S-407

PARTS, OPERATION, AND MAINTENANCE MANUAL

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Fig. 1-1. MY 40. (Part 1 of 2)

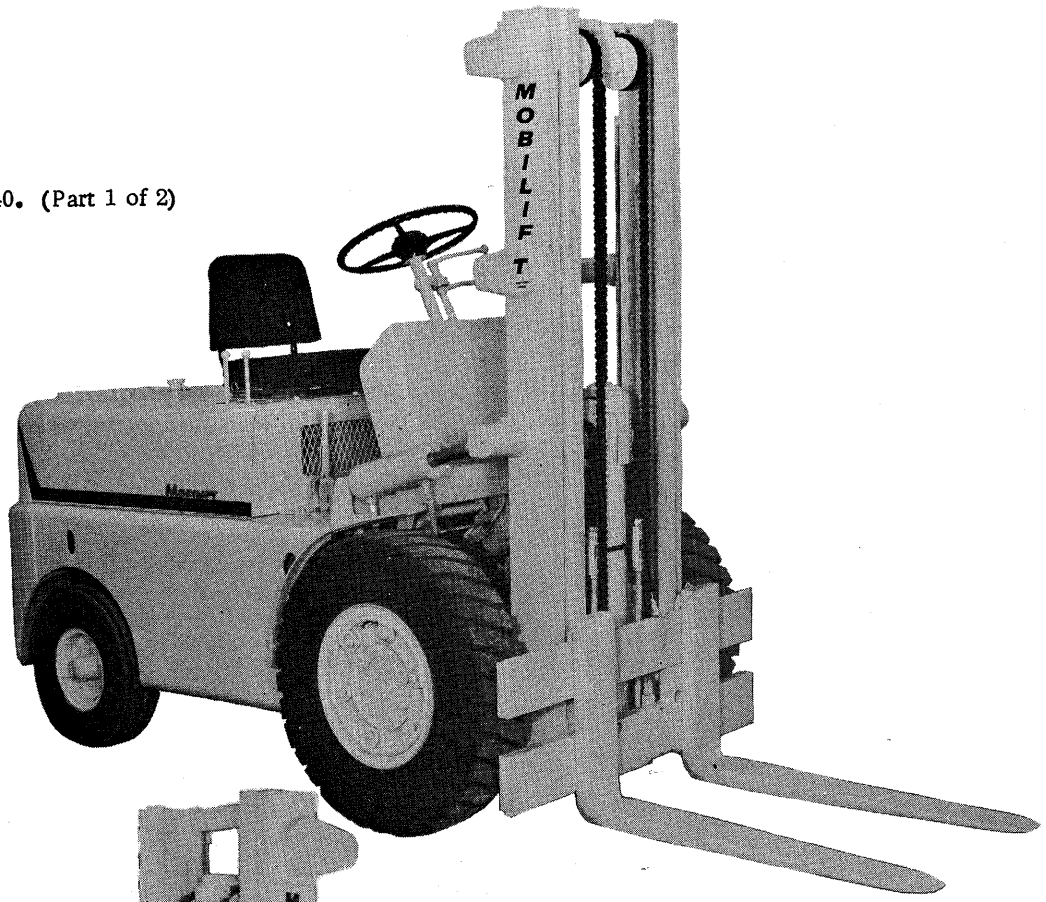
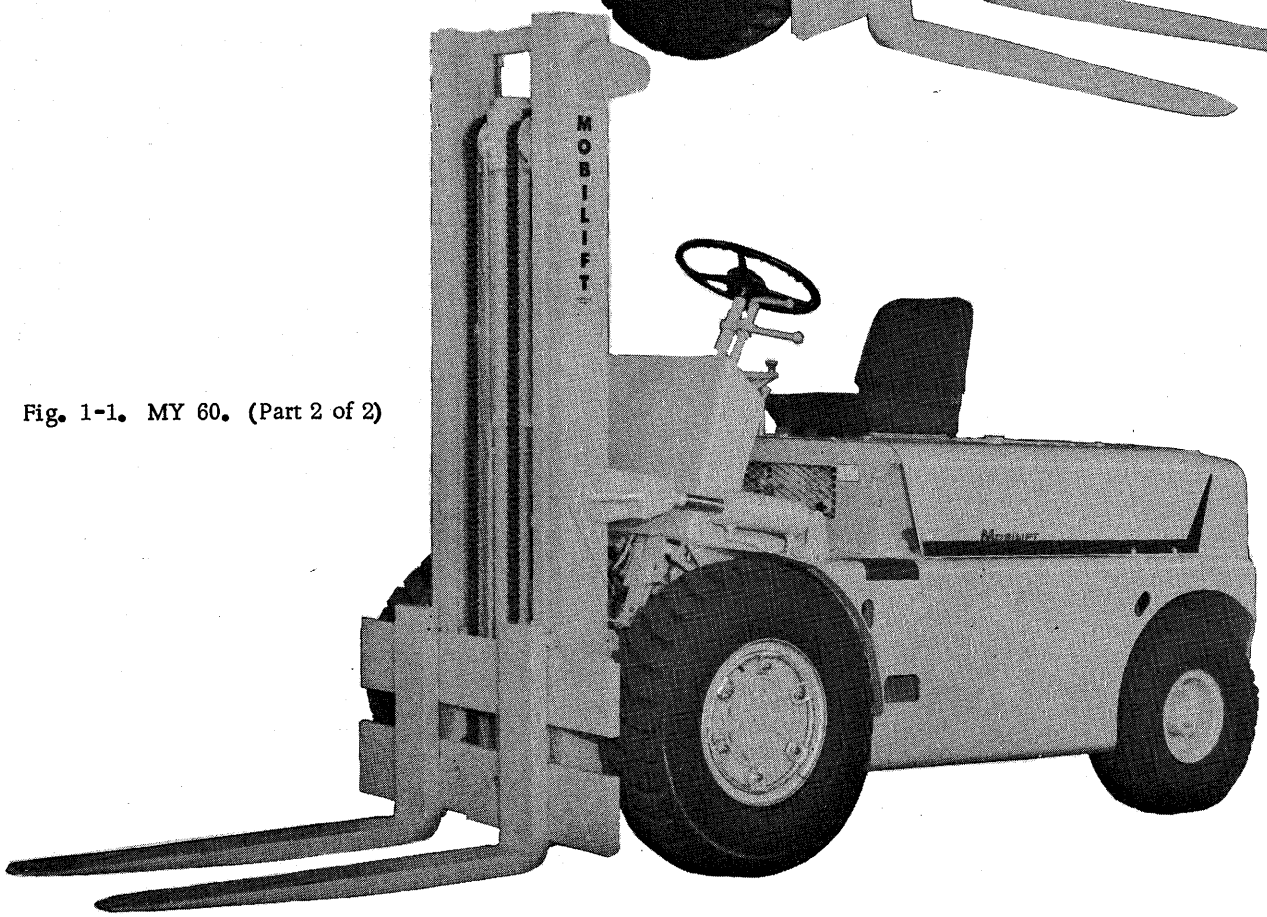


Fig. 1-1. MY 60. (Part 2 of 2)



CHAPTER 1
INTRODUCTION

Section I. General Description

1-1. SCOPE

1-2. This manual provides instructions on the operation, maintenance, and overhaul of the MY Series Lift Trucks. Most of the instructions apply to both the MY 40 and the MY 60. Where there are differences, it will be noted either in the text or paragraph heading.

1-3. It is strongly recommended that all personnel concerned with the various phases of this manual have a thorough knowledge and understanding of the equipment and the instructions pertaining thereof, before performing any procedures with the equipment.

1-4. GENERAL DESCRIPTION

1-5. Due to its design and intended purpose, the equipment will be referred to as "lift truck" or "truck" throughout this manual. Reference to either the right or left sides of the lift truck are made in respect to the normal direction of travel, which is forward.

1-6. The trucks can be equipped with either a gasoline or LP-Gas engine. The MY 40 has a capacity of 4000 pounds, the MY 60 a capacity of 6000 pounds, both at a 24-inch load center.

1-7. The lift truck is a completely self-contained vehicle; its power train consisting of a four-cylinder engine, a hydraulic torque converter, and a multiple disc clutch and power shift type transmission. All these assemblies are integrally mounted together, forming one compact unit, which in turn drives the front axle differential and the front drive wheels. A gear type pump, driven from the engine camshaft, supplies pressure to the hydraulic system. Electrical components of the lift truck utilize the current supplied from one 12-volt battery.

Section II. Detailed Description

1-8. DETAILED DESCRIPTION

1-9. ENGINE. The engine (4, figure 1-2) is a four-cylinder, four-cycle, gasoline or LP-Gas operated, valve-in-head type. Its normal governed speed with no load is 1980 rpm. One complete stroke is required for suction, compression, expansion, and exhaust; thereby providing one power stroke per cylinder for each revolution of the crankshaft.

1-10. TORQUE CONVERTER. The torque converter (3, figure 1-2) is a compact, complete, sealed unit, consisting of an impeller, turbine, and single-stage stator. The charging pump is coupled to the engine flywheel through the impellor hub. The oil from the pump charges the converter and the torque is multiplied by the stator. The turbine is splined to the input shaft in the transmission.

1-11. TRANSMISSION. The transmission (2, figure 1-2) is a power shift gear box equipped with two pairs of hydraulically actuated multiple disc clutches. One set of clutches is mounted on the input shaft and controls the forward and reverse movement of the lift truck. The other set is mounted on the output shaft, and determines either high or low range. The control valve receives pressure from an engine-driven hydraulic pump mounted on the transmission cover. The valve is controlled by the hand levers mounted on the steering column. Both levers must be in an operating position before the lift truck will move.

1-12. INCHING SYSTEM. The inching system is controlled by the inching pedal (1, figure 1-9). The pedal actuates a valve incorporated into the transmission control valve. The inching valve supplies only partial pressure to the clutch. The clutch is thus allowed to slip, thereby delivering only partial power to the drive wheels. This feature provides very slow ground speeds at full engine speed, while the lift mechanism operates at its normal speed.

1-13. DIFFERENTIAL AND DRIVE AXLE. See figure 1-2. Coupled to, and driven by the transmission pinion shaft (output), is the conventional type automotive differential. The assembly is provided with an internal gear reduction at the axle end, which forms an offset in the axle and allows a lower center of gravity for the lift truck. A common lubricant is used for the transmission, differential, and axles.

1-14. STEER AXLE. The rear end of the lift truck is supported by a heavy-duty axle casting which embodies the conventional wheel spindles, steering arms, tie rods, and drag link which in turn is connected to the hydraulic steering booster.

1-15. HYDRAULIC SYSTEM. The hydraulic tank is an integral part of the main frame, on the right hand side. A gear-type pump draws fluid from the tank through the strainer, to a lift and tilt control valve, and to the hydraulic steering booster. Two hand levers, located conveniently to the right of the operator, are used to direct fluid to the lift and tilt cylinders. Fluid under pressure is available at each of the components when the engine is running. Return lines provide a complete circuit when the cylinders or booster are not in actual operation.

1-16. HYDRAULIC STEERING SYSTEM. Steering of the lift truck is accomplished by an 18-inch diameter steering wheel, which is mounted on an automotive-type steering column. A hydraulic steering booster is incorporated into the drag link. As the steering wheel is turned, a valve in the booster opens, and hydraulic pressure from the hydraulic system assists in turning the rear wheels.

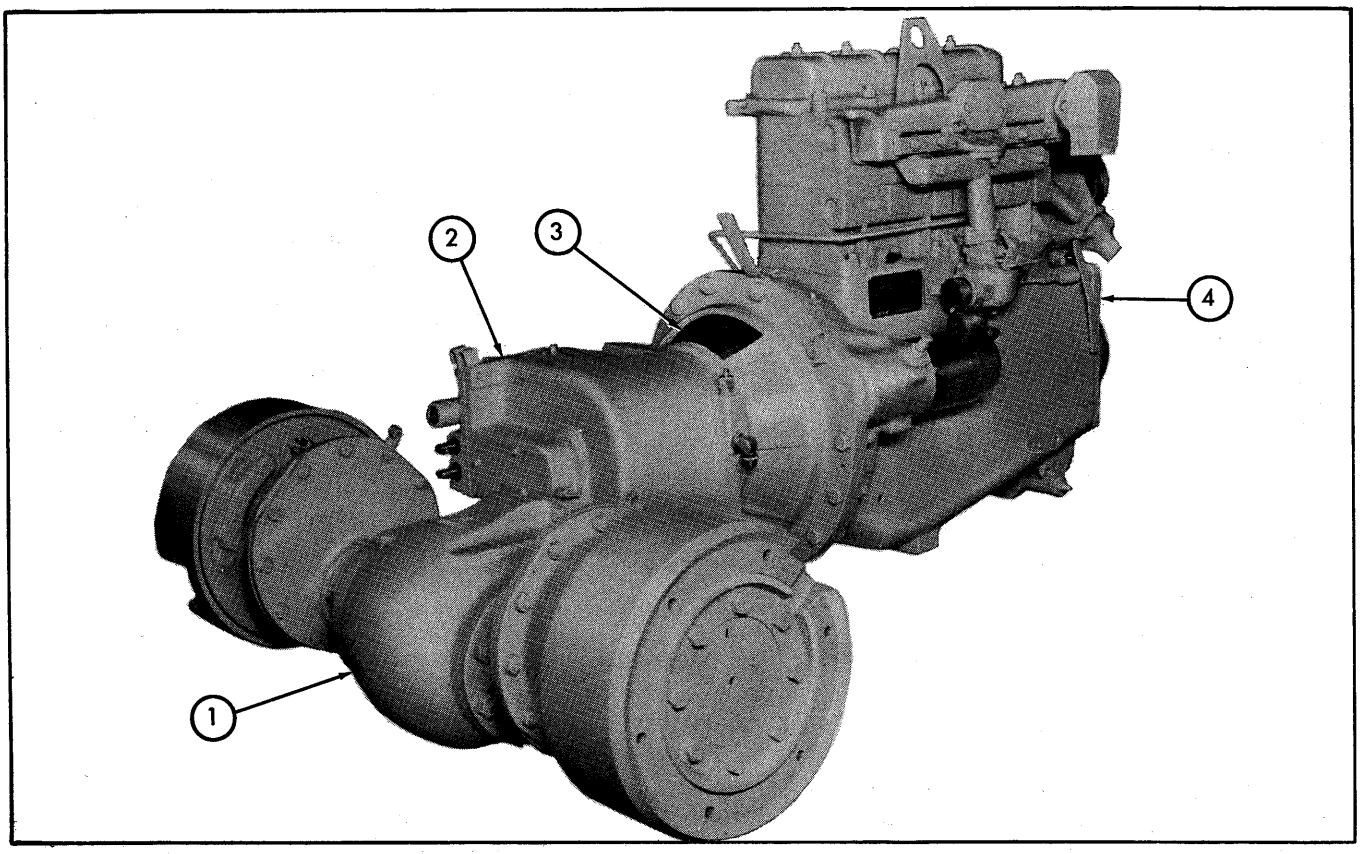


Fig. 1-2. Power Train

1. Differential
2. Transmission
3. Torque converter
4. Engine

1-17. ELECTRICAL SYSTEM. The electrical system consists of a 12-volt battery, generator, distributor, voltage regulator, starter, and the head and tail light. The battery is the basic source of electrical current; the generator maintains the battery in a charged condition; and the voltage regulator govers the amount of voltage output into the electrical system.

1-18. LIFT AND TILT ASSEMBLY. The lift and tilt assembly consists of an upright assembly, forks, a lift cylinder and two tilt cylinders. The lift and tilt mechanism is controlled by two hand levers located to the right of the operator's seat. The lift is capable of lifting its rated load from ground level to a specified height, depending on the mast assembly on the truck. The uprights can be tilted from 6 degrees forward of vertical to 12 degrees aft of vertical. A restrictor valve in the system provides that the load will not drop at a rate of more than 80 feet per minute in case of hydraulic failure or damage to the lines.

1-19. SERVICE BRAKES. The heavy duty type service brake uses two identical brake shoes which are anchored against individual anchor pins mounted in a spider fastened to the axle. Individual shoe return springs, each hooked between an anchor pin and the underside of its shoe table, hold the shoes anchored. A brake backing plate, mounted behind the spider, supports the brake wheel cylinder and provides three shoe support pads for each shoe against which the shoe rests. Shoes are loosely held on the backing plate by hold-down pins and spring clips, two being used on the secondary shoe, one on the primary shoe. Opposite the anchor, brake shoes are linked by a floating star wheel adjuster and a single retracting spring hooked between the shoe ribs so that it engages and locks the star wheel. The star wheel is reached through a slot in the backing plate and is used to expand the shoes as required to adjust lining clearance. The star wheel link causes the shoes to function as a single compound unit. In operation, one shoe, depending upon drum rotation, leaves its anchor. (The "primary" shoe is dragged from its anchor by forward drum rotation while the "secondary" shoe remains anchored. In reverse drum rotation, the "secondary" shoe is the one leaving the anchor.)

1-20. PARKING BRAKE. The same brake shoes are utilized in a cable operated parking brake. A toggle lever, pinned to the rib of the secondary shoe, engages a connecting link, pinned to the primary shoe rib. The parking brake cable is connected at the opposite end of the toggle lever. When the cable is pulled taut, movement of the toggle lever on its fulcrum pin causes the connecting link to expand the shoes into the brake drum.

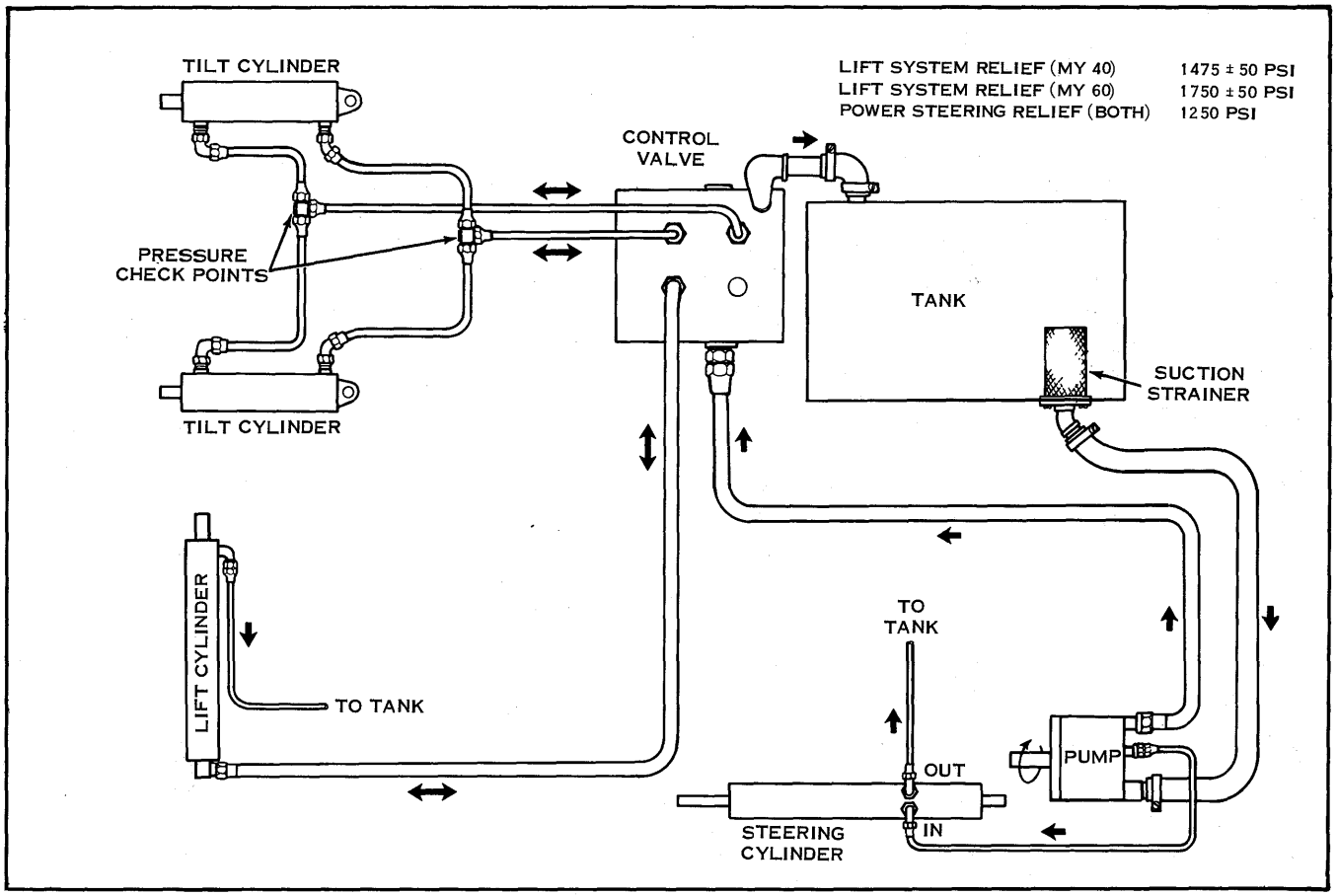


Figure 1-3. Hydraulic Flow Diagram.

1-21. FUEL SYSTEM (GASOLINE). A 16-gallon gasoline fuel tank is an integral part of the frame on the left hand side. It contains a "protected" safety filler cap. The fuel suction line originates at the inside bottom of the tank and emerges at the upper right hand corner of the tank, thereby preventing loss of fuel should a fuel line be broken. A plug is provided at the tank bottom for fuel drainage and cleaning. A fuel shut-off valve is installed in the flexible hose leading from the tank to the fuel pump.

1-22. FUEL SYSTEM (LP-GAS). The LP-Gas system consists of a replaceable tank (33-1/2 pound capacity), a filter, a converter, and the carburetor. The fuel is confined in the tank as a liquid under pressure. When the valve is opened, the liquid passes to the converter where it is changed into a gas, and then is metered to the carburetor.

1-23. COOLING SYSTEM. Cooling of the engine is accomplished by an 18-inch, six-bladed pusher fan, and a water circulating, pressure system radiator. The bottom portion of the radiator is designed with coils to cool the torque converter fluid.

1-24. EXHAUST SYSTEM. Engine exhaust vapors are vented out of the exhaust manifold on the left side of the engine, down through the exhaust pipe, and out the muffler at the rear of the lift truck.

1-25. SERVICING ACCESSIBILITY. See figure 1-4. Raising the appropriate hood section and propping it open with the support rod provides easy access for servicing the battery, air cleaner, generator, starter, distributor, spark plugs, fan belt, engine and transmission oil supplies, filters and dip sticks. The radiator and fuel tank are serviced externally. The hydraulic tank fill tube is located under the right hand hood section.

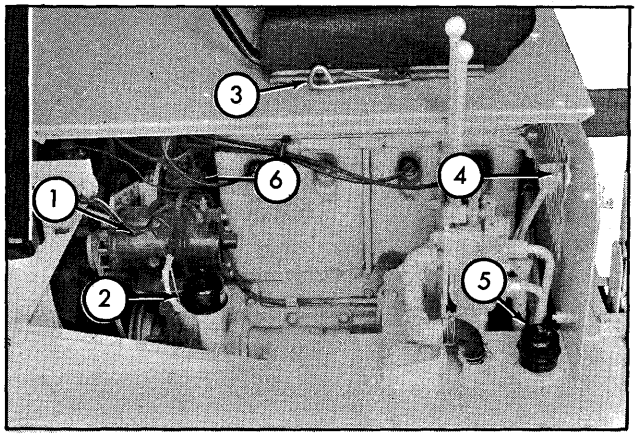


Fig. 1-4. Servicing Accessibility -- Right Side

1. Generator
2. Crankcase oil filler
3. Seat adjustment
4. Engine oil dip stick
5. Hydraulic tank filler
6. Distributor

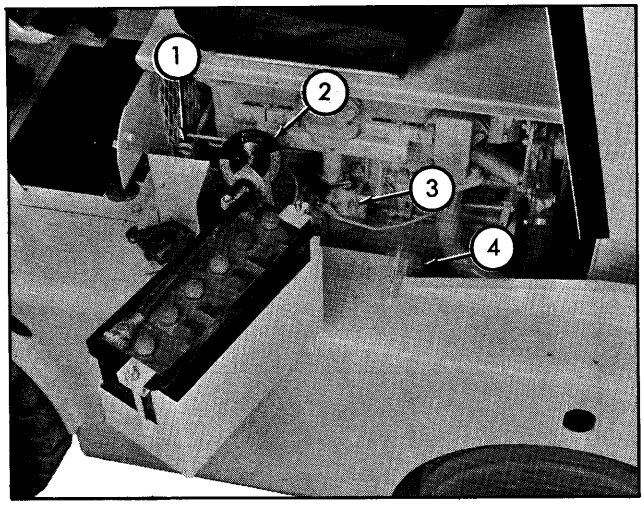


Fig. 1-5. Servicing Accessibility -- Left Side

1. Transmission oil filler and dip stick
2. Air cleaner
3. Carburetor
4. Engine oil filter

1-26. WHEELS AND TIRES. The brake drums for the front or drive wheels are included in the wheel centers. Tire pressures are given in paragraph 2-9.

1-27. SEAT. The seat is adjustable forward and backward. Loosen the mounting carriage bolts under the cushion, slide the seat to the desired position, and retighten the bolts.

1. Pump
2. Pressure relief valve
3. Priority valve
4. Pressure regulator valve
5. Inching valve
6. To brake master cylinder
7. Forward - Reverse valve
8. High - Low valve
9. Reverse clutch
10. Forward clutch
11. Low clutch
12. High clutch
13. Lube
14. Relief valve
15. Converter
16. Heat exchanger
17. Pressure relief valve
18. Filter

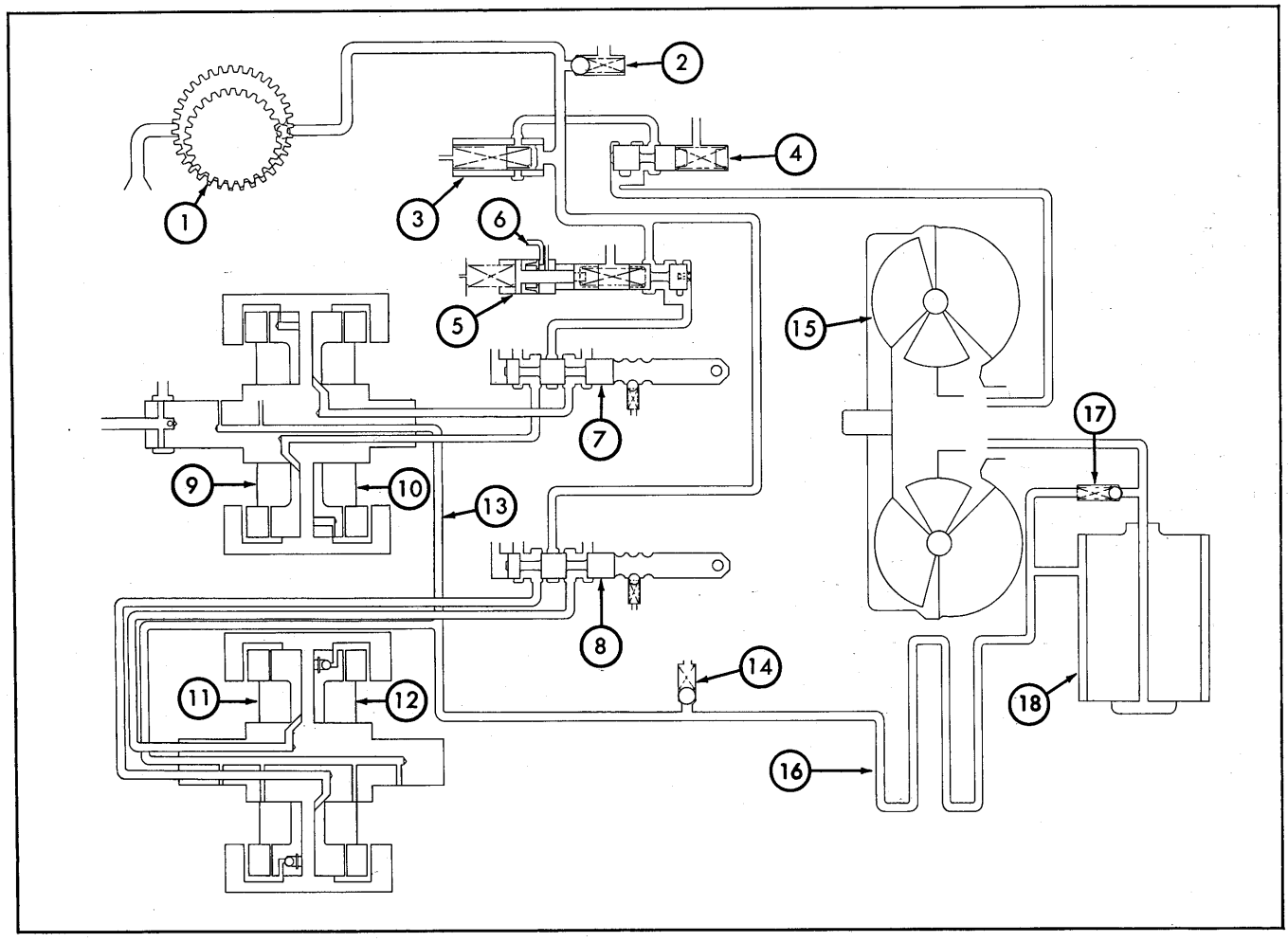


Figure 1-6. Drive System Flow Diagram

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. Initial Preparation for Use

2-1. SERVICE UPON DELIVERY

a. UNLOADING. Since the lift truck may be shipped from the factory in a number of ways, dependent upon geographical location of the final destination, no attempt will be made to cover all methods of unloading procedures. The lift trucks were shipped from the factory in accordance with standard shipping procedures, and should be unloaded from their carriers in a safe, logical manner, and following generally accepted methods.

2-2. REMOVAL OF PROTECTIVE MATERIALS AND DISASSEMBLED COMPONENTS. Remove any protective tape or padding from the lighting components of the lift truck. Remove any components that have been packaged separately and attached to or shipped with the lift truck; refer to the Table of Contents and note the page number on which that component is listed. Install the component accordingly.

2-3. VISUAL INSPECTION FOR SHIPPING DAMAGE. Although every attempt has been made at the factory to protect the equipment against damage during shipment, it is possible for some damage to be incurred. It is necessary, therefore, that a careful, visual inspection be made of the lift truck upon delivery and before placing it in operation. It is further recommended that a written record be maintained which outlines the nature of the damage, and the urgency required in its correction.

2-4. SERVICE PRIOR TO USE. The following procedures are to be accomplished before operation of the lift truck:

2-5. BATTERY.

a. The battery is shipped without electrolyte. Remove the right hand hood section and remove the battery from the lift truck, and discard any vent plug seals. Fill all the cells to the proper level with the electrolyte shipped with the lift truck. Allow the battery to stand for about 20 minutes after filling.

WARNING

Electrolyte can burn or damage the eyes, skin, or clothing. Wear safety glasses to prevent damage to the eyes due to splashed electrolyte. If electrolyte is spilled on the skin or clothing, flush off immediately with a solution of baking soda and water, or some other neutralizing agent, then flush off with clean water.

b. Code date the battery according to the month and year. Stamp the code on the intercell connector nearest the negative terminal of the battery. The first number of the code indicates the month (1-January, 2- February, etc.), and the second number indicates the year (4-1964, 5-1965, etc.).

c. Give the battery a booster charge after it has been filled and dated. Fast charge for at least 10 minutes at the rate of 30 to 40 amps; or slow charge for at least 30 minutes at 10 amps. See paragraphs 3-7, 8, and 9, for battery service procedures and data.

d. If any electrolyte spilled on the battery, flush it off with clean water. Dry the battery before installing.

e. The battery has a negative ground. Install it as shown in Figure 1-7. Install the hold-down clamp and cables.

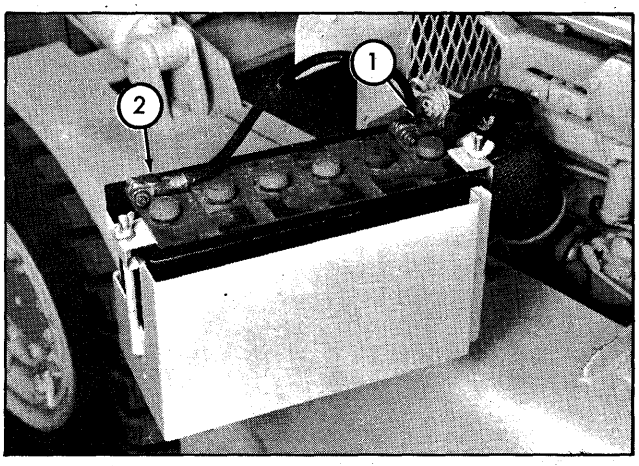


Figure 1-7. Battery

1. Negative post
2. Positive post

2-6. ELECTRICAL SYSTEM. Inspect wiring and connections. Place ignition switch "ON" and test for electrical current to that component. With switch "ON", actuate light switch and inspect the lights for proper response. Test horn.

2-7. FUEL SYSTEM (GASOLINE). Open fuel shut-off valve located in fuel pump line. Open the fill cover of the fuel tank located on the left side of the lift truck; fill as necessary with a good grade of regular gasoline. Close the fuel tank cover, and padlock if desired. Wipe tank free of dirt or fuel hose leakage, and inspect fuel line and engine-mounted accessories for signs of fuel leakage at their connections.

2-8. FUEL SYSTEM (LP-GAS). Open the valve on the fuel supply tank. Check all connections in the fuel line for evidence of leaks. A leak will result in a formation of frost at the point of the leak.

2-9. WHEELS AND TIRES. Inflate front tires to 85 pounds and rear tires to 80 pounds pressure. Inspect tires very closely for nails, glass, or any other foreign particles that may impair tire life.

2-10. HYDRAULIC SYSTEM. Raise the right hand section of the hood and remove the breather cap and dipstick from the hydraulic tank. Fill as necessary in accordance with the lubrication instructions given in figure 1-10. The capacity of the system with either a duplex cylinder or a simplex cylinder is approximately 12 gallons (depending on the cylinder). With the mast in the fully raised position, and all cylinders extended, the fluid should be up to the "Full" mark on the dip stick.

2-11. LUBRICATION. The lift trucks are completely serviced prior to delivery with lubricants specified for the ambient temperatures at the factory, and should require no further lubrication at point of delivery unless temperatures differ greatly from those of the factory. If such is the case, service the lift truck according to the lubrication chart. Figure 1-10.

2-12. LIFT TRUCK BODY. Inspect all sheet metal and fabricated parts for distortion or damage. Tighten all screws and nuts, particularly those of the steering wheel column, instrument panel components, and brake and accelerator pedals.

2-13. COOLING SYSTEM. Remove the engine radiator cap and inspect the coolant level. If weather is above freezing temperatures, add clean water until it covers the radiator core as seen through the fill cap opening. For operation in sub-freezing temperatures, provide the 13.5 quart capacity cooling system with a good grade permanent anti-freeze solution. Inspect for coolant leakage at all connections.

Section II. Operating Instructions

2-14. STARTING THE LIFT TRUCK.

a. If the truck is equipped with an LP-Gas engine, open the valve on the tank slowly. If the valve is opened too fast, an excess flow valve will snap shut and stop the flow of fuel. If this happens, close the valve and wait for a "click". This will indicate that the pressure has equalized on both sides of the excess flow valve. Then open the tank valve slowly.

b. Position the forward-reverse shift lever (4, figure 1-8) in neutral. A neutral starting switch prevents the engine from starting unless the lever is in neutral.

c. Engage the ignition-starter switch (9, figure 1-8) and release it as soon as the engine starts. Do not engage the starter longer than eight seconds. If the engine fails to start on the first try, allow the engine and starting motor drive to come to a complete stop before making a second attempt. This will prevent damage to the starting motor housing, the drive, and the flywheel ring gear. On a gasoline engine, it may be necessary to use the choke (5, figure 1-9). When the engine starts, allow it to warm up gradually to its normal operating temperature (approximately 180° F.). Do not race the engine during this warm-up period.

CAUTION

If, after starting the engine, there is very little or no pressure indicated on the engine oil pressure gage, or if there is a sudden drop in pressure while operating the lift truck, stop the engine immediately and determine the cause. Correction usually consists of replenishing the crankcase oil supply. Located on the instrument panel is a red warning light (1, figure 1-8). This light will glow only when the transmission lubricant temperature is excessive and indicates that the transmission oil supply is dangerously low or restricted and the situation must be remedied before further lift truck operation.

d. Normal procedure would be to shift into either high or low gear from neutral with the lower lever, and then shift into either forward or reverse direction with the upper lever; however, no damage will result if the direction is selected first and then the gear range desired. Both levers must be shifted into an operating position before the lift truck will move.

f. Apply foot pressure on the accelerator pedal and steer the lift truck in the direction selected.

IMPORTANT: DO NOT SHIFT DIRECTIONS ON THE GO. COME TO A COMPLETE STOP, WITH ENGINE AT IDLE SPEED, BEFORE SHIFTING DIRECTIONS.

g. Refer to Table I to correct any malfunction of the lift truck or its components under operating conditions.

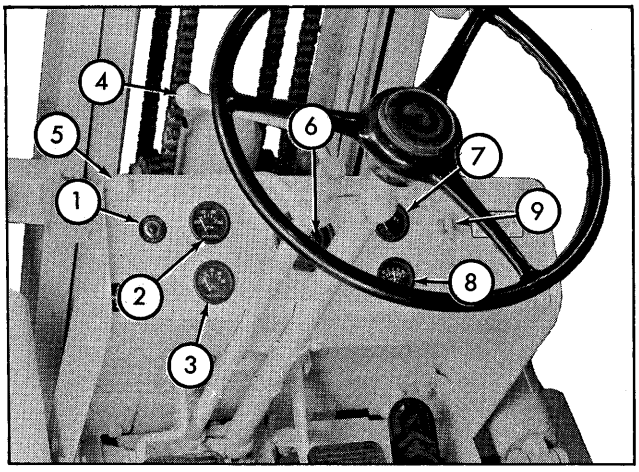


Fig. 1-8. Instrument Panel

1. Warning light
2. Temperature gage
3. Oil pressure gage
4. Forward - Reverse lever
5. High - Low range lever
6. Hourmeter
7. Fuel gage
8. Ammeter
9. Ignition - Starter switch

2-15. LOADING PROCEDURE.

a. Drive the lift truck into position as near the load's center of weight as possible. Place one of the transmission shift levers in neutral; position the forks slightly below the level of the load; drive the truck forward until the forks are directly beneath the load. If the depth of the load permits, drive forward until the load is against the load back rest.

b. Apply the service brakes while lifting the load.

c. Move the lift control handle (closest to operator) to the rear to raise the load. If the nature of the load permits, move the tilt control handle to the rear, to tilt the load rearward against the load back rest for maximum stability.

d. For maximum safety and stability, carry the load just high enough to clear obstacles or uneven terrain.

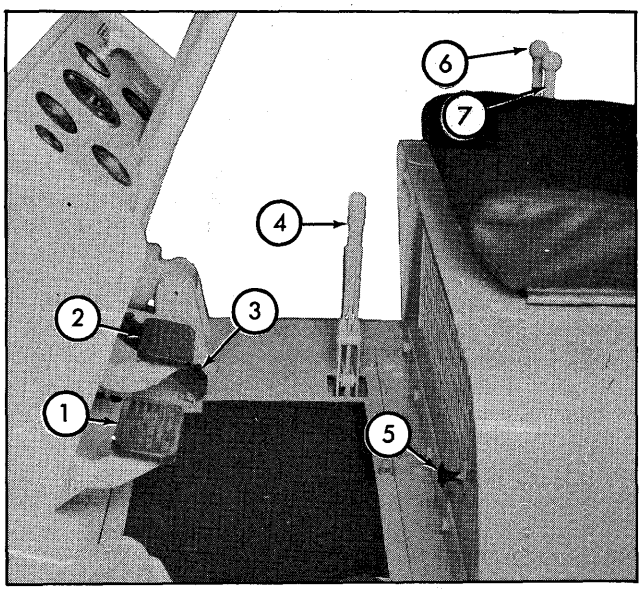


Figure 1-9. Controls

1. Inching pedal
2. Brake pedal
3. Accelerator pedal
4. Parking brake
5. Choke button
6. Tilt control lever (outer)
7. Lift control lever (inner)

2-16. UNLOADING PROCEDURE

a. Drive loaded lift truck to unloading area and position for unloading. Apply the service brakes, and move one of the transmission control levers to neutral.

b. Move lift control lever until load is lowered to the ground or is at the desired height for stacking. If load was tilted rearward against back rest while transporting, move control lever forward until the mast is vertical.

c. Release brakes, place transmission control lever in operative position, and move lift truck slowly forward until load is in desired position. Apply brakes and shift transmission into neutral.

d. Lower forks until they are free of weight of load. Back up lift truck until forks are clear of load. Lower forks to safe transport position.

2-17. INCHING INSTRUCTIONS. The inching valve is controlled by the inching pedal (1, figure 1-9). The upper portion of pedal travel provides inching control; the lower portion of pedal travel applies the service brakes. Depress the accelerator pedal with the right foot to maintain full engine speed while the inching feature is being utilized. Extremely slow ground speeds can be attained for operating in confined or dangerous areas, while the speed of the lift and tilt remains normal.

2-18. STOPPING THE LIFT TRUCK

a. Drive the lift truck to an area suitable for parking and place the transmission control levers in neutral. Apply the parking brake (4, figure 1-9).

b. Tilt the mast slightly forward and lower the forks to the bottom of the mast.

WARNING

Unless conditions prevent, always unload forks and lower them to bottom of mast before leaving lift truck, to avoid danger to personnel.

c. Turn off the lights, if they were used.

d. Turn the ignition switch to the "OFF" position.

2-19. CHANGING LP-GAS TANKS. To change LP tanks, first close the fuel valve. Disconnect the quick coupler and release the clamps. Lift the tank out of the bracket. Install the new tank, secure it with the clamps, and connect the quick coupler. See Fig. 1-16.

IMPORTANT: THE LP TANK MUST BE FILLED IN ACCORDANCE WITH ICC AND LOCAL REGULATIONS.

2-20. SAFETY PRECAUTIONS.

2-21. The following safety precautions must always be observed:

a. Driver should be thoroughly familiar with the lift truck, its capabilities and its limitations, before attempting its operation. Never attempt operation of a lift truck known to be faulty.

b. Provide adequate ventilation in operational areas; avoid prolonged operation in enclosed areas.

c. Constantly check for personnel and obstacles in path of both lift truck and load; keep lifting forks in driver's view whenever possible.

d. Transport load at lowest practical level, for maximum stability and visibility. Avoid sudden stops, sharp turns in either direction, and excessive speed.

e. Never leave the lift truck unattended with engine running or load elevated. Lower forks to bottom of mast and apply parking brakes before leaving lift truck.

f. Strap or otherwise secure load to carriage when descending grades steeper than 10 degrees from horizontal in a forward direction. Do not attempt operation of loaded lift truck on ascents or descents greater than 20 degrees.

g. Do not attempt to lift or transport loads that exceed the rated capacity of the truck.

h. Always secure forks in position with lock levers.

Section III.

PRINCIPLES OF OPERATION

2-22. Instruments and Controls (see figures 1-8 and 1-9).

2-23. OIL PRESSURE GAGE. The oil pressure gage (3, figure 1-8) does not indicate the amount of oil in the crankcase; it indicates the pressure of the oil in the engine lubricating system. The gage electrically senses the oil pressure and reflects it on the gage dial. With the engine at normal operating temperature and speed, the oil pressure should be between 25 and 35 pounds.

2-24. ENGINE TEMPERATURE GAGE. This gage (2, figure 1-8) indicates the temperature of the cooling fluid. Engine operation under normal conditions should register approximately 180 degrees on the gage. Temperatures excessively higher or lower than 180 degrees indicates a dirty or restricted radiator, loss of coolant, or a faulty thermostat or gage. Do not operate the lift truck until these conditions are corrected.

2-25. IGNITION-STARTER KEY. Turning the key (9, figure 1-8) energizes the starting motor which in turn drives the engine flywheel ring gear until combustion takes place in the engine.

2-26. AMMETER. The ammeter (8, figure 1-8) indicates the activity of the electrical system. If the needle indicates a continuous discharge when the engine is operating above an idle speed, the trouble would probably be a loose or broken fan belt, a short in some wire or component of the electrical system, or a faulty generator or regulator. The gage needle should move slightly to the positive side of the "O" mark on the ammeter when the engine is running at full governed speed and the battery is fully charged.

2-27. HOURMETER. The hourmeter (6, figure 1-8) reflects the actual hours of engine operation. Its main purpose is to be the determining factor as to when the lift truck components require maintenance or overhaul procedures.

2-28. WARNING LIGHT. The red warning light (1, figure 1-8) senses the transmission oil temperature and glows only when the temperature is in excess of proper operating limits. This condition is usually remedied by bringing the transmission oil level to full.

2-29. FUEL GAGE

a. Gasoline. The fuel gage (7, figure 1-8) electrically senses and indicates the amount of fuel in the tank.

b. LP-Gas. The gage (1, figure 1-16), indicates the amount of LP-Gas in the tank.

2-30. CHOKE CONTROL (GASOLINE ONLY). The choke control button (5, figure 1-9) is cable-connected to the choke disc in the carburetor assembly. Pulling forward on the choke button closes the choke disc, thereby enriching the air and gasoline mixture and providing quicker starting of a cold engine. Push the choke button in as the engine warms up to operating temperature.

2-32. POWER TRAIN (ENGINE AND TRANSMISSION). Actuation of the various components is achieved in the following sequence: Turning the key energizes the starting motor, which is pinion-meshed with the engine flywheel ring gear teeth. As the ring gear is rotated by the starting motor, the crankshaft is forced to rotate. It is at this point that fuel vapors enter the piston chambers and are ignited by the electrical impulse delivered by the spark plugs. The synchronized firing order of the spark plugs produces a continuous source of driving energy for the crankshaft. The transmission is inter-connected to the engine by a torque converter and plate arrangement, and a series of multiple disc clutches in the transmission allows the operator a selection of two speeds in either forward or reverse direction, and also a neutral position when no travel is desired. The transmission is in turn geared to the differential of the drive axle by means of a bevel pinion and ring gear. Shifting of the levers results in rotating the axle shafts in a clockwise or counterclockwise movement, depending upon which gears are engaged within the transmission housing.

2-33. HYDRAULIC SYSTEM. The hydraulic pump provides a constant flow of hydraulic fluid under pressure when the engine is running. The control levers direct the flow to either the lift or tilt cylinders as desired. Fluid is also supplied directly from the pump to the hydraulic steering booster. Return passages provide a complete circuit for the fluid when the cylinders are not being utilized.

CHAPTER 3
FIELD MAINTENANCE

Section I. Lubrication

3-1. LUBRICATION INFORMATION

a. The lubrication chart (figure 1-10) illustrates lubrication points of the lift truck and prescribes approved lubricants, recommended intervals, and application procedures.

b. In order that the lubricants can accomplish the protection for which they were intended, they must be kept free from dust, dirt, water, or other forms of contaminants.

c. Wipe each lubrication fitting clean with a cloth before applying lubricants.

d. Apply only the grade of lubricant specified for operation under the temperature ranges indicated.

e. It is recommended automotive practice to operate the lift truck immediately after a complete lubrication change in order to distribute the lubricant most effectively.

f. Special or detailed instructions for servicing the lift truck components are outlined in the lubrication chart under "NOTES".

Section II. Preventive Maintenance Services

3-2. PERIODIC IN-SERVICE MAINTENANCE

3-3. GENERAL. The instructions contained in this section are intended to aid the operator in maintaining the lift truck in an efficient, trouble-free condition. It is the purpose of this section to acquaint the operator with the possibilities of equipment malfunction, the indications of malfunction, and the corrective measures to be taken. Thorough understanding of the instructions by the operator is required to prevent minor malfunctions from going unnoticed until a part or a system is damaged beyond repair; resulting in removing the lift truck from service for extended periods.

3-4. SPECIAL MAINTENANCE TOOLS. No special tools are required by operating personnel to maintain the lift truck in serviceable condition. Standard tools, commonly used by automotive mechanics, should be made available to the operator.

3-5. MAINTENANCE CHARTS. In addition to, and summarizing the procedures of this section, Table I is presented in chart form to provide the operator with a ready reference as to typical troubles, the probable cause, and remedy procedures required.

3-6. ELECTRICAL SYSTEM.

NOTE

Disconnect battery ground cable before working on electrical components.

3-7. BATTERY. Battery "life" depends entirely upon proper care and thorough periodic inspections. The most important service in maintaining the battery, is to inspect the electrolyte (liquid) level daily. Add distilled water until the tops of the plates are covered approximately 1/8 inch. If distilled water is not available, use clean rain water or regular drinking water that is low in mineral content. Since the water and the electrolyte in the battery will not mix until charged by the generator current, make a practice of operating the engine for a minimum of one hour after filling if the danger of freezing exists.

WARNING

If the battery electrolyte is accidentally spilled or comes in contact with skin or clothing, immediately apply baking soda or a similar neutralizing agent.

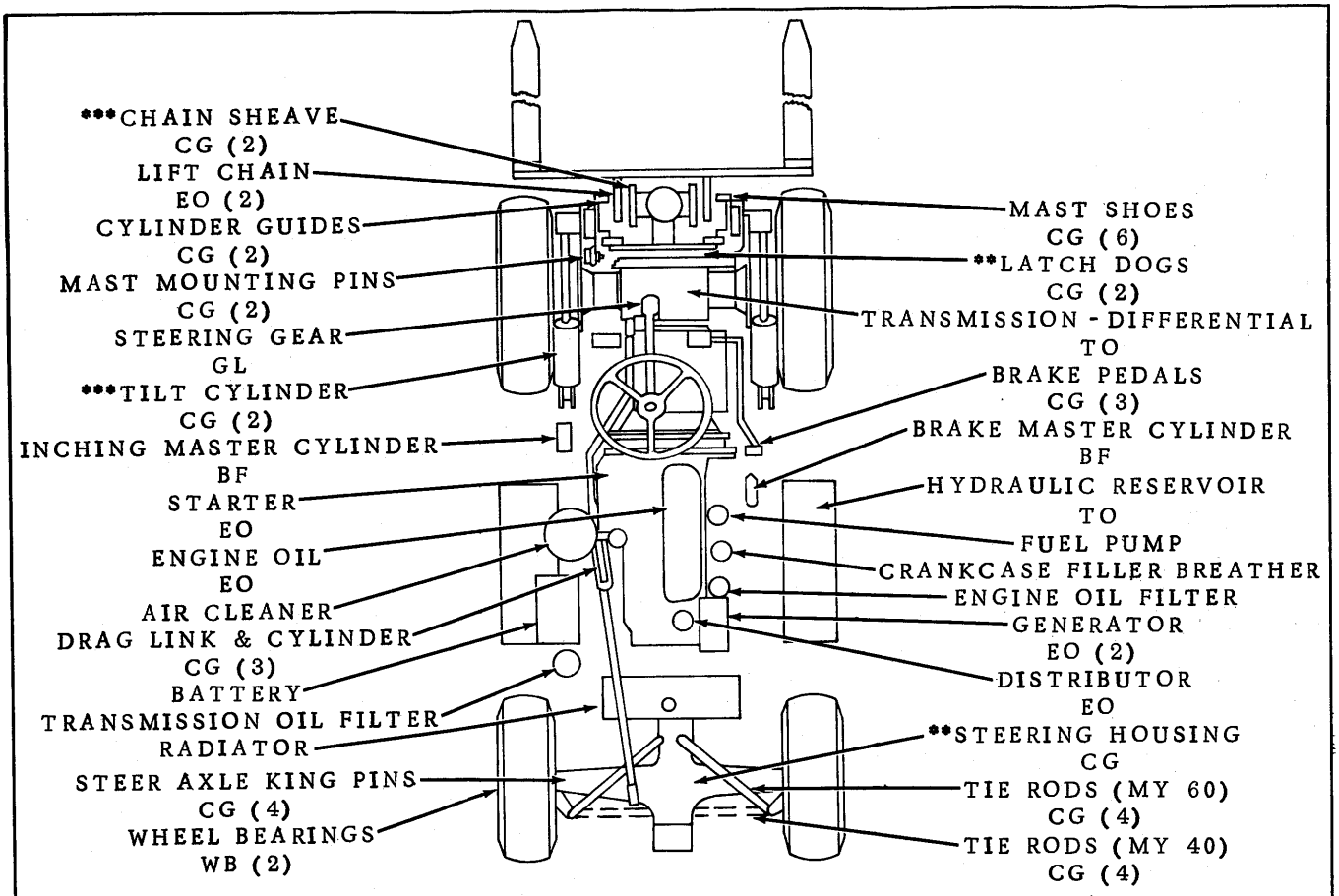
3-8. Use an accurate hydrometer to check the electrolyte specific gravity. When fully charged, the reading should be 1.260 at a liquid temperature of 80^{o} F. Wide variations from this reading between the cells indicates a faulty battery, and requires replacement with a new battery.

WARNING

Since the batteries release highly flammable hydrogen gas when being charged, keep all forms of sparks or flame away from lift truck.

3-9. Clean batteries with a solution of 1/2 pound baking soda mixed with 1 quart of water, apply with a brush, and flush with clean water. Prevent solution from entering vent holes; make sure holes are open after cleaning. Apply a light film of petroleum jelly to the battery terminals and cable clamps to retard corrosion.

3-10. GENERATOR. In addition to maintaining the generator (1, figure 1-4) in a clean condition at all times, a more detailed inspection of the brushes and commutator is required every 500 hours of operation. With the generator mounted on the engine make a visual inspection of the brushes through the openings in the commutator end frame. Do not pull the brushes against the spring tension by the leads. Do not snap the brush arm down against the brushes. Replace worn brushes with new brushes, being sure to tighten brush leads and screws, field leads, and all connections. Brush springs have sufficient tension if they hold the brushes tight against the commutator; re-



CODE	TYPE	CODE	TYPE
CG	Chassis Grease	BF	Brake Fluid
EO	Engine Oil	WB	Wheel Bearing Grease
GL	Gear Lube	TO	Transmission Oil (ATF)

APPLICATION SCHEDULE

LUBE POINT	CODE	HOURS	LUBE POINT	CODE	HOURS
***Chain Sheaves (2)	CG	50	*Mast Shoes	CG	150
Lift Chain (2)	EO	50	**Latch Dogs	CG	150
Cylinder Guide (2)	CG	50	*Transmission & Differential	TO	400
Mast Mounting Pin (2)	CG	50	Transmission Screen	--	400
*Steering Gear	GL	50	Brake Pedals (3)	CG	50
***Tilt Cylinders (2)	CG	50	*Brake Master Cylinder	BF	50
*Inching Master Cylinder	BF	50	*Hydraulic Tank, Screen, Breather	TO	2000
*Starter	EO	400	*Fuel Pump	None	400
*Engine Oil	EO	200	*Crankcase Breather		50
*Air Cleaner	None	400	Engine Oil Filter		400
Drag Link & Cylinder (3)	CG	50	*Generator	EO	400
Battery	W	50	*Distributor	EO	400
*Transmission Oil Filter	TO	400	**Steering Housing	CG	50
*Radiator	W	8	Tie Rods (4)	CG	50
Wheel Bearings (2)	WB	1000	Steer Axle King Pins (4)	CG	50

*See "LUBRICATION NOTES"
**MY 40 Only
***MY 60 Only

Figure 1-10. Lubrication Chart. (Sheet 1 of 2)

LUBRICATION NOTES

Hours listed in "APPLICATION SCHEDULE" refer to actual hours of machine operation. Numbers within brackets () after a lubrication point indicates the number of similar points to be lubricated. An asterisk *, indicates detail lubrication instructions as follows:

*AIR CLEANER. Every 50 hours of normal operation, remove element and shake out accumulated dirt. Every 400 hours of normal operation, install a new element. DO NOT WASH AND RE-USE ELEMENT. Service air cleaner more often if subjected to extreme dust conditions.

*STEERING GEAR. Check oil level every 40 operating hours. Keep reservoir filled with SAE 90 gear lube. Use a high grade straight mineral oil.

*BRAKE AND INCHING MASTER CYLINDERS. Check fluid level every 40 hours. Keep filled to within 1/4" from top. Keep vent holes in filler cap open at all times.

*ENGINE OIL. The crankcase capacity is 5 U.S. quarts; the filter holds an additional quart. Check twice daily, drain and refill every 200 operating hours and change filter every 400 operating hours under normal service.

Engine Oil Type (Use high grade MS oil)

80° F and above	SAE 30
32° F to 80° F	SAE 20 or 30
10° F to 32° F	SAE 10W
10° F and below	SAE 10W

*DISTRIBUTOR. Each 300 operating hours place 3 or 4 drops SAE 10W oil on wick under rotor. Remove plug at side of housing and fill with SAE 20 oil each 300 operating hours. Apply a trace of high quality ball bearing lubricant to the breaker cam every 300 operating hours.

*GENERATOR. Every 60 operating hours, add 8 to 10 drops SAE 10W engine oil to the respective oil cups.

*MAST SHOES. Replace shoes every 1500 hours. Grease full length of rail where shoes rub.

*STARTER. Place 8 to 10 drops SAE 10W oil in oil cup every 300 operating hours.

*HYDRAULIC OIL TANK. Check daily and maintain level at "Full" mark on dip stick, with mast fully raised. Use ATF Type A Suffix A Texaco 1808 or Mobil 200 oil. Drain, clean, and refill every 2000 operating hours. Clean screen at each drain period.

*RADIATOR. Check daily. Refill as required. Add permanent type anti-freeze when air temperature is 32° F. or lower.

*FUEL PUMP. Clean bowl and screen every 400 hours.

*TRANSMISSION. ATF Type A, Suffix A (Mobil Fluid 200, Texamatic 1808, or equivalent). Drain transmission, change filter, and clean suction strainer in transmission case after first 40 hours. Thereafter, change oil and filter and clean strainer every 400 hours of operation. Check oil level daily. Two marks on dipstick allow checking with unit either hot or cold. To check with unit hot, check with the engine idling at normal operating temperature, with both clutches engaged, and with the parking brake set. Level should be up to "FH" mark (Full-Hot) on dipstick. If unit is cold, level should be to "FC" mark (Full-Cold) on dipstick.

*DIFFERENTIAL. The lubricant used in the differential is common to the transmission; therefore, checking and changing are the same. Flushing transmission-differential compartments with solvent at time of oil change is not recommended as ingredients in solvent may attack the quad seal rings and destroy their sealing quality.

*LATCH DOGS. Disassemble and clean out dirt every 300 hours.

TORQUE CONVERTER. The lubricant used in the torque converter is common to the transmission and differential.

BREATHERS. Check and clean the breathers for the crankcase, hydraulic system, and the differential each 60 operating hours. Clean the breather caps in solvent, dip in clean engine oil, then shake out the excess oil.

Figure 1-10. Lubrication Chart. (Sheet 2 of 2)

place springs if they do not. Prevent brushes from sticking by keeping the holders clean. Clean a dirty commutator using a strip of number 00 flintpaper or a brush seating stone, held against the commutator with a piece of flat hardwood while the engine is idling. Blow out all dust and grit with compressed air. Do not use emery cloth to clean the commutator.

3-11. GENERATOR AND FAN BELT. Frequently inspect the fan and generator drive belt for proper tension; a loose or slipping belt will cause engine overheating and reduce generator charging rate and the rpm of the driven pulley. Check belt tension (figure 1-11) by pressing on the belt mid-way between the generator and crankshaft pulleys with a force of approximately 10 pounds. Proper

belt deflection should be 3/4 to 1 inch. Adjust belt tension by loosening generator mounting bolts and the adjusting bar cap screw, pull outwardly on the generator until correct tension is applied, and then tighten nuts and cap screw. Replace a worn or grease-soaked belt as it will not be capable of driving the fan or generator at their proper speeds.

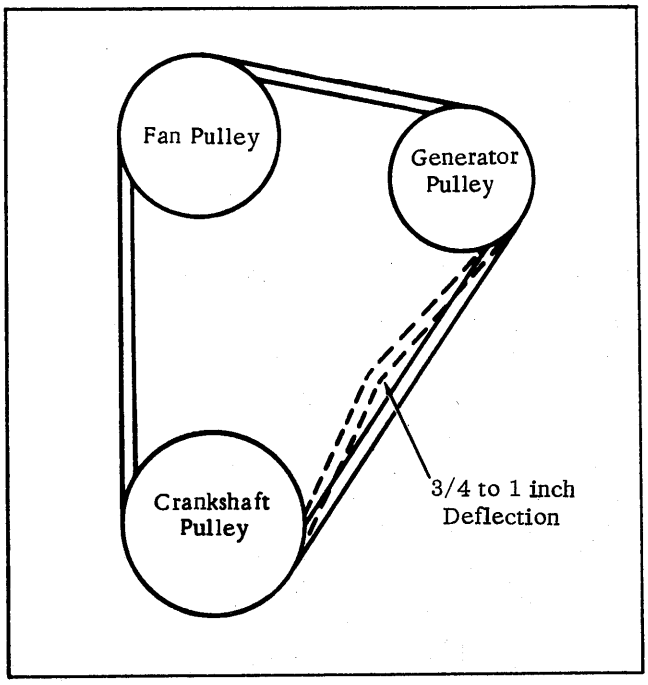


Figure 1-11. Fan Belt Tension

3-12. STARTING MOTOR. Service the starting motor, brushes and commutator in accordance with the instructions outlined for the generator assembly (paragraph 3-10). The commutator end frame must be removed from the starting motor in order to inspect brushes and commutator. If the starting motor pinion fails to engage the engine flywheel ring gear, it indicates a sticking drive pinion and requires removal from the engine. Remove the negative lead wire from the battery, disconnect all wires from the motor, remove the bolts that secure the starting motor to the engine, and withdraw the motor from the engine flywheel housing. Wash the pinion and shaft of the motor with clean kerosene, dry completely, and reinstall on engine. Clean the lead wire terminals and make proper connections of the motor leads and the negative lead of the battery. If starting motor still fails to operate, install a new assembly in its place and tag the faulty motor for overhaul.

3-13. SPARK PLUGS. Whenever engine performance is unsatisfactory, fuel consumption is excessively high, or idling is rough, it is an indication that the most logical component to check first is the spark plugs. Using a 7/8 inch deep socket wrench, loosen the plugs two full turns, blow all dirt away from the ports, and then remove the plugs. Clean plugs with a sand-blast cleaner if available, clean plug threads with a wire-bristle brush, and restore damaged threads in the head ports with a suitable size tap. Clean the sparking surfaces to a bright smoothness with a fine point file. Reset plug gap to 0.023-0.028 inch for gasoline engines; .014-.016 inch for LP-Gas engines by bending the ground or outside electrode, and test with a wire-type feeler gage. Using new copper gaskets, install the cleaned or new plugs, and tighten to 34 foot-pounds torque. If no wrench is available, install finger tight, and then tighten an additional 3/4 turn with the deep socket wrench.

3-14. DISTRIBUTOR. Remove the distributor (6, figure 1-4) cap; wipe it clean with a cloth, and inspect it closely for cracks (usually very thin). Inspect the cap and rotor for chips, cracks, or carbonized paths which allow high-tension leaks to ground. Inspect and discard a cap seal if it is glazed or matted with oil. Check the centrifugal advance mechanism for unbinding movement by turning the distributor shaft in its direction of rotation, and then release it. The advance springs should return the shaft to its original position without sticking. Clean the distributor points with a fine cut contact file. Do not attempt to remove all roughness, but merely remove scale and dirt from the contracting surfaces. Do not use emery cloth or sandpaper as their abrasive particles will imbed in the surface and cause the points to burn. Adjust the point gap to 0.018 inch by turning the engine over until the cam follower block for the breaker lever is on the high point of the cam lobe. Loosen the lock screw, turn the eccentric screw to obtain the above stated gap, and then tighten the lock screw. Apply a light film of ball bearing lubricant to the breaker cam; place two drops of light engine oil on the felt in the distributor shaft. Discard all parts that are worn, burned, pitted, or are in an otherwise unserviceable condition. No further distributor servicing is required for field maintenance; however, if a timing light is available, ignition timing can be checked at this time by following the procedure outlined in paragraph 3-32. Secure distributor cap in its original location on the distributor, and install coil and spark plug wires.

3-15. OIL PUMP. With the engine running at full governed speed and normal operating temperature, the dash panel-mounted oil pressure gage should register between 25 to 35 pounds. Erratic action, flickering, or a sudden lowering in the pressure is not always an indication of oil pump malfunction; check the crankcase oil level, test for a faulty gage by disconnecting the oil gage tube at the engine connection and turn the engine over with the starting motor. If a steady stream of oil comes out of the fitting in the crankcase, the gage is faulty and not the pump. If no oil comes out of the fitting, or the stream is broken or weak, it indicates a plugged oil intake passage or a plugged float screen. Clean the oil passage. Remove the cover from the lower right side of the engine after draining the crankcase oil, remove the cotter pin (1, figure 1-12) that secures the float to the connector tube, and withdraw the float and screen assembly. Thoroughly clean the screen, using clean kerosene, dry completely, inspect for damage, and re-install it in its original position. Remove the oil filter cartridge (27, figure 2-12) and install a new one. An oil pressure

regulator (figure 1-13) is installed on the left side of the oil pump housing. To adjust the oil pressure on the pressure gage, loosen the lock nut of the regulator and rotate the set screw clockwise to increase pressure, and counterclockwise to decrease oil pressure. When the gage indicates low oil pressure and no further adjustment of the regulator setscrews is possible, it indicates that the oil pump gears have too much end clearance or are worn beyond serviceable limits, or that the regulator spring has collapsed or is broken. Drain the crankcase oil, remove the attaching parts that secure the pump to the crankcase, and withdraw the pump assembly. Inspect the gears and spring; remove and replace as necessary. Do not remove the oil pump drive shaft as that would also require removal of the entire distributor assembly which in turn involves retiming of the engine. Such procedures are beyond operator maintenance category. Install and check for drive gear end clearance as outlined in the oil pump overhaul procedures in paragraph 4-129.

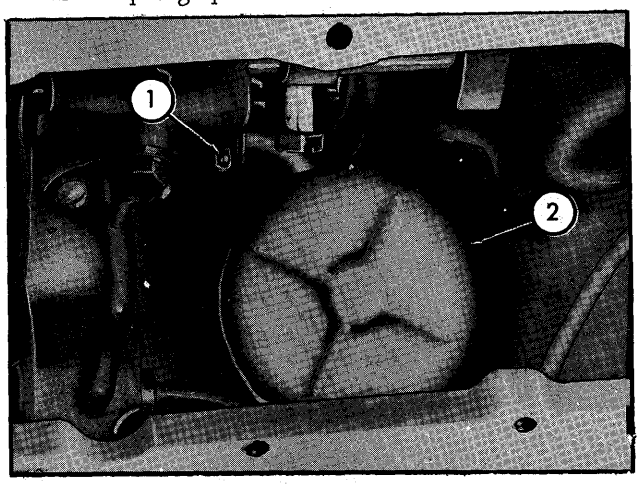


Figure 1-12. Oil Float and Screen

1. Cotter pin
2. Float

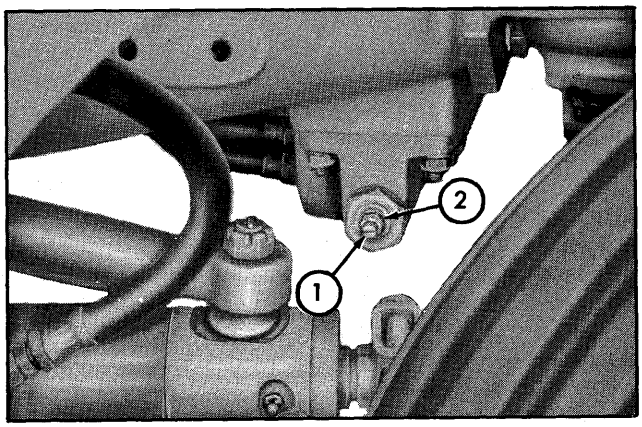


Figure 1-13. Oil Pressure Regulator

1. Adjusting screw
2. Lock nut

3-16. GASOLINE CARBURETOR. (See figure 1-14.) Inspect the linkages for signs of rough edges, paint, or binding. Check all connections for evidence of leaking. If the engine fails to start or does not operate properly, make the following carburetor adjustments:

a. Screw in the idle adjusting needle (2, figure 1-14) until it just seats; then open the needle two full turns.

b. Make certain the idle speed stop screw (1, figure 1-14) is holding the throttle disc slightly open.

c. Start the engine and allow it to warm up at an idle speed of approximately 800 rpm.

d. After the engine has warmed up to normal operating temperature (approximately 180 degrees), release the accelerator pedal and allow the engine to idle.

e. Adjust the idle speed stop screw to obtain the engine idle speed of 450 to 500 rpm.

f. Back out the idle adjusting needle until the engine speed drops from an over-lean gas mixture. Then, turn the needle in until the engine runs smoothly and steadily.

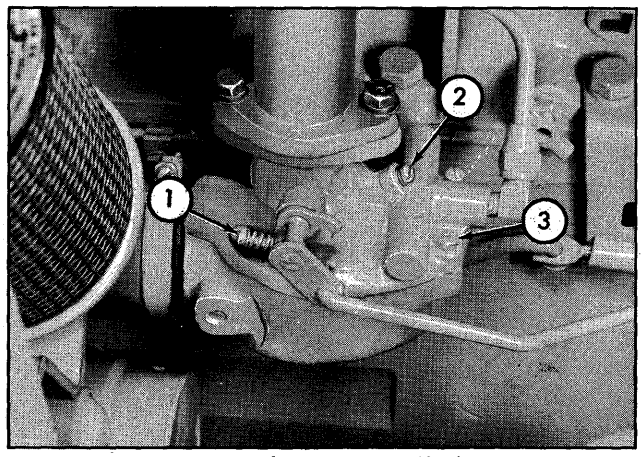


Figure 1-14. Carburetor (Gasoline)

1. Idle speed stop screw
2. Idle adjusting needle
3. Block drain

3-17. LP-GAS SYSTEM

a. Power Adjustment. Set the pointer (not the slot) on the power adjustment screw between 2 and 3. Warm the engine up to normal operating temperature. Turn adjusting screw clockwise to enrich mixture, counterclockwise for leaner mixture.

b. Idle Adjustment. Set the idle speed stop screw to obtain an idle speed of 450 to 500 RPM. Set the idle screw for the smoothest idle (approximately three full turns out).

c. LP-Gas Filter. The filter element needs very little service. Generally speaking, it should be cleaned or

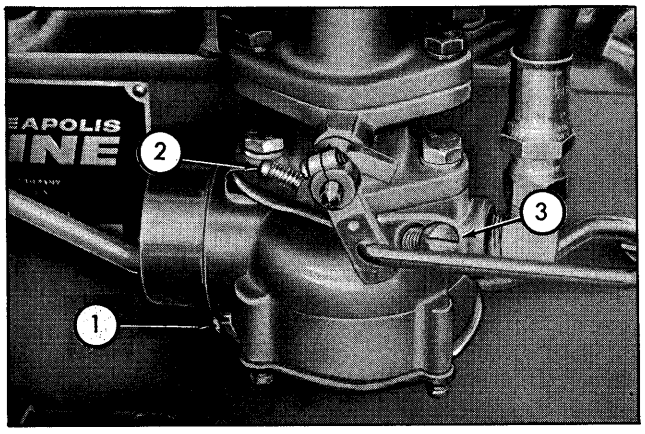


Fig. 1-15. Carburetor (LP-Gas)

1. Power adjustment
2. Idle speed stop screw
3. Idle adjusting screw

changed only if a loss of power is noted which can be traced to no other cause. The element is located in the relief valve assembly. See Fig. 1-16.

d. LP-Tank. It is recommended that the tank be removed when the truck is out of service for any length of time, such as overnight. Store the tank in a safety rack.

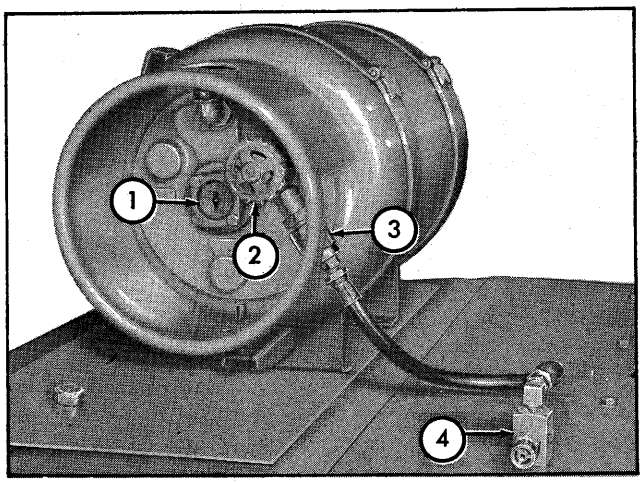


Fig. 1-16. LP-Gas Tank

1. Gage
2. Fuel valve
3. Quick coupler
4. Relief valve

3-18. GOVERNOR. Inspect the governor and carburetor linkages (figure 1-17) for signs of rough edges, paint, or binding. Adjust linkage for proper governed speeds of 1980 rpm as follows: Start the engine and allow it to reach normal operating temperature. Stop engine and disconnect the spring and plunger assembly from the fork shaft lever, disconnect the carburetor control rod, then push the rod back until the lever for the throttle disc shaft is all the way back against its stop on the carburetor. Push the lever for the governor fork shaft all the way back also, (toward carburetor) and then adjust the pivot pin on the carburetor control rod until the pin is 1/16-inch past the upper hole in the governor lever. Insert the pin in the fork shaft lever and secure it with washers and a cotter pin. Lock pin in position with the lock nut. Move the hand throttle control to the idle position and connect the adjusting rod spring to the lower hole in the fork shaft lever, making certain that the adjusting rod plunger is in proper alignment with the lever for the fork shaft. If the plunger is not in alignment, reposition the adjusting rod guide so that the plunger is centered on the lever. Thread the plunger in or out until it contacts the edge of the fork shaft lever, insuring a positive idle position, and then secure with the lock nut. To check the governed speed, move the throttle linkage to the wide open position, and adjust the jam nuts in the direction necessary to obtain the desired governed speed. Tighten the nuts against each other after obtaining desired setting.

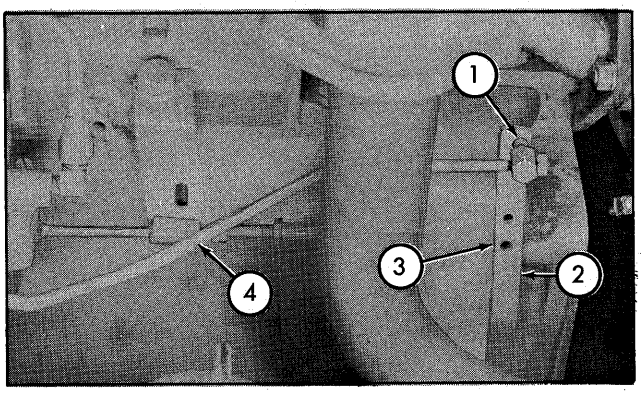


Fig. 1-17. Governor Adjustments

1. Pivot pin 1/16" past hole in arm
2. Arm toward carburetor
3. Plunger spring disconnected
4. Rod against stop on carburetor

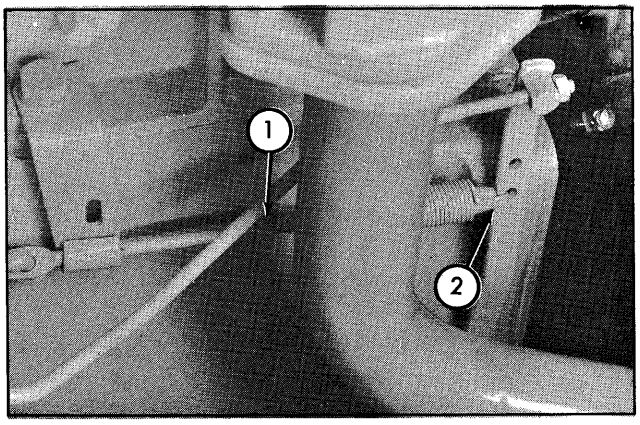


Fig. 1-18. Governor

1. Jam nuts
2. Plunger contacting governor arm

3-19. COOLING SYSTEM.

3-20. The cooling system plays an important role in the life and efficiency of an internal combustion engine. Overheating not only causes the engine to knock and lose power, but also results in damage to bearings and other moving parts of the engine.

3-21. Overcooling, although less sudden in effect than overheating, may be equally dangerous to the engine. Low engine temperatures cause the formation of sludge which interferes with proper lubrication; it also creates harmful acids which attack engine parts.

WARNING

Be careful when removing radiator cap when engine is hot. Turn cap slowly until it reaches vent position, then allow steam pressure to escape before removing.

3-22. A pressure-type cooling system raises the boiling point of the coolant and permits the engine to operate at higher temperatures without coolant loss. A pressure-type system will not function properly unless it is absolutely airtight; consequently, the system must be kept in good condition. Air in the system will also force coolant out of the overflow pipe, reduce the rate of heat transfer, and accelerate rusting within the system.

3-23. The cooling system on a gasoline engine has 3 drains -- the radiator drain, located at the lower side of the bottom tank; and a drain for each engine block (3, figure 1-14). The LP-Gas engine has, in addition, a drain in the converter. Whenever the system is drained, it should be done at the end of a day's run when any foreign material is in suspension and will be removed with the coolant. To insure complete draining, open all drains and remove the radiator cap.

3-24. The type of coolant used in the radiator depends on climatic conditions. If there is no danger of freezing, use a solution of clean, soft water and rust inhibitor; however, if the truck will be exposed to freezing temperatures, use a permanent type anti-freeze.

3-25. Avoid the use of water having a high mineral content or containing other impurities. Water containing minerals or other foreign material will form deposits throughout the cooling system. These deposits, in addition to restricting the proper flow of coolant, act as an insulator to prevent the effective transfer of heat. Clean rain water and a rust inhibitor is a good coolant solution.

3-26. If the danger of freezing exists, fill the cooling system with a permanent type anti-freeze solution. Follow the recommendations of the anti-freeze manufacturer to obtain a solution that will give the desired protection for the lowest anticipated temperatures. After filling the radiator, run the engine until it reaches normal operating temperature and the thermostat opens. This will establish circulation through the radiator and engine blocks to insure proper mixing of the anti-freeze and water. If the solution is not thoroughly mixed, slush ice may form. Slush ice will stop circulation, causing overheating and subsequent loss of coolant. Another reason for running the engine is to release any air trapped in the engine water jacket by the closed thermostat. When the thermostat opens, the trapped air is released and the water passages fill with coolant. Eliminating trapped air lowers the coolant level of the radiator, and more water must be added to fill it to the proper level.

3-27. As mentioned previously, rust inhibitors should always be used in a radiator to protect it against corrosion. Most high-quality anti-freeze solutions are compounded with a rust inhibitor or corrosion deterrent. Do not add a rust inhibitor to these solutions as the chemical reaction may damage the system. Maintain full strength corrosion protection in the coolant system at all times. Corrosion inhibitors tend to lose their effectiveness with use, and we recommend draining the system and renewing the inhibitor every 6 months. In a system that was clean originally, the appearance of rust in the radiator, or in the solution, is an indication that the inhibitor is weakened or exhausted completely. Whenever the cooling system shows signs of rust, the coolant should be drained, the system flushed, and the radiator refilled with fresh coolant containing an inhibitor.

3-28. After the anti-freeze solution is drained in the spring, it is recommended that the cooling system be flushed thoroughly, cleaned if necessary, and a suitable rust inhibitor added to a summer filling of fresh water. In areas where anti-freeze is not required, add rust inhibitor to a fresh filling of water both spring and fall.

NOTE

Flush the system thoroughly before and after the use of anti-freeze solutions.

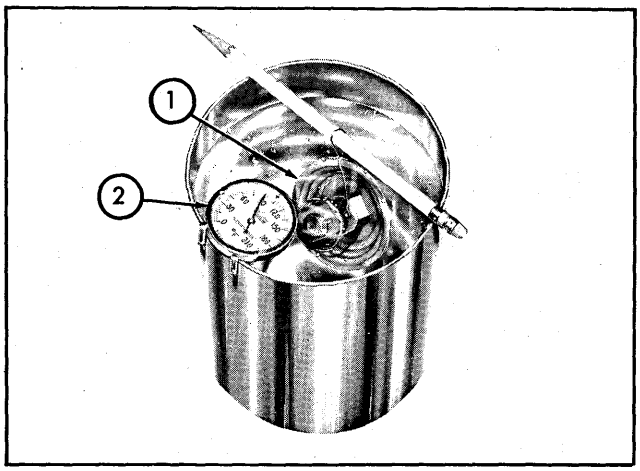


Fig. 1-19. Checking Thermostat

1. Thermostat
2. Thermometer

3-29. Efficient operation of the cooling system requires an occasional cleaning--particularly at seasonal changes when anti-freeze solution is added or drained. The proper method of cleaning depends on the condition of the system. The exterior of the radiator should also be cleaned regularly. Dirt, insects, or other foreign material will clog the radiator fins and reduce cooling efficiency. Clean the fins with forced air or water. Straighten any bent fins noticed during the cleaning operation, but be careful not to damage the tubes or break the bond between fins and tubes.

3-30. To check the thermostat, suspend it and a thermometer in a container of clean water. Heat the water and observe the opening and closing temperature. If the valve fails to open and close within 10 degrees of the rated opening temperature (180 degrees), replace the thermostat.

3-31. TIRES. Tires are an integral and expensive part of the lift truck. It is important that they be kept in the best possible condition as follows:

a. Tires should always be kept inflated to the recommended pressure.

b. The lift truck should never be driven at high speed over rocky or rough ground.

c. When the lift truck is not in use, it should be kept out of the sun as much as possible. Sunlight causes surface checking of the tires.

d. The lift truck should not be parked on oily or greasy floors. Oil and grease deteriorate rubber and shorten tire life.

e. Tire damage should be repaired immediately. Small breaks or cuts allow dirt and moisture to enter and cause fabric rot.

f. If the lift truck is to be out of service for any length of time, it should be blocked up to take the weight off the tires. If this is not possible, check the tires regularly and keep them inflated to the recommended pressure.

3-32. ENGINE TIMING. (See figure 1-20). To check the timing, connect a 12-volt timing light to the spark plug for the number 1 cylinder (the one closest to the radiator end of the engine). Set the accelerator to obtain an engine speed of 1980 rpm. Allow the engine to warm up to normal operating temperature. Direct the timing light at the timing point (2, figure 1-20) and the crankshaft sheave. As the light flashes, the timing mark (1, figure 1-20) on the sheave should line up with the pointer. If the mark does not line up with the pointer, loosen the distributor lock nuts, and rotate the distributor body to correct the timing. Tighten the lock nuts.

3-33. STORING THE LIFT TRUCK.

3-34. If the lift truck is to be stored for an extended period of time, the following steps should be taken to prevent unnecessary deterioration and to insure top performance when the lift truck is returned to service.

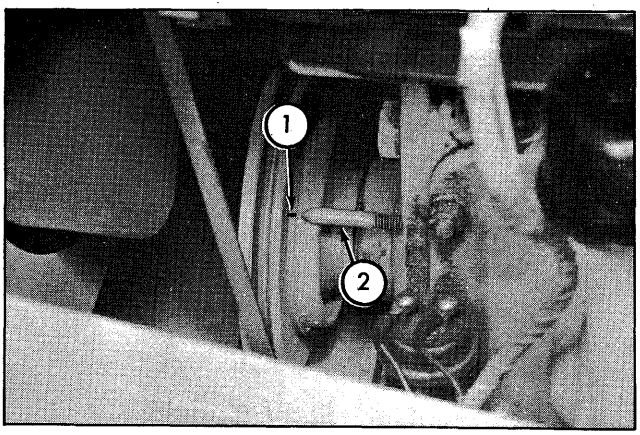


Figure 1-20. Engine Timing

1. Timing mark
2. Timing pointer

a. Drain the crankcase, transmission-differential compartments, and discard the oil filters. Install new filters and refill the units with the specified grade of fresh oil.

b. Thoroughly lubricate the lift truck, and service the air cleaner and breathers according to the instructions given in this manual. Drive the lift truck for a short distance to distribute the fresh lubricants.

c. Drain and flush the cooling system. Leave the radiator and block drains open to prevent the collection of condensation.

d. Drain the fuel tank, fuel filter, and carburetor. Make certain the system is completely drained as any fuel remaining in the system will oxidize and form gummy deposits. Leave the shut-off valve and the carburetor drain open. Clean the fuel filter. If the truck has an LP-Gas system, close the fuel valve, remove the tank, and store it in a safety rack.

e. Remove the valve covers and flush the valves, rocker arms, and push rods with heavy oil (SAE 30) to prevent rust.

f. Remove the spark plugs and pour a liberal amount of engine oil into each cylinder. Turn the engine over several times to distribute a protective oil film on the pistons and cylinder walls.

g. Remove the battery and store it in a cool, dry place where it will not freeze. Keep the battery fully charged, and maintain the proper electrolyte level. A run-down battery will deteriorate rapidly when stored. If the terminals and the top of the battery appear corroded, clean them with a stiff brush and a solution of baking soda and water. Make certain the vent holes in the filler caps are open.

h. Drain and flush the hydraulic system. Remove the strainer (43, figure 2-34) from the hydraulic tank and clean it. Refill the tank to the specified level in accordance with the lubrication chart (figure 1-10). Operate the hydraulic controls for several minutes to distribute the new fluid throughout the system. Contract the cylinders during storage.

i. Thoroughly clean the lift truck. Check for worn or damaged parts, and make any necessary repairs, replacements or adjustments. Touch up any areas where the paint has worn or rubbed off.

j. Block up the lift truck to take the weight off the tires. If the weight is left on the tires, they may take a "set" and become permanently damaged.

k. Store the lift truck in a dry building; however, if it cannot be stored inside, cover it with a tarpaulin.

3-35. TROUBLE SHOOTING.

3-36. Trouble shooting involves taking the proper steps to locate the source of a trouble, and then correcting the trouble. Do not confuse trouble shooting with an engine tune up. In an engine tune up, all parts of the system where the trouble is occurring are checked. For example, in an ignition tune up, the battery, which is the source of electrical energy, is tested first; then the battery cable connections are inspected, etc. This checking and testing is continued in successive steps until each portion of the system that can have an influence on other portions is thoroughly tested and any abnormalities corrected.

3-37. In trouble shooting the serviceman wishes to isolate the part responsible for the trouble by quickly eliminating all other parts. For example, suppose the engine misses (misfires) under a heavy load. In about 85 per cent of the engines with this trouble, it will be found that the ignition system is at fault.

3-38. The first step in trouble shooting the ignition system is to check the spark output from the ends of the spark plug wires. Check each wire by holding it 1/16-inch away from the engine block while cranking the engine with the ignition switch turned on. If each wire shows a good spark, it indicates that the ignition system from the ends of the spark plug wires to the battery is satisfactory. Thus, nothing would be gained by checking the distributor, battery, battery cables, ignition switch, etc. By this one test, it has been established that the ignition system is delivering a satisfactory spark to each spark plug. Since the rest of the ignition system has been eliminated, it is logical to assume that faulty spark plugs are responsible for the trouble.

3-39. Trouble shooting can be applied to any part of the lift truck that is not functioning properly and follows the same pattern.

a. First, confirm the suspected condition before proceeding with any tests.

b. Next determine and recognize the possible causes.

c. Finally isolate the cause (or causes) by performing a series of quick tests to eliminate the others.

TROUBLES, CAUSE, AND REMEDY

TROUBLE	POSSIBLE CAUSE	SUGGESTED REMEDY
ENGINE IS HARD TO START OR FAILS TO START	No fuel in carburetor.	Make sure fuel shut-off valve is open. Check fuel lines and filter.
	Water in fuel.	Open carburetor drain to check for water. Drain system and refill with fresh fuel if there is evidence of water.
	Water in cylinders.	Check head gasket.
	Weak spark.	Check ignition system.
	No spark.	Check wiring and connections.
	Incorrect ignition timing.	Check ignition timing.
	Incorrect valve adjustment.	Check valve clearances.
	Restricted air intake.	Clean and service air cleaner.
	Restricted exhaust.	Clean soot and foreign material from exhaust passages.
	Poor compression.	Check valves, rings, etc.