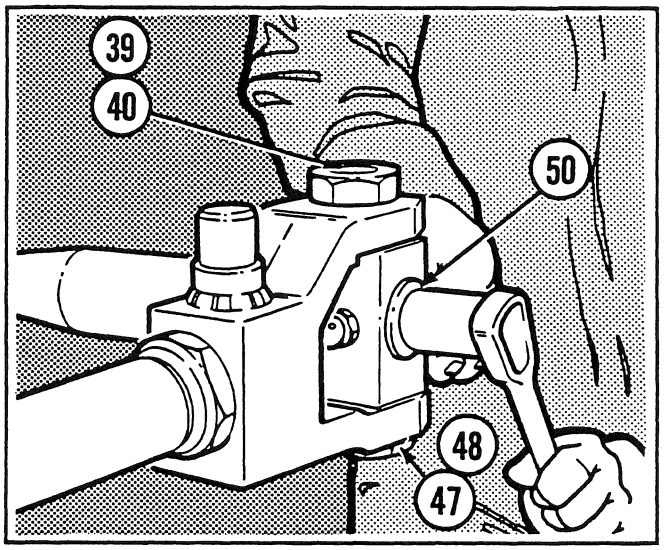

Fig. 72

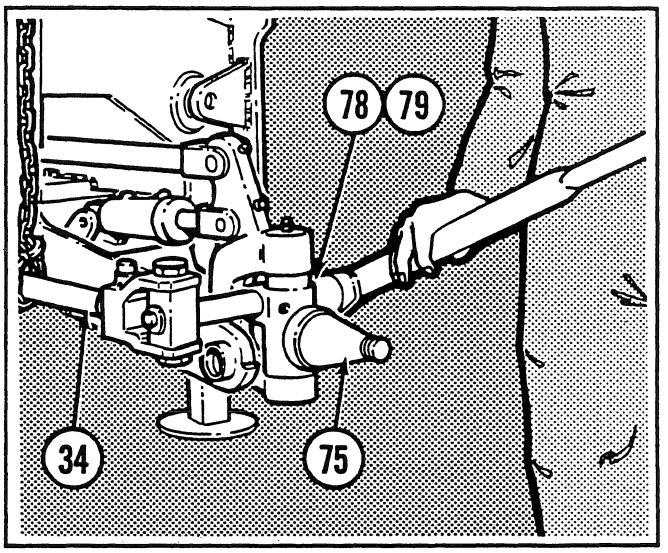

Fig. 73

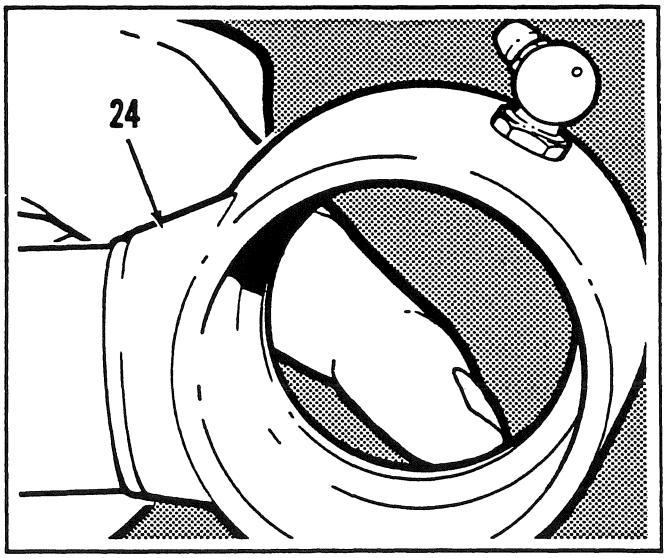

Fig. 74

Reassembly (continued)

Fig. 69
Secure the radius arm vertically in a vise and install the bearing retainer (55) ensuring that the beveled surface is facing downwards

Fig. 70
Use a hammer and an installation drift (**special tool No. 37117**), install the bearing cone (53). Lubricate and install a new O-ring (52) and insert the radius arm (56) into the pivot block and drag link assembly with the pivot studs on the yoke facing upwards.

Fig. 71
Install the bearing cone (53), O-ring (52) and the O-ring retainer (51). Make sure that the O-ring is seated before installing the washer (49) and **new** locknut (50).

Fig. 72
Slightly tighten the adjustment pins (40), (47) and the radius arm locknut (50), this compresses the pivot block bearings. Ensure that the top and bottom of the pivot blocks are equally spaced between the inner faces of the yokes. Lubricate the pivot block bearings with grease recommended in the Lubrication Specifications at the front of this Shop Manual. **Make sure you see grease seeping out of the O-rings.** If necessary, tighten or loosen the adjustment pins (40), (47) and the locknut (50) until you achieve the proper adjustment. Holding the adjustment pins with a screwdriver, tighten the jam nuts (39), (48).

Fig. 73
Support the drag link (34) with a lifting device and install each radius arm into the bore on the spindles (75). Install the lockwasher (79) and tighten the nut (78).

Fig. 74
When installing the radial spherical plain bearing into the rod end of the steering cylinder (24), note the lip in the bottom of the bore permits installation of the spherical plain bearing (30), (38) from the top only.

Reassembly (continued)

Fig. 75
Install the spherical plain bearings (30), (38) into the steering cylinder (24) using an installation drift (**special tool No. 37116**). Mount the steering cylinder (24) onto the axle frame (21) and force the radial bearing down onto the pivot stud.

Fig. 76
Install the external snap ring (36), followed by the internal snap ring (37).

Fig. 77
Install a new expansion plug (35) using a hammer and a drift. Secure the expansion blugs by indenting the center of the plug. Make sure all expansion plugs have a central vent hole.

Fig. 78
At the base end of the steering cylinder (24) use a jack and drift to press the pivot pin up into the anchor lugs. With a hammer and drift, force the roll pin (26) into the pivot pin (25) to secure it.

Fig. 79
Install the inner (71) and outer (67) bearing cups into the wheel and apply a generous amount of grease in the bore.

Fig. 80
Install a new V-ring seal (74) and back-up ring (73) on the spindle (75) with the back-up ring in the groove of the V-ring. Apply grease to the spindle and pack the inner bearing cone (72) with grease and install it on the spindle.

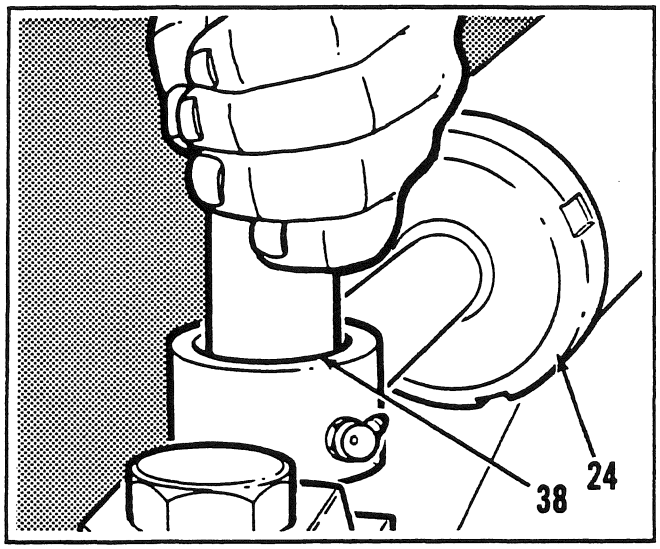

Fig. 75

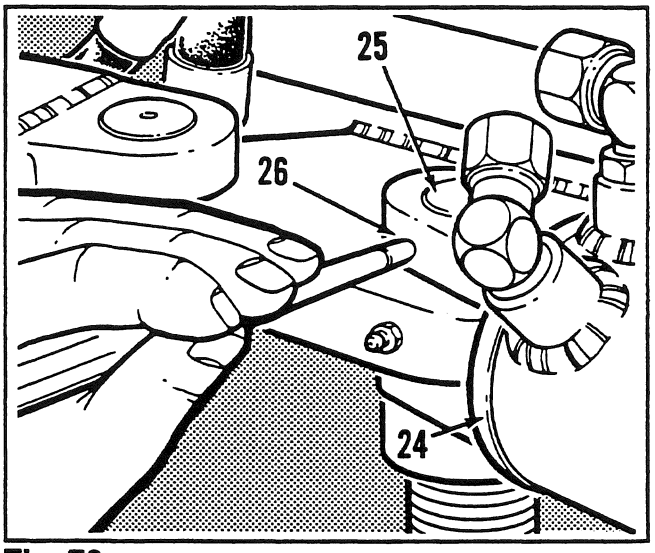

Fig. 78

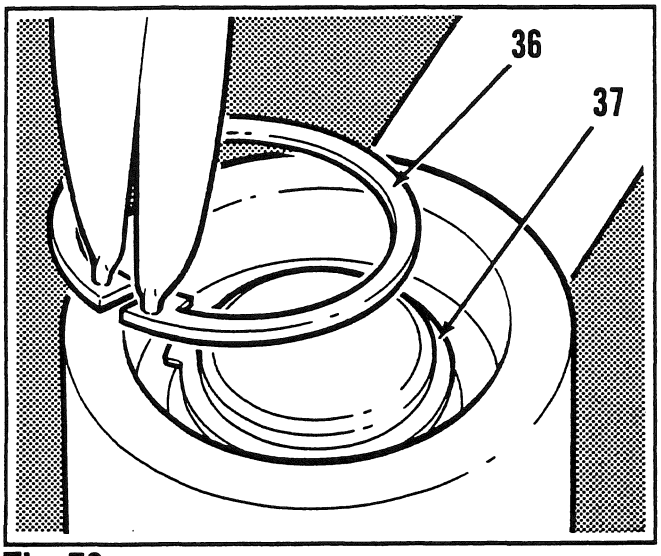

Fig. 76

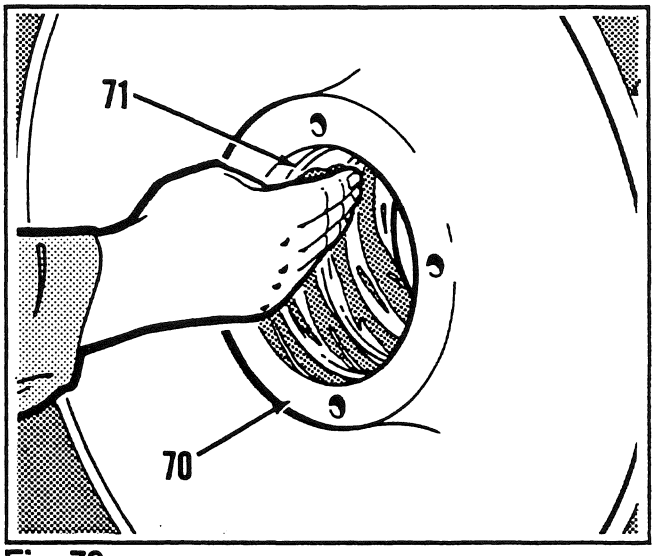

Fig. 79

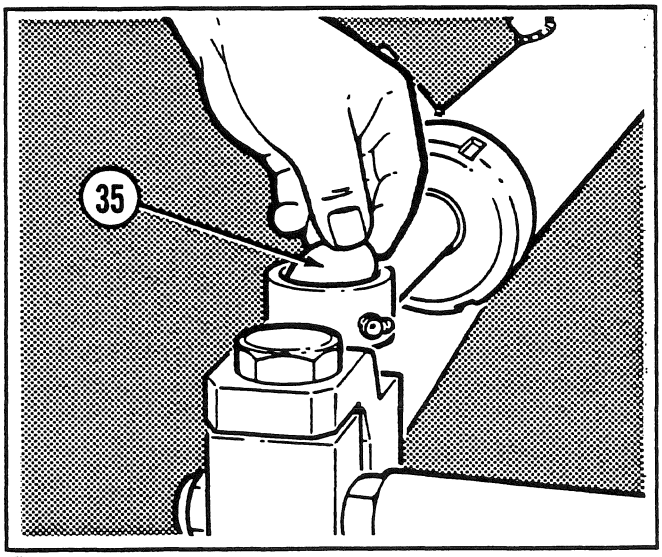

Fig. 77

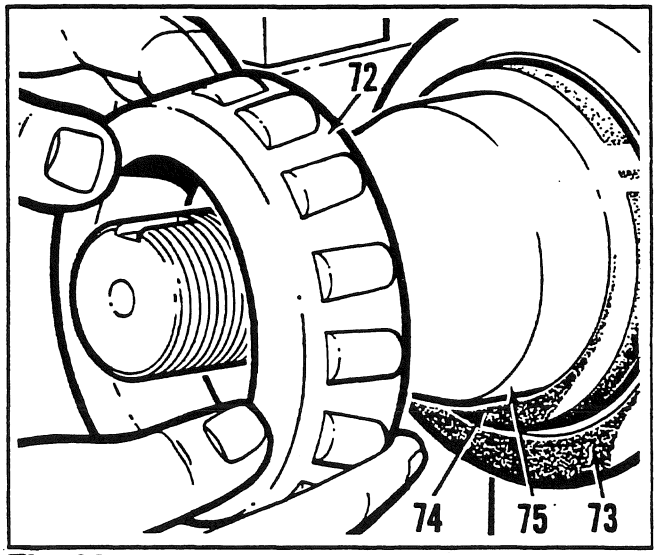

Fig. 80

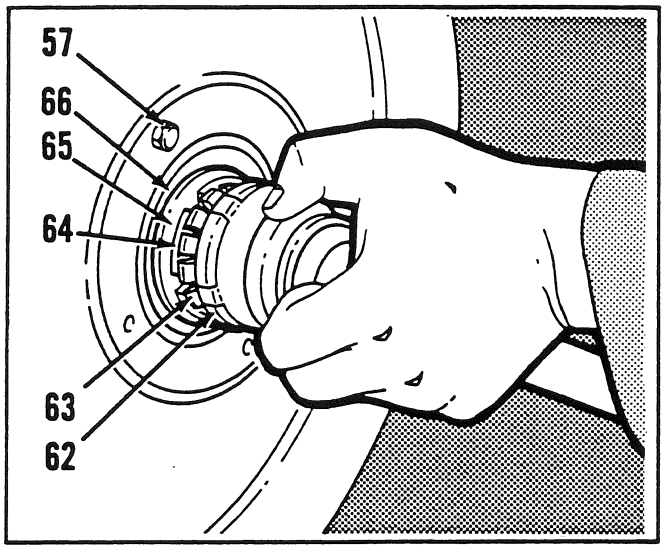

Fig. 81

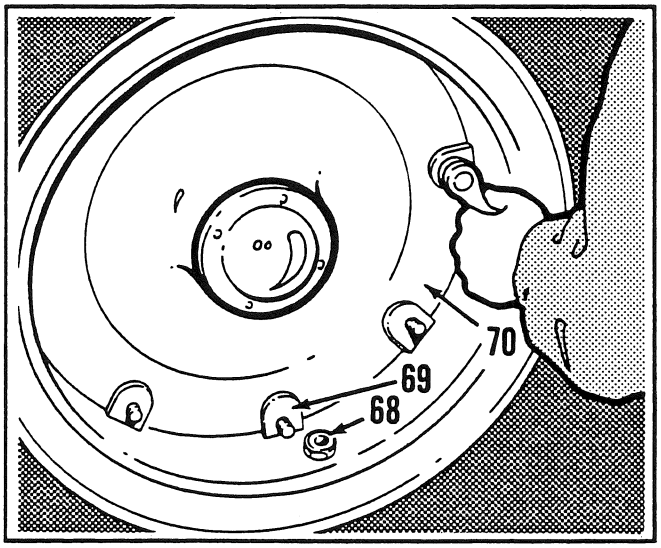

Fig. 84

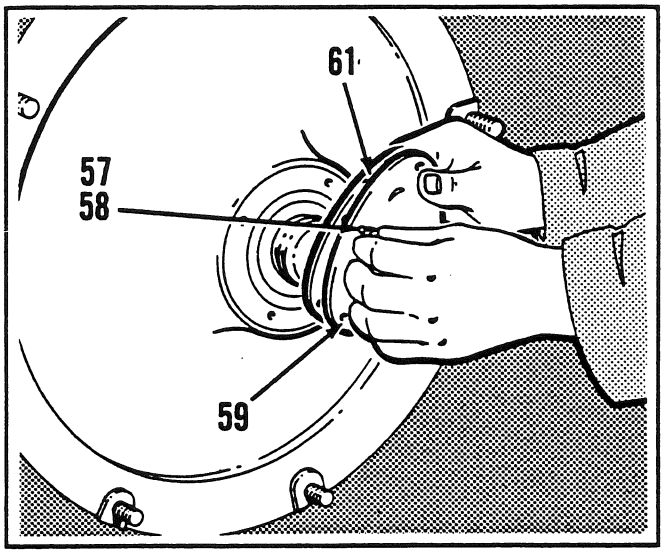

Fig. 82

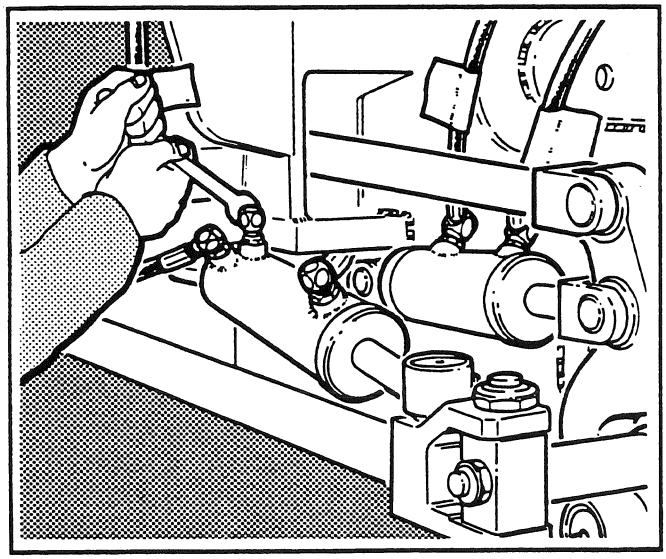
Fig. 83

Reassembly (continued)

Fig. 81
Attach a safe lifting device to the wheel (70) and slide it on to the spindle (75). Pack the outer bearing cone (66) with grease and install it on the spindle. Install the bearing washer (65) and the inner wheel nut (64). Set wheel preload by installing one of the hubcab screws (57) with a torque wrench. Tighten the wheel nut until 1 to 2 kgf.m (8 to 12 lbf-ft.) are needed to turn the wheel with the torque wrench. Install the lockwasher (63) and the outer wheel nut (62) using a socket wrench (**special tool No. 18516**) tighten it to the recommended torque. Bend the tabs so they fit into the slots on both wheel nuts.

NOTE

ALWAYS install the wheel nuts (62), (64) with the chamfer facing outwards from the wheel.

Fig. 82
Install the hubcap (59), the lockwashers (58) and the capscrews (57) with a new hubcap gasket (61).

Fig. 83
Reconnect the hydraulic hoses to all the cylinders and grease all fittings.

NOTE

DO NOT over-lubricate the wheel bearing cones. Excess grease can rupture the hub cap gasket.

Fig. 84
Before installing the rims and tires, tighten all the nuts and capscrews on the axle to the recommended torques.

Maneuver the tire and rim onto the wheel and place the rim clamps on the wheel studs and retain them with nuts. Tighten the nuts to the specified torque, in a diagonal sequence. Repeat these procedures for the other wheel.

Do another preload check on the wheels by rotating them. The wheels should rotate one and one half turns before stopping.

To check the preload of the axle pivot pin, stand on one of the front wheel rims and hold onto the tire. The weight of an average man 82,0 kg (180 lbs.) should pivot the axle.

To start the grader, turn the isolation switch to the "ON" position. Start the engine. Lower the moldboard to raise the front end of the machine, remove the supports. Raise the moldboard to lower the front of the machine onto its wheels.