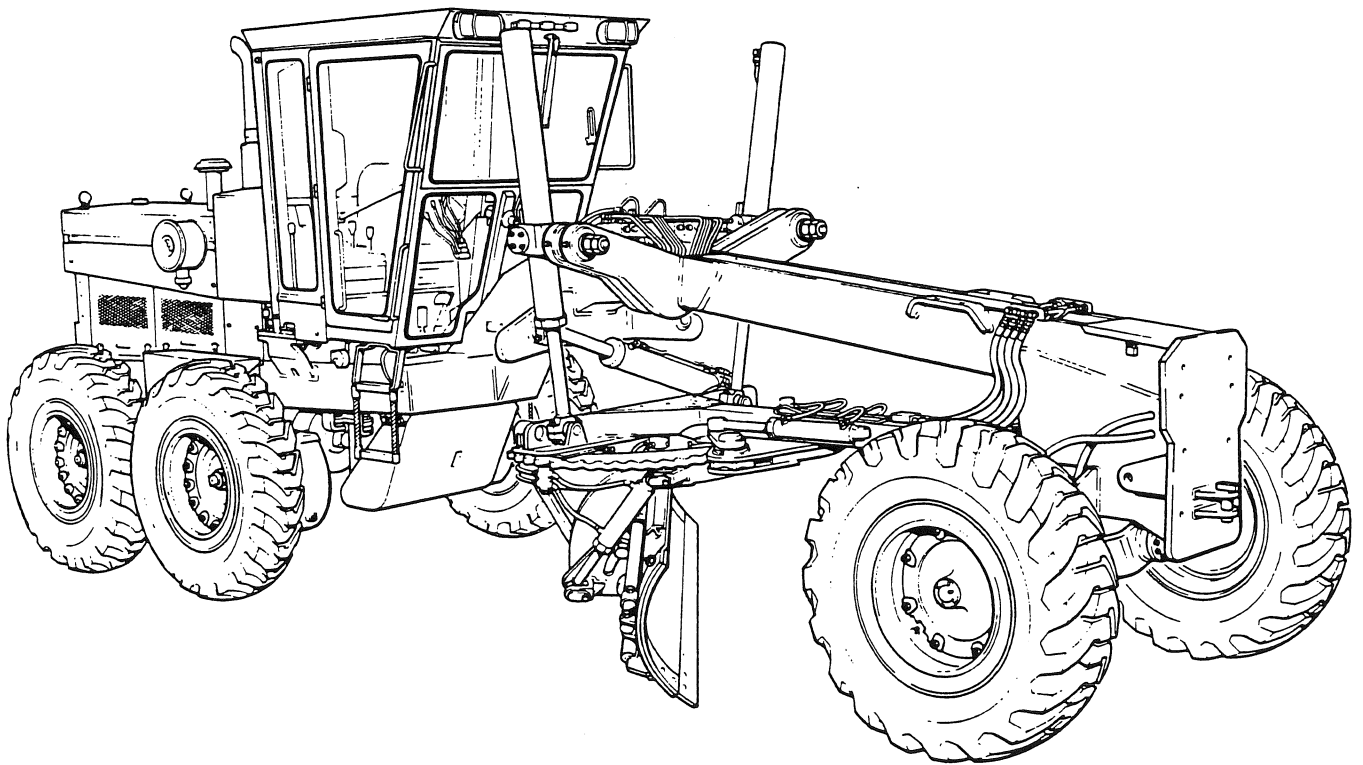


700 SERIES SHOP MANUAL

SECTION 2

CIRCLE, DRAWBAR AND MOLDBOARD





CIRCULATE TO:
PARTS MANAGER _____
SALES MANAGER _____

RETURN TO:
SERVICE MANAGER _____

PRODUCT SUPPORT BULLETIN No. 507

SUBJECT: Timing Circles with New Tooth Profile (Standard and Heavy Duty) August, 1989

Starting at production grader serial number 19895, Champion introduced a new circle and drive pinion tooth profile. The shape appears as if the end of the circle and drive pinion teeth has been cut square. A slightly different circle timing adjustment method is required for the new tooth profile. Perform this timing adjustment at the first 250 hours, every 500 hours or as required.

For the new tooth profile only, refer to the 700 Series Shop Manual P/N L 2005, section 2, and revise the following steps.

Fig. 55, Page 21. Circle drive pinion tooth root to tip clearance is no longer measured.

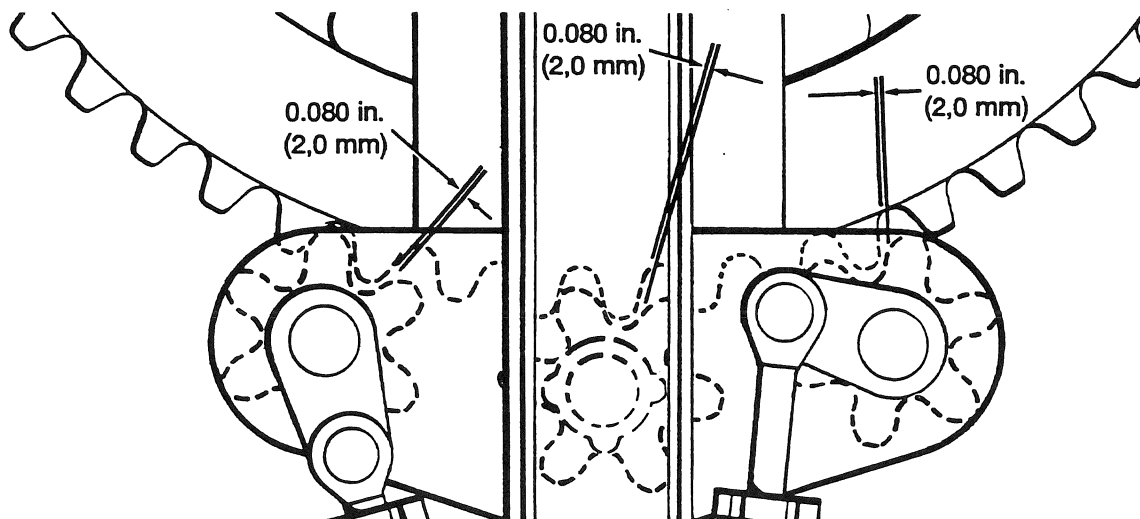
Adjust the front guide plate(s) to contact the inner face of the circle. Contact should be across the complete width of the guide plate(s). Refer to the illustration and use feeler gauges to measure the backlash of both drive pinions. This should be 0.080 in. (2,0 mm). The shape of the teeth allows you to measure the backlash at any location along the tooth. Adjust the guide plates to maintain drive pinion and valve pinion backlash.

Fig. 56, Page 24. Circle turn valve pinion tooth root to tip clearance is no longer measured.

The circle turn valve pinion backlash must also be 0.080 in. (2,0 mm). If not, check parts for wear.

Fig. 57, Page 24. Two guide plates no longer contact the circle.

Adjust the clearance of the rear guide plates to 0.040 to 0.080 in. (1,0 to 2,0 mm) evenly between the guide plates and the circle. When the circle adjustment is complete, install and tighten all clamp and guide plate nuts to the specified torque.



**700 SERIES SHOP MANUAL
CIRCLE, DRAWBAR AND MOLDBOARD**

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700 SERIES SHOP MANUAL
 CIRCLE, DRAWBAR AND MOLDBOARD

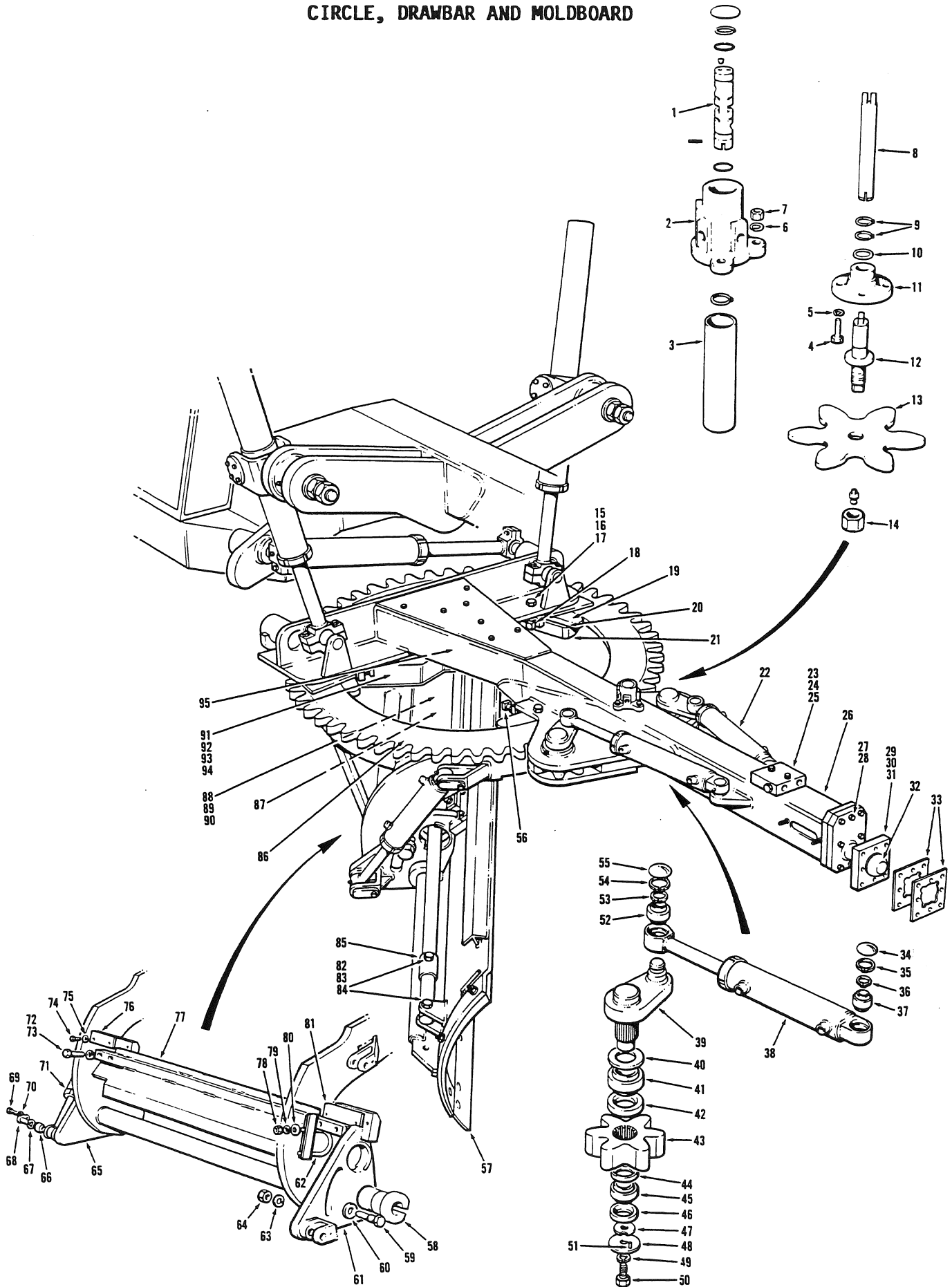


Fig. 1

**700 SERIES SHOP MANUAL
CIRCLE, DRAWBAR AND MOLDBOARD**

Item	Description	Item	Description	Item	Description
1	Spool	33	Shim pack	65	Quadrant
2	Circle turn valve	34	Expansion plug	66	Spherical bearing
3	Hose guard tube	35	Snap ring	67	Snap ring
4	Capscrew	36	Snap ring	68	Lower pin
5	Lockwasher	37	Spherical bearing	69	Capscrew
6	Lockwasher	38	Circle turn cylinder	70	Lockwasher
7	Nut	39	Crank	71	Power tilt cylinder
8	Drive shaft	40	Seal	72	Capscrew
9	Snap ring	41	Spherical bearing	73	Lockwasher
10	Thrust washer	42	Seal	74	Capscrew
11	Pinion shaft bearing	43	Drive pinion	75	Lockwasher
12	Pinion shaft	44	Seal	76	Quadrant wear plate
13	Valve pinion	45	Spherical bearing	77	Cylinder guard
14	Locknut	46	Seal	78	Nut
15	Bolt	47	Notch washer	79	Lockwasher
16	Nut	48	Retaining washer	80	Plain washer
17	Jam nut	49	Lockwasher	81	Quadrant wear plate
18	Setscrew	50	Capscrew	82	Bolt
19	Guide plate	51	Roll pin	83	Lockwasher
20	Shim pack	52	Spherical bearing	84	Nut
21	Clamp plate	53	Snap ring	85	Piston rod extension
22	Circle turn cylinder	54	Snap ring	86	Circle
23	Cushion valve	55	Expansion plug	87	Slide shift cylinder
24	Capscrew	56	Setscrew	88	Bolt
25	Lockwasher	57	Moldboard	89	Lockwasher
26	Drawbar	58	Lower slide casting	90	Nut
27	Capscrew	59	Quadrant pivot bolt	91	Drive arm
28	Lockwasher	60	Retaining washer	92	Bolt
29	Drawplate	61	Quadrant	93	Lockwasher
30	Capscrew	62	U clamp	94	Nut
31	Lockwasher	63	Lockwasher	95	Hydraulic swivel joint
32	Ball stud	64	Nut		

Key to Fig. 1

700 SERIES SHOP MANUAL
CIRCLE, DRAWBAR AND MOLDBOARD

General



Make sure proper tools are available and in good working order. You will require a safe lifting device; blocks; a hydraulic jack and normal shop tools.



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

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

ON ARTICULATED MACHINES, INSTALL THE LOCKING PINS ON BOTH SIDES OF THE HINGE. ALLOW THE ENGINE AND HYDRAULIC SYSTEM TO COOL BEFORE WORKING IN THESE AREAS.

THE GRADER IS READY FOR SERVICING.

NOTE

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

Description

The circle, drawbar and moldboard is the working area of the grader. The circle is a heavy steel fabrication suspended under the drawbar. Teeth on the circle circumference mesh with two drive pinions. Two hydraulic cylinders and cranks transmit power through the drive pinions to turn the circle.

The drawbar is a "T"-shaped welded assembly connected at four points to the grader. The front is mounted on a pivoting ball stud. The two sides of the rear cross-member include ball pin anchors for the blade lift cylinder ball caps. The circle shift cylinder, attached to the drawbar and frame arch, moves the drawbar sideways.

700 SERIES SHOP MANUAL
CIRCLE, DRAWBAR AND MOLDBOARD

Cleaning and Inspection

Cleaning - Bearings and Small Parts



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

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

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

After rinsing, immediately dry the parts using moisture-free compressed air or lint-free rags. Make sure all oil passages are unblocked. Lubricate all bearings with system oil; wrap in clean, lint-free cloth or paper and store in a cool, dry place.

Cleaning - Large Welded Assemblies

Large welded assemblies are most easily cleaned using a high-pressure detergent spray. Use a brush soaked in diesel fuel to remove old lubricant. Protect all wear surfaces from corrosion by drying them quickly and applying fresh lubricant.

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 spherical races, cups and teflon-lined cones 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.

Inspection - Gaskets, Oil Seals and Snap Rings

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

700 SERIES SHOP MANUAL
CIRCLE, DRAWBAR AND MOLDBOARD

Cleaning and Inspection (Continued)

Inspection - Gears and Shafts

Examine teeth of all pinion gears for wear caused by contamination, misalignment, etc. Inspect shafts for signs of bent or twisted splines and replace any deformed cranks.

Torque Guide

Fig. No.	Application	Torque Value		
		N.m	kgf.m	lbf.ft
Fig. No. 30	Drawplate capscrews	244	25	180
Fig. No. 40	Pinion bearing capscrews	31	3	23
Fig. No. 57	Circle clamp and guide plate nuts	1301,5	133	960
Fig. No. 64	Slide shift cylinder anchor nut	1003	102	740
Fig. No. 66	Slide shift cylinder guard capscrews	339	34,5	250
Fig. No. 67	Slide shift cylinder U clamp nuts	13,5	1,4	10
Fig. No. 71	Slide shift cylinder piston rod anchor nut .	1003	102	740

Adjustments

Fig. No.	Application	mm	in.		
Fig. No. 47 } Fig. No. 48 } Fig. No. 49 }	Clearance between circle face and drawbar (add this dimension to the total thickness of the inside edge of the circle and the clamp plate lip)	1,58	1/16		
Fig. No. 55				Clearance between root of circle teeth and tips of both drive pinions	1,6 - 3 .06 - .12
Fig. No. 57				Clearance between third guide plate and circle inside edge	1,6

700 SERIES SHOP MANUAL
CIRCLE, DRAWBAR AND MOLDBOARD

Troubleshooting

Problem	Cause	Remedy
Circle turns under load.	Drive cylinders are passing oil.	Replace the cylinder packing.
	Cushion valve leaking.	Replace the cushion valve.
Circle will not turn.	Obstruction in the circle turn mechanism.	Remove debris from the circle turn mechanism.
	Circle out of adjustment.	Adjust the circle.
	Drive pinion/drive shaft for the timing valve slipped, damaged or broken.	Adjust, repair or replace the drive pinion or shaft.
	Damaged or broken circle drive mechanism.	Repair or replace circle drive components as required.
	Circle timing is out of adjustment.	Adjust the circle timing
	Hydraulic malfunction.	See Hydraulics Section.
Circle turns in the wrong direction.	Timing valve spool is 180° out of adjustment.	Adjust the timing valve.
Circle turns in one direction only.	Circle turn cushion valve out of adjustment.	See Hydraulics Section.
Moldboard is loose.	Lower slide castings are worn.	Replace the lower slide castings.
	Upper slide rail or wear plates are worn.	Install new wear plates. DO NOT install wear plates so that the clearance is too tight. The wear plates will be damaged.
Moldboard drifts under load.	Tilt cylinders are passing oil.	Replace the cylinder packing.
	Power tilt lock valve is malfunctioning.	Repair or replace the lock valve.

700 SERIES SHOP MANUAL
CIRCLE, DRAWBAR AND MOLDBOARD

Circle, Drawbar and Moldboard - Removal and Disassembly

Fig. 2

Park the grader on level ground. Place the transmission mode lever in **Neutral**. Centralize the circle, drawbar and moldboard assembly using the circle shift and blade lift cylinders. Tilt the moldboard (57) forward. Move the moldboard to the right as far as possible using the slide shift cylinder (87). Lower the moldboard onto wooden blocks. Shut down the engine and place the machine in the **Service Position**.

Fig. 3

Remove the capscrews (74) and lockwashers (75) retaining the quadrant wear plates (76 and 81). Remove the wear plates.

Fig. 4

Tilt the moldboard (57) as far back as possible. Remove the nut (84), bolt (82) and lockwasher (83) retaining the slide shift cylinder piston rod or rod extension (85) to the moldboard lugs.

Fig. 5

Retract the piston rod. Place a block of wood between the end of the rod and the moldboard lugs. Support the end of the moldboard (57) with a safe lifting device. Push the moldboard out of its slides using the slide shift cylinder. **Make sure** that the slide shift cylinder piston rod does not bend or become damaged during this procedure. Fully retract the piston rod. Move the moldboard to a safe place.

Fig. 6

Support the slide shift cylinder (87). Remove the nuts (78), lockwashers (79), plain washers (80) and U clamp (62).

Fig. 7

Remove the capscrews (72) and lockwashers (73) retaining the slide shift cylinder guard (77). Carefully remove the guard.

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CIRCLE, DRAWBAR AND MOLDBOARD

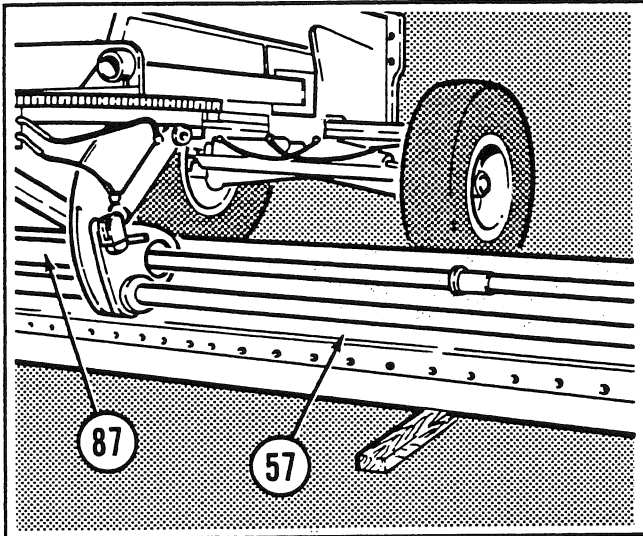


Fig. 2

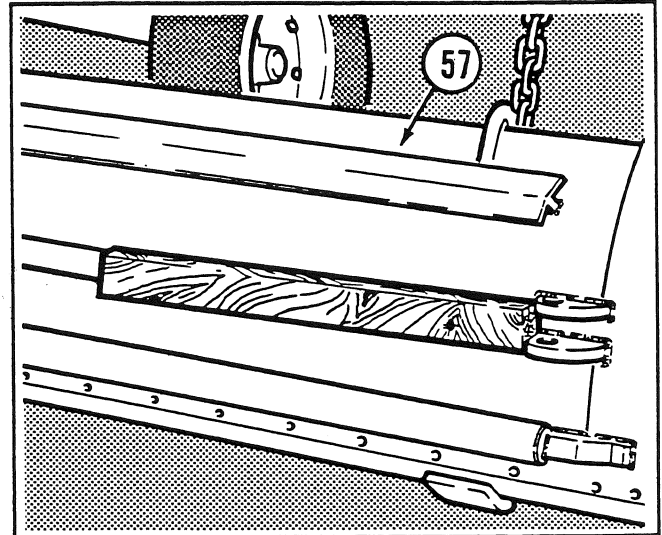


Fig. 5

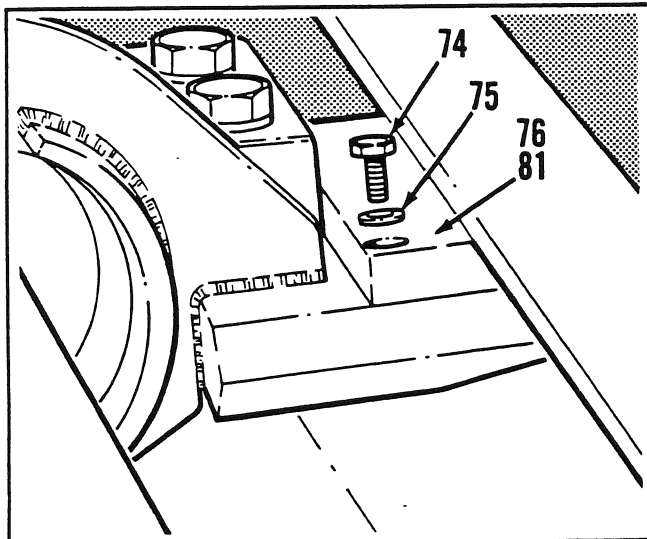


Fig. 3

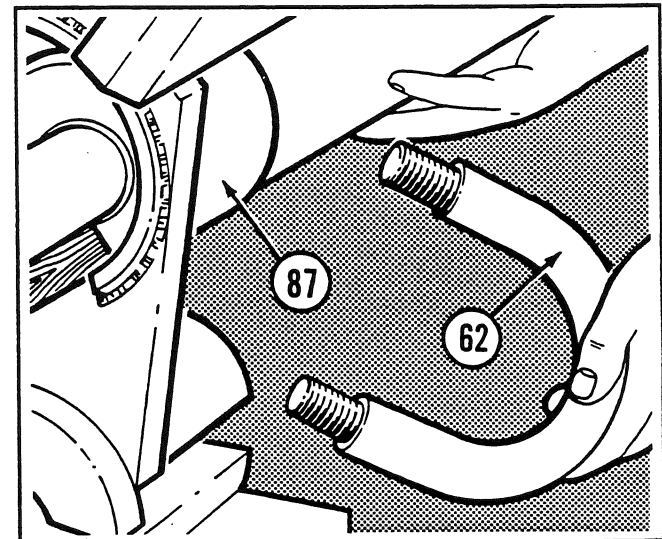


Fig. 6

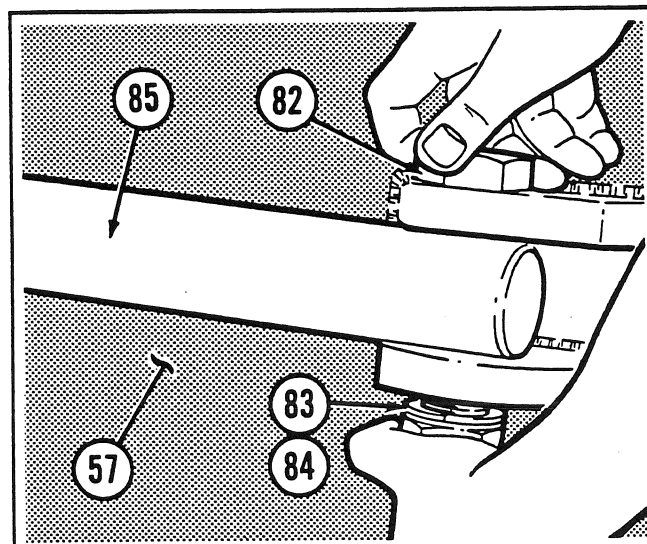


Fig. 4

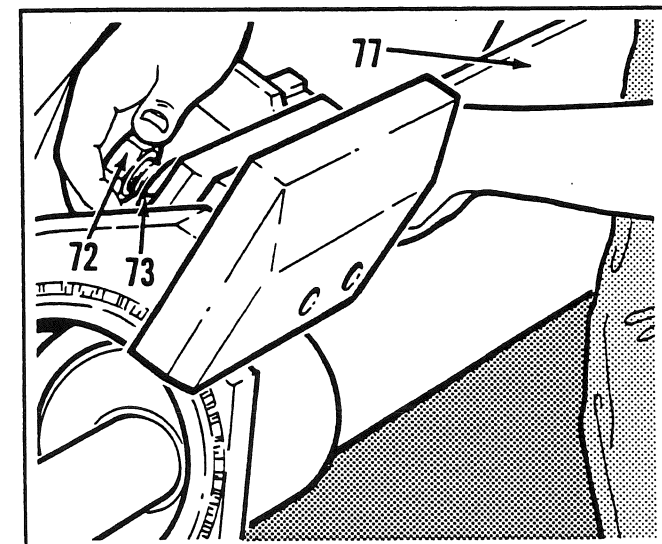


Fig. 7

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CIRCLE, DRAWBAR AND MOLDBOARD

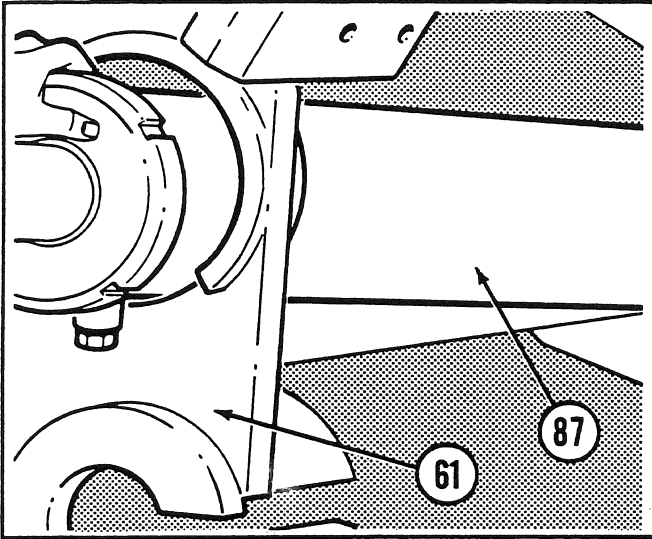


Fig. 8

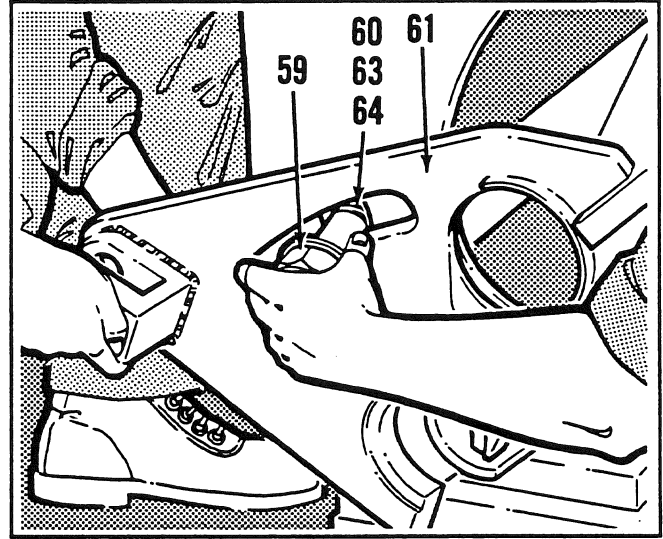


Fig. 11

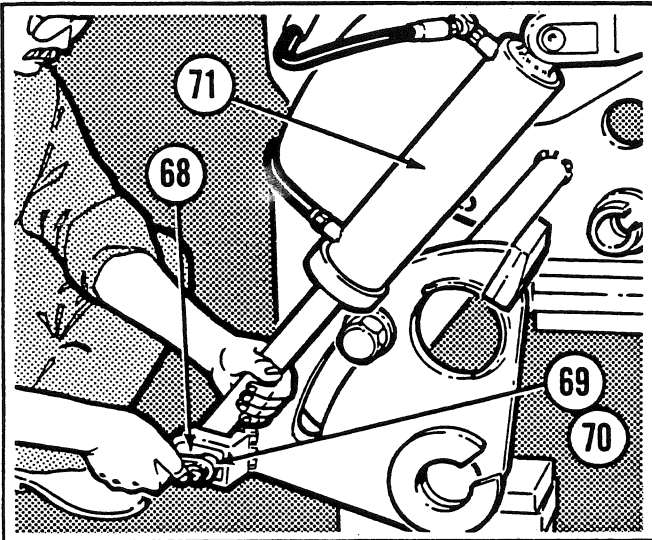


Fig. 9

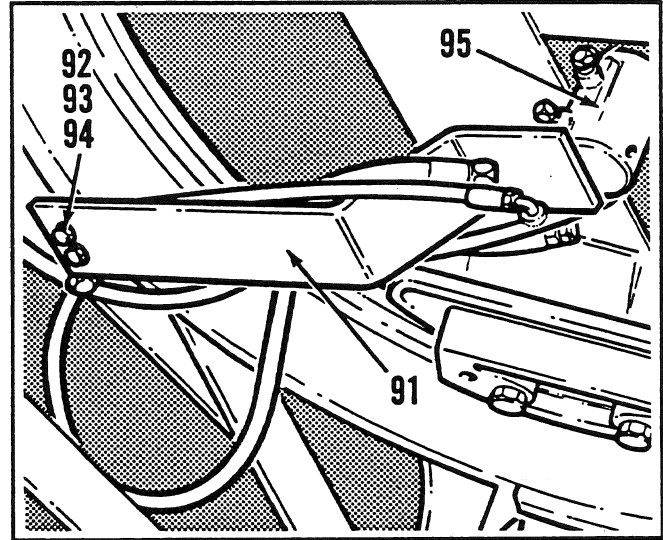


Fig. 12

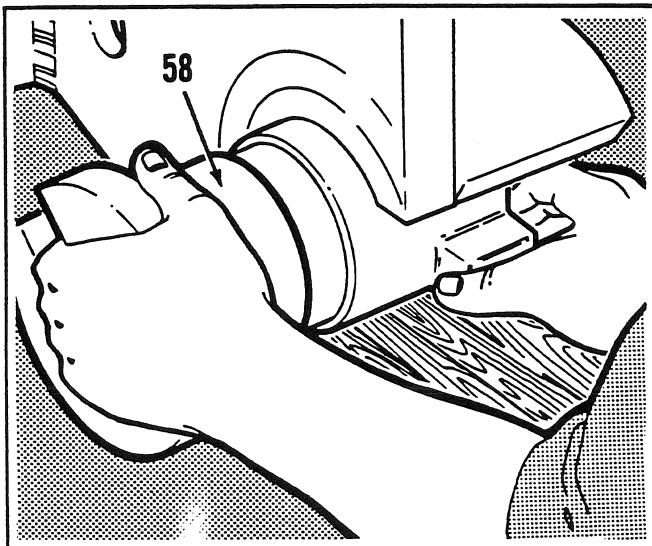


Fig. 10

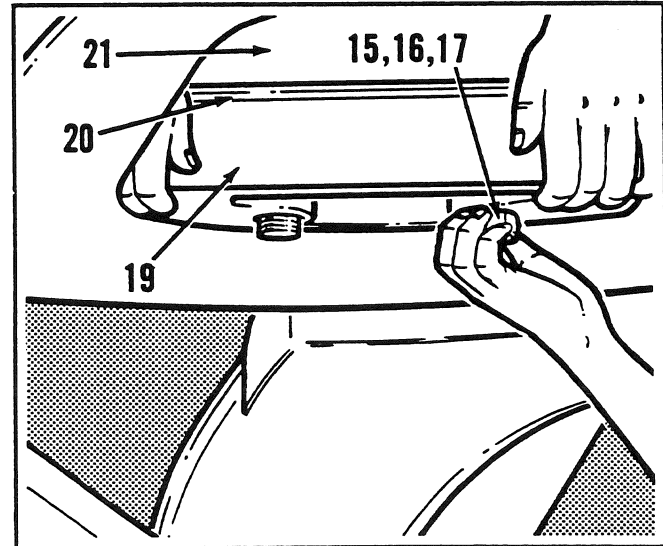


Fig. 13

700 SERIES SHOP MANUAL
CIRCLE, DRAWBAR AND MOLDBOARD

Circle, Drawbar and Moldboard - Removal and Disassembly (Continued)

Fig. 8

Disconnect the hoses from the slide shift cylinder (87). Identify the hoses to avoid confusion during assembly. Remove the fittings from the cylinder. Plug the hoses and cylinder ports to prevent contamination. Remove the cylinder anchor bolt (88), nut (90) and lockwasher (89). Remove the cylinder through the access hole in the right hand quadrant (61).

Fig. 9

Fully extend the power tilt cylinder (71) or manual tilt link. Remove the capscrew (69) and lockwasher (70) retaining the lower pin (68). Remove the pin using a hammer and soft metal drift. Carefully retract the cylinder. Disconnect the hoses. Plug the hoses and fittings to prevent contamination. Remove the capscrew and lockwasher retaining the upper pin. Remove the pin using a slide hammer. Remove the cylinder or link. When replacing spherical bearings (66), remove and discard the snap rings (67).

Fig. 10

A lug retains the lower slide casting (58). Turn the casting 180° and align the lug with the openings in the circle arm and quadrant. Support and remove the casting.

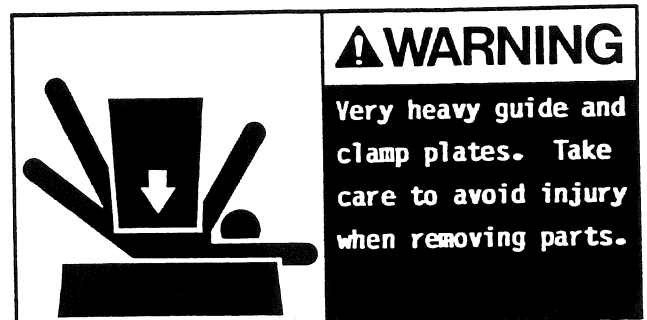
Fig. 11

Remove the quadrant pivot bolt (59), retaining washer (60), nut (64) and lockwasher (63). Support and remove the quadrant (61). Repeat the steps in Fig. 9 through Fig. 11 for the other side.

Fig. 12

Before separating the circle (86) from the drawbar (26), support the circle arms on proper blocks and the front of the circle on a secure stand. Disconnect both ends of the hoses between the hydraulic swivel joint assembly (95) and the circle. Plug the hoses and fittings to prevent contamination. Remove the nuts (94), bolts (92) and lockwashers (93) securing the drive arm (91). Remove the drive arm.

Fig. 13



Support the guide plates (19) and clamp plates (21). Remove the bolts (15), jam nuts (17), nuts (16), plates and shim packs (20).

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Circle, Drawbar and Moldboard - Removal and Disassembly (Continued)

Fig. 14

Start the grader and carefully drive it forward, disengaging the circle (86) teeth from the drive pinions (43).

Fig. 17

Remove both cylinder ends from the studs using a puller. Inspect the spherical bearings (52) and studs for excessive wear or damage. Replace defective bearings.

Fig. 15

Raise and move the drawbar (26) to one side using the blade lift and side shift cylinders. Attach chains securely at three points around the circle (86). Raise and move the circle away from the grader using the lifting device. Center and level the drawbar and secure safely.

Fig. 18

Before disassembling the crank (39) and drive pinion (43), mark the position of the crank in relation to one of the drive pinion teeth. This will help during assembly and in the circle timing procedure.

Fig. 16

To disassemble the circle turn mechanism, disconnect the hoses from the circle turn cylinders (22 and 38) and circle turn valve (2). Plug the hoses and fittings to prevent contamination. Cut a slot in the expansion plug (55). Remove and discard the expansion plug and external snap ring (54).

Fig. 19

Remove the capscrew (50), lockwasher (49), retaining washer (48) and notch washer (47). Remove and discard the roll pin (51). Remove the crank (39) from the drive pinion (43) using a hydraulic jack.

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CIRCLE, DRAWBAR AND MOLDBOARD

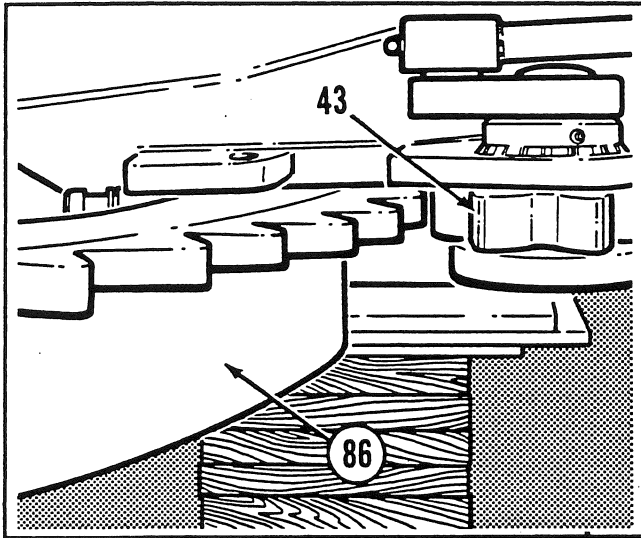


Fig. 14

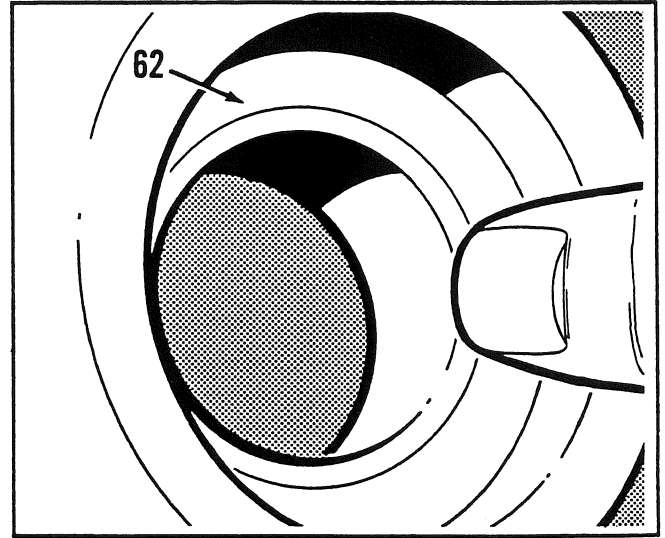


Fig. 17

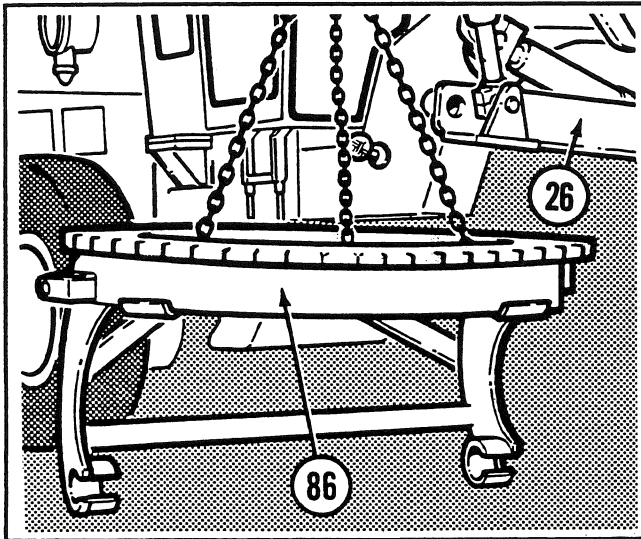


Fig. 15

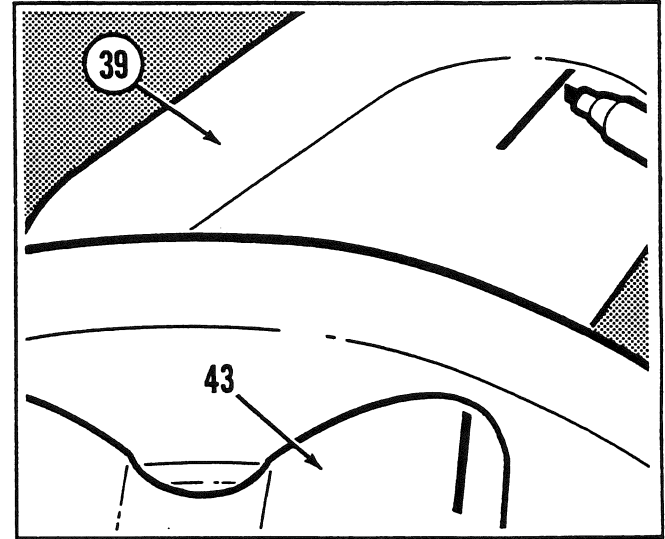


Fig. 18

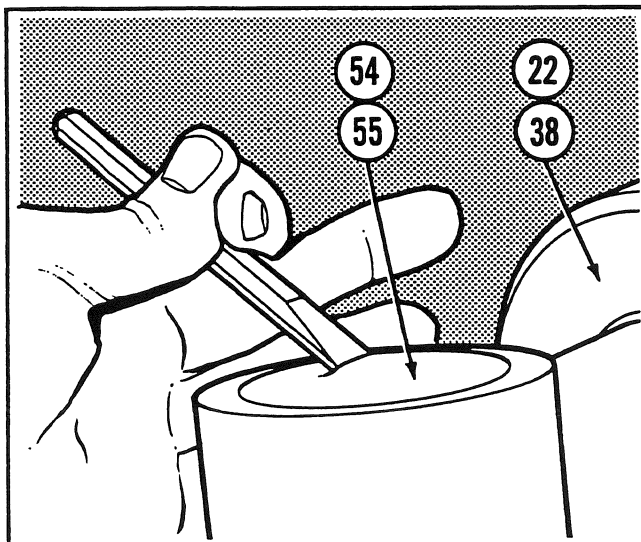


Fig. 16

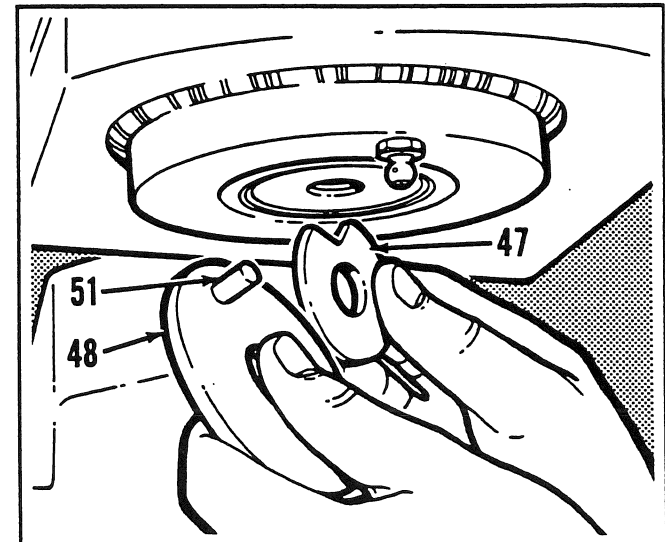


Fig. 19

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 CIRCLE, DRAWBAR AND MOLDBOARD

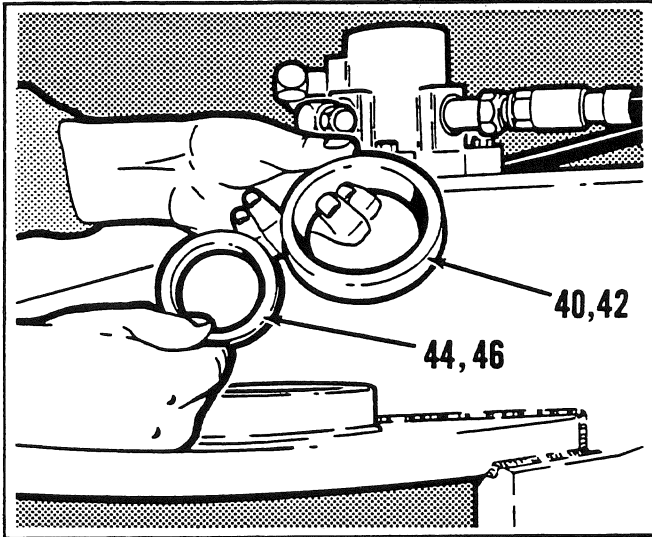


Fig. 20

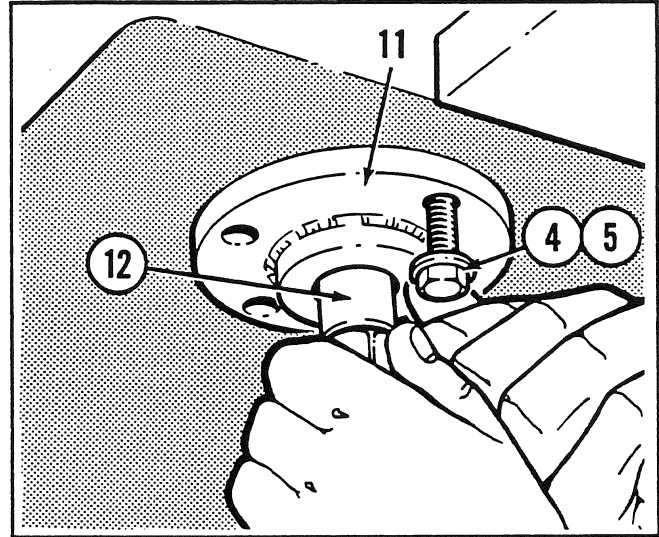


Fig. 23

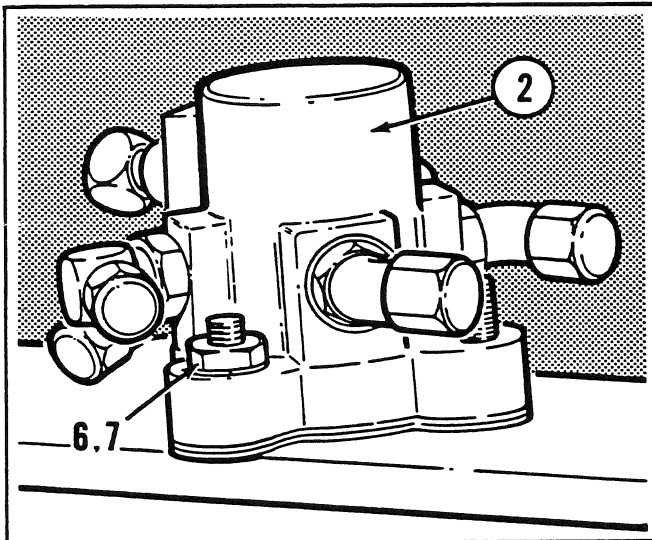


Fig. 21

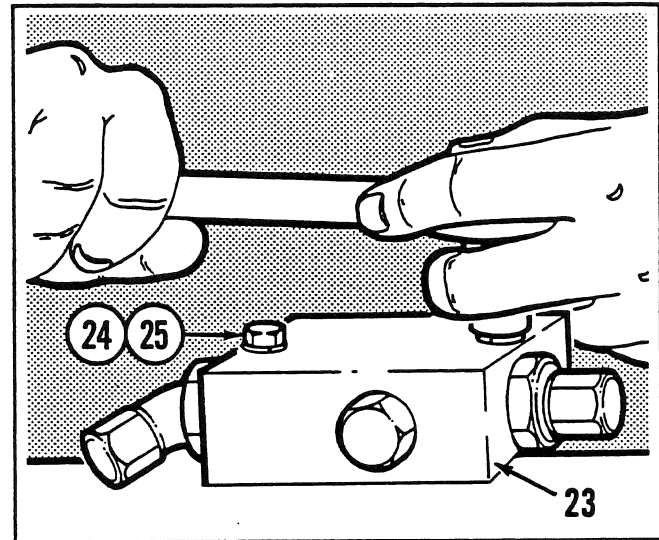


Fig. 24

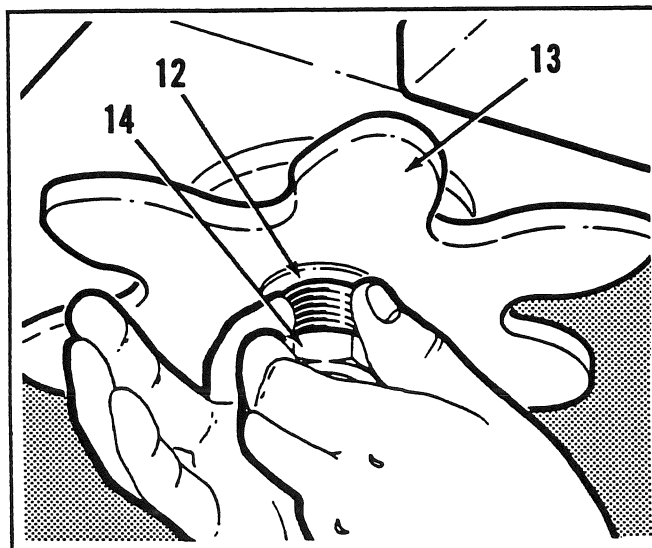


Fig. 22
 Section 2
 Page 11

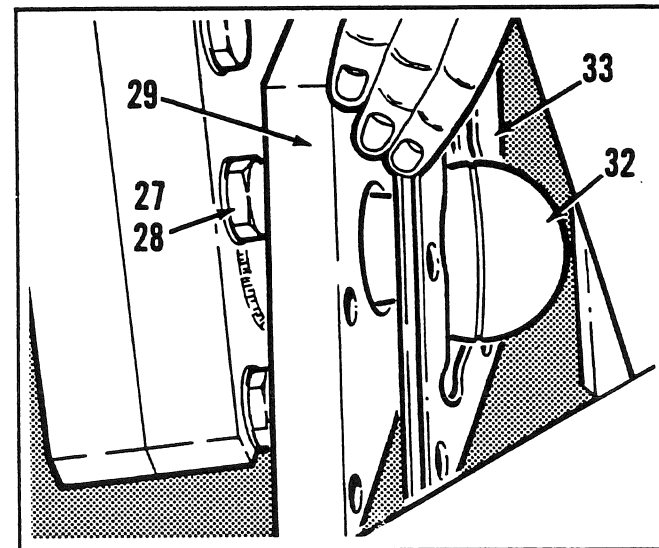


Fig. 25

700 SERIES SHOP MANUAL
CIRCLE, DRAWBAR AND MOLDBOARD

Circle, Drawbar and Moldboard - Removal and Disassembly (Continued)

Fig. 20

Remove the spherical bearing (41) from the crank (39) using a bearing separating device. Remove and discard the top and bottom seals (40 and 42). Remove the drive pinion (43). Remove the spherical bearing (45) from the lower boss using a soft metal drift. Remove and discard the top and bottom seals (44 and 46). Inspect the bearings for excessive wear or damage. Replace defective bearings.

Fig. 21

Disconnect any remaining lines and hoses from the circle turn valve (2). Plug the hoses and fittings to prevent contamination. Remove the nuts (7) and lockwashers (6) retaining the valve. Remove the valve and discard any spacer gaskets. Remove the drive shaft (8) and hose guard tube (3).

Fig. 22

Remove the valve pinion locknut (14) and inspect for possible re-use. Locknuts can normally be re-used twice from new. If in doubt, discard the part. Remove the valve pinion (13) from the pinion shaft (12).

Fig. 23

Remove the capscrews (4) and lockwashers (5) retaining the pinion shaft bearing (11). Remove and discard the snap ring (9). Remove the pinion shaft (12) and thrust washer (10) from the bearing. Inspect the shaft and bearing for excessive wear or damage. Replace defective parts.

Fig. 24

Disconnect the lines and hoses from the cushion valve (23). Cap the hoses and fittings to prevent contamination. Remove the capscrews (24) and lockwashers (25) retaining the cushion valve. Remove the valve.

Fig. 25

To disconnect the ball stud (32), support the front of the drawbar using the lifting device. Remove the capscrews (30) and lockwashers (31) retaining the drawplate (29). Move the drawbar (26) away from the frame, ensuring there is sufficient slack in the hoses. Remove the shim pack (33). To replace the ball stud, remove the capscrews (27) and lockwashers (28).

700 SERIES SHOP MANUAL
CIRCLE, DRAWBAR AND MOLDBOARD

Circle, Drawbar and Moldboard - Assembly and Installation

Fig. 26

Following disassembly of the circle, drawbar and moldboard, refer to **Cleaning and Inspection** on pages 2 and 3 of this Shop Manual Section. Thoroughly clean and inspect all applicable parts before assembling the circle, drawbar and moldboard.

Fig. 27

To begin the drawbar assembly, determine the required shim pack (33) thickness. Place the drawplate (29) on the frame and retain with the capscrews (30) and lockwashers (31). Tighten the capscrews.

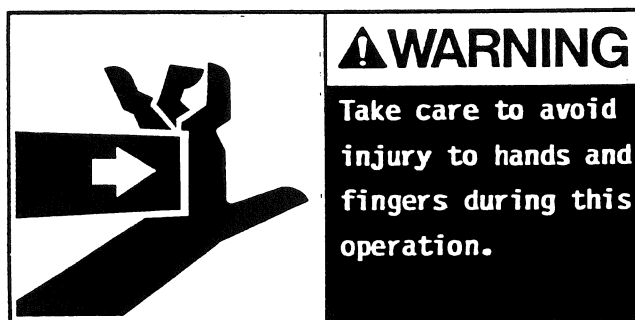
Fig. 28

Measure the gap between the drawplate (29) and the frame on all four sides. Assemble a shim pack (33) equal to the average of the four measurements. Remove the capscrews (30), lockwashers (31) and drawplate.

Fig. 29

Place the shim pack (33) over the ball stud (32). Lubricate the socket with the type of grease recommended in the Lubrication Specifications at the front of this Shop Manual.

Fig. 30



Move the drawbar (26) forward until the ball stud (32) is firmly installed in the socket. Align the shim pack (33) and drawplate (29). Install the capscrews (30) and lockwashers (31). Tighten the capscrews to the specified torque.

Fig. 31

Install the cushion valve (23) on the drawbar (26) and retain with the capscrews (24) and lockwashers (25). Clean the fittings and re-connect the lines and hoses to the valve.

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CIRCLE, DRAWBAR AND MOLDBOARD

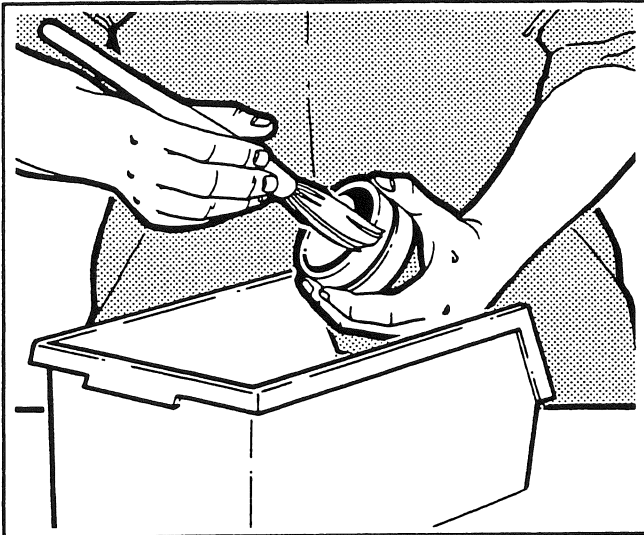


Fig. 26

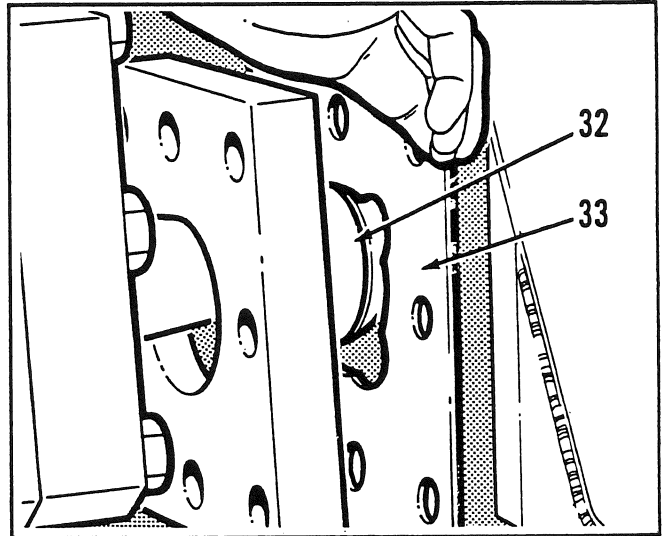


Fig. 29

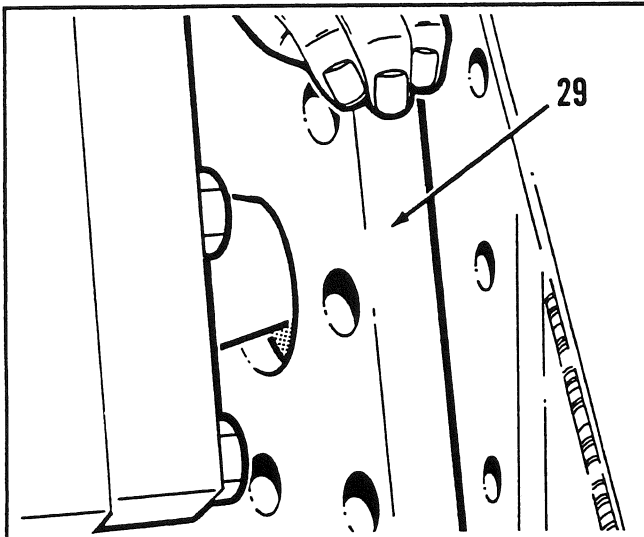


Fig. 27

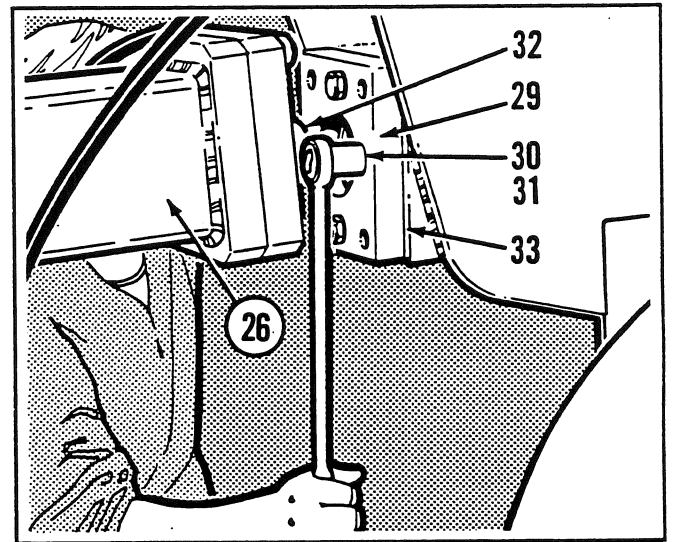


Fig. 30

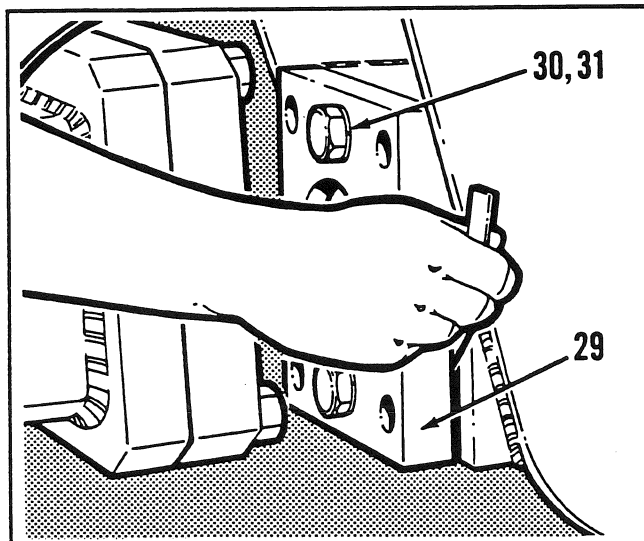


Fig. 28

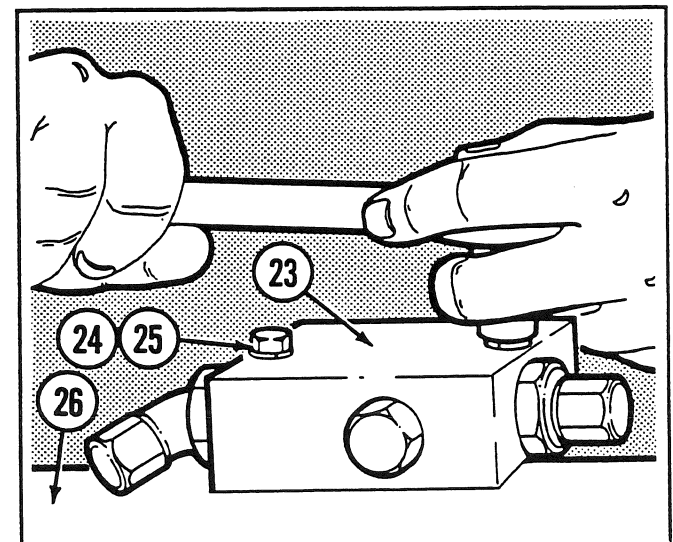


Fig. 31

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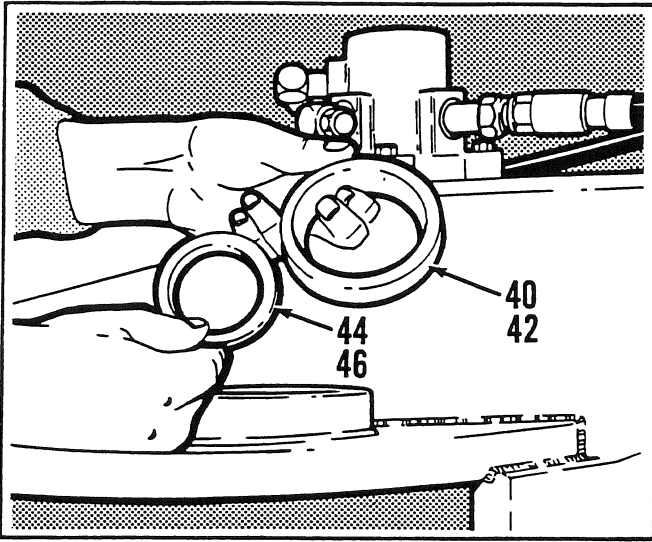


Fig. 32

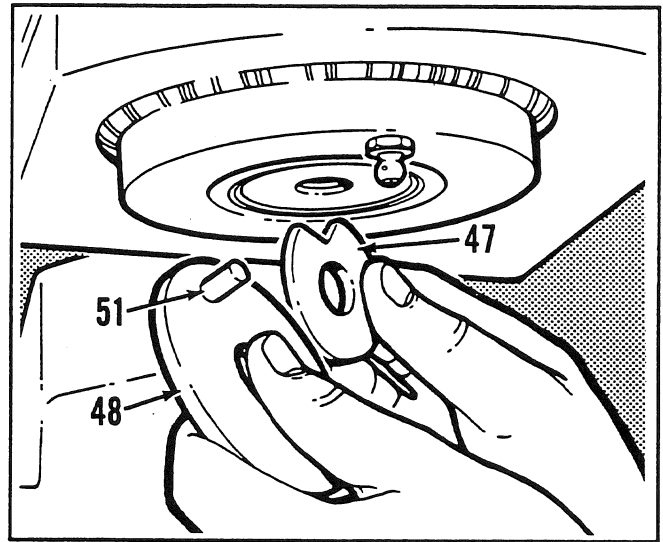


Fig. 35

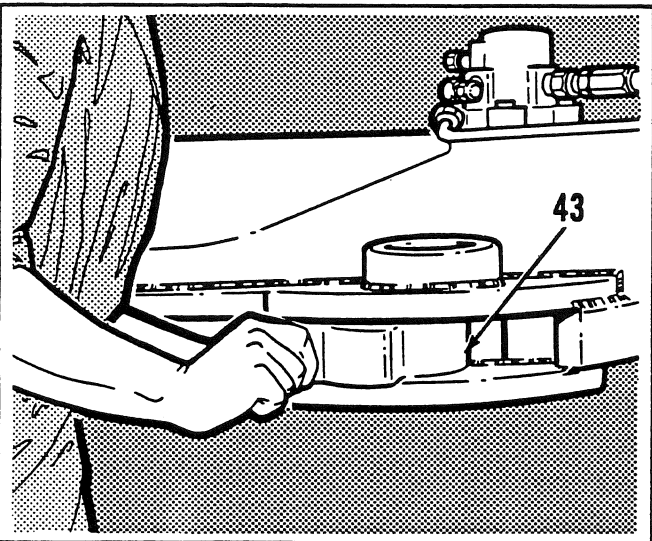


Fig. 33

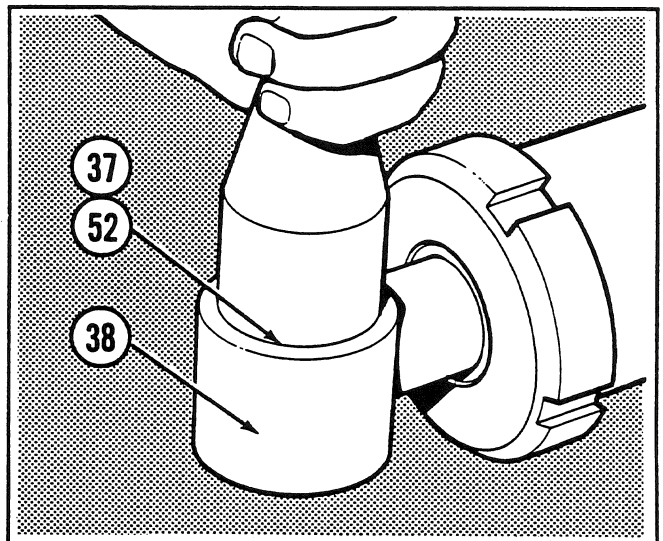


Fig. 36

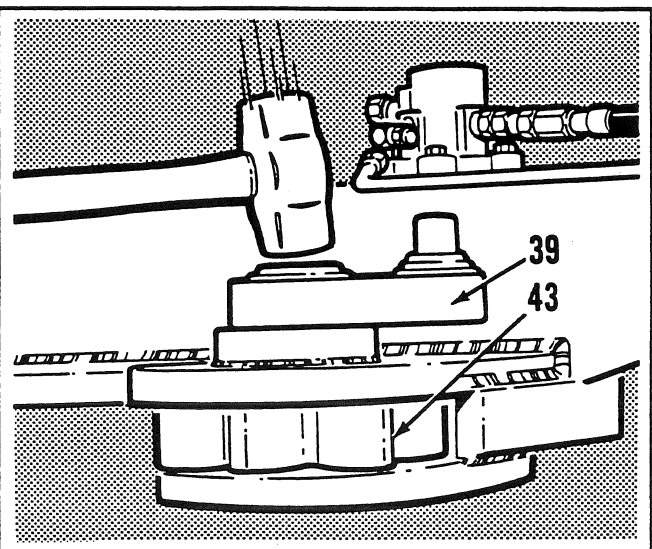


Fig. 34

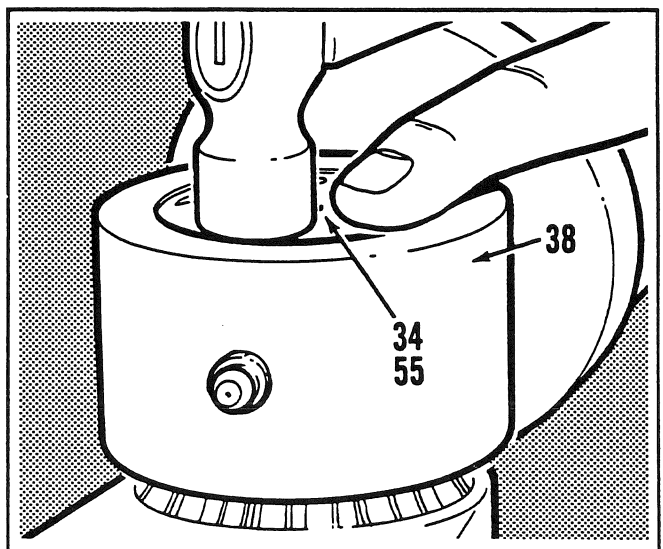


Fig. 37

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Circle, Drawbar and Moldboard - Assembly and Installation (Continued)

Fig. 32

Install the crank (39), with the splined shaft pointing up, into a vise. Lubricate and install a new top seal (40), lip pointing up. Apply a coating of grease onto all surfaces of the spherical bearing (41). Install the bearing using a soft metal tubular drift with the same diameter as the bearing inner race. Lubricate and install a new bottom seal (42), lip pointing down.

Fig. 33

Apply a coating of grease onto all surfaces of the spherical bearing (45) and upper and lower boss bores. Install the bearing into the lower boss using a soft metal tubular drift with the same diameter as the bearing outer race. Lubricate and install a new top seal (44), lip pointing down. Carefully install the drive pinion (43). Make sure the aligning mark drawn previously is visible. Apply anti-seize compound, part number **30453** onto the splines.

Fig. 34

Remove the crank (39) from the vise and turn it over. Align the two marks drawn previously. Engage the splines. Install the crank through the drive pinion (43) using an appropriate hammer. Make sure the lower spherical bearing (45) is not displaced.

Fig. 35

Check the installation for alignment. Install a new roll pin (51). Lubricate and install a new bottom seal (46), lip pointing up. Install the notch washer (47) and retaining washer (48). Secure the crank assembly with the capscrew (50) and lockwasher (49).

Fig. 36

If you are installing new spherical bearings (37 and 52), first apply a coating of grease onto all surfaces of the bearings. Install the bearings into the circle turn cylinder (38) using a soft metal tubular drift with the same diameter as the bearing outer race. Install new snap rings (36 and 53).

Fig. 37

Install the circle turn cylinder (38) using a soft metal tubular drift with the same diameter as the bearing inner race. Install new snap rings (35 and 54). Install new expansion plugs (34 and 55). Secure the expansion plugs by indenting the center of the plug. Make sure all expansion plugs have a central vent hole. Repeat the steps in **Fig. 32** through **Fig. 37** for the other side.

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Circle, Drawbar and Moldboard - Assembly and Installation (Continued)

Fig. 38

Make sure that the cranks are properly positioned for the circle timing operation. Fully retract the right hand circle turn cylinder. The crank should point forward. A line should pass along its axis and through the center point of both anchor studs.

Fig. 39

Position the left hand crank so that the turn cylinder anchor stud, crank center line and crank stud make a 90° angle.

Fig. 40

Install the pinion shaft (12) into the bearing (11) and thrust washer (10). Secure with a new snap ring (9). Install the pinion shaft and bearing assembly. Secure with the capscrews (4) and lockwashers (5). Tighten the capscrews to the specified torque.

Fig. 41

Install the drive shaft (8) into the drawbar (26) and connect the notched ends of the two shafts. Install the hose guard tube (3). Install the circle turn valve (2) with new gaskets.

Fig. 42

Carefully turn the pinion shaft (12) from below to engage the drive shaft (8) with the spool (1). Make sure the circle turn valve (2) sits evenly on the drawbar. If required, install several spacer gaskets to provide proper clearance for the shaft. Secure the valve with the nuts (7) and lockwashers (6).

Fig. 43

Install the valve pinion (13) on the pinion shaft (12). Retain the pinion with the locknut (14), refer to text for Fig. 22. Re-connect all hoses.

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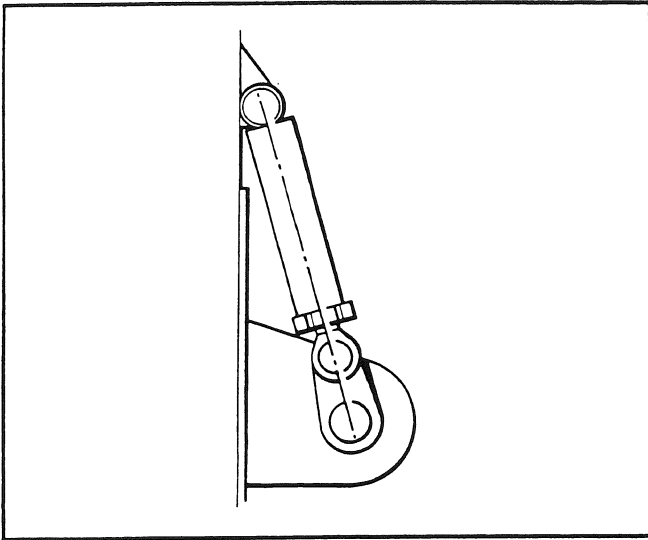


Fig. 38

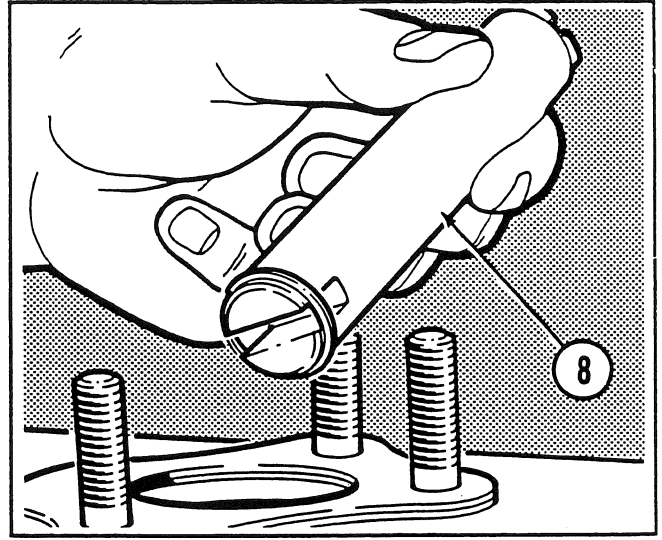


Fig. 41

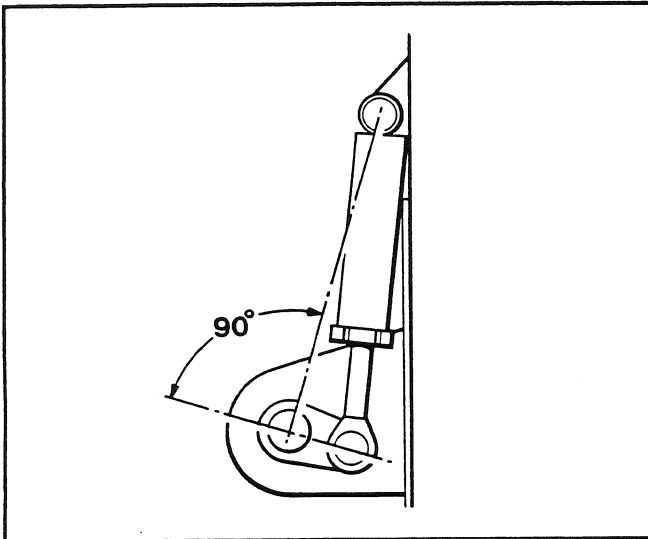


Fig. 39

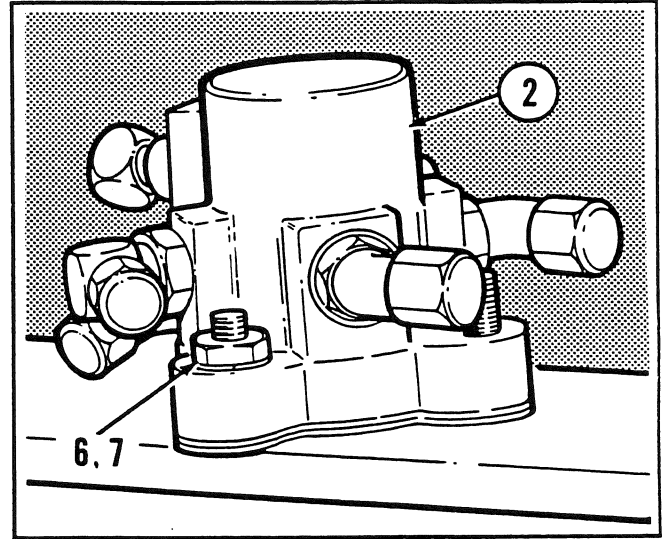


Fig. 42

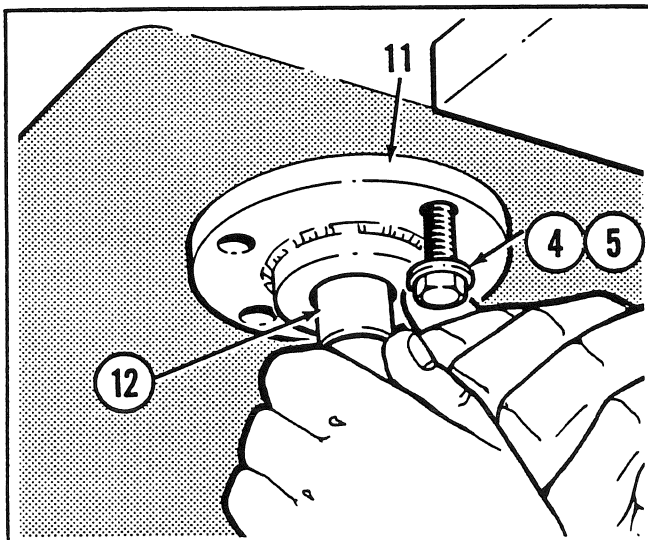


Fig. 40

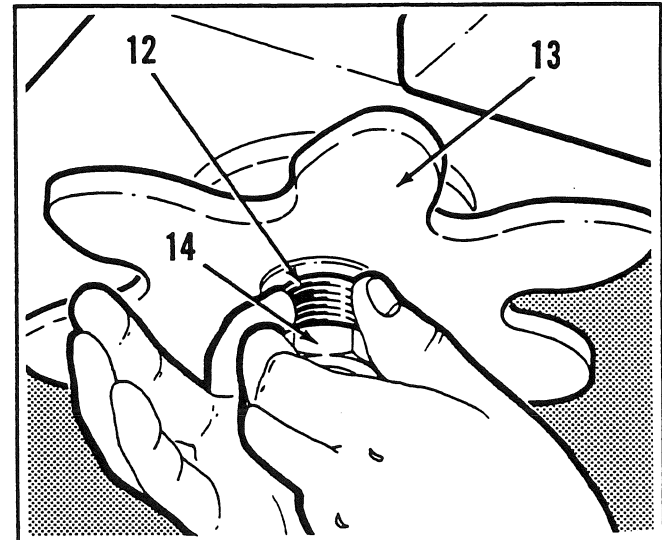


Fig. 43

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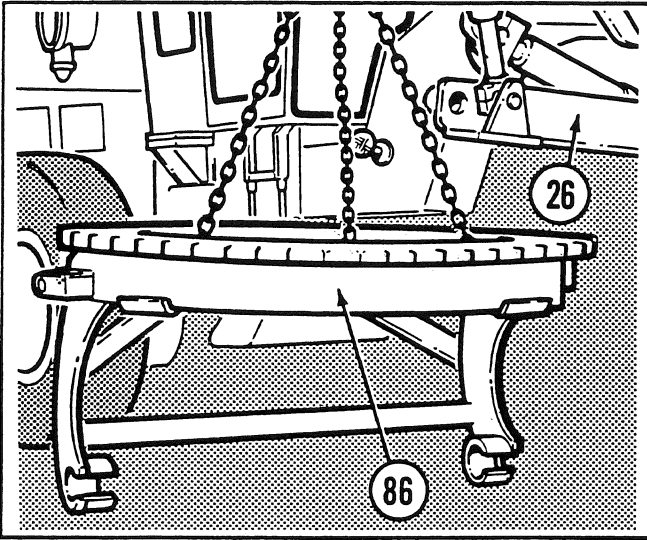


Fig. 44

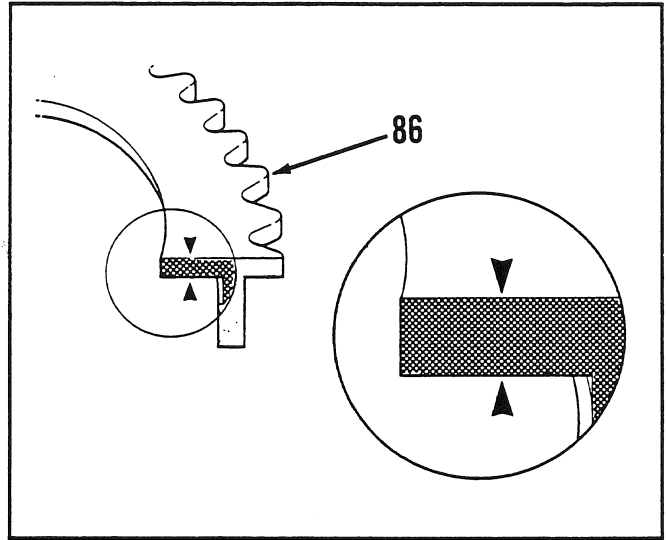


Fig. 47

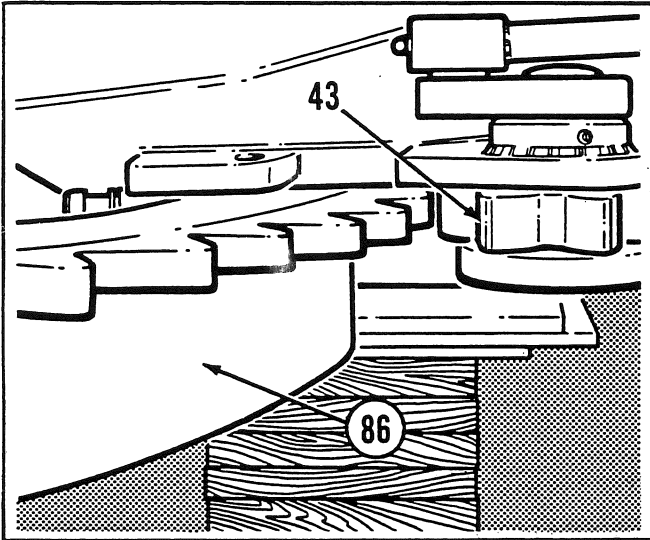


Fig. 45

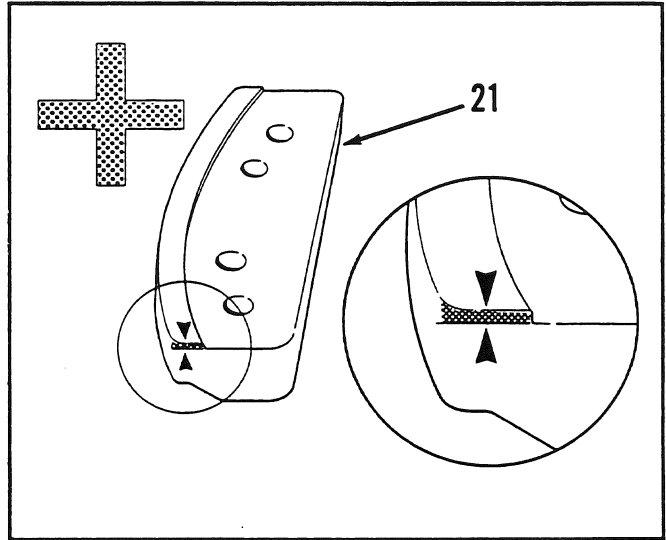


Fig. 48

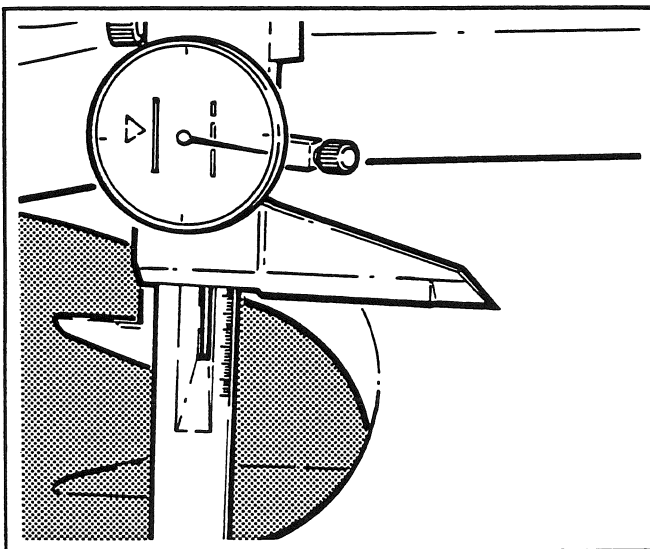


Fig. 46

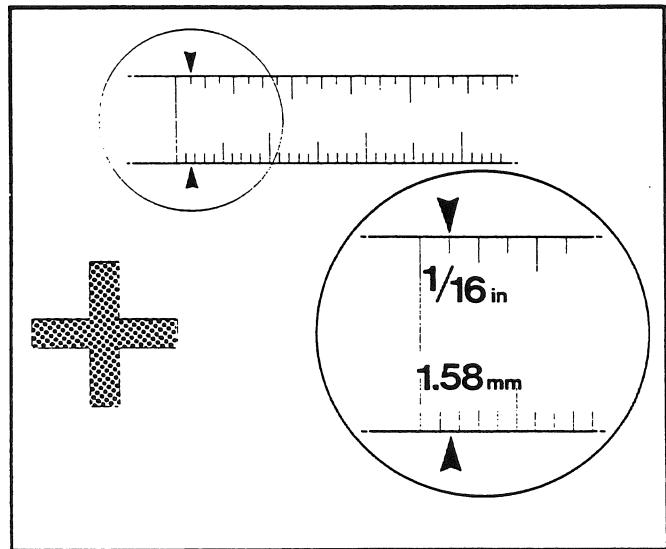


Fig. 49

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Circle, Drawbar and Moldboard - Assembly and Installation (Continued)

Fig. 44

Raise and move the drawbar (26) to one side using the blade lift and circle shift cylinders. Attach chains securely at three points around the circle (86). Raise and move the circle under the grader using the lifting device. Support the circle arms on proper blocks and the front of the circle on a secure stand. Remove the lifting chains. Center and lower the drawbar onto the circle.

Fig. 45

Start the grader and carefully drive it backward, meshing the circle (86) teeth and drive pinions (43).

Fig. 46

Clearance between the circle (86) and drawbar (26) is adjusted using shim packs (20). Before installing the clamp plates (21) and guide plates (19), you must calculate the thickness of the shim pack.

Fig. 47

Measure the thickness of the inside edge of the circle (86).

Fig. 48

Measure the thickness of the lip of the clamp plate (21). Add the thickness dimension in **Fig. 47** to this measurement.

Fig. 49

Now, add the clearance specification of 1,58 mm (1/16 in.) to the total of the thickness dimensions measured in **Fig. 47** and **Fig. 48**.

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Circle, Drawbar and Moldboard - Assembly and Installation (Continued)

Fig. 50

Measure the thickness of the guide plate (19) and subtract this figure from the total calculated in Fig. 49. The final figure is the equivalent to the shim pack thickness.

Fig. 51

Assemble a shim pack (20), equal in thickness to the final figure calculated in Fig. 50. Repeat the procedure from Fig. 47 through Fig. 51 for each clamp and guide plate assembly.

Fig. 52



Install the bolts (15). Install the shim pack (20) between the guide plate (19) and clamp plate (21). Carefully install the plate and shim assembly. Secure the assembly with the nuts (16 and 17). Note that no washers are used. **DO NOT** fully tighten the nuts. Circle adjustment is the next step.

Fig. 53

To adjust the circle, measure and record the distance from the inside diameter edge of the circle to the drawbar frame. Place your rule along the length of the drawbar rear cross-member for constant points of reference. Repeat this procedure on the opposite side of the grader.

Fig. 54

Adjust the guide plates (19) using the right and left hand setscrews (18) until the distance is equal on both sides.

Fig. 55

Measure the gap between the root of the circle teeth and the tips of both drive pinions (43). The designed clearance is 1,6 mm to 3 mm (.06 in. to .12 in.). Adjust the guide plate (19) using the front setscrew (56) until you have the proper clearance.

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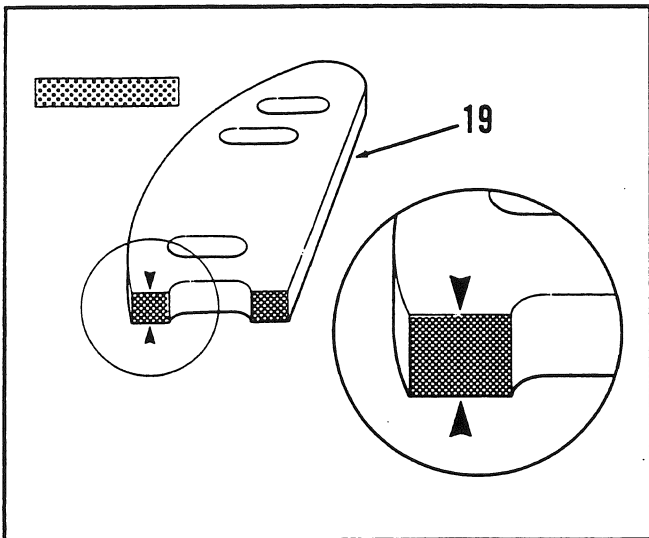


Fig. 50

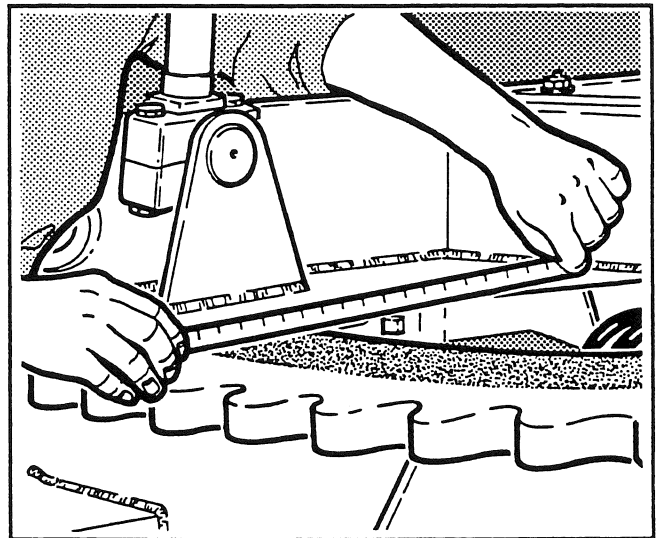


Fig. 53

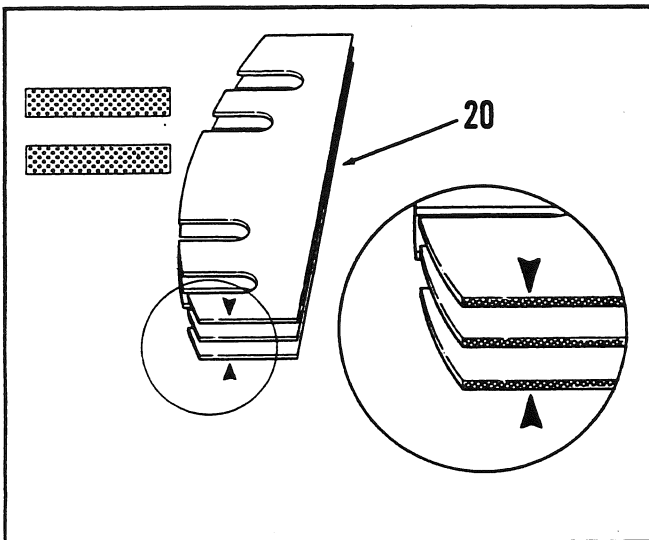


Fig. 51

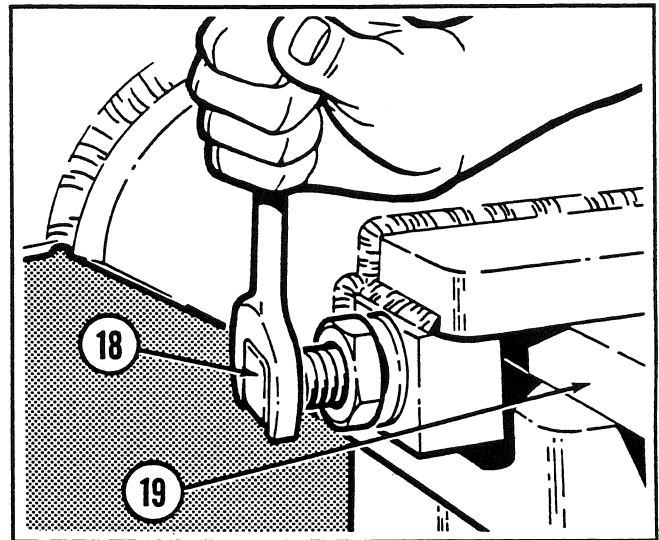


Fig. 54

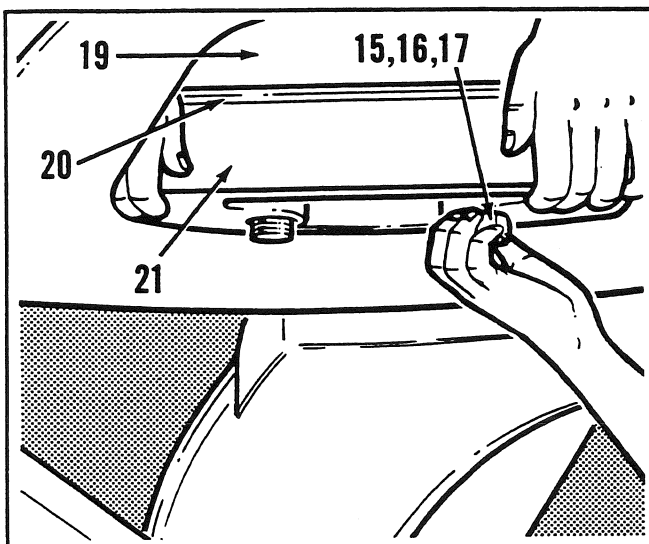


Fig. 52

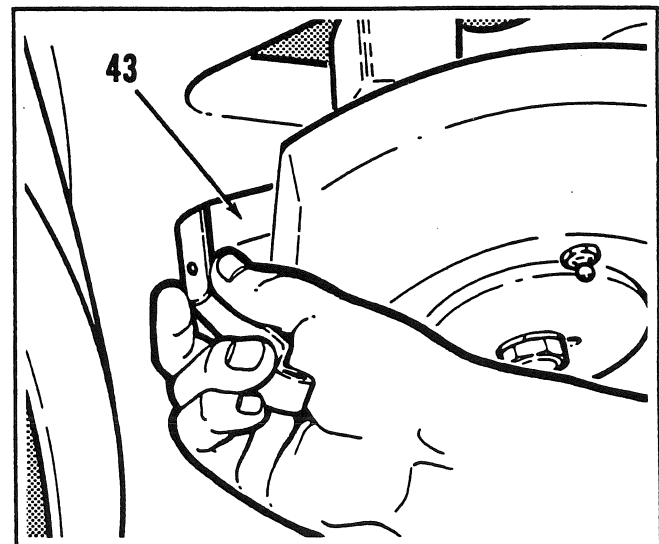


Fig. 55

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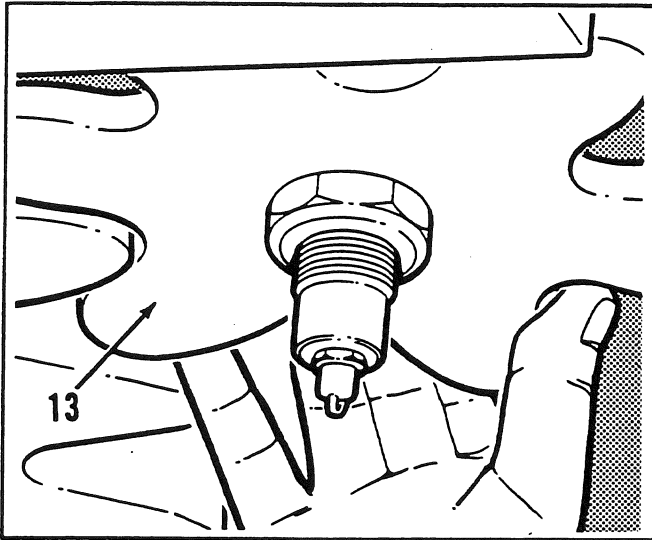


Fig. 56

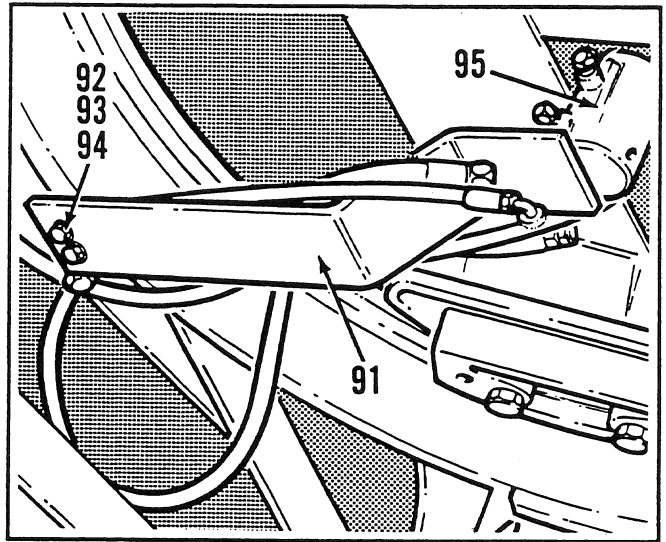


Fig. 59

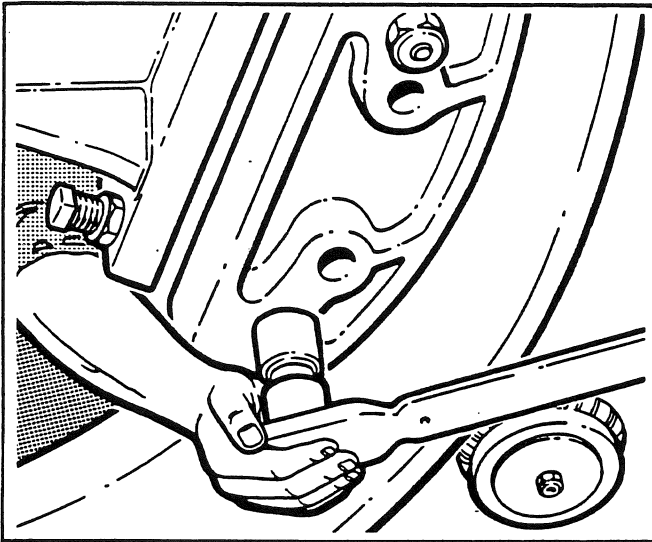


Fig. 57

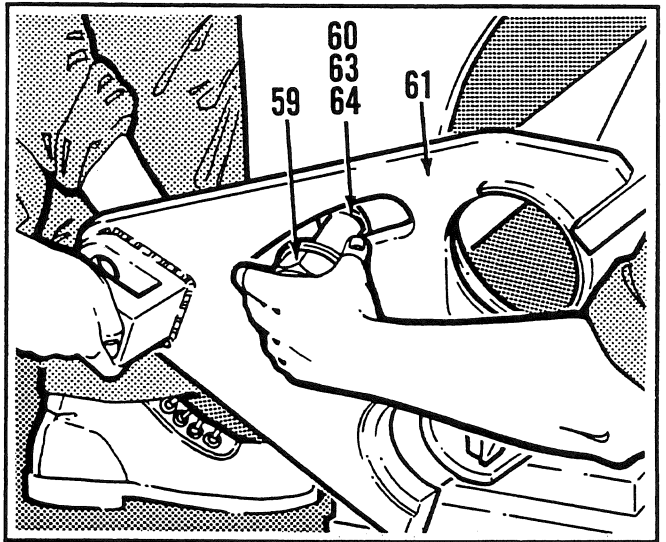


Fig. 60

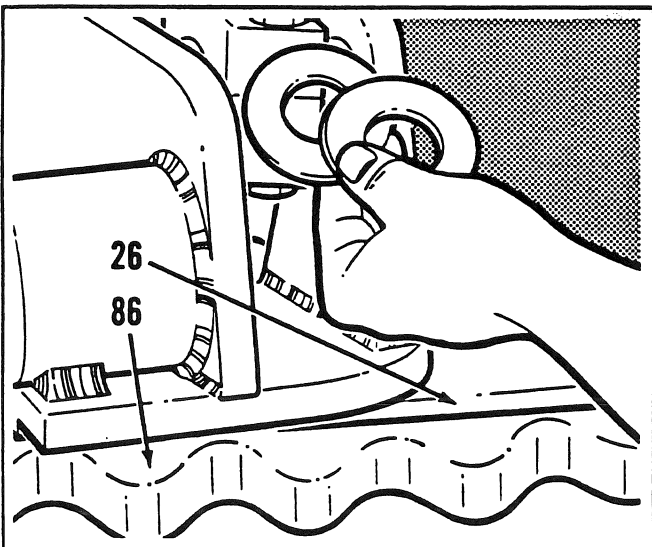


Fig. 58

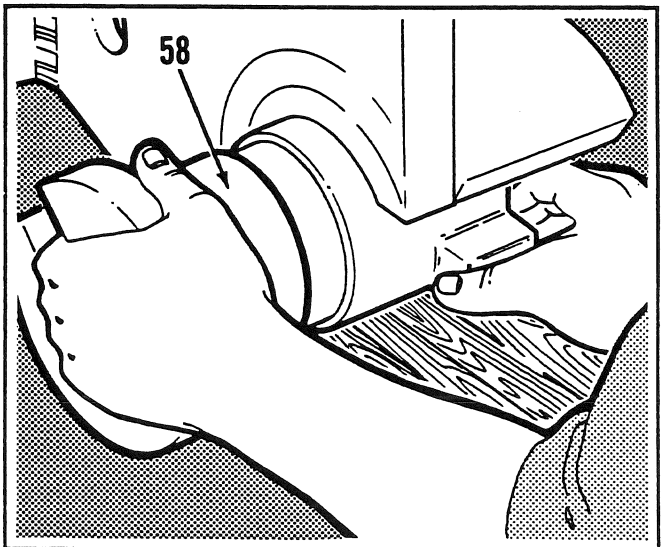


Fig. 61

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Circle, Drawbar and Moldboard - Assembly and Installation (Continued)

Fig. 56

After you have adjusted the drive pinion clearance, check the circle turn valve pinion (13) for free play. If there is no free play, the drive pinion and/or circle teeth may be excessively worn. Check for wear and replace parts as necessary.

Fig. 57

Check that only two guide plates (19) are actually contacting the circle (86). Adjust the setscrews to give the third guide plate a 1,6 mm (.06 in.) clearance. When the circle adjustment is complete, install and tighten all clamp and guide plate nuts to the specified torque.

Fig. 58

As a final check, make sure that the clearance between the circle (86) face and the drawbar (26) is correct at both ends. Install shims where required.

NOTE

Refer to Product Support Bulletin No. 442, dated February, 1987, giving important lubrication recommendations for the circle and moldboard.

January, 1987

Fig. 59

Install the drive arm (91) and secure with the bolts (92), nuts (94) and lockwashers (93). Re-connect both ends of the hoses between the hydraulic swivel joint assembly (95) and the circle (86).

Fig. 60

Support and install the quadrant (61). Install the quadrant pivot bolt (59), retaining washer (60), nut (64) and lockwasher (63).

Fig. 61

Support the lower slide casting (58). Turn the retaining lug and align with the openings in the circle arm and quadrant. Carefully install the casting.

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Circle, Drawbar and Moldboard - Assembly and Installation (Continued)

Fig. 62

If you are installing new spherical bearings (66), first apply a coating of grease onto all surfaces of the bearings. Install the bearings into the power tilt cylinder (71) or manual tilt link using a soft metal tubular drift with the same diameter as the bearing outer race. Install new snap rings (67).

Fig. 63

Install the power tilt cylinder (71) or manual tilt link using a soft metal tubular drift with the same diameter as the bearing inner race. Retain with the upper and lower (68) pins, capscrews (69) and lockwashers (70). **DO NOT** re-connect the hoses. Repeat the steps in **Fig. 60** through **Fig. 63** for the other side.

Fig. 64

Install the slide shift cylinder (87) through the access hole in the right hand quadrant. Install the fittings on the cylinder. Re-connect the hoses. Install the cylinder anchor bolt (88), nut (90) and lockwasher (89). Tighten the nut to the specified torque.

Fig. 65

Remove the caps from the power tilt cylinder fittings. **Simultaneously** move the quadrants (61 and 65) **by hand**, otherwise the quadrants could move independently and damage the slide shift cylinder. Fully extend the cylinder piston rods. Re-connect the hoses.

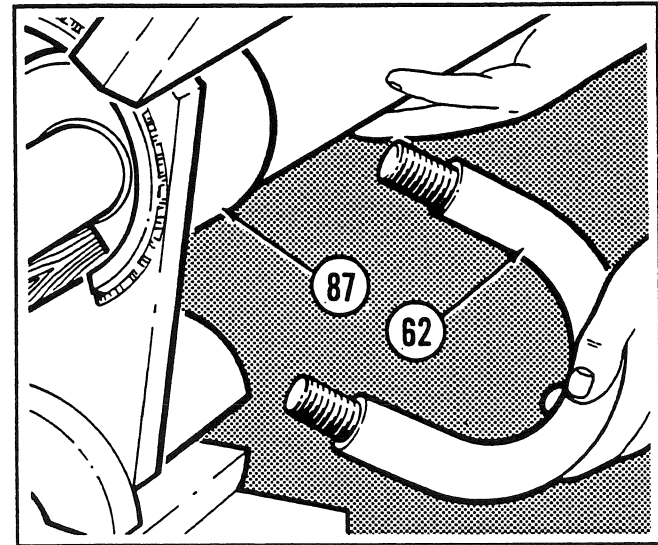
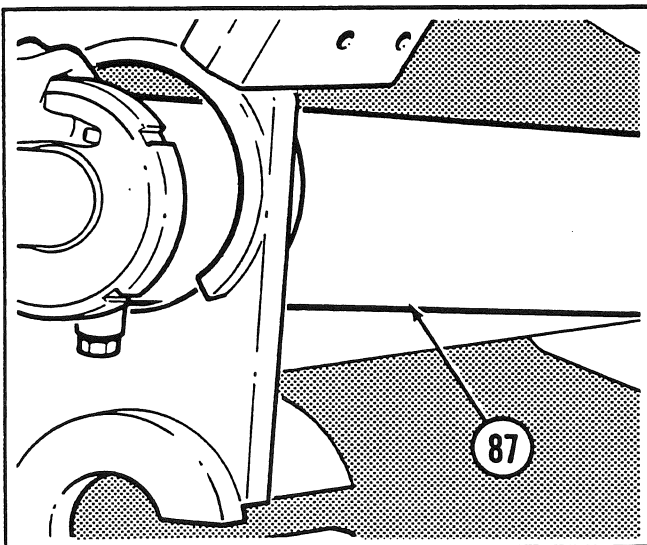
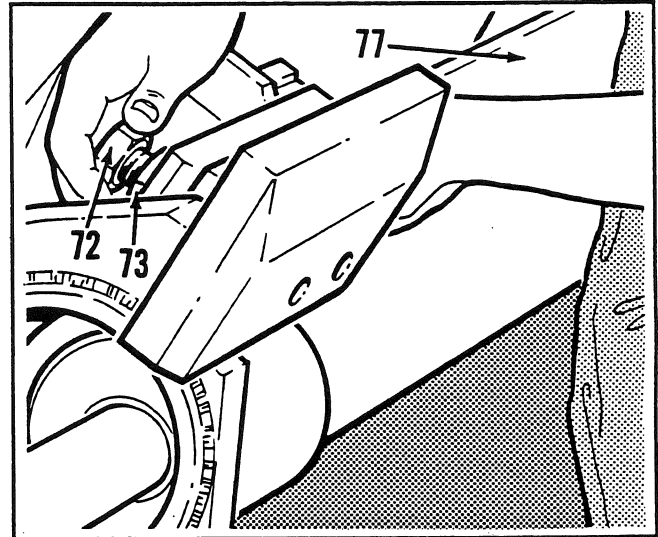
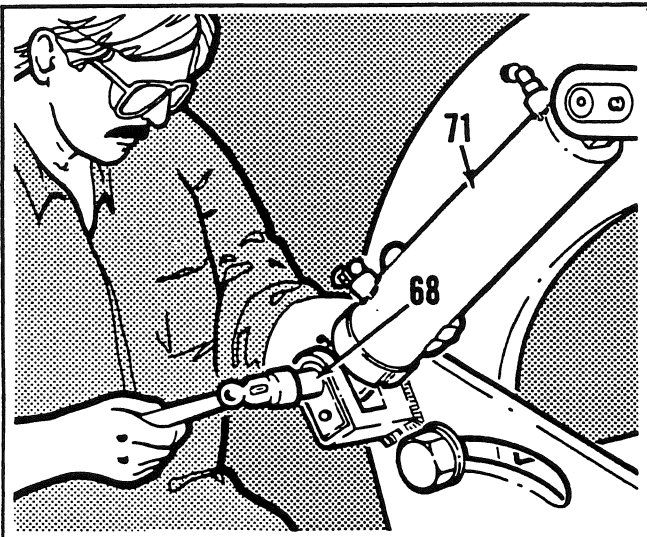
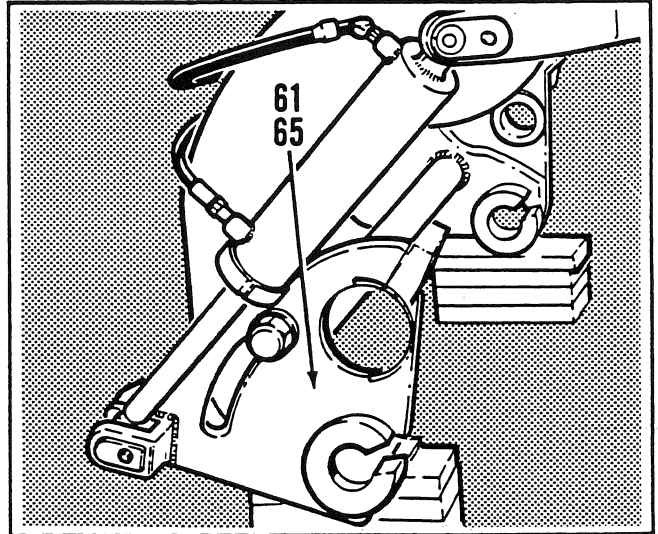
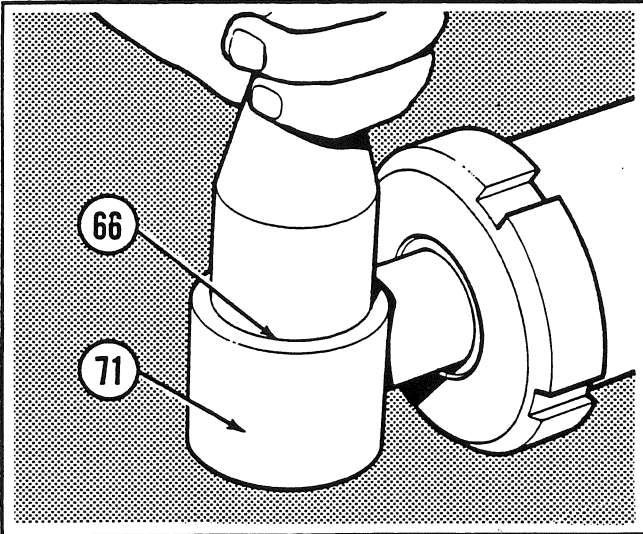
Fig. 66

Install the slide shift cylinder guard (77) and retain with the capscrews (72) and lockwashers (73). Tighten the capscrews to the recommended torque.

Fig. 67

Support the slide shift cylinder (87). Install the U clamp (62), plain washers (80), lockwashers (79) and nuts (78). Tighten the nuts to the specified torque. Check all hoses for correct re-connection and freedom of routing.

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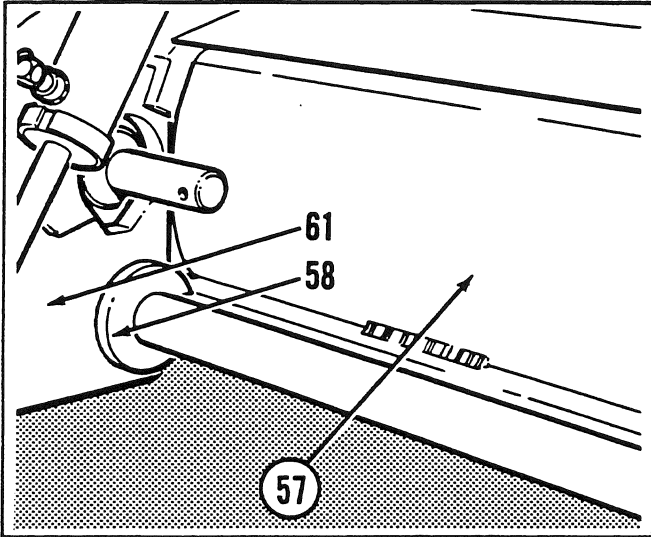


Fig. 68

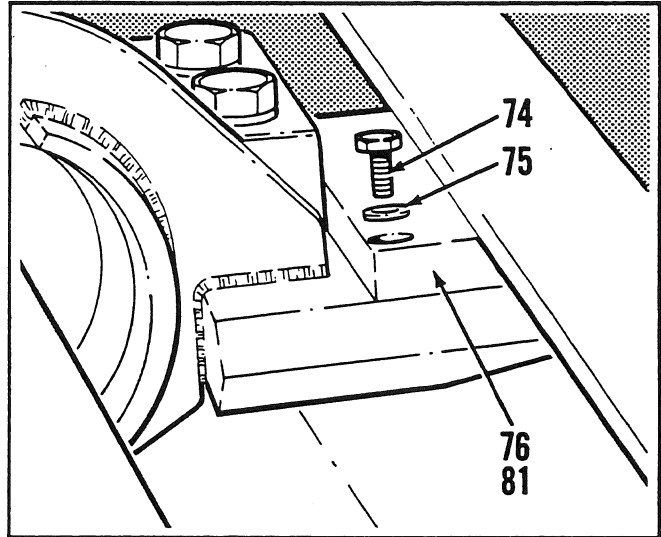


Fig. 71

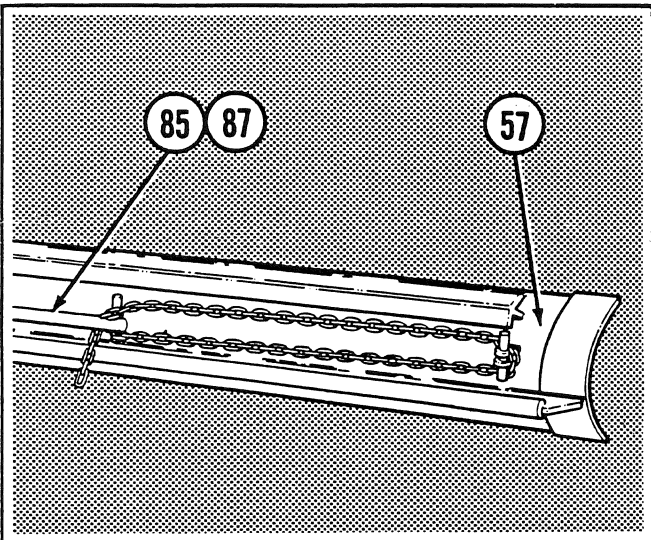


Fig. 69

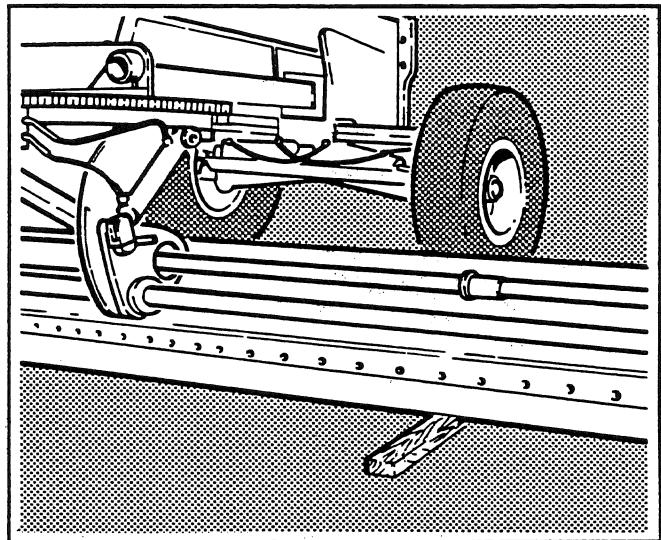


Fig. 72

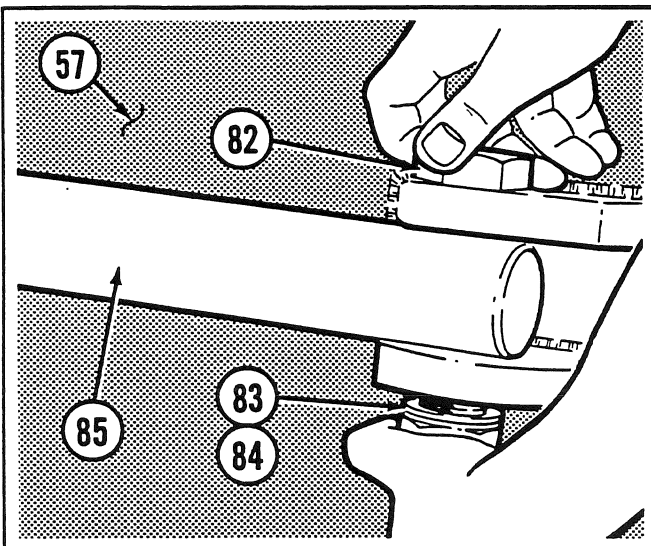


Fig. 70

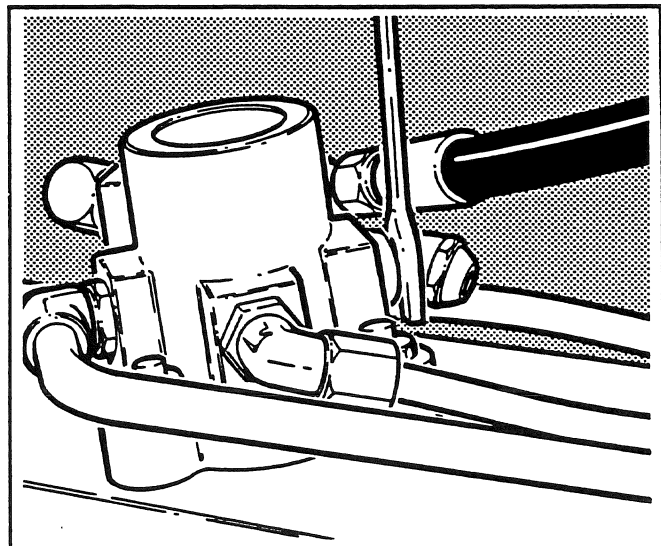


Fig. 73

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Circle, Drawbar and Moldboard - Assembly and Installation (Continued)

Fig. 68

Raise the moldboard (57) using the lifting device. Align the upper and lower slide rails with the right hand quadrant (61) and lower slide casting (58).

Fig. 69

Fully extend the slide shift cylinder (87) piston rod or rod extension (85). Connect the piston rod to the moldboard (57) using a chain.

Fig. 70

With the free end of the moldboard (57) raised from the floor, retract the slide shift cylinder (87) and pull the moldboard into place. Make sure the lower slide rail aligns with the left hand slide casting. When the moldboard is safely in place, remove the chain. Install the bolt (82), nut (84) and lockwasher (83) retaining the slide shift cylinder piston rod or rod extension (85) to the moldboard lugs.

Fig. 71

Tilt the moldboard (57) forward and rest the front edge on a secure stand. Tighten the nut (84) to the specified torque. Install the quadrant wear plates (76 and 81) and retain with the capscrews (74) and lockwashers (75).

Fig. 72

Move the circle, drawbar and moldboard assembly under the frame using the circle shift and blade lift cylinders. Lower the moldboard onto wooden blocks. Assembly and installation is now complete. You should now make the following adjustments in the circle timing procedure.

Circle Timing

Fig. 73

You have made two of the three steps in the circle timing procedure by centralizing the circle and positioning the cranks. The third step in the sequence is the adjustment of the circle turn valve spool (1). To start, find the forward left port on the valve. Disconnect the hose and immediately plug the hose and fitting.

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Circle, Drawbar and Moldboard - Circle Timing (Continued)

Fig. 74



Look inside the open port. You should see only the shiny surface of the spool (1). If this is the case, the spool is in the proper position. Re-connect the hose.

Fig. 75

If you see a only a dark portion, the spool (1) needs adjustment.

Fig. 76

To adjust the spool, first loosen the locknut (14) retaining the valve pinion (13).

Fig. 77

Turn the pinion shaft (12) until the shiny surface of the spool (1) is visible. Only a slight adjustment is necessary.

Fig. 78

Tighten the locknut (14). Check the position of the spool (1) and make sure that it has not moved when tightening the locknut. Re-connect the hose.

Fig. 79

You are ready to test the system. Start the engine and push the circle turn control lever forward. The circle should turn smoothly in a clockwise direction. If the circle turns in a counter-clockwise direction when the lever is pushed forward, the spool (1) is 180° out of position. Repeat the steps in Fig. 76 through Fig. 78, but this time, turn the pinion shaft (12) 180°. The circle timing is now complete and should not normally need adjusting again.

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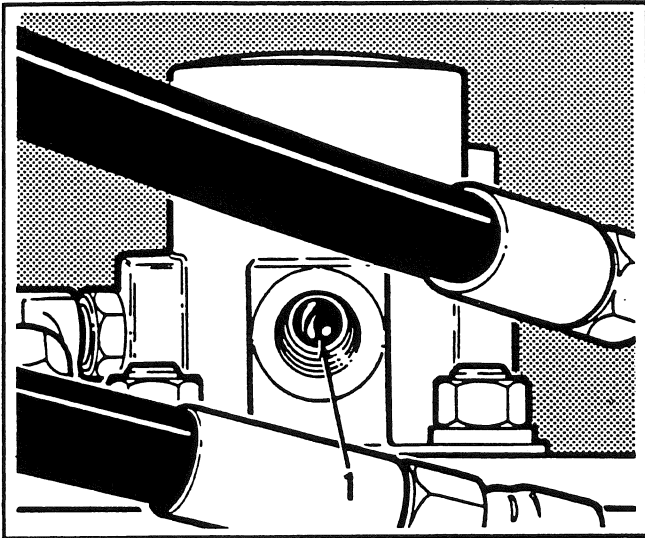


Fig. 74

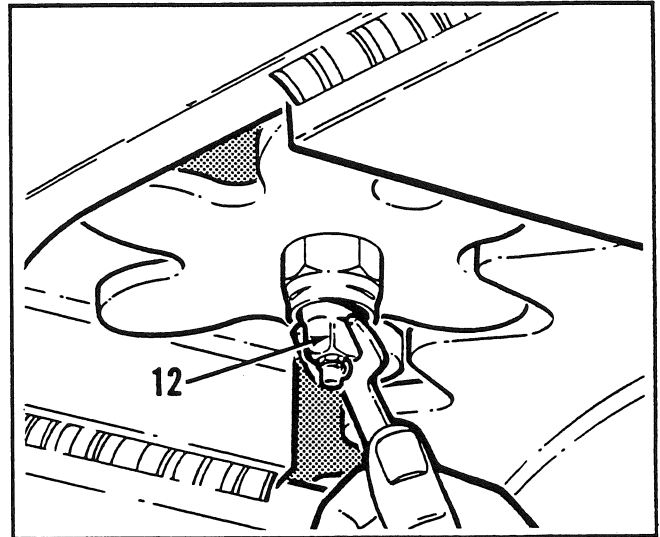


Fig. 77

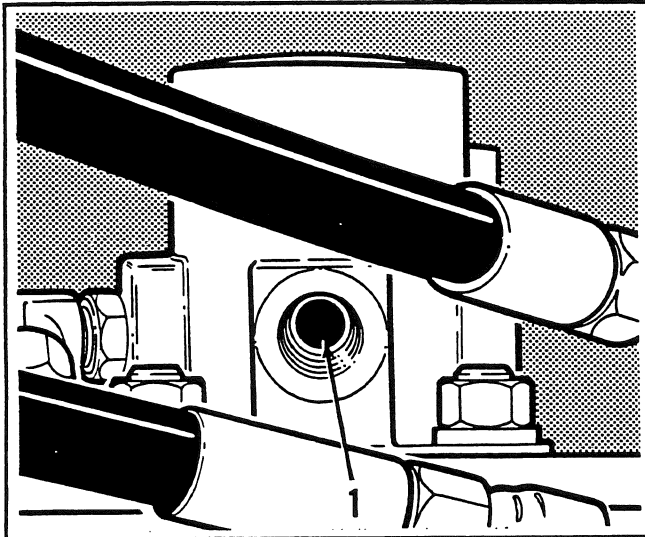


Fig. 75

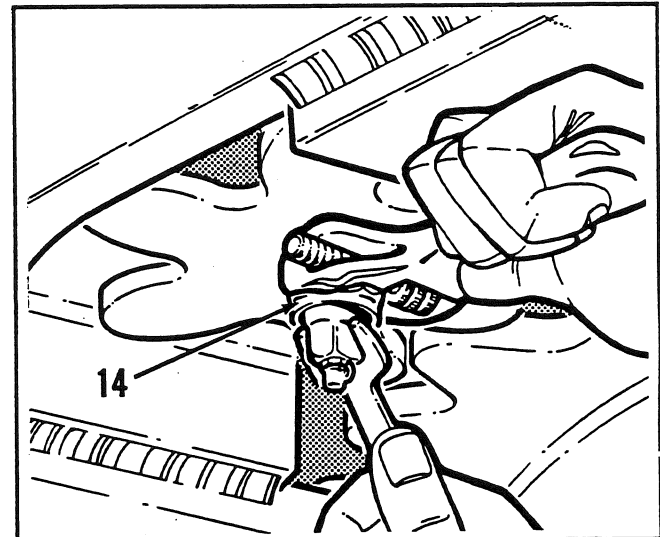


Fig. 78

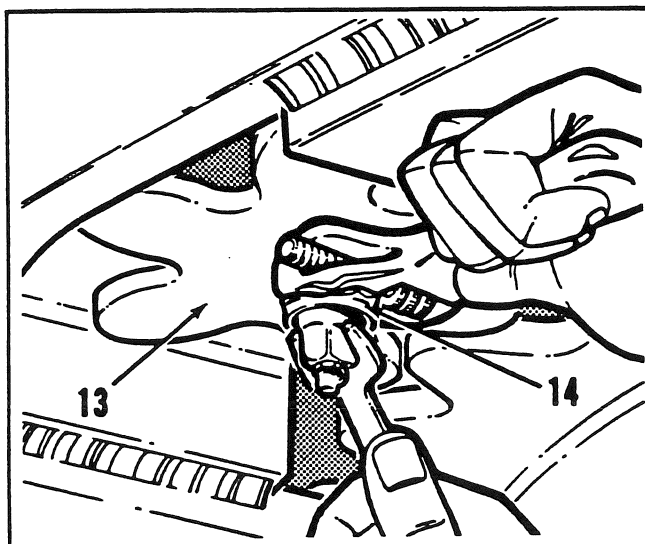


Fig. 76

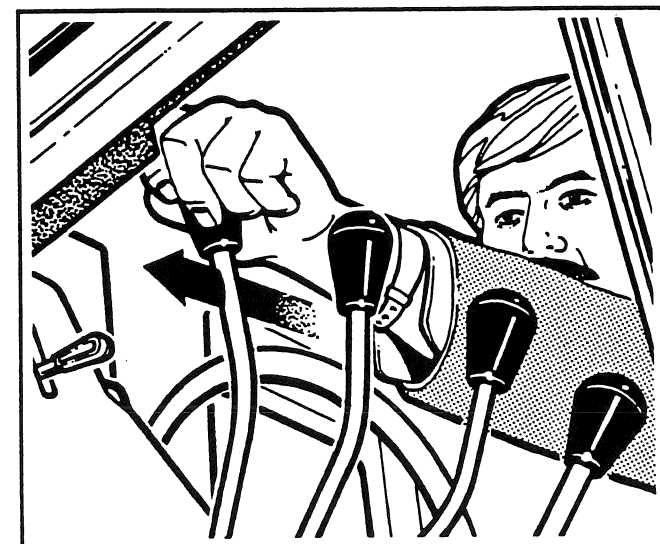


Fig. 79

