CLARK EQUIPMENT

INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT

OPERATORS MANUAL

FOR

CLARKTOR 120 - 120 B

1ST REVISION
0-175

CLARK EQUIPMENT COMPANY

PUBLISHED BY

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

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13. All hydraulic systems should be regularly inspected and maintained in conformance with good practices. Tilt cylinders, valves, and other similar parts should be checked to assure that "drift" has not developed to the extent that it would create a hazard.

14. Capacity rating, operation and maintenance instruction plates, tags, or decals should be maintained in legible condition.

15. Batteries, motors, controllers, limit switches, protective devices, electrical conductors and connections should be inspected and maintained in conformance with good practices. Special attention should be paid to the condition of electrical insulation.

16. Industrial trucks should be kept in a clean condition to minimize fire hazards and facilitate detection of loose or defective parts.

17. Modifications and additions which affect capacity rating and safe operation should not be performed by the user without manufacturer's approval.

18. Care should be taken to assure that all replacement parts are interchangeable with the original parts and of a quality equal to that provided in the original equipment.

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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. Such as: 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.

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

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

INDUSTRIAL TRUCK DIVISION

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LUBRICATION AND PREVENTIVE MAINTENANCE

TROUBLE SHOOTING GUIDE

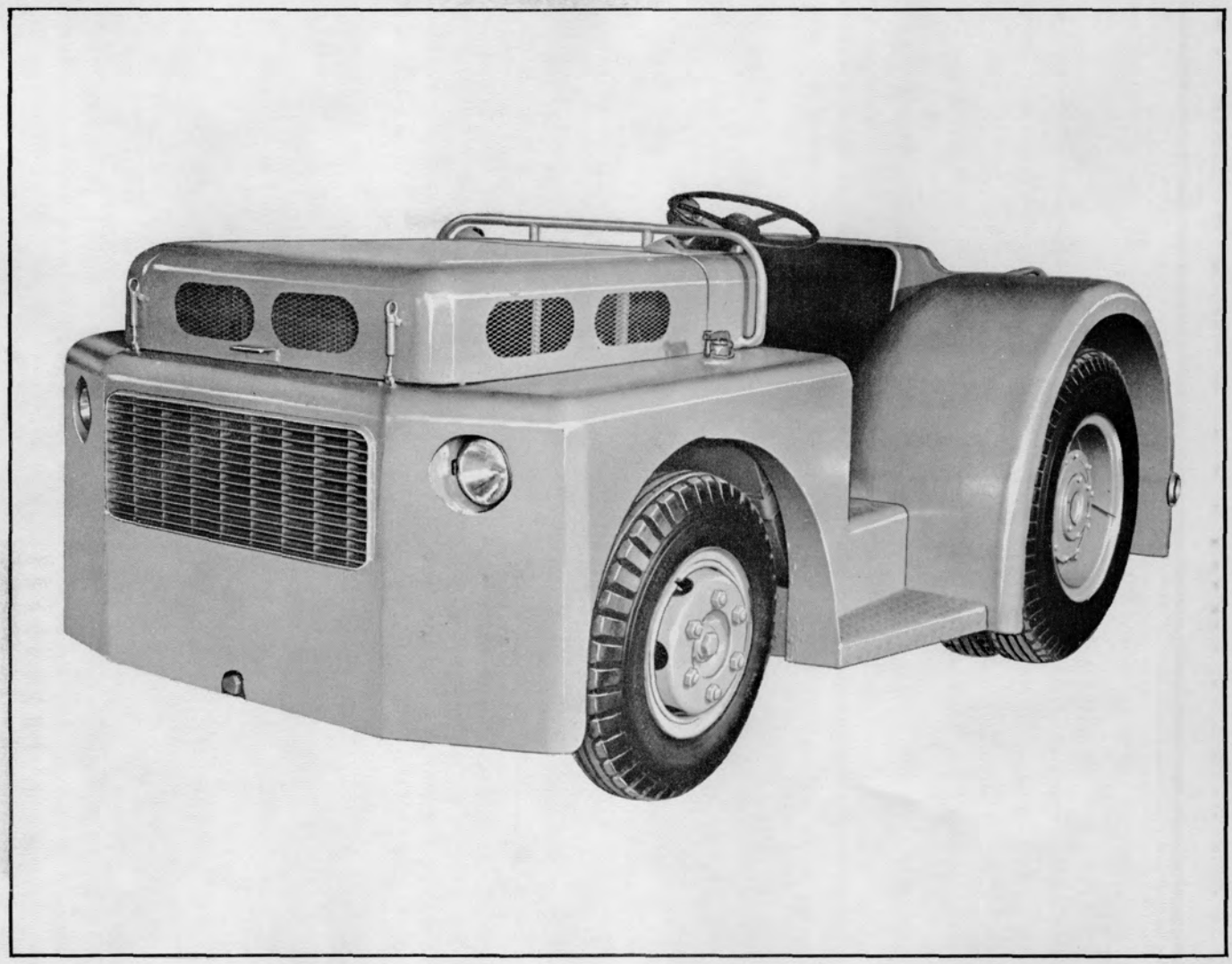


Plate 8513. Illustration of Machine

INDUSTRIAL TRUCK DIVISION

SPECIFICATIONS

GENERAL

Type of vehicle.....Towing Tractor

Single Drive
Tread steer tires.....59 5/8"
Dual Drive
Tread outside rear tires....80 7/8"
Tread inside rear tires.....58 1/8"

Turning radius, outside.....127"
Turning radius, inside.....18 1/2"

Ground clearance - under counterweight tow hitch or mounting.....8"
Ground clearance - under rear axle.....9"
Ground cleanance - under front axle.....6 3/4"
Ground clearance between axles.....8"
Grade clearance.....42%

Draw bar pull.....12000# at 12" coupler height.
Draw bar pull (loaded) 1st gear 12000# at 0 MPH

Travel speeds:
Empty: 1st.....2.5 MPH
2nd.....4.5 MPH
3rd.....8.5 MPH
4th.....15 MPH

Gradeability:
Low gear: 42% @.9 coefficient of friction

ENGINE (Make: Chrysler. Model: Industrial)
Model.....IND32-1563
Type.....L-Head
Number of cylinders.....6
Bore.....3 7/16
Stroke.....4 3/4
Displacement.....265
Governed Speed (No Load)....3350-3400 RPM
Bare Engine H.P.at Governed RPM..117@3200
Maximum torque.....225 @ 1200 RPM
Governor setting (loaded).....3200 RPM
Firing order.....153624
Crankcase capacity:
With filter.....6 Quarts
Without filter.....5 quarts

FUEL TANK CAPACITY.....25 Gallons

COOLING SYSTEM CAPACITY.....20 Quarts

FAN BELT DEFLECTION.....1/4 to 1/2

CLUTCH (Make: Borg & Beck)
Outside diameter.....11"
Clutch pedal free travel.....approx. 3/4"
Clutch throwout bearing.....
Permanent type, greased for life

FLUID COUPLING
Capacity.....13 Pts

TRANSMISSION (Make: Clark, Model: 185F)
Speeds.....4
Gear ratio: First.....6.35 to 1
Second.....3.31 to 1
Third.....1.73 to 1
Fourth.....1.00 to 1
Reverse.....7.54 to 1
Capacity.....4 Quarts

STEER AXLE

Axle Alignments:
Toe-in.....0 degrees
Camber angle.....1 degrees
Caster.....0 degrees
Left-hand turning radius angle:
Left wheel.....40 degrees
Right wheel.....67 degrees
Right-hand turning radius angle:
Left wheel.....67 degrees
Right wheel.....40 degrees

DRIVE AXLE

Ratio.....23.35 to 1
Differential capacity.....14 Pints
Wheel end capacity.....8 Pints
(each end)

WHEELS AND TIRES
Size:
Front (steer).....7.50X15
Rear (drive).....8.25X20
Air pressure:
Front (single drive).....55 lbs.
Rear (dual drive).....55 lbs.

SPLIT RIM WHEELS (Standard or Optional)

Torque wheel nuts.....450-500 lbs.
Drive wheel.....450-500 ft. lbs.
(Both dry thread)
Steer wheel 450-500 ft. lbs. (Dry thread)
Steering gear pitman arm lock nut torque .....100-125 ft. lbs.
Steering gear mounting bolts and clamp bolt torque.....47 ft. lbs.

BRAKE SYSTEM

Type: Hydraulic/Hydraulic Vacuum Booster.
Brake pedal free travel.....1/2-3/4
(As measured from top pedal position to where pedal meets resistance from the master cylinder.)

DISTRIBUTOR

Make.....Autolite AR-80
Rotation.....Clockwise
Advance Control.....Automatic
Drive.....Camshaft Gear
Bushings..... 2 Absorbent Bronze

CONDENSER CAPACITY (microfarads).....23 to .26

POINT GAP (in.).....018 to .020

POINTS OPEN.....TDC

BREAKER ARM SPRING TENSION (oz.).....17 to 20

CONTACT DWELL (degrees).....38 to 40

TIMING MARK LOCATION.....Vibration Damper

FIRING ORDER.....1-5-3-6-2-4

SPARK PLUGS (Make: Autolite AR-80)

Gap: Standard.....025
Resistor.....030

BATTERY (Negative Ground)

Number of cells.....6
Number of plates.....11
70 Hour rate A.H.....20
300 Amps., 0 Deg.F.
Total min.....2 Min. to 1 volt/cell
10 Sec. Volt. 7.5
Group.....EE3
Model.....CLARK

STARTING MOTOR (Make: Autolite)

Voltage.....6
Armature
End Play (in.).....005 to .030
Run Out (in.).....003
Brushes
Number used.....4
Spring tension (oz.).....42 to 53
Field Coils.....4

Pinion to thrust washer clearance (in.)..
.....015 to .030
Pinion teeth.....9
Free running test
Voltage.....5.5
Amperage draw (max.).....65
Minimum speed (rpm).....5300
Stall torque test
Voltage.....2.0
Amperage draw (max.).....410
Minimim torque (ft.lbs.).....8.0

GENERATOR (Make: Autolite)

Type.....6 Volt, shunt wound
Rotation (drive end).....clockwise
Bearing (drive end).....ball bearing
Bushing (commutater end)..bronze bushing
Armature end play(in.) .003 to .010
Commutator run out (in.).....005
Ground polarity.....positive
Number of brushes.....2
Brush spring tension (oz.).....35 to 53
Field coil draw (amps.).....1.6 to 1.8
(volts).....6
Output-Hot
Volts.....8.0
Maximum Amps.....40
Maximum RPM.....2250
Control.....Current and voltage regulator

THE FOLLOWING SPECIFICATIONS are for engine accessories used in later productions. Each specification is listed according to machine serial number.

GENERATORS

CT120B-1-718 and above

Rated volts.....12
Rotation (drive end).....Clockwise
Ground polarity.....Negative
Brush spring tension.....18-36 ounces
Field coil draw:
Volts.....10.0
Amps.....1.2-1.3
Motoring draw:
Volts.....10.0
Amps.....3.4-3.9
Output:
Volts.....15.0
Maximum amps.....30.0
Minimum RPM.....2250
Control.....CVR

CT120B-1-C94 thru last machine in lot 484

Rated volts.....6
Rotation (Drive end).....Clockwise
Ground polarity.....Positive
Brush spring tension.....35-53 ounces
Field coil draw:
Volts.....5.0
Amps.....1.6-1.7
Motoring draw:
Volts.....5.0
Amps.....5.0-5.5
Output:
Volts.....8
Maximum amps.....45
Minimum RPM.....2125
Control.....CVR

CT120-1-KP-119 thru last machine lot 275

Rated volts.....6
Rotation (drive end).....Clockwise
Ground polarity.....Positive
Brush spring tension.....35-53 ounces
Field coil draw:
Volts.....5.0
Amps.....1.6-1.7
Motoring draw:
Volts.....5.0
Amps.....5.0-5.5
Output:
Volts.....8.0
Maximum amps.....45.0
Minimum RPM.....2125
Control.....CVR

STARTERS

CT120B-1-718 and above

Rated volts.....12
Rotation (drive end).....Clockwise
Brush spring tension.....32-48 ounces
Armature end play.....005-.030
Transmission.....Clutch
No load test:
  Volts.....10.0
  Maximum amps.....56
  Minimum RPM.....3600
Stall torque test:
  Volts.....4.0
  Maximum amps.....350
  Minimum foot pounds.....8.5
Pinion position:
  At rest.....1 5/16-1 15/32

CT120B-1-KP-119 thru last machine lot 484

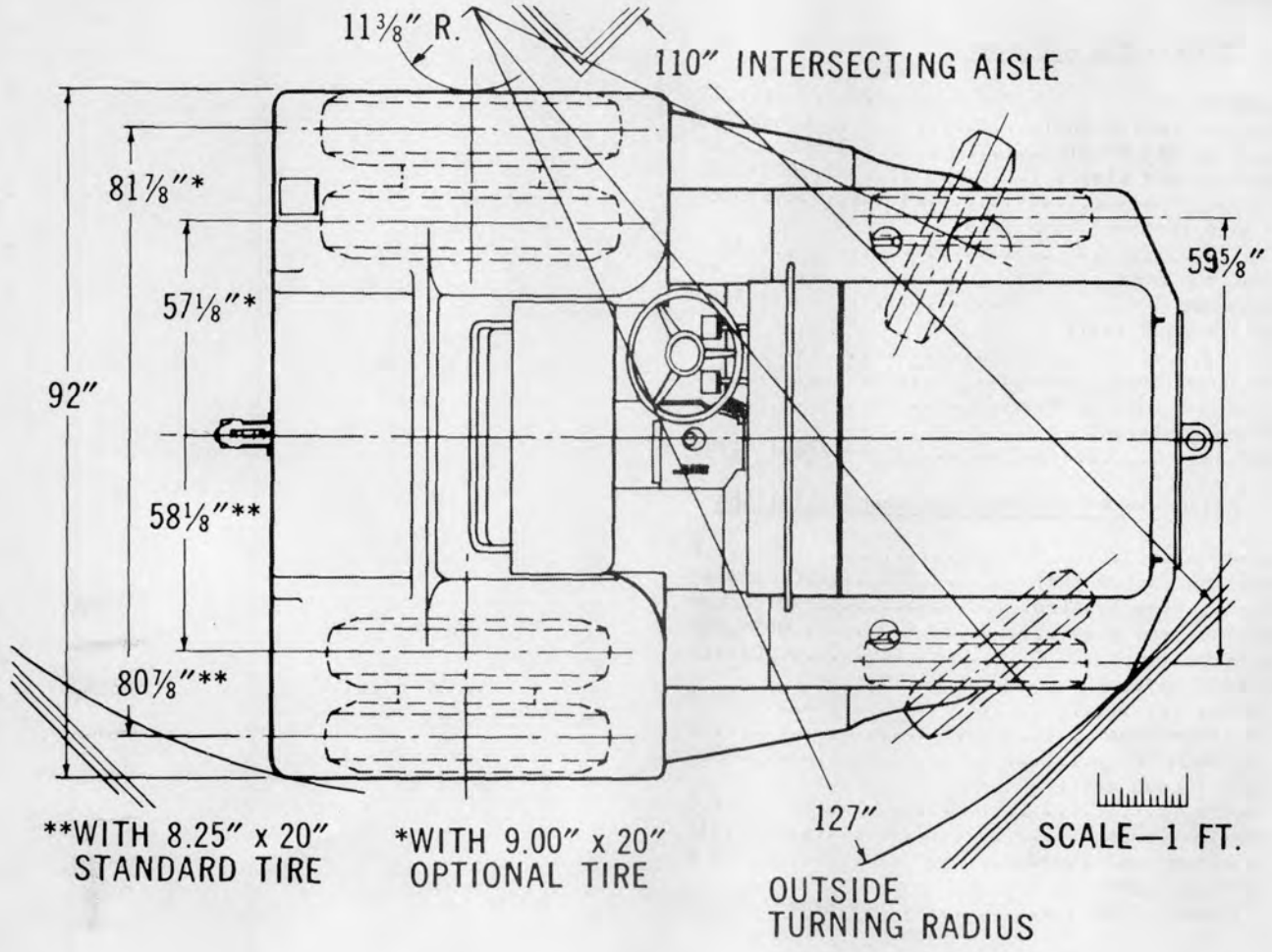
Rated volts.....6
Rotation (drive end).....Clockwise
Brush spring tension.....32-40 ounces
Armature end play.....005-.030
Transmission.....Clutch
No load test:
  Volts.....5.0
  Maximum amps.....65
  Minimum RPM.....4900
Stall torque test:
  Volts.....2.0
  Maximum amps.....410
  Minimum foot pounds.....8.0
Pinion position:
  At rest.....1 5/16-1 15/32

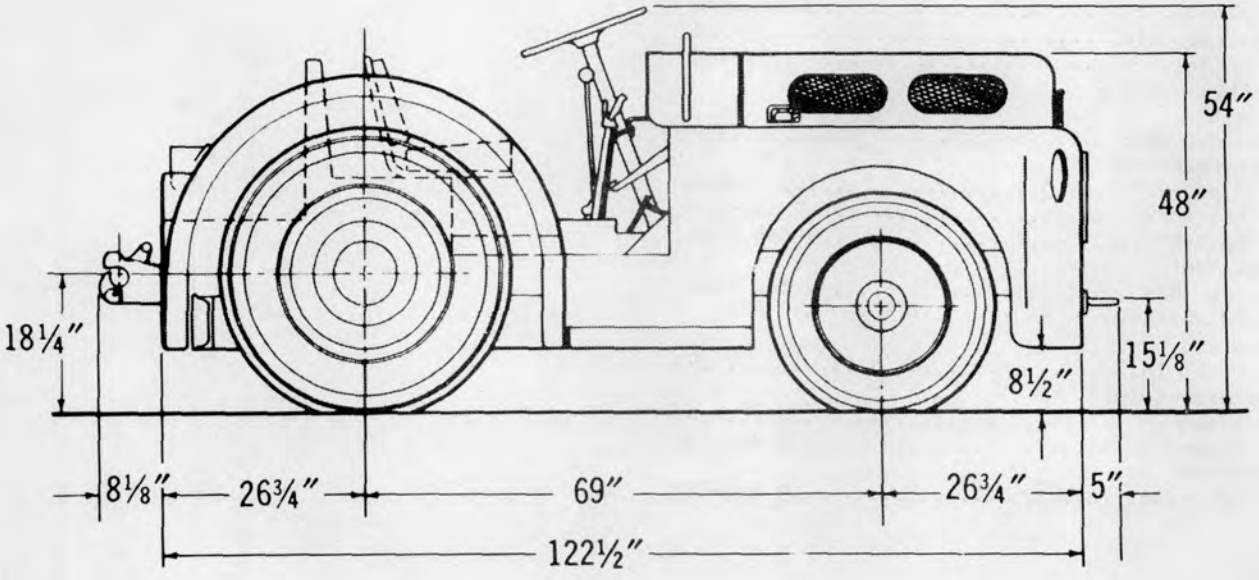
DISTRIBUTOR CT120B-1-KP-119 and above

Cylinders.....6
Rotation.....Clockwise
Cond. cap. mfd.....25-.28
Cam angle.....39 deg
GOVERNOR ADVANCE
  Start:
    0 deg RPM.....350
  Intermediate:
    1 deg RPM 450
    Adv.-RPM.....5 deg-800
    Adv.-RPM.....9 deg 1300
  Maximum:
    Adv.-RPM.....10 deg 1425
VACUUM ADVANCE
  Start:
    0 deg in.....5
  Intermeniate:
    1 deg in.....6
    Adv.-Vac. In.....8 deg-14
  Maximum:
    Adv.-Vac. In.....9 deg-15

INDUSTRIAL TRUCK DIVISION

SPECIFICATIONS





CT-120 Dimensions

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

NEW MACHINE 50 HOUR SERVICE AND INSPECTION

Air Cleaner, Service	8H 403
Battery Test and Level Check	100H 603
Brake Master Cylinder Level Check	100H 303
Brake Pedal, Adjust	100H 302
Cooling System, Inspect	100H 103
Cylinder Head, Tighten	1000H 003
Engine Crankcase, Drain and Refill	100H 003
Engine Oil Filter, Change	100H 003
Fan Belt, Adjust	100H 203
Fluid Coupling Level Check	1000H 1333
Fuel Pump Strainer, Clean or Replace	500H 001
Hand Brake, Adjust	1000H 1103
Intake and Exhaust Manifold, Tighten	500H 403
Lubricate Machine	100H 703
Nuts, Bolts and Capscrews, Tighten	500H 403
Steering Gear Level Check	100H 603
Transmission Level Check	100H 001

NOTE

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

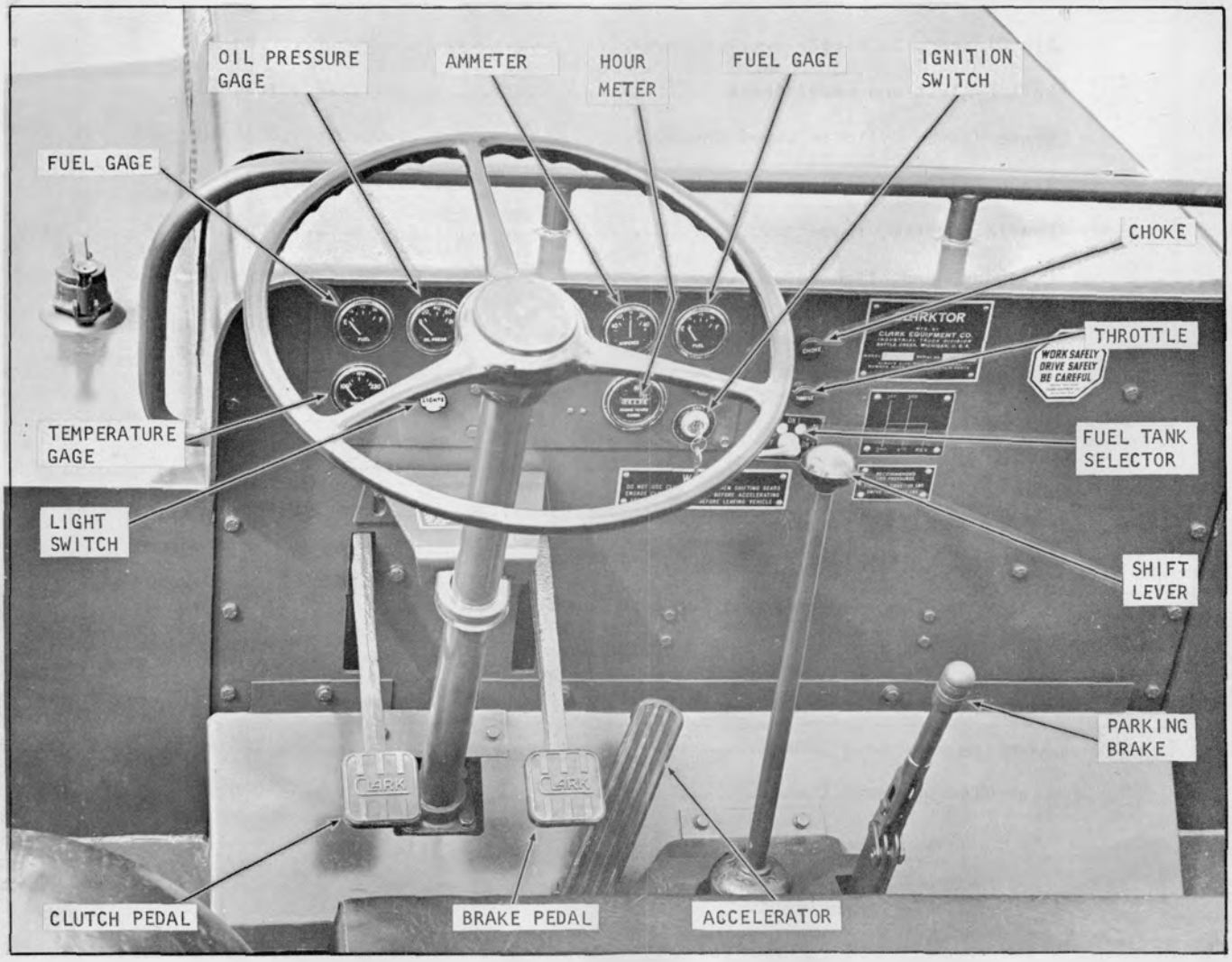


Plate 4711. "Typical" Control Locations

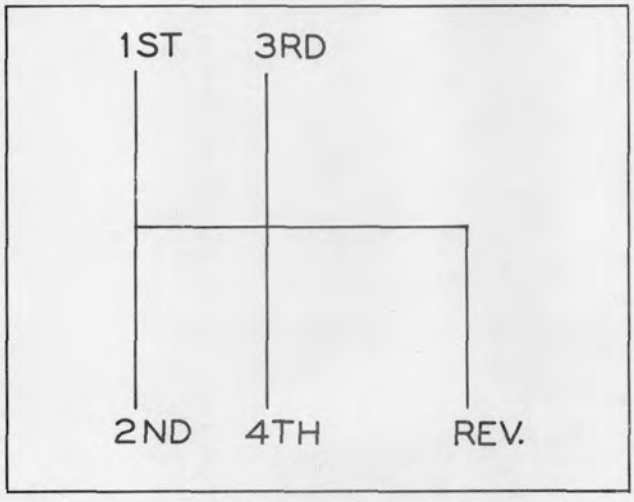


Plate 3155. Shaft Lever Diagram

Plate 8512. Oil Pressure Indicator

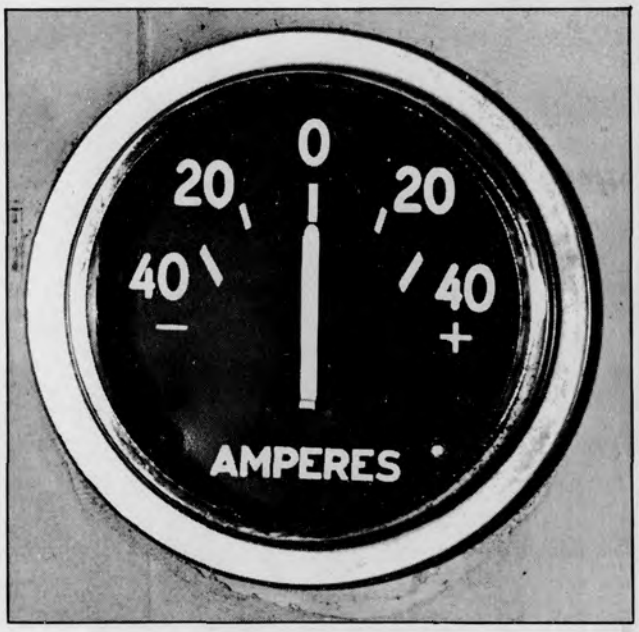


Plate 7647. Ammeter

INSTRUMENT INDICATORS

Oil Pressure Indicator. Oil pressure should fall in the above indicated ranges if all systems related are operating properly.

C A U T I O N

IF THE OIL PRESSURE IS ERRATIC OR FALLS BELOW THE ABOVE LIMITS, 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 5 MINUTES, THEN STOP AND RECHECK OIL LEVEL IN CRANKCASE. BRING OIL LEVEL TO HIGH MARK, IF NECESSARY.

Ammeter. The ammeter is connected in the generator (or alternator if used) and battery circuit in such a manner as to indicate rate of charge or discharge. If the generator (or alternator) is functioning properly the ammeter should show a small amount of charge at engine idle. As engine R.P.M. increases the rate of charge also increases. When the battery becomes fully charged the circuit is regulated to reduce the rate of charge, and cause the ammeter needle to return to near neutral position, showing only a small amount of charge.

N O T E

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

N O T E

Diesel engine models.....refer to engine operators manual.

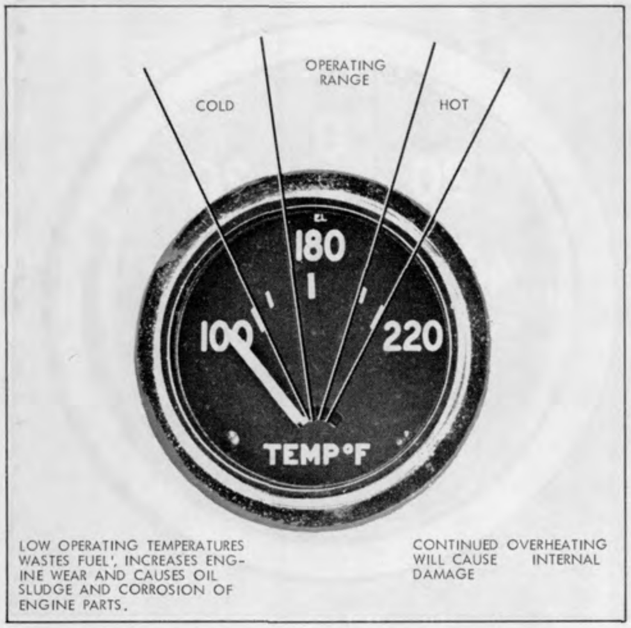


Plate 6287. Engine Coolant Temperature Indicator

NOTE

The coolant temperature should register around 180 degrees Fahrenheit after the first ten or fifteen 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.

Plate 7162. Hour Meter

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

****

* DIESEL ENGINES: REFER TO ENGINE OPERATORS MANUAL FOR COOLANT OPERATION TEMPERATURES. *

****

TO MOVE A LOAD

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

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

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

I M P O R T A N T

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

SAFETY AND OPERATION SUGGESTIONS

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

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

1. Operate machine with forks close to floor, loaded or empty, but high enough to avoid hitting obstructions.

2. If vision is obstructed by the load, operate machine in reverse and sufficiently turn in the seat to obtain clear vision.

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

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

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

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

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

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

9. Do not allow riders or hitchhikers.

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

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

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

13. Drive carefully on wet or slippery floors.

14. Keep feet within running line of truck.

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

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

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

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

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

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

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

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

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

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

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

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

1. Close all primary shutoff valves on tank and equipment.

2. Properly ventilate work area.

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

4. Prohibit smoking.

5. Have fire fighting equipment present.

6. Check all equipment before installation.

7. Securely mount cylinder (container) to the truck.

8. Protect all hoses from damage by using new grommets or some suitable means, where necessary.

9. After installation, check for leaks with soapy water. NEVER USE A MATCH OR FLAME WHEN CHECKING FOR LEAKS.

W A R N I N G

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

W A R N I N G

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

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

1. Properly ventilate work area.

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

3. Prohibit smoking.

4. Have fire fighting equipment present.

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

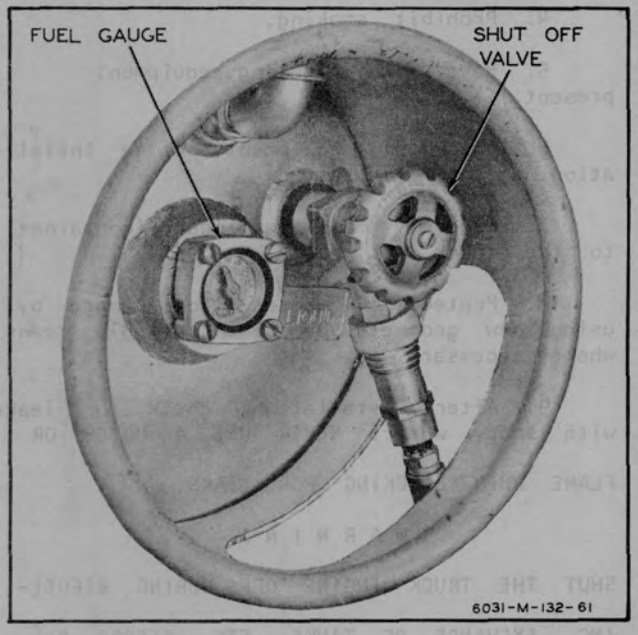


Plate 6031. Typical L.P. Gas Container

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

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

8. Check all equipment for security of mounting.

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

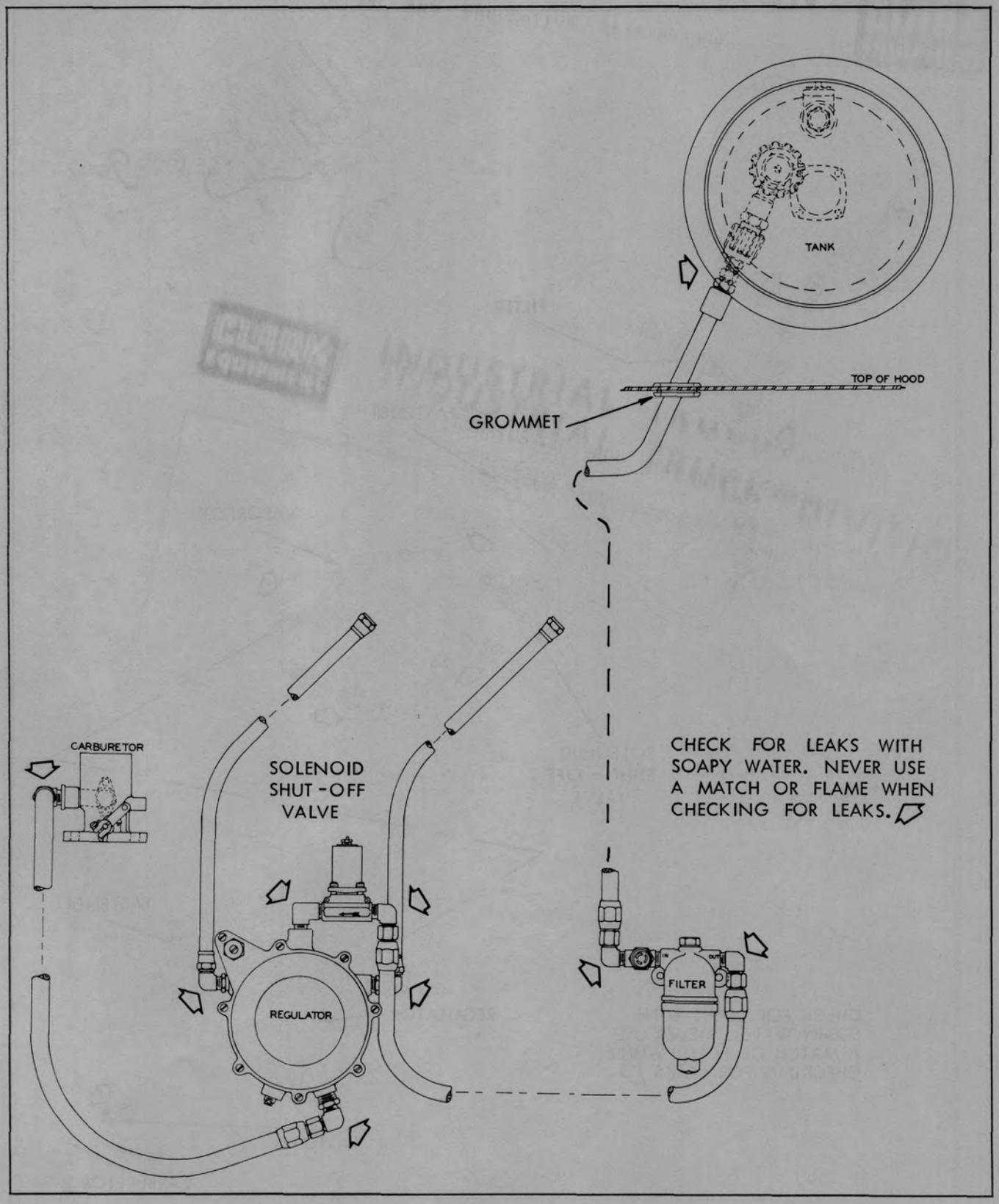


Plate 7405. Typical L.P. GAS Installation

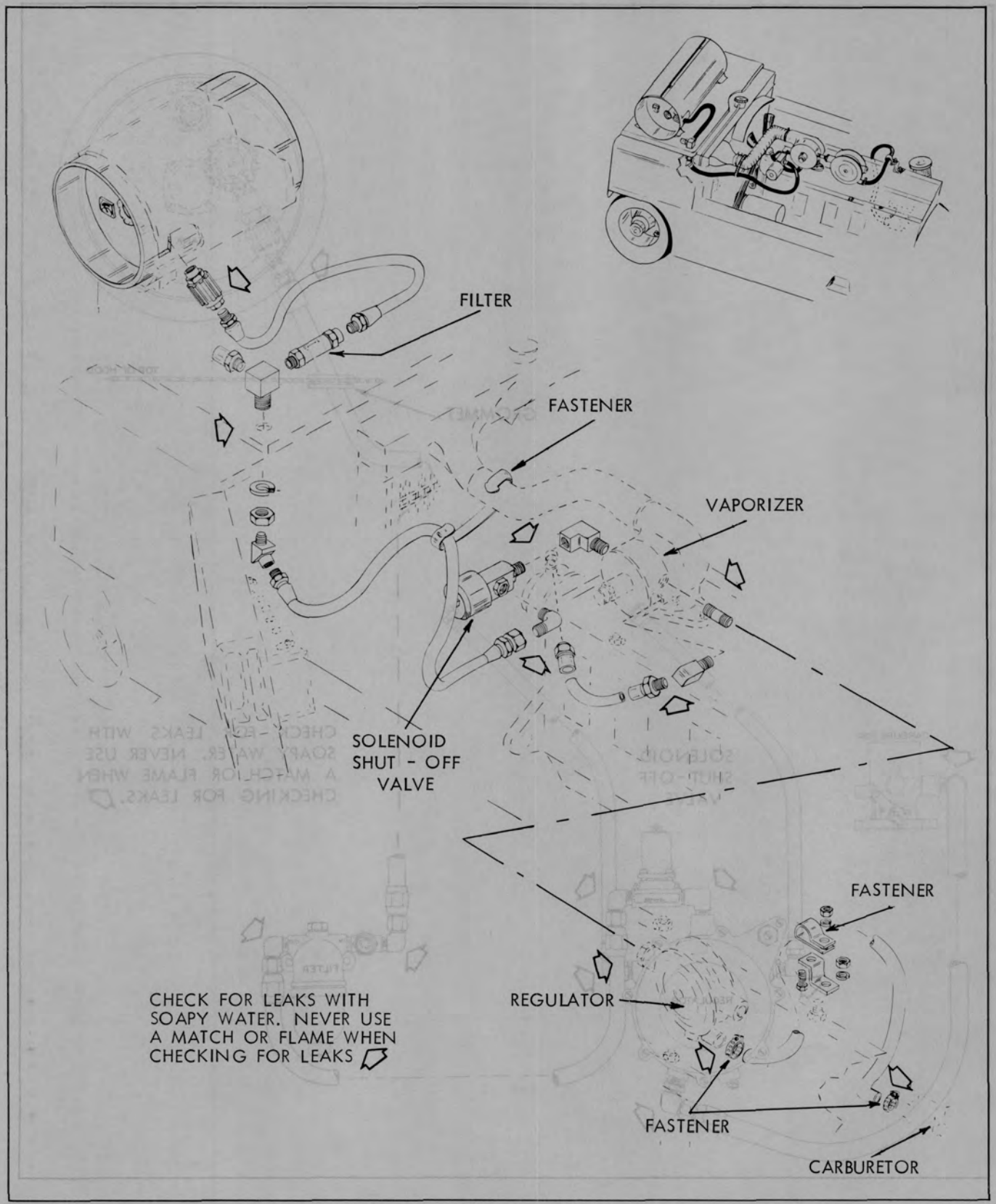


Plate 7406. Typical L.P. GAS Installation

INDUSTRIAL TRUCK DIVISION

LUBRICATION AND PREVENTIVE MAINTENANCE
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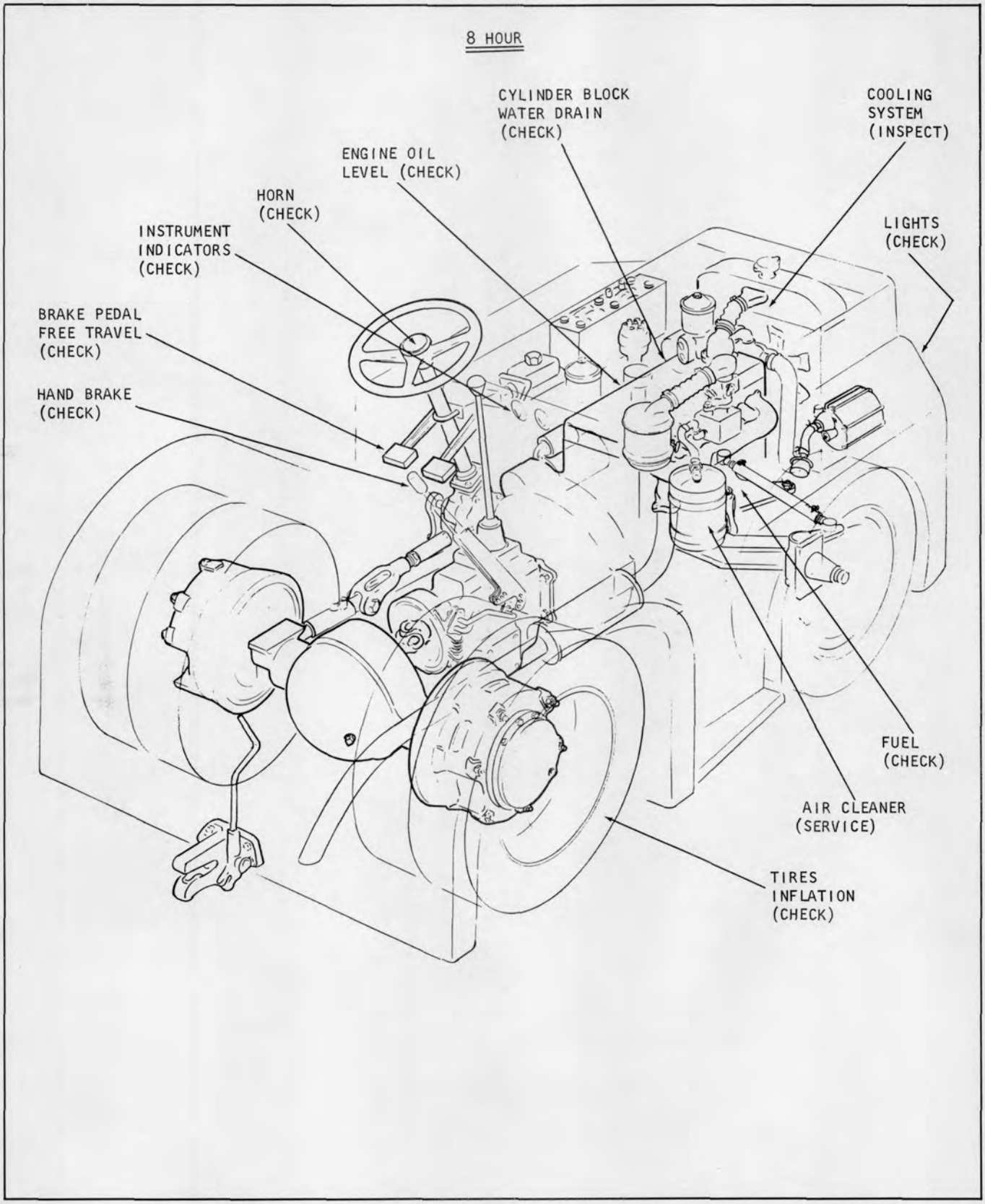


Plate 8603. Lubrication and Preventive Maintenance Illustration

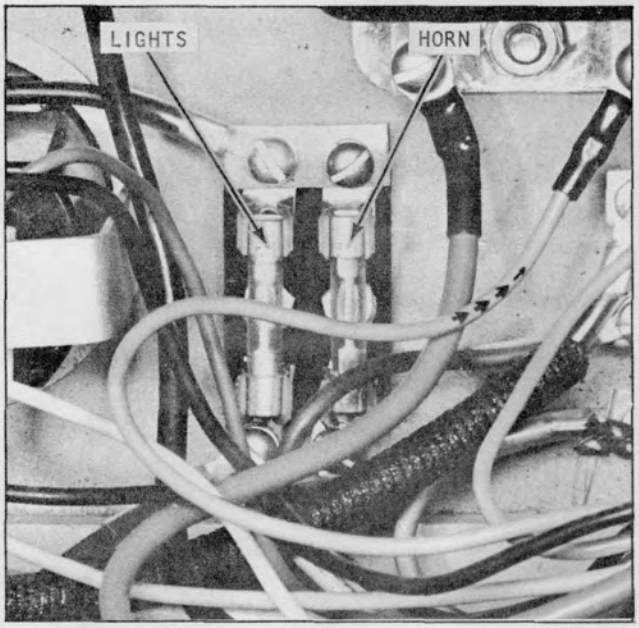


Plate 8597. Electrical System Fuses

HORN

Check to be sure the horn is working properly.

FUEL TANK

Check fuel supply and fill if necessary. Use a good grade of fuel. Before filling fuel tank, make certain the filler cap screen is in place and not damaged (on machines so equipped.)

LIGHTS

Check head lights and tail lights to be sure they are working properly.

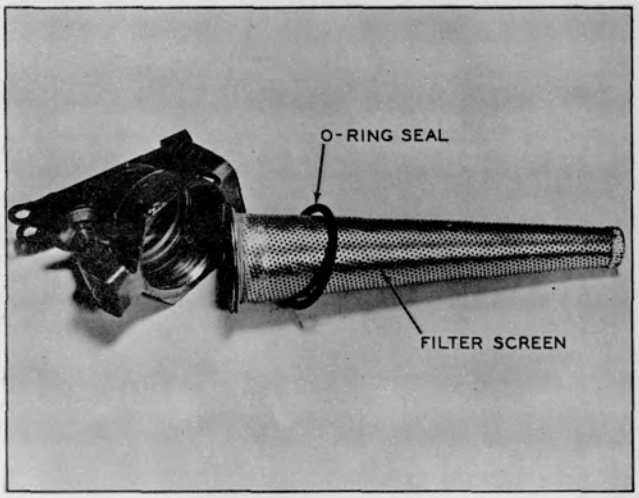


Plate 6627. Gasoline Tank Filler Cap & Screen

TIRES

Check for proper inflation.

Front.....55 lbs.
Rear.....55 lbs.

FUSES

Check the electrical circuit fuses. The fuse holder is located under the engine hood and behind the instrument cluster.

W A R N I N G

DO NOT FILL THE TANK WITH THE FILLER CAP SCREEN REMOVED. (GASOLINE MODELS)

ENGINE CRANKCASE

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

C A U T I O N

NEVER PERMIT THE OIL LEVEL TO FALL BELOW THE "ADD" MARK ON THE DIPSTICK. DO NOT OVERFILL THE CRANKCASE, AS TO MUCH OIL WILL BRING THE LEVEL HIGH ENOUGH FOR THE CONNECTING RODS TO DIP, THUS CAUSING EXCESSIVE QUANTITIES OF OIL TO BE THROWN TO THE CYLINDER WALLS RESULTING IN OIL CONSUMPTION, SMOKING, EXCESSIVE CARBON DEPOSITS AND FOULED SPARK PLUGS.

N O T E

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

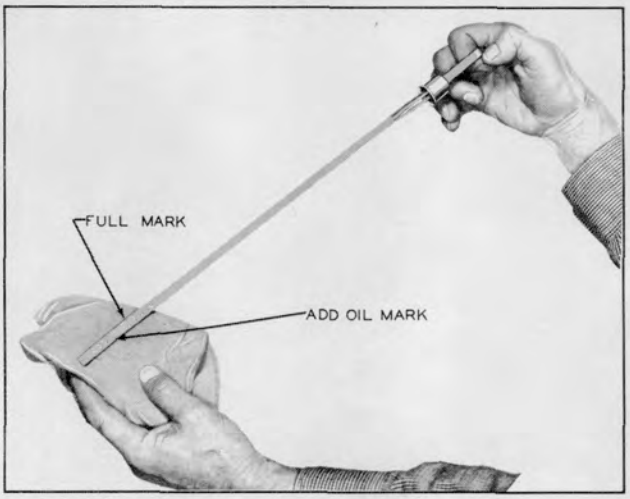


Plate 3145. Crankcase Oil Check

CRANKCASE CAPACITY

Use only good quality engine oil having both an S.A.E. designation and an MS service classification on the container.

S.A.E. 10W.....0 to 32 degrees F
S.A.E. 20W.....32 to 75 degrees F
S.A.E. 30W.....75 degrees F & above
Or use 10W-30 MULTI-GRADE OIL

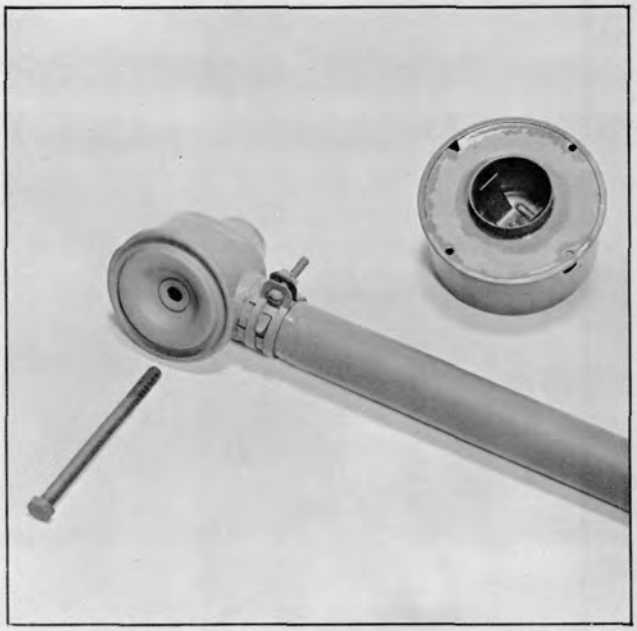


Plate 8511. Crankcase Breather Caps

CRANKCASE VENTILATION

The crankcase is ventilated by air entering the oil filler pipe, and is expelled through the crankcase exhaust pipe. Both the oil filler pipe and the outlet pipe contain filter elements which may be cleaned.

CRANKCASE BREATHER CLEANING

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

N O T E

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

ENGINE COOLING

Make sure that the radiator drain cock and the water drain in the cylinder block are closed (Plate 8436.) 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.

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.

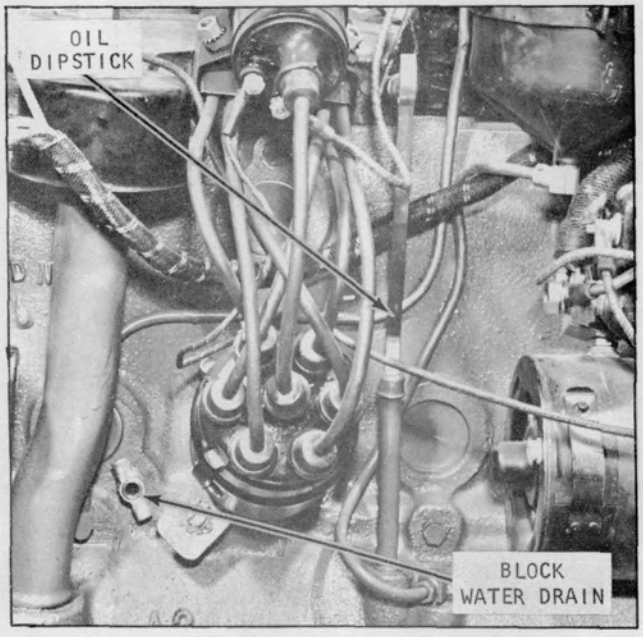


Plate 8436. Cylinder Block Water Drain

C A U T I O N

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

Plate 8512. Oil Pressure Indicator

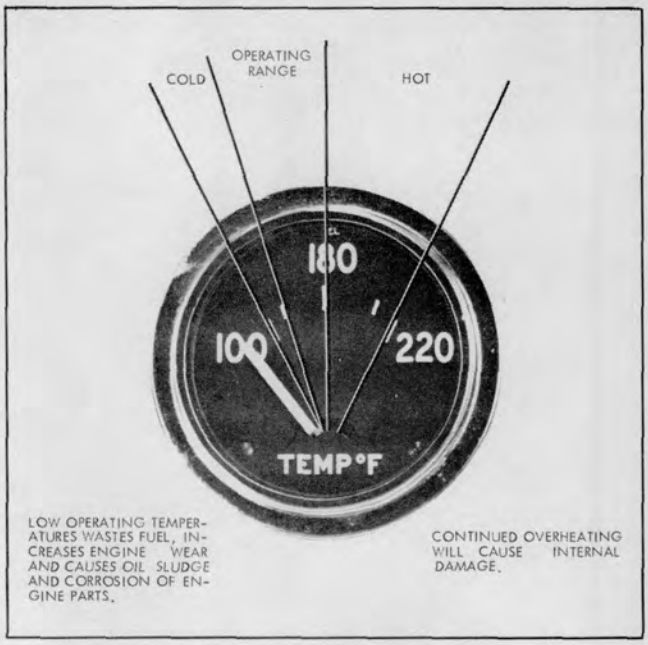


Plate 6287. Temperature Indicator

INSTRUMENT INDICATORS

Oil Pressure Indicator. Oil pressure should fall in the above indicated ranges if all systems related are operating properly.

C A U T I O N

IF THE PRESSURE IS ERRATIC OR FALLS BELOW THE ABOVE LIMITS, 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 5 MINUTES. THEN STOP AND RECHECK OIL LEVEL IN CRANKCASE. BRING OIL LEVEL TO HIGH MARK, IF NECESSARY.

N O T E

For diesel engines refer to engine operators manual for coolant operation temperatures.

Temperature Indicator. The coolant temperature should register around 180 degrees Fahrenheit after the first ten or fifteen minites of operation. Low operating temperatures wastes fuel and increases engine wear.

Ammeter. The ammeter is connected in the generator (or alternator if used) and battery circuit in such a manner as to indicate rate of charge or discharge. If the generator (or alternator) is functioning properly the ammeter should show a small amount of charge at engine idle. As engine R.P.M. increases the rate of charge also increases. When the battery becomes fully charged the circuit is regulated to reduce the rate of charge, and cause the ammeter needle to return to near neutral position, showing only a small amount of charge.

C A U T I O N

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

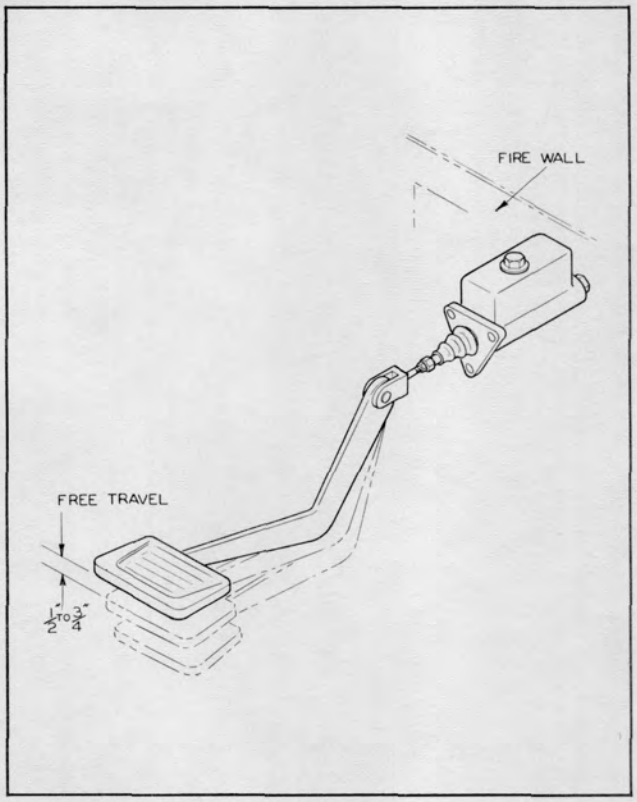


Plate 8434. "Typical"
Brake Pedal Adjustment Check.

BRAKE PEDAL CHECK

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

Correct pedal free travel is 1/2 to 3/4 of an inch when resistance is felt from the master cylinder. See 100H-302 for adjustment proceedure.

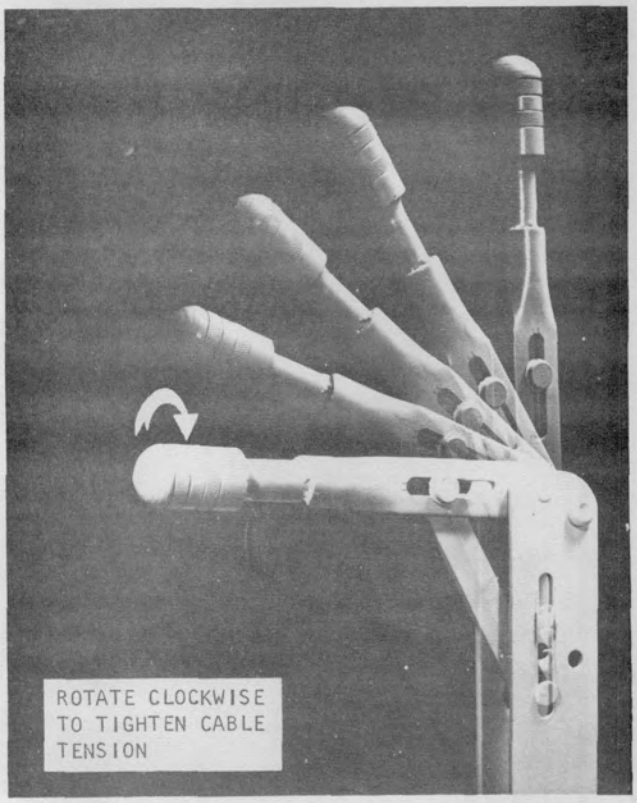


Plate 6505. Parking Brake.

PARKING BRAKE CHECK

Make certain that the parking brake is capable of holding the truck on a 3% grade. This should be tested with the parking brake applied and truck out of gear.

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

Plate 5985. Air Cleaner
Fill to oil level only.

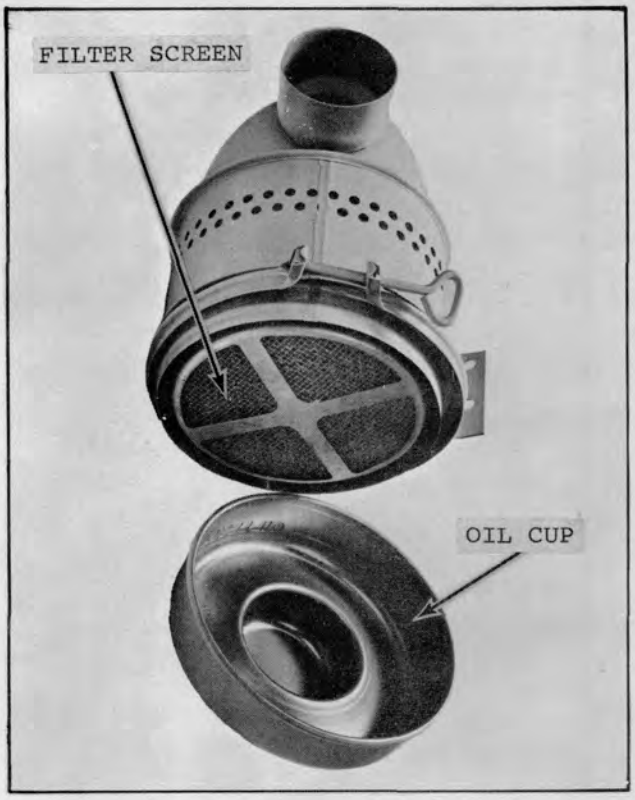


Plate 7663. Air Cleaner Screen and Oil Cup.

AIR CLEANER (OIL BATH TYPE)

The air cleaner is of the oil bath type. The main function of the air cleaner is to prevent dirt and grit from getting into the engine. All engines, when operating, consume several thousand cubic feet of air per hour. Since dusty air is full of abrasive matter, the engine will soon wear excessively if the air cleaner does not remove the dust before entering the cylinders.

Operating conditions determine the air cleaner service periods. As the dirt is strained from the air flowing through the cleaner, it thickens the oil in the cup and raises the level. If the level is to high, agitation of the oil on the screen is affected and gritty oil is carried over into the air stream, through the carburetor and into the engine cylinders. This would actually introduce a grinding compound with resulting very rapid wear.

Air cleaner maintenance may seem trivial, but it can mean longer engine life, less engine up keep and better economy providing proper maintenance is exercised. Common sense with a close observance can best determine the frequency of air cleaner maintenance.

RECOMMENDED MAINTENANCE

The air cleaner should be checked every 8 operating hours and cleaned if needed. This may be necessary twice daily under extreme dirty conditions.

Remove air cleaner oil cup and wash in a Stoddard type cleaning solvent. Wipe dry and refill with new engine oil. Replace oil cup on air cleaner being sure it is properly positioned.

Check all hose connections to be sure they are tight. Periodically remove hose connections and check interior of hose for dirt or dust. If found, this indicates that additional cleaning intervals are necessary.

C A U T I O N

ALWAYS CHECK AIR CLEANER ASSEMBLY WITH THE ENGINE TURNED OFF. NEVER CHECK OR REFILL THE OIL CUP WITH THE ENGINE OPERATION.

Plate 8509. Typical Front (Steer) Wheels

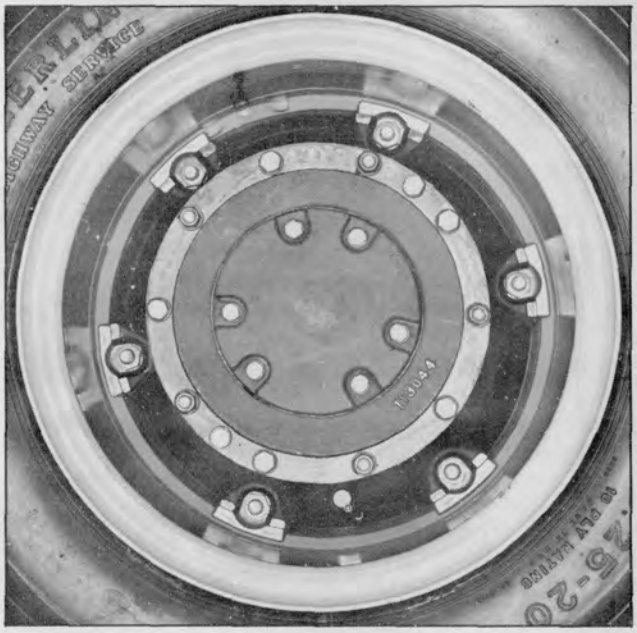


Plate 8510. Typical Rear (Drive) Wheels

WARNING

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

BEFORE REMOVING TIRE FROM RIM, RELEASE ALL AIR FROM THE TIRE BY REMOVING THE VALVE STEM CORE. CAUTION SHOULD BE USED WHEN DOING THIS.

DO NOT INTERCHANGE LOCK RINGS FROM ONE RIM TO ANOTHER.

WARNING

BEFORE REMOVING TIRES WITH SPLIT RIMS FROM THE MACHINE, COMPLETELY DEFLATE TIRES BY REMOVING THE VALVE STEM CORE. CAUTION SHOULD BE EXERCISED WHILE DOING THIS. IF TIRES ARE NOT DEFLATED AND THE OUTER WHEEL STUD NUTS ARE REMOVED PRIOR TO THE REMOVAL OF THE INNER WHEEL STUD NUTS, IT IS POSSIBLE FOR THE SPLIT RIMS TO SEPARATE WITH GREAT FORCE AND COULD RESULT IN SERIOUS INJURY TO ANYONE STRUCK BY IT.

WARNING

TO REMOVE WHEEL ASSEMBLY FROM VEHICLE ---- REMOVE INNER WHEEL STUD NUTS ONLY.

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

Plate 7613. Typical Wheel with Inner and Outer Halves

3. In all cases, when removing wheels equiped 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.

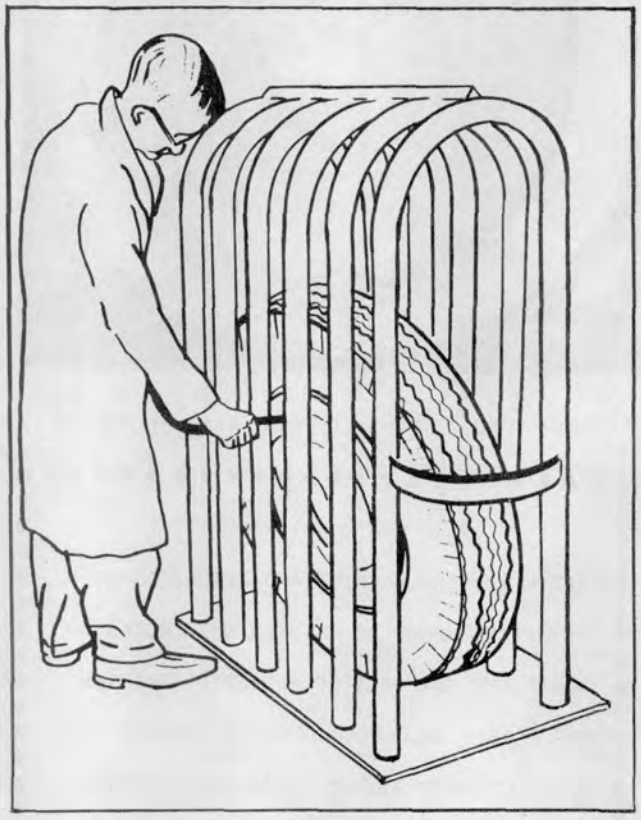


Plate 7614. Typical Safety Cage

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

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 throughly inspecting it and the rim assembly. It is especially important to make sure the lock ring is secure in the gutter and has not been damaged prior to re-inflation.

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

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

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

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

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

N O T E

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

If 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 foward rotation, see Plate 6422.

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

2. Outside dual tire arrow to point in the direction of rearward rotation, see Plate 6423.

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

Directional Tread Single Drive Tires:

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

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

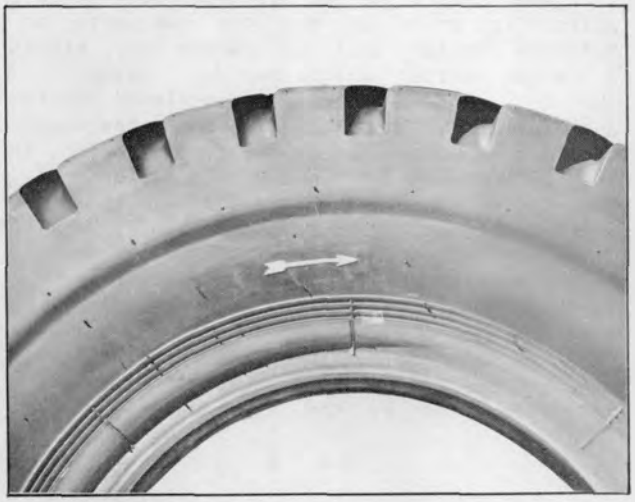


Plate 6422. Inside Dual Tire
(or Single Drive Tire)
(Arrow to point toward front of truck)

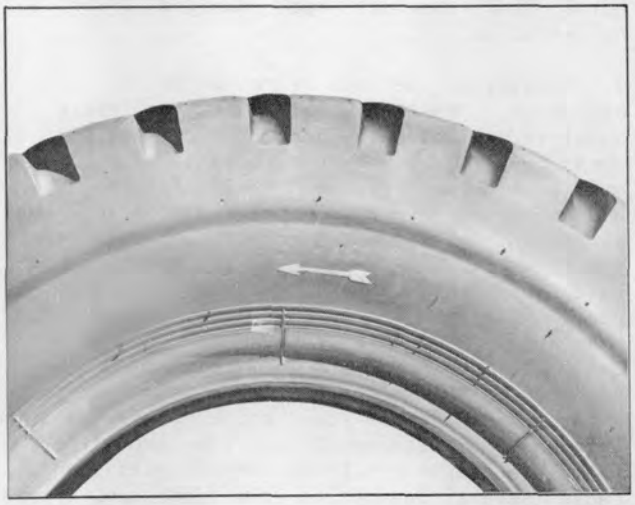


Plate 6423. Outside Dual Tire
(Arrow to point toward
rear of truck)

SOLID OR CUSHION TIRE AND RIM MAINTENANCE

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

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

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

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

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

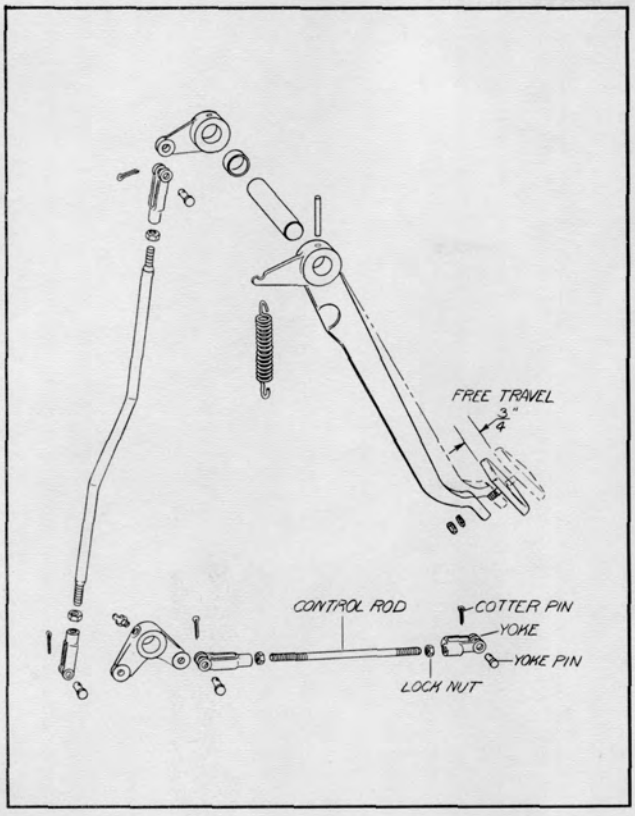


Plate 8455. Clutch Pedal Free Travel Check

CLUTCH PEDAL FREE TRAVEL.

Depress clutch pedal from the top position to a point where it meets resistance. This free travel should be approximately 3/4 of an inch from top pedal position.

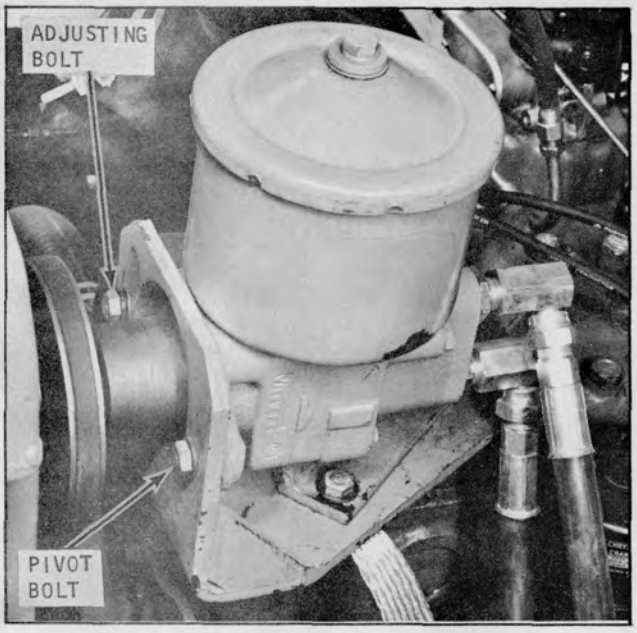


Plate 8598. Hydraulic Pump Assembly

LUBRICATION

The fluid level in the pump reservoir should be checked every 8 operating hours & maintained to the indicated level. Extreme care should be used in checking or adding oil to prevent the entrance of dirt or any foreign material. The clearance of parts and seals depend on cleanliness for proper operation. Use Type "A", Suffix "A" Auto-Matic Transmission Fluid which the containers display a qualification number prefixed by AQ-ATF, CLARK Part Number 879803.

When fluid in the reservoir becomes contaminated it should be drained by removing the return line hose at the bottom of the reservoir, refilled, operated with engine running, and the fluid level rechecked.

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 RESULT.

PUMP BELT ADJUSTMENT

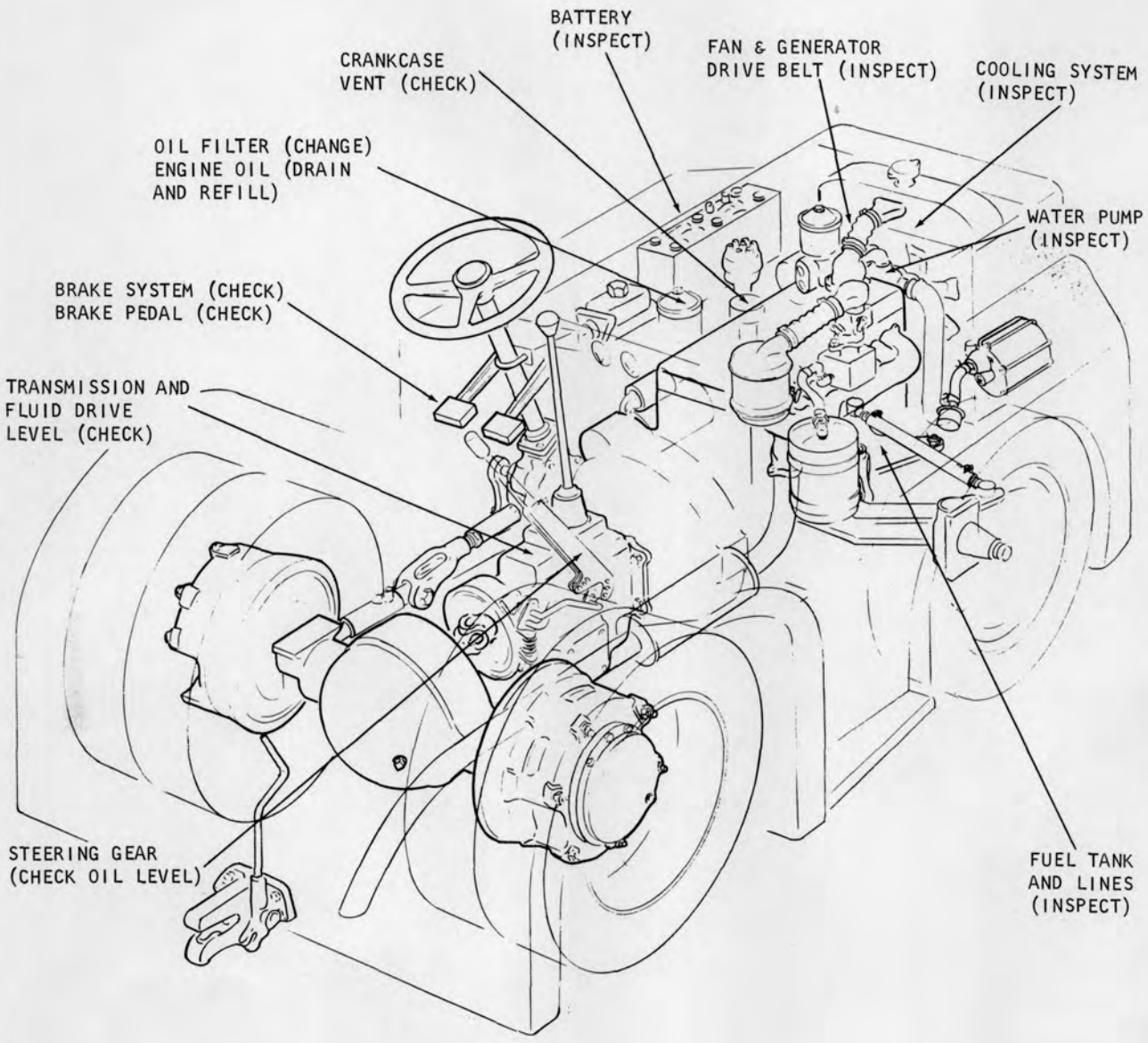
The pump belt tension should be checked frequently and adjusted, if necessary, to prevent noise and slippage. A loose belt will result in loss of power assist and increased steering effort will be noticed.

To adjust the belt tension on the belt driven pump, loosen the pivot bolt first. Then while keeping tension on the belt, loosen the adjusting bolt, make the adjustment, and then tighten the adjusting bolt. After checking the deflection, tighten the pivot bolt.

C A U T I O N

BE CAREFUL WHEN USING THE PUMP RESERVOIR AS A LEVER. IN FACT IT IS NOT RECOMMENDED. ALSO, BE CAREFUL ABOUT PRYING AGAINST THE RESERVOIR. WHEN THE BELT IS ADJUSTED TO PROPER TENSION, IT SHOULD NOT DEFLECT MORE THAN 1/4" WHEN THUMB PRESSURE IS APPLIED MIDWAY BETWEEN THE PULLEYS.

100 HOUR



LUBRICATE ALL GREASE FITTINGS
(REFER TO LUBE DIAGRAM AND LUBE
CHART IN BACK OF THIS SECTION)

Plate 8604. Lubrication and Preventive Maintenance Illustration

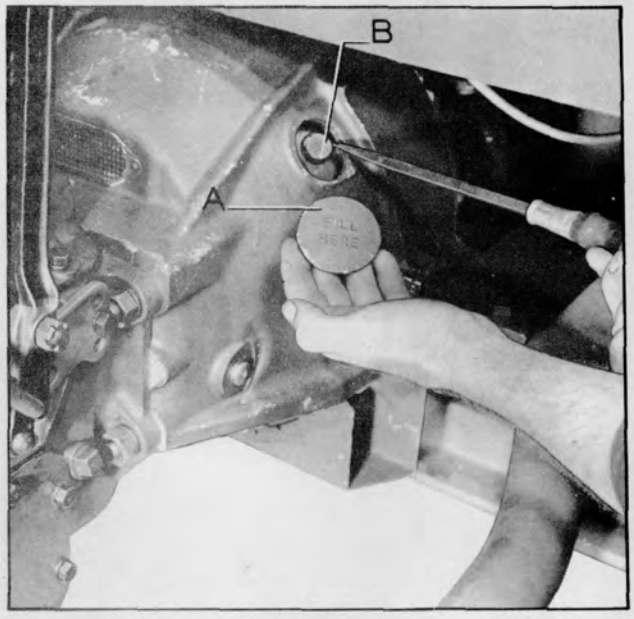


Plate 3247. Fluid Coupling Check

The fluid level in the Fluid Coupling should be checked every 100 operating hours following this proceedure:

Allow unit to cool to atmospheric temperature to allow maximum contraction. Remove cap (A), then rotate fluid unit until filler plug (B) is opposite filler hole in clutch housing. Add fluid, if necessary, to bring level to bottom of filler hole in fluid drive unit. When adding or refilling unit, use type "A", suffix "A" Automatic Transmission Fluid. The oil in the fluid drive coupling is retained by means of seals, and normally the unit requires no servicing. (Fluid containers must also display a qualification number prefixed by AQ-ATF. Clark Part Number 879803.)

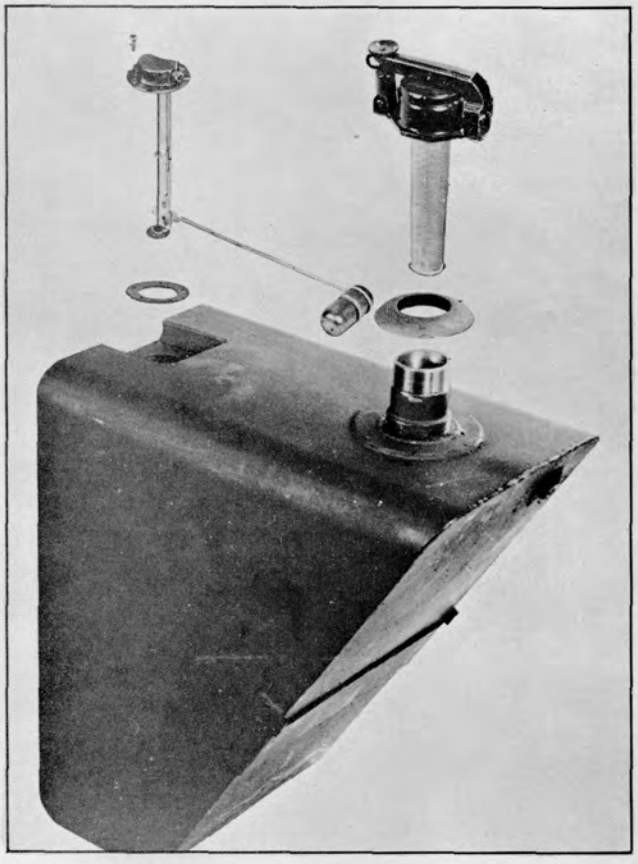


Plate 8508. Fuel Tank
One on each side.

FUEL LINES

Make certain that fuel tank and line connections are secure. Check fuel lines for obstructions and leaks.

ENGINE CRANKCASE

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

Use only good quality engine oil having both an S.A.E. designation and an MS service classification on the container.

Crankcase Capacity.....Refer to Specifications
S.A.E. 10W.....0 to 32 degrees F
S.A.E. 20W.....32 to 75 degrees F
S.A.E. 30.....above 75 degrees F
Or use 10W-30 MULTI-PURPOSE OIL

ENGINE CRANKCASE VENTILATION BREATHER

Remove breather caps and dislodge foreign particles by washing in a Stoddard type solvent until clean. Allow to air dry. Replace breathers after it is completely air dried.

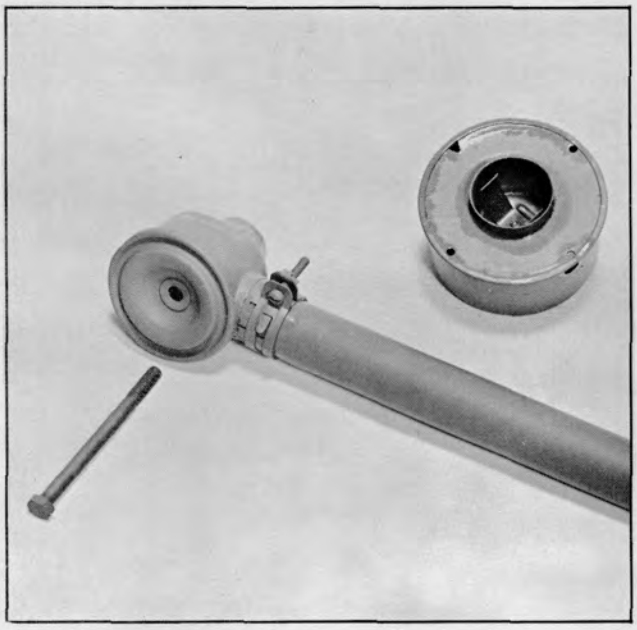


Plate 8511. Crankcase Breather Caps

ENGINE OIL FILTER

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

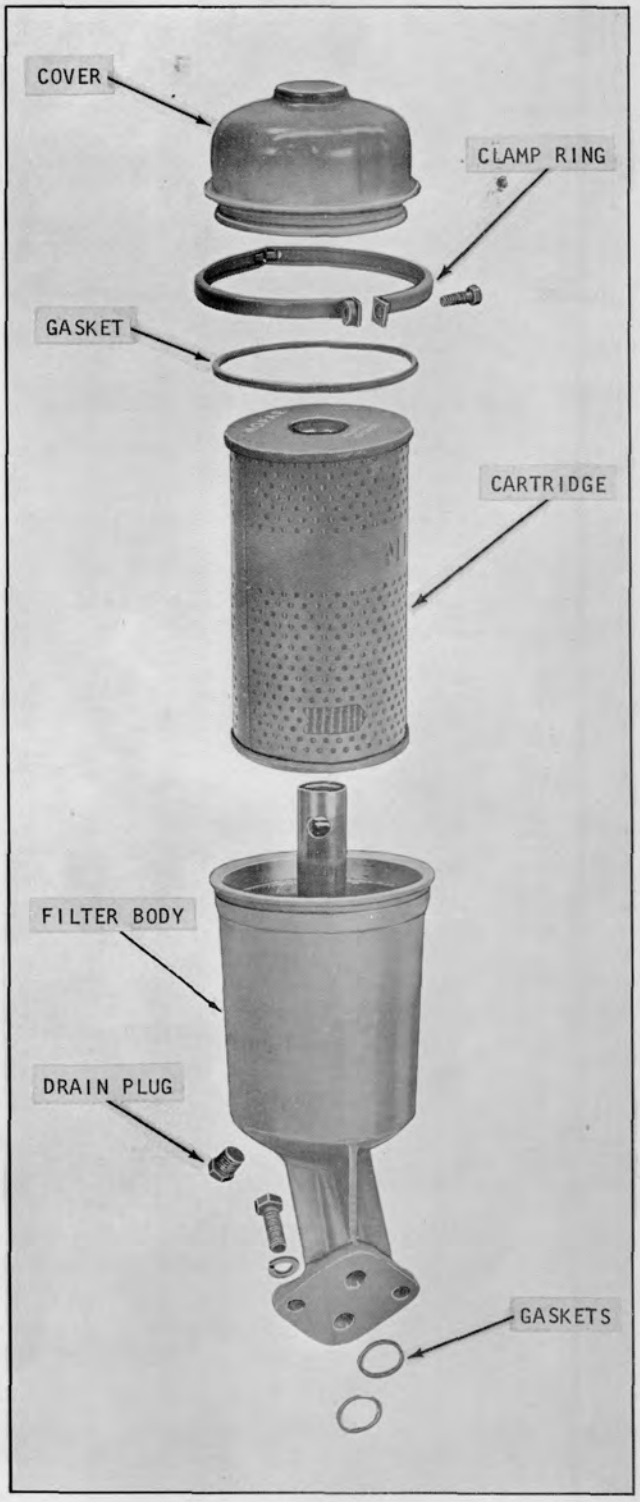


Plate 8504. "Typical" Oil Filter

Plate 6458. Radiator Pressure Cap

W A R N I N G

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

COOLING SYSTEM

Check radiator, hoses and water pump for leaks.

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

N O T E

COOLING SYSTEM CAPACITY - REFER TO SPECIFICATIONS.

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

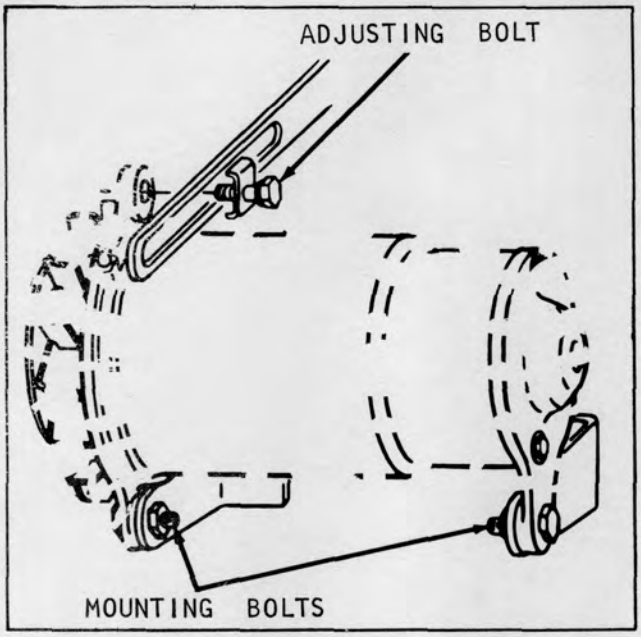


Plate 6631. Generator Drive Belt Adjustment

FAN AND GENERATOR DRIVE BELTS

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

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

2. Move generator toward cylinder block to loosen Generator Drive Belts and away from cylinder block to tighten belts. Tighten bolts when correct finger deflection is obtained.

C A U T I O N

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

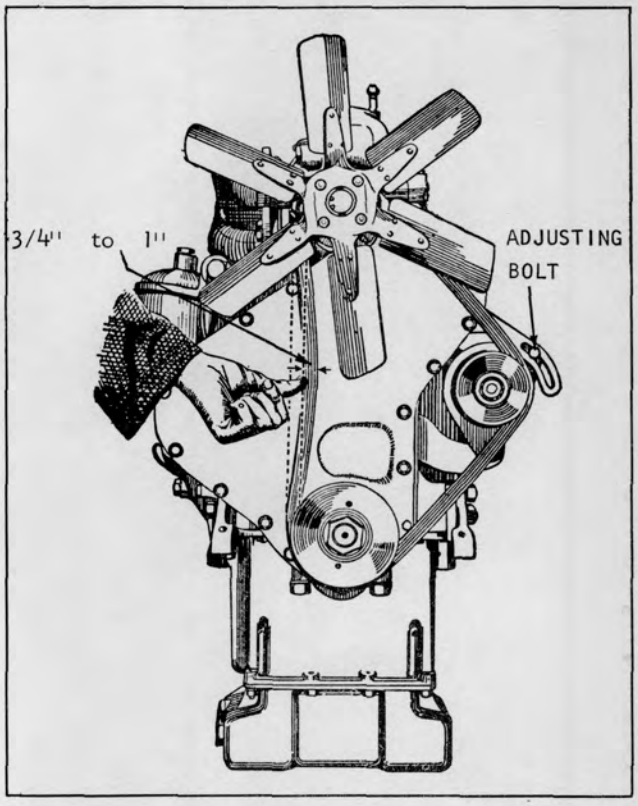


Plate 6632. Belt Deflection Check

N O T E

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

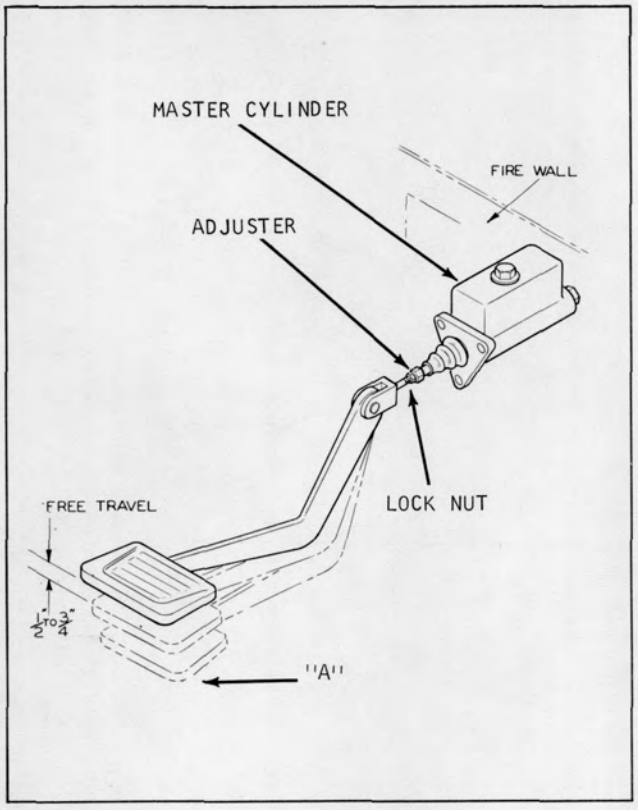


Plate 8454. "Typical"
Brake Pedal Check and Adjustment

BRAKE PEDAL FREE TRAVEL CHECK

Using a rule, measure pedal free travel. Clearance should be measured from top pedal position to where pedal meets resistance from the master cylinder. Depress brake pedal by hand. When pedal meets resistance from the master cylinder, the distance traveled should be 1/2" to 3/4". If free travel is incorrect, adjust as follows:

1. Loosen lock nut.

2. Rotate adjuster to obtain specified pedal free travel.

3. Tighten lock nut to hold adjustment.

ACTUATION STROKE

If brake pedal travels beyond point "A" it indicates either lack of fluid in the master cylinder, air in the system, or the brake linings require adjustment or replacement.

BRAKE SYSTEM

Check brake fluid level in the master cylinder. Brake fluid should be within 1/4 inch of the top. Fill with S.A.E. 70 R3 Heavy Duty Hydraulic Brake Fluid, CLARK part #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 6633.

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.

X X X X X X X X X X X X X X X X X X X X X X X X X X
X X
X W A R N I N G X
X X
X CORRECT BRAKE PEDAL FREE TRAVEL IS X
X X
X IMPORTANT FOR SAFE OPERATING BRAKES. X
X X
X X X X X X X X X X X X X X X X X X X X X X X X X X

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

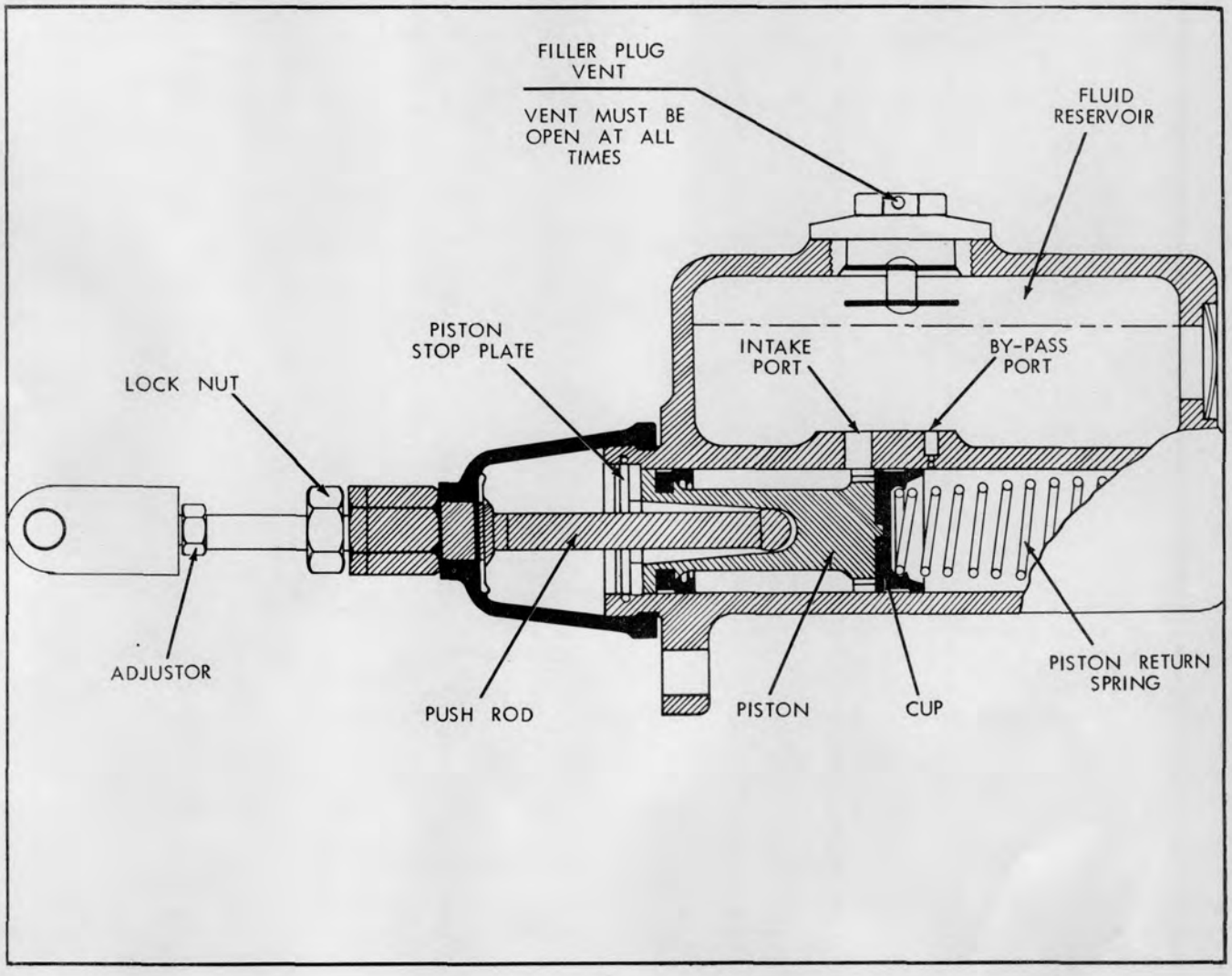


Plate 6633. Brake Pedal Adjustment

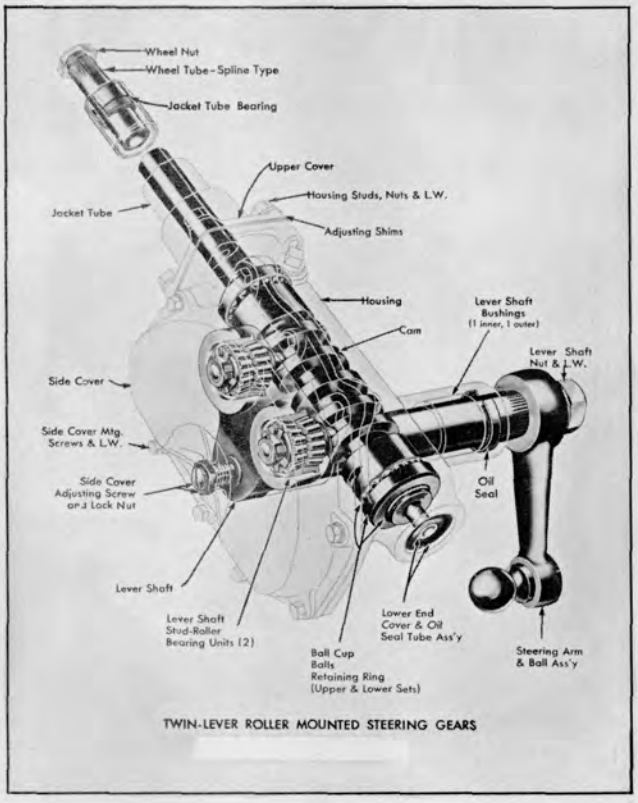


Plate 3017. Steering Gear

LUBRICATION

Lubricate through the oil filler (1) in the top of the housing. Fill housing slowly until lubricant begins to run out of vent hole (8) in the jacket tube. Keep housing full by adding lubricant periodically according to its usage; every few thousand miles or at least spring and fall. Use only AMOCO Lithium Multi-purpose Grease or its equivalent.

BATTERY INSPECTION

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

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

C A U T I O N

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

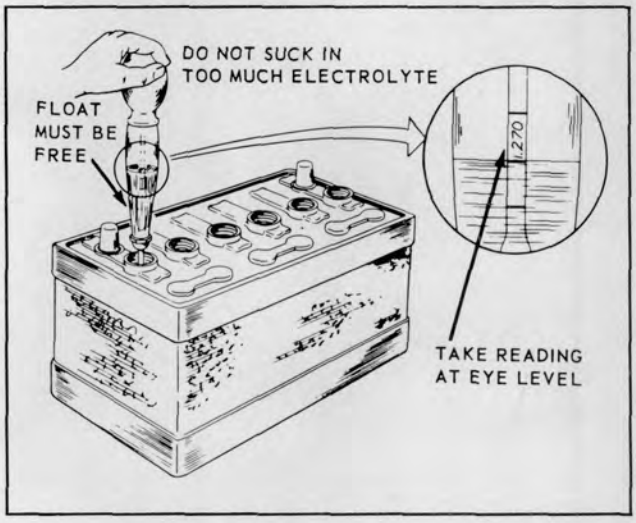


Plate 6271. Checking Specific Gravity of Battery

N O T E

Since the battery is the primary source of all electrical energy, it must be maintained.

N O T E

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

TO TEST BATTERY

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

2. Record voltmeter reading.

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

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

5. Compare this reading with the previously recorded reading.

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

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

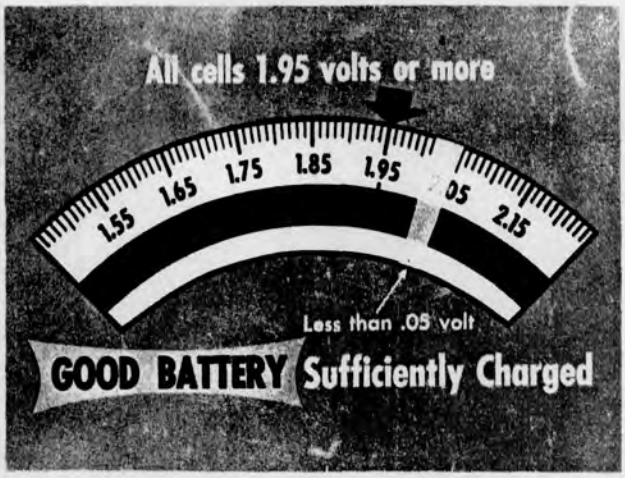


Plate 8306.

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.

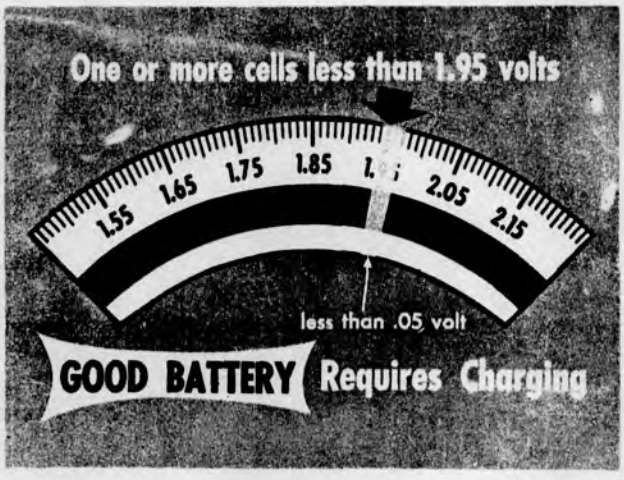


Plate 8307.

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.

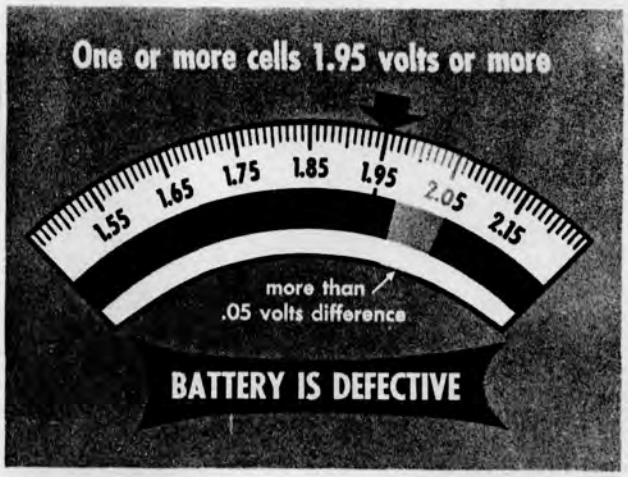


Plate 8308.

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.

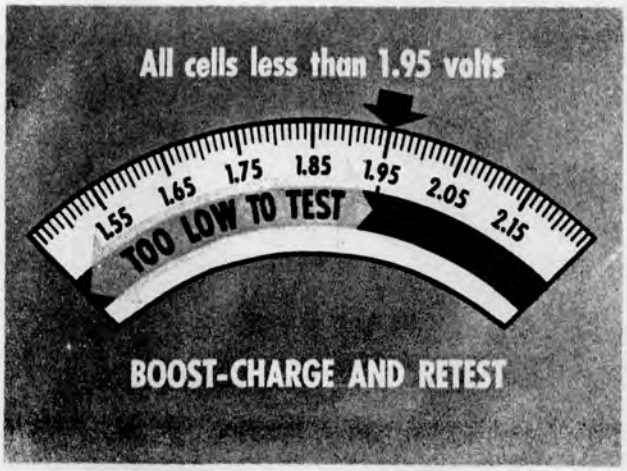


Plate 8309.

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

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.

The clutch pedal free travel should be 3/4 of an inch. 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 top pedal position (clutch arm against stop bolt) to a point where resistance is noticed from the release bearing making contact with the pressure plate release fingers. If an adjustment is necessary loosen clutch control rod adjusting yoke lock nut and remove yoke pin and cotter pin. Adjust yoke to provide proper pedal free travel, tighten lock nut, and reinstall yoke in position with the yoke pin and cotter pin.

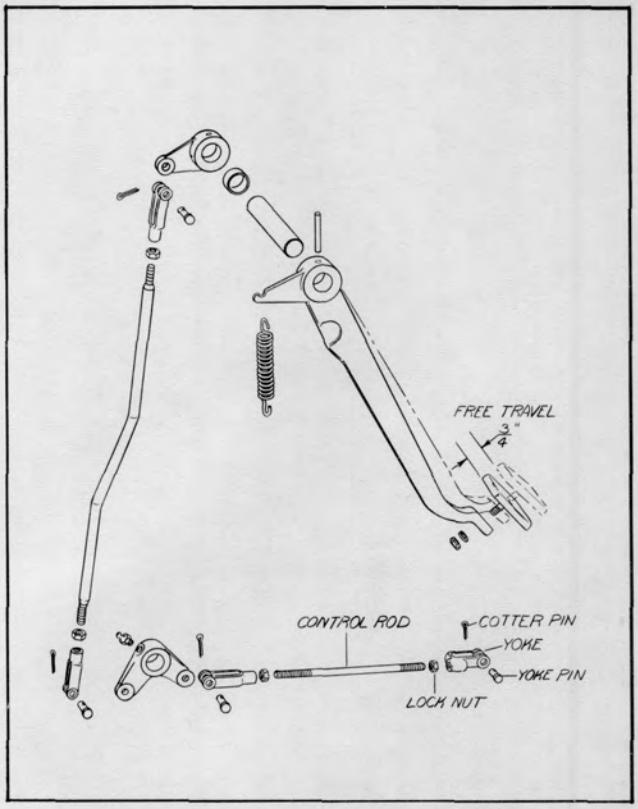
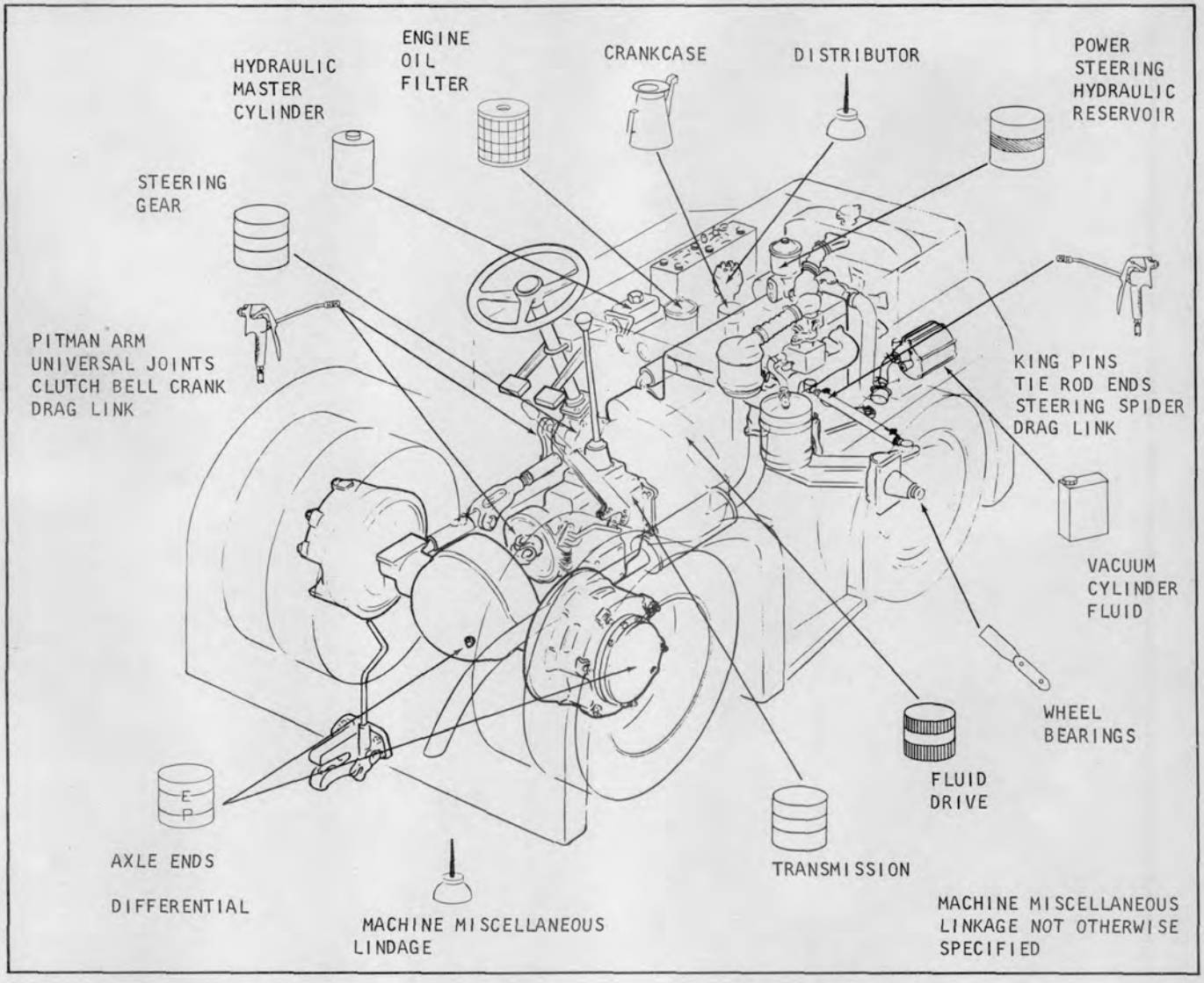


Plate 8455. Clutch Pedal Adjustments

INDUSTRIAL TRUCK DIVISION

LUBRICATION AND PREVENTIVE MAINTENANCE



WHEEL BEARING GREASE
SPEC. MS 9C

GEAR LUBE SAE 90

ENGINE OIL SAE 20

CHASSIS GREASE

VACUUM POWER CYLINDER LUBRICANT

ENGINE OIL: SAE 10W 0-32 deg. F
SAE 20W 32-75 deg. F
SAE 30W 75 deg. F +
Or use 10W-30 MULTI-GRADE OIL WITH MS ON CAN.

EXTREME PRESSURE
SAE 90 GEAR LUBE
PER CLARK SPECIFICATIONS MS-8 879803

AUTOMATIC TRANSMISSION FLUID
TYPE "A", SUFFIX "A". CLARK
PART NUMBER 879803

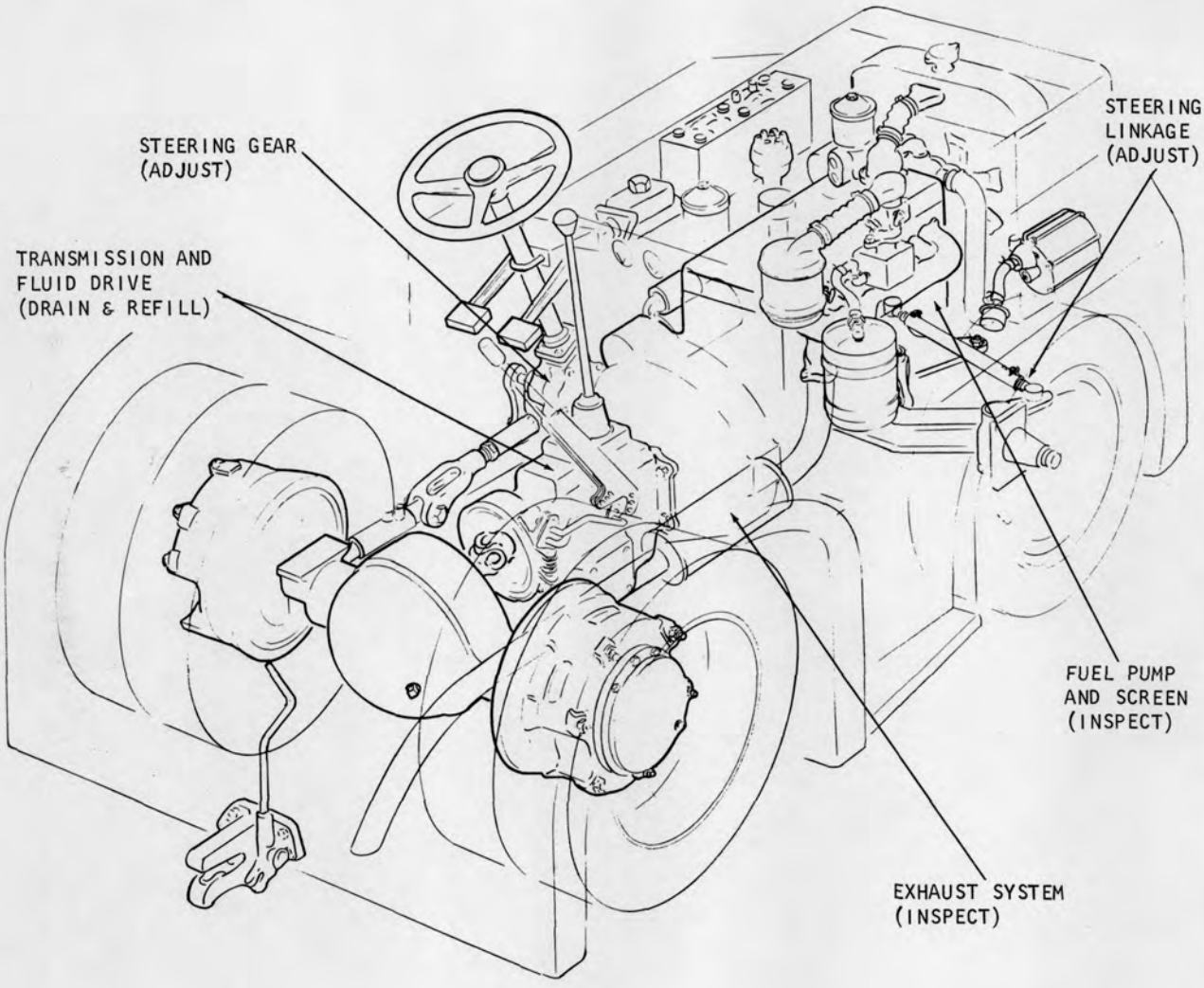
1800200 HYDRAULIC BRAKE FLUID
HEAVY DUTY SAE 70 R3

ENGINE OIL FILTER
CARTRIDGE KIT

HYDRAULIC OIL, CLARK
SPEC. MS 68 885385

500 HOUR

CHECK SECURITY OF ALL NUTS, BOLTS, AND CAPSCREWS.



STEAM CLEAN COMPLETE MACHINE BEFORE PERFORMING THE 500 HOUR LUBRICATION AND PREVENTIVE MAINTENANCE.

Plate 8601. Lubrication and Preventive Maintenance Illustration

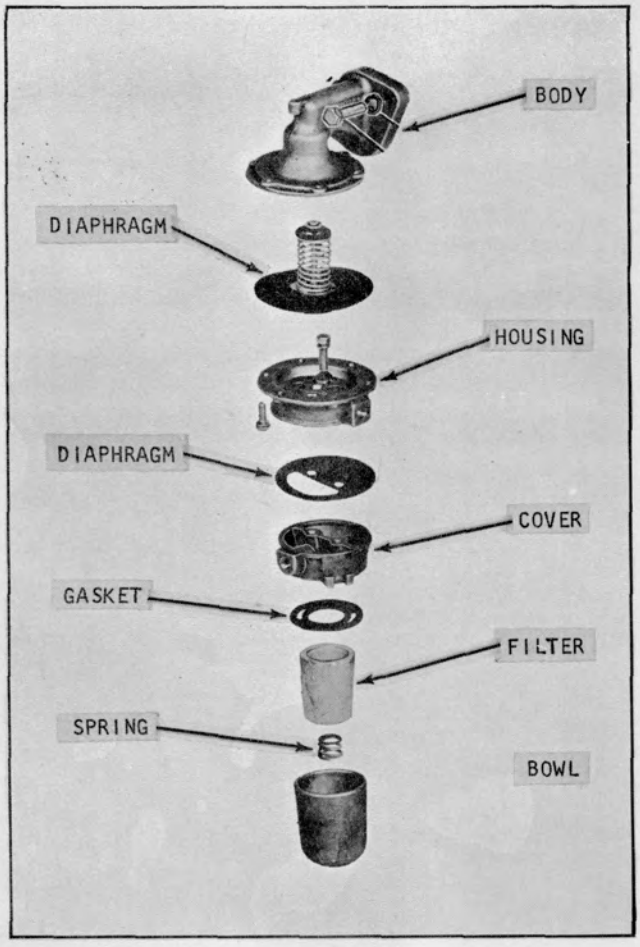


Plate 8506. Fuel Pump Assembly

FUEL PUMP "ON ENGINE" TESTS

VOLUME TEST

This test is made by disconnecting the pump supply line at the carburetor, connecting a short hose to same, and pumping fuel into a quart container. Holding the quart container at carburetor level, the pump should deliver one quart of fuel in one minute or less at 500 RPM engine speed.

VACUUM TEST

This test is made by disconnecting both inlet and outlet lines at the pump, attaching vacuum gauge to inlet port, operating engine at 500 RPM and the gauge should register at least 10" of vacuum.

PRESSURE TEST

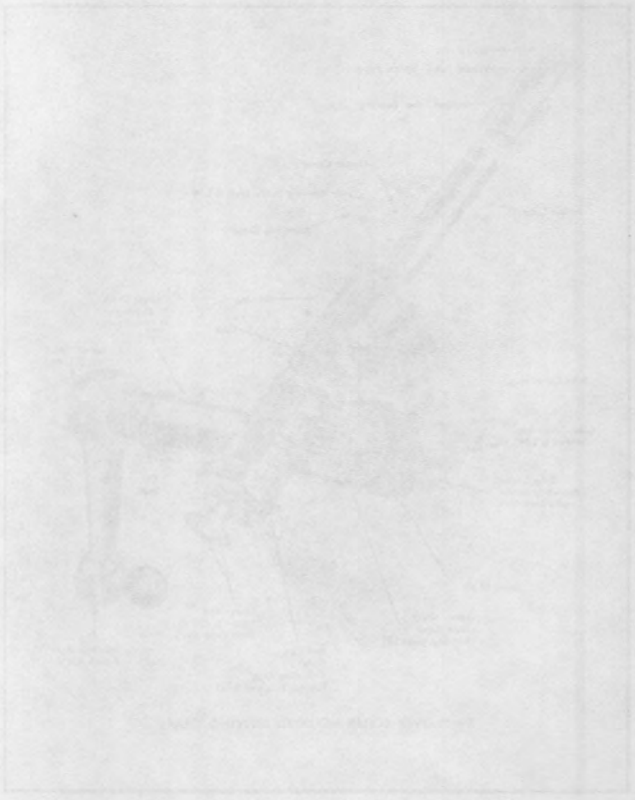
This test is made by attaching a "T" fitting in the fuel supply line at the carburetor, attaching a pressure gauge to the "T" fitting, and the pressure gauge should read a minimum of 3 1/2 lbs. and a maximum of 5 lbs. at 500 RPM engine speed.

CLEANING

Cleaning of the ceramic filter is accomplished by removing and rinsing same in some Stoddard type cleaning solvent. Allow to 'air' dry.

W A R N I N G

TO AVOID CREATING A FIRE HAZARD CARE SHOULD BE TAKEN SO THAT GASOLINE IS NOT SPILLED DURING THESE OPERATIONS.



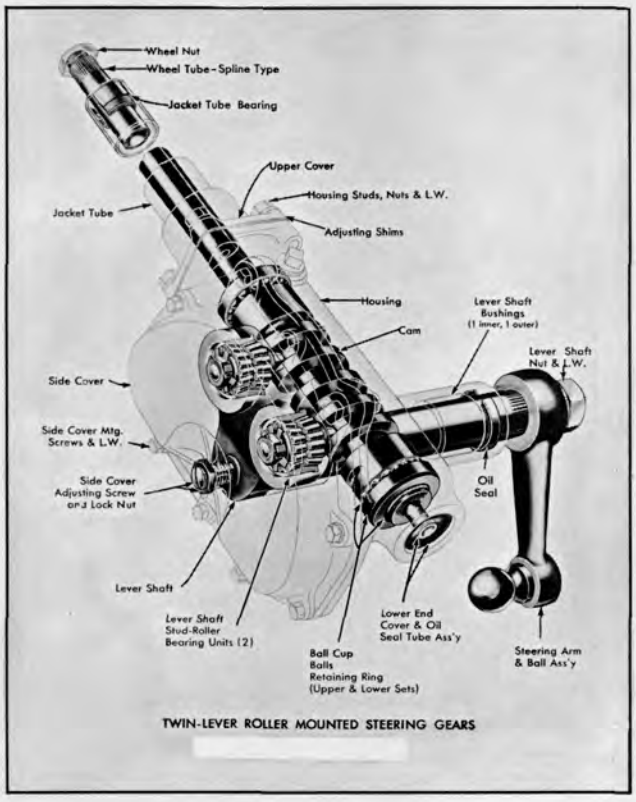


Plate 3017. Steering Gear

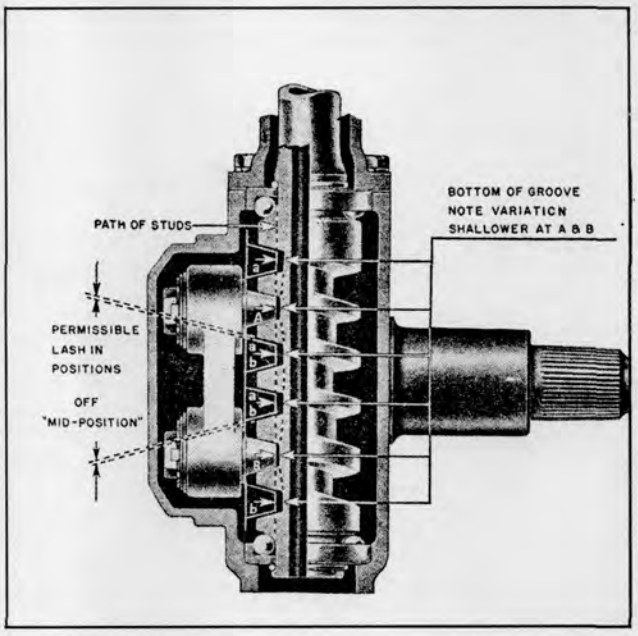


Plate 8497. Steering Gear
(Mid-position of Travel)
(a shows various positions of stud A on turns)
(b shows various positions of stud B on turns)

ADJUSTMENTS

When making adjustments, free steering gear of load by disconnecting draglink from steering arm, and loosen instrument board bracket clamp on steering gear jacket tube. If ball thrust bearings on cam must be adjusted, make this adjustment (I) before making side adjustment (II).

I. Adjustment of Ball Thrust Bearings on Cam.

Adjust to a minimum drag but allow steering wheel to turn freely (with minimum effort.) Before making this adjustment, loosen housing side cover and adjusting screw (9, 10) to free studs in cam groove.

To adjust: unscrew the four nuts (3) and move up housing upper cover (4) to permit removal of shims (5). Shims are .002", .003" and .010" thick. Clip and remove shims as required. Tighten all four nuts. Test adjustment and if necessary remove or repiace shims until adjustment is correct.

N O T E

Do not hammer off arm (steering) without support against end of lever shaft. Use arm puller if possible. If necessary to remove arm with hammer or wedge, light blows are better.

II. Adjustment For Minimum Backlash of Tapered Studs in Cam Grove.

Adjust so that a very slight drag is felt through the mid-position when turning the steering wheel slowly from one extreme position to the other. Backlash of studs in the groove shows up as backlash at steering wheel and at ball on steering arm. The groove is purposely cut shallower, therefore narrower, in the mid-position range of travel of each stud to provide close adjustment where usually the straight ahead driving action takes place. It also makes this close adjustment possible after normal wear occurs without causing a bind elsewhere. Therefore, adjust through the mid-position. Do not adjust in positions off mid-position as backlash at these points is normal and not objectionable.

To adjust: tighten side cover adjusting screw (10) until adjustment is correct and tighten the lock nut (9) to hold it. Then give the gear a final test.

Secure the gear at all points loosened prior to making the adjustment. Also check tightness of mounting bracket bolts and nuts, and of steering arm on lever shaft and the nut and lockwasher (7). With all supporting brackets clamped tight, turn steering wheel to see if any stiffness exists. If so, the column might be out of alignment and needs correcting.

Stud-Roller Bearing Units Adjustment

The foregoing adjustments will suffice in nearly every instance, but in some cases it may be necessary to adjust the stud-roller bearing units in the lever shaft. When necessary to replace this type of stud roller bearing unit replace both units. Each set of two stud units is matched to assure proper pin contact in the cam lead. The roller bearings should be preloaded at all times. Adjust to a noticeable drag. Factory adjustments on new units are set to the minimum inch pounds of torque, as indicated below, to revolve stud. Used or replacement units should be set to this same minimum inch pounds torque; never below.

Unit	Inch Pounds of Torque To Revolve Stud
In 1 3/8" and 1 1/2" dia. shaft	3-3 1/2
In 1 5/8" and 1 1/2" dia. shaft	4-4 1/2

To Adjust, (a) Wash bearings in kerosene and lubricate with light oil.

(b) Straighten out prong of locking washer and replace washer.

(c) Tighten nut as required while holding stud from turning by using spanner wrench on washer, or by clamping stud but do not nick or burr stud surface.

(d) Turn stud back and forth and test adjustment.

(e) Lock adjustment by bending a prong of washer against a side of the nut. Bend the prong that is at tight angle to side of the nut. **Do not use a washer twice** unless prongs used **before** have been removed.

(f) Lubricate with lubricant used in gear.

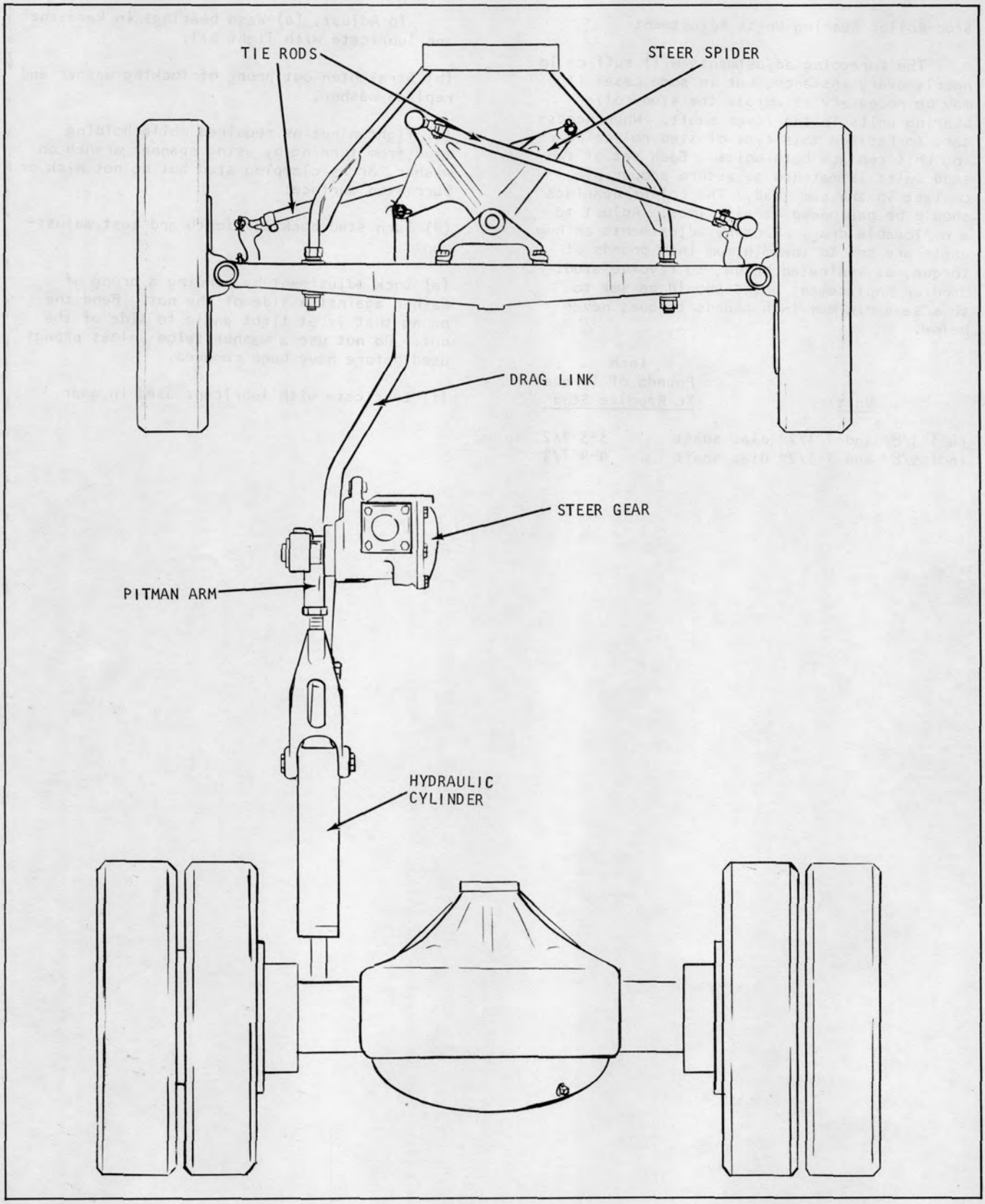


Plate 8600. Steer Linkage Adjustment

STEERING SYSTEM ADJUSTMENTS

1. Support the front of the tractor in such a manner as to take the weight off the steering wheels.

W A R N I N G

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

2. Back off Pitman arm stops.

3. Set each steering wheel to axle stop for approximately 67 degrees wheel movement from a straight ahead position, make sure the two tie rod holes in the spider are positioned equidistant off center and parallel with centerline of truck, check steering wheels for being straight forward and parallel with each other. Adjust the tie rods if necessary to meet this condition.

4. At this point it is advisable to determine if the Pitman arm is assembled to the steering gear shaft in proper relationship to the ste ring gear worm. Do this by removing the Pitman arm from the steering gear shaft then count the number of turns the hand wheel makes from the extreme clock-wise position to the extreme counter-clockwise position. Now return the hand wheel to the mid-point. At this position of the hand wheel, with the steering wheels straight ahead, the Pitman arm should be assembled as near vertical down position as possible. Make adjustments in the control drag link to satisfy the above condition.

5. Now set the Pitman arm stops to limit the steering cylinder travel in both directions so that the axle stops do not contact by apprro approximently 1/16". This will prevent the steering cylinder force from being "locked up" withing the steering linkage and causing excessive wear or possible damage.

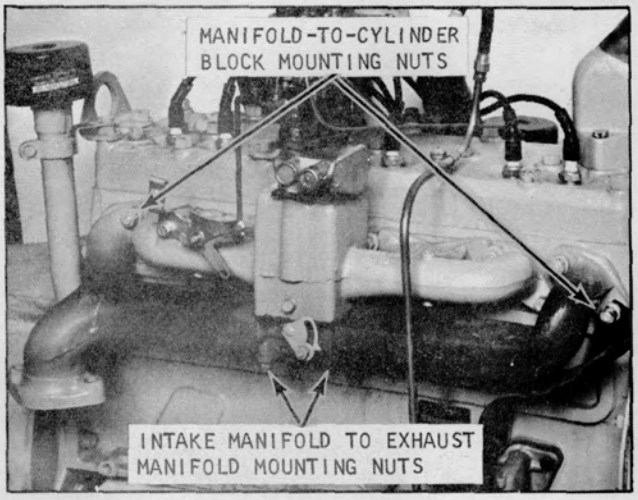


Plate 8452. Intake and Exhaust Manifolds

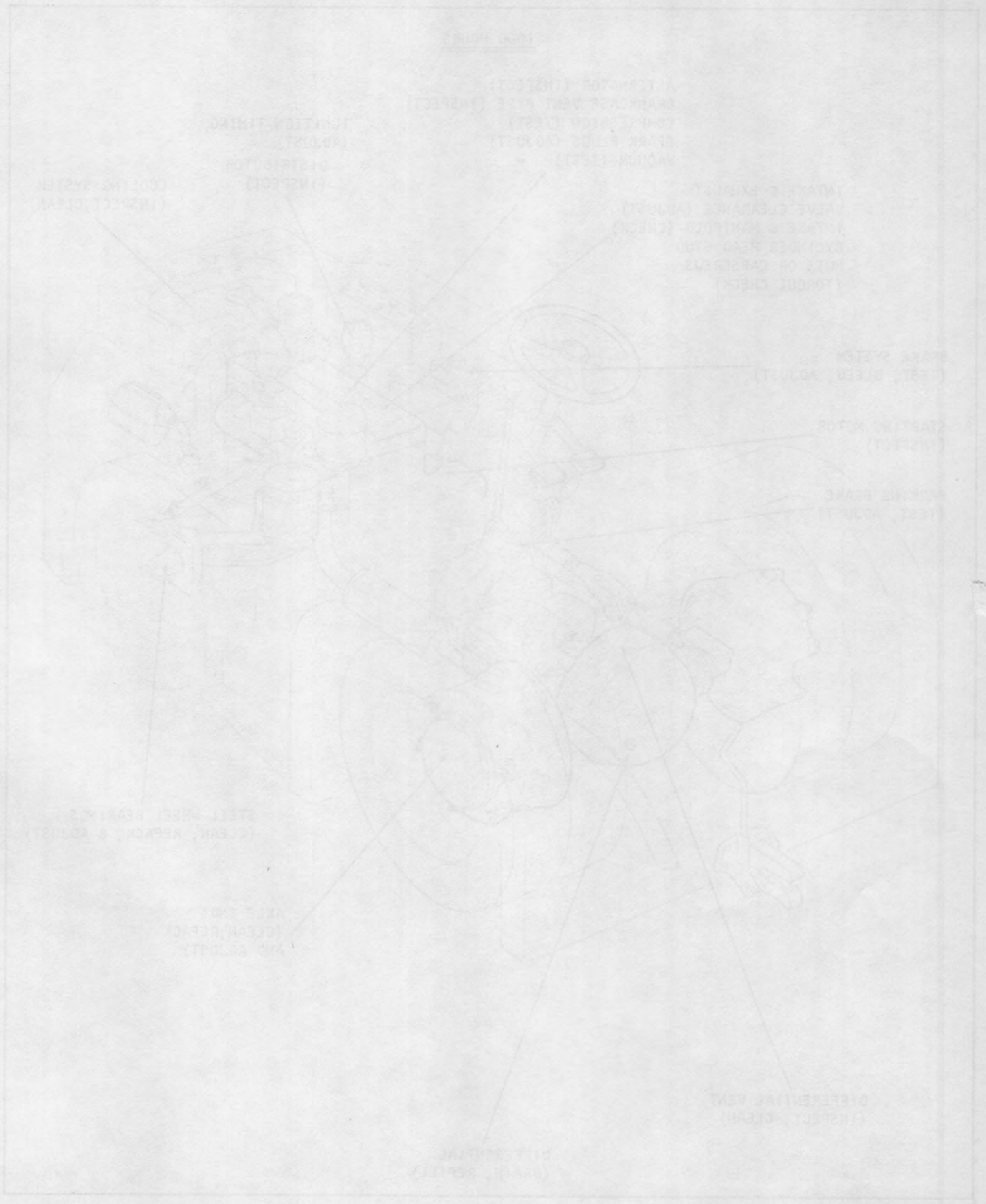
INTAKE AND EXHAUST MANIFOLDS

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

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

3. Check security of nuts, bolts, and cap screws. Tighten as required.

Plate 8507. Typical Muffler and Mounting



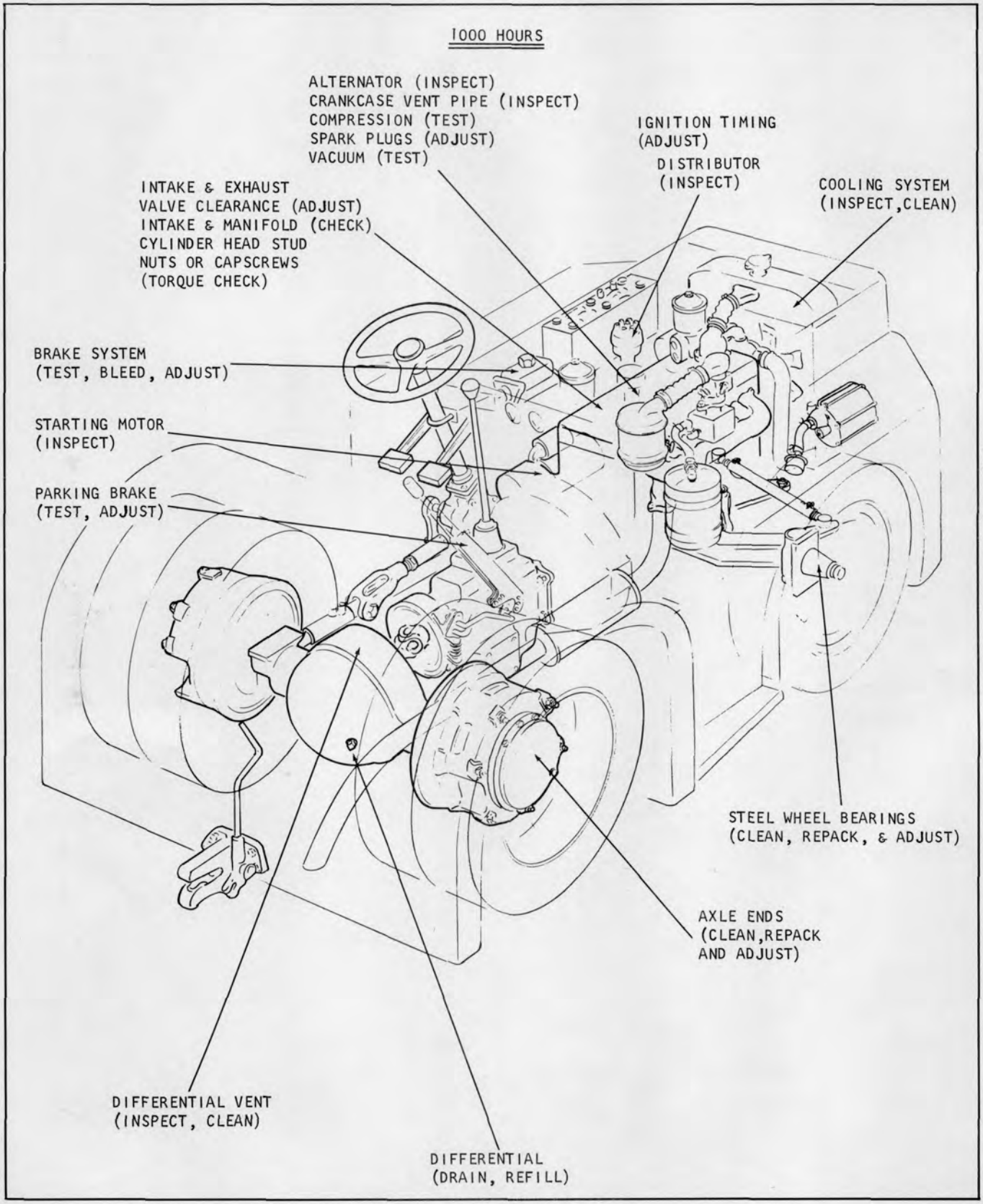


Plate 8602. Lubrication and Preventive Maintenance Illustration

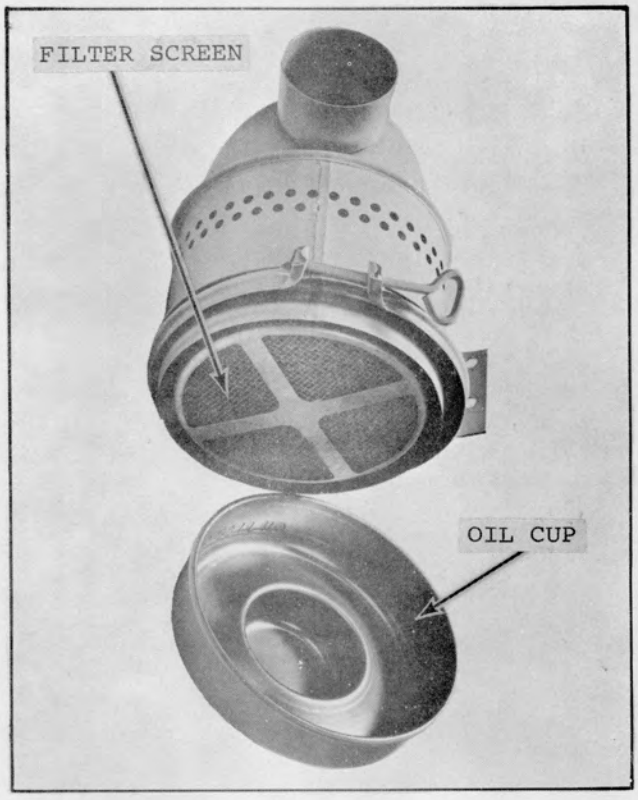


Plate 7663. Air Cleaner Screen and Oil Cup

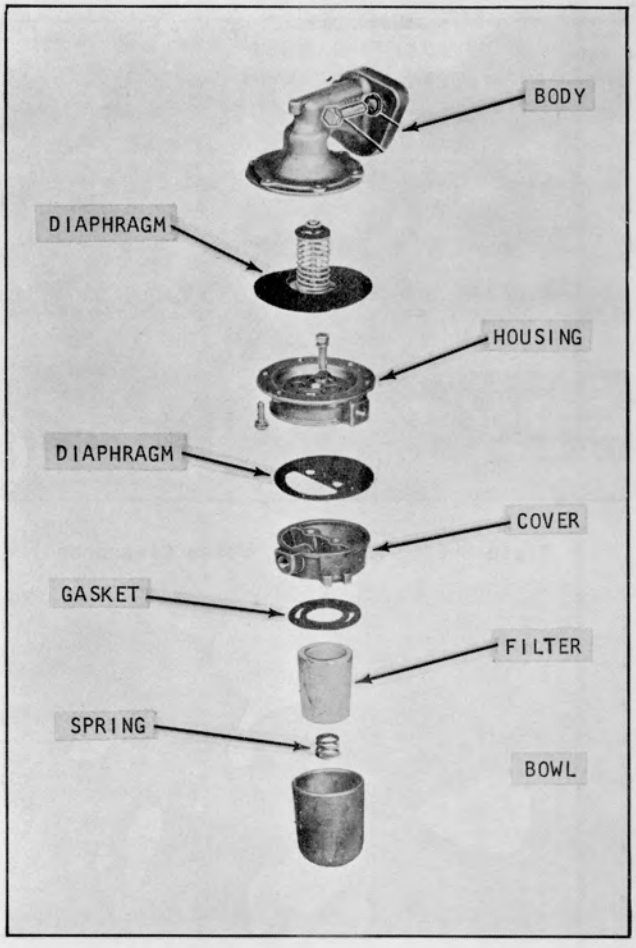


Plate 8506. Fuel Pump Assembly

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 in the next few pages.

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

Fuel Pump. Be sure the fuel pump bowl and strainer has been properly serviced and the fuel pump is operating satisfactory.

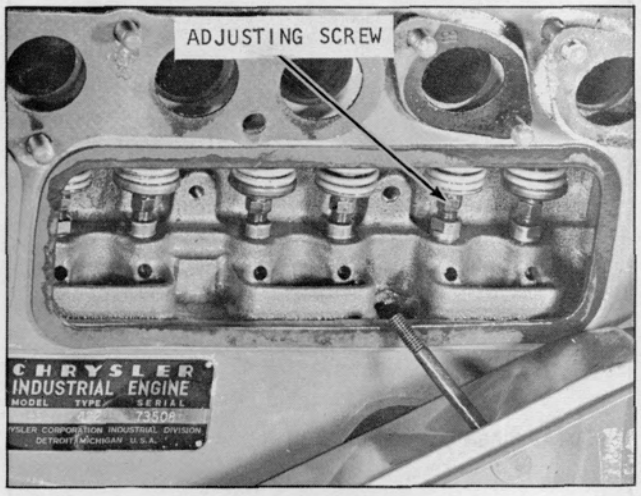


Plate 8465. Adjusting Valve Clearance

CYLINDER HEAD STUD NUTS. Check all stud nuts for correct torque (52-57 ft lbs.) Check cylinder head gasket for leaks. (Cap screws 65/70)

C A U T I O N

THE SEQUENCE LISTED IN PLATE 8463 MUST BE FOLLOWED. ALL CYLINDER HEAD CAP SCREWS OR NUTS MUST BE TIGHTENED EVENLY AND TORQUED IN ACCORDANCE WITH LIMITS LISTED IN SPECIFICATIONS.

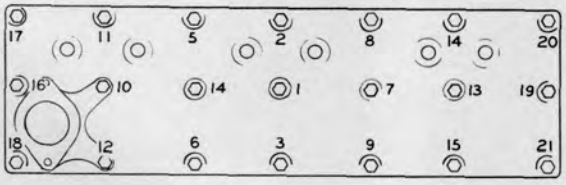


Plate 8463. Cylinder Head Stud Nut Tightening Sequence

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

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 to obstructions. The pipe must be open to provide proper ventilation. Clean, repair, or replace as required. (See Plate 8464.)

INTAKE AND EXHAUST VALVE CLEARANCE ADJUSTMENTS.

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 and exhaust valves as follows:

c. Check for proper 0.015 inch clearance by alternately passing a 0.014 inch and a 0.016 inch flat feeler gauge between head of adjusting screw and valve stem.

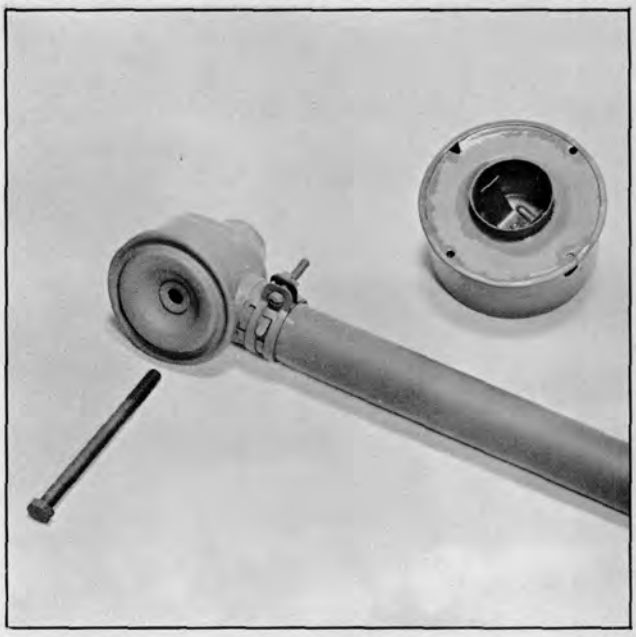


Plate 8511. Crankcase Vent Caps

d. If a 0.014 inch feeler gauge moves freely back and forth in gap when valve is not being lifted and a 0.016 inch feeler gauge binds at all times, clearance requires no adjustment.

e. If a 0.014 inch feeler gauge is gripped at all times, the clearance is insufficient.

f. Adjust lifter by turning adjusting screw 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 0.016 inch feeler moves freely when valve is not being lifted, the clearance is too great. Adjust lifter by turning adjusting screw counter-clockwise. Repeat clearance check and adjustment until proper clearance is obtained.

h. Repeat clearance check and adjustment on remaining valves.

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

j. Check valve chamber cover gasket for leaks.

k. 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.

N O T E

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

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.

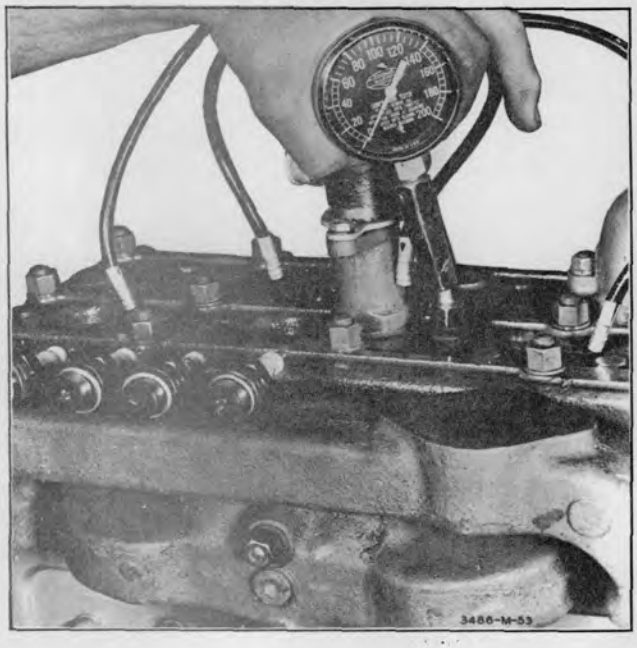


Plate 3486. Compression Test

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.

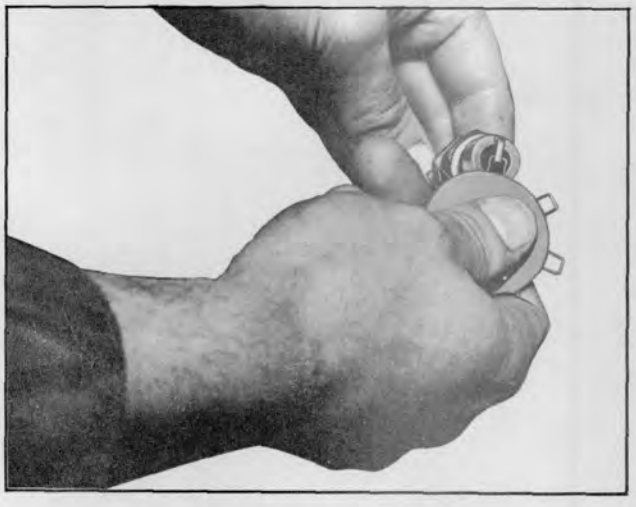


Plate 3278. Check Spark Plug Gap

8. DISTRIBUTOR

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

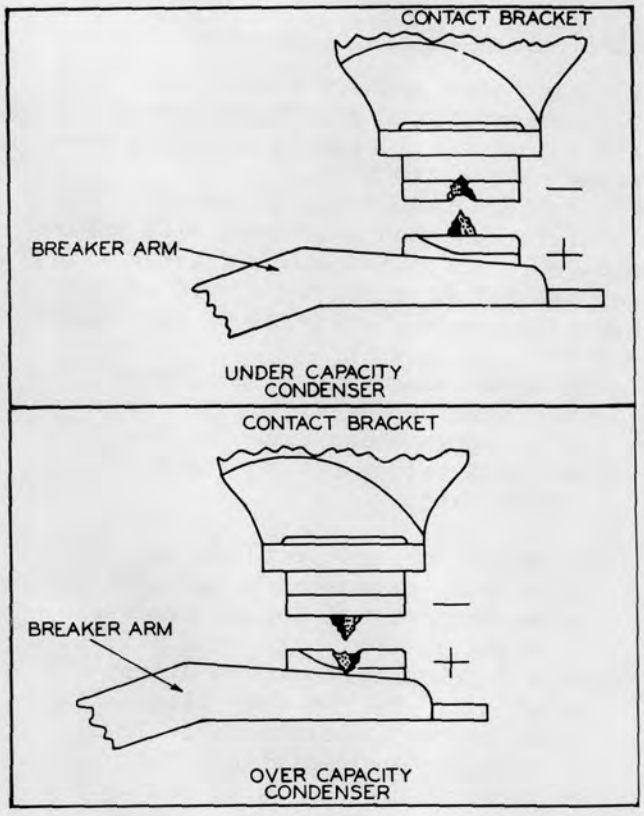


Plate 5933. Breaker Points

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

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 7475.

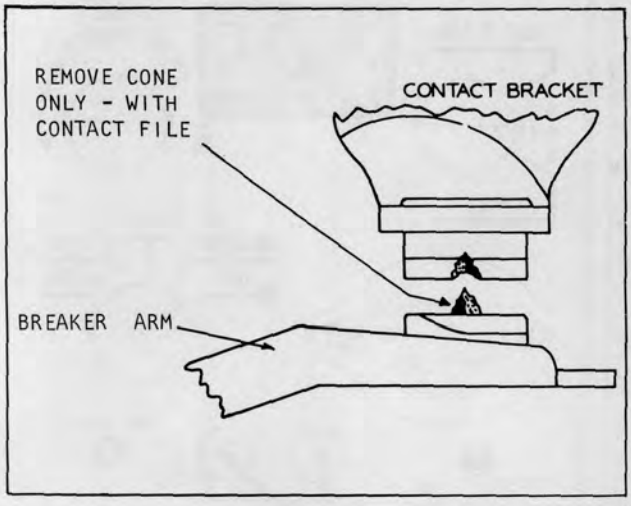
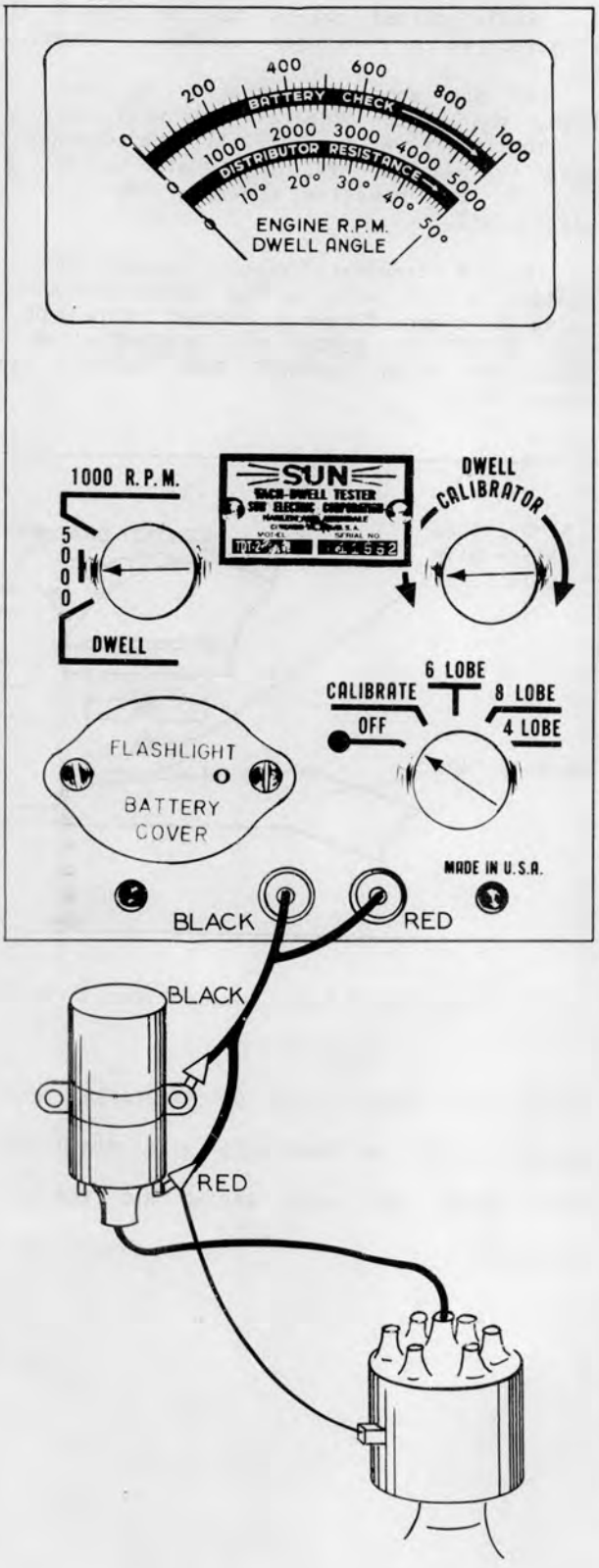


Plate 7475. File Contact Points

C A U T I O N

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



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

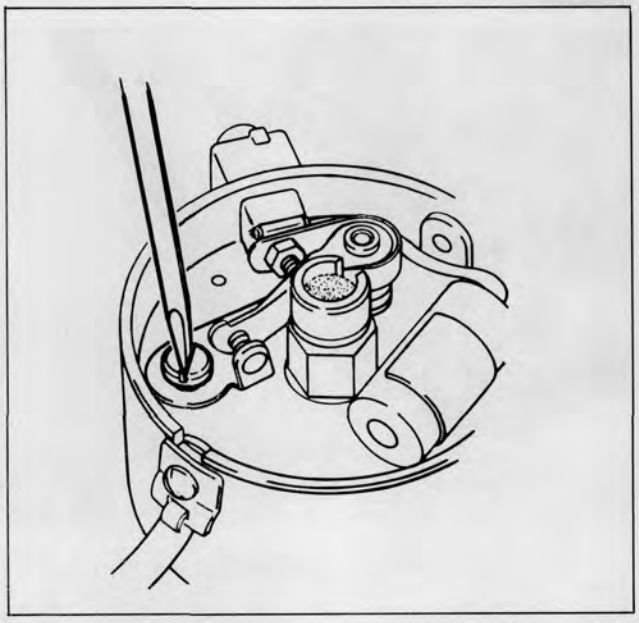


Plate 9153. Typical Contact Point Adjustment

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 open 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, one of the following methods will apply:

1. 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.

2. Loosen the lock screw and turn the eccentric screw until the proper clearance is obtained. Retighten locking screw and recheck point gap.

When replacing contacts, be sure they are aligned and that they make contact near the center. Bend the stationary contact bracket to secure proper alignment. DO NOT BEND THE BREAKER ARM.

Breaker Arm Spring Tension should be checked when the contacts are inspected and adjusted. Use a spring scale hooked on the arm at the contact and held at right angles to the contact surfaces. Take a reading as the contacts separate. Adjust by loosening the screw holding the end of the contact spring and install spacing washers or slide the end of the spring in or out as necessary. Retighten the screw and recheck the pressure.

If the tension is too weak, the contacts will chatter at high speed giving poor performance while if the tension is too strong, excessive wear of the cam and breaker arm rubbing block will result.

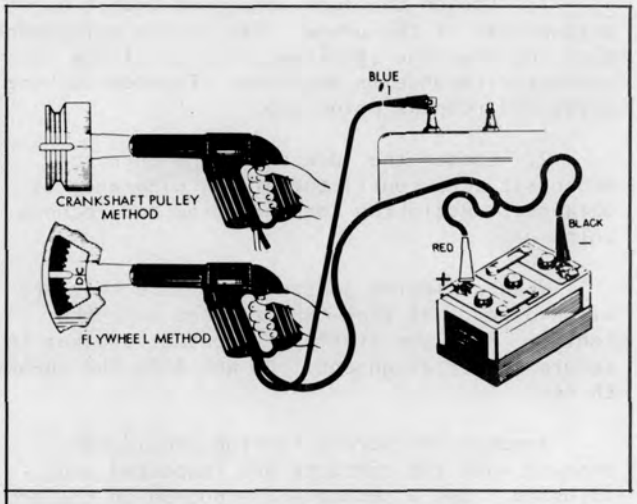


Plate 7818. Typical Timing Light Hookup

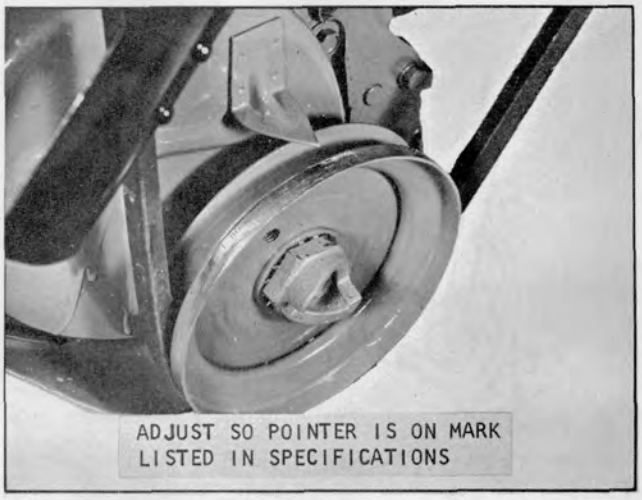


Plate 8462. Typical Timing Mark

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 the following sequence:

1. Paint a line on the front pulley at the degree wanted so that the correct timing mark will be more legible under the timing light.

2. Clip blue secondary lead of light to #1 spark plug. Leave spark plug wire on plug.

3. Connect primary red positive lead to positive terminal of battery.

4. Connect primary black negative lead to negative battery terminal.

5. Start engine and run at idle speed.

6. Direct timing light on the crankshaft pulley and note timing marks as light flashes. The light should flash on the timing mark.

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

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

ALTERNATE METHOD

1. Remove #1 spark plug. Put your thumb over the spark plug hole and crank engine by hand until air is exhausting. Continue to slowly crank engine until the mark lines up with the pointer on the pulley, see above illustration.

2. 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 losed the light will be ON and as soon as the points break the light will go OFF.)

3. Tighten distributor mounting bolts.

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 the gasket.

a. Remove pipe plug from intake manifold. Attach vacuum gauge in pipe plug opening.

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

c. Check Vacuum Gauge. Reading should be 17 to 22 inches and needle should hold a steady flutter. If needle does not indicate desired reading, an idle fuel adjustment should be made to obtain highest steady reading.

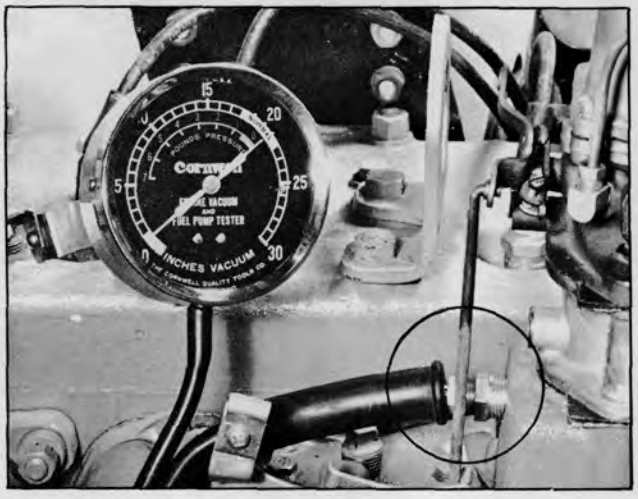


Plate 8443. Vacuum Test

Idle Fuel Adjustment: The carburetor is controlled by the idle adjustment screw that regulates the fuel-air mixture. 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 counter-clockwise, or away from seat, allows more air to be mixed with the fuel making a leaner mixture for idling.

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.

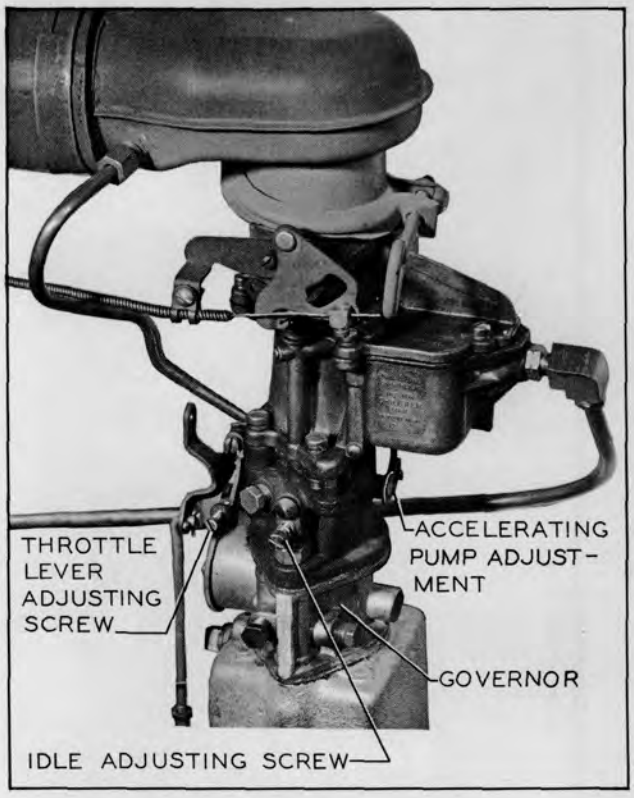


Plate 3819. Carburetor Adjustment

Idle Speed Adjustment: A stop screw controls action of the throttle valve. Turn screw clockwise for faster idle speed, or counter-clockwise 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.

Accelerating Pump Adjustment: Three positions are provided on the accelerating pump lever in order to give a greater or lesser discharge of fuel on quick acceleration depending upon climate conditions.

(1) SHORT STROKE-(hole in pump lever nearest throttle shaft). For extremely warm weather or for high altitudes above 2,500 feet.

(2) MEDIUM STROKE-(center hole). For normal summer temperatures.

(3) LONG STROKE-(hole in pump lever farthest from throttle shaft). For cold weather operation.

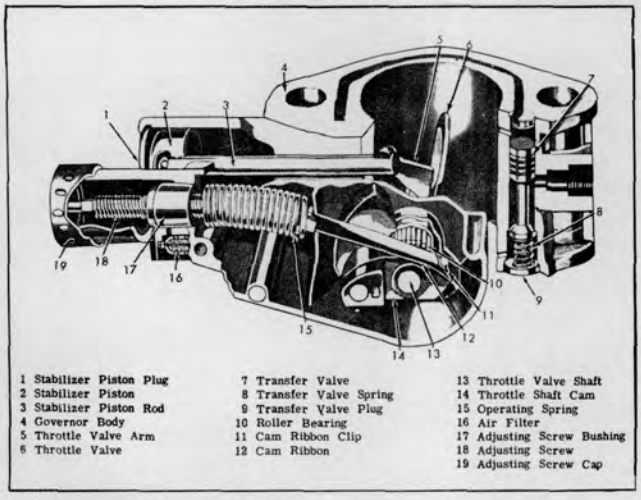


Plate 3039. Governor Adjustment

GOVERNOR

The velocity type governor is an integral part of the carburetor. An accurately calibrated spring system attached to the throttle shaft opposes the impact and vacuum force on the offset throttle valve. The position of the throttle and the maximum speed of the engine are governed by the spring adjustment. When in proper operating condition, the governor does not affect engine performance below the speed at which it begins to control and does not affect fuel consumption.

GOVERNOR ADJUSTMENTS

Warm up engine and test manifold vacuum. Before attempting to adjust the governor, make certain no engine deficiencies exist. Run the engine until normal operating temperature is reached. The manifold vacuum at sea level must be at least 16 inches with engine operating at no-load (manual throttle control wide open with governor controlling engine speed) and there should be at least 17 inches at idling speed (500 to 600 RPM) with an allowable reduction of approximately 3 1/2 inches at 5,000 feet above sea level.

To adjust governor proceed as follows: For a HIGHER speed, turn adjusting cap counterclockwise or to the left; for LOWER speeds, turn adjusting cap clockwise or to the right. One turn of the adjusting screw will change the engine speed approximately 300 RPM.

C A U T I O N

DO NOT TURN ADJUSTING SCREW OUT BEYOND THE END OF THE GOVERNOR HOUSING TO THE EXTENT THAT IT WILL INTERFERE WITH THE COMPLETE TIGHTENING OF THE SCREW CAP, AS THE PRIMARY SPRING MAY DISENGAGE FROM THE ADJUSTING SCREW IF TURNED TOO FAR.

The governed speed range (no load) in RPM is found in the Specifications Range of 2500 RPM. It is desireable to check and set the maximum governed engine speed with the aid of a reliable electric or mechanical tachometer.

The governor is properly calibrated when it leaves the factory and should not requfre any attention, aside from possible change in the maximum engine speed adjustment. However, if it has been tampered with or should the adjusting screw be accidentally turned out of the primary spring, recalibration will be necessary to insure proper operation which will require the removal of the carburetor from the engine.

STARTING MOTOR

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

CAUTION

NEVER ALLOW SPRING TO SNAP DOWN ON BRUSHES.

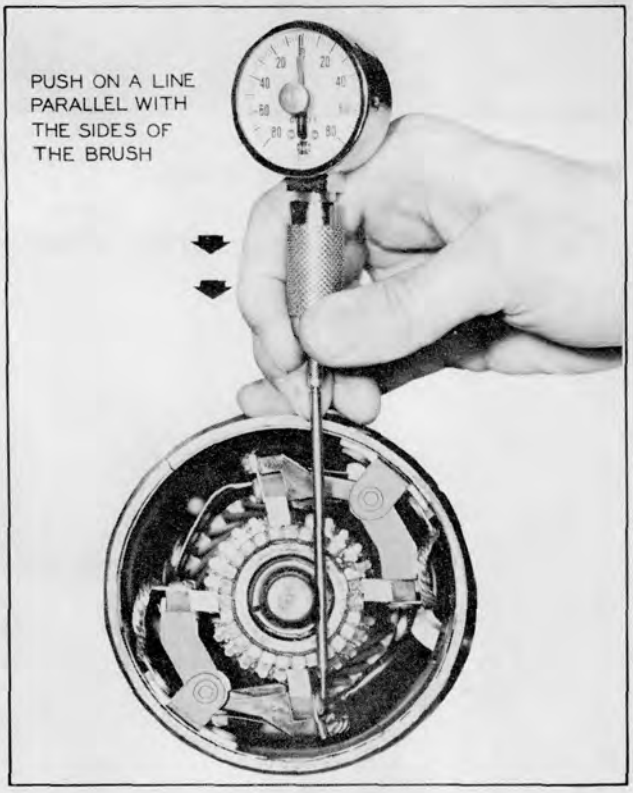


Plate 6449 Checking Brush Spring Tension

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

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

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

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

CAUTION

DO NOT USE EMERY CLOTH TO CLEAN COMMUTATOR.

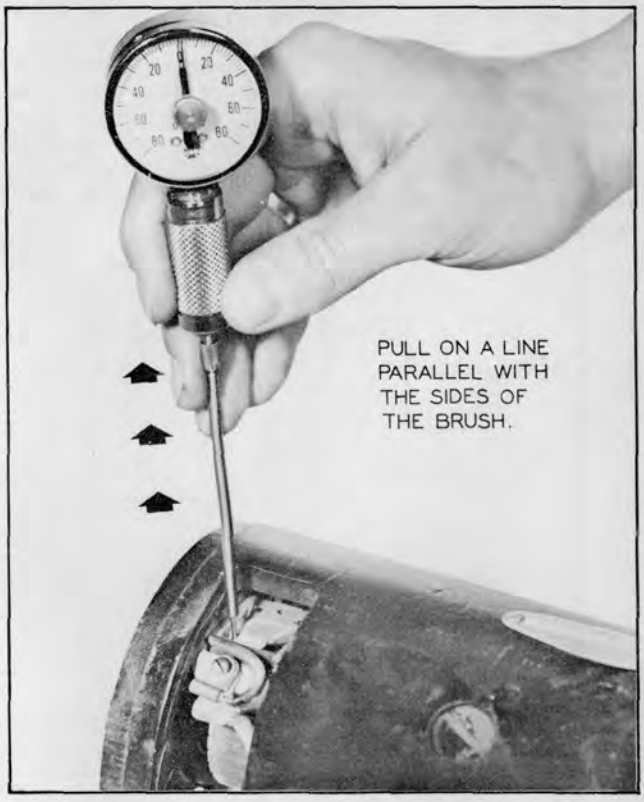


Plate 6450. Checking Brush Spring Tension

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

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

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

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

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

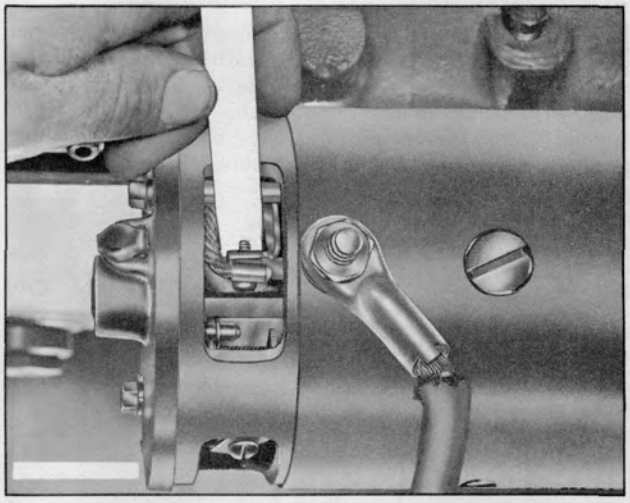


Plate 3436. Seating Brushes

NOTE

BLOW OUT ABRASIVE PARTICLES AFTER SEATING BRUSHES.

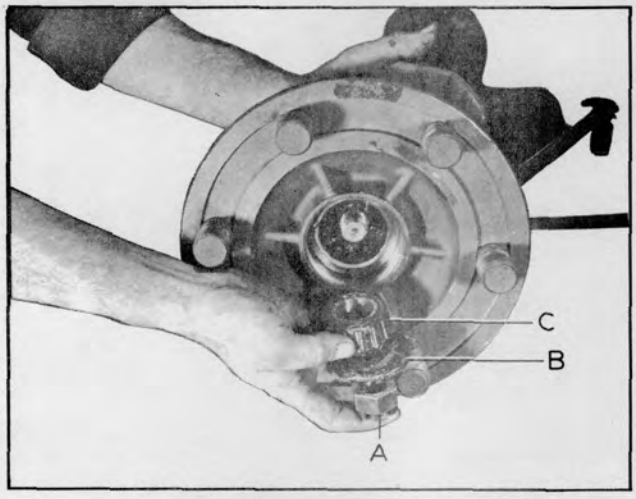


Plate 3133. Wheel Bearings

STEERING WHEEL BEARINGS

Adjustment:

1. Raise front of machine so that tires clear the ground.

WARNING

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

2. Inspect adjustment of bearings by gripping top and bottom of tire, chuck tire in and out to determine looseness or wobble. Now grip front and rear side of tire, chuck tire in and out to determine looseness or wobble.

NOTE

Before making wheel bearings adjustments, be sure play (looseness or wobble) is in the wheel bearings and not in the king pins. If wheel bearings need adjusting, clean and repack bearings before making adjustments. Refer to lubrication paragraph.

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

Lubrication:

1. Remove wheels after 1000 hours or every six months of operation. Clean bearings and repack with medium bodied high temperature wheel bearing grease.

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

AXLE ENDS

Drain and refill with Extreme Pressure Gear Lubricant S.A.E. #90, Clark Specifications MS 8.

After rotating wheel so that plug is at the 6 o'clock position, remove plug and completely drain old lubricant. Fill to the level of the plug opening when it is located in the 4 o'clock position. Securely tighten plug.

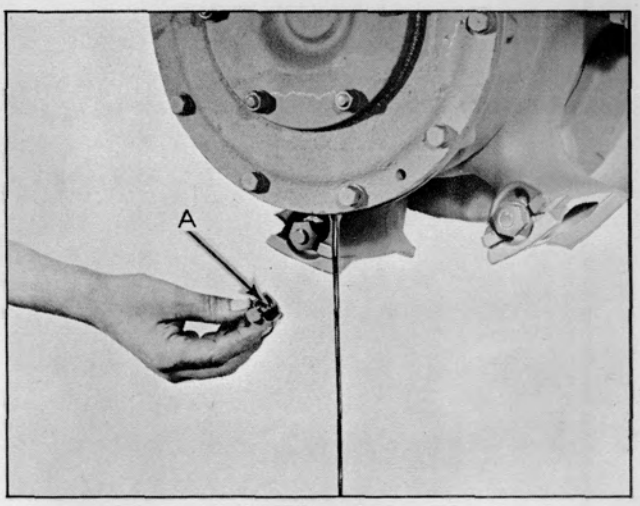
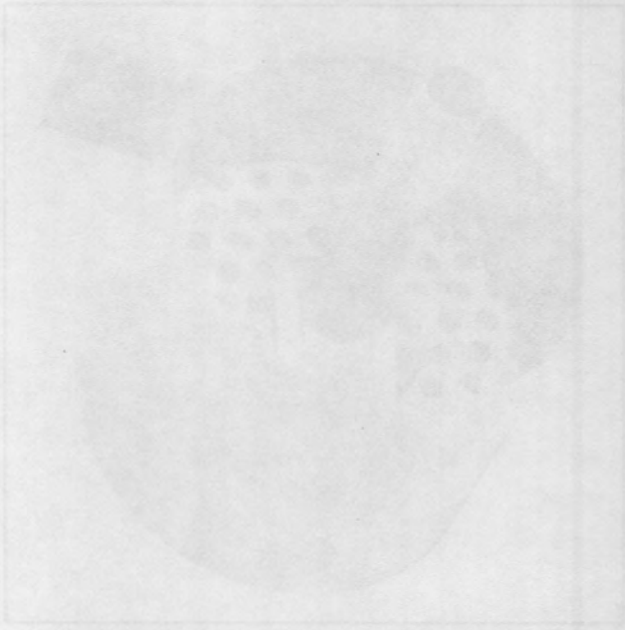


Plate 3125. Axle End Lubrication



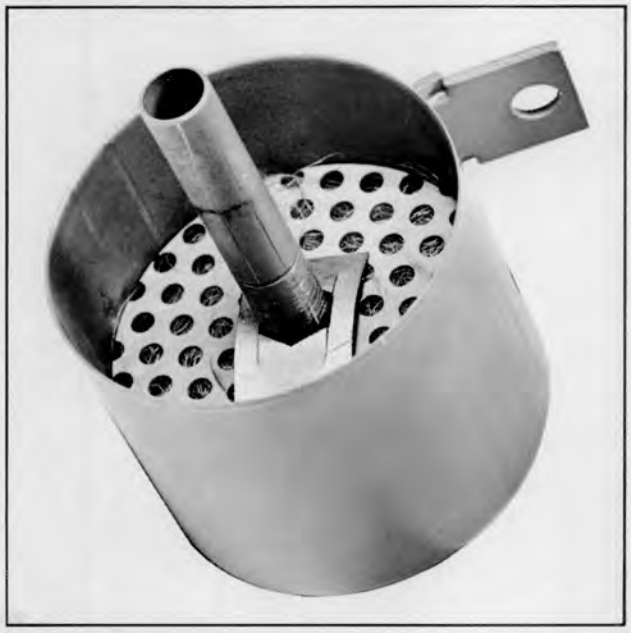


Plate 6456. Hydrovac Air Cleaner

HYDROVAC AIR CLEANER

Remove and tap air cleaner on a hard flat surface until all loose dirt and dust is removed.

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

BRAKE SYSTEM (TESTS)

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

1. Performance Test Without Gauges

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

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

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

c. Check brake pedal for proper free travel of 1/2 to 3/4 inch.

Start the engine and allow it to idle for about ten seconds. Depress brake pedal with about as much foot pressure as required for normal stopping. Remove foot from pedal and turn off ignition switch. Depress and release brake pedal five times slowly. Pedal should be depressed approximately the same distance each time. If the pressure required to push the pedal to this position during the fifth application is noticeably greater than on the first application the vacuum system is operating satisfactorily. If pressure required to depress the pedal to the same position has not increased, the vacuum system is not working correctly.

2. Performance Test With Gauges

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

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

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

N O T E

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

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

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

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

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

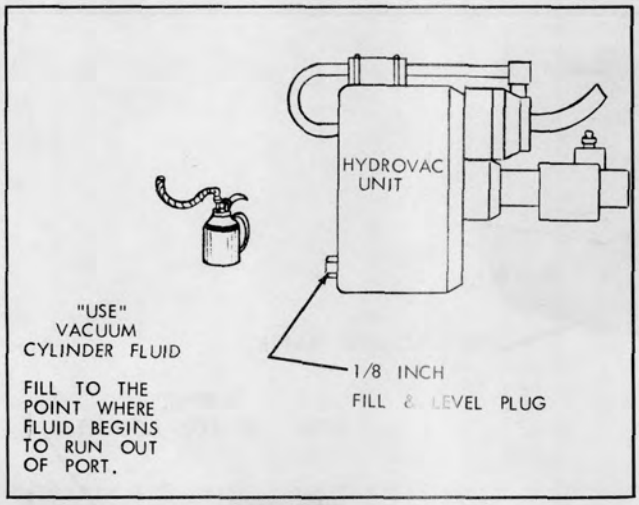


Plate 6469. Check Hydrovac Fluid Level

N O T E

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

Test Number 4. Start engine, allow it to idle about ten seconds. Vacuum gauge reading should be at least 16 inches. Make a moderate brake application and note any change in vacuum gauge reading. There should not be a decrease of more than 5 inches in 15 seconds.

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

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

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

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

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

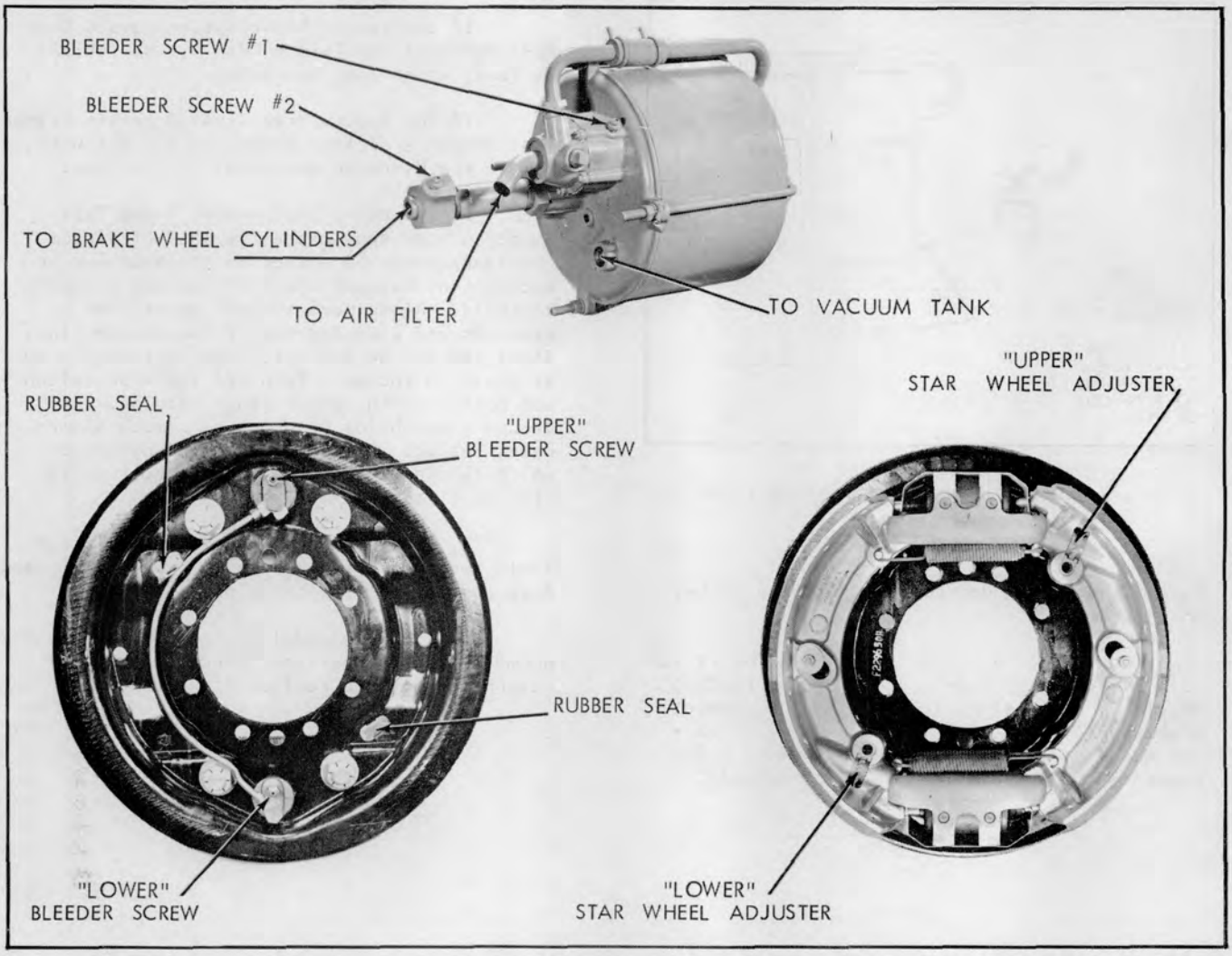


Plate 6457. Bleeding Brake System

BLEEDING BRAKE SYSTEM

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

C A U T I O N

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

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

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

N O T E

CHECK HYDROVAC FLUID LEVEL. Fill with vacuum cylinder fluid to the point where fluid begins to run out of port. (See Plate 7908, next page, for correct fluid 'lubricant'.

Plate 7908. Vacuum Cylinder Fluid

N O T E

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

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

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

N O T E

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

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

N O T E

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

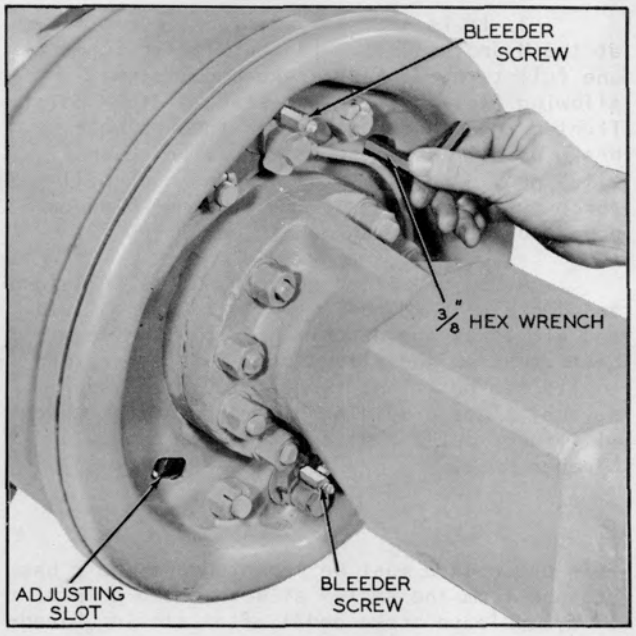


Plate 4379. Adjusting Brakes

BRAKE ADJUSTMENTS

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

1. Adjust brake pedal free play from 1/2 to 3/4 inch.

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

C A U T I O N

PLACE BLOCKING UNDERNEATH AXLE FOR SAFETY.

3. Remove rubber seals from backing plate.

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

5. Rotate wrench in opposite direction, increasing clearance until drag is relieved. Then rotate adjustment one additional turn (2 turns with new lining) to provide working clearance.

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

7. Replace rubber seals in adjustment slots.

8. Repeat this operation on the opposite drive wheel.

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

Plate 3093. Brake Shoe Adjustment

BRAKE SHOE ADJUSTMENT

When brake lining becomes worn allowing the brake pedal too much travel, it is necessary to adjust brake in closer relation with the brake drum. Adjustment is made at the outside of the brake backing plate.

WARNING

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

Raise the drive wheels off the floor so the wheels may be rotated during the adjustment of brake shoes. Remove the two small pressed in sheet metal covers, (A), on back of backing plate that cover openings into the brake adjusting worm gear. This gear meshes with threaded end of square headed brake adjusting screw.

Insert a 3/8" Allen set screw wrench into hex hole in brake adjusting worm as shown in Plate 3093.

With machine out of gear and parking brake released, turn drive wheel slowly while giving an equal amount of turning to the adjusting worm of both wheels. When point in adjustment is reached where both brake shows drag, it is then only necessary to back off adjustment enough so there is freedom from drag.

To determine that adjustment point has been reached evenly at both shoes, check by backing off one adjustment and turning wheel to determine if drag still persists. Return this to previous adjusted position and back off other adjustment which is shown a If drag is still prese then shoes are in equal adjustment and by backing off both adjustments the same amount both shoes will be in correct adjustment. Back off adjustment just enough for freedom from drag.

HAND BRAKE ADJUSTMENT

The brake is located on the drive shaft between the front drive axle and transmission see Plate 4963. The brake has two adjustments. A minor adjustment may be made at the Actuating Lever located in the driver's compartment. If necessary, a major adjustment may be made at the brake assembly. Brake adjustments are made as follows:

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

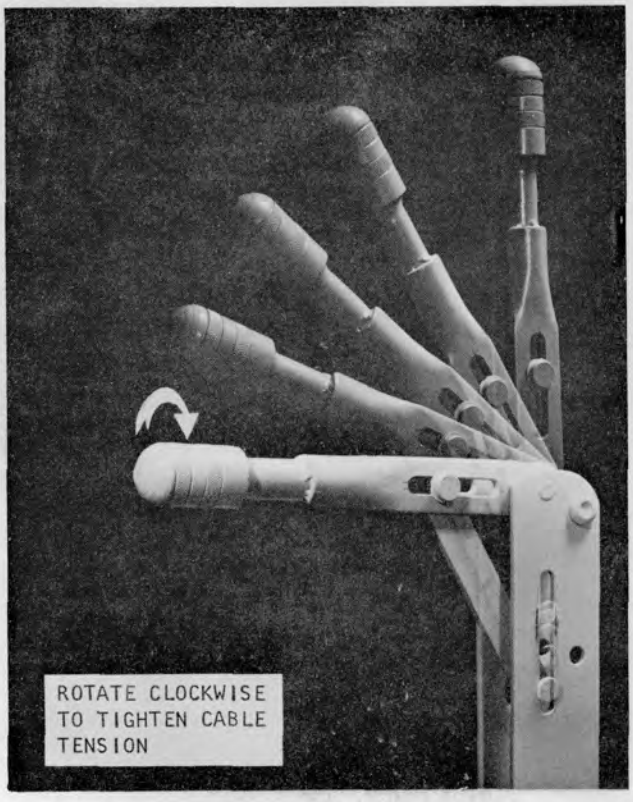


Plate 6505. Hand Brake (Actuating) Lever

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

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

b. Turn brake band anchor clip bolt until feeler gauge placed between lining and drum indicates a 0.010 to 0.015 inch clearance. See Plate 6291.

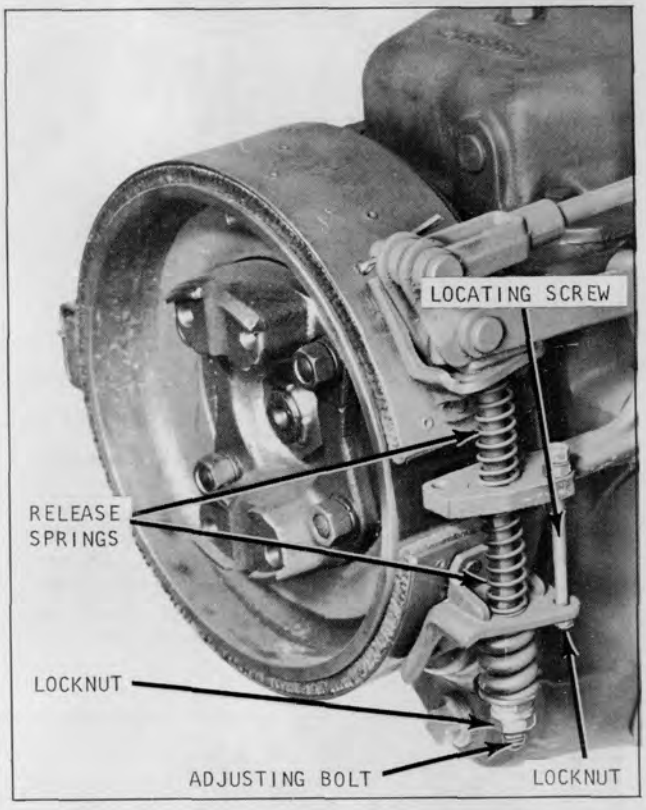


Plate 7447. Hand Brake Adjustments

c. Loosen lock nut and tighten screw until feeler gauge placed between lower end of lining and brake drum indicates a 0.020 inch clearance. Tighten lock nut when this clearance is obtained. See Plate 6290.

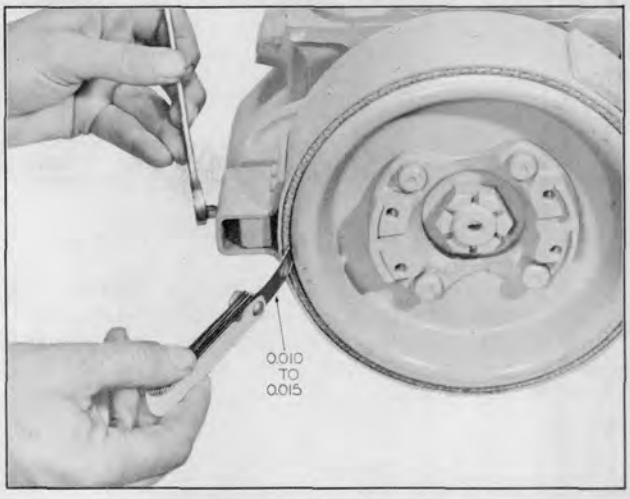


Plate 6291. Brake Band Centering Adjustment

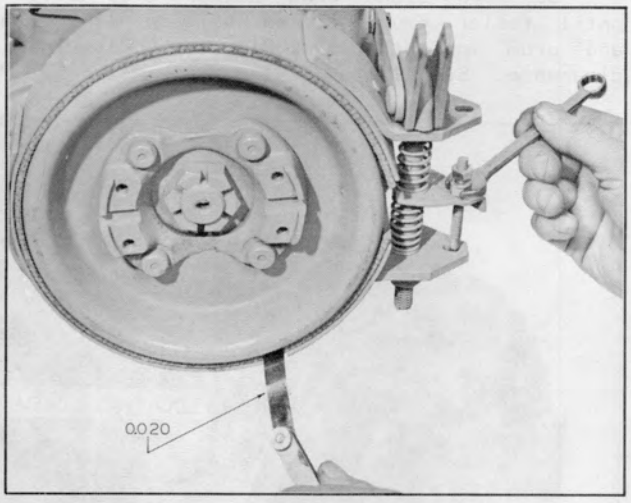


Plate 6290. Brake Band Lower Adjustment

d. Loosen lock nut from end of adjusting bolt and tighten adjusting bolt until feeler gauge placed between upper end of lining and brake drum indicates a 0.020 inch clearance. Tighten lock nut when this clearance is obtained. See Plate 6289.

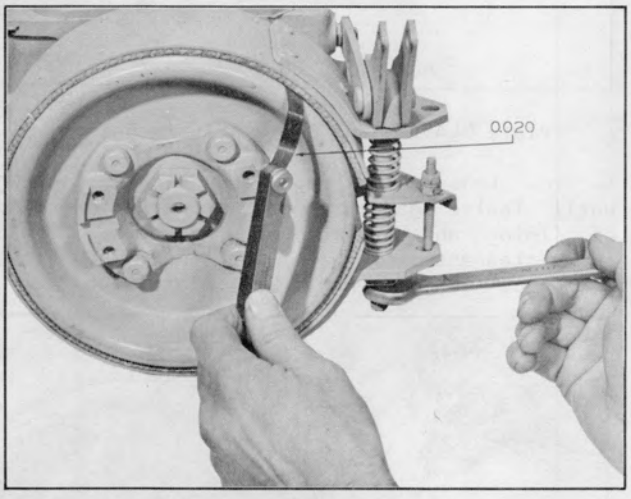


Plate 6289. Brake Band Upper Adjustment

e. Rotate adjusting knob, located at upper end of brake lever, clockwise until sufficient tension is obtained to properly apply parking brake when lever is actuated. See Plate 6505.

COOLING SYSTEM

Radiator Pressure Caps:

WARNING

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

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

Plate 6458. Radiator Pressure Cap

2. Inspect pressure cap for freedom of operation.

Pressure caps employ a spring loaded, rubber-faced valve which presses against a seat in the radiator top tank. Pressure caps employ either a vacuum valve held against its seat under spring pressure, or a weighted vacuum valve which hangs open until forced closed by a surge of vapor or coolant. Check to be sure components are free to operate.

NOTE

IF A NEW CAP IS REQUIRED, ALWAYS INSTALL A CAP OF THE SAME TYPE AND PRESSURE RATING. PRESSURE RATING 7 LB.

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

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

Inspect and Clean Cooling System:

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

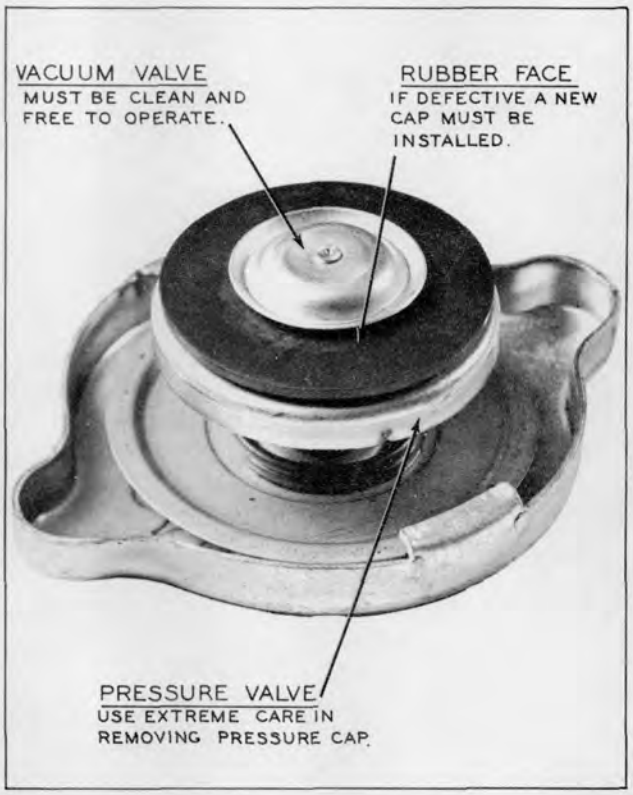


Plate 6459. Pressure Cap Gasket, Valve and Valve Gasket

NOTE

EXHAUST GAS LEAKAGE BETWEEN CYLINDER HEAD AND GASKET ALSO RESULTS IN CORROSION. IF EXHAUST GAS DISCHARGES INTO COOLANT, THE COOLANT AND THE GAS COMBINE TO FORM A VARIETY OF ACIDS. IT IS THEREFORE IMPORTANT THAT CYLINDER HEAD STUD NUTS BE DRAWN DOWN TO SPECIFICATIONS AS INSTRUCTED IN "ENGINE TUNE-UP".

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

1. Drain system.

2. Replace half of volume with fresh water. Refer to Specifications for capacity.

3. Boil other half of volume and add washing soda until no more will dissolve.

4. Add hot soda solution to cooling system (fill up).

5. Operate engine normally for 24 hours.

6. Drain, flush, refill with clean water to which a soluable oil has been added in a proportion of 1 ounce per gallon of water.

Maintaining the cooling system efficiency is important, as engine temperatures must be brought up to and maintained within satisfactory range for efficient operation; however, must be kept from overheating, in order to prevent damage to valves, pistons and bearings. Continued overheating may cause internal damage, while continuously low operating temperature wastes fuel, increases engine wear and causes oil sludge and corrosion of engine parts.

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

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.

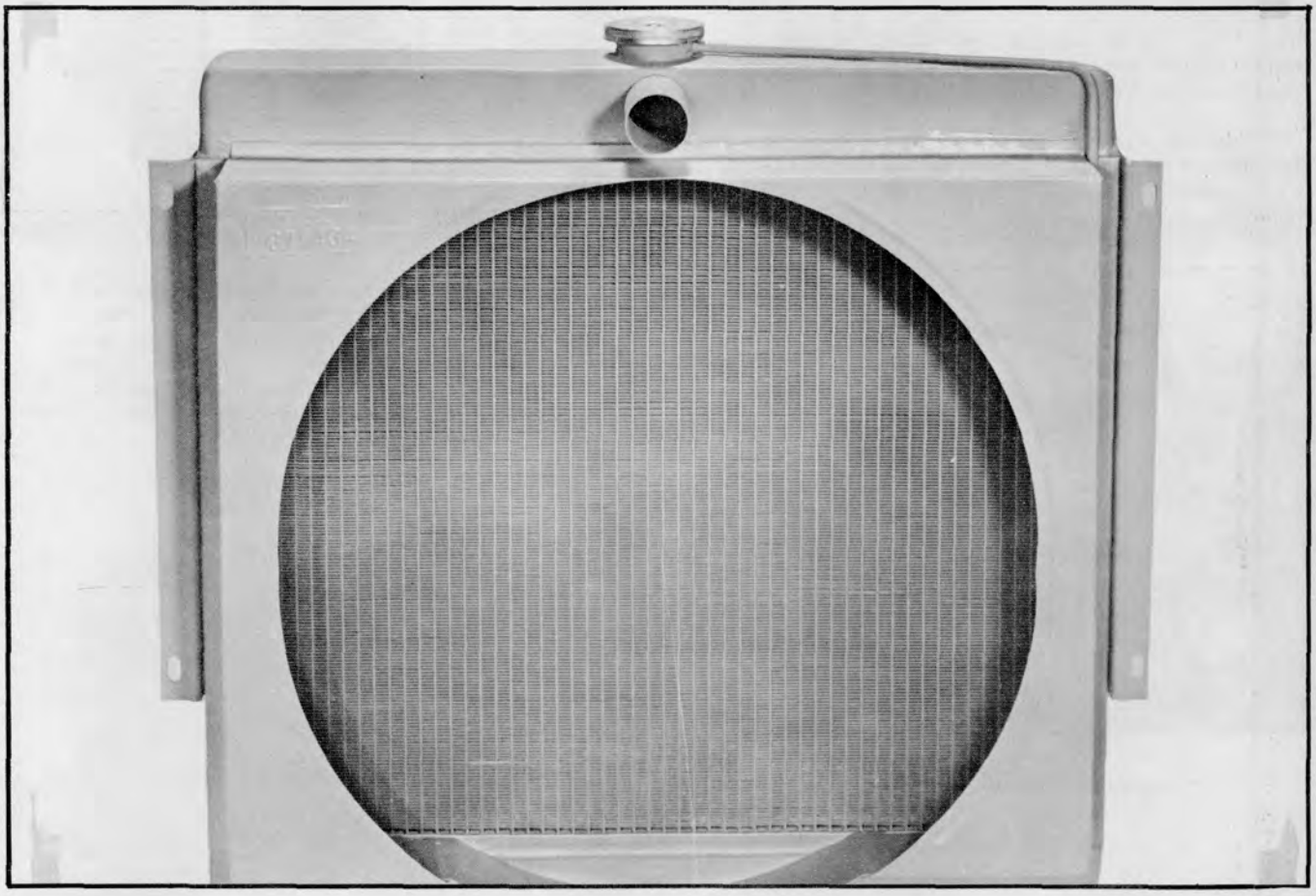


Plate 6461 Typical Radiator

TESTING THERMOSTAT

Remove the water outlet elbow from the cylinder head by removing upper radiator hose, water pump by-pass elbow hose, and the bolts holding water outlet elbow to cylinder head. Remove thermostat and before testing, clean and examine the bellows for rupture or distortion. If the valve can be pulled or pushed off its seat with only a slight effort when cold or it does not seat properly, the unit is defective and should be replaced.

The thermostatic operation can be checked in the following method:

1. Hang thermostat by its frame in a container of water so that it does not touch the bottom.

2. Heat the water and check temperature with a thermometer.

3. If the valve does not start to open at temperatures of 185 degress to 205 degrees F. or if it opens well before the 185 degrees point is reached the thermostat should be replaced.

When replacing the thermostat in the water elbow, be sure seal is in place, and seal seat as well as the counterbore is clean.

Assemble a new gasket to housing or spacer. Thermostat flange must seat in counterbore with gasket sealing contact between it and the housing.

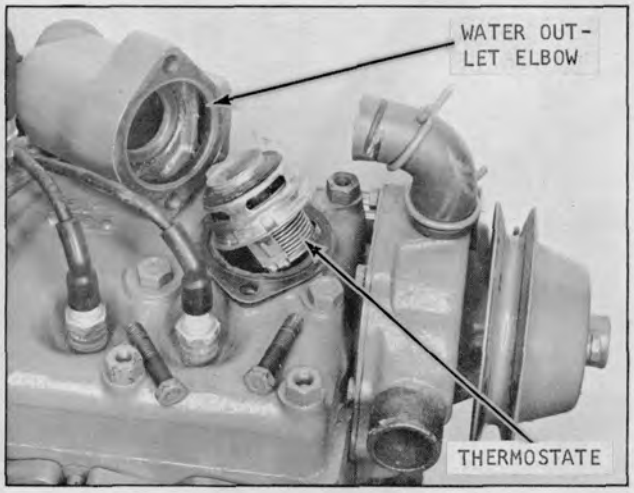


Plate 8456. Thermostat Removed

C A U T I O N

NEVER FILL AN ENGINE WITH STRAIGHT WATER AFTER IT HAS BEEN EXPOSED TO SUB-FREEZING TEMPERATURES FOR ANY LENGTH OF TIME. THIS APPLIES EVER WHEN WARM WATER IS USED BECAUSE THE WATER IN THE RADIATOR AND JACKET PASSAGES COOLS RAPIDLY AND IS LIKELY TO FREEZE BEFORE THE ENGINE CAN BE STARTED.

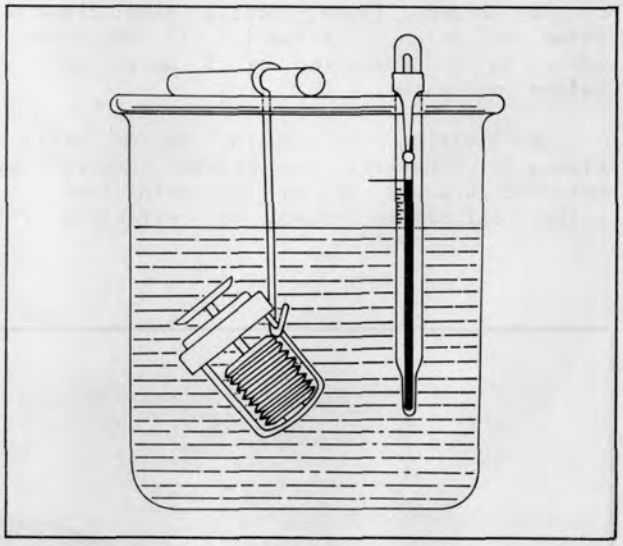


Plate 3553. Thermostat Testing

If it is planned to leave the coolant in the engine at the next shutdown, then mix the proper proportion of soluble oil, anti-freeze and water before filling the engine. If water alone is used, assurance against damaging the radiator should be taken to prevent inoppertune shutdowns.

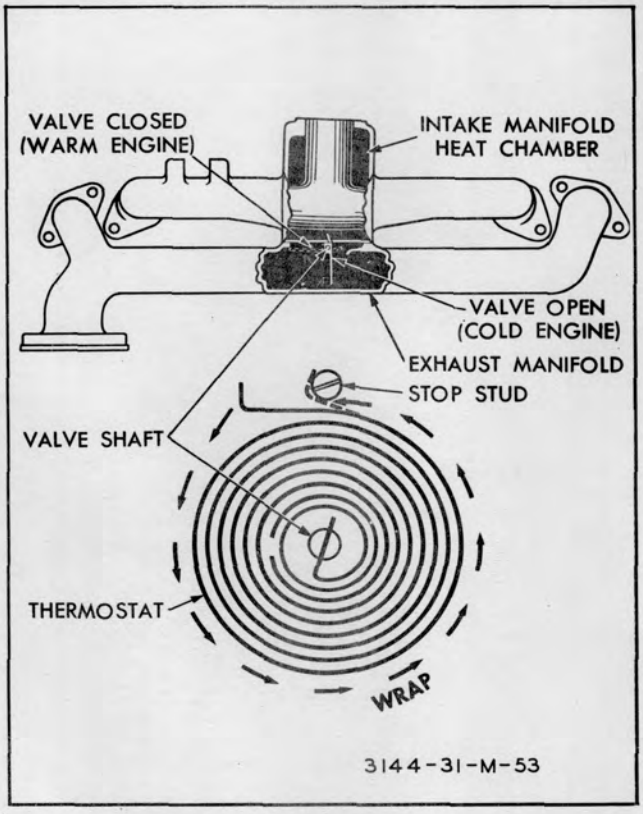


Plate 3144. Manifold Heat Control Valve

AUTOMATIC HEAT CONTROL VALVE

Exhaust from the combustion chamber passes through the exhaust valve ports into the exhaust manifold and out through the exhaust pipe. The manifold heat control valve permits faster warmup of the engine by diverting exhaust from the engine through a by-pass port and out through the exhaust manifold.

An automatic heat control valve is used on engines equipped with a universal type manifold. (The universal type manifold makes possible up-front or down-rear exhaust. In addition, updraft and downdraft carburetion is available.)

This valve regulates the amount of heat that by-passes around the inlet manifold heater body. An occasional check should be made to insure that the valve and shaft are free and not restricted in their operation. If the shaft is frozen or bushing is damaged, the assembly should be repaired or replaced.

The thermostat spring attached to the valve shaft in the manifold should be replaced when it becomes weak.

The manifold heat control valve counterweight employed with universal type manifolds can be positioned to meet manufacturers' specifications.

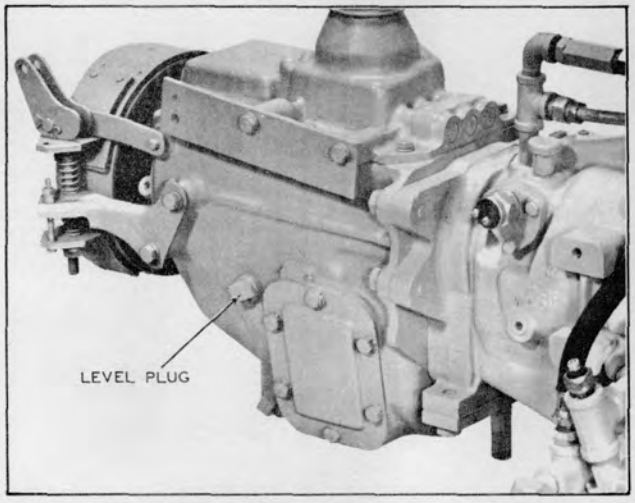


Plate 6740. Transmission Drain and Filler Plugs

Remove the drain plug from the transmission and drain old lubricant at operating temperature.

After draining flushing is desirable. Replace the drain plug and clean all dirt from around the filler plug before removing. After removing filler plug fill to plug level with a light flushing oil. Drive the transmission for a short period at fast idle in such a manner that the gears in the transmission are rotating without load. This washes out the old oil clinging to the interior of the gear case, cover and shifting rails.

C A U T I O N

BE SURE TO DRAIN OUT ALL OF THE FLUSHING OIL BEFORE ATTEMPTING TO REFILL WITH NEW LUBRICANT.

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

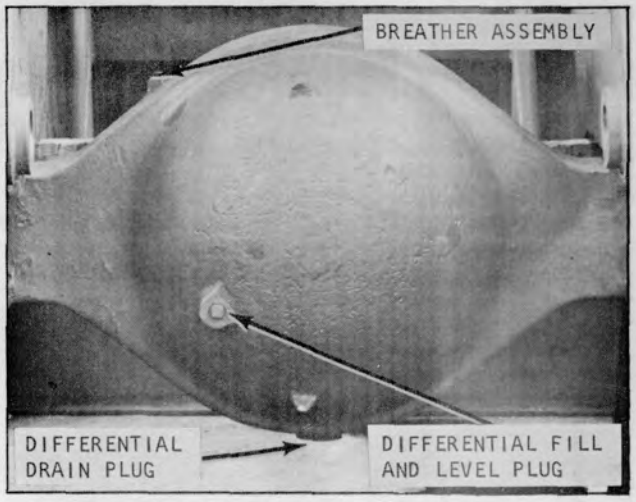


Plate 7336. Differential Filler and Level Plug

Drain differential by removing the drain plug from the differential bowl. Drain differential at operating temperatures.

Inspect the differential breather for cleanliness. Remove and clean in a Stoddard type cleaning solvent if necessary. Dry breather with compressed air before replacing it on the differential.

After the differential is completely drained replace the drain plug and refill the differential with E.P.G.L. S.A.E. #90 Clark specification MS 8. DO NOT fill above the level of the filler plug. Replace filler plug and tighten securely.

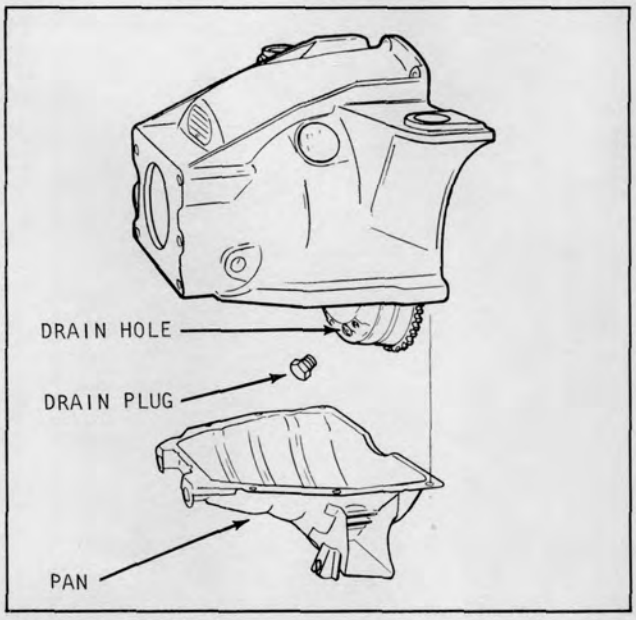


Plate 8461. Fluid Coupling Drain

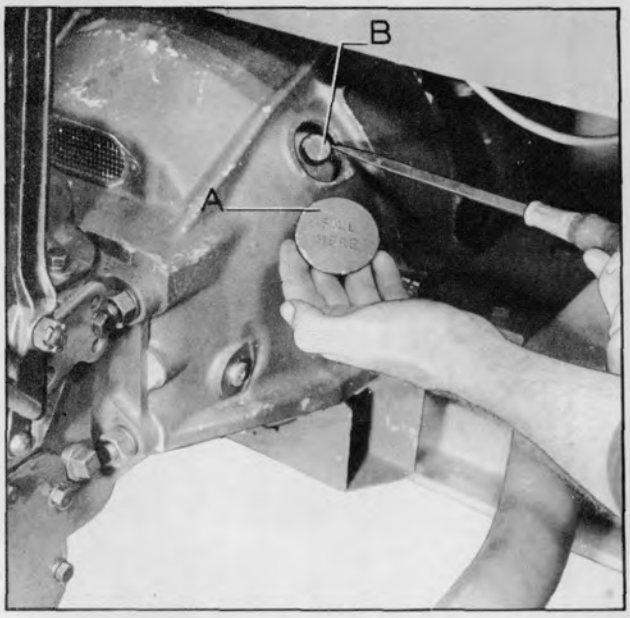


Plate 3247. Check Fluid Level

FLUID COUPLING DRAIN

The Fluid Coupling should be drained and refilled every 1000 operating hours. The proceedure is as follows:

N O T E

FLUID COUPLING SHOULD BE DRAINED AT OPERATING

TEMPERATURES TO ASSURE COMPLETE DRAINAGE.

1. Jack up machine so that the underside is easily accessable. Place heavy blocking under machine so that it cannot accidently become lowered.

2. Remove bolts from pan assembly and remove pan.

3. Rotate fluid drive assembly by momentarily engaging starter with the ignition key off until the filler plug is on the bottom.

4. Remove filler plug and drain fluid coupling.

5. Replace filler plug and pan assembly.

6. Remove blocking and lower machine. Remove filler hole cover.

7. Again rotate fluid drive assembly in the same manner as before till filler plug is seen at clutch housing filler hole.

8. Remove filler plug and fill with Automatic Transmission Fluid Type "A", Suffix "A". Fluid containers must display a qualification number prefixed by AQ-ATF. Clark Part Number 879803.

9. Replace filler hole cover.

10. Run engine in neutral for a few minutes, shut off engine, and when fluid coupling has cooled to room temperature, check fluid level. Add fluid if necessary.

ENGINE

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

ENGINE (Continued)

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

ENGINE (Continued)

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

ENGINE (Continued)

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

ENGINE (Continued)

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

ENGINE (Continued)

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

ENGINE (Continued)

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

ENGINE (Continued)

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

FUEL SYSTEM

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

COOLING SYSTEM

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

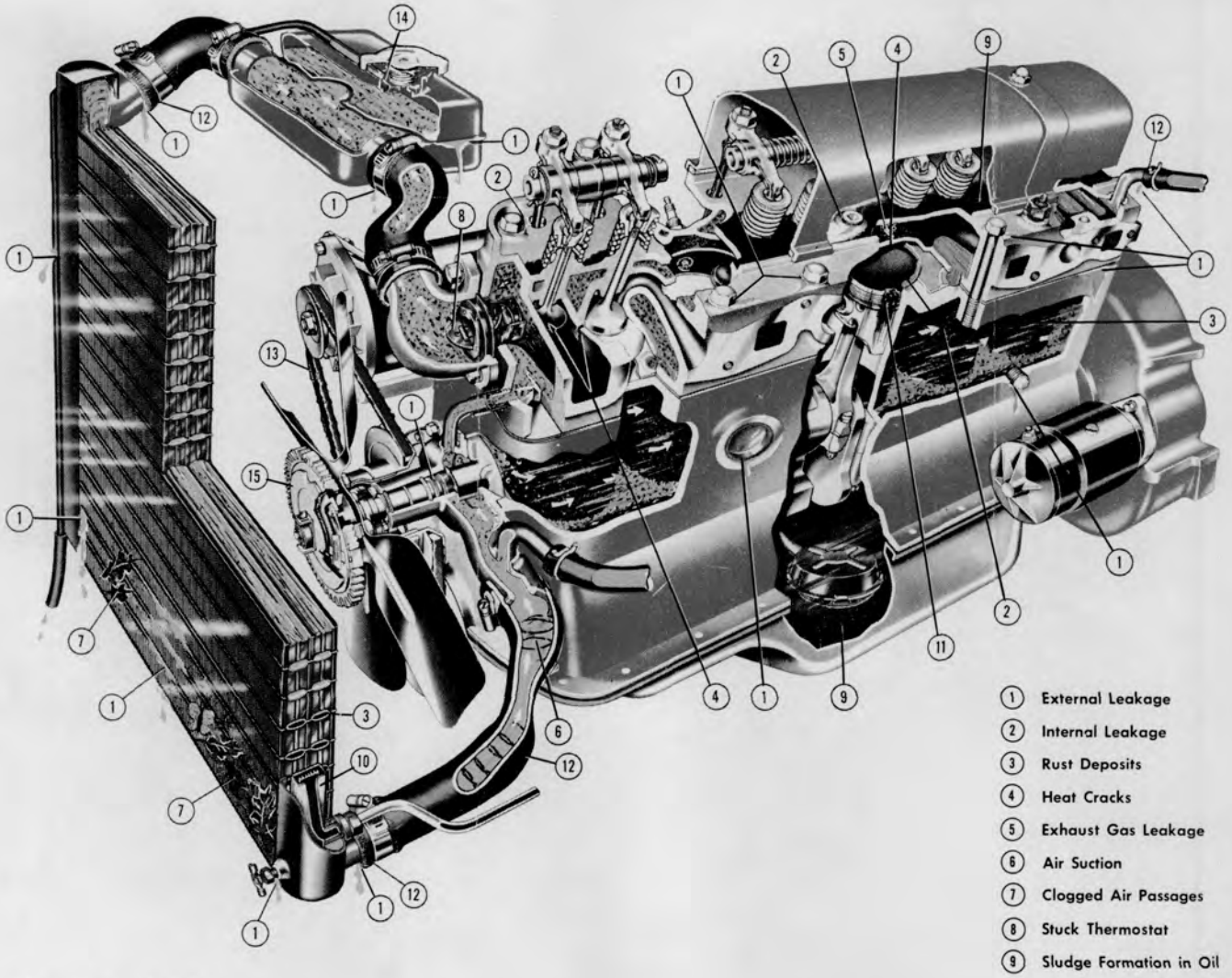
CLARK EQUIPMENT

INDUSTRIAL TRUCK DIVISION

CLARK EQUIPMENT

THE ENGINE COOLING SYSTEM

Trouble spots resulting from service neglect



1. External Leakage
2. Internal Leakage
3. Rust Deposits
4. Heat Cracks
5. Exhaust Gas Leakage
6. Air Suction
7. Clogged Air Passages
8. Stuck Thermostat
9. Sludge Formation in Oil
10. Transmission Oil Cooler
11. Heat Damage
12. Hose Failure
13. Worn Fan Belt
14. Pressure Cap Leakage
15. Temperature Control Fan Drive

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

Cooling System Care Pays!

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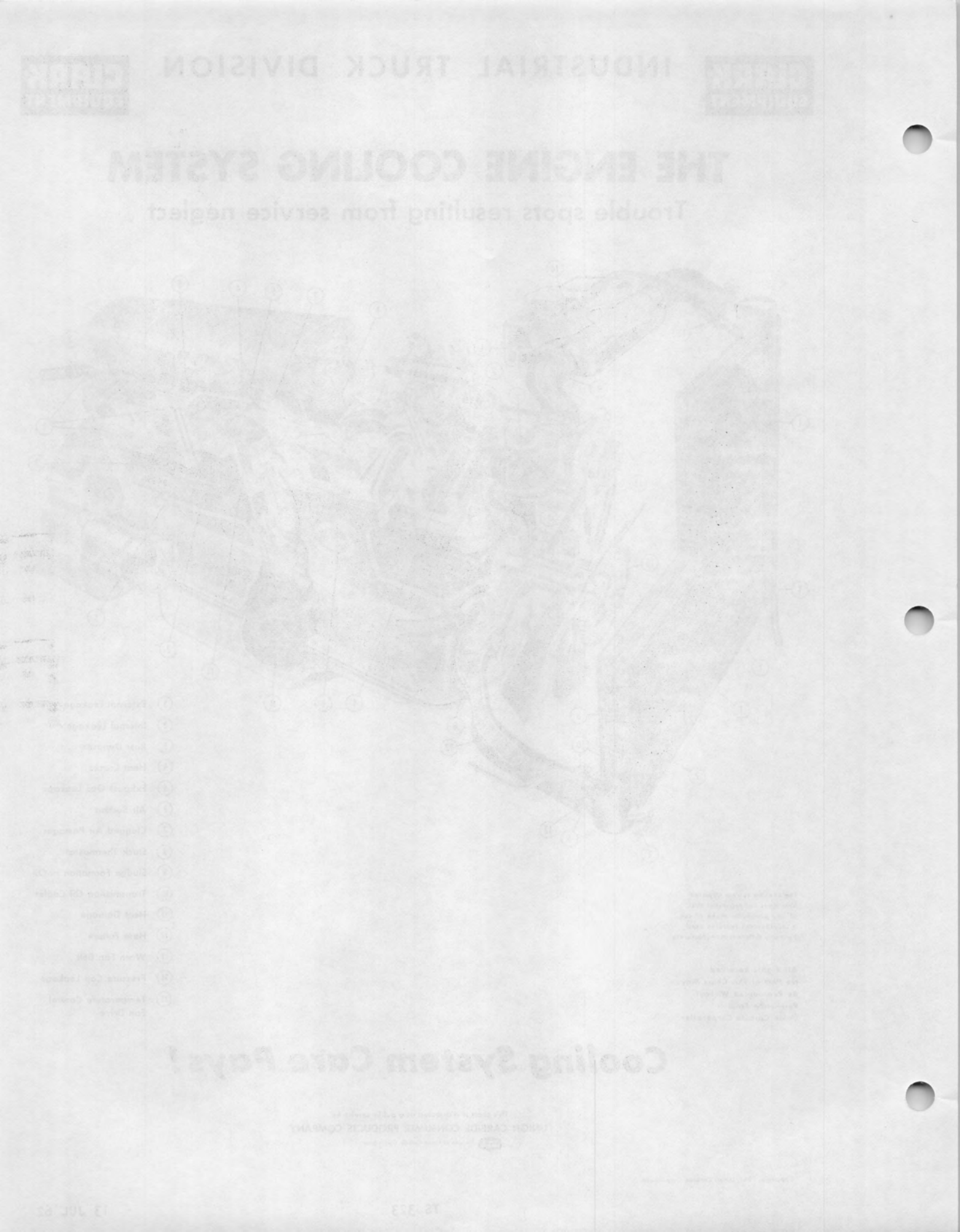

IGNITION SYSTEM

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

STARTING MOTOR

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

GENERATOR TROUBLES

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

BATTERY, LIGHTS AND HORN

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

BATTERY, LIGHTS AND HORN (Continued)

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

TRANSMISSION

TROUBLE	PROBABLE CAUSE	REMEDY
Hard shifting	Improper selector rod adjustment.	Adjust as necessary.
	Synchronizer shifting plate damaged or broken.	Remove and replace.
	Synchronizer springs improperly installed.	Reinstall properly.
	Broken or worn synchronizer stop rings.	Remove and replace.
	Absence of gearshift rail interlock.	Install as necessary.
	Improper clutch adjustment.	Adjust as required.
Transmission slips out of gear.	Second or direct speed gear synchronizer clutching teeth worn.	Remove and replace.
	Gearshift fork lock screw loose.	Tighten as required.
	Clutch housing bore or face out of alignment.	Adjust as necessary.
Transmission noises.	For backlash noise:	
	a. Excessive end play in the cluster gear.	Adjust as necessary.
	b. Loose synchronizer hub spline fit on mainshaft.	Tighten as necessary.
	c. Loose spline fit on low speed sliding gear to maintain spline.	Tighten as required.
	d. Loose spline fit of rear mainshaft flange.	Tighten as required.
	For continuous noise:	
	a. Damaged, broken or excessively worn gear teeth.	Remove and replace.
	b. Drive pinion bearing worn.	Remove and replace.

DRIVE AXLE

TROUBLE	PROBABLE CAUSE	REMEDY
Trouble.	Noisy gears or backlash.	Report to designated individual in authority.
	Damaged axle.	Replace axle.
	Abnormal tire wear.	Inflate tires properly.
	Lubrication leaks.	Drain excessive lubricant; clean housing vent; remove excessive grease in wheel hubs; replace leaking defective gaskets.

STEERING AXLE

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

STEERING

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

BRAKES

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

BRAKES (Continued)

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