



INDUSTRIAL TRUCK DIVISION



OPERATORS MANUAL

CH60, CH70, CH80

CHY60, CHY70, CHY80

CF60, CF70, CF80

CFY60, CFY70, CFY80

2nd REVISION

BOOK NO. 0-131-1

CLARK EQUIPMENT COMPANY

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BATTLE CREEK MICHIGAN, U.S.A.

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SAFETY INSTRUCTIONS FOR MAINTAINING INDUSTRIAL TRUCKS

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

Maintenance and inspection of all powered industrial trucks should be performed in conformance with the recommendation in this manual and the following practices.

1. A scheduled preventive maintenance, lubrication, and inspection system should be followed.
2. Only qualified and authorized personnel should be permitted to maintain, repair, adjust, and inspect industrial trucks.
3. Before Leaving The Truck:
 - A. Stop truck.
 - B. Fully lower the load engaging means.
 - C. Place directional controls in neutral.
 - D. Apply the parking brake.
 - E. Stop the engine or turn off power.
 - F. Lock the control or ignition circuit.
 - G. Block the wheels if truck is on a ramp, or being worked on.
4. Before Working On Truck:
 - A. Raise wheels free of floor or disconnect power source.
 - B. Use chocks or other positive truck positioning devices.
 - C. Block load engaging means, innermast(s), or chassis before working under them.

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

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

Operation to check performance of the truck or attachments should be conducted in an authorized, safe clearance area.
5. Before Starting To Operate The Truck:
 - A. Be in operating position.
 - B. Depress clutch (or brake pedal on automatic transmission and electric trucks).
 - C. Place directional controls in neutral.
 - D. Start engine or turn on power.
 - E. Before operating truck, check functioning of lift and tilt systems, directional and speed controls, steering, warning devices, brakes, and any attachment. (If used)
 - F. Release parking brake.

SAFETY INSTRUCTIONS FOR MAINTAINING INDUSTRIAL TRUCKS

6. Avoid fire hazards and have fire protection equipment present. Do not use an open flame to check level, or for leakage, of fuel, electrolyte or coolant. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.
7. Properly ventilate work area, vent exhaust fumes and keep shop clean and floor dry.
8. Handle LP gas cylinders with care. Do not drop, dent, or damage in any way.
9. Brakes, steering mechanisms, control mechanisms, warning devices, lights, governors, lift overload devices, guards and safety devices should be inspected regularly and maintained in a safe operating condition.
10. All parts of lift and tilt mechanisms and frame members should be carefully and regularly inspected and maintained in a safe operating condition.
11. Special trucks or devices designed and approved for hazardous area operation should receive special attention to ensure that maintenance preserves the original, approved safe operating features.
12. Fuel systems should be checked for leaks and condition of parts. Extra special consideration should be given in the case of a leak in the fuel system. Action should be taken to prevent the use of the truck until the leak has been corrected.
13. All hydraulic systems should be regularly inspected and maintained in conformance with good practice. Tilt cylinders, valves, and other similar parts should be checked to assure that "drift" has not developed to the extent that it would create a hazard.
14. Capacity, operation and maintenance instructions plates, tags, or decals should be maintained in legible condition.
15. Batteries, motors, controllers, limit switches, protective devices, electrical conductors and connections should be inspected and maintained in conformance with good practice. Special attention should be paid to the condition of electrical insulation.
16. Industrial trucks should be kept in a clean condition to minimize fire hazards and facilitate detection of loose or defective parts.
17. Modifications and additions which affect capacity and safe truck operation should not be performed by the customer or user without manufacturers prior written approval. Capacity, operation and maintenance instruction plates, tags or decals should be changed accordingly.
18. Care should be taken to assure that all replacement parts are interchangeable with the original parts and of a quality equal to that provided in the original equipment.



INDUSTRIAL TRUCK DIVISION



PLEASE NOTE

INSTRUCTIONS ON USE OF MANUAL

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

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

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

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

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

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

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

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

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

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

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

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



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(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.



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<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
 O P E R A T I O N S 	
C002	Overall Controls
C003	Instrument Indicators
C103	Starting and Operating Instructions
C203	Fuel Tank Reserve Manual Cut-in
C303	To Move, Stack and Lower Loads. Safety and Operating Suggestions.

LUBRICATION AND PREVENTIVE MAINTENANCE

<u>Time Interval (H-Hours)</u>	<u>& Page Number (0000-)</u>	<u>Description</u>
H	001	Index
8H	002	<u>8 Hour Lubrication & 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 & 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 & 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



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LUBRICATION AND PREVENTIVE MAINTENANCE

Time Interval (H=Hours)	& Page Number (0000-)	Description
1000H	002	<u>1000 Hour Lubrication & Preventive Maintenance Illustration</u>
		Engine Tune Up; Air Cleaner, Fuel Pump
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

Page	Description
TS 001	Engine
TS 251	Fuel System
TS 301	Clutch
TS 321	Cooling System
TS 341	Ignition System
TS 361	Starter
TS 381	Generator
TS 401	Battery & Horn
TS 421	Transmission
TS 493	Drive Axle
TS 521	Steering Axle
TS 541	Brake System
TS 653	Hydraulic System

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ILLUSTRATION OF MACHINE

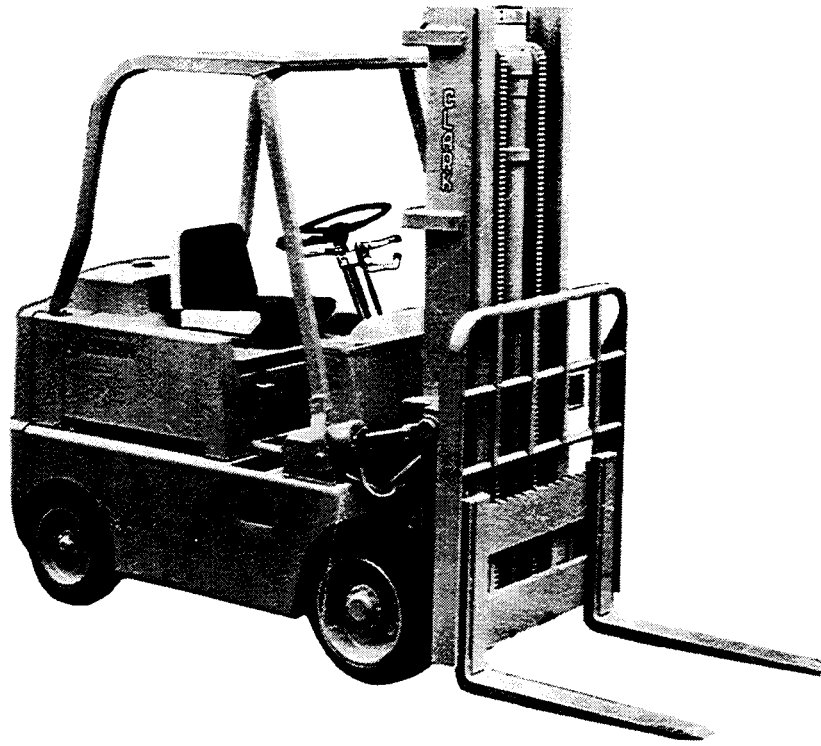


Plate 7239. CLARKLIFT CF60, CF70, CF80

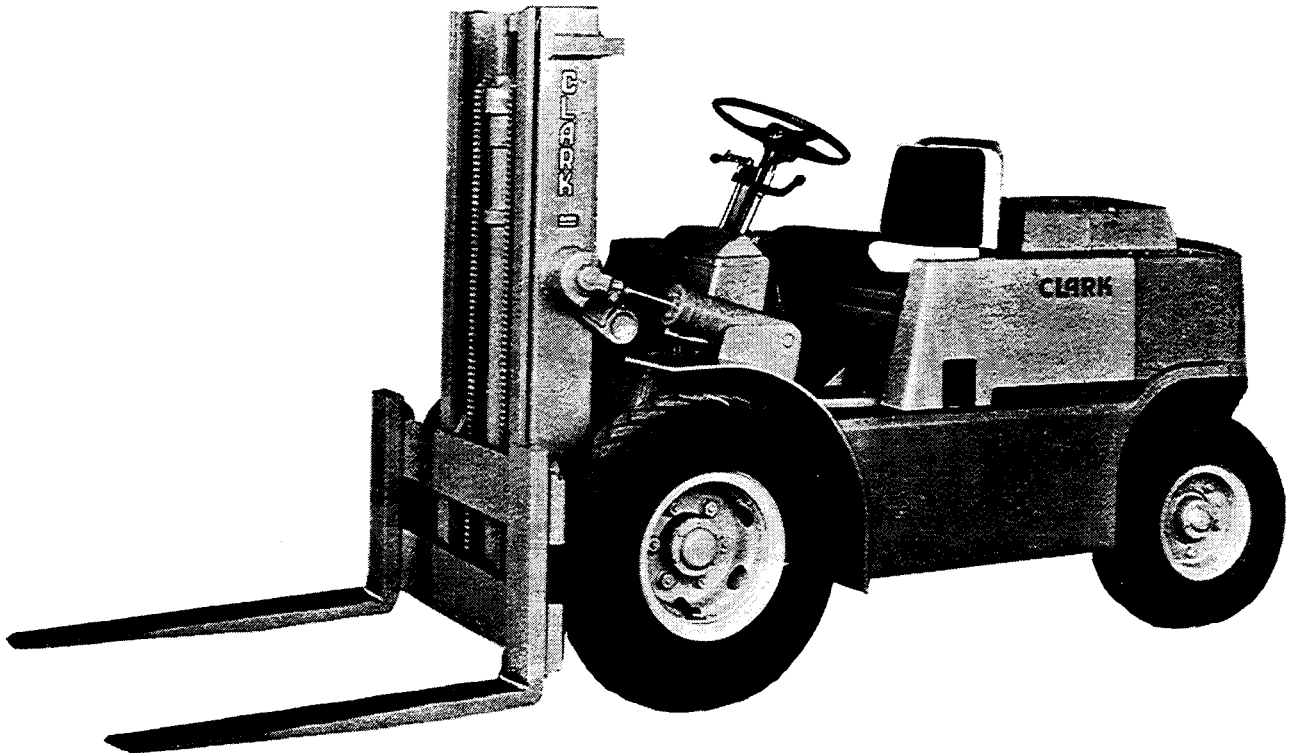


Plate 7240. CLARKLIFT CFY60, CFY70, CFY80

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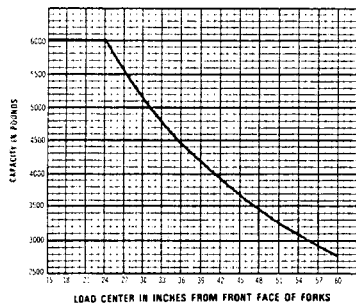
INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

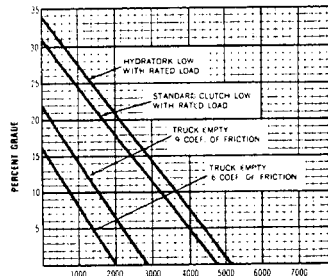
CLARKLIFT® DIMENSIONAL SPECIFICATIONS C-60 CF-60

CAPACITY CHART



RATED CAPACITIES SHOWN ABOVE ARE COMPUTED WITH UPRIGHTS IN VERTICAL POSITION. THEY APPLY ONLY ON MAXIMUM FORK HEIGHTS UP TO AND INCLUDING 154".

GRADE & DRAWBAR PULL CHART



AVAILABLE DRAWBAR PULL IN POUNDS WITH TOWING COUPLER 12" FROM FLOOR. EMPTY TRUCK GRADES ARE WITH EITHER TRANSMISSION.

UPRIGHT DIMENSIONAL TABLE

Max. Fork Ht.	Over-all Height		Free Lift		
	Std. Hi-Lo	TSU	Std.	Hi-Lo	TSU
76	—	56	13½	32¾	—
82	—	59	13½	35¾	—
88	—	62	13½	38¾	—
94	126	65	13½	41¾	11½
100	135	68	13½	44¾	11½
*106	*144	71	13½	47¾	11½
112	153	74	13½	50¾	11½
118	162	77	13½	53¾	11½
124	171	80	13½	56¾	11½
*130	*180	83	13½	59¾	11½
136	189	86	13½	62¾	9½
142	198	89	13½	65¾	9½
148	207	** 92	11½	68¾	9½
*154	*216	** 95	11½	71¾	9½
160	225	** 99	13½	75¾	9½
172	243	**106	13½	82¾	9½
*178	252	**109	11½	85¾	9½
184	—	112	11½	88¾	—
190	—	116	13½	92¾	—
196	—	119	11½	95¾	—
202	—	123	13½	99¾	—
208	—	126	11½	102¾	—

*Preferred standard heights.
**Add 1" for triple stage upright.
For overall height raised add 2¼" to maximum fork height.

ENGINEERING SPECIFICATIONS

MODEL C(F) 60 Weight9,800 lbs.

WEIGHT Percent on drive wheels, truck empty: 42%
DISTRIBUTION Rated capacity 6,000 lbs. at 24" load center
AND CAPACITY Alternate ratings 5,100 lbs. at 30" load center
4,400 lbs. at 36" load center
(See capacity chart for other ratings)

DIMENSIONS *Dimensions*
AND Length to face Basic aisle for right
UNDERCLEARANCES of forks94¼" angle stacking
Wheelbase58" (add load
length)101¾"
Width (drive Underclearances
tires)44" Upright37/16"
Tread (drive)35" Drive axle5½"
Tread (steer)35½" Steer axle3¾"
Turning radius86" Center of frame5½"
Counterweight4"

SPEEDS Travel speeds with rated load C 60 CF 60
AND GRADES 10.5 mph 10.7 mph
Gradeability with rated load ... 33.5% 30.5%
STANDARD HI-LO
Loaded Empty Loaded Empty
Lift speed 71 78 65 72
Lowering speed 60 80 60 65

ENGINE Industrial Continental Red Seal, 6 cylinder, L-head, equipped with stellite-faced valves; seats, positive valve rotators. Connecting rods, main bearings, cam shaft and timing gears are pressure lubricated by submerged gear type pump. Mechanical governor controls engine speed accurately without choking off power.

Model F-209
Bore 3¾"
Stroke 4¾"
Displacement — cubic inches 209
Crankcase capacity — quarts 5
Governed rpm with rated load 2250
Horsepower at governed rpm 65
Max. torque — lb. ft. 157
Fuel tank capacity — gals. 10.5
Note: LP Gas adaptation optional at extra cost.

ENGINE FILTERS Three types. (1) Fuel filter in metallic bowl. (2) One quart oil filter with automotive-type replaceable cartridge. (3) Dry type in-take air filter that uses a replaceable pleated paper cartridge with minute 5-micron openings.

ELECTRICAL SYSTEM 12-volt, 60 amp-hour battery, 25 amp. low cut-in generator charges at idle. Other features include enclosed electric starter motor with positive engagement and electrical cut-out; weather-shielded key starting switch; dust-proof distributor; electric horn. Multiple-disconnect plug to instrument panel simplifies servicing.

INSTRUMENTS Direct reading engine hour meter, ammeter, engine-oil pressure, fuel and temperature gauges, all mounted in cowl for easy reading.

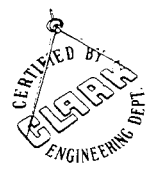
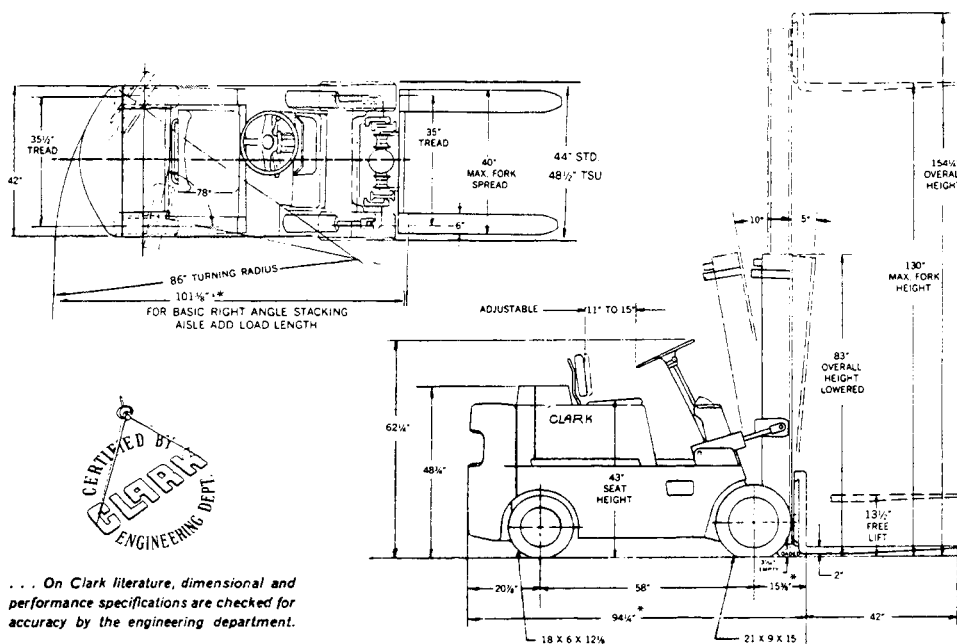
DRIVE AXLE AND TRANSMISSION Integral assembly with 3-point mounting including engine, torque converter, transmission, spiral bevel pinion and ring gear, differential and full floating drive axle assembly. Axle housing, not drive shaft, carries weight of truck. Final gear reduction is made through fully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

HYDRATOROK® DRIVE, STANDARD 2-speed power shifted transmission has torque converter which multiplies engine torque without shock on drive shaft and gears. Transmission oil is cooled thru cooler in bottom radiator tank and is a filtered system with replaceable type cartridge. The forward and reverse gears and high and low range gears are in constant mesh. Direction selector lever for left-hand finger-tip control on steering column.

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

FRICITION CLUTCH TRANSMISSION, OPTIONAL "Quick Change" 12" diameter single disc, dry plate clutch capacity of 300 lb. ft. of torque, controlled by low effort automotive type pedal. Two shift levers mounted on the steering column control the 3-speed synchronized transmission in either direction.

SPECIFICATIONS (CONTINUED)



... On Clark literature, dimensional and performance specifications are checked for accuracy by the engineering department.

* ADD 1 1/2" FOR TRIPLE STAGE UPRIGHT

BRAKES (Two systems). Hydraulic spot disc brakes provide powerful braking without self-energization. Eliminates sudden "grabbing" of the brakes. Foot brake torque multiplied through final reduction at each drive wheel minimizes pedal effort. Brakes are enclosed within drive axle housing and require no adjustment for life of lining. Mechanical parking brake operates on transmission drive shaft.

STEERING Power steering is standard. Steering control is maintained through mechanical linkage in the event of power failure. Strong vanadium steel steer axle is mounted on two torsional rubber bushings to cushion shock and to provide articulation for floor level variations up to 3 1/2". Positive stops for lateral stability. Inclined king pins minimize road shocks. Recirculated ball type steering gear with 18" diameter handwheel. Tie rods are automotive type.

UPRIGHT Nested telescopic roller type. "I" beam inner section of SAE 1045 steel is nested within outer channel of SAE 1045 steel for greater safety and visibility. Side loading on upright rails is taken on upright rollers. Upright and carriage rollers are adjustable for wear to maintain new truck tolerances. Carriage also has 4 interior adjustable side thrust rollers to prevent binding. Carriage has additional lateral thrust rollers to prevent upright spread, insuring maximum free-rolling movement.

LIFT AND TILT CYLINDERS Tilt rods chrome plated. Externally removable shims compensate for wear on tilt cylinder gland packings. Tilt lock valves insure positive control — no upright drift. Both lift and tilt cylinders have metal rod wipers to keep foreign material from the packings. Free-floating mounting of piston type lift cylinder minimizes side strains. Modulated flow regulator in cylinder base reduces maximum lowering speed as weight of load increases.

HYDRAULIC SYSTEM Full feathering balanced spool type valves for gentle starts and stops. Built-in pressure relief valve protects system against overloads. S.A.E. straight threads and O-ring seals used throughout pressure system. Vane-type pump is driven by hardened gears. Hydraulic sump, built into frame of 3/8" thick plate has 10 gal. capacity. Flexible rubber hydraulic hose lines are steel braid reinforced. System is protected from dirt by (1) a 5-micron pleated replacement filler cap breather, (2) a 25-micron full flow filter in sump.

FORK CARRIAGE AND FORKS All-welded construction, 1045 steel fork carriage to withstand impacts. Lateral fork adjustments from 0" to 40" with or without optional load rack. Convenient snap action latch assures positive fork positioning. Heat treated and upset forged forks to provide full section strength at heel.

SEATING Rubber mounted wide seat and back rest are Polyether, covered with vinyl plastic. Curved back rest tilts to provide additional driver comfort. An automotive type latch releases the seat for horizontal adjustment up to 4".

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

GENERAL Protectoseal gas tank filler cap. Auxiliary fuel supply — 1/2 gal. 12" height recessed pin-type coupler. Bolts and screws are zinc or cadmium plated. Multi-pass muffler. All exposed surfaces are shot-blasted and prime painted with weather resistant paint.

DRIVER'S OVERHEAD GUARDS AND LOAD BACK RESTS Driver's Overhead Guards and Load Back Rests are available as optional equipment. Clark Equipment Company recommends the use of these accessories and advises owner to consider his operation for their necessity.

COLORS Two tone. Silver gray, combined with one of five options: red, orange, yellow, green, or blue.



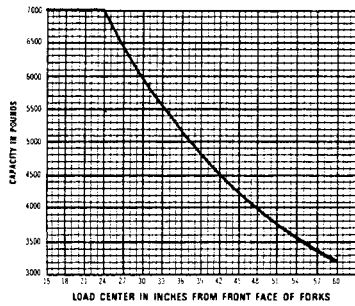
INDUSTRIAL TRUCK DIVISION



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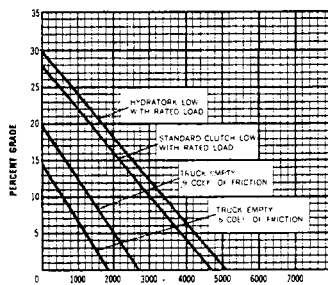
CLARKLIFT® DIMENSIONAL SPECIFICATIONS C-70 CF-70

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EMPTY TRUCK GRADES ARE WITH EITHER TRANSMISSION

UPRIGHT DIMENSIONAL TABLE

Std. Hi-Lo	Max. Fork Ht.	TSU	Over-all Height		Free Lift	
			Lowered	Std.	Hi-Lo	TSU
75	—	—	59	19½	35¾	—
81	—	—	62	19½	38¾	—
87	—	—	65	19½	41¾	—
93	126	—	68	19½	44¾	17½
* 99	135	—	71	19½	47¾	17½
105	*144	—	74	19½	50¾	17½
111	153	—	77	19½	53¾	17½
117	162	—	80	19½	56¾	17½
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*Preferred standard heights.
**Add 1" for triple stage upright.
For overall height raised add 24¼" to maximum fork height.

ENGINEERING SPECIFICATIONS

MODEL C(F) 70 Weight10,480 lbs. standard

WEIGHT DISTRIBUTION AND CAPACITY Percent on drive wheels, truck empty: 38%
Rated capacity7,000 lbs. at 24" load center
Alternate ratings5,900 lbs. at 30" load center
5,150 lbs. at 36" load center
(See capacity chart for other ratings)

DIMENSIONS AND UNDERCLEARANCES *Dimensions*
Length (to face of forks)96½"
Wheelbase58"
Width (drive tires)44"
Tread (drive)35"
Tread (steer)35½"
Turning radius ..87½"
Basic aisle for right angle stacking (add load length)102¾"
Underclearances
Upright3¼"
Drive axle5½"
Steer axle3¾"
Center of frame5½"
Counterweight4"

SPEEDS AND GRADES Travel speeds with rated load C 70 CF 70
10.5 mph 10.7 mph
Gradeability with rated load ... 29.5% 27.5%
STANDARD HI-LO
Loaded Empty
Lift speed 71 78 65 72
Lowering speed 60 80 60 65

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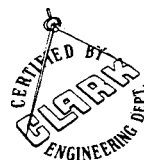
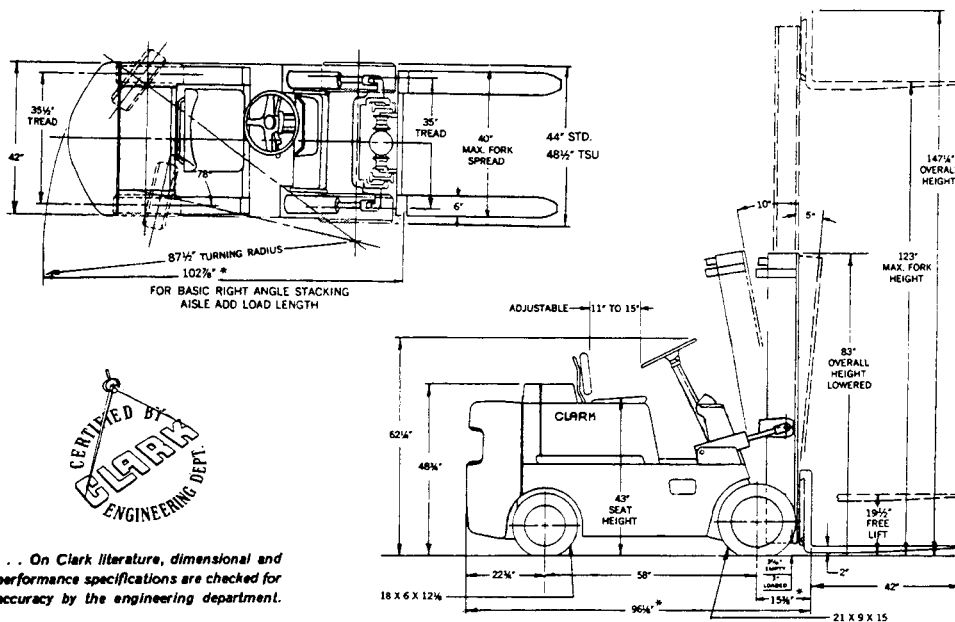
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*ADD 1 1/2" FOR TRIPLE STAGE UPRIGHT

BRAKES (Two systems). Hydraulic spot disc brakes provide powerful braking without self-energization. Eliminates sudden "grabbing" of the brakes. Foot brake torque multiplied through final reduction at each drive wheel minimizes pedal effort. Brakes are enclosed within drive axle housing and require no adjustment for life of lining. Mechanical parking brake operates on transmission drive shaft.

STEERING Power steering is standard. Steering control is maintained through mechanical linkage in the event of power failure. Strong vanadium steel steer axle is mounted on two torsional rubber bushings to cushion shock and to provide articulation for floor level variations up to 3 1/2". Positive stops for lateral stability. Inclined king pins minimize road shocks. Recirculated ball type steering gear with 18" diameter handwheel. Tie rods are automotive type.

UPRIGHT Nested telescopic roller type. "I" beam inner section of SAE 1045 steel is nested within outer channel of SAE 1045 steel for greater safety and visibility. Side loading on upright rails is taken on upright rollers. Upright and carriage rollers are adjustable for wear to maintain new truck tolerances. Carriage also has 4 interior adjustable side thrust rollers to prevent binding. Carriage has additional lateral thrust rollers to prevent upright spread, insuring maximum free-rolling movement.

LIFT AND TILT CYLINDERS Tilt rods chrome plated. Externally removable shims compensate for wear on tilt cylinder gland packings. Tilt lock valves insure positive control — no upright drift. Both lift and tilt cylinders have metal rod wipers to keep foreign material from the packings. Free-floating mounting of piston type lift cylinder minimizes side strains. Modulated flow regulator in cylinder base reduces maximum lowering speed as weight of load increases.

HYDRAULIC SYSTEM Full feathering balanced spool type valves for gentle starts and stops. Built-in pressure relief valve protects system against overloads. S.A.E. straight threads and O-ring seals used throughout pressure system. Vane-type pump is driven by hardened gears. Hydraulic sump, built into frame of 3/8" thick plate has 10 gal. capacity. Flexible rubber hydraulic hose lines are steel braid reinforced. System is protected from dirt by (1) a 5-micron pleated replacement filler cap breather, (2) a 25-micron full flow filter in sump.

FORK CARRIAGE AND FORKS All-welded construction, 1045 steel fork carriage to withstand impacts. Lateral fork adjustments from 0" to 40" with or without optional load rack. Convenient snap action latch assures positive fork positioning. Heat treated and upset forged forks to provide full section strength at heel.

SEATING Rubber mounted wide seat and back rest are Polyether, covered with vinyl plastic. Curved back rest tilts to provide additional driver comfort. An automotive type latch releases the seat for horizontal adjustment up to 4".

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

GENERAL Protectoseal gas tank filler cap. Auxiliary fuel supply — 1/2 gal. 12" height recessed pin-type coupler. Bolts and screws are zinc or cadmium plated. Multi-pass muffler. All exposed surfaces are shot-blasted and prime painted with weather resistant paint.

DRIVER'S OVERHEAD GUARDS AND LOAD BACK RESTS Driver's Overhead Guards and Load Back Rests are available as optional equipment. Clark Equipment Company recommends the use of these accessories and advises owner to consider his operation for their necessity.

COLORS Two tone. Silver gray, combined with one of five options: red, orange, yellow, green, or blue.



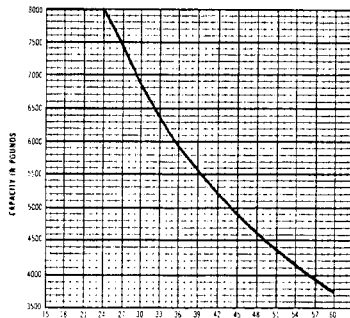
INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

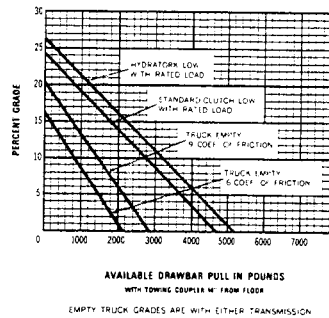
CLARKLIFT® DIMENSIONAL SPECIFICATIONS C-80 CF-80

CAPACITY CHART



RATED CAPACITIES SHOWN ABOVE ARE COMPUTED WITH UPRIGHTS IN VERTICAL POSITION. THEY APPLY ONLY ON MAXIMUM FORK HEIGHTS UP TO AND INCLUDING 154".

GRADE & DRAWBAR PULL CHART



AVAILABLE DRAWBAR PULL IN POUNDS WITH TOWING COUPLER FROM FLOOR. EMPTY TRUCK GRADES ARE WITH EITHER TRANSMISSION.

UPRIGHT DIMENSIONAL TABLE

Std. Hi-Lo	TSU	Over-all Height		Free Lift	
		Lowered	Std.	Hi-Lo	TSU
75	—	59	19½	35¾	—
81	—	62	19½	38¾	—
87	—	65	19½	41¾	—
93	126	68	19½	44¾	17½
* 99	135	71	19½	47¾	17½
105	*144	74	19½	50¾	17½
111	153	77	19½	53¾	17½
117	162	80	19½	56¾	17½
*123	171	83	19½	59¾	17½
129	*180	86	19½	62¾	17½
135	189	89	19½	65¾	15½
141	198	** 92	19½	68¾	17½
*147	207	** 95	17½	71¾	15½
153	*216	** 99	19½	75¾	17½
159	225	**102	19½	78¾	15½
165	234	**106	19½	82¾	17½
*171	243	**109	19½	85¾	15½
177	—	112	17½	88¾	—
183	—	116	19½	92¾	—
189	—	119	19½	95¾	—
195	—	123	19½	99¾	—
201	—	126	19½	102¾	—

*Preferred standard heights.
**Add 1" for triple stage upright.
For overall height raised add 24¾" to maximum fork height.

ENGINEERING SPECIFICATIONS

MODEL C(F) 80 Weight10,900 lbs. standard

WEIGHT DISTRIBUTION AND CAPACITY
Percent on drive wheels, truck empty: 38%
Rated capacity 8,000 lbs. at 24" load center
Alternate ratings ... 6,800 lbs. at 30" load center
6,400 lbs. at 36" load center
(See capacity chart for other ratings)

DIMENSIONS AND UNDERCLEARANCES
Dimensions
Length (to face of forks) 101½"
Wheelbase 63"
Width (drive tires) 46"
Tread (drive) 36"
Tread (steer) ... 35½"
Turning radius 93"
Basic aisle for right angle stacking (add load length) 108¾"
Underclearances
Upright 37½"
Drive axle 5½"
Steer axle 3¾"
Center of frame 5½"
Counterweight 4"

SPEEDS AND GRADES
Travel speeds with rated load C 80 CF 80
10.5 mph 10.7 mph
Gradeability with rated load ... 26.2% 24.3%
STANDARD HI-LO
Loaded Empty Loaded Empty
Lift speed 71 78 65 72
Lowering speed 60 80 60 65

ENGINE Industrial Continental Read Seal, 6 cylinder, L-head, equipped with stellite-faced valves; seats, positive valve rotators. Connecting rods, main bearings, cam shaft and timing gears are pressure lubricated by submerged gear type pump. Mechanical governor controls engine speed accurately without choking off power. Updraft carburetor.
Model F-209
Bore 3¾"
Stroke 4¾"
Displacement — cubic inches 209
Crankcase capacity — quarts 5
Governed rpm with rated load 2250
Horsepower at governed rpm 65
Max. torque — lb. ft. 157
Fuel tank capacity — gals. 12.5
Note: LP Gas adaptation optional at extra cost.

ENGINE FILTERS Three types. (1) Fuel filter in metallic bowl. (2) One quart oil filter with automotive-type replaceable cartridge. (3) Dry type in-take air filter that uses a replaceable pleated paper cartridge with minute 5-micron openings.

ELECTRICAL SYSTEM 12-volt, 60 amp-hour battery. 25 amp. low cut-in generator charges at idle. Other features include enclosed electric starter motor with positive engagement and electrical cut-out; weather-shielded key starting switch; dust-proof distributor; electric horn. Multiple-disconnect plug to instrument panel simplifies servicing.

INSTRUMENTS Direct reading engine hour meter, ammeter, engine-oil pressure, fuel and temperature gauges, all mounted in cowl for easy reading.

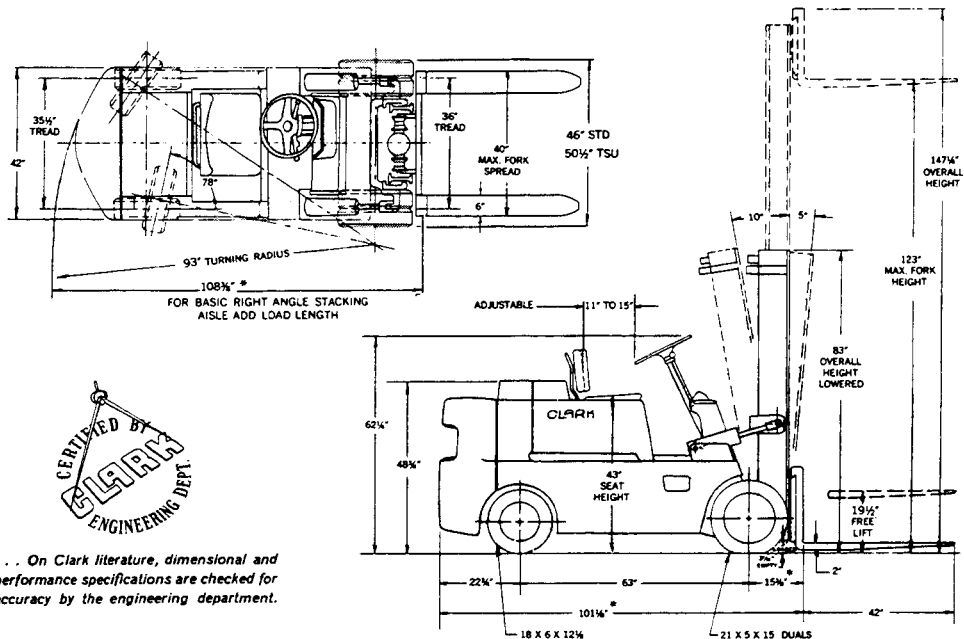
DRIVE AXLE AND TRANSMISSION Integral assembly with 3-point mounting including engine, torque converter, transmission, spiral bevel pinion and ring gear, differential and full floating drive axle assembly. Axle housing, not drive shaft, carries weight of truck. Final gear reduction is made through fully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

HYDRATOROK® DRIVE, STANDARD 2-speed power shifted transmission has torque converter which multiplies engine torque without shock on drive shaft and gears. Transmission oil is cooled thru cooler in bottom radiator tank and is a filtered system with replaceable type cartridge. The forward and reverse gears and high and low range gears are in constant mesh. Direction selector lever for left-hand finger-tip control on steering column.

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

FRICTION CLUTCH TRANSMISSION, OPTIONAL "Quick Change" 12" diameter single disc, dry plate clutch capacity of 300 lb. ft. of torque, controlled by low effort automotive type pedal. Two shift levers mounted on the steering column control the 3-speed synchronized transmission in either direction.

SPECIFICATIONS (CONTINUED)



... On Clark literature, dimensional and performance specifications are checked for accuracy by the engineering department.

BRAKES (Two systems). Hydraulic spot disc brakes provide powerful braking without self-energization. Eliminates sudden "grabbing" of the brakes. Foot brake torque multiplied through final reduction at each drive wheel minimizes pedal effort. Brakes are enclosed within drive axle housing and require no adjustment for life of lining. Mechanical parking brake operates on transmission drive shaft.

STEERING Power steering is standard. Steering control is maintained through mechanical linkage in the event of power failure. Strong vanadium steel steer axle is mounted on two torsional rubber bushings to cushion shock and to provide articulation for floor level variations up to 3 1/2". Positive stops for lateral stability. Inclined king pins minimize road shocks. Recirculated ball type steering gear with 18" diameter handwheel. Tie rods are automotive type.

UPRIGHT Nested telescopic roller type. "I" beam inner section of SAE 1045 steel is nested within outer channel of SAE 1045 steel for greater safety and visibility. Side loading on upright rails is taken on upright rollers. Upright and carriage rollers are adjustable for wear to maintain new truck tolerances. Carriage also has 4 interior adjustable side thrust rollers to prevent binding. Carriage has additional lateral thrust rollers to prevent upright spread, insuring maximum free-rolling movement.

LIFT AND TILT CYLINDERS Tilt rods chrome plated. Externally removable shims compensate for wear on tilt cylinder gland packings. Tilt lock valves insure positive control — no upright drift. Both lift and tilt cylinders have metal rod wipers to keep foreign material from the packings. Free-floating mounting of piston type lift cylinder minimizes side strains. Modulated flow regulator in cylinder base reduces maximum lowering speed as weight of load increases.

HYDRAULIC SYSTEM Full feathering balanced spool type valves for gentle starts and stops. Built-in pressure relief valve protects system against overloads. S.A.E. straight threads and O-ring seals used throughout pressure system. Vane-type pump is driven by hardened gears. Hydraulic sump, built into frame of 3/8" thick plate has 12 gal. capacity. Flexible rubber hydraulic hose lines are steel braid reinforced. System is protected from dirt by (1) a 5-micron pleated replacement filler cap breather, (2) a 25-micron full flow filter in sump.

FORK CARRIAGE AND FORKS All-welded construction, 1045 steel fork carriage to withstand impacts. Lateral fork adjustments from 0" to 40" with or without optional load rack. Convenient snap action latch assures positive fork positioning. Heat treated and upset forged forks to provide full section strength at heel.

SEATING Rubber mounted wide seat and back rest are Polyether, covered with vinyl plastic. Curved back rest tilts to provide additional driver comfort. An automotive type latch releases the seat for horizontal adjustment up to 4".

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

GENERAL Protectoseal gas tank filler cap. Auxiliary fuel supply — 1/2 gal. 12" height recessed pin-type coupler. Bolts and screws are zinc or cadmium plated. Multi-pass muffler. All exposed surfaces are shot-blasted and prime painted with weather resistant paint.

DRIVER'S OVERHEAD GUARDS AND LOAD BACK RESTS Driver's Overhead Guards and Load Back Rests are available as optional equipment. Clark Equipment Company recommends the use of these accessories and advises owner to consider his operation for their necessity.

COLORS Two tone. Silver gray, combined with one of five options: red, orange, yellow, green, or blue.



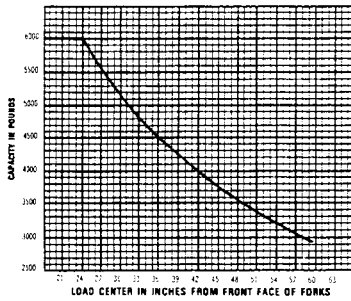
INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

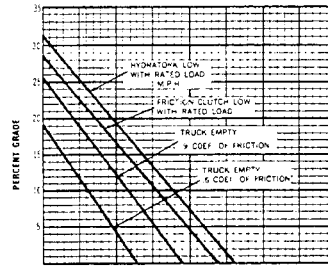
CLARKLIFT® DIMENSIONAL SPECIFICATIONS CY-60 CFY-60

CAPACITY CHART



RATED CAPACITIES SHOWN ABOVE ARE COMPUTED WITH UPRIGHTS IN VERTICAL POSITION. THEY APPLY ONLY ON MAXIMUM FORK HEIGHTS UP TO AND INCLUDING 154".

GRADE & DRAWBAR PULL CHART



AVAILABLE DRAWBAR PULL IN POUNDS WITH TOWING COUPLER 1" FROM FLOOR. EMPTY TRUCK GRADES ARE WITH EITHER TRANSMISSION.

UPRIGHT DIMENSIONAL TABLE

Std. Hi-Lo	TSU	Over-all Height		Free Lift	
		Lowered	Std.	Hi-Lo	TSU
75	—	60½	19½	37¼	—
81	—	63½	19½	40¼	—
87	—	66½	19½	43¼	—
93	126	69½	19½	46¼	17½
* 99	135	72½	19½	49¼	17½
105	*144	75½	19½	52¼	17½
111	153	78½	19½	55¼	17½
117	162	81½	19½	58¼	17½
*123	171	84½	19½	61¼	17½
129	*180	87½	19½	64¼	17½
135	189	90½	19½	67¼	15½
141	198	** 93½	19½	70¼	17½
*147	207	** 96½	17½	73¼	15½
153	*216	**100½	19½	77¼	17½
159	225	**103½	19½	80¼	15½
165	234	**107½	19½	84¼	17½
*171	243	**110½	19½	87¼	15½
177	—	113½	17½	90¼	17½
183	—	117½	19½	94¼	17½
189	—	120½	19½	97¼	17½
195	—	124½	19½	101¼	17½
201	—	127½	19½	104¼	17½

*Preferred standard heights.
**Add 1" for triple stage upright.
For overall height raised add 24¼" to maximum fork height.

ENGINEERING SPECIFICATIONS

MODEL C(F)Y 60 Weight10,375 lbs. standard

WEIGHT DISTRIBUTION AND CAPACITY Percent on drive wheels, truck empty: 48%
Rated capacity6,000 lbs. at 24" load center
Alternate ratings4,550 lbs. at 36" load center
3,610 lbs. at 48" load center
(See capacity chart for other ratings)

TIRES *Standard Tires* Ply Air Press.
Single Drive 8.25 x 15 12 100 lbs.
Steer 7.00 x 12 12 100 lbs.
Optional Tires
Dual Drive 7.50 x 15 10 95 lbs.

DIMENSIONS AND UNDERCLEARANCES *Dimensions* Basic aisle for right angle stacking (add load length) 119"
Length (to face of forks) 108"
Wheelbase 69"
Underclearances
Width (single drive tires) 50¾"
Tread (drive) 40¾"
Tread (steer) 42¾"
Turning radius 98"
Upright 6"
Drive axle 9"
Steer axle 8¼"
Center of frame 11"
Counterweight 8¼"

SPEEDS AND GRADES Travel speeds *Loaded Empty*
C(F)Y 12.5 mph 13.8 mph
Gradeability with rated load 31% 28%
STANDARD HI-LO
Loaded Empty Loaded Empty
Lift speed 71 78 65 72
Lowering speed 60 80 60 65

ENGINE Industrial Continental Red Seal, 6 cylinder, L-head, equipped with stellite-faced valves; seats, positive valve rotators, Connecting rods, main bearings, cam shaft and timing gears are pressure lubricated by submerged gear type pump. Mechanical governor controls engine speed accurately without choking off power. Updraft carburetor.
Model F-244
Bore 3¾"
Stroke 4¾"
Displacement — cubic inches 244
Crankcase capacity — quarts 5
Governed rpm with rated load 2250
Horsepower at governed rpm 69
Max. torque — lb. ft. 192
Fuel tank capacity — gals. 15
Note: LP Gas adaptation optional at extra cost.

ENGINE FILTERS Three types. (1) Fuel filter in metallic bowl. (2) One quart oil filter with automotive-type replaceable cartridge. (3) Dry type in-take air filter that uses a replaceable pleated paper cartridge with minute 5-micron openings.

ELECTRICAL SYSTEM 12-volt, 60 amp-hour battery. 25 amp. low cut-in generator charges at idle. Other features include enclosed electric starter motor with positive engagement and electrical cut-out; weather-shielded key starting switch; dust-proof distributor; electric horn. Multiple-disconnect plug to instrument panel simplifies servicing.

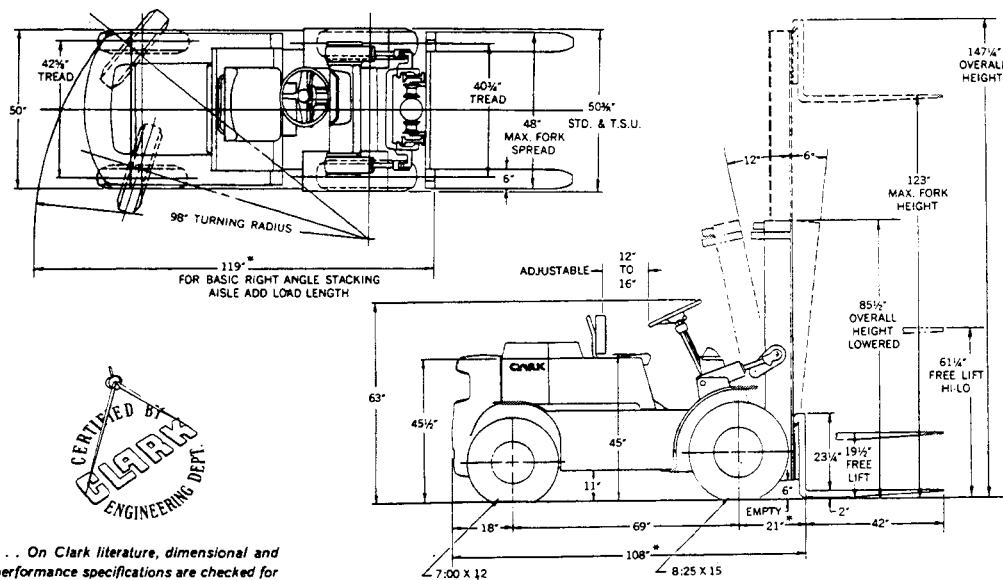
INSTRUMENTS Direct reading engine hour meter, mounted above gas fill compartment. Ammeter, engine-oil pressure light, fuel and temperature gauges, all mounted in cowl for easy reading.

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

HYDRATORK® DRIVE, STANDARD 2-speed power shifted transmission has torque converter which multiplies engine torque without shock on drive shaft and gears. Transmission oil is cooled thru cooler in bottom radiator tank and is a filtered system with replaceable type cartridge. The forward and reverse gears and high and low range gears are in constant mesh. Direction selector lever for left-hand finger-tip control on steering column.

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

FRICTION CLUTCH TRANSMISSION, OPTIONAL "Quick Change" 12" diameter single disc, dry plate clutch capacity of 330 lb. ft. of torque, controlled by automotive type pedal with over-center spring assist to reduce foot effort required. Two shift levers mounted on the steering column control the 3-speed synchronized transmission in either direction.



... On Clark literature, dimensional and performance specifications are checked for accuracy by the engineering department.

* ADD 1 1/2" FOR TRIPLE STAGE UPRIGHT

BRAKES (Two systems). Hydraulic spot disc brakes provide powerful braking without self-energization. Eliminates sudden "grabbing" of the brakes. Foot brake torque multiplied through final reduction at each drive wheel minimizes pedal effort. Brakes are enclosed within drive axle housing and require no adjustment for life of lining. Mechanical parking brake operates on transmission drive shaft.

STEERING Power steering is standard. Steering control is maintained through mechanical linkage in the event of power failure. Strong vanadium steel steer axle is mounted on two torsional rubber bushings to cushion shock and to provide articulation for ground level variations up to 6". Positive stops for lateral stability. Inclined king pins minimize road shocks. Recirculated ball type steering gear with 18" diameter handwheel. Tie rods are automotive type.

UPRIGHT Nested telescopic roller type. "I" beam inner section of SAE 1045 steel is nested within outer channel of SAE 1045 steel for greater safety and visibility. Side loading on upright rails is taken on upright rollers. Upright and carriage rollers are adjustable for wear to maintain new truck tolerances. Carriage also has 4 interior adjustable side thrust rollers to prevent binding. Carriage has additional lateral thrust rollers to prevent upright movement.

LIFT AND TILT CYLINDERS Tilt rods chrome plated. Externally removable shims compensate for wear on tilt cylinder gland packings. Tilt lock valves insure positive control — no upright drift. Both lift and tilt cylinders have metal rod wipers to keep foreign material from the packings. Free-floating mounting of piston type lift cylinder minimizes side strains. Modulated flow regulator in cylinder base reduces maximum lowering speed as weight of load increases.

HYDRAULIC SYSTEM Full feathering balanced spool type valves for gentle starts and stops. Built-in pressure relief valve protects system against overloads: will open fully within 100 p.s.i. of cranking pressure. SAE straight threads and O-ring seals used throughout pressure system. Vane-type pump is driven by hardened gears. Hydraulic sump, built into frame of 3/8" thick plate has 12.5 gal. capacity. Flexible rubber hydraulic hose lines are steel braid reinforced. System is protected from dirt by (1) a 5-micron pleated replacement filler cap breather, (2) a 25-micron full flow filter in sump.

FORK CARRIAGE AND FORKS All-welded construction, 1045 steel fork carriage to withstand impacts. Lateral fork adjustments from 0" to 48" with or without optional load rack. Convenient snap action latch assures positive fork positioning. Heat treated and upset forged forks to provide full section strength at heel.

SEATING Rubber mounted extra wide seat and back rest are Polyether, covered with vinyl plastic. Curved back rest tilts to provide additional driver comfort. An automotive type latch releases the seat for horizontal adjustment up to 4".

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

GENERAL Protectoseal gas tank filler cap, 12" height recessed pin-type coupler. Bolts and screws are zinc or cadmium plated. Multi-pass muffler. All exposed surfaces are shot-blasted and prime painted with weather resistant paint.

DRIVER'S OVERHEAD GUARDS AND LOAD BACK RESTS Driver's Overhead Guards and Load Back Rests are available as optional equipment. Clark Equipment Company recommends the use of these accessories and advises owner to consider his operation for their necessity.

COLORS Two tone. Silver gray, combined with one of five options: red, orange, yellow, green, or blue.



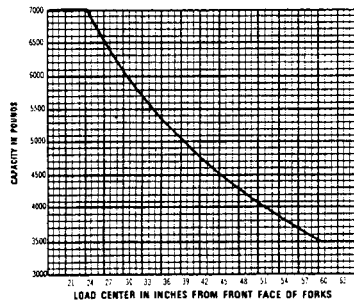
INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

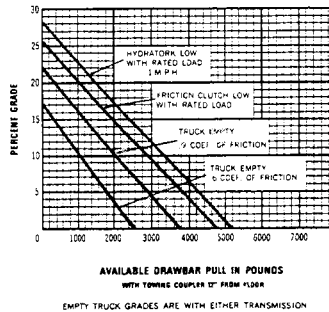
CLARKLIFT® DIMENSIONAL SPECIFICATIONS CY-70 CFY-70

CAPACITY CHART



RATED CAPACITIES SHOWN ABOVE ARE COMPUTED WITH UPRIGHTS IN VERTICAL POSITION. THEY APPLY ONLY ON MAXIMUM FORK HEIGHTS UP TO AND INCLUDING 154".

GRADE & DRAWBAR PULL CHART



UPRIGHT DIMENSIONAL TABLE

Max. Fork Ht.	Over-all Height		Free Lift			
	Std. Hi-Lo	TSU	Lowered	Std.	Hi-Lo	TSU
75	—	60 1/2	19 1/2	37 1/4	—	—
81	—	63 1/2	19 1/2	40 1/4	—	—
87	—	66 1/2	19 1/2	43 1/4	—	—
93	126	69 1/2	19 1/2	46 1/4	17 1/2	—
* 99	135	72 1/2	19 1/2	49 1/4	17 1/2	—
105	*144	75 1/2	19 1/2	52 1/4	17 1/2	—
111	153	78 1/2	19 1/2	55 1/4	17 1/2	—
117	162	81 1/2	19 1/2	58 1/4	17 1/2	—
*123	171	84 1/2	19 1/2	61 1/4	17 1/2	—
129	*180	87 1/2	19 1/2	64 1/4	17 1/2	—
135	189	90 1/2	19 1/2	67 1/4	15 1/2	—
141	198	** 93 1/2	19 1/2	70 1/4	17 1/2	—
*147	207	** 96 1/2	17 1/2	73 1/4	15 1/2	—
153	*216	**100 1/2	19 1/2	77 1/4	17 1/2	—
159	225	**103 1/2	19 1/2	80 1/4	15 1/2	—
165	234	**107 1/2	19 1/2	84 1/4	17 1/2	—
*171	243	**110 1/2	19 1/2	87 1/4	15 1/2	—
177	—	113 1/2	17 1/2	90 1/4	17 1/2	—
183	—	117 1/2	19 1/2	94 1/4	17 1/2	—
189	—	120 1/2	19 1/2	97 1/4	17 1/2	—
195	—	124 1/2	19 1/2	101 1/4	17 1/2	—
201	—	127 1/2	19 1/2	104 1/4	17 1/2	—

*Preferred standard heights.
**Add 1" for triple stage upright.
For overall height raised add 24 1/4" to maximum fork height.

ENGINEERING SPECIFICATIONS

MODEL C(F)Y 70 Weight11,315 lbs. standard

WEIGHT DISTRIBUTION AND CAPACITY Percent on drive wheels, truck empty: 44%
Rated capacity7,000 lbs. at 24" load center
Alternate ratings5,320 lbs. at 36" load center
4,220 lbs. at 48" load center
(See capacity chart for other ratings)

TIRES *Standard Tires* Ply Air Press.
Single Drive 8.25 x 15 12 100 lbs.
Steer 7.00 x 12 12 100 lbs.
Optional Tires
Dual Drive 7.50 x 15 10 95 lbs.

DIMENSIONS AND UNDERCLEARANCES *Dimensions*
Length (to face of forks)110"
Wheelbase 69"
Width (single drive tires) 50 3/4"
Tread (drive) 40 3/4"
Tread (steer) 42 3/8"
Turning radius 100"

Basic aisle for right angle stacking (add load length) 121"

Underclearances
Upright 6"
Drive axle 9"
Steer axle 8 1/4"
Center of frame 11"
Counterweight 8 1/4"

SPEEDS AND GRADES Travel speeds *Loaded Empty*
C(F)Y 12.4 mph 13.3 mph
Gradeability with rated load 28% 25%

	STANDARD		HI-LO	
	Loaded	Empty	Loaded	Empty
Lift speed	71	78	65	72
Lowering speed	60	80	60	65

ENGINE Industrial Continental Red Seal, 6 cylinder, L-head, equipped with stellite-faced valves; seats, positive valve rotators. Connecting rods, main bearings, cam shaft and timing gears are pressure lubricated by submerged gear type pump. Mechanical governor controls engine speed accurately without choking off power. Updraft carburetor.

Model F-244
Bore 3 1/8"
Stroke 4 3/8"
Displacement — cubic inches 244
Crankcase capacity — quarts 5
Governed rpm with rated load 2250
Horsepower at governed rpm 69
Max. torque — lb. ft. 192
Fuel tank capacity — gals. 15
Note: LP Gas adaptation optional at extra cost.

ENGINE FILTERS Three types. (1) Fuel filter in metallic bowl. (2) One quart oil filter with automotive-type replaceable cartridge. (3) Dry type in-take air filter that uses a replaceable pleated paper cartridge with minute 5-micron openings.

ELECTRICAL SYSTEM 12-volt, 60 amp-hour battery, 25 amp. low cut-in generator charges at idle. Other features include enclosed electric starter motor with positive engagement and electrical cut-out; weather-shielded key starting switch; dust-proof distributor; electric horn. Multiple-disconnect plug to instrument panel simplifies servicing.

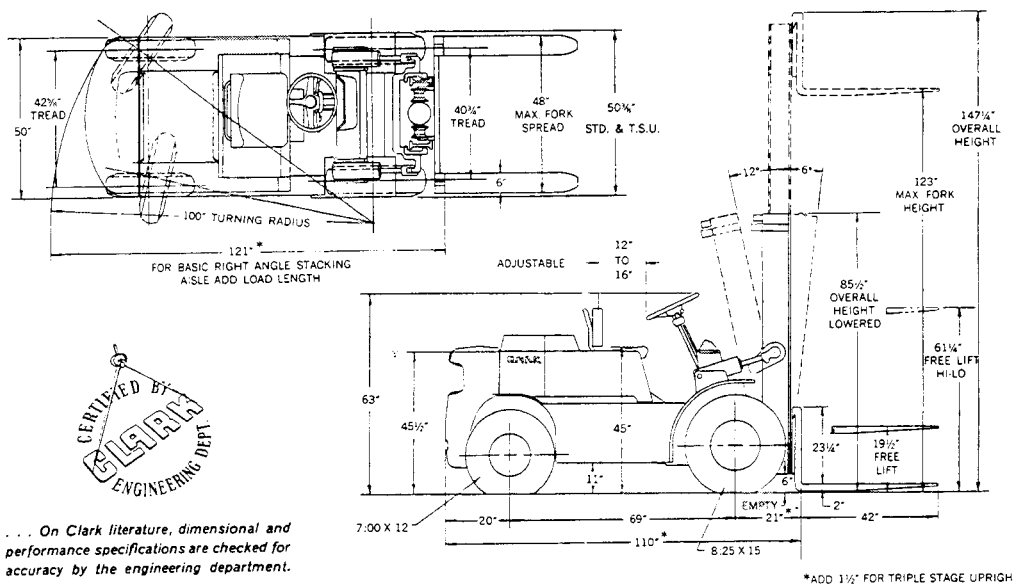
INSTRUMENTS Direct reading engine hour meter, mounted above gas fill compartment. Ammeter, engine-oil pressure light, fuel and temperature gauges, all mounted in cowl for easy reading.

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

HYDRATOR® DRIVE, STANDARD 2-speed power shifted transmission has torque converter which multiplies engine torque without shock on drive shaft and gears. Transmission oil is cooled thru cooler in bottom radiator tank and is a filtered system with replaceable type cartridge. The forward and reverse gears and high and low range gears are in constant mesh. Direction selector lever for left-hand finger-tip control on steering column.

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

FRICTION CLUTCH TRANSMISSION, OPTIONAL "Quick Change" 12" diameter single disc, dry plate clutch capacity of 330 lb. ft. of torque, controlled by automotive type pedal with over-center spring assist to reduce foot effort required. Two shift levers mounted on the steering column control the 3-speed synchronized transmission in either direction.



BRAKES (Two systems). Hydraulic spot disc brakes provide powerful braking without self-energization. Eliminates sudden "grabbing" of the brakes. Foot brake torque multiplied through final reduction at each drive wheel minimizes pedal effort. Brakes are enclosed within drive axle housing and require no adjustment for life of lining. Mechanical parking brake operates on transmission drive shaft.

STEERING Power steering is standard. Steering control is maintained through mechanical linkage in the event of power failure. Strong vanadium steel steer axle is mounted on two torsional rubber bushings to cushion shock and to provide articulation for ground level variations up to 6". Positive stops for lateral stability. Inclined king pins minimize road shocks. Recirculated ball type steering gear with 18" diameter handwheel. Tie rods are automotive type.

UPRIGHT Nested telescopic roller type. "I" beam inner section of SAE 1045 steel is nested within outer channel of SAE 1045 steel for greater safety and visibility. Side loading on upright rails is taken on upright rollers. Upright and carriage rollers are adjustable for wear to maintain new truck tolerances. Carriage also has 4 interior adjustable side thrust rollers to prevent binding. Carriage has additional lateral thrust rollers to prevent upright spread, insuring maximum free-rolling movement.

LIFT AND TILT CYLINDERS Tilt rods chrome plated. Externally removable shims compensate for wear on tilt cylinder gland packings. Tilt lock valves insure positive control — no upright drift. Both lift and tilt cylinders have metal rod wipers to keep foreign material from the packings. Free-floating mounting of piston type lift cylinder minimizes side strains. Modulated flow regulator in cylinder base reduces maximum lowering speed as weight of load increases.

HYDRAULIC SYSTEM Full feathering balanced spool type valves for gentle starts and stops. Built-in pressure relief valve protects system against overloads; will open fully within 100 p.s.i. of cracking pressure. SAE straight threads and O-ring seals used throughout pressure system. Vane-type pump is driven by hardened gears. Hydraulic sump, built into frame of 3/4" thick plate has 12.5 gal. capacity. Flexible rubber hydraulic hose lines are steel braid reinforced. System is protected from dirt by (1) a 5-micron pleated replacement filler cap breather, (2) a 25-micron full flow filter in sump.

FORK CARRIAGE AND FORKS All-welded construction, 1045 steel fork carriage to withstand impacts. Lateral fork adjustments from 0" to 48" with or without optional load rack. Convenient snap action latch assures positive fork positioning. Heat treated and upset forged forks to provide full section strength at heel.

SEATING Rubber mounted extra wide seat and back rest are Polyether, covered with vinyl plastic. Curved back rest tilts to provide additional driver comfort. An automotive type latch releases the seat for horizontal adjustment up to 4".

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

GENERAL Protectoseal gas tank filler cap. 12" height recessed pin-type coupler. Bolts and screws are zinc or cadmium plated. Multi-pass muffler. All exposed surfaces are shot-blasted and prime painted with weather resistant paint.

DRIVER'S OVERHEAD GUARDS AND LOAD BACK RESTS Driver's Overhead Guards and Load Back Rests are available as optional equipment. Clark Equipment Company recommends the use of these accessories and advises owner to consider his operation for their necessity.

COLORS Two tone. Silver gray, combined with one of five options: red, orange, yellow, green, or blue.



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

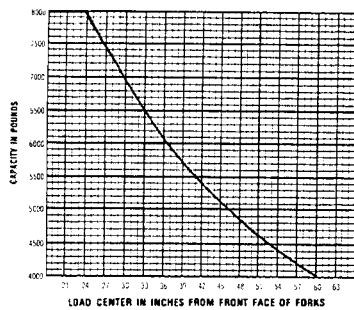
CLARKLIFT® CY-80 CFY-80 DIMENSIONAL SPECIFICATIONS

UPRIGHT DIMENSIONAL TABLE

Max. Fork Ht.		Over-all Height		Free Lift		
Std. Hi-Lo	TSU	Lowered	Std.	Hi-Lo	TSU	
75	—	60½	19½	37¼	—	
81	—	63½	19½	40¼	—	
87	—	66½	19½	43¼	—	
93	126	69½	19½	46¼	17½	
* 99	135	72½	19½	49¼	17½	
105	*144	75½	19½	52¼	17½	
111	153	78½	19½	55¼	17½	
117	162	81½	19½	58¼	17½	
*123	171	84½	19½	61¼	17½	
129	*180	87½	19½	64¼	17½	
135	189	90½	19½	67¼	15¼	
141	198	** 93½	19½	70¼	17½	
*147	207	** 96½	17½	73¼	15¼	
153	*216	**100½	19½	77¼	17½	
159	225	**103½	19½	80¼	15¼	
165	234	**107½	19½	84¼	17½	
*171	243	**110½	19½	87¼	15¼	
177	—	113½	17½	90¼	17½	
183	—	117½	19½	94¼	17½	
189	—	120½	19½	97¼	17½	
195	—	124½	19½	101¼	17½	
201	—	127½	19½	104¼	17½	

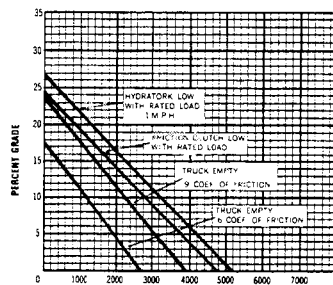
*Preferred standard heights.
**Add 1" for triple stage upright.
For overall height raised add 2¼" to maximum fork height.

CAPACITY CHART



RATED CAPACITIES SHOWN ABOVE ARE COMPUTED WITH UPRIGHTS IN VERTICAL POSITION. THEY APPLY ONLY ON MAXIMUM FORK HEIGHTS UP TO AND INCLUDING 154".

GRADE & DRAWBAR PULL CHART



EMPTY TRUCK GRADES ARE WITH EITHER TRANSMISSION WITH TOWING COUPLER "B" FROM FLOOR

ENGINEERING SPECIFICATIONS

MODEL C(F)Y 80 Weight11,725 lbs. standard

WEIGHT DISTRIBUTION AND CAPACITY Percent on drive wheels, truck empty: 45%
Rated capacity8,000 lbs. at 24" load center
Alternate ratings6,110 lbs. at 36" load center
4,875 lbs. at 48" load center
(See capacity chart for other ratings)

TIRES *Standard Tires* Ply Air Press.
Single Drive 8.25 x 15 12 100 lbs.
Steer 7.00 x 12 12 100 lbs.
Optional Tires
Dual Drive 7.50 x 15 10 95 lbs.

DIMENSIONS AND UNDERCLEARANCES *Dimensions* Basic aisle for right angle stacking (add load length) 129"
Length (to face of forks)118"
Wheelbase77"
Underclearances
Width (single drive tires)50¾"
Tread (drive)40¾"
Tread (steer)42¾"
Turning radius108"
Upright6"
Drive axle9"
Steer axle8¼"
Center of frame11"
Counterweight8¼"

SPEEDS AND GRADES Travel speeds *Loaded Empty*
C(F)Y 12.1 mph 13.3 mph
Gradeability with rated load 26% 24%

	STANDARD		HI-LO	
	Loaded	Empty	Loaded	Empty
Lift speed	71	78	65	72
Lowering speed	60	80	60	65

ENGINE Industrial Continental Red Seal, 6 cylinder, L-head, equipped with stellite-faced valves; seats, positive valve rotators. Connecting rods, main bearings, cam shaft and timing gears are pressure lubricated by submerged gear type pump. Mechanical governor controls engine speed accurately without choking off power. Updraft carburetor.
ModelF-244
Bore3¾"
Stroke4¾"
Displacement — cubic inches244
Crankcase capacity — quarts5
Governed rpm with rated load2250
Horsepower at governed rpm69
Max. torque — lb. ft.192
Fuel tank capacity — gals.15
Note: LP Gas adaptation optional at extra cost.

ENGINE FILTERS Three types. (1) Fuel filter in metallic bowl. (2) One quart oil filter with automotive-type replaceable cartridge. (3) Dry type in-take air filter that uses a replaceable pleated paper cartridge with minute 5-micron openings.

ELECTRICAL SYSTEM 12-volt, 60 amp-hour battery, 25 amp. low cut-in generator charges at idle. Other features include enclosed electric starter motor with positive engagement and electrical cut-out; weather-shielded key starting switch; dust-proof distributor; electric horn. Multiple-disconnect plug to instrument panel simplifies servicing.

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

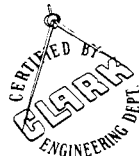
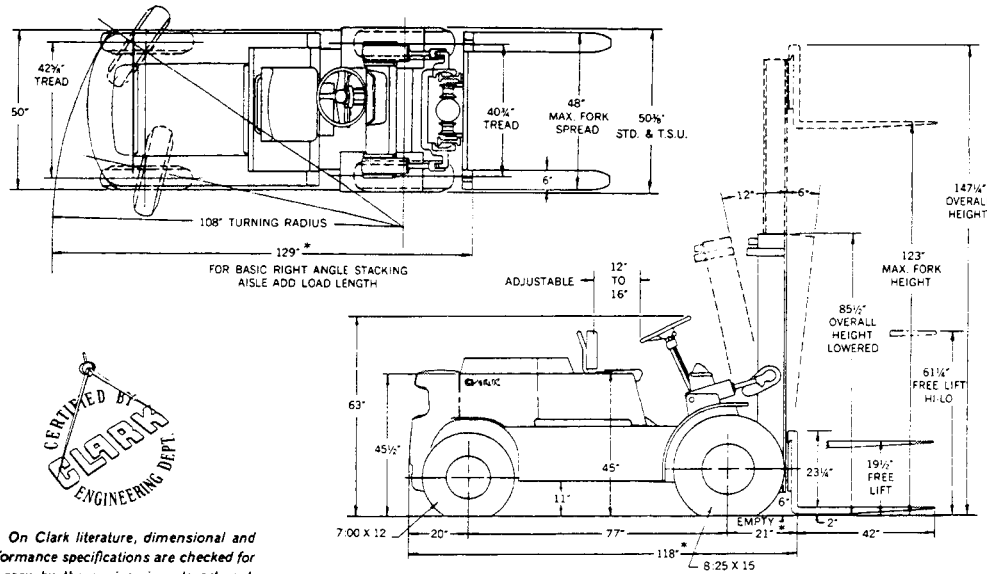
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SPECIFICATIONS (CONTINUED)



... On Clark literature, dimensional and performance specifications are checked for accuracy by the engineering department.

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INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

DISTRIBUTOR (All FOUR and SIX Cylinder Engines)

N O T E

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

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

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

Heavy Duty Points

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

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



- FOUR (4) CYLINDER ENGINES, ONLY -

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

- SIX (6) CYLINDER ENGINES, ONLY -

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

N O T E

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

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

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



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

For machines equipped with diesel engines, refer to your diesel engine manual for specifications on the engine and its accessories; items prefixed by a plus sign '+'.
 + Cooling System Capacity.....15 quarts
 + Fan Belt Deflection (long span).....3/4"

Clutch Pedal Free Travel (CF & CFY).....
5/8 to 1 inch
 Brake Pedal Free Travel.....3/16 to 5/16 inch
 Torque Converter (C & CY)....diameter 11 inches
Torque multiplication 2 to 1

Transmission	Hydrator	Friction Clutch
Speeds:	2	3
Capacity:	13 quarts	12½ pints

STEERING AXLE

Toe in.....0 degrees
 Camber.....1 degree
 Caster.....0 degrees

Left hand turning radius angle:

	C(F) MODELS	C(F) Y MODELS
Left wheel	78 deg	75 deg
Right wheel	55 deg 42'	52 deg

Right hand turning radius angle:

	C(F) MODELS	C(F) Y MODELS
Left wheel	55 deg 42'	52 deg
Right wheel	78 deg	75 deg

DRIVE AXLE

	C(F) MODELS/C(F) Y MODELS
Ratio-Bevel Gear...	4.375 to 1 5.286 to 1
Wheel Reduction....	4.09 to 1 4.09 to 1
Axle end (grease) capacity.....	1¼ pounds 1¼ pounds

MAIN HYDRAULIC PUMP

Type.....Vane
 Capacity.....17 GPM @ 2250 engine RPM

STEERING PUMP

Type.....Vane
 Capacity:.....
regulated to 2 GPM by flow control

HYDRAULIC VALVE

Pressure Relief Valve Setting.....
2000 PSI @ 2250 engine RPM

+ ELECTRICAL SYSTEM

Starting Motor

Brush tension (min).....35 oz.
 Rotation viewing D.E.....C
 Spec. No.....2441
 No load test:
 Volts.....10.6
 Min. amps.....49*
 Max. amps.....76*
 Min RPM.....6200
 Max. RPM.....9400
 Resistance test:
 Volts.....4.3
 Min amps.....270
 Max amps.....310

Distributor

Rotation viewing D.E.....C
 Point opening (in)......021
 Cam angle (deg).....22-26
 Spec. No.....70
 Centrifugal advance:
 Start
 RPM.....300
 Deg.....3-2.3
 Intermediate
 RPM.....400
 Deg.....3-5
 Intermediate
 RPM.....800
 Deg.....5.5-7.5
 Maximum
 RPM.....1100
 Deg.....7.5-9.5

Generator

Rotation.....C
 Circuit.....A
 Brush spring tension.....24-32
 Field Current
 Amps.....1.69-1.79
 Volts.....12.0
 Cold output
 Amps.....25.0
 Volts.....14.0
 RPM.....1970

Voltage regulator

Circuit.....A
 Polarity.....N
 Spec. No.....2146
 Cutout Relay
 Air gap (in)......020
 Point opening......020
 Closing voltage range..11.8-13.5
 Voltage regulator
 Air gap (in)......075
 Volt setting range.....
14.2-15.2 at 85 degrees
 Current regulator
 Air gap (in)......075
 Current setting range.....
24.5-29 at 85 degrees



INDUSTRIAL TRUCK DIVISION



SPECIFICATIONS

Ignition timing.....2 degrees BTDC

SPARK PLUGS

Gap (in).....Standard .025
.....Resistor .035

BATTERY (12 Volt)

20 hr. rate @ 6l amp. hr.
300 amp. @ 1.6 min. @ 0 deg F
300 amp. @ 10 sec. @ 7.7 volts @ 0 deg F
6 cell, 66 plates
Group number SAE 25 MD.

WHEEL NUT TORQUE

Steering wheels.....275-300 lb. ft.
Drive wheels.....450-500 lb. ft.

* Includes solenoid.



INDUSTRIAL TRUCK DIVISION



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

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



ADJUST TAPPETS TO THE STATIC COLD SETTINGS LISTED IN THE FOLLOWING CHART:

Engine Model	Intake	Exhaust	NOTE
Y-69	.014 "	.014 "	Static Cold Settings.
Y-91	.014 "	.014 "	Static Cold Settings.
Y-112	.014 "	.014 "	Static Cold Settings.
F-124	.016 "	.018 "	Static Cold Settings.
F-140	.016 "	.018 "	Static Cold Settings.
F-162	.016 "	.018 "	Static Cold Settings.
F-244	.016 "	.018 "	Static Cold Settings.
F-186	.016 "	.018 "	Static Cold Settings.
F-209	.016 "	.018 "	Static Cold Settings.
F-226	.016 "	.018 "	Static Cold Settings.
F-135	.012 "	.020 "	Static Cold Settings.
F-163	.012 "	.020 "	Static Cold Settings.
F-227	.012 "	.020 "	Static Cold Settings.
F-245	.012 "	.020 "	Static Cold Settings.
NOTE: Engine Nameplate Tappet Settings is for Hot Idle only.			

FOR -- VEHICLES EQUIPPED WITH CONTINENTAL ENGINES.



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.

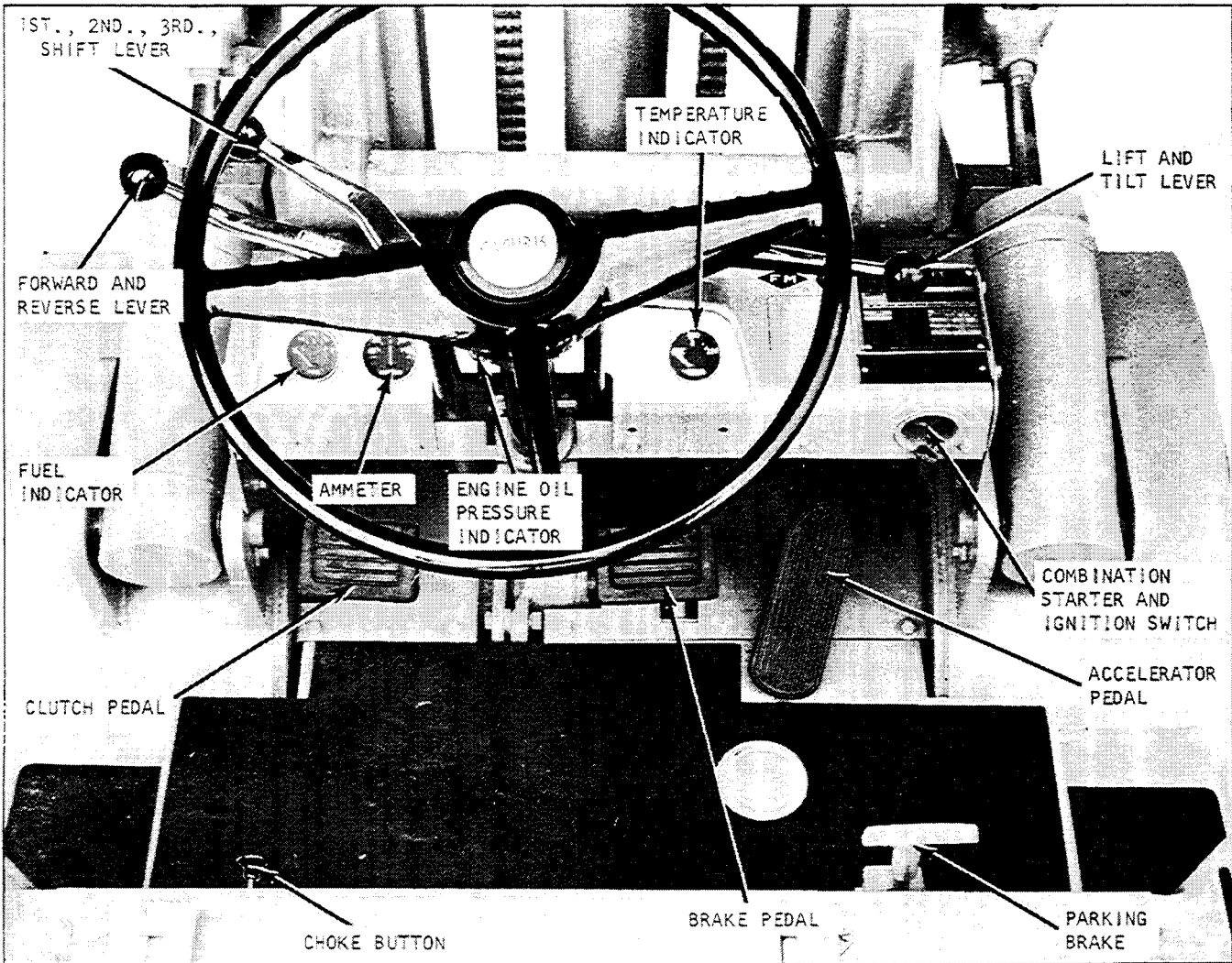


Plate 7397. Overall Controls

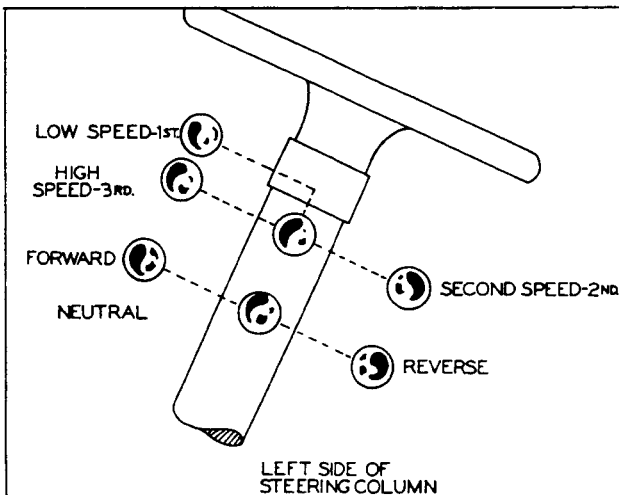


Plate 5888. Directional Control Levers

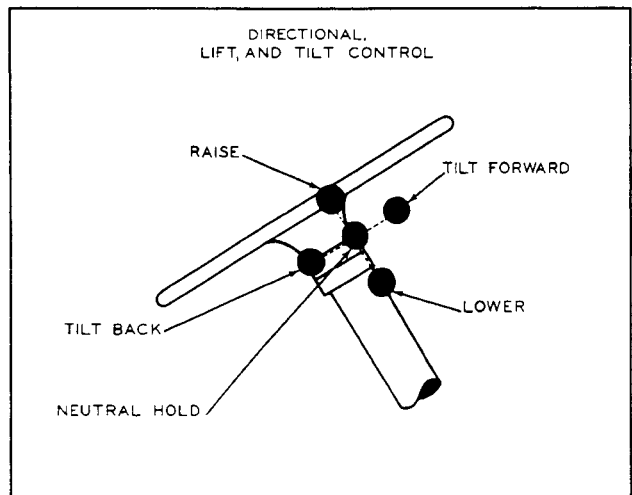


Plate 4448. Hydraulic Control Lever

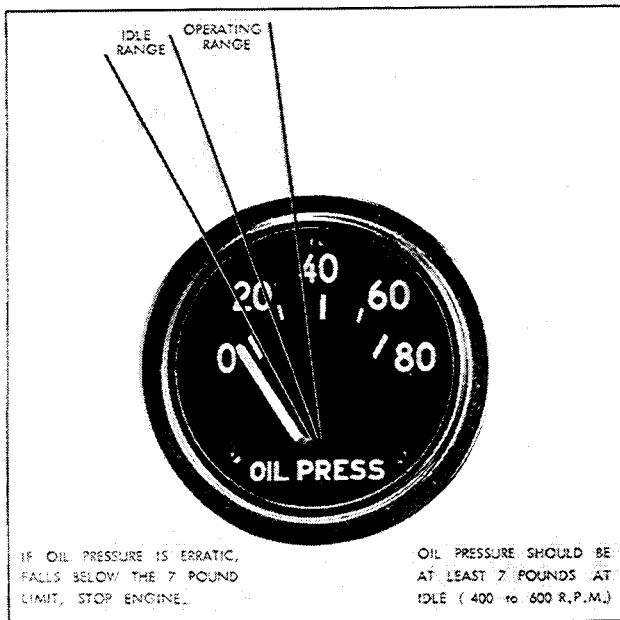


Plate 6288. Oil Pressure Indicator
(MACHINES SO EQUIPPED)

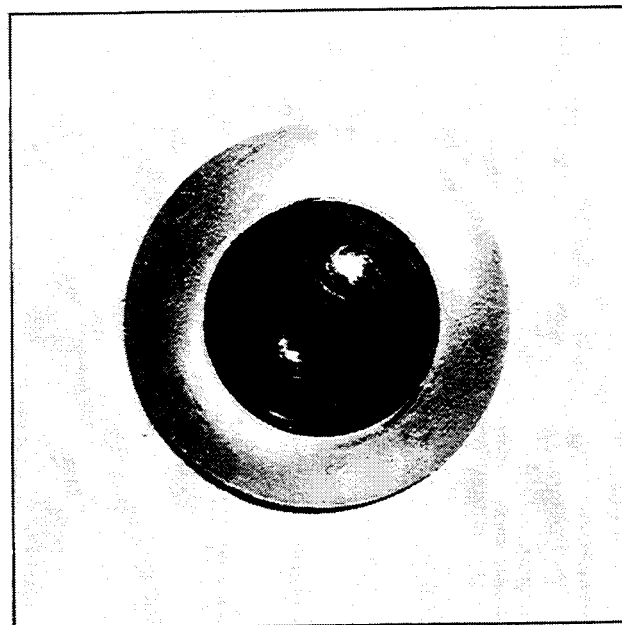


Plate 6885. Oil Pressure Warning Light
(MACHINES SO EQUIPPED)

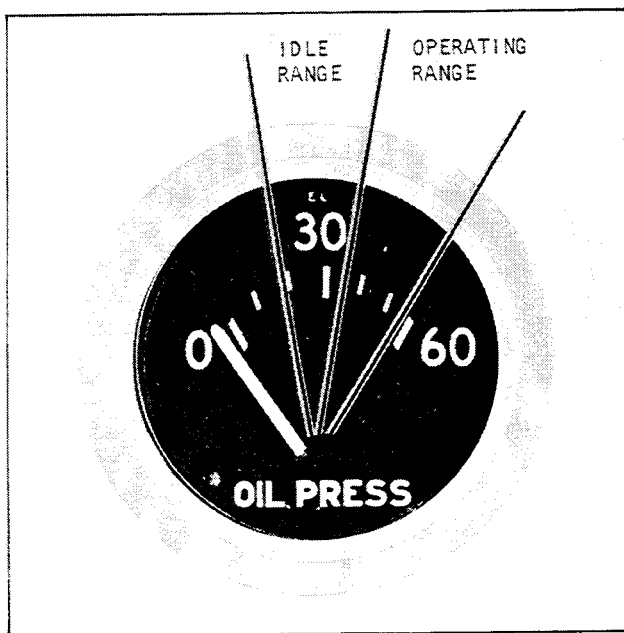


Plate 8606. Oil Pressure Indicator
(MACHINES SO EQUIPPED)

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

C A U T I O N

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

N O T E

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

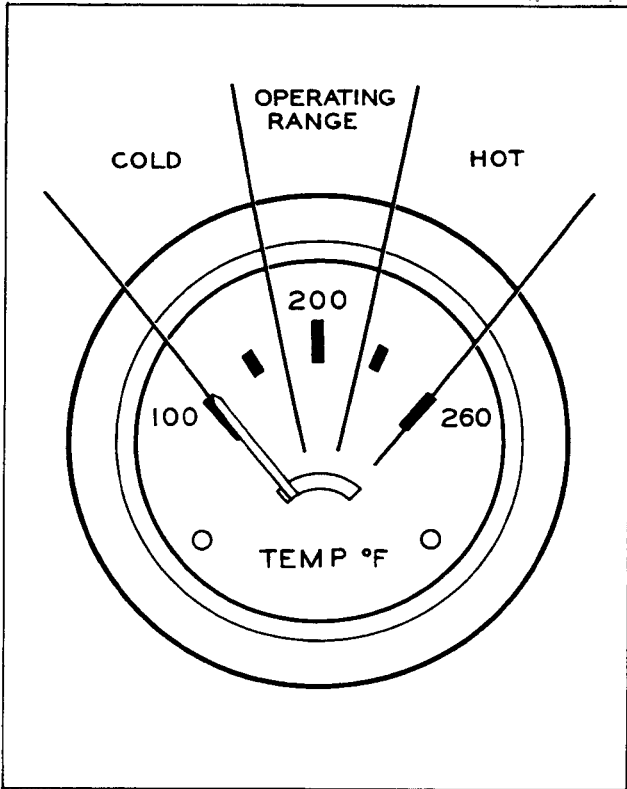


Plate 8288. Engine Coolant Temperature Indicator

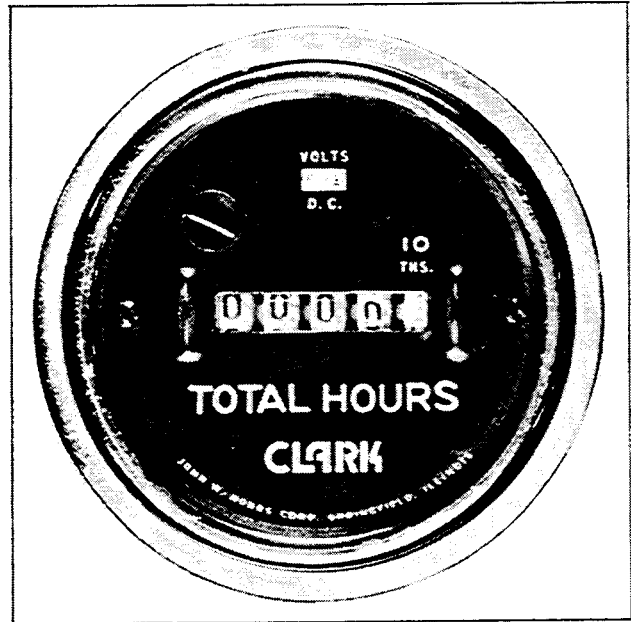


Plate 7162. Hour Meter

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

N O T E

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

C A U T I O N

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

N O T E

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

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

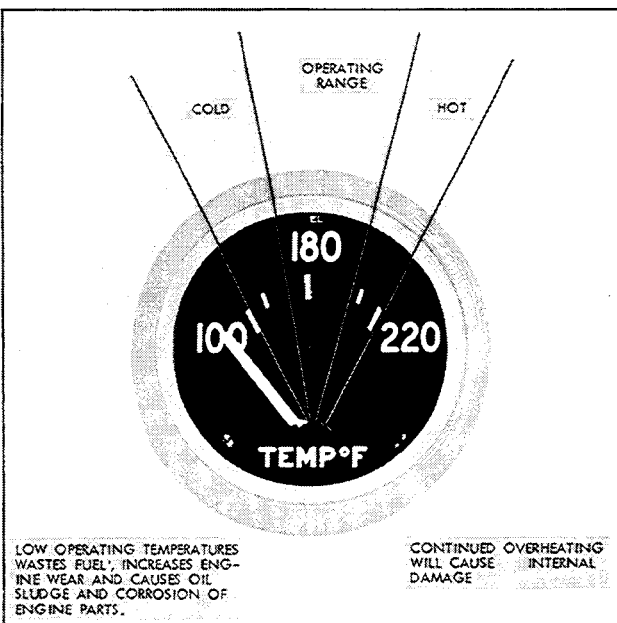


Plate 6287. Engine Coolant Temperature Indicator

O P E R A T I O N S

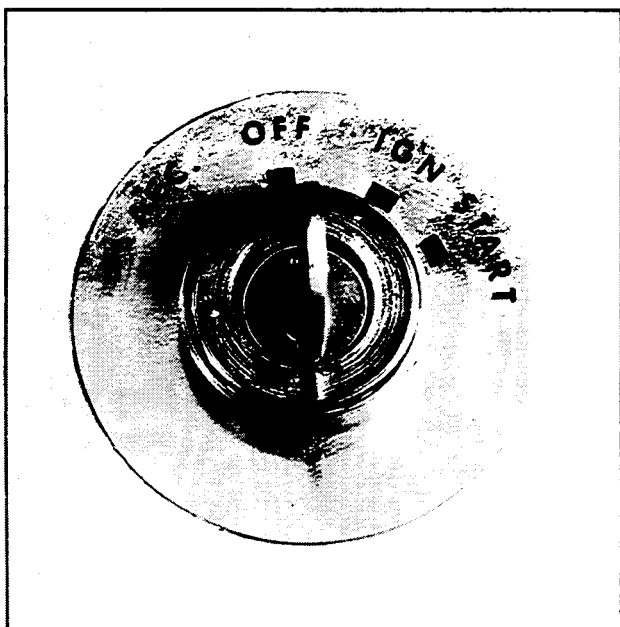


Plate 6418. Ignition Switch

STARTING

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

C A U T I O N

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

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

After engine has started, make certain that the oil pressure indicator registers adequate pressure. If an abnormal reading is indicated, stop engine and correct the 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 hand brake and depress clutch pedal. Position shift levers for desired speed and direction.
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 WHILE 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 hand 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.

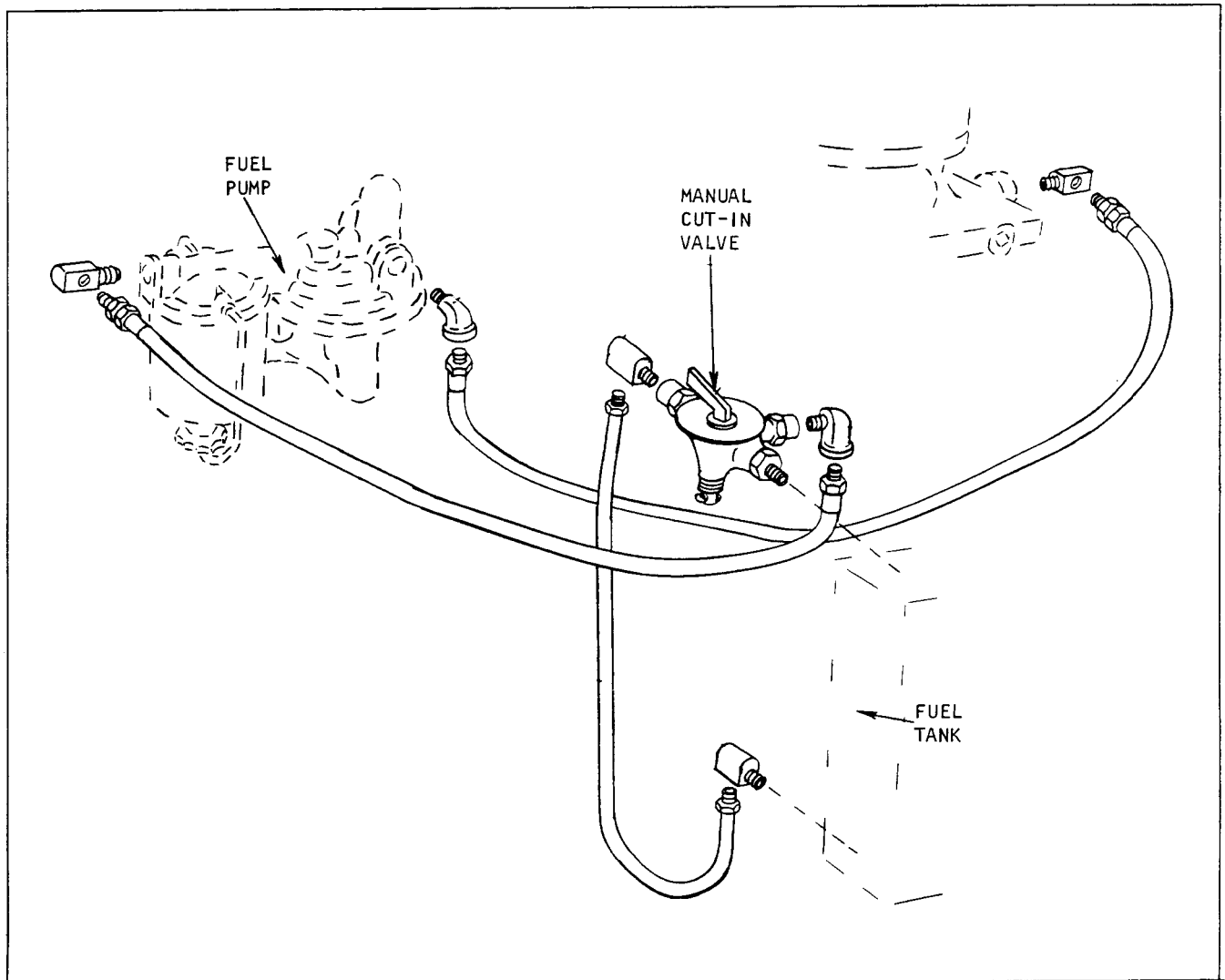


Plate 7236. Manual Cut-in Valve

The auxiliary fuel reserve manual cut-in valve located at 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.

(ON MACHINES SO EQUIPPED)



INDUSTRIAL TRUCK DIVISION



OPERATIONS

To Move A Load.

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

The operator should have clear vision ahead when moving in a forward direction. When this is not possible, the operator should drive in reverse and turn in his seat to obtain clear vision backward.

When the load is to be deposited, enter the area squarely, especially when placing one load on top of another, in order that all piles will be square and secure. Place load directly over desired area and slowly lower into position. Disengage forks from the load by using necessary lift-tilt and then back away.

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

I M P O R T A N T

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

OPERATING SAFETY RULES AND PRACTICES.

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

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

GENERAL.

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

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

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

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

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

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

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

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

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

```
x x x x x x x x x x x x x x x x x x x x x x x x x
x
x           W A R N I N G           x
x
x AN OVERHEAD GUARD IS INTENDED TO OFFER   x
x PROTECTION FROM THE IMPACT OF SMALL      x
x PACKAGES, BOXES, BAGGED MATERIAL, ETC.,  x
x REPRESENTATIVE OF THE JOB APPLICATION,   x
x BUT NOT TO WITHSTAND THE IMPACT OF A     x
x FALLING CAPACITY LOAD.                   x
x
x x x x x x x x x x x x x x x x x x x x x x x x x
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10. Use only approved industrial trucks in hazardous locations.



INDUSTRIAL TRUCK DIVISION



FUEL HANDLING AND STORAGE SAFETY

Liquefied Petroleum Gas Fuel (LPG Powered Trucks)

1. The storage and handling of liquefied petroleum gas (LP-Gas) should be in accordance with the Standard for Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58, USA Standard Z106.1-1965).
2. Trucks using LP-Gas should be refueled only at locations designated for that purpose. Safe outdoor locations are preferable to indoor. Trucks should be refueled as provided in the Standard for the Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58, USA Standard Z106.1-1965.)
3. Reasonable care should be exercised in handling of LP-Gas containers to avoid damage. Do not drop, throw, roll, or drag LP-Gas containers or any associated parts of the containers or fuel systems.
4. Do not over-fill LP-Gas containers.
5. Engine should be stopped and operator off the truck during refueling.
6. Trained and designated personnel should recharge or exchange LP-Gas containers.
7. Personnel engaged in recharging of LP-Gas containers should wear protective clothing such as face shield, long sleeves, and gauntlet gloves.
8. Never use a match or flame to check for leaks, use a soap solution.
9. LP-Gas powered trucks should not be refueled nor stored near underground entrances, elevator shafts nor any other place where LP-Gas could collect in a pocket causing a potentially dangerous condition.
10. Trucks equipped with permanently mounted LP-Gas containers should be refueled outdoors.
11. Exchange of removable LP-Gas containers preferably should be done outdoors, but may be done indoors. Means should be provided in the fuel system to minimize the escape of fuel when the containers are exchanged. This should be accomplished by either of the following methods:
 - A. Using an automatic quick closing coupling (a type closing in both directions when uncoupled) in the fuel line, or.....
 - B. Closing the valve at the LP-Gas container and allowing the engine to run until the fuel in the line is consumed.
12. When installing removable LP-Gas containers they should be so located on the truck that the safety pressure relief valve opening is always in contact with the vapor space (top) of the cylinder. This is accomplished by an indexing pin which, when the tank is properly installed, positions the container.
13. All reserve LP-Gas containers should be stored and transported with the service valve closed. Safety relief valves should have direct communication with the vapor space of the container at all times.
14. The careless handling of LP-Gas containers can result in a serious accident. Extreme care should be exercised when transporting containers so that they are not accidentally dropped or physically damaged. When it is necessary to move more than one container at one time, a proper carrying device should be provided.
15. Physical damage such as dents, scrapes, or gouges, may materially weaken the structure of the LP-Gas container and render it unsafe for use. All LP-Gas containers should be examined before recharging and again before reuse, for the following defects or damage:
 - A. Dents, scrapes, and gouges of the pressure vessel.
 - B. Damage to the various valves and liquid level gage.
 - C. Debris in the relief valve.
 - D. Indications of leakage at valves or threaded connections.
 - E. Deterioration damage or loss of flexible seals in the fill or servicing connections.All defective or damaged LP-Gas containers should be removed from service.
16. Smoking should be prohibited in the refueling area.
17. Whenever vehicles using LP-Gas as a fuel are parked overnight or stored for protracted periods of time indoors, with the fuel container in place, the service valve on the fuel container should be closed.

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

1. Properly ventilate work area.
2. Eliminate ignition sources (sparks, pilot lights etc.).
3. Prohibit smoking.
4. Have fire fighting equipment present.
5. Check all equipment, lines, connections with soapy water. NEVER USE A MATCH OR FLAME WHEN CHECKING FOR LEAKS.

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.

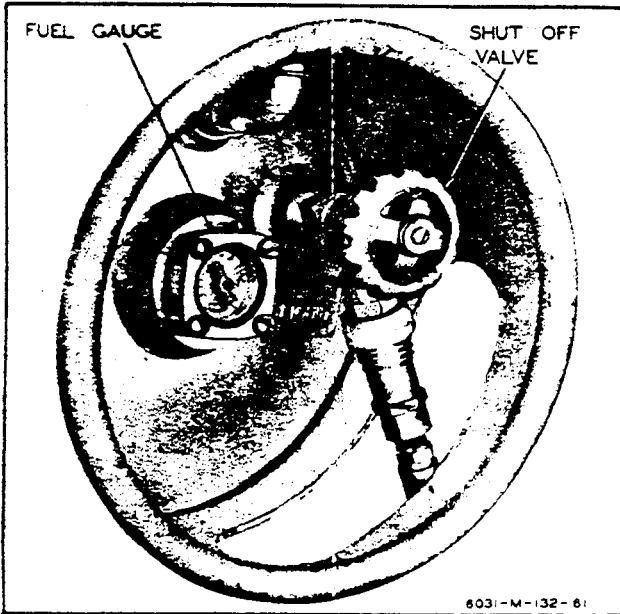


Plate 6031. Typical L.P. Gas Container

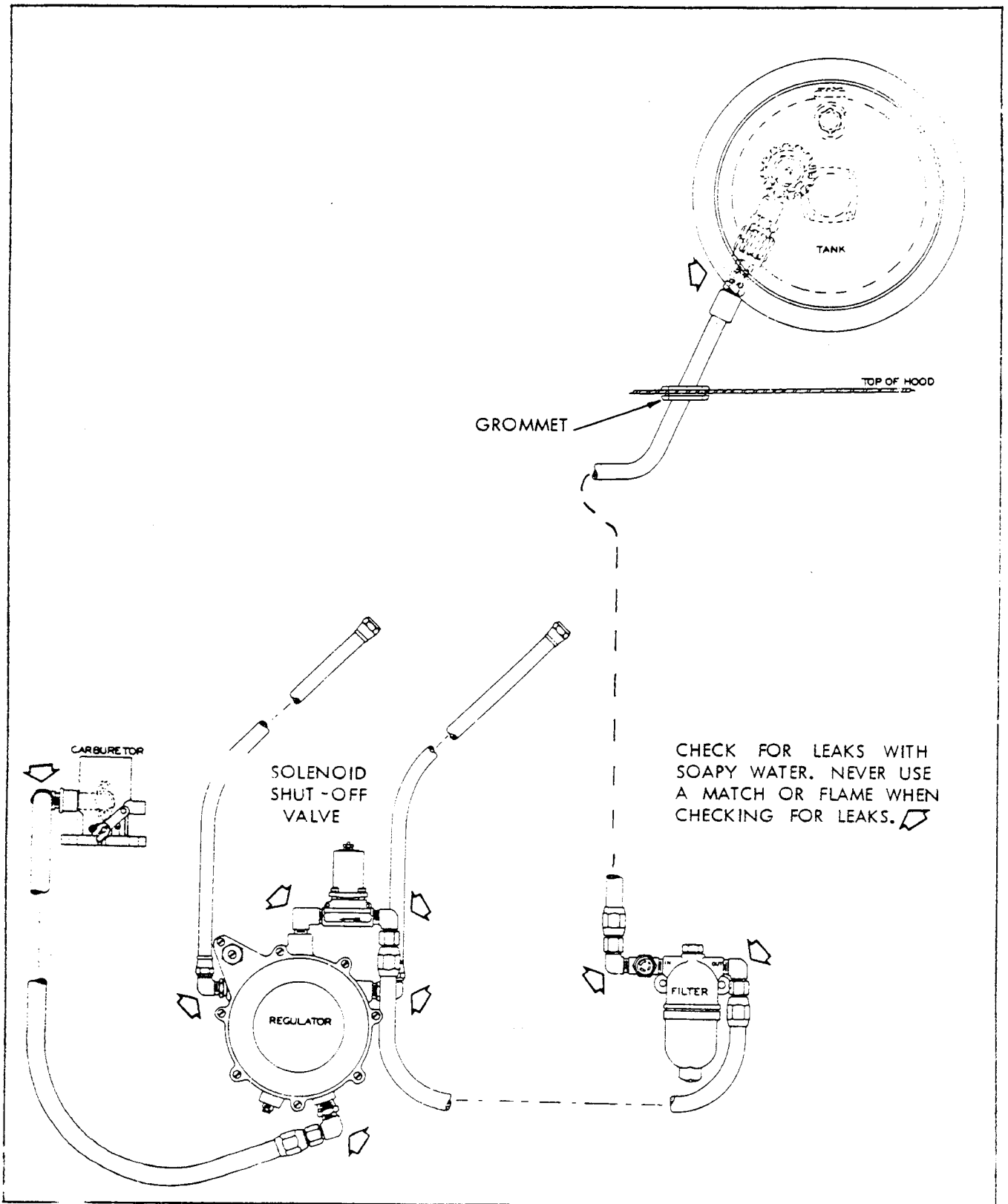


Plate 7405. Typical L.P. GAS Installation

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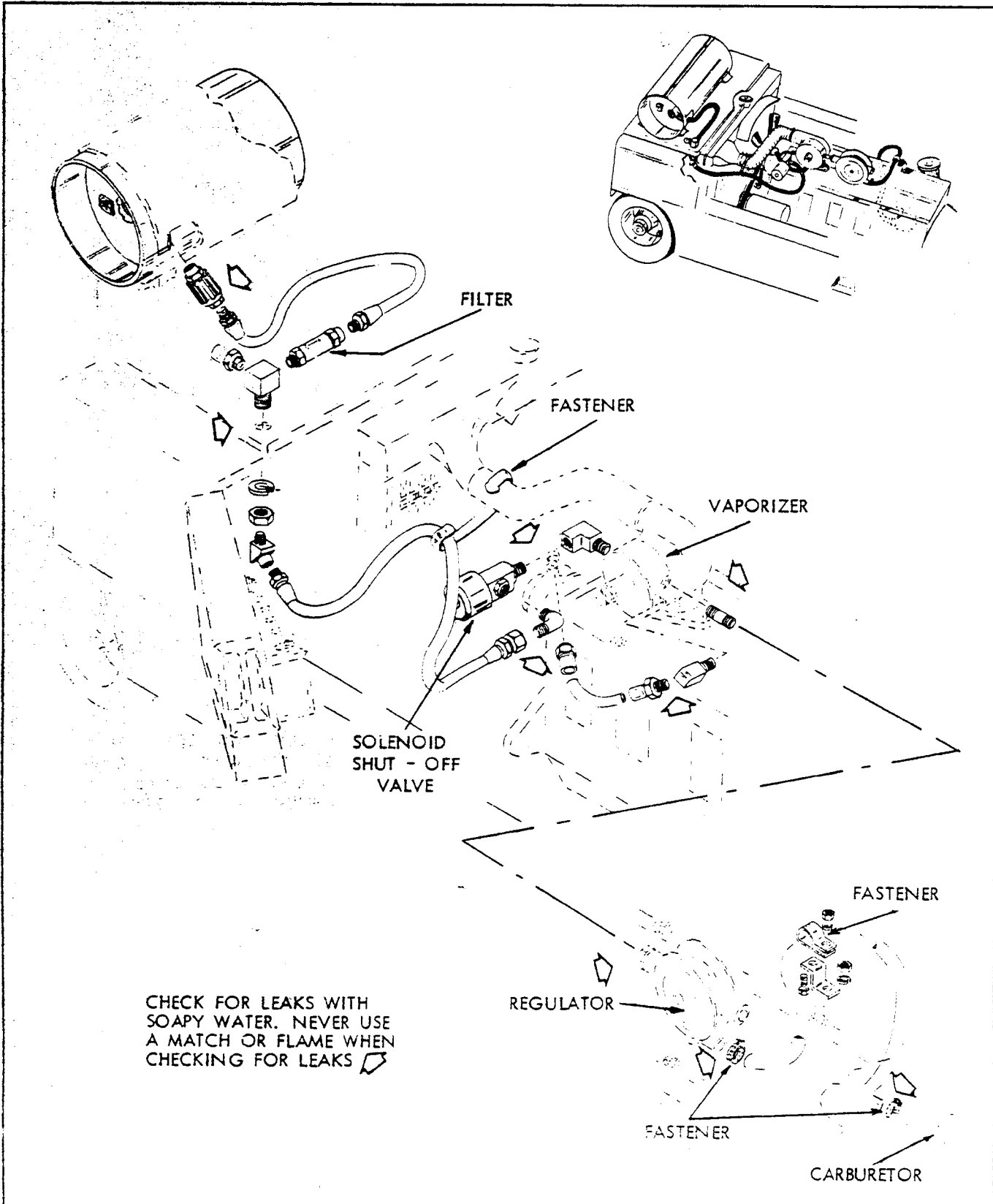


Plate 7406. Typical L.P. GAS Installation

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INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE INDEX

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



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE INDEX

(8 HOURS)	Time Interval & (H-Hours)	Page Number (000-)
Cooling System, inspect and clean.....	1000H	1202
Crankcase Ventilation, inspect and clean.....	1000H	003
Cylinder Head Tightening Sequence, torque cylinder head fasteners		003
Distributor, inspect and adjust		203
Engine, tune-up.....	1000H	002
Generator, inspect.....	1000H	703
Governor, adjust.....	1000H	503
Hand Brake, adjust.....	1000H	1103
Hydracool Clutch, drain & refill.....	1000H	1353
Ignition Timing, adjust.....	1000H	303
Intake and Exhaust Valves adjust valve clearance.	1000H	003
Pressure Checks -- check hydraulic system for specified pressure setting.....	1000H	1503
Transmission & Axle Adaptor, drain and refill.....	1000H	1303
Spark Plugs, clean and adjust	1000H	103
Starting Motor, inspect.....	1000H	603
Steer Wheel Bearings, inspect, clean, repack and adjust	1000H	803
Upright & Lift Carriage Rollers, check and adjust rollers, lubricate rollers.....	1000H	1803
Regulator Wiring, inspect.....	1000H	704
Vehicle Wiring, inspect.....	1000H	704

LUBRICATION & PREVENTIVE MAINTENANCE ILLUSTRATIONS

Plate 7393. L.P.M. illustration 1000H 002

NOTE

When performing the 100, 500 or 1000 hour Lubrication and Preventive Maintenance Schedules, always include the previous schedule.

Description

Plate 7390. L.P.M. Illustrations 8H	002
Plate 7391. L.P.M. Illustrations 100H	002
Lubrication Diagram 100H	703
Plate 7392. L.P.M. Illustrations 500H	002

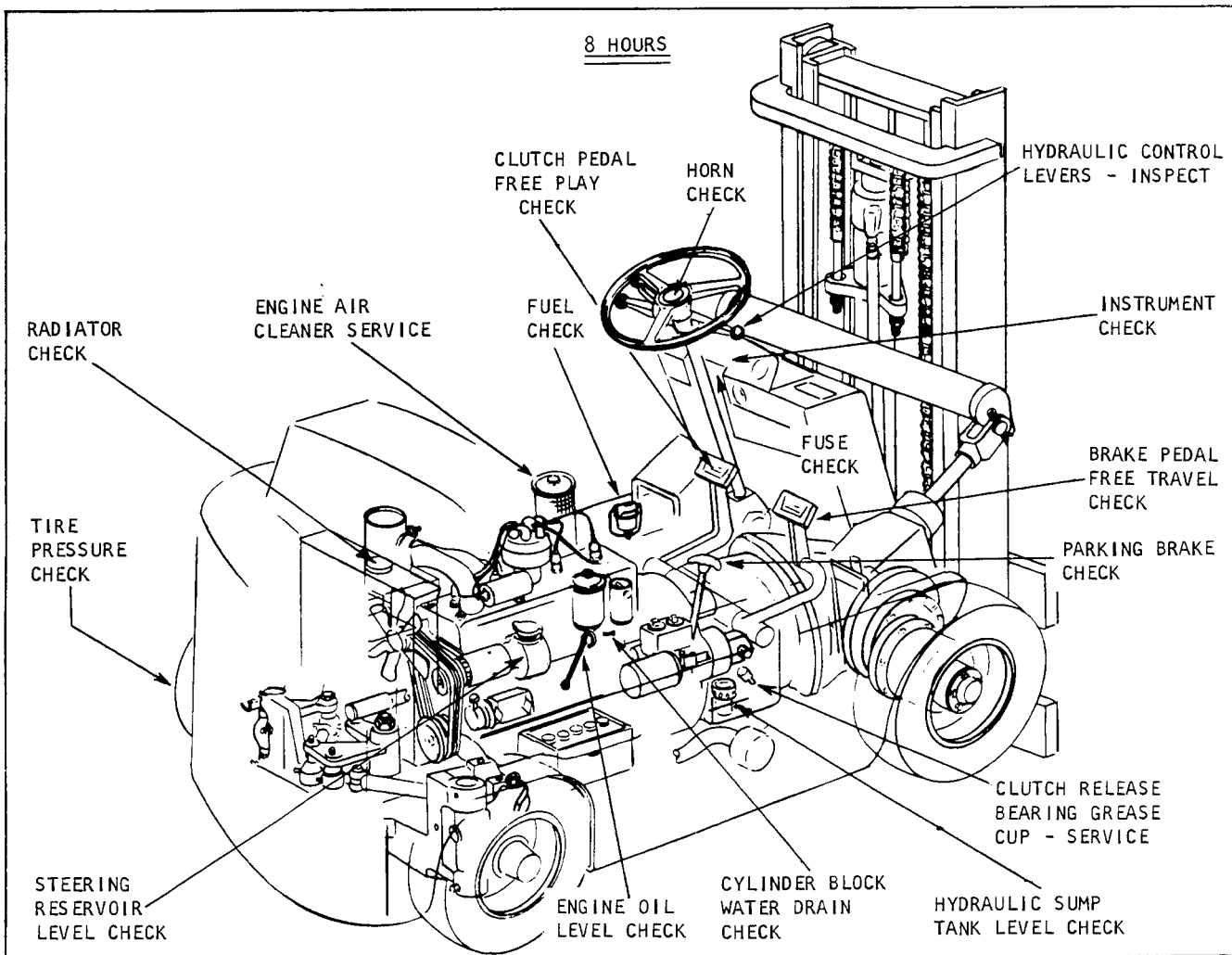


Plate 7390. Lubrication & Preventive Maintenance Illustration

HORN

Check to be sure the horn is working properly. The horn fuse holder is located beneath the dash near the steering column.

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.

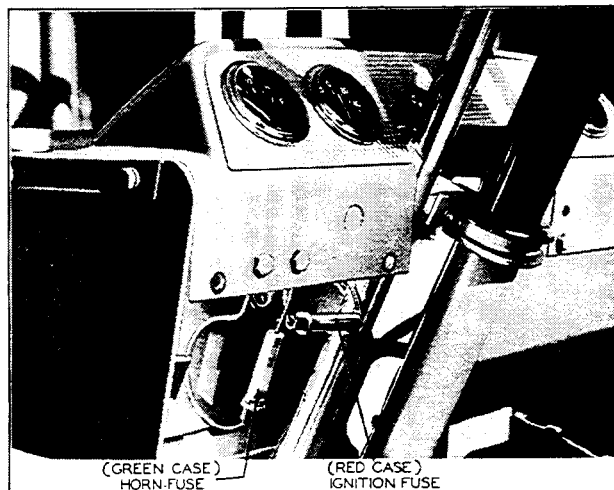


Plate 5900. Horn Fuse

Engine Crankcase

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

N O T E

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

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

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

C A U T I O N

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

Do not overfill the crankcase...too much oil will bring the level high enough for the connecting rods to dip, thus causing excessive quantities of oil to be thrown to the cylinder walls resulting in oil consumption, smoking, excessive carbon deposits and fouled spark plugs.

N O T E

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

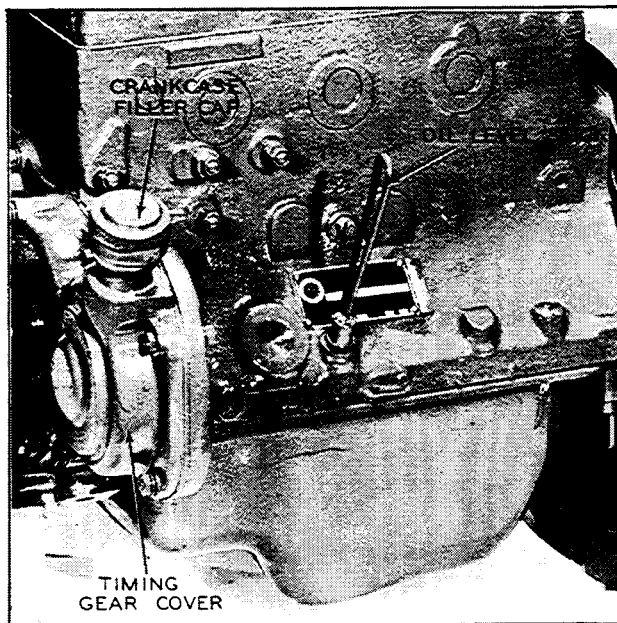


Plate 6629. Crankcase...location of Fill Cap and Oil Level Dipstick.

LUBRICATING OIL RECOMMENDATIONS
Crankcase Capacity...Refer to Specifications

SERVICE "MS"

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

Low Temperature Operation

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

Service Conditions

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

N O T E

Refer to Diesel engine manual for machines so equipped.

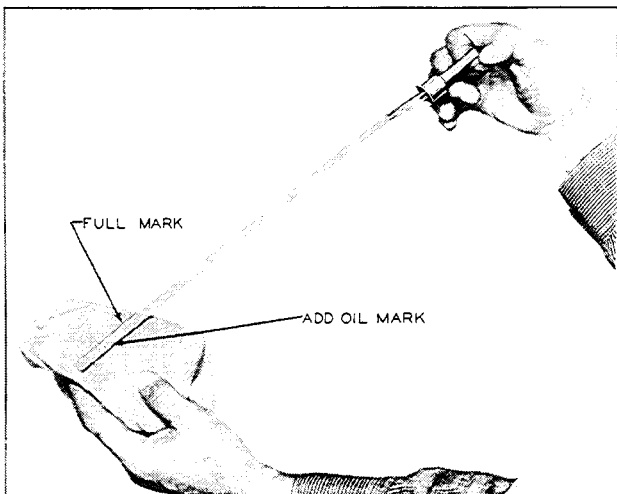


Plate 3145. Check Crankcase with Dipstick



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

ENGINE COOLING

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

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

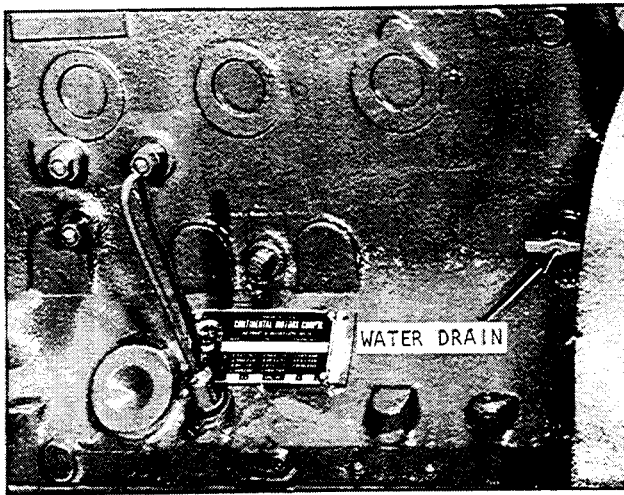


Plate 7008. Typical Cylinder Block Water Drain

C A U T I O N

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

N O T E

REFER TO DIESEL ENGINE MANUAL FOR MACHINES SO EQUIPPED.

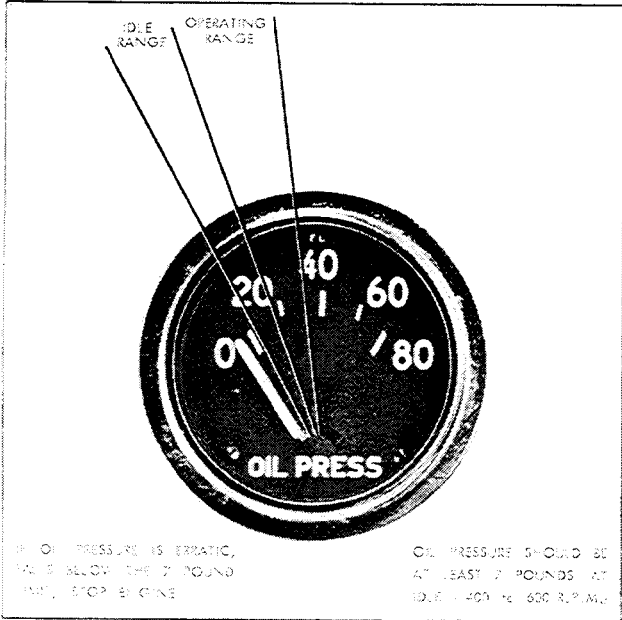


Plate 6288. Oil Pressure Indicator
(MACHINES SO EQUIPPED)

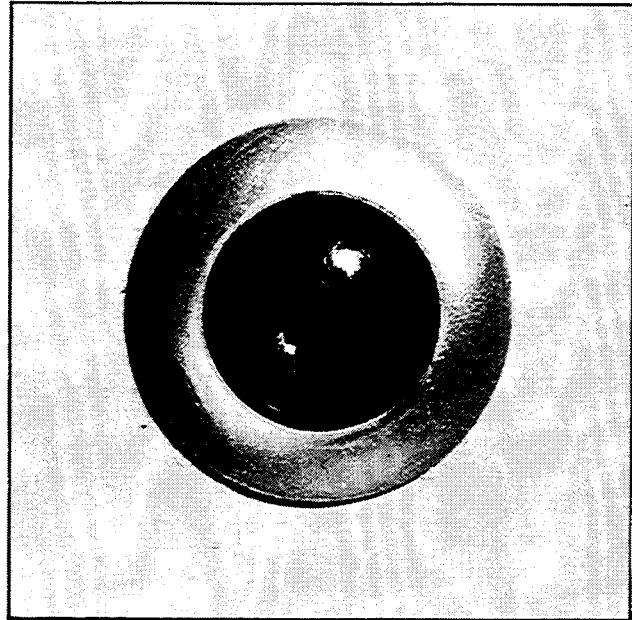


Plate 6885. Oil Pressure Warning Light
(MACHINES SO EQUIPPED)

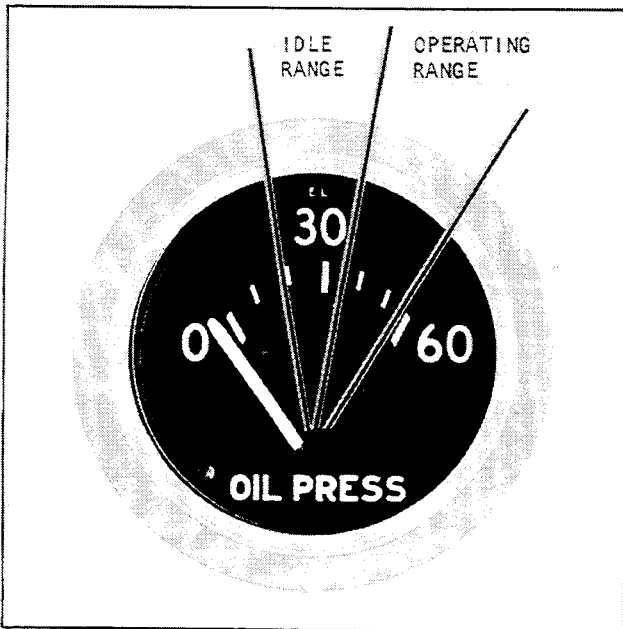


Plate 8606. Oil Pressure Indicator
(MACHINES SO EQUIPPED)

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

C A U T I O N

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

N O T E

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

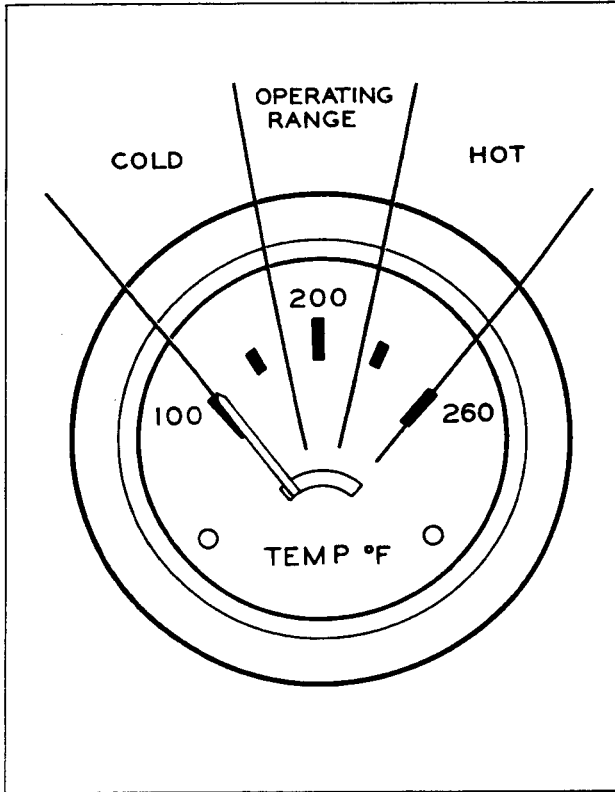


Plate 8288. Engine Coolant Temperature Indicator

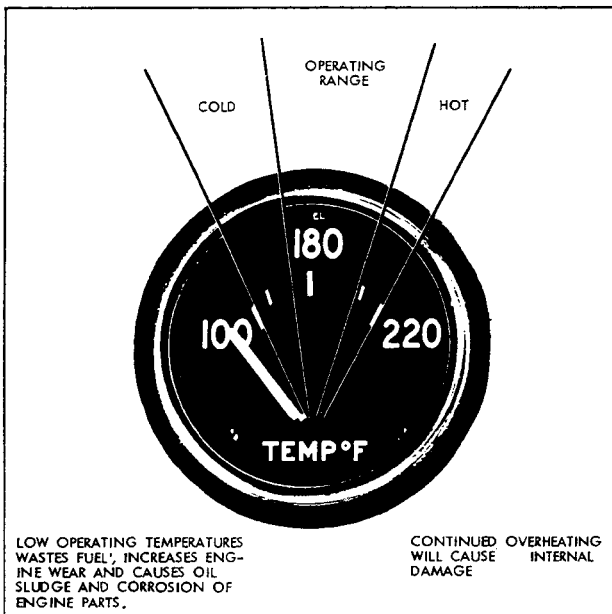


Plate 6287. Engine Coolant Temperature Indicator



Plate 7162. Hour Meter

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

NOTE

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

CAUTION

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

NOTE

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

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

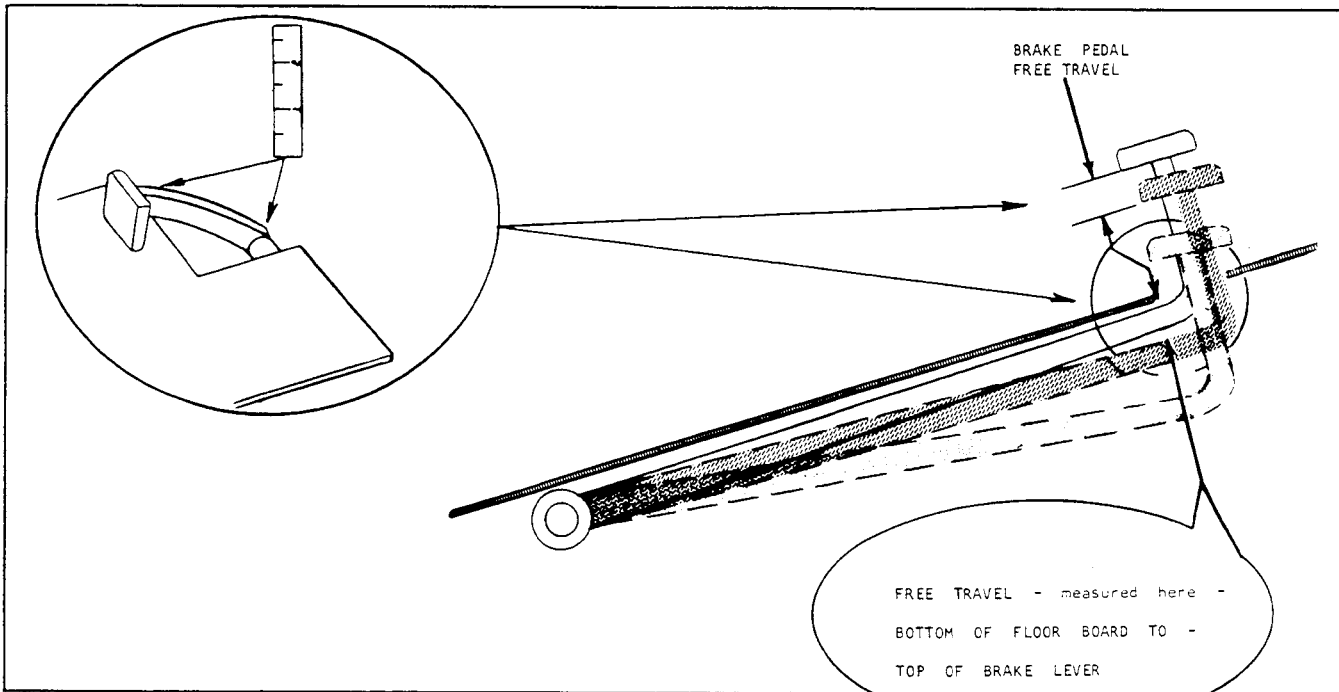


Plate 7042. Brake Pedal Free Travel

BRAKE PEDAL

1. Depress brake pedal by hand. When pedal meets resistance from the master cylinder, the distance traveled should be $3/16''$ to $5/16''$. If free travel is incorrect an adjustment should be made at the master cylinder linkage adjuster.

2. Depress foot pedal and hold for at least 10 seconds. Pedal must be solid, must not be spongy or drift under foot pressure.

PARKING BRAKE

The parking brake linkage should be adjusted so that the brake handle will have 2 inches of upward free travel, before resistance is noticed and the brake becomes applied.

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

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

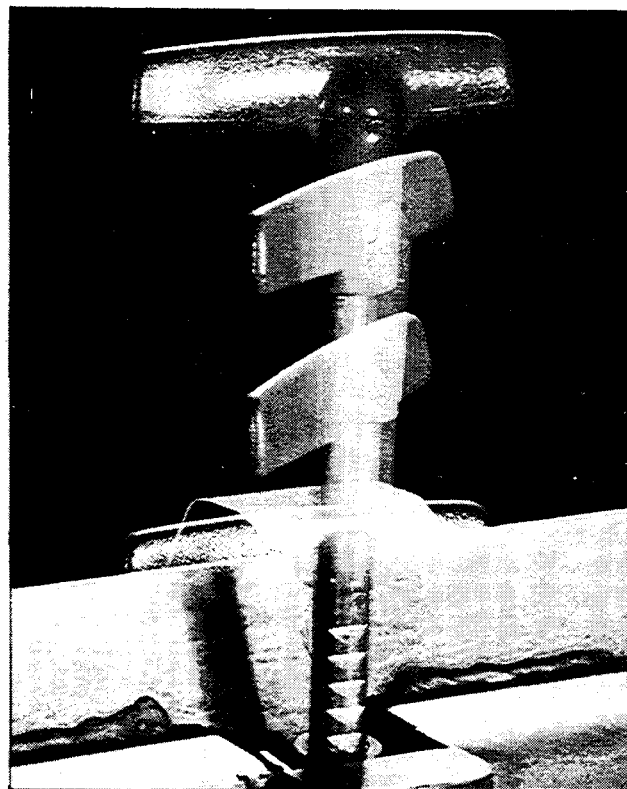


Plate 7482. Parking Brake

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.

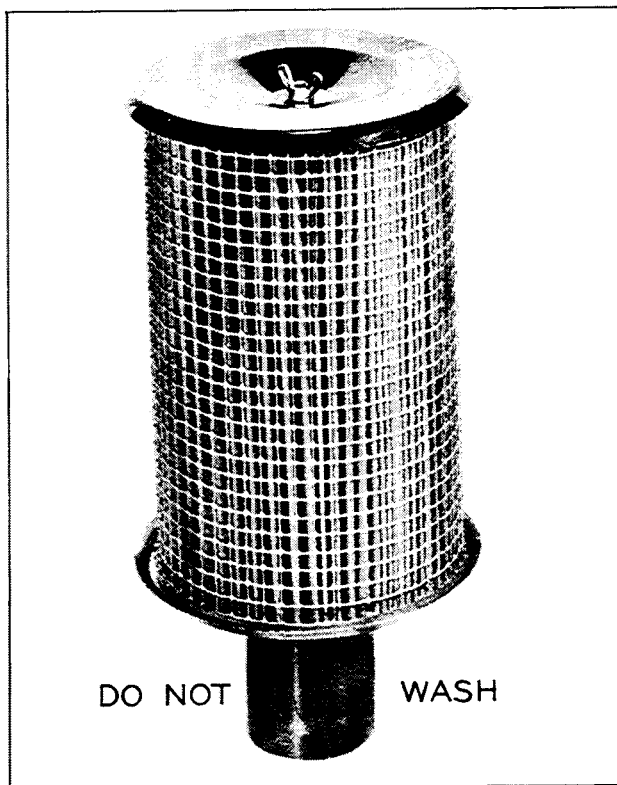


Plate 5697. Air Cleaner

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 filtered.

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

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

NOTE

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

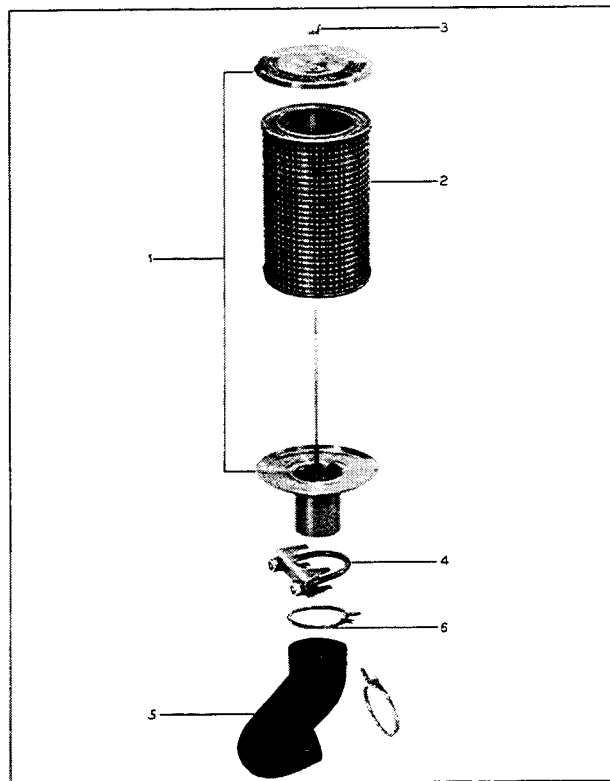


Plate 6980. Air Cleaner Components

NOTE

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 EXER- CISED. CLOSE OBSERVANCE AND COMMON SENSE CAN BEST DETERMINE THE FREQUENCY OF AIR CLEANER MAINTENANCE.

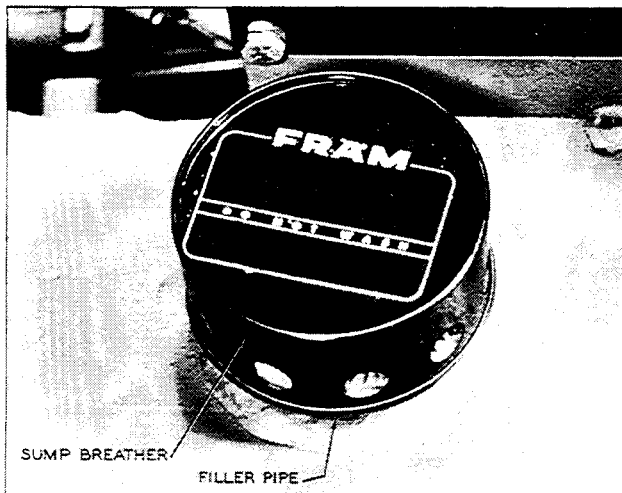


Plate 6626. Hydraulic Sump Tank and Sump Breather

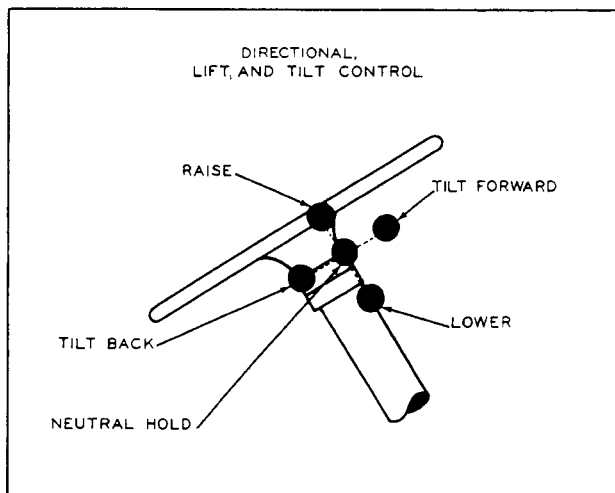


Plate 4448. Lift and Tilt Lever

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.

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

WARNING

AN INFLATED TIRE AND RIM CAN BE VERY DANGEROUS. MANY ACCIDENTS, SOME FATAL, HAVE RESULTED FROM IMPROPER HANDLING AND OPERATION OF VEHICLE RIMS TIRES AND WHEELS. IT IS, THEREFORE, OF THE UTMOST IMPORTANCE THAT THE FOLLOWING PRECAUTIONS BE NOTED BY ALL PERSONS CONCERNED TO AVOID PERSONAL INJURY AND COSTLY DAMAGE.

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

2. Some vehicles use a rim that has an inner half and an outer half. The two halves are held together by bolts and by the wheel attaching bolts. See Plate 7613. In all cases the air should be removed from the tire by removing the valve core before attempting to remove the wheel from the vehicle. The tire should not be inflated while it is "off" the vehicle. Check for security of all rim retainment bolts and wheel attaching bolts before



Plate 7613. Typical Wheel with Inner and Outer Halves

inflating tire. A clip-on type air chuck should be used so the operator can stand to one side during tire inflation.

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

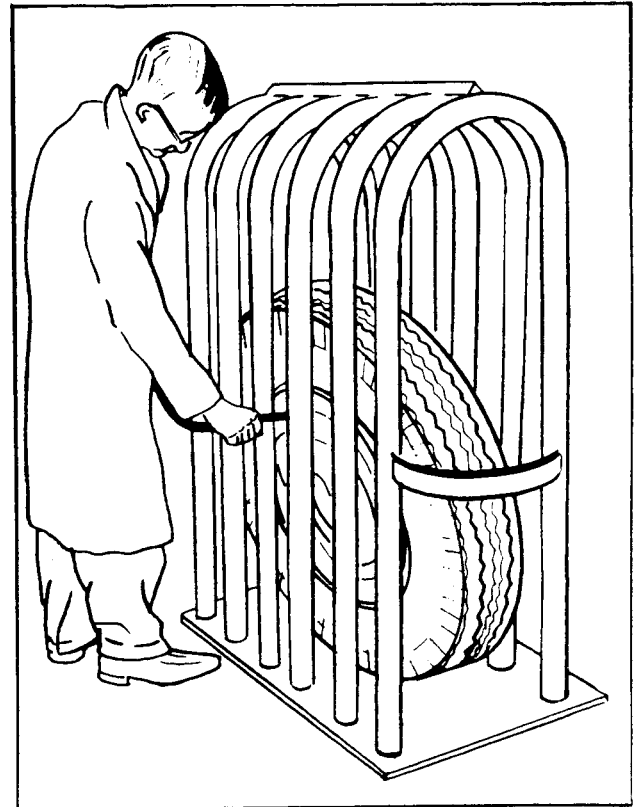


Plate 7614. Typical Safety Cage

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

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

6. Remove rust and other foreign matter. Accumulation of such material in the rim gutter can prevent the proper fitting of rings. Parts that are excessively corroded are weakened and should be replaced. Use



INDUSTRIAL TRUCK DIVISION



TIRE AND RIM MAINTENANCE

of a rust preventative compound (not containing water) during mounting will minimize rusting.

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

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

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

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

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

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

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

NOTE

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

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

DIRECTIONAL TREAD TIRES

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

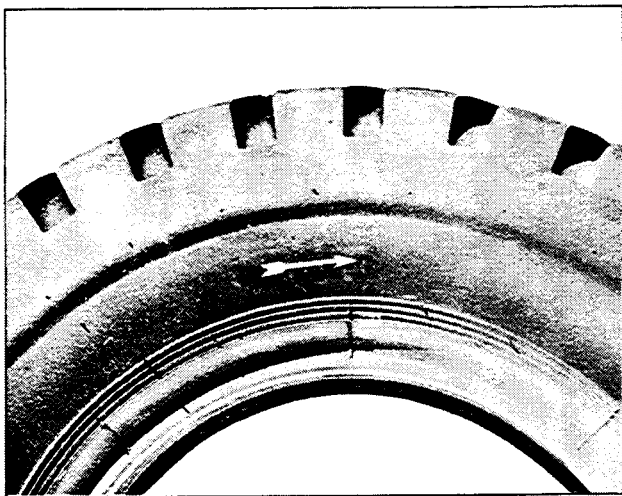


Plate 6422. Inside Dual Tire
(or Single Drive Tire)
(Arrow to point toward front of truck)

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.)

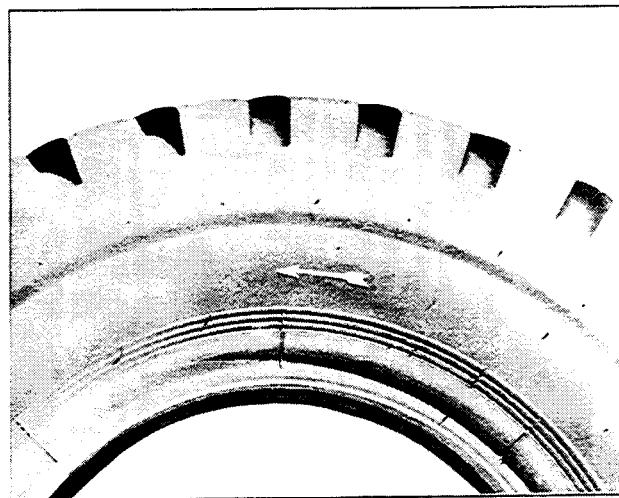


Plate 6423. Outside Dual Tire
(Arrow to point toward rear of truck)

SOLID OR CUSHION TIRE AND RIM MAINTENANCE

1. Inspect tires regularly - remove all sharp objects picked up by treads before they have a chance to cut further into the rubber and cause chipping or possible separation of the rubber from the base metal.
2. Avoid overloading and do not allow vehicle to stand under heavy loads for prolonged periods as this will cause a "flat" spot on the tires.
3. Check steering axle alignment regularly to protect against fast, irregular tread wear and separation.
4. If rubber tires come in contact with oils, grease, and gasoline they should be wiped off without delay.
5. Regular lubrication of all wheel bearings will assure free-rolling and elimination of tire drag when stopping or starting.

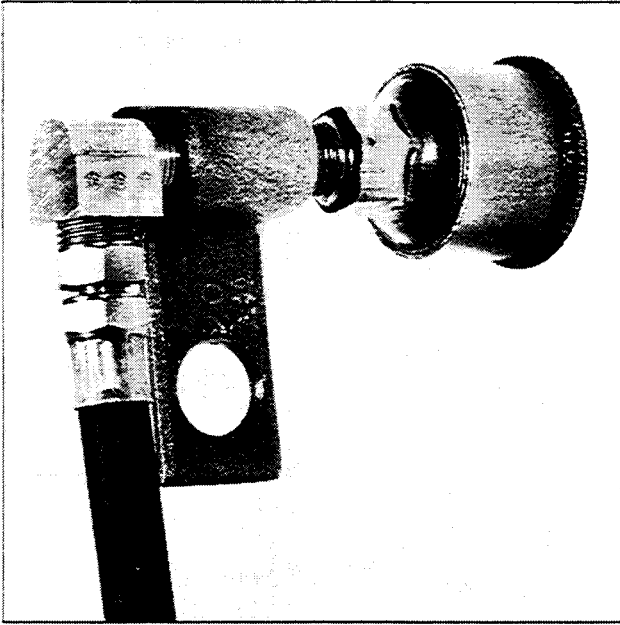


Plate 7398. Clutch Release
Bearing Grease Cup

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 NLGI #2 (Amolith grease EP #2 or its equivalent)

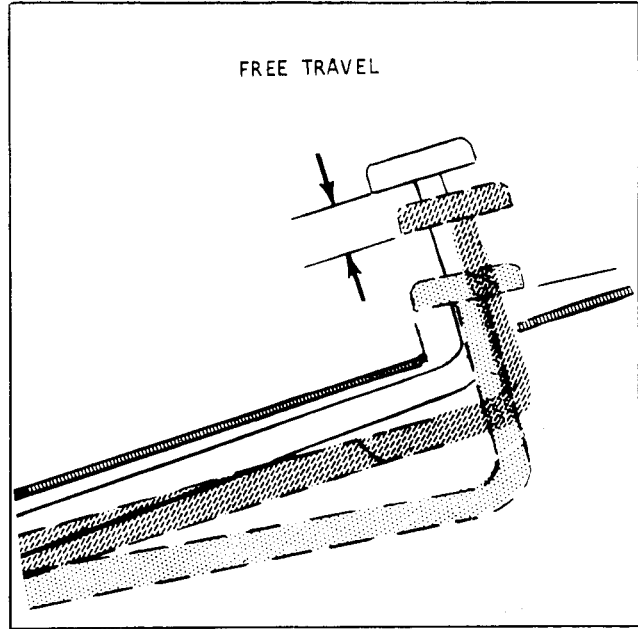


Plate 7048. Clutch Pedal
Free Travel Check

CLUTCH PEDAL FREE TRAVEL. Depress clutch pedal from the top position to a point where it meets resistance. This free travel should be approximately 5/8 to 1" inches from top pedal position.

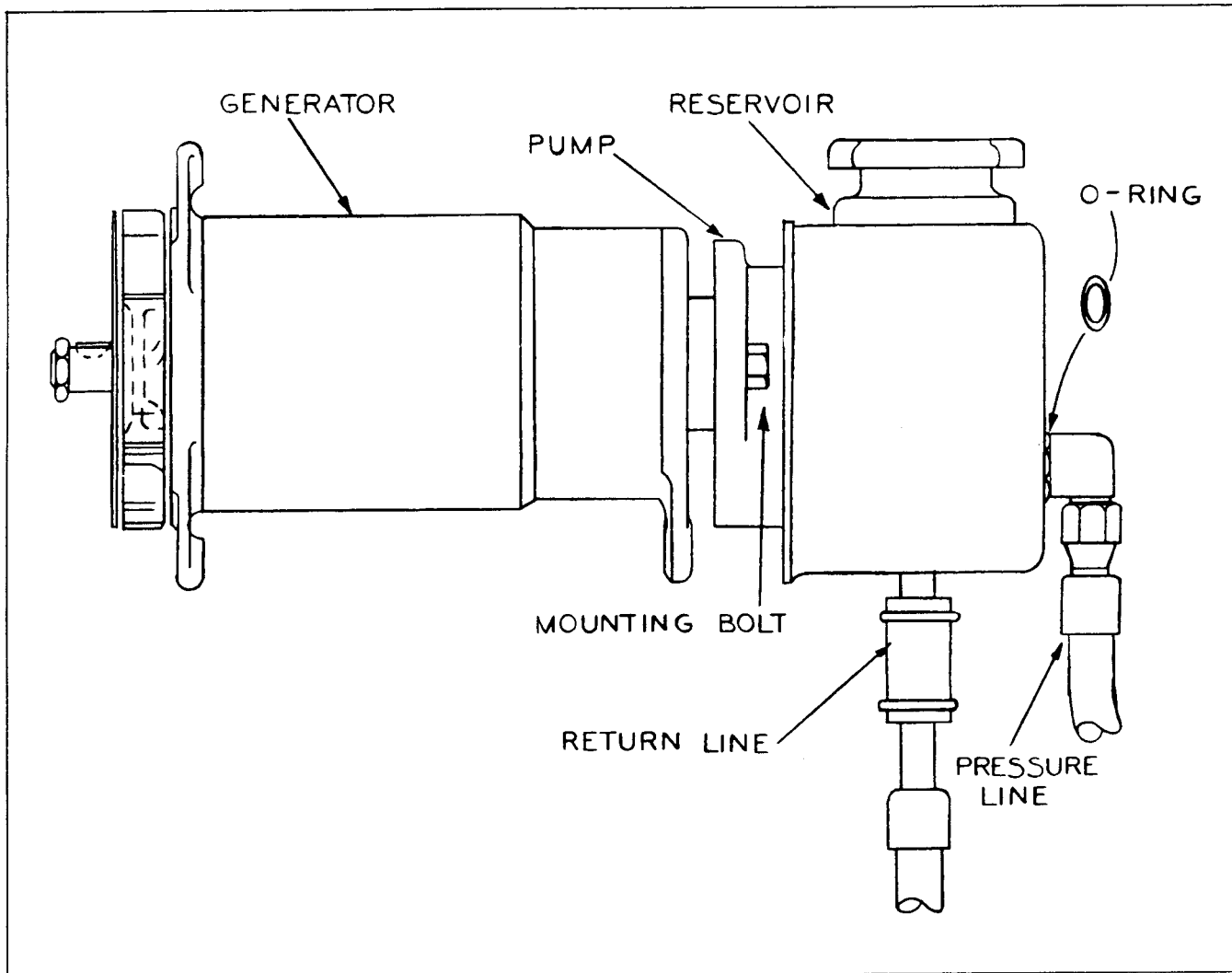


Plate 5940. Typical Power Steering Pump (Machines So Equipped)

POWER STEERING PUMP

Check reservoir fluid level each 8 operating hours. Fill (if necessary) with type "A" suffix "A" automatic transmission fluid, CLARK part number 879803. (Fluid containers must display a qualification number prefixed by AQ-ATF.) When fluid in 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 engine for a few minutes and recheck fluid level. Fill to the proper level if necessary.

C A U T I O N

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

N O T E

Later model vehicles are equipped with a steering system which is supplied with fluid from the hydracool clutch reservoir. Refer to page 100H 657.

LUBRICATION AND PREVENTIVE MAINTENANCE

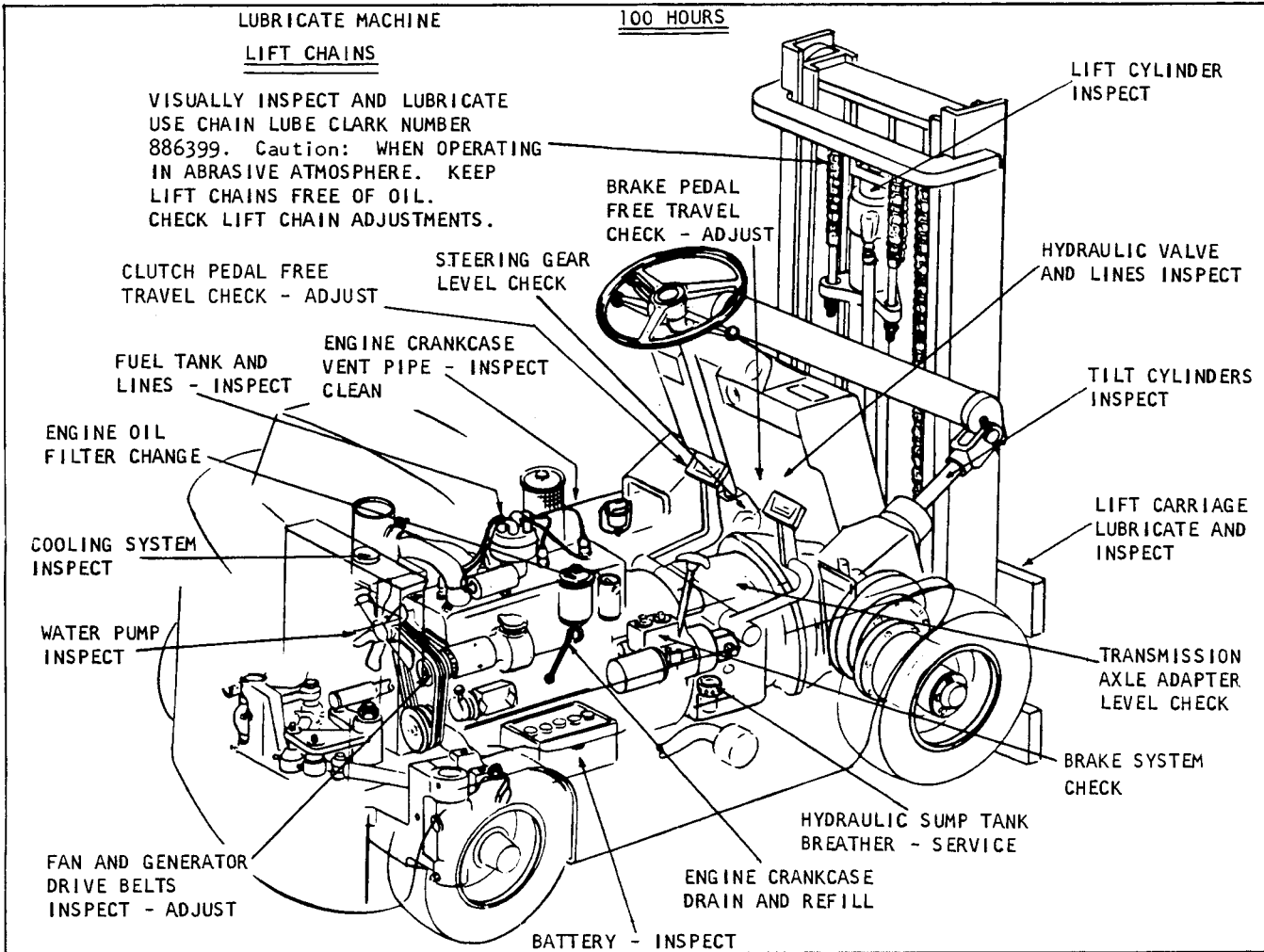


Plate 7391. Lubrication & Preventive Maintenance Illustration

TRANSMISSION AND AXLE ADAPTER

Verify lubricant level, fill if necessary to the full mark on the transmission dipstick. Use straight gear lube of S.A.E. number 90 grade. DO NOT OVERFILL.

FUEL LINES.

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

WARNING

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.

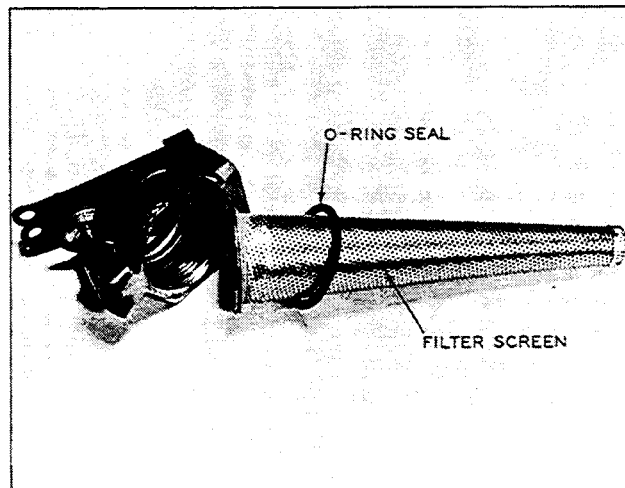


Plate 6627. Fuel Tank Filler Cap & Screen

ENGINE CRANKCASE

1. Every 100 operating hours; drain the engine crankcase at operating temperature and clean the magnetic drain plug.
2. Change the engine oil filter element. The filter is of the replaceable type. The element should be changed whenever the crankcase is drained. To remove the element, remove oil filter cover screw and gasket, oil filter cover, cover spring and cover gasket. Lift out oil filter element. Install new element after draining and thoroughly cleaning filter case. Install new element after draining and thoroughly cleaning filter case. Install new gaskets and replace cover spring, oil filter cover and secure with oil filter cover screw.

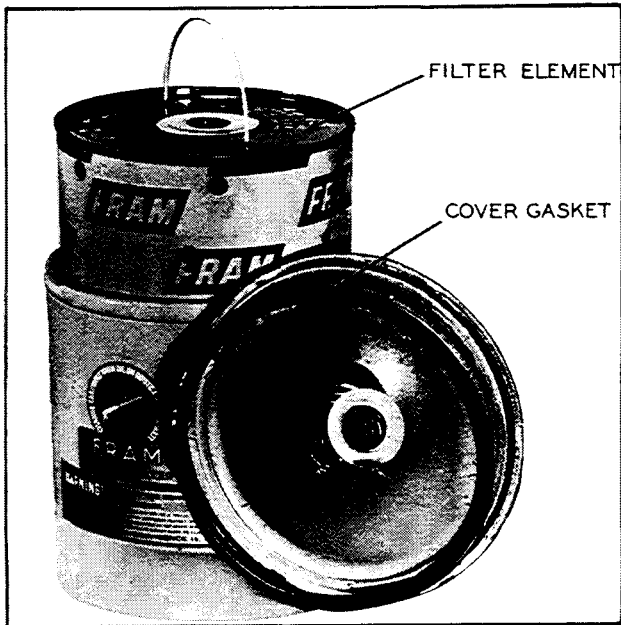


Plate 6642. Engine Oil Filter

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

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

Low Temperature Operation

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

4. Start engine and check oil filter for leaks at cover. Run engine at idle a few minutes, then

shut down engine. Allow time for engine oil to return to crankcase (approx. 5 min.) and then check oil level with the dipstick. Add oil as necessary to bring oil level to full mark on the dipstick.

Service Conditions

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

Engine Crankcase Ventilation Pipe

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

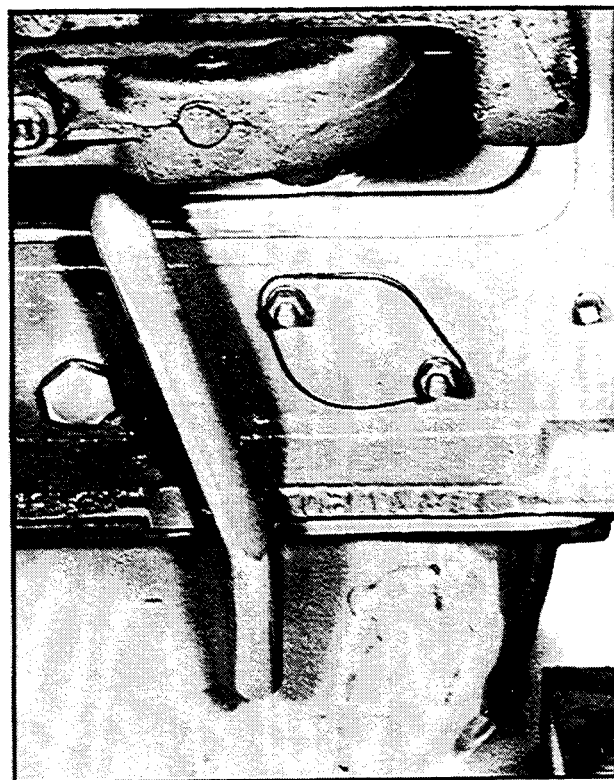


Plate 6628. Crankcase Vent Pipe

NOTE

Refer to Diesel Engine Manual for Machines So Equipped.

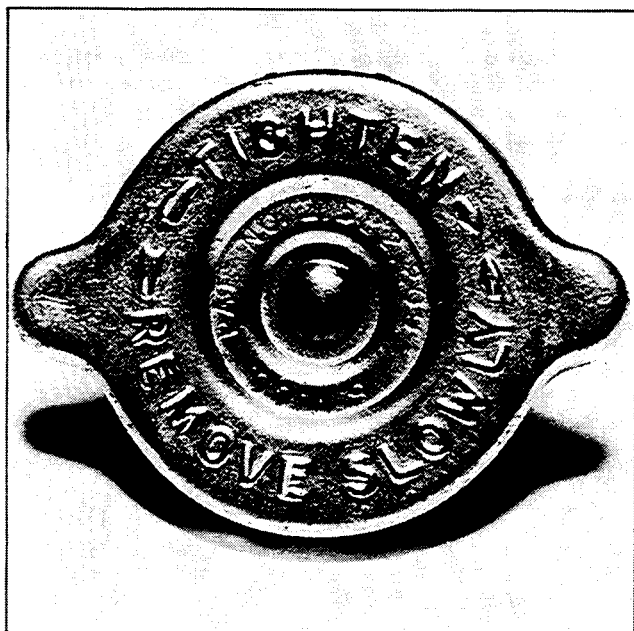


Plate 6458. Radiator Pressure Cap

W A R N I N G

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

COOLING SYSTEM

Check radiator, hoses and water pump for leaks.

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

N O T E

COOLING SYSTEM CAPACITY - REFER TO SPECIFICATIONS.

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

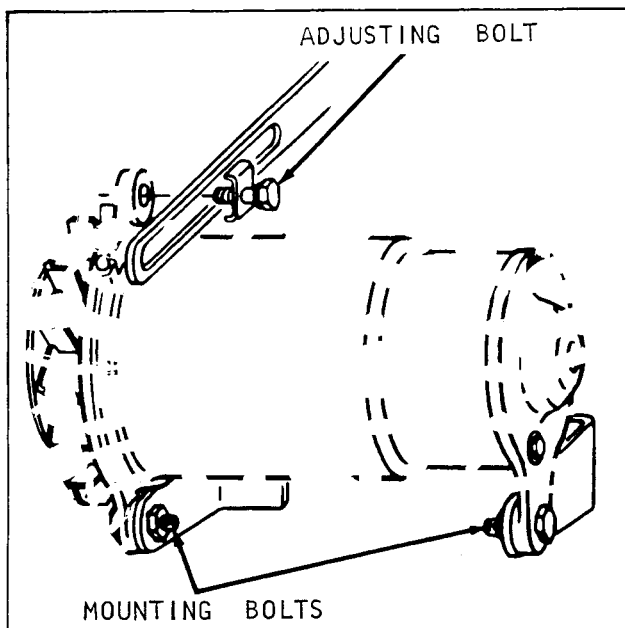


Plate 6631. Generator Drive Belt Adjustment

FAN AND GENERATOR DRIVE BELTS

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

C A U T I O N

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

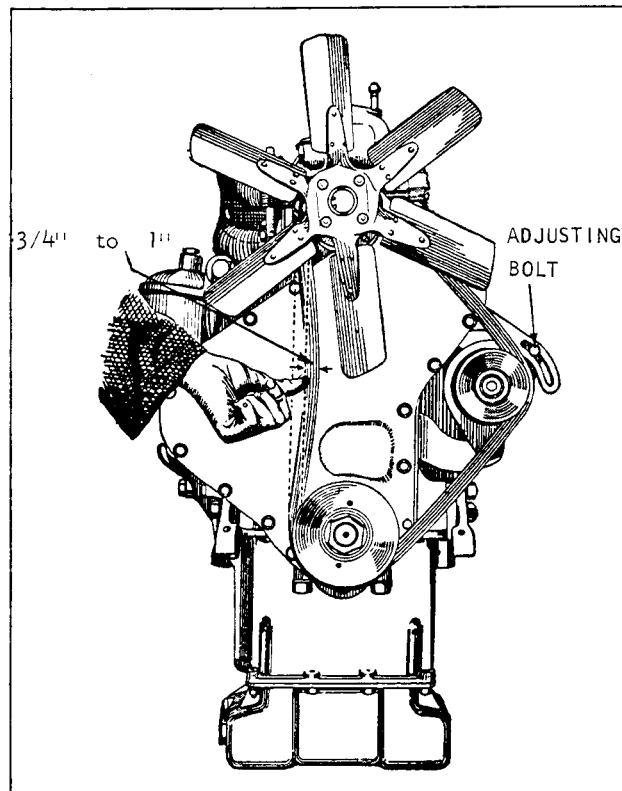


Plate 6632. Belt Deflection Check

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

N O T E

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

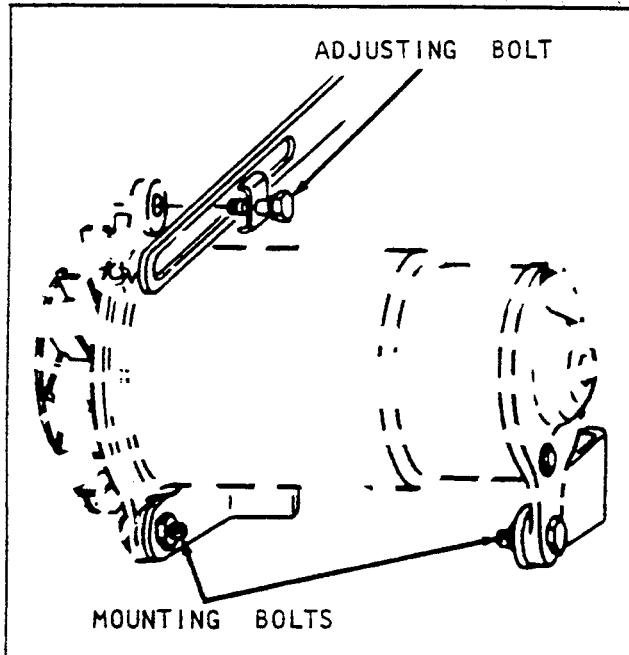


Plate 6631. Generator Drive Belt Adjustment

FAN AND GENERATOR DRIVE BELTS
(Gas Engine Machines)

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

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

CAUTION

EXERCISE CAUTION WHEN ADJUSTING BELTS. BELTS ADJUSTED TOO TIGHT WILL VERY LIKELY CAUSE BEARING DAMAGE. CONVERSELY, BELTS ADJUSTED TOO LOOSE WILL RESULT IN BELT WEAR AND HIGH ENGINE TEMPERATURE DUE TO BELT SLIP-
PAGE.

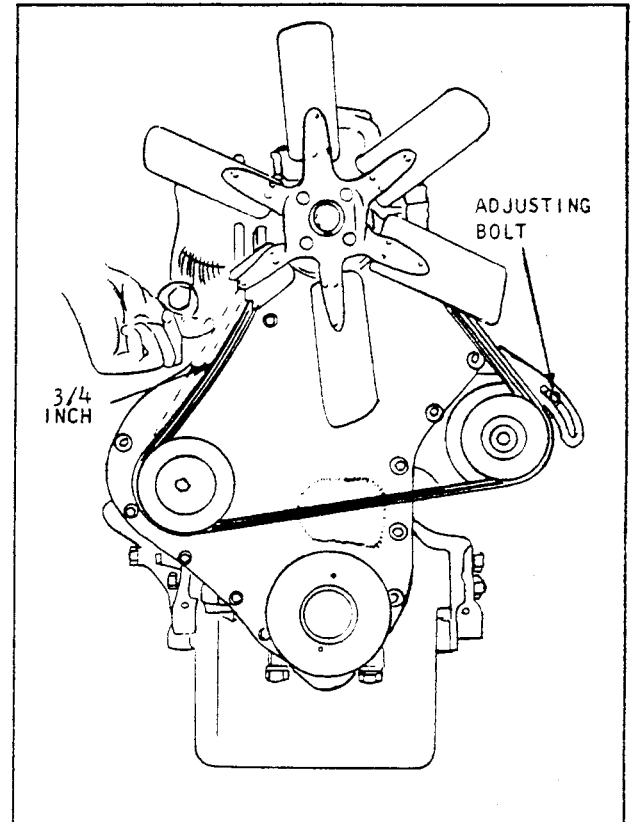


Plate 7652. Belt Deflection Check

GENERATOR BELTS
(Diesel Engine Machines)

The procedure for checking generator belt tension is the same as outlined under (Gas Engine Machines).

FAN BELT
(Diesel Engine Machines)

The fan belt should also have finger pressure deflection of 3/4 inch midway on the span. If adjustment is necessary loosen the fan bracket bolts and move the bracket in the direction necessary to obtain the correct belt deflection. Tighten bolts to retain this adjustment. To install a new set of fan belts it is necessary to remove the flange bolts from the crankshaft pulley, remove the hydraulic pump mounting bolts and move the pump and universal joint assembly forward enough to allow the belts to pass between the pulley and flange.

NOTE

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



INDUSTRIAL TRUCK DIVISION



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 $3/16''$ to $5/16''$ -- if free travel is incorrect, adjust as follows:

1. Loosen lock nut, see Plate 7339.
2. Rotate adjuster to obtain specified pedal free travel.
3. Tighten lock nut to hold adjustment.

ACTUATION STROKE

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 adjustment or replacement.

CLEARANCE - measured here -

TOP PEDAL POSITION -TO- WHERE

PEDAL MEETS RESISTANCE FROM THE

MASTER CYLINDER.

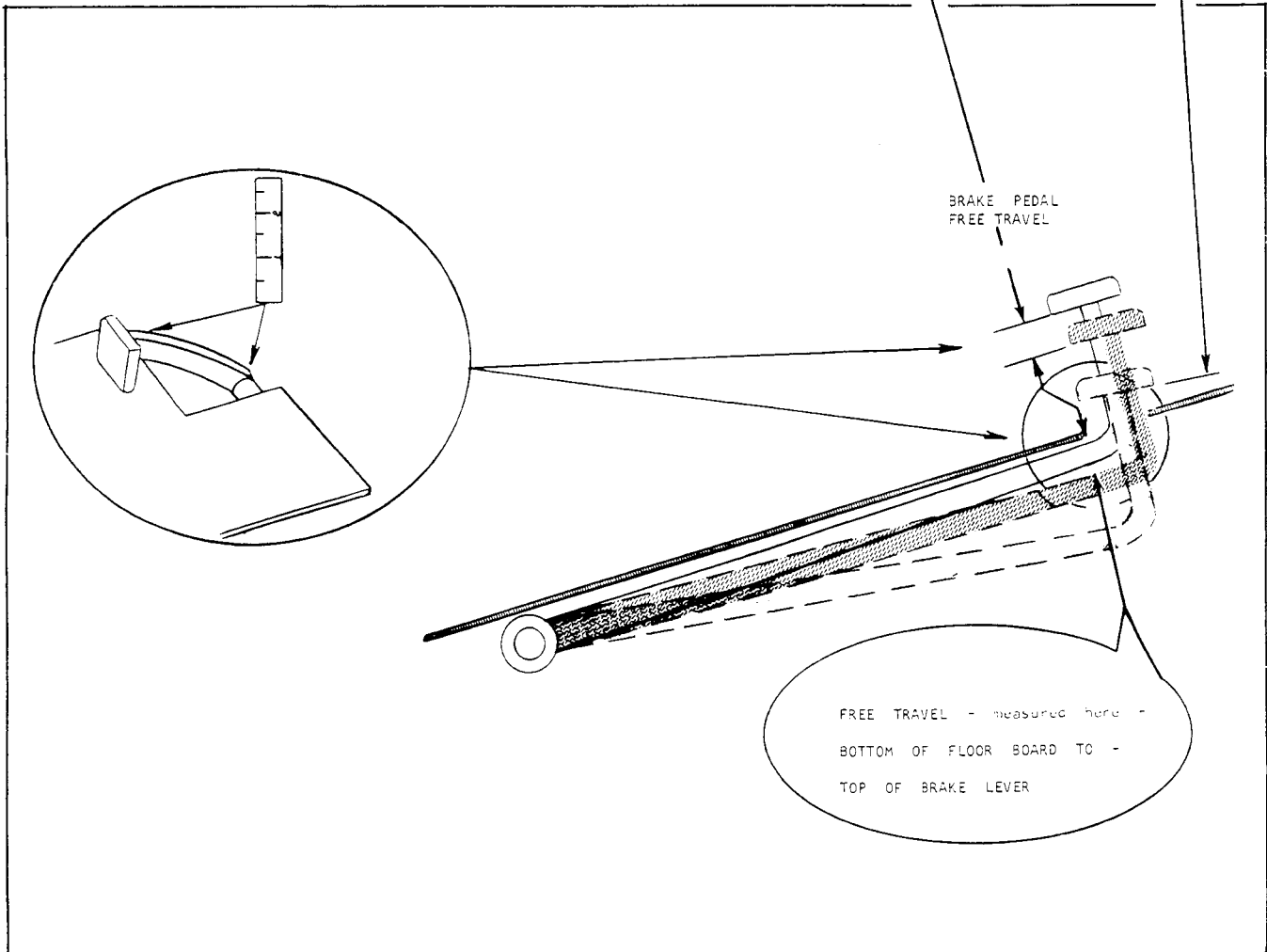


Plate 7042. Brake Pedal Check and Adjustment

BRAKE SYSTEM

Check brake fluid level in the master cylinder. Brake fluid should be within 1/4 inch of the top. Fill with SAE 70 R3 Heavy Duty Brake Fluid. Clark Part Number 1800200.

Master Cylinder Filler Cap Vent Hole:

Check cap vent hole for obstruction. Vent hole must be open at all times. Clean if necessary, see Plate 7339.

BRAKE PEDAL

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 disc or drum, resulting in lining wear and excessive fuel consumption.

Brake Pedal Adjustment: Refer to Plate 7964 on Page 100H 302 and follow the instructions and diagrams.

WARNING

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

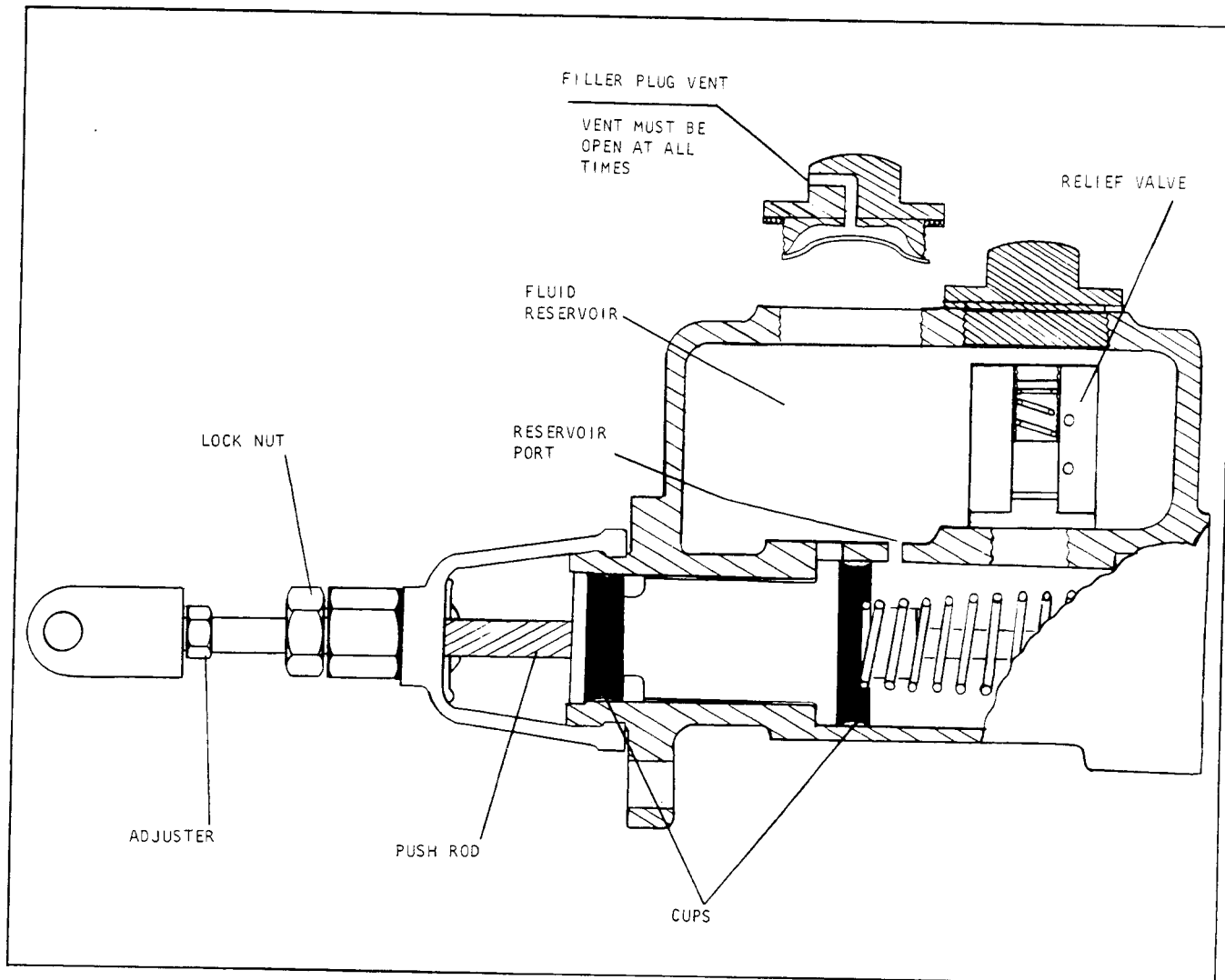


Plate 7339. Brake Pedal Adjustment



INDUSTRIAL TRUCK DIVISION



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.

WARNING

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

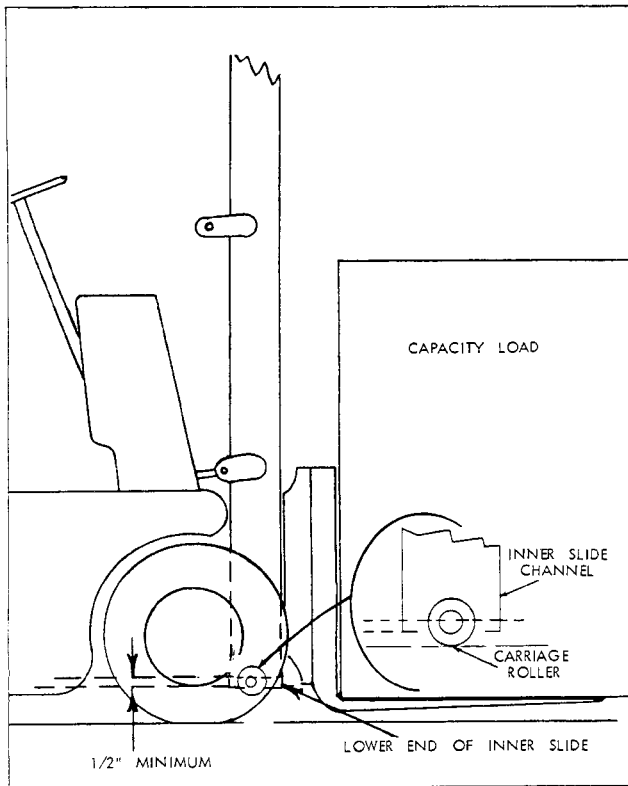


Plate 6884. Lift Chain Adjustment (Place Maximum Load On Forks)

LUBRICATE MACHINE

CAUTION

WHEN LUBRICATING THE TRUCK, MAKE A VISUAL INSPECTION OF ALL HYDRAULIC LINES, FITTINGS AND ALL ELECTRICAL WIRING. LUBRICATE ALL MISCELLANEOUS LINKAGE WITH S.A.E. NUMBER 20 OIL.

HYDRAULIC CONTROL VALVE AND LINES

Inspect for damage, leakage and security of mounting.

LIFT BRACKET

Inspect for damage, bent forks etc.

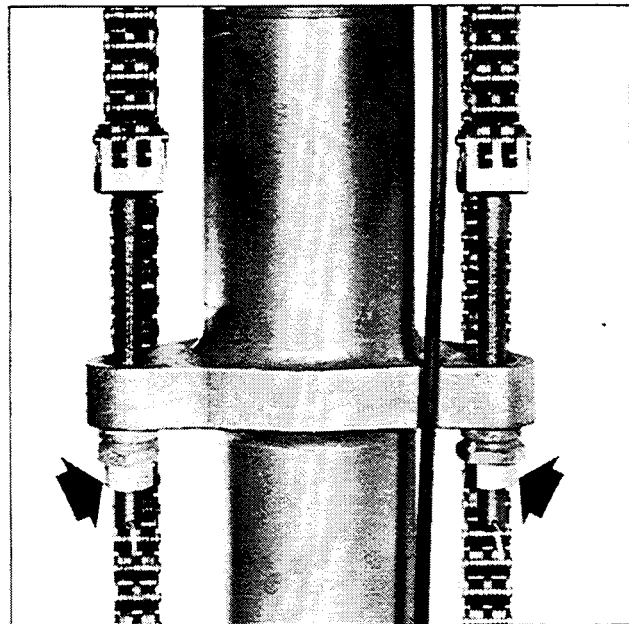


Plate 6634. Lift Chain Adjustment (Chain Anchor Rods)

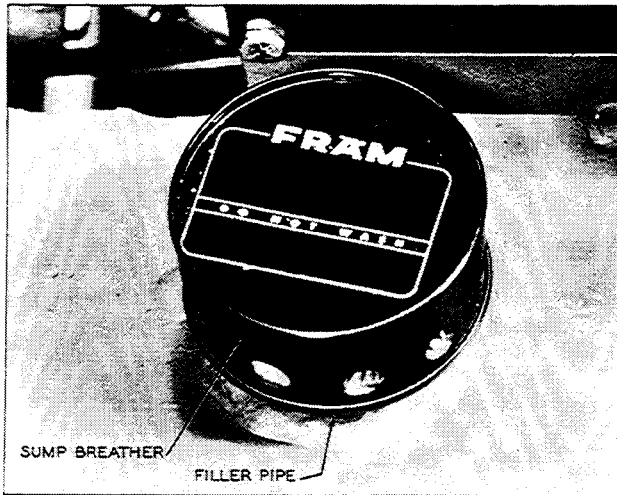


Plate 6626. Hydraulic Sump Tank

HYDRAULIC SUMP TANK BREATHER

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

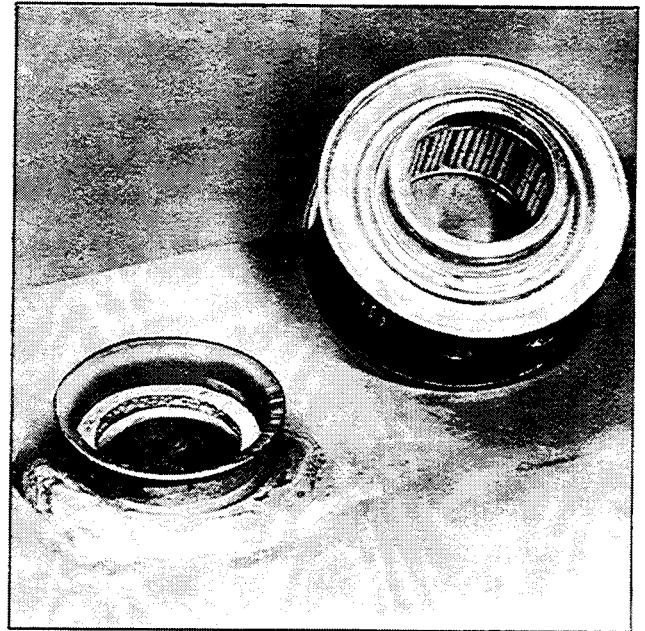


Plate 6682. Hydraulic Sump Tank & Sump Breather

BATTERY INSPECTION

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

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

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

N O T E

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

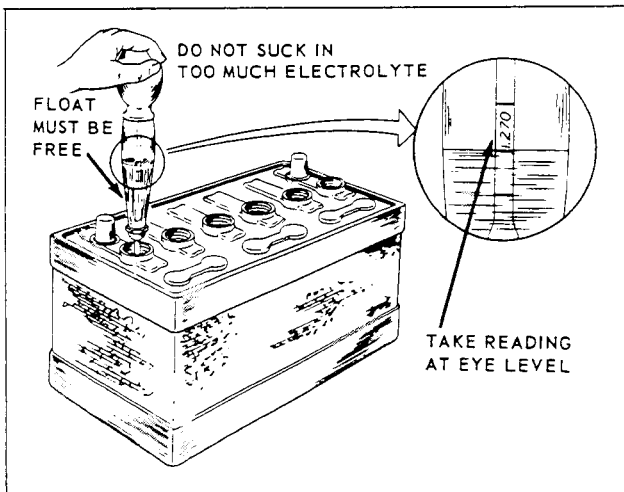


Plate 6271. Checking Specific Gravity of Battery

Make sure that all connections are tight at battery, starter, generator/alternator voltage

regulator, distributor and spark plugs. Corrosion can be removed from the battery cables and terminals with a solution of baking soda or ammonia and water. After cleaning, flush the top of the battery with clean water, and coat the parts with grease to retard further corrosion.

BATTERY TEST PROCEDURE

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

1. Place an electrical load on the battery by cranking the engine for three seconds. If it starts, turn the ignition off immediately.
2. Place a 10 ampere load across the battery terminals for one minute. This will condition the battery so an accurate voltage comparison test can be made between cells. (Connecting two headlights turned on low beam will equal the 10 ampere load - this method may be used in place of the load placed across the terminals.)

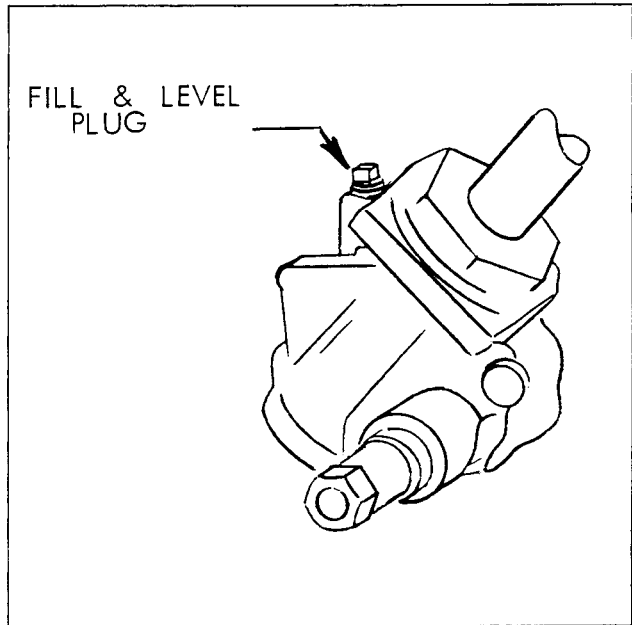


Plate 6429. Typical Steering Gear

STEERING GEAR

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

3. After one minute, and with the 10 ampere load still on the battery, check the individual cells with an expanded scale voltmeter.

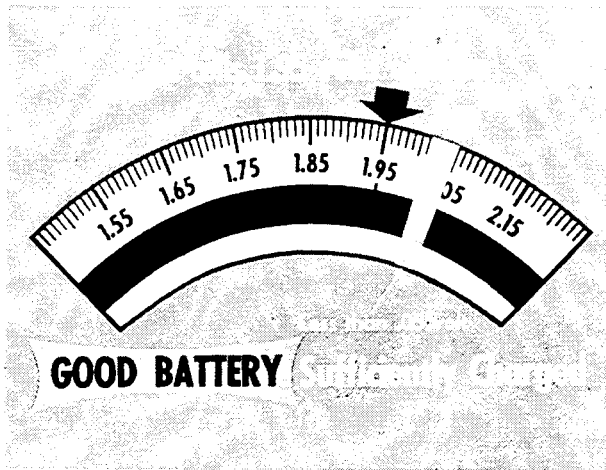


Plate 8306.

4. Place the positive voltmeter prod on the positive side of the cell and the other prod on the negative side. A good battery, sufficiently charged will read 1.95 volts or more on each cell with a difference of less than .05 volt between highest and lowest cell.

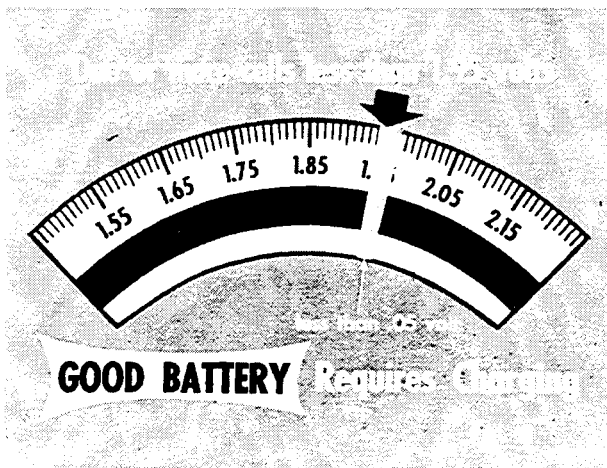


Plate 8307.

5. If cells read both above and below 1.95 volts and the difference between highest and lowest cell is less than .05 volt, battery is good but requires charging.

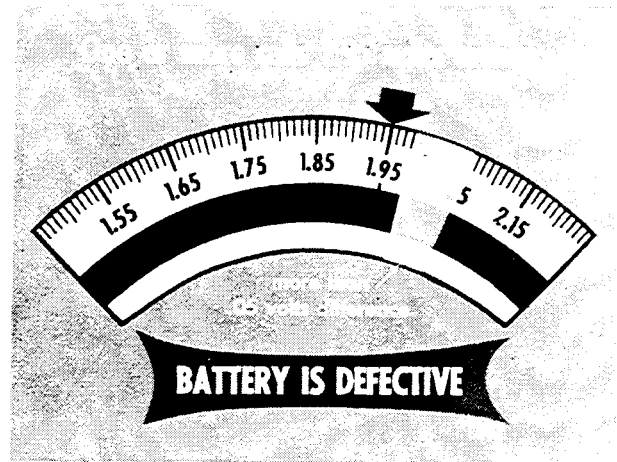


Plate 8308.

6. If any cell reads 1.95 volts or more and there is a difference of .05 volt or more between the highest and lowest cell, the battery is defective.

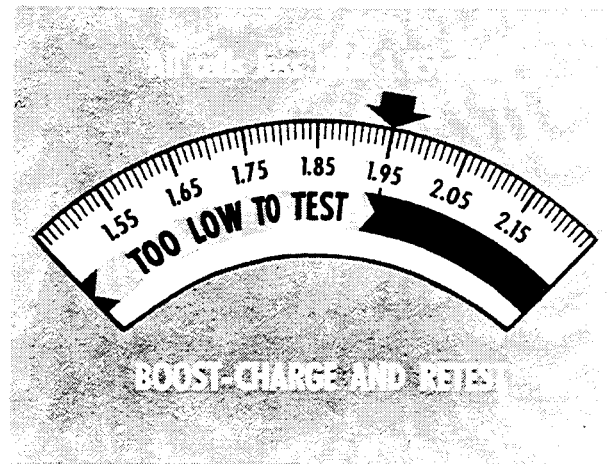


Plate 8309.

7. If all cells read less than 1.95 volts, battery is too low to test accurately. Boost-charge and repeat light load test.

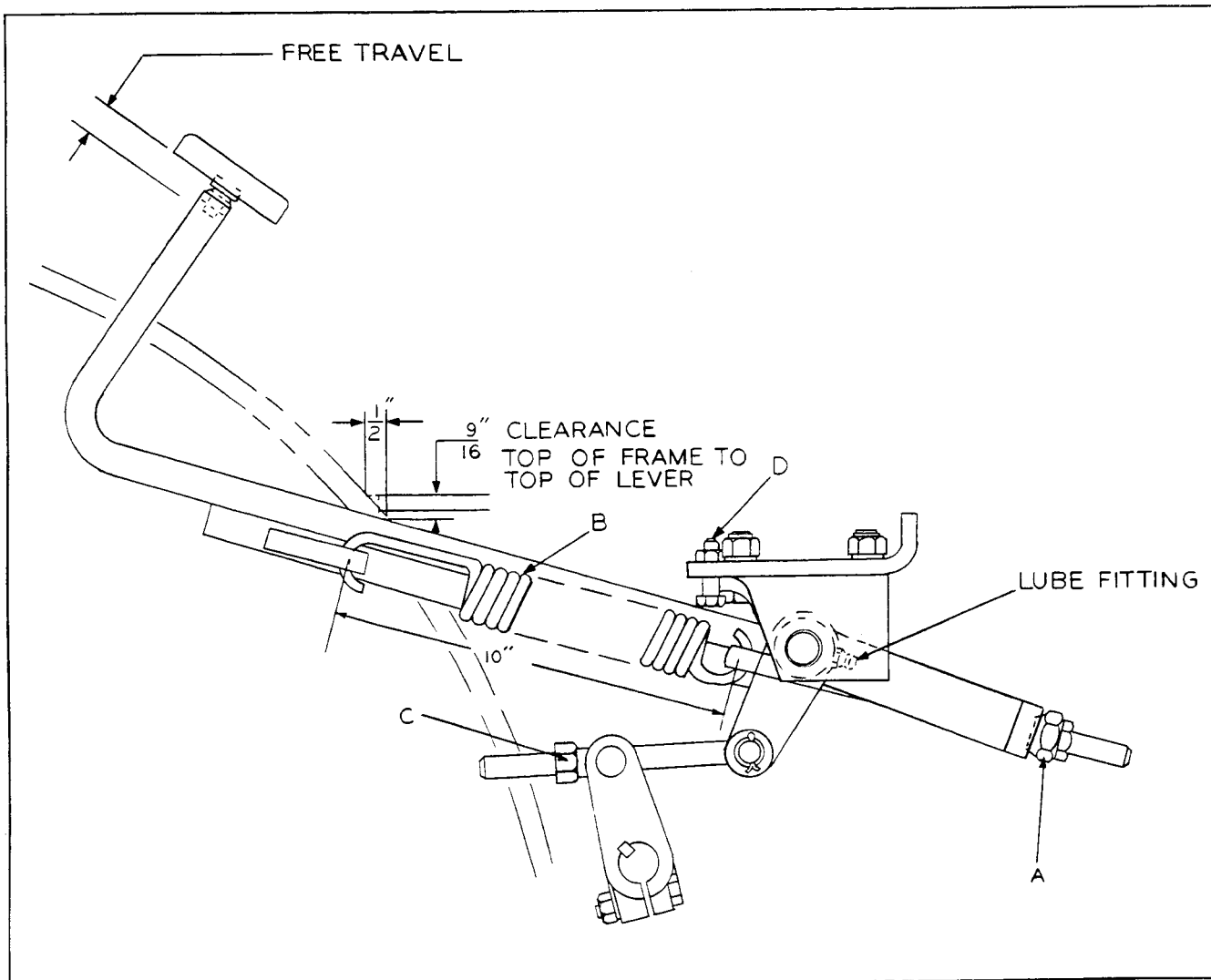


Plate 5887. CFY-CHY 60,70,80 Typical Clutch Pedal Adjustment

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

1. Adjust nut "A" on the spring adjuster rod until spring "B" measures (10") in length between the inside of the end hooks on the spring.

2. Adjust stop bolt "D" until there is 9/16 inch clearance from top of brake lever to top of frame. This measurement is taken 1/2 inch to the rear of the frame weld as shown in Plate 5887.

3. Adjust nut "C" of the clutch release arm until the clutch pedal has 5/8" to 1 inch free travel. Test the amount of free travel by depressing pedal by hand rather than the foot since this is a sensitive adjustment. The specified clearance is the distance from the top pedal position to a point where resistance is noticed from the release bearing making contact with the pressure plate release fingers.

See following page for Clutch Pedal Adjustments on CH-CF 60,70,80 machines.

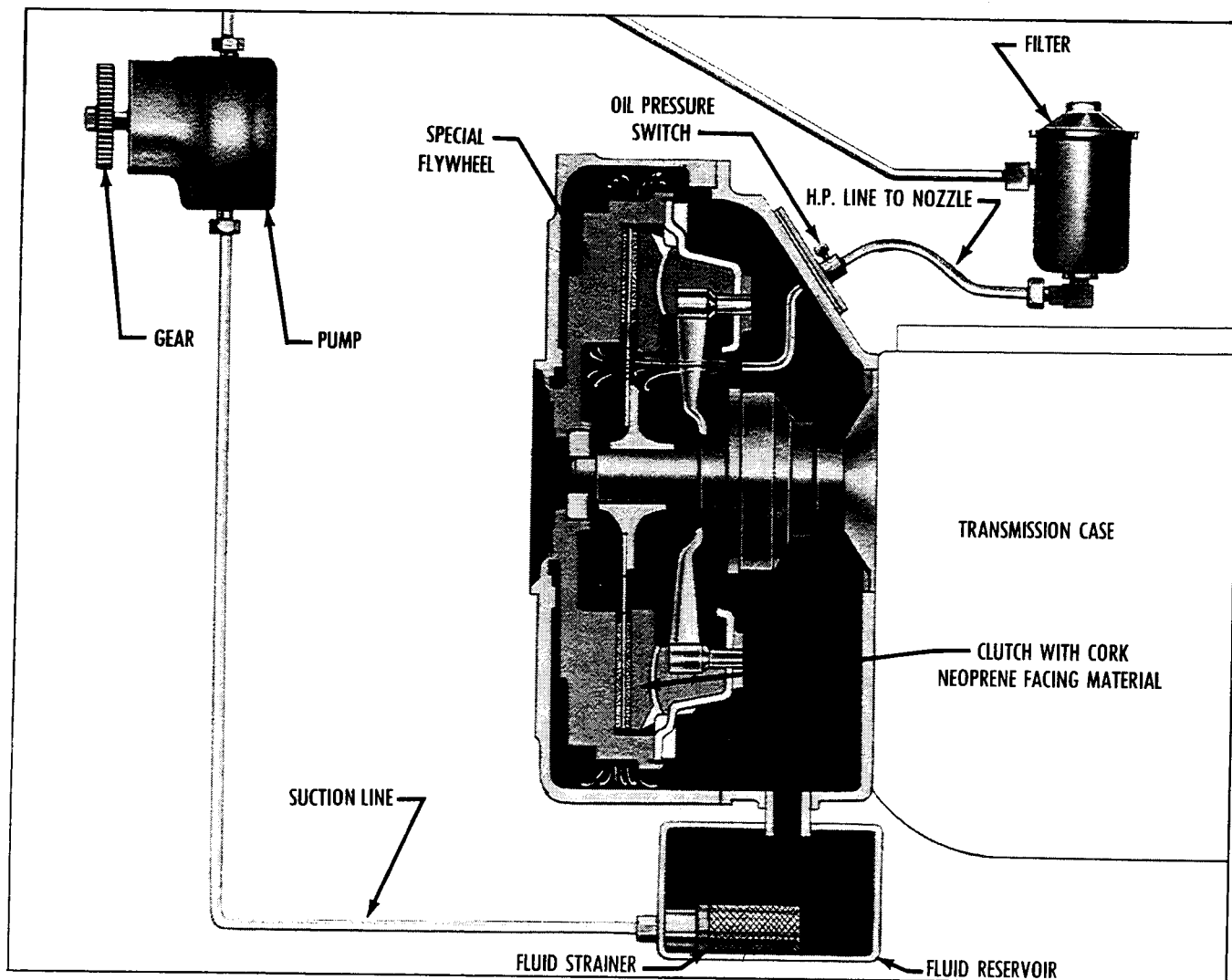


Plate 7182. Hydracool Clutch

HYDRACOOOL CLUTCH

Remove the floorplate and check fluid level. Fill, if necessary, with automatic transmission fluid type "A", suffix "A" - Clark part number 879803. Fluid containers must display a qualification number prefixed by AQ-ATF.

N O T E

AFTER THE FIRST 100 OPERATING HOURS REMOVE AND CLEAN THE SUMP SCREEN. CHECK THE OIL FILTER AND CHANGE ELEMENT IF NECESSARY. THE FILTER ELEMENT AND SUMP SCREEN WILL NEED TO BE SERVICED EVERY 1000 OPERATING HOURS THEREAFTER.

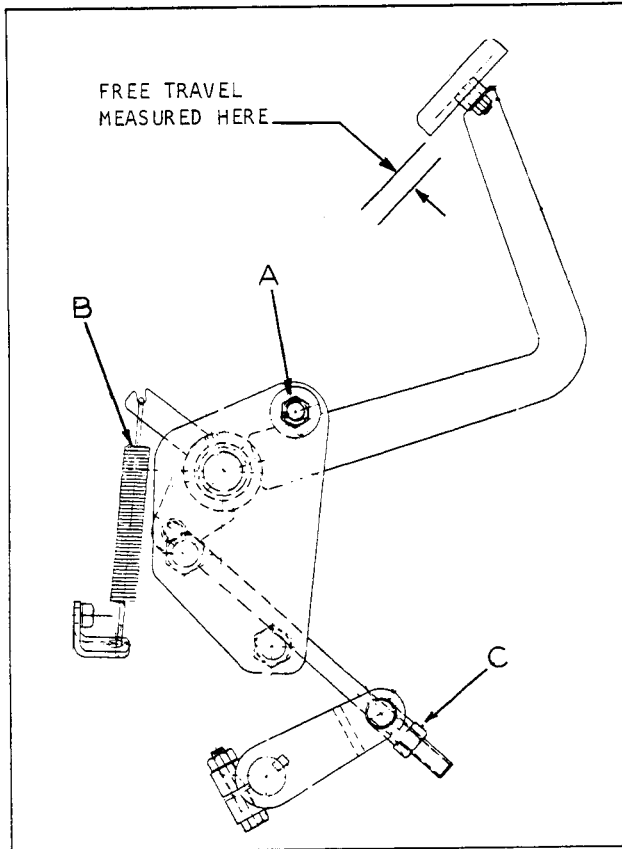


Plate 7399. CF-CH 60,70,80
Clutch Pedal Adjustment

The Clutch Pedal Adjustment is necessary to compensate for clutch facing wear and provide clearance between the release bearing and pressure plate fingers. The adjustment is made beneath the floor plates.

1. It is recommended that the return spring "B" be disconnected before proceeding to the clutch pedal free travel adjustment.

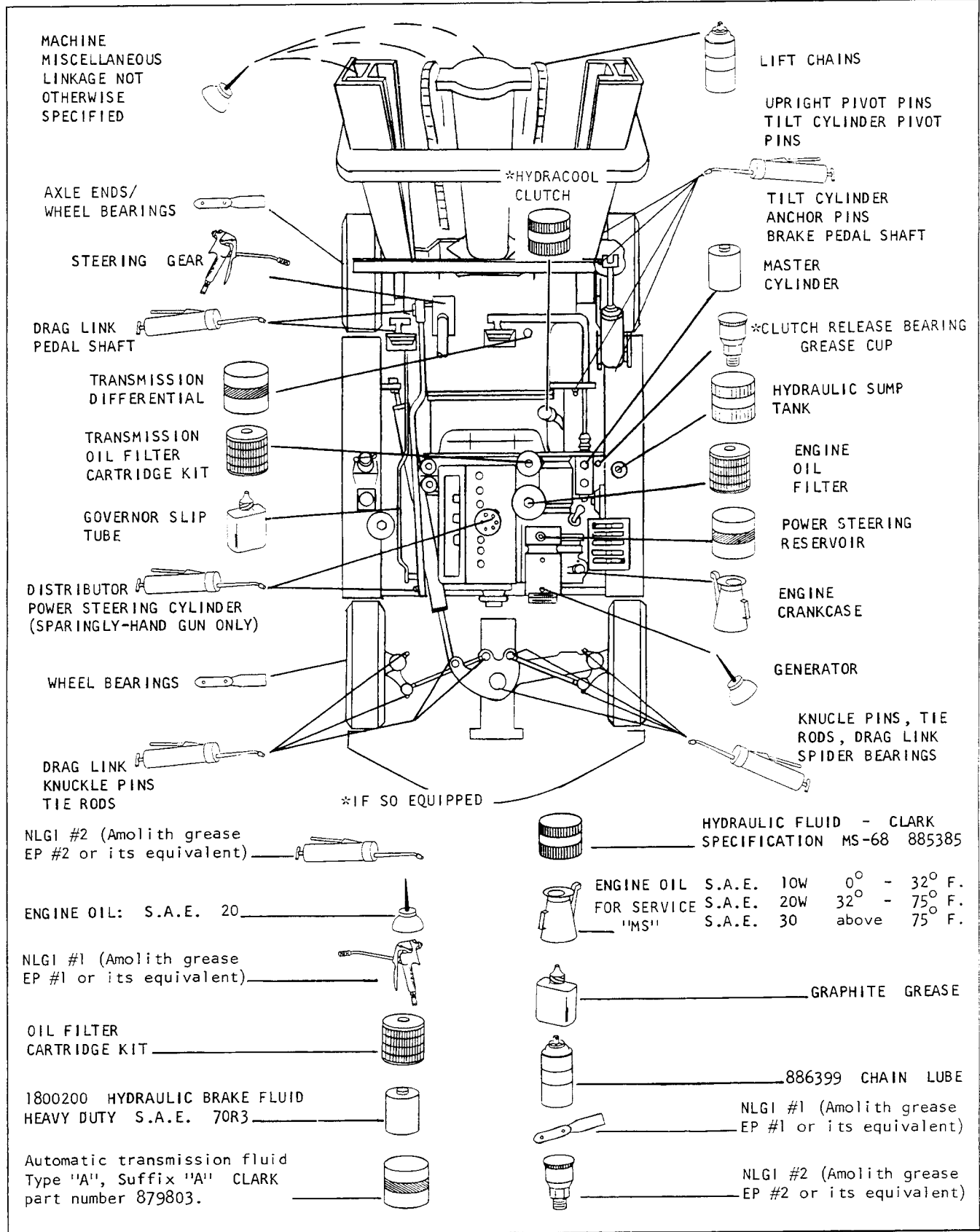
2. Adjust nut "C" of the clutch release rod until the clutch pedal has 5/8" to 1" free travel. The specified clearance is the distance from top pedal position (against lever stop "A") to a point where resistance is noticed from the release bearing making contact with the pressure plate release fingers. After correct free play is obtained replace clutch pedal return spring.



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FOUNDRY SPECIAL INSPECTION AND SERVICE INTERVAL CHECK LIST

	HOURS					
	8	50	100	250	500	1000
ENGINE OIL - CHECK LEVEL	X					
DRAIN & REFILL		X				
REPLACE FILTER		X				
ENGINE AIR FILTER - PRECLEANER BOWL - EMPTY	X					
DUST CUP - END COVER - EMPTY	X					
FILTER - CLEAN (CLEAN MORE FREQUENTLY IF RESTRICTION INDICATOR IS IN RED ZONE)			X			
FILTER - REPLACE						X
RADIATOR COOLANT LEVEL - CHECK	X					
BATTERY WATER LEVEL - CHECK			X			
TRANSMISSION OIL LEVEL - CHECK	X					
REPLACE FILTER ELEMENT				X		
DRAIN OIL, CLEAN SUMP SCREEN & REFILL					X	
CRANKCASE VENTILATION - COLLECTOR JAR - EMPTY		X				
VAPOR FILTER ELEMENT - REPLACE				X		
CHECK VALVE - CLEAN				X		
CRANKCASE BREATHER FILTER - CLEAN				X		
CRANKCASE BREATHER FILTER - REPLACE						X
SUMP TANK - BREATHER FILTER - CLEAN		X				
- REPLACE					X	
INTAKE SCREEN - CLEAN OR REPLACE						X
CHANGE OIL & FLUSH HYDRAULIC OIL SYSTEM						X
HYDRAULIC OIL RETURN LINE FILTER - REPLACE						
ELEMENT WHEN INDICATOR GAUGE POINTS TO RED ZONE OR AS INDICATED ON FILTER DECAL. (CHECK AT IDLE SPEED WITH OIL HOT) (APPROX.)					X	
POWER STEERING - FILLER CAP - REPLACE						X
DRAIN OIL, FLUSH COMPLETE SYSTEM, ADD OIL						X
ROD WIPER - REPLACE						X
LIFT & TILT CYLINDER ROD WIPER (URETHANE) REPLACE						X
BRAKE MASTER CYLINDER BREATHER FILTER - CLEAN					X	

NOTE - SEE TRUCK OPERATORS MANUAL FOR ADDITIONAL INSPECTION & SERVICE RECOMMENDATIONS

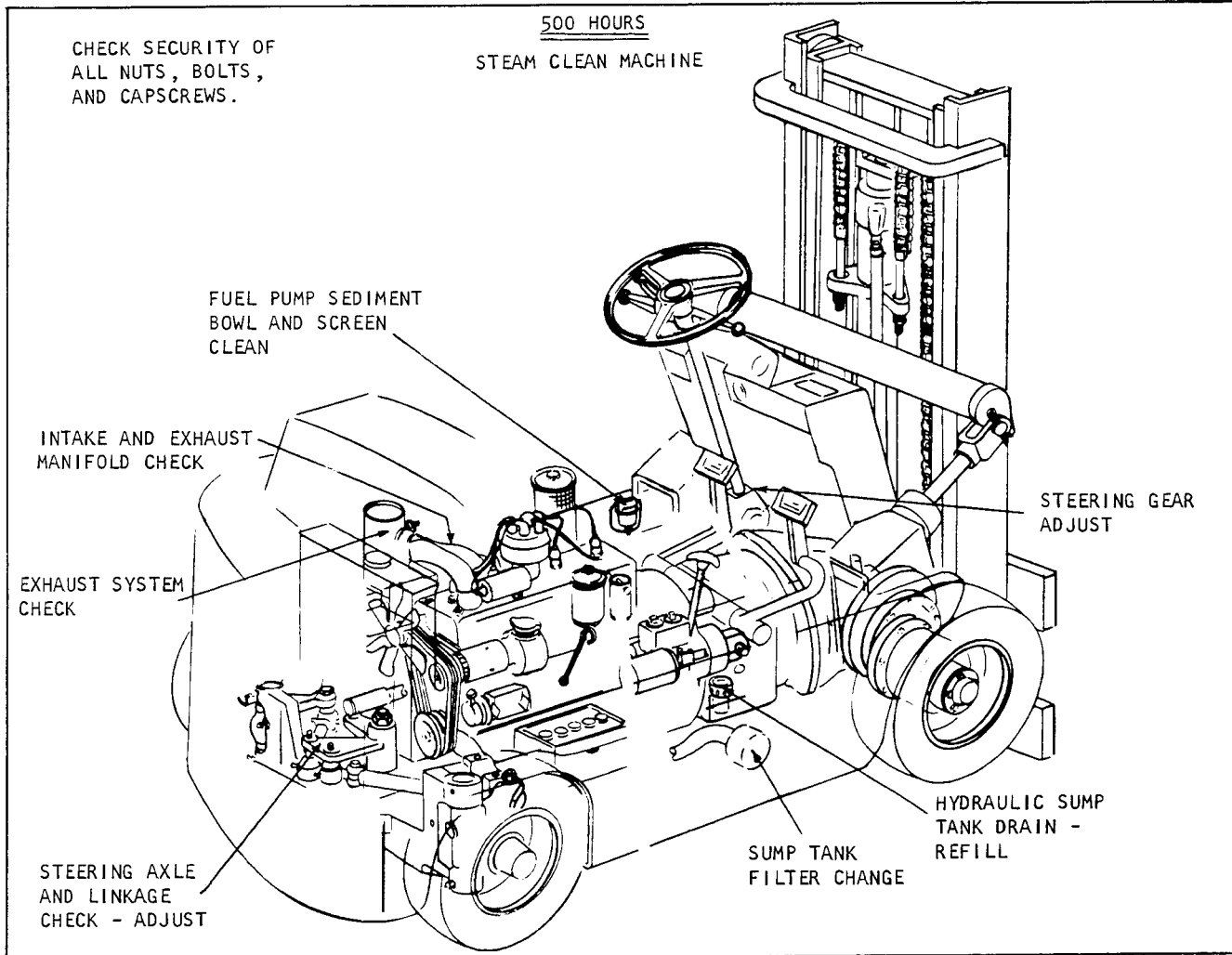


Plate 7392. Lubrication and Preventive Maintenance Illustration

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 lbs. If the fuel pump pressure is not within this range the pump should be removed for repair or replacement. CAUTION: TO MINIMIZE ANY POSSIBLE FIRE HAZARD. DO NOT SPILL GASOLINE.

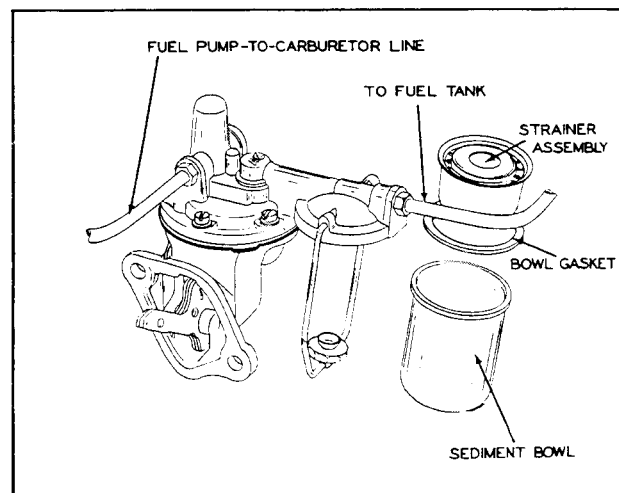


Plate 6432. Fuel Pump & Sediment Bowl

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.

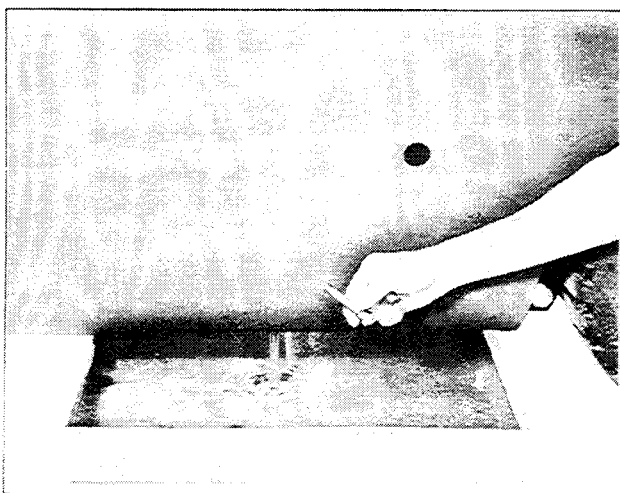


Plate 5359. Draining Sump Tank

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.

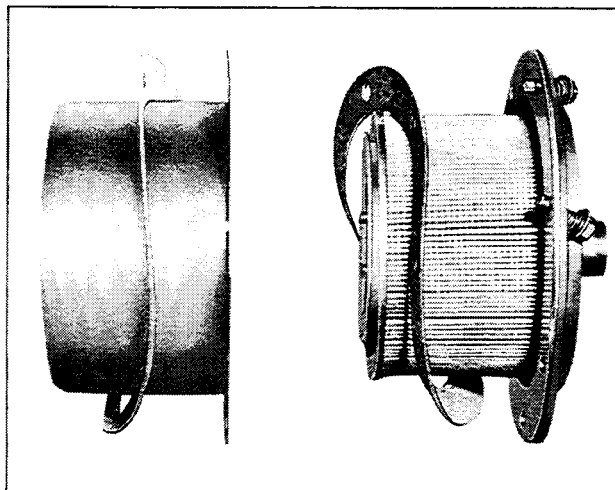


Plate 5274. Sump Tank Oil Filter Components

- 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 NLGI #1 Amolith grease EP #1 or its equivalent).
3. Tighten steering gear housing to frame side member bolts, see Plate 6636.
4. Determine straight-ahead position of steering mechanism by turning steering wheel to extreme right.

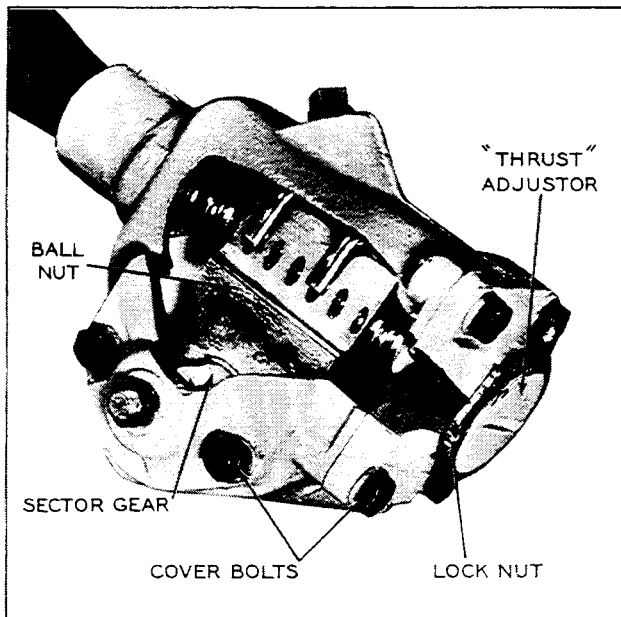


Plate 6636. Steering Gear Thrust Adjustment (Worm Bearings)

C A U T I O N

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

Then turn to extreme left, counting the exact number of turns from right to left end. Turn wheel back one-half number of wheel turns. Mark wheel with respect to steering column so center position may readily be found during adjustment procedures.

Worm Bearing THRUST Adjustment: Refer to Plate 6636 and proceed as follows:

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

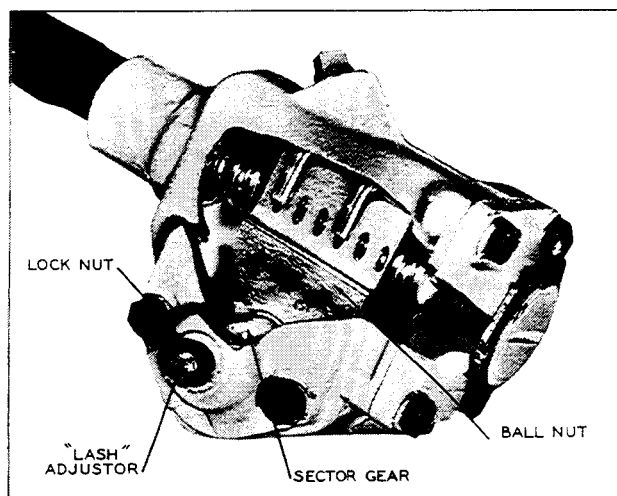


Plate 6637. Steering Gear Lash Adjustment (Sector Gear)

2. Turn steering wheel GENTLY to one extreme end. Turn wheel back one full turn. With spring scale on spoke of wheel, measure pull required to KEEP WHEEL MOVING. Pull on scale should be made at right angles to wheel spoke. If pull is within 1 1/2 to 2 pounds, proceed to lash adjustment in the following paragraphs. If pull is not within 1 1/2 to 2 pounds, adjust worm bearings. The pitman shaft adjustment must be made if worm bearing check is accomplished, or if the worm bearings are adjusted.

3. If it is necessary to adjust the worm bearings, loosen lock nut and then turn worm bearing adjuster nut clockwise until all end play is removed, see Plate 6636. Using



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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.

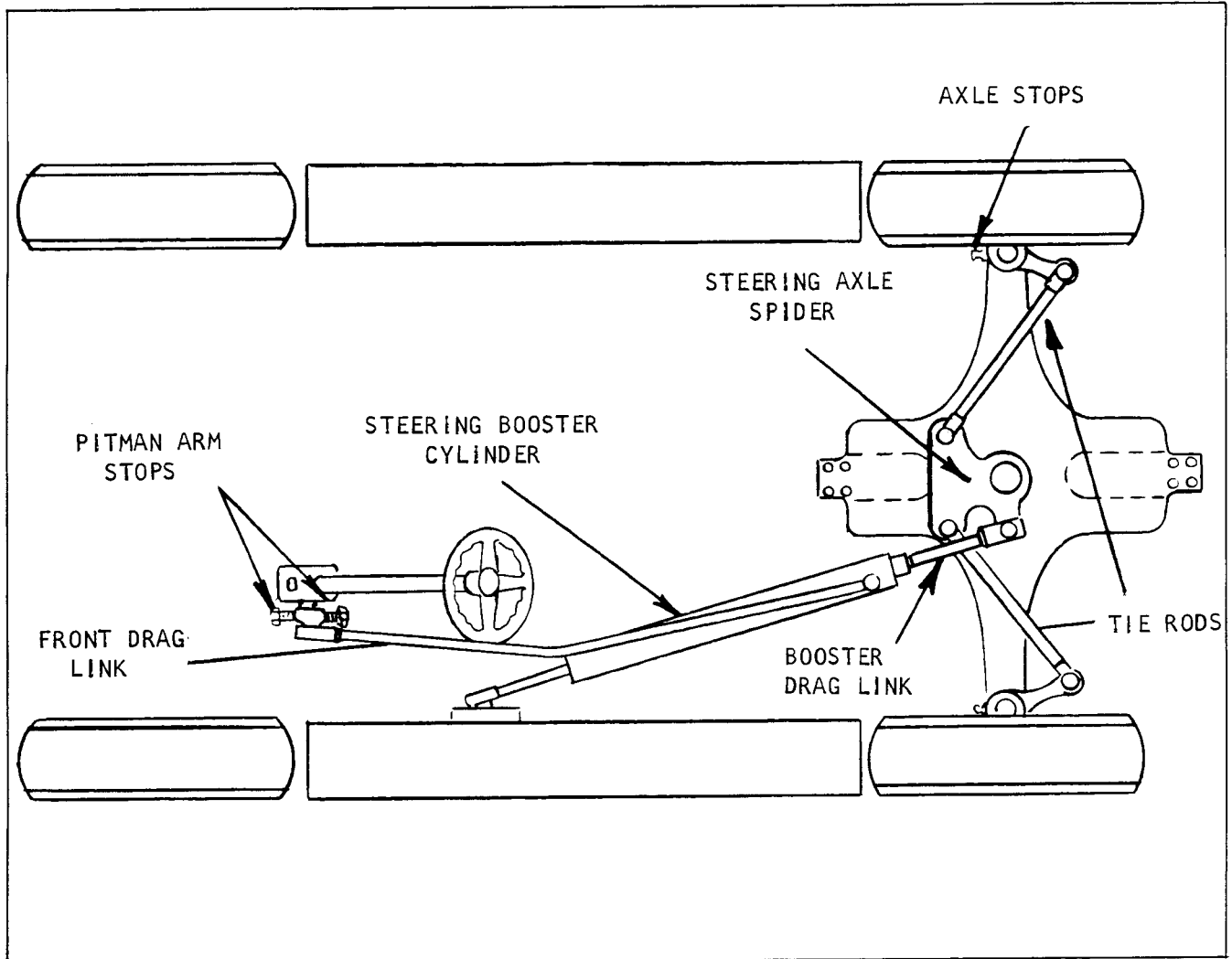


Plate 7340. Steering Linkage

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 steering booster socket from the steering axle spider noting the relative position of the socket parts so they may be re-installed correctly

after checking wheels for correct turning geometry.

4. Check wheels for correct turning geometry by turning the wheels all the way for a left turn - this should allow the left wheel to attain an angle of 75 degrees to the frame on pneumatic tire machines and 78 degrees on solid tire machines. If an adjustment is necessary, the axle stop on the left side should be turned in or out whichever is necessary to achieve the correct angle. Repeat this procedure in a right turn with the opposite wheel and adjust the right axle stop as required.

WARNING

IF THE STEERING BOOSTER CYLINDER IS TO BE ACTUATED UNDER POWER DO SO ONLY WITH THE ENGINE RUNNING AT IDLE SPEED, USING EXTREME



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CARE TO KEEP CLEAR OF MOVING LINKAGES TO PREVENT PERSONAL INJURY.

5. Collapse the booster cylinder until bottomed out. Extend booster cylinder from collapsed position 1/4" to 1/2". Adjust socket on end of rear drag link so that grease fitting lines up with center of spider ball. (Wheels remaining in the right turn position against axle stop). Before securing socket lock nut position the booster cylinder so that the control ball stud points out toward the truck frame at an angle of about 45 degrees to the vertical.

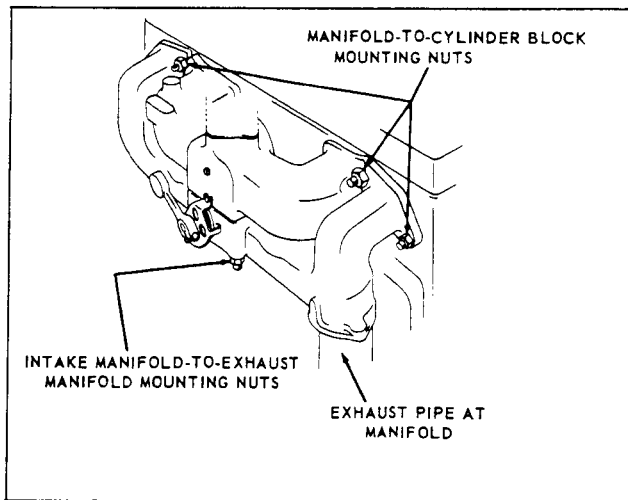
6. Turn wheels to straight ahead position and disconnect drag link at pitman arm.

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

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

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

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

**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

LUBRICATION AND PREVENTIVE MAINTENANCE

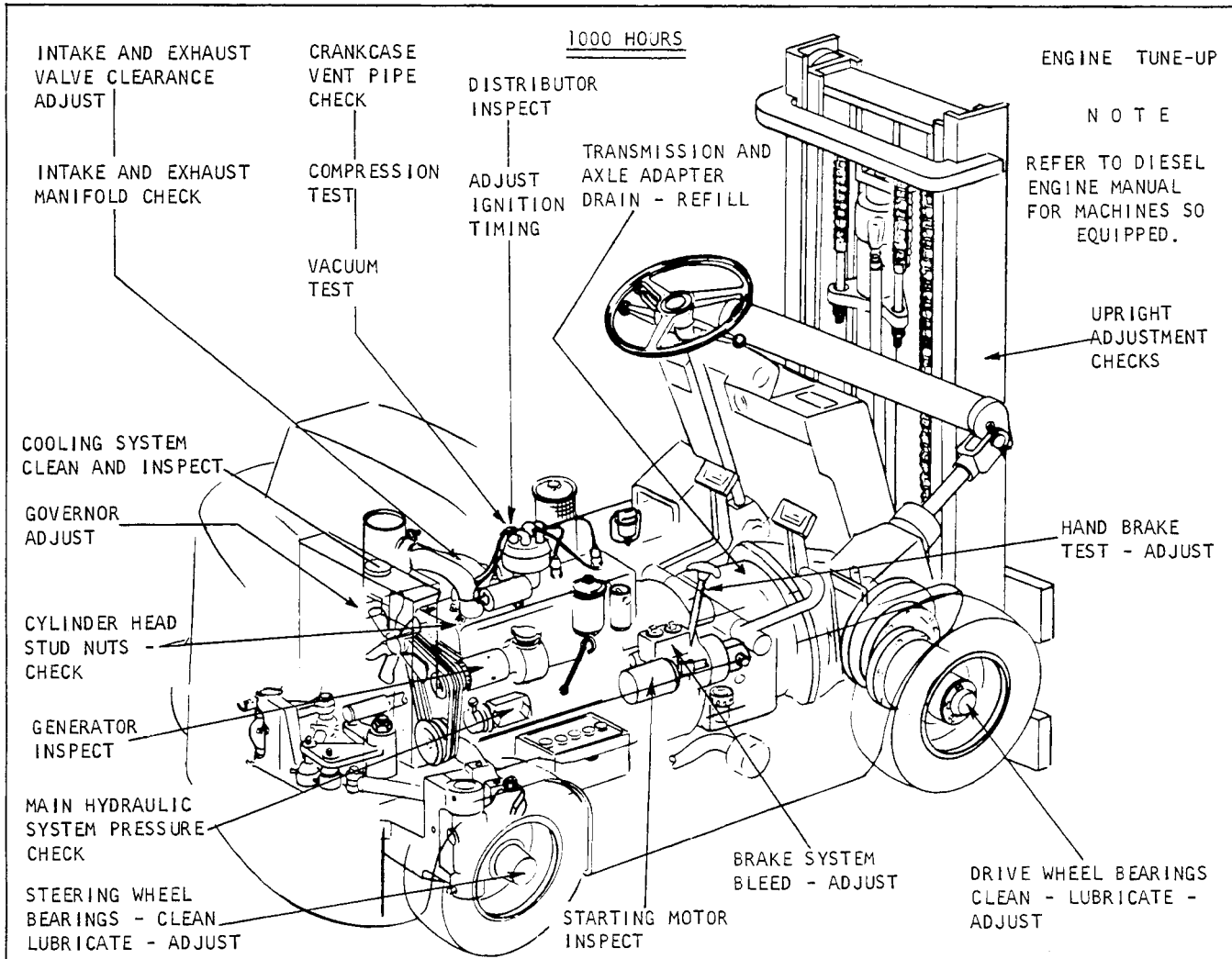


Plate 7393. Lubrication and Preventive Maintenance Illustration

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.

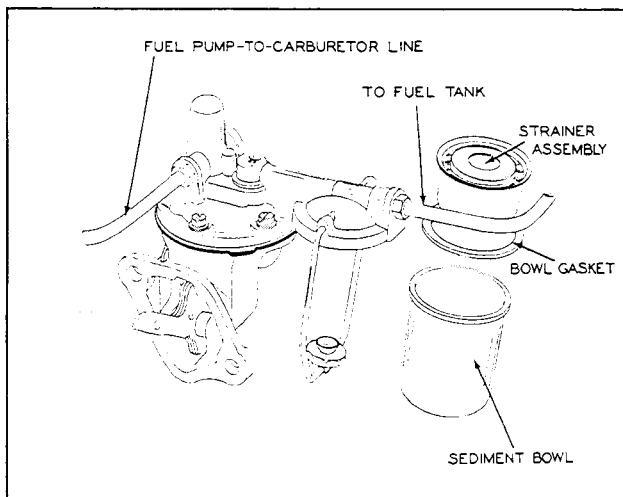


Plate 6432. Fuel Pump Strainer & Sediment Bowl

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 LISTED IN PLATE 5927 MUST BE FOLLOWED. ALL CYLINDER HEAD CAP SCREWS OR NUTS MUST BE TIGHTENED EVENLY AND TORQUED IN ACCORDANCE WITH LIMITS LISTED IN SPECIFICATIONS.

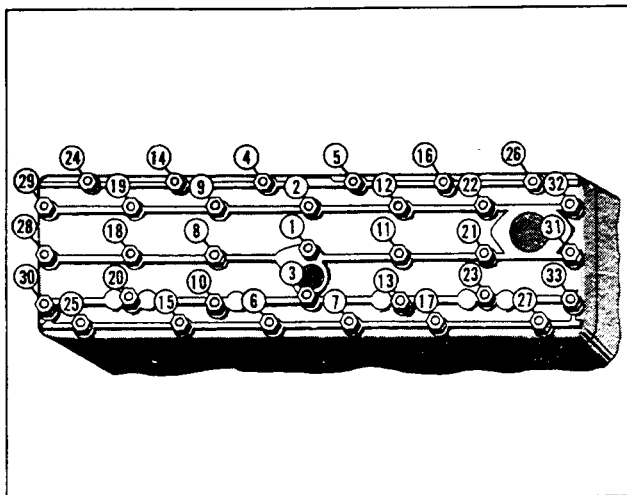


Plate 5927. Cylinder Head Stud Nut Tightening Sequence

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

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:

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.

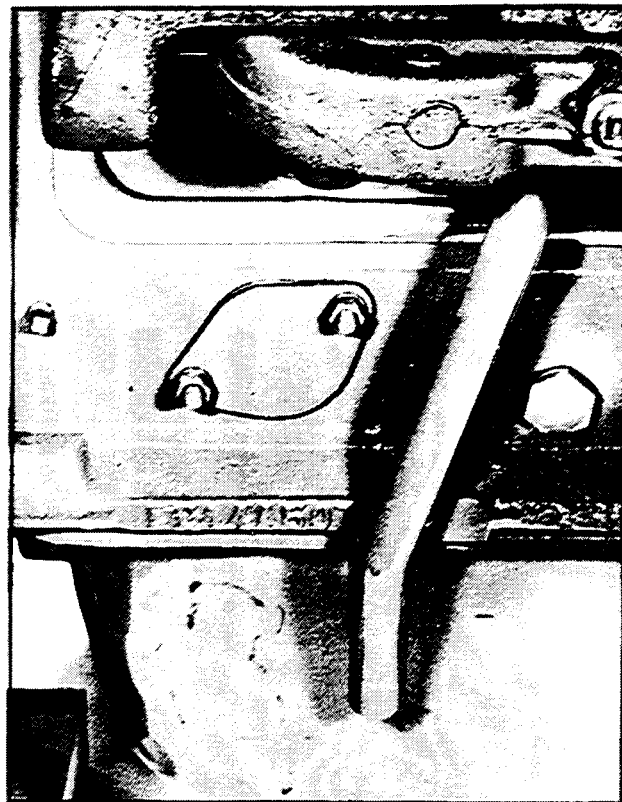


Plate 6628. Crankcase Vent Pipe

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 inch 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.



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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 listed, 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.

NOTE

DO NOT REUSE OLD GASKETS. THEY DO NOT AFFORD A POSITIVE SEAL.

o. Check valve chamber cover gasket for leaks.

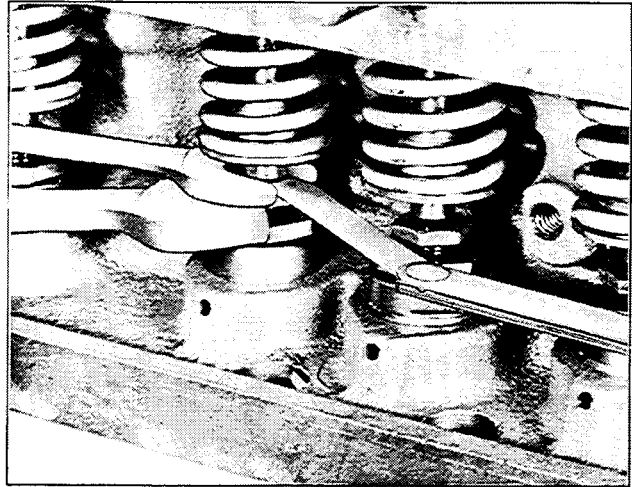


Plate 3223. Adjusting Valve Clearance

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 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 six cylinder engine is: E-I-I-E-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: 1-5-3-6-2-4.



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ADJUST TAPPETS TO THE STATIC COLD SETTINGS LISTED IN THE FOLLOWING CHART:

Engine Model	Intake	Exhaust	NOTE
Y-69	.014"	.014"	Static Cold Settings.
Y-91	.014"	.014"	Static Cold Settings.
Y-112	.014"	.014"	Static Cold Settings.
F-124	.016"	.018"	Static Cold Settings.
F-140	.016"	.018"	Static Cold Settings.
F-162	.016"	.018"	Static Cold Settings.
F-244	.016"	.018"	Static Cold Settings.
F-186	.016"	.018"	Static Cold Settings.
F-209	.016"	.018"	Static Cold Settings.
F-226	.016"	.018"	Static Cold Settings.
F-135	.012"	.020"	Static Cold Settings.
F-163	.012"	.020"	Static Cold Settings.
F-227	.012"	.020"	Static Cold Settings.
F-245	.012"	.020"	Static Cold Settings.

NOTE: Engine Nameplate Tappet Settings is for Hot Idle only.

FOR -- VEHICLES EQUIPPED WITH CONTINENTAL ENGINES.

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.

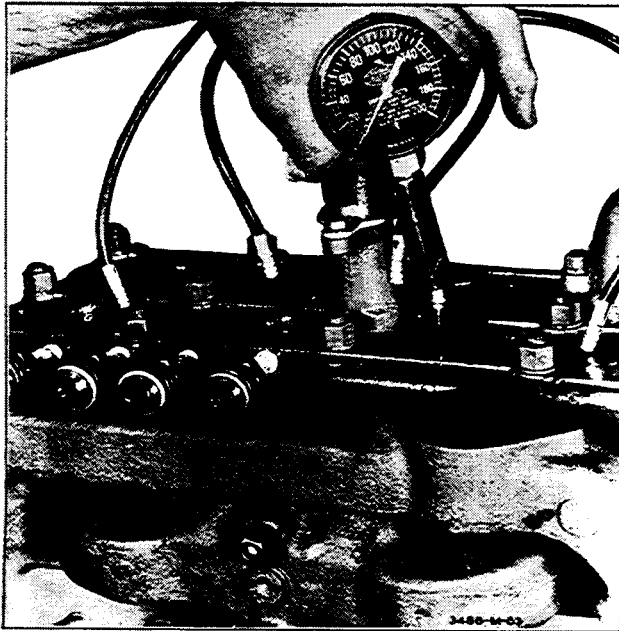


Plate 3486. Compression Test

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.

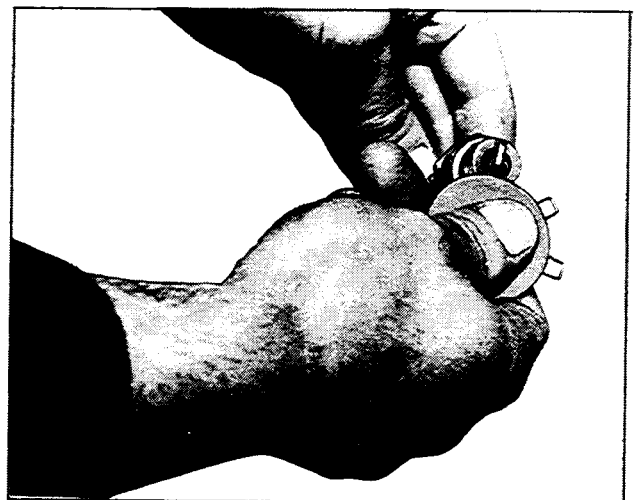


Plate 3278. Check Spark Plug Gap

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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.

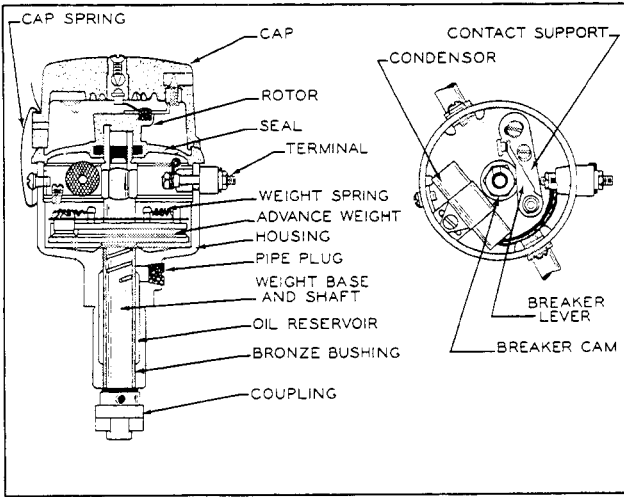


Plate 3409. Distributor

8. DISTRIBUTOR

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

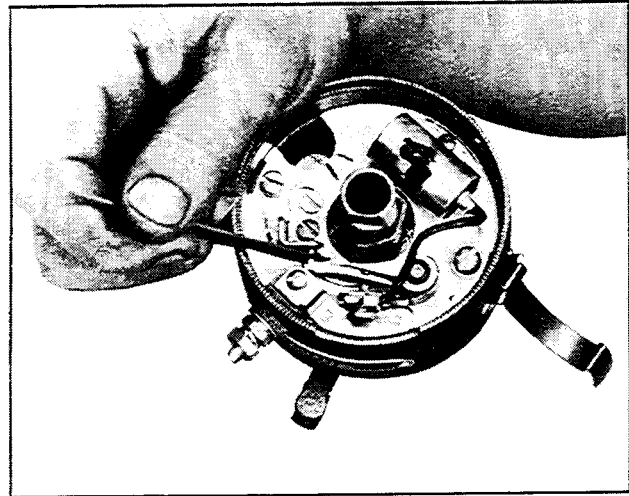


Plate 3364. File Contact Points

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

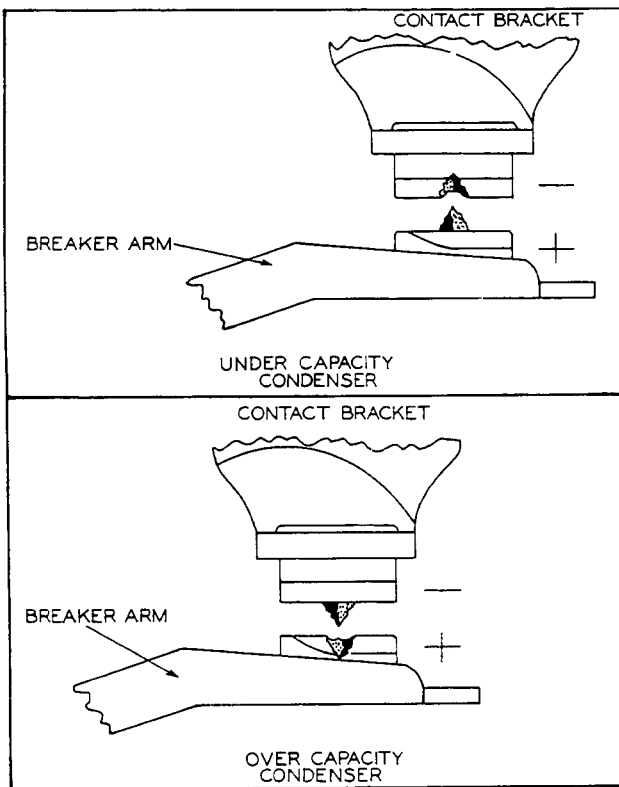


Plate 5933. Breaker Points

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.

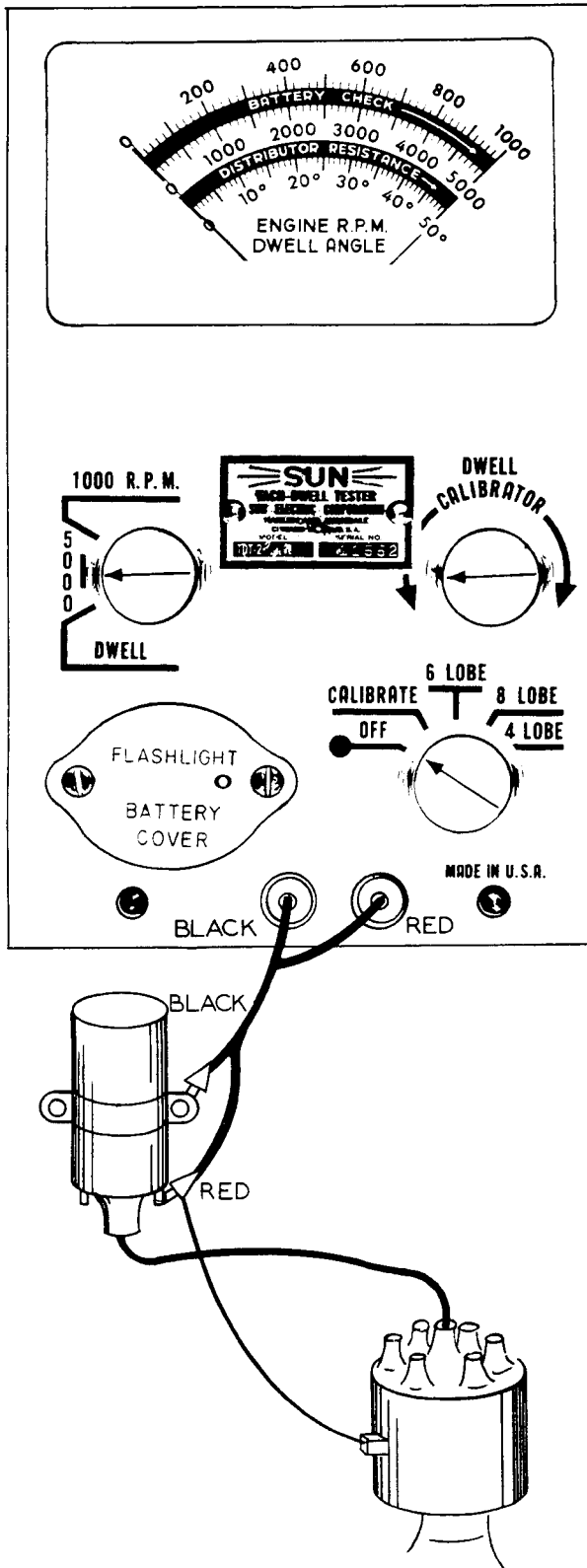


Plate 6887 Tach Dwell Meter

LUBRICATION AND PREVENTIVE MAINTENANCE

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. Manufactures of this type equipment furnish complete instructions as to their use.

NOTE

REFER TO SPECIFICATIONS FOR DWELL ANGLE AND CONTACT POINT OPENING.

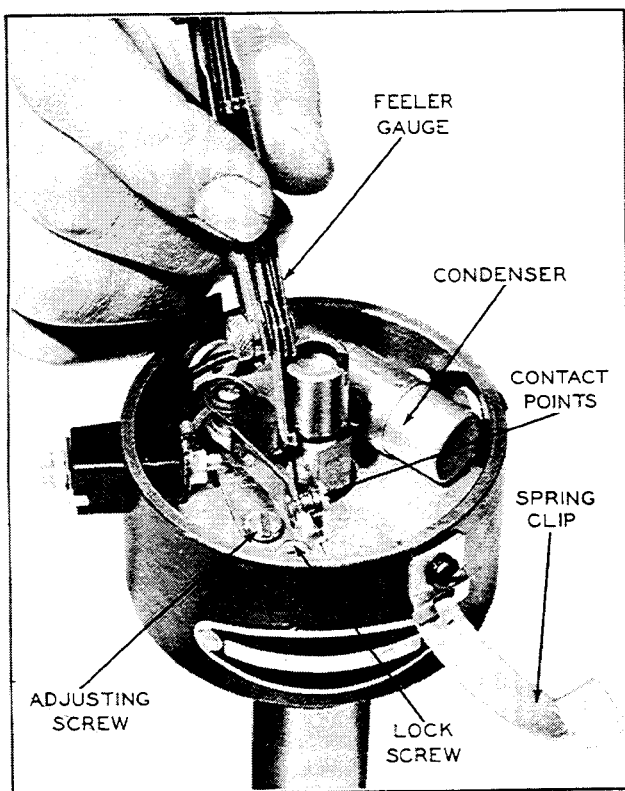


Plate 6266. Contact Point Adjustment

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.

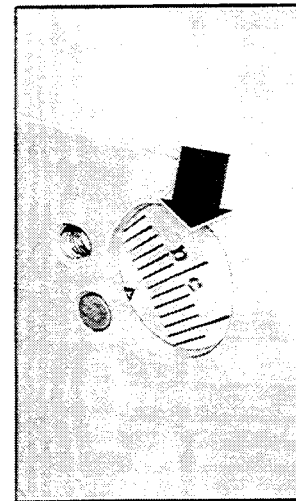


Plate 3471. Ignition Timing



INDUSTRIAL TRUCK DIVISION

SPECIFICATIONS



DISTRIBUTOR (All FOUR and SIX Cylinder Engines)

Heavy Duty Points

N O T E

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

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

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

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

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



- FOUR (4) CYLINDER ENGINES, ONLY -

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

- SIX (6) CYLINDER ENGINES, ONLY -

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

N O T E

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

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

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

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

N O T E

REFER TO SPECIFICATIONS FOR DWELL ANGLE AND CONTACT POINT OPENING.

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

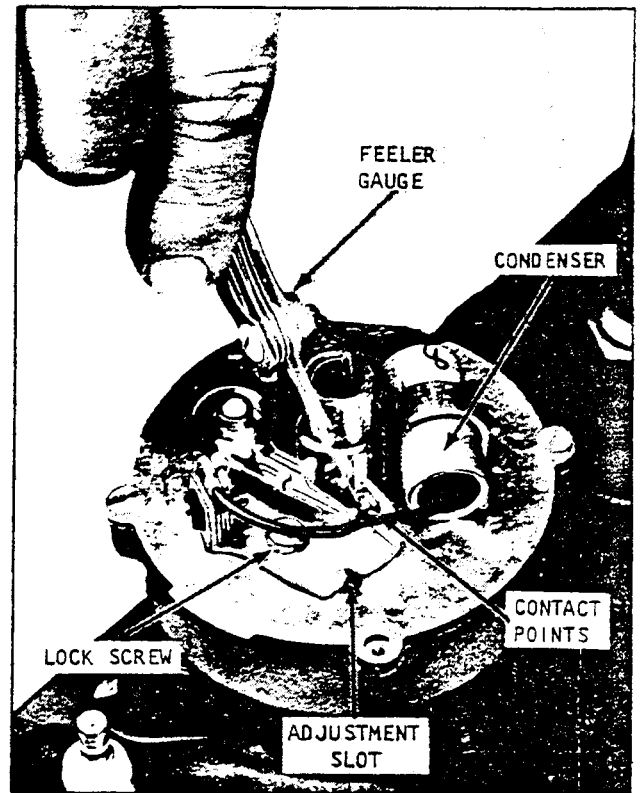


Plate 7457. Contact Point Adjustment

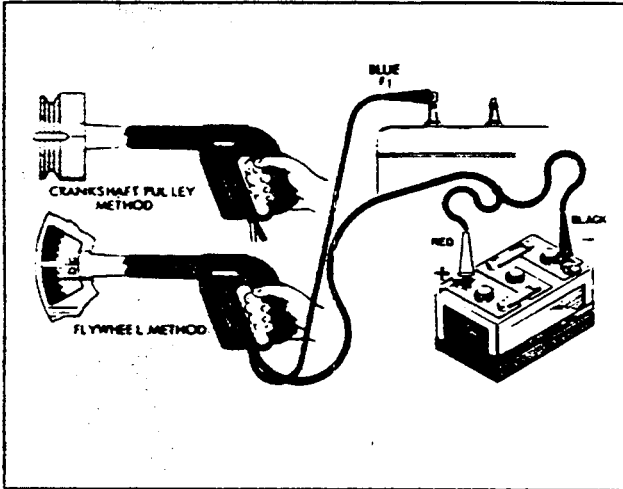


Plate 7818. Timing Light Hookup



Plate 7861. Ignition Timing

9. IGNITION TIMING

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

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

- a. Clip blue secondary lead of light to the #1 spark plug -- leave spark plug wire on plug.
- b. Connect primary positive lead (red) to positive terminal of battery.
- c. Connect primary negative lead (black) to negative battery terminal.
- d. Start engine and run a 400 RPM or below so the automatic advance of the distributor is completely retarded. **THIS IS VERY IMPORTANT TO OBTAIN CORRECT TIMING.**

NOTE

The initial advance RPM range is 430-580. Distributor advance at 600 engine RPM should be 1° to 5°.

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

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

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

ALTERNATE TIMING METHOD

- a. Remove #1 Spark Plug -- put your thumb over the spark plug hole and crank engine by hand until air is exhausting.
- b. Continue to slowly crank engine until the mark listed in specifications lines up with the pointer in bell housing.
- c. Loosen the distributor clamp bolt and rotate the distributor body until the contact points just start to open. (This may be more accurately checked by means of a test lamp connected between the distributor primary lead and the negative terminal of the battery -- when the points are closed the light will be ON and as soon as the points break the light will go OFF.)
- d. Tighten distributor mounting bolts.

10. VACUUM TEST

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

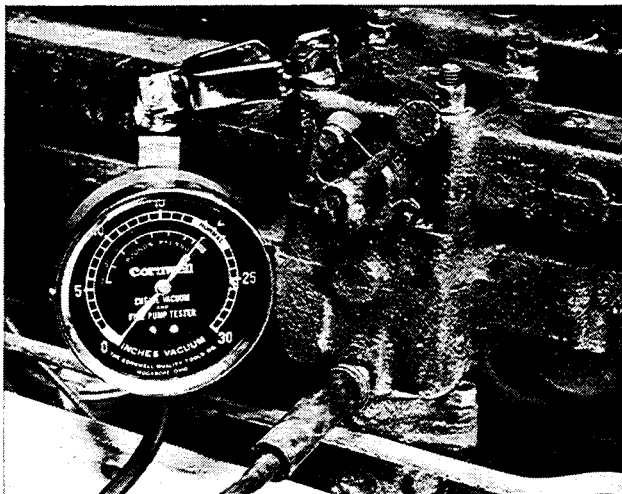


Plate 6643. Vacuum Test

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

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

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

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

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

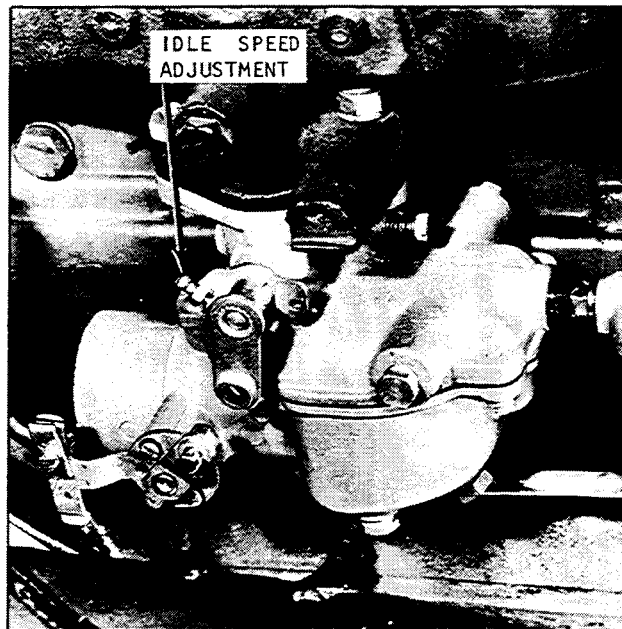


Plate 6889. Idle Speed Adjustment

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

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

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

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

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

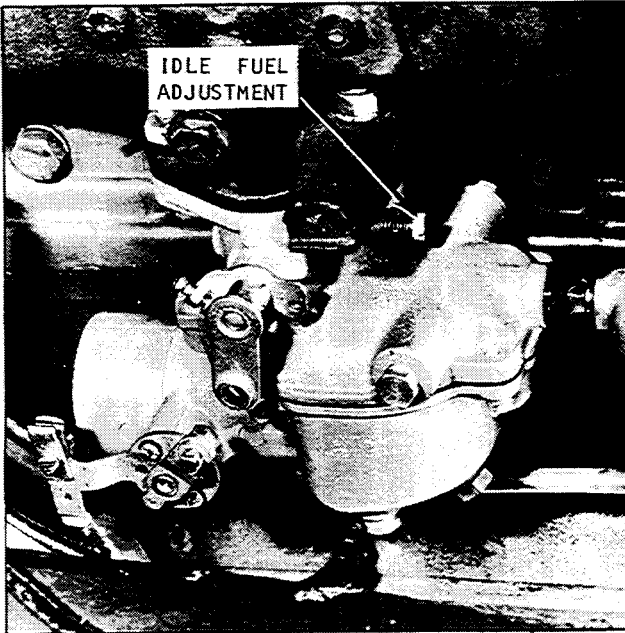


Plate 6888. Idle Fuel Adjustment

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

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

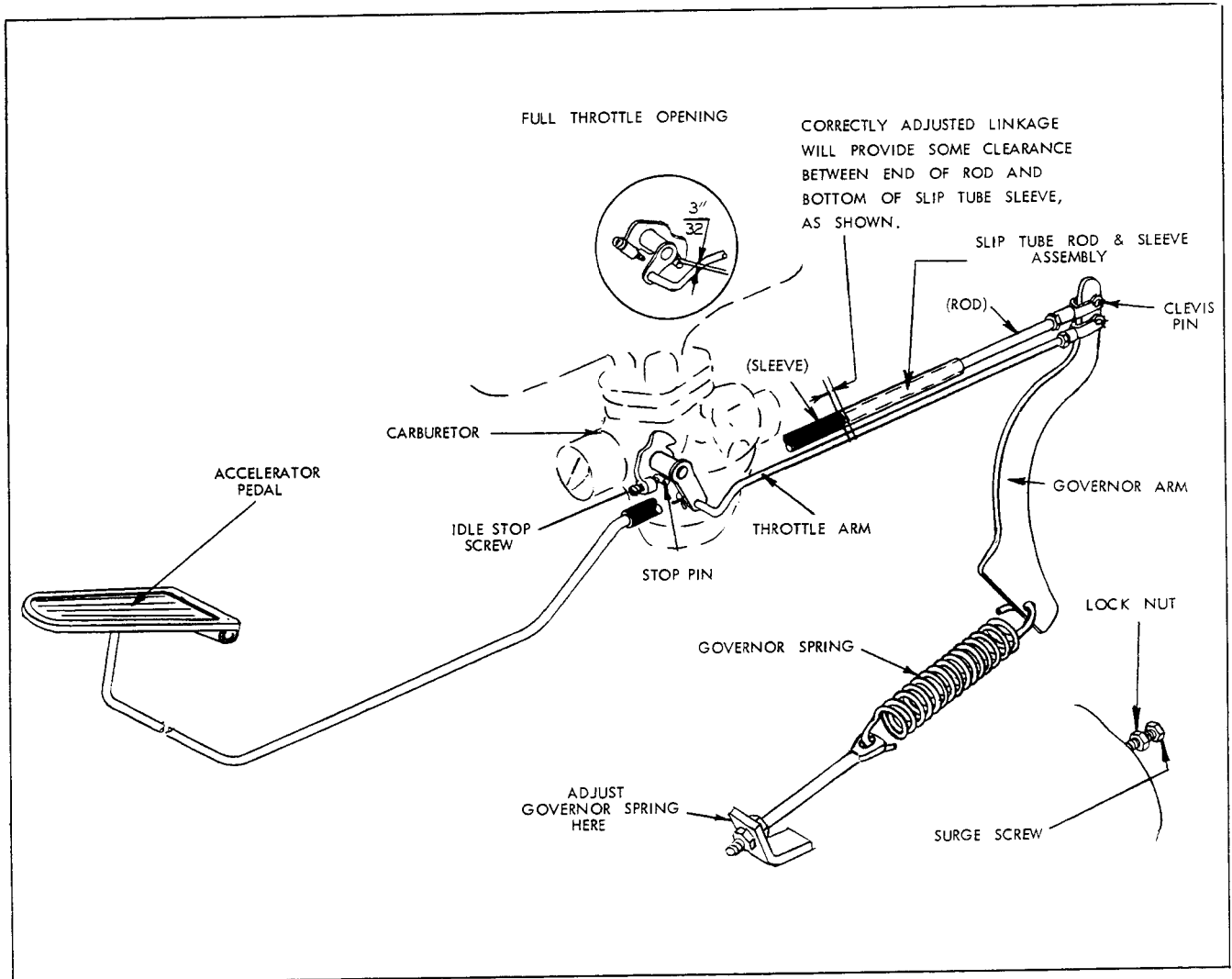


plate 6660. Governor Adjustment

11. GOVERNOR ADJUSTMENT

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

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

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

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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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.

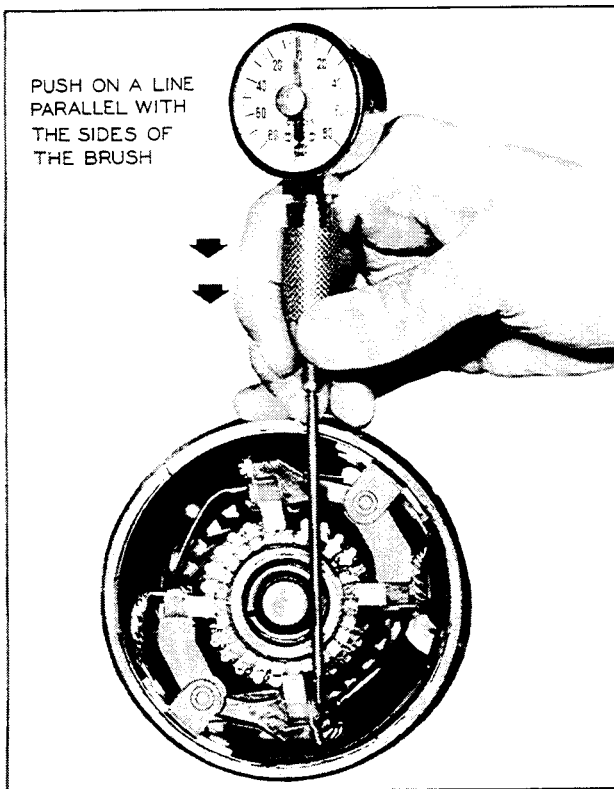


Plate 6449 Checking Brush Spring Tension

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.

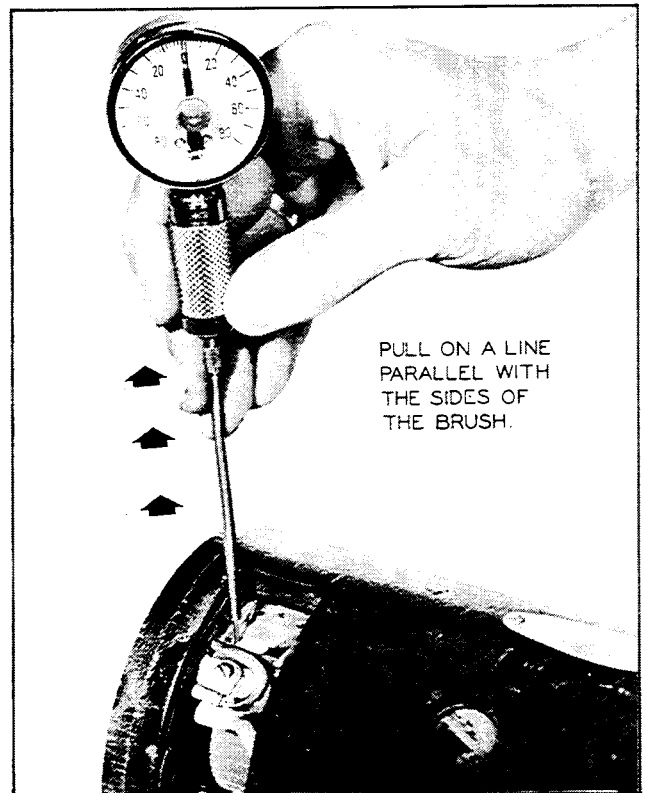


Plate 6450. Checking Brush Spring Tension

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.

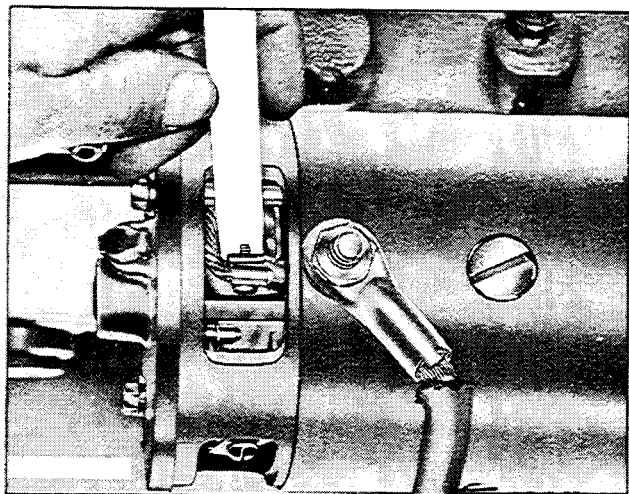


Plate 3436. Seating Brushes

N O T E

BLOW OUT ABRASIVE PARTICLES AFTER SEATING BRUSHES.

STARTER LUBRICATION

The starter end frame bushing (Commutator End) should be lubricated every 30,000 starts or at least once a year (2000 operating hours). Use American Oil Molyth number 2 grease or its equivalent.

C A U T I O N

DO NOT OVER-LUBRICATE, AS EXCESS GREASE IS DETRIMENTAL TO STARTER COMPONENTS — OVER-LUBRICATING MAY CAUSE GREASE TO BE FORCED ONTO THE COMMUTATOR AND BRUSHES.

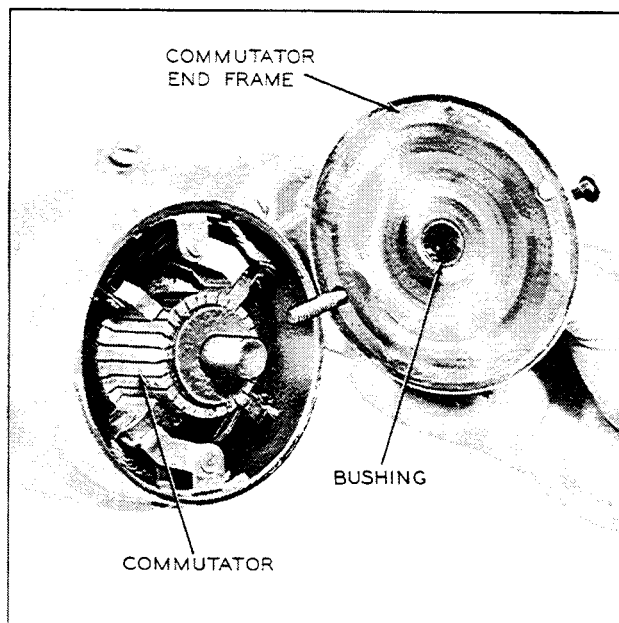


Plate 6236. End Frame Bushing Lubrication-Typical Starter

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.

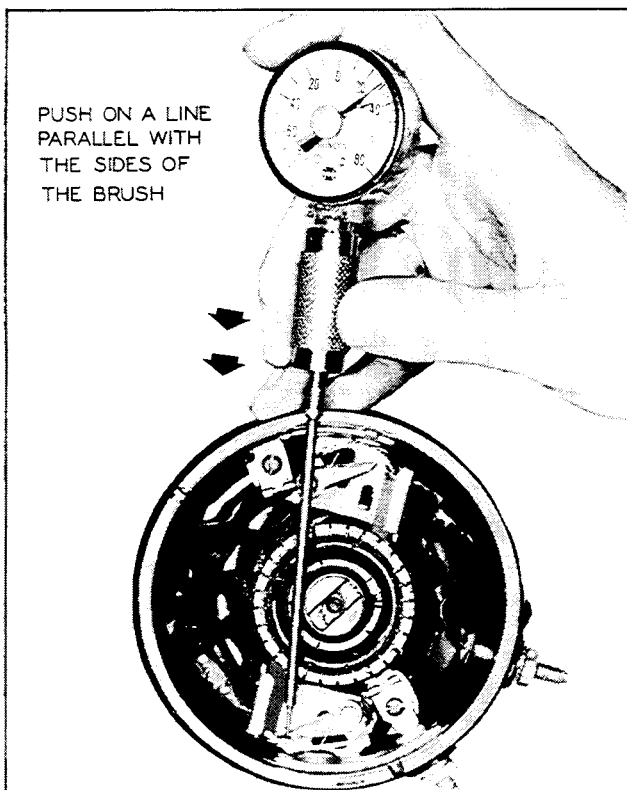


Plate 6451. Checking Brush Spring Tension

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-

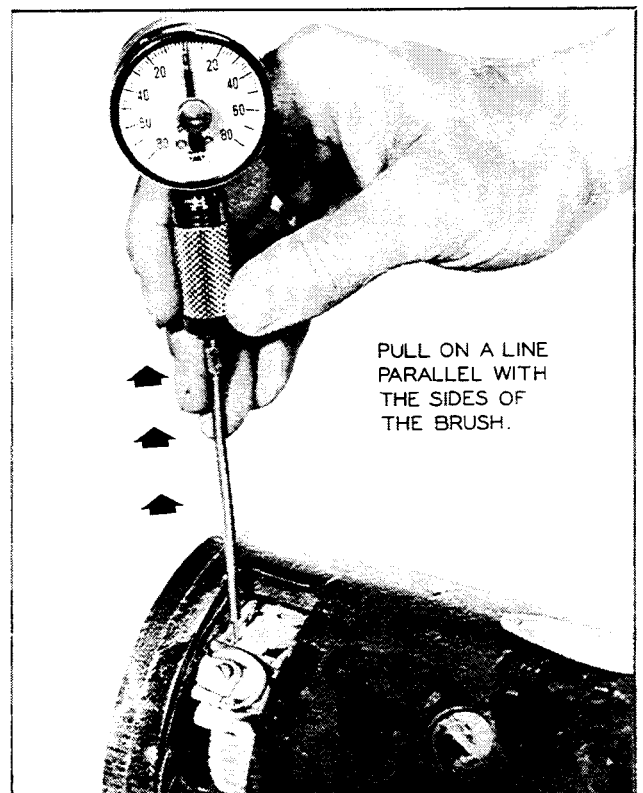


Plate 6450. Checking Brush Spring Tension



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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.

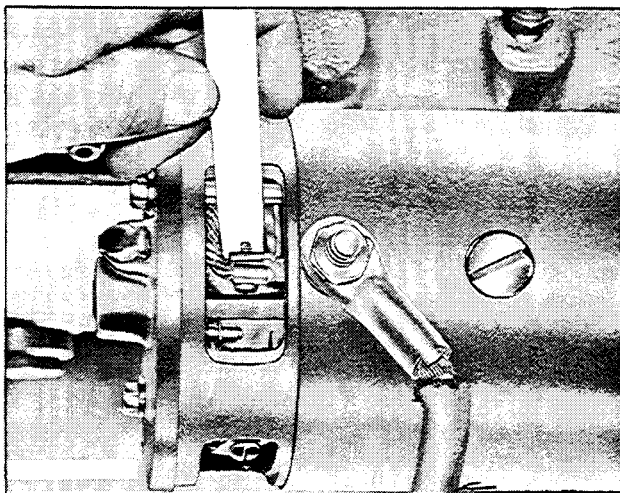


Plate 3436. Seating Brushes

CLEAN AND REPACK AXLE ENDS

Every 1000 operating hours remove and repack the axle ends.

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.

WARNING

ON PNEUMATIC TIRE MACHINES DEFLATE TIRES BEFORE REMOVING WHEELS.

2. Remove hub cap, outer spindle nut, lockwasher, inner spindle nut and washer. Pull hub assembly from spindle.

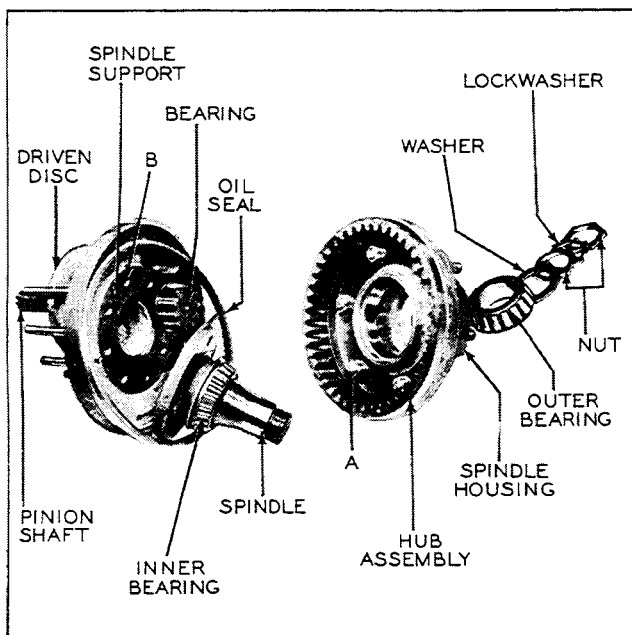


Plate 5694. Axle End Assembly

3. Remove bearings and clean in a Stoddard type cleaning solvent. Sloss 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. Pack all bearings with NLGI #1 (Amolith grease EP #1 or its equivalent) before final assembly. Also pack the hub cavity between the

bearings 1/2 full. (As an alternate grease No. 1 E.P. lithium soap grease may be used).

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

6. Inspect seals for cuts, scratches and nicks. It is necessary to replace seal if such a condition is found. Check the axle end vent for obstruction, vent must be open. See Plate 6893.

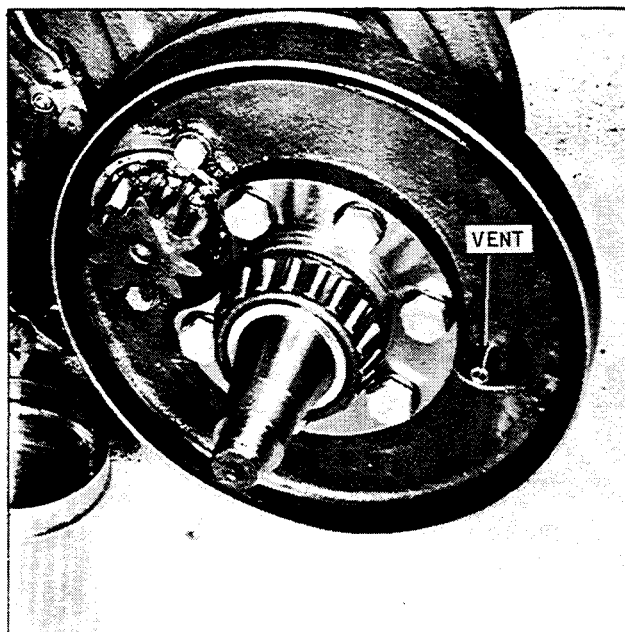


Plate 6893. Typical Axle End Vent

7. Pack the spaces between the teeth of the ring gear and pinion, level full for the entire circumference with NLGI #1 (Amolith grease EP #1 or its equivalent). The approximate amount of grease in this area is to be 1 1/4 pounds.

8. Install bearings, seal and hub assembly on spindle. Tighten inner bearing adjusting nut until bearings bind slightly during rotation. Back off adjusting nut approximately 1/8 turn and lock with outer nut. Secure this adjustment by bending the tangs on the lock washer. Install the hub cap.

9. Replace drive wheels and tires. Inflate tires if they are of the pneumatic type. Tilt upright back and remove blocking.

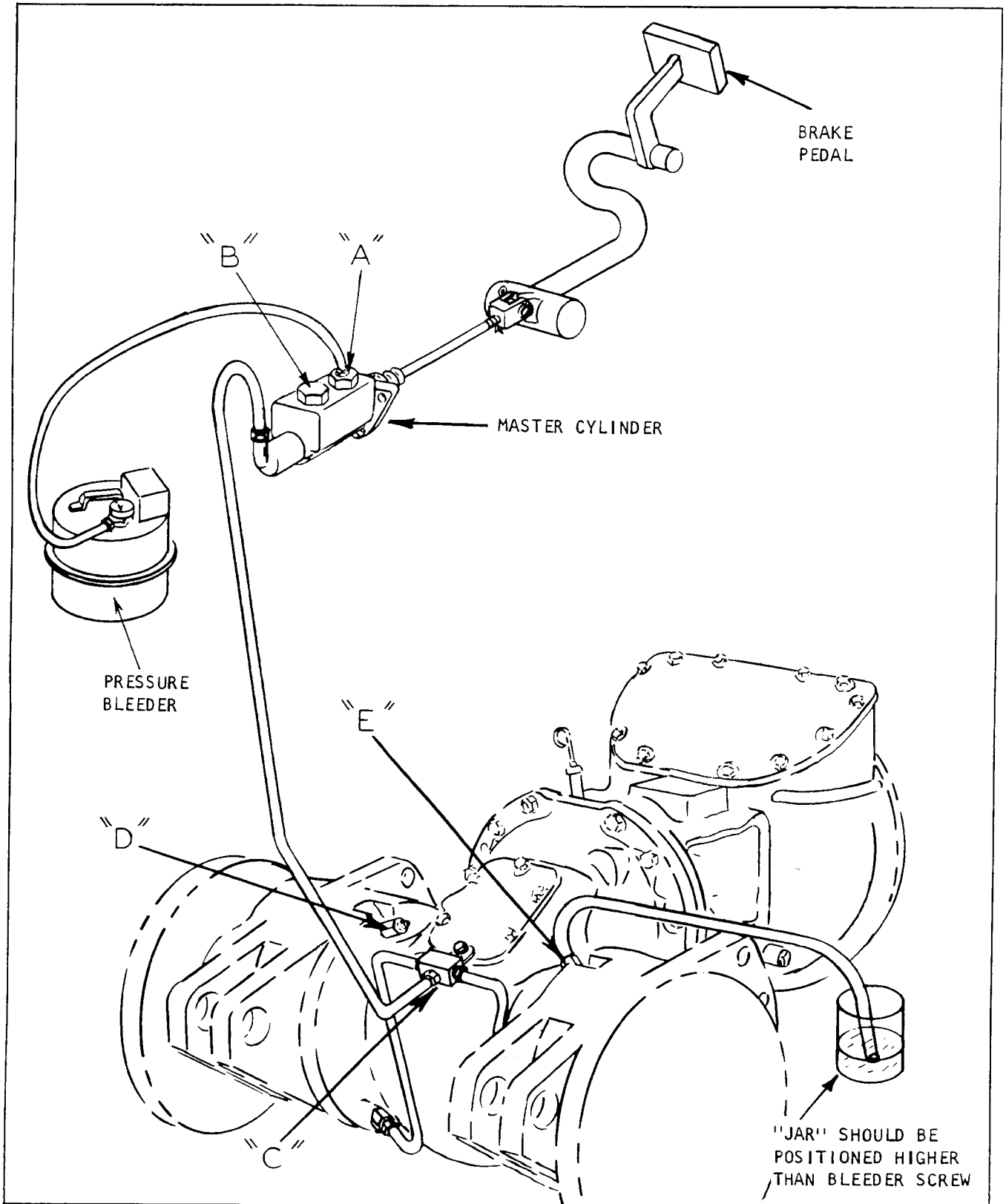


Plate 7394. Bleeding Brakes



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BRAKE BLEEDING PROCEDURE

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

Step 1. Tilt upright back. Place solid heavy blocks under each upright rail. Tilt upright forward until vertical to the floor. This should allow the drive wheels to clear the floor. If the bleeder screws are not accessible with the drive wheels on the machine, the wheels should be removed.

N O T E

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

Step 2. Check the brake pedal free travel (see Specifications). Clean dirt from around the vented filler cap of the master cylinder reservoir. Brake fluid should be within 1/4 of an inch from the top. With filler cap off the master cylinder, depress and release brake pedal. A small displacement of fluid should be noticed in the reservoir. If this happens, the brake pedal (upon being released) is returning the master cylinder piston to its normal position to open a cylinder port. This port must be open. If 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 S.A.E. 70R-3 heavy duty brake fluid be connected to the master cylinder reservoir point "A". Pressure bleeder should then be pressurized to approximately 20 P.S.I.

Step 4. Loosen plug "B" to permit air to escape from reservoir. Tighten plug after oil appears around plug.

Step 5. Loosen tube nut "C" and allow all air to escape. Tighten tube nut.

Step 6. Install a bleeder hose on bleeder screw "D" and submerge the unattached end of the hose in a clean transparent jar containing several inches of brake fluid. NOTE: DURING BLEEDING OF THE WHEEL CYLINDERS, THE JAR SHOULD BE ELEVATED TO A POSITION HIGHER THAN THE BLEEDER SCREW MAKING SURE THAT THE END OF THE HOSE REMAINS SUBMERGED IN THE

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

Step 7. Install bleeder hose on the remaining bleeder screw "E" and proceed as in Step 6.

Step 8. 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 vented cap.

Step 9. If drive wheels were removed from the machine replace them. (Inflate tires if they are of the pneumatic type). Tilt upright back and remove blocking from under each upright rail.

If a pressure bleeder is unavailable, the system may be bled manually by following Steps 1, 2, 5, 6, 7 and 9. It must be remembered that the brake pedal should be depressed slowly and held to the floorboard until the line connections or bleeder screws are securely tightened. This prevents the possibility of air being drawn into the system during the bleeding operation. Check master cylinder reservoir level periodically during manual bleeding and fill to within 1/4 of an inch of the top as required.

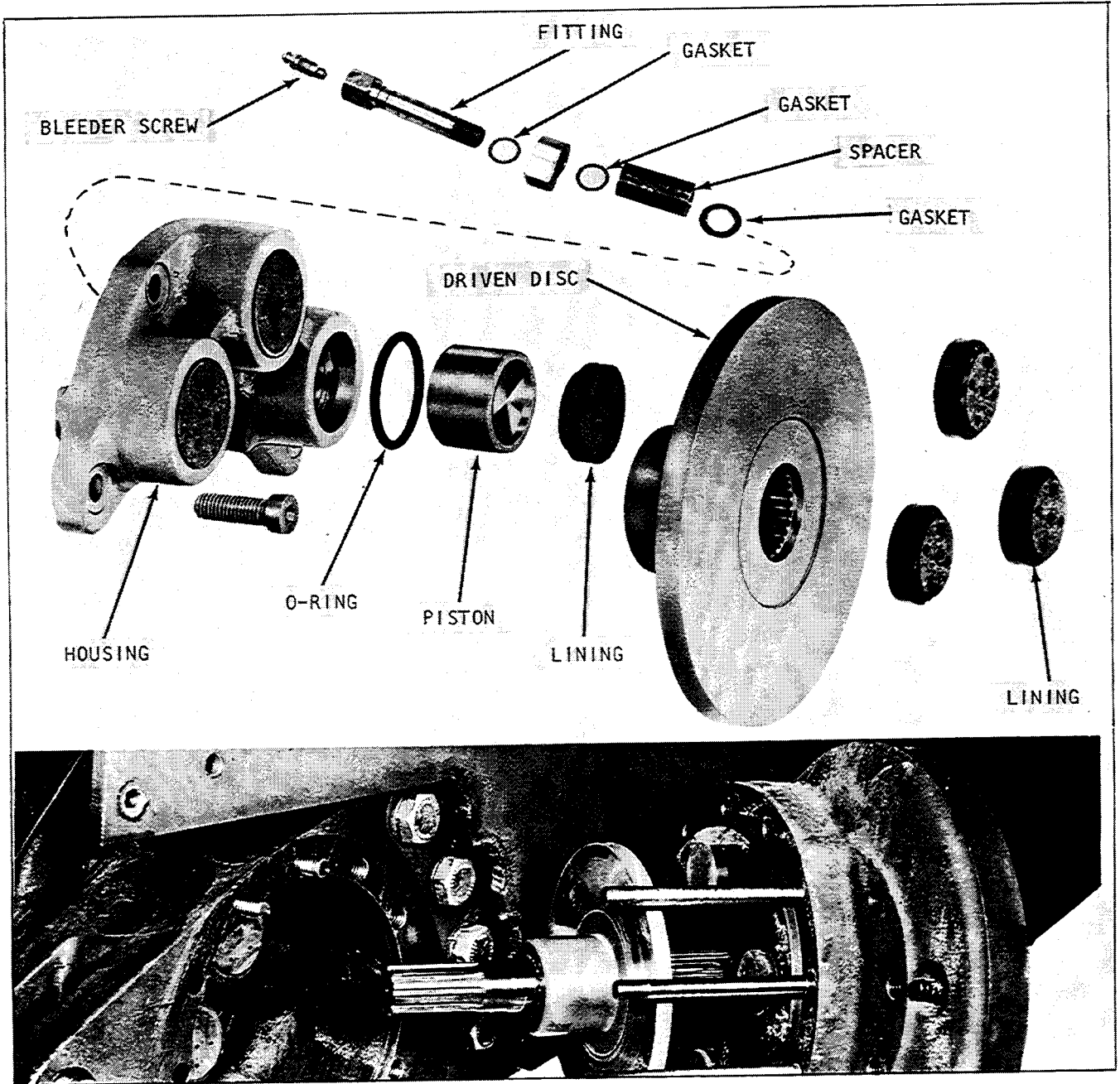


Plate 7567. Typical Service Wheel Brake Assembly

DESCRIPTION

When depressing the brake pedal hydraulic pressure is applied to the brakes, the pistons move out clamping the rotating disc between the pistons and anvil linings producing the braking action. When hydraulic brake pressure is released the clamping action is removed and the disc is again free to rotate.

If it is found that the brake effectiveness has gradually dropped to a noticeable degree (and the system has been properly bled and pedal free travel is adjusted correctly) the linings are worn beyond their designed limits. If lining wear has reached this point, the replacement of linings is necessary. Report to designated person in authority.

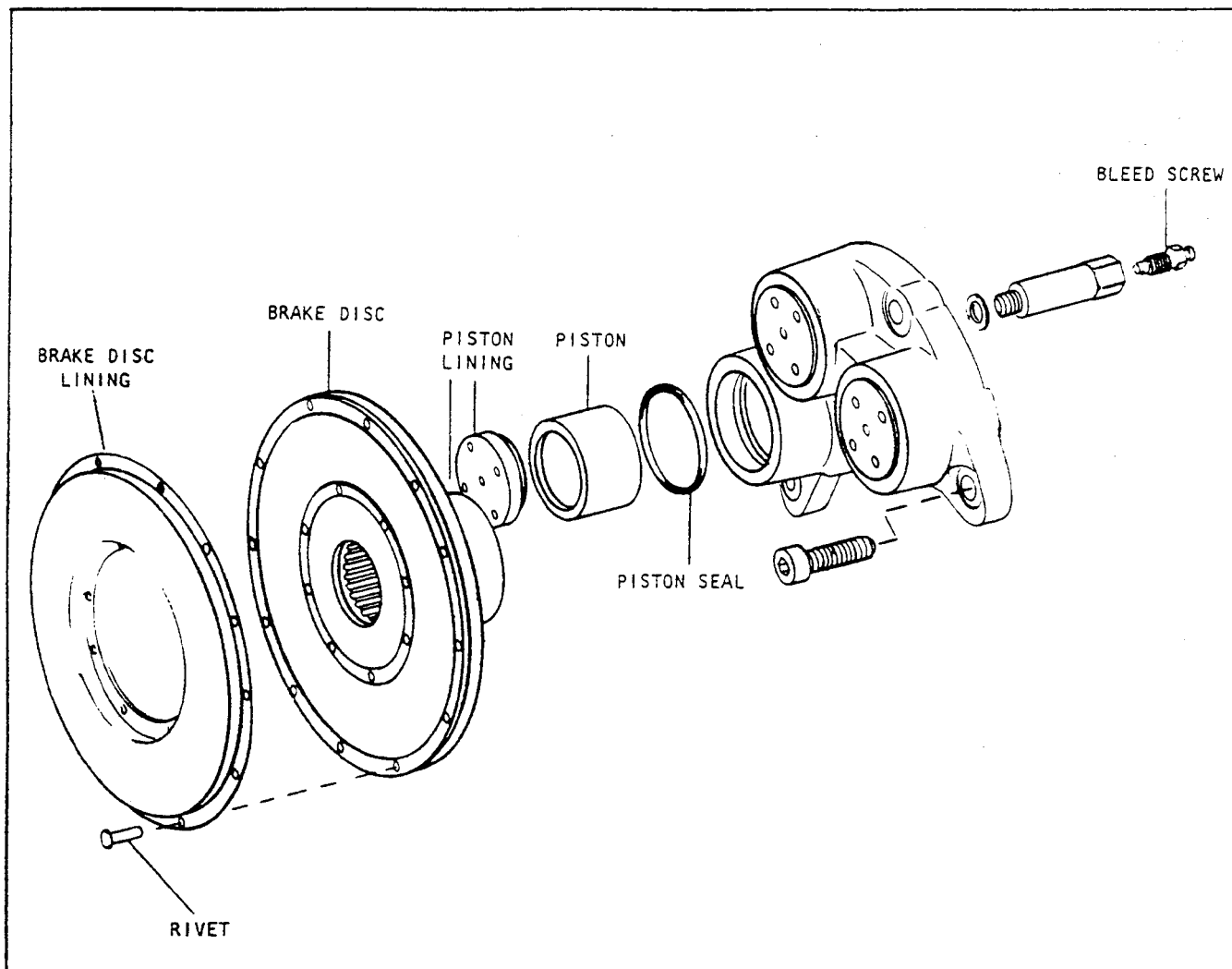


Plate 8261. Typical Wheel Brake Assembly

DESCRIPTION

When depressing the brake pedal, hydraulic pressure is applied to the brakes, the pistons move out and their linings force the brake disc and its lining against a member of the axle end producing braking action by friction.

INSPECTION

Operating conditions determine the inspection and service periods for the brake linings. If it is found that the brake effectiveness has dropped to a noticeable degree (and the system has been properly bled and pedal free travel is correctly adjusted) the axle ends should be removed so that linings may be inspected to determine their further serviceability.

The original thickness of the brake disc lining is 0.221 inch. The disc lining is effective until it is worn to 1/16 inch thickness. If after inspection it is found that the lining is worn to the extent that it will not be effective until the next inspection period, it should be replaced. The brake piston lining when new is 0.649 inch thick to the step on the lining. This lining should also be replaced if it is determined that it will be worn to within 1/16 inch of step before the next inspection period.

Before replacing axle ends, check the cylinders for leakage. The actual presence of fluid, other than mere dampness, indicates a fluid leak. Correct leaks as necessary by replacing the piston seals after cleaning the pistons and seal grooves thoroughly.

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. See Plate 5669.

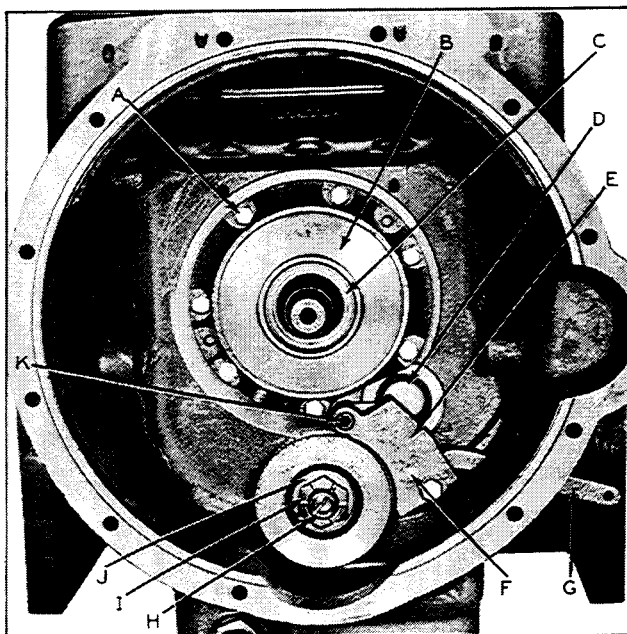


Plate 5669. Parking Brake Assembly

When the hand brake is properly adjusted the lever travel "B" should be between 1 1/2 to 2 inches when fully applied. See Plate 5709.

If adjustment is necessary it may be made by turning the clevis at point "A" until lever travel is within specified limits.

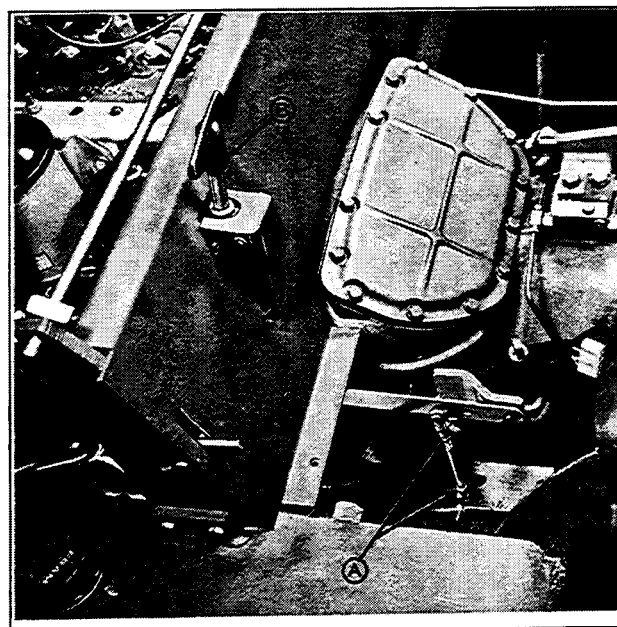


Plate 5709. Parking Brake Adjustment

After adjustment, test parking brake effectiveness while occupying the drivers seat and the transmission in neutral. The brake must be capable of holding the truck, with full rated load on a 15% grade.

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.

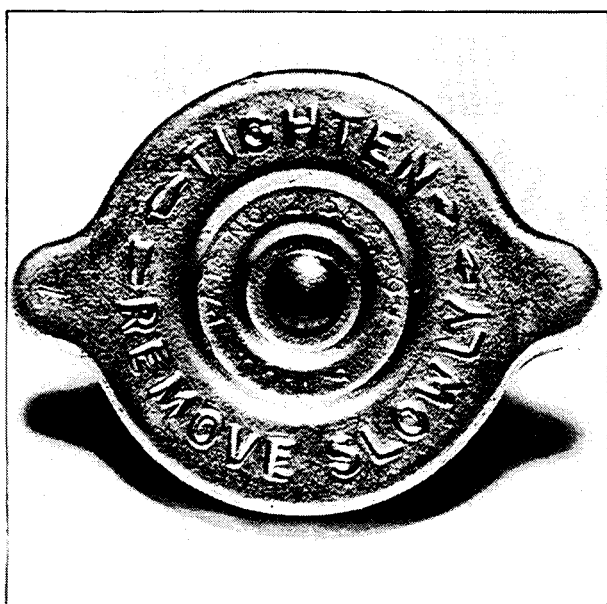


Plate 6458. Radiator Pressure Cap

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.

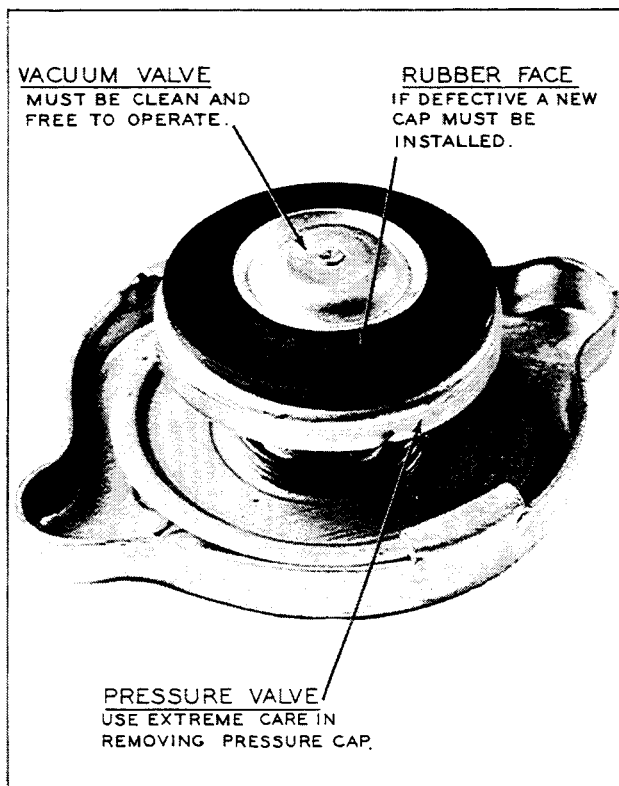


Plate 6459. Pressure Cap Gasket, Valve and Valve Gasket

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.

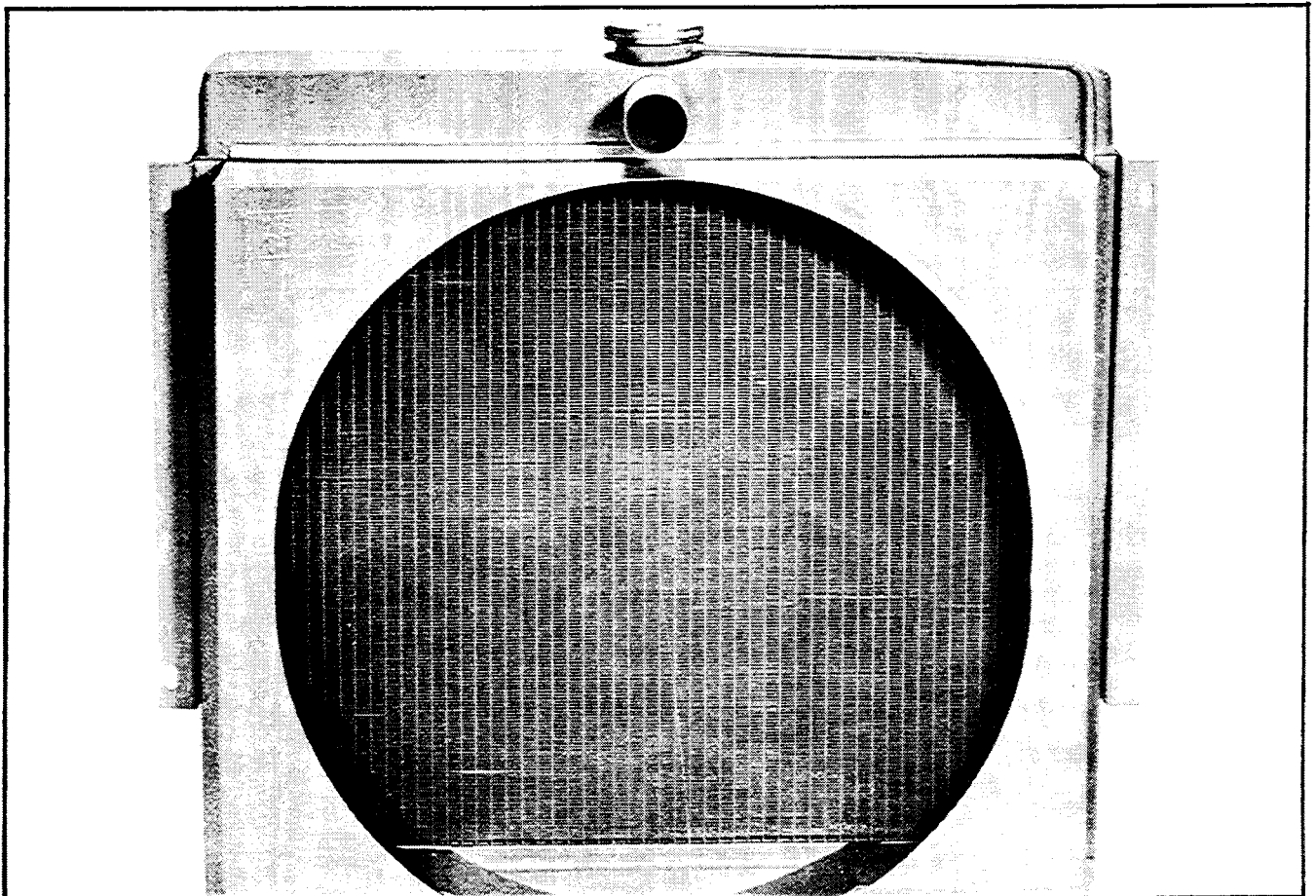


Plate 6461 Typical Radiator

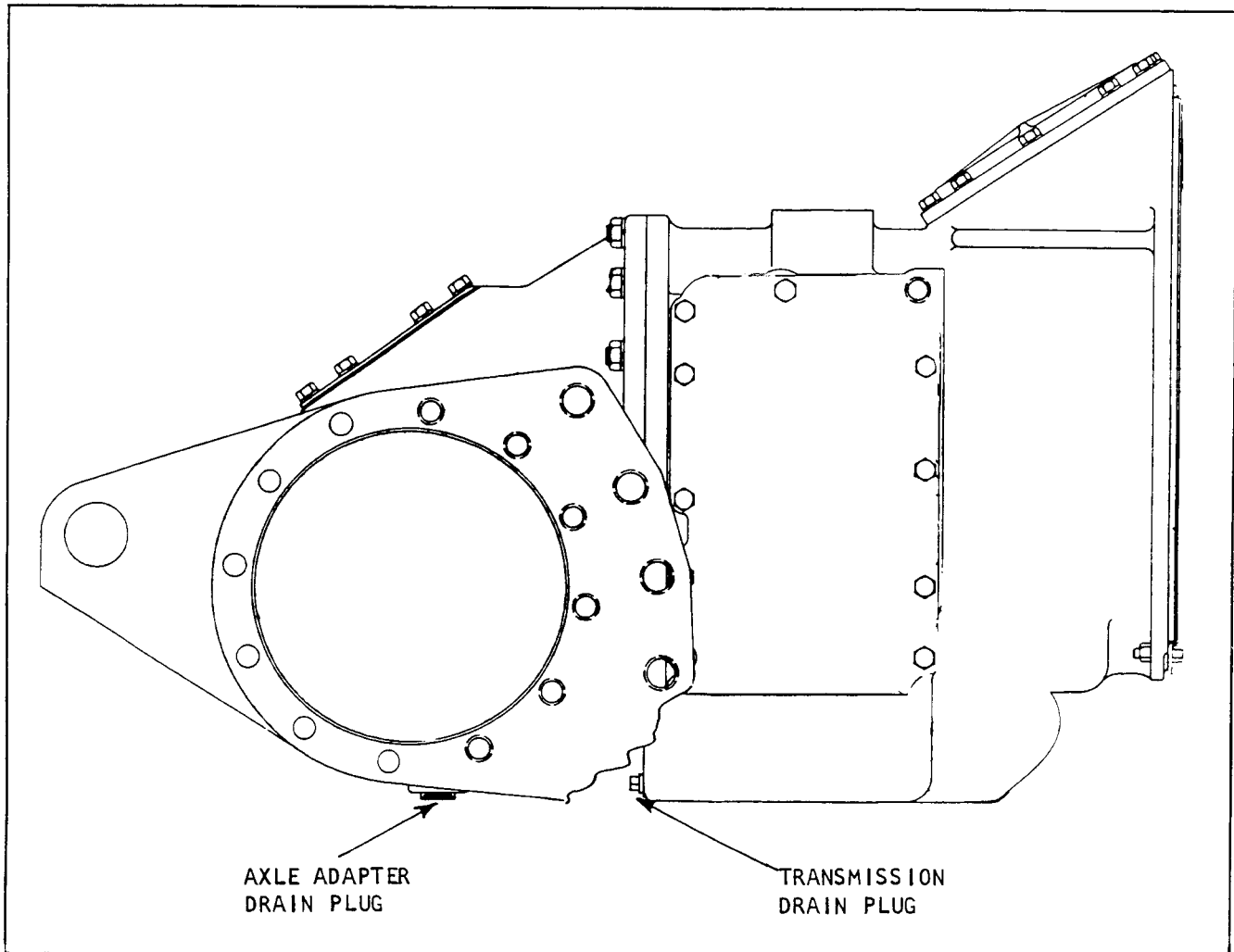


Plate 7301. Axle Adapter and Transmission Drain Plugs

**TRANSMISSION AND AXLE ADAPTER -
DRAIN AND REFILL.**

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

It is necessary to remove both the axle adapter drain plug and the transmission drain plug to facilitate complete draining.

After the transmission and axle adapter have completely drained, replace drain plugs and refill to the full mark on the transmission dipstick. Use a straight mineral gear lubricant of a S.A.E. number 90 grade.

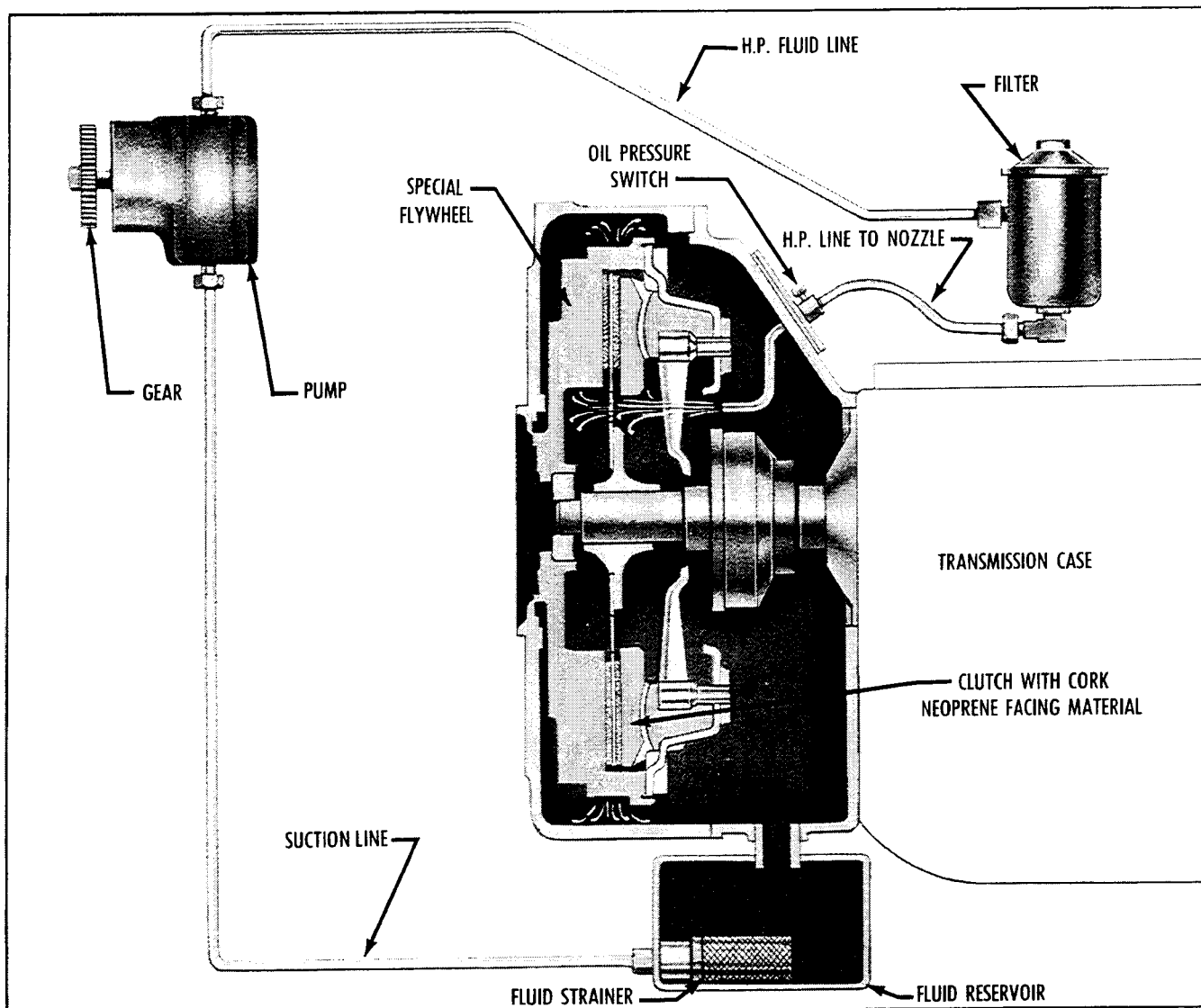


Plate 7182. Typical Hydracool Clutch

HYDRACOOOL CLUTCH

1. Drain clutch reservoir at drain plug.
2. Remove fluid strainer screen from clutch reservoir. Thoroughly clean screen in a Stoddard type solvent.
3. Install screen into reservoir. Refill clutch reservoir through dipstick opening to proper level indicated on the dipstick (capacity 6 quarts). Use Automatic Transmission Fluid Type 'A', Suffix 'A', Clark Part number 879803. Fluid containers must display a qualification number prefixed by AQ-ATF.

HYDRACOOOL CLUTCH FILTER

The filter element is of the replaceable type and should be changed every time the fluid reservoir is drained.

1. Remove filter cover retainer, cover, gasket and spring.
2. Remove old element and thoroughly clean case with a lint free cloth.
3. Install new filter element.
4. Install spring and cover using a new gasket. Secure cover with retainer.

CAUTION

AFTER CLEANING RESERVOIR SCREEN, CHANGING RESERVOIR FLUID AND INSTALLING NEW FILTER ELEMENT, START ENGINE AND CHECK FOR LEAKS.

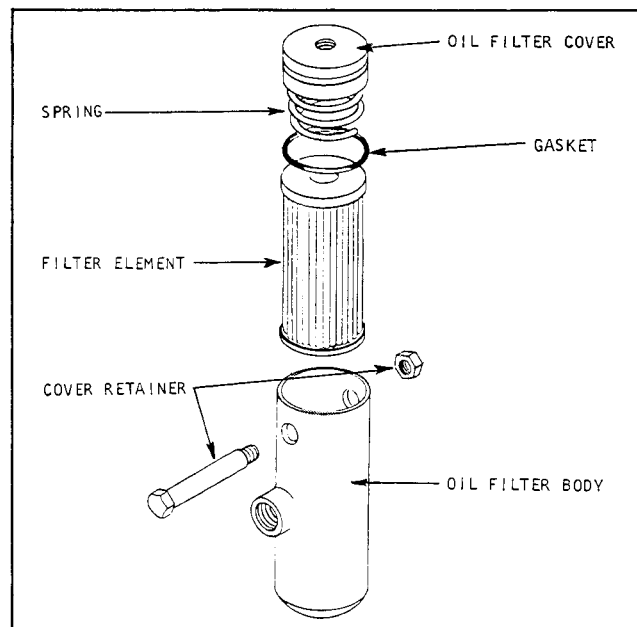


Plate 7234. Typical Hydracool
Clutch Fluid Filter

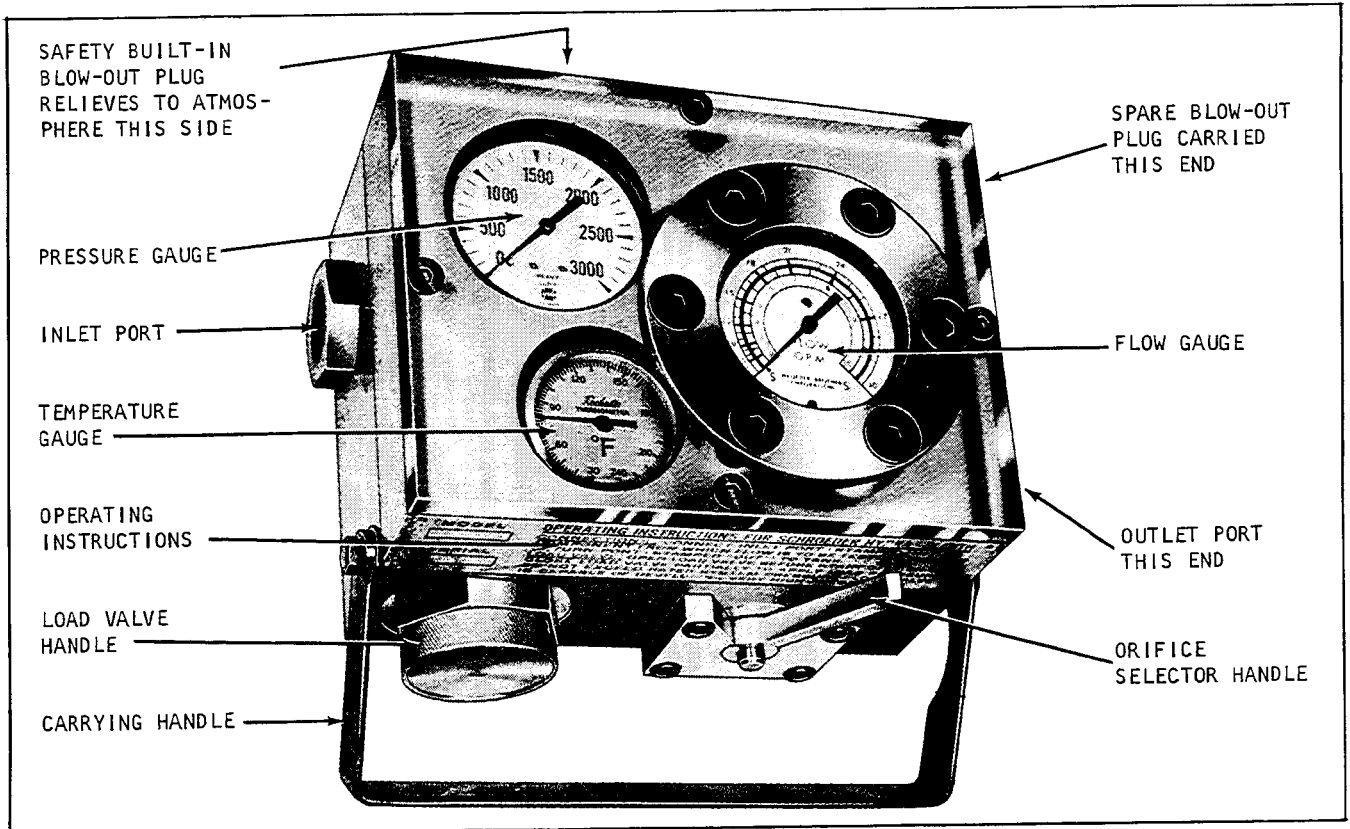


Plate 6747. Schroeder Hydraulic Circuit Tester CLARK PART NUMBER 1800060

PRESSURE GAUGE

Reads directly in pounds per square inch (PSI).

TEMPERATURE GAUGE

Reads directly in degrees Fahrenheit and indicates the temperature of the oil passing through the instrument.

FLOW GAUGE

Reads two scales in gallons per minute.

- 0 - 30 gallons
- 9 - 30 gallons

Read the scale that corresponds with the orifice selector position.

Turn orifice selector to the left (counter-clockwise) to read 10 gallon scale.

Turn orifice selector to the right (clockwise) to read 30 gallon scale.

You may switch from one scale to the other, while operating machine. Always start on 30 gallon scale.

LOAD VALVE

The load valve is a flow restrictor or shut off valve. Turning the valve to the right throttles flow through the Hydra-Sleuth, thus the operator may load a hydraulic pump or circuit to the desired test pressure, simulating work.

SAFETY PLUG

Located opposite the load valve this plug protects the Hydra-Sleuth and the tested system from pressures in excess of 3200 PSI. When pressure becomes higher the plug will rupture and dump oil to atmosphere.

HYDRAULIC FLUID

Unless marked to the contrary, the unit is for use with petroleum, hydraulic fluids.

HOW TO CONNECT THE PORTABLE TESTER

Using a 1/2" hose or larger, connect tester INLET PORT to the flow to be tested. Connect the tester outlet port to reservoir fill port, or system return line.



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LUBRICATION AND PREVENTIVE MAINTENANCE

HYDRA-SLEUTH ADJUSTMENTS BEFORE OPERATION

A. Depending on flow (GPM) to be checked choose proper orifice. (It is good practice to start always on 30 gallon scale.)

B. Fully open load valve by turning all the way to the left.

HYDRA-SLEUTH ADJUSTMENTS DURING OPERATION

1. Turn load valve to right to develop test pressures.

CAUTION

LOAD VALVE IS CAPABLE OF VERY HIGH PRESSURES.

A. Always start test with load valve fully open.

B. Do not exceed design pressure of system under test.

C. Keep load pressures within range of the Hydra-Sleuth pressure gauge.

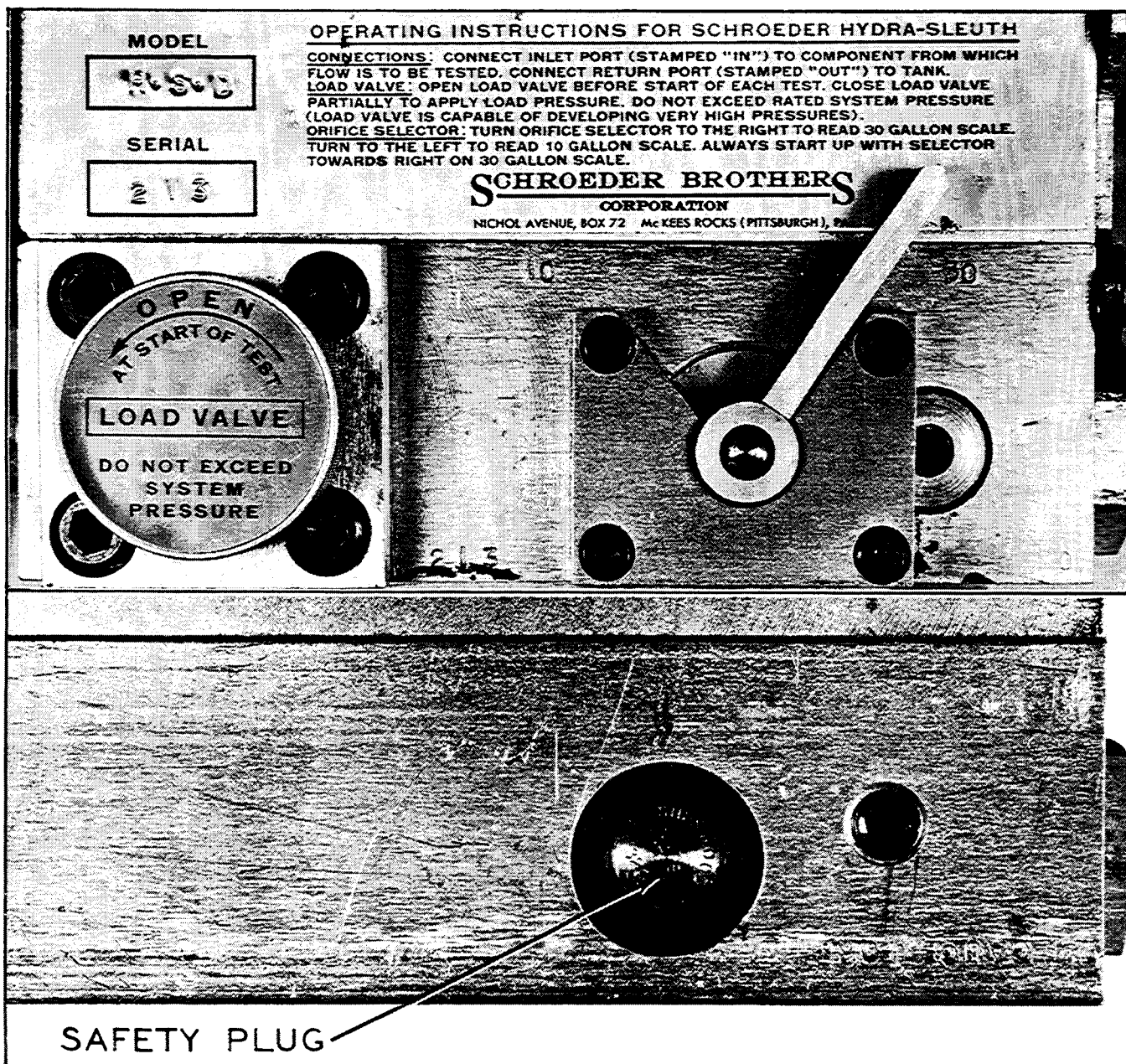


Plate 6748. Schroeder Hydraulic Circuit Tester

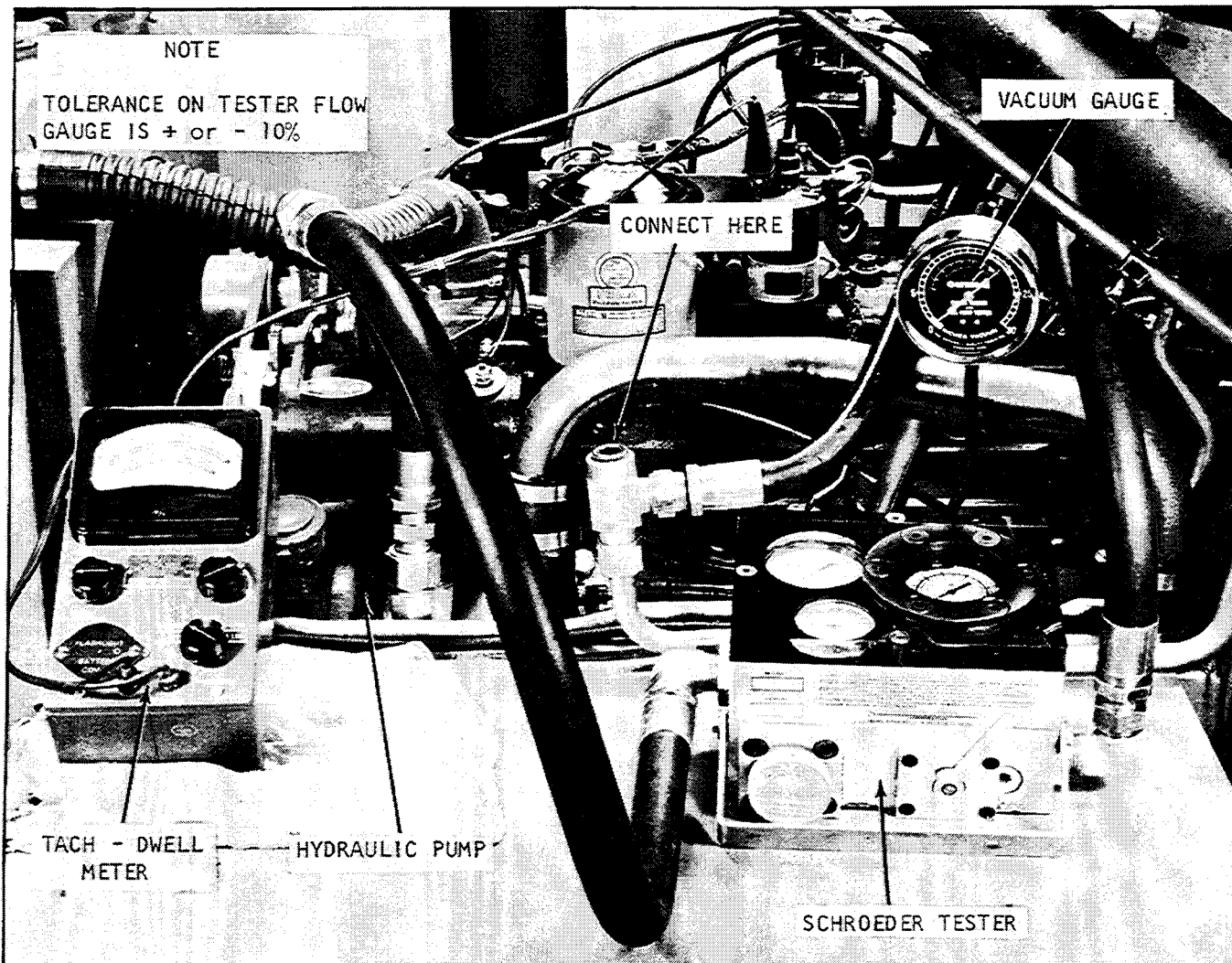


Plate 6749. Flowmeter Hookup

HOOK UP FLOWMETER

Install the high pressure hose onto the pump as shown, see Plate 6749. Attach the return line hose as shown in Plate 6749.

TESTING PUMP OUTPUT

1. Start the Tractor engine, and set speed to the exact R.P.M. stated in the chart below.

2. To heat up oil, apply the load valve until pressure reaches 1000 P.S.I. CAUTION: APPLY PRESSURE GRADUALLY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN "BLOWING-OUT" THE FLOWMETER RELIEF PLUG.

3. After the oil has come up to test temperature (120°F.) and the flow gauge needle is stabilized, apply the load valve GRADUALLY until desired pressure is achieved. Then stabilize the pressure needle. NOTE: IT WILL BE NECESSARY TO INCREASE TRACTOR SPEED SLIGHTLY AS PUMP MUST BE TESTED UNDER LOAD (AT SPECIFIED R.P.M.)

CAUTION: LIMIT TIME THE LOAD VALVE IS SET FOR A READING OF 2000 P.S.I. TO 30 SECONDS EXTENDED PERIOD OF TIME WITH MAXIMUM READING COULD CAUSE DAMAGE.

4. Read the flow gauge. It should read reasonably close to the specifications for a new pump as listed below.

ENGINE R.P.M.	P.S.I.	G.P.M.
2250	2000	17

MAIN HYDRAULIC SYSTEM PRESSURE CHECK

The hydraulic relief valve setting may also be checked with the hydraulic circuit tester.

If a circuit tester is not available the relief valve setting may be checked in the following manner.

1. Provide a means for connecting a 0-4000 P.S.I. pressure gauge at the inlet side of the valve. A tee at the inlet port may be used. See Plate 7333.

2. System pressure should be checked with the engine running at governed speed. Move lift lever to 'raise' position. When forks reach maximum lift height, check gauge reading. Pressure should be within the limits listed in Specifications. If adjustment is necessary remove acorn nut at valve and turn adjuster clockwise to raise pressure, counterclockwise to lower. After correct adjustment is obtained replace acorn nut.

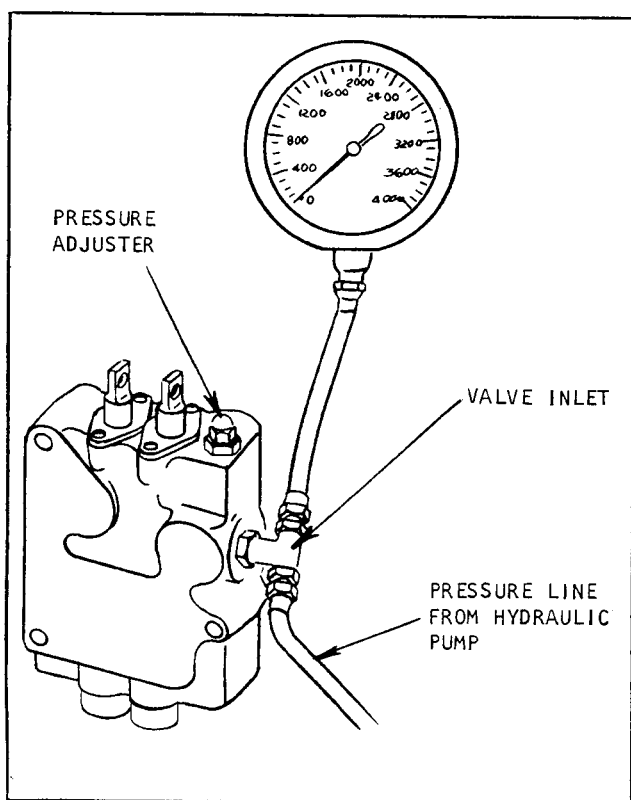


Plate 7333. Main Hydraulic System
Pressure Check

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.

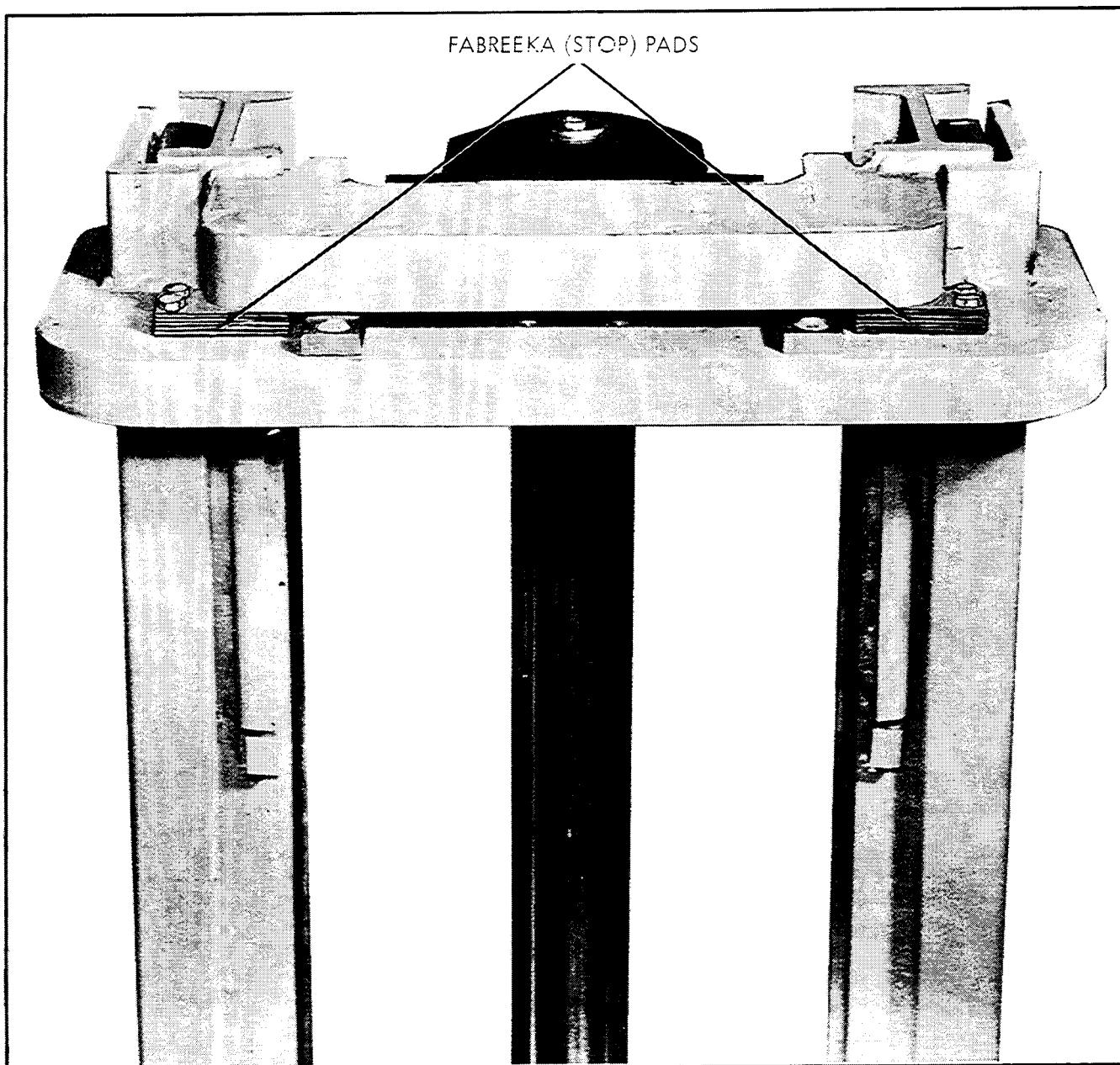


Plate 6619. Inner Slide Must Contact Both Fabreeka (Stop) Pads
At The Same Time When Lowering Inner Slide

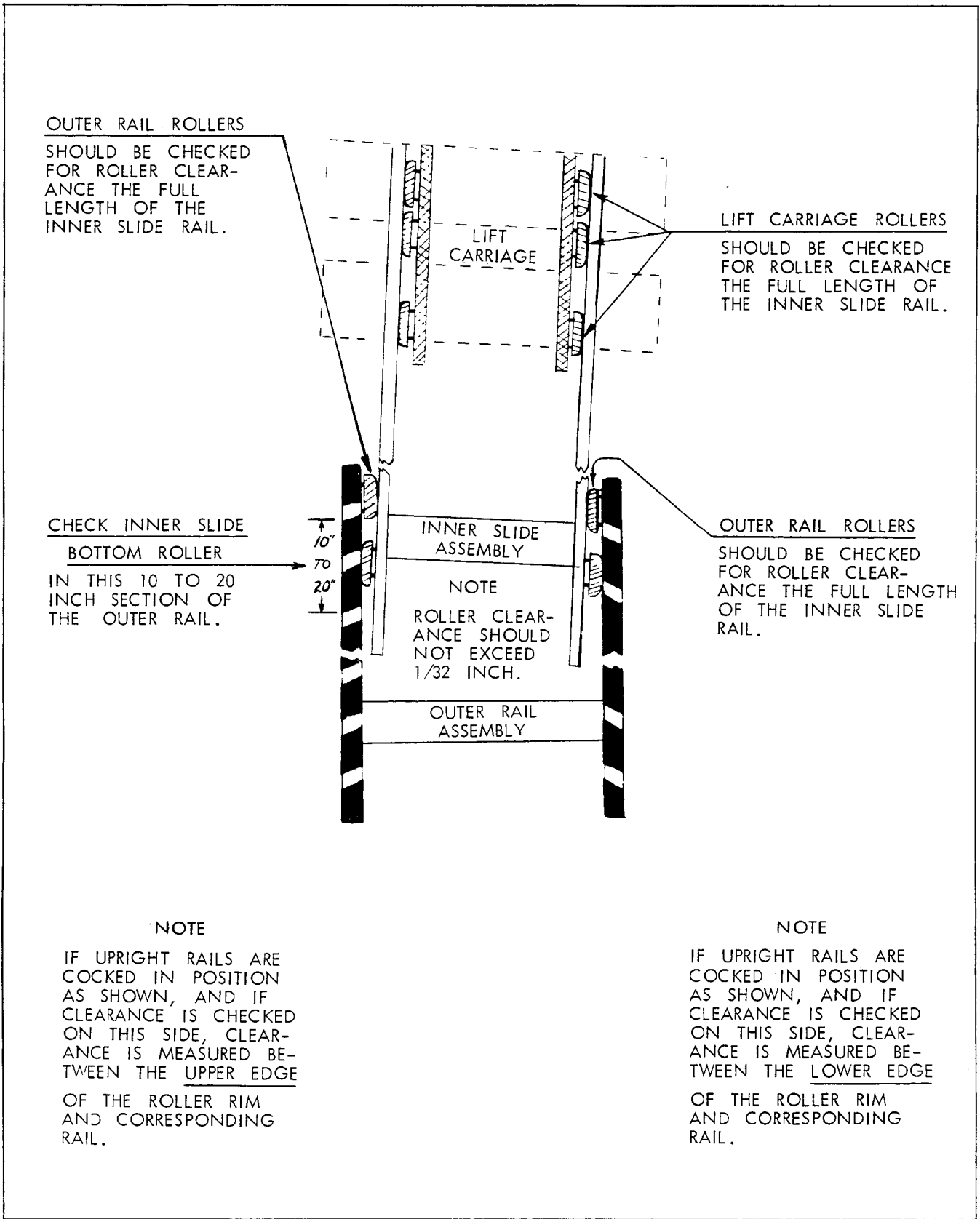


Plate 689i. Roller Adjustments

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 689i.

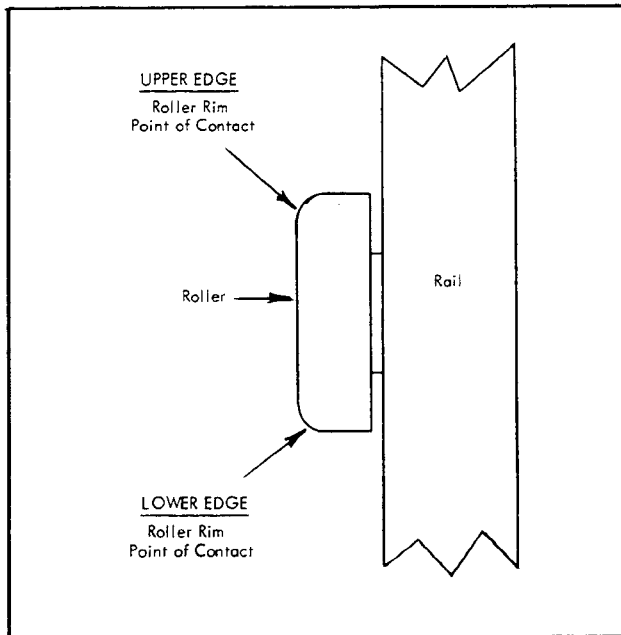


Plate 6325. Upright Roller

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 689i 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.

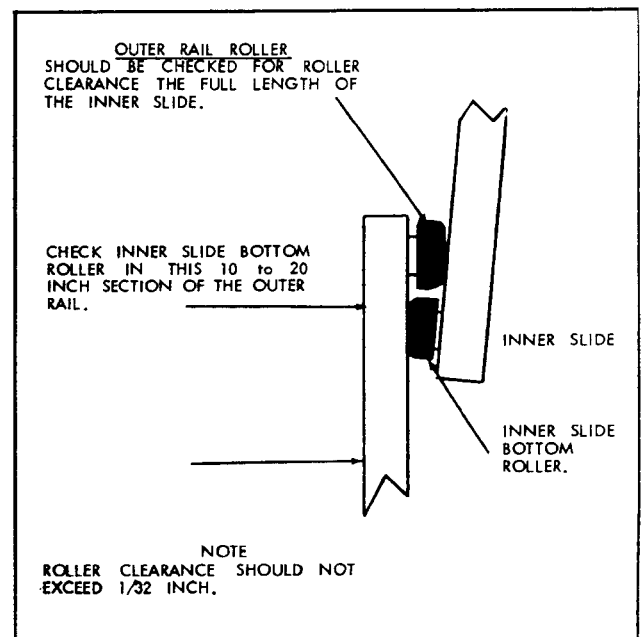


Plate 6572. Outer Rail Roller Clearance Check



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LUBRICATION AND PREVENTIVE MAINTENANCE

8. Remove rollers from shafts and add or remove shims to acquire the clearance previously stated.

NOTE

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.

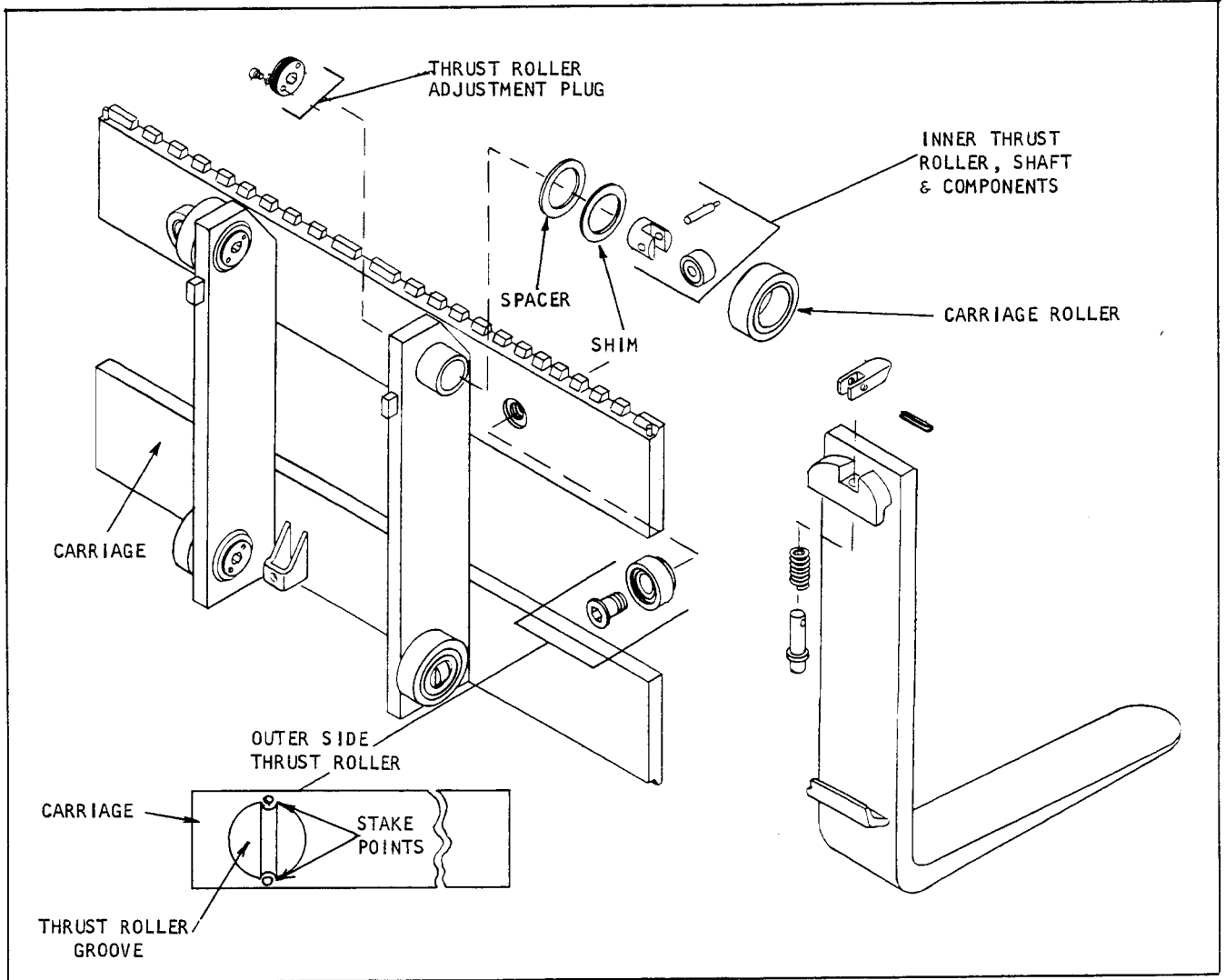


Plate 7238. Lift Carriage

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

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 7238.) 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 7238.



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LUBRICATION AND PREVENTIVE MAINTENANCE

2. Remove the retaining screw and the set screw from the thrust roller adjusting plug.

3. Turn the adjusting plug until the correct clearance is obtained on the thrust roller.

The thrust roller shaft is so designed that the end facing the adjusting plug has three machined holes. The adjusting plug must be positioned so that one of its threaded holes is in registry with a machined hole on the thrust roller shaft. When the set screw is installed and securely tightened in this position, the adjusting plug cannot turn and its adjustment will be retained.

4. Install the retainer screw and tighten against the set screw.

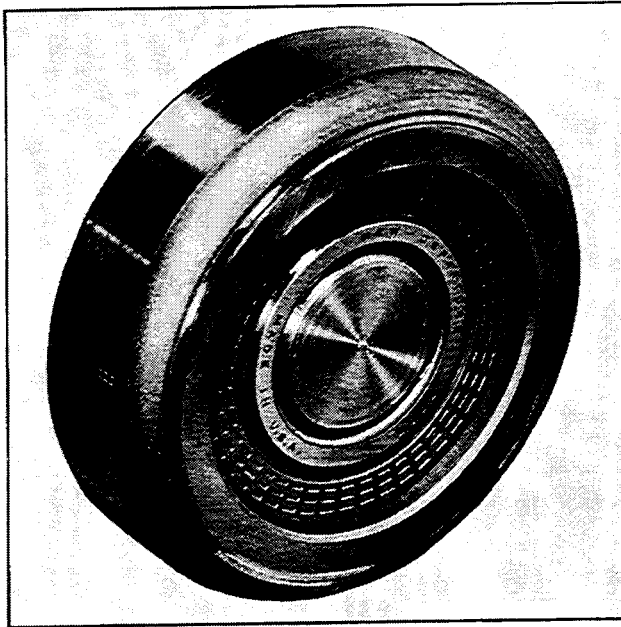


Plate 6323. Upright Roller

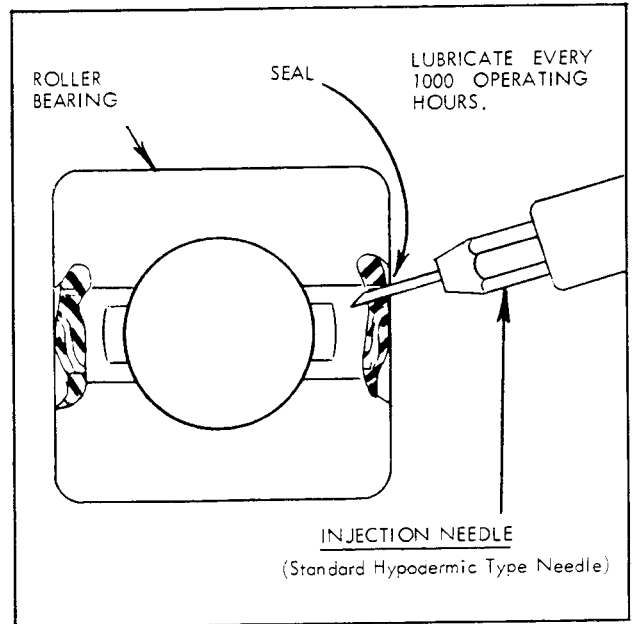


Plate 6328. Roller Bearing Lubrication

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.



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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>



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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>



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TROUBLE SHOOTING GUIDE

ENGINE (Continued)

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



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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>



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

ENGINE (Continued)

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



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.



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

ENGINE (Continued)

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



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>



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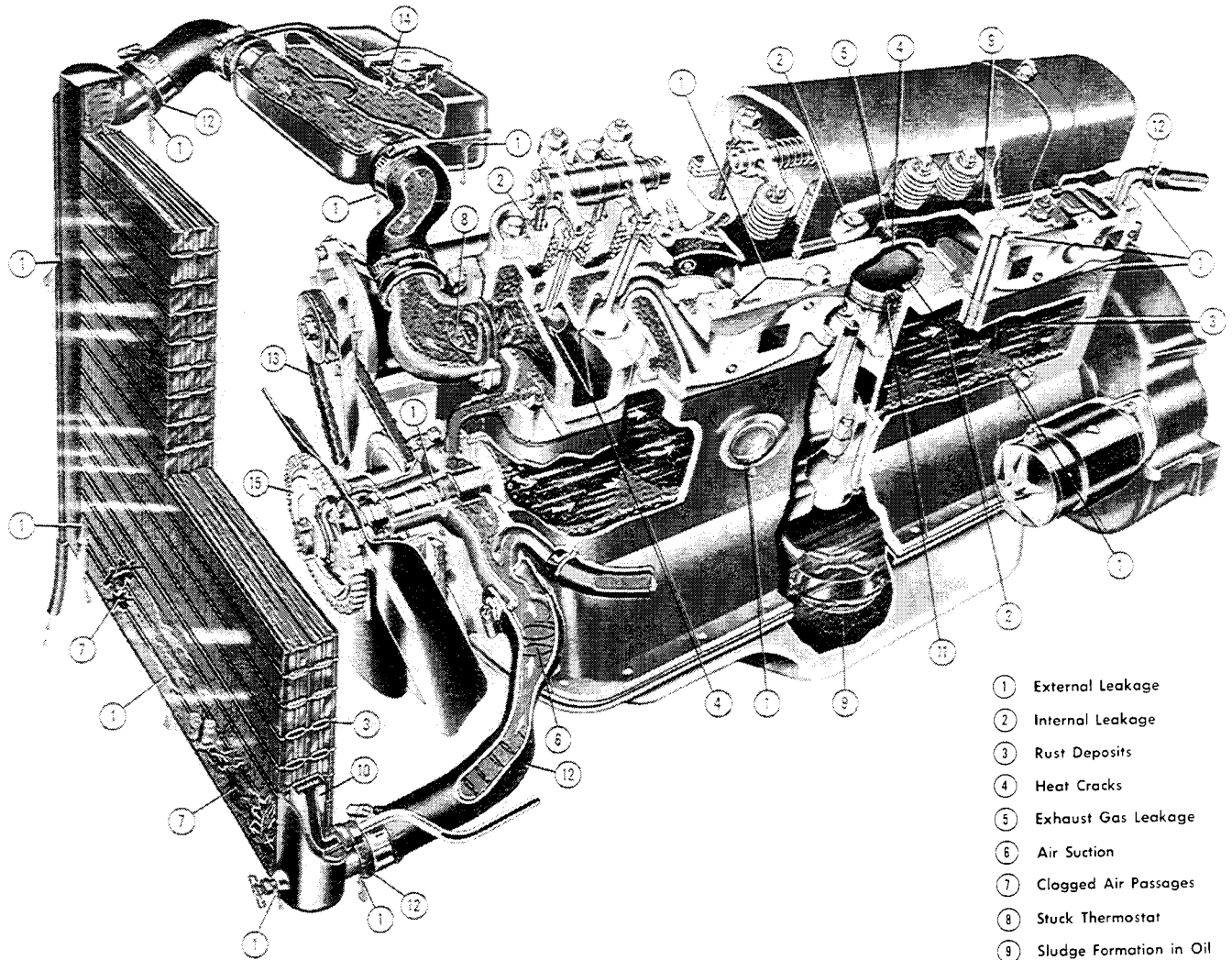
TROUBLE SHOOTING GUIDE

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.

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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TROUBLE SHOOTING GUIDE

IGNITION SYSTEM

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



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TROUBLE SHOOTING GUIDE

STARTING MOTOR

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



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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.



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TROUBLE 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



TRANSMISSION

TROUBLE SHOOTING GUIDE

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



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TROUBLE SHOOTING GUIDE

DRIVE AXLE

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



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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.



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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.



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TROUBLE SHOOTING GUIDE

BRAKES

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



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TROUBLE SHOOTING GUIDE

BRAKES (Continued)

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



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.	<p>Hydraulic Oil level low.</p>	<p>Fill sump tank.</p>

