



INDUSTRIAL TRUCK DIVISION



OPERATORS MANUAL

FOR
PAN-AMERICAN AIRWAYS

CLARKTOR PERKINS DIESEL
MODELS

0-222

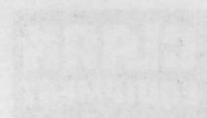
CLARK EQUIPMENT COMPANY

PUBLISHED BY

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



INDUSTRIAL TRUCK DIVISION



OPERATORS

MANUAL

FOR

PAN-AMERICAN AIRWAYS

CLARK FOR PERKINS DIESEL

MODELS

0-522

CLARK EQUIPMENT COMPANY

PUBLISHED BY

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

SAFETY INSTRUCTIONS FOR MAINTAINING INDUSTRIAL TRUCKS

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

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

1. A scheduled preventive maintenance, lubrication, and inspection system should be followed.
2. Only qualified and authorized personnel should be permitted to maintain, repair, adjust, and inspect industrial trucks.
3. Before Leaving The Truck:

- A. Stop truck.
- B. Fully lower the load engaging means.
- C. Place directional controls in neutral.
- D. Apply the parking brake.
- E. Stop the engine or turn off power.
- F. Lock the control or ignition circuit.
- G. Block the wheels if truck is on a ramp, or being worked on.

4. Before Working On Truck:

- A. Raise wheels free of floor or disconnect power source.
- B. Use chocks or other positive truck positioning devices.
- C. Block load engaging means, innermast(s), or chassis before working under them.

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

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

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

5. Before Starting To Operate The Truck:

- A. Be in operating position.
- B. Depress clutch (or brake pedal on automatic transmission and electric trucks).
- C. Place directional controls in neutral.
- D. Start engine or turn on power.
- E. Before operating truck, check functioning of lift and tilt systems, directional and speed controls, steering, warning devices, brakes, and any attachment. (If used)
- F. Release parking brake.

- continued -

SAFETY INSTRUCTIONS FOR MAINTAINING INDUSTRIAL TRUCKS

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

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

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

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

Lubrication and Preventive Maintenance Instructions are listed under the TIME INTERVALS that they should be performed. The TIME INTERVAL is part of the page number. 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.

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 charts.

The TABLE OF CONTENTS for this manual is printed on page 1 and is placed at the front for easy reference. A separate INDEX (also printed on page 1) is placed in front of the Lubrication and Preventive Maintenance section.

Lubrication and Preventive Maintenance Instructions are listed under the TIME INTERVALS and they should be performed at the TIME INTERVAL in part of the page number. For example, 84-001-01 is the time interval (8 operating hours) and 01 is the page number, and 0 is a code number or code as a reference should disregard. The serial number or code number is not the benefit of the publisher only.

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

The data you give your machine will greatly determine the expectation and service life that you will obtain from it. A regular maintenance program should be set up and followed. Regular maintenance will only lead to fairly long machine and short life.



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Pan-American Towing Tractor With Perkins Diesel Engine and Automatic Transmission

<u>Page</u>	<u>Description</u>
B003	Specifications
C000	Overall Controls
C001	Controls & Instruments
C002	Electrical Coolant Heater
C003	Instrument Indicators
C103	Starting and Stopping Engine
C104	Driving the Tow Tractor
C105	Emergency Bleeding of Fuel System
C303	Safety and Operating Suggestions

LUBRICATION AND PREVENTIVE MAINTENANCE

NOTE: Refer to PERKINS DIESEL ENGINE HANDBOOK for engine and accessory service instructions in addition to those instructions covered herein.

<u>Time Interval (H ... Hours)</u>	<u>Page Number (000 - No.)</u>	<u>Description (Service Instructions)</u>
8H	000	P.M. INDEX ... 8 HOUR
8H	001	Lights, Horn, System Fuses, Tires and Fuel...check.
8H	103	Cooling System...inspect.
8H	203	Instrument Indicators...performance check.
8H	303	Brake Pedal (Service Brakes) and Parking Brake... ...performance check.
8H	403	Engine Air Cleaner...service.
8H	601	Wheel Removal (Wheels and Tires...inspect).
100H	000	P.M. INDEX ... 100 HOUR
100H	001	Fuel System...inspect (Transmission and Converter... ...check fluid level).
100H	003	Engine Crankcase...drain & refill (Engine Oil Filter... ...change filter element).
100H	103	Cooling System...inspect/clean.
100H	203	Fan and Alternator...belt tension check/adjust.
100H	302	Brake Pedal...system performance check/adjust.
100H	602	Alternator/Battery/Electrical Precautions.
100H	603	Steering Gear...lubricant check (Battery...inspect).
100H	701	Lubrication Chart KEY ... and ...
100H	702 and 703	Lubrication Charts.

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// continued -

Time Interval (H ... Hours)	Page Number (000 - No.)	Description (Service Instructions)
500H	000	P.M. INDEX ... 500 HOUR
500H	001	Fuel Filters...change element /clean (water trap... ...clean bowl).
500H	003	Automatic Transmission...drain and refill -also- ...Transmission Bands...adjust.
500H	202	Steering Gear...adjust
500H	303	Steer Axle and Linkage...adjust
500H	403	Exhaust System...check condition and security of... ...mounting (Nuts, Bolts, Capscrews...security of mounting.).
1000H	000	P.M. INDEX ... 1000 HOUR
1000H	713	Alternator...inspect.
1000H	803	Wheel Bearings...clean, repack and adjust.
1000H	912	Brake System...performance check/bleed system.
1000H	1003	Brake System...performance check/brake adjust.
1000H	1103	Parking Brake...performance check/brake adjust.
1000H	1202	Cooling System...inspect/clean/flush.
1000H	1303	Drop Gear Case and Differential...drain and refill... ...check vents for obstructions/clean.
1000H	1703	Transmission Upshift Linkage...performance check/... adjust.
1000H	1704	Transmission Control Pressure...check
1000H	1792	Neutral Starting Switch...performance check/adjust.

TROUBLE SHOOTING SECTION

Page	Description
TS321	Cooling System
TS391	Alternator
TS401	Battery, Lights and horn.
TS427	Transmission
TS481	Drive Axle
TS521	Steering Axle and System
TS541	Brake System

NOTE: Refer to PERKINS DIESEL ENGINE HANDBOOK for information covering the engine.

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MACHINE ILLUSTRATION



Clarktor Perkins Diesel Engine Models

SPECIFICATIONS

Clarktor Perkins Diesel...with Automatic Transmission
Towing Tractor Models

<u>Turning radius...outside</u>	108"
<u>Turning radius...inside</u>	29"
<u>Grade clearance</u>	34%

Draw bar pull

2000 to 5000 lbs @ 12" coupler height...

Travel Speeds

Empty:	1st Gear	8.9 MPH
	2nd Gear	13.1 MPH
	Rev.	6.5 MPH

Engine

Governed speed (no-load)	2650 RPM
Engine Stall	1725 RPM
Engine Idle	625 RPM
	(615 to 630 RPM)

REFER TO DIESEL ENGINE HANDBOOK.

Firing Order	1 - 3 - 4 - 2
Valve Tip Clearance	0.010" Hot
	0.012" Cold
Crankcase Capacity	10 quarts
Fuel Oil Specification.....	
ASTM #1 or #2 Diesel Fuel	✓ 45-Centane Mim.

Transmission (Automatic)

Speeds	2 Forward and 1 Reverse
Capacity	22 pints

Steer Axle

Axle Alignment:	
Toe-In	0°
Camber Angle	1°
Caster	0°
L.H. Turning Radius	deg. 56 Left Wheel
L.H. Turning Radius	deg. 36-1/2 Right Wheel
R.H. Turning Radius	deg. 36-1/2 Left Wheel
R.H. Turning Radius	deg. 56 Right Wheel

Drive Axle

Capacity	10 quarts
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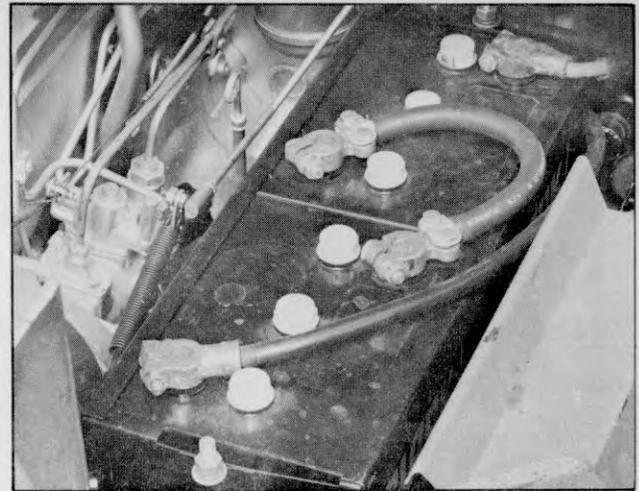


Plate 10497. Batteries - 12 Volt Sys.

Battery/s

20 Hour rate A.H. (each Battery) 115 amps
Negative Ground

PAN-AMERICAN AIRWAYS

Brake System

Type: Vacuum suspended tandem diaphragm power unit with dual system (split system) master cylinder.

Pedal Free Travel 1/4 to-1/2 of an inch.

Tire Pressures

Front Tires	40 pounds	all models
Rear Tires	45 pounds	CTA20-30
	55 pounds	CTA40
	65 pounds	CTA50

Cooling System

Capacity 18 quarts

Heating Unit (Cold Weather)

Electrical inline heater... plugs into grounded electrical system. Located at right-front side of vehicle.

Alternator

System Voltage	12
System Ground	Negative

- continued -



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SPECIFICATIONS

- continued - Alternator

Amperes	42
Rotation	CW
Pulley nut...torque	40 -to- 60 lb. ft.
Battery terminal nut	20 -to- 25 in. lb.
Ground terminal nut	15 -to- 20 in. lb.

Wheels and Tires

Size:	Front...steer	6:50 x 10 6-ply
	Rear...Drive	6:50 x 16 6-ply

Split Rim Wheels (Front)

Steer Wheels:

Inner Rim Nuts (torque)	60 -to- 75 lb. ft.
Outer Rim Nuts (torque)	60 -to- 75 lb. ft.

(.....DRY THREAD.....)

Drive Wheels (Rear)

Wheel Nuts (torque)	90 -to- 100 lb. ft.
---------------------	---------------------

Steering Gear

Pitman arm lock nut	120 -to- 130 lb. ft.
Mounting bolts & clamp bolt.....	40 -to- 45 lb. ft.

Drive Axle -to- Springs

Torque Nuts	200 -to- 220 lb. ft.
-------------	----------------------

Steer Axle -to- Springs

Torque Nuts	65 -to- 75 lb. ft.
-------------	--------------------

C A U T I O N

WELDING ON VEHICLES EQUIPPED WITH ALTERNATORS...DISCONNECT ALTERNATOR BEFORE WELDING ON VEHICLE FRAME OR DAMAGE WILL OCCUR TO THE ALTERNATOR ASSEMBLY.

I M P O R T A N T

Since the alternator and regulator are designed for use on only one polarity system...the following precautions must be observed when working on the charging circuit. Failure to observe these precautions will result in serious damage to the electrical equipment.

1. When installing a battery...always make absolutely sure the ground polarity of the battery and the ground polarity of the alternator are the same.
2. When connecting a booster battery...make certain to connect the negative battery terminals together and the positive battery terminals together.
3. When connecting a charger to the battery...connect the charger positive lead to the battery positive terminal and the negative lead to the battery negative terminal.
4. Never operate the alternator on open circuit. Make absolutely certain all connections in the circuit are secure.
5. Do not short across or ground any of the terminals on the alternator or regulator.
6. Do not attempt to polarize the alternator.

REFER TO PERKINS DIESEL ENGINE HANDBOOK



OPERATIONS

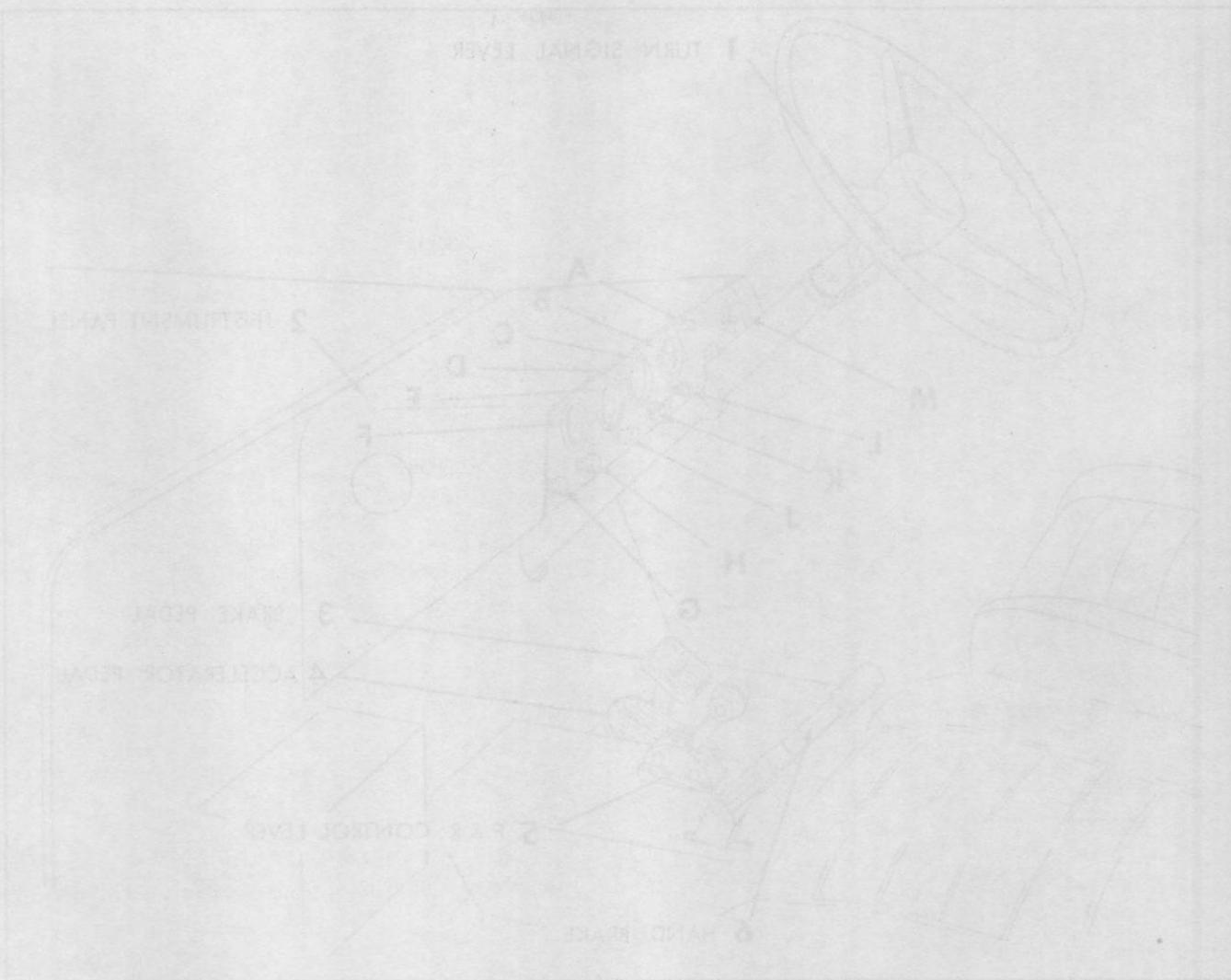


Plate 10485, Location of Vehicle Controls

INSTRUMENTS

The instrument panel is located in front of the operator. It contains the following instruments:

- 1. Tachometer: Shows engine speed in revolutions per minute (RPM).
- 2. Speedometer: Shows vehicle speed in miles per hour (MPH).
- 3. Fuel Gauge: Shows the amount of fuel in the tank.
- 4. Oil Pressure Gauge: Shows the oil pressure in the engine.
- 5. Water Temperature Gauge: Shows the temperature of the engine cooling water.
- 6. Air Pressure Gauge: Shows the pressure of the air in the tires.
- 7. Battery Charge Indicator: Shows the charge level of the battery.
- 8. Warning Lights: Indicate various warning conditions such as low oil pressure, high temperature, and low battery charge.

CONTROLS

The following controls are located in the operator's area:

- 1. Steering Wheel: Used to control the direction of the vehicle.
- 2. Accelerator Pedal: Used to increase engine speed.
- 3. Brake Pedal: Used to slow down or stop the vehicle.
- 4. Hand Brake: Used to hold the vehicle in place when parked.
- 5. Gear Shift: Used to change gears.
- 6. Clutch Pedal: Used to disengage the clutch when shifting gears.
- 7. Turn Signal Levers: Used to indicate the direction of a turn.
- 8. Horn: Used to sound the horn.
- 9. Parking Brake: Used to hold the vehicle in place when parked.

OPERATIONS

Refer to your Diesel Engine Handbook for starting and operating the low tractor.

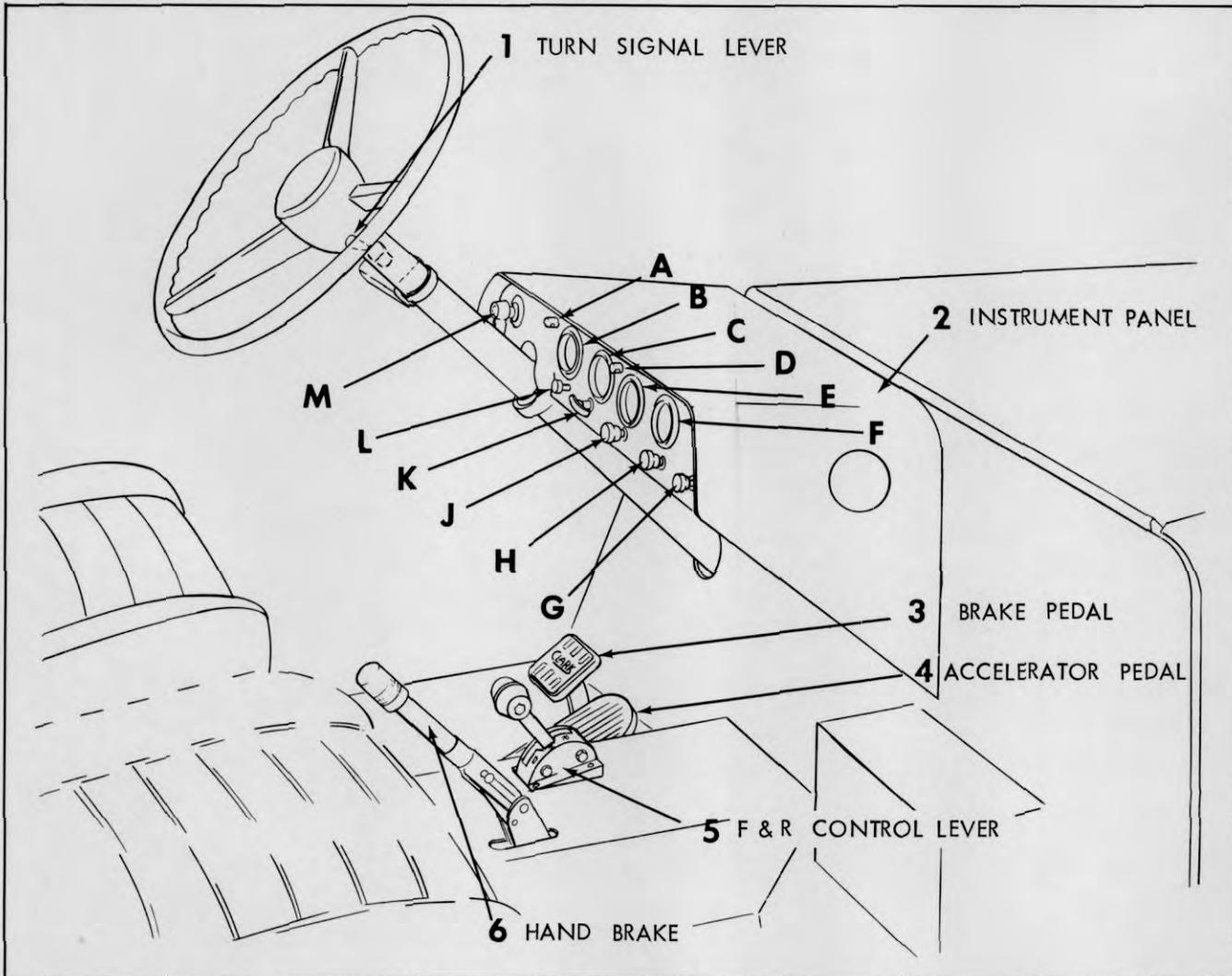


Plate 10487. Location of Vehicle Controls

CONTROLS

Shift Lever... is used to direct the tractor transmission which supplies the vehicle with forward, neutral and reverse. A shifting diagram aids the operator in selecting correct gear.

Hand Brake... is connected to the transmission at the drive shaft... is used for securing machine on a reasonable grade and parking. Refer to page 8H 303.

INSTRUMENTS

Instrument Cluster... contains many instruments and indicators to tell you at a glance important things about the performance of your tow tractor. The information on this and the following pages will enable you to more quickly understand and properly interpret these instruments. Familiarize yourself with their location and purpose and make it a practice to scan the instrument cluster as you start the engine, after it starts, and periodically as you drive.

I M P O R T A N T

Refer to your Diesel Engine Handbook prior to starting and operating the tow tractor.

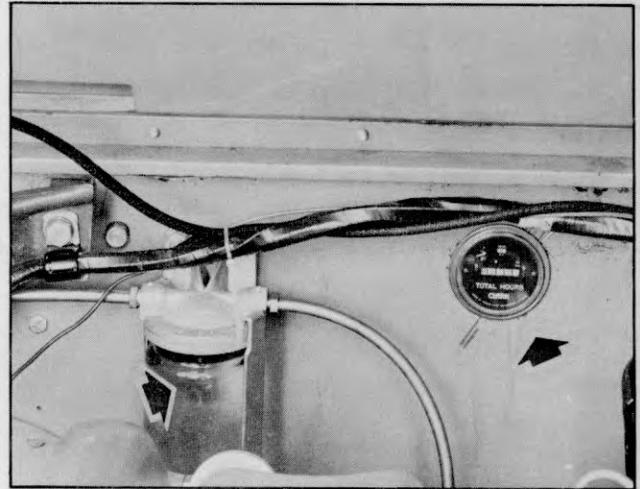
The controls in the driver's compartment are:

1. Turn Signal Lever.
2. Instrument Panel.
3. Brake Pedal.
4. Accelerator Pedal.
5. Forward and Reverse (Transmission Control) Lever.
6. Parking Brake Lever.

The driver's seat can be adjusted fore and aft to provide a more comfortable ride.

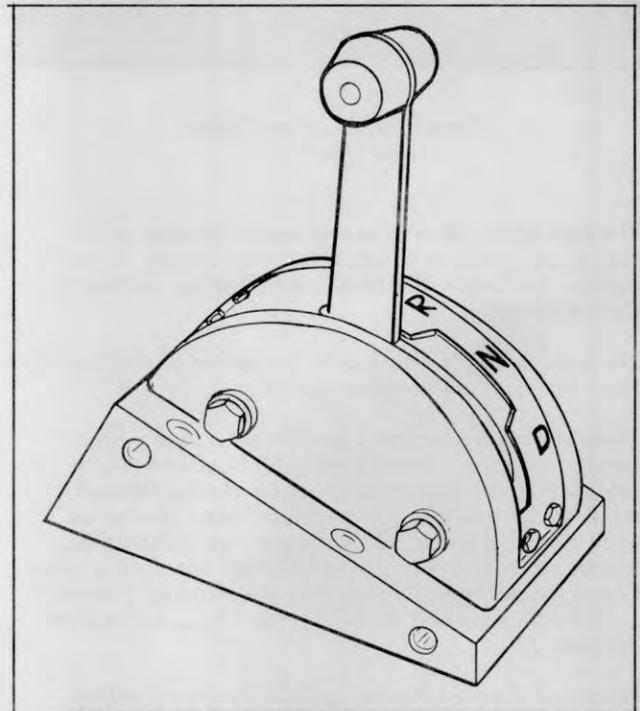
The instrument panel has these instruments and controls:

- A. Instrument Panel Light/s.
- B. Engine Temperature Indicator.
- C. Engine Oil Pressure Indicator.
- D. Instrument Panel Light/s.
- E. Fuel Indicator.
- F. Ammeter.
- G. Heater Defroster Switch.
- H. Back-Up Lights Switch.
- J. Head Lights Switch.
- K. Engine Stop (Shut Down) Control.
- L. Windshield Wiper Switch.
- M. Ignition/Starter Switch.



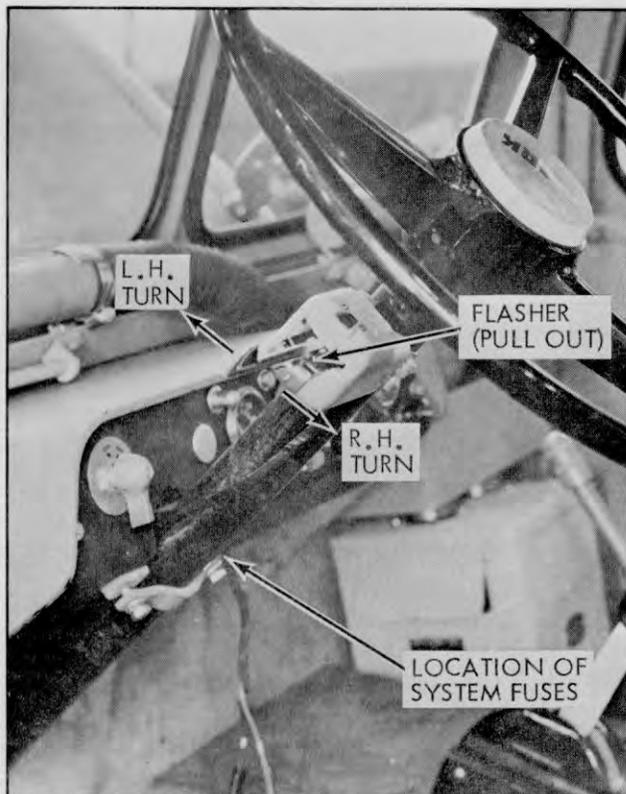
Engine Hour Meter
Plate 10489

Another instrument...the engine hour meter...is located beneath the hood on the fire wall just above the engine.



Transmission Control Lever
Plate 10490

The shift patterns are shown on the lever housing ... in forward, the lever is pulled toward you. In reverse, the lever is pushed away from you. Transmission has two forward speeds, one automatic...and...one reverse. Neutral is in center "N" position.



Turn Signal Control Lever
Plate 10491

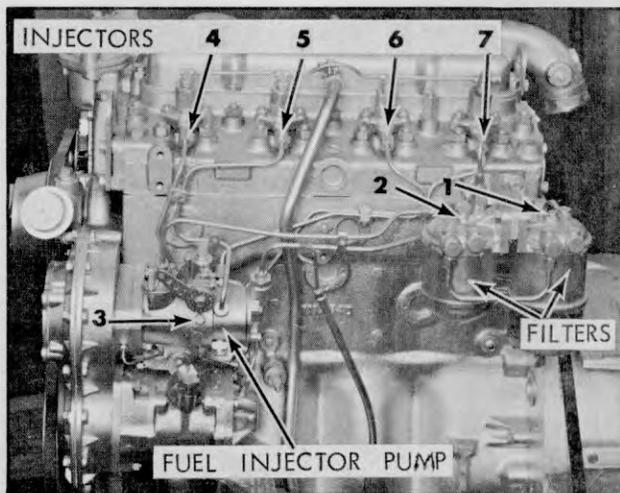
The turn signal lever is moved up to indicate a left turn...pulled down to indicate a right turn. A small switch, just below the lever, is pulled out to turn on flasher lights.

The horn button is mounted in the center of the steering hand wheel...push to blow horn/s.

Three mirrors are mounted on the cab...one mirror, located in upper center of windshield allows you to see people and objects as would be viewed through the rear cab window. Two mirrors, one mounted on each side of the cab, allows you to see behind the tractor when vision is blocked through the back window. Check mirrors to make sure they are mounted correctly...affording the best visibility possible...and are not damaged.

Electrical Coolant Heater...Cold Weather Starting

The electrical plug...see illustration to your right... has three prongs and should be used with a mating receptical and a grounded electrical system...should be plugged in immediately after shutting engine down...while engine coolant is at operating temperature. The heater unit will keep the engine coolant warm until the next shift or following day...at which time, the unit should be unplugged and normal starting procedures followed.

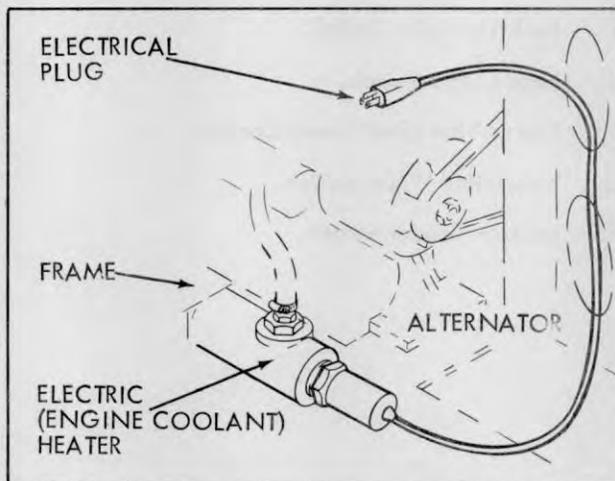


Fuel System Bleeder Valves
Plate 10492

Necessity of Bleeding Tow Tractor Fuel System

In the event of air entering the fuel system, it will be necessary to bleed the whole fuel system.

Cause of air entering system is: (a) to run out of fuel, (b) leakage in fuel supply line...especially on the suction side, (c) any time the fuel system filters are replaced. Bleeding procedures are outlined on the following pages.



Engine Coolant Heater Electrical Plug
Plate 10493

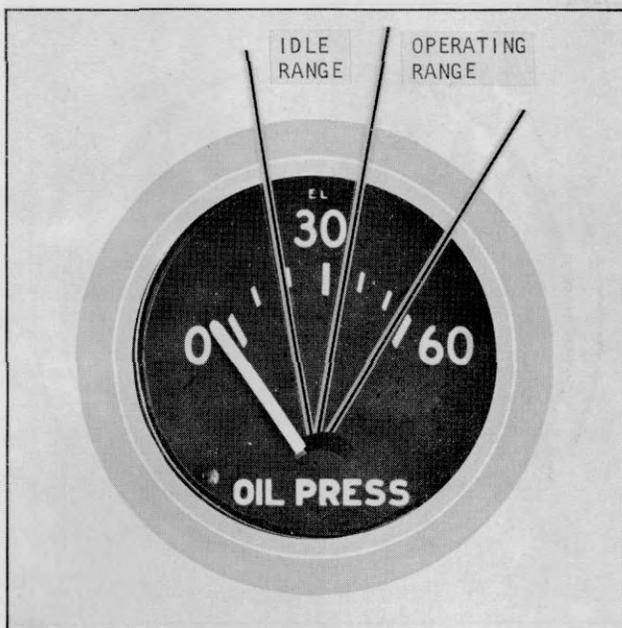


Plate 8606. Typical Oil Pressure Indicator

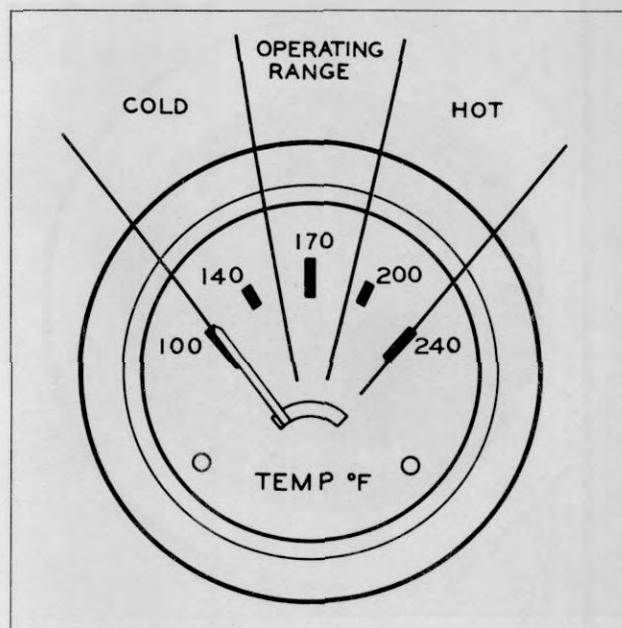


Plate 9283. Typ. Engine Temperature Indicator

REFER TO DIESEL ENGINE MANUAL

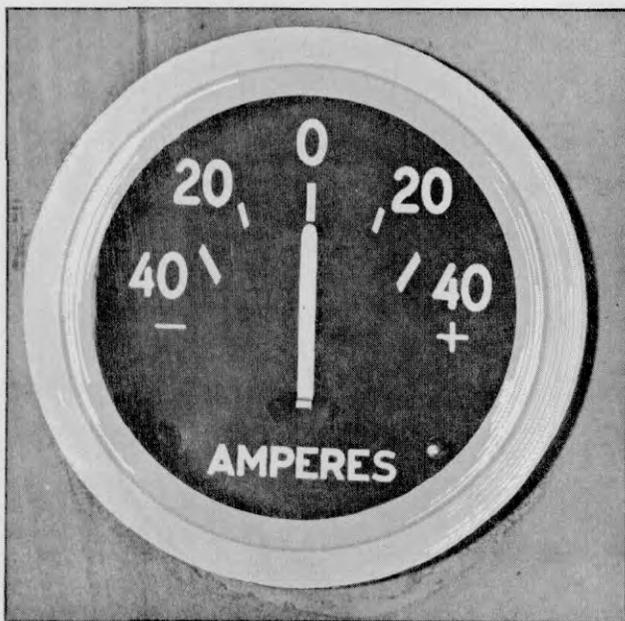


Plate 7647. Ammeter

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.



Plate 7162. Hour Meter

HOUR METER

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

N O T E

Refer to DIESEL ENGINE MANUAL for machines so equipped.

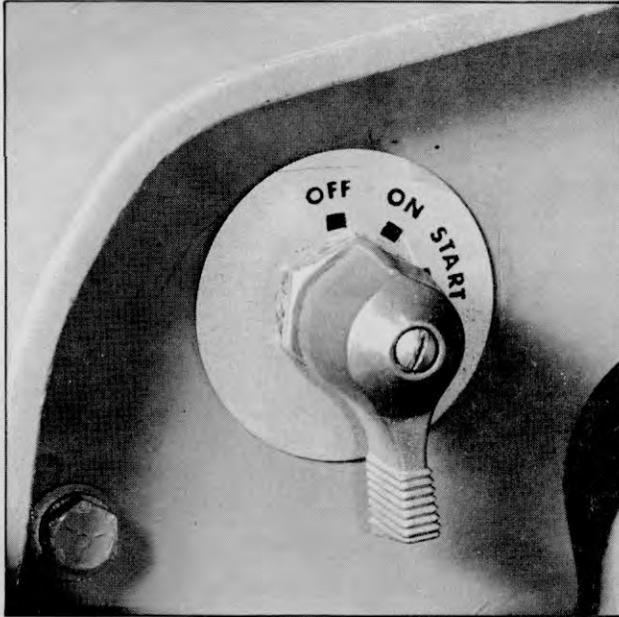


Plate 9282. Typical Ignition/Starter Switch

Starting Diesel Engine

1. Place transmission control lever in neutral and set parking brake...ensure stop control is fully in.
2. Turn ignition switch key to start position...the starter is energized when the key is held in this position.

CAUTION

DO NOT ENGAGE STARTER LONGER THAN 15 SECONDS AT A TIME — ALLOW A MINUTE OR SO INTERVAL BETWEEN TRIALS.

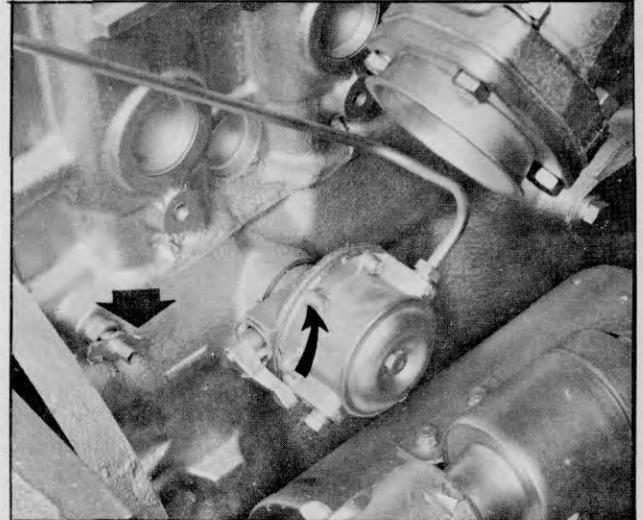
3. If the engine does not start after the first two (2) attempts, then...

(A) Open hood of engine compartment...at the fuel pump is a lever...lift the spring return lever and release...prime engine a few times and again try to start the engine...operate primer only as necessary to start the engine.

4. After engine has started...check instrument panel making certain the oil pressure indicator registers a build up in oil pressure. If oil pressure does not build up immediately...is low, erratic or there is no pressure indicated...the engine should be shut down until the cause of the trouble can be located and corrected.

NOTE

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

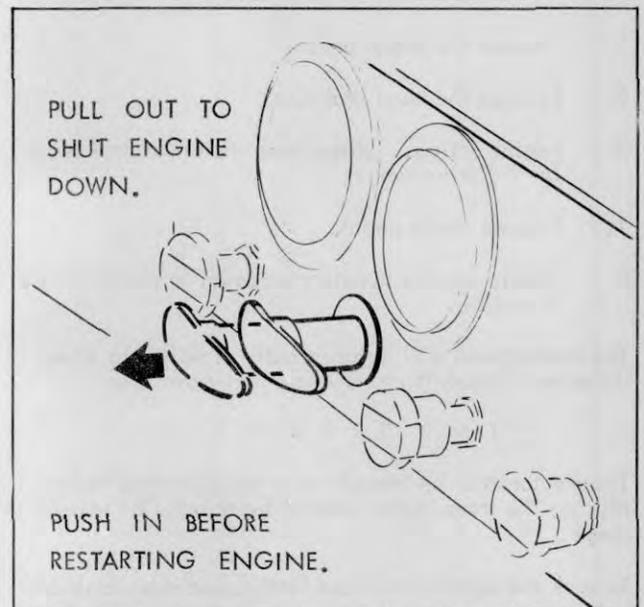


Engine Fuel Primer Lever
Plate 10494

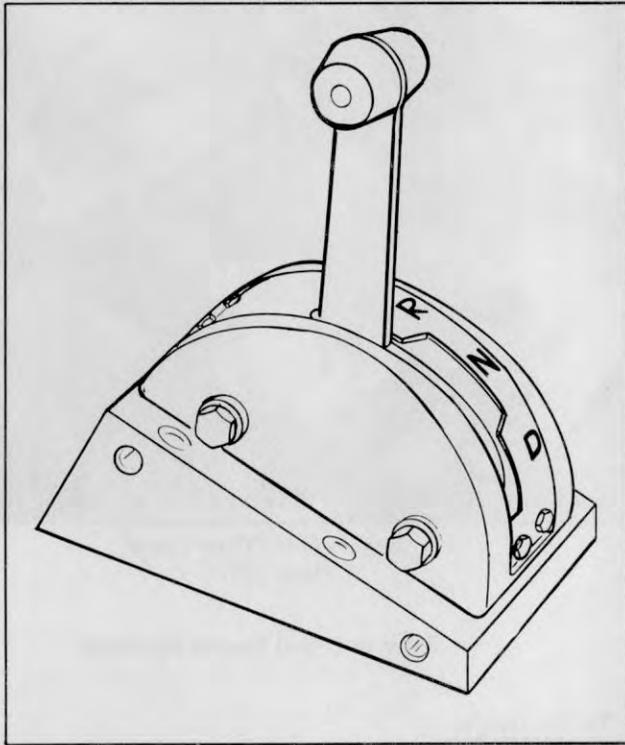
--- Refer to Diesel Engine Handbook

To Stop Engine

1. Pull stop control and hold in this position until engine shuts down.
2. Ensure the stop control is fully in...otherwise difficulty may be experienced in restarting the engine.



Engine Stop Control
Plate 10495



Transmission Control Lever
Plate 10490

Driving the Tow Tractor

When the tow tractor is to be placed into motion...

1. Depress the brake pedal.
2. Release the hand brake.
3. Engine idling...place transmission control lever in "D" drive range.
4. Release brake pedal.
5. Slowly depress accelerator pedal to place tractor in motion.

The transmission will automatically upshift into direct drive, and downshift at varying accelerator feed.

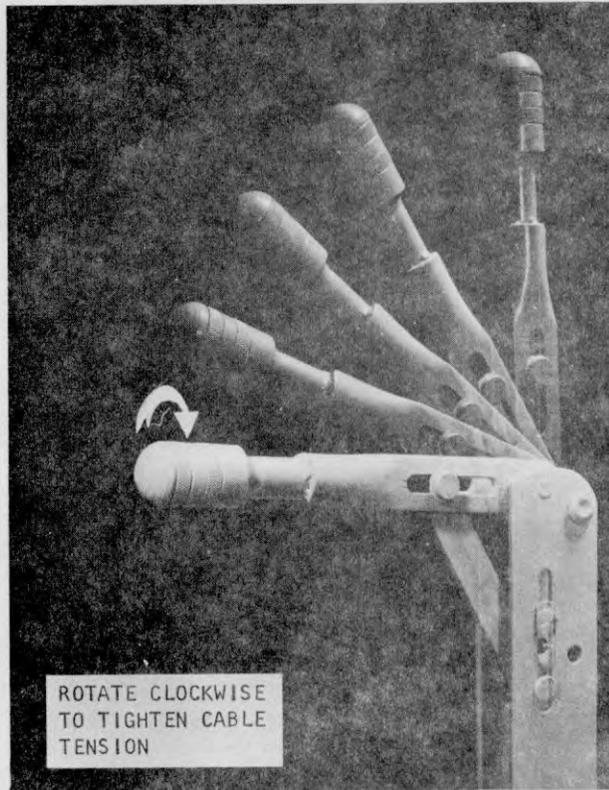
I M P O R T A N T

The tractor must be brought to a complete stop before placing the transmission control lever into "R" reverse range.

To rock the tractor back and forth...maintain a steady but moderate pressure on the accelerator pedal and move the shift lever back and forth between the "R" and "D" positions.

To Stop Tow Tractor

1. Remove foot from accelerator pedal.
2. Depress foot brake pedal gradually until vehicle comes to a halt.
3. When tractor stops...place transmission control lever in "N" neutral position.
4. To park tow tractor...apply hand brake and shut engine down.



Parking Brake Control Lever
Plate 6505

BLEEDING FUEL SYSTEM

When it becomes necessary to bleed the fuel system, you must:

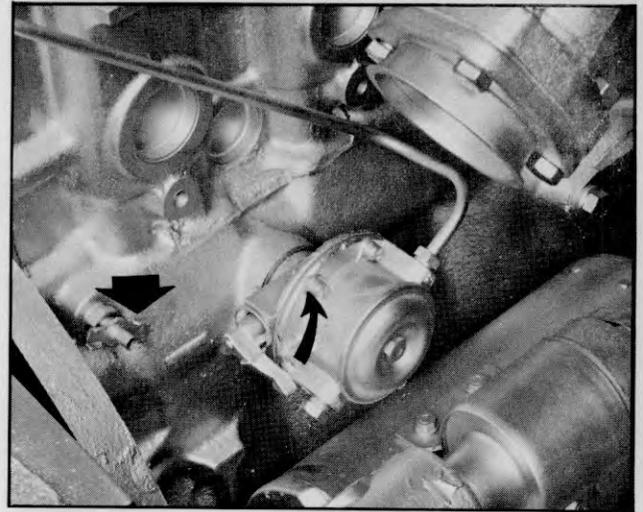
Before attempting to start the engine...

1. Prime pump at primer lever.
2. Open bleeder valve #1 ... allowing fluid to run until clear of air bubbles. Close valve.
3. Open bleeder valve #2 ... when fluid is clear of air bubbles, close valve.
4. Open bleeder valve #3 ... again bleed system until clear of bubbles, close valve.
5. Now...crank engine and...
6. ...while cranking, crack connection #4 at injector. Bleed off some fluid...never mind clearing fluid of air bubbles at this time.
7. Continue to do this at bleeder valves #5, #6, and #7... closing valves after bleeding each one.
8. After engine starts...go back and bleed points #4 thru #7 until fluid is clear of air bubbles. Getting the engine started and then bleeding these points clear of bubbles makes the job easier and faster.
9. After bleeding...shut engine down and wipe clean of fuel oil.

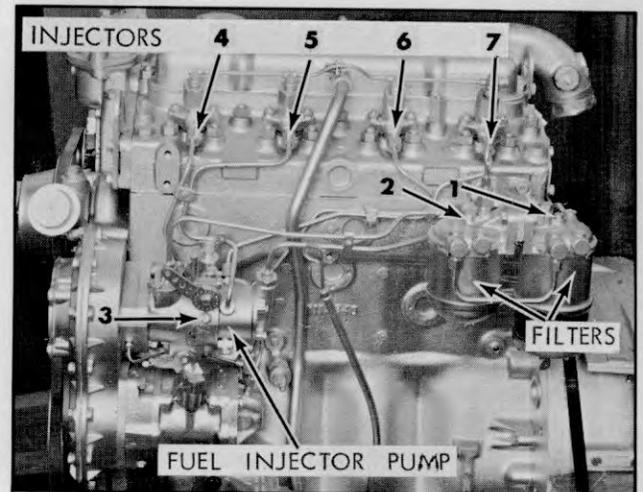
NOTE

It should be necessary to bleed the fuel system only in the event of air entering the system...then the complete system must be bled as outlined above.

Cause of air entering system is: (a) to run out of fuel, (b) leakage in fuel supply line...especially on the suction side, (c) any time the fuel system filters are replaced.



Engine Fuel Primer Lever
Plate 10494



Fuel System Bleeder Valves
Plate 10492

STARTING FUEL SYSTEM

When it becomes necessary to bleed the fuel system...

Before attempting to start the engine...

1. Turn on the primer pump.

2. Open bleed valve 1, allowing fuel to flow until most of the fuel has been drawn out of the bleed valve.

3. Open bleed valve 2, when fuel is drawn out of bleed valve.

4. Open bleed valve 3, when bleed valve 2 has been closed.

5. Close all bleed valves.

6. While cranking, crank operation is at normal speed. Bleed off any fuel that may have drawn into the fuel system.

7. Repeat for each of bleed valves 1, 2, and 3. Close the valve when bleeding is complete.

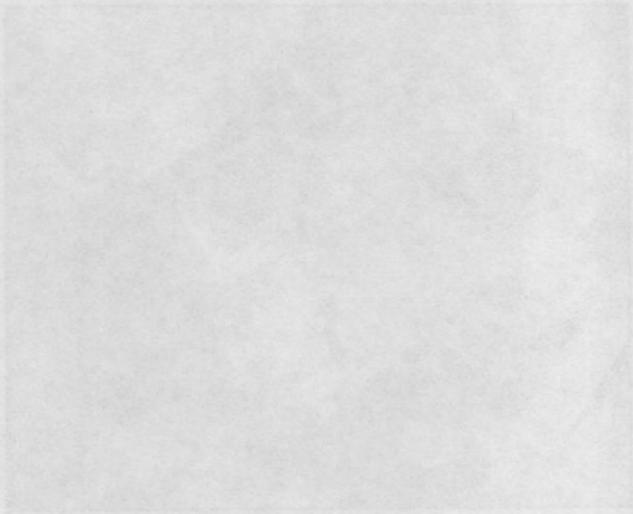
8. After engine starts, close bleed valve 1. When engine is running, close bleed valve 2. When engine is running, close bleed valve 3.

9. After bleeding, the engine can be started with fuel air.

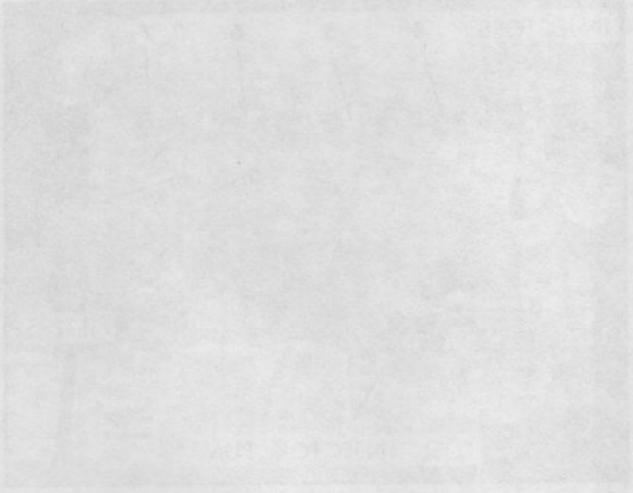
NOTE

It should be necessary to bleed the fuel system only in the event of a service fault. When the engine is running, fuel should be drawn out of the bleed valves.

Caution: Do not attempt to bleed the fuel system while the engine is running. This could result in a fire or explosion.



Primer Pump Assembly
Fig. 100-1



Bleed Valve Assembly
Fig. 100-2



INDUSTRIAL TRUCK DIVISION



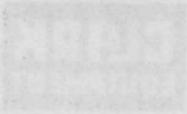
OPERATIONS

SAFETY PRECAUTIONS

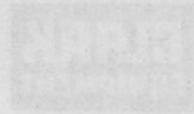
1. Only qualified drivers should be allowed to operate the vehicle.
2. Do not tow a train of more than three trailers.
3. Drive slowly in rough or congested areas.
4. Do not drive with wet or greasy hands.
5. Observe the Operating Rules and Preventive Maintenance Instructions A.S.A. B56.1 Safety Code for Powered Industrial Trucks.
6. Avoid making sudden stops or starts.
7. When backing, be sure to look for fellow workers before moving machine.
8. If the machine does not respond immediately, report to designated person in charge. A minor adjustment now may save a major repair later.
9. Do not allow anyone to ride on this machine unless a standard seat is provided.
10. Operate the machine at a safe distance behind other vehicles.
11. Observe highway safety rules in operation of vehicle in buildings as well as out.
12. Drive carefully on wet or slippery driving areas.
13. Keep hands, elbows and feet within running line of truck.
14. Do not operate machine for prolonged periods in an unventilated area.
15. Be sure brakes, tires and steering are in proper condition at all times.

NOTE

A 1,000 POUND TRACTOR DRAWBAR PULL WILL EQUAL A 10,000 POUND LOAD ON A FOUR WHEEL TRAILER (INCLUDING THE WEIGHT OF THE TRAILER.)



INDUSTRIAL TRUCK DIVISION



OPERATING INSTRUCTIONS

SAFETY PRECAUTIONS

1. Do not operate the vehicle until you have read and understood these instructions.

2. Do not use the vehicle on uneven or slippery surfaces.

3. Do not use the vehicle on inclines greater than 10%.

4. Do not use the vehicle to transport passengers.

5. Do not use the vehicle to transport loads exceeding the rated capacity.

6. Do not use the vehicle to transport hazardous materials.

7. Do not use the vehicle to transport flammable or volatile liquids.

8. Do not use the vehicle to transport loads that are not properly secured.

9. Do not use the vehicle to transport loads that are not properly balanced.

10. Do not use the vehicle to transport loads that are not properly distributed.

11. Do not use the vehicle to transport loads that are not properly secured to the vehicle.

12. Do not use the vehicle to transport loads that are not properly secured to the vehicle.

13. Do not use the vehicle to transport loads that are not properly secured to the vehicle.

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18. Do not use the vehicle to transport loads that are not properly secured to the vehicle.

19. Do not use the vehicle to transport loads that are not properly secured to the vehicle.

20. Do not use the vehicle to transport loads that are not properly secured to the vehicle.



INDUSTRIAL TRUCK DIVISION



FUEL HANDLING AND STORAGE SAFETY

(Gasoline Powered Trucks)

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

1. The storage and handling of liquid fuels should be in accordance with the Flammable and Combustible Liquids Code. (NFPA No. 30).
2. Trucks using liquid fuels should be refueled only at locations designated for that purpose. Safe outdoor locations are preferable to those indoors. The Flammable and Combustible Liquids Code (NFPA No. 30), Paragraph 7211, outlines recommendations for arranging safe indoor fueling facilities.
3. Engines should be stopped and operator off the truck during refueling.
4. Liquid fuels not handled in approved dispensing pumps should be transported in safety cans. Safety cans should be inspected regularly for damage to closures and for leaks; faulty cans repaired or replaced. Care should be exercised in handling of safety cans to avoid damage.
5. Reasonable care should be exercised to prevent the spillage of fuel or overfilling either the vehicle fuel tanks or safety cans. Filler cap should be replaced and any spilled fuel disposed of by using a noncombustible adsorbent before the engine is restarted.
6. Smoking should be prohibited in the refueling area.



INDUSTRIAL TRUCK DIVISION



SAFETY INSTRUCTIONS

For the Operator

1. Read the Operator's Manual and Safety Instructions

1. The storage and handling of liquid fuels should be in accordance with the applicable and appropriate safety code (NFPA 30).

2. Trucks using liquid fuels should be refueled only at locations designed for that purpose. Fuel should be dispensed into the fuel tank from the top of the fuel tank. The applicable and appropriate safety code (NFPA 30) should be followed. The manufacturer's instructions should be followed.

3. Trucks should be stopped and secured at the truck during refueling.

4. Liquid fuels should be handled in approved dispensing areas. Trucks should be equipped with safety cans. Safety cans should be inspected regularly for damage to the handle and the spout. Safety cans should be replaced if damaged. The applicable and appropriate safety code (NFPA 30) should be followed in handling of safety cans to avoid damage.

5. Refueling areas should be marked and restricted. The refueling area should be marked with either the words "FUEL" or "SAFETY CAN". The refueling area should be restricted and any spilled fuel removed as soon as possible. The applicable and appropriate safety code (NFPA 30) should be followed.

6. Smoking should be prohibited in the refueling area.



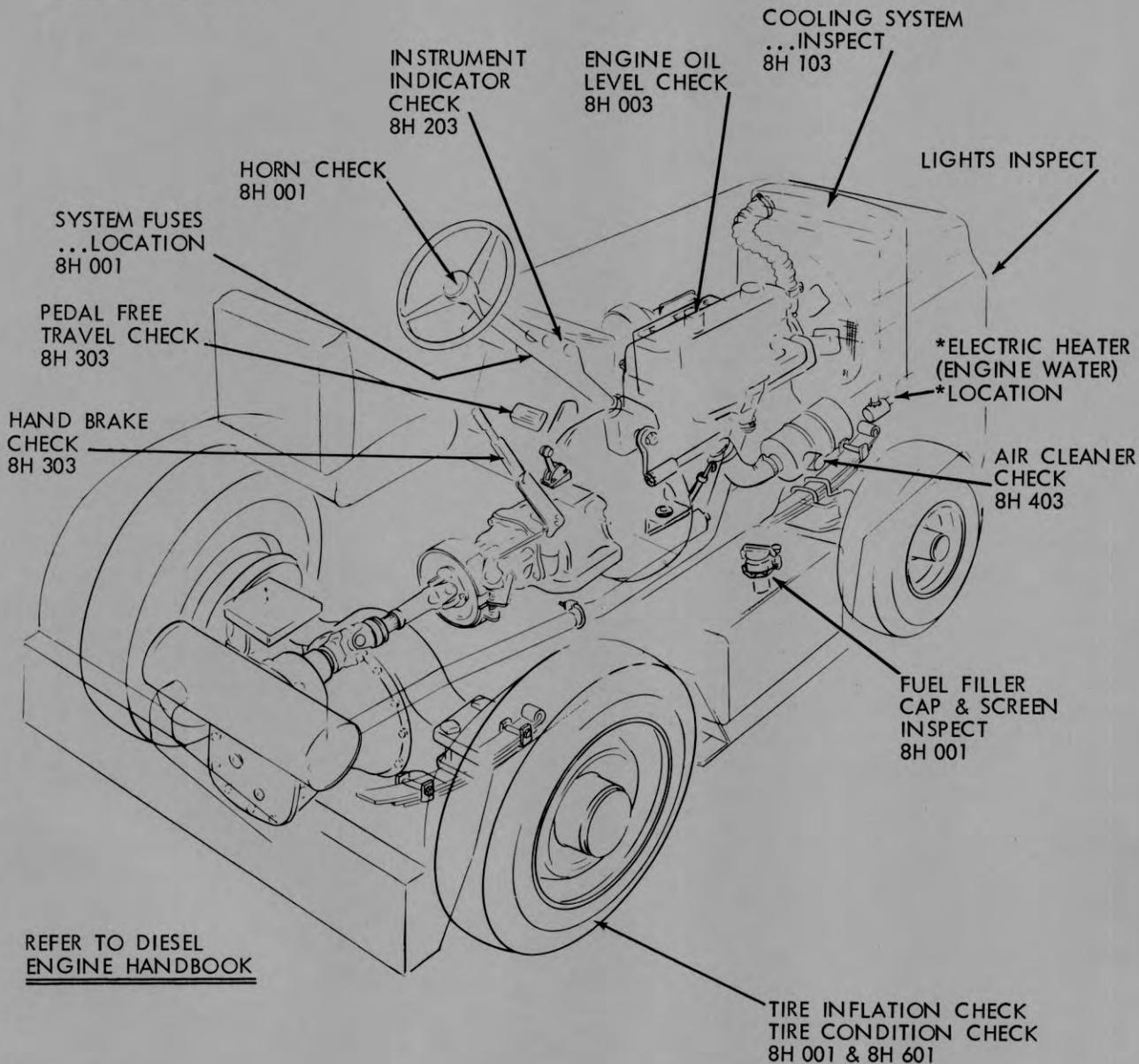
INDUSTRIAL TRUCK DIVISION

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8 HOUR INDEX



REFER TO DIESEL
ENGINE HANDBOOK

NOTE: After each 8 operating hours,
perform the above preventive main-
tenance services.

Lubrication and Preventive Maintenance
Pictorial Illustration Index - 8 HOUR

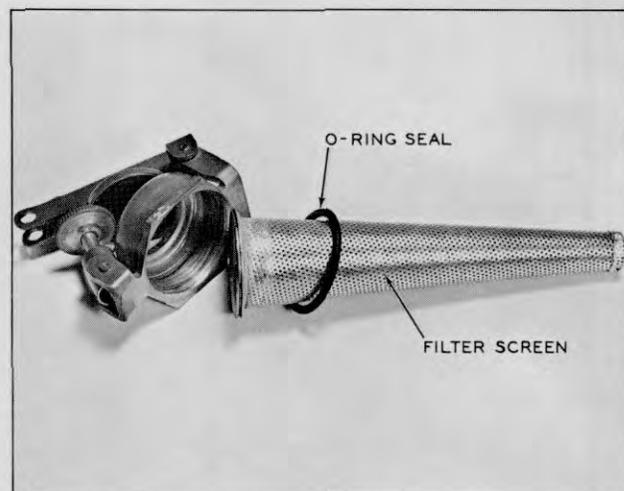
Fuel System

1. Check fuel supply every shift...use a good grade diesel fuel.

ASTM #1 or #2 Diesel Fuel
45-Centane Minimum

2. Before filling the tank...make certain filler cap & screen is in place and not damaged.*

- *Smoking or carrying lighted tobacco or any open flame is prohibited during all fueling operation.
- *Refill fuel tanks only at locations designated for this purpose...refer to local ordinances.
- *Never operate the vehicle with a leaking fuel system...report it to your supervisor.
- *Refer to "Fuel Handling and Storage Safety" procedures located in the front of this manual.



Fuel Tank Filler Cap and Screen Assy.
Plate 6627

--- Refer to Diesel Engine Handbook

Tow Tractor Tires

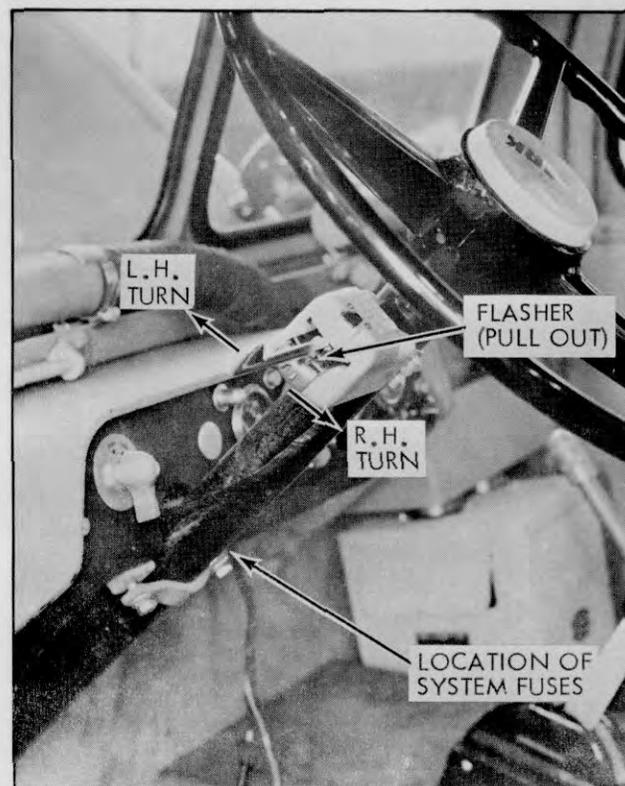
1. Check tire condition...pry out of tire treads any objects which could damage the tires.
2. Check tire inflation...inflation should be as outlined in following chart:

Front Tires:	40 Pounds	All Models
Rear Tires:	45 Pounds	CTA20-30
	55 Pounds	CTA40
	65 Pounds	CTA50

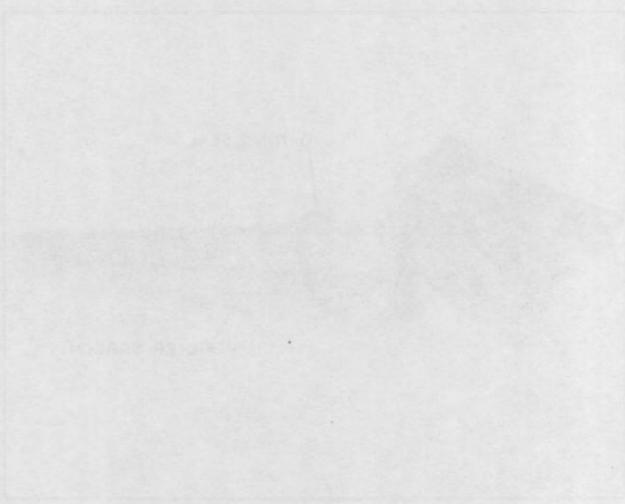
System Fuses

Located beneath Instrument panel...see illustration on opposite page.

Horn Fuse	14 AMP
Head, Tail & Back-Up & Stop Lights	20 AMP
Directional (Turn Signal)	14 AMP



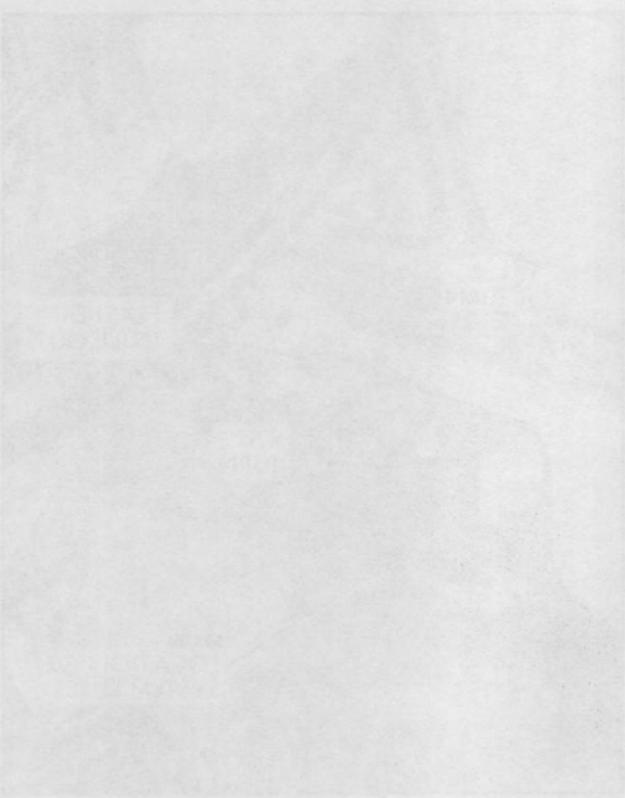
Location of Electrical System Fuses
Plate 10491



Fuel tank location on the chassis

Fuel System

1. Check fuel supply every time you add more diesel fuel.
2. Before filling the tank, make sure the tank is clean and dry.
3. Always use the correct grade of diesel fuel.
4. Never use any other liquid in the fuel system.
5. If the fuel tank is empty, do not try to start the engine.
6. If the fuel tank is empty, do not try to start the engine.
7. If the fuel tank is empty, do not try to start the engine.
8. If the fuel tank is empty, do not try to start the engine.



Battery location on the chassis

Battery

1. Check the condition of the battery every time you add more diesel fuel.
2. If the battery is low, do not try to start the engine.
3. If the battery is low, do not try to start the engine.
4. If the battery is low, do not try to start the engine.
5. If the battery is low, do not try to start the engine.
6. If the battery is low, do not try to start the engine.
7. If the battery is low, do not try to start the engine.
8. If the battery is low, do not try to start the engine.

Front Tires	40 Pounds	CTA 50-30
Rear Tires	40 Pounds	CTA 50-30
Steering Axle	50 Pounds	CTA 50-30
Drive Axle	50 Pounds	CTA 50-30

Control System

1. Check the condition of the control system every time you add more diesel fuel.
2. If the control system is low, do not try to start the engine.
3. If the control system is low, do not try to start the engine.
4. If the control system is low, do not try to start the engine.
5. If the control system is low, do not try to start the engine.
6. If the control system is low, do not try to start the engine.
7. If the control system is low, do not try to start the engine.
8. If the control system is low, do not try to start the engine.

Engine Crankcase Level Check

Every 8 operating hours...or every shift...check the crankcase oil level. If the engine was just shut down...allow a few minutes for the oil to drain back into the crankcase. Then pull dipstick...level should be at the MAX. mark indicated on the dipstick...fill as necessary.

CAUTION / / /

NEVER PERMIT THE OIL LEVEL TO FALL BELOW THE "MIM." MARK ON THE DIPSTICK ... DO NOT OVERFILL THE CRANKCASE AS TOO MUCH OIL WILL BRING THE LEVEL HIGH ENOUGH FOR THE CONNECTING RODS TO DIP AND CAUSE EXCESSIVE QUANTITIES OF OIL TO BE THROWN TO THE CYLINDER WALLS.

Engine Oil Specifications

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

Engine Oil to meet or exceed API "MS", "DM" AND "DS" service classification for Series 3 approval per SAE J340A (MILW-L-45199A).

Refer to the LUBRICATION CHAR KEY located on page 100H 701.....

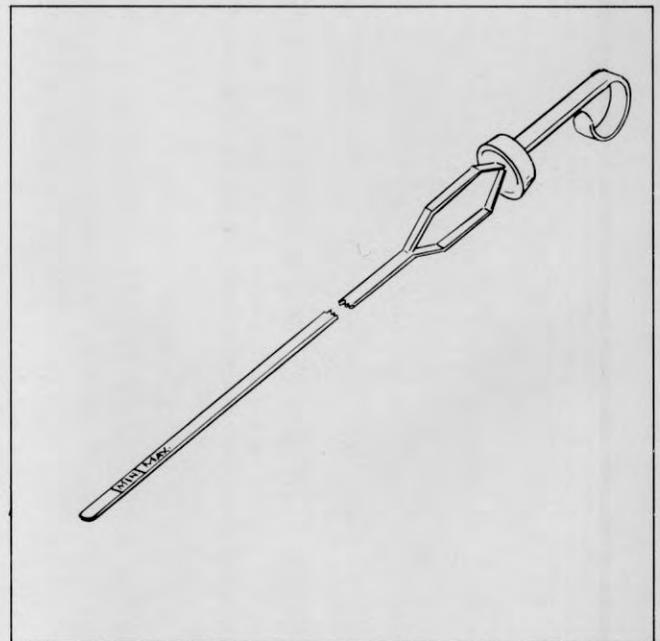
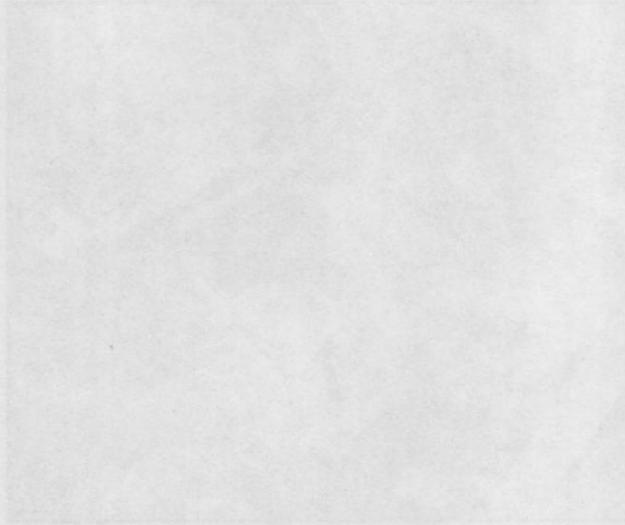
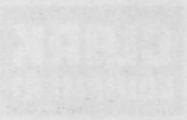
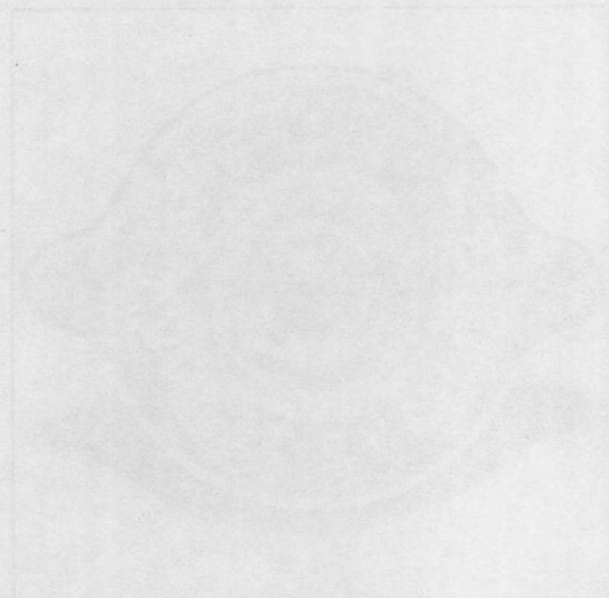


Plate 10498. Dipstick



Cooling System Details
Figure 100N



Radiator Pressure Cap
Figure 100B

Engine Cooling

Check radiator coolant level and fill to within 1 inch of the top with clean water. If coolant is low, add coolant. Use a suitable antifreeze solution. It is recommended that a soluble oil in the coolant of 1 ounce per gallon of water be added to the coolant.

CAUTION

NEVER POUR COLD WATER OR COLD AIR DIRECTLY INTO THE RADIATOR OF AN OVERHEATED ENGINE. ALLOW ENGINE TO COOL AND AVOID THE RANGE OF ENGINE HEAD OR BLOCK. KEEP ENGINE RUNNING WHEN ADDING WATER OR ANTIFREEZE. WHEN PERMANENT ANTIFREEZE OF THE ETHYLENE GLYCOL TYPE IS USED, THE COOLANT SOLUTION MUST CONTAIN AT LEAST 10% WATER.

WARNING

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

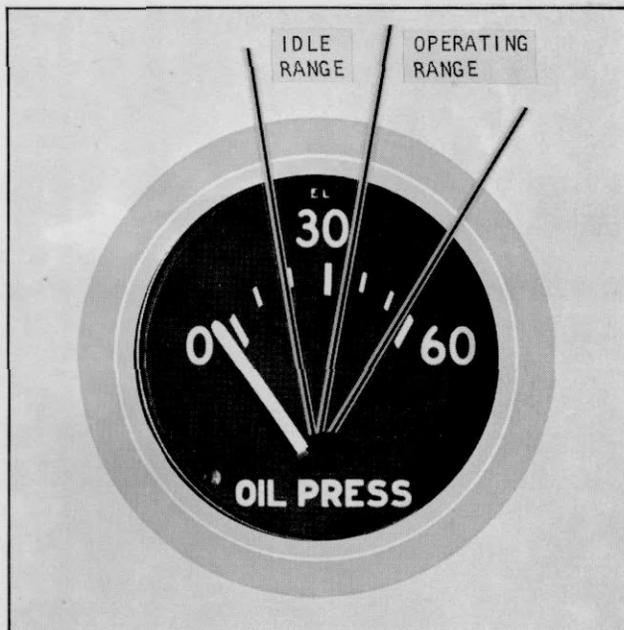


Plate 8606. Typical Oil Pressure Indicator

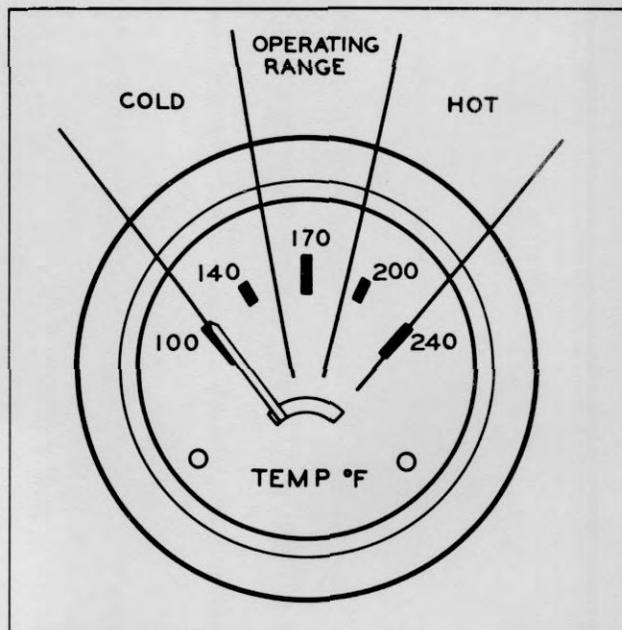
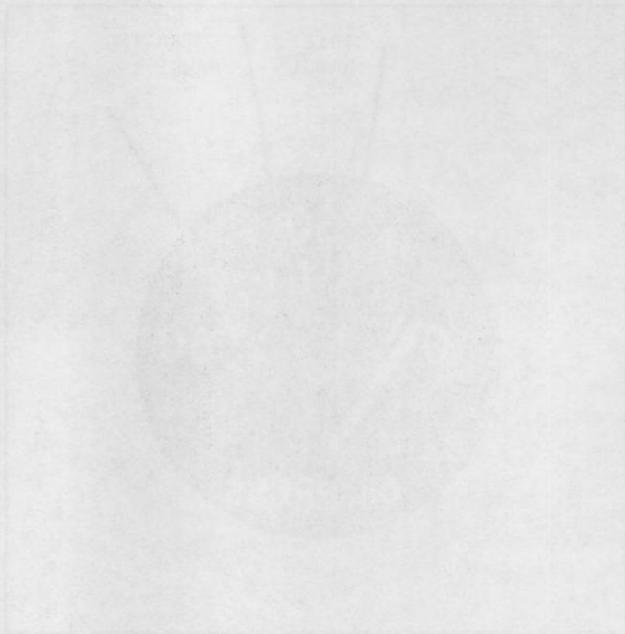
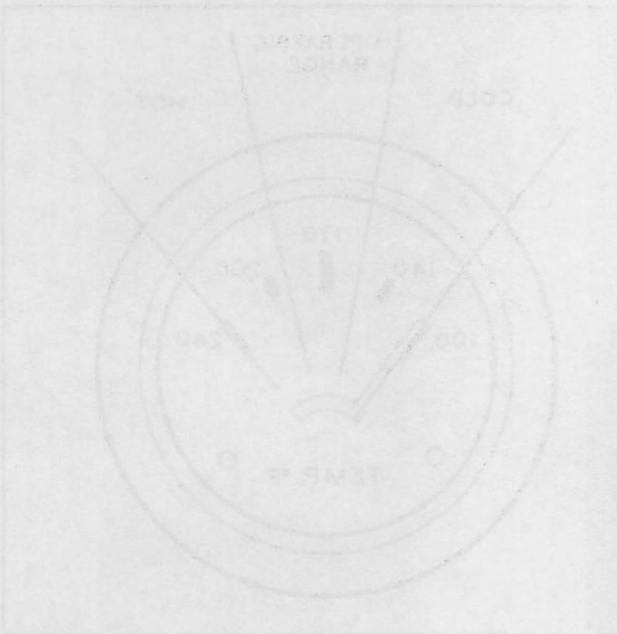
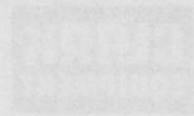


Plate 9283. Typical Temperature Indicator

REFER TO DIESEL ENGINE MANUAL



INDUSTRIAL TRUCK DIVISION



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Brake Pedal Freel Travel...Performance Check

N O T E

Pedal free travel check must be made with the engine shut down.

1. Depress pedal and hold foot pressure for at least ten seconds...pedal must be solid, must not be spongy or drift under foot pressure.
2. Check pedal free travel...1/4 to 1/2 of an inch downward movement should be had as resistance is felt from the cylinder.

Power Brake System...Performance Check

1. Loss of Vacuum Power: in the event of engine failure...the vacuum chambers within the power brake provide adequate vacuum reserve for two or three brake applications. If the vacuum check valve is defective or after the braking has depleted the vacuum reserve...the driver can still operate the brakes by pushing straight through the power cylinder...but pedal effort is noticeably greater.

2. System Test: as a check...apply brakes several times with the engine shut down and vehicle standing still. Hold the pedal applied firmly...and start the engine. The brake pedal should drop or "fall away" slightly under steady pressure but then should remain firm without further travel or sponginess.

(a) If pedal fails to "fall away"...check vacuum hose connections.

(b) If pedal continues to fall...check and tighten all hydraulic connections and bleed screws. Apply pedal again and if pedal still falls away to the floor...there is a hydraulic leak in the system...locate and repair the leak...do not drive vehicle.

(c) If pedal is spongy...bleed remaining air out of the hydraulic system.

Parking Brake

1. 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...truck out of gear...and driver occupying the driver's seat.
2. If brake operation is not satisfactory...report to designated person in authority.

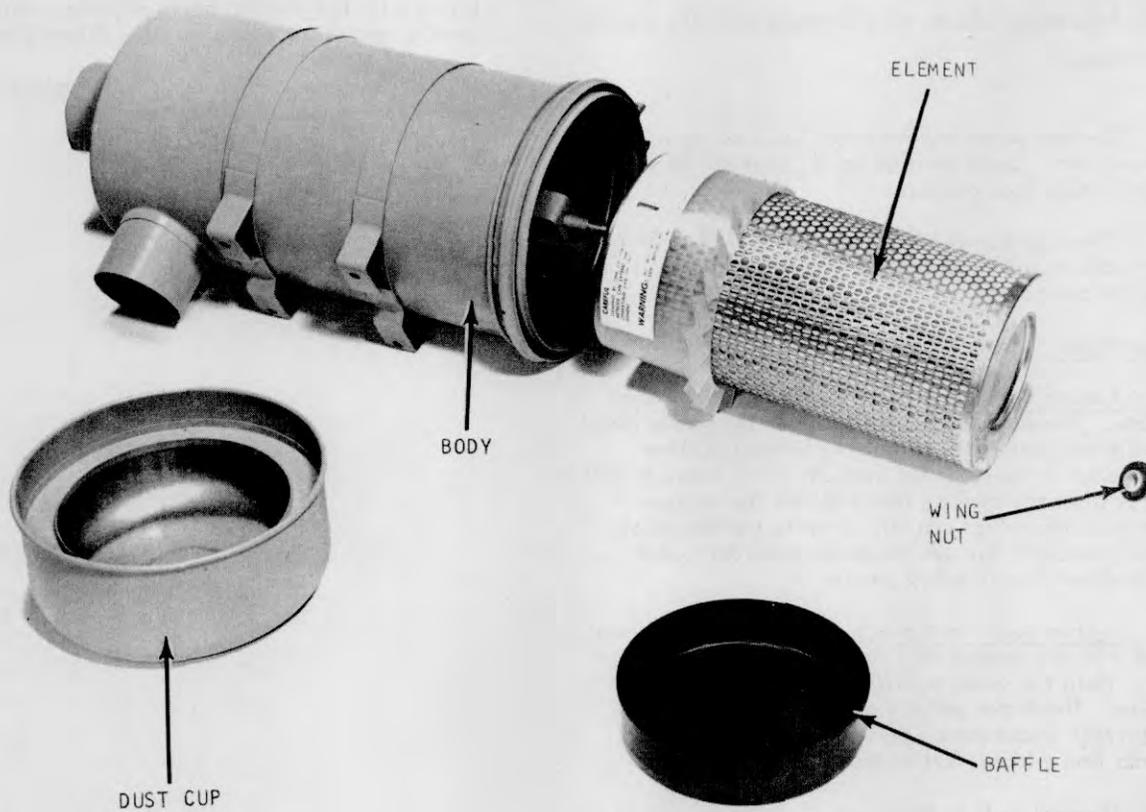


Plate 9154. Air Cleaner Assembly

AIR CLEANER ASSEMBLY

Dust Cup: Empty and clean dust cup every 8 operating hours or more often under extremely dusty conditions. Dust should not be allowed to build up in cup. Remove foreign material such as leaves from around filter and tighten wing nut if necessary. Replace baffle and securely replace cup on air cleaner body.

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

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

When cleaning the filter element, proceed as follows:

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

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

C A U T I O N

AIR PRESSURE MUST NOT EXCEED 100 P.S.I. MAINTAIN A REASONABLE DISTANCE BETWEEN NOZZLE AND



Plate 7173. Cleaning Dusty Element

ELEMENT. DIRECT AIR THROUGH ELEMENT (OPPOSITE TO DIRECTION OF ARROWS CAST ON END OF ELEMENT). DO NOT DAMAGE FINS OR SEALING SURFACES OR RUPTURE ELEMENT NOR ALLOW DUST TO DEPOSIT ON CLEAN AIR SIDE.

(b) Oily or Sooty Element: For best results, use small amount of cool tap water with non-sudsing household detergent then add to warm (70 deg - 100 deg F) water. The warmer the solution the better the cleaning. Soak for approximately 15 minutes. Rinse element thoroughly with clean water from hose (maximum pressure 40 P.S.I.). Air dry completely before installing.

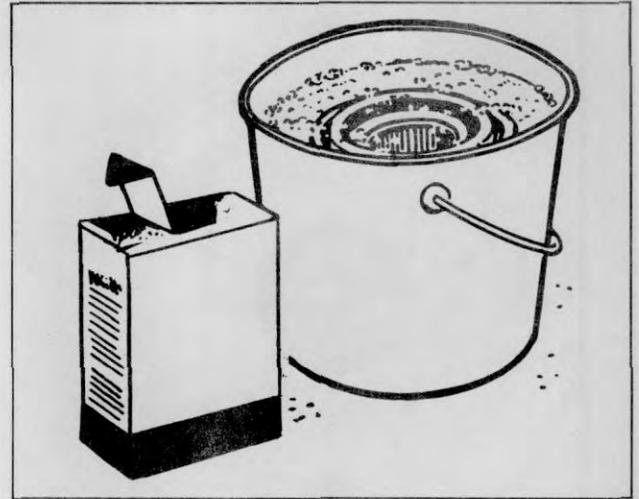


Plate 7174. Cleaning Oily Sooty Element

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

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

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

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

9. Replace baffle.



Plate 7613. Typical Split Wheel

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

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

1. Attach air hose to valve stem.
2. Open shut-off valve allowing compressed air to enter tube.
3. Shut off air supply occasionally to check pressure in tube at air gauge.
4. Inflate to proper capacity. If pressure exceeds proper inflation capacity, depress the relief valve to release excess air pressure.
5. This alternating procedure is followed until proper inflation is reached. See specifications.

I M P O R T A N T

MAINTAIN UNIFORM INFLATION IN BOTH TIRES OF A DUAL ASSEMBLY SO THAT WEIGHT IS EQUALLY SUSTAINED. NEVER RE-INFLATE A TIRE THAT HAS GONE FLAT WITHOUT FIRST INSPECTING IT AND THE WHEEL ASSEMBLY.

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

Parts can be ordered from the following suppliers:

Relief Valve - Model 250V-1/4"

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

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

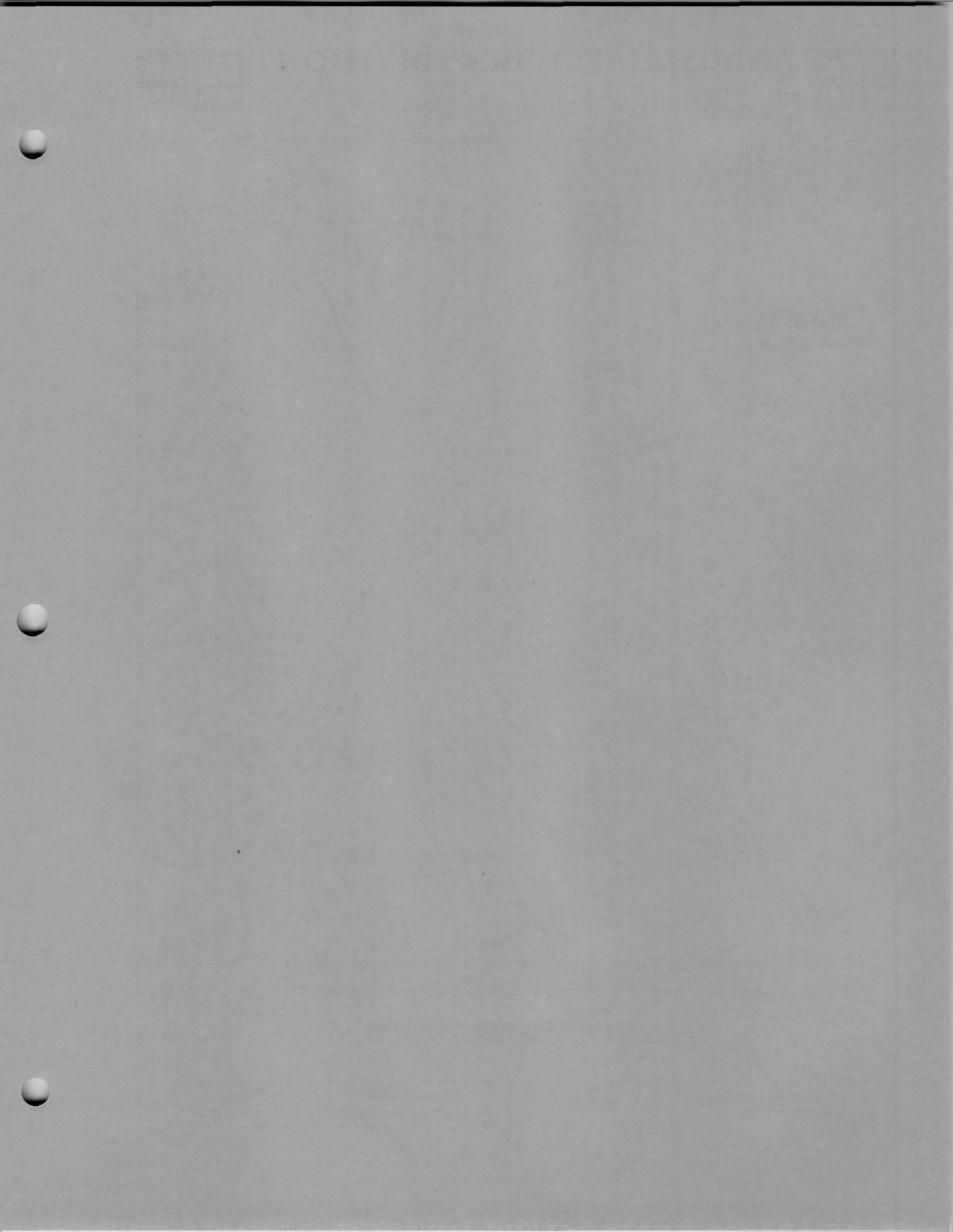
Kendall Industrial Supplies, Inc.
702 N. 20th St.
Battle Creek, Mich. 49016

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

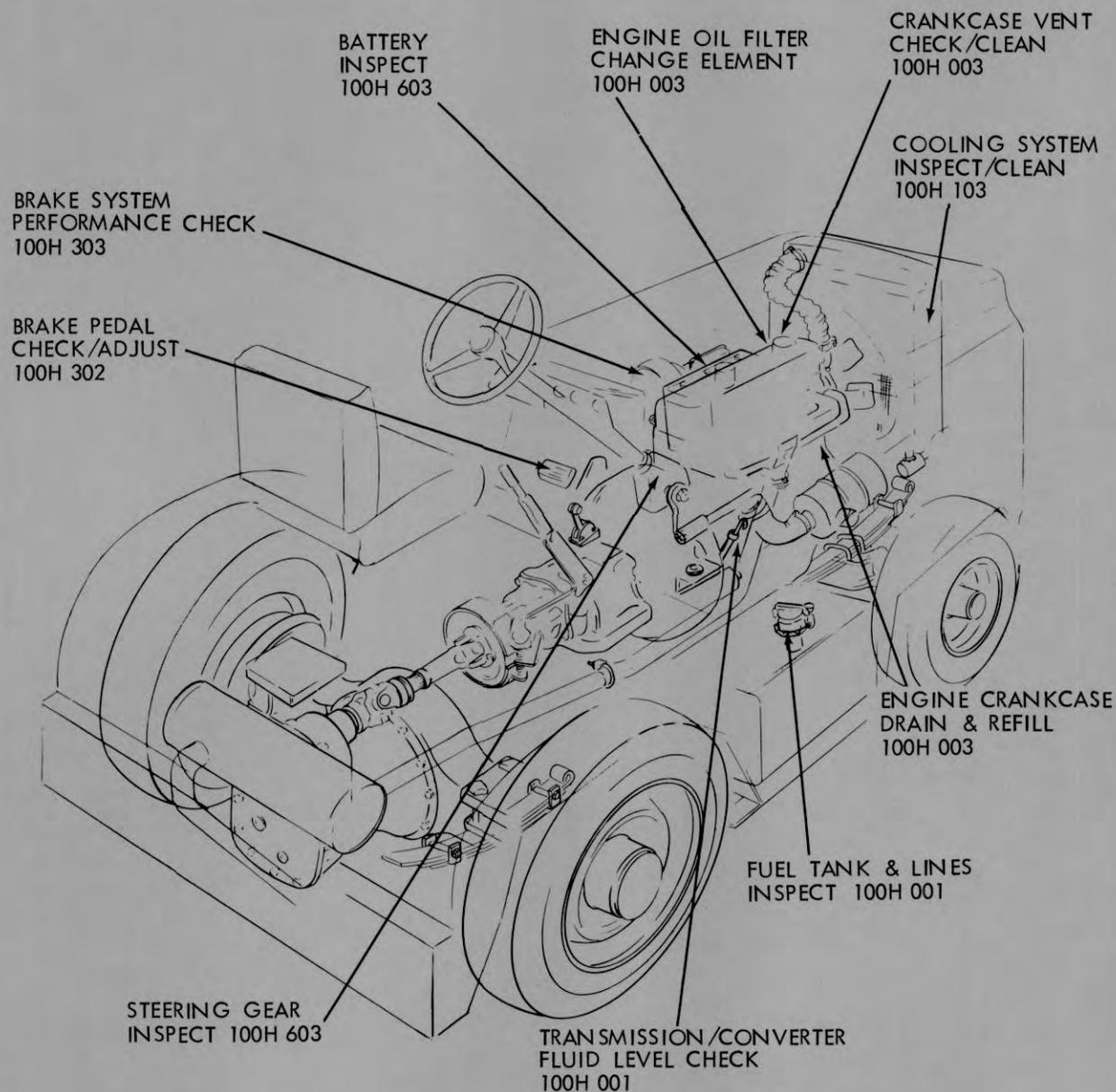
Kendall Industrial Supplies, Inc.
702 N. 20th St.
Battle Creek, Mich. 49016

Safety Cage

Meyers Tire Supplies
6400 Epworth Blvd.
Detroit, Mich.



100 HOUR INDEX



LUBRICATE ALL GREASE FITTINGS (REFER TO LUBRICATION CHARTS)
100H 701 and 100H 702 and 100H 703

REFER TO PERKINS DIESEL ENGINE HANDBOOK

NOTE: In addition to the above,
perform the 8 hour preventive
maintenance services.

Lubrication and Preventive Maintenance
Pictorial Illustration Index - 100 HOUR

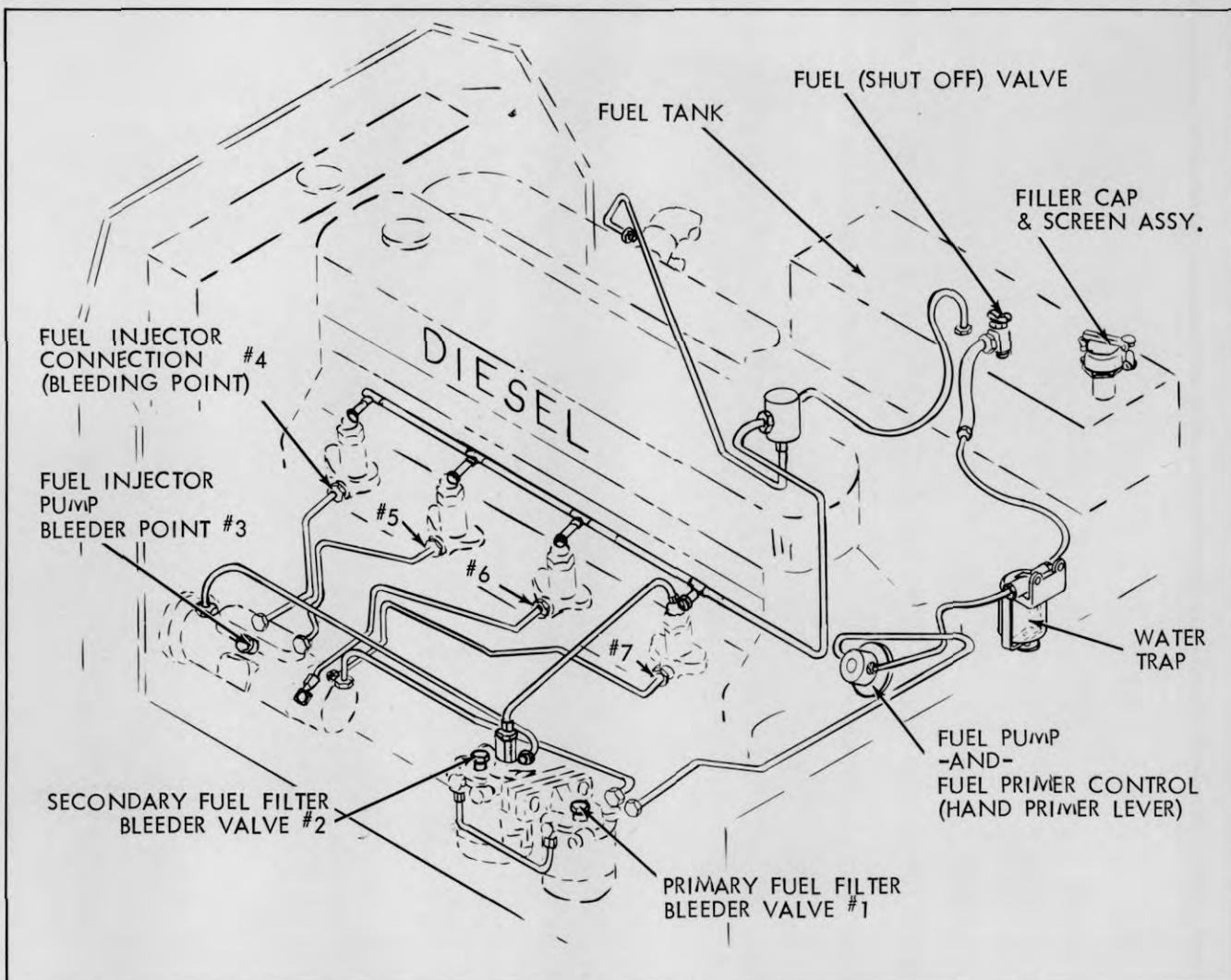


Plate 10488. Typical Fuel Lines - Perkins Diesel Engine

Fuel Lines

Make certain that fuel line connections are secure. Check fuel lines for obstructions and leaks. Check screen in fuel filler cap, and cap O-ring to see that they are properly installed and not damaged.

Fuel Specifications

Use automotive quality diesel fuel...ASTM #1 or #2 45-centane minimum.

Transmission/Converter Fluid Level Check

1. Tractor standing level...apply hand brake... run engine at normal idle speed. Run engine at fast idle if fluid is cold...until normal operating temperature is reached.
2. Shift selector lever through all positions...place lever in "N" position. Clean dirt from dipstick...remove and wipe it clean of oil...push it back into tube. Pull dipstick out again...fluid level should be at the FULL

mark on the dipstick...if not, add fluid until proper level is reached. Do not overfill. Now... shut engine down.

NOTE

Converter/transmission fluid level check should always be made with fluid at operating temperature...transmission in "N" neutral position and engine running at idle.

INDUSTRIAL TRUCK DIVISION

LUBRICATION AND REPAIR MAINTENANCE

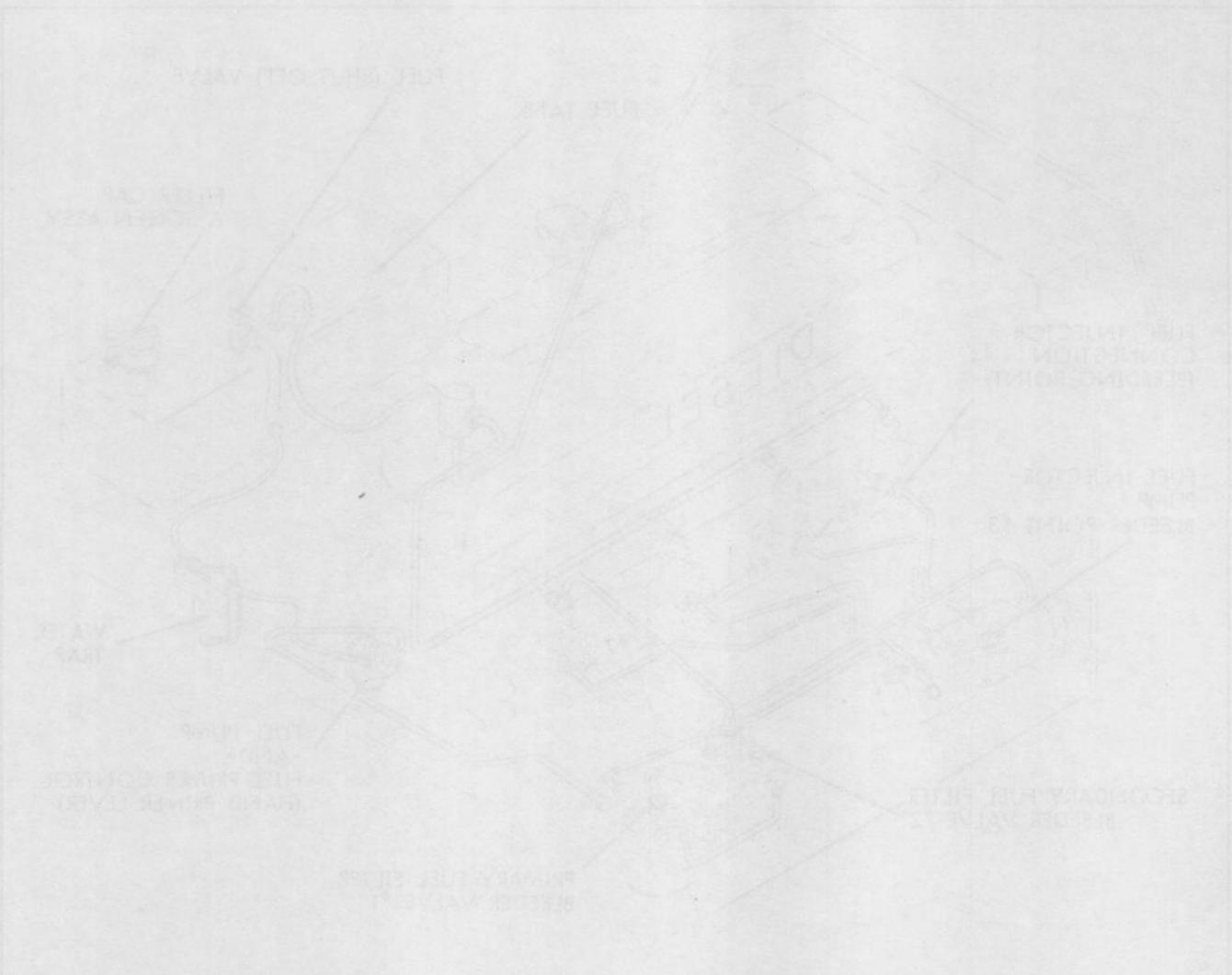


Plate 10488, Typical Fuel Line - Diesel Engine

Fuel System
 The fuel system consists of the fuel tank, fuel filter, fuel pump, fuel lines, and fuel injectors. The fuel filter is used to remove any dirt or debris from the fuel before it reaches the injectors. The fuel pump is used to draw fuel from the tank and pump it through the lines to the injectors.

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Engine Crankcase - Drain & Refill

Every 100 operating hours...drain and refill the engine crankcase...drain at operating temperature.

Engine Oil

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

Engine Oil to meet or exceed API "MS", "DM" & "DS" service classification for series 3 approval per SAE J340A (MIL-L-45199A).

Refer to Lubrication Chart Key 100H 701.

Change Engine Oil Filter

Remove housing retainer bolt...separate housing from adapter...remove and discard old element...clean inside of housing.

Install spring into housing with filter adapter plate...install new element...be sure adapter and element are correctly positioned.

Install new housing seal...position housing assembly to adapter and secure in position with retainer bolt.

Run Engine

Run engine a few minutes...check and add oil as necessary to bring level to MAX mark indicated on the dipstick...check sealing area around filter for leaks.

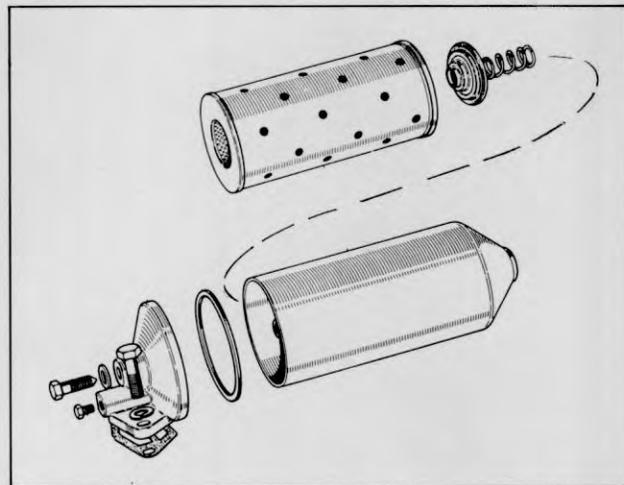


Plate 10502. Filter Assembly

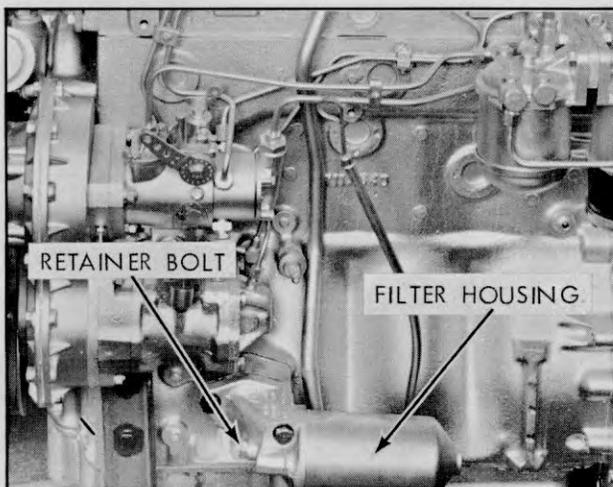


Plate 10501. Engine Oil Filter

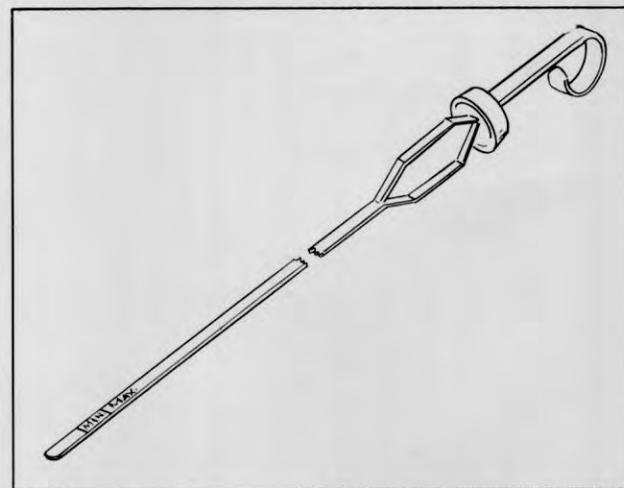


Plate 10498. Dipstick

Refer to Perkins Diesel Engine Handbook

INDUSTRIAL TRUCK DIVISION

MAINTENANCE AND REPAIR MANUAL

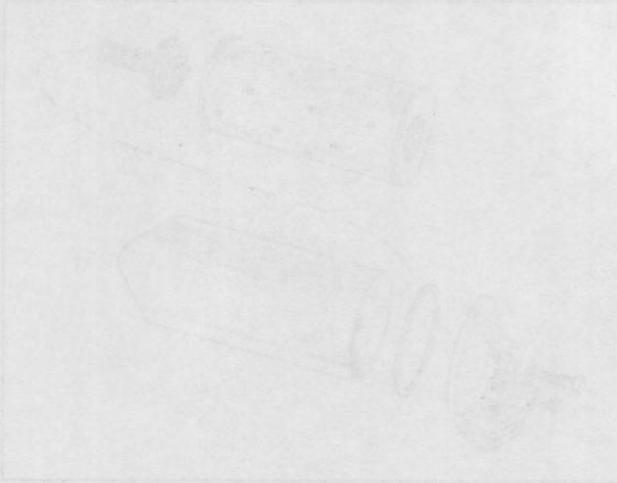


Figure 1000 - Piston Assembly

Remove the piston and connecting rod from the engine. Clean the parts and inspect for wear.

Inspect the piston rings for wear. Measure the ring end gap and compare it to the specification. If the gap is too large, the rings should be replaced.

Inspect the connecting rod for wear. Measure the rod end clearance and compare it to the specification. If the clearance is too large, the rod should be replaced.

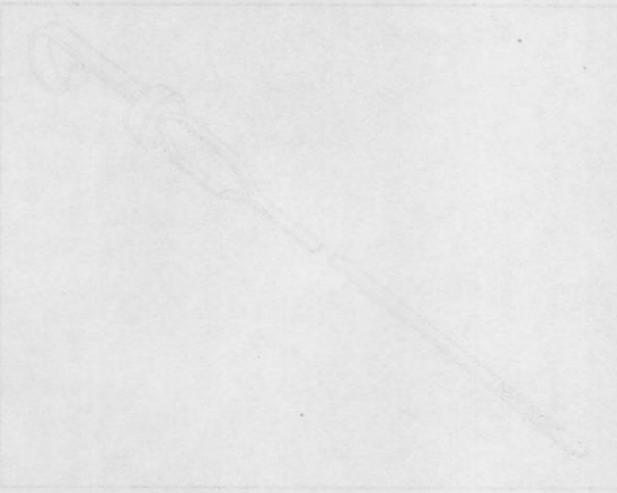


Figure 1005 - Crankshaft

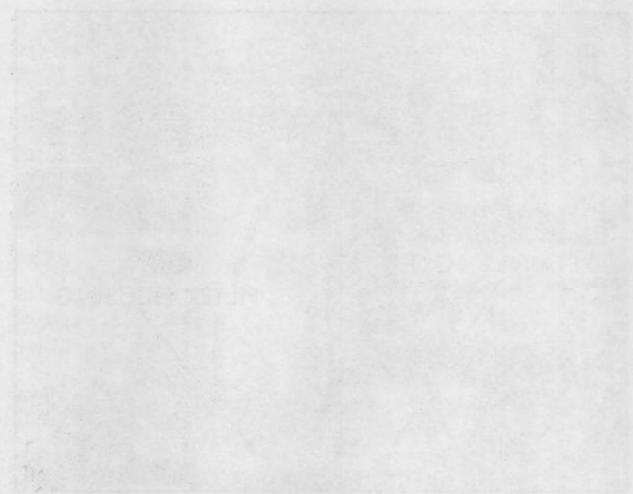


Figure 1010 - Camshaft and Lifters

Inspect the camshaft for wear. Measure the camshaft end float and compare it to the specification. If the float is too large, the camshaft should be replaced.

Refer to Figure 1010 for engine lifters.



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.

INDUSTRIAL TRUCK DIVISION

OPERATION AND MAINTENANCE

COOLING SYSTEM

The cooling system is designed to maintain the engine and transmission at normal operating temperatures. The system consists of a water pump, radiator, fan, and hoses. The water pump circulates the coolant through the radiator and engine. The fan draws air through the radiator to cool the coolant. The hoses connect the radiator to the engine and the water pump.

Check the coolant level in the radiator regularly. If the level is low, add coolant. Do not top off the radiator with plain water. Use only the coolant specified in the operator's manual. The coolant should be changed every 10,000 miles or 12 months, whichever comes first.

Do not open the radiator cap when the engine is hot. The coolant is under pressure and can be scalding. Wait until the engine is cool before opening the cap. Use a radiator cap wrench to remove the cap. Place a towel over the cap and turn it slowly to release the pressure. Then remove the cap.

NOTE

COOLING SYSTEM CAPACITY - REFER TO SPECIFICATIONS

OPERATION

When the engine is started, the cooling fan should begin to operate. If the fan does not operate, check the fan belt and the fan motor. The fan belt should be tight and the fan motor should be free to rotate. If the fan does not operate, the engine will overheat. Stop the engine immediately and call a qualified mechanic for assistance.



FIGURE 1. COOLING SYSTEM

OPERATION AND MAINTENANCE

INDUSTRIAL TRUCK DIVISION

OPERATION AND MAINTENANCE

INDUSTRIAL TRUCK DIVISION

OPERATION AND MAINTENANCE

INDUSTRIAL TRUCK DIVISION

OPERATION AND MAINTENANCE

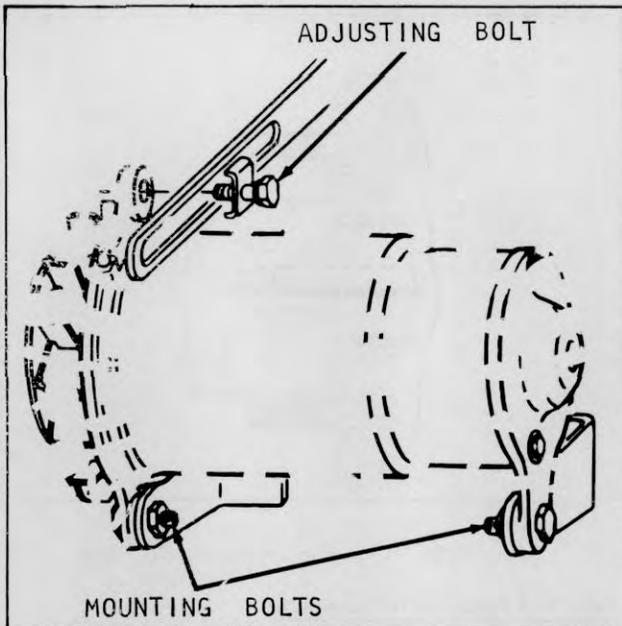


Plate 6631. Generator Drive Belt Adjustment

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

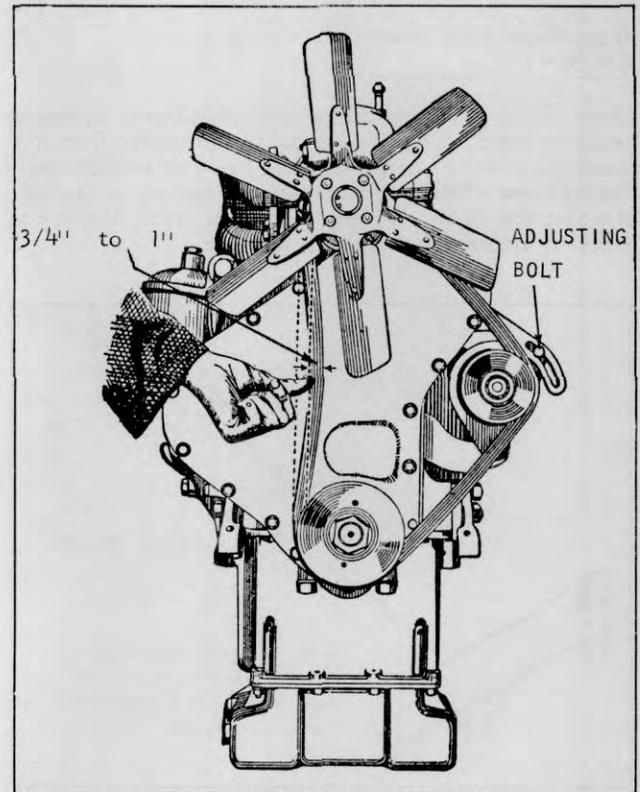


Plate 6632. Belt Deflection Check

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

N O T E

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

Brake Pedal Free Travel
Check - Adjust

Using a ruler, measure brake pedal free travel...depress pedal by hand. Clearance should be measured from top pedal position to where the pedal meets resistance from the cylinder. When pedal meets resistance...distance traveled should be 1/4 to- 1/2 of an inch. If the free travel is incorrect...adjust as follows:

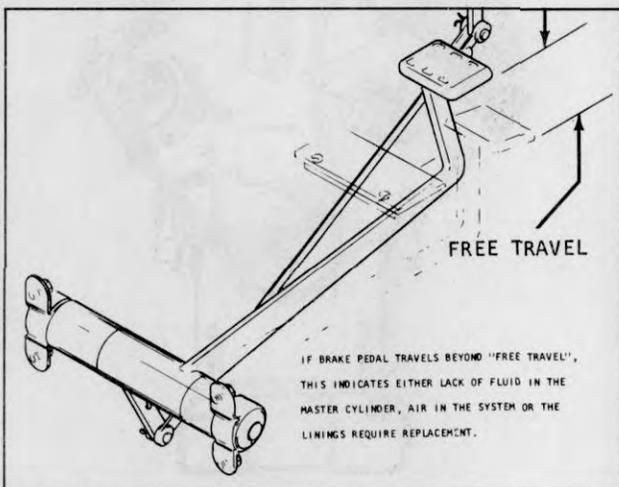


Plate 9285. Typical Brake Linkage

1. Loosen lock nut.
2. Rotate clevis to obtain specified free travel.
3. Tighten lock nut to hold adjustment.

Actuation Stroke

If the brake pedal travels beyond the free travel distance...this could indicate either of the following conditions:

1. Lack of fluid in the reservoir.
2. Air in the brake system lines.
3. Brake linings need adjustment...or replacement. ...report to Designated Person in Authority.

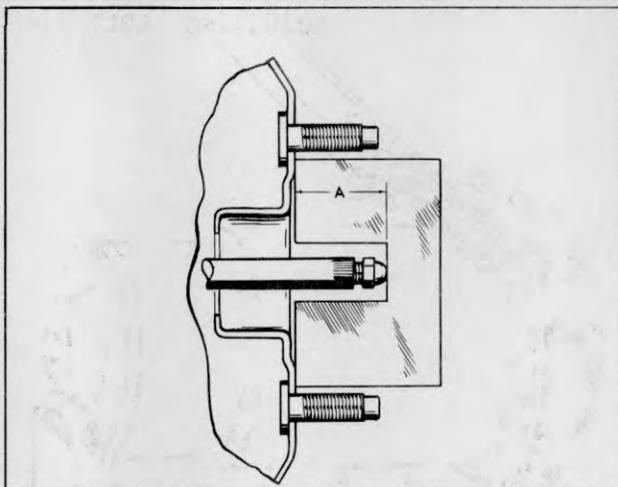


Plate 9286. Gauging Hydraulic Push Rod

Push Rod Adjustment Procedure

The self-locking adjustment screw on the outer end of the hydraulic push rod is set to the correct dimension "A" (ref. Plate 9286 above)...at time of manufacture and no further adjustment should be required. However...if the adjustment has been changed or a new push rod is installed...adjustment may be required.

1. Check push rod length...as shown...with gauges made as detailed in Plate 9287 below. To adjust...turn nut in or out...but do NOT scratch machined shaft of push rod.

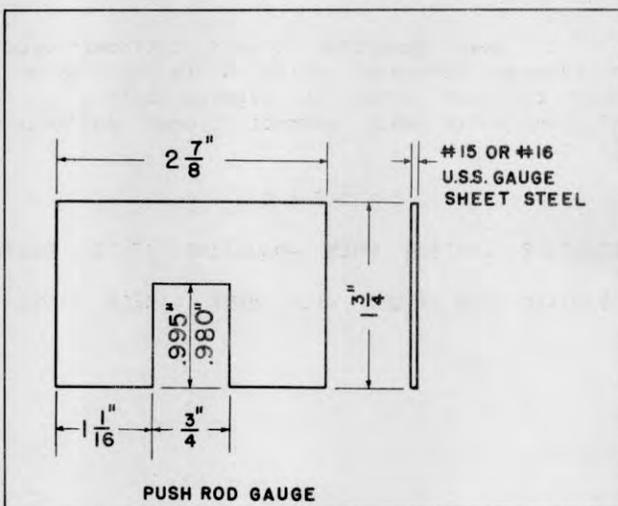


Plate 9287. Making Push Rod Gauge

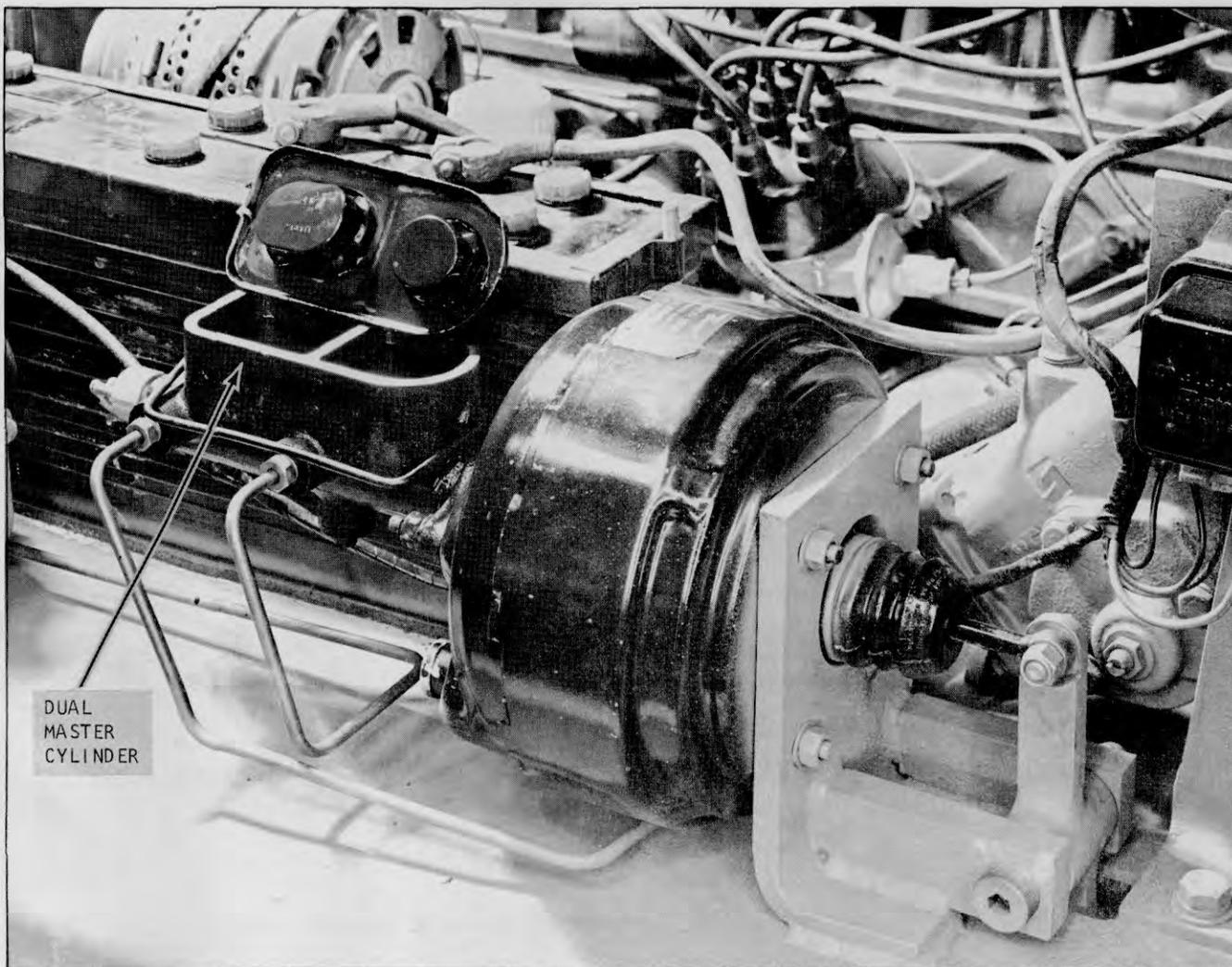


Plate 9161. Master Cylinder

MASTER CYLINDER

Check the brake fluid level in the master cylinder. The 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 number 1800200.)

Check the master cylinder filler cap vent hole for obstructions. Vent must be open at all times. Clean if necessary.

BRAKE PEDAL

WARNING

CORRECT BRAKE PEDAL FREE TRAVEL IS IMPORTANT

FOR SAFE OPERATING BRAKES.

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

An improperly adjusted pedal 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. This will cause lining wear and excessive fuel consumption.



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

ALTERNATOR - BATTERY - ELECTRICAL SYSTEM

CAUTION

IMPORTANT — Since the alternator and regulator are designed for use on only one polarity system, the following precautions must be observed when working on the charging circuit. Failure to observe these precautions will result in serious damage to the electrical equipment.

1. When installing a BATTERY, always make absolutely sure the ground polarity of the battery and the ground polarity of the alternator are the same.

2. When connecting a BOOSTER BATTERY, make certain to connect the negative battery terminals together and the positive battery terminals together.

3. When connecting a CHARGER to the battery, connect the charger positive lead to the battery positive terminal and the negative lead to the battery negative terminal.

4. NEVER OPERATE THE ALTERNATOR ON OPEN CIRCUIT. Make absolutely certain all connections in the circuit are secure.

5. Do not short across or ground any of the terminals on the alternator or regulator.

6. Do not attempt to polarize the alternator.

LUBRICATE MACHINE

NOTE

WHEN LUBRICATING THE VEHICLE, MAKE A VISUAL INSPECTION OF ALL ELECTRICAL WIRING. LUBRICATE ALL MISCELLANEOUS LINKAGE WITH S.A.E. NUMBER 20 OIL.

BATTERY INSPECTION

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

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

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

N O T E

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

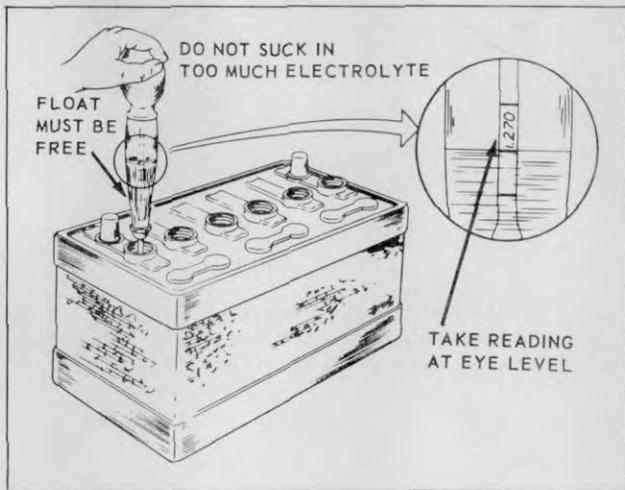


Plate 6271. Checking Specific Gravity of Battery

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

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

BATTERY TEST PROCEDURE

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

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



Plate 6429. Typical Steering Gear

STEERING GEAR

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

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

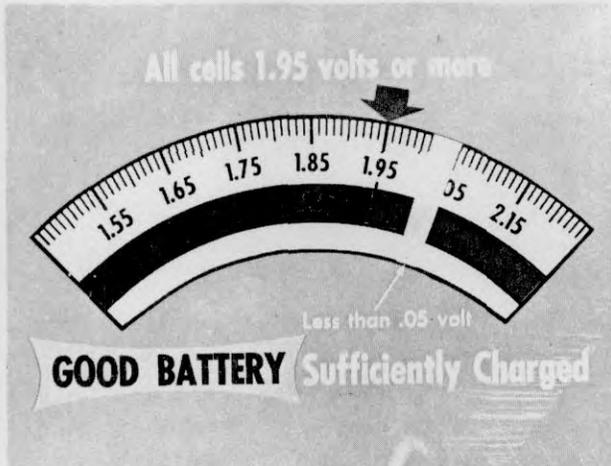


Plate 8306.

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

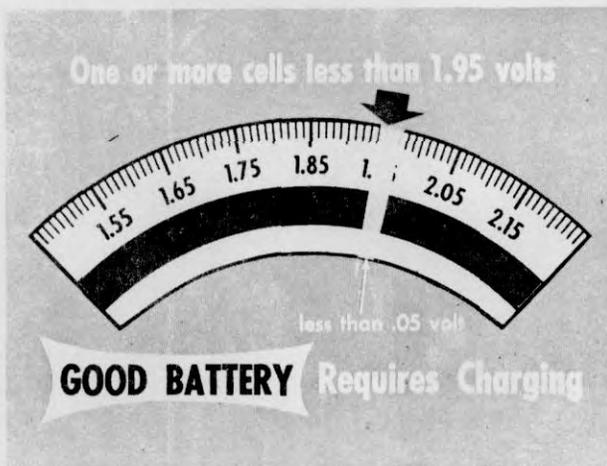


Plate 8307.

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



Plate 8308.

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

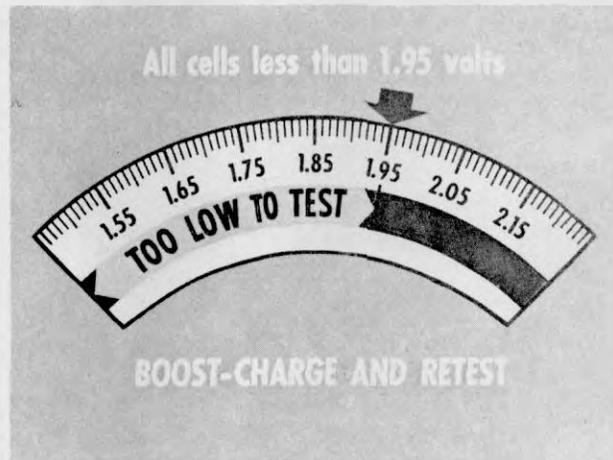


Plate 8309.

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



Engine Oil.....

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

Engine Oil to meet or exceed API "MS", "DM" & "DS" service classification for series 3 approval per SAE J304A ...MIL-L-45199A

SAE - Society of Automotive Engineers
API - American Petroleum Institute
MIL - Military Specification

Shell-Rimula Motor Oil
Sunfleet S-3 Motor Oil
Gulf Super Duty Motor Oil
Amoco 300
Citgo C-300 Premium Motor Oil
Havoline or URSA Extra Duty Motor Oil
Purrol HD Motor Oil
.....or the equivalent to the above.



Transmission Fluid.....

Automatic Transmission Fluid, Type "A", Suffix "A". Fluid Containers must display a qualification number prefixed by AQ-ATF. Clark Part Number 879803. (or) use DEXRON Automatic Transmission Fluid.

Shell Automatic Transmission Fluid Donax T-6
Sunoco Auto Trans Fluid Type "A", Suffix "A"
Sinclair Auto Trans Fluid Type "A", Suffix "A"
Gulf Automatic Trans Fluid Type "A", Suffix "A"
Amoco Auto Trans Fluid Type "A", Suffix "A"
Citgo Auto Trans Fluid Type "A", Suffix "A"
Texamatic Auto Trans Fluid Type "A" 1826-3528
Purrolube Auto Trans Fluid Type "A" Suffix "A"
.....or the equivalent to the above.



Brake Master Cylinder.....

SAE 70R3 Heavy Duty Brake Fluid
Clark Part Number 1800200

Shell Super Heavy Duty Hydraulic Brake Fluid
Gulf Heavy Duty Hydraulic Brake Fluid
Atlas Heavy Duty Hydraulic Brake Fluid
Texaco Super Heavy Duty Hydraulic Brake Fluid
Pure Super Heavy Duty Hydraulic Brake Fluid
.....or the equivalent to the above.



Axle End/Steer Wheel Bearings.....

NLGI #1 or NLGI #2 --- a smooth multi-purpose grease or refined mineral oil blended with a lithium soap thickener containing anti-wear, anti-rust and anti-oxidants with "EP" additives. To meet or exceed Clark Specifications MS-107 and Timken Test 40# minimum.

Shell Aluania "EP" Grease #1 or #2
Sun Prestige 741 "EP" #1 or "EP" #2
Gulfcrown Grease "EP" #1 or #2
Amolith Grease "EP" #1 or #2
Citgo HEP Grease "EP" #1 or #2
Texaco Multifak "EP" #1 or Marfak ALL Purpose #2
Poco HT Grease "EP" #1 or #2
Molub-Alloy General Purpose Grease #1 or #2
.....or the equivalent to the above.



Chassis Lubricant.....

NLGI #2 (same as stated above)

NLGI #2 (Refer to the above)



Oil Filters.....

Oil Filter Cartridge Kit (Engine Oil Filter and Automatic Transmission Filter)

Refer to Parts Manual



Extreme Pressure Gear Lubricant.....

"EP" type gear lubricant with Sulphur-Chlorine-Lead (SCL) for API service GL-4 per SAE J308 report...to meet or exceed Clark Specifications MS-8 and MS-49...MIL-L-2105B

Shell Spirax "EP" or "HD" Gear Lubricant
Sunoco XD Gear Lubricant
Gulf Hypoid Gear Lubricant A.P.T.
Superla Gear Lubricant
Citgo Lead Base Gear Oil
Texaco Universal Gear Lubricant SCL
Purrolube Multi-Purpose Gear Lubricant
Molub-Alloy Drive Axle Lubricant #518
.....or the equivalent to the above.

LUBRICATION CHART

BRAKE SYSTEM RESERVOIR:
CHECK FLUID LEVEL EVERY
100 OPERATING HOURS.



ENGINE CRANKCASE OIL:
DRAIN OIL AT OPERATING
TEMPERATURE EVERY 100
HOURS...REFILL WITH NEW
OIL. REF. 100H 701.

STEERING GEAR:
CHECK LUBRICANT LEVEL
EVERY 100 OPERATING HOURS
...PREPACKED...SHOULD
REQUIRE LITTLE ATTENTION
UNTIL SUCH TIME AS IT IS
DISASSEMBLED.

ENGINE OIL FILTER:
CHANGE FILTER CARTRIDGE
EVERY 100 OPERATING
HOURS.



ENGINE AIR CLEANER:
CHECK AND SERVICE
EVERY 8 OPERATING
HOURS.

TRANSMISSION VENT:
CHECK LUBRICANT LEVEL
EVERY 100 OPERATING HOURS
...DRAIN & REFILL EVERY
500 OPERATING HOURS.

WHEEL BEARINGS:
CLEAN, REPACK AND ADJUST
EVERY 1000 OPERATING HOURS.



DROP GEAR CASE:
CHECK LUBRICANT LEVEL
EVERY 100 OPERATING HOURS
...DRAIN & REFILL EVERY
1000 OPERATING HOURS



AUTOMATIC TRANSMISSION:
CHECK FLUID LEVEL EVERY
100 OPERATING HOURS...
DRAIN & REFILL...CHANGE
OIL FILTER EVERY 500 OPERAT-
ING HOURS.

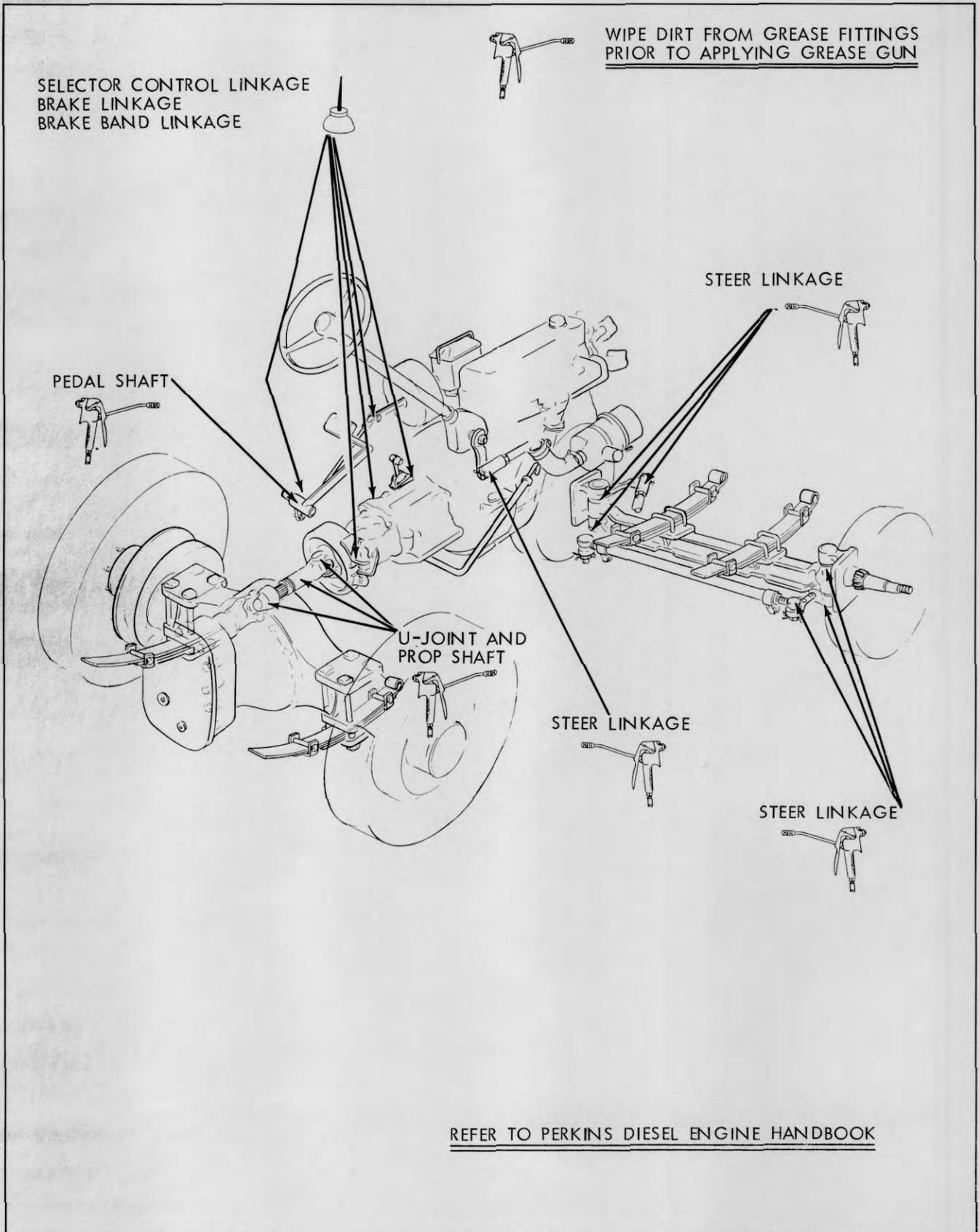


DIFFERENTIAL :



CHECK LUBRICANT LEVEL
EVERY 100 OPERATING HOURS.
...DRAIN & REFILL EVERY 1000
OPERATING HOURS.

LUBRICATION CHART



INDUSTRIAL TRUCK DIVISION

QUALIFICATION CHART

WIRE DIRT FROM GREAT FITTING
PRIOR TO APPLYING GREAT D.V.

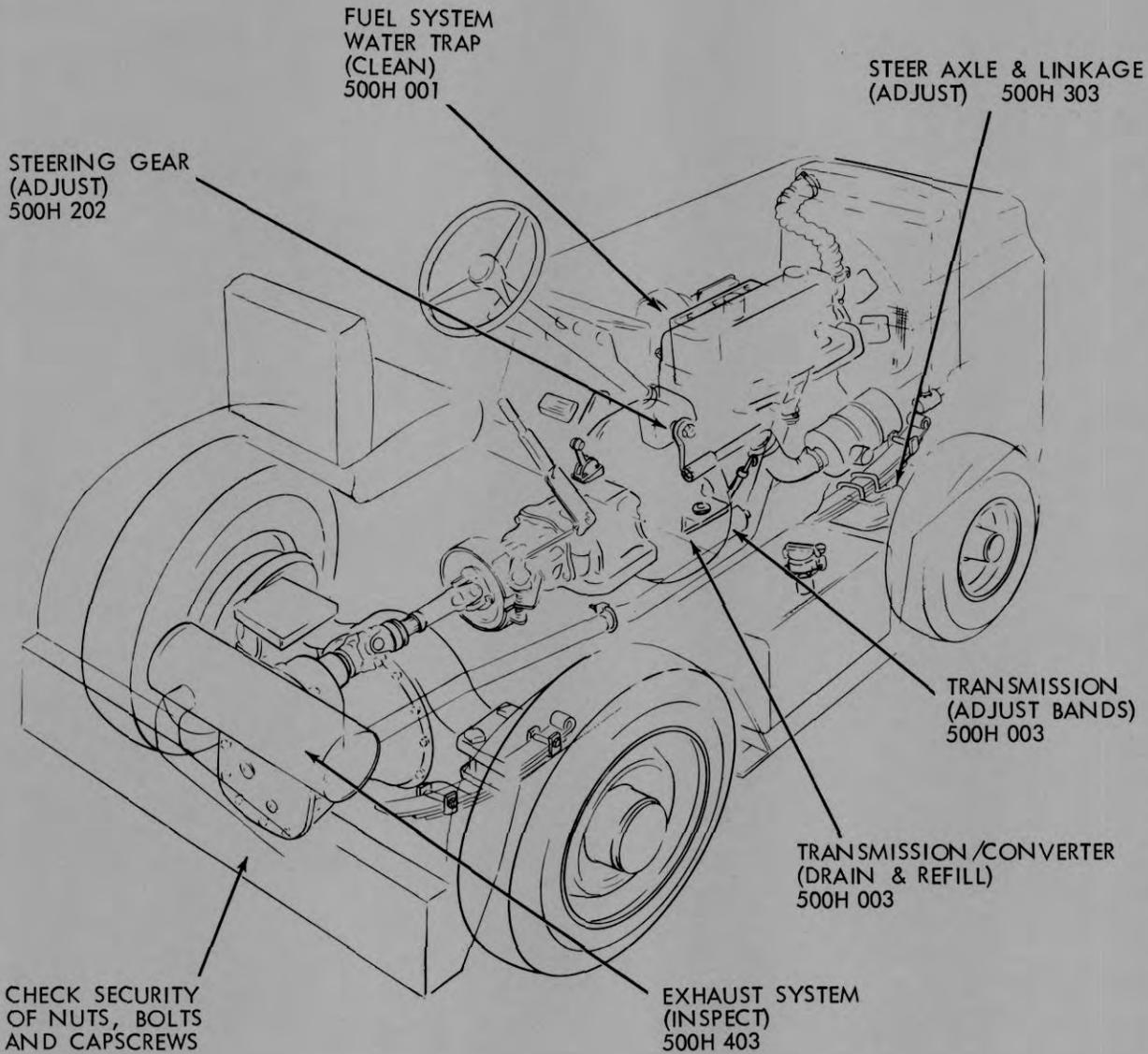
RELATIONSHIP BETWEEN FRAME AND LINKAGE



WIRE TOGETHER THE UPPER END OF THE FRAME

THE UNIVERSITY OF CHICAGO PRESS

500 HOUR INDEX



I M P O R T A N T

STEAM CLEAN ENTIRE
MACHINE PRIOR TO
PERFORMING THESE
SERVICE INTERVALS.

NOTE: In addition to the above,
perform the 8 hour and 100 hour
preventive maintenance services.

Lubrication and Preventive Maintenance
Pictorial Illustration Index - 500 HOUR

Change Fuel System Filters

1. Thoroughly clean the exterior of the fuel filter assembly.
2. Unscrew the filter bowl retainer bolt.
3. Lower bowl...discard old element.
4. Thoroughly clean filter bowl.
5. Inspect sealings rings...it is recommended they be replaced with new ones.
6. Install new element into bowl.
7. Place bowl to adaptor...squarely so that top rim of bowl locates properly against the sealing ring...secure in position with retainer bolt.

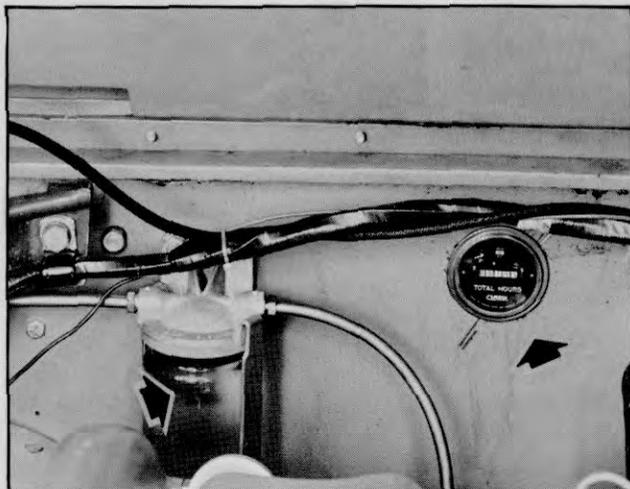


Plate 10489. Fuel System Water Trap
(Located beneath hood on fire wall next to hour meter)

Empty and Clean Fuel System Water Trap

1. Thoroughly clean exterior of the water trap.
2. Unscrew retainer bolt.
3. Lower bowl...empty...and thoroughly clean.
4. Replace sealing rings.
5. Reposition bowl to adaptor and secure with the retainer bolt.
6. Now...bleed the fuel system free of air.

IMPORTANT

After the fuel system filters and water trap have been serviced...it is necessary to bleed the fuel system...refer to C105 in front of this manual.

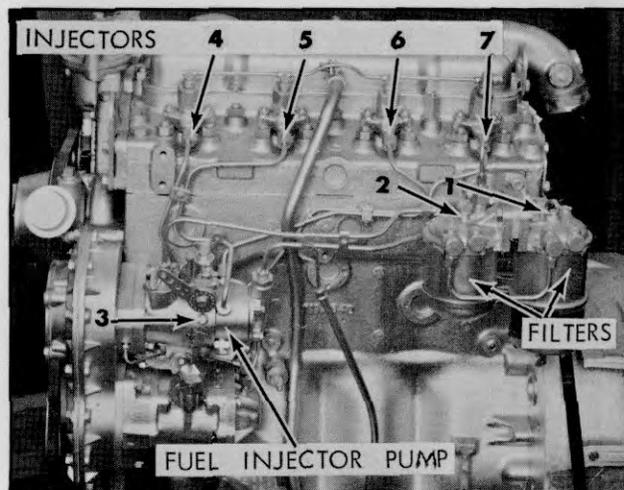


Plate 10492. Bleeder Valves and Filters
(System must be bled in order described...starting with the fuel filters first...refer to C105 in front of this manual for complete procedures.)



INDUSTRIAL TRUCK DIVISION



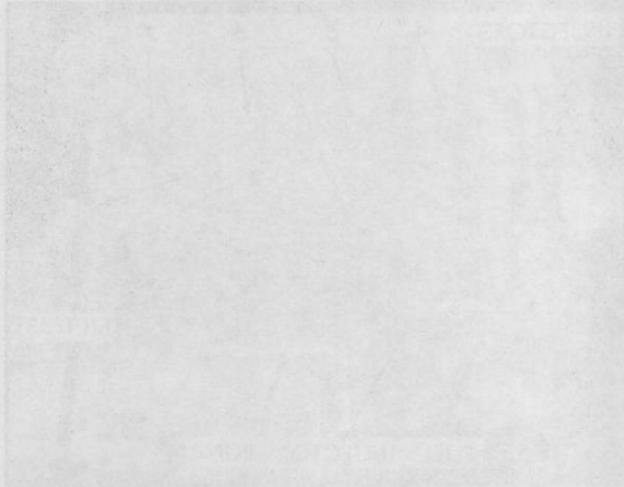
LUBRICATION AND PREVENTIVE MAINTENANCE

Change Fuel System Filter

1. Thoroughly clean exterior of the water trap.
2. Remove reservoir bolt.
3. Lower bowl assembly and thoroughly clean.
4. Reinstalling new.
5. Reinstall bowl to engine and secure with the reservoir bolt.
6. Now, bleed the fuel system free of air.

IMPORTANT

After the fuel system filter and water trap have been replaced, it is necessary to bleed the fuel system, refer to CID in front of this manual.



When using 10W-30, Electric Valves and Filter (EVA) must be used in order to avoid starting with the fuel filter. Refer to CID in front of this manual for complete procedure.

Change Fuel System Filter

1. Thoroughly clean the exterior of the fuel filter assembly.
2. Remove the filter bowl reservoir bolt.
3. Lower bowl assembly and clean.
4. Thoroughly clean the bowl.
5. Reinstall bowl assembly and secure with the reservoir bolt. If it is recommended by CID to replace the new filter.
6. Reinstall new element into bowl.
7. Place bowl to assembly, securely to fuel up line of bowl. Reinstall and secure the sealing ring.
8. Secure all position with reservoir bolt.



When using 10W-30, Electric Valves and Filter (EVA) must be used in order to avoid starting with the fuel filter. Refer to CID in front of this manual for complete procedure.

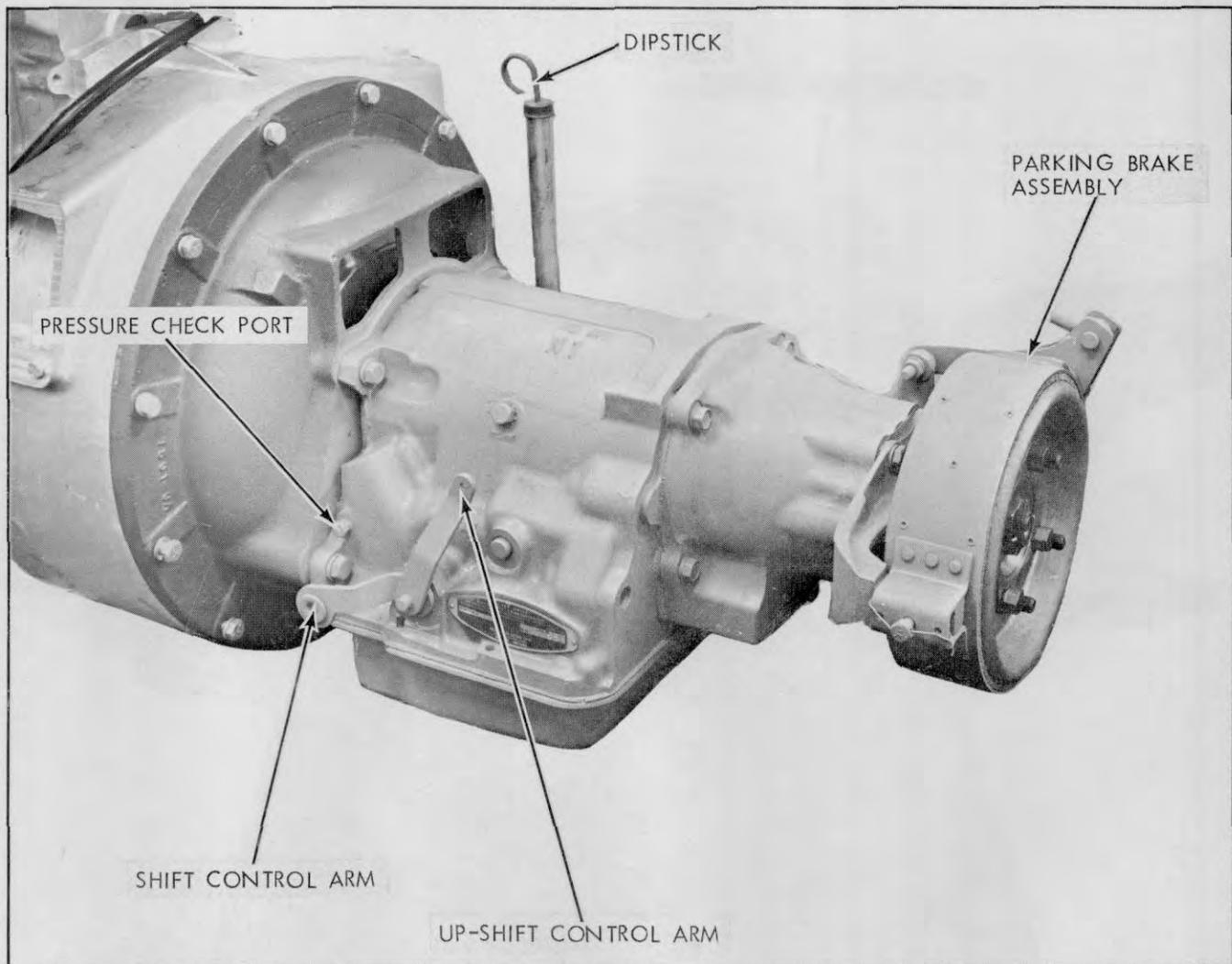


Plate. 10504. Automatic Transmission

Transmission - Converter Drain and Refill...
...and Band Adjustment Procedures

Every 500 operating hours the transmission and converter should be drained of old fluid...front and rear bands adjusted...and transmission and converter refilled with new fluid.

Refer to Lubrication Chart and Chart Key for Specifications.

N O T E

The draining procedure is included with the band adjustment because the transmission fluid pan has to be removed to accomplish both operations.

Normal maintenance and lubrication requirements necessitate periodic automatic transmission fluid changes.

Also...if a major failure, such as a clutch, band, bearing, etc., has occurred in the transmission, it will have to be removed for service. At this time the converter must be thoroughly flushed to remove any dirt.

Converter Draining Procedure

1. Drive the tow tractor onto a hoist...but do not raise it at this time.

- continued -

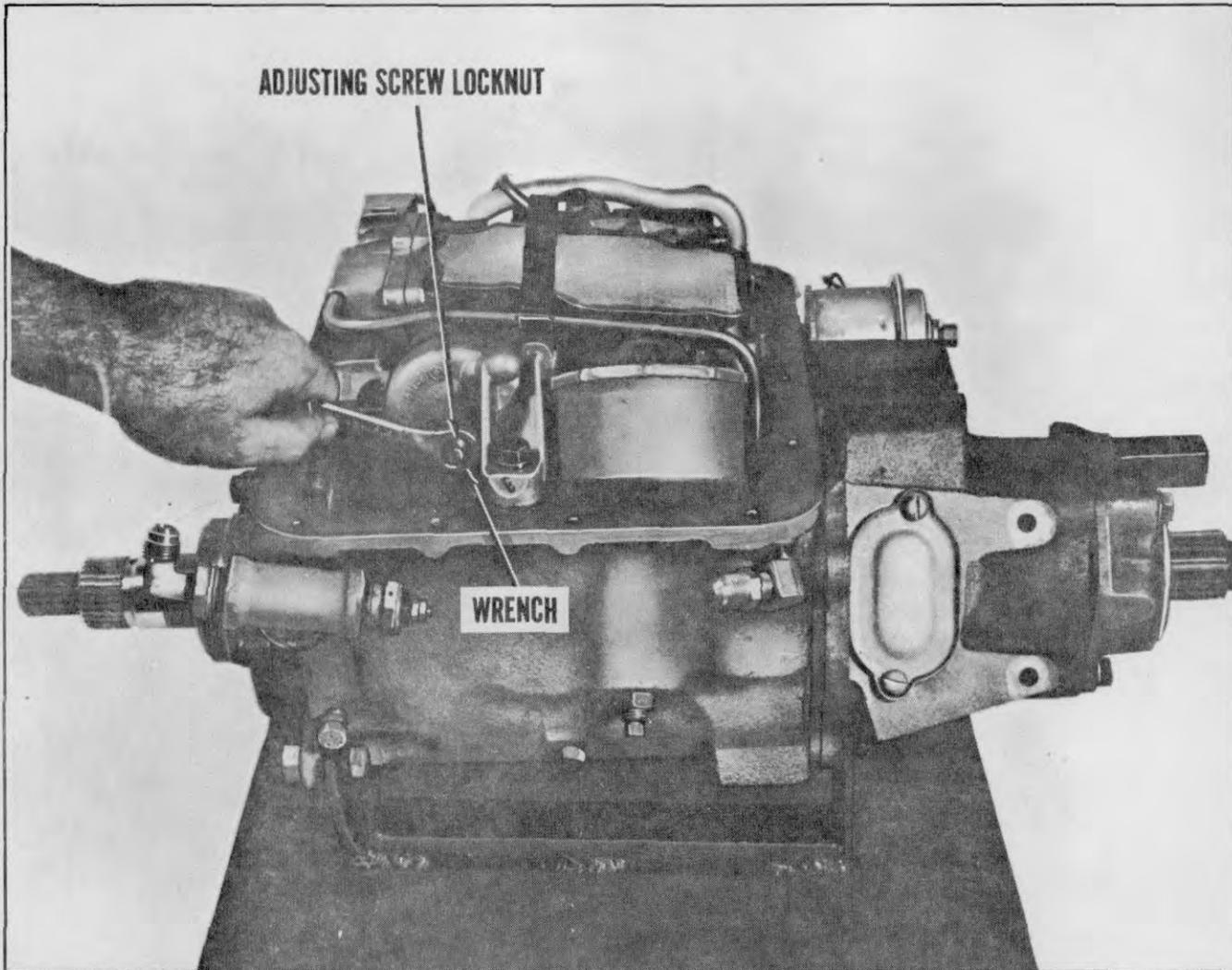


Plate 8542. Loosen Front Servo Adjustment Screw

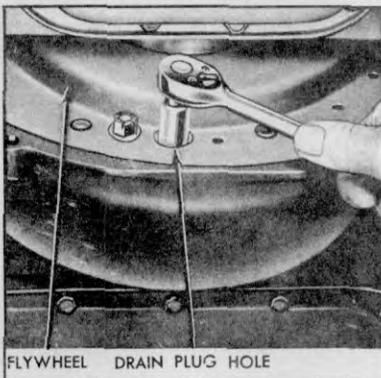


Plate 9298. Converter Drain Plug Location

2. After removing the converter access hole cover, remove the two upper bolts and lock

washers which attach the converter housing to the engine.

3. Raise the vehicle and remove the cover from the lower front side of the converter housing.

4. Remove one of the converter drain plugs (Plate 9298). Then rotate the converter 180° and remove the other plug. Do not attempt to turn the converter with a wrench on the converter stud nuts.

Transmission Drain

1. Disconnect the fluid filler tube from the transmission.

2. When the fluid has stopped draining from the transmission, remove and thoroughly clean the oil pan. Discard the oil pan gasket.

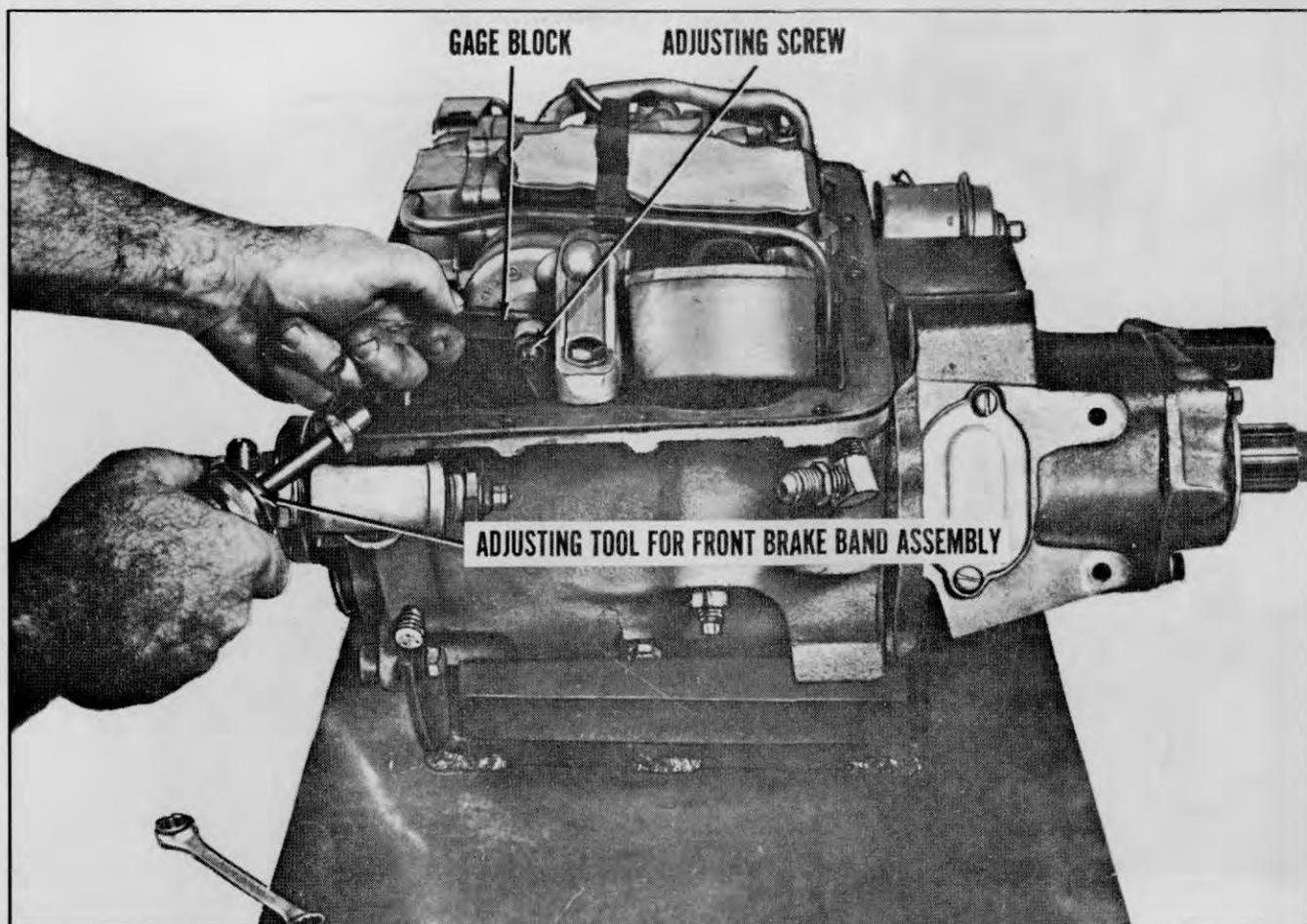


Plate 8543. Pull Back On Adjusting Rod and Insert Gauge Block

Front Band Adjustment

1. Disconnect the fluid filler tube from the oil pan and drain the fluid from the transmission.
2. Remove and thoroughly clean the oil pan and screen. Discard the oil pan gasket.
3. Loosen the front servo adjusting screw lock nut (Plate 8542) two full turns. Check the adjusting screw for free rotation in the servo actuating lever. Free the screw if necessary.
4. Pull back on the actuating rod and insert the gauge block (of the front band adjusting wrench) between the servo piston and adjusting screw. (See above.)

NOTE

The adjusting tool shown above is typical in design and may be purchased from most reputable auto parts store.

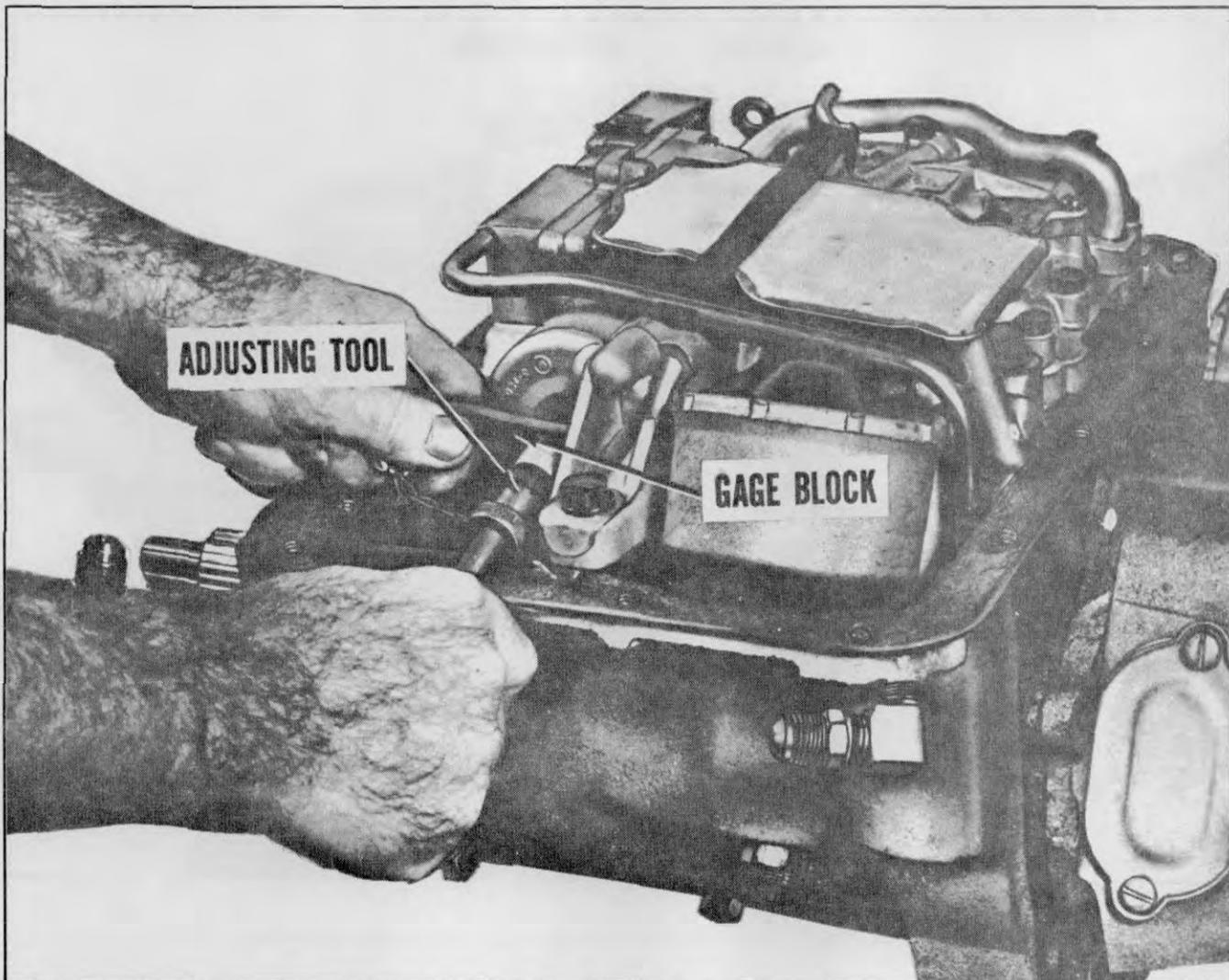


Plate 8544. Torque Adjusting Screw

5. Torque the adjusting screw with the adjusting tool (wrench) until the wrench over-runs 10 in. lbs. (See above illustration). Then back off the screw exactly one full turn.

CAUTION

SEVERE DAMAGE MAY RESULT TO THE TRANSMISSION IF THE ADJUSTING SCREW IS NOT BACKED OFF EXACTLY ONE FULL TURN.

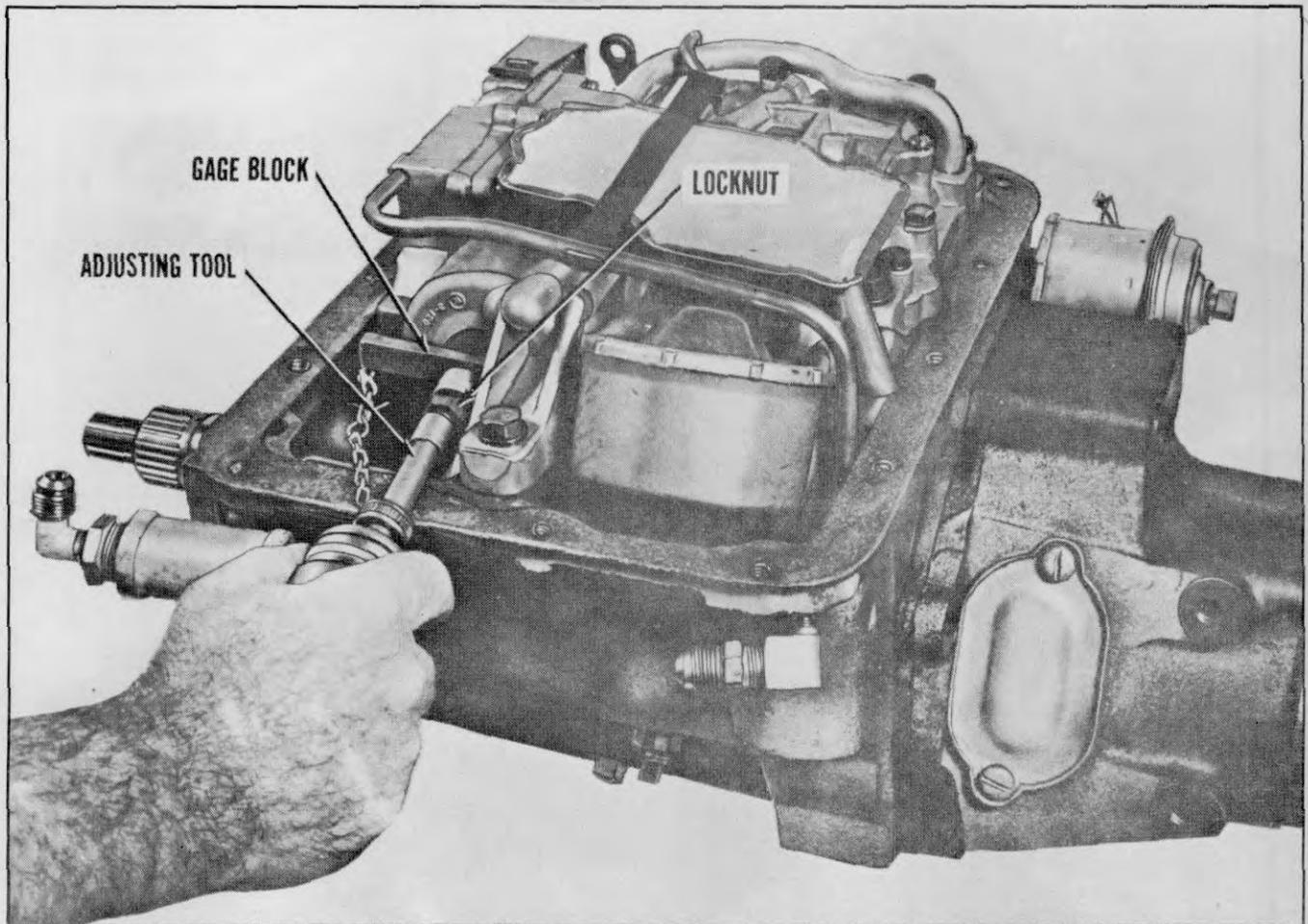


Plate 8545. Pull Gauge Block Out And Torque Nut

6. Pull gauge block out, hold adjusting screw stationary and torque the lock nut clockwise to 20 - 25 ft. lbs.

The front band should now be in proper adjustment. Refer to the following pages for rear band adjustment.

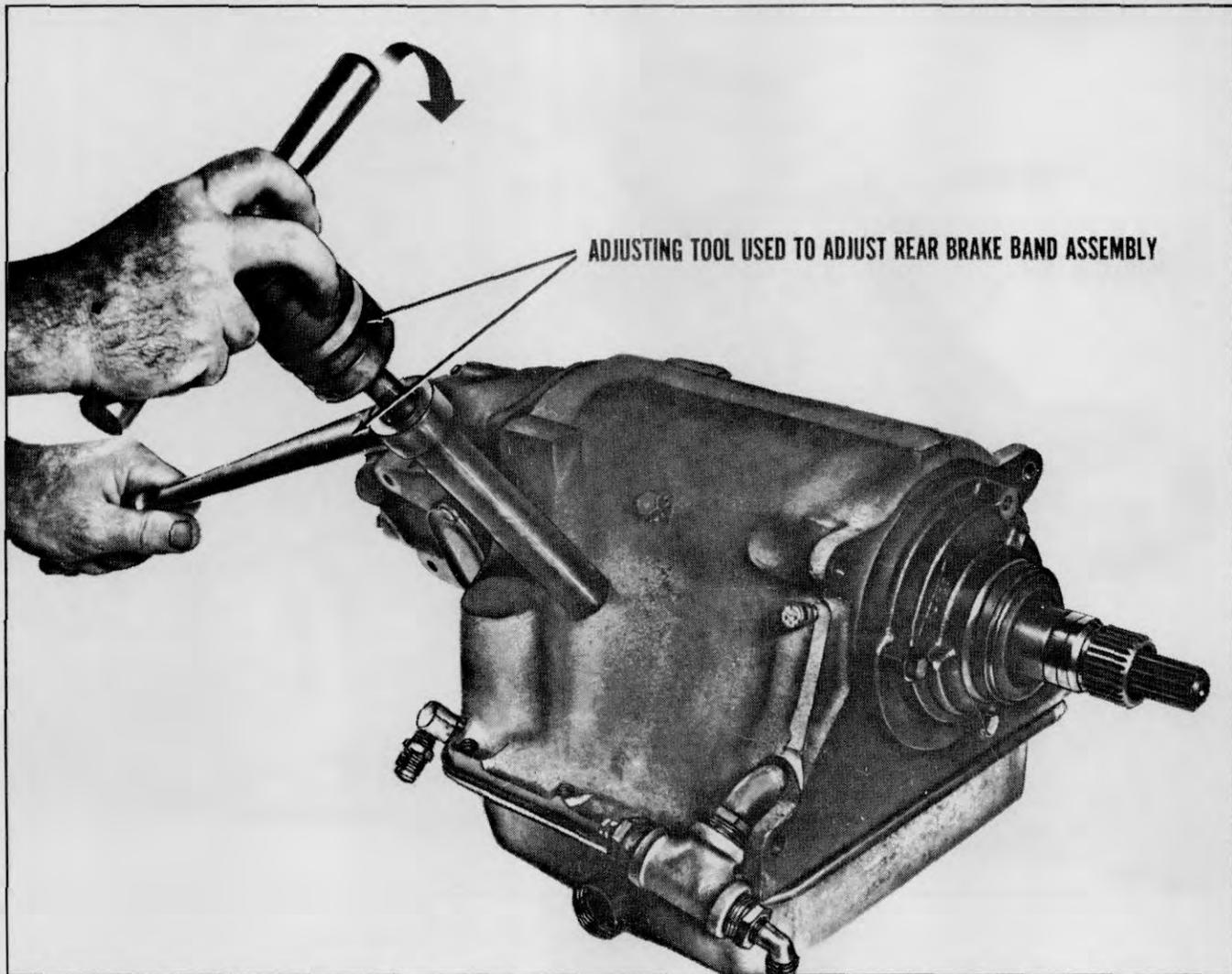


Plate 8546. Loosen Rear Band Screw Nut

REAR BAND ADJUSTMENTS

N O T E

Be sure all dirt is removed from around the rear band adjusting screw. Oil the threads.

7. Loosen the rear band adjusting screw lock nut. Torque the adjusting screw until the wrench over-runs 10 lb. ft.

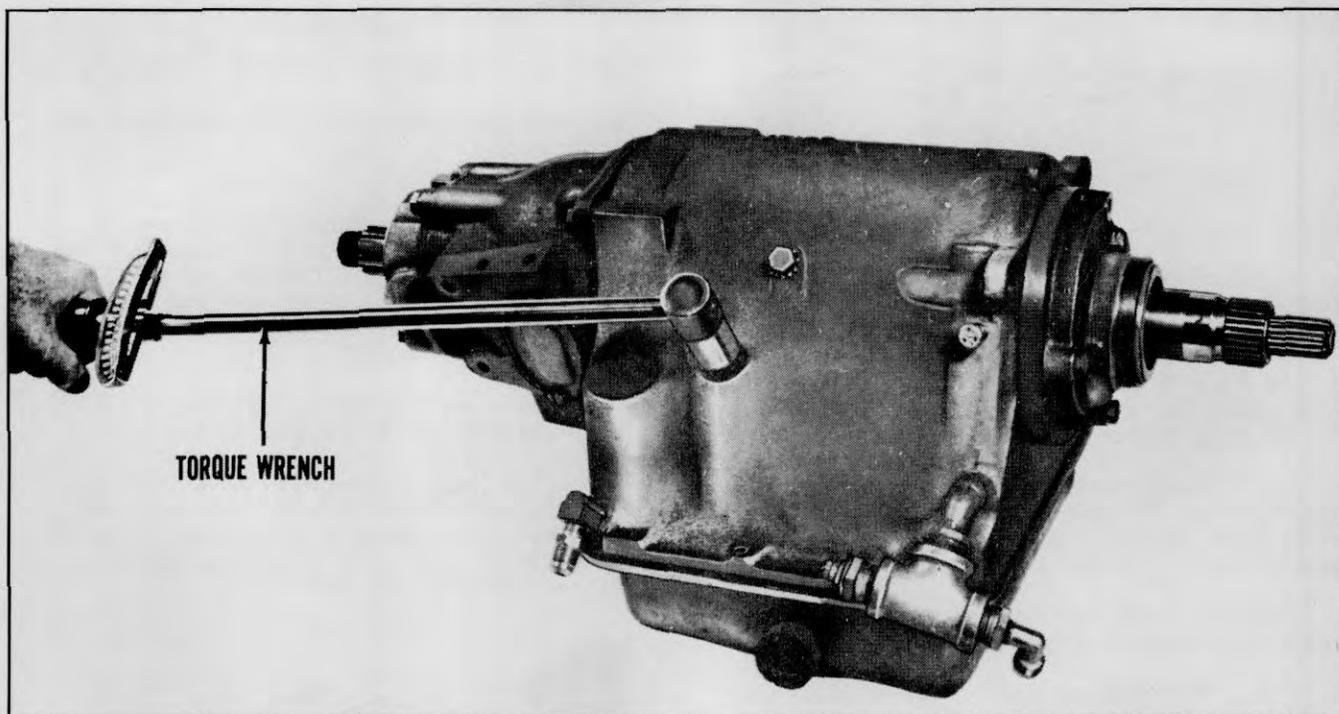


Plate 8547 Torque Lock Nut as shown

8. Back off the adjusting screw exactly (1-1/2) one and a half turns...hold the adjusting screw stationary and torque the screw lock nut to 35 -to- 45 pound feet.
9. Replace the transmission oil pan and screen in reverse order of removal. Torque the pan bolts to 12 -to- 15 pound feet.
10. Connect the fluid filler tube to the transmission oil pan...tighten the connection securely.
11. Replace the converter plugs...converter housing cover...converter housing and access hole cover.
12. When filling a dry transmission and converter...initial fill should be (11) eleven quarts of fluid or 22 pints (approx.).
13. Run the engine at idle speed for about two minutes and then run it at fast idle speed (about 1200) until it reaches its normal operating temperature...
...DO NOT RACE THE ENGINE.
14. Shift the selector lever through all the positions, place it at "N" (neutral) and check fluid level. If necessary...add enough fluid to the transmission to raise the level to the "F" (full) mark on the dipstick.
DO NOT OVERFILL THE TRANSMISSION.

STEERING GEAR

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

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

Before making above adjustments, the following preliminary operations are necessary.

1. Disconnect steering drag link from pitman arm. Note relative position of drag link parts when disconnecting link so the parts may be re-assembled correctly.
2. Check lubricant level in steering gear housing. If low, add enough lubricant to bring level up to filler plug hole. (Use NLGI #1 Amolith grease EP #1 or its equivalent).
3. Tighten steering gear housing to frame side member bolts, see Plate 6636.
4. Determine straight-ahead position of steering mechanism by turning steering wheel to extreme right.

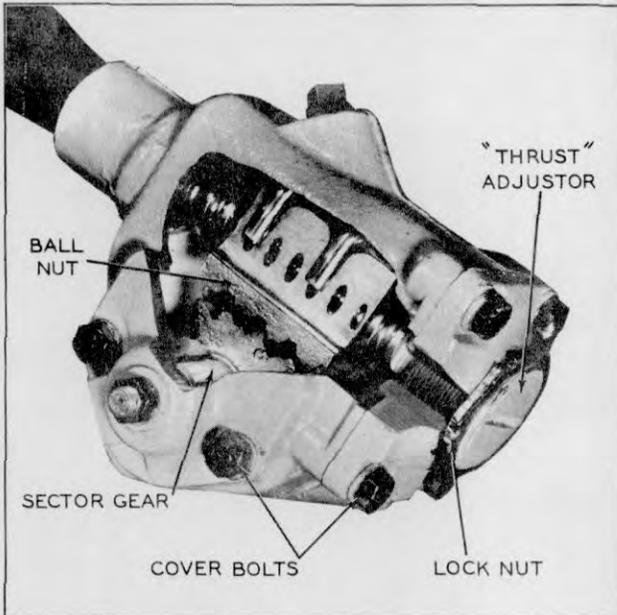


Plate 6636. Steering Gear Thrust Adjustment (Worm Bearings)

CAUTION

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

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

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

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

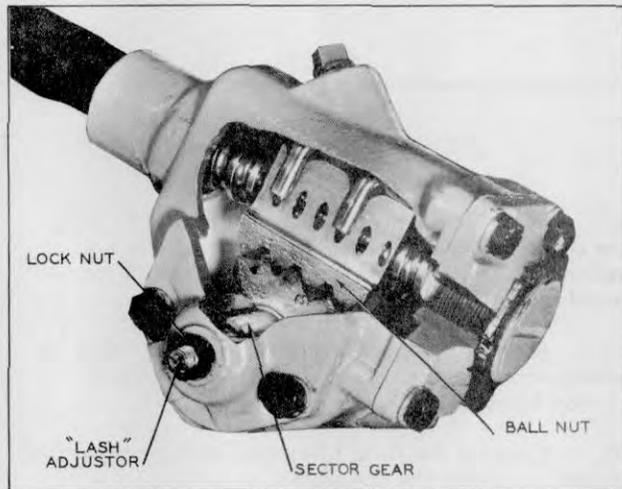


Plate 6637. Steering Gear Lash Adjustment (Sector Gear)

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

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

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

Sector Gear Lash Adjustment: Refer to Plate 6637 and proceed as follows:

1. Steering Gear Mechanism must be in straight ahead position as previously explained.
2. Turn lash adjuster screw clockwise to remove all lash between gear teeth. Tighten adjuster screw lock nut. Position spring scale on steering wheel so pull may be made at right angles to wheel spoke.
3. Measure pull while wheel is TURNED THROUGH CENTER POSITION. Readjust if reading is not within 2 1/2 to 3 pounds.
4. Tighten adjuster screw lock nut, check pull again.
5. After adjustments are made, install drag link on pitman arm.

N O T E

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



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LUBRICATION AND PREVENTIVE MAINTENANCE

spring scale, as directed in step 2, check pull
and resist as necessary, then tighten lock
nut securely.

Steering Linkage Adjustment: Refer to plate
(1) and proceed as follows:

1. Steering lock mechanism must be in
straight ahead position as previously explained.

2. Turn lock adjuster screw clockwise
to remove all lash between gear teeth. Turn
adjuster screw lock nut. Position spring scale
on steering wheel on pull way or push as right
engine to wheel corner.

3. Release pull while wheel is turned
THROUGH CENTER POSITION. Readjust if reading
is not within 2 lbs to 3 pounds.

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

5. After adjustments are made, install
drag link as shown etc.

NOTE

If steering linkage adjustment is necessary,
to lock (install drag link to wheel end).

Intake and Exhaust System

1. Inspect gaskets for leaks and inspect security of manifold nuts.
2. Inspect exhaust pipe and muffler for damage... leakage and security of mountings.

Nuts, Bolts and Cap Screws

Check every nut and bolt on the tow tractor for security of mounting...tighten as required... refer to Specifications in the front of this manual for special torque requirements.

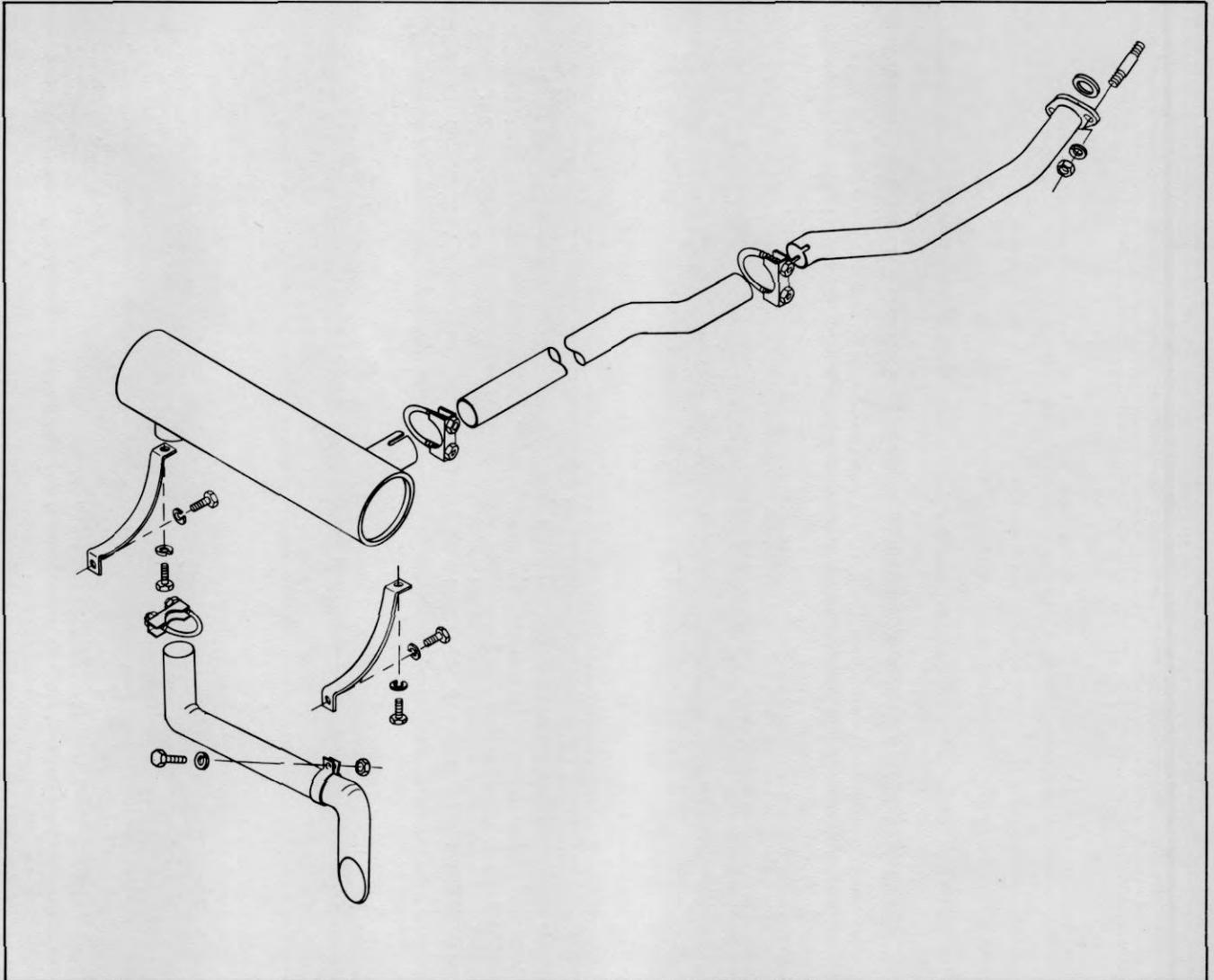
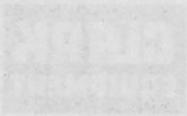


Plate 9253. Typical Exhaust System



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LUBRICATION AND PREVENTIVE MAINTENANCE

14 Top, Bolt and Cap Screws

Check every nut and bolt on the rear tractor for security - tighten as required. Refer to 2-10 for instructions in the front of the manual for special torque requirements.

Inside and Outside System

1. Inspect gauges for leaks and inspect location of - install nut.
2. Inspect exhaust pipe for 1 - install for damage. Inspect and security of - install.

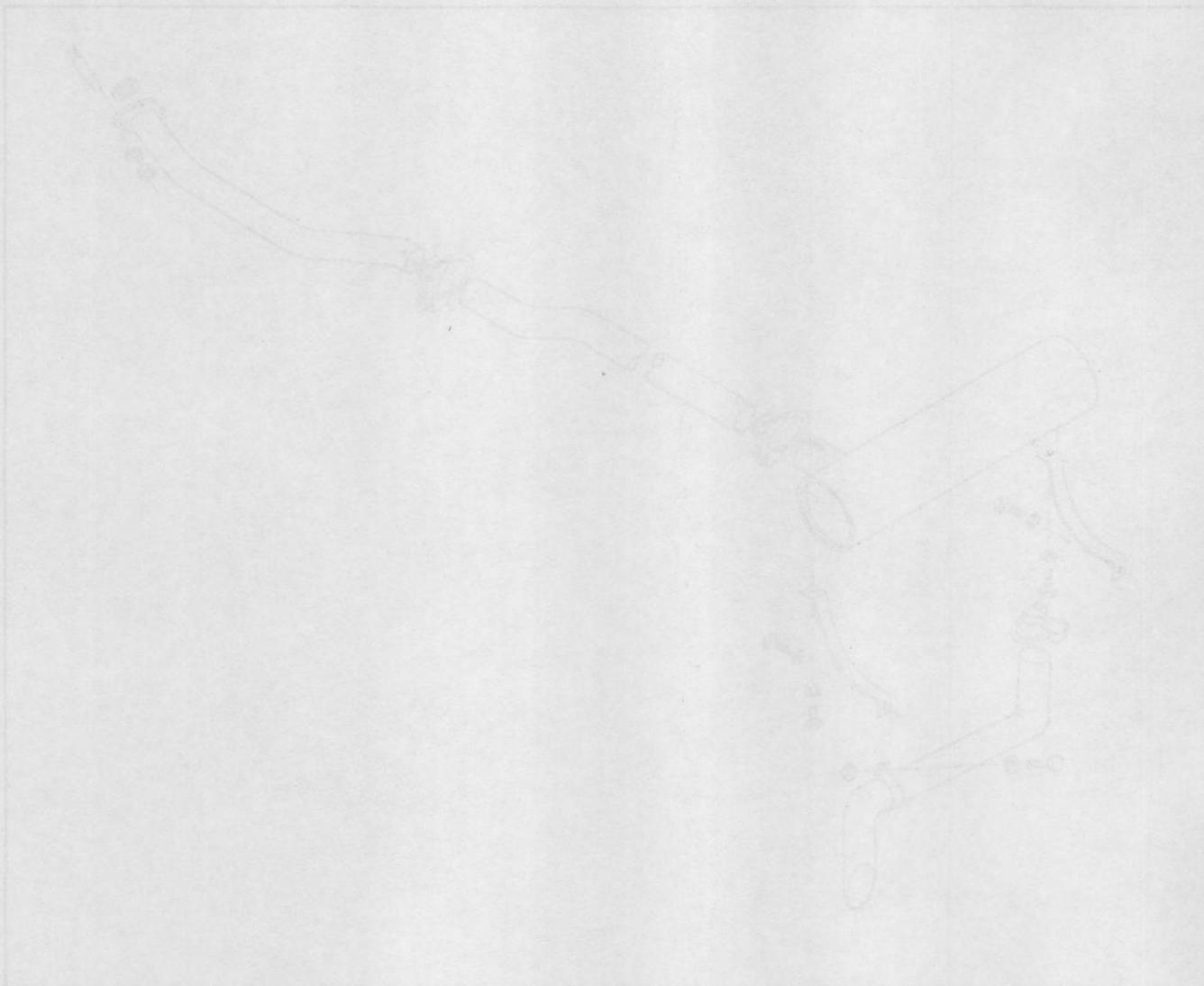
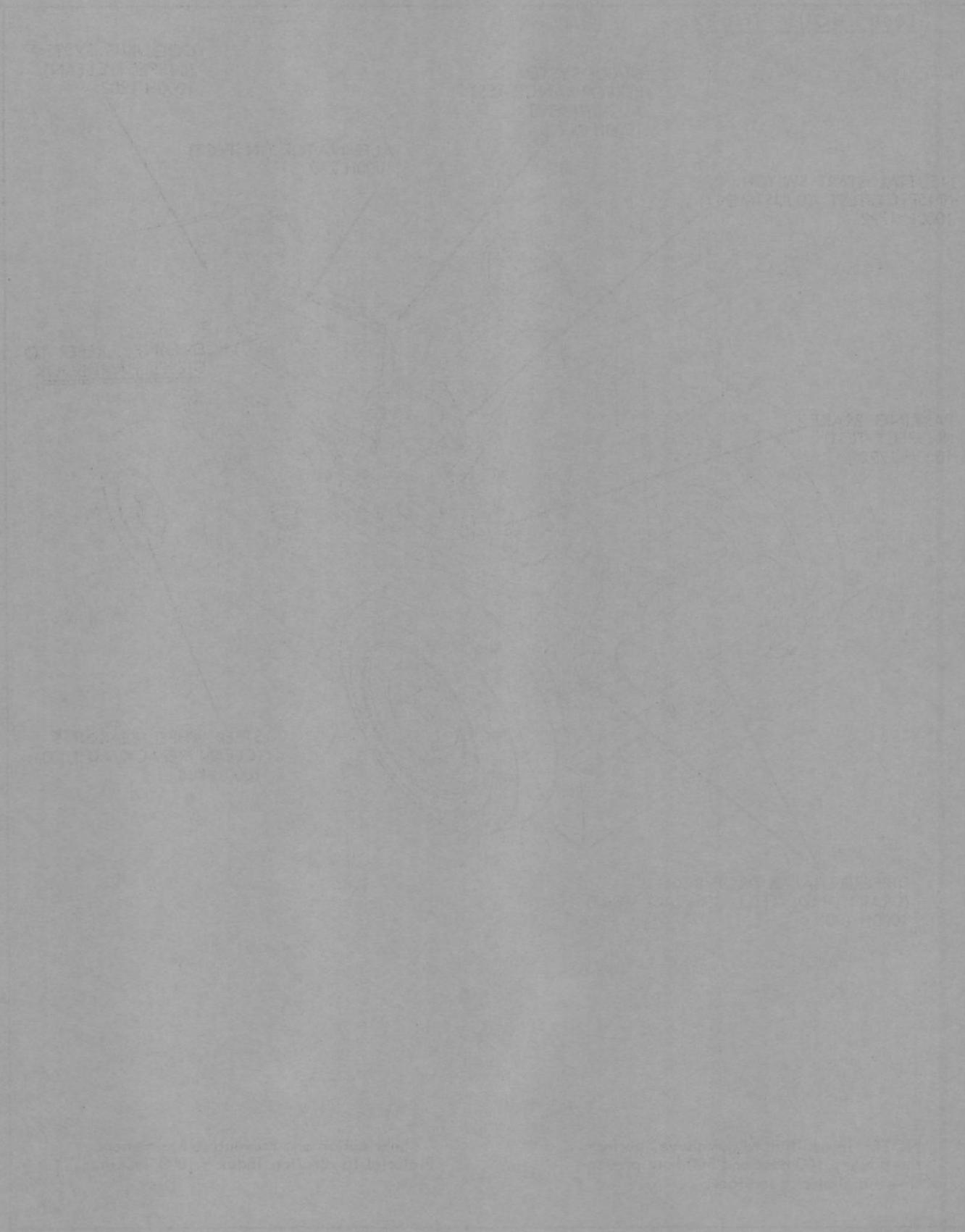
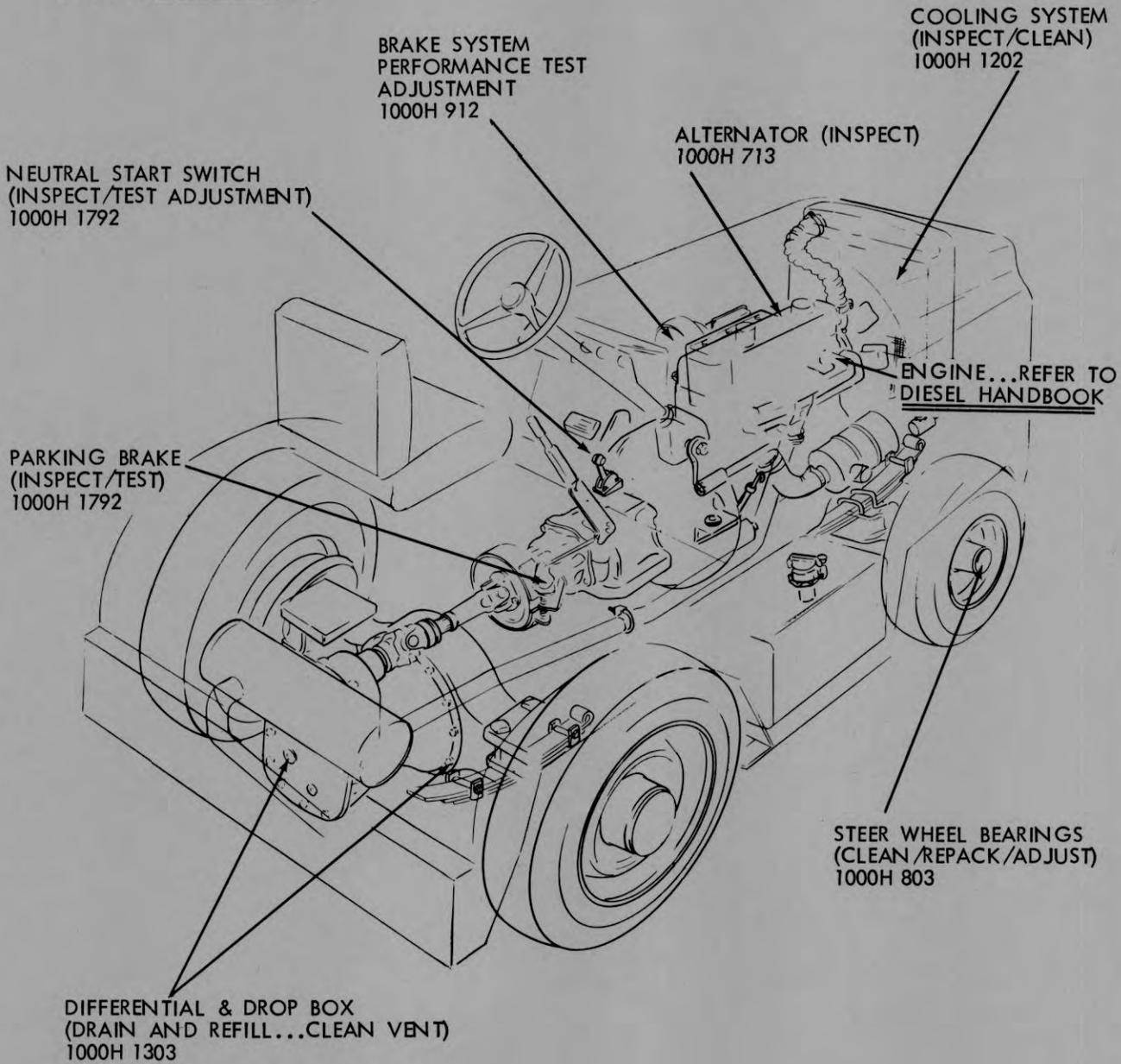


Plate 1257, Typical Exhaust System



1000 HOUR INDEX



NOTE: In addition to the above, perform the 8 hour, 100 hour and 500 hour preventive maintenance services.

Lubrication and Preventive Maintenance
Pictorial Illustration Index - 1000 HOUR.....



INDUSTRIAL TRUCK DIVISION



LUBRICATION AND PREVENTIVE MAINTENANCE

ALTERNATOR

IMPORTANT ---- Since the alternator and regulator are designed for use on only one polarity system, the following precautions must be observed when working on the charging circuit. Failure to observe these precautions will result in serious damage to the electrical equipment.

1. When installing a battery, always make absolutely sure the ground polarity of the battery and the ground polarity of the alternator are the same.

2. When connecting a booster battery, make certain to connect the negative battery terminals together and the positive battery terminals together.

3. When connecting a charger to the battery, connect the charger positive lead to the battery positive terminal and the charger negative lead to the battery negative terminal.

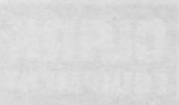
4. Never operate the alternator on open circuit. Make absolutely certain all connections in the circuit are secure.

5. Do not short across or ground any of the terminals on the alternator or regulator.

6. Do not attempt to polarize the alternator.

INSPECTION — The terminals should be inspected for corrosion and loose connections, and the wiring for frayed insulation. Check the mounting bolts for tightness, and the belt for alignment, proper tension and wear. Belt tension should be inspected and adjusted if necessary every 100 operating hours and adjusted per the procedures listed on page 100H 203.

After extended periods of operation, or at time of engine overhaul, the alternator may be removed from the vehicle for a thorough inspection and cleaning of all parts. The alternator requires no other service other than the previously mentioned inspection. When it becomes necessary to perform tests and internal inspection of the alternator, see your nearest authorized Clark Equipment Dealer.



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The Industrial Truck Division is a leading manufacturer of material handling equipment. Our products are designed for efficiency, reliability, and safety. We offer a wide range of equipment, including forklifts, pallet jacks, and tractors. Our commitment to quality and customer service has made us a trusted name in the industry.

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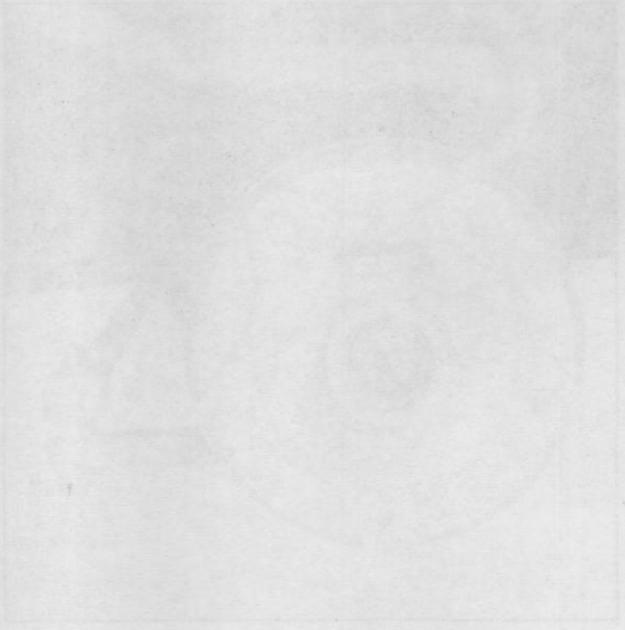
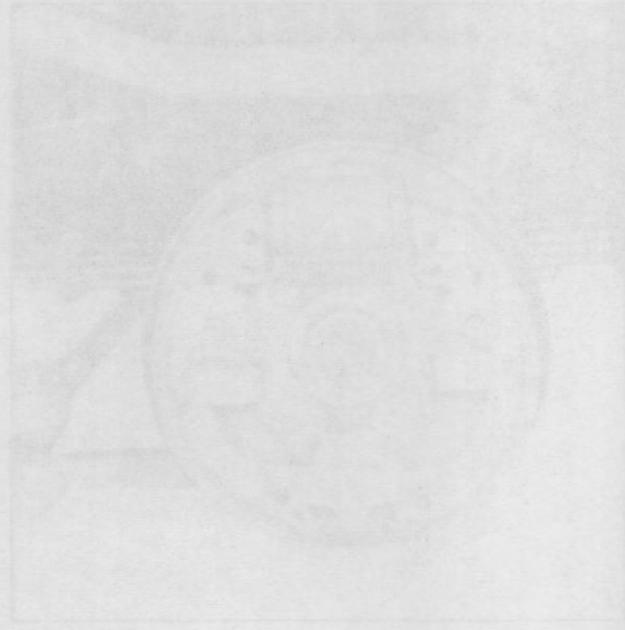
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MAINTENANCE AND REPAIRS



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State Seal, Florida

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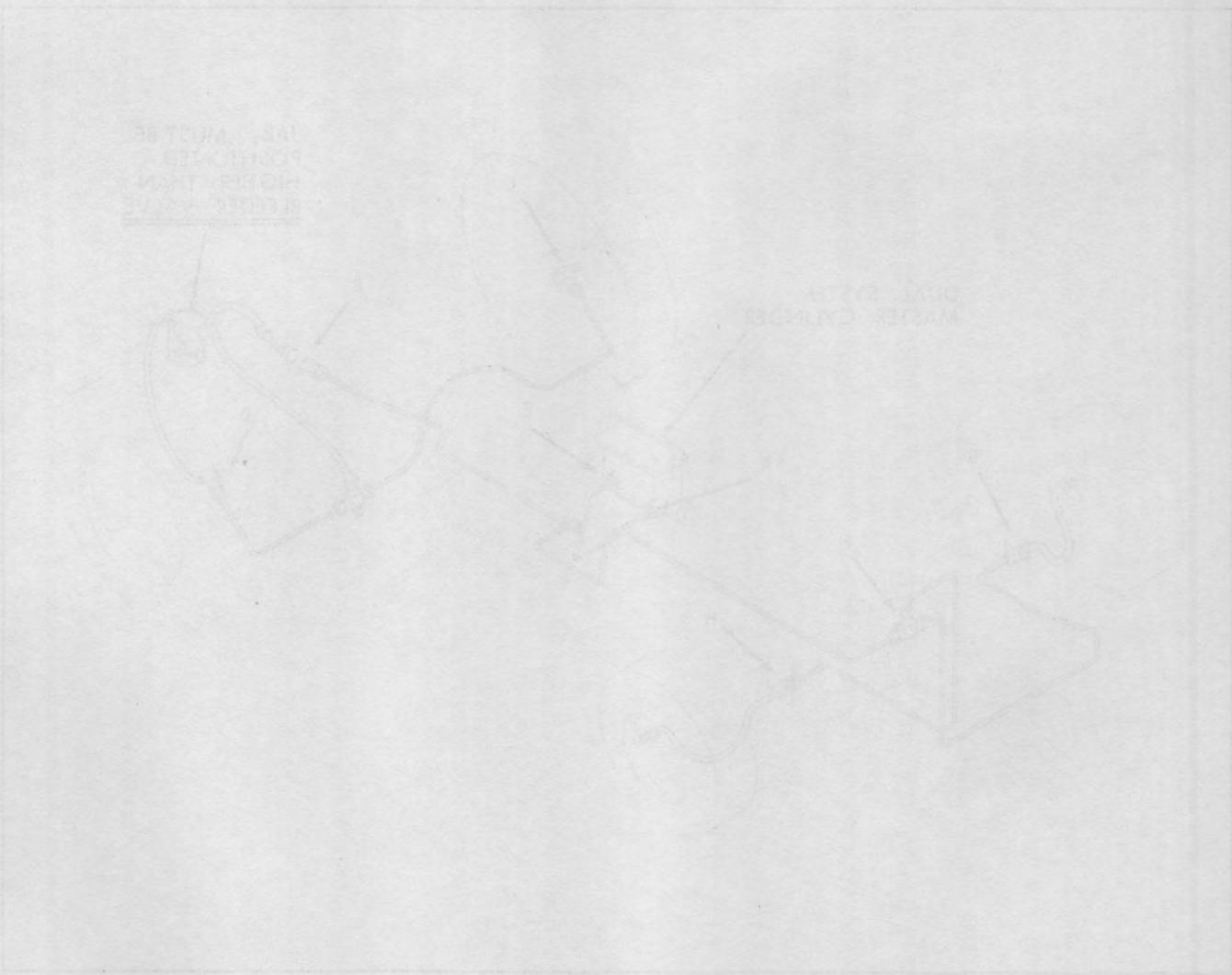
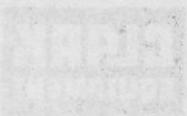


Plate 2321 Hydraulic Line - Brake Line - CTA-Risking Line

1. Loosen the adjust nut (A) and turn the nut clockwise until the pressure is set. Tighten the nut.

2. Loosen the adjust nut (B) and follow the same procedure as above.

3. Position a wrench on the bleeder fitting on the wheel cylinder (C) then (D) and connect a drain tube to it.

4. Squeeze drain tube in container partly filled with clean fluid.

5. Turn brake pedal down slowly through its full travel. Close bleeder fitting.

6. Repeat steps 1 through 5 for each wheel.

7. After all wheels are bled, check the fluid level in the master cylinder. Do not let the fluid level drop below the "Full" mark.

8. After the fluid level is checked, the truck should be driven for a short distance to check the operation of the brakes.

The power brake unit is a self-contained vacuum-operated unit for power braking that is supplied with vacuum from the engine. The vacuum is drawn from the engine through a vacuum line to the power brake unit. The power brake unit consists of a master cylinder and a control valve. The master cylinder is a hydraulic cylinder that provides the hydraulic pressure for the control valve. The control valve is a hydraulic valve that directs the hydraulic pressure to the brake lines. The brake lines are hydraulic lines that carry the hydraulic pressure to the wheel cylinders. The wheel cylinders are hydraulic cylinders that convert the hydraulic pressure into mechanical force to apply the brakes.

Since each subsystem is contained in itself, each subsystem should be bled the first time it is installed. Bleed the master cylinder first. The master cylinder is bled by turning the bleed screw on the top of the master cylinder. The bleed screw is a small screw that is used to release the air from the master cylinder. The bleed screw is turned clockwise until a steady stream of fluid is seen. The bleed screw is then turned counter-clockwise until it is tight. The master cylinder is then bled.

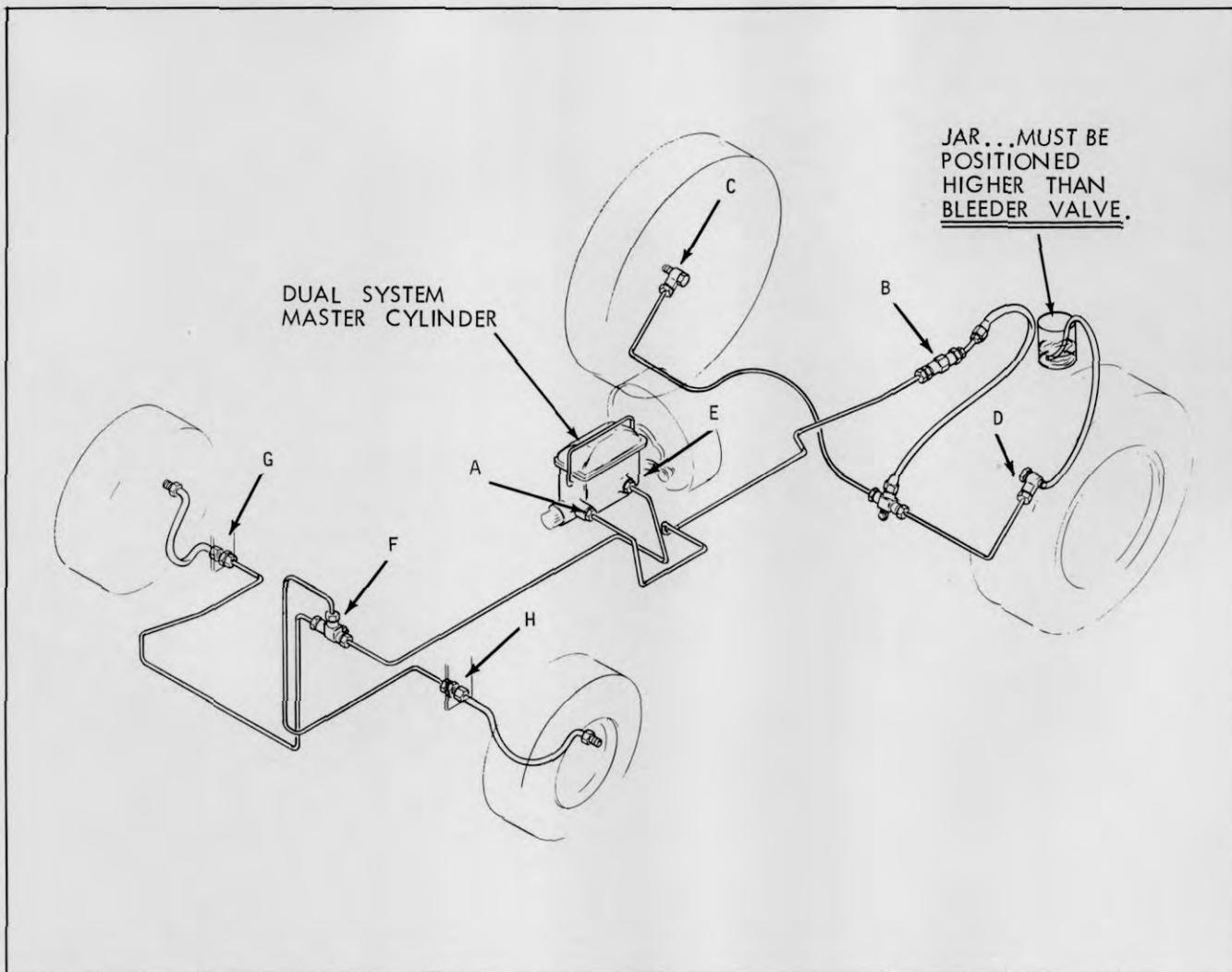


Plate 9321. Typical Dual System Brake Lines - CTA-Perkins Diesel

Power Brake Unit

The power brake unit is a self-contained vacuum-hydraulic unit for power braking that is supplied with vacuum from a vacuum pump on the engine. The separate hydraulic systems provided by the (dual) master cylinder prevents a hydraulic failure in either system from affecting the other. If one of the systems fail...the driver will be aware of this because of greater pedal travel and more effort will be needed to achieve the expected braking results.

Manual Bleeding Procedures

Bleeding the new dual-master hydraulic brake system is not too different from bleeding the previous design single system.

Since each sub-system is complete in itself, each is bled separately. Bleed the longest line first of the sub-system being bled...DO NOT ALLOW THE RESERVOIR TO

RUN DRY...also, do not intermix brake fluids... such as adding extra-heavy duty brake fluid with heavy duty brake fluid or vice versa, or use low temperature brake fluid with the specified fluid.

1. Loosen the outlet port tube nut (A) ..operate brake pedal slowly until fluid is free of bubbles, then tighten the tube nut.
2. Next...loosen fitting at point (B) and follow the same procedure as above.
3. Now...position a wrench on the bleeder fitting on the brake wheel cylinder at point (C) then (D) and connect a drain tube to fitting.
4. Submerge drain tube in container partly filled with clean fluid.
5. Push brake pedal down slowly through its full travel. Close bleeder fitting, then...

...let pedal return to its released position. Repeat this until all air bubbles disappear in bleeder container. Close fitting and remove bleeder tube.

6. Be sure not to let the pedal return till the screw is closed.

7. Repeat bleeding procedures 1 through 6 for the other brake sub-system.

Pressure Bleeding Procedures

Make sure the bleeder tank contains enough of the right type of brake fluid to do the job...do not intermix types of brake fluids...never reuse brake fluid drained from any brake system.

1. Clean dirt, grime, etc., from master cylinder and cylinder cover.

2. Remove cover and gasket...fill reservoir with specified fluid.

3. Install bleeder adapter tool at master cylinder outlet port and attach bleeder tank hose to adapter fitting.

4. Put about 2 quarts or more, of fluid in tank...apply air pressure of no more than 30 psi...attach hose.

5. Place a flat pan under bleeder valve to be bled.

6. Open bleeder valve on bleeder tank...to pressurize brake fluid to cylinder reservoir.

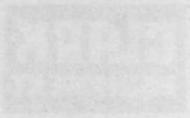
7. Submerge bleeder hose in a container partially filled with clean fluid and loosen bleeder fitting at wheel cylinder (C)...right rear brake.

8. When air bubbles stop coming into container...close bleeder fitting and remove tube.

9. Repeat steps (5) thru (8) at points (D), (G), and (H) respectively.

10. When bleeding operation is completed...close bleeder tank valve...release pressure in line between tank and cylinder...then, remove hose from adapter fitting.

11. Remove pressure bleeder adapter tool...fill master cylinder reservoir to within 1/4 to 1/2 of an inch from the top of reservoir and install gasket and cylinder cover.



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LUBRICATION AND TIRE MAINTENANCE

1. Check oil level in the engine oil pan. Add oil if necessary. Check tire pressure and tread condition.

2. Check the oil level in the hydraulic system. Add oil if necessary. Check the condition of the hydraulic hoses and fittings.

3. Check the condition of the tires. Look for signs of wear, such as uneven tread, cracks, or bulges. Replace tires as needed.

4. Check the condition of the brakes. Look for signs of wear, such as thinning pads or shoes, or a spongy brake pedal. Adjust or replace brake components as needed.

5. Check the condition of the steering system. Look for signs of wear, such as loose ball joints or tie rod ends. Adjust or replace steering components as needed.

6. Check the condition of the suspension system. Look for signs of wear, such as worn shock absorbers or springs. Adjust or replace suspension components as needed.

7. Check the condition of the electrical system. Look for signs of wear, such as loose battery terminals or corroded wires. Clean and tighten electrical connections as needed.

8. Check the condition of the engine. Look for signs of wear, such as low oil level, noisy operation, or excessive smoke. Adjust or replace engine components as needed.

9. Check the condition of the chassis. Look for signs of wear, such as loose bolts or nuts, or rust. Tighten and lubricate chassis components as needed.

10. Check the condition of the operator's compartment. Look for signs of wear, such as worn seats or controls. Adjust or replace operator's compartment components as needed.

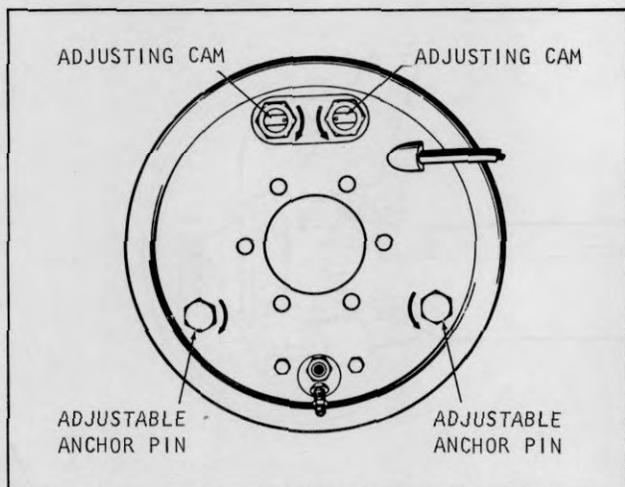


Plate 10158. Typical Brake Assembly

BRAKE ADJUSTMENT:

```

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  AFTER RAISING MACHINE AND BEFORE MAKING  x
x  ANY ADJUSTMENTS, ADJUSTMENT CHECKS OR   x
x  BEFORE PERFORMING ANY MAINTENANCE, PLACE x
x  ADEQUATE BLOCKING (SUFFICIENT TO SUPPORT x
x  THE MACHINE) UNDER THE FRAME TO PREVENT  x
x  ACCIDENTAL LOWERING OR FALLING OF THE    x
x  VEHICLE, THUS PREVENTING PERSONAL INJURY x
x  TO MECHANIC OR BYSTANDERS.              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
  
```

To decrease clearance at anchor end of forward shoe;

1. Turn forward shoe anchor pin in direction illustrated by arrow.

To increase clearance at anchor end of forward shoe;

1. Turn forward shoe anchor pin in opposite direction indicated by arrow.

Alternate between the anchor pin and the adjusting cam until brake shoe feeler gauge (.010") just fits between the drum and lining at both "heel" and "toe". Then tighten the anchor pin locknut.

Repeat this same procedure at the opposite shoe and on the other drive wheel brake assembly.

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.

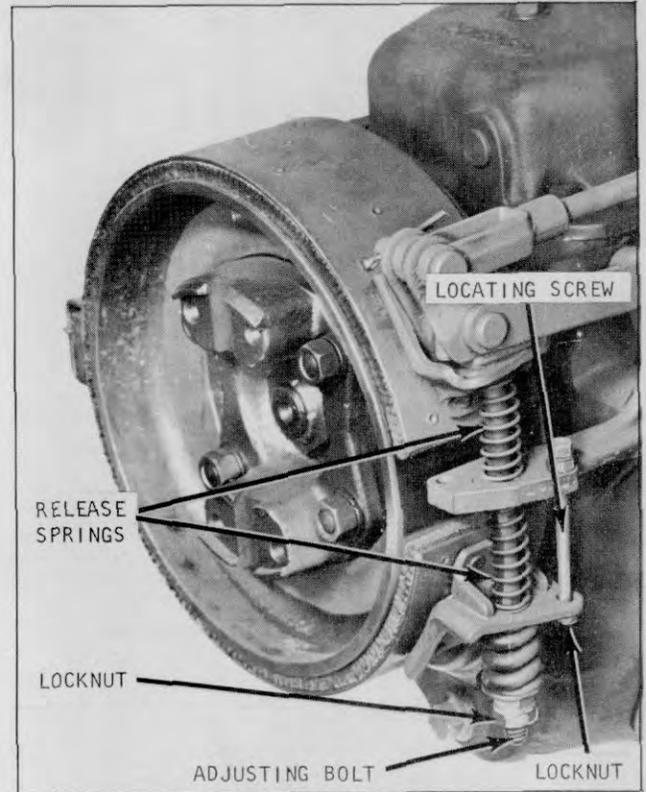


Plate 7447. Hand Brake Adjustments

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.

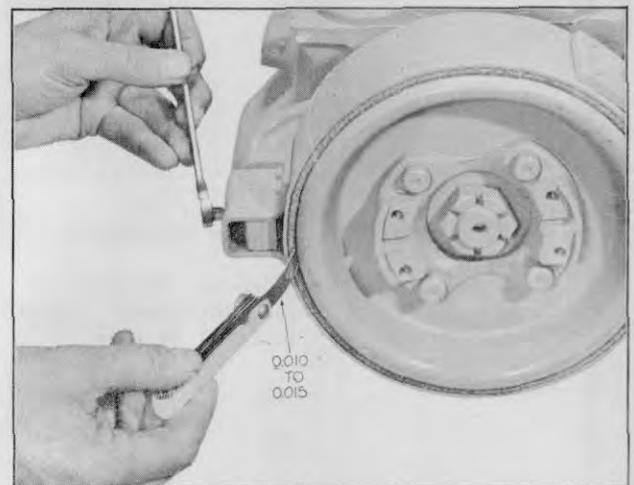


Plate 6291. Brake Band Centering Adjustment

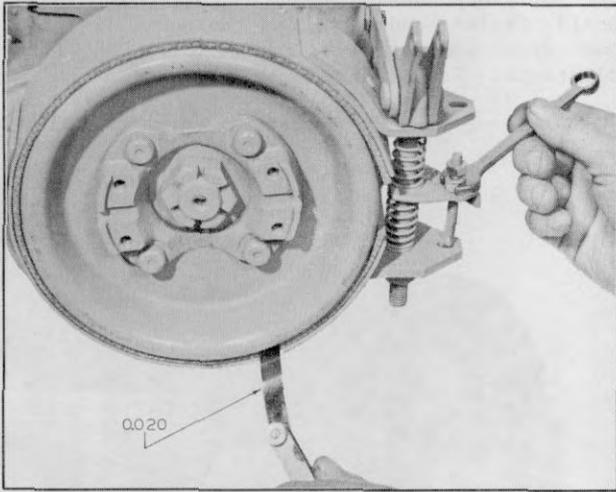


Plate 6290. Brake Band Lower Adjustment

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.

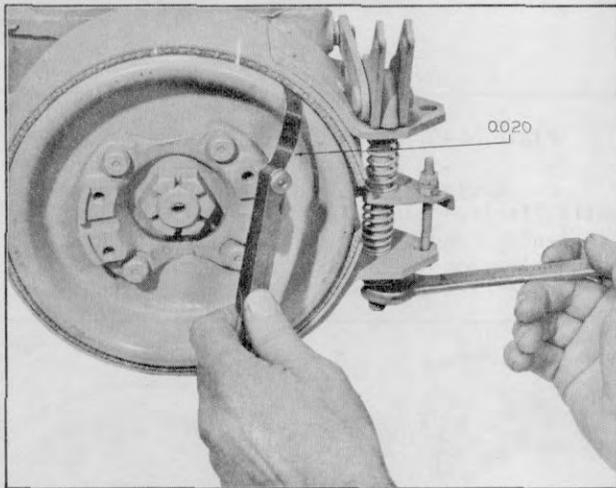


Plate 6289. Brake Band Upper Adjustment

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.



LOADING SYSTEM

When a vehicle is loaded, the load should be distributed evenly across the entire surface of the vehicle to prevent damage to the structure.

The maximum load capacity of the vehicle should be determined by the manufacturer's specifications. Exceeding this capacity may result in structural failure.

OPERATION AND MAINTENANCE INSTRUCTIONS

Check the oil level in the engine before starting the vehicle. The oil level should be maintained between the minimum and maximum marks on the dipstick.

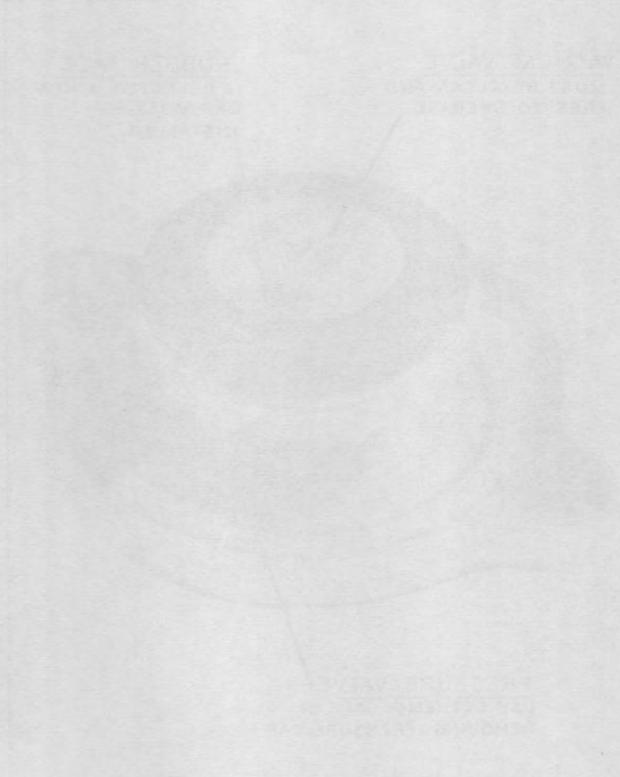


FIGURE 1: CHASSIS AND ENGINE COMPONENTS

The engine compartment should be inspected regularly for leaks and unusual noises. The oil filter should be replaced at the intervals specified in the maintenance schedule.

The loading system is designed to handle a maximum load of 10,000 lbs. The load should be centered on the vehicle's frame.

When loading, the operator should ensure that the load is secured properly to prevent shifting during transport.

OPERATION AND MAINTENANCE INSTRUCTIONS

The operator should always wear the seat belt and use proper tie-down techniques to secure the load.

Regular maintenance is essential for the safe operation of the vehicle. This includes checking the tires, brakes, and lights.

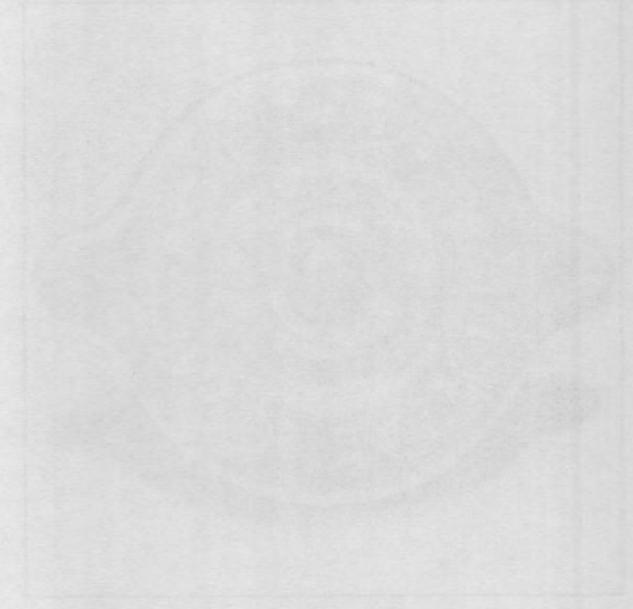


FIGURE 2: FRONT SUSPENSION AND STEERING COMPONENTS

The front suspension system should be inspected for wear and tear. The steering knuckles and ball joints should be checked for proper alignment.

The operator should be familiar with the vehicle's controls and safety features before operating it. This includes understanding the load capacity and proper tie-down techniques.

COOLING SYSTEM

Radiator Pressure Caps:

WARNING

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

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



Plate 6458. Radiator Pressure Cap

2. Inspect pressure cap for freedom of operation.

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

NOTE

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

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

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

Inspect and Clean Cooling System:

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

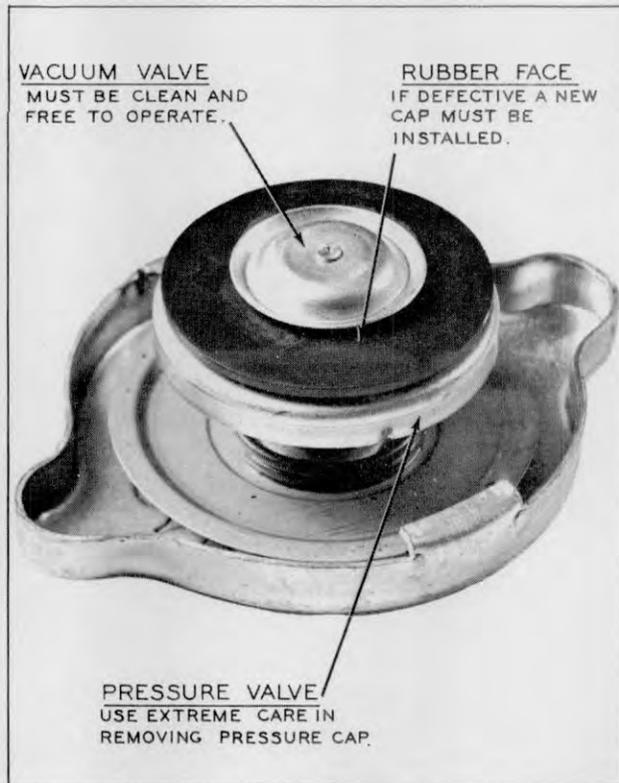


Plate 6459. Pressure Cap Gasket, Valve and Valve Gasket

NOTE

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

LUBRICATION AND PREVENTIVE MAINTENANCE

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

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

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

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

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

CAUTION

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

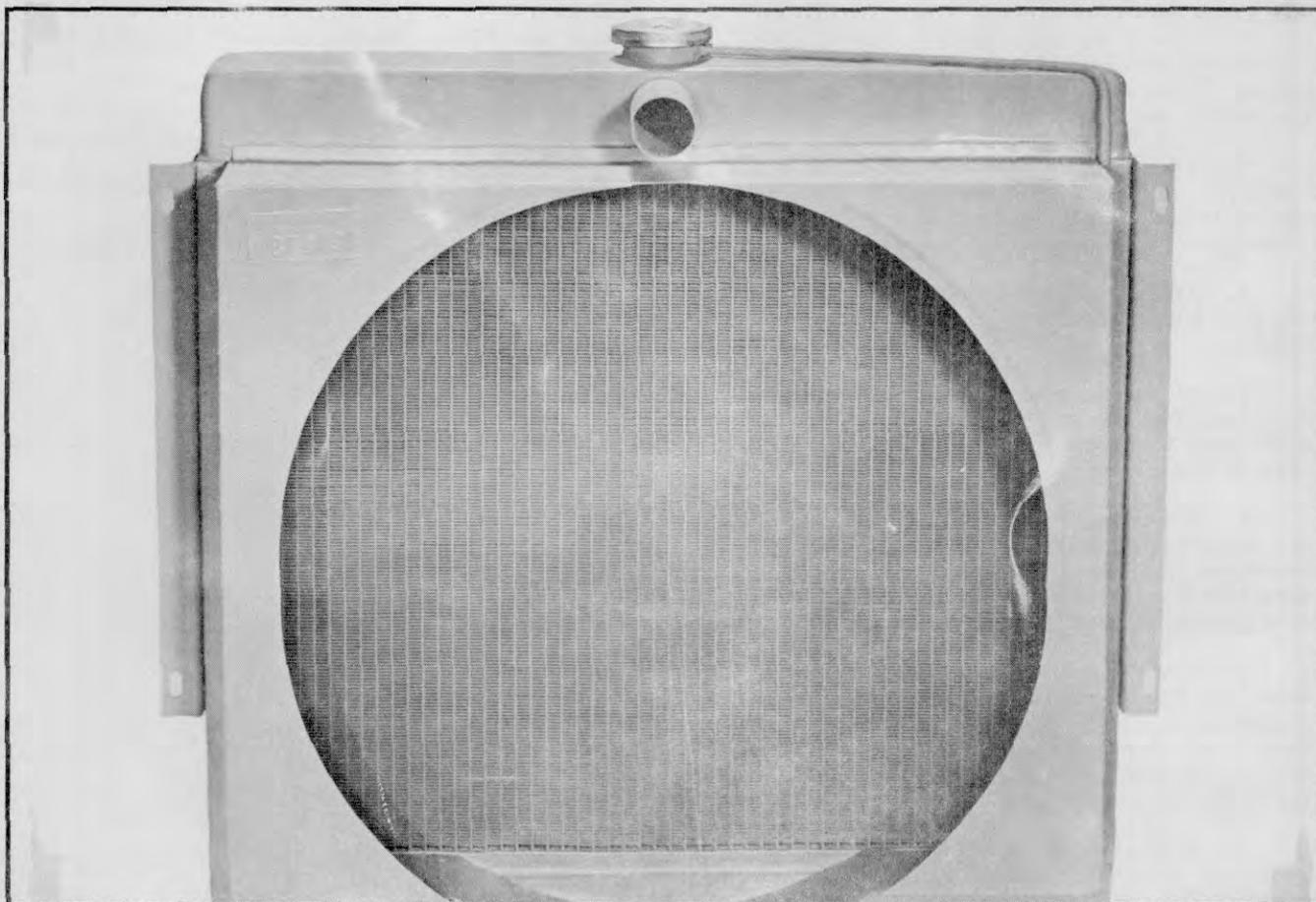


Plate 6461 Typical Radiator

TRANSMISSION OIL COOLER

Flushing Cooler When Cleaning Equipment is Not Available

When necessary to clean or flush a cooler when a converter and cooler cleaning equipment is not available, the following procedure should be used:

1. Disconnect the oil cooler return line from the transmission.
Place the transmission selector lever in the N (neutral) position and connect the cooler inlet (converter out) line to the transmission. Place a pan under the end of the cooler return line that will hold automatic transmission fluid. Do not start the engine.
2. Install 5 quarts of automatic transmission fluid type "F". (See next column CAUTION)
3. Now, start the engine and allow it to run at normal idle speed for 3 minutes with the selector lever in the N (neutral) position. Stop the engine, add additional transmission fluid required to complete total fill. Start the engine and allow it to run at normal idle speed.
4. Allow approximately two quarts of transmission fluid to drain into the pan placed under the end of the cooler return line.
5. If the fluid does not run clean after draining two quarts of transmission fluid through the cooler, shut off the engine and add two additional quarts of automatic transmission fluid.
6. Repeat steps 3-5 until the transmission fluid flowing out of the cooler return line is clean.
7. If there is no fluid flow or the fluid does not flow freely, shut off the engine and disconnect both cooler lines from the transmission and cooler.
8. Use an air hose with not more than 100 psi air pressure to reverse flush the cooler lines and the cooler. After flushing, connect both lines at the cooler and the cooler inlet line (converter out) to the transmission.
9. Start the engine and check the fluid flow. If the transmission fluid flows freely, proceed with steps 3-6. If there is no fluid flow, check for pinched cooler lines. If the flow is restricted, replace cooler lines and/or the radiator.
10. Shut off engine, remove the temporary plug from the cooler return line fitting on the transmission case and connect the cooler return line to the transmission. Check the transmission

fluid level. Add or remove transmission fluid as required until the proper fluid level is obtained on the dipstick. Do not overfill the transmission.

12. Do not attempt to correct cooler or cooler line leaks by closing off the lines.

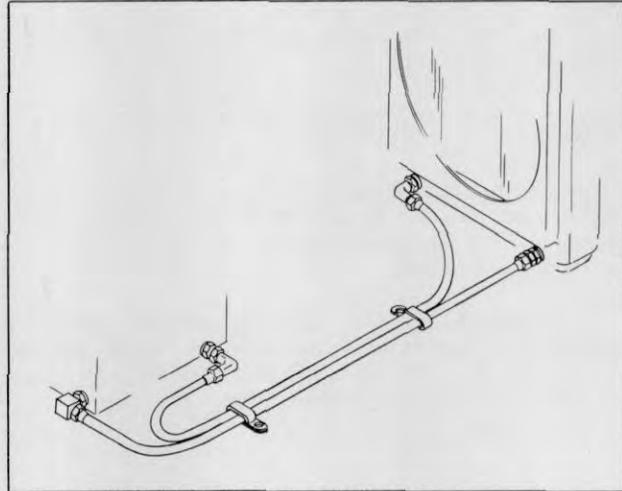


Plate 9269. Transmission Oil Cooler Lines

C A U T I O N

USE TYPE "F" AUTOMATIC TRANSMISSION FLUID PER FORD MOTOR COMPANY, SPECIFICATION NUMBER M2C-33D OR M2C-33E. DO NOT USE TYPE "A" FLUID. REFER TO SPECIFICATIONS IN THIS MANUAL.

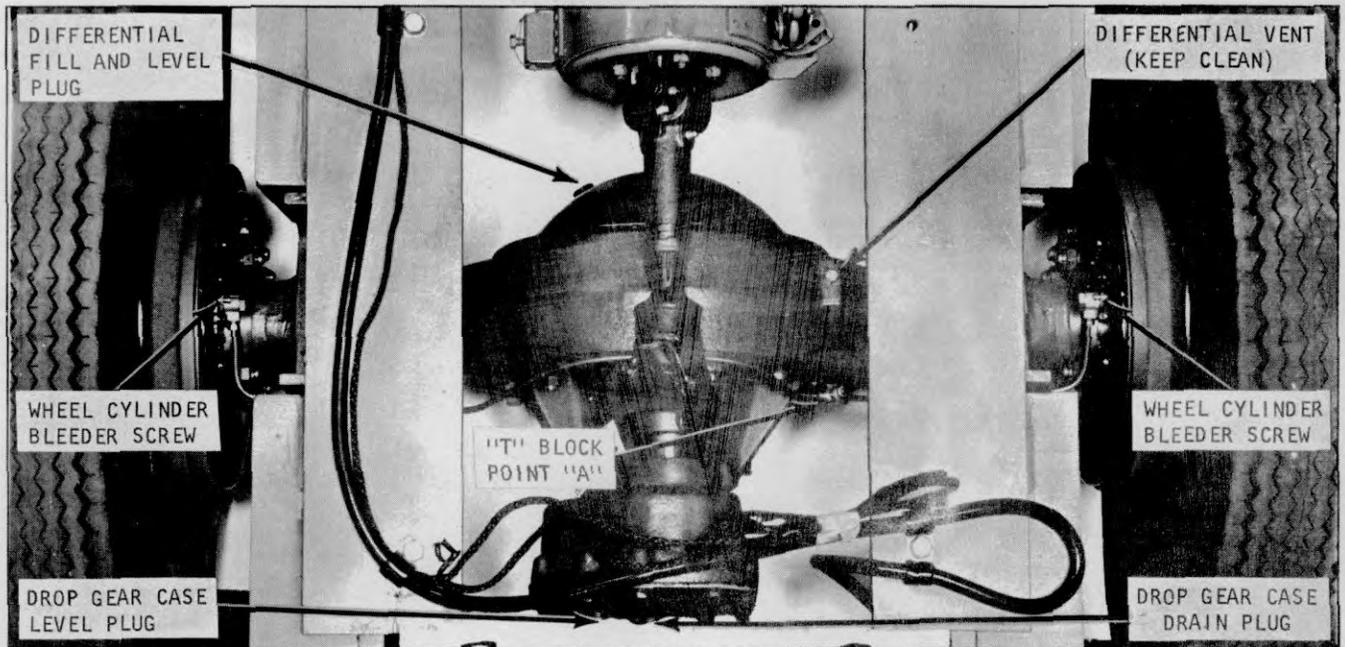


Plate 7435. Drop Gear Case and Differential - Drain and Refill

DIFFERENTIAL AND DROP GEAR CASE

1. Drain differential by removing the lower capscrew on the front cover of the differential bowl. Drain differential at operating temperatures. Removal of the filler/plug will allow full atmospheric pressure to enter the differential bowl and speed up the draining process.

NOTE

BEFORE REMOVING PLUGS FROM EITHER DIFFERENTIAL OR DROP GEAR CASE, CLEAN BOTH ASSEMBLIES SO THAT THE AREA AROUND THE DRAIN, FILL/LEVEL PLUGS IS ABSOLUTELY CLEAN.

2. Remove drain plug from the drop gear case and drain lubricant at operating temperature.

3. Replace drain plugs after both units are completely drained and tighten plugs securely.

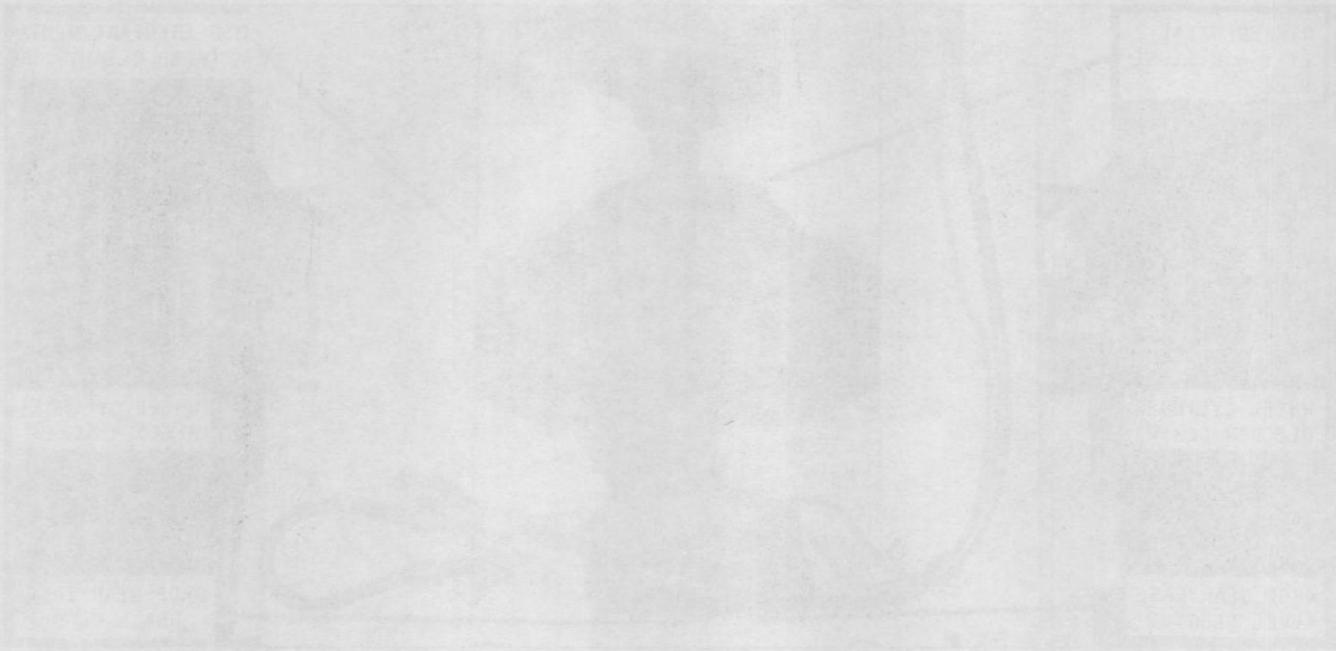
4. Remove fill/level plug and fill differential with E.P.G.L. S.A.E. 90 Clark Specifications MS8. Do not fill above the level of the plug hole. Replace plug and securely tighten.

5. Remove fill/level plug of drop gear case and add one quart of E.P.G.L. S.A.E. 90. Then replace fill/level plug and securely tighten.

Refer to Specifications for combined capacity of differential and drop gear case.

INDUSTRIAL TRUCK DIVISION

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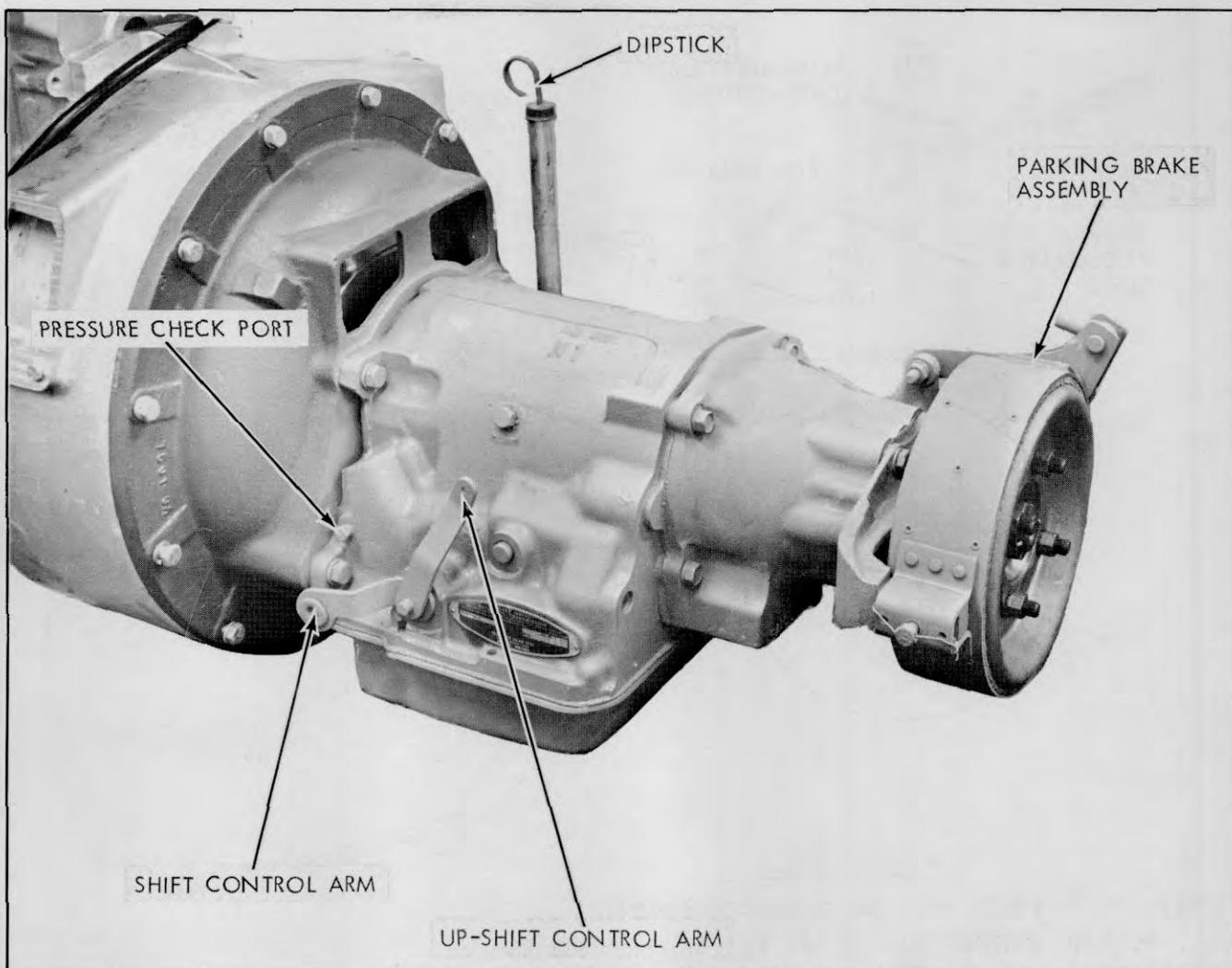


Plate 10504. Transmission....Left Hand Side View

Up-Shift Adjustment Check

1. Attach tachometer.
2. Remove 1/8-inch pipe plug (item 9 above)... connect a 0 to 300 PSI gauge.
3. Apply hand brake.
4. Start engine...allow to run at fast idle until engine temperature reaches normal.
5. Depress brake pedal...hold in this position.
6. Place selector lever in "D" drive range.

7. Accelerate engine to approximately 1000 RPM.
8. Check pressure gauge...reading should be between 80 and 100 PSI. If not...adjust the up-shift linkage as follows:

C A U T I O N

DO NOT RUN ENGINE WITH TRANSMISSION IN "D" DRIVE RANGE FOR MORE THAN 10 SECONDS TO DO SO MAY CAUSE DAMAGE.

I M P O R T A N T

Check engine IDLE....prior to adjusting the up-shift linkage. 615 -to- 630 RPM - IDLE

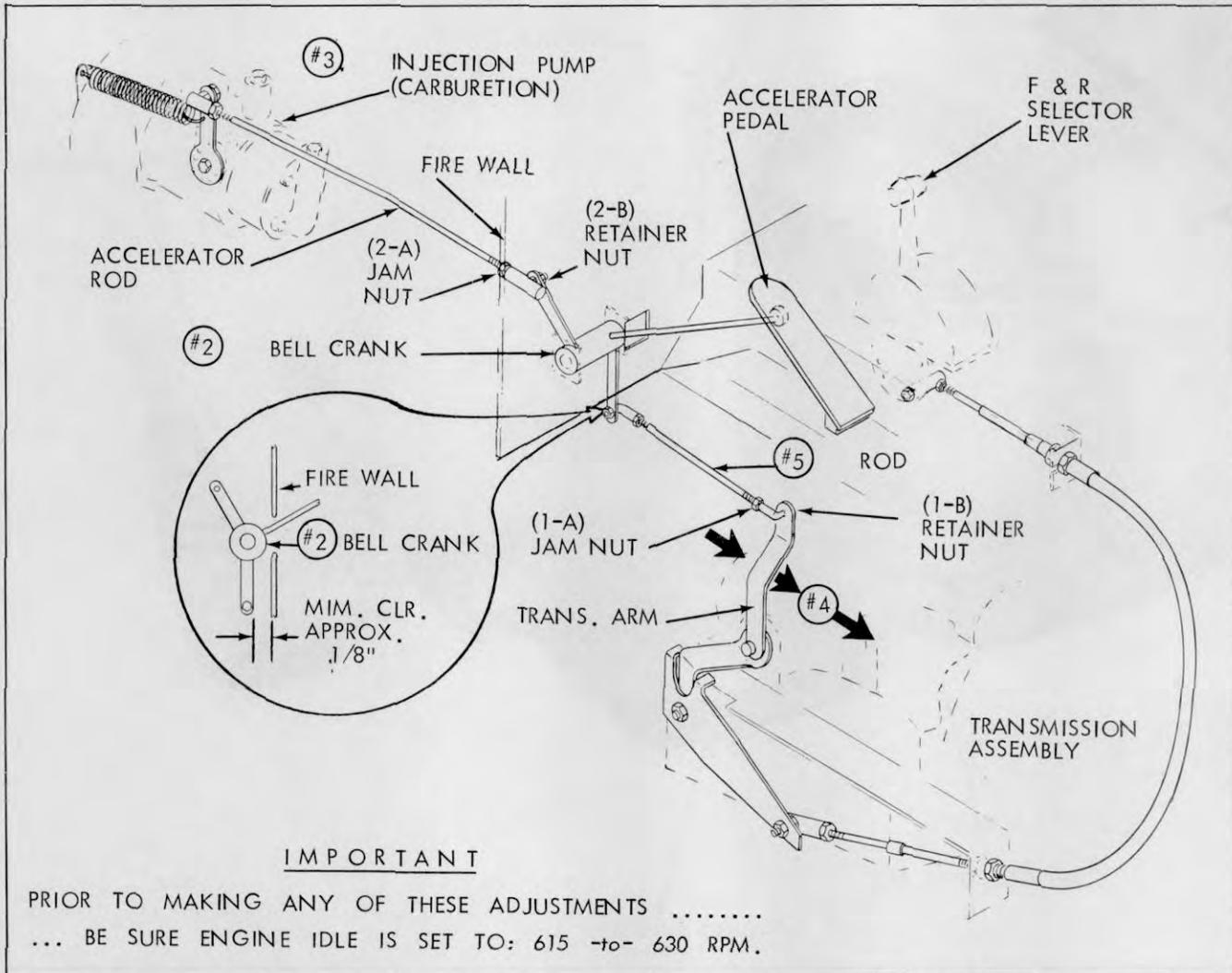


Plate 10503. Up-Shift Control Linkage

1. Back off jam nut (1-A) at transmission arm... remove retainer nut (1-B) at back side of arm and pull rod free.
2. With rod disconnected...bell crank (2) should not touch fire wall (minimum clearance should be held between bell crank and fire wall). If clearance is incorrect...loosen jam nut (2-A) on accelerator rod, remove retainer nut (2-B) from rod ball joint and pull free of bell crank.
3. Allow spring of injection pump to pull arm against its stop...move bell crank (2) so lever is approx. 1/8-inch from fire wall. Rotate ball joint (3-A) until it can connect to bell crank without moving either pump arm or bell crank out of position...tighten retainer nut (2-B) and jam nut (2-A).
4. Push transmission arm toward rear of vehicle... and hold in this position.
5. Adjust rod end until rod can be connected to arm (4) without moving either bell crank (2) or arm (4) ...do not install arm at this time. First...rotate rod end back nine (9) turns to shorten rod. Now install rod...secure with nut (1-B) and tighten jam nut (1-A) ...allow transmission lever to return to its released position.
6. With pressure gauge installed as previously outlined...hand brake applied...selector lever in "N" neutral...start engine and allow it to idle. Now...
7. ...move selector to "D" Drive range. Check pressure gauge...reading should be 60 to 65 PSI (the same pressure you should have in neutral). Next...
8. ...move selector to "R" reverse range. Check pressure gauge...reading should increase 3 to 5 PSI.

- continued -

If this does not happen...again, shorten rod (1) one turn at a time...until you obtain the 3 to 5 PSI increase in reverse position.

Check transmission in "N" neutral position...engine running at 1000 RPM. Check pressure gage...reading should be 90 to 95 PSI. If reading is incorrect, report to designated person in authority.

Control Pressure Checks

1. Control pressure varies with throttle opening...remove 1/8-inch pipe plug...install 0 to 300 PSI pressure gauge.
2. Apply hand brake...step on brake pedal...hold pedal in this position.
3. Start engine...allow engine temperature to reach normal.
4. Now...move shift lever to each position...observing pressure readings at the same time. Idle pressures should be between 50 to 70 PSI

C A U T I O N

DO NOT OPERATE ENGINE WITH TRANSMISSION IN ANY GEAR WHEN BRAKES ARE APPLIED FOR MORE THAN 10 SECONDS AT A TIME.

5. Depress brake pedal...and hold. Move the selector lever into "D" drive range...fully depress accelerator pedal...long enough to observe gauge readings only. Stall readings should be between 130 and 160 PSI. Repeat procedure in "R" reverse range. DO NOT ACCELERATE IN NEUTRAL POSITION.
6. If idle pressures are found to be above those specified in preceding checks...repeat up-shift linkage check. If idle or stall pressures are below the limits previously specified...report the condition to designated person in authority.
7. Remove pressure gauge...install 1/8-inch pipe plug...torque plug to 7 to 12 ft. lbs.

Torque Converter - Stall Check

1. Install tachometer on engine.
2. Apply hand brake.
3. Depress brake pedal...hold in this position.
4. Start engine...engine should be at operating temperature prior to making the following check.
5. Move selector lever to "D" drive range.
6. Depress accelerator to the floor...hold in this position while observing tachometer reading. DO NOT HOLD ACCELERATOR LONGER THAN 10 SECONDS AT A TIME.
7. Converter should stall at 1725 RPM. A stabilized tachometer reading...remaining stabilized or steady for 5 to 10 seconds at normal converter stall speed...indicates the converter is operating normally. Any other tachometer reading should be reported to the designated individual in authority.
8. Shut engine down...remove tachometer.

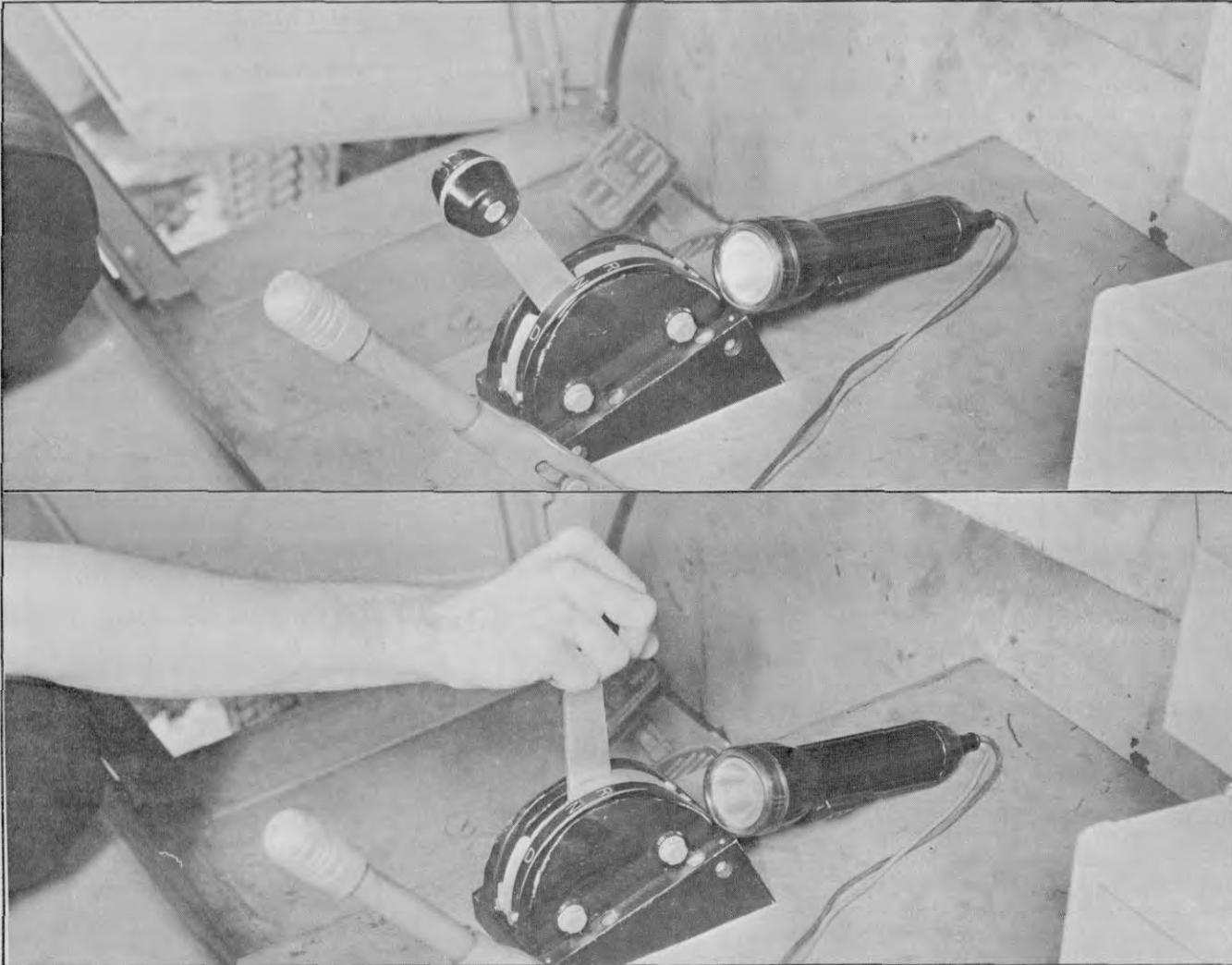


Plate 10499. Neutral Starting Switch Adjustment Using Continuity Tester Light

Neutral Start Switch Adjustment

Using a 3 volt battery and a 3 volt lamp...a continuity (flashlight) tester such as a BRIGHT STAR No 1618 CT circuit tester...check switch as follows:

1. Place tester light next to shift lever...drop tester leads through opening around hand brake lever...
...engine shut down, hand brake applied.
2. Beneath vehicle...transmission cowl...is a wire harness. Two orange wires come out of this harness and attach to the start switch wires at connectors...
...unplug these connectors from switch wires.
3. Connect continuity tester leads to the switch leads...as shown in illustration on opposite page.
4. With shift lever in "N" neutral...tester light should be on.

5. Moving either way...out of neutral...light should go out.
6. Be sure switch is adjusted correctly...rotate switch adjustor nuts in or out until tester light comes on...as outlined in Steps 4 and 5.
7. After obtaining correct adjustment...tighten adjustor nuts securely...disconnect tester light and attach harness connectors to switch wires.

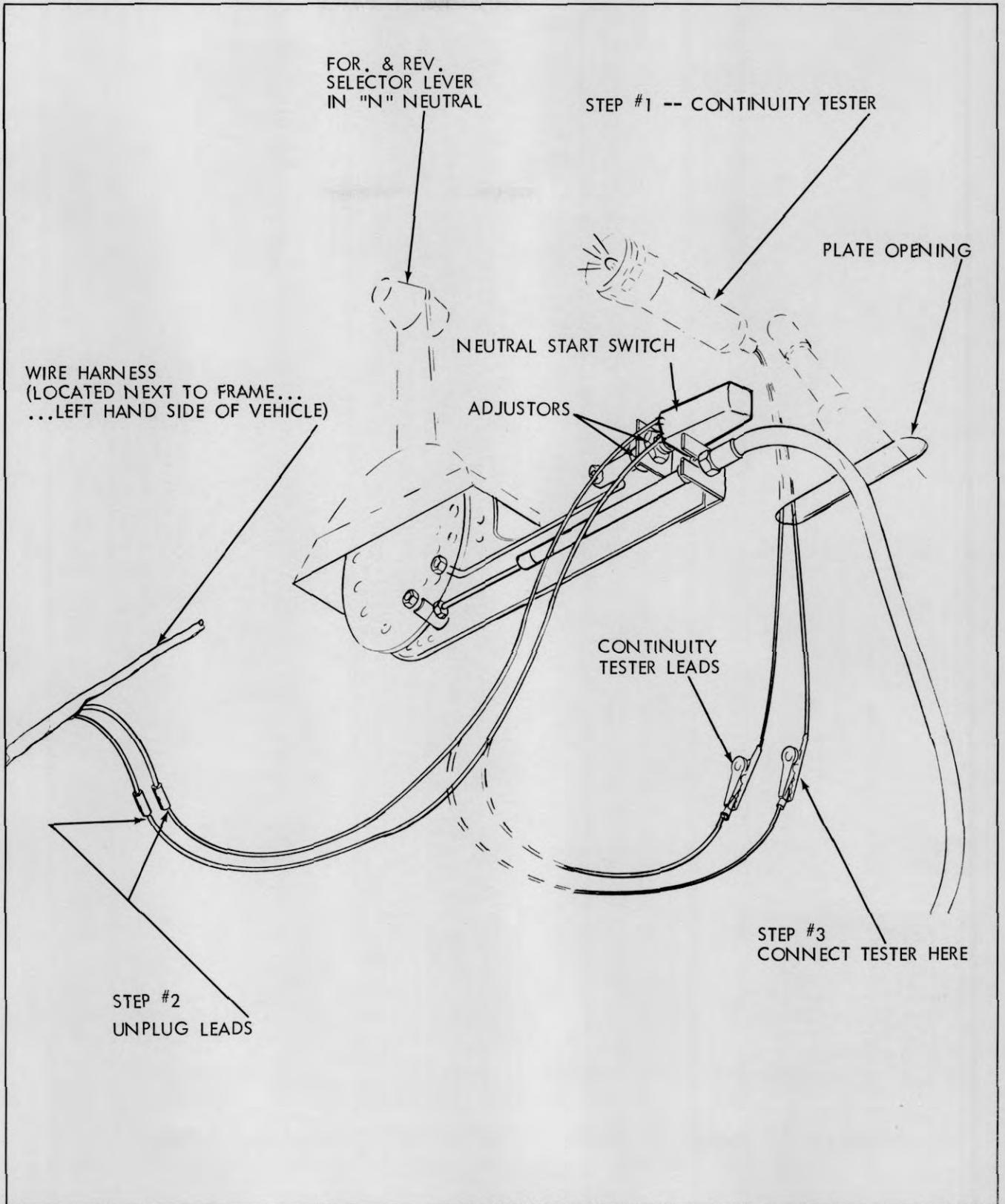


Plate 10500. Tester Leads and Switch & Leads



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LUBRICATION AND PREVENTIVE MAINTENANCE

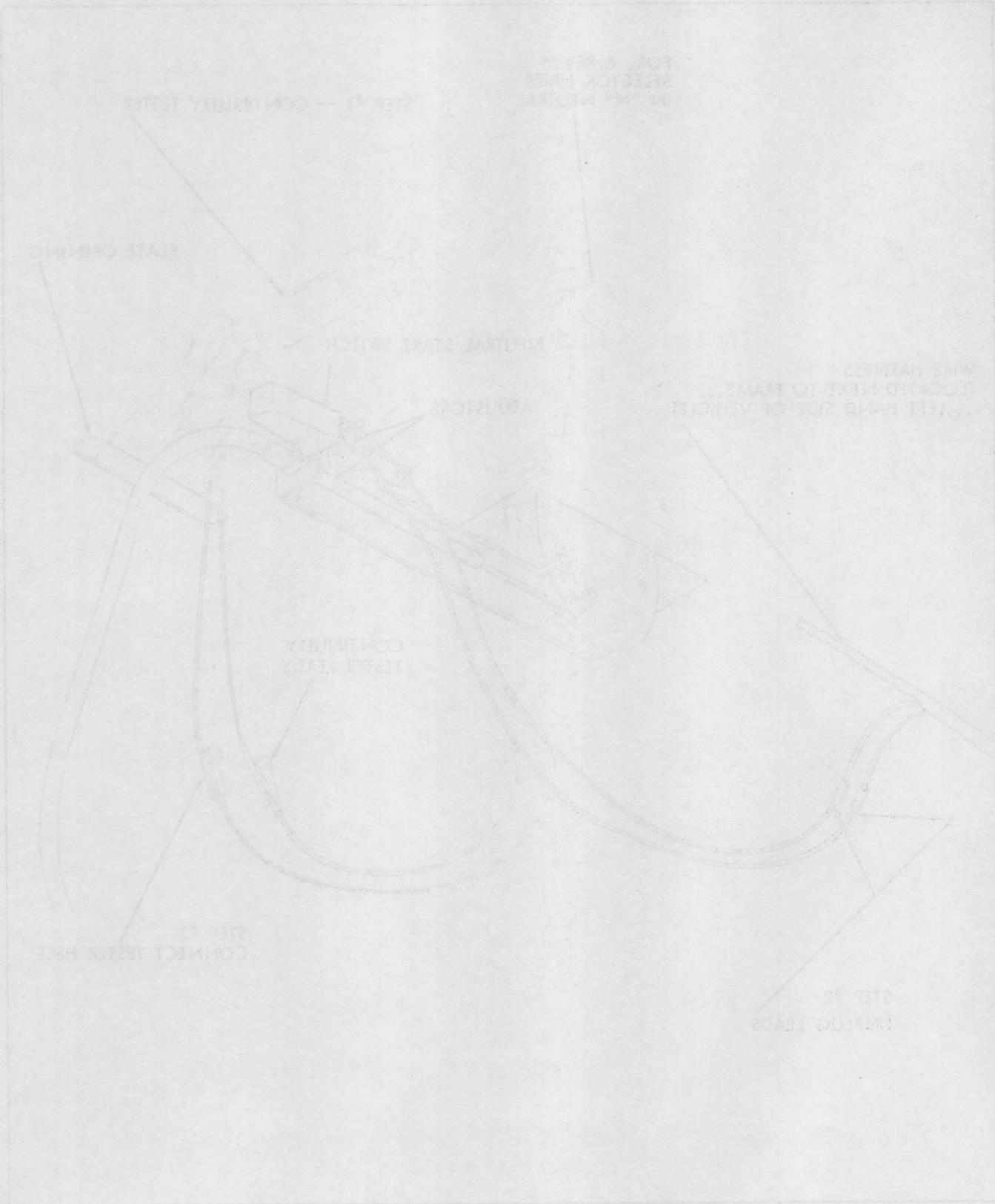


Plate 1000: Test Leads and Switch 2-1000

TROUBLE SHOOTING GUIDE

COOLING SYSTEM

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



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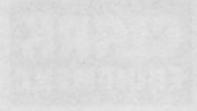
TROUBLE SHOOTING GUIDE

ALTERNATOR TROUBLES

TROUBLE	PROBABLE CAUSE	REMEDY
Noisy alternator.	Worn or dirty bearings Loose mounting bolts. Loose drive pulley. Defective diode. Defective stator.	Report to designated person in authority. Tighten as required. Tighten shaft nut. Report to designated person in authority. Report to designated person in authority.



INDUSTRIAL TRUCK DIVISION



INDUSTRIAL TRUCK DIVISION

INDUSTRIAL TRUCK DIVISION

Model

Capacity

Year

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TROUBLE SHOOTING GUIDE

BATTERY, LIGHTS AND HORN

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



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TROUBLE SHOOTING GUIDE

BATTERY, LIGHTS AND HORN (Continued)

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

Trouble	Cause	Solution
<u>Pressure too high.</u>	Up-shift linkage incorrectly adjusted	Recheck up-shift linkage adjustment between accelerator and transmission linkage...refer to page 1000H 1703.

A PRELIMINARY CHECK OF THE FOLLOWING ITEMS WILL OFTEN ISOLATE THE DIFFICULTY:

- | | |
|---------------------|---------------------|
| 1. Fluid Level | 4. Up-Shift Linkage |
| 2. Engine Idle | 5. Manual Linkage |
| 3. Control Pressure | |

If none of the preliminary checks and subsequent corrections eliminate the difficulty...the following list of causes and corrections will provide a guide for further investigation:

<u>Trouble</u>	<u>Cause</u>	<u>Solution</u>
<u>Initial Engagement Too Rough</u>	Control pressure too high	Clean control valve assembly and pressure regulator assembly.
<u>Initial Engagement Delayed</u>	1. Rear band loose. 2. Control pressure too low at idle speed.	1. Adjust rear band. 2. Clean control valve assembly pressure regulator assembly. (A) Check front pump for wear. (B) Check fluid circuits for leaks, and correct.
<u>Inoperative in all ranges</u>	1. No control pressure. 2. Rear band and/or servo inoperative. 3. Converter failure.	1. Check front pump and front pump drive tangs on converter. (A) Inspect and clean pressure regulator assembly. 2. (a) Check band adjustment. (b) Check rear servo action... with air pressure. (c) Inspect and clean control valve assembly. 3. Check converter operation... refer to 500H 000.
<u>No drive in "D" position</u>	1. Control pressure low. 2. Front clutch will not apply. 3. Rear band will not apply. 4. Transition valve stuck.	1. Clean control valve assembly and pressure regulator valve assembly. 2. Check front clutch action with air pressure. 3. Check rear servo and band with air pressure. 4. Clean control valve assembly.

AUTOMATIC TRANSMISSION TROUBLE SHOOTING

- continued -

Trouble	Cause	Solution
<u>No Drive in "D" Position</u>	<ol style="list-style-type: none"> 1. Control pressure low. 2. Front clutch will not apply. 3. Rear band will not apply. 4. Transition valve stuck. 	<ol style="list-style-type: none"> 1. Clean control valve assembly and pressure regulator assembly. 2. Check action with air pressure. 3. Check rear servo and band with air pressure. 4. Clean control valve assembly.
<u>No Drive in "R" Position</u>	<ol style="list-style-type: none"> 1. Control pressure low. 2. Rear clutch will not apply. 3. Rear band will not apply. 4. Transition valve stuck. 	<ol style="list-style-type: none"> 1. Clean control valve assembly and pressure regulator assembly. 2. Check action with air pressure. 3. Check rear servo action with air pressure. 4. Clean control valve assembly.
<u>Locks up in "D" position (low)</u>	<ol style="list-style-type: none"> 1. Rear band applied. 2. Rear clutch applied. 	<ol style="list-style-type: none"> 1. Check band and servo for mechanical failure. 2. Check clutch for mechanical failure.
<u>Locks Up In "D" Position (direct drive)</u>	<ol style="list-style-type: none"> 1. Rear band applied. 2. Front band applied. 	<ol style="list-style-type: none"> 1. (a) Clean control valve assy. (b) Check band and servo for mechanical failure. (c) Check for broken seal rings and primary sun gear shaft and output shaft. 2. Check band and servo for mechanical failure.
<u>Locks Up in "R" Position</u>	<ol style="list-style-type: none"> 1. Front clutch applied. 2. Front band applied. 	<ol style="list-style-type: none"> 1. Check clutch for mechanical failure. 2. (a) Check band and servo for mechanical failure. (b) Clean control valve assy.
<u>Slips in "D" Position</u>	<ol style="list-style-type: none"> 1. Control pressure low. 2. Rear servo travel limited. 3. Front clutch slips. 4. Rear pump check valve stuck open. 	<ol style="list-style-type: none"> 1. Clean control valve assembly and pressure regulator valve assy. 2. Check servo and band for mechanical failure. 3. Check front clutch for mechanical failure. 4. Clean control valve assembly and check rear pump check valve.
<u>Slips in "R" Position</u>	<ol style="list-style-type: none"> 1. Control pressure low. 	<ol style="list-style-type: none"> 1. Clean control valve assembly and pressure regulator valve assembly.

- continued -

AUTOMATIC TRANSMISSION TROUBLE SHOOTING

- continued -

Trouble	Cause	Solution
- continued - <u>Slips in "R" Position</u>	2. Rear servo travel limited. 3. Rear clutch slips. 4. Rear pump check valve stuck open.	2. Check servo and band band for mechanical failure. 3. (a) Check rear clutch for mechanical failure. (b) Check for broken seal rings on primary sun gear shaft and output shaft. 4. Clean control valve assembly and check rear pump check rear pump check valve.
<u>Upshift Rough</u>	1. Band adjustments. 2. Governor valve stuck.	1. Check and adjust bands. 2. Clean governor valve assy.
<u>Upshift Slips</u>	1. Control pressure low. 2. Band adjustments. 3. Governor valve stuck. 4. Front servo piston travel limited.	1. Clean control valve assy. Clean regulator valve assy. 2. Adjust bands. 3. Clean valve assy. 4. Check with air pressure/correct.
<u>No Upshift</u>	1. Governor valve stuck. 2. Shift valve stuck.	1. Clean valve. 2. Clean valve.
<u>Upshift Early</u>	1. Governor valve stuck.	1. Clean governor valve assy.
<u>Upshift Late</u>	1. Governor valve stuck. 2. Leak in governor circuit. 3. Control pressure too high.	1. Clean valve. 2. Check and correct. 3. Clean valve and regulator valve assemblies.
<u>No Push Start</u>	1. Rear pump inoperative. 2. Pressure regulator valve stuck.	1. Check and correct. 2. Clean valve assembly.

The servicing or repair of the AUTOMATIC TRANSMISSION should be done only by your Authorized CLARK dealer...it is recommended that only band adjustments be performed by the customer...and... the front and rear bands of the transmission be adjusted every 500 operating hours (the same time the fluid is drained for refill). Refer to the Lubrication Key and Charts...pages: 100H 701, 702 and 703.

I M P O R T A N T * * *



INDUSTRIAL TRUCK DIVISION

AUTOMATIC TRANSMISSION TROUBLE SHOOTING



Problem	Causes	Solutions
1. Gear slippage	1. Low oil level 2. Worn gears 3. Worn shafts	1. Check and adjust bands. 2. Clean governor valve assy.
2. Gear noise	1. Control pressure low 2. Shift solenoid 3. Governor valve stick 4. Oil seal leaks (over pressure)	1. Clean control valve assy. 2. Clean regulator valve assy. 3. Adjust bands. 4. Clean valve assy. 5. Check with air pressure/correct
3. Gear lockup	1. Governor valve stick 2. Shift valve stick	1. Clean valve. 2. Clean valve.
4. Gear hunting	1. Governor valve stick	1. Clean governor valve assy.
5. Gear slipping	1. Governor valve stick 2. Oil pressure low 3. Control pressure low 4. Shift solenoid	1. Clean valve. 2. Check and correct. 3. Clean valve and regulator valve assembly.
6. Gear grinding	1. Low oil level 2. Worn gears 3. Worn shafts	1. Check and correct. 2. Clean valve assembly.

The following is a list of the AUTOMATIC TRANSMISSIONS which are used only by your Authorized Clark Dealer. It is recommended that only Clark adjustment be made on the customer's and... the front and rear ends of the transmission to adjust evenly. See operating from the same time the fluid is added. Refer to the Lubrication Manual, pages 1004, 1005 and 1006.

Clark Equipment Company
1000 Clark Drive
Clark, NJ 07066



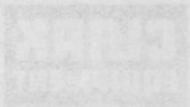
INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

DRIVE AXLE

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



INDUSTRIAL TRUCK DIVISION



FOR THE SHOWING FLOOR

DRIVE AXLE

REMEDY	ROBBER CARD	TICKETS
<p>1. Check for correct tire pressure.</p> <p>2. Check for correct tire tread.</p> <p>3. Check for correct tire alignment.</p> <p>4. Check for correct tire rotation.</p> <p>5. Check for correct tire condition.</p> <p>6. Check for correct tire age.</p> <p>7. Check for correct tire load.</p> <p>8. Check for correct tire speed.</p> <p>9. Check for correct tire temperature.</p> <p>10. Check for correct tire humidity.</p> <p>11. Check for correct tire air quality.</p> <p>12. Check for correct tire noise level.</p> <p>13. Check for correct tire vibration level.</p> <p>14. Check for correct tire wear level.</p> <p>15. Check for correct tire damage level.</p> <p>16. Check for correct tire safety level.</p> <p>17. Check for correct tire performance level.</p> <p>18. Check for correct tire efficiency level.</p> <p>19. Check for correct tire cost level.</p> <p>20. Check for correct tire value level.</p>	<p>1. Check for correct tire pressure.</p> <p>2. Check for correct tire tread.</p> <p>3. Check for correct tire alignment.</p> <p>4. Check for correct tire rotation.</p> <p>5. Check for correct tire condition.</p> <p>6. Check for correct tire age.</p> <p>7. Check for correct tire load.</p> <p>8. Check for correct tire speed.</p> <p>9. Check for correct tire temperature.</p> <p>10. Check for correct tire humidity.</p> <p>11. Check for correct tire air quality.</p> <p>12. Check for correct tire noise level.</p> <p>13. Check for correct tire vibration level.</p> <p>14. Check for correct tire wear level.</p> <p>15. Check for correct tire damage level.</p> <p>16. Check for correct tire safety level.</p> <p>17. Check for correct tire performance level.</p> <p>18. Check for correct tire efficiency level.</p> <p>19. Check for correct tire cost level.</p> <p>20. Check for correct tire value level.</p>	<p>1. Check for correct tire pressure.</p> <p>2. Check for correct tire tread.</p> <p>3. Check for correct tire alignment.</p> <p>4. Check for correct tire rotation.</p> <p>5. Check for correct tire condition.</p> <p>6. Check for correct tire age.</p> <p>7. Check for correct tire load.</p> <p>8. Check for correct tire speed.</p> <p>9. Check for correct tire temperature.</p> <p>10. Check for correct tire humidity.</p> <p>11. Check for correct tire air quality.</p> <p>12. Check for correct tire noise level.</p> <p>13. Check for correct tire vibration level.</p> <p>14. Check for correct tire wear level.</p> <p>15. Check for correct tire damage level.</p> <p>16. Check for correct tire safety level.</p> <p>17. Check for correct tire performance level.</p> <p>18. Check for correct tire efficiency level.</p> <p>19. Check for correct tire cost level.</p> <p>20. Check for correct tire value level.</p>



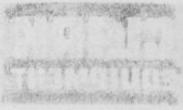
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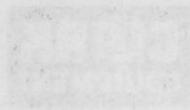
TROUBLE SHOOTING GUIDE

STEERING AXLE

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



INDUSTRIAL TRUCK DIVISION



MODEL NO. 1000000000

DATE

REMARKS

REMARKS

REMARKS

1. The truck is in good condition.
 2. The engine oil level is low.
 3. The tires are worn and need to be replaced.
 4. The brakes are working properly.
 5. The steering is smooth.
 6. The lights are all working.
 7. The horn is working.
 8. The door is working.
 9. The seat is comfortable.
 10. The truck is easy to drive.

1. The truck is in good condition.
 2. The engine oil level is low.
 3. The tires are worn and need to be replaced.
 4. The brakes are working properly.
 5. The steering is smooth.
 6. The lights are all working.
 7. The horn is working.
 8. The door is working.
 9. The seat is comfortable.
 10. The truck is easy to drive.

1. The truck is in good condition.
 2. The engine oil level is low.
 3. The tires are worn and need to be replaced.
 4. The brakes are working properly.
 5. The steering is smooth.
 6. The lights are all working.
 7. The horn is working.
 8. The door is working.
 9. The seat is comfortable.
 10. The truck is easy to drive.



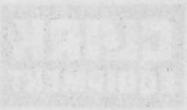
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TROUBLE SHOOTING GUIDE

STEERING

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



INDUSTRIAL TRUCK DIVISION



TRUCKS

STEERING

SYMPTOM	POSSIBLE CAUSE	TRUCKS
Steering wheel binds	Loose steering system components	Steering wheel binds
Steering wheel wobbles	Loose steering system components	Steering wheel wobbles
Steering wheel drifts	Loose steering system components	Steering wheel drifts
Steering wheel vibrates	Loose steering system components	Steering wheel vibrates
Steering wheel turns hard	Loose steering system components	Steering wheel turns hard
Steering wheel turns loose	Loose steering system components	Steering wheel turns loose
Steering wheel turns slow	Loose steering system components	Steering wheel turns slow
Steering wheel turns fast	Loose steering system components	Steering wheel turns fast
Steering wheel turns in one direction	Loose steering system components	Steering wheel turns in one direction
Steering wheel turns in both directions	Loose steering system components	Steering wheel turns in both directions
Steering wheel turns in one direction at low speed	Loose steering system components	Steering wheel turns in one direction at low speed
Steering wheel turns in one direction at high speed	Loose steering system components	Steering wheel turns in one direction at high speed
Steering wheel turns in one direction at all speeds	Loose steering system components	Steering wheel turns in one direction at all speeds
Steering wheel turns in one direction at all speeds and in both directions	Loose steering system components	Steering wheel turns in one direction at all speeds and in both directions
Steering wheel turns in one direction at all speeds and in both directions and vibrates	Loose steering system components	Steering wheel turns in one direction at all speeds and in both directions and vibrates
Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds	Loose steering system components	Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds
Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles	Loose steering system components	Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles
Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles and drifts	Loose steering system components	Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles and drifts
Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles and drifts and turns hard	Loose steering system components	Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles and drifts and turns hard
Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles and drifts and turns hard and turns loose	Loose steering system components	Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles and drifts and turns hard and turns loose
Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles and drifts and turns hard and turns loose and turns slow	Loose steering system components	Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles and drifts and turns hard and turns loose and turns slow
Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles and drifts and turns hard and turns loose and turns slow and turns fast	Loose steering system components	Steering wheel turns in one direction at all speeds and in both directions and vibrates and binds and wobbles and drifts and turns hard and turns loose and turns slow and turns fast

TROUBLE SHOOTING GUIDE

BRAKES

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



INDUSTRIAL TRUCK DIVISION



TROUBLE SHOOTING GUIDE

BRAKES (Continued)

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

Dual Brake System - Test Procedure - Power Brake System - Towing Tractor

Apply brakes...several times...with engine shut down...hold pedal down on last stroke. Start engine...brake pedal should drop or "fall away" slightly under steady pressure...but then should remain firm without further travel or sponginess.

1. If pedal fails to "fall away" check vacuum hose connections for security of mounting.
2. If pedal continues to "fall away" check and tighten all hydraulic connections and bleed screws. Apply pedal again and if pedal falls away to floor...there is a hydraulic leak in the system. Locate and repair leak.
3. If pedal is spongy bleed remaining air out of hydraulic system ...refer to page 1000H 912 for bleeding procedures.
4. If pedal travels beyond the specified free travel this could indicate either of the following conditions:
 1. Lack of fluid in reservoir...fill it... to within 1/4 inch of the top.
 2. Air in the brake system lines...bleed system...refer to page 1000H 912 for bleeding procedures.
 3. Brake linings need adjustment (refer to page 1000H 1003) for adjustment procedures...or, linings need replacement...report to designated person in authority.

