

Installation and Operation
• Instructions

for

CATERPILLAR

REG. U.S. PAT. OFF.

NO. 44
HYDRAULIC
CONTROL

Serial Numbers

6W5001 -up

7W1 -up

8W5001 -up

9W1 -up

CATERPILLAR TRACTOR CO.
PEORIA . ILLINOIS . U. S. A.

Avoid Accidents

Most accidents, whether they occur in the air, in industry, on the farm, at home, on the highways, or at sea, are caused by someone's failure to follow simple and fundamental safety rules or precautions. For this reason most accidents can be prevented by recognizing the real cause and doing something about it before the accident occurs.

Regardless of the care used in the design and construction of any type of equipment, there are many conditions that cannot be completely safeguarded against without interfering with reasonable accessibility and efficient operation.

A careful operator is the best insurance against an accident.

The complete observance of one simple rule would prevent many thousands of serious injuries each year. That rule is: "Never attempt to clean, oil or adjust a machine while it is in motion."

Foreword

"Caterpillar" products are a combination of advanced engineering, skilled manufacturing, and the finest materials metallurgical science can select. Thousands of satisfying, economical working hours are built into each machine.

Whether or not the owner derives the maximum of service from his machine depends largely on the care exercised in its operation and maintenance. This book is written to give the operator essential information regarding the day-to-day operation, lubrication and adjustment of the machine. Careful adherence to these instructions will result in assured economy.

A great many "Caterpillar" owners depend upon their dealer for service other than the care and adjustments described in this book. This practice is recommended because "Caterpillar" dealers have stocks of genuine "Caterpillar" parts and are equipped with tools designed and built by "Caterpillar". Their servicemen are factory-trained and are kept closely informed by the factory regarding advanced methods of servicing "Caterpillar" products — thus, in all ways they are equipped to render the best of service.

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Introduction

The hydraulic system is designed to give long life when operated with clean oil. Special attention is given during manufacturing and shipping at the factory to insure an absolutely clean system.

The metal parts of the hydraulic system are treated with a special acid solution to remove any dirt, scale or abrasive material, then a corrosion resistant coating is applied to guard against undesirable oxidation. Suitable covers are used for shipping to cover the openings of the hydraulic control, cylinders, hoses and lines to exclude dirt and moisture. Keep the covers so they can be used again to protect the openings in the hydraulic system if the equipment is disassembled or removed for any reason.

To obtain maximum service, cleanliness must be the rule. Be careful to avoid introducing dirt into the hydraulic system when installing, filling with oil and replacing lines or hoses during any maintenance operation.

Retighten the clamp bolts on all hose connections about two weeks after the hose is placed in service so there will be compensation for the initial set of the rubber and a tight joint will result.

"KEEP IT CLEAN"

Installation Instructions

GENERAL

The No. 44 Hydraulic Control can be installed on the D6, D4 and D2 tractors as a basic installation which is covered in the first topic in each part of the book. Several arrangements can be installed either individually or more than one at a time, by adding the various arrangements of hydraulic lines to the basic installation and are covered in the ATTACHMENTS sections of the book.

The application of the various arrangements of lines for the D6 installation are:

- (1) One Implement
- (2) Scraper or Two Implement
- (3) Tool Bar

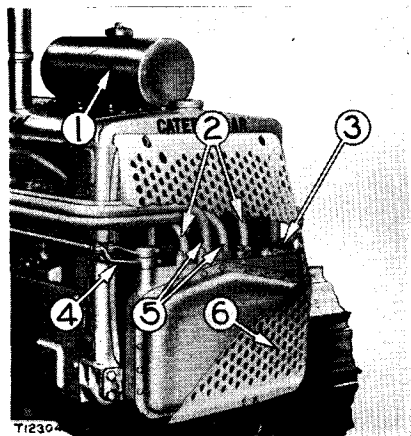
The applications of the various arrangements of lines for the D4 installation are:

- (1) Bulldozer
- (2) Tool Bar
- (3) No. 40 Scraper or Two Implements
- (4) One Implement
- (5) Bulldozer and One Implement
- (6) Bulldozer and Tool Bar
- (7) Bulldozer and No. 40 Scraper or Two Implements

The applications of the various arrangements of lines for the D2 installations are:

- (1) Bulldozer
- (2) One Implement
- (3) Bulldozer and One Implement
- (4) Two Implements
- (5) Bulldozer and Two Implements

The hydraulic surge tank **(1)** is used with No. 40 Scraper applications and two hydraulic implements. These applications will also have two sets of pipes extending to the rear of the tractor and two levers shown at the upper right corner of the control. In applications where the hydraulic surge tank is not used a filler neck will be installed at **(3)**, and



**HYDRAULIC CONTROL FOR BULLDOZER
AND EITHER SCRAPER OR TWO IMPLE-
MENT OPERATION ON D4 TRACTOR**

1—Hydraulic surge tank. 2—Long pipe assembly. 3—Location of filler neck or connection of hydraulic surge tank and control. 4—Single lever for single valve operation. (Two levers on double valve controls.) 5—Basic pipe assembly. 6—Pump guard.



plates will cover the openings in the hydraulic control instead of the long pipe assembly (2). On single valve operations a single lever (4) and the basic pipe assembly (5) will be used on the control. In bulldozer arrangements the pump guard (6) is supplied and if so desired can be obtained as an attachment for other arrangements.

The hydraulic control may be partially mounted on the tractor at the factory or it may be shipped not installed and processed for shipping. If it is received disassembled and processed for shipping the dirt sealing and rust proofing applications should be carefully removed. The covers should be saved for future use, if the unit is removed or another application of the control is desired.

CAUTION

"Caterpillar" hydraulic cylinders for agricultural implement control are the double acting type. Only double acting cylinders should be used with the No. 44 Hydraulic Control. Cylinders of five inch bore and up to twelve inch stroke, or those of approximately the same volume should be used with the hydraulic control equipped with pump of 25 G.P.M. capacity. Damage to the implement may result if cylinders smaller than five inch bore and twelve inch stroke are used with a control equipped with a 37 G.P.M. pump. The use of single acting cylinders is not recommended when the No. 44 Hydraulic Control is equipped with either pump **since damage to the hydraulic control may result.**

Supplied with the hydraulic control are hardware, ring seals, bolts, nuts and lockwashers placed in bags and tagged for identification.

Part One

Installation On D6 Tractor

MOUNTING GROUP AND HYDRAULIC CONTROL INSTALLATION

The hydraulic control mounts on the front of the tractor and is driven from the front of the crankshaft pulley.

A new radiator lower guard which will replace the standard radiator lower guard is also supplied with the control.

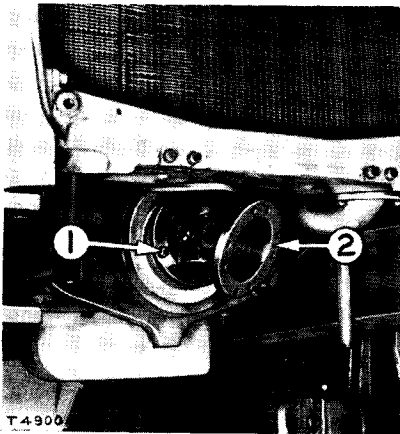
See the topic, ATTACHMENTS when installing the various arrangements of hydraulic lines.

Drive Coupling Installation on D6 Tractors

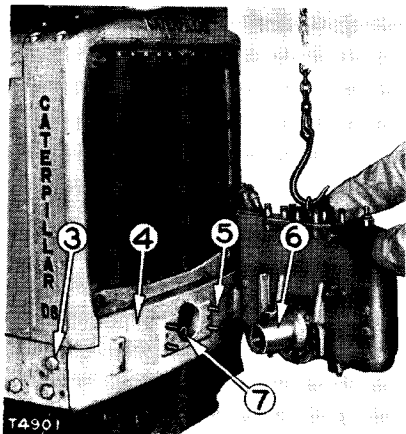
Remove the radiator lower guard and the crankshaft pulley guard between the engine front support and the radiator lower guard if the tractor is so equipped.

Install the universal joint (2) to the crankshaft pulley with eight capscrews (1) and lockwashers.

Install the new radiator lower guard (4) in the tractor frame channels and fasten it with six large bolts (3), nuts and lockwashers furnished with the group. It may be necessary to remove excess welding material from inside the frame channels to make the radiator lower guard fit properly. Install four mounting studs (5) in the guard. Inspect the flange coupling

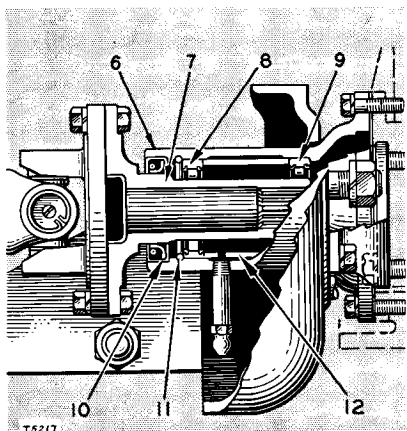


INSTALLING UNIVERSAL JOINT
1—Capscrew. 2—Universal joint.

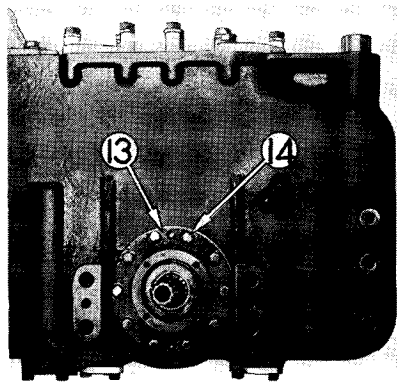


INSTALLATION OF HYDRAULIC CONTROL
3—Bolts. 4—Radiator lower guard.
5—Mounting studs. 6—Coupling bracket. 7—Flange coupling.

(7) to be sure the plug is in the flange end. Fasten the flange coupling (7) to the universal joint with eight bolts, nuts and lockwashers and position the flange coupling in the hole in the radiator lower guard. Clean the flange coupling as well as the bearings (8) and (9), spacer (12), seal (10) and coupling bracket (6) in kerosene or some non-inflammable cleaning fluid, then work a lubricant into the bearings before assembly. Install front bearing (9), spacer (12), rear bearing (8), retainer ring (11) and dust seal (10) in the coupling bracket as shown. Be sure the lip of seal (10) is turned outward, away from the lubricant chamber. Remove the ten capscrews (14) from the rear of the hydraulic control which hold the pump retainer cover (13) in place. Earlier controls which have a rough facing on the pump retainer cover (13) will require a new cover with a machined face. Install coupling bracket (6) to the hydraulic control and fasten with ten longer capscrews and lockwashers.



COUPLING BRACKET ASSEMBLY



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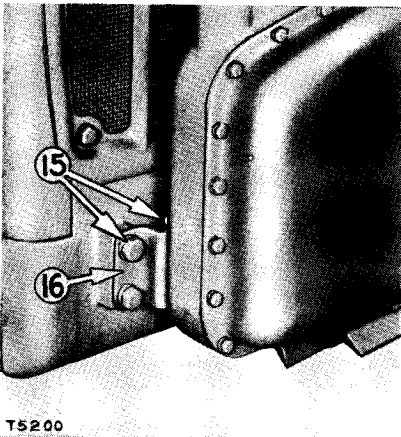
REAR OF HYDRAULIC CONTROL

6—Coupling bracket. 7—Flange coupling. 8—Rear bearing. 9—Front bearing. 10—Dust seal. 11—Retainer ring. 12—Spacer. 13—Pump retainer cover. 14—Capscrews.

When installing the coupling bracket to the hydraulic control, make sure the hole for the lubricant fitting is toward the bottom.

Hydraulic Control Installation On D6 Tractors

Lift the hydraulic control into position and guide flange coupling (7) into coupling bracket (6). Align the drive coupling and pump shaft splines then push the control on the four mounting studs in the radiator lower guard. Install the nuts and lockwashers on the four mounting studs (5) and tighten them securely. Fasten brackets (16) to the hydraulic control and radiator lower guard with four capscrews (15) and lockwashers.



INSTALLATION OF BRACKETS

15—Capscrews. 16—Brackets.



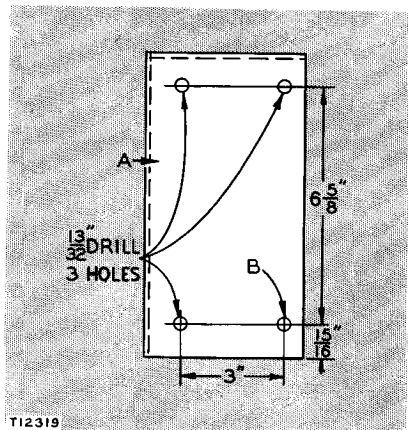
**Basic Hydraulic Pipes and Control Lever
Installation On D6 Tractor**

Whenever the hydraulic control is installed, the basic hydraulic pipes and control lever with connecting rods must be installed with one or a combination of the groups in the topic, ATTACHMENTS.

Rework Seat Side Plate, Right Fender And Fender Sheet: Lay out and drill three 13/32 inch (10.3 mm.) holes in the front face (A) of the seat side plate using hole (B), already in the plate for a starting location, as instructed in the illustration. These holes will be used for installation of the operating control lever bracket.

**CONTROL LEVER BRACKET MOUNTING
HOLE LOCATIONS**

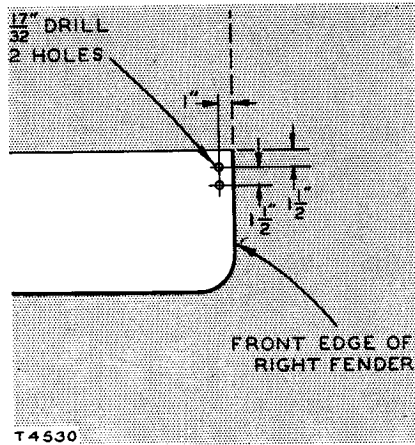
A—Front face of seat side plate.
B—Hole already in plate.



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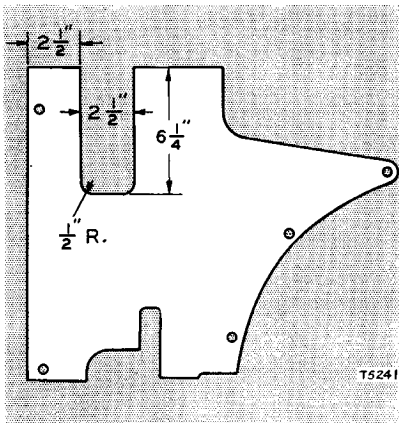
Drill two 17/32 inch (13.4 mm.) holes in the right fender as shown to mount the control rod bearing.

CONTROL ROD BEARING MOUNTING HOLE LOCATIONS



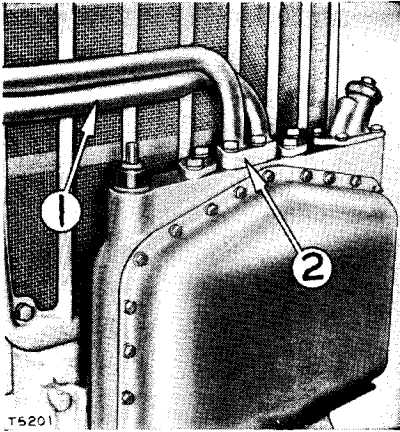
Cut a $2\frac{1}{2}$ x $6\frac{1}{4}$ inch (6.4 x 15.8 cm.) section from the right fender sheet as shown in the illustration to accommodate the long pipe assembly from the hydraulic control.

If the two implement or scraper arrangement is to be used, cut a $4\frac{1}{2}$ x $6\frac{1}{4}$ inch (11.4 x 15.8 cm.) section in place of the above as instructed in the topic, TWO IMPLEMENT OR SCRAPER MOUNTING GROUP INSTALLATION.



RIGHT FENDER SHEET REWORKING DIMENSIONS

Basic Hydraulic Pipe Connected At The Center Openings Of Hydraulic Control: Remove the metal covers from the two center openings on top of the hydraulic control. Insert ring seals in the grooves in the top of the control at flange connections (2) and install pipe assembly (1) to the hydraulic control with four capscrews and lockwashers.



INSTALLATION OF PIPE ASSEMBLY

1—Pipe assembly. 2—Flange connection.



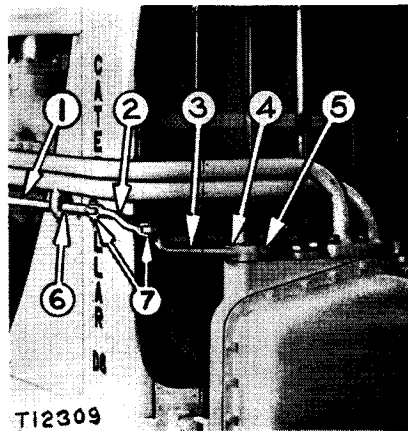
NOTE

Install the front pipe assembly of the scraper or two implement mounting group as instructed in the topic, **SCRAPER OR TWO IMPLEMENT MOUNTING GROUP INSTALLATION**, before installing the basic hydraulic pipe assembly, if the scraper or two implement front pipe assembly is to be used.

Control Lever And Rods: To install control lever (3) to the hydraulic control, insert the key (4) in the large shaft keyway, align the key with the lever keyway and clamp the lever on the shaft with the clamping screw

INSTALLATION OF CONTROL LEVERS AND RODS

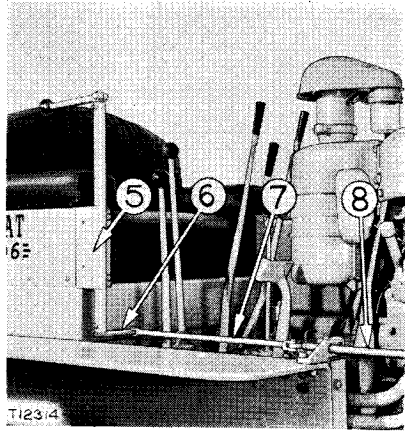
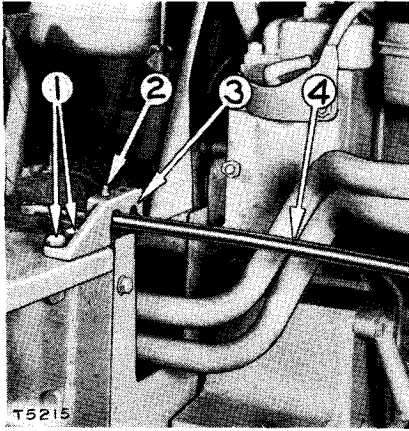
1—Long control rod. 2—Short link. 3—Control lever. 4—Key. 5—Clamping screw. 6—Bearing. 7—Pins.



screw (5). Remove the eye bolts from the ends of the long control rod (1). Install the long control rod (1) through bearing (6) and fasten to the control lever (3) with short link (2), pins (7) and lock the pins in place with cotter pins.

Control Rod Bearing And Operating Control Lever Bracket: Install the control rod bearing (3) on rod (4) and fasten the bearing to the right fender with two bolts, nuts and lockwashers (1), but do not tighten. Install lubricant fitting. Fasten operating control lever bracket (5) to seat plate with four bolts, nuts and lockwashers. Connect short rod (7) between long control rod (8) and lever (6) with pins and cotter pin. Lubricate all bearing points so that the rods move freely.

Move the operating control lever until any binding in the control rods and bearings is removed. Tighten bolts and nuts on right fender bearing. The control lever should operate freely with no binding in the bearing points.



INSTALLING CONTROL ROD BEARING AND OPERATING CONTROL LEVER BRACKET

- 1—Bolts. 2—Fitting. 3—Bearing. 4—Control rod. 5—Bracket. 6—Lever.
7—Short rod. 8—Long rod.

NO. 44 HYDRAULIC CONTROL APPLICATIONS ON D6 TRACTOR

The No. 44 Hydraulic Control can be used in several arrangements either individually or more than one at a time. This is accomplished by adding the various hydraulic lines and control lever to the basic hydraulic control pipe and control lever just installed.

Following is a list of some of the possible arrangements which can be installed on the tractor to operate the hydraulically controlled equipment:

1. One Implement, single valve, 25 G.P.M. pump.
2. Two Implements or Scraper, double valve, 37 G.P.M. pump with hydraulic surge tank.
3. Two Implements, double valve, 25 G.P.M. pump with hydraulic surge tank.
4. Tool Bar, single valve, 37 G.P.M. pump.

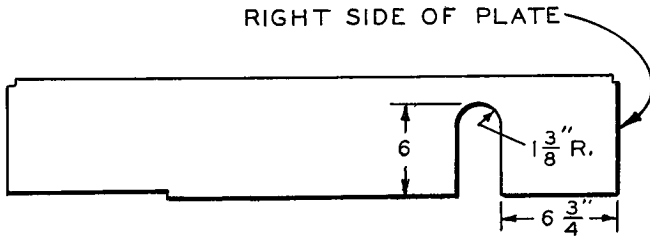
The installation instructions of the various individual arrangements are covered in the following topics. The installation, operation and maintenance instructions for the equipment being controlled will be found in the Operator's Instructions furnished with each equipment group or arrangement.

The hydraulic control is designed to operate with double acting cylinders of limited dimensions. The use of single acting cylinders is not recommended since damage to the control may result.

ATTACHMENTS

One Implement Group Installation On D6 Tractor

This group can be installed on the tractor after the installation of the basic hydraulic pipe and control lever as instructed in the topic, BASIC HYDRAULIC PIPE AND CONTROL LEVER INSTALLATION.



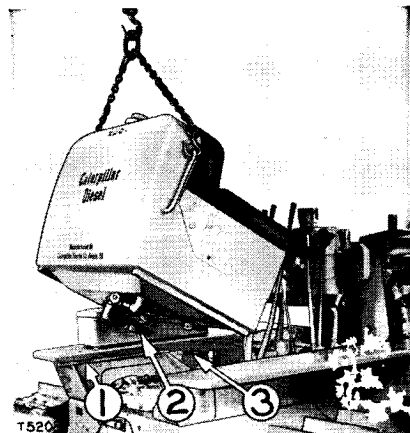
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REAR PLATE REWORKING INSTRUCTIONS
(As viewed from rear of tractor)

Rework Right Fender Brace And Rear Plate: Remove rear plate from tractor. Layout and cut holes as instructed in the illustration. Remove the floor plates just ahead of the seat. Shut off the fuel at valve (2) and

SEAT AND FUEL TANK REMOVAL

- 1—Support. 2—Valve. 3—Fuel line.

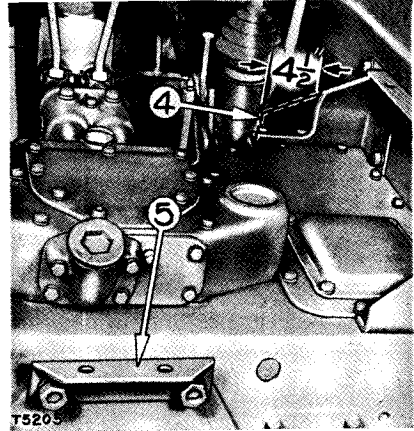


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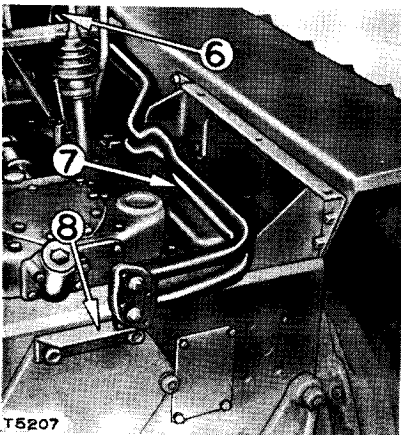
disconnect the fuel line (3). Remove the three capscrews along each side which hold the seat to the support (1). Cut a 4½ inch (11.5 cm.) section from the right fender brace (4), as shown. Remove upper two nuts from transmission case rear center cover and install bracket (5) supplied in mounting group bag.

**RIGHT FENDER BRACE
REWORKING INFORMATION**

4—Fender brace. 5—Bracket.



Pipe Assembly: Remove cover from front of pipe flange and clean off any sealing materials, dirt or paint from around the flange openings. Insert a ring seal in pipe flange (6) and position pipe assembly (7) in place on the right rear side of the transmission case. Fasten the pipe assembly (7) with two bolts nuts and lockwashers to the pipe connected to the two center openings of the hydraulic control. Fasten rear of pipe assembly to bracket (8) with a bolt, nut and lockwasher. Fasten fuel tank and seat to tractor, connect fuel line and open fuel line valve and replace floor plates. Install rear plate on tractor.



**INSTALLATION OF ONE IMPLEMENT
PIPE ASSEMBLY**

6—Flange. 7—Pipe assembly. 8—Bracket.

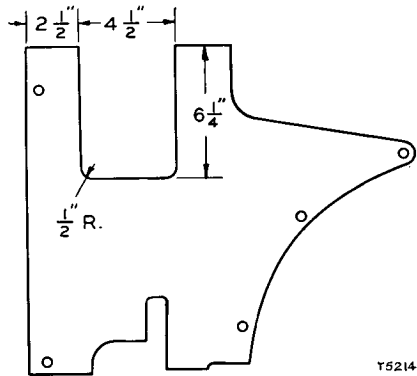


**Two Implement Or Scraper Mounting
Group Installation On D6 Tractor**

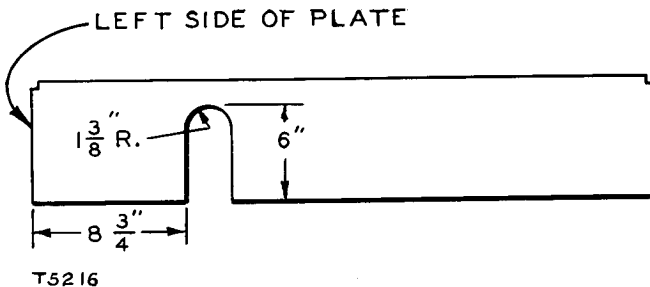
The front pipe assembly of this group must be installed before the basic hydraulic pipe can be installed. See the topic, BASIC HYDRAULIC PIPE AND CONTROL LEVER INSTALLATION. A second control lever and connecting rods are also included in this group.

Cut a $4\frac{1}{2} \times 6\frac{1}{4}$ (14.4 x 15.8 cm.) section from the right fender sheet as shown in the illustration to accommodate the two implement pipe assembly from the hydraulic control.

**RIGHT FENDER SHEET
REWORKING DIMENSIONS**



Cut a section from the rear plate as shown for the scraper line assemblies.



**REAR PLATE REWORKING INFORMATION
(As Viewed From Rear of Tractor)**

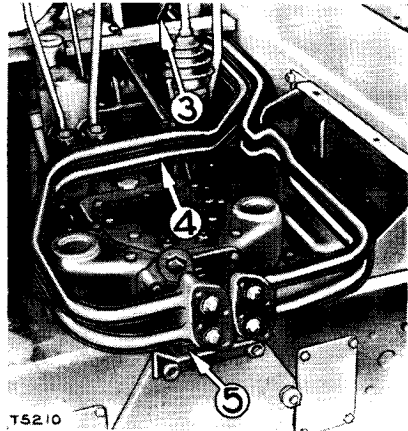
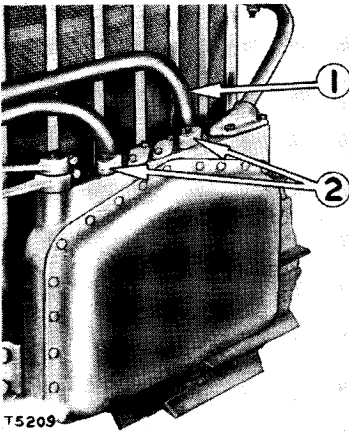
Pipe Assembly: Remove the metal covers from the two outer openings on top of hydraulic control and clean off any sealing material, dirt or paint from around the openings in the pipe connections. Insert a ring seal in the grooves in the top of the control at flange connections (2).

NOTE

If the tractor is equipped with the basic hydraulic pipe assembly it will be necessary to remove this pipe to install the two implement pipe assembly to the hydraulic control.

Fasten the front pipe assembly (1) to the hydraulic control with four capscrews and lockwashers.

Remove the seat and floor plates as instructed in the topic, ONE IMPLEMENT GROUP INSTALLATION ON D6 TRACTOR.



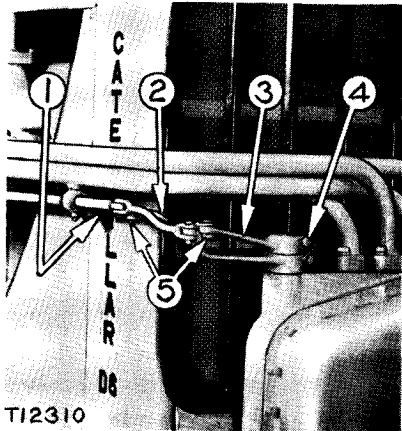
INSTALLING TWO IMPLEMENT PIPE ASSEMBLIES

- 1—Front pipe assembly. 2—Flange connections. 3—Flange.
4—Rear pipe assembly. 5—Bracket.

Remove the metal cover from the rear of the front pipe assembly and clean off any sealing materials, dirt or paint from around the flange openings. Insert a ring seal in the pipe flange (3) and position rear pipe assembly (4) on the left side of the hydraulic steering booster. Fasten the rear pipe assembly to the front pipe assembly with two bolts, nuts and lockwashers. Fasten the rear pipe assembly bracket (5) to the bracket on the transmission case center rear cover with a bolt, nut and lockwasher. Fasten the fuel tank and seat to tractor, connect fuel lines and open fuel line valve and replace floor plate. Install the rear plate on tractor.

Control Lever And Rods: To install lever (3) on the small shaft which is in the center of the large shaft extending through the top of the hydraulic control, insert the key in the small shaft keyway, align the key with the lever keyway and clamp the lever on the shaft with the clamping screw (4). Remove the eye bolts from the ends of the long control rod (1).

Install control rod (1) through pipe assembly rod bearing and fender bearing. Install eye bolts on the ends of the control rod and fasten to the control lever (3) with short link (2), pins (5) and lock the pins in place with cotter pins.



INSTALLING CONTROL LEVER AND RODS

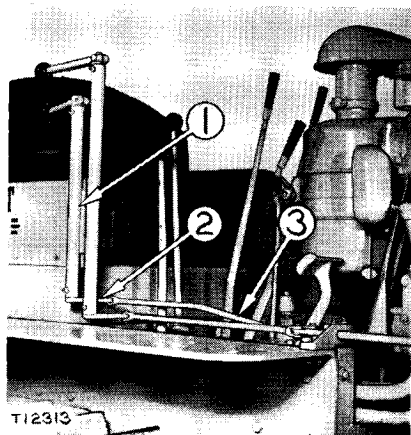
- 1—Control rod. 2—Short link. 3—Lever.
- 4—Clamping screw. 5—Pins.



Operating Control Lever Bracket: Fasten operating control lever bracket (1) on the side of the single implement control lever bracket with two bolts, nuts and lockwashers. Connect short control rod (3) between long control rod and lever (2) with pins and cotter pins. Lubricate all bearing points so that the rods move freely.

INSTALLING LEVER BRACKET AND ROD

- 1—Bracket. 2—Lever. 3—Short control rod.

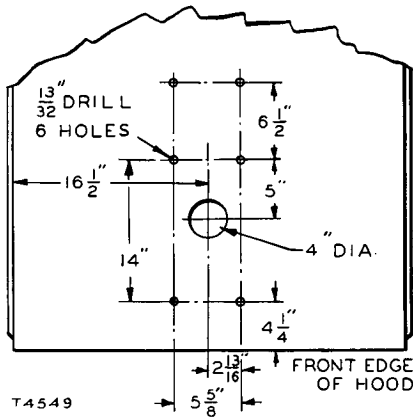


Move the operating control levers to remove any binding in the control rods and bearings. It might be necessary to loosen fender bearing bolts and nuts so bearing may be adjusted for both control rods.

Two Implement or Scraper Hydraulic Surge Tank Group Installation On D6 Tractors

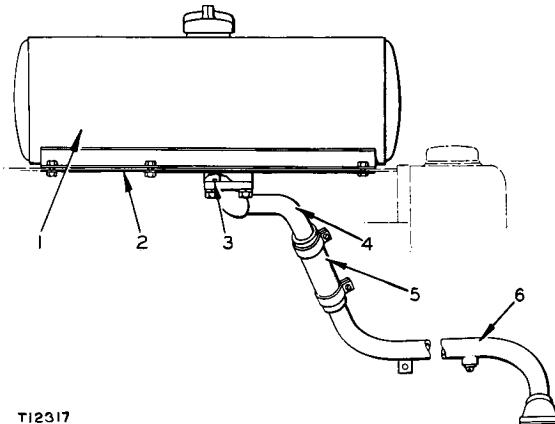
The hydraulic surge tank is used to increase the oil capacity and supply sufficient air cavity to protect the hydraulic control from damage whenever Two Implement or Scraper arrangement is used. This closed hydraulic system must have an air cavity large enough to accommodate oil displaced by the cylinders.

Rework Tractor Hood: Remove the hood. Layout and cut holes as instructed in the illustration.



HYDRAULIC SURGE TANK MOUNTING
HOLE LOCATIONS

Tank Installation: Install the tank (1) on top of the hood (2) and fasten it with the bolts, nuts and lockwashers provided. Clean off any sealing material, dirt or paint from around the flange openings in the pipe connections. Insert the ring seal (3) in the groove in the flange of the tank



HYDRAULIC SURGE TANK INSTALLATION

1—Tank. 2—Hood. 3—Seal. 4—Upper pipe. 5—Hose. 6—Lower pipe.

and fasten the upper pipe (4) to the flange with the capscrews and lockwashers provided. Install and clamp hose (5) to the upper pipe.

Install the hood with tank on the tractor being careful to prevent dirt from entering the hydraulic oil passages.

Remove the cover from the top left opening of the hydraulic control and clean off any sealing material, dirt or paint from around the openings of the hydraulic control and pipe. Install the lower pipe (6) in the hose (5) and fasten the pipe to the hydraulic control with capscrews and lockwashers provided with the hydraulic control. Be sure the gasket between the hydraulic control and lower pipe will properly seal the hydraulic oil system. Clamp the hose to the lower pipe. Using the hole in the lower pipe bracket as a template, drill a 13/32 inch (10.3 mm.) hole in the radiator side guard and then fasten the pipe bracket to the guard with bolt, nut and lockwasher.

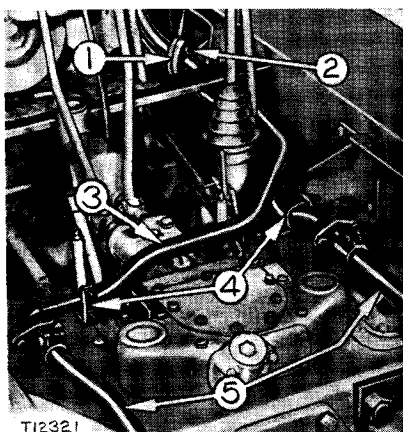
Tool Bar Line Group Installation On D6 Tractor

Remove the seat and floor plates then rework the right fender brace as instructed in the topic, ONE IMPLEMENT GROUP INSTALLATION ON D6 TRACTOR. The rear plate between the seat and transmission case is not used with the tool bar line group.

Pipe Assembly: Remove the cover from front of pipe flange and clean off any sealing materials, dirt or paint from around the flange openings. Connect support with the two rear bolts to the fender bracket. Install ring seals in the pipe flange (1) and position tool bar pipe assembly (3) in place. Fasten the tool bar pipe assembly to the front pipe assembly from the hydraulic control and support with two bolts (2), nuts and lockwashers. Fasten the brackets (4) to the transmission case and clamp the pipes to the brackets with the U-bolts provided. Install the tool bar hoses (5). Then fasten the seat fuel tank to the tractor, connect the fuel line and open the fuel line valve. Replace the floor plates.

INSTALLATION OF TOOL BAR PIPE ASSEMBLY

1—Flange. 2—Bolts. 3—Tool bar pipe
assembly. 4—Brackets. 5—Tool bar
hoses.



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Part Two

Installation On D4 Tractor

MOUNTING GROUP AND HYDRAULIC CONTROL INSTALLATION

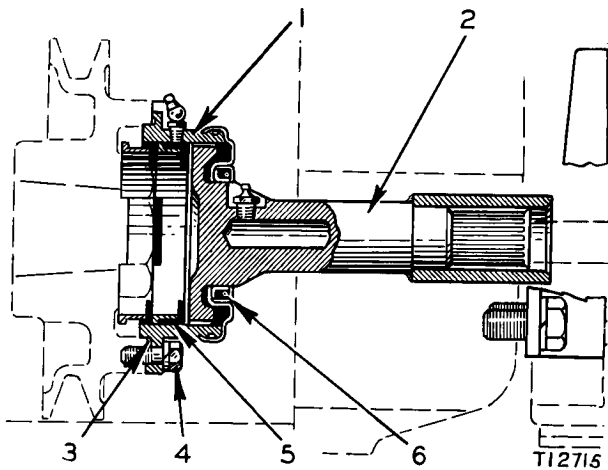
The hydraulic control can be installed on all D4 Tractors. Three different drive couplings are needed and these coupling installation procedures are included in the following three topics.

The hydraulic control mounts on the front of the tractor and is driven from the front of the crankshaft. Drain and remove the radiator and oil cooler from all tractors.

See the topic, ATTACHMENTS when installing the various arrangements of hydraulic lines.

Drive Coupling Installation On D4 Tractors

Tractors 6U1 And 7U1 Up: Place the shaft assembly (2) in the gear assembly (1) making sure the seal (6) is in the correct position on the shoulder of the shaft assembly as shown. Install the seal (3) in the groove on the gear assembly flange, and place the two spacers (5) between the gear end of the shaft and the pulley. Earlier couplings had the shaft held in the gear with either a slotted or hexagon head screw. After the shaft has been positioned in the gear, remove any dirt or paint from the crankshaft pulley and install the gear and shaft assembly as a unit on

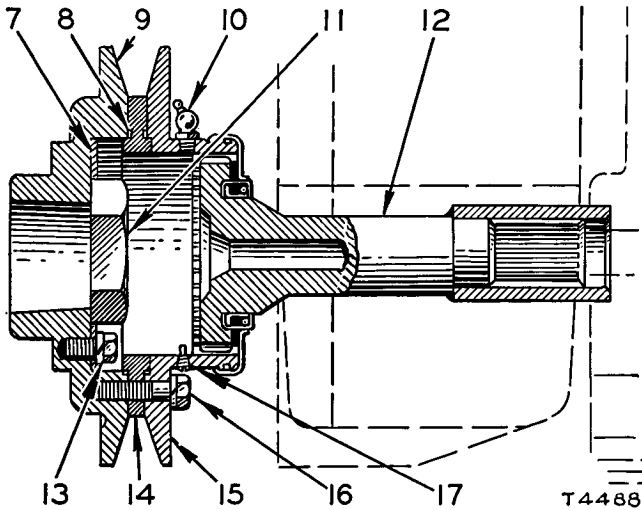


HYDRAULIC CONTROL DRIVE COUPLING
(Tractors 6U1 and 7U1 up)

1—Gear assembly. 2—Shaft assembly. 3—Seal. 4—Capscrews.
5—Spacers. 6—Seal.

the pulley. Tighten the capscrews (4) and install the lubricant fittings in the gear and shaft assemblies. Fill the gear and shaft assemblies with lubricant through the fittings. Earlier gear and shaft assemblies were lubricated through one fitting.

Tractors 7J5104 to 5T7411: Remove the crankshaft pulley from the crankshaft, install the new pulley (9) and fasten it securely with the retaining nut (11). Place the lock (7) over the nut and install the lockwashers and capscrews (13) to lock the nut in place. Insert the shaft (12) in



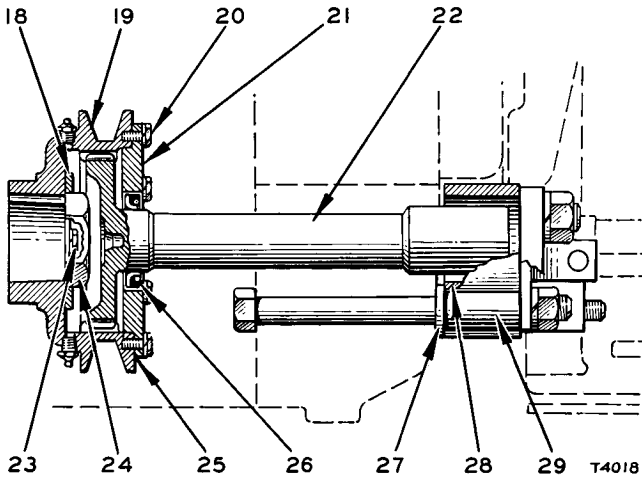
HYDRAULIC CONTROL DRIVE COUPLING

(Tractors 7J5104 to 5T7411)

- 7—Lock. 8—Seal. 9—Pulley. 10—Lubricant fitting. 11—Retaining nut. 12—Shaft.
13—Lock capscrew. 14—Pulley ring. 15—Gear. 16—Capscrew.
17—Location of capscrew or plug.

the gear (15) and install the capscrew and lockwasher at (17) in the gear to hold the shaft in the gear. Earlier couplings used a plug at (17) which should be staked in place with a prick punch. Install the lubricant fittings (10). Install the seals (8) in the grooves in the ring (14) and fasten the ring, gear (15) and shaft (12) with lockwashers and capscrews (16). Install the fan belt, and fill the gear and shaft assemblies with lubricant through the fitting in the gear assembly.

Tractors 4G1 to 7J5104: Remove the crankshaft pulley from the crankshaft, install the new pulley (19) and fasten it securely with the retaining nut (24). Place the lock (18) over the nut and install the lock washers and capscrews (23) to lock the nut in place. Insert the shaft (22) in the pulley. Install the seal (26) in cover (21). Install the cover gasket (25) and cover (21) over the end of the shaft and fasten them to the pulley as shown



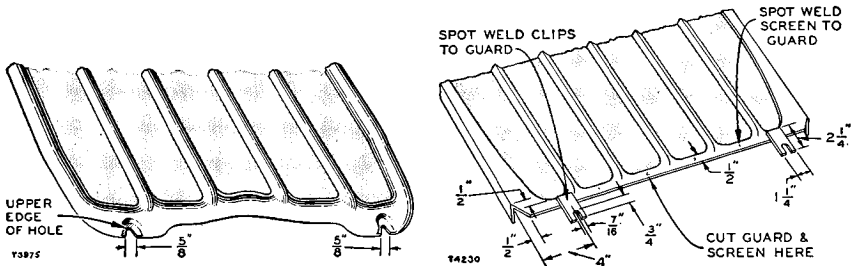
HYDRAULIC CONTROL DRIVE COUPLING
(Tractors 4G1 to 7J5104)

- 18—Lock. 19—Pulley. 20—Capscrew. 21—Cover. 22—Shaft. 23—Lock capscrews.
24—Retaining nut. 25—Gasket. 26—Seal. 27—Angle washer. 28—Spacer.
29—Spacer at outer edge of radiator.

with the lockwashers and capscrews (20). Install the two fittings in the pulley and fill the pulley and shaft assembly with lubricant through a fitting.

Reinstall The Radiator On D4 Tractors

Install the radiator and oil cooler group on the tractor, and install the four studs and the two dowels in the radiator bottom tank. The dowels are not necessary on tractors before 5T7411. Fill the cooling system with a suitable coolant.



(Tractors 6U1 & 7U1 up)

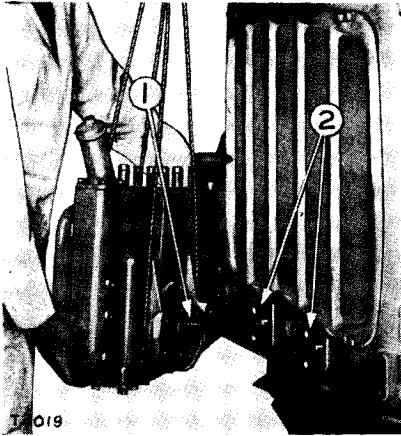
(Tractors 7J7319 to 5T7411)

RADIATOR GUARD SCREEN REWORKING INSTRUCTIONS

On tractors 6U1 and 7U1 up remove the two lower capscrews that hold the radiator screen guard to the radiator bottom tank. Slot the screen lower mounting holes as shown. On tractors before 5T7411 the radiator screen guard can be reworked to permit easy removal of the screen for cleaning.

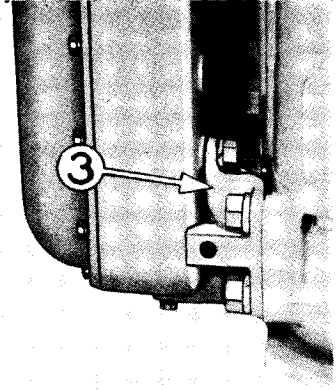
Hydraulic Control Installation On D4 Tractors

Tractors 6U1 and 7U1 Up: Place the seal (1) in the groove in the pump shaft. Lift the hydraulic control into position on the four studs in the radiator bottom tank. The splines of the shaft sleeve and pump shaft must be aligned. Push the hydraulic control into place. Install the lockwashers and



INSTALLING THE HYDRAULIC CONTROL

- 1—Pump shaft coupling seal.
2—Studs.



T4020

HYDRAULIC CONTROL MOUNTING BRACKET

- 3—Bracket.

nuts on the four studs (2) and tighten them securely. Place the brackets (3) on each side of the hydraulic control and with lockwashers and cap-screws fasten them to both the hydraulic control and the radiator bottom tank.

Effective With Tractors 7J7319 To 5T7411: The installation of the hydraulic control on tractors 7J7319 to 5T7411 is the same as described in the previous topic except that angle washers (27), (see illustration of hydraulic control drive coupling for tractors 4G1 to 7J5104 on a previous page), which are 3/16 inch thick on one edge and 1/4 inch thick on the other, should be placed between the brackets and the radiator bottom tank at the outer edge of the tank.

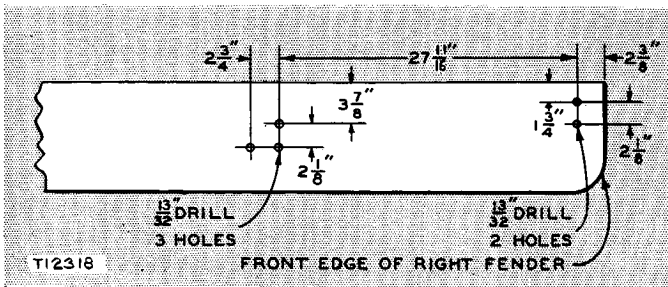
Tractors Before 7J7319: The installation of the hydraulic control on tractors before 7J7319 is the same as described in the two previous topics with the addition of spacers (28) and (29), (see the illustration of hydraulic control drive coupling for tractors 4G1 to 7F5104 on a previous page.) These spacers are used around the drive shaft between the radiator bottom tank and the hydraulic control; and between the hydraulic control brackets and the radiator bottom tank at the outer edge of the tank. Angle washers (27) mentioned in the above topic are placed between the spacers (29) and the radiator bottom tank at the outer edge of the tank.

Crossover Valve, Basic Hydraulic Pipes And Control Lever Installation On D4 Tractors

See the HT4 Shovel Operator's Instruction Book for installation instructions of line and control levers.

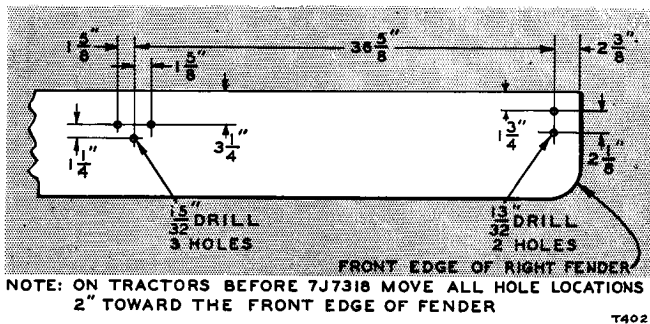
Whenever the complete basic hydraulic control is installed, the crossover valve, the basic hydraulic pipes and control lever with connecting rods must be installed with one or a combination of the groups in the topic, ATTACHMENTS.

Rework Right Fender: Cut or drill two $13/32$ inch (10.3 mm.) holes in the right fender for the crossover valve (2) as shown in the following illustration.



**CROSSOVER VALVE AND CONTROL LEVER BRACKET MOUNTING
HOLE LOCATIONS**
(Tractors 6U5843 and 7U11952 Up)

Drill the three $15/32$ inch (11.9 mm.) holes in the right fender, as shown to mount the control lever bracket (1). On tractors before 7J7319, drill the



**CROSSOVER VALVE AND CONTROL LEVER BRACKET
MOUNTING HOLE LOCATIONS**
(Tractors Before 6U5843 and 7U11952)

control lever bracket mounting holes two inches closer to the front of the tractor than is shown in the preceding illustration. The tool box on earlier tractors must be moved to a new location so the control bracket can be installed.

Crossover Valve: When the crossover valve (2) is installed on the tractor right fender, the covers over the hydraulic passages in the valve will be on the front, right and rear sides of the valve.

NOTE

Install the long pipe assembly of the scraper or two implement mounting group as instructed in the topic, SCRAPER OR TWO IMPLEMENT MOUNTING GROUP INSTALLATION, before installing the basic hydraulic pipe assembly if the long pipe assembly is to be used.

Basic Hydraulic Pipe Between Control And Crossover Valve: Remove the cover from the front of the crossover valve (2) and clean off any sealing materials, dirt or paint from around the openings in the pipe connections.

Remove the covers from the two center openings on top of the hydraulic control. Insert the ring seals in the grooves in the flange connections (6) and (8) of the control and crossover valve. A light coating of grease on the seals will hold them in the grooves. Install the pipe assembly (3) between the crossover valve and hydraulic control, with the lockwashers and capscrews provided. On tractors before 7J7319, place the two inch spacer between the pipe and crossover valve. Fasten the valve to the fender with the capscrews and lockwashers provided.

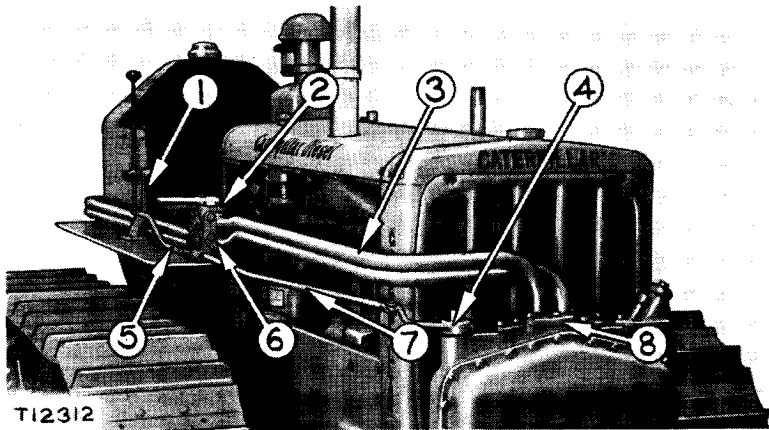
Place a 1/4 inch spacer under the crossover valve on tractors not equipped with heavy duty fenders.

It may be necessary to slot the crossover valve mounting holes to prevent imposing a strain on the hydraulic pipe.

Control Levers and Rods: Bolt the operating control lever bracket (1) in place on the right fender with three bolts, nuts and lockwashers. On tractors before 6U5843 and 7U11952 there is a reinforcement plate which is to be bolted under the fender to give added support to the earlier control lever brackets. Put the operating control lever and washer on the outside end of the shaft in the bracket and install the cotter pin. The lubricant fitting in the lever should be to the front.

Insert the short offset end of the front control rod (7) through the outside bearing in the crossover valve (2). Install the locknuts on the eyebolts and install the bolts in both ends of the front control rod.

To install the hydraulic control long bottom lever (4) on the large control shaft which extends through the top of the hydraulic control, insert the key in the shaft keyway, align the key and lever keyway and clamp the lever on the shaft with the clamping capscrew.



VALVE, PIPE AND CONTROL LEVER INSTALLATION

1—Control lever bracket. 2—Crossover valve. 3—Pipe assembly. 4—Hydraulic control long bottom lever. 5—Rear rod. 6—Crossover valve flange connection. 7—Front rod. 8—Hydraulic control flange connection.

Connect the rear rod (5) to the front rod (7), then fasten the front rod to the hydraulic control lever (4) (long bottom lever). Fasten the rear rod to the operating control lever. The operating control lever position can be adjusted by turning the bolts in both ends of the rod (7). Tighten the lock nuts so that the control rod will move freely and lubricate the bearing points.

NO. 44 HYDRAULIC CONTROL APPLICATIONS ON D4 TRACTORS

The No. 44 Hydraulic Control can be used in several arrangements either individually or more than one at a time. This is accomplished by adding the various hydraulic lines and control lever to the basic hydraulic control pipes, crossover valve and control lever just installed.

Following is a list of some of the possible arrangements which can be installed on the tractor to operate the desired hydraulically controlled equipment:

1. Bulldozer, single valve, 37 G. P. M. pump.
2. Tool Bar, single valve, 25 G. P. M. pump.
3. Scraper or Two Implements, double valve, 37 G. P. M. pump with hydraulic air tank.
4. One Implement, single valve, 25 G. P. M. pump.
5. Bulldozer and One Implement, single valve, 25 G. P. M. pump.

6. Two Implement, double valve, 25 G. P. M. pump, with hydraulic surge tank.
7. Bulldozer and Tool Bar, single valve, 25 G. P. M. pump.
8. Bulldozer and either scraper or Two Implement, double valve, 37 G. P. M. pump with hydraulic surge tank.
9. HT4 Shovel, double valve, 37 G. P. M. pump. Tank and lines furnished with the shovel.

The installation instructions of the various individual arrangements are covered in the following topics. The installation instructions for the HT4 Shovel lines and controls will be covered in the HT4 Shovel Operator's Instruction book.

The hydraulic control is designed to operate with any double acting cylinders of limited dimensions. The use of single acting cylinders is not recommended since damage to the control may result.

The installation, operation and maintenance instructions for the equipment being controlled will be found in the Operator's Instructions furnished with each equipment group or arrangement.

ATTACHMENTS

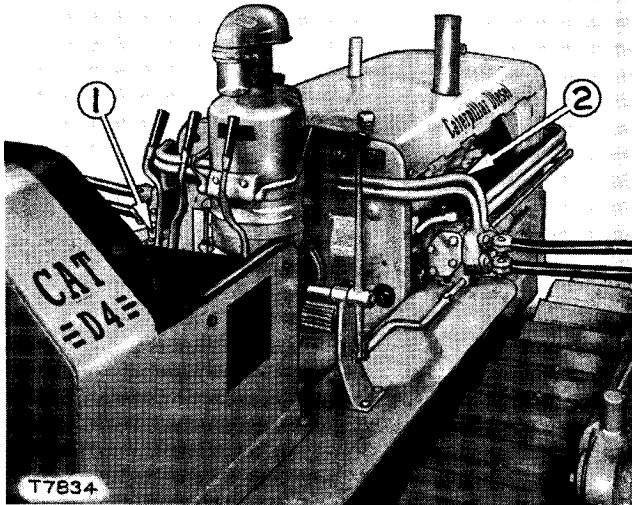
Cross Pipe Installation On D4 Tractor

This group can be installed on the tractor after the installation of the basic hydraulic pipe and control lever as instructed in the topic, CROSS-OVER VALVE, BASIC HYDRAULIC PIPE AND CONTROL LEVER INSTALLATION.

Tractors 6U1 and 7U1 up: Remove the cover from the right side of the crossover valve and clean off any sealing materials, dirt or paint from around the openings in the cross pipe connections. Remove the entire air cleaner from the air inlet pipe by removing the four stud nuts at the connection. Insert the ring seals in the grooves in the crossover valve and fasten the cross pipe (2) to the valve by clamping it between the hydraulic hose flange connections and the crossover valve. A light coating of grease on the seals will hold them in the grooves.

When the adapter plate is furnished on the cross pipe it should be placed between the hose flanges and cross pipe with seal toward the cross pipe.

Fasten the bracket (1) to the left end of the cross pipe and drill one 13/32 inch (10.3 mm.) hole in the left fender using the bracket for a template. Fasten the bracket to the fender with bolt, lockwasher and nut supplied with the group. Reinstall the air cleaner.



CROSS PIPE INSTALLATION

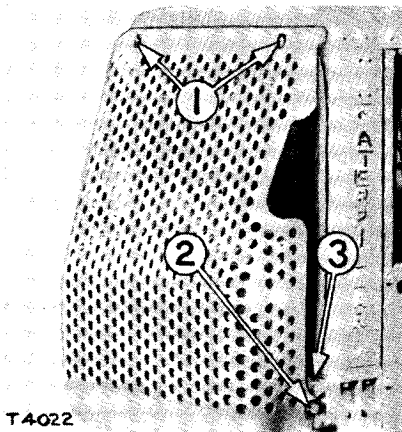
1—Bracket. 2—Cross pipe.

Tractors Before 6U1 and 7U1: Installation is the same as for the above tractors except that the Diesel engine air cleaner does not have to be removed.

Pump Guard Installation On D4 Tractor

The pump guard is furnished with the hydraulic control for bulldozer application and is available as an attachment for other applications.

Remove the capscrews which hold the radiator screen to the radiator top tank and raise the pump guard into position. Insert the capscrews (2) through the side of the guard into the brackets (3) and tighten them. Insert capscrews (1) through the guard, spacer and screen then fasten them securely to the radiator top tank.



PUMP GUARD INSTALLATION

1—Capscrews. 2—Capscrew fastening pump guard to bracket.
3—Mounting bracket.



No. 64 Tool Bar Lines Group Installation On D4 Tractor

This group can be installed on the tractor after the installation of the hydraulic control, basic hydraulic pipe and control lever as instructed in the topic, CROSSOVER VALVE, BASIC HYDRAULIC PIPE AND CONTROL LEVER INSTALLATION.

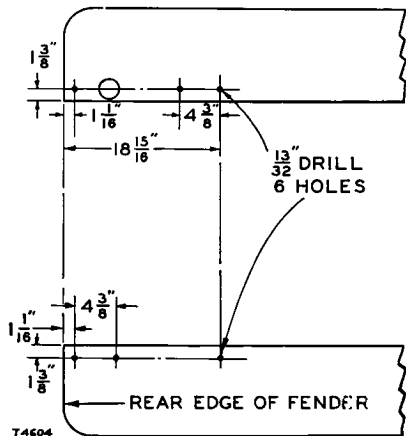
To install the tool bar lines, remove the seat whether equipped with seat or fender mounted fuel tank. The same tool bar pipe is used for either type fuel tank.

Remove the cover from the rear of crossover valve and clean any sealing material, dirt or paint from around the openings in the pipe connections. Insert the ring seals in the grooves in the crossover valve body, then fasten the front end of the pipe to the crossover valve (3).

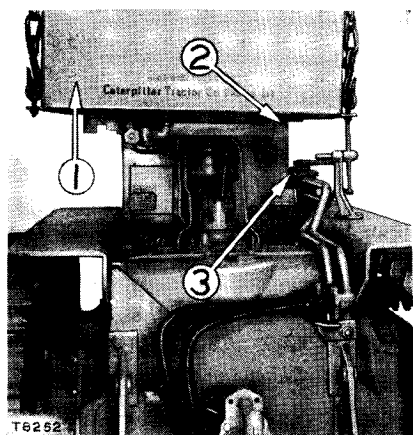
Fasten the rear end of the pipe with the pipe bracket to the tool bar lift frame bracket. See the No. 64 TOOL BAR OPERATOR'S INSTRUCTION BOOK, for information on the installation of the tool bar lift frame bracket and cylinder.

Fender Mounted Fuel Tank: Drill six 13/32 inch (10.27 mm.) holes in the fenders as shown in the fender drilling diagram. These holes are for mounting two brackets which raises the operator's seat. The brackets are not required if a seat mounted fuel tank is used. Install the seat with brackets on the fenders using the bolts, lockwashers and nuts provided.

FENDER DRILLING DIAGRAM



Seat Mounted Fuel Tank: Before installing the seat mounted fuel tank (1), remove a section from the right end of the baffle, 3 1/2 inches by 2 1/4 inches as shown at (2). This should be done by cutting with a hacksaw, thus about 1/4 inch of the baffle will remain on the bottom of the tank at this location. Install the seat mounted fuel tank on the fenders.



TOOL BAR LINES INSTALLATION

1—Seat mounted fuel tank. 2—Baffle cut-out $3\frac{1}{2} \times 2\frac{1}{4}$ inches. 3—Crossover valve.



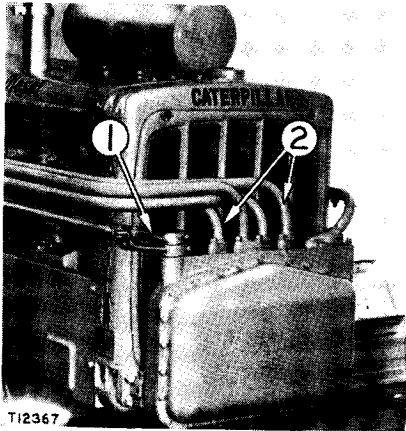
Scraper Or Two Implement Mounting Group Installation on D4 Tractor

The front pipe assembly of this group must be installed before the basic hydraulic pipe can be installed. See the topic, CROSSOVER VALVE, BASIC HYDRAULIC PIPE AND CONTROL LEVER INSTALLATION. A second control lever and connecting rods are also included in this group.

Pipe Assembly For Tractors 6U5843 and 7U11952 Up: Clean any sealing material, dirt or paint from around the two outer covers on top of the hydraulic control, around the covers on the rear of the crossover valve, and from around the openings in the pipe connections. Install the pipe assemblies in the following manner:

1. Remove the covers.
2. Insert the ring seals in the grooves in the top of the hydraulic control and crossover valve where the covers were removed. A light coat of grease will hold the seals in position.
3. Lift the long pipe assembly (2) to the fender and install on the hydraulic control with the capscrews and lockwashers provided.
4. Install the large bracket (3) under the fenders to the rear of the seat.
5. Install the short hydraulic pipe assembly (4) to the crossover valve.
6. Fasten the small brackets to the rear of both pipe assemblies and install on the large bracket.

Tractors Before 6U5843 and 7U11952: The pipe assembly is installed in the same manner as in the preceding topic except omit step 4 and in step 6, fasten the small bracket at the center hole in the back of the seat support assembly and to the long hydraulic pipe rear connection. Install



SHORT TOP LEVER AND PIPE INSTALLATION

1—Short top lever. 2—Pipe
assembly.



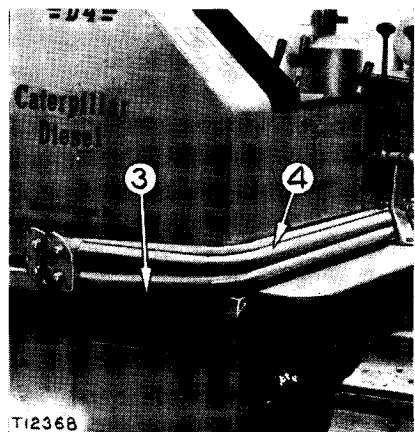
the large bracket to the short hydraulic pipe rear connection. Using the large bracket as a template, drill a $13/32$ inch (10.3 mm.) hole in the seat support assembly and fasten the bracket to the support with the lockwasher, bolt and nut provided.

Control Levers And Rods: Place the operating control lever (5) and washer on the inside end of the shaft in the fender mounted bracket and install the cotter pin. The lubricant fitting in the lever should be to the front.

To install the short top lever (1) on the small shaft which is in the center of the large shaft which extend through the top of the hydraulic control, insert the key in the small shaft keyway, align the key with the lever keyway and clamp the lever on the shaft with the clamping capscrew.

LARGE BRACKET AND PIPE INSTALLATION

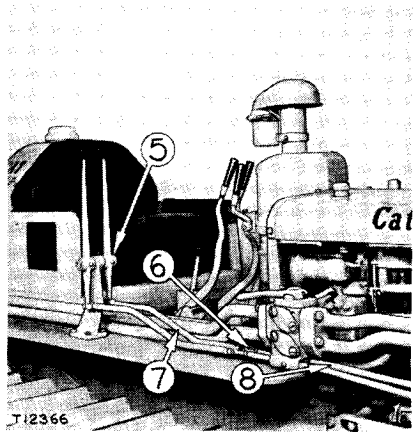
3—Large bracket. 4—Pipe assembly.



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CONTROL LEVER AND ROD INSTALLATION

- 5—Inside control lever. 6—Eyebolt.
7—Rear control rod. 8—Front
control rod.

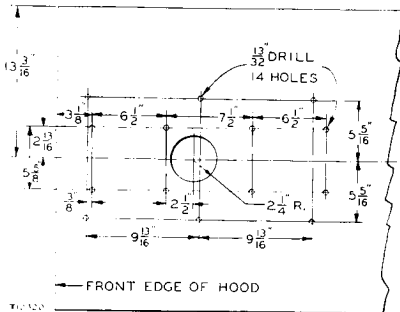


Remove the eyebolt (6) from the offset end of the front control rod (8) and insert the rod through the inside bearing in the crossover valve. Replace the eyebolt.

Connect the rear control rod (7) to the front control rod, and to the control lever. The operating control lever position can be adjusted by turning the eyebolts in both ends of the long rod. Tighten the lock nuts so that the control lever will move freely in the bearing points.

Scraper Or Two Implement Hydraulic Surge Tank Group Installation On D4 Tractor

The hydraulic surge tank is used to increase the oil capacity and provide sufficient air cavity to protect the hydraulic control from damage whenever either Scraper or Two Implement arrangement is used. This closed hydraulic system must have an air cavity large enough to accommodate oil displaced by the cylinder rods.

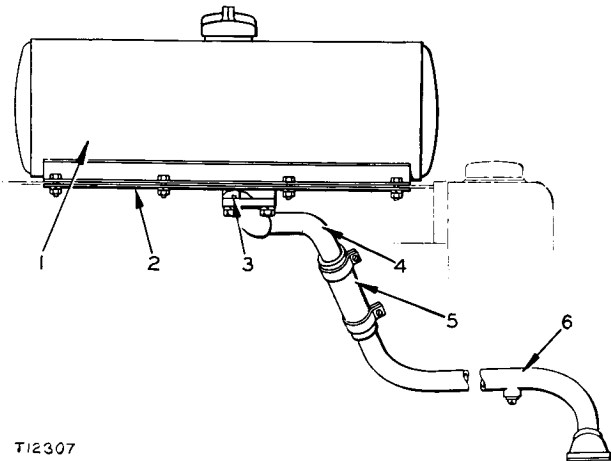


HYDRAULIC SURGE TANK MOUNTING HOLE LOCATIONS



Rework Tractor Hood: Remove the hood. Layout and cut holes as instructed in the illustration.

Tank Installation: Install the tank (1) on top of the hood and fasten it, with the reinforcing plate (2), on the bottom side of the hood, with the bolts, lockwashers and nuts provided. Clean off any sealing materials, dirt or paint from around the openings in the pipe connection. Insert the ring seal (3) in the groove in the flange of the tank and fasten the upper



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HYDRAULIC SURGE TANK INSTALLATION

1—Tank. 2—Reinforcing plate. 3—Seal. 4—Upper pipe.
5—Hose. 6—Lower pipe.

pipe (4) to the flange with the lock washers and capscrews provided. Install and clamp hose (5) to the upper pipe.

Install the hood with tank, on the tractor being careful to prevent dirt entering the hydraulic oil passage.

Remove the cover from the top left opening of the hydraulic control and clean off any sealing material, dirt or paint from around the openings in the lower pipe connection. Install the lower pipe (6) in the hose and fasten the pipe to the hydraulic control with lock washers and capscrews provided with the hydraulic control. Be sure the gasket between the lower pipe and hydraulic control will properly seal the hydraulic system oil. Clamp the hose to the lower pipe.

One Implement Group Installation On D4 Tractor

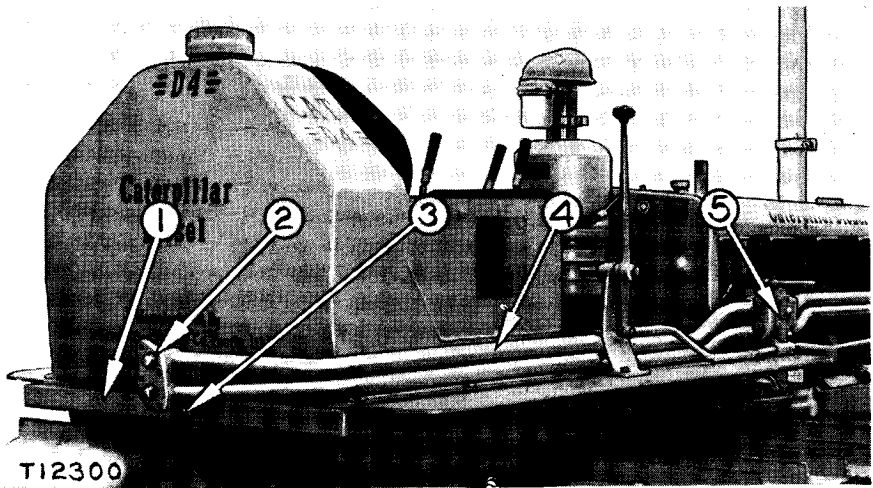
Pipe Assembly For Tractor 6U5843 And 7U11952 Up: Clean any sealing material, dirt or paint from around the covers on the rear of the crossover valves, and from around the openings in the pipe connections.

Install the pipe assembly in the following manner:

1. Remove the covers.
2. Insert the ring seals in the grooves in the crossover valve (5). A light coating of grease on the seals will hold them in position.

3. Fasten the small bracket (3) to the short hydraulic pipe rear connection (2).
4. Install the large bracket (1) under the fenders and to the rear of the seat.
5. Fasten the short hydraulic pipe assembly (4) to the crossover valve with capscrews and lockwashers provided.
6. Fasten the pipe assembly to the large bracket.

Tractors Before 6U5843 And 7U11952: The pipe assembly is installed in the same manner as in the preceding topic except omit step 4 and in step 6, fasten the small bracket at the center hole in the back of the seat support assembly and to the short hydraulic pipe rear connection. Using the large bracket as a template, drill a 13/32 inch (10.3 mm.) hole in the seat support assembly and fasten the bracket to the support with the lockwasher, bolt and nut provided.



ONE IMPLEMENT GROUP INSTALLATION

1—Large bracket. 2—Rear connection. 3—Small bracket. 4—Pipe assembly. 5—Crossover valve.

Part Three

Installation On D2 And R2 Tractors

MOUNTING GROUP AND HYDRAULIC CONTROL INSTALLATION

The hydraulic control mounts on the front of the tractor and is driven from the front of the crankshaft. Drain and remove the radiator and oil cooler from all tractors.

See the topic, ATTACHMENTS when installing the various arrangements of hydraulic lines.

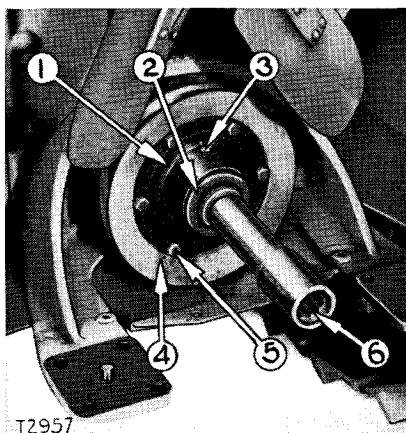
Drive Coupling Installation On D2 and R2 Tractors

The hydraulic control can be installed on all D2 and R2 Tractors. Different drive couplings are needed for D2 Tractors before 4U1 and 5U1 and R2 Tractors, than for D2 tractors effective with 4U1 and 5U1. These two coupling installation procedures are included in the following two topics.

Effective With Tractors 4U1 and 5U1: Place the shaft assembly (6) in the gear (1) and install the seal (2) making sure it is in the correct position against the shoulder in the gear. Install the capscrew and lockwasher at (3) in the gear so the shaft assembly is held in the gear, earlier couplings used a plug at (3) which should be staked in place with a prick punch. Clean the bore in the crankshaft pulley install the gasket, supplied with the group, in the bore. Then fill the gear with lubricant and install the drive coupling as a unit on the crankshaft pulley (4). Tighten the capscrews (5) and install the lubricant fitting in the crankshaft pulley. Install the radiator on the tractor.

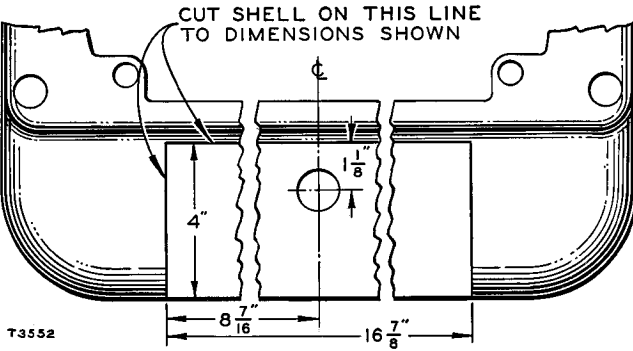
HYDRAULIC CONTROL DRIVE COUPLING INSTALLATION

- 1—Gear. 2—Seal. 3—Capscrew or retaining plug installed here. 4—Crankshaft pulley. 5—Capscrew. 6—Shaft assembly.



Effective With Tractors 3J1, 4J1, 5J1 and 6J1: Layout and cut away a portion of the bottom of the radiator shell as shown.

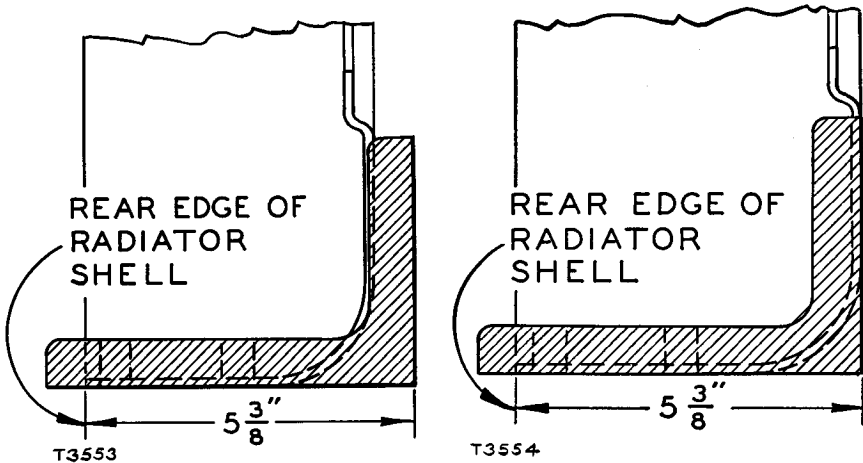
Position the radiator support plate (13) supplied in the bulldozer shipment in the opening cut in the radiator shell (15) as shown and weld in



RADIATOR BOTTOM SHELL REWORKING DIMENSIONS

place. With a $\frac{3}{8}$ inch fillet weld all the way around at the joint. See illustration on page 37 for reference.

After reworking the radiator bottom shell remove the crank jaw from the crankshaft and install the crankshaft pulley capscrew and lock (1). Align the holes in the pulley and lock, then install the six studs (10) in the crankshaft pulley. The lugs on the lock should point toward the front of the tractor.



LOCATING SUPPORT PLATE

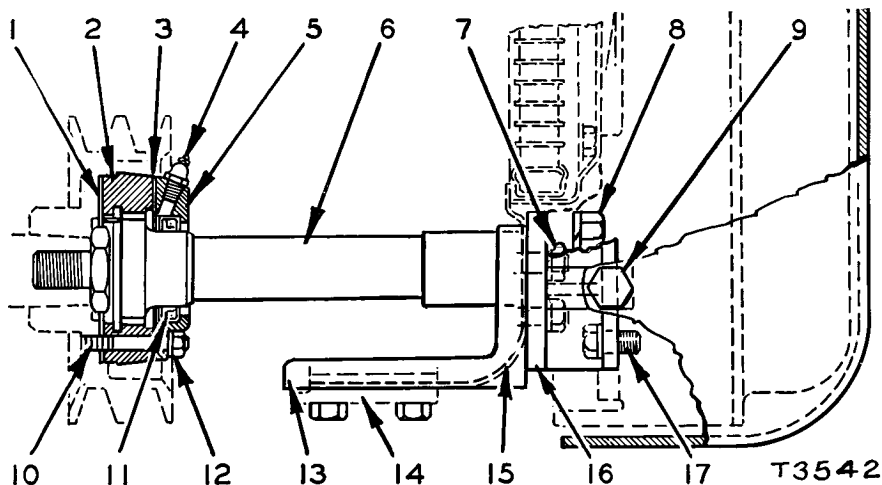
(Tractors 3J1 to 3J2555; 5J1 to 5J1276;
4J1 to 4J63 and 6J1 to 6J130)

(Tractors 3J2555 — up; 5J1276 — up;
4J63 — up and 6J130 — up)

Assemble the hydraulic control drive shaft. Insert the oil seal (11) in the cover (5) with the lip of the seal out. Install the lubricant fitting (4) in the cover (5). Slip the cover over the drive shaft (6).

Install the drive shaft coupling (2) on the crankshaft pulley studs (10). Then install the gasket (3). Position the drive shaft in the drive shaft coupling (2) and install the nuts and lockwashers (12) fastening it securely to the pulley.

Install the radiator on the radiator mounting bracket (14) and fasten it securely with the eight capscrews provided in the shipment.



HYDRAULIC CONTROL MOUNTING GROUP INSTALLATION

- 1—Pulley cap screw lock. 2—Drive shaft coupling. 3—Gasket. 4—Lubricant fitting.
- 5—Cover. 6—Drive shaft. 7—Six capscrews. 8—Stud nuts. 9—Cap screw fastening pump guard to support plate bracket. 10—Crankshaft pulley stud. 11—Oil seal. 12—Nuts and lockwashers. 13—Radiator support plate. 14—Radiator mounting bracket. 15—Radiator shell.
- 16—Hydraulic control support plate. 17—Cap screw fastening hydraulic control to support plate bracket.

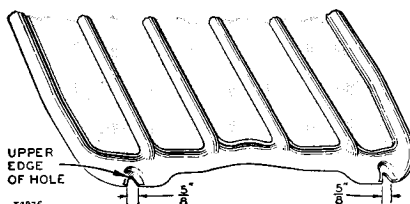
Grind off any part of the studs which might protrude through the hydraulic control support plate (16) so that it will fit tightly against the radiator support plate (13). Position the hydraulic control support plate (16) on the front of the radiator support plate. Insert the six capscrews (7) through the hydraulic control support plate to fasten it securely to the radiator support plate.

The stud nuts (8) and capscrews (17), which fasten the hydraulic control to the support plate and the support plate bracket, as well as the cap screw (9) which fastens the hydraulic pump guard bracket, will be installed later.

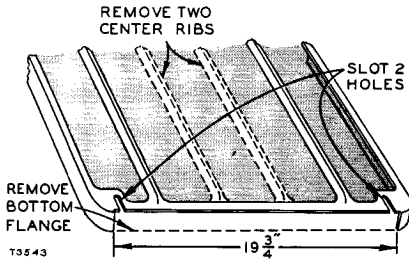
Radiator Screen Guard Reworking For D2 Tractors

Effective With Tractors 4U1 and 5U1: Remove the two lower capscrews that hold the radiator screen guard to the radiator bottom tank. Slot the screen lower mounting holes as shown. This will permit easy removal of the screen for cleaning.

**RADIATOR SCREEN GUARD
REWORKING INSTRUCTIONS
(Tractors 4U1 & 5U1 Up)**



Effective With Tractors 3J1, 4J1, 5J1 and 6J1: Take off the radiator screen and remove the two center ribs, slot the two holes at the bottom and remove the bottom flange as shown. Slotting the holes and removing the bottom flange will allow the screen to be taken out and cleaned without removing the hydraulic control guard. Install the screen on the radiator.



**RADIATOR SCREEN GUARD
REWORKING INSTRUCTIONS**
(Tractors 3J1, 4J1, 5J1, and 6J1 Up)

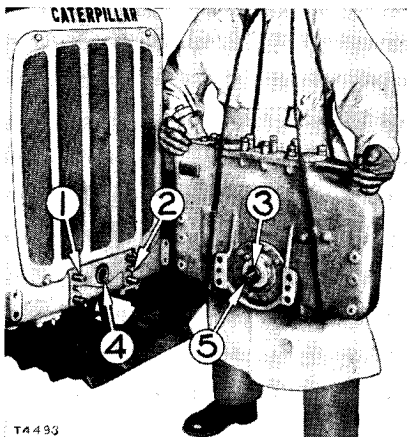
Hydraulic Control Installation On D2 and R2 Tractors

The hydraulic control mounts on the radiator bottom tank when installed on D2 Tractors effective with 4U1 and 5U1. On all R2 Tractors and D2 Tractors before 4U1 and 5U1 a radiator support plate and hydraulic control support plate are used to mount the hydraulic control on the standard tractor radiator mounting bracket.

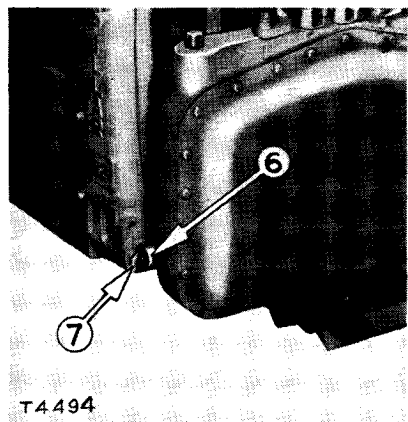
When the tractor is equipped with a crankcase guard two inches must be removed from the front of the guard so that the hydraulic control can be installed.

Effective With Tractors 4U1 and 5U1: Install the four studs (1) and the two dowels (2) in the radiator bottom tank. Fill the cooling system with a suitable coolant.

Place the seal (3) in the groove in the pump shaft (5). Lift the hydraulic control into position on the four studs (1) in the radiator bottom tank. The splines of the shaft sleeve (4) and the pump shaft must be aligned.



HYDRAULIC CONTROL INSTALLATION
1—Studs. 2—Dowels. 3—Seal. 4—Shaft sleeve. 5—Pump shaft.



**HYDRAULIC CONTROL MOUNTING
BRACKET INSTALLATION**
6—Mounting bracket. 7—Capscrew.

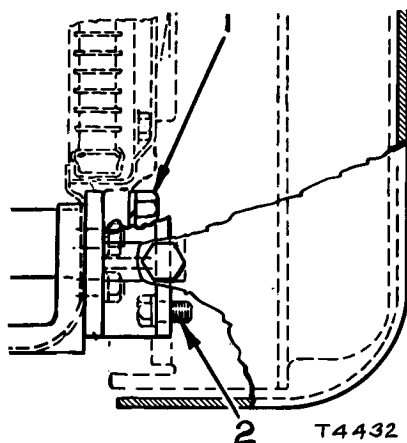
Push the hydraulic control into place. Install the lockwashers and nuts on the four mounting studs and tighten them securely. Place the mounting brackets (6) on each side of the hydraulic control and with the lockwashers and capscrews (7) fasten them to both the hydraulic control and radiator bottom tank.

Effective With Tractors 3J1, 4J1, 5J1, and 6J1: Place the seal in the groove in the pump shaft, align the drive shaft and pump shaft, then push the hydraulic control against the support plate. Place lockwashers and nuts (1) on the four hydraulic control support plate studs and insert the four capscrews (2) through the brackets at each end of the support plate. Tighten the nuts and capscrews to securely fasten the hydraulic control in position.

HYDRAULIC CONTROL INSTALLATION

(Tractors 3J1, 4J1, 5J1 and 6J1)

1—Stud nuts. 2—Capscrews.

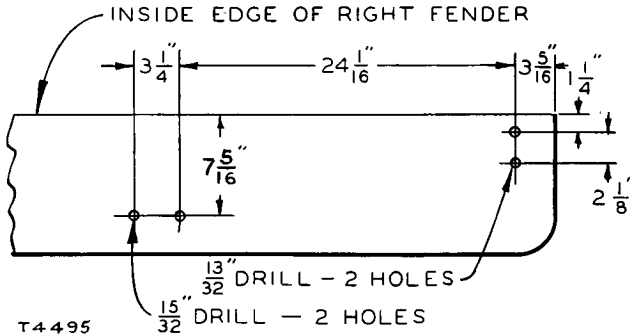


Crossover Valve, Basic Hydraulic Pipes And Control Lever Installation On D2 and R2 Tractors

Whenever the complete basic hydraulic control is installed, the crossover valve, the basic hydraulic pipes and control lever with connecting rods must be installed with one or a combination of the groups in the topic, ATTACHMENTS.

Rework Right Fender: Cut or drill two 13/32 inch (10.3 mm.) holes in the right fender for the crossover valve as shown in the following illustration.

Drill the two 15/32 inch (11.9 mm.) holes in the right fender, as shown to mount the control lever bracket. On tractors for hydraulic implement operation, the tool box must be moved to a new location so the control bracket can be installed. On tractors for only bulldozer operation with fender mounted fuel tanks it will be necessary to move the tool box toward the rear of the tractor to allow the installation of the control lever bracket.



CROSSOVER VALVE AND CONTROL LEVER BRACKET MOUNTING HOLE LOCATIONS

Crossover Valve: When the crossover valve (2) is installed on the tractor right fender, the covers over the hydraulic passage in the valve will be on the front, right and rear sides of the valve.

Basic Hydraulic Pipe Between Control and Crossover Valve: Remove the cover from the front of the crossover valve (2) and clean off any sealing materials, dirt or paint from around the openings in the pipe connections.

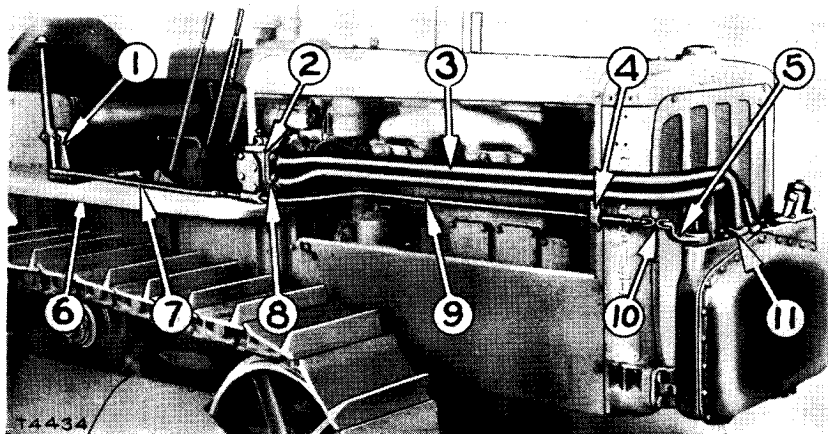
Remove the covers from the two center openings on top of the hydraulic control. Insert the ring seals in the grooves in the flange connections (8) and (11) of the control and crossover valve. A light coating of grease on the seals will hold them in the grooves. Install the pipe assembly (3) between the crossover valve and hydraulic control with the lockwashers and capscrews provided. Fasten the valve to the fender with the capscrews and lockwashers provided.

It may be necessary to slot the crossover valve mounting holes to prevent imposing a strain on the hydraulic pipe.

Control Levers And Rods: Bolt the operating control lever bracket (1) in place on the right fender with plate (6) under the fender for reinforcement. Put the operating control lever and washer on the shaft to the left of the bracket and install the cotter pin. The lubricant fitting in the lever should be to the front.

Insert the short off set end of the front control rod (9) through the outside bearing in the crossover valve (2). Push the rod back far enough to allow it to be moved forward through the bearing in the bracket. Install the locknuts on the eyebolts and install the bolts in both ends of the front control rod.

To install the hydraulic control long bottom lever (5) on the large control shaft which extends through the top of the hydraulic control, insert the key in the shaft keyway, align the key and lever keyway and clamp the lever on the shaft with the clamping capscrew.



VALVE, PIPE AND CONTROL LEVER INSTALLATION

1—Control lever bracket. 2—Crossover valve. 3—Pipe assembly. 4—Bracket. 5—Hydraulic control long bottom lever. 6—Plate. 7—Rear rod. 8—Crossover valve flange connection. 9—Front rod. 10—Short front rod. 11—Hydraulic control flange connection.

Connect the rear rod (7), the front rod (9) and the short front rod (10), then fasten the short front rod to the hydraulic control lever (5) (long bottom lever). Fasten the rear rod to the operating control lever. The operating control lever position can be adjusted by turning the eyebolts in both ends of the rod (9). Tighten the lock nuts so that the control rod will move freely and lubricate the bearing points.

NO. 44 HYDRAULIC CONTROL APPLICATIONS ON D2 AND R2 TRACTORS

The No. 44 Hydraulic Control can be used in two arrangements either individually or both at a time. This is accomplished by adding the various hydraulic lines to the basic hydraulic control pipes, crossover valve and control lever just installed.

Following is a list of some of the possible arrangements which can be installed on the tractor to operate the desired hydraulically controlled equipment:

- 1—Bulldozer, single valve, 27 G. P. M. pump.
- 2—One Implement, single valve, 27 G. P. M. pump.
- 3—Bulldozer and One Implement, single valve, 27 G. P. M. pump.

The installation instructions of the various individual arrangements are covered in the following topics. The installation, operation and maintenance instructions for the equipment being controlled will be found in the Operator's Instructions furnished with each equipment group or arrangement.

The hydraulic control is designed to operate with any double acting cylinders of limited dimensions. The use of single acting cylinders is not recommended since damage to the control may result.

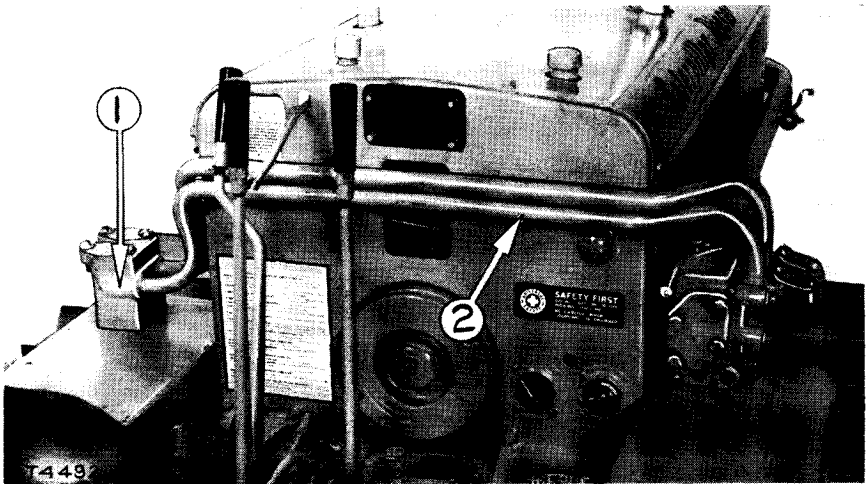
ATTACHMENTS

Cross Pipe Installation On D2 and R2 Tractors

This group can be installed on the tractor after the installation of the basic hydraulic pipe and control lever as instructed in the topic, CROSS-OVER VALVE, BASIC HYDRAULIC PIPE AND CONTROL LEVER INSTALLATION.

Remove the cover from the right side of the crossover valve and clean off any sealing materials, dirt or paint from around the openings in the cross pipe connections. Remove the entire air cleaner from the air inlet pipe by removing the four stud nuts at the connection. Insert the ring seals in the grooves in the crossover valve and fasten the cross pipe (2) to the valve with the capscrews provided with the group. A light coating of grease on the seals will hold them in the grooves.

By using the left bracket (1) on the pipe for a templet mark the location of the hole on the left fender. Remove the pipe and drill a 9/16 inch (14.2 mm.) hole in the fender. Again fasten the pipe to the crossover valve and then install the capscrew and lockwasher to fasten the pipe to the left fender. Reinstall the air cleaner.

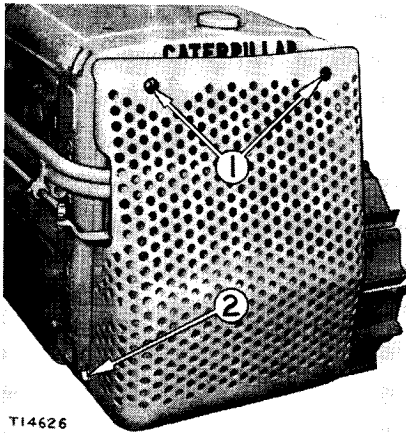


CROSS PIPE INSTALLATION

1—Left bracket. 2—Cross pipe.

Pump Guard Installation On D2 and R2 Tractors

The pump guard is furnished with the hydraulic control for bulldozer application and is available as an attachment for other applications.



T14626

PUMP GUARD INSTALLATION
(Tractors 4U1 and 5U1 Up)

1—Capscrews. 2—Capscrew in mounting bracket.



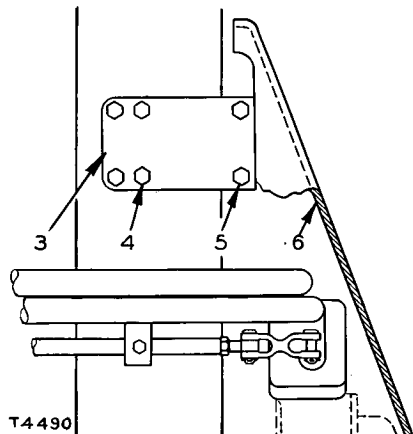
Effective With Tractors 4U1 and 5U1: Remove the capscrews which hold the radiator screen to the radiator top tank and raise the pump guard into position. Insert the capscrews (1) through the top of the guard, spacer and screen, then fasten them securely to the radiator top tank. Insert the screws (2) through the side of the guard into the mounting brackets and tighten them.

Effective With Tractors 3J1, 4J1, 5J1, and 6J1: Install the two pump guard top support brackets (3) on the sides of the tractor. Fasten the brackets securely using the four capscrews (4) provided for each side.

Raise the pump guard (6) into position and insert the capscrews through the holes in the sides of the guard and into the hydraulic control support plate and tighten them. Install the two capscrews (5) through each top support bracket and fasten the guard securely.

PUMP GUARD TOP SUPPORT BRACKET INSTALLATION
(Tractors 3J1, 4J1, 5J1 and 6J1 Up)

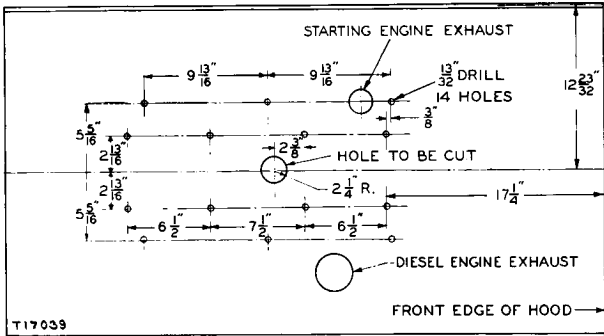
3—Support bracket. 4—Capscrew holding bracket. 5—Capscrew holding guard. 6—Pump guard.



T4490

Bulldozer or Two Implement Hydraulic Surge Tank Group Installation on D2 Tractors

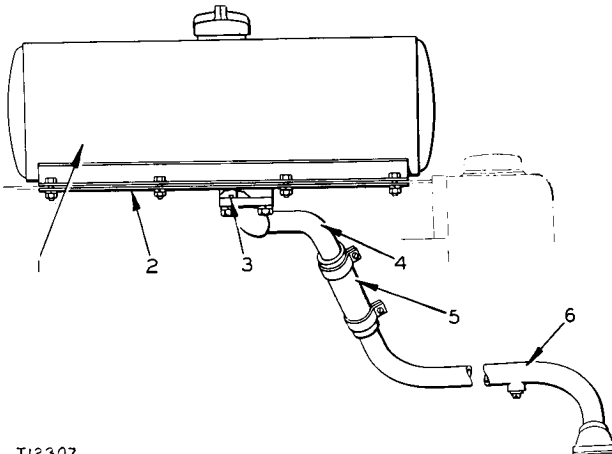
The hydraulic surge tank is used to increase the oil capacity and provide sufficient air cavity to protect the hydraulic control from damage whenever either Bulldozer or Two Implement arrangement is used. This closed hydraulic system must have an air cavity large enough to accommodate oil displaced by the cylinder rods.



HYDRAULIC SURGE TANK MOUNTING HOLE LOCATIONS

Rework Tractor Hood: Remove the hood. Layout and cut holes as instructed in the illustration.

Tank Installation: Install the tank (1) on top of the hood and fasten it, with the reinforcing plate (2), on the bottom side of the hood, with the bolts, lockwashers and nuts provided. Clean off any sealing materials, dirt or paint from around the openings in the pipe connections. Insert the ring seal (3) in the groove in the flange of the tank and fasten the upper pipe (4) to the flange with the lockwashers and capscrews provided. Install and clamp hose (5) to the upper pipe.



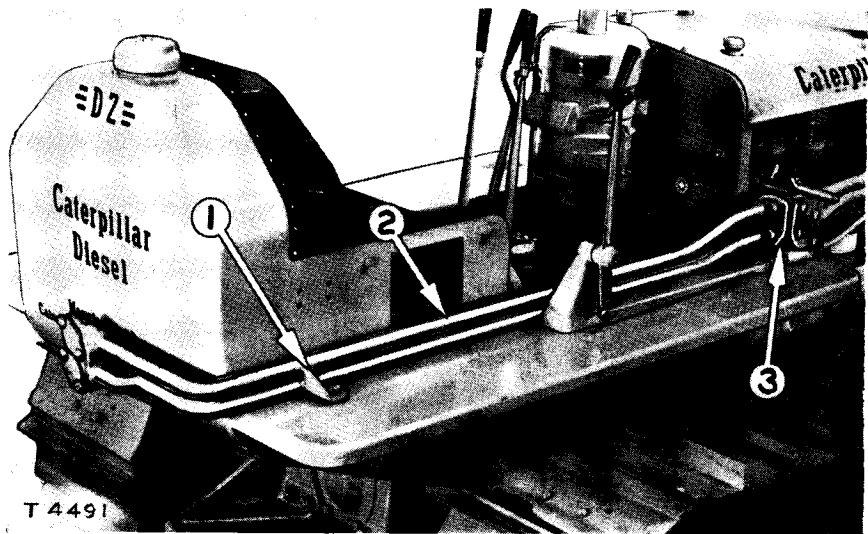
HYDRAULIC SURGE TANK INSTALLATION
1-Tank. 2-Reinforcing plate. 3-Seal. 4-Upper pipe.
5-Hose. 6-Lower pipe.

Install the hood with tank, on the tractor being careful to prevent dirt entering the hydraulic oil passage.

Remove the cover from the top left opening of the hydraulic control and clean off any sealing material, dirt or paint from around the openings in the lower pipe connection. Install the lower pipe (6) in the hose and fasten the pipe to the hydraulic control with lockwashers and capscrews provided with the hydraulic control. Be sure the gasket between the lower pipe and hydraulic control will properly seal the hydraulic system oil. Clamp the hose to the lower pipe.

One Implement Group Installation On D2 and R2 Tractors

Remove the cover from the rear of crossover valve (3) and clean any sealing material, dirt or paint from around the openings in the pipe connections. Insert the ring seals in the grooves in the crossover valve body. A light coating of grease on the seals will hold them in position. Lift the hydraulic implement pipe assembly (2) to the fender and fasten it to the crossover valve with the capscrews and lockwashers provided. Use the bracket (1) as a templet for locating the mounting holes in the right fender. Drill two 13/32 inch (10.3 mm.) holes in the fender and fasten the pipe assembly with the bolts, lockwashers and nuts provided.



ONE IMPLEMENT PIPE ASSEMBLY INSTALLATION

1—Bracket. 2—Pipe assembly. 3—Crossover valve.

Lubrication Instructions

GENERAL LUBRICATION INFORMATION

Detailed instructions regarding the lubrication of the hydraulic control are given in the lubrication chart and in the illustrations following. The lubrication chart specifies the points to be serviced, the hourly intervals and the type of lubricant to be used. Hourly intervals are to be interpreted as those recorded on the "Hour Meter" of the tractor. The hours indicated are for normal service. For operating conditions of extreme water, dust and mud lubricate more frequently where hydraulic fittings are used. Clean the fittings before lubricating so that dirt will not be carried in with the lubricant.

Careful attention to the following information on lubricants and their proper selection will add much to performance, economy and long life of the hydraulic control.

When checking and refilling the hydraulic control, do so with the tractor on level ground.

Use the brush supplied in the tractor tool equipment when removing dirt from fittings and when cleaning around the filler opening and covers. Lubricate all miscellaneous points, not equipped with fittings, with crankcase lubricating oil every 60 hours.

The following topics recommend the types, viscosities and grades of lubricants best suited for use in the hydraulic control for various operating temperatures. The S.A.E. (Society of Automotive Engineers) and N.L.G.I. (National Lubricating Grease Institute) numbers refer only to the viscosity or consistency of the lubricant and have reference to no other characteristic or property.

CRANKCASE LUBRICATING OIL (Abbreviated CO)

(CO) Use either Superior Lubricants (Series 2) or an oil conforming to the requirements of MIL-L-2104A specification in the hydraulic control tank.

The oil in the hydraulic system should be fluid enough to flow freely at the lowest temperature at which the engine will be started in order to insure maximum service life from the hydraulic system. For this reason use S.A.E. No. 10W oil for temperatures above 0° F. For temperatures below 0° F. dilute the oil with kerosene up to 25% so it will be fluid enough to insure free circulation.

Naturally, any precautions taken during cold weather to keep the tractor and hydraulic system warm will reduce the need for diluting the hydraulic system oil.

LUBRICATION CHART

CATERPILLAR

REG. U.S. PAT. OFF.

No. 44

HYDRAULIC CONTROL

The folded page is arranged to serve two purposes:

First, it is a complete outline of all the information required to lubricate the hydraulic control.

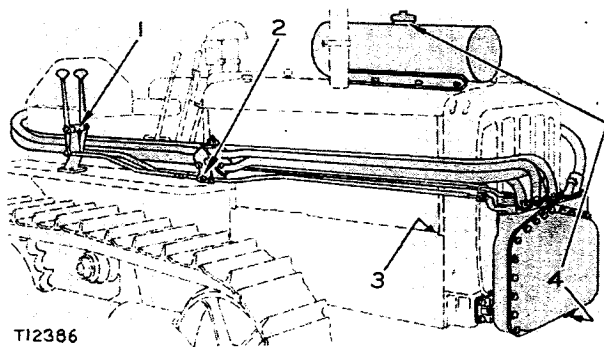
Second, the illustration and identification of points of lubrication can be used with the detailed illustrations and information on the pages following the chart as a reference for lubrication and service information.

Identification Of Points Of Lubrication, Lubricants To Apply And Interval Of Service

Point	Identification	Lubri- cant	Every 10 HRS.	Every 60 HRS.	Every 120 HRS.	Every 900 HRS.
1	Control Lever Bearings	BR			X	
2	Control Rod Bearings	BR			X	
3	Hydraulic Control Drive Coupling	BR			X	
4	Hydraulic Control Tank	CO	X	X		X

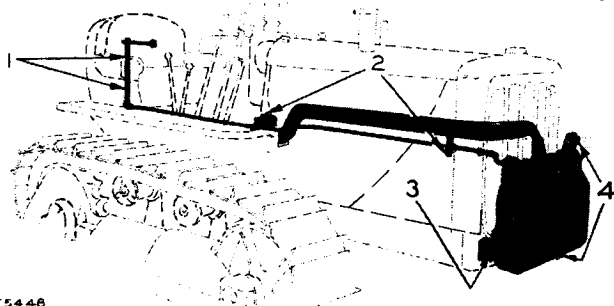
Location of Points of Lubrication

(D4 Tractor and D2 Tractor)*



Location of Points of Lubrication

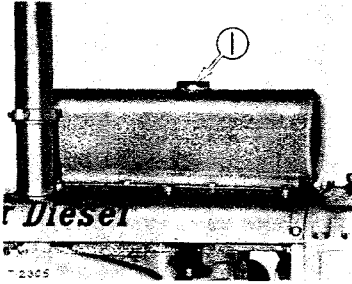
(D6 Tractor)**



*D2 Tractors use only one control lever and the Hydraulic Control Tank filler opening will be at top left corner of the Hydraulic Control. The Hydraulic surge tank illustrated here is used for Scraper or Two Implement applications on D4 and D6 Tractors.

**D6 Tractor Scraper or Two Implement application will have the hydraulic surge tank mounted on the hood as shown for D4 Tractors.

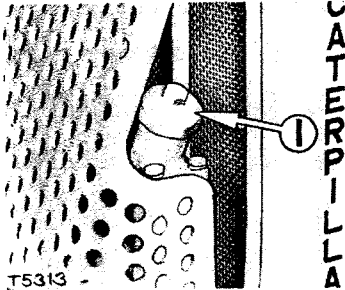
CO Crankcase Lubricating Oil



4

CHECK HYDRAULIC CONTROL TANK

Check oil level every 10 hours when equipped with the hydraulic surge tank (60 hours when not) and when oil is either warm or cool as indicated in the Operator's Instruction Book furnished for the equipment group or arrangement. Clean dirt from around filler neck cap and remove cap. Oil level should be visible in filler neck (1).



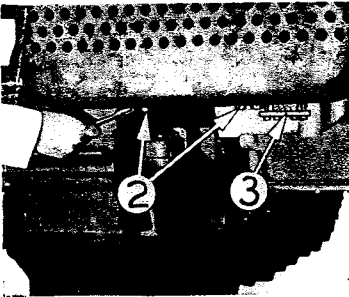
4

DRAINING HYDRAULIC CONTROL TANK

Every 900 hours drain the hydraulic system. Position the tractor and hydraulically controlled equipment so the cylinder pistons can move a complete stroke.

Stop the engine, loosen the oil filter plate (3) to relieve the pressure in the tank by allowing oil to drain.

Remove the drain plugs (2) and the filler neck cap. Move the control levers to satisfactorily drain the system. Clean the magnetic drain plugs and be sure the ring seals are in place before installing the plugs.

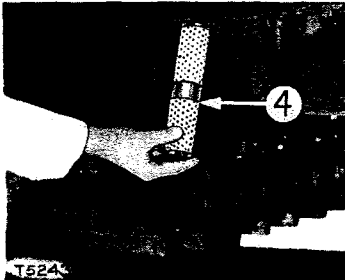


4

HYDRAULIC CONTROL OIL FILTER

Remove the filter element (4) at each oil change. Replace the element and filter cover ring seal with a new element and filter seal each time the oil is drained.

Effective with hydraulic controls 6W6048, 7W608, 8W5008 and 9W364 an element with a perforated metal cover is used. Earlier controls use an absorbent yarn type element.



Hydraulic oil should be drained and replaced with undiluted S.A.E. No. 10W oil at the end of the cold season when dilution of the oil is no longer required.

It is extremely important in handling the oil to keep it clean. Every precaution should be taken to use only clean filler cans and to be sure that all dirt is removed from the filler cap for the hydraulic control before it is taken off for filling.

Careful attention was given to the design of the hydraulic system to guard against oil leaks. Connections were eliminated where possible and metal to metal joints, with rubber ring seals, are used instead of the usual pipe thread joints.

Oil leaks should not be neglected as the loss of oil is an unnecessary expense as well as a possible cause of damage to the hydraulic system.

The operator should take every precaution to prevent dirt getting into the hydraulic system to extend the life of the hydraulic pump.

BALL AND ROLLER BEARING LUBRICANT

(Abbreviated BR)

(BR) This lubricant is a mixture of mineral oil and metallic soaps. Use No. 2 grade for most temperatures. For extremely low temperatures use No. 0 or No. 1 grade.

This grease can be applied to all bearing points — plain bushings, ball bearings and roller bearings—where equipped with hydraulic pressure fittings or when bearings are hand packed.

Use only a high grade Ball and Roller Bearing Grease of short fiber. This grease must be satisfactory in anti-friction bearings at speeds up to 3000 RPM at a maximum temperature of 300° F. It is a grease with sufficient adhesive qualities to cling to the bearings in all extremes of high and low operating temperatures. Greases of this kind have been classified by grades by the N.L.G.I. (National Lubricating Grease Institute) designated in order of "worked" penetration or consistency.

CO Crankcase Lubricating Oil

4

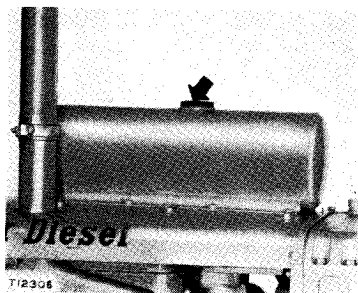
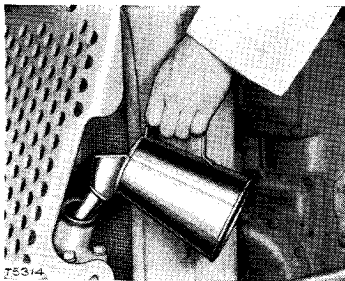
GENERAL INFORMATION ON FILLING HYDRAULIC SYSTEM

Before starting the engine fill the hydraulic control tank. See Note A. Subsequent fillings should be made when the engine is running at IDLE SPEED.

Install the filler cap loosely after each filling.

Operate control lever to fill lines and cylinders when engine is running at full engine speed. Move pistons small amount then fill tank to prevent aeration of the oil. Repeat this procedure until system is filled and oil level is visible in filler neck.

Check oil level several times during the first day of operation after filling. Be careful when removing the cap when the oil is warm because pressure in the tank may force out oil when the cap is removed.



BR Ball and Roller Bearing Lubricant

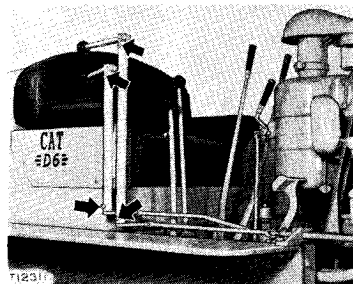
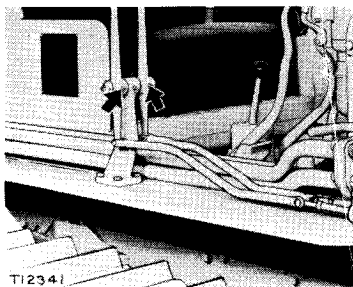
1

CONTROL LEVER BEARINGS

Lubricate the control lever bearings every 120 hours.

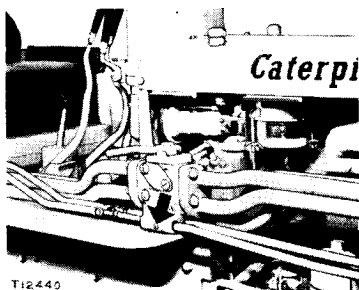
Two fittings for Scraper or Two Implement applications on D4 Tractor and one for D2 Tractors.

Four fittings for two implement applications and two fittings for all others on D6 Tractors.



NOTE A: Specific instructions for filling each piece of hydraulically controlled equipment will be covered in Operator's Instruction Book for that equipment.

BR Ball and Roller Bearing Lubricant



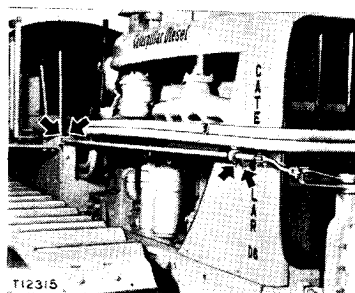
T12440

2

CONTROL RODS

Lubricate control rod bearing points every 120 hours.

Four fittings on D6 Tractor, one on D4 Tractor Scraper or Two Implement applications and two on all others.



T12315

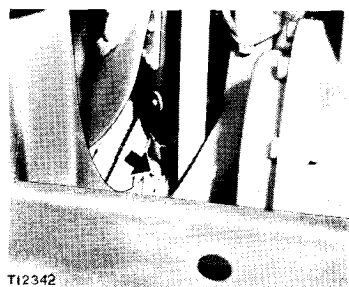
3

HYDRAULIC CONTROL DRIVE COUPLING

(D2 Tractor and D4 Tractor)

The drive coupling on later model D4 Tractors is lubricated through two fittings. All other drive couplings on D2 and D4 Tractors are lubricated through one fitting.

Turn pulley and lubricate sparingly every 120 hours. Do not overlubricate. Excess lubricant lodges on the fan belts and pulleys resulting in excessive wear.



T12342

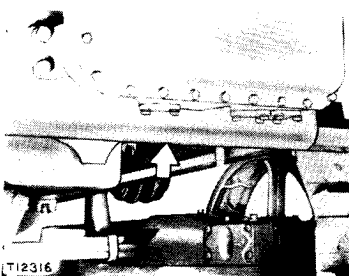
3

HYDRAULIC CONTROL DRIVE COUPLING AND UNIVERSAL JOINT

(D6 Tractor)

Lubricate drive coupling every 120 hours. Experience with universal joints shows that packing with lubricant at the time of assembly at the factory or if they are disassembled for seal replacement, eliminates the need for periodic lubrication.

Where fittings are provided on earlier arrangements, further lubrication is not necessary and the fittings should be removed and plugs installed in their places.



T12316

Operation Instructions

PREPARATION FOR USE

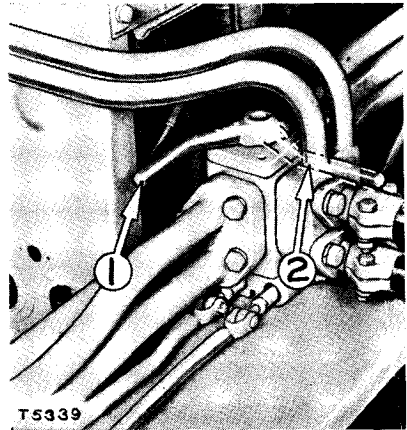
The first duty of anyone charged with the care and operation of a hydraulic control is to give it a detailed inspection to see if all bolts, nuts, capscrews and pins are properly locked in position. All points should be lubricated as indicated in the lubrication chart.

OPERATION

The control lever is located to the right and in front of the operator's seat. When the engine is running the hydraulic control is always ready to operate the hydraulically controlled equipment.

CROSSOVER VALVE LEVER POSITION FOR SCRAPER OPERATION

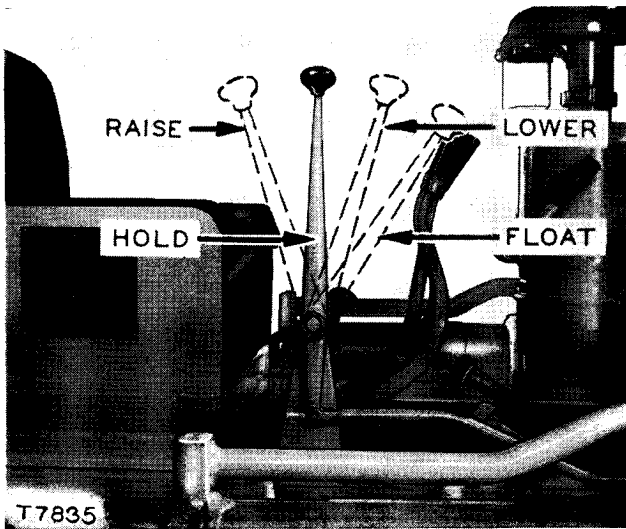
1—Control lever position for bulldozer operation. 2—Control lever position for Scraper. Two Implement. One Implement or Tool Bar operation.



Crossover Valve: The crossover valve installed on the right fender of D4 and D2 Tractors is designed to operate with the crossover valve lever in one of two positions. The valve lever should be turned to position (2) when operating the No. 40 Scraper, One Implement, Two Implements, or the Tool Bar. With the lever in this position the hydraulic oil passages are straight through the valve from front to rear. When the valve lever is turned 90° back to (1) as for bulldozer operation, the straight through passages will be blocked and turned to the cross pipe to provide passages to both sides of the tractor. In the bulldozer applications the cross pipe fastens to the crossover valve and provides connections for the hydraulic cylinders on both sides of the tractor.

Control Levers: Always operate the hydraulic control with quick full movements of the control lever with the engine running at full governed speed.

Raise position is obtained by pulling the lever back. Release the lever as the piston or pistons approach the end of the stroke.



HYDRAULIC CONTROL LEVER POSITIONS

The cylinder piston can be held in any position, by releasing the control lever and allowing it to return to the neutral or hold position. It is necessary to pull the control lever out of float position then release it to allow it to return to neutral or hold position.

Lower position is obtained by pushing the control lever forward until resistance is felt in the control lever.

Release the control lever when the piston or pistons have reached the limit of their strokes to stop the oil by-passing the valves and also to reduce heat and wear.

Float position is obtained by pushing the control lever forward through lower position. At this point, a noticeable resistance will be felt on the lever. Continue to push it forward to the float position. The control lever will remain in float position until it is pulled back and released to return to the hold or neutral position.

Float position is available in only one valve of a double valve hydraulic control or in all single valve controls.

DAILY CARE

A daily check of the hydraulic control should be made to see if there are any loose nuts, bolts, capscrews, or parts worn to such an extent that they are no longer serviceable. If corrective steps are taken immediately upon discovery of loose or worn parts, fewer forced stops and more economical operation will result.

Dirt should not be allowed to accumulate and pack on the hydraulic control. A few minutes spent daily in keeping it clean are well repaid in greater ease and safety of operation.

Connections in the hydraulic system should be checked for looseness that might result in leakage. The hydraulic hoses should be inspected for signs of leakage or wear because hoses move and can rub against each other as well as against parts of the tractor during operation. Replace the hoses showing signs of leakage or signs of sufficient wear to permit leakage or breakage. See the topic, CARE OF THE HYDRAULIC SYSTEM. This inspection can be made more easily by keeping the hydraulically controlled equipment and tractor clean.



Maintenance Instructions

"Caterpillar" Hydraulic Controls have been constructed so that very few adjustments are necessary. If they are properly maintained they will give an unlimited amount of trouble free service. Maintenance and care of the hydraulic system will be covered in the following topics.

CARE OF THE HYDRAULIC SYSTEM

The hydraulic system is designed so that no adjustments are necessary. There are, however, a few precautionary measures which should be followed. Cleanliness is of great importance in the hydraulic system and great care should be taken to keep dirt out.

Check the oil every 10 hours in Two Implement or Scraper applications and fill with oil if necessary. If the oil is low, make a thorough inspection of the hoses and connections for leaks. It should not be necessary to add oil if all the connections are tight and the hoses are in good condition. See the LUBRICATION INSTRUCTIONS for type of oil, general draining, filter replacement and general filling of the hydraulic system.

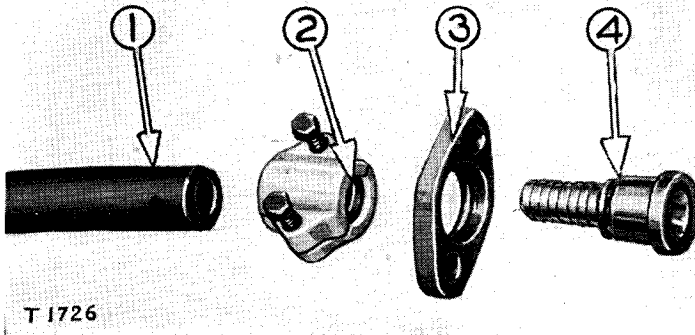
Details of draining and filling the hydraulic system will be found in the Operator's Instruction Book for the controlled equipment.

The control levers and rods should be in correct adjustment at all times to prevent partial opening or closing of the control valves. The control lever should always operate freely and return to the "hold" position by spring action when released from either "raised" or "lower" position.

Hose Replacement: Check the hose daily for any signs of leakage or wear. Do not wait for actual breakage before replacing the hoses. Check the hose clamps frequently after installing new hoses, to make certain they are tight. A loose clamp could cause a separation of the hose from the sleeve. The loss of hydraulic system oil, due to a broken hose, will cause unnecessary loss of time as well as damage to the hydraulic control.

Remove the hose by disconnecting the flange connections at the cylinder and the pipe assembly or crossover valve. Cap all openings of the hydraulic system when the hoses are removed. Remove the clamp (2) and cut half way around the hose at a 45° angle from the end of the hose until it can be removed from the stem (4). It is necessary to cut only the wire braids in the hose. Cut the hose with an 18 teeth to the inch hack saw by using short choppy strokes. Lift the blade slightly on the return stroke.

If the stem is cut or burrs are noticed, remove the burrs or replace the stem with a new one. Replace the hose with new $\frac{3}{4}$ inch (1.90 cm.) two wire braid high pressure hydraulic hose the same length as the one being replaced. Clean the cuttings from the hose before installing the stem.



T 1726

HOSE CONNECTION**1-Hose. 2-Clamps. 3-Flange. 4-Stem.**

Place the flange (3) on the stem (4) next to the large shoulder on the stem. Lubricating the stem with crankcase oil will make installation easier. Start the stem in the hose (1) and be sure the stem is inside the inner covering not next to the wire braid at any point. Push the hose over the stem until the end of the hose is approximately 1/16 inch (1.6 mm.) from the stem shoulder. If a vise is not available, force the stem into the hose with a wooden block. Position the clamps (2) so that flange (3) can be easily fastened to the pipe connection. The lip on the inside of the clamp should fit into the large groove in the stem. Place the two bolts in the clamp and tighten them evenly until a slight bulge of the hose appears between the clamps. Replace the ring seal at the end of the stem. Before installing the hoses make sure the faces and seal seats are free from all dirt.

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Capacities

Approximate Quantities

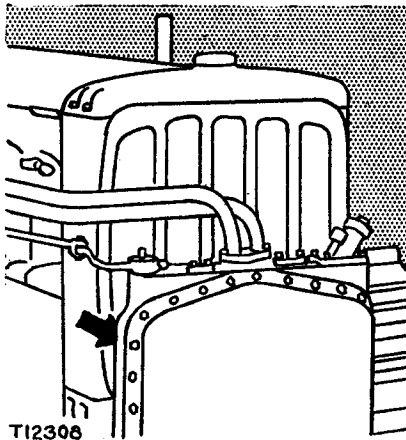
No. 44 Hydraulic Control (Front Mounted) 3½ gal.

See the Operator's Instruction Book furnished with each equipment group or arrangement for full capacity of the hydraulic system.

Serial No.	Valves	R.P.M.	G.P.M.	P.S.I.
6W5001	1	1400	37	1000
7W1	2	1400	37	1000
8W5001	2	1400	25	1000
9W1 (D4)	1	1400	25	1000
9W1 (D2)	1	1525	27	1000

◆

Location Of Serial Number



T12308

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PEORIA, ILLINOIS, U.S.A.

Diesel Engines . . Tractors . . Motor Graders
. Earthmoving Equipment

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