



**W 24**  
**Articulated Loader**  
**Operators Manual**

Form No. 9-2262

# NOTICE!

At the time your Case Dealer delivers your new Loader, he will acquaint you with its operation and maintenance as outlined in the "Delivery Procedure and Warranty Registration". When your Dealer has completed these instructions, he will ask you to sign the report and will then hand you a copy for your records.

**NOTE:** The "Delivery Procedure and Warranty Registration" also contains a record of the Pre-Delivery Checkup which your Dealer made on your Loader.

## AFTER DELIVERY CHECKUP

The Authorized Case Dealer from whom you purchased your new Loader will perform the "After Delivery Checkup" outlined on the following page, if you will arrange to bring your Loader to his Service Shop within - - -

60 days after date of delivery or 200 hours of operation (whichever occurs first).

**NOTE:** The only charge your dealer will make for this inspection will be for oil, filters, or other accessories.

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## AFTER DELIVERY CHECKUP

Owner's Name \_\_\_\_\_

Date Checkup Performed \_\_\_\_\_

Owner's Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Dealership \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Tractor has been operated \_\_\_\_\_ hours. Serial No. \_\_\_\_\_

### COOLING SYSTEM

- ☐ Check radiator coolant level
- ☐ Check for leaks

### FUEL SYSTEM

- ☐ Check for leaks

### ELECTRICAL SYSTEM

- ☐ Check battery specific gravity and fluid level
- ☐ Check alternator belt tension
- ☐ Check operation of starter, alternator and instruments

### LUBRICATION

- ☐ Grease all pressure fittings
- ☐ Drain engine oil and refill
- ☐ Change oil filter
- ☐ Check transmission oil level
- ☐ Check differential and planetary oil level

### ENGINE

- ☐ Torque cylinder head bolts
- ☐ Check valve tappet clearance
- ☐ Check no load full governed engine speed and low idle speed

### HYDRAULIC SYSTEM

- ☐ Check hydraulic reservoir oil level
- ☐ Clean inlet filter screen
- ☐ Check main relief valve pressure on loader
- ☐ Check steering operation

### GENERAL

- ☐ Check foot and parking brake adjustment
- ☐ Service air cleaner
- ☐ Inspect for oil leaks
- ☐ Tighten all accessible bolts
- ☐ Clean all breathers

DEALER: Question purchaser carefully concerning his experience with the loader and answer any questions concerning maintenance or operation that are not clear to him.

Checkup performed by \_\_\_\_\_

Dealer's signature \_\_\_\_\_

Owner's signature \_\_\_\_\_

ORIGINAL -  
Dealer

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Owner's Address	City	State
Dealership	City	State

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Dealer's signature \_\_\_\_\_

Owner's signature \_\_\_\_\_

DUPLICATE -  
Owner

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## TO THE CASE LOADER OWNER

The care you give your new Case Loader will greatly determine the satisfaction and service life you will obtain from it. Use this manual as your guide. By observing the instructions and suggestions in this manual, your Case Loader will serve you well for many years.

As an Authorized Case Dealer, we stock Genuine Case Parts, which are manufactured with the same precision and skill as the original equipment. Our factory trained staff is kept well informed on the best methods of servicing Case equipment and is ready and able to help you.

Should you require additional aid or information, contact us.

*Your Authorized Case Dealer*

To insure efficient and prompt service, please furnish us with the Model, Serial, Transmission, Axle and Engine Numbers of your Loader in all correspondence or contacts.

The J. I. Case Company reserves the right to make improvements in design or changes in specifications at any time, without incurring any obligation relating to such changes.



Look for the symbol to point out important safety precautions. It means - ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!





## **SAFETY PRECAUTIONS**



**DON'T TAKE CHANCES** - Use this manual to thoroughly familiarize yourself with your loader. The safety precautions listed below are for your protection. **BE SAFETY CONSCIOUS.**

### **Pre-Starting Tips**

1. Wear the proper safety equipment - avoid loose clothing. If you feel that additional safety equipment is required, notify your foreman.
2. Always carry a fire extinguisher and first aid kit.
3. Familiarize yourself with the local terrain, under ground cables, gas lines, mains, etc.
4. Know the hand signals, flags or signs to be used on the job site.
5. Visually check out your loader for leaks and broken, missing or malfunctioning parts.
6. Be sure the operator's area is free of oil, ice or loose objects.
7. Check that the parking brake is set and the transmission is in neutral before starting the engine.

### **Operational Tips**

8. Clear the area of all unauthorized people.
9. Never operate the loader in a closed shed or garage without proper ventilation.
10. Do not operate the loader or its controls from any position other than the operator's seat.
11. After the engine is started, observe the instruments for proper indications. Leave the parking brake set until at least 65 psi is indicated on air pressure gauge.
12. Test steer the loader for proper operation and braking.
13. Be extremely careful when working on banks or hillsides.

14. Operate at a safe speed, especially on a rough terrain.
15. Keep the loader bucket low enough to the ground for good visibility but high enough to clear obstacles when transporting loads.
16. Secure the safety bar in place before performing any service operations. See Figure 1.



Figure 1

Always lower the loader to the ground or block it securely before performing any service operation or when leaving the loader unattended.

**NOTE:** A set of loader lift cylinder safety stops can be fabricated from channel stock. Use the dimensions shown in Figure 2. To install, raise the loader to full height and position the stops over the rod end of the lift cylinders. Lower the loader into the stops.

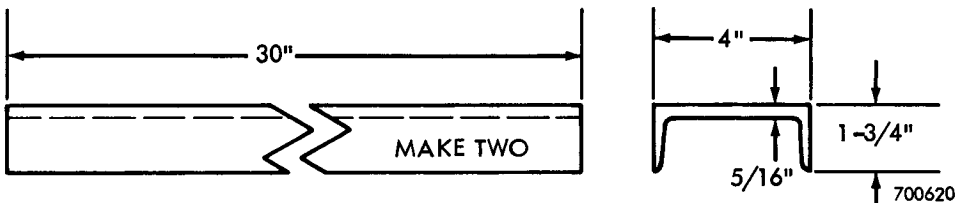


Figure 2

**REMEMBER,** a careful operator is always the best insurance against an accident.



## INTRODUCTION

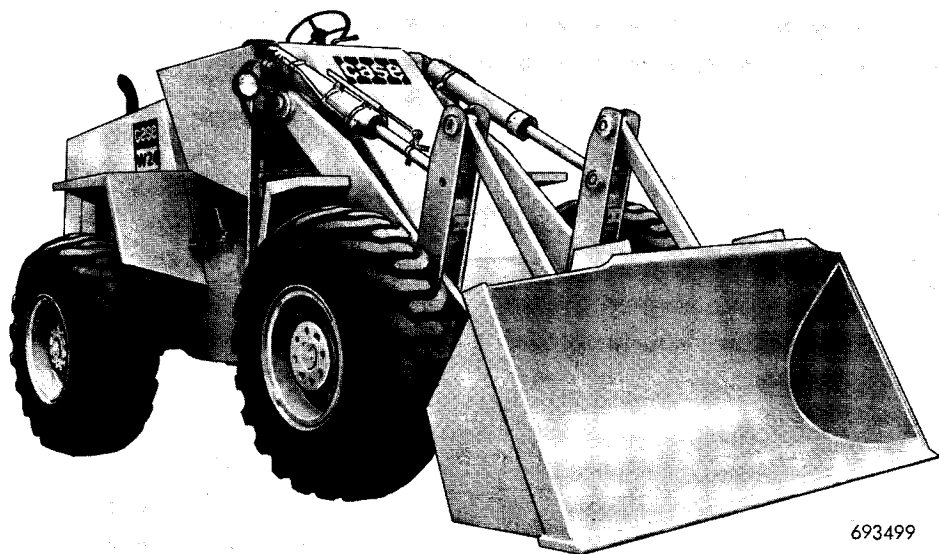


Figure 3

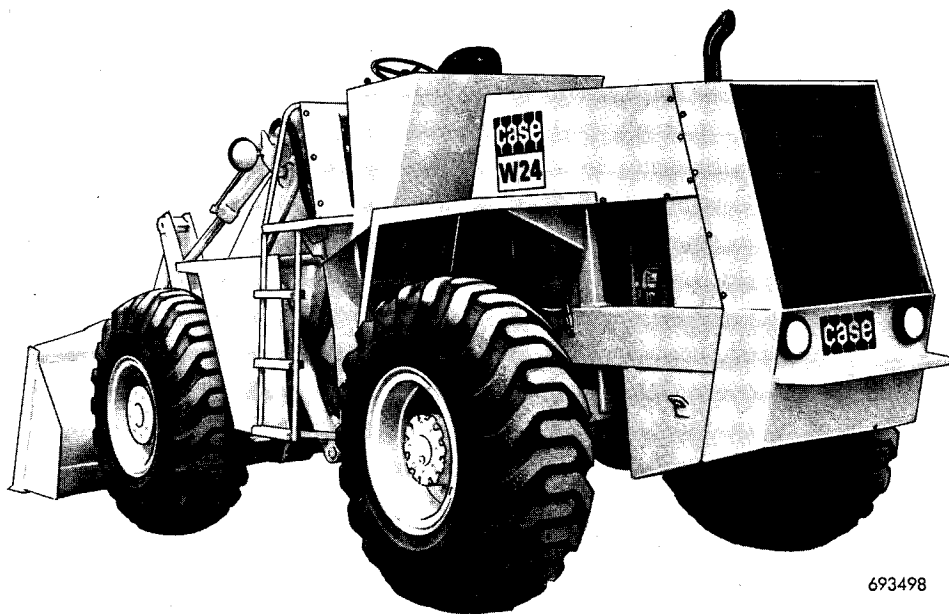


Figure 4

## **General**

To avoid confusion when following instructions in this manual. The use of "Right Hand" and "Left Hand" must be understood. "Right Hand" and "Left Hand" indicates the right and left sides of the machine when viewed from the operator's seat.

### **Serial Number Location**

**LOADER** - Below and between converter temperature gauge and clutch pressure gauge.

**ENGINE** - Left side of cylinder block, above starter motor.

**TRANSMISSION** - Lower right side of transmission case. Note: Serial, Model and Part Numbers are listed. When ordering parts or requesting information, be sure to include all three numbers.

**FRONT AND REAR AXLE** - Before Serial Number 9105061 - plate attached to axle housing. Serial Number 9103061 and after - plate attached to carrier assembly.

For convenient reference, fill in Model Number and Serial Numbers in the spaces below.

**LOADER** \_\_\_\_\_

**ENGINE** \_\_\_\_\_

**TRANSMISSION: Serial** \_\_\_\_\_

Model TT 2420-1

Part \_\_\_\_\_

**FRONT AXLE** \_\_\_\_\_

**REAR AXLE** \_\_\_\_\_

## ENGINE

Type	6 Cylinder, 4 Stroke Cycle. Valve-In-Head Diesel Engine.
Firing Order	1-5-3-6-2-4
Bore	4-5/8" (117 mm)
Stroke	5" (127 mm)
Piston Displacement	504 cu. in. (8259 cm <sup>3</sup> )
Compression Ratio	16.5 to 1
Oil Pressure	45-55 lbs. (20-25 kg)
Maximum Rated Horsepower	
1 (Gross)	140 @ 2200 rpm
2 (SAE Net)	125 @ 2200 rpm
Engine Speeds	
Governed - No Load	2315 to 2365 rpm
Rated - Full Load	2200 rpm
Low Idle	725 to 775 rpm
Valve Clearance	Intake .015 Cold (.381 mm) Exhaust .025 Cold (.635 mm)

1. Manufacturer's rating of maximum engine horsepower at fly-wheel when equipped with oil and water pumps. Fuel set at maximum quantity for the application. Corrected to sea level -29.92" Hg. and 60° F. dry air.
  2. SAE net flywheel horsepower of engine as applied to this vehicle when equipped with operating accessories including oil and water pumps, alternator, air cleaner, fan and muffler. Corrected to 500' altitude with .38" Hg. vapor pressure (29.38 Hg. observed barometer) and 85° F. air (per SAE J816a).
- Diesel Fuel Recommendation . . . . . No. 2

## COOLING SYSTEM

Thermostat	Starts to Open at Approximately 179° F. (79° C) Fully Open at 202° F. (94° C)
Radiator Pressure Cap	7 psi (.49 kg/cm <sup>2</sup> )
Operating Temperature	202° F. to 230° F. (94° C. to 110° C.)

## ELECTRICAL SYSTEM

Type of System ..... 24 Volt Negative Ground  
Batteries ..... (2) 12 Volt Connected in Series  
155 Ampere Hour, 21 Plates  
Head Lights ..... 24 Volt, 60 Watt, Sealed Unit, GE4578  
Rear Working Lights ..... 24 Volt, 60 Watt, Sealed Unit, GE4578  
Stop and Taillight ..... 24 Volt, GE1683  
Instrument Panel Light ..... 24 Volt, GE1850  
Ignition Indicator Light ..... 24 Volt, GE1819

## HYDRAULIC SYSTEM

Pressurized System .....  $16 \pm 3$  psi @750 rpm  
 $1,1 \pm ,2$  kg/cm<sup>2</sup> @750 tr/mn  
Pump ..... Dual Stage, Gear Type, Converter Driven,  
48 gpm @2200 rpm @2000 psi  
182 l/mn @2200 tr/mn @ 141 kg/cm<sup>2</sup>  
Reservoir ..... Pressurized with Dipstick, Three Full Flow  
Outlet Filters and One Inlet Screen.  
Relief Valve Pressure Setting ..... 1900 to 2200 psi @2200 rpm  
134 to 155 kg/cm<sup>2</sup> @2200 tr/mn

## STEERING SYSTEM

Type ..... Center Pivot Articulated  
Steering Cylinders (2) ..... Double Acting  
Steering Hydraulic Pump (Rear  
Section of Dual Pump) ..... 23 gpm @2200 rpm @2000 psi  
87 l/mn @2200 tr/mn @141 kg/cm<sup>2</sup>

## TRAVEL SPEEDS

mph (km/hr) with 17.5 x 25 Tires

	1st	2nd
Forward	6 (9,7)	23 (37)
Reverse	8 (13)	

## TIRES

SIZE	PLY	TYPE	PRESSURE
17.5 x 25	12	Rock Tread	50 P.S.I.
20.5 x 25	12	Rock Tread	40 P.S.I.
17.5 x 25	12	Traction Tread	50 P.S.I.
20.5 x 25	12	Traction Tread	45 P.S.I.

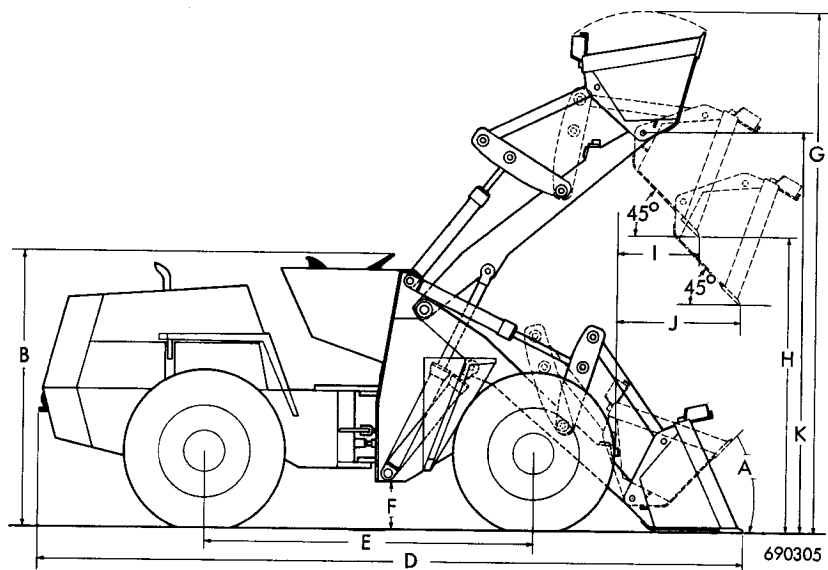
## CAPACITIES

Fuel Tank . . . . .	58 Gallons (230 litres)
Engine Crankcase	
Without Filter Change . . . . .	12 Quarts (11 litres)
With Filter Change . . . . .	13 Quarts (12 litres)
Axles - Before Serial Number 9105061	
Front Axle . . . . .	31 Pints (15 litres)
Rear Axle . . . . .	29 Pints (14 litres)
Axles - Serial Number 9105061 And After	
Front and Rear . . . . .	52 Pints (25 litres)
Transmission and Torque Converter . . . .	9 Gallons ( 39 litres)
Cooling System . . . . .	27 Quarts (26 litres)
Hydraulic Reservoir, Refill . . . . .	20.8 Gallons (76 litres)
Steering Gear Housing . . . . .	2.5 Pints (1 litre)

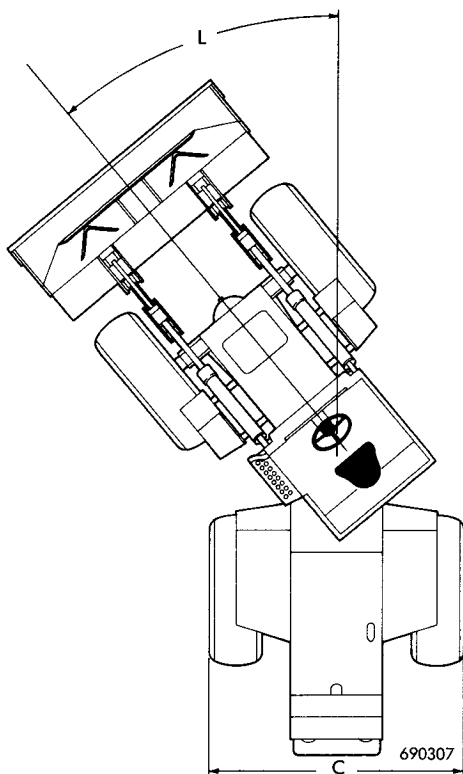
## APPROXIMATE SHIPPING WEIGHT

Standard Loader Models . . . . .	22,900 lbs. (10 387 kg)
----------------------------------	-------------------------

# **LOADER WITH STANDARD BUCKET**



**Figure 5**



**Figure 6**

## Operating Data

*Breakout Force, Pivot 25" From Lip of Bucket . . .	34,600 lbs. 16 694 kg
*Tipping Load at Maximum Reach, Straight . . . . .	16,900 lbs. 7666 kg
Tipping Load at Maximum Reach, 40° Turn . . . . .	15,100 lbs. 6849 kg
*Hydraulic Lift Capacity at Ground Level . . . . .	22,000 lbs. 9979 kg
*Maximum Lift Capacity at Maximum Height . . . . .	11,900 lbs. 5398 kg
*Operating Load, Straight . . . . .	8,450 lbs. 3833 kg
*Digging Depth, Bucket at 10° Angle . . . . .	11-1/2" 292 mm
*Raising Time to Full Height, Bucket Empty . . . . .	7 Sec.
*Lowering Time from Full Height	
Power Down, Bucket Empty . . . . .	4 Sec.
Float Down, Bucket Empty . . . . .	4.4 Sec.
*Dumping Time, Bucket Full . . . . .	2.8 Sec.
Grading Angle . . . . .	60°
*Bucket Rollback at Full Height . . . . .	69°
A *Bucket Rollback at Ground Level . . . . .	46°
*Bucket Rollback at 36" Carry . . . . .	32°

## Dimensions

B *Height to Top of Steering Wheel . . . . .	8' 9" (2667 mm)
C *Overall Width - 20.5 x 25 Tires . . . . .	100" (2540 mm)
D *Overall Length, Bucket on Ground . . . . .	22' 2-1/2" (6769 mm)
E *Wheel Base. . . . .	121-1/2" (3086 mm)
*Tread - 20.5 x 25 Tires . . . . .	79" (2007 mm)
F *Ground Clearance At Lift Cylinder Anchor . .	12-1/4" (311 mm)
*Turning Clearance Circle . . . . .	39' 10" (14 656 mm)
G *Overall Operating Height . . . . .	15' 9" (4801 mm)
*Maximum Dump Angle, Fully Raised. . . . .	54°
H *Dump Clearance at Maximum Height, 45° Dump. . . .	8' 10-1/2" (2705 mm)
I *Dump Reach at Maximum Height, 45° Dump. .	3' 2-1/2" (998 mm)
J *Dump Reach at 7' Dump Height, 45° Dump . . .	4' 6" (1372 mm)
K *Height to Bucket Hinge Pin . . . . .	12' 1-1/2" (3696 mm)
L *Turning Angle . . . . .	40°
*Frame Oscillation . . . . .	23°

\*Specifications conforming to SAE or IEMC.

**NOTE:** All specifications taken with the 2-1/2 (1,9 cm<sup>3</sup>) cu. yd. bucket and 17.5 x 25 - 12 ply tires.



## Buckets

SAE Nominal Heaped	Struck	Width
2 cu. yd. (1,5 m <sup>3</sup> )	1.6 cu. yd. (1,2 m <sup>3</sup> )	96" (2438 mm)
2-1/2 cu. yd. (1,9 m <sup>3</sup> )	2.0 cu. yd. (1,7 m <sup>3</sup> )	96" (2438 mm)
*2-1/2 cu. yd. (1,9 m <sup>3</sup> )	2.0 cu. yd. (1,7 m <sup>3</sup> )	104" (2642 mm)
3 cu. yd. (2,3 m <sup>3</sup> )	2.6 cu. yd. (2 m <sup>3</sup> )	104" (2642 mm)
4 cu. yd. (3,1 m <sup>3</sup> )	3.5 cu. yd. (2,7 m <sup>3</sup> )	104" (2642 mm)

\*Standard bucket

## Hydraulic Cylinders

Lift Cylinders - Double Acting	..... 5" dia. x 34-1/4" stroke
	127 mm dia. x 870 mm stroke
Tilt Cylinders - Double Acting	.. 4-1/2" dia. x 29-1/2" stroke
	114 mm dia. x 749 mm stroke
Steering Cylinders - Double Acting	.. 3" dia. x 18-1/4" stroke
	76 mm dia. x 464 mm stroke

**MOST HYDRAULIC PROBLEMS ARE CAUSED BY  
CONTAMINATED OIL!**

**Keep The Oil Clean**

1. Clean the filler cap area before checking oil level.
2. Use a clean funnel and container when adding oil.
3. Clean exterior of components, lines, and fittings before removal.  
Close openings with clean capplugs.
4. Make repairs on a clean work bench. Use clean tools.
5. Change oil and service the filter(s) when making repairs.

**NOTE:** If drained oil is reused, it should be filtered before reinstalling in the reservoir.

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## **RUN-IN PROCEDURE**

Careful attention must be given to the proper "run-in" procedure. Piston rings and cylinder sleeves may be damaged in a new engine if "run-in" instructions are not followed. The following procedure is recommended.

**LOAD:** For the first 50 hours, maintain a normal load. Do not baby the engine, but under no condition "lug it". The engine must not be "lugged" down below its full governed engine speed.

**ENGINE SPEED:** During the "run-in" period always operate the engine at full governed rpm (throttle wide open). Avoid idling at reduced speed.

**OPERATING TEMPERATURE:** Maintain temperature at recommended levels. Low operating temperatures contribute to the formation of destructive acids and harmful deposits in the engine.

**CRANKCASE OIL:** Drain "run-in" oil and remove the crankcase filter after the first 20 hours operation. Install a new filter cartridge and refill crankcase with the recommended grade of oil.

An engine that has been operating under load should idle a few minutes before stopping. This allows the engine parts time to cool evenly.

## INDICATORS AND CONTROLS

Refer to Figure 7

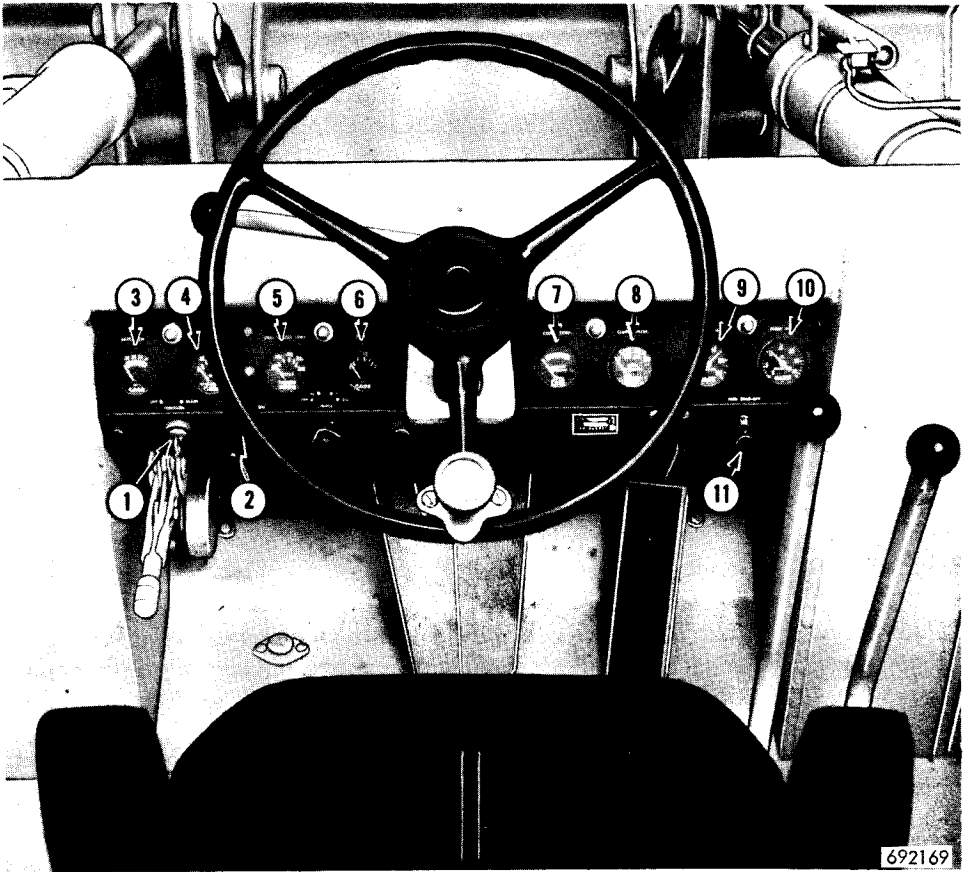


Figure 7

1. **KEY SWITCH** - Combination four position switch. The four positions are Accessory, Off, Run and Start. The Loader will not start without the key.
2. **IGNITION INDICATOR LIGHT** - Indicates positive electrical current in system with key switch in run position whether engine is operating or not. If light, fails, check light bulb or electrical system for trouble.
3. **VOLTMETER** - Indicates state of battery. Operating zone is Green at 26 Volts. Yellow zone indicates electrical trouble which is less than 25 volts, and red zone is danger zone. If needle appears in either yellow or red zone, investigate.

4. **ENGINE OIL PRESSURE GAUGE** - The engine oil pressure gauge should register between 45 to 55 psi when the engine is warm and running at full governed speed. When low or no oil pressure is indicated, stop the engine and check for the cause of low oil pressure.
5. **ENGINE TEMPERATURE GAUGE** - This gauge indicates the coolant temperature. The normal operating temperature is between 202° F. and 230° F.
6. **FUEL GAUGE** - Indicates amount of fuel in the fuel tank.
7. **TORQUE CONVERTER TEMPERATURE GAUGE** - Indicates operating temperature of the oil in the torque converter. The gauge needle should register in the green zone on the gauge. If gauge needle enters red zone, place transmission in neutral and idle engine until gauge needle returns to green zone. One of the causes of converter oil overheating is operating too long at stall speed.
8. **CLUTCH PRESSURE GAUGE** - Indicates hydraulic clutch operating oil pressure. The gauge needle should register between 145 psi and 180 psi unless the brakes are applied. The gauge will register zero until the brake pedal is released. If the needle should (a) drop out of or (b) not reach, or (c) goes over the normal operating range, stop loader and determine cause.
9. **AIR PRESSURE GAUGE** - The air pressure gauge indicates pressure in the main air reservoir. During normal operation the reading will vary between 86 and 110 psi.
10. **PUMP INLET PRESSURE GAUGE** - Indicates the pressure of the hydraulic oil as it enters the hydraulic pump. The gauge should read 12-14 psi during operating of the loader. At idling speed, 750 rpm, the gauge will indicate a higher pressure, 16 psi  $\pm$  3. If the gauge does not indicate a pressure of 13-19 psi shortly after starting engine, check the air valve at the hydraulic reservoir and make sure it is open. If the air valve is open and the proper pressure is not indicated, see your Authorized Case Dealer.
11. **FUEL SHUT-OFF CONTROL** - Release accelerator pedal, pull shut-off control out and turn key to OFF position to stop engine.

## **INDICATORS AND CONTROLS**

### **Refer to Figures 8 & 9**

1. **PARKING BRAKE** - Pull handle up to engage parking brake when stopped on an incline or when operator leaves the loader. For adjustment, refer to page 55.
2. **BUCKET HEIGHT CONTROL** - A control which allows the operator to select one of three maximum bucket heights. For complete instructions, refer to page 21.
3. **HORN BUTTON** - Located on floor board on the left hand side of compartment and operated by pressing with foot.
4. **LIGHT SWITCH** - Turn light switch to 2nd position to turn front lower flood lights and taillights on. Turn switch to 3rd position for upper and lower front lights and taillights. Turn switch to 4th position to turn upper and lower front lights and rear flood lights on with no taillights. Instrument panel lights are on in 2nd, 3rd and 4th positions. Turn to 1st position for OFF.
5. **COLD START BUTTON** - For quicker starting in cold weather. Refer to Manifold Heater on page 23 for instructions.
6. **BRAKE PEDAL** - Depress brake for braking action and operation of the clutch cut-out valve.
7. **ACCELERATOR PEDAL** - Depress pedal to increase engine speed and release pedal to decrease engine speed.
8. **FUEL PRESSURE GAUGE** - Indicates when fuel filters should be serviced. The gauge needle will be in the green zone when filters are in satisfactory condition. When the needle drops into the red zone the filters must be replaced.
9. **TACHOMETER AND HOUR METER** - Indicates engine speeds in revolutions per minute. Revolutions per minute is indicated in 50 rpm steps. Hour meter records average engine hours at an average engine rpm in hours and tenths of hours.
10. **AIR CLEANER SERVICE INDICATOR** - When the red signal appears in full view in the restriction indicator the air cleaner must be serviced immediately. To reset, push reset button in and release. When the green signal appears after the engine has been started, it indicates the air cleaner has been properly serviced. Refer to page 43 for service information.

Figure 9

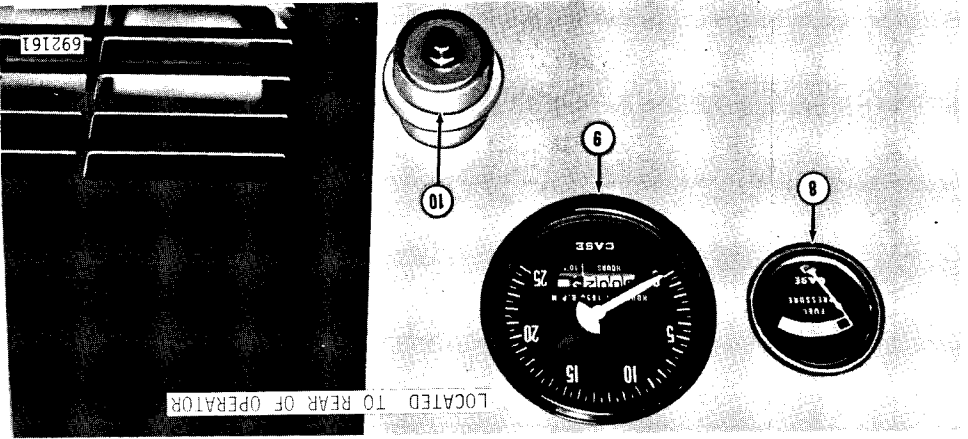
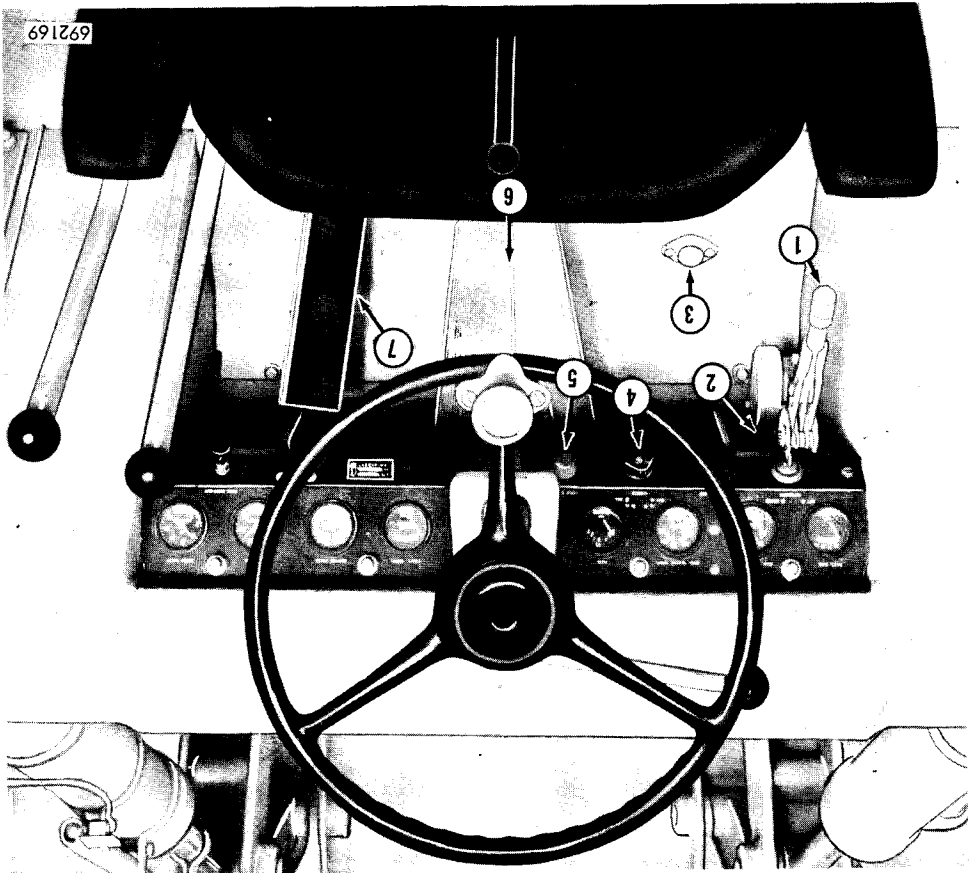


Figure 8





## INDICATORS AND CONTROLS

Refer to Figure 10

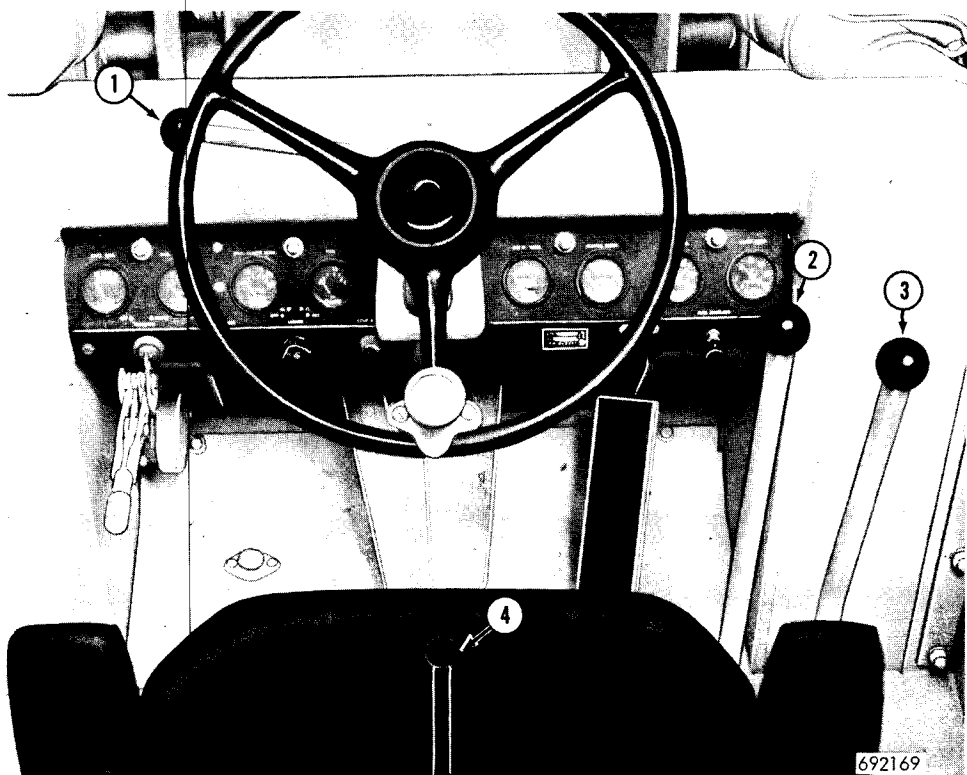


Figure 10

**CAUTION:** The loader must be stopped before making a shift to change directions. Do not down shift if loader speed exceeds low range maximum travel speed.

1. **DIRECTIONAL SELECTOR AND RANGE LEVER** - From neutral position, push lever up to move loader in forward direction. To move loader in a rearward direction, pull lever down. For high range lift lever upwards and then push lever fully forward.
2. **TILT CONTROL LEVER** - The tilt control lever controls the dumping and rollback actions of the bucket. Refer to page 19.
3. **LIFT CONTROL LEVER** - The lift control lever controls the lifting and lowering of the bucket. Refer to page 19.
4. **SEAT CONTROL LEVER** - Pull the seat control lever to the left, adjust seat to desired position and release lever to lock.

# LOADER CONTROLS

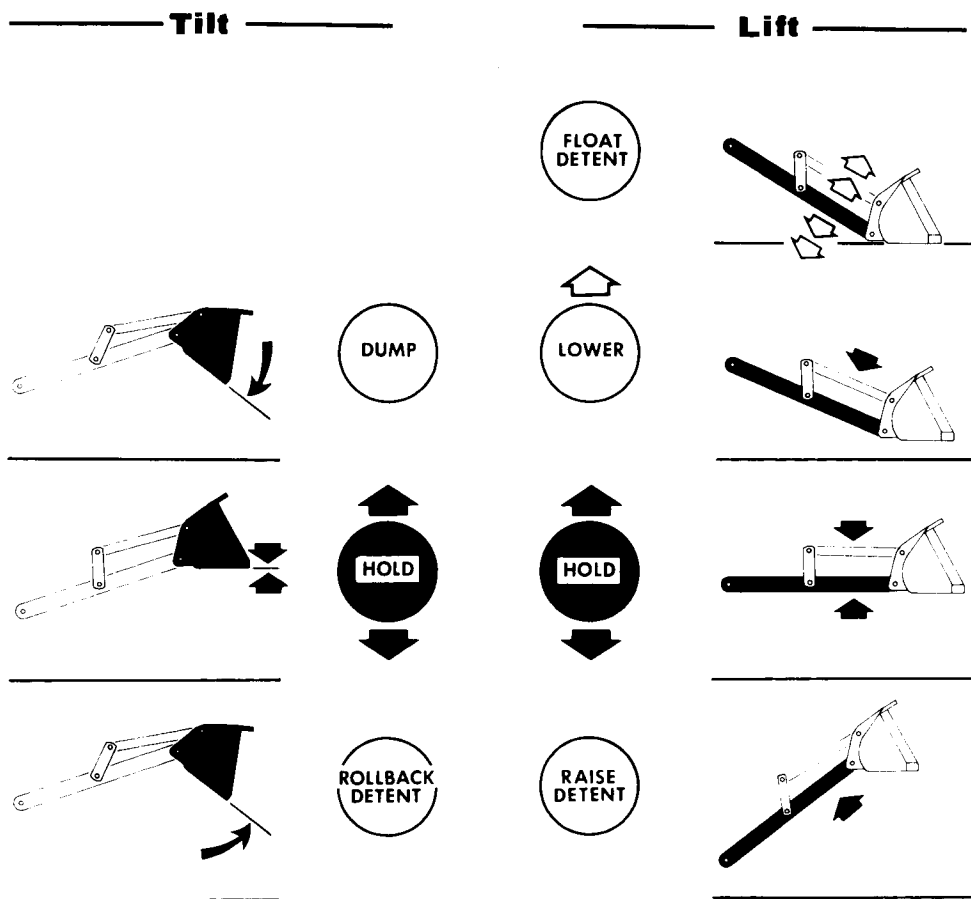


Figure 11

The **FLOAT**, **RAISE** and **ROLLBACK** positions are detented positions. That is, the control lever is retained in the position selected.

The control levers, when placed in the **RAISE** or **ROLLBACK** detent positions, will be automatically returned to the **HOLD** position by electric solenoids. However, the lift control lever must be manually returned to **HOLD** from the **FLOAT** position.

When the control lever is placed in the **FLOAT** position, the bucket is free to follow the contour of the ground.

The tilt lever will not remain in the detent position when the bucket is level or rolled back from level.

## Return-To-Dig Feature

The bucket may be returned to the digging position after dumping automatically, thus allowing the operator to concentrate on maneuvering the machine.

After the bucket has been dumped, push the lift control lever forward into the FLOAT detent position and pull the tilt control lever back into the ROLLBACK detent position. The bucket will lower and return to the digging position automatically.

At the end of the cycle, the tilt control lever will return to HOLD, however, the lift control lever must be moved manually to HOLD.

### Adjustment

1. With bucket flat on floor, make sure actuating rod clamp is positioned as shown in Figure 12.

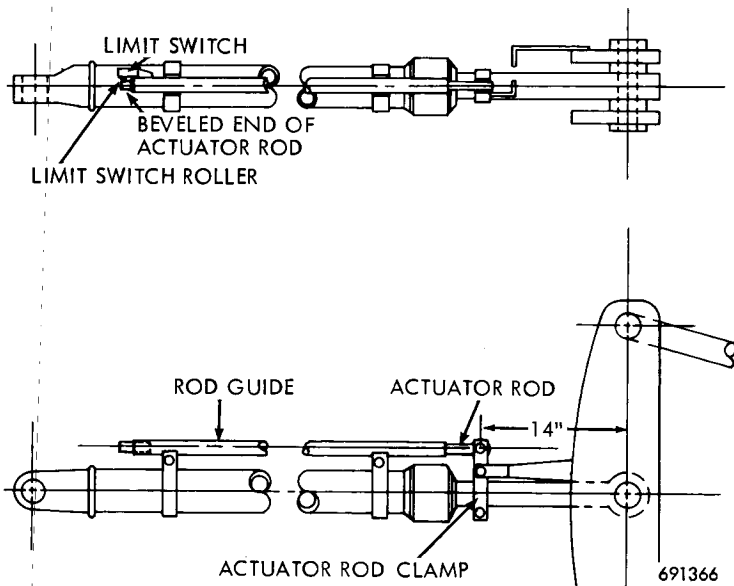


Figure 12

2. Loosen rod guide clamps and position rod guide on tilt cylinder until the limit switch roller just touches the actuating rod.
3. Move rod guide forward until the limit switch clicks and tighten clamp bolts. Make sure actuating rod is centered in rod guide to prevent binding and excessive wear.

4. To check adjustment:

- a. Raise bucket to full height and dump bucket.
- b. Place the tilt control lever in rollback detent position and the lift control lever in the float position.
- c. When the bucket touches the floor it should be level.

### Bucket Height Control

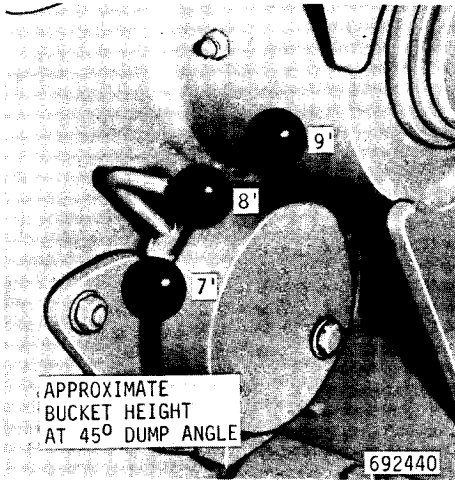


Figure 13

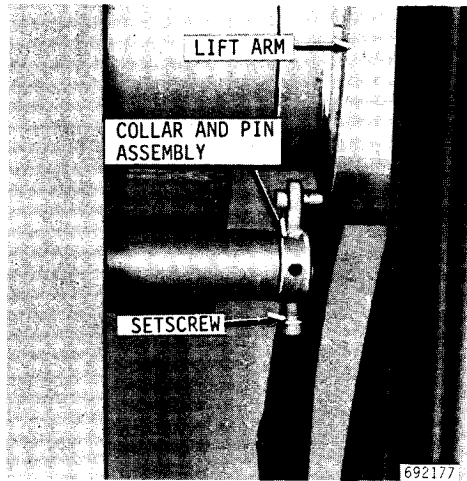


Figure 14

The bucket height control is a convenience for the operator, permitting a set and faster work pattern. There are three bucket positions with a difference of approximately 12" between each position. To select the highest possible bucket height push control lever forward. To select the lowest possible bucket height pull control lever all the way rearward. As the bucket raises, the left hand lift arm operates the actuating rod that closes the limit switch. This in turn actuates the float spool solenoid, returning the lift control lever to HOLD from the RAISE position.

### Adjustment

Raise the bucket to desired maximum height and block in this position. Push bucket height control lever all the way forward. Loosen the Allen head set screw, Figure 14, and rotate the collar and pin assembly until contact is made with the pin on the lift arm. Tighten set screw. Operate bucket to check for proper operation.

## Bucket Position Indicator

A bucket position indicator, Figure 15, is located directly ahead and to the right of the operator and is in his normal line of vision when operating the loader. When the indicators are even the bucket is in a level position.

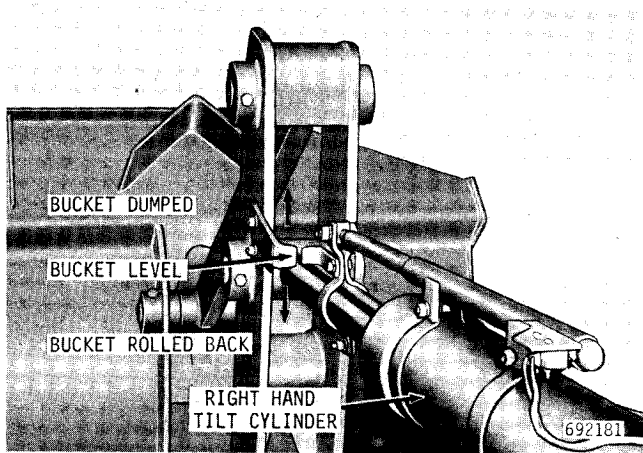


Figure 15

## ENGINE OPERATION

Before starting the engine, set the parking brake, place the transmission control in neutral and be sure that the fuel shut-off knob is pushed in.

1. Depress the foot throttle half way down and turn the key switch clockwise to engage the starter.

**NOTE:** If the engine fires and stops, wait for the starting motor to stop spinning before re-engaging.

2. Do not use the starting motor longer than 30 seconds at one time. Wait at least (3) three minutes so the batteries can recuperate the starting motor can cool.

While the diesel engine is being turned over with the starter, white or black exhaust smoke should be observed. If none is observed and the engine will not start, it is an indication that no fuel is being delivered to the cylinders.

3. Immediately check the oil pressure gauge for low or no oil pressure. Shut down the engine if none is indicated.

## Starting Aids

### Manifold Heater

To start the diesel engine at temperatures near freezing or below it may be necessary to use the manifold heater. Normally the manifold heater will aid cold weather starting above 10° F. For temperatures below 10° F., see Cold Weather Starting Fluid.

The manifold heater is located in the air intake manifold. It heats the air before it enters the combustion chamber. The manifold heater is activated by pressing the cold start button located on the instrument panel.

The heater should be activated one minute initially. Then crank the engine for a maximum of 5 seconds. If the engine does not start, heat for 30 seconds and crank 5 seconds for each cycle thereafter.



**WARNING:** Crank the engine 5 seconds before attempting to use the manifold heater if cold weather starting fluid has been used.

### Cold Weather Starting Fluid



**WARNING:** Wait 10 minutes before using starting fluid if the manifold heater has been used.

Proceed as follows when using starting fluid:

1. Place the controls in neutral and set the parking brake.
2. Spray starting fluid into the intake weather cap.
3. At the same time, engage starter until engine starts. See Engine Operation on page 22.

### Coolant Heater

The engine cylinder block is provided with a passage for installing a coolant heater plug. The passage is located on the right-hand rear side of the engine, and just to the right of the engine serial number plate. The coolant heater kit can be purchased from your Authorized Case Dealer.

To install the coolant heater, partially drain coolant from radiator and cylinder block, remove the cup plug by punching a hole in it and pulling the plug out. Do not use a drill on the plug. Follow the heater manufacturer's instructions for installation. Replace coolant.

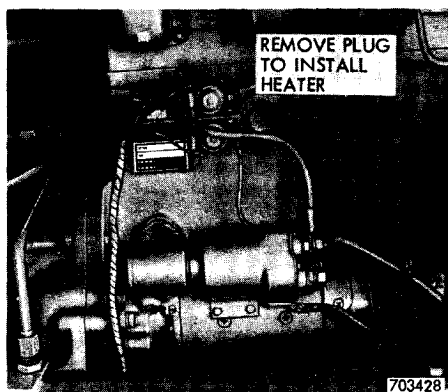


Figure 16

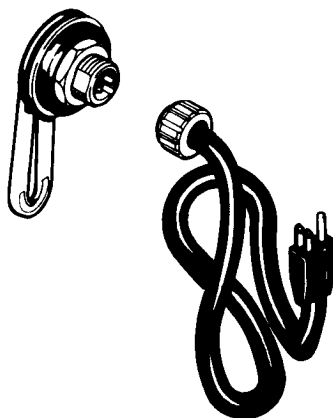


Figure 17

### **Hot Weather Operation**

Observe the following precautions to assure efficient and trouble free operation during periods of hot weather.

1. Follow the lubrication and maintenance schedule carefully.
2. Check the coolant level at frequent intervals. Keep the radiator pressure cap tight.
3. Keep the radiator core free of foreign matter.
4. Check the air cleaner condition indicator frequently when operating in dusty conditions.

### **Cold Weather Operation**

Observe the following precautions to assure efficient and trouble free operation during cold weather.

1. Keep the batteries fully charged. At 0° F. a fully charged battery is reduced to 40% efficiency.
2. Follow the lubrication and maintenance schedule carefully. Use lubricants of the grade and viscosity specified in this manual.



3. Use an ethylene glycol base permanent antifreeze in cooling system.
4. Keep fuel tank full to aid in the prevention of fuel tank condensation. A diesel fuel conditioner can be obtained from your Case dealer.
5. Maintain normal engine operating temperature. See Engine Idling below.
6. The following suggestions are offered for use in extreme cold.
  - a. Remove batteries and store in a warm place. Always store batteries on wood and not concrete. Reinstall batteries just before placing loader into service.
  - b. Drain crankcase oil while warm and store in a warm place. If possible, preheat oil to about 100° F. before reinstalling in engine.

### **Engine Idling**

During long engine idling period, the engine coolant temperature will fall below the normal operating range. Incomplete combustion in a cold running engine causes crankcase oil dilution, formation of lacquer and gummy deposits on valves, pistons and rings. Rapid accumulation of crankcase sludge will result.

Operate at 2/3 throttle when prolonged engine idling is necessary.

### **Engine Stopping Procedure**

Apply parking brake and place all controls in neutral. Idle the engine for a few minutes before stopping engine to allow slower and more even cooling of engine parts. Turn the key switch to the OFF position and pull shut-off control out. After the engine has stopped, push shut-off control in.

## **Towing**

**CAUTION:** The loader can be towed at slow speed for a distance not greater than 1/2 mile. (If loader is to be towed in excess of 1/2 mile, the front and rear axle drive shaft must be disconnected. The reason for disconnecting the transmission from drive line is to prevent damage to the upper bearings and shafts that do not receive lubrication when the engine, converter and charging pumps are inoperative). Disconnect front pins from steering cylinders and tie together for better tracking when towing. **USE A RIGID TYPE COUPLER WHEN TOWING.** Do not try to start loader by towing.

## **GENERAL**

Keep the machine serviced and in top running condition at all times. A few minutes of preventive maintenance will save hours of down time. Use the proper attachments and extra equipment available for specialized applications. Above all, know your machine thoroughly.

Review the following tips on operating techniques. They'll help you move more yardage with less wear on the machine and less effort for you.

### **Job Layout**

- A. Set up the work cycle as short as possible. Proper spotting of the truck is very important for efficient operation.
- B. Spend a few minutes leveling off the work area, if necessary. Smooth runways for the machine and a level parking area for trucks will speed up the job.
- C. Keep transport distances as short as possible; less transport makes a shorter work cycle.

### **Filling the Bucket**

- A. Set the bottom of the bucket level or parallel to ground for loose materials. You may use the sight level gauge or allow the Return to Dig Feature to return the bucket to a level or digging position.
- B. Don't have the bucket tilted back from level position. This causes a lifting force as the bucket enters material and reduces crowding action.
- C. Don't "cowboy" the machine by hitting the bank or pile too hard or fast. This is hard on man and machine.
- D. Coordinate tilt of bucket so bucket fills gradually as it "walks" its way up the pile in loose material.
- E. In packed or hard material, coordinate the bucket controls to fill the bucket in a continual arc.

- F. Don't try to fill the bucket completely at the bottom of the bank or pile. This overloads or stalls the hydraulic system and wastes time.
- G. Don't sit and spin the wheels when crowding the bank. As the bucket is pushed into the bank, under full engine power, the transmission increases torque output until maximum efficiency is reached. At this point the engine will be running at the stall speed. Apply the brakes. This will interrupt the flow of power to the wheels and allow the engine R.P.M. to increase for more efficient hydraulic operation.

### **Transporting**

- A. Keep bucket low when backing out and carrying. This provides best stability, particularly when backing up a ramp or incline.
- B. Don't back out with the bucket fully raised. Stability is reduced and steering traction is lowered.

### **Emptying the Bucket**

- A. Approach the dump area with the bucket at proper dumping height, decelerate and brake. Push the tilt control forward and pull the directional selector and range lever downward, accelerate. This will throw the load out of the bucket. Use extreme care and plenty of practice to perfect this method of emptying the bucket.
- B. If sticky material packs in bucket corners, raise the bucket to full height and rapidly move the tilt lever back and forth to rap the bucket.

### **Truck Loading**

- A. Keep the wind to your back for dumping into a truck. This eliminates a chance of dust and loose material blowing into your face and impairing visibility. This also reduces engine air cleaner maintenance.
- B. Start raising the bucket so it will just reach dumping height at the time you arrive at the dump area.
- C. If one side of the truck is lower than the other, try to spot the truck so you dump over the low side. This improves reach and distribution of the load in the truck.

- D. Reach over and dump into the far side of the truck first. Fill the truck gradually from the far side to the near side in order to distribute the load in the truck properly.

**PERCENTAGE OF EARTH SWELL**

Payments for earth work are generally made on the basis of measurements of solid or compacted material. The terms "Pay Load", "Bank Measure", "Compact Measure", generally refer to quantity of earth as measured in the cut before it is loosened. Since loaders, scrapers and other pieces of equipment handle earth after it has been loosened, it is necessary to know the pay load hauled per trip.

The difference between the volume occupied by the material after it is loosened and that occupied in its original compact form is called the "Swell" and is expressed in terms of percentage of the original volume occupied. Thus, if a cubic yard of solid rock occupies 1-1/2 cubic yards of space after it has been blasted, we would say that the swell is .5 or 50 percent. The following table gives the generally accepted percentages of swell for different classes of material.

**Percentage of Swell in Different Classes**

MATERIAL	PERCENT OF SWELL
Clean Sand or Gravel . . . . .	5 to 15
Top Soil . . . . .	11 to 20
Loam . . . . .	17-1/2
Good Common Earth . . . . .	24 to 35
Clay with Sand or Gravel . . . . .	30 to 45
Clay - Light and Friable . . . . .	35 to 55
Clay - Hard and Tough . . . . .	42 Hard Lump to 62 with rocks or roots.
Shale and Soft Rock . . . . .	50 to 73
Hard Rock . . . . .	56 Well blasted to 98 poorly blasted.

## **APPROXIMATE WEIGHTS OF COMMON MATERIALS IN POUNDS PER CUBIC YARD**

Ashes and Cinders .....	700 - 1200
Asphalt .....	2700
Average Crushed Stone .....	2300 - 2800
Clay	
Dry - Loose .....	1700 - 2300
Wet .....	2900
Clay and Gravel (dry) .....	2700
Coal (Broken)	
Anthracite .....	1400 - 1550
Bituminus .....	1300 - 1500
Coke .....	600 - 850
Concrete - Mix, wet .....	3500 - 3750
Common Earth	
Loose - Dry .....	1950 - 2150
Packed - Moist .....	2400 - 2700
Wet Packed .....	2950 - 3500
Gravel	
Dry .....	2700 - 3240
Wet .....	3200
Iron Ore (Broken) .....	3600 - 550
Limestone (Broken) .....	2500 - 2700
Rock Salt .....	3650
Sand	
Dry - Loose .....	2400 - 2850
Moist - Loose .....	3250
Sand and Gravel .....	2800 - 3200

# FUEL

## Number 2 Diesel Fuel

Case diesel engines are designed to operate most efficiently with No. 2 diesel fuel. Most well known refiners and distributors market a good grade of diesel fuel and there should be no difficulty in obtaining it.

Do not confuse No. 2 diesel fuel with No. 2 furnace oil which is similar but does not always meet specifications for diesel engines.

**CAUTION:** No. 1 diesel fuel is not recommended for normal operating conditions. This is a lighter fuel which can result in loss of engine power, increase fuel consumption, and lessened injection pump life.

## Fuel Specifications

There can be considerable variation in diesel fuels marketed as No. 2. The American Society for Testing Materials (ASTM) has established a widely recognized specification, ASTM Designation D975, which is used in the United States, Canada, and many other areas of the world. Any fuel purchased for use in a Case engine should meet this ASTM specification.

However, there is not a world-wide standardization of diesel fuels and ASTM specifications are not used everywhere. Following are the most important specifications of an acceptable diesel fuel:

Pour point, maximum	10° F. below lowest atmospheric temperature at which engine must start and operate.
Cetane number, minimum	40 (45-55 for winter or high altitudes).
Sulphur, by weight, maximum	.50 of 1%
Water and sediment, by volume, maximum	.05 of 1%
Ash, by weight, maximum	.01 of 1%
Carbon residue on 10%, maximum	.20 of 1%
Distillation, 90% point	540° - 625°
End point	675°
Flash point, minimum	125° or legal
Viscosity, centistokes at 100° F.	2.0 - 4.3
Saybolt Universal Seconds at 100° F.	32 - 40
Corrosion, copper strip, 3 hours at 212° F.	No. 3 ASTM
API gravity, minimum	30

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## **Storing The Fuel**

The importance of proper fuel storage cannot be stressed too highly. Many engine difficulties can be traced to dirty fuel and fuel that has been stored too long. To keep the fuel system in its most efficient condition, keep all dirt, scale, water and other foreign matter out of the fuel. Avoid storing fuel for a longer period of time.

Fuel should be stored in a convenient place outside of buildings. If stored in a tank, regular syphoning of condensed water must be accomplished. If barrel storage is used, avoid upright placement. Position the barrel horizontally, with the outlet end raised a few inches higher than the base. This will allow sediment and water to collect at the base.

## **Filling The Tank**

The fuel tank on your loader is located at the rear of the unit. The capacity of the fuel tank is 58 gallons. Always clean the filler neck area before removing the cap.

Fill the fuel tank at the end of each day's operation to prevent moisture from collecting and freezing in the fuel system. Clean the filler neck screen as required.

# LUBRICANTS AND FLUIDS

COMPONENT	CAPACITY		SPECIFICATIONS
	U.S.	LITRES	
Engine crankcase	12 qts.	11,3	CD - Commercial class D (Service D, Series 3) Mil-L 45199 Above 32° F. (0° C.) . . . . SAE 30 10° F. to 50° F. . . . . SAE 20W -12° C. to 10° C. Below 32° F. (0° C.) . . . . SAE 10W
Engine crankcase, with filter change	13 qts.	12,3	
Transmission	9 gal.	34	Case TCH Fluid Alternate oil Type A, suffix A automatic transmission oil Type C2 transmission and hydraulic oil
Axles - before S/N 9105061 Front Rear	31 pts. 29 pts.	15 14	Multipurpose gear lubricant SAE 90 (API-GL-4, MIL-L-2105B)
Axles - S/N 9105061 and after Front and rear	52 pts.	25	
Hydraulic reservoir	20.8 gal.	76	Case TCH Fluid Alternate oil Motor oil SD-Service class D or CA-Commercial class A (Service MS or DG) Above 32° F. (0° C.) . . . . SAE 10W Below 32° F. (0° C.) . . . . SAE 5W
Grease fittings			Below 32° F. (0° C.) Multipurpose or No. 1 lithium- soap base grease  Above 32° F. (0° C.) Multipurpose or No. 2 lithium- soap base grease
Cooling system	27 qts.	26	1/2 ethylene glycol base permanent antifreeze and 1/2 water protects to approximately -29° F. (-34° C.)
Brake system	As required		SAE J1703 brake fluid

# *maintenance/lubrication*

This section contains the routine and periodic maintenance information necessary to keep your machine in top operating condition. Following the maintenance chart is the easiest and most economical means of assuring many hours of satisfactory operation.

## **MAINTENANCE CHART**

INTERVAL	TYPE OF SERVICE	FLUIDS & LUBRICANTS	INSTRUCTIONS
Run-In Every 2 Hours	Check wheel bolt torque until stabilized. Torque 380 to 420 foot pounds. (Dry threads).		
Run-In After First 20 Hours	Change engine oil.  Replace engine oil filter	See page 33.	See page 38.  See page 39.
Every 10 Hours Or Daily	Grease the loader pivot points.  Check engine oil level.  Drain water from main air reservoir.  Drain water from auxiliary air reservoir.  Check radiator coolant level.	See page 33.	See page 36.  See page 38.
Every 60 Hours Or Weekly	Grease rear axle trunnion pivots.  Grease upper and lower hinge pins.  Grease steering cylinders.  Check hydraulic oil level.  Check transmission oil level.  Check battery electrolyte level.  Lubricate brake pedal.  Drain water from 1st stage fuel filter.	See page 33.  See page 33.  See page 33.      Distilled water.  Few drops engine oil.	See page 37.  See page 37.  See page 37.  See page 49.  See page 51.    See page 41.
Every 150 Hours	Change engine oil.  Grease all drive line grease fittings and plugs.  Grease pitman arm link.  Check brake master cylinders fluid level.	See page 33.  See page 33.  See page 33.  SAE J1703 fluid	See page 38.  See page 37.  See page 37.

INTERVAL	TYPE OF SERVICE	FLUIDS & LUBRICANTS	INSTRUCTIONS
Every 300 Hours	Replace engine oil filter.		See page 39.
Every 500 Hours	Check front and rear axle oil level.  Check steering gear box oil level.  Check fan belts and air compressor drive belt tensions.  Change hydraulic oil.  Replace hydraulic oil outlet filters (3).  Clean air baffle screen.  Clean hydraulic oil inlet screen.  Drain water from fuel tank.	See page 33.	See page 54.   See page 57. See page 50.  See page 50. See page 50. See page 50.
Every 1000 Hours	Clean transmission breather.  Clean transmission oil screen.  Replace transmission oil filter.  Change transmission and converter oil.  Change front and rear axle oil.  Remove air compressor cylinder head and clean (by Case dealer only).	See page 33.  See page 33.	See page 52. See page 52. See page 52.  See page 52. See page 54.
Every 3000 Hours	Rebuild or replace air compressor (by Case Dealer only).		
As required	Clean air cleaner filter element when indicator red band is showing.  Replace fuel filters when gauge is in red zone.  Remove and clean fuel tank filler screen.		See page 43.  See page 42.

## LUBRICATION POINTS

If the loader is operated in severe or abnormal conditions, reduce all time intervals by 1/2. Wipe all fittings clean before greasing. Clean grease must be maintained in all pivot points to insure long bearing life.

### Every 10 Hours

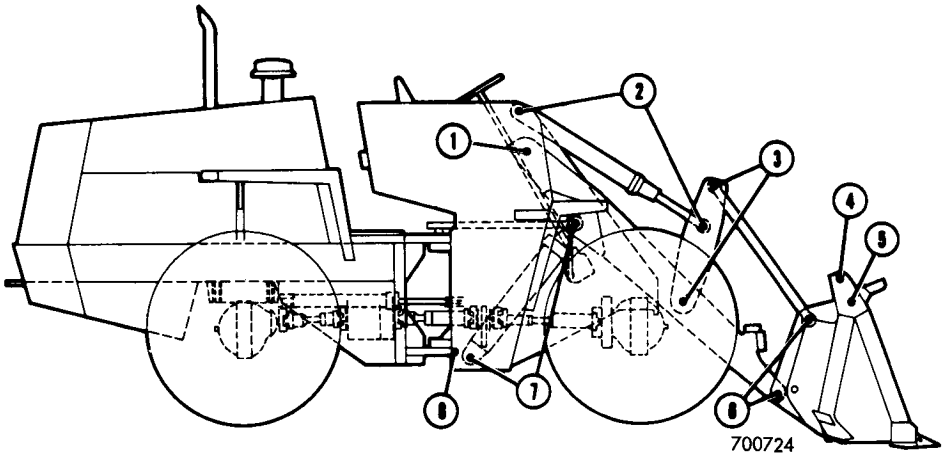


Figure 18

- |                                  |                                       |
|----------------------------------|---------------------------------------|
| 1. Lift arm pivots               | (2) one each side                     |
| 2. Tilt cylinders                | (9) four L.H. side and five R.H. side |
| 3. Tilt linkage                  | (1) five each side                    |
| 4. Drott clam cylinder (rod end) | (2) one each side                     |
| 5. Drott clam pivot              | (2) one each side                     |
| 6. Bucket pivot points           | (12) six each side                    |
| 7. Lift cylinder                 | (6) three each side                   |
| 8. Lift cylinder cross shaft     | (1) one in the middle                 |

## Every 60 Hours

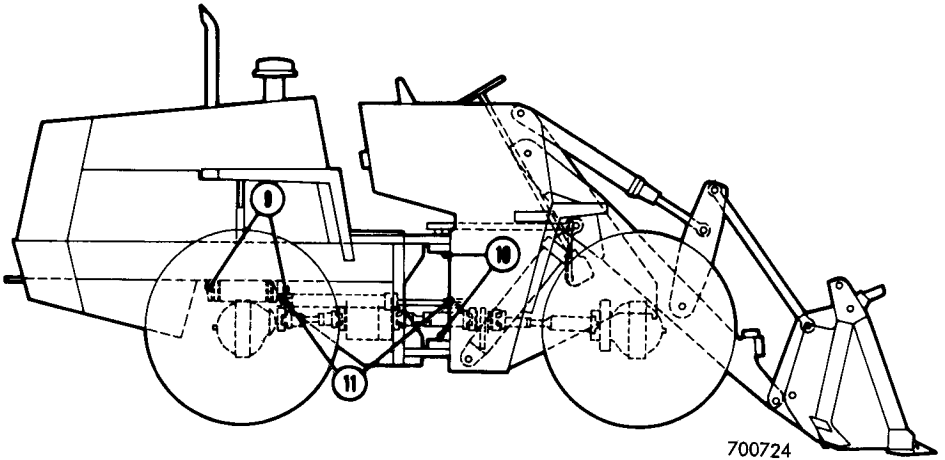


Figure 19

- 9. Rear axle trunnion pivots..... (2) one each end
- 10. Upper and lower hinge pins ..... (2) one each hinge
- 11. Steering cylinders ..... (4) one each end of each cylinder

## Every 150 Hours

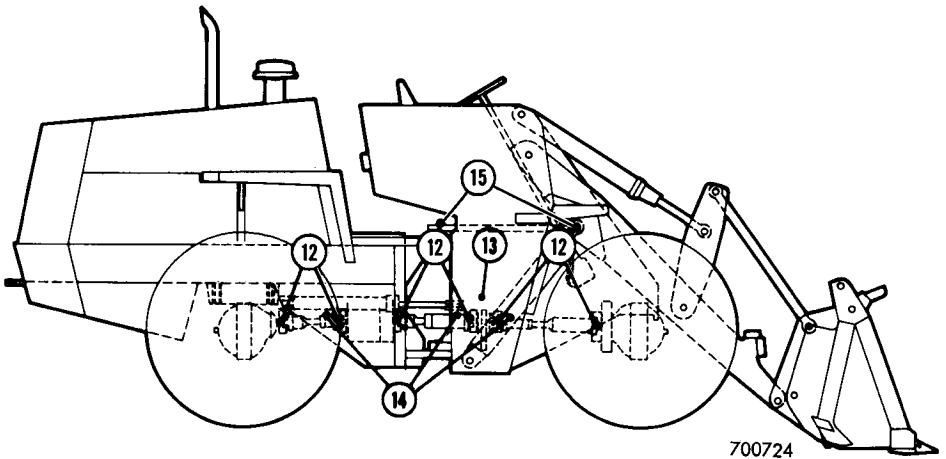


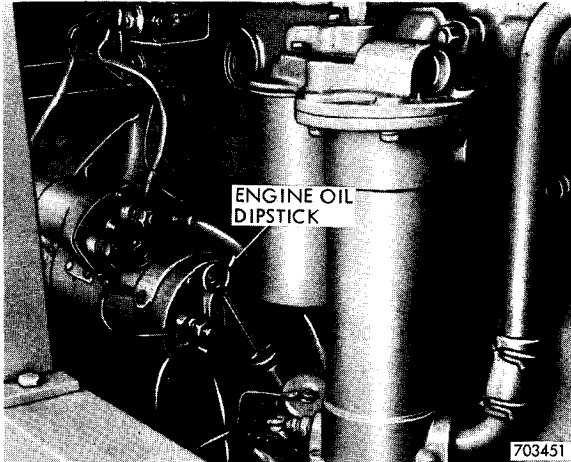
Figure 20

- 12. Universal joints ..... (6)
- 13. Front drive line center bearing ..... (1)
- 14. Drive line spline ..... (3) one fitting each shaft
- 15. Pitman arm link ..... (2) one each end

## **ENGINE OIL AND FILTER**

### **Checking Engine Oil Level**

Check the engine oil level daily by using the oil level dipstick. It is located on the left side of the engine. Refer to Figure 21. Check the level first thing in the morning before the engine is started - or allow 5 to 10 minutes after stopping the engine before checking the oil level.



**Figure 21**

### **Changing Engine Oil**

The engine oil should be changed after the first 20 hours of operation and every 150 hours thereafter. These are suggested maximums; if the operating conditions are severe, the oil should be changed more often.

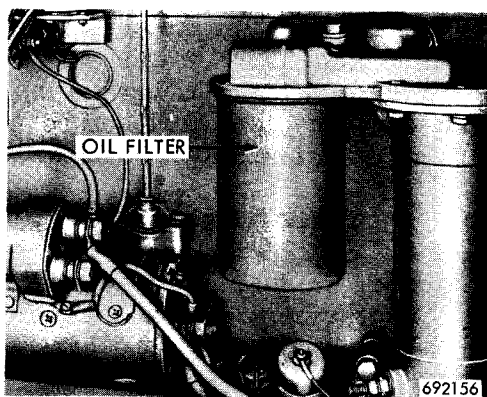
The oil should be changed while hot. Contaminants will be in suspension and therefore are removed when the oil is drained. Replace the drain plug after draining.

#### **TO REFILL:**

1. Select a high quality oil that meets all the specifications in the chart on page 33. Refill with 12 measured quarts if filter was not changed. Do not use the dipstick as a guide.
2. If the oil filter was replaced, refill with 13 measured quarts. Operate the engine for a few minutes at low idle no load and check for leaks. Stop the engine, allow a few minutes for the oil to run down, and then check the oil level with the dipstick.

**NOTE:** The preceding procedure will prevent overfilling or underfilling, either of which is detrimental to engine life and will give you false oil consumption records.

## **Replacing Engine Oil Filter**



**Figure 22**

The spin-on type engine oil filter is located on the left side of the engine. See Figure 22.

You cannot determine the condition of an oil filter element by its appearance. It may not appear excessively dirty, but it can be completely contaminated with abrasive material. Therefore, change the oil filter at the recommended interval (after the first 20 hours and every 300 hours thereafter).

Replace filter as follows:

1. Remove the contaminated filter with a strap wrench by turning it counterclockwise.
2. Wipe clean the contact area on the filter mounting bracket.
3. Apply a thin coat of clean oil or grease to the new filter gasket. Install the filter by turning it clockwise until gasket contact is made. Hand tighten  $1/2$  to  $3/4$  turn to obtain the proper seal. Do not use a wrench when installing.
4. Add one measured quart of oil to the engine. Operate the engine at low idle - no load for a few minutes and check for leaks. Recheck oil level.



## FUEL SYSTEM

The fuel system consists of a fuel tank, fuel pump, filters and the injection equipment. The service life of the fuel injection equipment on your diesel engine is wholly dependent upon the cleanliness of the fuel. If abrasives or water is permitted to reach the high precision moving parts in the injection equipment, rapid wear will result and poor performance may be expected. To prevent abrasives or water from reaching the injection equipment, it is important that you use clean fuel and regularly service the filters as described in this section.

### General

Figure 23 illustrates the fuel flow from the engine fuel supply tank to the combustion chambers and excess fuel flow returning to the tank.

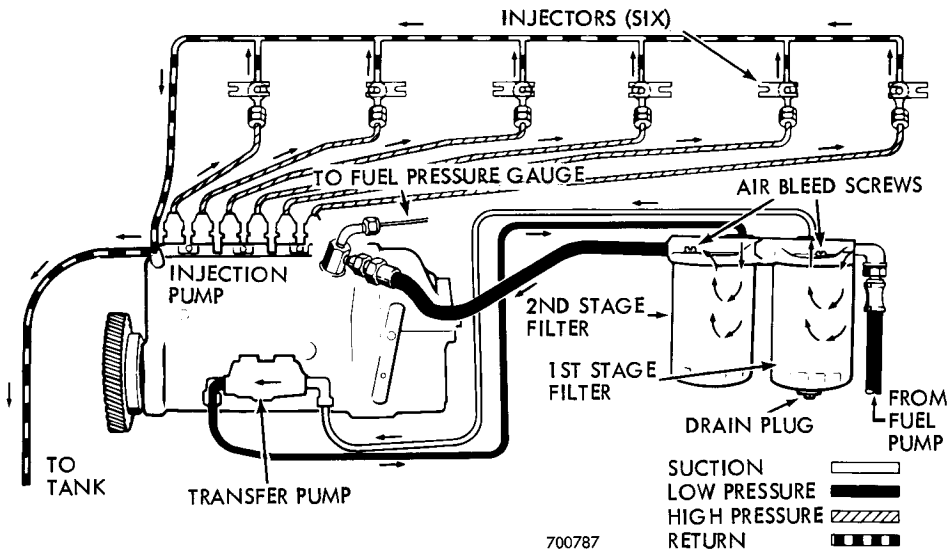


Figure 23

**FUEL TANK** - The fuel tank holds 58 U.S. gallons. The drain plug is located on the bottom side of the tank.

**ELECTRIC FUEL PUMP** - The electric fuel pump supplies fuel to the engine as long as the key switch is turned on.

**FIRST STAGE FILTER** - The first stage filter is a spin-on replaceable cartridge. It has an air bleed screw on the top and a water drain on the bottom. This filter removes the coarse particles from the fuel.

**TRANSFER PUMP** - The fuel transfer pump supplies fuel to the injection pump from the fuel filters. It is an integral part of the injection pump.

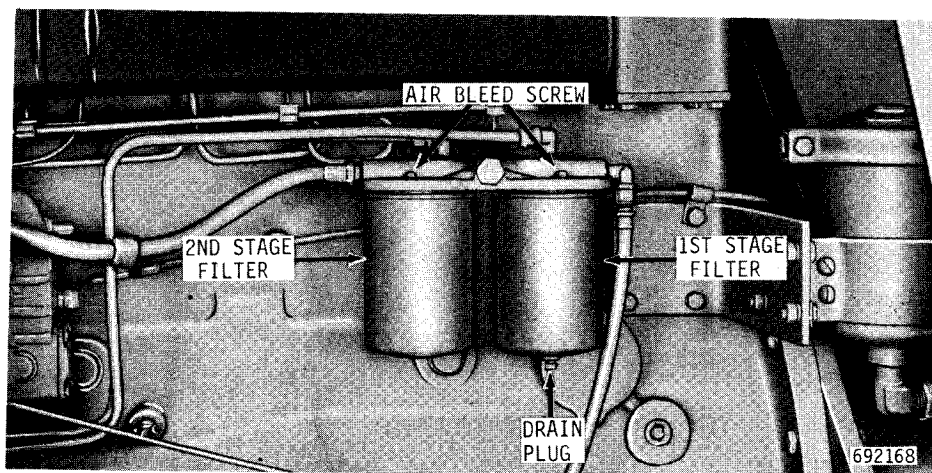
**SECOND STAGE FILTER** - The second stage filter is a spin-on replaceable cartridge. It has an air bleed screw on the top. This filter removes very fine particles from the fuel.

**INJECTION PUMP** - The fuel injection pump receives fuel from the transfer pump then meters and distributes the fuel under very high pressure to each of the injectors. Fuel in excess of the engine demand is returned to the fuel tank through the return line.

**FUEL INJECTORS** - The fuel injectors deliver the fuel to the combustion chambers in a predetermined spray pattern. The fuel used to lubricate each injector is returned to the fuel tank through the return line.

### **Draining Water**

Drain water from the bottom of the first stage fuel filter at least once a week. See Figure 24. After removal of water, it may be necessary to bleed air from the filter housing. See page 42 for bleeding procedure.



**Figure 24**

## **Checking Condition Of Filters**

As sediment gradually plugs a filter element, a drop in pressure will result. Change the fuel filters when the pressure gauge needle enters the red zone.

## **Replacing Fuel Filters**

The first and second stage filters must be replaced whenever the gauge needle falls into the red zone. Replace both filters at the same time, using Genuine Case filters available from your Authorized Case Dealer.

To replace filters:

1. Clean the filter head, elements, and the engine area next to the filters. Keeping the system clean during this operation is very important.
2. Be sure that the key switch is in the off position.
3. Remove both filters with a strap wrench by turning counter-clockwise.
4. Place a thin coat of grease on the new filter gaskets.
5. Install the new filters until gasket contact is made. Hand tighten each filter  $1/2$  to  $2/3$  turn. Do not tighten with a wrench.

## **Bleeding The System**

The fuel system must be bled if air enters the lines as a result of:

1. Engine running out of fuel.
2. Parts removed for service or repairs.
3. Engine stored for a considerable period of time.

To bleed the system, fill the tank and turn the key switch on. Open the bleed screw on the first stage filter. Close the screw when clear fuel appears. Open the pressure relief valve  $2-1/2$  turns and loosen the bleed screw on the second stage filter. When clear fuel appears, close the relief valve and bleed screw.

Start the engine. If roughness or missing is detected, bleed each injector line starting with number one. Just "crack" open the tube nut at each injector.

If the engine still lacks power and stalls under load, repeat preceding bleeding procedure.

## **AIR INTAKE SYSTEM**

### **Safety Filter**

A safety filter is built into the connector which joins the tube from the service indicator to the air intake tube. This filter prevents unfiltered air from entering the engine if the tube to the indicator or the indicator itself becomes damaged.

The safety filter will plug up with continued operation if a leak occurs. When the filter is plugged, the service indicator will not operate.

### **Checking For Plugged Safety Filter**

Seal off the air cleaner intake opening. Start the engine. If the signal band in the service indicator fails to appear, the safety filter is plugged and service is required.

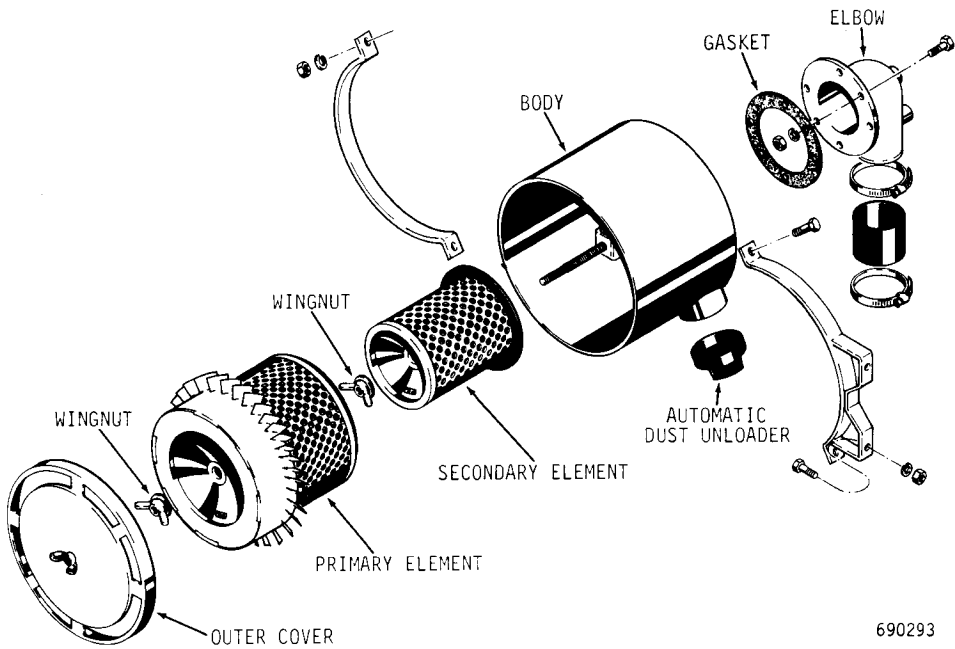
Once a leak has been detected, locate and correct it at once and service or replace the safety filter to regain use of the service indicator.

### **Servicing The Safety Filter**

Disconnect the tube from the service indicator at the connector. Remove the connector and safety filter. Direct compressed air through the safety filter in the opposite direction to the normal air flow; if it cannot be cleaned, install a new safety filter.

## **Air Cleaner Service**

The air cleaner element must be serviced whenever the red band on the service indicator is in full view. The element can be cleaned either by washing or by compressed air. The element should be replaced after 6 washings or one year, whichever comes first.



690293

Figure 25

The system consists of two filtering elements, the "outer" or primary element and the "inner" or secondary element. The outer filter can be cleaned by washing or compressed air. However, the inner filter must not be cleaned, it can only be replaced.

Service the outer element when the restriction indicator remains in the red zone. Service the inner element when the restriction indicator remains in the red after the outer element has been cleaned or replaced.

Inspect the rubber seals for damage and replace if necessary. Use the proper gasket cement which is available through your dealer.

Washing is the preferred method of cleaning as it removes more dust and soot thus restoring the element to an almost new condition. This will result in better engine performance and longer intervals between service. It is suggested that a spare element be available for use while the serviced one is drying. This will reduce unit down-time to only a few minutes and allow sufficient time to properly service the restricted element.

To wash the filter, use Case Filter Element Cleaner which is available through your Authorized Case Dealer. Mix two ounces of cleaner to one gallon of water (temperature 70° to 100° F.). Soak the element in this solution for 15 minutes. Rinse thoroughly. Do not use water pressure over 40 psi at the nozzle. Let the element air dry completely before installing. Do not use air pressure to dry the filter.

The element can also be cleaned with compressed air (maximum pressure 100 psi at nozzle). Keep the air nozzle a reasonable distance from the filter. The use of compressed air is not recommended because it will not remove carbon and soot - washing will. NEVER attempt to clean the element by rapping it. This will only dent the metal covering. The inner paper will rub this dent causing a puncture. If any fuzz is noted around a dent or any place on the element, the paper is punctured and must be replaced immediately or serious damage will result. Do not accept a new filter or install one if the metal covering is dented.

The filter can be checked for damage or pin holes by rotating it against a light. If any holes appear, replace the element.

## **COOLING SYSTEM**

### **Radiator Cap**

The radiator pressure cap serves two purposes:

1. It pressurizes the cooling system at 7 psi, thereby raising the boiling point of the coolant, and reduces loss of coolant by evaporation, surging and boiling. The efficiency of a pressurized cooling system is maintained by immediate repair of leaks and replacement of weak or defective parts.
2. It serves as a relief valve if the system pressure rises above 7 psi.



**WARNING:** Always remove the pressure cap slowly. Quick removal of the cap can reduce system pressure enough to make the coolant boil out of the radiator opening and result in painful burns to the operator.

## Coolant

### Antifreeze

Use only a reputable brand of permanent type, high boiling point, ethylene glycol antifreeze.

This machine is shipped from the factory with permanent type antifreeze in the cooling system for protection down to approximately  $-29^{\circ}$  F. The antifreeze should never be used more than one winter due to the natural breakdown of the rust inhibitor.

Do not mix different types or brands of antifreeze in the cooling system. They may not be chemically compatible, and the mixture may not give correct test readings.

**NOTE:** The use of alcohol type antifreeze is not recommended because the alcohol boiling point is frequently below the minimum engine operating temperature.

If water alone is used in the cooling system during the summer months, add a rust inhibitor.

If possible, use soft water. If only hard water is available, check the system at frequent intervals for signs of scale formation.

**CAUTION:** Never pour cold coolant into a hot engine. The temperature differential between the coolant and metal may cause the cylinder block or cylinder heads to crack. The coolant level should be approximately one inch up from the radiator fins.

## Thermostat

### Temperature Range

The cooling system is equipped with two thermostats that start to open at  $175-182^{\circ}$  F. and are fully open at  $202^{\circ}$  F. Coolant temperature will vary according to the workload. A radiator with a properly functioning pressure cap will permit engine temperatures up to  $230^{\circ}$  F. without engine damage or loss of coolant.

### Checking Thermostat

A thermostat suspected of being defective may be checked in the following manner. Remove thermostat(s) and suspend a thermostat in a pan of water that is being heated and check the opening temperature with a thermometer. If a thermostat is

proven defective, discard it and replace it with a genuine Case thermostat.

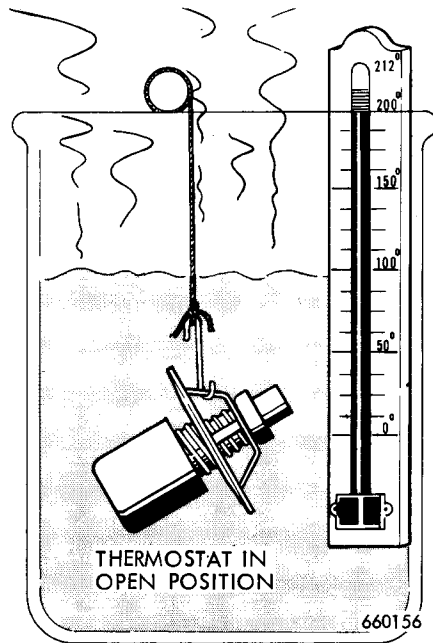


Figure 26

## Replacing Thermostat

To replace thermostat(s):

1. Drain the radiator to a level below the thermostats, Figure 27.
2. Remove the upper radiator hose from thermostat housing. Then remove the three thermostat housing bolts and remove housing from water manifold.
3. Remove thermostat(s) from water manifold.
4. Remove gasket from thermostat housing and/or water manifold.
5. Install new thermostat(s).
6. Place new gasket on water manifold and reinstall thermostat housing, tightening the three bolts evenly. Then reinstall upper hose on thermostat housing and tighten hose clamp.



7. Refill radiator and operate engine for about five minutes and check for leaks. Check coolant level and add as required.

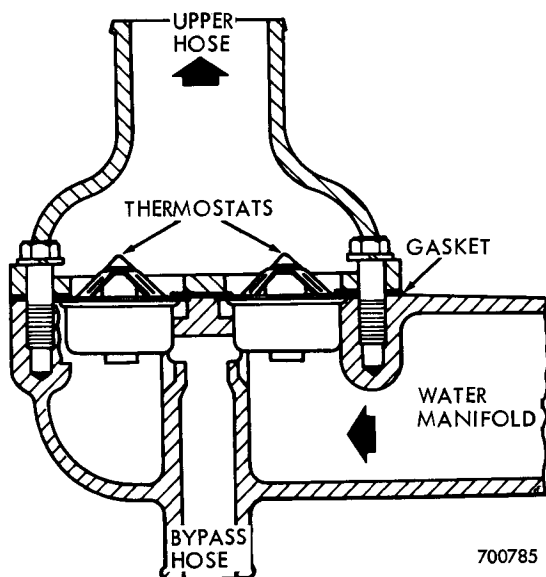


Figure 27

## **Cleaning The Cooling System**

Clean the cooling system at least once a year. In areas where water containing scale forming mineral is all that is available, clean the system more often.

To clean the system:

1. While the coolant is still hot, open the radiator drain valve, engine oil cooler drain valve and engine block drain valve. See Figures 28, 29 and 30. Remove radiator cap to aid draining. Drain all coolant and close drain valves.
2. Add a radiator cleaner to the system and refill with clean water. Use a cleaner marketed by a reputable manufacturer. Follow the directions provided with the cleaner.
3. After draining the cleaning solution, check hoses, water pump, radiator and gaskets for leaks. Then flush the cooling system with clean water.
4. Remove accumulated dirt and grease from engine and radiator.
5. Refill cooling system and add a cooling system conditioner.

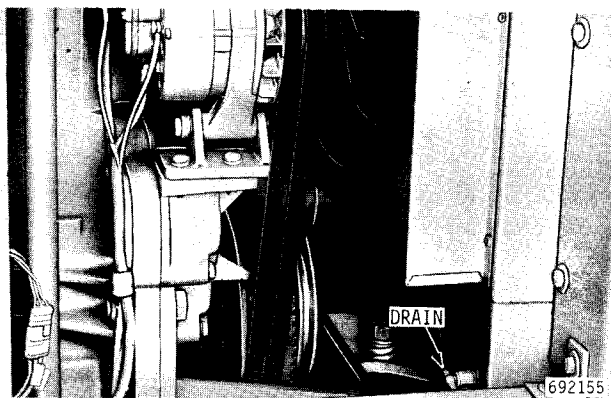


Figure 28

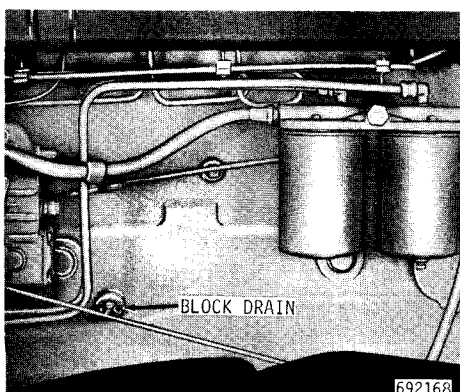


Figure 29

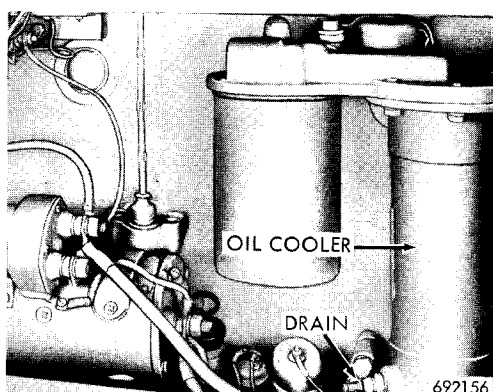


Figure 30

6. Run the engine about five minutes to bleed air from the system and check coolant level. Add coolant as required.

## HYDRAULIC AND STEERING SYSTEM

### Hydraulic Oil Level

Check the hydraulic oil level every 60 hours or once a week.

Shut off the engine and close the air valve located above the reservoir. This is a pressurized hydraulic system. Remove the air pressure by slowly removing the dipstick/filler cap. Add oil as required.

If the oil level is to be checked after servicing parts in the loader or steering hydraulic system, operate the machine through several complete cycles to remove air in the lines. Raise, dump

retract and lower the loader or turn the steering wheel to the extreme right and left to remove air.

**CAUTION:** Do not operate engine above low idle until the pump inlet pressure gauge indicates 13 - 19 psi.

## Servicing The Hydraulic Reservoir

Change the hydraulic oil, replace the outlet filters, clean the air baffle screen, and clean the oil inlet screen after every 500 hours of operation.

Disconnect air line from breather and remove breather from reservoir. Clean breather in cleaning solvent. After breather is dry, reinstall breather and connect air line.

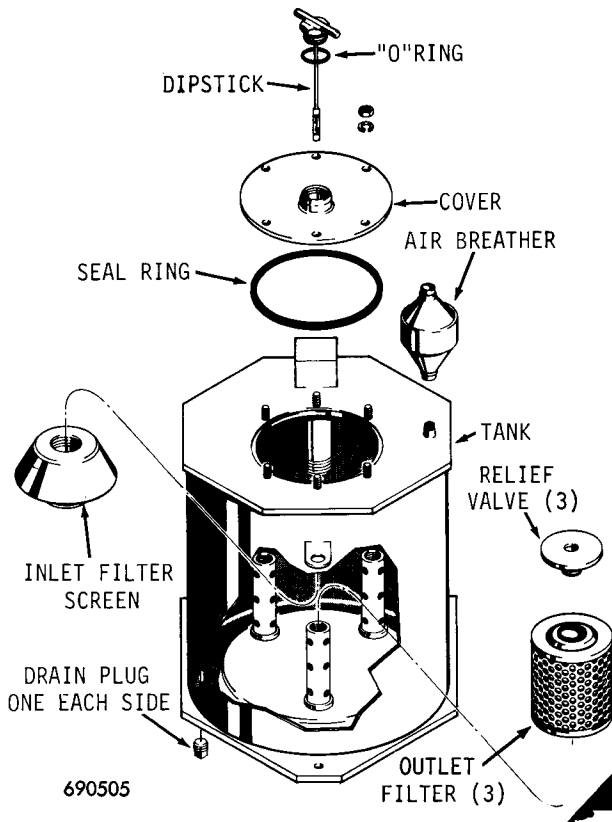


Figure 31

Before performing any reservoir maintenance, always close air valve and relieve reservoir air pressure.

Remove reservoir top cover and seal ring. Discard seal ring. Remove the two drain plugs on bottom of reservoir and drain hydraulic fluid.

Remove the filter screen and clean with cleaning solvent. Then remove the three relief valves that hold the three outlet filter elements. Remove and discard filters. Clean inside of reservoir with a lint free cloth.

Reinstall filter screen. Install new outlet filter elements and secure in place with relief valves. Reinstall drain plugs. Install cover with new seal ring and torque nuts to 35-40 foot pounds.

Refill reservoir with 20.8 gallons of Case TCH fluid. Open air valve and check oil level as instructed on page 49.

## **TRANSMISSION SERVICE**

### **Oil Level Check**



**WARNING:** The oil level is checked with the engine running, the parking brake **MUST** be applied and the safety bar installed.

### **Level Plug Method**

Two level plugs are located at the lower-left rear of the transmission housing.

#### **COLD CHECK**

1. Before starting the engine, remove the upper plug. If oil does not flow from opening, add oil until oil flows from opening and reinstall plug.
2. Start engine and run at 1000-1500 rpm with transmission in neutral for approximately one minute. Then remove the lower plug and add oil as required to establish oil at the lower opening.

**CAUTION:** Checking oil at lower engine speeds may result in low oil level at operating speeds. The oil level will raise as oil temperature increases.

## HOT CHECK

1. With the transmission at normal operating temperature (approximately 180° F.), idle the engine and slowly shift through all range positions.
2. With the transmission in neutral and the engine running at 1200-1500 rpm, remove the upper plug. The oil should be level with plug opening. Add oil as required to establish oil at the upper opening.

## Dipstick Method

**NOTE:** One quart of oil will raise oil level approximately 1/2 inch.

## COLD CHECK

1. Before starting the engine, remove dipstick and check oil level. If oil level is below the hot mark add oil to raise level to hot mark.
2. Start the engine and run at low idle for approximately two minutes. Recheck oil level and add oil as required to establish oil at the cold mark.

## HOT CHECK

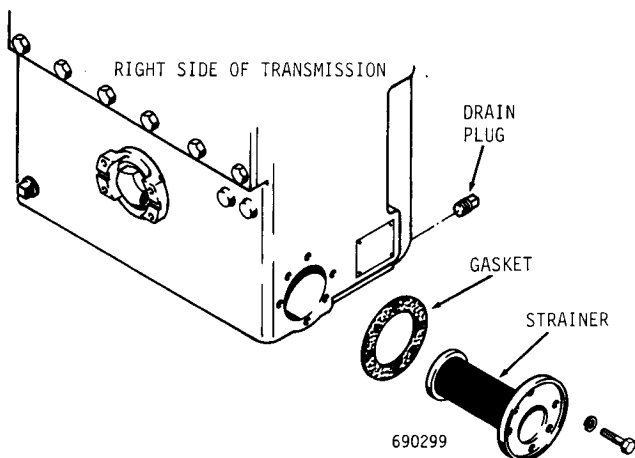
1. With the transmission at normal operating temperature (approximately 180° F.), place transmission in neutral and idle the engine. Remove dipstick and check oil level. The oil level should be within the operating range and not exceed the hot mark.
2. If oil is below the cold mark, add oil as required.

## Servicing The Transmission

Change the oil, replace the oil filter and clean the strainer and breather after every 1000 hours of operation.

Remove drain plug and strainer and gasket. Discard gasket. Clean the strainer in cleaning solvent.

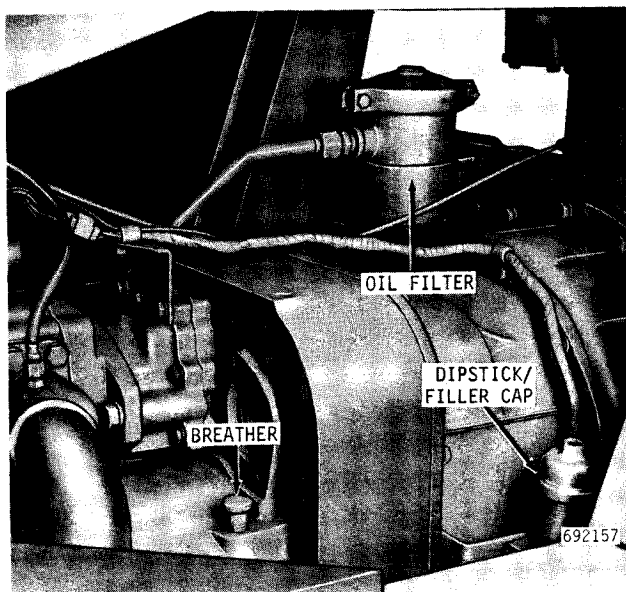
**NOTE:** Do not install drain plug and strainer until the oil filter and breather have been serviced. This procedure is recommended to allow maximum oil drainage.



**Figure 32**

Remove breather and clean in the recommended cleaning solvent. Reinstall breather. If the breather appears to be damaged it must be replaced.

To remove the filter element, loosen the cover retaining clamp bolts and remove clamp, cover with relief valve, gasket and filter element. Discard gasket and filter element. Remove the remaining oil from the filter case with a hand suction gun. Clean the inside of the filter case with a lint free cloth. Install a new filter element and gasket. Reinstall cover and retaining clamp and tighten clamp bolts.



**Figure 33**

After servicing the oil filter, reinstall the drain plug and strainer with a new gasket. Fill transmission with 9 gallons of new Case TCH fluid. Start engine and run at idling speed for a few minutes to fully charge the transmission and converter. Check oil level as instructed on page 51. Check for oil leaks.

## **FRONT AND REAR AXLE**

### **Oil Level Check**

Each axle has a common oil level, therefore it is not necessary to check the differential and planetary ends separately unless leakage at the planetary ends is noted.

When checking axle oil level, park the machine on a level surface. Remove the fill plug from the axle housing center bowl. The oil should be level with the bottom of the plug opening.

### **Filling Procedure**

The circulation of lubricant between the two planetary ends and the center bowl is partially restricted by gears, bearings, washers, etc. Therefore it is important that the lubricant is properly installed, particularly if the unit is to be put in service soon after filling.

1. Have the machine on a level surface with the drain/fill plug in the planetary housing on top. Jack up axle and move wheel by hand, if required.
2. Refer to page 8 for axle capacity. Fill center bowl until lubricant is level with plug opening. Note amount of lubricant used.
3. Install the remainder of lubricant in the planetary ends, an equal amount in each.

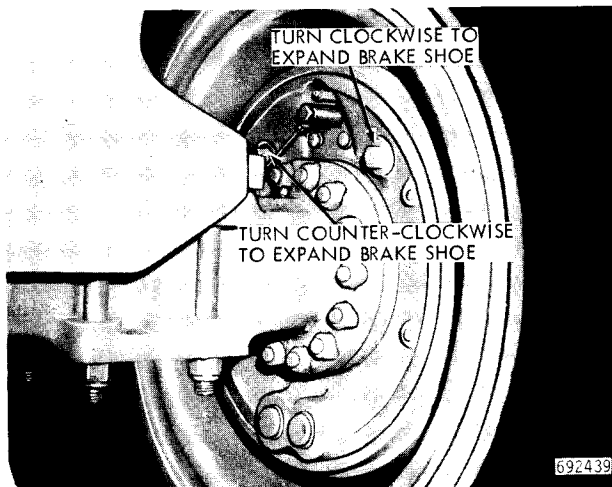
# **BRAKES**

## **Foot Brakes**

### **Adjustment**

The following procedure applies to units before serial number 9105061.

1. Block wheels to prevent machine from rolling. Raise one wheel at a time.
2. Refer to Figure 34. Turn the eccentric cam in the direction shown until a heavy drag is felt while rotating the wheel. Then loosen the eccentric cam until the wheel turns freely.



**Figure 34**

3. Repeat steps 1 and 2 for the other wheel.

The following procedure applies to units with serial number 9105061 and after.

1. Block wheels to prevent machine from rolling. Raise one wheel at a time.
2. Refer to Figure 35. Remove plugs from adjusting slots.
3. Expand one brake shoe until wheel cannot be turned. Use a brake adjusting tool or screwdriver and turn the star wheel clockwise (move tool towards axle).



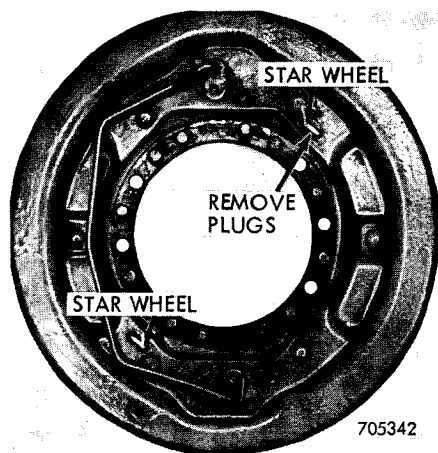


Figure 35

4. Back off the star wheel until a very slight drag is noticeable.
5. Repeat steps 3 and 4 for the other shoe.
6. Repeat adjustment procedure for the other wheel.

## **Bleeding The Brake System**

Whenever the front or rear brake system has been disconnected for any reason that system must be bled at the wheel cylinders. It is recommended that a pressurized bleed tank be used.

1. Fill and bleed pressure tank according to the manufacturer's instructions.
2. Connect pressure tank to master cylinder fill opening.
3. Loosen bleeder valve on wheel cylinder and observe brake fluid flow.
4. When bubbles cease to appear, close bleed valve and disconnect bleed tank.

## **Parking Brake Adjustment**

### **Minor Adjustment**

With the parking brake handle in the released position, turn the knurled portion of the handle clockwise to tighten parking brake. After several minor adjustments it may be necessary to perform a major adjustment.

## Major Adjustment

1. Block wheels to prevent machine from moving and release parking brake. Then back off the knurled portion of the parking brake handle several turns.
2. Refer to Figure 36. Loosen the locknut and remove the yoke pin.

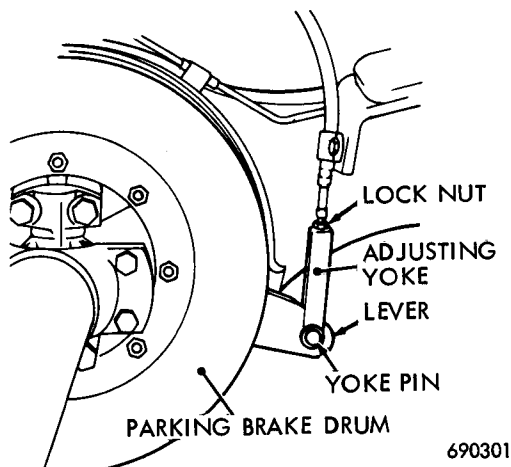


Figure 36

3. Screw yoke onto brake cable until the hole in the yoke and lever are aligned.
4. Reinstall yoke pin and tighten locknut.
5. Perform minor brake adjustment if necessary.

## DRIVE BELTS

The drive belts should be checked for looseness, cracks or wear after every 500 hours of operation. If new belts are installed they will stretch after the first few hours of operation. Check belts tightness and adjust as necessary during the first 40 hours of operation.

## Fan Belts

### Adjustment

See Figure 37. Loosen alternator pivot and adjustment bolts. Position a small prybar behind alternator front housing and pull against fan belts. Tighten pivot and adjustment bolts. The proper belt adjustment will give a deflection of 1/2 inch. Measure deflection between the fan and crankshaft pulleys.

Belts too tight will cause bearing failure of driven parts. Belts too loose will cause excessive belt wear, also low or no alternator output.

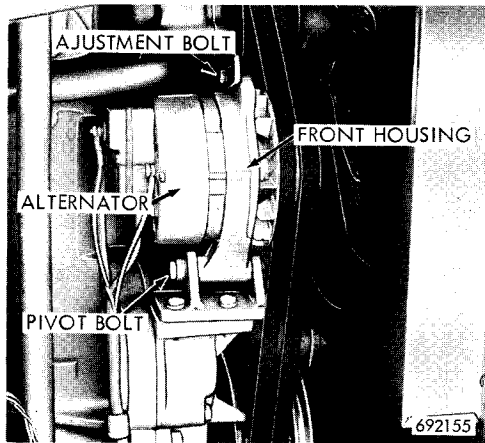


Figure 37

### Replacement

Remove air compressor drive belt. Loosen alternator pivot and adjustment bolts. Remove belts. Slip new belts over fan and onto fan pulley then onto crankshaft pulley and the alternator pulley. Tighten belts properly. Replace air compressor drive belt.

**NOTE:** The fan belts are a matched set. Do not replace one belt. Replace as a set.

## Air Compressor Belt

### Adjustment

Loosen the two air compressor mounting bolts. Turn nuts on hook bolts clockwise to tighten belt. Make sure air compressor pulley is aligned with fan pulley. Tighten air compressor mounting bolts. Refer to Figure 38.

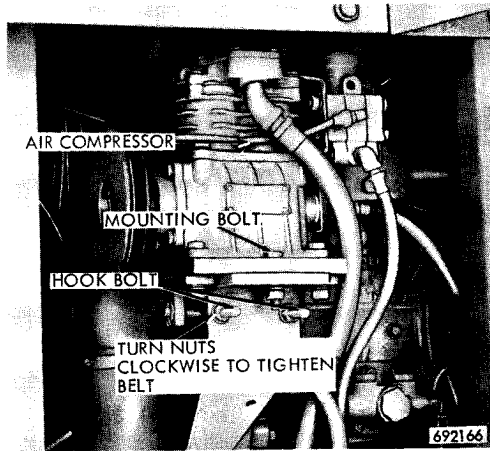


Figure 38

### Replacement

Loosen the two air compressor mounting bolts. Loosen nuts on hook bolts and slide compressor towards the engine. Remove belt. Slip new belt over fan and onto fan pulley and the compressor pulley. Tighten nuts on hook bolts to tighten the belt. Make sure compressor pulley is aligned with fan pulley. Tighten air compressor mounting bolts. Belt deflection should be 1/2 inch.

## **ELECTRICAL SYSTEM**

### **Instrument Panel Lights**

To replace an instrument panel bulb, pull the light hood off and remove bulb. Use a GE1450 bulb or equivalent and reinstall hood.

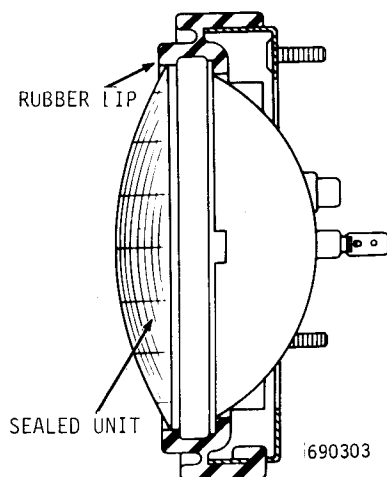
### **Ignition Indicator Light**

To replace the ignition indicator bulb, unscrew lens and remove bulb. Use a GE1819 bulb or equivalent and reinstall lens.

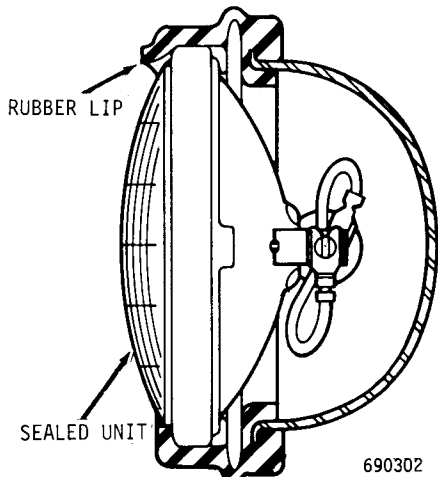
### **Front And Rear Working Lights**

The voltage and watts of the sealed unit are stamped on the back of the sealed unit. Check the new sealed unit to make sure the proper light is being installed. If a 6 or 12 volt light is installed it will burn out immediately. When replacing either light, use a GE4578 sealed unit or equivalent.

To replace a headlight or rear work light, roll the rubber lip off the edge of the sealed unit. Disconnect the defective unit and connect wires to new unit, then roll rubber lip over the edge of the new unit. See Figures 39 and 40.



**Figure 39**



**Figure 40**

## Combination Stop And Taillights

To replace a taillight bulb, roll the rubber lip from the edge of the lens. Remove and replace bulb and reinstall lens by rolling rubber lip over edge of lens. See Figure 41.

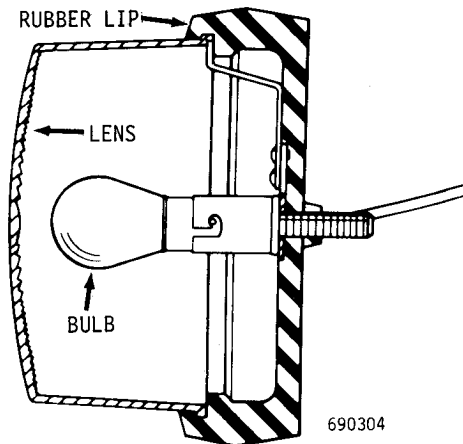


Figure 41

## Starting Motor

The starter used on this machine is classified as "long life", and will provide a long period of maintenance free operation. Starter maintenance is reduced because of built-in oil reservoirs and o-rings that seal the motor against water and dirt.

The starter should be disassembled, inspected, repaired as required, and lubricated whenever the engine is overhauled.

## Alternator

### Important Tips For The Alternator Charging System

DO....

1. Do connect booster batteries correctly if used as a starting aid. Connect the booster batteries' negative (-) cable to the vehicle batteries' negative (-) terminal; connect the booster batteries' positive (+) cable to the vehicle batteries' positive (+) terminal.
2. Do disconnect the battery ground cable when performing work on the electrical system or charging batteries.

3. Do disconnect the regulator plug and wires at alternator terminals whenever using an arc welder on the machine.
4. Do maintain the drive belts at proper tension and in good condition.

**DON'T....**

1. Don't reverse the battery connections. This will damage the diodes. This machine has a negative (-) ground.
2. Don't ground the alternator output terminal.
3. Don't ground the field circuit between the alternator and regulator.
4. Don't operate the machine with the batteries disconnected.
5. Don't attempt to polarize the alternator.
6. Don't use a steam cleaner or cleaning solvent to clean the alternator.

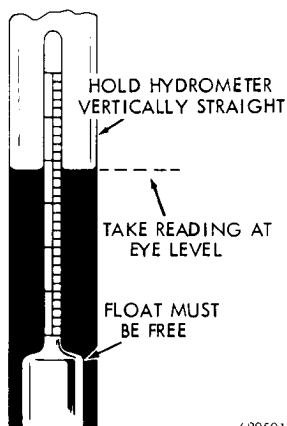
### **Battery Care**

It is very important, especially with diesel units, to keep the batteries fully charged. Starting the diesel engine depends on a great deal of cranking speed developed by the starting motor.

The efficiency of a fully charged battery is in direct relation to atmospheric temperatures which raise and lower the temperature of the electrolyte. A full charged battery with an electrolyte temperature of 80° F. is capable of 100% performance. However, if the temperature is 0° F. the battery will only be 40% effective.

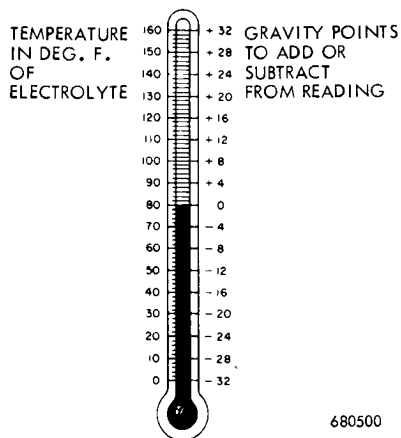


**WARNING:** Do not lay metal objects across the posts of a battery to determine the battery's charge. The air directly above the battery is filled with explosive hydrogen gas. A heavy spark may cause an explosion.



680501

Figure 42



680500

Figure 43

State of Charge

Specific Gravity Range for Climate Zone  
(Readings corrected to 80° F.)

	Frigid	Temperate	Tropical
100%	1.270	1.250	1.225
75%	1.230	1.215	1.180
50%	1.180	1.170	1.135
25%	1.130	1.120	1.090
Discharged	1.080	1.070	1.045

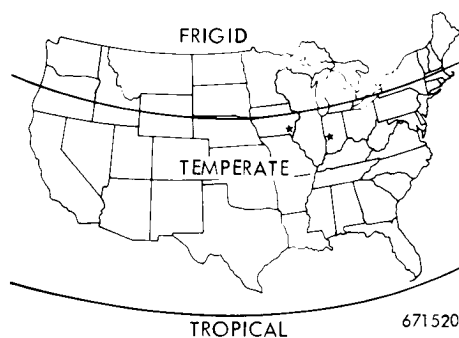


Figure 44



There are two important things that must be done periodically in order to obtain long life from a battery.

First, the electrolyte solution must be kept above the plates and separators. **DO NOT OVERFILL** - Use only pure distilled water. If water is added in zero weather and the battery is not charged, the water will remain on top and freeze. Add the water just before the loader is used, or sufficiently charge the battery to mix the water with the electrolyte. Never add acid, except when it is definitely known that acid has been lost by spillage. Even then, it should be added by an experienced battery man.

Secondly, be sure that the battery is kept nearly charged at all times. The state of charge should be checked at frequent intervals by making a hydrometer reading. Hydrometer floats are usually calibrated to indicate a correct reading at 80° F. only. If your hydrometer does not incorporate a thermometer, use an ordinary dairy type thermometer. Figure 42.

To correct the hydrometer reading to the existing temperature, add .04 to the reading for every 10° F. over 80° F. Subtract .04 from the reading for every 10° F. under 80° F. See Figure 43.

If the hydrometer indicates a state of charge higher than the 100% value, have the voltage regulator checked. Overcharging can be harmful to your battery.

Be sure battery cap vent holes are open at all times. Wash periodically with a solution of baking soda and water and rinse with clean water. **DO NOT** allow the solution to enter the battery.

Keep the battery terminals clean and free of corrosion. After cleaning, a thin coating of vaseline or light cup grease will retard further corrosion.

### **Neutral Start Switch Adjustment**

The neutral start switch is placed in the starting circuit for your protection. When properly adjusted, the switch will allow the engine to start in neutral only. Normally, adjustment will be necessary only if the switch has been replaced.

The neutral start switch is located beneath the floorboard and to right of the shift lever shaft.

To adjust the switch:

1. Place shift lever in neutral.

**CAUTION:** Do not reposition actuator on shift lever shaft.

2. Loosen neutral switch mounting screws. Position the switch on the mounting bracket so the switch roller rests in groove in actuator collar and tighten mounting screws.
3. The engine should start with the shift lever in neutral. Then try starting the engine with the shift lever in forward and reverse. If the engine starts in forward or reverse readjust switch.
4. If proper adjustment cannot be achieved, see your Authorized Case Dealer.

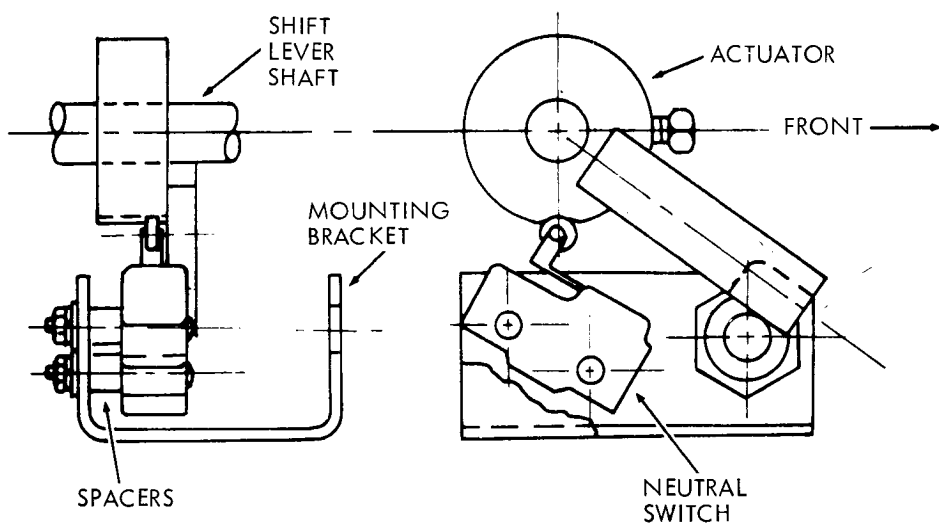
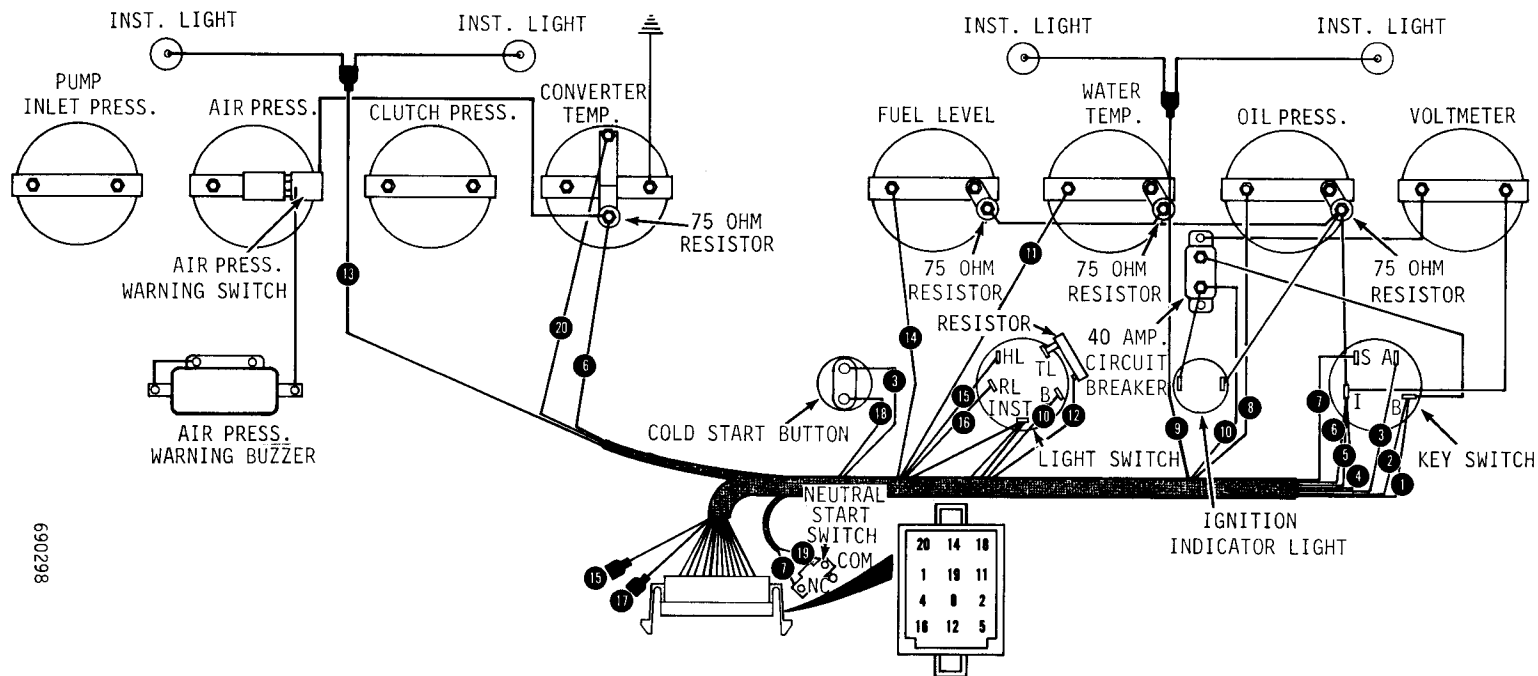


Figure 45

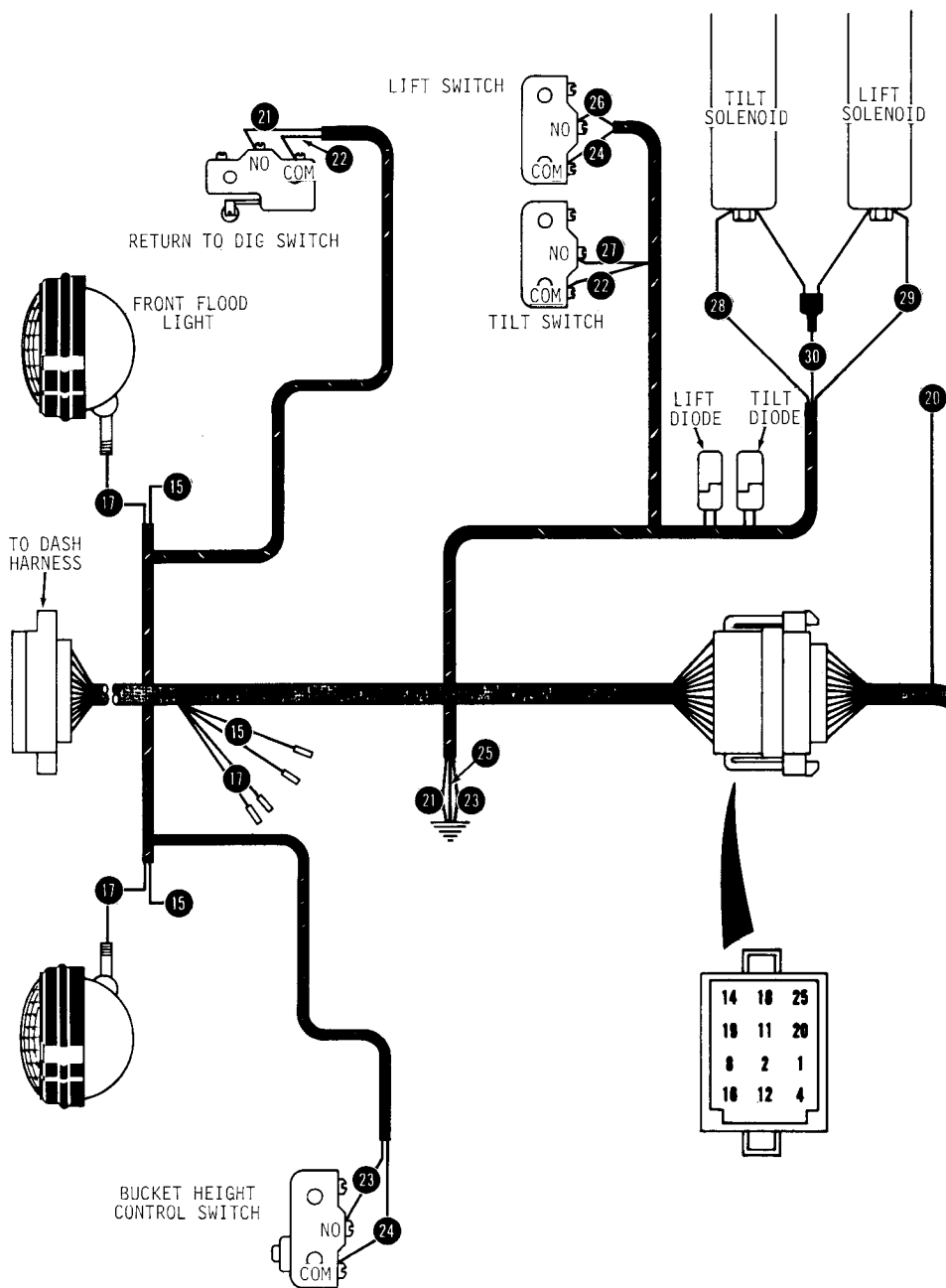
# Wiring Code

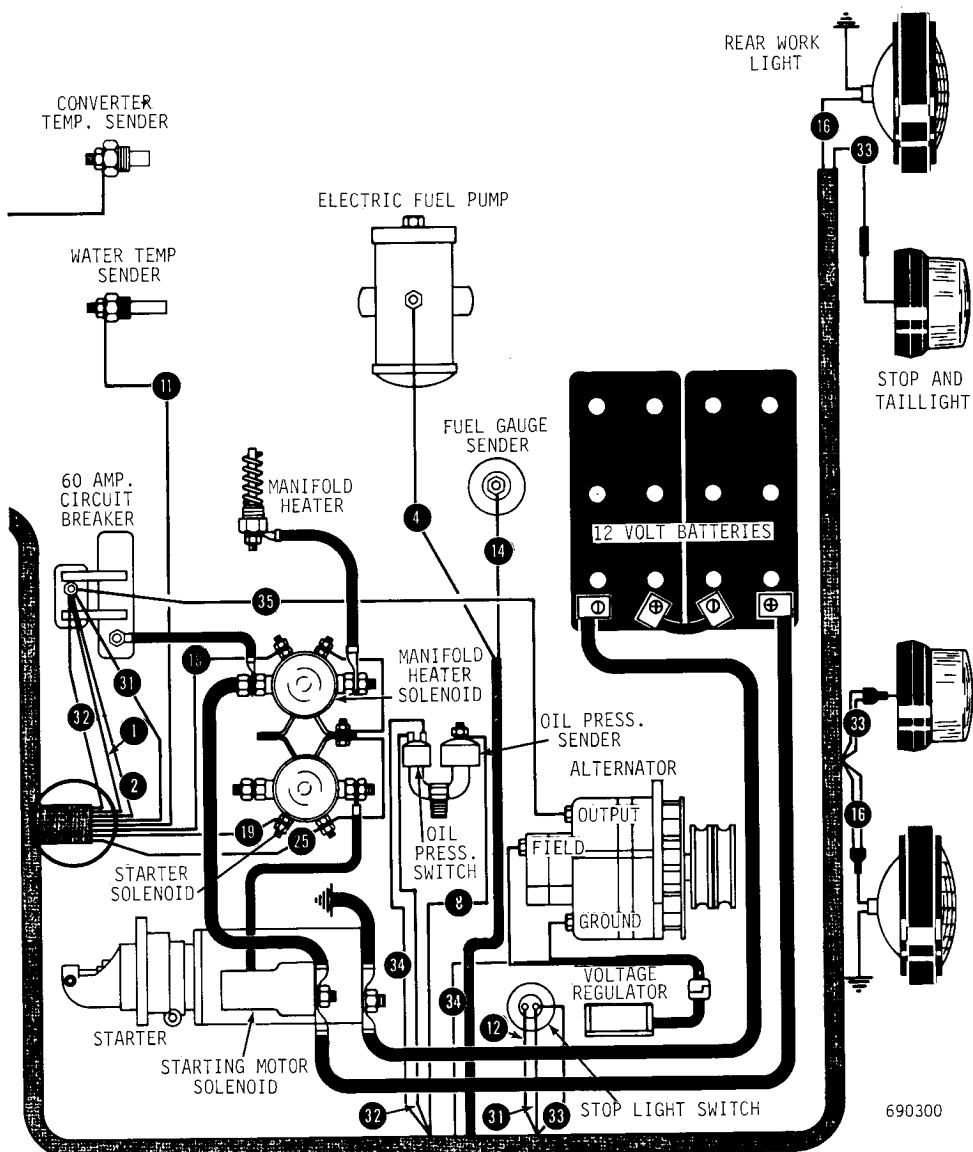
NO.	FROM	TO	COLOR
1	Key Switch B Term.	Circuit Breaker on Engine	Red
2	Key Switch B Term.	Circuit Breaker on Engine	Red
3	Key Switch A Term.	Cold Start Button	Dk. Blue & White
4	Key Switch I Term.	Fuel Pump	Red & White
5	Key Switch I Term.	Diode	Red & White
6	Key Switch I Term.	Converter Oil Temp. Gauge	Red & White
7	Key Switch S Term.	Neutral Start Switch	Black & White
8	Engine Oil Pressure Gauge	Engine Oil Pressure Sender	Light Green
9	Light Switch I Term.	Inst. Lights - Left Side	Gray
10	Light Switch B Term.	Circuit Breaker on Dash	Red
11	Engine Water Temp. Gauge	Engine Water Temp. Sender	Pink & Black
12	Light Switch TL Term.	Tail Lights	Yellow
13	Light Switch I Term.	Inst. Lights - Right Side	Gray
14	Fuel Gauge	Fuel Tank Sender	Dk. Green & White
15	Light Switch HL Term.	Head Lights	Pink
16	Light Switch RL Term.	Rear Work Lights	Dark Blue
17	Light Switch I Term.	Front Flood Lights	Dark Green
18	Cold Start Button	Manifold Heater Solenoid	Orange & Black
19	Neutral Start Switch	Starter Solenoid	White
20	Converter Oil Temp. Gauge	Converter Oil Temp. Sender	Light Blue
21	Return to Dig Switch	Ground	Yellow & Black
22	Return to Dig Switch	Tilt Switch	Lt. Blue & Black
23	Bucket Height Control Switch	Ground	Yellow & Black
24	Bucket Height Control Switch	Lift Switch	Purple & White
25	Starter Solenoid	Ground	Yellow & Black
26	Lift Switch	Diode	Tan & White
27	Tilt Switch	Diode	Lt. Green & White
28	Diode	Tilt Solenoid	Tan & White
29	Diode	Lift Solenoid	Lt. Green & White
30	Diode	Tilt and Lift Solenoid	Red & White
31	60 Amp. Circuit Breaker	Stop Light Switch	Red
32	60 Amp. Circuit Breaker	Engine Oil Pressure Switch	Red
33	Stop Light Switch	Stop Lights	Yellow
34	Voltage Regulator	Engine Oil Pressure Switch	Red
35	Alternator Output Term.	Circuit Breaker on Engine	Orange



690298

Figure 46





690300

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