

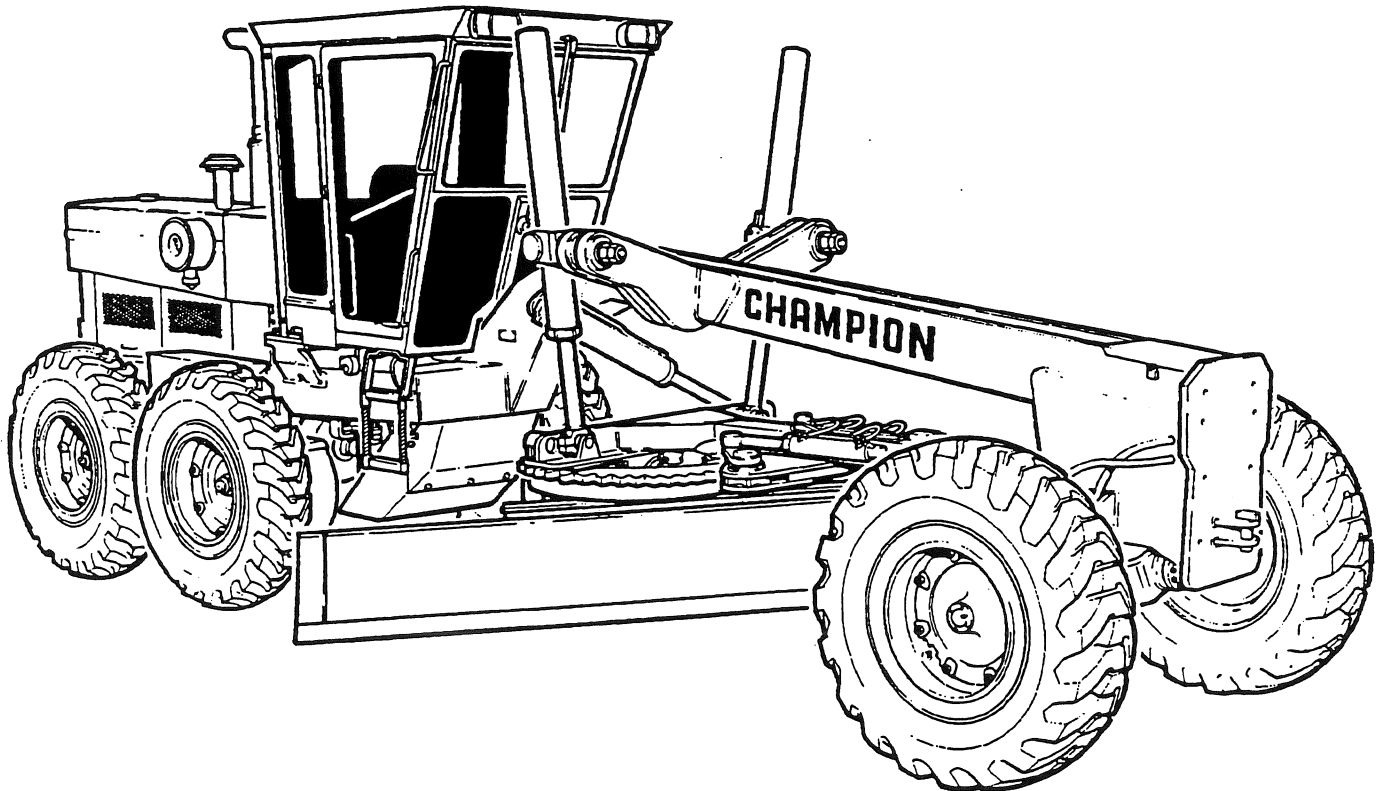
# SECTION 1

## FRONT AXLE

### TABLE OF CONTENTS

### PAGE

Table of Contents - Models 710 through 760A .....	iii
Table of Contents - Models 780/780A .....	37



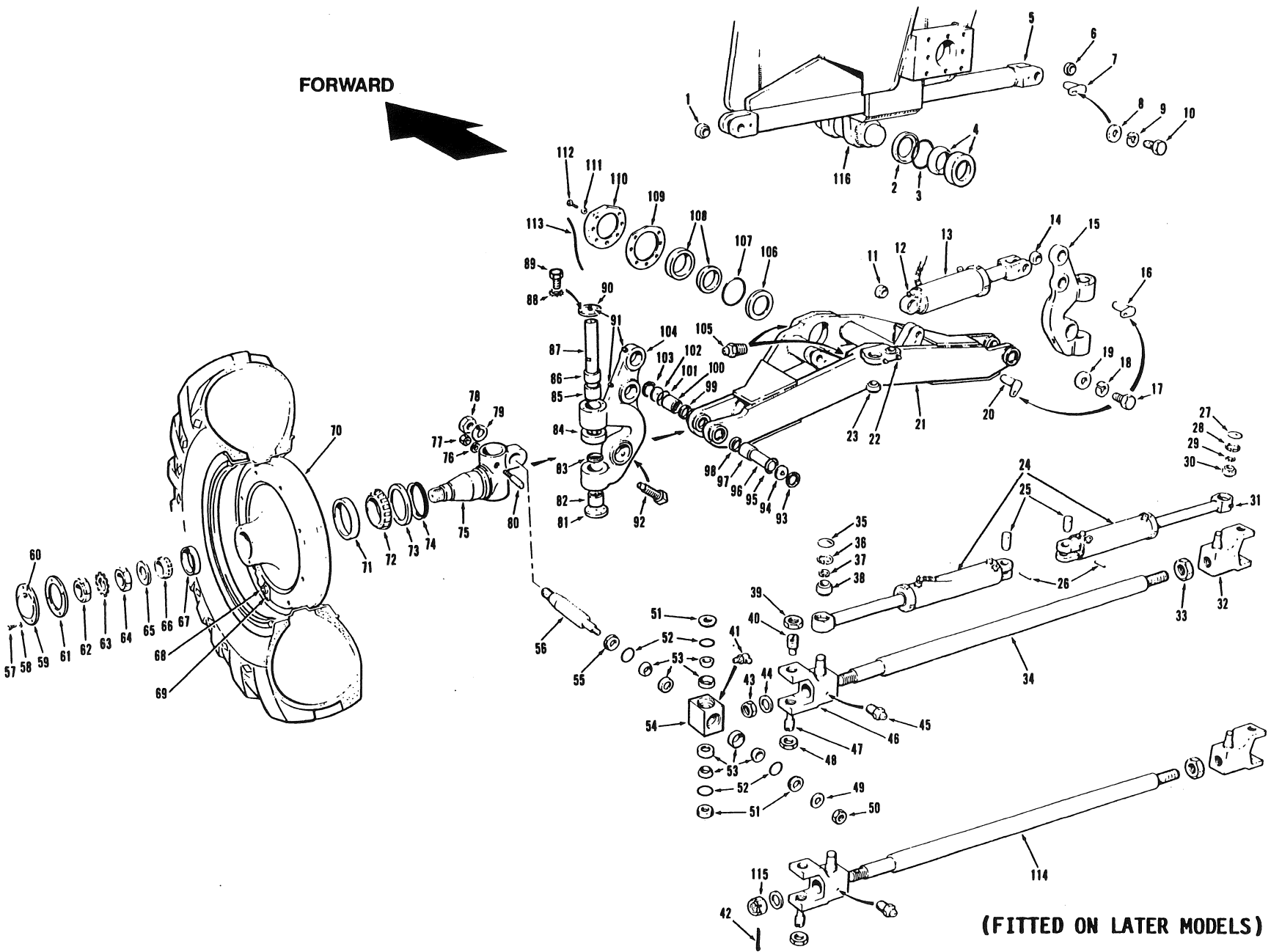


Fig. 1

**700 SERIES SHOP MANUAL  
FRONT AXLE**

<b>Item</b>	<b>Description</b>	<b>Item</b>	<b>Description</b>	<b>Item</b>	<b>Description</b>
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**

700 SERIES SHOP MANUAL  
FRONT AXLE

TABLE OF CONTENTS	PAGE
General .....	1
<b>Think Safety First!</b> and Service Position Warnings .....	1
Description and Operation .....	2
Cleaning and Inspection .....	3
Cleaning-General .....	3
-Bearings .....	3
Inspection-General .....	3
-Bearings .....	3
-Oil Seals, O Rings and Snap Rings .....	4
Torque Guide .....	5
Special Tools .....	5
Trouble Shooting .....	6
Front Axle - Disassembly .....	8
Front Axle - Reassembly .....	20
Toe-in Adjustment .....	36

700 SERIES SHOP MANUAL  
FRONT AXLE

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.

700 SERIES SHOP MANUAL  
FRONT AXLE

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 per-

pendicular 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.

700 SERIES SHOP MANUAL  
FRONT AXLE

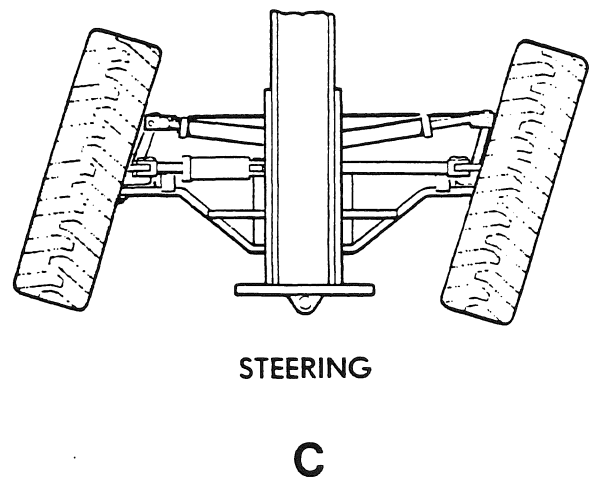
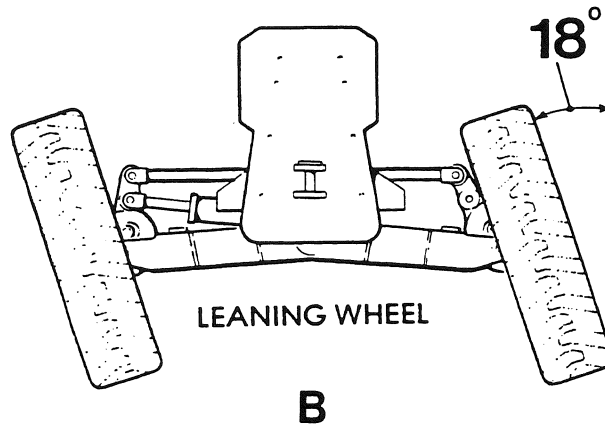
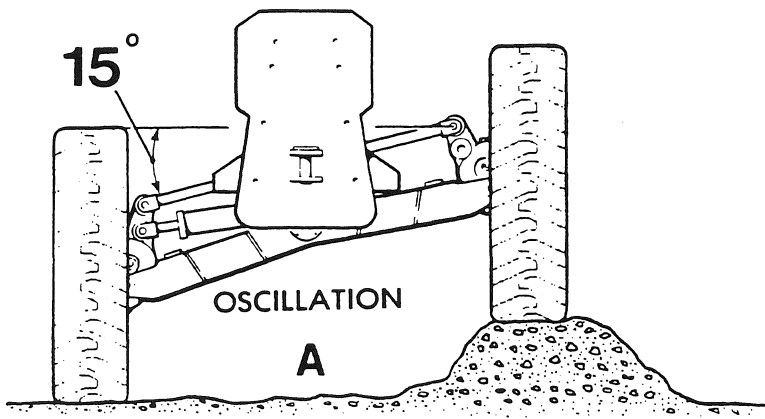


Fig. 2

700 SERIES SHOP MANUAL  
FRONT AXLE

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.



**700 SERIES SHOP MANUAL  
FRONT AXLE**

**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**

<b>Application</b>	<b>Torque Value</b>		
	<b>N.m</b>	<b>kgf.m</b>	<b>lbf.ft</b>
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.

<b>Part Number</b>	<b>Description</b>
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

700 SERIES SHOP MANUAL  
FRONT AXLE

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.

700 SERIES SHOP MANUAL  
FRONT AXLE

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 hydraulic 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.

700 SERIES SHOP MANUAL  
FRONT AXLE

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.

700 SERIES SHOP MANUAL  
FRONT AXLE

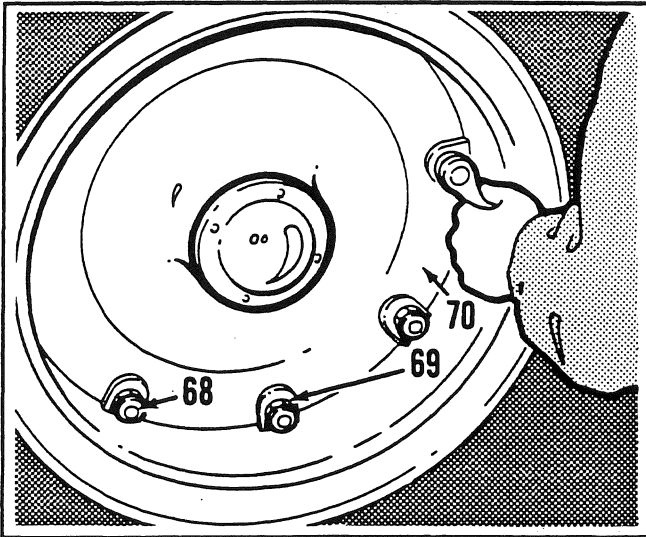


Fig. 3

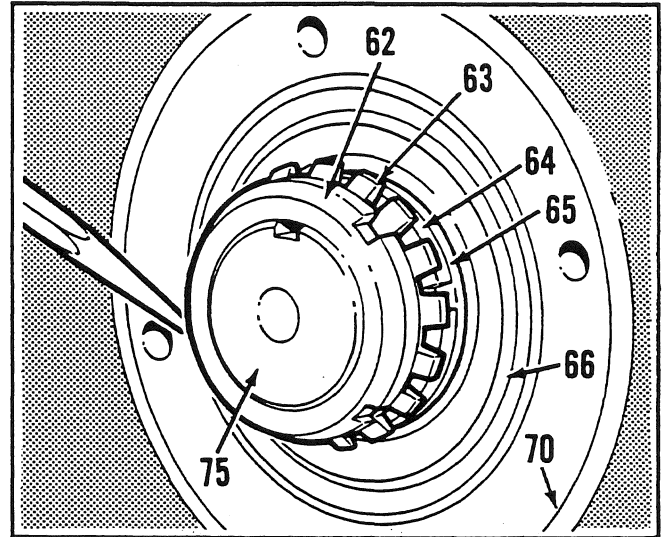


Fig. 6

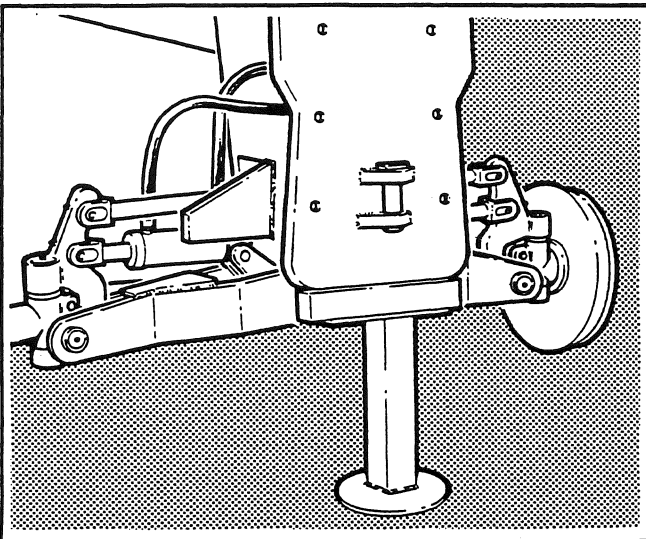


Fig. 4

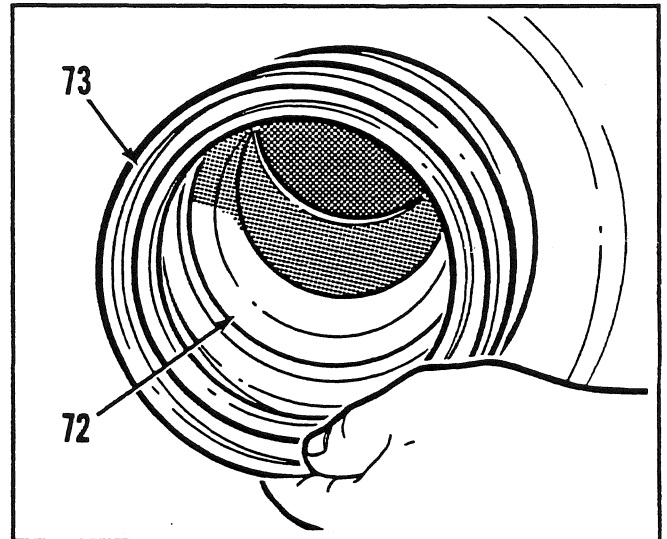


Fig. 7

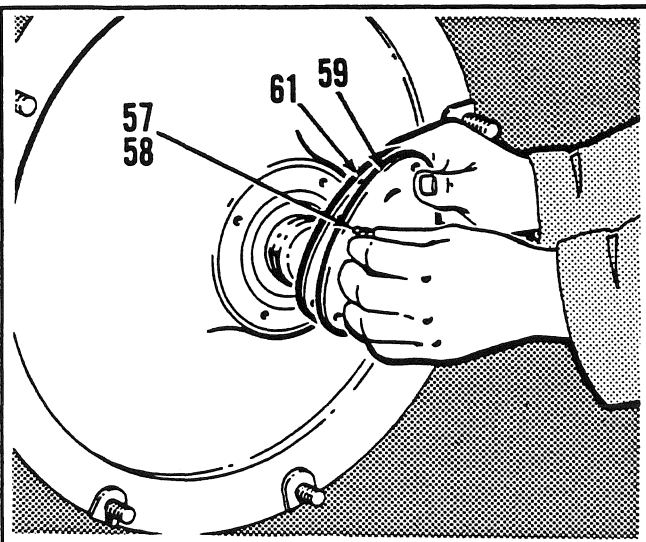


Fig. 5

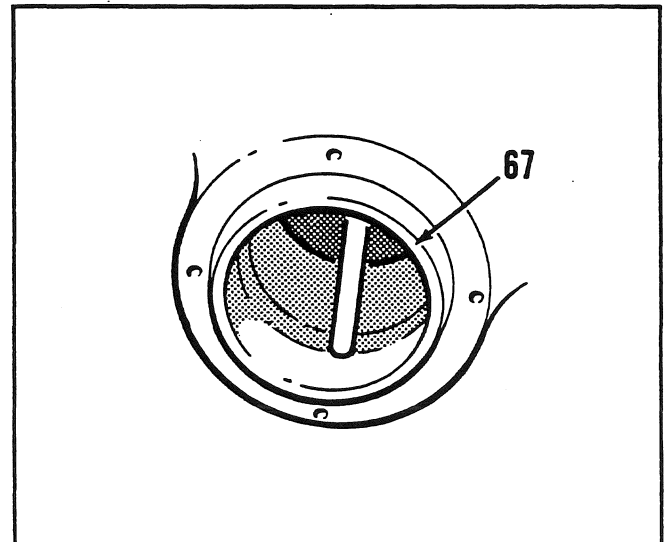


Fig. 8

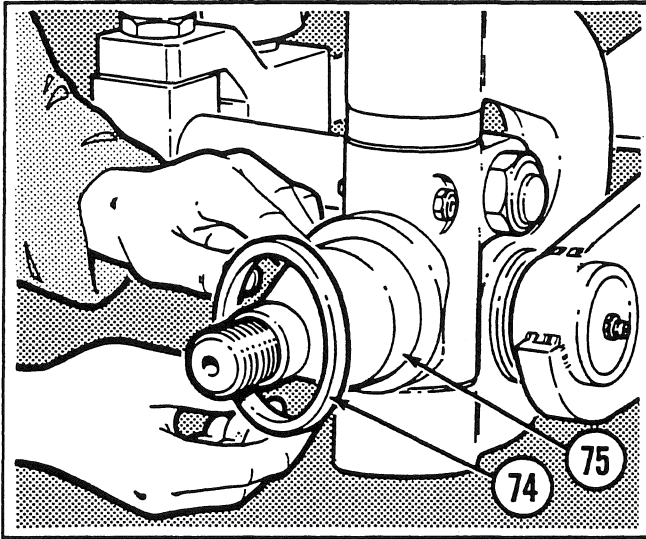


Fig. 9

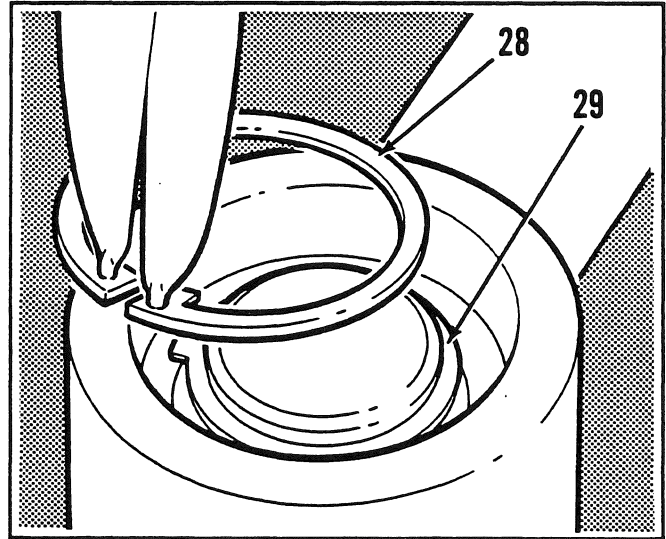


Fig. 12

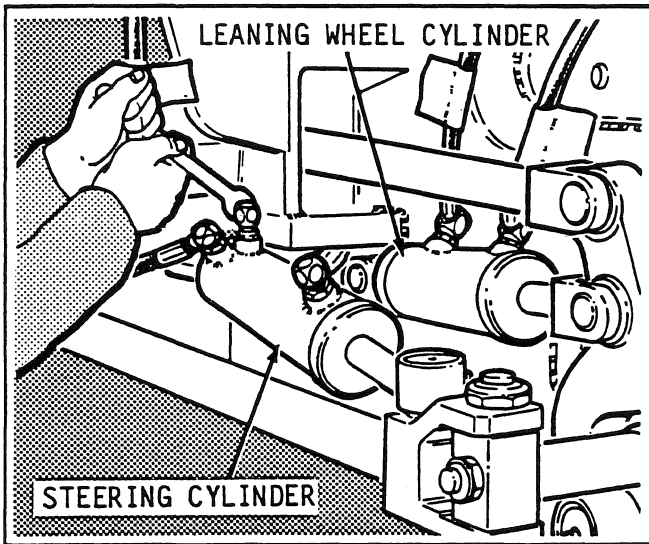


Fig. 10

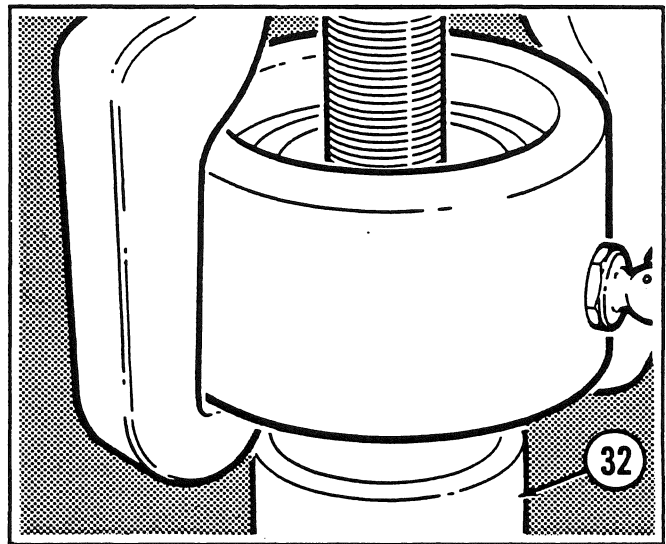


Fig. 13

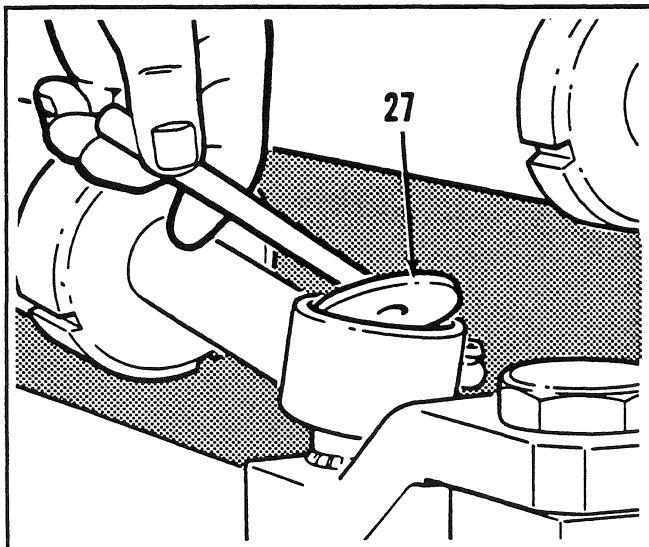


Fig. 11  
Section 1  
Page 10

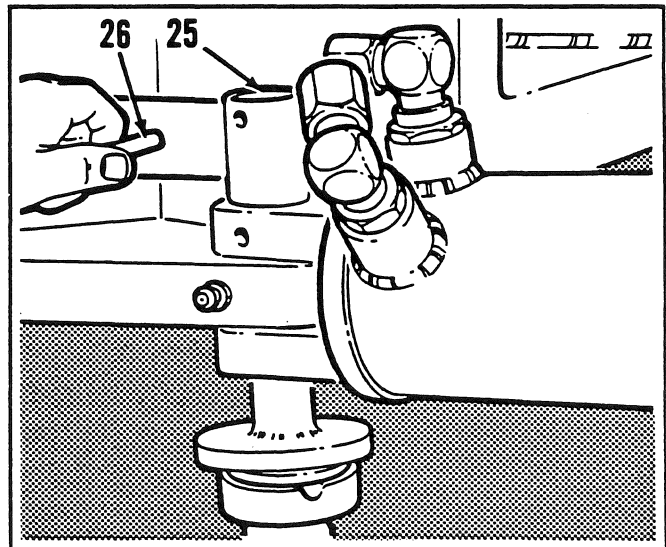


Fig. 14

700 SERIES SHOP MANUAL  
FRONT AXLE

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.

700 SERIES SHOP MANUAL  
FRONT AXLE

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.



700 SERIES SHOP MANUAL  
FRONT AXLE

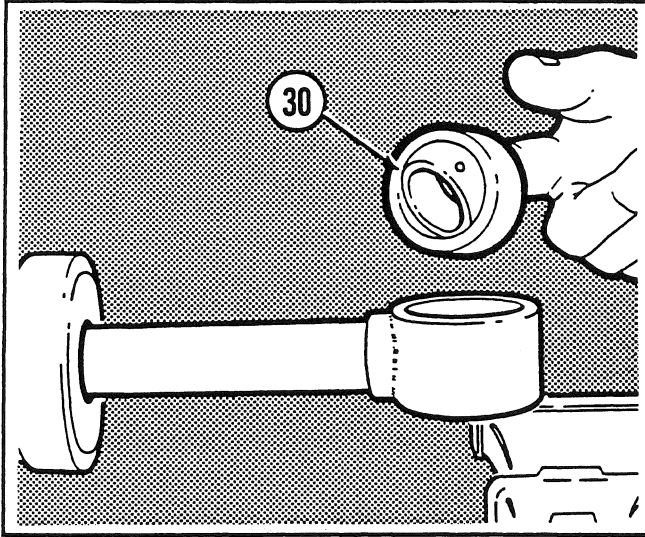


Fig. 15

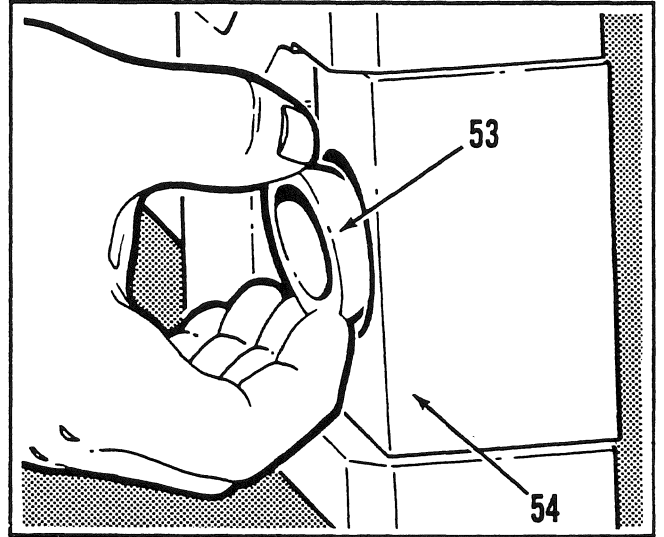


Fig. 18

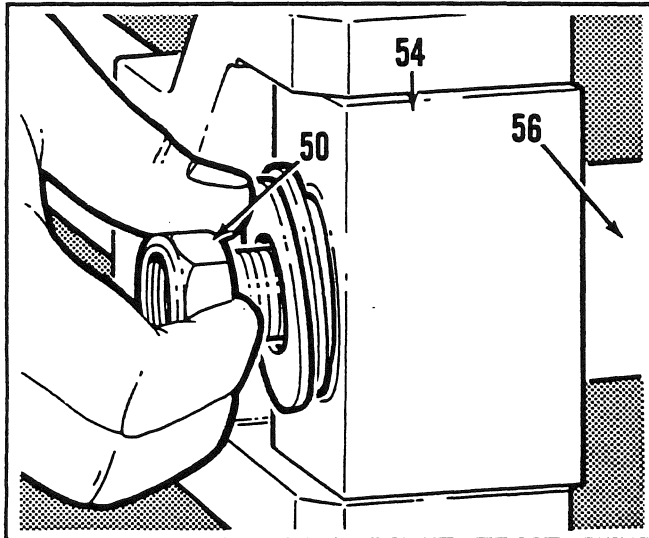


Fig. 16

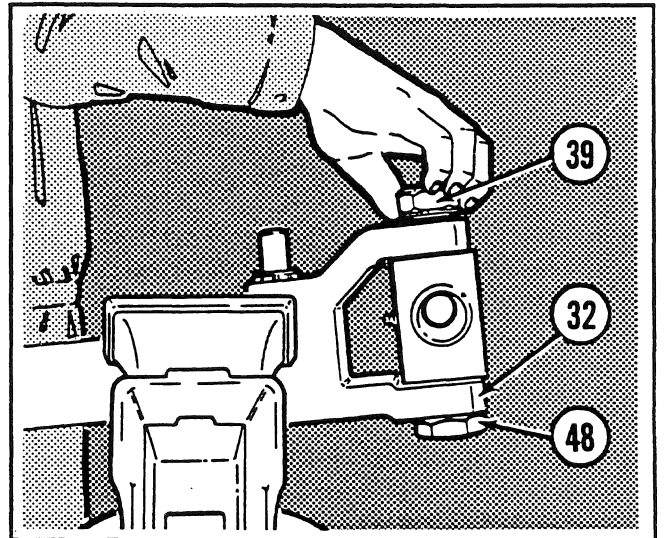


Fig. 19

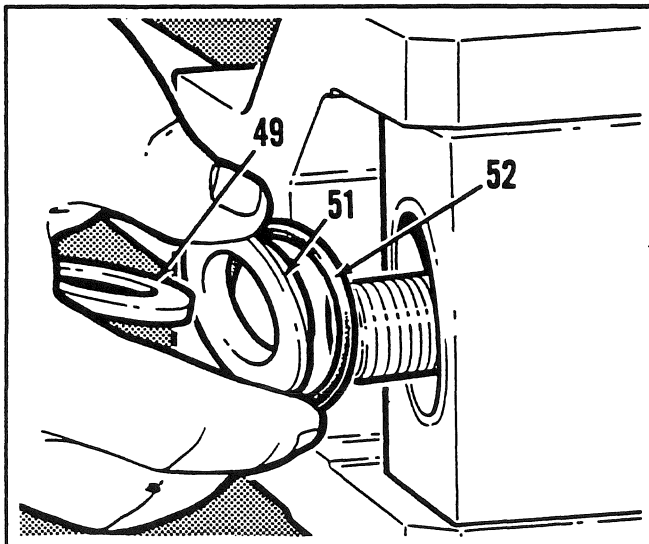


Fig. 17

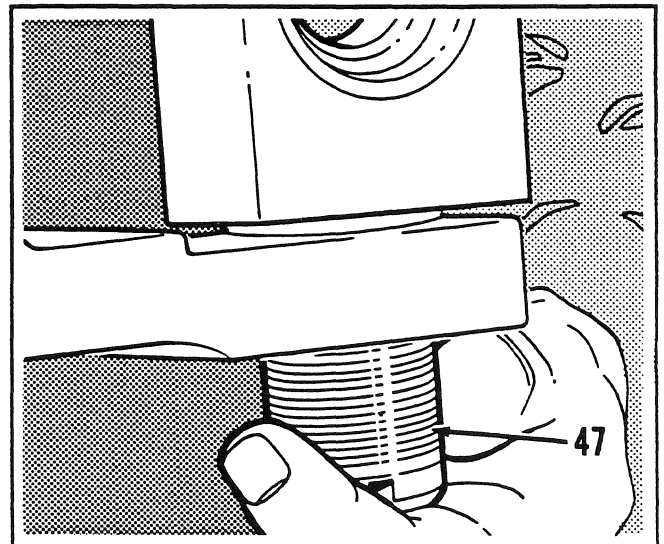


Fig. 20

700 SERIES SHOP MANUAL  
FRONT AXLE

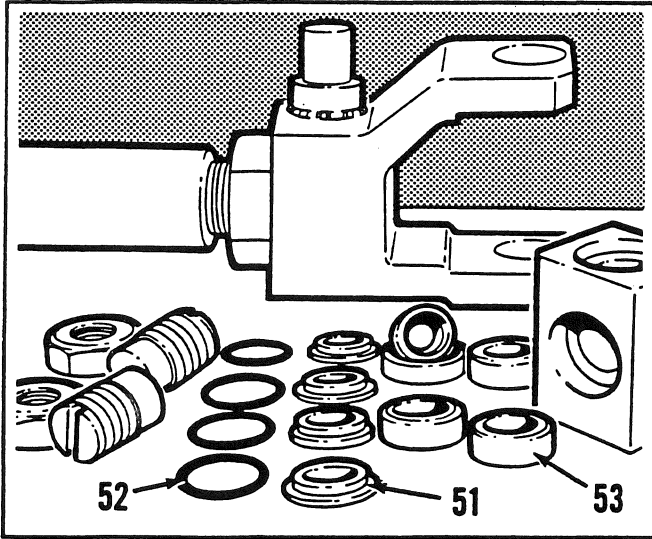


Fig. 21

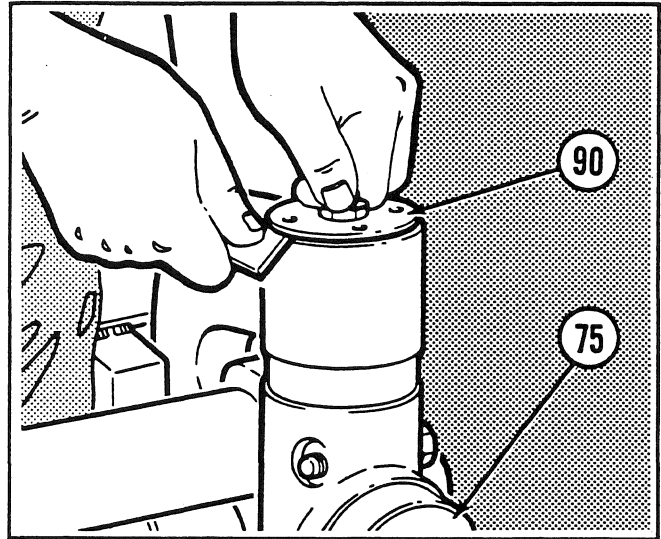


Fig. 24

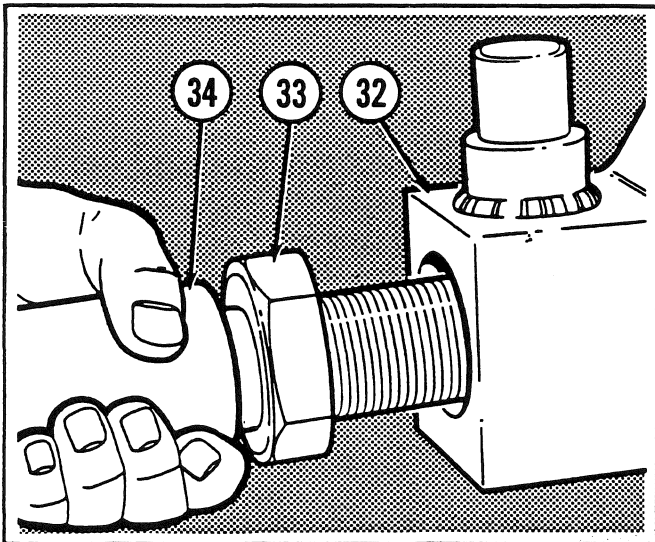


Fig. 22

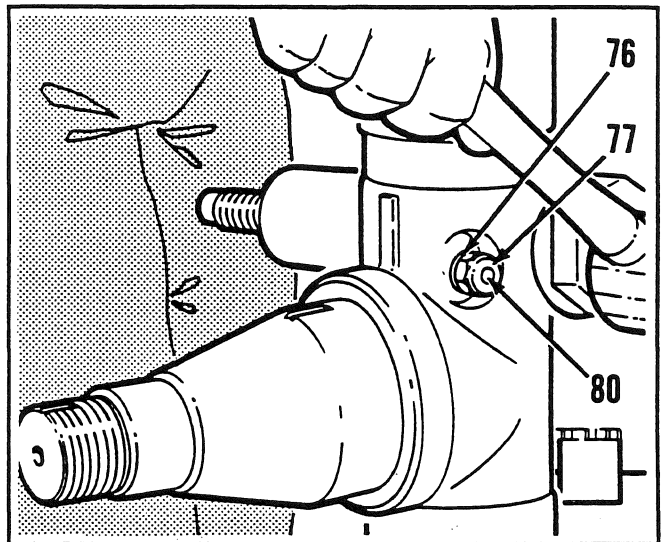


Fig. 25

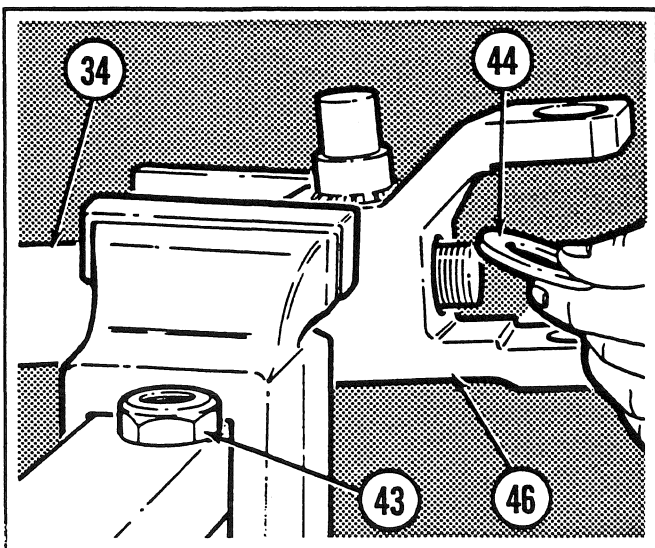


Fig. 23

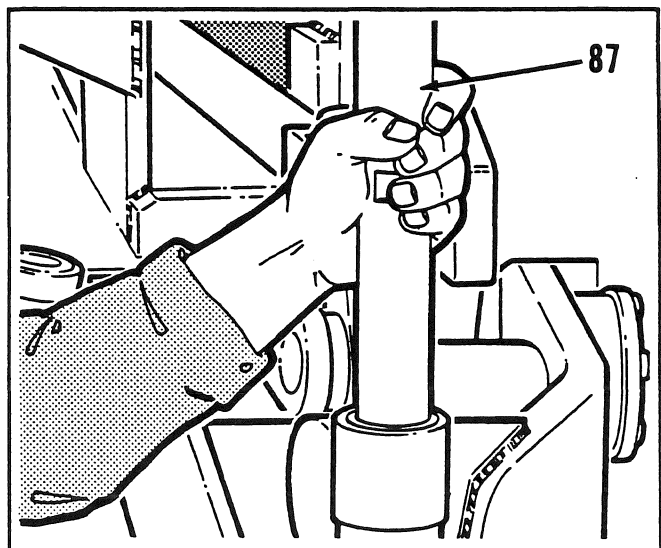


Fig. 26

**700 SERIES SHOP MANUAL**  
**FRONT AXLE**

**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 flat-washer (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.

700 SERIES SHOP MANUAL  
FRONT AXLE

**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).

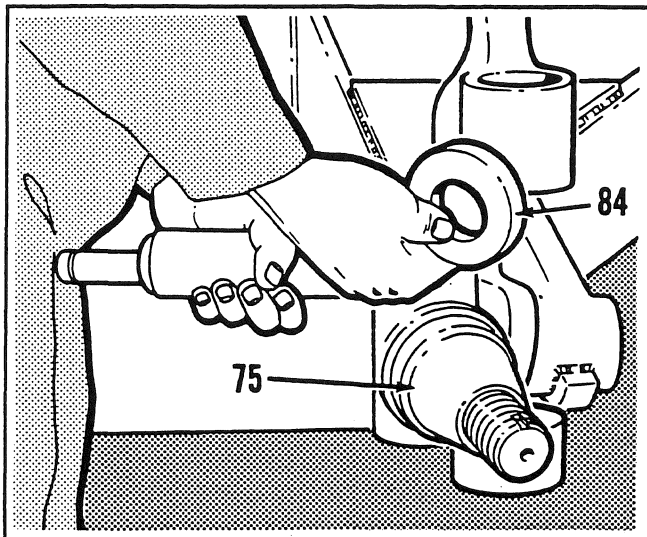


Fig. 27

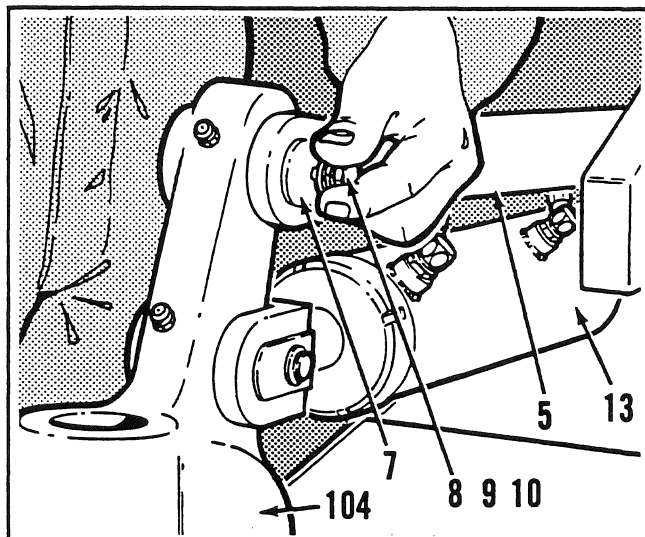


Fig. 30

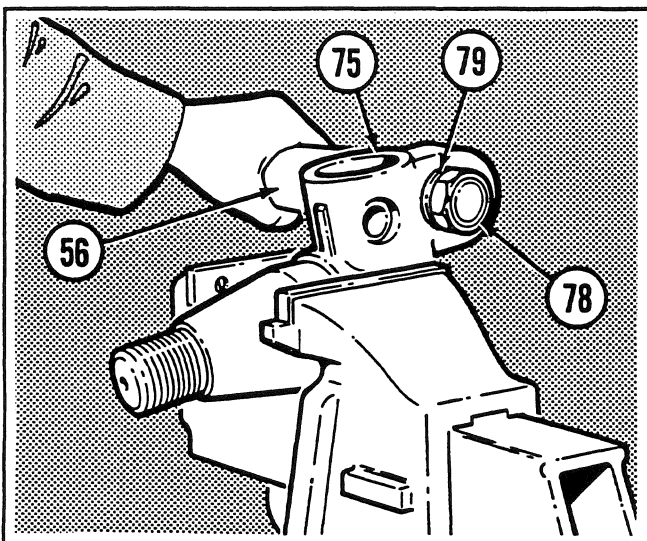


Fig. 28

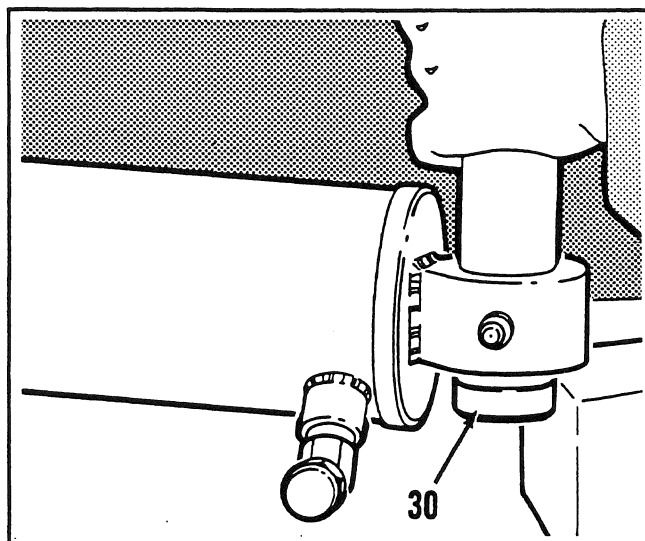


Fig. 31

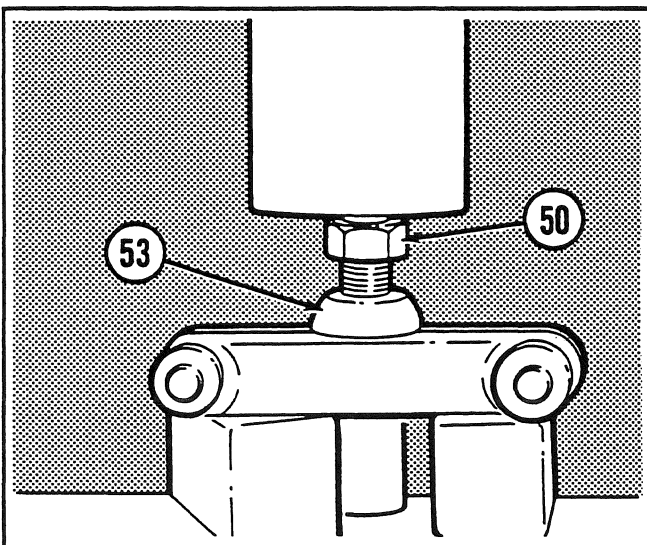


Fig. 29

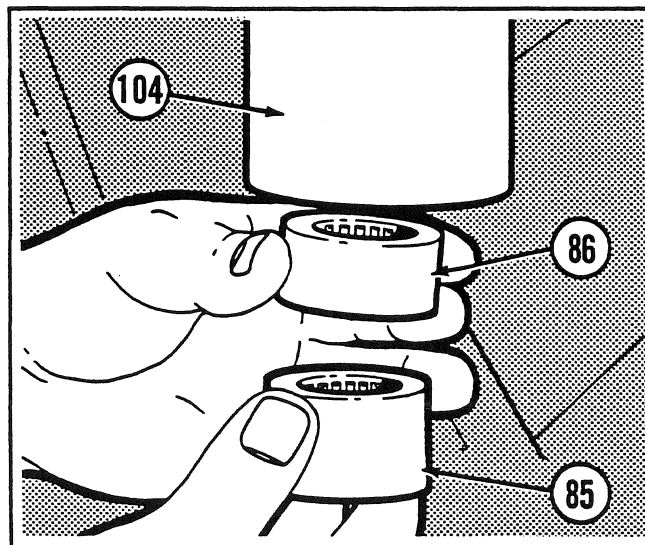


Fig. 32

700 SERIES SHOP MANUAL  
FRONT AXLE

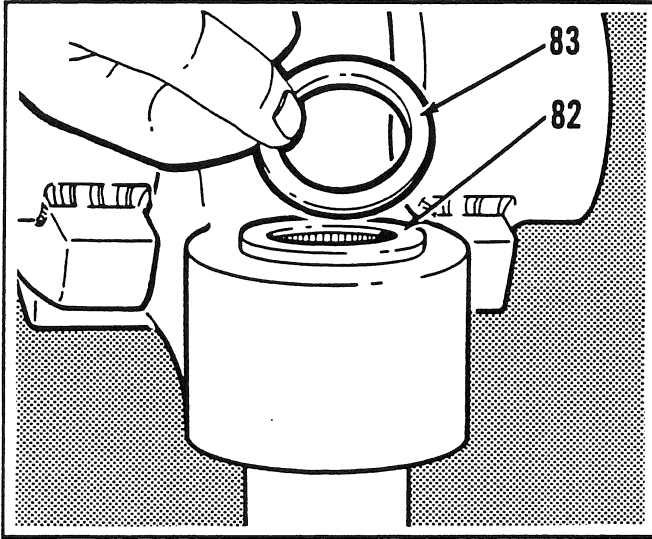


Fig. 33

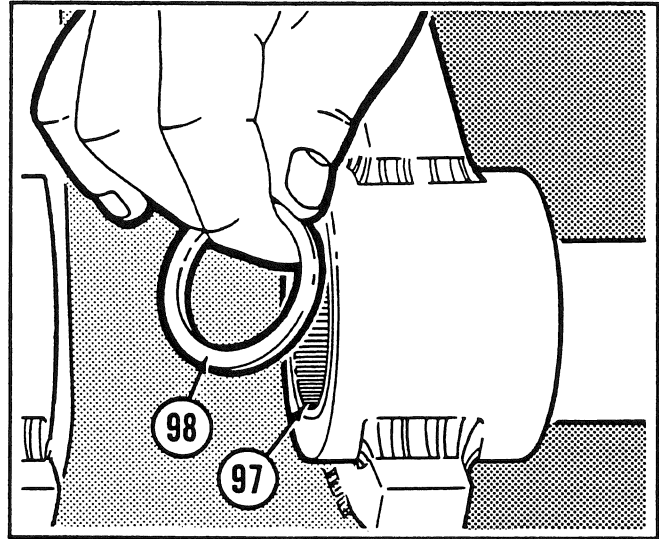


Fig. 36

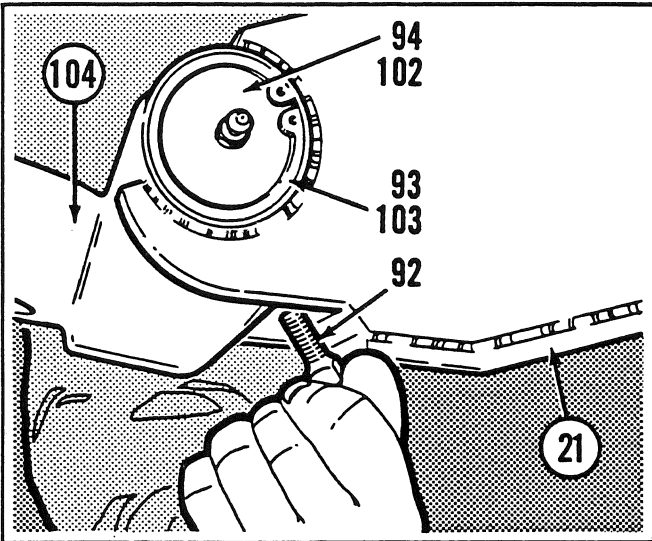


Fig. 34

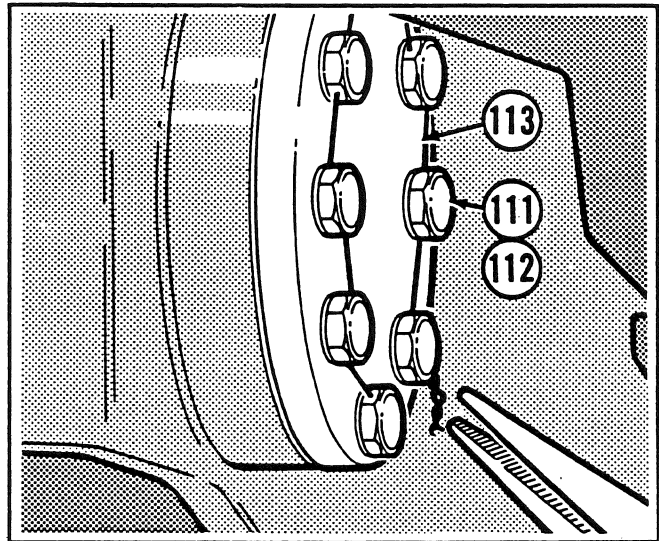


Fig. 37

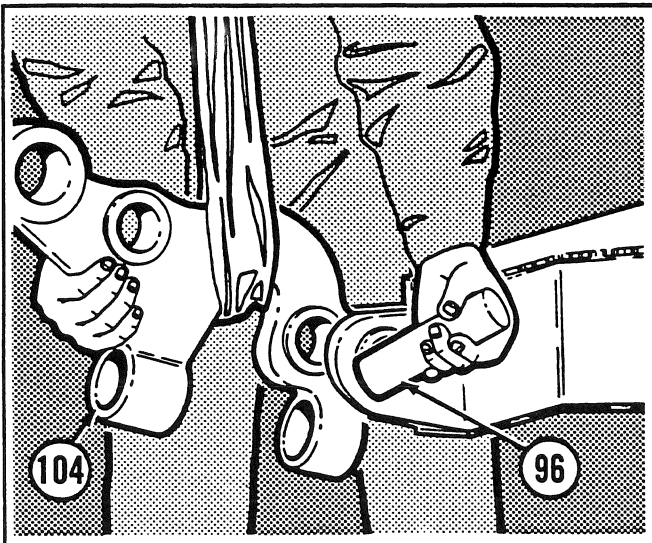


Fig. 35  
Section 1  
Page 18

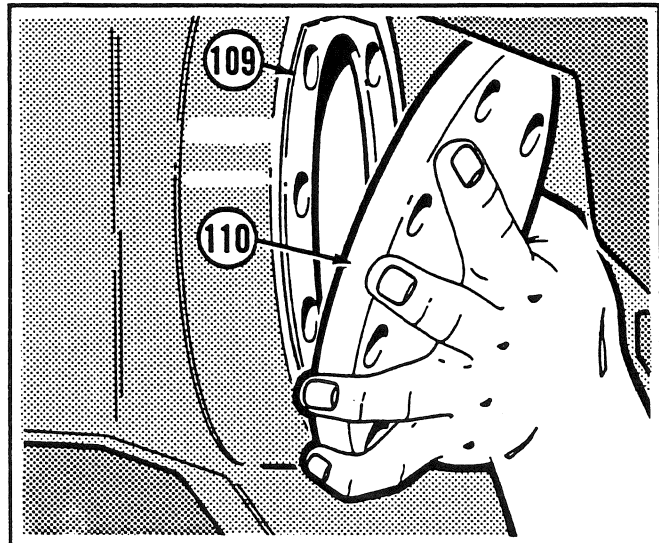


Fig. 38

700 SERIES SHOP MANUAL  
FRONT AXLE

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. 36**

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

**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. 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. 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. 38**

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

700 SERIES SHOP MANUAL  
FRONT AXLE

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).



700 SERIES SHOP MANUAL  
FRONT AXLE

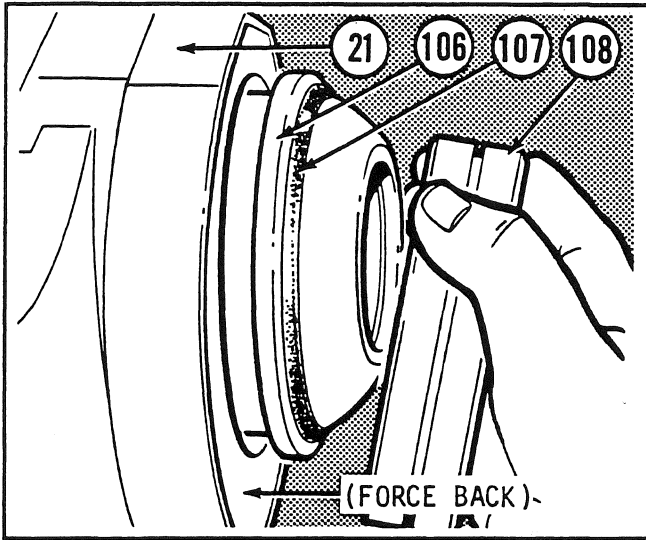


Fig. 39

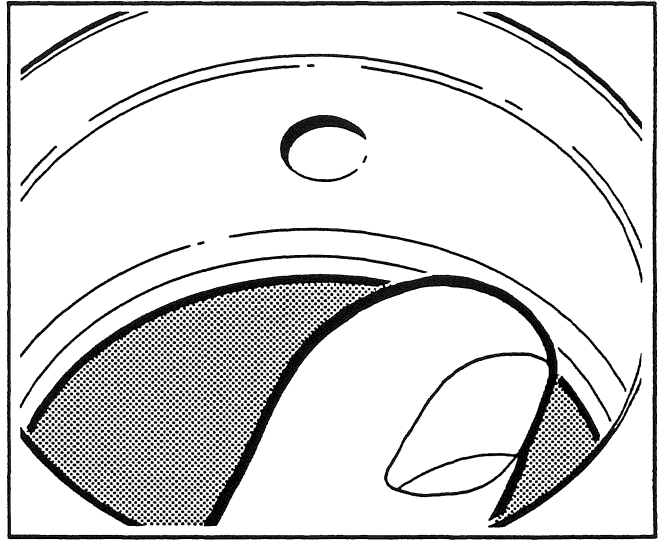


Fig. 42

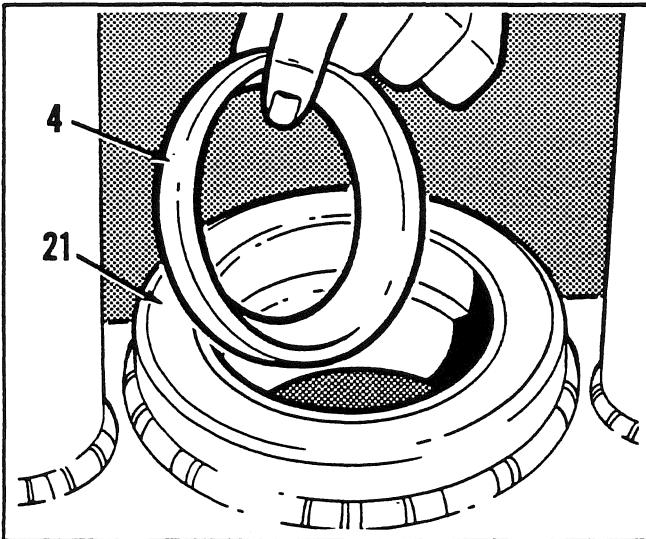


Fig. 40

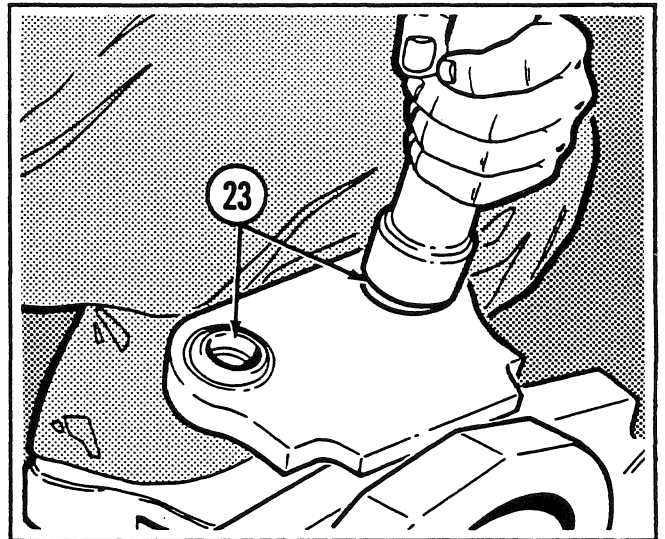


Fig. 43

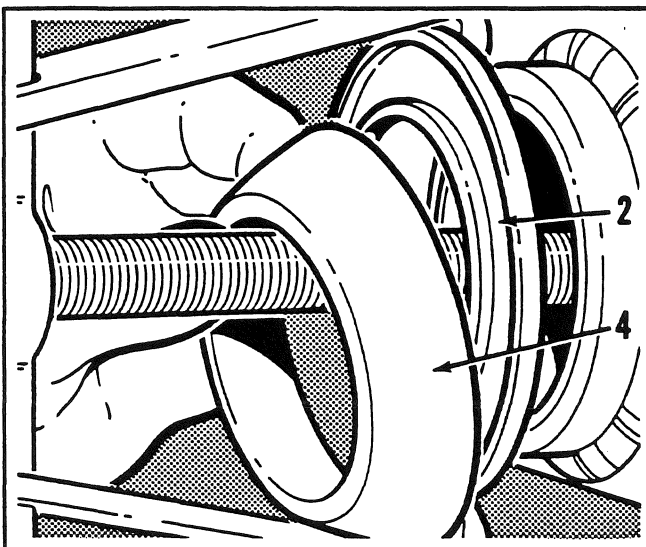


Fig. 41

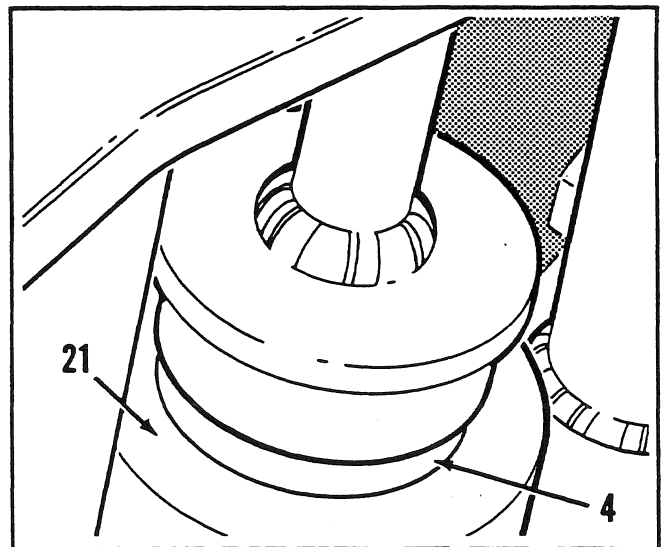


Fig. 44

700 SERIES SHOP MANUAL  
FRONT AXLE

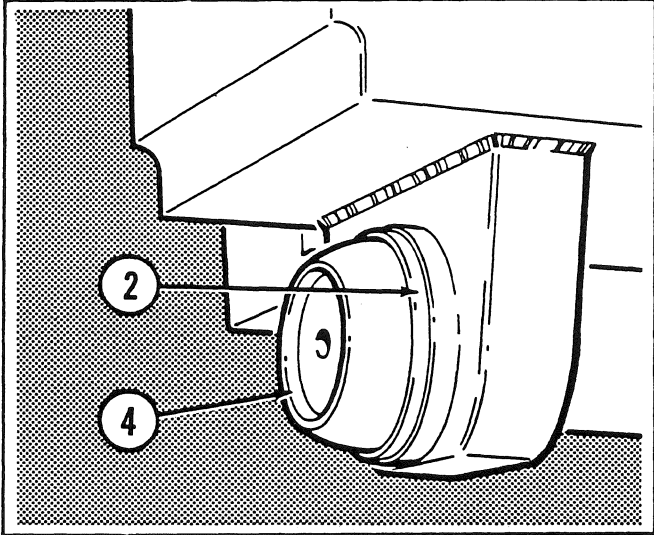


Fig. 45

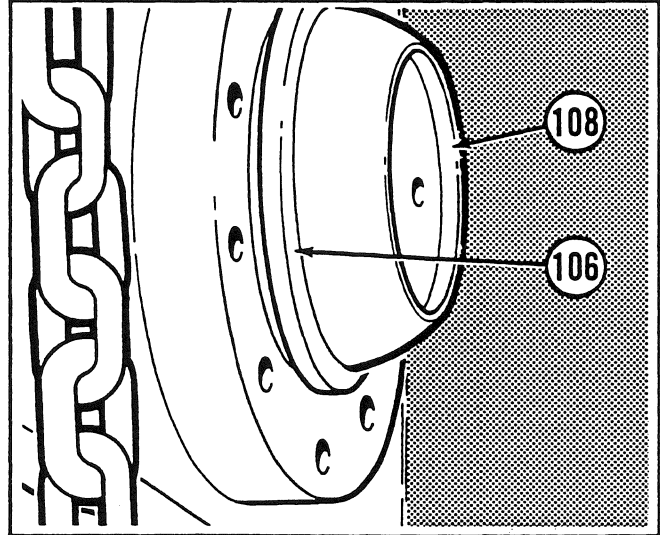


Fig. 48

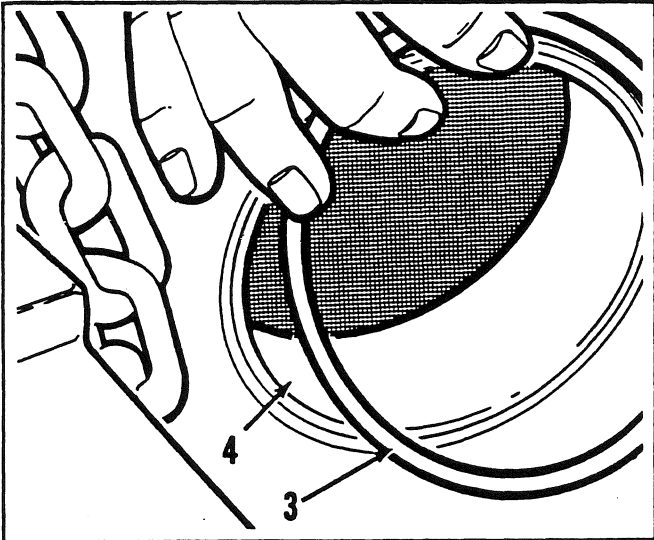


Fig. 46

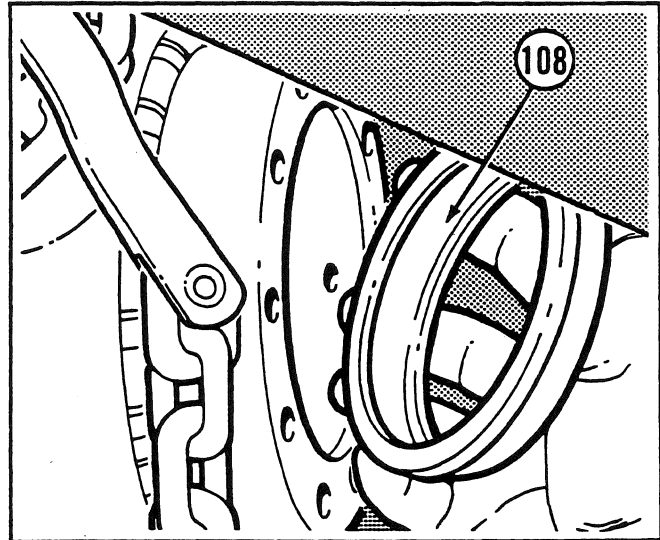


Fig. 49

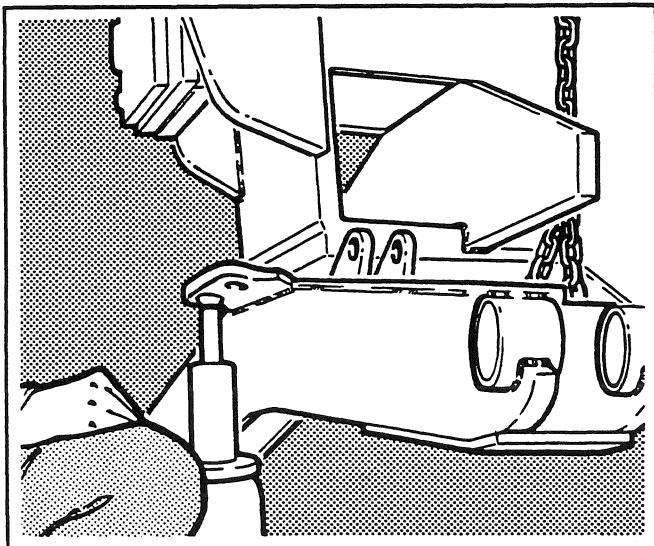


Fig. 47  
Section 1  
Page 22

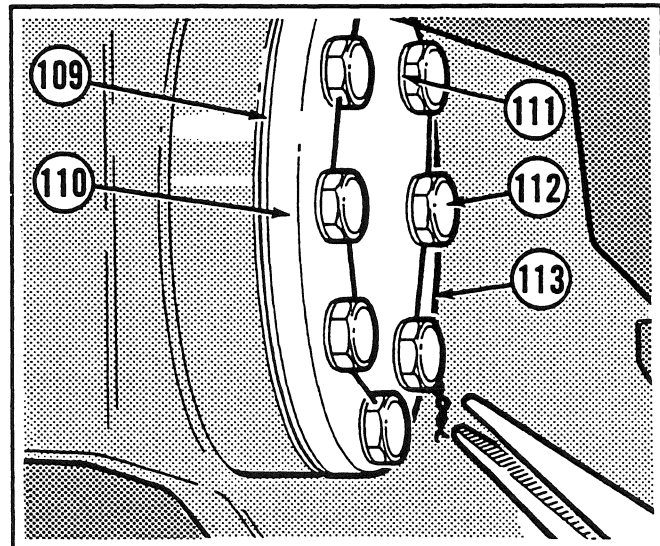


Fig. 50

700 SERIES SHOP MANUAL  
FRONT AXLE

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.

700 SERIES SHOP MANUAL  
FRONT AXLE

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.

700 SERIES SHOP MANUAL  
FRONT AXLE

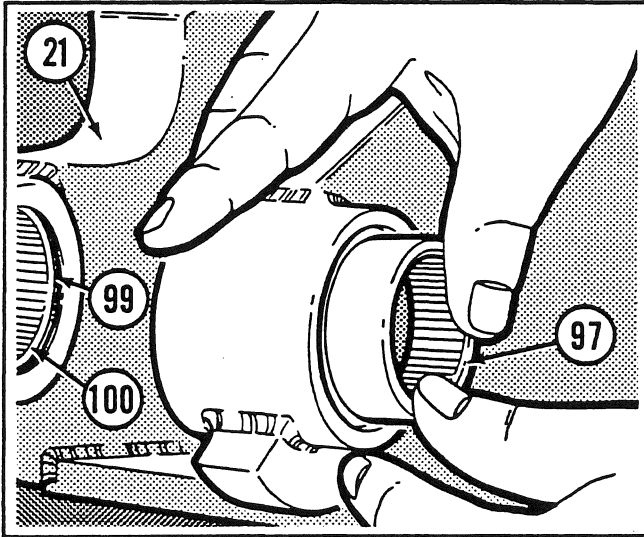


Fig. 51

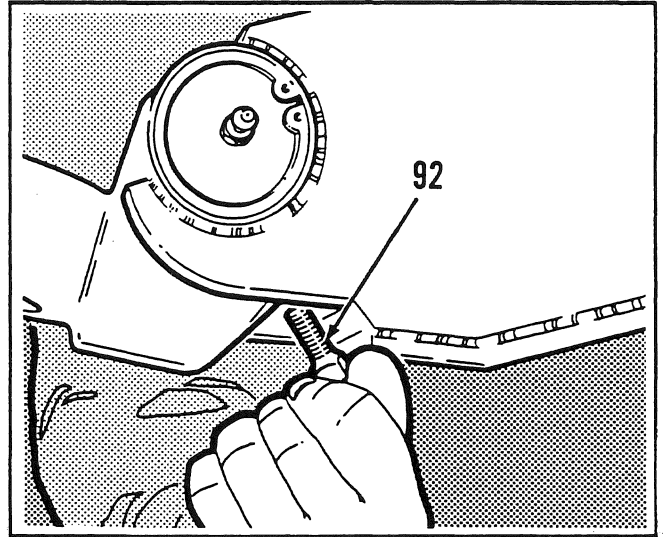


Fig. 54

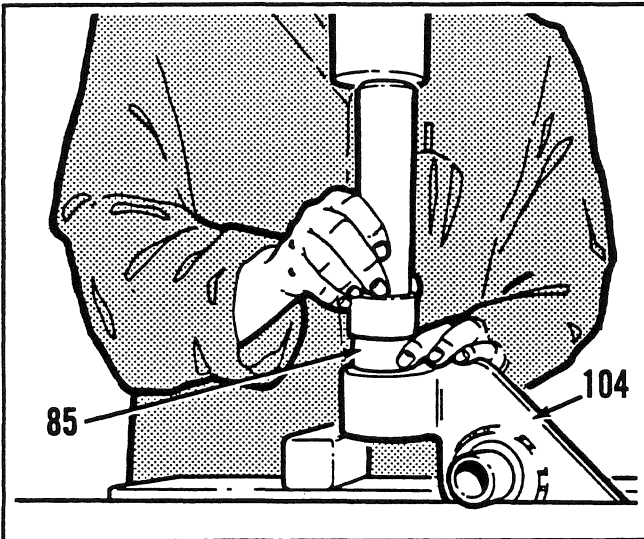


Fig. 52

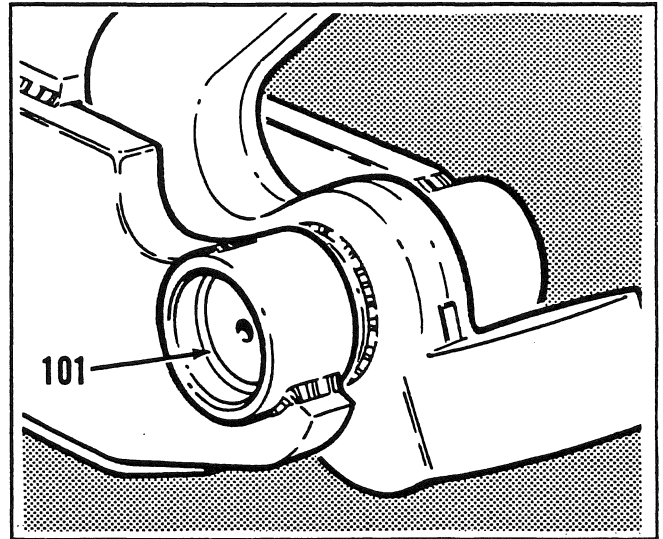


Fig. 55

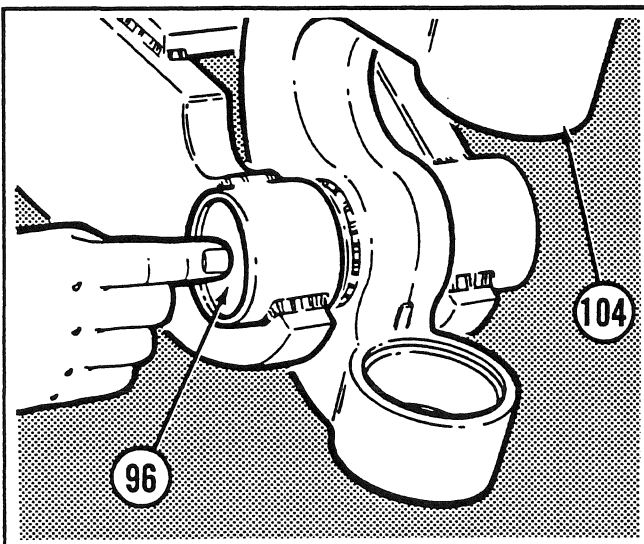


Fig. 53

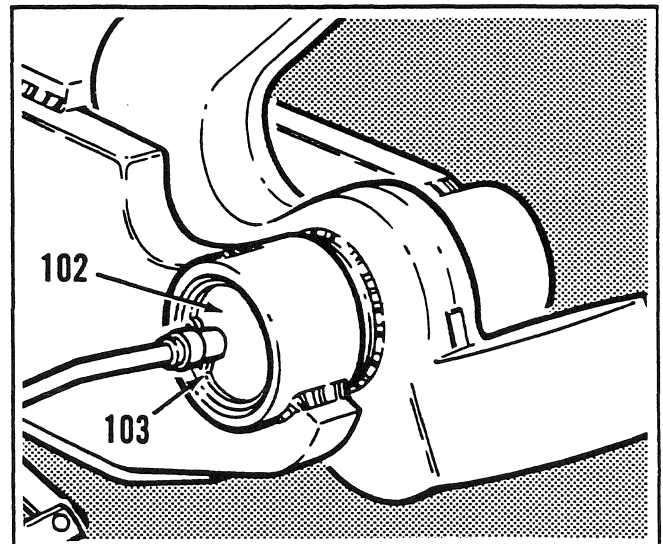


Fig. 56

700 SERIES SHOP MANUAL  
FRONT AXLE

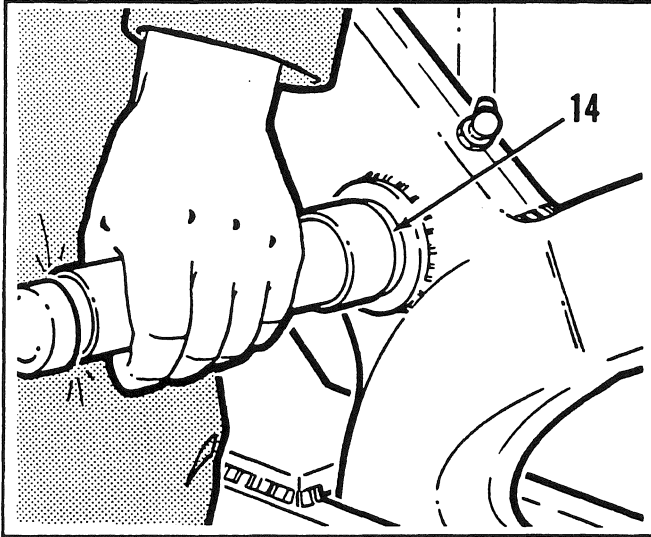


Fig. 57

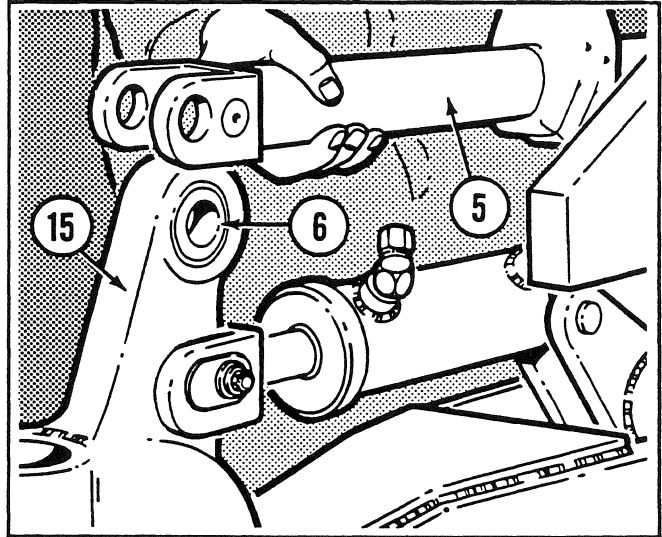


Fig. 60

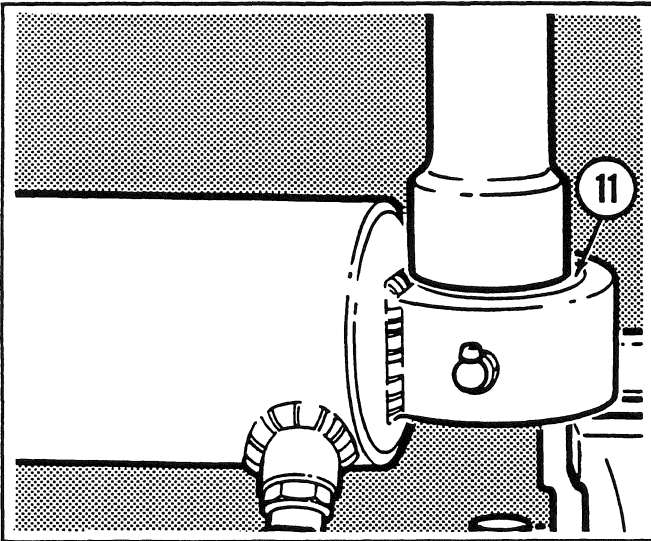


Fig. 58

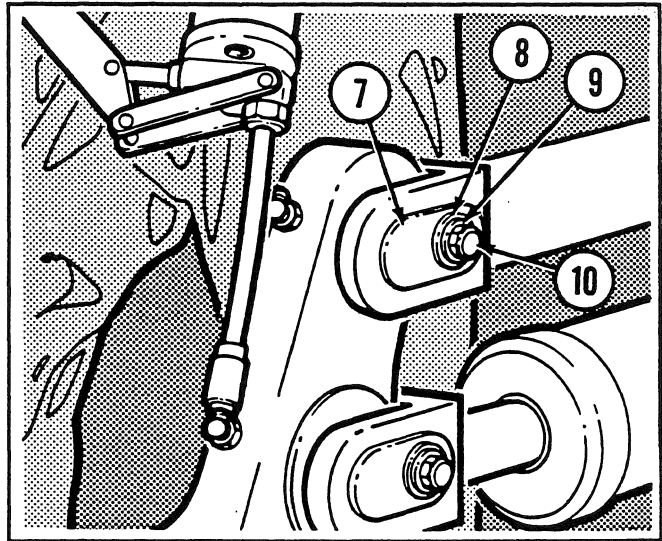


Fig. 61

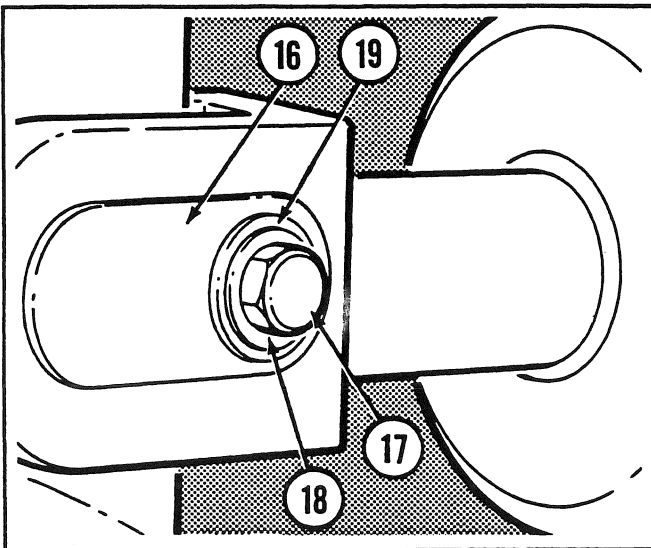


Fig. 59

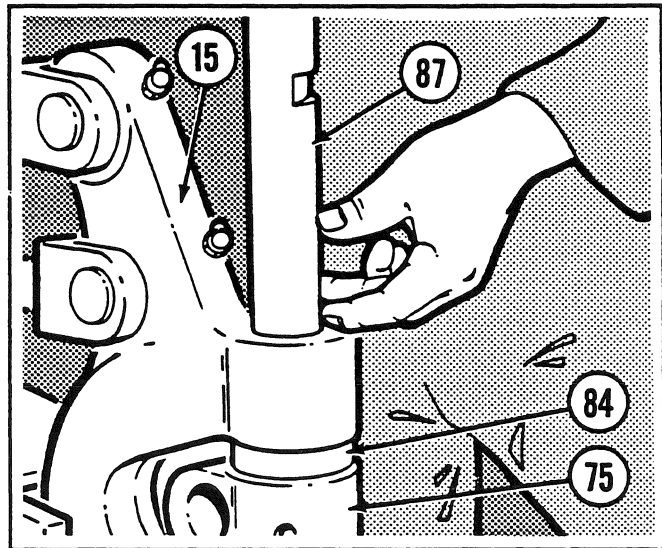


Fig. 62

700 SERIES SHOP MANUAL  
FRONT AXLE

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.

700 SERIES SHOP MANUAL  
FRONT AXLE

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 pin.**

**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.



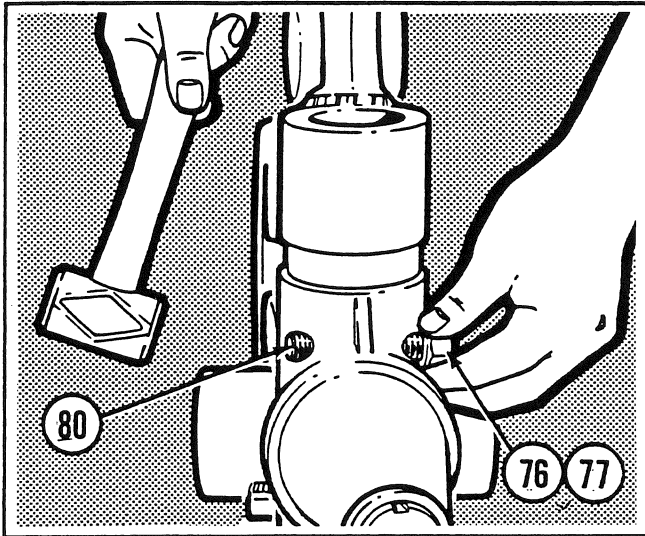


Fig. 63

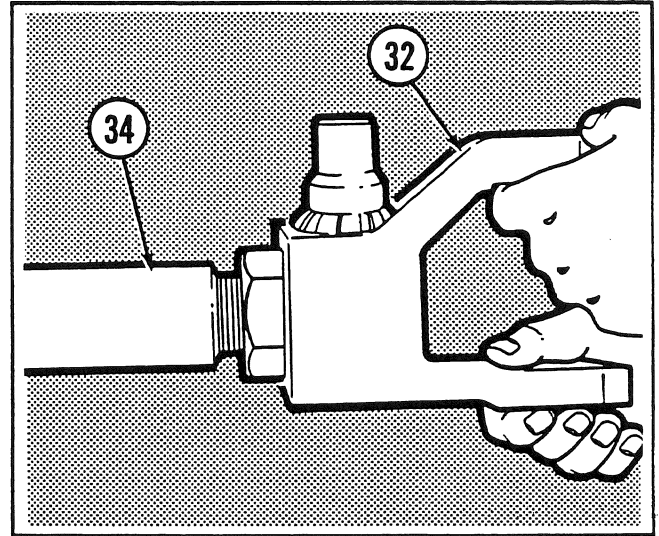


Fig. 66

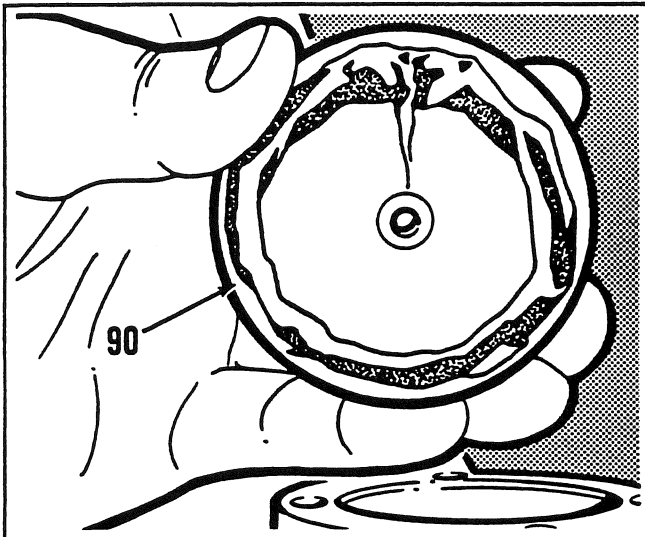


Fig. 64

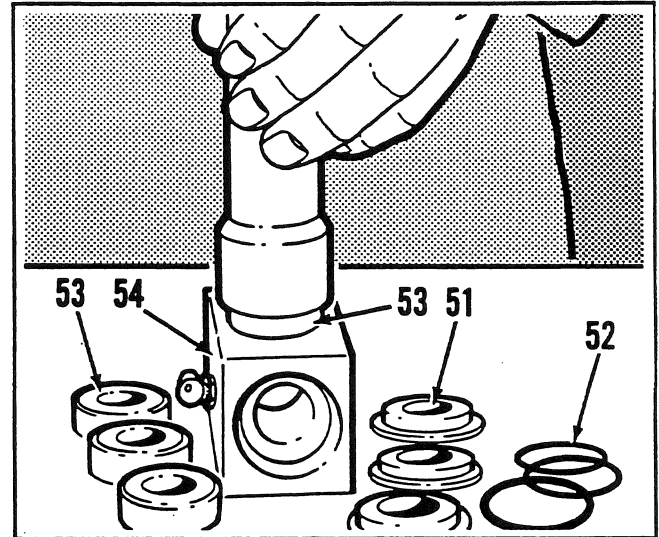


Fig. 67

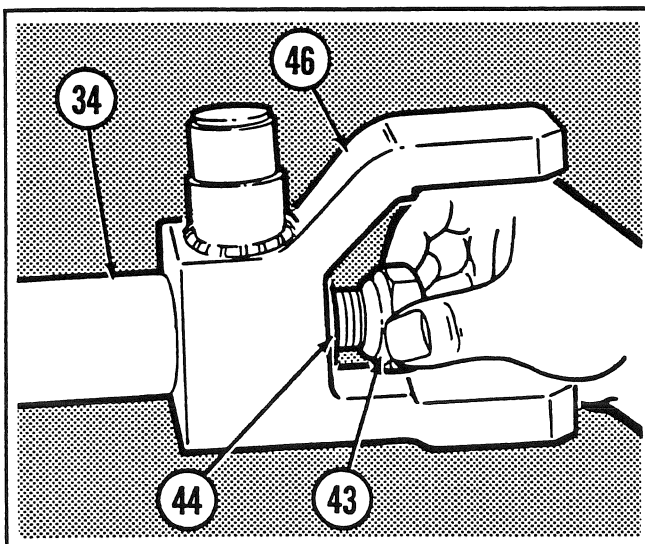


Fig. 65

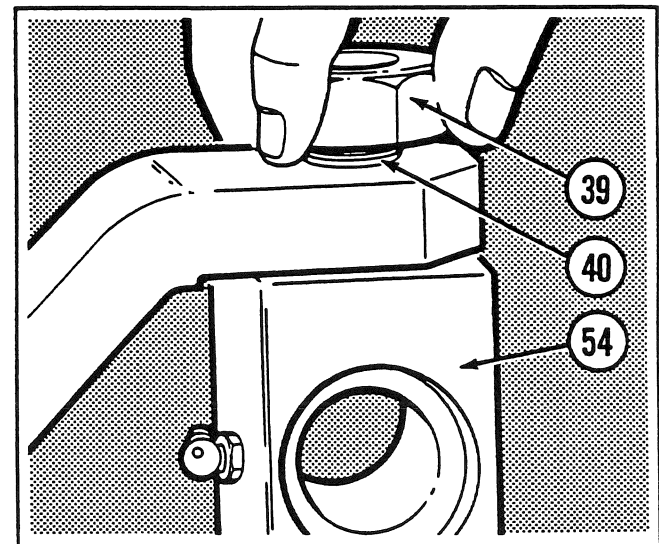


Fig. 68

700 SERIES SHOP MANUAL  
FRONT AXLE

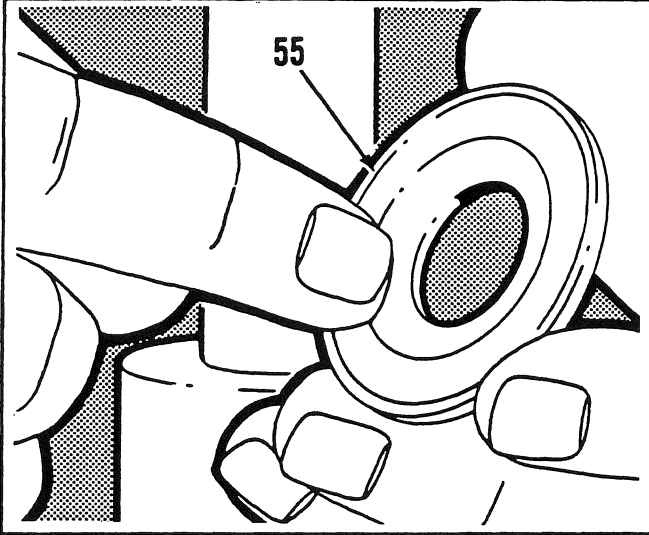


Fig. 69

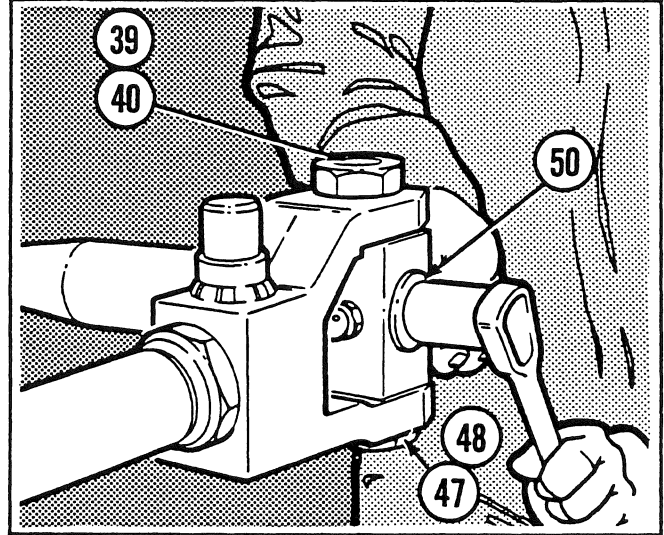


Fig. 72

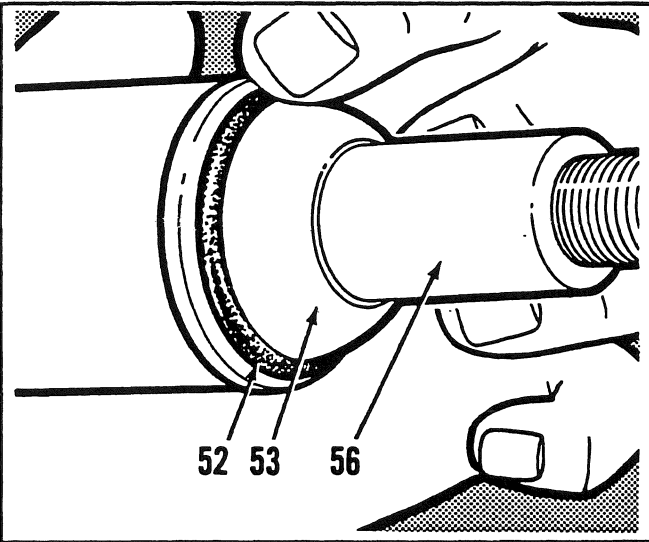


Fig. 70

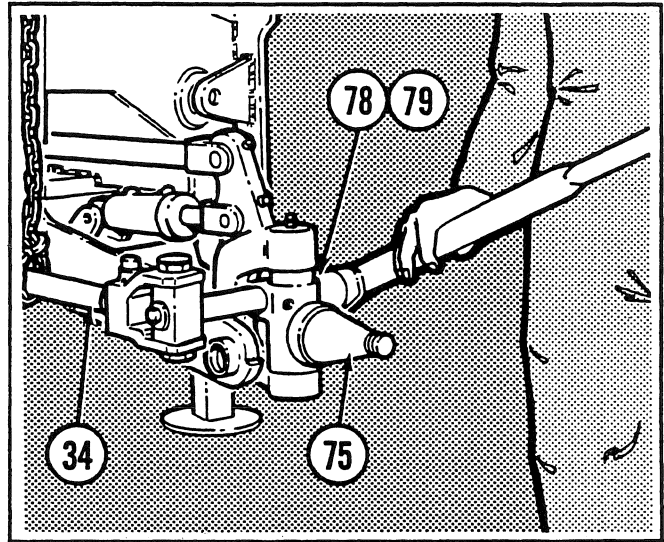


Fig. 73

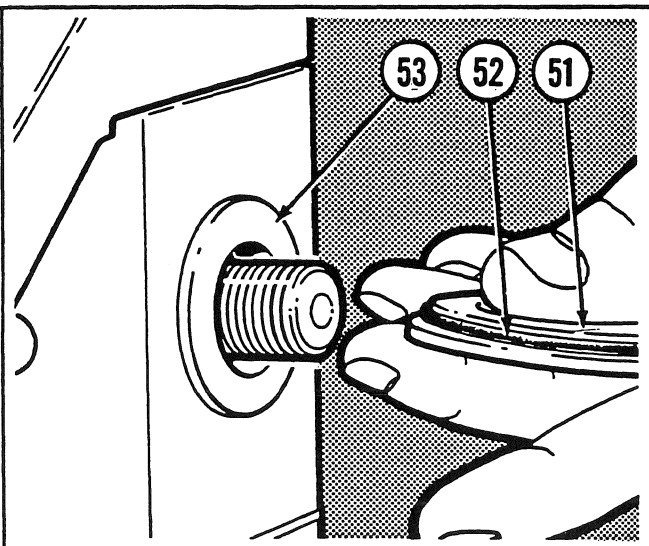


Fig. 71

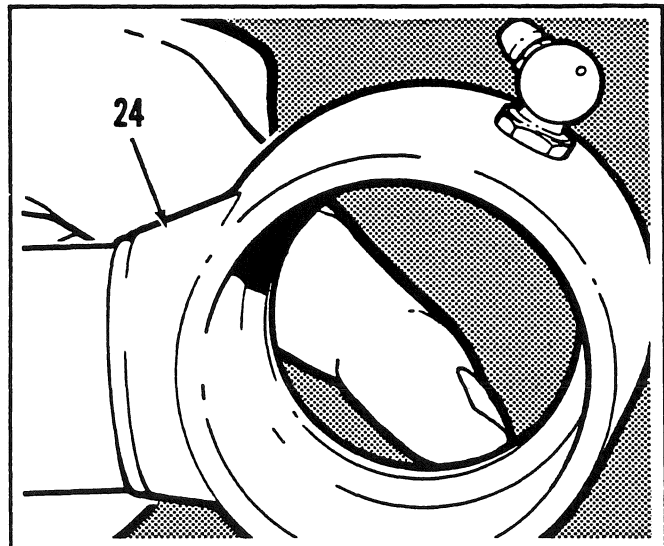


Fig. 74

700 SERIES SHOP MANUAL  
FRONT AXLE

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.

700 SERIES SHOP MANUAL  
FRONT AXLE

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 plugs 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.

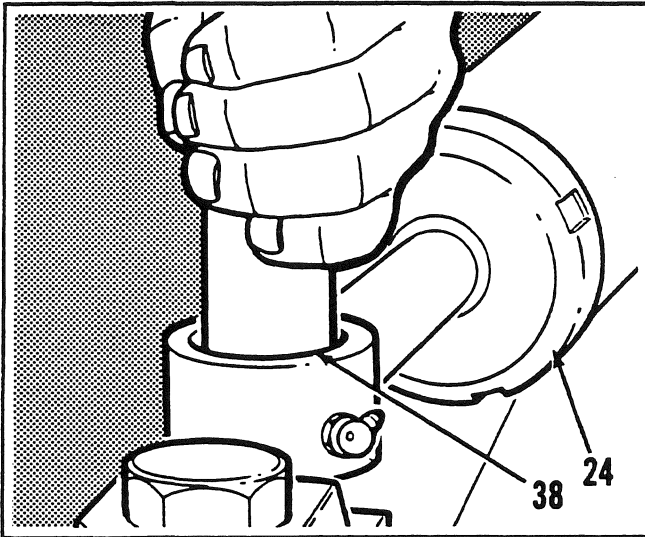


Fig. 75

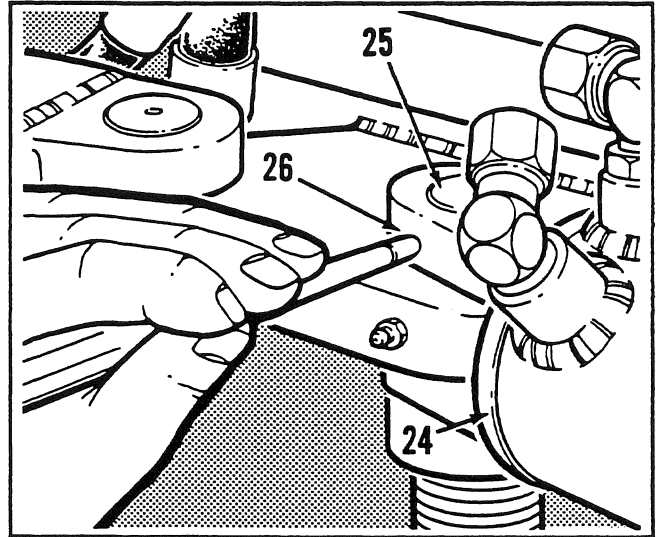


Fig. 78

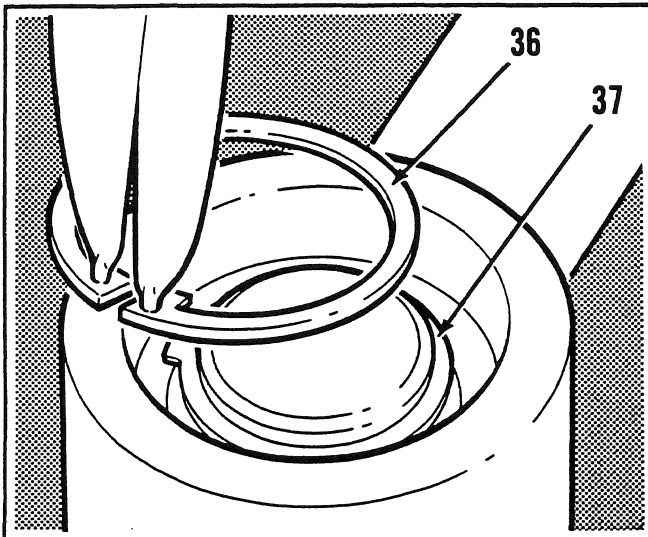


Fig. 76

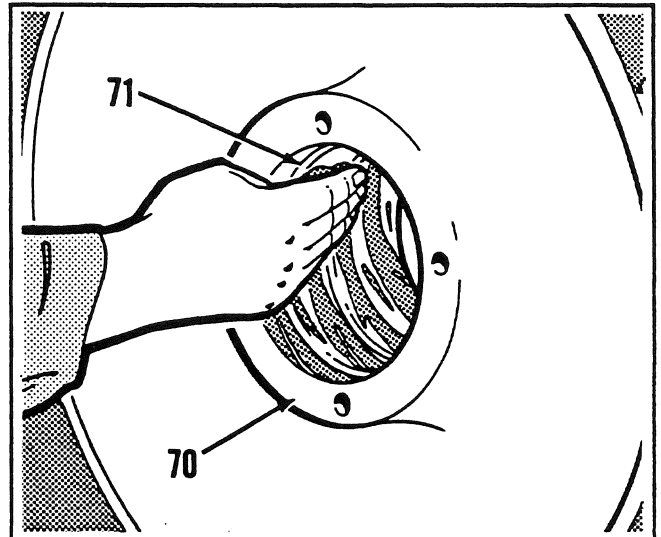


Fig. 79

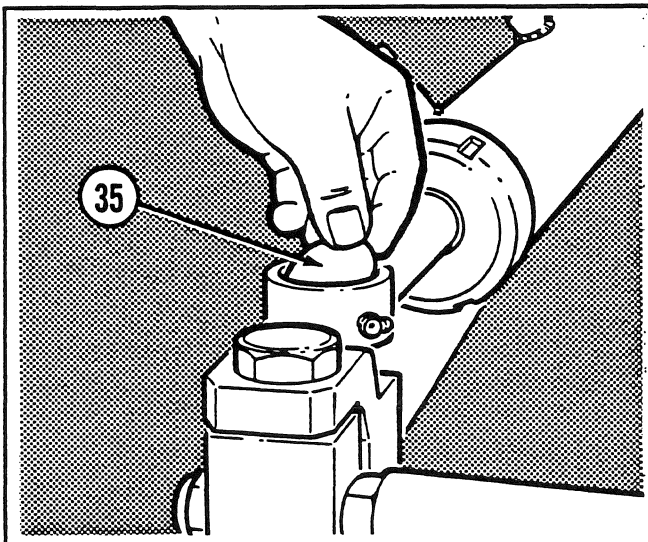


Fig. 77

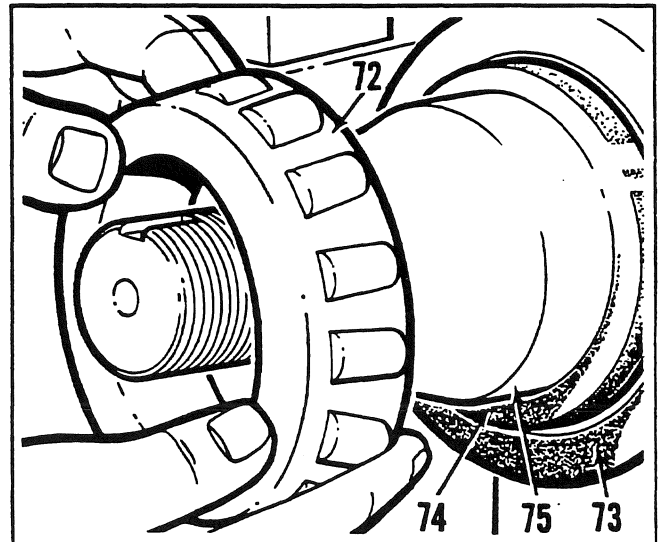


Fig. 80

700 SERIES SHOP MANUAL  
FRONT AXLE

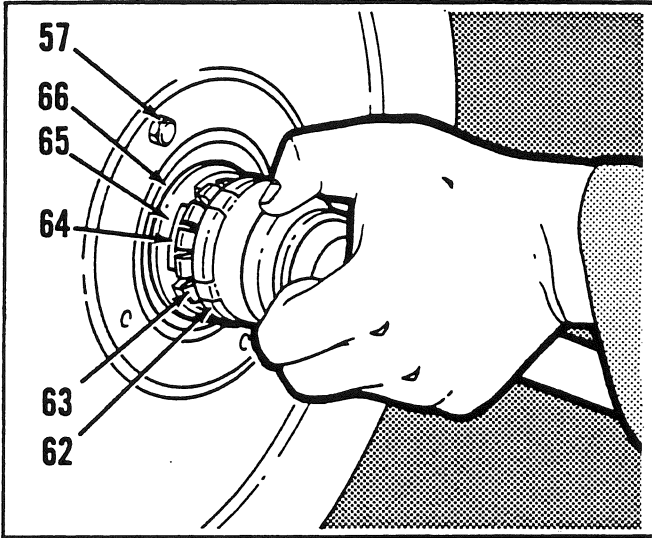


Fig. 81

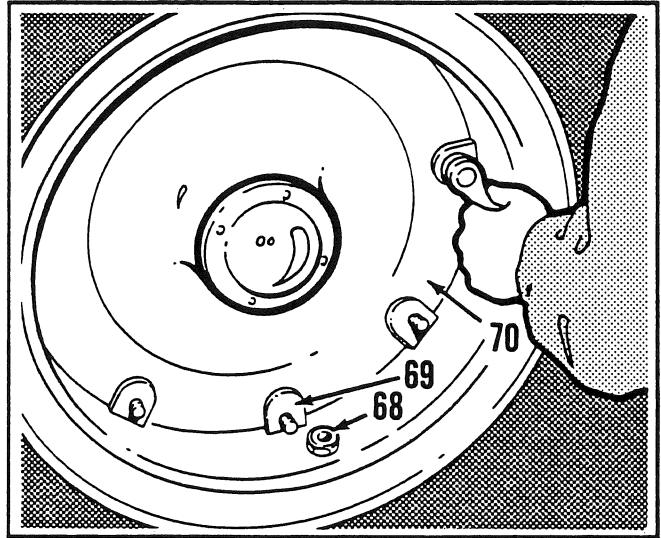


Fig. 84

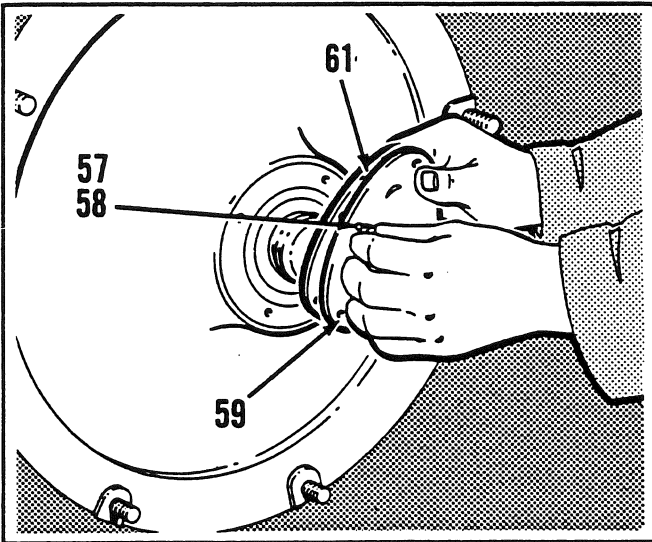


Fig. 82

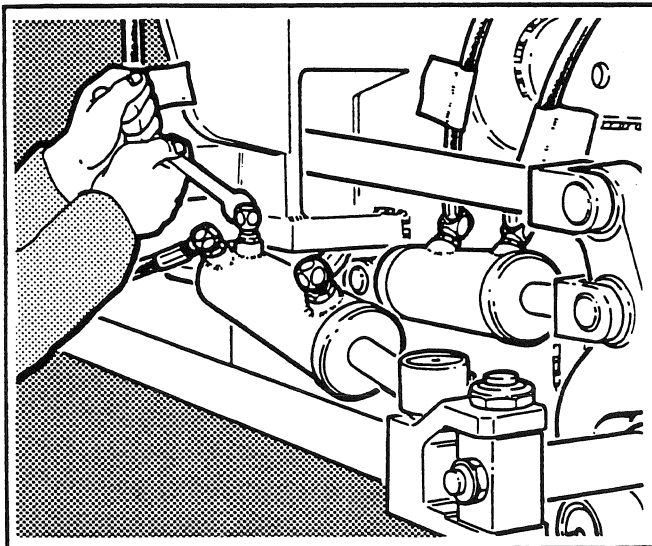


Fig. 83  
Section 1  
Page 34

700 SERIES SHOP MANUAL  
FRONT AXLE

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 hubcap 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.

700 SERIES SHOP MANUAL  
FRONT AXLE

Reassembly (continued)

Toe-in Adjustment

Fig. 85

Check the toe-in of the front wheels by making a mark on the tires behind the axle, level with the centre line of the spindle. Measure the distance between tires at these marks.

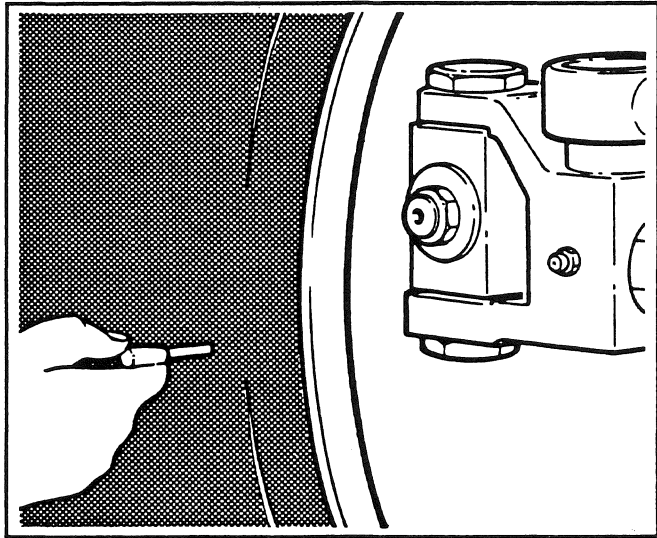


Fig. 85

Fig. 86

Drive the grader forward to position the markings on the centre line of the spindles in front of the axle and record this measurement. The front measurement should be 13,0 mm to 16,0 mm (1/2 in. to 5/8 in.) less than the measurement taken behind the front axle.

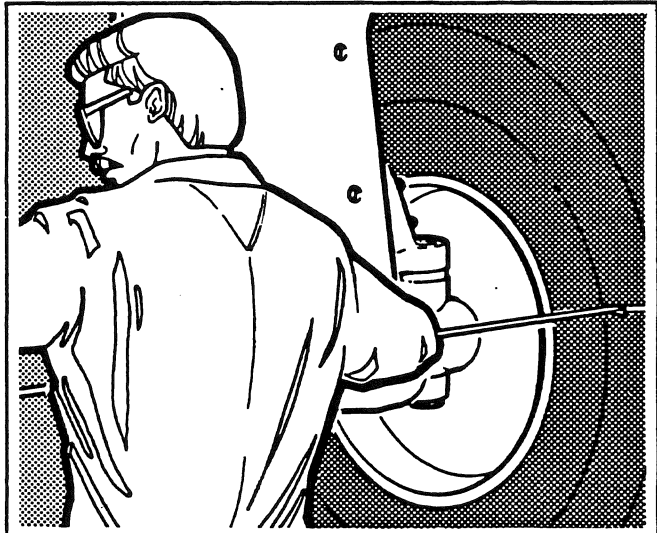


Fig. 86

Fig. 87

To adjust the toe-in, first loosen the hex. jam nut (33) at the right hand yoke (32). Then use a pipe wrench to rotate the drag link (34). This varies the length of the drag link and changes the toe-in. When the toe-in is correct tighten the hex. jam nut to secure the drag link.

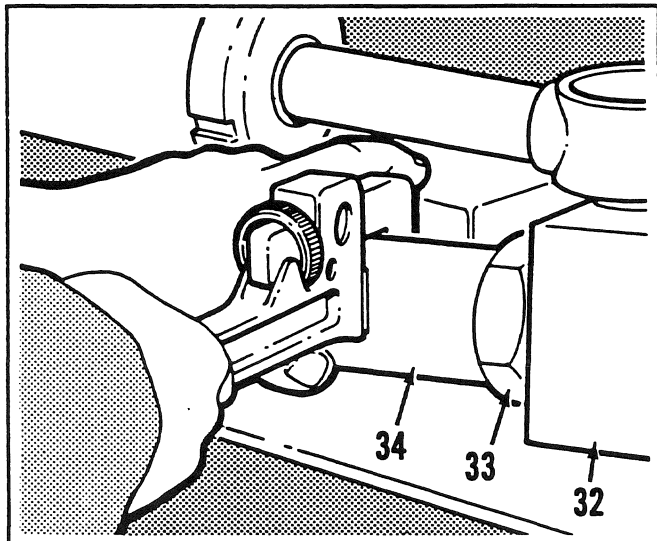


Fig. 87

The front axle disassembly and reassembly is now complete.

Road test the grader to check for leaks and to ensure the front axle functions properly and is safe for the operator.



# SECTION 1

## MODELS 780/780A FRONT AXLE

TABLE OF CONTENTS	PAGE
General .....	40
Service Position Precaution .....	40
Description .....	40
Cleaning and Inspection .....	40
Cleaning .....	40
Inspection .....	41
Lubrication .....	41
Torque Guide .....	42
Front Axle Pivot Pin Bearings - Disassembly .....	42
Front Axle Pivot Pin Bearings - Assembly .....	43
King Pin Bearings and Spindle Thrust Bearing - Disassembly .....	45
King Pin Bearings and Spindle Thrust Bearing - Assembly .....	46
Wheel Bearings - Disassembly .....	47
Wheel Bearings - Assembly .....	48
Pivot Block and Toe-in Adjustments .....	49

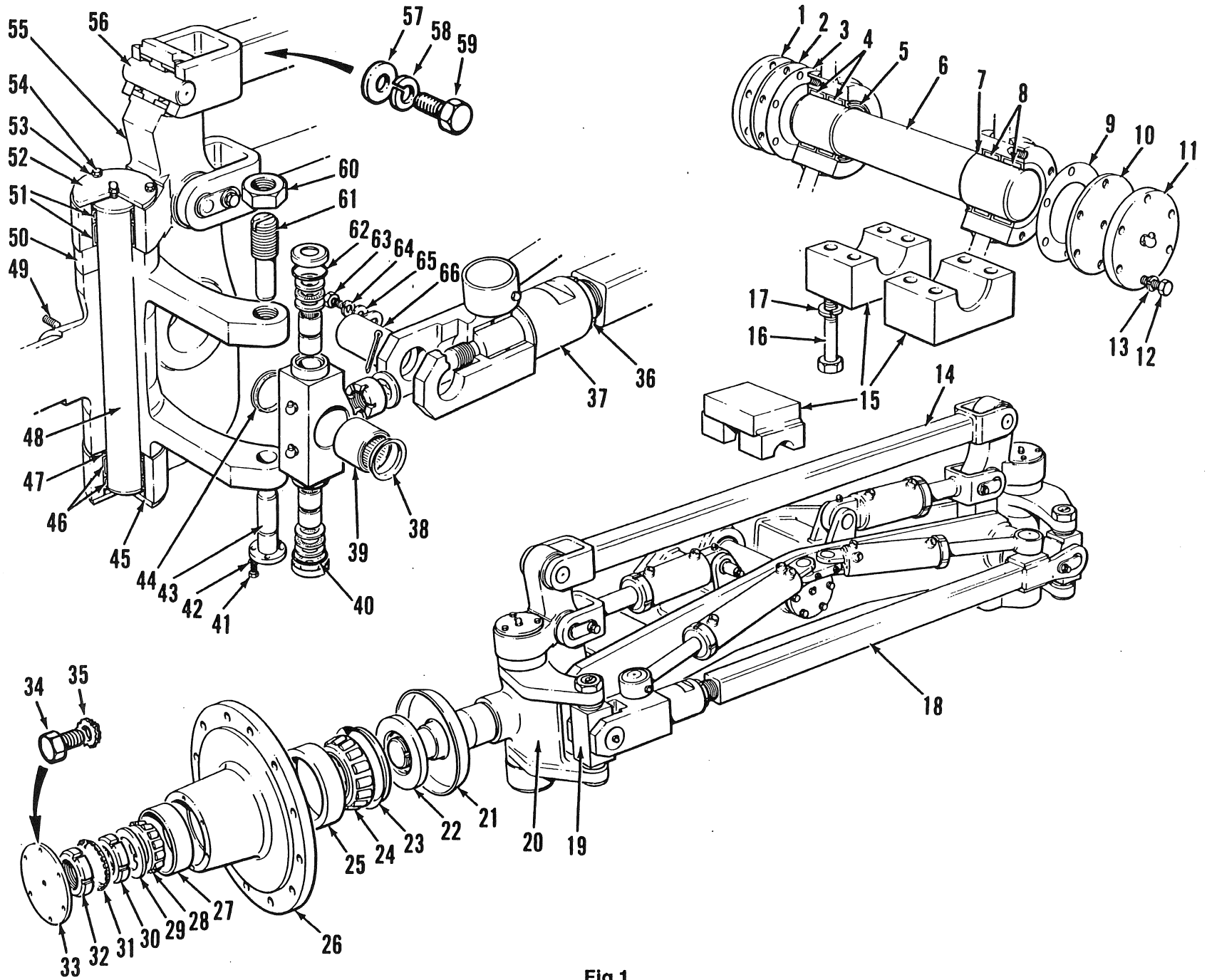


Fig.1

Item	Description	Item	Description	Item	Description
1	Thrust cap	23	V ring seal	45	King pin cap
2	Thrust washer	24	Inner bearing cone	46	Needle roller bearing
3	Shim	25	Inner bearing cup	47	Seal
4	Needle roller bearings	26	Wheel and hub	48	King pin
5	Seal	27	Outer bearing cup	49	Setscrew
6	Pivot pin	28	Outer bearing cone	50	Thrust washer
7	Seal	29	Lockwasher	51	Needle roller bearings
8	Needle roller bearings	30	Inner locknut	52	King pin cap
9	Shim	31	Tabwasher	53	Starwasher
10	Thrust washer	32	Outer locknut	54	Bolt
11	Thrust cap	33	Hub cap	55	Knuckle
12	Bolt	34	Bolt	56	Bearing pin
13	Lockwasher	35	Starwasher	57	Flatwasher
14	Tie bar	36	Locknut	58	Lockwasher
15	Mounting block matched halves	37	Adjusting collar	59	Bolt
16	Bolt	38	Seal	60	Locknut
17	Lockwasher	39	Needle roller bearing	61	Adjustment pin
18	Drag link	40	O ring	62	O ring
19	Pivot block	41	Bolt	63	Bolt
20	Spindle and radius arm assembly	42	Starwasher	64	Lockwasher
21	Dust seal	43	Radius arm pin	65	Flatwasher
22	Deflector spacer	44	Seal	66	Bearing pin

Key to Fig. 1

## 700 SERIES SHOP MANUAL



### General

Make sure proper shop tools are available and in good working order. You will need a safe lifting device, blocks or proper stands and a hydraulic jack.

Refer to the 700 Series Parts Manual P/N L 3008 for spare parts information.

### Service Position Precaution

**NOTE:** Always place the grader in the SERVICE POSITION before attempting any overhaul, maintenance or inspection procedure. Refer to the SERVICE POSITION procedure on page (ii) in the front of this Shop Manual.

### Description

The Model 780 front axle is designed for the arduous applications of heavier Champion motor graders. It is capable of handling the higher front axle loads while maintaining the mobility of a standard front axle. This axle has wider spacing (track width) between the front tires to allow full axle mobility with 20.5 x 25 tires. The pivot pin, king pins and knuckle pins are supported by double row needle roller bearings.

The front axle performs three essential functions:

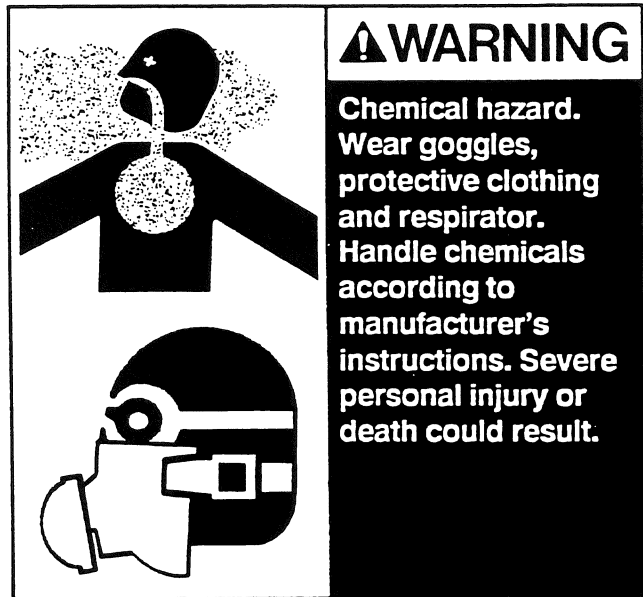
- Hydraulic assisted steering turns the front wheels to either side.
- You can lean the front wheels to the left or right. This reduces the turning radius, counteracts side loads

created by the action of the moldboard, and provides stability on side slopes.

- The central pivot pin allows the front axle to oscillate from a level position when traveling over uneven ground.

### Cleaning and Inspection

#### Cleaning



Use a cleaning solvent to clean ground or polished parts or surfaces. Kerosene or diesel fuel oil can be used. Do not use gasoline.

Use a flat-bladed tool to remove silicone sealant residue.

Do not clean ground or polished parts in water, steam, alkaline solutions or a hot solution tank.

Immediately dry parts after cleaning. Use soft, clean paper or cloth rags. You can also dry parts - except bearings - using moisture-free compressed air.

**NOTE:** Do not dry bearings with compressed air. Spinning bearings with compressed air can damage the races and rollers.

# 700 SERIES SHOP MANUAL

Apply grease or system oil to undamaged parts that are ready for assembly. If storing parts for some time, apply a rust inhibitor to all surfaces. Wrap parts in rust inhibitor impregnated paper before storing.

## Inspection

Inspect all tapered roller bearing cups and cones. Replace the bearing if you see the following defects.

- a) Center of the large diameter end of the roller worn level with or below the outer surface of the roller.
- b) Radius of the large diameter end of the roller worn to a sharp edge.
- c) Visible roller grooves in the cup or cone inner race surfaces.
- d) Deep cracks in the cup, cone inner race or roller surfaces.
- e) Bright wear marks on the roller cage outer surface.
- f) Etched and pitted rollers or cup and cone inner race surfaces that touch the rollers.
- g) Cup and cone inner race surfaces that touch the rollers damaged by spalling and flaking.

Replace worn or damaged front axle assembly parts. Following are examples of what to check, repair or replace.

- a) Replace any fasteners if the corners of the head are worn.
- b) Replace damaged washers.
- c) Replace all oil seals, O rings, V rings and cotter pins.

d) Clean parts and apply new silicone sealant P/N 56427 where required when front axle is assembled.

e) Remove nicks, scratches and burrs from machined or ground surfaces. Use a fine file, india stone, emery cloth or crocus cloth.

f) Clean and repair threads. Use a die or tap of the correct size. You can also use a fine file.

**NOTE:** *Threads must be clean and undamaged to ensure correct values when fasteners are torque-tightened.*

## Lubrication

It is important to use the correct type of grease when lubricating the front axle. Refer to the front of this Shop Manual or your **700 Series Operator's Manual** for complete details of temperature range and appropriate grease specifications.

In most applications, the front axle requires lubricating only once a week. Champion recommends lifting the front wheels off the ground at every fourth greasing. Place a safe, adequate stand under the nose plate before greasing. Always increase the lubrication intervals in extremely dusty or wet conditions, or if the joints are dry.

# 700 SERIES SHOP MANUAL

## Torque Guide

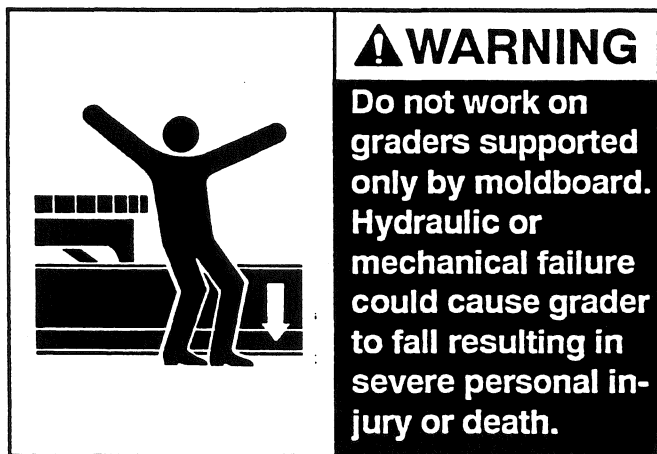
Page No.	Application	Torque Value		
		lbf·ft	N·m	kgf·m
44	Bolts retaining pivot pin thrust cap	36	49	5
44	Bolts retaining mounting block halves	290	393	40
45	Bolts retaining pivot pin thrust cap	36	49	5
47	Nuts retaining wheels	460	624	64
49	Inner locknut retaining wheel bearings	100	135	14
49	Outer locknut retaining wheel bearings	200	271	28
49	Nuts retaining wheels	460	624	64
50	Locknut retaining pivot block adjusting pin	2100	2847	290

## Front Axle Pivot Pin Bearings

### - Disassembly

1. During this service procedure, you will have to start the engine several times. Be sure that it is safe to start the engine each time it is required. Remember to remove and retain the ignition key when you shut down the engine.

2.



Make a visual safety check around the grader. Ensure all personnel are away from the area. Signal your intention and start the engine when it is safe to do so. Position the moldboard at 90° to the frame. Apply down pressure to the moldboard and lift the front end of the grader until the tires are just touching the ground. Place a safe, adequate stand under the nose plate.

3. Shut down the engine. Remove and retain the ignition key.

4. Identify the steering and leaning wheel hydraulic hoses to avoid confusion during assembly.

5. Disconnect the steering cylinder hydraulic hoses. Plug and cap all open ports and fittings to prevent contamination.

6. Disconnect the left-hand leaning wheel cylinder hoses. Plug and cap all open ports and fittings to prevent contamination.

7. Disconnect the right-hand leaning wheel cylinder hoses. Plug and cap all open ports and fittings to prevent contamination.

8. Remove the bolts (59), lockwashers (58) and flat-washers (57) securing the tie bar bearing pins (56). Use a hammer and metal drift to remove the bearing pins. Remove the tie bar (14). Attach a safe lifting device to the drag link (18).

9. Use a hammer and center punch to mark the pivot pin mounting blocks (15). The marks will help identify the upper and lower mounting block matched halves during assembly.

## 700 SERIES SHOP MANUAL

10. Remove the bolts (16) and lockwashers (17) retaining the lower mounting block halves (15). Remove the lower mounting block halves.
11. Make a visual safety check around the grader. Ensure all personnel are away from the area. Signal your intention and start the engine when it is safe to do so. Apply down pressure to the moldboard and lift the front end of the grader until it is clear of the front axle frame. Remove the safety stand.
12. Lower the lifting device and allow the front axle to roll over slowly (see Fig. 2). Remove the lifting device and roll the front axle away from the grader.

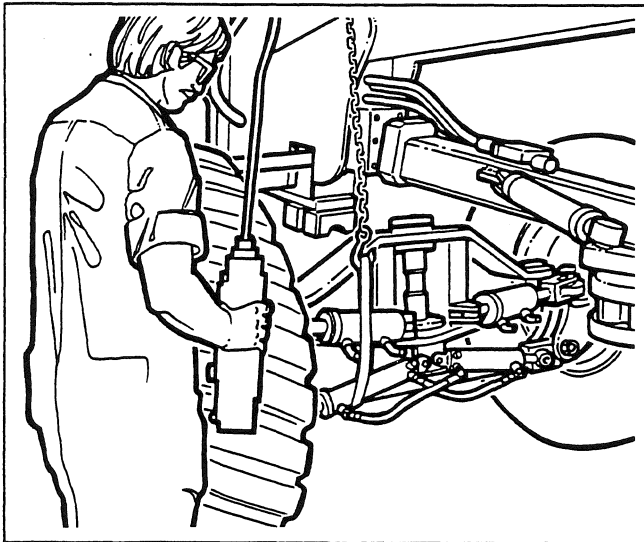


Fig. 2

13. Lower the front end of the grader and place the safety stand under the nose plate. Shut down the engine. Remove and retain the ignition key.
14. Remove the bolts (12) and lockwashers (13) retaining the front and rear thrust caps (1 and 11). Remove the thrust caps, thrust washers (2 and 10) and any shims (3 and 9) from the axle frame bosses.
15. Remove the pivot pin (6) out of the bearings (see Fig. 3).

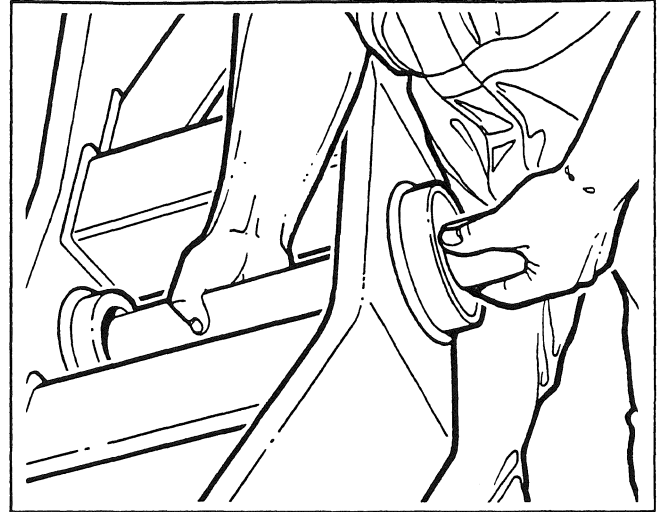


Fig. 3

16. Use a hammer and appropriate tubular drift to remove the needle roller bearings (4 and 8) and seals (5 and 7). Discard the seals.
17. The front axle pivot pin bearing disassembly is now complete. Place the parts to one side for cleaning and inspection.

### Front Axle Pivot Pin Bearings - Assembly

1. Lubricate the needle roller bearings (4 and 8) with grease. Use a hammer and appropriate tubular drift to install the bearings into the axle frame front and rear bosses (see Fig. 4). Lubricate and install new seals (5 and 7). The seal lips should face outward.

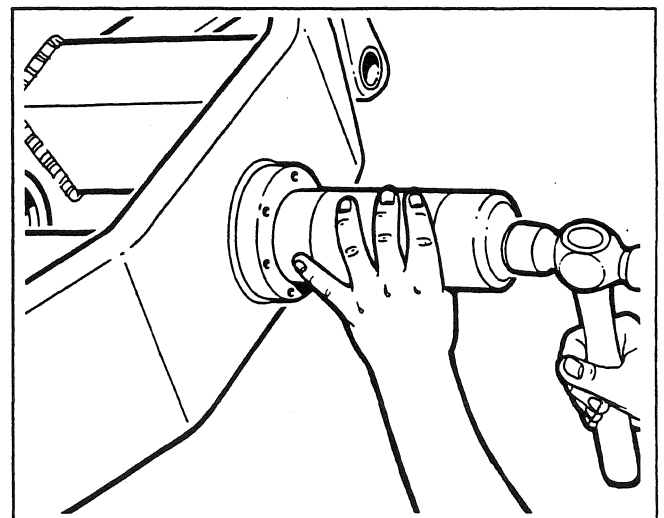


Fig. 4

## 700 SERIES SHOP MANUAL

2. Lubricate the pivot pin (6) with grease. Use a rubber or hide mallet to install the pivot pin into the bearings; taking care not to damage the seals.
3. Install the thrust cap (11), thrust washer (10) and three shims (9) onto the rear boss face of the axle frame. Retain the thrust cap with bolts (12) and lockwashers (13). Tighten the bolts in a diagonal sequence to the specified torque.
4. Install the thrust cap (1) and thrust washer (2) onto the front boss face of the axle frame. Do not install any shims. Retain the thrust cap with bolts (12) and lockwashers (13). Do not torque-tighten the bolts.
5. Make a visual safety check around the grader. Ensure all personnel are away from the area. Signal your intention and start the engine when it is safe to do so. Apply down pressure to the moldboard and lift the front end of the grader until it is clear of the safety stand. Remove the stand.
6. Roll the axle assembly under the grader front end. Attach a safe lifting device to the drag link (18). Use the lifting device to slowly turn the axle over (see Fig. 5). Take care that the axle does not turn over-center.

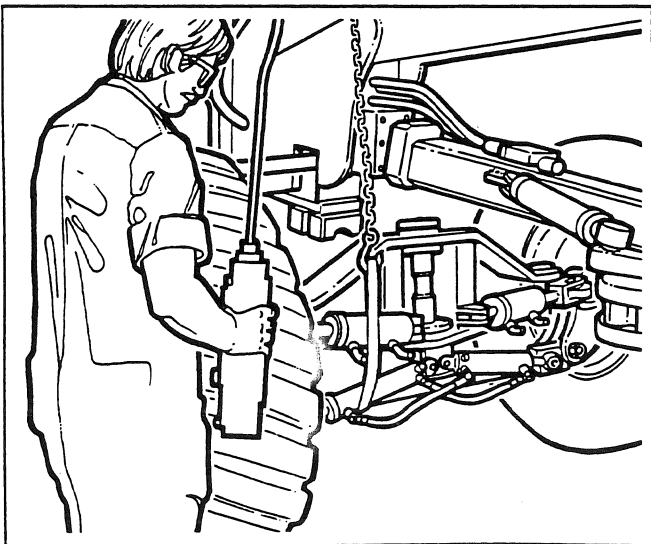


Fig. 5

7. Make sure the mounting block mating faces (15) are clean. Place the safety stand under the nose plate and lower the front end of the grader onto the axle frame. Align the pivot pin with the mating groove of the upper pivot blocks. Shut down the engine. Remove and retain the ignition key.
8. Align the match marks and install the lower mounting block halves (15). Retain the mounting block halves with bolts (16) and lockwashers (17). Tighten the bolts to the specified torque (see Fig. 6).

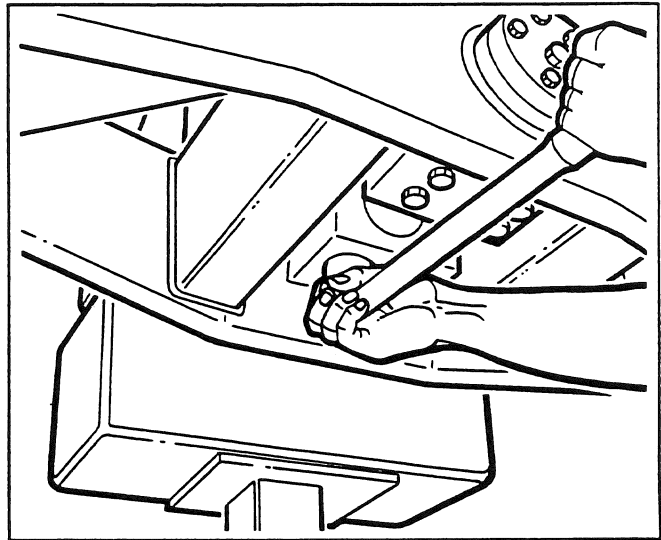


Fig. 6

9. Install the tie bar (14). Lubricate and install the bearing pins (56). Retain the bearing pins with bolts (59), lockwashers (58) and flatwashers (57).
10. Reconnect the left-hand leaning wheel cylinder hoses. Reconnect the right-hand leaning wheel cylinder hoses. Reconnect the steering cylinder hoses.
11. Make a visual safety check around the grader. Ensure all personnel are away from the area. Signal your intention and start the engine when it is safe to do so. Apply down pressure to the moldboard and lift the front end of the grader until it is clear of the safety stand. Remove the stand.



## 700 SERIES SHOP MANUAL

12. Set the end float by tightening the front thrust cap bolts until the thrust cap is snug against the pivot pin. Do not overtighten the bolts as you can bend the thrust cap. Lower the grader front end. Shut down the engine. Remove and retain the ignition key.
13. Use feeler gauges to measure the gap between the front thrust cap and the axle frame boss face in three or four places (see Fig. 7). The average of these measurements determines the number of shims you will need.

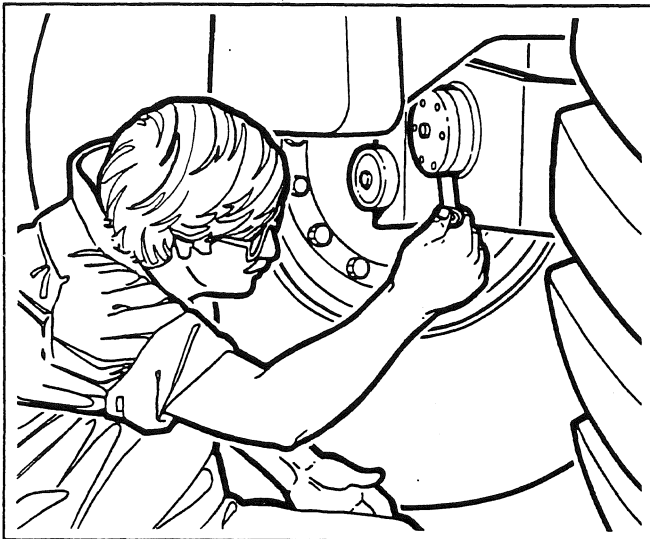
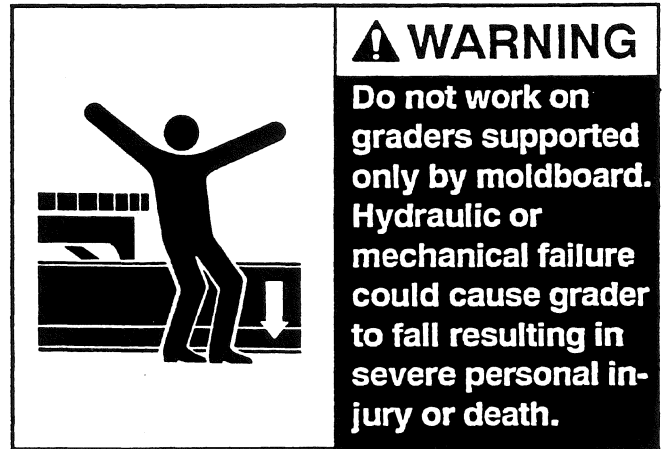


Fig. 7

14. Remove the thrust cap and thrust washer. Now install the thrust cap, thrust washer, required number of shims (3), and another shim equal to the end float specification of 0.003 to 0.005 inch (0,076 to 0,127 mm). Retain the thrust cap with bolts (12) and lockwashers (13). Tighten the bolts in a diagonal sequence to the specified torque.
15. Lubricate both front axle thrust caps through the grease fittings. Road test the grader to ensure that the front axle is working properly and is correctly adjusted.

### King Pin Bearings and Spindle Thrust Bearing - Disassembly

1. Since many components are duplicated on both sides of the grader, the following steps describe the disassembly and assembly procedures for the left-hand side only.
- 2.



Loosen the wheel nuts. Make a visual safety check around the grader. Ensure all personnel are away from the area. Signal your intention and start the engine when it is safe to do so. Position the moldboard at 90° to the frame. Apply down pressure to the moldboard and lift the front end of the grader until the tires are just touching the ground. Place a safe, adequate stand under the nose plate.

3. Shut down the engine. Remove and retain the ignition key.
4. Remove the tire and rim. Attach a safe lifting device onto one of the wheel studs.
5. Remove the bolt (63), lockwasher (64) and flat-washer (65) retaining the pivot block bearing pin (66). Use a hammer and appropriate metal drift to remove the bearing pin. This disconnects the drag link (18) from the pivot block (19).

## 700 SERIES SHOP MANUAL

6. Remove the bolts (54) and starwashers (53) retaining the king pin caps (52 and 45). Remove the caps. Remove the setscrew (49) from the spindle (20).

7. Use a jack and appropriate drift to remove the king pin (48) (see Fig. 8). Use the lifting device to remove the spindle/wheel hub assembly. Remove the thrust bearing (50).

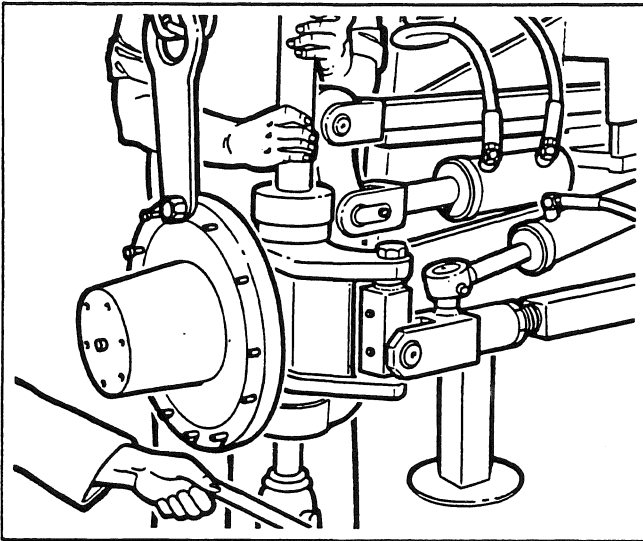


Fig. 8

8. Use a hammer and appropriate tubular drift to remove the two needle roller bearings (51) from the top bore of the knuckle (55) (see Fig. 9).

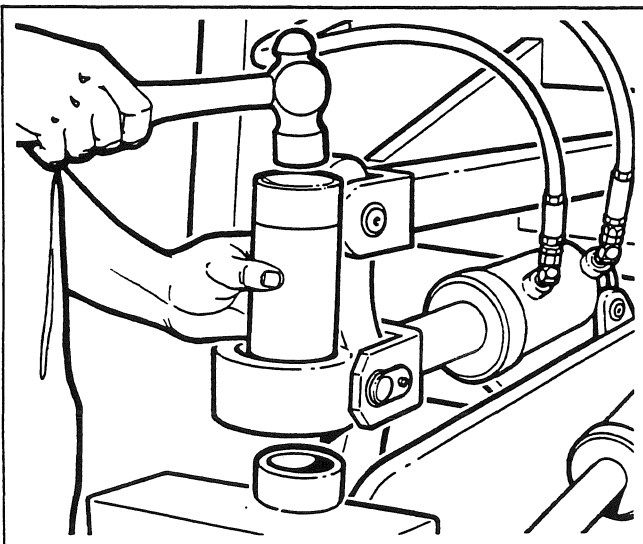


Fig. 9

9. Use a jack and appropriate tubular drift to remove the two needle roller bearings (46) and seal (47) from the bottom bore of the knuckle (see Fig. 10). Discard the seal.

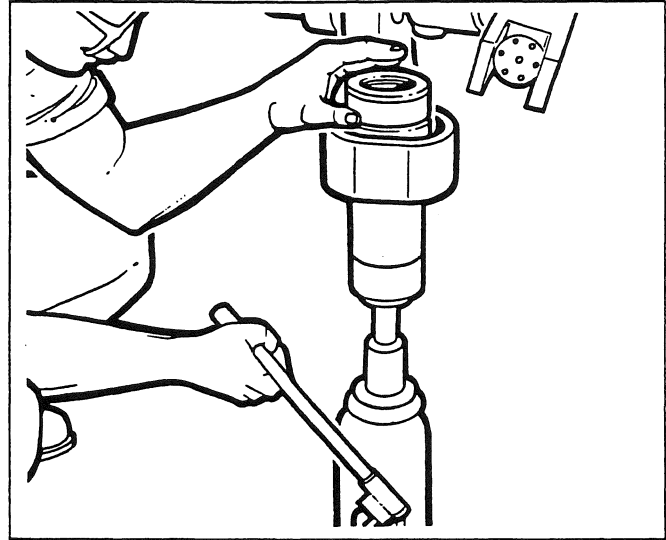


Fig. 10

10. The left-hand king pin bearing and spindle thrust bearing disassembly is now complete. Place the parts to one side for cleaning and inspection.

### King Pin Bearings and Spindle Thrust Bearing - Assembly

1. Place the king pin (48) in a freezer or dry ice. Freezing causes the king pin to shrink and makes installation easier.
2. Lubricate the needle roller bearings (46 and 51) with grease. Use a hammer and appropriate tubular drift to install the bearings into the upper and lower bores of the knuckle (55) (see Fig. 11). Lubricate and install a new seal (47) at the top face of the knuckle lower bore. The seal lip should face upward.
3. Use the lifting device to maneuver the spindle/wheel hub assembly into position at the knuckle. Install the thrust bearing (50) in between the spindle and knuckle upper boss.

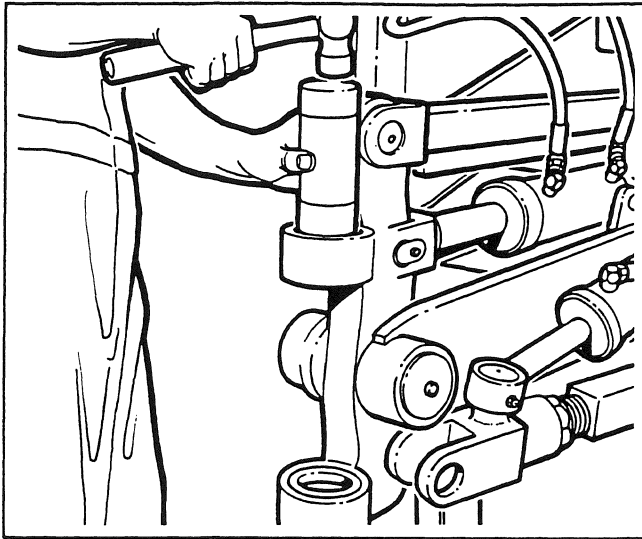


Fig. 11

4. Carefully install the king pin. Make sure you align the slot in the king pin with the tapped hole for the setscrew (49) (see Fig. 12). As previously stated, freezing the king pin helps make the installation easier. Install the setscrew to secure the king pin. Check to see that the spindle pivots freely on the king pin.

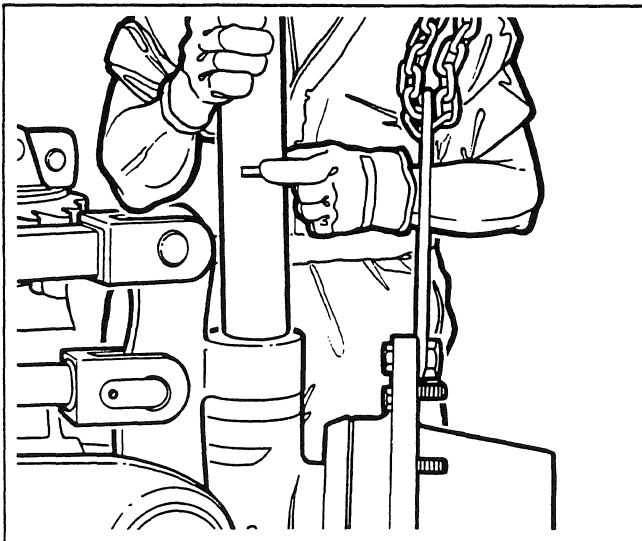


Fig. 12

5. Apply a bead of silicone sealant P/N 56427 to the king pin caps (45 and 52). Install the caps and retain them with bolts (54) and starwashers (53). Lubricate both king pin caps through the grease fittings.

6. To install the pivot block bearing pin (66), you must first remove the pivot block (19). Loosen the adjustment pin locknut (60) and remove the adjustment pin (61). Remove the bolts (41) and starwashers (42) retaining the radius arm pin (43). Remove the radius arm pin. Remove the pivot block.

7. Check the pivot block needle roller bearing (39) and seals (38 and 44) for serviceability. Replace parts as necessary. Lubricate the bearing with grease.

8. Install the pivot block into the yoke of the drag link (18) and retain with the pivot block bearing pin. Secure the pin with the bolt (63), lockwasher (64) and flatwasher (65).

9. Install the pivot block in between the spindle radius arms. Install the radius arm pin and retain with the bolts and starwashers. Install the adjustment pin and locknut. For the proper adjustment procedure, see **Pivot Block and Toe-in Adjustments** in this section. Lubricate the pivot block and pivot block pin through the grease fittings.

10. Install the tire and rim on the wheel. Tighten the wheel nuts in a diagonal sequence to the specified torque. Road test the grader to ensure that the spindle and knuckle are working correctly.

## Wheel Bearings - Disassembly

	<p><b>⚠ WARNING</b></p>
	<p><b>Do not work on graders supported only by moldboard. Hydraulic or mechanical failure could cause grader to fall resulting in severe personal injury or death.</b></p>

## 700 SERIES SHOP MANUAL

1. Since many components are duplicated on both sides of the grader, the following steps describe the disassembly and assembly procedures for the left-hand side only.
2. Loosen the wheel nuts. Make a visual safety check around the grader. Ensure all personnel are away from the area. Signal your intention and start the engine when it is safe to do so. Position the moldboard at 90° to the frame. Apply down pressure to the moldboard and lift the front end of the grader until the tires are just touching the ground. Place a safe, adequate stand under the nose plate.
3. Shut down the engine. Remove and retain the ignition key.
4. Remove the tire and rim. Attach a safe lifting device onto one of the wheel studs.
5. Remove the bolts (34) and starwashers (35) retaining the hub cap (33). Remove the hub cap.
6. Use a hammer and appropriate drift to bend back the tabs of the tabwasher (31) (see Fig. 13). Remove the outer locknut (32). Remove and discard the tabwasher. Remove the inner locknut (30). Remove the lockwasher (29).

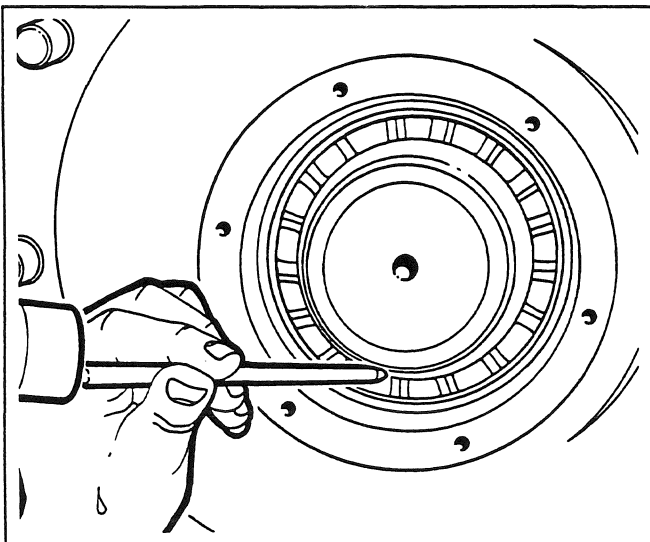


Fig. 13

7. Pull the wheel (26) out slightly on the spindle (20). Remove the outer bearing cone (28). Remove the wheel. Remove the inner bearing cone (24).
8. Remove and discard the V ring seal (23) from the deflector spacer (22). Remove the deflector spacer and dust seal (21). Discard the dust seal.
9. Use a hammer and appropriate soft metal drift to remove the inner and outer bearing cups (25 and 27) (see Fig. 14).

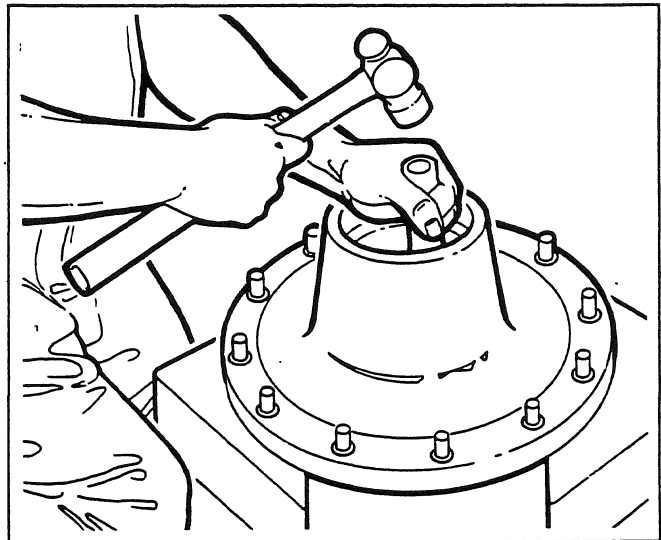
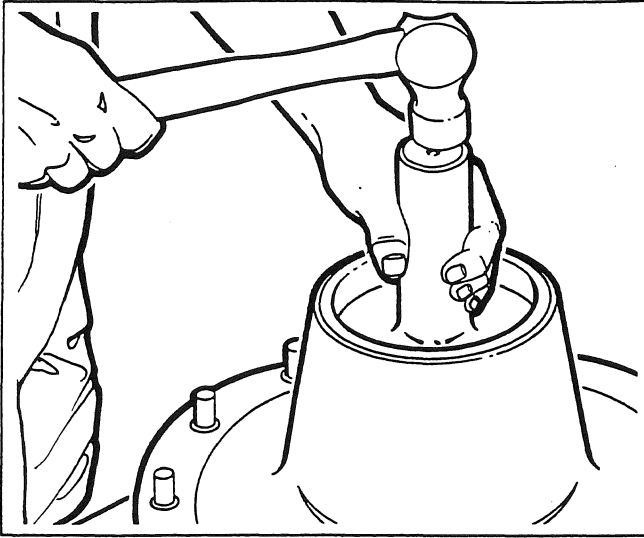


Fig. 14

10. The front axle wheel bearing disassembly is now complete. Place the parts to one side for cleaning and inspection.

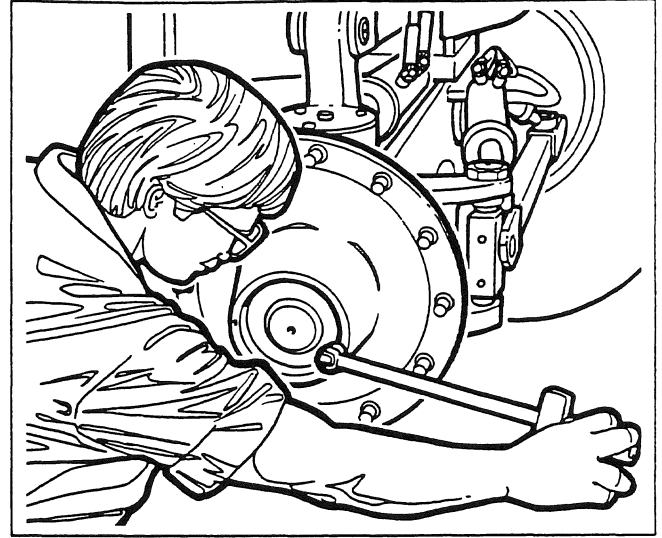
### Wheel Bearings - Assembly

1. Lubricate the outside diameter of the inner and outer bearing cups (25 and 27) with oil. Use a hammer and appropriate bearing driver to install the bearing cups into the wheel counterbores (see Fig. 15). Lubricate the wheel bore and inside diameter of the bearing cups with a generous amount of grease.



**Fig. 15**

2. Install a new dust seal (21), deflector spacer (22) and new V ring seal (23). Apply grease onto the spindle (20).
3. Generously lubricate the inner bearing cone (24) with grease and install it onto the spindle. Attach a safe lifting device to the wheel (26) and install it onto the spindle. Generously lubricate the outer bearing cone (28) with grease and install it onto the spindle.
4. Install the lockwasher (29). Install the inner locknut (30).
5. Install one of the hub cap bolts (34) to help determine the wheel bearing preload. Tighten the inner locknut to the specified torque or until 8 to 12 lbf·ft (11 to 16 N·m; 1,1 to 1,6 kgf·m) of torque, applied at the hub cap bolt, is needed to turn the wheel (see Fig. 16).
6. After setting the wheel bearing preload, install a new tabwasher (31). Install the outer locknut (32) and tighten to the specified torque. Bend the tabwasher tabs until they fit into the slots of both locknuts.
7. Apply a bead of silicone sealant P/N 56427 to the hub cap (33). Install the hub cap and retain it with



**Fig. 16**

- bolts (34) and starwashers (35). Lubricate the hub cap until the wheel bearings are full of grease.
8. Install the tire and rim on the wheel. Tighten the wheel nuts in a diagonal sequence to the specified torque.
9. Recheck the wheel bearing preload by pushing the wheel, which should rotate one and one half turns before stopping. Road test the grader to ensure that the wheel bearings are working properly and are correctly adjusted.

### **Pivot Block and Toe-in Adjustments**

1. Proper pivot block and toe-in adjustment is essential to ensure reduced tire wear and stable operation of the grader.
2. Start the procedure with the left-hand pivot block. You will need to tighten or loosen the adjustment pin (61) found at the top of the pivot block (19).
3. Tighten the adjustment pin until grease just passes through the O rings (40 and 62) when you lubricate the pivot block.

## 700 SERIES SHOP MANUAL

- When the adjustment is correct, hold the adjustment pin with a screwdriver. Tighten the locknut (60) to the specified torque. Repeat steps 3 and 4 for the right-hand pivot block.
- Before starting the toe-in measurement, ensure that the wheels are straight and are not leaning to the left or right. If necessary, move the grader forward and backward to remove any tread distortions.
- Start the toe-in check by making a mark on the tires behind the axle frame and at the same level as the center line of the spindle. Measure the distance between the tires at these marks (see Fig. 17).

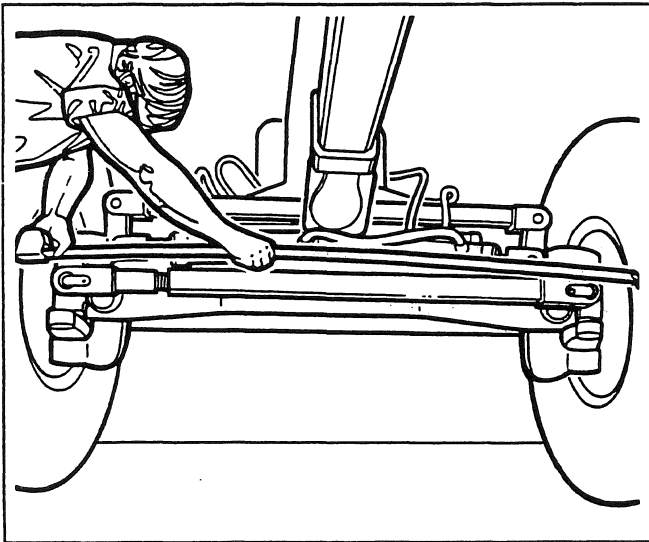


Fig. 17

- Make a visual safety check around the grader. Ensure all personnel are away from the area. Signal your intention and start the engine when it is safe to do so. Slowly drive the grader forward so the marks on the tires are in front of the axle frame and are at the same level as the center line of the spindle. Shut down the engine and retain the ignition key.
- Again measure the distance between the tires at the marks (see Fig. 18). The front measurement should be one half to five eighths of an inch (1,3 cm to 1,6 cm) less than the rear measurement.

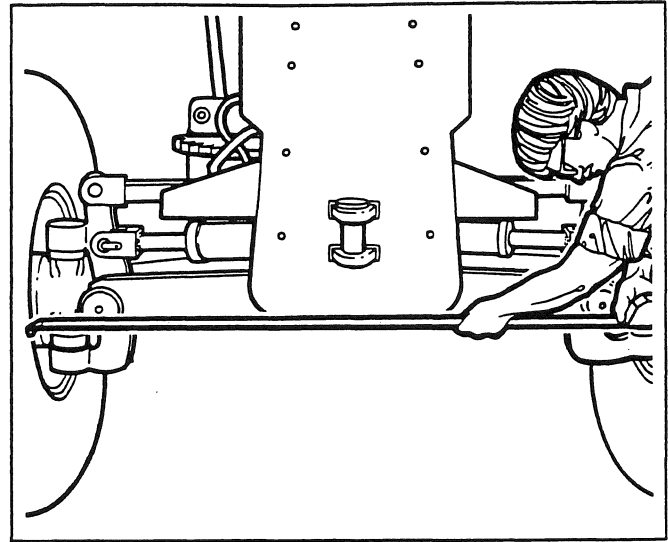


Fig. 18

- To adjust the toe-in, loosen the locknut (36) on the drag link (18). Use a wrench to turn the adjusting collar (37) (see Fig. 19). Turning the adjusting collar varies the length of the drag link and changes the toe-in measurement.

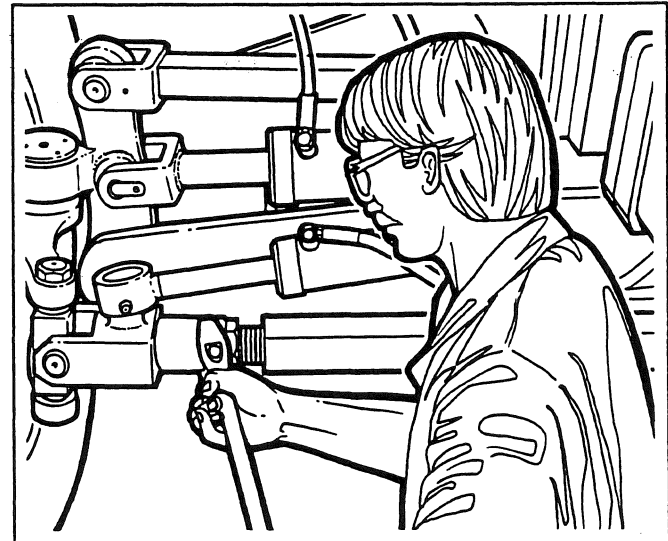


Fig. 19

- Once you have completed the toe-in adjustment, retain the adjusting collar and tighten the locknut. Re-check the toe-in measurement.
- The pivot block and toe-in adjustments are now complete.