



INDUSTRIAL TRUCK DIVISION



OPERATORS MANUAL

FOR

CY 160 BD

GOV'T 0-215

CLARK EQUIPMENT COMPANY

PUBLISHED BY

TECHNICAL SERVICE DEPARTMENT,
BATTLE CREEK, MICHIGAN, U.S.A.



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SAFETY INSTRUCTIONS FOR MAINTAINING INDUSTRIAL TRUCKS

Powered industrial trucks may become hazardous if adequate maintenance is neglected. Therefore, adequate maintenance facilities, personnel and procedures should be provided.

Maintenance and inspection of all powered industrial trucks should be performed in conformance with the recommendations in this Manual and the following practices:

1. Only qualified and authorized personnel should be permitted to maintain, repair, adjust, and inspect industrial trucks, and a scheduled preventive maintenance, lubrication, and inspection system should be followed.
2. When truck is to be parked for maintenance: Turn off engine, lower lifting mechanism, place directional controls in neutral, (clutch type trucks may be left in gear) apply parking brake and chock wheels.
3. Before working on truck raise wheels free of floor or disconnect power source. Use chocks or other positive truck positioning devices and block carriage, innermast(s), or chassis before working under them. Before working on engine fuel system of: (a) Gasoline powered trucks with gravity feed fuel systems, be sure fuel shutoff is closed; (b) LP gas powered trucks, close LP-gas cylinder valve and run engine until fuel in system is depleted and engine dies.
4. When starting engine place shift levers in neutral and depress clutch (or brake pedal on automatic transmissions).
5. Avoid fire hazards and have fire protection equipment present. Do not use an open flame to check level, or for leakage, of fuel, electrolyte or coolant. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.
6. Properly ventilate work area, vent exhaust fumes and keep shop clean and floor dry.
7. Use hoisting equipment for heavy lifts.
8. Handle LP Gas cylinders with care. Do not drop, dent, or damage in any way.
9. Brakes, steering mechanisms, control mechanisms, warning devices, lights governors, lift overload devices, safety guards and safety devices should be inspected regularly and maintained in a safe operating condition.
10. All parts of lift and tilt mechanisms and frame members should be carefully and regularly inspected and maintained in a safe operating condition.
11. Special trucks or devices designed and approved for hazardous area operation should receive special attention to ensure that maintenance preserves the original approved safe operating features.

(Continued)

SAFETY INSTRUCTIONS FOR MAINTAINING INDUSTRIAL TRUCKS

12. Fuel systems should be checked for leaks and condition of parts. Extra special consideration should be given in the case of a leak in the fuel system. Action should be taken to prevent the use of the truck until the leak has been corrected.
13. All hydraulic systems should be regularly inspected and maintained in conformance with good practices. Tilt cylinders, valves, and other similar parts should be checked to assure that "drift" has not developed to the extent that it would create a hazard.
14. Capacity rating, operation and maintenance instruction plates, tags, or decals should be maintained in legible condition.
15. Batteries, motors, controllers, limit switches, protective devices, electrical conductors and connections should be inspected and maintained in conformance with good practices. Special attention should be paid to the condition of electrical insulation.
16. Industrial trucks should be kept in a clean condition to minimize fire hazards and facilitate detection of loose or defective parts.
17. Modifications and additions which affect capacity rating and safe operation should not be performed by the user without manufacturer's approval.
18. Care should be taken to assure that all replacement parts are interchangeable with the original parts and of a quality equal to that provided in the original equipment.



INDUSTRIAL TRUCK DIVISION



P L E A S E N O T E

I N S T R U C T I O N S O N U S E O F M A N U A L

This Operator's Manual is published as a service reference guide and includes Specifications, Operating Instructions, Lubrication and Preventive Maintenance Instructions, and Trouble Shooting Guide.

The TABLE OF CONTENTS for this manual is printed on green paper and is placed at the front for easy reference. A separate INDEX (also printed on green paper) is placed in front of the Lubrication and Preventive Maintenance Section.

Lubrication and Preventive Maintenance Instructions are listed under the TIME INTERVALS that they should be performed.

The TIME INTERVAL is part of the page number and code number.

Example: 8H 002-0; 8H is the TIME INTERVAL (8 operating hours), 002 is the PAGE NUMBER, and -0 is a CODE NUMBER that you as a customer should disregard. The dash number or code number is for the benefit of the publisher only.

The INDEX is set up under the TIME INTERVALS that the Lubrication and Preventive Maintenance should be performed.

Example: (8 Hours)	Time Interval (H=Hours)	&	Page Number (000-)
	Hydraulic Sump Tank, level check...	8H	503
	Brake Pedal Free Travel, check.....	8H	303

The above states to check the sump tank fluid level every 8 operating hours and refer to page 503 for fluid recommendations etc. Also, to check brake pedal free travel at this interval and turn to page 303 for instructions.

Turn to the eight (8) hour section (8H) and then to the page listed — 503 or 303 etc. The instructions covered therein will pertain only to the checks or adjustments that should be performed at this TIME INTERVAL.

If, for instance, the Brake Pedal Free Travel is incorrect, you would then refer to the INDEX for "Brake Pedal Free Travel, adjust" which would be listed in the TIME INTERVALS following the 8 hour section.

<u>Example:</u> (100 Hours)	Time Interval (H=Hours)	&	Page Number (000-)
	Brake Pedal Free Travel, adjust....	100H	302

Turn to the one hundred hour section (100H) and then to



INDUSTRIAL TRUCK DIVISION



(continued)

I N S T R U C T I O N S O N U S E O F M A N U A L

page 302. Complete instructions as to the importance of pedal free travel, the method to check and adjust for correct free travel with illustrations are included therein.

N O T E

YOU WILL NOTE THAT AT THE BEGINNING OF EVERY SECTION A LUBRICATION AND PREVENTIVE MAINTENANCE ILLUSTRATION IS SHOWN GIVING THE LOCATION OF THE COMPONENTS TO BE SERVICED.

It is impossible to cover all types of machine operations in one manual. Operating conditions should determine the lubrication and maintenance intervals. Common sense and a close observance can best determine the frequency with which you should service your machine.

The care you give your machine will greatly determine the satisfaction and service life that you will obtain from it. A definite maintenance program should be set up and followed. Haphazard maintenance will only lead to faulty performance and short life.



INDUSTRIAL TRUCK DIVISION



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To Start Engine	C 005
To Operate Machine	C 005
To Stop Machine	C 005
To Move a Load	C 303
Safety and Operation Suggestions	C 303

L U B R I C A T I O N S & P R E V E N T I V E M A I N T E N A N C E

Index	H 001
8 Hour	8H 002
100 Hour	100H 002
100 Hour Lubrication Chart	100H 013
500 Hour	500H 002
1000 Hour	1000H 002

T R O U B L E S H O O T I N G G U I D E

Engine	See Diesel Operators Manual
Torque Converter.....	TS 273
Cooling	TS 321
Starter	TS 361
Battery and Horn	TS 401
Transmission	Refer to 06S600 A thru J
Drive Axle	TS 483
Steering Axle	TS 521
Brakes	TS 541
Steering	TS 561
Hydraulic System	TS 652

SPECIFICATIONS



Plate 10123. Machine Serial No. Location

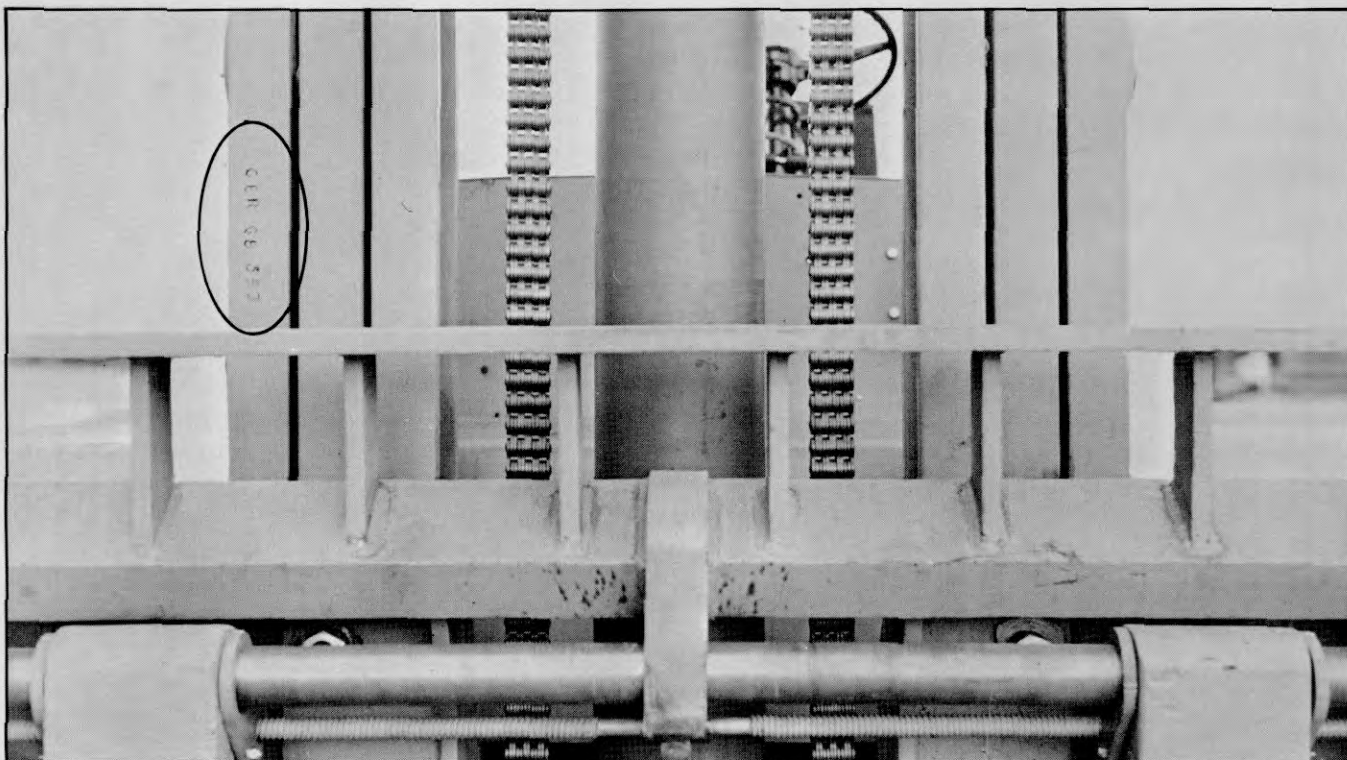
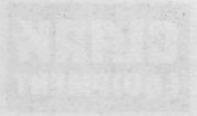
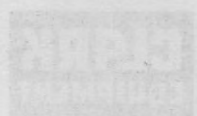


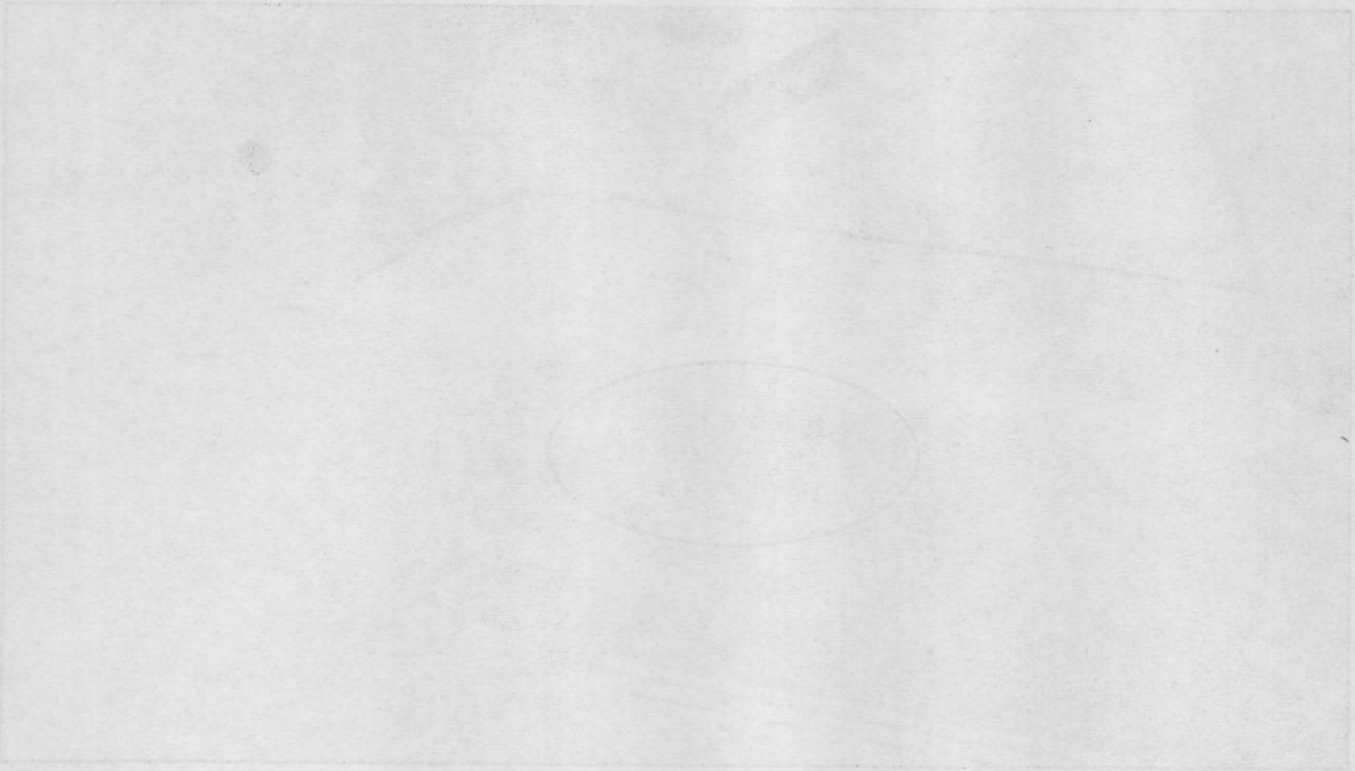
Plate 10124. Upright Serial (Deck) No. Location



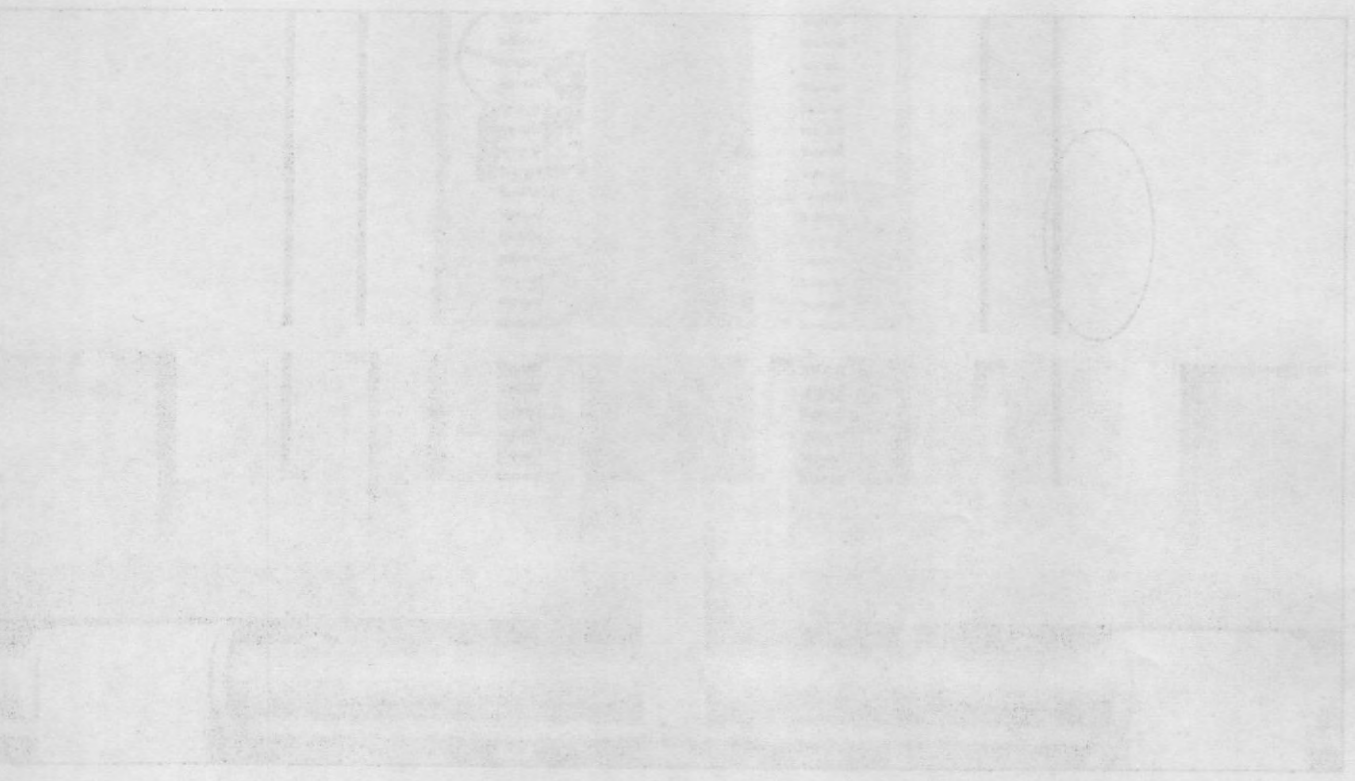
INDUSTRIAL TRUCK DIVISION



RECOMMENDATIONS



Please refer to Machine Serial No. Location



Please refer to Machine Serial (Back) No. Location



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

GENERAL

Type of vehicle Yardlift

Capacity 16,000

Vehicle Gross Service Weight:

Front Axle (Drive)..... 12,600 Lbs

Rear Axle (Steer) 10,700 Lbs

Total Gross Weight 23,300 Lbs

ENGINE

Crankcase Capacity:Refer to Diesel Oper. Manual

FUEL TANK CAPACITY 44 Gallons

COOLING SYSTEM CAPACITY19 Quarts

FAN BELT DEFLECTION 3/4" to 1"

TORQUE CONVERTER

Diameter 12 Inch

Torque Multiplication..... 3.0 to 1

TRANSMISSION

Speeds 4 Forward 4 Reverse

Capacity (Torque Converter and Trans. ...

..... 30 Quarts

STEER AXLE

Axle Alignment:

Toe-in 0 Degrees

Camber Angle 1 Degree

Caster 0 Degrees

Left-hand turning radius angle,

Inside Wheel 75 Degrees

Right-Hand Turning Radius Angle,

Inside Wheel 75 Degrees

DRIVE AXLE

Differential Capacity 14 Pints

Wheel End Capacity 8 Pints
(each end)

ELECTRICAL SYSTEM 12 Volt Negative Ground

Battery 12 Volts 70 Amp Hour

Alternator 22 Amp

Armature Rotation Either

Cold Output

.... 20 Amps at 14 Volts at 2000 R.P.M.

Field Current
2.2-2.6 Amps at 12 Volts (80°F)

Brush Spring Tension (ounces) 28

HYDRAULIC SYSTEM

Sump Tank Capacity 44 Gallons

Sump Tank Filter (Replaceable). 25 Micron

Sump Tank Breather (Cleanable)

Sump Tank Strainer..... 80 Mesh

Hydraulic Pumps

Main Pump:

Type Gear

Capacity

75 G.P.M. at Governed R.P.M.

Steer Pump

Type Gear

Capacity.....

..... 20 G.P.M. at Governed R.P.M.

System Pressure Relief Valve Setting...

..... 1750 P.S.I.

Hydraulic Valve

Pressure Relief Valve Setting

..... 1750 to 1800 P.S.I.

BRAKE SYSTEM

TypeHydraulic Vacuum Booster

Brake Pedal Free Travel....1/16 to 3/16"

.....(1/8" Nominal)



INDUSTRIAL TRUCK DIVISION



VEHICLE IDENTIFICATION

12 Volt Current (12 Volt) (80A)

12 Volt Amps at 12 Volt (80A)

HYDRAULIC SYSTEM

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

HYDRAULIC TANKS

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

HYDRAULIC VALVE

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

BRAKE SYSTEM

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

GENERAL

Type of vehicle

Capacity

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)

12 Volt Tank Capacity (Gallons)

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12 Volt Tank Capacity (Gallons)

12 Volt Tank Capacity (Liters)



INDUSTRIAL TRUCK DIVISION



D I M E N S I O N A L S P E C I F I C A T I O N S

SPEEDS AND GRADES

Travel Speed, M.P.H.										
	LOADED					EMPTY				
Gear	1	2	3	4	5	1	2	3	4	5
	3.4	6.4	8.6	17.4	-	3.8	6.8	9.2	18.5	-
Lift and Lowering Speeds										
	LOADED					EMPTY				
Lift Speeds (FPM)	89					105				
Lowering Speeds (FPM)	70					80				
Drawbar Pull in Pounds First Gear										
	LOADED					EMPTY				
(at 1 M.P.H.)	15,380					15,300				
Gradeability (%) First Gear										
(at 1 M.P.H.)						40				

TIRES PNEUMATIC

Standard 9.00 X 20 — 12 Ply

Drive and Steer Tires are on demountable rims and fully interchangeable.

Tire Pressure..... 95 Lb P.S.I.

ENGINE FILTERS: Four, all standard equipment. (1) Fuel filter in metallic bowl. (2) Final fuel filter at carburetor. (3) One quart oil filter with automotive type replaceable cartridge. (4) Dry type air cleaner with pre-cleaner, visual restriction indicator.

ELECTRICAL SYSTEM: 12-volt electrical system. 70-amp. hour battery; 22 amp, controlled by voltage regulator; electric starter, dust enclosed ignition distributor, keyless starting ignition switch, electric horn. Automotive type fuses protect the electrical circuits. A multiple disconnect plug under the instrument panel is provided for servicing ease.

HYDRATORK TRANSMISSION: Standard on CY Models. 12" industrial torque converter, 3:0 to 1 torque multiplication; charging pump and pressure control valves externally mounted. 4 speed power shift transmission is a separate unit with constant mesh alloy steel gears. Speed and direction selectors externally located.

ENGINE, DIESEL: General Motors 4 cylinder, 2-cycle, 4-valve Rotor-type pump crank shaft driven. Quickly replaceable cam-operated unit fuel injectors pressurize fuel at injector tip, eliminating high pressure fuel lines.

	GM
Model	Diesel 4-53
Bore	3 7/8"
Stroke	4 1/2"
Displacement—cu. in.	212.3
Governed r.p.m.	2800
Net brake Hp. at gov. r.p.m.	110
Bare engine Hp. at gov r.p.m.	130

Max torque—lb ft.	272
Crankcase capacity—qts.	14
Fuel tank capacity—gals.	44

INSTRUMENTS: Engine hour meter; ammeter; oil pressure, fuel and temperature gauges; all mounted in cowl within easy view of operator.

HYDRAULIC SYSTEM: Pump, Gear type, with tandem steering pump; capacity at full governed r.p.m., 75 g.p.m.; Steering pump, 20 g.p.m. at governed r.p.m.; 8 g.p.m. controlled flow to steering

Control valve — Spool type full feathering with integral, pilot controlled relief; individual checks on each port to prevent back flow or reverse control.

System oil capacity, 44 gallons; 3" intake line with 80 mesh screen in the sump and a 10 micron full-flow filter in the return line from valve to sump. The oil lines consist of S.A.E. straight thread ports with "O" ring seals, J.I.C. tested steel tube and high pressure wire braid reinforced hose.

POWER BRAKES: Vacuum power operated; 16" diameter lining. Hand operated parking brake on differential. Hand Brake lever with adjustment in handle.

GENERAL: Protectoseal fuel tank filler cap, recess pin-type coupler and multi-pass muffler are all standard equipment.



INDUSTRIAL TRUCK DIVISION



DIMENSIONAL SPECIFICATIONS

Max capacity—lb (kg)
 Tractor capacity—gal (l)
 Fuel tank capacity—gal (l)

INSTRUMENTS: Engine hour, wheel, manual, oil, coolant, fuel and carburetor gauges, oil pressure, fuel, water, temperature, and hydraulic pressure gauges are provided. A fuel gauge is also provided.

HYDRAULIC SYSTEM: This gear drive unit features a hydraulic pump, capacity as full power, and a 15.5-gallon hydraulic oil reservoir. An advanced 7.5-gal. hydraulic tank, controlled by the operator, is provided. A 3-gal. oil reservoir is also provided.

Control valve—25-gal. (10-l) reservoir with hydraulic filter, controlled by the operator. A reverse control valve is also provided.

System oil capacity: 44 gallons (168 l) with 100% oil. In the standard configuration, a 100-gal. (378-l) oil reservoir is provided. A 100-gal. (378-l) oil reservoir is provided with 100-gal. (378-l) oil. A 100-gal. (378-l) oil reservoir is provided with 100-gal. (378-l) oil. A 100-gal. (378-l) oil reservoir is provided with 100-gal. (378-l) oil.

POWER BRASS: Vacuum power steering for manual steering, hand-cranked parking brake, on differential, hand crank, lever, wheel, oil, etc.

GENERAL: Frontal, rear, fuel tank filter, etc. are provided. The operator and engine, etc. are provided.

Model
 Year
 Price
 Options

6500
 1977
 \$12,500

6500
 1977
 \$12,500

6500
 1977
 \$12,500

6500
 1977
 \$12,500

6500
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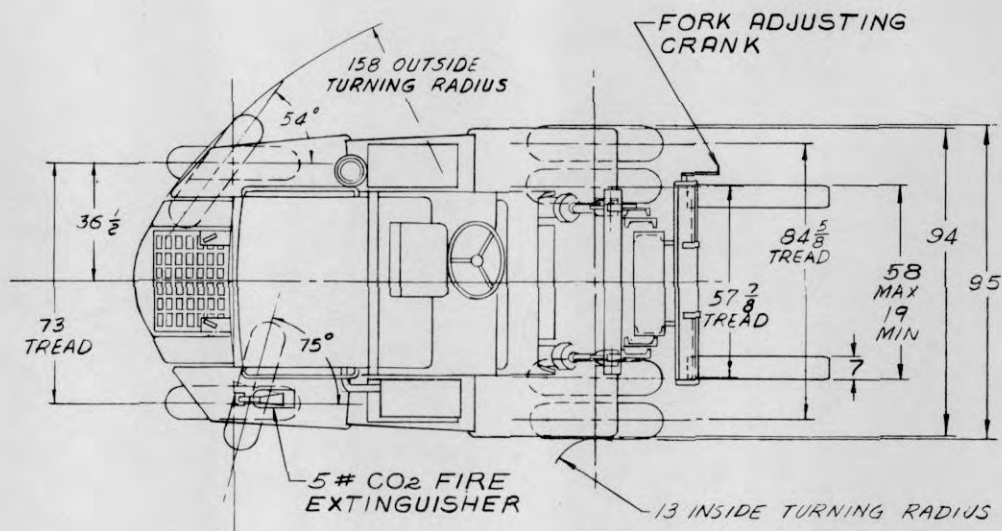
6500
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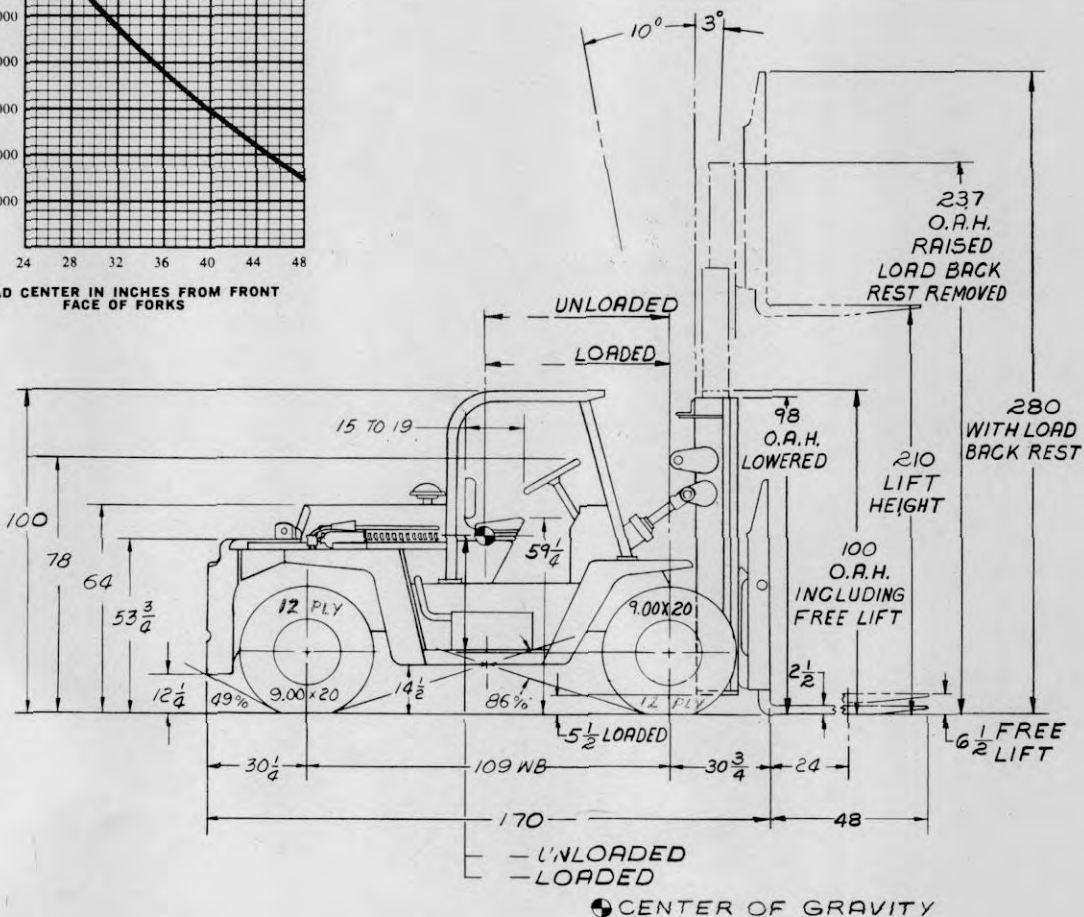
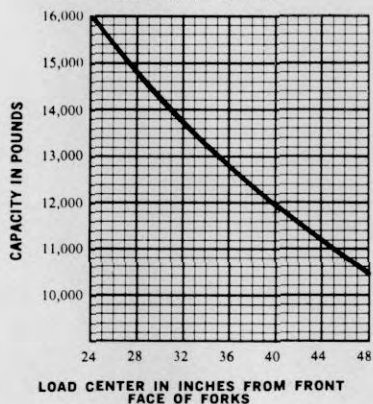
6500
 1977
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6500
 1977
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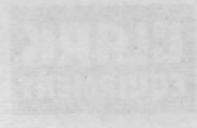
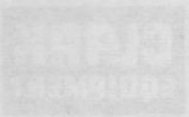
SPECIFICATIONS



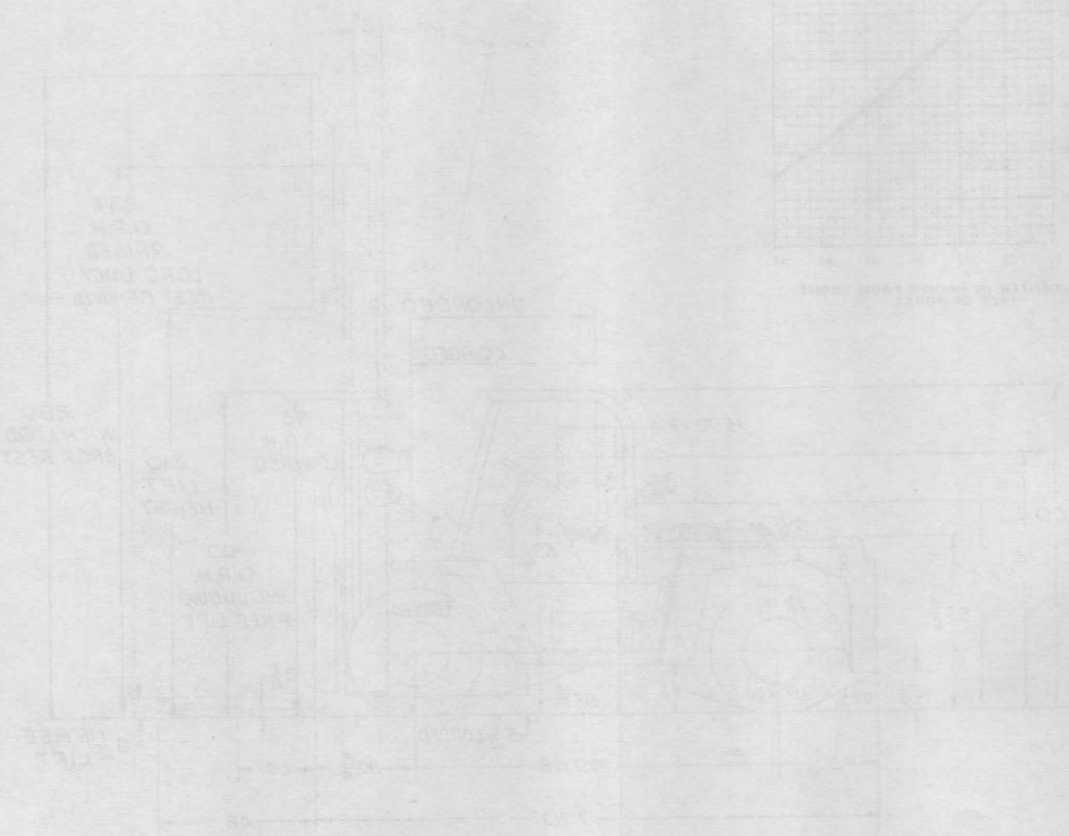
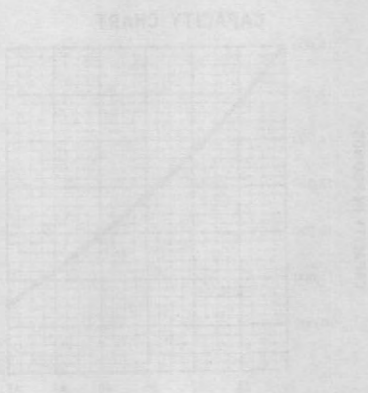
CAPACITY CHART



MASTER MAINTENANCE MANUAL



EXHAUSTION PIPE
3/4" WIDE TYPICAL



WATER CENTER OF GRAVITY
- FLOODED
- FLOODED



INDUSTRIAL TRUCK DIVISION



NEW MACHINE 50 HOUR SERVICE AND INSPECTION

	<u>PAGE</u>
Air Cleaner, Service	8H 009
Axle End Level Check	100H 009
Battery Test and Level Check	100H 009
Brake Master Cylinder Level Check	100H 009
Brake Pedal, Adjust	100H 009
Charging Unit Drive Belt, Adjust	100H 005
Cooling System, Inspect	100H 003
Differential Level Check	100H 002
Engine Breather, Clean	Refer to Diesel Operators Manual
Engine Crankcase, Drain and Refill!	Refer to Diesel Operators Manual
Engine Oil Filter, Change	Refer to Diesel Operators Manual
Fan Belt, Adjust	100H 005
Fuel Pump Strainer, Clean or Replace	Refer to Diesel Operators Manual
Hand Brake, Adjust	1000H 033
Hydraulic Oil Filter, Change	500H 003
Hydraulic Sump Tank Breather, Clean	100H 009
Lift Chains, Adjust	100H 011
Lubricate Machine	100H 013
Nuts, Bolts and Capscrews, Tighten	500H 003
Pressure Check Main Hydraulic System	1000H 041
Pressure Check, Steering System	1000H 043
Steering Gear Level Check	100H 007
Transmission and Converter Level Check	100H 002

N O T E

PERFORM THIS SERVICE AND INSPECTION AFTER THE
FIRST 50 HOURS OF OPERATION OF NEW MACHINES.

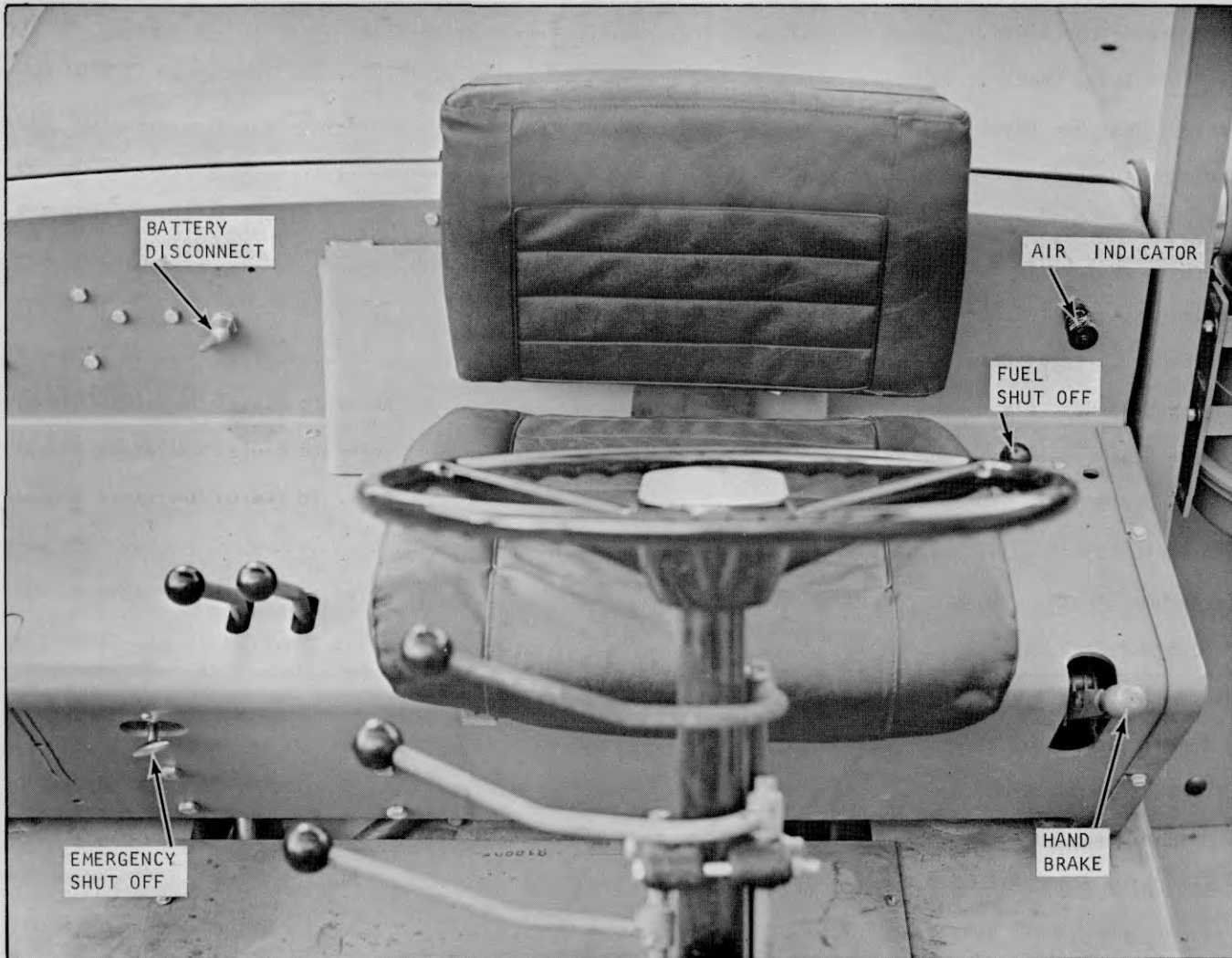
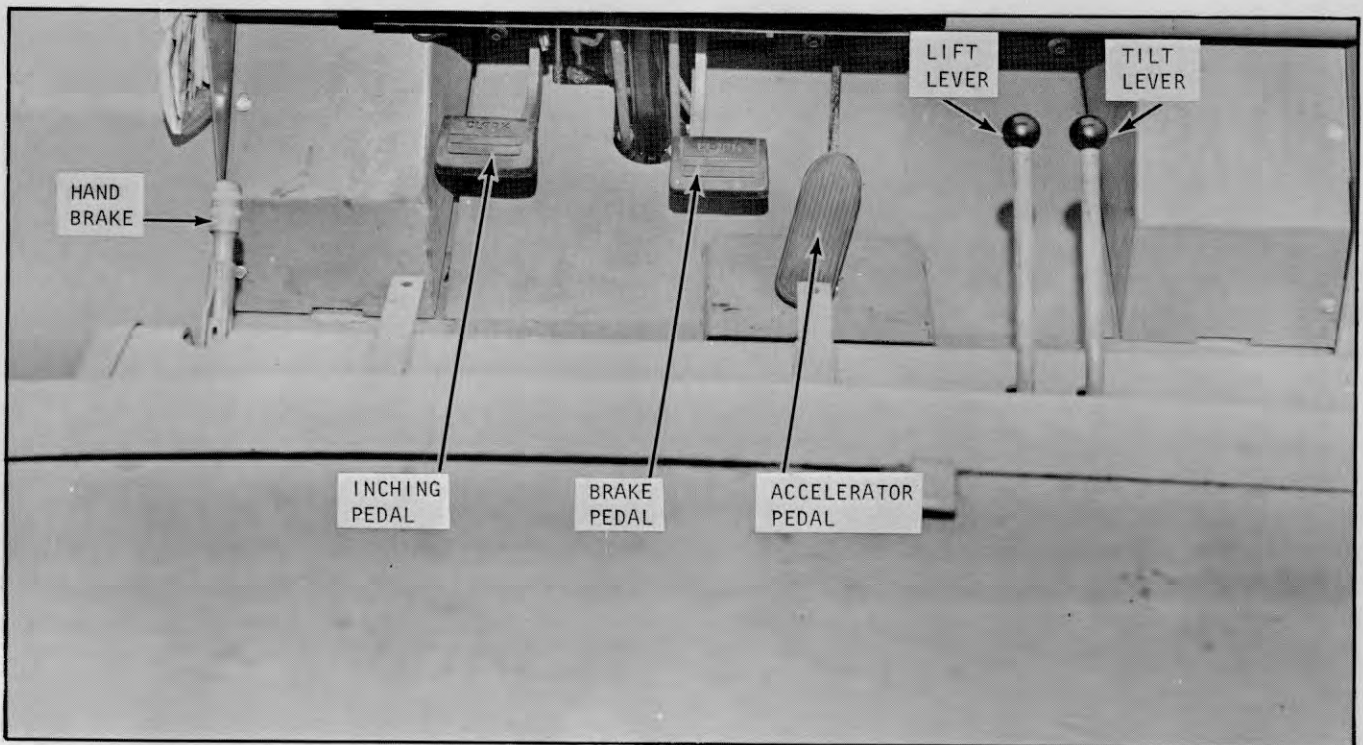
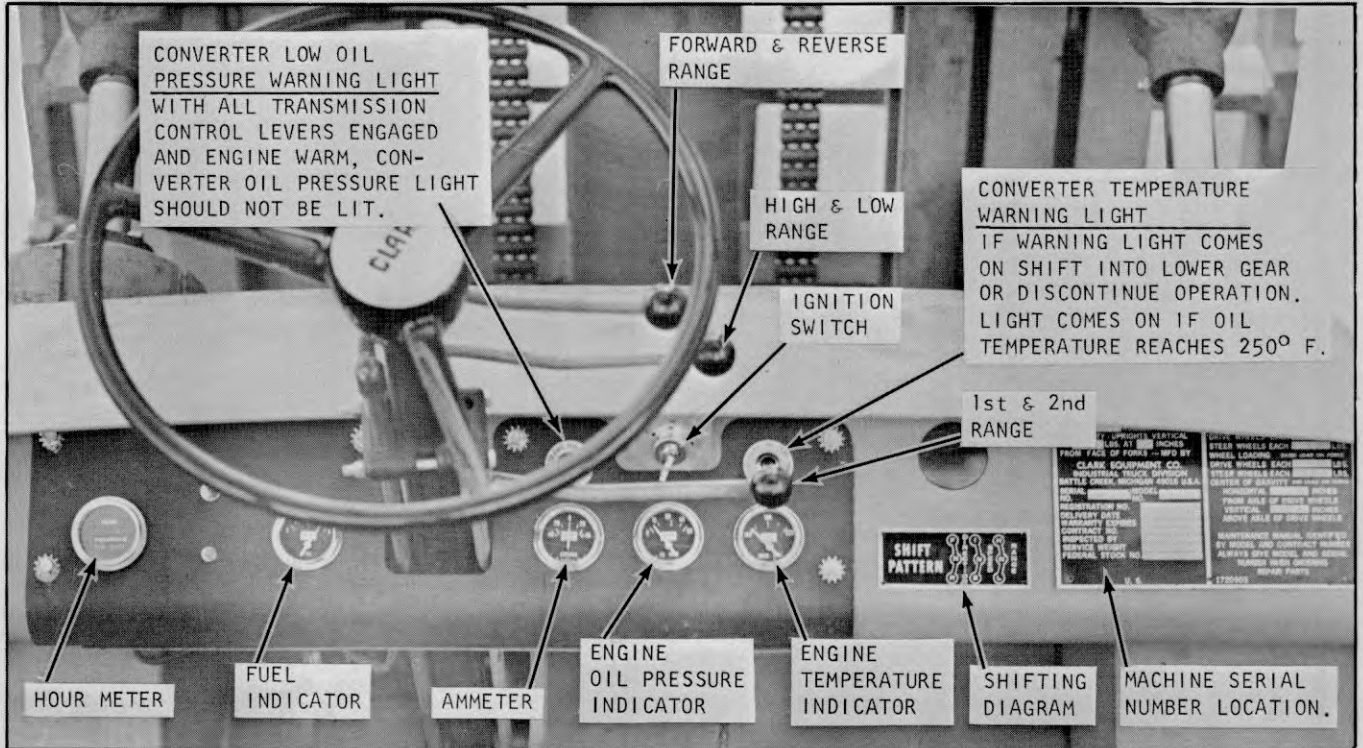
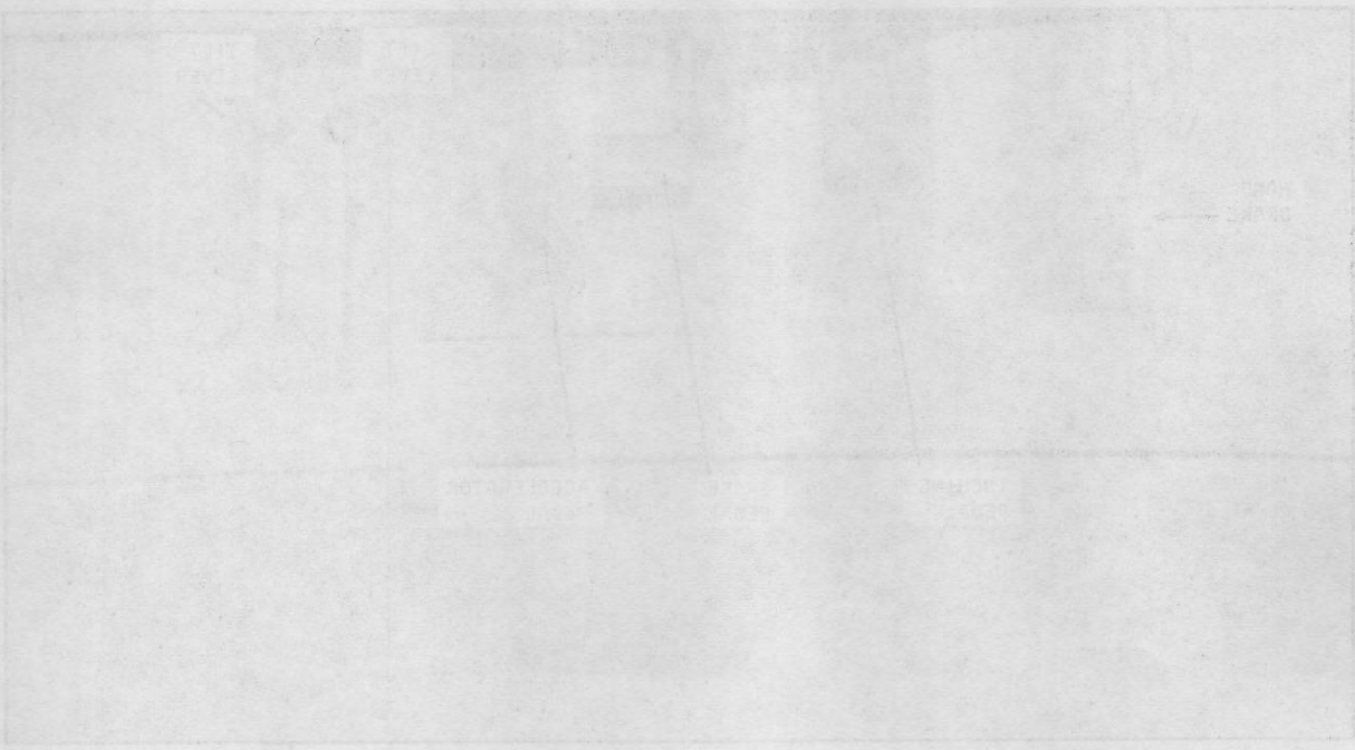
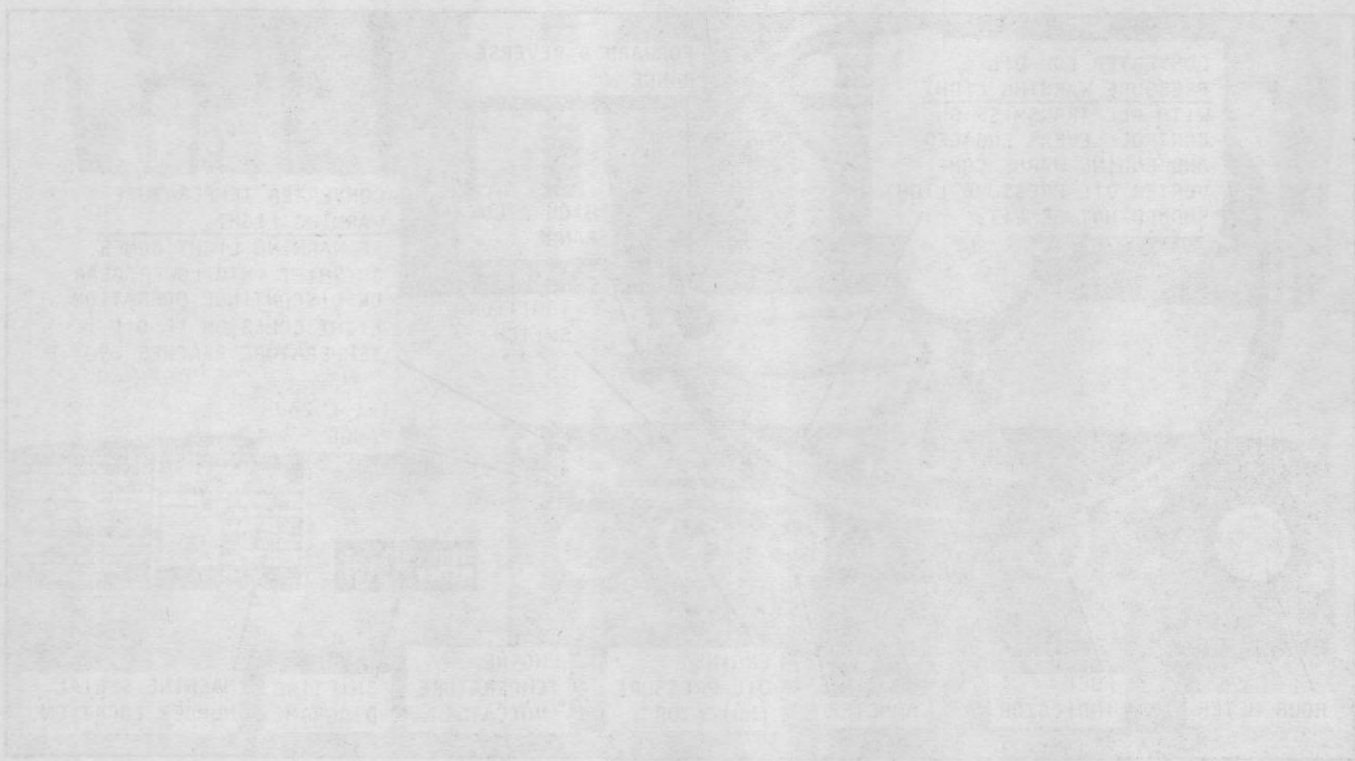
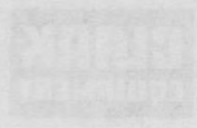


Plate 10126. Controls



Playe 10125. Location of Controls

INDUSTRIAL TRUCK DIVISION



Please Refer to Location of Controls

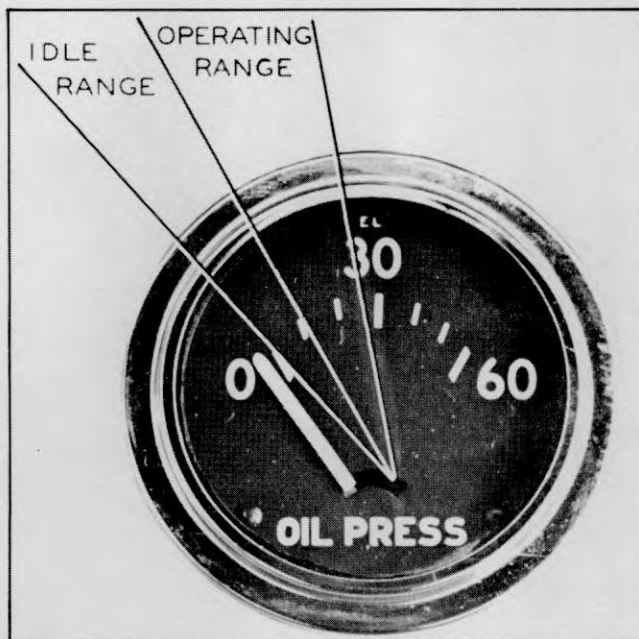


Plate 6417. Oil Pressure Indicator

NOTE

Normal oil pressure is 26 lbs. at 2600 R.P.M. with oil hot (about 140° F) which at idling speed results in pressure between 5 and 10 lbs.

CAUTION

IF OIL PRESSURE IS ERRATIC OR FALLS BELOW THE 5 TO 10 LB. LIMIT, STOP THE ENGINE IMMEDIATELY AND FIND THE CAUSE OF THE TROUBLE. REFER TO TROUBLE SHOOTING SECTION FOR THIS INFORMATION.

CAUTION

ON NEW MACHINES, AFTER STARTING ENGINE -- RUN IT AT IDLE FOR 5 MINUTES, THEN STOP ENGINE AND RECHECK OIL LEVEL IN CRANKCASE -- BRING OIL LEVEL TO HIGH MARK, IF NECESSARY.

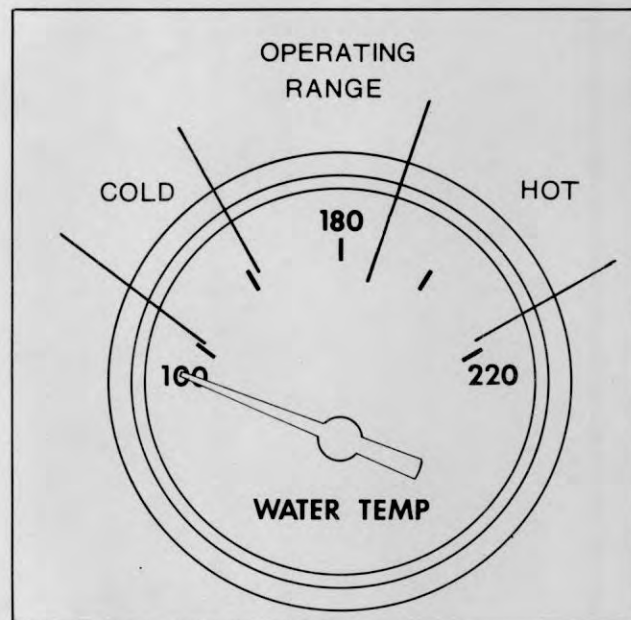


Plate 9974. Engine Coolant Temperature Indicator

NOTE

Before placing machine in operation run engine a few minutes to warm oil especially in cold operating conditions.

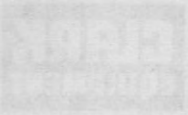
Low operating temperatures wastes fuel and increases engine wear.

NOTE

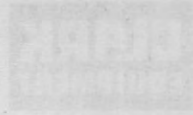
The coolant temperature should register 150° to 185° F. after the first ten or fifteen minutes of operation.

CAUTION

DO NOT IDLE THE ENGINE FOR LONG PERIODS, AS IT IS NOT ONLY DETRIMENTAL TO THE ENGINE BUT ALSO INCREASES OPERATING COSTS AS YOU ARE USING FUEL WITHOUT BENEFIT.



INDUSTRIAL TRUCK DIVISION



OPERATING RANGE

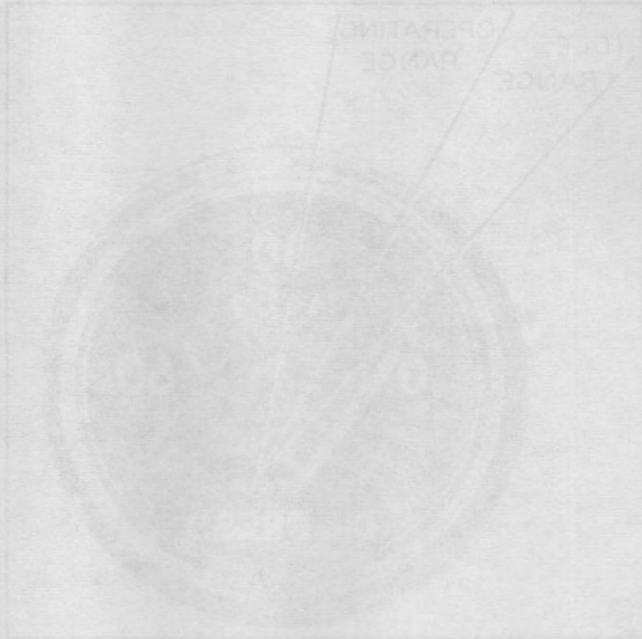


FIG. 107, Engine Cooling Temperature Indicator

FIG. 108, Oil Pressure Indicator

WATER

Before you begin working on an engine, you should check the water level in the cooling system. If the level is low, you should add water to the system. Do not use distilled water, as it can cause corrosion. Use only clean, fresh water.

The normal temperature range for an engine is 150 to 180°F. If the temperature is above 180°F, you should check the cooling system for problems. If the temperature is below 150°F, you should check the thermostat.

CAUTION

DO NOT JUMP THE ENGINE FOR LONG PERIODS, AS THIS IS NOT ONLY DANGEROUS TO THE ENGINE BUT ALSO INCREASES WEAR AND TEAR. ALWAYS USE FRESH WATER WITHOUT SALT.

CAUTION

IF THE PRESSURE IS CRITICAL OR FAULTY, DO NOT RUN THE ENGINE AT FULL LOAD. THE ENGINE IS DESIGNED TO OPERATE AT A PRESSURE OF 15 TO 20 PSI. IF THE PRESSURE IS ABOVE 20 PSI, YOU SHOULD STOP THE ENGINE IMMEDIATELY AND CHECK THE CAUSE OF THE PROBLEM. NEVER TO PROCEED WITHOUT STOPPING FOR THIS REASON.

OPERATION

STARTING

ON NEW MACHINES, AFTER TIGHTENING THE ENGINE AND RUNNING FOR 5 MINUTES, THEN STOP THE ENGINE AND CHECK OIL LEVEL IN CRANKCASE. BRING OIL LEVEL TO PROPER LEVEL, IF NECESSARY.

OPERATIONS

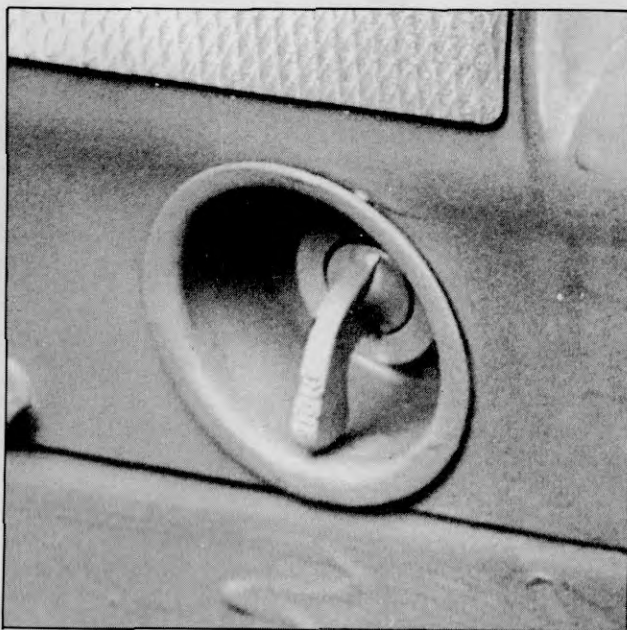


Plate 7018. Ignition Switch

STARTING

Place all transmission control levers in neutral position. Pull out on choke button and turn ignition switch. The starter is engaged when the switch lever is turned to ignition position.

DO NOT ENGAGE THE STARTER LONGER THAN 15 SECONDS WITHOUT A MINUTE OR SO INTERVAL BETWEEN TRIALS.

If the engine becomes overchoked or flooded; push choke button in, depress accelerator pedal fully and engage starter. If all necessary equipment is in correct working order, the engine will start.

Allowing a reasonable time interval for the engine to warm up, check instrument panel making certain the converter oil temperature light is not lit. Check engine oil pressure indicator. If reading is erratic or low; or, if the previously mentioned light is lit, turn off machine and correct difficulty.

NOTE

Converter pressure light will remain on until all transmission control levers are engaged. Run engine a few minutes to warm oil, especially in cold operating conditions.

TO OPERATE MACHINE

1. Place all transmission control levers in neutral position and start engine.
2. Move HIGH and LOW shift lever into desired position.
3. Move 1st and 2nd lever into position.
4. Now move FORWARD And REVERSE lever into position.

NOTE

Either the forward and reverse or 1st and 2nd lever must be in neutral position before moving high and low shift lever into position. All control levers must be engaged before machine will move. A diagram located on the instrument panel (Plate 9958) will aid the operator in selecting the correct gear and range.

TO STOP MACHINE

Remove foot from accelerator pedal and depress brake pedal. If machine is to be parked, place all transmission control levers in neutral position, apply hand brake and shut engine off.

CAUTION

IF THE ENGINE HAS BEEN OPERATING AT OR NEAR FULL LOAD, IT SHOULD BE ALLOWED TO RUN AT FAST IDLE (600 TO 800 R. P. M.) FOR ONE OR TWO MINUTES AFTER LOAD IS REMOVED BEFORE BEING STOPPED. THIS ALLOWS INTERNAL ENGINE TEMPERATURES TO EQUALIZE.



INDUSTRIAL TRUCK DIVISION



OPERATIONS

TO OPERATE MACHINE

1. Place all transmission control levers in neutral position and start engine.
2. Move hand and foot shift levers into desired position.
3. Move foot and hand shift levers into desired position.
4. Move hand and foot shift levers into desired position.

NOTE

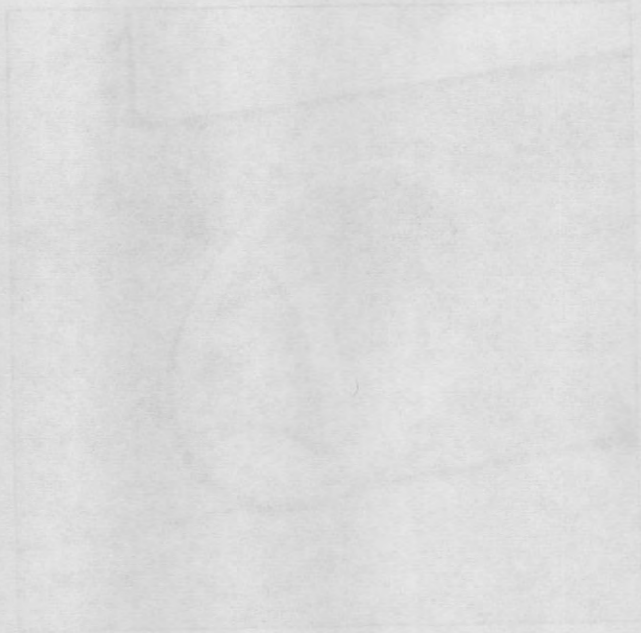
When the forward and reverse control levers are moved from the neutral position to the forward or reverse position, the control levers must be moved before the hand and foot shift levers are moved. This will prevent a situation where the hand and foot shift levers are moved while the control levers are in the forward or reverse position.

TO STOP MACHINE

When the operator wishes to stop the machine, the hand and foot shift levers must be moved to the neutral position. The engine must be stopped by the operator.

C A U T I O N

IF THE ENGINE HAS BEEN OPERATING AT OR NEAR FULL LOAD, IT SHOULD BE ALLOWED TO RUN AT FAST IDLE (500 TO 800 R.P.M.) FOR ONE OR TWO MINUTES AFTER LOAD IS REMOVED BEFORE STOPPING. THIS ALLOWS INTERNAL ENGINE TEMPERATURES TO EQUALIZE.



Drive Shaft Location Detail

STAIRING

Place the transmission control levers in neutral position and start the engine. The operator is to operate the machine in the forward or reverse position.

DO NOT EXCEED THE STARTER TORQUE THAN IS SPECIFIED WITHOUT A MINUTE OR SO INTERVAL BETWEEN ATTEMPTS.

If the engine does not start after several attempts, the operator should stop the engine and check the battery and starter. The operator should also check the fuel system and the air filter.

After a reasonable time interval, the operator should attempt to start the engine again. If the engine does not start after several attempts, the operator should stop the engine and check the battery and starter. The operator should also check the fuel system and the air filter.

NOTE

Lowest possible tire pressure should be maintained at all times. The operator should check the tire pressure before starting the machine and after every 1000 feet of operation.

O P E R A T I O N S

TO MOVE A LOAD

The forks should be adjusted sidewise on fork bars to obtain maximum balance in proportion to width of load. Raise or lower forks to proper level and center the load as nearly as possible on the forks. Tilt upright assembly slightly backward to prevent the load from falling, accelerating engine slightly at the same time. Back away from stack.

Adjust the forks with load so they are close to the floor or ground but high enough to avoid hitting obstructions. The operator should have clear vision ahead when moving in a forward direction. When this is not possible, the operator should drive in reverse and sufficiently turn in his seat to obtain clear vision backward.

When the load is to be deposited, enter the area squarely, especially when placing one load on top of another, in order that all piles will be square and secure. Place load directly over desired area and slowly lower to the floor.

I M P O R T A N T

EVERY 8 OPERATING HOURS (OR EVERY SHIFT) ELEVATE UPRIGHT TO THE UPPER LIMIT. THIS WILL PROVIDE LUBRICATION TO THE TOP PORTION OF THE LIFT CYLINDER.

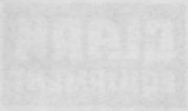
SAFETY AND OPERATION SUGGESTIONS

The use of industrial powered trucks is subject to certain hazards that cannot be overcome by purely mechanical means. The exercise of intelligence, care and common sense by the truck operator is necessary to eliminate the hazards of overloading, slipping and falling of the load; obstructions in the path of travel, or the use of equipment for a purpose for which it is not intended or designed.

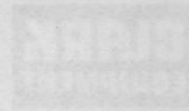
The following are a few suggestions that should be followed in the operation of this machine.

1. Operate machine with forks close to floor, loaded or empty, but high enough to avoid hitting obstructions.
2. If vision is obstructed by the load, operate machine in reverse and sufficiently turn in the seat to obtain clear vision.

3. Avoid sudden stops or starts. When backing, be sure to look for fellow workmen before moving machine.
4. Drive carefully at all times. Exercise caution at cross aisles. Sound horn for safety.
5. Be sure loads are safe to move. Have loads properly centered on machine. Refer to the Capacity Chart in Specifications for various load center ratings.
6. An operator should be assigned to a specific machine.
7. The operator should be qualified and drive in accordance with his company's safety rules.
8. If the machine does not respond immediately, report to designated individual in charge. A minor adjustment now may save a major repair later.
9. Do not allow riders or hitchhikers.
10. Operate the machine at a safe distance behind other vehicles.
11. Do not operate machine with wet or greasy hands.
12. Observe highway traffic laws in the operation of the vehicle in the plant.
13. Drive carefully on wet or slippery floors.
14. Keep feet within running line of truck.
15. Observe the Operating Rules and Preventive Maintenance Instructions ASA B56.1 Safety Code for Powered Industrial Trucks.
16. Avoid overloading the truck -- this is a safety measure against possible injury to the driver and fellow workmen. Overloading shortens the life of the truck and increases maintenance.
17. Do not operate machine for prolonged periods in an unventilated area. All engines produce poisonous carbon monoxide gas as a by-product of combustion and can be dangerous if allowed to accumulate in a closed area.
18. Be sure the brakes are in proper working condition. Be sure all mechanical and electrical components are working correctly.



INDUSTRIAL TRUCK DIVISION



OPERATING INSTRUCTIONS

TO MOVE A LOAD

The forks should be adjusted slightly on each side to obtain a level surface in proportion to width of load. Raise or lower forks to proper level and adjust the load as nearly as possible to the center of the fork. Slightly back up and forward the load to the center of the fork. Slightly back up and forward the load to the center of the fork. Slightly back up and forward the load to the center of the fork.

When the load is to be deposited, the operator should slightly back up and forward the load to the center of the fork. Slightly back up and forward the load to the center of the fork. Slightly back up and forward the load to the center of the fork.

THIS PART

EVERY OPERATING HOUR (OR EVERY SHIFT) ELEVATE FORK TO THE WORK LIMIT WITH FORWARD TRACTION TO THE FORK TIRE OF THE LEFT CYLINDER.

SAFETY AND OPERATION PRECAUTIONS

1. Do not operate machine on wet or slippery floors. 2. Do not operate machine with wet or greasy hands. 3. Observe highway traffic law at all times. 4. Drive carefully on wet or slippery floors. 5. Do not operate machine with wet or greasy hands. 6. Observe highway traffic law at all times. 7. Drive carefully on wet or slippery floors. 8. Do not operate machine with wet or greasy hands.

The following are the suggestions that should be followed in the operation of this machine. 1. Do not operate machine on wet or slippery floors. 2. Do not operate machine with wet or greasy hands. 3. Observe highway traffic law at all times. 4. Drive carefully on wet or slippery floors. 5. Do not operate machine with wet or greasy hands. 6. Observe highway traffic law at all times. 7. Drive carefully on wet or slippery floors. 8. Do not operate machine with wet or greasy hands.

1. Avoid sudden stops or starts when backing. Do not look for follow workmen before moving backward.

2. Drive carefully of all lines, curves, corners or cross aisles. Sound horn as necessary.

3. Do not load and safety to move. Have load properly centered on machine. Refer to the specific chart in specifications for various load center ratings.

4. An operator should be assigned to a specific machine.

5. The operator should be qualified and drive in accordance with his company's safety rules.

6. If the machine does not respond properly, report to designated individual in charge. A minor adjustment may have a major result later.

7. Do not allow floors or obstructions.

8. Operate the machine at a safe distance from other vehicles.

9. Do not operate machine with wet or greasy hands.

10. Observe highway traffic law at all times. Operate of the vehicle in the same direction.

11. Drive carefully on wet or slippery floors.

12. Do not operate machine with wet or greasy hands.

13. Observe the operating rules and prevent the maintenance instructions for this battery load for heavy industrial trucks.

14. Avoid overloading the truck. This is a safety feature against possible injury to the driver and follow warning. Operating instructions the lift of the truck and increase maintenance.

15. Do not operate machine for prolonged periods in an unventilated area. All engine produce poisonous carbon monoxide gas as a by-product of combustion and can be dangerous if allowed to accumulate in a closed area.

16. Do not use the brakes in a stop-and-go condition. Do not lift the load. The electrical components are working correctly.



INDUSTRIAL TRUCK DIVISION



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Nuts, Bolts & Capscrews, Tighten	500H 003
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(1000 HOURS)	
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And Refil	1000H 021
Upright & Lift Carriage Roller.....	
Adjustments Checks	1000H 028

LUBRICATION & PREVENTIVE MAINTENANCE ILLUSTRATIONS

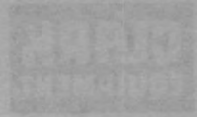
<u>Description</u>	
Plate 9973. Lube. & Prev. Main. Illus. ..	8E 002
Plate 6509. Lube. & Prev. Main. Illus. .	100H 002
Lube. Instruction Diagram..	100H 013
Plate 6510. Lube. & Prev. Main. Illus...	500H 002
Plate 6511. Lube. & Prev. Main. Illus..	1000H 002

NOTE

When Performing the 100, 500, or 1000 Hour Lubrication and Preventive Maintenance, always include the previous lubrication and preventive maintenance schedules.



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

1. Check oil level in crankcase before starting engine. Add oil if necessary.
 2. Check oil level in hydraulic system. Add oil if necessary.
 3. Check oil level in transmission. Add oil if necessary.
 4. Check oil level in differential. Add oil if necessary.
 5. Check oil level in steering gear. Add oil if necessary.
 6. Check oil level in rear axle. Add oil if necessary.
 7. Check oil level in front axle. Add oil if necessary.
 8. Check oil level in brake system. Add oil if necessary.
 9. Check oil level in cooling system. Add oil if necessary.
 10. Check oil level in power steering system. Add oil if necessary.

LUBRICATION & PREVENTIVE MAINTENANCE

1. Check oil level in crankcase before starting engine.
 2. Check oil level in hydraulic system.
 3. Check oil level in transmission.
 4. Check oil level in differential.
 5. Check oil level in steering gear.
 6. Check oil level in rear axle.
 7. Check oil level in front axle.
 8. Check oil level in brake system.
 9. Check oil level in cooling system.
 10. Check oil level in power steering system.

NOTE

When performing the lubrication and preventive maintenance always use the correct oil grade and weight.

1. Check oil level in crankcase before starting engine.
 2. Check oil level in hydraulic system.
 3. Check oil level in transmission.
 4. Check oil level in differential.
 5. Check oil level in steering gear.
 6. Check oil level in rear axle.
 7. Check oil level in front axle.
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 4. Check oil level in differential.
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 7. Check oil level in front axle.
 8. Check oil level in brake system.
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 3. Check oil level in transmission.
 4. Check oil level in differential.
 5. Check oil level in steering gear.
 6. Check oil level in rear axle.
 7. Check oil level in front axle.
 8. Check oil level in brake system.
 9. Check oil level in cooling system.
 10. Check oil level in power steering system.

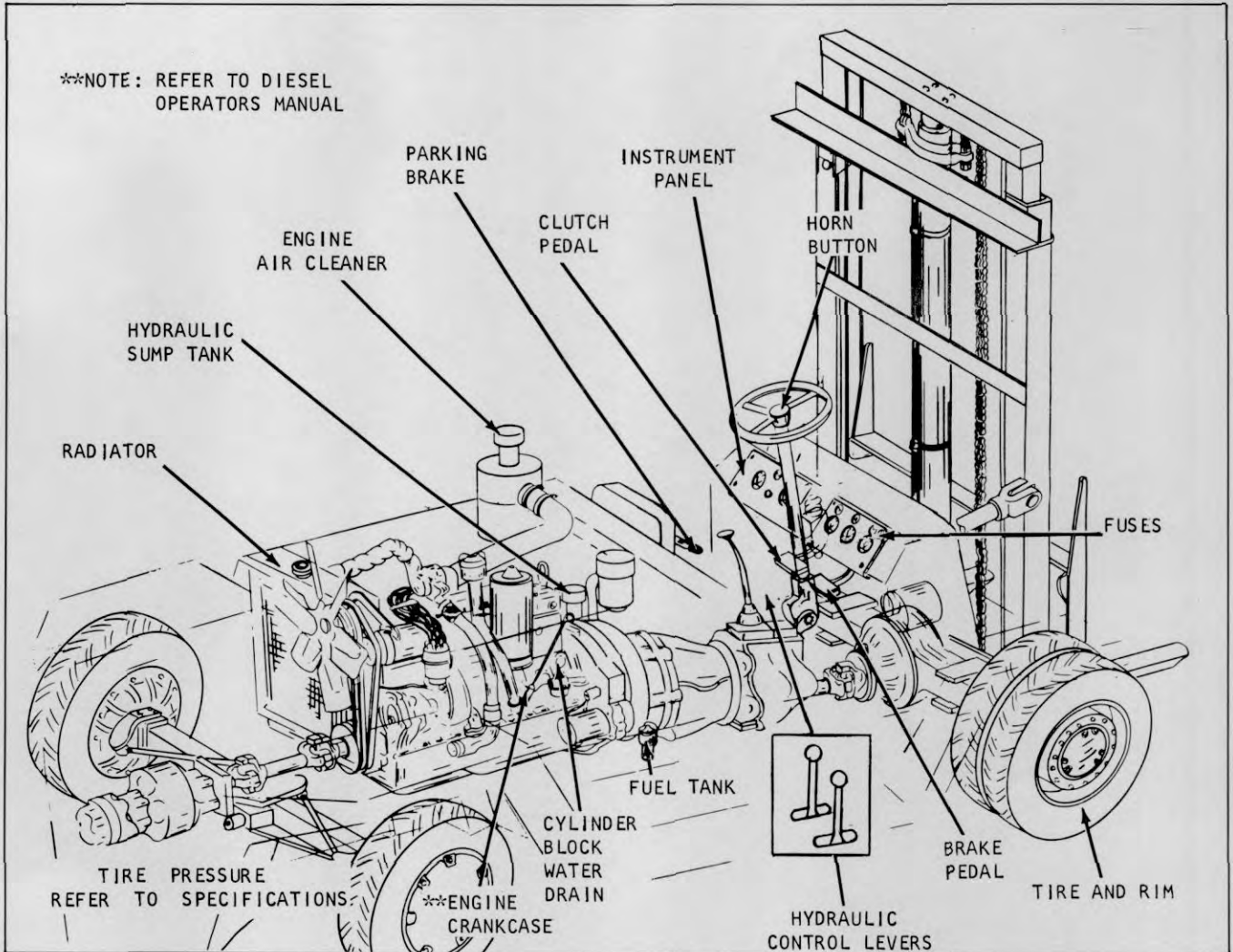


Plate 9973. Lubrication & Preventive Maintenance Illustration

HORN

Check to be sure the horn is working properly.

FUEL TANK

Check fuel supply and fill if necessary. Use a good grade of fuel.

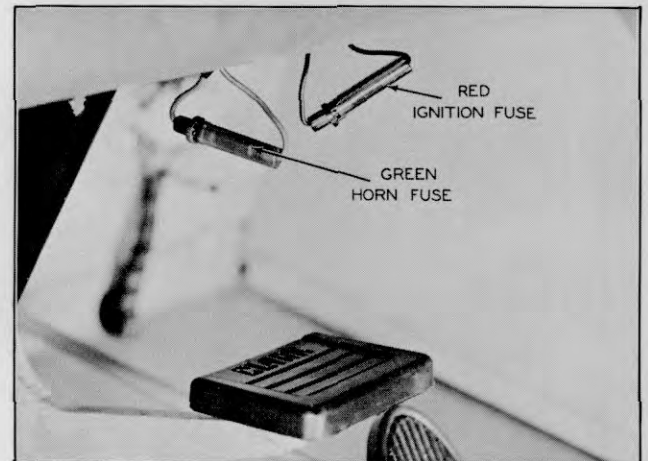


Plate 6424. Ignition Fuse and Horn Fuse

INDUSTRIAL TRUCK DIVISION

LUBRICATION AND PREVENTIVE MAINTENANCE

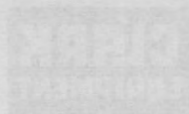
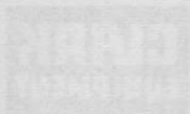


Plate 923, Lubrication & Preventive Maintenance Illustration



NOTE: Before working on the truck, be sure the truck is working properly.
FUEL TANK
Check fuel supply and fill if necessary.
Use a good grade of fuel.

Place keys, ignition fuse and horn fuse

ENGINE CRANKCASE

Before attempting to start the engine, first make sure that it has sufficient oil. The oil filler pipe is located on the right side of the machine. The oil level stick is of the dipstick or bayonet type and is also located on the right side of the machine. Fill the crankcase reservoir through the filler pipe to the proper level as indicated on the dipstick, Plate 3145. Never permit the oil level to fall below the low mark on the dipstick.

C A U T I O N

DO NOT OVERFILL THE CRANKCASE, AS TOO MUCH OIL WILL BRING THE LEVEL HIGH ENOUGH FOR THE CONNECTING RODS TO DIP, THUS CAUSING EXCESSIVE QUANTITIES OF OIL TO BE THROWN TO THE CYLINDER WALLS RESULTING IN OIL CONSUMPTION, SMOKING, EXCESSIVE CARBON DEPOSITS AND FOULED SPARK PLUGS.

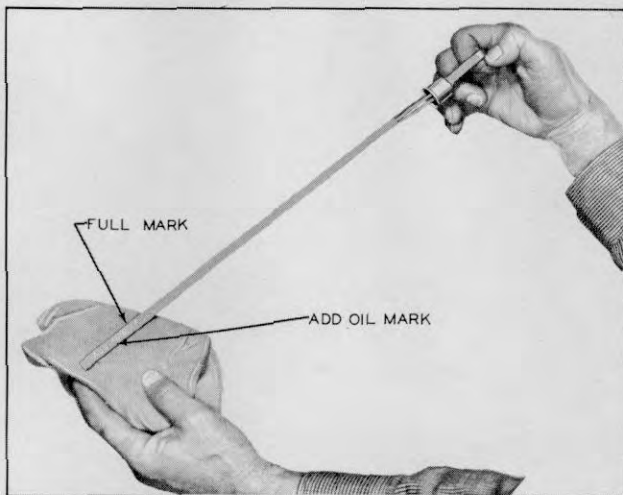


Plate 3145. Crankcase Oil Check

ENGINE COOLING

Make sure that the radiator drain cock and the water drains in the cylinder block are closed. Check radiator coolant level and fill to within 1 inch of the top with clean water; or if operation is in cold weather, use a suitable anti-freeze solution.

C A U T I O N

NEVER POUR COLD WATER OR COLD ANIT-FREEZE INTO THE RADIATOR OF AN OVERHEATED ENGINE. ALLOW THE ENGINE TO COOL AND AVOID THE DANGER OF CRACKING THE CYLINDER HEAD OR BLOCK. KEEP ENGINE RUNNING WHILE ADDING WATER OR ANTI-FREEZE.

C A U T I O N

WHEN PERMANENT ANTI-FREEZE OF THE ETHYLENE GLYCOL TYPE IS USED, THE COOLANT SOLUTION MUST CONTAIN AT LEAST 40% WATER.

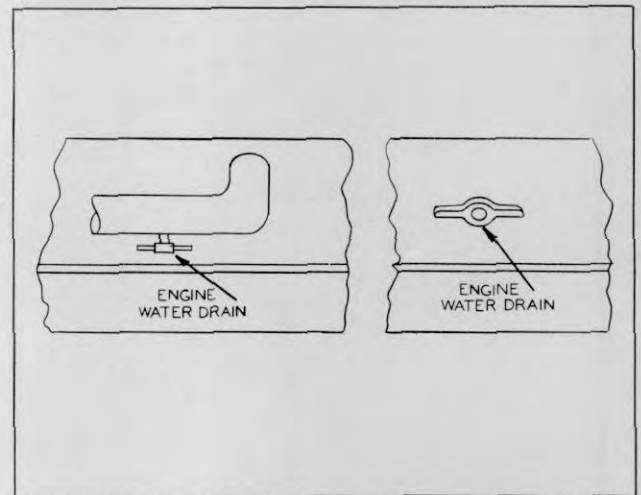


Plate 6421. Cylinder Block Water Drain



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

CAUTION

NEVER POUR COLD WATER OR COOLANT DIRECTLY INTO THE RADIATOR OF AN OVERHEATED ENGINE. ALLOW THE ENGINE TO COOL AND AVOID THE DANGER OF CRACKING THE CYLINDER HEAD OR BLOCK. AFTER ENGINE RUNNING WHILE ADDING WATER OR ANTI-FREEZE.

CAUTION

WHEN PERMANENT ANTIFREEZE OF THE ETHYLENE GLYCOL TYPE IS USED, THE PROPER SOLUTION MUST CONTAIN AT LEAST 50% WATER.

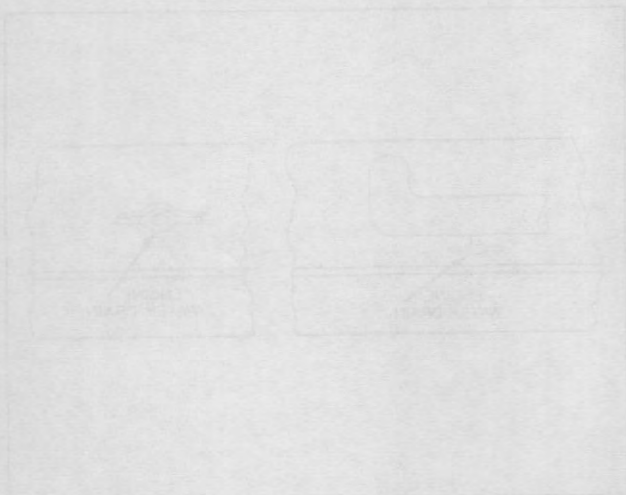


Plate B011 - Coolant to Top Radiator

ENGINE CRANKCASE

Before attempting to start the engine, first make certain that the oil level is correct. The oil dipstick is located on the right side of the engine. The oil level is also shown on the right side of the engine. The crankcase is located on the right side of the engine. The oil level is also shown on the right side of the engine.

CAUTION

DO NOT OVERFILL THE CRANKCASE AS TOO MUCH OIL WILL RAISE THE LEVEL HIGH ENOUGH FOR THE CONNECTING RODS TO HIT. THIS CAUSING EXCESSIVE QUANTITIES OF OIL TO BE THROWN TO THE EXHAUST MANIFOLD RESULTING IN OIL CONSUMPTION, SPARKING, EXCESSIVE CRACKING, AND OTHER SPARK RINGS.

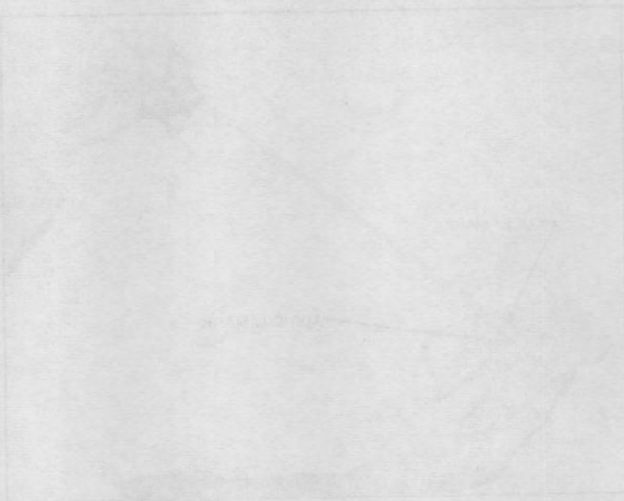


Plate B012 - Crankcase Oil Check

ENGINE COOLING

Make sure that the radiator drain cock and the water pump are the correct type and are properly adjusted. The radiator drain cock is located on the right side of the engine. The water pump is located on the left side of the engine.



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

Inspect for proper inflation. Refer to Specifications for correct tire pressure.

Inspect tires and wheels regularly for cuts, breaks, alignment, security of wheel clamp bolts and lug nuts or bolts.

Even with the best of maintenance practices, cuts will still be a source of tire trouble. The correct procedure for handling and repairing tires should be given careful attention. Close inspection of all tires should be made at the time of inflation check, and all tires having cuts that penetrate into the cord body should be taken off for proper repair.

Failure to make regular inspections and repairs, when needed, will result in further deterioration of the cord body and eventually a blowout. Small rocks and dirt will get into shallow cuts in the tread and if neglected will gradually be pounded through the cord body.

One simple method to forestall this action is to clean out the cut with an Awl or similar tool to remove any stones or other matter which may be lodged in the cut. Use a sharp, narrow-bladed knife and cut away the rubber around the cut to form a cone-shaped cavity extending to the bottom of the injury. The sides of the cavity should be slanted enough to prevent stones from wedging into it. Tires with cuts treated in this manner may be continued in service without danger of further growth of these injuries. If a tire has at least one deep cut that requires a repair, then all smaller cuts may be quickly and economically repaired and vulcanized by the steam kettle method.

NOTE

It is not recommended that tires with breaks be used again.

If uneven tire wear is evident, wheel alignment should be checked.

```

X X X X X X X X X X X X X X X X X X X X X X X
X
X      W A R N I N G
X
X   IN ALL CASES, WHEN REMOVING TIRES WITH
X
X  SPLIT RIMS FROM THE MACHINE FOR REPAIR
X
X OR PERIODIC ROTATION, COMPLETELY DEFLATE
X
X TIRES. THIS MAY BE ACCOMPLISHED BY REMOV-
X
X   ING THE VALVE CORE.
X
X X X X X X X X X X X X X X X X X X X X X X
  
```

```

X X X X X X X X X X X X X X X X X X X X X X X
X
X      W A R N I N G
X
X   IN ALL CASES, WHEN REMOVING TIRES EQUIP-
X
X  PED WITH THE LOCK RING TYPE RIM FROM THE
X
X MACHINE FOR REPAIR OR PERIODIC ROTATION,
X
X COMPLETELY DEFLATE TIRES. THIS MAY BE
X
X ACCOMPLISHED BY REMOVING THE VALVE CORE.
X
X X X X X X X X X X X X X X X X X X X X X X
  
```

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X X X X X X X X X X X X X X X X X X X X X X X
X
X      W A R N I N G
X
X   WHEN REPAIRING TIRES USED ON MACHINES
X
X THAT EMPLOY THE LOCK RING TYPE RIM, USE
X
X CAUTION WHEN INFLATING TIRE, PROCEED AS
X
X   FOLLOWS:
X
X X X X X X X X X X X X X X X X X X X X X X
  
```

- (1) After positioning lock ring on rim, turn wheel and rim assembly over so that lock ring is on side toward ground.
- (2) Inflate tire to 5 to 10 pounds.
- (3) Turn rim over and tap lock ring carefully with a mallet to be sure it is properly seated.
- (4) Turn rim and wheel over once again so that lock ring is on the bottom and inflate tire to proper pressure.

```

X X X X X X X X X X X X X X X X X X X X X X X
X
X      W A R N I N G
X
X   IF LOCK RING IS NOT LOCATED PROPERLY, IT
X
X IS POSSIBLE FOR IT TO POP OFF RIM WITH
X
X GREAT FORCE WHEN TIRE IS INFLATED AND
X
X COULD RESULT IN SERIOUS INJURY TO ANYONE
X
X   STRUCK BY IT.
X
X X X X X X X X X X X X X X X X X X X X X X
  
```

On machines using split rims, make periodic checks for noises in the wheel, as it is possible for damage to occur to the wheel bolts if they are not securely tightened when tires are changed. If the wheel bolts are loose or have been sheared off as a result of being loose, a grinding or scraping noise will be present when wheels are turned. Should this condition



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

exists it will be necessary to immediately remove the rim and tire from the machine and determine the cause of noise and repair or replace defective parts.

```

X X X X X X X X X X X X X X X X X X X X X X X X X
X
X           W A R N I N G           X
X
X  BEFORE REMOVING TIRE FROM RIM, RELEASE  X
X
X  ALL AIR FROM THE TIRE BY REMOVING VALVE  X
X
X  STEM CORE.                            X
X
X X X X X X X X X X X X X X X X X X X X X X X X X
  
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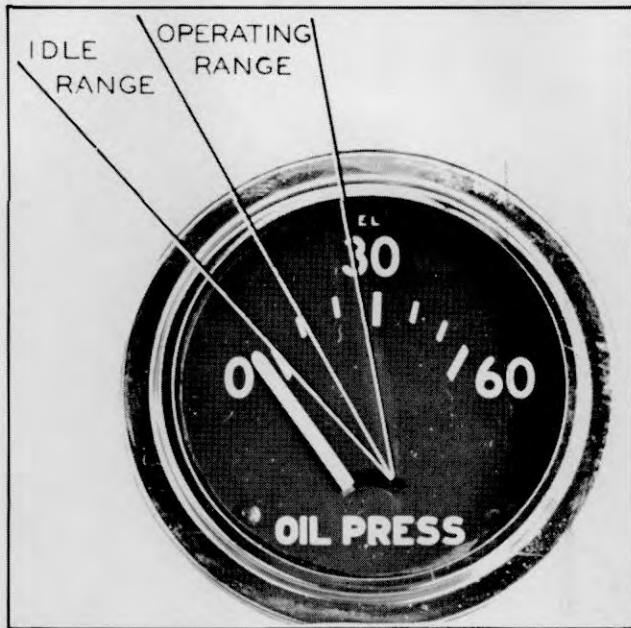


Plate 6417. Oil Pressure Indicator

NOTE

Normal oil pressure is 26 lbs. at 2600 R. P. M. with oil hot (about 140° F) which at idling speed results in pressure between 5 and 10 lbs.

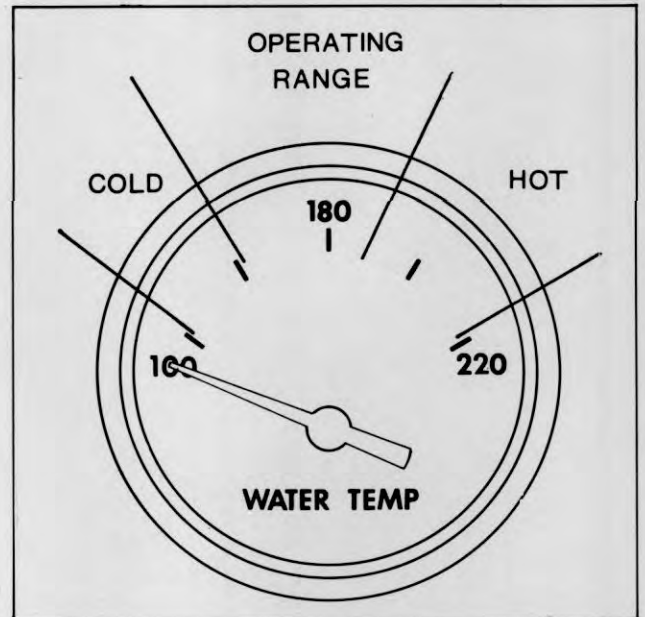


Plate 9974. Engine Coolant Temperature Indicator

NOTE

The water temperature should register 150° to 185° F. after the first ten or fifteen minutes of operation.



SHUT ENGINE OFF, IF WARNING LIGHT COMES ON. LIGHT WILL COME ON IF OIL TEMPERATURE REACHES 250° F.

Plate 6419. Converter Oil Temperature Warning Light

NOTE

If warning light comes on shift into lower gear or discontinue operation until oil cools. Converter temp light should not be lit. Light will come on if oil temperature reaches 250° F.



TRANSMISSION CONTROL LEVERS ENGAGED AND ENGINE WARM, LIGHT SHOULD NOT BE LIT. SHUT ENGINE OFF IF LIGHT COMES ON.

Plate 6420. Converter Low Oil Pressure Warning Light

NOTE

With all transmission control levers engaged and engine warm, converter oil pressure light should not be lit. If light comes on discontinue operation and determine cause.

INDUSTRIAL TRUCK DIVISION

OPERATION AND PREVENTIVE MAINTENANCE



Plate 207, Engine Oil and Water Temperature Indicator



Plate 217, Oil Pressure Indicator

NOTE:
The water temperature should indicate 150° to 180° F. After the first ten minutes of operation of protection.

NOTE:
Normal oil pressure is 20 psi at 1500 R.P.M. with oil temperature 100° F. which is being used only in between 2 and 10 psi.

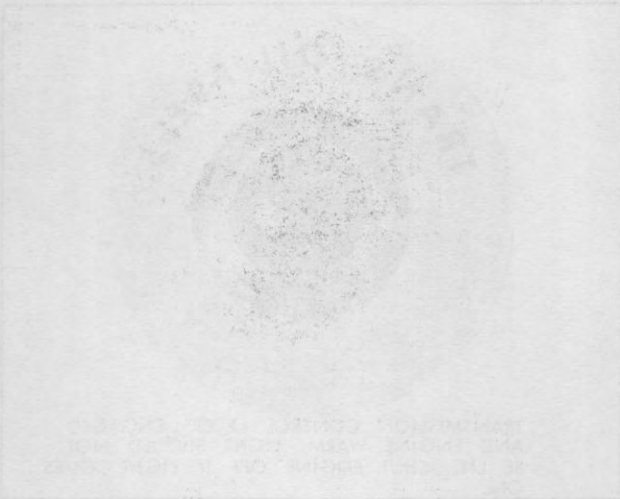


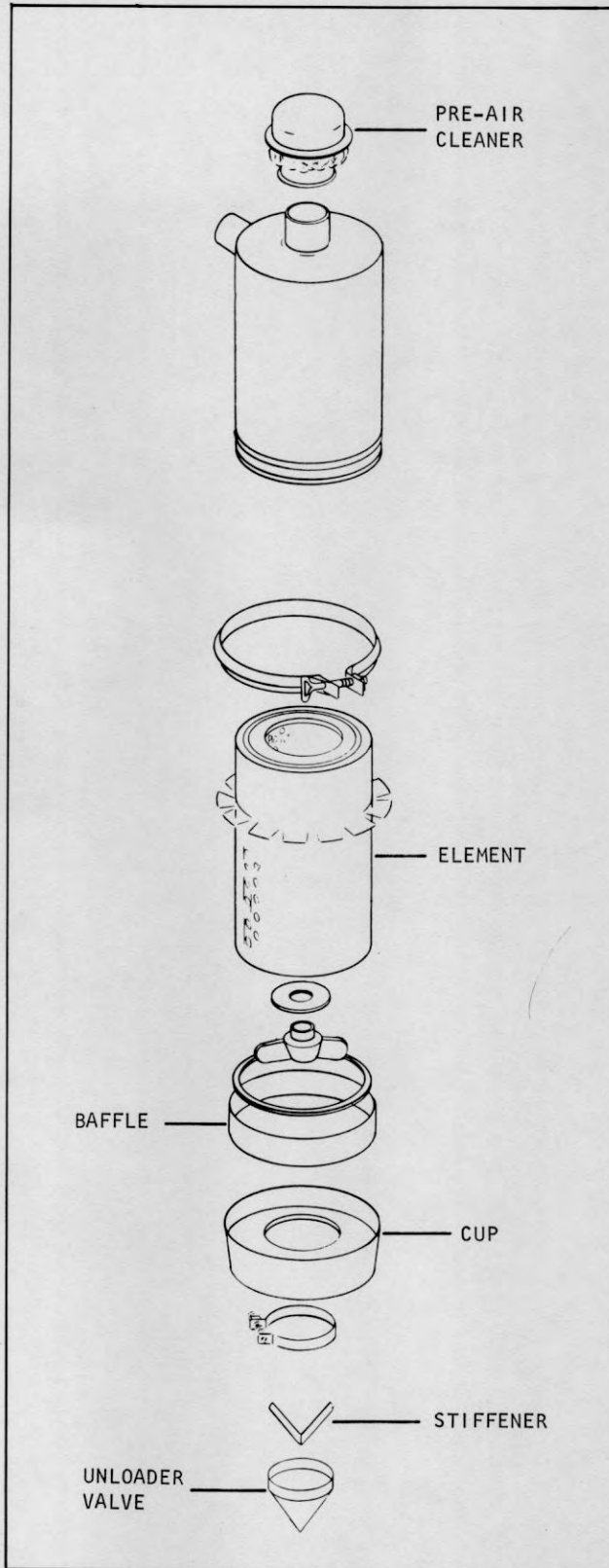
Plate 210, Converter Oil Pressure Warning Light



Plate 212, Converter Oil Temperature Warning Light

NOTE:
With all electrical control lights engaged, and engine running, converter oil pressure light should also be lit. If light comes on during operation and detaches cover.

NOTE:
If warning light comes on with engine at rest, or during operation until oil cools, cover should be removed and the light will come on if oil temperature reaches 150° F.

PRE-AIR CLEANER

Remove and clean exterior and interior thoroughly every 8 operating hours or more often under extremely dusty conditions, see Plate 9975.

DUST CUP

Empty and clean dust cup regularly. Daily care may be necessary under dusty conditions. Remove foreign material such as leaves from around filter and tighten wing nut if necessary.

Unloader valve should be serviced regularly and daily under extremely dusty operating conditions.

Plate 9975. Air Cleaner Assembly

PRE-AIR CLEANER

Remove and clean exterior and interior thoroughly every 6 operating hours or more often under extremely dirty conditions. See Plate 2825.

DUST CUP

Check and clean dust cup frequently. Daily check and clean dust cup. Wash dust cup with clean water and brush. Remove foreign material such as leaves from around filter and clean with air if necessary.

Unloader valve should be checked regularly and daily under extremely dirty operating conditions.

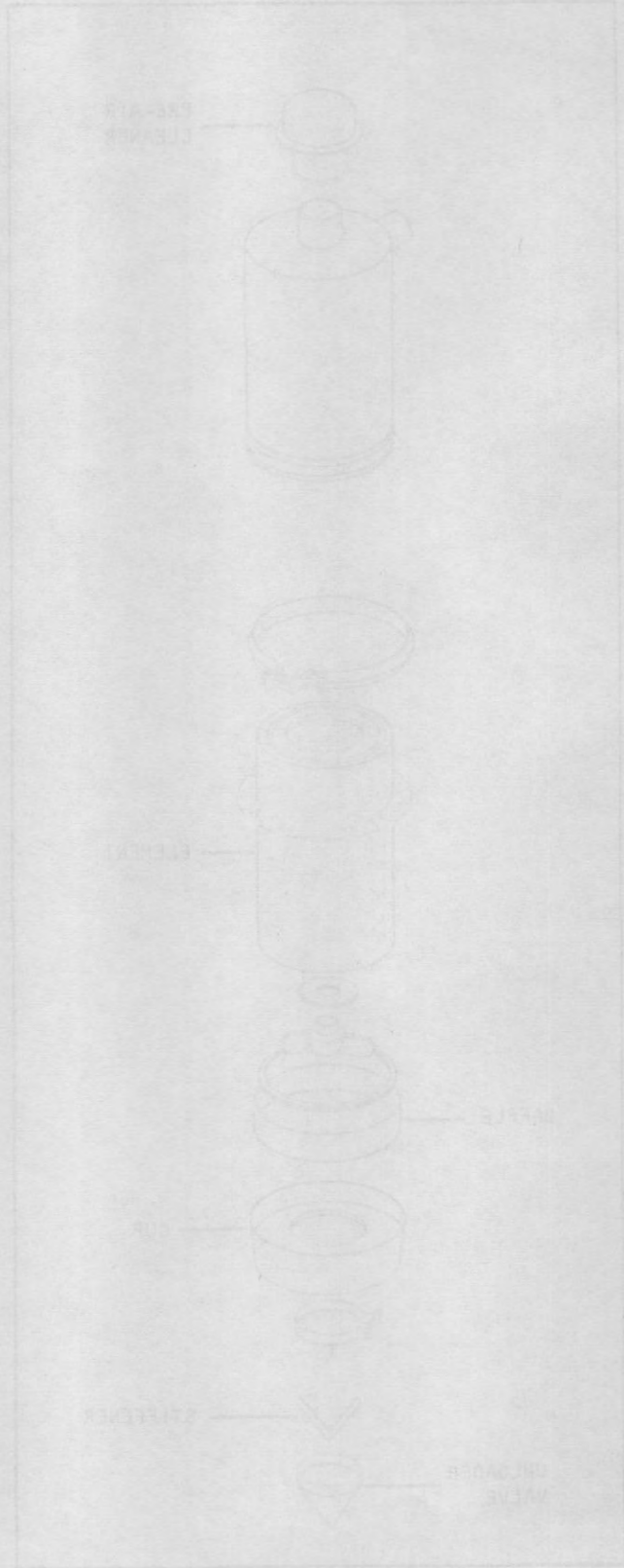


Plate 2825 - Air Cleaner Assembly

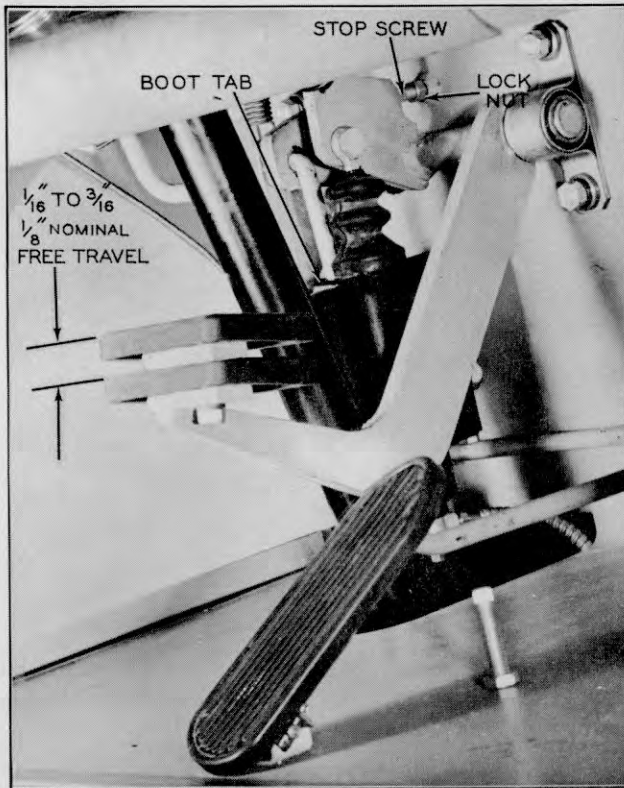


Plate 6425. Brake Pedal Free Travel

BRAKE PEDAL

1. Depress brake pedal with ignition off and hold foot pressure for at least ten seconds. Pedal must be solid, must not be spongy or drift under foot pressure.
2. Start engine and allow it to idle for about ten seconds.
3. Depress brake pedal with about as much foot pressure as required for normal stopping and hold pressure.
4. Remove foot from pedal and turn off ignition switch.
5. Depress brake pedal five times slowly. Pedal should be depressed approximately the same distance each time. If the pressure required to depress the pedal to the same position has increased, the brake system is working properly.
6. Check pedal free travel. Pedal should have 1/16 to 3/16 (1/8 nominal) inch free travel.

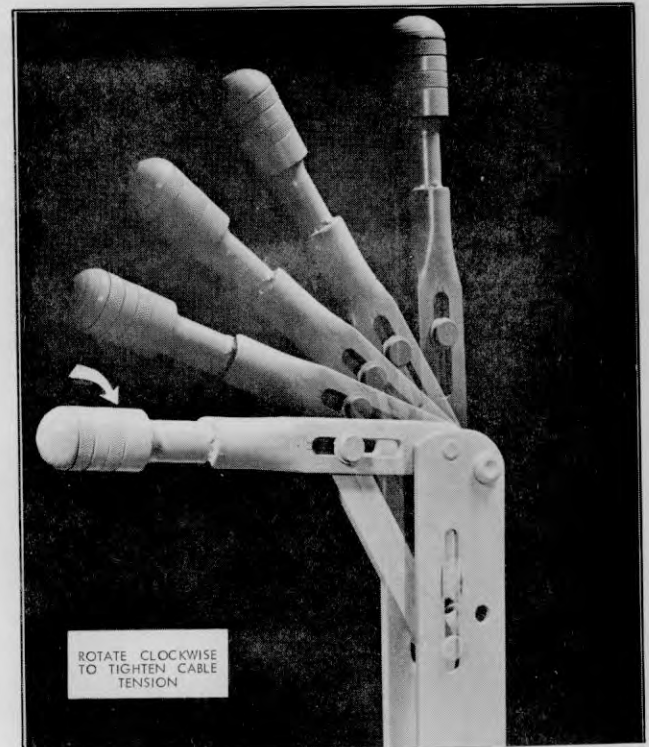
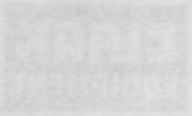


Plate 6505. Parking Brake

PARKING BRAKE

Make certain that the parking brake is working properly and will hold truck on a reasonable grade.





INDUSTRIAL TRUCK DIVISION

LUBRICATION AND PREVENTIVE MAINTENANCE

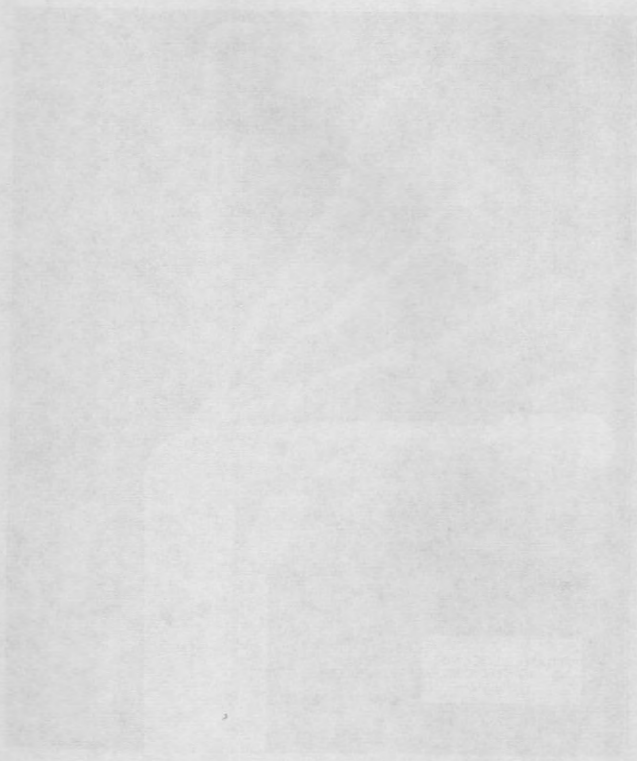
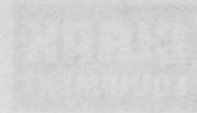


FIGURE 1. Parking Brake

PARKING BRAKE

When parking the truck, pull the parking brake lever down to the stop. This will lock the rear wheels.

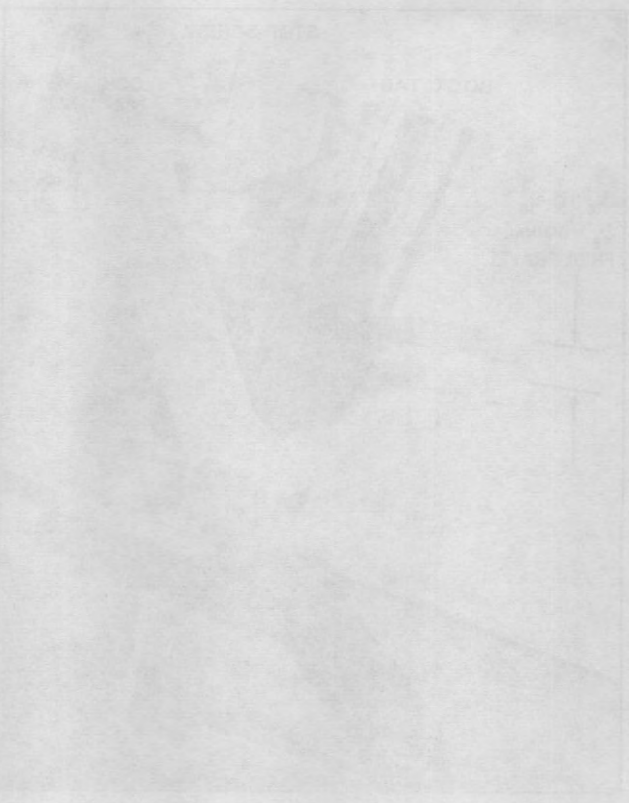


FIGURE 2. Brake Pedal

BRAKE PEDAL

1. Before driving, check the brake pedal. It should be firm and not spongy. If it is spongy, the brake system may need adjustment.

2. When driving, use the brake pedal to slow down or stop the truck. Do not pump the brake pedal while the truck is moving.

3. When parking, pull the parking brake lever down to the stop. This will lock the rear wheels.

4. Remove the foot pedal and turn off the engine.

5. Check the brake pedal. It should be firm and not spongy. If it is spongy, the brake system may need adjustment.

6. Check the brake pedal. It should be firm and not spongy. If it is spongy, the brake system may need adjustment.



LUBRICATION AND PREVENTIVE MAINTENANCE

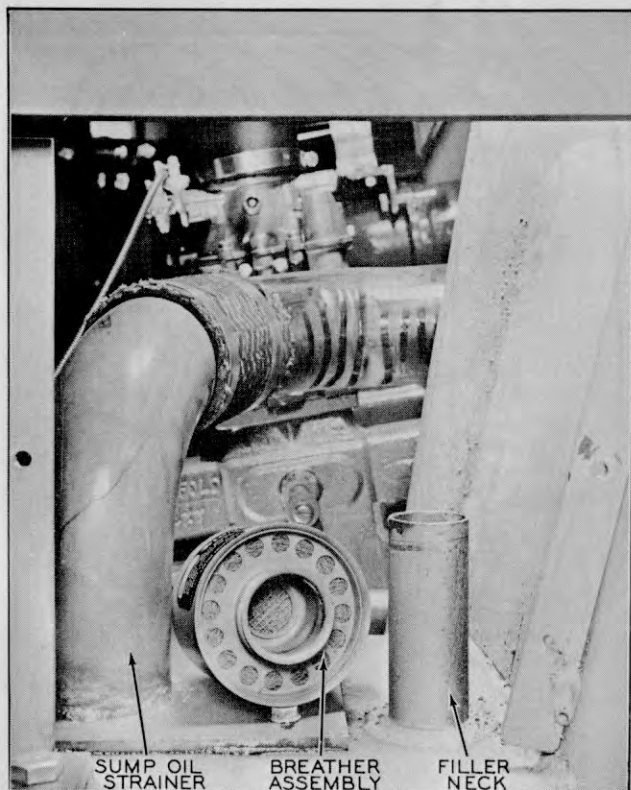


Plate 6426. Hydraulic Sump Tank

HYDRAULIC SUMP TANK

Check hydraulic sump tank fluid level in the following manner.

1. Lower upright.
2. Shut engine off.
3. Check fluid level by measuring from top of filler pipe. Oil level should be (8) eight inches from the top.

When adding fluid to the system, care should be taken to keep the fluid free of dust, dirt and all foreign particles. The fluid should be poured through a 200-mesh wire screen which may be conveniently placed or soldered into the large end of a funnel.

NOTE

BEFORE PLACING FUNNEL IN USE, BE CERTAIN THAT IT IS CLEAN.

CAUTION

NEVER USE A CLOTH STRAINER WHEN ADDING FLUID TO THE HYDRAULIC SUMP TANK. CLOTH STRAINERS CONTAIN LINT WHICH IS HARMFUL TO THE HYDRAULIC SYSTEM.

Fill sump tank, if necessary. Start engine and operate valve control levers allowing any air in the lines to escape, then recheck sump tank fluid level before putting machine into operation.

HYDRAULIC CONTROL LEVERS

Check lift and tilt operation. The lift and tilt cylinders should actuate when lift or tilt levers are moved either way from neutral position.

When load is elevated and control lever returned to neutral position, load should remain in elevated position with no downward drift. If load drifts downward, this may indicate lift cylinder leather or seal damage.

With tilt lever in neutral position, upright should remain steady with no backward or forward drift. If upright drifts either way, this may indicate tilt cylinder seal or leather damage.

CAUTION

DO NOT HOLD CONTROL LEVERS IN EXTREME POSITIONS AFTER A LOAD HAS REACHED ITS LIMITS. TO DO SO WILL RESULT IN EXCESSIVE HIGH OIL PRESSURE THAT MAY RESULT IN HEATING OF THE HYDRAULIC OIL.

X
X
X W A R N I N G X
X X
X AN INFLATED TIRE AND RIM CAN BE VERY DAN- X
X X
X GEROUS. MANY ACCIDENTS, SOME FATAL, HAVE X
X X
X RESULTED FROM IMPROPER HANDLING AND OPERA- X
X X
X TION OF VEHICLE RIMS TIRES AND WHEELS. IT X
X X
X IS, THEREFORE, OF THE UTMOST IMPORTANCE X
X X
X THAT THE FOLLOWING PRECAUTIONS BE NOTED BY X
X X
X ALL PERSONS CONCERNED TO AVOID PERSONAL X
X X
X INJURY AND COSTLY DAMAGE. X
X X
X X

1. After raising the vehicle and prior to removal of wheels, place blocking under the frame so the vehicle cannot become lowered by accident. Blocking must be of adequate strength to support the weight of the vehicle.

2. In all cases the air should be removed from the tire by removing the valve core before attempting to remove the wheel from the vehicle. The tire should not be inflated while it is "off" the vehicle. Check for security of all rim retainment bolts and wheel attaching bolts before inflating tire. A clip-on type air chuck should be used so the operator can stand to one side during tire inflation.

3. In all cases, when removing wheels equipped with the lock ring type rim from the vehicle for repair or periodic rotation, completely deflate tires. This is best accomplished by removing the valve core.

4. Tires used on the lock ring type rim should be inflated in a safety cage. See Plate 7614. Insure that rings are properly seated prior to inflation. An inflated tire contains potentially explosive energy that can blow rings loose. A clip-on type air chuck should also be used, so the operator can stand to one side during tire inflation.

5. Use properly matched parts only. Rim base and rings must be matched according to manufacturer, size and type. This information is stamped on each part.

6. Remove rust and other foreign matter. Accumulation of such material in the rim gutter can prevent the proper fitting of rings. Parts that are excessively corroded are weakened and should be replaced. Use of a rust preventative compound (not containing water) during mounting will minimize rusting.

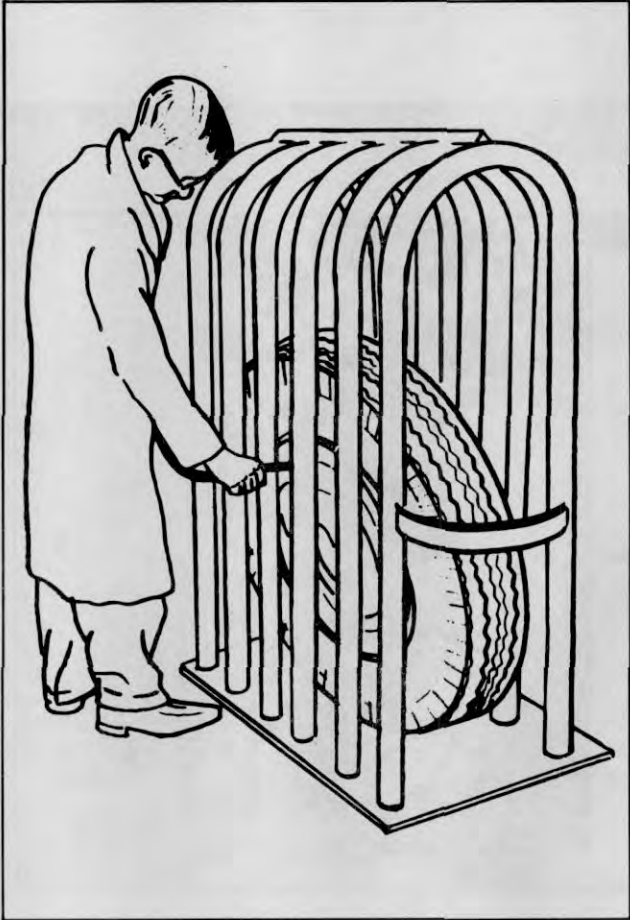


Plate 7614. Safety Cage

7. Do not use over-size or over-inflated tires. Use only preferred or alternate size rims for tires and do not exceed recommended air pressures. It is also important to maintain uniform inflation in both tires of a dual assembly so that weight is equally sustained.

8. Do not run vehicle on one tire of a dual assembly. Never re-inflate a tire that has been run flat without first thoroughly inspecting it and the rim assembly. It is especially important to make sure the lock ring is secure in the gutter and has not been damaged prior to re-inflation.

9. Completely deflate tire prior to demounting. Remove valve core to insure complete deflation. Check for damage or worn parts. Mark defective parts for destruction to preclude their future use. Abuse during operation or in mounting the tire can cause dents, cracks or distortions which weaken the parts and prevent safe, proper assembly. Replace defective parts with new parts of the correct size and type.

10. Periodically check clamps and wheel nuts.

Loose clamps can cause dangerous rim slippage or detachment of rim and tire from the vehicle. Loose wheel nuts can cause severe damage to rim and hub. Excessive torque is also dangerous in that it can cause stud and rim breakage.

11. Even with the best of maintenance practices, cuts will still be a source of tire trouble. The correct procedure for handling and repairing tires should be given careful attention. Close inspection of all tires should be made at the time of inflation check, and all tires having cuts that penetrate into the cord body should be taken off for proper repair.

Failure to make regular inspections and repairs, when needed, will result in further deterioration of the cord body and eventually a blowout. Small rocks and dirt will get into shallow cuts in the tread and if neglected will gradually be pounded through the cord body.

One simple method to forestall this action is to clean out the cut with an Awl or similar tool to remove any stones or other matter which may be lodged in the cut. Use a sharp, narrow-bladed knife and cut away the rubber around the cut to form a cone-shaped cavity extending to the bottom of the injury. The sides of the cavity should be slanted enough to prevent stones from wedging into it. Tires with cuts treated in this manner may be continued in service without danger of further growth of these injuries. If a tire has at least one deep cut that requires a repair, then all smaller cuts may be quickly and economically repaired and vulcanized by the steam kettle method.

N O T E

It is not recommended that tires with breaks be used again.

If even tire wear is evident, wheel alignment should be checked.

DIRECTIONAL TREAD TIRES

All directional tread tires are to be mounted in the correct position with respect to the arrow cast on the side of the tire as explained and illustrated.

Directional Tread Dual Tires:

1. Inside dual tire arrow to point in the direction of forward rotation, see Plate 6422.

(Rotate wheel to bring arrow on tire above the wheel. Arrow must point toward front of truck.)
2. Outside dual tire arrow to point in the



Plate 6422. Inside Dual Tire
(or Single Drive Tire)
(Arrow to point toward front of truck)



Plate 6423. Outside Dual Tire
(Arrow to point toward rear of truck)

direction of rearward rotation. See Plate 6423.

(Rotate wheel to bring arrow on tire above the wheel. Arrow must point toward rear of truck.)

Directional Tread Single Drive Tires:

1. Tire arrow to point in the direction of forward rotation, See Plate 6422.

(Rotate wheel to bring arrow on tire above the wheel. Arrow must point toward front of truck, see Plate 6422.)

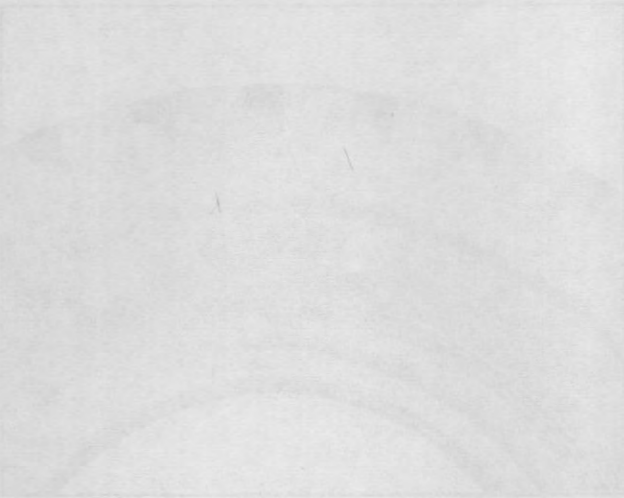


FIGURE 1. Front view of truck chassis showing suspension and steering components.

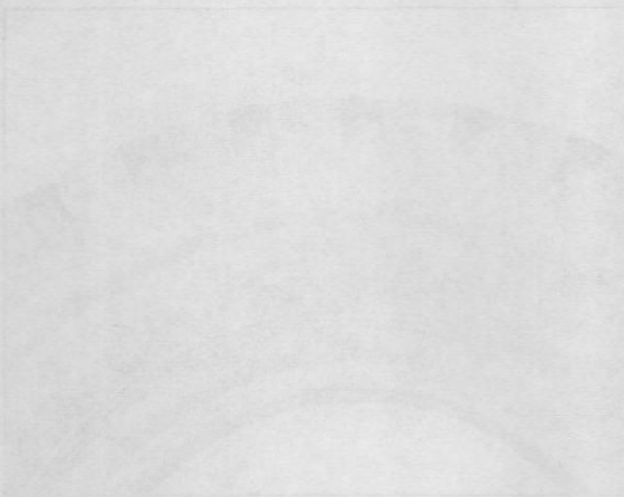


FIGURE 2. Rear view of truck chassis showing suspension and drive shaft components.

Direction of travel is shown by arrow pointing forward from the wheel.

Directional Travel - Drive Shafts

The drive shafts are located in the rear of the truck. They are connected to the rear axle and the transmission.

Outside view of the truck showing the location of the drive shafts.

Loss of air pressure in the tires will cause the truck to pull to one side. This is because the tires on the side with the lower pressure will have a smaller diameter and will rotate faster than the tires on the side with the higher pressure.

Even when the air pressure is equal in all tires, the truck may still pull to one side. This is because the tires on the side with the higher load will have a smaller diameter and will rotate faster than the tires on the side with the lower load.

To correct a pull, the driver should check the air pressure in all tires and adjust it to the correct level. If the truck still pulls, the driver should check the load on each side of the truck and adjust it to be equal.

The truck should be driven on a level surface. If the truck is driven on a hill, it will pull to one side. This is because the tires on the side with the higher load will have a smaller diameter and will rotate faster than the tires on the side with the lower load.

NOTE

It is recommended that tires with blocks be used on the rear of the truck.

When a tire is replaced, it should be checked for proper inflation.

DIRECTIONAL TRAVEL

The directional travel of the truck is determined by the position of the front wheels. The truck will travel in the direction that the front wheels are pointing.

Direction of Travel - Pushing

When pushing a load, the truck should be driven in the direction of the load. This is because the truck will pull to one side if the load is not centered.

When pulling a load, the truck should be driven in the opposite direction of the load. This is because the truck will pull to one side if the load is not centered.

Outside view of the truck showing the location of the drive shafts.

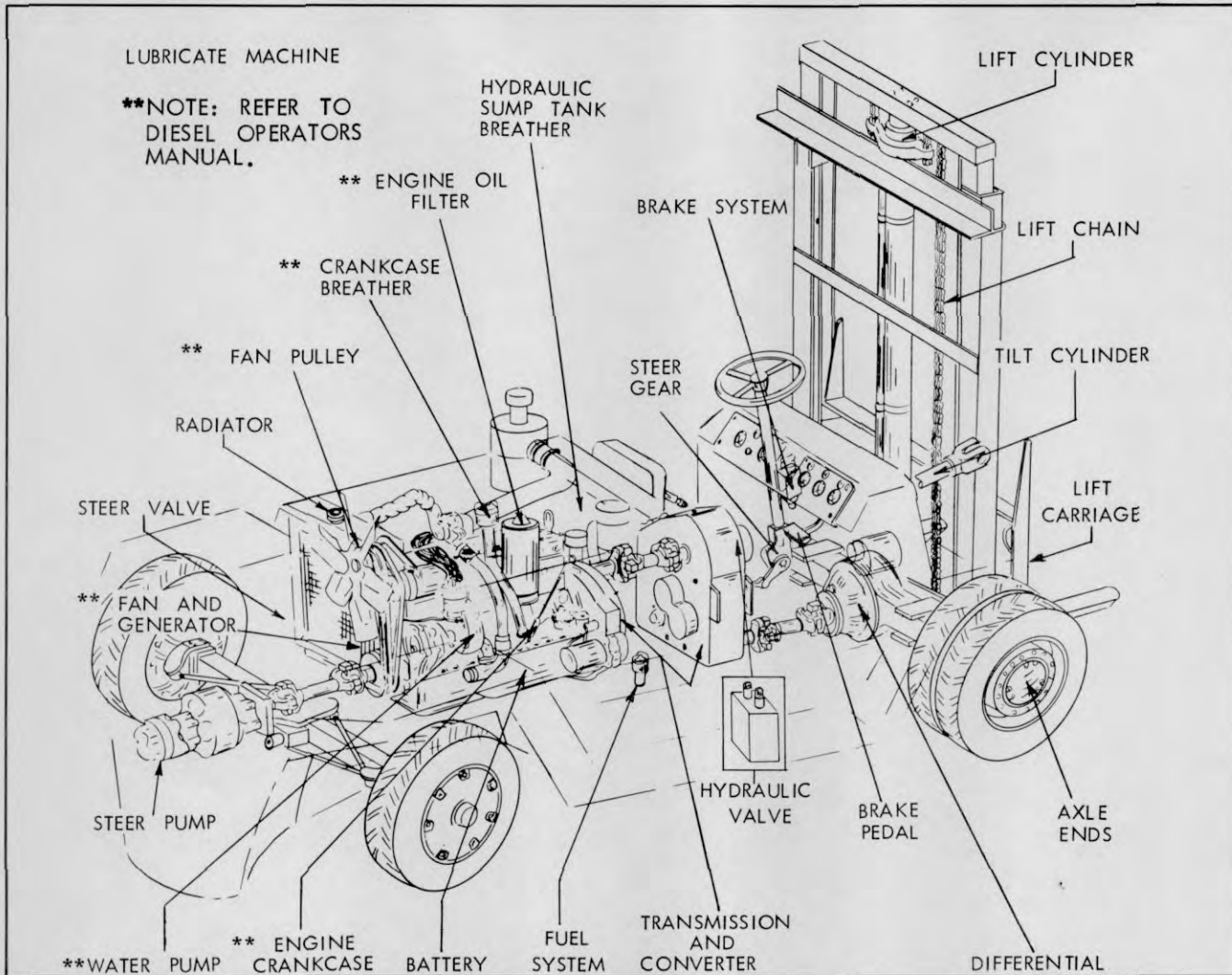


Plate 6509. Lubrication & Preventive Maintenance Illustration

TRANSMISSION & CONVERTER. Verify fluid level, fill if necessary with Automatic Transmission Fluid Type AQATF. Transmission Level Plug is located on the right front face of transmission. Fill through Filler Plug located on left hand side of converter until oil comes up to level plug in transmission.

DIFFERENTIAL. Verify lubricant level, fill if necessary with E.P.G.L. S.A.E. 90, Clark Specifications MS 8.

FUEL LINES. Make certain that fuel line connections are secure. Check fuel lines for obstructions and leaks. Check screen in fuel filler cap to make certain that it is properly installed.

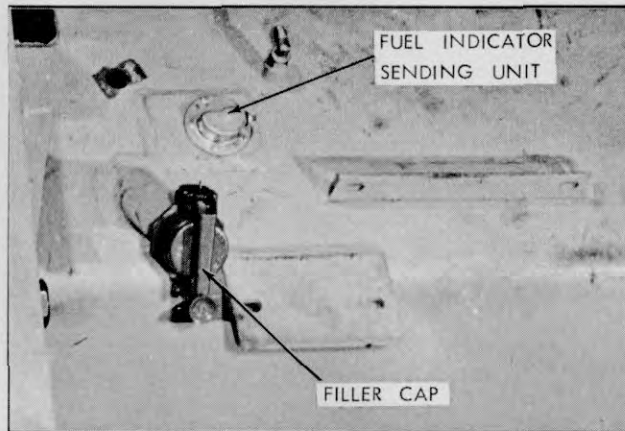


Plate 6506. Fuel Tank



INDUSTRIAL TRUCK DIVISION



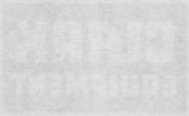
LUBRICATION AND PREVENTIVE MAINTENANCE

COOLING SYSTEM

Check radiator and hoses for leaks.

Add proper amount of water or anti-freeze solution to cooling system. If anti-freeze is not available and machine is to be at rest for an appreciable length of time, drain radiator when temperature is likely to be 32° F, or lower. If water is added to radiator containing anti-freeze solution, always test solution in radiator with a hydrometer to determine the degree of protection. For proper amount of anti-freeze solution required to protect the cooling system, refer to instructions on anti-freeze container.

Cooling System Capacity - Refer to Specification.



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LUBRICATION AND PREVENTIVE MAINTENANCE

COOLING SYSTEM

Check radiator and hoses for leaks.

Add proper amount of water or anti-freeze solution to cooling system. If anti-freeze not available and water is to be used, for an appropriate length of time, drain radiator when temperature is likely to be 25° F or lower. If water is added to radiator containing anti-freeze solution, always use solution in radiator with a hydrometer to determine the degree of protection. For proper amount of anti-freeze solution required to protect the cooling system, refer to instructions on anti-freeze container.

Cooling system capacity - refer to specification.

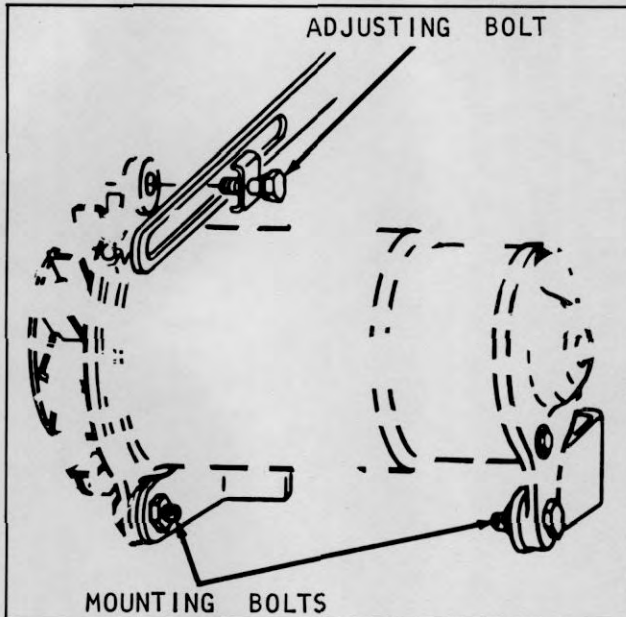


Plate 6631. Drive Belt Adjustment

DRIVE BELT ADJUSTMENT

The drive belts should have finger pressure deflection of 3/4 to 1 inch midway on long span. If belts require adjustment, use following procedure.

1. Loosen brace adjusting bolt and two lower mounting bolts, see Plate 6631.
2. Move charging unit toward cylinder block to loosen Drive Belt and away from cylinder block to tighten belt. Tighten bolts when correct finger deflection is obtained.

C A U T I O N

EXERCISE CAUTION WHEN ADJUSTING BELTS. BELTS ADJUSTED TOO TIGHT WILL VERY LIKELY CAUSE BEARING DAMAGE. HOWEVER, BELTS ADJUSTED TOO LOOSE, BELT WEAR WILL RESULT AND ALSO HIGH ENGINE TEMPERATURE DUE TO BELT SLIPPAGE.

N O T E

Upon replacement of drive belts, it will be necessary to use a matched set of belts.

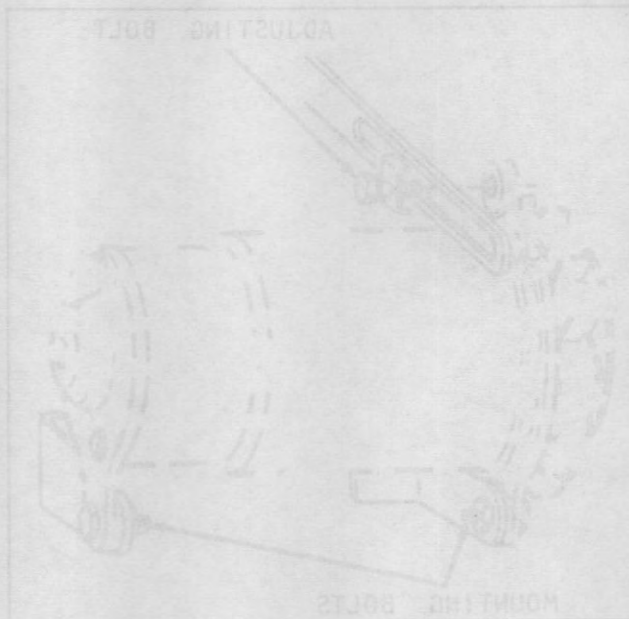


Plate 6521, Drive Belt Adjustment

DRIVE BELT ADJUSTMENT

The drive belts should have about 3/4 inch deflection at 1/4 inch midway on long span. If belts require adjustment, use following procedure:

1. Loosen back adjusting bolt and two lower mounting bolts, see Plate 6521.
2. Move carrying unit toward cylinder back to loosen drive belt and away from cylinder back to tighten belt. Tighten bolts when correct finger deflection is obtained.

C A U T I O N

EXERCISE CAUTION WHEN ADJUSTING BELTS. BELTS ADJUSTED TOO TIGHT WILL VERY QUICKLY CAUSE BEARING DAMAGE. HOWEVER, BELTS ADJUSTED TOO LOOSE, BELT WEAR WILL RESULT AND ALSO HIGH ENGINE TEMPERATURE DUE TO BELT SLIPAGE.

N O T E

Upon replacement of drive belts, it will be necessary to use a matched set of belts.

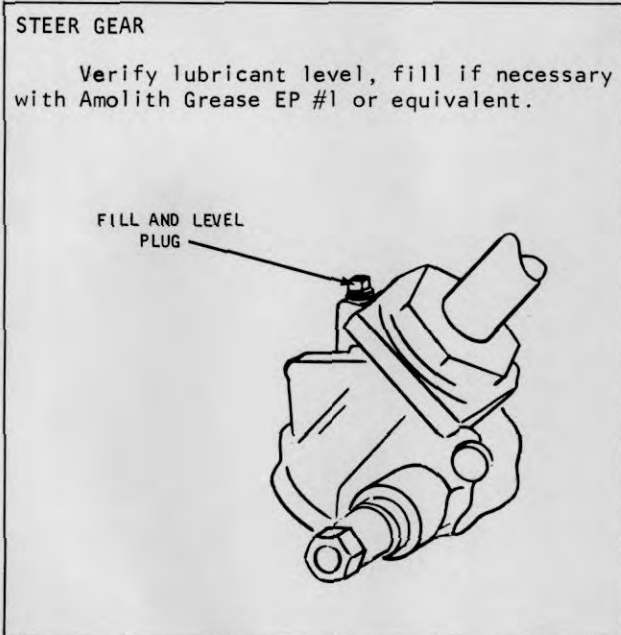


Plate 6429. Steering Gear

BATTERY INSPECTION

Check battery fluid level. Make sure that all connections are tight at battery, starter, charging unit, voltage regulator, distributor and spark plugs.

Take hydrometer reading of electrolyte to determine state of charge. Charge battery if reading is below 1.225 at 24° C (75° F), or below 1.265, if machine is operating in cold climates. If machine is operating in tropical areas, in which freezing weather is not encountered, the full charge specific gravity reading may be lowered from 1.375 to 1.225 by diluting the electrolyte with distilled water.

C A U T I O N

MAKE CERTAIN THAT SPECIFIC GRAVITY IS ADJUSTED TO NORMAL IF MACHINE IS SHIPPED TO AREAS WHERE IT WILL BE EXPOSED TO FREEZING TEMPERATURES.

N O T E

Add distilled water immediately before charging. Do not add distilled water to a battery immediately after a charge.

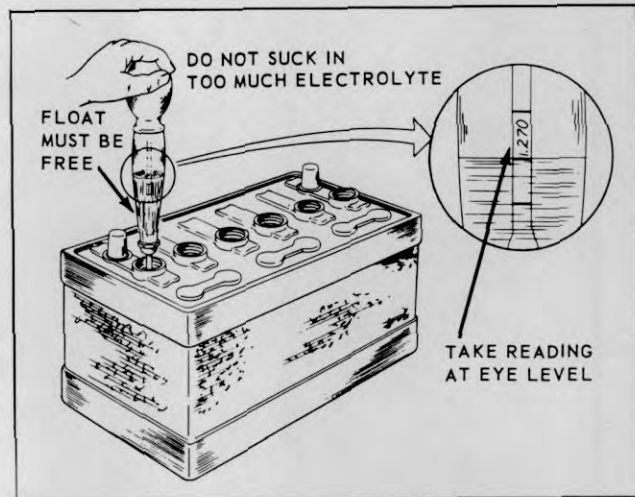


Plate 6271. Check specific Gravity of Battery TO TEST BATTERY

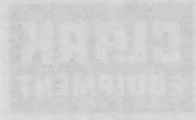
1. Connect positive lead of test voltmeter to positive terminal of battery and negative lead of voltmeter to negative (grounded) terminal of battery.
2. Record voltmeter reading.
3. Now pull high tension wire from ignition coil so engine will not start when starter is engaged.
4. Turn ignition switch to start position and check the voltmeter reading.
5. Compare this reading with the previously recorded reading.

If the voltage drop was more than 4 volts, or if the second reading registered below 8 volts, battery should be replaced.

X
 X
 X W A R N I N G X
 X
 X NEVER ALLOW FLAME OR SPARKS NEAR THE X
 X BATTERY FILLER HOLES. BECAUSE EXPLOSIVE X
 X
 X HYDROGEN GAS MAY BE PRESENT. X
 X
 X



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

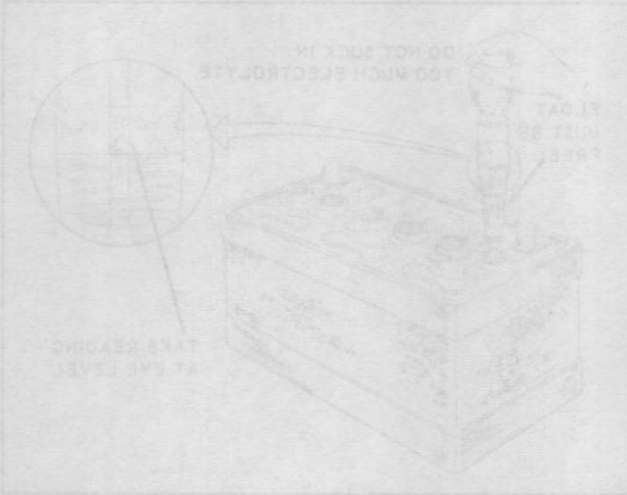


Plate 65/1. Check specific gravity of battery
TO TEST BATTERY

1. Connect positive lead of test voltmeter to positive terminal of battery and negative lead of voltmeter to negative (grounded) terminal of battery.

2. Record voltmeter reading.

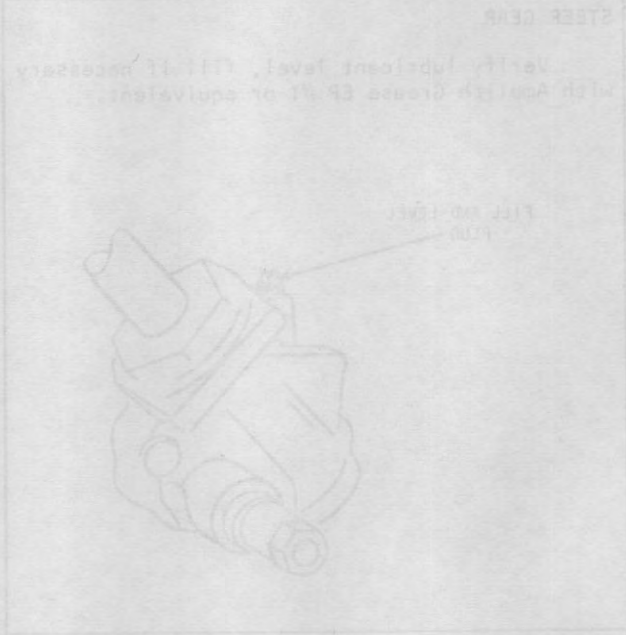
3. Now pull high tension wire from ignition coil so engine will not start when starter engaged.

4. Turn ignition switch to start position and check the voltmeter reading.

5. Compare this reading with the previously recorded reading.

If the voltage drop was more than 0.5 volts or if the second reading registered below 0 volts, battery should be replaced.

X
X
X W A R N I N G
X
X NEVER ALLOW FLAME OR SPARKS NEAR THE
X
X BATTERY FILTER HOLES, BECAUSE EXPLOSIVE
X
X
X HYDROGEN GAS MAY BE PRESENT.
X
X
X X



STEER GEAR
Verify lubricant level. Fill if necessary.
With Amstar grease 69% of available.

Plate 64/5B. Steering Gear

BATTERY INSPECTION

Check battery fluid level. Make sure that all connections are tight at battery, starter, charging unit, voltage regulator, distributor and spark plugs.

Take hydrometer reading of electrolyte to determine state of charge. Charge battery if reading is below 1.225 at 24° C (75° F) or below 1.205 if machine is operating in cold climate. If machine is operating in tropical climate, in which freezing weather is not encountered, the full charge specific gravity reading may be lowered from 1.225 to 1.220 by diluting the electrolyte with distilled water.

CAUTION

MAKE CERTAIN THAT SPECIFIC GRAVITY IS ADJUSTED TO NORMAL IF MACHINE IS SHIPPED TO AREAS WHERE IT WILL BE EXPOSED TO FREEZING TEMPERATURES.

NOTE

Add distilled water immediately before charging. Do not add distilled water to a battery immediately after a charge.

BRAKE SYSTEM

Using Boot Tap (See Plate 6425, pull boot free of master cylinder and check brake fluid level. Brake fluid should be within 1/4 inch of the top. Fill with S.A.E. 70R3 Heavy Duty Hydraulic Brake Fluid. Be sure to replace boot properly over "lip" of master cylinder after checking or adding fluid.

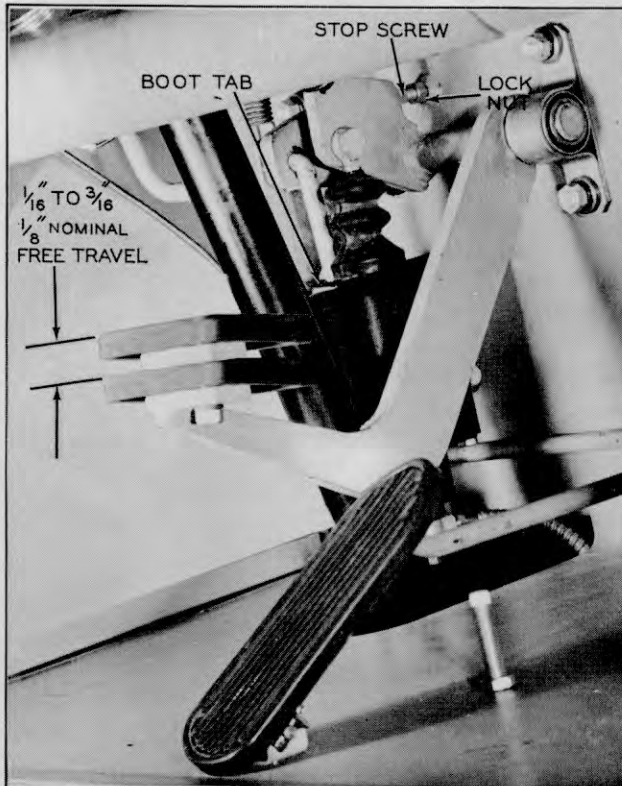


Plate 6425. Brake Pedal Adjustment

BRAKE PEDAL

The brake pedal is properly adjusted if it has at least 1/16 to 3/16 inch (1/8 inch nominal) free play before meeting resistance from master cylinder. If necessary, adjust per instructions given in the following paragraphs.

Brake Pedal Adjustment: Refer to Plate 6425, then make the following adjustment.

1. Loosen lock nut and rotate stop screw to obtain the specified pedal free travel.
2. Tighten lock nut to hold the adjustment.

AXLE ENDS

Verify lubricant level, fill if necessary with Extreme Pressure Hypoid Gear Lubricant, S.A.E. 90. Verify lubricant level by rotating

wheel so plug is at approximately 4 o'clock, See Plate 6430.

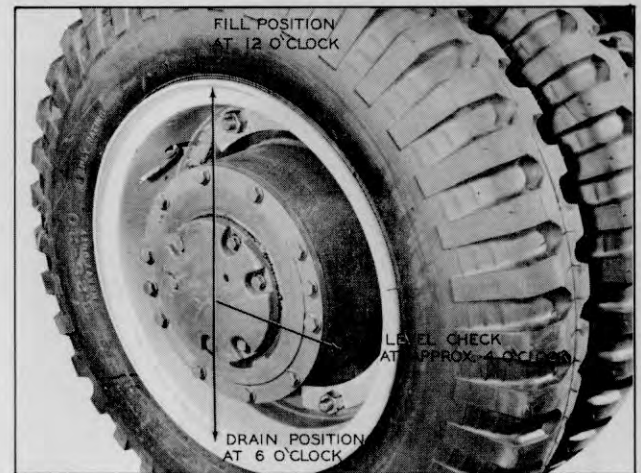


Plate 6430. Check Axle End Lubricant

HYDRAULIC SUMP TANK BREATHER

Check breather to be sure it is not dirty or clogged with foreign matter. Replace breather if dirty.

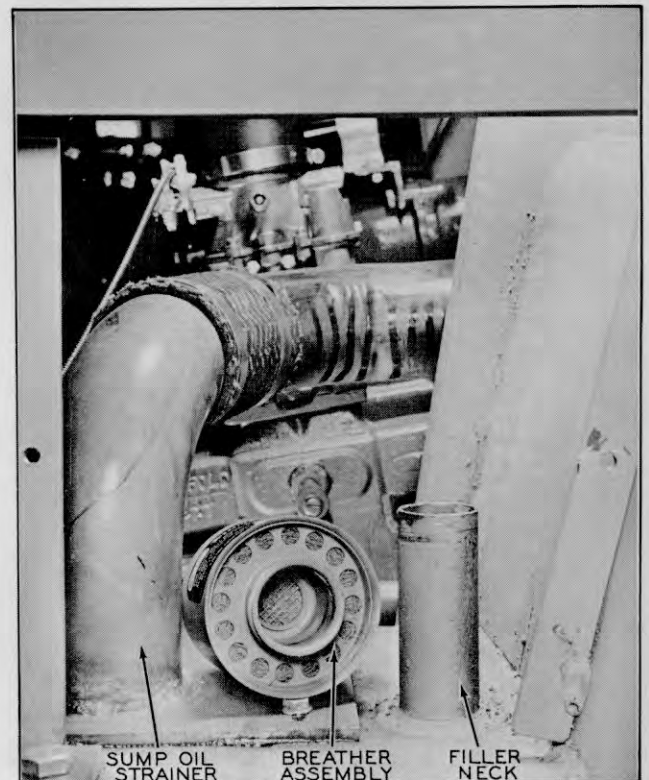
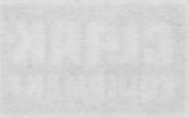


Plate 6426. Sump Tank Breather



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LUBRICATION AND PREVENTIVE MAINTENANCE

Wheel as this is at approximately A or C
See Page 8430.

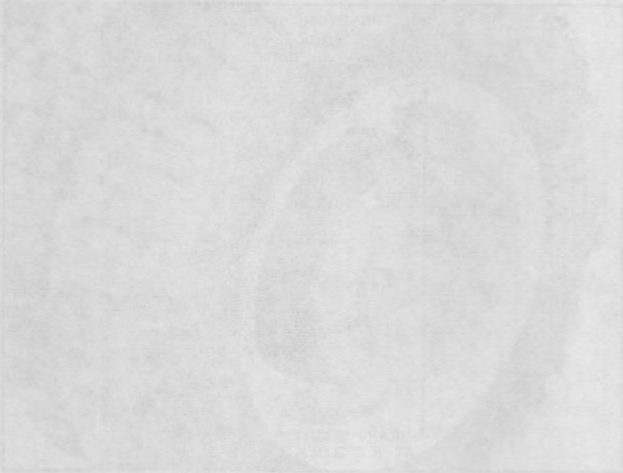


Plate 8430, Check Axle Endplay

HYDRAULIC OIL TANK BREATHER

Check breather to be sure link not dirty
or clogged with foreign matter. Replace breather
if dirty.

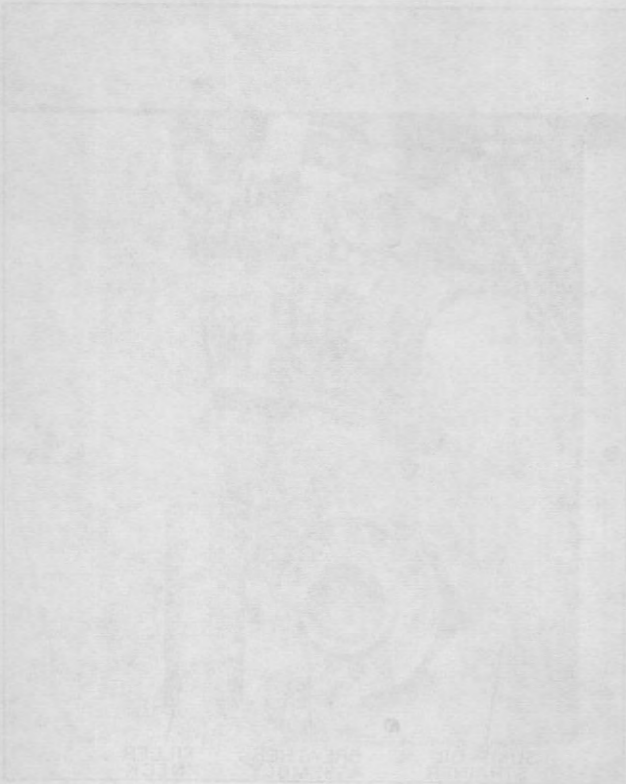


Plate 8432, Tank Breather

BRAKE SYSTEM

Using foot tap (see Plate 8435) put foot
tap of master cylinder and check brake fluid
level. Brake fluid should be within 1/4 inch of
the top fill with S.A.E. 70W heavy duty.
Hydraulic brake fluid be sure to replace foot
tap. If fluid is low, master cylinder
condition or adding fluid.



Plate 8435, Brake Pedal Adjustment

BRAKE PEDAL

The brake pedal is properly adjusted if
it has a travel of 2 1/2 to 3 1/2 inch (1 1/2 inch
normal) travel before reaching resistance
from master cylinder. If necessary, adjust per
instructions given in the following paragraphs.

1. This pedal adjustment refers to Plate
8435, then also the following adjustment.

2. Loosen lock nut and rotate stop screw to
obtain the specified pedal free travel.
3. Tighten lock nut to hold the adjustment.

AXLE OIL

Verify lubricant level. Fill if necessary
with extreme pressure hypoid gear lubricant.
S.A.E. 90. Verify lubricant level by rotating

LUBRICATION AND PREVENTIVE MAINTENANCE

LIFT AND TILT CYLINDERS

Check for drift, leakage at packings, damage and security of mountings (Anchor and Pivot Pins, Flanges).

LIFT CHAINS

The lift chains are mounted to the chain anchors on the lift carriage and at the chain anchor rods near the lift cylinder piston head.

NOTE

LIFT CHAINS MUST NOT HAVE ANY SLACK WITH FORKS LOWERED. WITH LIFT CARRIAGE LOWERED AND CARRIAGE FORKS EMPTY, LIFT CHAINS ARE PROPERLY ADJUSTED IF THE BOTTOM OF THE FORK HEEL IS 1/2 INCH OFF THE FLOOR.

If it becomes necessary to adjust the lift chains, use the following procedure:

1. Machine must be on a level surface with forks empty.
2. Bring upright to vertical position (no backward or forward tilt).
3. Lower lift carriage -- be sure upright is vertical to the level (floor) surface.
4. Adjust chain length so that the bottom of the fork heel is 1/2 inch off floor.

LUBRICATE MACHINE

CAUTION

WHEN LUBRICATING THE TRUCK, MAKE A VISUAL INSPECTION OF ALL HYDRAULIC LINES, FITTINGS AND ALL ELECTRICAL WIRING. LUBRICATE ALL MISCELLANEOUS LINKAGE WITH S.A.E. NO. 20 OIL.

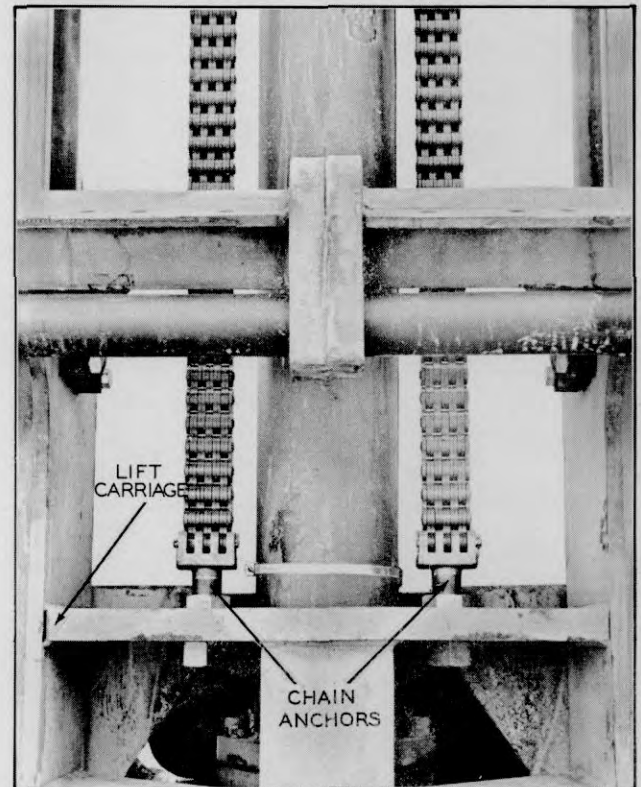


Plate 6431. Lift Chain Adjustment

STEER VALVE (BOOSTER) AND STEER PUMP

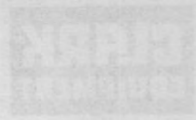
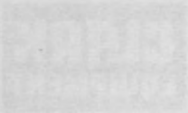
Inspect for leakage, damaged lines, security of mounting.

HYDRAULIC CONTROL VALVE AND LINES

Inspect for damage, leakage and security of mounting.

LIFT BRACKET

Inspect for damage, bent forks etc.



LUBRICATION AND PREVENTIVE MAINTENANCE

LIFT AND TILT CYLINDERS

Check for drift, leakage of working medium and security of mounting. Anchor and level lift cylinders.

LIFT CHAINS

The lift chains are attached to the chain anchor on the lift carriage and to the chain anchor on the lift cylinder.

NOTE

LIFT CHAINS MUST NOT HAVE ANY SLACK WITH FORKS LOWERED. WITH LIFT CARRIAGE LOWERED AND CARRIAGE FORKS EMPTY, LIFT CHAINS ARE PROPERLY ADJUSTED IF THE BOTTOM OF THE FORK BEEL IS 1/2 INCH OFF THE FLOOR.

If it becomes necessary to adjust the lift chains, use the following procedure:

1. Machine must be on a level surface with forks empty.
2. Bring weight to vertical position (no back-ward or forward tilt).
3. Lower lift carriage - be sure vertical is without for level floor surface.
4. Adjust chain length so that the bottom of the fork heel is 1/2 inch off floor.

LUBRICATE MACHINE

CAUTION

WHEN LUBRICATING THE TRUCK, MAKE A VISUAL INSPECTION OF ALL HYDRAULIC LINES, FITTINGS AND ALL ELECTRICAL WIRING. LUBRICATE ALL MISCELLANEOUS LINKAGE WITH S.A.E. NO. 30 OIL.

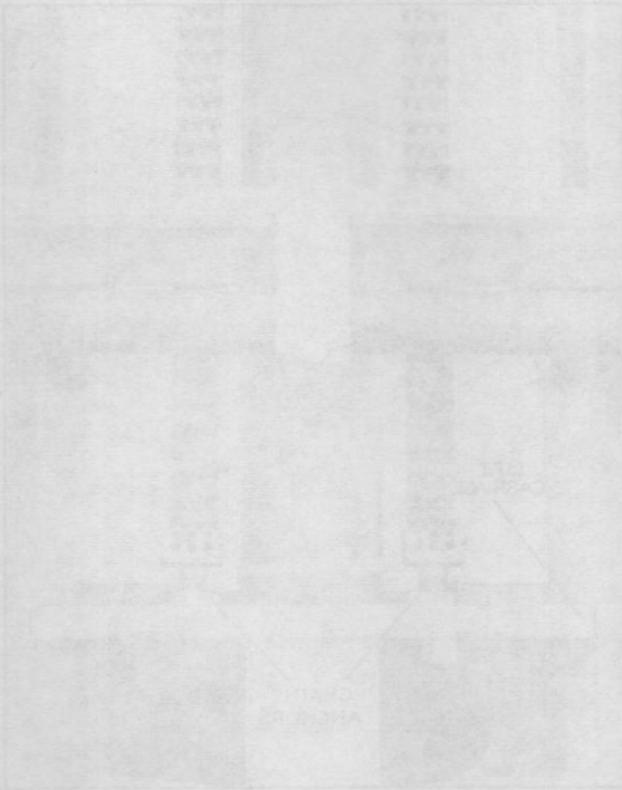


FIG. 1. CHASSIS, LIFT CYLINDER ADJUSTMENT

STEER VALVE (ROOSTER) AND STEER PUMP

Check for leakage, damaged lines, security of mounting.

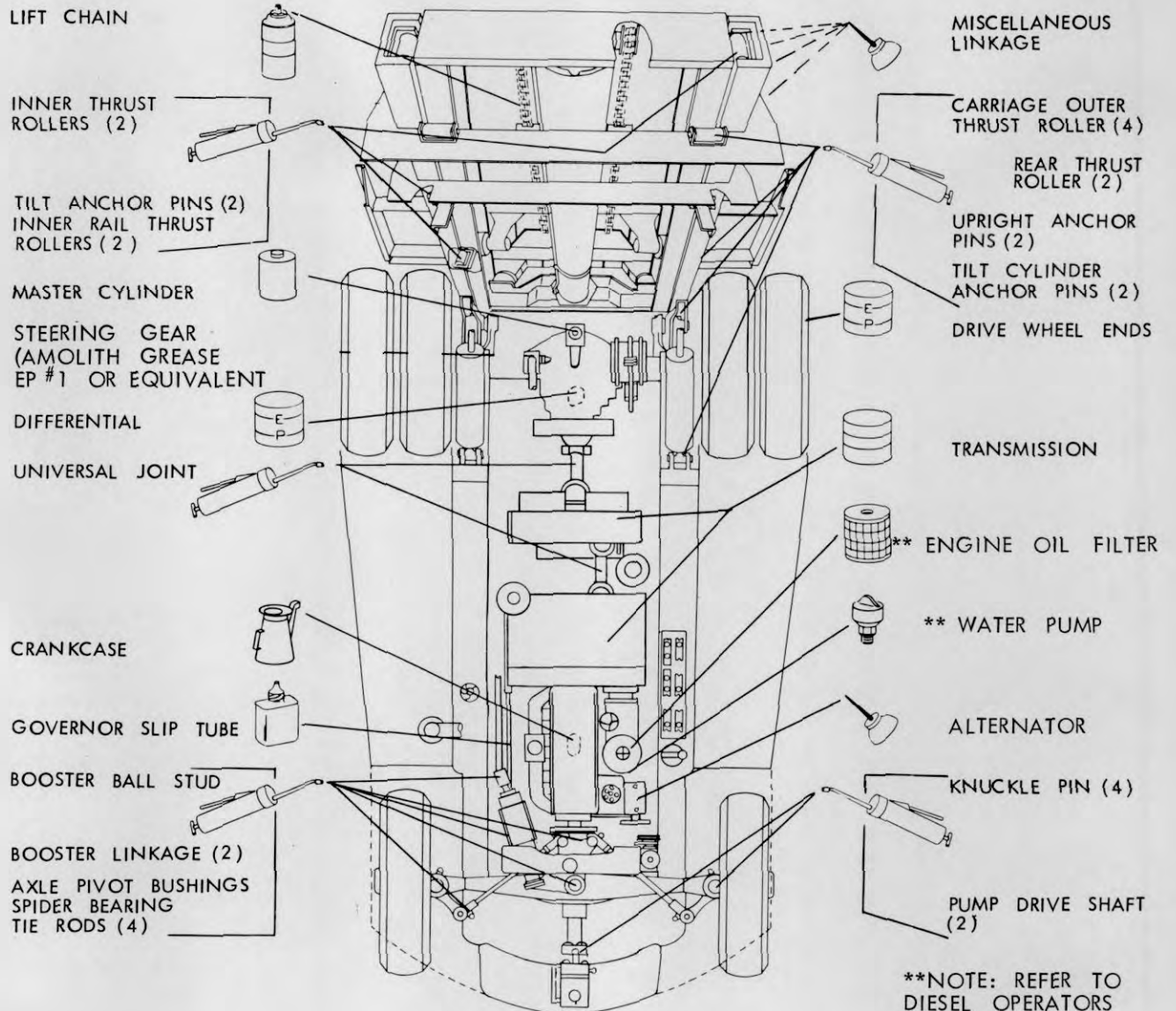
HYDRAULIC CONTROL VALVE AND LINES

Check for damage, leakage and security of mounting.

LIFT BRACKET

Check for damage, and fork

LUBRICATION AND PREVENTIVE MAINTENANCE



- | | | | |
|--|--|--|---|
| CHASSIS GREASE _____ | | | _____ |
| ENGINE OIL: S.A.E. 20 _____ | | | _____ |
| 879803 AUTOMATIC TRANSMISSION
FLUID TYPE "A" ARMOUR QUALIFIED _____ | | | _____ GRAPHITE GREASE |
| WATER PUMP GREASE _____ | | | _____ 886399 CHAIN LUBE |
| ENGINE OIL FILTER
CARTRIDGE KIT _____ | | | _____ GEAR LUBE, S.A.E. 90 |
| 1800200 HYDRAULIC BRAKE FLUID
HEAVY DUTY S.A.E. 70 R3 _____ | | | _____ EXTREME PRESSURE
S.A.E. 90 GEAR LUBE |

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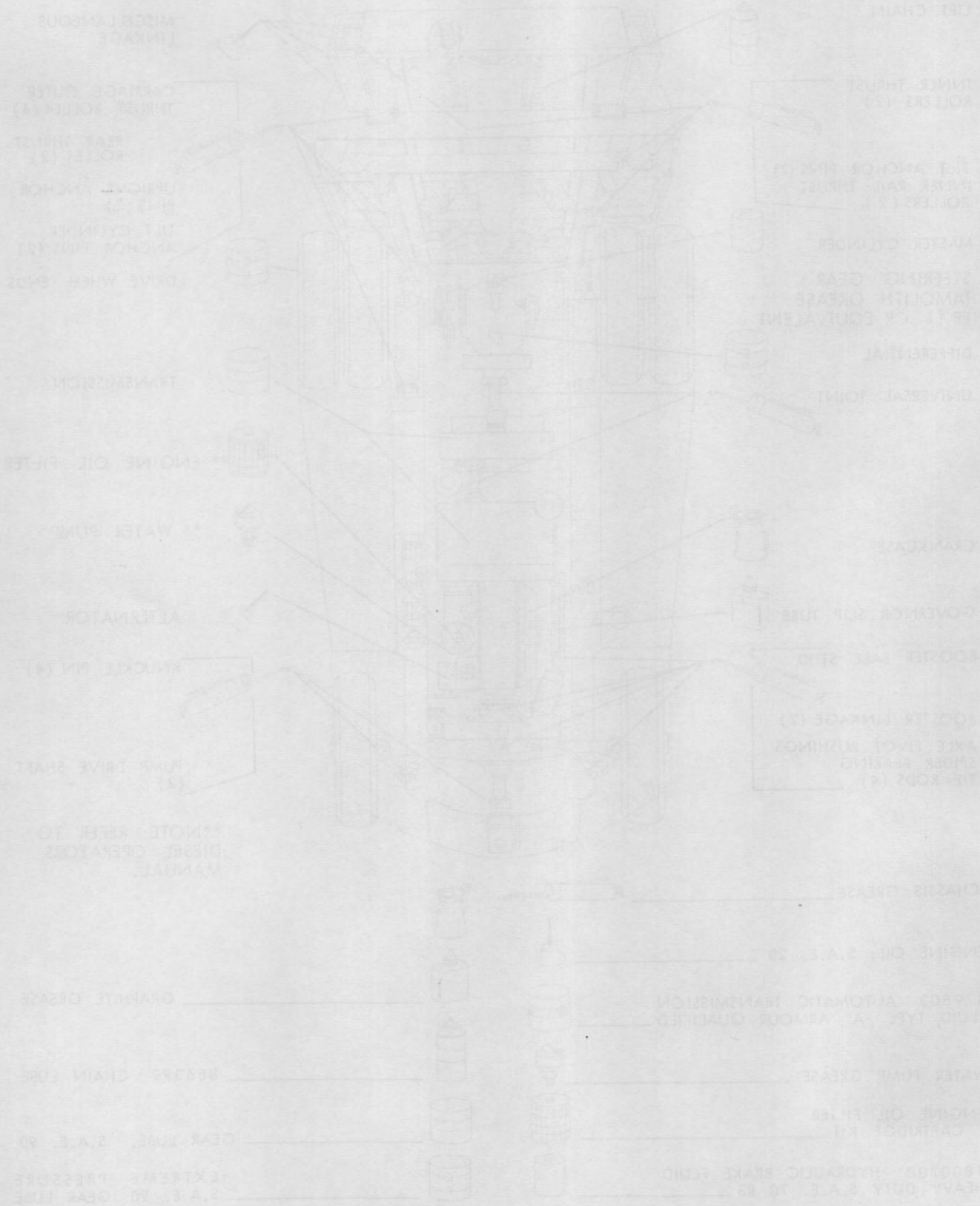




Plate 7165. Restriction Indicator



Plate 7173. Cleaning Dusty Element

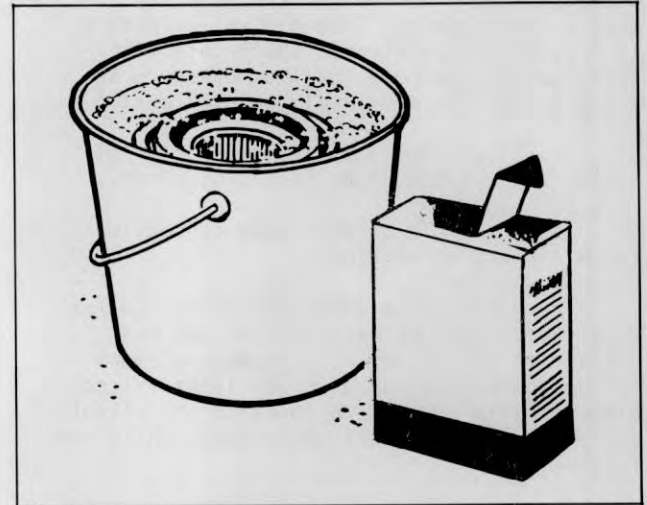


Plate 7174. Cleaning Oily Sooty Element

CAUTION

AIR PRESSURE MUST NOT EXCEED 100 P. S. I. MAINTAIN A REASONABLE DISTANCE BETWEEN NOZZLE AND ELEMENT. DIRECT AIR THROUGH ELEMENT (OPPOSITE TO DIRECTION OF ARROWS CAST ON END OF ELEMENT). DO NOT DAMAGE FINS, OR SEALING SURFACES OR RUPTURE ELEMENT NOR ALLOW DUST TO DEPOSIT ON CLEAN AIR SIDE.

NOTE

Pre-Air cleaner fins are not removable.

RESTRICTION INDICATOR

When signal locks in view (Plate 7165.), service the filter element as follows:

1. Remove cover.
2. Lift out baffle.
3. Empty dust from cup.
4. Remove filter element. Clean thoroughly by using one of the following methods.

(a) Dry Dusty Element: Use compressed dry, clean air directing air up and down pleats on the clean side of the element.



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(b) Oily or Sooty Element: For best results, use small amount of cool tap water with non-sudsing household detergent then add warm water. The warmer the solution the better the cleaning. Soak for approximately 15 minutes. Rinse element thoroughly with clean water from hose (maximum pressure 40 P.S.I.). Air dry completely before reusing.

5. Clean cover, baffle and inside of filter body with a clean lint free cloth.

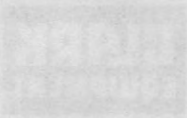
6. Check air cleaner hose connections for air tight connections.

7. After air cleaner has dried, (a fan or air draft may be used, but do not heat element to hasten drying), inspect element for damage by placing a bright light inside element. Thin spots, pin holes or the slightest rupture will render the element unfit for further use.

8. Install filter element making sure wing nut is tight.

9. Replace baffle, cup, and unloader valve.

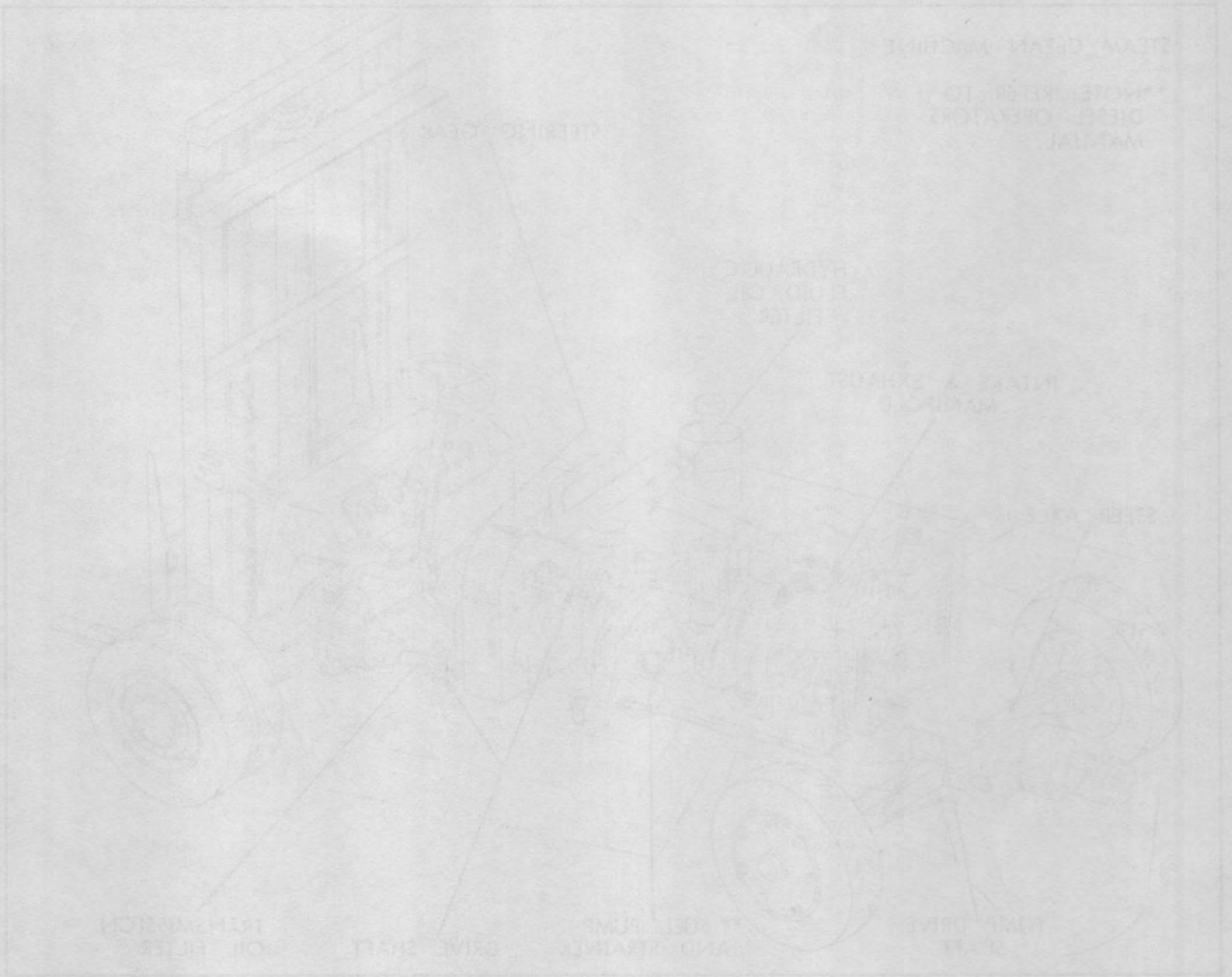




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OPERATION AND MAINTENANCE INSTRUCTIONS



PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE OPERATING THIS TRUCK

STEAM CLEAN MACHINE

****NOTE: REFER TO
DIESEL OPERATORS
MANUAL.**

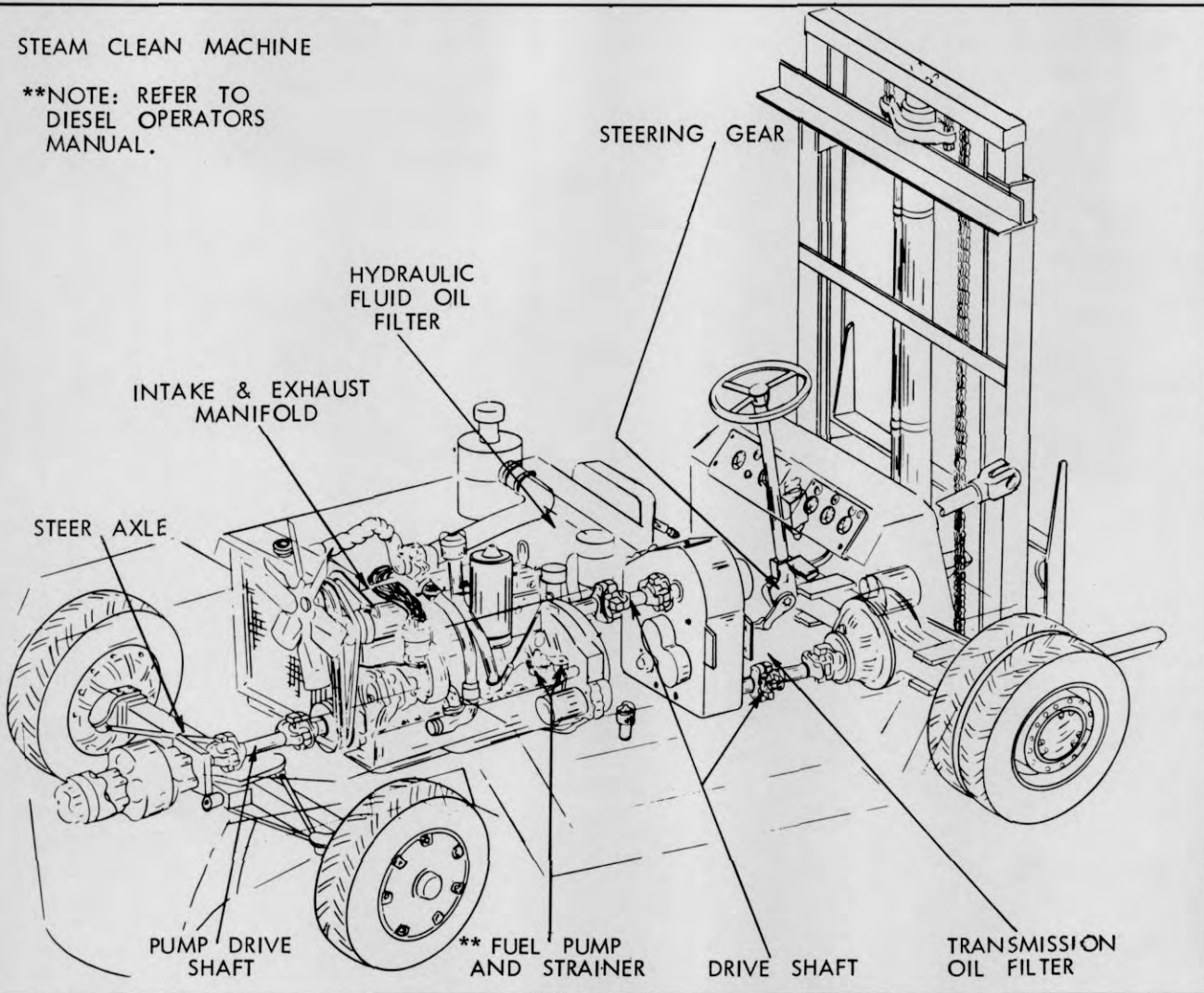


Plate 6510. Lubrication and Preventive Maintenance Illustration

NUTS, BOLTS AND CAP SCREWS. Check security of mounting, tighten as required.

TRANSMISSION & CONVERTER OIL FILTER. The oil filter element is of the replaceable type. The element should be changed whenever the oil is drained. To remove element, remove oil filter cover screw and gasket. Lift out oil filter element. Drain and thoroughly clean filter case. Install new element. Use new gaskets and install cover spring, oil filter cover and secure with cover screw.

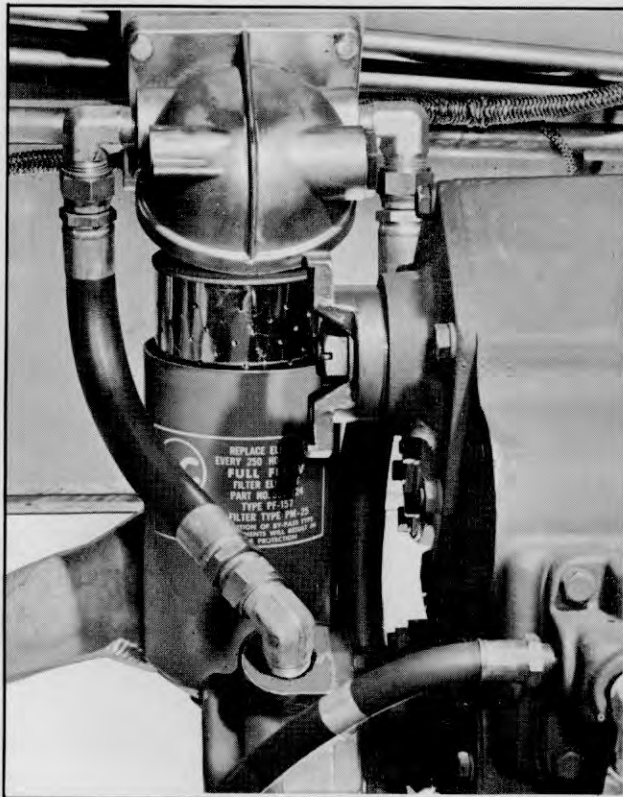


Plate 6258. Transmission Oil Filter

NOTE

Oil filter should be replaced any time oil is changed or a repair is made.

HYDRAULIC SUMP TANK OIL FILTER. The oil filter element is of the replaceable type.

1. Remove filter case, bolt and gasket, pull from machine, See Plates 6434 and 6433.
2. Remove filter, filter spring and thoroughly clean case.
3. Replace bolt gasket and install bolt in case.

4. Install filter spring (narrow end down) and filter in case.

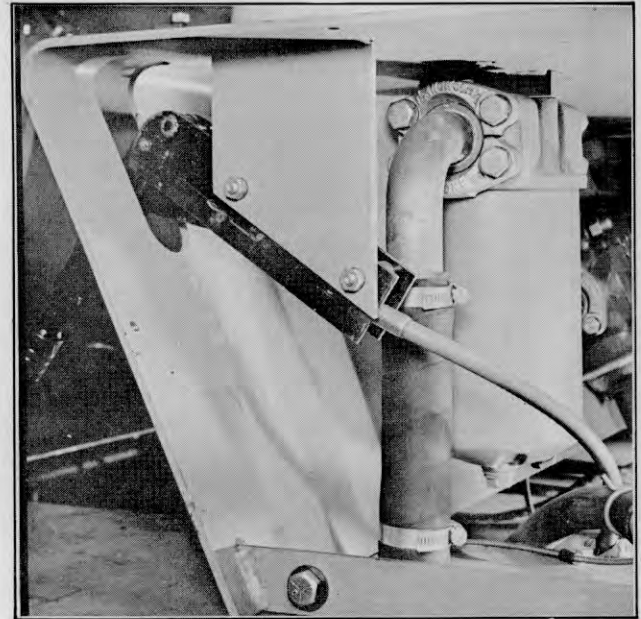


Plate 6434. Sump Tank Oil Filter

5. Using a new case seal ring, install case and secure with bolt. Replace seal ring and gasket, do not reuse old components as they do not afford a positive seal.

CAUTION

START ENGINE AND OPERATE HYDRAULIC CONTROL LEVERS SEVERAL TIMES, CHECK OIL FILTER FOR LEAKS.

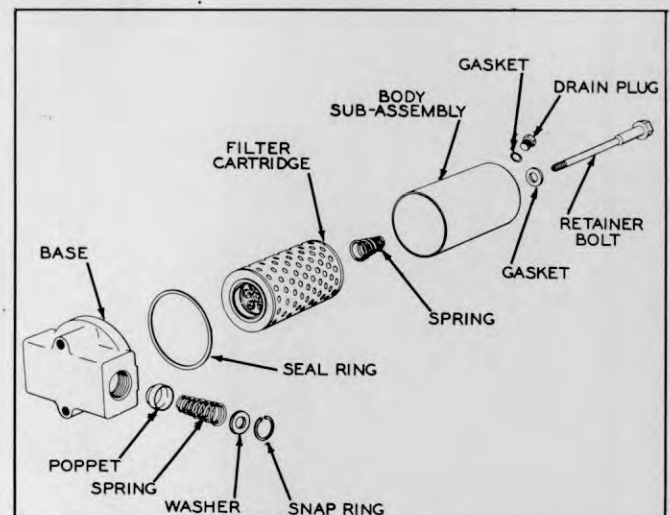


Plate 6433. Hydraulic Oil Filter Components.

STEERING GEAR

Steering gear adjustments must be made in the following manner (See Plates 6435 & 6436.)

Always check worm bearing thrust adjustment, and adjust if necessary, before making sector gear lash adjustment.

Before making adjustments, the following preliminary operations are necessary.

1. Disconnect steering drag link from pitman arm. Note relative position of drag link parts when disconnecting link so the parts may be assembled correctly.
2. Check lubricant level in steering gear housing. If low, add enough lubricant to bring level up to filler plug hole. Use Amolith Grease EP #1 or Equivalent.
3. Tighten steering gear-ahead position of steering mechanism by turning steering wheel to extreme right.

C A U T I O N

APPROACH EXTREME ENDS CAUTIOUSLY; WORM BALL NUT MUST NOT STRIKE ENDS WITH ANY DEGREE OF FORCE.

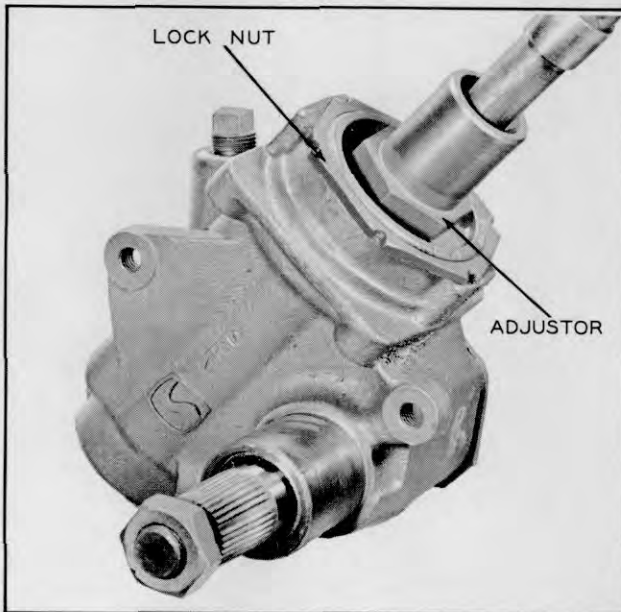


Plate 6435. Steering Gear Thrust Adjustment (Worm Bearings)

Turn to opposite end in the same manner, counting the exact number of turns from right

to the left end. Turn wheel back one-half number of wheel turns. Mark wheel with respect to steering column so center position may readily be found during adjustment procedures.

Worm Bearing THRUST Adjustment: Refer to Plate 6435. and proceed as follows:

1. Check tightness of end cover bolts. Loosen lock nut and turn lash adjuster screw (Plate 6436.) counterclockwise a few turns to provide clearance between sector gear and worm ball nut.
2. Turn steering wheel GENTLY to one extreme end. Turn wheel back one full turn. With spring scale on spoke of wheel, measure pull required to KEEP WHEEL MOVING. Pull on scale should be made at right angles to wheel spoke. If pull is within 1 1/2 to 2 pounds, proceed to lash adjustment in the following paragraphs. If pull is not within 1 1/2 to 2 pounds, adjust worm bearings. The pitman shaft adjustment must be made if worm bearing check is accomplished, or if the worm bearings are adjusted.
3. If it is necessary to adjust the worm bearings, loosen lock nut and then turn worm bearing adjuster nut clockwise until all end play is removed, See Plate 6435. Using spring scale as directed in Step 2, check pull and readjust as necessary; then tighten lock nut securely.

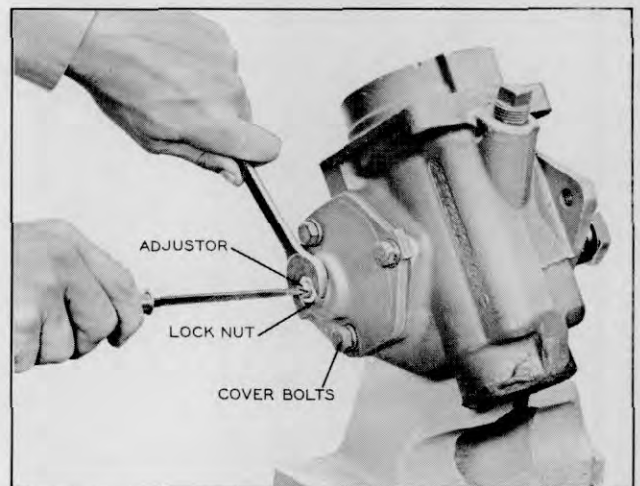


Plate 6436. Steering Gear Lash Adjustment (Sector Gear)

Sector Gear Lash Adjustment: Refer to Plate 6436. and proceed as follows:

1. Steering Gear Mechanism must be in straight-ahead position as previously explained.
2. Turn lash adjuster screw clockwise to remove all lash between bear teeth. Tighten adjuster screw lock nut. Position spring scale on steering

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STEERING GEAR

Steering gear adjustment must be made in the following manner (See Plates 2022 & 2023).

1. A few drops of oil should be applied to the steering gear shaft and the steering gear housing.

2. Before adjusting, the steering gear should be in the following position:

1. The steering wheel should be turned to the right to the extreme position of the steering wheel.

2. The steering gear should be in the following position:

3. Tighten the steering gear housing cap screw to the specified torque.

NOTE: THE STEERING GEAR SHOULD BE ADJUSTED WITH THE TRUCK ON A LEVEL SURFACE.

DRIFT BEARING



Plate 2024, Drift Bearing (Front Adjustment) (Wheel Bearings)

1. The drift bearing should be adjusted in the following manner:

to the left and turn wheel back one half turn of wheel turn; then wheel with respect to steering column so center position may readily be found during adjustment procedure.

2. Turn steering wheel slowly to the left to the extreme position of the steering wheel.

3. Turn steering wheel slowly to the right to the extreme position of the steering wheel.

4. Turn steering wheel slowly to the left to the extreme position of the steering wheel.

5. Turn steering wheel slowly to the right to the extreme position of the steering wheel.

6. Turn steering wheel slowly to the left to the extreme position of the steering wheel.

7. If it is necessary to adjust the drift bearing, the lock nut should be loosened and the adjuster should be turned to the right or left as required. The lock nut should be tightened after adjustment.

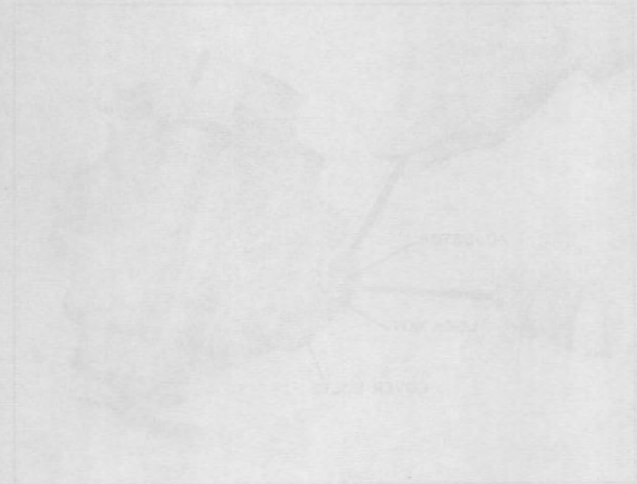


Plate 2025, Drift Bearing (Rear Adjustment) (Wheel Bearings)

1. The drift bearing should be adjusted in the following manner:

2. Turn steering wheel slowly to the right to the extreme position of the steering wheel.

3. Turn steering wheel slowly to the left to the extreme position of the steering wheel.

wheel so pull may be made at right angles to wheel spoke.

3. Measure pull while wheel is TURNED THROUGH CENTER POSITION. Readjust if reading is not within 2 1/2 to 3 pounds.

4. Tighten adjuster screw lock nut, check pull again.

5. After adjustments are made, install drag link on pitman arm.

N O T E

1 Steer linkage adjustment is necessary do not install drag link to pitman arm.

STEERING AXLE AND LINKAGE ADJUSTMENTS

1. Raise the steer wheels from the floor.
2. Remove the rear drag link from the steer axle spider, Plate 6437. Item A.
3. Check steer wheels for correct turning geometry by turning the wheels all the way to the left -- this should allow the right hand steer wheel to attain an angle of 75 degrees to the frame. If adjustment is necessary, the axle stops on the right side of the axle are turned "in" or "out", whichever is necessary to achieve the correct angle. Repeat this procedure with the left wheel.

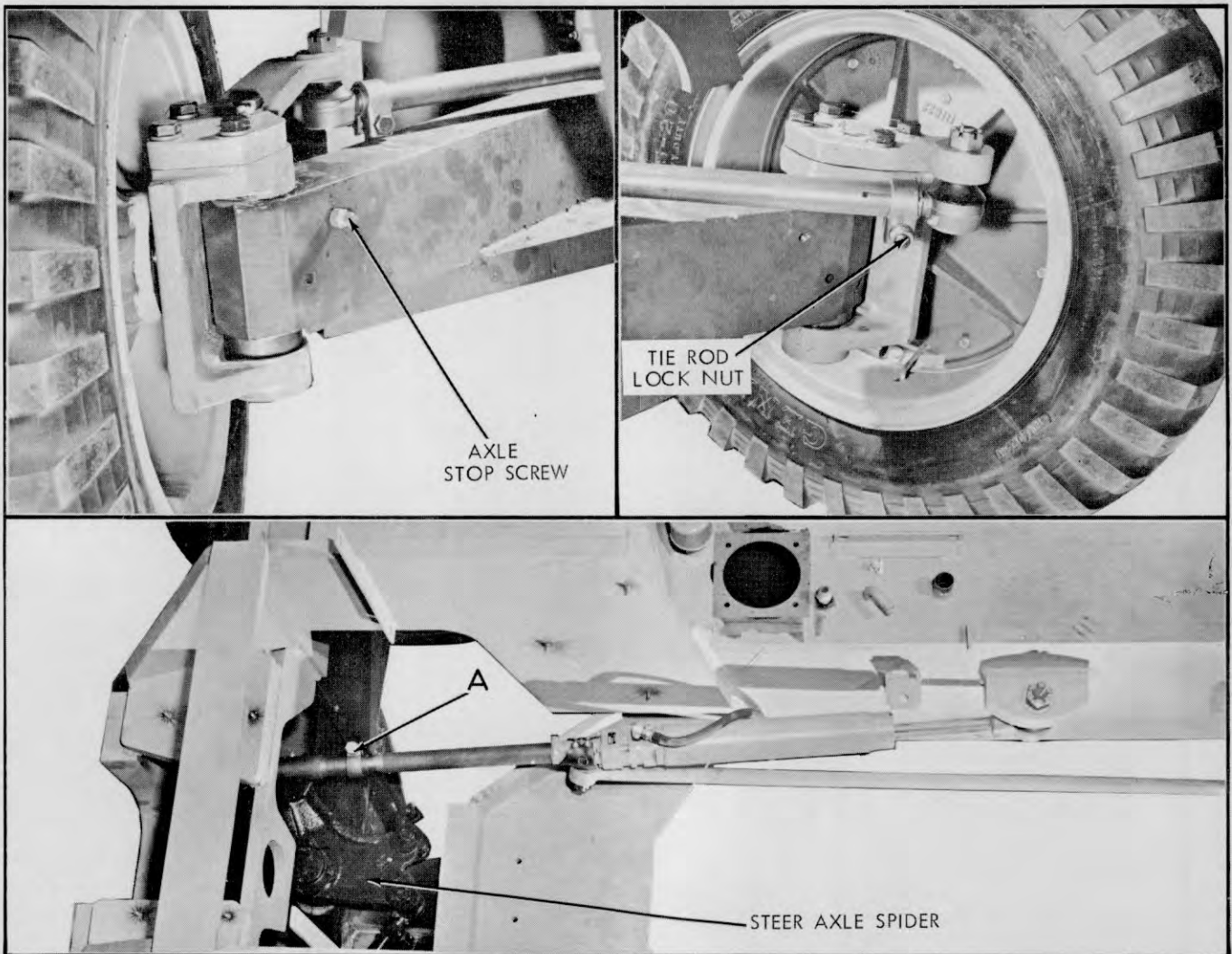
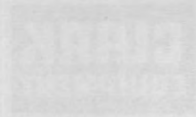


Plate 6437. Steer Axle and Linkage Adjustments



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LUBRICATION AND PREVENTIVE MAINTENANCE

STEERING AXLE AND BRAKE ADJUSTMENTS

To raise the air or weight limit the truck, remove the rear drum link from the stop and lower the drum link.

To check steering wheel for correct turning, turn wheel until the wheels all the way to the left or right. This should allow the truck to turn about 15 degrees to the right or left. If it is necessary to adjust the steering, it is necessary to remove the correct wheel lock and adjust the wheel with the left wheel.

See the bolt on the end of the axle on the wheel end.

Remove the link from the wheel through the hole in the frame. Insert the link in the hole and tighten the nut.

To check the wheel lock, lock the wheel and turn the wheel. The wheel should turn about 15 degrees to the right or left. If it is necessary to adjust the steering, it is necessary to remove the correct wheel lock and adjust the wheel with the left wheel.

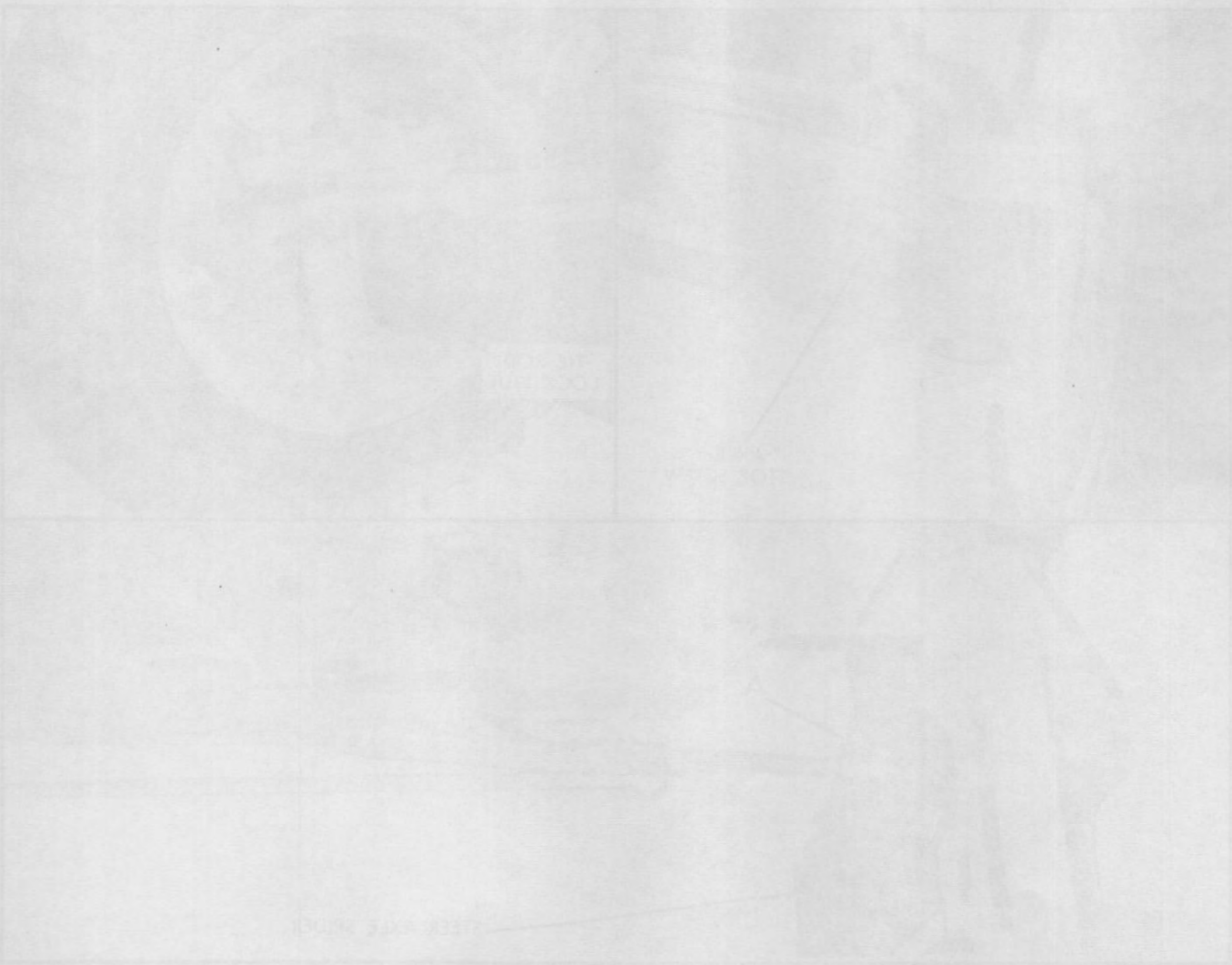


Figure 6-17. Steering axle and brake adjustment

4. After adjusting the stop screws, check the steering wheel alignment. Steer wheels must be in straight-ahead position before making the following adjustments.

a. Rotate hand wheel as far as it will go in one direction. Carefully counting the number of turns, turn wheel all the way in the opposite direction.

b. Now turn hand wheel back exactly half-way, noting position by a piece of tape placed on the hand wheel.

5. The steering wheels should track square with the drive wheels with no toe-in or toe-out. If adjustment is necessary, adjust the alignment of the steering wheels by loosening the lock nut of the tie rod ends and turning the tie rods until the wheels are in alignment.

N O T E

Tie rods should be adjusted the same length. Adjust both tie rods until wheels are in alignment, then tighten lock nut against tie rod ends to secure adjustment.

6. With steer wheels in full left turn position, pull piston rod out of steer cylinder so it is fully extended. Then push the rod into the cylinder one-half inch. Loosen clamp (A) on the adjustable end of drag link (located nearest steer cylinder) and turn rod until it lines up with the ball stud in the axle spider -- attach rod end to spider ball stud and tighten clamp.

7. Remove pitman arm (plate 6438.) Turn the hand wheel all the way to the left. Loosen lock nuts on pitman arm stops. Remove and then remount pitman arm in serration nearest rear stop (B). Turn hand wheel one-half turn clockwise, loosen lock nuts on the adjustable end of drag link (C), and turn the rod end until it lines up with pitman arm, install, and tighten lock nuts.

8. Turn hand wheel to full left turn, adjust (rear) pitman arm stop (B) until it is just contacting pitman arm, then turn stop one complete turn in and tighten lock nut. Repeat for full right turn, adjusting (front) Pitman arm stop (D).

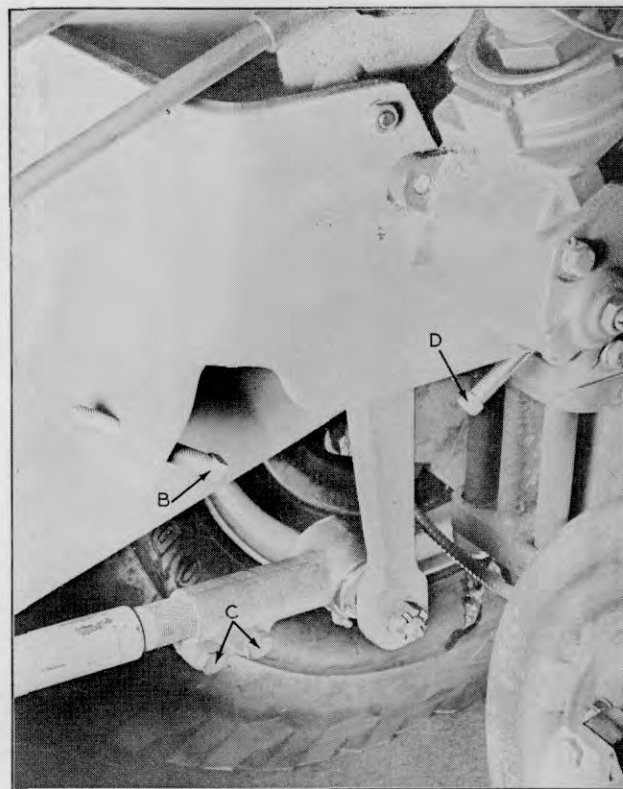
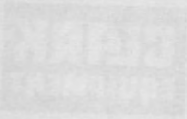
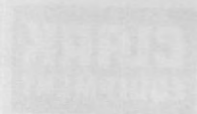


Plate 6438. Steer Linkage Adjustments
(Pitman Arm Stops)

9. Turn hand wheel until steer wheels are in straight-ahead position. Remove hand wheel and replace on steering column with the center spoke aligned plus or minus 10 degrees with the center line of the machine -- the center spoke pointing back.



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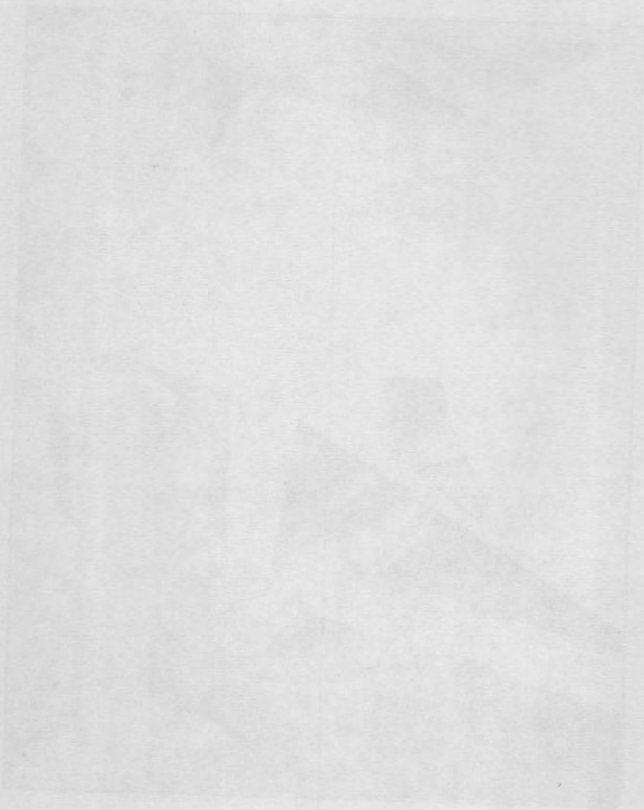


Figure 1: Front End Steering Adjustment (Pitman Arm Setup)

1. Turn hand wheel until steering wheel is in straight-ahead position. Loosen lock wheel and tighten on steering column with the center spoke aligned with the mark in center with the center line of the marking — the center spoke pointing back.

2. After adjusting the stop screws, check the steering wheel to make sure wheel does not move in a clockwise or counter-clockwise direction.

3. Turn hand wheel as far as it will go to the right. Loosen the stop screws and adjust them so that the wheel is in the straight-ahead position.

4. Now turn hand wheel back exactly the same number of degrees as it was turned to the right. Loosen the stop screws and adjust them so that the wheel is in the straight-ahead position.

5. The steering wheel should be in the straight-ahead position when the truck is in the straight-ahead position. If it is not, adjust the steering block by loosening the lock nut on the screw and turning the block until the wheels are in alignment.

6. The right side should be adjusted the same as the left side. Turn the right side in the same direction as the left side. Tighten lock nut and adjust the side to correct adjustment.

7. Now turn wheel to full right-hand position and adjust the out of center cylinder so that the truck is in the straight-ahead position. Turn the out of center cylinder in the same direction as the steering block.

8. Turn the out of center cylinder in the same direction as the steering block until the truck is in the straight-ahead position. Tighten the lock nut and turn the out of center cylinder in the same direction as the steering block.

9. Remove pitman arm (Figure 2) from the truck and set the way in the left corner.

10. Turn the out of center cylinder and the steering block in the same direction as the steering block until the truck is in the straight-ahead position. Tighten the lock nut and turn the out of center cylinder in the same direction as the steering block.

11. Turn hand wheel to full left-hand position and adjust the out of center cylinder so that the truck is in the straight-ahead position. Turn the out of center cylinder in the same direction as the steering block.

12. Turn the out of center cylinder in the same direction as the steering block until the truck is in the straight-ahead position. Tighten the lock nut and turn the out of center cylinder in the same direction as the steering block.

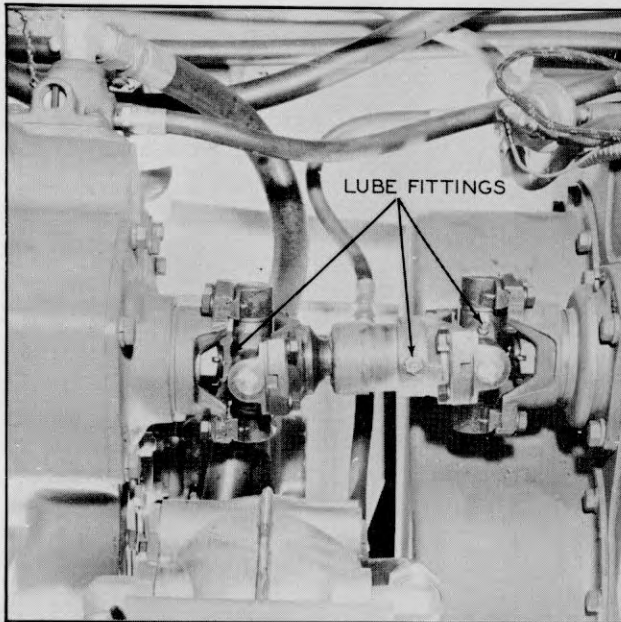


Plate 6439. Drive Shaft

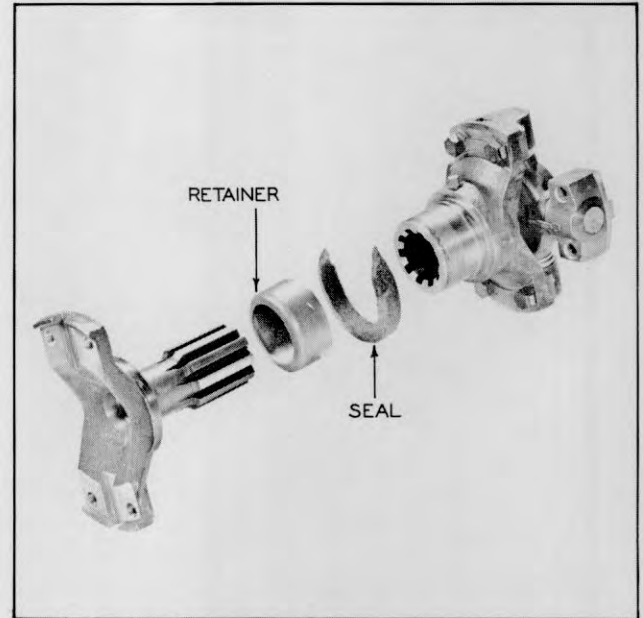


Plate 6440. Steering Pump Drive Shaft

UNIVERSAL JOINTS

Inspect drive universal joints (Plate 6439.) and steer pump universal joints (driven off engine crank pulley, (Plate 6440) for security of mounting and excessive bearing wear.

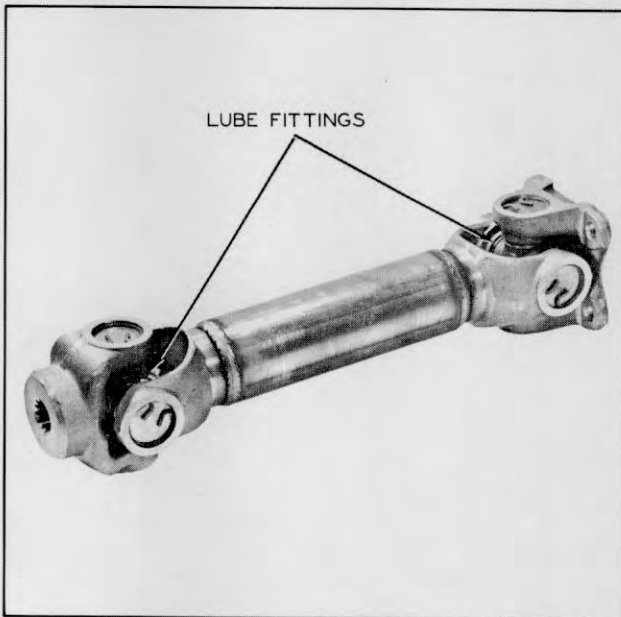
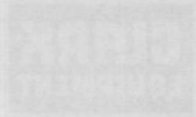


Plate 6441. Drive Shaft



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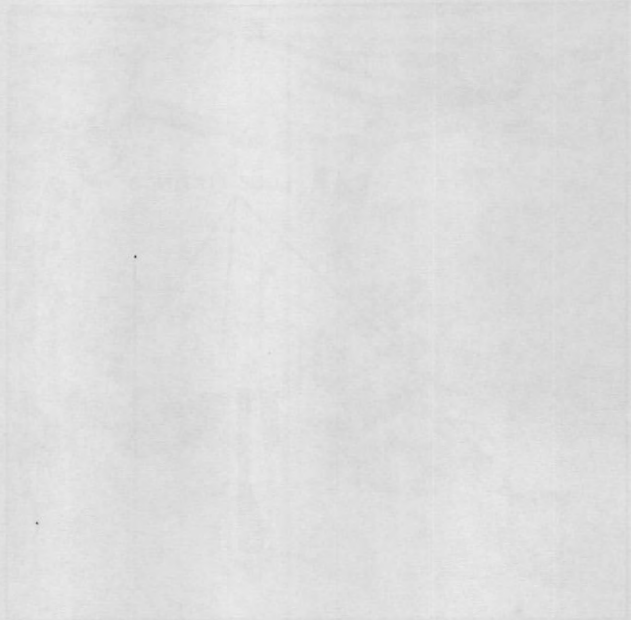


Plate 8402, Drive Shaft

Plate 8403, Drive Shaft

UNIVERSAL JOINTS
A universal joint is a type of constant velocity joint that allows for the transmission of torque between two shafts that are not in a straight line. It is commonly used in drive shafts of vehicles and industrial machinery.

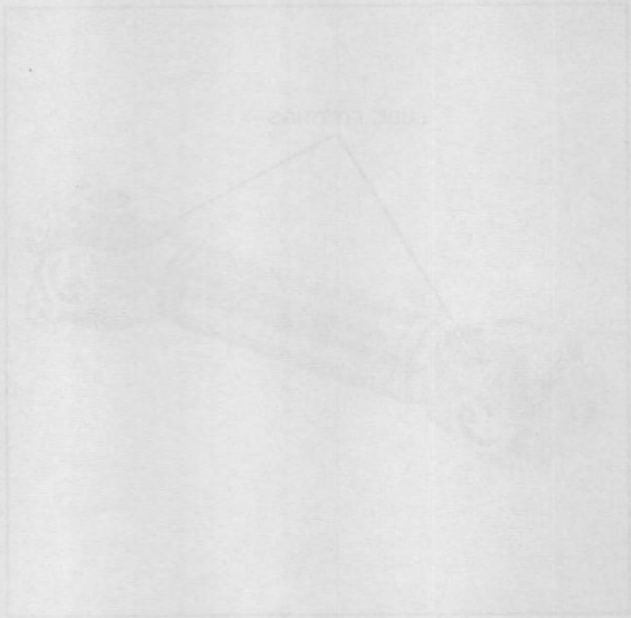
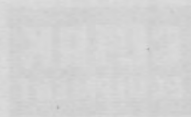


Plate 8404, Drive Shaft



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OPERATION AND PREVENTIVE MAINTENANCE

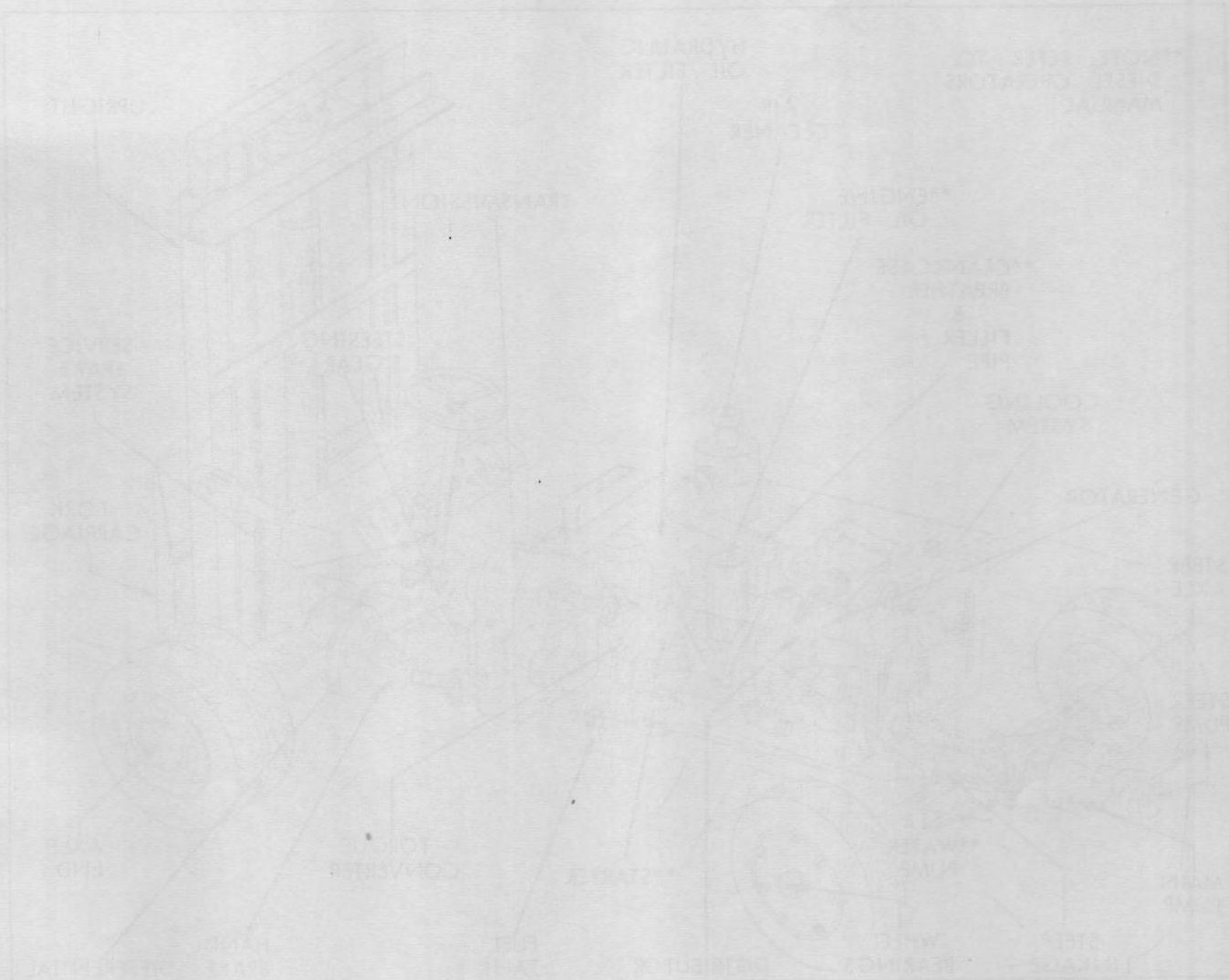


Figure 1011, Operation and Preventive Maintenance Illustration

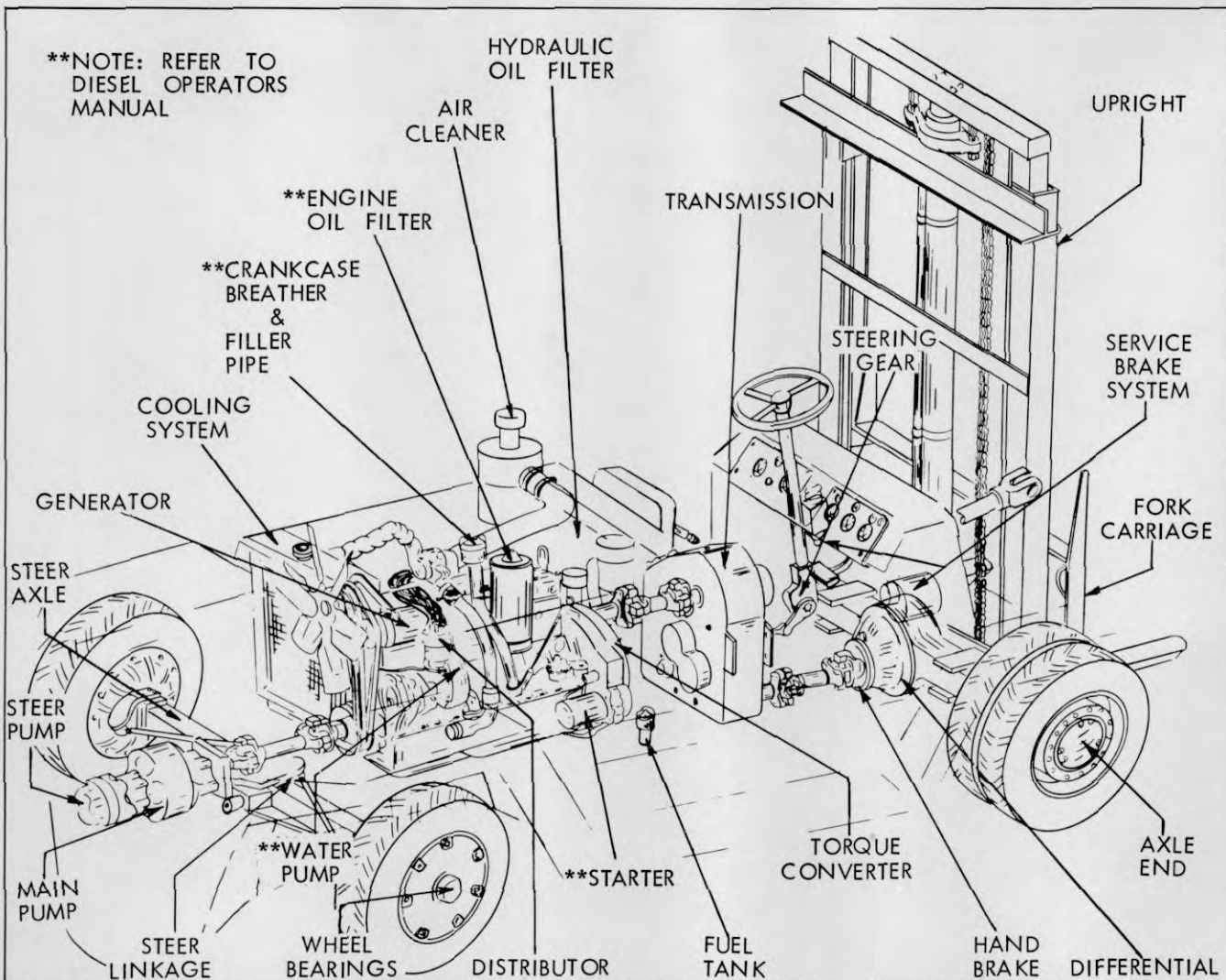


Plate 6511. Lubrication and Preventive Maintenance Illustration

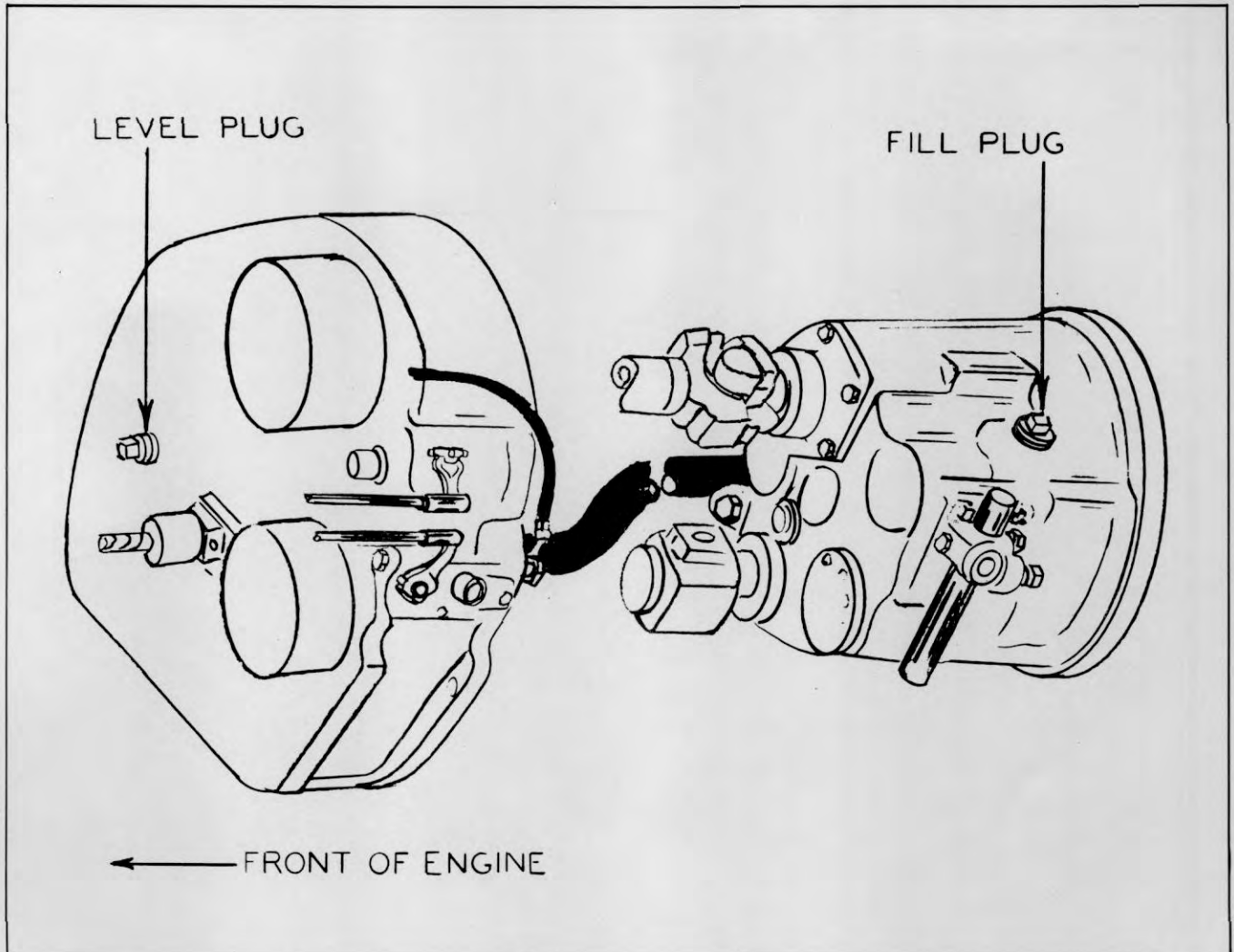


Plate 6455. Converter and Transmission

DIFFERENTIAL

Drain and refill to proper level with E.P.G.L. S.A.E. 90, Clark Specification MS 8.

TRANSMISSION AND CONVERTER

Drain and refill converter and transmission with Type AQATF Lubricant.

C A U T I O N

DO NOT USE FLUSHING OIL OR COMPOUND TO FLUSH SYSTEM.

N O T E

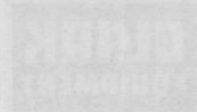
Fill through filler plug at left hand side of converter until oil comes up to level plug on lower right front face of transmission case.

2. Run engine at fast idle 2 minutes to prime converter.

3. Check oil level in transmission, add as required. Refer to Specifications for capacity.



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LUBRICATION AND PREVENTIVE MAINTENANCE

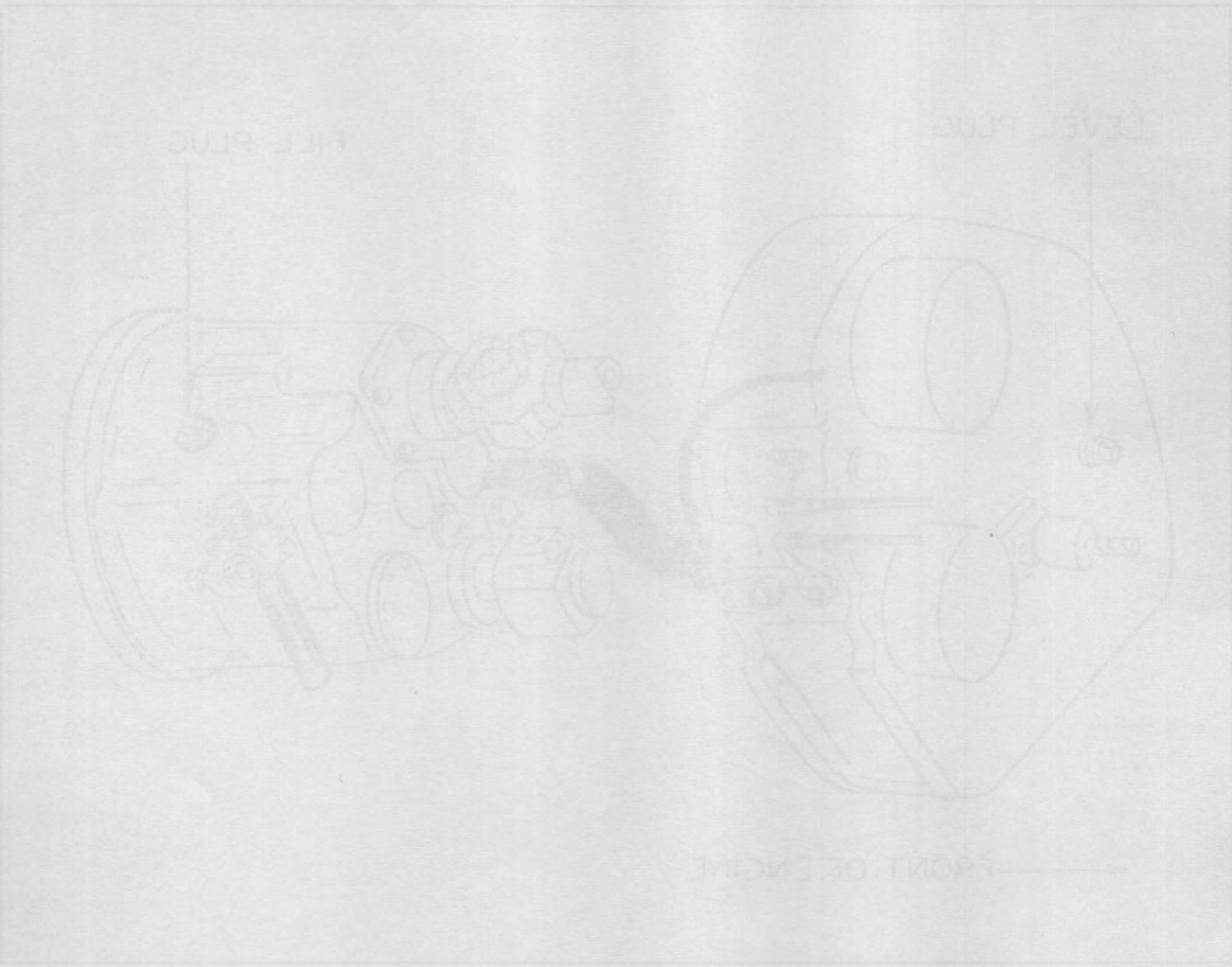


Figure 6-2. Converter and Transmission

NOTE

1. Fill through filler plug at rear of converter until oil comes up to level in level sight glass; transmission case.
2. Run engine at 1500 RPM 5 minutes to prime converter.
3. Check oil level in transmission and as required, refer to specification for capacity.

PRELIMINARY

1. Drain and refill to proper level with SAE 90, GLK Specification No. 1.
2. TRANSMISSION AND CONVERTER
3. Drain and refill converter and trans with Type AGATE lubricant.

CAUTION

DO NOT USE PUSHERS OR DRUMS TO PUSH SYSTEM

STEERING WHEEL BEARINGS

Adjustments:

1. Raise rear of machine so that tires clear floor.
2. Inspect adjustment of bearings by gripping top and bottom of tire, chuck tire "in" and "out" to determine looseness or wobble. Now grip front and rear side of tire, chuck tire "in and "out" to determine looseness or wobble.

N O T E

Before making wheel bearing adjustments, be sure play (looseness or wobble) is in the wheel bearings and not in the king pins.

N O T E

If wheel bearings need adjusting, clean and repack bearings before making adjustments. Refer to Lubrication paragraph.

3. If looseness or wobble is in the wheel bearings, remove hub cap and nut and nut lock, see Plates 6452 & 6453. Tighten inner nut with a 12" wrench, and at the same time turning the wheel in one direction and then in the other until there is a slight bind to be sure all bearing surfaces are in contact. Then back off adjusting nut 1/6 to 1/4 turn allowing the wheel to rotate freely. Secure nut at this position with nut and nut lock.

Lubrication:

1. Remove wheels after 1000 hours or every six months of operation. Clean bearings and repack with medium bodied high temperature wheel bearing grease, See Plates 6452 & 6453.
2. Install wheels and adjust wheel bearings as previously described.

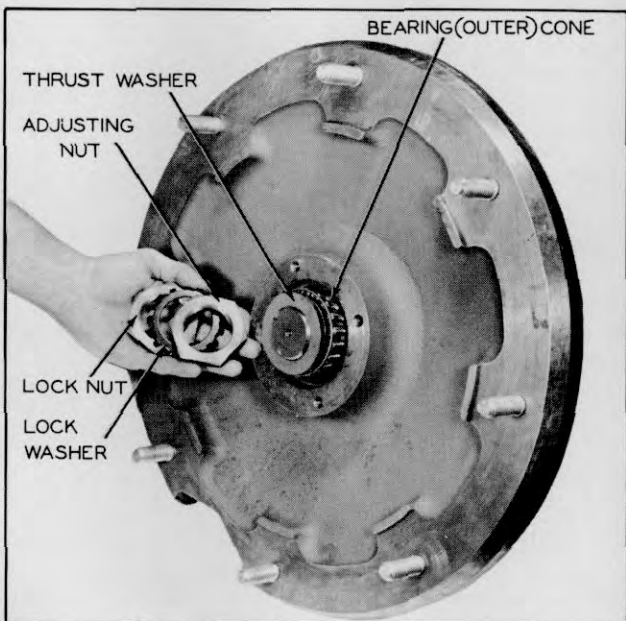


Plate 6452. Wheel Bearings

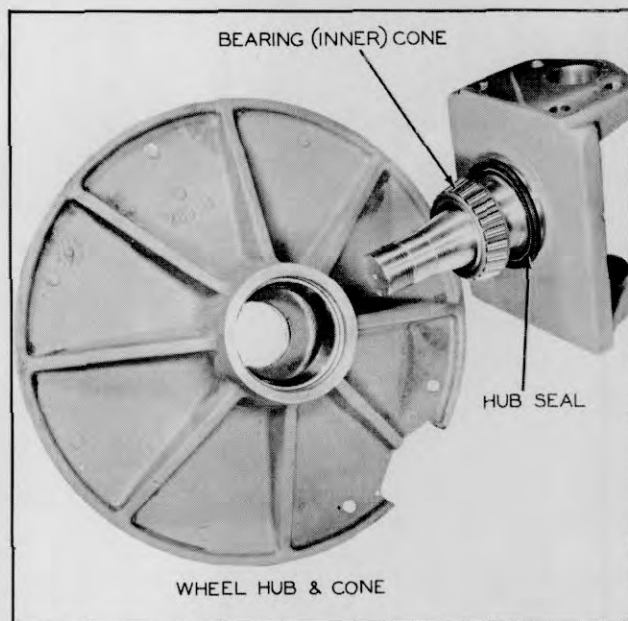
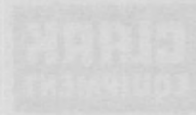


Plate 6453. Wheel Bearings



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

1. If looseness or wobble is in the wheel bearings, remove hub cap and nut and see Plate 652, Figure 1, for correct bearing adjustment and for the correct wheel in one direction and for the other until there is a slight bind. Do not adjust bearing surfaces and do not adjust back the adjustment nut. Do not adjust the wheel to correct looseness unless the position with nut and nut lock.

Lubrication:

1. Remove grease after 1000 hours of work or the number of cycles. Clean bearing and reassemble with new grease. Do not use wheel bearing grease. See Plate 652, Figure 1.

2. Install seals and adjust wheel nut as previously described.

STEERING WHEEL BEARINGS

ADJUSTMENT:

1. Raise rear of machine on level clear floor.

2. Inspect adjustment of bearing by pulling top and bottom of tire toward the hub and toward loosening. Loosen nut until there is a slight bind of the wheel to the hub. Do not adjust looseness or wobble.

NOTE:

Before making wheel bearing adjustment, loosen the looseness or wobble in the wheel bearing and nut in the hub.

NOTE:

1. Wheel bearings need oiling, clean and inspect for wear before using oil. Do not use grease.

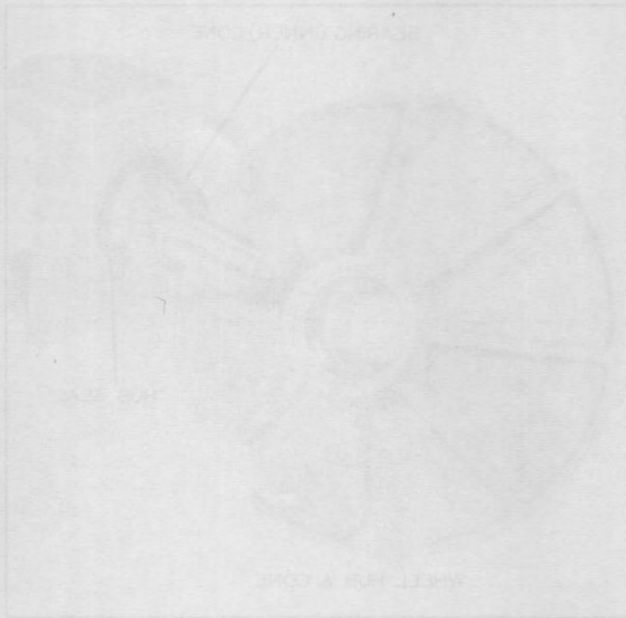


Plate 652, Wheel Bearings

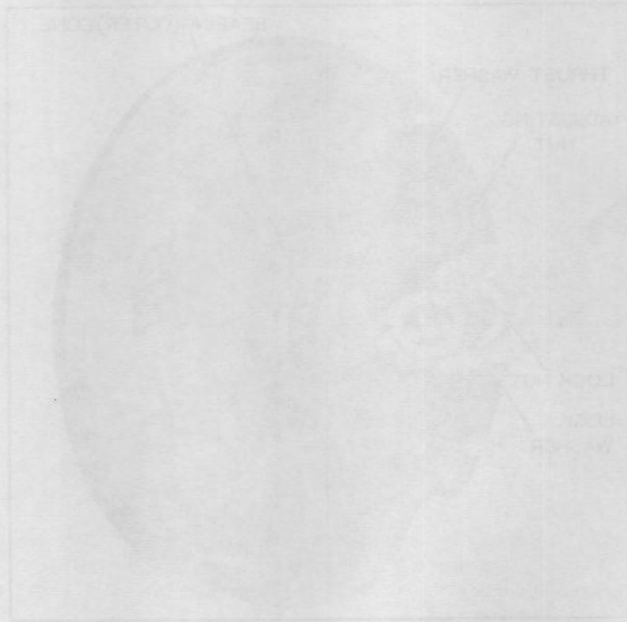


Plate 653, Wheel Bearings

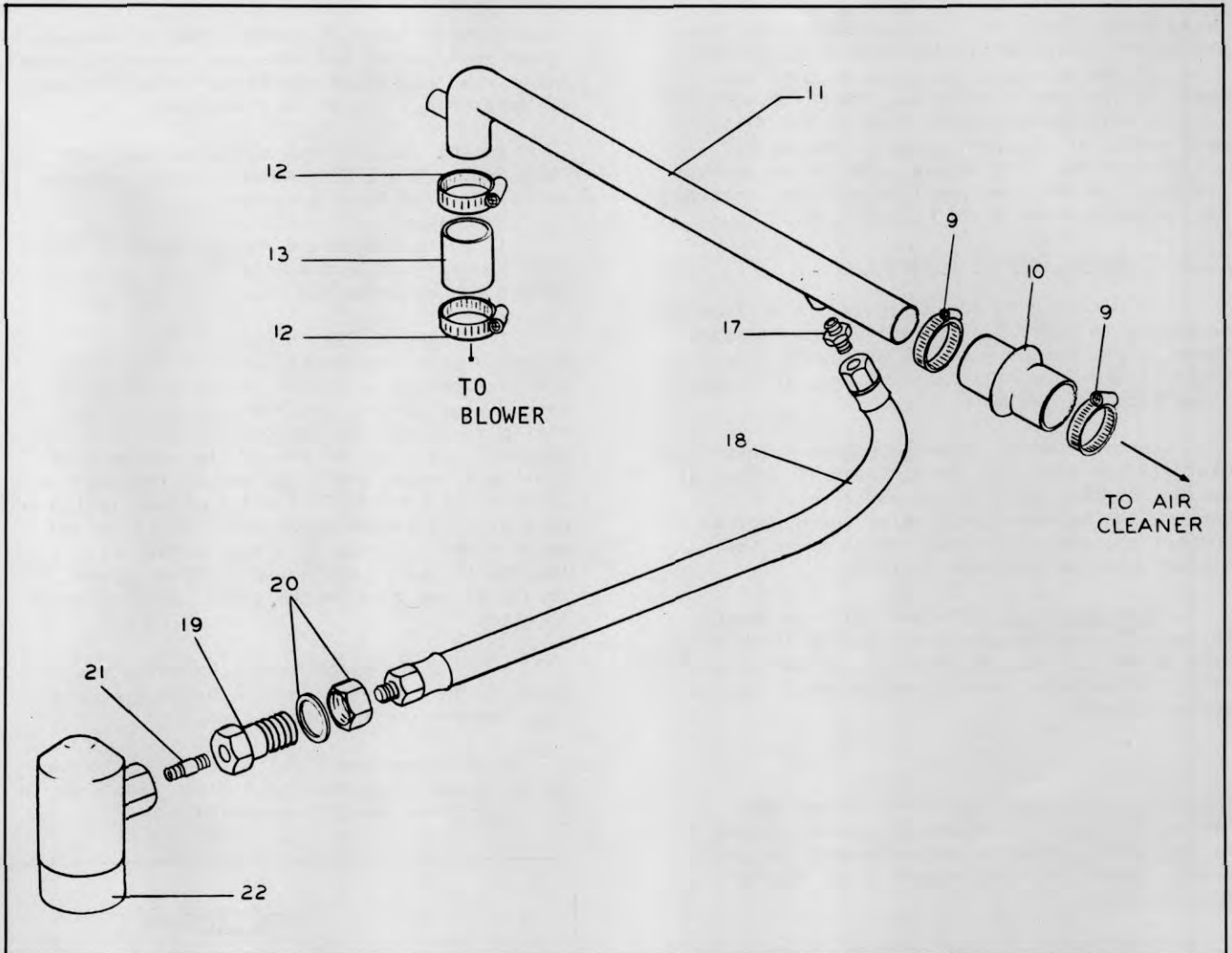


Plate 9977. Hydrovac -to- Air Cleaner Lines

When installing air cleaner, be sure all hose connections are tight preventing any dirt or dust from entering at these points.

Check Hydrovac -to- Engine Air Cleaner Hose for security of mounting See Plate 9977. Hose clamps must be tight preventing air and dirt from entering the unit.

BRAKE SYSTEM

TESTS. Because improper action of the brake pedal may indicate troubles other than faulty pedal adjustment, make the following preliminary tests and observations to determine whether a brake pedal adjustment will remedy the condition.

1. Performance Test Without Gauges:

With the ignition off, depress brake pedal

and hold foot pressure for at least ten seconds. If brake pedal gradually "falls away" under foot pressure, the hydraulic brake system is leaking and immediate correction must be made.

a. Check level of brake fluid in brake master cylinder. If level is low, fill to within 1/4 inch of the top. Check master cylinder for leakage.

b. Inspect all fluid lines, connections and backing plates for leakage.

c. Check brake pedal for proper free travel of 1/16 to 3/16 inch (1/8 nominal).

Start the engine and allow it to idle for about ten seconds. Depress brake pedal with about as much foot pressure as required for nominal stopping. Remove foot from pedal and turn off ignition switch. Depress and release

brake pedal five times slowly. Pedal should be depressed approximately the same distance each time. If the pressure required to push the pedal to this position during the fifth application is noticeably greater than on the first application the vacuum system is operating satisfactorily. If pressure required to depress the pedal to the same position has not increased the vacuum system is not working correctly.

2. Performance Test With Gauges:

To make the following tests, it will be necessary to have: (1) Hydraulic Line Pressure Gauge, capacity 300 lbs. (2) Hydraulic Line Fittings and Hose. (3) Vacuum Gauge. (4) Vacuum Gauge Fittings and Hose.

Connect vacuum gauge to engine intake manifold and make sure of at least 16 inches of vacuum. Remove Vacuum gauge and insert in vacuum line between check valve and Hydrovac. Connect the hydraulic pressure gauge in the bleeder hole at any wheel cylinder.

Test Number 1. With the ignition switch turned off, and vacuum gauge reading at zero. Make moderate brake application and hold for at least ten seconds. Record reading of hydraulic pressure gauge.

N O T E

There must be no vacuum in the system when making this test. If there is vacuum present in the system, depress and release brake pedal several times to bring vacuum gauge reading down to zero.

Test Number 2: Start engine, allow it to idle ten seconds. With vacuum gauge reading at least 16 inches, make a moderate brake application. Record reading of hydraulic pressure gauge.

The hydraulic line pressure gauge reading for Test Number 2, should be considerable higher than the pressure reading taken in Test Number 1, using the same pedal pressure. If not, the vacuum power system is not functioning properly.

Test Number 3: Start engine, allow it to idle about ten seconds. Vacuum gauge reading should be at least 16 inches.

Turn off ignition and note any decrease in the vacuum readings.

N O T E

Vacuum should not decrease more than 5 inches in 15 seconds.

Test Number 4: Start engine, allow it to idle about ten seconds. Vacuum gauge reading

should be at least 16 inches. Make a moderate brake application and note any change in vacuum gauge reading. There should not be a decrease of more than 5 inches in 15 seconds.

If the vacuum brake system passes both Test Number 3 and Test Number 4, the vehicle is ready to go into operation.

If the vacuum brake system passes either Test Number 3 or Test Number 4, but not both, remove the hydrovac and repair or replace.

If, however, Test Number 3 and Test Number 4 both show excessive loss of vacuum, the leakage may be either in the Hydrovac or Vacuum Line between the Hydrovac and Intake Manifold. Disconnect the vacuum line at the Hydrovac and plug the end of the vacuum line. Start the engine and allow vacuum to build up at least 16 inches. Turn off ignition switch and note drop in vacuum gauge reading. If vacuum gauge holds or drops at a much slower rate, leakage is indicated in the Hydrovac which should be occurring in the check valve, line or fittings.

3. If brake pedal reacts normally but feels spongy, bleed hydraulic brake system as described on the following page.

4. If brake pedal fails to return to normal released position, check brake pedal return spring, and replace if necessary.

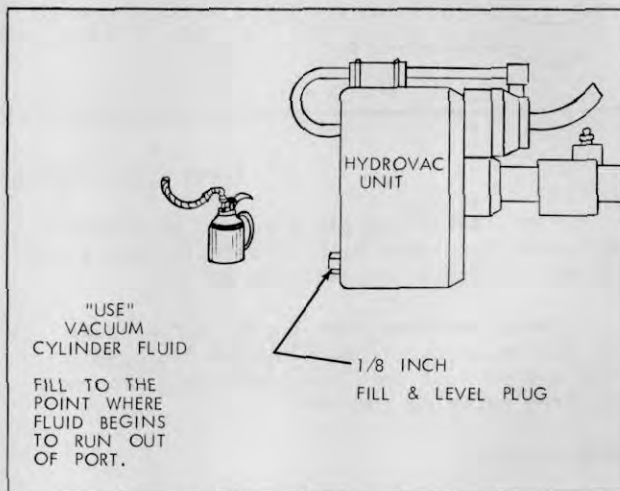


Plate 6469. Check Hydrovac Fluid Level.

LUBRICATION AND PREVENTIVE MAINTENANCE

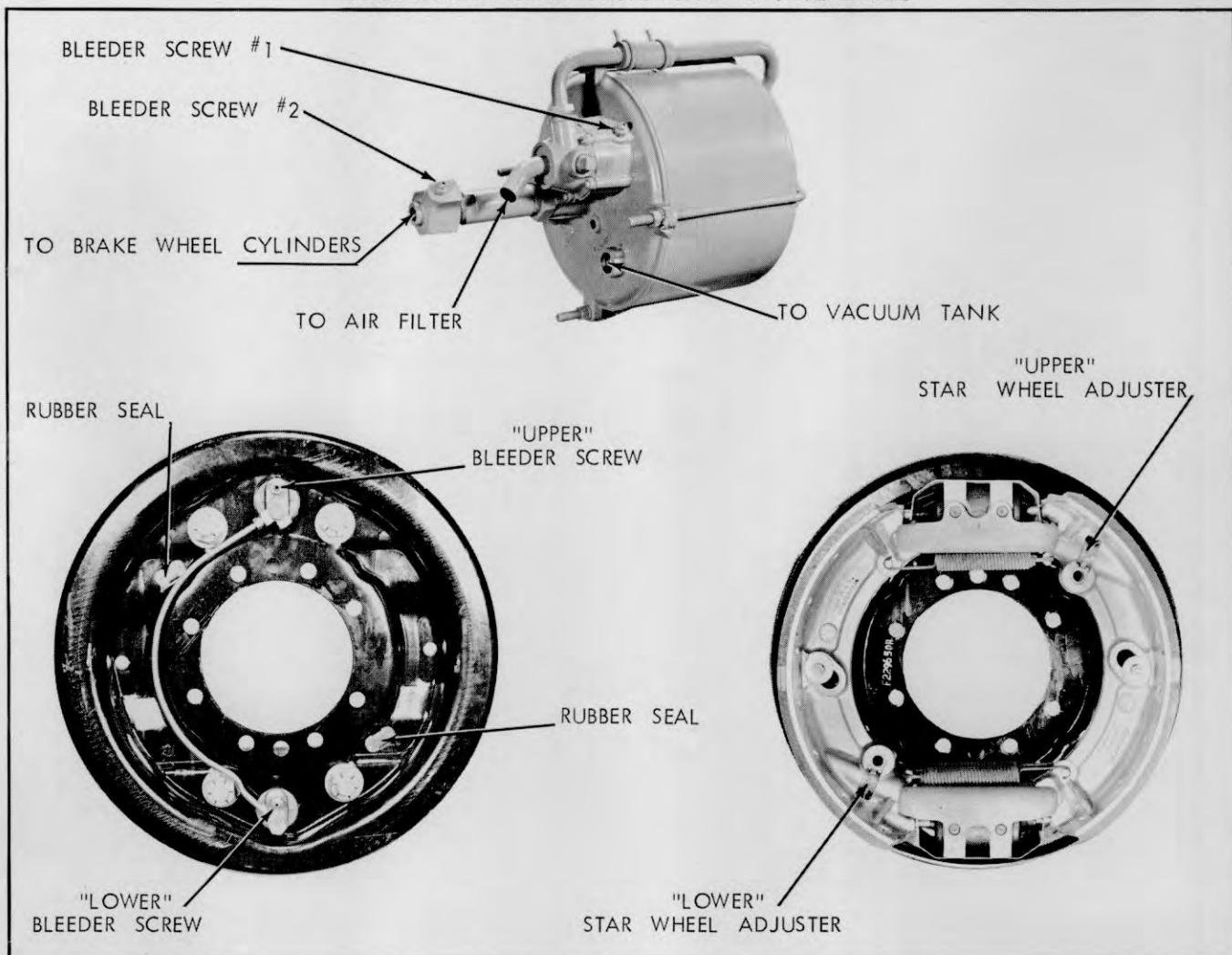


Plate 6457. Bleeding Brake System and Brake Adjustments

BLEEDING BRAKE SYSTEM

Proper operation of the hydraulic brake system requires a solid column of fluid without air bubbles at all points in the pressure system. Under certain conditions it becomes necessary to bleed fluid from system in order to expel air bubbles which have become mixed with the fluid. The necessity of bleeding is indicated by a soft or spongy brake pedal, or at any time a brake line is removed (or broken) the system must be bled.

CAUTION

THE BLEEDING OPERATION MUST BE DONE WITH THE ENGINE OFF, AND NO VACUUM IN THE SYSTEM.

CODE GOV'T 0-215

1. Clean dirt from around the filler cap of the master cylinder reservoir and then remove the filler cap.

2. Fill master cylinder reservoir with brake fluid (S.A.E. 70R3 Heavy Duty Hydraulic Brake Fluid).

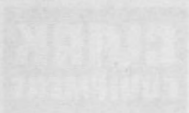
NOTE

Check hydrovac fluid level. (See Plate 6469)

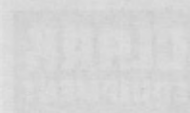
FILL WITH VACUUM CYLINDER FLUID TO THE POINT WHERE FLUID BEGINS TO RUN OUT OF PORT.

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LUBRICATION AND PREVENTIVE MAINTENANCE

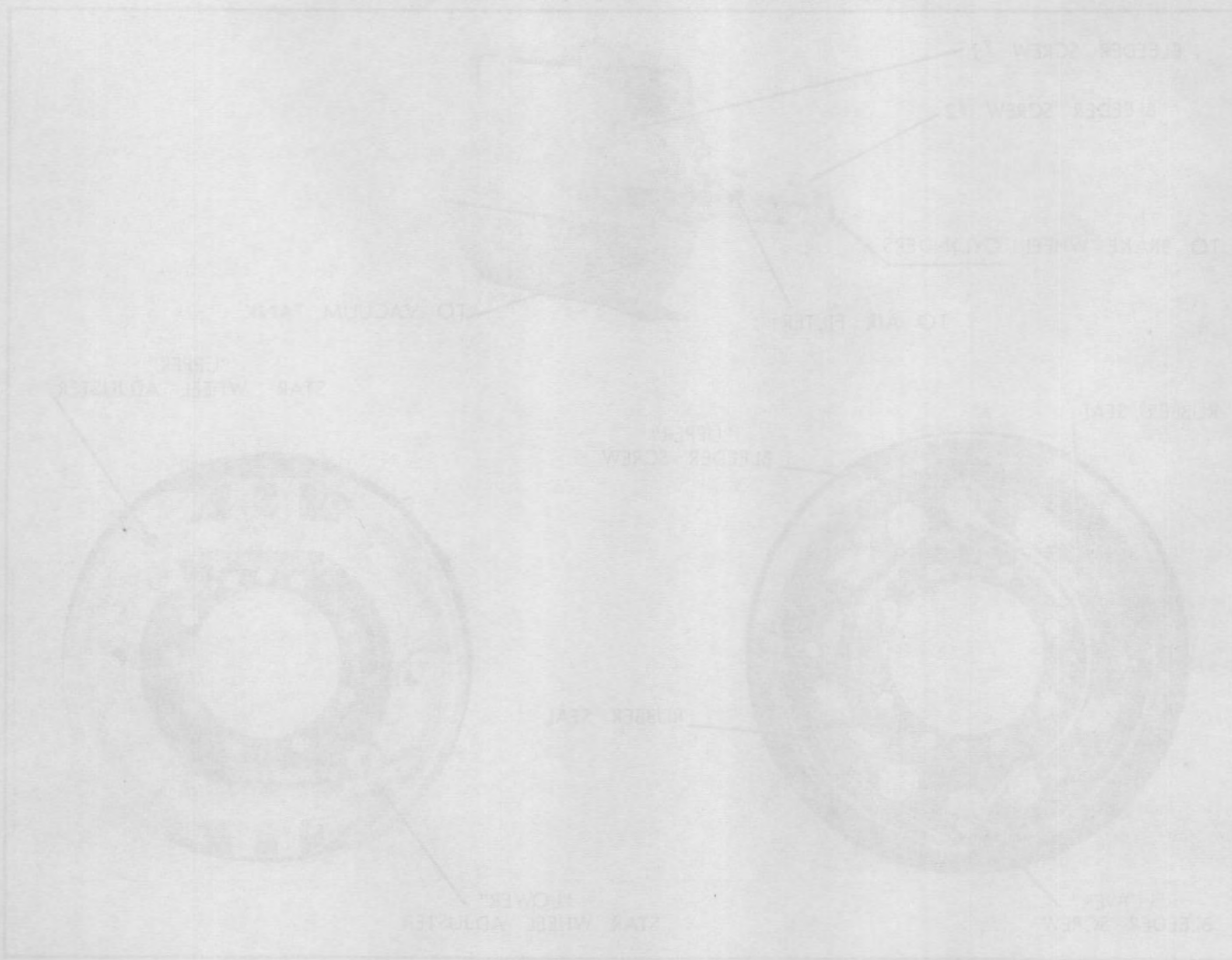


FIG. 5127, Bleed-off Valve System and Wheel Adjustment

1. Clean the top cover of the bleed-off valve and the remove the filter cap.

2. Fill master cylinder reservoir with brake fluid (2.5A-E, 20R3 Heavy Duty Hydraulic Brake Fluid).

NOTE

Check hydraulic fluid level (See Page 510)

FILL WITH VACUUM CYLINDER FLUID TO THE POINT WHERE FLUID BEGINS TO RUN OUT OF PORT.

BLEEDING BRAKE SYSTEM

Proper operation of the hydraulic brake system requires a solid column of fluid without air bubbles or air voids in the pressure system. Under certain conditions it becomes necessary to bleed fluid from certain lines to expel air bubbles which are caused mixed with the fluid. The necessity of bleeding is indicated by a low or spongy brake pedal, or on any time a brake line is removed (or broken) the system must be bled.

CAUTION

THE BLEEDING OPERATION MUST BE DONE WITH THE ENGINE OFF AND NO VACUUM IN THE SYSTEM.

N O T E

Only new, clean genuine hydraulic brake fluid should be used. Keep master cylinder filled with clean fluid during bleeding operation. A bleeder hose should be used. Install bleeder hose on first bleeding screw to be bled. Have loose end of bleeder hose submerged in brake fluid in glass jar. This prevents the possibility of air being sucked into lines during bleeding operation.

3. It is necessary to first bleed fluid at the Hydrovac Unit, See Plate 6457. Loosen bleeder screw #1 one full turn, depress brake pedal slowly allowing fluid and air to escape at this point. Tighten the bleeder screw and then release brake pedal. Repeat this operation several times providing a pumping action which will force out air at this point. Remove bleeder hose and install hose on bleeder screw #2.

4. Loosen bleeder screw #2 one full turn and depress brake pedal slowly allowing fluid and air to escape at this point — tighten bleeder screw and allow brake pedal to return to its off position. Repeat this procedure several times providing a pumping action which will force out air at this point. Remove bleeder hose.

N O T E

This procedure must be repeated until air has escaped from the system at both these points. Always release brake pedal after closing bleeder screw — never before.

5. Install bleeder hose on the bleeder screw of the lower wheel cylinder on the left front wheel. Loosen bleeder screw and depress brake pedal slowly allowing fluid and air to escape, tighten bleeder screw and release brake pedal. Repeat procedure approximately ten times. After this line has been properly bled, repeat the same procedure on the upper wheel cylinder of the same wheel. Then bleed the lower right front wheel cylinder. Now bleed the upper right front wheel cylinder. The bleeding operation must be repeated until the system is properly bled — completely free of air.

N O T E

Fluid withdrawn from system during bleeding operation should not be used again.

BRAKE ADJUSTMENTS

When drums are hot, allow to cool, then proceed as follows:

1. Adjust brake pedal free play to 1/16 to 3/16 inch (1/8 inch nominal).

2. Raise machine until drive wheel tires clear floor. Be sure machine is properly supported and blocked.

C A U T I O N

PLACE BLOCKING UNDERNEATH AXLE FOR SAFETY.

3. Remove rubber seals from backing plate, see Plates 6457 and 4379.

4. At one adjustment slot, insert 3/8 INCH HEX WRENCH until it engages shoe adjusting worm. Rotate wrench in the direction of forward wheel rotation until lining drags on drum.

5. Rotate wrench in opposite direction, increasing clearance until drag is relieved. Then rotate adjustment one additional turn (two turns with new lining) to provide working clearance.

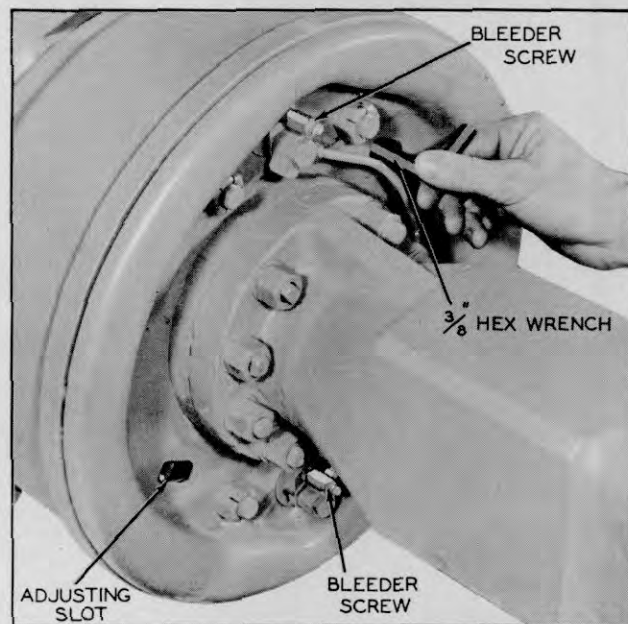


Plate 4379. Adjusting Brakes

6. Repeat Steps 4 and 5 at the second adjustment slot.

7. Replace rubber seals in adjustment slots.

8. Repeat this operation on the opposite drive wheel.

9. Remove blocking, lower machine to floor. Test brakes.

HAND BRAKE ADJUSTMENT

The brake is located on the drive shaft just behind the front drive axle differential, see Plate 6470. The brake has two adjustments. A minor adjustment may be made at the actuating lever located in the driver's compartment. If necessary, a major adjustment may be made at the brake assembly. Brake adjustments are made as follows:

1. Minor Adjustment: Rotate knob on top of the hand brake lever clockwise to increase tension, or counterclockwise to loosen tension. Adjustment should be made with hand lever in fully released position, then test adjustment by applying (pivoting) lever to set brake. See Plate 6505.

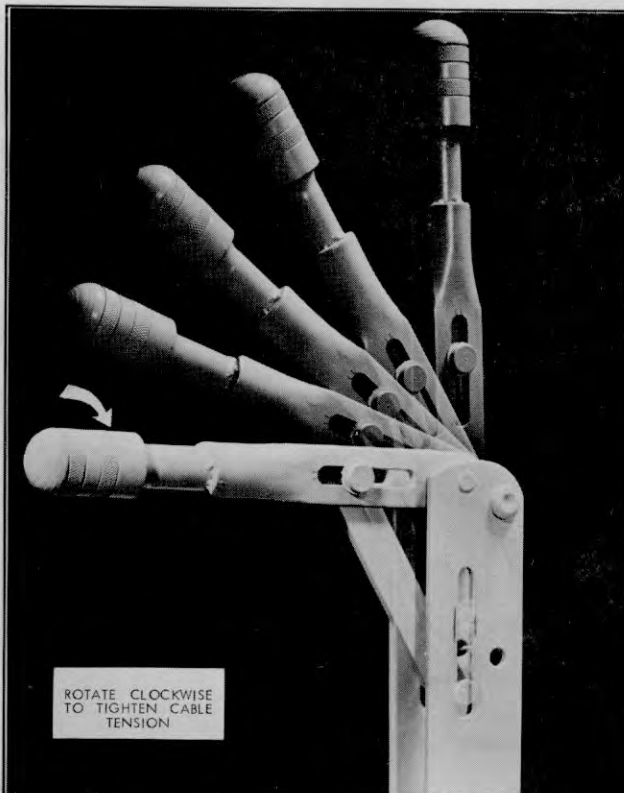


Plate 6505. Hand Brake (Actuating) Lever

2. Major Adjustment: If a major adjustment is necessary to provide proper brake lever release travel and also to provide proper brake tension, proceed as follows:

a. Set hand brake lever in fully released position and turn knob adjustment counterclockwise as far as possible, See Plate 6505.

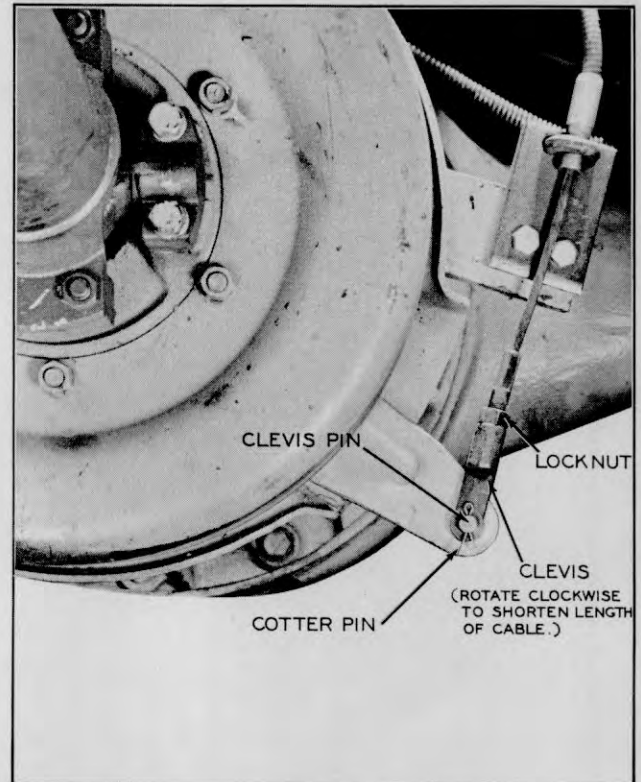


Plate 6470. Brake Assembly

b. The major adjustment is made at the brake assembly, see Plate 6470. Remove cotter pin and clevis releasing clevis from actuating arm of the brake assembly. Loosen clevis lock nut and rotate clevis in a clockwise direction to shorten length of cable. After satisfactory adjustment is made, install clevis and secure with clevis pin and cotter pin. Tighten lock nut.

c. Test brake adjustment at hand lever. If necessary, make minor adjustment at hand lever knob as required.



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OPERATION AND PREVENTIVE MAINTENANCE

HAND BRAKE ADJUSTMENT

The hand brake is located on the driver's side of the truck. It consists of a hand lever and a cable. The hand lever is used to apply the hand brake. The cable is used to transmit the force from the hand lever to the brake shoes. The hand brake should be adjusted so that it can be applied and released easily. The adjustment should be checked regularly.

The hand brake should be adjusted so that it can be applied and released easily. The adjustment should be checked regularly. The hand brake should be adjusted so that it can be applied and released easily. The adjustment should be checked regularly.

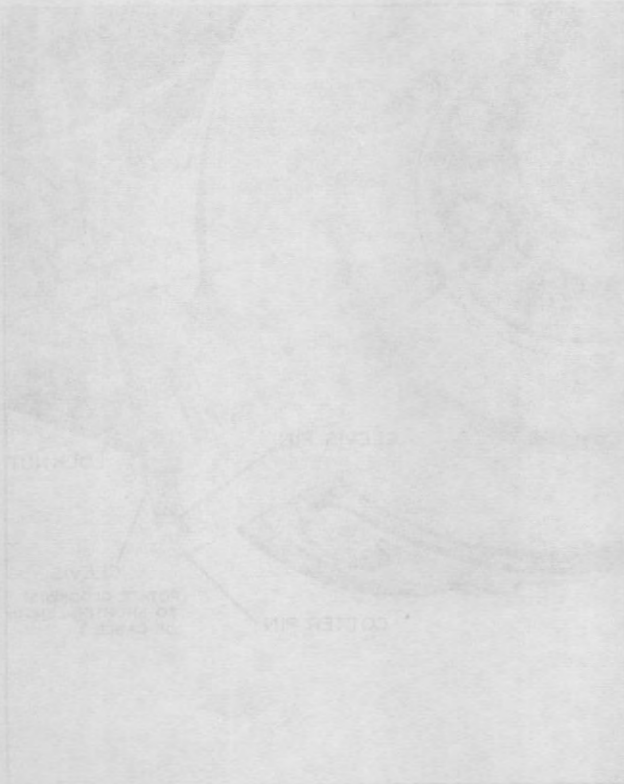


FIGURE 1. Hand Brake Assembly

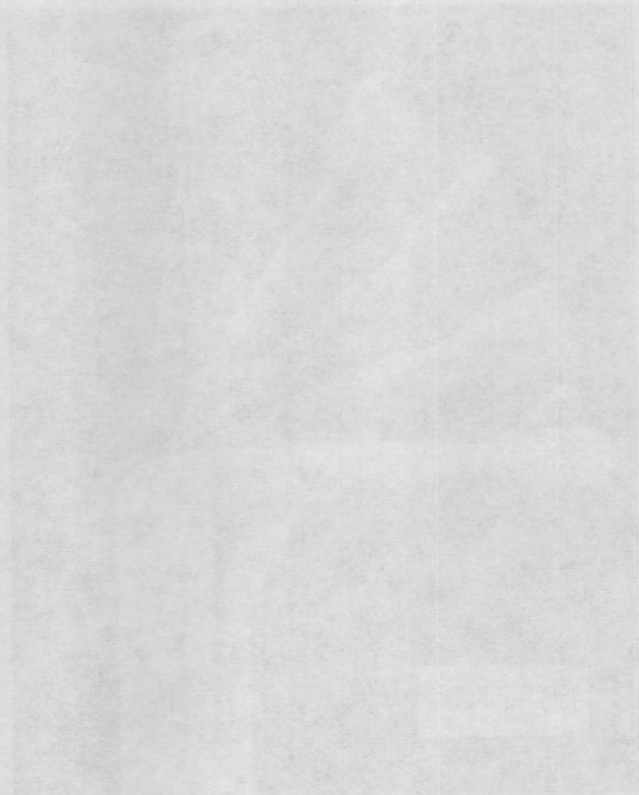


FIGURE 2. Hand Brake (Detailed View)

The hand brake should be adjusted so that it can be applied and released easily. The adjustment should be checked regularly. The hand brake should be adjusted so that it can be applied and released easily. The adjustment should be checked regularly.

The hand brake should be adjusted so that it can be applied and released easily. The adjustment should be checked regularly. The hand brake should be adjusted so that it can be applied and released easily. The adjustment should be checked regularly.

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COOLING SYSTEM

Radiator Pressure Caps:

X
 X
 X W A R N I N G X
 X USE EXTREME CARE IN REMOVING THE RADIATOR X
 X PRESSURE CAP. IN PRESSURE SYSTEMS, THE X
 X SUDDEN RELEASE OF PRESSURE CAN CAUSE A X
 X STEAM FLASH AND THE FLASH, OR THE LOOSENED X
 X CAP CAN CAUSE SERIOUS PERSONAL INJURY. X
 X LOOSEN CAP SLOWLY AND ALLOW STEAM TO X
 X ESCAPE. X
 X

1. Inspect pressure cap gasket and radiator filler neck to be sure they are providing a proper seal. If the rubber face of the valve is defective, a new cap should be installed.



Plate 6458. Radiator Pressure Cap

2. Inspect pressure cap for freedom of operation.

Pressure caps employ a spring loaded, rubber-faced valve which presses against a seat in the radiator top tank. Pressure caps employ either a vacuum valve held against its seat under spring pressure, or a weighted vacuum valve

which hangs open until forced closed by a surge of vapor or coolant. Check to be sure components are free to operate.

NOTE

If a new cap is required, always install a cap of the same type and pressure rating, which is 7 Lb.

3. Inspect for dented or clogged overflow pipe. To remove clogged material, run a flexible wire through pipe until obstruction is removed.

When a pressure cap opens the sudden surge of vapor or liquid must blow by the overflow pipe. If the pipe is dented or clogged, the pressure developed by the obstruction may cause damage to radiator or hoses.

Inspect and Clean Cooling System:

Check hose connections for coolant leaks as well as air leakage. Air leakage around hose connections allows oxygen into the system which is a major factor in corrosion.

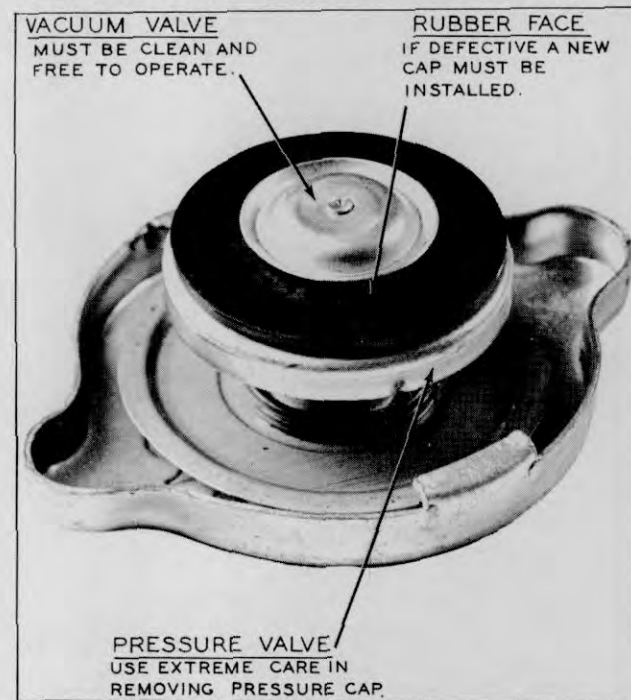
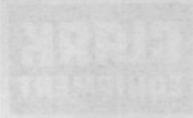
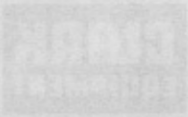


Plate 6459. Pressure Cap Gasket, Valve and Valve Gasket

NOTE

Exhaust gas leakage between cylinder head and gasket also results in orrision. If exhaust gas discharges into coolant, the coolant and the gas combine to form a variety of acids. It is therefore important that cylinder head stud nuts be drawn down to specifications as instructed in "engine tune-up".



which hangs open until forced closed by a surge of vapor or coolant. Check to be sure coolant caps are free to operate.

If a new cap is required, always install a cap of the same type and pressure rating, which is 7 lb.

Inspect for damage or closed position. To remove closed radiator, use a flexible wire through pipe until obstruction is removed.

When a pressure cap opens, the sudden surge of vapor or liquid must flow by the outer edge of the pipe to prevent air escape. The pressure developed by the obstruction may cause damage to radiator or hoses.

Inspect and Clean Cooling System

Check hose connections for coolant leaks as well as air leakage. Air leakage around hose connections allows oxygen into the system which is a major factor in corrosion.

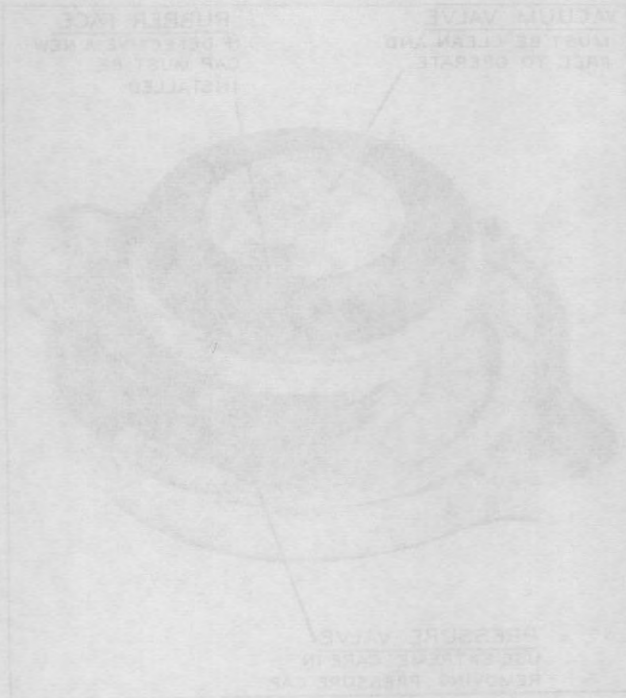


Plate 65-3, Pressure Cap Gasket, Valve and Valve Gasket

Exhaust gas leakage between cylinder head and gasket also results in oxidation. If exhaust gas discharge also contains the coolant and the gas contains 13 volts a variety of acids. It is therefore important that cylinder head studs must be checked for correct location as instructed in engine manual.

COOLING SYSTEM

Radiator Pressure Cap

X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Insured pressure cap gasket and radiator. Effort should be made to keep radiator clean and free of dirt. In the event the cap valve is defective, a new one should be installed.

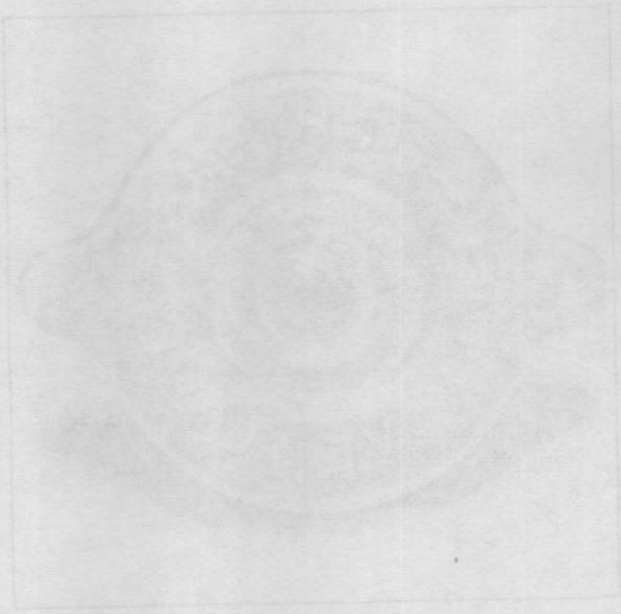


Plate 65-3, Radiator Pressure Cap

Inspect pressure cap for freedom of operation. Pressure cap gasket and valve loaded. Rubber cap gasket which allows oxygen to seal the radiator cap. Pressure cap gasket fitted a vacuum valve held against its seat under spring pressure, or a weighted vacuum valve.

Using a washing soda solution, flush cooling system in the following manner:

1. Drain system.
2. Replace half of volume with fresh water. Refer to Specifications for capacity.
3. Boil other half of volume and add washing soda until no more will dissolve.
4. Add hot soda solution to cooling system (fill up).
5. Operate engine normally for 24 hours.
6. Drain, flush, refill with clean water to which a soluble oil has been added in a proportion of 1 ounce per gallon of water.

Maintaining the cooling system efficiency is important, as engine temperatures must be brought up to and maintained within satisfactory range

for efficient operation; however, must be kept from overheating, in order to prevent damage to valves, pistons and bearings. Continued overheating may cause internal damage, while continuously low operating temperature wastes fuel, increases engine wear and causes oil sludge and corrosion of engine parts.

Overcooling may be caused by operating conditions such as excessive idling, low speeds and light loads during cold weather. Overheating may be caused by faulty thermostat, clogged radiator or an improperly adjusted fan belt.

CAUTION

NEVER POUR COLD WATER OR COLD ANTI-FREEZE INTO THE RADIATOR OF AN OVERHEATED ENGINE. ALLOW THE ENGINE TO COOL AND AVOID THE DANGER OF CRACKING THE CYLINDER HEAD OR BLOCK. KEEP ENGINE RUNNING WHILE ADDING WATER.

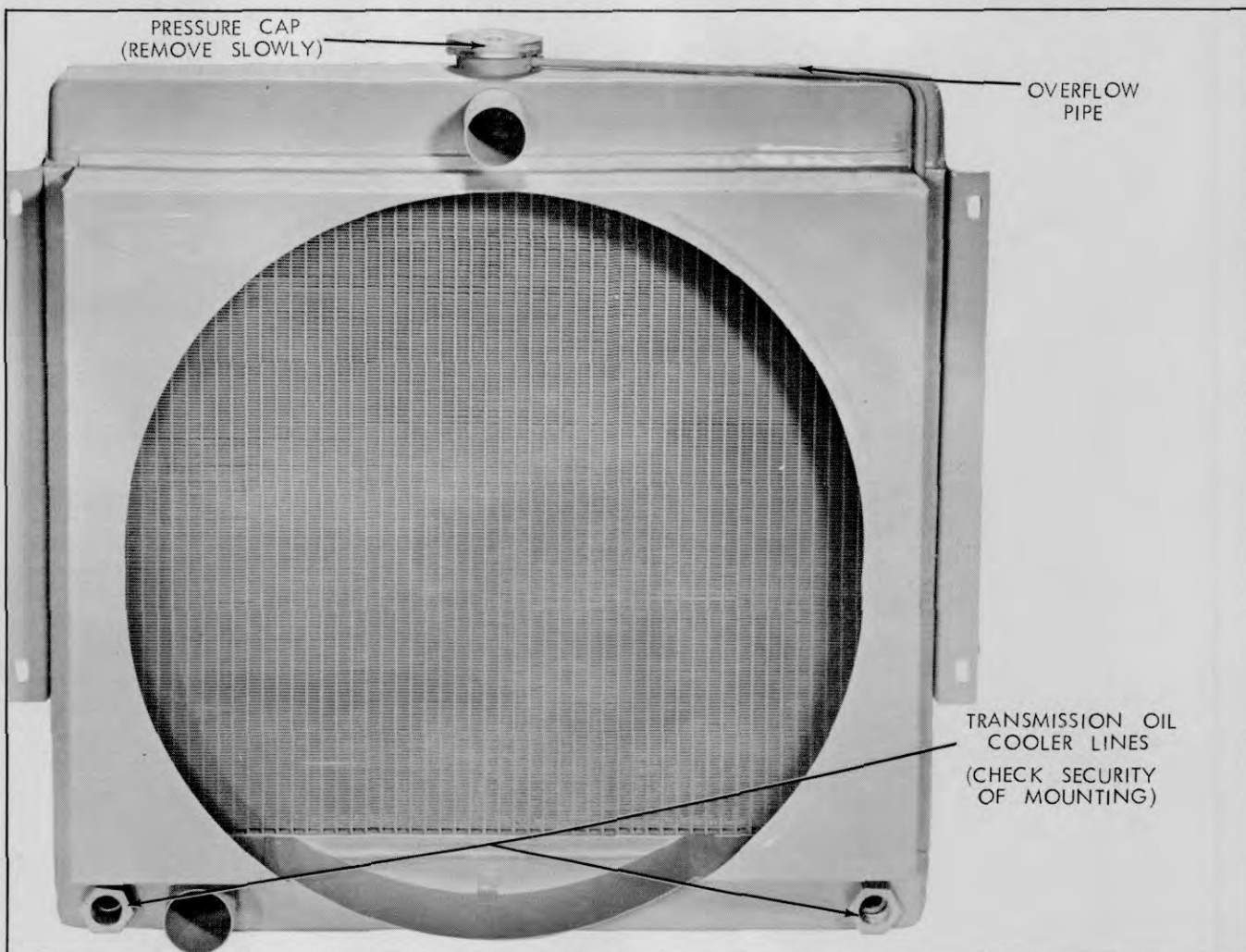


Plate 6460. Radiator



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For efficient operation, however, care must be kept from overheating in order to prevent damage to valves, pistons and bearings. Continued over-heating may cause internal damage while over-heating may cause internal damage while fuel injection low resulting in excessive wear and tear on pistons, valves and cause oil leakage and burning of engine parts.

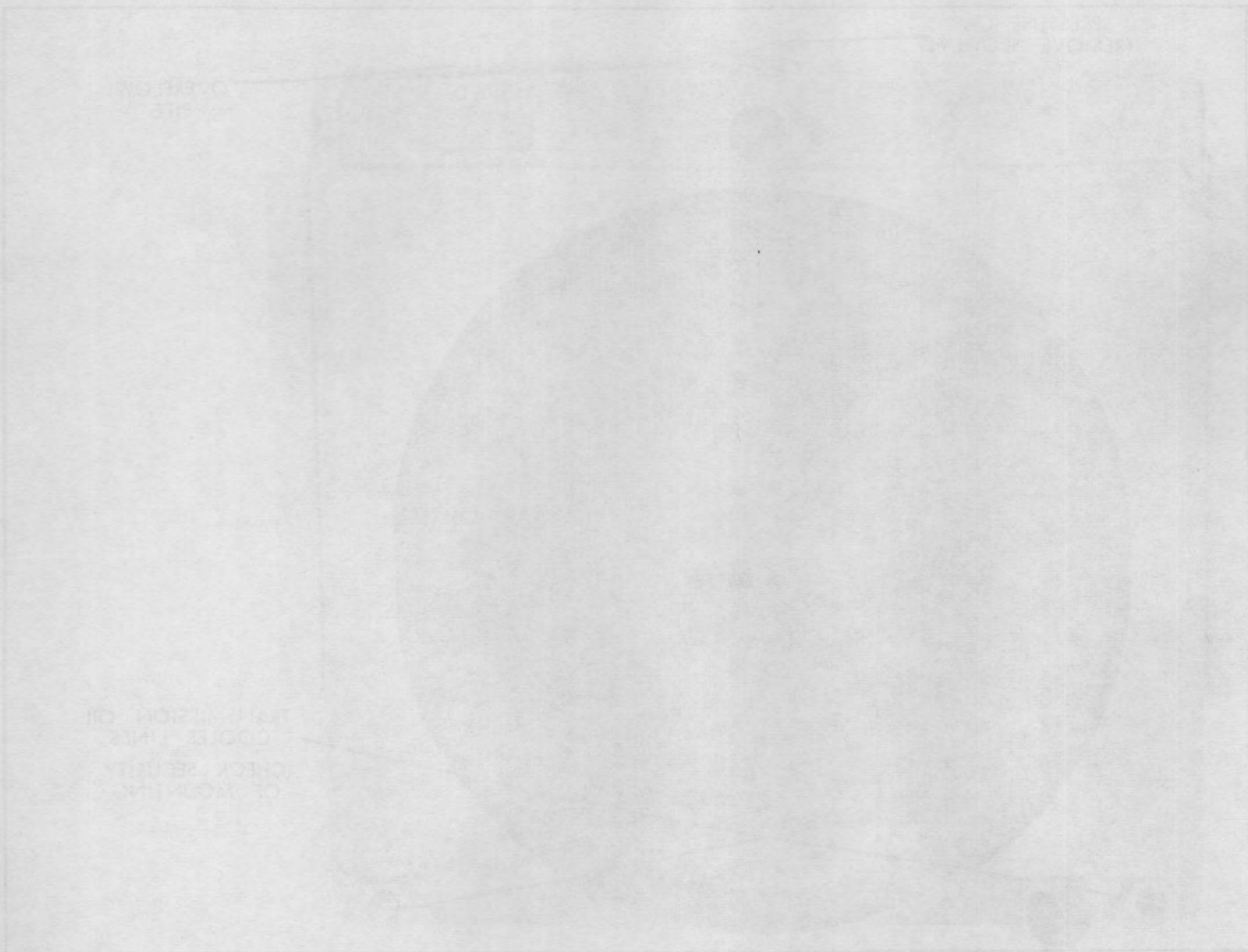
Overheating may be caused by excessive idling, low water level, low water temperature, and light load during cold weather. Overheating may be caused by dirty radiator, stopped fan belt or an improper adjustment on fan belt.

CAUTION

NEVER POUR COLD WATER OR COLD ANTIFREEZE INTO THE RADIATOR OF AN OVERHEATED ENGINE. ALLOW THE ENGINE TO COOL AND AVOID THE DANGER OF BACKFIRING THE CYLINDER HEAD OR BLOCK. WHEN ENGINE RUNNING, WHILE ADDING WATER,

Using a weighing scale solution, check cooling system in the following manner:

1. Drain system.
2. Replace half of volume with water. Refer to specification for weight.
3. Add other half of volume and mix.
4. Add hot acid solution to cooling system (fill up).
5. Oxidize engine normally for 24 hours.
6. Drain. Refill with clean water.
7. While in normal oil, let acid settle in a reservoir and cause separation of water.
8. Maintain the cooling system efficiency. Monitor oil level adjustment and oil change up to one month with 100000 miles.



CHECK RESULT OF YOUR TEST
CHECK RESULT
COOLING TEST
THAT ALL ON OFF

HYDRAULIC SUMP TANK

Drain and refill with Hydraulic Fluid Per Clark Specifications MS-68.

CAUTION

THE HYDRAULIC SYSTEM MUST BE KEPT CLEAN. IT MAY BE NECESSARY TO DRAIN, CLEAN AND REFILL THE SUMP TANK MORE OFTEN UNDER ADVERSE CONDITIONS. THIS IS BEST DETERMINED BY CHECKING CONDITION OF THE HYDRAULIC FLUID FOR EVIDENCE OF DIRT, SLUDGE OR ANY FOREIGN MATTER AT PERIODIC INTERVALS.

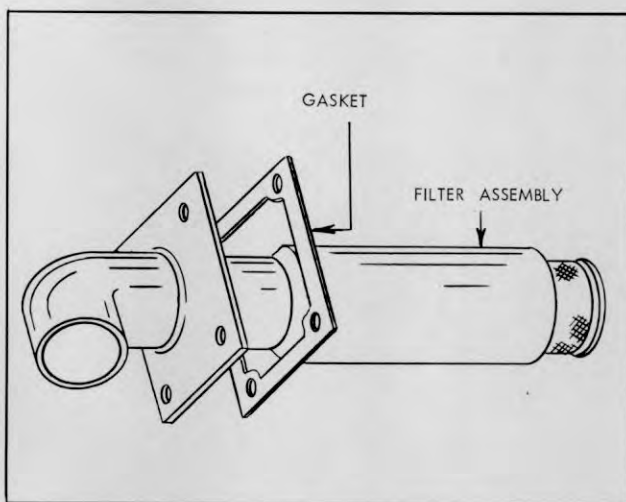


Figure 34. Strainer Assembly

1. Lower upright. Shut engine off.
2. Place a large container underneath the sump tank which is located at the left side of machine.
3. Remove sump tank drain plug, located at bottom of tank, and allow the fluid to drain. Replace drain plug.

CAUTION

DO NOT START PUMP WHILE SUMP TANK IS EMPTY AS DAMAGE TO THE HYDRAULIC PUMP WILL RESULT.

4. Remove and Clean Sump Tank Strainer Assembly:

- a. Disconnect hose and remove retainer bolts.
- b. Lift strainer assembly out of sump tank.

c. Soak assembly in Stoddard type cleaning solvent; or, steam clean unit.

d. Remove any remaining gasket material from mounting flange.

e. Before installation, be sure strainer assembly is absolutely clean. If cleaned in Stoddard type solvent, let unit dry before installing to sump tank.

f. Using new gasket, install strainer assembly to sump tank.

g. Install hose and tighten hose connections.

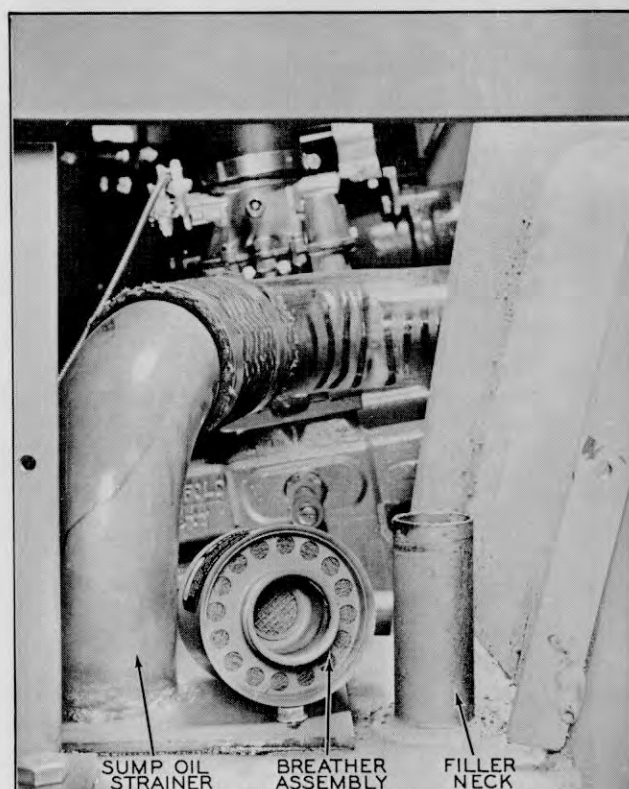


Plate 6426. Sump Tank and Strainer Assembly

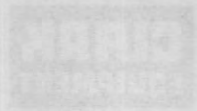
5. Place or solder a 200-mesh wire screen into the large end of a funnel. Thoroughly clean funnel before putting it into use. Fill sump tank to within 8 inches of the top of the fill pipe.

CAUTION

NEVER USE A CLOTH STRAINER WHEN FILLING OR ADDING FLUID TO THE HYDRAULIC SUMP TANK. CLOTH STRAINERS CONTAIN LINT WHICH IS HARMFUL TO THE HYDRAULIC SYSTEM.



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

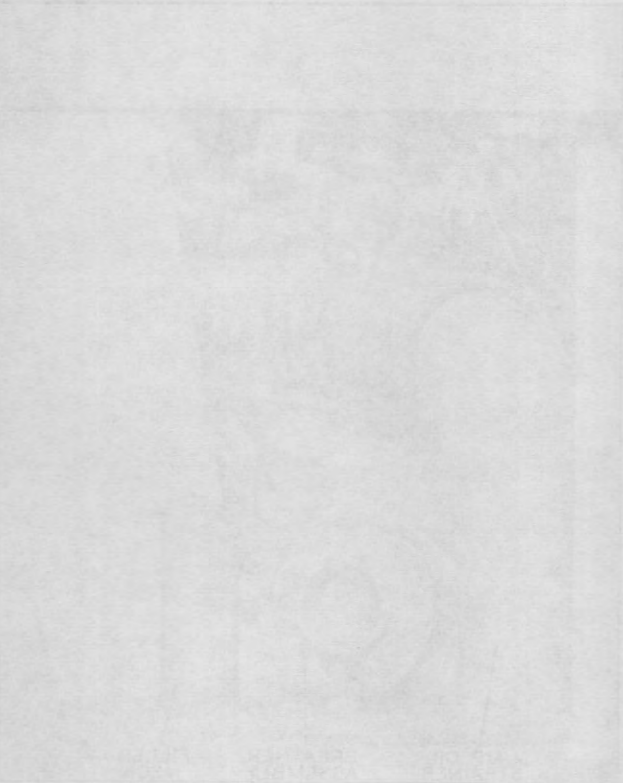
2. Back assembly in standard type class
ing solvent or steam clean unit

3. Remove any remaining gasket material
from mounting flange

4. Before installation, be sure strainer
assembly is absolutely clean. If cleaned in 200
mesh type solvent, let unit dry before installing
in pump tank

5. Using new gasket, install strainer assembly
to pump tank

6. Install hose and tighten hose connect-
ions



7. Place a cloth strainer when filling
plate with pump tank and strainer assembly

8. Place a cloth or 200 mesh wire screen
into the top of the pump tank. Fill pump tank
before starting engine. Fill pump tank
to within 2 inches of the top of the fill pipe.

CAUTION

NEVER USE A CLOTH STRAINER WHEN FILLING
OR ADDING FLUID TO THE HYDRAULIC PUMP
TANK. CLOTH STRAINERS CONTAIN OIL
WHICH IS HARMFUL TO THE HYDRAULIC SYSTEM.

HYDRAULIC PUMP TANK

1. Drain and refill with Hydraulic Fluid per
Class Specifications MS-68

CAUTION

THE HYDRAULIC SYSTEM MUST BE KEPT CLEAN.
IT MAY BE NECESSARY TO DRAIN, CLEAN
AND REFILL THE PUMP TANK MORE THAN
ONCE UNDER ADVERSE CONDITIONS. THIS IS BEST
DETERMINED BY CHECKING CONDITION OF
THE HYDRAULIC FLUID FOR EVIDENCE OF DIRT,
SLUDGE OR ANY FOREIGN MATTER AT PER-
IODIC INTERVALS.

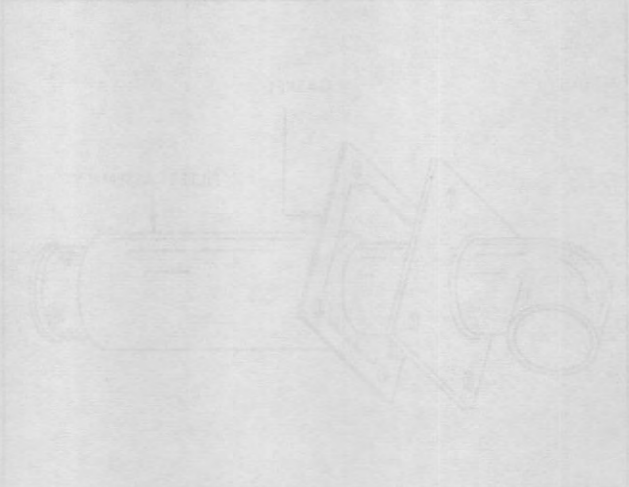


Figure 4. Strainer Assembly

2. Lower pump tank engine oil

3. Place a large cloth strainer in the
pump tank which is located at the left side of
the engine

4. Remove pump tank when filling, located
at bottom of tank, and allow the fluid to drain
before drain pipe

CAUTION

DO NOT START PUMP WHILE PUMP TANK IS
EMPTY AS DAMAGE TO THE HYDRAULIC PUMP
WILL RESULT.

5. Remove and Clean Pump Tank Strainer

6. Disconnect hose and remove strainer
from

7. Lift strainer assembly out of pump tank.

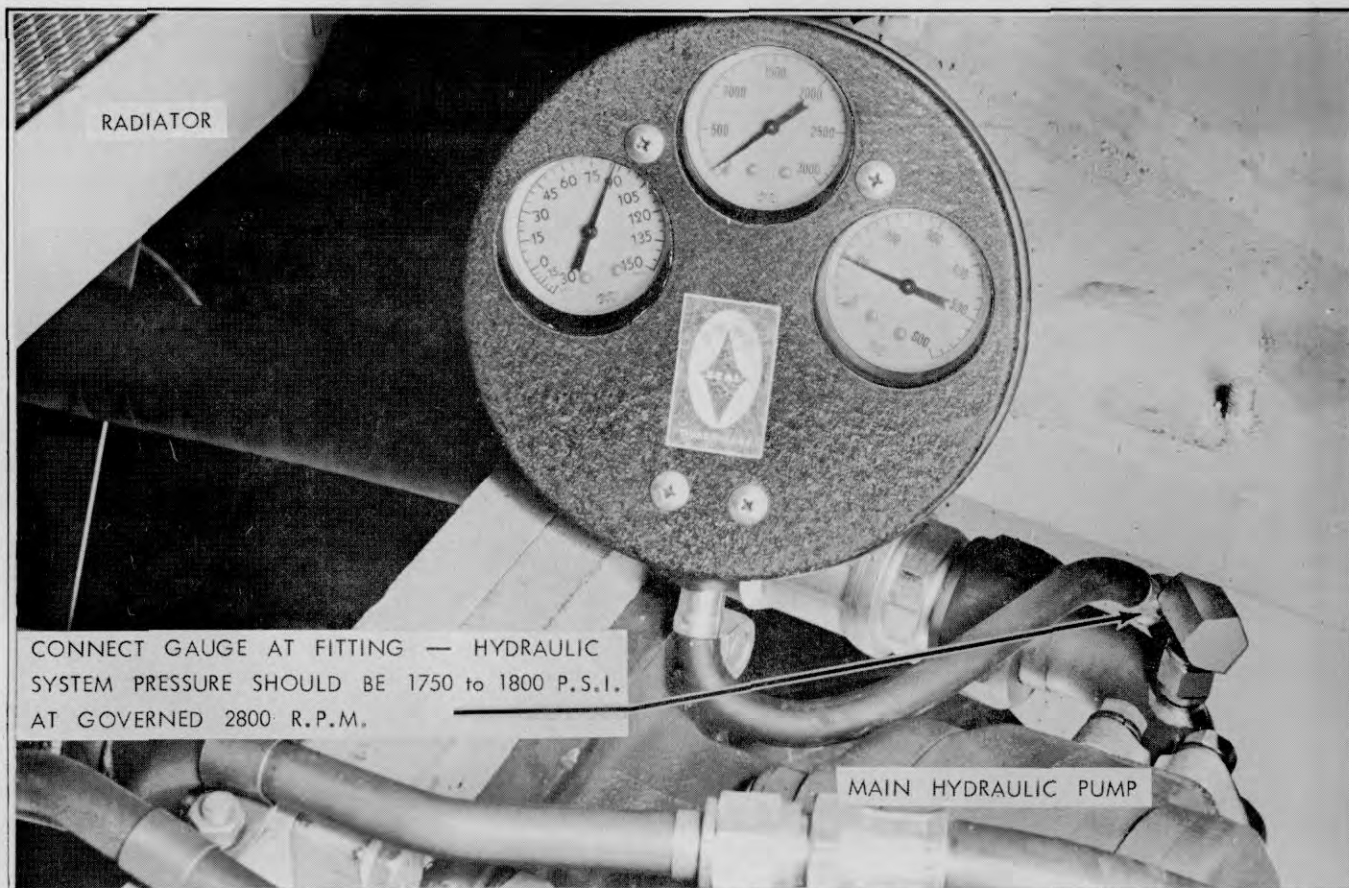


Plate 6464. Main Hydraulic System Pressure Check

MAIN HYDRAULIC SYSTEM PRESSURE CHECK

Make a pressure check of the Hydraulic System as shown in Plate 6464.

System pressure should be checked with engine running at governed 2800 R.P.M. Move lift lever to 'raise' position. When forks reach maximum lift height, check gauge reading. Pressure should be 1750 to 1800 P.S.I.

If adjustment is necessary, remove acorn nut and washer, See Plate 6463. Rotate adjusting stud clockwise to raise pressure and counter-clockwise to lower pressure. After obtaining satisfactory adjustment, replace washer and acorn nut.

NOTE

Pressure relief adjustment is made at the hydraulic control valve.

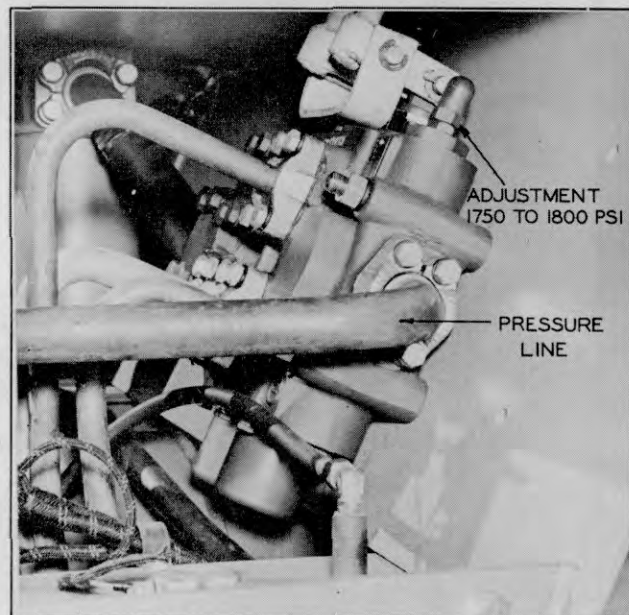
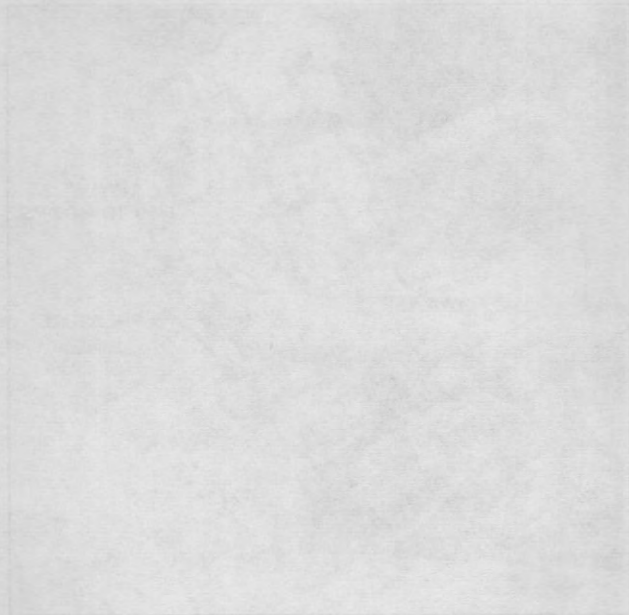
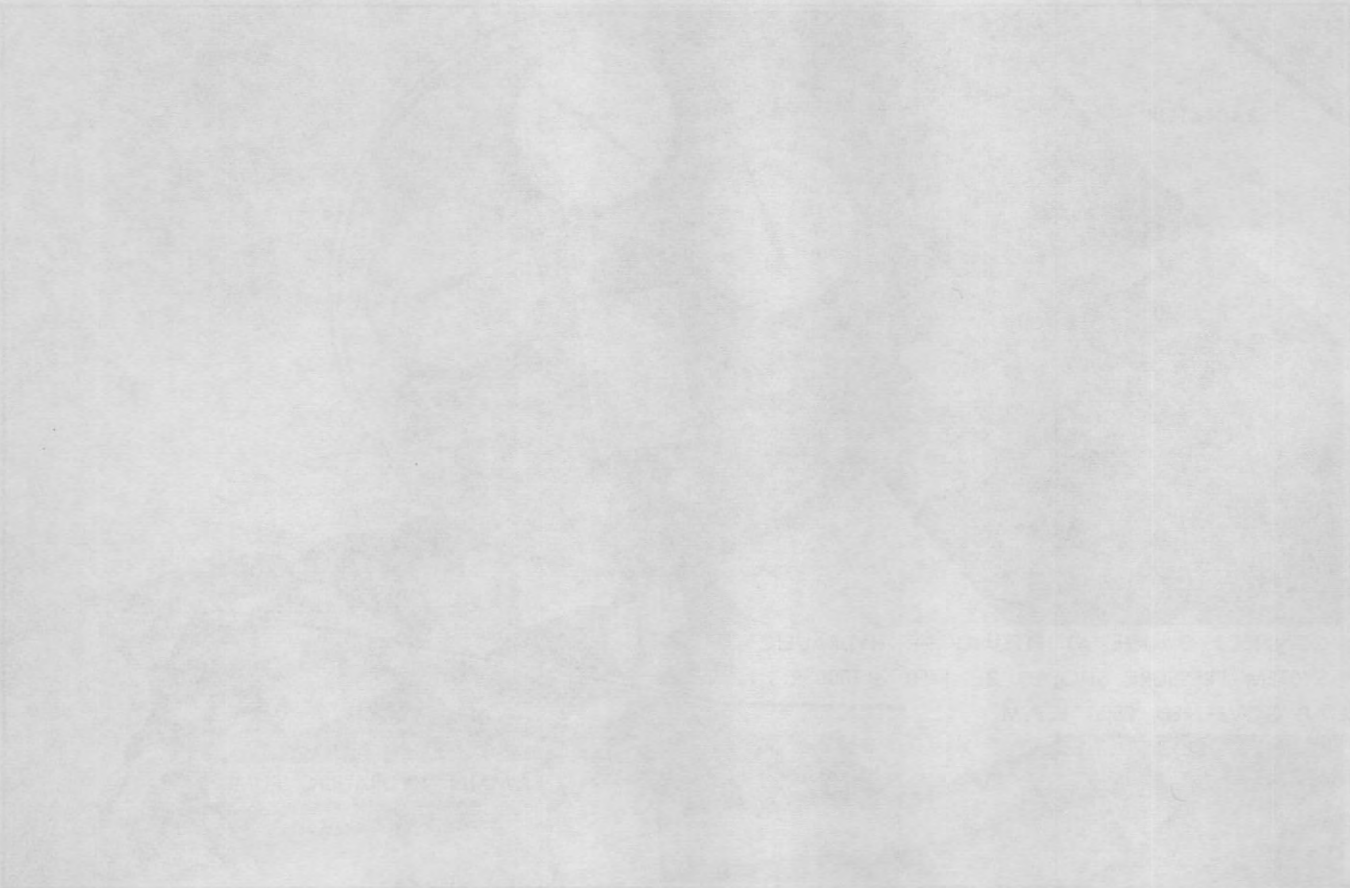


Plate 6463. Hydraulic Control Valve



INDUSTRIAL TRUCK DIVISION

OPERATION AND MAINTENANCE MANUAL



MAIN HYDRAULIC SYSTEM PRESSURE CHECK

Check the main hydraulic system pressure of the tractor system at 1000 psi (70 bar).

The pressure should be checked with the engine running and the tractor in gear. The pressure should be checked with the tractor in gear and the engine running. The pressure should be checked with the tractor in gear and the engine running.

The adjustment is necessary to give the correct pressure. The pressure should be checked with the tractor in gear and the engine running. The pressure should be checked with the tractor in gear and the engine running.

Pressure after adjustment is 1000 psi (70 bar).

See Fig. 10 - Hydraulic Control Valve

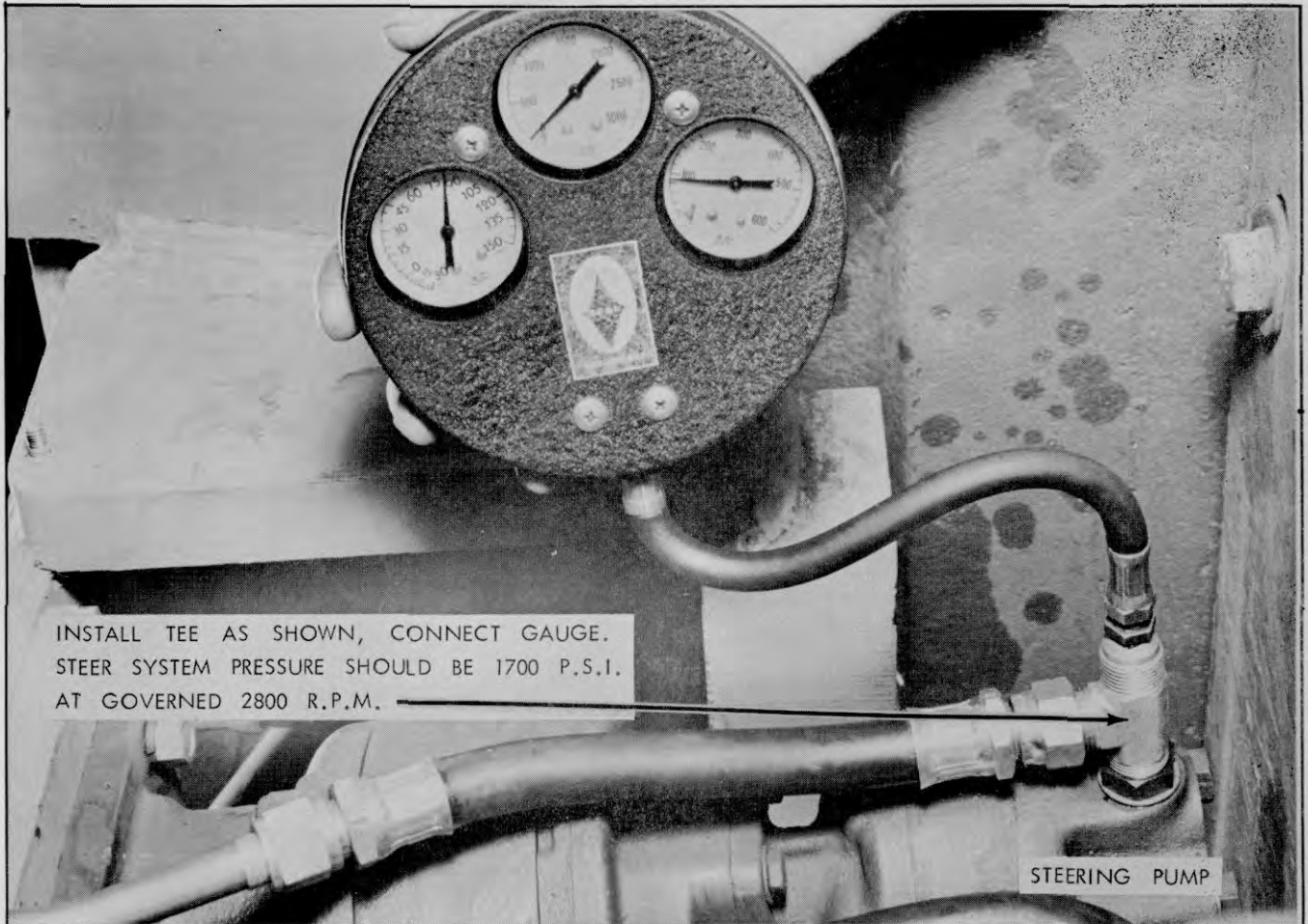


Plate 6465. Steering System Pressure Check

STEER SYSTEM HYDRAULIC PRESSURE CHECK

Make a pressure check of the Steer System as shown in Plate 6465.

N O T E

System pressure should be 1750 P.S.I. at governed 2800 R.P.M.

Place blocking near the steer axle stops so that when wheels are turned the pressure relief valve will actuate, See Plate 6466.

With wheels blocked and turned, gauge reading should be 1750 P.S.I. with engine running at governed 2800 R.P.M.

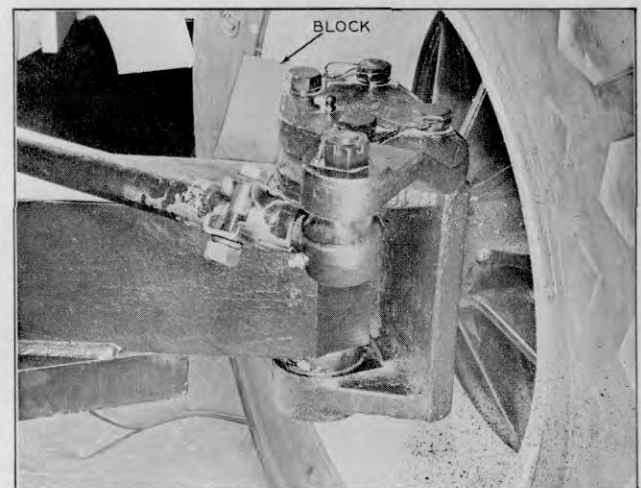
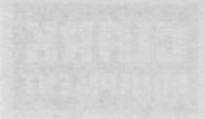


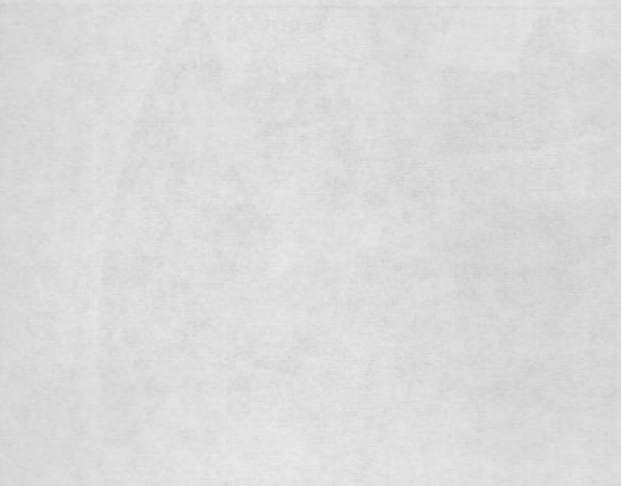
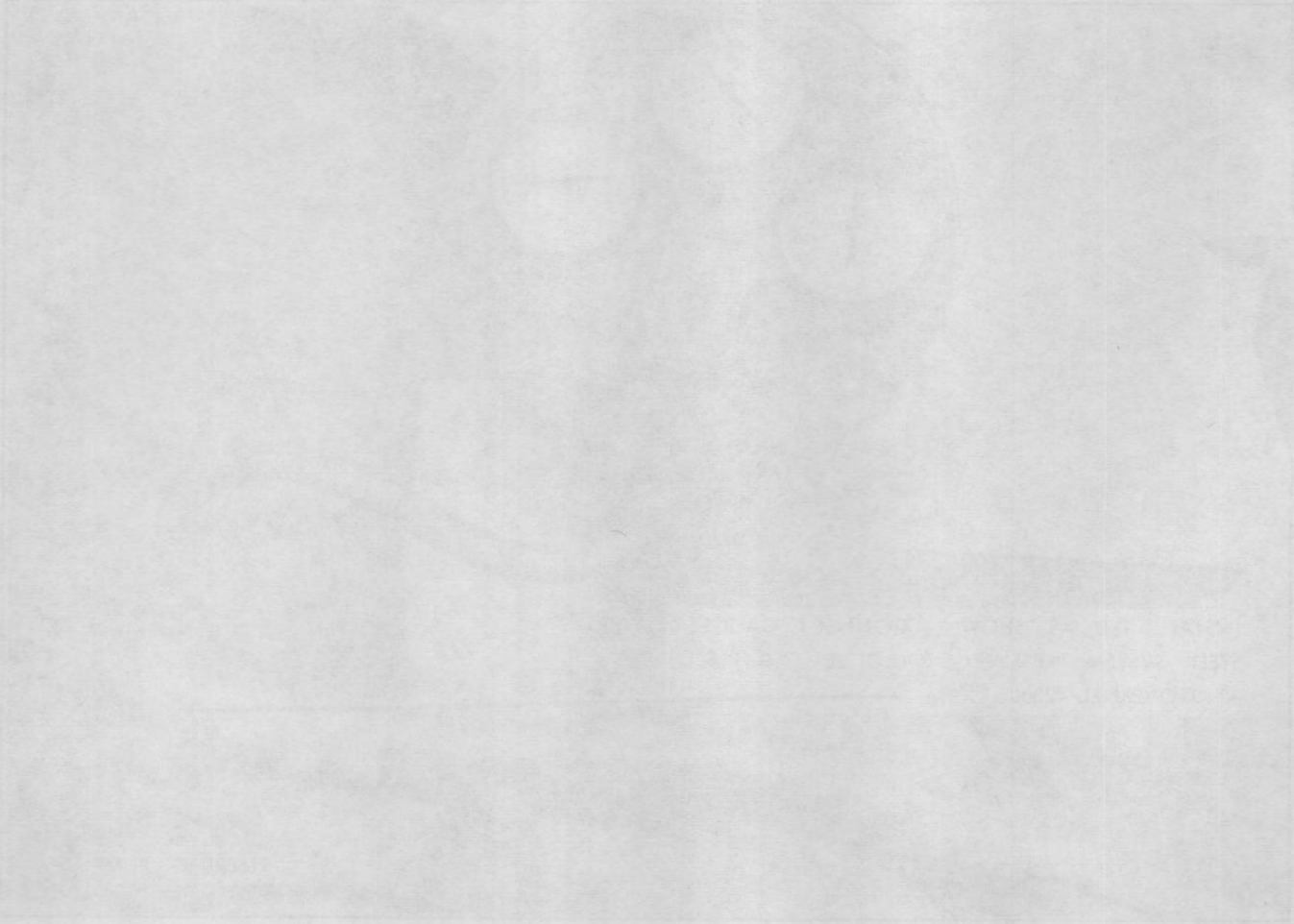
Plate 6466. Blocking Steer Wheels for System Pressure Check



INDUSTRIAL TRUCK DIVISION



APPLICATION OF PREVENTIVE MAINTENANCE



1. THESE SYSTEMS HYDRAULIC PRESSURE CHIT
 2. WHEN A PRESSURE CHIT IS USED
 3. SYSTEM PRESSURE SHOULD BE 1750 P.S.I.
 4. GOVERNOR 2000 P.S.I.
 5. PLACE SYSTEM PRESSURE CHIT IN THE
 6. TO FIND PRESSURE CHIT IN THE SYSTEM
 7. TO FIND PRESSURE CHIT IN THE SYSTEM
 8. TO FIND PRESSURE CHIT IN THE SYSTEM
 9. TO FIND PRESSURE CHIT IN THE SYSTEM
 10. TO FIND PRESSURE CHIT IN THE SYSTEM

11. TO FIND PRESSURE CHIT IN THE SYSTEM

12. TO FIND PRESSURE CHIT IN THE SYSTEM



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LUBRICATION AND PREVENTIVE MAINTENANCE

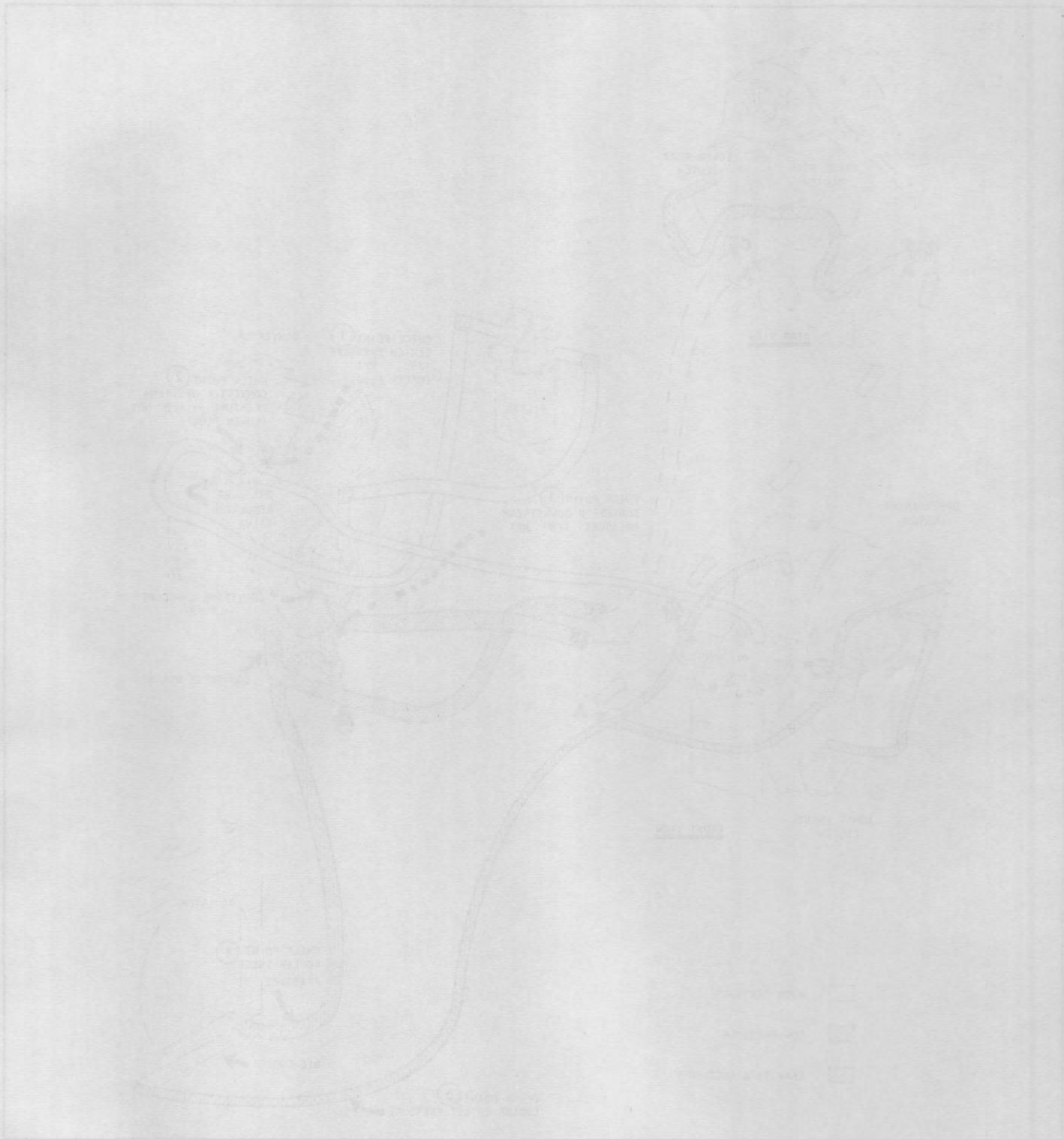


Plate 0411
SPECIAL 4-1-10

INDUSTRIAL TRUCK DIVISION
LUBRICATION AND PREVENTIVE MAINTENANCE

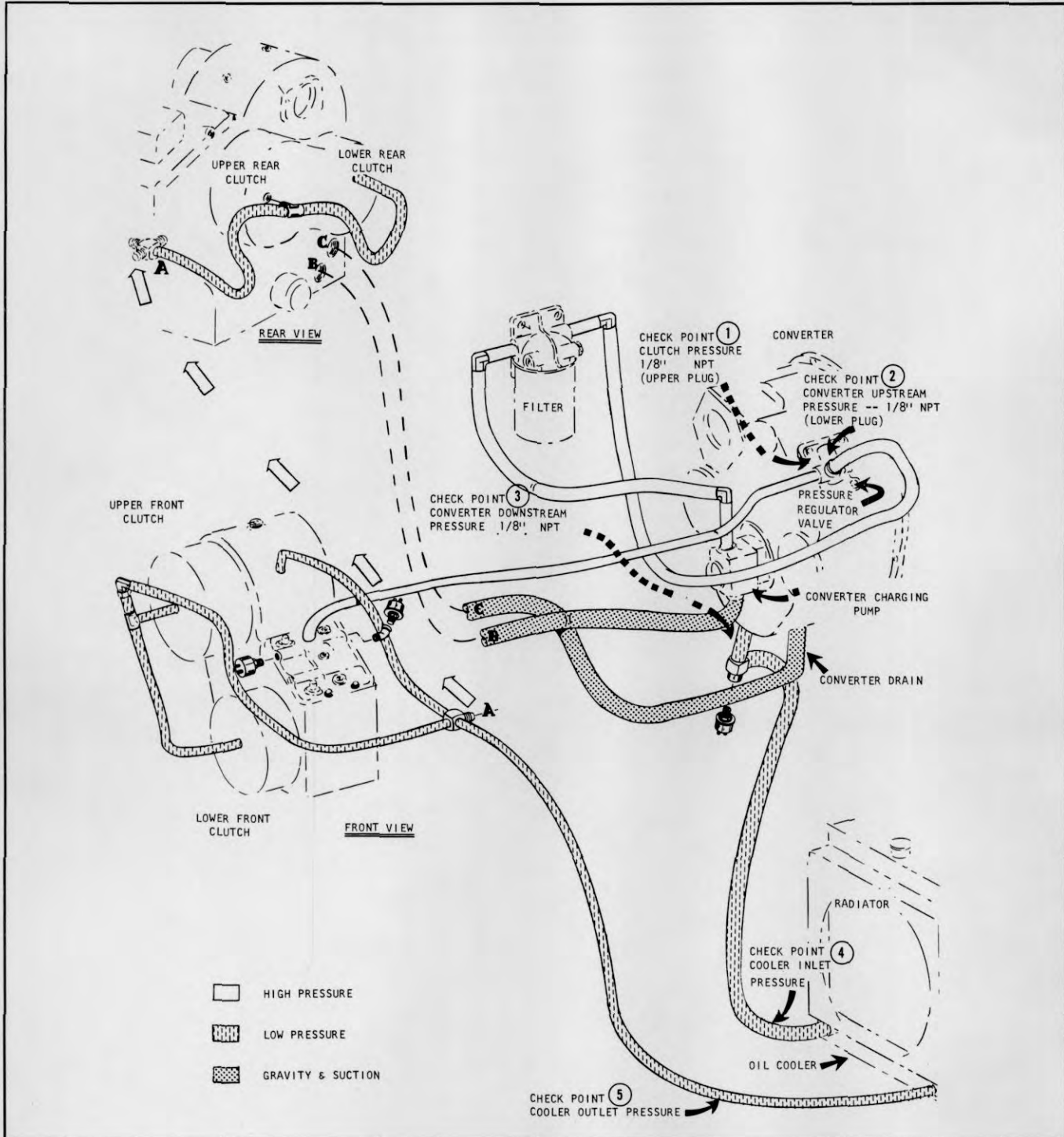


Plate 8432.

SPECIFICATIONS

HYDRATORK (POWERSHIFT) TRANSMISSION MODEL T-76B
4-SPEED FORWARD AND 4-SPEED REVERSE



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

HYDRATORK (POWER SHIFT) TRANSMISSION MODEL T-76B
4-SPEED FORWARD AND 4-SPEED REVERSE

MAKE ALL CHECKS AFTER COMPLETE SYSTEM IS UP TO NORMAL OPERATING TEMPERATURE (200° F. MINIMUM)

Converter Pressure Check: Operate engine at 2000 R.P.M. Place transmission direction and speed levers in neutral position

TRANSMISSION CLUTCH OIL PRESSURE P. S. I.

Check Point	CLUTCH	All Other Models	240 to 280 P.S.S.
-------------	--------	------------------	-------------------

Check Point	Converter OUT	25 Minimum
		40 Maximum

NOTE: Check Points 2, 4, & 5 (Not Used)

NOTE

Refer to the Diagram on the previous page for location of check points, high and low pressure lines and gravity & suction lines.

LUBRICATION AND PREVENTIVE MAINTENANCE

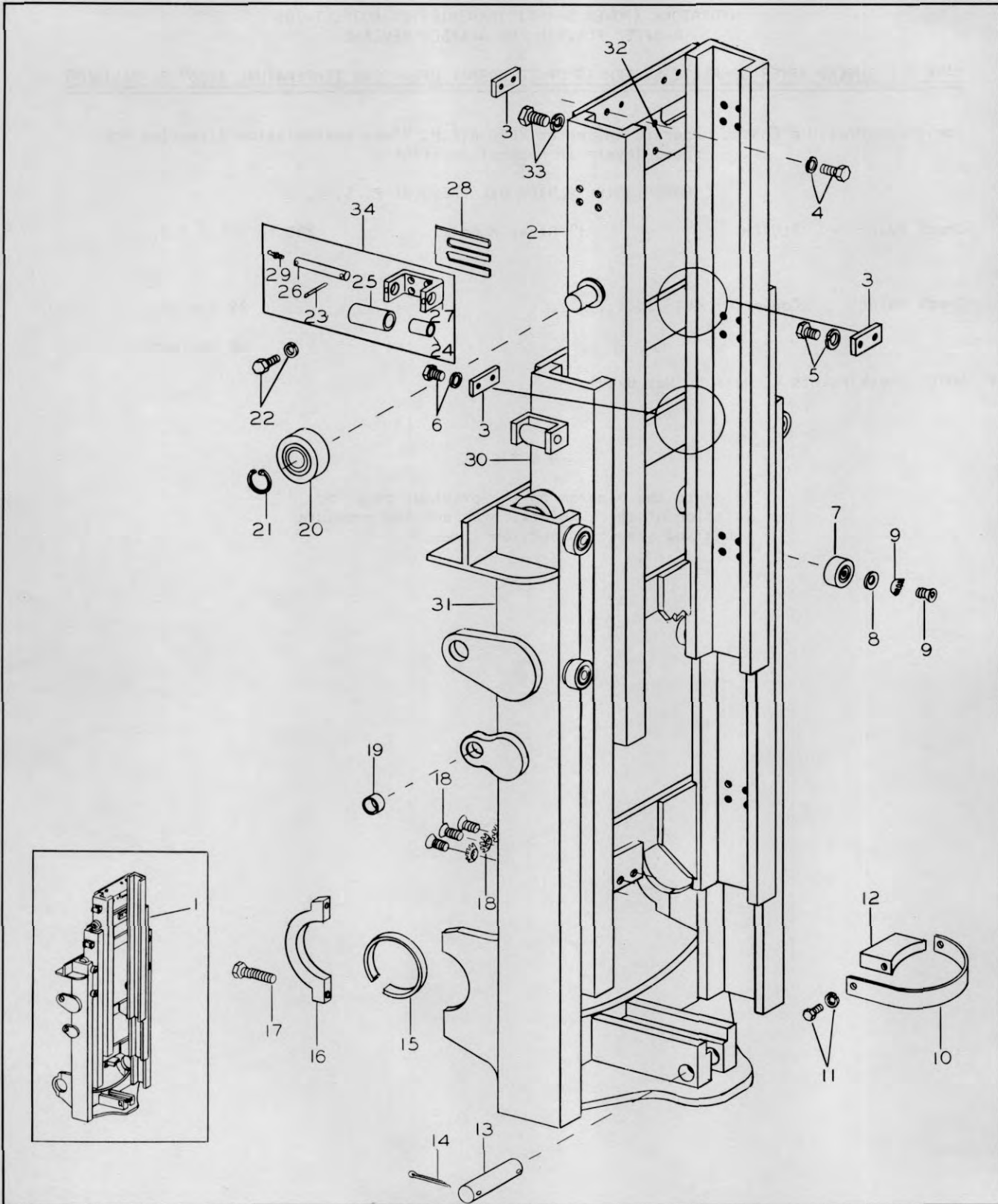


Plate 9993. Upright Roller Adjustment Checks

LIFT CARRIAGE AND UPRIGHT
ROLLER ADJUSTMENTS

To maintain top performance from the upright it may be necessary, from time to time, to adjust the rollers located on the lift carriage and upright. These adjustments may be accomplished as follows:

N O T E

The upright rail assemblies are manufactured with a slight taper. Check to be sure there is no bind. Extend upright to the upper limit, then lower upright. If there is a bind, the inner rail will hesitate or remain at the upper limit. As the lift cylinder begins to retract, the rails will break free and then lower. This indicates improper adjustment or this may indicate a damaged roller. Raise and lower carriage and check to be sure all rollers rotate freely.

Inner Rail Thrust Rollers:

1. Because of the taper in the rail assemblies; the rollers may bind if roller adjustment is made with the upright lowered; therefore, the upright must be extended to the upper limit with no backward or forward tilt before making any adjustments.
2. Insert pry bar between end of either right or left inner rail and outer rail, See Plate 6467.
3. Move inner rail sideways to remove all clearance at opposite rail.
4. When checking clearance on side pry bar was installed, there should be some clearance between the Outer Rail and the Bottom Roller at roller edge. THIS CLEARANCE SHOULD NOT EXCEED 1/32 INCH.

N O T E

The inner rail thrust rollers must be checked for proper clearance the full length of the outer rail assembly.

N O T E

There are four inner rail rollers which do not require adjustment. Replace in the event of wear or damage. Maximum clearance 1/16 inch or 1/32 inch at each side.

N O T E

The inner thrust rollers (located at top of upright outer rail) must be checked for proper clearance the full length of the inner rail assembly.

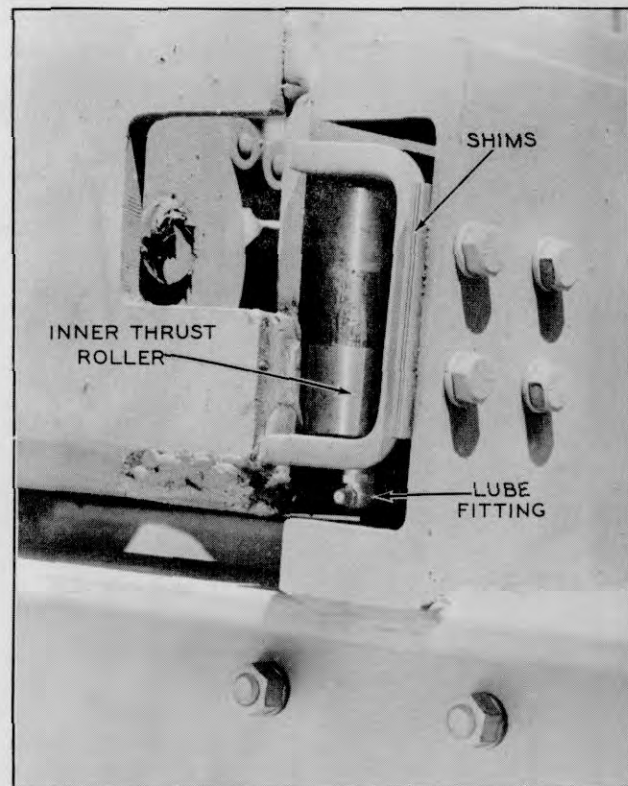


Plate 6467. Upright Roller Adjustment Check

5. Check clearance between Inner Thrust Roller and Inner Rail. ROLLER CLEARANCE MUST BE CHECKED THE FULL LENGTH OF THE INNER RAIL ASSEMBLY. Refer to Step 4 for roller clearance specifications.
6. If adjustment is required, proceed as follows.
7. Disassemble upright.
8. Loosen Roller Bracket Retaining Bolts and add or remove shims to acquire the clearance previously stated.
9. Reassembly upright.
10. Follow Steps 1 thru 5 and recheck clearance.

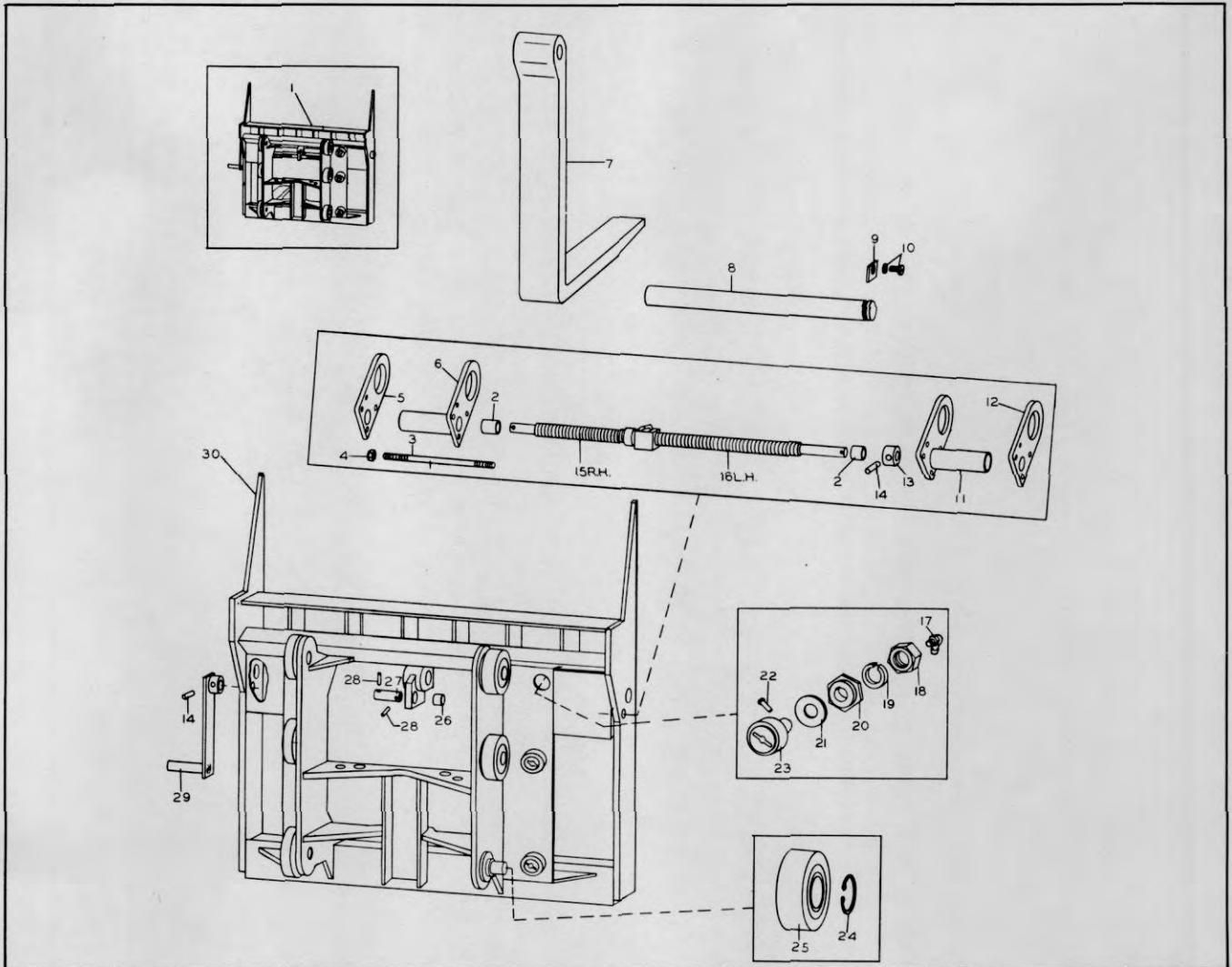


Plate 9992. Lift Carriage

Outer Thrust Rollers:

Check clearance between the Outer Thrust Rollers and Inner Rails. Maximum allowable clearance is 1/64 inch or 1/32 inch each side. Rollers should be free to rotate without binding.

N O T E

Roller Clearance should be checked the full length of the rails.

If adjustment is necessary, loosen roller shaft lock nut and using wrench, rotate eccentric bushing (20) in direction necessary to obtain correct clearance.

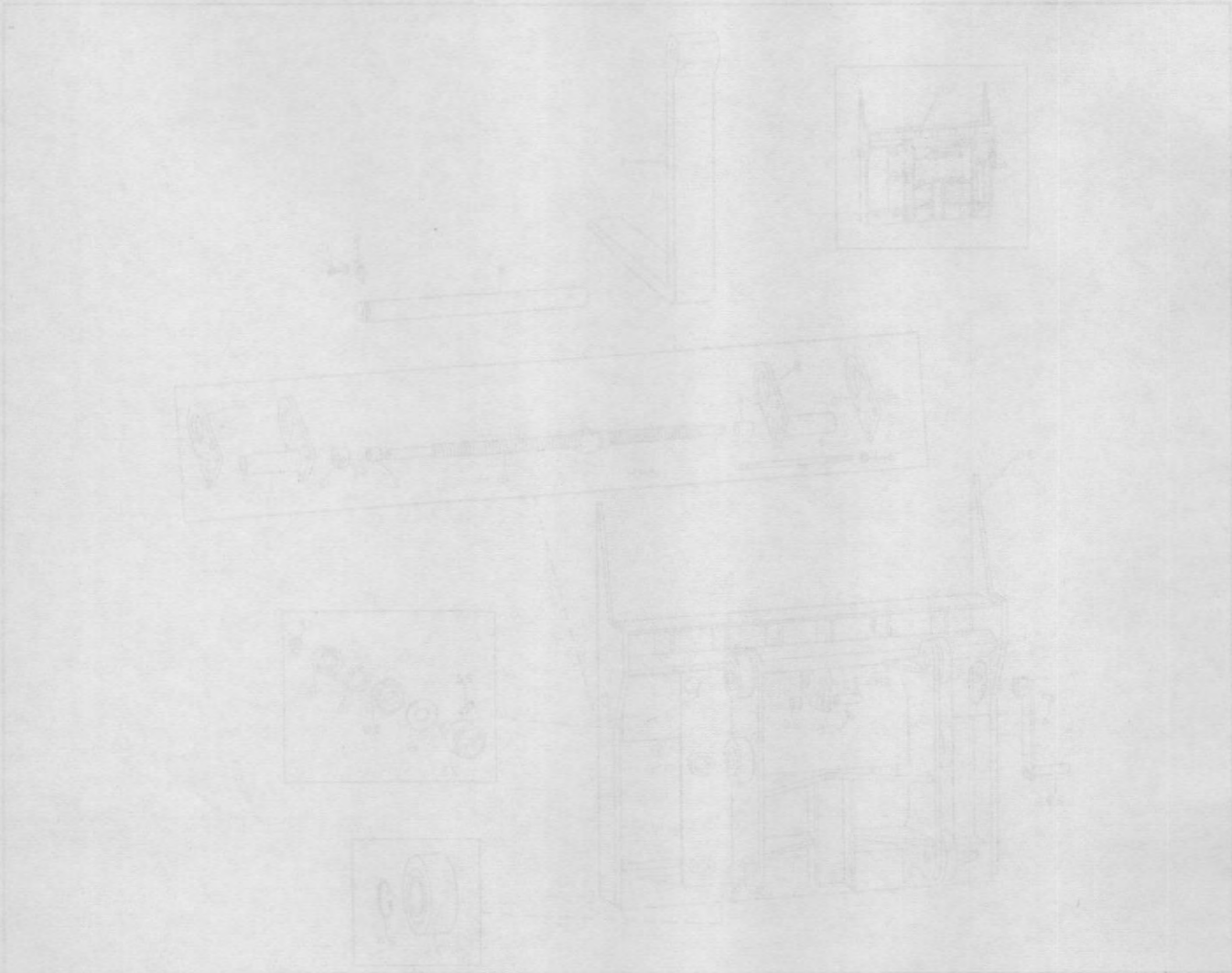
Tighten lock nut without moving shaft and roller from adjusted position.



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LUBRICATION AND PREVENTIVE MAINTENANCE



Roller, Front, C-1, Detail

Roller, front adjusted position
 Tighten lock nut without moving shaft and roller. Check correct clearance.
 (c) To adjust (20) in direction necessary to
 shift lock nut and using wrench, rotate wheel
 If adjustment is necessary, loosen roller.

Outer Thrust Rollers
 Roller Clearance should be checked without binding rollers. It is 1/16 inch on 1 1/2 inch rollers.
 Roller and Inner Roller maximum clearance
 Check clearance between the Outer Thrust

NOTE

Roller Clearance should be checked the full
 length of the roller.

TROUBLE SHOOTING GUIDE

TORQUE CONVERTER

TROUBLE	PROBABLE CAUSE	REMEDY
<p>Low converter downstream pressure (Below 20 P.S.I. with engine at 2000 RPM - NO LOAD)</p>	<p>Worn oil sealing and "O" rings.</p> <p>Worn oil pump.</p> <p>Safety Valve remains open.</p>	<p>Trouble is internal and will require a complete teardown of the converter.</p> <p>Replace.</p> <p>Clean and check valve spring and valve.</p>
<p>Suction line taking air.</p>	<p>Low oil level.</p> <p>Suction line connections taking air.</p> <p>Worn oil pump.</p>	<p>Fill to proper level.</p> <p>Check oil line connections and tighten securely.</p> <p>Replace.</p>
<p>High converter downstream pressure (Above 45 R.S.I. with engine at 2000 RPM - NO LOAD)</p>	<p>Oil cooler or oil restricted.</p> <p>Oil too heavy</p> <p>Cold oil.</p>	<p>Check oil cooler line and oil cooler for restrictions. Clean or replace.</p> <p>Check oil weight. See oil recommendations.</p> <p>Converter pressure in cold weather will vary. As soon as converter gets hot, pressure should drop.</p>
<p>Over-heating.</p>	<p>See items #1 & #2.</p> <p>Oil cooler or oil cooler lines restricted causing safety valve to stay open.</p> <p>Oil cooler too small.</p> <p>Worn oil pump.</p> <p>Converter drain line to transmission or oil sump not installed properly.</p>	<p>Clean and check oil cooler and oil cooler lines. Replace if necessary.</p> <p>Replace with larger cooler.</p> <p>Replace oil pump.</p> <p>Install at lowest drain opening in converter housing. Line must maintain constant gradual drop to oil sump for gravity drain.</p>
<p>Noisy Converter.</p>	<p>Worn coupling gear.</p> <p>Worn oil pump</p> <p>Damaged bearing.</p> <p>Worn drive gears.</p>	<p>Replace.</p> <p>Replace.</p> <p>A complete teardown will be necessary to determine this. Replace if necessary.</p> <p>Replace.</p>
<p>Low clutch pressure.</p>	<p>Transmission malfunction.</p>	<p>Close pressure line to transmission control valve. If clutch pressure returns to normal, trouble is in transmission.</p>



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

TORQUE CONVERTER CONTINUED

TROUBLE	PROBABLE CAUSE	REMEDY
	Worn oil pump. Regulation valve stuck open.	Replace Clean and check valve for worn or dirty parts, replace if necessary.
High clutch pressure. (See pressure specifications)	Regulation valve stuck closed.	Clean and check valve for worn or dirty parts, replace if necessary.
Lack of power.	Improper engine function. Engine stall speed below normal. Low converter downstream pressure. Air in the oil. Improper oil.	Tune engine. Tune engine. Check governor. Report to designated individual in authority. Change oil. See oil recommendations.
Oil in engine flywheel housing.	"O" ring between impeller cover and impeller damaged. Oil baffle "O" ring damaged. Oil baffle oil seal damaged.	Replace. Replace. Replace.



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

COOLING SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Overheating	Unusual operating condition of high temperature.	Inspect. (Refer to Diesel Engine Operators Manual)
Loss of cooling solution.	Loose hose connections. Damaged or deteriorated hose. Leaking Radiator	Tighten hose connections. Replace hoses. Repair or replace radiator.
Engine operates too cool.	Thermostat sticking. Low air temperature.	Replace thermostat and gasket Cover radiator.
Noises	Frayed or loose fan belt. Water pump defective.	Replace or adjust belt. Replace pump.



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

COOLING SYSTEM

TROUBLE	POSSIBLE CAUSE	REMEDY
Overheating	Under operating condition in high temperature	Inspect water to Diesel Engine Operator Manual
Loss of cooling solution	Loose hose connections Damaged or deteriorated hose Leaking Radiator	Tighten hose connections Replace hoses Repair or replace radiator
Engine overheat too cool	Thermostat sticking Low air temperature	Replace thermostat and gasket Cover radiator
Noises	Frays or loose fan belt Water pump defective	Replace or adjust belt Replace pump



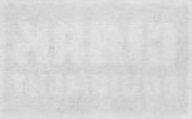
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TROUBLE SHOOTING GUIDE

COOLING SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Overheating	Unusual operating condition of high temperature.	Inspect. (Refer to Diesel Engine Operators Manual)
Loss of cooling solution.	Loose hose connections. Damaged or deteriorated hose. Leaking Radiator	Tighten hose connections. Replace hoses. Repair or replace radiator.
Engine operates too cool.	Thermostat sticking. Low air temperature.	Replace thermostat and gasket Cover radiator.
Noises	Frayed or loose fan belt. Water pump defective.	Replace or adjust belt. Replace pump.



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TROUBLE SHOOTING GUIDE

COOLING SYSTEM

SYMPTOM	POSSIBLE CAUSE	REMEDY
Overheating	Insufficient operating condition at high temperature	Inspect thermostat & fan. Engine Operator Manual
Loss of cooling solution	Loose hose connections Leakage or restricted passage Leaking radiator	Tighten hose connections. Replace hoses. Repair or replace radiator.
Engine operates too cool	Low oil temperature Thermostat sticking	Replace thermostat and gasket. Cover radiator.
Noises	Water pump defective Belted or loose fan belt	Replace pump. Replace or adjust fan belt.

STARTING MOTOR

TROUBLE	PROBABLE CAUSE	REMEDY
Starting motor cranks engine slowly.	<p>Engine oil too heavy.</p> <p>Battery charge low.</p> <p>Battery cell shorted.</p> <p>Battery connections corroded, broken, or loose.</p> <p>Dirty commutator.</p> <p>Insufficient brush surface contact.</p> <p>Defective starting motor.</p> <p>Starting switch defective.</p>	<p>Change to proper grade oil.</p> <p>Recharge or replace battery.</p> <p>Replace battery.</p> <p>Clean and tighten, or replace cables.</p> <p>Clean commutator.</p> <p>Free-up or replace brush.</p> <p>Replace starting motor.</p> <p>Replace switch.</p>
Starting motor does not crank engine.	<p>Engine oil too heavy.</p> <p>Starting motor, Solenoid, or cables defective; loose connections.</p> <p>Starting motor pinion gear jammed in flywheel drive gear.</p> <p>Dirty drive mechanism.</p> <p>Faulty Relay Switch.</p> <p>Ignition Fuse Blown.</p> <p>Faulty Ignition Switch.</p> <p>Faulty Neutral Starting Switch.</p>	<p>Change to proper grade oil.</p> <p>Replace or tighten loose connections.</p> <p>Remove starting motor and reinstall. Replace defective driving gear.</p> <p>Clean and lubricate drive mechanism.</p> <p>Replace Relay Switch.</p> <p>Replace Fuse.</p> <p>Replace Switch.</p> <p>Replace Switch. NOTE: The INDEX of this manual will list an ADJUSTABLE Neutral Starting Switch if your machine is so equipped.</p>



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

STARTING MOTOR

TROUBLE	PROBABLE CAUSE	REMEDY
Starting motor cranks engine slowly	<ul style="list-style-type: none"> Engine oil too heavy Battery charge low Battery cell shorted Battery connections corroded, dry, or loose Dirty commutator Inefficient commutator contact Defective starting motor Starting switch defective 	<ul style="list-style-type: none"> Change to proper grade oil Recharge or replace battery Replace battery Clean and tighten or replace cables Clean commutator Press or replace brush Replace starting motor Replace switch
Starting motor does not crank engine	<ul style="list-style-type: none"> Engine oil too heavy Starting motor, solenoid or cables defective, loose connection Starting motor pinion gear jammed in forward drive gear Dirty drive mechanism Faulty relay solenoid Faulty fuse block Faulty ignition switch Faulty neutral starting switch 	<ul style="list-style-type: none"> Change to proper grade oil Replace or tighten loose connection Remove to the motor and reinstall. Replace defective driving gear Clean and lubricate drive mechanism Replace relay switch Replace fuse Replace switch Replace switch NOTE: THE INDEX OF THIS MANUAL WILL LIST AN INSTRUCTIONS NEARLY STARTING SWITCH IS YOUR MACHINE IS AN EQUIPMENT



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TROUBLE SHOOTING GUIDE

ALTERNATOR TROUBLES

TROUBLE	PROBABLE CAUSE	REMEDY
Noisy alternator.	Worn or dirty bearings Loose mounting bolts Loose drive pulley Defective diode. Defective Stator	Replace parts. Tighten as required Tighten shaft nut. Replace Diodes Replace stator or alternator
No Output	Slipping Belts	Replace or Adjust belts
Low Output	Defective Diode Check Wiring Slipping Belts Voltage Regulator out of adjustment	Replace Diode Tighten Fasteners Adjust Belts Adjust or Replace



INDUSTRIAL TRUCK DIVISION



TRUCK SHOOTING GUIDE

ALTERNATE TROUBLES

REMEDY	PROBABLE CAUSE	TROUBLE
Replace parts Tighten as required Tighten shaft nut Replace dipper Replace shaft or sprocket	Worn or dirty bearing Loose mounting bolts Loose drive pulley Defective blade Defective dipper	Noisy alternator
Replace or adjust belt	Slipping belt	No output
Replace blade Tighten alternator Adjust belt Adjust sprocket	Defective blade Check wiring Slipping belt Voltage too low out of adjustment	Low output



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

BATTERY AND HORN

TROUBLE	PROBABLE CAUSE	REMEDY
Battery discharged.	Battery solution level low. Short in battery cell. Alternator not charging Loose or dirty connections; broken cables. Excessive use of starting motor. Idle battery Short circuits.	Add distilled water to bring level above plates; inspect for cracked case. Replace battery. Inspect alternator, fan belt, and regulator. Clean and tighten connections; replace cables. Tune up engine; charge battery. Recharge or replace battery. Replace defective wiring.
Battery (other troubles)	Overheated battery. Case bulged (or out of shape).	Inspect for short circuit or excessive alternator charge. Inspect for overcharging and overtightening of hold-down screws.



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

BATTERY, LIGHTS AND HORN (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Horn troubles.	Loose or dirty wiring connections.	Clean and tighten connections.
Horn sounds continuously.	Short-circuit in wiring between horn and horn button.	Replace wire.
Improper tone.	Loose or dirty wiring connections. Cover or bracket screws loose. Points adjusted improperly.	Clean and tighten connections. Tighten. Adjust points.
Horn will not operate.	Horn Fuse Blown. Open Circuit. Faulty Horn Relay.	Replace Fuse. Trace, repair or replace as required. Replace relay.



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

DRIVE AXLE

TROUBLE	PROBABLE CAUSE	REMEDY
Continuous Axle Noise.	Badly worn parts. Unevenly worn tires. Improperly adjusted wheel bearing. Lack of lubricant.	Replace worn parts with new. Replace tires. Adjust correctly. Add sufficient lubricant of correct grade.
Axle Noise on Drive or on Coast Only.	Differential pinion gear and ring gear out of adjustment or worn excessively.	Adjust, repair or replace entire unit if conditions warrants.
Excessive Backlash in Axle Driving.	Loose axle shaft drive flange cap screws. Flange loose on axle shaft. Worn splines on axle shaft at differential end. Differential drive pinion gear and ring gear out of adjustment or worn excessively.	Tighten cap screws. Reweld flange to shaft. Replace drive flange and shaft assembly. Adjust or replace as condition warrants.
Complete Failure to Function.	Broken axle shaft. Broken teeth on ring gear or pinion gear.	Replace axle shaft. Replace ring gear and pinion and other parts of differential necessary. Adjust ring gear and pinion gear correctly.



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TRUCK SHOOTING GUIDE

TRUCK AXLE

REAR	FRONT	TRUCK AXLE
<p>Excessive wear on rear axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>	<p>Excessive wear on front axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>	<p>Excessive wear on axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>
<p>Excessive wear on rear axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>	<p>Excessive wear on front axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>	<p>Excessive wear on axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>
<p>Excessive wear on rear axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>	<p>Excessive wear on front axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>	<p>Excessive wear on axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>
<p>Excessive wear on rear axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>	<p>Excessive wear on front axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>	<p>Excessive wear on axle housing.</p> <p>Excessive tire wear.</p> <p>Excessive axle end float.</p> <p>Excessive bearing end float.</p> <p>Excessive wheel end float.</p>



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TROUBLE SHOOTING GUIDE

STEERING AXLE

TROUBLE	PROBABLE CAUSE	REMEDY
Uneven Tire Wear	Damaged Axle.	Replace Axle.
	Incorrect Caster or Camber.	Adjust Tie Rods
	Tire Pressure Low	Inflate tires properly. Check Wheel alignment.



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TROUBLE SHOOTING GUIDE

STEERING AXLE

REAR

PROBABLE CAUSE

TROUBLE

Replace Axle

Damaged Axle

Driver-Tire wear

Adjust Tire Rods

Loose or Excess Tire Tension

Inspect tire properly. Check wheel alignment.

Low Tire Pressure

TRUBLE SHOOTING GUIDE

BRAKES

TROUBLE	PROBABLE CAUSE	REMEDY
Brakes drag.	<p>Improper pedal adjustment.</p> <p>Brake pedal return spring broken or weak.</p> <p>Brakes improperly adjusted.</p> <p>Brake shoe anchor pin tight in shoe.</p> <p>Brake shoe return spring broken or weak.</p> <p>Loose or damaged wheel bearings.</p> <p>Insufficient brake shoe clearance, or improper brake anchor pin adjustment.</p> <p>Brake backing plate loose.</p> <p>Grease on linings.</p> <p>Dirt imbedded in lining.</p> <p>Drums scored or rough.</p>	<p>Adjust brake pedal free travel.</p> <p>Replace spring.</p> <p>Adjust brakes.</p> <p>Free-up pin and lubricate lightly.</p> <p>Replace spring.</p> <p>Adjust or replace wheel bearings.</p> <p>Adjust brakes.</p> <p>Tighten plate.</p> <p>Correct grease leakage; clean or install new shoes and lining assemblies.</p> <p>Clean lining with wire brush.</p> <p>Replace drum and brake shoe and lining assemblies.</p>
Severe brake action on light pedal pressure.	<p>Brake shoes improperly adjusted.</p> <p>Grease on linings.</p> <p>Loose brake shoe anchor.</p>	<p>Adjust brakes.</p> <p>Correct grease leakage; clean or install new shoes and lining assemblies.</p> <p>Adjust and tighten.</p>
Brake locked.	<p>Brake pedal lacks free travel.</p> <p>Brakes frozen to drums (cold weather).</p>	<p>Adjust pedal free travel.</p> <p>Break loose by driving vehicle.</p>
Brake noisy or chatters.	<p>Brake lining worn.</p> <p>Grease on linings.</p> <p>Dirt embedded in linings.</p> <p>Improper or loose linings.</p> <p>Brake shoe or drum distorted.</p>	<p>Replace shoe and lining assemblies.</p> <p>Correct leakage; clean or replace shoe and lining assemblies.</p> <p>Clean lining with wire brush.</p> <p>Replace shoe and lining assemblies.</p> <p>Straighten or replace.</p>



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TROUBLE SHOOTING GUIDE

BRAKES (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive pedal travel.	Lining worn. Brake improperly adjusted. Scored brake drums.	Adjust or replace shoe and lining assemblies. Adjust brake. Repair or replace drums.
Excessive pedal pressure.	Grease on linings; worn or glazed lining. Warped brake shoes, or defective brake linings. Shoes improperly adjusted. Brake drum scored or distorted. Shoes improperly adjusted. Insufficient fluid in master cylinder.	Correct grease leakage; clean up and replace shoe and lining assemblies. Replace shoe and lining assemblies. Adjust brakes. Repair or replace drums. Adjust brakes. Fill master cylinder to within 1/4 inch of the top.
Wheel troubles.	Wheel wobbles; bent. Wheel loose on hub. Wheel out of balance. Wheel bearings run hot.	Inspect mounting on hub, spindles, and drive axle; replace defective wheel or mounting. Tighten. Balance wheel. Adjust, lubricate wheel bearings.



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TROUBLE SHOOTING GUIDE

STEERING

TROUBLE	PROBABLE CAUSE	REMEDY
Steering difficult	Lack of Lubrication Tire Pressure low. Tight steering system connections Tight steering gear; misaligned front wheels; or bent frame. Bent Steering connecting linkage or arm. Misaligned steering gear mounting.	Lubricate Inflate properly Lubricate and adjust linkage. Adjust Straighten or replace linkage.
Wander or weaving	Improper camber or caster (axle twisted). Tire pressures uneven Steering system connections or king pin bearings not properly adjusted. Loose wheel bearings. Steering gear worn or maladjusted. Steering gear mountings loose.	Install new axle Inflate properly. Lubricate and adjust. Adjust wheel bearings. Adjust drag link & tie rod. Tighten mounting bolts.
Low speed shimmy or wobble.	Loose steering connections. Steering gear worn, or adjustment too loose. Loose wheel bearings.	Adjust and tighten linkage. Adjust Adjust wheel bearings.
Vehicle pulls to one side.	Odd size, or new and old tires on opposite front wheels. Tires not inflated evenly. Tight wheel bearings. Bent steering arm or connection.	Match tires. Inflate properly Adjust. Lubricate wheel bearings. Straighten or replace bent linkage.



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TROUBLE SHOOTING GUIDE

STEERING

TROUBLE	PROBABLE CAUSE	REMEDY
Steering off-center	Lack of lubrication Tire pressure low Rear steering system connections Tight steering gear, misaligned Front wheels, or bent frame Bent steering connecting linkage on one side Misaligned axle and gear mounting	Lubricate Inflate properly Adjust Adjust Adjust Adjust
Wander or weaving	Improper center or caster (axle twisted) Tire pressure uneven Steering system connections or king pin bushings not properly adjusted Loose wheel bearings Steering gear worn or not adjusted Steering gear mounting loose	Lubricate Inflate properly Adjust Adjust Adjust Adjust
Low speed shimmy or wobble	Loose steering connections Steering gear worn or adjustment too loose Loose wheel bearings	Adjust Adjust Adjust
Vehicle pulls to one side	Bad size or new and old tires on opposite front wheels Tires not inflated evenly Tight wheel bearings Bent steering arm or connection linkage	Inflate properly Adjust Adjust Adjust Adjust

TROUBLE SHOOTING GUIDE

HYDRAULIC SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Pump not delivering oil.	<p>Wrong direction of rotation.</p> <p>Tank oil level low.</p> <p>Oil intake pipe or suction filter plugged.</p> <p>Air leak in suction line.</p> <p>Oil viscosity too heavy to pick up prime.</p> <p>Broken pump shaft or gear.</p>	<p>Must be reversed immediately to prevent seizure and breakage of parts due to lack of oil.</p> <p>Add recommended oil.</p> <p>Replace filter cartridge, clean strainer if so equipped.</p> <p>Will prevent priming, or cause noise and irregular action of control circuit.</p> <p>Thinner oil should be used, per recommendations for given perature and service.</p> <p>Replace parts</p>
Pump not developing pressure.	<p>Pump not delivering oil for any of the above reasons.</p> <p>Relief valve setting not high enough.</p> <p>Relief valve sticking open.</p> <p>Leak in hydraulic control system (cylinders or valves).</p> <p>Partially clogged intake line, intake filter or restricted intake pipe.</p>	<p>Check oil circulation by watching oil in tank.</p> <p>Refer to relief valve instructions.</p> <p>Dirt under pressure adjustment valve. Refer relief valve instructions.</p> <p>Find leak and correct.</p> <p>Pump must receive intake oil freely or cavitation will take place.</p>
Pump making noise.	<p>Small air leak at pump intake piping joints.</p> <p>Air leak at pump shaft packing.</p> <p>Tank air vent plugged.</p> <p>Too high oil viscosity.</p> <p>Shaft packing worn.</p> <p>Oil filter dirty.</p>	<p>Test by pouring oil on joints while listening for change in operation. Tighten as required.</p> <p>Repair or replace.</p> <p>Must be open thru breather opening or air filter.</p> <p>Use recommended oils.</p> <p>Replace shaft packing per preceding instructions.</p> <p>Replace filter element.</p>
Forks do not lift to maximum height.	<p>Hydraulic Oil level low.</p>	<p>Fill sump tank.</p>



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

HYDRAULIC SYSTEM CONTINUED

TROUBLE	PROBABLE CAUSE	REMEDY
Lift or tilt action fails.	Loss of oil pressure.	Check Hydraulic pump. Inspect Hose.
Oil leak at top of lift cylinder assembly.	Worn or damaged lift piston seal. Scored cylinder wall. Plugged vent line.	Replace seal. Replace cylinder. Clean out vent line. Replace if collapsed.
Oil leak around piston rod at tilt cylinder.	Worn seal. Scored piston rod.	Replace seal. Replace rod and eliminate cause of scoring which may be caused by misalignment, worn bearing or foreign matter.
With load centered on lift forks load is lifted unevenly.	Lift chains out of adjustment.	Adjust chains.

