TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

TRUCK, FORK LIFT; 4000 LB CAPACITY; 144 IN. LIFT; GASOLINE ENGINE DRIVEN (BAKER MODEL FJF-040; ARMY MODEL MHE-211) FSN 3930-935-7963

This copy is a reprint which includes current pages from Changes 1 and 2.

HEADQUARTERS, DEPARTMENT OF THE ARMY

MARCH 1971

WARNING

DANGEROUS CHEMICALS

are used in this equipment.

SERIOUS INJURY OR DEATH

may result if personnel fail to observe these safety precautions. Avoid contact with the battery electrolyte. If the solution comes in contact with the skin, rinse the area immediately with clear water to avoid skin burns. Do not smoke or use an open flame in the vicinity when servicing batteries as hydrogen gas, an explosive is generated. Use only distilled water to maintain battery electrolyte level.

WARNING

FIRE OR EXPLOSION HAZARD

SERIOUS INJURY OR DEATH

may result if personnel fail to observe these safety precautions. Do not fill fuel tank while engine is running. Provide metallic contact between the fuel container and fuel tank to prevent a static spark from igniting fuel. Wipe or flush any spillage.

WARNING

ASPHYXIATION DANGER

The engine exhaust gases contain carbon monoxide, which is a colorless, odorless, and poisonous gas.

DEATH

or nausea may result if personnel fail to observe safety precautions. Do not operate the forklift truck in a closed building without providing adequate ventilation.

WARNING

Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional.

CHANGE
No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *8 April 1974*

Operator and Organizational Maintenance Manual

TRUCK, FORK LIFT; 4000 LB CAPACITY;
144 IN. LIFT; GASOLINE ENGINE DRIVEN
(BAKER MODEL FJF-040; ARMY MODEL MHE-211)
FSN 3930-935-7963

TM 10-3930-623-12, 17 March 1971, is changed as follows:
Inside Front Cover. Add the following warning to the list of safety precautions:

WARNING

Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional.

Page 1-1. Paragraph 1-2 is superseded as follows:

1-2. Recommendation for Maintenance Publications Improvements

You can help to improve this manual by calling attention to errors and by recommending improvements. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed direct to: Commander, US Army Troop Support Command, ATTN: AMSTS-MPP, 4300 Goodfellow Blvd., St. Louis, MO 63120. A reply will be furnished direct to you.
Page 4-1. Immediately after Section IV title, add the following warning:

WARNING

Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional. (Refer to TB MED 251)

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:

VERNE L. BOWERS
Major General, United State Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25A (qty rqr block No. 894), Organizational maintenance requirements for Warehouse Equipment.

CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *16 May 1972*

Operator and Organizational Maintenance Manual

**TRUCK, FORK LIFT; 4000 LB CAPACITY;
144 IN. LIFT; GASOLINE ENGINE DRIVEN
(BAKER MODEL FJF-040; ARMY MODEL MHE-211)
FSN 3930-935-7963**

TM 10-3930-623-12, 17 March 1971, is changed as follows:

Page 3-1. Paragraph 3-3.1 is added as follows:

3-3.1. Maintenance and Operating Supplies

A list of maintenance and operating supplies required for initial operation of the fork lift truck are contained in table 3-1;

Table 3-1. Maintenance and Operating Supplies

(1) Component Application	(2) Federal Stock No.	(3) Description	(4) Quantity Required F/Initial Operation	(5) Quantity Required F/8 Hrs Operation	(6) Notes
Crankcase		Oil lubricating (1)			(1) Includes quantity of oil to fill engine oil system as follows: 4 qt-crankcase 1 qt-oil filter
	9150-265-9435(2)	OE 30	5 qt	(1), (3)	
	9150-265-9428(2)	OE 10	5 qt	(1), (3)	
	9150-242-7603(2)	OES	5 qt	(1), (3)	
Hydraulic Brake Cylinder		Brake Fluid: Automotive, 1 gallon can as follows			(2) See C9100 - IL for additional data and requisitioning procedures
	9150-252-6375(2)	HBA	1/2 PT	(3)	(3) See current LO for grade application and replenishment intervals (LO 10 - 3930-623-12).
Hydraulic Reservoir		Oil Lubricating: 55 gallon drum as follows:			(4) Fuel tank capacity
	9150-265-9430(2)	OE 10	12 1/2 gal	(3)	
	9150-242-7605(2)	OES	12 1/2 gal	(3)	
Radiator		Water			
		Antifreeze, 5 gallon can as follows:		as	
	6850-224-8730	Ethylene Glycol, type 1	13 qt		
		Antifreeze: 5 gallon drum as follows:			
	6850-174-1806	Arctic grade	13 qt		
Fuel Tank		Fuel, Gasoline: Bulk as follows:			
	9130-160-1818(2)	Automotive Combat 91A	12.7 gal (4)		
	9130-160-1830(2)	Automotive Combat 91C	12.7 gal (4)		
Transmission and Differential	9150-698-2382	Type A Automatic Transmission Fluid Suffix A, 1 qt. can	16 qt	(3)	
Grease Points		Grease, Automotive and Artillery: 5 lb. cans as follows:			
	9150-190-0905(2)	GAA			

Page B-1. Appendix B is superseded as follows:

APPENDIX B
BASIC ISSUE ITEMS UST AND ITEMS TROOP INSTALLED OR AUTHORIZED

Section I. INTRODUCTION

B-1. Scope

This appendix lists items required by the operator for operation of the fork lift truck.

B-2. General

This list is divided into the following sections:

a. Basic Issue Items List-Section II. Not applicable.

b. Items Troop Installed or Authorized List Section III. A list of items in alphabetical sequence, which at the discretion of the unit commander may accompany the fork lift truck. These items are NOT subject to turn-in with the fork lift truck when evacuated.

B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items List, Section II, and Items Troop Installed or Authorized, Section III.

a. Source, Maintenance, and Recoverability Code(s) (SMR) :

(1) Source Code, indicates the source for the listed item. Source codes are:

Code	*Explanation*
P	Repair parts, special tools and test equipment supplied from GSA/DSA or Army supply system and authorized for use at indicated maintenance levels.
P2	Repair parts, special tools and test equipment which are procured and stocked for insurance purposes because the combat or military essentiality of the end item dictates that a minimum quantity be available in the supply system.

(2) Maintenance Code, indicates the lowest level of maintenance authorized to install the listed item. The maintenance level code is:

Code	*Explanation*
C	Crew/Operator

(3) Recoverability Code, indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are nonrecoverable. Recoverability codes are:

Code	*Explanation*
R	Applied to repair parts (assemblies and components), special tools and test equipment which are considered economically reparable at direct and general support maintenance levels.
S	Repair parts, special tools, test equipment and assemblies which are economically reparable at DSU and GSU activities and which normally are furnished by supply on an exchange basis.

b. Federal stock number. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description. This column indicates the Federal item name and any additional description of the item required.

d. Unit of measure (U/M). A 2 character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

e. Quantity furnished with equipment (BIIL only). This column indicates the quantity of an item furnished with the equipment.

f. Quantity authorized (Items troop installed or authorized only). This column indicates the quantity of the item authorized to be used with the equipment.

g. Illustration (BIIL only). This column is divided as follows:

(1) *Figure number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item number.* Indicates the callout number used to reference the item in the illustration.

Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) SMR Code	(2) Federal stock number	(3) Description Ref No. & Mfr on code / Usable on code	(4) Unit of meas	(5) Qty Auth
	7510-889-3494	BINDER, LOOSE LEAF	EA	1
	7520-559-9618	CASE, MAINTENANCE AND OPERATING	EA	1
I		MANUALS		
	4210-889-2221	EXTINGUISHER, FIRE	EA	1

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:

VERNE L. BOWERS,
Major General, United States Army,
The Adjutant General.

Distribution:
To be distributed in accordance with DA Form 12-25A (qty rqr block No. 894) organizational maintenance requirements for Warehouse.

WARNING

OPERATING HAZARD

SERIOUS INJURY OR DEATH

to the operator or personnel may result if operator does not observe these safety precautions and is not alert at all times while operating the forklift truck. Use extreme care when high tiering. Position elevated load with slight back tilt of mast directly over loading spot, then tilt mast forward to stack. Use caution when approaching doorways, aisles, intersections or other workers. Always travel with mast tilted back and fork raised Just high enough to clear any uneven floor conditions. Avoid sudden starting and stopping. Reduce speed on turns. Know the rated capacity of the fork lift truck and do not overload it. Never pick up a load until certain it can be carried safely. Make sure the load is steady before lifting and keep the load against the carriage rest. When transporting bulky loads, travel in reverse. Always descend ramps in reverse when carrying load. Do not butt loads with the forks or with the rear of the truck.

WARNING

MAINTENANCE HAZARD

SERIOUS INJURY OR DEATH

to personnel may result if the fork lift is not blocked securely before crawling under the fork lift truck.

The format of this manual is not in accordance with established Department of Army specifications because of the short leadtime involved. The technical content has been furnished by the equipment manufacturer and augmented with a Maintenance Allocation Chart (MAC), Basic Issue Items List (BIIL) to assure that it provides the essential data needed to operate and maintain the equipment.

TECHNICAL MANUAL

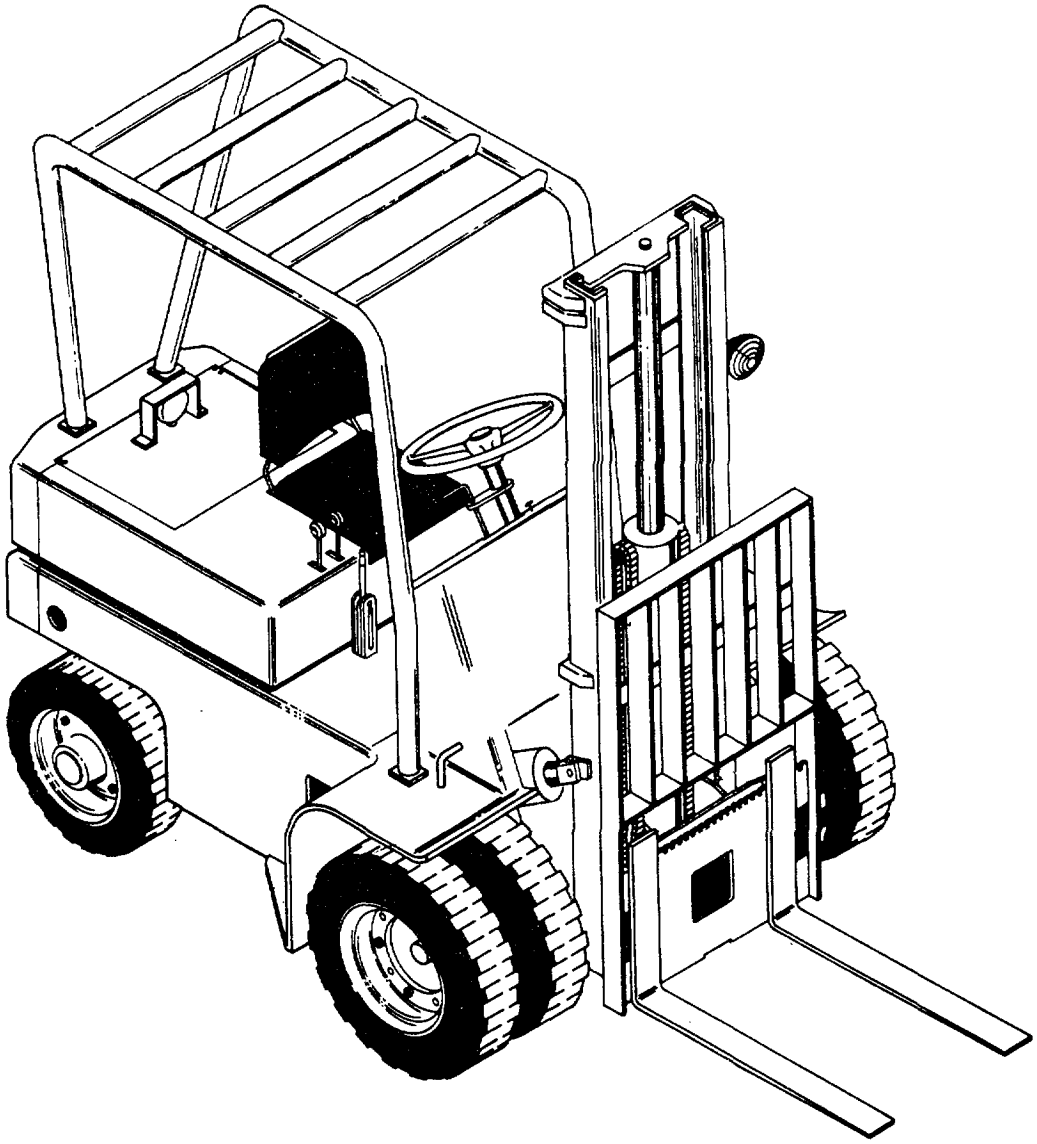
NO. 10-3930-623-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *17 March 1971*

Operator's and Organizational Maintenance Manual

TRUCK, FORK LIFT, 4000 LB CAPACITY,
144 IN. LIFT, GASOLINE ENGINE DRIVEN
(BAKER MODEL FJF-040; ARMY MODEL MHE-211)
FSN 3930-935-7963

LIST OF ILLUSTRATIONS



2012-1

Figure i. FJF-040 Fork Lift Truck

SECTION I

INTRODUCTION AND GENERAL DESCRIPTION

1-1. INTRODUCTION.

1. Scope. These instructions are published for the information and guidance of personnel to whom the forklift truck is issued. information is provided on the operation, preventive maintenance services, and organizational maintenance of the equipment, accessories, and components.

2. Demolition and Administrative Storage

a. For information on the administrative storage of this equipment, refer to TM 740-90-1.

b. For information on the demolition of this equipment, refer to TM 750-244-3..

3. Maintenance Forms and Records. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

1-2. Recommendation for Maintenance Publications Improvements

You can help to improve this manual by calling attention to errors and by recommending improvements. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed direct to: Commander, US Army Troop Support Command, ATTN: AMSTS-MPP, 4300 Goodfellow Blvd., St. Louis, MO 63120. A reply will be furnished direct to you.

1-3. GENERAL DESCRIPTION.

1-4. The Model FJF-040 fork lift truck is a front loading unit rated to handle loads to 4000 pounds at 24 inch load centers. Pneumatic tires permit satisfactory operation of the truck off paved surfaces.

1-5. Handling of loads is accomplished by engaging the two 40 inch fork prongs with the load. The forks are mounted on a hydraulically operated mast assembly which can raise the load to a height of twelve feet for stacking of commodities handled. The mast is tiltable ten degrees rearward to cradle the load when traveling, to three degrees forward to facilitate disengaging the load when depositing it. Travel speed of the trucks is limited to about 12 miles per hour loaded, or 14 miles per hour empty, by an engine speed governor. Steering is power assisted. Arrangement of the controls conforms to general industrial truck standards, permitting ready use by operators with previous fork lift experience.

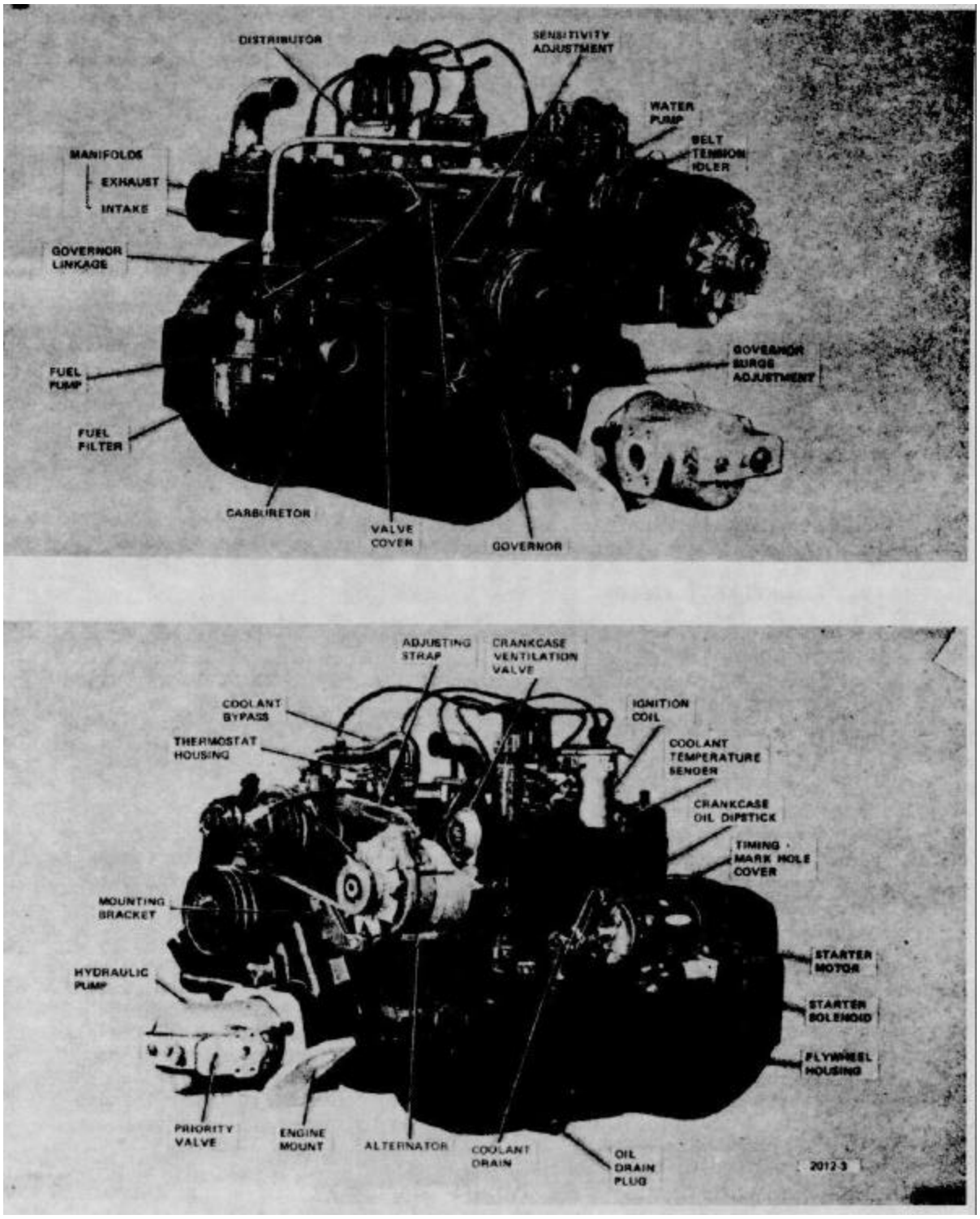


Figure 1-2. Typical Engine, Front and Rear Views

1-6. The forklift trucks are powered by Continental FS-244 Military Standard engines rated at 82.3 horsepower when operating at 2800 revolutions per minute.

1-7. DETAILED DESCRIPTION.

1-8. ENGINES (See figure 1-2). Differences between the engines used in the trucks are mainly in parts dimensions. The details given in subsequent paragraphs apply to all trucks unless otherwise stated.

1-9. The full pressure lubrication system includes a gear-type oil pump with adjustable bypass valve to maintain suitable pressure through all speeds, and a replaceable element oil filter.

1-10. The fuel system includes a mechanical diaphragm fuel pump, driven by the engine camshaft, a single venturi updraft carburetor, and a mechanical governor which limits the maximum speed of the engine by closing the carburetor throttle valve when the engine reaches the governed speed. The carburetor air cleaner uses a disposable paper filter element.

1-11. ALTERNATOR. The alternator is an ac generator designed and constructed to give long service with a minimum of maintenance. The rotor is mounted on a ball bearing at the drive end, and a roller bearing at the slip ring end, and each bearing has a grease supply which eliminates the need for periodic lubrication. Two brushes are used to carry current through the two slip rings to the field coil which is mounted on the rotor. The brushes are extra long and under normal operating conditions will provide long periods of service. The stator windings are assembled on the inside of a laminated core that forms part of the frame. Six rectifies diodes, mounted in the slip ring end frame, are connected to the stator windings. The six diodes change the ac voltage to de voltage which appears at the BAT terminal on the alternator. A capacitor, or condenser, mounted in the end frame protects the diodes from high voltages. Current output of the alternator is self-limiting by design to its rated maximum, regardless of speed or external circuit conditions. An externally mounted voltage regulator limits the operating voltage to a specified value through the full speed range of the alternator. Figure 1-3 shows a schematic view of the alternator and regulator.

1-12. VOLTAGE REGULATOR. The transistor is an electrical device made of semiconductor materials which is used as a switch to control the alternator field current in order that alternator voltage can be limited to a proper value. Figure 1-3 is a greatly simplified diagram of the alternator and regulator circuit. A brief description of the operation follows:

1. When the ignition switch is closed, battery voltage supplies current through the emitter (E) and collector (C) of the transistor to the field coil of the alternator. This emitter-collector circuit is complete since the transistor is turned "on" by a higher voltage on the emitter than on the base (B), which permits emitter-base current to flow. The flow of current to the field circuit

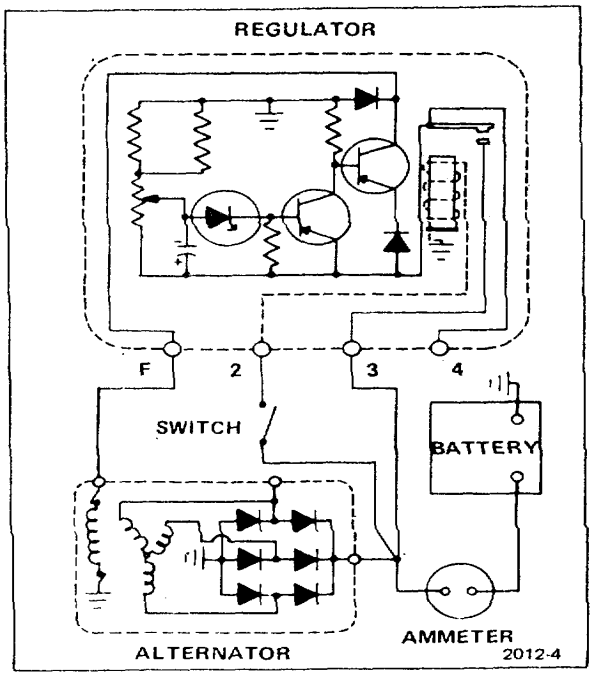


Figure 1-3. Charging System Basic Schematic

of the alternator provides the magnetic field for the alternator. When the engine is started, the alternator builds up voltage. This causes current to flow to charge the battery and/or power accessories.

2. As alternator speed increases or the accessory load decreases, alternator voltage builds up to a predetermined value at which the regulator is set or adjusted. The electrical control portion of the regulator then places a higher voltage on the base of the transistor than is impressed upon the emitter, and the transistor is turned "off". With no current flow in the emitter-collector circuit, there is no current flow in the field coil of the alternator. As a result, alternator voltage drops below the setting or adjustment of the regulator.

3. Then the electrical control portion of the regulator places a lower voltage on the base of the transistor than that on the emitter, and the transistor is again turned "on". With current flow again in the emitter-collector and field coil circuit, the magnetic field is reestablished in the alternator, and alternator voltage can again build up to the setting of the regulator.

4. Thus, the switching "on" and "off' of the transistor regulates the amount of field current supplied to the alternator. The frequency of this switching is dependent primarily upon the accessory load and alternator speed. Under certain conditions the "on" and "off" cycle is repeated as much as 7,000 times per second.

5. A zener diode, driver transistor, capacitor, and resistors act together as the electrical control portion of the regulator to electrically switch the output transistor "on" and "off". A thermistor provides a temperature compensated voltage setting which is matched to the charging requirement characteristics of the battery.

1-13. STARTING SYSTEM. The trucks are fitted with a Delco-Remy enclosed shift starter motor using a solenoid shifted overrunning clutch drive. The starter is operated from the instrument panel by a push button switch. A neutral safety switch operated by the transmission shift linkage is installed in the starter control circuit. This switch is closed only when the transmission is in neutral, to permit starting at that time. The trucks also have a starter lockout relay in the control circuit to prevent accidental operation of the starter while the engine is running.

1-14. IGNITION SYSTEM. The ignition system is a conventional high tension battery powered system, modified to meet radio interference shielding requirements, or radio interference suppressed, The system includes an ON-OFF switch on the instrument panel; a high tension coil, which transforms the low voltage of the battery to voltage high enough to jump the spark plug gap, providing ignition; a distributor which times the occurrence of the spark at the cylinder and directs each-high voltage pulse to the proper cylinder in firing order of the engine; a set of spark plugs and all connecting leads.

1-15**. DELETED**

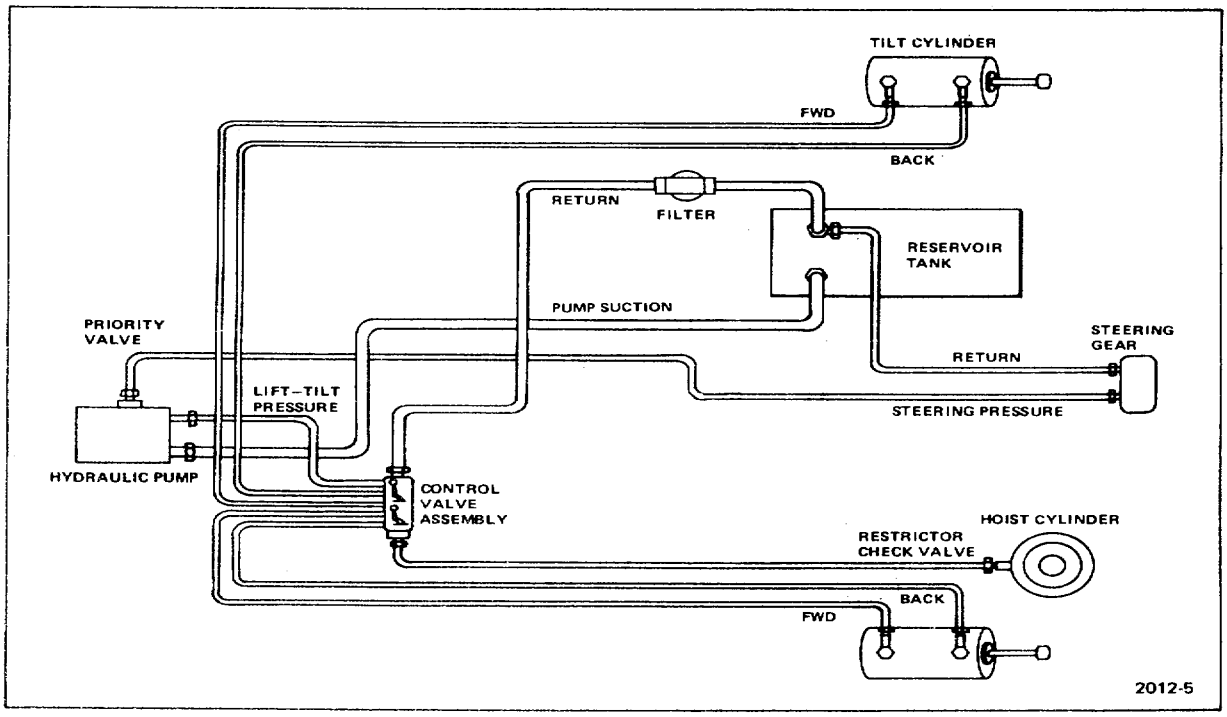


Figure 1-4. Hydraulic System Diagram

1-16. The distributor times the occurrence of the ignition spark in relation to the engine by a set of breaker points operated by an engine-driven cam. Variations in timing under changing speed are accomplished through a centrifugally operated spark advance mechanism in the distributor. The timed high voltage impulses are fed through the center terminal of the distributor cap to the rotor inside. The rotor then directs the high voltage to each spark plug wire (arranged from cap to spark plugs in proper engine firing order) in sequence, to spark each spark plug at the proper time.

1-17. HYDRAULIC PUMP. Hydraulic pressure for steering, hoisting, and tilting of the uprights is supplied by an engine-driven hydraulic pump. This pump is mounted at the left rear side of the engine, driven by a gear which engages the camshaft timing gear. The pump is a gear type positive displacement pump.

1-18. UPRIGHT CARRIAGE AND FORK ASSEMBLY HYDRAULIC SYSTEM (See figure 1-4). Using pressure from the engine-driven hydraulic pump, this system controls raising of the forks and fore and aft tilting of the uprights. The control valve assembly permits the operator to direct pressure to the hoist cylinder for raising the forks, or to the tilt cylinders to adjust the angle of the uprights and forks.

1-19. The flow divider (priority) valve directs the pump output to both the power steering system and the control valve assembly inlet port. A relief valve in the flow divider valve limits hydraulic pressure in the power steering system. This relief valve cracks open at 700 psi and is fully open at 1050 psi.

1-20. The control valve assembly is a two-spool fluid control valve with a control handle for each spool. The inboard control handle and spool control the raising and lowering of the forks by applying or releasing hydraulic pressure to the hoist cylinder. The outboard control handle and spool control tilting of the upright carriage. Each control handle has two actuating positions with a center neutral position. A pilot operated relief valve limits system pressure to 1500 psi. The hoist cylinder is a two-stage single-acting unit, raised by applying fluid pressure, and lowered by releasing pressure to permit gravity return of the elevated parts. The tilt cylinders are double-acting cylinders.

1-21. POWER STEERING GEAR. The power steering gear unit is basically a Saginaw recirculating ball steering gear to which has been added a torque sensitive valving arrangement, and in which the ball nut has been redesigned to act as a hydraulic piston. The valve (see figure 1-6) is an open-center rotary three-way valve, with a grooved spool to

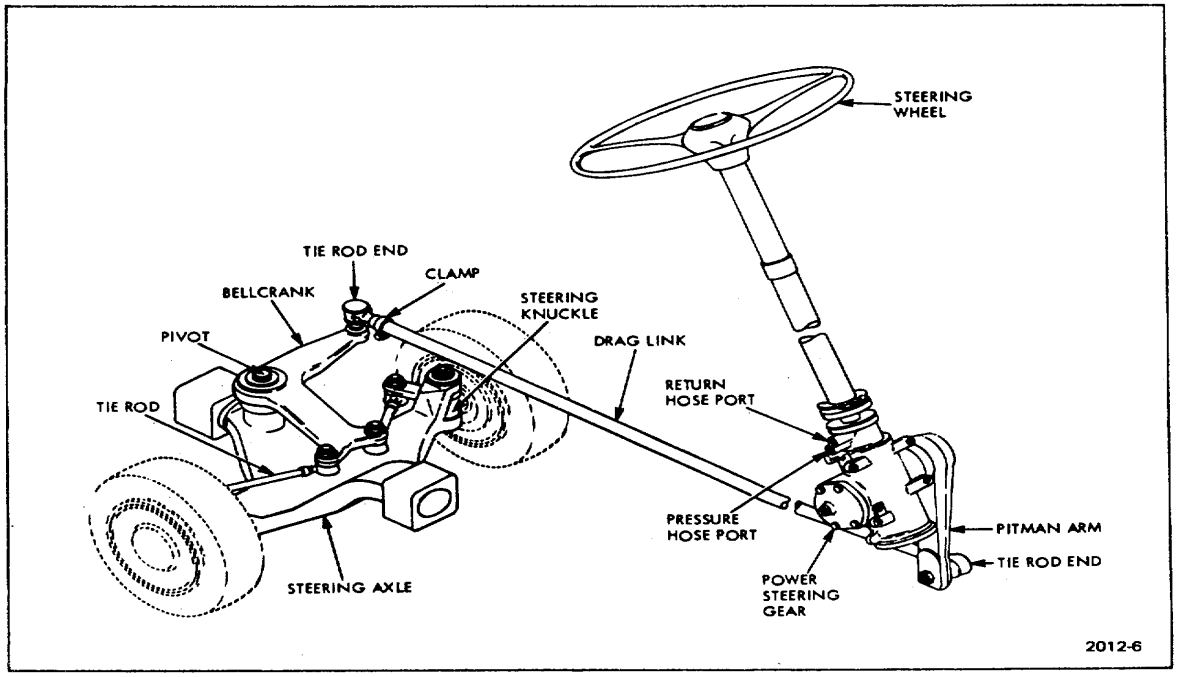


Figure 1-5. Steering System Arrangement

direct hydraulic pressure as required for either right or left turn assist. The spool is attached to the valve body at one end, and through a torsion bar to the steering gear stub shaft at the other end. Turning the steering wheel will steer the wheels without power assistance, through the torsion bar, spool and valve body, until more than about three pounds pull at the rim of the steering wheel is required. At this amount of resistance the torsion bar twists, shifting the spool in the valve body, to valve hydraulic fluid as required to supplement steering effort in the direction in which the wheel is turned, as diagrammed in figure 1-6. Note that the rack-piston nut is geared directly to the pitman shaft. Power assistance is proportional to demand, and ceases when reduction in torsional load permits the torsion bar to return the valve spool to neutral. Hydraulic power is taken from the truck main hydraulic pump via a pressure reducing priority valve on the main hydraulic pump, connected by tubing directly to the steering gear housing.

1-22. STEERING AXLE ASSEMBLY (See figure 1-5). The steering axle assembly is mounted on two neoprene blocks located to permit a degree of movement to the axle necessary to pass over irregular surfaces. The steering axle layout, and its relationship to the power steering system is shown in figure 1-5.

1-23. Two equal length tie rods connect a center-mounted bellcrank to each of the steering knuckles. Steering axle king pins are mounted in true vertical position to provide similar steering characteristics in either forward or reverse travel. The pneumatic tired wheels of the steering axle are not fitted with brakes.

1-24. TRANSMISSION (See figures 1-7 and 1-8). The transmission is a power-shifted single ratio forward and reverse unit. A torque converter transmits engine output to the transmission input shaft. The transmission is mounted directly to the engine and drive axle. No intervening drive shaft is used. Shifting between forward and reverse is accomplished by engagement of either a forward or reverse wet clutch in the unit. These clutches are engaged by hydraulic pressure selected by a control valve.

1-25. The clutches are contained in one large balanced drum assembly, and the plates drive concentric shafts. The outer shaft has a gear mounted on it which is in direct mesh with the output gear on the output shaft. This transmits forward rotation to the output shaft. A gear on the inner shaft drives the output shaft through an idler gear to give reverse drive. The main case is of two piece construction and the rear half contains a heavy diaphragm midwall which forms one side of a straddle mounting for the output gear and shaft. Oil passages are internal except for the lines to the transmission oil cooler. The oil supply is common for the torque converter, transmission, and drive axle, including the drive wheel bearings.

1-26. An internal gear pump driven by the torque converter hub supplies oil to the torque converter through a metering orifice and to a control valve assembly in the transmission housing. Oil delivered to the torque converter maintains circulation through the converter to the oil cooler, or heat exchanger in the engine radiator.

1-27. Additional oil from the pump is used by the control valve to provide forward or reverse directional control to the vehicle. The control valve includes a pressure regulator valve, a brake pedal operated inching valve, a forward and reverse clutch supply valve, and a forward and reverse selector valve, with neutral position. These four valves are essentially in series in the control circuit. Regulated pump pressure is delivered to the inching valve, which can either deliver it through, or partially or completely shut off this pressure as the operator requires, for inching operations while maintaining high engine speed for hoisting. Pressure on the brake pedal controls the degree of clutch slippage for inching, while the position of the selector valve determines which clutch will be engaged.

1-28. DRIVE AXLE (See figure 1-9). This assembly is a double-reduction drive axle, bolted directly to the front of the transmission. The output shaft of the transmission includes the drive pinion gear which mates with the ring gear of the differential assembly to provide the first reduction. Internal gears at the outer end of the first drive axles drive sun gears to give the second stage reduction to the final drive axles and the wheels.

1-29. The hydraulic brake assemblies at each wheel are pedal actuated as service brakes and handle operated by mechanical linkage as parking brakes. A self-adjusting feature eliminates periodic adjustment to compensate for lining wear. The brake master cylinder is a conventional automotive type, connected to a wheel cylinder at each front wheel by hydraulic lines. The service brake shoes serve also as parking brakes, being actuated by linkage from the hand brake lever next to the operator's seat. The operator can adjust any slack from the parking brake linkage by turning a knurled knob at the top of the parking brake lever.

1-30 UPRIGHT CARRIAGE AND FORK ASSEMBLY (See figure 1-10). The upright carriage and fork assembly consists of four main items which are described in the following paragraphs.

1-31. OUTER UPRIGHT. This item is a welded one-piece assembly attached to the frame of the vehicle. It encloses the hydraulic hoist cylinder and inner upright assembly. The outer upright is pivot mounted on the frame to permit tilting by the tilt cylinder of the entire carriage and fork assembly as necessary.

1-32. INNER UPRIGHT. This item is a one-piece welded assembly mounted within the outer upright. The hydraulic hoist cylinder, mounted in the base of the outer upright, is attached at the top to the inner upright crossmember. The inner upright is raised by the hydraulic cylinder.

1-33. CROSSHEAD ASSEMBLY. The crosshead assembly is mounted on the top end of the hoist cylinder primary plunger. Chains, secured at one end to the hoist primary cylinder, pass over rollers on the crosshead assembly and are secured to the lift carriage assembly. Raising the hoist cylinder primary plunger raises the crosshead assembly to hoist the lift carriage and forks by the chain.

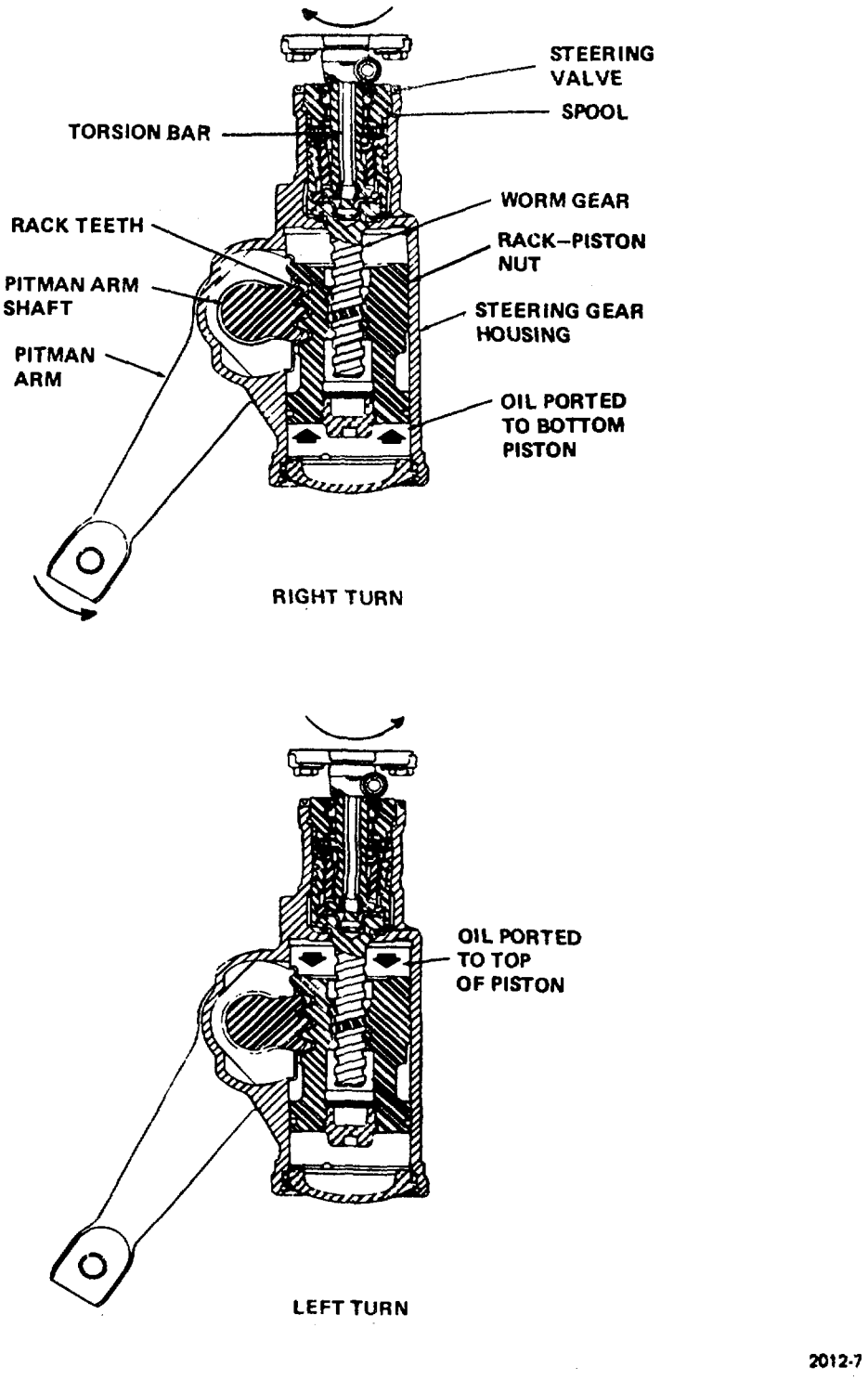


Figure 1-6. Power Steering Gear Operation

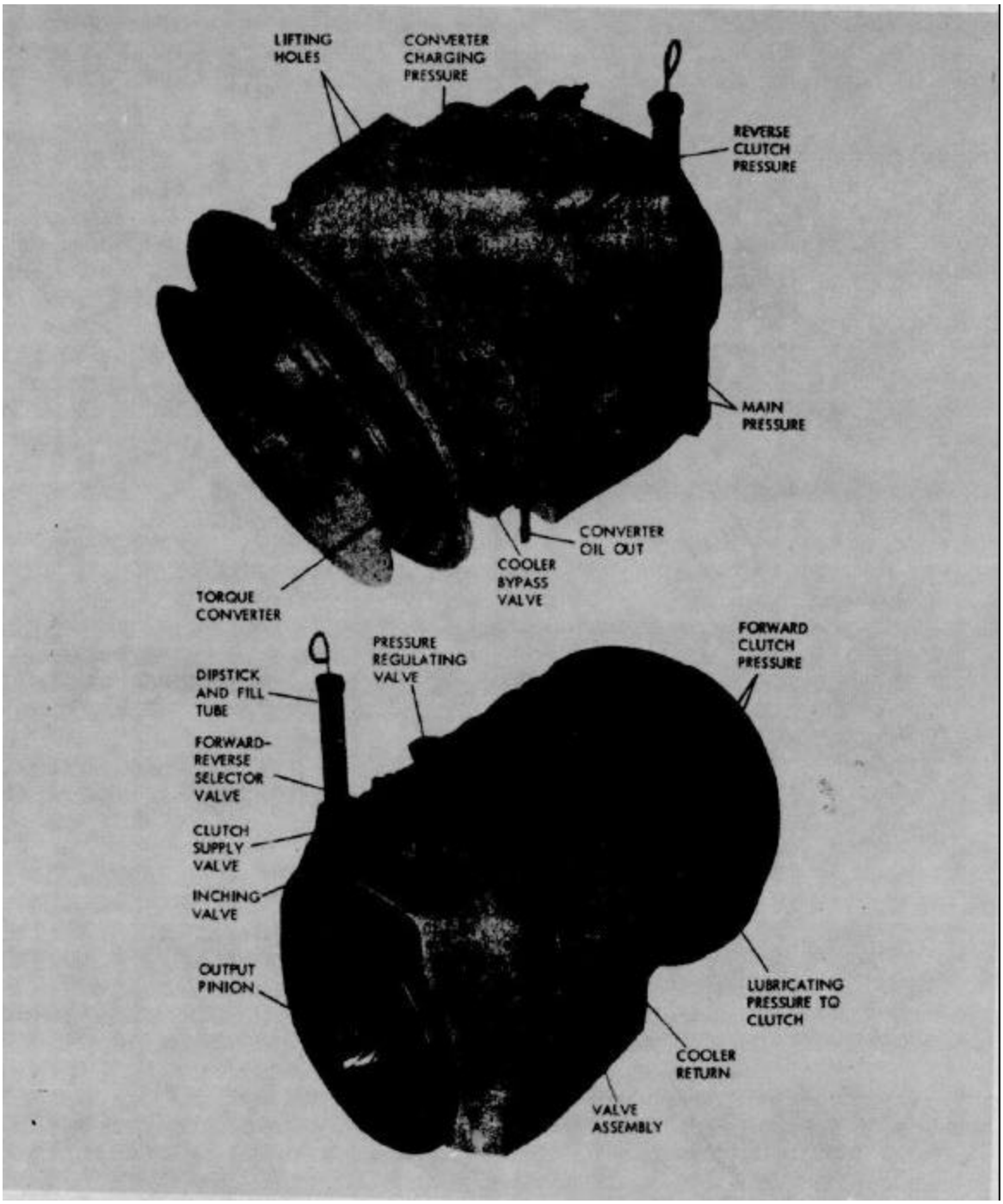


Figure 1-7. Transmission, Showing Pressure Passages

1-34. LIFT CARRIAGE ASSEMBLY. The lift carriage assembly is mounted on rollers between the outer and inner uprights, which serve as guide tracks for it. The forks are mounted on the lift carriage, traveling up and down with it.

1-35. FRAME. The basic structure of the fork lift truck is the one-piece welded frame, to which all components and major assemblies of the truck are attached. The running gear is attached to the underside of the frame, the hoisting mechanism is mounted at the frame front end, and a one-ton counterweight is fastened to the back of the frame. Since the frame houses much of the mechanism for the truck, access openings for service and maintenance are provided at appropriate locations.

1-36. SHEET METAL. The operator's seat is mounted on top of a hinged compartment cover. A manually operated latch at the front of this cover permits raising the cover for access to the engine compartment from above. A radiator cover plate is bolted to the counterweight. The operator's pedal controls, the steering column, and electrical leads to the instruments and switches are mounted on or through a floor plate. For minor service of components beneath the floor plate, a small cover is located above the transmission dipstick and fill tube, and the brake system master cylinder. The floor plate can be removed for more extensive maintenance.

1-37. ELECTRICAL SYSTEM COMPONENTS.

1-38. The following paragraphs contain descriptions of electrical system components for the truck, excepting those units previously described in connection with the engine assembly. (See figure 1-11).

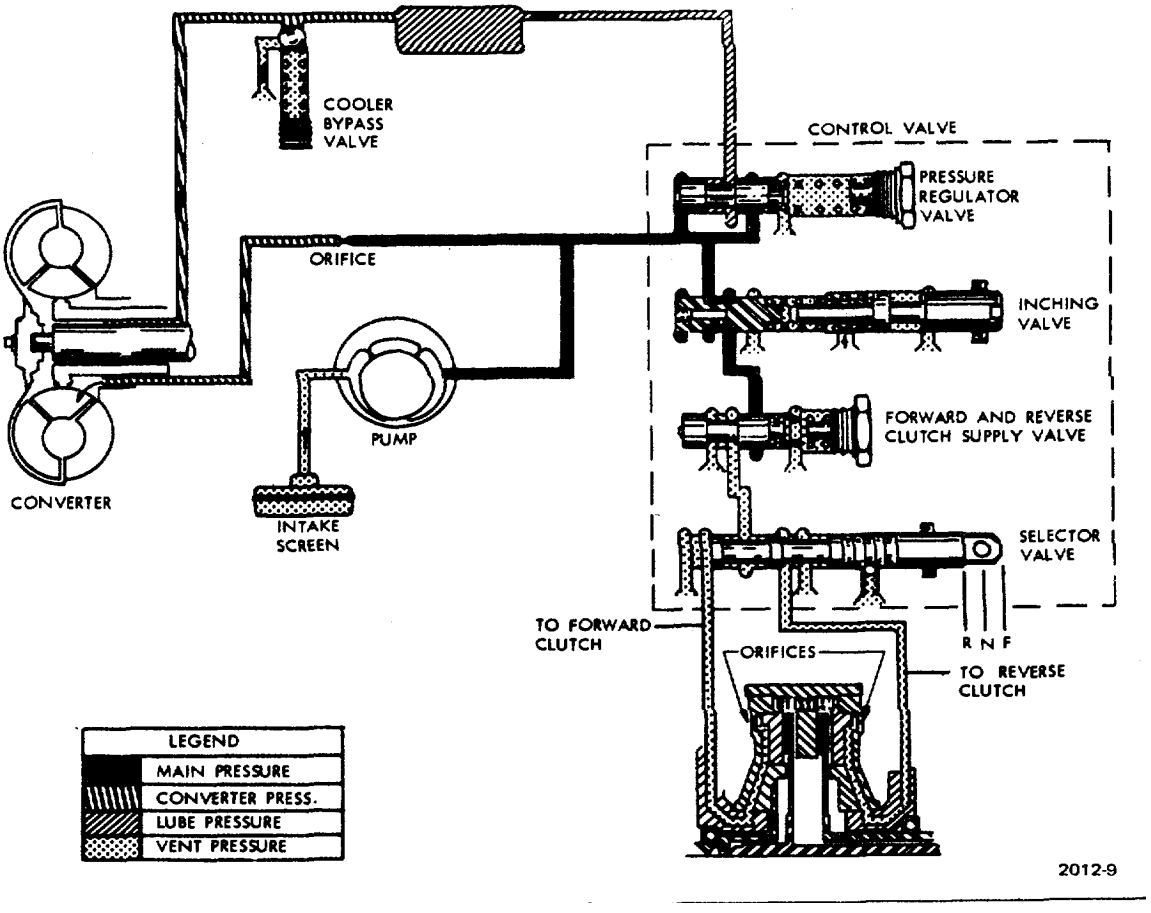


Figure 1-8. Transmission Hydraulic Diagram

1-39. SPOTLIGHT ASSEMBLY. The sealed-beam spotlight is mounted on the left hand hoist upright. This light is operated by a toggle switch mounted on the instrument housing.

1-40. COMBINATION TAIL AND STOP LIGHT ASSEMBLY. The tail and stop light assembly is mounted within a steel guard on the upper rear of the engine compartment. The taillight operates when the spotlight is turned on. The stop light is operated by the brake light switch when the-foot brakes are used.

1-41. IGNITION SWITCH. The ignition switch is mounted on the instrument panel. Setting the ignition switch to ON position energizes the ignition system and instrument panel gages.

1-42. SENDING UNITS. Three sending units on the truck actuate instruments on the instrument panel. The fuel gage sending unit is mounted atop the fuel tank. This unit consists of a float mounted on an arm attached to a sliding contact. The position of the arm is proportional to the quantity of fuel. The slider shorts out turns of a resistance winding to change the current in the gauge circuit proportional to the fuel level, which is registered on the instrument.

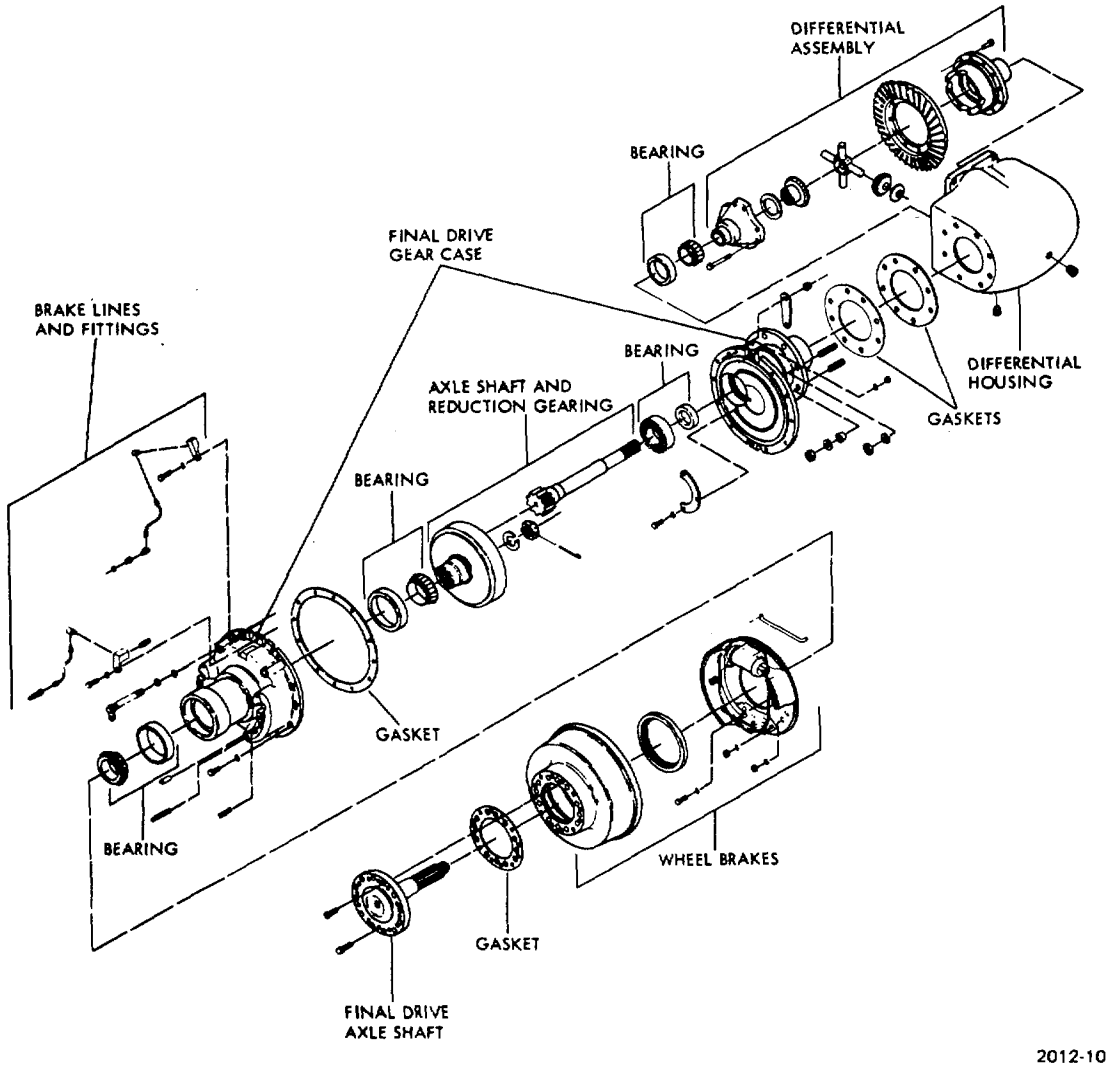


Figure 1-9. Drive Axle, Exploded View

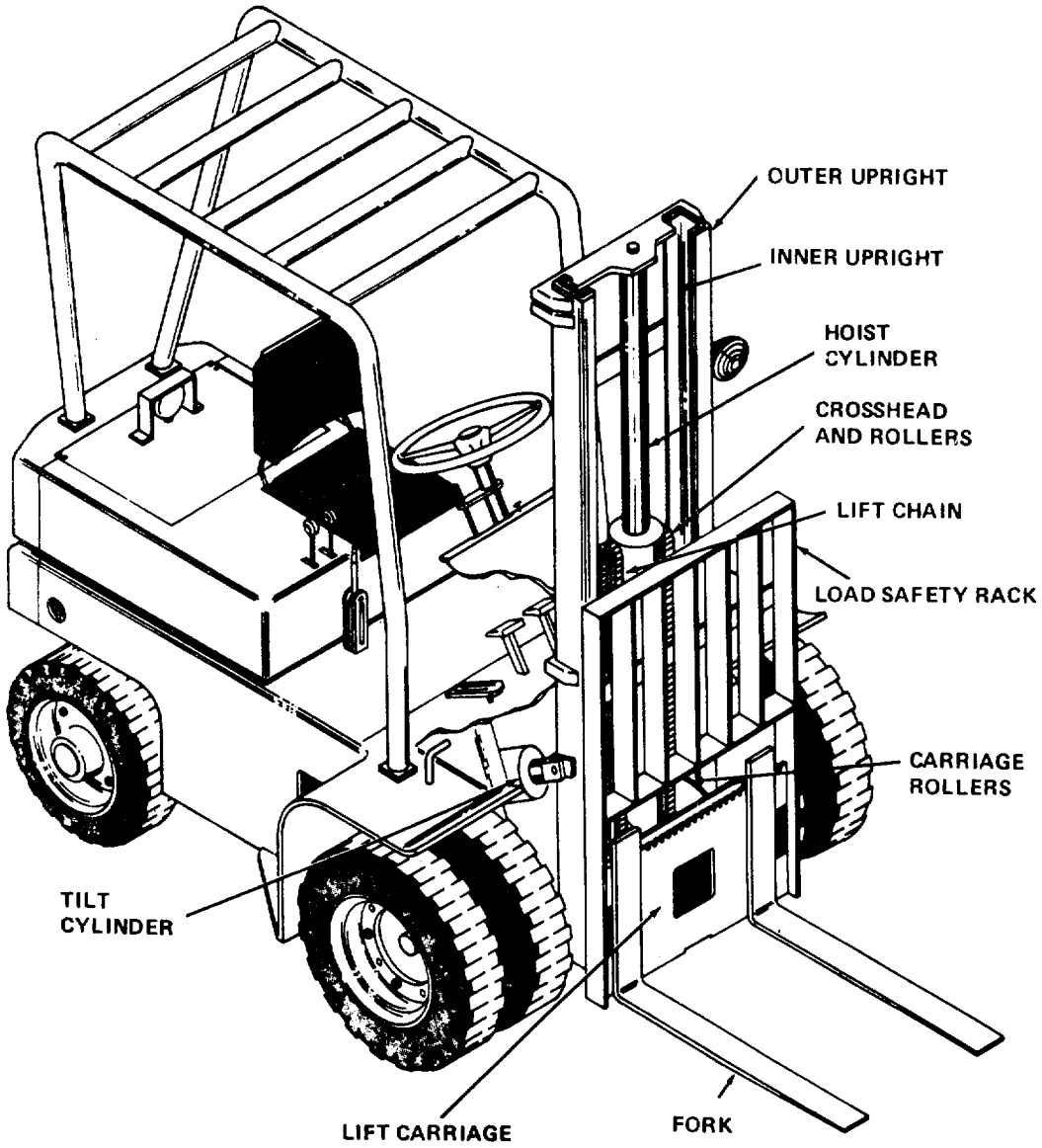


Figure 1-10. Uprights, Carriage and Fork

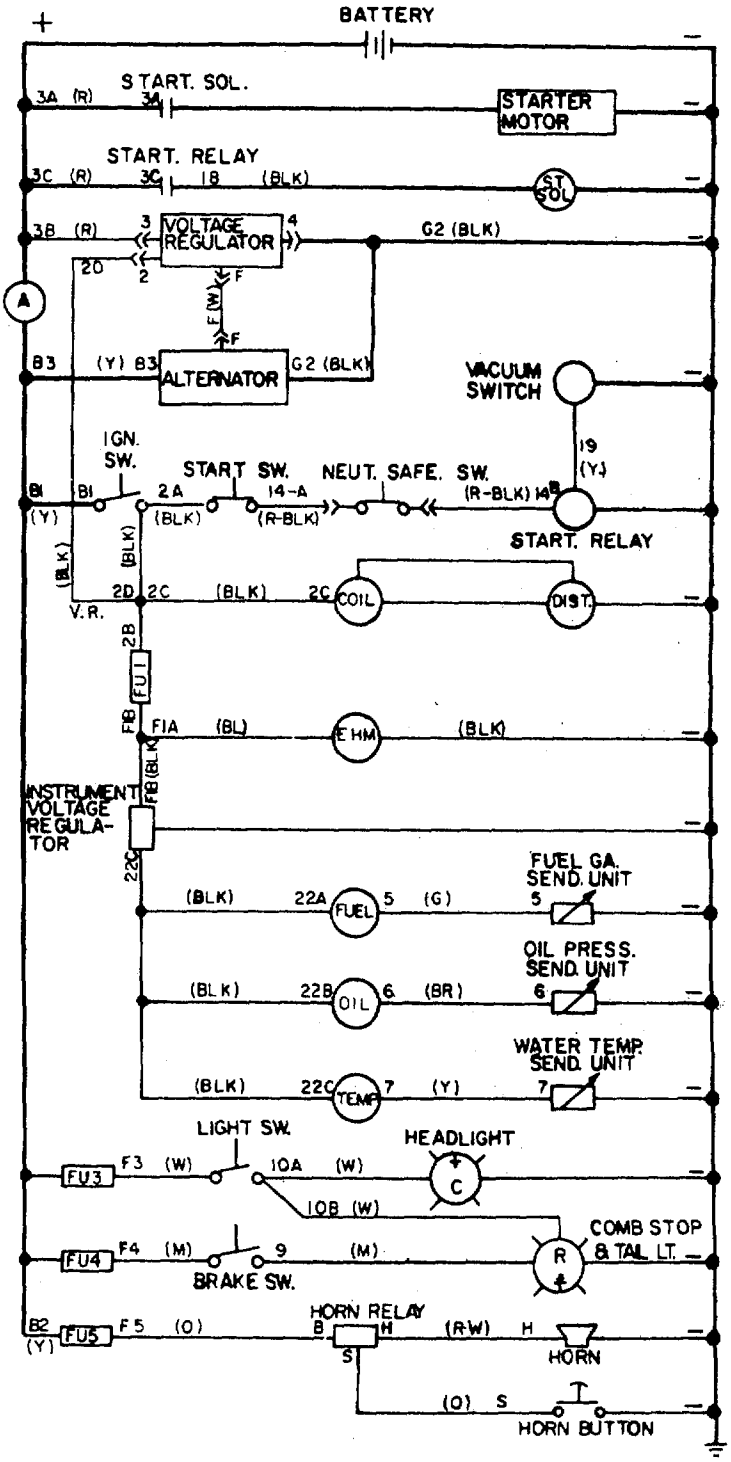


Figure 1-11. Electrical Schematic

1-43. The oil pressure sending unit is connected into the pressure side of the lubricating oil system. This unit contains a coil, the resistance of which varies with pressure. Actuating current to the instrument passes through this resistance coil which varies the current, and thus the indication, in proportion to the pressure on the sending unit.

1-44. The water temperature sending unit is threaded into the engine cylinder head to sense and respond to engine coolant temperature. This unit contains a temperature sensitive resistance coil which regulates the flow of actuating current to the engine temperature gage in proportion to engine coolant temperature (see figure 1-2).

1-45. INSTRUMENT PANEL (See figure 1-12). The instrument panel assembly incorporates the usual standard instruments in a compact group. The engine operation hourmeter is used to determine when periodic service operations are due. in addition to controlling the ignition system, the ignition switch energizes the instruments, and the starter circuit up to the starter button. The light switch operates the spot light and taillight.

1-46. The fuses in the fuse holder protect the various electrical circuits of the truck. Refer to the wiring diagram (figure 1-11) for identification of each fuse.

1-47. The instrument voltage regulator is a small voltage divider which reduces system voltage to six volts for instrument power.

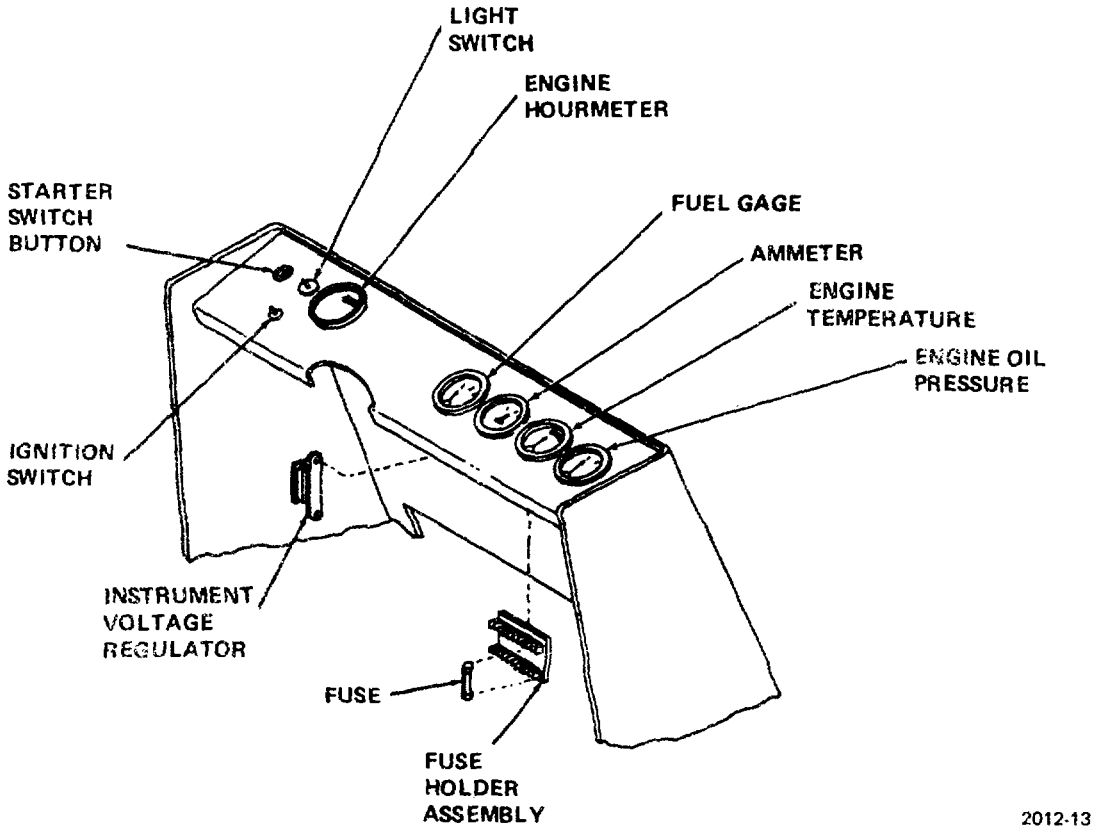


Figure 1-12. Instrument Panel'

SECTION II

TABLE OF SPECIFICATIONS

1. GENERAL

Type of Vehicle ..... Fork Lift Truck gasoline engine powered

Rated Capacity .....4000 lb at 24 in. from heel of fork

Lift Type .....telescopic upright boom, tiltable 3 deg forward, 10 deg backward from upright

Lift Elevation (Max.) .....144 in.

Fork Data .....4 in. wide prongs, 40 in. long. ..... Adjustable from 9 to 38 in.

Wheels ..... 4 drive wheels and 2 steerable wheels

Tires .....pneumatic, size 7.00 x 12 (drive axle), and 6.90/6.00 x 9 (steering axle)

Vehicle Turning Radius .....90 in. min. outside turning radius

Vehicle Top Speed .....12 mph

Overall Dimensions

Height (Forks Fully Lowered) .....91 in.

Height (Forks Fully Raised) .....192 in.

Width.....63 in.

Length (Less Forks) .....91 in.
Vehicle Weight (Group A & C Trucks) .....8165 lb

Ground Clearance (Minimum) ..... 3 in.

Attachments ..... overhead guard and load safety rack

2. DELETED

3. ENGINE

Type ..... Continental Model No. FS244

Number of Cylinders 6

Bore and Stroke ..... 3-7/16 x 4-3/8 in.

Displacement ..... 244 cu in.

Compression Ratio..... 6.9:1

Brake Horsepower .....82.3 at 2800 rpm

Torque (Ft Lb) .....192 at 1200 rpm

Max. Oil Pressure

Hot at 1800 rpm.....30 to 40 psi

Min. Oil Pressure .....7 psi at idle

Firing Order 1-5-3-6-2-4

Oil Capacity

Crankcase..... 4 qt

Filter ..... 1 qt

Total ..... 5 qt

Valve Clearance

Intake..... 0.014 in.

Exhaust ..... 0.014 in.

Water Capacity

Engine ..... 6-1/2 qt

Engine and Radiator ..... 13 qt

Weight (Bare Engine) .....516 lb

ENGINE OVERHAUL TOLERANCES AND WEAR LIMITS IN INCHES EXCEPT AS NOTED

Cylinder Block

Cylinder Out-of-Round.....0.0005

Cylinder Taper 0.0005

Crankshaft and Bearings

Main Bearing Journal Dia 2.2442/2.2451

Additional Wear 0.001

Connecting Rod Journal Dia.....2.0594/2.0601

Additional Wear 0.001

Main Bearing Clearance.....0.0008/0.0028

Bearing Thickness 0.0948/0.0953

Additional Wear 0.0005

- Crankshaft End Thrust 0.002/0.006
- Main Bearing Size (Case Hole) 2.4365/2.4372
- Out-of-Round.....0.0005
- Taper 0.0005
- Runout 0.002

Connecting Rods and Bearings

- Bearing Thickness 0.0623/0.0628
- Bearing Length 1.057/1.067
- Side Play..... 0.006/0.010
- Connecting Rod Bend..... 0.000/0.002
- Crankshaft Journal to Connecting
- Rod Bearing Clearance 0.0008/0.003
- Connecting Rod Twist 0.000/0.002
- Pin Bushing Inside Dia 0.859310.8596
- Pin Bushing Outside Dia..... 0.9165/09185
- Bearing Outside Dia 2.1865/2.1870
- Pin Bushing Length.....1.17/1.19
- Pin Bushing Thickness 0.0345/0.0365
- Bearing Inside Din.....2.0609/2.0624

Pistons

- Ring Land Clearance..... 0.028/0.035
- Skirt Clearance.....0.0015
- Taper of Skirt 0.0005/0.0015
- Pin Hole Dia 0.8593/0.8596

Piston Pins

- Pin Dia 0.8591/0.8593
- Additional Wear 0.001
- Desired Fit in Bushing 0.0000/0.0005
- Desired Fit in Piston at 70 Deg F 0.0001/0.0003
- Pin Length 2.738/2.753

Piston Rings

- Cylinder Dia.....3.4375/3.4395
- Width-Top Chrome & 2nd Groove Rings... 0.0930/0.0940
- Width-3rd & 4th Groove Rings 0.1545/0.1555
- Thickness-Top Chrome Ring 0.162/0.172
- Thickness-2nd, 3rd & 4th Groove Rings 0.143/0.153
- Gap Clearance-All Rings 0.010/0.020
- Side Clearance-Top Ring 0.002/0.004
- Side Clearance-2nd Ring 0.0015/0.0035
- Side Clearance-3rd & 4th Rings 0.001/0.003
- Weight Compressed-Top, 3rd & 4th Rings .....7-1/2 lb
- Weight Compressed-2nd Ring .....6-1/2 lb

Camshaft

- Front Journal Size 1.8715/1.8725
- Additional Wear (All Journals) 0.002
- Intermediate Front Journal Size 1.8085/1.8095
- Intermediate Rear Journal Size 1.7457/1.7465
- Rear Journal Size 1.2465/1.2475
- Valve Lift, All Valves 0.248
- End Thrust 0.005/0.009

Camshaft Bushings

- Clearance (All) 0.002/0.004
- Additional Wear (All) 0.002
- Inside Dia (Front) 1.8745/1.8755
- Inside Dia (Intermediate Front) 1.8115/1.8125
- Inside Dia (Intermediate Rear).....1.7495/1.7502
- Inside Dia (Rear) 1.2495/1.2505

Valves and Springs (Intake)

- Stem Dia 0.3405/0.3415
- Additional Wear 0.002
- Head Dia 1.495/1.505
- Overall Length 5.1745/5.2895
- Valve Face Desired.....0.124
- Tappet Clearance (Hot) 0.014

Stem to Guide Clearance 0.0017/0.0037
Additional Wear 0.002
Valve Seat Angle .....45 deg
Valve Seat Width Desired 0.066
Valve Spring Free Length..... 2-1/16
Valve Spring Outside Dia 31/32
Valve Spring Wire Size 0.142
Spring Length (Valve Closed) 1-45/64
Valve Spring Load at Closed Length..... 47/53 lb

Valves and Springs (Exhaust)

Stem Dia 0.3405/0.3415
Additional Wear 0.002
Head Dia 1.307/1.317
Overall Length 5.1745/5.2895
Valve Face 0.124
Tappet Clearance (Hot) 0.014
Stem in Guide Clearance 0.0037/0.0057
Valve Seat Angle .....45 deg
Valve Seat Width 0.085
Valve Spring Free Length..... 2-1/16
Valve Spring Outside Dia 31/32
Valve Spring Wire Size 0.142
Spring Length (Valve Closed) 145/64
Valve Spring Load at Closed Length..... 50/53 lb

Valve Tappets

Tappet Dia 0.999/0.9995
Tappet Clearance in Guide 0.0015/0.005

Valve Guides

Distance From Top of Block to
Top of Guide 1-15/32
Stem Hole Dia (Intake) 0.3432/0.3442
Stem Hole Dia (Exhaust) 0.3452/0.3462
Additional Wear (All) 0.0015
Length 2-5/16
Outside Dia 0.6565/0.6575

Valve Timing

Intake Valves Open Before
Top Dead Center .....4-1/2 deg
Crankshaft Rotation Piston Travel,
Top of Block to Top of Piston at 4-1/2
Deg Before fop Dead Center 0.0134

Timing Gears

Backlash..... 0.001/0.003

Cylinder Head

Max. Warpage Crosswise.....0.003
Max. Warpage Lengthwise 0.004

Oil Pump

Clearance Between End of Gear
Teeth and Body 0.002/0.004
Backlash to Camshaft Gear 0.003
Lash Between Gears 0.001/0.003

4. FUEL SYSTEM

Carburetor

Make .....Zenith
Type ..... updraft, single bore

Adjustments

Idle Mixture Screw..... 1 to 1.5 turns open
Idle Speed Screw.....450 to 500 engine rpm

Fuel Pump

Pressure (Static) .....1.5 to 2.25 psi
Capacity (Minimum) ..... 1 pt per min.

Fuel Tank Capacity .....12.7 gal.

Governor Setting .....2500 engine rpm

5. TRANSMISSION

Make ..... Baker

Type .....single-speed with forward and reverse constant mesh, power-shifted by selective engagement of clutches in oil

Ratio ..... 1.19 to 1 reduction

Input .....from torque converter

Output .....direct to drive axle ring gear

Clutches ..... 2 self-adjusting single cork-faced disks

Fluid (Group C Trucks) ..... OE 10

Capacity..... 16 qt

(Includes Drive Axle and Torque Converters)

6. DRIVE AXLE

Make.....Rockwell-Standard

Reduction Gearing ..... double-reduction, ring and pinion plus internal-to-sun gears

Reduction Overall ..... 17.27 to 1

Number of Wheels 6

Tire Size..... 7.00 x 12

Pressure ..... 100 psi

Brake (Service).....hydraulic drum type, internal expanding shoes, self-adjusting

Brake (Parking) ..... uses service brakes, lever operated through linkage to wheels

Brake Drum Size..... 11.5 in. x 2.5 in.

Wheels ..... individually demountable disk type

7. STEERING AXLE

Manufacturer ..... Baker

King Pin Geometry .....neutral

Tire Size..... 6.90/6.00 x 9

Pressure ..... 100 psi

8. POWER STEERING

Make ..... Saginaw

Type .....rotary valve

Power Source..... main hydraulic pump priority valve

9. HYDRAULIC SYSTEM

Fluid Capacity of Reservoir ..... 12-1/2 gal.

Fluid..... OE 10

System Relief Valve Setting ..... .1800 psi

Pump

Make..... Tyrone PVP2-150 AND

Drive .....from engine timing gear

Type ..... gear

Tilt Cylinders

Make ..... Baker

Type .....double-acting

Hoist Cylinder

Make..... Baker

Type ..... single-acting 2-stage, pressure hoist, gravity return

10. ELECTRIC SYSTEM

Voltage.....12 volts dc

Engine Ignition System..... Delco-Remy battery-coil-distributor type; radio interference suppressed

Alternator

Make and Model

.....Delco-Remy 1100858

Ground Polarity ..... negative

Test Specifications (All Trucks)

Field Current at 80 Deg F .....2.2 to 2.6 amp and 12 Volts

Cold Output at 14 Volts ..... 21 amp at 2000 rpm
30 amp at 5000 rpm

Rated Hot Output .....32 amp

Voltage Regulator

Make and Model .....Delco-Remy 1116381

Ground Polarity ..... negative

Test Specifications

Field Relay Closing Voltage .....2 to 4 volts

Voltage Setting ..... 14.1 to 14.8 at 65 deg F

13.9 to 14.7 at 85 deg F

13.7 to 14.5 at 105 deg F

13.6 to 14.3 at 125 deg F

13.4 to 14.2 at 145 deg F

13.2 to 14.0 at 165 deg F

13.1 to 13.8 at 185 deg F

Spark Plugs..... Champion XD 16

Thread Size .....14 mm

Gap ..... 0.025 in.

Distributor

Make and Model

.....Delco-Remy 1112672

Rotation (Top View) ..... counterclockwise

(All Trucks)

Test Specifications (All Trucks)

Point Opening ..... 0.021 in.

Cam Angle ..... 22 to 26 deg

Centrifugal Advance in

Distributor Deg and Rpm .....0.3 deg to 2.3 deg at 300 rpm (start)

3 deg to 5 deg at 400 rpm

5.5 deg to 7.5 deg at 800 rpm

7.5 deg to 9.5 deg at 1100 rpm

Starter Motor

Make and Model

.....Delco-Remy 1107244

No-Load Test Specifications (All Trucks)
(Test Values Include Solenoid)

Current Draw at 9 Volts ..... 53 amp min.

69 amp max.

Speed ..... 6400 rpm min.

8600 rpm max.

Starter Lockout Relay

Make and Model .....Delco-Remy 1115885

SECTION III

PREPARATION FOR USE

3-1. VISUAL EXAMINATION.

3-2. Examine the truck exterior for visible discrepancies, such as loose fasteners, dirt, physical damage or missing parts.

3-3. SERVICES UPON RECEIPT.

3-3.1. Maintenance and Operating Supplies

A list of maintenance and operating supplies required for initial operation of the fork lift truck are contained in table 3-1.

3-4. ENGINE OIL. Before starting the engine, raise engine compartment cover and check the oil level in the crankcase. The oil fill pipe and bayonet type dipstick are located on the right side of the crankcase (see figure 3-1). Add oil as necessary (LO 10-3930-623-12) to bring the level to the upper mark on the dipstick. Use a grade of oil appropriate to the lowest expected temperature. Never operate the truck with the oil level below the LOW mark on the dipstick, nor add oil so that the level will be above the upper mark on the dipstick.

3-5. COOLING SYSTEM. Check that the radiator drain cock at the bottom of the radiator and cylinder block drain cock are closed. Fill cooling system with water, or, if below freezing temperatures are expected, with a mixture of ethylene glycol, inhibited, meeting the requirements of Federal Specification O-A-548A in proportions to provide protection to the lowest expected temperature.

NOTE

If extreme cold is expected, fill the cooling system (after complete draining of water) with Arctic type antifreeze meeting the requirements of Specification MIL-C-11755. This will protect the cooling system against frost damage to -65 degrees F. Start the engine and permit it to reach operating temperature (about 180 degrees F), as indicated by the gage on the instrument cluster. At operating temperature the cooling system will be under slight pressure. Inspect radiator, water pump, and hose connections for leaks at this time.

3-6. FUEL SYSTEM. Fill the fuel tank through the fuel fill (Appendix B). The engine will operate on higher grades of automotive gasoline, but does not require them.

CAUTION

Do not use aromatic blend aviation gasoline. Components of the fuel system are not designed for aromatic fuels and damage to the system will probably result.

3-7. BRAKE SYSTEM. Check level, of brake fluid in brake master cylinder (for access, remove plug at left side of truck floorplate). Maintain level of fluid to within 1/4 inch of top of filler hole with nonpetroleum base hydraulic brake fluid meeting the requirements of Federal Specification W-H-910. Check operation of hand brake.

3-8. BATTERY (see figure 3-1). Check electrolyte level. Add distilled or mineral-free water as needed.

CAUTION

Do not use water in the battery which has been treated by a water softener. Such water is usually harmful to lead-acid type batteries.

Check specific gravity of electrolyte with a battery hydrometer to learn if battery is sufficiently charged for use. If temperature corrected specific gravity is less than 1.225 (half charged), recharge battery from an external source. Full charge is indicated by, a reading of 1.260 to 1.280 in each cell.

3-9. HYDRAULIC SYSTEM TANK. TANK IS LOCATED ON LEFT SIDE OF TRUCK. RAISE HOOD COVER FOR ACCESS TO GAGE AND FILLER TUBE. WITH FORK FULLY LOWERED, REMOVE BREATHER CAP FROM TANK AND CHECK QUANTITY OF FLUID. REPLENISH AS NECESSARY WITH HYDRAULIC FLUID MEETING THE REQUIREMENTS OF (LO 10-3930-623-12.

3-10. TRANSMISSION. With engine idling, and transmission in neutral, check level of transmission fluid with transmission dipstick. Add only type A automatic transmission fluid suffix A, (LO 10-3930-623-12).

NOTE

Extra fluid (4 quarts) is added to the transmission before shipment from the factory. Drain oil as necessary to bring level down to FULL mark on dipstick before using truck.

CAUTION

If truck has been serviced for Arctic conditions (to -65 degrees F) use only the transmission fluid given on LO 10-3930-623-12. Do not mix the two types of transmission fluids recommended for different climatic conditions.

Table 3-1. Maintenance and Operating Supplies

(1) Component Application	(2) Federal Stock No.	(3) Description	(4) Quantity Required F/Initial Operation	(5) Quantity Required F/8 Hrs Operation	(6) Notes
Crankcase		Oil lubricating (1)			(1) Includes quantity of oil to fill engine oil system as follows: 4 qt-crankcase 1 qt-oil filter
	9150-265-9435(2)	OE 30	5 qt	(1), (3)	
	9150-265-9428(2)	OE 10	5 qt	(1), (3)	
	9150-242-7603(2)	OES	5 qt	(1), (3)	
Hydraulic Brake Cylinder		Brake Fluid: Automotive, 1 gallon can as follows			(2) See C9100 - IL for additional data and requisitioning procedures
	9150-252-6375(2)	HBA	1/2 PT	(3)	(3) See current LO for grade application and replenishment intervals (LO 10 - 3930-623-12).
Hydraulic Reservoir		Oil Lubricating: 55 gallon drum as follows:			(4) Fuel tank capacity
	9150-265-9430(2)	OE 10	12 1/2 gal	(3)	
	9150-242-7605(2)	OES	12 1/2 gal	(3)	
Radiator		Water			
		Antifreeze, 5 gallon can as follows:		as	
	6850-224-8730	Ethylene Glycol, type 1	13 qt		
		Antifreeze: 5 gallon drum as follows:			
	6850-174-1806	Arctic grade	13 qt		
Fuel Tank		Fuel, Gasoline: Bulk as follows:			
	9130-160-1818(2)	Automotive Combat 91A	12.7 gal (4)		
	9130-160-1830(2)	Automotive Combat 91C	12.7 gal (4)		
Transmission and Differential	9150-698-2382	Type A Automatic Transmission Fluid Suffix A, 1 qt. can	16 qt	(3)	
Grease Points		Grease, Automotive and Artillery: 5 lb. cans as follows:			
	9150-190-0905(2)	GAA			

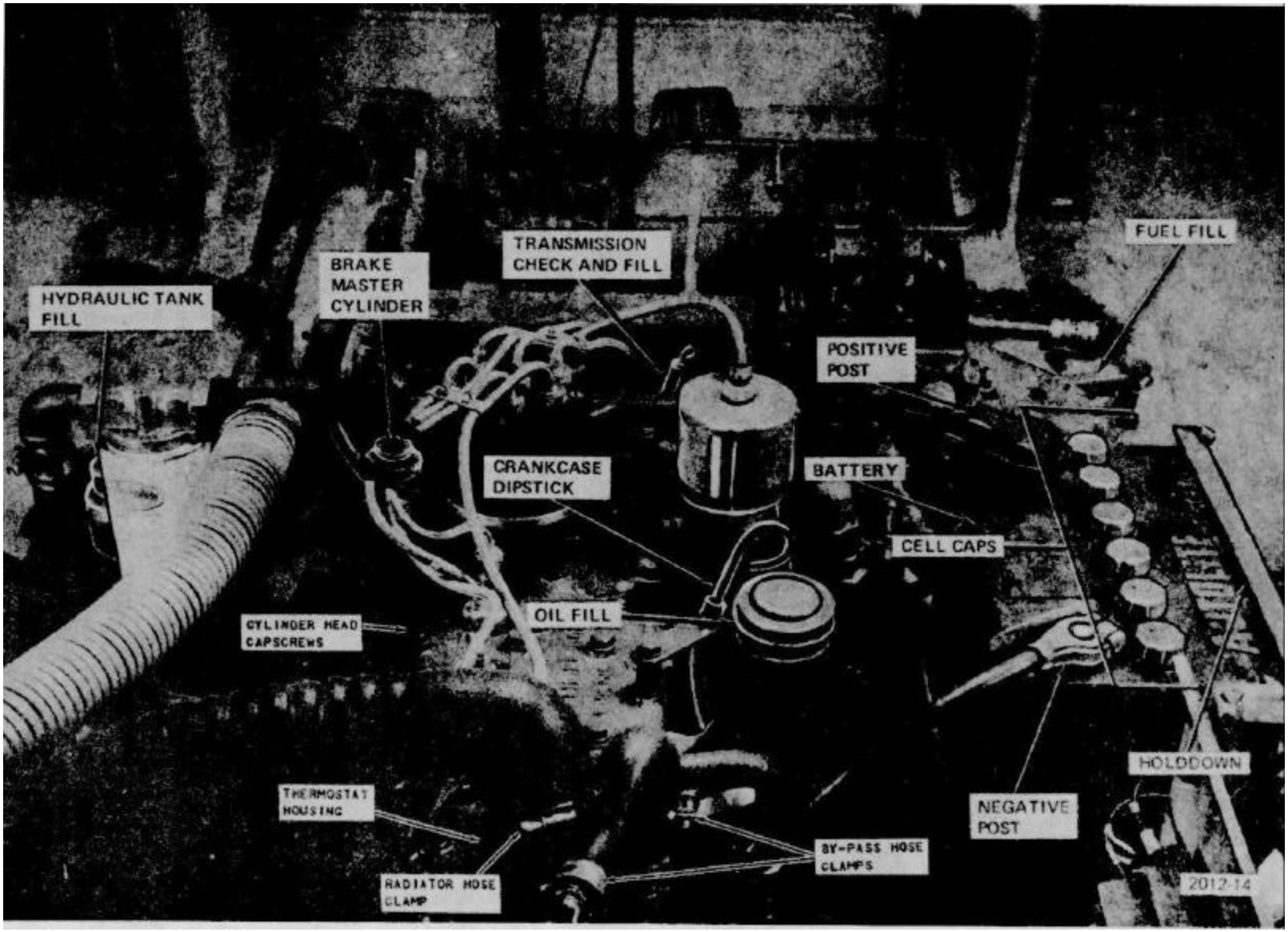


Figure 3-1. Check Points Before Use

3-11. OPERATIONAL CHECKOUT.

3-12. STEERING GEAR. Start engine and check for satisfactory operation of power steering system.

3 13. LIGHTS. Turn on ignition switch and check operation of stop light by pressing brake pedal. Turn on spotlight; taillight should light at the same time.

3-14. CHARGING SYSTEM. Start engine and operate at fast idle of 1000 to 1200 rpm. Ammeter should at first indicate a high (up to 20 amperes) rate of charge, gradually decreasing as the battery is recharged to near zero charging rate.

3-15. ENGINE. Check engine as follows:

1. Run engine until stable operating temperature is reached (about 180 degree F).

2. Check that oil pressure is steady at between 20 and 30 pounds at and above a fast idle speed, and remains above seven pounds at normal slow idle speed.

3. Listen for any unusual sounds indicating a malfunction or potential trouble.

3-16. TRANSMISSION. OPERATE TRUCK IN FORWARD AND REVERSE DIRECTIONS, CHECKING FOR SATISFACTORY PERFORMANCE. CHECK THAT INCHING VALVE IS FULLY CLOSED WHEN BRAKES ARE RELEASED TO ASSURE FULL APPLICATION OF CLUTCHES. IF VALVE IS NOT FULLY CLOSED, ADJUST AS FOLLOWS:

1. ADJUST PEDAL STOP TO WHERE BRAKE ARM 1/8 INCH UNDERNEATH FLOOR BOARD.

2. ADJUST INCHING VALVE ADJUSTING SCREW UNTIL PEDAL ARM DOES NOT RETURN TO FULL STOP REST POSITION.

3. ADJUST PEDAL STOP ADJUSTING SCREW APPROXIMATELY 3/4 TO ONE TURN LONGER SO THAT PEDAL WILL NOT REST ON INCHING VALVE OR CAUSE IMPROPER PRESSURE.

4. APPLY SUFFICIENT BRAKING PRESSURE TO PEDAL AND ADJUST MASTER CYLINDER PUSH ROD TO POSITION INCHING VALVE in THE FULL EXTENDED POSITION.

5. TIGHTEN ALL LOCK NUTS.

3-17. HYDRAULIC SYSTEM. With a substantial load hoisted on the forks, operate tilt cylinders to tilt upright through full fore and aft range. Raise and lower the loaded fork through its full limit of travel. Observe for any malfunctioning at any stage of operation. With. load raised and control in neutral position, check for any creep-down of the loaded fork. After test, inspect hydraulic system for leaks.

SECTION IV

OPERATION

WARNING

Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional. (Refer to TB MED 251)

4-1. PRINCIPLES CF OPERATION.

4-2. In the first part of this section, the principles of operation of the major assemblies of the fork lift truck will be explained.

4-3. ENGINE.

4-4. The engine used in the truck (see figure 1-2) is a six cylinder, four stroke cycle gasoline engine of conventional L-head design, with battery and coil ignition. One updraft carburetor supplies fuel-air mixture to all cylinders through a manifold. Exhaust from all cylinders is delivered to a common exhaust system by an exhaust manifold. A camshaft in the engine block, driven by the crankshaft through gears, turns at half crankshaft speed to operate (and time) the valves and ignition distributor, and drive the oil pump and fuel pump, The camshaft drive gear is positioned in relation to the crankshaft so valves and ignition will operate at the correct time in relation to piston travel which is controlled by the crankshaft. Hence, the expression "timing" of the valves or ignition. Note that two revolutions of the crankshaft cause only one revolution of the camshaft, which results in two upstrokes and two downstrokes of each piston to complete a cycle.

4-5. In the following explanation, a cycle of one cylinder will be discussed. What is said of one cylinder is true of each of the others; however, consider that each piston (in firing order) lags behind the one ahead of it by 120 degrees of crankshaft rotation.

4-6. FOUR-STROKE CYCLE (see figure 4-1).

4-7. INTAKE STROKE. The piston begins its intake stroke at the top of its travel in the cylinder with the camshaft opening the intake valve for that cylinder. The intake stroke is a downstroke of the piston, which with the intake valve open produces a suction from the cylinder through the valve and intake manifold to the carburetor. This suction draws a charge of air and vaporized gasoline into the cylinder. At the end of the intake stroke, the intake valve closes, Since the exhaust valve is also closed at this time, the full charge (in compressible gaseous form) is trapped in the cylinder ready to be compressed.

4-8. COMPRESSION STROKE. As the crankshaft continues to turn the piston returns upward to compress the fuel charge in the cylinder to about one-seventh its volume at the end of the intake stroke.

NOTE

The higher the degree of compression (compression ratio) the more energy will be obtained from a given quantity of fuel. The compression ratio of the engine is limited by the grade of fuel for which the engine is designed, and is as high as practical for this application.

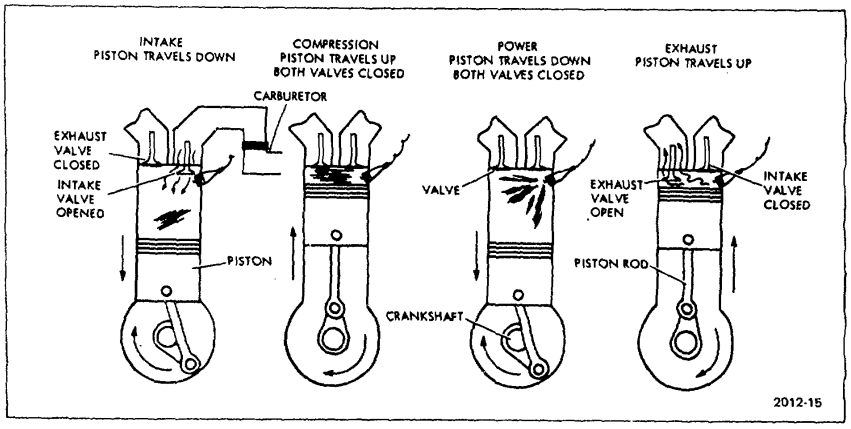


Figure 4-1. Four Stroke Engine Cycle

When the piston reaches the top of its travel on the compression stroke, both valves remain closed, and the compressed fuel charge is ignited by the spark plug. At this time, the power stroke begins.

4-9. POWER STROKE. Both valves remain closed through this stroke. A spark, timed and delivered to the spark plug by the distributor, has ignited the compressed fuel charge. Burning the fuel charge raises its pressure to about four times the pressure in the cylinder before ignition occurred, exerting a strong downward push on the piston, thereby turning the crankshaft to power the vehicle. Some of this power, of course, also carries the other pistons through their nonpower producing strokes. At the bottom of piston travel on the power stroke, the exhaust valve is opened to permit escape of the burned fuel during the next exhaust stroke.

4-10. EXHAUST STROKE. The burned fuel charge is now worthless and must be disposed of to make room for a fresh charge on the next (intake) stroke. The piston now is pushed up by the connecting rod and crankshaft, pushing out the burned gas through the valve to the exhaust manifold. When the piston has reached the top of its exhaust stroke, the engine has completed one cycle.

4-11. Since a! this stage one cylinder, piston and intake and exhaust valve have completed a full cycle, each of the others has also completed a full cycle. The cycle described is repeated as long as the engine is running, once for each two revolutions of the crankshaft.

4-12. FUEL SYSTEM.

4-13. The fuel system consists of the fuel tank, the mechanical fuel pump (actuated by an eccentric on the camshaft) and the carburetor, with their connecting fuel lines. The fuel pump transfers gasoline as needed from the fuel pump to the carburetor.

4-13.1. FUEL TANK.

1. Removal. Refer to figure 4-1.1 and remove the fuel tank as follows:

a. Disconnect the fuel line (1) from the fuel shutoff valve (7).

b. Drain fuel tank; remove drain plug (2) located on fuel tank bottom and drain fuel into a suitable container.

c. Loosen jam nut (10) and unscrew fuel filler cap assembly (8) from fuel tank (6). Remove cap assembly by lifting until screen clears top of fuel filler tube.

d. Disconnect wire from the sending unit (13) terminal.

e. Remove 4 nuts (3) and washers (4 & 5) which secure the fuel tank to the side of the truck body.

f. Move the bottom of the fuel tank toward the center of the truck and clear the support plate. Lower fuel tank until fuel filler tube clears opening in truck body and lift tank from truck.

2. Installation. Reverse removal procedure and install the fuel tank.

4-14. CARBURETOR. The updraft carburetor used on this vehicle is a device for simultaneously vaporizing liquid gasoline and mixing it with air being drawn into the engine in a ratio suitable for use as fuel. The carburetor includes a throttle valve, controlled by the accelerator pedal, which governs the amount of fuel (air-fuel mixture) admitted to the engine to control speed and power of the engine. The carburetor is mounted on a flanged opening of the engine's intake manifold. As each intake stroke takes place, air is drawn through the carburetor bore and intake manifold to the intake valve of the cylinder on the intake stroke. As the incoming air passes through the carburetor bore, it picks up a quantity of gasoline (proportional to the amount of passing air) to form the fuel mixture burned by the engine. The carburetor throttle valve is positioned in the path of the air-fuel mixture, opening and closing to admit more or less fuel to the engine, as required.

4-15. ENGINE SPEED GOVERNOR. The governor is required to limit engine speed to 2500 rpm, without limiting power output below this speed. The throttle valve is opened through a spring operated by the carburetor linkage. The governor responds to engine speed only, to override the tension of this spring and limit throttle opening regardless of gas pedal position. However, should load increase while the engine is operating at governed speed, the governor will react to the resulting drop in speed immediately to permit the throttle valve to open wider, increasing available power. This process would be reversed if load decreased while operating at governed speed. In actual operation there will be a difference of about 200 rpm between unloaded and fully loaded governed speed, to provide a working range within limits of the governor's sensitivity.

1. Adjustment

a. Connect a tachometer to the engine to read engine rpm.

b. Start and warm up engine to operating temperature.

c. Loosen locknut on speed adjust screw (fig. 6-8) and adjust screw down to increase governed speed, and up to decrease speed. Adjust governor to limit engine speed to 2500 rpm.

d. Tighten locknut to retain governor setting. If engine speed surges at governed speed, loosen locknut on surge adjust screw, and turn screw in until surge ceases.

4-16. IGNITION SYSTEM.

4-17. The ignition system (figure 4-2) consists of the ignition coil, condenser, ignition distributor, ignition switch, low and high tension wiring, spark plugs, and a source of electrical energy (battery or alternator). The ignition system has the function of producing high voltage surges and directing them to the spark plugs in the engine cylinders. The sparks must be timed to appear at the plugs at the correct instant near the end of the compression stroke with relation to piston position. The spark ignites the fuel-air mixture under compression so that the power stroke follows in the engine.

4-18. FUNCTION OF DISTRIBUTOR. The distributor has three functions. First, it opens and closes the low tension circuit between the source of electrical energy and the ignition coil so that the primary winding is supplied with intermittent, timed, surges of current. Each surge of current builds up a magnetic field in the coil. The distributor then opens its circuit so that the magnetic field will collapse and cause the coil to induce a high voltage surge. Second, the distributor has to time these surges with regard to the engine requirements. Third, the distributor directs the high voltage surge through the distributor rotor, cap and high tension wiring to the spark plug of the cylinder which is ready to fire.

4-19. There are two circuits through the ignition distributor. One of these is the primary circuit which includes the distributor contact points and condenser. The other is the secondary or high tension circuit which includes the distributor cap and rotor.

4-20. The primary circuit is opened and closed by the contact points and the breaker cam. The cam is rotated by the distributor shaft. The shaft is driven by gearing on the engine camshaft, The distributor shaft and breaker cam are rotated at one-half engine speed and the breaker cam has the same number of lobes as there are cylinders in the engine. As each breaker cam lobe passes under the breaker-lever rubbing block, the points are opened so that a high voltage surge is induced in the ignition coil. Thus, with every breaker cam revolution, one spark will be produced for each engine cylinder. Since each cylinder fires every other revolution in a four-stroke cycle engine, each cylinder will fire once for every two crankshaft revolutions or every single distributor breaker cam revolution.

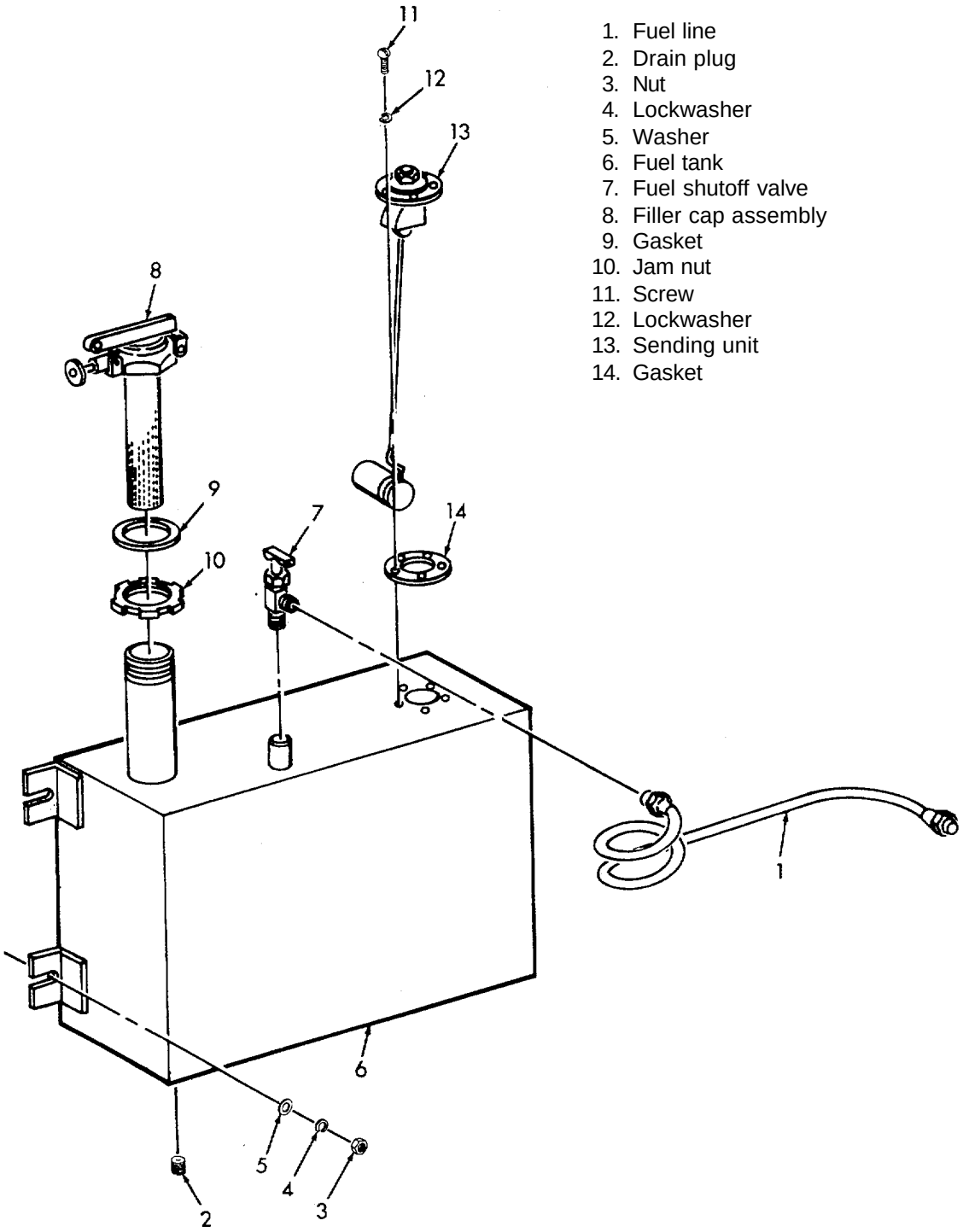


Figure 4-1.1. Fuel tank components, exploded view.

4-21. The capacitor is 'connected across the distributor contact points to produce a quick collapse of the magnetic field in the coil so that a high voltage will be produced. In doing this, the capacitor protects the distributor contact points from arcing. After the high tension surge is induced in the coil, it is conducted through the coil high tension lead to the center terminal of the distributor cap (figure 4-2). From there it passes down to the rotor and to the outer cap electrode under which the rotor segment is positioned at the moment that the surge occurs. This outer terminal is connected by a high tension lead to the spark plug in the cylinder which is ready to fire. The cap, rotor and high tension leads form a system which distributes the high voltage surges to the spark plugs.

4-22. SPARK ADVANCE. The timing of the spark to piston position in the cylinder must vary if best engine performance is to be obtained. Thus, at high speed, the spark must occur at the plug earlier in the compression stroke in order to give the fuel-air mixture ample time to ignite, burn and give up its power to the piston as it starts down on the power stroke.

4-23. CENTRIFUGAL ADVANCE MECHANISM. The distributor centrifugal advance mechanism advances the breaker cam ahead of the distributor shaft (and thus the camshaft, crankshaft and pistons). This mechanism consists of an advance cam which is integral with the breaker cam, a pair of advance weights, springs and a weight base which is integral with the distributor shaft. Different spark advance is required on different engines through their speed ranges. The centrifugal advance for any particular engine is determined by operating that engine at wide-open throttle on a dynamometer and varying the spark advance at each engine speed until the advance is found which will give maximum power at that speed. Centrifugal advance weights, and weight springs are designed to supply this advance through the engine speed range. Some centrifugal advance curves are straight lines when shown in graph form relating speed to degrees of advance. In others the spark advance does not increase proportionally with engine speed increase so that the curve breaks or "dog-legs" at some intermediate speed. Maximum advance provided for some engines is only a few degrees. Other engines can use as much as 42 degrees advance (spark occurs 42 degrees of engine crankshaft rotation before piston reaches top dead center) at high speed. Maximum advance for the distributor used on this truck is 15 degrees to 19 degrees (crankshaft) obtained at 2000 engine rpm.

4-24. COOLING SYSTEM.

4-25. In liquid cooling systems, the heat from the cylinders is transferred to a liquid contained in jackets surrounding the cylinders. This liquid then passes through a radiator designed to expose as large an area as possible to the air. Air

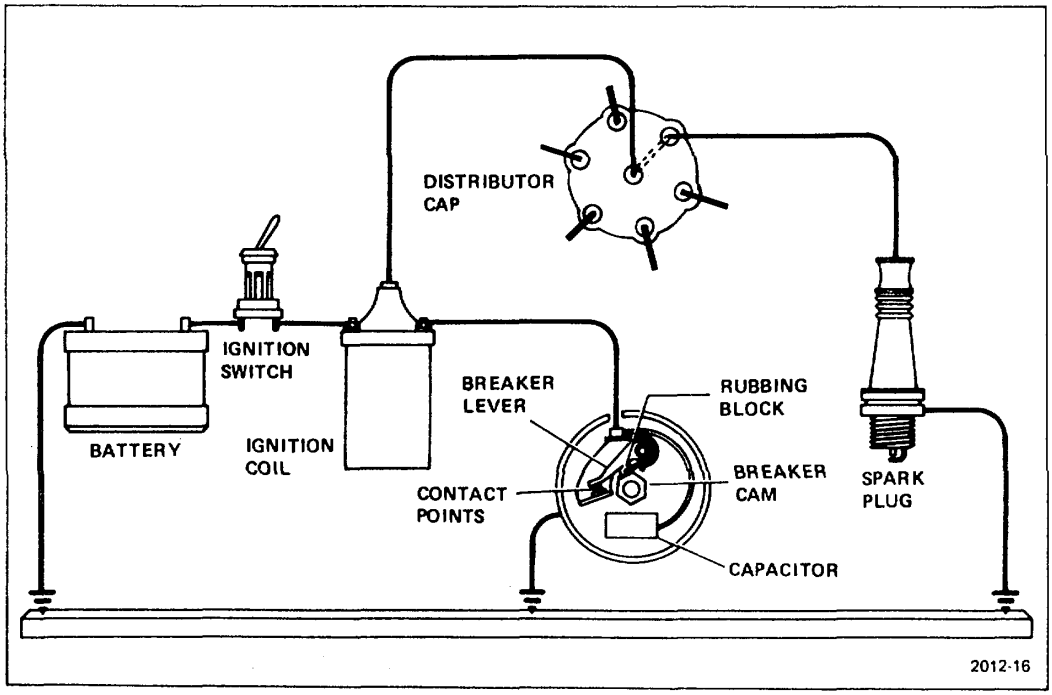


Figure 4-2. Ignition System Schematic

is circulated over the radiating surface by an engine-driven fan. The heat is carried away by this air stream. Liquid cooling systems usually are designed to maintain a coolant temperature of about 180 degrees F. It is desirable that normal operating temperatures be reached as quickly as possible. In liquid cooling systems, the circulation of the water can be delayed by means of a thermostatically opened valve until normal temperatures are reached.

4-26. PUMP CIRCULATING SYSTEM. The pump circulating system uses a centrifugal pump to circulate the water, to provide efficient cooling. The water pump, driven by a V-belt, maintains circulation in the cooling system.

4-27. RADIATOR. The purpose of the radiator is to cool water received from the engine. The radiator consists of an upper and lower tank and a core. In order to provide rapid dissipation of heat, the radiator is made of copper. Water from the engine enters the radiator through the upper connection. The radiator core divides the water into thin streams which flow into the bottom tank. In passing through the core, the water gives up heat, transferring it through the metal conductors of the core to the air stream blown through the core by the fan. An overflow pipe connected to the upper tank permits excess water or steam to escape. A baffle plate soldered inside the upper tank above the radiator-intake opening directs the flow of the water toward the radiator core.

4-28. FAN. The fan is centrally located ahead of the radiator core and forces the air through the radiator.

4-29. THERMOSTAT. Normal minimum water temperatures in the cooling system are automatically maintained by a thermostatic valve that remains closed, to prevent coolant circulating through the radiator, until the

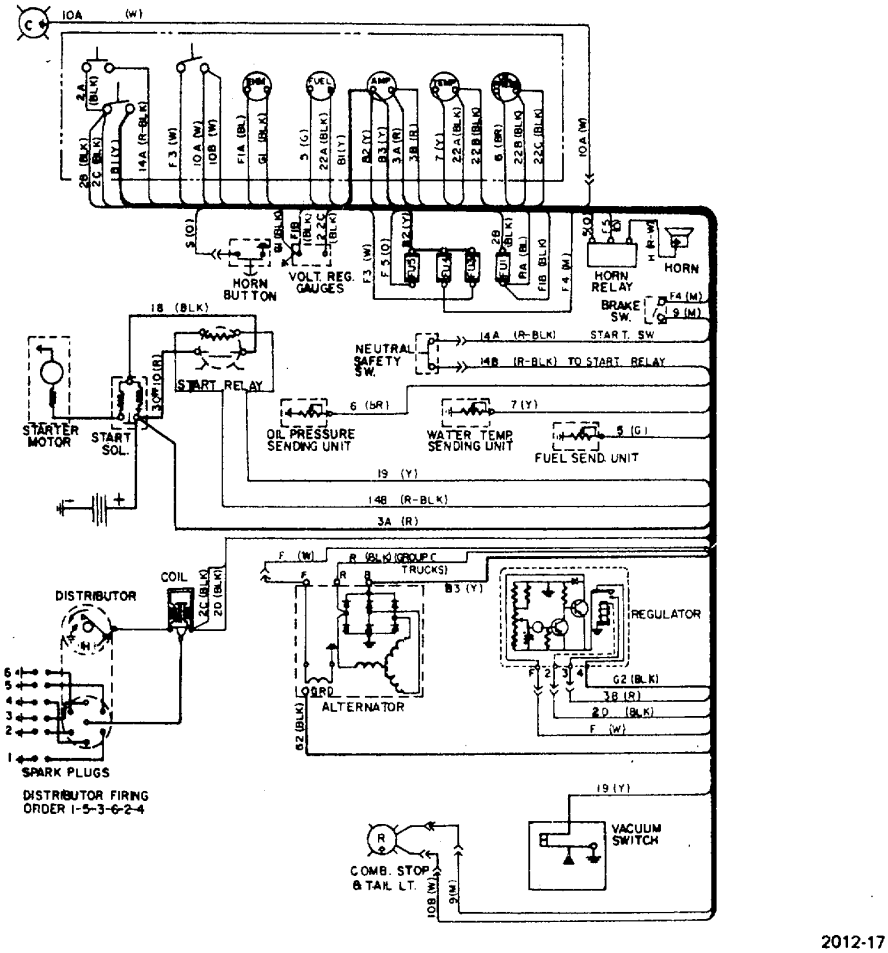


Figure 4-3. Wiring Diagram

desired temperature is reached. This thermostat is located in the cylinder head water outlet connection.

1. Removal

a. Drain cooling system (para 5-17).

b. Remove hose clamps (fig. 3-1) and upper hose. Remove hose clamp and bypass tube from elbow on cylinder head water outlet connection.

c. Remove two nuts, washers, and remove cylinder head water outlet connection and gasket. Lift thermostat from cavity in cylinder head.

2. Installation. Reverse removal procedure and install thermostat.

4-30. CHARGING SYSTEM.

4-31. The charging system includes the battery, alternator, regulator, ammeter, and necessary wiring to connect these components.

4-32. The continuous output alternator consists of two major parts, a stator and a rotor. The stator is composed of a large number of windings assembled on the inside of a laminated core that is attached to the frame. The rotor revolves within the stator on bearings located in each end frame. Two brushes are required to carry current through the two slip rings to the field coils wound concentric with the shaft of the rotor. Six rectifier diodes are mounted in the slip ring end frame and are joined to the stator windings at three internally located terminals.

4-33. Diodes are mounted in heat sinks to provide adequate heat dissipation. The six diodes replace the separately mounted rectifier as used in other types of application. The diodes change the alternating current to direct current.

4-34. The transistor regulator is an assembly composed principally of transistors, diodes, resistors, a capacitor, and a thermistor to form a completely static voltage regulating unit in Combination with a field relay.

4-35. The transistor is an electrical device which limits the alternator voltage to a preset value by controlling the alternator field current. The diodes, capacitor and resistors act together to aid the transistors in controlling the alternator voltage. This is the only function that the regulator performs in the charging circuit. The thermistor provides a temperature-compensated voltage setting. A wiring diagram of this regulator's internal circuit is shown in Figure 4-3, on the wiring diagram for the truck.

4-36. The voltage at which the alternator operates is determined by the regulator adjustment. The regulator voltage setting can be adjusted externally by removing a pipe plug in the cover and turning the adjusting arm inside the regulator. This procedure is explained in the following section, and permits regulator adjustments without removing the cover.

4-37. The field relay in the regulator is a single pole, single throw normally open relay, the coil of which is energized at the time the ignition switch is turned ON. On closing, this relay connects the truck battery voltage to the alternator field circuit, energizing the field circuit. Note that the alternator field has no residual magnetism, therefore the field cannot be self-excited, but depends on battery power to function.

4-38. Self-discharge of the battery to ground through the alternator is prevented by the natural function of the alternator rectifiers, which permit current flow in the charging direction, but block reverse current flow quite effectively.

4-39. Numerous models of similar 'appearing alternators and regulators exist which have no practical interchangeability with original equipment, since their internal construction may differ in electrical values. In the course of maintenance, replace only with parts of identical part numbers as the original equipment.

4-40. TEMPERATURE COMPENSATION. Reference to the test specifications in Section 2 of this manual will show that the regulated voltage will decrease slightly with any increase in temperature. This design consideration presumes that both battery and regulator temperature will warm up at a similar rate as the truck engine warms up. Since a cold battery can be safely charged at a higher rate than a warm one, the initial charging voltage applied to a cold battery is decreased as the truck engine and accessories warm up with operation. The thermistor in the regulator is the temperature sensitive component which controls this aspect of voltage regulation.

4-41. CHARGING SYSTEM POLARITY. The components of the charging system are suitable for use only in a 12 volt system in which the battery negative terminal is grounded. If a replacement battery, for example, is installed with file polarity reversed, (positive terminal grounded), the truck engine will start and run, but the solid state components of the charging system would probably be ruined before the engine could be shut off. This also applies should it be necessary to connect a jumper battery to the truck for an emergency start. Always check battery polarity carefully before making connections.

4-42. DRIVE AXLE AND TRANSMISSION.

4-43. The drive axle (see figure 1-9) of the fork lift truck includes an axle housing, differential assembly, two axleshafts with integrally machined spur reduction gears, mating with internal sun) gears providing second rage of speed reduction, and hydraulic self-adjusting brake assemblies at the wheel ends.

4-44. DIFFERENTIAL ASSEMBLY. This item of the drive axle is similar in design and function to equipment found in the drive axle of practically all automotive equipment. The purpose of the differential is to provide equal power to each driving wheel, while permitting the outside wheel in any turning maneuver to travel further than the inside wheel. This provision is necessary since the wheel on the outside of a turn must travel in a larger circle than the inside wheel.

4-45. CONSTRUCTION. Figure 4-4 shows the construction of a typical differential assembly schematically. The pinion gear shown in the picture is actually the output shaft of the transmission, and not part of the drive axle assembly, but must be considered to understand the power flow to the wheels.

4-46. FUNCTION. The gears and shafts of the differential are carried in a housing or cage mounted between the two shafts in the rear axle housing. Differential gearing can be thought of as a special form of planetary gearing. The rear

axle drive ring gear does not drive the axle shafts directly. Instead, it drives the differential cage to which it is secured. The differential pinions, which are small bevel gears, are mounted in the cage on small shafts, so that they drive the side gears which are splined to or are a part of the axleshafts. If the differential is thought of as a kind of planetary gear train, the side gears are considered to take the place of the planetary sun and annular gears. However, instead of being one inside the other, the side gears are the same size and face each other. They are bevel gears. When the cage revolves, the pinions, which mesh with the side gears, drive the side gears together with the cage as one unit. When one of the side gears is stopped, the cage which is the driving member drives the other side gear by the forces exerted on the pinions by the first gear, in the same way that a planetary cage and pinions drive the remaining member when one member is held stationary.

4-47. GEAR RATIO. The gear reduction for differential gearing is computed in the same way that it is computed for planetary gears. In the planetary train, when driven by the cage, the reduction is equal to the number of teeth in the stationary gear added to the number of teeth in the driven gear. The same thing is true in the differential. The computation is greatly simplified, and there are always twice as many teeth in both gears as there are in either one by itself. It does not matter how many teeth each side gear has; when one of them stops, the other one always goes twice as fast. When the vehicle is being turned, the side gear on the slow side allows the pinions to run by or walk around. The number of teeth passed on the slow side gear are passed on the pinion which drives the fast side gear ahead by the same number of teeth. Thus, if one wheel speeds up 10 percent, the other slows down 10 percent. and vice versa.

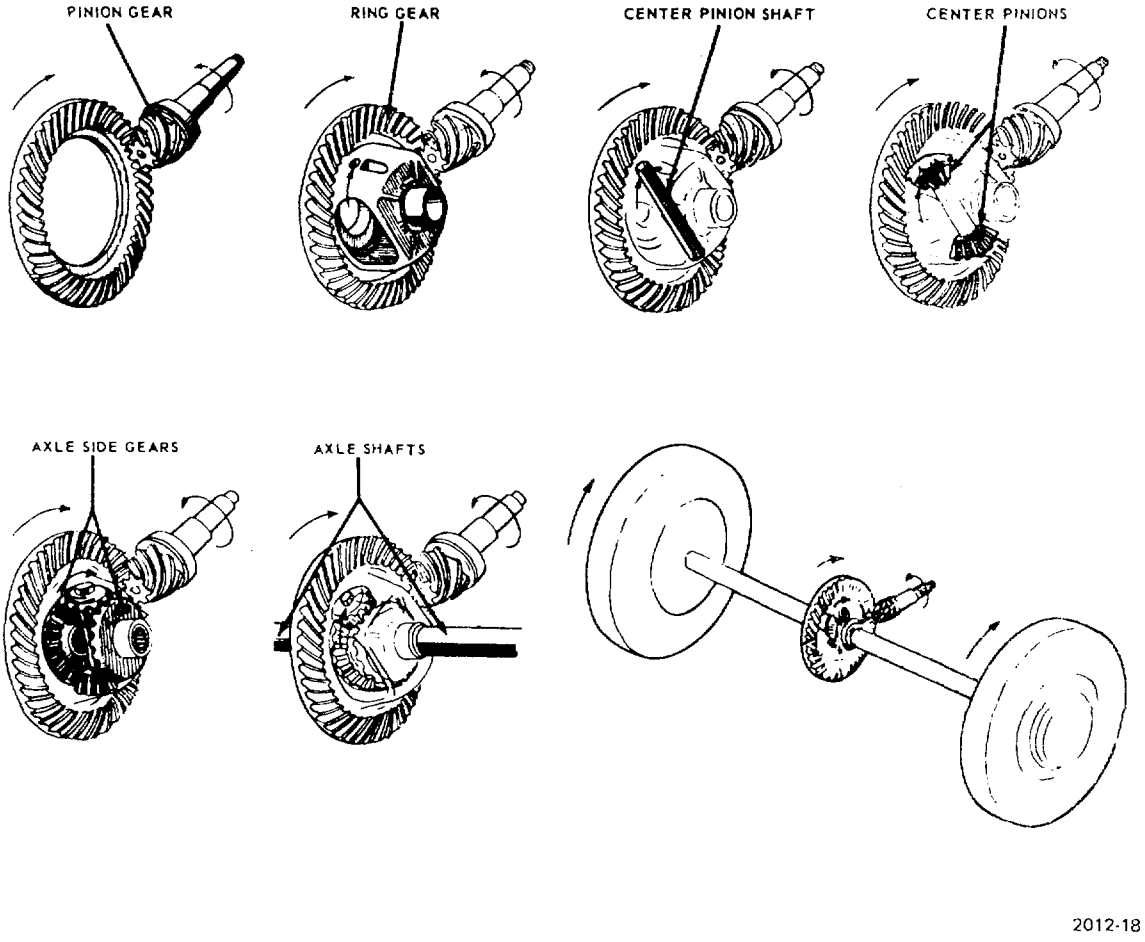


Figure 4-4. Differential Diagram

4-48. TRANSMISSION (see figures 1-7 and 1-8). Engine power is delivered to the transmission through a torque converter between the engine flywheel and the transmission input shaft. Refer to paragraphs 1-24 through 1-27 for a description of the mechanical arrangement of the transmission. Figure 4-5 shows how engagement of either the forward or reverse clutch directs the power flow through the transmission to drive the truck. Hydraulic control of the transmission is accomplished as follows:

4-49. Control Oil. Oil is directed from the transmission oil pump to a regulating valve which regulates main pressure and bypasses excess oil to the lubrication circuit. Oil under main pressure then flows to the inching valve which is controlled through linkage by the brake pedal in the operator's compartment. Depressing the brake pedal allows the inching control valve to move outward, gradually blocking main pressure feed to the pump valve located in the main valve body adjacent to the inching valve. The end

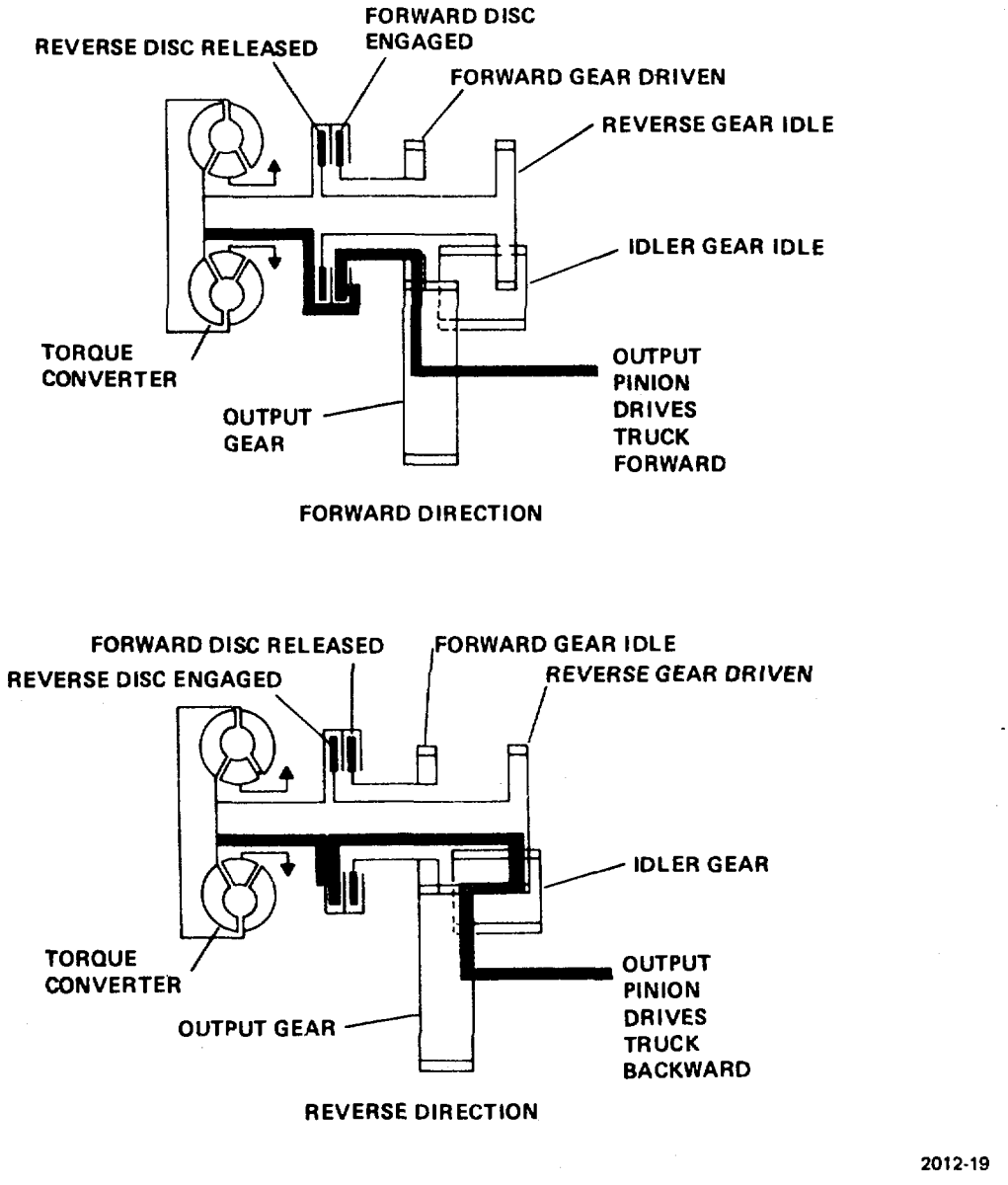


Figure 4-5. Transmission Power Flow

of the pump valve is also fed from an orifice directly by main pressure which positions the pump valve so that oil from the inching valve can flow through it to the selector valve.

4-50. Converter Oil. Converter oil flow comes directly from the oil pump outlet, but is reduced in pressure in passing through an orifice to get into the converter. Exit oil from the converter goes to a bypass valve located in the converter oil, out line. This bypass valve directs the oil to the sump in case of a clogged oil cooler or clogged cooler lines and provides a safety feature against extreme internal converter pressures caused by accidental restrictions. Oil from the cooler is directed to the lubrication circuit which maintains a flow of cooled oil under pressure to the clutch plates and bearings in the transmission.

4-51. WHEEL BRAKES (see figure 4-6). The wheels of the drive axle are fitted with a set of drum-and-shoe type brakes. The design and principles of operation of these brakes are simple, and generally similar to the most commonly used automotive hydraulic brakes. The brake assembly at each wheel consists of the following principal parts:

1. Backing plate (7) on which the nonrotating parts of the brake mechanism are mounted. The backing plate is anchored to the reduction gear housing, and cannot rotate.

2. Two lined brake shoes (16) mounted on the backing plate. The shoes are anchored at one end so they can pivot slightly on the anchor point, and are separated at the other end by a hydraulic cylinder (15) which spreads them in operation, to press them against the brake drum (4).

3. A hydraulic cylinder (15) (called the wheel cylinder to distinguish it from the pedal actuated master cylinder) is fastened to the backing plate.

a. Removal.

(1) Block up front of truck so weight is taken from front wheels.

(2) Drain oil from power axle.

(3) Disconnect brake hoses (2 and 3, fig. 6-6) from elbows (4).

(4) Disconnect parking brake linkage at parking brake lever(2, fig. 4-6.1).

(5) Remove cotter pin (3) and nut (4) and remove parking brake lever (2) from brake lever and pin assembly (45).

(6) Remove screws (22) and washers (23) and separate sections of final drive gear case (47) from axle housing (61).

(7) Remove cotter pin (25), nut (26) and washer (27) and pull wheels, brake drum, brake drum seal, gasket, and final drive shaft from axle housing as an assembly.

(8) Disassemble hydraulic brake assembly as follows:

(a) Press outer of two spring retainers (2) inward to compress springs (1) and turn it 90 degrees to free retainer and spring from spring rod (3). Remove items 1, 2 and 3 from assembly.

(b) Spread brake shoes (6) apart at top, enough to permit them to be removed from packing plate (17) with springs still attached. Remove brake shoes and springs (4 and 5). Lever (7) will be freed at the same time.

(c) Remove two brake push rods (8), dust boots (11), pistons (12), cups (13), and spring (14) at each brake. Remove two screws and washers (9 and 10) and take wheel cylinder (15) and spacer (16) from backing plate (17). Remove and discard felt seal (18).

b. Cleaning and Inspection.

(1) Wipe the brake shoes with a clean dry cloth. Clean all other parts with dry cleaning solvent (Federal Specification P-D-680) and dry thoroughly.

(2) Inspect brake lining for graze, grease or oil soaked condition, and wear. Inspect wheel cylinder bore for rust pits or scoring. Replace cylinders which can not be reconditioned with light honing. Inspect rubber cups and boots for cracks or deterioration. Replace brake shoes if lining is glazed, grease or oil soaked, or if lining thickness is less than 1/8 inch. Replace defective wheel cylinder cups and boots if cylinder can be honed effectively. If wheel cylinder is badly pitted, replace cylinder assembly.

c. Repair. Repairs consist of replacement of the brake shoes in matched sets on both wheels and rebuild or replacement of the wheel cylinder. Rebuild kits are available to replace the internal parts of the wheel cylinder. Brake shoes are always replaced in full sets to maintain equal braking.

NOTE

Discoloration of wheel cylinder bore may be polished out with crocus cloth. Pits or scratches require use of a hone.

d. Installation. Reverse removal procedure and install the power axle assembly. Refer to LO 10-3930-623-12 for lubrication requirements for the power axle assembly. Bleed the service brake system (para 5-41).

e. Brake shoe adjustment. With front wheels raised from floor, turn front cam bolt until brakeshoe drags on drum, then back off cam until wheel is just free to turn. Repeat at rear cam bolt.

4. Spring (18, fig. 4-6) to retain the shoes in place and retract them from contact with the drum when the brakes are released.

5. A brake drum (4) to which the final drive axle and wheel are bolted. The drum is the rotating part of the assembly.

6. Parking brake mechanism to spread the brake shoes mechanically. This system is actuated by the hand brake lever, cables, and linkage.

a. Removal. Refer to figure 4-6.2.

1. Release hand brake lever.

2. Remove headed pin (26) and cotter pin (27) connecting brake cable equalizer plate link (25) to lever assembly (29).

3. Remove screws (19) attaching brake lever (29) to mounting bracket (18).

b. Installation and Adjustment.

NOTE

Adjustment knob of brake lever should be turned fully counterclockwise before installing.

1. Install hand brake lever (29) to bracket (18) with screws (19 and washers (18).

2. Adjust knob of brake lever (29) until a hard pull is required to pull the lever "over center". If pin in the brake lever slide plate slot is in the top half of the slot or the cables are loose over the pulleys (12) when the brake is released, readjust cable length at upper end of clevis.

NOTE

If the knob cannot be rotated, grip the lower knurled bank with pliers and the upper band with second pair and unscrew top half of knob. Make adjustment with lower nut and lock with upper half.

4-52. Foot pressure on either brake pedal moves a plunger in the master cylinder to create hydraulic pressure in the brake system. This pressure is transmitted through tubing and fittings (14) to each wheel cylinder to spread the brake shoes until they contact the interior friction surface of the drums. The friction, or drag, between the shoes and the drum, brakes the front wheels, and slows or stops the truck.

4-53. OPERATING INSTRUCTIONS.

4-54. INSTRUMENTS AND CONTROLS. In addition to the instruments and controls (switches) on the instrument panel (see figure 1-12) the following controls are provided for operation of the fork lift truck (see figure 4-7):

1. Engine choke control on the instrument panel at the right of the driver's seat. Used principally when starting a cold engine.

2. Steering wheel with the horn button in the center.

3. Hand brake lever. This control actuates, through supplementary mechanical linkage, the service brake shoes at the wheels. The hand brake is primarily a parking brake. If the truck's foot brake is pressed during application of the parking brake, less effort will be required at the handle for a given degree of brake application.

4. Accelerator pedal for controlling engine speed.

5. Double brake pedal. Pressure on either pedal operates the inching valve and applies the brakes, as follows:

a. If the transmission is in either drive range slight brake pedal travel bypasses a portion of Clutch Apply pressure to the applied clutch, permitting clutch slippage for close quarter inching operations.

b. Further pedal travel dumps all Clutch Apply pressure, effectively neutralizing the transmission even if the selector is in a Drive position. The operator can then inch in under a load, pick it up without shifting to neutral, and take it away with minimum operation of controls. Further pressure on the pedal beyond inching applies the brakes.

6. Shift lever. This lever is used to shift the transmission into FORWARD, NEUTRAL, or REVERSE. Design of the transmission permits power shifting between FORWARD and REVERSE at any speed, without using brakes, if the operation being performed requires it.

7. Hoist control lever. With the truck engine running, drawing this lever rearward directs hydraulic pressure to the hoist cylinder to raise the forks. In center position, the hoist cylinder is locked in whatever position it was at the time the control was placed in that position. Moving the lever forward releases the hydraulic fluid in the hoist cylinder to permit lowering the forks by gravity. The control can be manipulated by the operator to select the rate of raising or lowering as desired.

8. Tilt control lever. When moved forward, this control tilts the uprights and forks OUT to facilitate picking up certain types of load, and in (when moved rearward) for security in carrying a load.

1. Wheel Retaining Bolt
2. Drum Retaining Bolt
3. Final Drive Axle
4. Brake Drum
5. Backing Plate Retaining Screw
6. Backing Plate Retaining Nuts
7. Backing Plate
8. Studs
9. Locating Dowel Pin
10. Reduction Gear Housing
11. Parking Brake Outer Lever
12. Parking Brake Lever and Pin
13. Bleeder Screw
14. Brake Lines and Fittings
15. Wheel Hydraulic Cylinder
16. Brake Shoe
17. Brake Shoe Retainer
18. Brake Shoe Retracting Spring

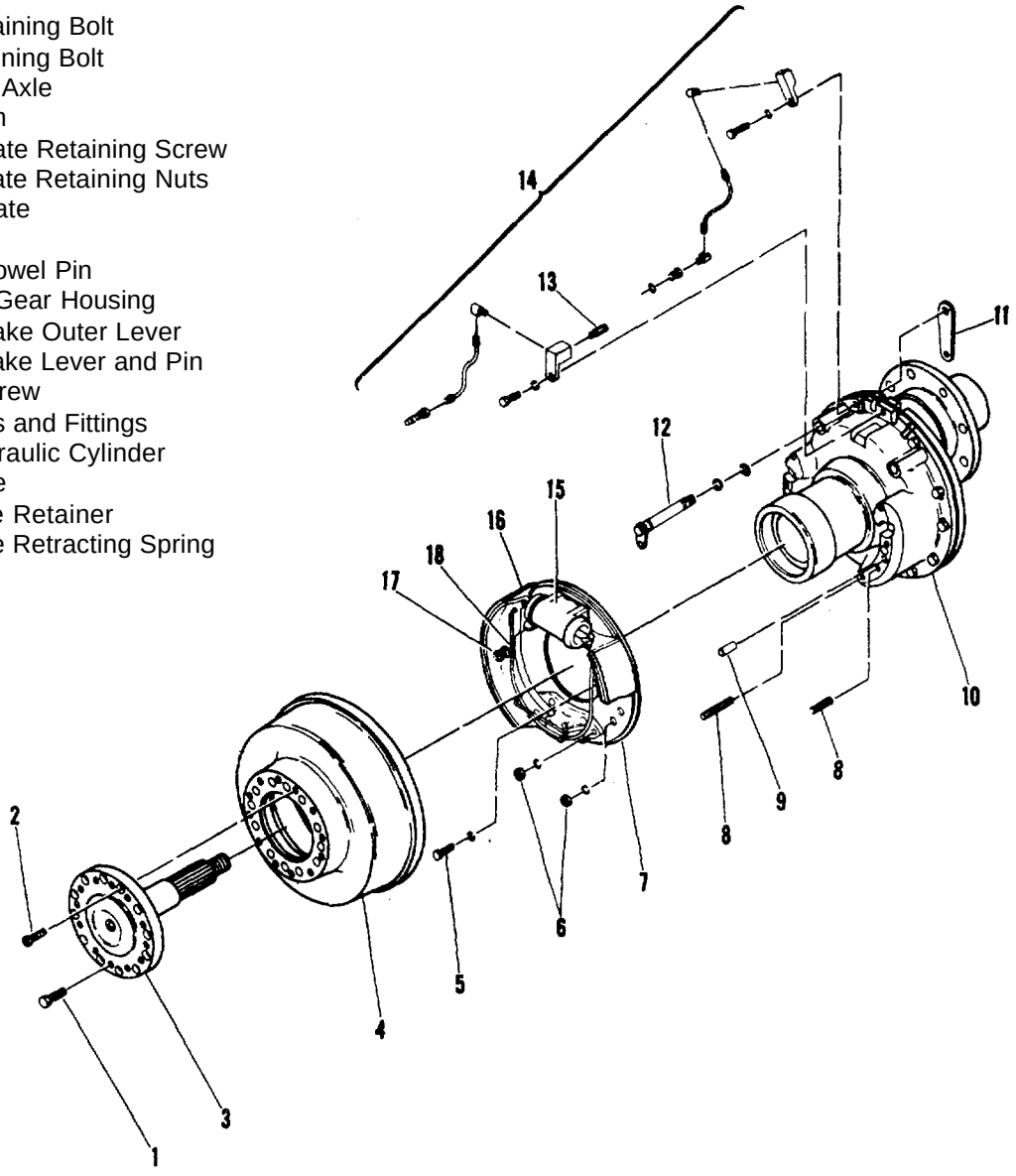


Figure 4-6. Wheel Brake Layout

1. Wheel Bolt
2. Parking Brake Lever
3. Cotter Pin
4. Castellated Nut
5. Parking Brake Rod, RH
6. Spring Pin
7. Brake Bleeder Screw
8. Brake Tube Assembly (Actuating)
9. Brake Tube Assembly (Bleed)
10. Elbow
11. Adapter
12. Gasket
13. Bleeder Tube Adapter
14. Brake Line Fitting
15. Screw
16. Nut
17. Washer
18. Washer
19. Bleeder Screw Fitting
20. Screw
21. Washer
22. Screw
23. Washer
24. Internal Gear (Final Drive)
25. Cotter Pin
26. Nut
27. Washer
28. Roller Bearing Inner Cone and Rollers
29. Inner Bearing Cup
30. Final Drive Shaft
31. Screw
32. Gasket
33. Bearing Outer Cone and Rollers
34. Outer Bearing Cup
35. Brake Drum
36. Brake Drum Seal
37. Brake Assembly
38. Screw
39. Washer
40. Nut
41. Washer
42. Stud
43. Stud
44. Pin
45. Brake Lever and Pin Assembly
46. Packing
47. Final Drive Gear Case
48. Gasket
49. Bearing Retainer
50. Screw
51. Washer
52. Axle Shaft
53. Axle shaft Bearing Retainer
54. Bearing
55. Nut
56. Washer
57. Washer
58. Tapered Bushing
59. Stud
60. Roller Bearing Cup
61. Axle Housing
62. Gasket
63. Gasket
64. Bearing Cone and Rollers
65. Case Assembly
66. Screw
67. Side Bevel Gear
68. Thrust Washer (Side Gear)
69. Thrust Washer (Spider Bevel Gear)
70. Bevel Gear (Spider)
71. Differential Spider
72. Ring Gear
73. Rivet
74. Pipe Plug
75. Housing Oil Drain Plug
76. Final Drive Housing

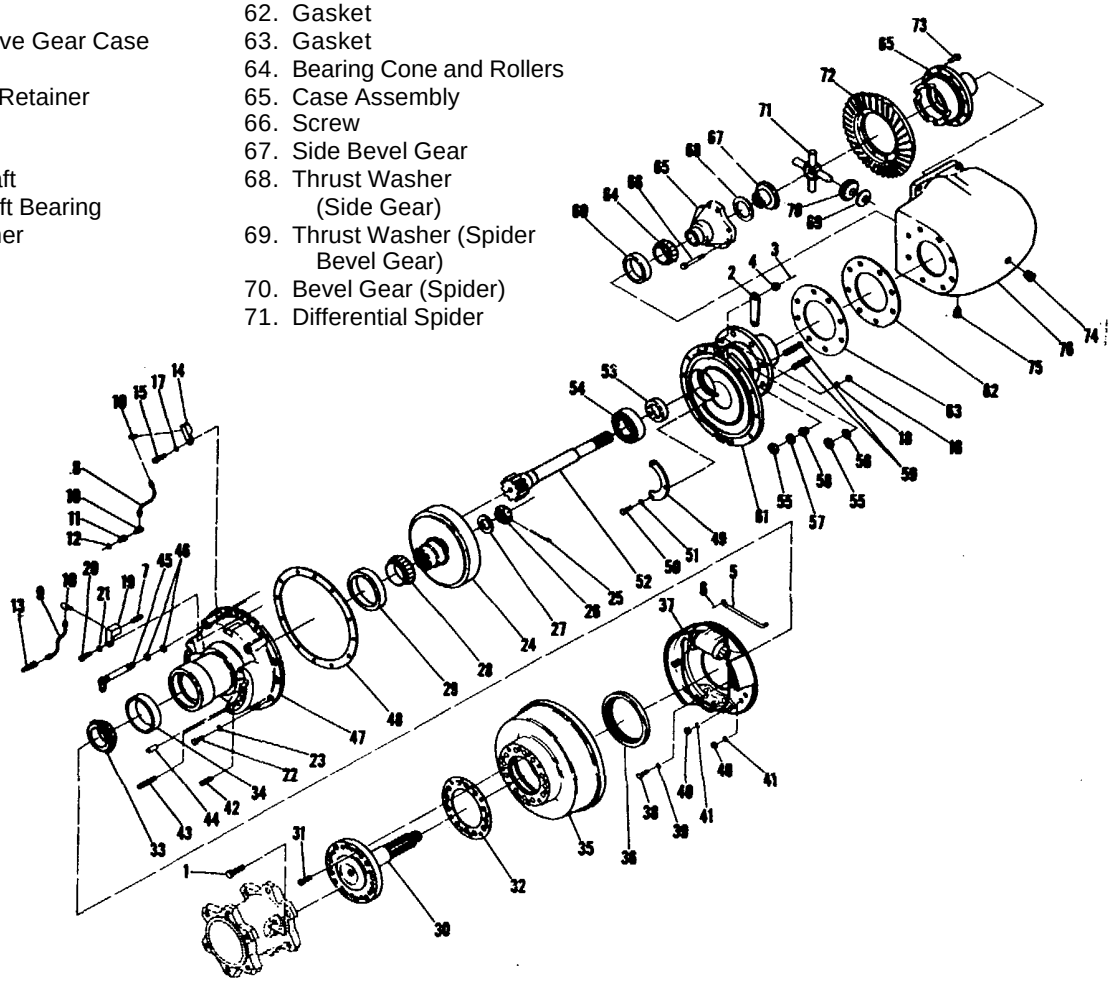
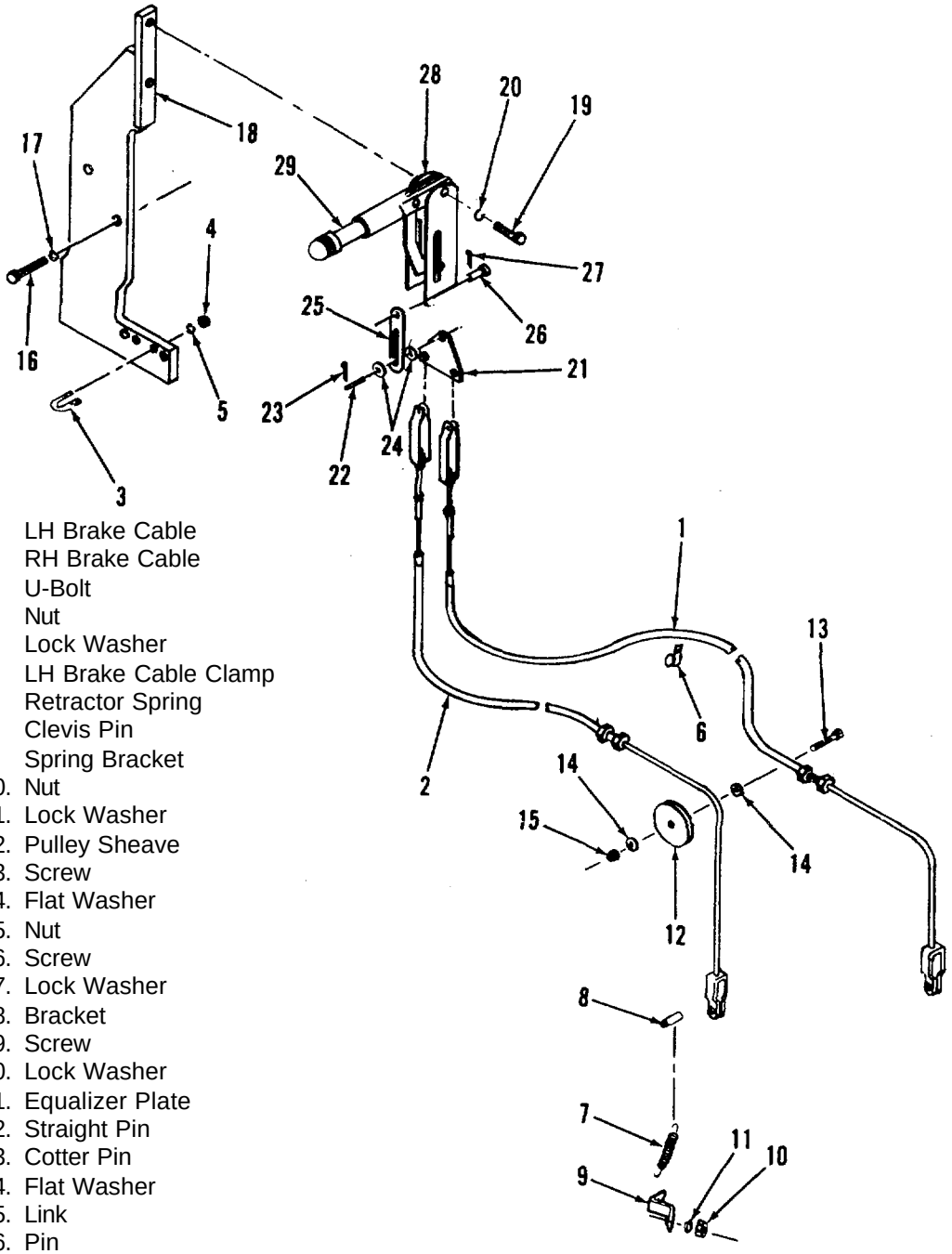


Figure 4-6.1. Front Drive Axle Complete, Exploded View



1. LH Brake Cable
2. RH Brake Cable
3. U-Bolt
4. Nut
5. Lock Washer
6. LH Brake Cable Clamp
7. Retractor Spring
8. Clevis Pin
9. Spring Bracket
10. Nut
11. Lock Washer
12. Pulley Sheave
13. Screw
14. Flat Washer
15. Nut
16. Screw
17. Lock Washer
18. Bracket
19. Screw
20. Lock Washer
21. Equalizer Plate
22. Straight Pin
23. Cotter Pin
24. Flat Washer
25. Link
26. Pin
27. Cotter Pin
28. Cross Link
29. Hand Brake Lever Assembly

Figure 4-6.2. Hand Brake Control Installation, Exploded View

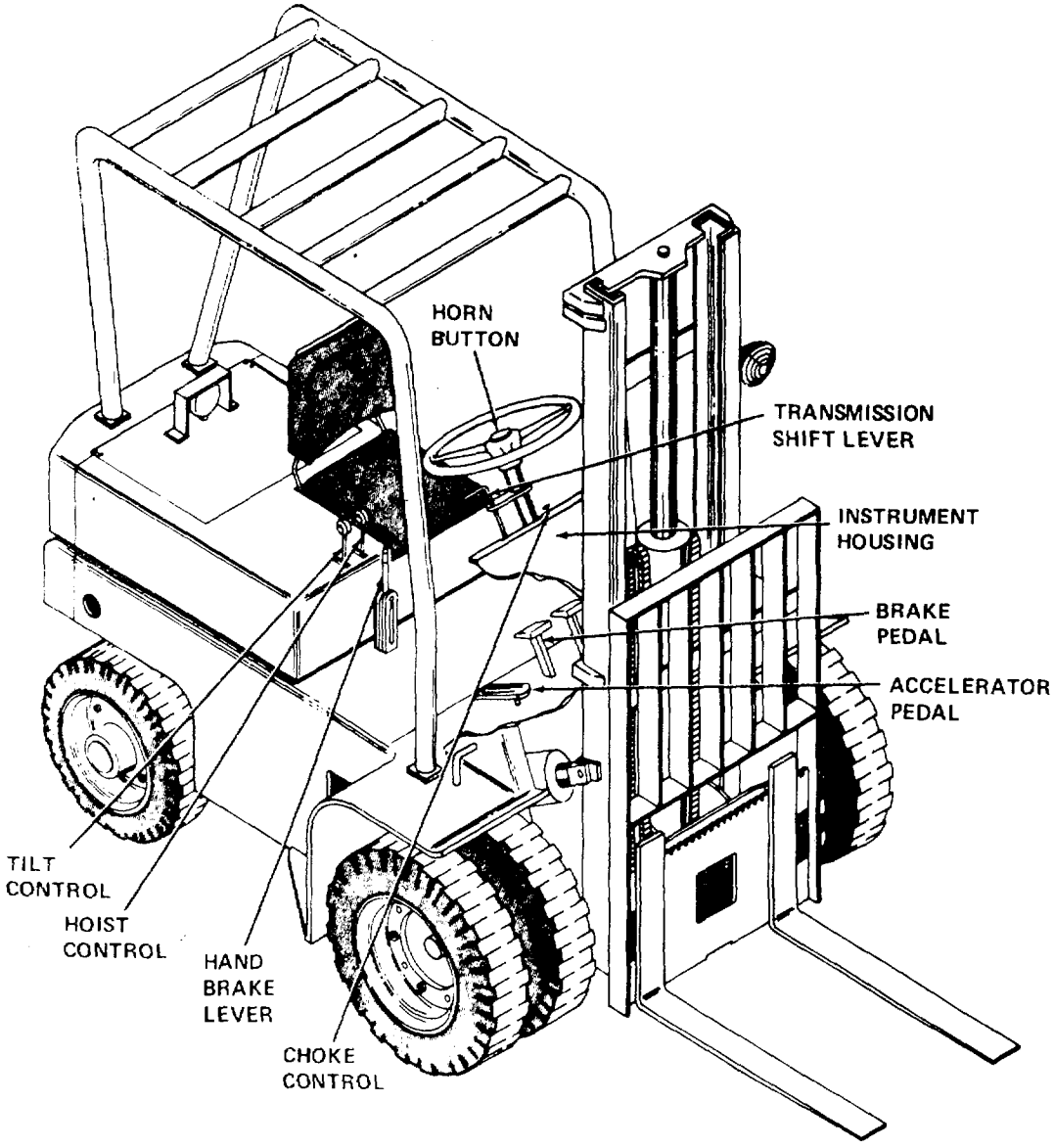


Figure 4-7. Instruments and Controls

4-55. STARTING THE FORK LIFT TRUCK. Start the engine of the truck as follows:

1. Position shift lever in NEUTRAL (center of fore and aft travel) position. Shift lever must be in NEUTRAL to close neutral safety switch and complete starter circuit.
2. Draw out engine choke control fully.
3. Turn on ignition switch (figure 1-12).
4. Press starter button on instrument housing to crank engine until it starts, while holding throttle slightly open with accelerator pedal.
5. As soon as engine starts, push choke control back in as far as possible without causing rough running of the engine. As the engine warms up, return choke control to fully in position. It is required only in starting and possibly during engine warmup.

NOTE

If engine cannot be started in fifteen seconds of cranking effort, discontinue trying to start it and determine the reason for failure to start. Section V contains a list of the most commonly met service troubles and remedies. Refer to this list before requesting assistance from a higher maintenance level.

6. When engine starts, note that oil pressure gage on instrument cluster indicates at least 35 pounds pressure. If pressure is low or erratic, stop engine immediately and check oil level.
7. To stop engine, turn off ignition switch.

4-56. OPERATING PROCEDURES AND TECHNIQUES.

4-57. SHIFTING. Shifting from forward to reverse or reverse to forward is accomplished by moving the transmission shift lever in the direction the operator wishes to travel. The vehicle can be power shifted from forward to reverse or vice versa. It is not necessary to bring the truck to a complete stop to perform forward-reverse shifting operation.

4-58. SERVICE BRAKES AND INCHING CONTROL. Inching control provides a convenient method of either partially or completely disengaging engine power from the drive axle to obtain high engine rpm for rapid lifting speeds while inching the vehicle. Two service brake pedals, on a common shaft and located for either left or right foot operation operate the inching valve. The operator can use his left foot for operating the inching control and brake, and his right foot to accelerate the engine for high speed lifting. The first part of the brake pedal stroke controls inching. Depressing pedal reduces oil pressure to the clutches. Further depressing of the pedal cuts off oil pressure and actuates the service brakes.

4-59. SHUTTLE TYPE OPERATION WITH POWER SHAFTING. For additional speed in shuttle type operations, the operator can go from forward to reverse without bringing his truck to a stop with the brakes. This power shifting procedure enables the operator to shift into the opposite direction at the precise time that reverse movement is desired. As a result, in many operations, loading or unloading can be accomplished in less time, since delays due to shifting are avoided. By power shifting, the expert operator can snatch loads without using his brakes as follows:

1. Have forks correctly spaced for pallet.
2. Approach pallet with forks at correct height to enter pallet. As forks enter pallet, shift into reverse direction.
3. Just as vehicle reverses, operate hoist lever momentarily.
4. Truck will stop, pick up load and then reverse smoothly and quickly.
5. With practice. the operator can determine the precise moment to power shift and operate hoist controls for a smooth loading and reversal.

4-60. GENERAL LOADING AND DRIVING PROCEDURES.

4-61. LOADING. Observe the following procedures and precautions:

1. Never, under any circumstances, attempt to operate a fork lift truck with a load so heavy that steering becomes uncertain.
2. The forks should be positioned so that load is centered.
3. Spread the forks apart when carrying wide loads.
4. Never attempt to use one fork only to lift a load. Using one fork may twist, strain or permanently damage the truck.
5. Make sure that the load is placed as far back on the forks as possible. If the load is placed out near the tips of the forks, the rated capacity of the truck will be greatly reduced. This procedure is especially important with long loads, to prevent loss of traction on the trailing wheels.
6. Do not tilt load out beyond vertical position of mast when elevated.
7. Always tilt the mast back to cradle the load before hoisting it.
8. If the load is not on a pallet or is round in shape, tilt the mast out, and slide the forks under the load, then tilt mast in before hoisting.
9. When hoisting or tilting, shift into neutral, or apply inching control.

4-62. STEERING. Observe the following procedures and precautions:

1. Turns should be made smoothly and gradually. Avoid sudden turns which may cause loss of control or spilling of the load.

2. A loaded fork truck usually steers easier than an empty one. The truck operator should accustom himself to these changes in steering.

3. Do not go around corners too fast, especially when there is no load on forks, as truck may overturn.

4. When turning sharp corners, start from the inside corner rather than from the middle of the aisle.

5. The operator should accustom himself to the peculiarities of rear wheel steering. Allowance must be made for the tail swing and "free turning" tendencies of the vehicle.

4-63. DRIVING AND TRANSPORTING THE LOAD. Observe the following procedures and precautions:

1. While traveling, keep the mast tilted back.

2. Raise the load only high enough to clear obstructions while traveling. Do not carry the load so high as to cause instability.

3. When traveling unloaded, always keep the forks in a low position.

4. Back the fork lift truck down steep inclines so that the load will not slip off the forks.

5. Always reduce speed gradually, as sudden stops are unnecessarily hard on the truck, and the load may fall forward.

6. Observe instruments to insure proper vehicle operation.

7. Always set parking brake when leaving the truck.

8. Do not activate starter with engine running.

4-64. SAFETY PRECAUTIONS.

4-65. In addition to the general rules of good driving practice that apply to use of any vehicle, such as observing posted regulatory signs and rules, certain special rules apply to the operation of a fork lift truck. Observance of these rules will minimize the chance of personal injury and damage to equipment. The following safety precautions apply to the use of the fork lift truck.

1. Never stand or pass under elevated loads.

2. Always back down inclines.

3. Always check the height of doorways and overhead obstructions for adequate boom and load clearance.

4. Loaded or empty, drive with the forks raised to about six inches ground clearance, and with the boom tilted backwards.

5. Never put arms or legs between the uprights.

6. Transport no unauthorized riders.

7. Use two trucks for one load only if the operation is authorized and supervised by a competent third person.

8. Brake and turn the truck gently to avoid upset or losing the load.

9. Never use only one fork prong for hoisting to avoid twisting the uprights and related parts.

10. Report any defect in the truck or its operation to responsible authority immediately. Do not continue to use a truck with a defect unless specifically authorized to do so.

SECTION V

INSPECTION, MAINTENANCE AND LUBRICATION

5-1. SCOPE OF SECTION.

5-2. This section contains instructions for periodic inspection of the fork lift truck, maintenance which can be performed with commonly available hand tools, lubrication instructions, and a table of the service troubles most likely to be encountered, and their remedies. No special tools are required to accomplish any of the operations in this manual.

5-3. PREVENTIVE MAINTENANCE SERVICES. To ensure that the fork lift truck is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance checks and services to be performed are listed as described in paragraphs 5-4 and 5-8. The item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation of the unit will be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded together with the corrective action taken (on DA Form 2028) at the earliest possible opportunity.

5-4. PREVENTIVE MAINTENANCE CHECKS AND SERVICES. Refer to table 5-3 and perform the preventive maintenance checks and services on the fork lift truck.

5-5. DELETED

5-6. EIGHT HOUR OPERATIONAL INSPECTION (ROAD TEST). Road tests on the fork lift truck should also be conducted following maintenance and service operations. Periodic road tests should also be scheduled if the vehicle is subjected to infrequent use. The road test should provide sufficient operational time to insure proper operation of the vehicle. Before attempting to drive the vehicle, but while the engine is operating, check the operation of the brakes, steering wheel, truck lighting system and hydraulic system in accordance with their respective operating instructions. When the engine is started, observe the indicating instruments and perform inspection as described in the subsequent steps:

1. Observe the oil pressure gage (figure 1-12) which should normally indicate a pressure of 20 to 30 psi at governed speed when engine is warm. If there is no oil pressure indication, or the pressure is unsteady after the engine has operated for 30 seconds, stop the engine and determine the cause. With engine fully warmed up, oil pressure should never be below 7 psi at idle speed.

2. When the engine is started, the ammeter will normally indicate a high charging rate and then gradually return to a slight charging rate. If a discharge indication or absence of indication is noted, stop the engine and investigate the cause.

3. The normal engine temperature range (after warm-up) should be between 165 degrees to 190 degrees F. If the temperature gage indicates temperature outside these limits, stop the engine and investigate the cause. Low coolant level is the most common cause of overheating, while a defective thermostat will cause overcooling.

4. Operation. Check engine at various speeds for evidence of overheating, lubricant leakage and other abnormal conditions. Note any excessive noise or vibration of the engine over its entire speed range.

5. Transmission. Place the fork lift truck in motion and check operation of transmission in forward and reverse. The transmission shift lever should slide smoothly into position without a tendency to slip out of gear. Note any excessive vibration of shift lever when decelerating or accelerating the vehicle.

6. Service and Hand Brakes. Test operation of service brakes at start of road test while traveling at various vehicle speeds. Brake action should be positive and applied equally to both front wheels. Note any mushiness or creeping of the brake pedal or tendency of the wheels to lock, pull to one side or produce unusual noises. Test the hand brake with the vehicle on an incline, noting if the brakes hold the vehicle satisfactorily.

7. Steering. Check the steering wheel travel for hard steering, poor return to center and noises.

8. Upright Assembly Hydraulic System (see figure 1-4). Check the hydraulic system by testing operation of both the tilt and hoist cylinders through their complete range of movement. Pushing the control valve handle marked HOIST

back raises the forks to the extreme top of the upright assembly. Slowly push lever forward and allow the forks to bottom by gravity. If, in raising the hoist, the lever is not returned to neutral when top is reached, the overload bypass in the control valve will open automatically and detour the flow of oil back to the reservoir tank. This action is indicated by a buzzing sound which is normal. Note if there is any tendency for channels to bind and be sure there is complete freedom of the crosshead assembly, both up and down. In testing of the tilt operation, when lever marked TILT is pulled back to its extreme, the forks should tilt up and back. When the TILT lever is pushed forward, the forks should tilt out and down. Both tilting actions are accomplished by hydraulic pressure. Note any tendency fox either the hoist or tilt action to hesitate or mush.

5-7. WEEKLY INSPECTION. Perform the daily inspection. In addition:

1. Remove the pleated paper air cleaner element. Clean it by tapping it lightly on floor, then carefully blowing surface dust from the exterior with compressed air.

CAUTION

Do not blow high pressure airstream at close range to the element. Do not wet the element for cleaning or any other reason.

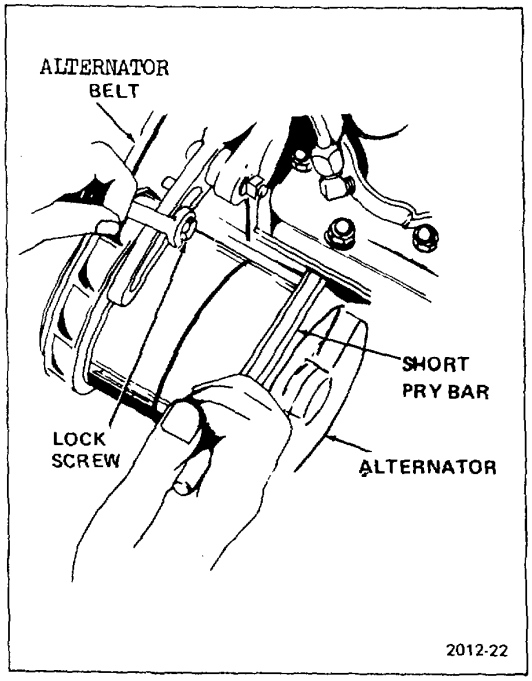


Figure 5-1. Tensioning Alternator Belt

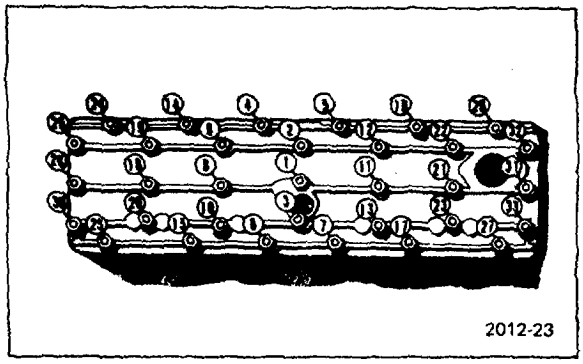


Figure 5-2. Cylinder Head Tightening Sequence

2. Check fan belt tension. At firm thumb pressure at center of the long span, belt should yield 3/4-inch minimum and one-inch maximum. Adjust tension as necessary by repositioning IDLER BELT TENSION (Fig. 6-8).

3. Check lubrication requirements (refer to LO 10-3930-623-12)

5-8. QUARTERLY PREVENTIVE MAINTENANCE SERVICES. Before this inspection, clean the truck, including the engine, transmission, drive and steering axles and hoist mechanism, Use a steam cleaner or an approved type engine cleaning solution. After cleaning, relubricate exposed parts of hoisting mechanism in accordance with instructions LO 10-3930-623-12: inspect according to table 5-3 and as follows:

1. Perform eight hour visual and operational inspections, and weekly inspection.

2. Inspect all grease-fitting lubricated parts for signs of wear.

3. Remove and inspect engine spark plugs. Clean or replace, if necessary. Inspect condition of all ignition wiring.

4. Remove distributor cap (but not wiring to cap). Inspect interior for dirt accumulation or burned lines on plastic surface.

5. Inspect distributor point gap, and condition of points. If points are serviced (adjusted, cleaned, or replaced), check ignition timing with a timing light.

5-9. ENGINE MAINTENANCE.

TABLE 5-3 **PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

B - BEFORE OPERATION **A - AFTER OPERATION** **M - MONTHLY**
D - DURING OPERATION **W - WEEKLY** **Q - QUARTERLY**

ITEM NUMBER	INTERVAL								
	OPERATOR				ORG.				
	DAILY								
	B	D	A	W	M	Q	ITEM TO BE INSPECTED	PROCEDURE	REFERENCE
1	1						Engine oil level	Check engine oil levels Add oil as necessary.	para 3-4
2	2						Cooling system	Verify coolant level in radiator. Add coolant as necessary.	para 3-5
3	3		7				Fuel tank	Fill fuel tank to proper level	para 3-6
4	4						Tires	Inspect for cuts and damage. Inflate to 100 psi	para 5-5
5	5				1	10	Controls and instruments	Inspect for damage and insecure mounting. Check for proper indication	paras 3-12 thru 3-17, and 5-6
6	6		8		2	11	Body	Inspect the truck for damage, loose parts, general appearance, cleanliness and lubrication of the hoisting mechanism	para 5-5
7				9	3	12	Brake system	Check level of fluid in brake master cylinder. Add fluid as necessary.	para 3-7

TABLE 5-3 (continued) **PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

ITEM NUMBER	INTERVAL						B - BEFORE OPERATION D - DURING OPERATION	A - AFTER OPERATION W - WEEKLY	M - MONTHLY Q - QUARTERLY
	OPERATOR				ORG.				
	DAILY								
	B	D	A	W	M	Q	ITEM TO BE INSPECTED	PROCEDURE	REFERENCE
8				10	4	13	Battery	Check electrolyte level in each cell. Add distilled water until level is 3/8 inch above plates. Remove corrosion from battery cable terminals	para 3-8
9				11	5	14	Hydraulic oil reservoir	Check fluid level. Replenish as necessary.	para 3-9
10				12	6	15	Transmission fluid level	Check transmission fluid level. Add fluid as necessary.	para 3-10
11				13	7	16	Alternator and fan belt tension	Check for proper deflection between pulleys	paras 5-7.2, and 5-26
12				14	8	17	Air cleaner	Remove air cleaner element and clean	para 5-7.1
13					9	18	Lubrication requirements	Refer to LO 10-3930-623-12 and lubricate fork lift truck accordingly	
14						19	Grease-fitting lubricated parts	Inspect all grease-fitting lubricated parts for signs of wear. Notify direct support personnel of worn parts.	

TABLE 5-3 (continued) **PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

B - BEFORE OPERATION A - AFTER OPERATION M - MONTHLY
D - DURING OPERATION W - WEEKLY Q - QUARTERLY

ITEM NUMBER	INTERVAL						ITEM TO BE INSPECTED	PROCEDURE	REFERENCE
	OPERATOR				ORG.				
	DAILY								
	B	D	A	W	M	Q			
15						20	Spark plugs	Remove and inspect engine spark plugs. Clean or replace if necessary. Inspect condition of all ignition wiring	para 5-32
16						21	Ignition distributor	Inspect the distributor assembly for cracks, carbon streaks, corroded terminals and dirt.	para 5-31
								Check distributor point gap and condition of the points.	para 5-8 and 5-31

5-10. CYLINDER HEAD

1. Removal.

a. Drain cooling system (para 5-17).

b. Remove hose clamps (fig. 3-1), bypass tube, upper hose, thermostat housing and gasket.

c. Remove lead to temperature transmitter, and remove transmitter.

d. Remove distributor and spark plug cables (para 6-53).

e. Remove spark plugs.

f. Tag all head capscrews and key location to cylinder head.

g. Remove cylinder head capscrews and washers. Lay ignition coil and bracket along side of engine.

h. Lift off cylinder head from engine. Remove and discard head gasket.

2. Cleaning.

a. Scrape carbon from inside of combustion chamber area with carbon scraper, or use a wire brush. Do not scratch surface when scraping.

b. Scrape or brush gasketed surfaces of cylinder head and block to remove gasket paste residue. Wipe both surfaces with a cloth dampened with dry cleaning solvent (Fed. Spec. P-S-661).

3. Installation.

a. Position new cylinder head gasket on block.

b. Position cylinder head on block and start capscrews. Replace ignition coil with bracket and lifting eye bracket under proper capscrews.

c. Tighten capscrews following sequence shown in figure 5-2. Torque capscrews to 75 ft-lbs.

5-11. INTAKE AND EXHAUST VALVE TAPPET ADJUSTMENT.

1. Start engine and allow it to run until normal operating temperature is reached. Stop engine, remove valve cover (see figure 1-2) and cover gasket.

2. Start engine and insert feeler gage between valve tappet and valve stem. (See figure 5-3.) Adjust tappet until the clearance on the intake and exhaust is as specified for the engine in Section 2.

3. Repeat the above adjustment procedures on all valve tappets. Stop the engine and inspect all visible valve components for wear or weakness.

4. Install valve cover assembly and a new cover gasket.

5-12. FUEL SYSTEM MAINTENANCE.

5-13. CARBURETOR ADJUSTMENT. With the fork lift truck on level ground, turn the idle mixture adjusting needle with the fingers until it is barely seated, then back off exactly one turn. Start engine and run until normal operating temperature is reached. Adjust idle speed screw as required to obtain an idle speed of 450 to 500 rpm.

NOTE

Do not seat the idle adjusting needle too tightly since the tip of the needle will groove and prevent smooth engine idling. Discard grooved needle and install new idle adjusting needle as necessary.

5-13.1. ACCELERATOR LINKAGE.

1. Removal.

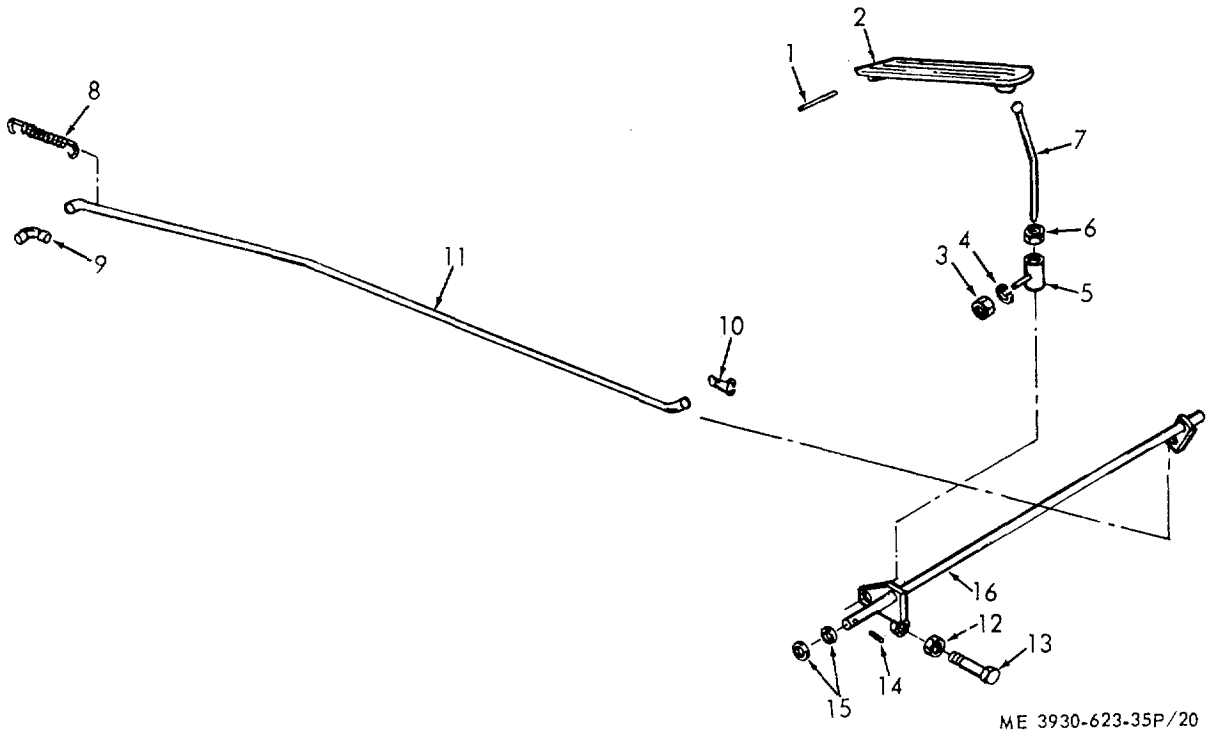
a. Unhook spring (8, fig. 5-2.1), release clips (9 & 10) and remove accelerator rod (11).

b. Remove cotter pin (1), unsnap pedal from accelerator rod (7) and remove pedal.

c. Remove nut (3), rasher (4), and rod (5).

d. Remove 2 cotter pins (14), 2 washers (15), and remove accelerator lever assembly (16).

2. Installation. Reverse removal procedure and install the accelerator linkage.



1. Cotter pin
2. Accelerator pedal
3. Nut
4. Washer
5. Ball Joint
6. Nut
7. Accelerator rod
8. Spring
9. Clip
10. Clip
11. Accelerator rod
12. Nut
13. Screw
14. Cotter pin
15. Washer
16. Accelerator lever assembly

Figure 5-2.1. Accelerator pedal and linkage, exploded view.

3. Adjustment.

a. Adjust governor linkage (para 4-15).

b. Loosen nut (12, fig. 5-2.1) and press accelerator pedal to floor board. Adjust screw (13) until maximum engine RPM (para 4-15) is reached.

c. Release accelerator pedal and tighten nut (12) while holding screw (13) with another wrench.

5-14. AIR CLEANER SERVICING. Refer to paragraph 5-7.

5-15. COOLING SYSTEM MAINTENANCE.

5-16. CLEANING. To clean the cooling system of scale, rust or sludge, use engine cooling system cleaning compound and inhibitor meeting the requirements of Military Specification MIL-C-10597. Be sure to flush system thoroughly after cleaning as the cleaner contains a strong acid which, if not completely removed, may attack the parts of the cooling system.

CAUTION

Do not pour cold coolant into the radiator when engine temperature is above 200 degrees F.

5-17. Draining System. Operate the engine at a fast idle until normal engine operating temperature is reached. A fast idle (about 1000-1200 rpm) will stir up any loose rust, scale or other formations in the cooling system. Stop engine and remove radiator filler cap. Open cylinder block and radiator drain cocks and allow cooling system to drain.

5-18. Cleaning System. Close radiator and cylinder cocks. Be sure temperature of engine is below 200 degrees F. Pour cleaning compound into radiator and fill coolant system with water. Install pressure type cap on radiator. Start engine and operate it at fast idle until solution is heated to at least 180 degrees F. Use a cardboard to cover radiator, if necessary, but do not allow the solution to boil. Continue to operate the engine at least 30 minutes. Stop the engine, remove radiator cap, open radiator and cylinder block drain cocks and allow system to drain completely.

5-19. Neutralizing Cleaner in System. Close radiator and cylinder block drain cocks. Pour inhibitor into radiator, fill system with clean, fresh water and install radiator cap. Start engine at a fast idle, using radiator cover, if necessary, to bring engine operating temperature to at least 180 degrees F. Continue to operate engine for at least ten minutes. Remove radiator cap, open radiator and cylinder block drain cocks and allow system to drain completely.

5-20. Flushing System. Close radiator and cylinder block drain cocks, Fill system with clean, fresh water and install radiator cap. Start engine and operate at a fast idle, using radiator cover as necessary to bring engine operating temperature to at least 180 degrees F. Continue to operate engine for at least five minutes. Remove radiator cap, open radiator and cylinder block drain cocks and allow system to drain. If water is discolored to any extent, repeat this flushing operation.

CAUTION

Do not flush system by inserting a hose in the radiator with the engine running and drain cocks open. This procedure will close the thermostat and stop circulation of coolant through the engine.

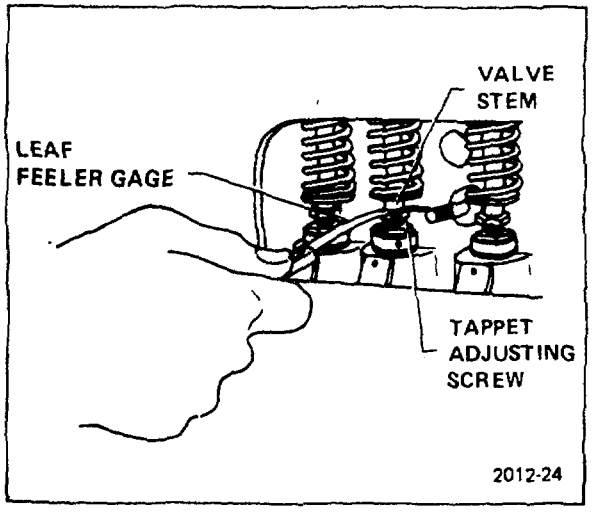


Figure 5-3. Measuring Tappet Clearance

5-21. Cleaning Radiator. Clean the radiator cap by spraying a stream of water (hot, if possible) through the holes in the valve cage while moving the valve up and down with a pencil or a blunt wooden instrument. Clean out dirt, trash and insects imbedded in the air passages of the radiator, using compressed air or a stream of water. Do not use steam.

CAUTION

Do not hold air or water hose too close to radiator or use too great a pressure as damage to the radiator may result. Clean out any stoppage in drain cocks with a soft wire.

5-22. Filling System. Close radiator and cylinder block drain cocks. Fill system to suit climate conditions as follows: If the prevailing temperature is above 32 degrees F, partially fill the system with clean, fresh water. Add corrosion inhibitor compound and fill system with water until coolant is evident at radiator opening. If there is a possibility that temperatures below 32 degrees F will be encountered, add anti-freeze as required to safeguard cooling system from freezing at lowest expected temperature. Fill with coolant to level of filler neck, install radiator cap, start engine and operate at fast idle until temperature gage shows normal operating temperature. Stop engine and check coolant level. Add coolant, if necessary.

5-23. LEAKAGE TESTS. Air in the cooling system or exhaust gas leaking into the system causes rapid corrosion and rust formations which will eventually clog the system and cause overheating and loss of coolant. Air may be drawn into the system due to low liquid level in the radiator, leaky water pump or loose fittings. Exhaust may be blown into the coolant system, past the cylinder head gasket or through cracks in the cylinder head and crankcase.

5-24. Air Suction Test. Completely fill radiator with coolant. Drain out one and one-half pints of coolant to prevent overflow during test. Be sure radiator cap is in good condition and will make an air-tight seal. Attach a length of rubber tubing to the end of the overflow tube, being certain the connection is air-tight. Operate engine until temperature gage stops rising and remains stationary. Without changing engine speed, put end of rubber tube in bottle of water. Be sure there are no kinks or sharp bends to restrict air flow. Watch for air bubbles in the water as an indication that air is entering the cooling system. Correct the condition by tightening cylinder head bolts, water pump mounting bolts, hose clamps and all fittings. Replace all hose that is cracked, swollen or otherwise deteriorated.

5-25. Head Gasket Leakage Test. Start test with a cold engine. Remove thermostat housing and reinstall thermostat housing without thermostat or water outlet hose. Add water to level of housing outlet. Disconnect drive belt from fan and water pump pulley. Start engine, accelerate several times and watch for bubbles in thermostat housing. The appearance of bubbles or the sudden rise of liquid when accelerating is evidence of head gasket leakage into cooling system. Make test quickly before coolant reaches boiling point as steam will give misleading results. Correct the condition by replacing cylinder head gasket and repeat test. If leakage is still evident, a cracked cylinder head, requiring replacement, is indicated. Install thermostat; and connect radiator hose. Fill radiator. Install and adjust fan and alternator drive belt.

NOTE

The cooling system must be free of rust and scale to maintain efficiency of the system. The use of corrosion inhibitor compound reduces corrosion and formation of scale. inhibitors are not cleaners and do not remove rust or scale already formed. Treating the cooling system with the inhibitor consists of adding the compound to the coolant. The inhibitor should be renewed periodically, especially if the system has been cleaned or flushed.

5-26. FAN BELT ADJUSTMENT (fig. 6-8). Loosen capscrew attaching idler pulley mounting bracket to slotted adjusting arm bracket. Loosen capscrew attaching idler pulley bracket to adjusting arm and move idler pulley either way to obtain correct belt tension. A light pressure applied to belt midway between fan pulley and water pump must produce a 3/4 to 1 inch belt deflection. When properly adjusted, tighten capscrew attaching bracket to arm.

5-27. ELECTRICAL SYSTEM MAINTENANCE.

5-28. IGNITION TIMING. Timing the ignition system so the spark occurs at each plug at the correct point in piston travel may be done by either of two methods: (a) using a spark plug triggered timing light with the engine running, or; (b) static timing, with the engine not running. Either method requires observation of a timing mark on the flywheel through an observation hole in the top of flywheel housing (see figure 1-2).

5-29. USING TIMING LIGHT.

1. Connect timing light according to the specific instructions for the timing light being used. Timing light lead to spark plug may be connected to either number 1 or number 6 spark plug. Remove cover from timing mark hole (see figure 1-2).

2. Start engine and run it at slow idle speed (400 rpm or less). Direct flash from timing light into hole in top of flywheel housing (see figure 1-2) to light timing mark each time it passes hole. Mark will appear to stand still although engine is running. Shade area if needed to increase visibility.

3. If timing mark does not appear centered in hole, loosen distributor clamp bolt just enough to permit rotation by hand of the entire distributor with a slight drag. While observing timing mark with light, turn distributor in its mounting hole until timing mark is centered in hole.

4. Retighten distributor clamp bolt, and recheck timing.

5-30. STATIC TIMING METHOD. The following instructions presume the timing needs only minor adjustment. If the distributor has been removed from the engine, refer to the instructions for reinstallation of the distributor in Section 6; otherwise, proceed as follows:

1. Remove spark plug from number 1 cylinder. With ignition switch OFF, seal plug hole with thumb, and crank engine (or turn it slowly by turning the fan by hand) until pressure can be felt at plug hole. This pressure indicates piston is coming up on compression stroke.

2. Continue to turn engine slowly until timing mark is seen through hole in flywheel housing as shown in figure 54. Center mark in hole.

3. Remove distributor cap, loosen distributor clamp bolt, and turn distributor counterclockwise until breaker points are definitely closed.

4. Turn ignition switch ON. Turn distributor body clockwise slowly until exact position is reached at which breaker points separate. Do not over travel beyond this point. Reaching this position will be indicated by one or more of the following:

a. A slight spark can be seen at the points if distributor cap is removed.

b. The ammeter reading (discharge) will decrease suddenly.

c. With distributor cap installed and spark plug end of number one plug wire held about 1/8 inch from cylinder head, a spark will be seen.

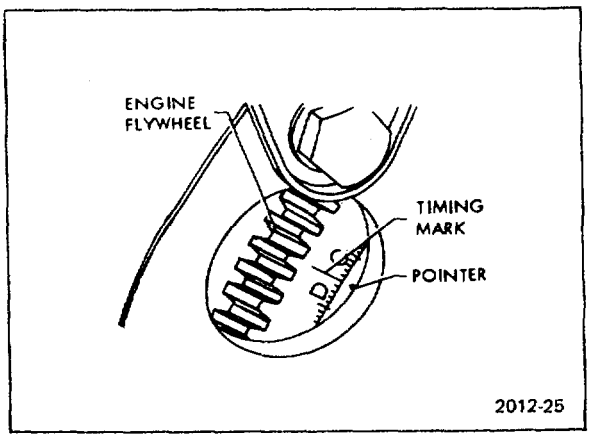


Figure 5-4. Flywheel Timing Marks

5. Tighten distributor clamp bolt, reinstall spark plug and plug wire.

5-31. DISTRIBUTOR MAINTENANCE.

1. Contact Point Cleaning. Dirty contact points should be dressed with a few strokes of a clean, fine-cut contact file. The file should not be used for other metals and should not be allowed to become greasy or dirty. Never use emery cloth to clean contact points. Contact surfaces, after considerable use, may not appear bright and smooth, but this is not necessarily an indication that they are not functioning satisfactorily. Do not attempt to remove all roughness nor dress the point surfaces down smooth; merely remove scale or dirt. Badly burned or pitted contact points should be replaced and the cause of trouble determined so it can be eliminated. High resistance or loose connections in the condenser circuit, oil or foreign materials on the contact surfaces, improper point adjustment or high voltages may cause oxidized contact points. Check for these conditions where burned contacts are experienced. An out-of-balance condition in the ignition system, often the result of too much or too little condenser capacity, is indicated where point pitting is encountered.

2. Contact Point Replacement.

a. Release distributor cap hold-down screws, remove cap and place it out of work area.

b. Remove rotor.

c. Disconnect primary and condenser lead wires from contact point terminal (see figure 5-5).

d. Remove contact set attaching screw, lift contact point set from breaker plate.

e. Clean breaker plate of oil smudge and dirt.

f. Place new contact point assembly in position on breaker plate, install attaching screw.

CAUTION

Carefully wipe protective film from point set prior to installation.

NOTE

Pilot on contact set must engage matching hole in breaker plate.

g. Connect primary and condenser lead wires to terminal on contact point set.

h. Check and adjust points for proper alignment and breaker arm spring tension. Use an aligning tool to bend stationary contact support if points need alignment.

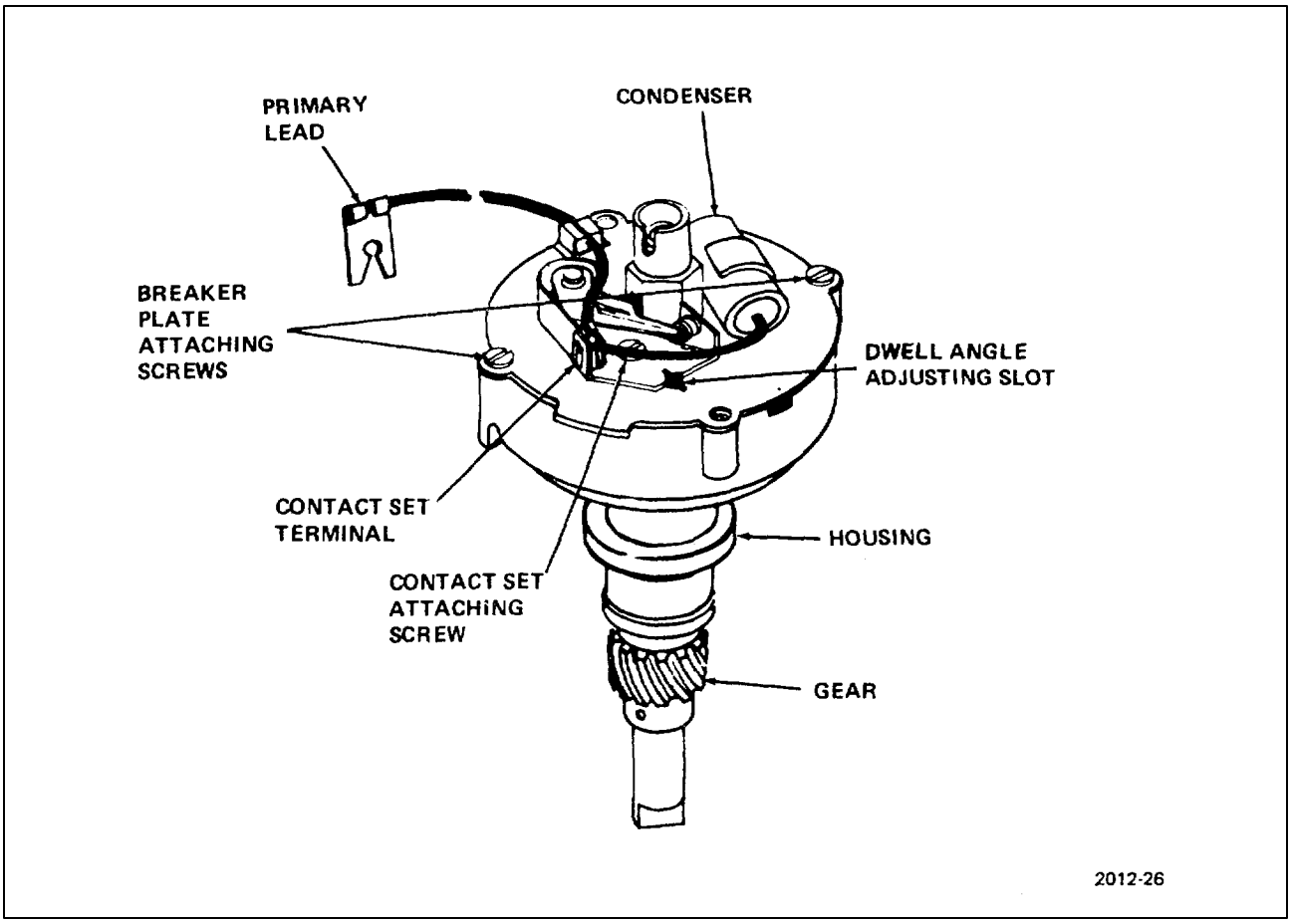


Figure 5-5. Breaker Plate

NOTE

The contact point pressure must fall within specified limits. Weak tension will cause chatter resulting in arcing and burning of the points and an ignition miss at high speed, while excessive tension will cause undue wear of the contact points, cam and rubbing block. Breaker arm spring tension should be 19-23 ounces. The contact point pressure should be checked with a spring scale, The scale should be hooked to the breaker lever and the pull exerted at 90 degrees at the breaker lever. The reading should be taken just as the points separate. The pressure can be adjusted by bending the breaker lever spring. If the pressure is excessive, it can be decreased by pinching the spring carefully. To increase pressure, the lever must be removed from the distributor so the spring can be bent away from the lever. Avoid excessive spring distortion.

i. Set point opening to 0.021 inch as shown in figure 5-6.

j. Reinstall rotor, position and lock distributor cap to housing.

k. Start engine and test dwell and ignition timing using standard shop equipment as instructed by the equipment maker.

5-32. SPARK PLUG SERVICING (see figure 5-7).

1. Clean spark plugs with standard spark plug cleaning equipment. If the electrodes are excessively burned, install new spark plugs.

2. Using a round feeler gage, check for proper gap between the spark plug electrodes. Adjust the gap to 0.025 inch by bending the side electrode only. Do not attempt to bend the center electrode for any reason.

5-33. DELETED

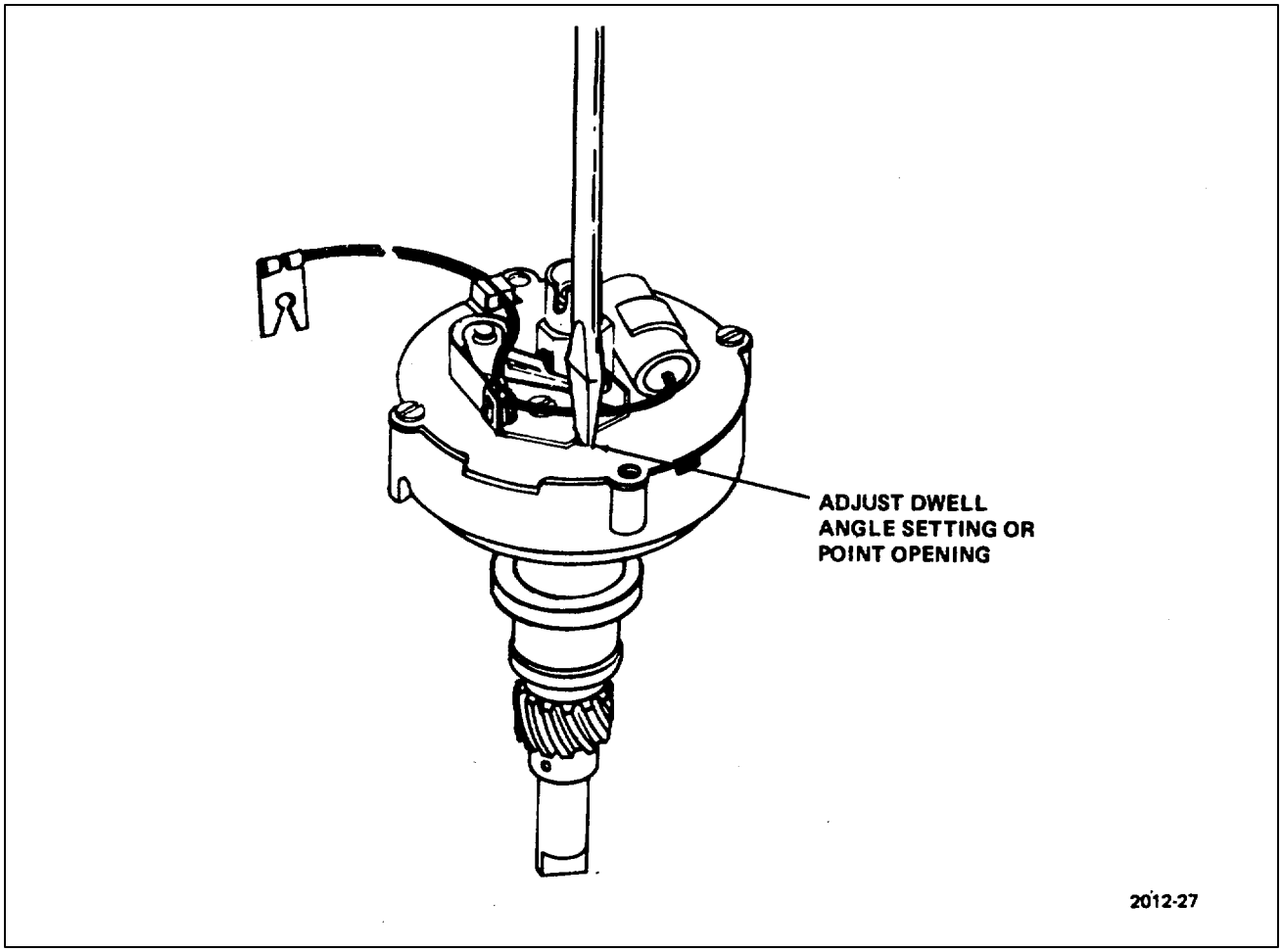


Figure 5-6. Breaker Point Adjustment

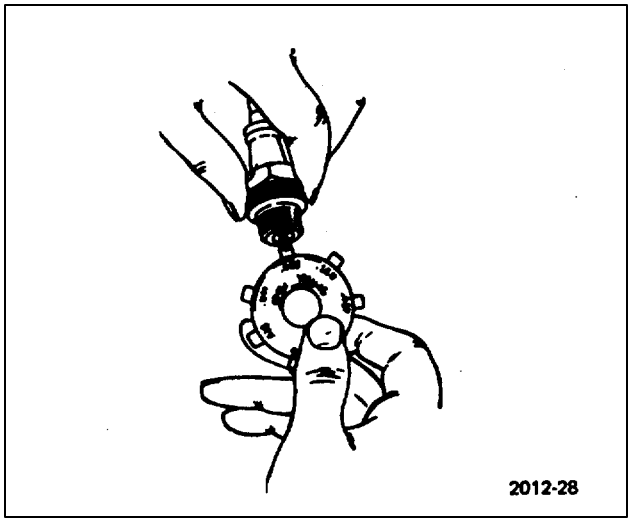


Figure 5-7. Measuring Spark Plug Gap

5-34. CHARGING SYSTEM MAINTENANCE.

1. Battery. Daily, check fluid level of battery. If necessary, add distilled water until water reaches required level to cover plates. Keep battery clean. If necessary, flush corrosion from top with solution of baking soda and water. This will neutralize battery acids. Make sure battery cables are securely connected. In subfreezing temperatures, run engine for at least 30 minutes after adding water to battery to assure that water will mix with acid and will not freeze. If condition of battery is in doubt, check each cell with a hydrometer to check if individual cells are faulty. Recharge battery after properly filling with distilled water and recheck with hydrometer after charging. If cell or cells continue to show low readings, replace battery.

CAUTION

This truck uses an alternator instead of a dc generator. Special precautions must be taken to prevent reversal of polarity when changing, charging, or boosting battery. Refer to paragraph 5-35 for special instructions.

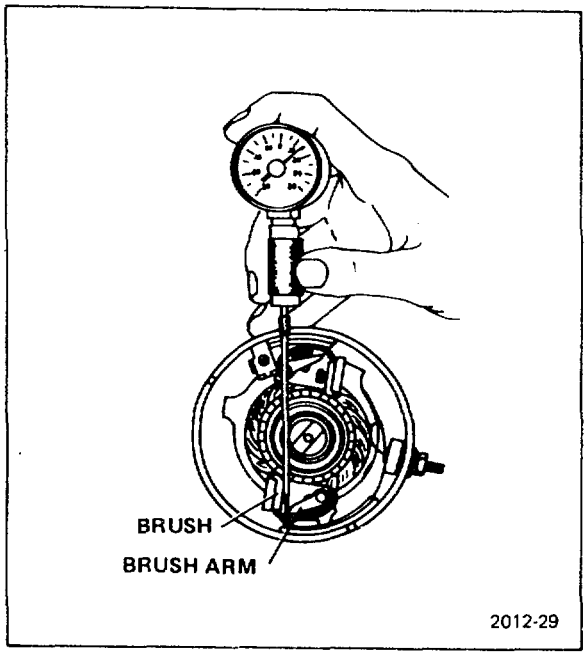


Figure 5-8. Measuring Brush Spring Tension

2. Wiring and Terminals. Check wiring for cracked and frayed insulation. Reposition wiring whose insulation is being damaged by rubbing or contact with surrounding objects. Tape or replace damaged electrical leads. Protect wiring from being saturated with lubricants. Keep terminals clean and free of corrosion. Check ground cable of battery frequently for corrosion and deterioration.

3. Regulator. Test regulator settings periodically with good test equipment. In case of battery over or undercharge, test and if necessary adjust or replace regulator before replacing battery.

4. Alternator Drive Belt Tension. Maintain alternator drive belt tension so that drive belt can be deflected one-half inch by finger pressure at midpoint between drive and driven pulleys. To adjust tension, loosen cap screw that holds adjusting strap to alternator (see figure 5-1) and loosen bolts that hold alternator to mounting bracket. To tighten, use bar to pry alternator away from engine to achieve correct tension; then tighten adjusting strap cap screw. Tighten mounting bolts.

5-35. ALTERNATOR.

1. Alternator Precautions. Since this truck is provided with an alternator some special maintenance precautions are necessary. Note that alternator and regulator circuits have negative ground. Take special care that following procedures are used. Failure to follow these procedures will result in burned out diodes and/or alternator windings.

a. When installing battery, always make absolutely sure negative terminal of battery is grounded.

b. When connecting booster battery, make certain to connect negative battery terminals together and positive battery terminals together.

c. When connecting charger to battery, connect charger positive lead to positive battery terminal and charger negative lead to negative battery terminal.

d. Never operate alternator on open circuit. Make sure all connections in circuit are secure.

e. Do not short across or ground any alternator terminals or regulator terminals.

2. Alternator Removal, Installation, and Test.

a. Remove alternator from truck (para 6-51). Clean alternator with cloth dampened with cleaning solvent. Dry thoroughly. Do not allow solvent to enter alternator.

b. Inspect alternator for cracked housing, bent shaft, or damaged drive pulley. Turn shaft by hand; it should rotate freely with no catching or binding. Replace or repair damaged alternator.

c. Alternator Test.

(1) Connect assembled alternator as shown in figure 5-12. Make sure negative terminal is connected to ground. Adjust load rheostat to obtain specified output of 14 volts. Check amperage at 2000 alternator rpm or 1000 engine rpm (cold); it should be 21 amperes. Check amperage at 5000 alternator rpm or 2500 engine rpm (cold); it should be 30 amperes. Operate alternator until it is at operating temperature. Check output amperage; it should be 32 amperes.

(2) If output is not as specified, replace alternator.

d. Alternator Installation.

(1) Position alternator on mounting bracket; secure with mounting bolt.

(2) Loosely attach alternator to adjusting strap with cap screw. Move alternator down and slip belts over pulley. Adjust belt tension as directed in paragraph 5-34d. and tighten cap screw on adjusting strap. Connect alternator as

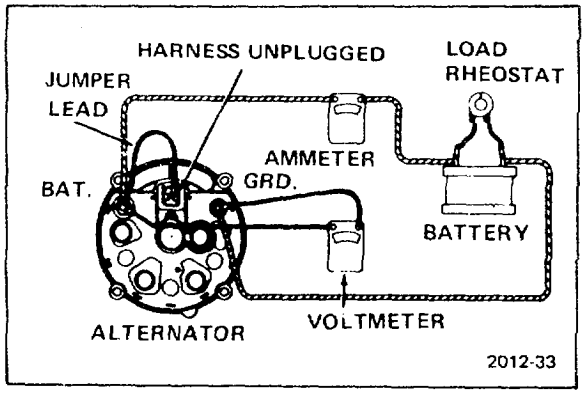


Figure 5-12. Alternator Test Setup

shown in wiring diagram, figure 1-11. Observe all precautions given in paragraph 5-35 to prevent damage to diodes and windings.

5-36. SETTING VOLTAGE REGULATOR TO BATTERY NEEDS.

1. The desired voltage regulator setting is one which keeps the battery in a satisfactory state of charge (3/4 charge or more) without causing excessive battery overcharge (as evidenced by excessive battery water usage). However, if operating service conditions are above or below average, the voltage regulator setting must be adjusted or tailored to adapt it to the battery and type of service conditions. Either of two conditions may persistently exist which indicate the need for adjusting the regulator setting: either battery is being overcharged, or battery remains undercharged. Corrections should be made as follows:

a. If the battery uses too much water at the normal setting, reduce the voltage setting approximately 0.3 volt and check for decreased battery water usage over a reasonable period. If necessary, repeat this process until the battery remains charged with a minimum use of water.

b. If the battery is consistently undercharged (evidenced by inability to crank the engine) at the normal setting, increase the voltage setting 0.3 volt and check for improved condition over a reasonable service period. If necessary, repeat this process until the battery remains charged with a minimum use of water.

2. Batteries which do not respond to the voltage settings within the specified range of this regulator usually will be found to be batteries used in vehicles that are operated consistently at low speeds or that have added electrical loads to the original electrical system, or batteries that have been improperly activated.

a. When a vehicle is operated consistently at low speed and/or electrical loads have been added to the original electrical system, the battery may remain undercharged even with the regulator placed in its maximum setting. Under these conditions, alternator output or charging time may be insufficient to offset the electrical load on the battery. Periodic recharging of the battery from an outside source of replacement of the original alternator with a special extra-output alternator will be required in these cases.

b. Replacement batteries suspected of having been improperly activated should be removed for a complete check. If the specific gravity at full charge is less than 1.230 in any cell, the battery has either been improperly activated or is worn out and, in either case, will give poor performance. If the specific gravity is above 1.310 in any cell, the battery has either been filled with electrolyte of too high specific gravity or electrolyte has been added in place of water. Either situation is harmful to the battery and will cause early failure.

3. Voltage Adjustment. To adjust the voltage regulator setting, remove the access plug from the regulator. Then for an undercharged battery insert screwdriver into slot and turn clockwise one notch (0.3 volt) to increase the setting. For an overcharged battery, turn counterclockwise one notch (0.3 volt) to decrease setting. Then check for an improved battery condition over a service period of reasonable length. If necessary, repeat the above procedure for a higher or lower setting.

4. Removal.

a. Disconnect negative battery cable from battery post (para 6-47).

b. Tag and disconnect alternator and battery leads at the voltage regulator (fig. 6-3).

c. Remove capscrews and lockwashers that secure the regulator to the mounting bracket and remove regulator.

5. Installation. Reverse removal procedure and install the voltage regulator.

5-37. BATTERY SPECIFIC GRAVITY TEST. Specific gravity testing of the battery electrolyte determines the state of charge in each battery cell. Use a hydrometer and thermometer, correcting the hydrometer reading for temperature. A corrected specific gravity reading of 1.260 to 1.280 in each cell indicates a fully charged battery. A specific gravity reading of 1.2220 or less in each cell indicates that the battery must be recharged or replaced.

NOTE

A temperature corrected specific gravity measurement is obtained by adding 0.004 to the actual hydrometer reading for each 10 degrees F the electrolyte is above 80 degrees F, or subtracting 0.004 from the actual hydrometer reading for each 10 degrees F the electrolyte is below 80 degrees F.

5-38. BATTERY CLEANING. The top of the battery must be kept clean. Tighten vent plugs and clean battery with a brush dipped in a solution of baking soda and water, followed by a thorough rinse with clear water. If terminals and cable clamps are corroded, disconnect cables and clean in same manner as battery.

5-39. CHASSIS MAINTENANCE.

5-40. STEERING LINKAGE ADJUSTMENT (see figure 1-5).

1. Road test truck to see that equal turning angle is obtained in either direction of turn.

2. If turning angle is not equal, adjust by raising truck and adjusting length of drag link as given below. Lengthening drag link increases angle in left turn; shortening it increases angle in right turn within the limits of range permitted by the stops on the steering axle.

3. Loosen both clamps shown on figure 1-5, at the ends of the drag link without disconnecting the tie rod ends.

NOTE

Tie rod ends on drag link have opposing threads (one right-hand threaded, the other left-hand threaded). Do not remove them from pitman arm or steering axle for this adjustment.

4. Turn drag link as necessary (to screw tie rod ends in or out) until turn angle is equal in either direction of turn, and retighten clamps to secure adjustment.

5-41. BLEEDING SERVICE BRAKE SYSTEM. The hydraulic brake system must be bled to expel air that enters when the lines have been broken or disconnected. The need is generally indicated by springy or spongy brake pedal action.

1. Remove fill cap from brake master cylinder and connect a pressure brake bleeder to the master cylinder. Be sure the brake bleeder tank contains enough of the specified brake fluid, and enough air pressure to complete the job.

2. Clean the bleeder screws (13, figure 4-6) at each wheel. Attach one end of bleeder hose to bleeder screw and place other end of hose in clean container partially filled with hydraulic brake fluid. Be sure end of hose is submerged in the hydraulic fluid.

3. Turn bleeder screw counterclockwise three-quarters of a turn. Hydraulic fluid containing air bubbles should be forced through the bleeder hose into container.

4. Continue until the fluid flows in a steady solid stream without air bubbles. Close bleeder screw by turning in clockwise direction. Remove bleeder hose.

5. Repeat the bleeding procedure at the other wheel. Replace filler cap. Hydraulic brake fluid bled from the brake system must not be reused.

CAUTION

Hydraulic brake fluid bled from the brake system must not be reused.

5-42. LUBRICATION.

5-43. LO 10-3930-623-10 for the fork lift truck gives the type of lubricant, lubricating time interval and location of lubricating points. The service intervals specified in the LO are for normal operation where moderate temperature, humidity and atmospheric conditions prevail. Reduce the service intervals when operating the truck under unusual conditions to compensate for abnormal or extreme conditions.

5-44. TROUBLESHOOTING.

5-45. The following table contains troubleshooting information concerning troubles that may be encountered on the fork lift truck. Each symptom is followed by a listing of possible causes and suggested remedies. To isolate the possible cause, proceed in a systematic manner to determine the faulty component.

TABLE 5-1. SERVICE TROUBLES AND REMEDIES

Trouble	Probable Cause	Remedy
ENGINE		
ENGINE WILL NOT TURN WHEN STARTER BUTTON IS PRESSED	Defective battery	Replace or charge
	Loose terminals	Clean and tighten
	Damaged or defective cables	Replace cables
	Defective starter solenoid switch	Replace switch
	Defective starting motor	Replace starting motor
	Incorrect oil viscosity (cold weather)	Drain and refill with proper grade for temperature
	Mechanical seizure of parts	Replace parts
	Defective neutral safety switch	Replace switch
	Defective frequency sensing relay (Group C Trucks)	Replace frequency sensing relay
ENGINE WILL NOT TURN, STARTING MOTOR TURNS	Stripped starting motor drive	Replace starting motor
	Stripped flywheel ring gear	Replace flywheel ring gear
ENGINE TURNS BUT WILL NOT START	Starting operation overlooked	See starting instructions
	Defective coil	Replace coil
	Defective condenser	Replace condenser
	Defective points	Replace points
	Defective rotor	Replace rotor
	Ignition switch	Replace or repair switch
	Defective spark plugs	Replace spark plugs
	Defective spark plug cables	Replace cables
	Weak battery	Replace or charge
	Damaged battery cables	Replace cables
	Loose or corroded battery terminals or connections	Clean and tighten
	Loose connections on ignition switch	Clean and tighten
	Improper distributor timing	Time distributor
	Improper valve timing	Retime valves
	Plugged fuel line	Disconnect and clean

TABLE 5-1. SERVICE TROUBLES AND REMEDIES (Cont'd)

Trouble	Probable Cause	Remedy
ENGINE (Cont'd)		
ENGINE TURNS BUT WILL NOT START (Cont'd)	Clogged fuel filter	Remove and clean
	Lack of fuel	Fill fuel tank
ENGINE SLUGGISH, MISSES, BACKFIRES	Defective spark plugs	Replace or clean and regap, tighten properly
	Spark plug wires off, faulty or misplaced	Replace correctly
	Breaker points dirty or improper gap	Dress clean and regap
	Distributor rotor corroded, pitted or dirty	Clean or replace
	Spark retarded	Adjust distributor timing
	Distributor advance not operating properly	Clean and adjust or replace as necessary
	Worn distributor shaft	Replace
	Weak condenser	Replace
	Weak coil	Replace
	High tension cable grounded or loose	Tighten or replace
	Low tension cable grounded or loose	Tighten or replace
	Rich carburetor mixture	Adjust carburetor
	Lean carburetor mixture	Adjust carburetor
	Dirty or restricted air cleaner	Clean
	Water in fuel	Drain entire fuel system and refuel
	Fuel pump malfunction	Replace or correct
	Leak in intake manifold or gasket	Tighten or replace
	Cylinder head loose	Tighten head
	Cylinder head warped	Replace
	Cylinder head gasket leaking	Tighten or replace
	Valves out of adjustment	Adjust tappets

TABLE 5-1. SERVICE TROUBLES AND REMEDIES (Cont'd)

Trouble	Probable Cause	Remedy
ENGINE (Cont'd)		
ENGINE SLUGGISH, MISSES, BACKFIRES (Cont'd)		
	Valve timing incorrect	Correct timing
	Overheating	Check cause and correct
	Restricted exhaust	Remove obstruction and correct
ENGINE OVERHEATS	Insufficient coolant	Add coolant
	Late ignition timing	Check timing adjustment
	Improper valve timing	Check valve adjustment
	Thermostat defective	Replace
	Water pump not working properly	Replace pump
	Fan not working properly	Check fan mounting
	Fan belt slipping or broken	Adjust or replace as necessary
	Lack of oil	Fill crankcase to proper level
	Exhaust pipe restricted	Clean and remove restriction
ENGINE TEMPER-ATURE TOO LOW (OVERCOOLING)	Defective thermostat	Replace
	Weather or climatic conditions too cold to allow thermostat to hold temperature	Cover radiator sufficiently to bring coolant into proper range or use winter front
ENGINE NOISES		
SHARP PING	Wrong ignition timing	Adjust ignition timing
	Wrong grade of fuel	Fill tank with proper grade of fuel
	Excessive carbon deposits	Clean

TABLE 5-1. SERVICE TROUBLES AND REMEDIES (Cont'd)

Trouble	Probable Cause	Remedy
ENGINE NOISES (Cont'd)		
CONTINUOUS SQUEAL OR SQUEAK	Lack of lubrication at alternator, water pump or distributor	Lubricate
INTERMITTENT SQUEAL OR SQUEAK	Loose fan belt	Tighten belt properly
LOW OIL PRESSURE INDICATION	Insufficient oil	Fill crankcase properly
	Oil too thin	Drain and refill with proper grade of oil
	Oil line leaking	Tighten connections or replace oil line
	Pump screen clogged	Clean or replace
	Restricted oil line	Clean or replace
	Defective pressure gage	Replace gage
	Oil pump defective	Replace
EXCESSIVE OIL CONSUMPTION	Leak in oil lines	Tighten or replace
	Leaking oil seal	Replace seal
	Defective gasket	Replace gasket
IGNITION SYSTEM		
NO SPARK	Defective breaker points	Adjust or replace points
	Defective coil	Replace coil
	Defective ignition wiring	Test wiring; replace as necessary
	Defective high tension cables	Test and replace as necessary
	Defective spark plugs	Replace
	Defective ignition switch	Replace switch
	Defective condenser	Replace condenser
	Defective distributor cap	Clean or replace as necessary
	Defective rotor	Replace rotor
	Discharged battery	Charge battery
HIGH SPEED MISS	Spark plug gap too wide	Clean and regap or replace

TABLE 5-1. SERVICE TROUBLES AND REMEDIES (Cont'd)

Trouble	Probable Cause	Remedy
IGNITION SYSTEM (Cont'd)		
HIGH SPEED MISS (Cont'd)	Breaker points improperly adjusted	Regap points, dress or replace as necessary
	Weak condenser	Replace condenser
	Weak coil	Replace coil
	Weak spring on points	Replace points
SLOW SPEED MISS	Defective breaker points	Adjust or replace as necessary
	Spark advanced too far	Adjust timing
	Spark plug gaps too small	Clean and adjust or replace as necessary
	Fouled spark plugs	Clean and adjust or replace as necessary
	Weak coil	Replace coil
ALTERNATOR NOT CHARGING	Defective alternator	Replace alternator
	Brushes not making proper contact	Clean and adjust or replace as necessary
	Defective alternator regulator	Replace
ALTERNATOR OUT-PUT LOW OR ERRATIC	Loose or worn drive belt	Tighten or replace
	Alternator loose	Tighten mounting screw
	Defective commutator	Clean or replace as necessary
IMPROPER AM-METER INDICA-TION	Battery discharged	Check battery and charge if necessary
	Loose cable connections	Check connections at terminals of battery, ammeter, alternator and voltage regulator
	Defective ammeter	Replace
	Alternator not operating	Replace
	Defective alternator regulator	Replace
FUEL SYSTEM		
FUEL DOES NOT REACH CARBURET-OR	Restricted fuel lines or filter	Clean or replace
	Loose or broken fuel lines	Tighten or replace
	Defective fuel pump	Replace pump

TABLE 5-1. SERVICE TROUBLES AND REMEDIES (Cont'd)

Trouble	Probable Cause	Remedy
FUEL SYSTEM (Cont'd)		
FUEL DOES NOT REACH CYLINDERS	Carburetor jets plugged	Clean or replace carburetor
	Fuel flow restricted	Clean or replace lines or filter
	Fuel leaks	Tighten or replace parts as necessary
TRANSMISSION		
OIL LEAKAGE	Loose drain plug	Tighten plug
	Defective gaskets or seals	Replace
COOLANT LEAKAGE	Worn or damaged hoses	Replace hoses
	Loose fittings	Tighten or replace as necessary
HIGH STALL SPEED	Low oil level	Add oil to proper level
	Slipping clutch	Actuate other clutch to verify slipping of particular clutch being checked
	Foaming oil	Too low or too high oil level
		Water in oil
		Air leak on intake side of pump
		Improper oil
CONTINUOUSLY HIGH OIL TEMPERATURE	Low or high oil level	Add or drain oil
	Foamed oil	Check for proper oil and whether or not air leak exists on intake side of pump
	Engine cooling system inoperative	Check radiator coolant level
		Eliminate restricted water or oil flow through cooler
	Improper vehicle operation	Operate away from stall more frequently

TABLE 5-1. SERVICE TROUBLES AND REMEDIES (Cont'd)

Trouble	Probable Cause	Remedy
TRANSMISSION (Cont'd)		
CONTINUOUSLY HIGH OIL TEMPERATURE (Cont'd)	Low oil flow through converter	Converter pressure regulator valve stuck in near closed position
SLOW OR ERRATIC CLUTCH ENGAGEMENT	Improper shift linkage arrangement or adjustment	Free linkage and adjust
	Low main pressure	Main pressure regulator valve stuck. Clean, check springs, free up in valve bore
	Internal oil leaks	Check other clutches
		Check shaft seal rings
LOW CLUTCH PRESSURES AND SLOW ENGAGEMENT AT IDLE	Worn main pump	Inspect pump and replace if worn
	Low oil level	Add oil
	Leak on intake side of main pump	Check intake line
LOSS OF POWER	Cold oil	Warm and recheck
	Parking brake on	Release parking brake
HYDRAULIC PUMP		
LOW PUMP PRESSURE	Hose leaks	Tighten or replace hoses and/or clamps as necessary
	Truck engine malfunction	Refer to engine troubleshooting
	Low fluid level	Add sufficient fluid of proper type
UNDUE PUMP VIBRATION	Clogged	Clean
	Loose mounting	Tighten

TABLE 5-1. SERVICE TROUBLES AND REMEDIES (Cont'd)

Trouble	Probable Cause	Remedy
UPRIGHT ASSEMBLY HYDRAULIC SYSTEM		
NO MOVEMENT OF UPRIGHT ASSEMBLY	Excessive fluid leakage	Correct and replenish fluid supply
	Truck engine malfunction	Refer to engine troubleshooting
EXCESSIVE "DRIFT" OF HOIST AND TILT CYLINDERS	Leakage at hydraulic lines and fittings	Inspect and correct as necessary
HOIST CYLINDER WILL NOT MAINTAIN RAISED POSITION WITH LOAD	Leakage at hydraulic lines and fittings	Inspect and correct as necessary
EXCESSIVE HYDRAULIC FLUID CONSUMPTION	Leakage in lines and fittings	Repair, replace or tighten loose fittings and lines
WILL NOT LIFT FULL RATED LOAD	Excessive fluid leakage	Check fittings, lines and cylinders
	Low fluid level	Add sufficient fluid of proper type
	Incorrect pressure relief	Correct pressure
BRAKES		
EXCESSIVE PEDAL TRAVEL	Linings worn	Replace brake shoes
	Fluid low in master cylinder	Replenish fluid and check for leaks
	Air in system	Bleed hydraulic system
	Pedals improperly adjusted	Adjust linkage
WEAK BRAKING ACTION	Oil on linings	Replace lining
	Incorrect lining	Replace lining
HARSH BRAKING ACTION	Brake lining greased soaked	Replace lining
	Brake backing plate loose	Tighten or replace
BRAKE RELEASES SLOWLY	Hydraulic fluid congealed	Drain, flush and replace with proper brake fluid
	Master cylinder improperly adjusted	Drain, clean or adjust as necessary

TABLE 5-1. SERVICE TROUBLES AND REMEDIES (Cont'd)

Trouble	Probable Cause	Remedy
BRAKES (Cont'd)		
BRAKE RELEASES SLOWLY (Cont'd)	Retraction of brake shoes prevented by weak return springs or dirt	Clean, adjust or replace as necessary
TRUCK PULLS TO ONE SIDE	Brake linings grease or oil soaked	Replace brake linings and correct source of grease or oil leakage
BRAKES DRAG	Mineral base oil in brake system	Drain and flush system, replace parts and service brake system
	Linings grease soaked	Replace brake linings
STEERING		
DIFFICULT STEERING OR WANDERING	Steering gear out of adjustment	Readjust steering gear
	Damaged drag link	Replace
	Excessive leakage of fluid	Check for leaks, correct and fill with proper fluid
FLUCTUATING PRESSURE	Faulty operation of relief valves	Flush and refill system. If condition still exists, overhaul valve assembly
LOSS OF SYSTEM PRESSURE	Slippage of pump drive, other pump malfunction	Check pump and pump drive gear
CYLINDER PISTON ROD BINDING OR STICKING	Cramping of linkage	Replace unit and readjust pitman arm stops
CHATTER CONDITIONS	Loose mountings or linkage	Make certain all ball stud mounting and other linkage is tight. Check pitman arm stops to be certain the arm strikes the stops slightly before the steering knuckles contact the stops on the axle. Set relief valve at least 150 psi higher than normal steering requirements of the vehicle. Bleed air from system. Insufficient pump flow at idle speeds can be corrected by increasing engine idle rpm
	Relief valve set too low	
	Insufficient pump flow	
UNSATISFACTORY STEERING IN EITHER DIRECTION	Air in system	Replace cylinder packings
	Excessive wear in steering cylinder	Replace cylinder
	Incorrect system pressure	Reset pressure

TABLE 5-1. SERVICE TROUBLES AND REMEDIES (Cont'd)

Trouble	Probable Cause	Remedy
STEERING (Cont'd)		
UNSATISFACTORY STEERING IN EITHER DIRECTION (Cont'd)	Worn pump	Replace pump. Check to be sure air is not entering system through poor threads, hoses, pump seals, O-rings, gaskets, and loose connections.
		Excessively worn cylinders result in leakage past the piston. Correct by replacing cylinder. Set relief valve at least 150 psi higher than normal steering requirements of the vehicle. Repair or replace pump.
ELECTRICAL EQUIPMENT		
LAMPS WILL NOT LIGHT	Loose connections	Check and correct
	Burned out lamp	Replace lamp
	Defective switch	Replace switch
	Blown fuse	Replace fuse
ENGINE HOUR-METER DOES NOT OPERATE	Defective engine hourmeter	Replace
	Loose electrical connections	Check and correct
	Defective engine hourmeter sending unit	Replace

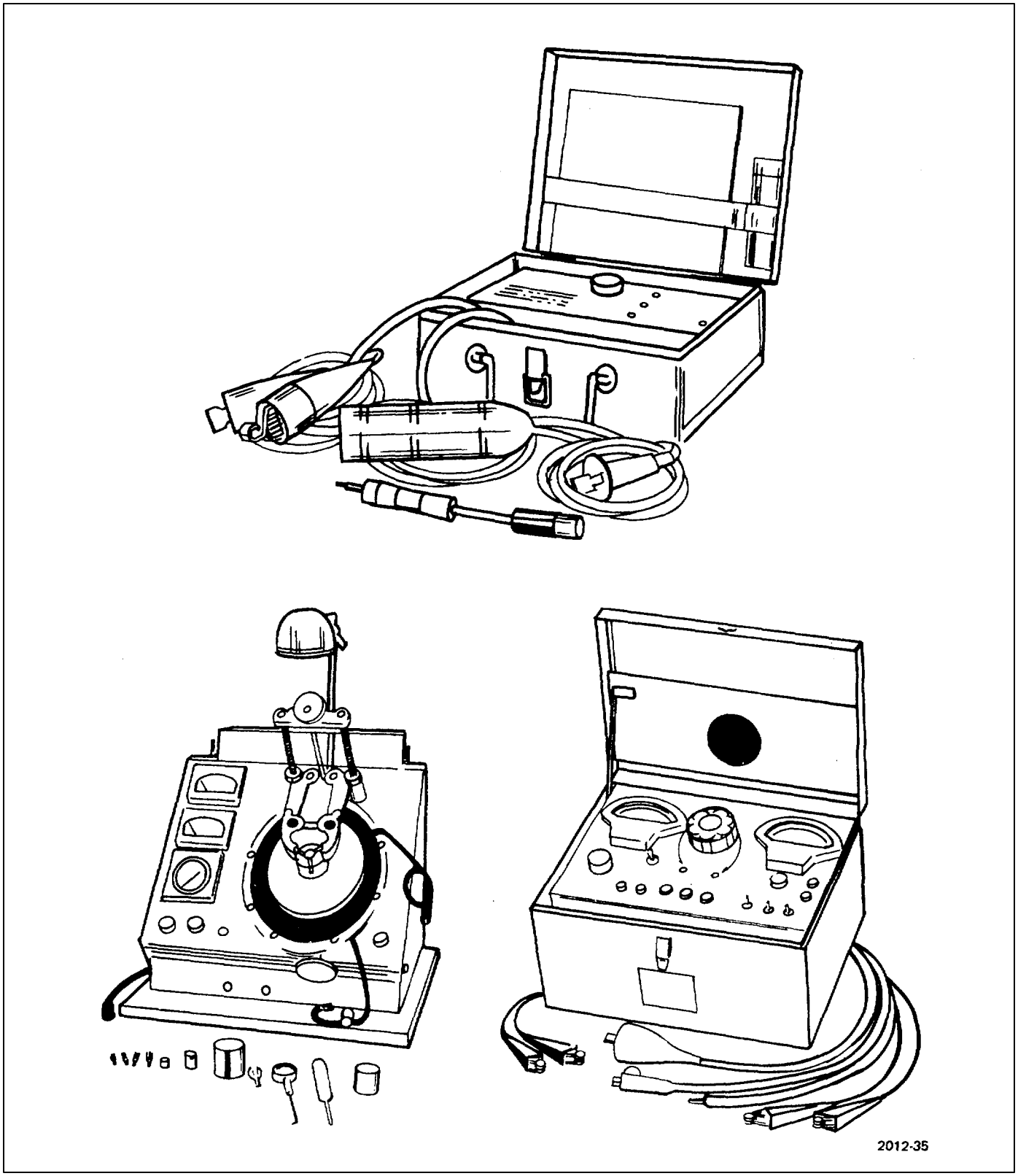


Figure 5-14. Test Equipment

5-46. TEST EQUIPMENT.

5-47. The test equipment listed in Table 5-2 and illustrated in figure 5-14 will support all test procedures given in this manual. All necessary accessories and adapters are furnished with test sets, together with complete operating instructions and detailed procedures for performing the tests specified in this manual. Listing of these test sets does not exclude use of other suitable equipment in the Federal Supply System as available, if it will do the required job.

TABLE 5-2. TEST EQUIPMENT LIST

Type designation	Alternate type designation	Fig. no.	Nomenclature	Use
*PDT FSN IY4910-272-7970	PDT-5 FSN 4910-392-2939	5-14	Portable Distributor Tester	Para. 5-31
VAT-25 No FSN	LVR-3A FSN 4910-092-9136	5-14	Volt Ampere Tester	Para. 5-35
X-45A FSN 4910-839-9749	X-47 FSN 4910-500-2135	5-14	Power Timing Light	Para. 5-29

*Type designations assigned by Sun Electric Corp., Chicago, Ill. Manufacturer's Federal Supply Code No. 82386.

SECTION VI

REMOVAL AND INSTALLATION OF ASSEMBLIES

6-1. GENERAL.

6-2. This section contains instructions for the removal and installation of major assemblies of the fork lift truck (see figure 6-1). Minor repair and adjustment instructions related to removal and replacement are also given to the extent such work could be performed with the tools and equipment normally available to the using facility.

6-3. In general the instructions are arranged for removal of exterior parts and assemblies first thus giving access to interior assemblies. Instructions for removal of interior assemblies will assume that interfering external parts have been removed as far as necessary to proceed with the next job to be done.

6-4. OVERHEAD GUARD.

6-5. REMOVAL. Remove one large bolt, flat washer and lock washer entering each leg of the guard (see figure 6-1) from below the point of attachment to the frame and counterweight, and lift off the overhead guard.

6-6. INSTALLATION. Position the overhead guard on the truck, and align the threaded bore of at least one leg with the corresponding hole in the truck with a drift or dowel to. Install one bolt, flat washer and lock washer at this point but do not tighten. Repeat at other three legs, and after all bolts are started in threads, tighten bolts.

6-7. COUNTERWEIGHT.

6-8. REMOVAL. Arrange a hoist to relieve the weight (one ton) of the counterweight on the attaching bolts, and remove three bolts, nuts, and washers which attach the counterweight to the frame. Hoist counterweight free of frame.

6-9. INSTALLATION. Position counterweight to frame with suitable hoisting device, and attach to frame with three bolts, nuts, and washers.

6-10. SEAT ASSEMBLY.

6-11. REMOVAL.

1. Raise engine compartment cover (see figure 6-1), and latch it in open position.
2. from underside of cover, remove four nuts and washers which attach seat guide tails to cover. Seat assembly can slow be lifted free of truck.

6-12. INSTALLATION.

1. With engine cover lowered, position seat on cover so attaching studs enter corresponding holes in cover.
2. Hold seat in position and raise cover to open position.
3. Install four nuts and washers on studs.

6-13. SHEET METAL.

6-14. The sheet metal used on the truck is subject to minor repair to the extent of removing dents or deformations, and replacing defective latches. Follow conventional sheet metal repair practice in straightening and refinishing. Replace items damaged beyond practical repair.

6-15. ENGINE COMPARTMENT COVER REMOVAL. Raise engine compartment cover (see figure 6-1) fully. Relieve the weight of the engine cover on the attaching parts at the bottom of the hinge arms which are now supporting the cover. A small hoist or light line may be attached to the overhead guard for this purpose. Carefully pry torsion spring ears away from boss on lower arms to release remaining torsion, remove nuts, washers and screws holding arms to frame bracket and take cover and hinge arms from truck.

6-16. ENGINE COMPARTMENT COVER INSTALLATION. Support cover above mounting brackets on frame, and position hinge arms to permit installation of attaching screw, nuts and washers. Install all attaching parts in any convenient order, then tighten them after all are installed and hinge arms are aligned. With cover in fully raised position, pry ears of torsion spring into position under bosses on lower hinge arms. Lower cover and verify proper operation and alignment of installation.

6-17. RADIATOR COVER REMOVAL. With engine compartment cover raised, support radiator cover (see figure 6-1) at the front end and remove the four button head screws "which attach it to the top of the counterweight.

6-18. RADIATOR COVER INSTALLATION. With engine compartment cover raised, align holes in radiator cover with corresponding holes in top of counterweight and install four button head screws.

6-19. FLOOR PLATE REMOVAL.

1. Raise engine compartment cover and remove the nuts, lock washers and plain wasters at the rear corners of the floor plate.

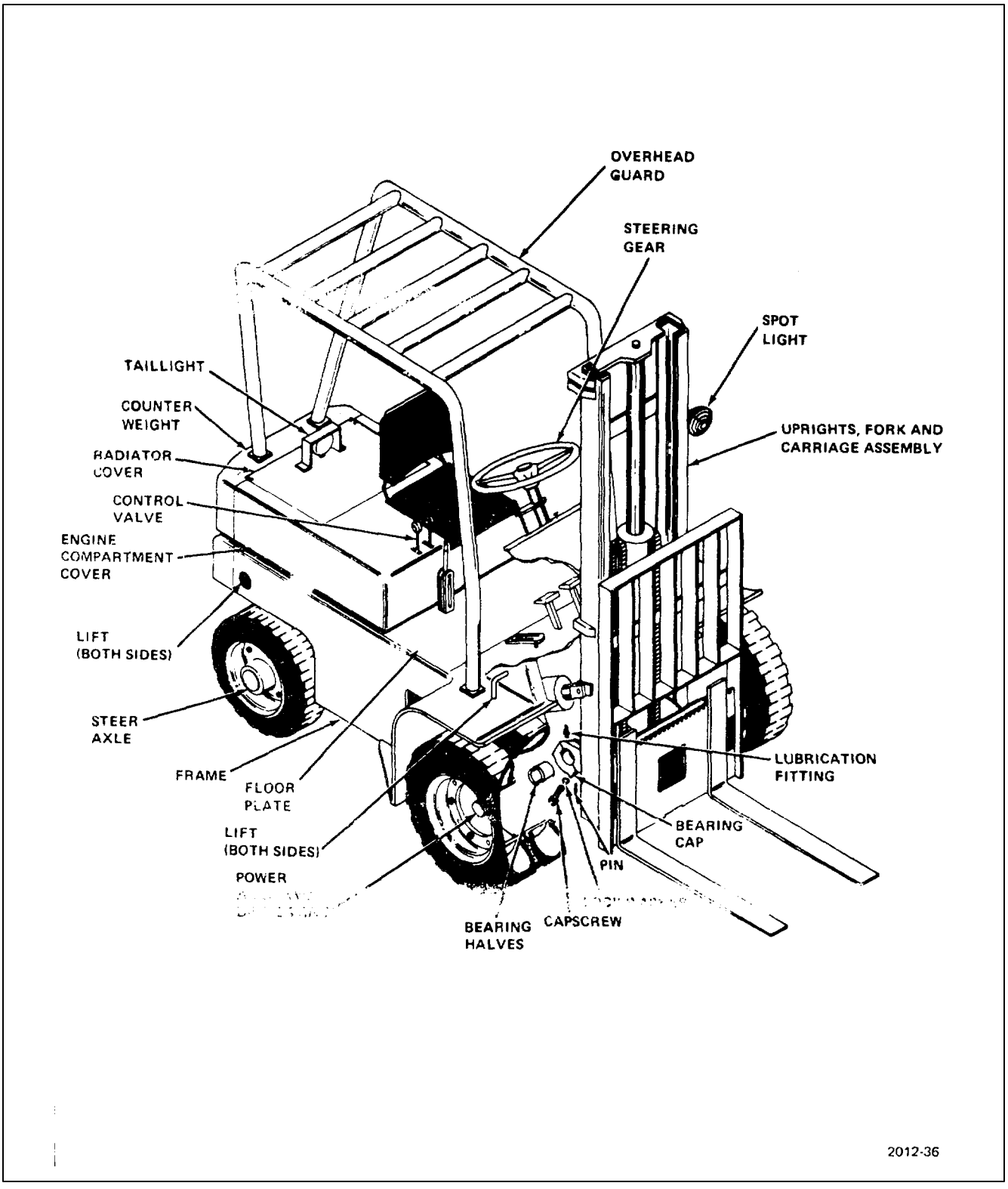


Figure 6-1. Fork Lift Truck Components

2. Remove the two screws at the front corners of the floor plate, and pull accelerator pedal free of the throttle linkage. The pedal has a molded rubber socket mating with a ball formed on the end of the linkage rod for a friction fit.

3. Raise the rear edge of the floor plate, and draw it clear of the brake pedals and steering gear.

6-20. FLOOR PLATE INSTALLATION.

1. Lay floor plate in position on truck frame, with throttle linkage in position for connection to accelerator pedal.

2. Install attaching parts previously removed and press ball at end of throttle linkage into socket in underside of accelerator pedal. Wetting socket will make installation of ball easier, but do not use oil.

6-21. DELETED

6-22. DELETED

6-23. DELETED

6-24. DELETED

6-25. TILT CYLINDER ASSEMBLIES.

6-26. REMOVAL.

WARNING

Before disconnecting tilt cylinders, tilt uprights back and tie in place, to prevent it falling forward while tilt cylinders are disconnected.

1. Remove truck floor plate for access to tilt cylinders. Disconnect both hoses at each tilt cylinder.

2. Remove lock screws (see figure 6-2) and pins attaching tilt cylinders to outer uprights and the truck frame. Remove tilt cylinders from truck.

6-27. INSTALLATION.

1. Attach rear end of each tilt cylinder to truck frame with pins and lock screws removed previously. Reconnect tilt cylinder hoses.

2. Operate tilt control to bring plungers fully into tilt cylinders as far as they will go. Check that mounting pins will enter both plunger yoke holes and mounting holes on uprights at the same time without extending one plunger

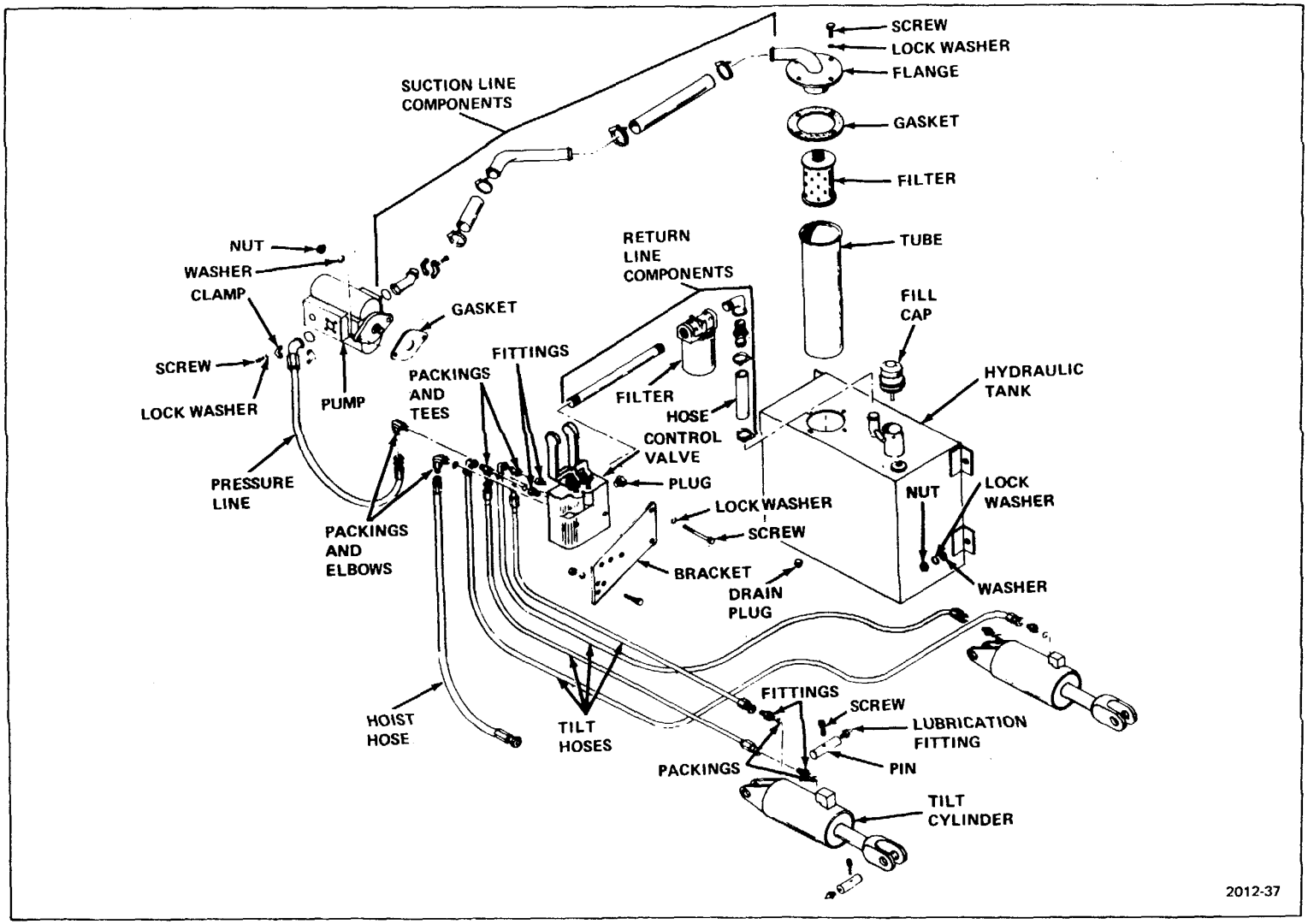
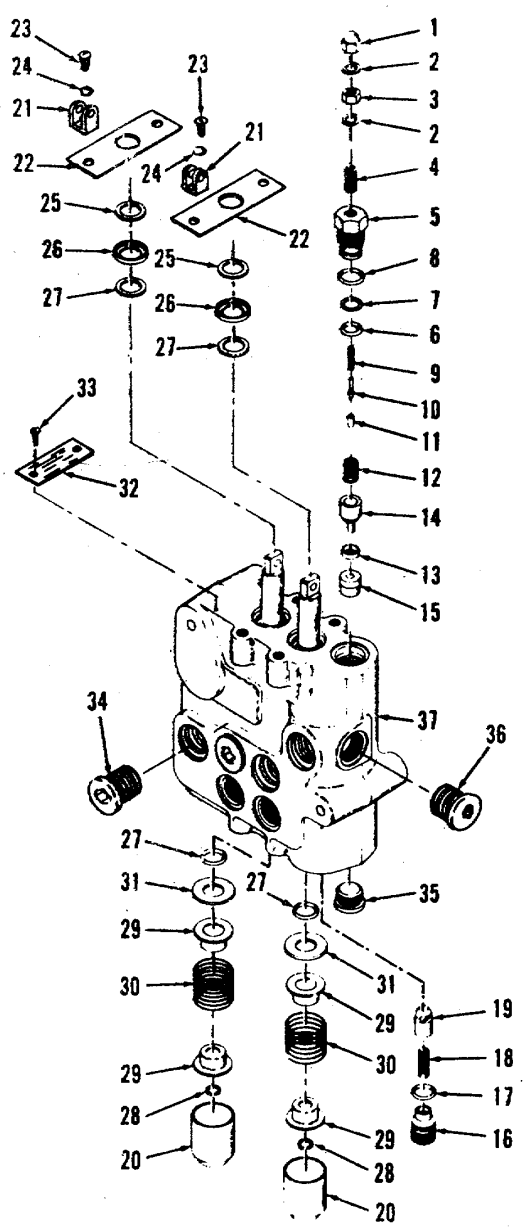


Figure 6-2. Hydraulic System Layout



1. Acorn Nut
2. Preform Packing
3. Nut
4. Setscrew
5. Relief Valve Cap
6. Preform Packing
7. Back-Up Ring
8. Preform Packing
9. Spring
10. Pilot Plunger
11. Plunger Seat
12. Plunger Spring
13. Plunger Screen
14. Poppet Plunger
15. Poppet Seat
16. Check Valve Cap
17. Preform Packing
18. Check Valve Spring
19. Check Valve Poppet
20. Spool Cap
21. Lever Pivot Bracket
22. Retainer Plate
23. Screw
24. Lock Washer
25. Wiper Ring
26. Packing Retainer
27. Preform Packing
28. Retainer Ring
29. Spring Seat
30. Spool Spring
31. Packing Retainer
32. Identification Plate
33. Drive Screw
34. Pipe Plug
35. Pipe Plug
36. Pipe Plug
37. Control Valve Body

Figure 6-2.1. Hydraulic Hoist and Tilt Control Valve, Exploded View

more than the other. Install pins and lock screws, and free mast from tie-down arrangement.

3. If one plunger yoke extends more than the other one, so that tilting to either extreme of travel would twist the uprights, loosen clamp bolt on one plunger yoke and screw yoke in or out on shaft threads as necessary to equalize the extension of both shafts.

CAUTION

Pad jaws of wrench used to hold plunger shaft so plated surface will not be damaged.

6-28. LIFT CHAINS.

6-29. REMOVAL. Lower carriage onto supporting blocks to relieve the weight on the chains (see figure 1-10). With upright carriage and fork assembly completely bottomed, release chains at hydraulic hoist cylinder by removing two adjusting screws and four nuts. Unhook chains at lift carriage assembly and pull free of unit.

6-30. INSTALLATION. Feed chains over rollers of crosshead assembly, and hook in position in carriage assembly. Install adjusting screws through chain ends into hydraulic hoist assembly and install four nuts. Relubricate chain (see LO 10-3930-623-12).

Adjust chains as follows:

1. Lower carriage until hoist cylinder bottoms.

2. Adjust chain adjusting nuts until slack is removed from both chains and chains are taut.

3. Be certain load is shared equally by both chains.

6-31. DELETED

6-32. DELETED

6-33. DELETED

6-34. SPOTLIGHT.

6-35**. REMOVAL**. Disconnect electrical cables from spotlight. Remove two nuts, bolts and washers attaching spotlight to left side of uprights. Remove spotlight.

6-36. **INSTALLATION**. Mount spotlight in position on bracket welded to upright and fasten in place with two bolts, washers and nuts. Reconnect electrical wiring.

6-37. THRU 6-42 DELETED

6-43. CONTROL VALVE.

6-44. REMOVAL.

1. Disconnect and tag each hose to the control valve (see figure 6-2). Cap or plug hoses to keep out dirt.

2. Remove three nuts, lock washers and through bolts which attach valve to mounting bracket.

3. Raise valve and return line high enough to permit turning valve, and unscrew it from return line pipe to remove valve from truck.

4. If returning valve for exchange, strip valve of al fittings and save them for reuse on installation of new valve.

6-45. INSTALLATION.

1. If installing a replacement valve, install fittings removed from original valve, if they are serviceable.

2. Screw return line pipe into return opening in side of valve.

3. Connect all hoses to valve fittings as tagged.

4. Mount valve to mounting bracket with through bolts, lock washers and nuts. Start engine to pressurize system, and operate valve through all its functions, checking for leaks as each line is under pressure.

5. Adjustment. Sluggish operation of tilt and lift cylinders may result from improper adjustment of the control valve relief valve. Adjust as follows:

a. Remove pipe plug (36, fig. 6-2.1) and install suitable 9-3000 psi gage having ¼ NPT male threads.

b. Start engine (para 4-55) and operate TILT control (para 4-53) until mast reaches limit of travel. Hold lever in operating position and-note line pressure. Pressure should be 1650 psi.

c. If pressure is not correct, remove cap nut (1) and loosen locknut (3).

d. To raise pressure, turn setscrew (4) clockwise and to reduce line pressure turn setscrew counterclockwise.

6-46. ELECTRICAL SYSTEM.

6-47. BATTERY REMOVAL.

1. Loosen nuts which clamp cable terminals to battery posts (see figure 3-1) and remove cables from posts. Do not remove caution tag from negative cable terminal.

2. Remove nuts securing battery holddown angle, remove holddown angle and hook bolts. Carefully lift out battery.

CAUTION

If battery top is wet, there is probably electrolyte present which is corrosive to metals and destructive to clothing. Avoid contact and rinse battery freely with clear water.

6-48. BATTERY INSTALLATION. Since charging system components of this truck could be damaged if the battery is connected in reverse polarity, be careful to identify the battery posts before reconnecting cables. The ground cable is to be connected to the negative post.

1. Install holddown angle and hook bolts, and tighten nuts on hook bolts only snug enough to hold battery in place. Do not draw them tight enough to exert significant pressure on the battery case.

2. Connect battery cables to posts.

6-49. STARTER MOTOR REMOVAL.

1. Disconnect one cable at the battery to prevent shorting of tools against truck frame.

2. Disconnect and tag all electrical leads at the starter solenoid (see figure 1-2).

3. Remove starter motor mounting screws and washers, and take starter motor from flywheel housing.

6-50. STARTER MOTOR INSTALLATION.

1. Position starter motor at mounting pad on flywheel housing.

2. Install mounting bolts and washers and tighten.

3. Reconnect leads to starter solenoid.

4. Reconnect battery cable at battery.

6-51. ALTERNATOR REMOVAL.

1. Disconnect wiring harness and ground lead at front of alternator.

2. Remove attaching screw at adjusting strap (see figure 1-2) and screws at mounting bracket, and lift off alternator.

6-52. ALTERNATOR INSTALLATION.

1. Position alternator on mounting bracket and install screws attaching alternator to mounting bracket and adjusting strap.

2. Install drive belt on alternator pulley, and adjust belt tension as given in paragraph 5-34(4).

3. Reconnect wiring harness and ground lead to alternator.

6-53. DISTRIBUTOR REMOVAL. The following steps anticipate timing the distributor on installation.

1. Remove cover from timing mark hole(see figure 1-2) and crank engine until timing mark is aligned with pointer.

2. Remove two distributor cap holddown screws, remove cap and place a chalk mark on the cylinder head corresponding to the position of the rotor tip. From this point the crankshaft must not be turned until the distributor is reinstalled.

3. Disconnect the primary lead (see figure 6-3) at the distributor, loosen the clamp bolt which holds the distributor and lift off the distributor.

6-54. DISTRIBUTOR INSTALLATION.

1. Install distributor in engine so rotor tip points to chalk mark placed on head at removal.

2. Tighten clamp bolt at base of distributor, connect primary wire from coil to distributor, and install cap.

3. Start engine, and finish timing distributor as given in paragraphs 5-29 and 5-30.

6-55. NEUTRAL SAFETY SWITCH REMOVAL. This assembly is mounted on the top of the transmission, directly in front of the control valve, where it is operated by the shifting linkage. The switch assembly consists of a mounting bracket, a striker plate with detent, and a sensitive switch, arranged to interrupt the starter circuit when the transmission is not in the neutral position. Remove the unit as follows:

1. Remove the truck floor plate.

2. Disconnect the two electrical leads at the switch.

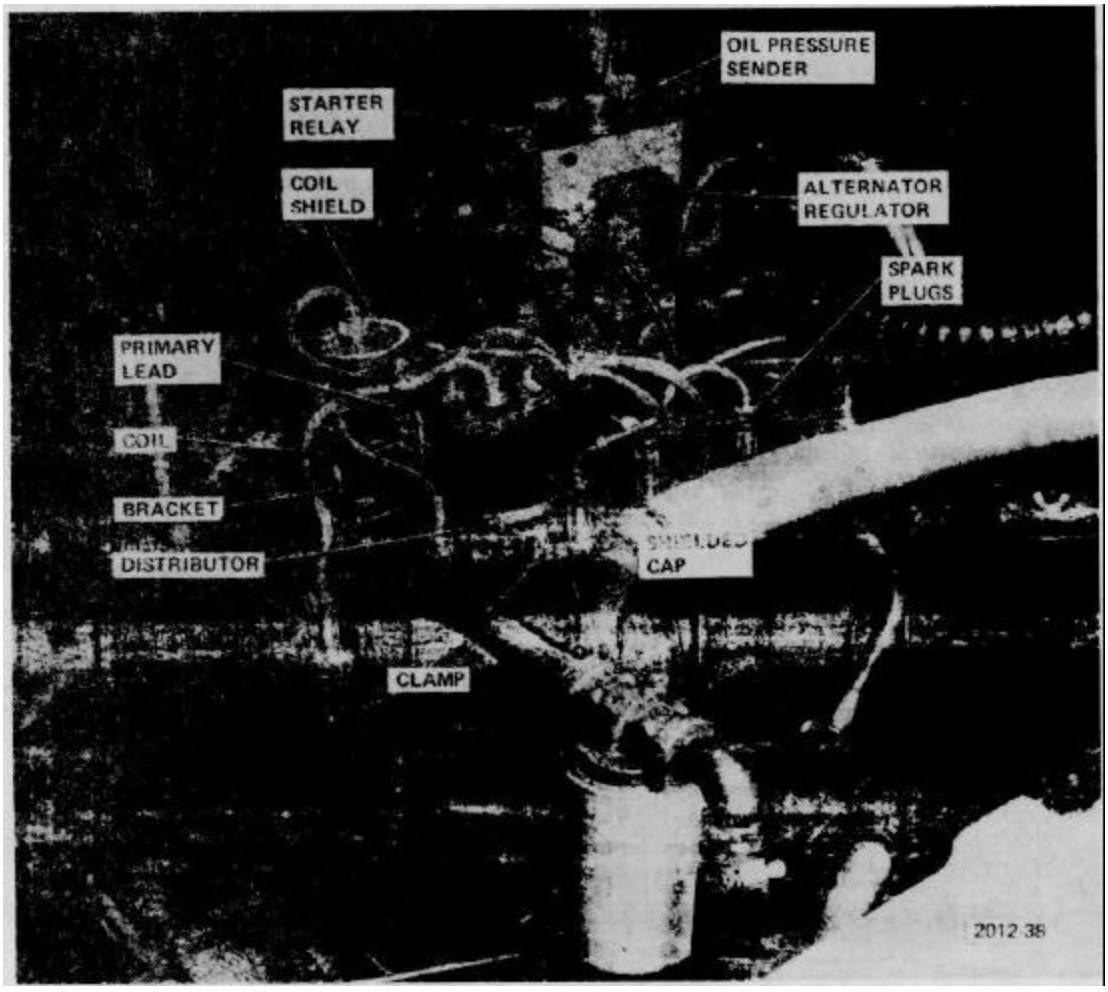


Figure 6-3. Engine Mounted Electrical Units

3. Disconnect the shift linkage and control valve plunger from the pivoted lever plate which operates the roller of the sensitive switch.

4. Remove the attaching screws which hold the bracket to the top of the transmission and take the unit from the truck.

6-56. NEUTRAL SAFETY SWITCH ADJUSTMENT. If the sensitive switch has been removed from the assembly, it must be adjusted before putting it into service. To adjust, proceed as follows:

1. With the switch roller contacting the flat area of the striker plate, out of the detent, as shown in figure 6-4, adjust the switch position just to the point where a click is heard in the switch.

2. At this point measure the distance between the switch body and the roller arm with a feeler gage.

3. Move the switch 3/32 inch toward the striker plate, as measured with a feeler gage at the same point as in step 2. above, and lock sensitive switch in position.

6-57. NEUTRAL SAFETY SWITCH INSTALLATION.

1. Attach the mounting bracket to the transmission with attaching parts previously removed.

2. Connect the shift linkage and control valve plunger to the lever plate.

3. Connect the two electrical leads to the terminals of the switch and check that the starter can only be energized when the shift, lever is in the neutral position. When adjustment has been checked as satisfactory, replace truck floor plate.

6-58. ENGINE MOUNTED ELECTRICAL COMPONENTS, REMOVAL AND INSTALLATION. These units not previously covered are shown in figure 6-3. Since all attaching parts and connecting leads are exposed, and no special techniques are involved, remove and replace them using the obvious procedures.

1. Procedure for Testing Ignition Coil.

2. Test the coil for grounded or open circuits by using a test lamp as follows:

a. Check primary circuit by placing the test points on the two primary terminals. If the lamp does not light the primary circuit is open and the coil must be replaced.

b. Check the secondary circuit by placing one test point in the high tension terminal and the other test point on one of the primary terminals. The lamp will not light but sparks will be noted as the test point is rubbed over the terminal. If no sparks occur the secondary circuit is open and the coil must be replaced.

6-59. RADIATOR.

6-60. REMOVAL.

1. Remove radiator cover plate from counterweight.

2. Drain coolant and disconnect all hoses at radiator. Slide hose clamps down hoses for storage if the clamps are reusable.

3. Remove two screws, and four washers securing the radiator at each side and take the radiator carefully from the truck.

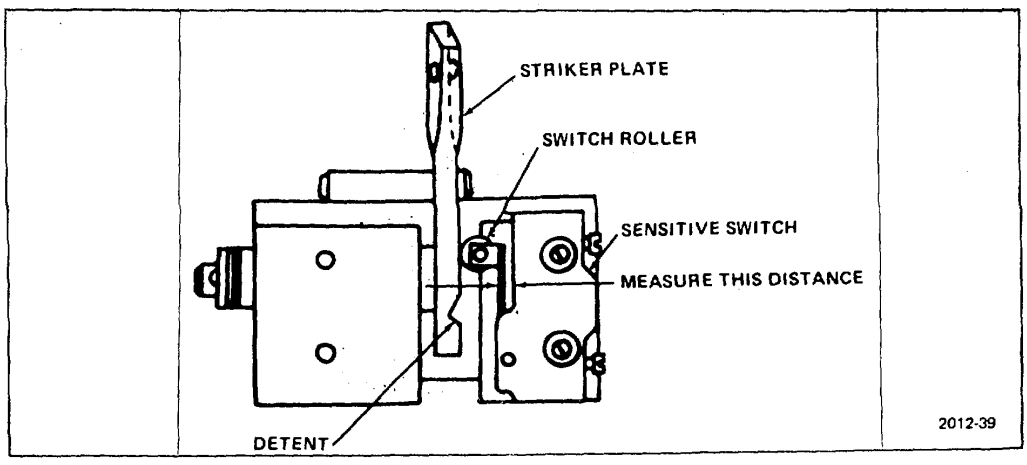


Figure 6-4. Neutral Safety Switch Adjustment

6-61. INSTALLATION.

1. Carefully place radiator in position, and install mounting screws and washers.

2. Reconnect engine-to-radiator hoses, transmission to-radiator hoses, close engine and radiator drain cocks, and replace coolant.

6-62. POWER TRAIN.

6-63. Removal and installation of the power train, which includes the power axle, transmission and the engine, is ordinarily not within the capacity of equipment available to the using facility. Should a component of the power train have to be removed, refer the truck to a suitably equipped overhaul facility.

6-64. FUEL FILTER, FUEL PUMP AND CARBURETOR.

6-45. REMOVAL. Before starting removal of any fuel system units, shut off the fuel supply by dosing the valve at the point that the fuel line is connected to the top of the fuel tank,

1. Disconnect the fuel line at the filter inlet, then unscrew the filter (see figure 1-2) from the fitting connecting it to the fuel pump.

2. Remove and save all reusable fittings as work proceeds. Disconnect the pump-to-carburetor fuel line, remove the two nuts and washers which attach the pump to the engine crankcase and take off the pump. Discard the pump mounting gasket. Drain remaining gas from pump in a safe place.

3. Remove spring clips at carburetor end of throttle and governor linkage, and disconnect linkage at carburetor. Loosen hose clamp at carburetor and remove air intake hose. Loosen, but do not remove choke cable housing screw, and choke wire screw at choke valve lever arm. Set choke cable aside.

4. Remove the two nuts and washers holding the carburetor to the intake manifold, remove carburetor and drain fuel from the carburetor. Manifold-to-carburetor gasket may be saved for reuse if it is in good condition.

6-65.1. FUEL PUMP TEST.

1. Static pressure test.

a. Disconnect fuel pump-to-carburetor line at carburetor.

b. Install adapter and T-fitting in opening and attach a pressure gage rubber tubing to the line.

c. Run engine at 500 revolutions per minute or until fuel remaining in carburetor is used.

d. The reading on the gage is the static pressure of the fuel pump and should be $3^1/_2$ to 5 pounds per square inch. Since inaccurate readings may result if a longer hose is used, the length of hose on the pressure gage should not exceed 6 inches.

e. Replace pump if static pressure test shows an under pressure or an overpressure reading.

2. Capacity test. The capacity test is designed to measure amount of fuel that the pump will deliver in excess of fuel needed to operate engine at idling speed.

a. Disconnect fuel pump-to-carburetor line at carburetor and attach T-fitting in carburetor inlet opening.

b. Attach fuel line to T-fitting.

c. Start engine and count time necessary to fill 1-pint measure with fuel from remaining opening in T-fitting. Adequate fuel delivery is available when 1 quart flows in 1 minute or less at 500 revolutions per minute.

3. Bench test.

a. Clamp fuel pump in vise. If vise jaws have serration's, use brass shims to protect gasket surface of pump flange.

b. Connect mercury manometer or suitable vacuum gage to intake side of pump.

c. Actuate cam lever a full stroke at 60 strokes per minute. The pump should pull at least 10 inches of mercury. If it does not, replace pump.

6-66. INSTALLATION.

1. Place gasket on mounting flange of carburetor (see figure 1-2), position carburetor against intake manifold and install attaching lock washers and nuts. Tighten nuts evenly and snugly to prevent air leak.

2. With choke button on instrument panel pushed fully in, and choke valve held fully open, connect choke linkage to carburetor.

3. Reconnect throttle and governor linkage, and install inlet elbow fitting. Attach air intake hose to carburetor air intake.

4. Using a new gasket at the mounting flange, attach fuel pump to crankcase with nuts and lock washers. Install pump-to-carburetor fuel line, and fittings.

5. Screw fuel filter onto pump inlet fitting, connect fuel line from tank, open fuel shutoff valve at tank and check installation for fuel leaks. Start engine and check operation of linkage.

6-67. WATER PUMP.

6-68. REMOVAL.

1. Remove the radiator cover, drain the cooling system, and disconnect the coolant bypass hose (see figure 1-2) at top of pump.

2. Remove truck radiator (paragraph 6-60), to protect it against damage during work.

3. Remove cap screws and lock washers attaching belt tension idler and alternator adjusting straps to water pump. Slack off adjustments and remove both drive belts.

4. Remove nuts, cap screws and lock washers holding pump to engine block, lift off pump and discard used gasket.

6-69. INSTALLATION.

1. Using a new gasket, replace pump on front of engine and attach with nuts, cap screws and lock washers. Loosely replace both drive belts.

2. Attach alternator and belt tension idler adjusting straps to pump, adjust tension of both belts to specifications, and tighten holddown nuts.

3. Reinstall radiator, connect hoses, refill cooling system and check for leaks.

6-70. STEERING GEAR.

6-71. It is not necessary for any repair operation to remove both the steering gear and the steering column at the same time. These items can be separated at the flange shown in figure 6-5, permitting removal only of the item needing service without disturbing the other item.

6-72. REMOVAL. Refer to the following steps only as far as necessary to remove the desired assembly.

1. Remove the truck floor plate, and loosen the pinch bolt which clamps the split bore of the flexible coupling to the splined stub shaft of the gear (see figure 6-5).

2. To remove the steering column:

a. Uncouple the horn wire which extends from the grommet in the lower part of the mast jacket.

b. Remove two screws attaching shift lever support to steering column, and move shift lever aside.

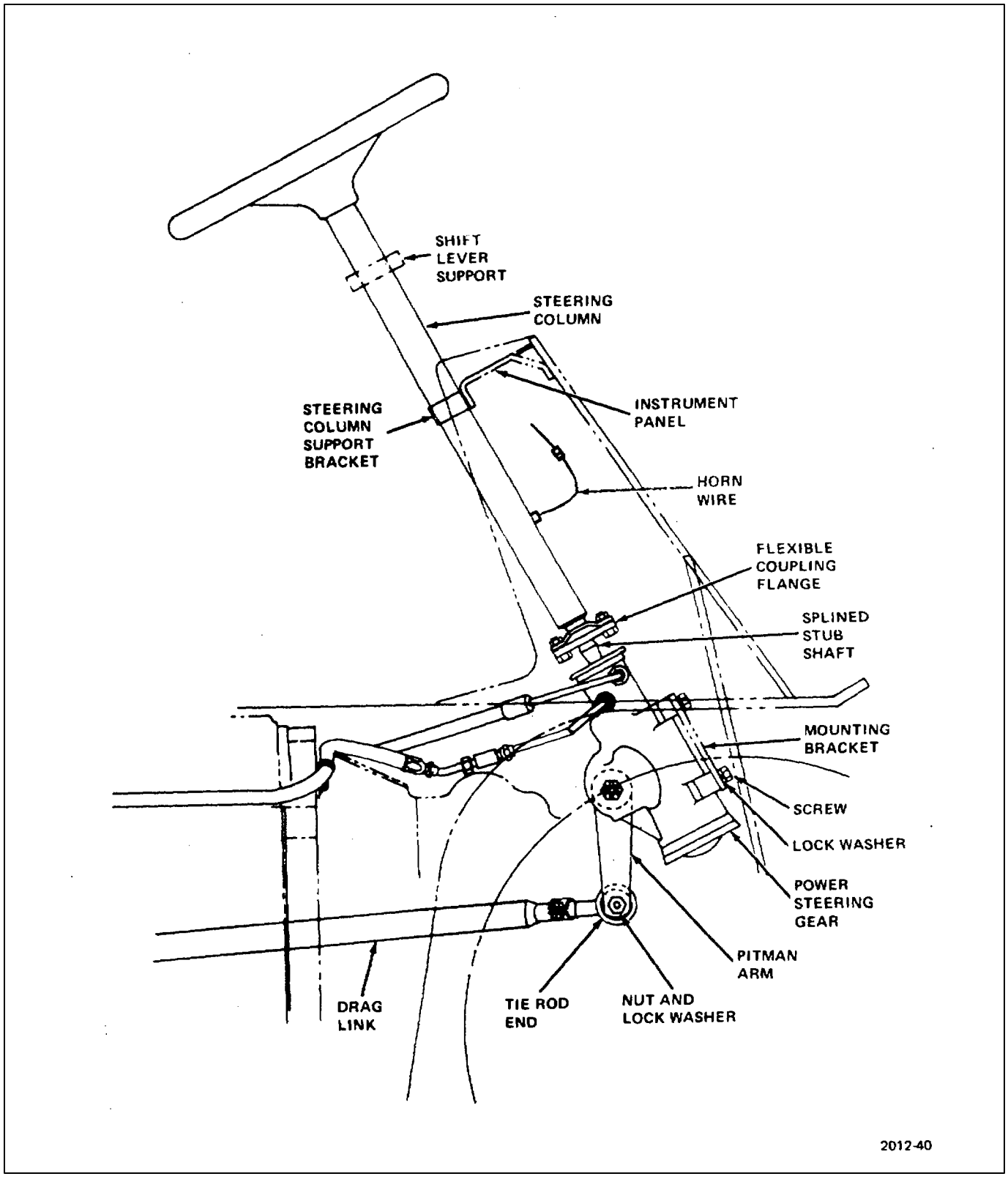


Figure 6-5. Steering Gear Removal

c. Remove screws, nuts and washers attaching steering column support bracket to instrument panel, and lift steering column from splined stub shaft on steering gear.

3. To remove the steering gear:

a. Remove nut and washer, and pull tie rod end on drag link from tapered hole in pitman arm.

NOTE

It may be necessary to use a puller to separate tie rod end and pitman arm. Do not use a hammer on tie rod end, so threads will not be damaged.

b. Disconnect pressure and return hoses at steering gear. Cap hoses and plug ports in gear to keep out dirt.

c. Remove screws and washers at gear mounting bracket, and take gear from truck.

6-73. INSTALLATION.

1. To install the steering column:

a. Hold steering gear in installed position, with flexible coupling engaged with gear stub shaft, and attach steering column to instrument panel with steering column support bracket. Tighten pinch bolt in flexible coupling.

b. Reinstall shift lever support on steering column, and reconnect horn wire at connector under instrument panel.

2. To install the steering gear:

a. Place steering gear in position at mounting bracket, entering stub shaft splines into flexible coupling, and install mounting screws and lock washers through bracket into gear.

b. Carefully turn steering wheel to one extreme of travel, then counting the number of turns, turn it to the opposite limit. Now turn wheel to midpoint of travel (straight ahead travel position). Pitman arm should now be pointing straight down. If it is not, pull arm from sector gear shaft and reposition arm to point straight down with gear in straight ahead position.

c. Install pressure and return hoses in gear, and attach drag link tie rod end to pitman arm with lock washer and nut. Replace truck floor plate, and road test operation of steering.

6-74. HYDRAULIC BRAKE MASTER CYLINDER.

6-75. REMOVAL.

1. Remove truck floor plate (para 6-19) and disconnect tube (1, fig. 6-6) at fitting (29).

2. Unscrew push rod. (33 add clevis (24).

3. Remove screws (22) and washers (23) and take master cylinder from truck.

6-76. INSTALLATION.

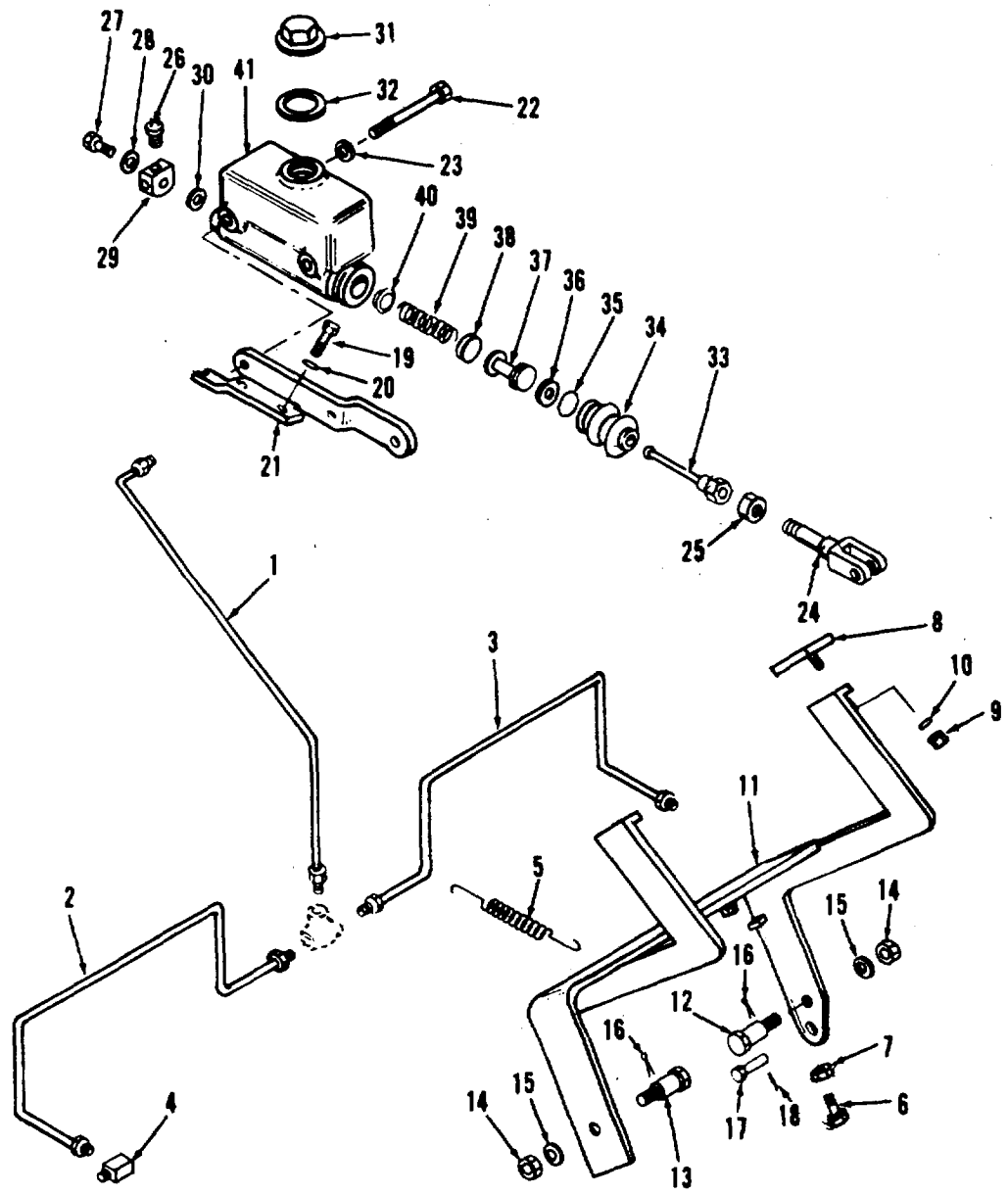
1. Install master cylinder on bracket (21) with screws (22) and washers (23).

2. Connect push rod clevis (24) to brake pedal assembly (11) with pin (17) and cotter pin (18).

3. Connect brake tubing (1) to master cylinder.

4. Replace truck floor plate (para 6-20).

5. Bleed brake system (para 5-41).



1. Brake Tube
2. Brake Tube
3. Brake Tube
4. Elbow
5. Retractor Spring
6. Screw
7. Nut
8. Pedal Pad
9. Nut
10. Lock Washer
11. Brake Pedal
12. Trunnion Bolt
13. Trunnion Bolt
14. Nut
15. Washer
16. Cotter Pin
17. Headed Pin
18. Cotter Pin
19. Screw
20. Lock Washer
21. Master Cylinder Bracket
22. Screw
23. Lock Washer
24. Push Rod Clevis
25. Nut
26. Stop Light Switch
27. Connector Bolt
28. Washer
29. Brake Fitting
30. Washer
31. Filler Cap
32. Gasket
33. Push Rod
34. Push Rod Boot
35. Retaining Ring
36. Stop Plate
37. Master Cylinder Piston
38. Piston Cup
39. Spring
40. Check Valve
41. Master Cylinder Body

Figure 6-6. Hydraulic Brake Master Cylinder and Pedal Assembly, Exploded View

6-77. BRAKE PEDAL.

6-78. REMOVAL,

1. Remove hydraulic brake master cylinder (para 6-74).

2. Remove pedal retractor spring (5, fig. 6-6),

3. Remove brake pedal (11) by removing trunnion bolts (12 and 13) and headed pin (17) to master cylinder push rod.

6- 79 INSTALLATION.

1. Reverse removal procedure and install the brake pedal assembly.

2. Adjust brake pedal stop screw (6) to provide a 1/8 inch free movement of push rod (33) before contact and resistance of piston (37) is felt. This should provide necessary 1¼ inch "free" movement at pedal pad (8).

6-80. EXHAUST HOSE.

6-81. REMOVAL.

1. Remove clamps (1 & 3, fig. 6-7) from exhaust hose (7).

2. Remove 2 screws (4), lockwashers (5), and washers (6), from exhaust hose bracket.

3. Slide exhaust hose from exhaust pipe (10) and then remove curved portion of pipe from muffler (2).

6-82. INSTALLATION. Reverse removal procedure and install the exhaust hose.

6-83. INTAKE AND EXHAUST MANIFOLD ASSEMBLY.

6-84. REMOVAL.

1. Remove exhaust hose (para 6-80).

2. Remove air inlet tube (fig. 6-8), accelerator rod, fuel line, governor control rod and choke cable from carburetor.

3. Remove two nuts and lockwashers attaching carburetor to intake manifold. Remove carburetor with gasket.

4. Remove eleven nuts and washers holding manifold assembly to cylinder block.

5. Remove positive crankcase ventilation valve and tubing assembly.

6. Remove manifold assembly and gasket from engine.

6-85. INSTALLATION. Refer to paragraph 6-81 and reverse removal procedures to install intake and exhaust manifolds.

6-86. RETURN LINE FILTER ASSEMBLY. Assemble filter by-pass valve parts (3, 4, 5 and 6, fig. 6-8) to filter head (8) with machine screw (1) and nut (2).

NOTE

Filter element is left off until the filter head is installed to provide sufficient clearance.

6-87. RETURN LINE FILTER INSTALLATION.

1. Install street elbow (fig. 6-2) into filter assembly outlet port and control valve to filter pipe into the inlet port.

2. Tighten elbow until it is face down and install hose adapter.

3. Install filter and pipe with valve adapter in control valve.

NOTE

Tighten assembly with wrench on flats of filter head. Do not use filter element as lever to tighten joints.

4. Install clamps and hose between filter outlet and hydraulic system reservoir tank.

5. Install new filter element (7, fig. 6-9). Coat element seal with OE-engine oil. Tighten hand tight and then tighten one-half turn.

1. Clamp
2. Muffler
3. Clasp
4. Screw
5. Lockwasher
6. Washer
7. Exhaust hose
8. Nut
9. Washer
10. Exhaust pipe
11. Gasket pipe

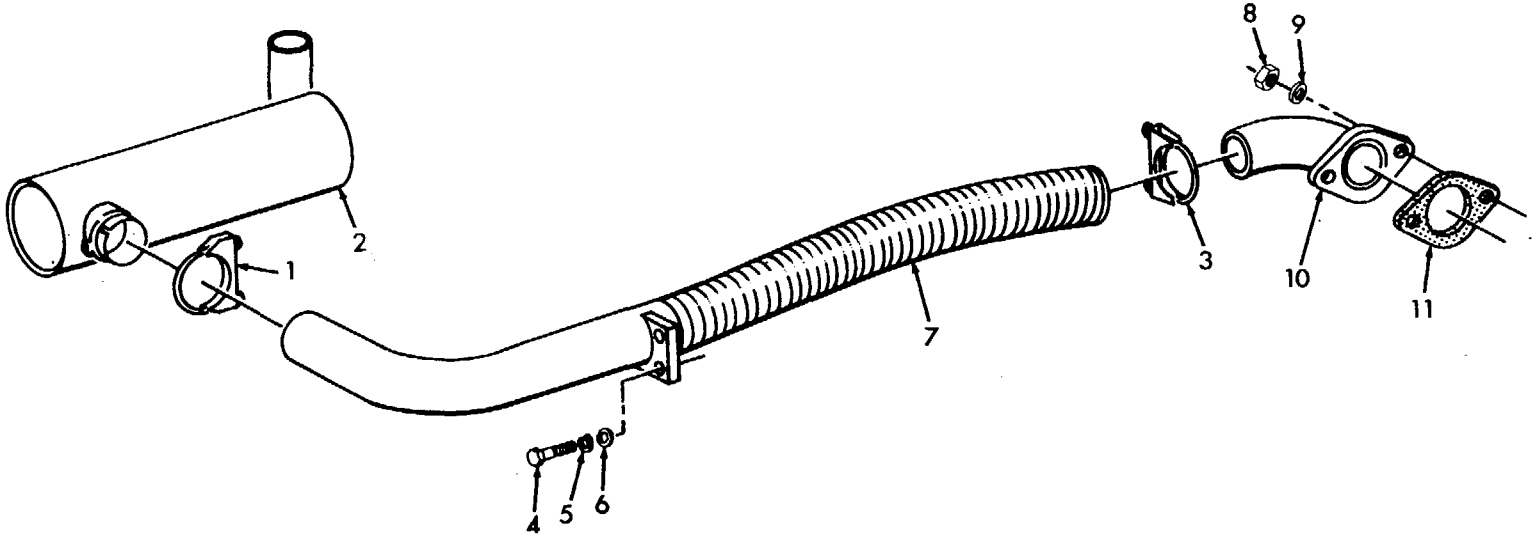


Figure 6-7. Muffler, exhaust pipe and exhaust hose, exploded view.

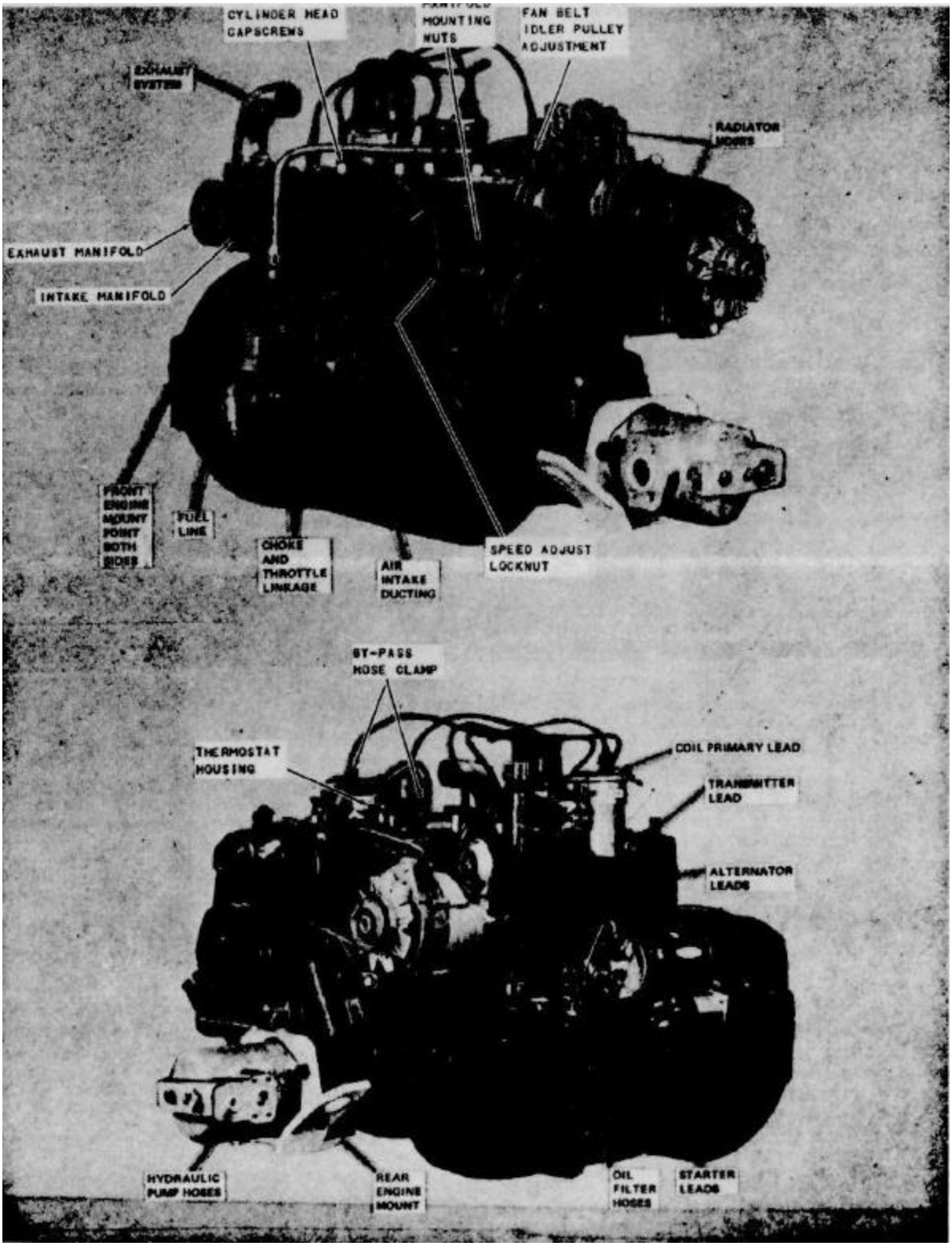


Figure 6-8. Engine Assembly

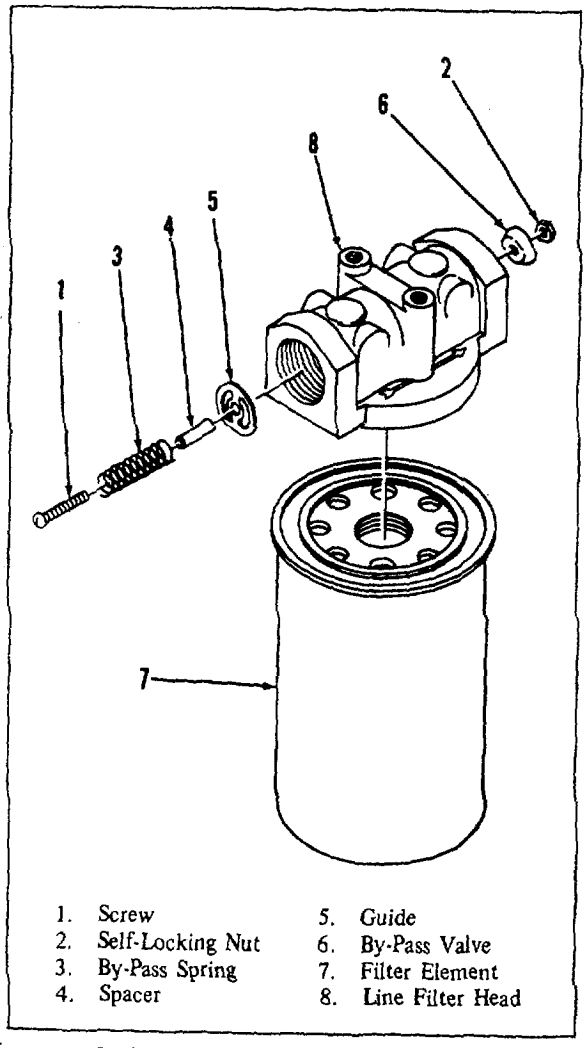


Figure 6-9. Hydraulic System Line Filter, Exploded View

APPENDIX A

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

A-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II. Not Applicable .

d. Section IV contains supplemental instructions, explanatory notes and or illustrations required for a particular maintenance function. Not Applicable.

A-2. Explanation of Columns in Section II.

a. Group Number. Column 1. The assembly group is a numerical group assigned to each assembly in a top down breakdown sequence. The applicable assembly groups are listed on the MAC in disassembly sequence beginning with the first assembly removed in a top down disassembly sequence.

b. Assembly Group. Column 2 This column contains a brief description of the components of each assembly group.

c. Maintenance Functions. Column 3 This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows:

C - Operator or crew

O - Organizational maintenance

F - Direct support maintenance

H - General support maintenance

D - Depot maintenance

The maintenance functions are defined as follows:

A - INSPECT. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

B - TEST. To verify serviceability and to detect electrical or mechanical failure by use of test equipment.

C - SERVICE. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

D - ADJUST. To rectify to the extent necessary to bring into proper operating range.

E - ALIGN. To adjust specified variable elements of an item to bring to optimum performance.

F - CALIBRATE. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

G - INSTALL. To set up for use in an operational environment such as an emplacement, site, or vehicle.

H - REPLACE. To replace unserviceable items with serviceable like items.

I - REPAIR. Those maintenance operations necessary to restore an item to serviceable condition through correction of material damage or a specific failure. Repair may be accomplished at each category of maintenance.

J - OVERHAUL. Normally, the highest degree of maintenance performed by the Army in order to minimize time work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

K - REBUILD. The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

L - SYMBOLS. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

d. Tools and Equipment. Column 4. This column is provided for referencing by code the special tools and test equipment, (Section III) required to perform the maintenance functions (Section II).

e. Remarks. Column 5. This column is provided for referencing by code the remarks (Section IV) pertinent to the maintenance functions.

A-3. Explanation of Columns in Section III.

a. Reference Code. This column consists of a number and a letter separated by a dash. The number references the T&TE requirements column on the MAC. The letter represents the specific maintenance function the item is to be used with. The letter is representative of columns A through K on the MAC.

b. Maintenance Category. This column shows the lowest level of Maintenance authorized to use the special tool or test equipment.

c. Nomenclature. This column lists the name or identification of the tool or test equipment.

d. Tool Number. This column lists the manufacturer's code and part number, or Federal Stock Number of tools and test equipment.

A-4. Explanation of Columns in Section IV.

a. Reference Code. This column consists of two letters separated by a dash, both of which are references to Section II. The first letter references column 5 and the second letter references a maintenance function, column 3, A through K.

b. Remarks. This column lists information pertinent to the maintenance function being performed, as indicated on the MAC, Section II.

SECTION II - MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMARKS
01	UPRIGHT, CARRIAGE, AND FORK ASSEMBLY													
	Fork, lift	O							O					
	Upright assembly			O					F	F				
	Chain				O				O	O				
	Carriage assembly								F	F				
02	TILT AND HOIST CYLINDERS													
	Tilt cylinders			O					O	F				
	Hoist cylinder			O					F	F				
03	GUARD, COUNTERWEIGHT, FLOOR, ENGINE COVER AND SEAT													
	Guard								O	F				
	Counter weight	O							O					
	Floor	O							O					

SECTION II - MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMARKS
03	GUARD, COUNTERWEIGHT, FLOOR, ENGINE COVER AND SEAT - CONTINUED													
	Engine cover				O	O			O	F				
	Seat	O												
04	EXHAUST SYSTEM													
	Muffler	O							F					
	Pipe	O							O					
05	RADIATOR, HOSE AND TRANS-MISSION COOLER LINES													
	Radiator		F	C					O	F				
	Hose	C												
	Cooler lines	C							O					

SECTION II - MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMARKS
06	BATTERY AND CABLES													
	Battery	O	O	C					O					
	Cables			O					O					
07	LIGHTS													
	Stoplight, taillight	C							O	O				
	Spot light	C			C				O	O				
08	AIR CLEANER AND HOSE													
	Air cleaner			C					O					
	Hose	O							O					

SECTION II - MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMARKS
09	WHEELS, TIRES, HUBS AND STEERING AXLE ASSEMBLY-CONTINUED													
	Wheels (Dual and single)	O							O					
	Hubs								O	F				
	Bearings and seals			O	O				F					
	Tires, tubes	O							O	O				
	Tie rod			O	O				O					
	Drag link			O					O					
	Axle			O					F	F				
10	HAND BRAKE AND SHIFTING MECHANISM													
	Hand Brake assembly				O				O					
	Cables				O				O					
	Shifting mechanism				O				O					

SECTION II - MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMARKS
11	BRAKES, CYLINDERS AND DRIVE AXLE ASSEMBLY													
	Brake shoes	O							O					
	Master cylinder			O					O	F				
	Wheel cylinder								O	O				
	Pedal			O					O					
	Axle assembly (drive)			O					F	F				
	Differential				F				F	H				
12	ACCELERATOR PEDAL AND LINKAGE													
	Pedal	O							O					
	Linkage				O				O					
13	STEERING WHEEL, COLUMN, AND POWER STEERING GEAR													
	Wheel	O							O					

SECTION II - MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
GROUP NO.	FUNCTIONAL GROUP	A INSPECT	B TEST	C SERVICE	D ADJUST	E ALIGN	F CALIBRATE	G INSTALL	H REPLACE	I REPAIR	J OVERHAUL	K REBUILD	TOOLS AND EQUIPMENT	REMARKS
13	STEERING WHEEL, COLUMN, AND POWER STEERING GEAR-CONTINUED													
	Column								F	F				
	Steering gear			O					F	F				
	Horn button assembly			O					O	O				
	Valve								F	F				
14	HYDRAULIC PUMP, CONTROL VALVE AND TRANSMISSION CONTROL VALVE													
	Pump, hydraulic								F	F				
	Valve, control				O				O	F				
	Valve, transmission control				O				F	F				

SECTION II - MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
GROUP NO.	FUNCTIONAL GROUP	INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	TOOLS AND EQUIPMENT	REMARKS
15	CONTROL LEVERS, FILTER, AND HOSE ASSEMBLIES													
	Control levers and linkage				O				O					
	Hose assemblies	O							O	F				
	Filter, hydraulic			O					O					
16	ALTERNATOR, AND STARTING MOTOR													
	Alternator		O						O	F				
	Starting motor		F						O	F				
17	TRANSMISSION													
	Transmission assembly		F	C					F	F	H	D		
	Torque converter			O					F					
	Friction clutch assembly		F						F	F				

SECTION II - MAINTENANCE ALLOCATION CHART

(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTIONS A INSPECT	B TEST	C SERVICE	D ADJUST	E ALIGN	F CALIBRATE	G INSTALL	H REPLACE	I REPAIR	J OVERHAUL	K REBUILD	(4) TOOLS AND EQUIPMENT	(5) REMARKS
18	ENGINE													
	Engine assembly	O	O	C	O				F	O	H	D		
	Cylinder head								O	F				
	Crankshaft								H	D				
	Flywheel assembly								F	H				
	Valve, engine				O				F	F				
	Gears, timing	F							F					
	Breather			O					O					
	Filter, oil			O					O					
	Pump, oil	F							F					
	Manifold	O							O					
	Carburetor				O				O	F				
	Fuel pump		O	O					O					

SECTION II - MAINTENANCE ALLOCATION CHART

(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTIONS A INSPECT	B TEST	C SERVICE	D ADJUST	E ALIGN	F CALIBRATE	G INSTALL	H REPLACE	I REPAIR	J OVERHAUL	K REBUILD	(4) TOOLS AND EQUIPMENT	(5) REMARKS
18	ENGINE - CONTINUED													
	Governor				O				F	F				
	Thermostat		O						O					
	Water pump	O							O					
	Belts, Fan and/or alternator				O				O					
	Distributor				O				O	O				
	Spark plugs		O	O	O				O					
	Ignition coil		O						O					
	Battery		O	C					O					
	Cables, battery			O					O					

SECTION II - MAINTENANCE ALLOCATION CHART

(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTIONS A INSPECT	B TEST	C SERVICE	D ADJUST	E ALIGN	F CALIBRATE	G INSTALL	H REPLACE	I REPAIR	J OVERHAUL	K REBUILD	(4) TOOLS AND EQUIPMENT	(5) REMARKS
19	FUEL TANK ASSEMBLY AND FUEL LINE													
	Tank, fuel			C					O	H				
	Fuel line	O							O	O				
20	HYDRAULIC TANK LINES AND FITTINGS													
	Tank, hydraulic			O					F					
	Breather, oil tank			O					O					
	Lines and fittings	O							O	O				
21	FRAME AND ATTACHING PARTS													
	Frame	O							H	H				
	Engine cover supports	O							O					
	Instrument panel and gages	O							O					

APPENDIX B
BASIC ISSUE ITEMS UST AND ITEMS TROOP INSTALLED OR AUTHORIZED

Section I. INTRODUCTION

B-1. Scope
This appendix lists items required by the operator for operation of the fork lift truck.

B-2. General
This list is divided into the following sections:

a. Basic Issue Items List-Section II. Not applicable.

b. Items Troop Installed or Authorized List Section III. A list of items in alphabetical sequence, which at the discretion of the unit commander may accompany the fork lift truck. These items are NOT subject to turn-in with the fork lift truck when evacuated.

B-3. Explanation of Columns
The following provides an explanation of columns in the tabular list of Basic Issue Items List, Section II, and Items Troop Installed or Authorized, Section III.

a. Source, Maintenance, and Recoverability Code(s) (SMR) :

(1) Source Code, indicates the source for the listed item. Source codes are:

Code	*Explanation*
P	Repair parts, special tools and test equipment supplied from GSA/DSA or Army supply system and authorized for use at indicated maintenance levels.
P2	Repair parts, special tools and test equipment which are procured and stocked for insurance purposes because the combat or military essentiality of the end item dictates that a minimum quantity be available in the supply system.

(2) Maintenance Code, indicates the lowest level of maintenance authorized to install the listed item. The maintenance level code is:

Code	*Explanation*
C	Crew/Operator

(3) Recoverability Code, indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are nonrecoverable. Recoverability codes are:

Code	*Explanation*
R	Applied to repair parts (assemblies and components), special tools and test equipment which are considered economically reparable at direct and general support maintenance levels.
S	Repair parts, special tools, test equipment and assemblies which are economically reparable at DSU and GSU activities and which normally are furnished by supply on an exchange basis.

b. Federal stock number. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description. This column indicates the Federal item name and any additional description of the item required.

d. Unit of measure (U/M). A 2 character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

e. Quantity furnished with equipment (BIIL only). This column indicates the quantity of an item furnished with the equipment.

f. Quantity authorized (Items troop installed or authorized only). This column indicates the quantity of the item authorized to be used with the equipment.

g. Illustration (BIIL only). This column is divided as follows:

(1) *Figure number.* Indicates the figure number of the illustration in which the item is shown.

(2) *Item number.* Indicates the callout number used to reference the item in the illustration.

Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) SMR Code	(2) Federal stock number	(3) Description Ref No. & Mfr on code	Usable on code	(4) Unit of meas	(5) Qty Auth
	7510-889-3494	BINDER, LOOSE LEAF		EA	1
	7520-559-9618	CASE, MAINTENANCE AND OPERATING		EA	1
I		MANUALS			
	4210-889-2221	EXTINGUISHER, FIRE		EA	1

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