CLARK

Industrial Truck Division

OPERATORS MANUAL

C30B-1-331 AND ABOVE
C40B-1-331 AND ABOVE
C50B-1-331 AND ABOVE
CLR40B-1- 548 AND ABOVE

Book No. O-B81, 2nd REV

Clark Equipment Company
Customer Service Publications Department
Battle Creek, Michigan 49016

Litho U.S.A.

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 recommendation in this manual and the following practices.

1. A scheduled preventive maintenance, lubrication, and inspection system should be followed.

2. Only qualified and authorized personnel should be permitted to maintain, repair, adjust, and inspect industrial trucks.

3. Before Leaving The Truck:

   A. Stop truck.

   B. Fully lower the load engaging means.

   C. Place directional controls in neutral.

   D. Apply the parking brake.

   E. Stop the engine or turn off power.

   F. Lock the control or ignition circuit.

   G. Block the wheels if truck is on a ramp, or being worked on.

4. Before Working On Truck:

   A. Raise wheels free of floor or disconnect power source.

   B. Use chocks or other positive truck positioning devices.

   C. Block load engaging means, innermast(s), or chassis before working under them.

   Before working on engine fuel system of gasoline powered trucks with gravity feed fuel systems, be sure fuel shutoff valve is closed.

   Before working on engine fuel system of LP gas powered trucks, close LP gas cylinder valve and run engine until fuel in system is depleted and engine stops running.

   Operation to check performance of the truck or attachments should be conducted in an authorized, safe clearance area.

5. Before Starting To Operate The Truck:

   A. Be in operating position.

   B. Depress clutch (or brake pedal on automatic transmission and electric trucks).

   C. Place directional controls in neutral.

   D. Start engine or turn on power.

   E. Before operating truck, check functioning of lift and tilt systems, directional and speed controls, steering, warning devices, brakes, and any attachment. (If used)

   F. Release parking brake.

- continued -

SAFETY INSTRUCTIONS FOR MAINTAINING INDUSTRIAL TRUCKS

6. 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.

7. Properly ventilate work area, vent exhaust fumes and keep shop clean and floor dry.

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, 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.

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 practice. 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, operation and maintenance instructions 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 practice. 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 and safe truck operation should not be performed by the customer or user without manufacturers prior written approval. Capacity, operation and maintenance instruction plates, tags or decals should be changed accordingly.

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.

PLEASE NOTE

INSTRUCTIONS ON USE OF MANUAL

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.

Example: (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

INSTRUCTIONS ON USE OF MANUAL

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 difinite 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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INDUSTRIAL TRUCK DIVISION

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LUBRICATION AND PREVENTIVE MAINTENANCE

TROUBLE SHOOTING GUIDE

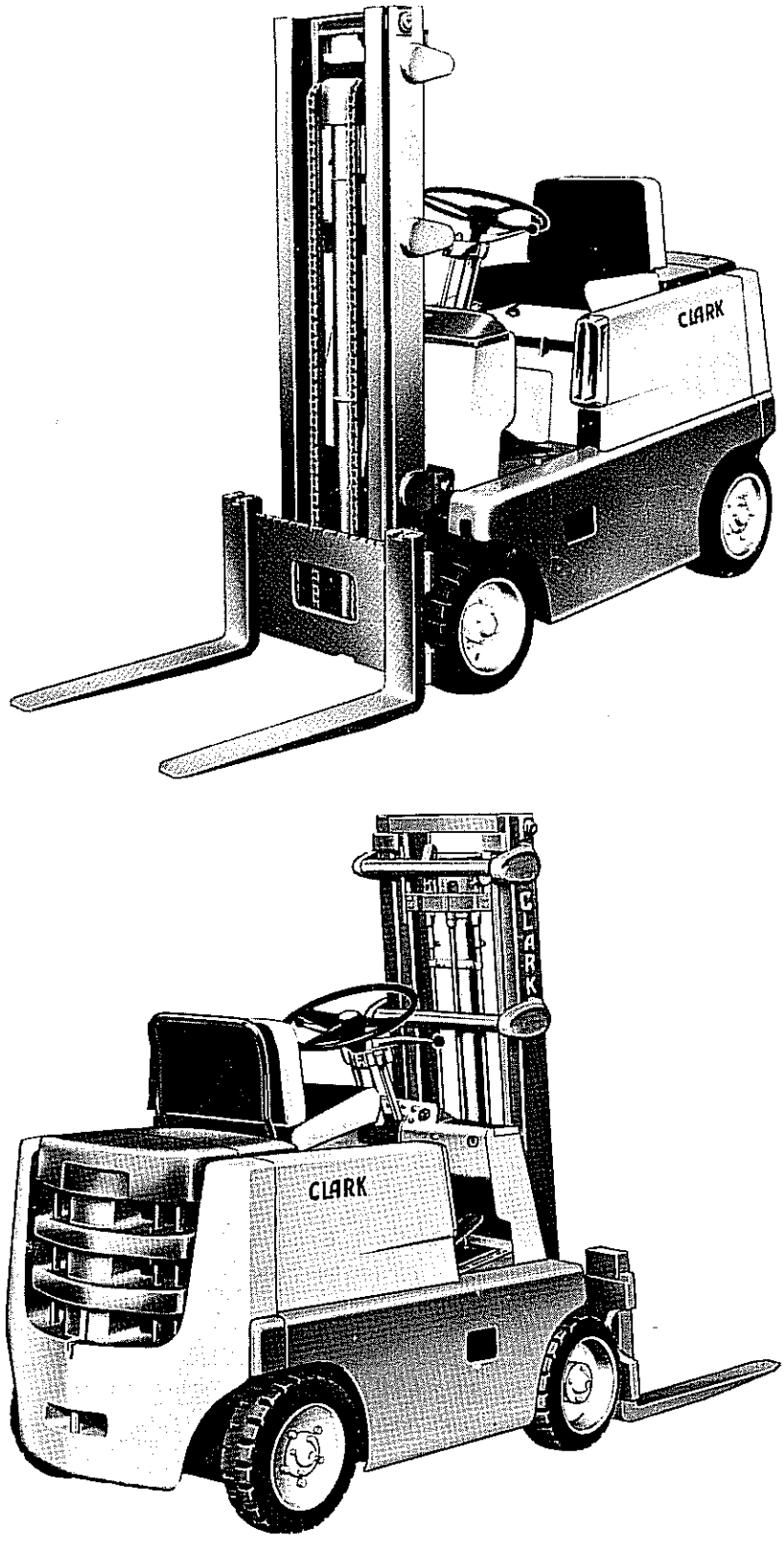


ILLUSTRATION OF MACHINE

INDUSTRIAL TRUCK DIVISION

SPECIFICATIONS

DISTRIBUTOR (All FOUR and SIX Cylinder Engines)

N O T E

Distributors are equipped with either Standard or Heavy Duty Points. Heavy Duty Points are thicker (have more contact material) than Standard Points.

Heavy Duty Points - All FOUR Cylinder Engines
Set Dwell Angle at.....31° - 34°

Heavy Duty Points - All SIX Cylinder Engines
Set Dwell Angle at.....22° - 26°

Heavy Duty Points

When connecting leads, terminals must be back to back (flat sides together). Push into slot between insulator and spring. (DO NOT push lever spring.) Then push other terminal in place between first terminal and insulator. See following illustration.

WHEN CONNECTING LEADS, THE TERMINALS MUST BE BACK TO BACK (flat sides together).....

- FOUR (4) CYLINDER ENGINES, ONLY -

Point Opening (in.)	Dwell Angle (deg.)	Centrifugal Advance							
		START		INTERMEDIATE		INTERMEDIATE		MAXIMUM	
		Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.
.022*	31-34	600	1-5	800	6-10	1600	11-15	2200	15-19
.021**	31-34	600	1-5	800	6-10	1600	11-15	2200	15-19

- SIX (6) CYLINDER ENGINES, ONLY -

Point Opening (in.)	Dwell Angle (deg.)	Centrifugal Advance							
		START		INTERMEDIATE		INTERMEDIATE		MAXIMUM	
		Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.	Eng.rpm.	Eng.adv.
.020*	28-32	600	1-5	800	6-10	1600	11-15	2200	15-19
.021**	22-26	600	1-5	800	6-10	1600	11-15	2200	15-19

N O T E

Time engine with timing light and tachometer at 400 engine RPM or below to the above specifications. The initial advance RPM range is 430 - 580. Distributor advance at 600 engine RPM should be 1° to 5°. Distributor rotation (as viewed from cap end) is counterclockwise.

When checking Distributor on a test stand, the above specifications are 1/2 that shown.

*..... Four (4) or Six (6) Cylinder Engine STANDARD Points.
**..... Four (4) or Six (6) Cylinder Engine HEAVY DUTY Points.

INDUSTRIAL TRUCK DIVISION

SPECIFICATIONS

Clarklift 30B

GENERAL

Type of vehicle ..... Clarklift

Gross vehicle weight:

	Standard	Hi-Lo
Front Drive Axle	2910 lbs	2955 lbs
Rear Steer Axle	3290 lbs	3285 lbs
Total vehicle gross weight.	6200 lbs	6240 lbs

Overall length with forks..... 118 1/2 inches

Overall length without forks..... 78 1/2 inches

Overall width ..... 38 inches

Overall height with 154 MFH upright.. 95 inches

Tread Drive (front) tires..... 31 inches

Tread Steer (rear) tires ..... 32 inches

Turning radius, outside ..... 70 1/4 inches

Turning radius, inside ..... 3 1/4 inches

Basic aisle for right Angle Stacking.....
.....(add load length) ..... 82 3/4 inches

Ground clearance - under steer axle.... 4 inches

Ground clearance - under drive axle.... 4 inches

Ground clearance between axles..... 4 3/4 inches

Grade clearance 49%

Upright ..... 3 inches

Counterweight ..... 3 1/2 inches

Draw bar pull (Loaded)3080 lbs., at 12 inch.....
..... coupler height

Draw bar pull (Empty) 2040 lbs., at 12 inch.....
..... coupler height

Travel speeds:

Loaded: (Forward and Reverse).... 8.2 MPH

Empty: (Forward and Reverse)..... 8.2 MPH

Gradeability: at 1 MPH
Loaded 33 1/2%
Empty 23%
at .9 coefficient of friction

Lifting & Lowering Speeds:

	Standard	Hi-Lo
Lift.....		
Loaded	65 FPM	59 FPM
Empty.....	73 FPM	66 FPM
Lower.....		
Loaded	65 FPM	65 FPM
Empty.....	80 FPM	65 FPM

NOTE

FOR ADDITIONAL DIMENSIONAL SPECIFICATIONS, REFER TO FOLLOWING PAGES.

ENGINE

Model.....Continental, F Series

Type ..... L-Head

Number of cylinders 4

Bore ..... 3 7/16"

Stroke ..... 4 3/8"

Displacement ..... 162 cu. in.

Governed Speed (No Load)..... 2350 R.P.M.

Bare Engine H.P. at Governed R.P.M..... 49

Maximum torque ..... 123 lb. ft.

Governor Setting (Loaded)..... 2200 R.P.M.

Firing Order 1-3-4-2

Crankcase Capacity:
With Filter ..... 4 1/2 Quarts

Without Filter ..... 4 Quarts

Lubrication System...Pressure lubricated by submerged gear-type pump.

FUEL TANK CAPACITY..... 6.4 gallons

COOLING SYSTEM CAPACITY ..... 11 1/2 quarts

FAN BELT DEFLECTION ..... 3/4" to 1"

TORQUE CONVERTER

Diameter..... 11 inch

Torque multiplication ..... 2.2 to 1

TRANSMISSION & DIFFERENTIAL

Speeds..... 1 Forward & 1 Reverse

Capacity ..... 15 quarts

STEER AXLE

Axle Alignment:

Toe-In ..... 0 degrees
Camber Angle..... 1 degree
Caster ..... 0 degrees

INDUSTRIAL TRUCK DIVISION

SPECIFICATIONS
CONTINUED
C30B

STEER AXLE (continued)

Left-hand turning radius angle,
Left wheel ..... 80 degrees
Right wheel..... 55 degrees

Right-hand turning radius angle,
Left wheel ..... 55 degrees
Right wheel ..... 80 degrees

DRIVE AXLE

Ratio ..... 4.4 to 1

Axle End Capacity ..... 1 lb . (each end)

WHEELS AND TIRES

Size... Drive..
18" Dia. x 7" wide x 12 1/8" I.D.
Size... Steer..
18" Dia. x 5" wide x 12 1/8" I.D.

ELECTRICAL SYSTEM .....
..... 12 volt negative ground

Battery .....12 volts 45 amp hour

Generator..... 25 amp

Brush spring tension 24-28 ounces

Rotation..... clockwise

Distributor

Contact point gap..... .022 inch

Rotation (viewed from cap end)...
..... clockwise

Dwell Angle ..... 25° - 34°

Spark Plugs

Gap Setting
Resistor..... .035 inch
Standard ..... .025 inch

Starting Motor

Brush spring tension.....
..... 35 ounces min.

HYDRAULIC SYSTEM

Sump Tank Capacity.. Approx. 5.1 gal

Sump Tank Filter (Replaceable).....
..... 25- micron

Sump Tank Breather (Replaceable)....
..... 5- micron

Hydraulic Pumps

Main Pump:
Type ..... vane
Capacity.....
13 1/2 G.P.M. at 2350 R.P.M.

Hydraulic Valve
Pressure Relief Valve Setting
..... 2000 P.S.I.

Power Steering Pump

Controlled flow ..... 3.0 GPM
Relief Valve Setting. 1250 PSI

BRAKE SYSTEM

Type ..... Hydraulic
Brake Pedal Free Travel
(as measured from top pedal position -to- where pedal meets resistance from the master cylinder) ..... 3/16" to 5/16"

(as measured from bottom of floor board -to- top of brake lever)..3/16" to 5/16"

GENERATOR
Armature Rotation (viewed from drive end)..... Clockwise
Cold Output .....
25 Amps at 14 Volts at 1750 R.P.M.
Field Current.....
1.69 - 1.79 Amps at 12 Volts (80°F)
Brush Spring Tension (ounces)..24-28

STARTERS

C30,40,50B-1-331 thru 188-419

Rotation C
Brush Spring Tension (oz.) ...35 Min
No Load Test
Max. Amps 75
Volts..... 10.3
Approx. RPM..... 6900

C30,40,50B-1-586 thru last machine in 814

Rotation C
Brush Spring Tension (oz.)..... 35
No Load Test
Max. Amps..... 76
Volts 10.6
Approx. RPM..... 6200-9400

C30,40,50B-1-850 and above

Rotation C
Brush Spring Tension..... 35
No Load Test
Max. Amps..... 76
Volts 10.6
Approx. RPM..... 6200-9400

(Measuring Brush Spring Tension - Swinging Type Brushes: Hook the Spring Scale under the Brush Screw tight against the Brush and pull on a line parallel to the sides of the brush. Take the reading just as the Brush leaves the Commutator. Pulling slightly on a strip of paper which has been placed under the Brush will indicate when the Brush leaves the Commutator and the correct instant for reading the Scale.) **

SPARK PLUGS

Gap

Standard	.025
Resistor	.035

STARTER RELAY

Point Opening	.020 - .030
Opening Voltage	.6 Min.

VOLTAGE REGULATOR

Cutout Relay Air Gap	.020
Voltage Regulator Air Gap	.075
Current Regulator Air Gap	.075
Cutout Relay Closing Voltage	11.8 to 13.5
Voltage Regulator Setting Range	6.9-7.3 @ 125°
Current Regulator Settings	31.0-35.5 @ 125°
Cutout Relay Point Opening	.020

Sump Tank Filter Attaching Bolts Torque	40 to 50 inch pounds
Transmission Sump Pan Cap Screw Torque	20 to 25 foot pounds
Transmission Control Cover Cap Screws Torque	35 to 45 foot pounds
Steering Gear Mounting Bolts and Clamp Bolt Torque	90 foot pounds
Steering Gear Pitman Arm Lock Nut Torque	100 to 125 foot pounds

** (Measuring Brush Spring Tension - Reaction Type Brushes: Hook the scale under the brush spring near the end and pull on a line parallel to the sides of the brush. To assist in telling the exact instant that the pressure is relieved, a small strip of paper can be placed under the brush. Pull slightly on the paper and the paper will slip out at the correct instant for reading the spring scale).

START ENGINE, WARM IT UP ... SHUT IT OFF

ADJUST TAPPETS TO THE STATIC WARM SETTINGS LISTED BELOW:

Engine Model	Intake Valves	Exhaust Valves	
Y-112	.012 inch	.020 inch	STATIC WARM SETTING

NOTE: The above is effective with Engine Specifications No. *8054 and above. Refer to the Engine Name Plate on the engine.

*For tappet settings on units built prior to this specification number, refer to "Static Cold Setting Adjustments" listed below.

F-135 F-163 F-227 F-245	.012 inch	.020 inch	STATIC WARM SETTING

ADJUST TAPPETS TO THE STATIC COLD SETTINGS LISTED BELOW:

Engine Model	Intake Valves	Exhaust Valves	
Y-112	.014 inch	.014 inch	STATIC COLD SETTING

NOTE: *The Static Cold Settings are effective with all Y-112 engines built prior to Engine Specification No. 8054. Refer to the Engine Name Plate located on the side of the engine.

Y-69 Y-91	.014 inch	.014 inch	STATIC COLD SETTING

F-124 F-140 F-162 F-186 F-209 F-226	.016 inch	.018 inch	STATIC COLD SETTING

NOTE: ENGINE "NAMEPLATE" SPECIFY TAPPET SETTINGS AT "HOT IDLE" ONLY.

VEHICLES EQUIPPED WITH CONTINENTAL ENGINES.

INDUSTRIAL TRUCK DIVISION

S P E C I F I C A T I O N S

CKARKLIFT CF30

GENERAL

Type of vehicle ..... Clarklift

Overall length with forks..... 116 1/2 inches

Overall length without forks .... 76 1/2 inches

Overall width ..... 38 inches

Overall height with 130 MFH upright 178 inches

Single Drive

Tread drive tires ..... 31 inches
Tread steer tires ..... 32 inches

Basic aisle for right angle stacking (add length of load) ..... 82 3/4 inches

Turning radius, outside ..... 70 1/4 inches

Turning radius, inside ..... 3 1/4 inches

Ground clearance - under counterweight ..... 3 1/2 inches

Ground clearance - under rear axle ... 4 inches

Ground clearance - under front axle .. 4 inches

Ground clearance - under upright ..... 3 inches

Ground clearance between axles ....4 3/4 inches

Grade clearance 49%

Draw bar pull (Loaded) 2770 lbs., at 12 inch coupler height.

Draw bar pull (Empty) 2001 lbs., at 12 inch coupler height.

GRADEABILITY

Loaded... 32.0% @9 coefficient of friction
Empty ... 26.5% @9 coefficient of friction

DRIVE AXLE

Ratio ..... 19.25 to 1

Wheel End Capacity ..... (each end) 1 pd.

WHEELS AND TIRES

Size....Front (non-directional)..... 18 x 7 x 12 1/8

Size....Rear (non-directional)..... 18 x 5 x 12 1/8

HYDRAULIC SYSTEM

Sump Tank Capacity ..... 6.49 gal.

Sump Tank Filter (Replaceable).. 25 micron

Sump Tank Breather (Replaceable).. 5 micron

Sump Tank Filter Attaching Bolts Torque ... . 35 to 45 inch lbs.

INDUSTRIAL TRUCK DIVISION

SPECIFICATIONS

Clarklift 40B

GENERAL

Type of vehicle ..... Clarklift

Gross vehicle weight:

	Standard	Hi-Lo
Front Drive Axle	2925 lbs	2970 lbs
Rear Steer Axle	3950 lbs	3945 lbs
Total vehicle gross weight.	6875 lbs	6915 lbs

Overall length with forks:.....123 3/4 inches

Overall length without forks..... 83 3/4 inches

Overall width ..... 38 inches

Overall height with 154 MFH upright... 95 inches

Tread Drive (front) tires ..... 30 inches

Tread Steer (rear) tires ..... 32 inches

Turning radius, outside..... 75 1/2 inches

Turning radius, inside..... 4 1/8 inches

Basic aisle for right angle stacking.....
.....(add load length)..... 88 inches

Ground clearance - under steer axle.....4 inches

Ground clearance - under drive axle.....4 inches

Ground clearance between axles..... 4 3/4 inches

Grade clearance 42%

Upright ..... 3 inches

Counterweight ..... 3 1/2 inches

Draw bar pull (Loaded) 3050 lbs., at 12 inch....
..... coupler height

Draw bar pull (Empty) 2045 lbs., at 12 inch.....
..... coupler height

Travel speeds:

Loaded: (Forward and Reverse)..... 8.2 MPH

Empty: (Forward and Reverse)..... 8.2 MPH

Gradeability: at 1 MPH
Loaded 28%
Empty 22%
at .9 coefficient of friction

Lifting & Lowering Speeds:

	Standard	Hi-Lo
Lift		
Loaded	65 FPM	59 FPM
Empty.....	73 FPM	66 FPM
Lower.....		
Loaded.....	65 FPM	65 FPM
Empty.....	80 FPM	65 FPM

NOTE

FOR ADDITIONAL DIMENSIONAL SPECIFICATIONS, REFER TO FOLLOWING PAGES.

ENGINE

Model .....Continental, F Series

Type ..... L-Head

Number of cylinders..... 4

Bore ..... 3 7/16"

Stroke ..... 4 3/8"

Displacement ..... 162 cu. in.

Governed Speed (No Load)..... 2350 R.P.M.

Bare Engine H.P. at Governed R.P.M..... 49

Maximum torque ..... 123 lb. ft.

Governor Setting (Loaded).....2200 R.P.M.

Firing Order 1-3-4-2

Crankcase Capacity:
With Filter ..... 4 1/2 Quarts

Without Filter..... 4 Quarts

Lubrication System...Pressure lubricated by submerged gear-type pump.

FUEL TANK CAPACITY ..... 7.8 gallons

COOLING SYSTEM CAPACITY..... 11 1/2 quarts

FAN BELT DEFLECTION ..... 3/4" to 1"

TORQUE CONVERTER

Diameter ..... 11 inch

Torque multiplication ..... 2.2 to 1

TRANSMISSION & DIFFERENTIAL

Speeds ..... 1 Forward & 1 Reverse

Capacity ..... 15 quarts

STEER AXLE

Axle Alignment:

Toe-In ..... 0 degrees
Camber Angle ..... 1 degree
Caster..... 0 degrees

INDUSTRIAL TRUCK DIVISION

SPECIFICATIONS
CONTINUED
C40B

STEER AXLE (continued)

Left-hand turning radius angle,
Left wheel ..... 80 degrees
Right wheel..... 55 degrees

Right-hand turning radius angle,
Left wheel ..... 55 degrees
Right wheel..... 80 degrees

DRIVE AXLE

Ratio ..... 4.4 to 1

Axle End Capacity.....1 lb .
(each end)

WHEELS AND TIRES

Size... Drive..
18" Dia. x 8" wide x 12 1/8" I.D.
Size... Steer..
18" Dia. x 5" wide x 12 1/8" I.D.

ELECTRICAL SYSTEM.....
.....12 volt negative ground

Battery..... 12 volts 45 amp hour

Generator.....25 amp

Brush spring tension 24-28 ounces

Rotation..... clockwise

Distributor

Contact point gap..... .022 inch

Rotation (viewed from cap end)...
..... clockwise

Dwell Angle.....25° - 34°

Spark Plugs

Gap Setting
Resistor ..... .035 inch
Standard ..... .025 inch

Starting Motor

Brush spring tension.....
..... 35 ounces min.

HYDRAULIC SYSTEM

Sump Tank Capacity.. Approx. 6.3 gal

Sump Tank Filter (Replaceable).....
..... 25- micron

Sump Tank Breather (Replaceable)....
..... 5- micron

Hydraulic Pumps

Main Pump:
Type..... vane
Capacity .....
13 1/2 G.P.M. at 2350 R.P.M.

Hydraulic Valve
Pressure Relief Valve Setting
..... 2000 P.S.I.

Power Steering Pump

Controlled flow ..... 3.0 GPM
Relief Valve Setting..1250 PSI

BRAKE SYSTEM

Type ..... Hydraulic
Brake Pedal Free Travel
(as measured from top pedal position -to-where pedal meets resistance from the master cylinder) ..... 3/16" to 5/16"

(as measured from bottom of floor board -to- top of brake lever)..3/16" to 5/16"

GENERATOR

Armature Rotation (viewed from drive end) ..... Clockwise
Cold Output.....
25 Amps at 14 Volts at 1750 R.P.M.
Field Current.....
1.69 - 1.79 Amps at 12 Volts (80°F)
Brush Spring Tension (ounces)..24-28

STARTERS

C30,40,50B-1-331 thru 188-419

Rotation C
Brush Spring Tension (oz.)....35 Min
No Load Test
Max. Amps 75
Volts 10.3
Approx. RPM 6900

C30,40,50B-1-586 thru last machine in 814

Rotation C
Brush Spring Tension (oz.)..... 35
No Load Test
Max. Amps 76
Volts 10.6
Approx. RPM 6200-9400

C30,40,50B-1-850 and above

Rotation C
Brush Spring Tension..... 35
No Load Test
Max. Amps 76
Volts 10.6
Approx. RPM 6200-9400

(Measuring Brush Spring Tension - Swinging Type Brushes: Hook the Spring Scale under the Brush Screw tight against the Brush and pull on a line parallel to the sides of the brush. Take the reading just as the Brush leaves the Commutator. Pulling slightly on a strip of paper which has been placed under the Brush will indicate when the Brush leaves the Commutator and the correct instant for reading the Scale.) **

SPARK PLUGS

Gap

Standard	.025
Resistor	.035

STARTER RELAY

Point Opening	.020 - .030
Opening Voltage	.6 Min.

VOLTAGE REGULATOR

Cutout Relay Air Gap	.020
Voltage Regulator Air Gap	.075
Current Regulator Air Gap	.075
Cutout Relay Closing Voltage	11.8 to 13.5
Voltage Regulator Setting Range	6.9-7.3 @ 125°
Current Regulator Settings	31.0-35.5 @ 125°
Cutout Relay Point Opening	.020

Sump Tank Filter Attaching Bolts Torque	40 to 50 inch pounds
Transmission Sump Pan Cap Screw Torque	20 to 25 foot pounds
Transmission Control Cover Cap Screws Torque	35 to 45 foot pounds
Steering Gear Mounting Bolts and Clamp Bolt Torque	90 foot pounds
Steering Gear Pitman Arm Lock Nut Torque	100 to 125 foot pounds

** (Measuring Brush Spring Tension - Reaction Type Brushes: Hook the scale under the brush spring near the end and pull on a line parallel to the sides of the brush. To assist in telling the exact instant that the pressure is relieved, a small strip of paper can be placed under the brush. Pull slightly on the paper and the paper will slip out at the correct instant for reading the spring scale).

ENGINEERING SPECIFICATIONS

CLARKLIFT® C(F) 40

4,000 pounds capacity, 24 inch load center

	STANDARD	HI-LO	TSU
MODEL C 40 Service Weight	7,035 lbs.	7,075 lbs.	7,270 lbs.
MODEL C(F) 40 Service Wt.	6,885 lbs.	6,925 lbs.	7,120 lbs.

Percent on drive wheels, truck empty: 43%

INSURANCE CLASSIFICATIONS. Underwriters' Laboratories, Inc. Listed and Factory Mutual Approved for types G; GS; LP; and LPS.

DIMENSIONS

Length to front face of forks	81¾"
Wheelbase	53"
Width, standard	38"
Tread, drive	30"
Tread, steer	32"
Turning radius	75½"
Basic aisle for right angle stacking (add load length)	88"

UNDERCLEARANCES

Upright	3"
Drive axle	4"
Steer axle	4"
Center of frame	4¾"
Counterweight	3½"
Grade clearance	42%

SPEEDS AND GRADES

	C-40	CF-40
Travel speeds with rated load	8.3 MPH (730 FPM)	7.9 MPH (696 FPM)
Gradeability with rated load	27.7%	27.0%

	STANDARD		HI-LO		TSU	
	Loaded	Empty	Loaded	Empty	Loaded	Empty
Lifting speed (FPM)	65	73	60	66	63	71
Lowering speed (FPM)	60	80	60	65	60	80

Lift of 10 feet averages 12.4 seconds.

ENGINE. Industrial Continental Red Seal, 4 cylinder, "L" head, equipped with stellite-faced valves; seats; positive valve rotators. Connecting rods, main bearings, cam shaft, and timing gears are pressure lubricated by submerged gear-type pump. Mechanical governor controls engine speed accurately without choking off power. Updraft carburetor, incorporating design features for minimum carbon monoxide emission.

Model	F-163
Bore	3⅞"
Stroke	4⅜"
Displacement, cu. in.	162
Crankcase capacity, qts.	4½
Fuel tank capacity, gals.	7¾
Governed RPM with no load	2350
S.A.E. rated horsepower at 2350 RPM	52
Max. SAE rated torque, lb. foot at 1600 RPM	123

ENGINE FILTERS. Three types: (1) Fuel filter in metallic bowl. (2) One pint oil filter with automotive-type replaceable cartridge. (3) Enclosed dry type in-take air filter that uses replaceable pleated paper cartridge with minute 5-micron openings. Directional air in-take draws fresh air from outside the engine compartment thru air scoops.

ELECTRICAL SYSTEM. 12-volt, 46 amp-hour battery; 25 amp low cut-in generator charges at idle. Other features include enclosed electric starter motor with positive engagement and electrical cut-out; weather-shielded key starting switch; dust-proof distributor; electric horn. Multiple-disconnect plug to instrument panel simplifies servicing. Lights optional at extra cost.

INSTRUMENTS. Direct reading engine hour meter mounted on left-hand side above gas fill compartment. Ammeter, engine oil pressure light; fuel and temperature gauges, all mounted in cowl for easy reading.

AXLE AND FINAL DRIVE. Integral assembly with 3-point mounting including engine, torque converter, transmission, spiral bevel pinion and ring gear, differential and full-floating drive axle assembly. Axle housing, not drive shaft, carries weight of truck. Final gear reduction is made through fully enclosed pinion and ring gear at drive wheels.

HYDRATORK® POWER SHIFTED TRANSMISSION. Standard equipment on the C-40. Power shifted constant mesh transmission and torque converter multiply engine torque without punishing "shock" on drive shaft and gears. Transmission oil is cooled through cooler in bottom radiator tank and is a filtered system with replaceable type cartridge. The direction selector lever for left-hand finger-tip control is mounted on steering column.

HYDRAULIC INCHING. In close quarters, the "free-pedal" portion of brake pedal hydraulically actuates inching valve, permitting power to be gradually disengaged from drive wheels, even when the engine is running at top speed for fast lifting.

FRICTION CLUTCH TRANSMISSION. Standard equipment on the CF-40. "Quick-change" 11" diameter single disc, riveted facing dry plate clutch, capacity of 180 pounds feet of torque, controlled by automotive type foot pedal. Two direct-to-transmission shift levers (forward-reverse and high-low) select 2 forward and 2 reverse speed ranges.

BRAKES. (Two independent systems). Self-adjusting shoes require no adjustment for life of lining. Foot brake torque multiplied through final reduction at each drive wheel, reduces pedal effort, increases brake life. Hydraulic internal expanding double shoe has bonded lining. Wide pedal, centrally located on Hydratork models for convenient operation with either foot. Brake shoes and drums are enclosed within drive axle housing instead of inside drive wheels.

Mechanical "V" block parking brake operates on transmission drive shaft on both Hydratork and standard transmission models.

STEERING. Power steering is standard. Large rear steer tires are equal in diameter to drive tires for more comfortable ride, easier steering, and ability to negotiate rough surfaces. Steering also made easier by reduced weight on steer wheels due to longer wheelbase. Strong vanadium steel steer axle is mounted on two torsional rubber bushings to cushion shock and provide articulation up to 3". Inclined king pins for anti-kick back control. Recirculating ball type steering gear with 18" diameter steering hand wheel. Accurate center point steering geometry. Tie rods are automotive type. Manual steering available.

HYDRAULIC SYSTEM. Full feathering balanced spool type valves for gentle starts and stops. Built-in pressure relief valve protects system against overloads. Vane-type pump is driven by hardened gears. Hydraulic sump, built into frame of ⅜" thick plate has 5.5 gallon capacity. Flexible rubber hydraulic hose lines are steel braid reinforced. System is protected from dirt by (1) a 5-micron pleated replacement filler cap breather, (2) a 25-micron full flow filter in sump.

SEATING. Rubber mounted wide seat and back rest are Polyurethane foam, covered with vinyl plastic. Backrest is contoured, and center pivoted to fit position of driver, reducing driver fatigue. Automotive-type latch releases the seat for horizontal adjustment up to 4".

MAINTENANCE. Split swing-out hood offers easy access for servicing. Check points such as water and hydraulic sump filler caps, oil dip-stick and filler readily accessible. Battery swings out. Quickly detachable counterweight is hook mounted, secured with one large bolt.

OVERHEAD GUARD AND LOAD BACK REST. Driver's overhead guard and 48" high load back rest are standard equipment.

ADDED ADVANTAGES. Protectoseal gas tank filler cap; auxiliary fuel supply of ½ gallon; recessed pin-type coupler at 12"; multi-pass muffler; bolts and screws are zinc or cadmium plated; all exposed surfaces are shot-blasted and prime painted with weather resistant paint.

INDUSTRIAL TRUCK DIVISION

S P E C I F I C A T I O N S

Clarklift 50B

GENERAL

Type of vehicle ..... Clarklift

Gross vehicle weight:

	Standard	Hi-Lo
Front Drive Axle.....	2965 lbs	3010 lbs
Rear Steer Axle	4510 lbs	4505 lbs
Total vehicle gross weight	7475 lbs	7515 lbs

Overall length with forks ..... 127 inches

Overall length without forks ..... 87 inches

Overall width ..... 40 inches

Overall height with 154 MFH upright.. 95 inches

Tread Drive (front) tires ..... 31 inches

Tread Steer (rear) tires ..... 32 inches

Turning radius, outside ..... 78 3/4 inches

Turning radius, inside ..... 3 1/2 inches

Basic aisle for right angle stacking.....
.....(add load length)..... 91 1/4 inches

Ground clearance - under steer axle.....4 inches

Ground clearance - under drive axle.....4 inches

Ground clearance between axles..... 4 3/4 inches

Grade clearance 41%

Upright ..... 3 inches

Counterweight ..... 3 1/2 inches

Draw bar pull (Loaded) 3040 lbs., at 12 inch....
..... coupler height

Draw bar pull (Empty) 2100 lbs., at 12 inch.....
..... coupler height

Travel speeds:

Loaded: (Forward and Reverse)..... 8.2 MPH

Empty: (Forward and Reverse)..... 8.2 MPH

Gradeability: at 1 MPH
Loaded 24.5%
Empty 20.5%
at .9 coefficient of friction

Lifting & Lowering Speeds:

	Standard	Hi-Lo
Lift		
Loaded.....	65 FPM	59 FPM
Empty.....	73 FPM	66 FPM
Lower.....		
Loaded.....	65 FPM	65 FPM
Empty.....	80 FPM	65 FPM

N O T E

FOR ADDITIONAL DIMENSIONAL SPECIFICATIONS, REFER TO FOLLOWING PAGES.

ENGINE

Model.....Continental, F Series

Type ..... L-Head

Number of cylinders 4

Bore ..... 3 7/16"

Stroke ..... 4 3/8"

Displacement..... 162 cu. in.

Governed Speed (No Load) ..... 2350 R.P.M.

Bare Engine H.P. at Governed R.P.M. 49

Maximum torque ..... 123 lb.ft.

Governor Setting (Loaded)..... 2200 R.P.M.

Firing Order 1-3-4-2

Crankcase Capacity:
With Filter ..... 4 1/2 Quarts

Without Filter ..... 4 Quarts

Lubrication System...Pressure lubricated by submerged gear-type pump.

FUEL TANK CAPACITY .....8.6 gallons

COOLING SYSTEM CAPACITY ..... 11 1/2 quarts

FAN BELT DEFLECTION ..... 3/4" to 1"

TORQUE CONVERTER

Diameter ..... 11 inch

Torque multiplication ..... 2.2 to 1

TRANSMISSION & DIFFERENTIAL

Speeds..... 1 Forward & 1 Reverse

Capacity ..... 15 quarts

STEER AXLE

Axle Alignment:

Toe-In ..... 0 degrees
Camber Angle ..... 1 degree
Caster ..... 0 degrees

INDUSTRIAL TRUCK DIVISION

SPECIFICATIONS
CONTINUED
C50B

STEER AXLE (continued)

Left-hand turning radius angle,
Left wheel ..... 80 degrees
Right wheel..... 55 degrees

Right-hand turning radius angle,
Left wheel ..... 55 degrees
Right wheel..... 80 degrees

DRIVE AXLE

Ratio ..... 4.4 to 1

Axle End Capacity .....1 lb . (each end)

WHEELS AND TIRES

Size...Drive..
18" Dia. x 9" wide x 12 1/8" I.D.
Size...Steer..
18" Dia. x 5" wide x 12 1/8" I.D.

ELECTRICAL SYSTEM .....
.....12 volt negative ground

Battery ..... 12 volts 45 amp hour

Generator ..... 25 amp

Brush spring tension 24-28 ounces

Rotation ..... clockwise

Distributor

Contact point gap ..... .022 inch

Rotation (viewed from cap end)...
..... clockwise

Dwell Angle ..... 25° - 34°

Spark Plugs

Gap Setting
Resistor ..... .035 inch
Standard ..... .025 inch

Starting Motor

Brush spring tension .....
..... 35 ounces min.

HYDRAULIC SYSTEM

Sump Tank Capacity.. Approx. 6.9 gal

Sump Tank Filter (Replaceable).....
..... 25- micron

Sump Tank Breather (Replaceable)....
..... 5- micron

Hydraulic Pumps

Main Pump:
Type ..... vane
Capacity.....
13 1/2 G.P.M. at 2350 R.P.M.

Hydraulic Valve
Pressure Relief Valve Setting
.....-..... 2000 P.S.I.

Power Steering Pump

Controlled flow ..... 3.0 GPM
Relief Valve Setting. 1250 PSI

BRAKE SYSTEM

Type..... Hydraulic
Brake Pedal Free Travel
(as measured from top pedal position -to- where pedal meets resistance from the master cylinder)..... 3/16" to 5/16"

(as measured from bottom of floor board -to- top of brake lever)..3/16" to 5/16"

GENERATOR
Armature Rotation (viewed from drive end)..... Clockwise
Cold Output.....
25 Amps at 14 Volts at 1750 R.P.M.
Field Current.....
1.69 - 1.79 Amps at 12 Volts (80°F)
Brush Spring Tension (ounces)..24-28

STARTERS

C30,40,50B-1-331 thru 188-419

Rotation..... C
Brush Spring Tension (oz.)... 35 Min
No Load Test
Max. Amps 75
Volts 10.3
Approx. RPM 6900

C30,40,50B-1-586 thru last machine in 814

Rotation C
Brush Spring Tension (oz.).....35
No Load Test
Max. Amps 76
Volts 10.6
Approx. RPM 6200-9400

C30,40,50B-1-850 and above

Rotation C
Brush Spring Tension 35
No Load Test
Max. Amps 76
Volts 10.6
Approx. RPM 6200-9400

(Measuring Brush Spring Tension - Swinging Type Brushes: Hook the Spring Scale under the Brush Screw tight against the Brush and pull on a line parallel to the sides of the brush. Take the reading just as the Brush leaves the Commutator. Pulling slightly on a strip of paper which has been placed under the Brush will indicate when the Brush leaves the Commutator and the correct instant for reading the Scale.) **

SPARK PLUGS

Gap

Standard	.025
Resistor	.035

STARTER RELAY

Point Opening	.020 - .030
Opening Voltage	.6 Min.

VOLTAGE REGULATOR

Cutout Relay Air Gap	.020
Voltage Regulator Air Gap	.075
Current Regulator Air Gap	.075
Cutout Relay Closing Voltage	11.8 to 13.5
Voltage Regulator Setting Range	6.9-7.3 @ 125°
Current Regulator Settings	31.0-35.5 @ 125°
Cutout Relay Point Opening	.020

Sump Tank Filter Attaching Bolts Torque	40 to 50 inch pounds
Transmission Sump Pan Cap Screw Torque	20 to 25 foot pounds
Transmission Control Cover Cap Screws Torque	35 to 45 foot pounds
Steering Gear Mounting Bolts and Clamp Bolt Torque	90 foot pounds
Steering Gear Pitman Arm Lock Nut Torque	100 to 125 foot pounds

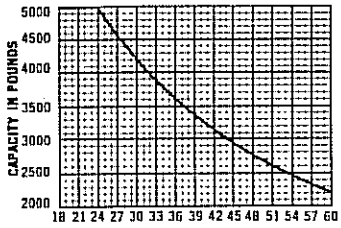
** (Measuring Brush Spring Tension - Reaction Type Brushes: Hook the scale under the brush spring near the end and pull on a line parallel to the sides of the brush. To assist in telling the exact instant that the pressure is relieved, a small strip of paper can be placed under the brush. Pull slightly on the paper and the paper will slip out at the correct instant for reading the spring scale).

DIMENSIONAL SPECIFICATIONS

CLARKLIFT® C(F) 50

5,000 pounds capacity, 24 inch load center

CAPACITY CHART



Load center in inches from front face of forks — Rated capacities shown above are computed with uprights in vertical position. Lifts above 154" maximum fork height, contact factory. Specific capacities will be shown on truck nameplate.

UPRIGHT DIMENSION TABLE

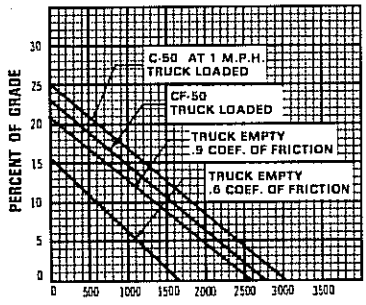
MFH		Overall Height Lowered	Free Lift		
Std. Hi-Lo	TSU & FFL TSU		Std.	Hi-Lo & FFL TSU	TSU
70	—	53	17⅜	—	—
76	—	56	17¼	—	—
82	—	59	17¼	—	—
88	—	62	17¼	—	—
94	135	65	17¼	44	12½
100	144	68	17¼	47	12½
*106	*153	71	17¼	50	12½
112	162	74	17¼	53	12½
118	171	77	17¼	56	12½
124	180	80	17¼	59	12½
*130	*189	83	17¼	62	12½
136	—	86	17¼	65	—
—	198	88	—	67	12½
142	—	89	17¼	68	—
148	—	92	17¼	71	—
—	207	93	—	72	12½
*154	—	95	17¼	74	—
—	216	98	—	77	12½
160	—	99	17¼	78	—
166	—	102	17¼	81	—
—	*225	103	—	82	12½
172	—	106	17¼	85	—
*178	—	109	17¼	88	—

INTERMEDIATE HEIGHTS AVAILABLE IN INCREMENTS OF 3" MFH.

FOR OVERALL HEIGHT RAISED—ADD 49" TO MFH.

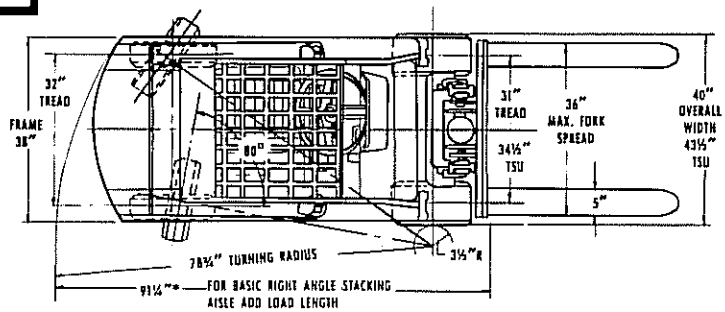
*INDICATES PREFERRED STANDARD SIZES.

GRADE & DRAWBAR PULL CHART

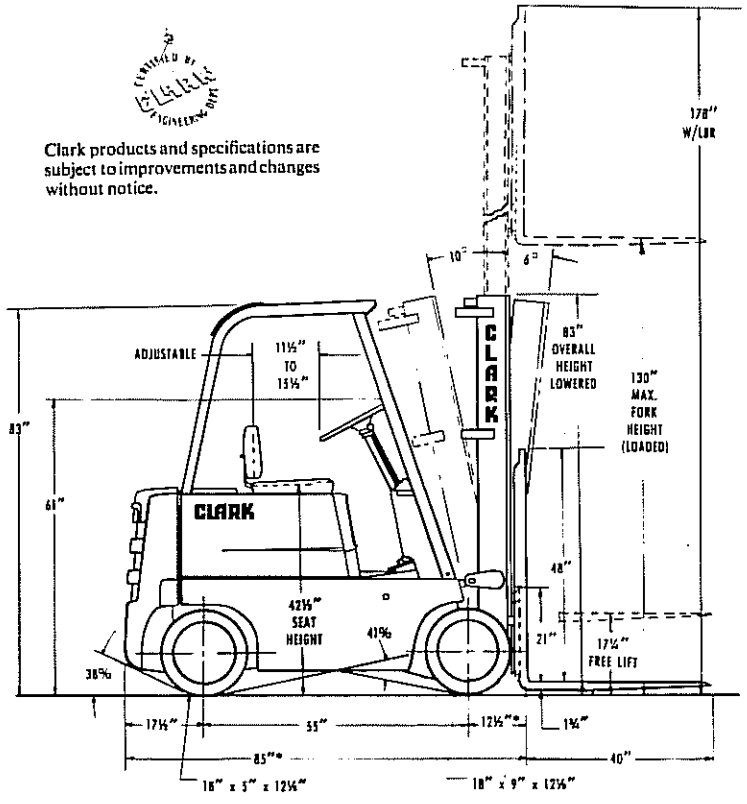


AVAILABLE DRAWBAR PULL IN POUNDS

(WITH TOWING COUPLER 12" FROM FLOOR) — EMPTY TRUCK GRADES ARE WITH EITHER TRANSMISSION.



Clark products and specifications are subject to improvements and changes without notice.



*ADD 1" TO THESE DIMENSIONS FOR TRIPLE STAGE UPRIGHT

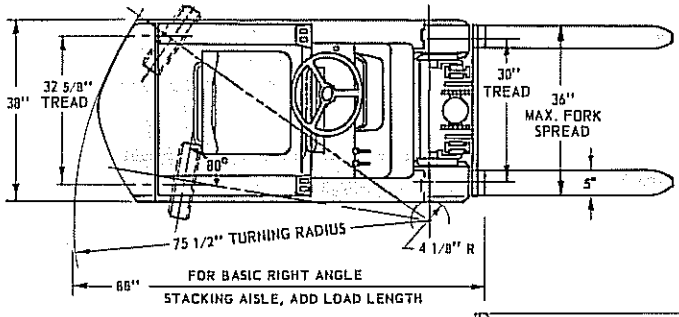
L.P.Gas and Gasoline ENGINE
TORQUE SPECIFICATIONS

Engines have many studs, bolts, and cap screws of special material and sizes and it is very important that care be exercised to torque all studs and bolts correctly.

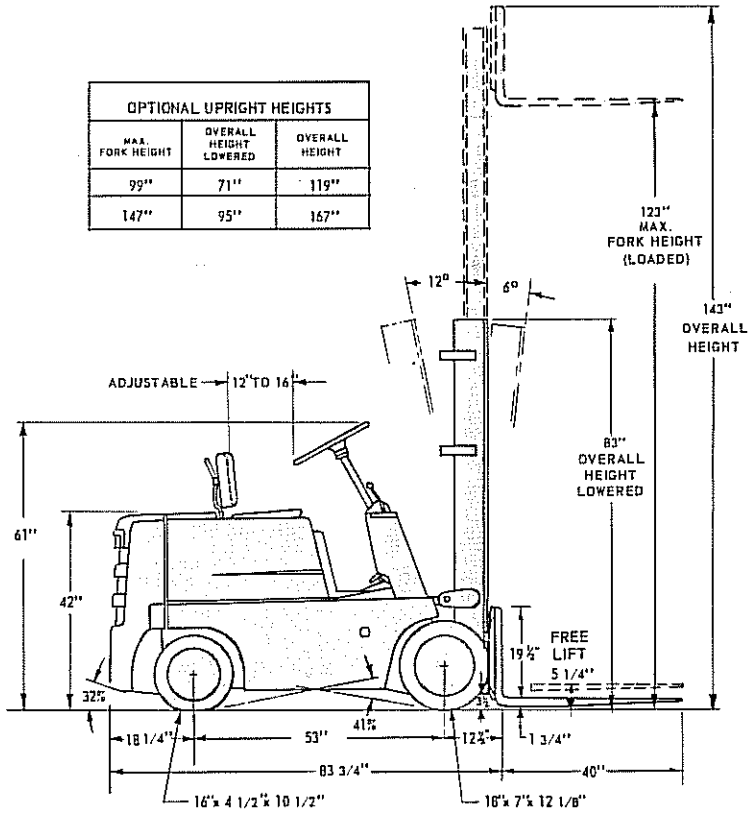
The torque specifications,' foot pounds, listed below MUST be followed in order to have the engine conform to the original specifications.

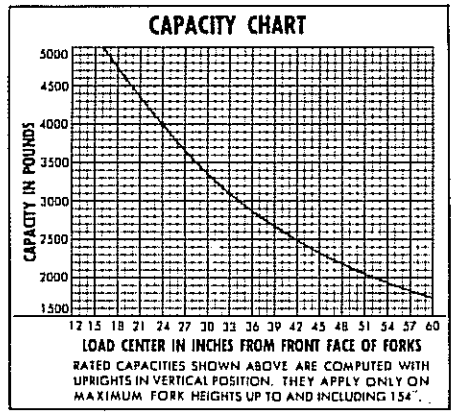
Size - Diameter	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"
Cylinder Heads	------	35-40	70-85	100-110	130-140	145-155
Manifolds	15-20	25-30	40-50	50-60	50-60	60-70
Gear Covers, Water Pumps, Front and Rear End Plates	15-20	25-30	50-55	80-90	-------	------
Oil Pans	12-16	12-16	------	------	------	------

CLARKLIFT® CLR40 CLFR40



OPTIONAL UPRIGHT HEIGHTS		
MAX. FORK HEIGHT	OVERALL HEIGHT LOWERED	OVERALL HEIGHT
99"	71"	119"
147"	95"	167"





INDUSTRIAL TRUCK DIVISION

S P E C I F I C A T I O N S

GENERAL

Type of vehicle ..... CLR 40

Overall length with forks ..... 123 3/4 inches

Overall length without forks .... 83 3/4 inches

Overall width ..... 38 inches

Overall height with 123 MFH upright.. 143 inches

Tread front tires ..... 30 inches

Tread rear tires..... 32 5/8 inches

Basic aisle for right angle stacking (add length of load)..... 88 inches

Turning radius, outside ..... 75 1/2 inches

Turning radius, inside ..... 4 1/2 inches

Ground clearance - upright ..... 3 1/2 inches

Ground clearance - under rear axle .... 3 inches

Ground clearance - under front axle ... 4 inches

Ground clearance between axles..... 4 1/4 inches

Grade clearance 41%

Travel speeds:
- Loaded: ..... 8.2 MPH
- Empty: ..... 8.2 MPH

Gradeability:

Loaded..27.5% @ .9 coefficient of friction.

Lifting & Lowering Speeds :	Standard
Lift	
Loaded	62 FPM
Empty	75 FPM
Lower	
Loaded.....	220 FPM
Empty.....	90 FPM

N O T E

FOR ADDITIONAL DIMENSIONAL SPECIFICATIONS, REFER TO FOLLOWING PAGES.

ENGINE

Model ..... F 162

Type ..... L-Head

Number of cylinders..... 4

Bore 3 7/16

Stroke 4 3/8

Displacement 162

Governed Speed (No Load)..... 2350 R.P.M.

Net Brake H.P. at Governed R.P.M. 49

Maximum torque ..... 123 lb. ft.

Governor Setting (Loaded)..... 2200 R.P.M.

Firing Order 1-3-4-2

Crankcase Capacity:
- With Filter..... 4 1/2 quarts
- Without Filter ..... 4 quarts

Lubrication System...Pressure lubricated by submerged gear-type pump.

FUEL TANK CAPACITY..... 7.5 gallons

COOLING SYSTEM CAPACITY ..... 11 1/2 quarts

FAN BELT DEFLECTION ..... 3/4" to 1" (on long span)

TRANSMISSION

Speeds..... 1 forward & 1 reverse

Capacity..... 15 quarts

STEER AXLE

Axle Alignment:
- Toe-in ..... 0 degrees
- Camber Angle ..... 1 degree
- Caster ..... 0 degrees

Left-hand turning radius angle,
- Left wheel..... 80 degrees
- Right wheel..... 55 degrees

Right-hand turning radius angle,
- Left wheel..... 55 degrees
- Right wheel..... 80 degrees

DRIVE AXLE

Ratio ..... 4.4 to 1

Capacity ..... 1 lb. (each end)

WHEELS AND TIRES ..... (Non-directional)
- SIZE.... Front 18" dia. x 7" wide x 12 1/8" I.D.
- SIZE.... Rear 16" dia. x 4 1/2" wide x 10 1/2" I.D.

HYDRAULIC SYSTEM

Sump Tank Capacity ..... 6.3 gallons

Sump Tank Filter (Replaceable).. 25- micron

Sump Tank Breather (Replaceable). 5- micron

Hydraulic Pumps

Main Pump:

Type ..... vane

Capacity .....
13 1/2 G.P.M. at 2350 engine R.P.M.

Hydraulic Valve

Pressure Relief Valve Setting .....
..... 2000 P.S.I.

BRAKE SYSTEM

Type ..... Hydraulic

Brake Pedal Free Travel..... 3/16" to 5/16"

GENERATOR

Armature Rotation (Viewed from drive end)..
..... Clockwise
Cold Output .....
..... 25 Amps at 14 Volts at 1750 R.P.M.
Field Current.....
..... 1.69 - 1.79 Amps at 12 Volts (80°F)
Brush Spring Tension (ounces)..... 24-28

DISTRIBUTOR

Rotation (Viewed from drive end)..Clockwise
Point Opening ..... .022
Start Advance
R.P.M. (Dist.) 400
Degree (Dist.) ..... 0° to 2°
Maximum Advance
R.P.M. (Dist.) 1250
Degree (Dist.) ..... 6° to 8°
Cam Angle Range 25-34

STARTER

Rotation (viewing drive end).....Clockwise
No Load Test ..... 49-76 Amps Max. at 10.6
..... Volts at 6200 to 9400 R.P.M.
Lock Test ..... 7 ft. lb. torque at 290
..... Max. Amperes at 4.3 Volts
Brush Spring Tension..... 35 oz. min.

(Measuring Brush Spring Tension - Reaction Type Brushes: Hook the scale under the Brush Spring near the end and pull on a line parallel to the sides of the brush. To assist in telling the exact instant that the pressure is relieved, a small strip of paper can be placed under the Brush. Pull slightly on the paper and the paper will slip out at the correct instant for reading the Spring Scale.)

(Measuring Brush Spring Tension - Swinging Type Brushes: Hook the Spring Scale under the Brush Screw tight against the Brush and pull on a line parallel to the sides of the brush. Take the reading just as the Brush leaves the Commutator. Pulling slightly on a strip of paper which has been placed under the Brush will indicate when the Brush leaves the Commutator and the correct instant for reading the Scale.)

SPARK PLUGS

Gap
Standard ..... .025
Resistor ..... .035
Ignition Timing ..... T.D.C.

STARTER RELAY

Point Opening ..... .020 - .030
Opening Voltage..... .6 Min.

VOLTAGE REGULATOR

Cutout Relay Air Gap ..... .020
Voltage Regulator Air Gap ..... .075
Current Regulator Air Gap ..... .075
Cutout Relay Closing Voltage...11.8 to 13.5
Voltage Regulator Setting Range .....
..... 6.9-7.3 @ 125°
Current Regulator Settings 31.0-35.5 @ 125°
Cutout Relay Point Opening ..... .020

Sump Tank Filter Attaching Bolts Torque .....
..... 40 to 50 inch pounds
Transmission Sump Pan Cap Screw Torque .....
..... 20 to 25 foot pounds
Transmission Control Cover Cap Screws Torque ...
..... 35 to 45 foot pounds
Steer Gear Mounting Bolts and Clamp Bolt Torque
..... 90 foot pounds
Steering Gear Pitman Arm Lock Nut Torque .....
..... 100 to 125 foot pounds

INDUSTRIAL TRUCK DIVISION

NEW MACHINE 50 HOUR SERVICE AND INSPECTION

Air Cleaner, Service	8H 403
Battery Test and Level Check	100H 603
Brake Master Cylinder Level Check	100H 303
Brake Pedal, Adjust	100H 302
Cooling System, Inspect	100H 103
Cylinder Head, Tighten	1000H 003
Engine Crankcase, Drain and Refill	100H 003
Engine Oil Filter, Change	100H 003
Fan Belt, Adjust	100H 203
Fuel Pump Strainer, Clean or Replace	500H 002
Hand Brake, Adjust	1000H 1103
Hydraulic Oil Filter, Change	500H 103
Intake and Exhaust Manifold, Tighten	500H 403
Lift Chains, Adjust	100H 403
Lubricate Machine	100H 703
Nuts, Bolts and Capscrews, Tighten	500H 403
Power Steering Reservoir Level Check	8H 703
Pressure Check Main Hydraulic System	1000H 1503
Steering Gear Level Check	100H 603
Transmission, Converter and Axle Adaptor Level Check	100H 002
Transmission, Converter and Axle Adaptor Change Filter	500H 003

NOTE

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

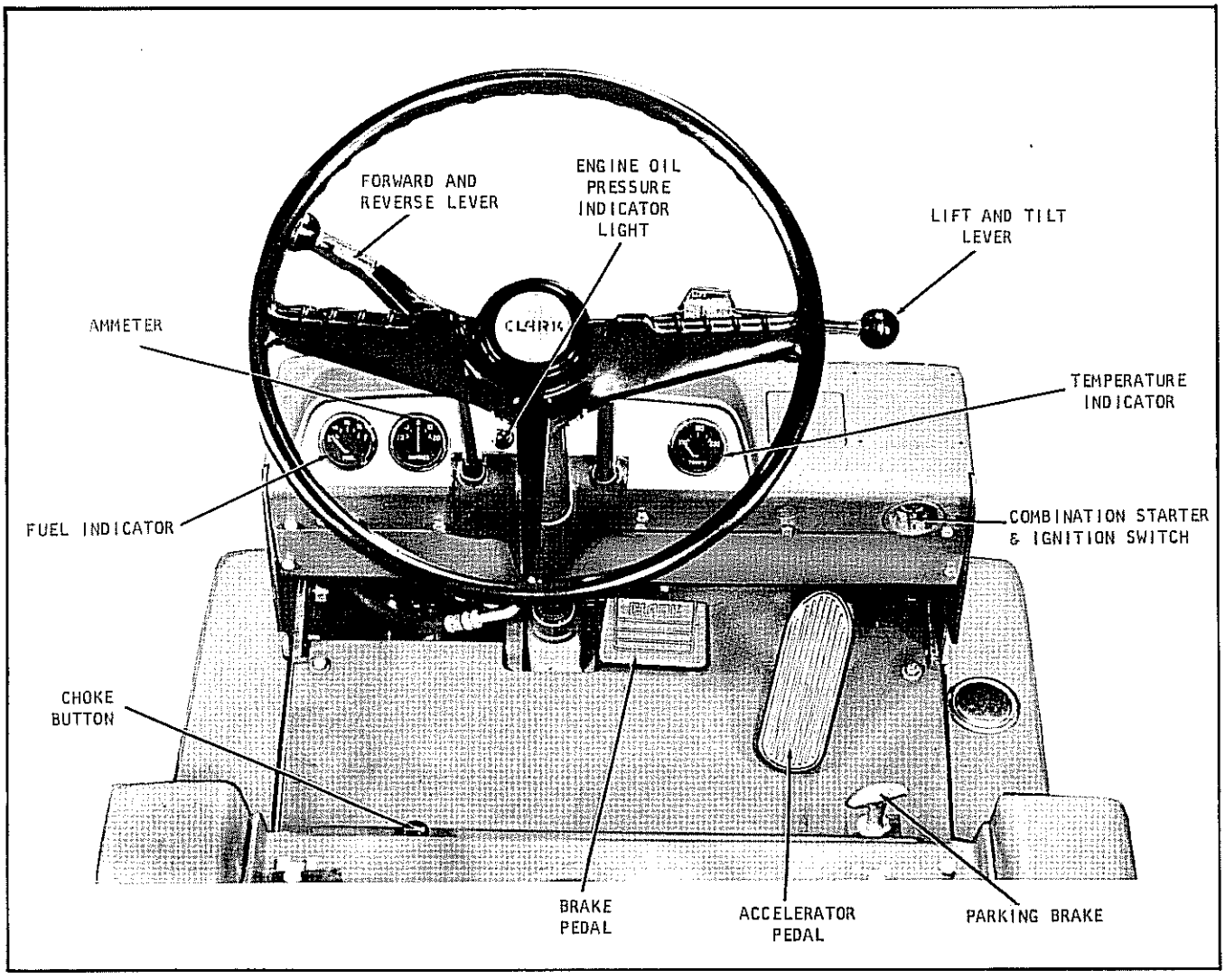


Figure 002a. Overall Controls

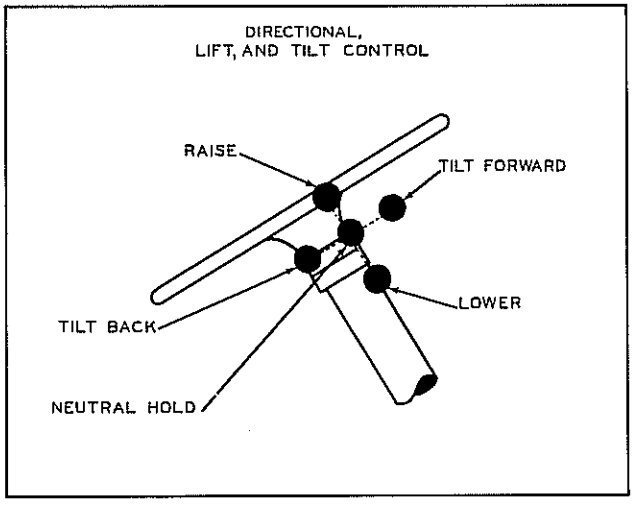


Figure 002b. Hydraulic Control Levers

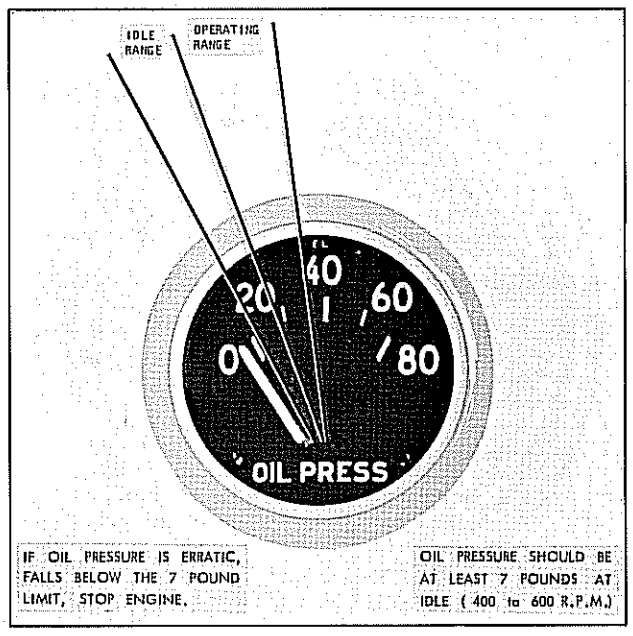


Plate 6288. Oil Pressure Indicator
(MACHINES SO EQUIPPED)

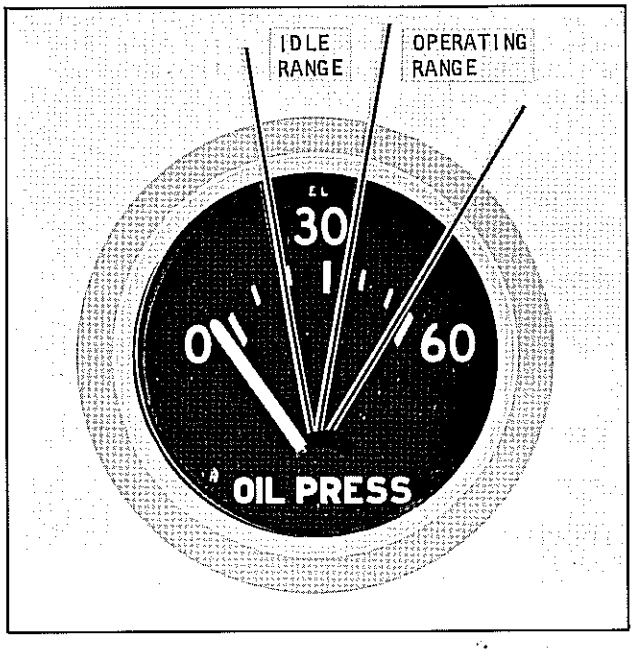


Plate 8606. Oil Pressure Indicator
(MACHINES SO EQUIPPED)

a. Oil Pressure Indicator. Select the gauge in your machine. Your machine engine oil pressure should read as marked in the illustration.

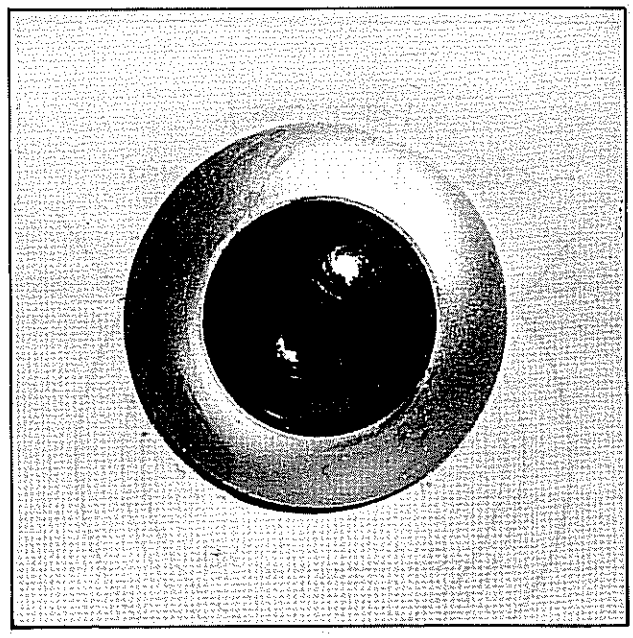


Plate 6885. Oil Pressure Warning Light
(MACHINES SO EQUIPPED)

C A U T I O N

IF OIL PRESSURE WARNING LIGHT COMES ON, STOP THE ENGINE IMMEDIATELY AND FIND THE CAUSE OF THE TROUBLE. REFER TO TROUBLE SHOOTING SECTION FOR THIS INFORMATION. IF THE OIL PRESSURE IS ERRATIC OR FALLS BELOW THE ABOVE LIMIT, STOP THE ENGINE IMMEDIATELY AND FIND THE CAUSE OF THE TROUBLE. REFER TO TROUBLE SHOOTING SECTION FOR THIS INFORMATION. ON NEW MACHINES, AFTER STARTING ENGINE, RUN IT AT IDLE FOR FIVE MINUTES, THEN STOP ENGINE AND RECHECK OIL LEVEL IN CRANKCASE. BRING OIL LEVEL TO HIGH MARK, IF NECESSARY.

N O T E

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

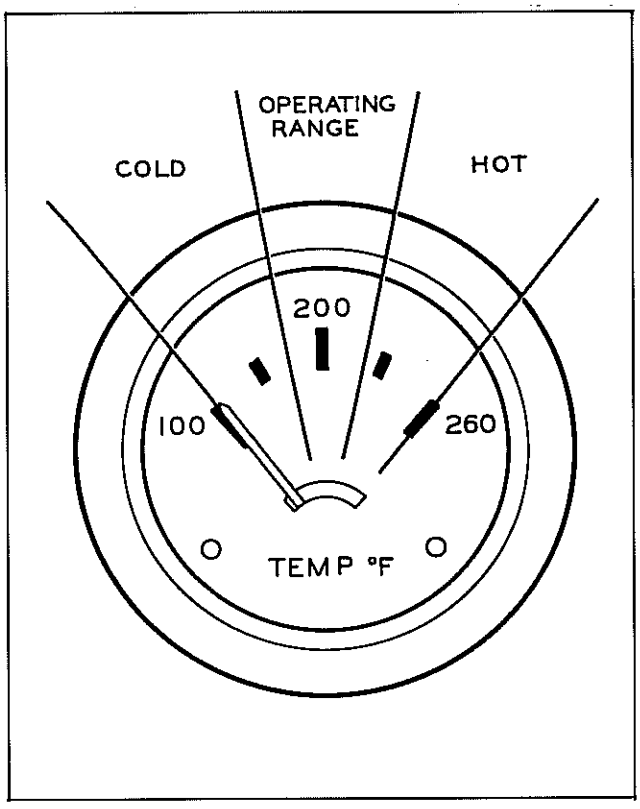


Plate 8288. Engine Coolant Temperature Indicator

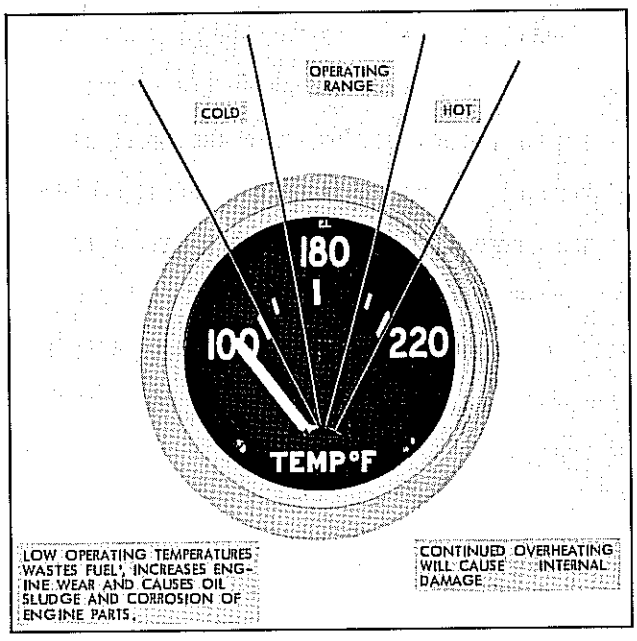


Plate 6287. Engine Coolant Temperature Indicator

Plate 7162. Hour Meter

The hour meter accurately records the actual hours of machine operation. This will serve as an aid in determining the time intervals for lubrication and preventive maintenance services.

N O T E

The coolant temperature should register in the operating range after the first few minutes of operation. Low operating temperatures wastes fuel and increases engine wear.

C A U T I O N

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.

N O T E

Select the indicator in your machine. Coolant temperatures should read as marked, except for diesel equipped machines.

DIESEL MACHINES: REFER TO DIESEL OPERATORS MANUAL FOR COOLANT TEMPERATURES.

O P E R A T I O N S

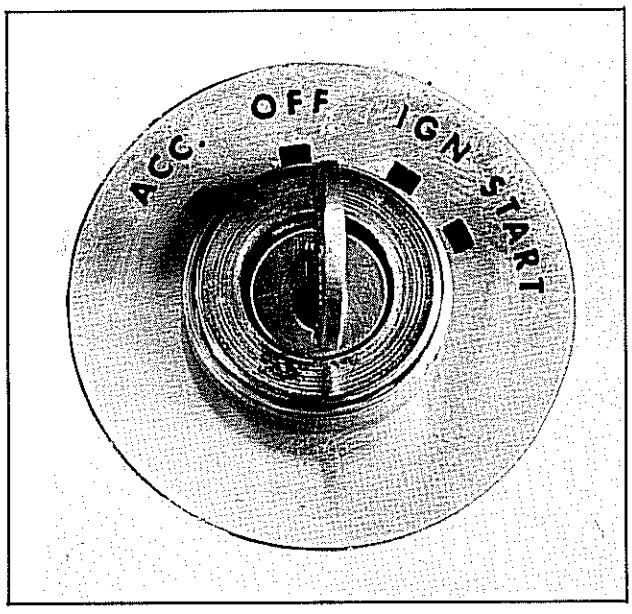


Fig. 005a. Ignition Switch

STARTING

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

C A U T I O N

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.

After engine has started, check instrument panel making certain the engine oil pressure light is not lit. If the light is lit, turn off engine and correct difficulty.

N O T E

Run engine a few minutes to warm oil before putting the machine to work, especially in cold operating conditions.

TO OPERATE MACHINE

1. Place transmission control lever in neutral position and start engine.

2. Depress service brake and move FORWARD or REVERSE lever into position.

3. Inching Operation: To inch the machine into a load, the brake pedal should be depressed in its free travel range and the accelerator pedal actuated as required. The initial brake pedal movement is used to regulate the inching control valve which allows a decrease in pressure on the transmission selector pack discs. This permits controlled slippage of the discs allowing the machine to inch ... after the brake pedal passes through free travel the brakes become applied and all pressure by-passes the selector discs.

C A U T I O N

TO PROLONG MACHINE LIFE IT IS BEST TO COME TO A COMPLETE STOP BEFORE SHIFTING TO THE OPPOSITE DIRECTION.

ALLOW FOOT TO REST ON BRAKE PEDAL ONLY WHEN INCHING IS DESIRED. DO NOT ALLOW FOOT TO REST ON BRAKE PEDAL WHILE DRIVING MACHINE FROM POINT TO POINT. RIDING THE BRAKE PEDAL WILL CAUSE CONTINUED SLIPPAGE OF THE TRANSMISSION SELECTOR PACKS RESULTING IN OVERHEATING AND UNNECESSARY WEAR OR DAMAGE TO TRANSMISSION COMPONENTS.

TO STOP MACHINE

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

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 (600 TO 800 RPM) FOR ONE OR TWO MINUTES AFTER LOAD IS REMOVED BEFORE BEING STOPPED. THIS ALLOWS INTERNAL ENGINE TEMPERATURES TO EQUALIZE.

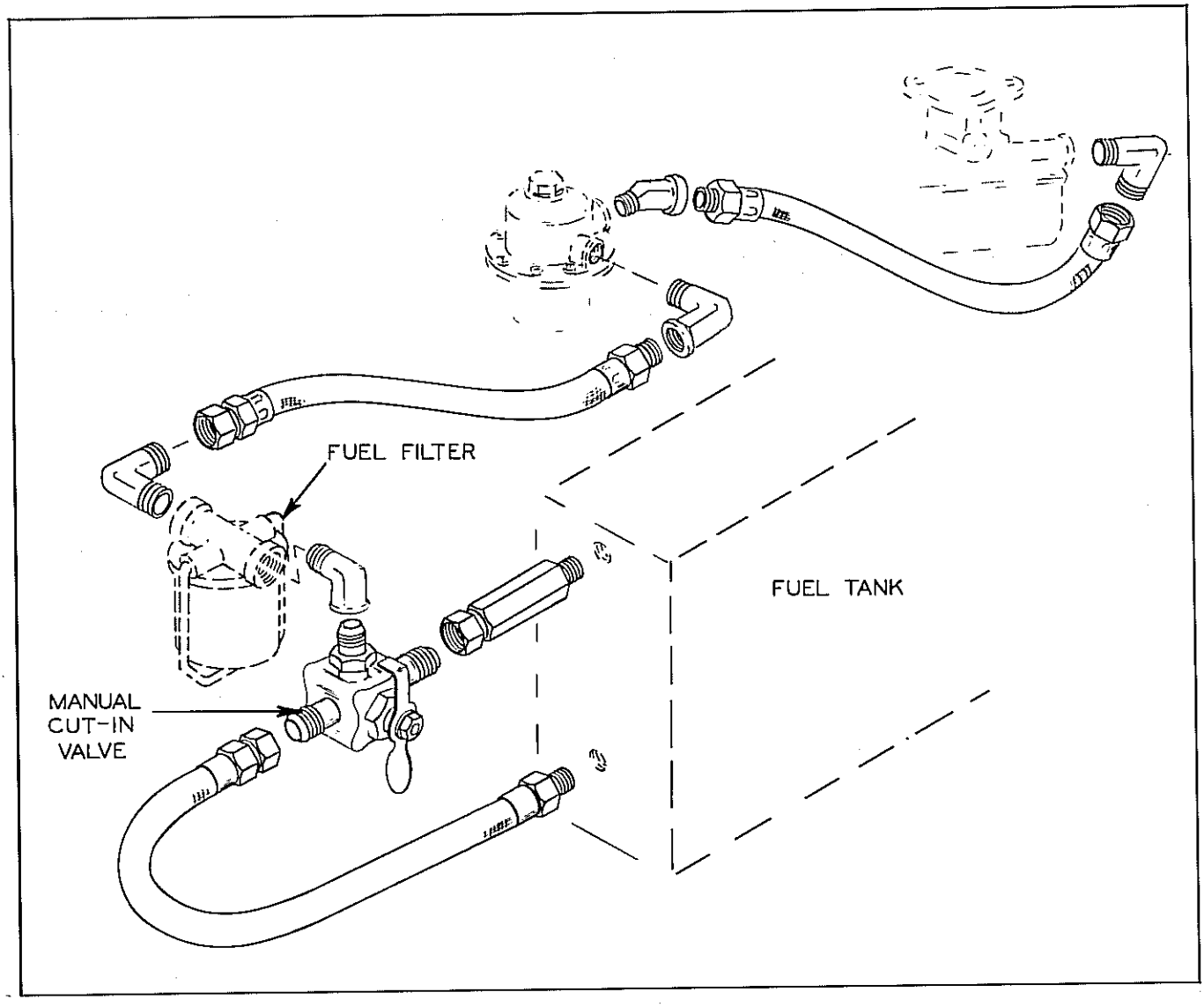


Figure 004a. Manual Cut-in Valve

The auxiliary fuel reserve manual cut-in valve located at the front of the fuel tank may be turned to the auxiliary position in the event that the main fuel tank supply becomes exhausted. The reserve fuel supply of approximately 1/2 gallon will in most cases be adequate to allow the machine to be driven to its refueling location. After the fuel supply has been replenished the manual cut-in lever should be turned to the normal position.

SERVICE RECORDER:

The service recorder records number of productive lifts in addition to busy and idle time of each truck. The records are made on a 6-inch diameter chart, revolving once. This model records the raising or lowering of a predetermined load. The limits generally are between 5% of the truck's capacity and a full load. Minimums may be established, and the chart will show only those lifts of the minimum weight or greater. Selective load records are made by using an adjustable pressure switch. This switch fits into the hydraulic system between the lift control and the cylinder. It is sensitive to system pressure changes but insensitive to surges or vibration. Switch setting can be adjusted externally and then sealed. The load recording stylus is always in contact with the chart. When the predetermined load or more is lifted, an electrical circuit is closed and this stylus is lifted up, making a record. A surge dampener is recommended particularly when lift trucks are in service where rough or uneven floors occur.

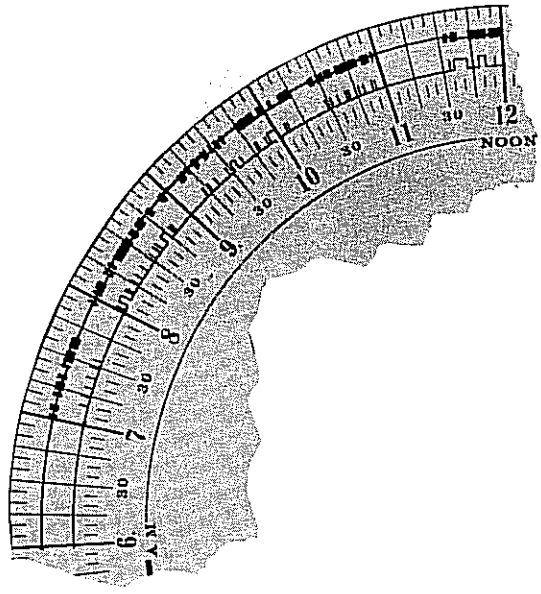


Plate 10161. Service Recorder Chart

HOW TO OPERATE SERVICE RECORDERS

Wind the Clock Movement: No key is needed. Turn the star-shaped winding disc clockwise until the movement is wound fairly tight. Do not over-wind. It is a good practice to wind the clock each time a chart is changed even if it is not run down.

Plate 10164

Place Chart in the Recorder: Snap up the two finger-like clamps. Slip the chart down over the now vertical clamps to the face of the winding disc.

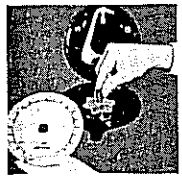


Plate 10165

To Set the Chart: Before clamping it down, turn the chart so that the place on it that corresponds to the present time of the day is at the little white spot on rim of Recorder case. If this is not done correctly, the recorder will be "that much off" all day.

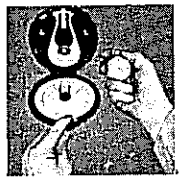


Plate 10166

Fasten the Chart in Place By snapping down the two clamping fingers. Now close and lock the Recorder and it is ready to operate for its full cycle, the length of time depending on the model and clock speed.

Plate 10167

HOW TO READ THE CHART:

This section of chart shows a typical record. The wide marks in the outer record band show when the truck was in motion. The fine line shows down time.

Inner record band shows lifts. Load recording stylus normally rests at lower or inner position. When activated by pressure switch, it is moved outward to record each lift.

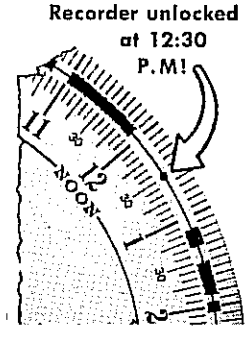


Plate 10162. Service Recorder Chart

When the key is turned to lock or unlock the Recorder, the stylus makes a round dot at the exact time of locking or unlocking. The mark appears on the face of the chart, and it is also embossed on the back. It is unmistakable.

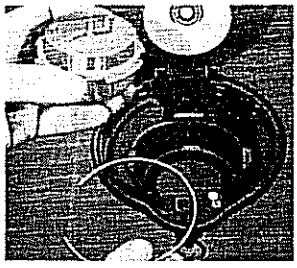


Plate 10163. Clock Exchange

HOW TO EXCHANGE CLOCK MOVEMENTS:

A clock movement is inherently a delicate mechanism that should receive reasonably good care. We have tried to make the clocks in Servis Recorders as rugged as possible to withstand the rough use they sometimes get. If the clock should fail, it can be easily lifted out and mailed in for repair or replacement. Merely unscrew the winding disc by turning it counter-clockwise and pry out wire retaining ring.

To replace the clock movement, first notice that one of the four retaining lugs in the Recorder case is wider than the rest. Match this wide space in movement top and settle movement into place. Then force wire retaining ring into place securely under lugs.

It is a good policy to have a spare clock movement in stock to insure uninterrupted service. Extra clocks are inexpensive.

To Move A Load.

The forks should be adjusted sidewise on the fork bars to obtain firm support and maximum balance of the load. Raise or lower the forks to the proper level and engage the load by driving forward. Tilt the upright backward sufficiently to adequately cradle the load, and raise load sufficiently to clear obstructions, accelerating engine slightly at the same time. Back away from stack.

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 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 into position. Disengage forks from the load by using necessary lift-tilt and then back away.

Loads will vary in size, shape, method of packaging, stacking procedures, etc. The best way to handle a load will depend on these factors. If in doubt, consult with your supervisor.

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. CHECK FOR NORMAL SEQUENCE OF OPERATION.

OPERATING SAFETY RULES AND PRACTICES.

1. Operators of powered industrial trucks should be physically qualified. An examination should be made on an annual basis and include such things as field of vision, hearing, depth perception and reaction timing.

2. Only trained and authorized operators should be permitted to operate a powered industrial truck. Methods should be devised to train operators in the safe operation of powered industrial trucks. It is recommended that badges or other visual indication of the operator's authorization should be displayed at all times during work period.

GENERAL.

1. Safeguard the pedestrians at all times. Do not drive a truck up to anyone standing in front of a bench or other fixed object.

2. Do not allow anyone to stand or pass under the elevated portion of any truck, whether loaded or empty.

3. Unauthorized personnel should not be permitted to ride on powered industrial trucks. A safe place to ride should be provided where riding of trucks is authorized.

4. Do not put arms or legs between the uprights of the mast or outside the running lines of the truck.

5. When leaving a powered industrial truck unattended, load engaging means should be fully lowered, controls should be neutralized, power shut off, brakes set, key or connector plug removed. Block wheels if truck is parked on an incline.

6. Maintain a safe distance from the edge of ramps or platforms and do not, while on any elevated dock or platform, push freight cars. Do not use trucks for opening or closing freight doors.

7. Have brakes set and wheel blocks in place to prevent movement of trucks, trailers, or railroad cars while loading or unloading. Fixed jacks may be necessary to support a semi-trailer during loading or unloading when the trailer is not coupled to a tractor. Check the flooring of trucks, trailers, and railroad cars for breaks and weakness before driving onto them.

8. Be sure of sufficient headroom under overhead installations, lights, pipes, sprinkler system, etc.

9. Use an Overhead Guard and Load Backrest Extension unless conditions prevent their use.

```
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                                                   x
x  AN OVERHEAD GUARD IS INTENDED TO OFFER           x
x                                                   x
x  PROTECTION FROM THE IMPACT OF SMALL              x
x                                                   x
x  PACKAGES, BOXES, BAGGED MATERIAL, ETC.,          x
x                                                   x
x  REPRESENTATIVE OF THE JOB APPLICATION,           x
x                                                   x
x  BUT NOT TO WITHSTAND THE IMPACT OF A             x
x                                                   x
x  FALLING CAPACITY LOAD.                           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
```

10. Use only approved industrial trucks in hazardous locations.

11. Elevate personnel only on an approved safety platform firmly secured to the lifting carriage and/or forks.

12. Report all accidents involving personnel, building structures, and equipment.

13. Fire aisles, access to stairways, and fire equipment should be kept clear.

TRAVELING.

1. Observe all traffic regulations including authorized plant speed limits. Under normal traffic conditions, keep to the right. Maintain a safe distance, approximately three truck lengths from the truck ahead, and keep the truck under control at all times. Use of truck on public roads should conform to local traffic regulations.

2. Yield the right of way to ambulances, fire trucks, or other vehicles in emergency situations.

3. Do not pass another truck traveling in the same direction at intersections, blind spots, or at other dangerous locations.

4. Slow down and sound horn at cross aisles and other locations where vision is obstructed. If the load being carried obstructs forward view travel with the load trailing.

5. Cross railroad tracks diagonally wherever possible. Do not park closer than 8 feet from center of railroad tracks.

6. Look in the direction of, and keep a clear view of the path of travel.

7. Ascend or descend grades slowly.

When ascending or descending grades in excess of 10%, loaded trucks should be driven with the load upgrade.

Unloaded trucks should be operated on all grades with the load engaging means downgrade.

On all grades the load and load engaging means should be tilted back if applicable, and raised only as far as necessary to clear the road surface.

8. Under all travel conditions the truck should be operated at a speed that will permit it to be brought to a stop in a safe manner.

9. Travel with load engaging means or load low and, where possible, tilted back. Do not elevate the load except during stacking.

10. Make starts, stops, turns or direction reversals in a smooth manner so as not to shift load and/or overturn the truck.

11. Stunt driving and horseplay should not be permitted.

12. Slow down for wet and slippery floors.

13. Before driving over a dockboard or bridgeplate, be sure that it is properly secured. Drive carefully and slowly across the dockboard or bridgeplate and never exceed its rated capacity.

14. Do not run vehicles onto any elevator unless specifically authorized to do so. Approach elevators slowly, and then enter squarely after the elevator car is properly leveled. Once on the elevator, neutralize the controls, shut off power, and set brakes. It is advisable that all personnel leave the elevator before a truck is allowed to enter or leave.

15. Avoid running over loose objects on the roadway surface.

LOADING.

1. Handle only stable or safely arranged loads. When handling off-center loads which cannot be centered, operate with caution.

2. Handle only loads within the rated capacity of the truck.

3. Adjust for long or high (including multiple tiered) loads which may affect capacity.

4. When attachments are used, particular care should be taken in securing, manipulating, positioning, and transporting the load. Operate trucks equipped with attachments as partially loaded trucks when not handling a load.

5. Place load engaging means under the load as far as possible and carefully tilt the mast backward to stabilize the load. Caution should be used in tilting backward with high or segmented loads.

6. Use extreme care when tilting load forward or backward particularly when high tiering. Do not tilt forward with load engaging means elevated except to pick up a load. Do not tilt an elevated load forward except when the load is in a deposit position over a rack or stack. When stacking or tiering use only enough backward tilt to stabilize the load.

OPERATOR CARE OF THE TRUCK.

1. Give special consideration to the proper functioning of tires, horn, lights, battery, controller, lift system (including load engaging means, chains, cable, and limit switches), brakes and steering mechanism. If at any time

OPERATOR CARE OF THE TRUCK (CONT.).

a powered industrial truck is found to be in need of repair, defective, or in any way unsafe, the matter should be reported immediately to the designated authority, and the truck should be taken out of service until it has been restored to safe operating condition.

2. Do not make repairs or adjustments unless specifically authorized to do so.

3. Do not fill fuel tanks while engine is running and avoid spillage.

4. Spilliage of oil or fuel should be carefully washed away or completely evaporated and fuel tank cap replaced before restarting engine.

5. Do not operate a truck with a leak in the fuel system until the leak has been corrected.

6. Do not use open flames for checking electrolyte level in storage batteries or gasoline level in fuel tanks.

NOTE

The preceding is reproduced from:

American National Standard ... Safety Standard for Powered Industrial Trucks. B56.1 - 1969

FUEL HANDLING AND STORAGE SAFETY

Liquefied Petroleum Gas Fuel (LPG Powered Trucks)

1. The storage and handling of liquefied petroleum gas (LP-Gas) should be in accordance with the Standard for Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58, USA Standard Z106.1-1965).

2. Trucks using LP-Gas should be refueled only at locations designated for that purpose. Safe outdoor locations are preferable to indoor. Trucks should be refueled as provided in the Standard for the Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58, USA Standard Z106.1-1965.)

3. Reasonable care should be exercised in handling of LP-Gas containers to avoid damage. Do not drop, throw, roll, or drag LP-Gas containers or any associated parts of the containers or fuel systems.

4. Do not over-fill LP-Gas containers.

5. Engine should be stopped and operator off the truck during refueling.

6. Trained and designated personnel should recharge or exchange LP-Gas containers.

7. Personnel engaged in recharging of LP-Gas containers should wear protective clothing such as face shield, long sleeves, and gauntlet gloves.

8. Never use a match or flame to check for leaks, use a soap solution.

9. LP-Gas powered trucks should not be refueled nor stored near underground entrances, elevator shafts nor any other place where LP-Gas could collect in a pocket causing a potentially dangerous condition.

10. Trucks equipped with permanently mounted LP-Gas containers should be refueled outdoors.

11. Exchange of removable LP-Gas containers preferably should be done outdoors, but may be done indoors. Means should be provided in the fuel system to minimize the escape of fuel when the containers are exchanged. This should be accomplished by either of the following methods:

A. Using an automatic quick closing coupling (a type closing in both directions when uncoupled) in the fuel line, or.....

B. Closing the valve at the LP-Gas container and allowing the engine to run until the fuel in the line is consumed.

12. When installing removable LP-Gas containers they should be so located on the truck that the safety pressure relief valve opening is always in contact with the vapor space (top) of the cylinder. This is accomplished by an indexing pin which, when the tank is properly installed, positions the container.

13. All reserve LP-Gas containers should be stored and transported with the service valve closed. Safety relief valves should have direct communication with the vapor space of the container at all times.

14. The careless handling of LP-Gas containers can result in a serious accident. Extreme care should be exercised when transporting containers so that they are not accidentally dropped or physically damaged. When it is necessary to move more than one container at one time, a proper carrying device should be provided.

15. Physical damage such as dents, scrapes, or gouges, may materially weaken the structure of the LP-Gas container and render it unsafe for use. All LP-Gas containers should be examined before recharging and again before reuse, for the following defects or damage:

A. Dents, scrapes, and gouges of the pressure vessel.

B. Damage to the various valves and liquid level gage.

C. Debris in the relief valve.

D. Indications of leakage at valves or threaded connections.

E. Deterioration damage or loss of flexible seals in the fill or servicing connections.

All defective or damaged LP-Gas containers should be removed from service.

16. Smoking should be prohibited in the refueling area.

17. Whenever vehicles using LP-Gas as a fuel are parked overnight or stored for protracted periods of time indoors, with the fuel container in place, the service valve on the fuel container should be closed.

When checking or adjusting L.P. Gas equipment be sure to:

1. Properly ventilate work area.

2. Eliminate ignition sources (sparks, pilot lights etc.).

3. Prohibit smoking.

4. Have fire fighting equipment present.

5. Check all equipment, lines, connections with soapy water. NEVER USE A MATCH OR FLAME WHEN CHECKING FOR LEAKS.

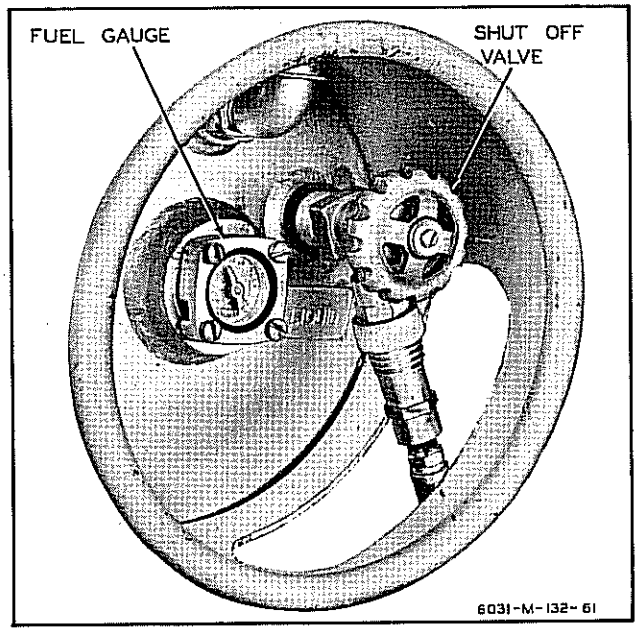


Plate 6031. Typical L.P. Gas Container

6. Check cylinder (container) for security of mounting.

7. Inspect hoses, grommets or whatever means is used to protect hoses from damage where they run through sheet metal etc. Replace any component that is unfit for further service.

8. Check all equipment for security of mounting.

9. Check the Solenoid Lock-Off Valve to be sure it is working. Upon turning off the ignition switch there should be an audible click indicating the valve has actuated shutting off the fuel flow at the valve. The valve should not open again until the ignition switch is turned on and the engine cranked. Cranking the engine provides oil pressure to the engine oil pressure sending unit which actuates completing an electrical circuit to the solenoid lock-off valve. The valve then opens allowing the L.P. Gas to pass through.

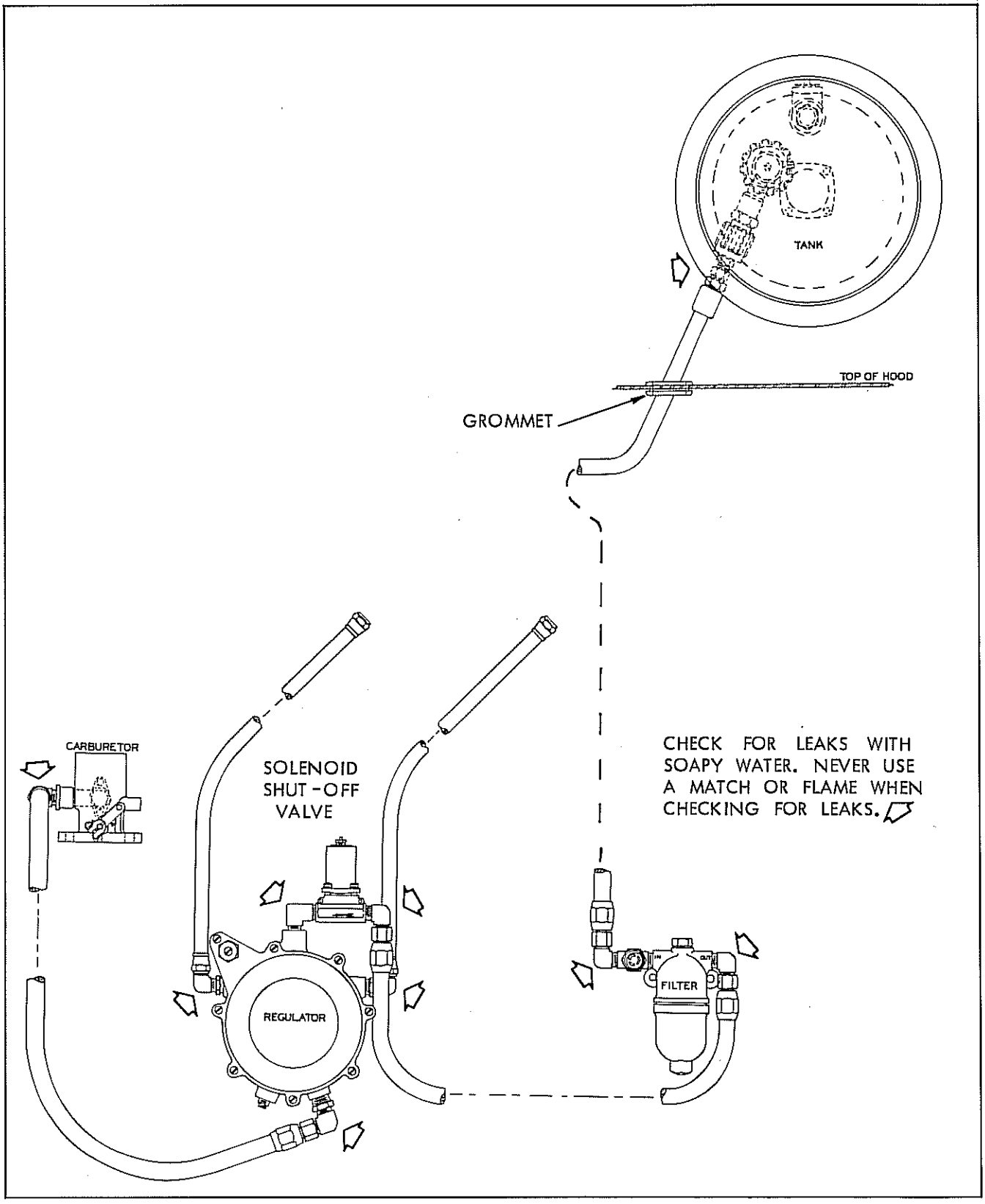


Plate 7405. Typical L.P. GAS Installation

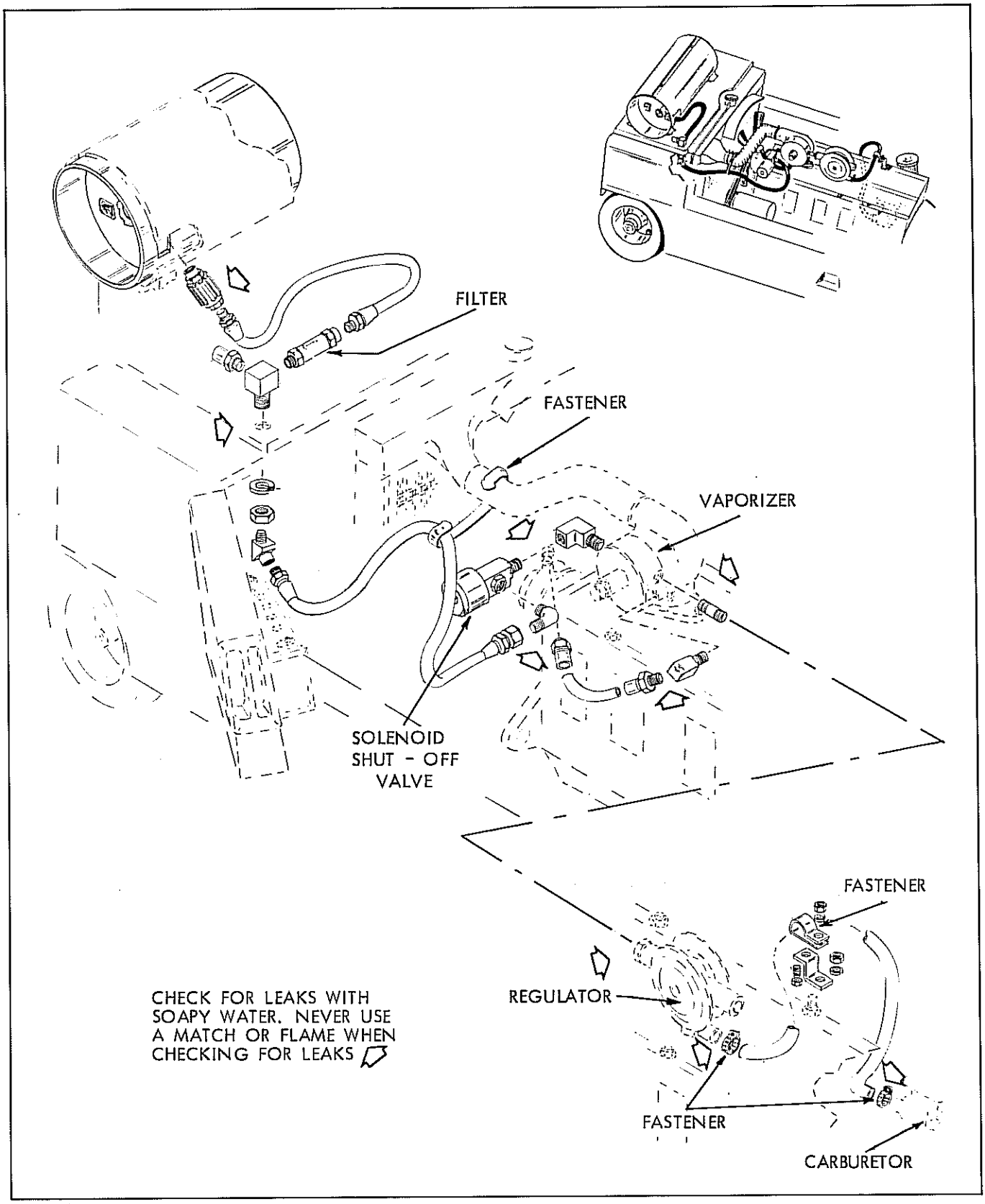


Plate 7406. Typical L.P. GAS Installation

FUEL HANDLING AND STORAGE SAFETY

(Gasoline Powered Trucks)

Liquid Fuels. (Such as Gasoline and Diesel Fuel).

1. The storage and handling of liquid fuels should be in accordance with the Flammable and Combustible Liquids Code. (NFPA No. 30).

2. Trucks using liquid fuels should be refueled only at locations designated for that purpose. Safe outdoor locations are preferable to those indoors. The Flammable and Combustible Liquids Code (NFPA No. 30), Paragraph 7211, outlines recommendations for arranging safe indoor fueling facilities.

3. Engines should be stopped and operator off the truck during refueling.

4. Liquid fuels not handled in approved dispensing pumps should be transported in safety cans. Safety cans should be inspected regularly for damage to closures and for leaks; faulty cans repaired or replaced. Care should be exercised in handling of safety cans to avoid damage.

5. Reasonable care should be exercised to prevent the spillage of fuel or overfilling either the vehicle fuel tanks or safety cans. Filler cap should be replaced and any spilled fuel disposed of by using a noncombustible adsorbent before the engine is restarted.

6. Smoking should be prohibited in the refueling area.

INDUSTRIAL TRUCK DIVISION

LUBRICATION AND PREVENTIVE MAINTENANCE INDEX

INDUSTRIAL TRUCK DIVISION

LUBRICATION AND PREVENTIVE MAINTENANCE INDEX

LUBRICATION & PREVENTIVE MAINTENANCE ILLUSTRATIONS

N O T E

WHEN PERFORMING THE 100, 500 OR 1000 HOUR LUBRICATION AND PREVENTIVE MAINTENANCE, ALWAYS INCLUDE THE PREVIOUS LUBRICATION AND PREVENTIVE MAINTENANCE SCHEDULES.

TO ELEVATE DRIVE WHEELS

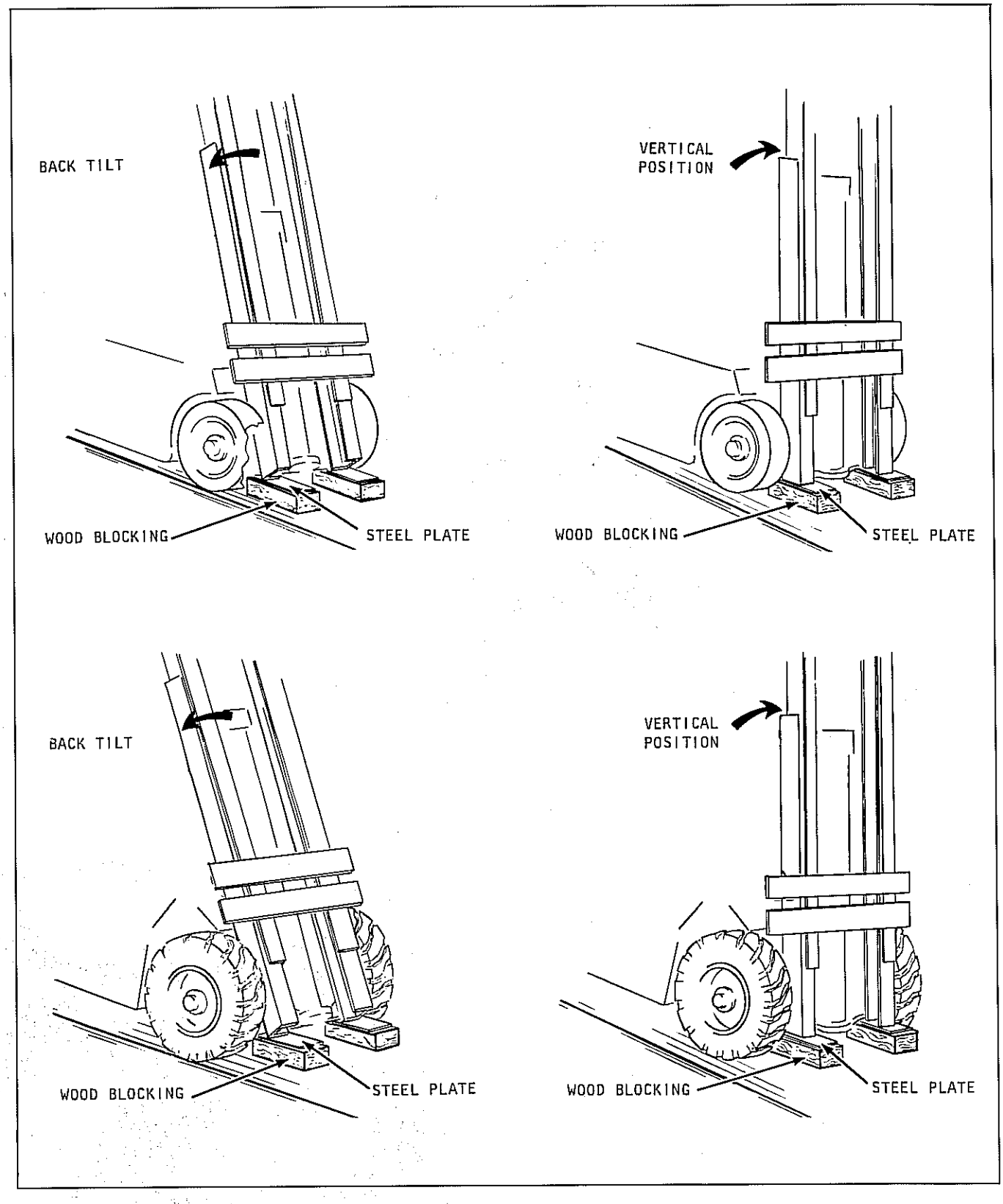


PLATE 10317. TO ELEVATE DRIVE WHEELS, PLACE UPRIGHT BLOCKING AS SHOWN ABOVE.

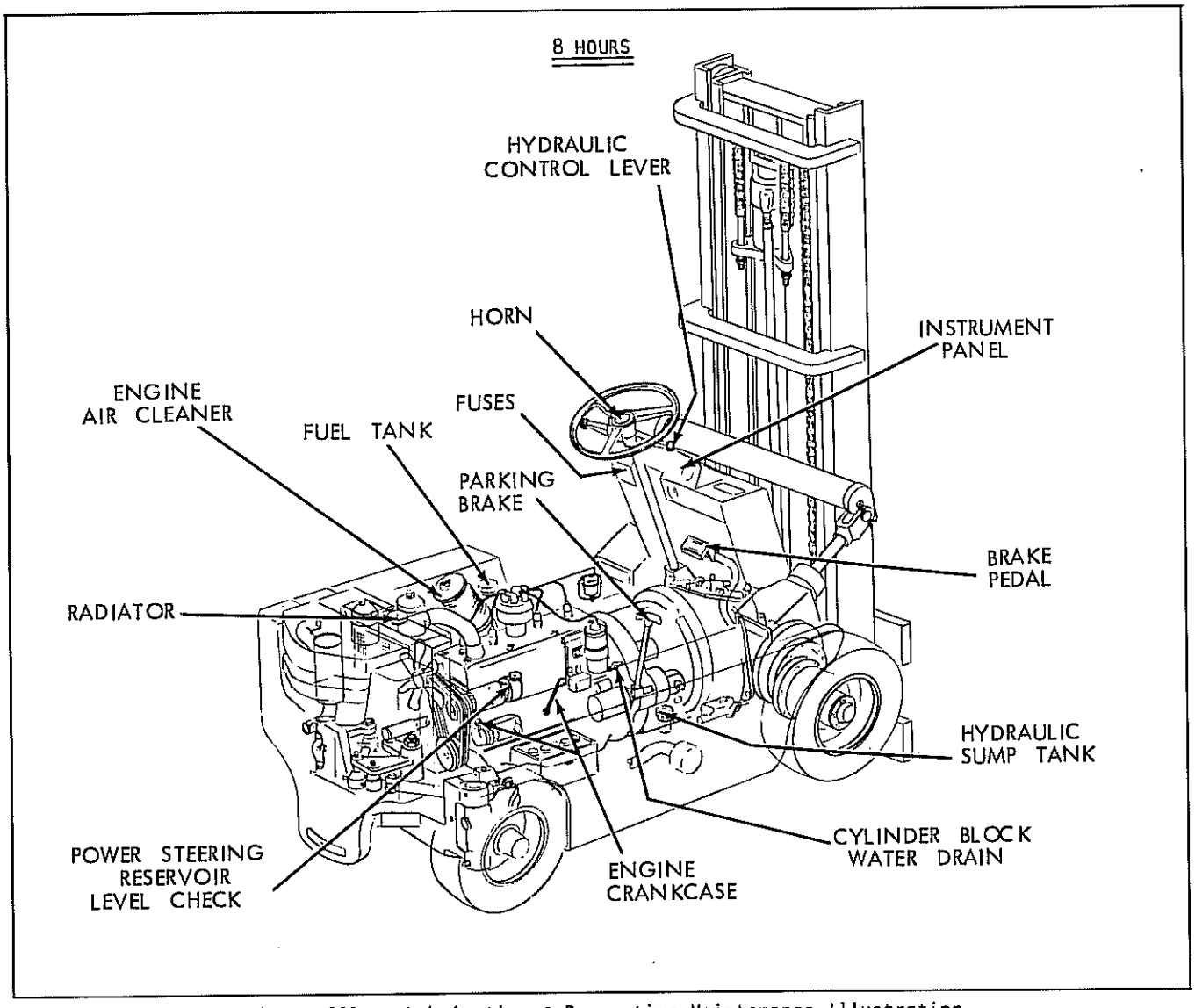


Figure 002a. Lubrication & Preventive Maintenance Illustration

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.

Before filling fuel tank, make certain the filler cap screen is in place and not damaged.

C A U T I O N

DO NOT REMOVE THE SCREEN WHILE FILLING TANK.

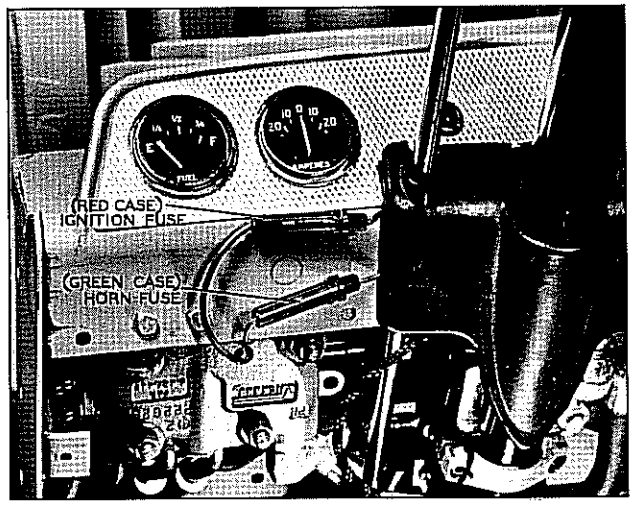


Figure 002b. Ignition Fuse and Horn Fuse

Engine Crankcase

Before attempting to start the engine...make sure the crankcase has sufficient oil.

N O T E

The oil filler pipe is located on the right side of the engine.

The oil level dipstick is also located on the right side of the engine.

Fill the crankcase reservoir through the filler pipe... check oil for proper level as indicated on the crankcase dipstick.

C A U T I O N

NEVER PERMIT OIL LEVEL TO FALL BELOW THE LOW LEVEL MARK ON THE CRANKCASE DIPSTICK.

Do not overfill the crankcase..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.

N O T E

On L.P. Gas machines...use a non-detergent oil during break-in periods.

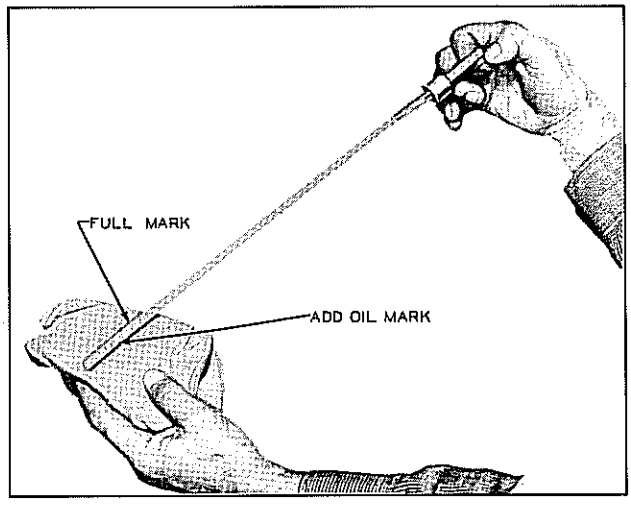


Plate 3145. Check Crankcase with Dipstick

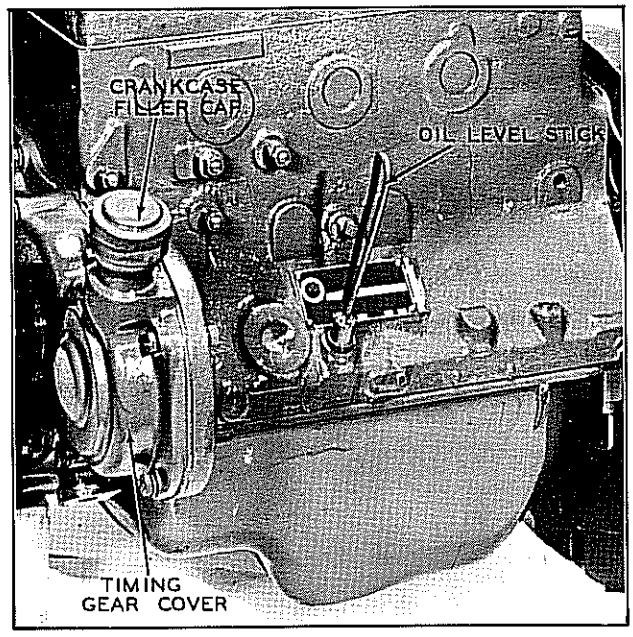


Plate 6629. Crankcase...location of Fill Cap and Oil Level Dipstick.

LUBRICATING OIL RECOMMENDATIONS

Crankcase Capacity..Refer to Specifications

SERVICE "MS"

S.A.E.	10W	0 deg to 32 deg F.
S.A.E.	20W	32 deg to 75 deg F.
S.A.E.	30	above 75 deg F.

Low Temperature Operation

Multi-viscosity oil should be used only where starting conditions make it necessary. The oil supplier should assume full responsibility for satisfactory performance of the multi-viscosity oil at both low and normal engine operating temperatures.

Service Conditions

Oil performance will reflect engine load, temperature, fuel quality, atmospheric dirt, moisture and maintenance. Where oil performance problems arise or are anticipated...the oil supplier should be consulted. When extended drain periods are contemplated, his analysis or that of a reputable laboratory should determine the suitability of oil for further service.

N O T E

Refer to Diesel engine manual for machines so equipped.

ENGINE COOLING

Make sure that the radiator drain cock and the water drain 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.

It is recommended that a soluble oil in the proportion of 1 ounce per gallon of water be added to the Cooling System.

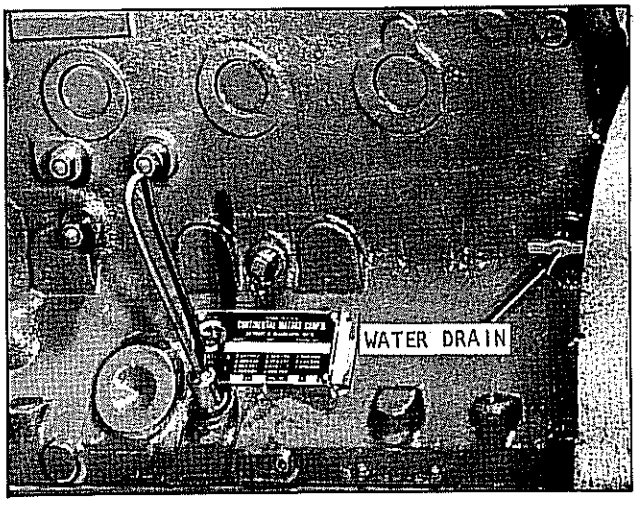


Plate 7008. Typical Cylinder Block Water Drain

C A U T I O N

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

N O T E

REFER TO DIESEL ENGINE MANUAL FOR MACHINES SO EQUIPPED.

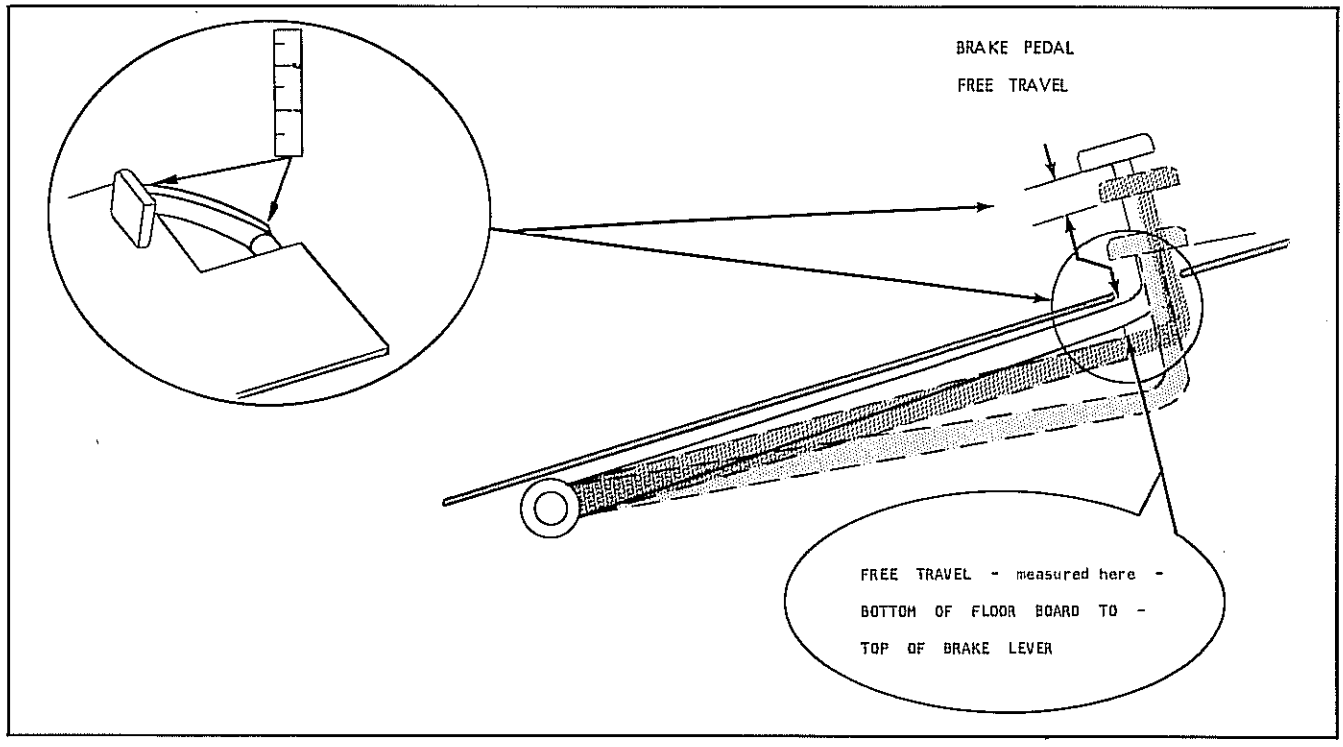


Plate 6630. Brake Pedal Free Travel

BRAKE PEDAL

1. Depress brake pedal and hold foot pressure for at least ten seconds. Pedal must be solid, must not be spongy or drift under foot pressure.

PARKING BRAKE

Fully apply the hand brake. Full application of hand brake should require 1 1/2 to 2 inches of travel. If the lever travel exceeds this amount the linkage should be adjusted.

Parking Brake Effectiveness - must be capable of holding the truck, with full rated load, on a 15% grade. This should be tested while occupying the driver's seat with the parking brake applied and truck out of gear.

If brake operation is not satisfactory, report to designated person in authority.

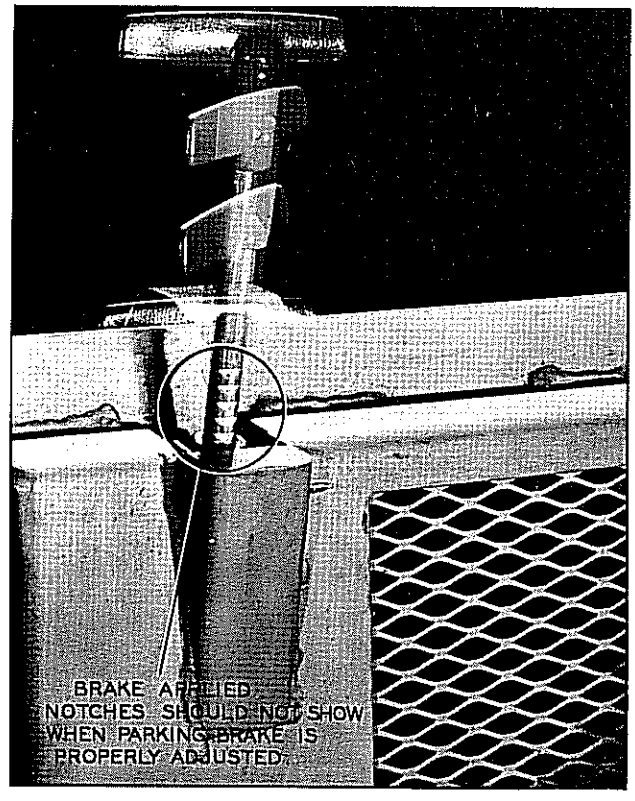


Plate 6625. Parking Brake

ENGINE AIR CLEANER (DRY TYPE)

Operating conditions determine the air cleaner service periods. The air cleaner should be checked every 8 operating hours and cleaned. This may be necessary more often under dusty operating conditions.

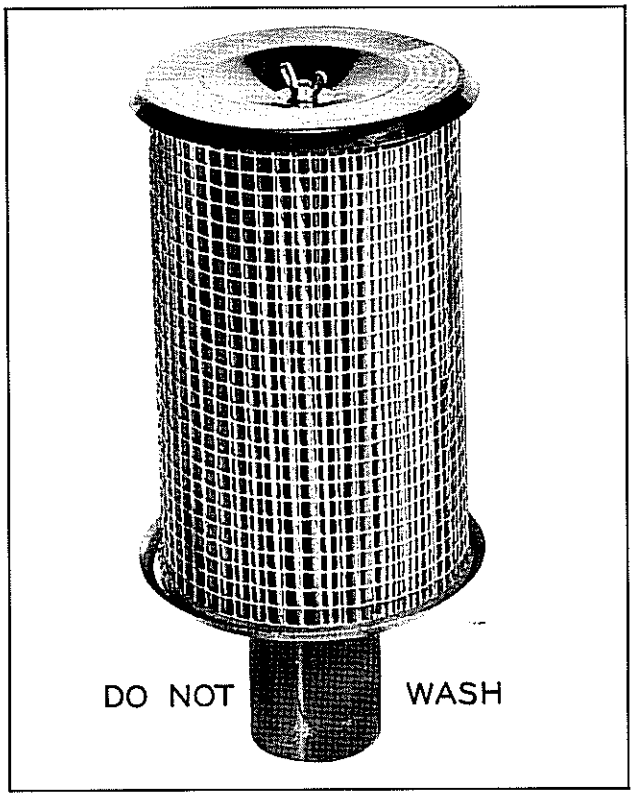


Plate 5697. Air Cleaner

Proper servicing means cleaning unit thoroughly and maintaining air-tight connections between the air cleaner and intake manifold so that all air entering the engine is filtered.

1. Remove air cleaner cartridge (2) and tap cartridge on a hard flat surface until all loose dirt is removed.

2. After cleaning by the above procedure, clean unit with filtered, moisture free, compressed air. Direct air stream from the inside, (thru cartridge) outward at the same time rotating cartridge by hand.

N O T E

IF FILTER CARTRIDGE CANNOT BE PROPERLY CLEANED, REPLACEMENT IS NECESSARY.

Check all hose connections to be sure they are tight thus preventing any air and dirt from entering at these points. Periodically remove hoses and check interior for any signs of dirt or dust. If found, this indicates that more frequent cleaning intervals are necessary as the hose interior should be free of all dirt and dust.

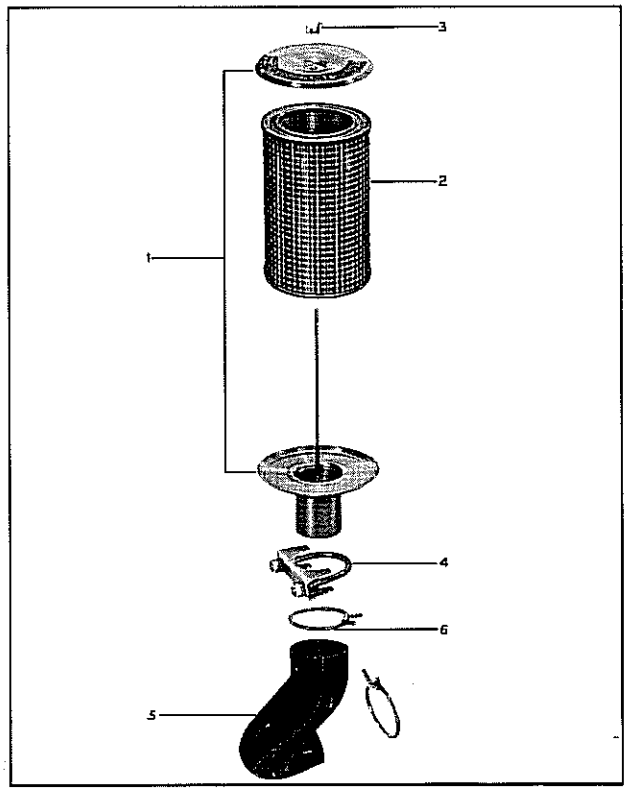


Plate 6980. Air Cleaner Components

N O T E

DEPENDING ON THE TYPE OF OPERATING THE MACHINE IS SUBJECTED TO WILL DETERMINE THE FREQUENCY OF AIR CLEANER MAINTENANCE. HAPHAZARD MAINTENANCE WILL LEAD TO SHORT ENGINE LIFE. AIR CLEANER MAINTENANCE MAY SEEM TRIVIAL, BUT IT CAN MEAN LONGER ENGINE LIFE, LESS ENGINE UPKEEP AND BETTER ECONOMY PROVIDED PROPER MAINTENANCE IS EXERCISED. CLOSE OBSERVANCE AND COMMON SENSE CAN BEST DETERMINE THE FREQUENCY OF AIR CLEANER MAINTENANCE.

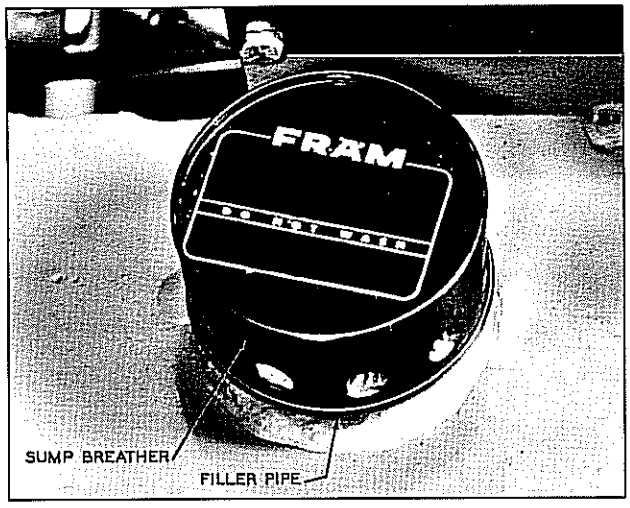


Plate 6626. Hydraulic Sump Tank and Sump Breather

HYDRAULIC SUMP TANK

Check hydraulic sump tank fluid level in the following manner:

1. Lower upright.

2. Turn switch key to off position.

3. Remove sump breather. Fluid level should be up to bottom of filler pipe.

If necessary, fill sump tank using MS 68 Hydraulic fluid. Move valve control levers with hydraulic pump operating to allow any air in the lines to escape, then recheck sump tank fluid level and fill as required before putting machine in operation.

HYDRAULIC CONTROL LEVERS

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.

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

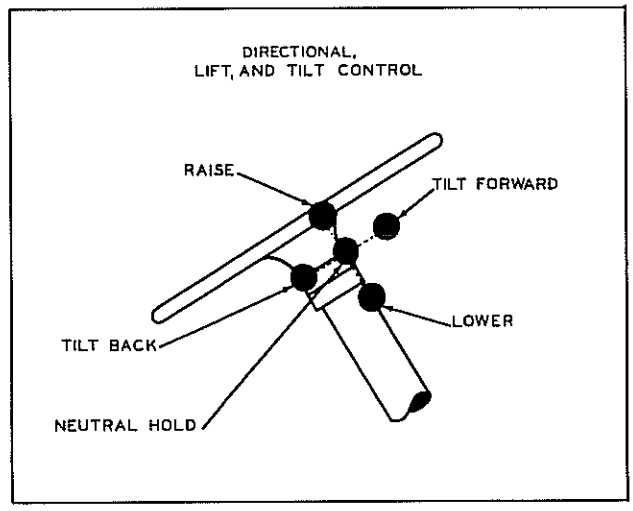


Plate 4448. Lift and Tilt Lever

When load is elevated and control lever returned to neutral position, load should remain in elevated position with no noticeable downward drift. If load drifts downward excessively, this may indicate lift cylinder U-Cup or seal damage -- report to designated person in authority.

With tilt lever in neutral position, upright should remain steady with no noticeable backward or forward drift. If upright drifts excessively either way, this may indicate tilt cylinder seal or U-Cup damage -- report to designated person in authority.

C A U T I O N

NEVER ALLOW LOADED OR UNLOADED LIFT CARRIAGE TO REMAIN IN AN ELEVATED POSITION FOR ANY PROLONGED PERIODS. LIFT CARRIAGE SHOULD BE LOWERED WHEN NOT IN USE.

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

W A R N I N G

OSHA REGULATION STATES THAT COMPRESSED AIR IN EXCESS OF 30 PSI CANNOT BE USED FOR CLEANING EQUIPMENT OR COMPONENTS.

ALSO WEAR PROTECTIVE CLOTHING AND GOGGLES WHEN CLEANING ANYTHING WITH COMPRESSED AIR.

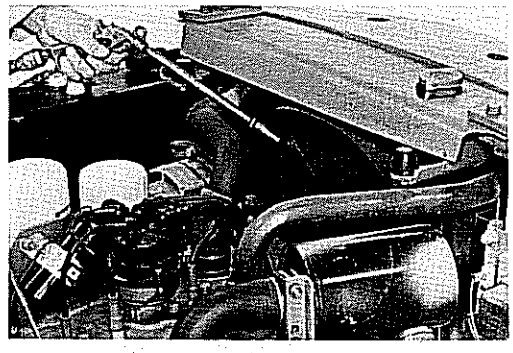


Fig. 13726

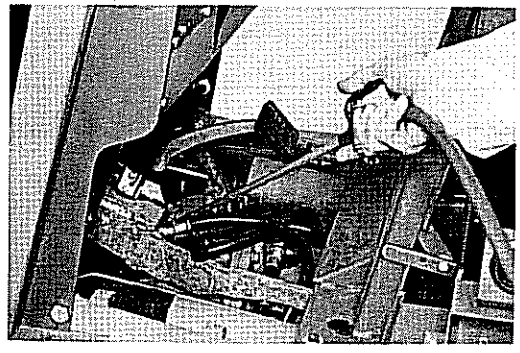


Fig. 16713

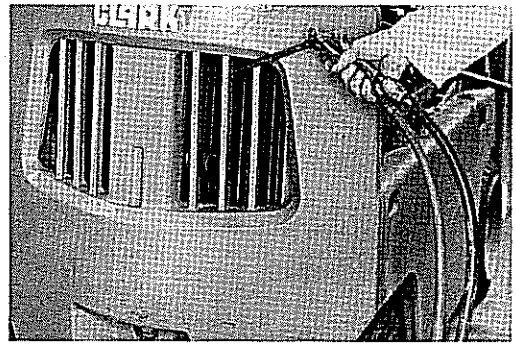


Fig. 13725

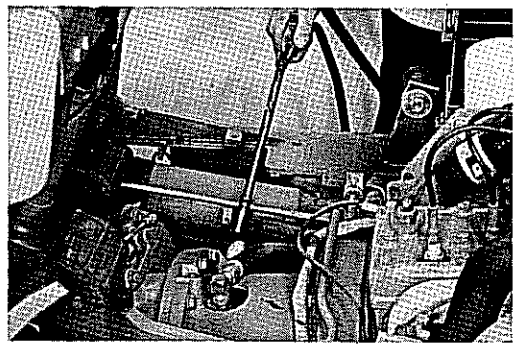


Fig. 13727

RIM AND WHEEL MAINTENANCE:

N O T E

"In order to maintain and insure maximum service, a continuous maintenance program is advisable... maintenance procedures should be carried out both during tire inspections and during tire changes."

```
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                                                   x
x  PULL DAMAGED RIMS OR WHEELS.  DEFLATE            x
x                                                   x
x  TIRES PRIOR TO THE REMOVAL OF RIMS OR            x
x                                                   x
x  WHEELS FROM THE VEHICLE.                         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
```

Check all metal surfaces thoroughly while making tire inspections...watch for...

1. Fatigue cracks in metal.
2. Bent flanges, resulting from road obstructions.
3. Deep rim tool marks.
4. Loose, missing or damaged nuts.
5. Bent or stripped studs.
6. Excessive rust or corrosion.

Mark damaged or hazardous areas with chalk so that part will be removed from service...replace damaged parts.

Insure that replacements are made with the proper sizes and types...refer to your machine serial number when ordering replacement parts. 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.

Check all metal surfaces, as listed above, and check for cracks. These are caused by deep rim tool marks, overloading and overinflating tires and using larger than recommended tire sizes.

Cracks in wheel between stud holes are caused by loose wheel nuts...improper installation procedures and use of incorrect sizes or types of attaching parts. Insufficient mounting torque can cause wheel shimmy, resulting in damage to parts and extreme tire tread wear. Excessive mounting torque can cause studs to break and disc to crack in the stud hole area.

Thoroughly clean wheels...remove rust, dirt and other foreign materials from all surfaces. Hand or electric wire brushes, and blasting or chemical baths may be used.

Bead seat areas of the rim should be free of rust and rubber deposits. This is especially important for drop-center tubless rims...because of the air-sealing element.

Paint rim by brush or spray with a fast-drying metal primer. Surfaces should be clean and dry prior to painting. Insure that bare metal areas on outside or tire side of rim are covered. This is especially important on drop-center tubless rims, because warm and somethimes moist air is in constant contact with the metal surface on the tire side of the rim.

Lubricate tire side of rim base just prior to mounting tire...avoid the use of any lubricant which contains water or solvent that is injurious to rubber...a combination lubricant and rust-preventive compound is preferable. This protective measure is of particular importance with drop-center tubless rims as the air in the tire is contained by the tire-side rim surface.

N O T E

Rim Distributors can supply the proper compound that serves as a lubricant and rust preventive.

TIRE 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 (on machine using split rims), 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

TIRE MAINTENANCE (CONTINUED):

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.

WARNING

IT IS NOT RECOMMENDED THAT TIRES WITH BREAKS BE USED AGAIN.

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

TIRE INFLATION:

Before inflating tires, make certain all wheel nuts are tightened to proper torque (see Specifications).

WARNING

IN ALL CASES, WHEN REMOVING TIRES WITH SPLIT RIMS FROM THE MACHINE FOR REPAIR OR PERIODIC ROTATION, COMPLETELY DEFLATE TIRES. THIS IS ACCOMPLISHED BY REMOVING THE VALVE CORE.

WARNING

IN ALL CASES, WHEN REMOVING TIRES EQUIPPED WITH THE LOCK RING TYPE RIM FROM THE MACHINE FOR REPAIR OR PERIODIC ROTATION, COMPLETELY DEFLATE TIRES. THIS IS ACCOMPLISHED BY REMOVING THE VALVE CORE.

WARNING

WHEN REPAIRING TIRES USED ON MACHINES THAT EMPLOY THE LOCK RING TYPE RIM, USE CAUTION WHEN INFLATING TIRE, PROCEED AS FOLLOWS:

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. If you have access to a steel cage...use it, (see next page)...otherwise turn rim and wheel over once again so that lock ring is on the bottom and inflate tire to proper pressure.

WARNING

IF LOCK RING IS NOT LOCATED PROPERLY, IT IS POSSIBLE FOR IT TO POP OFF RIM WITH GREAT FORCE WHEN TIRE IS INFLATED AND COULD RESULT IN SERIOUS INJURY TO ANYONE STRUCK BY IT.

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 exist, 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.

NOTE

Refer to WARNING on deflation of tires before removing wheels from machine.

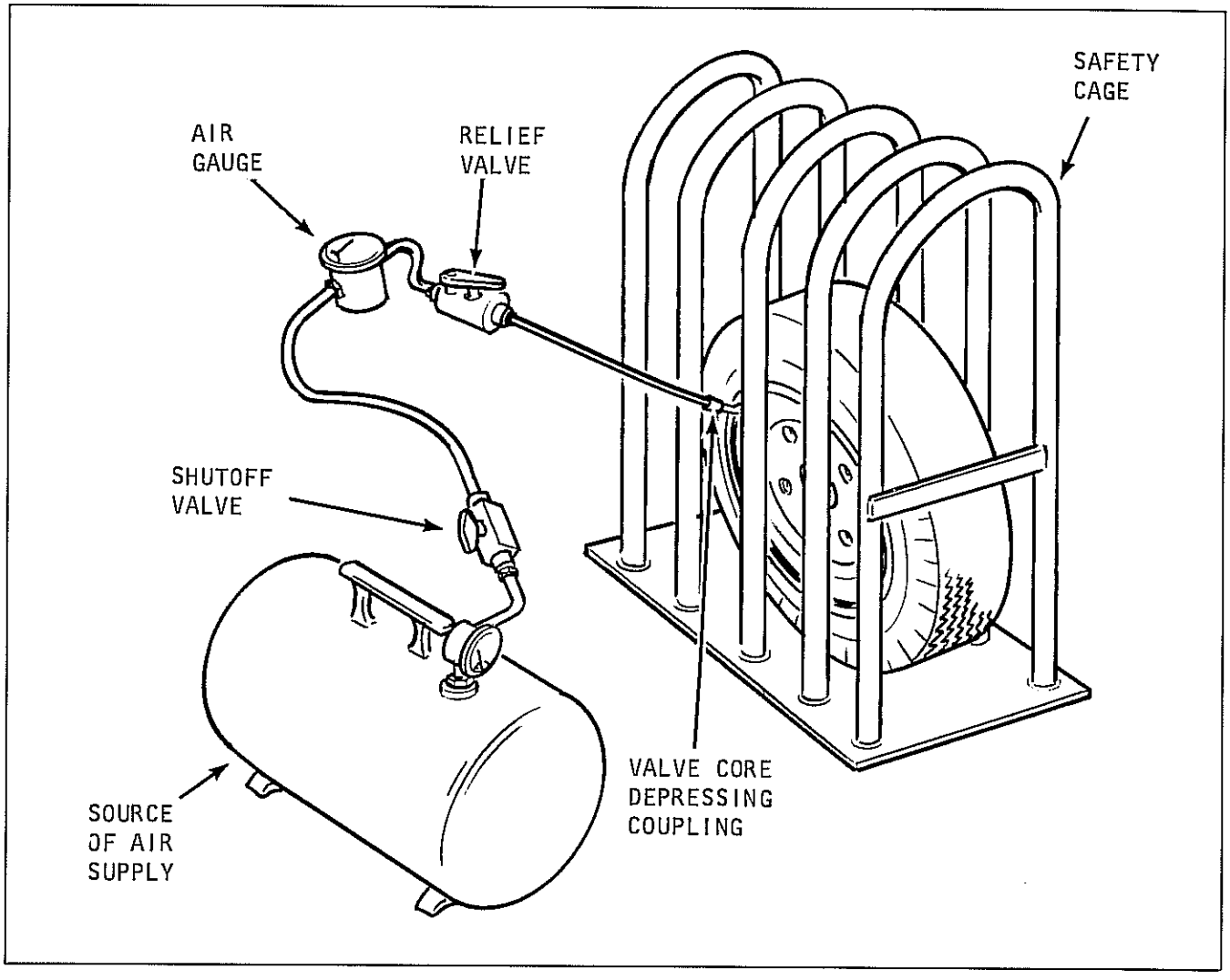


Plate 9702. Typical Tire Inflation Procedure

Torque wheel stud nuts or wheel bolts to the values listed in specifications. Excessive torque of wheel nuts can cause stud and rim damage.

Any replacement parts used should be of a quality equal to that provided in the original manufacture.

Inflation

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 C A U T I O N x
x x
x ALL FASTENERS SHOULD BE PROPERLY INSTALLED x
x x
x BEFORE INFLATING WHEEL/TIRE ASSEMBLY. 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

Tires with split wheels should be inflated in a safety cage or when properly installed on the vehicle. In either case, make sure all nuts and bolts are properly installed and torqued according to specifications.

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 C A U T I O N x
x x
x USE ONLY AN APPROVED SAFETY CAGE DESIGNED x
x x
x FOR THIS PURPOSE. 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

Tires used on lock-ring type wheels should be inflated in a safety cage (see previous caution) or use a clip-on type air chuck and stand aside (in-line with the tire tread) during inflation. Insure that rings are properly

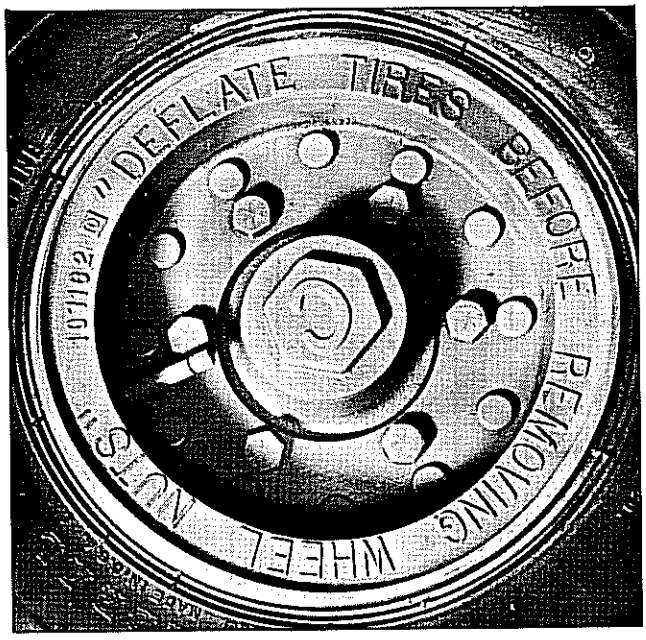


Plate 7613. Typical Split Wheel

seated prior to inflation. An inflated tire contains potentially explosive energy that can blow rings loose.

All wheel/tire assemblies should be inflated in a safety cage. The air hose should have a special set-up as shown in Plate 9702. The hose should have an adapter so that it can be securely fastened to the valve stem. Using this set-up you would:

1. Attach air hose to valve stem.

2. Open shut-off valve allowing compressed air to enter tube.

3. Shut off air supply occasionally to check pressure in tube at air gauge.

4. Inflate to proper capacity. If pressure exceeds proper inflation capacity, depress the relief valve to release excess air pressure.

5. This alternating procedure is followed until proper inflation is reached. See specifications.

I M P O R T A N T

MAINTAIN UNIFORM INFLATION IN BOTH TIRES OF A

DUAL ASSEMBLY SO THAT WEIGHT IS EQUALLY SUSTAINED.

NEVER RE-INFLATE A TIRE THAT HAS GONE FLAT WITH-

OUT FIRST INSPECTING IT AND THE WHEEL ASSEMBLY.

The tire inflation arrangement as shown in Plate 9702 can be made up from local suppliers.

Parts can be ordered from the following suppliers:

Relief Valve - Model 250V-1/4"

Humphrey Products
P.O. Box 2008
Kilgore at Sprinkle Rd.
Kalamazoo, Mich.

Shut-Off Valve - Imperial #77E(1/4 to 1/4 1 PT)

Kendall Industrial Supplies, Inc.
702 N. 20th St.
Battle Creek, Mich. 49016

Air Gauge - Marshaltown #23 (160 lb, 1/4 1 PT, 2 1/2" diameter gauge)

Kendall Industrial Supplies, Inc.
702 N. 20th St.
Battle Creek, Mich. 49016

Safety Cage

Meyers Tire Supplies
6400 Epworth Blvd.
Detroit, Mich.

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 below.

Directional Tread Dual Tires:

1. Inside dual tire arrow to point in the direction of foward 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 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.

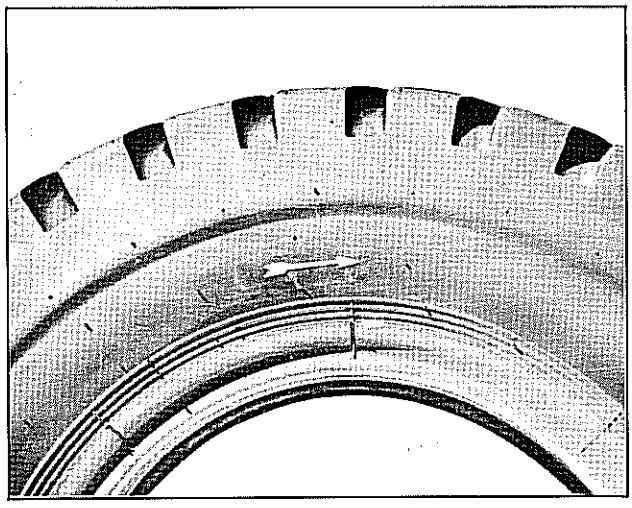


Plate 6422. Inside Dual Tire
(or Single Drive Tire)
(Arrow to point toward front of truck)

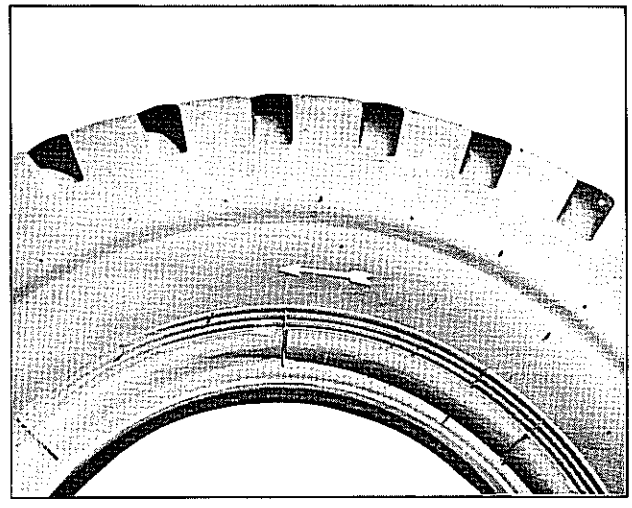


Plate 6423. Outside Dual Tire
(Arrow to point toward
rear of truck)

SOLID OR CUSHION TIRE AND RIM MAINTENANCE

1. Inspect tires regularly - remove all sharp objects picked up by treads before they have a chance to cut further into the rubber and cause chipping or possible separation of the rubber from the base metal.

2. Avoid overloading and do not allow vehicle to stand under heavy loads for prolonged periods as this will cause a "flat" spot on the tires.

3. Check steering axle alignment regularly to protect against fast, irregular tread wear and separation.

4. If rubber tires come in contact with oils, grease, and gasoline they should be wiped off without delay.

5. Regular lubrication of all wheel bearings will assure free-rolling and elimination of tire drag when stopping or starting.

INDUSTRIAL TRUCK DIVISION

SAFETY TIPS

RIMS AND WHEELS

1. NEVER ATTEMPT TO WELD ON AN INFLATED TIRE/RIM ASSEMBLY.

2. ALWAYS EXHAUST ALL AIR FROM A SINGLE TIRE AND FROM BOTH TIRES OF A DUAL ASSEMBLY PRIOR TO REMOVING ANY RIM COMPONENTS, OR ANY WHEEL COMPONENTS, SUCH AS NUTS AND RIM CLAMPS.

   MAKE SURE TO REMOVE THE VALVE CORE AND EXHAUST ALL AIR FROM THE TIRE.

   REMOVE THE VALVE CORES FROM BOTH TIRES OF A DUAL ASSEMBLY.

   CHECK THE VALVE STEM BY RUNNING A PIECE OF WIRE THROUGH THE STEM TO MAKE SURE IT IS NOT PLUGGED.

3. CHECK RIM COMPONENTS PERIODICALLY FOR FATIGUE CRACKS. REPLACE ALL CRACKED, BADLY WORN, DAMAGED AND SEVEREL RUSTED COMPONENTS.

4. CLEAN RIMS AND REPAINT TO STOP DETRIMENTAL EFFECTS OF CORROSION. BE VERY CAREFUL TO CLEAN ALL DIRT AND RUST FROM THE LOCK RING GUTTER.

   THIS IS IMPORTANT TO SECURE THE LOCK RING IN ITS PROPER POSITION.

   A FILTER ON THE AIR INFLATION EQUIPMENT TO REMOVE THE MOISTURE FROM THE AIR LINE PREVENTS A LOT OF CORROSION. THE FILTER SHOULD BE CHECKED PERIODICALLY TO SEE THAT IT IS WORKING PROPERLY.

5. MAKE SURE CORRECT PARTS ARE BEING ASSEMBLED. CHECK YOUR DISTRIBUTOR OR THE MANUFACTURER IF YOU HAVE ANY DOUBTS.

6. DOUBLE CHECK TO MAKE SURE ALL COMPONENTS ARE PROPERLY SEATED PRIOR TO INFLATION.

7. MIXING PARTS OF ONE MANUFACTURER'S RIMS WITH THOSE OF ANOTHER IS POTENTIALLY DANGEROUS. ALWAYS CHECK MANUFACTURER FOR APPROVAL.

8. DON'T OVERLOAD OR OVER-INFLATE RIMS. CHECK YOUR RIM MANUFACTURER IF SPECIAL OPERATING CONDITIONS ARE REQUIRED.

9. DON'T REINFLATE A TIRE THAT HAS BEEN RUN FLAT WITHOUT FIRST INSPECTING THE TIRE, RIM, AND WHEEL ASSEMBLY.

   DOUBLE CHECK THE LOCK RING FOR DAMAGE...MAKE SURE THAT IT IS SECURE IN THE GUTTER BEFORE INFLATION.

10. NEVER RUN A VEHICLE ON ONE TIRE OF A DUAL ASSEMBLY. THE CARRYING CAPACITY OF THE SINGLE TIRE AND RIM IS DANAGEROUSLY EXCEEDED, AND OPERATING A VEHICLE IN THIS MANNER CAN RESULT IN DAMAGE TO THE RIM.

11. DON'T BE CARELESS OR TAKE CHANCES. IF YOU ARE NOT SURE ABOUT THE PROPER MATING OF RIM AND WHEEL PARTS, CONSULT A WHEEL AND RIM EXPERT. THIS MAY BE THE TIRE MAN WHO IS SERVICING YOUR FLEET, THE RIM AND WHEEL DISTRIBUTOR IN YOUR AREA, OR THE CLARK DEALER.

12. DON'T USE UNDERSIZED RIMS. USE THE RIGHT RIMS FOR THE JOB.

13. DON'T SEAT RINGS BY HAMMERING WHILE THE TIRE IS INFLATED.

    DON'T HAMMER ON AN INFLATED OR PARTIALLY INFLATED TIRE/RIM ASSEMBLY.

14. DON'T LET ANYONE MOUNT OR DEMOUNT TIRES WITHOUT PROPER TRAINING.

15. NEVER SIT ON OR STAND IN FRONT OF A TIRE AND RIM ASSEMBLY THAT IS BEING INFLATED. USE A CLIP-ON CHUCK AND MAKE SURE INFLATION HOSE IS LONG ENOUGH TO PERMIT THE PERSON INFLATING THE TIRE TO STAND TO THE SIDE OF THE TIRE, NOT IN FRONT OR IN BACK OF THE TIRE ASSEMBLY.

16. DO NOT, UNDER ANY CIRCUMSTANCES, ATTEMPT TO REWORK, WELD HEAT, OR BRAZE ANY RIM COMPONENTS THAT ARE CRACKED, BROKEN OR DAMAGED. REPLACE WITH NEW PARTS OR PARTS THAT ARE NOT CRACKED, BROKEN, OR DAMAGED, WHICH ARE OF THE SAME SIZE, TYPE AND MAKE.

17. INFLATE IN A SAFETY CAGE OR USE SAFETY CHAINS DURING INFLATION.

18. REGARDLESS OF HOW HARD OR FIRM THE GROUND APPEARS, PUT HARDWOOD BLOCKS UNDER THE JACK.

19. BLOCK THE TIRE AND WHEEL ON THE OTHER SIDE OF THE VEHICLE, BEFORE YOU PLACE THE JACK IN POSITION...ALWAYS CRIB UP WITH BLOCKS JUST IN CASE THE JACK MAY SLIP.

20. REMOVE THE BEAD SEAT BAND SLOWLY TO PREVENT IT FROM DROPPING OFF AND CRUSHING YOUR TOES. SUPPORT THE BAND ON YOUR THIGH AND ROLL IT SLOWLY TO THE GROUND THIS WILL PROTECT YOUR BACK AND TOES.

21. BEAD BREAKERS AND RAMS APPLY PRESSURE TO BEAD FLANGES. KEEP YOUR FINGERS CLEAR. SLANT BEAD BREAKER ABOUT 10 DEGREES TO KEEP IT FIRMLY IN PLACE. IF... ...IT SLIPS OFF, IT CAN FLY WITH ENOUGH FORCE TO KILL. ALWAYS STAND TO ONE SIDE WHEN YOU APPLY HYDRAULIC PRESSURE.

21. WHEN USING A CABLE OR CHAIN SLING, STAND CLEAR...IT MIGHT SNAP AND LASH OUT.

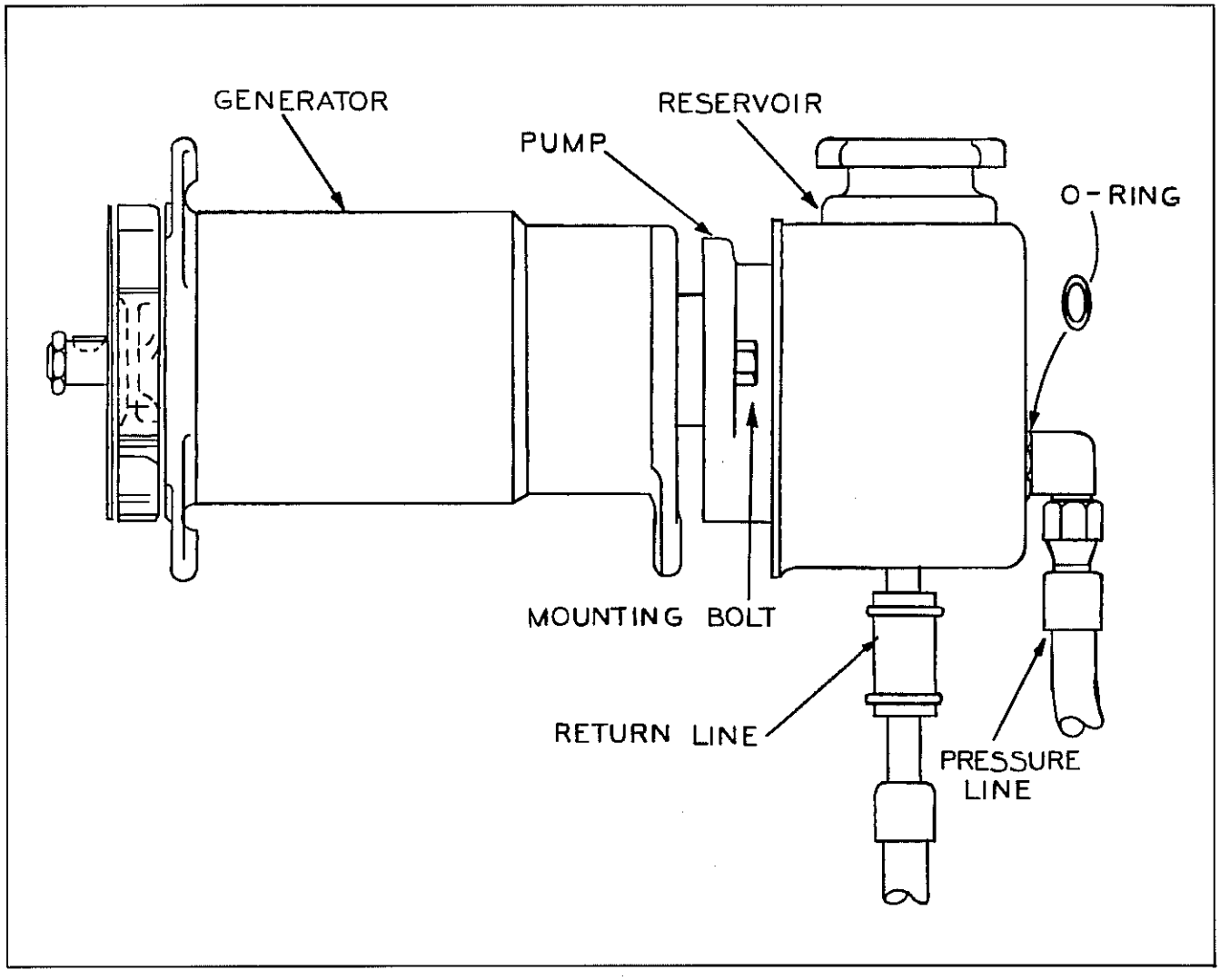


Plate 5940. Typical Power Steering Pump (Machines so Equipped)

Power Steering Pump

Check reservoir fluid level each 8 operating hours. Fill with Type "A" Automatic Transmission Fluid, Clark part number 879803, or DEXRON Automatic Transmission Fluid.

When fluid in reservoir becomes contaminated...it must be drained by removing the return line hose at the bottom of the reservoir. After draining...refill to the proper level with specified fluid. Operate engine for a few minutes and recheck fluid level...fill as required.

N O T E

Later model vehicles are equipped with a steering system which is supplied with fluid from the transmission sump (on hydratork models) or from the hydracool clutch reservoir...refer to page 100H657...if your machine is equipped with a hydracool clutch.

C A U T I O N

DO NOT OPERATE ENGINE WHILE THE RESERVOIR IS EMPTY.....WITH RESERVOIR DRY...PUMP DOES NOT RECEIVE LUBRICATION AND WILL BE SERIOUSLY DAMAGED IF OPERATED EVEN FOR A SECOND UNDER THIS CONDITION.

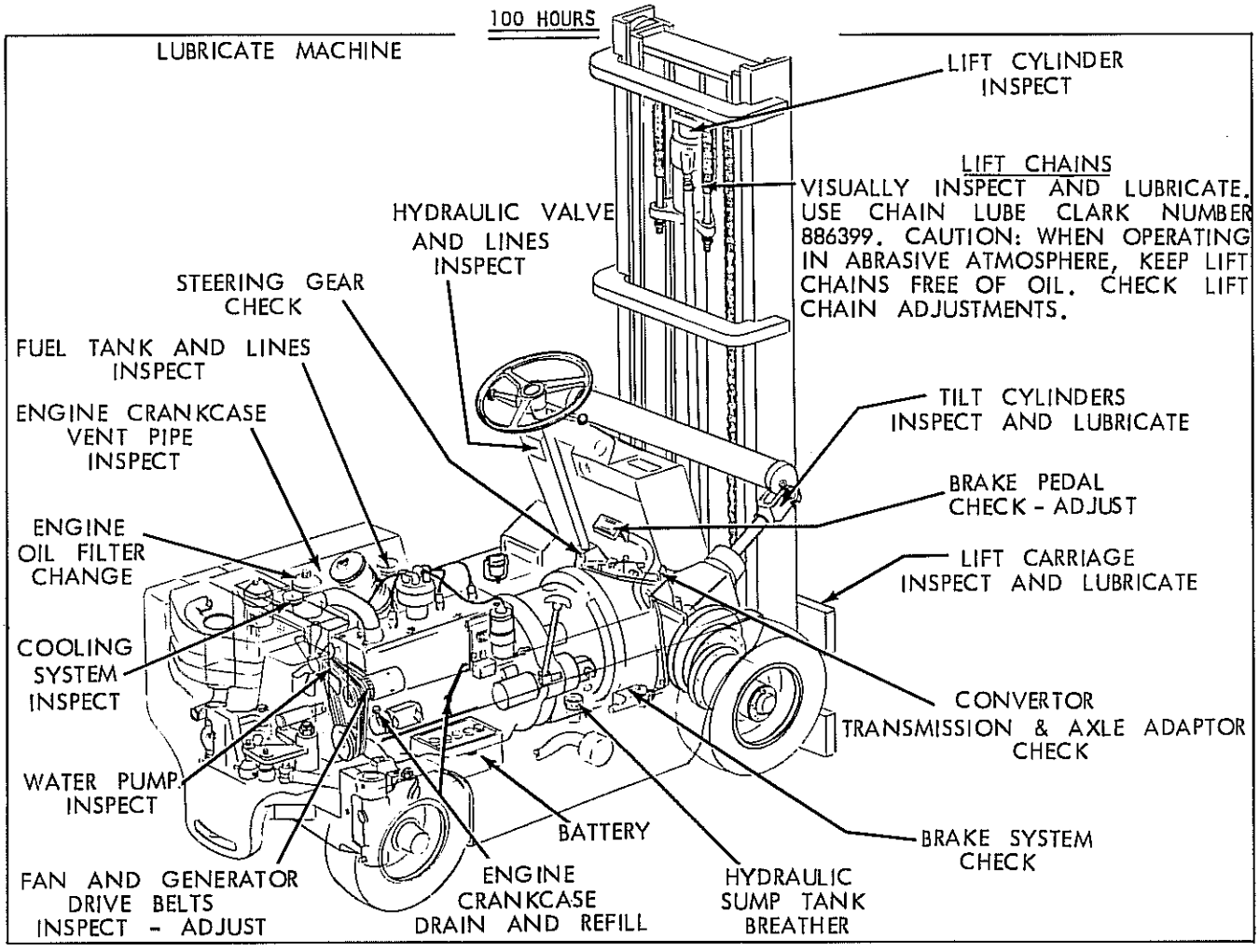


Figure 002a. Lubrication & Preventive Maintenance Illustration

CONVERTER, TRANSMISSION, AND AXLE ADAPTOR HOUSING. Verify fluid level, fill if necessary with Automatic Transmission Fluid Type "A" (Armour Qualified). A combination filler neck and fluid level stick is located in the Transmission Axle Adaptor Housing for filling or checking fluid level.

With directional selector in "NEUTRAL" position, start engine and operate approximately four minutes. Stop engine and check fluid level. Fill if necessary to "FULL" mark on fluid level stick.

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.

C A U T I O N

THE FUEL TANK IS AN INTEGRAL PART OF THE MACHINE FRAME AND ANY WELDING IN THIS AREA SHALL NOT BE ATTEMPTED BEFORE FIRST TAKING ADEQUATE SAFETY PRECAUTIONS. REPORT TO DESIGNATED PERSON IN AUTHORITY.

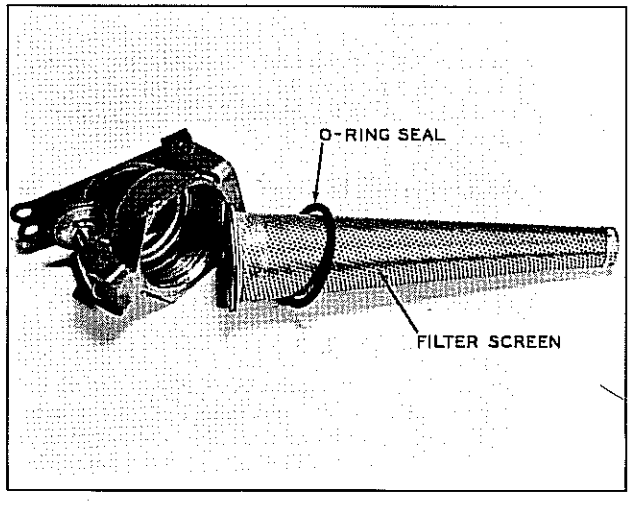


Figure 002b. Fuel Tank Filler Cap and Screen

ENGINE CRANKCASE

1. Every 100 operating hours; drain the engine crankcase at operating temperature and clean the magnetic drain plug.

2. Change the engine oil filter element. The filter is of the replaceable type. The element should be changed whenever the crankcase is drained. To remove the element, remove oil filter cover screw and gasket, oil filter cover, cover spring and cover gasket. Lift out oil filter element. Install new element after draining and thoroughly cleaning filter case. Install new element after draining and thoroughly cleaning filter case. Install new gaskets and replace cover spring, oil filter cover and secure with oil filter cover screw.

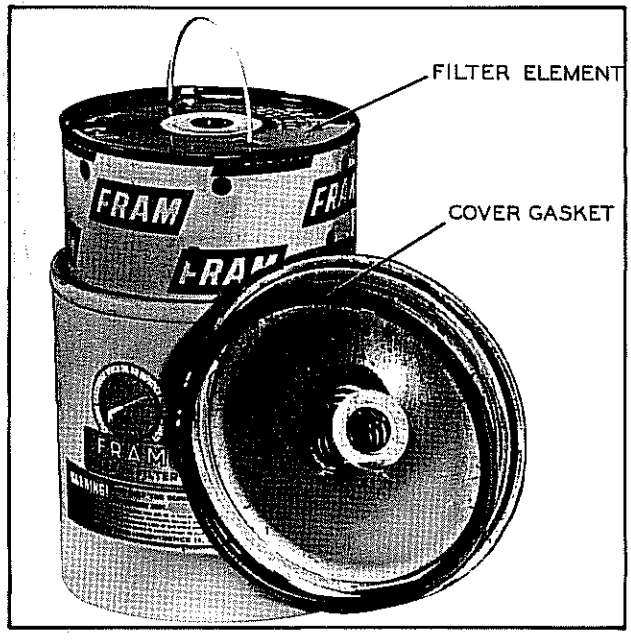


Plate 6642. Engine Oil Filter

3. Refill crankcase using recommended oil listed below. See specifications for capacity.

SAE 10W---0 deg to 32 deg F
SAE 20W---33 deg to 75 deg F
SAE 30----above 75 deg F

Low Temperature Operation

Multi-viscosity oil should be used only where cold starting conditions make it necessary. The oil supplier should assume full responsibility for satisfactory performance of the multi-viscosity oil at both low and normal engine operating temperatures.

4. Start engine and check oil filter for leaks at cover. Run engine at idle a few minutes, then shut down engine. Allow time for engine oil to return to crankcase (approx. 5 min.) and then check oil level with the dipstick. Add oil as necessary to bring oil level to full mark on the dipstick.

Service Conditions

Oil performance will reflect engine load, temperature, fuel quality, atmospheric dirt, moisture and maintenance. Where oil performance problems arise or are anticipated, the oil supplier should be consulted. When extended drain periods are contemplated, his analysis or that of a reputable laboratory should determine the suitability of oil for further service.

Engine Crankcase Ventilation Pipe

Check crankcase ventilation pipe for damage or obstructions. The pipe must be open to provide proper ventilation. Clean, repair or replace as required.

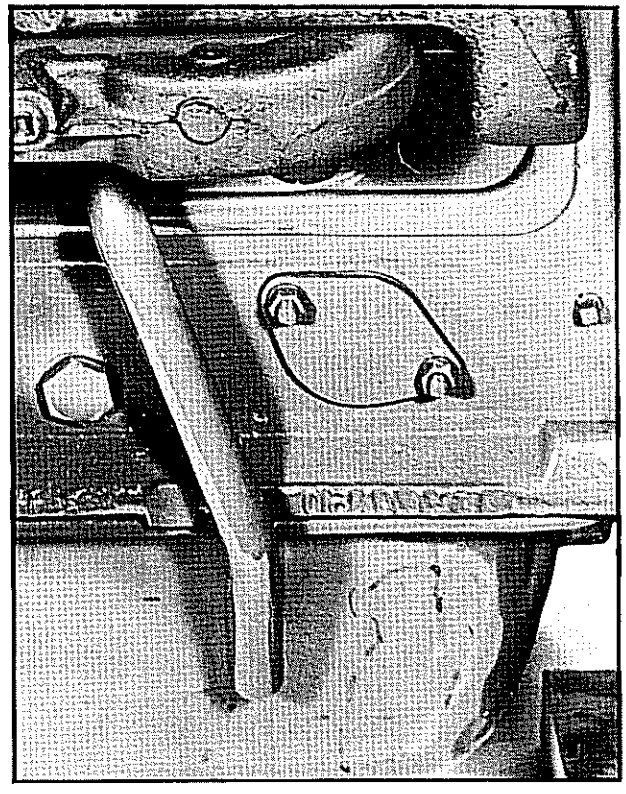


Plate 6628. Crankcase Vent Pipe

N O T E

Refer to Diesel Engine Manual for Machines So Equipped.

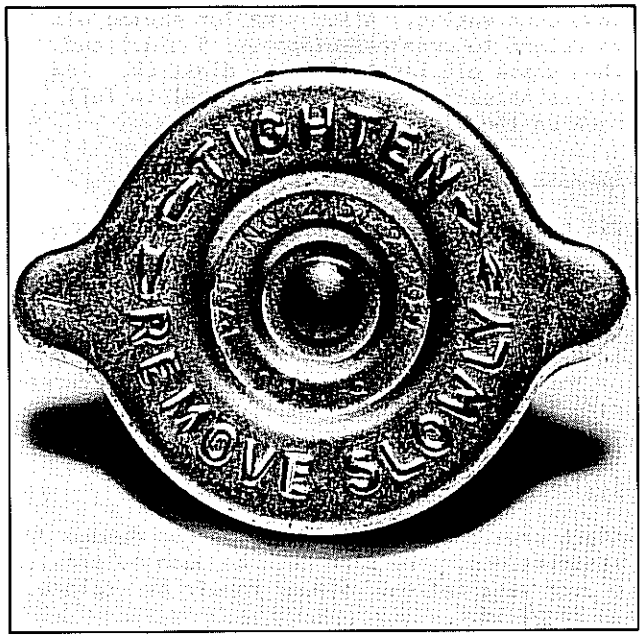


Plate 6458. Radiator Pressure Cap

W A R N I N G

USE EXTREME CARE IN REMOVING THE RADIATOR PRESSURE CAP. IN PRESSURE SYSTEMS, THE SUDDEN RELEASE OF PRESSURE CAN CAUSE A STEAM FLASH AND THE FLASH, OR THE LOOSENED CAP CAN CAUSE SERIOUS PERSONAL INJURY. LOOSEN CAP SLOWLY AND ALLOW STEAM TO ESCAPE. THIS MACHINE IS EQUIPPED WITH A 7 LB PRESSURE CAP.

COOLING SYSTEM

Check radiator, hoses and water pump 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 system 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.

N O T E

COOLING SYSTEM CAPACITY - REFER TO SPECIFICATIONS.

Accumulated foreign material should be blown from radiator fins with compressed air. Direct air stream through radiator fins towards engine to make this process effective.

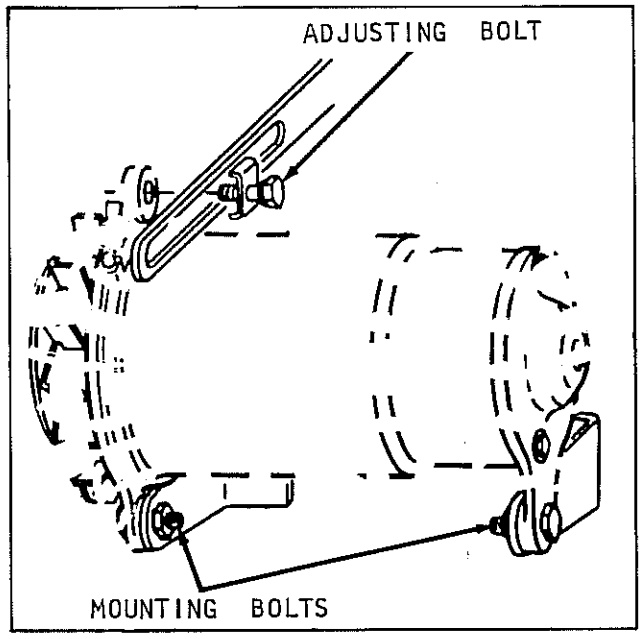


Plate 6631. Generator Drive Belt Adjustment

FAN AND GENERATOR DRIVE BELTS

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 generator brace adjusting bolt and two lower mounting bolts, see Plate 6631.

2. Move generator toward cylinder block to loosen Generator Drive Belts and away from cylinder block to tighten belts. 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. CONVERSELY, BELTS ADJUSTED TOO LOOSE WILL RESULT IN BELT WEAR AND HIGH ENGINE TEMPERATURE DUE TO BELT SLIPPAGE.

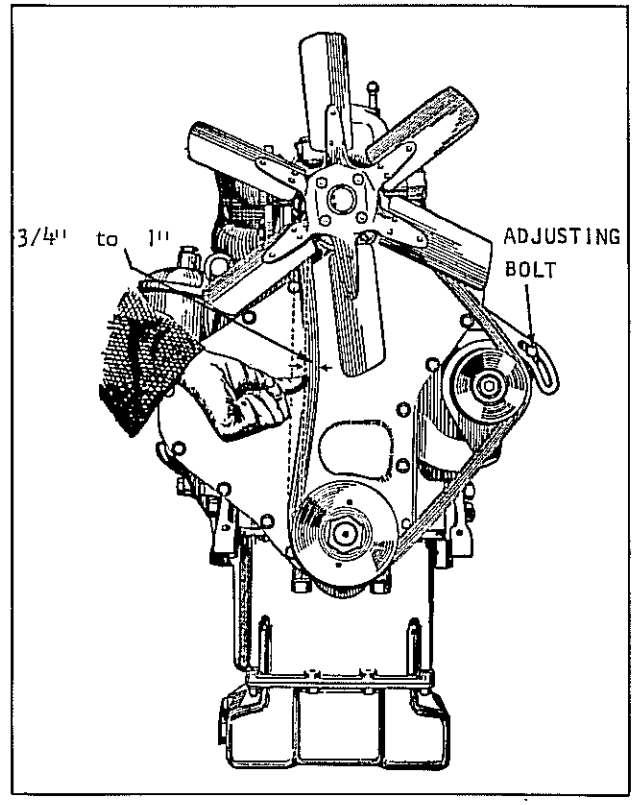


Plate 6632. Belt Deflection Check

N O T E

UPON REPLACEMENT OF DRIVE BELTS, IT WILL BE NECESSARY TO USE A MATCHED SET OF BELTS.

BRAKE PEDAL FREE TRAVEL

Using a rule, measure pedal free travel at either of the two places shown below.

Depress brake pedal by hand. When pedal meets resistance from the master cylinder, the distance traveled should be as specified — if free travel is incorrect, adjust as follows:

1. Loosen lock nut, see Figure 303a.

2. Rotate adjuster to obtain specified pedal free travel.

3. Tighten lock nut to hold adjustment.

ACTUATION STROKE

The Automatic Brake Adjustors will maintain pedal stroke, with little variation, until such time as the brake linings require replacement. At this time the brake pedal will drop toward the floor board.

If brake pedal travels beyond this point------ this indicates either lack of fluid in the master cylinder; air in the system, or the brake linings require replacement.

CLEARANCE - measured here -

TOP PEDAL POSITION -TO- WHERE PEDAL

MEETS RESISTANCE FROM THE MASTER

CYLINDER.

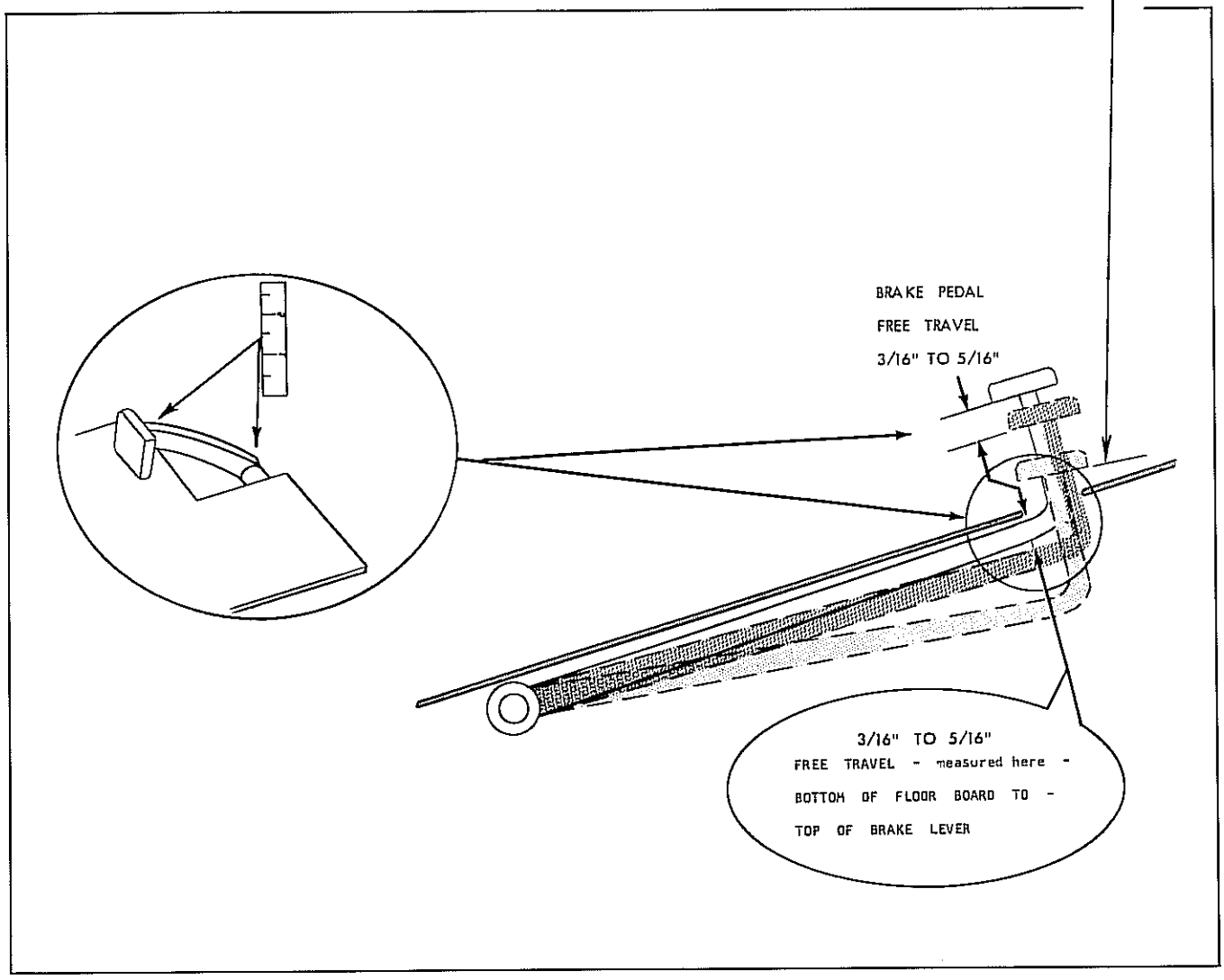


Figure 302a. Brake Pedal Check and Adjustment

BRAKE SYSTEM

Check brake fluid level in the master cylinder. Brake fluid should be within 1/4 inch of the top. Fill with S.A.E. 70 R3 Heavy Duty Hydraulic Brake Fluid.

Master Cylinder Filler Cap Vent Hole: Check cap vent hole for obstruction. Vent hole must be open at all times. Clean if necessary, see Figure 303a.

BRAKE PEDAL

W A R N I N G

CORRECT BRAKE PEDAL FREE TRAVEL IS IMPORTANT FOR SAFE OPERATING BRAKES.

A correctly adjusted brake pedal is important so that the internal ports in the master cylinder are not blocked by the cylinder piston. The following lists two important reasons for proper brake pedal free travel.

Inadequate pedal free travel will block the internal ports so that upon releasing the brake pedal fluid will be trapped in the lines and hold the brake linings in contact with the brake drums. Resulting in lining wear and excessive heating of the transmission.

Brake Pedal Adjustment: Refer to Figure 302a and follow the instructions and diagrams.

N O T E

INCHING IS CONTROLLED BY THE BRAKE MASTER CYLINDER. IMPROPER FREE PEDAL ADJUSTMENT WILL AFFECT INCHING QUALITIES.

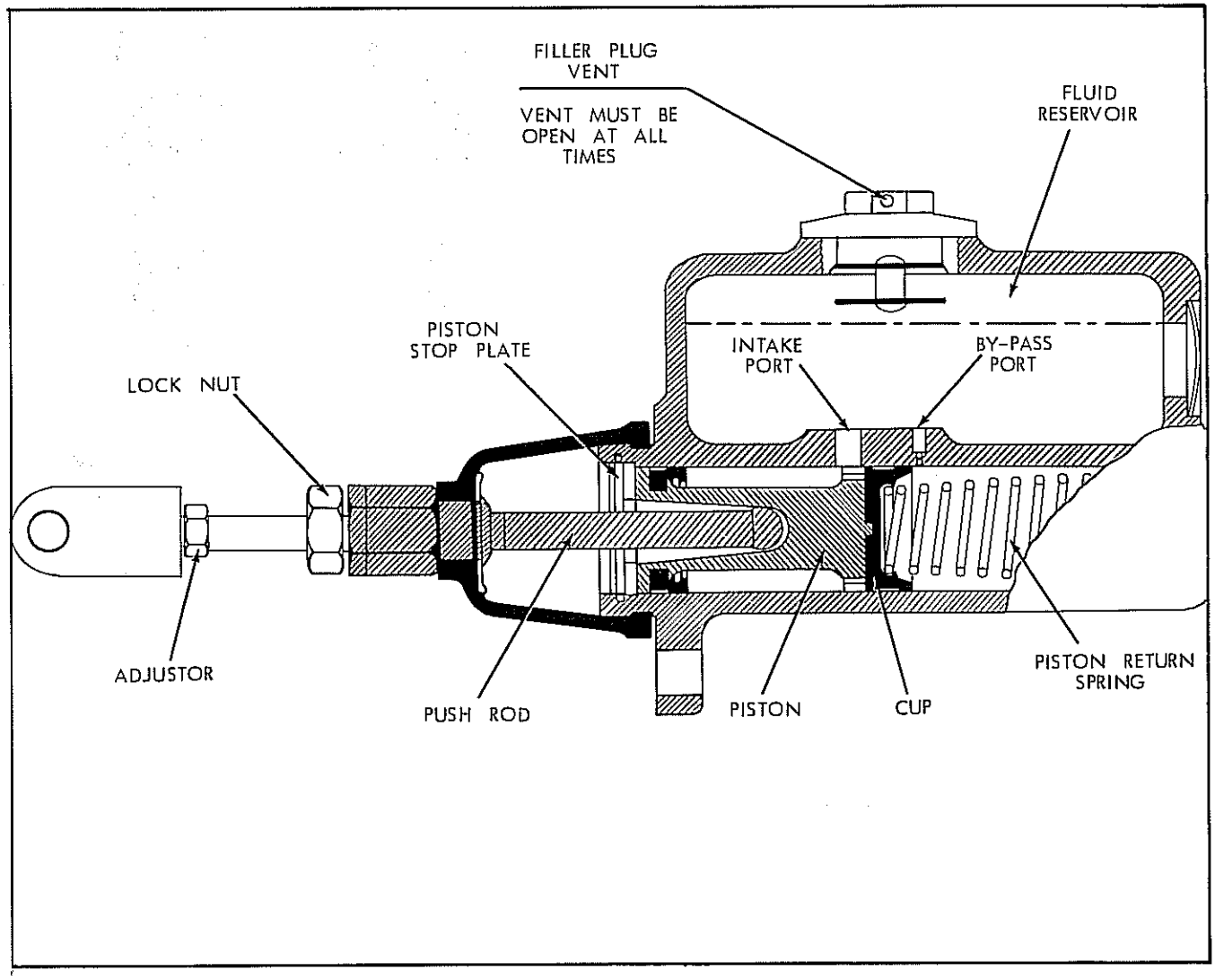


Figure 303a. Brake Pedal Adjustment

LIFT AND TILT CYLINDERS

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

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.

If it becomes necessary to adjust the lift chains place a capacity load on forks (or device if used) and adjust chains so center line of lower carriage roller is at least 1/2" above the bottom end of the innerslide channel. It is important that the chain adjustment be made with a capacity load. In this manner you will allow for chain stretch.

W A R N I N G

KEEP CLEAR OF LOAD DURING ADJUSTMENT TO AVOID INJURY IF ANY MALFUNCTION SHOULD OCCUR AND CAUSE LOAD TO FALL.

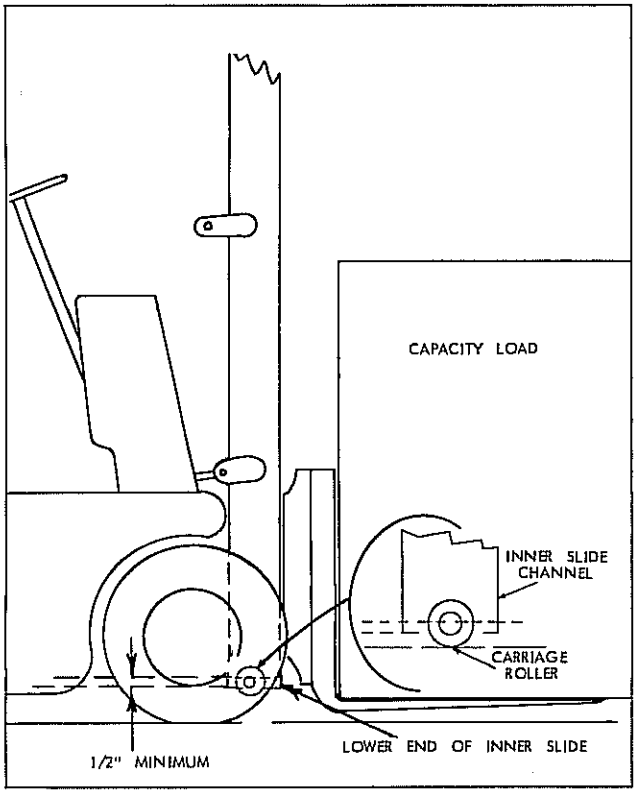


Plate 6884. Lift Chain Adjustment (Place Maximum Load On Forks)

LUBRICATE MACHINE

C A U T I O N

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. NUMBER 20 OIL.

HYDRAULIC CONTROL VALVE AND LINES

Inspect for damage, leakage and security of mounting.

LIFT BRACKET

Inspect for damage, bent forks etc.

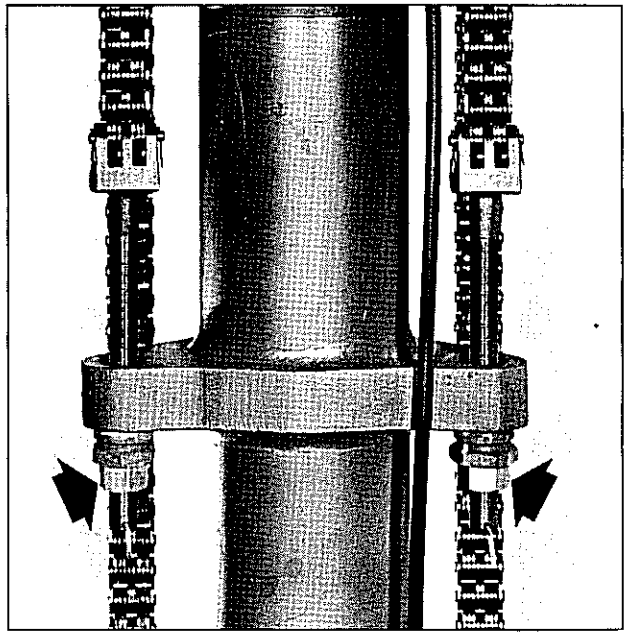


Plate 6634. Lift Chain Adjustment (Chain Anchor Rods)

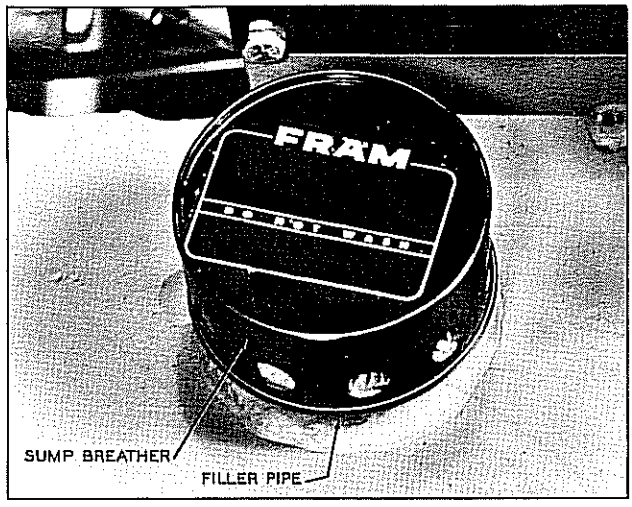


Plate 6626. Hydraulic Sump Tank

HYDRAULIC SUMP TANK BREATHER

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

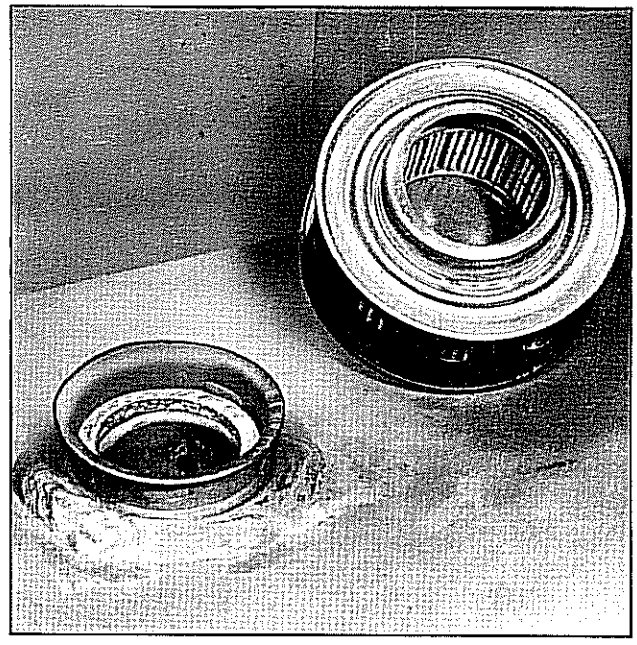


Plate 6682. Hydraulic Sump Tank & Sump Breather

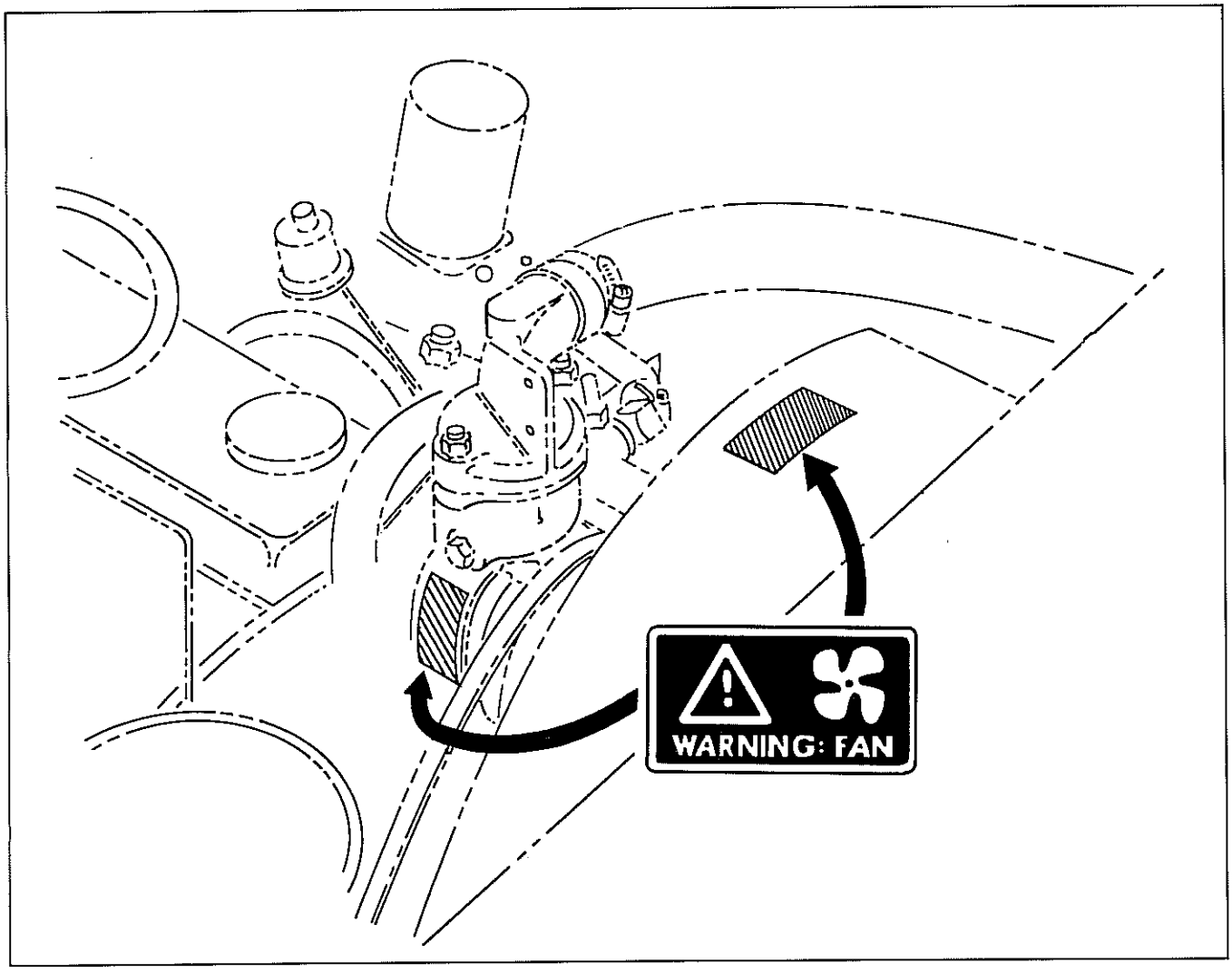


Fig. 20715

W A R N I N G

THE ENGINE COOLANT FAN, ON ALL INTERNAL COMBUSTION ENGINES, CAN CAUSE EXTENSIVE INJURY AND BODILY HARM. KEEP HANDS, ARMS AND CLOTHING AWAY FROM A SPINNING FAN. ALSO, DON'T STAND IN-LINE WITH A SPINNING FAN.

BATTERY INSPECTION

Remove all caps and check fluid level. Keep the fluid in each battery cell above the plates or up to the level ring in the bottom of the filler well. Use only pure distilled water. If the machine is exposed to freezing temperatures, operate the engine for a period of time to make sure the added water mixes thoroughly with the battery electrolyte solution. Otherwise, the water may freeze and damage the battery.

```
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                                                     x
x   NEVER ALLOW FLAME OR SPARKS NEAR THE              x
x                                                     x
x   BATTERY FILLER HOLES BECAUSE EXPLOSIVE            x
x                                                     x
x   HYDROGEN GAS MAY BE PRESENT.                      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
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Take hydrometer reading of electrolyte to determine state of charge. Charge battery if reading is below 1.225 at 24 deg. C (75 deg. F), or below 1.265, if machine is exposed to freezing temperatures. 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.

N O T E

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

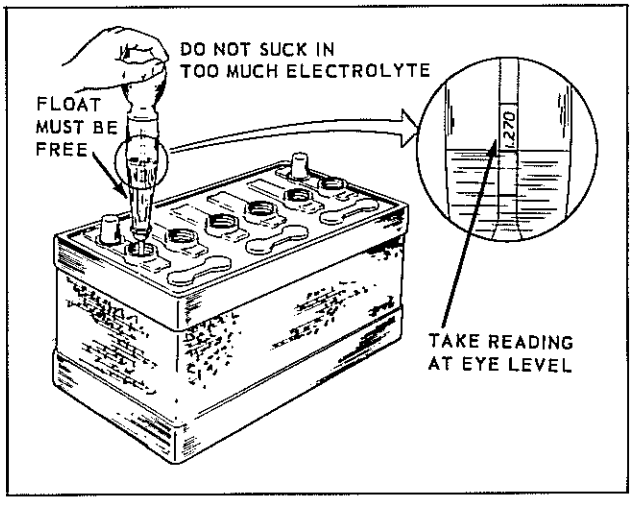


Plate 6271. Checking Specific Gravity of Battery

Make sure that all connections are tight at battery, starter, generator/alternator voltage regulator, distributor and spark plugs. Corrosion can be removed from the battery cables and terminals with a solution of baking soda or ammonia and water. After cleaning, flush the top of the battery with clean water, and coat the parts with grease to retard further corrosion.

BATTERY TEST PROCEDURE

A defective battery or a discharged battery may be found by performing the following "Light Load Test".

1. Place an electrical load on the battery by cranking the engine for three seconds. If it starts, turn the ignition off immediately.

2. Place a 10 ampere load across the battery terminals for one minute. This will condition the battery so an accurate voltage comparison test can be made between cells. (Connecting two headlights turned on low beam will equal the 10 ampere load - this method may be used in place of the load placed across the terminals.)

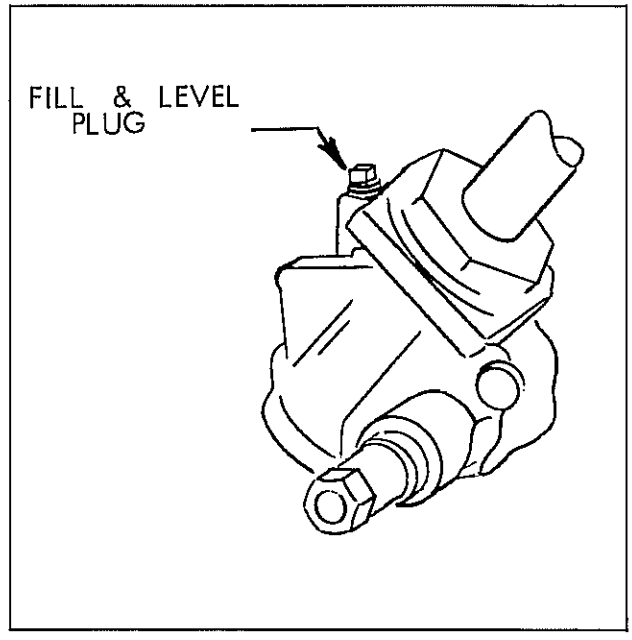
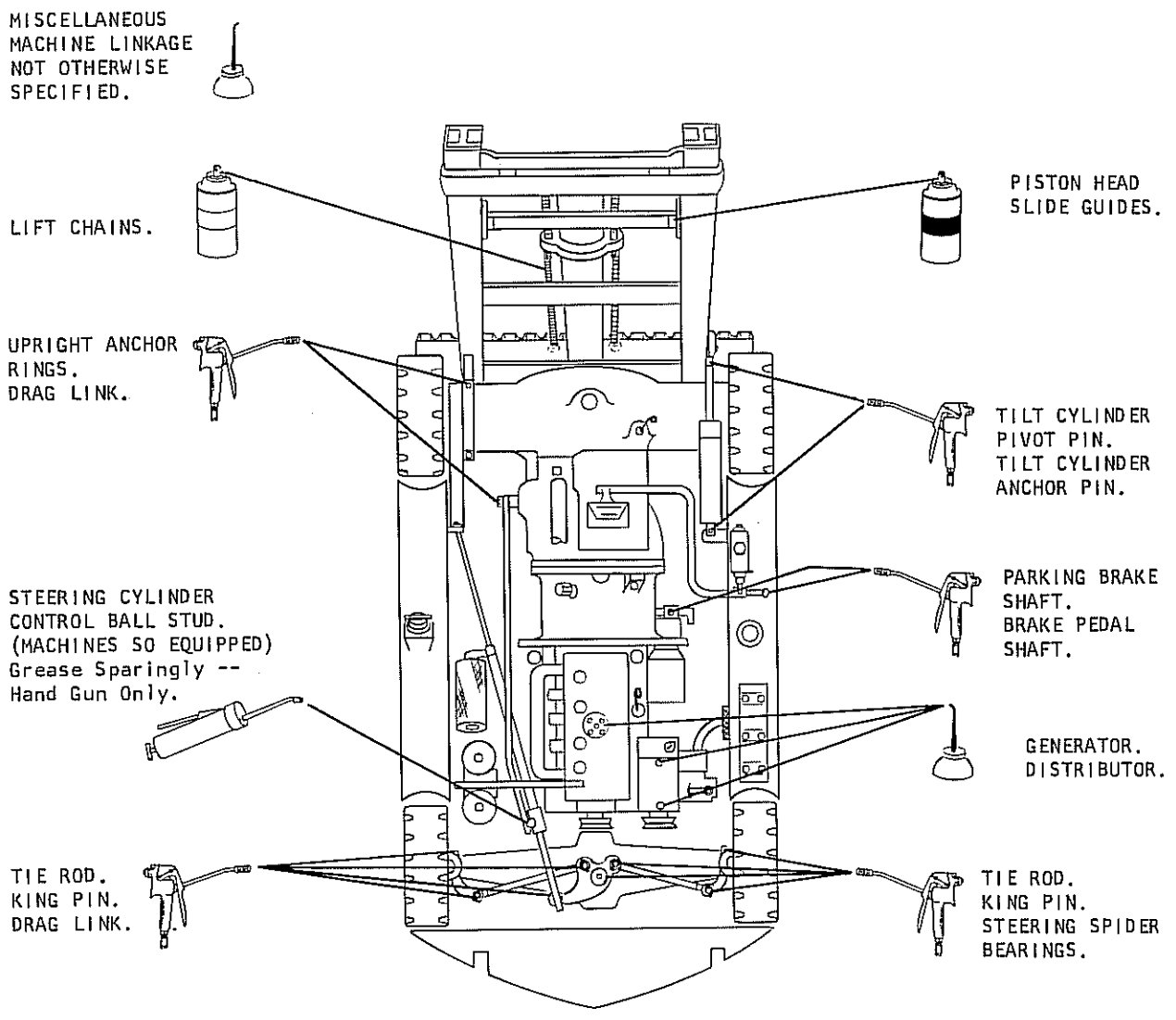


Plate 6429. Typical Steering Gear

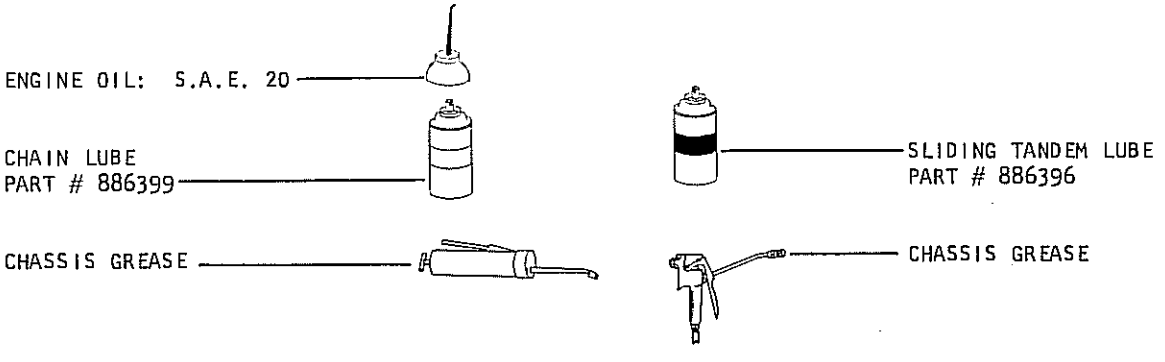
STEERING GEAR

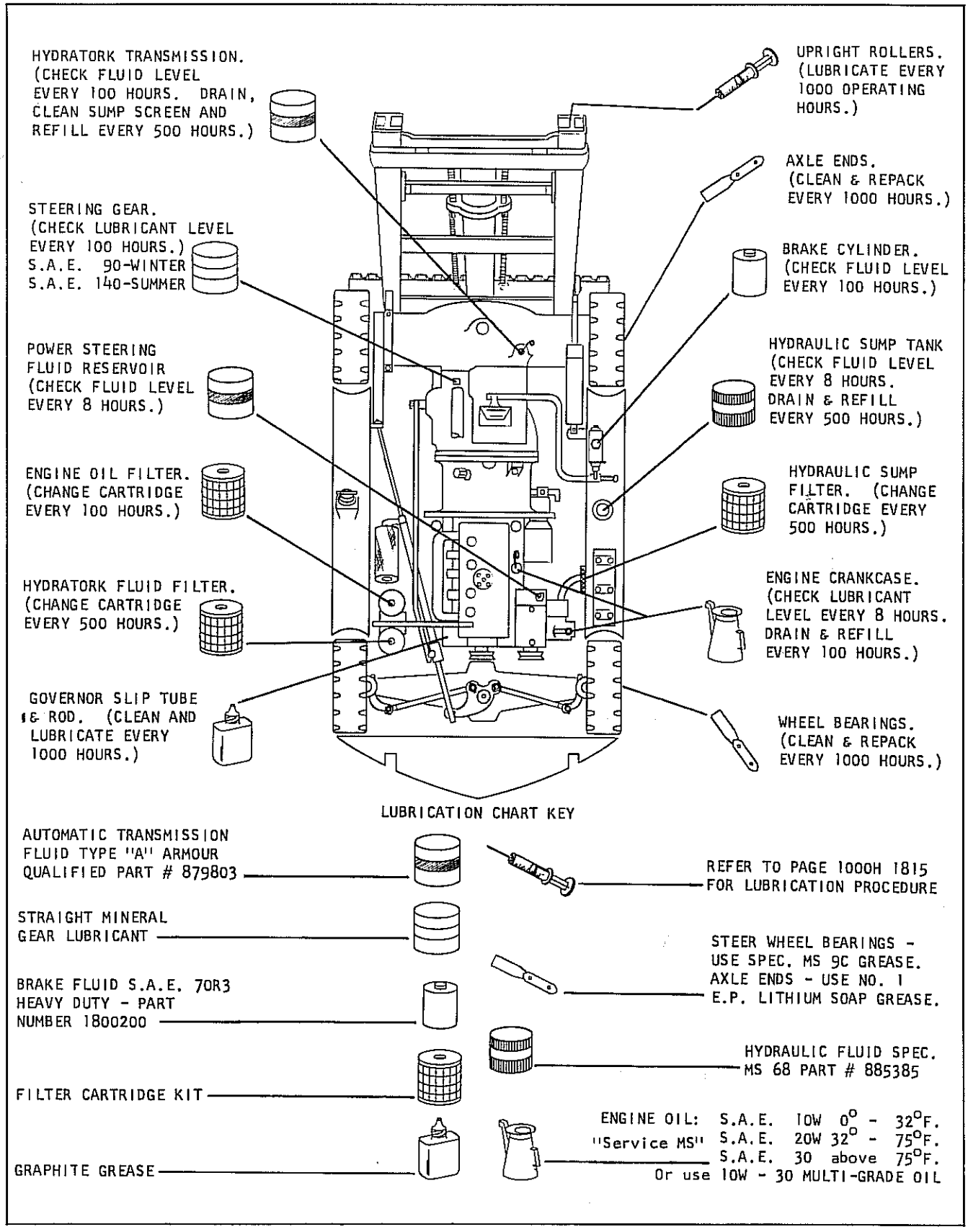
The steering gear is prepacked with grease at the factory and should not require lubrication until disassembled for repair. However, it is recommended that periodically the gear be checked for proper lubricant level, and filled if necessary with NLGI #1 (amolith grease EP #1 or its equivalent).

NOTE: WIPE ALL DIRT FROM FITTINGS BEFORE APPLYING A GREASE GUN



LUBRICATION CHART KEY





LUBRICATION CHART KEY

AUTOMATIC TRANSMISSION FLUID TYPE "A" ARMOUR QUALIFIED PART # 879803

STRAIGHT MINERAL GEAR LUBRICANT

BRAKE FLUID S.A.E. 70R3 HEAVY DUTY - PART NUMBER 1800200

FILTER CARTRIDGE KIT

GRAPHITE GREASE

REFER TO PAGE 1000H 1815 FOR LUBRICATION PROCEDURE

STEER WHEEL BEARINGS - USE SPEC. MS 9C GREASE. AXLE ENDS - USE NO. 1 E.P. LITHIUM SOAP GREASE.

HYDRAULIC FLUID SPEC. MS 68 PART # 885385

ENGINE OIL: S.A.E. 10W 0° - 32°F.
"Service MS" S.A.E. 20W 32° - 75°F.
S.A.E. 30 above 75°F.
Or use 10W - 30 MULTI-GRADE OIL

GENERAL:

Proper lubrication techniques, combined with a waterproof type grease, prevents corrosion of the sleeve and housing on steering boosters.

The proper lubrication techniques are explained in the following paragraphs.

LUBRICATION TECHNIQUES:

Recommended lubrication (greasing) techniques is to apply grease with ball stud in a vertical position.

This will place the grease nipple exactly 180 deg. opposite the ball stud. The lubrication access hole at the bottom of the sleeve will also be lined up with the grease nipple.

This will allow the grease to penetrate into the ball stud and ball seat area (primary lubrication area).

Grease should then be applied while moving the ball stud from side to side to lubricate between the sleeve and the housing (secondary lubrication area).

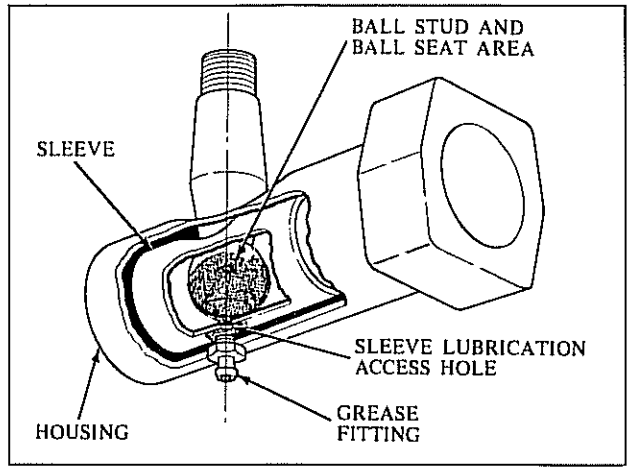
The following series of illustrations show how the grease should be properly dispersed in the ball joint area.

1. #11477 shows the ball stud in a vertical position which aligns the sleeve lubrication access hole directly opposite the grease nipple. This allows the grease to be adequately dispersed into the ball seat area (primary lubrication area) of the sleeve. Note that very little grease is dispersed between the sleeve and housing.

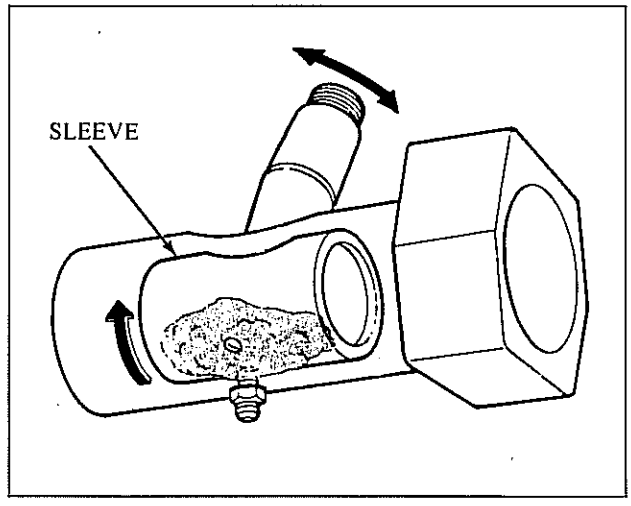
2. #11478 shows the grease properly dispersed around the O.D. of the sleeve. Apply grease when the sleeve is rotated and the grease fitting is not in line with the hole in the sleeve.

N O T E

Grease the control ball stud housing sparingly under low pressure through the grease fitting. Use a hand grease gun rather than a high pressure gun to avoid packing of grease which would hamper control valve movement. Housing must be at least 50% filled and all internal parts thoroughly coated.



#11477



#11478

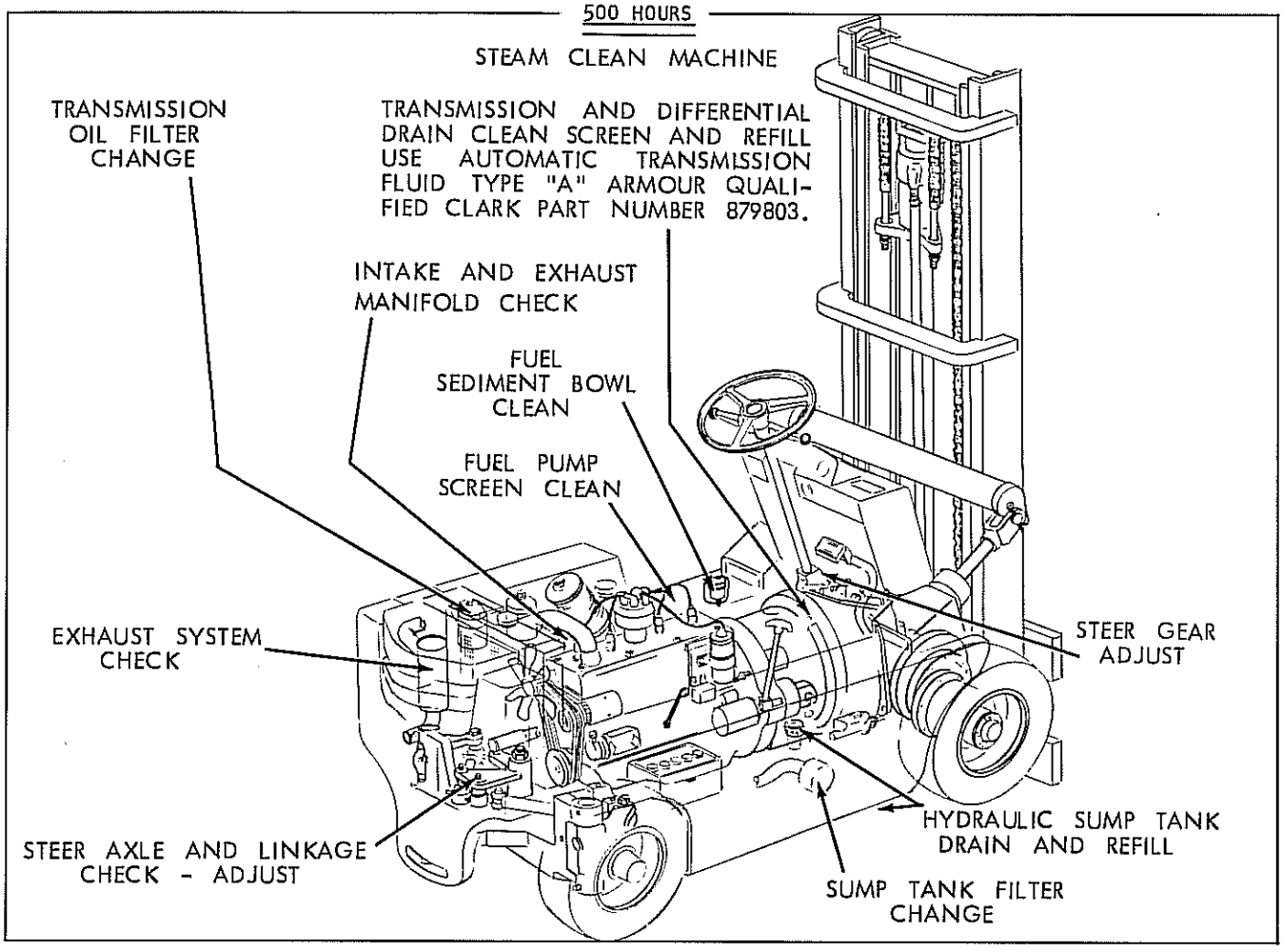


Figure 002a. Lubrication and Preventive Maintenance Illustration

FUEL PUMP STRAINER

The fuel filter and sediment bowl should be cleaned every 500 operating hours. Remove and clean sediment bowl. If fuel strainer is dirty, install a new strainer assembly and gasket. Do not reuse old gasket.

FUEL PUMP

To determine if the fuel pump is defective, remove the fuel tank supply line at the pump and blow out line with compressed air to remove any possible obstructions. Reconnect fuel tank line and disconnect pump to carburetor line. Install a fuel pressure gauge, by placing a "T" in the line, and run engine at 1800 R.P.M. with all lines connected. Fuel pump pressure should be between 1 1/2 and 2 1/4 pounds. If the fuel pump pressure is not within this range the pump should be removed for repair or replacement. CAUTION: TO AVOID CREATING A FIRE HAZARD CARE SHOULD BE TAKEN SO THAT GASOLINE IS NOT SPILLED DURING THESE OPERATIONS.

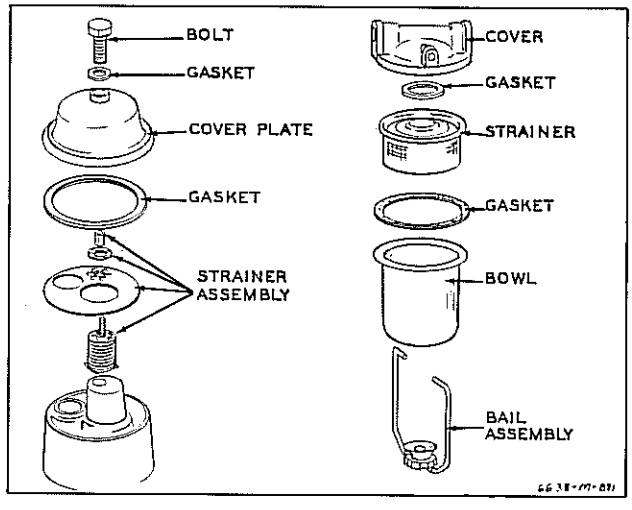


Figure 002b. Fuel Pump & Sediment Bowl

TRANSMISSION FLUID FILTER

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

N O T E

FILTER ELEMENT SHOULD BE REPLACED EACH TIME FLUID IS DRAINED OR AT ANY TIME WHEN A REPAIR TO THE TRANSMISSION IS MADE.

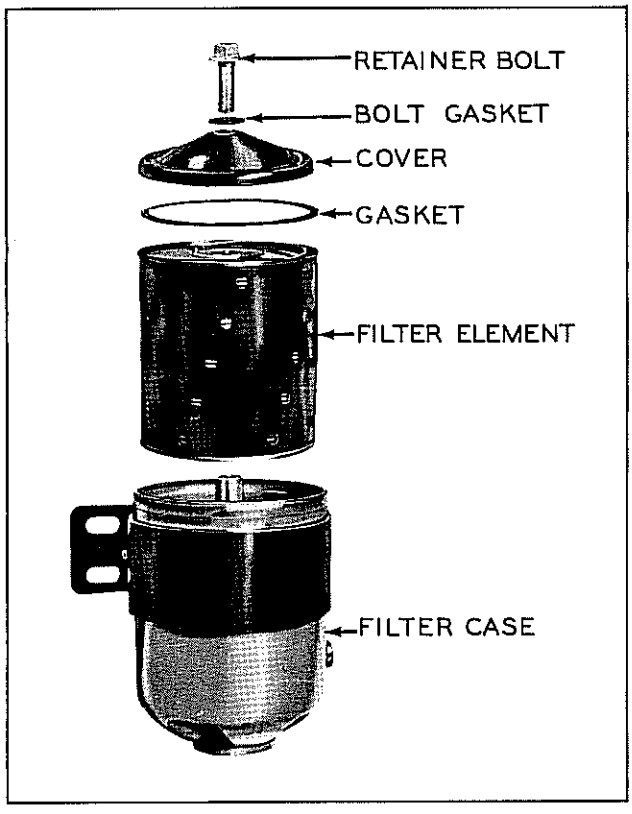


Plate 6635. Transmission Fluid Filter

CONVERTER, AXLE ADAPTER, TRANSMISSION AND TRANSMISSION SUMP SCREEN

1. The Transmission and Axle Adapter have a common lubrication system and should be drained at operating temperature. Remove both plugs to facilitate complete draining. (See Plate 6639).

C A U T I O N

DO NOT USE FLUSHING OIL OR COMPOUND TO FLUSH SYSTEM.

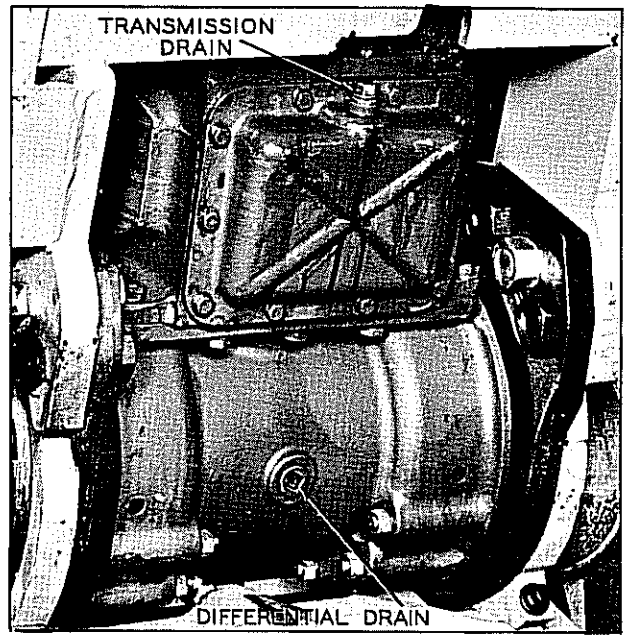


Plate 6639. Drain Differential and Transmission

2. Remove and clean transmission sump screen. Clean old gasket material from mating surfaces. Use a Stoddard type solvent to clean the screen. Blow dry with compressed air -- directing air stream from bottom side thru screen.

3. Coat both sides of new gaskets with number 3 Permatex and install screen and sump cover to bottom of transmission. Tighten capscrews to 20 to 25 foot pounds torque, see Plate 6886 on following page.

4. Replace drain plugs and refill transmission thru the dipstick opening on the axle adapter with type "A" Automatic Transmission Fluid (Armour Qualified) Clark Part Number 879803.

5. Operate engine at fast idle for approximately 4 minutes to distribute the lubricant throughout the system.

6. Shut down engine and check fluid level. Add fluid as required to bring the level to the full mark on the dipstick.

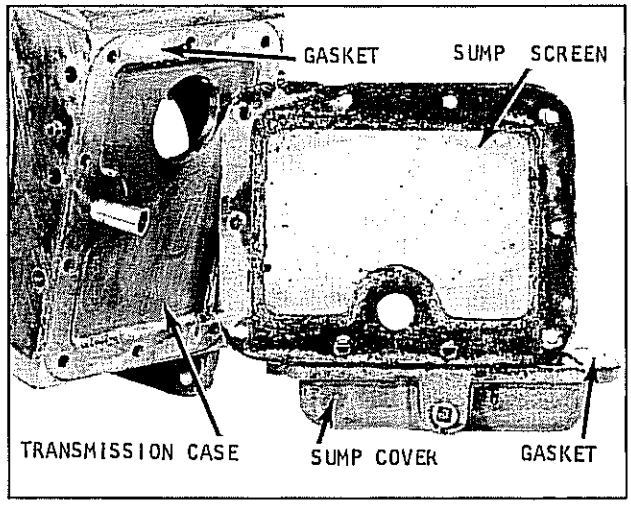


Plate 6886. Transmission Sump Cover and Screen

HYDRAULIC SUMP TANK AND SUMP OIL FILTER

C A U T I O N

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.

1. Lower upright. Shut engine off.

2. Place a large container underneath the sump tank which is located at the right side of machine.

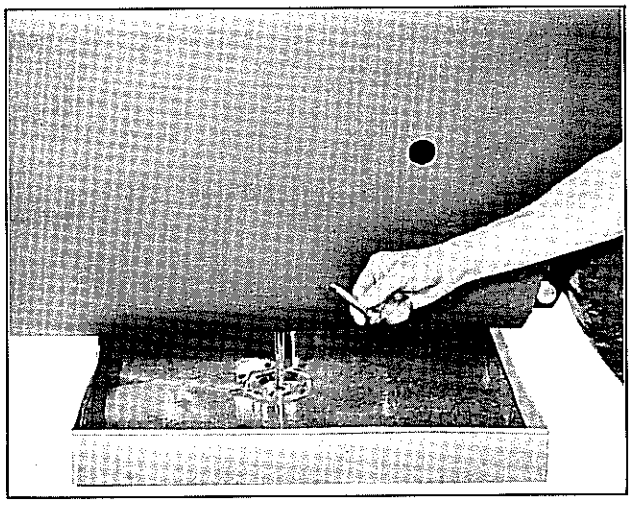


Plate 5359. Draining Sump Tank

3. Remove sump tank drain plug, located at bottom of tank, and allow the fluid to drain. Replace drain plug.

C A U T I O N

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

4. Remove Filter and Clean Sump Tank:

a. Disconnect hose and remove filter retainer bolts.

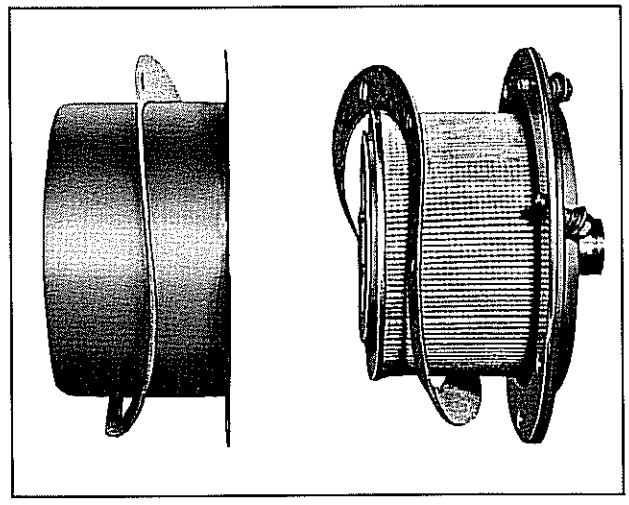


Plate 5274. Sump Tank Oil Filter Components

b. Pull filter assembly out of sump tank.

c. Remove any remaining gasket material from mounting flange.

d. Before installing a new filter and gasket, be sure sump tank is absolutely clean. Flush sump tank with two quarts of clean hydraulic oil.

N O T E

THE FILTER ATTACHING BOLTS SHOULD BE TIGHTENED TO 40 to 50 INCH POUNDS. IF THIS TORQUE IS EXCEEDED, DISTORTION MAY OCCUR, CAUSING LEAKAGE.

f. Install hose and tighten hose connections.

5. Fill sump tank with MS 68 Hydraulic fluid until level reaches the bottom of the fill pipe.

C A U T I O N

START ENGINE AND OPERATE HYDRAULIC CONTROL LEVERS SEVERAL TIMES, CHECK OIL FILTER FOR LEAKS, RECHECK OIL LEVEL AND FILL TO BOTTOM OF FILL PIPE IF NECESSARY.

STEERING GEAR

Steering gear adjustments must be made in the following manner (see Plates 6636 and 6637).

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

Before making above 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 re-assembled correctly.

2. Check lubricant level in steering gear housing. If low, add enough lubricant to bring level up to filler plug hole. (Use NLGI #1 Amolith grease EP #1 or its equivalent).

3. Tighten steering gear housing to frame side member bolts, see Plate 6636.

4. Determine straight-ahead position of steering mechanism by turning steering wheel to extreme right.

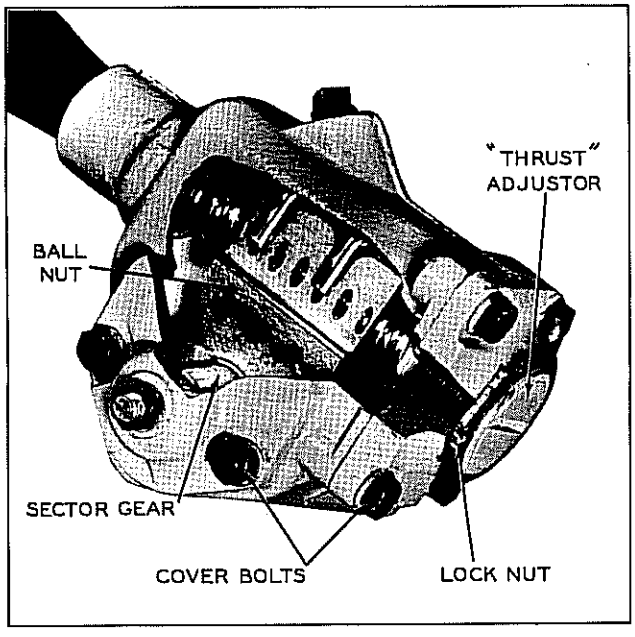


Plate 6636. Steering Gear Thrust Adjustment (Worm Bearings)

CAUTION

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

Then turn to extreme left, counting the exact number of turns from right to 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 6636 and proceed as follows:

1. Check tightness of cover bolts, see Plate 6636. Loosen lock nut and turn lash adjuster screw (Plate 6637) counterclockwise a few turns to provide clearance between sector gear and worm ball nut.

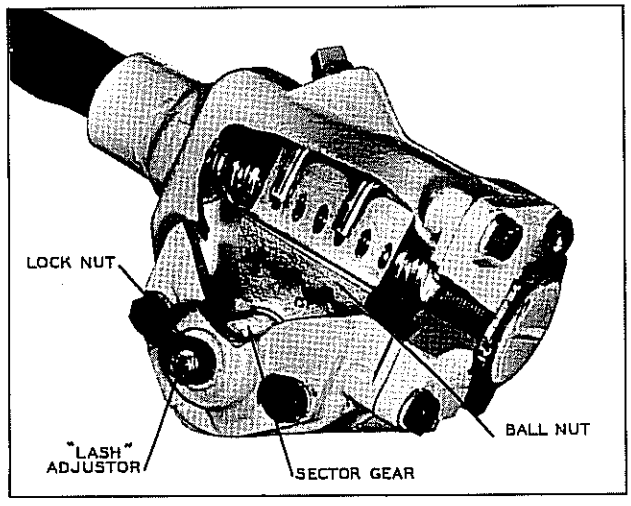


Plate 6637. Steering Gear Lash Adjustment (Sector Gear)

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 6636. Using

spring scale, as directed in Step 2, check pull and readjust as necessary; then tighten lock nut securely.

Sector Gear Lash Adjustment: Refer to Plate 6637 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 gear teeth. Tighten adjuster screw lock nut. Position spring scale on steering 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

If steering linkage adjustment is necessary do not install drag link to pitman arm.

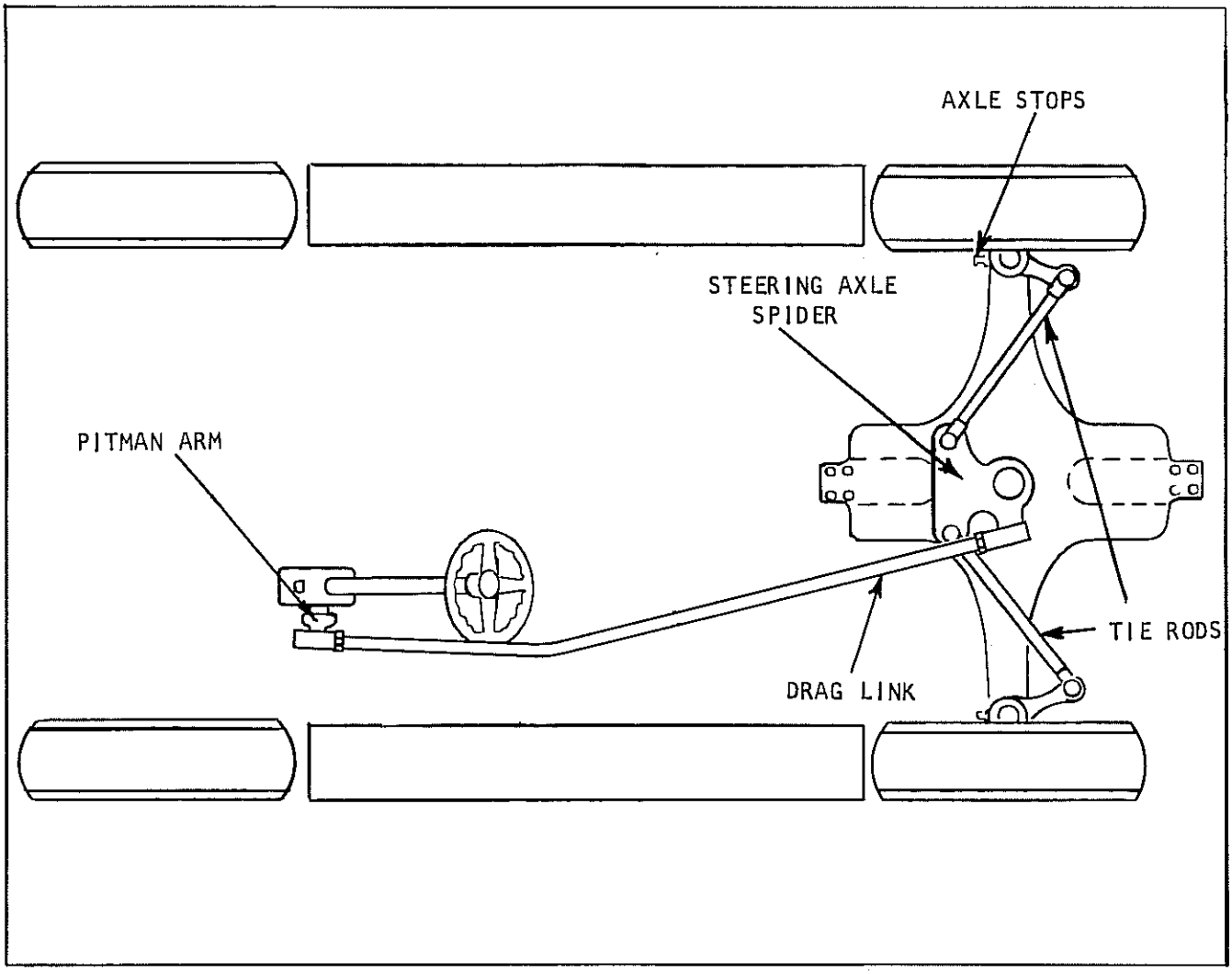


Plate 7419. Steering Linkage

STEERING AXLE AND LINKAGE ADJUSTMENTS

1. Raise the steering wheels far enough to clear the floor and place heavy blocking under the machine frame so it cannot accidentally become lowered during adjustments.

2. The steering wheels should track square with the drive wheels with no toe-in or toe-out. If adjustment is necessary loosen the lock nuts at the tie rod ends and turn each tie rod in a manner so they will be the same length when the correct adjustment is obtained. Tighten tie rod lock nuts to secure this adjustment.

3. Disconnect the drag link socket from the steering pitman arm noting the relative position of the socket parts so they may be re-installed correctly after checking wheels for correct turning geometry.

4. Check wheels for correct turning geometry by turning the wheels all the way for a left turn - this should allow the left wheel to attain an angle of 80 degrees to the frame. If an adjustment is necessary, the axle stop on the left side should be turned in or out whichever is necessary to acheive the correct angle. Repeat this procedure in a right turn with the opposite wheel and adjust the right axle stop as required.

5. Turn Steering wheels to straight ahead position.

6. Determine center position of steering gear. (Refer to Steering Gear adjustments for correct procedure).

7. Adjust drag link socket so that the grease fitting lines up with the centerline of the pitman arm ball stud and secure with lock nut and cotter pin.

8. Turn the handwheel until wheels are in straight ahead position. Remove handwheel and replace on steering column with the center spoke aligned minus or plus 10 degrees with the center line of the machine, the center spoke pointing back.

N O T E

CHECK STEERING GEAR SUPPORT BOLTS FOR SECURITY OF MOUNTING. TIGHTEN MOUNTING BOLTS AND CLAMP BOLTS TO 90 FOOT POUNDS TORQUE.

9. Remove blocking from under frame and lower machine to the floor.

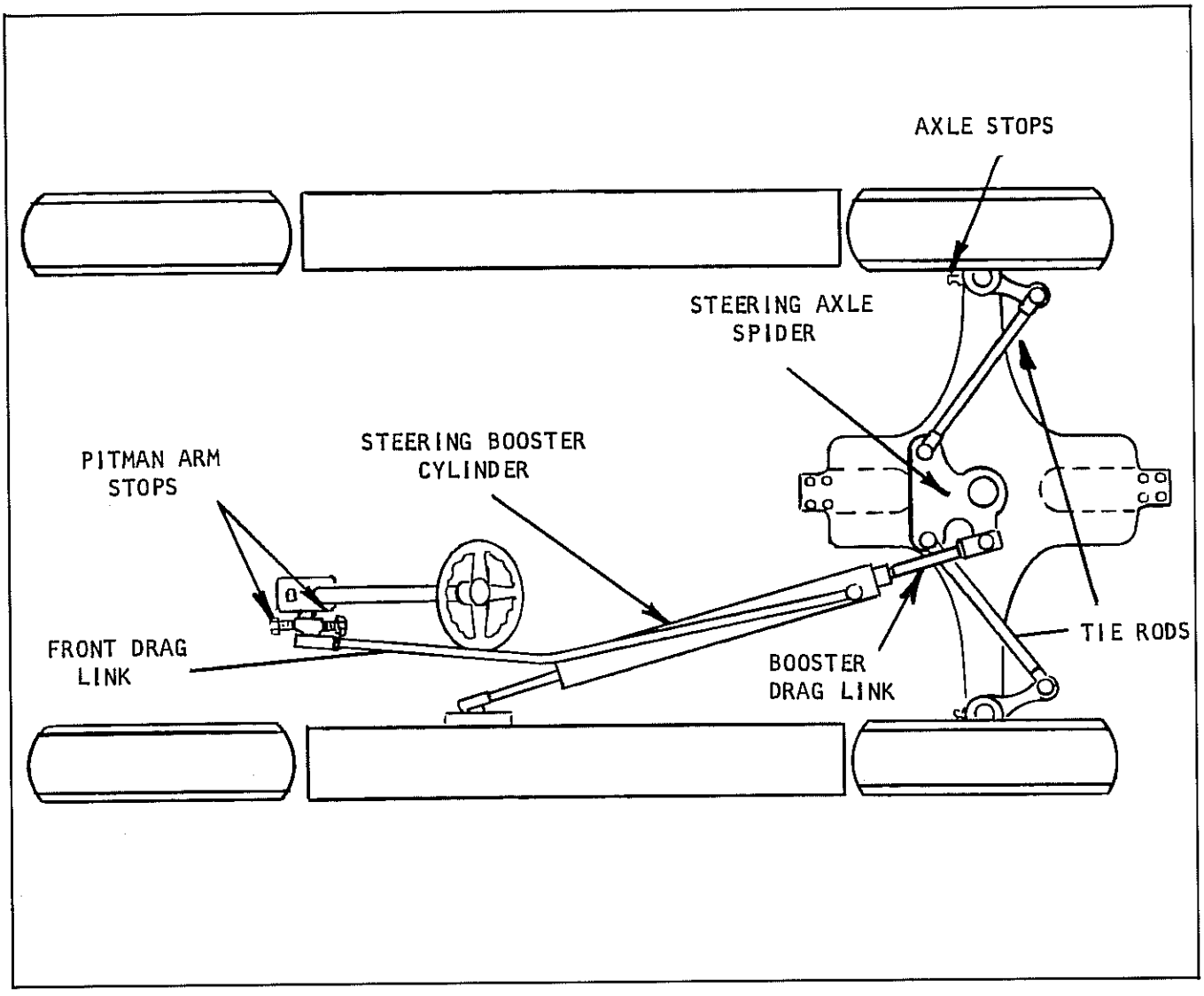


Plate 7340. Steering Linkage

STEERING AXLE AND LINKAGE ADJUSTMENT

1. Raise the rear of the machine until steering wheels clear the ground.

W A R N I N G

PRIOR TO ANY ADJUSTMENT OF THE LINKAGE, PLACE BLOCKING UNDER MACHINE FRAME SO IT CANNOT BECOME LOWERED BY ACCIDENT. BLOCKING MUST BE OF ADEQUATE STRENGTH TO SUPPORT THE WEIGHT OF THE MACHINE.

2. The steering wheels should track square with the drive wheels with no toe-in or toe-out. If adjustment is necessary loosen the lock nuts at the tie rod ends and turn each tie rod in a manner so they will be the same length when the correct adjustment is obtained. Tighten tie rod lock nuts to secure this adjustment.

3. Disconnect the steering booster socket from the steering axle spider noting the relative position of the socket parts so they may be re-installed correctly after checking wheels for correct turning geometry.

4. Check wheels for correct turning geometry by turning the wheels all the way for a left turn - this should allow

the left wheel to attain an angle of 80 degrees to the frame. If an adjustment is necessary, the axle stop on the left side should be turned in or out whichever is necessary to achieve the correct angle. Repeat this procedure in a right turn with the opposite wheel and adjust the right axle stop as required.

W A R N I N G

IF THE STEERING BOOSTER CYLINDER IS TO BE ACTUATED UNDER POWER DO SO ONLY WITH THE ENGINE OPERATING AT IDLE SPEED, USING EXTREME CARE TO KEEP CLEAR OF MOVING LINKAGES TO PREVENT PERSONAL INJURY.

5. Collapse the booster cylinder until the piston rod is bottomed. Extend booster cylinder rod from bottomed position 3/8". Adjust socket on end of rear drag link so that grease fitting lines up with center of spider ball. (Wheels remaining in the right turn position against axle stop.) Before securing socket lock nut, position the booster cylinder so that the control ball stud is on top and pointing out toward the truck frame at an angle of about 10 degrees to the vertical. (On some machines the control valve stud should point straight down. These models may be identified by the number of capscrews used to retain the control valve to the booster cylinder. If the control valve is retained to its cylinder by (3) three capscrews, the socket lock nut should be tightened to hold the control valve stud in the straight down position.) The correct mounting angle of the control valve stud is necessary to prevent mechanical interference of linkage while negotiating a turn. After making this adjustment it is suggested that the wheels be turned slowly from one extreme to the other, while observing all linkages to be sure there is adequate clearance.

6. Turn wheels to straight ahead position and disconnect drag link at pitman arm.

7. Determine center position of steering gear. (Refer to Steering Gear adjustments for correct procedure.)

8. With Steering Gear centered; adjust drag link socket so that the grease fitting lines up with the centerline of the pitman arm ball stud and secure with lock nut and cotter pin.

9. Back off pitman arm stop bolts and slowly turn wheel until steering knuckle contacts axle stop bolt. Turn pitman arm stop until it contacts pitman arm. Lock in this position. Repeat this procedure with the remaining pitman arm stop bolt with the wheels turned in the opposite direction.

10. Turn the handwheel until wheels are in straight ahead postion. Remove handwheel and replace on steering column with the center spoke aligned minus or plus 10 degrees with the center line of the machine, the center spoke pointing back.

11. Remove blocking and lower steering wheels to the ground.

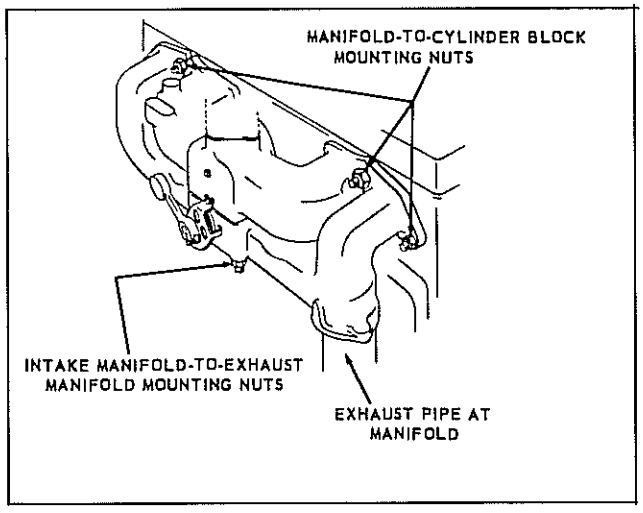


Plate 6269. Intake and Exhaust Manifolds

INTAKE AND EXHAUST MANIFOLDS

1. Inspect gaskets for leaks and inspect security of manifold nuts.

2. Inspect exhaust pipe and muffler for damage, leakage and security of mountings.

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

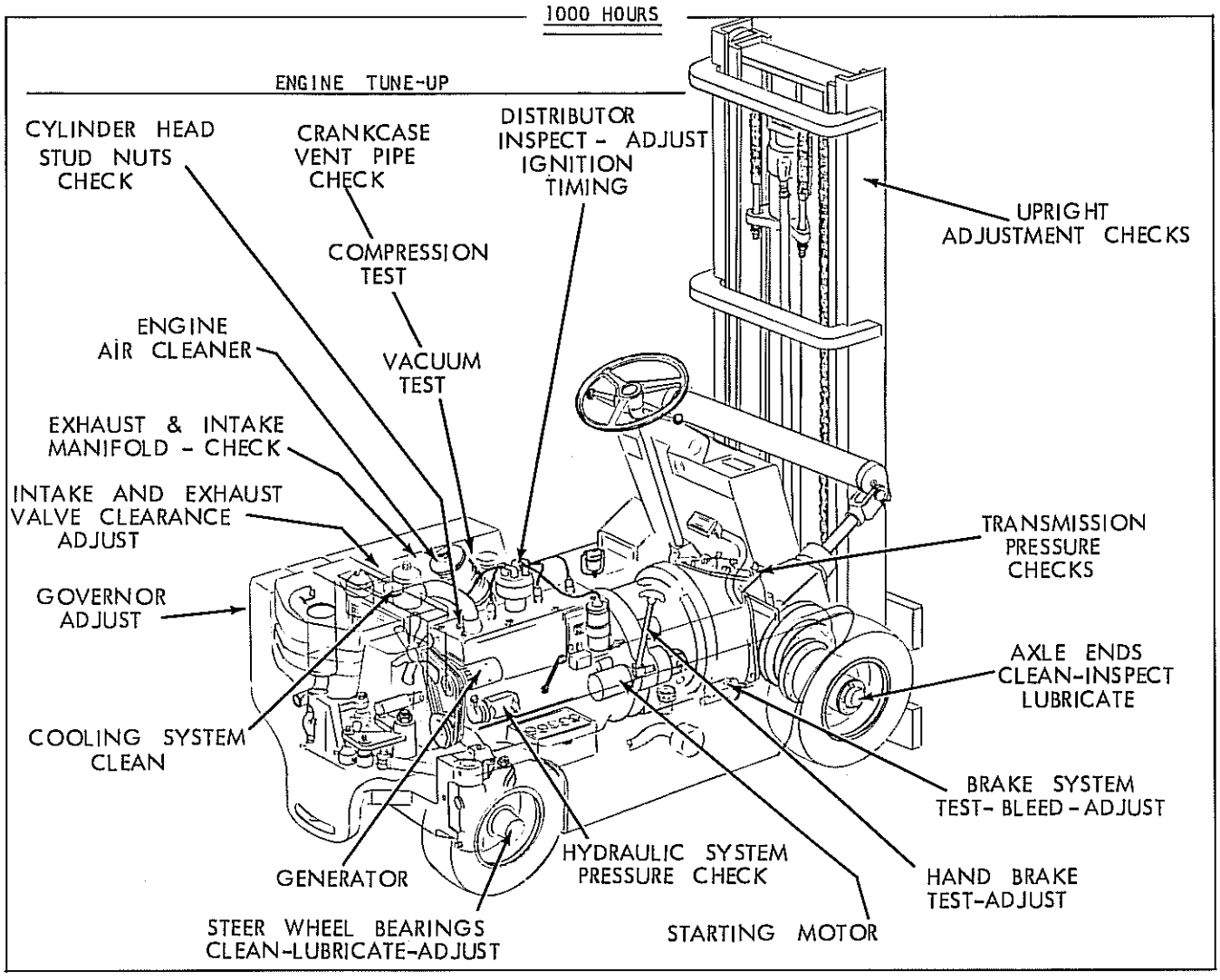


Figure 002a. Lubrication and Preventive Maintenance Illustration

ENGINE TUNE-UP

Engine tune-up is the orderly and systematic process of checking the engine and accessory equipment to maintain or restore satisfactory engine performance. Engine tune-up must be accomplished semi-annually and more frequently if engine performance indicates the need for these services. Perform engine tune-up as follows:

1. AIR CLEANER. Be sure air cleaner has received proper service. Air cleaner must be installed before making engine tune-up.

2. FUEL PUMP. Be sure the fuel pump bowl and strainer has been properly serviced and the fuel pump is operating satisfactorily.

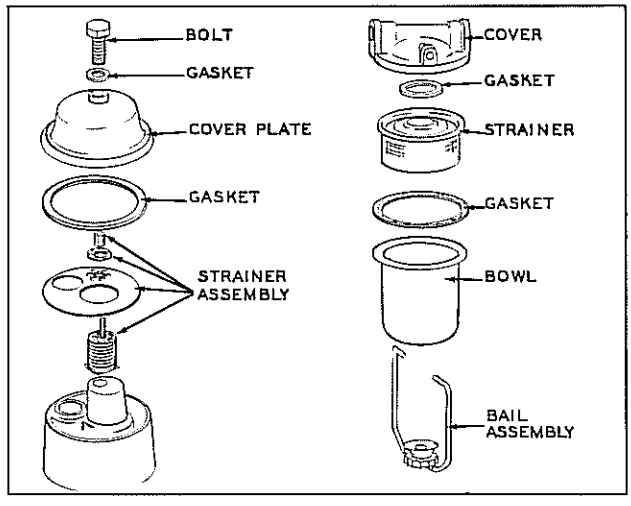


Figure 002b. Fuel Pump Assembly

3. CYLINDER HEAD STUD NUTS. Check all stud nuts for correct torque, refer to specifications. Check cylinder head gasket for leaks.

CAUTION

THE SEQUENCE SHOWN ON PLATE 6281 MUST BE FOLLOWED. ALL CYLINDER HEAD CAP SCREWS OR NUTS MUST BE TIGHTENED EVENLY AND TORQUED IN ACCORDANCE WITH LIMITS LISTED IN SPECIFICATIONS.

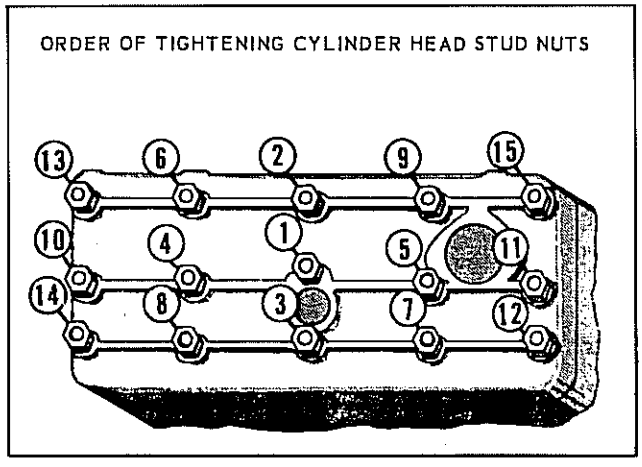


Plate 6281. Cylinder Head Stud Nut Tightening Sequence

4. INTAKE AND EXHAUST MANIFOLDS. Inspect for gasket leaks and security of mounting.

5. CRANKCASE VENTILATION. The crankcase vent pipe allows clean air to pass through the crankcase to help carry off corrosive gases (which are the by-products of combustion) that leak by the pistons and valve stems.

Check crankcase ventilation pipe for damage or obstructions. The pipe must be open to provide proper ventilation. Clean, repair, or replace as required, see Plate 6628.

6. INTAKE AND EXHAUST VALVE CLEARANCE ADJUSTMENTS. (PREFERRED METHOD)

a. Remove valve chamber cover mounting screws, and the valve chamber cover gasket.

b. With engine running at idling speed and at normal operating temperature, adjust intake valves as follows:

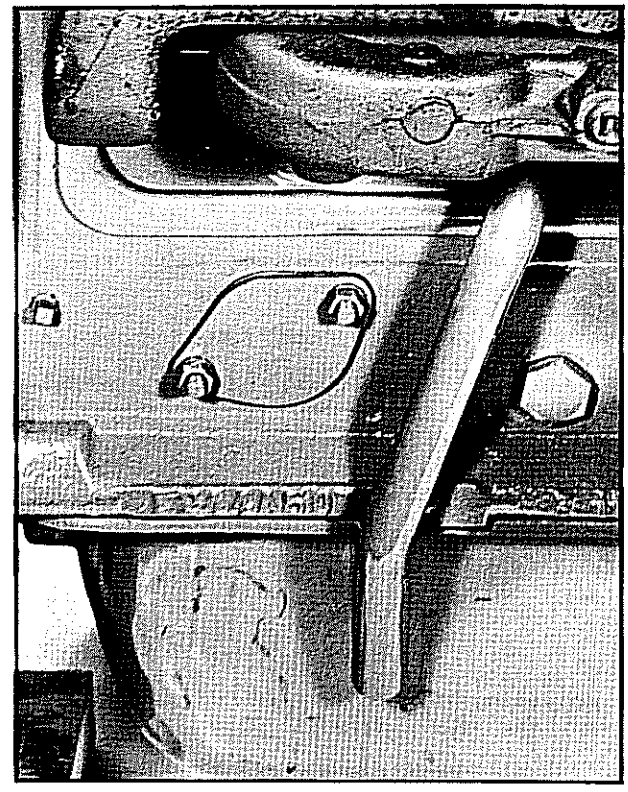


Plate 6628. Crankcase Vent Pipe

c. Check for proper 0.014 inch clearance by alternately passing a 0.013 inch and a 0.015 inch flat feeler gauge between head of adjusting screw and valve stem, see Plate 3223 on following page.

d. If a 0.013 inch feeler gauge moves freely back and forth in gap when valve is not being lifted and a 0.015 in. feeler gauge binds, at all times, clearance requires no adjustment.

e. If a 0.013 inch feeler gauge is gripped at all times, the clearance is insufficient.

f. Hold valve lifter with an open end wrench while using a second wrench to turn adjusting screw 1/4 to 1/2 turn clockwise. Repeat clearnace check and adjustment, until proper clearance is obtained. The adjustable type valve lifters have self-locking adjusting screws that require no lock nuts.

g. If 0.015 inch feeler moves freely when valve is not being lifted, the clearance is too great. Hold valve lifter with an open end

wrench while using a second wrench to turn valve lifter adjusting screw counterclockwise 1/4 to 1/2 turn. Repeat clearance check and adjustment until proper clearance is obtained.

h. Repeat clearance check and adjustment on remaining intake valves.

i. With engine running at slow idle and at normal operating temperature, adjust exhaust valves as follows:

j. Check for proper 0.016 inch clearance by alternately passing a 0.015 inch and a 0.017 inch flat feeler gauge between head of adjusting screw and valve stem, see Plate 3223.

k. If a 0.015 inch feeler gauge is gripped at all times, the clearance is insufficient. If a 0.017 inch feeler gauge moves freely when valve is not being lifted, the clearance is too great.

m. Turn adjusting screw in the direction necessary so that a 0.015 inch feeler gauge moves freely back and forth in gap and a 0.017 inch feeler is gripped at all times.

n. After adjustment is complete on all exhaust valves, install valve chamber cover using new cover gasket and replace cover retainment screws.

N O T E

Do not reuse old gaskets. They do not afford a positive seal.

p. Check valve chamber cover gasket for leaks.

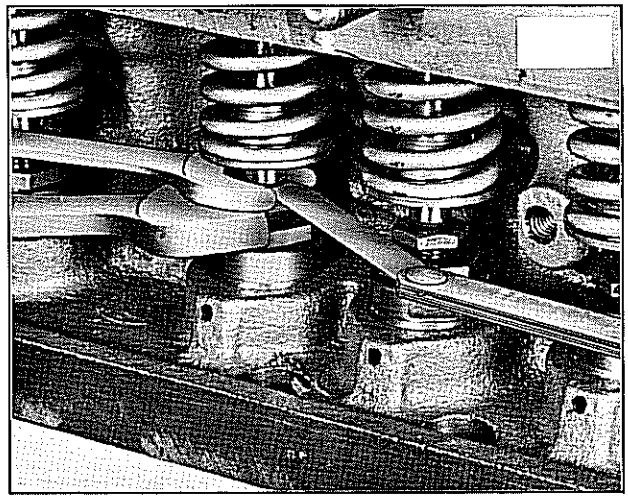


Plate 3223. Adjusting Valve Clearance

6A. COLD SETTING. (ALTERNATE METHOD) To adjust valve clearance when engine is at room temperature and not running, proceed in the following manner:

a. Remove distributor cap.

b. Crank engine until distributor rotor points to No. 1 cylinder position with the breaker points open. In this position the No. 1 piston is at the top of its compression stroke with both lifters on the base circle of the cam and both valves for this cylinder can be adjusted.

c. Adjust the valve clearance to 0.016 inch on the intake and 0.018 inch on the exhaust. The exhaust (E) and intake (I) valve arrangement on the four cylinder engine is: E-I-I-E-E-I-I-E.

d. The other valves may be adjusted by setting the engine with the distributor rotor pointing to the rest of the cylinder positions in the sequence of the firing order which is: 1-3-4-2.

7. COMPRESSION TEST

a. Test battery for full charge (specific gravity 1.280 temperature of 24°C (75° F). If battery is not fully charged, replace with fully charged battery.

b. Start engine and allow it to warm up until normal operating temperature is reached.

c. Turn off ignition.

d. Remove spark plug cables from spark plugs and remove spark plugs from cylinder head. Examine spark plugs for carbon deposits, defective insulation and general serviceability. All carbon or lead deposits must be removed from the insulation shell and electrodes. This can be done on a sand blast cleaner. Carbon deposits should be removed from the plug threads with a stiff brush. After cleaning, inspect plugs carefully for cracked or broken insulator, badly pitted electrodes or other signs of failure.

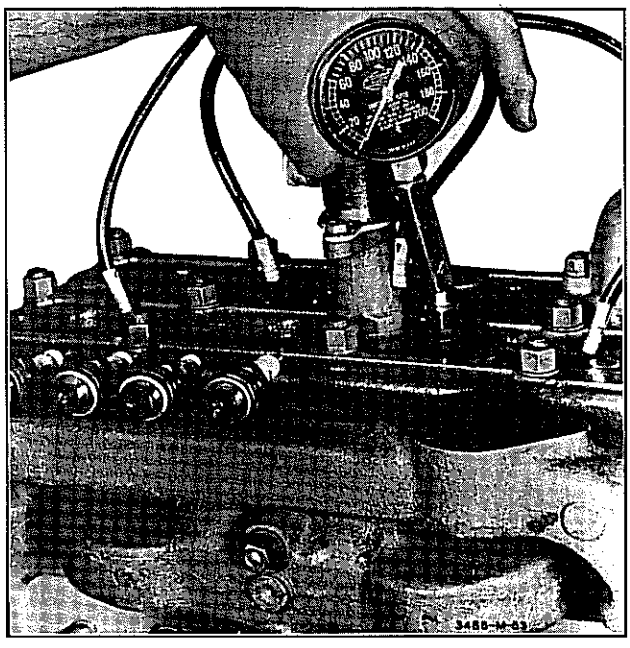


Plate 3486. Compression Test

e. With all plugs removed, install compression gauge in front spark plug port. Operate starting motor until maximum reading on gauge is obtained, see Plate 3486. Record gauge reading. Repeat this operation on each remaining cylinder.

f. If readings are reasonably high (110 to 120) pounds and the readings do not vary more than about 10 pounds between cylinders, compression may be considered normal. Excessively low readings or readings that vary more than 10 pounds between cylinders indicate internal trouble to be corrected after further examination and testing.

g. Set the spark plug gap as specified, by bending side electrode only. The gap should be checked with a wire feeler gauge rather than a flat type gauge as it is better suited for this purpose.

h. Spark Plug Specifications:

Standard Type	-	.025" Gap
Resistor Type	-	.035" Gap

i. Replace spark plugs using new gaskets. Always replace spark plug gasket whenever a spark plug is removed from the engine. Before installing plugs, be sure that the spark plug seat in the cylinder head is clean and free from obstructions. The spark plug should be screwed into cylinder head (using a socket of proper size) sufficiently tight to fully compress the gasket. This is most important as a large percentage of troubles due to overheated spark plugs are caused by plugs being too loose in the cylinder head. Conversely, excessive tightening may change the gap between the electrodes or crack the insulator.

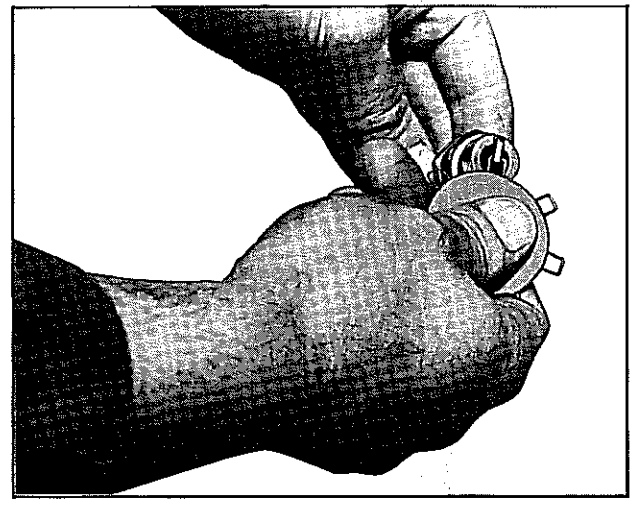


Plate 3278. Check Spark Plug Gap

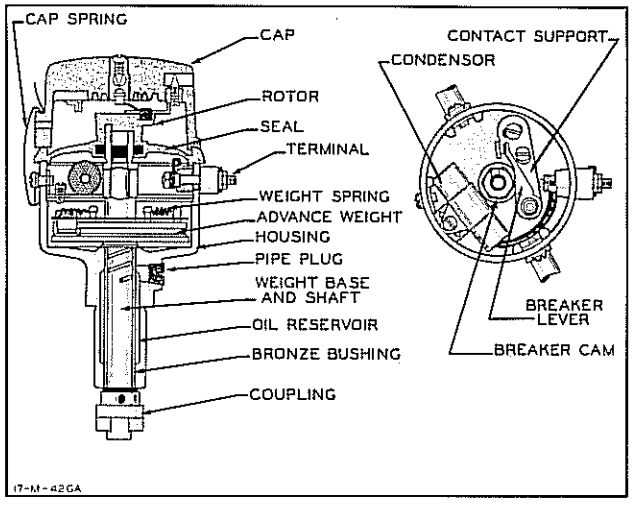


Plate 3409. Distributor

8. DISTRIBUTOR

Inspection: Remove distributor cap (without removing wires). Wipe cap with a clean cloth. Examine rotor and cap for chips, cracks, corroded terminals, carbon runners (paths which will allow high-tension leakage to ground) or if the vertical faces of the inserts are burned -- install a new cap and rotor, as this is due to the rotor being too short.

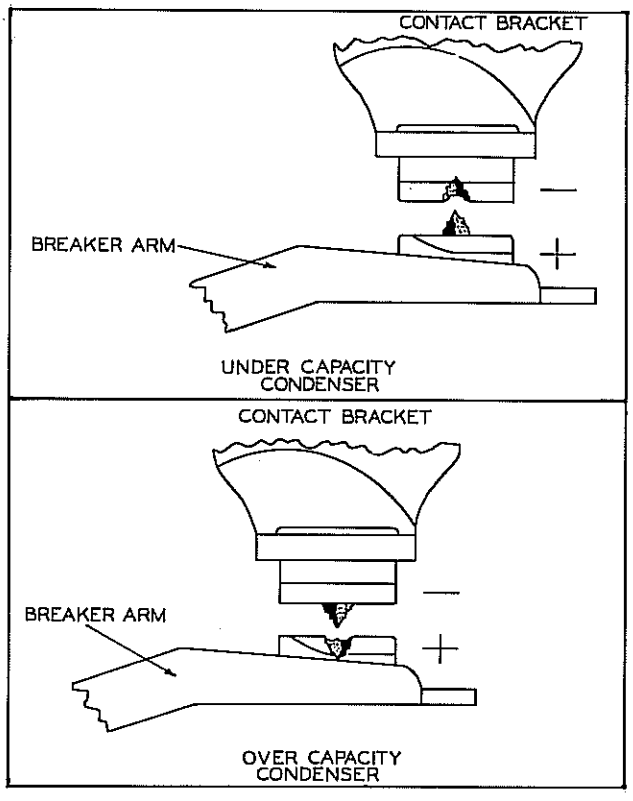


Plate 5933. Breaker Points

Check the centrifugal advance mechanism for "freeness" by turning the breaker cam in the direction of rotation and then releasing it. The advance springs should return the cam to its original position without sticking.

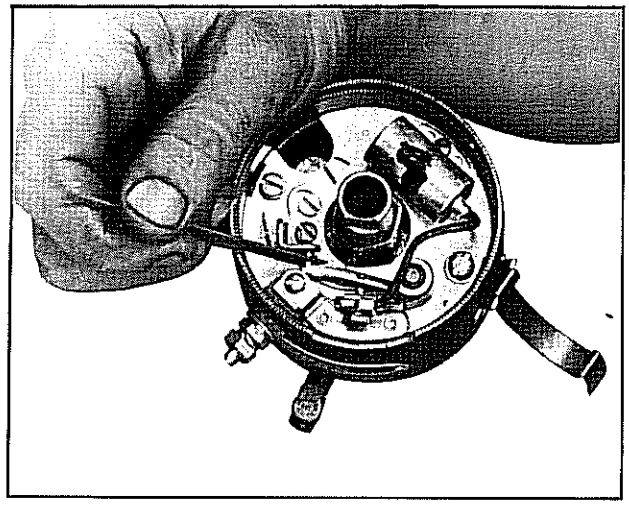


Plate 3364. File Contact Points

Inspect breaker points. If points are pitted, burned or worn to an unserviceable condition, install a new set of points.

The normal color of contact points should be a light gray. If the contact point surfaces are black, it is usually caused by oil vapor, or grease from the cam. If they are blue, the cause is usually excessive heating due to improper alignment, high resistance or open condenser circuit.

Badly pitted points may be caused by a defective or improper condenser capacity.

If the condenser capacity is too high, the crater (depression) will form in the positive contact. If the condenser capacity is too low, the crater will form in the negative contact, see Plate 5933.

For a temporary repair, dress the contact points with a few EVEN strokes using a clean fine-cut contact file. DO NOT ATTEMPT TO REMOVE ALL ROUGHNESS OR DRESS THE POINT SURFACES DOWN SMOOTH. See Plate 3364.

C A U T I O N

NEVER USE EMERY CLOTH OR SANDPAPER TO CLEAN POINTS AS PARTICLES WILL EMBED IN THE POINTS AND CAUSE ARCING AND RAPID BURNING.

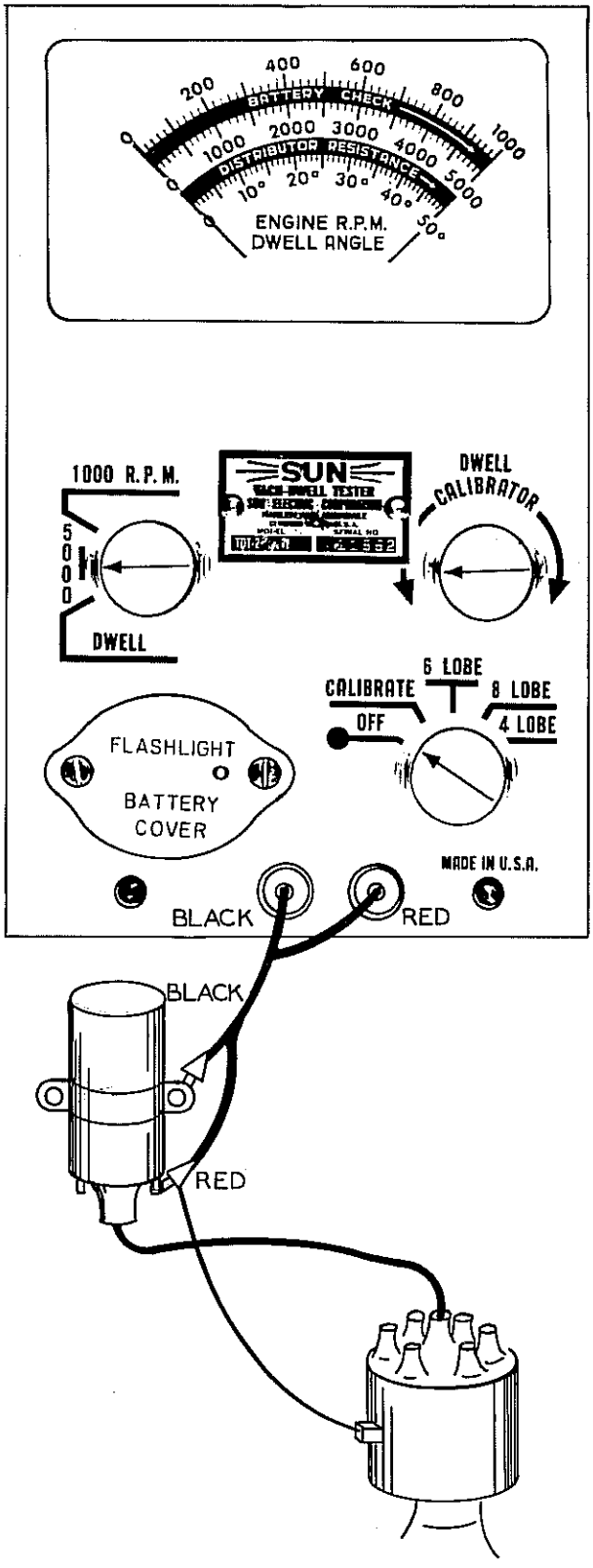


Plate 6887. Tach Dwell Meter

MEASURING ENGINE SPEED

1. Connect the test leads as shown.
2. Turn switch to the LOBE position corresponding to the number of cylinders.
3. Turn the other switch to the 1000 rpm position for all idle and low speed testing. Use the 5000 rpm position for all speeds over 1000 rpm.

DISTRIBUTOR RESISTANCE TEST

1. With test leads disconnected, turn switches to DWELL and CALIBRATE positions and adjust dwell calibrator until meter reads on the SET LINE.
2. Connect test leads as shown.
3. Turn ignition switch ON with engine stopped. If distributor resistance is not excessive, meter will read in the black bar marked DISTRIBUTOR RESISTANCE.

   If meter does read within black bar, readjust dwell calibrator until meter again reads on the SET LINE before making the following tests.

   If meter does not read within black bar, excessive resistance is indicated. To locate excessive resistance, trace the primary circuit through the distributor with the red test lead until point of high resistance is located. Excessive resistance must be eliminated and the dwell calibrator adjusted until the meter again reads on the SET LINE before proceeding with the following tests.

DWELL AND DWELL VARIATION TESTS

1. Turn switch to the proper LOBE position.
2. Operate engine at idle speed and note reading on dwell scale of meter. Refer to specifications for proper dwell.
3. Turn tachometer switch to the 5000 rpm position and increase speed to 1500 rpm.
4. Turn switch back to the DWELL position and again note dwell reading. Slowly reduce speed to idle while watching meter. Dwell should not change more than 3 degrees in either case.

Contact Point Adjustment: The point opening of new points can be checked with a wire feeler gauge, but the use of a feeler gauge on older, rough points is not recommended, since accurate gauging cannot be done on such points. The gauge measures between high spots on the points instead of the true point opening. Point opening of used points can be checked with a Dwell Angle Meter. A meter of this type indicates the cam or contact angle. This angle is the number of degrees that the breaker cam rotates from the time the points close until they open again. The cam angle increases as the point opening decreases and it is reduced as the point opening is increased. Manufacturers of this type equipment furnish complete instructions as to their use.

N O T E

REFER TO SPECIFICATIONS FOR DWELL ANGLE

AND CONTACT POINT OPENING.

To check point opening with a feeler gauge, insert a wire feeler gauge of proper size between the contact points. MAKE CERTAIN THAT THE BUMPER BLOCK ON THE MOVABLE CONTACT IS AT THE HIGH POINT ON THE CAM. If adjustment is necessary, loosen the lock screw, and insert a screwdriver of the proper size in the adjustment slot and move the stationary arm until the correct clearance is obtained. Tighten locking screw and recheck point gap. See Plate 7457.

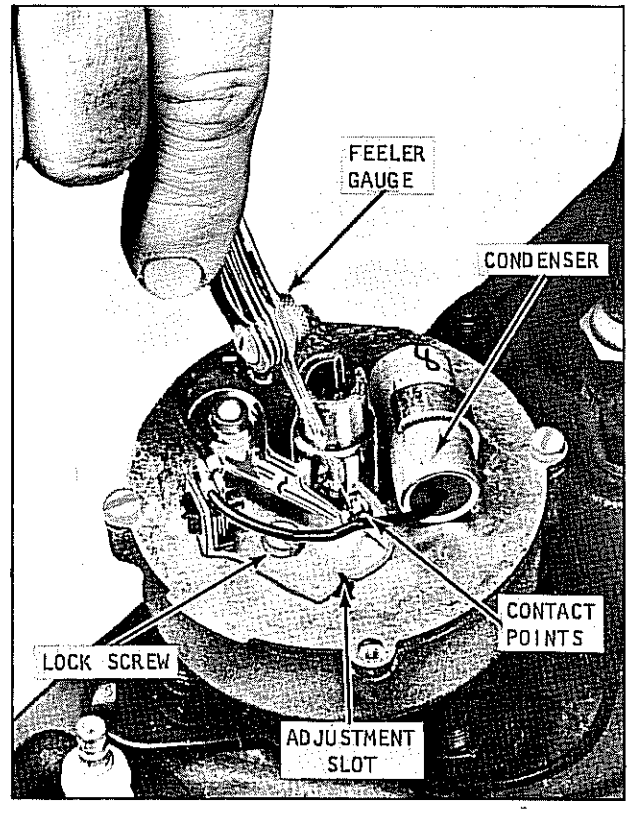


Plate 7457. Contact Point Adjustment

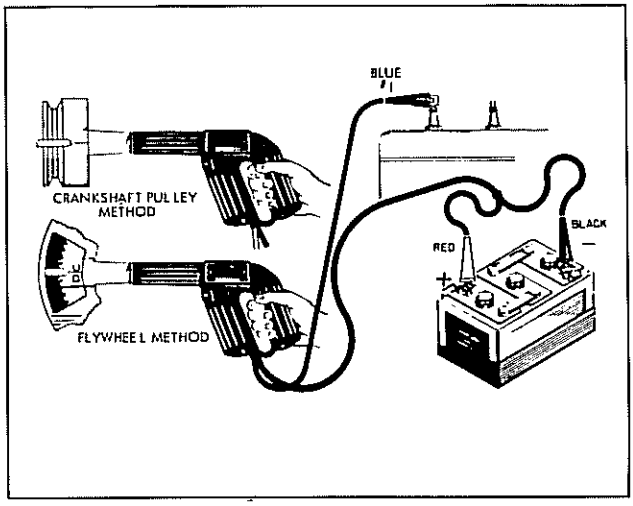


Plate 7818. Timing Light Hookup

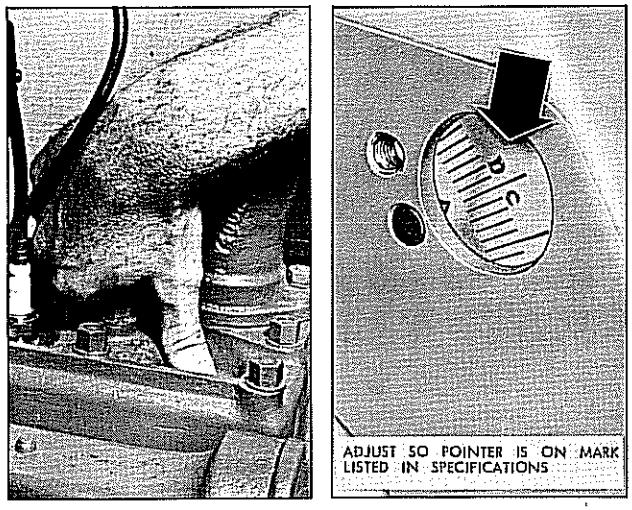


Plate 7861. Ignition Timing

9. IGNITION TIMING

There are two methods of checking ignition timing --- with or without a timing light. The PREFERRED METHOD is to use a timing light in following sequence:

Paint a line on the flywheel (or in some cases, on the front pulley) so the correct timing mark will be more legible under the timing light.

a. Clip blue secondary lead of light to the #1 spark plug -- leave spark plug wire on plug.

b. Connect primary positive lead (red) to positive terminal of battery.

c. Connect primary negative lead (black) to negative battery terminal.

d. Start engine and run a 400 RPM or below so the automatic advance of the distributor is completely retarded. THIS IS VERY IMPORTANT TO OBTAIN CORRECT TIMING.

N O T E

The initial advance RPM range is 430-580. Distributor advance at 600 engine RPM should be 1^{o} to 5^{o}.

e. Direct timing light on the pulley (or flywheel through opening in bell housing) and note timing marks as light flashes. The light should flash on the timing mark that is listed in specifications.

f. To advance timing, turn distributor body clockwise. To retard timing, turn distributor body counterclockwise.

g. When timing is correct, tighten distributor clamp screw securely. Then recheck timing again with light.

ALTERNATE TIMING METHOD

a. Remove #1 Spark Plug -- put your thumb over the spark plug hole and crank engine by hand until air is exhausting.

b. Continue to slowly crank engine until the mark listed in specifications lines up with the pointer in bell housing.

c. Loosen the distributor clamp bolt and rotate the distributor body until the contact points just start to open. (This may be more accurately checked by means of a test lamp connected between the distributor primary lead and the negative terminal of the battery -- when the points are closed the light will be ON and as soon as the points break the light will go OFF.)

d. Tighten distributor mounting bolts.

10. VACUUM TEST

Before making vacuum test, make certain cylinder head is securely tightened and that cylinder head gasket is not leaking. Air cleaner must be installed and must be clean to perform vacuum test. Manifold stud nuts must be tight and there must not be any leakage at gasket.

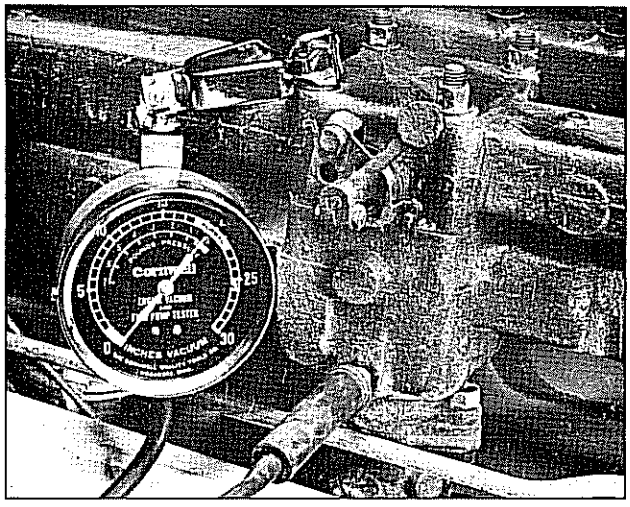


Plate 6643. Vacuum Test

(a) Remove plug at intake manifold and install vacuum gauge, see Plate 6443. Using the tachometer, set the engine idle speed at 450 to 500 RPM.

Idle Speed Adjustment: A stop screw controls action of the throttle valve. Turn screw clockwise for faster idle speed, or counterclockwise for slower idle speed. This adjustment should be made with a tachometer. Idling speed should be set for 450 to 500 revolutions per minute. Reset idle mixture screw if necessary, after throttle adjustment has been made, see Plate 6889.

(b) Check the vacuum gauge. A steady reading from 18" to 22" of mercury is a normal reading, indicating that valve and spark timing, valve seating, and piston ring sealing are all satisfactory.

(c) A steady but below normal reading indicates a condition common to all cylinders such as a leak at the carburetor gasket, late ignition or valve timing, or uniform piston ring and bore wear.

(d) A slowly fluctuating or drifting reading indicates that the fuel idle mixture is incorrect. Look for the cause in the fuel system.

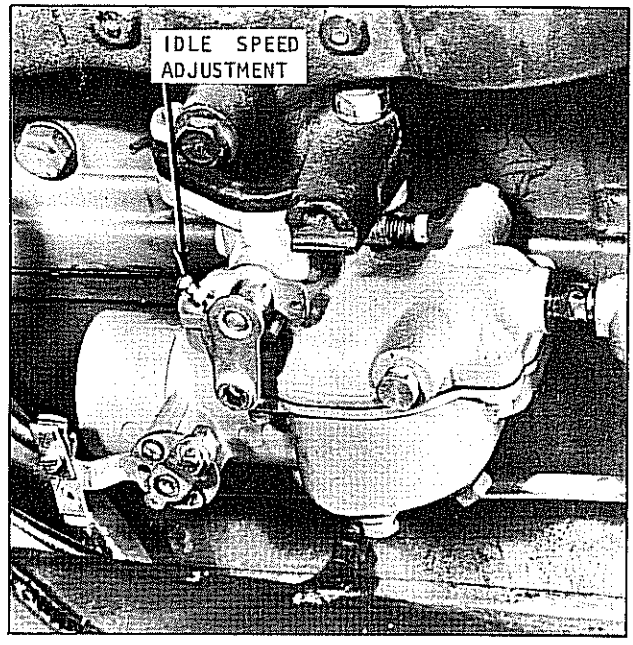


Plate 6889. Idle Speed Adjustment

(e) A rhythmic pulsating reading is caused by a condition affecting one or more cylinders, but not all, and indicates leaky valve, gasket blow-by, restricted intake port, or an electrical miss.

(f) An intermittent pulsating reading is caused by an occasional malfunction, such as a sticking valve (all valves may be erratic in operation if the valve springs are weak), electrical miss caused by insufficient distributor point tension or low coil voltage coupled with inconsistent spark plug gaps or fouled plugs, or dirt in the fuel system finding its way into passages of critical size or valve seats in the carburetor.

(g) A normal reading that quickly falls off (with engine running at approx. 1860 RPM) indicates exhaust back pressure caused by a restriction in the exhaust system.

(h) Make indicated corrections to bring vacuum to 18" to 22" of mercury normal reading.

Idle Fuel Adjustment: The carburetor is controlled by the idle adjustment screw that regulates the fuel-air mixture, see Plate 6889. Turning the screw clockwise, towards the seat, cuts off air increasing the suction on the idle jet and making the mixture richer. Turning the idle adjusting screw counterclockwise, or away from seat, allows more air to be mixed with the fuel making a leaner mixture for idling.

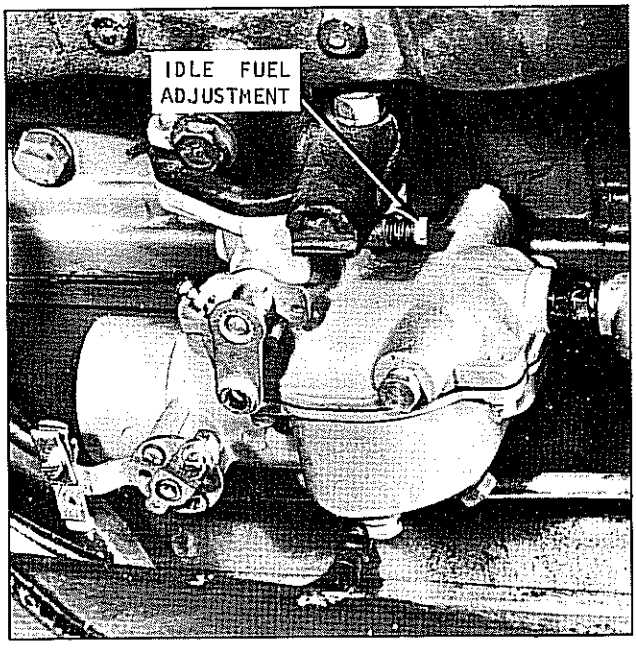


Plate 6888. Idle Fuel Adjustment

Turn the screw until highest vacuum reading is obtained. If vacuum gauge needle cannot be held steady after these adjustments have been made, report condition to designated person in authority.

If a gauge is not used, set the screw to a range at which engine idles its smoothest.

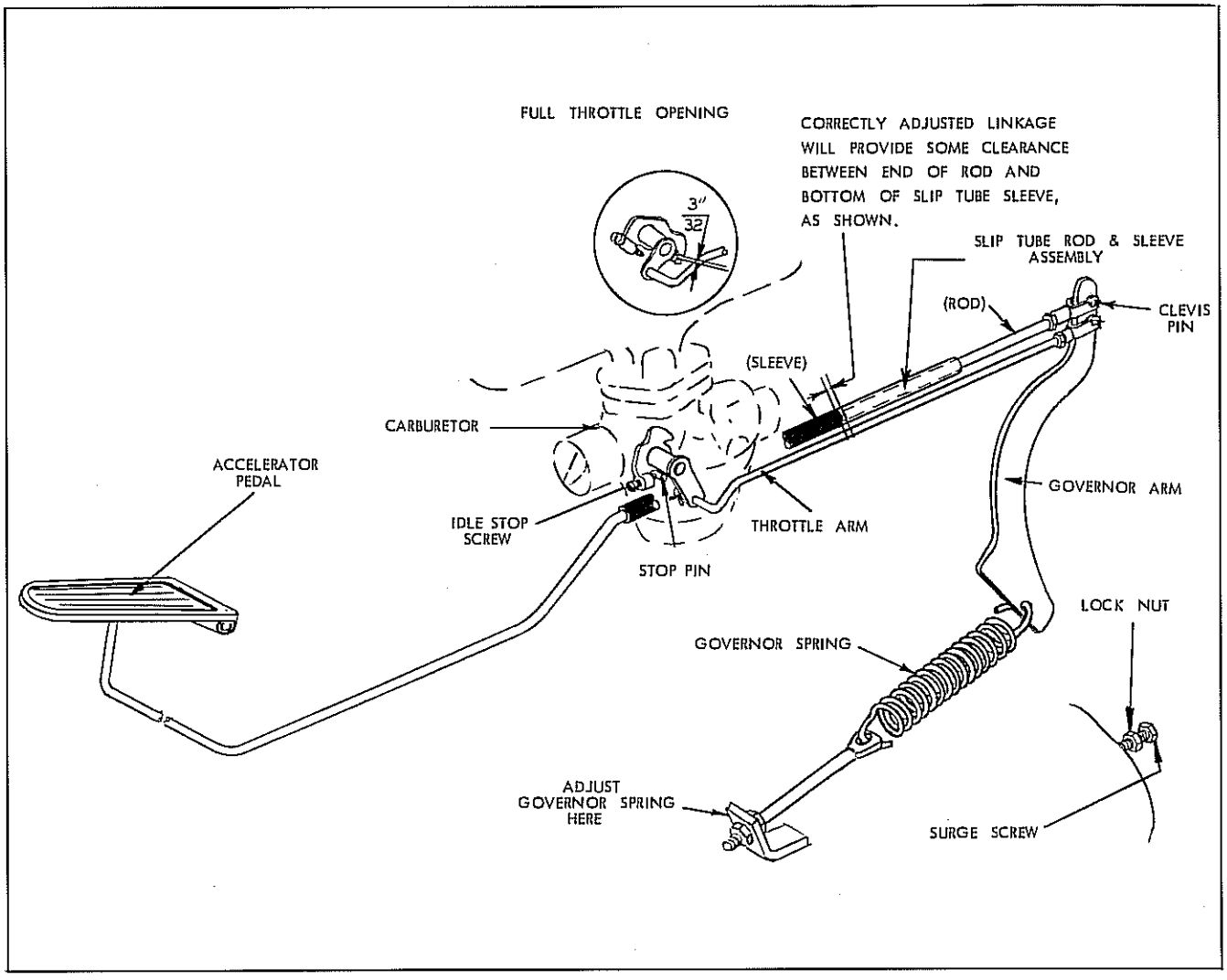


Plate 6660. Governor Adjustment

11. GOVERNOR ADJUSTMENT

With timing set on top dead center, and the carburetor properly adjusted to idle at 500 R.P.M., proceed with the following:

A. Loosen Governor Surge Screw Jam Nut and back Surge Screw out.

B. Disconnect Slip Tube Rod from Governor Arm by removing Clevis Pin.

N O T E

REMOVE CLEVIS PIN --- DO NOT LOOSEN CLEVIS JAM NUT.

C. Pull rod from Slip Tube Sleeve and thoroughly clean rod and sleeve. Lubricate rod with Graphite Grease after cleaning.

N O T E

THE SLIP TUBE ROD AND SLEEVE ASSEMBLY CANNOT FUNCTION PROPERLY IF IT IS BINDING, THEREFORE, THE ASSEMBLY MUST BE CLEAN AND PROPERLY LUBRICATED TO CORRECTLY ADJUST THE GOVERNOR.

D. With the Slip Tube and Sleeve Assembly disconnected, the Governor Arm will move forward. Check the Carburetor Throttle Opening. There should be 3/32 inch clearance between the Full Throttle Opening Stop and Stop Pin on the carburetor.

If adjustment is necessary, adjust the Throttle Rod between carburetor and

governor arm until the specified clearance (3/32 inch between STOP and STOP PIN) is obtained.

E. Push the Governor Arm toward rear of machine until the Idle Stop Screw contacts Stop Pin on the carburetor. Rotate the Governor Surge Screw inwards until screw comes in contact with the Governor Shaft Lever (when holding the Governor Arm rearward) ---- Do Not Rotate Screw So Far That The Idle Stop Screw Moves Away From Stop Pin. When correct surge screw adjustment is obtained, tighten jam nut.

F. With the use of an Electric Tachometer, start engine (Warm up to normal temperature) and check for NO -- LOAD 2350 R.P.M.

N O T E

GOVERNED R.P.M. SHOULD BE CHECKED WITH THE SLIP TUBE ROD DISCONNECTED BETWEEN THE ACCELERATOR LINKAGE AND THE GOVERNOR ARM.

If adjustment is necessary, adjust the Governor Spring, see Plate 6660.

G. Install Slip Tube over rod. Attach Rod Clevis to Governor Arm with Clevis Pin.

I M P O R T A N T

WITH IGNITION OFF, DEPRESS ACCELERATOR PEDAL AND CHECK THROTTLE OPENING. IF THERE IS MORE THAN 3/32 INCH CLEARANCE BETWEEN THE FULL THROTTLE OPENING STOP AND STOP PIN (ON THE CARBURETOR), ADJUST THE SLIP TUBE CLEVIS, OR ACCELERATOR PEDAL LINKAGE TO OBTAIN THIS DIMENSION.

H. Start engine and again check for NO - LOAD 2350 R.P.M.

If specified R.P.M. is not obtained, check for binding linkage, bent Slip Tube, etc., free up, straighten or repair as required.

STARTING MOTOR

1. Remove end plate (or Brush Cover) from starter. Use a wire hook to lift a brush spring and remove brush from holder. Compare brush size with that of a new brush. If brush is worn beyond half the original size, or if brushes are jammed, chipped, or broken they must be replaced.

CAUTION

NEVER ALLOW SPRING TO SNAP DOWN ON BRUSHES.

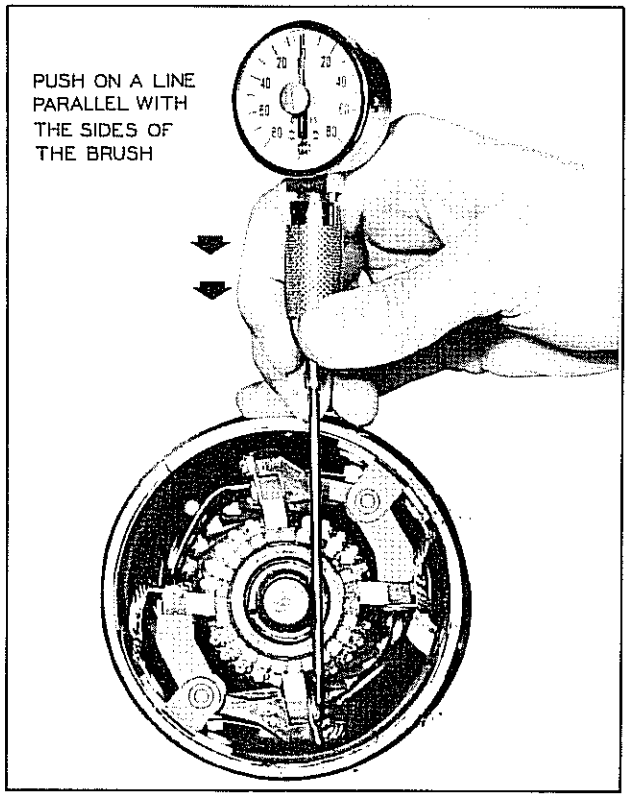


Plate 6449 Checking Brush Spring Tension

2. Check for Brush Spring Tension, refer to Specifications. Refer to the following procedures for checking spring tension.

Measuring Brush Spring Tension - Reaction Type Brushes. Hook the scale under the brush spring near the end and push or pull on a line parallel to the sides of the brush. To assist in telling the exact instant that the pressure is relieved, a small strip of paper can be placed under the brush. Pull slightly on the paper and the paper will slip out at the correct instant for reading the spring scale.

Measuring Spring Tension - Swinging Type Brushes: Hook the spring scale under the brush screw tight against the brush and push or pull on a line parallel to the sides of the brush. Take the reading just as the brush leaves the commutator. Pulling slightly on a strip of paper which has been placed under the brush will indicate when the brush leaves the commutator and the correct instant for reading the spring scale.

3. If commutator is glazed or dirty, clean with a strip of No. 00 sandpaper. Blow out all dirt and grit with compressed air.

CAUTION

DO NOT USE EMERY CLOTH TO CLEAN COMMUTATOR.

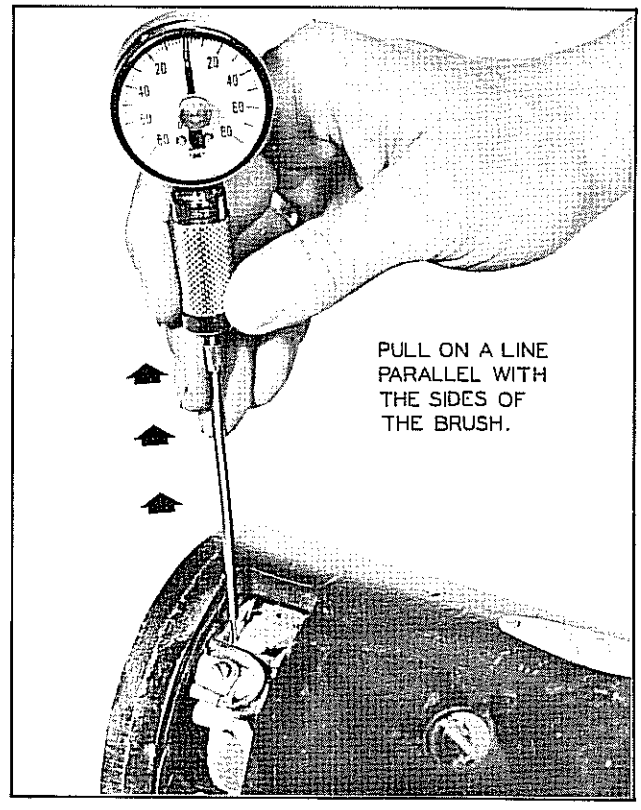


Plate 6450. Checking Brush Spring Tension

Condition Test: Use one of the two following methods to determine whether the starting motor should be removed from the engine for inspection, service or replacement.

1. First Method: Operate the starting motor by disconnecting the battery cable from the solenoid switch and holding the cable terminal firmly against the starting motor terminal, using a battery known to be fully charged and in good condition. To do this it will be necessary to remove the solenoid switch.

2. If the motor reacts correctly, and the drive mechanism engages and disengages each time the starting motor is operated, the starting motor is in good condition.

3. If motor does not react properly, it must be removed for inspection or replacement.

4. Second Method: Using a voltmeter and a battery (fully charged) that is in good condition, connect positive lead of test voltmeter to positive terminal of battery and negative lead of voltmeter to negative (grounded) terminal of battery. Record voltmeter reading. Now pull high-tension wire from ignition coil so engine will not start when starter is engaged. Connect positive lead of test voltmeter to ground and negative lead of test voltmeter to starter switch terminal. Turn ignition switch to start position and note voltmeter reading. Compare this reading with the previously recorded reading. If the voltage drop is more than 4 volts, or if the second reading is below 8 volts, the starting motor should be removed from the engine for further testing and repair, or replacement.

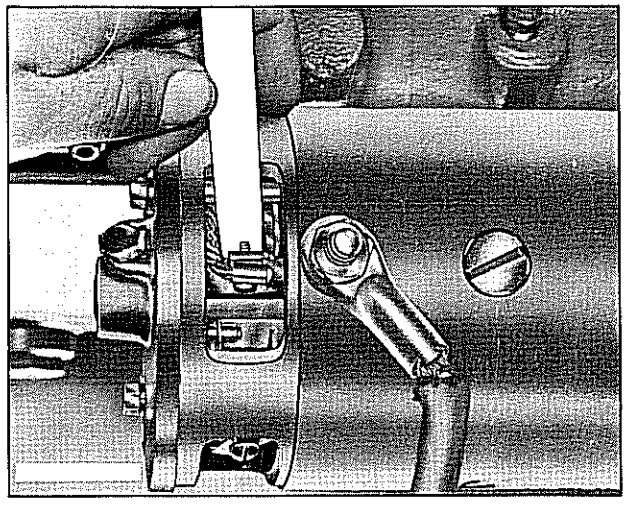


Plate 3436. Seating Brushes

NOTE

BLOW OUT ABRASIVE PARTICLES AFTER SEATING BRUSHES.

GENERATOR

1. Remove end plate (or Brush Cover) from generator. Use a wire hook to lift a brush spring and remove brush from holder. Compare brush size with that of a new brush. If brush is worn beyond half the original size, or if brushes are jammed, chipped, or broken they must be replaced.

CAUTION

NEVER ALLOW SPRING TO SNAP DOWN ON BRUSHES.

New brushes can be seated with a brush seating stone. When held against the revolving commutator, the abrasive material carries under the brushes, seating them in a few seconds. Blow out abrasive particles after seating brushes. See Plate 3436.

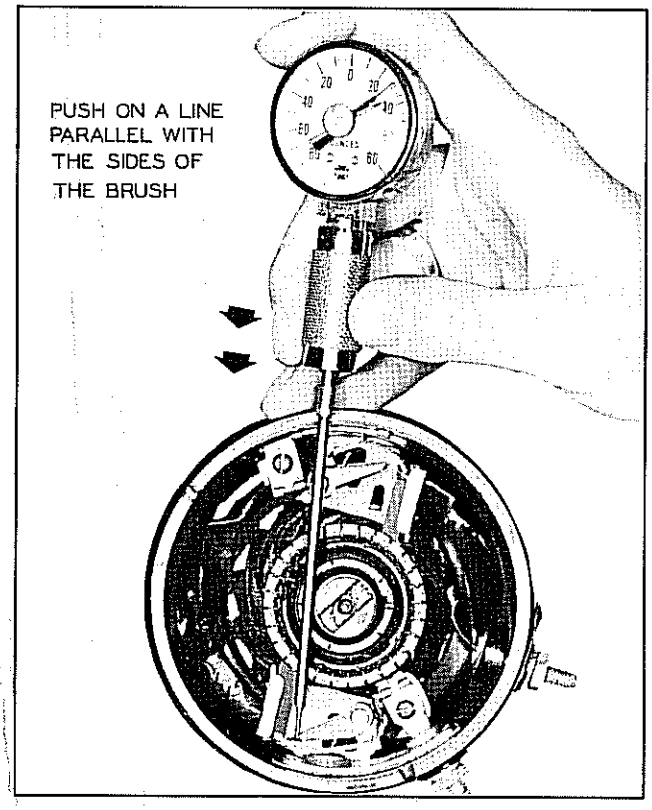


Plate 6451. Checking Brush Spring Tension

Using a spring scale, check for proper brush spring tension. Refer to Specifications. Refer to the following procedures for checking spring tension.

Measuring Brush Spring Tension - Reaction Type Brushes. Hook the scale under the brush spring near the end and push or pull on a line parallel to the sides of the brush. To assist in telling the exact instant that the pressure is relieved, a small strip of paper can be placed under the brush. Pull slightly on the paper and the paper will slip out at the correct instant for reading the spring scale.

Measuring Spring Tension - Swinging Type Brushes: Hook the spring scale under the brush screw tight against the brush and push or pull on a line parallel to the sides of the brush. Take the reading just as the brush leaves the commutator. Pulling slightly on a strip of paper which has been placed under the brush will indicate when the brush leaves the commutator and the correct instant for reading the spring scale.

3. If commutator is glazed or dirty, clean with a strip of No. 00 sandpaper. Blow out all dirt and grit with compressed air.

CAUTION

DO NOT USE EMERY CLOTH TO CLEAN COMMUTATOR.

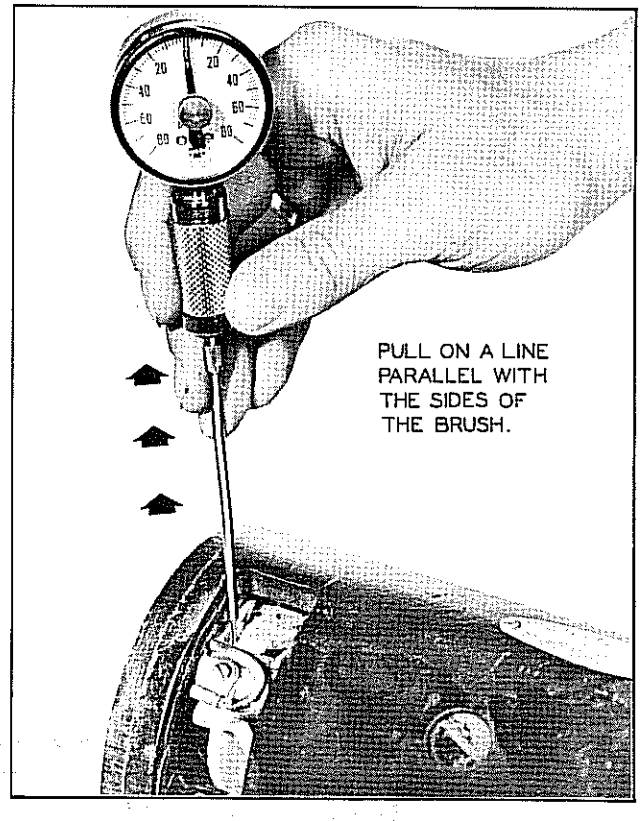


Plate 6450. Checking Brush Spring Tension

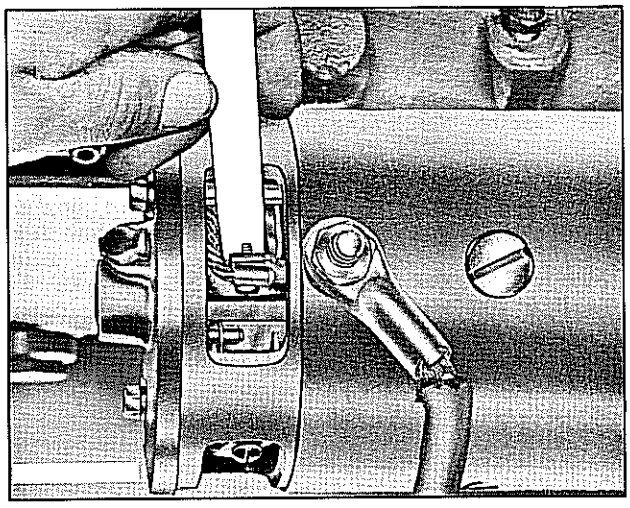


Plate 3436. Seating Brushes

NOTE

BLOW OUT ABRASIVE PARTICLES AFTER SEATING BRUSHES.

REGULATOR

Inspect regulator leads for frayed or worn condition. Check to make certain that leads are tight and securely mounted.

WIRING

Check all wires for loose or corroded connections and for fraying. Replace defective wires.

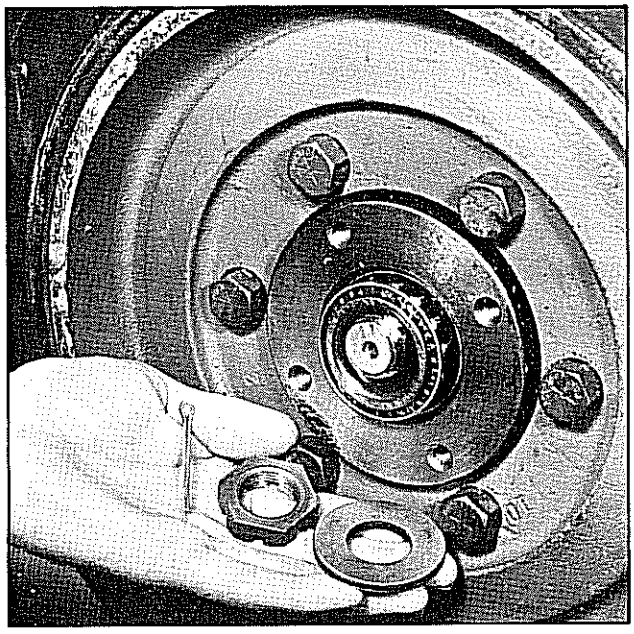


Plate 6640. Typical Wheel Bearings

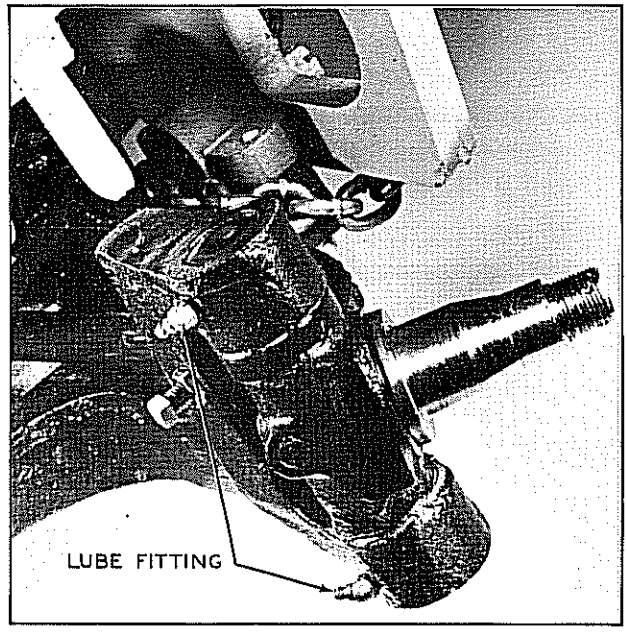


Plate 6641. Typical Spindle

STEERING WHEEL BEARINGS

Adjustment

1. Raise rear of machine so that tires clear floor.

WARNING

AFTER RAISING MACHINE AND BEFORE DOING ANY MAINTENANCE OR MAINTENANCE CHECKS, MAKE SURE SUPPORTS OF ADEQUATE STRENGTH ARE PLACED SECURELY UNDER THE MACHINE (IN A POSITION SO AS NOT TO CAUSE TEETERING) TO PREVENT THE POSSIBILITY OF ACCIDENTAL LOWERING OR FALLING OF THE MACHINE AND CAUSING INJURY TO PERSONNEL.

2. Inspect adjustment of bearings by gripping top and bottom then front and rear, chucking in and out to determine wobble.

N O T E

Before making wheel bearing adjustments, be sure play is in the wheel bearing and not in the king pins. 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 spindle cotter pin. Tighten nut with a 12" wrench and at the same time rotate 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 the nut 1/6 to 1/4 turn allowing the wheel to rotate freely. Secure nut at this position with a new cotter pin and replace hub cap.

Lubrication

1. Remove wheels after 1000 hours or every six months of operation. Clean bearings and repack with NLGI #1 (Amolith grease EP #1 or its equivalent).

2. Install wheels and adjust wheel bearings as previously described.

CLEAN AND REPACK AXLE ENDS

Every 1000 operating hours remove and repack the axle ends with NLGI #1 (Amolith grease #1 or its equivalent).

1. Tilt upright back. Place solid heavy blocks under each upright rail. Tilt upright forward until vertical to the floor. This should allow the drive wheels to clean the floor. Remove drive wheels.

2. Remove hub cap, cotter pin, washer, spindle nut and pull hub assembly from spindle.

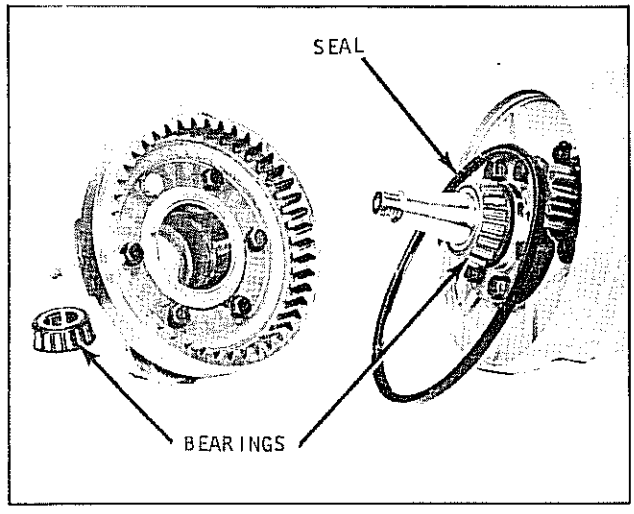


Plate 6892. Axle End Assembly

3. Remove bearings and clean in a Stoddard type cleaning solvent. Slosh bearings up and down in solvent. Remove and tap large side of bearing against a block of wood to dislodge solidified particles of lubricant. Repeat operation until bearings are thoroughly clean. Blow bearings dry with compressed air. Direct air stream across bearing to avoid spinning. Slowly rotate bearing by hand to facilitate drying. Dip bearings in gear oil and wrap in paper until they are to be reinstalled.

4. Clean ring gear, pinion drive shaft, hub assembly, spindle and spindle support.

5. Inspect seal for cuts, scratches and nicks. If is necessary to replace seal if such a condition is found.

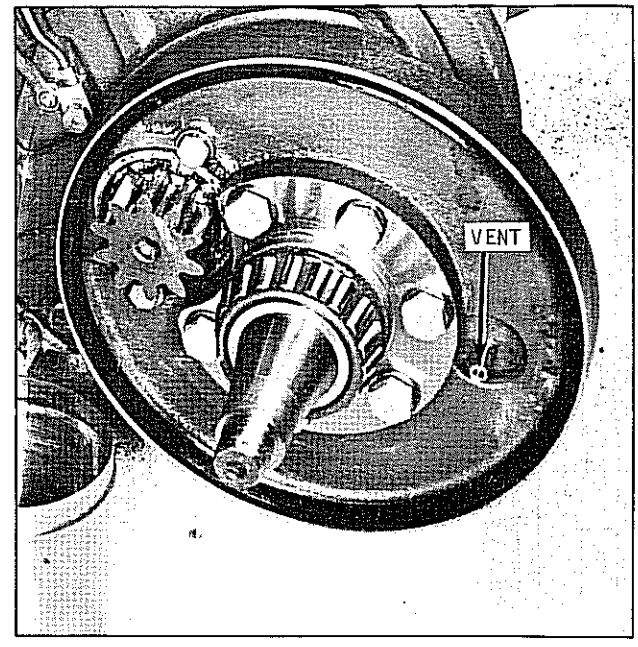


Plate 6893. Axle End Vent

6. Repack each axle end (bearings, spindle, ring gear and pinion) with one pound of NLGI #1 (Amolith grease #1 or its equivalent). Check the axle end vent for obstructions. the vent must be open.

7. Install bearings, seal and hub assembly.

8. Install washer, spindle nut and hub cap.

9. Tilt upright back and remove blocking.

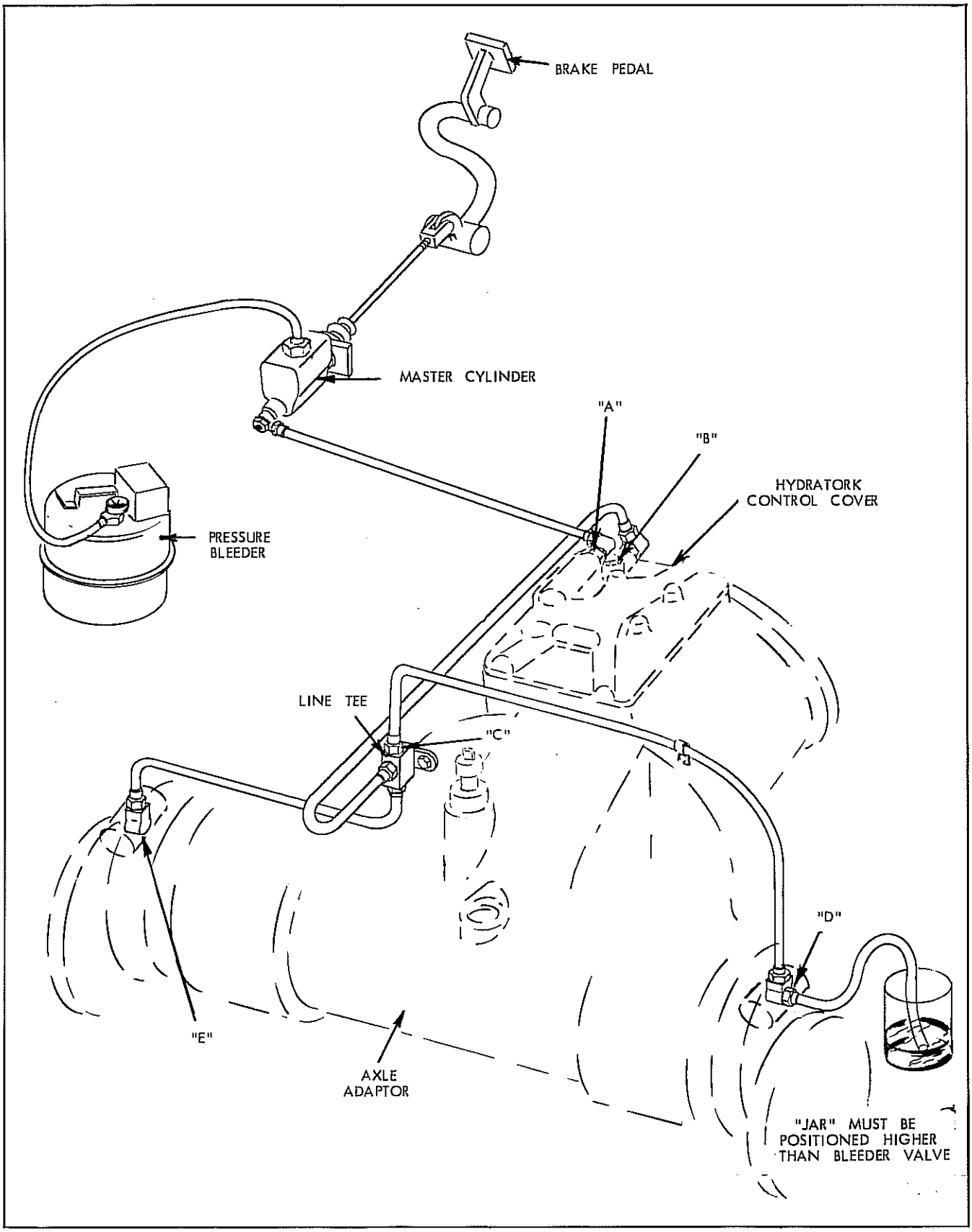


Plate 6881. Bleeding Brake System

BRAKE BLEEDING PROCEDURE

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 the system in order to expel air bubbles which have become mixed with the fluid. The necessity of bleeding is indicated by a soft spongy pedal, or at any time a brake line is removed (or broken) the system must be bled.

Step 1. Tilt upright back. Place solid heavy blocks under each upright rail. Tilt upright forward until vertical to the floor. This should allow the drive wheels to clear the floor. Remove drive wheels.

W A R N I N G

DEFLATE TIRES BEFORE REMOVING WHEELS FROM

MACHINES EQUIPPED WITH PNEUMATIC TIRES.

Step 2. Check the brake pedal free travel (Refer to Specifications). Clean dirt from around the filler cap of the master cylinder reservoir. Brake fluid should be within 1/4 of an inch from the top. With filler cap removed from the master cylinder, depress and release brake pedal. A small displacement of fluid should be noticed in the reservoir each time the pedal is actuated. If this happens, the brake pedal (upon being released) is returning the master cylinder piston to its normal position to open a cylinder port. This port must be open. If a noticeable displacement of fluid is not observed in the reservoir, during depression of the brake pedal, improper pedal free travel is indicated, and an adjustment is required.

Step 3. To properly bleed the system it is recommended that a pressure bleeder filled with about two quarts of S.A.E. 70R-3 heavy duty brake fluid be connected to the master cylinder reservoir. Pressure bleeder should then be pressurized to approximately 30 P.S.I.

Step 4. Loosen the brake line fitting at Point "A" (Plate 6881) enough to allow fluid and air to escape. Tighten fitting when escaping fluid is free of air bubbles.

Step 5. Loosen inching valve-check-ball stop bolt at Point "B" (Plate 6881) and depress brake pedal to the floorboard and hold in this position until connection is retightened. This operation should be repeated until escaping fluid is free of air bubbles.

Step 6. Loosen line connection at highest position on "T" block (See Point "C", Plate 6881) and bleed in the same manner as described in Step 5.

Step 7. Install a bleeder hose on one of the wheel cylinder bleeder screws and submerge the unattached end of the hose in a clean transparent jar containing several inches of brake fluid. NOTE: DURING BLEEDING OF THE WHEEL CYLINDERS, THE JAR

SHOULD BE ELEVATED TO A POSITION HIGHER

THAN THE BLEEDER SCREW MAKING SURE THAT

THE END OF THE HOSE REMAINS SUBMERGED IN

THE FLUID AT ALL TIMES. Loosen bleeder screw and slowly push brake pedal to the floorboard and hold pedal in this position until bleeder screw is retightened. Repeat this operation until all air bubbles disappear and clear fluid is being pumped into the jar.

Step 8. Install bleeder hose on the remaining bleeder screw and proceed as in step seven.

Step 9. After all bleeding has been completed close the pressure bleeder shut-off cock and loosen hose connection at master cylinder to allow pressure to escape. Replace master cylinder cap.

Step 10. Replace drive wheels. (Inflate tires if they are of the pneumatic type). Tilt upright back and remove blocking from under each upright rail.

If a pressure bleeder is unavailable, the system may be bled manually by following Steps 2, 4, 5, 6, 7, 8 and 10. It must be remembered that the brake pedal should be depressed slowly and held to the floorboard until the line connections or bleeder screws are securely tightened. This prevents the possibility of air being drawn into the system during the bleeding operation. Check master cylinder reservoir level periodically during manual bleeding and fill to within 1/4 of an inch of the top as required.

BRAKE ADJUSTERS (2ND. DESIGN)

When the brake system is operating properly, the cam like action of the reaction arm allows self-adjustment for the total thickness of the brake linings, without any noticeable increase in brake pedal free travel. The self-adjustment feature eliminates the need for manual adjustment of the brakes.

When the brake linings become worn beyond their designed limits there will be a noticeable change in the brake pedal effort required to stop the machine or, brakes will become noisy during application. If either of these conditions exist the axle ends should be removed so an inspection of the brake linings can be made to determine their further serviceability.

Before installing new brake linings the adjuster arm mounting bolt torque should be checked with a torque wrench. The bolt should not turn in the backing plate until a minimum of 40 lb. inches or a maximum of 50 lb. inches is reached. See Plate 7198 for correct procedure.

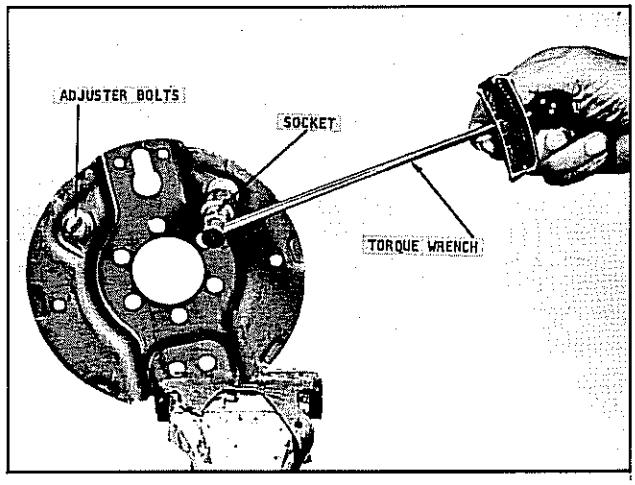


Plate 7198. Checking Adjuster Arm Torque

The backing plate and adjuster arm components must be clean, dry and free from rust when this torque test is made.

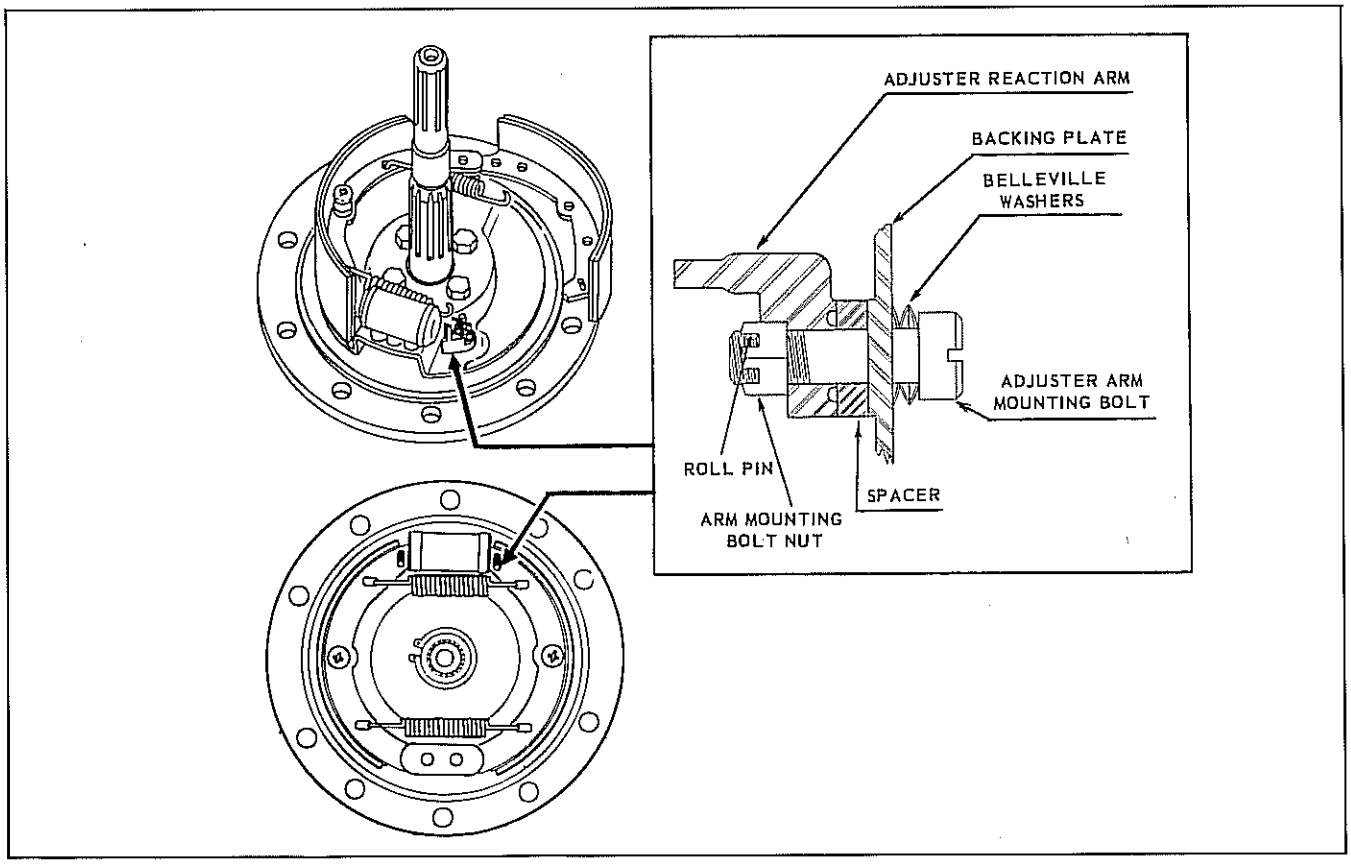


Plate 7494. Automatic Brake Adjusters

BRAKE ADJUSTERS (1ST DESIGN)

The mechanical brake adjusters maintain proper brake lining clearance until such time as the brake linings require replacement.

If it is found that during brake applications the brake pedal travel has gradually become excessive (and the system has been properly bled and pedal free travel is correctly adjusted) the brake linings are worm beyond their designed limits and the mechanical adjusters can no longer maintain proper brake lining clearance. If lining wear has reached this point and replacement of linings are necessary report to designated person in authority. When the Adjuster Reaction Arm INDEX WASHER "High Spot" rotates past the backing plate index washer "High Spot", excessive pedal travel will be noticed indicating that the brake linings have worn beyond their designed limits.

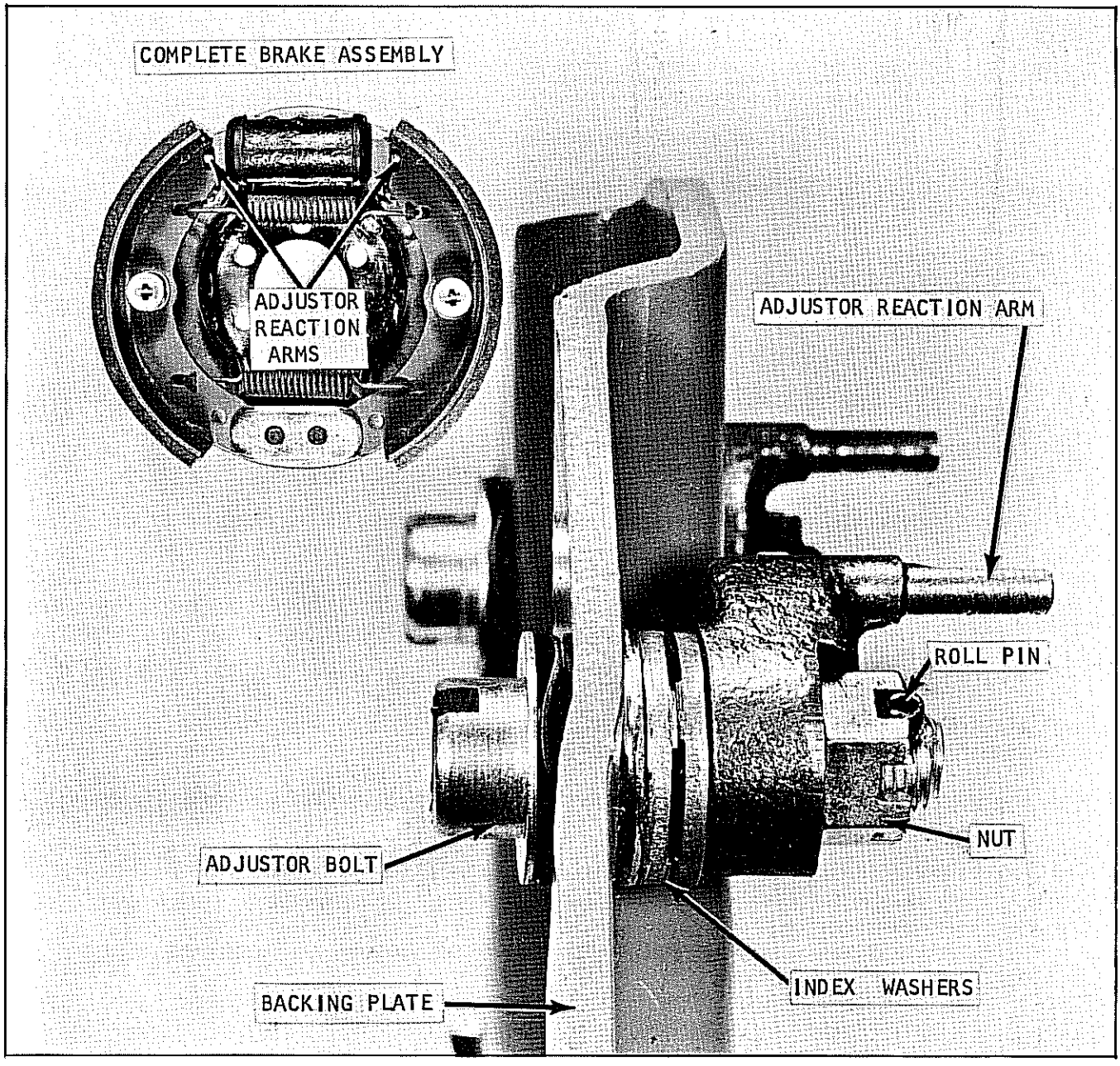


Plate 6890. Mechanical Brake Adjusters

HAND BRAKE ADJUSTMENT

The brake on this model is a "V" pulley type drum mounted on the end of the transmission pinion shaft with a "V" shaped brake shoe that fits into the drum groove. When lifting hand brake lever, pressure is applied to the brake shoe which presses the shoe against (into) the drum.

To adjust the hand brake, refer to Plate 5270 and proceed as follows:

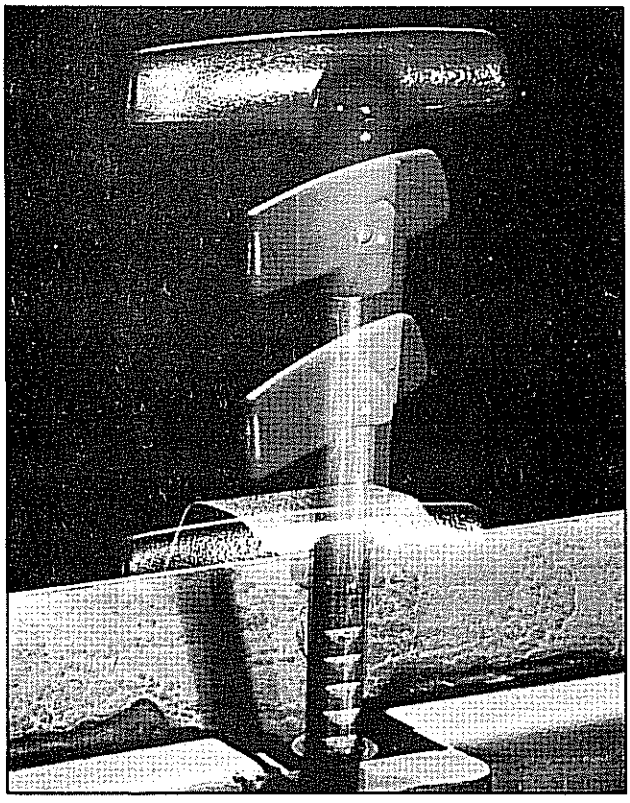


Plate 7482. Hand Brake (Actuating) Lever

Adjustment is made at the Parking Brake Draw Rod LOCK SLEEVE and LOCK NUT, Plate 5270.

These items protrude downward through the bottom-side of the Converter Housing.

1. Loosen the Lock Nut several turns.

2. Rotate the Lock Sleeve counterclockwise to close gap between brake shoe and brake drum.

3. Hold the Lock Sleeve and tighten the Lock Nut until snug against Cam Lever, then back off lock nut one half to three quarters of a turn.

4. Test Adjustment: Test adjustment while occupying the driver's seat.

Fully apply the hand brake. Full application of hand brake should require 1 1/2 to 2 inches of travel. If the lever travel exceeds this amount the linkage should be adjusted.

Test Parking Brake Effectiveness - must be capable of holding the truck, with full rated load, on a 15% grade.

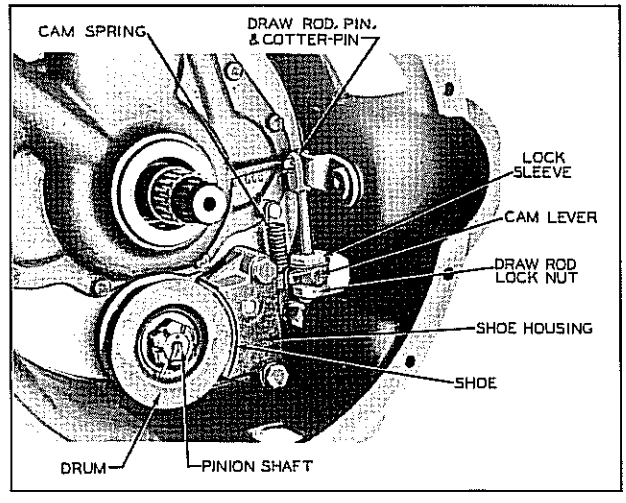


Plate 5270. Adjusting Brake

COOLING SYSTEM

Radiator Pressure Caps:

WARNING

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

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.

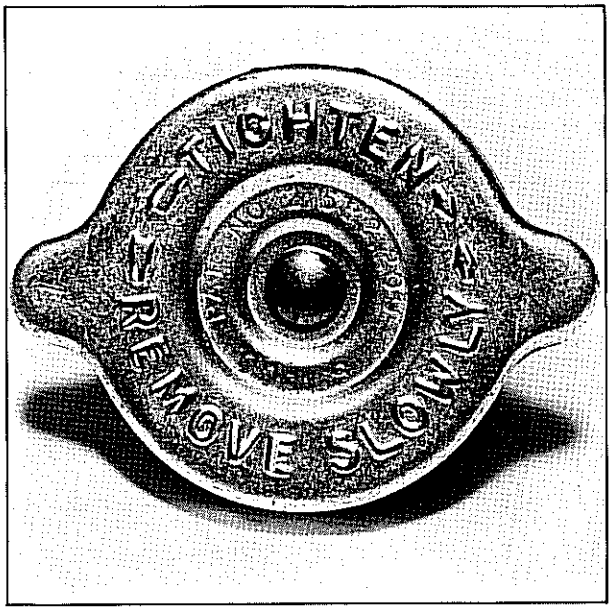


Plate 6458. Radiator Pressure Cap

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. PRESSURE RATING 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 pass thru 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.

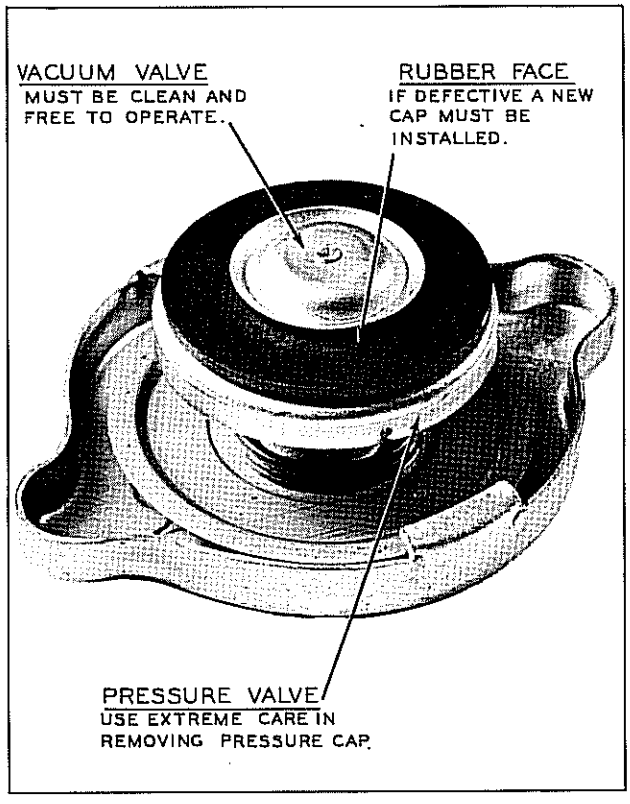


Plate 6459. Pressure Cap Gasket, Valve and Valve Gasket

NOTE

EXHAUST GAS LEAKAGE BETWEEN CYLINDER HEAD AND GASKET ALSO RESULTS IN CORROSION. 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".

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 soluable 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.

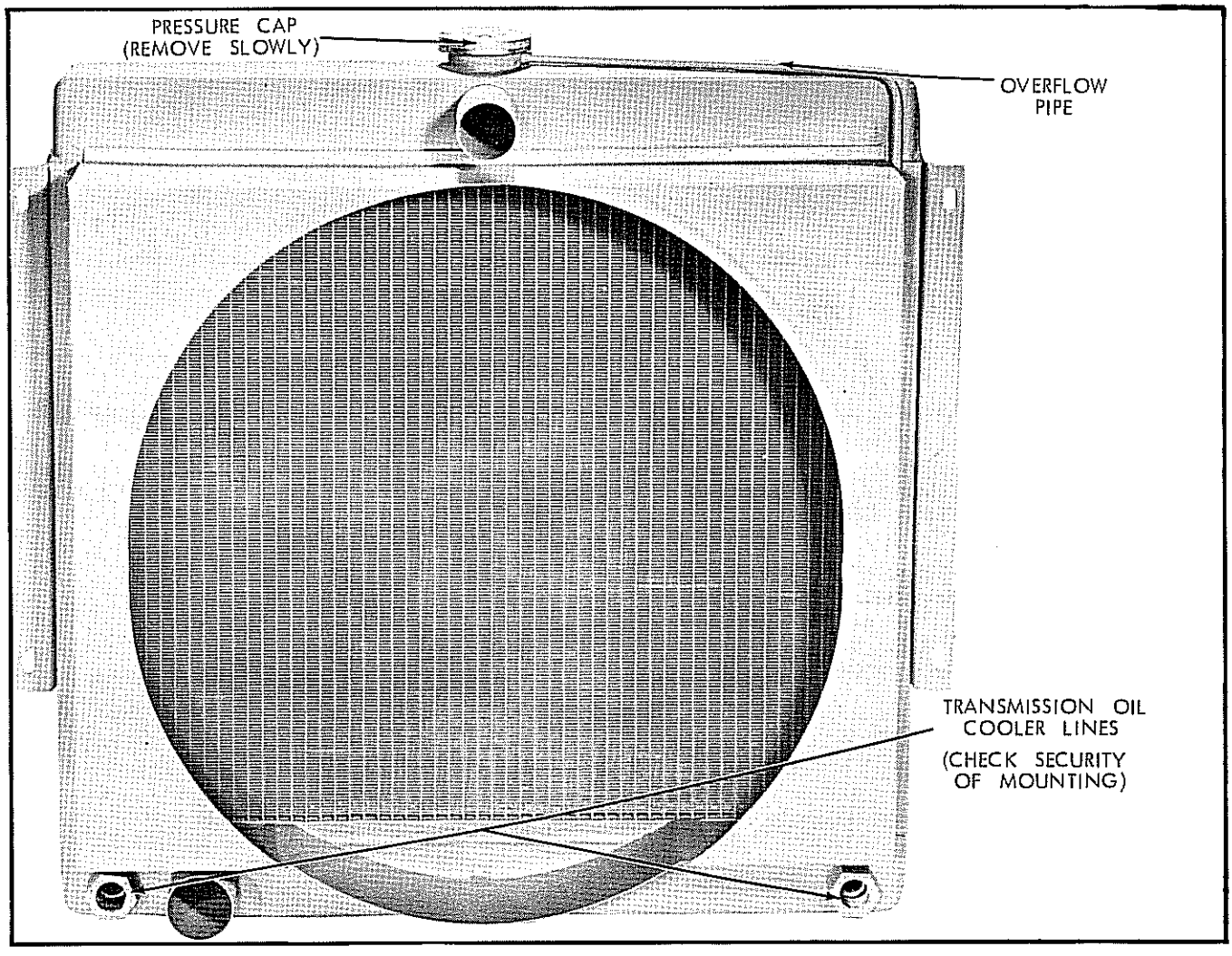


Plate 6460. Typical Radiator

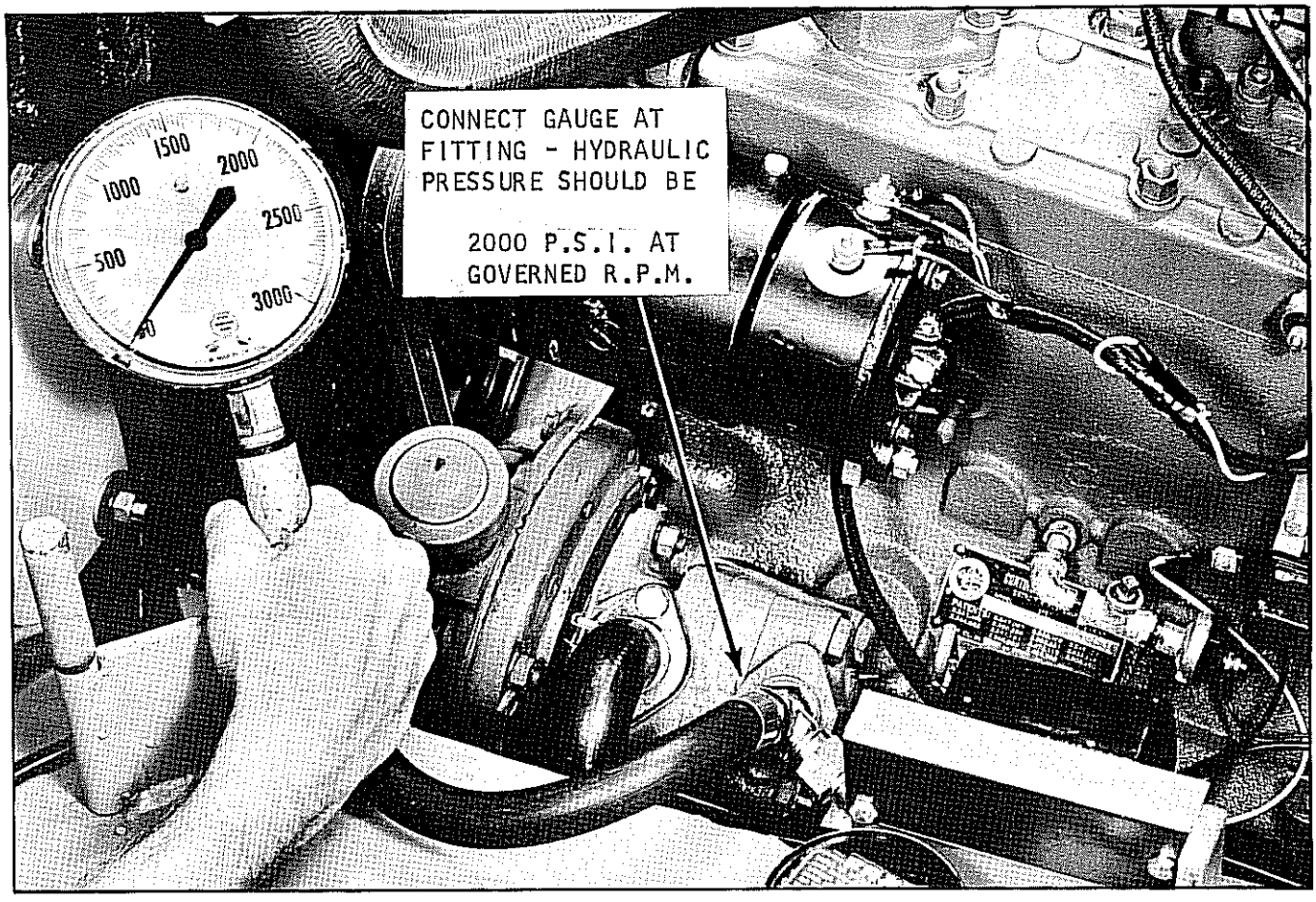


Figure 1503a. Main Hydraulic System Pressure Check

MAIN HYDRAULIC SYSTEM
PRESSURE CHECK

Make a pressure check of the Hydraulic System as shown in Figure 1503a.

System pressure should be checked with engine running at Governed 2350 R.P.M. Move lift lever to "raise" position. When forks reach maximum lift height, check gauge reading. Pressure should be 2000 P.S.I.

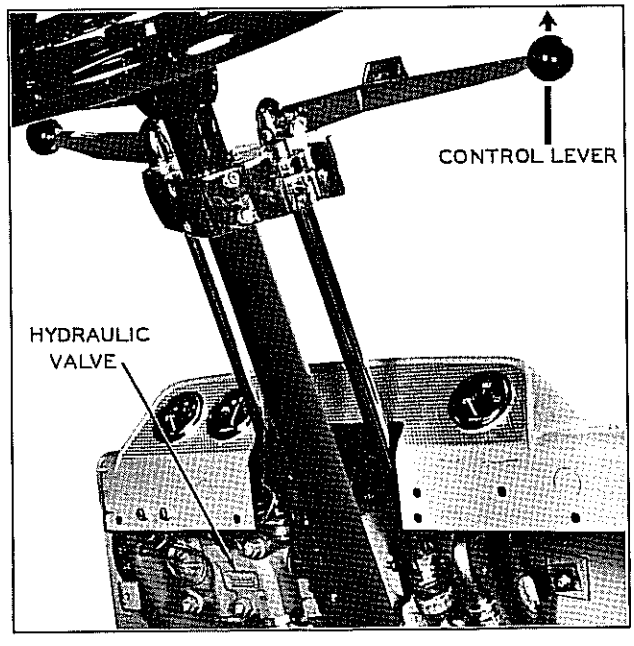


Figure 1503b. Hydraulic Control Lever

PRESSURE CHECKS
HYDRATORK TRANSMISSION

MINIMUM TOOLS REQUIRED
1 - Pressure Gauge 0 -to- 250 P.S.I.
1 - Tachometer

1. Completely clean the truck and hydratork before making pressure checks. This should include cleaning the complete machine with steam. Making sure the radiator and its tubes are clean externally and internally.

2. Check Transmission Fluid Level.

Run machine in Forward and Reverse for about one to three minutes total. Stop engine and check fluid level. Fill if necessary to the "FULL" mark on the Transmission Dip Stick.

3. Check Brake Pedal Free Travel.

The hydraulic inching (brake) pedal should contact the floor board with the pedal in the released (up) position.

Pedal free travel should be measured from bottom of floor board to top of pedal arm, or from top pedal position to where pedal meets resistance from the master cylinder when depressing pedal by hand. Refer to page 100H 302 for Pedal Free Travel and illustrations.

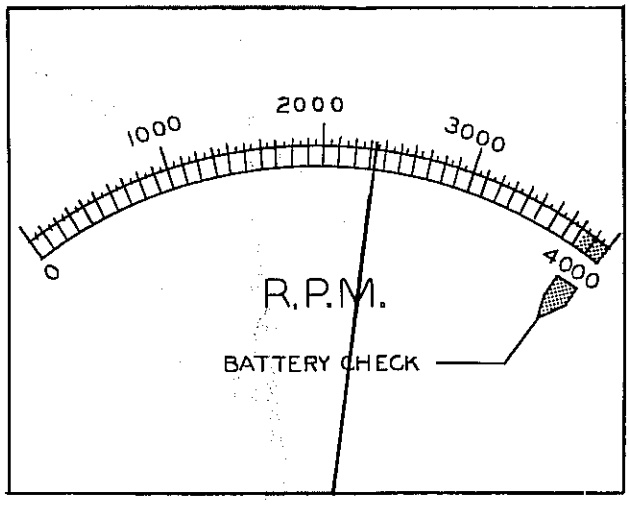


Figure 1703a. Check NO-LOAD R.P.M.

4. Check engine for prescribed NO-LOAD 2350 R.P.M.

5. Check engine for prescribed 2200 R.P.M. with rated load. This may be done by holding the tilt lever in the back position.
Engine must be properly tuned before making transmission pressure checks.

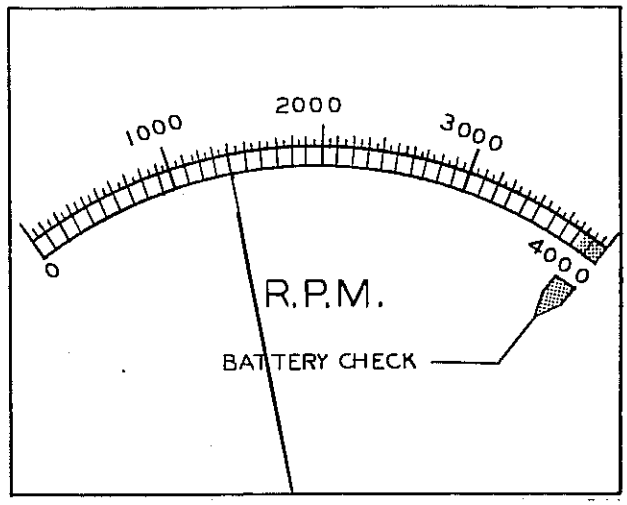


Figure 1703b. Normal Engine Stall

6. Check for normal engine stall by positioning machine against an immovable object. With machine in gear, accelerate to full throttle position. The normal engine stall R.P.M. is 1350 to 1500.

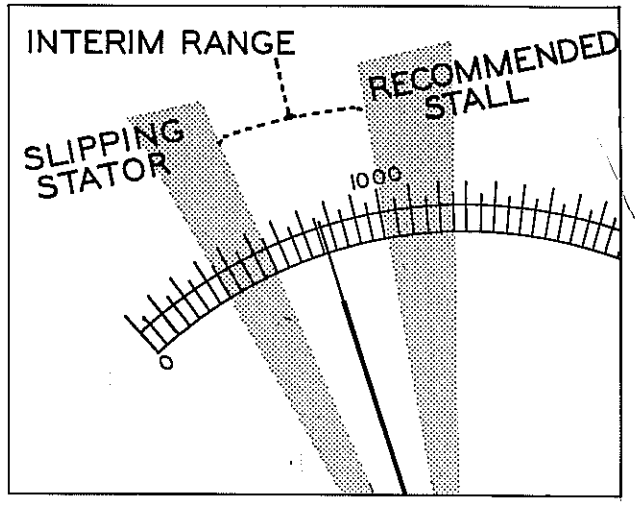
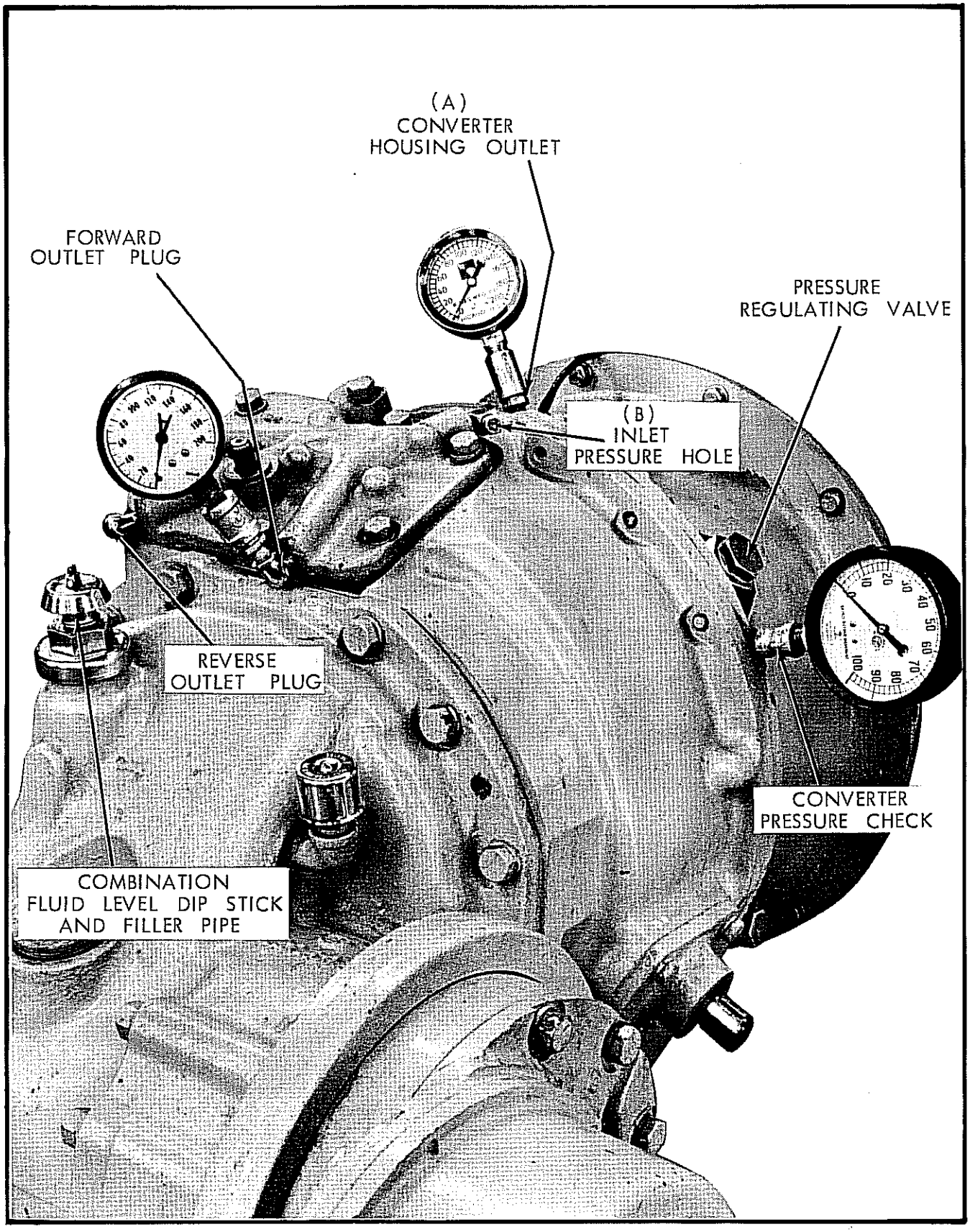


Figure 1703c. Low INTERIM stall

Low Interim Range Engine Stall (1000 -to- 1350 R.P.M.) indicates a loss of engine power. Report to designated person in authority.



(Figure 1704a.) Plate 6658. Transmission Pressure Checks

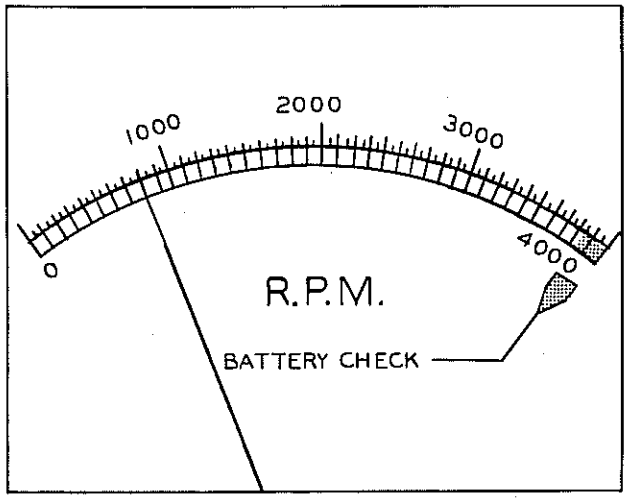


Figure 1705a. Low Engine Stall

Low — Low Engine Stall (650 -to- 900 R.P.M.) indicates Converter Stator slipping. Converter must be replaced. Report to designated person in authority.

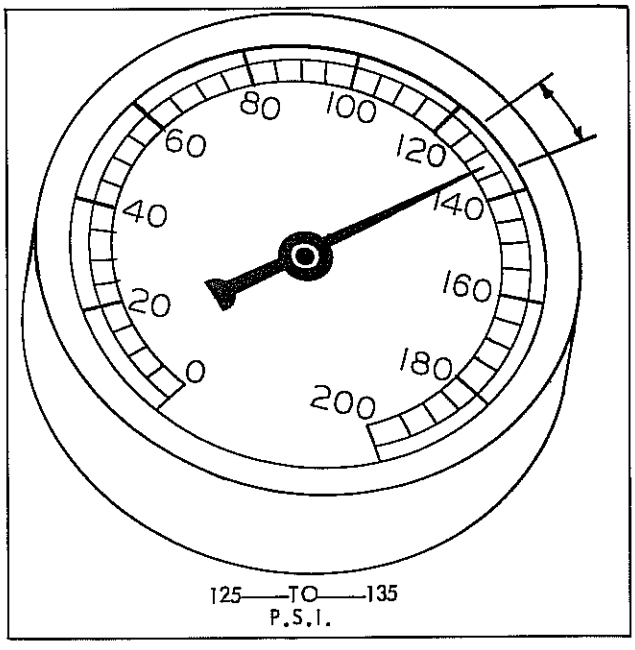


Figure 1705b. Pump Pressure Check

7. Pump Pressure Check, see Figures 1704a and 1705b.

(A) Remove pipe plug and install pressure gauge at the Converter Housing Outlet (A), see Fig. 1704a. Check pressure with transmission in NEUTRAL and engine running at 1400 R.P.M. Pressure should be 125 -to- 135 P.S.I. (Figure 1705b.)

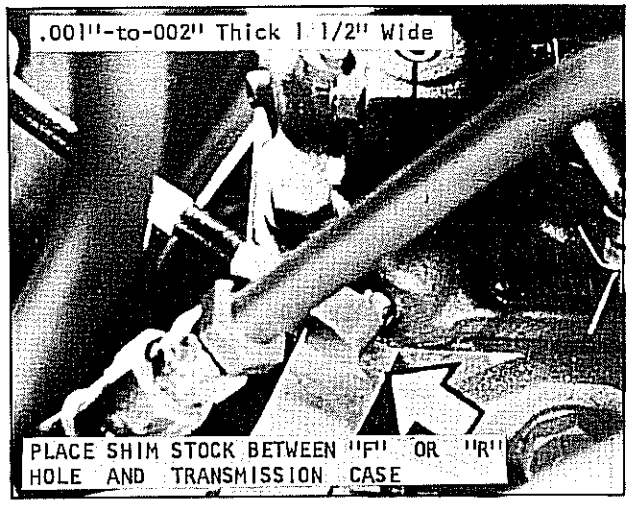


Figure 1705c. Install Shim Stock

(B) If pressure is low, place shim stock (.001" -to- .002" thick -x- 1 1/2" wide) between the Inlet Pressure Hole (B) of the Transmission Control Cover and Transmission Case, see Figure 1705c.

(C) Check pressure again. Pressure should be 125 -to- 135 P.S.I.

(D) If pressure is still low, the Transmission Pump or Pressure Regulating Valve may be defective. Report to designated person in authority.

8. Control Cover - Selector Check.

(A) Check control cover or selectors at either Forward or Reverse Outlet Plugs, see Figure 1704a.

Securely block machine so it cannot move. Install pressure gauge at either the Forward or Reverse Outlet Plugs. Start engine and place Directional Control Lever in either Forward or Reverse (depending upon which selector is being checked). Run engine at 1400 R.P.M. Pressure should be 125 -to- 135 P.S.I. (Figure 1705d.)

(B) If pressure is low, insert shim stock (.001" -to- .002" thick -x- 1 1/2" wide) between either the Forward or Reverse Hole (whichever one was used) and the Transmission Case. Check pressure again. Pressure should be 125 -to- 135 P.S.I. If pressure is low, trouble is in the control cover. If pressure is 125 -to- 135 P.S.I., the trouble is inside of the transmission. Report to designated person in authority.

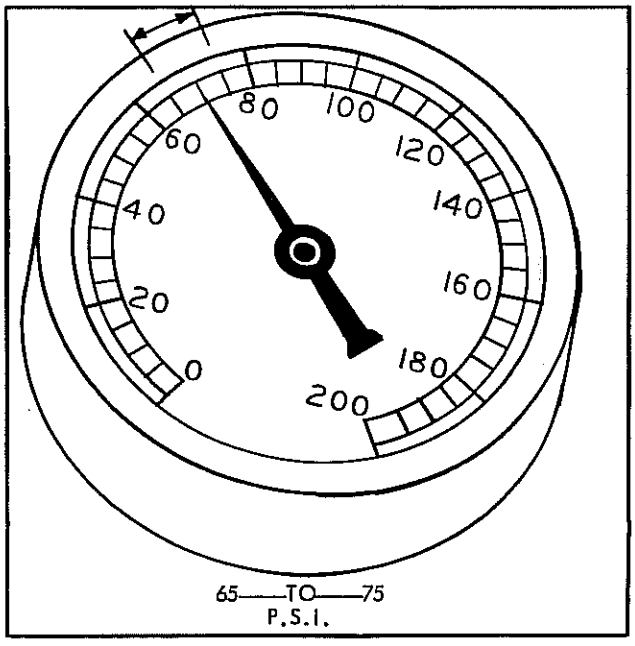


Figure 1707a. Converter Pressure Check

9. Converter Pressure Check, see Figures 1704a and 1707a.

(A) Converter Pressure should be checked with transmission in NEUTRAL and engine running at 1400 R.P.M. Pressure should be 65 -to- 75 P.S.I.

(B) If pressure is too high, the Convertor Pressure Regulator may be at fault; or if pressure is low, the Pressure Regulator may be defective, there may be internal leaks, bad seals, or a worn pump. Report to designated person in authority.

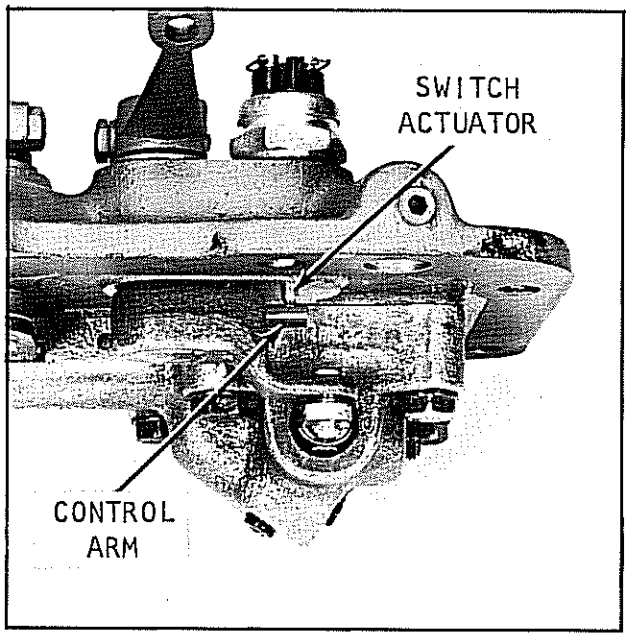


Figure 1793a. Starting Switch Actuated (NEUTRAL)

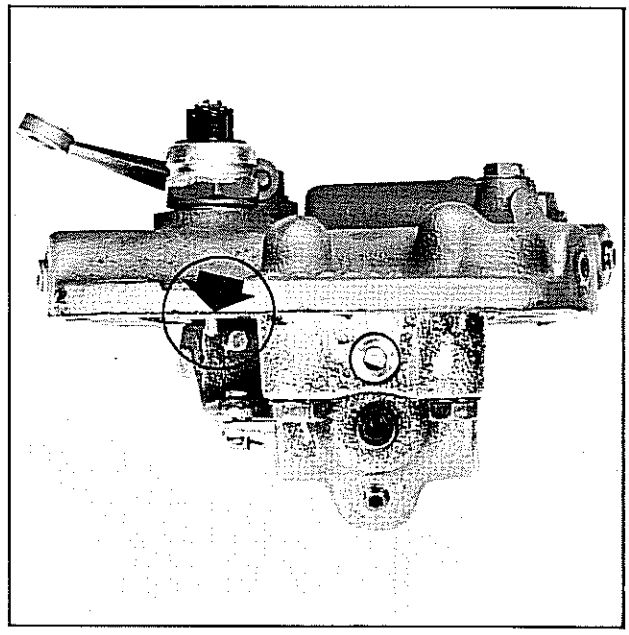


Figure 1793b. Starting Switch Unactuated (F or R)

NEUTRAL STARTING SWITCH

The neutral starting switch should be adjusted so that machine will not start except when the transmission control is in the (dead) neutral position.

ADJUSTMENT

1. With driver's seat occupied and transmission in gear hold starting switch in actuated position and gently move shift lever towards neutral position.

2. If engine does not start, repeat operation in opposite direction.

3. If engine starts, coming from either direction on the shift lever prior to reaching neutral, switch should be adjusted by means of shims underneath the switch until engine will not start unless it is in (dead) neutral; that is, vehicle will not move regardless of shift lever position during the starting cycle.

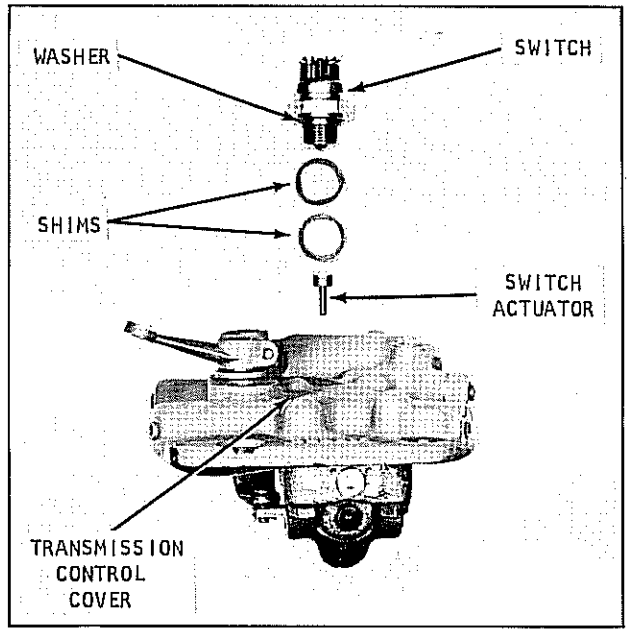


Figure 1793c. Neutral Starting Switch Adjustment

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 Assembly. These adjustments may be accomplished as follows:

Before checking for proper roller clearance, check to be sure the Inner Slide contacts with both Fabreeka (Stop) Pads at the same time when lowering the Inner Slide.

If adjustment is required, add or remove shims between Fabreeka (Stop) Pads located on the Outer Rail Tie Bar Assembly.

NOTE: More shims may be required on one side than the other in order to allow the Inner Slide to come in contact with both Fabreeka (Stop) Pads at the same time when lowering the Inner Slide.

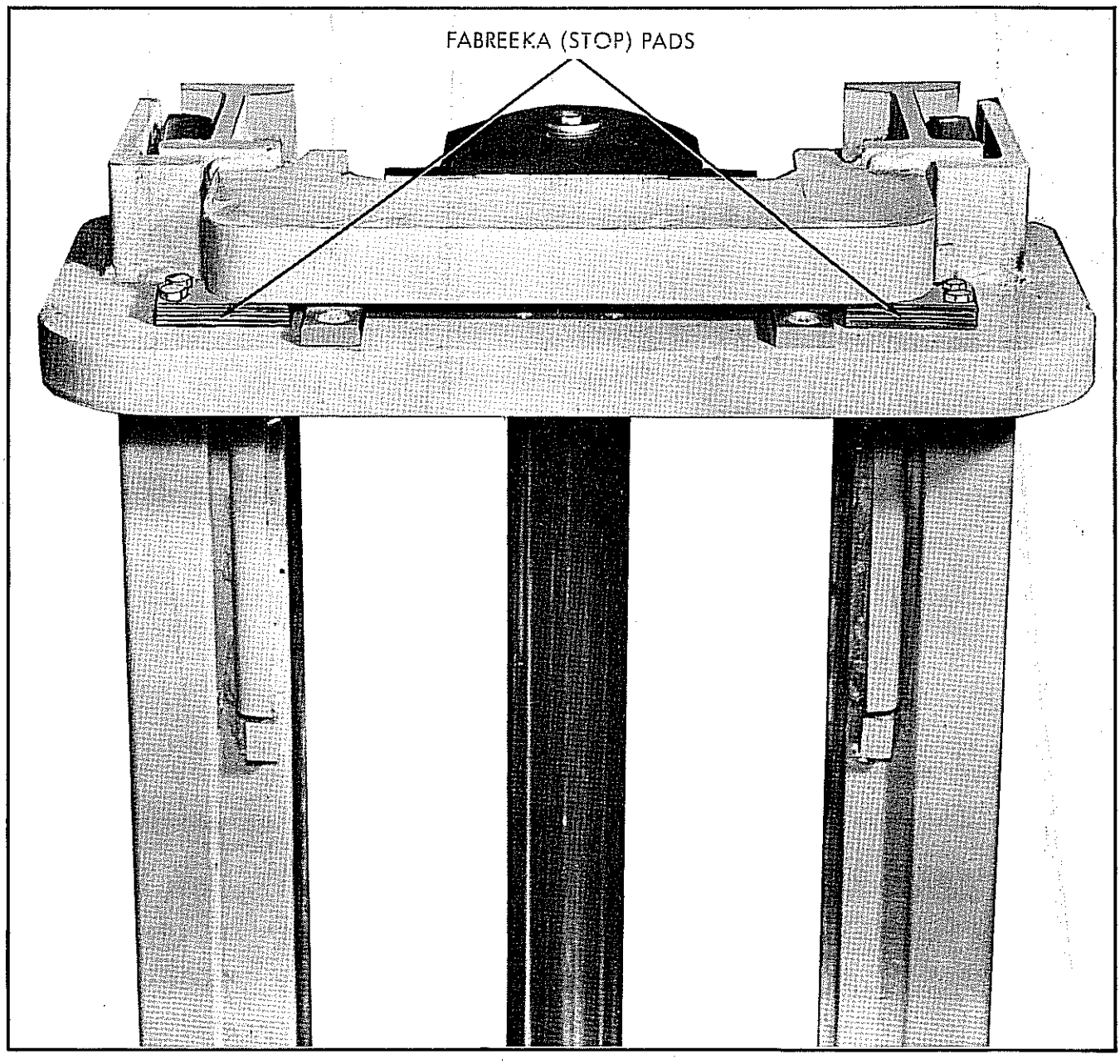
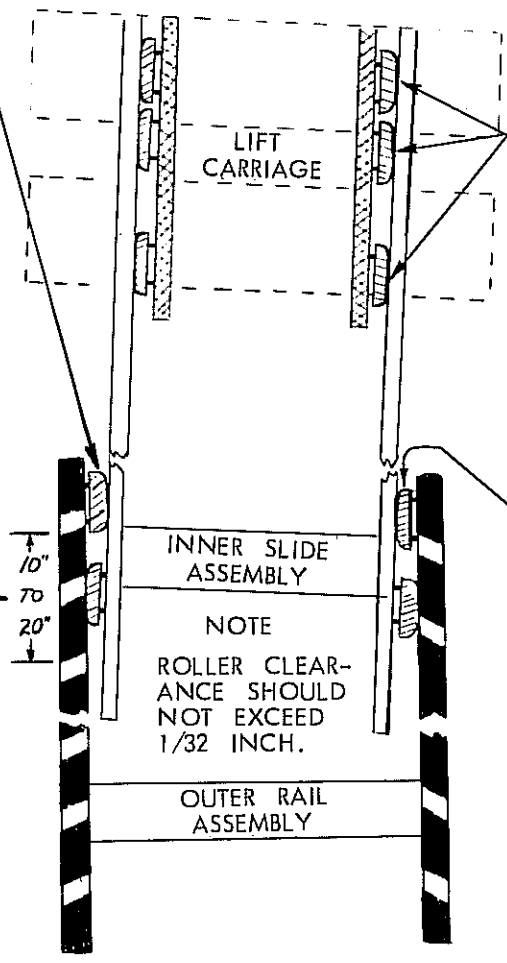


Plate 6619. Inner Slide Must Contact Both Fabreeka (Stop) Pads At The Same Time When Lowering Inner Slide



OUTER RAIL ROLLERS

SHOULD BE CHECKED FOR ROLLER CLEARANCE THE FULL LENGTH OF THE INNER SLIDE RAIL.

LIFT CARRIAGE ROLLERS

SHOULD BE CHECKED FOR ROLLER CLEARANCE THE FULL LENGTH OF THE INNER SLIDE RAIL.

CHECK INNER SLIDE BOTTOM ROLLER

IN THIS 10 TO 20 INCH SECTION OF THE OUTER RAIL.

OUTER RAIL ROLLERS

SHOULD BE CHECKED FOR ROLLER CLEARANCE THE FULL LENGTH OF THE INNER SLIDE RAIL.

NOTE

IF UPRIGHT RAILS ARE COCKED IN POSITION AS SHOWN, AND IF CLEARANCE IS CHECKED ON THIS SIDE, CLEARANCE IS MEASURED BETWEEN THE UPPER EDGE OF THE ROLLER RIM AND CORRESPONDING RAIL.

NOTE

IF UPRIGHT RAILS ARE COCKED IN POSITION AS SHOWN, AND IF CLEARANCE IS CHECKED ON THIS SIDE, CLEARANCE IS MEASURED BETWEEN THE LOWER EDGE OF THE ROLLER RIM AND CORRESPONDING RAIL.

Plate 6891. Roller Adjustments

UPRIGHT ROLLER ADJUSTMENTS.

NOTE

THE UPRIGHT OUTER RAIL ASSEMBLY IS MANUFACTURED WITH A SLIGHT TAPER, THE BOTTOM BEING 1/16 INCH WIDER THAN THE TOP. EXTEND THE UPRIGHT TO THE UPPER LIMIT. CHECK TO BE SURE THERE IS NO BIND. LOWER UPRIGHT. IF THERE IS A BIND, THE INNER SLIDE WILL HESITATE OR REMAIN AT THE UPPER LIMIT. AS THE LIFT CYLINDER BEGINS TO RETRACT, THE INNER SLIDE WILL BREAK FREE AND THEN LOWER. THIS INDICATES IMPROPER ADJUSTMENT, OR THIS MAY INDICATE A DAMAGED ROLLER WHICH WILL NOT ROTATE. RAISE AND LOWER CARRIAGE AND CHECK TO BE SURE ALL ROLLERS ROTATE FREELY.

1. Because of the 1/16 inch taper in the Outer Rail Assembly, the rollers may bind when upright is extended 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 bottom end of either right or left Inner Slide (Rail), and Outer Rail, refer to Plate 6891.

3. Move Inner Slide sideways to remove all clearance at opposite rail.

4. When checking clearance on the side that pry bar was installed, there must be some clearance between the Outer Rail and the bottom roller at the lower edge of the Roller Rim. THIS CLEARANCE SHOULD NOT EXCEED 1/32 INCH. If clearance is checked on opposite side, clearance should be checked between Outer Rail and bottom roller at the upper edge of Roller Rim, refer to Plate 6891 and 6325.

NOTE

THE BOTTOM ROLLERS OF THE INNER SLIDE, MUST BE CHECKED FOR CLEARANCE IN A 10 TO 20 INCH SECTION STARTING AT TOP OF OUTER RAIL ASSEMBLY, SEE Plate 6572.

5. Check clearance between Outer Rail Upper Rollers and Inner Slide. ROLLER CLEARANCE SHOULD BE CHECKED THE FULL LENGTH OF THE INNER SLIDE ASSEMBLY. Refer to Step 4 for Roller Clearance Specifications.

6. If adjustment is required, proceed as follows:

7. Disassemble upright.

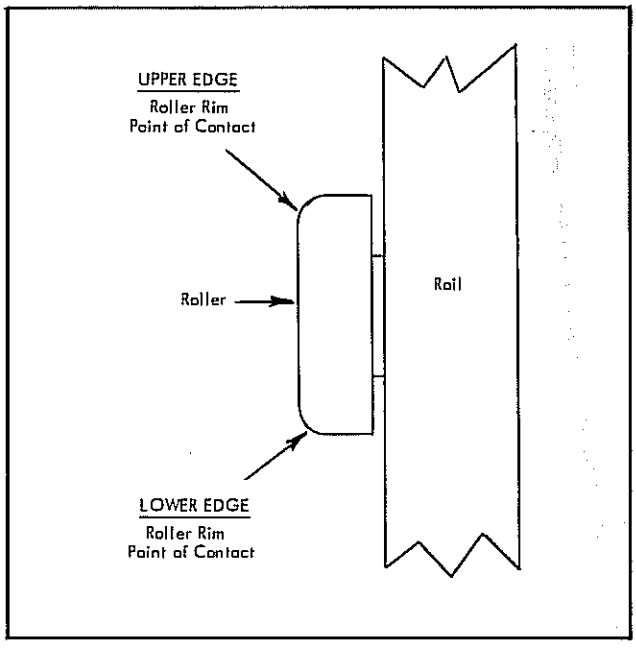


Plate 6325. Upright Roller

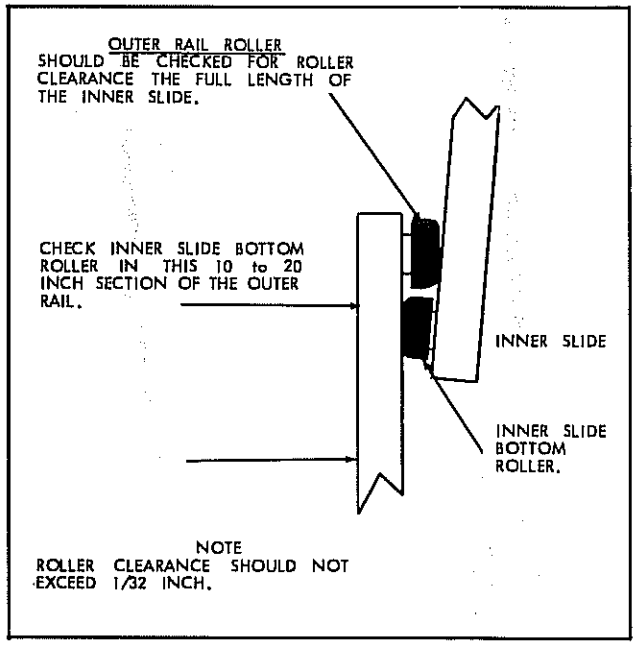


Plate 6572. Outer Rail Roller Clearance Check

8. Remove rollers from shafts and add or remove shims to acquire the clearance previously stated.

N O T E

THE ROLLER SHAFTS ARE WELDED TO THE RAIL ASSEMBLIES. TO REMOVE ROLLERS, MERELY PULL ROLLERS FREE OF ROLLER SHAFTS.

9. Reassembly upright.

10. Follow Steps 1 thru 5 and recheck clearance.

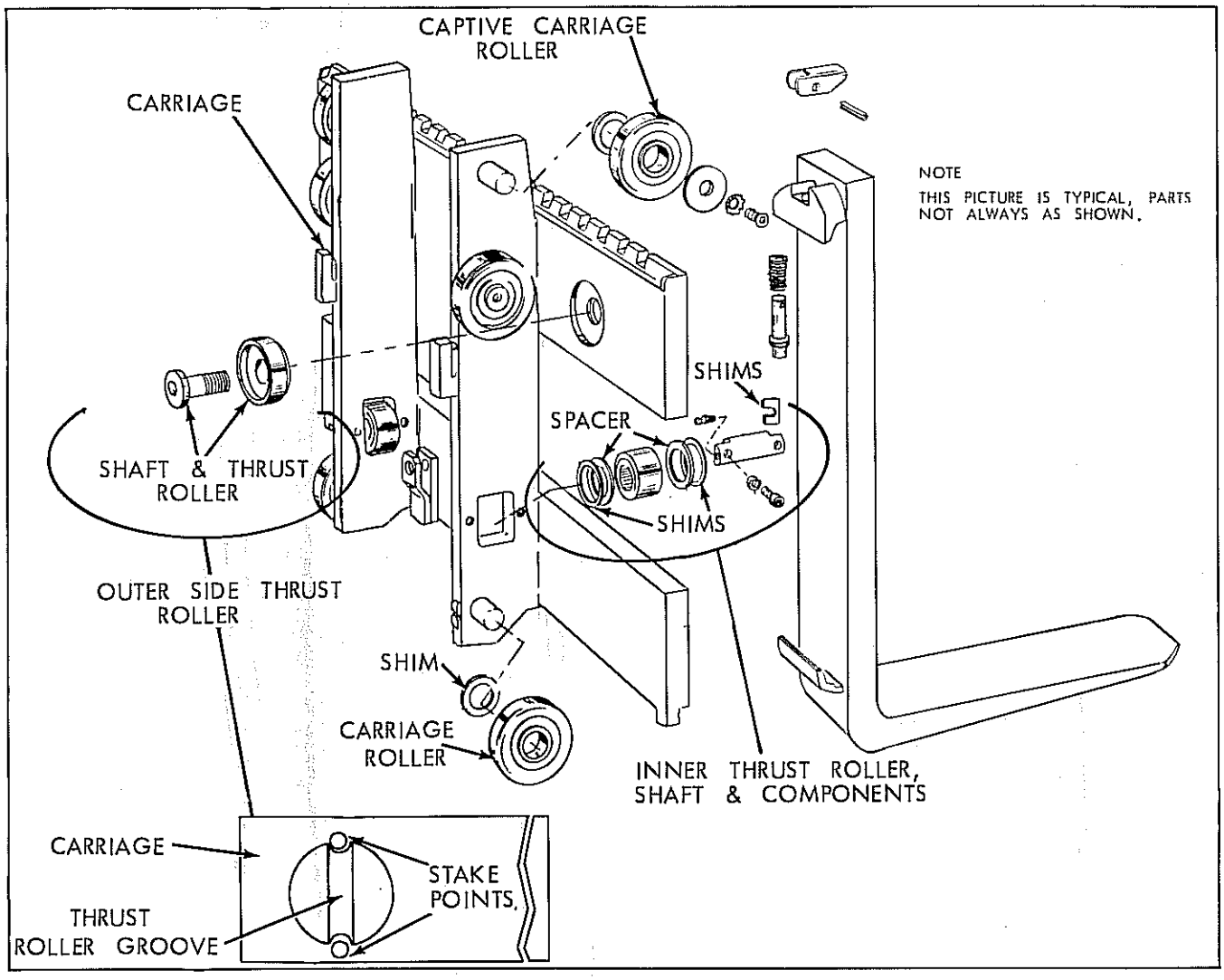


Plate 7000. Lift Carriage

LIFT CARRIAGE ROLLER ADJUSTMENTS

CARRIAGE MUST BE ADJUSTED SO IT IS HORIZONTAL AND CENTERED IN THE UPRIGHT FRAME. ROLLER CLEARANCE SHOULD BE CHECKED THE FULL LENGTH OF THE RAILS. ROLLERS SHOULD HAVE CLEARANCE OF NOT MORE THAN 1/32 INCH AT EACH SIDE.

Carriage Rollers are adjusted with shims placed on roller shaft between roller and carriage frame.

N O T E

CARRIAGE ROLLERS SHAFTS ARE WELDED TO CARRIAGE FRAME. TO REMOVE ROLLERS MERELY PULL ROLLER FREE OF SHAFT.

If adjustment is necessary refer to Steps 4 and 8.

Outer Side Thrust Rollers

The Outer Side Thrust Rollers do not require adjustment. These should be replaced in the event of wear or damage. The maximum clearance is 1/16 inch at each side.

Tighten the Outer Side Thrust Roller Shafts to 150 pound feet torque. The end of these shafts have a machined groove. Stake with a punch at each end of groove as shown in Plate 7000 This will secure shaft to lift carriage.

Inner Side Thrust Rollers

1. Check the clearance between the Inner Side Thrust Rollers and Inner Rails. Maximum allowable clearance is 1/32 inch

or 1/64 inch at each side. Rollers must be free to rotate without binding. See Plate 7000.

If adjustment is required, proceed as follows:

2. Elevate carriage and place a suitable support under the carriage. Plate 8623.

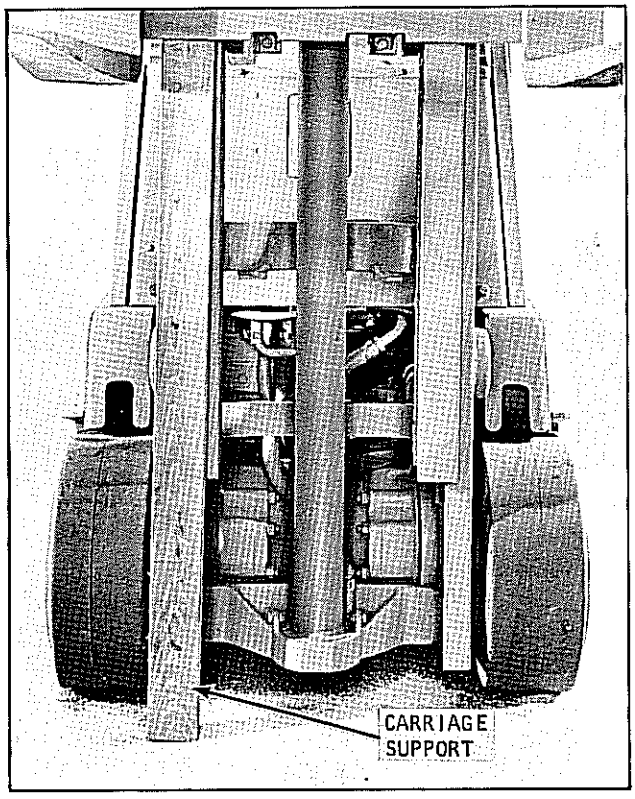


Plate 8623. Carriage Support

3. Remove carriage lift chain pins & replace with similar sized bolts. Plate 8599.

4. Remove carriage support, lower carriage to bottom, and tilt upright a little forward of vertical till carriage rests on the floor.

5. Remove bolts, raise channel, and back away from carriage. Plate 8922.

6. Add or remove shims as required to obtain correct clearance. Plate 8923.

7. Reinstall carriage by reversing steps 2-5.

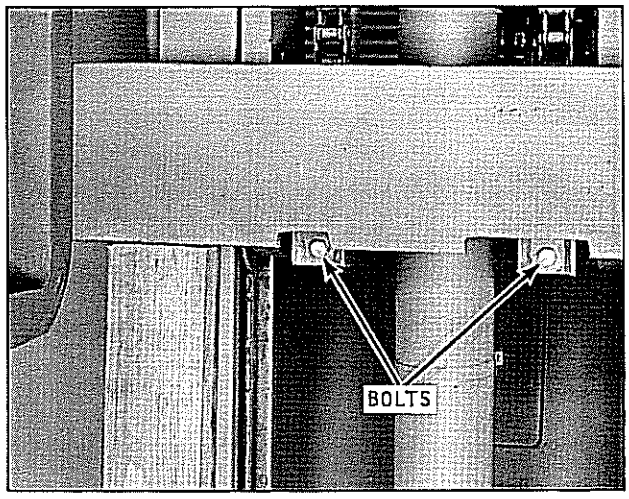


Plate 8599. Carriage Pin Replacement

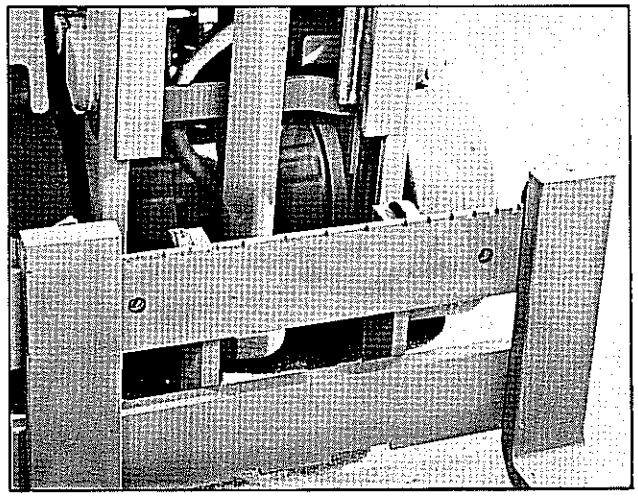


Plate 8922. Carriage Removed

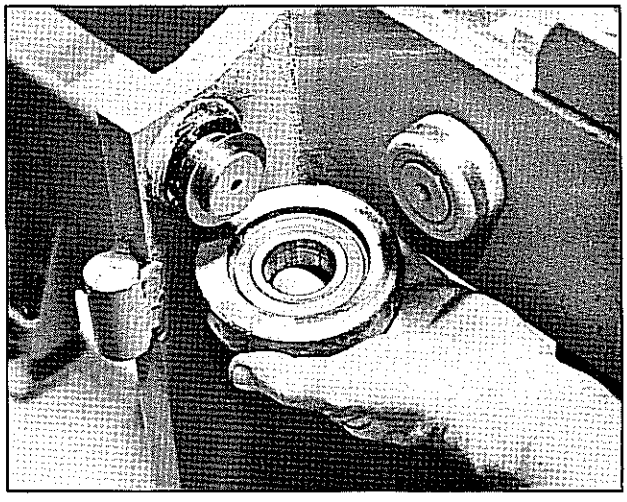


Plate 8923. Shim Adjustment

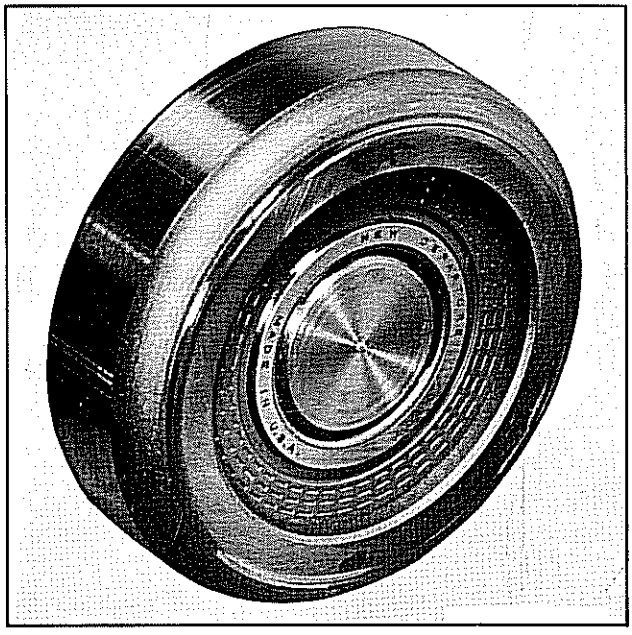


Plate 6323. Upright Roller

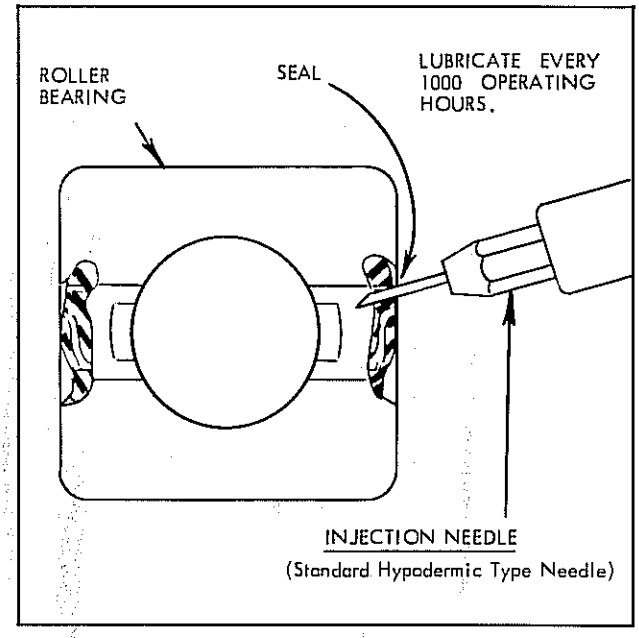


Plate 6328. Roller Bearing Lubrication

UPRIGHT AND CARRIAGE ROLLER LUBRICATION

The manufacturer does not recommend removing a bearing seal for periodic lubrication.

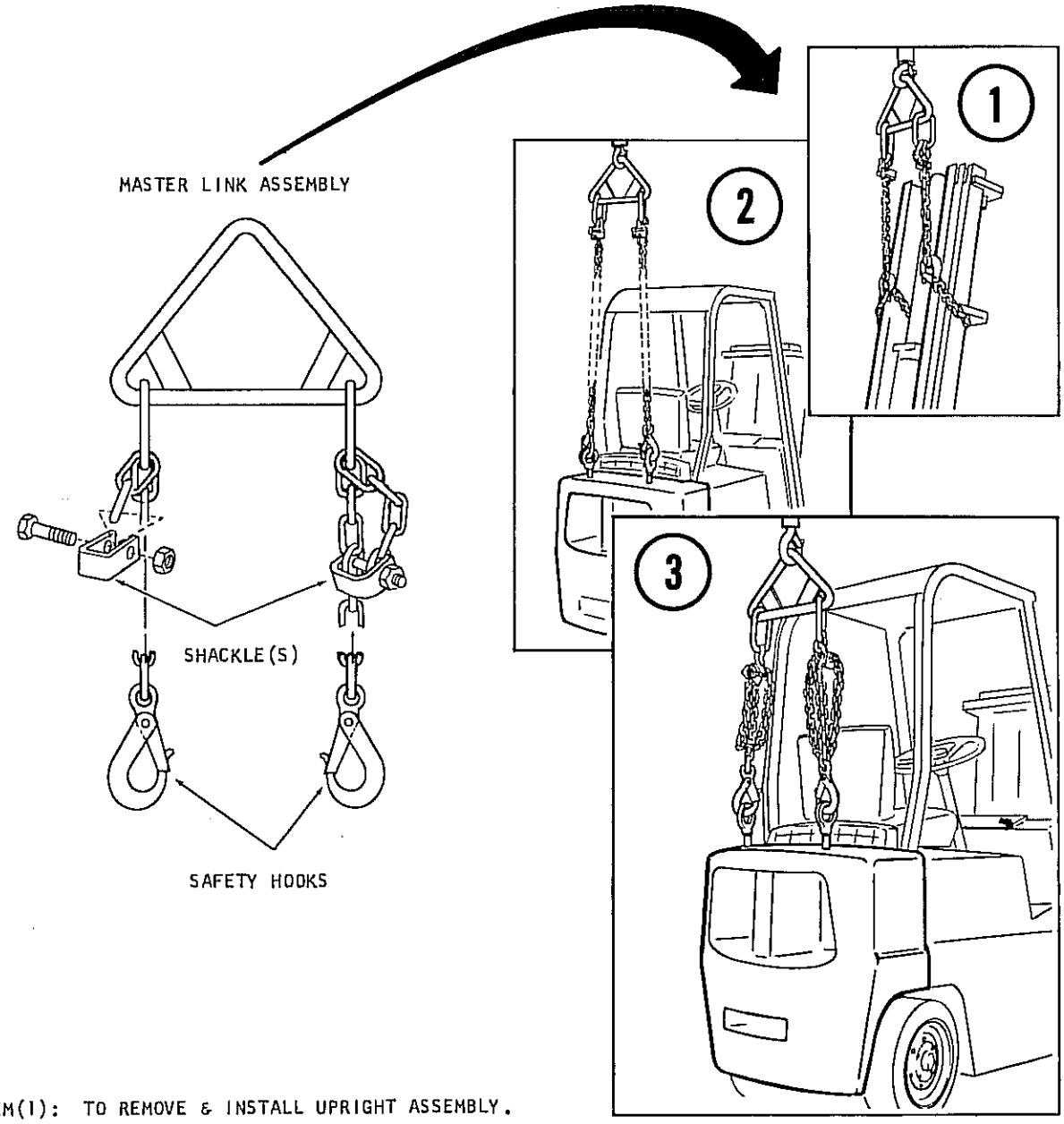
Bearings are generally provided with four openings (on the bearings front face, between the waffle pattern) for lubrication with an Injection Needle.

This needle is a standard hypodermic type needle and can be purchased in drug stores, refer to Plate 6328.

A good light petroleum base oil should be used.

IMPORTANT ..... HOIST CHAIN ASSEMBLY ... 10,000-POUND RATED LIFTING CAPACITY.

MATERIAL : HERCALLOY STEEL 3/8-INCH BODY CHAIN



ITEM(1): TO REMOVE & INSTALL UPRIGHT ASSEMBLY.

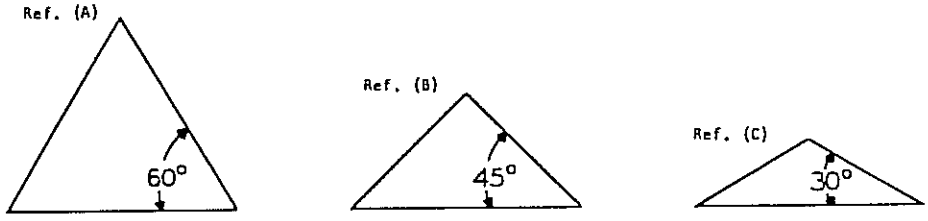
ITEM(2): TO REMOVE & INSTALL COUNTERWEIGHT.
ITEM(3)

WARNING DO NOT ELEVATE TRUCK BY THE COUNTERWEIGHT.

Fig. 14858

Diameter In Inches	Vertical	Choker	Basket	2 LEGS			3 LEGS			4 LEGS		
				*Total capacity with this Rig.			*Total capacity with this Rig.			*Total capacity with this Rig.		
	POUNDS			POUNDS			POUNDS			POUNDS		
1/4	2750	2050	5500	4750	3900	2750	5950	4850	3400	7150	5850	4150
3/8	6500	4850	13000	11300	9150	6500	14100	11500	8100	16900	13800	9800
1/2	11000	8250	22000	19100	15600	11000	23800	19400	13800	28600	23300	16500
5/8	16300	12200	32500	28100	23000	16300	35200	28700	20300	42200	34500	24400
3/4	22500	16900	45000	39000	31800	22500	48700	39800	28100	58500	47700	33800
7/8	29000	21800	58000	50200	41000	29000	62800	51300	36300	75300	61500	43500
1	38300	28700	76500	66200	54100	38300	82800	67600	47800	99400	81100	57400
1-1/4	57000	42800	114000	98700	80600	57000	123000	101000	71300	148000	121000	85500
1-1/2	78000	58500	156000	135000	110000	78000	169000	138000	97500	203000	165000	117000
1-3/4	104000	78000	208000	180000	147000	104000	225000	184000	130000	270000	221000	156000
2	129000	96800	258000	223000	182000	129000	279000	228000	161000	335000	274000	194000
2-1/4	161000	121000	322000	279000	228000	161000	349000	285000	201000	418000	341000	242000
				2 legs times vertical safe weight load times the sine of the angle.			2-1/2 legs times vertical safe weight load times the sine of the angle.			3 legs times vertical safe weight load times the sine of the angle.		
				Ref. (A) 60 deg.	Ref. (B) 45 deg.	Ref. (C) 30 deg.	Ref. (A) 60 deg.	Ref. (B) 45 deg.	Ref. (C) 30 deg.	Ref. (A) 60 deg.	Ref. (B) 45 deg.	Ref. (C) 30 deg.

*These capacities are only this high when the load is equally distributed to each leg.



GROUP 38

INDUSTRIAL TRUCK DIVISION

TROUBLE SHOOTING GUIDE

ENGINE

TROUBLE	PROBABLE CAUSE	REMEDY
Starting motor will not crank engine.	Battery discharged	Recharge or replace battery.
	Battery cable terminals loose or corroded. Ignition Fuse blown.	Remove and clean, reinstall and tighten cables. Replace fuse.
	Starting motor drive gear jammed in flywheel teeth.	Loosen starting motor and free-up gear.
	Improper oil.	Change oil to proper grade.
	Battery cable terminal broken.	Replace cable.
	Poor starting switch contacts.	Replace switch.
	Faulty Neutral Starting Switch.	Refer to Starting Motor.
Starting motor operates, but fails to crank engine when switch is engaged.	Starting motor gear does not engage flywheel.	Remove starting motor, and clean drive mechanism.
	Starting motor or drive gear defective.	Replace starting motor.
Engine will not start. No spark. Ammeter shows no discharge (Zero reading) with ignition switch "on".	Ignition switch partly "on".	Turn switch "on" fully.
	Ignition switch defective.	Replace switch.
	Ignition primary wires or starting motor cables broken or connections loose.	Repair, or replace and tighten.
	Ignition coil primary winding open.	Replace coil.
	Distributor points dirty.	Clean and adjust points.
	Distributor points not closing.	Adjust or replace points.
	Loose or corroded ground, or battery cable connections.	Remove and clean, reinstall and tighten cables.
Engine will not start. Ammeter showing abnormal discharge with ignition switch "on".	Defective condenser.	Replace condenser.
	Short-circuited or burned distributor cap or rotor.	Replace parts.
	Short-circuited wire between ammeter and ignition switch.	Repair or replace wire.
	Short-circuited primary winding in ignition coil.	Replace coil.
	Distributor points not opening.	Clean or replace, and adjust points.
Weak spark.	Distributor points pitted or burned.	Clean or replace, and adjust points.
	Distributor condenser weak.	Replace condenser.
	Ignition coil weak.	Replace coil.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine will not start.		
Weak spark (continued)	Primary wire connections loose.	Tighten.
	High-tension, spark plug wires, or distributor cap wet.	Dry thoroughly.
	High-tension, spark plug wires, or distributor cap damaged.	Replace defective parts.
	Distributor cap or rotor burned or broken.	Replace defective parts.
	Spark plug gap incorrect.	Reset gaps.
	Short-circuited secondary circuit in coil.	Replace coil.
Good spark.	Fuel tank empty.	Refill tank.
	Dirt or water in carburetor, or float stuck.	Drain and clean carburetor.
	Carburetor and engine flooded by excessive use of choke.	Depress accelerator pedal fully, crank engine with starting motor, when engine starts, reset throttle and leave choke control "in".
	Fuel does not reach carburetor.	Inspect for damaged or leaky lines or air leak into line between tank and fuel pump.
	Dirt in fuel lines or tank.	Disconnect lines, drain tank, and blow out lines.
	Fuel line pinched.	Repair or replace line.
	Ignition wires incorrectly installed in distributor cap.	Install wires correctly.
	Ignition timing incorrect.	Reset timing.
	Fuel Strainer Clogged.	Remove and clean strainer.
	Fuel pump does not pump.	Clean screen, replace pump if defective.
	Lack of engine compression.	Report to designated individual in authority.
Backfiring.	Ignition out of time.	Reset timing.
	Spark plug wires incorrectly installed distributor cap or at spark plugs.	Install wires correctly.
	Distributor cap cracked or shorted.	Replace cap.
	Valve holding open.	Report to designated individual in authority.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine operates, but backfires and spits.	Improper ignition timing.	Reset timing.
	Spark plug wires incorrectly installed in distributor cap.	Install wires correctly.
	Dirt or water in carburetor.	Drain and clean carburetor.
	Carburetor improperly adjusted.	Clean and adjust carburetor.
	Carburetor float level low.	Report to designated individual in authority.
	Valve sticking or not seating properly, burned or pitted.	Report to designated individual in authority.
	Excessive carbon in cylinders.	Remove carbon from cylinders.
	Valve springs weak.	Report to designated individual in authority.
	Heat control valve not operating.	Free-up, and adjust valve.
	Fuel pump pressure low.	Clean screen; replace pump, if defective.
	Fuel strainer clogged.	Remove and clean strainer.
	Partly clogged or pinched fuel lines.	Clean and repair lines.
	Intake manifold leak.	Inspect gaskets and tighten manifold stud nuts.
	Distributor cap cracked or shorted.	Replace cap.
Engine stalls on idle.	Carburetor throttle valve closes too far, or idle mixture incorrect.	Adjust carburetor.
	Carburetor choke valve remains closed.	Free-up and lubricate valve.
	Dirt or water in idler passages of Carburetor.	Clean or replace carburetor.
	Air leak at intake manifold.	Inspect gaskets and tighten manifold stud nuts.
	Heat control valve defective.	Free-up and adjust valve.
	Spark plugs defective, gaps incorrect.	Clean or replace spark plugs, set gap clearance.
	Ignition timing early.	Reset timing.
	Low compression.	Report to designated individual in authority.
	Water leak in cylinder head or head gaskets.	Replace gasket; report cylinder head leak to designated individual in authority.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine misfires on one or more cylinders.	Dirty spark plugs.	Clean, adjust, or replace plugs.
	Spark plug gap incorrect.	Reset gap.
	Cracked spark plug porcelain.	Replace spark plug.
	Spark plug wires grounded.	Replace wires.
	Spark plug wires incorrectly installed in cap or at spark plugs.	Install wires correctly.
	Distributor cap or rotor burned or broken.	Replace defective parts.
	Valve tappet holding valve open.	Report to designated individual in authority.
	Low engine compression.	Report to designated individual in authority.
	Leaky cylinder head gasket.	Replace gasket.
	Cracked cylinder block, broken valve tappet or tappet screw.	Report to designated individual in authority.
Engine does not idle properly.	Ignition timing.	Reset timing.
	Dirty spark plugs, or gaps too close.	Clean and adjust spark plugs.
Engine misses at high speeds.	Ignition coil or condenser weak.	Replace defective parts.
	Distributor points sticking, dirty or improperly adjusted.	Clean, adjust, or replace points.
	Distributor rotor or cap cracked or burned.	Replace defective parts.
	Leaky cylinder head gaskets.	Replace gaskets.
	Uneven cylinder compression.	Report to designated individual in authority.
	High-tension or spark plug wires leaky, cracked insulation.	Replace defective parts.
	Carburetor choke not adjusted.	Adjust choke.
	Carburetor accelerating pump system defective, dirt in metering jets or float level incorrect.	Report to designated individual in authority.
	Fuel pump defective, causing lack of fuel.	Clean screen, replace defective pump.
	Air cleaner dirty.	Clean complete air cleaner and refill oil cup.
	Heat control valve defective.	Free-up and adjust

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine misses at high speeds. (continued)	Valves sticking, weak or broken valve springs.	Report to designated individual in authority.
	Fuel strainer clogged.	Remove and clean strainer.
	Weak distributor bracket arm spring	Replace point set.
	Excessive play in distributor shaft bearing.	Replace distributor.
	Spark plugs defective, dirty or gap incorrectly set.	Clean, adjust or replace spark plugs.
Engine pings (Spark Knock).	Ignition timing early.	Reset timing.
	Distributor automatic spark advance stuck in advance position, or spring broken.	Replace distributor.
	Excessive carbon deposit in cylinders.	Remove cylinder head and clean.
	Incorrect fuel.	Drain, use correct fuel.
Engine lacks power.	Ignition timing late.	Reset timing.
	Incorrect fuel.	Use correct fuel.
	Leaky cylinder head gasket.	Replace gasket.
	Excessive carbon formation.	Remove cylinder head, and clean cylinder head, piston heads, cylinder block, and valves.
	Engine runs cold.	Test thermostat; in cold weather, cover radiator.
	Insufficient oil, or improper grade oil.	Lubricate in accordance with lubrication section.
	Oil system failure.	Report to designated individual in authority.
	Air Cleaner dirty.	Clean complete air cleaner, change oil in cup.
	Spark plug gaps too wide.	Reset gaps.
	Choke valve partially closed, or throttle does not open fully.	Adjust valve or throttle.
	Manifold heat control inoperative.	Free-up and adjust control.
	Exhaust pipe, muffler or tail pipe obstructed.	Service or replace obstructed parts.
	Low compression, broken valve springs, sticking valves.	Report to designated individual in authority.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine lacks power. (Continued)	Improper tappet adjustment.	Adjust tappets.
	Lack of fuel.	Clean filter, inspect fuel pump, inspect carburetor for water or dirt and clean if necessary.
Engine overheats.	Cooling system deficient. Water low, air flow through radiator core restricted.	Clean radiator core from engine side with compressed air or water, or fill radiator to proper level.
	Clogged radiator core (Clogged internally).	Clean by flushing radiator.
	Cylinder head gasket leaking.	Tighten cylinder head stud nuts and/or replace gasket.
	Radiator or water pump leaking.	Repair or replace defective parts.
	Damaged or deteriorated hose or fan belt.	Replace defective parts.
	Loose fan belt.	Adjust fan belt tension.
	Cylinder block or head leaking.	Report to designated individual in authority.
	Ignition timing incorrect.	Reset timing.
	Damaged muffler, bent or clogged exhaust pipe.	Service or replace defective parts.
	Excessive carbon in cylinders.	Remove cylinder head, and clean cylinder head, piston heads cylinder block, and valves.
	Insufficient oil, or improper grade.	Refer to Lubrication Instructions.
	Air Cleaner restricted.	Clean complete change oil in cup.
	Inoperative thermostat.	Replace thermostat and gasket.
	Water pump impeller broken.	Replace pump.
	Poor compression.	Report to designated individual in authority.
	Valve timing incorrect.	Reset timing.
High fuel consumption.	High engine speeds (Excessive driving in lower gear range).	Correct driving practice.
	Air cleaner clogged.	Clean complete air cleaner and change oil in cup.
	Carburetor float level too high, accelerating pump not properly adjusted.	Report to designated individual in authority.
	Fuel line leaks.	Correct leaks, replace lines.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
High fuel consumption. (Continued)	Overheated engine.	See "Engine overheats".
	Carburetor parts worn or broken.	Replace fuel carburetor.
	Fuel pump pressure too high, or leaky diaphragm.	Replace fuel pump.
	Engine running cold.	Inspect thermostat, cover radiator in winter.
	Ignition incorrectly timed.	Reset timing.
	Spark advance stuck.	Replace distributor.
	Leaking fuel pump bowl gasket.	Replace gasket.
	Low compression.	Report to designated individual in authority.
	Carburetor controls sticking.	Free-up and lubricate controls.
	Engine idles too fast.	Adjust carburetor throttle stop screw.
	Spark plugs dirty.	Clean or replace spark plugs.
	Weak coil or condenser	Replace coil or condenser.
	Clogged muffler, or bent exhaust pipe.	Service or replace defective parts.
	Loose engine mounts, permitting engine to shake and raise fuel level in carburetor.	Tighten; if damaged, replace defective mounts.
High oil consumption.	High engine speeds, or excessive driving in low gear range.	Correct driving practice.
	Oil leaks.	Replace leaking gaskets.
	Improper grade oil, or diluted oil.	Use new oil of proper grade.
	Overheating of engine causing thinning of oil.	See "Engine overheats".
	Oil filter clogged.	Clean filter case thoroughly and replace element.
	Defective piston or rings, excessive side clearance of intake valves in guides, cylinder bores worn (scored, out-of-round, tapered); excessive bearing clearance, misaligned connecting rods.	Report to designated individual in authority.

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Low oil pressure.	Insufficient oil supply.	Fill crankcase to prescribed level.
	Improper grade of oil, or diluted oil foaming at high speeds.	Change oil, inspect crankcase ventilator, inspect for water in oil.
	Oil too heavy (funneling in cold weather).	Change to proper grade oil. (Refer to Lubrication Instructions.
	Oil pump screen clogged.	Remove oil pan and clean pump screen.
	Oil leaks.	Report to designated individual in authority.
	Faulty oil pump, pressure regulator valve stuck or improperly adjusted, or spring broken.	Report to designated individual in authority.
Defective valves.	Incorrect tappet adjustment.	Adjust tappets.
	Other valve troubles.	Report to designated individual in authority.
Abnormal engine noises.	Loose fan, fan pulley or belt, heat control valve.	Tighten or correct conditions as required.
	Leaking intake or exhaust manifold or gaskets, cylinder head gasket, or spark plugs.	Tighten loose components or replace defective gaskets.
	Overheated engine, clogged exhaust system.	Remove obstruction from exhaust system. Inspect for further serviceability.
	Other abnormal engine noises.	Report to designated individual in authority.
Poor compression.	Incorrect tappet adjustment.	Adjust tappets.
	Leaking, sticking, or burned valves; sticking tappets; valve spring weak or broken; valve stems and guides worn; piston ring grooves worn or rings worn, broken, or stuck; cylinder bores scored or worn.	Report to designated individual in authority.

FUEL SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Fuel does not reach carburetor.	No fuel in fuel tank.	Fill fuel tank.
	Fuel pump inoperative.	Replace pump.
	Fuel line air leak between tank and fuel pump.	Repair or replace line.
	Fuel line clogged.	Disconnect and blow out lines.
	Fuel tank cap vent clogged.	Clean vent.
Fuel reaches carburetor, but does not reach cylinders.	Choke does not close.	Free-up and lubricate, inspect for proper operation.
	Fuel passage in carburetor clogged.	Clean or replace carburetor.
	Carburetor float valve stuck closed.	Report to designated individual in authority.
High fuel consumption.	Lubricant in power train too heavy.	Use correct lubricant.
	Incorrect adjustment of carburetor.	Adjust carburetor.
	Vehicle overloaded.	Reduce loads to specified maximum capacity.
	Tires improperly inflated.	Inflate tires properly.
	Tight brakes.	Adjust brakes.
Low fuel pressure.	Air leak in fuel lines.	Tighten connections, repair lines if damaged.
	Fuel pump defective, diaphragm broken; valves leaking, linkage worn.	Replace fuel pump.
	Fuel lines clogged.	Clean or replace lines.
Engine idles too fast.	Improper carburetor throttle stop adjustment.	Adjust throttle stop screw.
	Carburetor control sticking.	Free-up and lubricate control.
	Control return spring weak.	Replace spring.
Fuel gauge does not register.	Loose wire connection at instrument panel or tank unit .	Tighten connections.
	Instrument panel unit or tank unit inoperative.	Replace unit.

COOLING SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Overheating.	Unusual operating conditions of high temperature.	Inspect. (Refer to "Engine overheats".)
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.

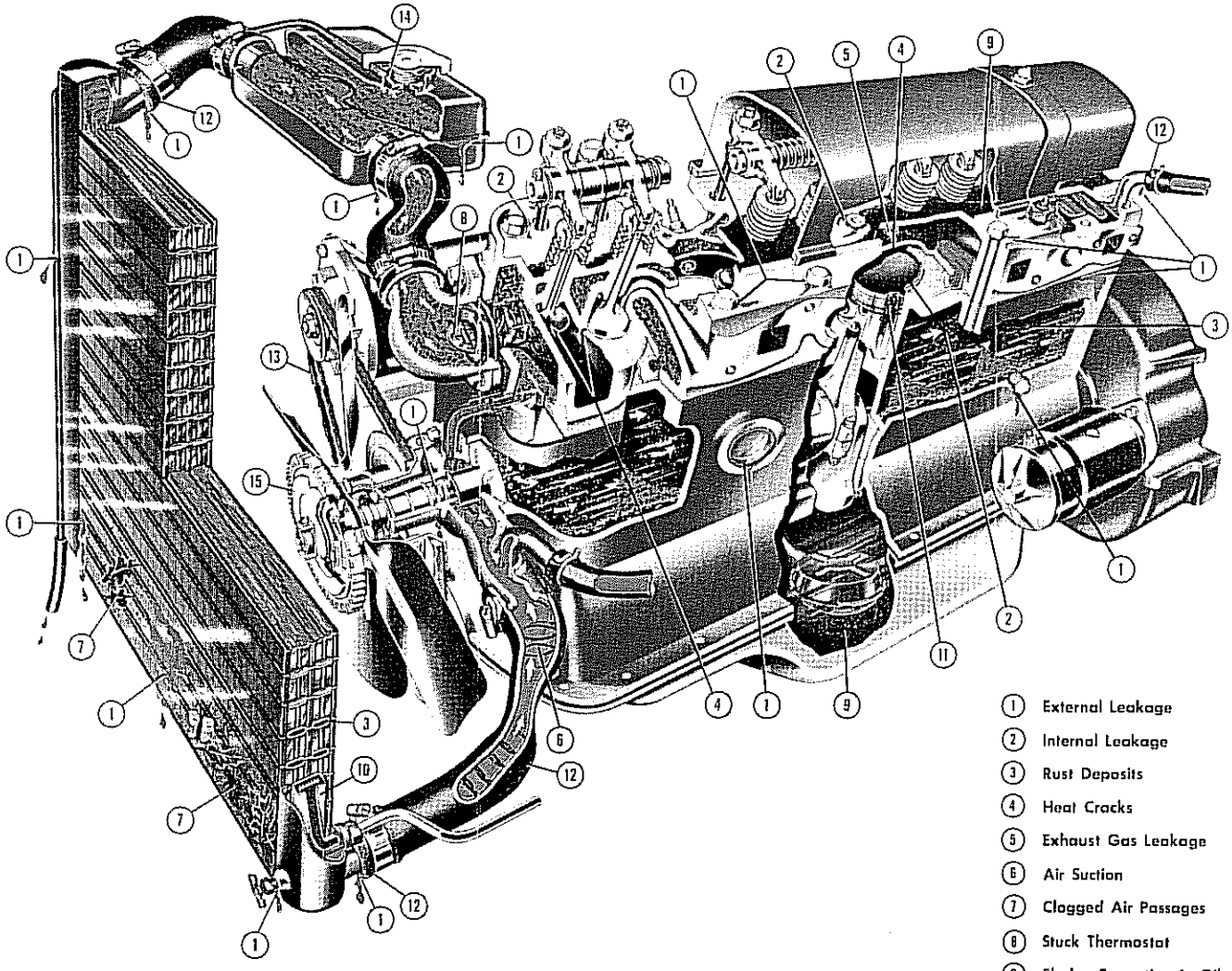
CLARK EQUIPMENT

INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT

THE ENGINE COOLING SYSTEM

Trouble spots resulting from service neglect



1. External Leakage
2. Internal Leakage
3. Rust Deposits
4. Heat Cracks
5. Exhaust Gas Leakage
6. Air Suction
7. Clogged Air Passages
8. Stuck Thermostat
9. Sludge Formation in Oil
10. Transmission Oil Cooler
11. Heat Damage
12. Hose Failure
13. Worn Fan Belt
14. Pressure Cap Leakage
15. Temperature Control Fan Drive

The cooling system depicted here does not represent that of any particular make of car, it incorporates features used by many different manufacturers.

Cooling System Care Pays!

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IGNITION SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Ignition system troubles.	Weak spark.	Refer to "Engine will not start".
	Timing incorrect.	Retime ignition.
	Moisture on distributor wires, coil, or spark plugs.	Clean and dry thoroughly.
	Ignition switch inoperative.	Replace switch.
	Primary or secondary wiring loose, broken, or grounded.	Service.
	Coil defective.	Refer to "Ignition coil troubles", below.
	Distributor defective.	Refer to "Distributor troubles", below.
	Spark plug defective.	Refer to spark plug troubles below.
Ignition coil.	Connections loose; dirty or broken external wire, wet.	Clean and tighten, or repair, dry thoroughly.
	Coil defective.	Replace coil.
Distributor troubles.	Distributor breaker points dirty or pitted, point gaps incorrect.	Clean, adjust or replace breaker points.
	Distributor breaker point arm spring weak.	Replace breaker point arm.
	Distributor breaker points sticking.	Free-up breaker points.
	Distributor automatic advance defective.	Lubricate and free-up. If seized, replace distributor.
	Distributor cap or rotor shorted, cracked or broken.	Replace defective parts.
	Distributor rotor does not turn.	Report to designated individual in authority.
	Condenser defective.	Replace condenser.
Spark plug troubles.	Cracked, broken, leaking, or improper type.	Replace spark plug.
	Spark plug wires incorrectly installed on plugs or in distributor cap.	Install wires correctly.
	Spark plugs dirty; gap incorrect.	Clean, set gaps, or replace plugs.
	Spark plug porcelain cracked or broken.	Replace plug.

STARTING MOTOR

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

GENERATOR TROUBLES

TROUBLE	PROBABLE CAUSE	REMEDY
No output.	Regulator defective.	Replace regulator.
Low or fluctuating output.	Loose fan belt.	Adjust belt.
	Insufficient brush surface contact.	Free-up or replace brush.
	Weak brush springs.	Replace spring.
	Worn commutator.	Report to designated individual in authority.
	Broken or loose connections.	Repair, tighten or replace.
	Dirty commutator.	Clean commutator.
	Regulator defective.	Replace regulator.
	Loose or dirty connections in charging circuit.	Clean and tighten connections.
Excessive output.	Short circuit between field coil and armature leads.	Replace generator.
	Regulator defective.	Replace regulator.
Noisy.	Loose pulley or generator mounting.	Tighten.
	Defective bearings, or armature rubbing on field poles.	Replace generator.
	Improperly seated brushes.	Seat brushes.
Generator regulator troubles.	Loose connections or mountings.	Clean and tighten.
	Defective regulator.	Replace regulator.

BATTERY, LIGHTS AND HORN

TROUBLE	PROBABLE CAUSE	REMEDY
Battery discharged.	Battery solution level low.	Add distilled water to bring level above plates; inspect for cracked case.
	Short in battery cell.	Replace battery.
	Generator not charging.	Inspect generator, fan belt, and regulator.
	Loose or dirty connections; broken cables.	Clean and tighten connections; replace cables.
	Excessive use of starting motor.	Tune up engine; charge battery.
	Idle battery, or excessive use of lights with engine at idle.	Recharge or replace battery. Use lights sparingly.
	Short circuits.	Replace defective wiring.
Battery (other troubles)	Overheated battery.	Inspect for short circuit or excessive generator charge.
	Case bulged (or out of shape).	Inspect for overcharging and overtightening of hold-down screws.
Light switch.	Loose or dirty connections; broken wire.	Clean and tighten; replace broken wire.
	Defective switch.	Replace switch.
Wiring.	Loose or dirty connections; broken wire or terminal.	Clean, tighten, repair or replace. Wire or terminal.
Lights do not light.	Switch not fully "on".	Turn switch "on" fully.
	Loose or dirty connections; broken wire.	Clean and tighten; replace or repair wire or terminal.
	Wiring circuit short-circuited, or open.	Correct short circuit or replace defective parts.
	Light burned out.	Replace light.
Lights dim.	Loose or dirty connection.	Clean and tighten connections.
	Wiring short-circuited.	Correct short circuit or replace defective parts.
	Defective switch.	Replace switch.

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.	Clean and tighten connections.
	Cover or bracket screws loose.	Tighten.
	Points adjusted improperly.	Adjust points.
Horn will not operate.	Horn Fuse Blown.	Replace Fuse.
	Open Circuit.	Trace, repair or replace as required.
	Faulty Horn Relay.	Replace relay.

DRIVE AXLE

TROUBLE	PROBABLE CAUSE	REMEDY
Continuous Axle Noise.	Badly worn parts.	Replace worn parts with new.
	Unevenly worn tires.	Replace tires.
	Improperly adjusted wheel bearing.	Adjust correctly.
	Lack of lubricant.	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.	Tighten cap screws.
	Flange loose on axle shaft.	Reweld flange to shaft.
	Worn splines on axle shaft at differential end.	Replace drive flange and shaft assembly.
	Differential drive pinion gear and ring gear out of adjustment or worn excessively.	Adjust or replace as condition warrants.
Complete Failure to Function.	Broken axle shaft.	Replace axle shaft.
	Broken teeth on ring gear or pinion gear.	Replace ring gear and pinion and other parts of differential necessary. Adjust ring gear and pinion gear correctly.

STEERING AXLE

TROUBLE	PROBABLE CAUSE	REMEDY
Trouble.	Damaged axle.	Replace axle.
	Lubrication leaks.	Replace oil seals. (Refer to Lubrication Section). Report to designated individual in authority.
	Incorrect caster or camber.	Report to designated individual in authority.
	Uneven tire wear.	Inflate tires properly. Check wheel alignment.

STEERING

TROUBLE	PROBABLE CAUSE	REMEDY
Steering difficult.	Lack of lubrication	Lubricate.
	Tight steering system connections.	Lubricate and adjust linkage.
	Tight steering gear; misaligned wheels.	Report to designated individual in authority.
	Bent steering connecting linkage or arm.	Straighten or replace linkage.
	Misaligned steering gear mounting.	Adjust mounting.
Wander or weaving.	Improper toe in camber or caster (axle twisted).	Report to designated individual in authority.
	Steering system connections or king pin bearings not properly lubricated.	Lubricate.
	Loose wheel bearings.	Adjust wheel bearings.
	Steering gear worn or maladjusted.	Report to designated individual in authority.
	Steering gear mountings loose.	Tighten mounting bolts.
Low speed shimmy or wobble.	Loose steering connections.	Adjust and tighten linkage.
	Steering gear worn, or adjustment too loose.	Report to designated individual in authority.
	Loose wheel bearings.	Adjust wheel bearings.
Vehicle pulls to one side.	Odd size, or new and old tires on opposite wheels.	Match tires.
	Tight wheel bearings.	Adjust. Lubricate wheel bearings.
	Bent steering arm or connection.	Straighten or replace bent linkage.

BRAKES

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

BRAKES (Continued)

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

INDUSTRIAL TRUCK DIVISION

TROUBLE SHOOTING GUIDE

HYDRAULIC SYSTEM

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

HYDRAULIC SYSTEM CONTINUED

TROUBLE	PROBABLE CAUSE	REMEDY
Lift or tilt action fails.	Loss of oil pressure.	Report to designated individual in authority.
Oil leak at top of lift cylinder assembly.	Worn or damaged lift piston seal.	Replace seal.
	Scored cylinder wall.	Replace cylinder.
	Plugged vent line.	Clean out vent line. Replace if collapsed.
Oil leak around piston rod at tilt cylinder.	Worn seal.	Replace seal.
	Scored piston rod.	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.

INDUSTRIAL TRUCK DIVISION

TROUBLE SHOOTING GUIDE

TRANSMISSION, CONVERTER AND AXLE ADAPTOR (HYDRATORK DRIVE)

TROUBLE	PROBABLE CASE	REMEDY
Machine will not move in either direction.	Parking Brake not released.	Release brake.
	Control Linkage not Properly adjusted.	Readjust linkage.
	Oil level low.	Determine cause and correct. Fill to proper level with Type "A" Automatic Transmission Fluid Armour Qualified.
	No oil pressure.	Report to designated person in authority.
Machine will move in one direction only.	Control linkage not adjusted.	Adjust linkage.
	No oil pressure to Directional Selector. Seals and "O" Rings in Directional Selector may be defective.	Report to designated person in authority.
	Directional Selector Discs not releasing. Discs defective. Relief hole in D.S. Drum clogged.	Report to designated person in authority.
Machine moves slowly in both directions at wide open throttle.	Oil level low.	Fill to correct level and determine cause for loss of oil.
	Low oil pressure. Faulty Inching Valve, Faulty Relief Valve, Faulty Pump.	Report to designated person in authority.
	Brakes dragging.	Report to designated person in authority.
	Clogged Sump Screen.	Clean Screen.
Transmission overheating.	Low oil.	Check and fill to correct level.
	Low Directional Selector pressure (check with gauge). Inching valve not functioning properly.	Report to designated person in authority.
	Seals in selector defective.	Report to designated person in authority.
	Regulating valve sticking open.	Report to designated person in authority.
	Brakes Dragging.	Report to designated person in authority.
	Clogged Sump Screen.	Clean Screen.

TRANSMISSION, CONVERTER AND AXLE ADAPTOR (HYDRATORK DRIVE)

TROUBLE	PROBABLE CAUSE	REMEDY
Transmission Overheating (Continued)	Insufficient oil to Torque Converter and Cooler.	Report to designated person in authority.
	Cooler clogged internally stopping flow of oil.	Clean Cooler.
	Bushing in Torque Converter Impeller Hub worn, allowing oil to leak out.	Report to designated person in authority.
	Slipping Stator.	Refer to Transmission Pressure Checks
Machine has full power and overheats.	Overloading machine.	Check Capacity Loads. Never overload.
	Radiator core clogged externally.	Clean Core.
	Pressure Regulator Valve sticking, giving low pressure.	Report to designated person in authority.