

**CLARK**

**Industrial Truck  
Division**

# OPERATORS MANUAL

CFY40B-1-388 & ABOVE  
CFYR40B-1-562 & ABOVE  
CFY50B-1-388 & ABOVE

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1917

## **SAFETY INSTRUCTIONS** FOR MAINTAINING INDUSTRIAL TRUCKS

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

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

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

*(Continued)*

**SAFETY INSTRUCTIONS** FOR MAINTAINING INDUSTRIAL TRUCKS

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



# INDUSTRIAL TRUCK DIVISION



## P L E A S E       N O T E

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

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

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

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

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

Example: 8H 002-0; 8H is the TIME INTERVAL (8 operating hours),

002 is the PAGE NUMBER, and -0 is a CODE NUMBER that you as

a customer should disregard. The dash number or code number is

for the benefit of the publisher only.

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

Example: (8 Hours)

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

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

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

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

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



# INDUSTRIAL TRUCK DIVISION



(continued)

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

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

### N O T E

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

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

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



# INDUSTRIAL TRUCK DIVISION



## TABLE OF CONTENTS

<u>Page</u>	<u>Description</u>
A001	Instructions On Use Of Manual
A003	Table Of Contents
B001	Illustration Of Machine
B003	Specifications
B031	New Machine 50 Hour Inspection

### OPERATIONS

C002	Overall Controls
C003	Instrument Indicators
C005	Starting and Operating Instructions
C006	Fuel Tank Reserve Manual Cut-in
C007	To Move, Stack and Lower Loads. Safety and Operating Suggestions.

### LUBRICATION AND PREVENTIVE MAINTENANCE

<u>Time Interval (H-Hours)</u>	<u>&amp; Page Number (0000-)</u>	<u>Description</u>
H	001	Index
8H	002	<u>8 Hour Lubrication &amp; Preventive Maintenance Illustration</u> Horn, Fuel Tank and System Fuses
8H	003	Crankcase Oil Level check; Recommended Lubricants
8H	103	Cooling System check
8H	203	Instrument Indicators, check
8H	303	Brake Pedal Free Travel check; Parking Brake Operation check
8H	403	Engine Air Cleaner service
8H	503	Hydraulic Sump Tank Level check; Hydraulic Control Lever Operation check
8H	603	Tires inspect
8H	605	Clutch Pedal Free Travel check
8H	605	Release Bearing lubricate
8H	703	Power Steering Reservoir level check
100H	002	<u>100 Hour Lubrication &amp; Preventive Maintenance Illustration</u> Transmission & Axle Adaptor Level check; Fuel Tank and Lines inspect
100H	003	Engine Crankcase drain & refill; Crankcase Ventilation inspect; Engine Oil Filter change
100H	103	Cooling System inspect; clean radiator fins
100H	203	Fan and Generator Belt adjustment
100H	302	Brake Pedal Free Travel check
100H	303	Brake Pedal Free Travel adjust; Master Cylinder level check
100H	403	Lift and Tilt Cylinders inspect; Lift Chains check and adjust; visually inspect all wiring and hydraulic piping; lubricate all miscellaneous linkage
100H	503	Hydraulic Sump Tank Breather inspect or replace
100H	603	Steering Gear verify lubricant level; Battery inspect
100H	653	Clutch Pedal Free Travel adjust
100H	703	Lubrication Chart
500H	002	<u>500 Hour Lubrication &amp; Preventive Maintenance Illustration</u> Fuel Pump Strainer clean; Fuel Pump Operation check
500H	103	Hydraulic Sump Tank drain & refill; Hydraulic Sump Tank Oil Filter change
500H	202	Steering Gear adjust
500H	302	Steering Axle and Linkage adjust
500H	403	Manifolds check security of mounting; Nuts, Bolts and Capscrews security check



# INDUSTRIAL TRUCK DIVISION



## TABLE OF CONTENTS

### LUBRICATION AND PREVENTIVE MAINTENANCE

<u>Time Interval (H=Hours)</u>	<u>Page Number (0000-)</u>	<u>Description</u>
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1000H	003	Engine Tune Up; Cylinder Head Stud Nuts Intake and Exhaust Manifolds, Crankcase Ventilation; Intake and Exhaust Valve Clearance adjustments
1000H	004	Engine Tune Up; Intake and Exhaust Valve Clearance adjustments
1000H	103	Engine Tune Up; Compression test, Spark Plugs
1000H	203	Engine Tune Up; Distributor
1000H	204	Engine Tune Up; Tach Dwell Meter
1000H	303	Engine Tune Up; Contact Point adjustment; Ignition Timing
1000H	403	Engine Tune Up; Vacuum Test and Carburetor adjustment
1000H	503	Engine Tune Up; Governor adjustment
1000H	603	Starting Motor inspect
1000H	703	Generator inspect
1000H	803	Wheel Bearings clean and repack; adjust
1000H	805	Axle Ends clean and repack
1000H	912	Bleeding Brake System
1000H	1003	Brake adjustment
1000H	1103	Hand Brake adjustment
1000H	1202	Cooling System inspect and clean
1000H	1303	Transmission, Axle Adaptor drain and refill
1000H	1503	Main Hydraulic System Pressure checks
1000H	1803	Upright Roller lubrication and adjustments

### TROUBLE SHOOTING GUIDE

<u>Page</u>	<u>Description</u>
TS 001	Engine
TS 251	Fuel System
TS 301	Clutch
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TS 381	Generator
TS 401	Battery & Horn
TS 421	Transmission
TS 483	Drive Axle
TS 521	Steering Axle
TS 541	Brake System
TS 653	Hydraulic System



**CLARK**  
EQUIPMENT

# INDUSTRIAL TRUCK DIVISION

**CLARK**  
EQUIPMENT

ILLUSTRATION OF MACHINE



B001-4

20 AUG 63

1912





# INDUSTRIAL TRUCK DIVISION



## SPECIFICATIONS

### CLARKLIFT CFY40B

#### GENERAL

Type of vehicle ..... Clarklift

Heavy Duty Friction Clutch.

Conventional Transmission 2 forward and 2 reverse speed ranges.

Overall length with forks.....136 3/8 inches

Overall length without forks..... 96 3/8 inches

Overall width..... 45 3/8 inches

Overall height with 130" Std. MFH upright.....  
.....(lowered)..... 84 1/2 inches

Tread single drive tires ..... 37 3/4 inches

Tread steer tires ..... 29 1/2 inches

Turning radius, outside ..... 85 inches

Turning radius, inside ..... 7 1/2 inches

Ground clearance - under rear axle 8 3/4 inches

Ground clearance - under front axle 6 1/2 inches

Ground clearance between axles..... 8 1/4 inches

Grade clearance ..... 62%

Upright clearance ..... 5 inches

Counterweight clearance ..... 10 7/8 inches

Draw bar pull (Loaded).... 2400 lbs., at 12 inch  
..... coupler height

Draw bar pull (Empty).... 2350 lbs., at 12 inch  
..... coupler height

#### Travel speeds:

Loaded: Low ..... 5 MPH  
High ..... 10.8 MPH

Empty: Low ..... 5.3 MPH  
High ..... 11.2 MPH

#### Gradeability: Low Gear

Loaded.. 21.5% @ .9 coefficient of friction

Empty..... 26% @ .9 coefficient of friction

#### Lifting & Lowering Speeds:

Lift	Standard	Hi-Lo	Triple
Loaded	65	61	62
Empty	73	69	70
Lower.....			
Loaded	60	60	60
Empty	80	65	80

#### NOTE

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 ..... 162.4

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

Bare Engine H.P. at Governed R.P.M. .... 53

Maximum torque ..... 128 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 ..... 10 3/4 gallons

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

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

#### CLUTCH

Outside diameter..... 11 inches

Clutch Pedal Free Travel.....

..... approx. 3/4 to 1 inch

Clutch throwout bearing.....

..... Lubricated thru use of grease cup.



# INDUSTRIAL TRUCK DIVISION



## SPECIFICATIONS

CONTINUED  
CLARKLIFT CFY40B

### TRANSMISSION

Speeds ..... 2 Forward 2 Reverse  
Capacity..... 12 pints

### DRIVE AXLE END

Ratio ..... 4.4 to 1  
Axle End Capacity ..... 1 lb.  
( each end )

### STEER AXLE

#### Axle Alignment:

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

#### Left-hand turning radius angle

Left wheel ..... 75 degrees  
Right wheel ..... 57 degrees

#### Right-hand turning radius angle

Left wheel ..... 57 degrees  
Right wheel ..... 75 degrees

### TIRES

STANDARD	Ply	Pres.
Single drive and steer.....		
..... 7:00-12	12	100 lbs.
OPTIONAL		
Dual drive and single steer.....		
..... 7:00-12	12	100 lbs.
Wide profile, single drive and steer.....		
..... 27x10:00-12	12	90 lbs.
Wide profile, dual drive and single steer..		
..... 27x10:00-12	6	45 lbs.

### HYDRAULIC SYSTEM

Sump Tank Capacity ..... 9 gallons  
Sump Tank Filter (Replaceable)... 25 micron  
Sump Tank Breather (Replaceable).. 5 micron  
Hydraulic Pumps

#### Main Pump:

Type..... vane  
Capacity..... 12.1 gal. per min.  
..... at 2200 R.P.M. Engine Speed

System Pressure Relief Valve Setting  
..... 2000 P.S.I.  
non-adjustable located  
in hydraulic valve.

### Steer Pump

Type ..... vane  
Capacity ..... 2 gal. per min. at  
..... 2200 R.P.M. Engine speed  
System Pressure Relief Valve Setting....  
..... 1250 P.S.I.

### 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 floorboard  
-to- top of brake lever.)..... 3/16 to 5/16

### ELECTRICAL

#### SPARK PLUGS

Gap  
Standard ..... .025  
Resistor ..... .035

#### VOLTAGE REGULATOR

Circuit Breaker  
Armature Air Gap ..... .025 to .027  
Contact Point Gap ..... .015 min.  
Contacts Close ..... 12.4 to 13.3 volts  
Contacts Open ..... 3 to 5 amps

Voltage Regulator  
Armature Air Gap..... .048 to .052  
Operating Voltages .....  
..... 7 amps or with a .25 OHM  
resistor between reg. and battery

Current Regulator  
Armature Air Gap ..... .048 to .052  
Operating Amperage ..... 24 to 26

### GENERATOR

Volts ..... 12  
Motoring Draw @ 70° F:  
..... 2.7 to 3.0 Amps @ 10 volts  
Field Coil Draw @ 70° F:  
..... 1.6 to 1.7 Amps @ 10 volts



# INDUSTRIAL TRUCK DIVISION



## SPECIFICATIONS

CONTINUED  
CLARKLIFT CFY 40B

### GENERATOR (Cont'd)

Brush Spring Tension ..... 18 to 36 oz.  
 Type ..... Ventilated  
 Rated output:..... 25 Amps.  
 Output Test 70° F:  
     15.0 volts, 12 amps. @ 1350 R.P.M.  
     15.0 volts, 15 amps. @ 1450 R.P.M.  
     15.0 volts, 25 amps. @ max. R.P.M.  
 Charging Starts Cold .....  
     ..... 980 R.P.M. Generator Speed  
 Charging Starts Hot .....  
     ..... 1100 R.P.M. Generator Speed  
 Generator Pulley: ..... 3" Dia.  
 Drive Pulley: ..... 7 1/4" Dia.  
     Ratio: ..... 2.416 to 1

### STARTING MOTOR

Brush Tension (oz)..... 40-35  
 Lock Test  
     Draw Current (amps)..... 435  
     Volts ..... 5.8  
     Torque (ft. lbs.)..... 10.5  
 No Load Test  
     Draw Current (amps)..... 49-76  
     Volts ..... 10.6  
     Speed (R.P.M.)..... 6200 min., 9400 max.  
 Teeth in pinion ..... 9  
 No. Teeth in Ring Gear ..... 112  
 Starter to Crankshaft Ratio:..... 12.44 to 1  
 Starting Medium ..... Solenoid

### DISTRIBUTOR

Start Advance (Deg.) @ 400 R.P.M. .... 0-2  
 Intermediate Advance (Deg.) @ 950 R.P.M.  
 ..... 4-6

Maximum Advance (Deg.) @ 1200 R.P.M.... 6-8  
 Breaker Point Opening (in.)..... .022  
 Cam Angle Range (Deg.)..... 25-34

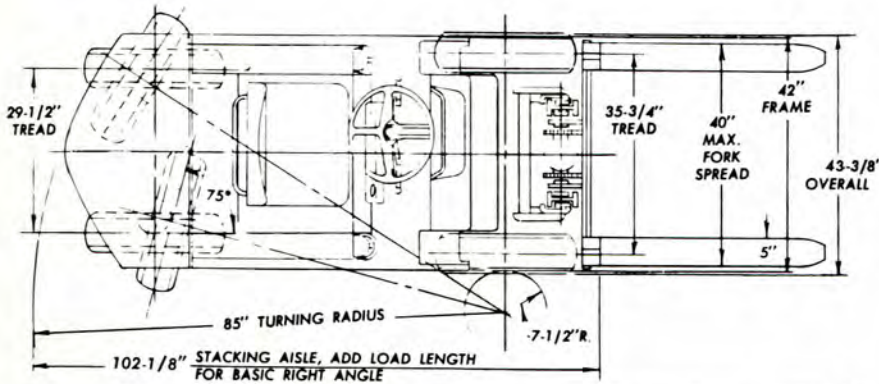
### BATTERY

No. of Cells: ..... 6  
 No. of Plates: ..... 42  
 20 Hour Rate A.H. .... 40  
 300 Amps, 0 Degrees F  
     Total Min.: ..... .6  
     5 Sec. Volt: ..... - -  
     10 Sec. Volt: ..... 6.1  
 Volts ..... 12  
 Group ..... S.A.E. #2SM  
 Model ..... 2SM40

### TORQUE SPECIFICATIONS

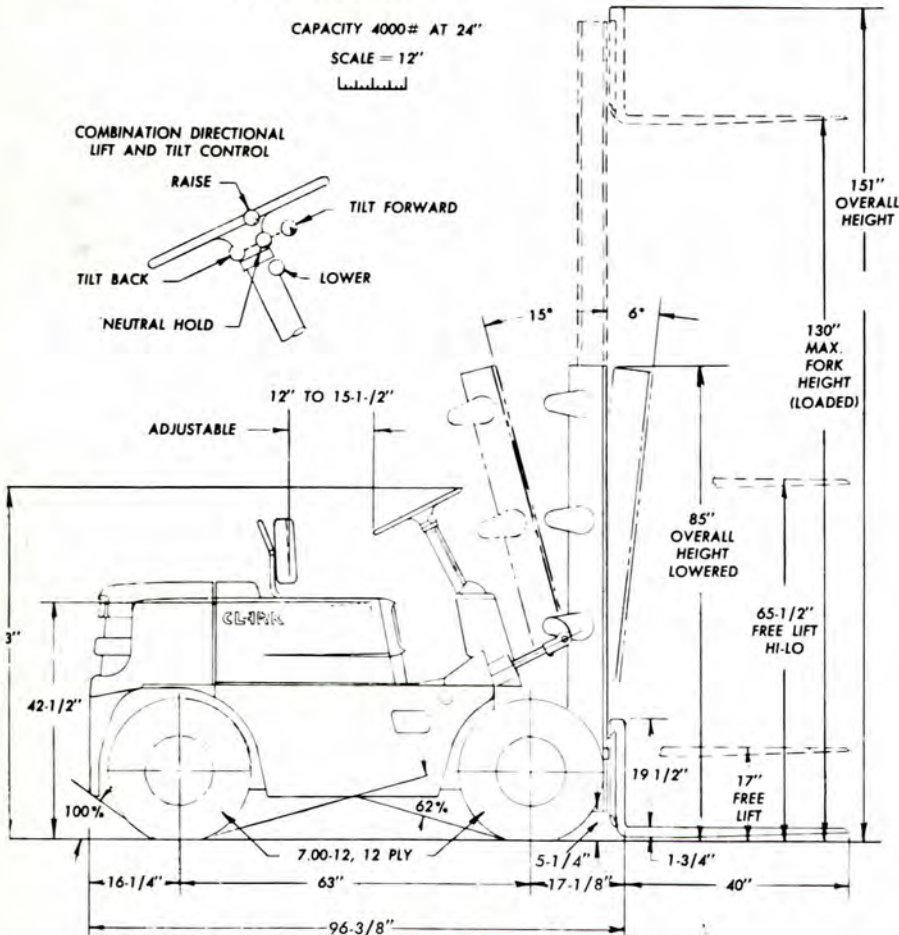
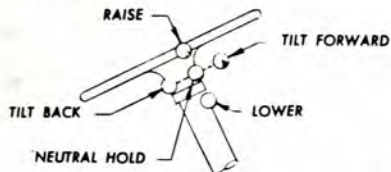
Sump Tank Filter Attaching Bolts Torque .....  
     ..... 40 to 50 inch pounds  
 Steering Gear Mounting Bolts and Clamp Bolt  
 Torque ..... 90 foot pounds  
 Steering Gear Pitman Arm Lock Nut Torque.....  
     ..... 100 to 125 foot pounds  
 Drive Wheel Mounting Nut Torque.....  
     ..... 330 to 350 foot pounds  
 Drive Wheel Inner and Outer Half Attaching Nuts  
     ..... 128-141 foot pounds  
 Steering Wheel Mounting Nut Torque .....  
     ..... 115 to 125 foot pounds  
 Steering Wheel Inner and Outer Half Attaching  
 Nuts..... 41-51 foot pounds

# CLARKLIFT® CY 40B and CFY 40 B

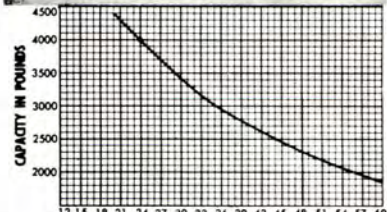


CAPACITY 4000# AT 24"  
SCALE = 12"

COMBINATION DIRECTIONAL  
LIFT AND TILT CONTROL



**CAPACITY CHART**



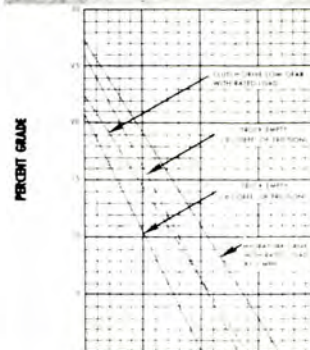
LOAD CENTER IN INCHES FROM FRONT FACE OF FORKS  
RATED CAPACITIES SHOWN ABOVE ARE COMPUTED WITH UPRIGHTS IN VERTICAL POSITION. THEY APPLY ONLY ON MAXIMUM FORK HEIGHTS UP TO AND INCLUDING 134"

**UPRIGHT DIMENSION TABLE**

MAX. FORK HEIGHT	OVERALL HEIGHT LOWERED	FREE LIFT (FORK HEIGHT WITHOUT INCREASING OVERALL HEIGHT)		OVERALL HEIGHT RAISED
		STANDARD	HI-LO	
70"	55"	17"	—	91"
76"	58"	17"	—	97"
82"	61"	17"	—	103"
88"	64"	17"	—	109"
94"	67"	17"	47%	115"
100"	70"	17"	50%	121"
106"	73"	17"	53%	127"
112"	76"	17"	56%	133"
118"	79"	17"	59%	139"
124"	82"	17"	62%	145"
130"	85"	17"	65%	151"
136"	88"	17"	68%	157"
142"	91"	17"	71%	163"
148"	95"	17"	75%	169"
154"	98"	17"	78%	175"
160"	101"	17"	81%	181"
166"	105"	17"	85%	187"
172"	108"	17"	88%	193"
178"	112"	17"	92%	199"
184"	115"	—	95%	205"
190"	118"	—	98%	211"
196"	122"	—	102%	217"
202"	125"	—	105%	223"

\*INDICATES PREFERRED STANDARD SIZES  
INTERMEDIATE HEIGHTS AVAILABLE IN INCREMENTS OF 3"  
MAXIMUM FORK HEIGHT  
MAXIMUM FORK HEIGHTS LESS THAN 94" AVAILABLE ONLY IN STANDARD UPRIGHT

**GRADE AND DRAWBAR PULL CHART**



AVAILABLE DRAW BAR PULL IN POUNDS  
WITH 10,000 LB. CAPACITY 17" HI-LO FORK  
SOLID LINES: CY40 BROKEN LINES: CFY40



# INDUSTRIAL TRUCK DIVISION



## SPECIFICATIONS

### CLARKLIFT CFY50B

#### GENERAL

Type of vehicle ..... Clarklift  
 Heavy Duty Friction Clutch.  
 Conventional Transmission 2 forward and 2 reverse speed ranges.  
 Overall length with forks ..... 140 1/4 inches  
 Overall length without forks..... 98 1/2 inches  
 Overall width ..... 45 3/8 inches  
 Tread single drive tires..... 37 3/4 inches  
 Tread steer tires ..... 29 1/2 inches  
 Turning radius, outside ..... 88 5/8 inches  
 Turning radius, inside ..... 7 1/2 inches  
 Ground clearance - under rear axle 8 3/4 inches  
 Ground clearance - under front axle 6 1/2 inches  
 Ground clearance between axles..... 8 1/4 inches  
 Grade clearance..... 62%  
 Upright clearance ..... 5 inches  
 Counterweight clearance ..... 10 7/8 inches  
 Draw bar pull (Loaded).... 2370 lbs., at 12 inch  
 .....coupler height  
 Draw bar pull (Empty)..... 2470 lbs., at 12 inch  
 ..... coupler height

#### Travel speeds:

Loaded: Low ..... 5 MPH  
 High ..... 10.8 MPH  
 Empty: Low ..... 5.3 MPH  
 High ..... 11.2 MPH

Gradeability: Low Gear  
 1 MPH Loaded.. 18.5% @ .9 coefficient of friction  
 ..... 21.5% @ .9 coefficient of friction

#### Lifting & Lowering Speeds:

Lift.....	Standard	Hi-Lo	Triple
Loaded	65	61	62
Empty	73	69	70
Lower.....			
Loaded	60	60	60
Empty	80	65	80

#### NOTE

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 ..... 162.4  
 Governed Speed (No Load)..... 2350 R.P.M.  
 Bare Engine H.P. at Governed R.P.M. .... 53  
 Maximum torque ..... 128 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 ..... 10 3/4 gallons

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

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

Outside diameter..... 11 inches  
 Clutch Pedal Free Travel .....  
 ..... approx. 3/4 to 1 inch  
 Clutch throwout bearing.....  
 ..... Lubricated thru use of grease cup.



# INDUSTRIAL TRUCK DIVISION



## SPECIFICATIONS

CONTINUED  
CLARKLIFT CFY50B

### TRANSMISSION

Speeds ..... 2 Forward 2 Reverse  
Capacity..... 12 pints

### DRIVE AXLE END

Ratio ..... 4.4 to 1  
Axle End Capacity ..... 1 lb.  
( each end )

### STEER AXLE

#### Axle Alignment:

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

#### Left-hand turning radius angle

Left wheel ..... 75 degrees  
Right wheel ..... 57 degrees

#### Right-hand turning radius angle

Left wheel ..... 57 degrees  
Right wheel ..... 75 degrees

### TIRES

STANDARD	Ply	Pres.
Single drive and steer.....		
..... 7:00-12	12	100 lbs.
OPTIONAL		
Dual drive and single steer .....		
..... 7:00-12	12	100 lbs.
Wide profile, single drive and steer.....		
..... 27x10:00-12	12	90 lbs.
Wide profile, dual drive and single steer...		
..... 27x10:00-12	6	45 lbs.

### HYDRAULIC SYSTEM

Sump Tank Capacity ..... 9 gallons  
Sump Tank Filter (Replaceable).... 25 micron  
Sump Tank Breather (Replaceable).. 5 micron  
Hydraulic Pumps

#### Main Pump:

Type ..... vane

Capacity ..... 12.1 gal. per min. at  
..... 2200 R.P.M. Engine Speed

System Pressure Relief Valve Setting  
..... 2000 P.S.I.  
non-adjustable located  
in hydraulic valve.

### Steer Pump

Type ..... vane

Capacity..... 2 gal. per min. at  
..... 2200 R.P.M. Engine Speed

System Pressure Relief Valve Setting...  
..... 1250 P.S.I.

### 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 floorboard -to-  
top of brake lever.)..... 3/16 to 5/16

### ELECTRICAL

#### SPARK PLUGS

#### Gap

Standard ..... .025  
Resistor ..... .035

#### VOLTAGE REGULATOR

#### Circuit Breaker

Armature Air Gap ..... .025 to .027

Contact Point Gap..... .015 min.

Contacts Close..... 12.4 to 13.3 volts

Contacts Open ..... 3 to 5 amps

#### Voltage Regulator

Armature Air Gap..... .048 to .052

Operating Voltages .....  
..... 7 amps or with a .25 OHM  
resistor between reg. and battery

#### Current Regulator

Armature Air Gap ..... .048 to .052

Operating Amperage ..... 24 to 26

### GENERATOR

Volts ..... 12

#### Motoring Draw @ 70° F:

..... 2.7 to 3.0 Amps @ 10 volts

#### Field Coil Draw @ 70° F:

..... 1.6 to 1.7 Amps @ 10 volts





# INDUSTRIAL TRUCK DIVISION



## SPECIFICATIONS

CONTINUED  
CLARKLIFT CFY50B

### GENERATOR (Cont'd)

Brush Spring Tension ..... 18 to 36 oz.  
 Type ..... Ventilated  
 Rated output: ..... 25 Amps.  
 Output Test 70° F:  
     15.0 volts, 12 amps. @ 1350 R.P.M.  
     15.0 volts, 15 amps. @ 1450 R.P.M.  
     15.0 volts, 25 amps. @ max. R.P.M.  
 Charging Starts Cold .....  
     ..... 980 R.P.M. Generator Speed  
 Charging Starts Hot .....  
     ..... 1100 R.P.M. Generator Speed  
 Generator Pulley: ..... 3" Dia.  
 Drive Pulley:..... 7 1/4" Dia.  
     Ratio: ..... 2.416 to 1

### STARTING MOTOR

Brush Tension (oz)..... 40-35  
 Lock Test  
     Draw Current (amps)..... 435  
     Volts ..... 5.8  
     Torque (ft. lbs.)..... 10.5  
 No Load Test  
     Draw Current (amps) ..... 49-76  
     Volts..... 10.6  
     Speed (R.P.M.).... 6200 min., 9400 max.  
 Teeth in pinion ..... 9  
 No. Teeth in Ring Gear ..... 112  
 Starter to Crankshaft Ratio:.... 12.44 to 1  
 Starting Method ..... Solenoid

### DISTRIBUTOR

Start Advance (Deg.) @ 400 R.P.M. .... 0-2  
 Intermediate Advance (Deg.) @ 950 R.P.M.  
 ..... 4-6

Maximum Advance (Deg.) @ 1200 R.P.M.... 6-8  
 Breaker Point Opening (in.)..... .022  
 Cam Angle Range (Deg.)..... 25-34

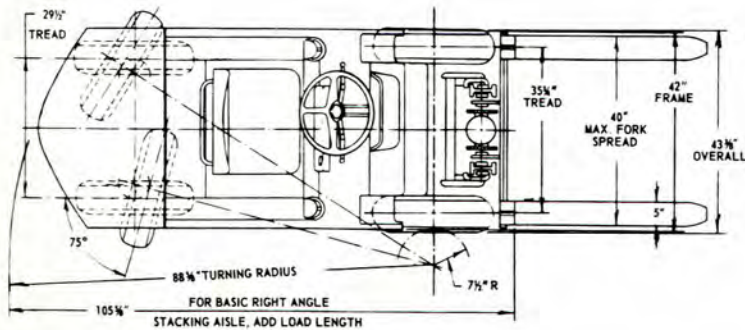
### BATTERY

No. of Cells: ..... 6  
 No. of Plates: ..... 42  
 20 Hour Rate A.H. .... 40  
 300 Amps. 0 Degrees F  
     Total Min.: ..... .6  
     5 Sec. Volt: ..... - -  
     10 Sec. Volt: ..... 6.1  
 Volts ..... 12  
 Group ..... S.A.E. #2SM  
 Model ..... 2SM40

### TORQUE SPECIFICATIONS

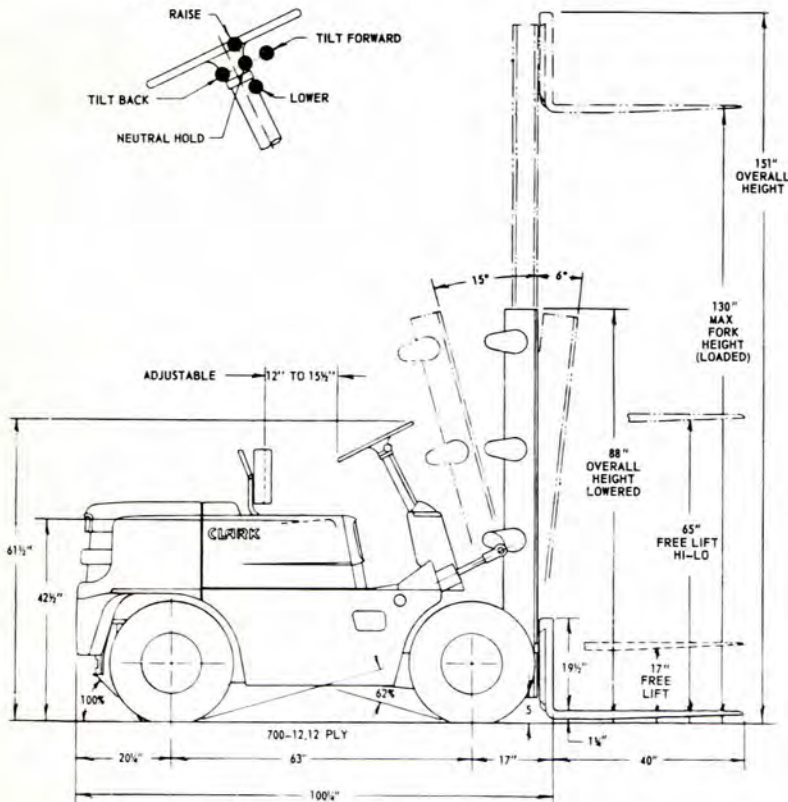
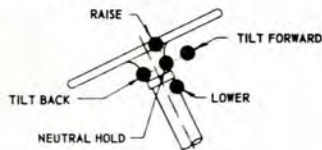
Sump Tank Filter Attaching Bolts Torque .....  
 ..... 40 to 50 inch pounds  
 Steering Gear Mounting Bolts and Clamp Bolt  
 Torque ..... 90 foot pounds  
 Steering Gear Pitman Arm Lock Nut Torque .....  
 ..... 100 to 125 foot pounds  
 Drive Wheel Mounting Nut Torque .....  
 ..... 330 to 350 foot pounds  
 Drive Wheel Inner and Outer Half Attaching Nuts  
 ..... 128-141 foot pounds  
 Steering Wheel Mounting Nut Torque .....  
 ..... 115 to 125 foot pounds  
 Steering Wheel Inner and Outer Half Attaching  
 Nuts ..... 41-51 foot pounds

# CLARKLIFT® CY 50B and CFY 50 B

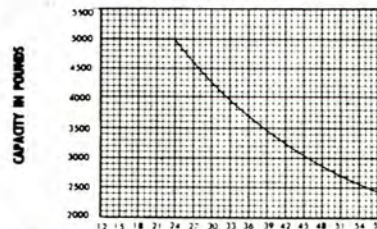


CAPACITY 5000<sup>LB</sup> AT 24"  
SCALE = 1/2"

COMBINATION DIRECTIONAL  
LIFT AND TILT CONTROL



CAPACITY CHART



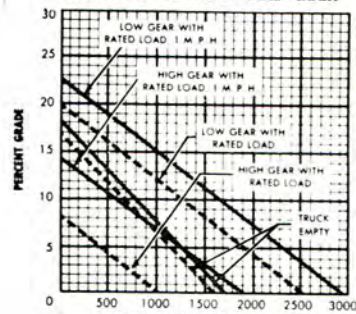
RATED CAPACITIES SHOWN ABOVE ARE COMPUTED WITH UPRIGHTS IN VERTICAL POSITION. THEY APPLY ONLY ON MAXIMUM FORK HEIGHTS UP TO AND INCLUDING 130" FOR MACHINES EQUIPPED WITH SINGLE DRIVE TIRES, 154" FOR DUAL DRIVE TIRES.

UPRIGHT DIMENSION TABLE

MAX. FORK HEIGHT	OVERALL HEIGHT LOWERED	FREE LIFT (FORK HEIGHT WITHOUT INCREASING OVERALL HEIGHT)		OVERALL HEIGHT RAISED
		STANDARD	HI-LO	
70"	58"	17"	—	91"
76"	61"	17"	—	97"
*82"	64"	17"	—	103"
88"	67"	17"	—	109"
94"	70"	17"	—	115"
*100"	73"	17"	50"	121"
*106"	76"	17"	53"	127"
112"	79"	17"	56"	133"
118"	82"	17"	59"	139"
*124"	85"	17"	62"	145"
*130"	88"	17"	65"	151"
136"	91"	17"	68"	157"
142"	95"	17"	72"	163"
148"	98"	17"	75"	169"
*154"	101"	17"	78"	175"
160"	105"	17"	82"	181"
166"	108"	17"	85"	187"
172"	112"	17"	89"	193"
*178"	115"	17"	92"	199"
184"	118"	—	95"	205"
190"	122"	—	99"	211"
196"	125"	—	102"	217"
202"	129"	—	106"	223"

\*INDICATES PREFERRED STANDARD SIZES  
INTERMEDIATE HEIGHTS AVAILABLE IN INCREMENTS OF 3" MAXIMUM FORK HEIGHT. MAXIMUM FORK HEIGHTS OVER 178" AVAILABLE ONLY IN HI-LO  
MAXIMUM FORK HEIGHTS LESS THAN 91" AVAILABLE ONLY IN STANDARD UPRIGHT

GRADE AND DRAWBAR PULL CHART



GRADES AND DRAWBAR PULL FOR TRUCK EMPTY ARE BASED ON DRIVING FORWARD. HIGHER VALUES ARE ATTAINED WHEN DRIVING UP A GRADE BACKWARDS  
SOLID LINES CY50 BROKEN LINES CFY50  
TRUCK EMPTY BASED ON .6 COEFF OF FRICTION





# INDUSTRIAL TRUCK DIVISION



## SPECIFICATIONS

### STEER AXLE (continued)

Right-hand turning radius angle  
 Left wheel ..... 57 degrees  
 Right wheel ..... 75 degrees

### TIRES

	Ply	Air Press.	Overall Width
Standard...Single drive .....			
..... 7.00x12	12	100 lbs.	43 3/8"
Standard...Steer.....			
..... 6.50x10	10	95 lbs.	
Optional...Dual Drive.....			
..... 7.00x12	12	100 lbs.	60 1/8"

### HYDRAULIC SYSTEM

Sump Tank Capacity ..... 9 gallons  
 Sump Tank Filter (Replaceable).... 25 micron  
 Sump Tank Breather (Replaceable)... 5 micron

#### Hydraulic Pumps

##### Main Pump:

Type ..... vane  
 Capacity ..... 12.1 gal. per min.  
 ..... at 2200 R.P.M. Engine Speed

System Pressure Relief Valve Setting  
 .....2000 P.S.I.  
 non-adjustable located  
 in hydraulic valve.

### CLUTCH (machines so equipped)

Outside diameter..... 11 inches  
 Clutch Pedal Free Travel .....

..... approx. 3/4. to 1 inch

Clutch throwout bearing.....  
 Lubricated thru use of grease cup.

### 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 floorboard -to-  
 top of brake lever.)..... 3/16 to 5/16

### ELECTRICAL

#### SPARK PLUGS

Gap  
 Standard ..... .025  
 Resistor ..... .035

#### VOLTAGE REGULATOR

Circuit Breaker  
 Armature Air Gap ..... .025 to .027  
 Contact Point Gap ..... .015 min.  
 Contacts Close .....12.4 to 13.3 volts  
 Contacts Open ..... 3 to 5 amps

#### Voltage Regulator

Armature Air Gap..... .048 to .052  
 Operating Voltages .....

..... 7 amps or with a .25 OHM  
 resistor between reg. and battery

#### Current Regulator

Armature Air Gap ..... .048 to .052  
 Operating Amperage ..... 24 to 26

### GENERATOR

Volts ..... 12  
 Motoring Draw @70° F;  
 ..... 2.7 to 3.0 Amps @ 10 volts  
 Field Coil Draw @ 70° F:  
 ..... 1.6 to 1.7 Amps @ 10 volts  
 Brush Spring Tension ..... 18 to 36 oz.  
 Type ..... Ventilated  
 Rated output: ..... 25 Amps.  
 Output Test 70° F:  
 15.0 volts, 12 amps. @ 1350 R.P.M.  
 15.0 volts, 15 amps. @ 1450 R.P.M.  
 15.0 volts, 25 amps. @ max. R.P.M.  
 Charging Starts Cold.....  
 ..... 980 R.P.M. Generator Speed  
 Charging Starts Hot.....  
 ..... 1100 R.P.M. Generator Speed  
 Generator Pulley ..... 3" Dia.



# INDUSTRIAL TRUCK DIVISION



## SPECIFICATIONS

### GENERATOR (continued)

Drive Pulley:..... 7 1/4" Dia.  
 Ratio:..... 2.416 to 1

### STARTING MOTOR

Brush Tension (oz.)..... 40-35

#### Lock Test

Draw Current (amps) ..... 435

Volts ..... 5.8

Torque (ft. lbs.)..... 10.5

#### No Load Test

Draw Current (amps) ..... 49-76

Volts..... 10.6

Speed (R.P.M.).... 6200 min., 9400 max.

Teeth in pinion ..... 9

No. Teeth in Ring Gear ..... 112

Starter to Crankshaft Ratio:.... 12.44 to 1

Starting Medium ..... Solenoid

### DISTRIBUTOR

Start Advance (Deg.) @ 400 R.P.M. .... 0-2

Intermediate Advance (Deg.) @ 950 R.P.M.  
 ..... 4-6

Maximum Advance (Deg.) @ 1200 R.P.M. ... 6-8

Breaker Point Opening (in.) ..... .022

Cam Angle Range (Deg.) ..... 25-34

### BATTERY

No. of Cells: ..... 6

No. of Plates: ..... 42

20 Hour Rate A.H. .... 40

300 Amps, 0 Degrees F.

Total Min:..... .6

5 Sec. Volt: ..... - -

10 Sec. Volt: ..... 6.1

Volts ..... 12

Group ..... S.A.E. #2SM

Model ..... 2SM40

### TORQUE SPECIFICATIONS

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 Screw 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

Drive Wheel Mounting Nut Torque .....  
 ..... 330 to 350 foot pounds

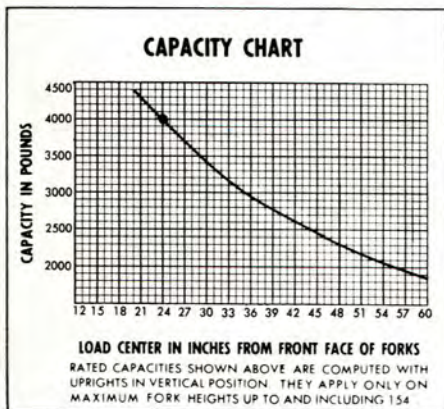
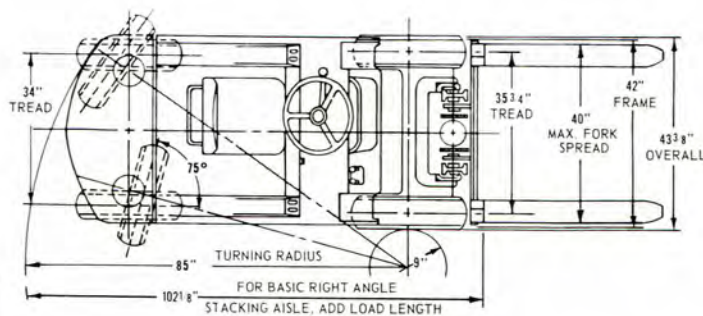
Drive Wheel Inner and Outer Half Attaching Nuts  
 ..... 128 to 141 foot pounds

Steering Wheel Mounting Nut Torque.....  
 ..... 115 to 125 foot pounds

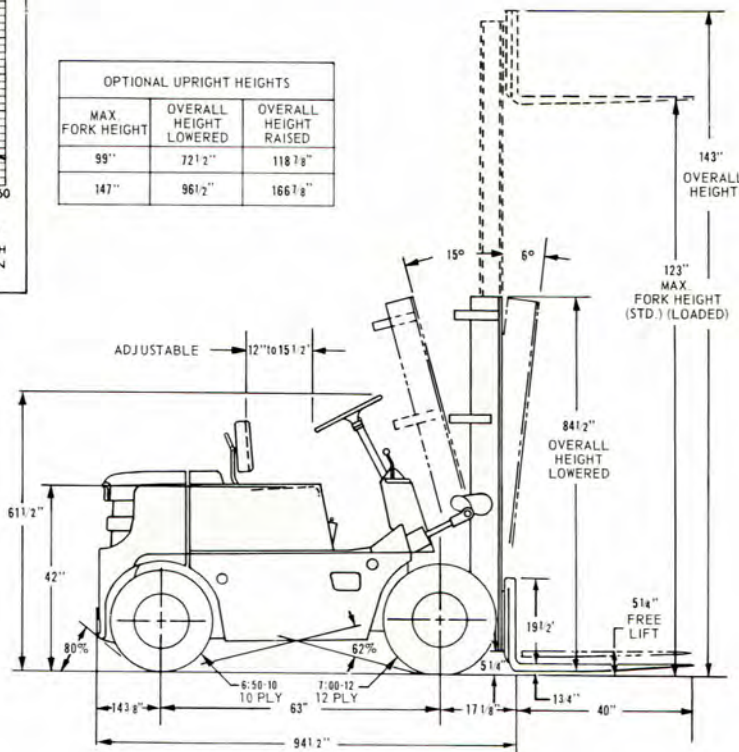
Steering Wheel Inner and Outer Half Attaching  
 Nuts ..... 41 to 51 foot pounds

# CLARKLIFT® CYR 40 CFYR 40

## SPECIFICATIONS



OPTIONAL UPRIGHT HEIGHTS		
MAX FORK HEIGHT	OVERALL HEIGHT LOWERED	OVERALL HEIGHT RAISED
99"	721 1/2"	118 7/8"
147"	961 1/2"	166 7/8"





# INDUSTRIAL TRUCK DIVISION



## SPECIFICATIONS

### 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	-----	-----	-----	-----



INDUSTRIAL TRUCK DIVISION



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# 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
Clutch Pedal, Adjust .....	100H 653
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
Power Steering Pump Level Check .....	8H 703
Nuts, Bolts and Capscrews, Tighten .....	500H 403
Pressure Check Main Hydraulic System .....	1000H 1503
Steering Gear Level Check .....	100H 603
Transmission and Axle Adaptor Level Check .....	100H 002

## N O T E

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

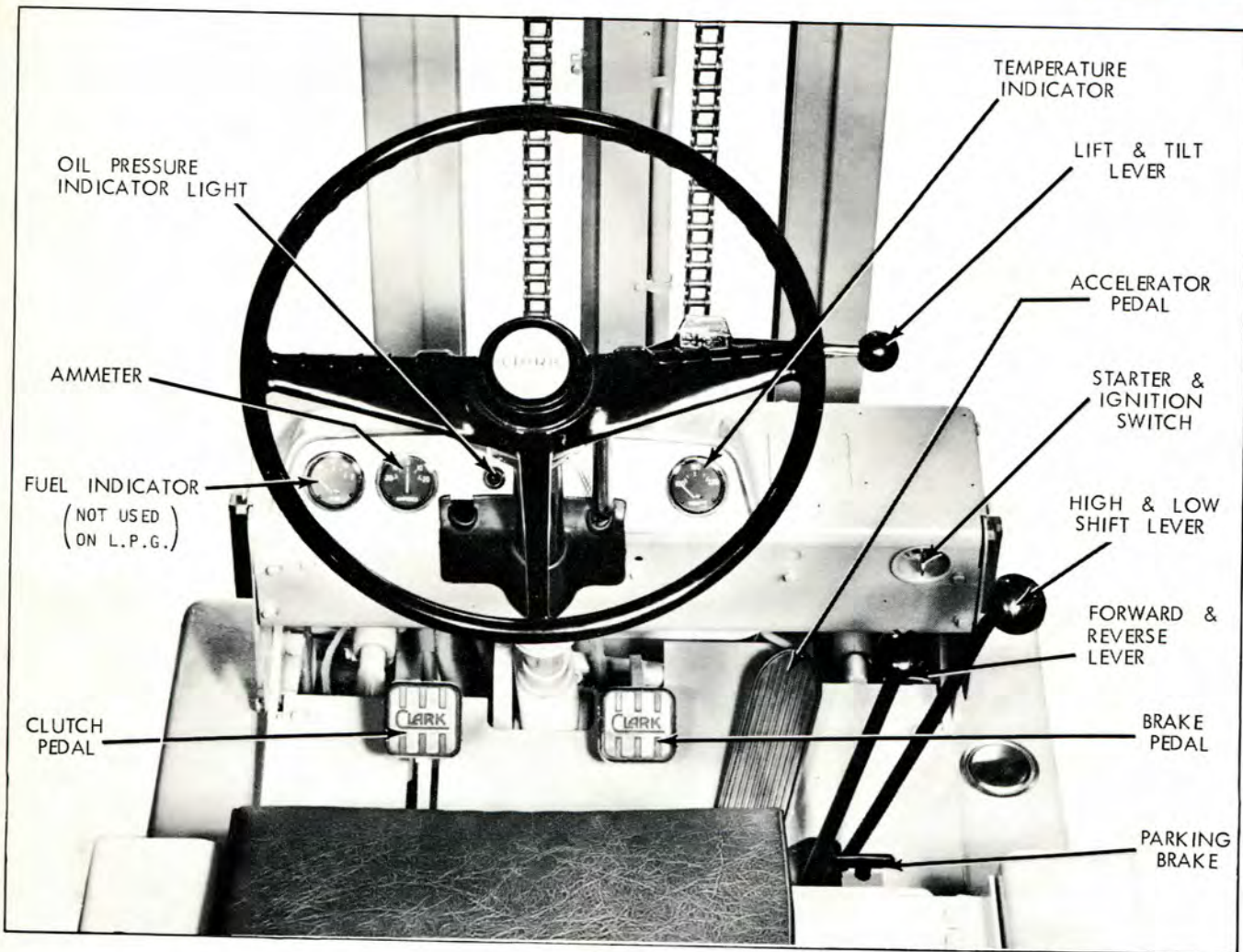


Plate 7009. Overall Controls

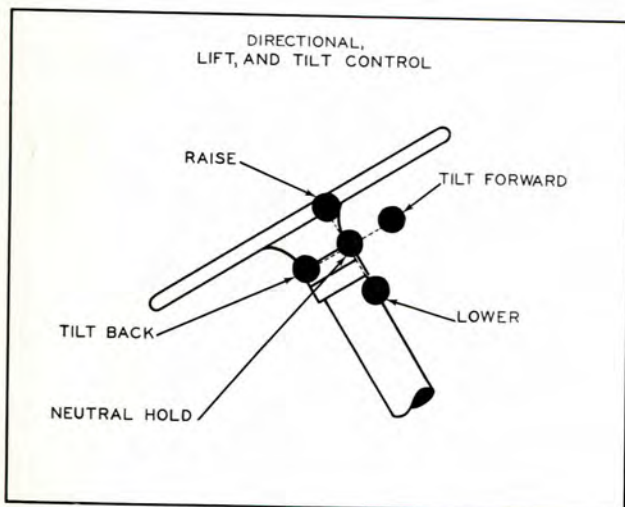


Plate 4448. Hydraulic Control Levers

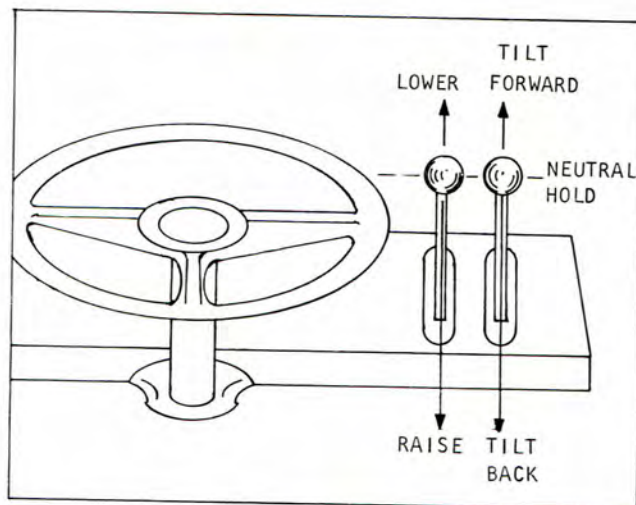


Plate 7305. Hydraulic Control Levers (RENTAL MODELS)



Plate 6885. Oil Pressure  
Warning Light

**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.

**C A U T I O N**

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

**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.

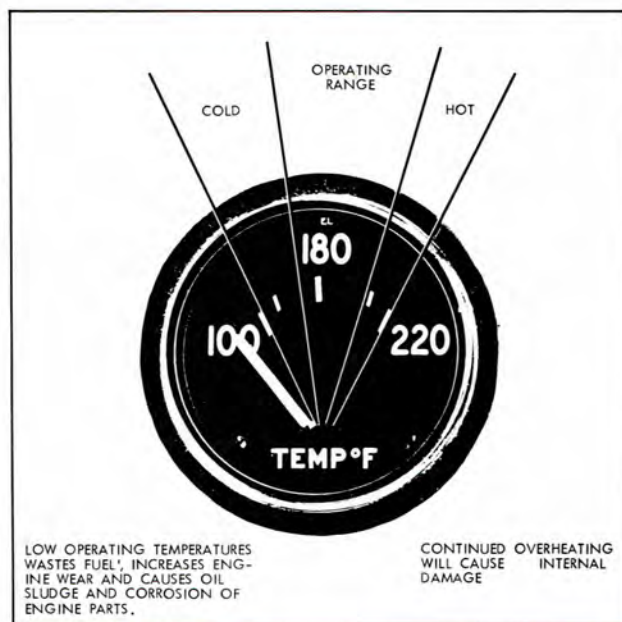


Plate 6287. Engine Coolant  
Temperature Indicator

**N O T E**

BEFORE PLACING MACHINE IN OPERATION RUN  
ENGINE A FEW MINUTES TO WARM OIL ESPE-  
CIALLY IN COLD OPERATING CONDITIONS.

LOW OPERATING TEMPERATURES WASTES FUEL AND  
INCREASES ENGINE WEAR.

**N O T E**

THE COOLANT TEMPERATURE SHOULD REGISTER 185°  
TO 205° F. AFTER THE FIRST TEN OR FIFTEEN  
MINUTES OF OPERATION.

100  
100  
100

100

100  
100





Plate 6418. Ignition Switch

**STARTING**

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

**CAUTION**

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

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 machine to work especially in cold operating conditions.

**TO OPERATE MACHINE**

1. Place transmission levers in neutral position and start engine.
2. Release parking brake and depress clutch pedal. Position shift levers for desired speed and direction. (The shifting diagram located near the shift lever aids the operator in selecting the correct gear).
3. Release clutch pedal slowly and at the same time accelerate as required.
4. Travel with the forks only high enough to clear any floor obstructions.

**C A U T I O N**

DO NOT ALLOW FOOT TO REST ON CLUTCH PEDAL DRIVING FROM POINT TO POINT. RIDING THE CLUTCH PEDAL WILL CAUSE SLIPPAGE OF THE DRIVEN DISC RESULTING IN UNNECESSARY WEAR OR DAMAGE TO THE CLUTCH COMPONENTS.

**TO STOP MACHINE**

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

**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 R.P.M.) FOR ONE OR TWO MINUTES AFTER LOAD IS REMOVED BEFORE BEING STOPPED. THIS ALLOWS INTERNAL ENGINE TEMPERATURES TO EQUALIZE.

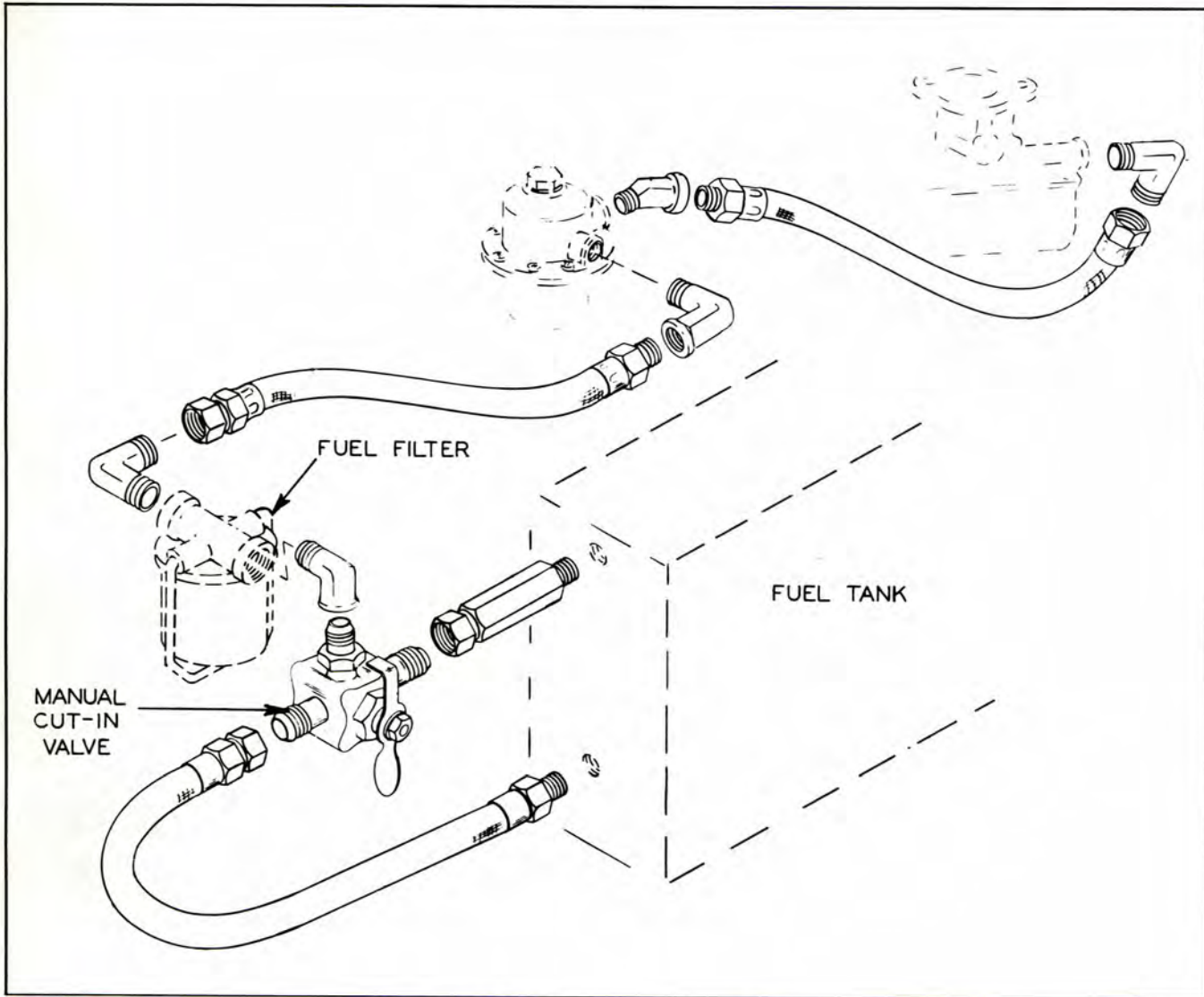


Figure 004a. Manual Cut-in Valve

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.

## O P E R A T I O N S

## TO MOVE A LOAD

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

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

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

## I M P O R T A N T

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

## SAFETY AND OPERATION SUGGESTIONS

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

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

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

3. Avoid sudden stops or starts. When backing, be sure to look for fellow workmen before moving machine.

4. Drive carefully at all times. Exercise caution at cross aisles. Sound horn for safety.

5. Be sure loads are safe to move. Have loads properly centered on machine. Refer to the Capacity Chart in Specifications for various load center ratings.

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

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

8. If the machine does not respond immediately, report to designated individual in charge. A minor adjustment now may save a major repair later.

9. Do not allow riders or hitchhikers.

10. Operate the machine at a safe distance behind other vehicles.

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

12. Observe highway traffic laws in the operation of the vehicle in the plant.

13. Drive carefully on wet or slippery floors.

14. Keep feet within running line of truck.

15. Observe the Operating Rules and Preventive Maintenance Instructions ASA B56.1 Safety Code for Powered Industrial Trucks.

16. Avoid overloading the truck -- this is a safety measure against possible injury to the driver and fellow workmen. Overloading shortens the life of the truck and increases maintenance.

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

18. Be sure the brakes are in proper working condition. Be sure all mechanical and electrical components are working correctly.







# INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

## PROPER HANDLING OF L.P. GAS (Machines so equipped)

This is being published to remind the user of the dangers present in the handling of fuels. It is urged that you take all necessary precautions in your operation to prevent accidents.

There is always danger of explosion and fire with any fuel, and L.P. Gas is no exception. Most people know how to handle gasoline safely and, while L.P. Gas is similar to gasoline, it is more volatile and vaporizes almost instantly at ordinary temperatures. Leaking gasoline is usually visible and it vaporizes slowly. L.P. Gas is a liquid while under pressure in the container, but vaporizes to a virtually invisible gas upon release. This results in a high concentration of vapor which is not easily detectable, except with the addition of an odorizer. Even a small leak can result in a mixture of vapor and air that will easily ignite with a spark or flame.

The vapors of both fuels will generally disperse in moving air, but since they are heavier than air may, in seeking the lowest level, move to areas a considerable distance from the source and lie as an explosive mixture for some time before dispersal is complete. This is more apt to happen with a ruptured tank than with a small leak.

Pamphlet #58, issued by the National Fire Protection Association (NFPA) is the accepted guide for the safe handling of L.P. Gas. Every shop should have a copy of this pamphlet, and a part of an organized safety program should be a periodic review and discussion of the pertinent sections.

Since L.P. Gas is an odorless gas, L.P.G. manufacturers add a malodorant (usually ethyl mercaptan) to aid in the detection of gas leaks. Often this odor ("rotten eggs") is found in the exhaust fumes and is ignored because it is considered natural. This is a mistake. Odorous exhaust fumes indicate that the odorant is not being burned completely, probably because the fuel mixture is too rich. This should be corrected immediately, not only for more efficient engine operation, but also because the fume odor might prevent detection of a similar odor resulting from a gas leak from the tank or hose couplings.

Some gas usually escapes when fuel tanks are changed, but even this small amount can be reduced or eliminated with proper techniques. The shut-off valve on the tank should be completely closed during this operation.

When installing or repairing L.P. Gas equipment be sure to:

1. Close all primary shutoff valves on tank and equipment.
2. Properly ventilate work area.
3. Eliminate ignition sources (sparks, pilot lights, etc.).
4. Prohibit smoking.
5. Have fire fighting equipment present.
6. Check all equipment before installation.
7. Securely mount cylinder (container) to the truck.
8. Protect all hoses from damage by using new grommets or some suitable means, where necessary.
9. After installation, check for leaks with soapy water. NEVER USE A MATCH OR FLAME WHEN CHECKING FOR LEAKS.

### WARNING

SHUT THE TRUCK ENGINE OFF DURING REFUELING, EXCHANGE OF TANKS, ETC. BEFORE DISCONNECTING LINES, DOING ANY WORK ON THE L.P. GAS SYSTEM, OR IF THE TRUCK IS NOT TO BE USED FOR ANY APPRECIABLE LENGTH OF TIME, THE VALVE SHOULD BE SHUT OFF ON THE FUEL CYLINDER (CONTAINER) AND THE ENGINE LEFT RUNNING UNTIL IT STOPS.

### WARNING

STORE AND REFILL ALL CYLINDERS (CONTAINERS) OUT-OF-DOORS WITH NO SMOKING OR FIRE IN THE VICINITY, AND DO NOT FILL THEM BEYOND THE RECOMMENDED CAPACITY, EITHER BY VOLUME OR WEIGHT.

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.

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.

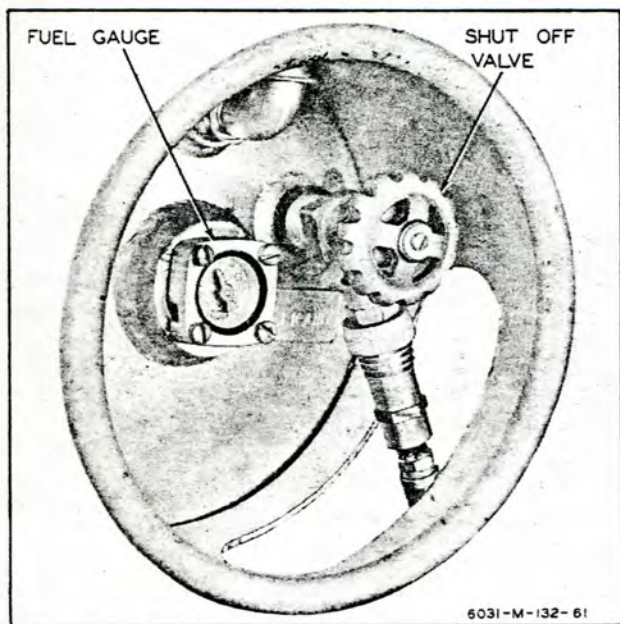


Plate 6031. Typical L.P. Gas Container

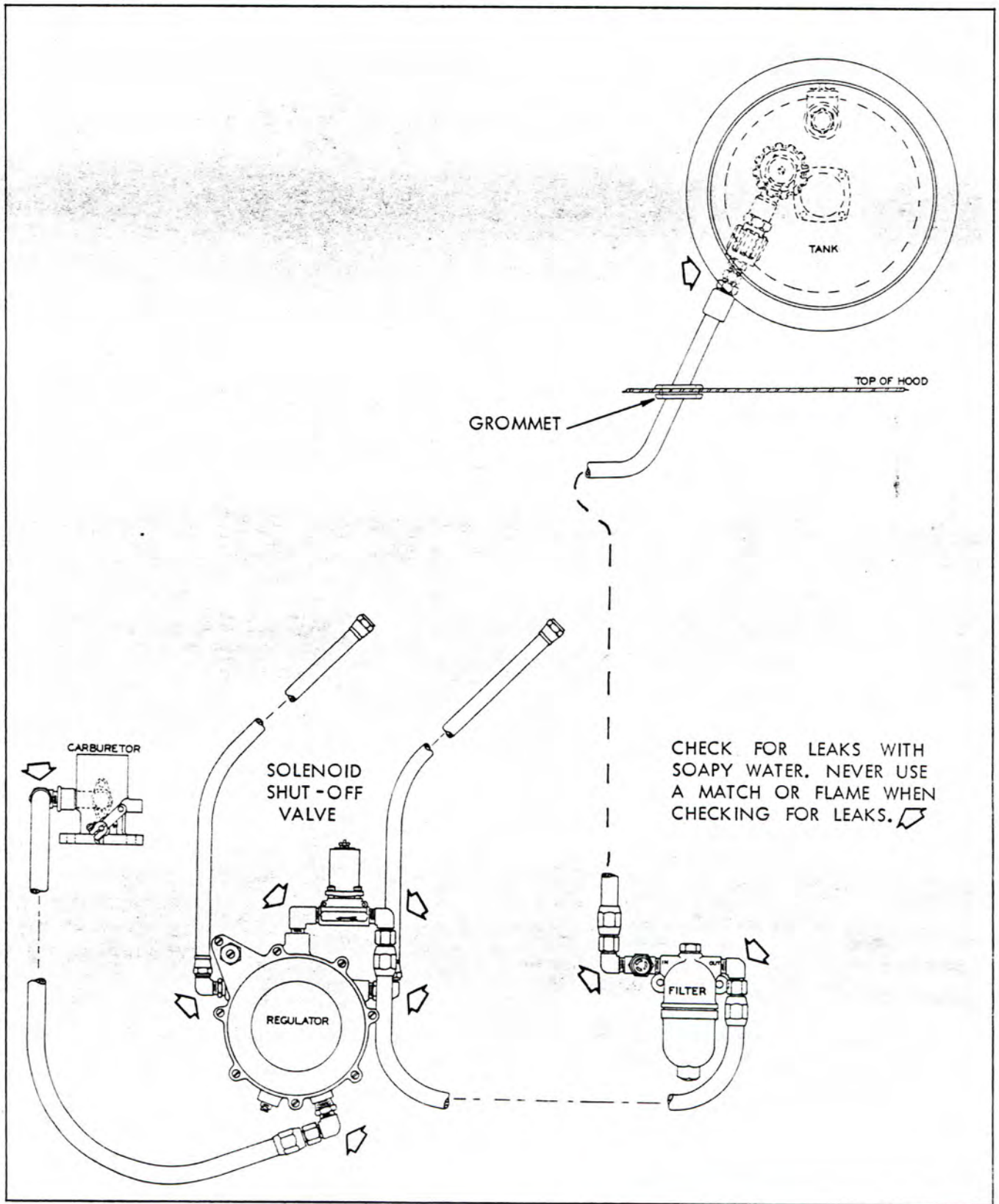
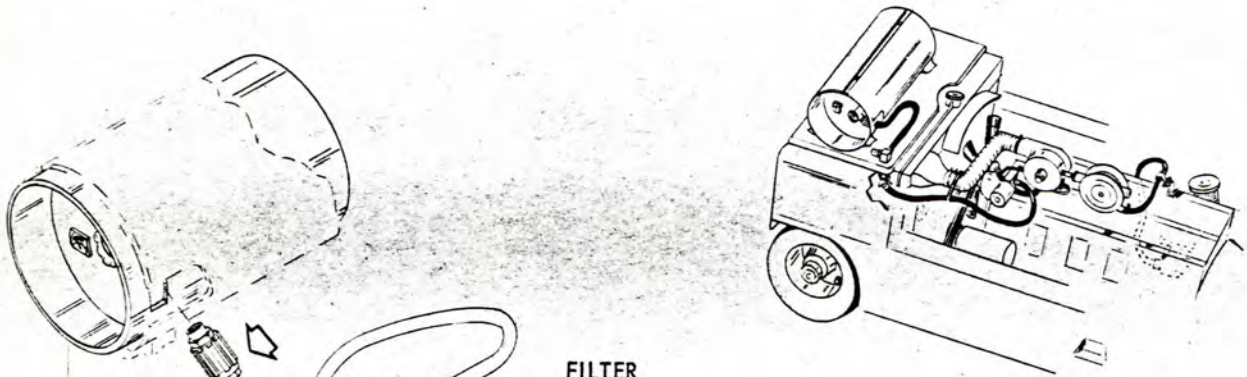


Plate 7405. Typical L.P. GAS Installation



FILTER

FASTENER

VAPORIZER

SOLENOID  
SHUT - OFF  
VALVE

CHECK FOR LEAKS WITH  
SOAPY WATER. NEVER USE  
A MATCH OR FLAME WHEN  
CHECKING FOR LEAKS

REGULATOR

FASTENER

FASTENER

CARBURETOR

Plate 7406. Typical L.P. GAS Installation



# INDUSTRIAL TRUCK DIVISION



## LUBRICATION AND PREVENTIVE MAINTENANCE INDEX

( 8 HOURS )	Time Interval & (H=Hours)	Page Number (000-)	( 100 HOURS cont. )	Time Interval & (H=Hours)	Page Number (000-)
Air Cleaner, service .....	8H	403	Engine Oil Filter, replace element, clean case...	100H	003
Brake Pedal, operation check	8H	303	Fan Belt, check and adjust.	100H	203
Brake/Parking, oper. check..	8H	303	Fuel Tank and Lines, inspect	100H	503
Clutch (Hydracool) Pedal, free travel check.....	8H	605	Hydraulic Sump Tank Breather, service.....	100H	503
Clutch Release Bearing, lubricate (if so equipped)..	8H	605	Hydraulic System, inspect..	100H	403
			Lift Brackets, inspect.....	100H	403
Crankcase Oil Level, check..	8H	003	Lift Chain, adjust.....	100H	403
Engine Cooling, check.....	8H	103	Lubrication Chart/s.....	100H	703
Engine Coolant Temp. Indicator, check.....	8H	203	Steer Gear, verify lubricant level.....	100H	603
Fuel Tank, check.....	8H	002	Transmission & Axle Adaptor, verify lubricant level	100H	002
Horn Fuse (location).....	8H	002			
Horn, operation check.....	8H	002	( 500 HOURS )		
Hydraulic Control, operation check.....	8H	503	Fuel Pump, inspect.....	500H	002
Hydraulic Sump Tank, verify fluid level.....	8H	503	Fuel Pump Strainer, service	500H	002
Ignition Fuse (location)....	8H	002	Hydraulic Oil Filter, replace element.....	500H	103
Oil Pressure Indicator, operation check.....	8H	203	Hydraulic Sump Tank, drain and refill.....	500H	103
Power Steering Pump, verify reservoir fluid level..	8H	703	Intake and Exhaust Manifold, check security of mounting		403
Tires, inspect.....	8H	603	Nuts, Bolts & Capscrews, check security of mounting....	500H	403
			Steer Axle & Linkage, adjust	500H	302
( 100 HOURS )			Steer Gear, adjust.....	500H	202
Battery, level check, test..	100H	603			
Brake Master Cylinder, verify fluid level.....	100H	303	( 1000 HOURS )		
Clutch (Hydracool) Pedal, adjust free travel.....	100H	653	Axle Ends, clean and repack	1000H	805
Engine Cooling, inspect.....	100H	103	Brake System, test, adjust & bleed.....	1000H	912
Engine Breather, clean.....	100H	003	Carburetor, adjust.....	1000H	403
Engine Crankcase, drain & refill		003	Compression Test, engine...	1000H	103



# INDUSTRIAL TRUCK DIVISION



## LUBRICATION AND PREVENTIVE MAINTENANCE INDEX CONTINUED

( 1000 HOURS CONT'D )	Time Interval (H=Hours)	Page Number (0000-)
Ignition Timing .....	1000H	303
Intake and Exhaust Valve Clearance, adjust .....	1000H	003
Pressure checks (Main Hydraulic System) .....	1000H	1503
Transmission & Axle Adaptor drain and refill .....	1000H	1303
Spark Plugs, clean & adjust...	1000H	103
Starter, inspect .....	1000H	603
Steer Wheel Bearings, inspect & adjust .....	1000H	803
Upright & Lift Carriage Roller Adjustments check...	1000H	1803
Regulator, inspect .....	1000H	704
Wiring, inspect .....	1000H	704

## LUBRICATION & PREVENTIVE MAINTENANCE ILLUSTRATIONS

Description	Time Interval (H=Hours)	Page Number (0000-)
<u>Description</u>		
Lube. & Prev. Main. Illus. ....	8H	002
Lube. & Prev. Main. Illus. ....	100H	002
Lube. Instruction Diagram .....	100H	703
Lube. & Prev. Main. Illus. ....	500H	002
Lube. & Prev. Main. Illus. ....	1000H	002

### N O T E

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



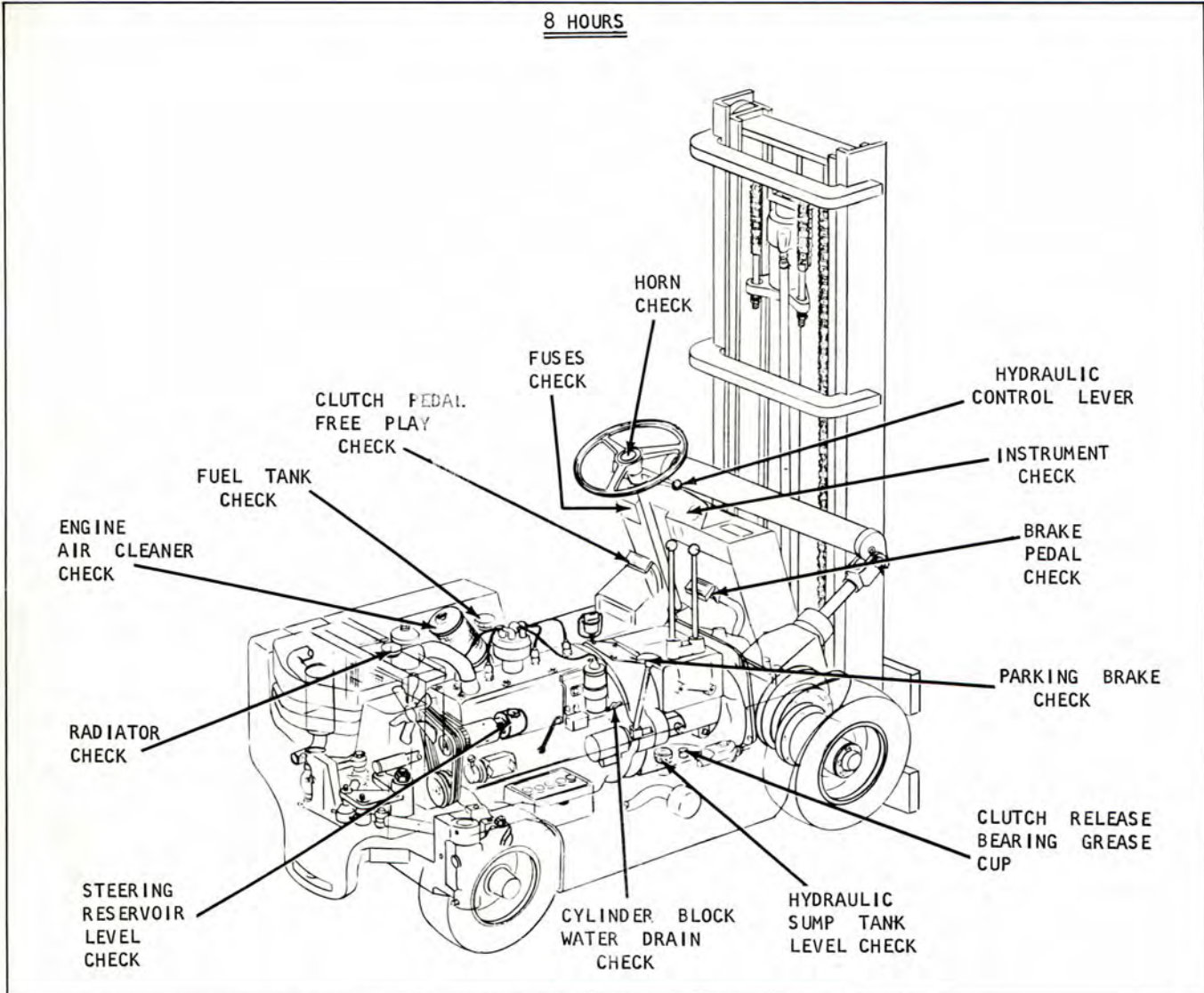


Figure 002a. Lubrication & Preventive Maintenance Illustration

**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.

**CAUTION**

DO NOT REMOVE THE SCREEN WHILE FILLING TANK.



Figure 002b. Ignition Fuse and Horn Fuse



**ENGINE CRANKCASE**

Before attempting to start the engine, first make sure that it has sufficient oil. The oil filler pipe is located on the right side of the machine. The oil level stick is of the dipstick or bayonet type and is also located on the right side of the machine. Fill the crankcase reservoir through the filler pipe to the proper level as indicated on the dipstick.

**CAUTION**

NEVER PERMIT THE OIL LEVEL TO FALL BELOW THE "ADD" MARK ON THE DIPSTICK.

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

**NOTE**

ON L.P. GAS MACHINES, USE A NON-DETERGENT OIL DURING BREAK-IN PERIODS.

Crankcase Capacity — Refer to Specifications

	Service "MS" Oils
S.A.E. 10W	..... 0° to 32° F.
S.A.E. 20W	..... 32° to 75° F.
S.A.E. 30	..... above 75° F.
or use	10W.... 30 MULTI-GRADE OIL.

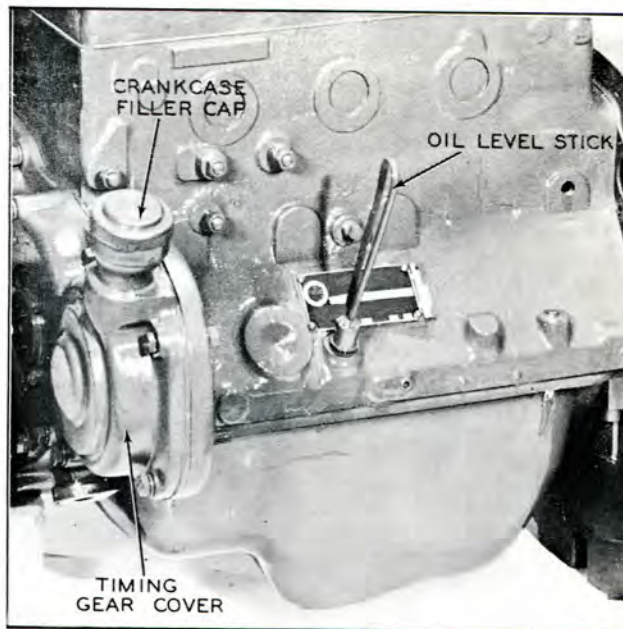


Plate 6629. Engine Crankcase Fill

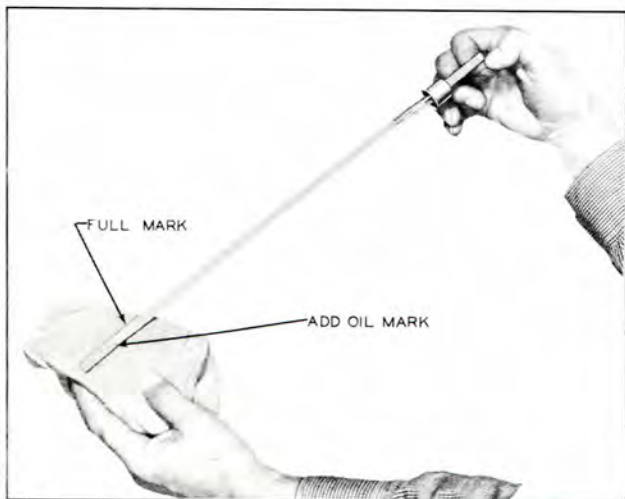


Plate 3145. Crankcase Oil Check

## 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.

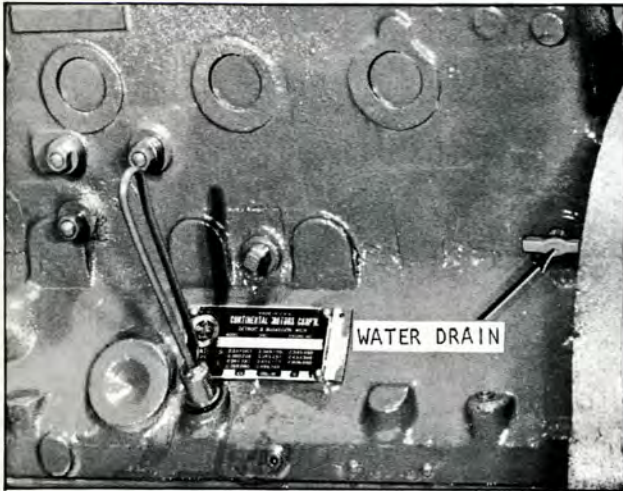


Plate 7008. Typical Cylinder Block Water Drain

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

## NOTE

REFER TO DIESEL ENGINE MANUAL FOR MACHINES SO EQUIPPED.



Plate 6185. Oil Pressure  
Warning Light

**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.

**C A U T I O N**

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

**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.

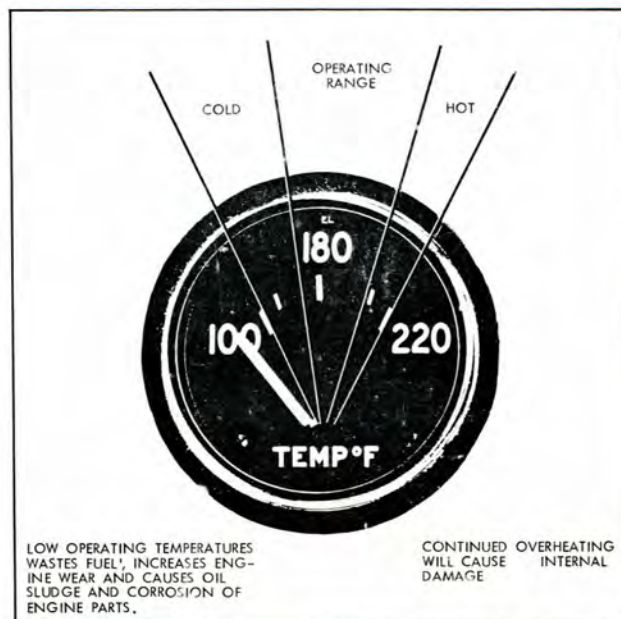


Plate 6287 Engine Coolant  
Indicator

**N O T E**

BEFORE PLACING MACHINE IN OPERATION RUN  
ENGINE A FEW MINUTES TO WARM OIL ESPE-  
CIALLY IN COLD OPERATING CONDITIONS.

LOW OPERATING TEMPERATURES WASTES FUEL AND  
INCREASES ENGINE WEAR.

**N O T E**

THE COOLANT TEMPERATURE SHOULD REGISTER 185°  
TO 205° F. AFTER THE FIRST TEN OR FIFTEEN  
MINUTES OF OPERATION.

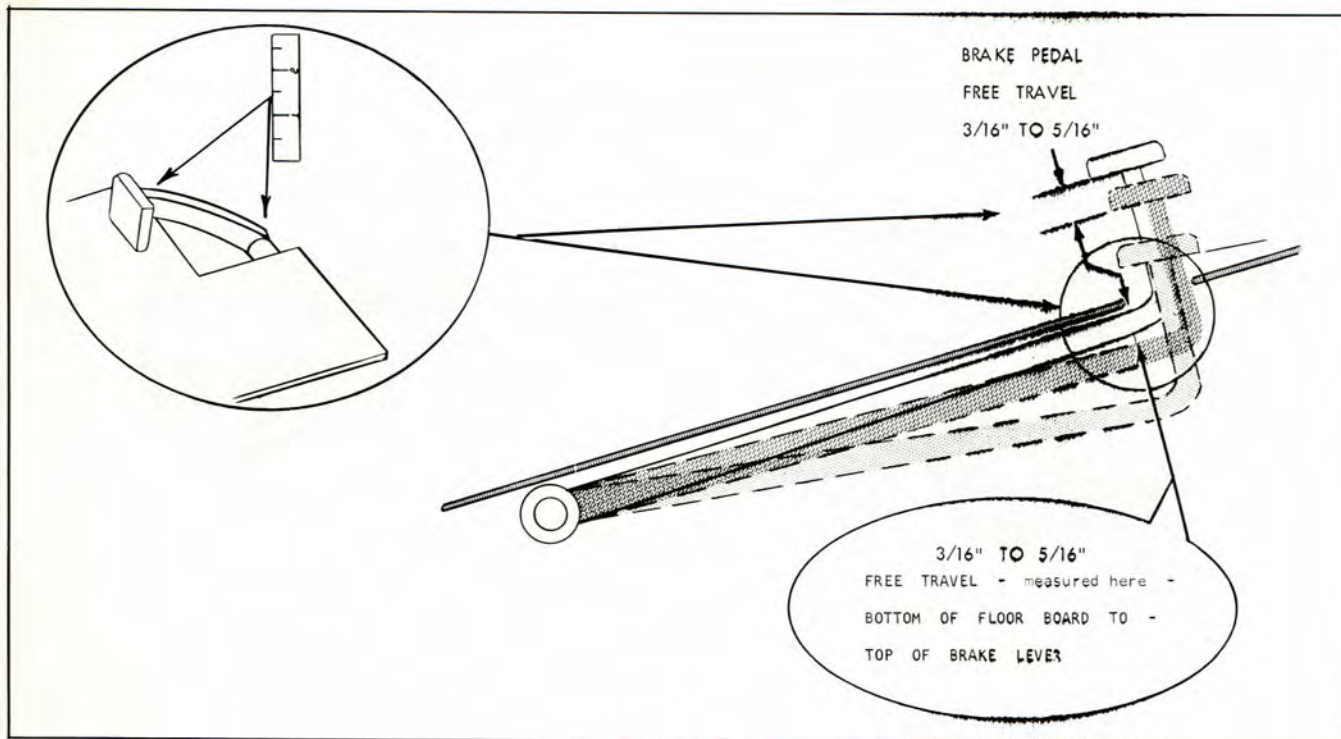


Figure 303a. Brake Pedal Free Travel

**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 2 to 2 1/2 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.



Figure 303b. Parking Brake

LUBRICATION AND PREVENTIVE MAINTENANCE

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.

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 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

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

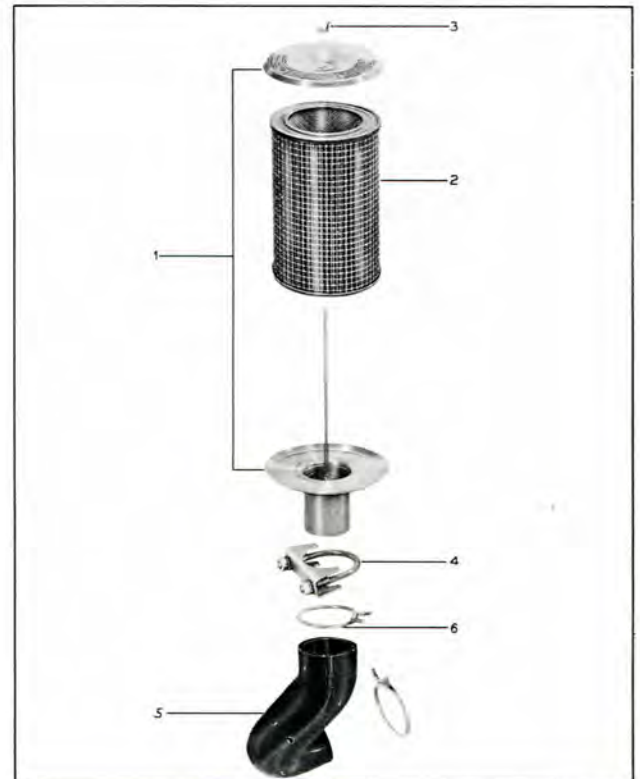


Plate 6980. Air Cleaner Components

**N O T E**

DEPENDING ON THE TYPE OF OPERATING THE MACHINE IS SUBJECTED TO WILL DETERMINE THE FREQUENCY OF AIR CLEANER MAINTENANCE. HAP- HAZARD 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.

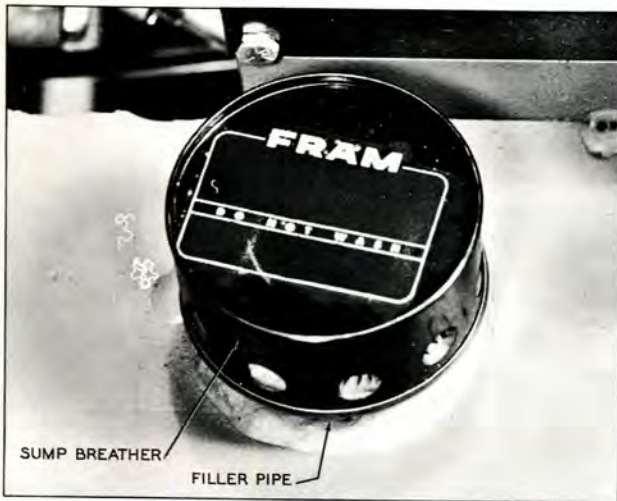


Plate 6626. Hydraulic Sump Tank and Sump Breather

**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**

**IMPORTANT**

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.

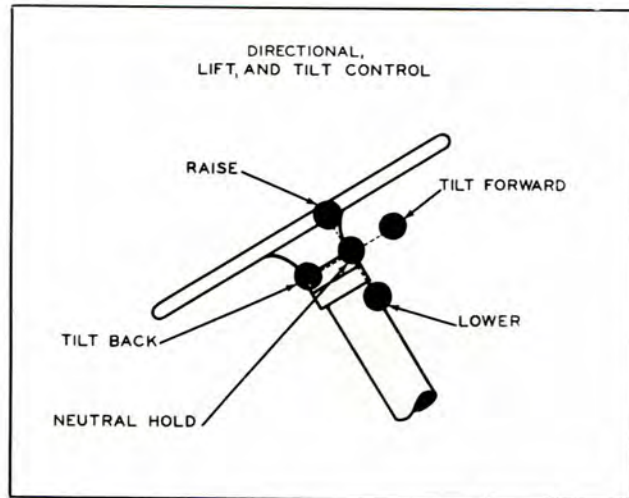


Plate 4448. Lift and Tilt Lever

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.

**CAUTION**

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.

## TIRE AND RIM 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 machines 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 wedging into it. Tires with cuts treated in this manner may be continued in service without danger of further growth of these injuries. If a tire has at least one deep cut that requires a repair, then all smaller cuts may be quickly and economically repaired and vulcanized by the steam kettle method.

## NOTE

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

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

On SPLIT RIM WHEELS, 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 MAY BE 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 MAY BE 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) 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.

## WARNING

BEFORE REMOVING TIRE FROM RIM, RELEASE ALL AIR FROM THE TIRE BY REMOVING VALVE STEM CORE.

**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 forward rotation, see Plate 6422.

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

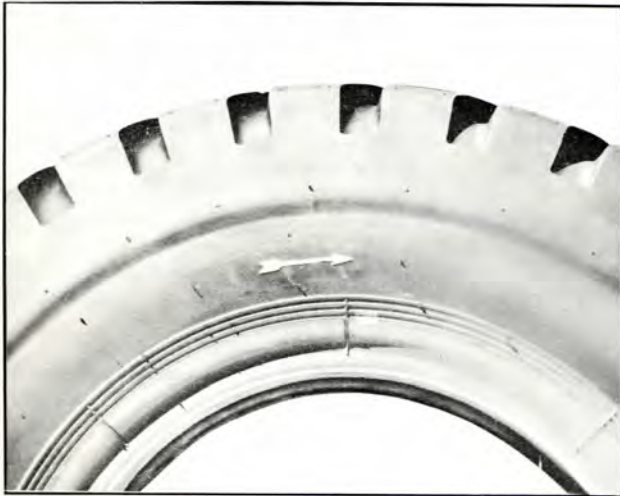


Plate 6422. Inside Dual Tire  
(or Single Drive Tire)  
(Arrow to point toward front of truck)

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



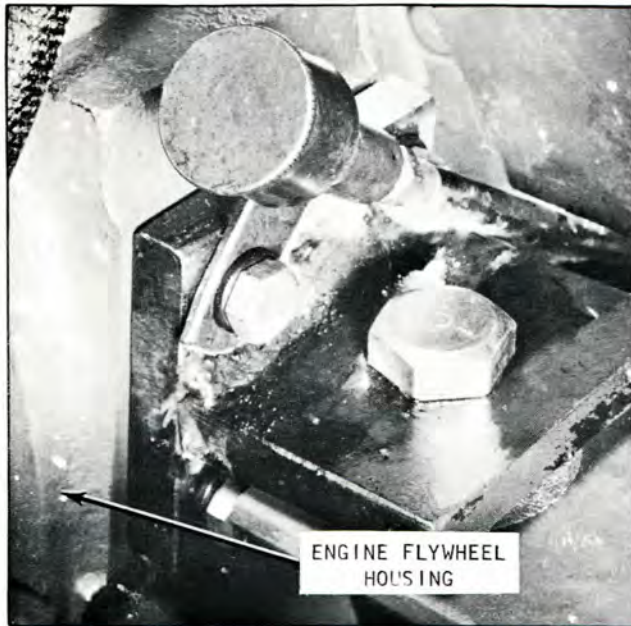


Figure 605a. Clutch Release Bearing Grease Cup

CLUTCH RELEASE BEARING LUBRICATION:

Rotate cup one complete turn every 8 operating hours.

Keep grease cup filled with Clutch Release Bearing high temperature grease. Use Shell 5A Texaco 1199 or equivalent.

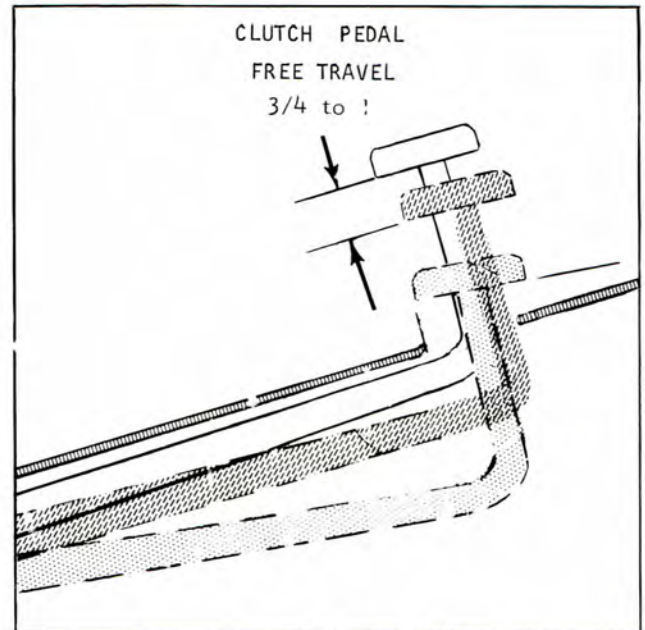


Figure 605b. Clutch Pedal Free Travel Check

CLUTCH PEDAL FREE TRAVEL. Depress clutch pedal from the top position to a point where it meets resistance. This free travel should be approximately 3/4 to 1 inches from top pedal position.



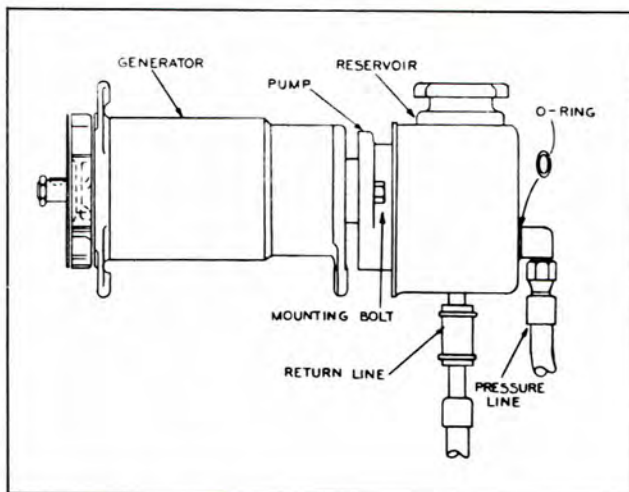


Plate 5940. Power Steering Pump  
(MACHINES SO EQUIPPED)

**POWER STEERING PUMP**

Check reservoir fluid level each 8 operating hours. Fill if necessary with Type 'A', Suffix 'A' Automatic Transmission Fluid. Containers must display a qualification number prefixed by the mark 'AQ-ATF'. Clark part number 879803. When fluid in the reservoir becomes contaminated it should be drained by removing the return line hose at the bottom of the reservoir. After draining refill to the proper level with the above mentioned fluid. Operate the engine for a few minutes and recheck fluid level. Fill to the proper level if necessary.

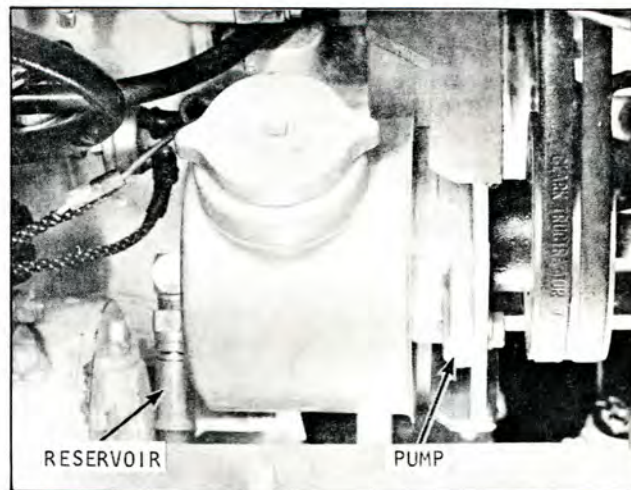


Plate 8611. Power Steering Pump

**CAUTION**

DO NOT OPERATE ENGINE WHILE RESERVOIR IS EMPTY  
AS THE STEERING PUMP WILL NOT BE LUBRICATED  
AND SERIOUS DAMAGE WILL OCCUR.

LUBRICATION AND PREVENTIVE MAINTENANCE

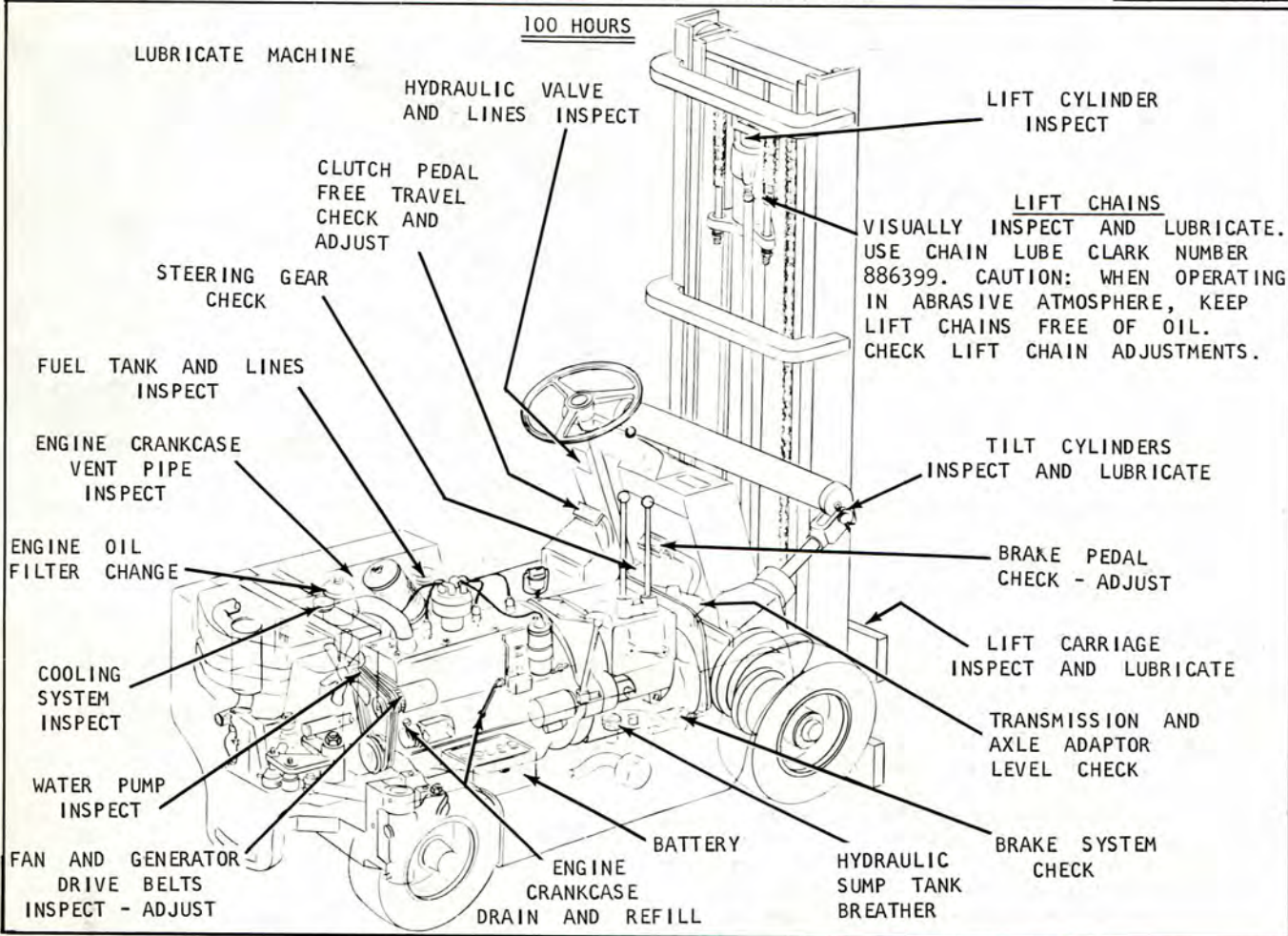


Figure 002a. Lubrication & Preventive Maintenance Illustration

TRANSMISSION AND AXLE ADAPTOR

Verify fluid level, fill if necessary with straight gear lube of S.A.E. Number 90 grade. Remove fill plug at top of axle adaptor and fill until lubricant reaches level plug located on front side of axle adaptor. (This plug may be removed after tilting unloaded forks forward). Recheck fluid level after lubricant has reached operating temperatures and drain or refill to level plug as necessary.

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.

CAUTION

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.

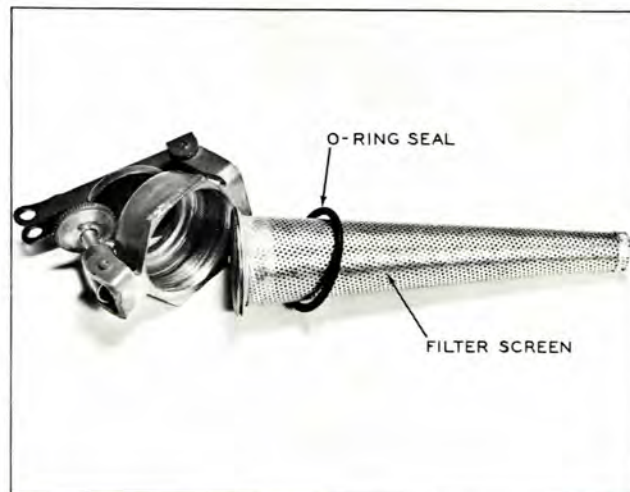


Figure 002b. Fuel Tank Filler Cap and Screen

**ENGINE CRANKCASE**

Every 100 operating hours, drain and refill. (Drain at operating temperatures). Refill, then run engine a few minutes and add oil as necessary to bring oil level to full mark indicated on the dipstick.

Crankcase Capacity — Refer to Specifications  
For Service "MS"  
SAE 10W ..... 0° to 32° F.  
SAE 20W ..... 32° to 75° F.  
SAE 30 ..... above 75° F.  
or use 10W - 30 MULTI-GRADE OIL

**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

**ENGINE OIL FILTER**

The oil filter element 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 gaskets and replace cover spring, oil filter cover and secure with oil filter cover screw.

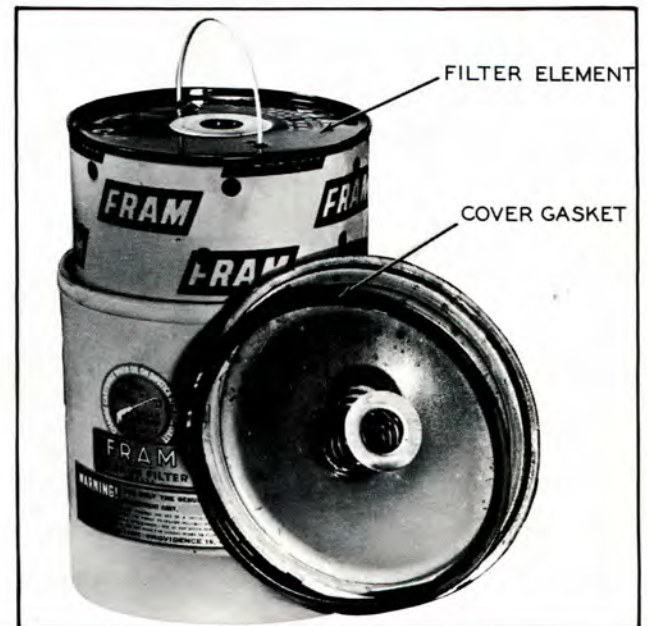


Plate 6642. Engine Oil Filter

**CAUTION**

START ENGINE, RUN AT IDLE FOR A FEW MINUTES, CHECK COVER AND COVER SCREW FOR LEAKS.

**NOTE****DIESEL ENGINES**

REFER TO ENGINE  
OPERATORS MANUAL



Plate 6458. Radiator Pressure Cap

#### 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. 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.

#### NOTE

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.

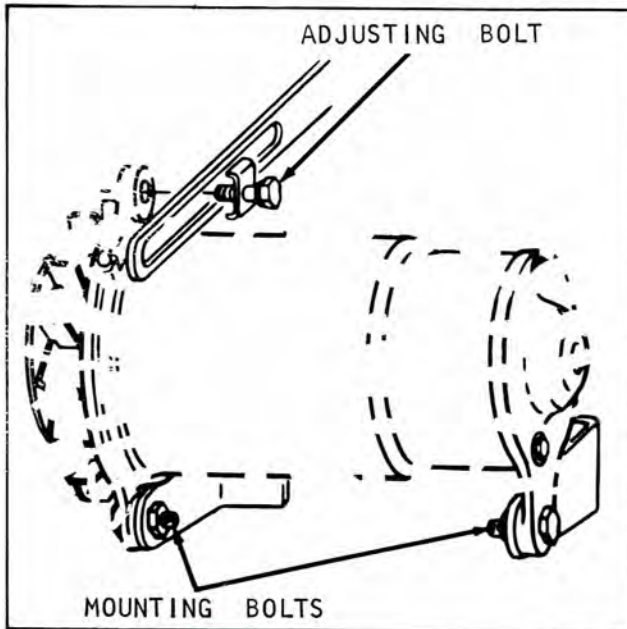


Plate 6631. Generator Drive Belt Adjustment

FAN AND GENERATOR DRIVE BELTS

The drive belts should have finger pressure deflection of 3/4 to 1 inch mid-way 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.

CAUTION

EXERCISE CAUTION WHEN ADJUSTING BELTS. BELTS ADJUSTED TOO TIGHT WILL VERY LIKELY CAUSE

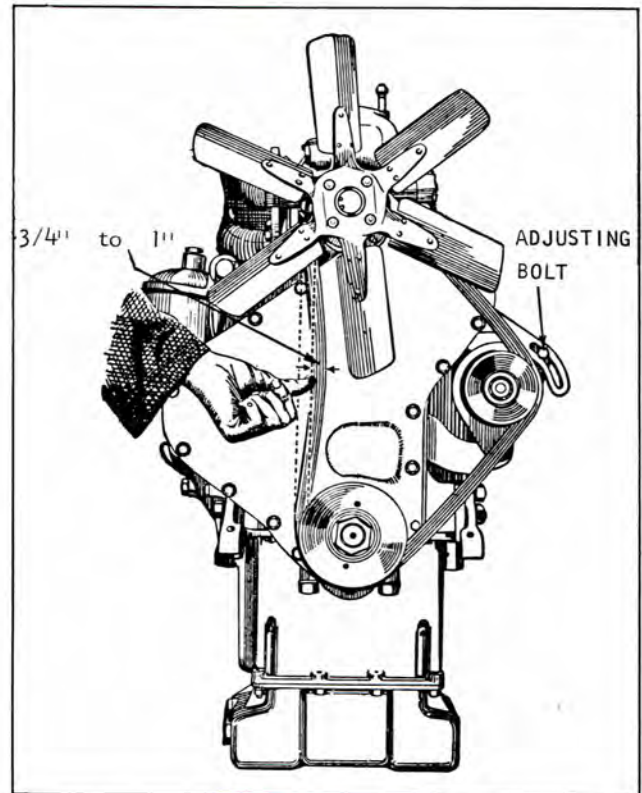


Plate 6632. Belt Deflection Check

BEARING DAMAGE. CONVERSELY, BELTS ADJUSTED TOO LOOSE WILL RESULT IN BELT WEAR AND HIGH ENGINE TEMPERATURE DUE TO BELT SLIP-PAGE.

NOTE

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

LUBRICATION AND PREVENTIVE MAINTENANCE

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.

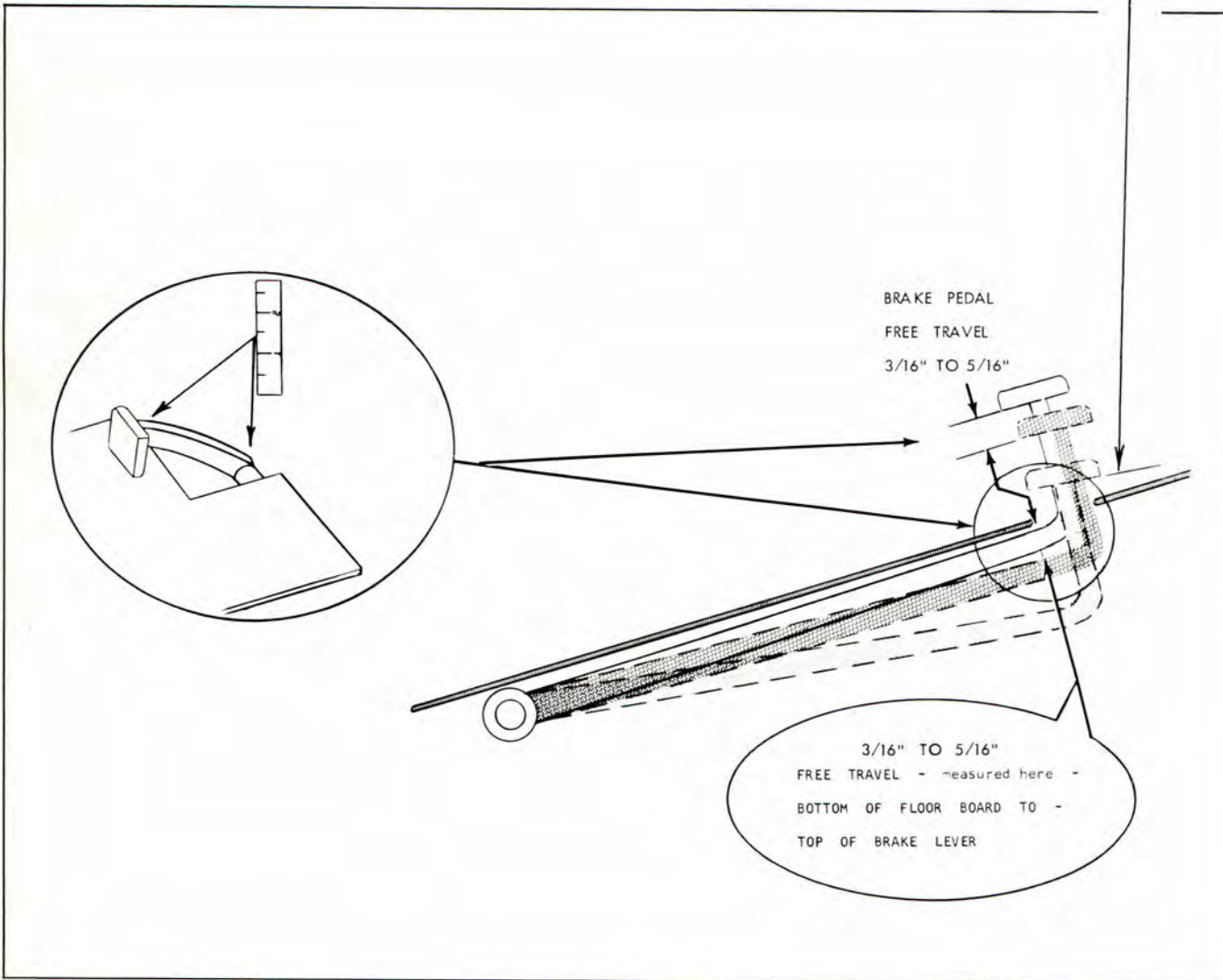


Figure 302a. Brake Pedal Check and Adjustment



**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**

**WARNING**

**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 fuel consumption.

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

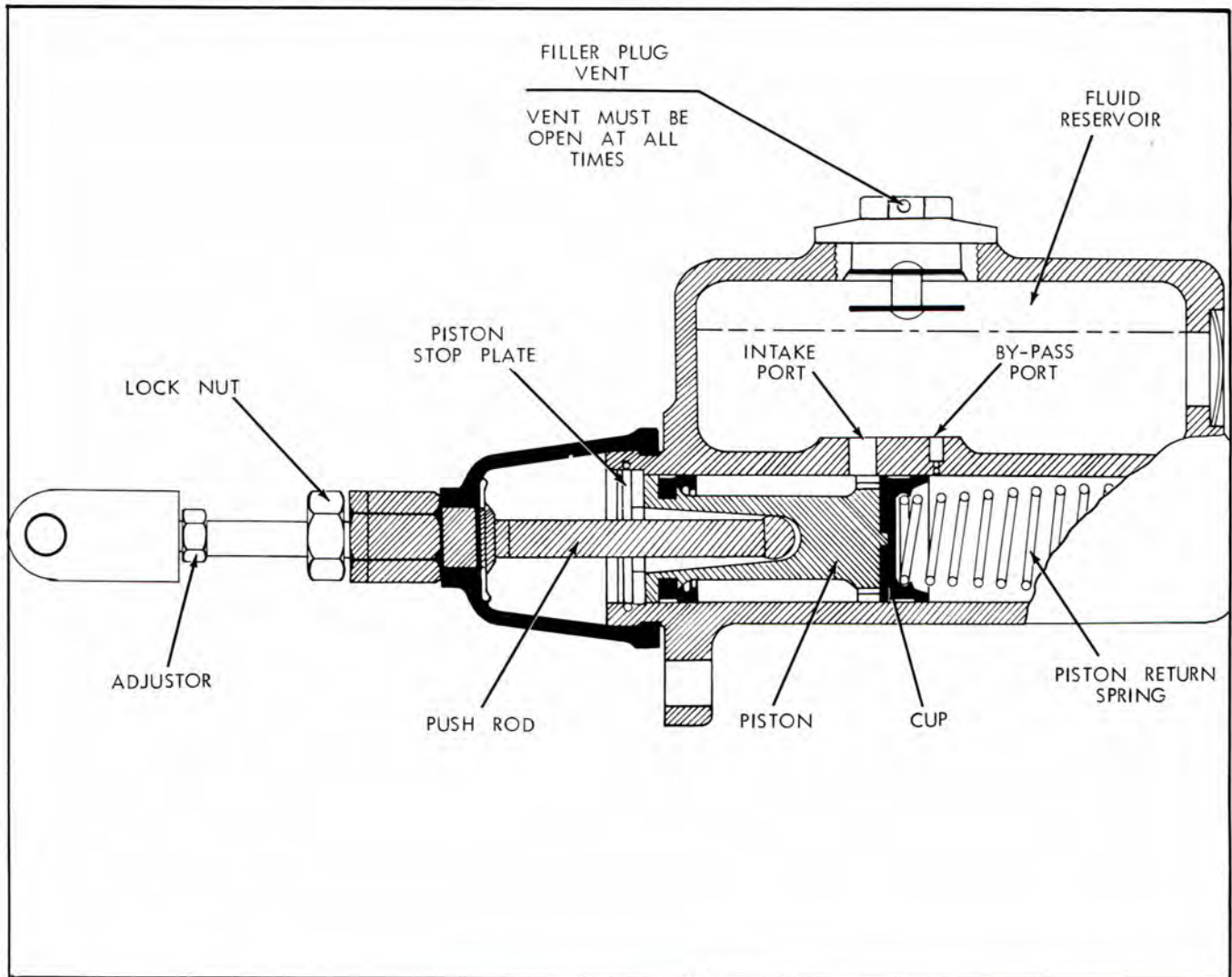


Figure 303a. Brake Pedal Adjustment

## LUBRICATION AND PREVENTIVE MAINTENANCE

## 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.

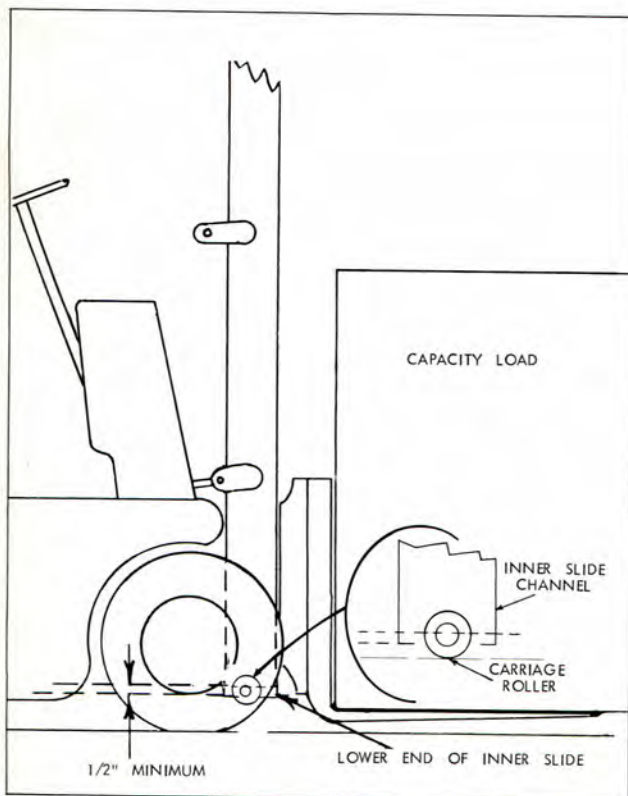


Plate 6884. Lift Chain Adjustment  
(Place Maximum Load On Forks)

## 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.

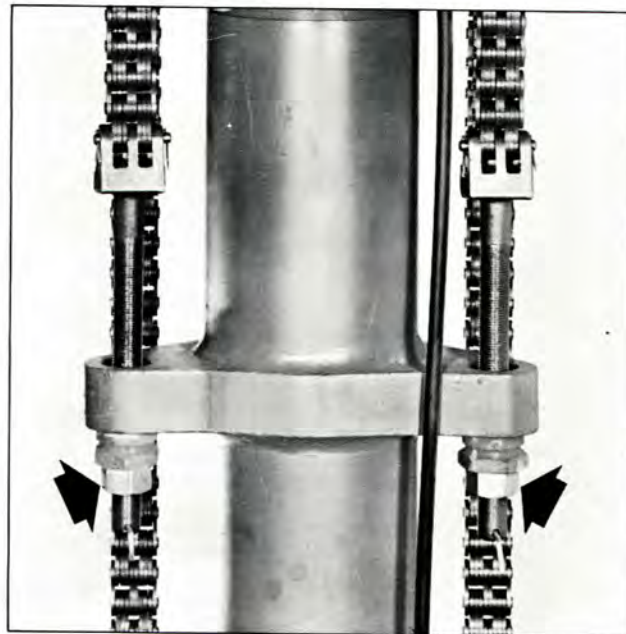


Plate 6634. Lift Chain Adjustment  
(Chain Anchor Rods)

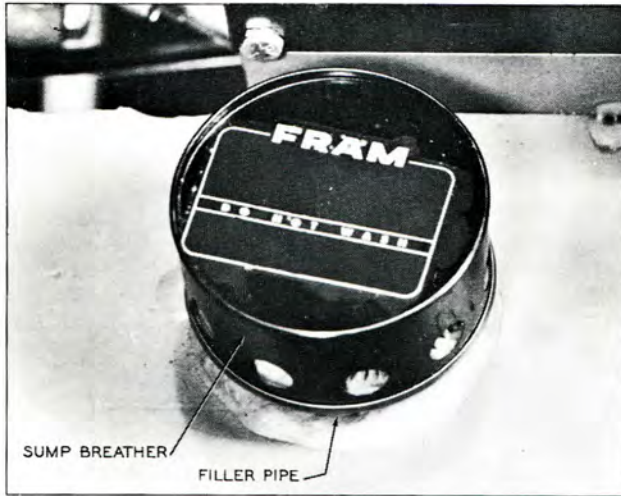


Plate 6626. Hydraulic Sump Tank

**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



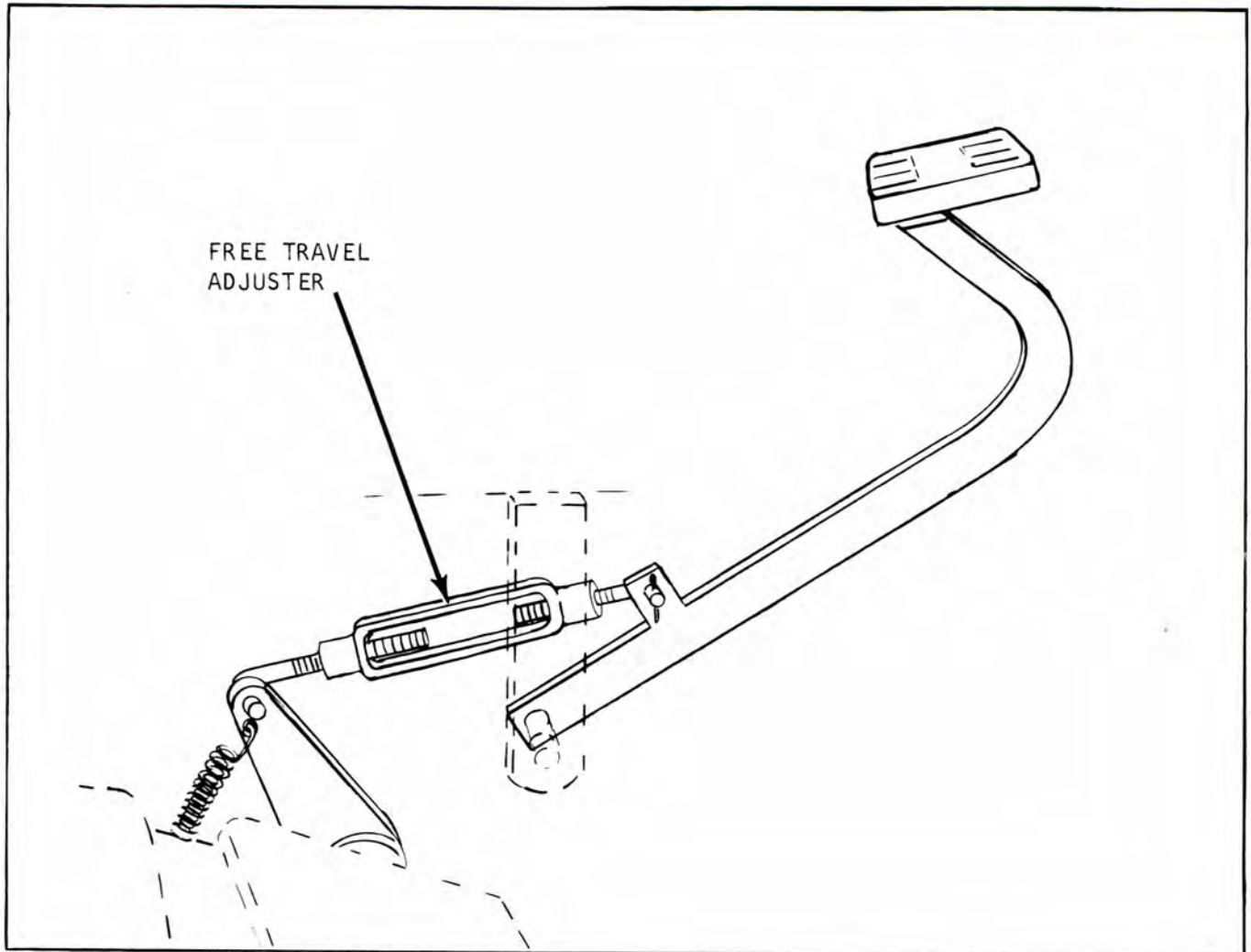


Figure 653a. Clutch Pedal Adjustment

#### CLUTCH PEDAL ADJUSTMENTS

The clutch pedal should be adjusted to allow free travel of  $3/4$  to 1 inch.

The clutch pedal adjustment is necessary to compensate for clutch wear and provide clearance between the release bearing and pressure plate fingers. The adjustment is made beneath the floor plates at the clutch rod turnbuckle.

1. Loosen turnbuckle lock nut.
2. Adjust turnbuckle to provide proper pedal free travel.
3. Tighten lock nut.

100 HOURS

MACHINE MISCELLANEOUS  
LINKAGE NOT OTHERWISE  
SPECIFIED

STEERING GEAR

WHEEL BEARINGS

TILT CYLINDER  
ANCHOR PINS (2)

DRAG LINK (1)  
CLUTCH PEDAL (1)

GOVERNOR SLIP TUBE

ENGINE  
OIL FILTER

WHEEL BEARINGS

KNUCKLE PINS (2)  
TIE RODS (2)

DRAG LINK (1)

LIFT CHAINS

TILT CYLINDER PIVOT  
PINS (2)

UPRIGHT ANCHOR  
RINGS (2)

TRANSMISSION &  
DIFFERENTIAL

MASTER CYLINDER

CLUTCH PEDAL  
SHAFT (2)  
BRAKE PEDAL  
SHAFT (1)

CLUTCH  
RELEASE  
BEARING

HYDRAULIC SUMP  
TANK

CRANKCASE

GENERATOR  
DISTRIBUTOR

KNUCKLE PIN (2)  
TIE RODS (2)

SPIDER BEARINGS (1)

(RENTAL MACHINES ONLY)

CHASSIS GREASE

ENGINE OIL: S.A.E. 20

GEAR LUBE S.A.E. 90

ENGINE OIL FILTER  
CARTRIDGE KIT

1 8 0 0 2 0 0 HYDRAULIC BRAKE FLUID  
HEAVY DUTY S.A.E. 70 R3

HIGH TEMPERATURE GREASE  
SHELL 5A TEXACO 1199 OR  
EQUIVALENT

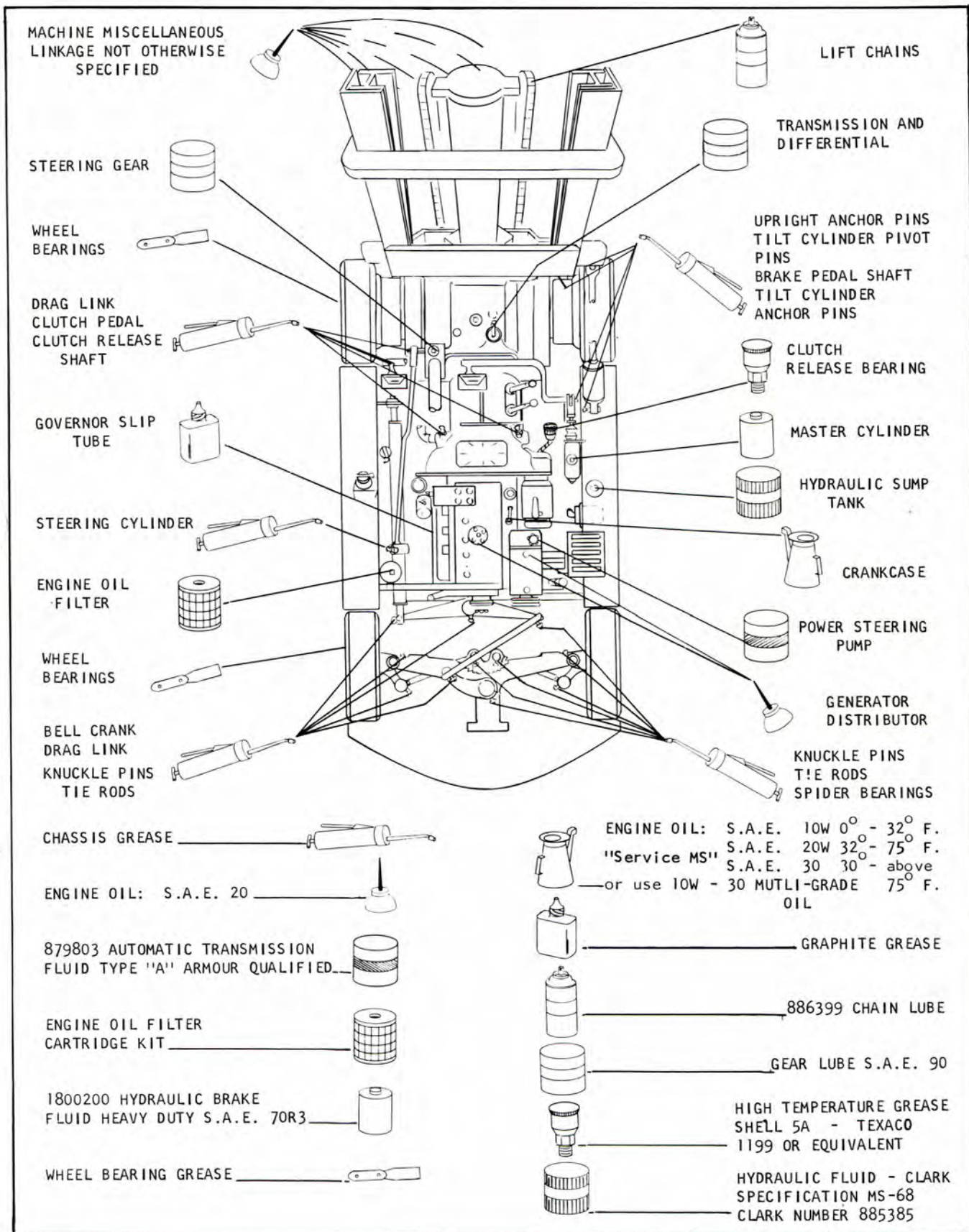
HYDRAULIC FLUID - CLARK SPECIFICATIONS  
MS-68 8 8 5 3 8 5

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

GRAPHITE GREASE

8 8 6 3 9 9 CHAIN LUBE

WHEEL BEARING GREASE



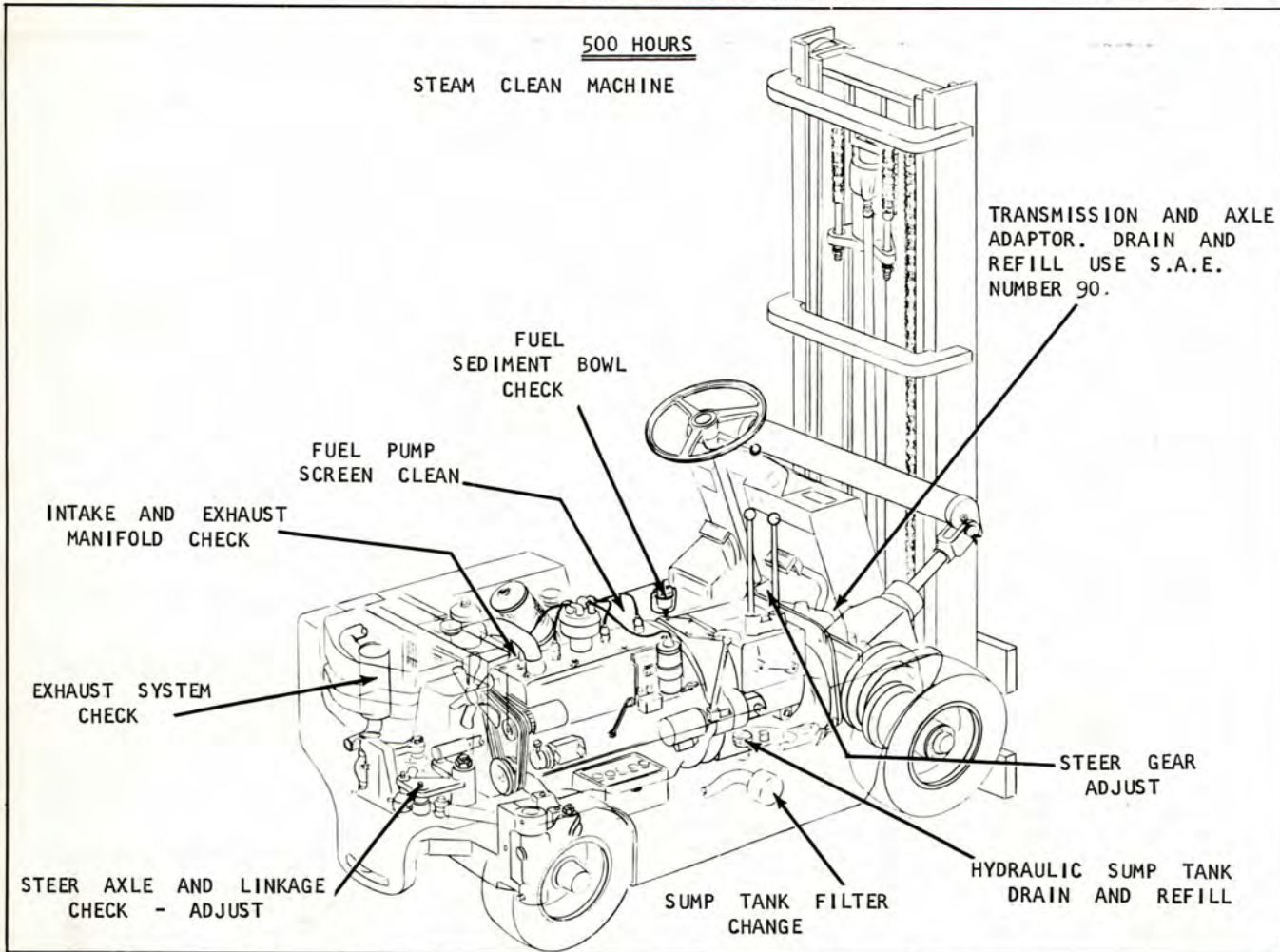


Figure 002a. Lubrication and Preventive Maintenance Illustration

**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.**

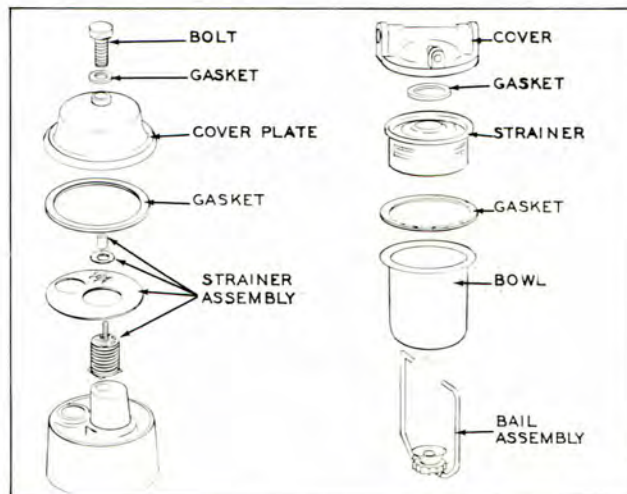


Figure 002b. Fuel Pump & Sediment Bowl



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.

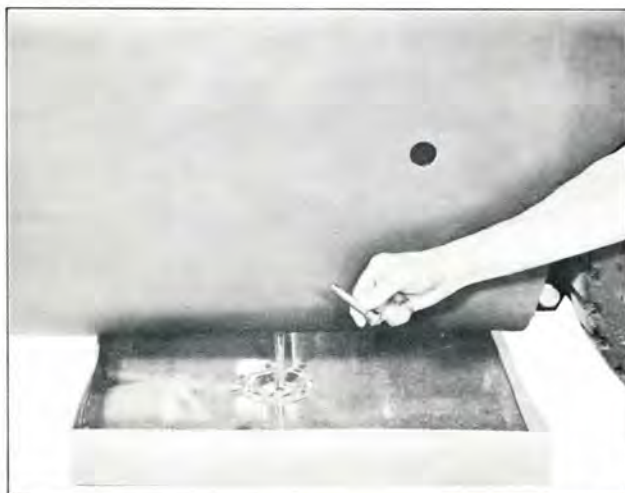


Plate 5359. Draining Sump Tank

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.

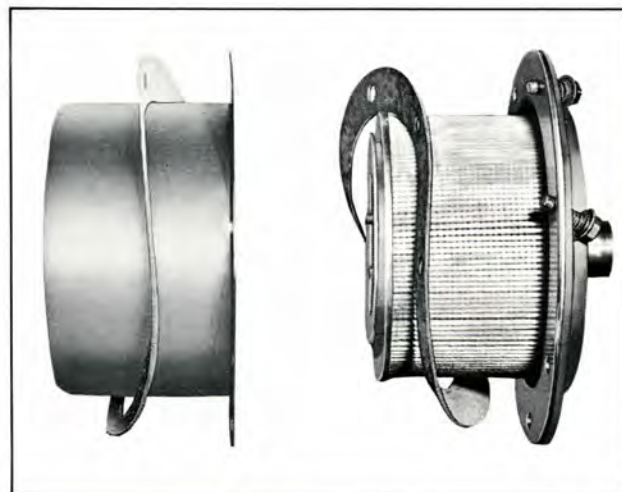


Plate 5274. Sump Tank Oil Filter Components

- 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 AMOCO Lithium Multipurpose Grease 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.

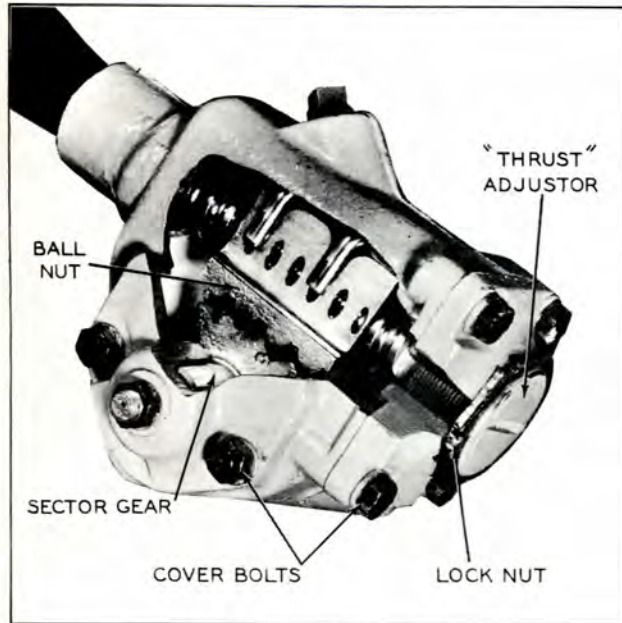


Plate 6636. Steering Gear Thrust Adjustment (Worm Bearings)

**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) counter-clockwise a few turns to provide clearance between sector gear and worm ball nut.

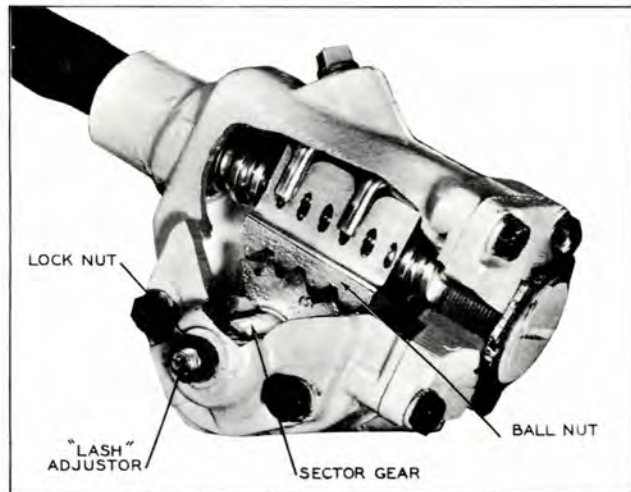


Plate 6637. Steering Gear Lash Adjustment (Sector Gear)

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.



# INDUSTRIAL TRUCK DIVISION



## LUBRICATION AND PREVENTIVE MAINTENANCE

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.

### NOTE

IF STEERING LINKAGE ADJUSTMENT IS NECESSARY  
DO NOT INSTALL DRAG LINK TO PITMAN ARM.

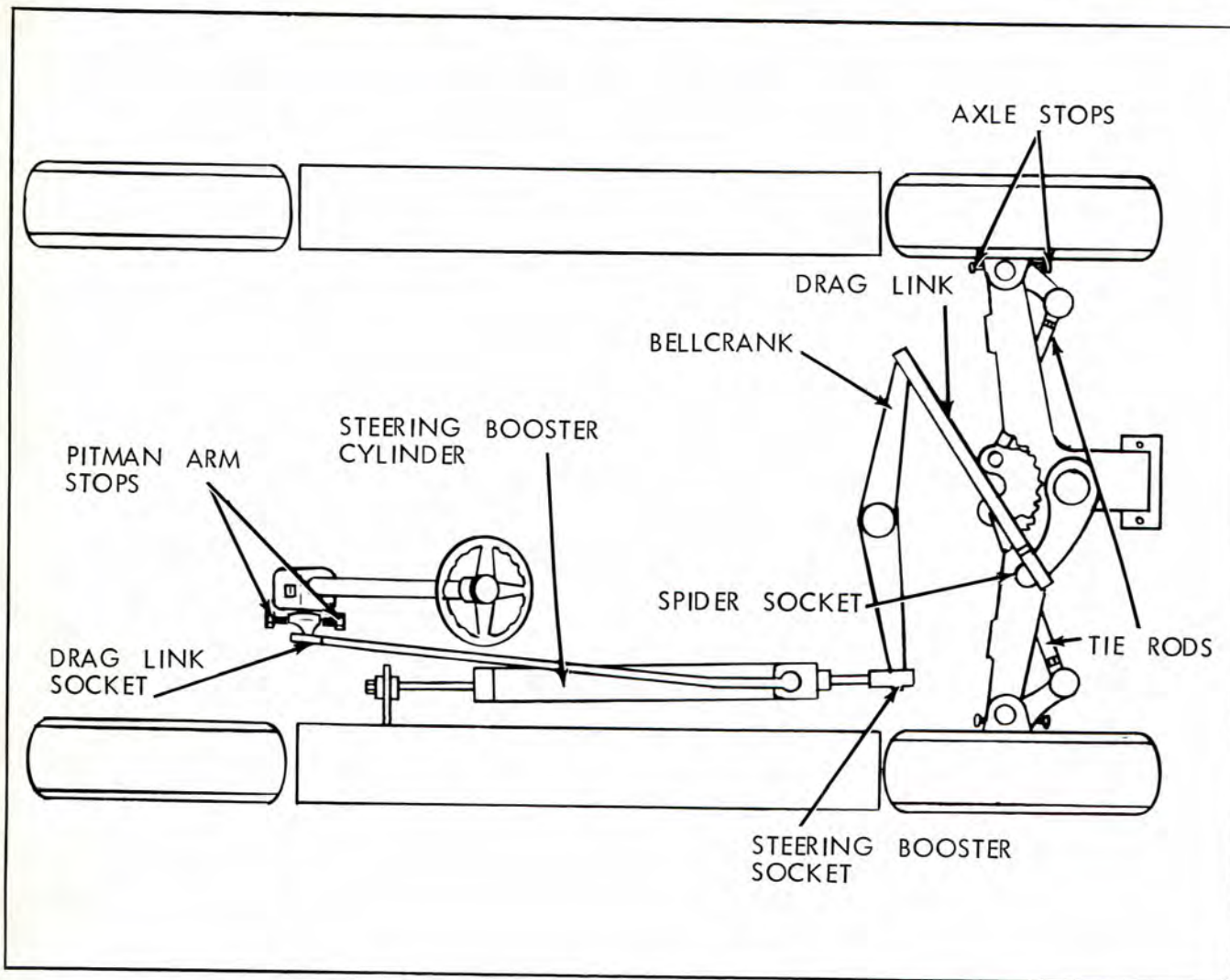


Figure 302a. Steering Linkage

**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 axle spider and socket on end of booster from the bell crank.

4. Check steering wheels for correct turning geometry. Turn the wheels all the way for a right turn - This should allow the right hand steering wheel to attain an angle of 75 degrees to the frame. If an adjustment is necessary, the axle stop on the right and left sides of the axle should be turned in or out, whichever is necessary to achieve the correct angle. Repeat this procedure in a left turn with the left wheel and adjust the axle stops as required.

5. Turn the steering wheels all the way for a left turn, connect the drag link to the spider, adjusting the socket so that the drag link will clear the silent mounting block nut on the axle by 1/8 to 1/16 of an inch.



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LUBRICATION AND PREVENTIVE MAINTENANCE

## CAUTION:

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

6. Disconnect front drag link from pitman arm. Collapse the booster cylinder until bottomed out. Extend booster cylinder from collapsed position 1/4" (with the steering wheels remaining in the full left turn position.) Adjust socket on end of booster, so grease fitting lines up with center of ball on bell crank.

7. Turn hand wheel to full left turn, back off 1/4 turn and adjust front drag link socket so grease fitting lines up with center line of pitman arm ball.

8. Adjust pitman arm stops - with engine running and with either wheel against axle stop, adjust pitman arm stop to make contact with pitman arm, then move pitman arm away from stop bolt and turn bolt one full turn towards pitman arm and lock in this position. Repeat this procedure to adjust other stop bolt.

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

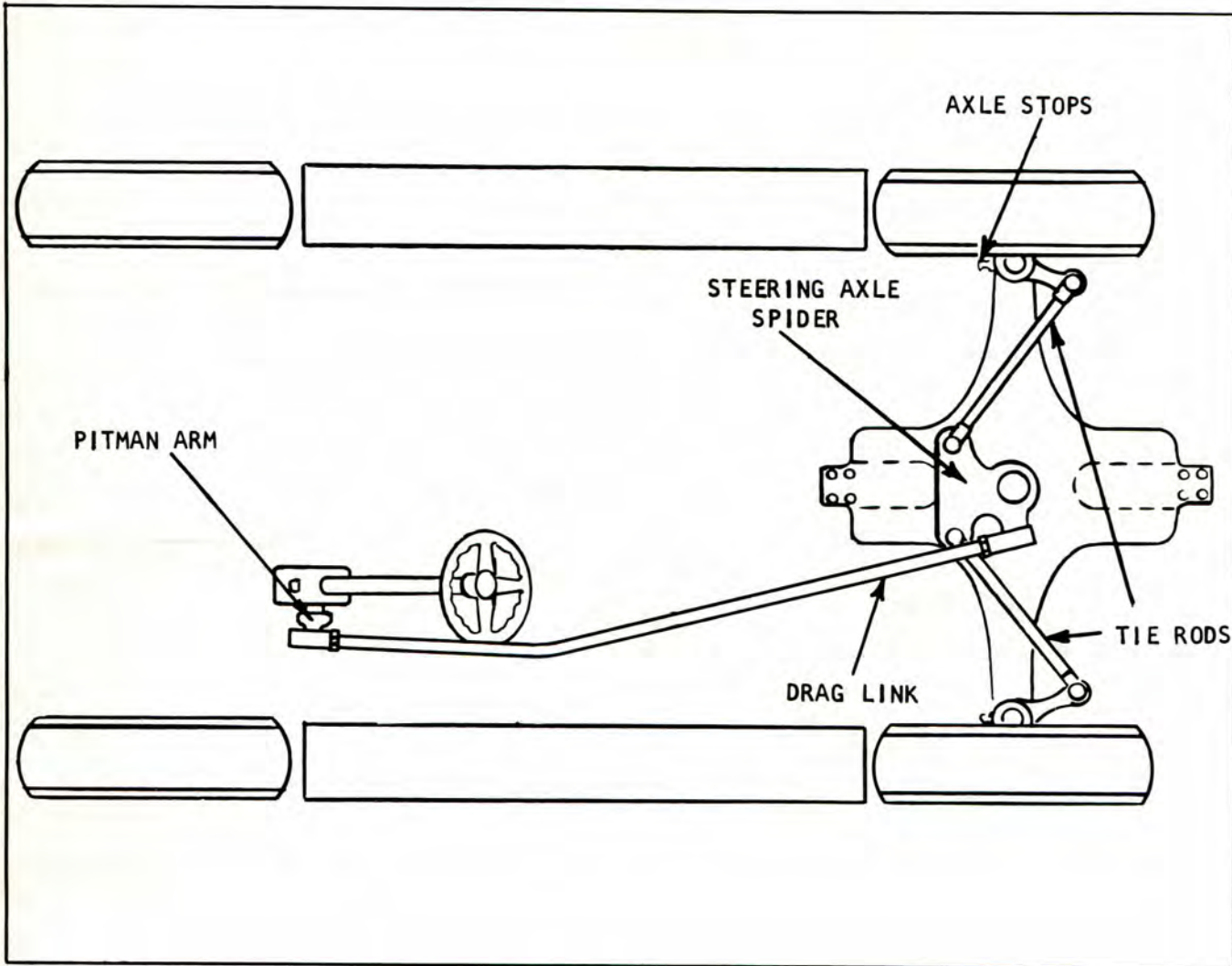


Plate 7419. Steering Linkage

**STEERING AXLE AND LINKAGE ADJUSTMENTS  
(RENTAL MACHINES ONLY)**

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. Check steering wheels for correct turning geometry. Turn the wheels all the way for a right turn - This should allow the right hand steering wheel to attain an angle of 75 degrees to the frame. If an adjustment is necessary, the axle stop on the right and left sides of the axle should be turned in or out, whichever is necessary to achieve the correct angle. Repeat this procedure in a left turn with the left wheel and adjust the axle stops as required.

4. Turn wheels to straight ahead position and disconnect the drag link at the pitman arm. Note relative position of drag link parts when disconnecting link so the parts may be re-assembled correctly.



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LUBRICATION AND PREVENTIVE MAINTENANCE

5. Center the steering gear as outlined under steering gear adjustments (Page 500H 202) and adjust the drag link socket so that the grease fitting lines up with the centerline of the pitman arm ball stud. Be sure the steering wheels are in the straight ahead position when this adjustment is completed. Tighten the lock nut against the socket to secure this adjustment.

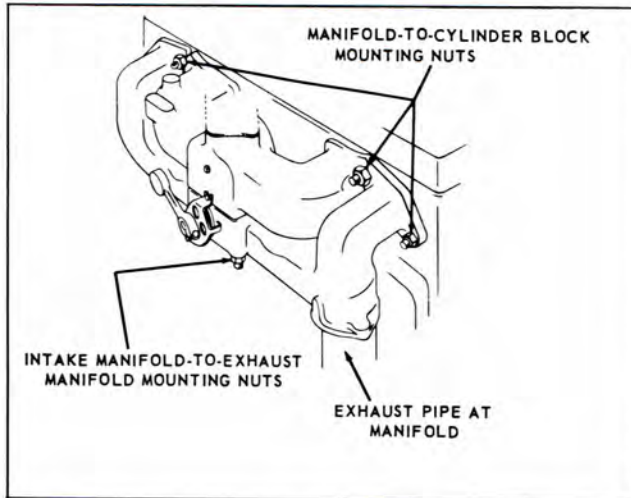
6. With the wheels remaining in the straight ahead position, remove handwheel and replace on steering column with the center spoke aligned within 10 degrees of the center line of the machine, the center spoke pointing back.

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Faint, illegible text in the top center and right area.





**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.

Plate 6269. Intake and Exhaust Manifolds

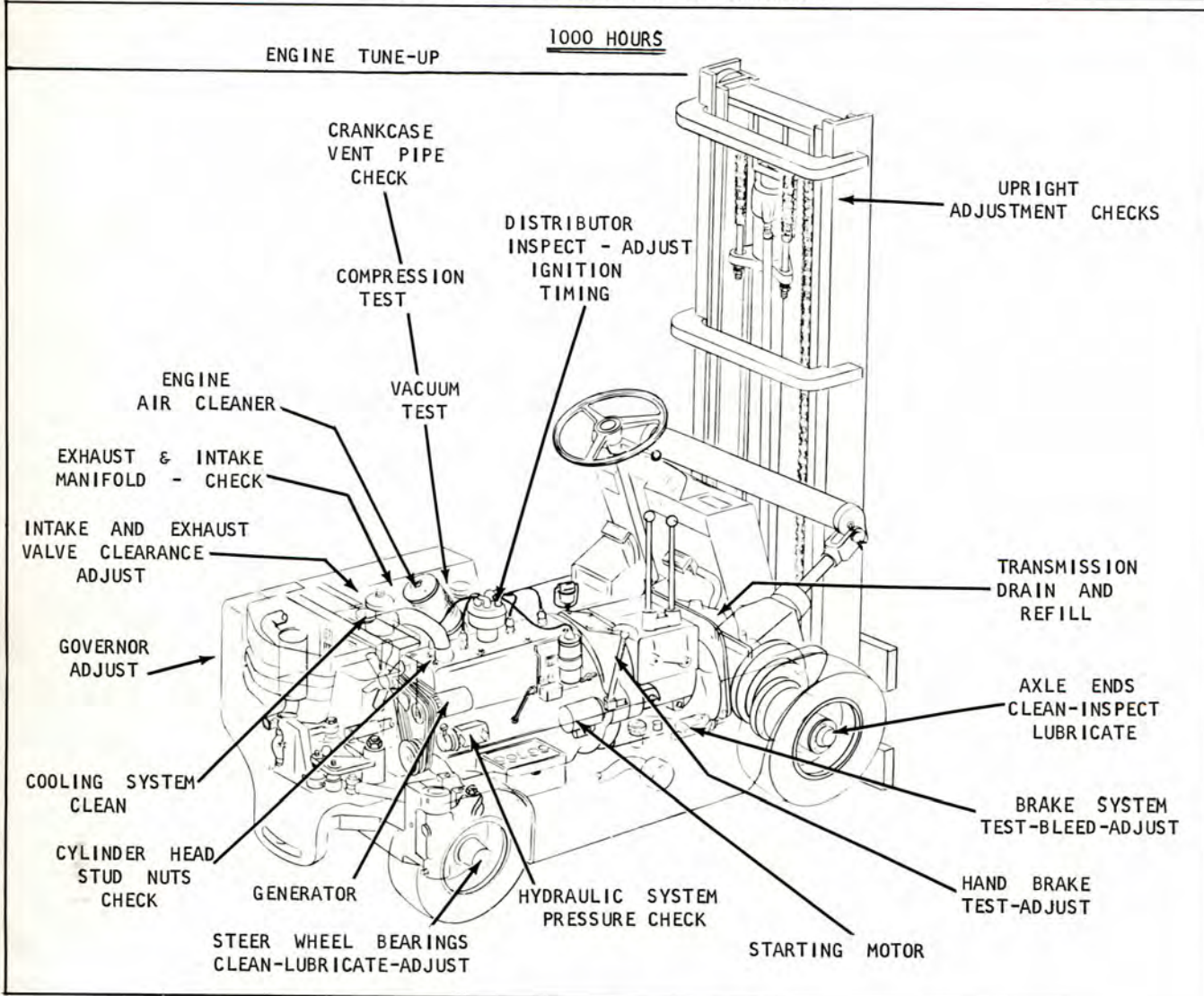


Figure 002a. Lubrication and Preventive Maintenance Illustration

**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.

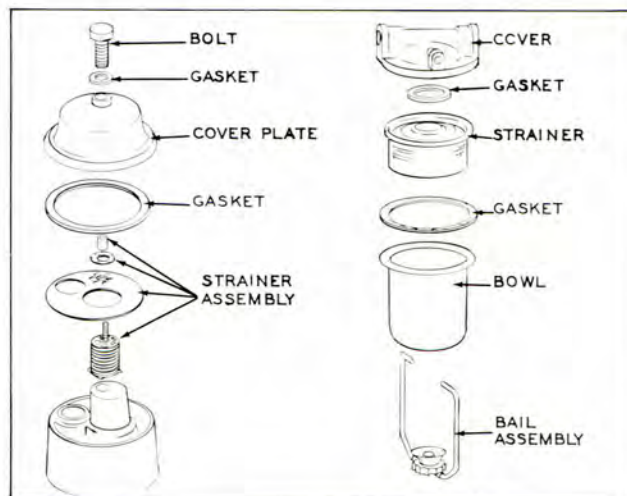


Figure 002b. Fuel Pump Assembly

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

C A U T I O N

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.

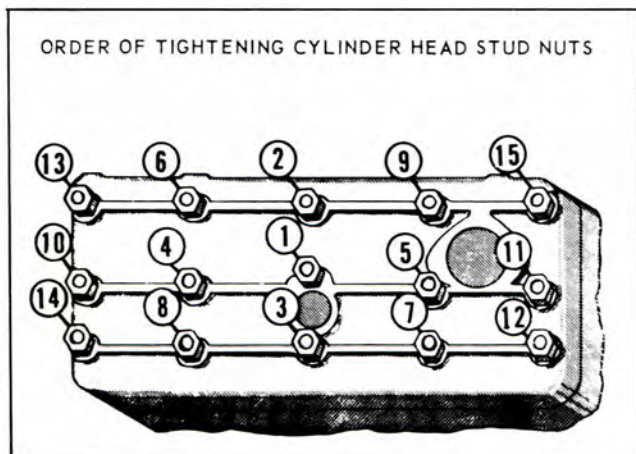


Plate 6281. Cylinder Head Stud Nut Tightening Sequence

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:

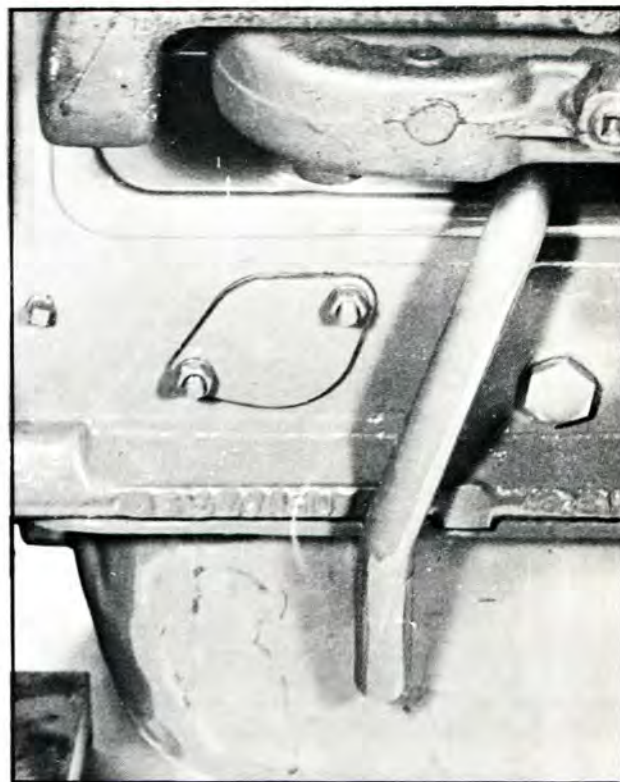


Plate 6628. Crankcase Vent Pipe

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 clearance 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.

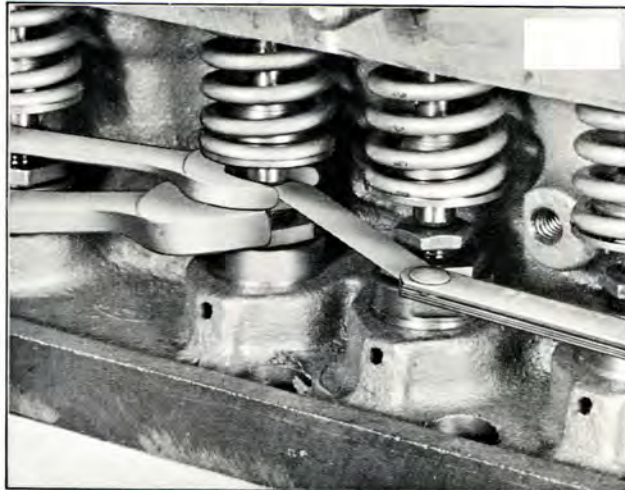


Plate 3223. Adjusting Valve Clearance

#### 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.

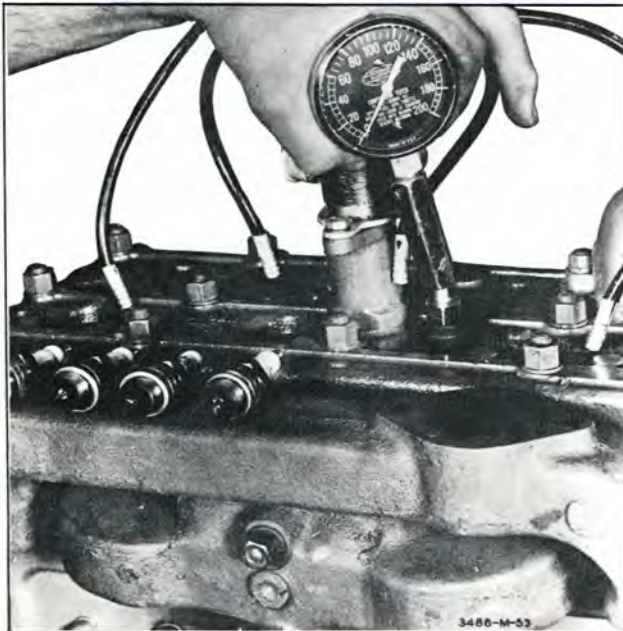


Plate 3486. Compression Test

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



LUBRICATION AND PREVENTIVE MAINTENANCE

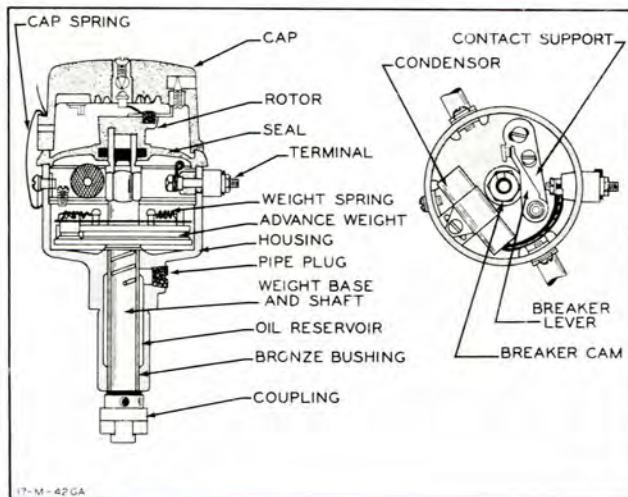


Plate 3409. Distributor

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.

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.

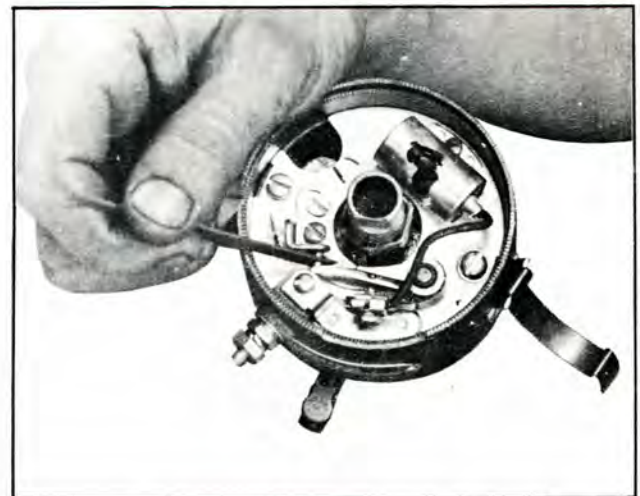


Plate 3364. File Contact Points

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.

CAUTION

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

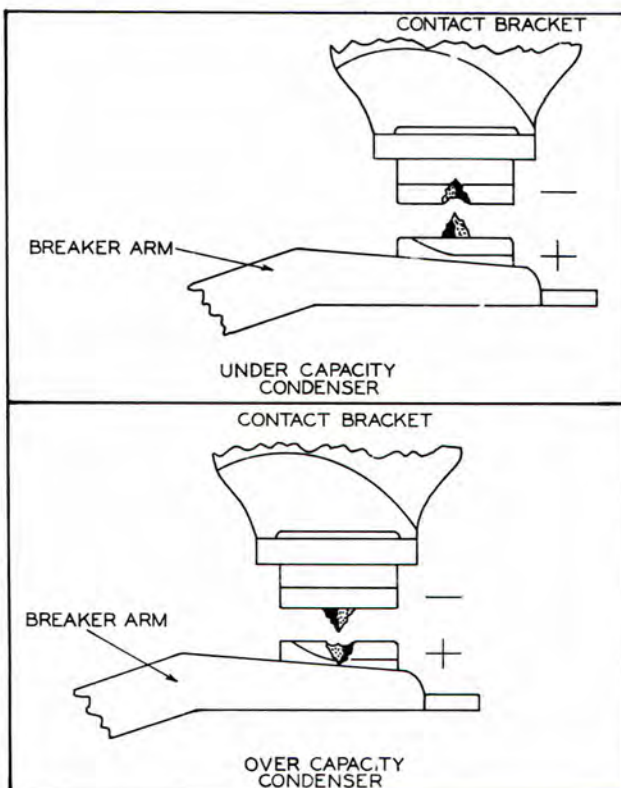
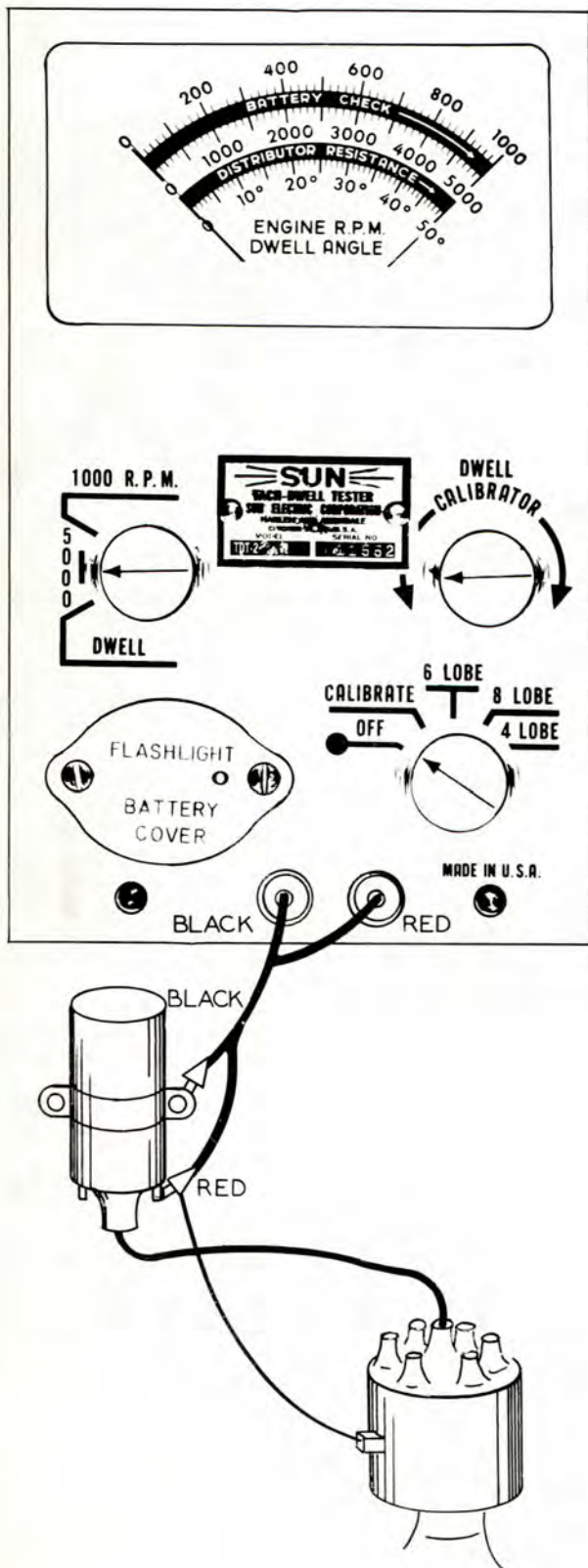


Plate 5933. Breaker Points



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.

Plate 6887 Tach Dwell Meter



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**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.

**NOTE**

REFER TO SPECIFICATIONS FOR DWELL ANGLE AND CONTACT POINT OPENING.

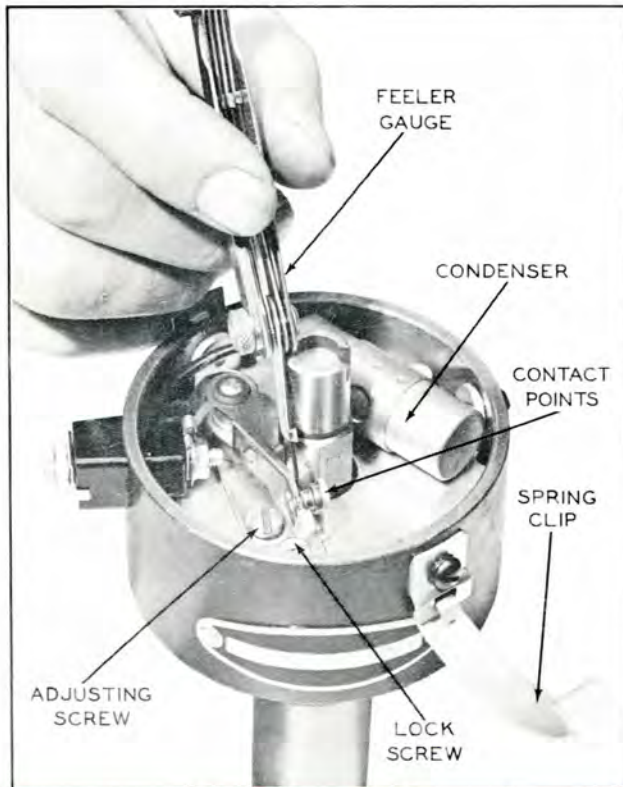


Plate 6266. Contact Point Adjustment

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 turn the eccentric screw until the proper clearance is obtained. Retighten locking screw and recheck point gap. See Plate 6266.

**9. IGNITION TIMING**

If the engine is out of time, the following procedure should be followed:

a. Remove No. 1 spark plug which is the one nearest the radiator.

b. Press thumb over hole left vacant by removal of the spark plug.

c. With thumb pressed over hole, Plate 3471, turn engine over slowly with the starter until air is being forced up around the thumb.

d. Stop turning engine over at this point for it means that No. 1 piston is on the compression stroke and it is approaching top dead center.

e. Flash a light into the timing hole and continue to turn engine over slowly until top dead center marking on flywheel appears in timing hole, Plate 3471

f. The pointer Plate 3471 should be centered on the top dead center marking.

g. With breaker points set a proper gap, loosen distributor clamp plate screw and rotate 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 a ground. When points are closed the light will be "OFF" and as soon as the points break the light will go "ON". Tighten clamp plate screws before starting engine.



Plate 3471. Ignition Timing



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.

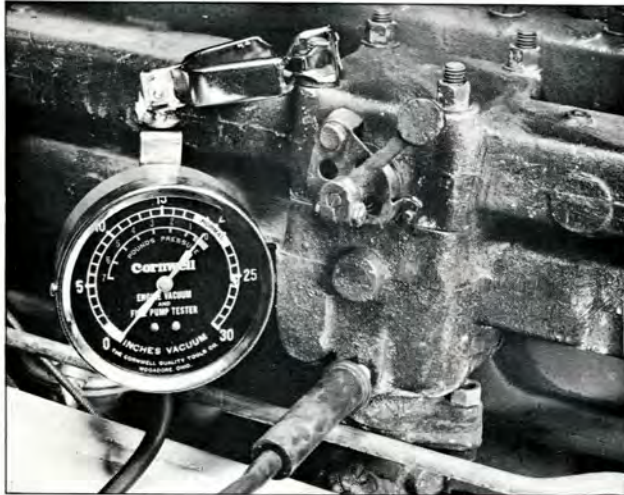


Plate 6643. Vacuum Test

(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.

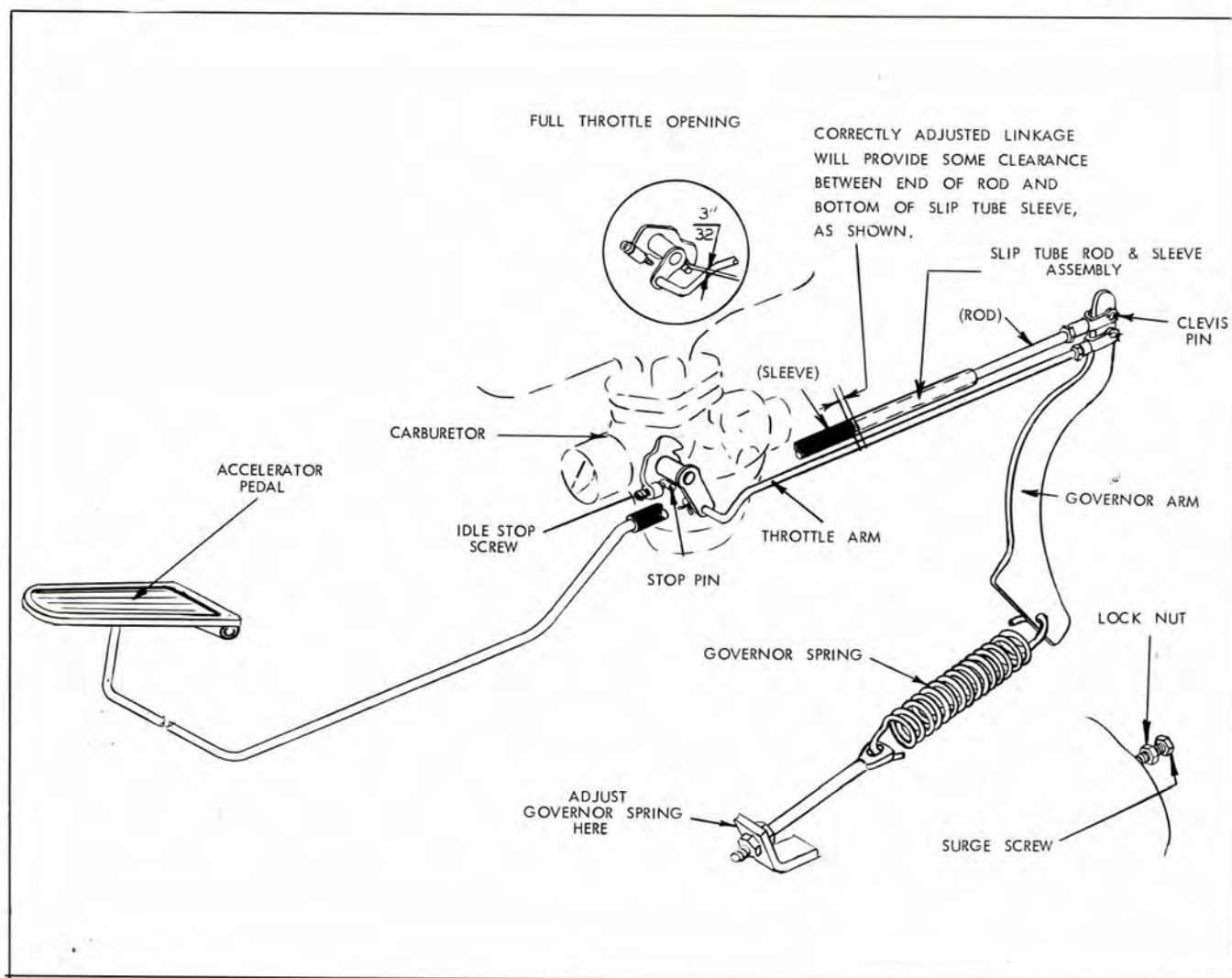


Plate 6660. Governor Adjustment

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.

NOTE

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.

NOTE

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



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## LUBRICATION AND PREVENTIVE MAINTENANCE

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.

### NOTE

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.

### IMPORTANT

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.

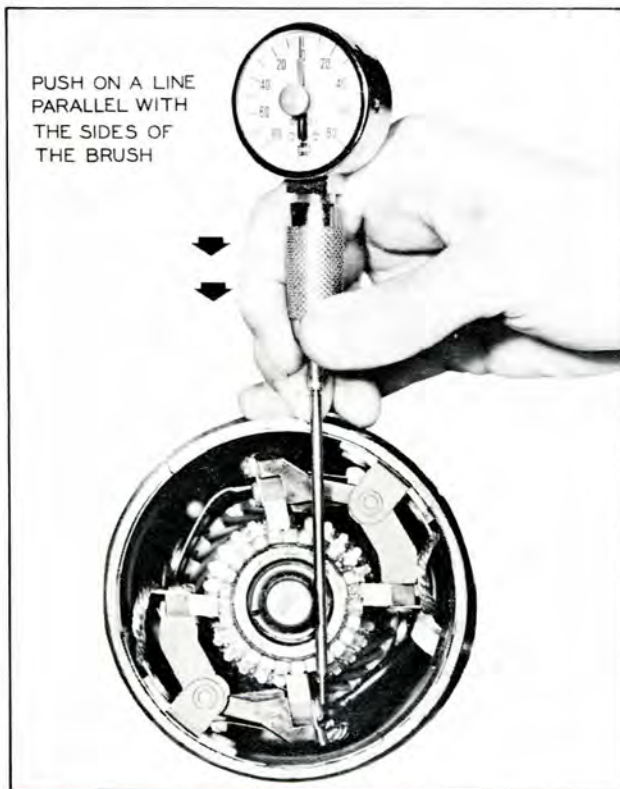


Plate 6449 Checking Brush Spring Tension

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.

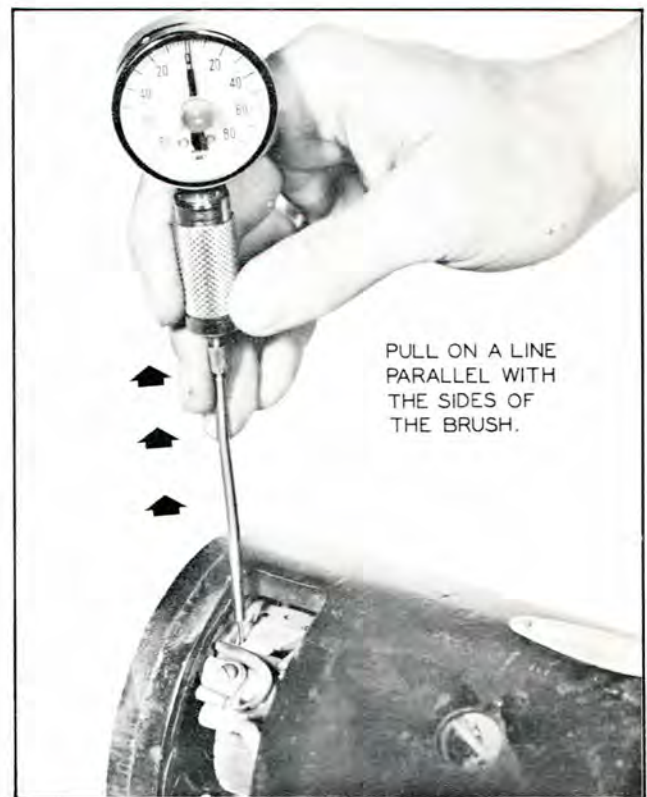


Plate 6450. Checking Brush Spring Tension

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.

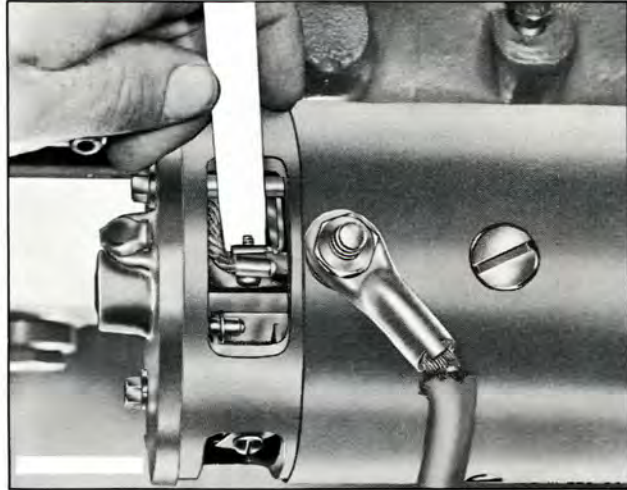


Plate 3436. Seating Brushes

**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.

allel 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.**

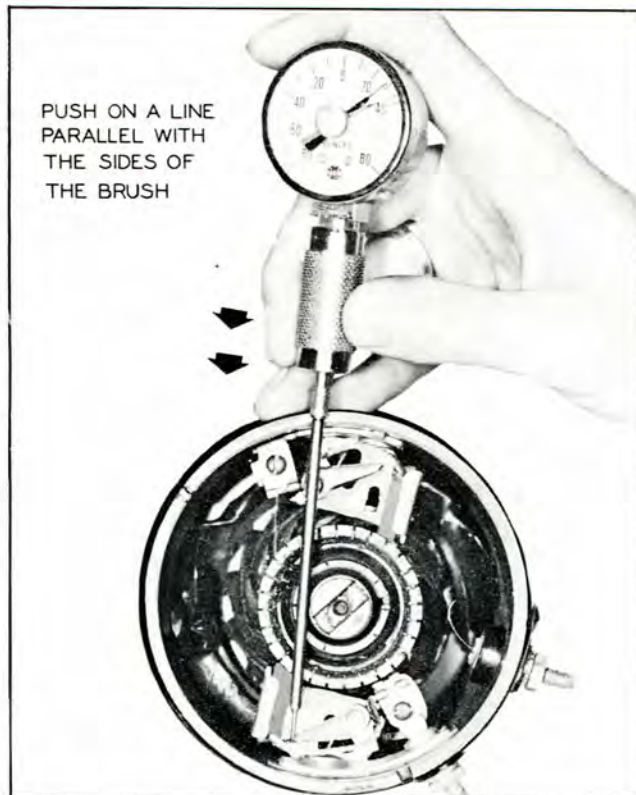


Plate 6451. Checking Brush Spring Tension

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 par-

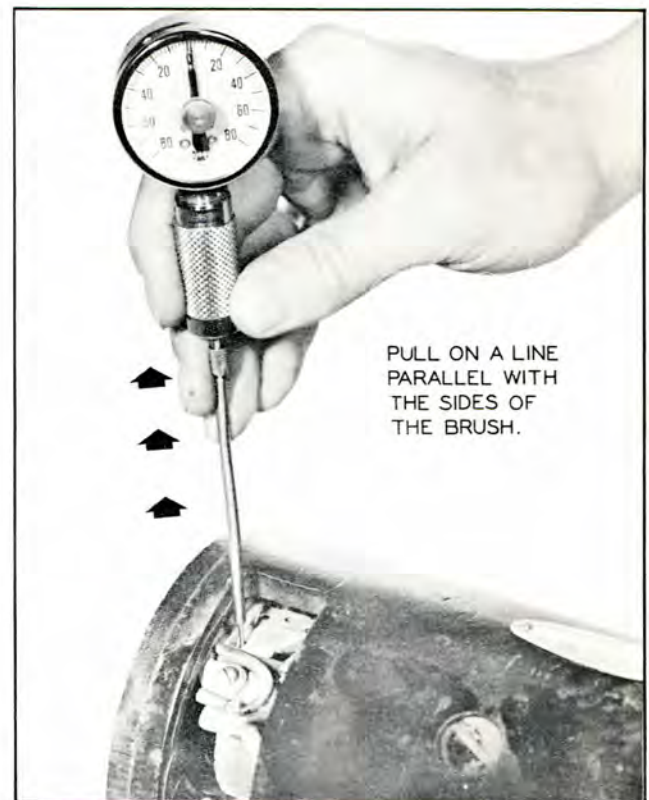


Plate 6450. Checking Brush Spring Tension

## 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.

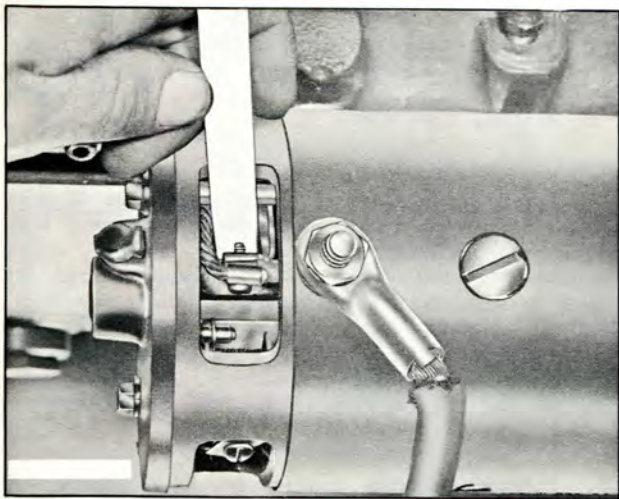


Plate 3436. Seating Brushes





LUBRICATION AND PREVENTIVE MAINTENANCE

CLEAN AND REPACK AXLE ENDS

Every 1000 operating hours remove and repack the axle ends with EP #1 Lithium Soap Base Grease.

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.

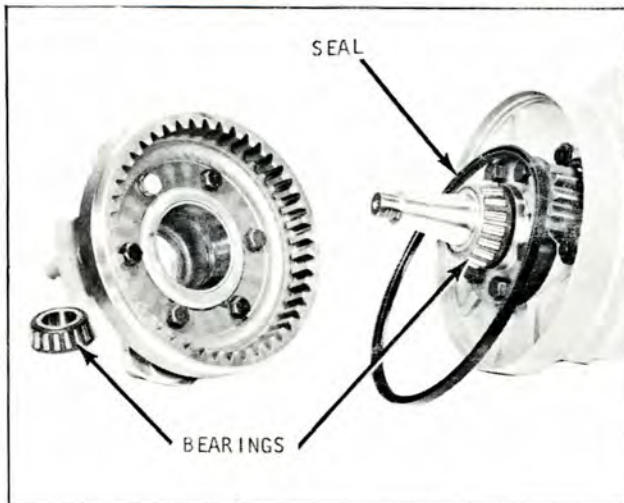


Plate 6892. Axle End Assembly

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.

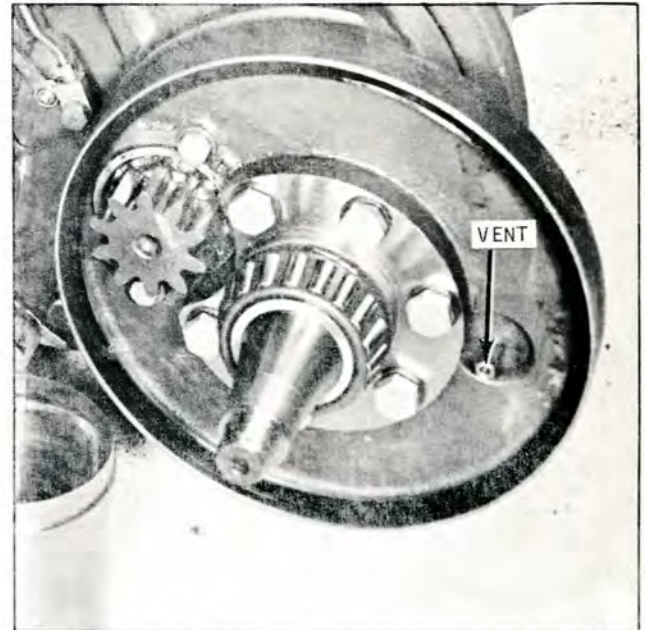


Plate 6893. Axle End Vent

6. Repack each axle end (bearings, spindle ring gear and pinion) with one pound of EP #1 Lithium Soap Base Grease previously listed. Check the axle end vent for obstruction, 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.

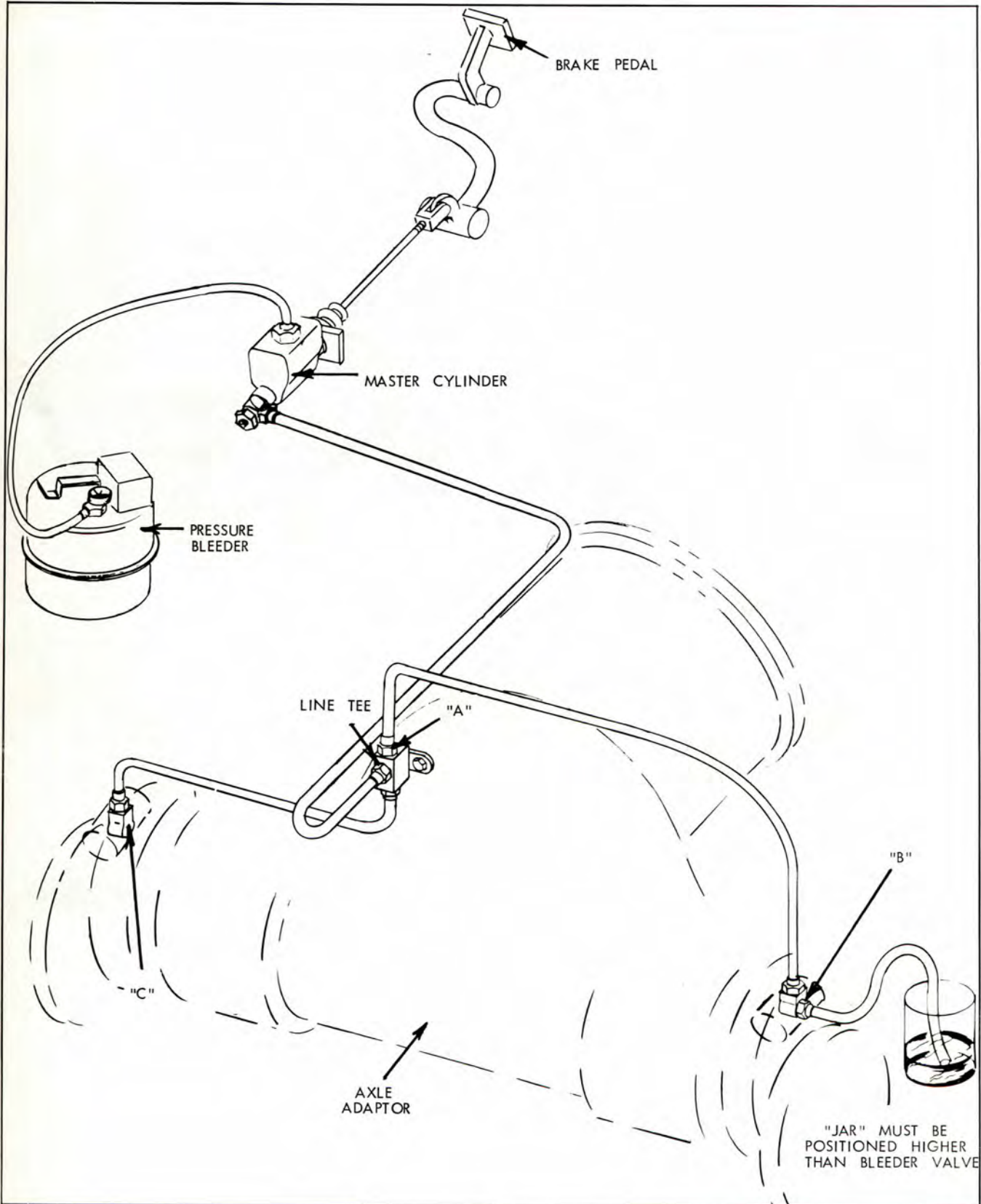


Plate 6883. Bleeding Brake System

1000H 912-1



# INDUSTRIAL TRUCK DIVISION



## LUBRICATION AND PREVENTIVE MAINTENANCE

### 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 or 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.

#### NOTE

MACHINES EQUIPPED WITH PNEUMATIC TIRES,  
DEFLATE TIRES BEFORE REMOVING DRIVE WHEELS  
FROM MACHINE.

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 the top. With filler cap off the master cylinder, depress and release brake pedal. A small displacement of fluid should be noticed in the cylinder reservoir. If this happens, the brake pedal (upon being released) is returning the master cylinder piston to its normal position to open a master cylinder port. This port must be open. If fluid does not return to the reservoir (when releasing brake pedal), this indicates improper pedal free travel and a pedal adjustment is required.

Step 3. To properly bleed the system it is recommended that a pressure bleeder filled with about two quarts of SAE 70R3 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 line connection at highest position on "T" block point "A" (Plate 6883) and allow fluid and air to escape. Tighten fitting at this point when escaping fluid is free of air bubbles.

Step 5. 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 SCREWS MAKING SURE THAT THE END OF THE HOSE REMAINS SUBMERGED IN THE FLUID AT ALL TIMES. Loosen bleeder screw "B" (Plate 6883) enough to allow fluid and air to escape. Tighten bleeder screw at this point when escaping fluid is free of air bubbles.

Step 6. Install bleeder hose on the remaining bleeder screw and proceed as in step five. 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 7. Replace drive wheels. (Inflate tires if they are of the pneumatic type).

Step 8. 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 four thru eight. It must be remembered that the brake pedal should be depressed slowly and held to the floor-board 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 inch of the top as required.

**BRAKE ADJUSTMENT**

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 worn 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.

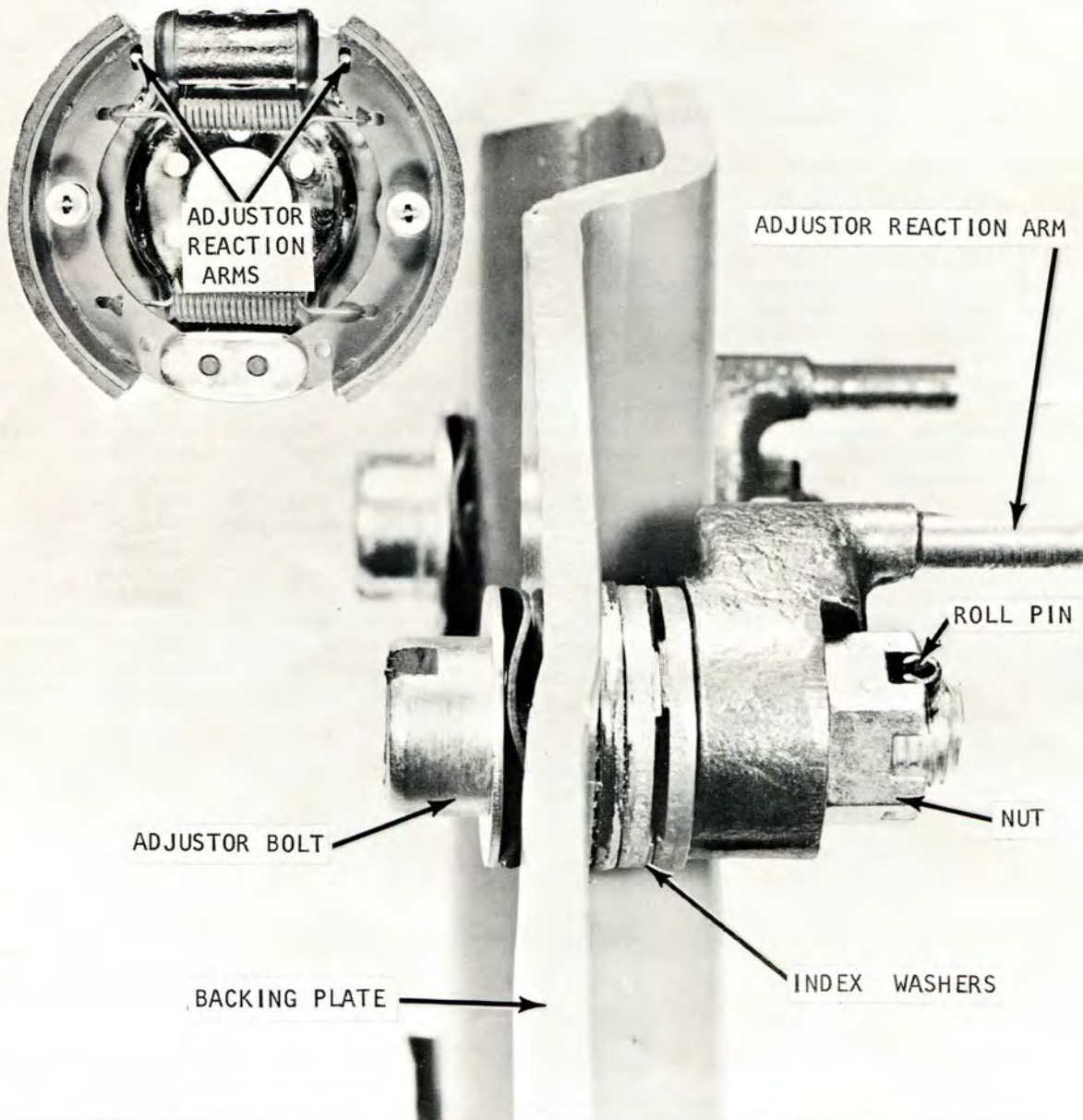
**COMPLETE BRAKE ASSEMBLY**

Figure 1003a. Mechanical Brake Adjusters



LUBRICATION AND PREVENTIVE MAINTENANCE

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 Figure 1103b and proceed as follows:

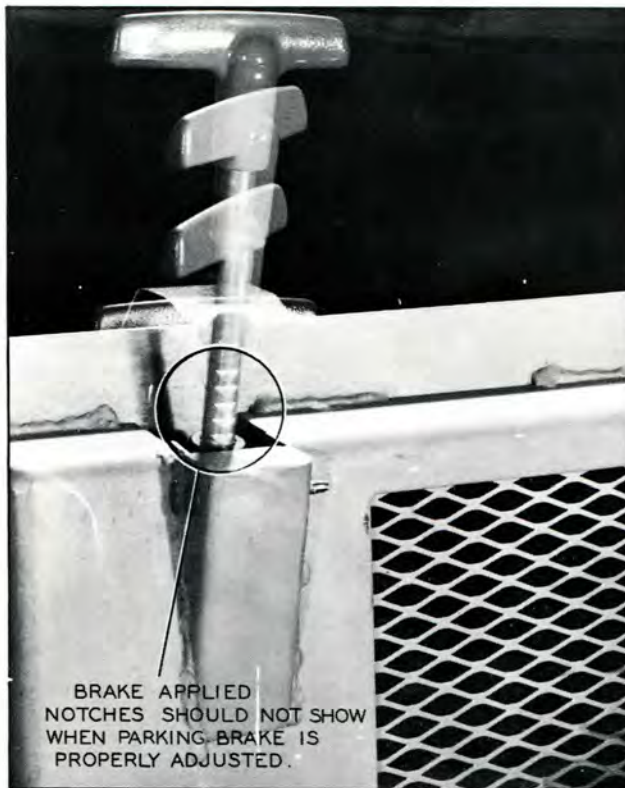


Figure 1103a. Hand Brake (Actuating) Lever

Adjustment is made at the parking Brake Draw Rod LOCK SLEEVE and LOCK NUT, Figure 1103b.

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

1. Loosen the Lock Nut several turns.
2. Rotate the Lock Sleeve counter-clockwise 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 2 to 2 1/2 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.

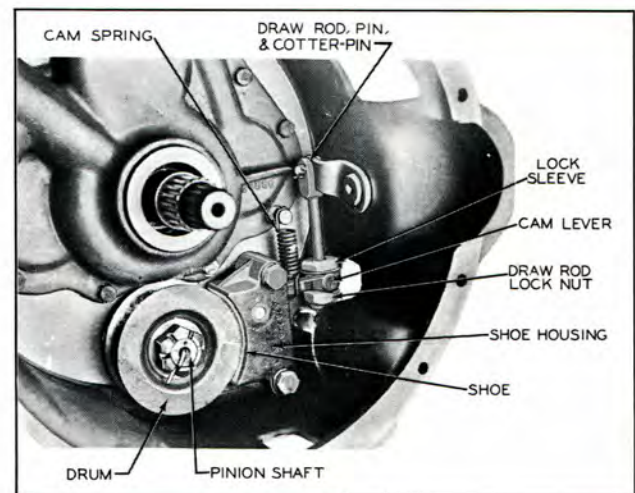


Figure 1103b. Adjusting Brake

**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.

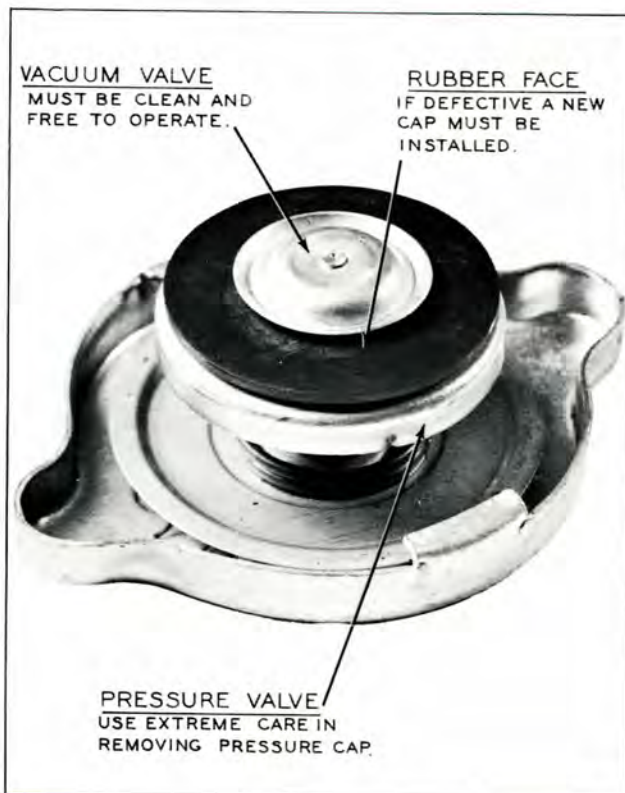


Plate 6459. Pressure Cap Gasket, Valve and Valve Gasket

**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".

## LUBRICATION AND PREVENTIVE MAINTENANCE

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

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

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

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

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

## CAUTION

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



Plate 6461 Typical Radiator.

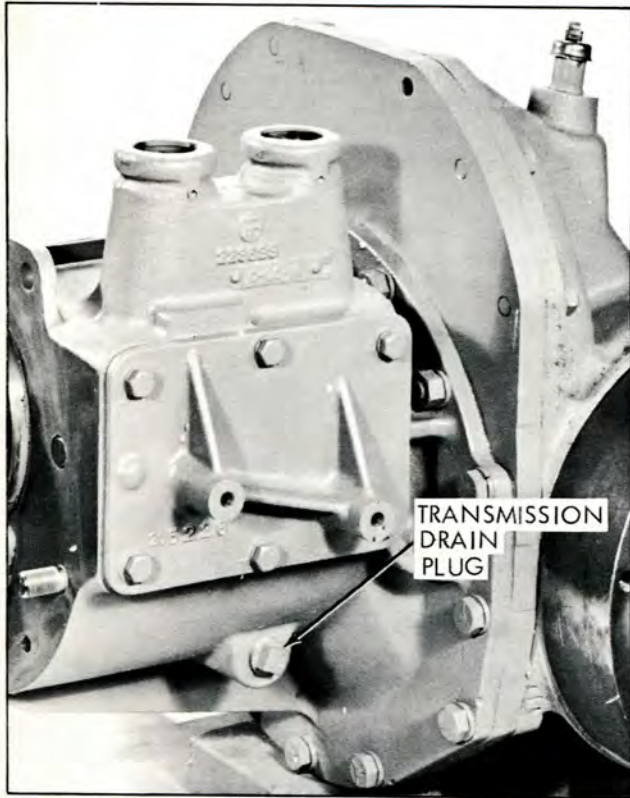


Figure 1303a. Transmission Drain Plug

Drain Transmission at drain plug Figure 1303a and at Axle adaptor plug Figure 1303b.

The transmission and axle adaptor have a common lubrication system and should be drained at operating temperatures.

After draining flushing is desirable. Replace the drain plugs and clean all dirt from around the filler plug before removing. The filler plug is located on top of the axle adaptor Figure 1303b. Fill through this opening with a light flushing oil to the level of the testing plug positioned at the front of the axle adaptor (Figure 1303b). Drive the transmission for a short period at fast idle in such a manner that the gears in the transmission are rotating without load.

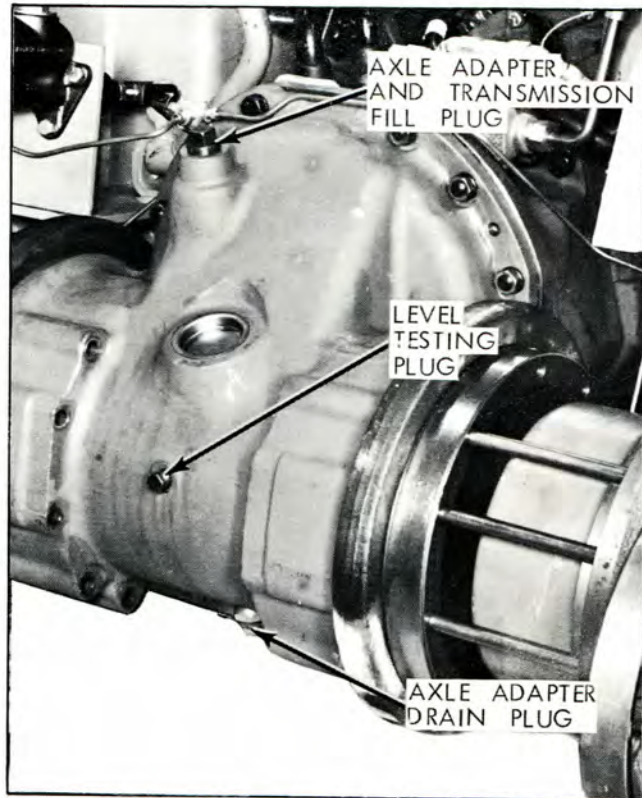


Figure 1303b. Axle Adaptor Drain, Level and Fill Plug

This washes out the old oil clinging to the interior of the gear case, cover and shifting rails. CAUTION: Be sure to drain out all of the flushing oil before attempting to refill with new lubricant.

Refill to the bottom of the level testing plug with straight mineral lubricant grade S.A.E. #90. DO NOT overfill, as the excess quantity will serve no useful purpose. If the oil level is too high, it will cause excessive oil churning and attendant high oil temperature and possible leakage.

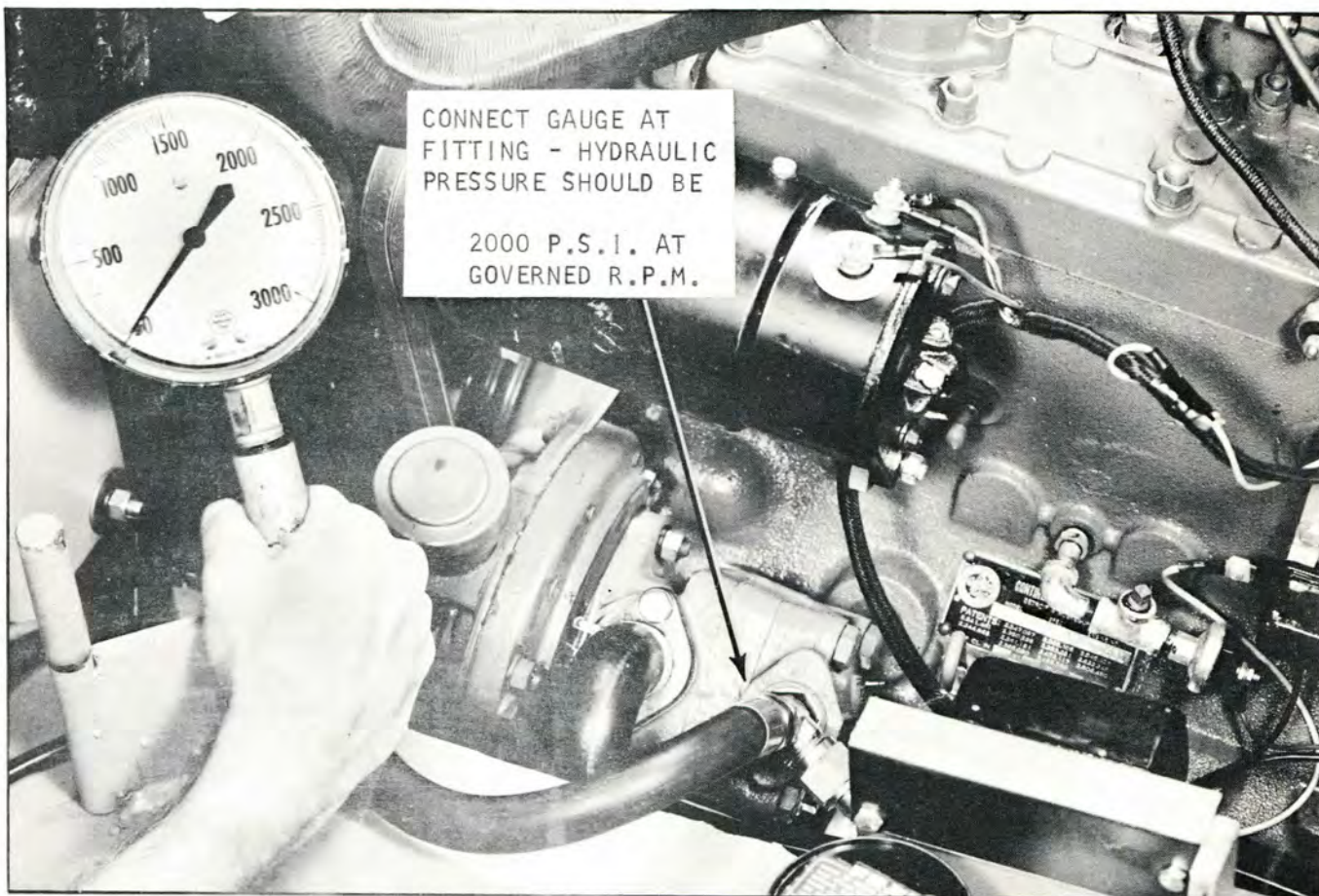


Figure 1503a. Main Hydraulic System Pressure Check

**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.

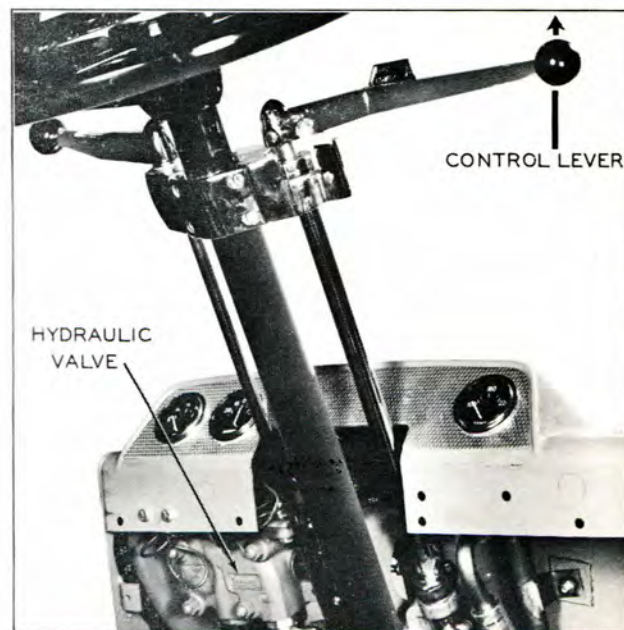
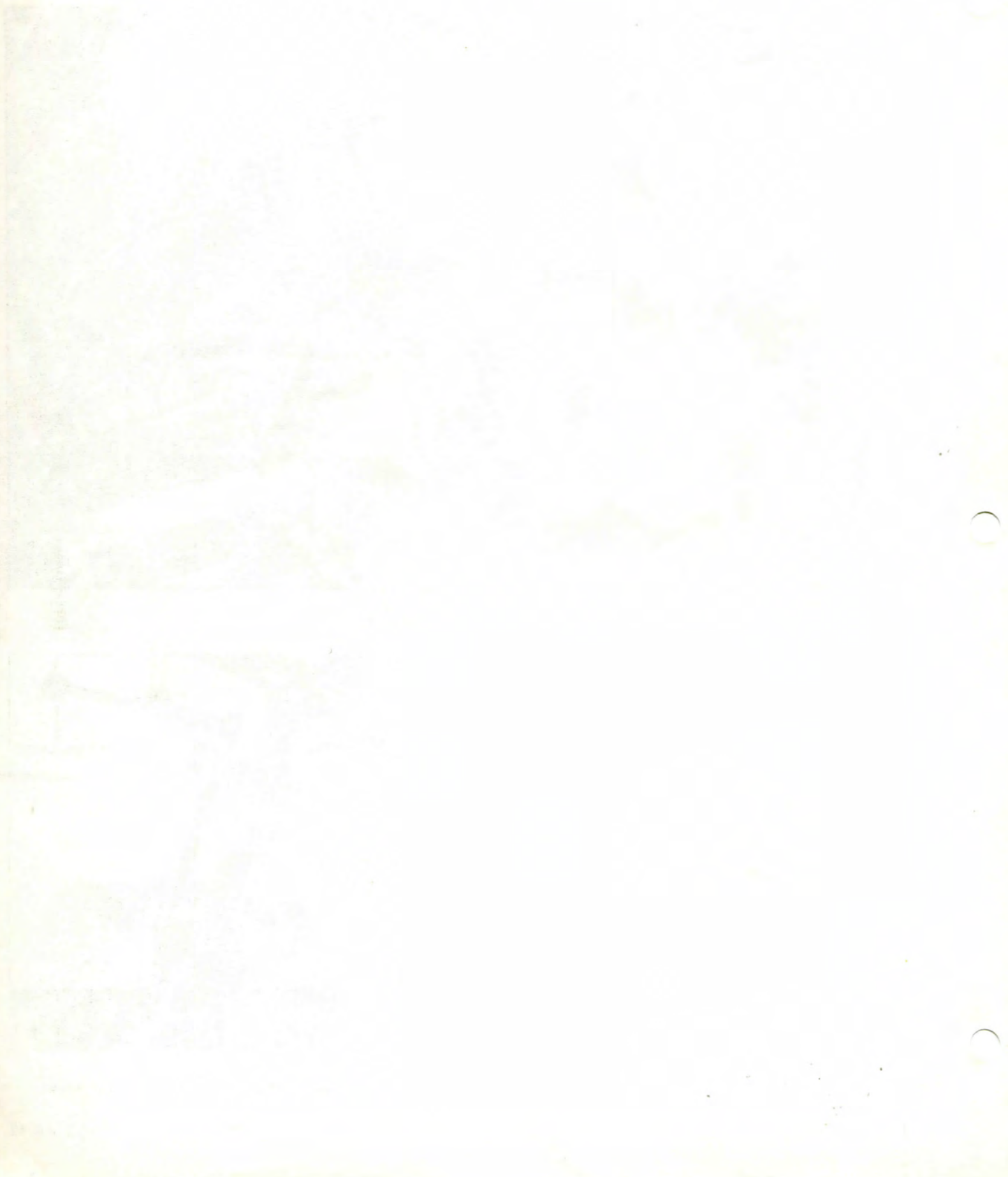


Figure 1503b. Hydraulic Control Lever



ADDITIONAL

1977



## LUBRICATION AND PREVENTIVE MAINTENANCE

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.

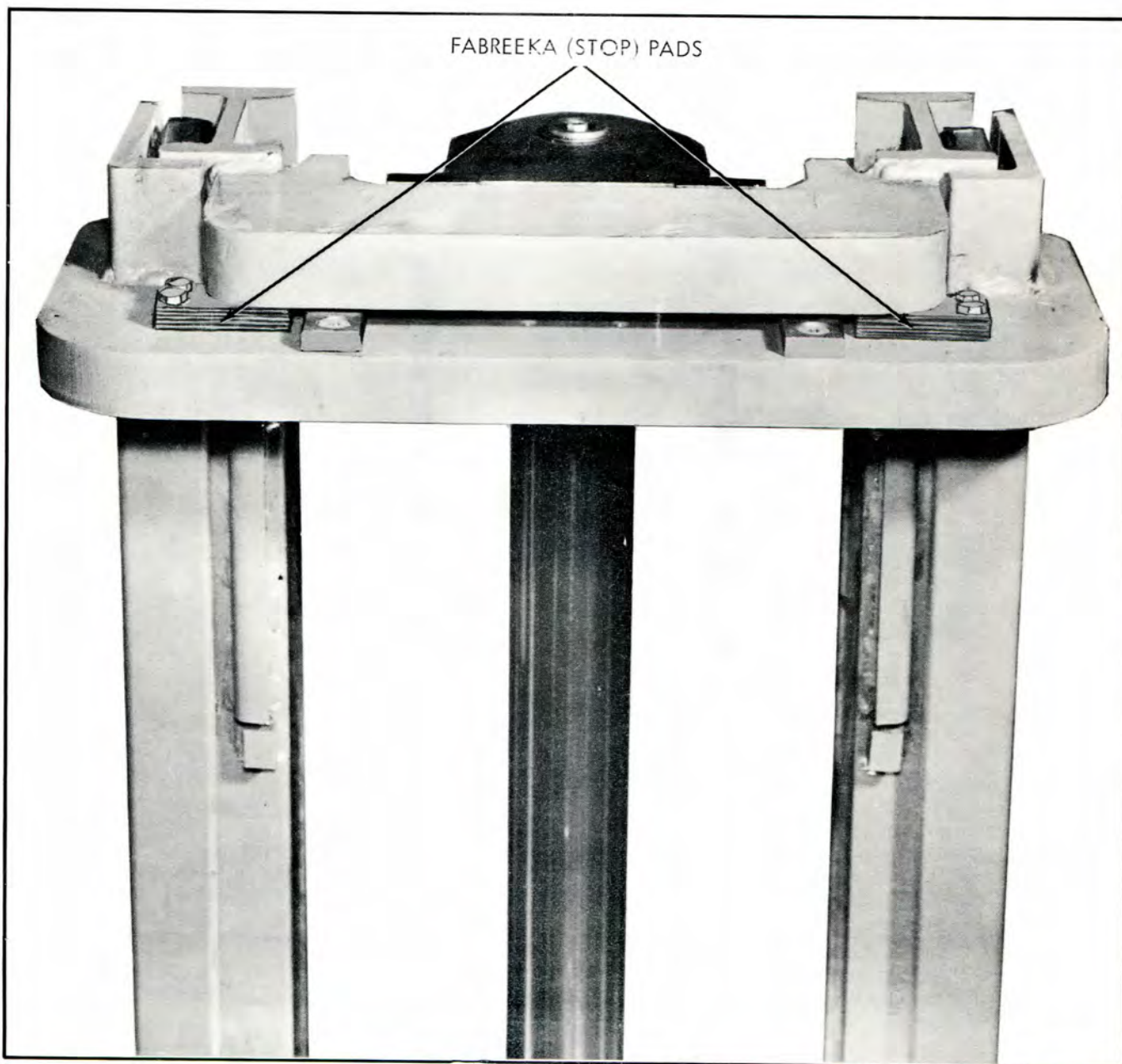


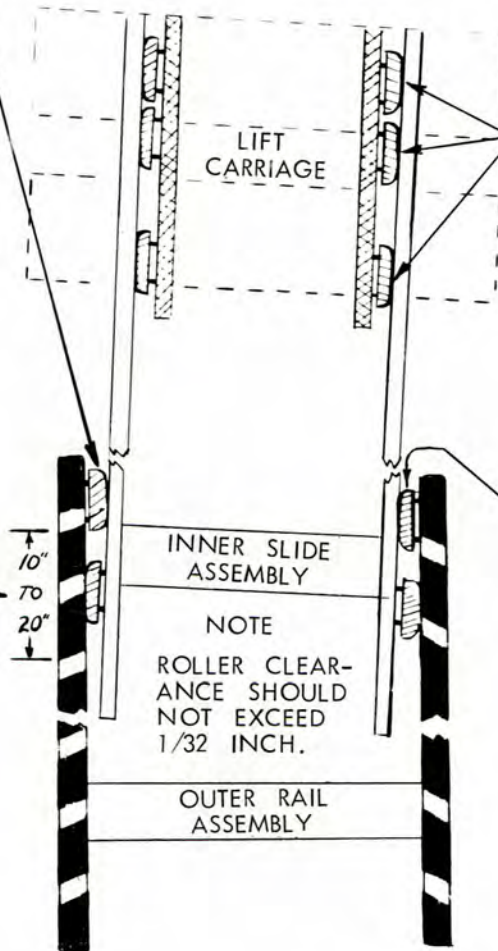
Plate 6619. Inner Slide Must Contact Both Fabreeka (Stop) Pads  
At The Same Time When Lowering Inner Slide

OUTER RAIL ROLLERS

SHOULD BE CHECKED FOR ROLLER CLEARANCE THE FULL LENGTH OF THE INNER SLIDE RAIL.

CHECK INNER SLIDE BOTTOM ROLLER

IN THIS 10 TO 20 INCH SECTION OF THE OUTER RAIL.



LIFT CARRIAGE ROLLERS

SHOULD BE CHECKED FOR ROLLER CLEARANCE THE FULL LENGTH OF THE INNER SLIDE RAIL.

OUTER RAIL ROLLERS

SHOULD BE CHECKED FOR ROLLER CLEARANCE THE FULL LENGTH OF THE INNER SLIDE RAIL.

NOTE  
ROLLER CLEARANCE SHOULD NOT EXCEED 1/32 INCH.

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.



LUBRICATION AND PREVENTIVE MAINTENANCE

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.

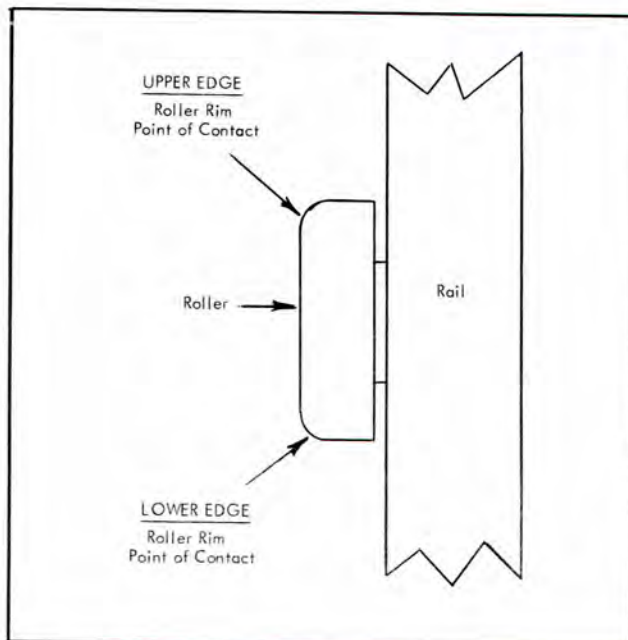


Plate 6325. Upright Roller

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.

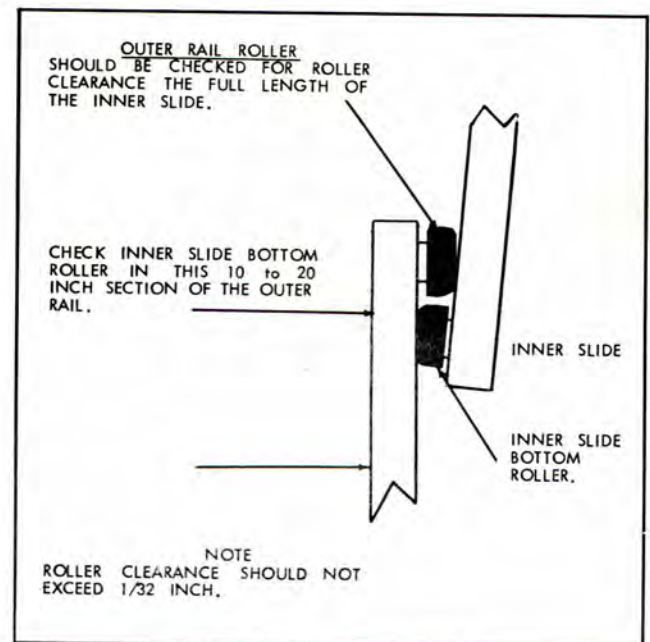


Plate 6572. Outer Rail Roller Clearance Check



# INDUSTRIAL TRUCK DIVISION



## LUBRICATION AND PREVENTIVE MAINTENANCE

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.

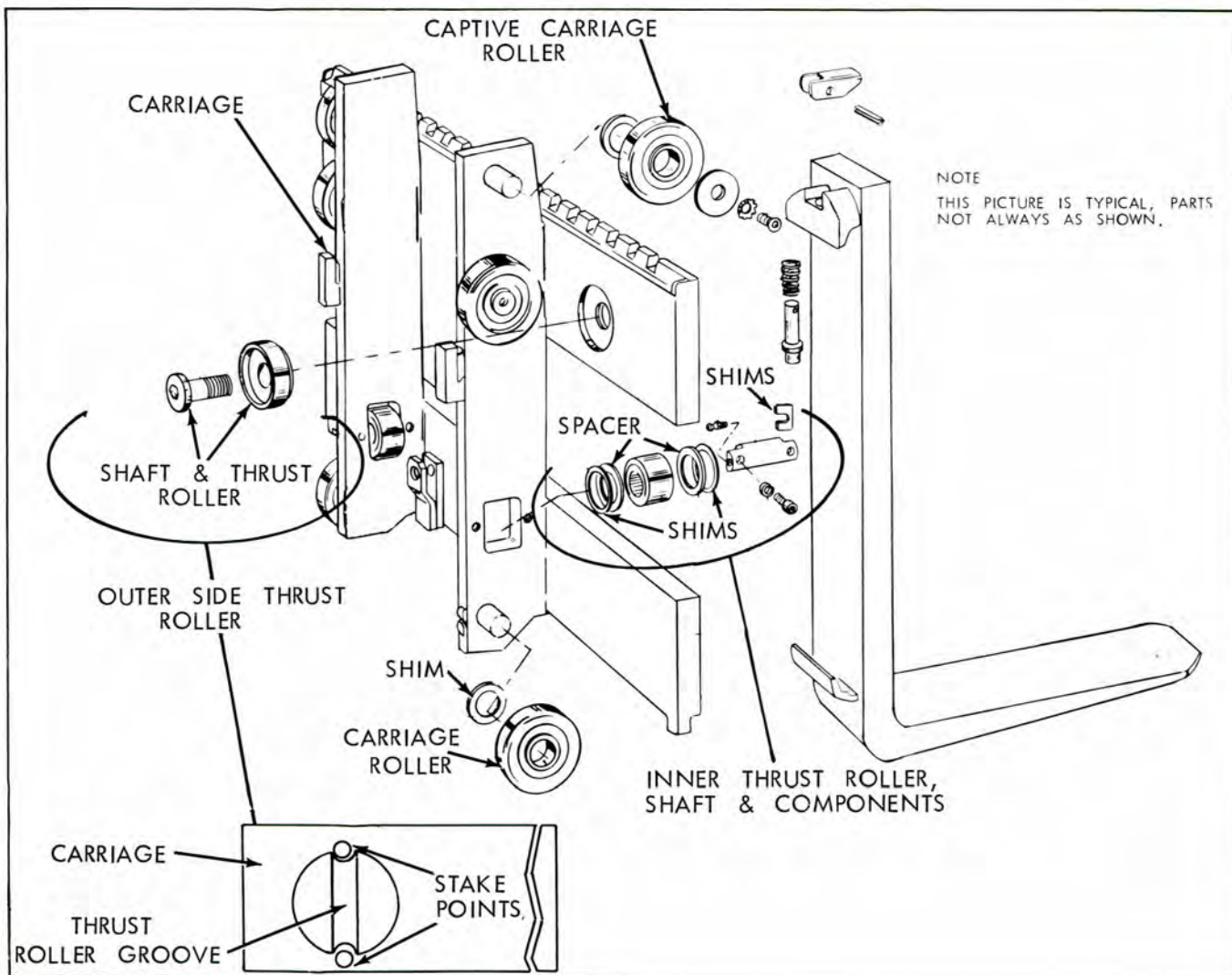


Plate 7000. Lift Carriage

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.

**NOTE**

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.

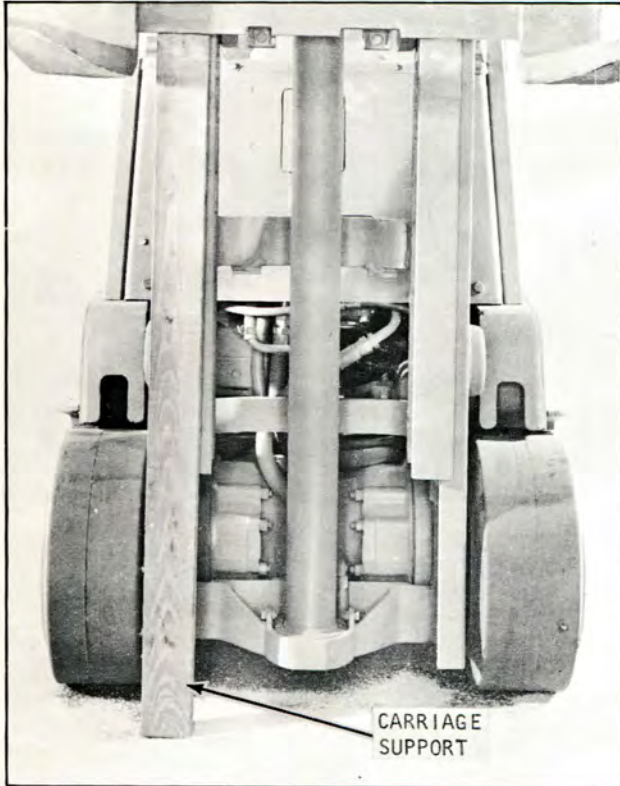


Plate 8623. Carriage Support

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.

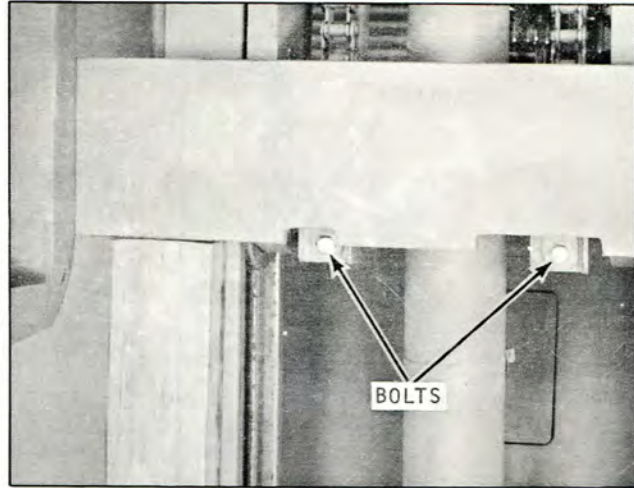


Plate 8599. Carriage Pin Replacement

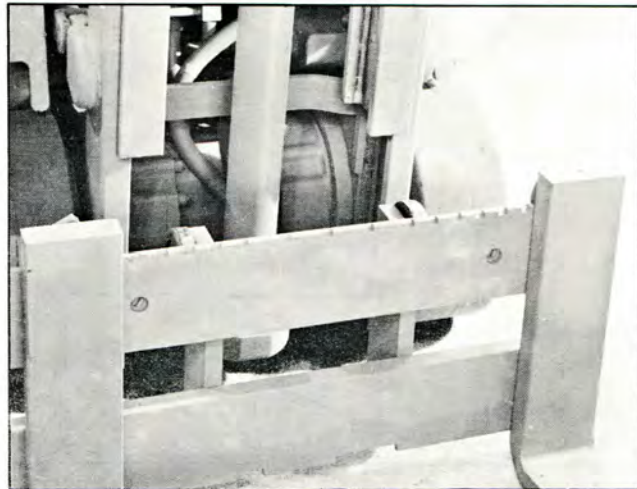


Plate 8922. Carriage Removed

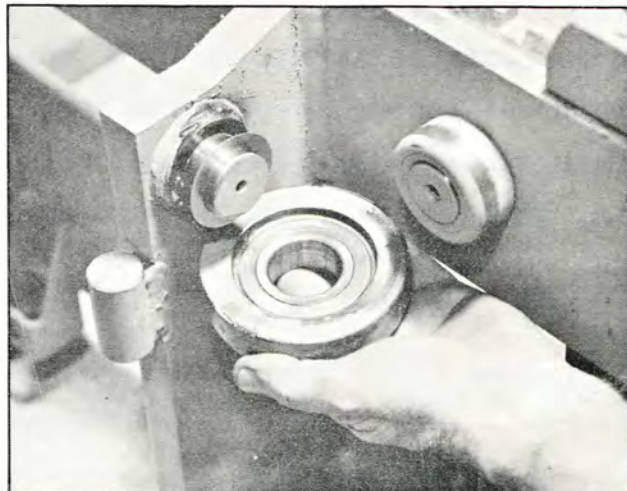


Plate 8923. Shim Adjustment



Plate 6323. Upright Roller

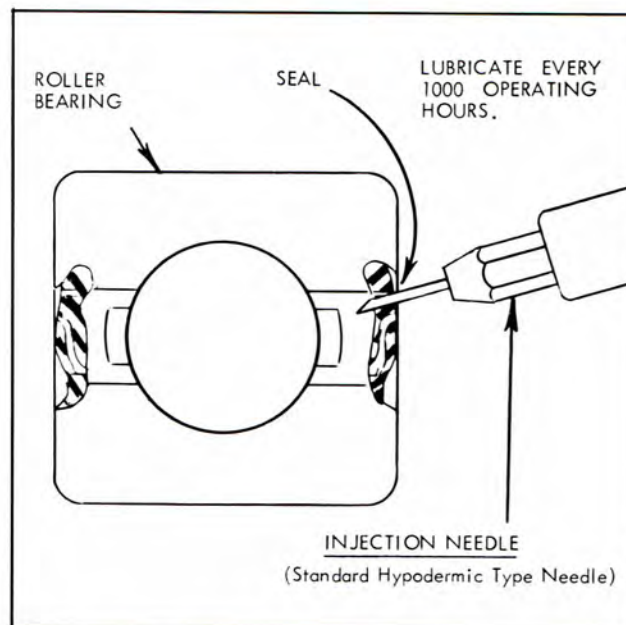


Plate 6328. Roller Bearing Lubrication

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.



TROUBLE SHOOTING GUIDE

ENGINE

TROUBLE	PROBABLE CAUSE	REMEDY
Starting motor will not crank engine.	<p>Battery discharged</p> <p>Battery cable terminals loose or corroded. Ignition Fuse blown.</p> <p>Starting motor drive gear jammed in flywheel teeth.</p> <p>Improper oil.</p> <p>Battery cable terminal broken.</p> <p>Poor starting switch contacts.</p> <p>Faulty Neutral Starting Switch.</p>	<p>Recharge or replace battery.</p> <p>Remove and clean, reinstall and tighten cables. Replace fuse.</p> <p>Loosen starting motor and free-up gear.</p> <p>Change oil to proper grade.</p> <p>Replace cable.</p> <p>Replace switch.</p> <p>Refer to Starting Motor.</p>
Starting motor operates, but fails to crank engine when switch is engaged.	<p>Starting motor gear does not engage flywheel.</p> <p>Starting motor or drive gear defective.</p>	<p>Remove starting motor, and clean drive mechanism.</p> <p>Replace starting motor.</p>
<u>Engine will not start.</u> No spark. Ammeter shows no discharge (Zero reading) with ignition switch "on".	<p>Ignition switch partly "on".</p> <p>Ignition switch defective.</p> <p>Ignition primary wires or starting motor cables broken or connections loose.</p> <p>Ignition coil primary winding open.</p> <p>Distributor points dirty.</p> <p>Distributor points not closing.</p> <p>Loose or corroded ground, or battery cable connections.</p>	<p>Turn switch "on" fully.</p> <p>Replace switch.</p> <p>Repair, or replace and tighten.</p> <p>Replace coil.</p> <p>Clean and adjust points.</p> <p>Adjust or replace points.</p> <p>Remove and clean, reinstall and tighten cables.</p>
<u>Engine will not start.</u> Ammeter showing abnormal discharge with ignition switch "on".	<p>Defective condenser.</p> <p>Short-circuited or burned distributor cap or rotor.</p> <p>Short-circuited wire between ammeter and ignition switch.</p> <p>Short-circuited primary winding in ignition coil.</p> <p>Distributor points not opening.</p>	<p>Replace condenser.</p> <p>Replace parts.</p> <p>Repair or replace wire.</p> <p>Replace coil.</p> <p>Clean or replace, and adjust points.</p>
Weak spark.	<p>Distributor points pitted or burned.</p> <p>Distributor condenser weak.</p> <p>Ignition coil weak.</p>	<p>Clean or replace, and adjust points.</p> <p>Replace condenser.</p> <p>Replace coil.</p>



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
<p><u>Engine will not start.</u> Weak spark (continued)</p>	<p>Primary wire connections loose.</p> <p>High-tension, spark plug wires, or distributor cap wet.</p> <p>High-tension, spark plug wires, or distributor cap damaged.</p> <p>Distributor cap or rotor burned or broken.</p> <p>Spark plug gap incorrect.</p> <p>Short-circuited secondary circuit in coil.</p>	<p>Tighten.</p> <p>Dry thoroughly.</p> <p>Replace defective parts.</p> <p>Replace defective parts.</p> <p>Reset gaps.</p> <p>Replace coil.</p>
<p>Good spark.</p>	<p>Fuel tank empty.</p> <p>Dirt or water in carburetor, or float stuck.</p> <p>Carburetor and engine flooded by excessive use of choke.</p> <p>Fuel does not reach carburetor.</p> <p>Dirt in fuel lines or tank.</p> <p>Fuel line pinched.</p> <p>Ignition wires incorrectly installed in distributor cap.</p> <p>Ignition timing incorrect.</p> <p>Fuel Strainer Clogged.</p> <p>Fuel pump does not pump.</p> <p>Lack of engine compression.</p>	<p>Refill tank.</p> <p>Drain and clean carburetor.</p> <p>Depress accelerator pedal fully, crank engine with starting motor, when engine starts, reset throttle and leave choke control "in".</p> <p>Inspect for damaged or leaky lines or air leak into line between tank and fuel pump.</p> <p>Disconnect lines, drain tank, and blow out lines.</p> <p>Repair or replace line.</p> <p>Install wires correctly.</p> <p>Reset timing.</p> <p>Remove and clean strainer.</p> <p>Clean screen, replace pump if defective.</p> <p>Report to designated individual in authority.</p>
<p>Backfiring.</p>	<p>Ignition out of time.</p> <p>Spark plug wires incorrectly installed distributor cap or at spark plugs.</p> <p>Distributor cap cracked or shorted.</p> <p>Valve holding open.</p>	<p>Reset timing.</p> <p>Install wires correctly.</p> <p>Replace cap.</p> <p>Report to designated individual in authority.</p>



TROUBLE SHOOTING GUIDE

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
<p>Engine operates, but backfires and spits.</p>	<p>Improper ignition timing.</p> <p>Spark plug wires incorrectly installed in distributor cap.</p> <p>Dirt or water in carburetor.</p> <p>Carburetor improperly adjusted.</p> <p>Carburetor float level low.</p> <p>Valve sticking or not seating properly, burned or pitted.</p> <p>Excessive carbon in cylinders.</p> <p>Valve springs weak.</p> <p>Heat control valve not operating.</p> <p>Fuel pump pressure low.</p> <p>Fuel strainer clogged.</p> <p>Partly clogged or pinched fuel lines.</p> <p>Intake manifold leak.</p> <p>Distributor cap cracked or shorted.</p>	<p>Reset timing.</p> <p>Install wires correctly.</p> <p>Drain and clean carburetor.</p> <p>Clean and adjust carburetor.</p> <p>Report to designated individual in authority.</p> <p>Report to designated individual in authority.</p> <p>Remove carbon from cylinders.</p> <p>Report to designated individual in authority.</p> <p>Free-up, and adjust valve.</p> <p>Clean screen; replace pump, if defective.</p> <p>Remove and clean strainer.</p> <p>Clean and repair lines.</p> <p>Inspect gaskets and tighten manifold stud nuts.</p> <p>Replace cap.</p>
<p>Engine stalls on idle.</p>	<p>Carburetor throttle valve closes too far, or idle mixture incorrect.</p> <p>Carburetor choke valve remains closed.</p> <p>Dirt or water in idler passages of Carburetor.</p> <p>Air leak at intake manifold.</p> <p>Heat control valve defective.</p> <p>Spark plugs defective, gaps incorrect.</p> <p>Ignition timing early.</p> <p>Low compression.</p> <p>Water leak in cylinder head or head gaskets.</p>	<p>Adjust carburetor.</p> <p>Free-up and lubricate valve.</p> <p>Clean or replace carburetor.</p> <p>Inspect gaskets and tighten manifold stud nuts.</p> <p>Free-up and adjust valve.</p> <p>Clean or replace spark plugs, set gap clearance.</p> <p>Reset timing.</p> <p>Report to designated individual in authority.</p> <p>Replace gasket; report cylinder head leak to designated individual in authority.</p>



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine misfires on one or more cylinders.	<p>Dirty spark plugs.</p> <p>Spark plug gap incorrect.</p> <p>Cracked spark plug porcelain.</p> <p>Spark plug wires grounded.</p> <p>Spark plug wires incorrectly installed in cap or at spark plugs.</p> <p>Distributor cap or rotor burned or broken.</p> <p>Valve tappet holding valve open.</p> <p>Low engine compression.</p> <p>Leaky cylinder head gasket.</p> <p>Cracked cylinder block, broken valve tappet or tappet screw.</p>	<p>Clean, adjust, or replace plugs.</p> <p>Reset gap.</p> <p>Replace spark plug.</p> <p>Replace wires.</p> <p>Install wires correctly.</p> <p>Replace defective parts.</p> <p>Report to designated individual in authority.</p> <p>Report to designated individual in authority.</p> <p>Replace gasket.</p> <p>Report to designated individual in authority.</p>
Engine does not idle properly.	<p>Ignition timing.</p> <p>Dirty spark plugs, or gaps too close.</p>	<p>Reset timing.</p> <p>Clean and adjust spark plugs.</p>
Engine misses at high speeds.	<p>Ignition coil or condenser weak.</p> <p>Distributor points sticking, dirty or improperly adjusted.</p> <p>Distributor rotor or cap cracked or burned.</p> <p>Leaky cylinder head gaskets.</p> <p>Uneven cylinder compression.</p> <p>High-tension or spark plug wires leaky, cracked insulation.</p> <p>Carburetor choke not adjusted.</p> <p>Carburetor accelerating pump system defective, dirt in metering jets or float level incorrect.</p> <p>Fuel pump defective, causing lack of fuel.</p> <p>Air cleaner dirty.</p> <p>Heat control valve defective.</p>	<p>Replace defective parts.</p> <p>Clean, adjust, or replace points.</p> <p>Replace defective parts.</p> <p>Replace gaskets.</p> <p>Report to designated individual in authority.</p> <p>Replace defective parts.</p> <p>Adjust choke.</p> <p>Report to designated individual in authority.</p> <p>Clean screen, replace defective pump.</p> <p>Clean complete air cleaner and refill oil cup.</p> <p>Free-up and adjust</p>

TROUBLE SHOOTING GUIDE

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine misses at high speeds. (continued)	<p>Valves sticking, weak or broken valve springs.</p> <p>Fuel strainer clogged.</p> <p>Weak distributor bracket arm spring</p> <p>Excessive play in distributor shaft bearing.</p> <p>Spark plugs defective, dirty or gap incorrectly set.</p>	<p>Report to designated individual in authority.</p> <p>Remove and clean strainer.</p> <p>Replace point set.</p> <p>Replace distributor.</p> <p>Clean, adjust or replace spark plugs.</p>
Engine pings (Spark Knock).	<p>Ignition timing early.</p> <p>Distributor automatic spark advance stuck in advance position, or spring broken.</p> <p>Excessive carbon deposit in cylinders.</p> <p>Incorrect fuel.</p>	<p>Reset timing.</p> <p>Replace distributor.</p> <p>Remove cylinder head and clean.</p> <p>Drain, use correct fuel.</p>
Engine lacks power.	<p>Ignition timing late.</p> <p>Incorrect fuel.</p> <p>Leaky cylinder head gasket.</p> <p>Excessive carbon formation.</p> <p>Engine runs cold.</p> <p>Insufficient oil, or improper grade oil.</p> <p>Oil system failure.</p> <p>Air Cleaner dirty.</p> <p>Spark plug gaps too wide.</p> <p>Choke valve partially closed, or throttle does not open fully.</p> <p>Manifold heat control inoperative.</p> <p>Exhaust pipe, muffler or tail pipe obstructed.</p> <p>Low compression, broken valve springs, sticking valves.</p>	<p>Reset timing.</p> <p>Use correct fuel.</p> <p>Replace gasket.</p> <p>Remove cylinder head, and clean cylinder head, piston heads, cylinder block, and valves.</p> <p>Test thermostat; in cold weather, cover radiator.</p> <p>Lubricate in accordance with lubrication section.</p> <p>Report to designated individual in authority.</p> <p>Clean complete air cleaner, change oil in cup. Reset gaps.</p> <p>Adjust valve or throttle.</p> <p>Free-up and adjust control.</p> <p>Service or replace obstructed parts.</p> <p>Report to designated individual in authority.</p>



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Engine lacks power. (Continued)	Improper tappet adjustment. Lack of fuel.	Adjust tappets. 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. Clogged radiator core (Clogged internally). Cylinder head gasket leaking. Radiator or water pump leaking. Damaged or deteriorated hose or fan belt. Loose fan belt. Cylinder block or head leaking. Ignition timing incorrect. Damaged muffler, bent or clogged exhaust pipe. Excessive carbon in cylinders. Insufficient oil, or improper grade. Air Cleaner restricted. Inoperative thermostat. Water pump impeller broken. Poor compression. Valve timing incorrect.	Clean radiator core from engine side with compressed air or water, or fill radiator to proper level. Clean by flushing radiator. Tighten cylinder head stud nuts and/or replace gasket. Repair or replace defective parts. Replace defective parts. Adjust fan belt tension. Report to designated individual in authority. Reset timing. Service or replace defective parts. Remove cylinder head, and clean cylinder head, piston heads cylinder block, and valves. Refer to Lubrication Instructions. Clean complete change oil in cup. Replace thermostat and gasket. Replace pump. Report to designated individual in authority. Reset timing.
High fuel consumption.	High engine speeds (Excessive driving in lower gear range). Air cleaner clogged. Carburetor float level too high, accelerating pump not properly adjusted. Fuel line leaks.	Correct driving practice. Clean complete air cleaner and change oil in cup. Report to designated individual in authority. Correct leaks, replace lines.

TROUBLE SHOOTING GUIDE

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
<p>High fuel consumption. (Continued)</p>	<p>Overheated engine.</p> <p>Carburetor parts worn or broken.</p> <p>Fuel pump pressure too high, or leaky diaphragm.</p> <p>Engine running cold.</p> <p>Ignition incorrectly timed.</p> <p>Spark advance stuck.</p> <p>Leaking fuel pump bowl gasket.</p> <p>Low compression.</p> <p>Carburetor controls sticking.</p> <p>Engine idles too fast.</p> <p>Spark plugs dirty.</p> <p>Weak coil or condenser</p> <p>Clogged muffler, or bent exhaust pipe.</p> <p>Loose engine mounts, permitting engine to shake and raise fuel level in carburetor.</p>	<p>See "Engine overheats".</p> <p>Replace fuel carburetor.</p> <p>Replace fuel pump.</p> <p>Inspect thermostat, cover radiator in winter.</p> <p>Reset timing.</p> <p>Replace distributor.</p> <p>Replace gasket.</p> <p>Report to designated individual in authority.</p> <p>Free-up and lubricate controls.</p> <p>Adjust carburetor throttle stop screw.</p> <p>Clean or replace spark plugs.</p> <p>Replace coil or condenser.</p> <p>Service or replace defective parts.</p> <p>Tighten; if damaged, replace defective mounts.</p>
<p>High oil consumption.</p>	<p>High engine speeds, or excessive driving in low gear range.</p> <p>Oil leaks.</p> <p>Improper grade oil, or diluted oil.</p> <p>Overheating of engine causing thinning of oil.</p> <p>Oil filter clogged.</p> <p>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.</p>	<p>Correct driving practice.</p> <p>Replace leaking gaskets.</p> <p>Use new oil of proper grade.</p> <p>See "Engine overheats".</p> <p>Clean filter case thoroughly and replace element.</p> <p>Report to designated individual in authority.</p>



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

ENGINE (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Low oil pressure.	Insufficient oil supply. Improper grade of oil, or diluted oil foaming at high speeds. Oil too heavy (funneling in cold weather). Oil pump screen clogged. Oil leaks.  Faulty oil pump, pressure regulator valve stuck or improperly adjusted, or spring broken.	Fill crankcase to prescribed level.  Change oil, inspect crankcase ventilator, inspect for water in oil.  Change to proper grade oil. (Refer to Lubrication Instructions).  Remove oil pan and clean pump screen. Report to designated individual in authority.  Report to designated individual in authority.
Defective valves.	Incorrect tappet adjustment.  Other valve troubles.	Adjust tappets.  Report to designated individual in authority.
Abnormal engine noises.	Loose fan, fan pulley or belt, heat control valve.  Leaking intake or exhaust manifold or gaskets, cylinder head gasket, or spark plugs.  Overheated engine, clogged exhaust system.  Other abnormal engine noises.	Tighten or correct conditions as required.  Tighten loose components or replace defective gaskets.  Remove obstruction from exhaust system. Inspect for further serviceability.  Report to designated individual in authority.
Poor compression.	Incorrect tappet adjustment.  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.	Adjust tappets.  Report to designated individual in authority.



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### FUEL SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Fuel does not reach carburetor.	No fuel in fuel tank. Fuel pump inoperative. Fuel line air leak between tank and fuel pump. Fuel line clogged. Fuel tank cap vent clogged.	Fill fuel tank. Replace pump. Repair or replace line. Disconnect and blow out lines. Clean vent.
Fuel reaches carburetor, but does not reach cylinders.	Choke does not close. Fuel passage in carburetor clogged. Carburetor float valve stuck closed.	Free-up and lubricate, inspect for proper operation. Clean or replace carburetor. Report to designated individual in authority.
High fuel consumption.	Lubricant in power train too heavy. Incorrect adjustment of carburetor. Vehicle overloaded. Tires improperly inflated. Tight brakes.	Use correct lubricant. Adjust carburetor. Reduce loads to specified maximum capacity. Inflate tires properly. Adjust brakes.
Low fuel pressure.	Air leak in fuel lines. Fuel pump defective, diaphragm broken; valves leaking, linkage worn. Fuel lines clogged.	Tighten connections, repair lines if damaged. Replace fuel pump. Clean or replace lines.
Engine idles too fast.	Improper carburetor throttle stop adjustment. Carburetor control sticking. Control return spring weak.	Adjust throttle stop screw. Free-up and lubricate control. Replace spring.
Fuel gauge does not register.	Loose wire connection at instrument panel or tank unit. Instrument panel unit or tank unit inoperative.	Tighten connections. Replace unit.







# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### CLUTCH

TROUBLE	PROBABLE CAUSE	REMEDY
Clutch slips.	<p>Improper pedal adjustment.</p> <p>Release linkage binding.</p> <p>Clutch facings burned or worn, torn loose from plate, or oil soaked.</p> <p>Weak pressure spring.</p> <p>Sticking pressure plate.</p> <p>Weak or broken retractor springs.</p> <p>Damaged pilot or clutch release bearing.</p>	<p>Adjust pedal free travel.</p> <p>Free-up and lubricate linkage.</p> <p>Report to designated individual in authority.</p> <p>Report to designated individual in authority.</p> <p>Report to designated individual in authority.</p> <p>Replace. Report to designated individual in authority.</p> <p>Replace. Report to designated individual in authority.</p>
Clutch grabs or chatters.	<p>Control linkage binding.</p> <p>Loose engine mounting.</p> <p>Facings burned, worn, or loose on driven plate; driven plate crimped, flattened out, worn, or binding on splined shaft.</p> <p>Pressure plate or clutch adaptor face scored or rough; pressure plate broken.</p> <p>Excessive looseness in power train.</p> <p>Oil on facings, or excessively worn disc surfaces.</p> <p>Sticking pressure plate.</p>	<p>Free-up and lubricate linkage.</p> <p>Tighten engine mounts.</p> <p>Report to designated individual in authority.</p> <p>Report to designated individual in authority.</p> <p>Report to designated individual in authority.</p> <p>Report to designated individual in authority.</p> <p>Report to designated individual in authority.</p>
Clutch drags.	<p>Excess pedal free play.</p> <p>Driven plate warped, facings torn or loose.</p> <p>Pressure plate warped or binds, improper clutch lever adjustment.</p>	<p>Adjust pedal free play.</p> <p>Report to designated individual in authority.</p> <p>Report to designated individual in authority.</p>
Clutch rattles.	<p>Clutch pedal return spring broken or disconnected.</p>	<p>Replace or connect spring.</p>



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### CLUTCH (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Clutch rattles. (Continued)	Release fork loose on ball stud.  Worn pressure plate, or broken return springs at driving lugs; worn driven plate hub on splined shaft, worn release bearings, pilot bushing worn.	Adjust clutch pedal free travel to one inch.  Report to designated individual in authority.



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

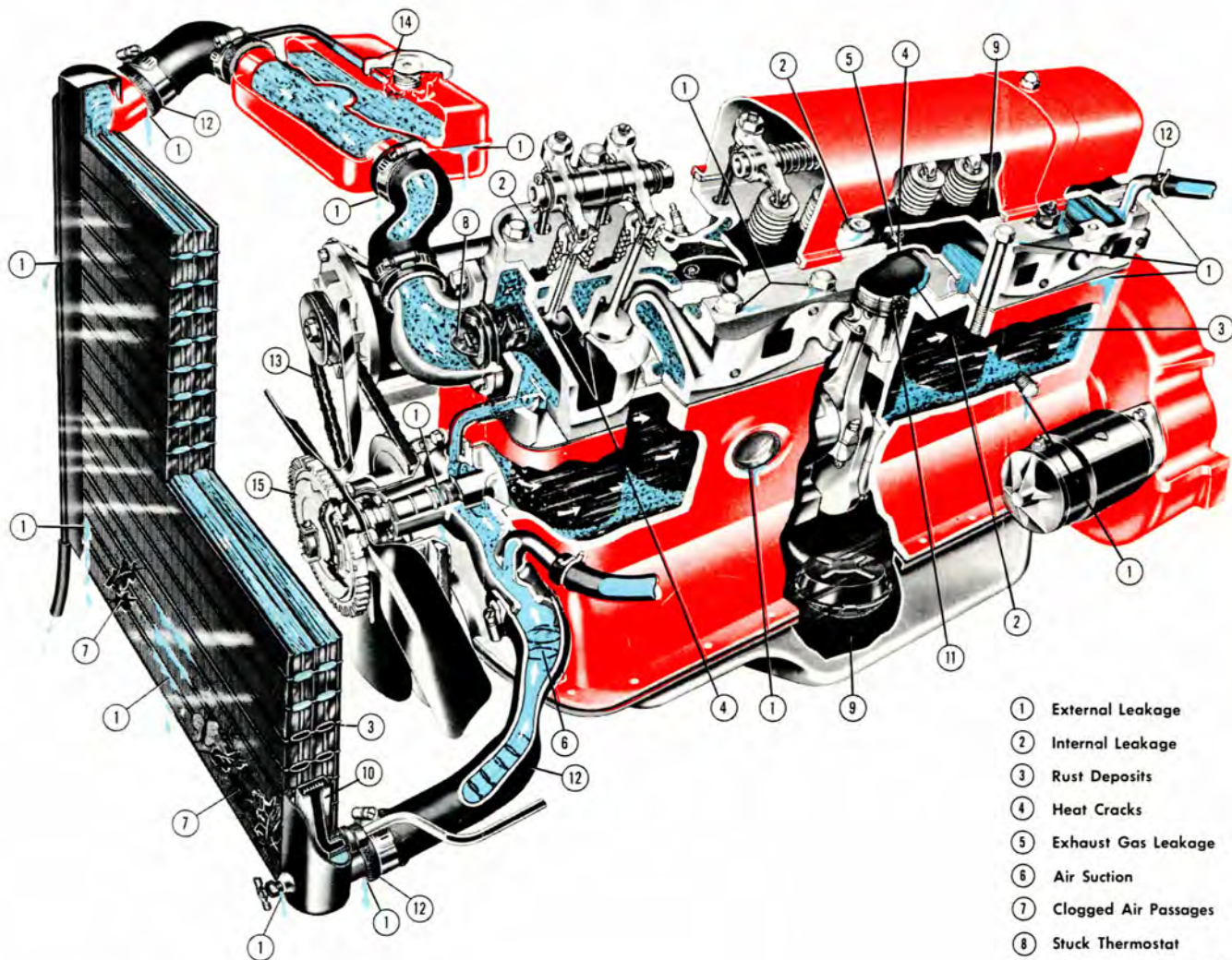
### COOLING SYSTEM

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.



# 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

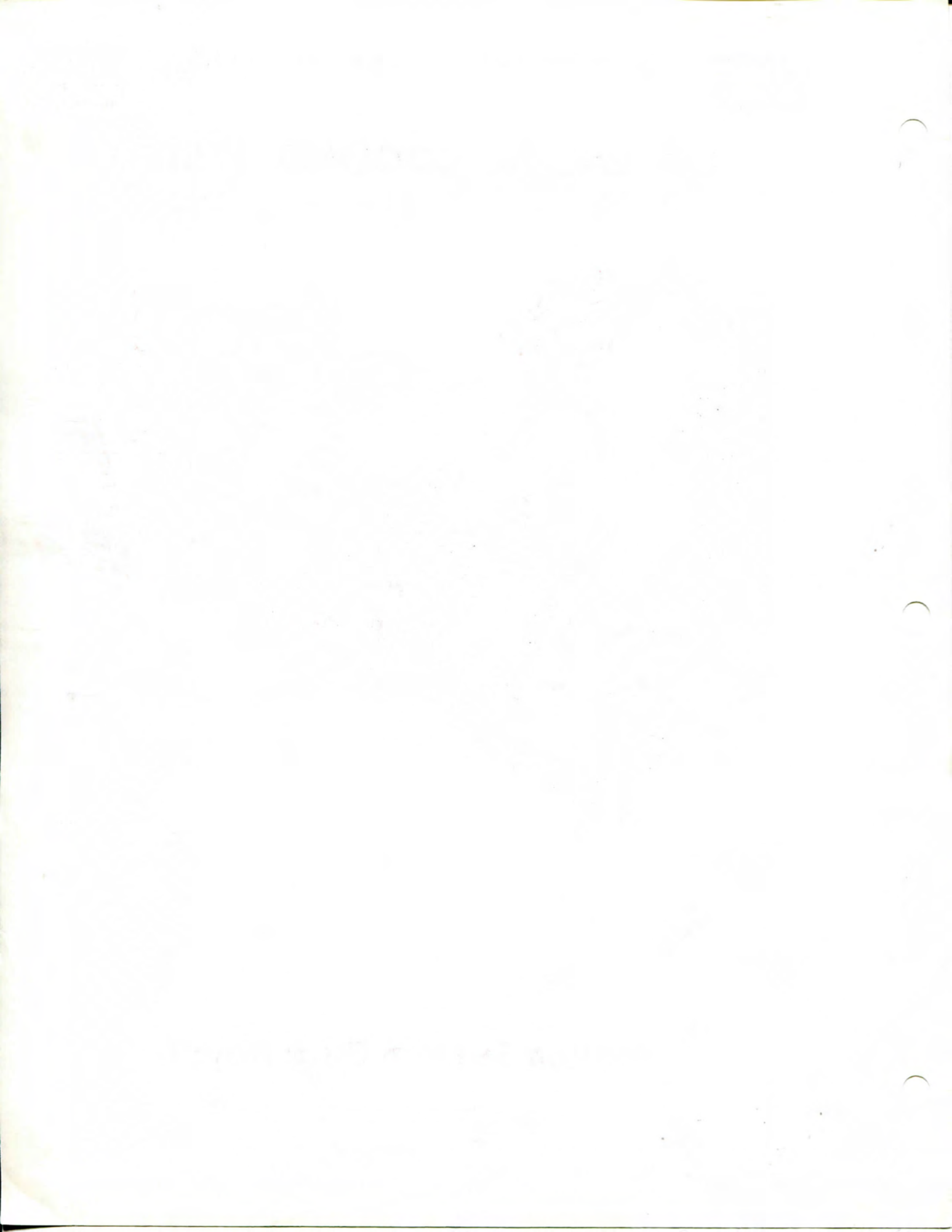
The cooling system depicted here does not represent that of any particular make of car, it incorporates features used by many different manufacturers.

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## Cooling System Care Pays!

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# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### IGNITION SYSTEM

TROUBLE	PROBABLE CAUSE	REMEDY
Ignition system troubles.	Weak spark. Timing incorrect. Moisture on distributor wires, coil, or spark plugs. Ignition switch inoperative. Primary or secondary wiring loose, broken, or grounded. Coil defective. Distributor defective. Spark plug defective.	Refer to "Engine will not start". Retime ignition. Clean and dry thoroughly. Replace switch. Service. Refer to "Ignition coil troubles", below. Refer to "Distributor troubles", below. Refer to spark plug troubles below.
Ignition coil.	Connections loose; dirty or broken external wire, wet. Coil defective.	Clean and tighten, or repair, dry thoroughly. Replace coil.
Distributor troubles.	Distributor breaker points dirty or pitted, point gaps incorrect. Distributor breaker point arm spring weak. Distributor breaker points sticking. Distributor automatic advance defective. Distributor cap or rotor shorted, cracked or broken. Distributor rotor does not turn. Condenser defective.	Clean, adjust or replace breaker points. Replace breaker point arm. Free-up breaker points. Lubricate and free-up. If seized, replace distributor. Replace defective parts. Report to designated individual in authority. Replace condenser.
Spark plug troubles.	Cracked, broken, leaking, or improper type. Spark plug wires incorrectly installed on plugs or in distributor cap. Spark plugs dirty; gap incorrect. Spark plug porcelain cracked or broken.	Replace spark plug. Install wires correctly. Clean, set gaps, or replace plugs. Replace plug.



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### STARTING MOTOR

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



## TROUBLE SHOOTING GUIDE

## GENERATOR TROUBLES

TROUBLE	PROBABLE CAUSE	REMEDY
No output.	Regulator defective.	Replace regulator.
Low or fluctuating output.	Loose fan belt. Insufficient brush surface contact. Weak brush springs. Worn commutator. Broken or loose connections. Dirty commutator. Regulator defective. Loose or dirty connections in charging circuit.	Adjust belt. Free-up or replace brush. Replace spring. Report to designated individual in authority. Repair, tighten or replace. Clean commutator. Replace regulator. Clean and tighten connections.
Excessive output.	Short circuit between field coil and armature leads. Regulator defective.	Replace generator. Replace regulator.
Noisy.	Loose pulley or generator mounting. Defective bearings, or armature rubbing on field poles. Improperly seated brushes.	Tighten. Replace generator. Seat brushes.
Generator regulator troubles.	Loose connections or mountings. Defective regulator.	Clean and tighten. Replace regulator.



TRUBLE SHOOTING GUIDE

BATTERY, LIGHTS AND HORN

TROUBLE	PROBABLE CAUSE	REMEDY
Battery discharged.	<p>Battery solution level low.</p> <p>Short in battery cell.</p> <p>Generator not charging.</p> <p>Loose or dirty connections; broken cables.</p> <p>Excessive use of starting motor.</p> <p>Idle battery, or excessive use of lights with engine at idle.</p> <p>Short circuits.</p>	<p>Add distilled water to bring level above plates; inspect for cracked case.</p> <p>Replace battery.</p> <p>Inspect generator, fan belt, and regulator.</p> <p>Clean and tighten connections; replace cables.</p> <p>Tune up engine; charge battery.</p> <p>Recharge or replace battery. Use lights sparingly.</p> <p>Replace defective wiring.</p>
Battery (other troubles)	<p>Overheated battery.</p> <p>Case bulged (or out of shape).</p>	<p>Inspect for short circuit or excessive generator charge.</p> <p>Inspect for overcharging and over-tightening of hold-down screws.</p>
Light switch.	<p>Loose or dirty connections; broken wire.</p> <p>Defective switch.</p>	<p>Clean and tighten; replace broken wire.</p> <p>Replace switch.</p>
Wiring.	<p>Loose or dirty connections; broken wire or terminal.</p>	<p>Clean, tighten, repair or replace. Wire or terminal.</p>
Lights do not light.	<p>Switch not fully "on".</p> <p>Loose or dirty connections; broken wire.</p> <p>Wiring circuit short-circuited, or open.</p> <p>Light burned out.</p>	<p>Turn switch "on" fully.</p> <p>Clean and tighten; replace or repair wire or terminal.</p> <p>Correct short circuit or replace defective parts.</p> <p>Replace light.</p>
Lights dim.	<p>Loose or dirty connection.</p> <p>Wiring short-circuited.</p> <p>Defective switch.</p>	<p>Clean and tighten connections.</p> <p>Correct short circuit or replace defective parts.</p> <p>Replace switch.</p>



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

BATTERY, LIGHTS AND HORN (Continued)

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



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### TRANSMISSION

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive noise.	Incorrect driving practice. Insufficient lubricant. Gears or bearings broken or worn; shift fork bent, gears worn on splines. Overheated transmission.	Correct practice. Add lubricant. Replace transmission. Inspect lubricant grade and supply.
Hard shifting.	Clutch fails to release. Clutch driven plate binds, or pressure plate is defective. Gearshift binding in housing. Shift rods binding in case. Transmission loose on bell housing. Clutch shaft pilot bearing binding, or shift housing damaged.	Adjust clutch pedal free travel. Report to designated individual in authority. Lubricate and free-up. Report to designated individual in authority. Tighten transmission mounting bolts. Report to designated individual in authority.
Slips out of gear.	Weak or broken rail spring. Transmission gears or bearing worn. Shifting fork bent, causing partial gear engagement. Transmission loose on bell housing. Damaged bell housing. Damaged mainshaft pilot bearing.	Report to designated individual in authority. Replace transmission. Report to designated individual in authority. Tighten transmission mounting bolts. Report to designated individual in authority. Report to designated individual in authority.
Loss of lubricant.	Worn or damaged seals or gaskets.	Report to designated individual in authority.



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### DRIVE AXLE

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



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### STEERING AXLE

TROUBLE	PROBABLE CAUSE	REMEDY
Trouble.	Damaged axle. Lubrication leaks. Incorrect caster or camber. Uneven tire wear.	Replace axle. Replace oil seals. (Refer to Lubrication Section). Report to designated individual in authority. Report to designated individual in authority. Inflate tires properly. Check wheel alignment.



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### STEERING

TROUBLE	PROBABLE CAUSE	REMEDY
Steering difficult.	Lack of lubrication Tight steering system connections. Tight steering gear; misaligned wheels. Bent steering connecting linkage or arm. Misaligned steering gear mounting.	Lubricate. Lubricate and adjust linkage. Report to designated individual in authority. Straighten or replace linkage. Adjust mounting.
Wander or weaving.	Improper toe in camber or caster (axle twisted). Steering system connections or king pin bearings not properly lubricated. Loose wheel bearings. Steering gear worn or maladjusted. Steering gear mountings loose.	Report to designated individual in authority. Lubricate. Adjust wheel bearings. Report to designated individual in authority. Tighten mounting bolts.
Low speed shimmy or wobble.	Loose steering connections. Steering gear worn, or adjustment too loose. Loose wheel bearings.	Adjust and tighten linkage. Report to designated individual in authority. Adjust wheel bearings.
Vehicle pulls to one side.	Odd size, or new and old tires on opposite wheels. Tight wheel bearings. Bent steering arm or connection.	Match tires. Adjust. Lubricate wheel bearings. Straighten or replace bent linkage.





# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### BRAKES

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



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### BRAKES (Continued)

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



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### HYDRAULIC SYSTEM

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



# INDUSTRIAL TRUCK DIVISION



## TROUBLE SHOOTING GUIDE

### 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. Scored cylinder wall. Plugged vent line.	Replace seal. Replace cylinder. Clean out vent line. Replace if collapsed.
Oil leak around piston rod at tilt cylinder.	Worn seal. Scored piston rod.	Replace seal. Replace rod and eliminate cause of scoring which may be caused by misalignment, worn bearing or foreign matter.
With load centered on lift forks load is lifted unevenly.	Lift chains out of adjustment.	Adjust chains.