

Operator's Manual

INSTALLING INSTRUCTIONS



INTERNATIONAL[®]

**15D-2 and 15G-2
HYDRAULIC OPERATED**

and

**15G-1, 15D-1, 15G-3 and 15D-3
CABLE OPERATED**

Bulldozers and Bullgraders

for

**TD-15 (151 Series)
Crawler Tractors**

INTERNATIONAL HARVESTER COMPANY

180 North Michigan Ave.

Chicago 1, Illinois, U.S.A.

TO THE OWNER

The purpose of this manual is to assist you in realizing the benefits you anticipated when you purchased this International Harvester product. Many people have contributed to the design and production of this product and its delivery to you. They have an interest in its successful performance and have provided this manual to give you the benefit of the experience they have gained through years of field testing and normal usage of this and similar products.

The way you operate and the care you give this product will have much to do with its successful performance. This manual has been carefully prepared and the information arranged and illustrated to make it as easy as possible for you to find the information you wish. It will pay you to read the entire manual carefully before operating and keep it handy for future reference. Your authorized International Construction Equipment Distributor or Dealer will be glad to answer any further questions you may have on the operation or care of this product.

It is the policy of International Harvester Company to improve its products whenever it is possible and practical to do so. We reserve the right to make changes or add improvements at any time without incurring any obligation to make such changes on products sold previously.

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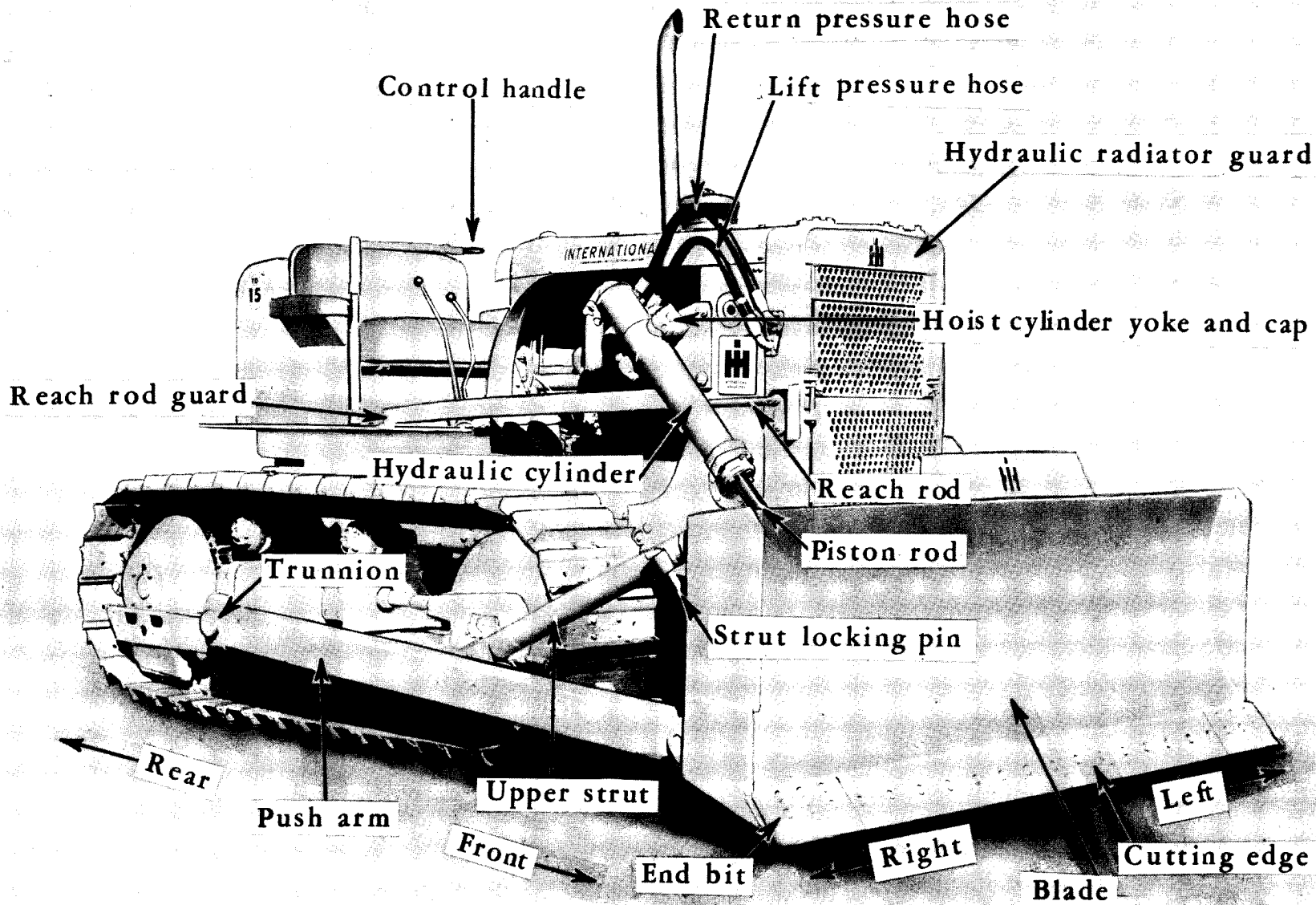
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A Careful Operator

IS THE BEST INSURANCE

AGAINST AN ACCIDENT

—National Safety Council.



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Illust. 1
Principal components of the 15D-2 bulldozer.

INTRODUCTION

Throughout this manual the use of the terms "left" and "right," and "front" and "rear" must be understood to avoid confusion when following instructions. (Refer to Illust. 1.)

This manual contains operation, lubrication, maintenance and installing instructions for the 15D-2 and 15G-2 hydraulically operated bulldozers and bullgraders; 15D-1, 15G-1, 15D-3 and 15G-3 cable operated bulldozers and bullgraders used with the TD-15 (151 series) crawler tractors.

Some illustrations and text in this manual are for general application to machines of this model and may not show your equipment accurately in all details.

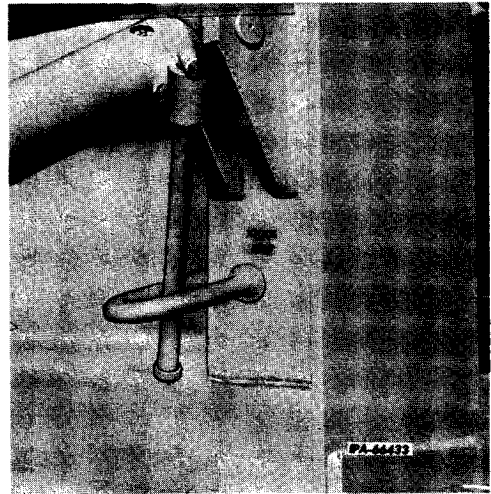
The serial number and model designation for the bulldozer and the bullgrader are stamped on the back of the blade at the top right corner (Illust. 2). The serial number is to be used when ordering parts. For ready reference we suggest that you write these serial numbers in the spaces provided.

Bulldozers

Serial No. 15 D-1 _____
15D-2 _____
15D-3 _____

Bullgraders

Serial No. 15G-1 _____
15G-2 _____
15G-3 _____



Illust. 2
Serial number.

DESCRIPTION

A bullgrader or bulldozer consists primarily of a blade and push frame in the front of a tractor, to be used for grading or pushing materials. The blades are designed for easy penetration and efficient suction and rolling action. The difference between a bulldozer and bullgrader is entirely in the push frame and blade construction.

The bulldozer is a straight blade dozer with struts attached to the blade so that the blade is held at a right angle to the center line of the tractor. The blade can be pitched (changing to the suction angle) and tilted vertically so that one end of the blade is above the other end.

The bullgrader blade is attached to the C-frame by a swivel at the center, and supported at the ends by the upper and lower struts. This construction makes it possible to angle the blade horizontally, and also to tilt it vertically.

CABLE-OPERATED BULLDOZERS AND BULLGRADERS

The major assemblies of the bulldozer and bullgrader are the radiator guard, blade, push frame, cable, sheaves, cable control unit and cable control levers.

Controls (15D-1 and 15G-1)

The control lever, which is used to raise or lower the blade, is mounted on the tractor at the right side of the operator.

Controls (15D-3 and 15G-3)

The control levers are mounted at the rear of the tractor, behind the operator. The lower lever controls the right drum which is used to raise or lower the blade. The upper lever controls the left drum.

DESCRIPTION

HYDRAULIC-OPERATED BULLDOZERS AND BULLGRADERS

The major assemblies of the bulldozer and bullgrader are the hydraulic cylinders, radiator guard with integral oil tank, hydraulic pump and valve, cylinder hose connections, blade, push frame, controls and trunnion brackets.

The hydraulic system consists of the hydraulic pump, oil strainer, control valve with control handle, oil tank, hydraulic cylinders and hoses.

The hydraulic pump forces oil to the cylinders on each side of the unit, for raising or

lowering the blade. The direction of the oil flow for raising, holding, lowering and floating the blade is controlled by the operating plunger (located in the valve housing).

Pressure control is established at the hydraulic pump where a pressure relief valve is located. This pressure relief valve is set at the factory at a pressure of 1650 pounds per square inch (at full throttle), and automatically bypasses oil when that pressure is reached.

Relief by-pass ports in each piston head automatically eliminate momentary high pressure caused by the piston reaching the end of the cylinder.

MODEL DESIGNATION OF TRACTOR EQUIPMENT

15D-2	Bulldozer	-	Direct Lift Hydraulic
15G-2	Bullgrader	-	Direct Lift Hydraulic
15D-1	Bulldozer	-	Front C. C. U.
15D-3	Bulldozer	-	Rear C. C. U.
15G-1	Bullgrader	-	Front C. C. U.
15G-3	Bullgrader	-	Rear C. C. U.

SPECIFICATIONS

	Models
	15D-2
Blade	
Length	9' 11"
Height	38"
Height, including spillboard	44-3/4"
Maximum lift	39-1/8"
Maximum drop, below ground level	14-1/2"
Moldboard	
Construction	Box framed
Cutting Edge (reversible)	
Length	7' 0"
Width	8"
Thickness	3/4"
Material	High carbon steel
End Bit (2)	
Length	15-7/16"
Width	8"
Thickness	7/8"
Material	High carbon steel

Specifications subject to change without notice.

Continued on next page.

DESCRIPTION

SPECIFICATIONS

	Models
	15D-2
Hydraulic System	
Oil capacity, gallons	6
Pump capacity, gpm	78
Pump type	Gear
Operating oil pressure (normal) psi	1650
	Models
	15G-2
Blade	
Length	12' 2"
Height, including spillboard	39"
Maximum lift	39"
Maximum drop below ground level	14
Moldboard	
Construction	Box framed
Cutting edge (reversible)	
Length	9' 11-7/8"
Width	8"
Thickness	3/4"
Material	High carbon steel
End bit (2)	
Length	15-5/16"
Width	8"
Thickness	7/8"
Material	High carbon steel
Hydraulic system	
Oil capacity, gallons	6
Pump capacity, gpm	78
Pump type	Gear
Operating oil pressure (normal) psi	1650
	Models
	15D-1
	15D-3
Blade	
Length	9' 11"
Height, including spillboard	44-3/4"
Maximum lift	42-1/2"
Maximum drop below ground level	Not limited
Moldboard	
Construction	Box framed

Specifications subject to change without notice.

Continued on next page.

DESCRIPTION

SPECIFICATIONS

	Models
	15D-1 15D-3
Cutting edge (reversible)	
Length	7' 0"
Width	8"
Thickness	3/4"
Material	High carbon steel
End bit (2)	
Length	15-7/16"
Width	8"
Thickness	7/8"
Material	High carbon steel
Sheave Diameter	8"
Number of lifting strands	4
Cable required (1/2" 6 x 25 wire rope core)	
15D-1	50' 0"
15D-3	70' 0"
Cable control unit required	
15D-1	110
15D-3	P-25
	Models
	15G-1 15G-3
Blade	
Length	12' 2"
Height, including spillboard	39"
Maximum lift	
15G-1	40"
15G-3	38"
Maximum drop below ground level	Not limited
Moldboard	
Construction	Box framed
Cutting edge (reversible)	
Length	9' 11-7/8"
Width	8"
Thickness	3/4"
Material	High carbon steel
End Bit (2)	
Length	15-5/16"
Width	8"
Thickness	7/8"
Material	High carbon steel
Sheave Diameter	8"
Number of lifting strands	4
Cable required (1/2" 6 x 25 wire rope core)	
15G-1	50' 0"
15G-3	70' 0"
Cable unit required	
15G-1	110
15G-3	P-25

Specifications subject to change without notice.

INSTALLATION

General

Installing this type of equipment should be done in a shop that is equipped with some type of hoisting equipment.

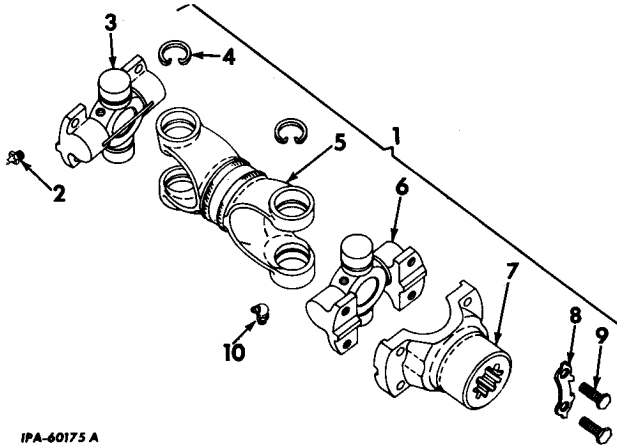
MODELS 15D-2 AND 15G-2 ONLY: Have available six gallons of clean Grade-10W heavy duty motor oil that contains an anti-foaming agent.

Remove all parts from their containers. Check all parts against the packing list included in the envelope attached to the container.

CAUTION: After installing equipment, lubricate completely before operating.

Installing front power take-off and shaft assembly

Mount the spider end (3) of the power take-off to the fan drive pulley, tap into the key and secure with four 3/8 inch cap screws and lock washers. (Illust. 3.)



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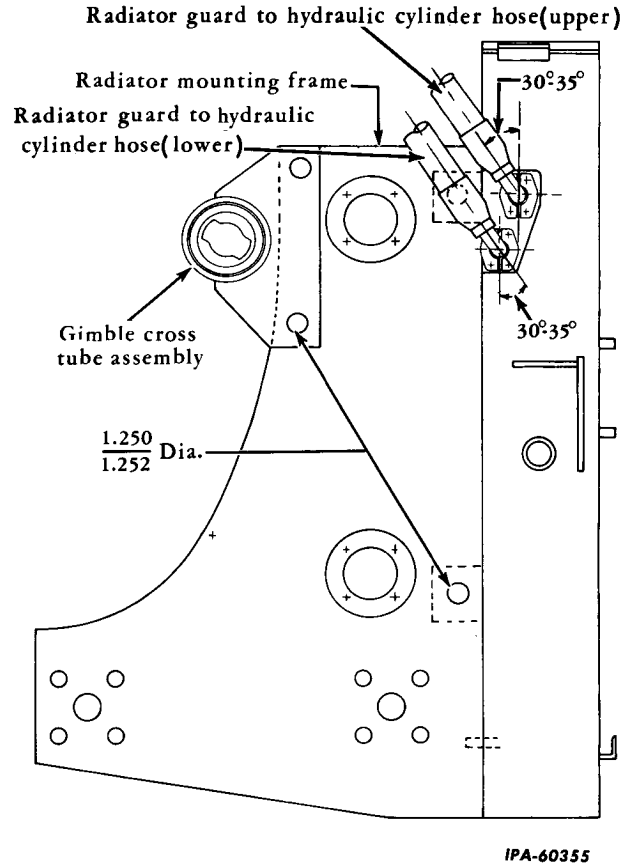
Illust. 3

Power take-off and shaft assembly.

1. SHAFT w/UNIVERSAL joint assembly.
2. FITTING, lubrication.
3. SPIDER w/BEARINGS.
4. RING, snap.
5. TUBE.
6. SPIDER w/BEARINGS.
7. YOKE, fitting.
8. PLATE, lock.
9. BOLT.
10. FITTING, lubrication

Installing radiator guard (Models 15D-2 and 15G-2 only)

To install a radiator guard for use with hydraulic bulldozers or bullgraders, proceed as follows:



Illust. 4

Radiator guard and radiator guard to hydraulic cylinder hose installation diagram (Models 15D-2 and 15G-2 only).

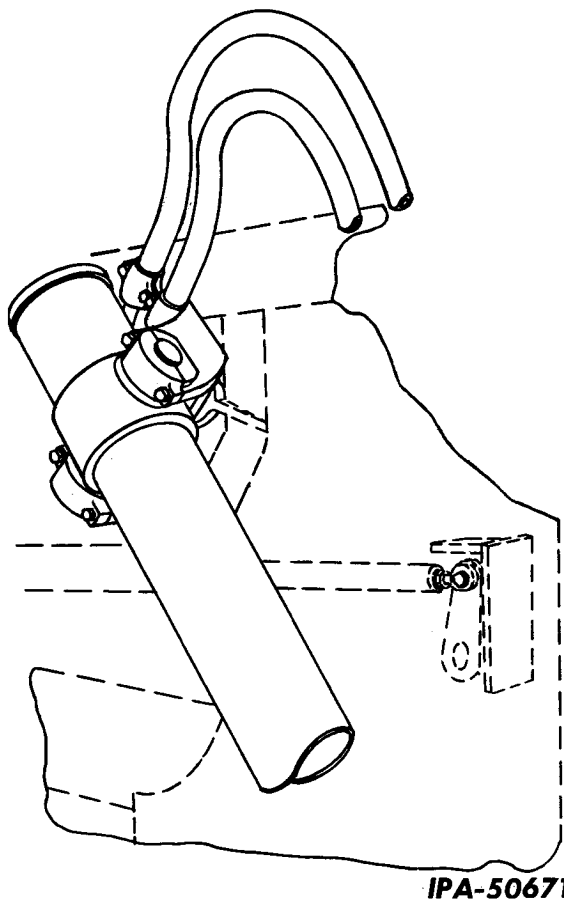
1. Remove the hood, radiator guard and the radiator from the mounting frame.

2. Attach the gimbal crosstube assembly to the radiator mounting frame by installing the top mounting dowels and retainers. Line ream the lower mounting holes to 1.250-1.252 inch diameter and install the dowels and retainers. (Illust. 4.)

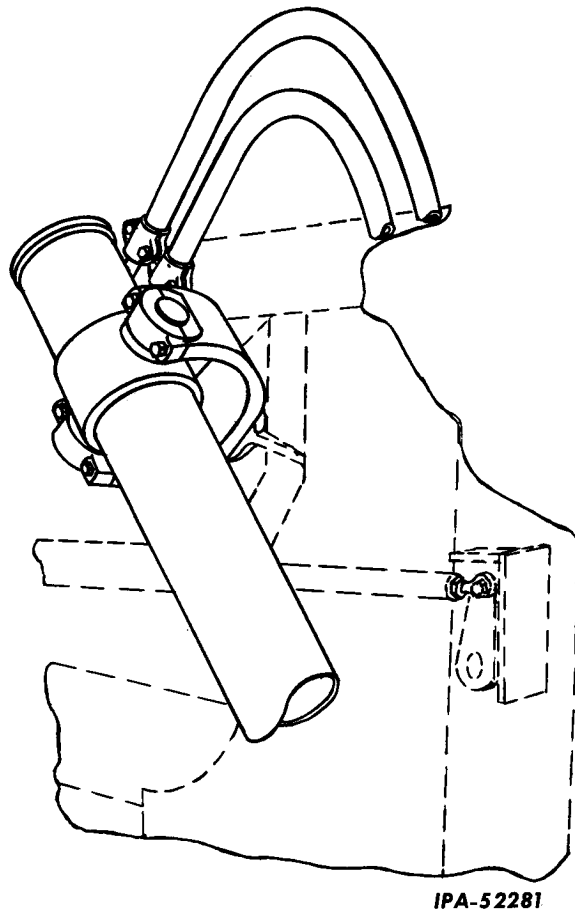
3. Use an overhead hoist and mount the new radiator guard by installing the top mounting dowels and dowel retainers. Locate the lower dowel holes and line ream them to 1.250-1.252 inch diameter. Install the lower mounting dowels and retainers. (Illust. 4.)

4. Reinstall the radiator. Connect the water inlet and outlet water hoses. Replace the hood and secure.

INSTALLATION



Illust. 5
Position of eccentric yoke (bulldozer)
(Model 15E-2 only).



Illust. 6
Position of eccentric yoke (bullgrader)
(Model 15G-2 only).

Installing hoist cylinder yokes (Models 15D-2 and 15G-2 only)

Before assembling the hoist yoke bracket into the gimbal crosstube, apply lubricant to the bearing surfaces of the yoke and inside of the bushings. After the brackets are in position, pump lubricant through the lubrication fittings until the housing cavity is completely packed and lubricant appears around the outer bearing.

Install the hoist cylinder yokes into the gimbal crosstube. The yoke must be in the forward position for Bulldozers (Illust. 5) and in the rear position for the Bullgraders (Illust. 6). Install the inner and outer bushings and thrust washer in the ends of the crosstube. Insert the shaft in the gimbal crosstube as far as it will go. For the right side, turn the yoke about one-quarter turn to the left (counterclockwise). For the left side turn the yoke about one-quarter turn to the right (clockwise). The turning action will lock the yoke in the proper position.

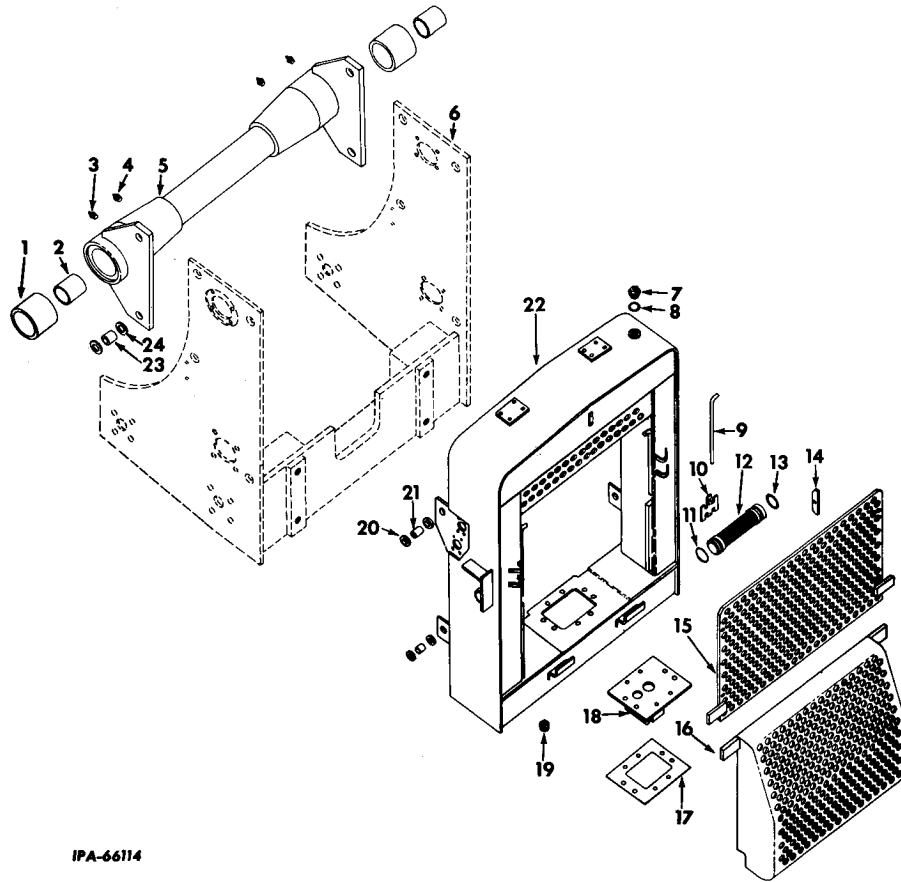
Mounting the pump and valve to the radiator guard (Models 15D-2 and 15G-2 only) (Illust. 7)

NOTE: Before mounting the pump and valve to the radiator guard, install the power take-off (refer to "Installing Front Power Take-Off and Shaft Assembly").

1. Clean off the top mounting surface of the hydraulic pump adapter (18) and the bottom mounting surface of the pump.
2. One "O" ring 2-1/8 x 2-3/8 x 1/8 inch and one "O" ring 2-3/4 x 3 x 1/8 inch fit in the recess of the bottom mounting surface of the hydraulic pump. Coat the "O" rings with cup grease to hold them firmly in place in the base of the pump.
3. Place the gasket (17) on the top surface of the bottom tank of the radiator guard.

Continued on next page.

INSTALLATION



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Illust. 7
Hydraulic radiator guard and components
 (Models 15D-2 and 15G-2 only).

Legend

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. BUSHING, yoke (outer). 2. BUSHING, yoke (inner). 3. FITTING, lubrication (outer bushing). 4. FITTING, lubrication (inner bushing). 5. GIMBAL, crosstube. 6. FRAME, mounting. 7. PLUG, oil filler. 8. RING, sealing. 9. PIN, door hinge. 10. EMBLEM. 11. RING, sealing. 12. STRAINER, oil. | <ol style="list-style-type: none"> 13. RING, sealing. 14. PLATE, strainer retainer. 15. DOOR, upper. 16. DOOR, lower. 17. GASKET, pump adapter. 18. ADAPTER, pump. 19. PLUG, magnetic drain. 20. RETAINER, mounting. 21. DOWEL, mounting. 22. GUARD, radiator. 23. DOWEL, mounting. 24. RETAINER, mounting. |
|---|---|

4. Mount the adapter (18) over the gasket (17). Align the holes in the adapter and gasket with the tapped holes in the bottom tank of the radiator guard and secure with four 1/2 inch cap screws.

5. Fasten a rope around the hydraulic pump and valve. Using an overhead hoist, set the pump and valve onto the hydraulic pump adapter (18).

6. Slide the yoke fitting (7), (Illust. 3), onto the splined shaft projecting from the rear of the pump.

7. Line up the holes in the hydraulic pump base with the holes in the adapter (18), taking care not to disturb the "O" rings.

8. Secure the pump to the adapter (18) with four 3/4 inch cap screws and lock washers.

INSTALLATION

9. Coat the "O" rings (11 and 13) with chassis lubricant and place them in the grooves of the strainer (12).

10. Install the oil strainer (12) thru the opening in the lower left side of the radiator guard (22) so that it contacts the strainer support guide.

NOTE: The strainer must be installed so that the two tapped holes of the strainer are towards the outside of the guard.

11. Place one retainer plate (14) in the groove with the chamfered end in the groove of the strainer (12).

12. Align the hole in the plate (14) with the tapped hole in the strainer (12) and secure with a 3/8 inch cap screw and lock washer. Install the other retainer plate in the same manner.

CAUTION! Do not attempt to start the tractor engine for any reason after the hydraulic pump and valve have been installed until all piping and connecting linkage is completed and the hydraulic system is filled with oil.

Installing radiator guard (Models 15D-1, 15D-3, 15G-1 and 15G-3 only)

To install a radiator guard for use with cable bullgraders or bulldozers, proceed as follows:

1. Remove the hood, radiator guard and radiator from the mounting frame.

2. Use an overhead hoist to install the new radiator guard. Install the top mounting dowels and dowel retainers. Locate the lower dowel holes and line ream them to 1.250-1.252 inch diameter. Install the lower mounting dowels and retainers. (Illust. 8.)

3. Reinstall the radiator. Connect the inlet and outlet water hoses. Replace and secure the hood.

Mounting the 110 cable control unit (Models 15D-1 and 15G-1 only)

Install the cable control unit support to the radiator guard, using two 5/8 inch cap screws and nuts. Using an overhead hoist, install the cable control unit and line the pinion shaft on the cable control unit with the yoke fitting (7), (Illust. 3), on the universal joint. Line up the four holes on the lower end of the cable control unit with the holes in the bracket welded to the radiator guard. Secure the cable control unit with the cap screws and nuts provided.

Mounting the P-25 cable control unit (Models 15D-3 and 15G-3 only)

Refer to the P-25 and P-29 Cable Control Units Operator's Manual for mounting instructions.

Installing connecting linkage and controls (Models 15D-1, 15D-2, 15G-1 and 15G-2 only) (Illust. 9.)

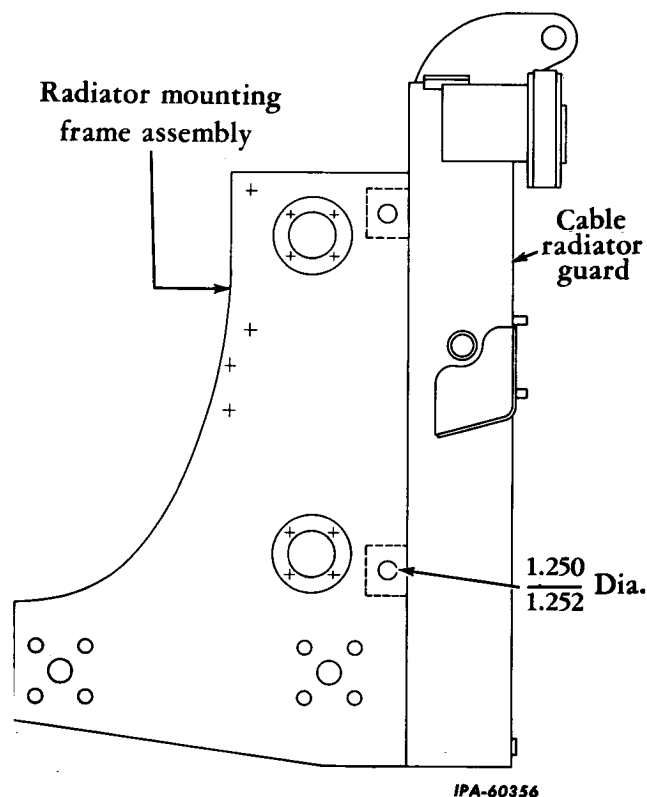
1. Mount the control bracket (7) to the seat side sheet on the right side of the tractor. Secure by bolting together through existing hole ("A," Illust. 10) in the front seat support with a 3/8 x 7/8 inch cap screw, lock washer and nut.

NOTE: The oil seals (5) and bearings (6) come assembled in the bracket (7).

2. Using the bracket (7) as a template, drill five 25/64 inch diameter holes ("B," Illust. 10). Then complete securing with five 3/8 x 3/4 inch cap screws, lock washers and nuts.

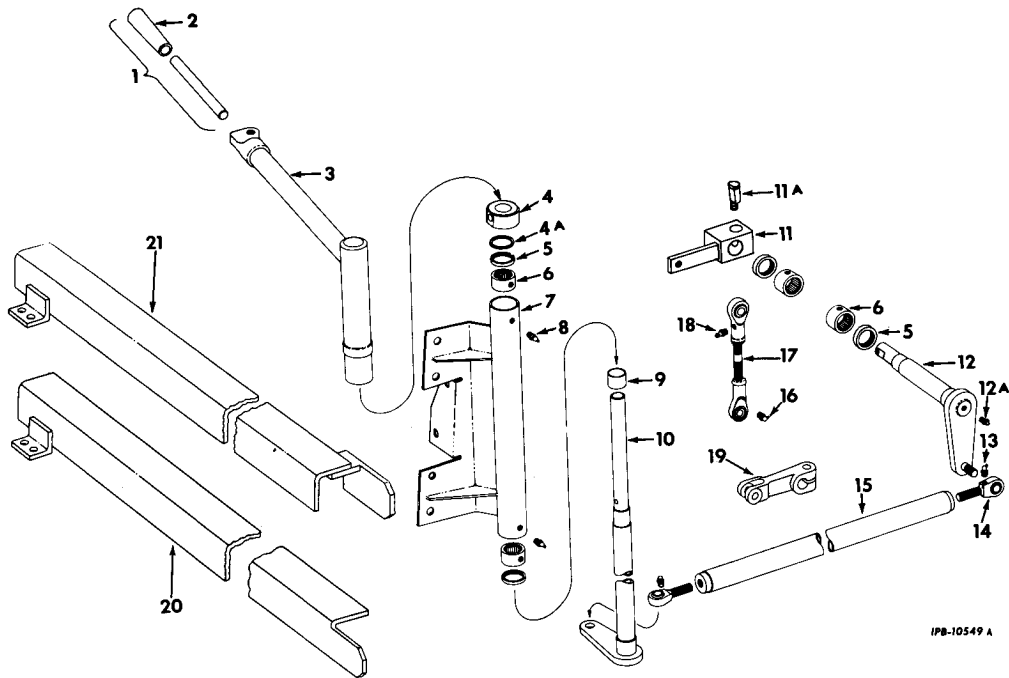
3. Insert the shaft (10) up through the bottom of bracket (7) with the shaft lever at the bottom.

Continued on next page.



Illust. 8
Radiator guard installation diagram.
(Models 15D-1, 15D-3, 15G-1 and 15G-3 only).

INSTALLATION



IPB-10549 A

Illust. 9

Connecting linkage and controls (Models 15D-2, 15G-2, 15D-1 and 15G-1 only),

Legend

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. GRIP, hand control adjustable. 2. GRIP, hand. 3. HANDLE, control. 4. COLLAR, rear control shaft. 4a. WASHER, flat. 5. OIL SEAL, front and rear control shaft. 6. BEARING, needle. 7. BRACKET, rear control shaft. 8. FITTING, lubrication. 9. RACE, inner. 10. SHAFT, rear control. 11. LEVER, front control (inner). 11a. BOLT, control lever locking. 12. SHAFT, front control. | <ol style="list-style-type: none"> 12a. FITTING, lubrication. 13. FITTING, lubrication. 14. BEARING, end. 15. ROD, side reach. 16. FITTING, lubrication. 17. LINK, control. 18. FITTING, lubrication. 19. LEVER, valve control (Models 15D-2 and 15G-2 only). 20. GUARD, reach rod (Models 15D-1 and 15 G-1 only). 21. GUARD, reach rod (Models 15D-2 and 15G-2 only). |
|---|--|

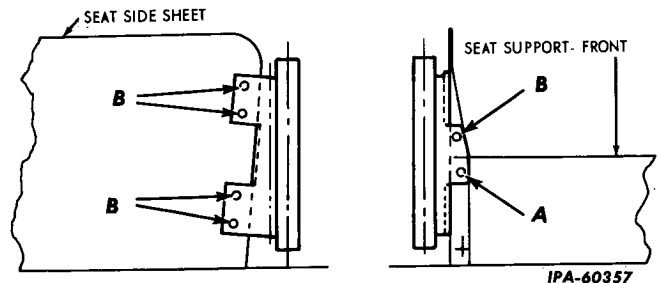
NOTE: The race (9) comes assembled to the rear control shaft (10).

4. Install the washer (4a) then the collar (4) over the top of the shaft (10). Align the hole in the collar with the hole in the shaft and secure with a 5/16 inch cap screw, lock washer and nut.

5. Install the control handle (3) onto the shaft (10) and secure with two 1/2 inch cap screws and lock washers.

6. Insert the handle and grip (1) into the control handle (3) and secure with a 1/2 inch cap screw and lock washer.

7. Connect the reach rod (15) to the lever of the control shaft (10) and secure with a 1/2 inch cap screw and jam nut.



IPA-60357

Illust. 10
Control bracket installation diagram
(Models 15D-1, 15D-2, 15G-1 and 15G-2 only).

INSTALLATION

NOTE: The bearings (14) come assembled to the reach rod (15).

8. Press a bearing (6) into each end of the radiator guard control support tube.

9. Press a seal (5) into each end of the radiator guard control support tube so that it contacts the bearings (6).

CAUTION: The lip of the seal must face towards the end of the radiator guard support tube.

10. Insert the front control shaft (12) through the hole in the right side of the radiator guard.

11. Install the inner control lever (11) (with the off-set of the lever facing to the left side of the tractor, refer to Illust. 9) on the control shaft (12). Secure with the locking bolt (11a) and a 5/16 inch Stover lock nut.

12. Connect the reach rod (15) to the shaft (12) securing it with a 1/2 inch slotted nut and 3/32 x 1-1/2 inch cotter pin.

13. Connect the top end of the control link (17) to the lever (11) and secure with a 1/2 inch cap screw and nut.

14. MODELS 15D-1 AND 15G-1 ONLY: Connect the bottom end of the control link (17) to the clutch lever located at the top of the cable control unit and secure with a 1/2 inch cap screw, lock washer and nut.

15. MODELS 15D-2 AND 15G-2 ONLY: Connect the valve control lever (19) onto the valve plunger shaft located on the hydraulic pump and secure with a 3/8 inch cap screw and 3/8 inch Stover lock nut.

16. MODELS 15D-2 AND 15G-2 ONLY: Insert the bottom end of the control link (17) into the clevis of the valve control lever (19) and secure with a 1/2 inch cap screw and nut.

17. Insert the end of the reach rod guard (20 or 21) in the reach rod guard support mounted on the inside of the mounting frame (right side). Secure the opposite end to the fender with two 1/2 inch cap screws, lock washers and nuts.

18. Insert the two lubrication fittings (8) to the control bracket (7), two fittings (13) to the reach rod end bearings (14), one fitting (12a) to the front control shaft (12) and fittings (16 and 18) to the control link (17).

Installing controls (Models 15D-3 and 15G-3 only)

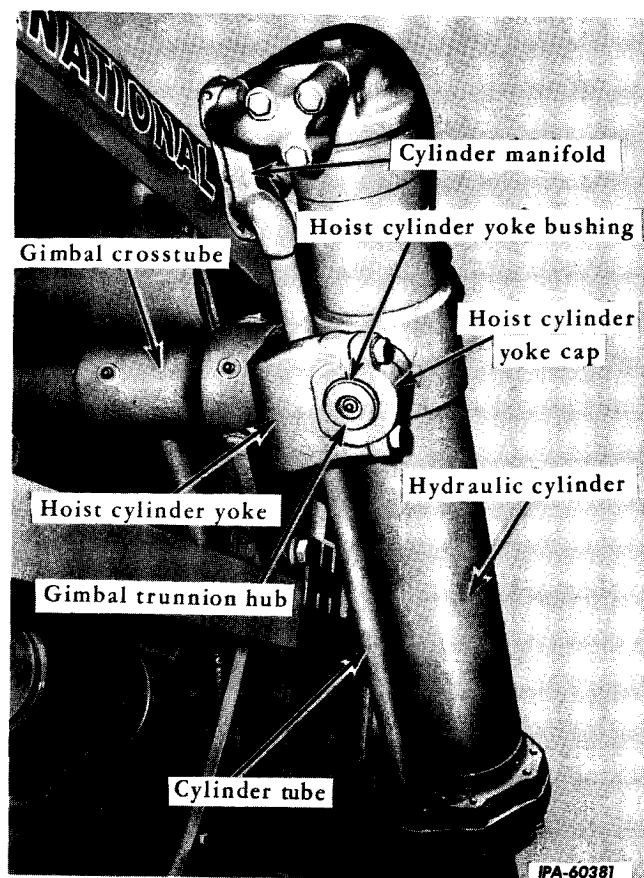
Two adjustable operating levers, one for each cable drum, are furnished.

Slide the operating levers down over the operating shafts on the control unit. Clamp them in the desired position by tightening the 1/2 inch cap screws in each lever.

NOTE: Both levers are adjustable vertically and radially to suit the operator's reach.

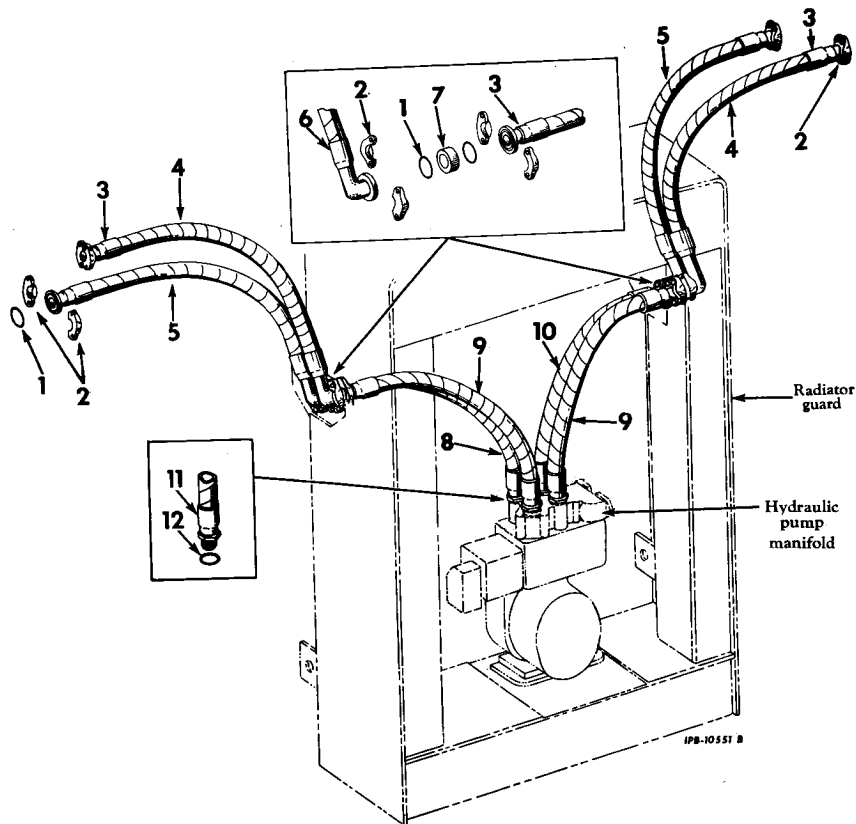
Installing cable guide tube (Models 15D-3 and 15G-3 only)

Slide the cable guide tube (28, Illust. 13) into the tube guide welded to the side of the side sheave bracket. Secure the guide tube to the fender with two 7/16 x 2 inch and two 7/16 x 1-1/2 inch cap screws, nuts and lock washers.



Illust. 11
Principal components of the hoist cylinder yoke and hydraulic cylinder.

INSTALLATION



Illust. 12

**Hydraulic hose connections
(Models 15D-2 and 15G-2 only).**

Legend

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. "O" RING (1-5/16 x 1-9/16 x 1/8 inch). 2. CLAMP - half. 3. FITTING. 4. HOSE, bulkhead to cylinder (upper). 5. HOSE, bulkhead to cylinder (lower). 6. FITTING. | <ol style="list-style-type: none"> 7. TUBE, "O" ring seat. 8. HOSE, pump to bulkhead (Lower RH). 9. HOSE, pump to bulkhead (Upper LH & RH). 10. HOSE, pump to bulkhead (Lower LH). 11. FITTING. 12. "O" ring. |
|---|---|

Installing hydraulic cylinders (Models 15D-2 and 15G-2 only)

1. Remove the hoist cylinder yoke cap and cap bushing from the hoist cylinder yoke. Coat the gimbal trunnion hub of the hydraulic cylinder and the inside and the outside of the cap bushing with a chassis lubricant. Place the bushing over the gimbal trunnion hub and hoist the hydraulic cylinder into place.

2. Place the hydraulic cylinders in the hoist cylinder yokes with the cylinder manifold next to the engine hood and the manifold holes facing forward. (Illust. 11.)

3. Place the hoist cylinder yoke caps in position (refer to the following "NOTE") and secure with 5/8 inch cap screws and lock washers.

NOTE: The hoist cylinder yoke and cap are a matched set, and have matched numbers stamped on them. Be sure when replacing the cap on the yoke that the numbers are matched.

Hydraulic hoses (Models 15D-2/and 15G-2 only) (Illust. 12)

There are four hydraulic hoses (8, 9 and 10) that connect between the hydraulic pump and the left and right bulkhead of the radiator guard. Both upper hoses (9) are 23-1/2 inches long including fittings. The lower LH hose (10) is 21 inches long including fittings and the lower RH hose (8) is 20-1/8 inches long including fittings.

Continued on next page.

INSTALLATION

There are four hydraulic hoses (4 and 5) that connect between the left and right cylinder manifolds and left and right bulkhead of the radiator guard.

MODEL 15G-2 ONLY: Both upper hoses (4) are 43-1/2 inches long including fittings and both lower hoses (5) are 38 inches long including fittings.

MODEL 15D-2 ONLY: Both upper hoses (4) are 41-1/2 inches long including fittings and both lower hoses (5) are 36 inches long including fittings.

Installation of hoses and connections as outlined here are for the right side. Installation is identical for the left side of the tractor.

1. Install the tube (7) into the bulkhead fitting on the radiator guard.
2. Clean the hydraulic cylinder manifold holes. Clean the recesses of the fittings (3 and 6).
3. Coat the "O" rings (1) with cup grease and place them in the recesses of the fittings (3 and 6).

CAUTION: Before installing hoses, be sure that all of the "O" rings are in the proper location.

4. Position the short hose (5) with the fitting (3) over the bottom hole of the cylinder manifold.

5. Place two hose clamp-halves (2) over the hose, catching the shoulder of the fitting (3). Secure the clamp-halves to the manifold with four 3/8 x 1-1/4 inch cap screws and lock washers.

6. Position the long hose (4) with the fitting (3) over the top hole of the cylinder manifold.

7. Secure the long hose as outlined in Step 5.

8. Position the hoses (4 and 5) with the fittings (6) at the bulkhead.

9. Place four clamp-halves (2) over the hoses (4 and 5), catching the shoulder of the fittings (6). Insert eight 3/8 x 2-1/2 inch cap screws through the clamp-halves and bulkhead to hold the hoses (4 and 5) into position.

10. Clean the four holes of the hydraulic pump manifold. Place an "O" ring (12) into the recesses of the manifold.

11. Connect the hoses (8 and 9) to the manifold and tighten.

12. Position the hoses (8 and 9) with the fittings (3) at the bulkhead of the radiator guard.

13. Place four clamp-halves (2) over the hoses (8 and 9), catching the shoulder of the fittings (3).

14. Align the holes in the clamp-halves (2) with the eight cap screws projecting from the bulkhead and loosely secure with eight 3/8 inch nuts and lock washers.

15. Position the hoses (4 and 5) as shown in Illust. 4. Tighten the eight nuts and screws.

CAUTION: The 30 to 35 degrees tolerance must be held as close as possible to help prolong the life of the hydraulic hoses.

16. Complete the installation of the hydraulic hoses for the left side of the tractor as outlined in the preceding steps.

17. Fill and vent the hydraulic system. Refer to "HYDRAULIC SYSTEM" in the "MAINTENANCE" section.

Upper and lower grille doors

Install the upper and lower grille doors by locking them to the radiator guard with the two grille latch pins.

Sheaves and sheave blocks (Models 15D-1, 15G-1, 15D-3 and 15G-3 only) (Illust. 13)

1. Assemble the bearings (3, 7, 16 and 26), rings (2, 6, 15 and 25) into the sheaves (1, 5, 14, and 24).

2. Install the assembled corner sheave (1) into the corner sheave bracket welded on the top right corner of the radiator guard.

3. Insert the shaft (4) through the hole in the corner sheave bracket and secure with a 5/8 inch cap screw.

4. **MODELS 15D-3 AND 15G-3 ONLY:** Install the assembled side sheave (24) into the side sheave bracket welded on the right side of the radiator guard and secure as outlined in Step 3.

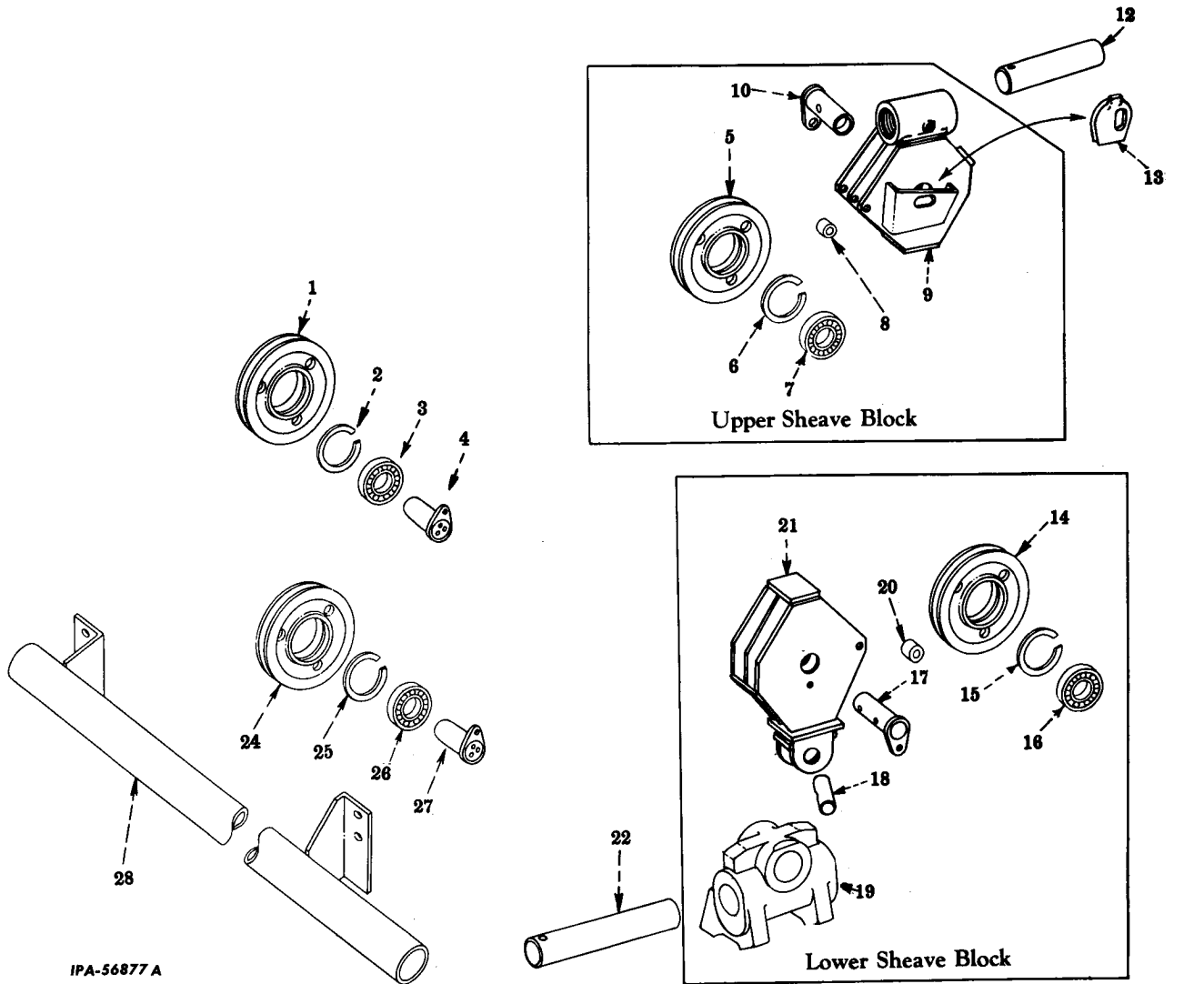
5. **MODELS 15D-3 AND 15G-3 ONLY:** Install the assembled cable control unit adapter sheave (24) into the sheave bracket on the rear cable control unit.

6. **MODELS 15D-3 AND 15G-3 ONLY:** Insert the shaft (27) through the hole in the sheave bracket and secure with a 5/8 inch cap screw.

7. Install the assembled upper and lower sheaves (5 and 14) into the upper and lower sheave blocks (9 and 21).

Continued on page 17.

INSTALLATION



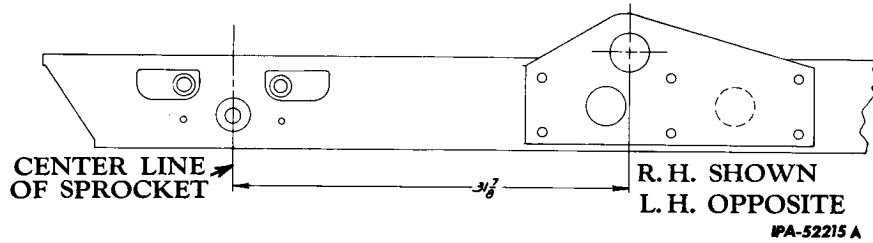
Illust. 13

Sheaves and Sheave Blocks (Models 15D-1, 15G-1, 15D-3 and 15G-3 only).

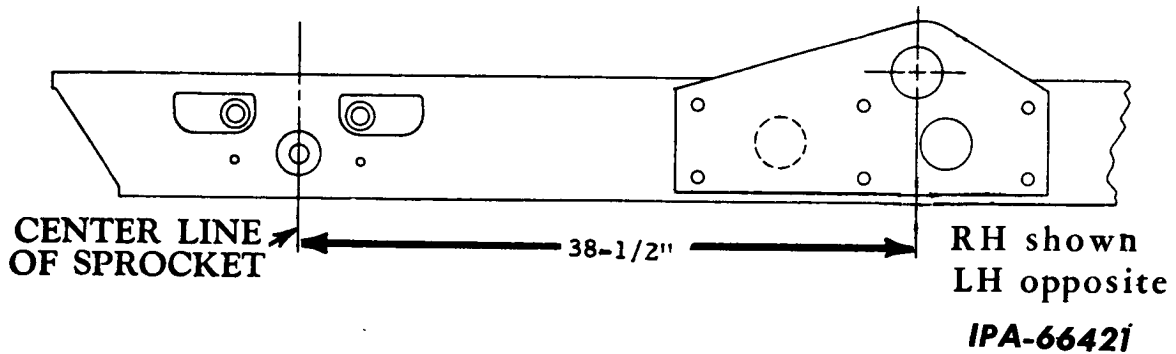
Legend

- | | |
|--|--|
| <ul style="list-style-type: none"> 1. SHEAVE, corner. 2. RING, sheave bearing retainer. 3. BEARING, corner sheave. 4. SHAFT, corner sheave. 5. SHEAVE, upper. 6. RING, sheave bearing retainer. 7. BEARING, upper sheave. 8. SPACER, upper sheave block cheek plate. 9. BLOCK, upper sheave. 10. SHAFT, upper sheave. 12. SHAFT, upper sheave block mounting. 13. LOCK, cable. 14. SHEAVE, lower. 15. RING, sheave bearing retainer. 16. BEARING, lower sheave. | <ul style="list-style-type: none"> 17. SHAFT, lower sheave. 18. SHAFT, lower sheave block universal. 19. UNIVERSAL, lower sheave block. 20. SPACER, lower sheave block cheek plate. 21. BLOCK, lower sheave. 22. SHAFT, lower sheave block mounting. 24. SHEAVE, side and/or cable control unit adapter. 25. RING, sheave bearing retainer. 26. BEARING, side and/or cable control unit adapter sheave. 27. SHAFT, side and/or cable control unit adapter sheave. 28. TUBE, cable guide. (MODELS 15D-3 and 15G-3 ONLY.) |
|--|--|

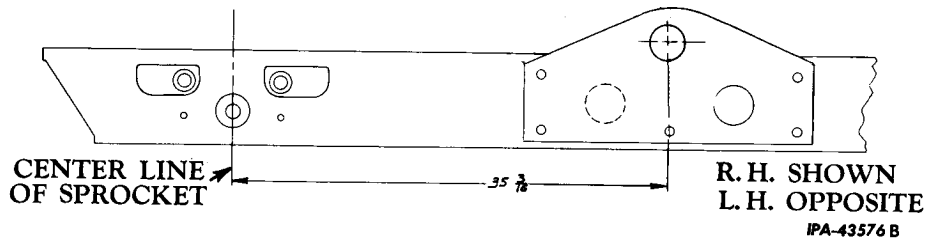
INSTALLATION



Illust. 14
Trunnion bracket installation diagram
(Models 15D-2, 15G-2 and 15G-3 Only),



Illust. 15
Trunnion bracket installation diagram
(Models 15D-1 and 15D-3 only),



Illust. 16
Trunnion bracket installation diagram
(Model 15G-1 only),

8. Insert the shafts (10 and 17) through the holes in the blocks (9 and 21) and secure with 5/8 inch cap screws.

9. Insert the spacers (8 and 20) between the cheek plates of the sheave blocks (9 and 21).

10. Insert a 1/2 x 5 inch cap screw through the holes in the cheek plates and secure with a 1/2 inch nut.

11. Install the assembled upper sheave block (9) between the radiator guard center mounting brackets. Insert the mounting shaft (12) through the brackets and secure with a 1/2 inch cap screw and lock nut.

12. Install the assembled lower sheave block (21) to the universal (19). Insert shaft (18) into the universal (19) with the notched surface facing down.

13. Reeve the tractor. Refer to "REEVING."

Installing trunnions

Models 15D-2, 15G-2 and 15G-3 only (Illust. 14)

Mount both the right hand and left hand trunnions to the trunnion mounting pad on the track frame with the trunnion pilot in the rear pilot hole of the mounting pad. Secure with six 7/8 NC x 3 inch cap screws.

INSTALLATION

Installing trunnions - Continued

Models 15D-1 and 15D-3 only (Illustr. 15)

Mount both the right hand and left hand trunnions to the trunnion pad on the track frame with the trunnion pilot in the front pilot hole of the mounting pad. Secure with six 7/8 NC x 3 inch cap screws

Model 15G-1 only (Illustr. 16)

1. Mount the right hand trunnion to the trunnion mounting pad on the track frame with the trunnion pilot in the front pilot hole of the mounting pad and secure with five 7/8 NC x 2 inch cap screws.

2. Mount the left hand trunnion to the trunnion mounting pad on the track frame with the trunnion pilot in the rear pilot hole of the mounting pad and secure with five 7/8 NC x 2 inch cap screws.

NOTE: After the initial four and twelve hours of operation, inspect and tighten the trunnion cap screws. Thereafter make periodic inspections.

Installing the push arms on the blade (Models 15D-1, 15D-2 and 15D-3 only) (Refer to Illustr. 18)

Attach the push arms to the blade with the push arm bracket pins. These pins must be installed so the pin locking hole lines up with the hole in the push arm brackets on the blade. Insert a 1/2 inch cap screw through each push arm bracket and secure with a 1/2 inch lock nut.

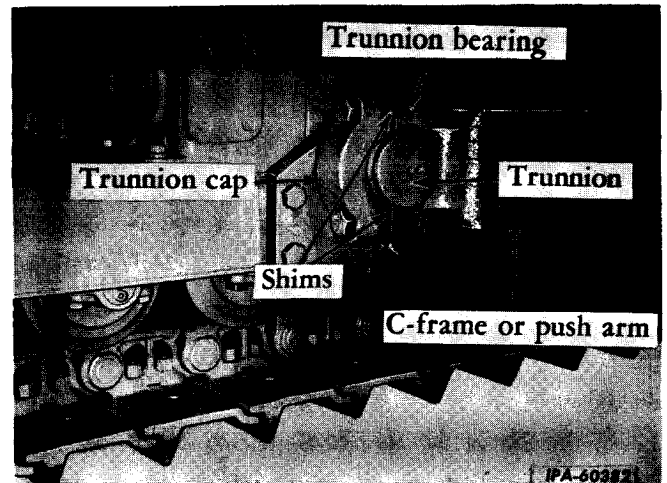
Installing diagonal and upper struts (Models 15D-1, 15D-2 and 15D-3 only) (Refer to Illustr. 18)

1. Adjust the upper struts so that the gap between the shoulder of the eyebolt, clevis and the upper strut body is 1-1/16 inch on each end. (Refer to Illustr. 20.)

2. Assemble both the upper struts to the blade and push arms. The upper strut pins must be installed so the pin locking hole lines up with the hole in the strut mounting lugs. Insert a 1/2 inch cap screw through each mounting lug and secure with a 1/2 inch lock nut.

3. Position the strut locking pins through the strut lock loops on the blade. This will lock the struts so that the adjustment will not change.

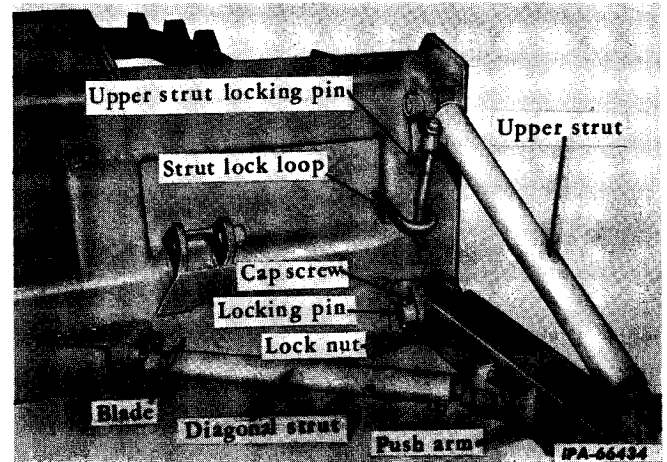
4. Adjust the diagonal struts so that the gap between the shoulder of the eyebolt and the diagonal strut is one inch. (Refer to Illustr. 21.)



Illustr. 17

Trunnion components

(For trunnion installation see Illustr. 14, 15 and 16).



Illustr. 18

Upper and diagonal struts installed.

(Models 15D-1, 15D-2 and 15D-3 only).

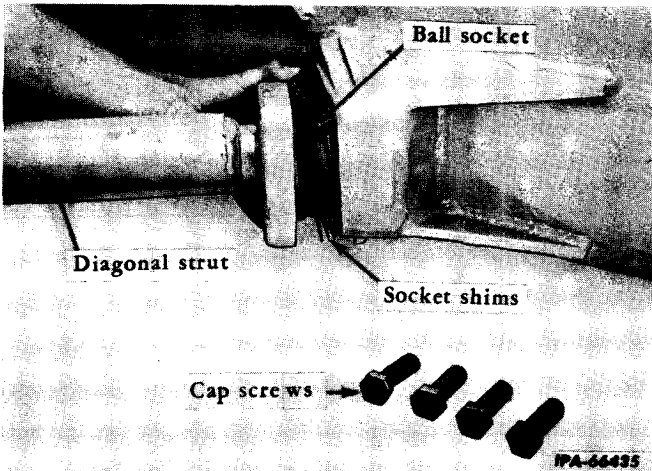
5. Attach the ball socket end of the diagonal struts to the blade (Illustr. 19) and secure with four 3/4 inch cap screws. (Use sufficient socket shims to eliminate play and still allow the struts to be moved easily.)

6. Secure the opposite end of the struts to the lug on the push arm using locking pins, 1/2 inch cap screws and lock nuts. Final adjustment of the diagonal struts will be done later.

Installing push arms and blade on the tractor (Models 15D-1, 15D-2 and 15D-3 only)

1. Block the rear ends of the push arms up to the height of the trunnions.

INSTALLATION



Illust. 19
Installing diagonal strut to blade
 (Models 15D-1 15D-2 and 15D-3 only).

2. Drive the tractor between the bulldozer push arms and attach the ends of the push arms to the trunnions, with the trunnion caps. The gap between the trunnion cap and the trunnion bearing will be approximately $\frac{3}{16}$ inch. Eight $\frac{1}{16}$ inch thick shims have been provided to fill this gap and provide $\frac{1}{16}$ inch minimum clearance (four shims at the top and four at the bottom). (Refer to Illust. 17.) It may be necessary to adjust the diagonal struts to move the push arms either in or out before attaching them to the trunnions.

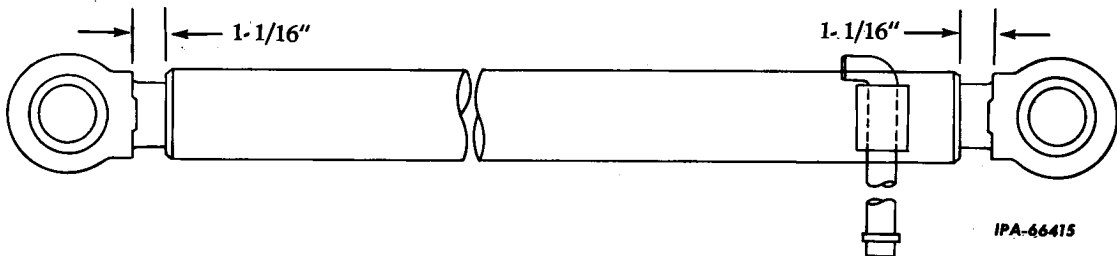
3. MODEL 15D-2 ONLY: Start the tractor engine and place the control handle in the "LOWER" position, allowing the piston rods to advance downward and line up the piston rod holes with the connecting holes of the hydraulic jack brackets on the back of the blade. Connect the piston rods to the hydraulic cylinder pins, and secure with cap screws and lock nuts.

3. MODELS 15D-1 AND 15D-3 ONLY (REFER TO ILLUSTR. 13): Mount the universal (19) with the attached sheave block (21) with the lift lugs on the back of the blade. Insert shaft (22) through the universal (19) and secure with a $\frac{1}{2}$ inch cap screw and lock nut.

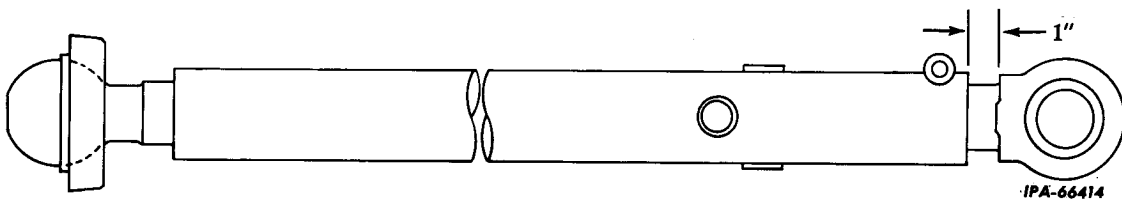
4. Raise the blade and adjust the diagonal struts so that the distance between the push arms and a fixed point on the track frame is the same on both sides of the tractor.

5. Readjust the diagonal struts so that there is no compression strain on the arm. To do this, remove the pin at the push arm bracket connection. Adjust the strut by lining up the holes in the strut eye and bracket. Make the strut as long as possible, still permitting the installation of the pin. Install the pin, lock bolt and nut at the bracket connection, and tighten the threaded clamp cap screw on the strut so that it cannot turn.

CAUTION: If the machine is to be used for pushing scrapers, or rippers, the blade must be protected in the contact area by a pusher block or push plate.

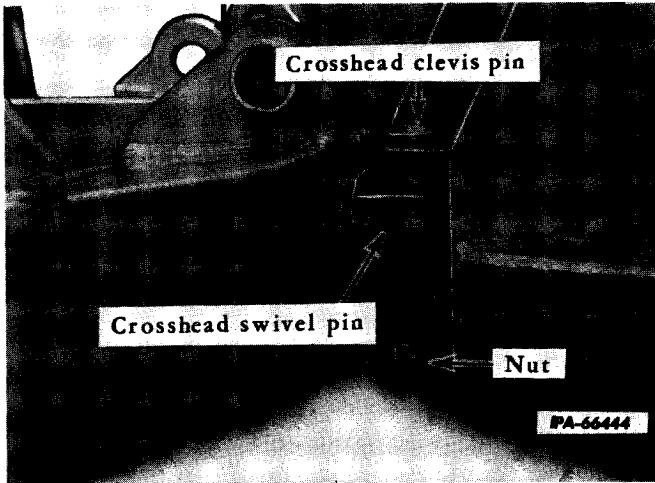


Illust. 20
Upper strut adjustment - bulldozer
 (Models 15D-1, 15D-2 and 15D-3 only).



Illust. 21
Diagonal strut adjustment - bulldozer
 (Models 15D-1, 15D-2 and 15D-3 only).

INSTALLATION



Illust. 22
C-frame with blade installed.
(Models 15G-1, 15G-2 and 15G-3 only).

Installing the C-frame on the tractor (Models 15G-1, 15G-2 and 15G-3 only)

1. Block the rear ends of the C-frame to the height of the trunnions. Drive the tractor into the C-frame and attach the ends of the C-frame to the trunnions with the trunnion caps. The gap between the trunnion caps and the trunnion bearings will be approximately $\frac{3}{16}$ inch. Eight $\frac{1}{16}$ inch thick shims have been provided to fill this gap and provide $\frac{1}{16}$ inch minimum clearance (four shims at the top and four at the bottom). (Refer to Illust. 17.)

2. MODEL 15G-2 ONLY: Start the tractor engine and place the control handle in the "LOWER" position, allowing the piston rods to advance downward. Line up the piston rod holes with the connecting holes of the hydraulic jack brackets and the C-frame.

3. MODEL 15G-2 ONLY: Connect the piston rods to the hydraulic jack brackets using the hydraulic cylinder pins, and secure with the cap screws and lock nuts.

Installing the blade on the C-frame (Model 15G-1, 15G-2 and 15G-3 only)

1. Drive the tractor up to the blade. Align the holes in the crosshead swivel pin with the holes in the crosshead clevis mounted on the blade. Insert the crosshead clevis pin and lock it in position with the crosshead clevis pin nut and $\frac{3}{8} \times 3\text{-}1/4$ inch cotter pin.

2. MODELS 15G-1 AND 15G-3 ONLY (REFER TO ILLUSTR. 13): Mount the universal (19) with the attached sheave block (21) between the lift lugs on the C-frame. Insert shaft (22) through the universal (19) and secure with a $\frac{1}{2}$ inch cap screw and lock nut.

Installing the lower struts (Models 15G-1, 15G-2 and 15G-3 only)

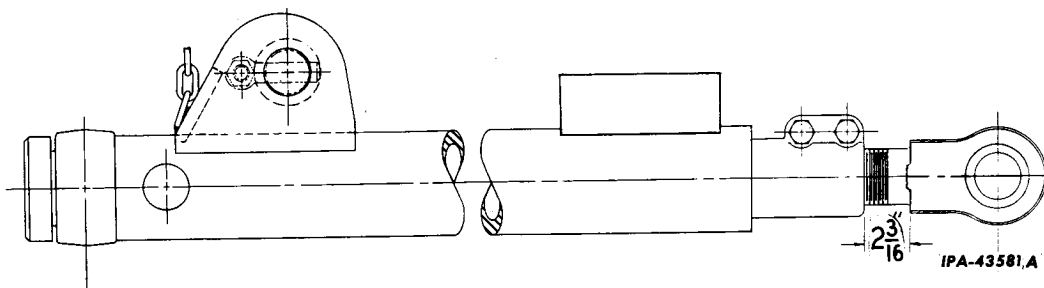
Install the upper and lower struts with the blade angled in the extreme positions first. The center positions will line up without further adjustment of the struts.

NOTE: Assemble the upper and lower strut clevis pins so that the hole in the clevis pins line up with the holes in the clevises or brackets. All pins should be flush with the outside surface of the clevises or brackets.

1. Adjust the clevis end of the lower strut so that the gap between the shoulder of the clevis and the strut body is $2\text{-}3/16$ inches. (Refer to Illust. 23.)

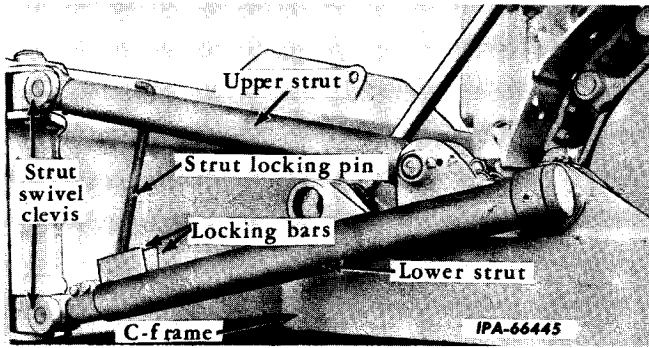
2. When the blade is angled, assemble the first lower strut to the part of the blade that is to the rear of the tractor. The upper strut clevis on the body of the lower strut should face upward.

3. Place the lower strut eyebolt between the holes in the lower strut swivel clevis on the blade. Install the lower strut pin through the hole in the strut swivel clevis and the strut eyebolt. Align the hole in the clevis, so the cap screw and lock nut can be assembled to hold the pin in place.



Illust. 23
Lower strut adjustment - bullgrader
(Models 15G-1, 15G-2 and 15G-3 only),

INSTALLATION



Illust. 24
Upper and lower struts installed
(Models 15G-1, 15G-2 and 15G-3 Only).

4. Assemble the lower strut trunnion into the rear strut trunnion bracket on the C-frame, and secure it with the lower strut trunnion retainer pin.

5. Assemble the lower strut on the opposite side of the blade by placing the lower strut trunnion into the front strut trunnion bracket of the C-frame and secure it with the lower strut trunnion retainer pin. Then install the clevis end of the lower strut between the holes in the lower strut swivel clevis on the blade. Install the lower strut pin through the hole in the strut swivel clevis and the strut eyebolt. Align the hole in the pin with the hole in the clevis, so that the cap screw and lock nut can be assembled to hold the pin in place.

6. The lower strut can move forward or backward in the eye of the lower strut trunnion. When the clevis of the lower strut is properly adjusted, the gap should be toward the rear, so that the body of the lower strut is tight against the trunnion swivel eye of the lower strut. The gaps between the shoulder of the clevis and the lower strut body should be identical on both lower struts. (Refer to Illust. 23.) If the gaps do not occur simultaneously, the clevis in the lower struts may be adjusted to lengthen or shorten the lower strut as desired.

7. The blade should now be angled in the opposite direction and the above adjustments rechecked, making corrections if necessary. After completing the lower strut adjustment, clamp the thread securely by tightening the cap screws and nuts.

Installing the upper struts (Models 15G-1, 15G-2 and 15G-3 only)

1. Adjust the upper struts so that the gap between the shoulder of the eyebolt, clevis and the upper strut body is 1-1/8 inches on each end. (Refer to Illust. 25.)

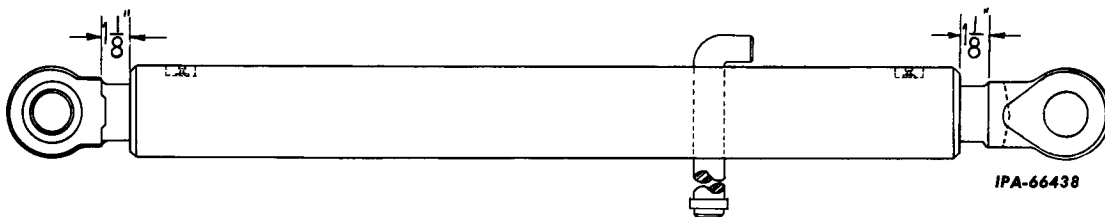
2. Place the strut locking pin end of the upper strut (refer to Illust. 24) between the holes in the upper strut swivel clevis on the blade. Install the upper strut pin through the hole in the strut swivel and the strut eyebolt. Align the hole in the pin with the hole in the clevis, so that the cap screw and lock nut can be assembled to hold the pin in place.

3. Assemble the other end of the upper strut to the clevis (mounted on the lower strut) by inserting the strut pin and locking it in position with the cap screw and lock nut.

4. Position the upper strut locking pins between the locking bars on the lower struts (Illust. 24). This will lock the upper struts so that the adjustment will not change.

NOTE: Raise the blade above the ground about 12 inches. Adjust the upper struts to a "NEUTRAL" position (no compression or tension); so that the blade connecting pins are free in their brackets.

CAUTION: If the machine is to be used for pushing scrapers, or rippers, protect the blade in the contact area by a pusher block or push plate.



Illust. 25
Upper strut adjustment - bullgrader.

INSTALLATION

Hydraulic tests after installation (Models 15D-2, and 15G-2 only)

1. Prepare unit for test by assuring that the hydraulic system has been filled with proper oil and purged of air. Wipe all oil from external surfaces and connections.

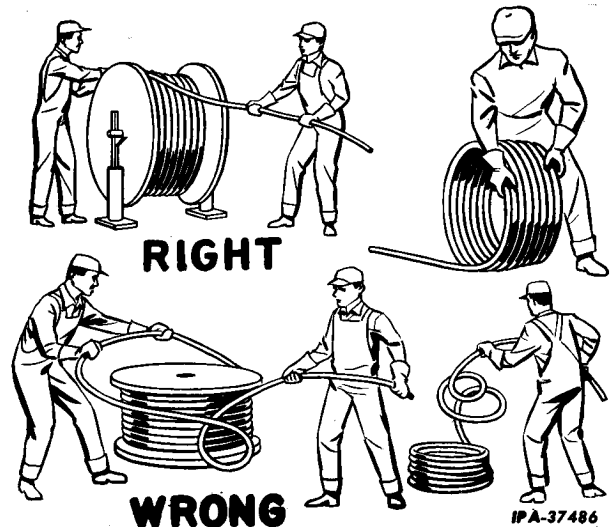
2. Operate the unit through "RAISE," "HOLD," "LOWER" and "FLOAT" cycles five to six times to assure proper function without unusual pump noise. If no operational defect or leakage is obvious, proceed to the next phase.

3. Operate the unit in "LOWER" position under full throttle until the temperature of the hydraulic system reaches 160°F. Reduce engine speed to half throttle, maintaining the "LOWER" position and make visual examination for leakage at the cylinders, pump, control valve and connections.

NOTE: This portion of the test should not exceed ten minutes duration.

4. Raise the blade to the maximum height and place the valve in the "HOLD" position. Wait 60 seconds and check for excessive drift.

NOTE: Piston rods should not travel out of the cylinder more than 5/16 inch in 60 seconds.



Illustr. 26
Removing the cable from the reel or coil.


The use of 6 x 25, preformed, right hand regular lay, independent wire rope center, improved plow steel, 1/2-inch wire rope is recommended.

NOTE: For maximum cable life, replace worn cable with cable of the recommended specifications. Abuse or kinking affects cable life materially.

REEVING

MODELS 15D-1, 15G-1, 15D-3 AND 15G-3 ONLY

Bulldozer and Bullgrader

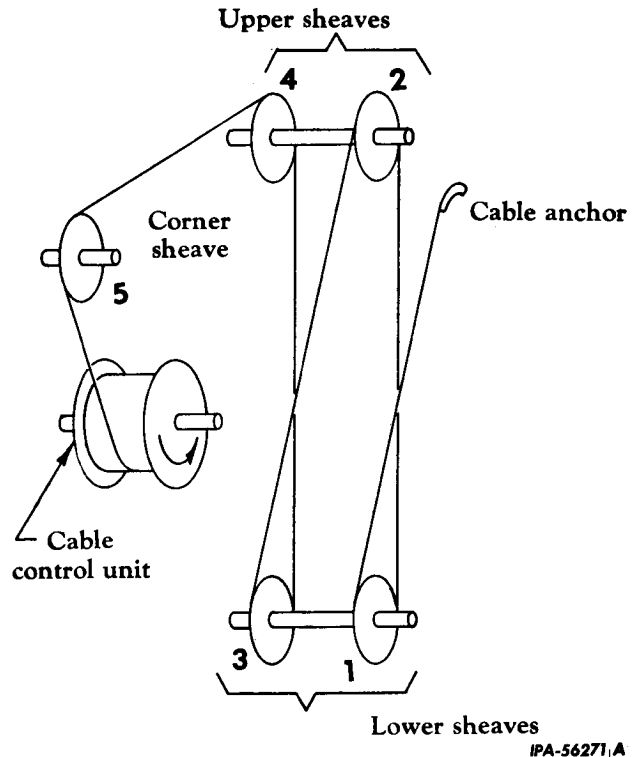
 **CAUTION:** Reeving must be done with the blade resting on level ground and the tractor engine stopped.

When reeving, follow the reeving diagram for your bullgrader or bulldozer on this page.

In following the steps shown on these diagrams, start with sheave one and reeve to the cable control unit drum, in the numerical order indicated.

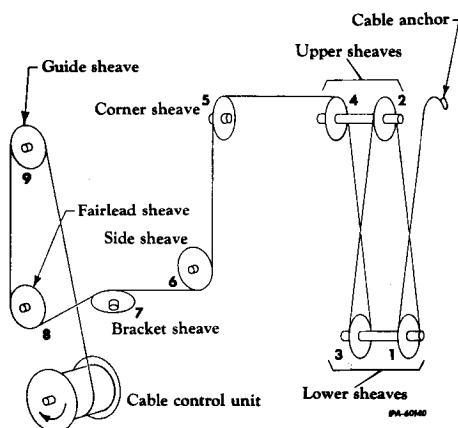
Always fasten the live end of the cable to the cable drum before anchoring the dead end.

Machines using the Model 110 cable control unit should have approximately five wraps of cable on the drum. Machines using the Model P-25 or P-29 cable control unit, should have approximately four wraps of cable on the cable drum. This is approximately 13 feet of cable on the Model 110 and 11 feet of cable on the Model P-29 or P-29, which will allow for average digging depth.



Illustr. 27
Cable reeving diagram
(Models 15D-1 and 15G-1 only).

INSTALLATION



Illust. 28
Cable reeving diagram
(Model 15D-3 and 15G-3 only).

Removing cable from a reel or coil without revolving it results in a twist as each turn is taken off. If this twist is not removed and the cable straightened before being placed under tension, kinks are apt to result.

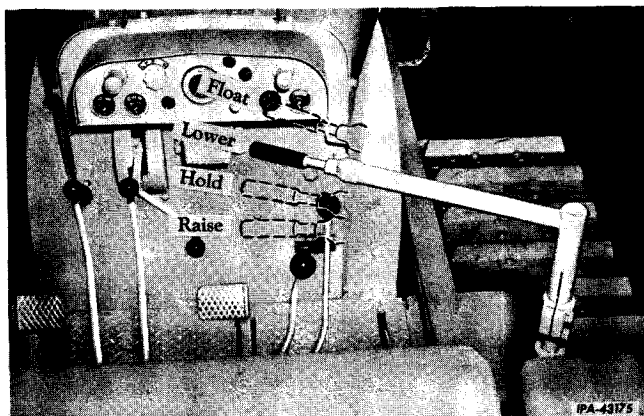
To prevent kinking the cable when removing it from a reel, revolve the reel and take the cable off in the same way it was put on the reel. Put a shaft through the center of the reel and jack it up so the reel will revolve freely. Pull the cable straight ahead, keeping it tight to prevent it from loosening on the reel. A board held against one flange may be used as a brake to keep the reel from revolving too fast.

To prevent kinking a cable when uncoiling it, remove the ties and roll the coil along the ground so that the cable lies straight. There will be no twist or kink in the cable if these instructions are followed. (Refer to Illust. 26.)

Lubrication

Lubricate all lubrication points as outlined in the "SCHEDULED MAINTENANCE" section.

OPERATION



Illust. 29
Control handle positions
(Models 15D-2 and 15G-2 only).

Control Handle Positions (Models 15D-2 and 15G-2 Only)

The positions of the operating control handle are the same for the bulldozer and bull-grader. The four positions of the handle, named in order from the rear, are: 1, RAISE; 2, HOLD; 3, LOWER; 4, FLOAT. Operation follows the natural reaction; pull back on the handle to raise and push forward to lower.

NOTE: After using the "RAISE" or "LOWER" position, the control handle will automatically return to "HOLD" position. Holding the hydraulic control handle in "RAISE" or "LOWER" position for a five minute interval upon reaching the limit of piston travel, will not damage the hydraulic system. However, extended holding in these positions will produce excessive heat, which may affect blade performance, and cause the pump to overheat. The correct procedure is to switch to the "HOLD" position at the limit of travel if it is desired to hold this position for several minutes.

Raise: To raise the blade, pull the control handle back as far as it will go. In this position, oil forces the piston and rod back to the top of the cylinder.

Hold: To hold the blade in any fixed position, move the control handle to the second position. This blocks the oil in the cylinders and holds the pistons and blade stationary. The blade is held in place until released.

Continued on next page.

OPERATION

To hold the blade level and prevent disturbances by track oscillation (as the tractor passed over bumps or rough ground), there is a connection between the cylinders. This connection permits the oil to flow back and forth between the rear ends and the front ends of the cylinders (but not past the piston head) so that the blade pressure remains equalized. The "HOLD" position therefore, holds the general position of the blade, but permits equalizing action to adjust against roughness in ground surface encountered by the tracks.

Lower: To lower the blade under power, move the control handle to the third position. Oil forces the piston and rod downward in the cylinder and forces the blade into the ground. Note that lowering the blade in this position is not just a matter of letting the weight lower the blade, but of forcing the blade down under power as for hard ground conditions. The lowering thrust, which is so powerful that it can easily lift the front end of the tractor off the ground, concentrates one third of the weight of the tractor plus that of the blade mechanism on the cutting edge of the blade.

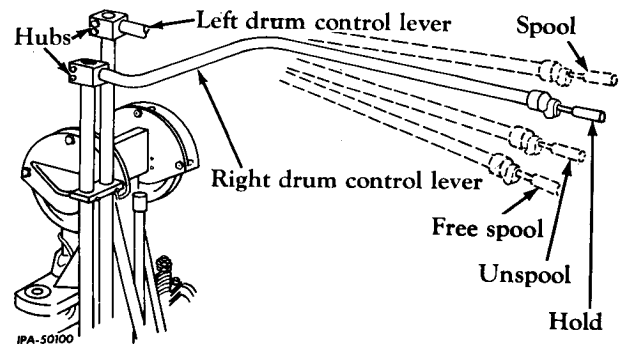
Float: To float the blade, move the control handle to the fourth position. This interconnects the cylinders so the pistons are free to move back and forth as the blade follows the ground surface, or to lower by its own weight. The "FLOAT" position provides a convenient and quick method of returning the blade from carrying to ground level because of the high speed gravity drop which is faster than the powered "LOWER" position.

CONTROL LEVER POSITIONS MODELS 15D-1, 15G-1, 15D-3 AND 15G-3 ONLY

Model P-25 and P-29 Cable Control Units (Models 15D-3 and 15G-3 Only)

The positions of the operating control lever are the same for the bulldozer and bullgrader. The four positions of the lever, named in order from the right of the operator are: 1. SPOOL; 2. HOLD; 3. UNSPOOL; and 4. FREE SPOOL. Operation follows the natural reaction; pull the lever to the left to spool in the cable and push to the right to unspool the cable. When the control lever is in the "SPOOL" or "UN-SPOOL" position, it will return automatically to the "HOLD" position when released. (Refer to Illust. 30.)

Pushing the control lever to the right, just past the "UN-SPOOL" position, will lock the lever in the "FREE SPOOL" position. In this position, the brake drum is free to turn in either direction so that the operator may step down from the tractor and with no assistance, reeve or change the cable on the drum.



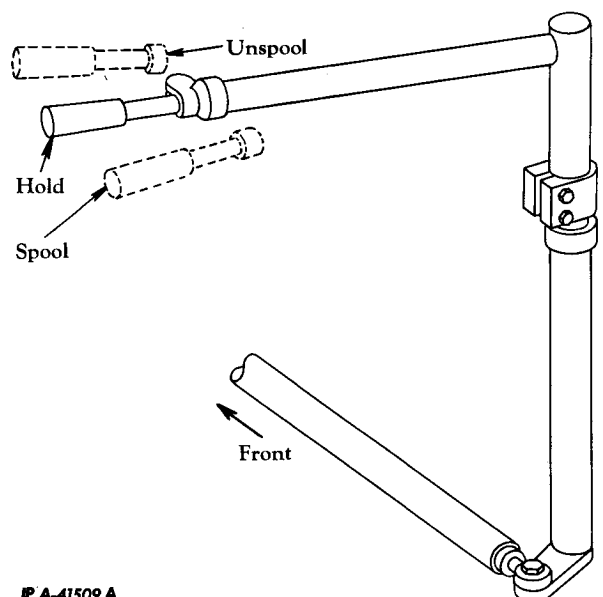
Illust. 30
Models P-25 and P-29 control lever positions.



CAUTION: Always stop the engine during this operation.

Model 110 Cable Control Unit (Model 15D-1 and 15G-1 Only)

The positions of the operating control lever are the same for the bulldozer and bullgrader. The three positions of the lever, named in order from the rear are: 1. SPOOL; 2. HOLD; 3. UNSPOOL. Operation follows the natural reaction; pull back on the lever to spool in the cable and push forward to unspool the cable. When the control lever is in the "SPOOL" position it will automatically return to the "HOLD" position when released. (Illust. 31.)



Illust. 31
Model 110 control lever positions.

OPERATION

BULLDOZER

Tilting the Blade

1. Raise the blade about a foot above the ground.
2. Remove the strut locking pin from the strut lock loop (refer to Illust. 18) and extend the upper strut on the side of the blade to be raised. Adjust this strut to tilt the blade about half of the desired tilt.
3. Adjust the upper strut on the opposite side of the blade by shortening it to obtain the balance of the desired tilt. Reinstall the strut locking pins.

NOTE: Do not tilt the blade in excess of 12 inches tip to tip.

Pitching the Blade

1. To pitch the blade forward (decreasing the suction angle), raise the blade a few inches above the ground. Extend the upper struts on each side of the blade.

NOTE: Do not extend beyond the marker groove in the eyebolt.

2. To pitch the blade backward (increasing the suction angle), the upper struts must be shortened.

NOTE: When increasing or decreasing the suction angle, the upper struts must be extended or shortened equally on both sides.

3. After making the adjustment, secure each strut with the locking pin so that it will not rotate.

Leveling the Blade

To level the blade, lift the blade a few inches above the ground, and adjust both upper struts so that the gap between the shoulder of the eyebolt, clevis and the upper strut body is 1-1/16 inches on each end. (Refer to Illust. 21.) This will position the blade in its neutral pitch position. If the blade is not level, a half turn of the upper strut in either direction will level the blade.

BULLGRADER

Angling the Blade

1. To angle the blade from the straight position, raise the blade a few inches above the ground.

2. Remove the strut trunnion from the strut trunnion bracket (on the side of the blade that is to be angled to the rear) and position it close to the C-frame.

3. Remove the strut trunnion from the opposite side of the blade, and swing the strut assembly out as far as it will go.



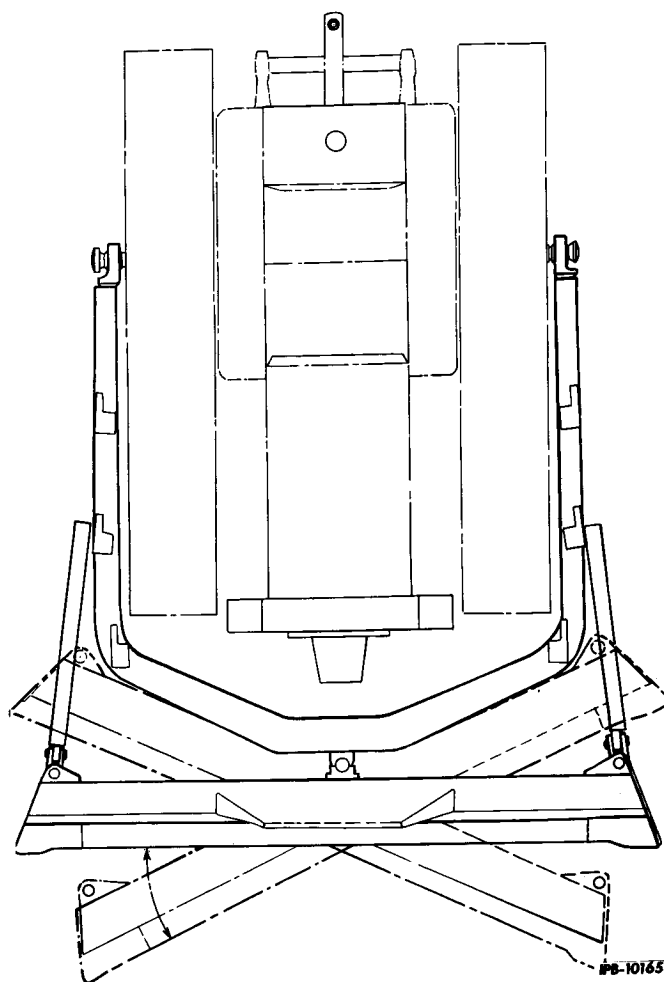
CAUTION: The blade will drop on the side where the strut is extended due to the loss of balance.

4. Return to the starting side of the blade, and swing the strut assembly outward.

5. Level the blade and maintain this level position while angling the blade.

NOTE: Perform the following operations in the order given to maintain the balance of the blade during the installation of the first strut trunnion.

Continued on next page.



Illust. 32
Blade angling positions.

OPERATION

6. First install the strut trunnion that is angled to the rear of the tractor.

7. Install the other strut trunnion to its bracket on the C-frame. If necessary, adjust the upper strut to align the strut trunnion with the strut trunnion bracket.

8. Level the blade so that when the blade is resting on the ground, one corner does not dig in more than the other. If only a small amount of adjustment is required, this may be accomplished by adjusting the upper struts.

9. To raise one end of the blade, lengthen the upper strut on the side to be raised. To lower one end of the blade, shorten the upper strut on the side to be lowered.

10. After the leveling the blade, raise the blade above the ground about 12 inches. Adjust the upper struts to a "NEUTRAL" position (no compression or tension); so that the blade connecting pins are free in their brackets.

Changing the Angle of the Blade

1. To change the angle of the blade, when it is already angled away from the straight position, raise the blade a few inches above the ground.

2. Remove the strut trunnion from its bracket on the other side, and swing the strut assembly all the way out.

3. Proceed as previously outlined under "Angling the Blade," if it is desired to make the blade sidecast in the opposite direction.

4. If it is desired to position the blade straight across the front of the tractor, angle the blade until it is straight. Maintain the blade in a level position during the process of angling.

5. Move either strut assembly until the assembly contacts the C-frame.



CAUTION: The blade will drop on the side where the strut is extended due to the loss of balance.

6. Move the strut assembly on the other side of the blade until it contacts the C-frame, and level the blade.

7. Assemble this strut trunnion into its trunnion bracket on the C-frame.

8. Assemble the strut trunnion on the opposite side into its trunnion bracket on the C-frame. If necessary, adjust the upper strut to align the strut trunnion with the trunnion bracket.

9. Level the blade, so that when the blade is resting on the ground, one corner does not dig in more than the other. If only a small amount of adjustment is required, this may be accomplished by adjusting the upper struts.

10. To raise one end of the blade, lengthen the upper strut on the side to be raised. To lower one end of the blade, shorten the upper strut on the side to be lowered.

11. After leveling the blade, raise the blade above the ground about 12 inches. Adjust the upper struts to a "NEUTRAL" position (no compression or tension); so that the blade connecting pins are free in their brackets.

Tilting the Blade

1. To tilt the blade, raise the blade about a foot above the ground.

2. Remove the strut trunnion from its bracket on the side to be raised, and position the strut close to the C-frame.

3. Adjust the opposite side to get the desired tilt by shortening the upper strut. Adjust this strut to tilt the blade about half of the desired tilt. Always adjust the side being lowered first, so that change of balance will not cause the loose strut assembly to swing out and cause unexpected damage.

4. Return to the side of the tractor on which the strut assembly was disengaged, and lengthen the upper strut until the strut trunnion can be inserted in its bracket on the C-frame.

NOTE: Do not tilt the blade in excess of 12-inches tip to tip.

5. After tilting the blade, raise the blade above the ground about 12 inches. Adjust the upper struts to a "NEUTRAL" position (no compression or tension); so that the blade connecting pins are free in their brackets.

SCHEDULED MAINTENANCE

Scheduled maintenance and periodic inspections are two very important functions which every owner and/or operator must follow to assure the maximum performance of the unit.

Scheduled maintenance and inspections must be performed at the specified intervals given below. Periodic maintenance and inspections listed below will also help keep your unit operating at top efficiency.

Scheduled

POINT OF INSPECTION

REMARKS

After Every 10 Hours of Operation

Lubrication points	Refer to "LUBRICATION GUIDES."
Hydraulic system	Remove filler plug and check oil level. Refer to "HYDRAULIC SYSTEM."

After Every 250 Hours of Operation

Lubrication points	Refer to "LUBRICATION GUIDES."
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After Every 1000 Hours of Operation

Hydraulic system	Drain and refill with clean oil. Refer to "HYDRAULIC SYSTEM."
Oil strainer	Remove and clean strainer. Refer to "HYDRAULIC SYSTEM."

Periodic

Cables	Inspect for wear or kinking. Refer to "REEVING."
Cap screws, nuts or pins	Inspect for loose or broken cap screws, nuts or pins.
Cutting edges and end bits	Inspect for wear. Refer to "CUTTING EDGES AND END BITS."
Trunnion cap screws	Tighten.

LUBRICATION

Thorough lubrication service performed at definite intervals and according to an established routine will aid greatly in prolonging the life of the tractor equipment and in reducing operating expense. In the "LUBRICATION GUIDES" the recommended intervals between lubrication periods are approximate, based on average operating conditions. The type of work being done, load, ground and weather conditions are all factors to consider in frequency of lubrication. The life and performance of a machine depend on the care that it is given. Proper lubrication is the most important maintenance service for your equipment.

Regular lubrication at recommended intervals also provides an opportunity for a general routine inspection of the equipment.

More frequent lubrication is required under adverse operating conditions such as excessively high or low temperatures, continued operation in sand or dust, immersion in water or exposure to moisture. Any one of these conditions may quickly destroy the protective qualities of the lubricants.

All lubrication fittings are 1/8 inch fittings. At all temperatures use a chassis lubricant to lubricate all fittings. Before applying the lubricant, clean all the fittings to avoid forcing dirt or abrasives into the working parts. Apply the new lubricant until the old lubricant is forced through the bearing and starts to seep out the edges of the bearing lubricated.

SCHEDULED MAINTENANCE

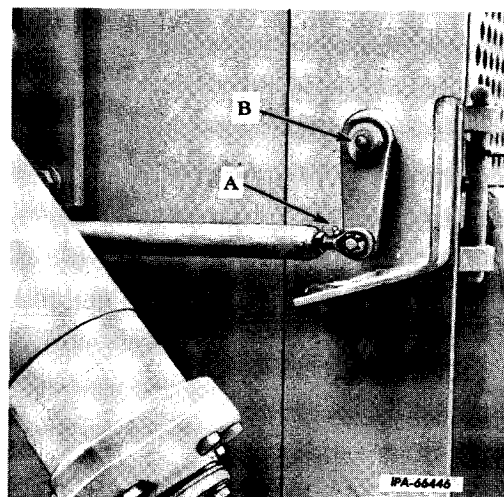
Hydraulic System

The hydraulic system (tank and cylinders) will hold 6 gallons of oil. When filling, use a good grade of SAE-10W heavy duty motor oil that contains an anti-foaming agent. Tank and cylinders should be drained after every 1000 hours of engine operation. Remove the oil strainer element and clean it in kerosene or fuel oil.

NOTE: If the tractor is shipped from the factory with a hydraulic unit mounted on it, it will already have hydraulic oil in the system and will not need to be changed until 1000 hours of operation.

Cable Control Unit

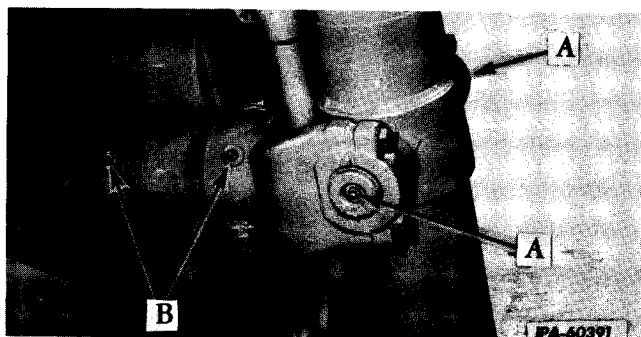
Lubricate the cable control units as outlined in the Model 110 or P-25 and P-29 Cable Control Units Operator's Manuals.



Illust. 34
Rod end bearing and front control shaft
(Models 15D-2 and 15G-2 only).

TRACTOR EQUIPMENT LUBRICATION POINTS

Service After Every 10 Hours of Operation



Illust. 33
Gimbal crosstube and gimbal trunnion ring
(Models 15D-2 and 15G-2 only).

Item 1 - Gimbal Crosstube and Gimbal Trunnion Ring
(Models 15D-2 and 15G-2 only) (Illust. 33)

Apply three of four strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.

A - Gimbal trunnion ring (two fittings on each cylinder).

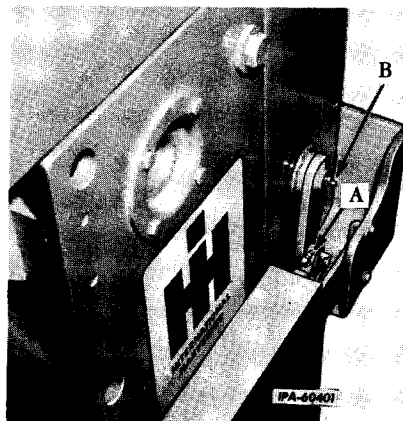
B - Gimbal crosstube (two fittings on each side).

Item 2 - Rod End Bearing and Front Control Shaft
(Models 15D-2 and 15G-2 only) (Illust. 34)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.

A - Rod end bearing.

B - Front control shaft.



Illust. 35
Rod end bearing and front control shaft
(Models 15D-1 and 15G-1 only).

Item 3 - Rod End Bearing and Front Control Shaft
(Models 15D-1 and 15G-1 only) (Illust. 35)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.

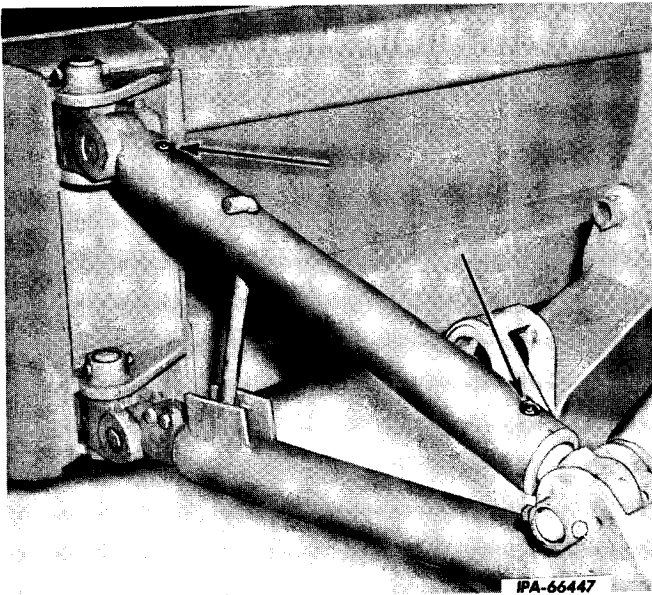
A - Front end bearing.

B - Front control shaft.

SCHEDULED MAINTENANCE

TRACTOR EQUIPMENT LUBRICATION POINTS

Service After Every 10 Hours of Operation - Continued

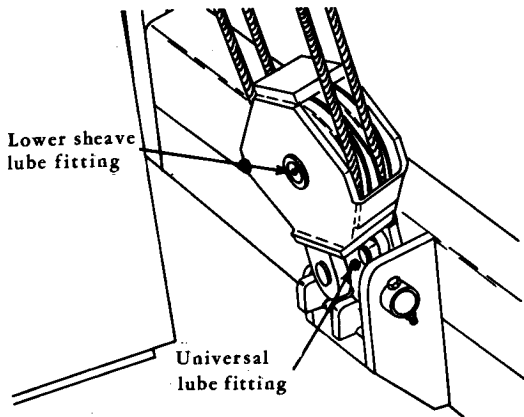


Illust. 36
Upper strut

(Models 15G-1, 15G-2 and 15G-3 only).

Item 4 - Upper Strut
(Models 15G-1, 15G-2 and 15G-3 only) (Illust. 36)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.

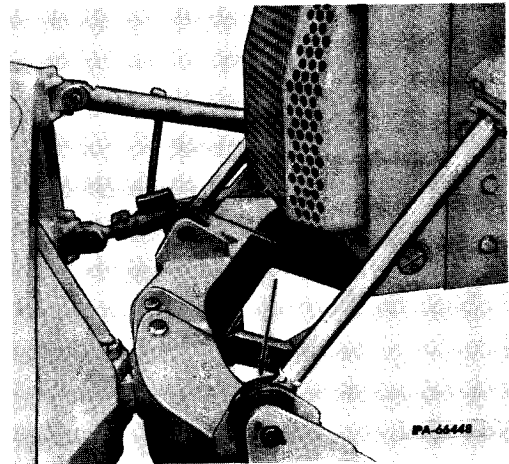


Illust. 37

Universal and lower sheave block
(Models 15D-1, 15G-1, 15D-3 and 15G-3 only).

Item 5 - Universal
(Models 15D-1, 15G-1, 15D-3 and 15G-3 only) (Illust. 37)

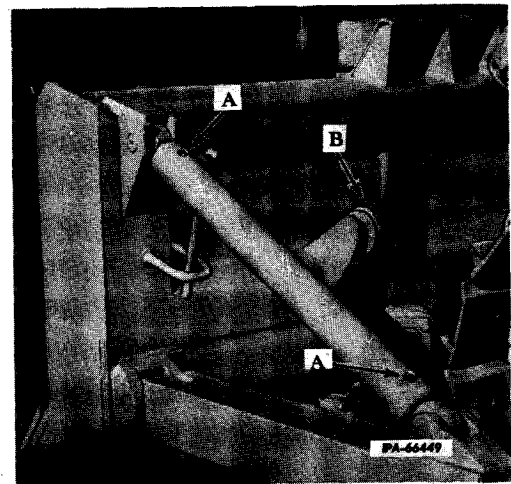
Apply two or three strokes of the lubricator to the fitting or sufficient lubricant to force out the old lubricant and dirt.



Illust. 38
Piston rods
(Model 15G-2 only).

Item 6 - Piston Rod (Model 15G-2 only) (Illust. 38)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.



Illust. 39
Piston rod and upper strut
(Model 15D-2 only).

Item 7 Piston Rod and Upper Strut
(Model 15D-2 only) (Illust. 39)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.

- A - Upper strut (two fittings on each strut)
- B - Piston rod (one fitting on each rod).

Continued on page 34 .

SCHEDULED MAINTENANCE

LUBRICATION GUIDE
(HYDRAULIC UNITS)

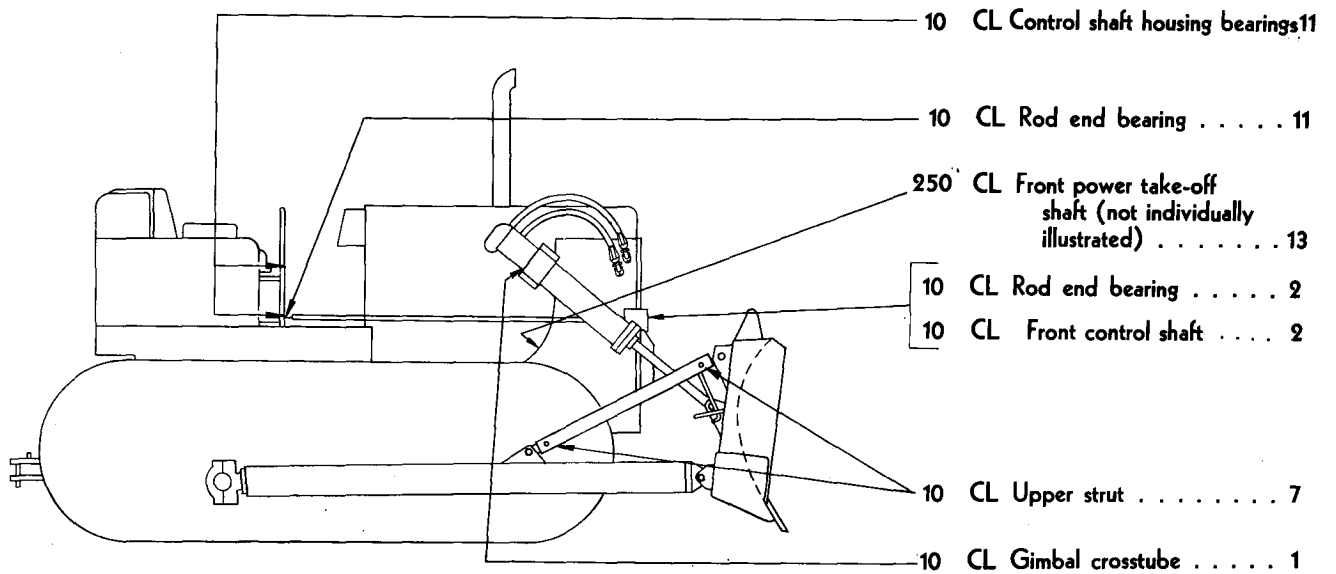
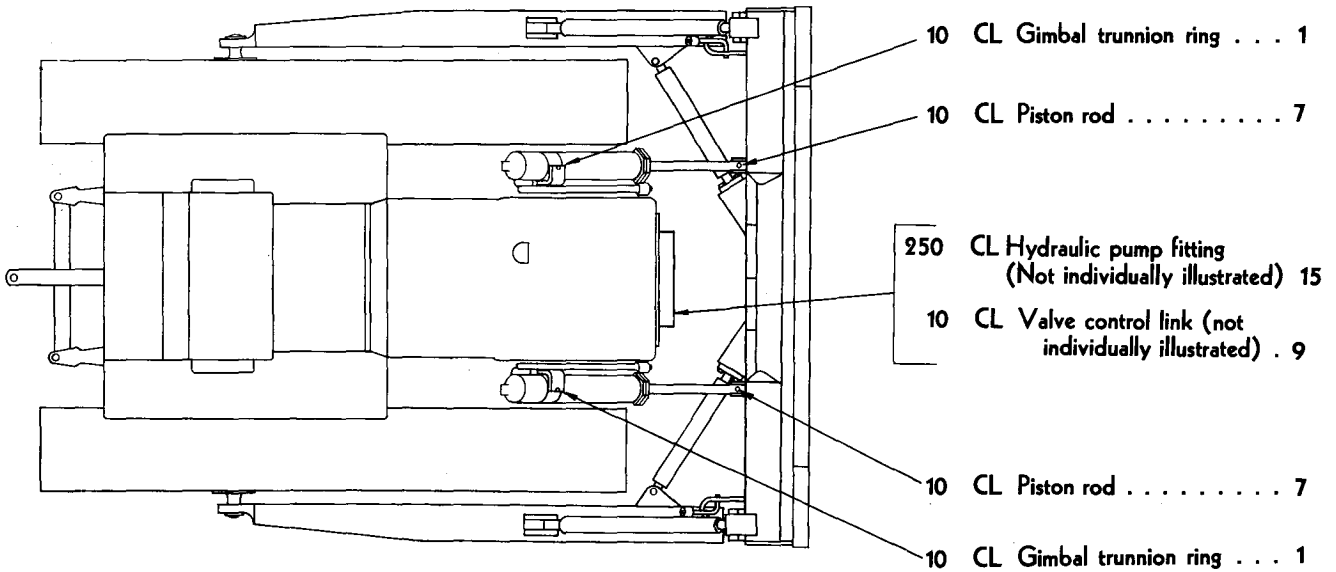
KEY CL (Chassis lubricant)—Use as pressure-gun grease; all temperatures

Points of lubrication are individually explained under "TRACTOR EQUIPMENT LUBRICATION POINTS." They are identified by item numbers corresponding with those listed along each side of the Lubrication Guide.

Note: Intervals of time between lubrication services are based on average operating conditions. Under unusually severe conditions of operation, reduce the interval of time between services.

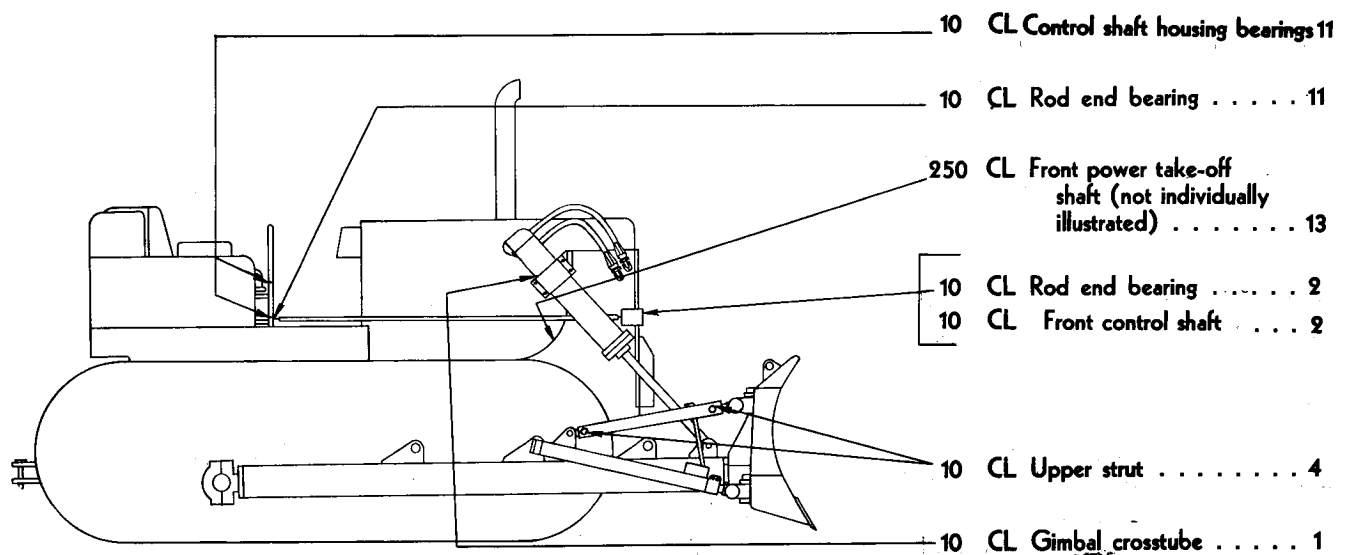
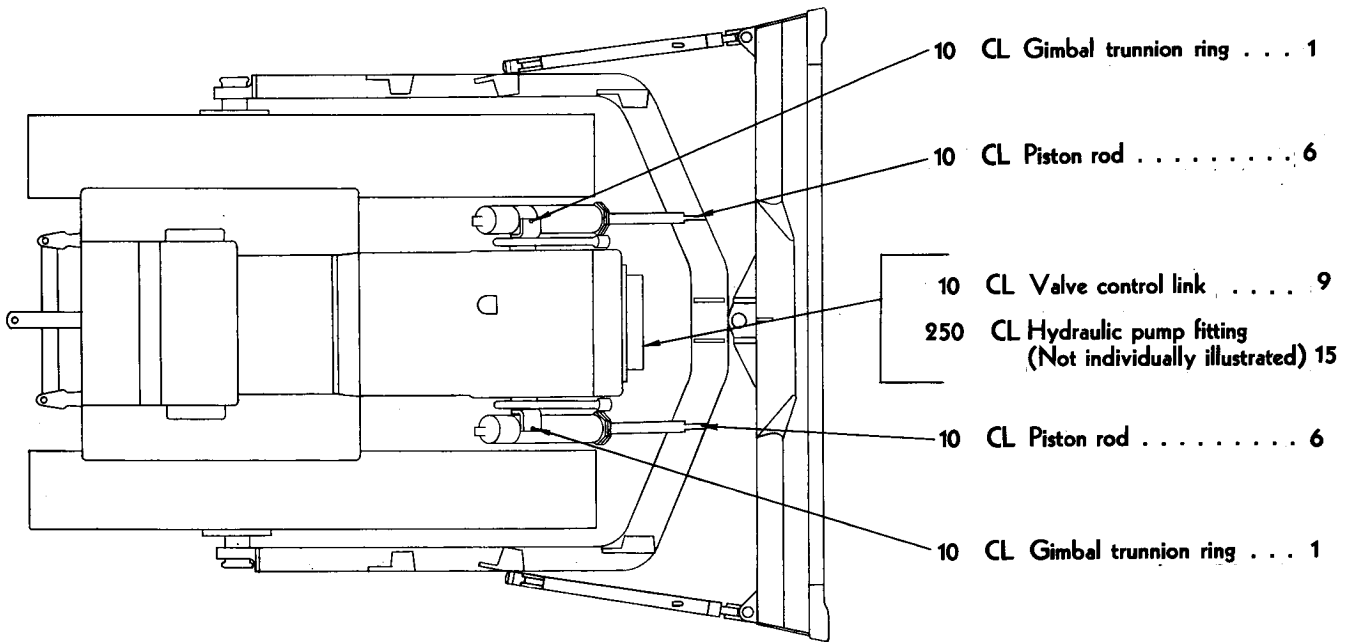
Always use clean containers. Keep lubricators clean. Wipe dirt from fittings before applying lubricators.

Lubri- Hours	Lubri- cant	Point of Lubrication	Item No.
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SCHEDULED MAINTENANCE

Hours	Lubri- cant	Point of Lubrication/	Item No.
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FPB-10167B

SCHEDULED MAINTENANCE

LUBRICATION GUIDE

(CABLE UNITS)

KEY

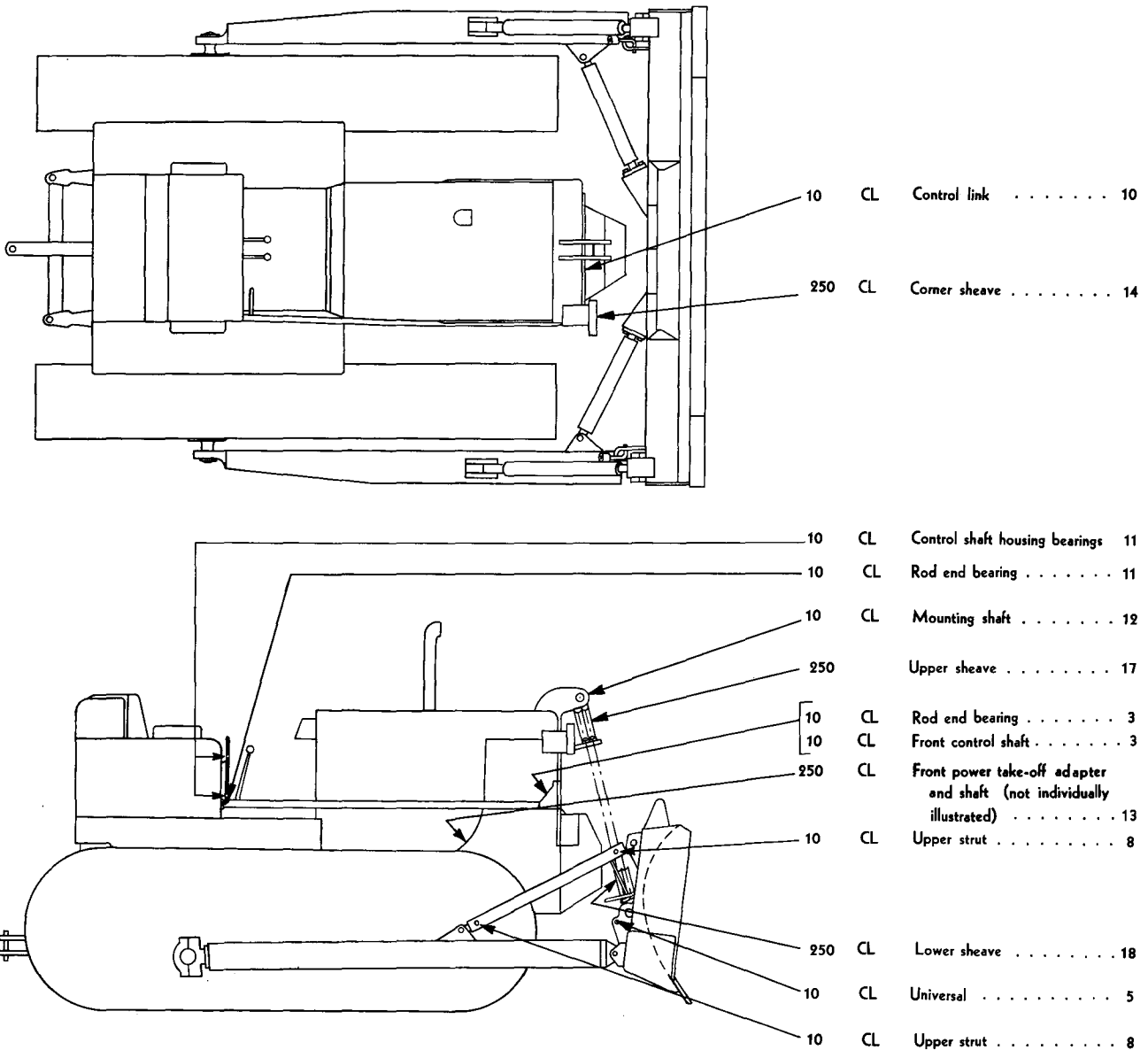
CL (chassis lubricant)—Use as Pressure-gun grease, all temperatures.

Points of lubrication are individually explained under "TRACTOR EQUIPMENT LUBRICATION POINTS." They are identified by item numbers corresponding with those listed along each side of the Lubrication Guide.

Always use clean containers. Keep lubricators clean. Wipe dirt from fittings before applying lubricators.

Note—Intervals of time between lubrication services are based on average operating conditions. Under unusually severe conditions of operation reduce the interval of time between services.

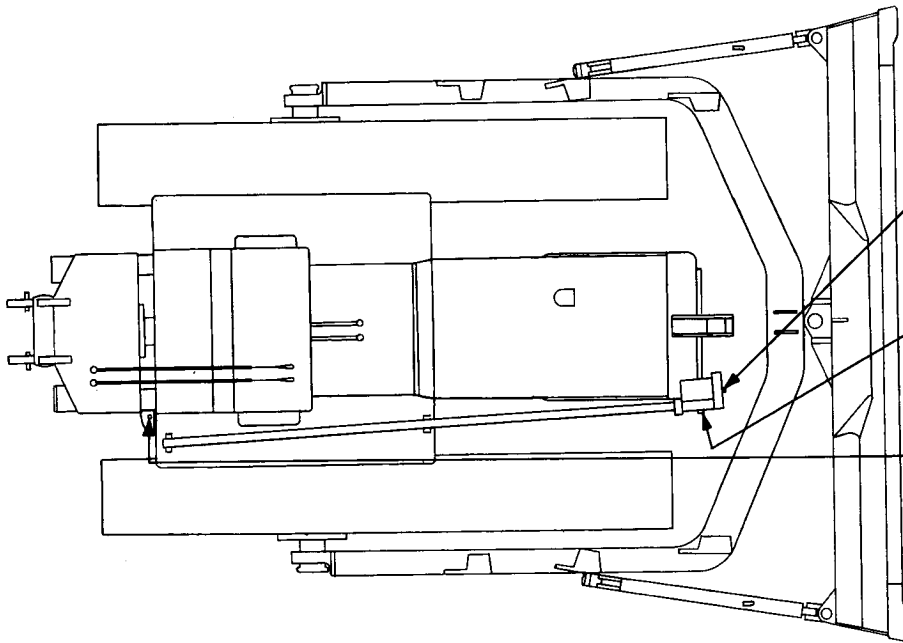
Hours	Lubri- cant	Point of Lubrication	Item No.
-------	----------------	----------------------	-------------



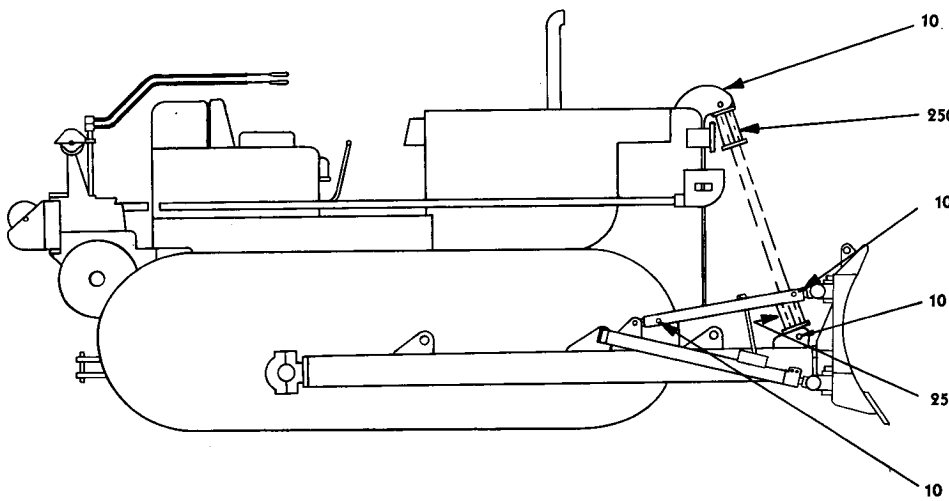
IPB-10717

SCHEDULED MAINTENANCE

Hours	Lubri- cant	Point of Lubrication	Item No.
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- 250 CL Corner sheave 14
- 250 CL Side sheave 14
- 250 CL Bracket sheave 16



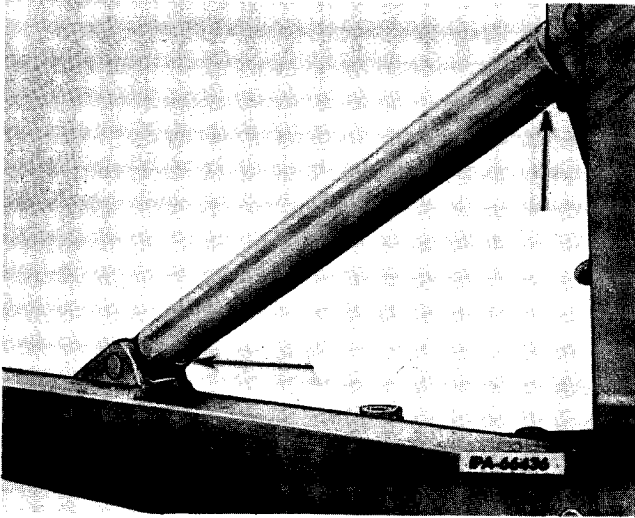
- 10 CL Mounting shaft 12
- 250 CL Upper sheave 17
- 10 CL Upper strut 4
- 10 CL Universal 5
- 250 CL Lower sheave 18
- 10 CL Upper strut 4

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SCHEDULED MAINTENANCE

TRACTOR EQUIPMENT LUBRICATION POINTS

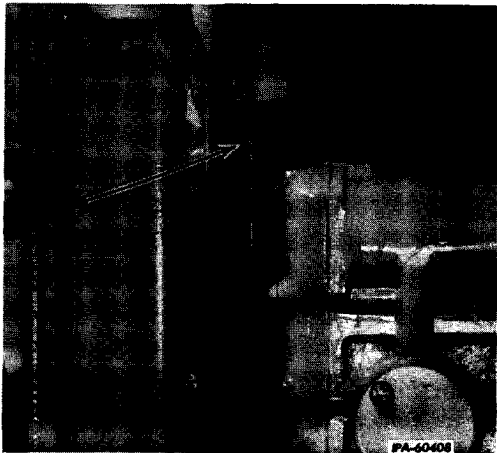
Service After Every 10 Hours of Operation - Continued



Illust. 40
Upper struts
(Models 15D-1 and 15D-3 only).

Item 8 - Upper Struts
(Models 15D-1 and 15D-3 only) (Illust. 40)

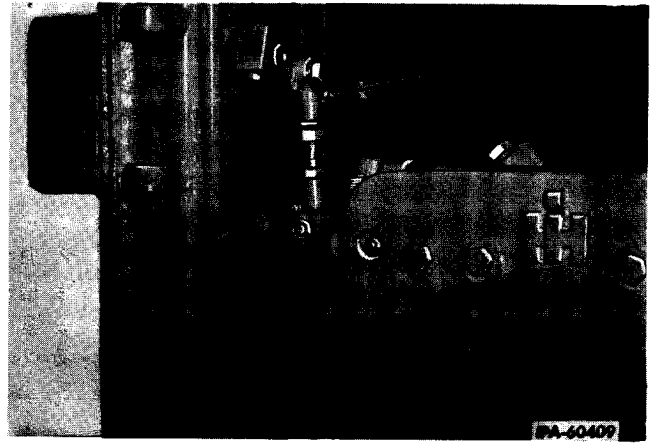
Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.



Illust. 41
Valve control link
(Models 15D-2 and 15G-2 only).

Item 9 - Valve Control Link
(Models 15D-2 and 15G-2 only) (Illust. 41)

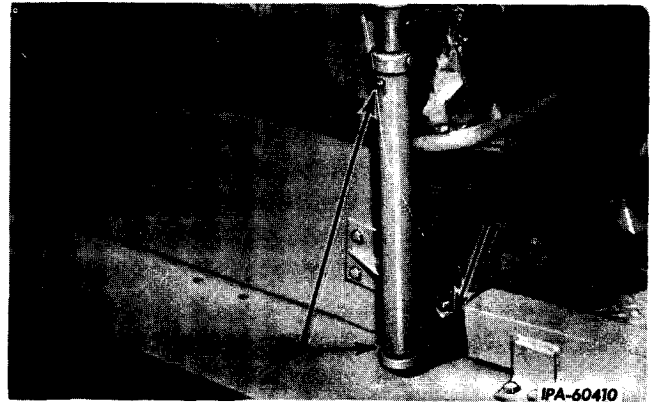
Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.



Illust. 42
Control link
(Models 15D-1 and 15G-1 only).

Item 10 - Control Link
(Models 15D-1 and 15G-1 only) (Illust. 42)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.



Illust. 43
Rod end bearing and control shaft housing
(Models 15D-1, 15D-2, 15G-1 and 15G-2 only).

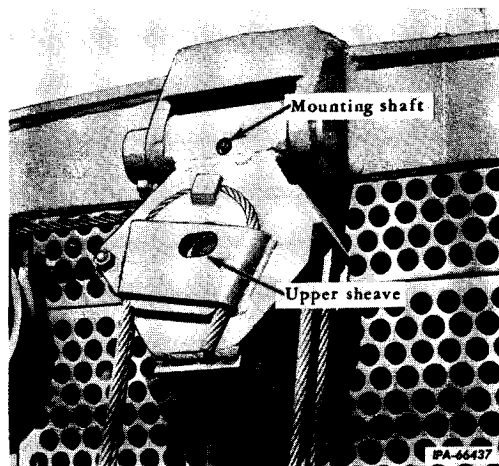
Item 11 - Rod End Bearing and Control Shaft Housing
(Models 15D-1, 15D-2, 15G-1 and 15G-2 only) (Illust. 43)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.

A - Rod end bearing.

B - Control shaft housing.

SCHEDULED MAINTENANCE



Illust. 44
Mounting shaft and upper sheave
(Models 15D-1, 15G-1, 15D-3 and 15G-3 only).

Item 12 - Mounting Shaft
(Models 15D-1, 15G-1, 15D-3 and 15G-3 only) (Illust. 44)

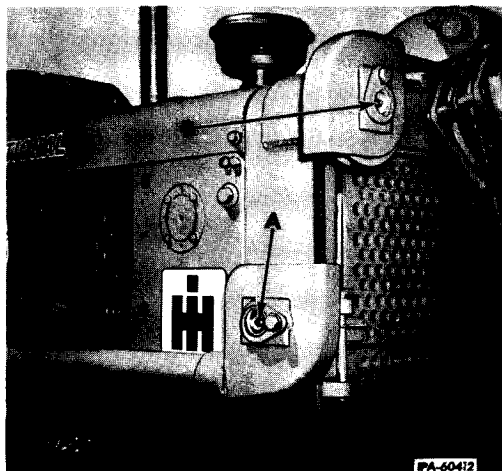
Apply two or three strokes of the lubricator to the fitting or sufficient lubricant to force out the old lubricant and dirt.

Service After Every 250 Hours of Operation

Item 13 - Front Power Take-off and Shaft
(Models 15D-1, 15D-2, 15G-1 and 15G-2 only)

Two fittings are located on the spider (3 and 6). (Refer to Illust. 3.)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.



Illust. 45
Side sheave and corner sheave
(Models 15D-1, 15D-3, 15G-1 and 15G-3 only).

Item 14 - Side Sheave and Corner Sheave
(Models 15D-1, 15D-3, 15G-1 and 15G-3 only) (Illust. 45)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.

A - Side sheave, Models 15D-3 and 15G-3 only.

B - Corner sheave, Models 15D-1, 15D-3, 15G-1 and 15G-3 only.

Item 15 - Hydraulic Pump Fitting
(Models 15D-2, 15DN-2 and 15G-2 only)

Apply two or three strokes of the lubricator to the fitting which is located at the lower rear of the hydraulic pump.



Illust. 46
Bracket sheave
(Models 15D-3 and 15G-3 only).

Item 16 - Bracket Sheave
(Models 15D-3 and 15G-3 only) (Illust. 46)

Apply two or three strokes of the lubricator to the fitting or sufficient lubricant to force out the old lubricant and dirt.

Item 17 - Upper Sheave
(Models 15D-1, 15G-1, 15D-3 and 15G-3 only) (Illust. 44)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.

Item 18 - Lower Sheave
(Models 15D-1, 15G-1, 15D-3 and 15G-3 only) (Illust. 37)

Apply two or three strokes of the lubricator to each fitting or sufficient lubricant to force out the old lubricant and dirt.

SCHEDULED MAINTENANCE

CHECKING MECHANICAL PROBLEMS OF HYDRAULIC SYSTEM

PROBABLE CAUSE

REMEDY

No Motion of Hydraulic System When First Started

- | | |
|---|--|
| 1. Low oil level due to leakage | Examine hydraulic lines, etc., for leaks, and correct. |
| 2. Oil viscosity too heavy | Use oil recommended. |
| 3. Air leak in pump inlet passage | Inspect pump line mountings for leakage and correct. |
| 4. Restricted pump inlet passage | Examine oil strainer and clean. |
| 5. Broken pump drive shaft or power take-off shaft | Replace.* |
| 6. Pressure relief valve plunger leaking and/or defective | * |
| 7. Pump not rotating | Check for broken pump drive shaft or power take-off shaft. |
| 8. Pump worn out | * |
| 9. Control lever linkage broken | Remove and replace.* |
| 10. Broken hydraulic lines | Repair.* |
| 11. Broken relief valve spring | * |

Loss of Motion During Operation

- | | |
|---|--|
| Insufficient oil supply | Check level of oil in oil tank and add oil if necessary. |
| A. Broken or loose pump inlet passage | Replace or tighten. |
| B. Broken outlet passage | Replace. |
| C. Broken cylinder connecting lines | * |
| D. Broken tank return line | * |

NOTE: For additional "causes," refer to the items listed under "No Motion of Hydraulic System When First Started."

Slow Motion

- | | |
|--|--|
| 1. Pump wearing out | * |
| 2. Partially clogged pump inlet | Clean hydraulic system and clean oil strainer. |
| 3. Air leak in pump inlet | Inspect pump line mountings for leakage and correct. |
| 4. Pressure relief valve plunger leaking | * |
| 5. Badly scored relief valve plunger seat | Replace.* |
| 6. Aerated oil supply (foam in tank) | Check hydraulic system for air leaks. |
| 7. Worn or scored piston packing or cups | * |
| 8. Inside diameter of cylinder tube badly scored or nicked | * |
| 9. Linkage to valve plunger bent | Remove and replace.* |

Jerky Motion in Upstroke

- | | |
|---|------------------------|
| 1. Air in system | Vent hydraulic system. |
| 2. Cylinder packing too tight | * |

* Consult your authorized International Construction Equipment distributor or dealer.

SCHEDULED MAINTENANCE

PROBABLE CAUSE

REMEDY

Jerky Motion in Downstroke

1. Dashpot plunger spring or cap broken . . . *
2. Float control plunger spring broken . . . *

Noisy Operation

1. Air in system Vent hydraulic system.
2. Insufficient oil supply Check level of oil in oil tank and add oil if necessary.
3. Pump bearings worn out *
4. Pump and coupling worn out *
5. Partially blocked pump inlet Drain hydraulic system and clean strainer.
6. Pump squealing caused by:
 - A. Air in system Vent hydraulic system.
 - B. Insufficient oil supply. Check level of oil in oil tank and add oil if necessary.
 - C. Partially blocked pump inlet Drain hydraulic system and clean strainer.
7. Chattering relief valve spring *
8. Broken flow control plunger spring *
9. Broken dashpot plunger spring or cap *

Load Slowly Drops (Valve Plunger in Hold Position)

1. Oil leaking by valve plunger *
2. Oil by-passing from holding side to opposite side of piston *
3. Oil leaks at fittings or in cylinder connecting lines Check hydraulic system.

Momentary Drop of Load When Valve Plunger is Actuated From Hold to Raise or Raise to Hold

1. Scored or worn check valve plunger or seat *
2. Check valve plunger held off its seat Clean system. Check for foreign matter.
3. Broken check valve spring. *

Sticking Valve Plunger

1. Scored or burred lands in plunger bore . . . *
2. Mounting face not level, thereby distorting housing *
3. Mounting bolts too tight or improperly tightened Loosen and retighten to proper torque (50 lbs).
4. Detent poppets worn or damaged (positive position type only). *
5. Dirt or foreign matter *
6. Warped valve plunger *

* Consult your authorized International Construction Equipment distributor or dealer.

MAINTENANCE

HYDRAULIC SYSTEM

(Models 15D-2 and 15G-2 only.)

Draining the Hydraulic System

After every 1000 hours of operation, drain the hydraulic system and clean the oil strainer.

To drain the system, including the cylinders, proceed as outlined below:

1. Operate the system to warm the oil for easy draining.
2. Position the tractor to permit the blade to drop below ground level, so that the blade is entirely supported by both cylinders at maximum dig position. This is necessary to cause the relief stems in the hydraulic cylinder pistons to open and permit draining at the cylinders.
3. Place the control valve into the "FLOAT" position and stop the tractor engine.



CAUTION: Always loosen the vent plugs and filler plug slowly in case there is still some pressure in the system.

4. Remove the filler plug (7, Illust. 7) from the top left side of the radiator guard and loosen the vent plug on the top of each hydraulic cylinder to allow air pressure to escape.
5. Remove the drain plug (19, Illust. 7) from the bottom of the radiator guard and remove the drain plug from the bottom of each hydraulic cylinder.
6. Remove both oil strainer retainer plates (14, Illust. 7). Remove the oil strainer (12, Illust. 1) and clean it in kerosene or fuel oil.

NOTE: The oil strainer must be cleaned whenever the hydraulic system is drained.

7. Inspect the oil strainer "O" rings (11 and 13, Illust. 1) and replace if worn or cut.
8. Reinstall the oil strainer and secure with the retainer plates.
9. Reinstall and tighten all the drain plugs.

Filling and Venting the Hydraulic System

CAUTION: Use clean oil from a clean container. Keep oil in the system clean. Maintain all packings and fittings against leakage.

To fill the hydraulic system, use 6 gallons of SAE-10W heavy duty engine oil that contains an anti-foaming agent.

1. Remove the filler plug from the top left side of the radiator guard tank and loosen the vent plugs in the top of the hydraulic cylinders. With the control handle in "HOLD" position, fill the oil tank to the bottom of the filler tube. Replace the filler plug.
2. Start the tractor engine and run at low idle speed.
3. Place the control handle into the "RAISE" position and hold it there for a few seconds. Then shift the valve into the "HOLD" position.



CAUTION: Loosen the filler plug slowly in case there is still some pressure in the system.

4. Remove the filler plug and check the oil level. Add oil if necessary.
5. Repeat this procedure until a solid stream of oil (no air) drains out from the vent plug in the top of each cylinder and until the oil level remains constant.
6. Tighten the vent plug in the top of each cylinder, and tighten the filler plug.

FAN BELTS

Removal

(Models 15D-1, 15D-2, 15G-1 and 15G-2 only)

1. Disconnect the coil-to-distributor cable at the coil end to eliminate any possibility of accidentally starting the engine.
2. Decrease the fan belt tension as outlined in the "Tractor Operator's Manual."
3. Remove the four cap screws and lock washers holding the spider (3, Illust. 3) to the fan drive pulley. Slide the power take-off shaft forward on the pump shaft and/or cable control unit shaft and drop the power take-off shaft down.
4. Working with one belt at a time, remove the belts from the generator pulley.
5. Turn the fan by hand and work the belts over the fan blades until the belts can be removed.

MAINTENANCE

Installation

(Models 15D-1, 15D-2, 15G-1 and 15G-2 only)

Reverse the procedure outlined under "Removal."

CUTTING EDGES AND END BITS

Service the cutting edge or end bits before wear occurs on the cutting edge back-up plate or drift board.

To service the cutting edge, raise the blade to the maximum height, set the control handle in the "HOLD" position, and securely block the C-frame or push arms. Then shut off the engine.



CAUTION: To avoid serious injury never work underneath the blade, trusting the hydraulic control unit or cable control unit to hold the blade elevated. Someone may move the control handle accidentally while climbing on the tractor or reaching for tools, and drop the blade.

Remove the cutting edge and end bits by taking out the attaching plow bolts. The life of the cutting edge may be increased by reversing it. If the end bits are worn, rebuild them with hard surface welding rods or replace.

Install the cutting edge and end bits and bolt securely.

NOTE: Firmly seat the end bits against the sheave blocks. Use only manufacturer's heat-treated plow bolts, which can be secured from your authorized distributor.

DISASSEMBLY OF THE BULLDOZER AND BULLGRADER

Removing the C-Frame or Push Arms (Bulldozer or Bullgrader)

1. Block up the C-frame or push arms before disconnecting them from the tractor to maintain the proper height for reassembling.

2. **MODELS 15D2 and 15G-2 ONLY:** Remove the hydraulic cylinder piston rods from the hydraulic jack brackets on the back of the blade of the bulldozer, or from the hydraulic jack brackets on the C-frame of the bullgrader by removing the cap screws, lock nuts and cylinder pins.

2. **MODELS 15D-1, 15G-1, 15D-3 AND 15G-3 ONLY:** Remove the cap screw and nut holding the lower sheave block universal mounting shaft, then remove the shaft, universal and sheave block from the blade or C-frame.

3. Remove two cap screws, nuts and shims from the left and right trunnion bearing caps located at the rear of the C-frame or push arms.

4. Having both sides disconnected, back the tractor out and away from the C-frame or push arms.

Removing the C-Frame or Push Arm Trunnions (Bulldozer or Bullgrader)

Remove six cap screws and lock washers from right and left side trunnions to disconnect the trunnions from trunnion support plates.

Removing the Upper Struts (Bullgrader)

To remove the upper struts from the lower struts and strut swivel clevis on the right and left side of the bullgrader, take out the cap screws, and remove the upper strut pins from the strut swivel clevis on the blade. Also remove the upper strut pins from the upper strut clevis on the lower strut.

Removing the Lower Struts (Bullgrader)

Remove the cap screws, and take out the strut swivel pins from strut swivel clevis on the blade. To remove the lower struts from the C-frame take out the strut trunnion pin attached to the chain and remove the strut trunnion from the trunnion bracket on the C-frame.

Removing the Blade from the C-Frame (Bullgrader)

Block up the front of the C-frame to prevent its falling when disconnected from the blade.



CAUTION: Attach a hoist to the lifting eye on the blade to prevent the blade from falling when disconnected from the C-frame.

The upper and lower struts must be removed, (refer to the removal procedures listed above). The blade is also connected at the front center section of the C-frame. Take out the cotter pin, remove the nut and take out the crosshead swivel pin.

Removing the Diagonal Struts (Bulldozer)

Remove the cap screws from the pins securing the struts to the push arm brackets and remove the pins. Remove the eight cap screws (four for each strut) which secure the struts to the blade and remove the struts. Remove the socket shims from the blade.

MAINTENANCE

Removing the Upper Struts (Bulldozer)



CAUTION: Secure the blade with a hoist so that it does not fall when removing the upper struts.

Remove the cap screws from the strut pins. Remove the pins from the blade and push arm brackets and remove the struts.


Removing the Blade from the Push Arms (Bulldozer)

1. Block up the push arms to prevent them from falling when disconnecting from the blade.

2. **HYDRAULIC UNITS ONLY:** Remove the cylinder piston rods from the hydraulic jack brackets on the back of the blade by removing the cap screws and cylinder pins.

2. **CABLE UNITS ONLY:** Remove the cap screw and lock nut holding the lower sheave block mounting shaft, then remove the shaft, lower sheave block and universal.

3. Remove the upper and diagonal struts. (Refer to procedure for removal of the upper struts (bulldozer) as stated above, and removal of diagonal struts (bulldozer) on preceding page.)

 **CAUTION:** Attach a hoist to the lifting eye on the blade to prevent the blade from falling when disconnected from the push arms.

4. The lower right and left sides of the blade are connected to the push arms. Remove the cap screws from the blade bracket pins.

5. Remove the pins which connect the blade to the push arms.

Removing the Grille Doors

Take out the cotter pins and hinge pins and remove the doors.

Removing the Connecting Linkage and Controls (Models 15D-1, 15D-2, 15G-1 and 15G-2 Only)

Reverse the installation procedure, refer to "Connecting Linkage and Controls" in the "INSTALLATION" section.

Removing the Hydraulic Cylinder and Pump Hoses (Models 15D-2 and 15G-2 Only)

Reverse the installation procedure, refer to "Hydraulic Hoses" in the "INSTALLATION" section.

Removing the Hydraulic Pump and Valve (Models 15D-2 and 15G-2 Only)

Fasten a rope around the hydraulic pump and valve, and remove the cap screws and lock washers. Using an overhead hoist pick up the pump and valve just enough so that it will be free of the radiator guard. Back the pump and valve away from the radiator guard slowly until the power take-off shaft assembly is free of the pump.

NOTE: Block up the power take-off shaft assembly to avoid damage while being disengaged from the pump and valve.

Removing the Power Take-off Shaft (Models 15D-1, 15G-1, 15D-2 and 15G-2 Only)

Remove the cap screws and lock washers at the flange end of the power take-off shaft attached to the fan drive pulley. Remove the power take-off shaft.

Removing the Hydraulic Cylinders (Models 15D-2 and 15G-2 Only)

Attach an overhead hoist to the hydraulic cylinder. Remove the cap screws and lock washers from the cylinder yoke cap, then remove the cap and bushings. Remove the cylinder. Keep the cap bushings with the cap to prevent them from being lost.

Removing the Hoist Cylinder Yokes (Models 15D-2 and 15G-2 Only)

Reverse the procedure for mounting the hoist cylinder yokes. Refer to the "INSTALLATION" section.

Removing the Cable Control Unit (Models 15D-1, 15G-1, 15D-3 and 15G-3 Only)

FOR MODELS 15D-1 AND 15G-1: Reverse the mounting instructions listed under "Mounting the 110 Cable Control Unit," in the "INSTALLATION" section. Instructions for servicing this cable control unit will be found in the Model 110 Single Drum Cable Control Unit Operator's Manual.

FOR MODELS 15D-3 AND 15G-3: Reverse the mounting instructions found in the P-25 and P-29 Cable Control Units Operator's Manual. Instructions for servicing these cable control units will also be found in the cable control units operator's manual.

Removing the Radiator Guard

Remove the cap screws, spacers and spacer retainers securing the guard, and remove the guard.

MAINTENANCE

STEEL CABLE MAINTENANCE

When new cable has been installed, operate with light loads or no loads for a short period of time after installation. This "break-in" period will prolong cable life.

Avoid sudden "shock" loads to the cable. The sudden impact of a load, especially if there is any cable slack, places excessive stress on the cable which causes cable strain and could possibly break the cable.

To prolong cable life, the cable must be periodically cleaned and lubricated. Lubricating the cable will help to reduce wearing, cracking or fraying.

More frequent application of lubricant produces better results than heavy coatings of lubricant less frequently applied.

Lubrication

To prepare the cable for lubrication use compressed air, live steam or a wire brush to clean the cable. After cleaning the cable allow it to dry completely.

Use clean Grade-10W engine oil to lubricate the cable. Apply a sufficient amount of oil to the entire cable to thoroughly lubricate all of the cable without saturating the cable with oil.

BLADE EQUIPMENT STORAGE

The following procedure covers the storage maintenance of the bulldozer and bullgrader equipment. This procedure must be performed every 30 days when the equipment is stored outdoors.

NOTE: All parts to be protected must be clean and dry before proceeding with the following.

1. Lubricate all points as indicated on the "LUBRICATION GUIDES."

2. Lubricate the cable control unit. (Refer to the cable control unit operator's manual.) When a cable control unit is to be stored for an extended period of time, the brake and clutch bands must be protected from taking a set as follows:

MODEL 110: Block the control lever into the unspool position.

MODEL P-25 and P-29: Place the control lever into the "free spool" position. The rear mounted cable control levers will lock into this position.

3. Coat the blade, cutting edge, end bits and all bolts and connecting pins on the blade with chassis grease.

NOTE: When storing, the blade and push arms or C-frame should always be blocked up to avoid contact with the ground.

4. Coat the exposed portions of the hydraulic cylinder rods and rod end bearings with chassis grease. Secure the cylinders to the tractor to avoid damage.

5. Thoroughly oil all connections, joints, nuts, pins, shafts and bushings of the control linkage which are not provided with a lubrication fitting.

6. Lubricate the steel cable. (Refer to "STEEL CABLE MAINTENANCE.")