

TM 10-3930-621-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL
MAINTENANCE MANUAL

TRUCK, LIFT, FORK, GED, SOLID RUBBER
TIRED WHEELS, 4000 LBS CAPACITY, 180 IN LIFT
ARMY MODEL MHE 209
ALLIS CHALMERS MODEL F40-24PS
FSN 3930-459-5948

HEADQUARTERS, DEPARTMENT OF THE ARMY
AUGUST 1970

SAFETY PRECAUTIONS

BEFORE OPERATION

When servicing battery, do not smoke or use flame in the vicinity. Batteries generate hydrogen, a highly explosive gas.

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.

Make sure fire extinguisher (Class B) is on the truck.

DURING OPERATION

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 forks 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 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 back 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.

AFTER OPERATION

Do not remove the radiator cap from an overheated radiator; stop engine and allow radiator to cool before removing cap to avoid injury by scalding.

Make sure forks are lowered to the ground and hand brake is engaged firmly.

If the truck is parked on an incline, set brakes and block at least two wheels in the event of hand brake failure.

CHANGE

NO. 5

HEADQUARTERS
DEPARTMENT OF THE ARM-Y
Washington D.C., 24 August 1991**OPERATOR AND ORGANIZATIONAL
MAINTENANCE MANUAL****TRUCK, LIFT, FORK; GED; SOLID RUBBER TIRED WHEELS;
4000-LB CAPACITY; 180-INCH LIFT ARMY MODEL MHE209
ALLIS CHALMERS MODEL F40-24PS, NSN 3930-00-459-5948;
100-INCH LIFT ARMY MODEL MHE224
ALLIS CHALMERS MODEL F40-24PS100, NSN 3930-00-165-4102**

TM 10-3930-621-12, 5 August 1970, is changed as follows:

Page 2-5, the following paragraph is added after **Section IV. "OPERATION UNDER USUAL CONDITIONS"**;

A decal has been developed that warns of NBC exposure. It is to be positioned in a noticeable place on or near the air cleaner or air filter housing. You may order the decal using part number 12296626, CAGEC 19207. Refer to TB 43-0219 for further information, Add the decal to the air cleaner (*page 3-5, figure 3-2*).

Add the following WARNING to the following locations;

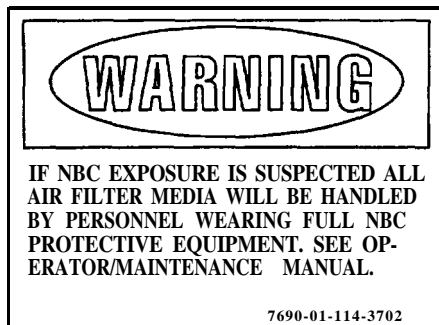
inside front cover:

page 1-3, paragraph 1-5 a, preceding, "Air cleaner";

page 3-4, preceding paragraph 3-10, "Air Cleaner Service";

page B-4, preceding, "AIR CLEANER";

page C-2, Group No. 02 FUEL SYSTEM preceding, "Air Cleaner";

**WARNING**

If NBC exposure is suspected, all air filter media should be handled by personnel wearing protective equipment. Consult your unit NBC Officer or NBC NCO for appropriate handling or disposal instructions.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

PATRICIA P. HICKERSON
Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25-E, Block 2191, Operator and Unit Maintenance Requirements for TM 10-3930-621-12.

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HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC 19 July 1984

OPERATOR AND ORGANIZATIONAL

MAINTENANCE MANUAL

**TRUCK, LIFT, FORK; GED; SOLID RUBBER TIRED WHEELS;
4000-LB CAPACITY; 180-INCH LIFT ARMY MODEL MHE209
ALLIS CHALMERS MODEL F40-24PS, NSN 3930-00-459-5948;
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ALLIS CHALMERS MODEL F40-24PS100, NSN 3930-00-165-4102**

TM 10-3930-621-12, 5 August 1970, is changed as follows:

Cover. The title is changed as shown above.

Page i. The title is changed as shown above.

Inside front cover. The title Safety Precautions is changed to read **WARNINGS.**

Paragraph Before Operation. Following line 5 add line 6 as follows: check the operating area to be sure it is clear of personnel and obstructions.

Paragraph During Operation. Following line 9 add line 10 as follows: Do not shift directional lever while truck is in motion.

Paragraph After Operation. Lines 1 and 2 are superseded as follows:

Remove radiator cap slowly to relieve pressure before completely removing when engine is hot. Do not remove radiator cap when engine is overheated. Stop engine and allow radiator to cool before removing cap to avoid injury by scalding. Allow engine to cool before filling the radiator, otherwise there is danger of cracking the cylinder head or block. Should you be scalded, seek medical aid immediately.

Line 3 is superseded as follows: Make sure forks are lowered to the ground when truck is parked and engage the parking brake firmly.

After inside front cover, before page i, the following warnings are added.

WARNING

CARBON MONOXIDE (EXHAUST GAS) CAN KILL YOU

Carbon monoxide is without color or smell, but it can kill you. Breathing air with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Brain damage or death can result from heavy exposure. Carbon monoxide occurs in the exhaust fumes of fuel-burning heaters and internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of no air movement. Precautions must be followed to ensure crew safety when the personnel heater, main, or auxiliary engine of any vehicle is operated for any purpose.

DO NOT operate personnel heater or engine of vehicle in a closed place unless the place has a lot of moving air.

DO NOT idle engine for long periods without ventilator blower operating. If tactical situation permits, open hatches.

DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.

BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either is present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected crew to fresh air and keep warm, DO NOT PERMIT PHYSICAL EXERCISE; if necessary, give artificial respiration.

FOR ARTIFICIAL RESPIRATION, REFER TO FM21-11.

BE AWARE; the field protective mask for chemical-biological-radiological (CBR) protection will not protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS GOOD VENTILATION.

WARNING

Death or severe injury may result if forklift truck engine is operated in an enclosed area without providing adequate ventilation. Exhaust fumes contain carbon monoxide, a colorless, odorless, poisonous gas.

WARNING

Do not smoke or use open flame in vicinity where batteries are being charged. The charging process generates hydrogen, a highly explosive gas.

WARNING

NBC (Nuclear, Biological, Chemical) contaminated filters must be handled using adequate precautions, (FM 21-40), and must be disposed of by trained personnel.

WARNING

When working on the brake system or asbestos fiber pad removal, use the wet process only! Wet process involves the use of running water to rinse away asbestos dust. Using compressed air to remove asbestos creates dust extremely dangerous to your health. Inhaled asbestos dust is carcinogenic and remains permanently in your breathing system.

WARNING

USING DRYCLEANING SOLVENT

Drycleaning solvent PD-680, (SD-II), is both toxic and flammable. Avoid prolonged breathing of vapors and avoid skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 138°F (59°C). Serious illness, injury, and loss of life could result.

WARNING

Particles blown by compressed air are hazardous. Make certain the airstream is directed away from user and other personnel in the area. To prevent injury, user must wear eye goggles or face shield when using compressed air.

WARNING

OIL UNDER PRESSURE

2500 psi pressure is used to operate this equipment. Never disconnect any hydraulic lines or fittings without checking manual to see how to drop the pressure to zero. Failure to follow this precaution could cause severe injury. Should you be struck by a high pressure oil stream, seek medical help immediately.

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.

WARNING

The use of diesel fuel oil, gasoline, kerosene, or benzene (benzol) for cleaning is prohibited.

WARNING

If you sustain any injury, no matter how slight, follow first aid procedures outlined in FM 21-11.

Page i. Reporting of errors statement is added after the title.

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Tank-Automotive Command, Warren, MI 48090, Attn: DRSTA-MB. A reply will be furnished to you.

Page i. Chapter 3, Section XIV is rescinded.

Page ii. List of illustrations. The following illustrations are deleted from the list of illustrations, 3-7, 3-8, 3-9, 3-10, 3-11, 3-48, and 3-49.

Page iii. List of illustrations (Continued). 3-52.1 Brake Pedal Assembly page 3-47 is added after 3-52.

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

1-2. Maintenance Forms and Records

Equipment maintenance forms and procedures for their use are contained in DA PAM 738-750.

Paragraphs 1-2.1, 1-2.2, and 1-2.3 are added after paragraph 1-2.

1-2.1. Administrative Storage

a. Store equipment to provide maximum protection from the elements and to provide for inspection, maintenance, and exercising. Anticipate removal or deployment problems and take suitable precautions.

b. Take into account environmental conditions such as extreme heat or cold; high humidity, blowing sand, dust, and loose debris; soft ground, mud, and heavy snow; and take adequate precautions.

c. Establish a fire plan and provide adequate fire fighting equipment and personnel.

d. Additional information can be found in TM 740-90-1.

1-2.2. Destruction of Army Material to Prevent Enemy Use

Procedures for destruction of Army materiel to prevent enemy use are explained in TM 750-244-3.

1-2.3. Reporting Equipment Improvement Recommendation (EIR)

EIR's can and must be submitted by anyone who is aware of an unsatisfactory condition with the equipment design or use. It is not necessary to show a new design or list a better way to perform a procedure, just simply tell why the design is unfavorable or why a procedure is difficult. EIR's may be submitted on SF 368 (Quality Deficiency Report). Mail directly to: Commander, US Army Tank-Automotive Command, ATTN: DRSTA-MP, Warren, MI 48090.

Page 2-2. Warning is added after paragraph 2-1c, and after all paragraphs listed below.

WARNING

USING DRYCLEANING SOLVENT

Dry cleaning solvent PD-680, (SD-II), is both toxic and flammable. Avoid prolonged breathing of vapors and avoid skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 138°F (59°C). Serious illness, injury, and loss of life could result.

Page	Paragraph
3-4	3-10.c (1)
3-16	3-26.c (2)
3-19	3-31.b (2)
3-21	3-33.c (2)
3-44	3-58.a
3-49	3-67.c (3)
3-51	3-69.b
3-53	3-70.c
3-58	3-76.c

Page 2-2. Change “(Spec P-S-661)” to read “SD-II” in all paragraphs listed below.

Page	Paragraph	Line
3-4	3-10.c (2)	3
3-16	3-26.c (3)	3

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

3-6. Operator/Crew (PMCS)

a. General.

(1) Do your before (B) PREVENTIVE MAINTENANCE just before you operate the vehicle. Pay attention to the CAUTIONS and WARNINGS.

(2) Do your (D) PREVENTIVE MAINTENANCE during operation. (During operation means to monitor the forklift and its components/systems while they are actually being operated.)

(3) Do your after (A) PREVENTIVE MAINTENANCE right after operating the vehicle. Pay attention to the CAUTIONS and WARNINGS.

(4) Do your weekly (W) PREVENTIVE MAINTENANCE weekly.

(5) Do your monthly (M) PREVENTIVE MAINTENANCE once a month.

(6) If something doesn't work, troubleshoot it with the instructions in your TM 10-3930-621-12, or notify your supervisor.

(7) Always do your PREVENTIVE MAINTENANCE in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

(8) If anything looks wrong and you can't fix it, write it on your DA form 2404. If you find something seriously wrong, report it to Organizational Maintenance RIGHT NOW.

(9) When you do your PREVENTIVE MAINTENANCE, take along the tools you will need to

3-19	3-31.b (3)	2
3-21	3-33.e (3)	2
3-44	3-58.b	3
3-49	3-67.c (4)	2
3-51	3-69.e (1)	2
3-53	3-70.c (1)	2
3-58	3-76.c (1)	2

Page 2-2. Paragraph 2-1e. Warning is added after warning 4.

WARNING

When servicing battery, do not smoke or use flame in vicinity. Batteries generate hydrogen, a highly explosive gas.

Page 3-3. Section III. Preventive Maintenance Checks and Services is superseded as follows:

make all the checks. Take along a rag, you'll always need at least one.

b. Standard Maintenance Checks.

WARNING

Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with skin or clothing is made, flush with water. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

(1) Keep it clean: Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use drycleaning solvent (SD-2) on all metal surfaces. Use soap and water when you clean rubber or plastic material.

(2) Bolts, nuts, and screws: Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around boltheads. If you find one you think is loose, tighten it, or report it to Organizational Maintenance if you cannot tighten it.

(3) Welds: Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to Organizational Maintenance.

(4) Electric wires and connectors: Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.

(5) Hoses and fluid lines: Look for wear, damage, and leaks and make sure clamps and fittings are tight. Wet spots show leaks, of course, but a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to Organizational Maintenance.

(6) It is necessary for you to know how fluid leakage affects the status of your vehicle. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your vehicle. Learn, then be familiar with them and REMEMBER - WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR!

Leakage Definitions for Organizational PMCS

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.

Class III Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

CAUTION

Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor. Exceptions are fuel and brake system, where no leakage is allowable.

When operating with Class I or II leaks, continue to check fluid levels as required in your PMCS.

Class III or fuel and brake system leaks should be reported to your supervisor or organizational maintenance.

(7) Asterisks (*) will be used to identify Make, Model, and Characteristic of the engine on the Forklift Model No. F40-24PS.

(*) Make: Waukesha, Model: FCB-G5943, Characteristic: Oil base air cleaner.

(**) Make: Waukesha, Model: FCB, Characteristic: Air cleaner element.

(***) Make: Teledyne Continental, Model: F163-8554, Characteristic: Air cleaner element (Engine Replacement Kit) MHE: 209.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Servicer

NOTE: Within designated interval, these checks are to be performed in the order listed.

B-Before D-During A-After W-Weekly M-Monthly

Item no.	Interval					Item to be inspected Procedure: Check for and have repaired, filled, or adjusted as needed.	Equipment is not ready/ available if:
	B	D	A	W	M		
1	•					PERFORM WEEKLY (W) AS WELL AS BEFORE (B) OPERATOR PMCS IF: 1. You are the assigned operator and have not operated the vehicle since the last weekly. 2. You are operating the vehicle for the first time. EXTERIOR OF VEHICLE a. Check for leaks or appearance of leaks.	Any Class III or any fuel or brake system leaks.
2	•					b. Visually check overhead guard for bends, damage, and obvious cracks in weldments. ENGINE OIL LEVEL Check oil dipstick; add oil, if needed, to raise level between add and full mark on the dipstick.	Visual cracks in welds, bends, or damage.
3		•				LIGHTS Check that lights are working.	
4		•				BRAKES Check for chatter, rubbing, uneven stopping, pulling, and/or unusual noise.	Service brake will not stop truck.
5		•				STEERING Check that truck steers free and easy.	Steering sticks or truck is hard to steer.
6		•				ACCELERATOR Check that the truck accelerator operates smoothly.	Pedal sticks.
7		•				HYDRAULIC CONTROLS a. Check that lifting and lowering is smooth.	Lifting and lowering jerky or uncontrollable.
8		•				b. Forward and backward tilt is smooth and immediate. INSTRUMENTS Observe the following instrument readings after achieving normal operating temperatures.	Tilt does not operate.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services -Continued

B-Before D-During A-After W-Weekly M-Monthly

Item no.	Interval					Item to be inspected Procedure: Check for and have repaired, filled, or adjusted as needed.	Equipment is not ready/ available if:
	B	D	A	W	M		
9		•				a. Oil pressure gage-	Reading on gages do not fall within specified ranges.
						(1) (*) 15 to 30 PSI	
						(2) (**) 15 to 30 PSI	
						(3) (***) 7 to 40 PSI	
		•				b. Ammeter indicates charge (+) at above idle speed.	
10		•				c. Water temperature gage-	Continuous high rate of charge or discharge or erratic.
						(1) (*) 160° - 180°	
						(2) (**) 160° - 180°	
						(3) (***) 180° - 203°	
		•				d. Transmission temperature gage - (**) 210° and above.	
11						HORN	Operating temperature reading should not exceed 250°.
		•				Check horn by pressing button.	
						RADIATOR	
					•	Check coolant - level should be 1 inch from bottom of fill neck.	
						AIR CLEANER	
12					•	a. Check and clean air cleaner element as necessary. Have Organizational Maintenance replace as required (ref. TM 10-3930-621-12/C2).	Horn inoperative.
						(1) (**) Engine	
						(2) (***) Engine	
						b. Refill oil reservoir to level mark - (*) Engine	
						TIRE	
					•	Check tires for wear, cracks, gouges, and chunking.	Chunking, gouging, or wear that would cause unsafe operating conditions is evident.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services - Continued

B-Before D-During A-After W-Weekly M-Monthly

Item no.	Interval					Item to be inspected Procedure: Check for and have repaired, filled, or adjusted as needed.	Equipment is not ready/ available if:
	B	D	A	W	M		
13						BATTERY	
						<p>WARNING</p> <p>Do not smoke, or allow any flame or spark in the vicinity while checking or filling the battery. The battery generates hydrogen, a highly explosive gas.</p> <p>a. Inspect level of electrolyte. Level should be one-half inch above plates. Add distilled water to split ring, if required (ref. TM 9-6140-200-14).</p> <p>b. Check battery post and terminals for corrosion. If present, notify Organizational Maintenance.</p>	Battery cracked or discharged.
14						HYDRAULIC RESERVOIR	
						<p>Lower mast and have all cylinders retracted. Check reservoir fluid level on dipstick; add oil, if needed, to raise level to FULL mark.</p>	
15						FAN BELT	
						<p>Inspect for loose or frayed condition.</p>	Belt slips, frayed, or missing.
16						TRANSMISSION OIL	
						<p>Check fluid level on dipstick filler cap on axle housing. Add transmission fluid, as necessary, to bring level between add and full mark on dipstick.</p>	Class III leak.

3-7. Organizational (PMCS)

a. General.

(1) Do your (M) PREVENTIVE MAINTENANCE once each month.

(2) Do your (S) PREVENTIVE MAINTENANCE once each 6 months.

(3) Do your (A) PREVENTIVE MAINTENANCE once each year.

(4) Do your (H) PREVENTIVE MAINTENANCE at the hour interval listed.

(5) If something doesn't work, troubleshoot it with the instructions in your TM 10-3930-621-12, or notify your supervisor.

(6) Always do your PREVENTIVE MAINTENANCE in the same order so it gets to be a habit. Once you've had some practice, you'll spot anything wrong in a hurry.

(7) If anything looks wrong and you can't fix it, write it on your DA Form 2404. If you find something seriously wrong, report it to Direct Support Maintenance RIGHT NOW.

(8) When you do your PREVENTIVE MAINTENANCE, take along the tools you will need to make all the checks. Take along a rag; you'll always need at least one.

b. Standard Maintenance Checks.

WARNING

Drycleaning solvent P-D-680 is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with skin or clothing is made, flush with water. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

(1) Keep it clean: Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use drycleaning solvent (SD-2) on all metal surfaces. Use soap and water when you clean rubber or plastic material.

(2) Bolts, nuts, and screws: Check them all for obvious looseness, missing, bent, or broken condition. You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around boltheads. If you find one you think is loose, tighten it, or report it to Direct Support Maintenance if you cannot tighten it.

(3) Welds: Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to Direct Support Maintenance.

(4) Electric wires and connectors: Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.

(5) Hoses and fluid lines: Look for wear, damage, and leaks and make sure clamps and fittings are tight. Wet spots show leaks, of course. But a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, report it to Organizational Maintenance.

(6) It is necessary for you to know how fluid leakage affects the status of your vehicle. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your vehicle. Learn, then be familiar with them and REMEMBER - WHEN IN DOUBT, NOTIFY YOUR SUPERVISOR!

Leakage Definitions for Crew/Operator PMCS

- | | |
|-----------|--|
| Class I | Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops. |
| Class II | Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected. |
| Class III | Leakage of fluid great enough to form drops that fall from the item being checked/inspected. |

CAUTION

Equipment operation is allowable with minor leakages (Class I or II). Of course, consideration must be given to the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor. Exceptions are fuel and brake system, where no leakage is allowable.

When operating with Class I or II leaks, continue to check fluid levels as required in your PMCS.

Class III or fuel and brake system leaks should be reported to your supervisor.

(7) Asterisks (*) will be used to identify Make, Model, and Characteristic of the engine on the Forklift Model No. F40-24PS.

- (*) Make: Waukesha, Model: FCB-G5943, Characteristic: Oil base air cleaner.
- (**) Make: Waukesha, Model: FCB, Characteristic: Air cleaner element.
- (***) Make: Teledyne Continental, Model: F163-8554, Characteristic: Air cleaner element (Engine Replacement Kit), MHE: 209.

Table 3-1.1. Organizational Preventive Maintenance Checks and Services

A-Annually

S-Semiannually

H-Hours

Item no.	Interval			Item to be inspected Procedure: Check for and repair, fill, or adjust as necessary.
	A	S	H	
				<p>NOTE</p> <p>Perform Operator/Crew PMCS prior to or in conjunction with Organizational PMCS if:</p> <p>a. There is a delay between the daily operation of the equipment and the Organizational PMCS.</p> <p>b. Regular operator is not assisting/participating.</p>
1			250	<p>ENGINE OIL</p> <p>Drain oil and replace engine oil filter. Refill with enough oil to bring oil level between add and full mark on dipstick (ref. LO 10-3930-621-12)</p>
2			250	<p>FUEL FILTERS</p> <p>Clean bowl and element.</p>
3			250	<p>ENGINE TUNE-UP</p> <p>a. Adjust or replace ignition points - point gap should be:</p> <p>(1) (1) Engine - 0.022 inch</p> <p>(2) (**) Engine - 0.022 inch</p> <p>(3) (***) Engine - 0.020 inch</p> <p>b. Check spark plugs and replace as necessary (gap should be 0.025 inch).</p> <p>c. Clean PCV valve and breather.</p> <p>d. Check timing of engine (ref. paragraph 3-44).</p>
4			250	<p>FAN BELTS</p> <p>Check belts for proper tension. Should be one-half to three-quarter inch deflection at point midway between pulleys; approximately 10 lb of force.</p>
5			250	<p>BATTERY</p> <p>Check specific gravity and charge as necessary. Clean terminals and ensure all connections are tight. Inspect battery for corrosion (ref. TM 9-6140-200-14).</p>
6			250	<p>BRAKE MASTER CYLINDER</p> <p>Check level of fluid. Fluid should be filled to the proper level (three-eighths to one-half inch from top).</p>
7			250	<p>STEERING AND AXLE ASSEMBLY</p> <p>Lubricate/check steering mechanism to ensure it operates freely without binding (ref. LO 10-3930-621-12).</p>

Table 3-1.1. Organizational Preventive Maintenance Checks and Services - Continued

Item no.	Interval			Item to be inspected Procedure: Check for and repair, fill, or adjust as necessary.
	A	S	H	
8			250	ACCELERATOR PEDAL AND LINKAGE Lubricate lever and linkage to ensure smooth operation (ref. LO 10-3930-621-12).
9			250	TILT CYLINDERS Lubricate pivot points (ref. LO 10-3930-621-12).
10			250	MAST ASSEMBLY a. Lubricate sliding and roller contact surfaces.
			250	b. Clean and inspect chains for signs of wear, damage, or excess stress, and then lubricate the chain.
11			500	HYDRAULIC OIL TANK BREATHER Clean breather. Replace if damaged or unserviceable.
12			500	BRAKE PEDAL ADJUSTMENT Adjust brake pedal free play (ideal free play is one-half inch).
13			500	SERVICE BRAKE a. Inspect brake shoes and replace as necessary (linings less than one-eighth inch).
			500	b. Inspect wheel cylinder for leaks, cracks, or damage.
14			500	ELECTRICAL SYSTEM Check tightness of terminals, wires, and electrical components. Check for and have any broken wires replaced.
15			500	HOSES, TUBES, AND FITTINGS Inspect, replace, or have replaced if necessary. Correct any leaks that are evident.
16			500	WHEELS a. Check teeth on bull gear inside wheel for damage.
			500	b. Inspect brakedrum for cracks, flat spots, and damage.
			1000	c. Clean and lubricate wheel bearings (ref. LO 10-3930-621-12).
17			1000	TRANSMISSION Drain oil and replace transmission oil filter. Refill with oil to bring fluid level up to FULL mark on dipstick (ref. LO 10-3930-621-12).
18			1000	DIFFERENTIAL Drain oil and refill (ref. LO 10-3930-621-12).

Table 3-1.1. Organizational Preventive Maintenance Checks and Services - Continued

Item no.	Interval			Item to be inspected Procedure: Check for and repair, fill, or adjust as necessary.
	A	S	H	
19			1000	HYDRAULIC RESERVOIR Drain hydraulic oil and replace filter. Refill reservoir to bring level between add and full mark on dipstick (ref. LO 10-3930-621-12).
20	•			RADIATOR Check coolant for antifreeze and corrosion protection and inspect coolant system for heavily rusted or partially clogged cooling system (ref. TB 750-651).

Page 3-8. In Table 3-2 Troubleshooting (continued), items 4.e and 5.g in Probable Cause and Corrective Action columns are rescinded.

Page 3-9. In Table 3-2 Troubleshooting - Continued, item 9.b in Probable Cause and Corrective Action columns is rescinded.

Page 3-10. In Table 3-2 Troubleshooting - Continued, line 26 is added as follows:

Malfunction	Probable cause	Corrective action
26. Excessive backlash in drive unit.	Loss or worn propeller shaft cross assembly.	Tighten or replace (para x-x).

Page 3-12. Paragraph 3-24 is rescinded.

Page 3-13. Figure 3-7 is rescinded.

Page 3-14. Figure 3-8 is rescinded.

Paragraph 3-25 is rescinded.

Page 3-15. Figures 3-9, 3-10, and 3-11 are rescinded.

Page 3-24. Paragraph 3-37.G line 2 "(FSN 6850-281-1989)" is changed to read "(NSN 6850-00-753-4967)".

Paragraph 3-38a. In line 2, add word "page" before 3-23.

Page 3-42. Section XIV is rescinded.

Page 3-43. Figures 3-48 and 3-49 are rescinded.

Page 3-42, fig. 3-47. Paragraphs 3-54.1 and 3-54.2 are added after Figure 3-47 as follows:

3-54.1. General

a. Description. Inching operation is controlled by the inching pedal. The pedal is installed on the

same shaft as the brake pedal and is connected to an actuating rod. The rod actuates the inching valve plunger located in the transmission control valve assembly. The transmission and braking function are combined to provide simultaneous transmission disengagement and position braking.

3-54.2. Inching Control

a. Removal. Refer to figure 3-47.1 and remove inching pedal as follows:

- (1) Remove floor plates and toe plates.
- (2) Remove inching plate assembly (1).
- (3) Remove cotter pin and clevis pin and disconnect master cylinder from brake pedal shaft, fig. 3-51.1.
- (4) Disconnect inching pedal spring (9) and brake pedal spring (4).
- (5) Holding pin (8) and spring (9) in a compressed position, depress treadle assembly slightly and carefully slide pin (8) and spring (9) from sleeve (10).
- (6) If necessary, remove sleeve (10) from transmission inching valve.
- (7) Remove screw (11, fig. 3-51.1), holding pedal shaft in position and screw (12) and lockwasher (11). Install 3/8-24 x 1 1/2 inch screw in tapped hole in end of shaft.
- (8) Remove bracket (13).
- (9) Holding inching treadle assembly (20) and brake pedal assembly (16, fig. 3-51.1) in position and, using screw installed in end of pedal shaft (10), pull pedal shaft out from steering support bracket.

(10) Slowly remove inching treadle assembly (20) and brake pedal assembly (16, fig. 3-51.1) from shaft (10, fig. 3-51.1).

(11) Remove adjusting nut (7) and setscrew (6) and lubrication fitting (4) from treadle assembly (20). If adjusting nut (7) is to be removed from setscrew (6), mark location for proper assembly.

b. Cleaning and Inspection. Clean and inspect all parts as follows:

(1) Clean all parts with cleaning compound, solvent SD-II. Dry thoroughly with compressed air.

(2) Inspect bearings (5) and shaft for excessive wear.

(3) Inspect treadle assembly (20) for cracks, deformation, or other damage.

(4) Replace damaged or worn parts as authorized.

c. Installation. Refer to figure 3-47.1 and install inching pedal as follows:

(1) Install lubrication fitting (4) and adjusting nut (7) and setscrew (6) in treadle assembly (20). If adjusting nut (7) was removed from setscrew (6), not disassembly mark and install nut (7) on setscrew (6).

(2) Install screw in end of pedal shaft.

(3) Install brake pedal assembly (16, fig. 3-51.1) and treadle assembly (20) on pedal shaft (10, fig. 3-51.1). Using setscrew installed in end of pedal shaft, press shaft through steering support bracket.

(4) Using screw installed in end of pedal shaft (10, fig. 3-51.1), align support brackets and pedal shaft holes. Remove screws from end of shaft.

(5) Install bracket (13) and secure to shaft with setscrew (12) and lockwasher (11). Secure end of shaft with screw (11, fig. 3-51.1) and lockwasher (12, fig. 3-51.1).

(6) If previously removed, install sleeve (10) in transmission inching valve.

(7) Depress treadle assembly (20) slightly and install spring (9) and pin (8) in sleeve (10).

(8) Connect inching pedal spring (19) and brake pedal spring (4, fig. 3-51.1).

(9) Install master cylinder clevis on pedal shaft and secure with clevis pin and cotter pin.

(10) Install plate assembly (1).

(11) Install toe plates and floor plates.

d. Adjusting. Refer to figure 3-47.2 and adjust inching control as follows:

(1) Remove toe plate and floor plate.

(2) Check to be sure that inching plunger is completely bottomed and that inching pedal stop prevents inch pedal plunger from piercing back of control valve before making any adjustment.

(3) Adjust return spring to length specified in fig. 3-47.1. If the toe plate touches the return spring, the spring anchor (17, fig. 3-47.1) must be moved one bolt down on transmission housing.

(4) Adjust inching pedal stop so plunger spring is compressed to 0.09-0.12 inch.

(5) With brake pedal against the brake pedal stop, set adjusting screw for 0.06-0.25 inch gap between brake pedal lug and lock.

(6) To check adjustment, raise drive wheels off floor and bring the engine to a high idle. Shift into forward and reverse. The inching pedal plunger should not move forward. If it does, repeat operations 4 and 5 above.

(7) To check transmission output, engine should approach stall when parking brake is locked, throttle is at low idle, and transmission is in gear.

Page 3-46, paragraph 3-62a. The following paragraphs are added after paragraph 3-62a.

b. Removal. Refer to paragraph 3-54.2 for removal procedures of brake pedal assembly (15, fig. 8-3).

c. Disassembly. Refer to figure 3-51.1 and disassemble brake pedal assembly (15) as follows:

(1) Remove nut (6), lockwasher (7), and pedal pad (8).

(2) Remove lubrication fitting (9).

(3) Remove bearing (17) from pedal (16).

(4) Remove steering gear support (21), brake pedal stop (3), and shaft support (13) only if necessary for repair or replacement.

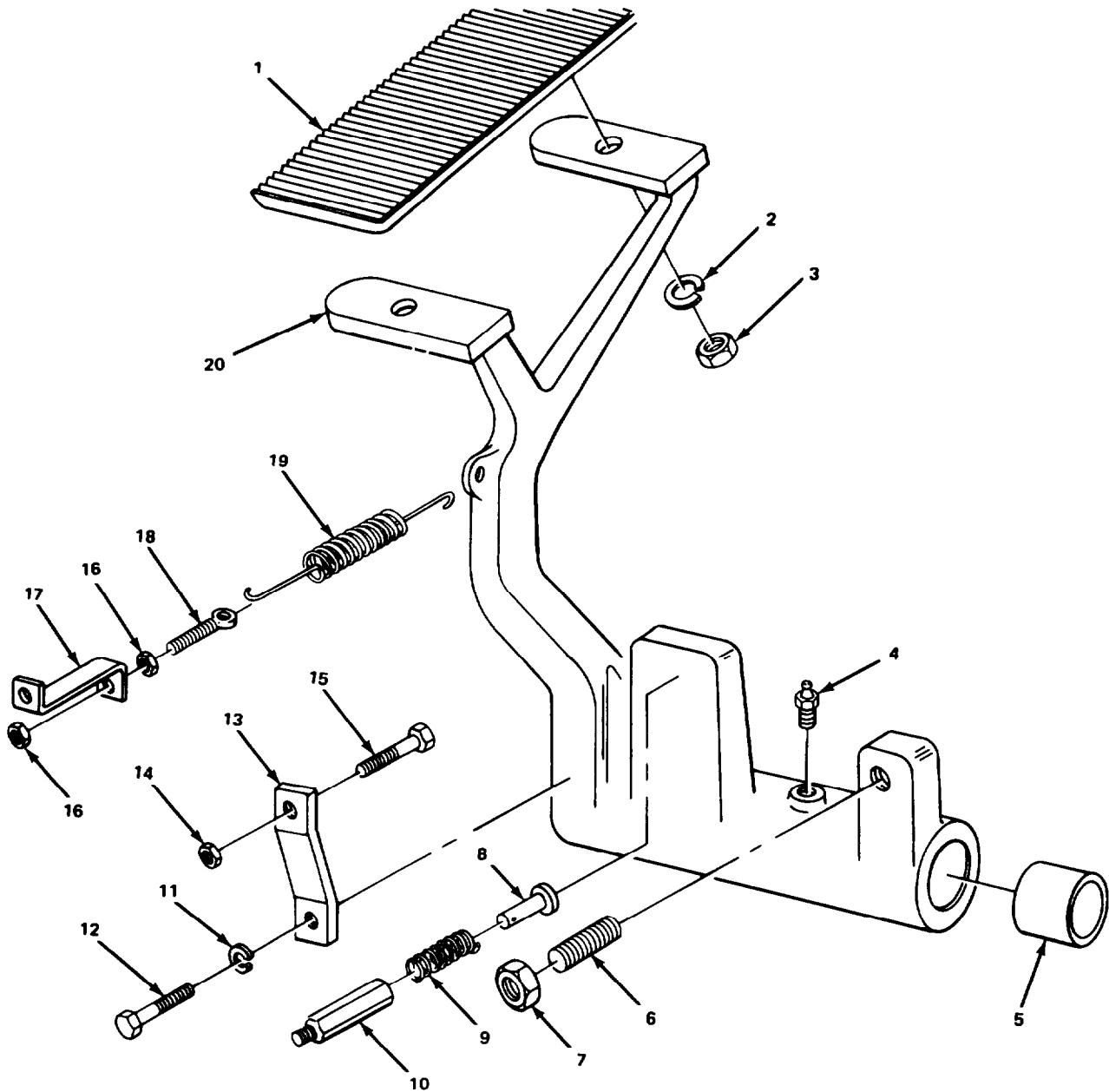
d. Inspection. Inspect all parts for damage or wear. Replace defective parts as authorized.

e. Assembly. Refer to figure 3-51.1 and assemble brake pedal as follows:

(1) Press bearing (1) into pedal (16).

(2) Install lubrication fitting (9).

(3) Install pedal pad (8) with lockwashers (7) and nut (6).



KEY TO FIG. 6-12:

- | | | |
|------------------------|-----------------|----------------------|
| 1. PLATE ASSEMBLY | 8. PIN | 15. SCREW |
| 2. LOCK WASHER | 9. SPRING | 16. NUT |
| 3. NUT | 10. SLEEVE | 17. ANCHOR |
| 4. LUBRICATION FITTING | 11. LOCK WASHER | 18. EYEBOLT |
| 5. BEARING | 12. SCREW | 19. SPRING |
| 6. SETSCREW | 13. BRACKET | 20. TREADLE ASSEMBLY |
| 7. NUT | 14. NUT | |

TA221223

Figure 3-47.1. Inching Pedal, Exploded View.

f. Installation. Refer to paragraph 3-54.2 for installation procedures of brake pedal assembly.

Paragraph 3-62b is changed to read "3-62f".

Page 3-47. Warning is added after paragraph 3-64.

WARNING

When working on the brake system or asbestos fiber pad removal, use the wet process only. The wet process involves the use of running water to rinse away asbestos dust. Using compressed air to remove asbestos creates dust extremely dangerous to your health. Inhaled asbestos dust is carcinogenic and remains permanently in your breathing system.

Page 4-1 Paragraph 4-1b. line 2 "MIL-STD-162A." is changed to read "MIL-STD-162E".

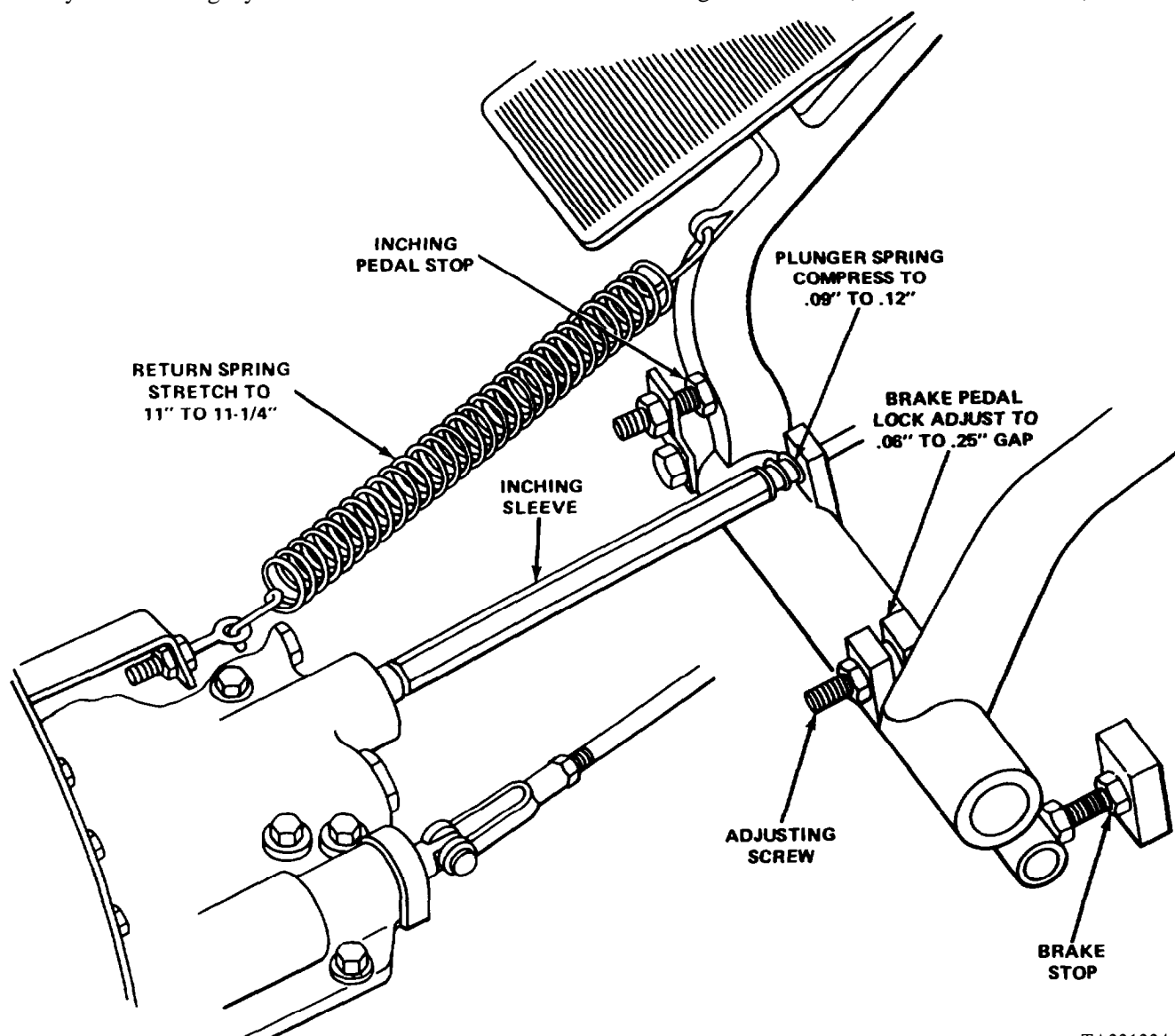
Paragraph 4-3a.(1) line 3 "(FSN 7510-269-8090)" is changed to read "(NSN 7510-00-269-8090)".

Paragraph 4-3e. (2) line 3 "MIL-STD-162A and Specification MIL-E-10062A" to read "MIL-STD-162E and Specification MIL-E-10062E".

Paragraph 4-3d (3A) "FSN-8010-161-7419)" is changed to read "(NSN 8010-00-161-7419)".

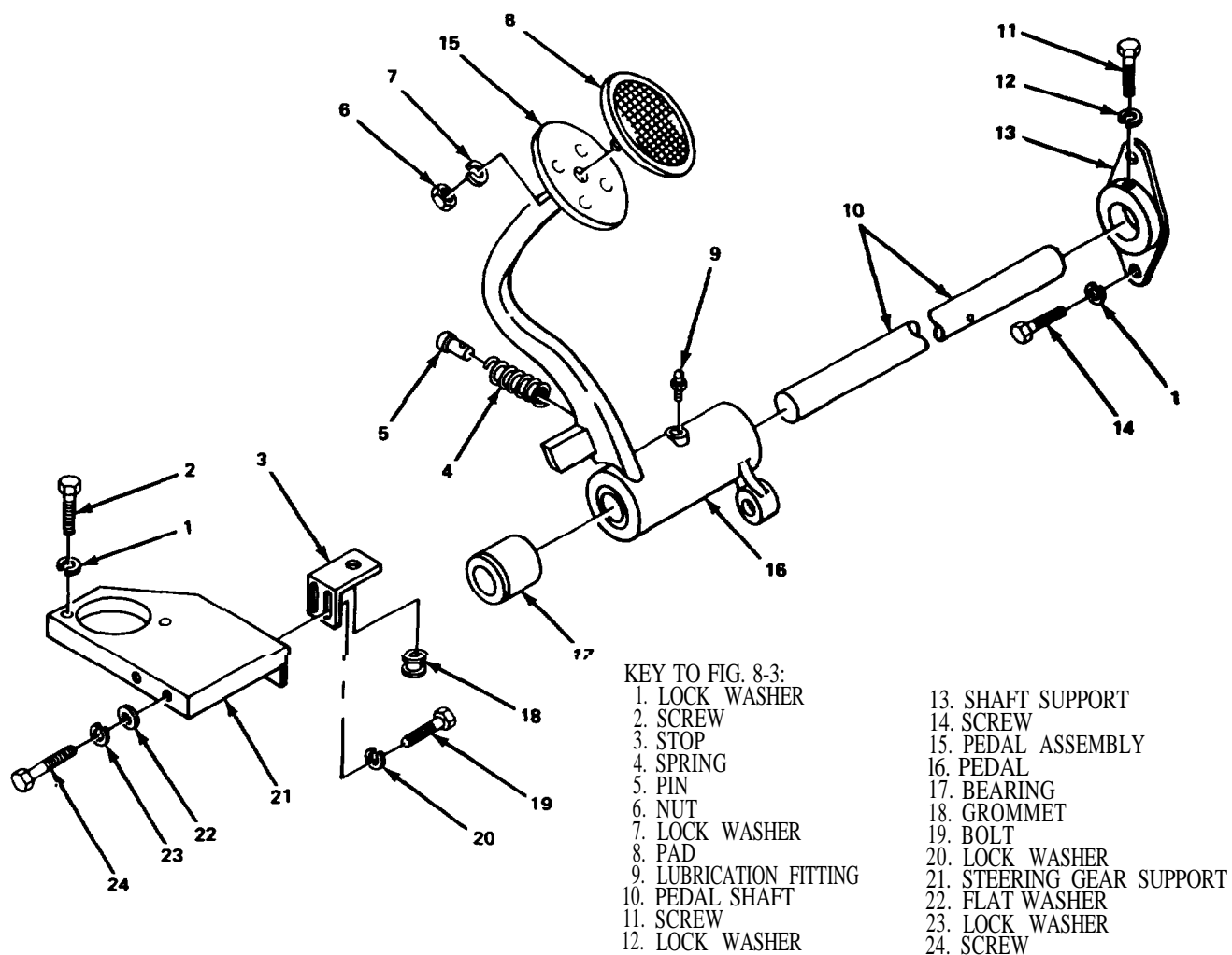
Paragraph 4-3d. (3b) line 3 "(FSN's 8010-286-7758, 8010-527-2045, and 8010-616-7488)" is changed to read "(NSN's 8010-00-286-7758, 8010-00-527-2045, and 8010-00-616-7488)".

Paragraph 4-4b (1) line 2 "(for 15 to .20 minutes)" is changed to read "(for 15 to 20 minutes)".



TA221224

Figure 3-47.2. Inching Control Adjustment.



TA221225

Figure 3-51.1. Brake Pedal and Associated Parts, Exploded View.

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

APPENDIX A REFERENCES

A-1. Fire Protection

Hand Portable Fire Extinguisher Approved for Army Use. TB 5-4200-200-10

A-2. Lubrication

Fuels, Lubricants, Oils and Waxes. C9100-IL
Lubrication Order. LO 10-3930-621-12

A-3. Painting

Painting Instructions for Field Use TM 43-0139

A-4. Maintenance

Use of Antifreeze Solution and Cleaning Compounds in Engine
Cooling Systems TB 750-651
The Army Maintenance Management System (TAMMS) DA PAM 738-750
Operator's, Organizational, Direct and General Support Maintenance
Manual for Lead Acid Storage Batteries TM 9-6140-200-14

A-5. Shipment and Storage

Preservation of USAMECOM Mechanical Equipment for Shipment
and Storage. TB 740-97-2
Administrative Storage of Equipment. TM 740-90-1

A-6. Destruction of Army Materiel to Prevent Enemy Use

Destruction of Army Materiel to Prevent Enemy Use TM 740-90-3

A-7. Occupational and Environmental Health Hearing

Conservation. TB MED501

Page B-1. Paragraph B-3a (3b) "Federal Stock Number" is changed to read "National Stock Number".

Page B-2. Paragraph B-4b "Federal Stock Number" is changed to read "National Stock Number".

Page B-3. Section II Basic Issue Items column (2) "Federal Stock Number" is changed to read "National Stock Number".

Page B-2. Paragraph B-4 is superseded as follows:

B-4. Explanation of Columns in the Expendable Supplies and Materials List - Section III

a. Column 1, Item Number. A numerical listing of all materials and supplies.

b. Column 2, Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Organizational Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. Column 3, National Stock Number. This is the number assigned to the item; use it to request or requisition the item.

d. Column 4, Description. Indicates the Federal name and, if required, a description to identify the item. The last line of each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column 5, Unit of Measure (U/M). Indicates the unit of measure used in performing the actual maintenance function. If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Page B-4. Section III is superseded as follows:

Section III. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item number	(2) Level	(3) National stock number	(4) Description	(5) U/M
1	0	9150-00-190-0904 9150-00-190-0905 9150-00-190-0907	GREASE, GAA, AUTOMOTIVE AND ARTILLERY (81349) MIL-G-10924 1-lb can 5-lb can 35-lb can	oz. oz. oz.
2	0	9150-00-186-6668 9150-00-191-2772	OIL, LUBRICATING, ENGINE (81349) MIL-L-2104C OE/HDO 10 - 5-gal. can OE/HDO 10 - 55-gal. drum	qt qt
3	0	9150-00-402-2372	OIL, LUBRICATING, ENGINE, ARCTIC (81349) MIL-L-46167 OEA - 5-gal. can	qt
4		9150-00-035-5392 9150-00-035-5393 9150-00-035-5394 9150-00-035-5395 9150-00-035-5396 9150-00-035-5390 9150-00-035-5391	OIL, LUBRICATING, GEAR (81349) MIL-L-2105C 80W/90 - 1-quart can 80W/90 - 5-gallon can 80W/90 - 55-gallon drum 85W/140 - 5-gallon can 85W/140 - 55-gallon drum 75W - 1-quart can 75W - 5-gallon drum	pt pt pt pt pt pt pt
5			BRAKE FLUID, SILICONE, AUTOMOTIVE (81349) MIL-B-46176 1-gallon (metal container) 1-gallon (plastic container)	oz. oz.
6	0	6850-00-181-7929 6850-00-181-7933 6810-00-249-9354 6850-00-246-9038	COOLANT, 50/50 ETHYLENE GLYCOL/WATER (81349) MIL-A-46153 1-gallon can 5-gallon can SULFURIC ACID, ELECTROLYTE (96906) MIL-STD-605 1-gallon container SOLVENT, DRYCLEANING (81348) FED. SPEC. P-D-680 5-gallon can	qt qt gl gl

Page C-1. Appendix C Maintenance Allocation Chart is superseded as follows:

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-1. General

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

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance function on the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

C-2. Maintenance Functions. Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (including decontaminate, when required), preserve, drain, paint, or replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Aline. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause correction to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons 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.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a space, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the third position of the SMR code.

i. Repair. The application of maintenance service¹, including fault location/troubleshooting², removal/installation, disassembly/assembly³ procedures, and maintenance actions⁴ to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

¹Service - inspect, test, service, adjust, aline, calibrate, and/or replace.

²Fault location/troubleshooting - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

³Disassembly/assembly - encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least component identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.

⁴Action - welding, grinding, riveting, straightening, facing, remachining, and/or resurfacing.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publication (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

C-3. Explanation of Columns in the MAC, Section II

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00".

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Function. Column 3 lists the function to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph C-2).

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a worktime figure in the appropriate subcolumns, the category of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the task within the listed maintenance function vary at different maintenance categories, appropriate worktime figures will be shown for each category. The worktime figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition

under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time, troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform a specific task identified for the maintenance functions authorized in the maintenance allocation chart. 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

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetical order, which shall be keyed to the remarks contained in Section IV.

C-4. Explanation of Columns in Tool and Test Equipment Requirements, Section III

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

C-5. Explanation of Columns in Remarks, Section IV

a. Column 1, Reference Code. The code recorded in column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

**Section II. MAINTENANCE ALLOCATION CHART
FOR
MHE 209 AND MHE 224**

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category					(5) Tools and eqpt	(6) Remarks
			C	O	F	H	D		
01	ENGINE								
0100	ENGINE ASSEMBLY	Inspect	0.3						
		Test		1.0					
		Service	0.4						
		Replace			8.0				
		Repair			6.0	12.0			
		Overhaul				28.0			
0101	Block Assembly, Short	Replace			8.0				
		Repair			12.0				
	Cylinder Head	Replace			2.5				
0102	Crank Shaft	Replace				12.0			
0103	Flywheel Assembly	Replace			1.0				
		Repair				1.0			
0104	Pistons and Connecting Rods	Replace				4.0			
		Repair				2.0			
0105	Camshaft	Replace				8.0			
	Valves, Engine	Adjust			1.0				
		Replace			5.5				
		Repair			2.0				
	Timing Gear	Replace				X			
0106	Engine Lubricating System								
	Oil Filter	Replace		0.2					
	Breather	Test	0.1						
		Replace		0.1					
	PCV Valve	Test	0.1						
		Replace		0.2					
	Oil Pan	Replace			1.0				
	Oil Pump	Replace			2.0				
		Repair			2.0				
0108	Manifold	Replace		1.0					
03	FUEL SYSTEM								
0301	Carburetor	Adjust		0.5					
		Replace		1.0					
		Repair			2.0				
0302	Fuel Pump	Test		0.3					
		Replace		0.5					
		Repair		0.5					
0304	Air Cleaner and Indicator	Inspect	0.1						
		Service		0.2					
		Replace		0.2					
0306	Fuel Tank	Service	0.1						
		Replace		0.4					
		Repair			1.5				

**Section II. MAINTENANCE ALLOCATION CHART
FOR
MHE 209 AND MHE 224**

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category					(5) Tools and eqpt	(6) Remarks
			C	O	F	H	D		
0308	Engine Speed Governor Control	Adjust Replace		0.2	0.5				
0309	Fuel Filter	Service Replace		0.3 0.3					
0312	Accelerator Pedal and Linkage	Adjust Replace	0.6	0.8					
	Choke Control Assembly	Replace		0.5					
04	EXHAUST SYSTEM								
0401	Muffler and Pipes			1.0					
05	COOLING SYSTEM								
0501	Radiator	Inspect Service Replace Repair	0.1 0.2	1.0		2.0			
0503	Thermostat	Test Replace		0.5 0.5					
	Radiator Hoses	Inspect Replace	0.1	0.4					
0504	Water Pump	Inspect Replace	0.1	0.4					
0505	Fan Belt	Inspect Adjust Replace	0.1	0.2 0.5					
06	ELECTRICAL SYSTEM								
0601	Alternator Generator	Test Replace Repair		0.5 0.5	2.0				
0602	Voltage Regulator	Test Adjust Replace		0.3 0.3 0.3					
0603	Starter Solenoid Relay	Replace		0.2					
	Starter, Engine	Test Replace Repair		0.3 0.6	1.5				
0605	Distributor	Adjust Replace Repair		0.3 0.5 0.3	1.0				
	Ignition Coil	Test Replace		0.2 0.3					
	Cable Set	Replace		0.5					
	Spark Plug	Adjust Replace		0.3 0.5					
0607	Instrument Panel	Replace Repair		1.0 1.0					

**Section II. MAINTENANCE ALLOCATION CHART
FOR
MHE 209 AND MHE 224**

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category					(5) Tools and eqpt	(6) Remarks
			C	O	F	H	D		
0608	Fuses and Related Parts	Replace		0.2					
	Stoplight Pressure Switch	Replace		0.2					
0609	Lights	Replace		0.4					
		Repair		0.4					
0610	Fuel, Oil, Temperature	Replace		0.4					
0611	Horn Button Assembly	Test	0.1						
		Replace		0.5					
	Horn	Test	0.1						
		Replace		0.5					
0612	Battery, Storage	Test	0.1						
		Service		0.3					
		Replace		0.3					
0613	Wiring Harness	Replace		2.5					
		Repair		2.0					
07	TRANSMISSION								
0705	Gearshift Assembly	Adjust		0.5					
		Replace			2.0				
	Torque Converter	Repair			0.5				
0710	Transmission	Test							
		Service							
		Replace			8.0				
		Repair			6.0	12.0			
		Overhaul				16.0			
0713	Clutch Assembly Forward and Reverse	Replace				4.0			
		Overhaul				4.0			
0714	Transmission Valve Assembly	Replace			1.0				
		Repair			1.0				
0721	Transmission Oil	Replace		0.2					
	Transmission Oil Cooler Lines	Replace		1.5					
	Transmission Converter Pump	Replace			1.0				
		Repair			1.5				
0726	Brakes, (Special)	Replace			0.5				
09	PROPELLER SHAFTS								
0900	Propeller Shaft	Replace			1.0				
		Repair			1.0				
10	FRONT AXLE								
1000	Drive Axle Housing and Shaft	Replace			2.0				
		Repair			3.0				
1002	Differential Assembly	Service		0.3					
		Replace			4.0				
		Repair				4.0			

**Section II. MAINTENANCE ALLOCATION CHART
FOR
MHE 209 AND MHE 224**

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category					(5) Tools and eqpt	(6) Remarks
			C	O	F	H	D		
11 1104	REAR AXLE Steering Axle	Service Replace Repair		0.4	2.0 2.0				
12 1201	BRAKES Handbrake Lever and Linkage	Test. Adjust Replace Repair	0.1 0.1	0.7 0.3					
	Handbrakes	Inspect Replace Repair		0.2	1.0 0.8				
1202	Service Brakes	Inspect Replace Repair		0.2 1.0	1.0				
1204	Wheel Cylinder Assembly	Replace Repair		1.0					
	Master Cylinder	Service Replace Repair		0.1 1.0	0.3				
	Lines and Fittings (Hydraulic)	Replace Repair			1.0 1.0				
1206	Brake Pedal Assembly	Adjust Replace Repair		0.2 0.5 0.5					
13 1311	WHEELS Wheel Assembly, Steering	Replace Repair		1.2		1.7			
	Wheel Assembly, Drive	Replace Repair		1.2		1.7			
	Bearing Sand Seals	Service Replace		0.2 0.2					
	Bull Gear	Service Replace		0.2 0.2					
	Tires, Solid Rubber	Inspect Replace	0.2		1.7				
14 1401	STEERING Steering Wheel Steering Gear	Replace Replace Repair			2.0 4.0	2.0			
1412	Power Steering Cylinder	Inspect Replace Repair	0.1	1.0	2.0				

**Section II. MAINTENANCE ALLOCATION CHART
FOR
MHE 209 AND MHE 224**

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category					(5) Tools and eqpt	(6) Remarks
			C	O	F	H	D		
15	FRAME, TOWING ATTACHMENTS, AND DRAWBARS								
1501	Frame	Replace		4.0					
1502	Counterweights	Replace	0.7						
1503	Pintles and Towing Attachment								
	Towing Shackle	Replace		0.3					
18	BODY, CAB, AND HOOD ASSEMBLY								
1801	Overhead Guard	Replace		0.7					
		Repair			1.0				
	Side Panels and Seat Support	Replace		1.5					
	Cowls	Replace		1.5					
	Fenders	Replace			1.5				
1805	Floor and Toe Plate	Replace		1.0					
1806	Seat	Adjust	0.1						
		Replace		0.5					
		Repair		0.5					
24	HYDRAULIC AND FLUID SYSTEMS								
2401	Hydraulic Pump	Test			0.5				
		Replace			1.0				
		Repair			2.0				
	Mounting Plate	Replace			1.0				
2402	Hydraulic Control Valve	Adjust			1.0				
		Replace			1.0				
		Repair			2.0				
2403	Hydraulic Control Lever	Replace			1.0				
		Repair			1.0				
2404	Tilt Cylinder	Service		0.2					
		Adjust		0.3					
		Replace		0.5					
		Repair			1.5				
2405	Lifting Fork	Replace		0.5					
	Backrest	Replace			1.0				
	Carriage Frame	Replace			1.0				
	Mast Assembly	Service		0.3					
		Adjust			0.7				
		Replace			2.0				
		Repair			1.0				
	Lift Cylinder Cluster	Replace			1.0				
		Repair			2.0				
	Lift Chains	Service		0.2					
		Adjust		0.5					
		Replace		0.5					

**Section II. MAINTENANCE ALLOCATION CHART
FOR
MHE 209 AND MHE 224**

(1) Group number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance category					(5) Tools and eqpt	(6) Remarks
			C	O	F	H	D		
2406	Hydraulic Fluid Filter	Service Replace		0.1 0.3					
	Hydraulic Lines and Fittings	Inspect Replace Repair	0.2		X X				
2408	Hydraulic Fluid Reservoir	Service Replace	0.2		0.7				
47	GAGES, WEIGHING, AND MEASURING DEVICES								
4702	Transmission Temperature Indi- cators (Model MHE 224)	Replace		0.5					

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

Tool or test equipment ref code	Maintenance category	Nomenclature	National stock number	Tool number
---------------------------------------	-------------------------	--------------	--------------------------	----------------

Section IV. REMARKS

Reference code	Remarks
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Page I-1, Index. The following changes are made in the index.

Page I-1 A, line 19. "Valves, paragraph 3-25, page 3-14" is rescinded.

A, line 22, Alternator. After line 22, "Administrative storage, paragraph 1-2.1, page 1-1" is added.

B, line 8, Service brake pedal and linkage. After line 8 "Brake pedal assembly, paragraph x-x, page x-xx" is added.

C, line 6. "Cylinder head, paragraph 3-24, page 3-12" is rescinded.

Page I-2 D, line 2, Description. After line 2, "Destruction of Army material to prevent enemy use, paragraph 1-2.2, page 1-1" is added.

M, line 2, Maintenance and operating supplies. After line 2, "Maintenance forms and records, paragraph 1-2, page 1-1" is added.

Page I-3 P, line 7. "Propeller shaft, paragraph 3-56, page 3-42" is rescinded.

R, line 7. "Record and report forms, paragraph 1-2, page 1-1" is rescinded.

R, line 11. "Rear light, combination" is changed to read "Rear light, combination".

R, line 12, Rear Wheel. After line 12, "Reporting equipment improvement recommendations (EIR), paragraph 1-2.3, page 1-1" is added.

Page I-4 V, line 2, "Valves, timing, and adjustment, paragraph 3-25, page 3-14" is rescinded.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25A (Block No. 893), Operator requirements for Warehouse Equipment.

CHANGE }
No. 3 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 22 March 1974

Operator and Organizational Maintenance Manual

**TRUCK, LIFT, FORK; GED; SOLID RUBBER TIRED WHEELS; 4000 LB
CAPACITY; 180 IN LIFT (ARMY MODEL MHE 209)
ALLIS-CHALMERS MODEL F40-24PS FSN 3930-459-5948)
100 IN. LIFT (ARMY MODEL MHE 224)
ALLIS-CHALMERS MODEL F40-24PS100, FSN 3930-165-4102**

TM 10-3930-621-12, 5 August 1970, 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. Subparagraph d is superseded as follows:

d. The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded 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 2-5. 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.

Page A-1, paragraph A-5. Add the following reference: "TB MED 251, Noise and Conservation of Hearing".

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 States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25A (qty rqr block No. 893) Operator's Maintenance requirements for Warehouse Equipment.

*U.S. GOVERNMENT PRINTING OFFICE: 1974-768116/1311

Changes in force: C1 and C2

**TM 10-3930-621-12
C 2**

Change }
No. 2 }

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, D.C., 19 April 1972

**Operator And Organizational Maintenance Manual
TRUCK, LIFT, FORK, GED, SOLID RUBBER TIRED WHEELS,
4000 LB CAPACITY, 180 IN. LIFT (ARMY MODEL MHE 209)
ALLIS CHALMERS MODEL F40-24PS, FSN 3930-459-5948;
100 IN. LIFT (ARMY MODEL MHE 224)
ALLIS CHALMERS MODEL F40-24PS100,
FSN 3930-165-4102**

TM 10-3930-621-12, 5 August 1970, is changed as follows:

Cover. The nomenclature is changed to read as shown above.

Page i. The nomenclature is changed to read as shown above.

Page i. In Table of Contents, "Appendix B. Basic Issue Items ***" is changed to read "Appendix B. Basic Issue Items List and items troop installed or authorized".

Page ii. All changes and additions to illustration numbers and titles should be appropriately reflected in the List of Illustrations.

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

a. These instructions are published for the use of personnel to whom the Allis-Chalmers Fork Lift Trucks, Model F40-24PS (Army Model MHE-209) and Model F40-24PS100 (Army Model MHE-224) are

issued. They provide information on the operation and organizational maintenance of the equipment. Included in the manual are descriptions of the main units and their functions in relation to other components. Page 1-1. Paragraph 1-4a is superseded as follows:

a. The Army Model MHE-209 (Allis-Chalmers Model F40-24PS) and Army Model MHE-224 (Allis-Chalmers Model F40-24PS100) are nontactical fork lift trucks (fig. 1-1, 1-1.1, 1-2, and 1-2.1) designed for warehouse operation. The trucks can be used to load, transport, unload, and stack loads weighing as much as 4,000 pounds at a 24 inch load center. (The load center is measured from the heel of the fork).

Page 1-2. In figure 1-1, all shipping dimensions are rescinded.

Page 1-2. Caption of figure 1-1 is superseded as follows:

TM 10-3930-621-12

C 2

Figure 1-1. Fork lift truck, right side view (Army Model MHE-209).

Page 1-2. Figure 1-1.1 is added after figure 1-1.

Page 1-2. Caption of figure 1-2 is superseded as follows:

Figure 1-2. Fork lift truck, left side view (Army Model MHE-209).

Page 1-2. Figure 1-2.1 is added after figure 1-2.

Page 1-3. Paragraph 1-4b is superseded

as follows:

b. Loads weighing up to 4,000 pounds, as described above, can be lifted by both models. The Army Model MHE-209 utilizes a three-section mast which permits loads to be lifted to a height of 180 inches. Army Model MHE-224 is equipped with a two-section mast which allows loads to be lifted to a height of 100 inches.

Page 1-3. Paragraph 1-5 is superseded as follows:

1-5. Tabulated Data

a. Capacities.

	Model MHE-209	Model MHE-224
Cooling system	10 qt.	10 qt.
Crankcase (with filter)	5 qt.	5 qt.
Differential	5 pt.	5 pt.
Fuel tank	6 gal.	6 gal.
Air cleaner	1 pt.	None
Hydraulic system	4-3/4 gal.	5-1/2 gal.
Transmission	10 qt.	10 qt.

b. Dimensions and Weight.

Ground clearance (at mast center)	5 in.	3-1/4 in.
Height:		
With uprights extended	228 in.	150 in.
With uprights retracted (w/overhead guard)	83 in.	83 in.
With uprights retracted (less overhead guard)	83 in.	68 in.
Length:		
Overall	126-3/4 in.	122-1/2 in.
Forks	40 in.	40 in.
Fork spread (maximum)	34-1/2 in.	34-1/2 in.
Width	42 in.	38 in.
Weight	8000 lbs.	6970 lbs.

c. Performance.

Aisle width (minimum)		
Intersecting	72 in.	69 in.
Right angle stacking	140-1/4 in.	136 in.
Lift height (maximum)	180 in.	100 in.
Load capacity (maximum)	4000 lbs.	4000 lbs.
Maximum speed (loaded)		
Forward	8 mph	8 mph
Reverse	8 mph	8 mph
Number of speeds		
Forward		
Reverse		
Tilt limitation:		
Backward	6 deg.	10 deg.
Forward	2 deg.	3 deg.
Turning radius		
Inside	3 in.	3-1/2 in.
Outside	78 in.	74 in.

d. Tires.

	Model MHE-209	Model MHE-224
Type	Solid	Solid
Number	4	
Size:		
Drive	18 x 9 x 12-1/8	18 x 7 x 12-1/8
Steer	15 x 5 x 11-1/4	15 x 5 x 11-1/4

e. Engine.

Make	Waukesha	Waukesha
Model	FCB G5943	FCB
Firing Order	1-3-4-2	1-3-4-2
Governor speed:		
Under load	2,000 rpm	2,000 rpm
Without load	2,400 rpm	2,400 rpm
Idle speed	600 rpm	600 rpm

f. Critical Torque Values.

Cylinder head bolts	61-62 ft-lb	61-62 ft-lb
Spark plugs	20-25 ft-lb	20-25 ft-lb

g. Battery.

Voltage	12	12
Ground	Negative	Negative

h. Hydraulic System.

Pressure setting:		
Engine speed 2,000 rpm	1,950 psi	1,950 psi

i. Wiring Diagram. Refer to figure 1-3 or 1-3.1 for the wiring diagram of the fork lift trucks.

Page 1-4. Caption of figure 1-3 is superseded as follows:

Figure 1-3. Wiring diagram (Army Model MHE-209).

Page 1-4. Figure 1-3.1 is added after figure 1-3.

Page 1-5. Paragraph 1-6 is superseded as follows:

1-6. Difference Between Models.

The fork lift trucks, Army Model MHE-209 and Army Model MHE-224, differ in the design of several components, such as the overhead guard, lift mast, radiator grille, tilt and lift control levers, fuel tank, transmission temperature gage, and engine air cleaner. Specific physical differences between models are described in the applicable maintenance paragraphs of this manual.

Page 2-3. Paragraph 2-7 is superseded as follows:

2-7. Controls and Instruments

Refer to figure 2-2, 2-2.1, and 2-3 for the purpose, normal readings, and location of all controls and instruments.

Page 2-4. Caption of figure 2-2 is superseded as follows:

Figure 2-2. Controls and instruments (Army Model MHE-209).

Page 2-4. Figure 2-2.1 is added after figure 2-2.

Page 2-5. Paragraph 2-9b is superseded as follows:

b. Starting. Refer to figures 2-4 or 2-4.1 and start the truck.

Page 2-6. Caption of figure 2-4 is superseded as follows:

Figure 2-4. Engine starting instructions (Army Model MHE-209).

Page 2-6. Figure 2-4.1 is added after figure 2-4.

Page 2-6. Paragraph 2-10a is superseded as follows:

a. Refer to figure 2-5 or 2-5.1 and stop the truck.

Page 2-7. Caption of figure 2-5 is super-

TM 10-3930-621-12
C2

sedes as follows:

Figure 2-5. Engine stopping instructions (Army Model MHE-209).

Page 2-7. Figure 2-5.1 is added after figure 2-5.

Page 2-7. All references to “(fig. 2-2)” are changed to read “(fig. 2-2 or 2-2.1)“.

Page 2-8. Caption of figure 2-6 is superseded as follows:

Figure 2-6. Lifting operation (Army Model MHE-209).

Page 2-8. Figure 2-6.1 is added after figure 2-6.

Page 2-8. All references to “figure 2-6” are changed to read “figure 2-6 or 2-6.1”.

Page 2-9. All references to “figure 2-6” are changed to read “figure 2-6 or 2-6.1”.

Page 2-9. All references to “figure 2-7” are changed to read “figure 2-7 or 2-7.1”.

Page 2-9. Caption of figure 2-7 is superseded as follows:

Figure 2-7. Lowering operation (Army Model MHE-209).

Page 2-9. Figure 2-7.1 is added after figure 2-7.

Page 2-10. In paragraph 2-14c, reference to “figure 2-7” is changed to read “figure 2-7 or 2-7.1”.

Page 3-1. Paragraph 3-2 is rescinded. Page 3-4. In the paragraph title of paragraph 3-10, “(Army Model MHE-209)” is added after the word “Service”.

Page 3-4. Paragraph 3-10.1 is added after paragraph 3-10.

3-10.1. Air Cleaner Service (Army Model MHE-224).

a. Refer to paragraph 3-9 and remove the seat from the truck.

b. Refer to figure 3-2.1 to service or remove the air cleaner.

CAUTION

Do not remove the air cleaner when the engine is running.

Do not run the engine unless the air cleaner is in place.

c. Remove the cup as shown in figure 3-2.1 and service as follows:

(1) Remove cartridge and shake out accumulated dirt.

(2) Clean cartridge by washing with water and detergent only. Rinse until water runs clear. Shake off excess water and dry with low pressure compressed air.

(3) Install cartridge in cup.

CAUTION

Do not oil the cartridge.

d. Install cup (fig. 3-2.1).

Page 3-5. Caption of figure 3-2 is superseded as follows:

Figure 3-2. Engine air cleaner, service and replacement (Army Model MHE-209).

Page 3-5. Figure 3-2.1 is added after figure 3-2.

Page 3-5. All references to “figure 3-3” are changed to read “figure 3-3 or 3-3.1”.

Page 3-6. Caption of figure 3-3 is superseded as follows:

Figure 3-3. Battery service (Army Model MHE-209).

Page 3-6. Figure 3-3.1 is added after figure 3-3.

Page 3-10. In table 3-2, item 26 is added as follows:

<i>Malfunction</i>	<i>Probable cause</i>	<i>Corrective action</i>
26. Transmission temperature gage indicates over 250 degrees.	a. Oil level low b. Engine overheating c. Defective transmission	a. Add proper grade of oil per LO 10-3930-621-12. b. Refer to item 5 above. c. Refer to direct and general support maintenance personnel.

Page 3-16. In paragraph 3-27b(1), reference to "(fig. 2-2)" is changed to read "(fig. 2-2 or 2-2.1)".

Page 3-17. In paragraph 3-28, reference to "(fig. 2-2)" is changed to read "(fig. 2-2 or 2-2.1)".

Page 3-21. In paragraph 3-33, all references to "figure 3-18" are changed to read "figure 3-18 or 3-18.1".

Page 3-21. Paragraph 3-33b(2) is superseded as follows:

(2) On fork lift trucks (Army Model MHE-209), attach a length of hose to the shut-off valve fitting and drain the tank through the hose into a suitable container. On fork lift trucks (Army Model MHE-224), remove the drain plug from elbow on the bottom of the tank and drain fuel into a suitable container.

Page 3-21. Caption of figure 3-18 is superseded as follows:

Figure 3-18. Fuel tank, installed view (Army Model MHE-209).

Page 3-21. Figure 3-18.1 is added after figure 3-18.

Page 3-23. Paragraph 3-37a(1) is superseded as follows:

(1) Remove the radiator grille (fig. 3-21 or 3-21.1) and front panel (fig. 3-21). Page 3-23. Caption of figure 3-21 is superseded as follows:

Figure 3-21. Radiator grille, installed view (Army Model MHE-209).

Page 3-23. Figure 3-21.1 is added after figure 3-21.

Page 3-24. Paragraph 3-37c(4) is superseded as follows:

(4) Refer to figure 3-21 or 3-21.1 and install radiator grille.

Page 3-26. Paragraph 3-40a is superseded as follows:

a. Refer to figure 1-3 or 1-3.1 for a schematic diagram of the electrical system. Page 3-28. In paragraph 3-42b, the reference to "figure 3-27" is changed to read "figure 3-27 or 3-27.1".

Page 3-28. Caption of figure 3-27 is superseded as follows:

Figure 3-27. Voltage regulator, installed view (Army Model MHE-209).

Page 3-28. Figure 3-27.1 is added after figure 3-27.

Page 3-29. In paragraph 3-42c, the reference to "figure 3-27" is changed to

read "figure 3-27 or 3-27.1".

Page 3-31. In paragraph 3-43d and 3-43e, the references to "figure 3-31," are changed to read "figure 3-31 or 3-31.1".

Page 3-31. Caption of figure 3-31 is superseded as follows:

Figure 3-31. Starter solenoid switch, installed view (Army Model MHE-209).

Page 3-31. Figure 3-31.1 is added after figure 3-31.

Page 3-35. In paragraph 3-47a, the reference to "figure 3-37" is changed to read "figure 3-37 or 3-37.1".

Page 3-36. Caption of figure 3-37 is superseded as follows:

Figure 3-37. Battery, installed view (Army Model MHE-209).

Page 3-36. Figure 3-37.1 is added after figure 3-37.

Page 3-36. Paragraph title of paragraph 3-48e is superseded as follows:

e. Transmitters (Army Model MHE-209).

Page 3-37. Paragraph 3-48f is added after paragraph 3-48e.

f. Transmitters (Army Model MHE-224).

(1) Refer to figure 3-38 and disconnect wire from oil pressure transmitter and remove transmitter from elbow in governor oil line. Install new transmitter and connect wire.

(2) Refer to figure 3-40 and disconnect wire from coolant temperature transmitter and remove transmitter from cylinder head. Install new transmitter and connect wire to terminal.

Page 3-37. Caption of figure 3-39 is superseded as follows:

Figure 3-39. Hourmeter actuating transmitter, installed view (Army Model MHE-209).

Page 3-51. In paragraph 3-68b, the reference to "figure 3-59" is changed to read "figure 3-59 or 3-59.1".

Page 3-52. Caption of figure 3-59 is superseded as follows:

Figure 3-59. Hydraulic system, schematic diagram (Army Model MHE-209).

Page 3-52. Figure 3-59.1 is added after figure 3-59.

Page 3-55. In paragraph 3-72a, the reference to "(fig. 3-59)" is changed to read "(fig. 3-59 or 3-59.1)".

Page 3-55. In paragraph 3-74, all references to "figure 3-64" are changed to read

C 2

“figure 3-64 or 3-64.1”.

Page 3-55. Paragraph 3-74b(3) is superseded as follows:

(3) On fork lift truck, Army Model MHE-209, support filter base and unscrew head bolt to lower filter base. On fork lift truck (Army Model MHE-224), unscrew filter base from filter head.

Page 3-56. Paragraph 3-74b(7) is superseded as follows:

(7) On fork lift truck, Army Model MHE-209, position base in head assembly and secure with head bolt. On fork lift truck, Army Model MHE-224, screw base into filter head.

Page 3-56. Caption of figure 3-64 is superseded as follows:

Figure 3-64. Hydraulic oil filter, service and replacement (Army Model MHE-209).

Page 3-56. Figure 3-64.1 is added after figure 3-64.

Page 3-57. Paragraph 3-75d is superseded as follows:

d. Tilt Adjustment. Normal tilt of mast (Army Model MHE-209) is 2° forward and 6° backward. Normal tilt of mast (Army Model MHE-224) is 3° forward and 10° backward. Operate tilt cylinders and check tilt angle with a protractor as shown in figure 3-66. Make sure both cylinders have reached the end of their stroke. Check both left and right sides of the mast assembly.

NOTE

Truck must be on a flat level surface to check and adjust mast tilt.

(1) Set protractor to measure 6° (Army Model MHE-209) or 10° (Army Model MHE-224) of tilt. Place protractor against mast as shown. Tilt mast to end of backward stroke. Bubble in protractor should be centered if tilt is correct.

(2) If tilt is not correct, tilt mast to the forward position and loosen clamp screw (fig. 3-65) on yoke at front end of tilt cylinders. Turn hex on cylinder piston rod to extend or retract as necessary to adjust tilt.

(3) After adjusting, check degree of

tilt. Continue to adjust piston rod until correct degree of backward tilt is obtained. Tighten clamp screw on yoke.

(4) Forward tilt is automatically adjusted to proper angle when backward tilt is correct.

Page 3-58. Paragraph 3-76e(2) is superseded as follows:

(2) Loosen locknuts and adjusting nuts (fig. 3-68) on the chain anchors. Locknuts, as illustrated in figure 3-68, are not supplied on the Army Model MHE-224 fork lift trucks.

Page 3-59. Paragraph title of paragraph 3-77 is superseded as follows:

3-77. Overhead Guard (Army Model MHE-209).

Page 3-59. Caption of figure 3-69 is superseded as follows:

Figure 3-69. Frame, guard, and seat, installed view (Army Model MHE-209).

Page 3-59. Figure 3-69.1 is added after figure 3-69.

Page 3-59. Paragraph 3-77.1 is added after paragraph 3-77.

3-77.1. Overhead Guard (Army Model MHE-224)

a. Removal. Refer to figure 3-69.1 and remove the overhead guard as follows:

(1) Remove two screws, lockwashers and nuts securing overhead guard to supports on counterweight.

(2) Remove four screws, lockwashers and nuts securing overhead guard to front corners of truck.

(3) Carefully remove guard from truck.

b. Installation. Refer to figure 3-69.1 and install overhead guard on truck as follows:

(1) Carefully lift overhead guard into place on truck.

(2) Secure overhead guard to four supports on corners of truck with six screws, lockwashers and nuts.

Page 3-59. In paragraph 3-78, all references to “figure 3-69” are changed to read “figure 3-69 or 3-69.1”.

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

APPENDIX B

BASIC ISSUE ITEM LIST AND ITEMS

TROOP INSTALLED OR AUTHORIZED

(Effective 1 July 1973)

Section I. INTRODUCTION

B-1. Scope

This appendix lists basic issue items, items troop installed or authorized which accompany the fork lift truck, and required by the crew/operator for operation, installation, or operator's maintenance.

B-2. General

This basic issue items, items troop installed or authorized 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 (Effective 1 July 1973). A list, in alphabetical sequence of items which at the discretion of the unit commander may accompany the end item, but are NOT subject to be turned in with the end item.

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 repairable at direct and general support maintenance levels.
S	Repair parts, special tools, test equipment and assemblies which are economically repairable 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

(Effective 1 July 1973)

(1) SMR Code	(2) Federal Stock Number	(3) Ref No. & Mfr Code Description Usable On Code	(4) Unit Of Meas	(5) Qty Auth
PC PC PC	7510-889-3494 7520-559-9618 4210-889-2221	Binder, Log Book Case, Manuals Extinguisher, Fire	EA EA EA	1 1 1

Page C-3. In the Maintenance Allocation Chart, groups 10 through 13 are superseded as follows:

Section II. MAINTENANCE ALLOCATION CHART

FOR

(1) Group No.	(2) Functional Group	(3) Maintenance Functions											(4) Tools And Equipment	(5) Remarks
		A	B	C	D	E	F	G	H	I	J	K		
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
10	BRAKES													
	Brake Shoes, Hand Brake				0				0	F				
	Lever, Hand Brake				0				0					
	Cable, Hand Brake				0				0					
	Brake Shoes, Service Brake								0	F				
	Master Cylinder			0					0	F				
	Wheel Cylinder								0	F				
	Pedal				0				F					
11	WHEELS													
	Wheels Assembly								0	H				
	Tires	0							H					
12	STEERING													
	Tie Rod				0				0	0				
	Gear Assembly, Steering				F				F	H				
	Hydraulic Cylinder				0				0	F				
13	HYDRAULIC LIFT COMPONENTS													
	Hydraulic Pump								F	F				
	Control Valve		F	F					F	F				
	Control Levers and Linkage			0					F					
	Tilt Cylinder			0					F	F				
	Lift Cylinder								F	F				
	Mast Assembly								F	F				
	Carriage Assembly								F	F				
	Chain				0				F					
	Lines and Fittings	0							0					
	Tank, Oil			0					F					
	Breather, Oil			0					0					
	Filter, Oil			0					0					

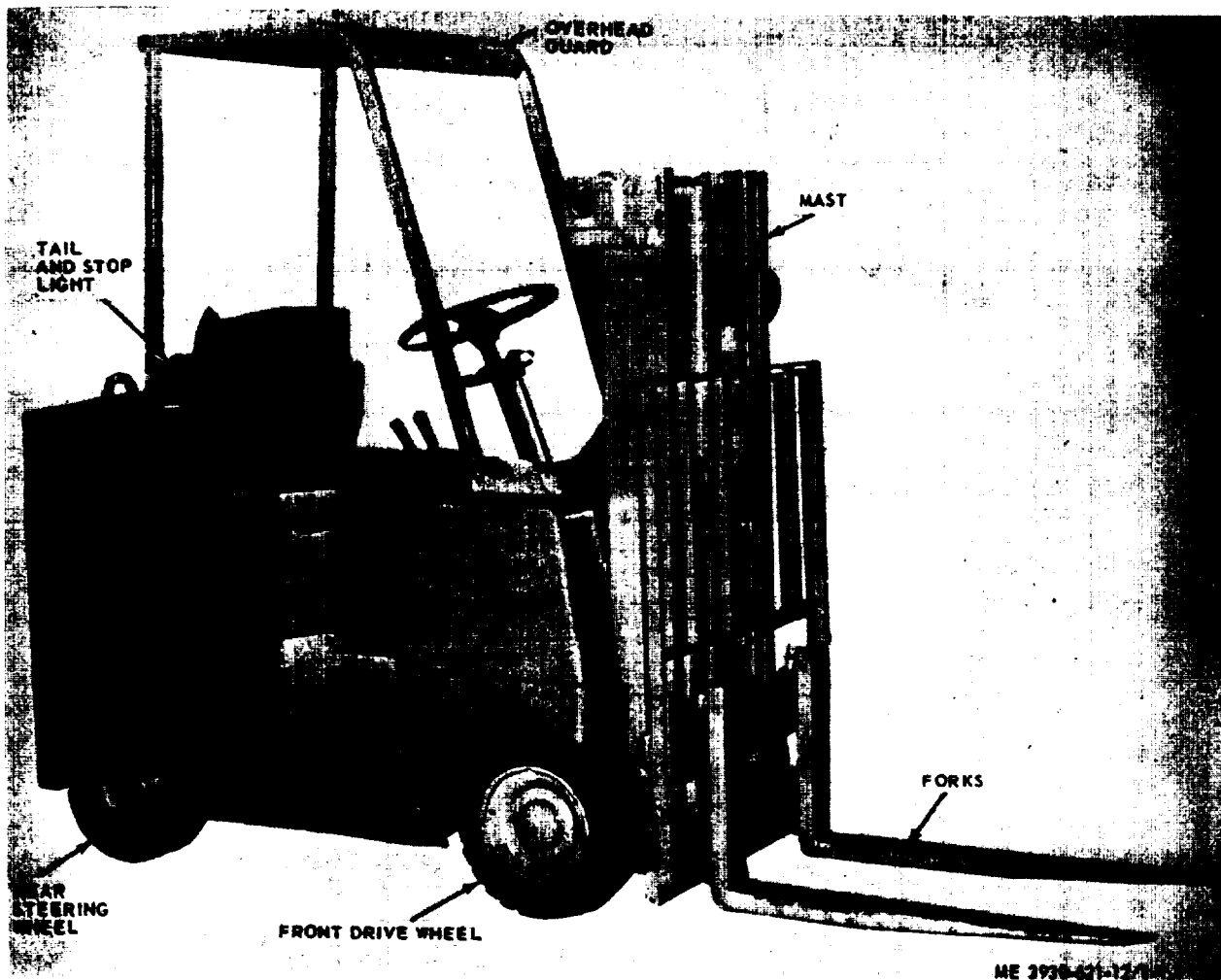


Figure 1-1.1. Fork lift truck, right side view (Army Model MHE-224).



Figure 1-2.1. Fork lift truck, left side view (Army Model MHE-224).

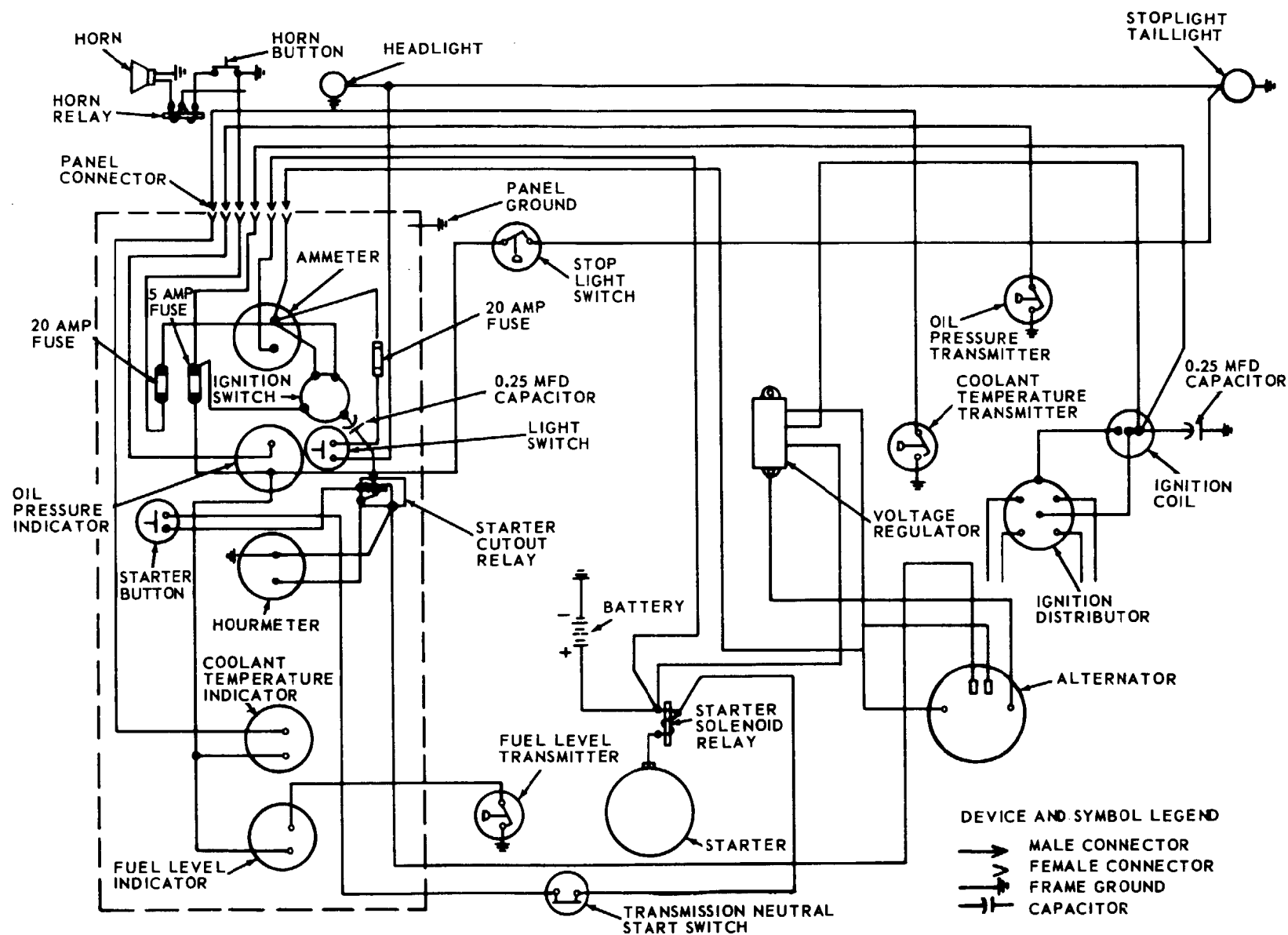
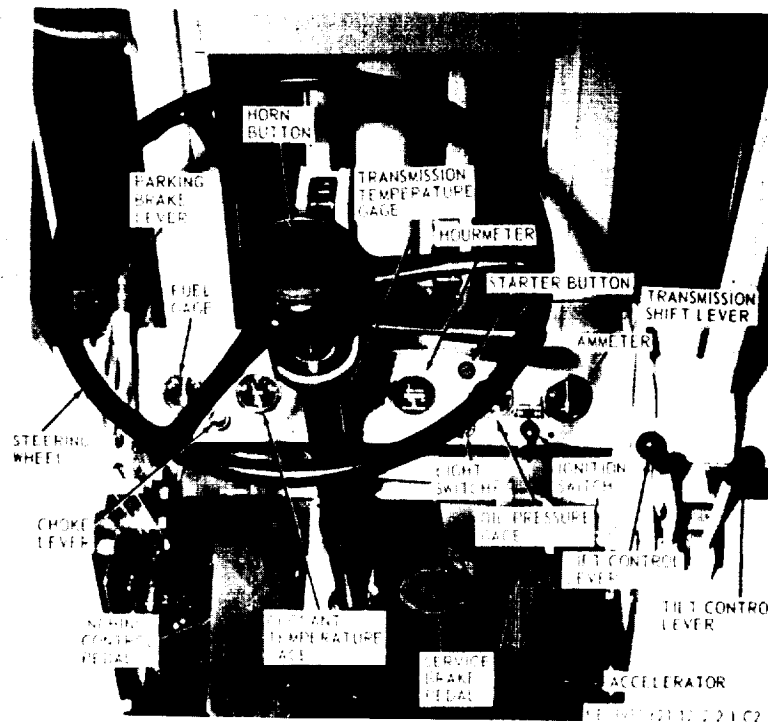


Figure 1-3.1. Wiring diagram (Army Model MHE-224).

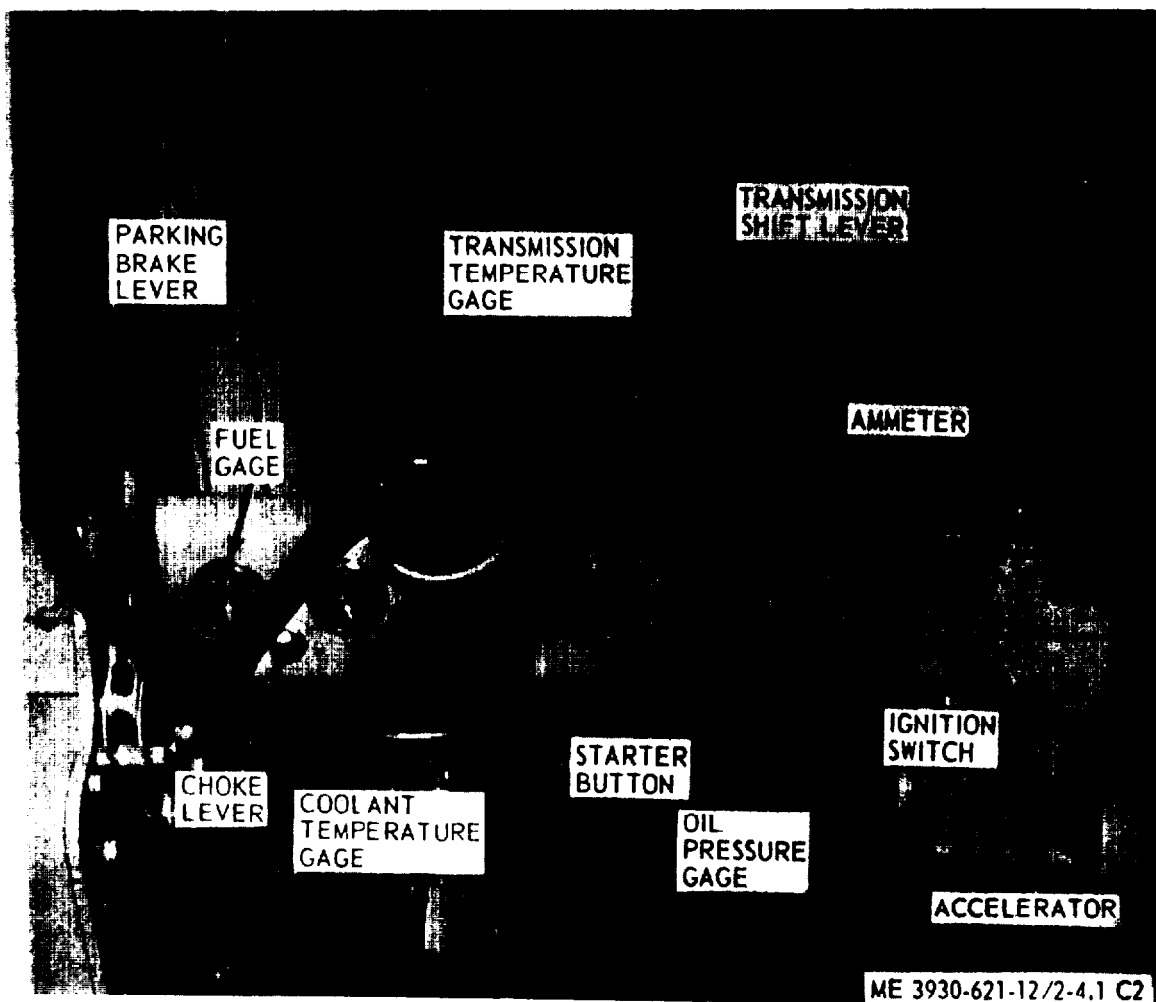


1. PARKING BRAKE LEVER-PULL BACK ON LEVER TO APPLY PARKING BRAKE. MOVE LEVER FORWARD TO RELEASE BRAKE.
2. HORN BUTTON-DEPRESS BUTTON TO SOUND HORN.
3. STARTER BUTTON-DEPRESS BUTTON TO ACTUATE ENGINE STARTER.
4. TRANSMISSION SHIFT LEVER-MOVE LEVER TO BRING POINTER TO "F" POSITION TO MOVE TRUCK FORWARD, MOVE LEVER TO BRING POINTER TO "R" POSITION TO MOVE TRUCK TO REAR, POSITION LEVER IN "N" (NEUTRAL) WHEN PARKING OR STARTING TRUCK.
5. LIFT CONTROL LEVER-MOVE LEVER TO REAR TO LIFT FORKS, MOVE LEVER FORWARD TO LOWER FORKS.
6. TILT CONTROL LEVER-MOVE LEVER FORWARD TO TILT FORKS FORWARD, PULL LEVER TO REAR TO TILT FORKS BACKWARD.
7. STEERING WHEEL-ROTATE WHEEL IN DIRECTION DESIRED TO TURN TRUCK.
8. ACCELERATOR-DEPRESS PEDAL TO INCREASE ENGINE SPEED. RELEASE PEDAL TO DECREASE ENGINE SPEED.
9. IGNITION SWITCH-ROTATE SWITCH TO RIGHT TO ACTUATE TRUCK ELECTRICAL CIRCUITS. SWITCH MUST BE ON TO OPERATE INSTRUMENTS AND START TRUCK.
10. SERVICE BRAKE PEDAL-DEPRESS PEDAL TO APPLY BRAKES AND STOP TRUCK.
11. INCHING CONTROL PEDAL -DEPRESS PEDAL TO SLOW TRANSMISSION SPEED AND ALLOW HIGH ENGINE SPEED. GIVES OPERATOR PRECISE CONTROL FOR INCHING LOADS.
12. CHOKE LEVER-PULL OUT TO CLOSE CHOKE VALVE DURING ENGINE START. PUSH ALL THE WAY IN TO OPEN CHOKE FOR NORMAL OPERATION.
13. LIGHT SWITCH-PULL SWITCH OUT TO TURN ON LIGHTS.

INSTRUMENTS

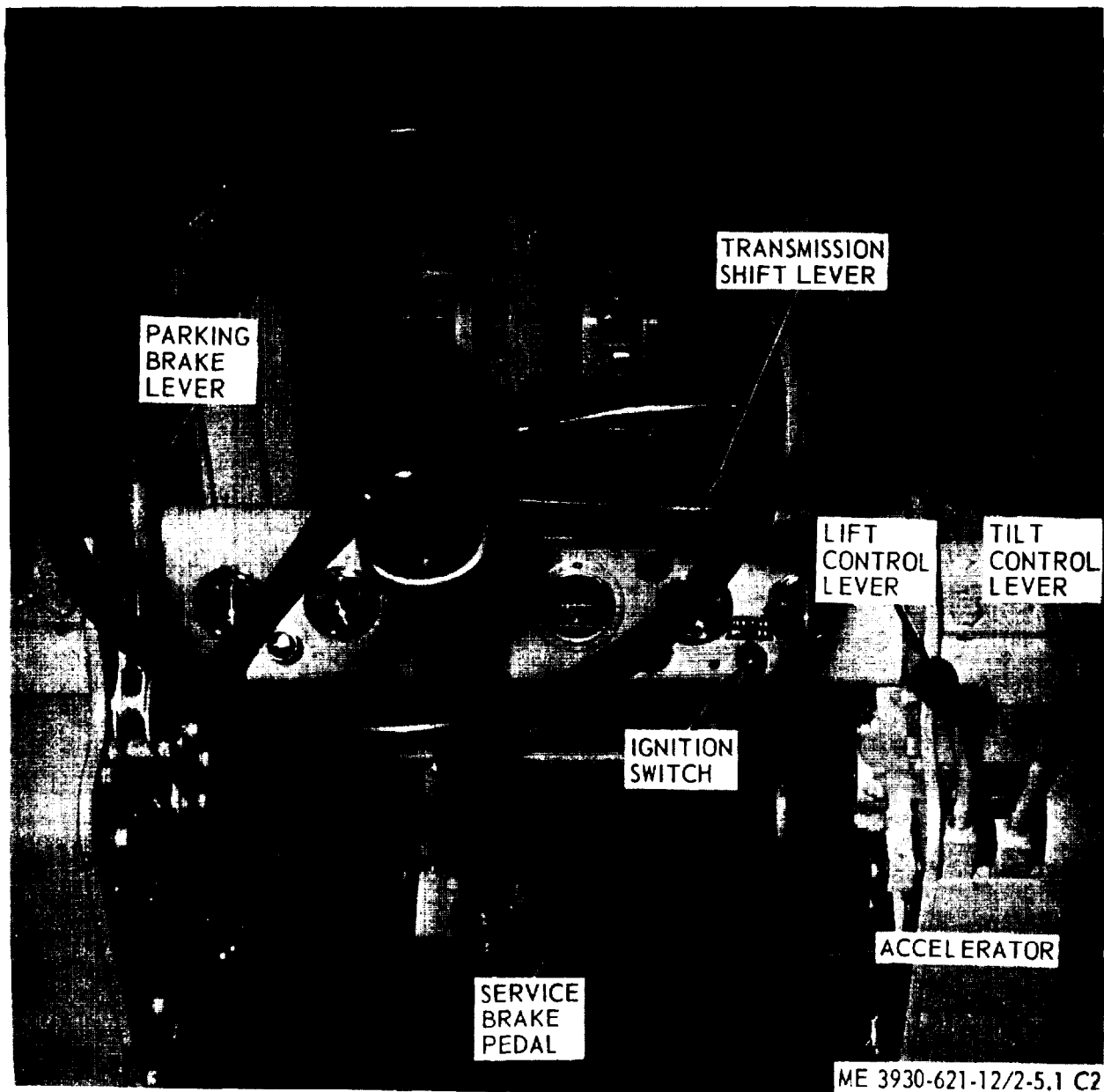
1. FUEL GAGE-INDICATES AMOUNT OF FUEL IN FUEL TANK.
2. COOLANT TEMPERATURE GAGE-INDICATES ENGINE OPERATING TEMPERATURE. NORMAL READING SHOULD BE 160° TO 180° F.
3. TRANSMISSION TEMPERATURE GAGE-INDICATES TRANSMISSION OPERATING TEMPERATURE-READING SHOULD NOT EXCEED 250° F.
4. AMMETER-INDICATES AMOUNT OF CURRENT FLOWING TO OR FROM THE BATTERY SHOULD SHOW HIGH RATE OF CHARGE AFTER STARTING AND TAPER DOWN TO NEAR CENTER OF DIAL AFTER OPERATING A SHORT TIME.
5. OIL PRESSURE GAGE-INDICATES WORKING OIL PRESSURE OF THE ENGINE. NORMAL OPERATION SHOULD INDICATE 15 TO 20 PSI AT NORMAL OPERATING SPEED.
6. HOURLY METER-OPERATES WHEN ENGINE IS RUNNING AND RECORDS HOURS OF ENGINE OPERATION.

Figure 2-2.1. Controls and instruments (Army Model MHE-224).



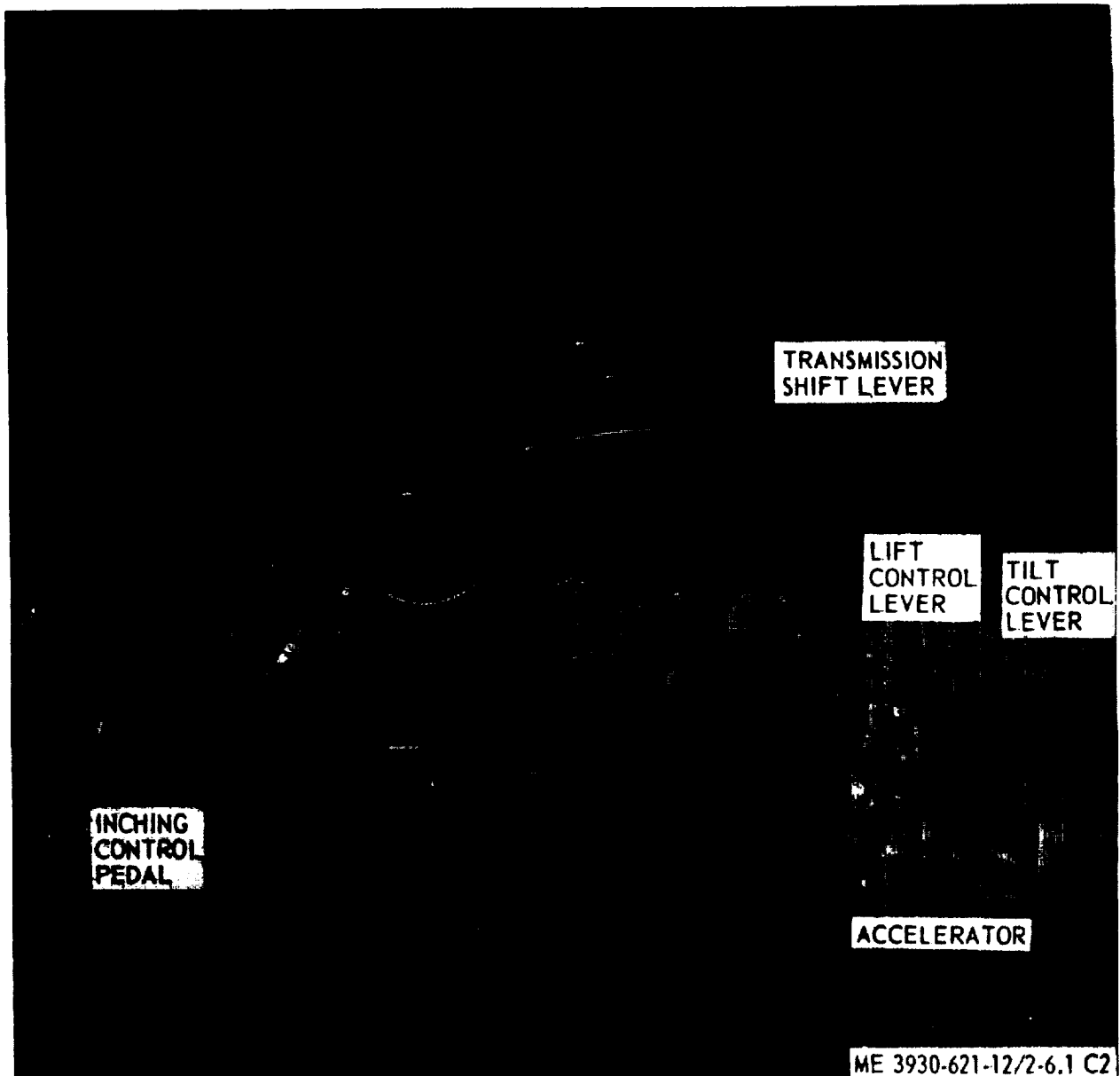
1. PULL PARKING BRAKE LEVER TO REAR TO SET PARKING BRAKE.
2. PLACE TRANSMISSION SHIFT LEVER IN "N" (NEUTRAL) POSITION.
3. IF ENGINE IS COLD PULL CHOKE LEVER ALL THE WAY OUT.
4. DEPRESS ACCELERATOR APPROXIMATELY ONE-THIRD OF THE WAY.
5. TURN IGNITION SWITCH TO RIGHT TO "ON" POSITION.
6. DEPRESS STARTER BUTTON TO CRANK ENGINE. RELEASE BUTTON WHEN ENGINE STARTS.
CAUTION. DO NOT OPERATE STARTER CONTINUOUSLY FOR LONGER THAN 30 SECONDS. IF ENGINE FAILS TO START AFTER THIRTY SECONDS ALLOW STARTER TO COOL OFF FOR TWO MINUTES BEFORE ATTEMPTING TO START ENGINE AGAIN.
7. HOLD ACCELERATOR STEADY AND ALLOW ENGINE TO WARM UP AT FAST IDLING SPEED.
8. CHECK OIL PRESSURE GAGE AND AMMETER FOR NORMAL READINGS. AS ENGINE WARMS UP, PUSH IN ON CHOKE LEVER. WHEN ENGINE IS WARM, PUSH LEVER ALL THE WAY IN.
9. WITH ENGINE AT OPERATING TEMPERATURE, CHECK FOR PROPER READINGS. ON AMMETER, OIL PRESSURE GAGE, COOLANT TEMPERATURE GAGE, AND TRANSMISSION TEMPERATURE GAGE. CHECK FUEL GAGE AND HOURMETER FOR PROPER OPERATION.
10. REPORT ANY MALFUNCTIONS TO PROPER AUTHORITY.

Figure 2-4.1. Engine starting instructions (Army Model MHE-224).



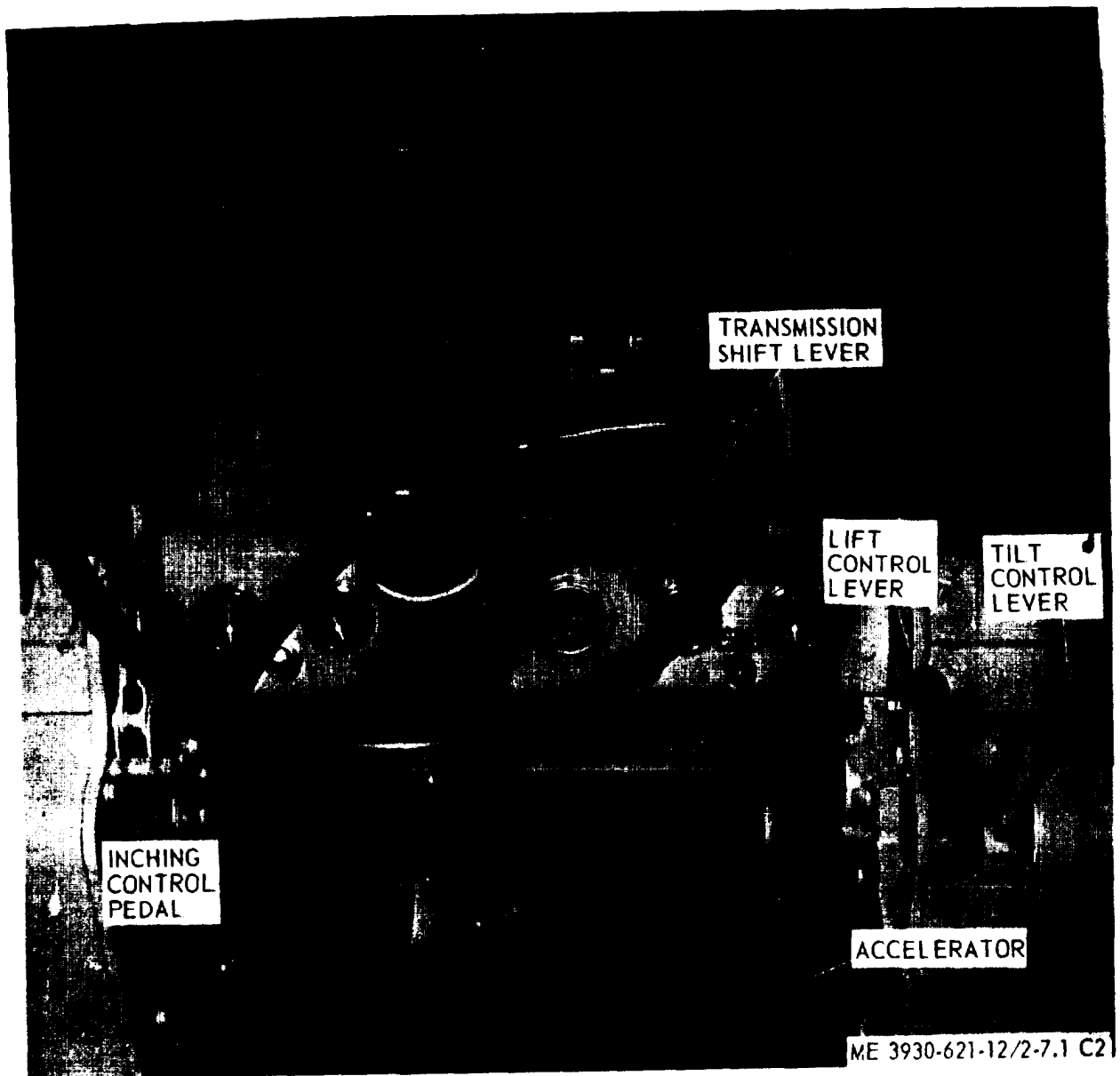
1. RELEASE FOOT FROM ACCELERATOR.
2. DEPRESS SERVICE BRAKE GRADUALLY TO BRING TRUCK TO SAFE SMOOTH STOP.
3. PULL PARKING BRAKE LEVER TO REAR TO APPLY PARKING BRAKE.
4. MOVE TILT CONTROL LEVER FORWARD TO PLACE MAST IN VERTICAL POSITION.
5. MOVE LIFT CONTROL LEVER FORWARD AND LOWER FORKS TO GROUND.
6. TURN IGNITION SWITCH TO THE LEFT TO "OFF" POSITION TO STOP ENGINE.

Figure 2-5.1. Engine stopping instructions (Army Model MHE-224).



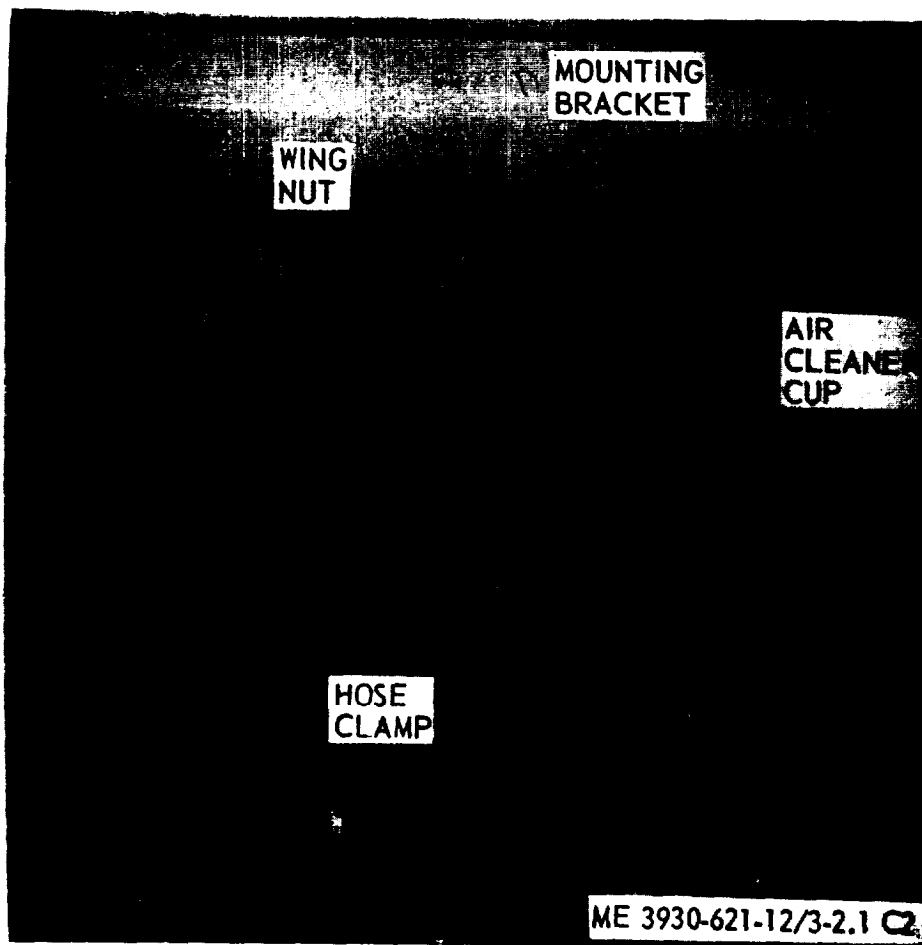
1. BRING TRUCK TO A HALT.
2. RAISE OR LOWER FORKS, USING LIFT CONTROL LEVER, TO BRING FORKS IN LINE WITH LOAD.
3. MOVE TRUCK FORWARD, USING INCHING CONTROL AND ACCELERATOR, TO BRING FORKS UNDER LOAD.
4. PULL LIFT CONTROL LEVER TO REAR TO RAISE FORKS AND LOAD TO CLEAR GROUND OR STACK. MOVE TRUCK IN REVERSE TO CLEAR STACK.
5. TILT MAST TO THE REAR BY PULLING TILT CONTROL LEVER TO REAR, TO SAFELY TRANSPORT LOAD.
6. RAISE OR LOWER LOAD AS NECESSARY, USING LIFT CONTROL LEVER.

Figure 2-6.1. Lifting operation (Army Model MHE-224).



1. MOVE TRUCK INTO POSITION WITH INCHING CONTROL PEDAL AND ACCELERATOR TO BRING FORKS AND LOAD OVER PLACE TO DEPOSIT LOAD.
2. HALT TRUCK USING SERVICE BRAKE PEDAL. SHIFT TRANSMISSION TO NEUTRAL.
3. PUSH LIFT CONTROL LEVER FORWARD TO GRADUALLY LOWER LOAD. MOVE TILT CONTROL LEVER FORWARD TO BRING MAST TO VERTICAL POSITION.
4. LOWER LOAD INTO POSITION.
5. PLACE TRANSMISSION SHIFT LEVER IN "R" (REVERSE) POSITION AND, USING INCHING CONTROL PEDAL AND ACCELERATOR, MOVE TRUCK AWAY FROM LOAD.

Figure 2-7.1. Lowering operation (Army Model MHE-224)



1. LOOSEN HOSE CLAMP AND DISCONNECT HOSE FROM AIR CLEANER.
2. REMOVE WINGNUT AND REMOVE AIR CLEANER CARTRIDGE AND AIR CLEANER CUP FROM MOUNTING BRACKET.
3. REFER TO PARAGRAPH 3-10.1 AND CLEAN THE CARTRIDGE.
4. INSTALL CARTRIDGE AND CUP ON MOUNTING BRACKET AND SECURE WITH WINGNUT.
5. INSTALL HOSE ON AIR CLEANER AND SECURE WITH HOSE CLAMP.

Figure 3-2.1. Engine air cleaner, service and replacement (Army Model MHE-224).

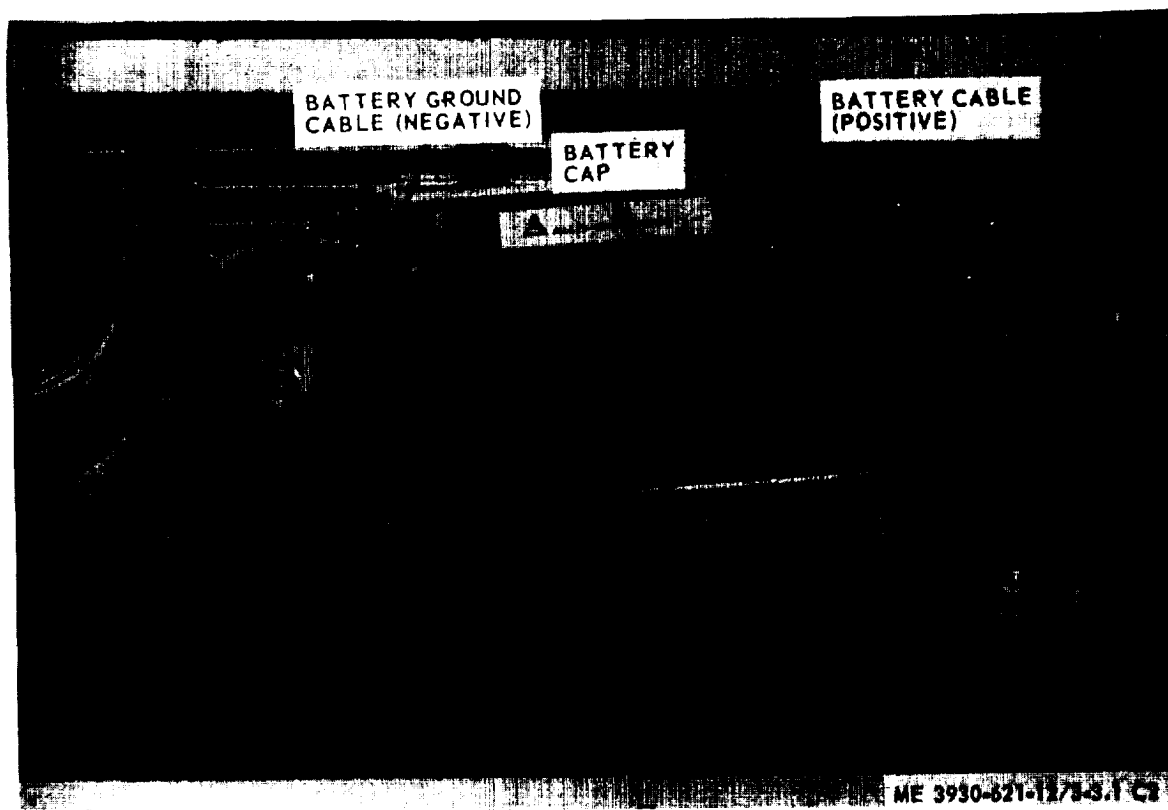


Figure 3-3.1. Battery service (Army Model MHE-224).

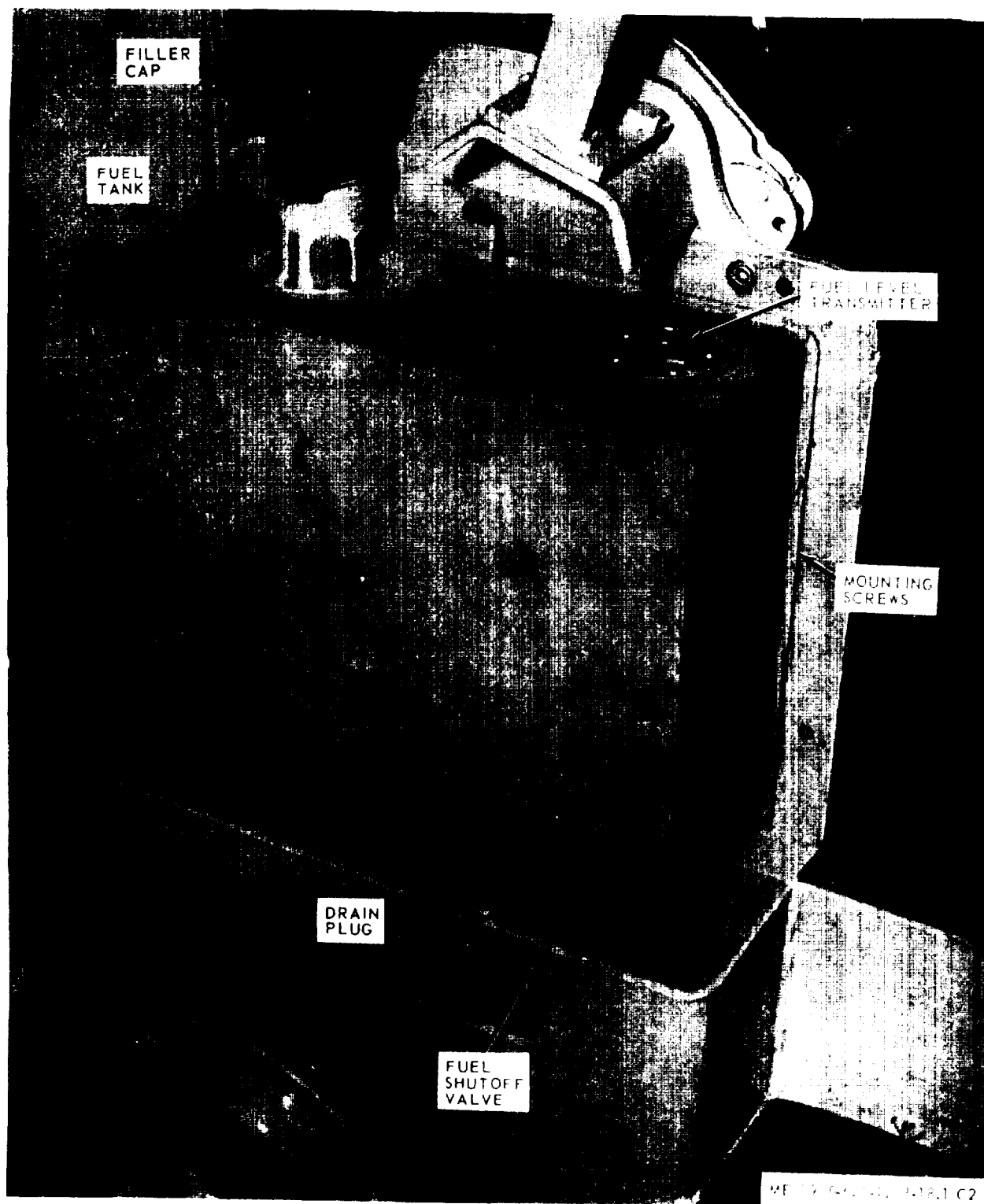


Figure 3-18.1. Fuel tank, installed view (Army Model MHE-224).

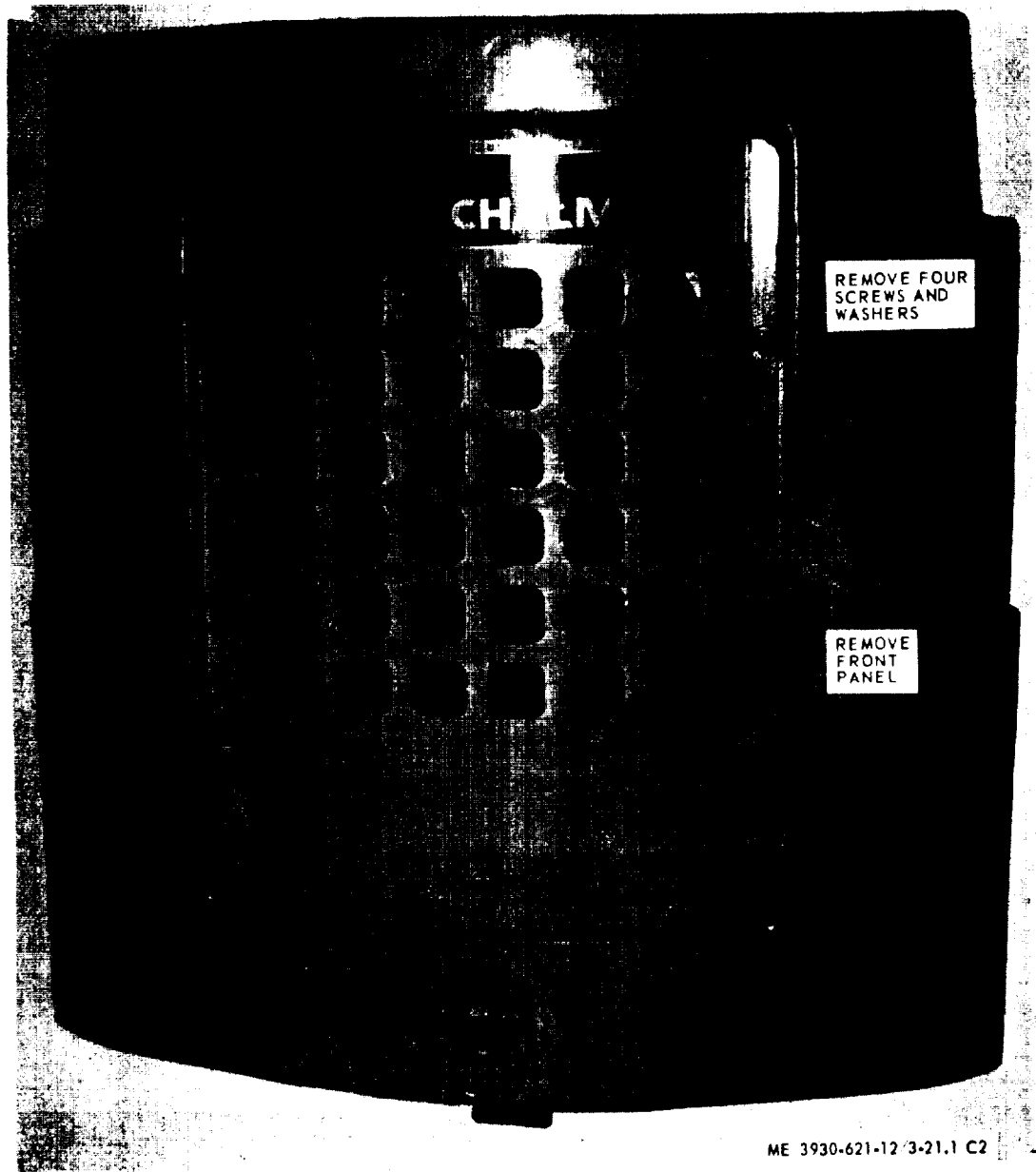
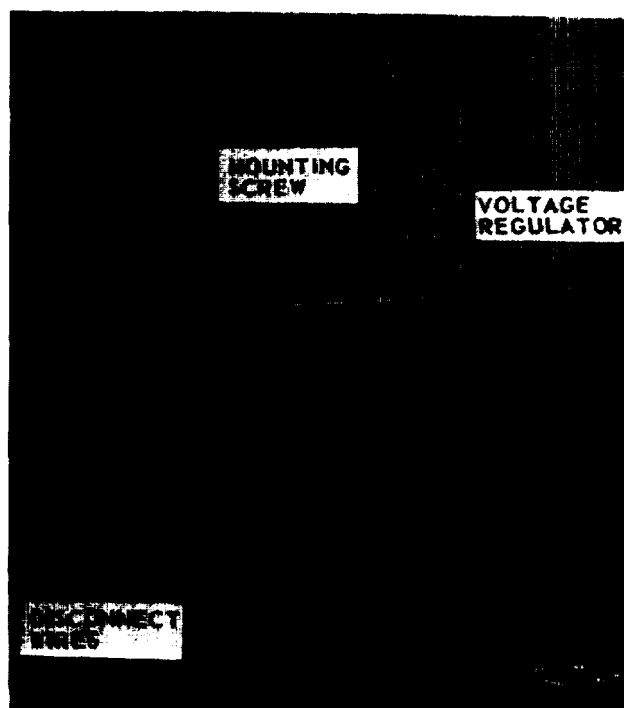
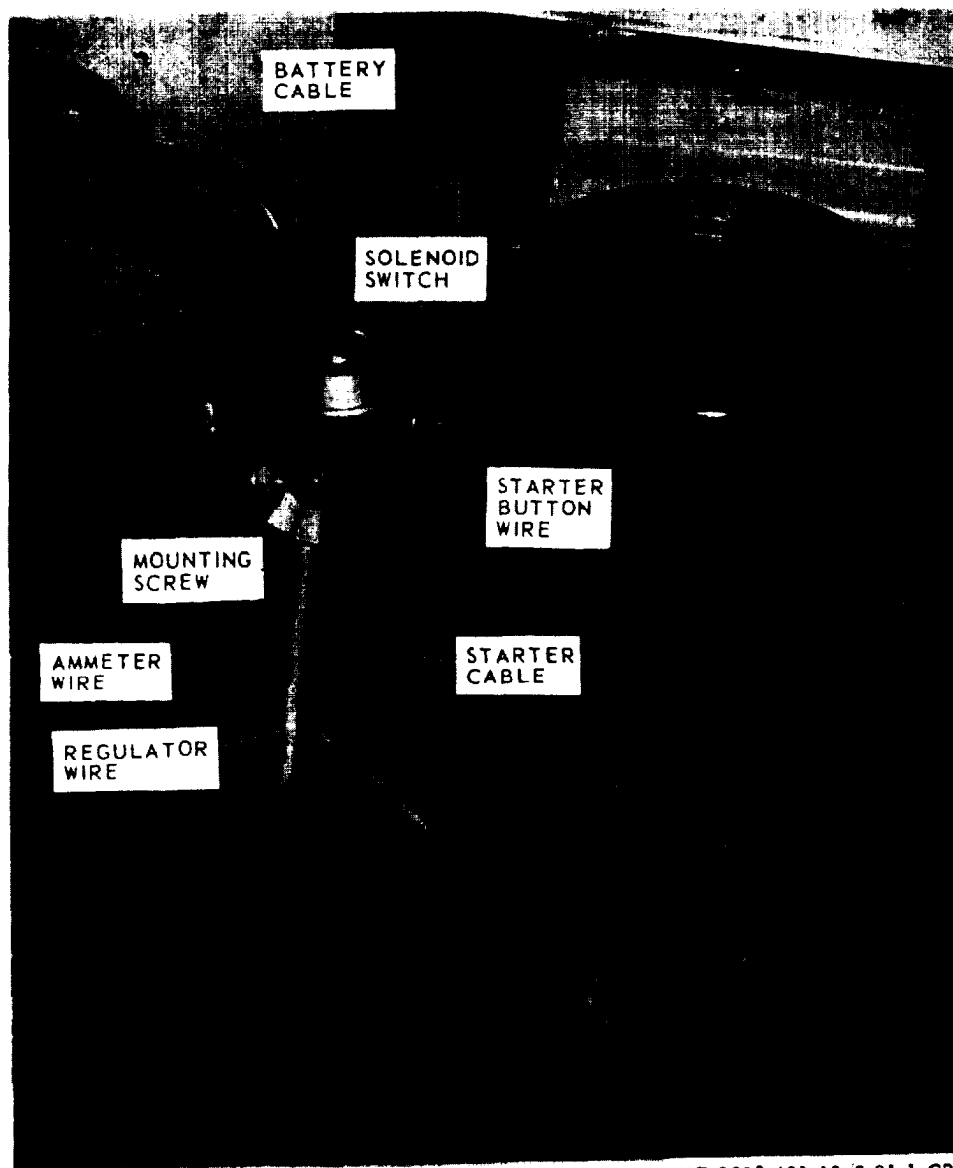


Figure 3-21.1. Radiator grille, installed view (Army Model MHE-224).



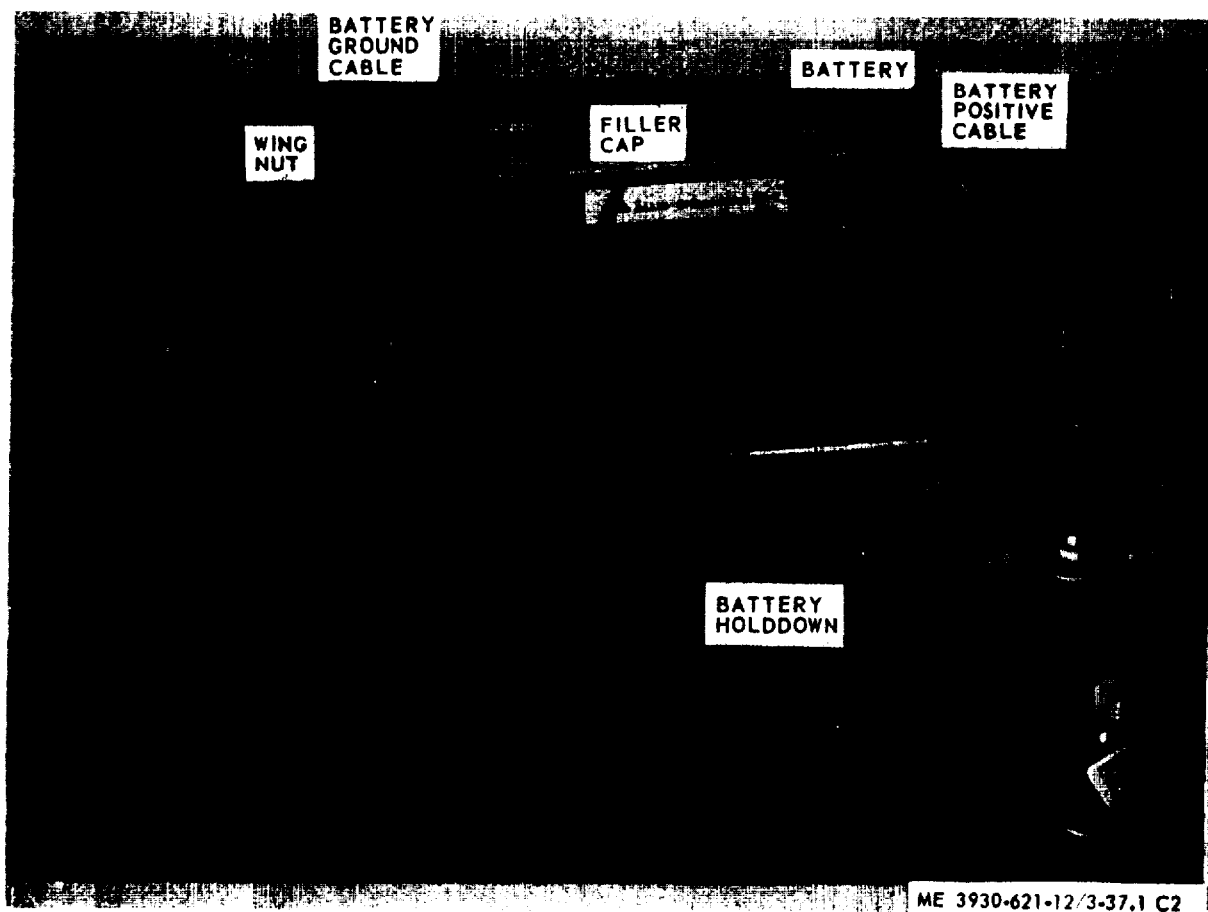
ME 3930-621-12/3-27.1 C2

Figure 3-27.1. Voltage regulator, installed view (Army Model MHE-224).



ME 3930-621-12/3-31.1 C2

Figure 3-31.1. Starter solenoid switch, installed view (Army Model MHE-224).

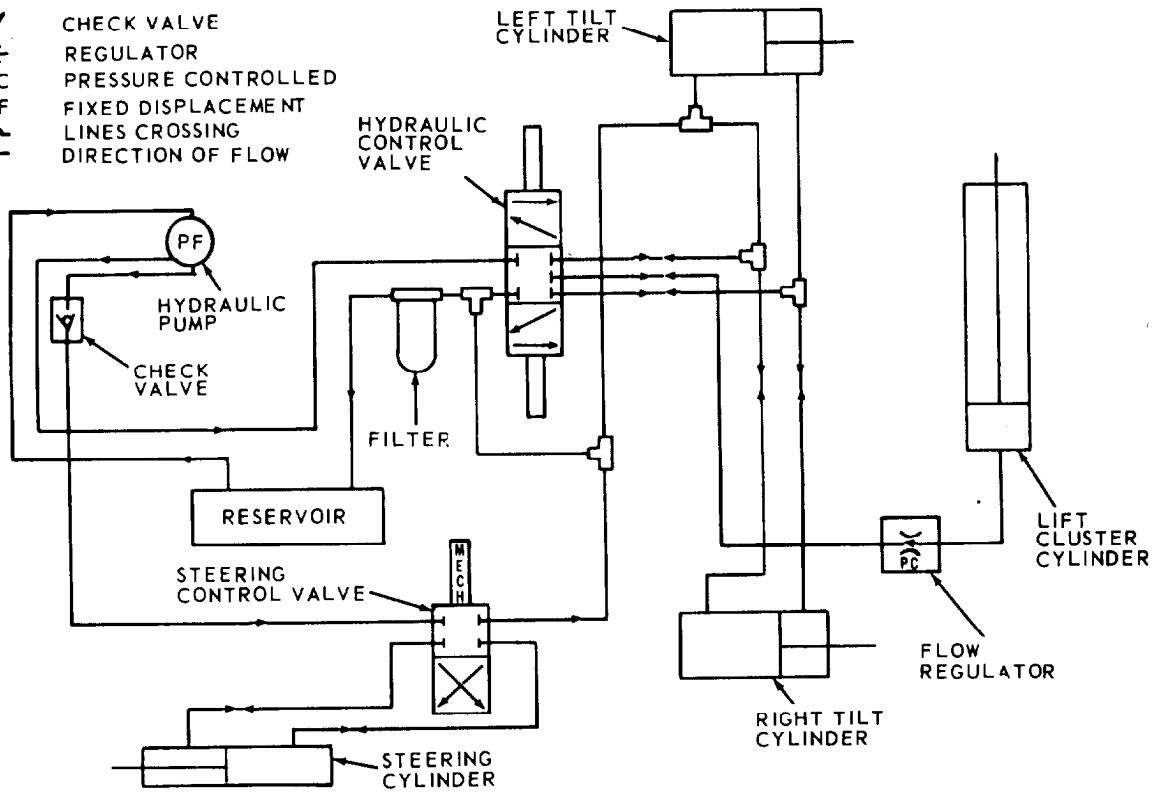


ME 3930-621-12/3-37.1 C2

Figure 3-37.1. Battery, installed view (Army Model MHE-224).

DEVICE AND SYMBOL LEGEND

- Y CHECK VALVE
- REGULATOR
- PC PRESSURE CONTROLLED
- PF FIXED DISPLACEMENT
- LINES CROSSING
- DIRECTION OF FLOW



ME 3930-621-12/3-59.1 C2

Figure 3-59.1. Hydraulic system, schematic diagram (Army Model MHE-224)

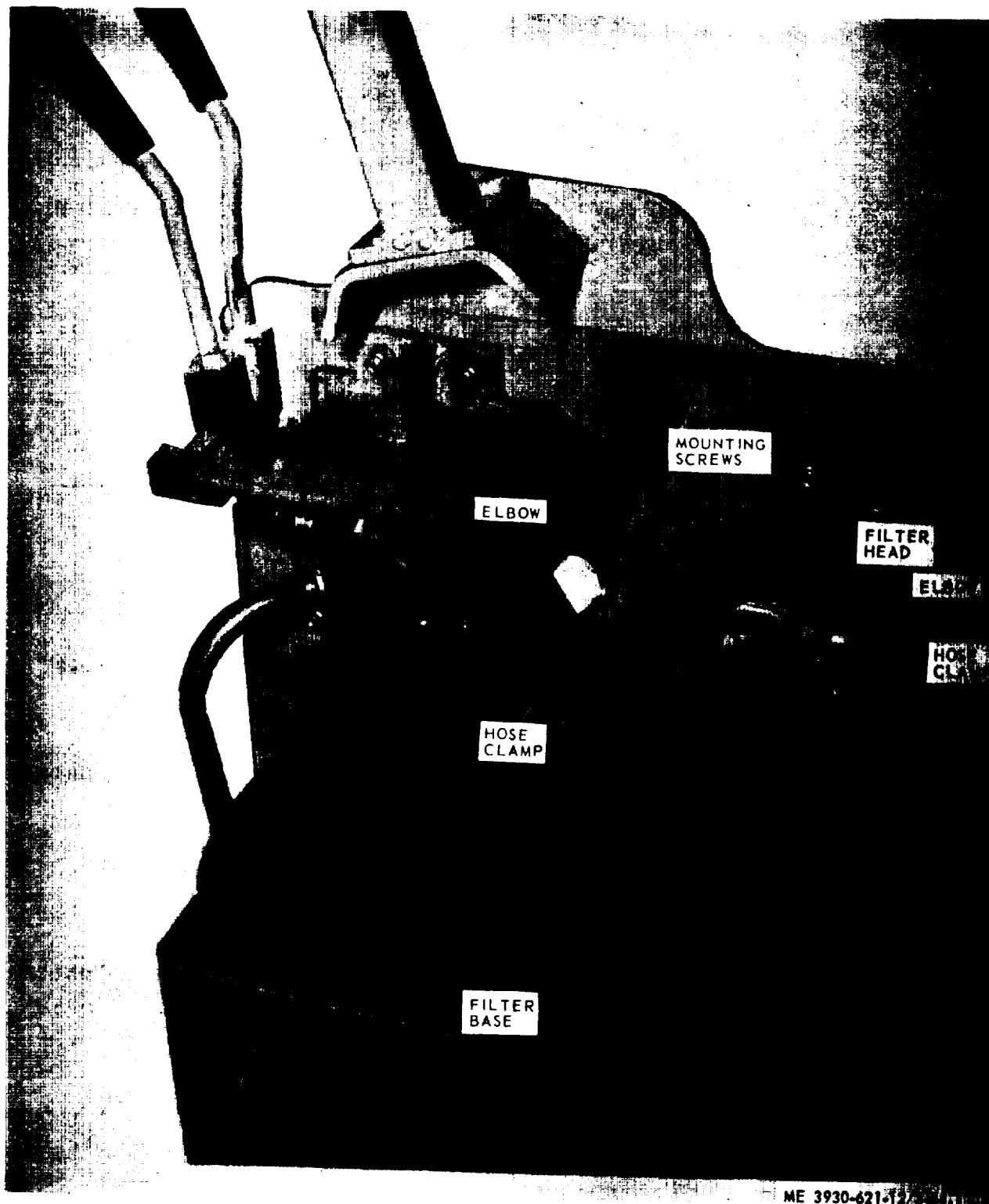


Figure 3-64.1. Hydraulic oil filter, service and replacement (Army Model MHE-224).

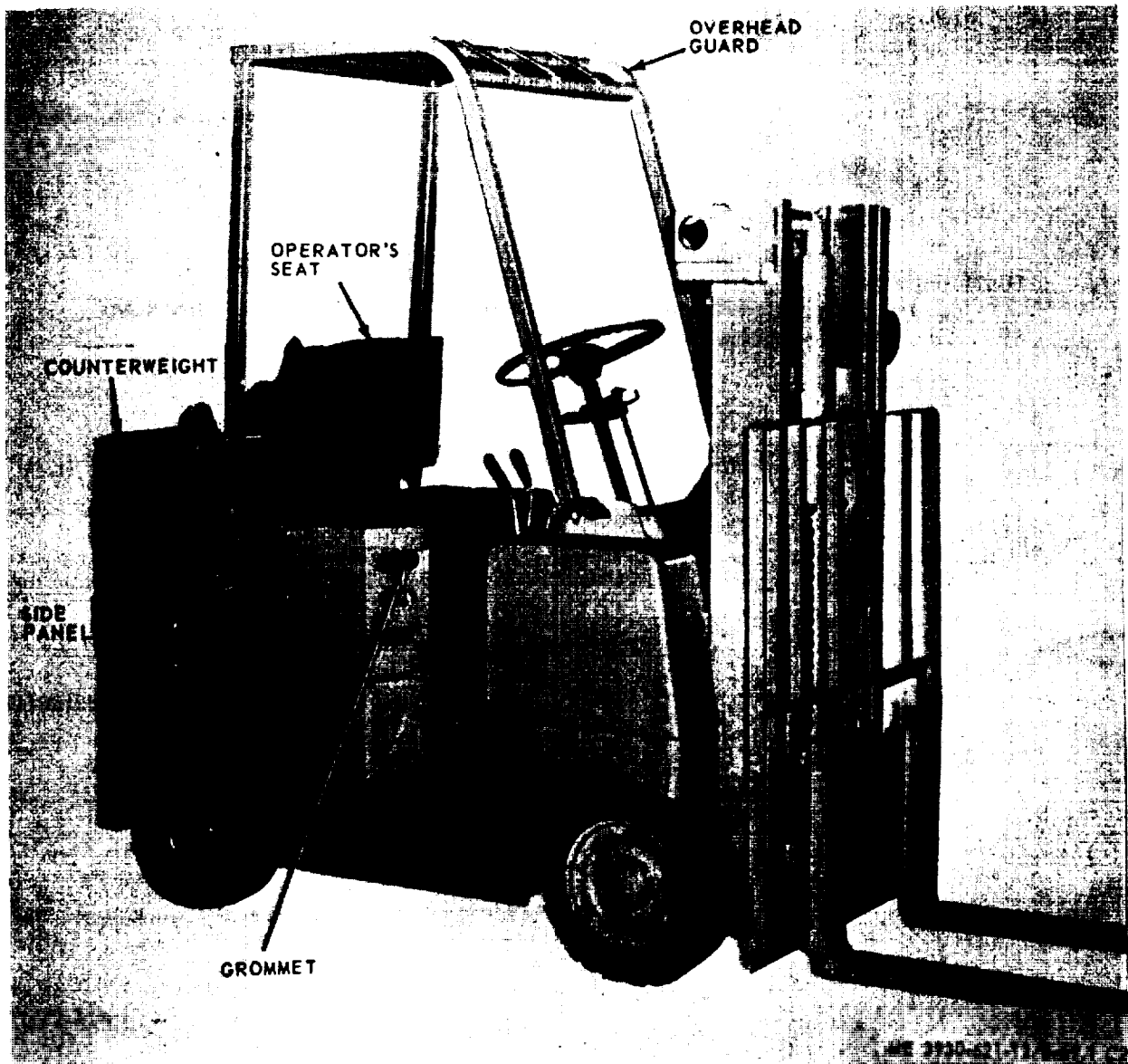


Figure 3-69.1. Frame, guard, and seat, installed view (Army Model MHE-224).

By Order of the Secretary of the Army:

Official:

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

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

Distribution:

To be distributed in accordance with DA Form 12-25A (Block No. 893), Operator requirements for Warehouse.

CHANGE }
No. 1 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 10 November 1971

Operator and Organizational Maintenance Manual

TRUCK, LIFT, FORK; GED; SOLID RUBBER TIRED WHEELS; 4000 LB

CAPACITY; 180 IN LIFT (ARMY MODEL MHE 209)

ALLIS-CHALMERS MODEL F40-24PS FSN 3930-459-5948

TM 10-3930-621-12, 5 August 1970, is changed as follows:

Page 2-2. Paragraph 2-1e. The warning is superseded and the following caution and warning are added:

CAUTION

When connecting battery cables make sure the positive (+) cable goes to the positive post and the negative (-) (ground) goes to the negative post. Electrical components could be damaged if cables are improperly connected.

WARNING

When jump-starting the battery, take the following precautions:

1. Remove vent caps from both batteries.
2. Cover vent openings with clean cloth to prevent dirt from entering batteries.
3. Use batteries of the same voltage (12 volts).
4. Always hook jumper cables to battery, positive (+) to positive and negative (-) (ground) to negative.

Page 2-7. Add figure number and caption beneath illustration.

Figure 2-5. Engine Stopping Instructions.

Page 3-3 and 3-4. Table 3-1.

Heading is changed as follows:

W-50 hours
M-250 hours
Q-1000 hours

Page 3-4. Table 3-1, Item 24. Under procedure add the following:

Remove and clean the crankcase breather cap with an approved solvent.

Page 3-8. Table 3-2. Items 1 through 8a are added as follows:

Table 3-2. Troubleshooting

Malfunction	Probable cause	Corrective action
1. Engine will not turn over.	a. Dead battery or loose connection.	a. Charge or replace battery. Check cables and tighten connections.
	b. Defective starter or starter button.	b. Replace starter or starter button.
2. Engine fails to start.	a. Cranking speed too slow.	a. Check batteries and charge batteries if necessary. Replace batteries if necessary. (para. 3-47).

Table 3-2. Troubleshooting (Continued)

Malfunction	Probable cause	Corrective action
3. Engine does not develop full power.	b. Faulty ignition	b. Check spark plugs for good spark. Set spark plug gap if necessary (para. 3-46). If spark is good, check ignition coil distributor, points, and wiring.
	c. No fuel in tank, or faulty fuel system.	c. Fill tank. Check fuel system for leaks, clogged filter, or defective carburetor. Check fuel shutoff valves at tank. Open valve, if necessary. Replace lines if defective. Clean filter (para. 3-31), replace defective carburetor (para. 3-29), or fuel pump (3-31).
	d. Intake manifold leaking or obstructed.	d. Clean manifold. Replace gasket (para. 3-26).
	a. Spark plug defective.	a. Clean, re-gap, or replace spark plugs as necessary (para. 3-46).
	b. Fuel shutoff partially closed or lines clogged.	b. Open valve. Clean lines.
	c. Manifold leaking.	c. Replace manifold gasket (para. 3-26).
	d. Ignition timing not correct.	d. Time ignition (para. 3-44).
	e. Engine governor out of adjustment.	e. Adjust governor (para. 3-30).
	f. Carburetor out of adjustment or defective.	f. Adjust or replace carburetor (para. 3-29).
	g. Valve tappet clearance incorrect.	g. Adjust clearance (para. 3-25).
4. Engine misses.	h. Engine losing compression.	h. Check compression (para. 3-27).
	i. Exhaust system clogged or damaged.	i. Clean exhaust system or replace damaged parts (para. 3-25).
	a. Spark plug defective.	a. Clean, re-gap, or replace plugs as necessary (para. 3-46).
	b. Contact points sticking or not properly gapped.	b. Clean points and set gap. Replace points if necessary (para. 3-44).
	c. Ignition timing incorrect.	c. Adjust timing (para. 3-44).
5. Engine overheats.	d. Manifold leaking.	d. Replace gasket (para. 3-26).
	e. Cylinder head gasket leaking.	e. Replace gasket (para. 3-24).
	a. Low coolant level.	a. Check for leaks. Add coolant to radiator.
	b. Drive belt worn or loose.	b. Adjust belt (para. 3-12). Replace worn belt (para. 3-29).
	c. Thermostat defective.	c. Replace thermostat (para. 3-38).
6. Engine noisy.	d. Cooling system or radiator clogged.	d. Clean cooling system by flushing. Clean clogged radiator.
	e. Defective water pump,	e. Replace water pump (para. 3-38).
	f. Improper ignition timing.	f. Adjust timing (para. 3-44).
	g. Cylinder head gasket leakage.	g. Replace gasket (para. 3-24).
	a. Low grade fuel.	a. Drain tank and replace with proper grade of fuel.
	b. Spark plugs fouled.	b. Clean, regap or replace plugs (para. 3-46).
	c. Low oil supply.	c. Fill with proper grade of oil for operating temperature (L.O. 10-3930-621-12).
	d. Improper ignition timing.	d. Adjust timing (para. 3-44).

Table 3-2. Troubleshooting (Continued)

Malfunction	Probable cause	Corrective action
7. High or low oil pressure.	e. Valve tappets improperly adjusted. a. Improper grade of oil. b. Low oil supply. c. Oil pressure gage defective.	e. Adjust tappets (para. 3-25). a. Drain crankcase and fill with proper grade of oil for operating temperature (L.O. 10-3930-621-12). b. Fill with proper grade of oil for operating temperature (L.O. 10-3930-621-12). c. Replace gage (para. 3-48). Normal operating pressure is 15- to 25-psi.
8. Excessive oil consumption.	a. Leakage in oil system or oil pan.	a. Check system for leaks and correct or refer to direct and general support maintenance personnel.

Page 3-14. Paragraph 3-25b is superseded, as follows.

b. Preparation.

(1) Remove front valve cover by:

(a) Remove PCV hose.

(b) Disconnect fuel lines and remove carburetor (para 3-29).

(c) Remove hourmeter actuating transmitter.

(d) Remove nut and washer securing front cover.

(2) Disconnect fuel lines from fuel pump and remove fuel pump (para 3-31).

(3) Remove capscrew and washer securing rear cover.

Page 3-15. Paragraph 3-25d (3) is superseded as follows:

(3) Install carburetor (para 3-29), fuel pump (para 3-31), fuel lines, and hourmeter actuating transmitter.

Page 3-24. Paragraph 3-38a is changed to read as follows:

a. *Removal.* Refer to paragraph 3-37 and remove radiator. Refer to 3-23 and remove thermostat and water pump as follows.

(1.1) (Added) Disconnect alternator at adjusting strap.

Paragraph 3-38c (8) is added as follows:

(8) Install alternator on adjusting strap.

Page 3-33. Paragraph 3-44i is added as follows:

i. *Distributor Point Dwell Angle.* Check the distributor point dwell angle as follows:

(1) Start engine and allow to operate at or below idle speed (approximately 350-500 RPM).

(2) With the function-selector switch of the

tachometer-dwell tester in the OFF position, connect the black lead to a suitable ground on the engine, connect the red lead to the positive part of the battery and connect the blue lead to the coil primary terminal on the side of the distributor.

NOTE

If the tachometer-dwell tester is equipped with two leads, connect the black lead to ground on the engine and connect red lead to primary terminal on side of distributor.

(3) Place the tachometer dwell tester controls in the "12 VOLT" and the "4 LOBE" position.

(4) Turn the function selector switch to "SET" or "CALIBRATE" position and adjust the control knob until the meter pointer is directly above the calibration line.

(5) Place the function selector switch in "DWELL" position and observe the meter reading which should be 31°- to 37°-degrees of dwell. If the reading on the dwell meter is not within this tolerance stated above, turn off the engine and remove the distributor cap. Touch the starter button until the breaker lever rubbing block is on a high lobe on the cam, thus opening the contact points to the maximum open position. Then adjust ignition points (para. 3-44g), install ignition cap start engine and observe degree of dwell again. It may be necessary to re-check the setting of the ignition points several times before the correct degree of dwell is obtained.

NOTE

If correct reading cannot be obtained with new ignition points installed, replace the distributor.

(6) Turn the function selector switch to "OFF" position and stop engine. Disconnect test leads.

Page 3-46. Paragraph 3-61.1 is added, as follows:

3-61.1. Parking Brake Shoes

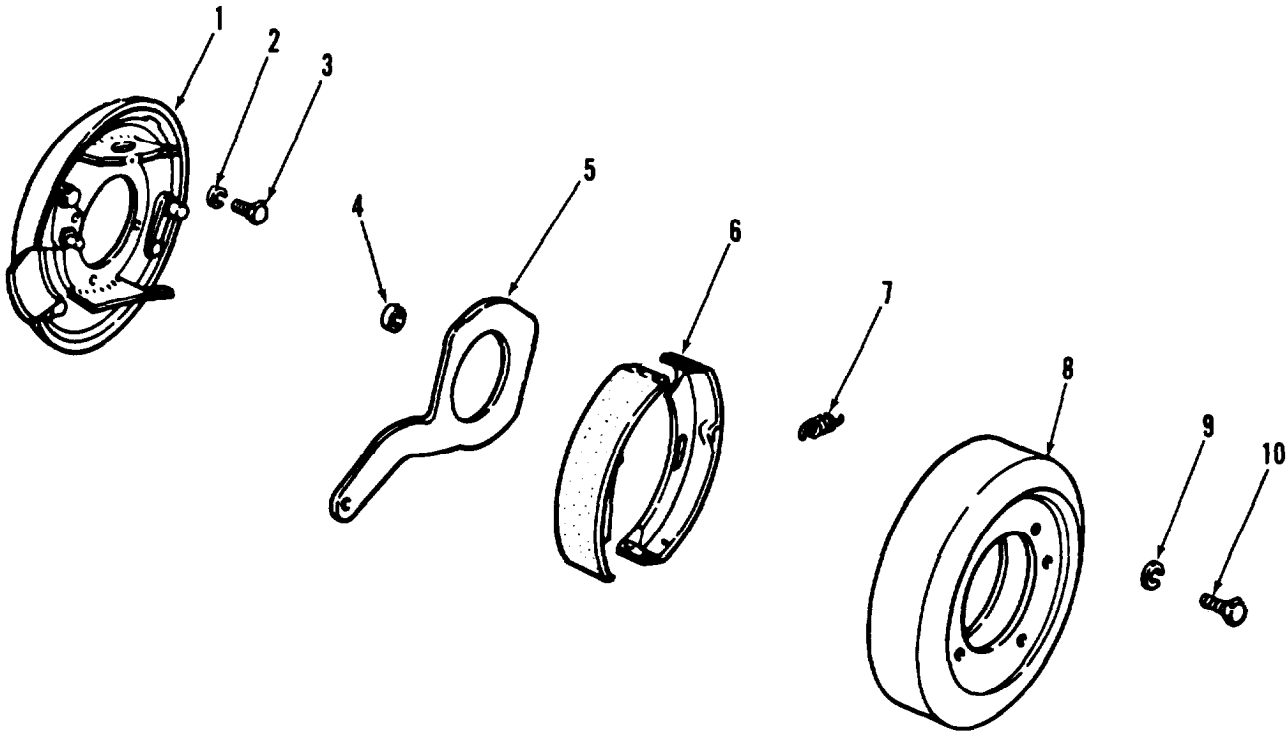
a. Removal.

- (1) Remove floor and toe plates.
- (2) Disconnect propeller shaft from differential pinion shaft flange (para. 3-56).
- (3) Disconnect parking brake cable (figure 3-51).

(4) Refer to figure 3-51.1 and remove the brake drum (8).

(5) Remove lever (5) and rollers (4) from backing plate (1).

(6) Remove brakeshoe return spring (7) and slide shoe and lining assembly (6) off backing plate (1).



ME 3930-621-12/3-51.1 C1

Figure 3-51.1. Parking brake assembly, exploded view.

b. Inspection.

- (1) Check backing plate (1) for distortion, loose or sheared rivets, or worn pawls.
- (2) Check brake lining on shoes (6) for wear or grease saturation. Wear limit for brake lining is to 0.0625 of an inch minimum thickness.
- (3) Check brake shoes and drum (8) for damage.
- (4) Replace defective parts as authorized.

c. Installation.

(1) Lightly coat backing plate (1) wear pads and pawls, cam lever (5), and brake shoe (6) wear points with grease. Avoid excessive lubricant as grease soaked linings are dangerous.

(2) Slide brake shoes (6) on backing plate (1) and install new return springs (7).

(3) Install cam lever (5) and rollers (4) on backing plate (1).

(4) Position brake drums (8) and install propeller shaft (para. 3-56).

(5) Connect parking brake cable and adjust (para. 3-61).

(6) Install floor and toe plate.

Page C-2. Section II of Maintenance Allocation Chart, add the following to group 05:

"Instruments" Inspect "C", Replace "0".

"LIGHTS" Inspect "C", Replace "0", Repair "0".

"Horn", Inspect "C", Test "0", Adjust "0", Replace "0".

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.

Ditribution:

To be distributed in accordance with DA Form 12-25, Section I (qty rqr block No. 193) Operator's Maintenance requirements for Truck, Fork Lift, Gasoline.

TECHNICAL MANUAL

No. 10-3930-621-12

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, D.C., 5 August 1970

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL
TRUCK, LIFT, FORK, GED, SOLID RUBBER TIRES,
4000 LBS CAPACITY, 180 IN LIFT, ARMY MODEL MHE 209
ALLIS CHALMERS MODEL F40-24PS
FSN 3930-459-5948

	Paragraphs	Pages
Chapter 1.	INTRODUCTION	
Section I.	General	1-1 - 1-3
II.	Description and data	1-4 - 1-6
Chapter 2.	INSTALLATION AND OPERATING INSTRUCTIONS	
Section I.	Service upon receipt of truck	2-1, 2-2
II.	Movement to a new worksite	2-3 - 2-5
III.	Controls and instruments	2-6, 2-7
IV.	Operation under usual conditions	2-8 - 2-14
V.	Operation of auxiliary material used in conjunction with the truck	2-15, 2-16
VI.	Operation under unusual conditions	2-17 - 2-21
Chapter 3.	OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS	
Section I.	Operator and organizational maintenance tools and equipment	3-1 - 3-3
II.	Lubrication	3-4, 3-5
III.	Preventive maintenance checks and services	3-6, 3-7
IV.	Operator's maintenance	3-8 - 3-12
V.	Troubleshooting	3-13
VI.	Field expedient repairs	3-14 - 3-18
VII.	Radio interference suppression	3-19 - 3-22
VIII.	Engine assembly	3-23 - 3-27
IX.	Fuel system	3-28 - 3-33
X.	Exhaust system	3-34, 3-35
XI.	Cooling system	3-36 - 3-39
XII.	Electrical system	3-40 - 3-51
XIII.	Transmission	3-52 - 3-54
XIV.	Propeller shaft	3-55, 3-56
XV.	Axle Assemblies	3-57 - 3-59
XVI.	Brakes	3-60 - 3-65
XVII.	Wheels	3-66, 3-67
XVIII.	Steering	3-68 - 3-71
XIX.	Hydraulic lift components	3-72 - 3-76
XX.	Frame, guard, and seat	3-77 - 3-79
Chapter 4.	SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE	
Section I.	Shipment and limited storage	4-1 - 4-5
II.	Demolition of material to prevent enemy use	4-6, 4-7
Appendix A.	References	A-1
B.	Basic issue items list and maintenance and operating supplies	B-1
C.	Maintenance allocation chart	C-1
Index		I-1

LIST OF ILLUSTRATIONS

<i>Number</i>	<i>Title</i>	<i>Page</i>
1-1.	Fork lift truck, with shipping dimensions, right side view	1-2
1-2.	Fork lift truck, left side view	1-2
1-3.	Wiring diagram	1-4
2-1.	Removing, installing, or adjusting lifting forks	2-1
2-2.	Controls and instruments	2-4
2-3.	Seat adjustment	2-5
2-4.	Engine starting instructions	2-6
2-5.	Engine stopping instructions	2-7
2-6.	Lifting operation	2-8
2-7.	Lowering operation	2-9
3-1.	Engine oil filter, service and replacement	3-2
3-2.	Engine air cleaner, service and replacement	3-5
3-3.	Battery service	3-6
3-4.	Drive belt adjustment	3-7
3-5.	Ignition coil capacitor, removal and installation	3-11
3-6.	Ignition switch capacitor, removal and installation	3-12
3-7.	Cylinder head, exploded view	3-13
3-8.	Cylinder head tightening sequence	3-14
3-9.	Flywheel timing marks	3-15
3-10.	Loosening valve tappet locknut	3-15
3-11.	Checking valve clearance	3-15
3-12.	Manifold, installed view	3-16
3-13.	Carburetor, installed view	3-17
3-14.	Governor, installed view	3-18
3-15.	Governor spring adjustment	3-19
3-16.	Fuel pump, installed view	3-19
3-17.	Accelerator and linkage, exploded view	3-20
3-18.	Fuel tank, installed view	3-21
3-19.	Exhaust elbow, installed view	3-22
3-20.	Muffler and pipes, exploded view	3-22
3-21.	Radiator grille, installed view	3-23
3-22.	Radiator and hoses, exploded view	3-23
3-23.	Rater pump and thermostat, exploded view	3-25
3-24.	Hydraulic pump, installed view	3-26
3-25.	Connections for alternator output test	3-27
3-26.	Alternator, installed view	3-28
3-27.	Voltage regulator, installed view	3-28
3-28.	Voltage regulator adjustment	3-29
3-29.	Checking voltage regulator setting	3-30
3-30.	Starter, installed view	3-30
3-31.	Starter solenoid switch, installed view	3-31
3-32.	Ignition distributor, installed view	3-31
3-33.	Ignition distributor, exploded view	3-32
3-34.	Adjusting distributor contact point gap	3-33
3-35.	Ignition coil, installed view	3-34
3-36.	Ignition coil test wiring	3-34
3-37.	Battery, installed view	3-36
3-38.	Oil pressure transmitter, installed view	3-37
3-39.	Hourmeter actuating transmitter. installed view	3-37
3-40.	Coolant temperature transmitter. installed view	3-37
3-41.	Headlight, removal and installation	3-38
3-42.	Combination rear light, exploded view	3-38
3-43.	Horn and horn relay, installed view	3-39
3-44.	Transmission neutral switch, installed view	3-40
3-45.	Transmission oil filter, installed view	3-41
3-46.	Transmission oil level gage	3-41
3-47.	Transmission oil cooler lines, exploded view	3-42
3-48.	Propeller shaft, installed view	3-43
3-49.	Propeller shaft, exploded view	3-43
3-50.	Parking brake lever, installed view	3-45
3-51.	Parking brake cable, installed view	3-45
3-52.	Service brake pedal adjustment	3-46

<i>Number</i>	<i>Title</i>	<i>Page</i>
3-53.	Service brake master cylinder, installed view	3-46
3-54.	Service brake system bleeder screw	3-47
3-55.	Service brake dust shield, installed view	3-47
3-56.	Service brake shoes, installed view	3-48
3-57.	Drive wheel, exploded view	3-50
3-58.	Rear wheel, exploded view	3-51
3-59.	Hydraulic system, schematic diagram	3-52
3-60.	Tie rod, exploded view	3-53
3-61.	Steering cylinder, exploded view	3-54
3-62.	Steering wheel spindle stop screw adjustment	3-55
3-63.	Hydraulic oil reservoir and breather, installed view	3-56
3-64.	Hydraulic oil filter, service and replacement	3-56
3-65.	Tilt cylinder, installed view	3-57
3-66.	Checking degrees of mast tilt	3-57
3-67.	Lift chains and carriage, installed view	3-58
3-68.	Lift chains and chain anchors, installed view	3-58
3-69.	Frame, guard, and seat, installed view	3-59

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. These instructions are published for the use of personnel to whom the Allis-Chalmers Fork Lift Truck Model F40-24PS, Army Model MHE-209, Federal Stock Number 3930-459-5948 is issued. They provide information on the operation and organizational maintenance of the equipment. Included in the manual are descriptions of the main units and their functions in relation to other components.

b. Appendix I contains a list of publications applicable to this manual. Appendix II contains a list of basic issue items and maintenance and operating supplies authorized the operator of the equipment. Appendix III consists of Maintenance Allocation Chart. Spare parts allocated to organizational maintenance are listed in TM 10-3930-621-20P.

1-2. Record and Report Forms

a. DA Form 2258, Depreservation Guide to Engineer Equipment.

b. DA Form 1397, Processing and Deprocessing for Shipment, Storage, and Issue of Vehicles and Spare Engines.

c. For other record and report forms applicable to operator/crew and organizational maintenance, refer to TM 38-750.

d. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to the Commanding General, U.S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, MO. 63120.

1-3. Orientation

Throughout this manual the terms right, left, front, and rear with respect to the truck and components is determined from the viewpoint of the operator sitting in the seat of the truck.

Section II. DESCRIPTION AND DATA

1-4. Description

a. The Army Model MHE-209 (Allis-Chalmers Model F40-24PS) is a nontactical fork lift truck (fig. 1-1 and 1-2; designed for warehouse operation. The

truck can be used to load, transport, unload, and stack loads weighing as much as 4,000 pounds at a 24 inch load center. (The load center is measured from the heel of the fork.)

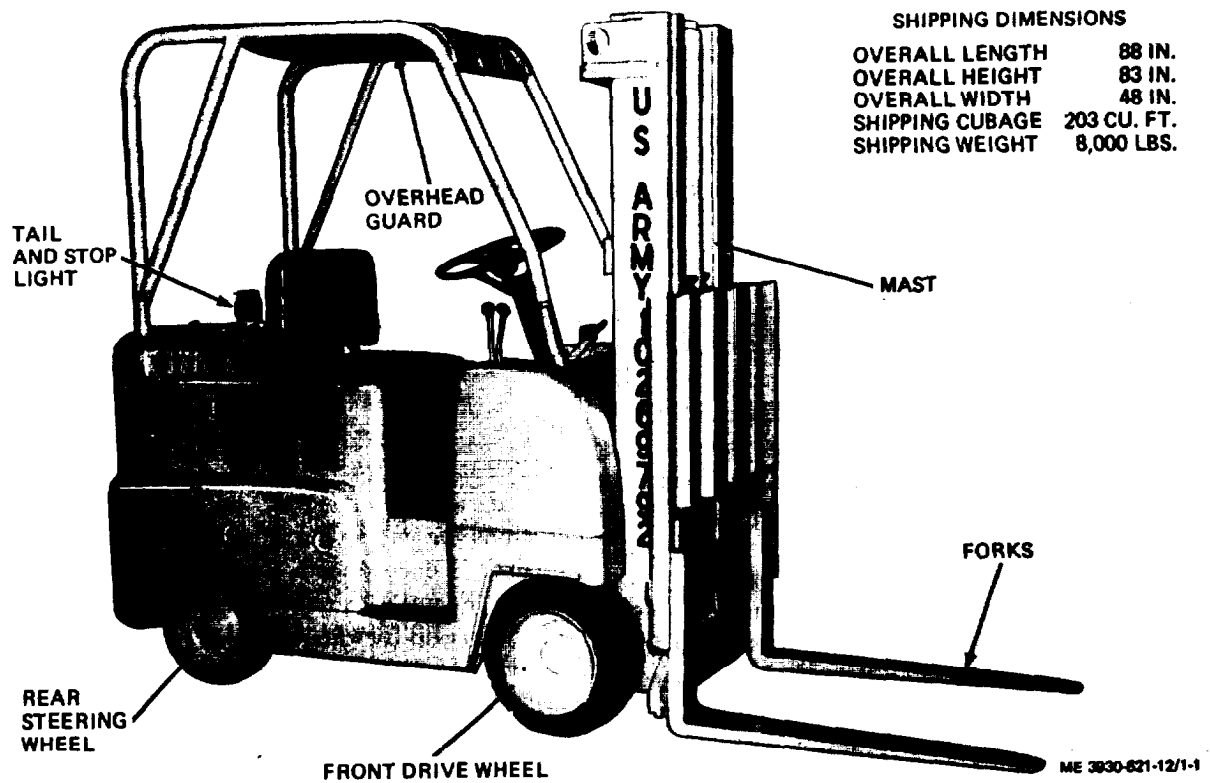


Figure 1-1. Fork lift truck, with shipping dimensions, right side view.

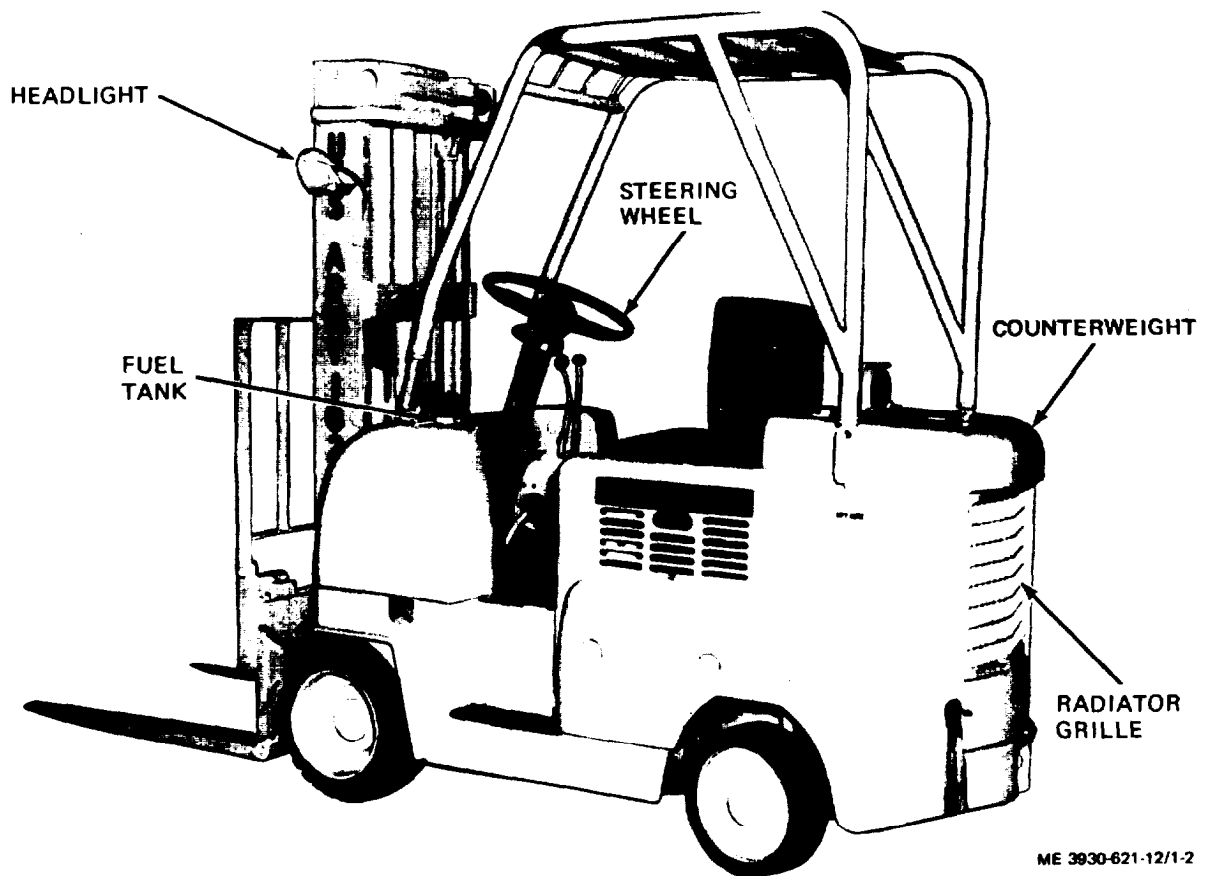


Figure 1-2. Fork lift truck, left side view.

b. Loads weighing up to 4,000 pounds as described above can be lifted to a height of 180 inches. Lifts of this height are made possible by the use of a three-section mast, with a lift cylinder and a cylinder cluster providing power for movement.

c. The truck is powered by a four cylinder, four stroke cycle, flat head, liquid cooled gasoline engine. Coupled to the engine is a power shift, single speed transmission. A short propeller shaft connects the transmission to the forward drive axle.

d. Hydraulic oil pressure for the steering gear and cylinder, lift cylinders, and tilt cylinders is supplied by a hydraulic pump. The pump is directly driven by the engine crankshaft. Speed of lift is controlled by positioning control lever and increasing or decreasing engine speed.

1-5. Tabulated Data

a. Capacities.

Cooling system	10 qt.
Crankcase (with filter)	5 qt.
Differential	6 pt.
Fuel tank	4½ gal.
Air cleaner	1 pt.
Hydraulic system	4¾ gal.
Transmission	10 qt.

b. Dimensions and Weight.

Ground clearance (at mast center)	5 in.
Height:	
With uprights extended	228 in.
With uprights retracted	83 in.
Length:	
Overall	126¾ in.
Forks	40 in.
Forks spread (maximum)	34½ in.
Width	48 in.
Weight	8,000 lbs.

c. Performance.

Aisle width (minimum):	
Intersecting	55½ in.

Right angle stacking	92¼ in.
Lift height (maximum)	180 in.
Load capacity (maximum)	4,000 lbs.
Maximum speed (loaded):	
Forward	8 mph
Reverse	8 mph

Number of speeds:

Forward	1
Reverse	1

Tilt limitation:

Backward	6 deg.
Forward	2 deg.

Turning radius:

Inside	3 in.
Outside	5 ft. 2 in.

d. Tires.

Type	Solid
Number	4
Size:	
Drive	18 x 9 x 12 1/8
Steer	15 x 5 x 11 1/4

e. Engine.

Make	Waukesha
Model	FCB-G5943
Firing Order	1-3-4-2
Governed speed:	
Under load	2000 rpm
Without load	2200 rpm
Idle speed	600 rpm

f. Critical Torque Values.

Cylinder head bolts	61-62 ft-lb
Spark plugs	20-25 ft-lb

g. Battery.

Voltage	12
Ground	Negative

h. Hydraulic System.

Pressure setting:	
Engine speed 2000 rpm	1,950 psi

i. Wiring Diagram.

Refer to figure 1-3 for the wiring diagram of the fork lift truck.

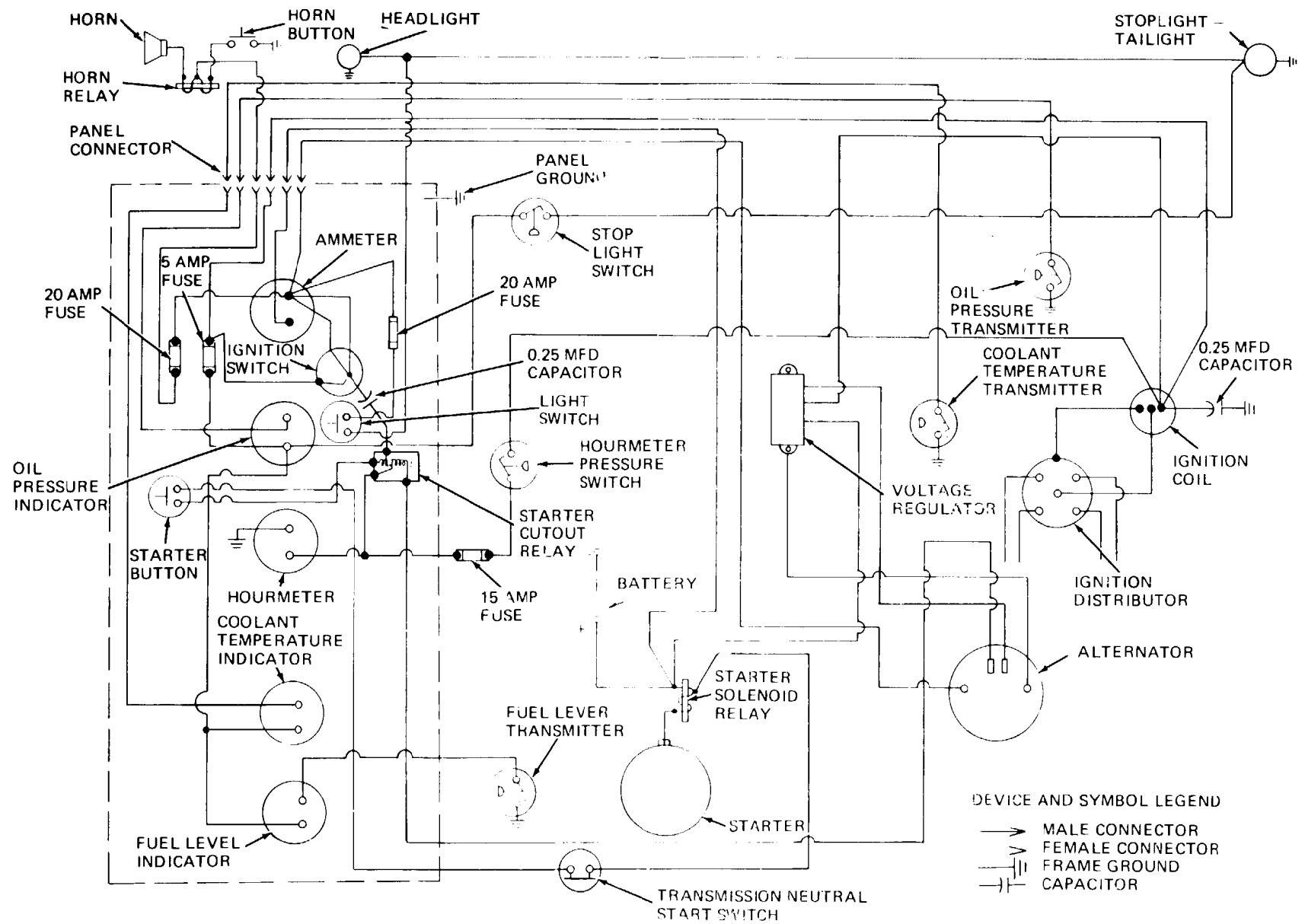


Figure 1-3. Wiring diagram.

j. Maintenance and Operating Supplies.

Refer to Appendix B, Section II, for a complete list of maintenance and operating supplies required for initial operation

1-6. Difference between Models

The only model covered in this manual is the Allis Chalmers Model F40-24PS Army Model MHE-209 4,000 pound fork lift truck.

CHAPTER 2

INSTALLATION AND OPERATING INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF TRUCK

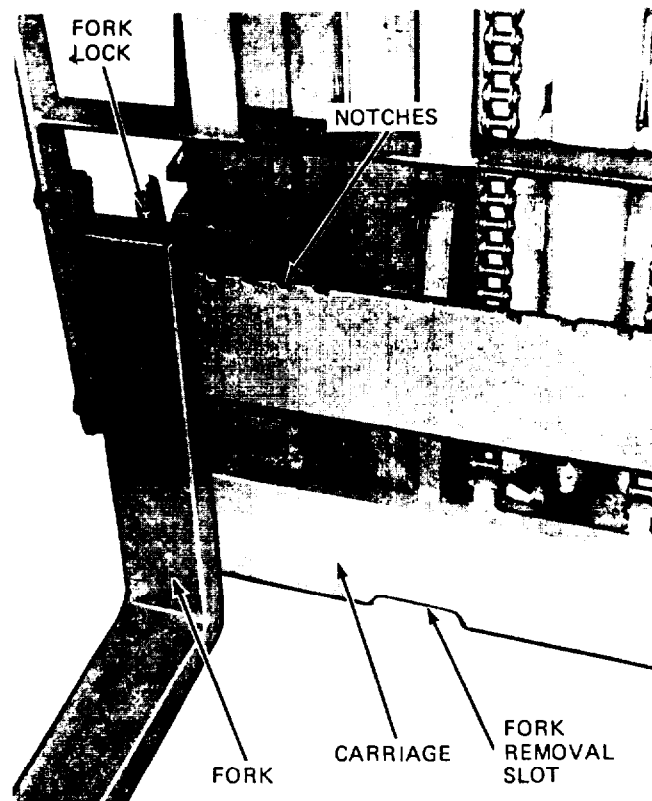
2-1. Inspecting and Servicing the Equipment

a. When a truck is received by the using organization it must be serviced to prepare it for operation. The services required are described in paragraph 3-7.

b. Carefully inspect the truck for any signs of dents or damage that may have occurred during shipment.

Pay particular attention to sheet metal panels and controls and instruments.

c. Remove tape, paper, and other packing materials. Remove forks from truck by removing strapping and tie downs and install forks on carriage as shown on figure 2-1.



INSTALLATION

1. RELEASE FORK LOCK BY TURNING POINT UP.
2. SLIDE FORK IN LINE WITH SLOT ON CARRIAGE. LIFT FRONT OF FORK UP AND SLIDE INTO POSITION.
3. TURN POINT OF FORK LOCK DOWN TO LOCK FORK IN NOTCH ON CARRIAGE.

REMOVAL

1. TURN POINT UP TO RELEASE FORK LOCK.
2. SLIDE FORK IN LINE WITH SLOT ON CARRIAGE. LIFT FRONT OF FORK UP AND REMOVE FROM CARRIAGE.

ADJUSTMENT

1. RELEASE LOCK.
2. SLIDE FORK IN LINE WITH NOTCH AND LOCK IN POSITION.

ME 3930-621-12/2-1

Figure 2-1. Removing, installing, or adjusting carriage forks.

d. Remove any preservative compound that has been sprayed on metal surfaces with cleaning compound, solvent (Spec. P-S-661) and dry thoroughly.

Note. Preservative compound is not a lubricant. Take special care to completely remove the compound from all nearing surfaces.

e. Fill battery with electrolyte to three-eighths of an inch above the plates. Check specific gravity of electrolyte as prescribed in TM 9-6140-200-15.

Warning: When servicing battery, do not smoke or use flame in the vicinity. Batteries generate hydrogen, a highly explosive gas.

f. Lubricate the truck in accordance with the current lubrication order.

g. See that the cooling system contains the proper anti-freeze mixture in accordance with table 2-1.

h. Check drive belts and adjust for proper deflection.

i. Refer to Appendix B and fill the fuel tank with proper grade of fuel.

Warning: Do not fill fuel tank while engine is running. When filling tank always provide metal-to-metal contact between fuel tank and container. Contact will prevent spark from being generated as fuel flows over metal surfaces.

Table 2-1. Freezing Points, Composition and Specific Gravities of Military Antifreeze Materials

Lowest expected ambient temperature °F	Pints of inhibited glycol per gal. of coolant ¹	Compound, antifreeze Arctic ²	Ethylene glycol coolant solution specific gravity at 68° F ³
+ 2	1½	Issued full strength and ready mixed for 0 to 65 F temperatures for both initial installation and replenishment of losses. DO NOT DILUTE WITH WATER OR ANY OTHER SUBSTANCE.	1.022
+10	2		1.036
0	2¾		1.047
-10	3¼		1.055
-20	4		1.062
-30	4¼		1.067
-40	Arctic		1.073
-50	anti-		
-60	freeze		
-75	pre-ferred		

¹ Maximum protection is obtained at 60 percent by volume (4.8 pints of ethylene glycol per gallon of solution).

² Military Specification MIL-C-11755 Arctic type, nonvolatile antifreeze compound is intended for use in the cooling system of liquid-cooled internal combustion engines. It is used for protection against freezing primarily in Arctic regions, where the ambient temperature remains for extended periods close to -40° F or drops below, to as low as -90° F.

³ Use an accurate hydrometer. To test hydrometer, use 1 part ethylene glycol to 2 parts water. This should produce a hydrometer reading of 0° F.

Note. Fasten a tag near the radiator filler cap indicating the type antifreeze.

2-2. Installation of Separately Packed Components

a. *Components.* The only components not already installed are the forks, the electrolyte, and the fire extinguisher.

b. *Fire Extinguisher.* Remove separately packed fire extinguisher and install in bracket behind seat of truck. Be certain bracket clamp locks properly to secure fire extinguisher in position.

Section II. MOVEMENT TO A NEW WORKSITE

2-3. Dismantling for Movement

The only component that may require dismantling for movement is the forks. If necessary to conserve space when transporting the lift truck by means of another carrier, refer to figure 2-1 and remove the forks.

2-4. Reinstallation after Movement

If forks were removed to transport the lift truck,

refer to figure 2-1 and install the forks on the carriage.

2-5. Normal Movement

The fork lift truck is fully mobile and can normally be moved to a new worksite under its own power.

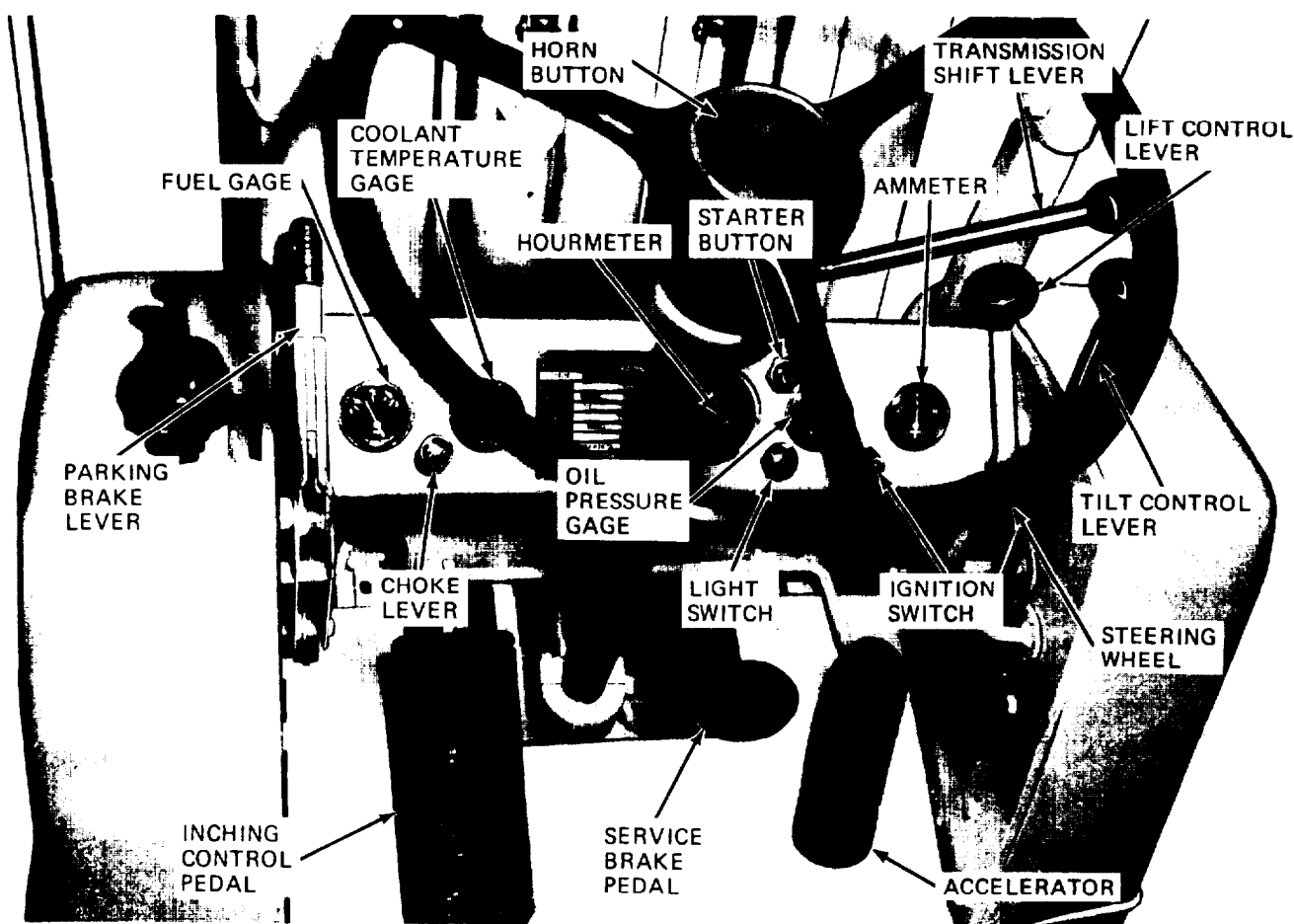
Section III. CONTROLS AND INSTRUMENTS

2-6. General

This section describes, locates, illustrates, and furnishes the operator, crew, or organizational maintenance personnel sufficient information to insure proper operation of the fork lift truck.

2-7. Controls and Instruments

Refer to figures 2-2 and 2-3 for the purpose, normal readings, and location of all controls and instruments.



CONTROLS

1. PARKING BRAKE LEVER - PULL BACK ON LEVER TO APPLY PARKING BRAKE. MOVE LEVER FORWARD TO RELEASE BRAKE.
2. HORN BUTTON - DEPRESS BUTTON TO SOUND HORN.
3. STARTER BUTTON - DEPRESS BUTTON TO ACTUATE ENGINE STARTER.
4. TRANSMISSION SHIFT LEVER - MOVE LEVER TO BRING POINTER TO "F" POSITION TO MOVE TRUCK FORWARD; MOVE LEVER TO BRING POINTER TO "R" POSITION TO MOVE TRUCK TO REAR; POSITION LEVER IN "N" (NEUTRAL) WHEN PARKING OR STARTING TRUCK.
5. LIFT CONTROL LEVER - MOVE LEVER TO REAR TO LIFT FORKS; MOVE LEVER FORWARD TO LOWER FORKS.
6. TILT CONTROL LEVER - MOVE LEVER FORWARD TO TILT FORKS FORWARD; PULL LEVER TO REAR TO TILT FORKS BACKWARD.
7. STEERING WHEEL - ROTATE WHEEL IN DIRECTION DESIRED TO TURN TRUCK.
8. ACCELERATOR - DEPRESS PEDAL TO INCREASE ENGINE SPEED; RELEASE PEDAL TO DECREASE ENGINE SPEED.
9. IGNITION SWITCH - ROTATE SWITCH TO RIGHT TO ACTUATE TRUCK ELECTRICAL CIRCUITS. SWITCH MUST BE ON TO OPERATE INSTRUMENTS AND START TRUCK.
10. SERVICE BRAKE PEDAL - DEPRESS PEDAL TO APPLY BRAKES AND STOP TRUCK.
11. INCHING CONTROL PEDAL - DEPRESS PEDAL TO SLOW TRANSMISSION SPEED AND ALLOW HIGH ENGINE SPEED. GIVES OPERATOR PRECISE CONTROL FOR INCHING LOADS.
12. CHOKE LEVER - PULL OUT TO CLOSE CHOKE VALVE DURING ENGINE START. PUSH ALL THE WAY IN TO OPEN CHOKE FOR NORMAL OPERATION.
13. LIGHT SWITCH - PULL SWITCH OUT TO TURN ON LIGHTS.

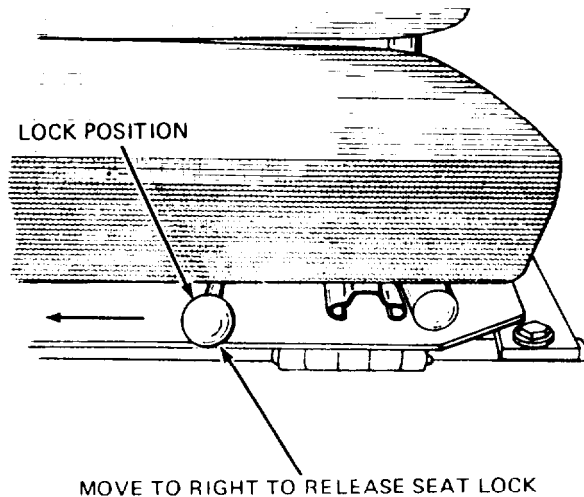
INSTRUMENTS

1. FUEL GAGE - INDICATES AMOUNT OF FUEL IN FUEL TANK.
2. COOLANT TEMPERATURE GAGE - INDICATES ENGINE OPERATING TEMPERATURE. NORMAL READING SHOULD BE 160° TO 180°F.
3. AMMETER - INDICATES AMOUNT OF CURRENT FLOWING TO OR FROM THE BATTERY. SHOULD SHOW HIGH RATE OF CHARGE AFTER STARTING AND TAPER DOWN TO NEAR CENTER OF DIAL AFTER OPERATING A SHORT TIME.
4. OIL PRESSURE GAGE - INDICATES WORKING OIL PRESSURE OF THE ENGINE. NORMAL OPERATION SHOULD INDICATE 15 TO 20 PSI AT NORMAL OPERATING SPEED.
5. HOURMETER - OPERATES WHEN OIL PRESSURE IS AT NORMAL OPERATING PRESSURE AND RECORDS HOURS OF ENGINE OPERATION.

ME 3930-621-12/2-2

Figure 2-2. Controls and instruments.

RELEASE LOCK AND MOVE
SEAT AS REQUIRED



ME 3930 621 12/2-3

Figure 2-3. Seat adjustment.

Section IV. OPERATION UNDER USUAL CONDITIONS

2-8. General

a. The instructions in this section are published for the information and guidance of personnel responsible for operation of the fork lift truck.

b. The operator must know how to perform every operation of which the fork lift truck is capable. The section gives instructions on starting and stopping the truck, operation of the truck, and on co-ordinating the basic motions to perform the specific tasks for which the equipment is designed. Since nearly every job presents a different problem the operator

may have to vary given procedures to fit the individual job.

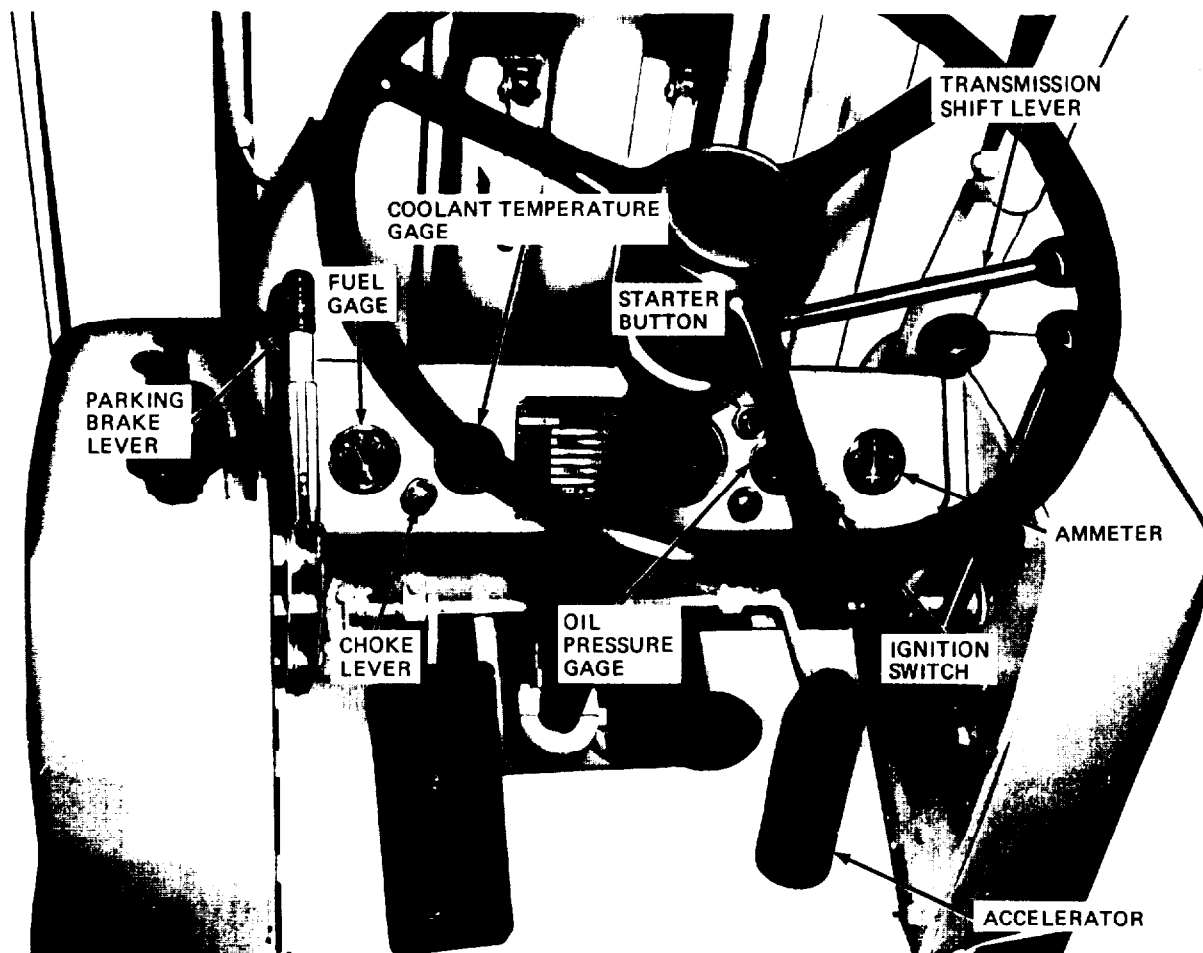
2-9. Starting

a. *Preparation for Starting.*

(1) Perform the before operation services (para 3-7).

(2) If necessary, lubricate the truck as specified in the current lubrication order.

b. *Starting.* Refer to figure 2-4 and start the truck.



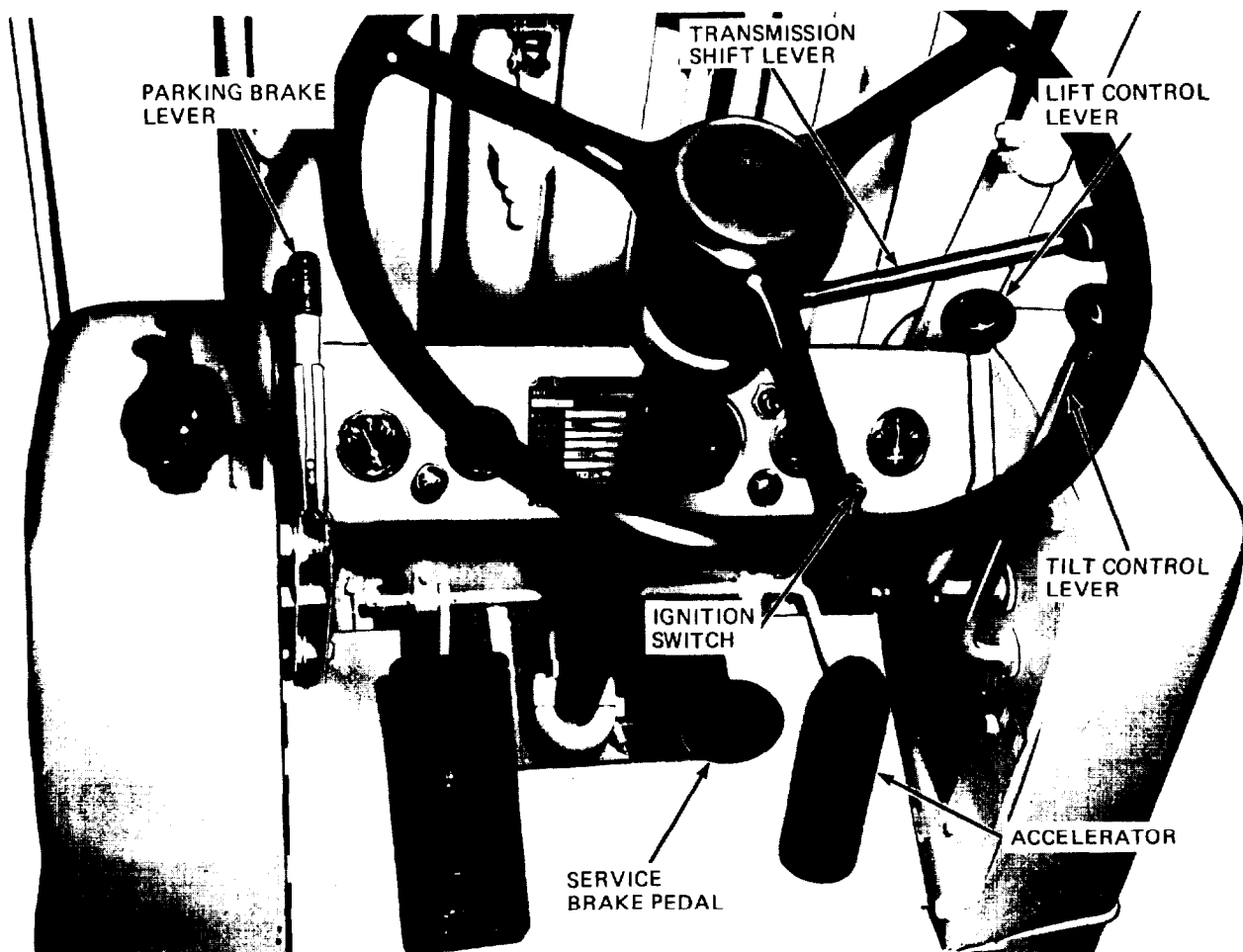
1. PULL PARKING BRAKE LEVER TO REAR TO SET PARKING BRAKE.
2. PLACE TRANSMISSION SHIFT LEVER IN "N" (NEUTRAL) POSITION.
3. IF ENGINE IS COLD PULL CHOKE LEVER ALL THE WAY OUT.
4. DEPRESS ACCELERATOR APPROXIMATELY ONE-THIRD OF THE WAY.
5. TURN IGNITION SWITCH TO RIGHT TO "ON" POSITION.
6. DEPRESS STARTER BUTTON TO CRANK ENGINE. RELEASE BUTTON WHEN ENGINE STARTS.
CAUTION. DO NOT OPERATE STARTER CONTINUOUSLY FOR LONGER THAN 30 SECONDS. IF ENGINE FAILS TO START AFTER 30 SECONDS. ALLOW STARTER TO COOL OFF FOR TWO MINUTES BEFORE ATTEMPTING TO START ENGINE AGAIN.
7. HOLD ACCELERATOR STEADY AND ALLOW ENGINE TO WARM UP AT FAST IDLING SPEED.
8. CHECK OIL PRESSURE GAGE AND AMMETER FOR NORMAL READINGS. AS ENGINE WARMS UP, PUSH IN ON CHOKE LEVER. WHEN ENGINE IS WARM, PUSH LEVER ALL THE WAY IN.
9. WITH ENGINE AT OPERATING TEMPERATURE, CHECK FOR PROPER READINGS ON AMMETER, OIL PRESSURE GAGE, AND COOLANT TEMPERATURE GAGE. CHECK FUEL GAGE AND HOURMETER FOR PROPER OPERATION.
10. REPORT ANY MALFUNCTIONS TO PROPER AUTHORITY.

ME 3930-621-12/2-4

Figure 2-4. Engine starting instructions.

2-10. Stopping

- a. Refer to figure 2-5 and stop the truck.



1. RELEASE FOOT FROM ACCELERATOR.
2. DEPRESS SERVICE BRAKE GRADUALLY TO BRING TRUCK TO SAFE SMOOTH STOP.
3. PULL PARKING BRAKE LEVER TO REAR TO APPLY PARKING BRAKE.
4. MOVE TILT CONTROL LEVER FORWARD TO PLACE MAST IN VERTICAL POSITION.
5. MOVE LIFT CONTROL LEVER FORWARD AND LOWER FORKS TO GROUND.
6. TURN IGNITION SWITCH TO THE LEFT TO "OFF" POSITION TO STOP ENGINE.

ME 3930-621-12/2-5

- b. Perform the after-operation services (para 3-7).

2-11. Operation of Equipment

The following paragraphs and illustrations describe truck operation under usual conditions.

2-12. Moving the Truck

- a. Refer to paragraph 2-11 and start the truck engine.
- b. Raise forks slightly to clear ground by pulling lift control lever (fig. 2-2) to rear.
- c. With engine at idle speed, release parking brake (fig. 2-2).
- d. Place transmission control lever (fig. 2-2) in F for forward movement or R for reverse movement.
- e. Depress accelerator (fig. 2-2) to increase engine speed and move truck. Control speed of movement with pressure on accelerator.

Warning: Use caution when approaching doorways, aisles, intersections, or other workers.

- f. Control direction of movement by turning steering wheel (fig. 2-2) to guide truck.

Caution: Avoid sudden stopping and starting. Reduce speed on turns.

- g. To change direction of travel release accelerator and depress brake pedal (fig. 2-2) to halt movement, using inching control pedal (fig. 2-2) where required to prevent engine from stalling. After truck comes to a complete stop, move transmission control lever to direction desired (d above) and repeat steps e and f.

- h. The inching control pedal (fig. 2-2) is provided to aid the operator in moving into a load. Depressing the pedal will slow truck travel while allowing the operator to maintain engine speed at the rate required.

- i. After completing movement and with truck

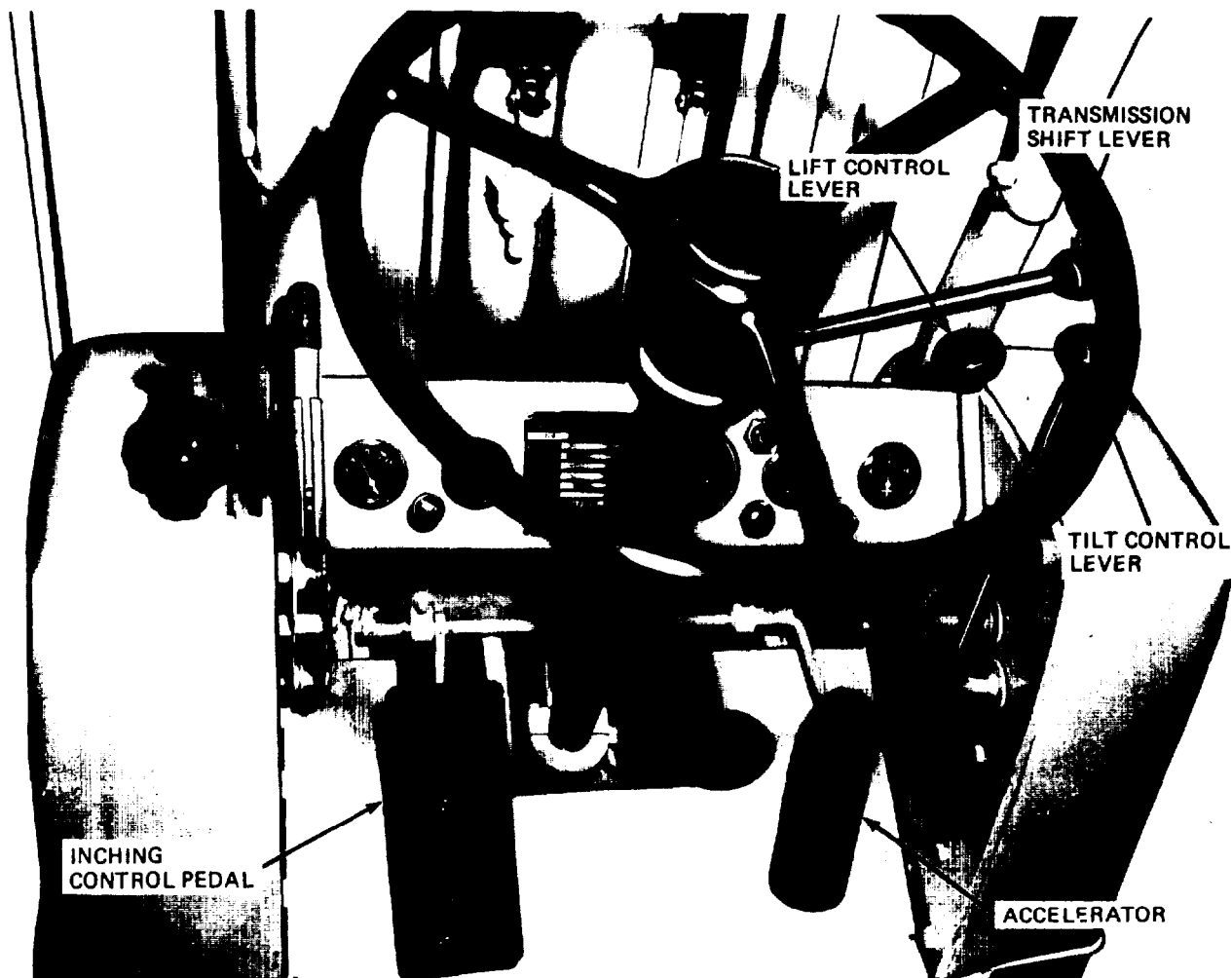
parked, refer to paragraph 2-10 to stop truck engine. Park truck on level surface if possible. If necessary to park truck on an incline, set brakes and block at least two wheels in event of parking brake failure.

Caution: Make sure forks are lowered to the ground and parking brake is engaged firmly.

2-13. Lifting and Transporting a Load

a. Refer to paragraph 2-12 and move the truck to the vicinity of the load.

b. As truck nears load, bring truck to a halt and raise or lower forks to position them under a load. Refer to figure 2-6 for listing operations.



1. BRING TRUCK TO A HALT.
2. RAISE OR LOWER FORKS, USING LIFT CONTROL LEVER, TO BRING FORKS IN LINE WITH LOAD.
3. MOVE TRUCK FORWARD, USING INCHING CONTROL AND ACCELERATOR, TO BRING FORKS UNDER LOAD.
4. PULL LIFT CONTROL LEVER TO REAR TO RAISE FORKS AND LOAD TO CLEAR GROUND OR STACK. MOVE TRUCK IN REVERSE TO CLEAR STACK.
5. TILT MAST TO THE REAR BY PULLING TILT CONTROL LEVER TO REAR, TO SAFELY TRANSPORT LOAD.
6. RAISE OR LOWER LOAD AS NECESSARY, USING LIFT CONTROL LEVER.

ME 3930-621-12/2-6

Figure 2-6. Lifting operation.

c. If load is on a pallet, center forks between upper and lower members of pallet. With the mast in vertical position, move truck forward (para 2-12) using accelerator and inching control, until load rests against rear of forks.

Caution: Know the rated capacity of the truck. 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 backrest.

d. Refer to paragraph 2-12 and move truck away floor below the load. Tilt must back by pulling tilt control lever (fig. 2-6) to rear. Mast must be tilted far enough to rear to travel safely with load. To increase speed of lift and tilt movement, increase engine speed.

e. Place transmission shift lever in reverse and move truck and load to rear to clear stack or other obstacle. Turn truck to face in direction of travel required. If load is raised, lower load to assure clear vision forward. If load is bulky and obstructs vision it may be required to travel in reverse to enable operator to see.

Caution: When transporting bulky loads, travel in reverse. Always descend ramps in reverse when carrying load.

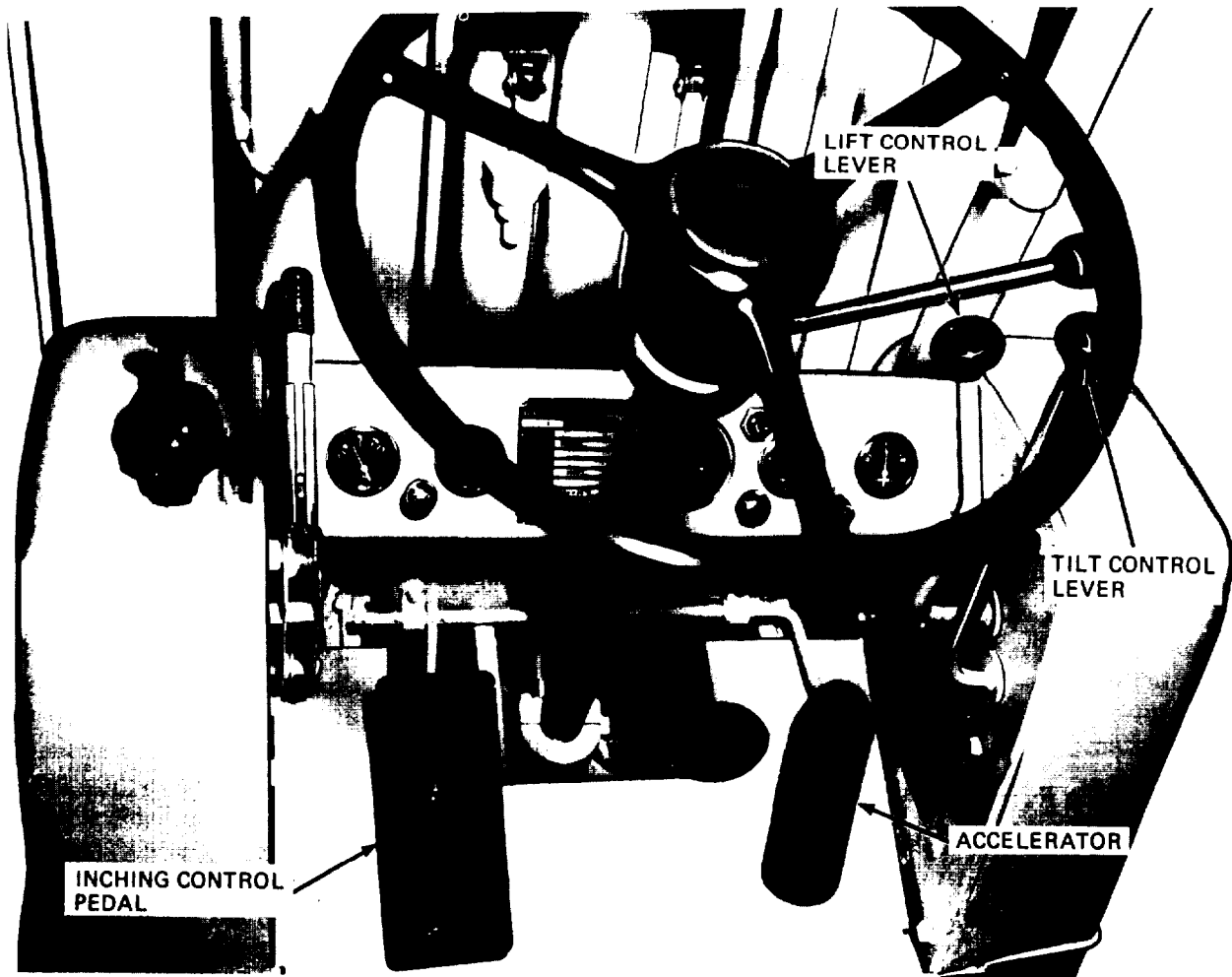
f. Obey speed limits and drive carefully. Avoid

sharp turns at too high of a speed, which could cause load to slip off or tip truck.

Warning: Always travel with the load tilted back and forks raised just high enough to clear any uneven floor conditions.

2-14. Depositing the Load

a. Move truck with load to place where load is to be deposited. Refer to figure 2-6 to raise or figure 2-7 to lower load and move truck as necessary to bring it in line with top of stack of ground.



1. MOVE TRUCK INTO POSITION WITH INCHING CONTROL PEDAL AND ACCELERATOR TO BRING FORKS AND LOAD OVER PLACE TO DEPOSIT LOAD.
2. HALT TRUCK USING SERVICE BRAKE PEDAL. SHIFT TRANSMISSION TO NEUTRAL.
3. PUSH LIFT CONTROL LEVER FORWARD TO GRADUALLY LOWER LOAD. MOVE TILT CONTROL LEVER FORWARD TO BRING MAST TO VERTICAL POSITION.
4. LOWER LOAD INTO POSITION.
5. PLACE TRANSMISSION SHIFT LEVER IN "R" (REVERSE) POSITION AND, USING INCHING CONTROL PEDAL AND ACCELERATOR, MOVE TRUCK AWAY FROM LOAD.

ME 3930-621-12/2-7

Figure 2-7. Lowering operation.

- b. Move tilt control lever forward to aline forks horizontally with stack or ground.
- c. Refer to figure 2-7 and lower load into desired position.

- d. Refer to paragraph 2-12 and move truck away from load and return for further loading operations or parking place.

Section V. OPERATION OF AUXILIARY MATERIAL USED IN CONJUNCTION WITH THE TRUCK

2-15. General

This section contains instructions for operating the portable fire extinguisher supplied with the truck.

2-16. Operating the Extinguisher

- a. Disconnect clamp securing extinguisher to mounting bracket on counterweight just in front of stop and tail light. Open clamp and remove extinguisher.

- b. Hold extinguisher upright and raise large locking handle to break seal.

- c. Aim fire extinguisher nozzle at base of fire and depress small operating lever with the thumb.

- d. Extinguish the fire by directing contents of extinguisher at the base of the fire with a side-to-side sweeping motion.

Section VI. OPERATION UNDER UNUSUAL CONDITIONS

2-17. General

Although the truck is designed primarily for warehouse operations, the truck could be operated under unusual conditions as described in the following paragraphs. When operating under these conditions, extra care must be provided to maintain the truck in good operating condition. To operate under these conditions certain additional services must be performed, and certain regular maintenance procedures may be required more often.

2-18. Operation in Extreme Heat

a. Cooling System.

- (1) Check adjustment of drive belt more often to see that the deflection is correct (para 3-12). Belt should deflect ½ inch when pressure is applied midway between the pulleys.

- (2) Check coolant level more often and maintain level to the bottom of filler neck on radiator. Check radiator cap to be certain it is secure.

- (3) Keep grille and radiator free of dirt and debris to insure good air circulation.

- (4) Flush and clean the cooling system frequently.

b. Electrical System.

- (1) Check battery electrolyte level more often. Maintain level ½ inch above the plates.

- (2) Check specific gravity of battery (para 3-11) more often.

- (3) Clean battery cables frequently.

2-19. Operation in Extreme Cold

- a. Protection.* The truck should be stored in a heated building or shelter if possible. If a shelter is not available, part the truck with the front end facing into the wind and cover with a tarpaulin. Fasten tarpaulin securely to prevent it from blowing away.

- b. Cooling System.* Service the cooling system with antifreeze as shown in table 2-1 and paragraph 2-1. If truck is to stand for any length of time in temperatures of 30°F or lower and antifreeze is not available, drain the cooling system. Attach a tag to the steering wheel to warn personnel that the steering system has been drained.

c. Electrical System.

- (1) Check specific gravity of battery more often.
- (2) Do not add water to the battery unless the engine is going to be operated immediately.

- (3) Keep battery charged as much as possible to insure starting at low temperatures.

- (4) Remove and store the battery in a warm place if truck is not going to be parked in a shelter.

2-20. Operation in Sandy or Dusty Areas

- a. Protect fuel and lubrication systems from entrance of sand. Use a bag of single layer cloth and loosely tie bag over entire air cleaner during sand storms. Clean fuel filter bowl, air cleaner, and oil filler breather daily.

- b. Remove all sand from axles, wheels, steering

spindles, radiator, and brake assemblies periodically. Check all parts often to prevent undue wear caused by sand.

c. Protect lift and tilt mechanisms from entrance of sand. Cover exposed parts of lift and tilt cylinder rods, lift chains, and reservoir during sand storms.

2-21. Operation in Damp Tropical Areas

a. Check all paint for chipping and scratching. Corrosive action from dampness will take place almost immediately if bare metal is exposed.

b. Touch up all spots where paint is chipped or scratched.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE

INSTRUCTIONS

Section I. OPERATOR AND ORGANIZATIONAL MAINTENANCE

TOOLS AND EQUIPMENT

3-1. Special Tools

No special tools are required for operation or to perform operator and organizational maintenance of the fork lift truck.

3-2. Basic Issue Supplies and Equipment

Supplies and equipment issued with or authorized for

the fork lift truck are listed in the basic issue items list, Appendix B, of this manual.

3-3. Organizational Maintenance Repair Parts

Repair parts allocated to organizational maintenance are listed and illustrated in TM 10-3930-621-20P.

Section II. LUBRICATION

3-4. General Lubrication Information

a. These paragraphs contain general lubrication instructions and lubrication instructions which are supplemental to, and not specifically covered in, the lubrication order.

b. Refer to DA PAM 310-4 for the current lubrication order.

3-5. Detailed Lubrication Information

a. *General.* Keep all lubricants in sealed containers and stored in a clean dry place away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready to use.

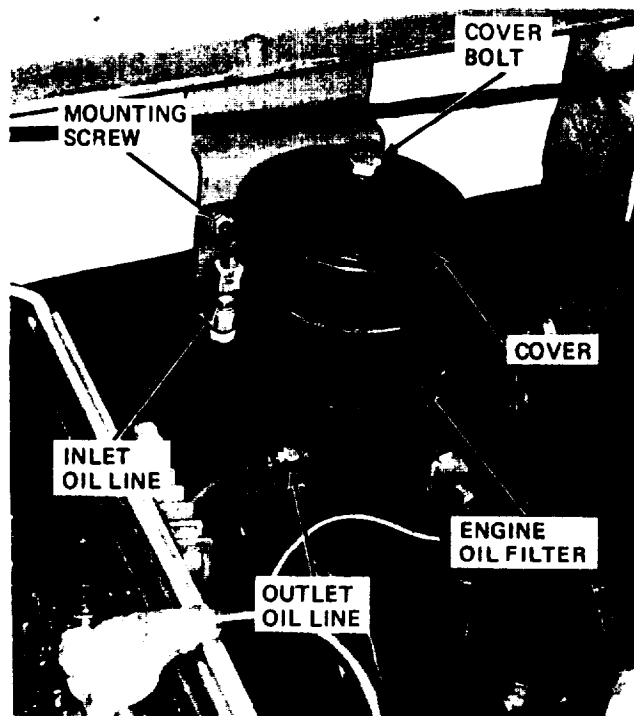
b. *Cleaning.* Keep all external parts not requiring lubrication clean of lubricants. Before lubricating

the equipment wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubricating to prevent accumulation of foreign matter.

c. *Points of Lubrication.* Service the points of lubrication at the proper intervals as illustrated on current lubrication order.

d. *Operation Immediately after Lubrication.* Operate the truck through all movements for 5 minutes immediately after lubrication. Inspect filters and lines for evidence of leakage. If crankcase oil was changed, operate engine for 5 minutes and again check oil level. Remove seat to gain access to engine compartment.

e. *Engine Oil Filter.* Refer to figure 3-1 and service the engine oil filter.



SERVICE

1. REMOVE COVER BOLT FROM FILTER.
2. REMOVE COVER AND GASKET FROM FILTER. DISCARD GASKET.
3. REMOVE FILTER ELEMENT AND DISCARD.
4. CLEAN INSIDE OF FILTER AND WIPE DRY.
5. INSTALL NEW- FILTER ELEMENT. INSTALL COVER AND NEW GASKET AND SECURE WITH COVER BOLT.

REPLACEMENT

1. DISCONNECT INLET AND OUTLET OIL LINES FROM FILTER.
2. REMOVE TWO MOUNTING SCREWS, NUTS, AND LOCK WASHERS.
3. REMOVE FILTER FROM TRUCK. REMOVE ELBOWS FROM FILTER.
4. INSTALL ELBOWS IN NEW FILTER. INSTALL FILTER ON BRACKET AND SECURE WITH TWO SCREWS, NUTS, AND LOCK WASHERS.
5. CONNECT INLET AND OUTLET OIL LINES TO FILTER.

ME 3930-621-12/3-1

Figure 3-1. Engine oil filter, service and replacement.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-6. General

To insure 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 and described in paragraph 3-7. 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 2404 at the earliest possible opportunity.

3-7. Preventive Maintenance Services

a. This paragraph contains a tabular listing of preventive maintenance services which must be performed by organizational maintenance personnel at the indicated intervals.

b. Table 3-1 lists preventive maintenance services in item numbers listed consecutively and indicate the sequence of minimum requirements. The intervals are listed under services to be performed by the operator and organizational maintenance personnel. Columns indicate the item to be inspected, the procedure, and the paragraph reference in this manual where the procedure is described.

Table 3-1. 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			W	M	Q	Item to be Inspected	Procedure	Procedure
	B	D	A						
1	X						Engine oil level	Check level on dipstick. Add oil if necessary.	3-5
2	X						Fuel level	Check fuel level indicated on gage. Add fuel if necessary.	3-33
3	X						Battery	Check electrolyte level. Fill to 3/8 inch above plates.	3-11
4	X						Radiator	Check level and add coolant as necessary.	3-38
5	X						Engine air cleaner	Refill oil reservoir to level mark.	3-11
6	X						Horn	Check horn for operation.	2-1
7	X						Lights	Inspect for proper operation.	2-7
8	X						Fire extinguisher	Inspect for broken seal and correct pressure.	2-16
9	X						Leaks, general	Check under truck for leaks. Report to organizational maintenance.	
10		X					Instruments	Check that all instruments indicate within the required ranges.	2-1
11		X					Controls	Check that controls perform as required.	2-1
12		X					Brakes	Check parking brake and service brake to assure safe operation.	2-7
13		X					Unusual noises and vibration	Listen for unusual noises and check for excessive vibration. If present. shut off engine and report to organizational maintenance.	
14			X				Fuel level	Fill fuel tank.	3-33
15				X			Transmission	Check oil level. Add oil as necessary.	3-53
16				X			Hydraulic reservoir	Check oil level. Add oil as required.	3-73
17					X		Fan belt	Check for proper adjustment, ½ inch deflection between pulleys. Replace worn, frayed or cracked belt.	3-12
18				X			Battery	Tighten loose cables, remove corrosion. Fill to 3/8 inch above plates. Clean vent holes in caps.	3-47
19					X		Tires	Remove imbedded material, check for gouges and other damage.	3-66

Table 3-1. Preventive Maintenance Checks and Services - Continued

Item number	Interval						B - Before operation	A - After operation	M - Monthly
	Operator			Org.			D - During operation	W - Weekly	Q - Quarterly
	Daily			W	M	Q	Item to be inspected	Procedure	Reference
	B	D	A						
2 0					X		Brake master cylinder	Inspect for leaks, clean fill plug vent, add fluid as required.	3-63
2 1					X		Brake pedal	Adjust if brake pedal does not have ½ inch free travel.	3-62
2 2					X		Steering gear	Check operation. Inspect for leaks.	2-7
2 3					X		Inching pedal and valve	Check for proper pedal operation.	2-7
2 4					X		Crankcase vent valve (PCV)	Remove and clean vent valve with an approved cleaning solvent.	3-26
2 5					X		Fuel pump	Inspect for insecure mounting and leaks. Clean bowl and screen. Replace bowl gasket.	3-31
2 6					X		Brakes	Correct deficiencies if brake application is spongy, or ineffective.	3-59
2 7						X	Engine tune up and test	Check engine compression, vacuum and timing.	3-22
2 8						X	Electrical system	Check and adjust electrical components including alternator, voltage regulator and starter.	3-39 3-42 3-43 3-44
2 9						X	Service brake lining	Check brake lining. If lining is worn to less than 1/16 inch thickness, replace brake shoes.	3-64

Section IV. OPERATOR'S MAINTENANCE

3-8. General

This section contains information on maintenance of the fork lift truck which is the responsibility of the operator and which is not covered in paragraph 3-7.

3-9. Operator's Seat Removal

a. The operator's seat is mounted over the engine compartment forward of the counterweight. For ease of access to the engine compartment and its components the seat is readily removable.

b. To remove the seat, lift rear of seat to clear pins and slide the seat forward to clear rear seat mount flange.

c. Tilt seat forward and lift seat and mount from truck by sliding forward flange of mount from frame.

d. To install seat, lift into position and slide front flange under frame. Lower seat into position and slide seat to rear to engage rear flange and pins.

3-10. Air Cleaner Service

a. Refer to paragraph 3-9 and remove the seat from truck.

b. Refer to figure 3-2 to service or remove the air cleaner.

Caution: Do not remove the air cleaner when the engine is running. Do not run the engine unless the air cleaner is in place.

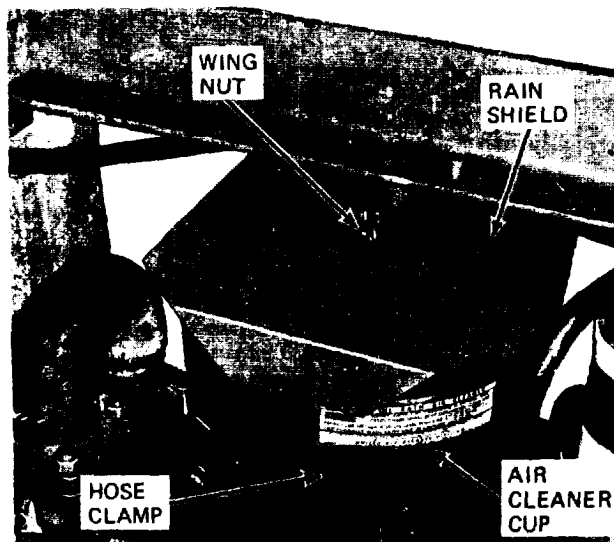
c. Remove the cup as shown in figure 3-2 and service as follows:

(1) Pour out the old oil from the cup. Scrape away accumulated dirt from bottom of cup.

(2) Clean the cover, oil cup, and base assembly inside and out with cleaning compound, solvent (Spec. P-S-661) and dry thoroughly.

(3) Refill oil cup (1½ pint capacity) with engine oil (OE) of grade and weight presently used in engine.

d. Install cup (fig. 3-2).



SERVICE AND REPLACEMENT

1. LOOSEN HOSE CLAMP AND DISCONNECT HOSE FROM AIR CLEANER.
2. REMOVE WING NUT AND REMOVE AIR CLEANER AND AIR CLEANER CUP FROM RAIN SHIELD.
3. REFER TO PARAGRAPH 3-10 AND CLEAN CUP AND REFILL WITH OIL.
4. INSTALL AIR CLEANER AND CUP ON RAIN SHIELD AND SECURE WITH WING NUT.
5. INSTALL HOSE ON AIR CLEANER AND SECURE WITH HOSE CLAMP.

ME 3930-821-12/3-2

Figure 3-2. Engine air cleaner, service and replacement

3-11. Battery and Cable Service

- a. Refer to paragraph 3-9 and remove seat from truck.
- b. Remove caps to check level of fluid in battery. Fill to 3/8-inch above plates if necessary.
- c. Refer to figure 3-3 and disconnect cables.

Caution: Always disconnect battery ground cable (negative side) first.

- d. Clean top of battery, posts, and cable terminals with a solution of baking soda and water. Make sure

filler caps are tight to prevent any of the solution from entering the cells.

- e. When foaming stops, flush battery and cable terminals with clean, fresh water.

- f. Replace damaged or frayed cables.

- g. Check condition of battery using a hydrometer. If specific gravity reading is 1.225 or lower, recharge battery. A fully charged battery should read 1.265 to 1.290 specific gravity.

- h. Refer to figure 3-3 and install battery cables. Connect ground cable (negative) last.

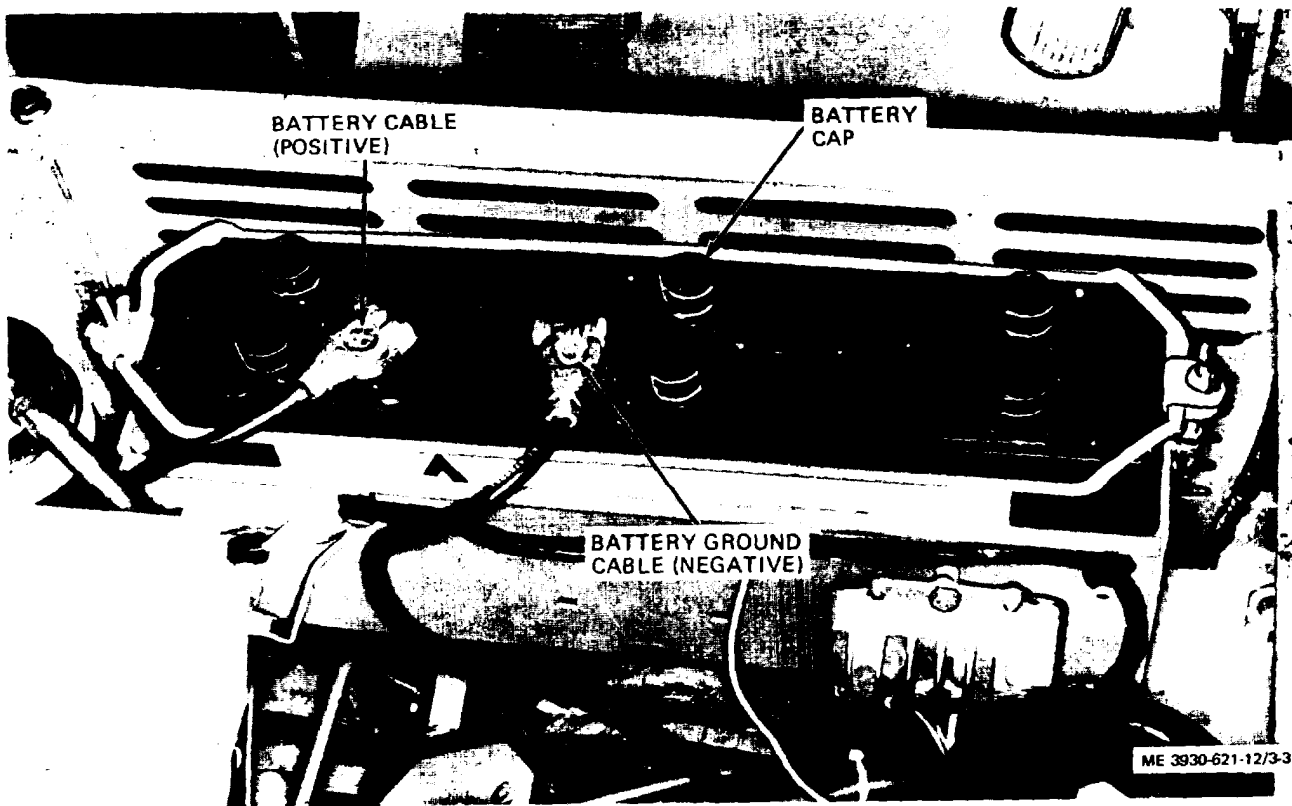
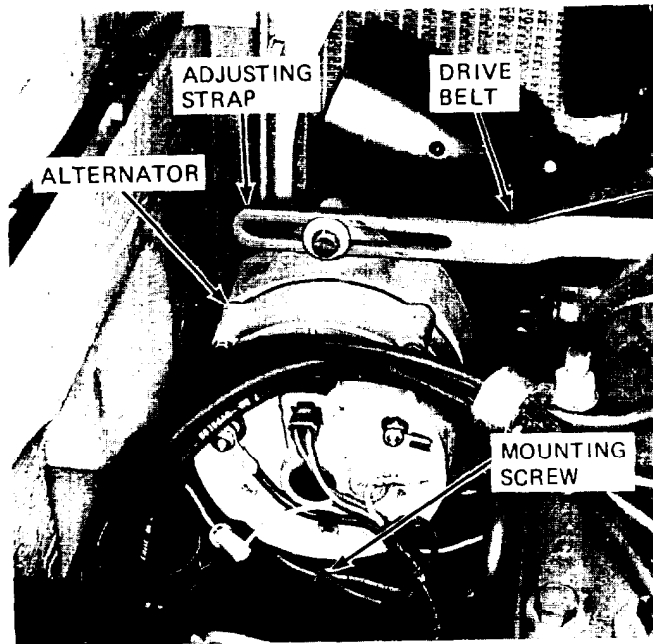


Figure 3-3. Battery service.

3-12. Drive Belt Adjustment

a. Refer to figure 3-4 and adjust drive belt.

b. Belt deflection should be 1/2 inch midway between two pulleys.



1. LOOSEN MOUNTING SCREW BELOW ALTERNATOR.
2. LOOSEN SCREW ATTACHING TOP OF ALTERNATOR TO ADJUSTING STRAP.
3. MOVE ALTERNATOR IN OR OUT FROM ENGINE TO APPLY CORRECT TENSION TO DRIVE BELT.
4. BELT DEFLECTION SHOULD BE 1/2-INCH MIDWAY BETWEEN PULLEYS.
5. WHEN DEFLECTION IS CORRECT, TIGHTEN SCREW IN ADJUSTING STRAP.
6. TIGHTEN MOUNTING SCREW SECURELY.

ME 3930 621-12/3-4

Figure 3-4. Drive belt adjustment.

Section V. TROUBLESHOOTING

3-13. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the fork lift truck and its components. Mal-

functions which may occur are listed in table 3-2. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause.

Table 3-2 Troubleshooting - Continued

Malfunction	Probable cause	Corrective action
9. Excessive exhaust smoke.	<ul style="list-style-type: none"> b. Improper grade of oil. c. Faulty rings or valves. d. Crankcase ventilation system clogged. 	<ul style="list-style-type: none"> b. Drain crankcase and fill with proper grade of oil for operating temperature (LO 10-3930-621-12). c. Perform compression test (para 3-27). d. Clean breather (para 3-26) or replace vent valve (para 3-26).
10. Charging rate on ammeter lower than normal.	<ul style="list-style-type: none"> a. Crankcase oil level too high. b. Cylinder head gasket leaking. c. Carburetor out of adjustment. a. Battery fully charged. b. Drive belt loose. c. Improperly adjusted or defective regulator. d. Alternator defective. 	<ul style="list-style-type: none"> a. Drain to correct level. b. Replace gasket (para 3-24). c. Adjust carburetor (para 3-29). a. Normal condition; no action required. b. Adjust belt tension (para 3-12). c. Adjust or replace regulator (para 3-42).
11. Charging rate on ammeter higher than normal.	<ul style="list-style-type: none"> a. Battery charge low. b. improperly adjusted regulator or defective regulator. 	<ul style="list-style-type: none"> d. Replace alternator (para 3-41). a. Normal condition; no action required. b. Adjust or replace regulator (para 342).
12. Lights do not function.	<ul style="list-style-type: none"> a. Defective lamp. b. Blown fuse. 	<ul style="list-style-type: none"> a. Replace lamp (para 349). b. Check circuit for short in lights or wiring. Replace fuse.
13. Horn does not sound.	<ul style="list-style-type: none"> c. Defective light switch. a. Blown fuse. b. Defective horn button. c. Loose wiring or defective relay. 	<ul style="list-style-type: none"> c. Replace switch (para 3-48). a. Replace fuse. b. Replace horn button or parts. c. Tighten connections or replace relay (para 349).
14. Brakes drag.	<ul style="list-style-type: none"> d. Defective horn. a. Improperly adjusted pedal or linkage. b. Weak or broken return spring. c. Wheel cylinder defective. d. Wheel bearings loose. 	<ul style="list-style-type: none"> d. Replace horn (para 3-49). a. Adjust pedal free travel (para 3-62). b. Replace spring (para 3-62). c. Replace cylinder (para 3-63). d. Adjust bearings (para 3-67).
15. Brake pedal soft or spongy when depressed.	<ul style="list-style-type: none"> a. Air in system. b. Inadequate oil supply. c. Brake linings not fitted properly. 	<ul style="list-style-type: none"> a. Bleed system (para 3-63). b. Fill master cylinder (para 3-63). c. Replace brake shoes (para 3-64).
16. Brake pedal is hard to depress.	<ul style="list-style-type: none"> a. Improperly adjusted pedal or linkage. b. Brake lining glazed. 	<ul style="list-style-type: none"> a. Adjust pedal free travel (para 3-62). b. Replace brake shoes (para 3-64).
17. Excessive pedal travel required to apply brakes.	<ul style="list-style-type: none"> a. Air in system. 	<ul style="list-style-type: none"> a. Pump pedal several times. If pressure builds up to hold pedal to normal travel, bleed brake system (para 3-63).
18. Truck pulls to one side when brakes are applied.	<ul style="list-style-type: none"> b. Inadequate oil supply. a. Fluid or grease on brake lining. b. Brake shoe return spring defective. c. Defective wheel cylinder. d. Wheel bearings loose. 	<ul style="list-style-type: none"> b. Fill master cylinder. a. Replace brake shoes (para 3-64). b. Replace spring (para 3-64). c. Replace brake cylinder (para 3-65). d. Adjust bearings (para 3-67).
19. Inching mechanism not operating properly.	<ul style="list-style-type: none"> a. Mechanism not adjusted properly. b. Defective transmission control valve. 	<ul style="list-style-type: none"> a. Refer to direct and general support maintenance personnel. b. Refer to direct and general support maintenance personnel.
20. Steering mechanism not operating properly.	<ul style="list-style-type: none"> a. Insufficient oil in hydraulic reservoir. b. Air leaks in system. c. Steering cylinder improperly adjusted. d. Incorrect toe-in. e. Defective hydraulic pump. f. Defective hydraulic steering valve. 	<ul style="list-style-type: none"> a. Fill as prescribed in LO 10-3930-621-12. b. Tighten connections. c. Adjust cylinder (para 3-70). d. Adjust tie rods (para 3-69). e. Refer to direct and general support maintenance personnel. f. Refer to direct and general support maintenance personnel.
21. Truck will not lift or tilt load.	<ul style="list-style-type: none"> a. Load too heavy. b. Insufficient oil in hydraulic reservoir. c. Leaks in hydraulic system. d. Defective cylinder. 	<ul style="list-style-type: none"> a. Lighten load to 4,000 pounds. b. Fill reservoir as prescribed in LO 10-3930-621-12. c. Inspect fittings, reservoir, and hose. Tighten connections. Replace hose if necessary. d. Replace cylinder (para 3-75). Refer to direct and general support maintenance personnel to repair cylinder.

Table 3-2. Troubleshooting - Continued

Malfunction	Probable cause	Corrective action
22. Lift and tilt motions too slow.	<i>a.</i> Engine speed governed too low. <i>b.</i> Air leaks in system. <i>c.</i> Insufficient oil in reservoir. <i>d.</i> Defective pump or cylinder.	<i>a.</i> Adjust governor (para 3-29). <i>b.</i> Tighten all connections. <i>c.</i> Fill reservoir as prescribed in LO 10-3930-621-12. <i>d.</i> Replace cylinder (para 3-75) or refer to direct and general support maintenance personnel to replace pump and repair cylinder.
23. Tilting action creeps.	<i>a.</i> Leak in hydraulic lines. <i>b.</i> Defective cylinder.	<i>a.</i> Tighten connections or replace damaged lines. <i>b.</i> Replace cylinder (para 3-75). Refer to direct and general support maintenance personnel to repair cylinder.
24. Hydraulic pump noisy.	<i>a.</i> Insufficient oil in hydraulic reservoir. <i>b.</i> Air leaks at pump. <i>c.</i> Reservoir breather restricted. <i>d.</i> Pump head loose. <i>e.</i> Worn or defective pump.	<i>a.</i> Fill reservoir as prescribed in LO 10-3930-621-12. <i>b.</i> Tighten connections at pump. <i>c.</i> Clean breather. <i>d.</i> Tighten screws. <i>e.</i> Refer to direct and general support maintenance personnel.
25. Mechanism lifts but will not lower load.	<i>a.</i> Control valve not properly adjusted. <i>b.</i> Control valve defective.	<i>a.</i> Refer to direct and general support maintenance personnel. <i>b.</i> Refer to direct and general support maintenance personnel.

Section VI. FIELD EXPEDIENT REPAIRS

3-14. General

Operator and organizational maintenance troubles may occur while the truck is operating in the field where supplies and repair parts are not available and normal corrective action cannot be performed. When this condition exists, the following expedient repairs may be used in emergencies, upon decision of the unit commander. Equipment so repaired must be removed from operation as soon as possible and properly repaired before being placed in operation again.

3-15. Loss of Fuel

Trouble	Expedient remedy
Fuel tank has pinhole leak	Install a metal screw with a rubber washer in the hole.
Fuel line cracked	Tape fuel line to stop leak and operate.
Fuel filter bowl cracked	Bypass fuel filter and operate without it.

3-16. Engine Overheats

Trouble	Expedient remedy
Collapsed radiator hose	Remove hose and insert section of heavy coiled wire inside hose. Install hose, fill with coolant, and operate.

Small hole in radiator Plug hole with wooden plug on metal screw. Fill with coolant and operate.

Thermostat defective (closed) Remove thermostat and operate without it (para 3-38).

3-17. Engine Not Receiving Sufficient Fuel

Trouble	Expedient remedy
Fuel filter bowl screen clogged	Remove screen and operate without it (para 3-31).

3-18. Loss of Lubricating Oil

Trouble	Expedient remedy
Oil filter element clogged	Remove element and operate without it (para 3-4).
Small hole in oil pan	Plug with a wooden plug or metal screw. Fill crankcase and operate truck.

Section VII. RADIO INTERFERENCE SUPPRESSION

3-19. General Methods to Obtain Proper Suppression

Essentially, suppression is obtained by providing a low resistance path to ground for stray currents. The methods used include grounding the frame with bonding straps, and using capacitors and resistors.

3-20. Interference Suppression Components

a. A ground strap is connected between the instrument panel and the frame.

b. The ignition coil is suppressed by the use of a 0.25 MFD capacitor mounted with the coil mounting screw.

c. The ignition switch is suppressed with an 0.25 MFD capacitor mounted on the underside of the instrument panel.

d. The following ground and mounting parts utilize internal-external teeth lockwashers to provide positive grounding.

- (1) Alternator mounting bolt.
- (2) Battery ground strap at transmission.
- (3) Regulator mounting screws.
- (4) All capacitor mountings.

e. Spark plugs are the resistor type.

f. Spark plug and ignition coil leads and cables are non-metallic conductor type.

3-21. Replacement of Suppression Components

a. The following paragraphs detail methods to replace suppression components.

b. Refer to figure 3-5 and replace the ignition coil capacitor.

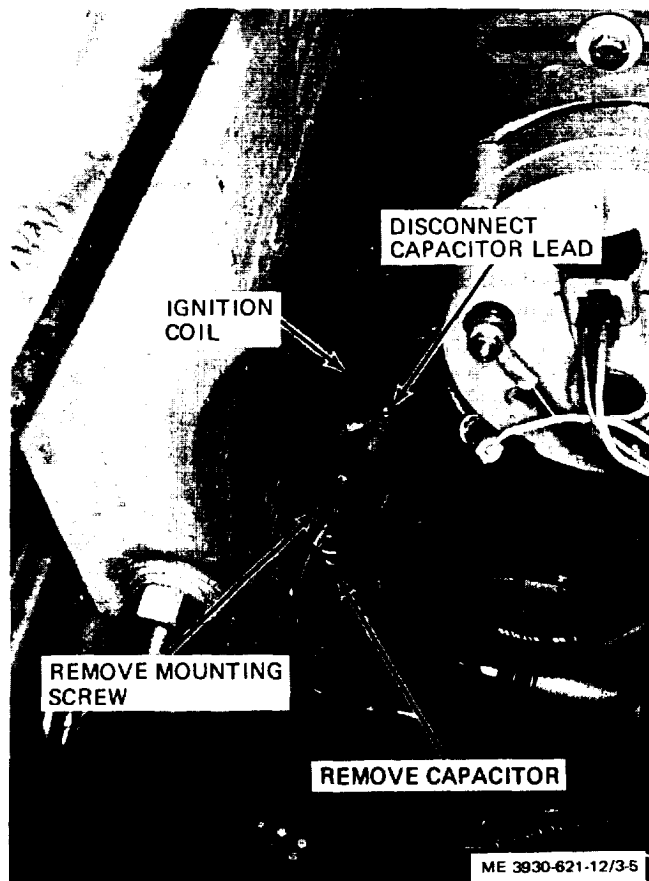


Figure 3-5. Ignition coil capacitor, removal and installation.

c. Refer to figure 3-6 and replace the ignition switch capacitor.

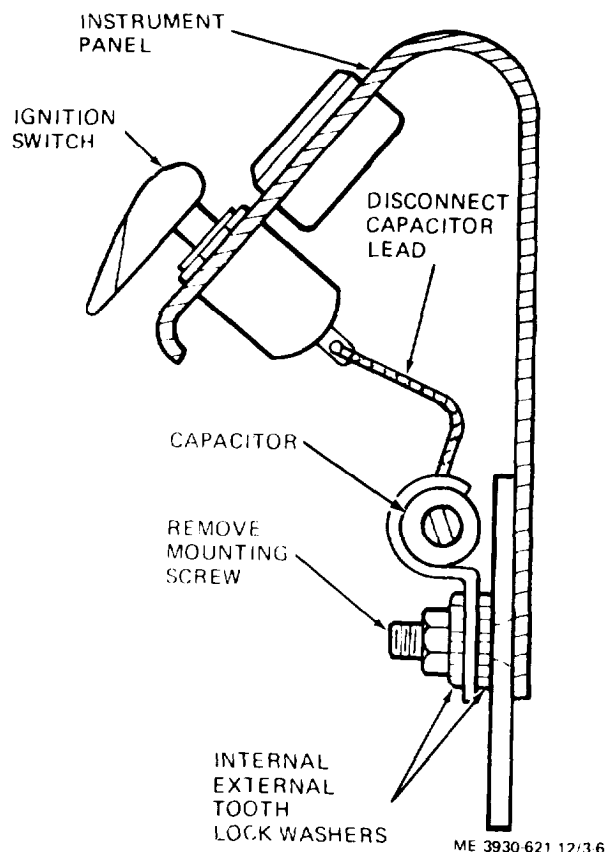


Figure 3-6. Ignition switch capacitor, removal and installation.

3-22. Testing of Suppression Components

- a. Test capacitors for leaks and shorts on a capacitor tester. Replace defective capacitors.
- b. If test equipment is not available and interfer-

ence is indicated, isolate the cause of interference by the trial-and-error method. Replace the capacitors in turn until the cause of interference is located and eliminated.

Section VIII. ENGINE ASSEMBLY

3-23. General

a. The engine is a Waukesha Model FCB-G5943 gasoline engine. It is a four cylinder, four stroke cycle, flat head engine. The engine is mounted on the frame below and behind the operator's seat. The following paragraphs describe engine maintenance procedures allocated to organizational maintenance.

Note. To gain access to engine compartment to perform the maintenance, remove seat and side panels as necessary.

3-24. Cylinder Head

a. *Removal.* Remove the cylinder head as follows:

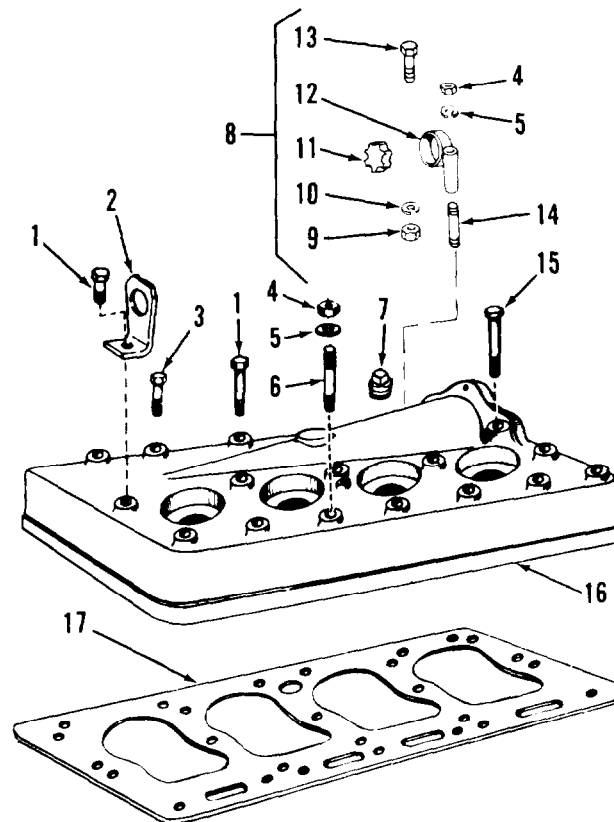
- (1) Drain radiator (para 3-37) to lower water level below cylinder head.
- (2) Refer to paragraph 3-37 and remove the thermostat housing and thermostat (para 3-38).
- (3) Refer to paragraph 3-46 and remove spark plugs and ignition cables.
- (4) Refer to figure 3-7 and remove the cylinder

head and gasket as follows:

(5) Remove one bolt (1) and lifting eye (2). Remove 10 bolts (3) and two bolts (15). Remove two

nuts (4) and lock washers (5).

(6) Remove cylinder head (16) and gasket (17).



ME 3930 621 12/3 7

- | | |
|---------------------------|--------------------------|
| 1. Bolt | 10. Lock washer |
| 2. Lifting eye | 11. Support block |
| 3. Bolt | 12. Cable support |
| 4. Nut | 13. Screw |
| 5. Lock washer | 14. Stud |
| 6. Stud | 15. Bolt |
| 7. Pipe plug | 16. Cylinder head |
| 8. Cable support assembly | 17. Cylinder head gasket |
| 9. Nut | |

Figure 3-7. Cylinder head, exploded view.

b. Cleaning and Inspection.

(1) Clean all carbon from combustion areas on cylinder head and engine block. Scrape carbon from surfaces with a scraper or wire brush.

(2) Clean cylinder head with cleaning compound, solvent (Spec. P-S-661) and dry thoroughly.

(3) Clean all gasket surfaces on cylinder head and block and inspect for nicks or cracks which could cause leaks. Check surfaces with a straightedge for warpage.

c. Installation.

(1) Install new gasket (17, fig. 3-7) on engine block and install cylinder head. Secure cylinder head (16), cable support (8), and lifting eye (2) and secure with bolts (1, 3, and 15), nuts (4), and lock washers (5).

(2) Tighten cylinder head bolts and nuts to a torque of 61 to 62 foot pounds, in the sequence shown on figure 3-8.

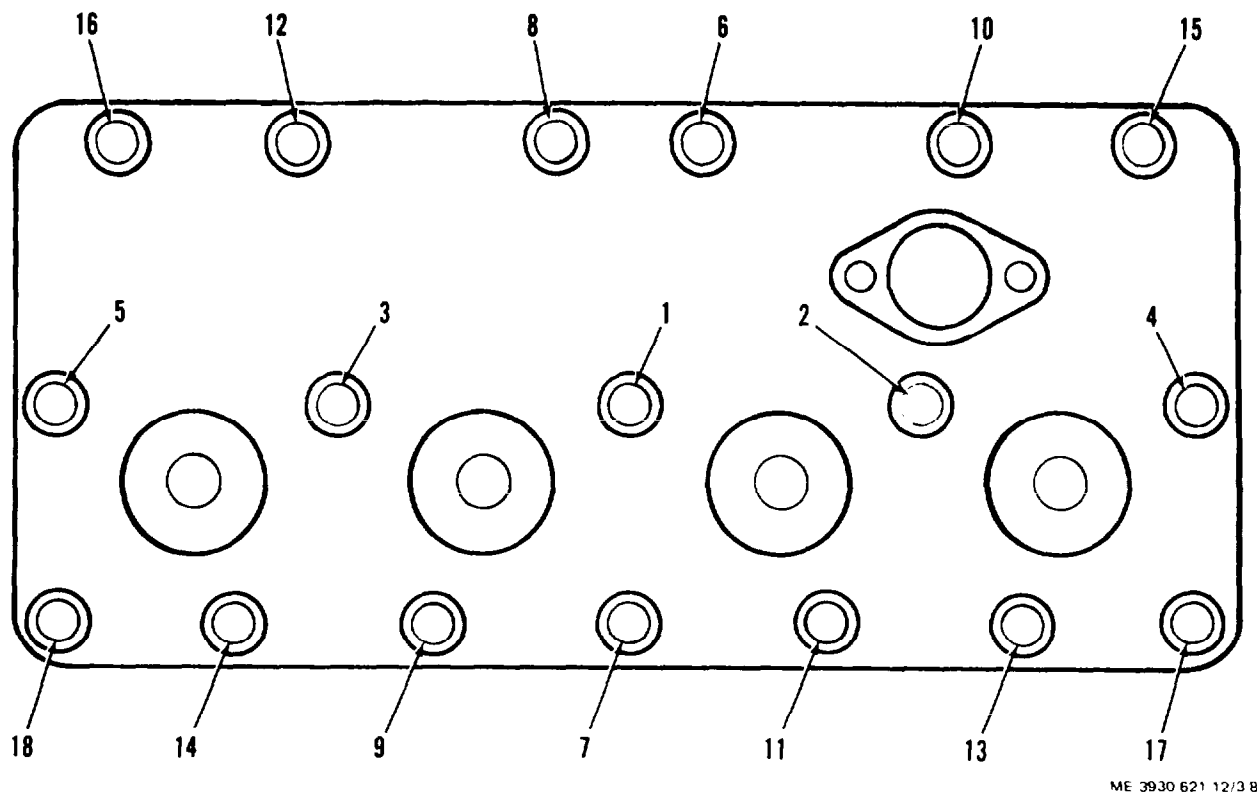


Figure 3-8. Cylinder head tightening sequence.

(3) Do not tighten bolts and nuts to final torque in a single pass. Tighten bolts and nuts to approximately 1/3 of the required torque (20 foot pounds) on the first application. Repeat procedure to apply another 20 foot pounds of torque. Finally tighten head to proper torque.

(4) Refer to paragraph 3-38 and install thermostat housing and thermostat.

(5) Refer to paragraph 3-46 and install spark plugs and cables.

(6) Replenish coolant in radiator before starting engine.

3-25. Valves

a. General. Valve clearance settings must be correct to assure good engine performance and prolong life. Damage to tappets, cams, and valves can result if clearance and timing are out of adjustment.

b. Preparation.

(1) Remove front valve cover and gasket above governor by removing nut and washer.

(2) Refer to paragraph 3-31 and disconnect fuel lines from fuel pump.

(3) Remove nut and washer and remove rear cover, with fuel pump attached, from the engine.

c. Clearance Adjustment.

(1) Disconnect high tension wire leading from coil to distributor to prevent accidental starting.

(2) Refer to paragraph 3-46 and remove spark plugs. Remove the timing cover and clamp from fly-wheel housing.

(3) Place thumb over number one cylinder spark plug opening. Have someone crank engine slowly by hand until an outward pressure can be felt on thumb indicating that number one piston is moving toward top dead center.

(4) Continue cranking until timing mark on fly-wheel is aligned with reference line on flywheel housing. Refer to figure 3-9. At this point both valves of number one cylinder are closed on the compression stroke.

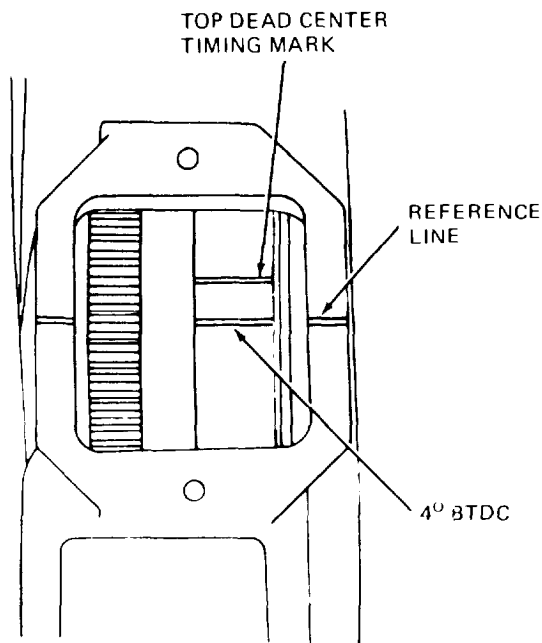


Figure 3-9. Flywheel timing marks.

(5) Use two thin open end wrenches as shown in figure 3-10 and make the adjustment as follows:

(6) Loosen the locknut.

(7) Hold the tappet with the lower wrench and raise or lower the tappet adjusting screw.

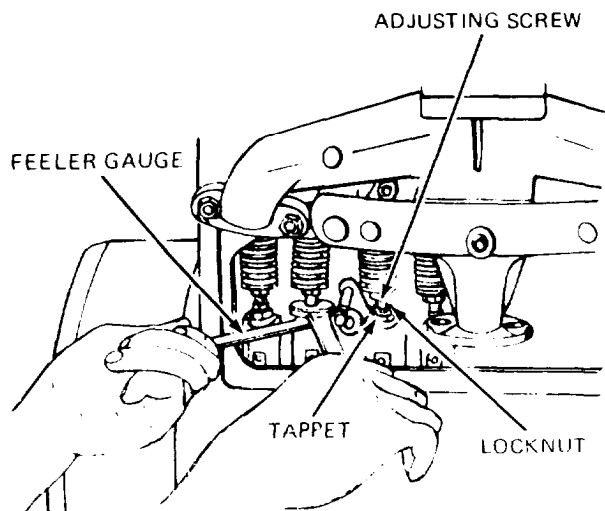


Figure 3-10. Loosening valve tappet locknut.

(8) Continue adjusting the clearance until a feeler gage of the proper thickness (0.007 to 0.009 inch for intake valves, 0.011 to 0.013 inch for exhaust valves) will pass between the valve stem and tappet adjusting screw (fig. 3-11) with a slight drag.

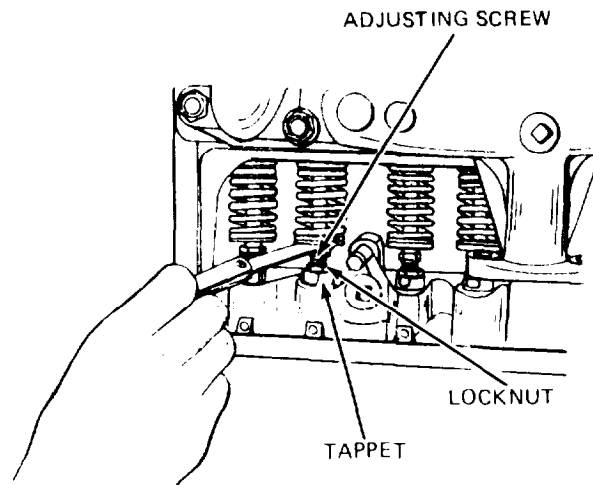


Figure 3-11. Checking valve clearance

(9) Tighten the locknut when the correct clearance is obtained. Check clearance after tightening.

(10) Crank the engine one-half revolutions at a time and check the clearance on each remaining set of valves in succession according to the firing order (1-3-4-2). Adjust valves to proper clearance if necessary.

d. Install Valve Chamber Covers.

(1) Install new gaskets and valve chamber covers over holddown studs. Secure covers with nuts and lock washers.

(2) Covers must make oil tight seal with crankcase. Check for leaks after starting engine.

(3) Refer to paragraph 3-31 and connect fuel lines to fuel pump.

(4) Install timing mark cover and clamp on flywheel housing.

3-26. Manifolds and Breather

a. *General.* The intake and exhaust manifolds on the engine are a one piece casting. The carburetor is attached to the intake manifold and the exhaust elbow carries exhaust gases out the top of the manifold. A crankcase vent valve, connected by a hose to the engine block, carries unburned gases from the block to the intake manifold.

b. Removal.

(1) Refer to paragraph 3-29 and remove the carburetor.

(2) Refer to paragraph 3-35 and disconnect the exhaust pipe from the outlet flange.

(3) Remove the hose clamps (fig. 3-12) and disconnect the hose from the vent valve.

(4) Remove the vent valve and elbow from manifold.

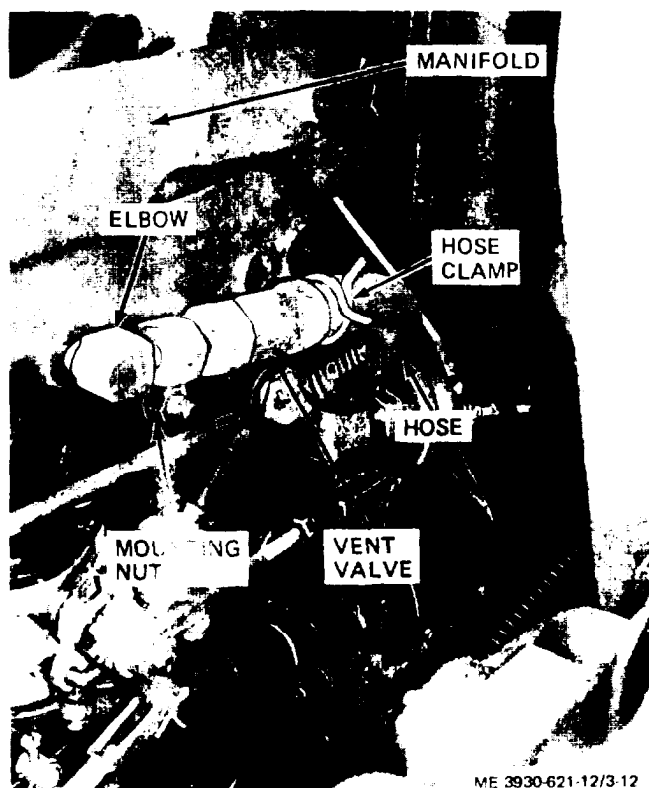


Figure 3-12. Mainfold, installed view.

(5) Remove six nuts and lock washers securing manifold to engine block and remove manifold and gaskets from engine.

c. Cleaning and Inspection

(1) Scrape all carbon and deposits from manifolds.

(2) Inspect manifolds for cracks.

(3) Inspect vent valve hose for damage and deterioration. Flush the valve with cleaning compound, solvent (Spec. P-S-661) and dry thoroughly.

(4) Replace vent valve at least once a year.

d. Installation.

(1) Install manifolds (fig. 3-12) with new gaskets and secure with nuts and lock washers.

(2) Install elbows and connect vent valve (fig. 3-12) and host to manifold and block.

(3) Refer to paragraph 3-29 and install the carburetor.

(4) Refer to paragraph 3-35 and connect the exhaust elbow to the manifold.

3-27. Engine Tests

a. General. The following tests aid in checking the condition of the engine and aid in determining the repairs that may be required and also the extent of those repairs.

b. Compression Test. The compression test helps to determine the condition of rings, valves, and head gasket. Check compression as described below.

(1) Start and operate engine at idle speed until normal operating temperature (fig. 2-2, is reached.

(2) Shut off engine and leave ignition switch in off position.

(3) Set carburetor throttle and choke controls in the full open position.

(4) Remove the spark plugs. Install a compression gage tightly in number one spark plug hole.

(5) Crank the engine with the starter to allow six compression strokes on the gage. Note the readings.

(6) Repeat the test with the gage for each of the remaining cylinders.

(7) Readings on gage should not vary more than 10 pounds. Starting speed normal compression should be 120 to 125 psi.

(8) If any of the cylinders have low readings, retest as follows:

(9) Add oil through the spark plug holes in an amount sufficient to seal the piston rings.

(10) Crank the engine over five or six times to allow oil to work down around rings and install gage as above. Repeat test to obtain another compression reading.

(11) If compression increases, defective or worn pistons or rings are indicated.

(12) If compression does not increase, defective valves are indicated.

(13) If two adjacent cylinders show low readings, a defective cylinder head gasket is indicated.

(14) Install spark plugs and operate engine to check operation.

c. Vacuum Test. Start engine and allow to reach operating temperature. Shut off engine and disconnect vent valve hose and fitting from manifold (para 3-26). Install a vacuum gage in intake manifold at fitting opening. Vacuum test the engine as follows:

(1) Start the engine and operate at idle speed. Observe the vacuum gage.

(2) Normal vacuum of approximately 18.3 inch suction pressure should be indicated. Open throttle and observe gage. A drop of about 3.4 inches should be noted. When throttle is closed, suction pressure should increase to about 24 inches.

(3) A steady pressure of 15 to 16 inches indicates pistons, piston rings, or lubricant are in poor condition. Slight needle fluctuation indicates late ignition timing. Refer to paragraph 3-44 to time distributor

and ignition.

(4) If vacuum indicated is a steady 8 to 12 inches it indicates worn valve guides, worn piston rings, poor lubricant, or a leak in the intake manifold.

(5) A vacuum below five inches indicates a leak in the intake manifold.

(6) A vacuum pressure that is normal, but which drops at irregular intervals, indicates sticking valves, incorrect carburetor fuel mixture, or defective spark plugs.

(7) A vacuum pressure that is normal, but which drops at regular intervals, indicates defective valves or a leaking cylinder head gasket.

(8) Install timing cover on flywheel housing.

(9) Remove vacuum gage from manifold and refer to paragraph 3-26 and connect vent valve and hose to intake manifold.

Section IX. FUEL SYSTEM

3-28. General

The engine fuel system consists of a fuel tank, mechanical fuel pump with filter, a single-vented updraft carburetor, a centrifugal governor, and connecting fuel lines. An electrical transmitter, located in the fuel tank, operates a fuel level indicator (fig. 2-2) to show fuel in the system.

3-29. Carburetor

a. General. The carburetor is mounted on the lower

flange of the intake manifold. A cable from the choke lever is connected to a choke bracket on the carburetor throat. Linkage from the accelerator connects to the throttle lever. The governor linkage connects to the throttle lever shaft.

b. Removed. Refer to figure 3-13 and remove the carburetor as follows:

(1) Disconnect fuel line from carburetor inlet.

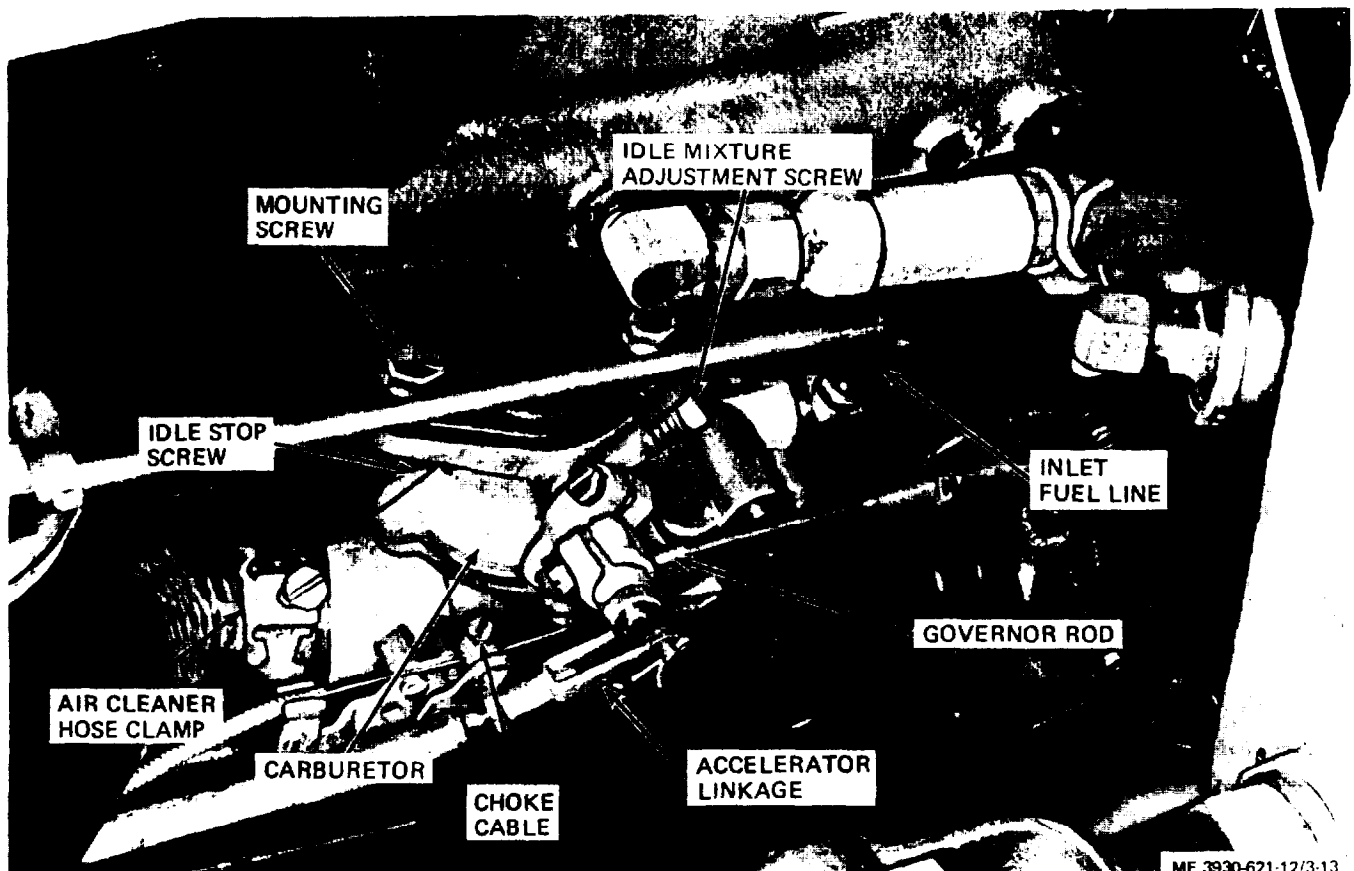


Figure 3-13. Carburetor, installed view.

(2) Open the carburetor bowl drain and allow all the fuel to drain into a suitable container.

(3) Loosen clamp (fig. 3-13) and disconnect air cleaner hose from carburetor.

(4) Loosen screws and disconnect choke cable (fig. 3-13) from carburetor.

(5) Remove cotter pin and clevis pin and disconnect accelerator linkage from carburetor.

(6) Remove cotter pin and disconnect governor rod from carburetor.

(7) Remove two screws (fig. 3-13), nuts, and lock washers securing carburetor to manifold flange. Remove carburetor and gasket from manifold.

c. Installation. Refer to figure 3-13 and install carburetor as follows:

(1) Install carburetor, with a new gasket, on manifold flange and secure with two screws, nuts, and lock washers.

(2) Connect governor rod to lever on carburetor and secure with cotter pin.

(3) Connect accelerator linkage to throttle lever on carburetor and secure with clevis pin and cotter pin.

(4) Connect choke cable to bracket on carburetor and tighten screws.

(5) Connect fuel line to carburetor inlet.

d. Adjustment. After installation, adjust carburetor idle speed and idle mixture as follows:

(1) Before starting the engine, turn the idle stop screw on rear side of carburetor against the stop to hold throttle slightly open.

(2) Set idle mixture adjustment screw (fig. 3-13) at approximately midposition.

(3) Start the engine (para 2-9) and allow engine to warm up to normal operating temperature.

(4) Gradually turn idle mixture adjustment screw in until engine begins to miss. Slowly turn screw out until engine begins to run unevenly. Count number of turns between two points.

(5) Rotate screw to bring it to approximately midway between the two points reached in (4) above, or until engine runs smoothly.

(6) Adjust idle stop screw to bring engine to an idling speed of 500 to 550 rpm.

(7) After adjusting idle speed ((6) above), readjust idle mixture adjustment screw to achieve smooth operation at normal idle speed.

3-30. Governor

a. General. The centrifugally operated governor is mounted in front of the carburetor and is driven by a gear. Adjustment is achieved by varying tension on the high speed spring.

b. Inspection

(1) Check governor and linkage for any damage.

(2) Inspect large governor high speed spring (fig. 3-14) for corrosion, damage, or wear. Notify field maintenance personnel if spring or governor requires replacement.

(3) Attach a tachometer to the alternator pulley and start the engine. Allow engine to warm up to normal operating temperature.

(4) Open throttle wide open by depressing accelerator pedal all the way down. Speed should be approximately 2,200 rpm. Engine should operate smoothly with no tendency to hunt (surge). Adjust speed and surging (c below) if necessary.

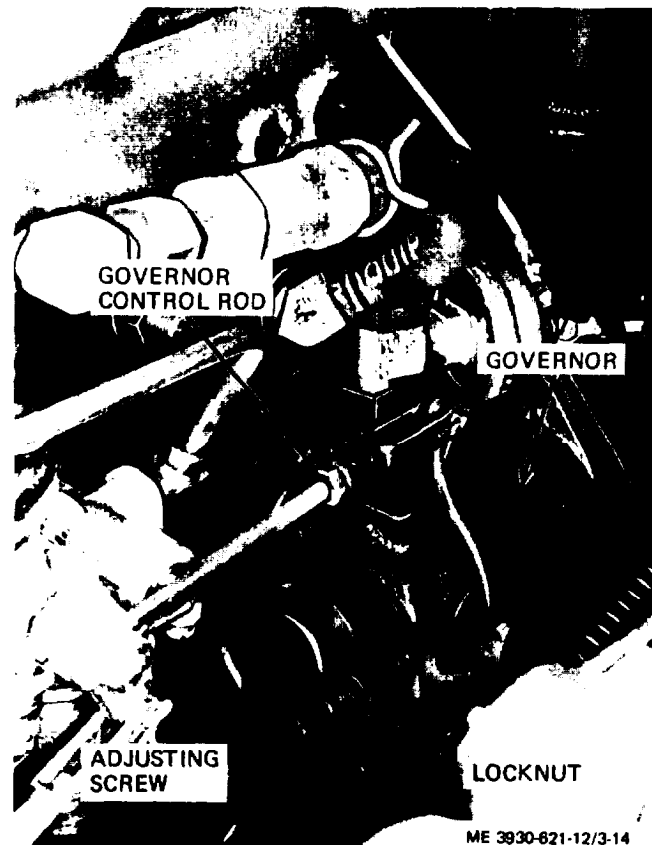


Figure 3-14. Governor, installed view.

c. Adjustment. Refer to figures 3-14 and 3-15, and adjust governor as follows:

(1) Adjust governor control rod so that lever on carburetor is approximately 5° towards the closed position (to the left, facing the carburetor).

(2) Start the engine and allow it to reach normal operating temperature.

(3) To increase governed high speed, tighten the adjusting nut (fig. 3-15) to increase tension on the high speed spring.

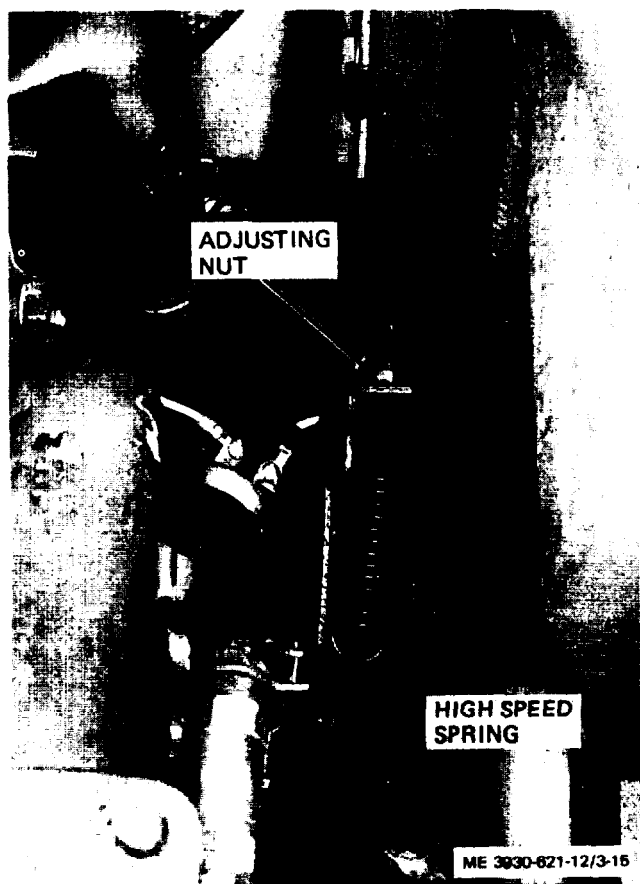


Figure 3-15. Governor spring adjustment

(4) To decrease governed high speed, loosen the adjusting nut to decrease tension on the high speed spring.

(5) The engine may surge at high speed setting. To correct surging, loosen the locknut (fig. 3-14) and turn the adjusting screw in until the engine runs smoothly.

(6) If the above does not correct surging, shorten governor control rod (fig. 3-14) slightly by screwing rod into clevis.

3-31. Fuel Pump Assembly

a. General. The mechanically operated fuel pump is located on the left side of the engine below the air cleaner.

b. Service.

(1) Inspect fuel pump assembly for cracks, breaks, leaks, and secure mounting.

(2) Loosen the thumb nut (fig. 3-16) and swing bail to one side. Remove the filter bowl, screen, and gasket.

(3) Clean bowl and screen with cleaning compound, solvent (Spec. P-S-661) and dry thoroughly. Remove all sediment and lint from the screen.

(4) Install gasket, screen, and bowl on fuel pump. Swing bail into place and tighten nut.

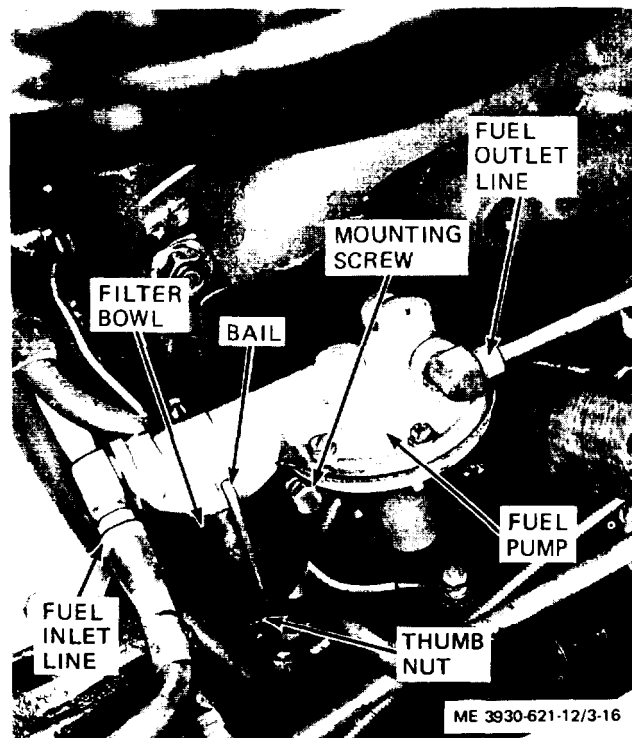


Figure 3-16. Fuel pump, installed view.

c. Removal Refer to figure 3-16 and remove the fuel pump as follows:

(1) Close fuel shut-off valve at the fuel tank.
(2) Disconnect fuel inlet and outlet lines from the fuel pump.

(3) Remove two screws and lock washers securing the pump assembly to the valve chamber cover. Remove the pump assembly and gasket from the engine.

d. Installation. Refer to figure 3-16 and install the fuel pump assembly as follows:

(1) Install fuel pump assembly and gasket on valve chamber cover and secure with two screws and lock washers.

(2) Connect inlet and outlet fuel lines to the fuel pump.

(3) Open shut-off valve at fuel tank.

(4) Start engine and check fuel pump operation. Check fuel lines for leaks.

e. Testing. If necessary, test the fuel pump pressure as follows:

(1) Disconnect the fuel outlet line (fig. 3-16) from the fuel pump.

(2) Install a suitable adapter and fitting in the outlet elbow. Connect a pressure gage to the fitting with a piece of rubber tubing less than 6 inches long.

(3) Start the engine and run at idle speed with fuel left in carburetor.

(4) Pressure indicated on the gage is the static pressure of the fuel pump. Pressure should be 3 psi maximum.

(5) Stop engine, remove gage and fittings and connect outlet fuel line to pump.

3-32. Accelerator Pedal and Linkage

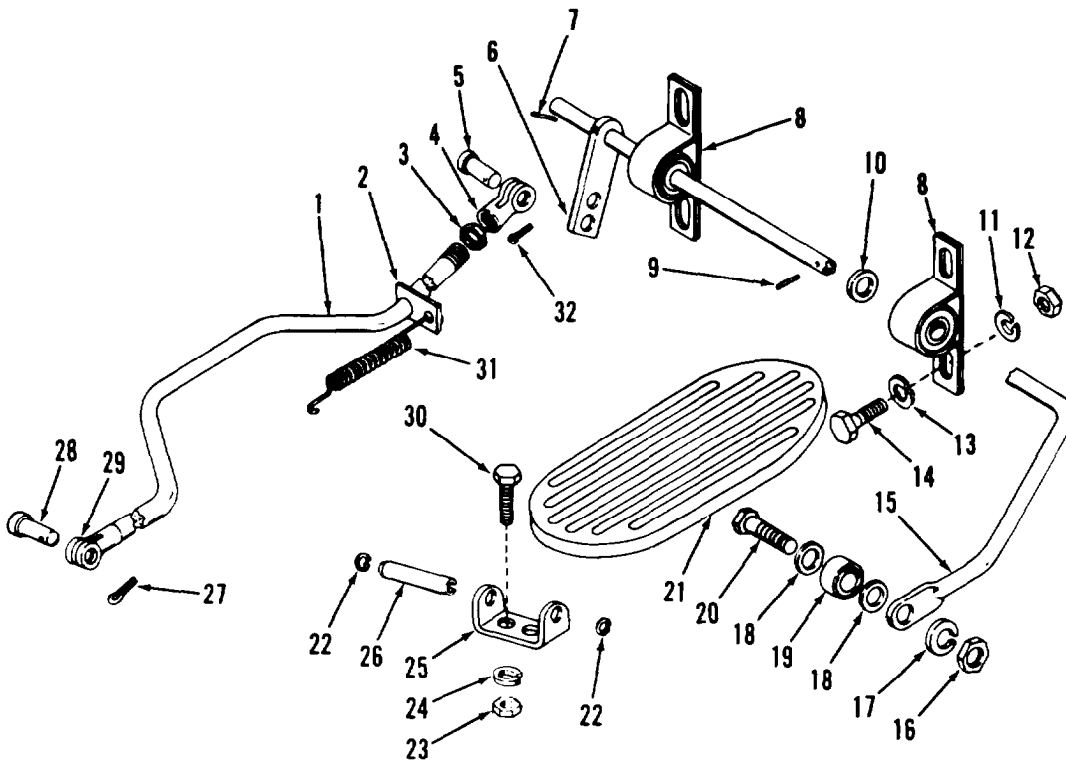
a. General. The accelerator pedal is mounted on the right side of the operator's floor board. Depressing the pedal moves the carburetor throttle lever to an open position, increasing engine speed.

b. Removal. The accelerator pedal and linkage is

illustrated on figure 3-17. Refer to the illustration to remove any of the parts requiring replacement. Do not remove the complete assembly.

c. Installation. Refer to figure 3-17 and install any of the accelerator pedal and linkage removed for replacement.

d. Adjustment. After installing accelerator rod (1, fig. 3-17), adjust clevis (4) to obtain a loose fit on the pins.



ME 3930-621-12/3-17

- | | |
|--------------------|--------------------|
| 1. Accelerator rod | 17. Lock washer |
| 2. Clip | 18. Flat washer |
| 3. Nut | 19. Bearing |
| 4. Clevis | 20. Screw |
| 5. Pin | 21. Pedal |
| 6. Lever | 22. Retaining ring |
| 7. Pin | 23. Nut |
| 8. Bearing block | 24. Lock washer |
| 9. Pin | 25. Bracket |
| 10. Flat washer | 26. Hinge pin |
| 11. Lock washer | 27. Cotter pin |
| 12. Nut | 28. Pin |
| 13. Flat washer | 29. Clevis |
| 14. Screw | 30. Screw |
| 15. Shaft | 31. Spring |
| 16. Nut | 32. Cotter pin |

Figure 3-17. Accelerator and linkage, exploded view

3-33. Fuel tank

a. General. The fuel tank is mounted on the left side of the truck. A fuel line runs from the fuel shut-off valve to the fuel pump.

b. Removal. Refer to figure 3-18 and remove the fuel tank.

(1) Close the shut-off valve and disconnect the fuel line from the valve.

(2) Attach a length of hose to the shut-off valve fitting and drain the tank through the hose into a suitable container.

(3) Remove three screws, nut, and lock washers from the outer edge of the mounting plate and remove the outer cowl from around the fuel tank.

(4) Disconnect the wire from the fuel tank transmitter terminal.

(5) Remove the three fuel tank mounting screws and lock washers securing the fuel tank to the mounting plate. Remove tank from the truck.

c. Cleaning.

(1) Remove the fuel filler cap from the tank. Clean the strainer.

(2) Remove the fuel shut-off valve and elbow from the bottom of the tank and remove any sediment and water from the tank.

(3) Clean the inside and outside of the tank with cleaning compound, solvent (Spec. P-S-661) and dry thoroughly. All solvent must be out of tank and tank dried thoroughly before filling with fuel.

(4) Install elbow and valve in bottom of tank. Install fuel filler cap on tank.

d. Installation. Refer to figure 3-18 and install

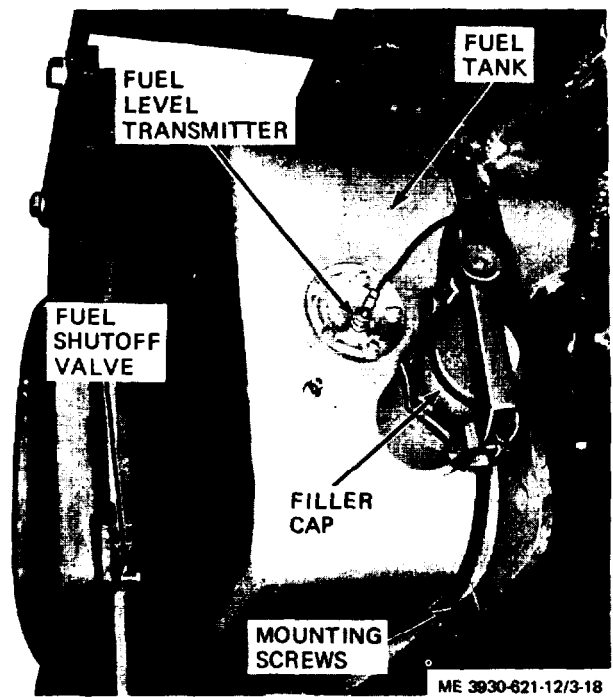


Figure 3-18. Fuel tank, installed view.

fuel tank on lift truck as follows:

(1) Install tank on mounting plate and secure with three mounting screws and lock washers.

(2) Connect wire to terminal on transmitter at top of fuel tank.

(3) Connect fuel line to fitting in shut-off valve at bottom of tank.

(4) Install cowl around fuel tank and secure with three screws, nut, and lock washers.

Section X. EXHAUST SYSTEM

3-34. General

The engine exhaust system carries the engine exhaust gases from the manifold, through the muffler and out the rear of the truck. An exhaust pipe, bolted to the exhaust manifold, carries the gases to the muffler mounted on the inside of the left frame. The gases pass through the muffler and out the tail pipe connected to the same end as the exhaust pipe. Clamps attach the two pipes to the muffler.

3-35. Muffler and Pipes

a. Removal. Refer to figures 3-19 and 3-20 and remove the muffler and pipes as follows:

(1) To remove the exhaust pipe, loosen clamp (fig. 3-19) securing pipe to elbow and remove clamp (fig. 3-20) securing exhaust pipe to muffler. Work

pipe free at each end and remove from engine.

(2) To remove tail pipe, loosen clamp (fig. 3-20) securing pipe to muffler. Remove screw and lock washer securing tail pipe clamp to frame and remove clamp and tail pipe.

(3) To remove muffler, disconnect the tail and exhaust pipes from the muffler. Remove two screws and washers (fig. 3-20) and remove the muffler from the frame. Remove two grommets from muffler mounting brackets.

(4) To remove the exhaust elbow, disconnect the exhaust pipe from the elbow. Remove four nuts and lock washers (fig. 3-19) securing the elbow to the manifold and remove the elbow and gasket from the manifold.

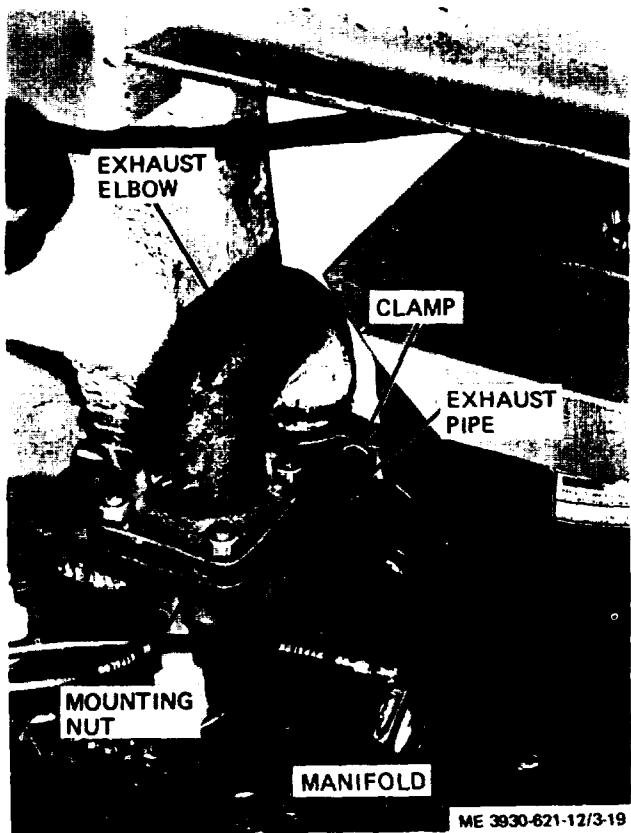


Figure 3-19. Exhaust elbow, installed view

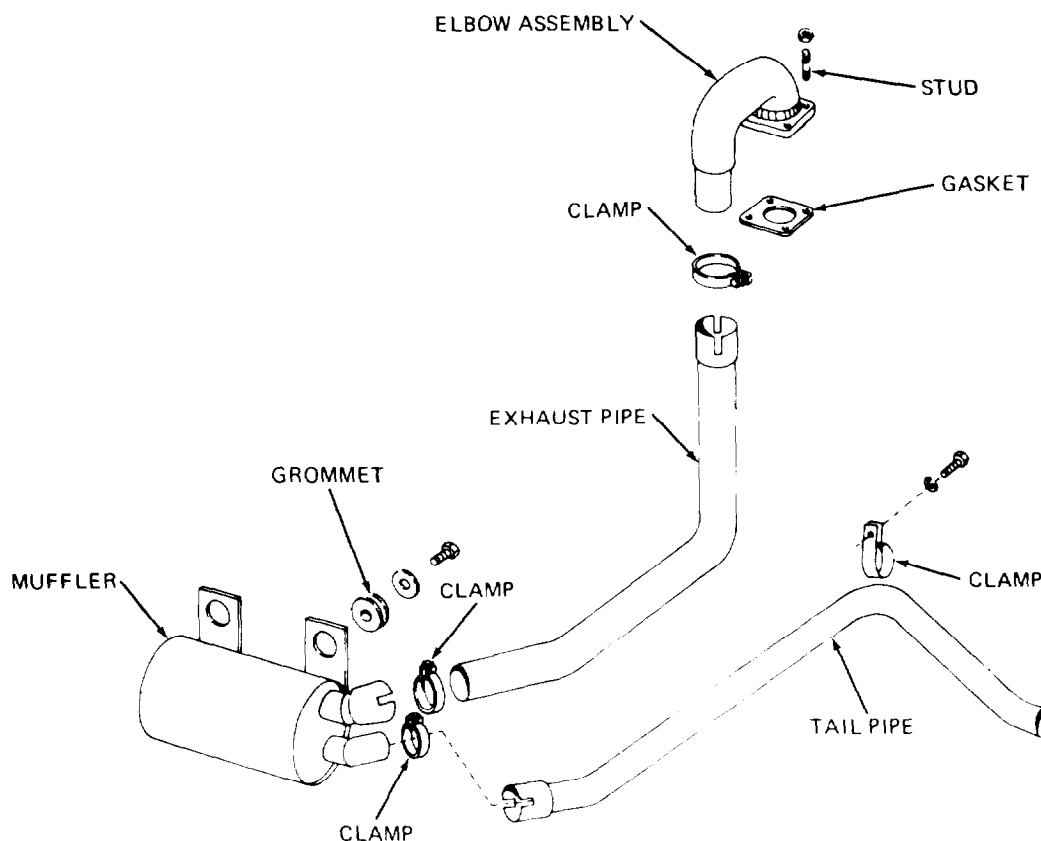
b. Installation. Refer to figures 3-19 and 3-20 and install the muffler and pipes as follows:

(1) Install grommets (fig. 3-20) in muffler bracket. Install muffler on frame and secure with two screws and lock washers.

(2) Connect exhaust and tail pipes to muffler and secure with clamps (fig. 3-20). Attach tail pipe to frame above rear wheel and secure with clamp, screw and lock washer.

(3) Install exhaust elbow (fig. 3-19), with gasket, on manifold and secure to studs with four nuts and lock washers.

(4) Connect exhaust pipe to elbow and secure with clamp. Tighten all clamps securely. Position gasket correctly to provide against leakage.



ME 3930-621 12/3 20

Figure 3-20. Muffler and pipes, exploded view

Section XI. COOLING SYSTEM

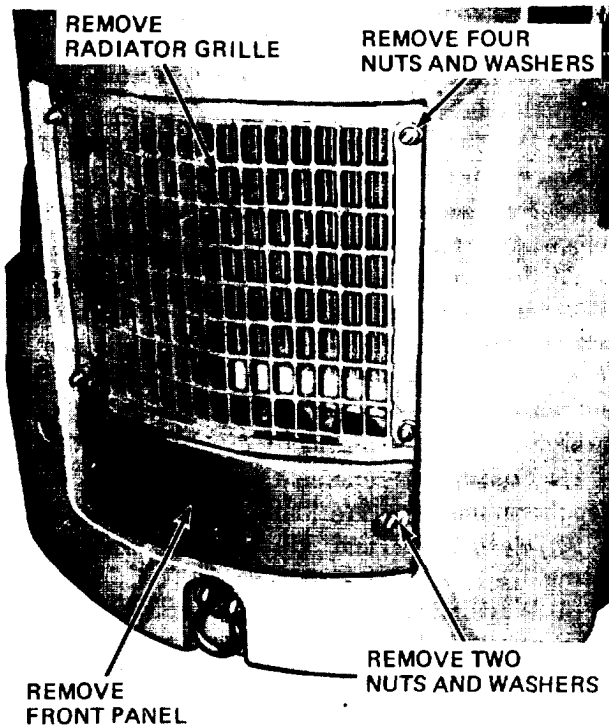
3-36. General

The engine cooling system consists of a centrifugal, engine-driven, water pump, radiator, thermostat, cooling fan, and connecting hoses and tubes. A tank, mounted below, and an integral part of the radiator, cools the transmission oil. Capacity of the system is 10 quarts.

3-37. Radiator

a. Installation and Cleaning.

(1) Remove the radiator grille (fig. 3-21) and front panel.



ME 3930-621-12/3-21

Figure 3-21. Radiator grille, installed view

(2) Blow dirt, debris, and other objects lodged in radiator fins by directing a stream of compressed air through the radiator from the engine side. Do not use steam, gasoline, fuel oil or kerosene.

(3) Check radiator for bent fins. Straighten fins if possible. Use care so as not to puncture radiator tubes.

(4) Inspect radiator and tank for leaks. Check and tighten radiator mounts if required.

(5) Tighten hose clamps. Inspect hoses for leaks and deterioration.

b. Removal. Refer to figure 3-22 and remove the radiator as follows:

(1) Remove seat and side panels.

(2) Remove radiator cap (2) and open drain valve

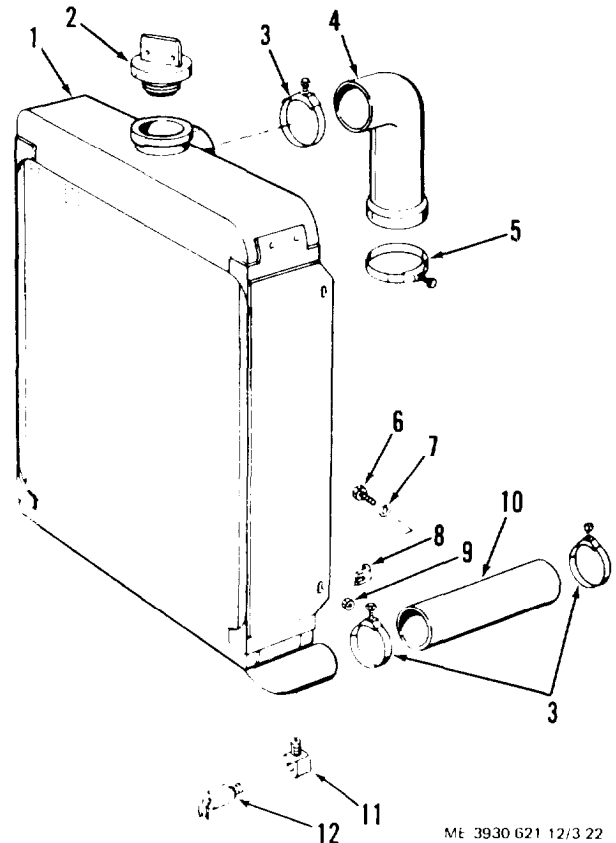
(12) on radiator and drain valve on engine inlet elbow and drain coolant from system.

(3) Loosen clamp (3 and 5) and remove hoses (4 and 10) from radiator and engine.

(4) Disconnect transmission oil cooler lines (para. 3-54) from bottom of radiator.

(5) Remove four screws (6), flat washers (7) and nuts (9) securing radiator to side frames.

(6) Slide bottom of radiator (1) out through radiator grille opening. Ease radiator down until filler neck clears hole in counterweight and remove radiator. Remove spacers (8).



ME 3930 621 12/3 22

- | | |
|-----------------|-----------------|
| 1. Radiator | 7. Flat washer |
| 2. Radiator cap | 8. Spacer |
| 3. Hose clamp | 9. Nut |
| 4. Upper hose | 10. Lower hose |
| 5. Hose clamp | 11. Elbow |
| 6. Screw | 12. Drain valve |

Figure 3-22, Radiator and hoses, exploded view

c. Installation. Refer to figure 3-22 and install radiator as follows:

(1) Slide radiator through radiator grille opening, with filler neck entering hole in top of counterweight. Aline holes in radiator shroud with holes in frame. Install spacers (8) in place on radiator. Secure radiator (1) in place with four screws (16), flat washers (7) and nuts (9).

(2) Install hoses (4 and 10) on radiator and engine and secure with clamps (3 and 4). Tighten clamps securely.

(3) Refer to paragraph 3-54 and connect transmission cooler lines to radiator.

(4) Refer to figure 3-21 and install radiator grille.

(5) Close drain valve (12) on radiator and drain valve on engine inlet elbow.

(6) Fill radiator and cooling system (d below).

d. Draining and Filling Cooling System.

(1) To drain cooling system, remove radiator cap (1, fig. 3-22) and open drain valve (12) and drain valve on engine inlet elbow.

(2) If cooling system is not to be refilled, attach a notice to steering wheel to warn other personnel that radiator has been drained.

(3) After draining and before refilling, flush radiator (e below) if radiator requires cleaning.

(4) Use soft water only in the cooling system, except in emergency conditions. Add anti-freeze or corrosion inhibitor to water as applicable.

(5) With drain cocks closed, fill cooling system through filler cap opening until coolant level reaches filler neck. Start engine and allow to idle until thermostat opens and allows coolant circulation.

(6) Add coolant to bring to proper level.

e. Cleaning and Flushing.

(1) Use a good grade of commercial flushing compound. Follow directions provided with compound.

(2) Check radiator for leaks after slushing and cleaning.

(3) To pressure flush radiator to clean obstructed radiator tubes, disconnect upper and lower hoses (b above).

(4) Connect a pressure water hose to the lower radiator connection, using a suitable adapter.

(5) Plug the upper hose connection on the radiator. Remove the radiator cap.

Caution: Do not use more than six pounds of pressure in flushing the radiator. Excess pressure may rupture tubes in the radiator or oil cooler.

(6) Turn on water and force water upward through radiator to loosen foreign material from tops of tubes. Material will be flushed out of top of radiator with water.

(7) Disconnect water hose and connect hoses to radiator and engine.

(8) Fill radiator and cooling system and check for leaks.

f. Anti-freeze Protection.

(1) Drain any anti-freeze solution from the cooling system at the end of each cold season and discard.

(2) Refer to table 2-1 (para 2-1) for anti-freeze and amounts required for protection.

g. Corrosion Inhibitor. Use a corrosion inhibitor compound (FSN 6850-281-1989) in coolant system using water only. Do not use corrosion inhibitor and antifreeze solution in the cooling system. Add eight ounces of corrosion inhibitor compound to ten quarts of water.

3-38. Water Pump and Thermostat

a. Removal. Refer to figure 3-23 and remove the thermostat and water pump as follows:

(1) Drain coolant system (para 3-37) to bring coolant level below thermostat housing (1).

(2) Remove two screws (23) and lock washers (24) securing housing to water pump. Remove housing and gasket (25).

(3) Remove thermostat (2) from top of water pump.

(4) Refer to paragraph 3-39 and remove the fan (19) and fan belt (18).

(5) Disconnect bypass tube (6) and remove elbow (5) from water pump assembly (3).

(6) Remove screw (17) and lock washer (16) and remove adjusting strap (15) from water pump.

(7) Remove two screws (14) and lock washers (13) and remove water pump assembly (3) and gasket (4) from engine.

b. Testing Thermostat. Fill a container with sufficient water to cover thermostat. Suspend thermostat in water.

(1) Suspend a reliable thermometer in water. Keep thermometer bulb off bottom of container.

(2) Heat water and stir water to assure even heating.

(3) When water reaches a temperature between 160° F and 165° F, thermostat should start to open. Thermostat should be completely open at 185° F to 190° F.

(4) Lift thermostat from container. Thermostat should close with a pronounced action after being exposed to surrounding air.

(5) Discard a thermostat that does not pass the above test.

c. Installation. Refer to figure 3-23 and install the thermostat and water pump as follows:

(1) Install water pump assembly (3) and new gasket (4) on engine and secure with two screws (14) and lock washers (13).

(2) Install adjusting strap (15) and secure with screw (17) and lock washer (16).

(3) Refer to paragraph 3-39 and install engine fan (19), fan belt (18), and pulley (22) on engine.

(4) Install elbow (5) in water pump assembly and connect by-pass tube (6) to elbow.

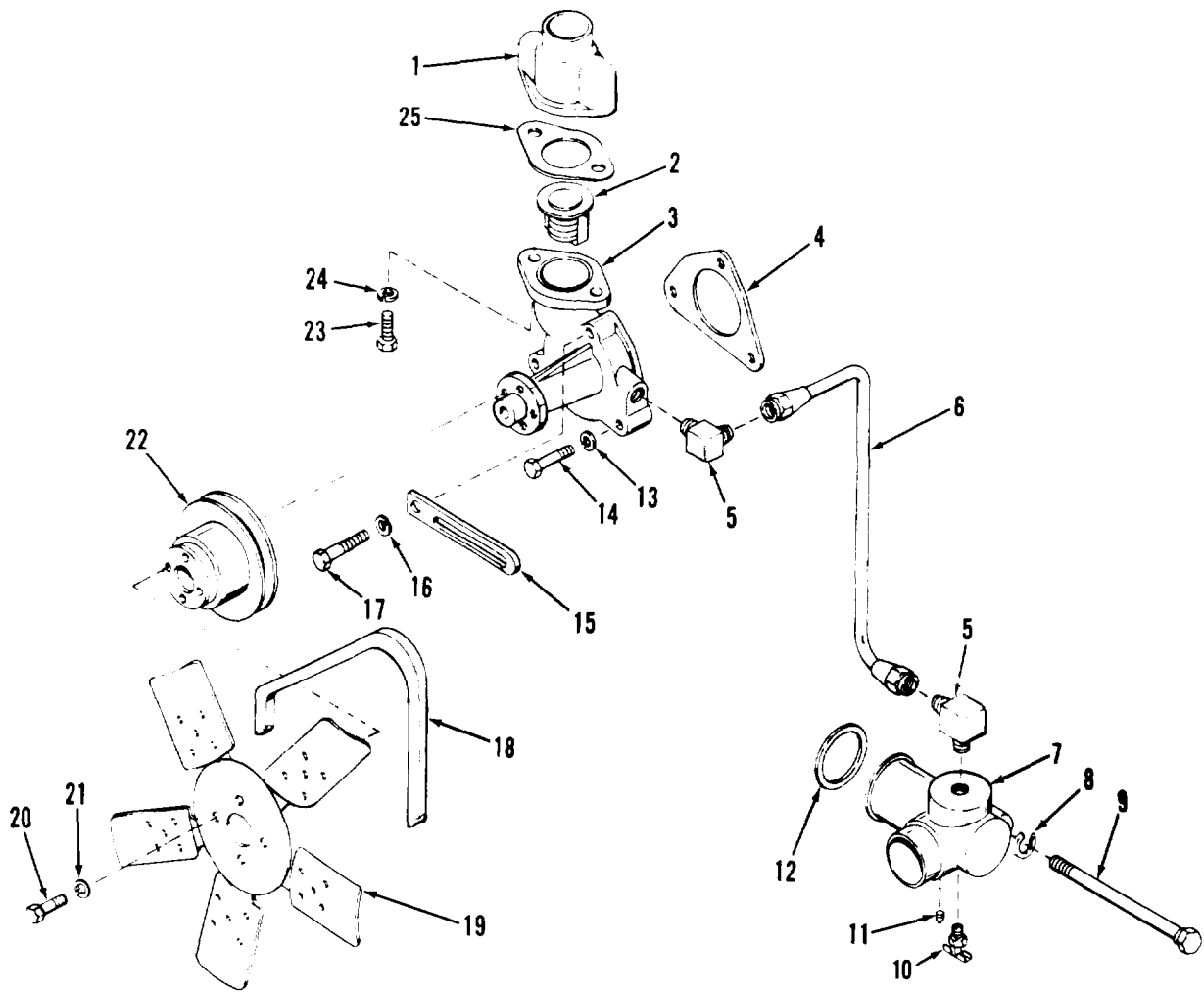
(5) Install thermostat (2) in top of water pump (3).

(6) Install new gasket (25) and thermostat hous-

ing (1) on water pump. Secure housing with two screws (23) and lock washers (24).

(7) Tighten hose clamp on thermostat housing

securely. Fill cooling system (para 3-37). Check system for leaks with engine operating.



ME 3030-621-12/3-23

- | | |
|------------------------|---------------------|
| 1. Thermostat housing | 14. Screw |
| 2. Thermostat | 15. Adjusting strap |
| 3. Water pump assembly | 16. Lock washer |
| 4. Water pump gasket | 17. Screw |
| 5. Elbow | 18. Fan belt |
| 6. Bypass tube | 19. Engine fan |
| 7. Inlet elbow | 20. Screw |
| 8. Lock washer | 21. Lock washer |
| 9. Bolt | 22. Fan pulley |
| 10. Drain valve | 23. Screw |
| 11. Plug | 24. Lock washer |
| 12. Seal | 25. Housing gasket |
| 13. Lock washer | |

Figure 3-23. Water pump and thermostat, exploded view

3-39. Fan and Fan Belt

a. *Inspection.* Inspect belt for wear, fraying or deterioration. Check for belt deflection and adjust (para 3-12), if necessary.

b. *Fan Belt Removal and Inspection.*

(1) Loosen alternator adjusting strap (fig. 3-5) to loosen fan belt and slip belt from alternator pulley.

(2) Remove radiator grille and panel (para 3-37).

(3) Refer to figure 3-24 and remove hydraulic pump as follows:

(4) Disconnect three hydraulic lines from hydraulic pump.

(5) Remove four screws and lock washers securing hydraulic pump plate to engine. Remove pump plate, with pump attached, from engine.

(6) Slip fan belt (18, fig. 3-23) from crankshaft pulley and work belt up and over fan blades and off fan pulley.

(7) Install new belt by slipping over fan blades and around crankshaft pulley and fan pulley.

(8) Refer to figure 3-24 and install hydraulic pump and plate and secure with four screws and lock washers. Connect hydraulic lines to pump. Install radiator grille (para 3-37).

(9) Slip fan belt over alternator pulley and refer to paragraph 3-12 and adjust fan belt tension and secure alternator.

c. *Engine Fan Removal and Installation.* Refer to figure 3-23 and remove engine fan as follows:

(1) Refer to paragraph 3-37 and remove radiator grille and radiator.

(2) Remove four screws (20) and lock washers

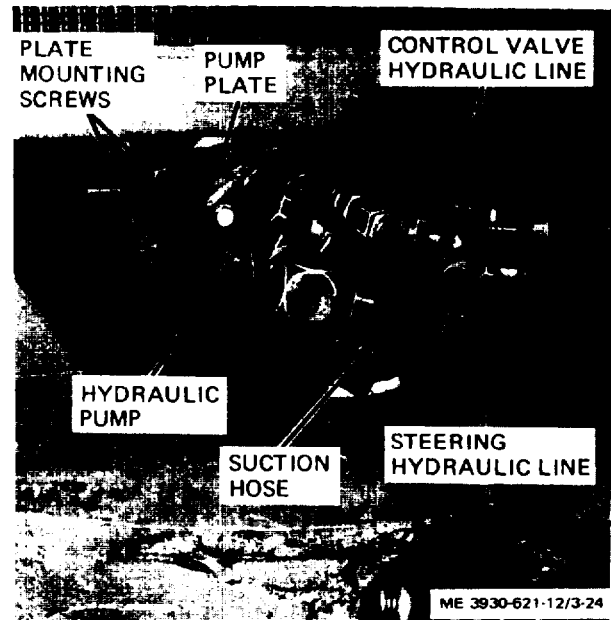


Figure 3-24. Hydraulic pump, installed view.

(21) securing fan to fan hub on water pump.

(3) Remove fan (19) and fan pulley (22) from engine.

(4) Install engine fan as follows:

(5) Install fan pulley and fan on fan hub, with fan pulley engaging fan belt.

(6) Secure fan and pulley to hub with four screws (20) and lock washers (21). Tighten screws securely.

(7) Refer to paragraph 3-37 and install radiator and radiator grille.

Section XII. ELECTRICAL SYSTEM

3-40. General

a. Refer to figure 1-3 for a schematic diagram of the electrical system.

b. The main components of the engine electrical system are the battery, alternator, voltage regulator, ignition coil, distributor and spark plugs.

c. Parts of the engine electrical system that power indicators and other instruments are the coolant temperature transmitter, engine oil pressure transmitter, and a pressure switch in the hourmeter circuit.

d. Lights on the truck consist of a front headlight and a stop and taillight. A pressure switch on the brake master cylinder powers the stop light. The light switch on the instrument panel actuates the lights.

e. The indicator circuit, horn circuit, and lighting circuits are protected by fuses. Two fuses are mounted on a panel beneath the instruments. The other fuses are in holders directly in the lines.

f. The starting circuit consists of a starter button, solenoid relay and engine starter.

g. The battery is a 12 volt, negative ground, long type, mounted in a battery box below the operator's seat. The voltage regulator is mounted on the side of the battery box.

Caution: Before attempting removal of any electrical component, disconnect the battery ground wire.

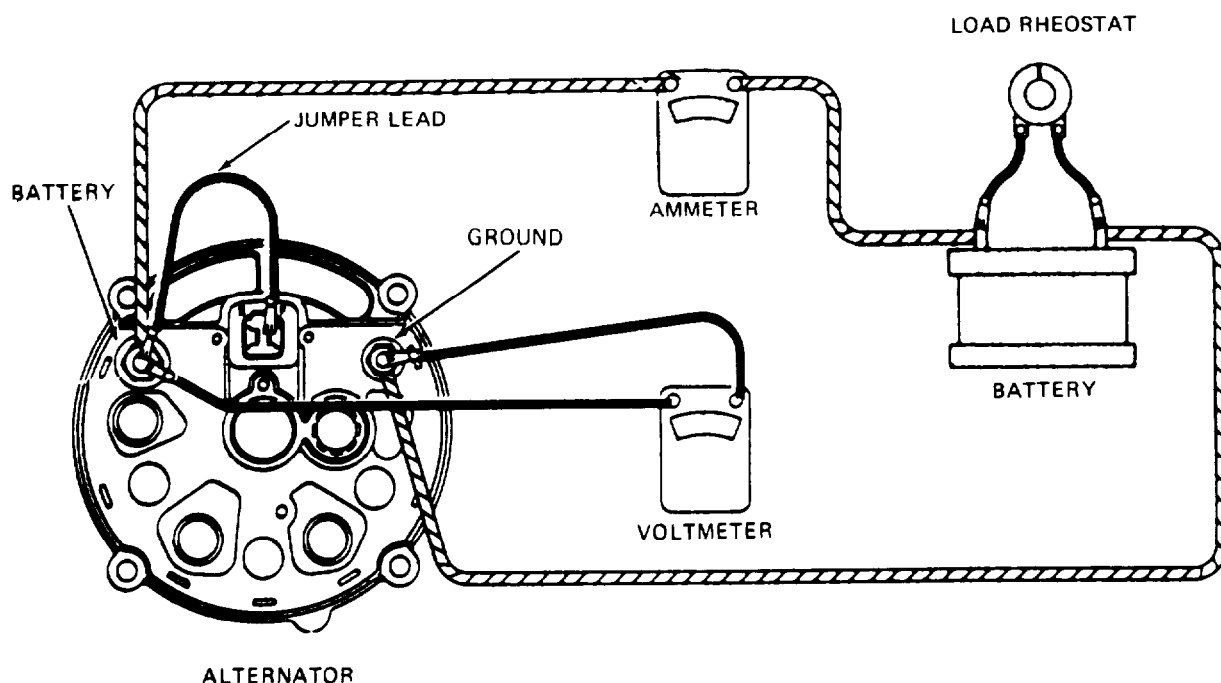
3-41. Alternator

a. *Output test.* Connect the alternator in a test circuit as shown in figure 3-25.

- (1) Connect a voltmeter between battery and ground terminals as shown.
- (2) Disconnect plug from rear of alternator.
- (3) Connect a jumper from field terminal to battery terminal as shown.
- (4) Operate engine at a fast idle, approximately

1100 rpm. Voltmeter should read 12 volts and ammeter should read 2.2 to 2.6 amps.

- (5) Increase engine speed to full throttle. The voltmeter should read 12 to 14 volts and the ammeter should read 25 to 29 amps.



ME 3930-621-12/3-25

Figure 3-25. Connections for alternator output test.

b. Removal. Refer to figure 3-26 and remove the alternator as follows:

- (1) Disconnect the battery ground cable (para 3-11).
- (2) Disconnect plug connecting R and F circuits.
- (3) Disconnect wires from battery and ground terminals on alternator. Mark wires for correct installation.

- (4) Loosen screw on adjusting strap and move alternator far enough toward engine to remove drive belt from alternator pulley. Remove screw, lock washer and flat washer from alternator and strap.

- (5) Remove two screws and nuts, and four lock washers attaching alternator to mounting bracket and remove alternator from engine.

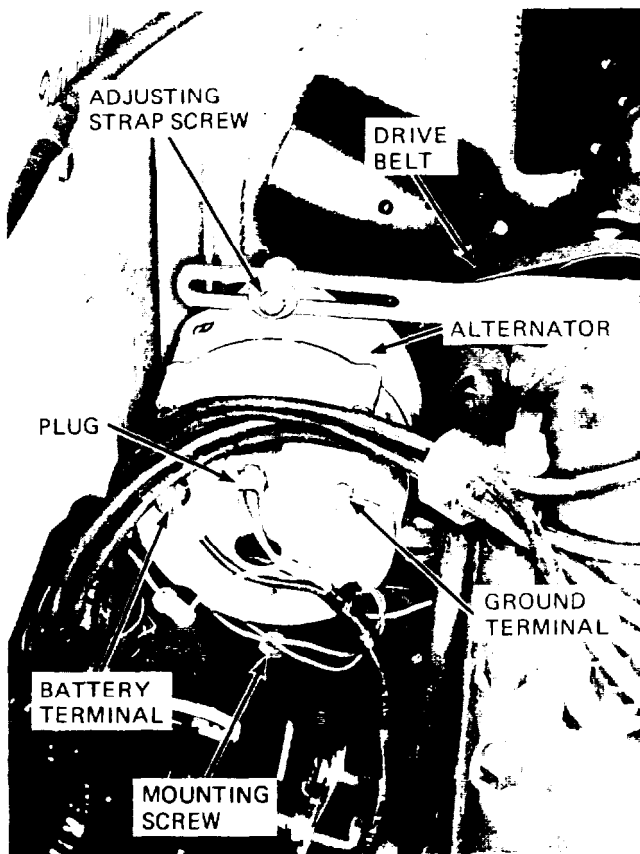


Figure 3-26. Alternator, installed view

c. Installation. Refer to figure 3-26 and install the alternator as follows:

- (1) Install alternator on mounting bracket and secure with two screws and nuts and four lock washers. Do not fully tighten screws.

- (2) Move alternator towards engine and install drive belt over alternator pulley. Secure top of alternator to adjusting strap with screw, lock washer and flat washer. Do not fully tighten screw.

- (13) Refer to paragraph 3-12 and adjust fan belt tension. Tighten mounting and adjusting brace screws securely.

- (4) Connect wires to battery and ground terminals on alternator.

- (5) Install plug to connect alternator R and F terminals to circuit.

- (6) Connect battery ground cable to battery (para 3-11).

d. Preparation for Operation. The following points must be adhered to before returning the truck to operation.

- (1) Do not polarize alternator.

- (2) Do not short or ground across any of the terminals of the alternator or regulator.

- (3) Never operate the alternator on an open circuit. Check all connections in the circuit for security.

- (4) Ground polarity of alternator and regulator

must be the same.

- (5) When using a booster battery, connect positive terminal of booster battery to positive terminal of truck battery and negative terminal to negative terminal.

- (6) When connecting a battery charger to battery, connect the same as for booster battery.

e. Operation. Start truck and check alternator operation. Alternator should show charging rate on ammeter.

3-42. Alternator Voltage Regulator

a. General. The voltage regulator is the transistor or solid state type. The regulator limits the voltage developed by the alternator and protects the circuits from too high a voltage. Protection is also provided to keep from over charging the battery.

b. Removal. Refer to figure 3-27 and remove the voltage regulator as follows:

- (1) Disconnect three wires from regulator terminals. Tag wires for correct installation.

- (2) Remove three screws, nuts, and lock washers and remove regulator from battery box.

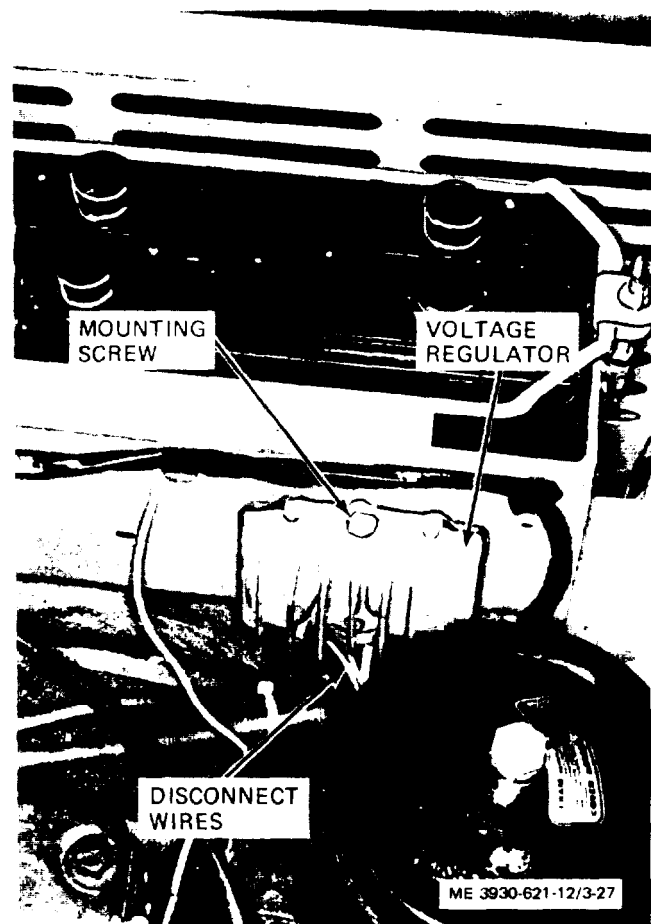


Figure 3-27. Voltage regulator, installed view.

c. *Installation.* Refer to figure 3-27 and install the voltage regulator as follows:

(1) Install regulator on battery box and secure with three screws, nuts, and lock washers.

(2) Connect three wires to proper terminals on regulator.

d. *Voltage Regulator Adjustment.* Slight adjustments can be made at the voltage regulator to increase or decrease battery charging rate.

(1) If battery is overcharging (indicated by battery using too much water) at normal setting, adjust regulator as follows:

(2) Remove access plug (fig. 3-28) and note position of slot in adjusting screw. The notches on the case indicate adjustment areas. Center notch is midpoint or normal setting. Each notch on sides of center notch indicates a change of 0.3 volts.

(3) To decrease voltage, turn adjusting screw counterclockwise one notch. This will decrease voltage 0.3 volts. Install access plug and check battery condition during a reasonable period of operation. If loss of water continues, repeat adjustment to further decrease charging rate until normal operation occurs.

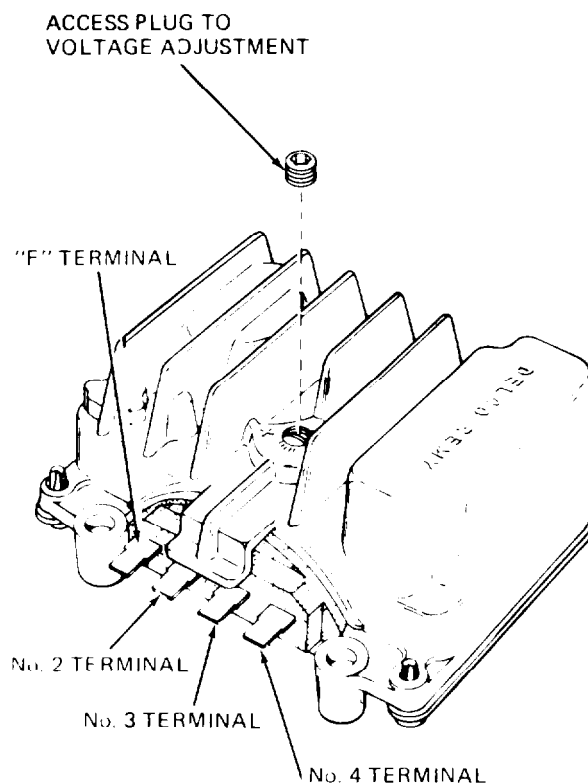
(4) To increase charging rate and keep batteries charged as required, rotate adjusting screw (fig. 3-28) counterclockwise as described above until normal operation is attained.

e. *Testing Voltage Regulator.* Test voltage regulator to check voltage regulator setting as follows:

(1) Connect a voltmeter as shown in figure 3-29, with one lead connected to regulator mounting screw and other lead to No. 3 terminal on regulator.

(2) Operate engine at approximately 1500 rpm for 15 minutes with truck lights on. Place a thermometer on the regulator and record temperature.

(3) The following readings, with regulator adjustment at midpoint, should be obtained on voltmeter for the temperature specified.



ME 3930 621 12/3-28

Figure 3-28. Voltage regulator adjustment.

- (a) 14.1 to 14.9 volts at 65°F.
- (b) 13.9 to 14.7 volts at 86°F.
- (c) 13.7 to 14.5 volts at 105°F.
- (d) 13.5 to 14.3 volts at 125°F.
- (e) 13.4 to 14.2 volts at 145°F.

(4) If voltage is not within the range for the specified temperature, remove plug and adjust regulator as described in c above.

(5) If correct readings cannot be obtained, replace the regulator.

d. *Removal of Solenoid Switch.* Refer to figure 3-31 and remove starter solenoid switch as follows:

(1) Tag and disconnect wires and cables from starter solenoid switch.

(2) Remove two screws, nuts and lock washers securing solenoid switch to battery box. Remove solenoid switch.

e. *Installation of Solenoid Switch.* Refer to figure 3-31 and install starter solenoid switch as follows:

(1) Install starter solenoid switch on battery box and secure with two screws, nuts, and lock washers.

(2) Connect wires and cables to solenoid switch. Refer to tags for correct installation.

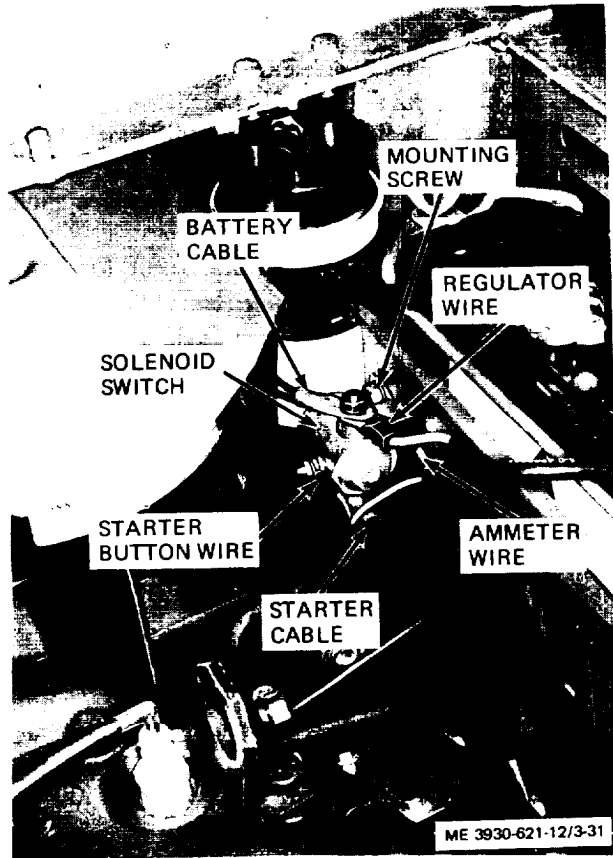


Figure 3-31. Starter solenoid switch, installed view.

3-44. Ignition Distributor

a. *General.* The distributor is mounted forward of the starter and is gear driven by a drive assembly actuated by the camshaft. The distributor can be removed and installed without retiming the engine. When removing the distributor do not loosen or remove the advance arm (fig. 3-32). Remove distributor and advance arm as an assembly.

b. *Removal.* Refer to figure 3-32 and remove the distributor as follows:

(1) Disconnect spark plug cables and high tension cable from coil from distributor cap. Disconnect coil primary lead from terminal on side of distributor. Disengage springs and remove cap from distributor.

(2) Remove screw and washers securing advance arm to engine and lift distributor from drive housing.

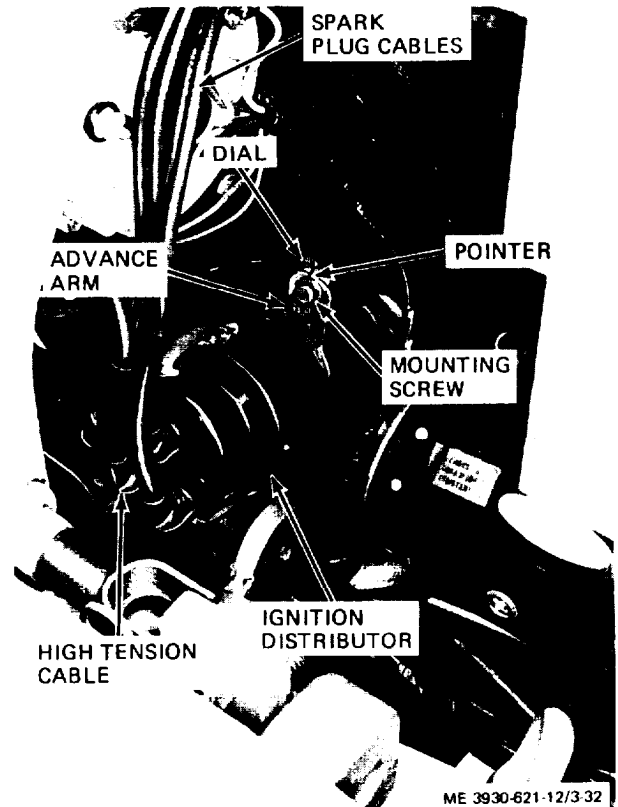
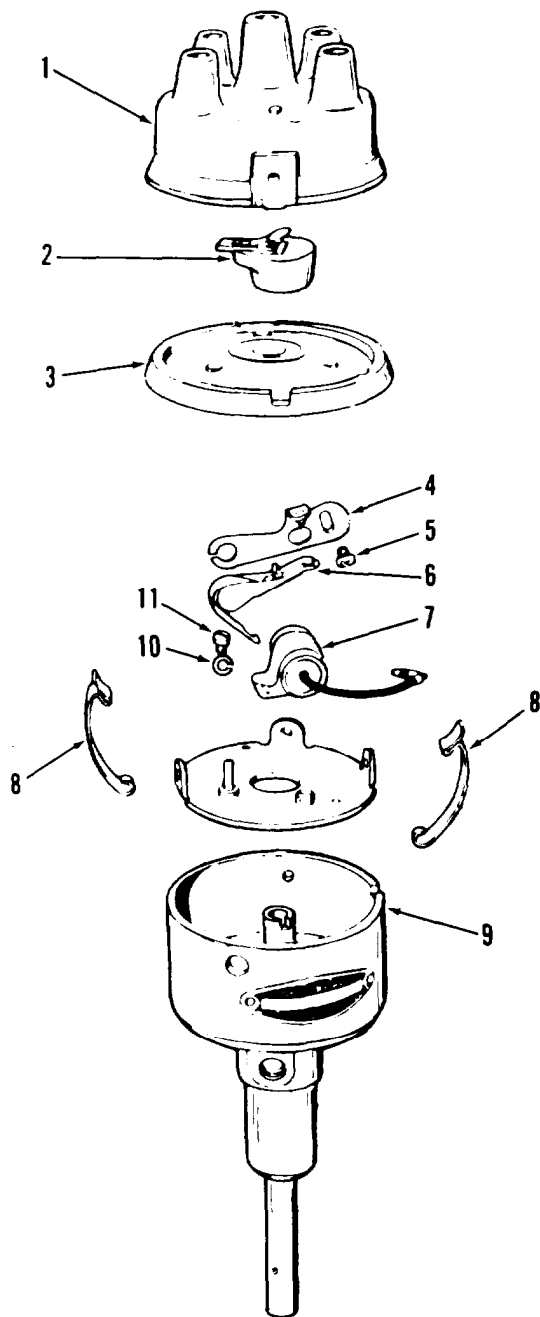


Figure 3-32. Ignition distributor, installed view



ME 3930-621 12/3-33

1. Distributor cap
2. Rotor
3. Dust cover
4. Contact assembly
5. Screw
6. Breaker lever
7. Capacitor
8. Retaining spring
9. Housing
10. Lock washer
11. Screw

Figure 3-33. Ignition distribution, exploded view

c. *Disassembly.* Refer to figure 3-33 and disassemble the distributor far enough to replace rotor and contacts as follows:

(1) Release cap retaining springs (8) and remove cap (1), rotor (2), and dust cover (3), from housing (9).

(2) Remove breaker lever (6) from pin. Remove two screws (5) and remove contact assembly (4).

(3) Disconnect wire and remove screw (11) and lock washer (10) and remove capacitor (7).

d. *Inspection and Repair.*

(1) Clean all parts thoroughly and replace any damaged or worn parts. Do not use solvent or degreasing compound on cap, dust cover, rotor, capacitor, insulator, or housing.

(2) Clean slightly worn or pitted contact points with a few strokes of a clean fine-cut file. Replace points if worn or badly pitted.

(3) Check breaker lever rubbing block for excessive wear.

(4) Check capacitor for leakage. Replace capacitor if unable to test.

(5) Check distributor cap and rotor for cracks, burned or pitted contacts, and carbon streaks.

e. *Assembly.* Refer to figure 3-33 and assemble distributor as follows:

(1) Install capacitor (7) and secure with screw (11) and lock washer (10). Connect capacitor wire to stud.

(2) Install contact assembly (4) and secure with screws (5). Do not tighten lock screw.

(3) Install breaker lever (6) on pin.

(4) Install dust cover (3) and rotor (2).

f. *Installation* Refer to figure 3-32 and install distributor as follows:

(1) Install ignition distributor in drive assembly.

(2) Secure distributor and advance arm with screws and lock washers. Install cap on distributor and secure with springs.

Note. Before installing spark plug cables and high tension cable, adjust point gap (g below).

(3) Install spark plug cables and high tension cable in distributor cap sockets.

(4) Connect coil primary wire to terminal on distributor.

g. *Distributor Point Adjustment.*

(1) Adjust distributor points as follows:

(2) Remove timing cover on flywheel housing (para 3-25).

(3) Remove spark plug from number one cylinder. Place thumb over spark plug opening. Rotate the engine crankshaft by hand until outward pressure against thumb is felt. Continue cranking slowly until T.D.C. mark (fig. 3-9) is aligned with the reference line at the center of the timing hole.

(4) Refer to c above and remove distributor cap, rotor, and dust cover.

(5) Check and adjust contact point gap as follows:

(6) Refer to figure 3-34. Rotate the crankshaft until the breaker lever rubbing block is on the high spot on the cam, bringing the contact points to their maximum open position.

(7) Loosen the contact assembly locking screw (fig. 3-34). Place an 0.022 inch feeler gage between points. Turn contact plate assembly adjusting screw to adjust gap until a slight drag is felt when feeler gage is slid between two contact points. Tighten locking screw.

(8) Check point gap after tightening locking screw.

(9) Refer to e above and install dust cover, rotor, and distributor cap on distributor.

h. Ignition Timing Adjustment.

(1) Remove the timing cover from the flywheel housing and remove spark plug from number one cylinder.

(2) Place thumb over spark plug opening and rotate the engine crankshaft by hand until T.D.C. mark on flywheel is aligned with reference line at center of the timing hole (fig. 3-9).

(3) Adjust contact point gap to correct setting (g above).

(4) Loosen screw at the distributor advance arm (fig. 3-32) and set pointer at zero mark.

(5) Rotate crankshaft until ignition timing line (fig. 3-9) is aligned with reference line on flywheel housing. This line is 4° B.T.D.C. (below top dead center).

(6) Chalk another line on the flywheel at 8° B.T.D.C. (approximately 1½ teeth below 4° line).

(7) Install number one spark plug on engine and connect a timing light to the engine. Connect the timing light as follows: black lead to negative battery post, red lead to positive battery post, and blue lead to number one spark plug.

(8) Install a tachometer to register engine revolutions.

(9) Start the engine and, using the carburetor idle speed adjusting screw (para 3-29), decrease idle speed so there is no apparent distributor advance or retard (approximately 300 to 350 rpm).

(10) Rotate distributor to set timing at 4° B.T.D.C. Timing light should flash and indicate the 4° line on the flywheel.

(11) Increase the idle speed to 500 to 550 rpm.

(12) Using the timing light again, check flywheel timing and note whether timing has advanced approximately 4° to the chalk mark at 8° B.T.D.C. If advance is correct, tighten distributor advance screw.

(13) With timing correctly adjusted, accelerate

the engine rapidly a few times and observe movement of flywheel timing mark. If spark advance is working properly the mark should move counterclockwise on the flywheel during acceleration and drop back to 8° B.T.D.C. as the engine decelerates to idle speed.

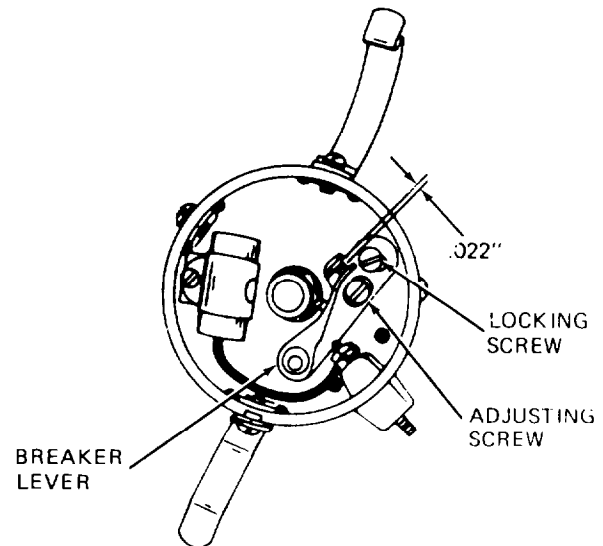


Figure 3-34. Adjusting distribution contact point gap.

3-45. Ignition Coil

a. General. High voltage required to provide the spark for engine operation is provided by the ignition coil. The coil is remotely mounted on the right side of the engine compartment and is suppressed by a 0.25 MFD capacitor.

b. Removal. Refer to figure 3-35 and remove the coil as follows:

(1) Disconnect high tension cable from top of coil. Disconnect capacitor and primary wires from the terminals at the sides of the coil.

(2) Remove two screws and lock washers securing ignition coil, and capacitor, to frame and remove coil and capacitor.

c. Installation Refer to figure 3-35 and install the coil as follows:

(1) Install coil and capacitor on truck frame and secure with two screws and lock washers.

(2) Connect capacitor and primary wires to terminals at sides of coil. Connect high tension cable to top of coil.

d. Amperage Draw Test. Connect the ignition coil in a circuit as shown in figure 3-36 and test as follows:

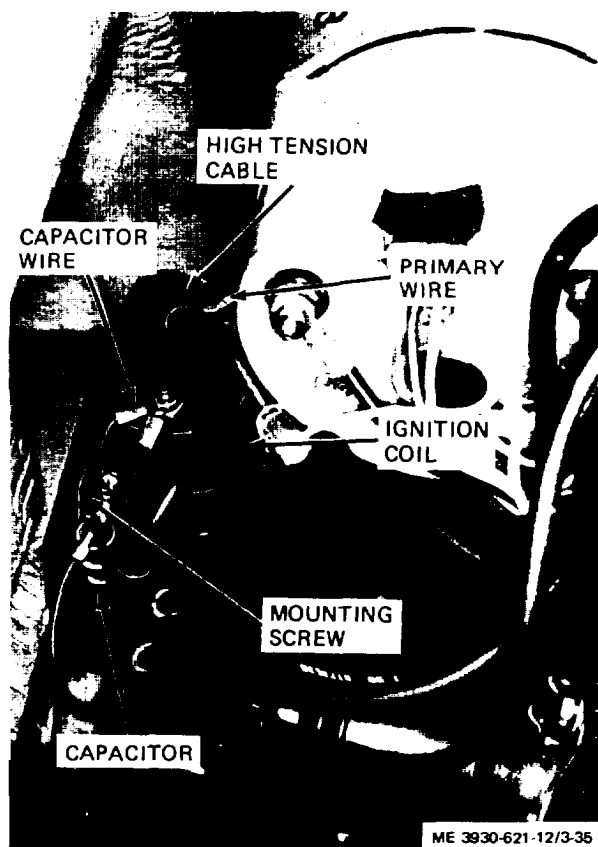


Figure 3-35. Ignition coil, installed view.

(1) A test ammeter is required as shown to give accurate measurement.

(2) Close ignition switch and adjust voltage to 12 volts.

(3) Test ammeter should read 2 to 3 amperes.

(4) Remove connections and instruments used for test wiring.

e. Primary Ignition Circuit Resistance Test. Connect a voltmeter with a one volt scale in series with the positive battery terminal and the coil primary terminal opposite distributor primary terminal.

(1) Remove distributor cap (para 3-44) and rotate engine to close breaker points in distributor.

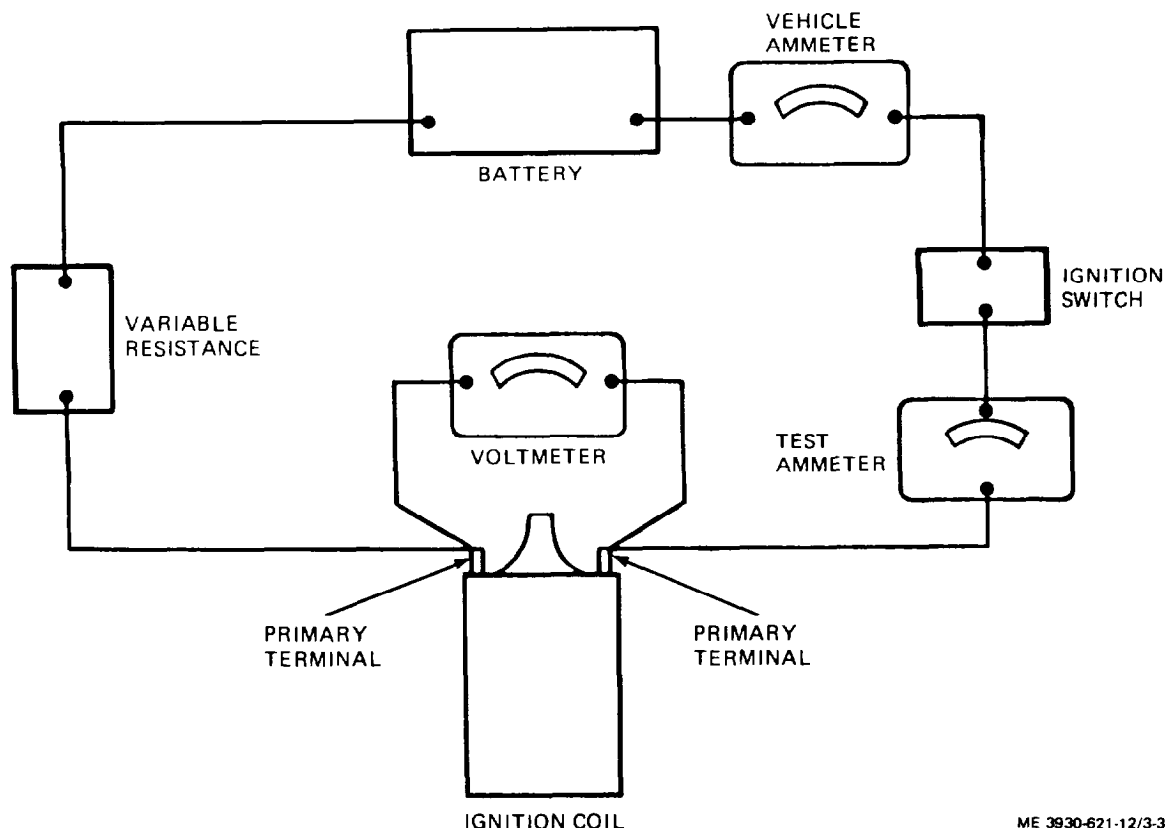
(2) Turn ignition switch to ON position. Voltmeter should not read more than 0.20 volts.

(3) Turn ignition switch to OFF position. Disconnect voltmeter leads from battery and coil. Connect one voltmeter lead to coil primary connected to distributor and ground the other to the distributor housing.

(4) Turn ignition switch to ON position. Voltmeter should read less than 0.10 volts.

(5) If readings exceed the values specified, replace ignition coil.

(6) Turn ignition switch to OFF position and disconnect test circuit.



ME 3930-621-12/3-36

Figure 3-36. Ignition coil test wiring.

f. Coil Primary Continuity Test. Connect an ohmmeter across the primary ignition coil terminals. Do not turn ignition switch to ON position. Check ohmmeter. Ohmmeter reading should be steady. If ohmmeter fluctuates, replace ignition coil. Disconnect ohmmeter.

g. Coil Secondary (High Tension) Continuity Test. Disconnect high tension wire from top of ignition coil. Connect an ohmmeter across the high tension terminal at top of ignition coil and to the primary terminal to distributor. Ohmmeter should read less than 20,000 ohms of resistance. If reading exceeds this value, replace ignition coil. Disconnect ohmmeter and connect high tension wire to ignition coil.

3-46. Spark Plugs and Cables

a. General. Keep spark plugs and spark plug cables in good condition and keep them free of dirt and grease. Replace any burned, cracked, or broken spark plugs or cables.

b. Removal.

(1) Disconnect cables from spark plugs. Blow out dirt from spark plug wells with compressed air.

(2) Refer to paragraph 3-24 to remove spark plug cable bracket and cables from cylinder head.

(3) Use a suitable spark plug socket wrench and remove spark plugs from cylinder head. Use correct fitting socket to prevent damage to spark plug.

(4) Remove copper gasket from spark plug well after removing spark plugs.

c. Cleaning.

(1) Scrape carbon and lead deposits from electrodes and insulator body of plugs.

(2) Sand blast electrodes on plug with care. Do not leave plug in sand blast machine too long. Damage to glaze on insulator material could result.

(3) Use a fine mill file and file electrodes to provide a square or flat surface at gap area.

(4) Clean all grease, dirt, and paint from exposed insulator surface.

d. Adjustment.

(1) Adjust spark plug gap by bending outside electrode. Do not bend center electrode.

(2) Use a round wire feeler gage to measure gap between electrodes. Adjust gap to 0.025 inch.

e. Testing. Test all spark plugs after cleaning and adjusting; test all plugs in a standard spark plug machine. Discard all plugs showing an unsatisfactory test.

f. Installation

(1) Install spark plugs in wells in cylinder head. Use new copper gaskets for all plugs.

(2) Tighten plugs by hand and then torque tighten plugs to 15 to 20 foot pounds.

(3) Refer to paragraph 3-24 to install bracket and spark plug cables. Connect cables to spark plugs.

3-47. Battery and Cables

a. Removal. Refer to figure 3-37 and remove the battery as follows:

(1) Disconnect battery ground cable (negative post) and battery positive cable from battery. Use a cable terminal puller tool to remove cables to prevent damage to battery.

(2) Remove wing nuts, flat washers, and lock washers, securing battery hold-down to studs. Remove hold-down from battery.

(3) Lift battery from battery box using a suitable lifting tool.

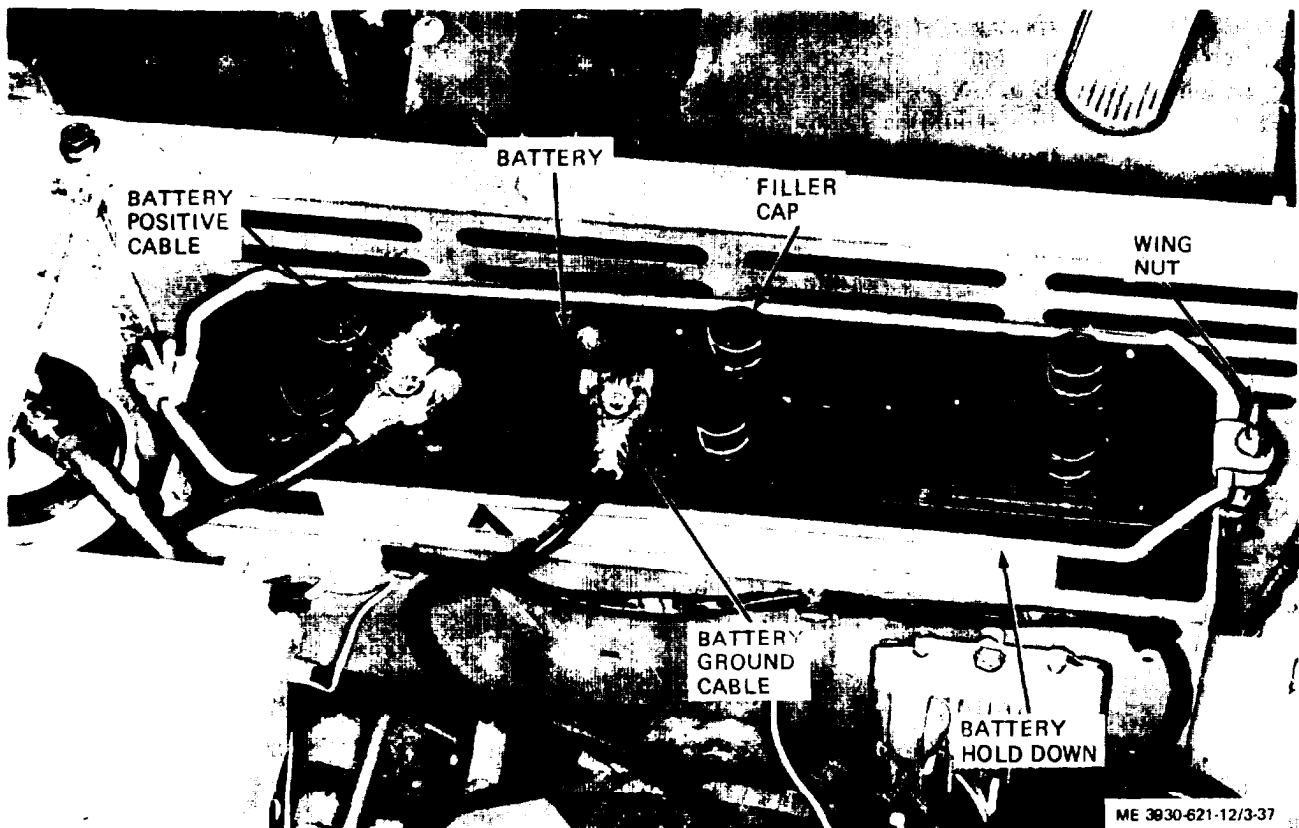


Figure 3-37. Battery, installed view

b. Cleaning.

(1) Tighten all filler caps securely. Clean battery posts, cable terminals, and top of battery with a solution of baking soda and water. Use care to be sure none of solution enters filler caps and gets into battery.

(2) After foaming from solution stops, flush battery and cable terminals with clean, fresh water.

c. Inspection and Testing.

(1) Check cables for frayed insulation, broken strands, and damaged terminals.

(2) Inspect battery for cracks, breaks, and other defects.

(3) Use a hydrometer and take a specific gravity reading of the battery. A fully charged battery should show a reading of 1.265 to 1.290 specific gravity. If the reading is 1.225 or lower, recharge battery.

d. Installation. Refer to figure 3-37 and install the battery as follows:

(1) Lift battery and place in position in battery box with terminals in position shown.

(2) Install hold-down on battery and secure hold-down to studs with wing nuts, flat washers, and lock washers.

(3) Coat battery posts with petroleum jelly (PTA) before connecting cables. Attach cable terminals (positive cable first) to battery posts.

3-48. Gages, Instruments, and Transmitters

a. General. The gages, instruments, and indicators, are mounted on the instrument panel mounted forward of the operator's seat. Transmitters to actuate the indicators are mounted on the engine and in the fuel tank.

b. Instrument Removal. Remove instruments by tagging the wires and disconnecting the wires from the instrument, removing attaching hardware, and removing the instrument.

c. Instrument Installation. Install instrument in proper location, secure with attaching hardware and connect wires to instruments.

d. Fuses. Fuses are mounted on a fuse holder beneath the instrument panel. Remove fuse from panel and install identical fuse in place. Fuses for the hourmeter circuit and stop light circuit are mounted in holders connected into the wire. Press holder and turn one-quarter turn to disengage holder and remove fuse. Install identical fuse in holder and secure holder.

e. Transmitters.

(1) Refer to figure 3-38 and disconnect wire from oil pressure transmitter and remove transmitter from elbow in governor oil line. Install new transmitter and connect wire.

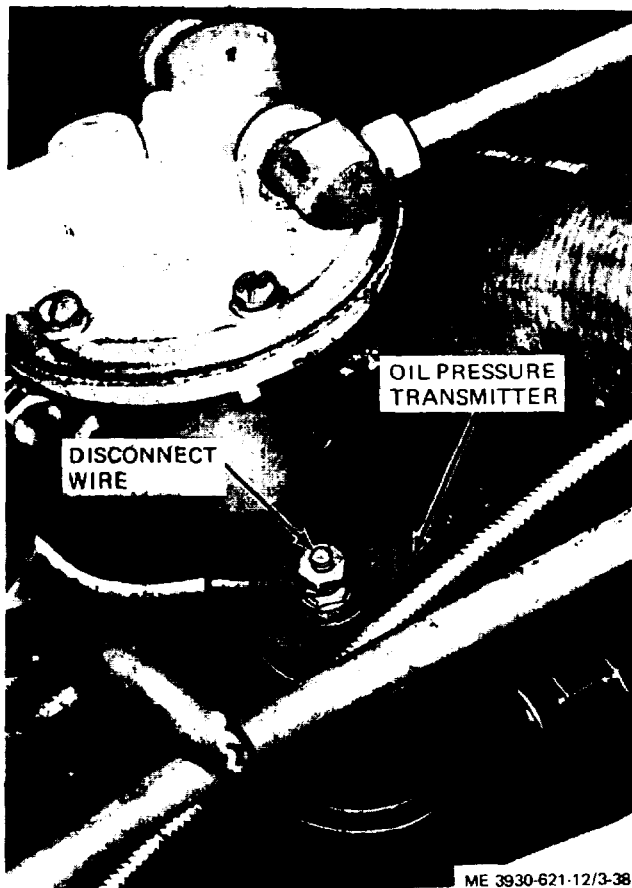


Figure 3-38. Oil pressure transmitter, installed view.

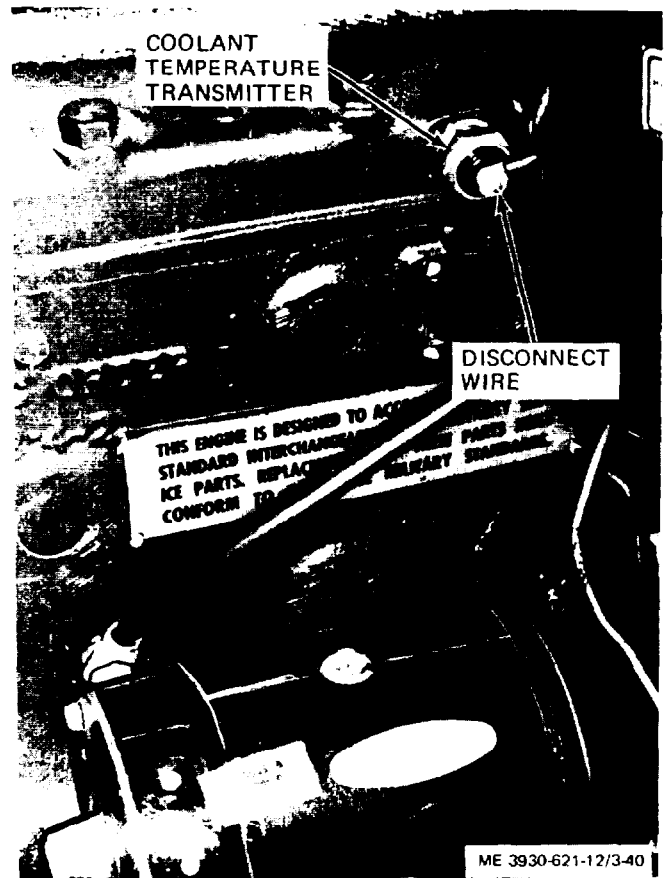


Figure 3-40. Coolant temperature transmitter, installed view.



Figure 3-39. Hourmeter actuating transmitter, installed view.

(2) Refer to figure 3-39 and disconnect two wires from hourmeter actuating transmitter and remove transmitter from elbow in top of governor. Install new transmitter and connect wires.

(3) Refer to figure 3-40 and disconnect wire from coolant temperature transmitter and remove transmitter from cylinder head. Install new transmitter and connect wire to terminal.

3-49. Lights

a. General. The lights on the lift truck consist of either one or two headlights and a stop and taillight. The headlight is mounted on a bracket on the mast. The taillight is mounted on the counterweight forward of the radiator cap.

b. Headlight.

(1) *Removal.* Refer to figure 3-41 and remove the lamp from the headlight as follows:

(a) Pull rubber bezel from headlight base. Loosen the terminal screws and disconnect the wires from the lamp.

(b) Using care, push the lamp from the bezel.

(c) To remove headlight from truck, disconnect

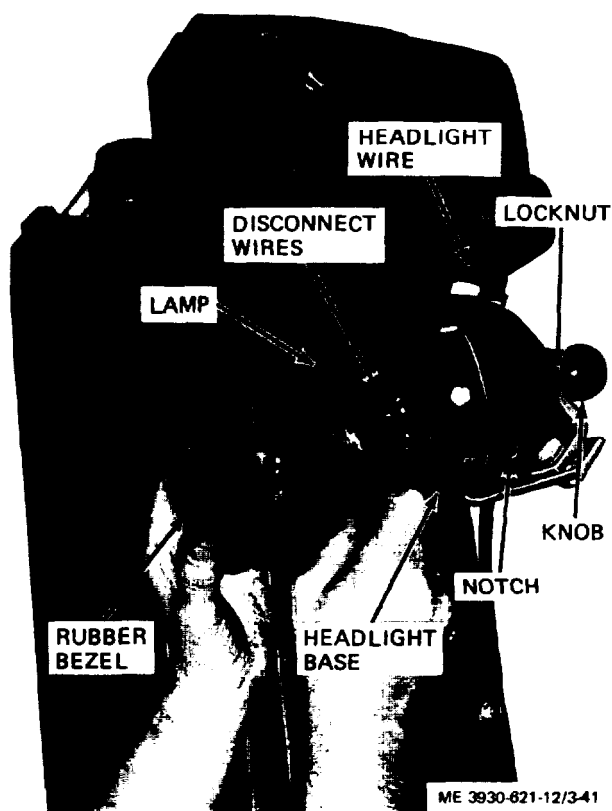


Figure 3-41. Headlight, removal and installation.

wire from headlight. Unscrew adjusting knob and remove locknut. Remove the headlight assembly from the mounting bracket. Remove lamp as described above.

(2) *Installation.* Refer to figure 3-41 and install the headlight.

(a) Install headlight on bracket and secure with locknut and adjusting knob. Connect wire to headlight.

(b) Install lamp in bezel.

(c) Connect wires to lamp terminals and tighten screws.

(d) Install bezel and lamp in headlight base. Align projections on bezel with notches on base and press bezel into place.

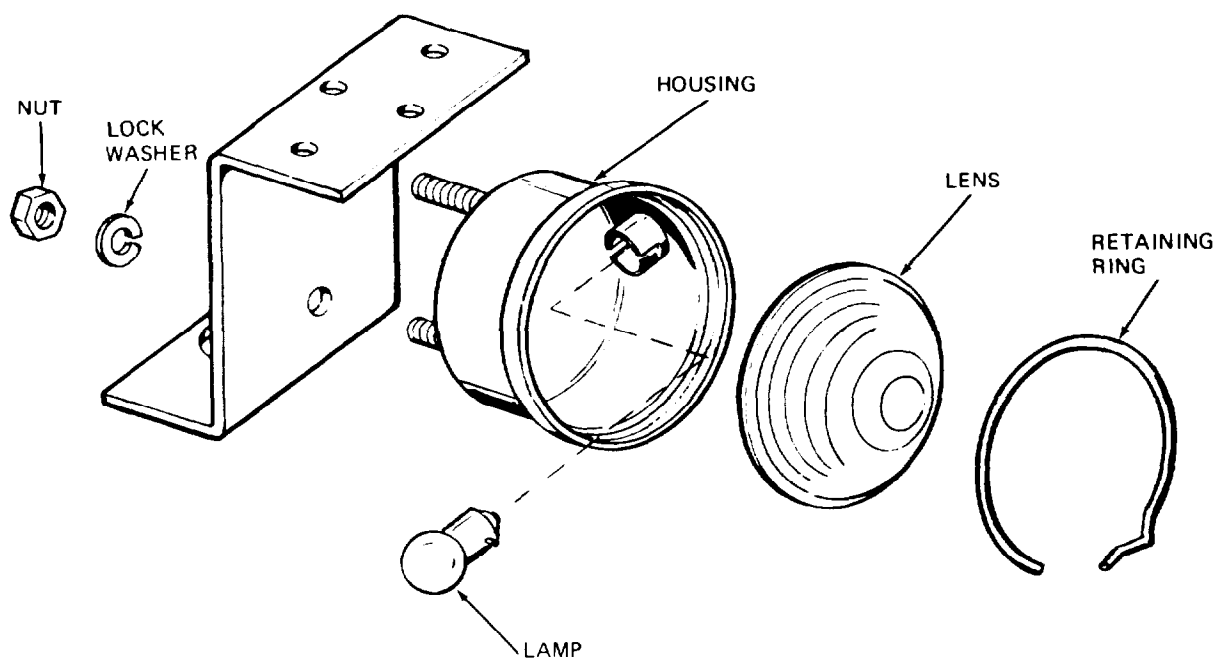
c. Combination Rear Light.

(1) *Removal.* Refer to figure 3-42 and remove combination rear light as follows:

(a) Remove lock ring securing lens in lamp.

(b) Depress lamp and turn one-quarter turn counterclockwise to remove from socket.

(c) Disconnect wires from connectors and remove two nuts and washers securing light to bracket and remove light.



ME 3930-621-12/3-42

Figure 3-42. Combination rear light, exploded view.

(2) *Installation.* Refer to figure 3-42 and install the combination rear lamp as follows:

(a) Install light on bracket and secure with two nuts and washers. Connect wires to connectors.

(b) Install lamp, depressing lamp into socket and turning lamp one-quarter turn clockwise.

(c) Install lens in light and secure by installing lock ring in groove in lamp.

3-50. Horn and Horn Relay

a. *General.* The horn and horn relay are mounted on the right post and are protected by the right hand cowl.

b. *Tests and Adjustments.* In the event the horn is not operating properly, check the battery voltage before proceeding with the following tests.

(1) Remove three screws, one nut, and lock washers and remove right hand cowl.

(2) In event the horn is producing a weak signal proceed as follows:

(a) Connect a voltmeter between the horn terminal and ground. Press the horn button and observe the voltage on voltmeter.

(b) If voltage is between zero and 10.7 volts, check for an open circuit, defective horn relay, defective wiring, or shorted horn coil.

(3) If voltage is normal and horn signal is weak, increase volume by using volume adjusting screw (fig. 3-43) in horn cover. Rotate screw clockwise to increase volume; counterclockwise to decrease.

(4) If defective horn relay is indicated, replace relay.

c. *Removal.* Refer to figure 3-43 and remove horn and horn relay.

(1) Tag and disconnect wires from horn and horn relay.

(2) Remove two nuts and washers from studs attaching horn to mounting bracket and remove horn.

(3) Remove screw, nut, and lock washer securing horn relay to bracket and remove relay.

d. *Installation.* Refer to figure 3-43 and install the horn and horn relay as follows:

(1) Install horn relay on bracket and secure with screw, nut, and lock washer.

(2) Install horn on bracket and secure with two nuts and washers on horn studs.

(3) Connect wires to horn and horn relay.

(4) Install right hand cowl and secure with three screws, nuts, and four lock washers.

3-51. Transmission Neutral Switch

a. *General.* A normally opened switch, connected in series with the starter button and starter solenoid switch, is attached to the underside of the steering column support bracket. The switch prevents start-

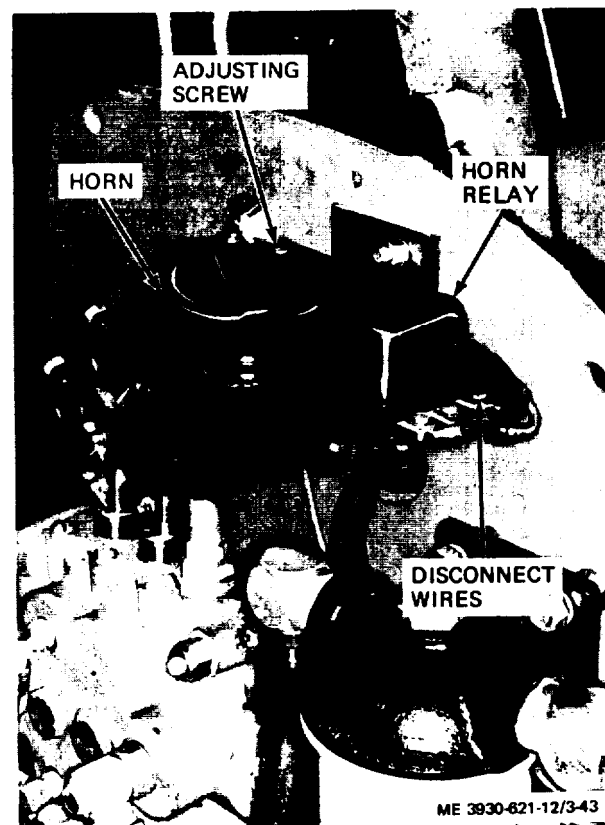


Figure 3-43. Horn and horn relay, installed view.

ing the engine unless the transmission is in neutral. Placing the transmission shift lever (fig. 2-2) into neutral (N) position moves a cam lever (fig. 3-44) into contact with the switch roller, closing the switch and completing the circuit. Check cam adjustment (d below) before replacing the switch.

b. *Removal.* Refer to figure 3-44 and remove the switch as follow:

(1) Disconnect wires leading from switch at connectors.

(2) Remove two screws, nuts, lock washers, and flat washers securing the switch to the support and remove the switch.

c. *Installation.* Refer to figure 3-44 and install the switch as follows:

(1) Install switch on steering column support and secure with two screws, nuts, lock washers, and flat washers.

(2) Connect wires from switch to connectors in wires from harness.

(3) Operate shift lever and check switch operation. Cam on lever must contact switch roller and open switch when shift lever is in forward or reverse positions. Adjust (d below) if necessary.

d. *Adjustment.* Refer to figure 3-44 and adjust cam lever as follows:

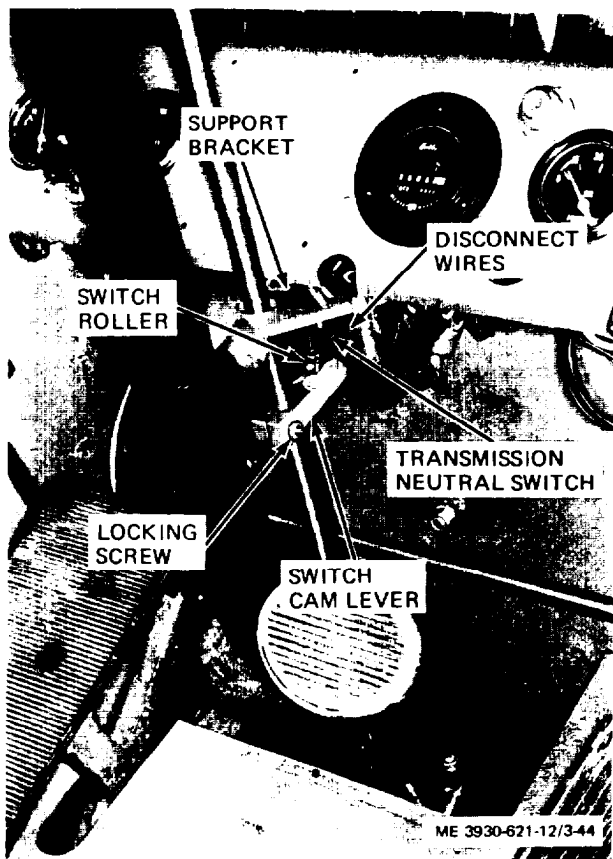


Figure 3-44. Transmission neutral switch, installed view.

- (1) Place the shift lever in neutral (N) position.
- (2) Loosen the locking screw on the cam lever and rotate or slide the cam lever on the shifting rod to position the switch roller at the high point on the cam. Tighten locking screw and check to see lever does not move from position.
- (3) Shift lever to forward and reverse positions. Cam lever should allow roller to extend from switch to open circuit.
- (4) Attempt to start engine with lever in forward (F) or reverse (R) positions. Starter should not operate with lever in these positions. Move lever to neutral (N) position. Depress button. Starter should operate.

Section XIII. TRANSMISSION

3-52. General

a. The two direction, torque converter transmission is directly coupled to the engine. A propeller shaft between the transmission and front axle carries power to the drive axle. The transmission is of the power-shift type, operated by a shift lever connected to the control value.

b. This section includes service of transmission components allocated to organizational maintenance. These include the transmission oil filter and oil cooling lines.

3-53. Transmission Oil Filter

a. General. The transmission oil filter is mounted on the left side of the frame beneath the operator's seat. It is a screw-in type filter, with the filter base secured to the frame.

b. Service. Refer to figure 3-45 and service the transmission oil filter as follows:

- (1) Rotate oil filter counterclockwise to remove filter from base.
- (2) Discard filter. Clean base and pipe nipple.
- (3) Install new oil filter and tighten snugly on filter base.

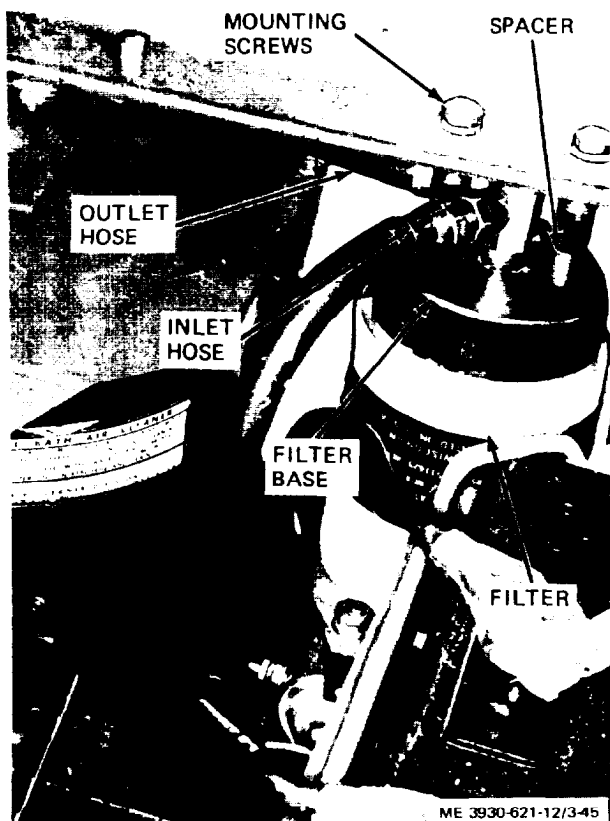


Figure 3-45. Transmission oil filter, installed view.

- (4) Check oil level in transmission at transmission oil gage (fig. 3-46). Add oil if necessary.

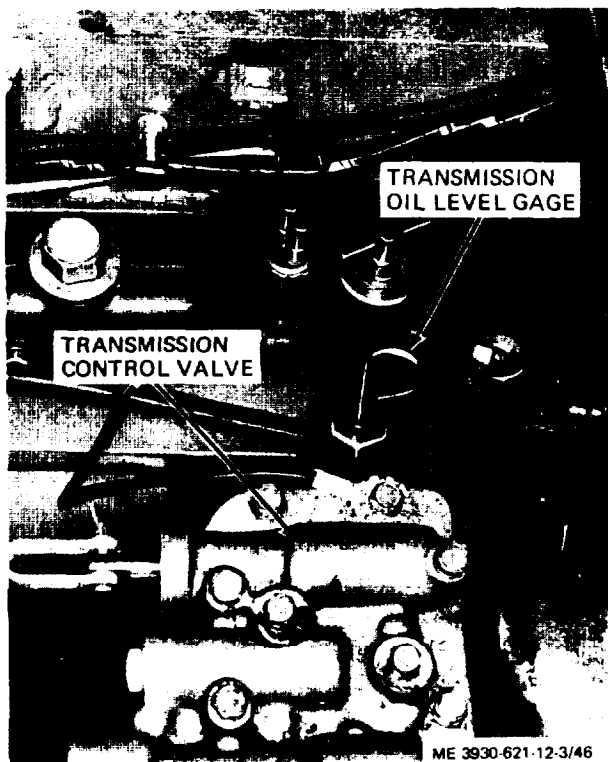


Figure 3-46. Transmission oil level gage.

c. *Removal.* Refer to figure 3-45 and remove the transmission oil filter as follows:

- (1) Remove seat. Disconnect inlet and outlet oil hoses from fittings in filter base.
- (2) Refer to b above and remove transmission oil filter from base.
- (3) Remove two screws, two spacers, and filter base from frame.

d. *Installation.* Refer to figure 3-45 and install transmission oil filter as follows:

- (1) Install filter base and two spacers on frame and secure with two screws.
- (2) Refer to b above and install oil filter on filter base.
- (3) Connect inlet and outlet oil lines to fittings in filter base.
- (4) Check level of oil in transmission on oil level gage (fig. 3-46) and add oil if necessary.

3-54. Transmission Oil Cooler Lines

a. *General.* The transmission oil is cooled by flowing through tubes in a cooler mounted below the radiator. The oil flows from the transmission converter through the oil cooler. From the oil cooler it flows through the filter back to the transmission.

b. *Removal* Remove floor plate. Refer to figure 3-47 and remove oil cooler lines as follows:

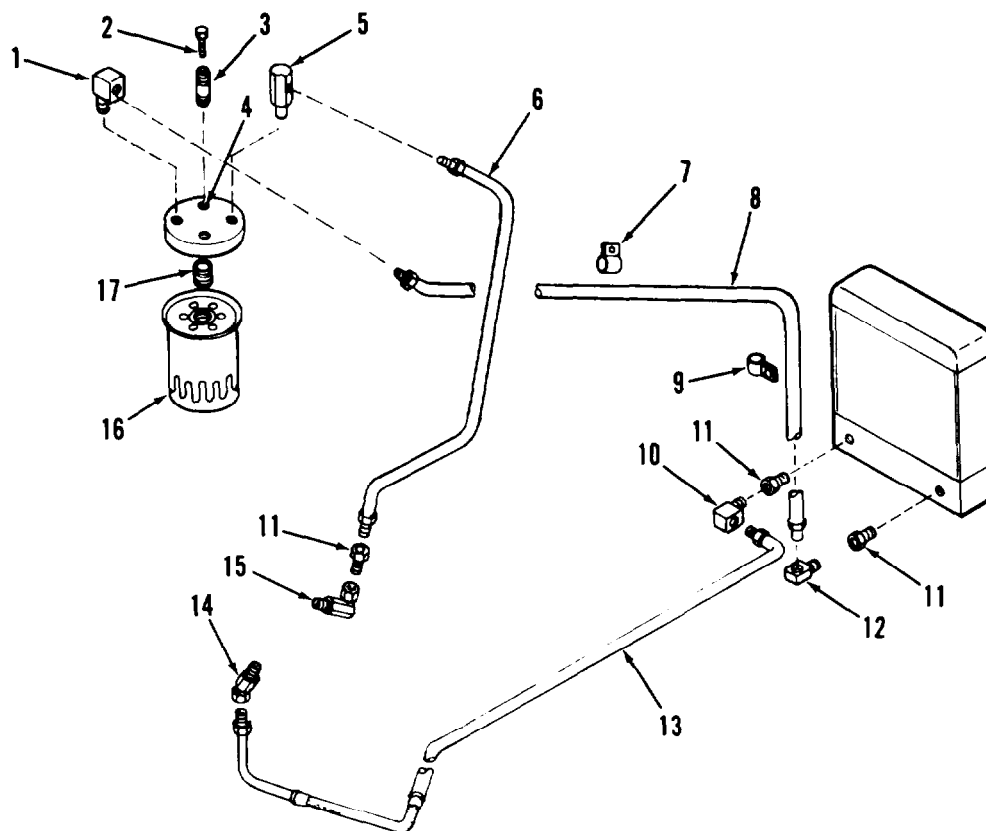
- (1) Disconnect hose assembly (6) from the filter and transmission. Remove hose assembly.
- (2) Disconnect hose assembly (8) from oil filter. Remove clamps (8 and 9) and disconnect hose assembly from elbow (12) at oil cooler. Remove hose assembly.
- (3) Disconnect line assembly (13) from transmission and from elbow (10) at oil cooler and remove line assembly.

c. *Inspection*

- (1) Inspect hose and line assemblies for deterioration, signs of leakage, and damage. Inspect tube for cracks and bends.
- (2) Inspect threads on hose and line assemblies and in fittings for stripped threads and other damage.

d. *Installation.* Refer to figure 3-47 and install the transmission oil cooler lines as follows:

- (1) Connect lines assembly (13) to elbow (10) at radiator and to fittings at transmission.
- (2) Connect hose assembly (8) to elbow (12) on radiator. Extend hose up along left side of radiator and secure with clamp (9). Connect hose into elbow (1) in filter base.
- (3) Connect hose assembly (6) to elbow (5) on filter base and to adapter (11) at transmission.
- (4) Check level of oil in transmission and add oil if necessary.
- (5) Install floor plate on truck.



ME 3930-621-12/3-47

- | | |
|--|---|
| 1. Elbow | 10. Elbow |
| 2. Screw | 11. Adapter |
| 3. Spacer | 12. Elbow |
| 4. Filter base | 13. Line assembly, cooler to transmission |
| 5. Elbow | 14. Adapter |
| 6. Hose assembly, filter to transmission | 15. Elbow |
| 7. Clamp | 16. Filter |
| 8. Hose assembly, filter to cooler | 17. Nipple |
| 9. Clamp | |

Figure 3-47 Transmission oil cooler lines, exploded view.

Section XIV. PROPELLER SHAFT

3-55. General

a. A short propeller shaft connects the transmission to the front drive axle. The propeller shaft is attached to flanges at the transmission output shaft and parking brake.

b. The propeller shaft transmits torque from the transmission to the front drive axle.

3-56. Propeller Shaft

a. *Removal.* Refer to figure 3-48 and remove the

propeller shaft as follows:

(1) Remove lock wires and eight screws attaching propeller shaft universal joints to transmission and parking brake flanges.

(2) Slide output shaft into transmission to allow room for removal of propeller shaft. Remove propeller shaft.

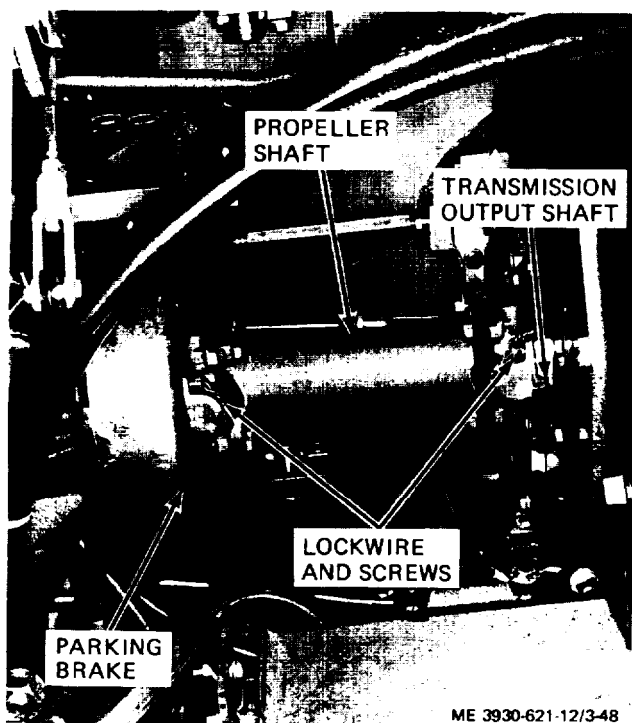


Figure 3-48. Propeller shaft, installed view.

b. *Disassembly.* Refer to figure 3-39 and disassemble the propeller shaft as follows:

(1) Bend back tabs on lock plates (6) and remove eight screws (7). Remove cross and bearings (1 and 5) from drive shaft (4).

(2) Remove output shaft from transmission.

c. *Inspection and Repair.* Refer to figure 3-50 and inspect the propeller shaft as follows:

(1) Inspect all bearings and surfaces in cross and bearings for wear and damage.

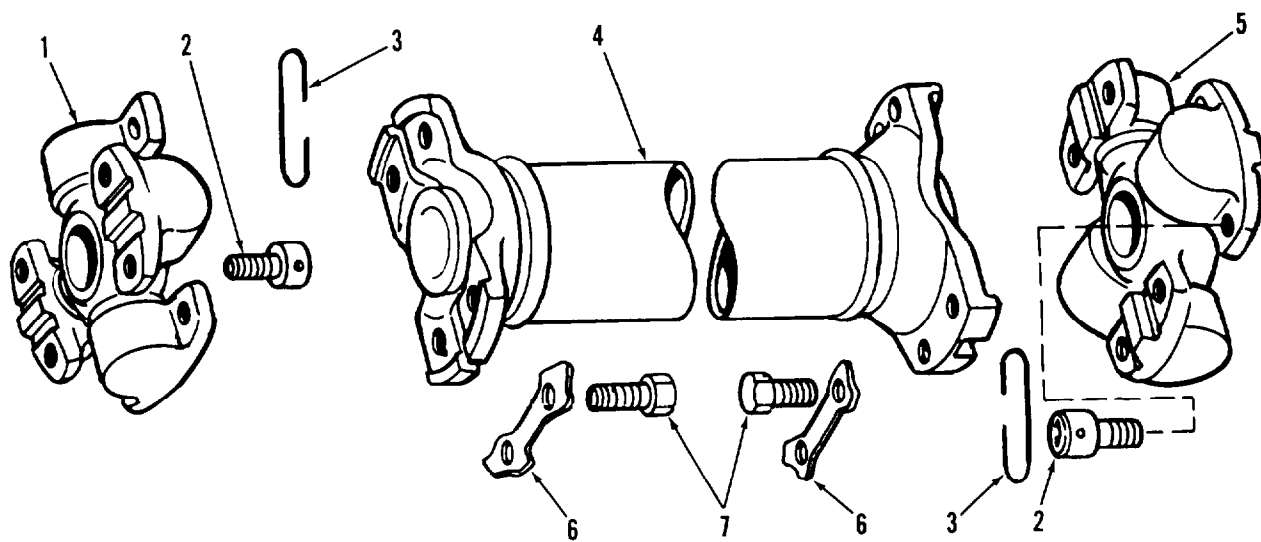
(2) Pack bearings with grease (GAA). Grease must cover all bearing surfaces.

(3) Inspect drive shaft for cracks, bends, and damage.

d. *Assembly.* Refer to figure 3-49 and assembly the propeller shaft as follows:

(1) Install output shaft in transmission.

(2) Install cross and bearings (1 and 5) on drive shaft and secure with eight screws (7) and lock plates (6). Bend tabs on lock plates over heads of screws to lock.



1. Cross and bearing
2. Screw
3. Lock wire
4. Drive shaft
5. Cross and bearing
6. Lock plate
7. Screw

ME 3930 621-12/3-49

Figure 3-49. Propeller shaft, exploded view.

e. Installation. Refer to figure 3-48 and install propeller shaft as follows:

(1) Slide output shaft into transmission to clear propeller shaft and install propeller shaft between

transmission and parking brake.

(2) Secure propeller shaft to parking brake and output shaft with eight screws. Lock screws with locking wire.

Section XV. AXLE ASSEMBLIES

3-57. General

a. The front or driving axle is connected to the transmission by the propeller shaft. The shaft drives the differential in the center of the axle. Torque is transmitted to the axles or jackshafts. The pinion on the axle is meshed with a ring or bull gear in the wheel assembly. Rotation of the axles rotates the wheels providing motive power for the truck.

b. The rear or steering axle is mounted on brackets at the front and rear. The spindles pivot on king pins and are actuated by tie rods extending from a pivot arm mounted at the center of the axle. A steering cylinder, controlled by the steering valve, rotates the pivot arm in the direction required to turn the wheels.

c. The following paragraphs describe service functions allocated to organizational maintenance for the axles.

3-58. Front Axle

a. Service points on the front axle include the breather and drain and level plugs.

b. The breather is located on the right top of the differential housing. Remove breather and clean with cleaning compound, solvent (Spec. P-S-661) and

dry thoroughly. Install breather and tighten securely.

c. The level plug is located at the right front of the axle housing. Remove plug and check level of lubricant. Oil should be to level of plug hole. Add lubricant as required. Install plug.

d. The drain plug is located at the bottom of the differential housing. Remove level plug. Place a suitable container beneath axle, remove plug, and drain lubricant. Install plug and tighten securely. Fill differential through level plug opening to level of hole. Install level plug.

e. Lubrication of axle pinion and ring and bull gear is accomplished by removing the front wheel. Refer to paragraph 3-62 and remove the rear wheels. Clean the pinion and ring gears with solvent and dry thoroughly with compressed air. Lubricate gears sparingly with grease (GAA). Install rear wheels.

3-59. Rear Axle

a. The rear, or steering axle, requires very little service. Lubricate according to the lubrication order.

b. Check tie rods, axle, and drag link for damage. Start engine and check steering action.

Section XVI. BRAKES

3-60. General

a. Brakes on the fork lift consist of two systems: a hand operated parking brake on the propeller shaft and service brakes on the two front wheels.

b. The parking brake is a dual-shoe mechanical operated type. Actuation of the brake is accomplished through a brake lever mounted on the left of the instrument panel. Pulling the brake lever to the rear tightens the cable and moves the cam lever at the brake up. Movement of the lever expands the brake shoes against the drum. This pressure keeps the shaft from rotating, locking the front wheels and holding the truck in position.

c. The service brakes are hydraulically actuated through a pedal and master cylinder. Depressing the pedal operates the master cylinder sending hydraulic pressure to the wheel cylinders. The wheel cylinders are the double end type and hydraulic pressure extends the ends of the cylinder, pivoting the brake shoes against the brake drum inside the wheel. The pressure in the master cylinder also closes the stop light switch and operates the stop light. When the pedal is released, springs return and the pedal and brake shoes to the released position. The brakes are self-adjusting.

3-61. Parking Brake Lever and Cable

a. Removal of Lever. Refer to figure 3-50 and remove the parking brake as follows:

- (1) Place brake lever in released position (forward).
- (2) Loosen setscrew securing adjusting knob and rotate knob counterclockwise to release tension on cable.
- (3) Remove two screws and lock washers securing brake lever to frame. Remove brake lever and two spacers.
- (4) Remove cotter pin and washer and remove pin from clevis on cable and brake lever.

b. Removal of cable. Refer to figure 3-51 and remove parking brake cable as follows:

- (1) Refer to a above and disconnect cable from brake lever. Remove floor plate from operator's compartment.
- (2) Remove cotter pin and clevis pin and disconnect cable from parking brake cam lever.
- (3) Remove four screws, nuts, and lock washers and remove two clamps and spacers.
- (4) Remove parking brake cable from truck.

c. Installation of Brake Cable. Refer to figure 3-51 and install cable as follows:

- (1) Install clevis on end of cable on brake cam lever and secure with clevis pin and cotter pin.
- (2) Aline cable along side of frame and install two cable clamps and spacers. Secure clamps with four screws, nuts, and lock washers.
- (3) Install floor plate.

d. Installation of Brake Lever. Refer to figure 3-50 and install the brake lever as follows:

- (1) Slide brake cable between sides of lever and aline holes in clevis with slot in lever. Slide pin through slots and clevis and secure with washer and cotter pin.

- (2) Install brake lever on side of frame and secure with two spacers, screws and lock washers.

e. Adjustment. Adjustment of the parking brake can be accomplished with the adjusting knob. However, if linings are worn too far for knob adjustment to take effect, further adjustment can be performed by shortening the cable at the lower clevis.

- (1) Place brake lever in fully released position.
- (2) Remove the setscrew securing adjusting knob (fig. 3-50) and rotate adjusting knob one or two turns clockwise. Check adjustment by engaging brake.
- (3) Repeat adjustment ((2) above) as necessary to assure correct lining contact with drum. After adjustment is correct, install setscrew to secure adjusting knob.

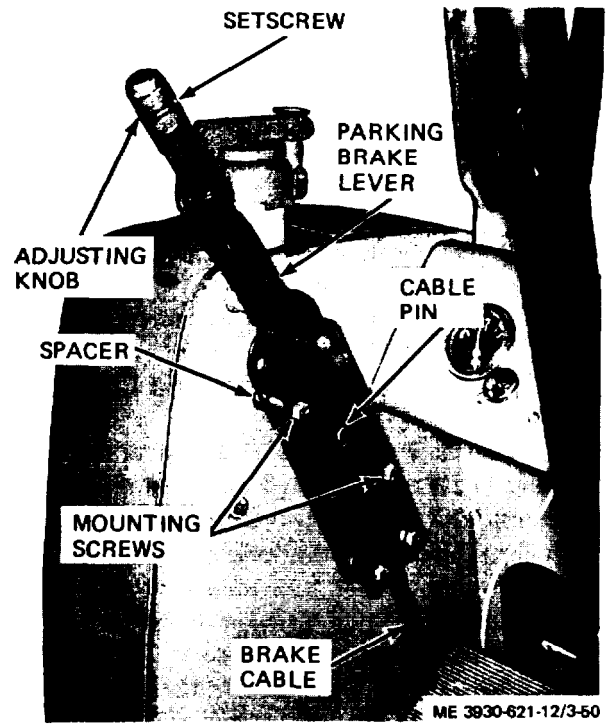


Figure 3-50. Parking brake lever, installed view.

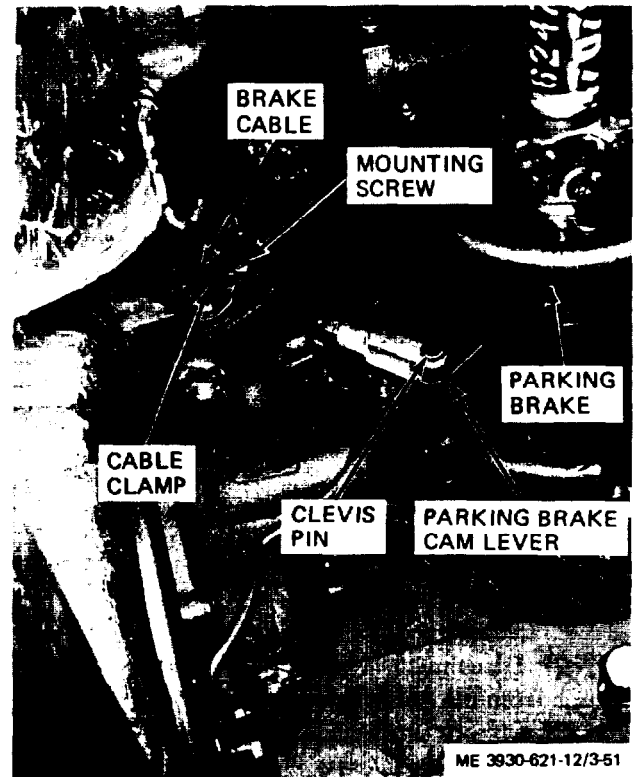


Figure 3-51. Parking brake cable, installed view.

(4) If above steps do not provide proper braking action, adjust cable.

(5) Refer to figure 3-51 and remove cotter pin, washer, and clevis pin securing clevis to cam lever.

(6) Loosen clevis locknut and turn clevis three or four turns clockwise on cable. Install clevis on cam lever and engage brake.

(7) Check braking action and adjust cable (6 above) until action is correct.

(8) Tighten locknut to secure adjustment.

3-62. Service Brake Pedal and Linkage

a. General. The service brake pedal (fig. 2-2) and inching pedal are mounted on a common shaft. Depressing the brake pedal actuates the master cylinder. Depressing the inching pedal operates the inching valve in the transmission control. Further depression of inching pedal will depress the brake pedal and operate the service brakes.

b. Brake Pedal Adjustment. Refer to figure 3-52 and adjust the brake pedal travel as follows:

(1) Pedal free play should be adjusted to one-half inch travel to allow master cylinder piston to return to off position and reduce unusable length of stroke in the master cylinder.

(2) Remove the floor plate.

(3) Slowly depress the brake pedal and check free travel. Observe push rod action at master cylinder.

(4) If free travel is more or less than one-half inch, loosen locknut on clevis at master cylinder and turn adjusting nut to adjust travel in direction required.

(5) After adjustment, check travel. When travel is within limits, tighten locknut.

(6) Depress inching pedal. At lower end of travel, inching pedal should contact brake pedal and apply brakes.

(7) If inching pedal adjustment is required refer to direct and general support personnel.

3-63. Service Brake Master Cylinder

a. Removal. Refer to figure 3-53 and remove the brake master cylinder as follows:

(1) Remove the floor plate.

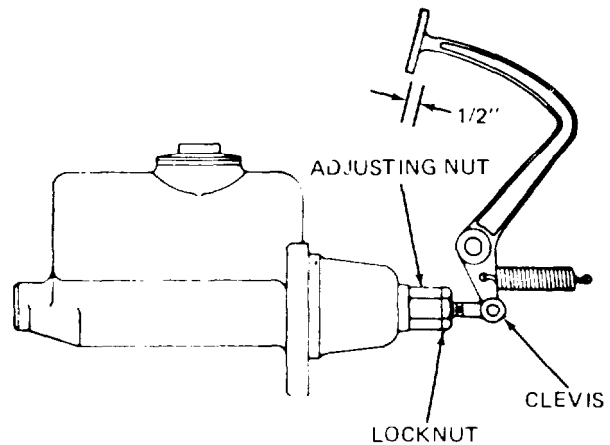
(2) Disconnect wires and remove stop light switch from master cylinder.

(3) Disconnect hydraulic oil line from master cylinder.

(4) Remove cotter pin and clevis pin and disconnect clevis from brake pedal push rod.

(5) Remove two screws and lock washers securing master cylinder to frame and remove master cylinder.

(6) Remove nut and clevis from master cylinder.

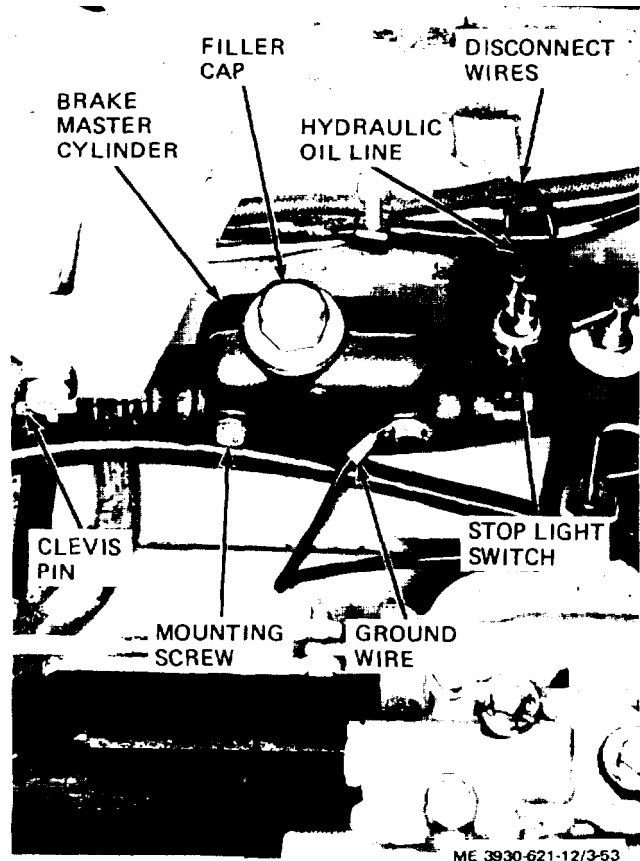


ME 3930 621 12/3 52

Figure 3-52. Service brake pedal adjustment

b. Installation. Refer to figure 3-53 and install the master cylinder.

(1) Install clevis and nut on master cylinder push rod.



ME 3930 621-12/3-53

Figure 3-53. Service brake master cylinder, installed view.

(2) Install master cylinder on frame and secure with two screws and lock washers. Connect ground wire with rear mounting screw.

(3) Connect clevis to brake pedal and secure with clevis pin and cotter pin.

(4) Connect hydraulic brake line to master cylinder.

(5) Install stop light switch in fitting in master cylinder and connect wires to switch.

(6) Refer to c below to fill master cylinder and bleed brake hydraulic system.

c. Bleeding Brake Hydraulic System. Each time the system has been drained or refilled or a part has been disconnected or replaced, the system must be bled as follows:

(1) Remove filler cap on master cylinder and fill to proper level (3/8 to 1/2 inch from top).

(2) Connect a bleeder hose to bleeder screw on front wheel (fig. 3-54). Submerge other end of hose in a glass jar filled with brake fluid.

(3) Open the bleeder screw one turn.

(4) Slowly depress brake pedal to end of travel and release pedal. Observe hose in jar and repeat pumping of brake pedal until no air bubbles escape from the hose. Hold pedal at bottom of travel and close bleeder screw to keep additional air from entering system.

Note. While pumping pedal, check fluid level in master cylinder. Add fluid to keep cylinder as close to full as possible at all times during bleeding process.

(5) Repeat bleeding operation on remaining front wheel bleeder screw.

(6) Fill master cylinder to proper level after bleeding operation.

Caution: Discard fluid salvaged from brake system during bleeding operation. Do not use in system.

3-64. Service Brake Brake Shoes

a. General. The service brake brake shoes are mounted beneath the dust shield. The shoes are attached to the wheel cylinders and return springs.

b. Removal.

(1) Refer to paragraph 3-67 and remove the wheel and tire assembly.

(2) Refer to figure 3-55 and remove the brake dust shield as follows:

(a) Remove four screws and lock washers securing dust shield to axle. Remove wheel bearing from axle.

(b) Carefully remove dust shield from around axle pinion.

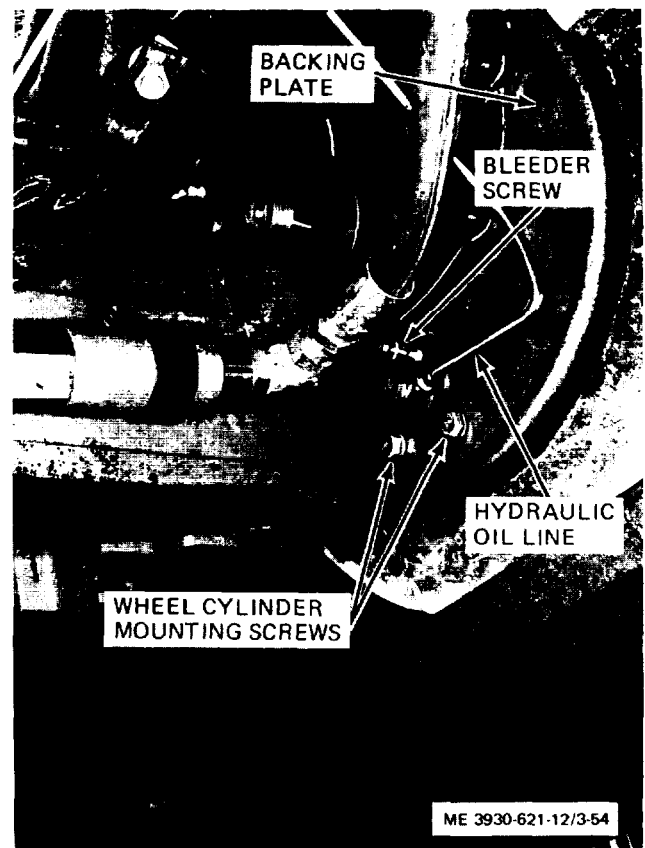


Figure 3-54. Service brake pedal adjustment

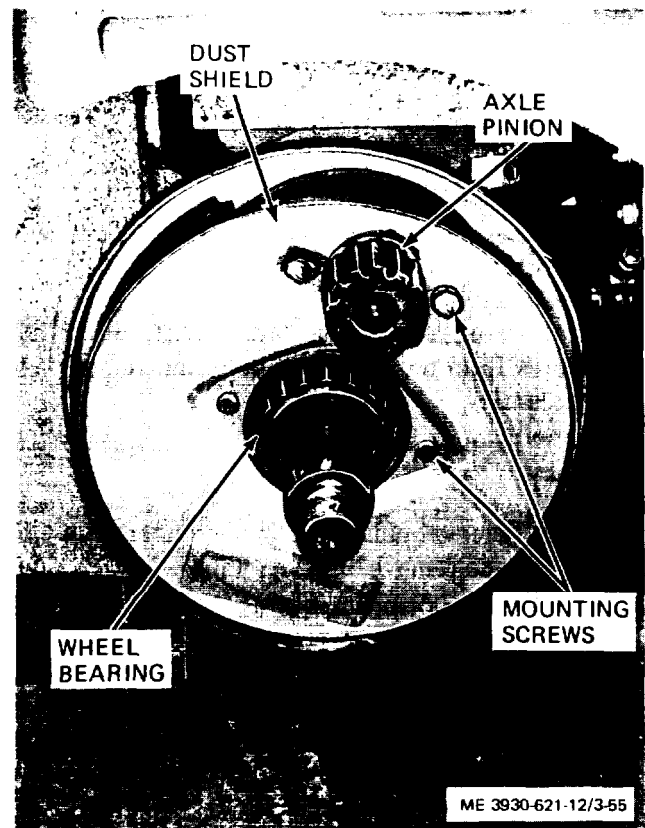
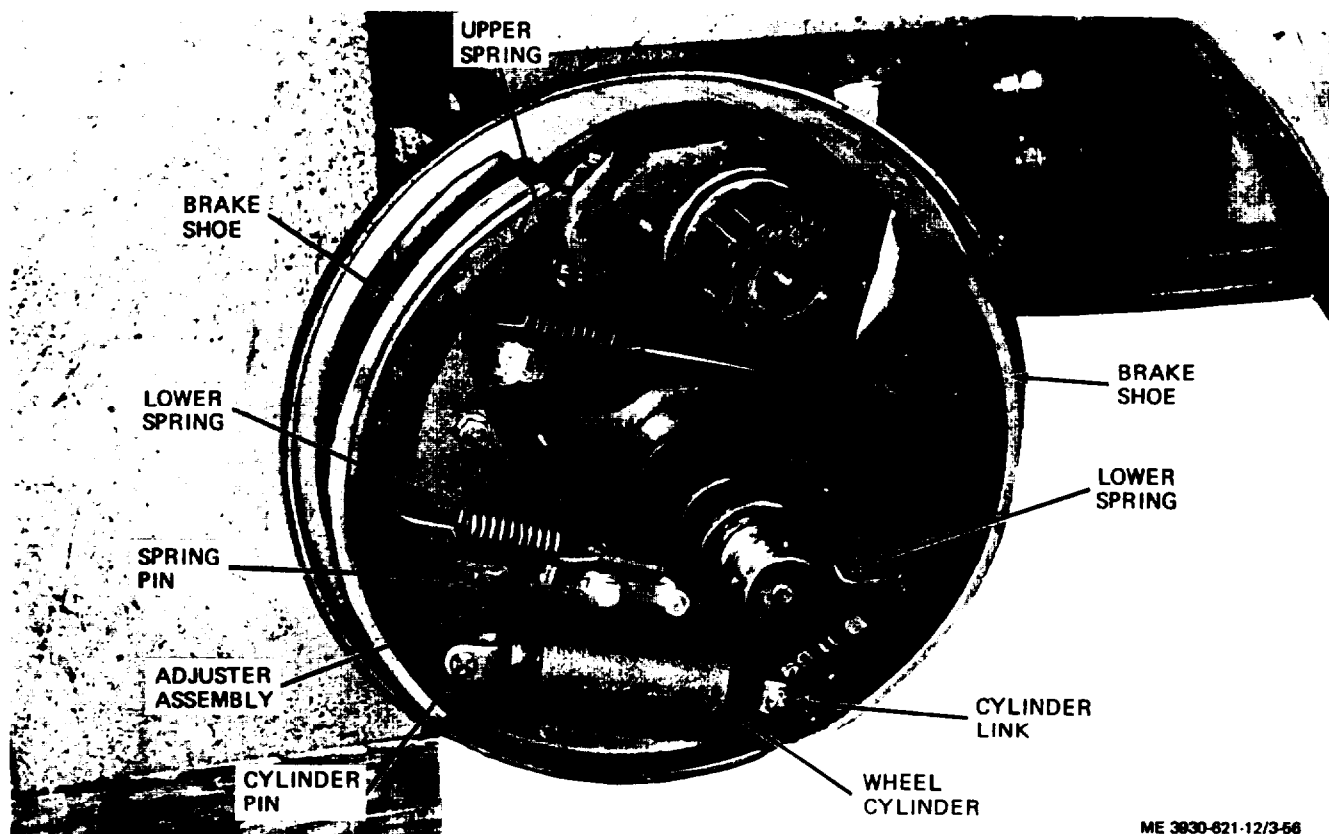


Figure 3-55. Service brake dust shield, installed view.



ME 3830-621-12/3-56

Figure 3-56. Service brake shoes,
installed view

(3) Refer to figure 3-56 and remove the brake shoes as follows:

(a) Disconnect three springs from the brake shoes.

(b) Disconnect brake shoes from wheel cylinder and lift brake shoes and attached adjuster assembly from backing plate.

(c) Using a suitable brass drift, drive the spring pins from adjuster assembly and remove adjuster assembly.

Note. Do not disassemble adjuster assembly. Assembly is pre-set at factory for correct operation.

(d) Remove pins securing cylinder links to brake shoes and remove links.

c. Cleaning and Inspection.

(1) Inspect linings on shoes for wear, dirt, grease, and brake fluid.

(2) Clean linings thoroughly to remove foreign matter.

(3) Inspect brake drums in wheels for cracks, deep scratches, and other defects.

(4) If linings are worn to less than 1/8 inch or if linings are saturated with fluid or grease, replace shoes.

(5) Inspect brake shoes for wear, cracks, and other damage.

(6) Inspect return springs for broken, nicked, or fatigued coils.

d. Installation.

Caution: Brake shoes are free floating and self-adjusting. Check for obstructions during installation that could interfere with floating action.

(1) Refer to figure 3-56 and install brake shoes as follows:

(a) Install wheel cylinder links on bottom of brake shoes and secure links with pins.

(b) Install adjuster assembly on brake shoes and secure to brake shoes with spring pins.

(c) Install brake shoes on backing plate, with links installed in ends of wheel cylinder. Hold shoes in position and install three return springs.

(2) Refer to figure 3-57 and install dust shield and secure with four screws and lock washers.

(3) Refer to paragraph 3-67 and install drive wheels.

3-65. Service Brake Wheel Cylinder

a. Removal.

(1) Refer to paragraph 3-64 and remove the service brake shoes.

(2) Refer to figure 3-54 and remove the wheel cylinder as follows:

(a) Disconnect brake line from fitting in wheel cylinder.

(b) Remove two screws and lock washers securing wheel cylinder to backing plate and remove wheel cylinder.

b. Installation.

(1) Refer to figure 3-54 and install wheel cylinder on brake backing plate as follows:

(a) Install wheel cylinder on backing plate and secure with two screws and lock washers.

(b) Connect brake line to fitting in wheel cylinder.

(2) Refer to paragraph 3-64 and install service brake shoes.

(3) Refer to paragraph 3-63 and bleed the brake system hydraulic lines.

Section XVII. WHEELS

3-66. General

a. The front drive wheels are mounted on spindles attached to the axles. Jackshafts, nit-h pinion gears, extend through the brake assemblies and mesh with the ring or bull gears in the wheels. Rotation of the pinions cause the ring gears to rotate around the spindle, driving the truck.

b. The rear steering wheels mount on spindles attached to the steering axle. Action of the hydraulic steering cylinder moves the pivot arm assembly. Tie rods, extending to the spindles are connected to the pivot arm. As the pivot arm moves, the tie rods move the spindles, turning the wheels in the direction of travel desired.

c. Both pairs of n-heels are mounted on tapered roller hearings. The bearings must be greased and adjusted as described in paragraph 3-67.

3-67. Wheels and Tires

a. General. The front or drive wheel assemblies consist of the wheel and brake drum tire, wheel hearings, and a ring or bull gear. The rear or steering wheel assemblies consist of the wheel, tire, and wheel bearings.

b. Front Wheel Removal.

(1) Raise the front of the truck until the wheel clears the floor. Tilt mast to full backward position. Place a wooden block under the mast assembly and tilt mast forward to vertical position. Movement of mast will elevate drive wheel clear of the floor.

(2) Refer to figure 3-57 and remove front drive wheel as follows:

(a) Remove three screws (9) and lock washers (8) and remove hub cap (7).

(b) Remove cotter pin (10) from wheel nut (6) and remove wheel nut and washer (5) from axle.

(c) Remove outer wheel bearing (4) from wheel and axle.

(d) Remove wheel assembly (3). Remove wheel carefully to prevent damage to brake shoes or drums.

(e) Remove inner wheel gearing (2) and grease shield (1).

c. Inspection.

(1) Inspect wheel and tire for damage. Check teeth on ring or bull gear inside wheel for damage.

(2) Inspect brake drum for cracks, flat spots, excessive wear, and damage.

(3) Inspect hearings and bearing cups in wheel for wear or damage.

(4) Clean bearings and hearing surfaces with cleaning compound, solvent (Spec. P-S-661).

d. Front Wheel Installation. Refer to figure 3-57 and install the wheel assembly as follows:

(1) Repack the inner and outer bearings with grease (GAA).

(2) Install grease shield (1) and inner bearing (2) on axle spindle, with taper on bearing pointing out.

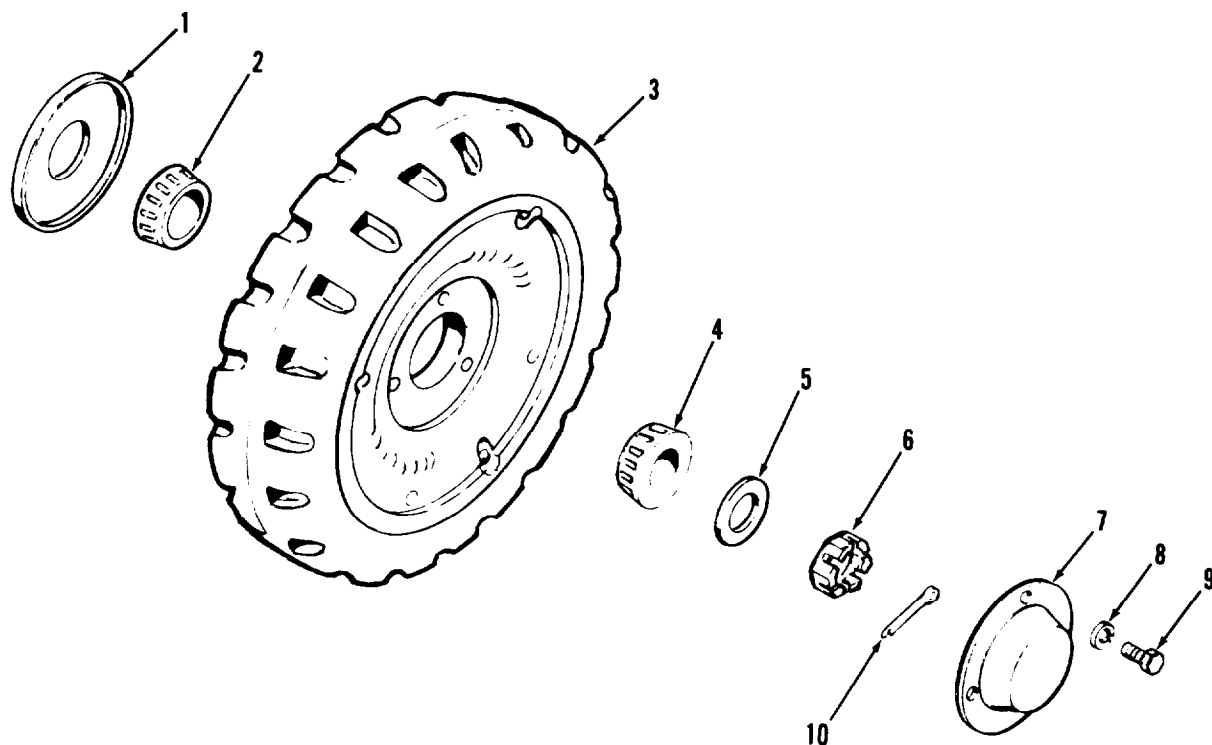
(3) Install wheel assembly (3) on bearing and spindle. Hold wheel assembly in place and install outer wheel bearing (4) on spindle and inside wheel, tapered side in.

(4) Install wheel nut (6) and washer (5) on spindle. Tighten nut and as nut is tightened rotate wheel. Continue tightening nut until heavy drag is felt while rotating wheel.

(5) Slowly loosen nut and rotate wheel. Loosen nut to a point where wheel rotates freely and no hearing end play is evident.

(6) Install cotter pin (10) to secure nut.

(7) Install hub cap (7) and secure with three screws (9) and lock washers (8).



ME 3930 621 12/3 57

- | | |
|----------------------------|----------------|
| 1. Grease shield | 6. Wheel nut |
| 2. Inner wheel bearing | 7. Hub cap |
| 3. Wheel and tire assembly | 8. Lock washer |
| 4. Outer wheel bearing | 9. Screw |
| 5. Washer | 10. Cotter pin |

Figure 3-57. Drive wheel.
exploded view.

(8) Tilt mast backward to lower wheel to floor. Remove block from under mast.

e. Rear Wheel Removal. Use a suitable jack and raise rear of truck until wheels clear the floor. Block front wheels to prevent truck from rolling. Refer to figure 3-58 and remove rear wheel as follows:

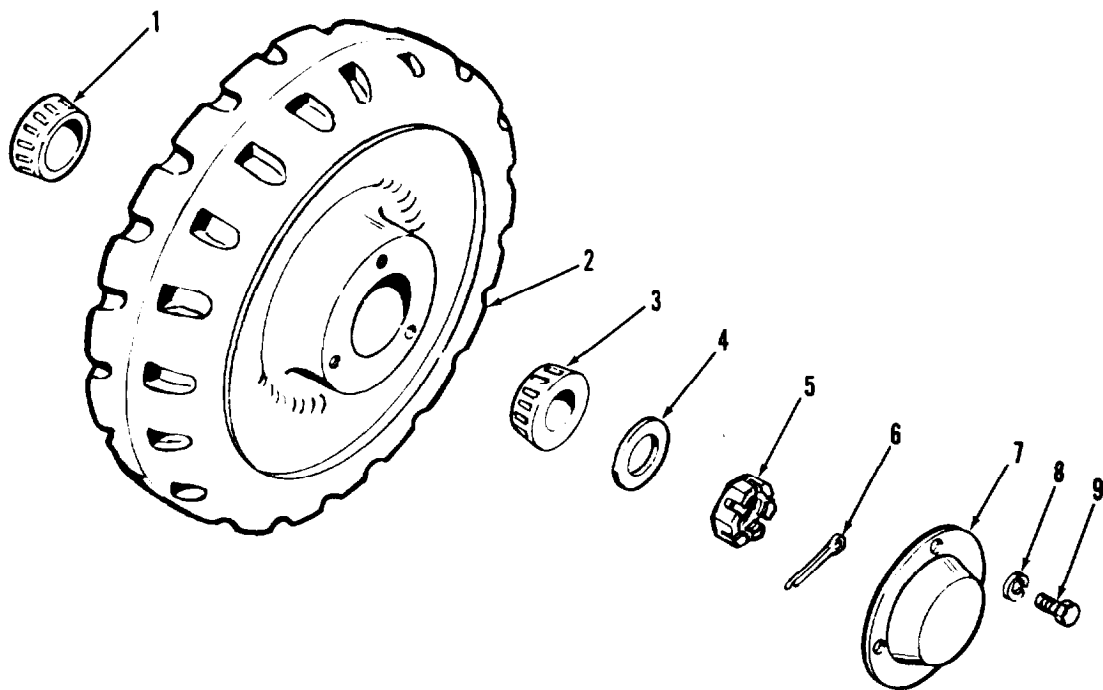
- (1) Remove three screws (9) and lock washers (8) and remove hub cap (7).
- (2) Remove cotter pin (6) from wheel nut (5) and remove wheel nut and washer (4).
- (3) Remove outer wheel bearing (3) and wheel assembly (2) from axle spindle.
- (4) Remove inner wheel bearing (1).

f. Inspection. Refer to b above to inspect and clean

wheel assembly. Repack wheel bearings with grease (GAA).

g. Rear Wheel Installation. Refer to figure 3-58 and install rear wheels as follows:

- (1) Install rear wheel bearing (1) on spindle, tapered side out, and install wheel assembly (2) over bearing.
- (2) Hold wheel in place and install outer wheel bearing (3), tapered side in, in wheel.
- (3) Refer to c above to adjust wheel bearings and install washer (4), wheel nut (5), and cotter pin (6).
- (4) Install hub cap (7) and secure with three screws (9) and lock washers (8).
- (5) Lower jack and remove jack from truck.



ME 3930 621-12/3-58

1. Inner wheel bearing
2. Wheel and tire assembly
3. Outer wheel bearing
4. Washer
5. Wheel nut
6. Cotter pin
7. Hub Cap
8. Lock Washer
9. Screw

Figure 3-58. Rear wheel.
exploded view.

Section XVIII. STEERING

3-68. General

a. Steering of the lift truck is accomplished with full hydraulic power from a hydraulic cylinder. Rotation of the steering wheel operates a hydraulic valve, sending hydraulic pressure to the steering cylinder.

b. Hydraulic oil pressure is supplied by the hydraulic pump mounted below the radiator. The pump also provides hydraulic oil pressure to operate the lift and tilt cylinders. Refer to figure 3-59 for a schematic drawing of the hydraulic system.

3-69. Tie Rods

a. *Removal.* Refer to figure 3-60 and remove the tie rods as follows:

(1) Place jack under rear of truck and raise truck far enough to provide working clearance. Place blocks under front wheels.

(2) Remove cotter pins (5 and 13) from adjusting plug (1) and nut (12).

(3) Loosen adjusting plug and disconnect tie rod socket from ball on pivot arm.

(4) Remove nut (12) from ball socket (10) and remove tie rod and boot (11) from spindle arm.

b. *Cleaning, Inspection, and Repair.*

(1) Wash all parts in cleaning compound, solvent (Spec. P-S-661) and dry thoroughly with compressed air.

(2) Inspect springs and ball sockets for damage. Check threaded areas for stripped or defective threads.

(3) Replace defective parts.

c. *Installation.* Lubricate tie rods with grease (GAA). Refer to figure 3-60 and install tie rods as follows:

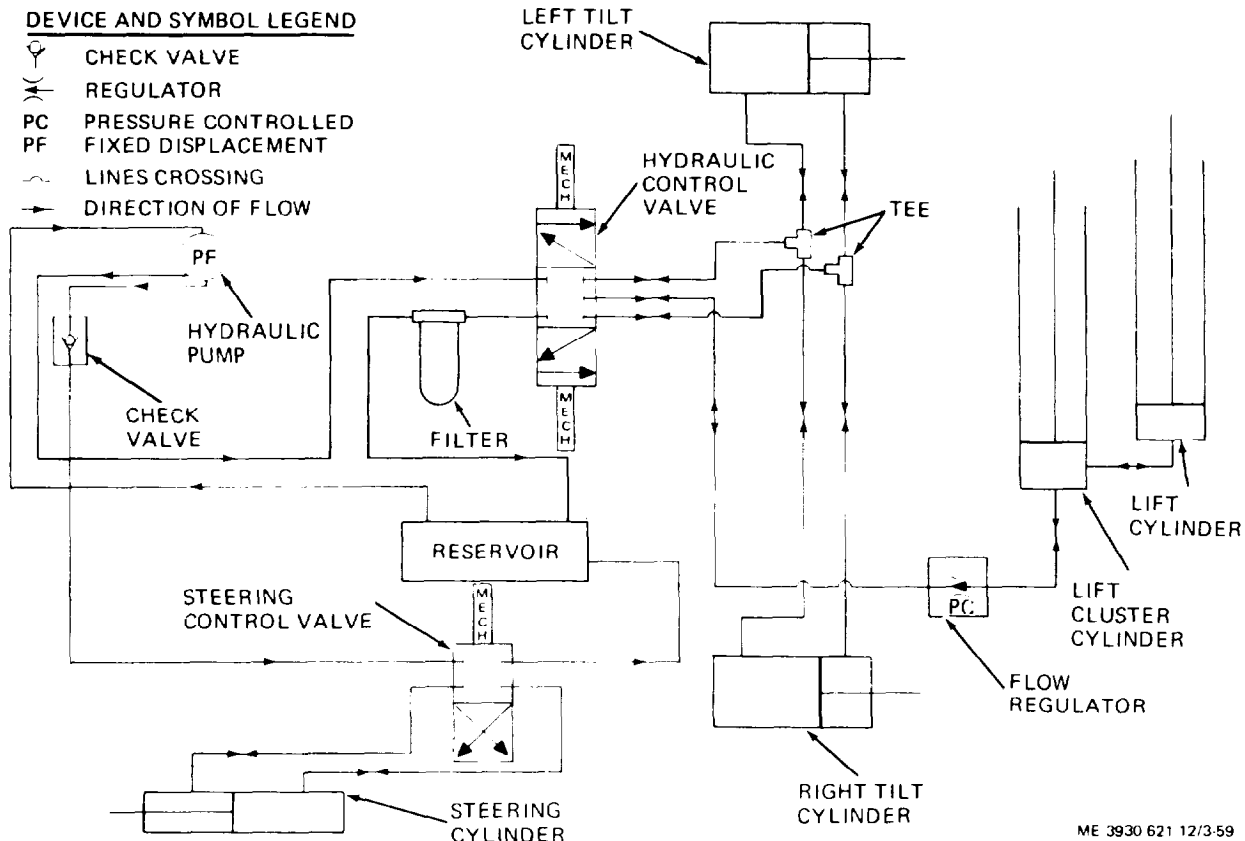


Figure 3-59. Hydraulic system schematic diagram

(1) Loosen adjusting plug (1) and install ball socket on tie rod tube (7) over ball on pivot arm. Tighten adjusting plug and secure with cotter pin (5).

(2) Install ball socket (10) and boot (11) on spindle arm and secure with nut (12) and cotter pin (13).

d. Adjustment.

(1) Rear wheels should be in line with and parallel to frame with zero toe-in. Set wheels straight ahead with steering wheel.

(2) Remove cotter pin (13, fig. 3-60) and nut (12). Remove boot (11) and tap ball socket (10) from spindle.

(3) Loosen nut (8) and adjust length of tie rods to bring wheels in line with frame by turning ball socket (10).

(4) Install tie rod (10) in spindle and secure with boot (11), nut (12), and cotter pin (13).

(5) Lower truck to floor and remove jack.

3-70. Steering Cylinder

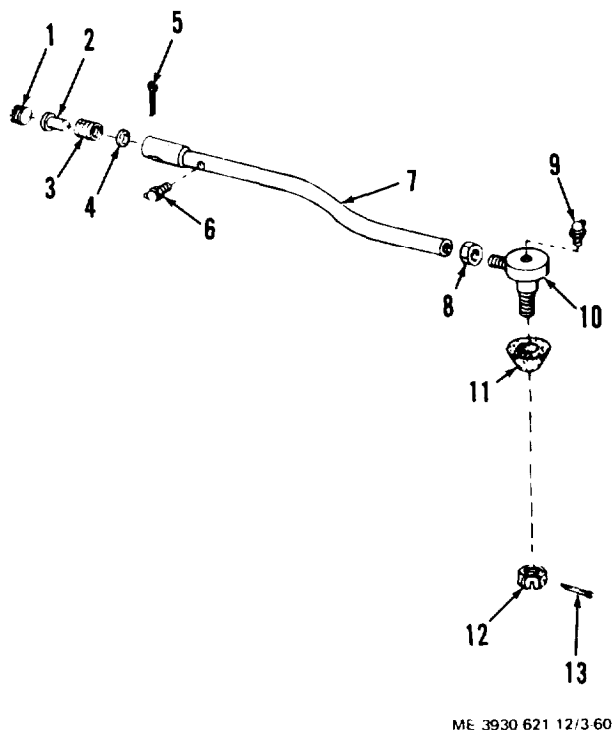
a. General. The steering cylinder is mounted on the left side of the rear of the muffler. A yoke or ball socket is connected directly to the cylinder rod and to the ball on the steering pivot arm. The yoke replaces the drag link.

b. Removal. Refer to figure 3-61 and remove the steering cylinder as follows:

(1) Raise rear of truck with a jack or chain hoist to gain access to cylinder. Block front wheels of truck and place blocks under frame.

(2) Place a suitable container under cylinder ports and disconnect hoses (5 and 11) from cylinder. Place plastic plugs in cylinder ports and ends of hoses to prevent foreign material from entering the system.

(3) Remove round head screw (8) and lock washer (7) securing steering cylinder and pin to frame bracket.



ME 3930 621 12/3-60

- | | |
|------------------------|------------------------|
| 1. Adjusting plug | 8. Nut |
| 2. Ball seat | 9. Lubrication fitting |
| 3. Spring | 10. Ball socket |
| 4. Spacing washer | 11. Boot |
| 5. Cotter pin | 12. Nut |
| 6. Lubrication fitting | 13. Cotter pin |
| 7. Tie rod tube | |

Figure 3-60. Tie rod, exploded view.

(4) Install screw in end of pin (6) and remove pin and flat washers (10) from cylinder and bracket.

(5) Remove cotter pin (1) from end of yoke ball socket (12) and loosen adjusting plug (16) far enough to remove ball socket from ball on pivot arm.

(6) Remove cylinder and yoke from lift truck. Loosen nut (3) on cylinder rod and remove yoke from cylinder (17).

c. Cleaning, Inspection and Repair.

(1) Clean yoke parts with cleaning compound, solvent (Spec. P-S-661) and dry thoroughly with compressed air.

(2) Check all parts for dents and damage. Inspect spring for damage.

(3) Inspect all threaded areas for stripping and damage.

d. Installation. Refer to figure 3-61 and install steering cylinder as follows:

(1) Install assembled yoke (12) and nut (3) on cylinder rod.

(2) Install cylinder in mounting bracket and place pin (6) and washers (10) through bracket and cylinder.

(3) Secure pin and cylinder in bracket with screw (8) and lock washers (7).

(4) Remove plugs from hoses and cylinder and connect hoses (5 and 11) to adapters (4) in cylinder.

e. Adjustment. Set the steering wheels straight ahead and parallel with frame. Adjust tie rods (para 3-69) to obtain correct toe-in, if necessary. Adjust steering cylinder as follows:

(1) If cylinder is installed, remove cotter pin (1, fig. 3-61) and loosen adjusting plug (16) and remove yoke from ball on pivot arm.

(2) Pull cylinder rod one-half way out of cylinder. Rod should extend approximately four inches.

(3) Hold cylinder rod with open end wrench on flats provided. Turn yoke assembly in or out on rod until yoke ball socket is centered over ball on pivot arm.

(4) Install yoke on ball and tighten adjusting plug (16) to hold yoke in position. Secure adjusting plug with cotter pin (1).

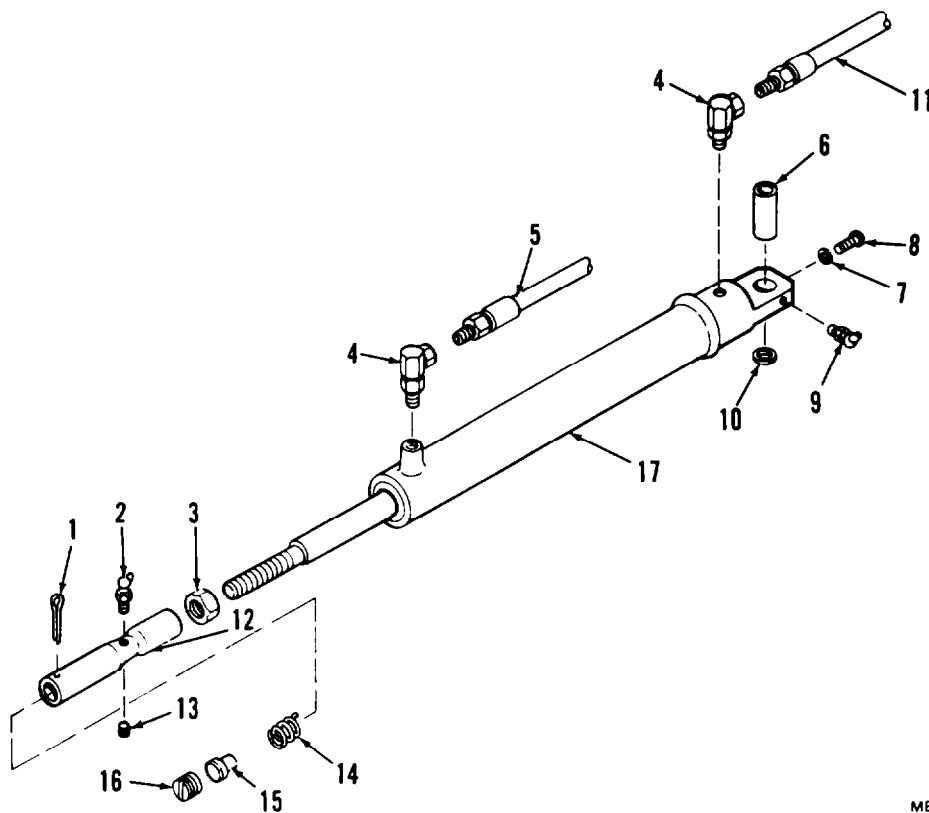
(5) Tighten nut (3) to secure yoke assembly in position on cylinder rod.

(6) Lubricate cylinder and yoke with grease (GAA).

(7) Lower truck to floor and remove jacks or chain hoist.

(8) Check hydraulic oil level in reservoir and fill to FULL mark on dipstick.

(9) Start engine and operate steering wheel to full right and full left. Wheel spindles should contact stop screws on steering axle to prevent piston from bottoming in cylinder. Loosen nut (fig. 3-62) and extend stop screws, if necessary, to stop spindle travel before cylinder piston bottoms.



ME 3930-621-12/3-61

- | | |
|------------------------|-----------------------|
| 1. Cotter pin | 10. Flat washer |
| 2. Lubrication fitting | 11. Hose assembly |
| 3. Nut | 12. Yoke ball socket |
| 4. Elbow | 13. Pipe plug |
| 5. Hose assembly | 14. Spring |
| 6. Mounting pin | 15. Ball seat |
| 7. Lock washer | 16. Adjusting plug |
| 8. Screw | 17. Steering cylinder |
| 9. Lubrication fitting | |

Figure 3-61. Steering cylinder, exploded view.

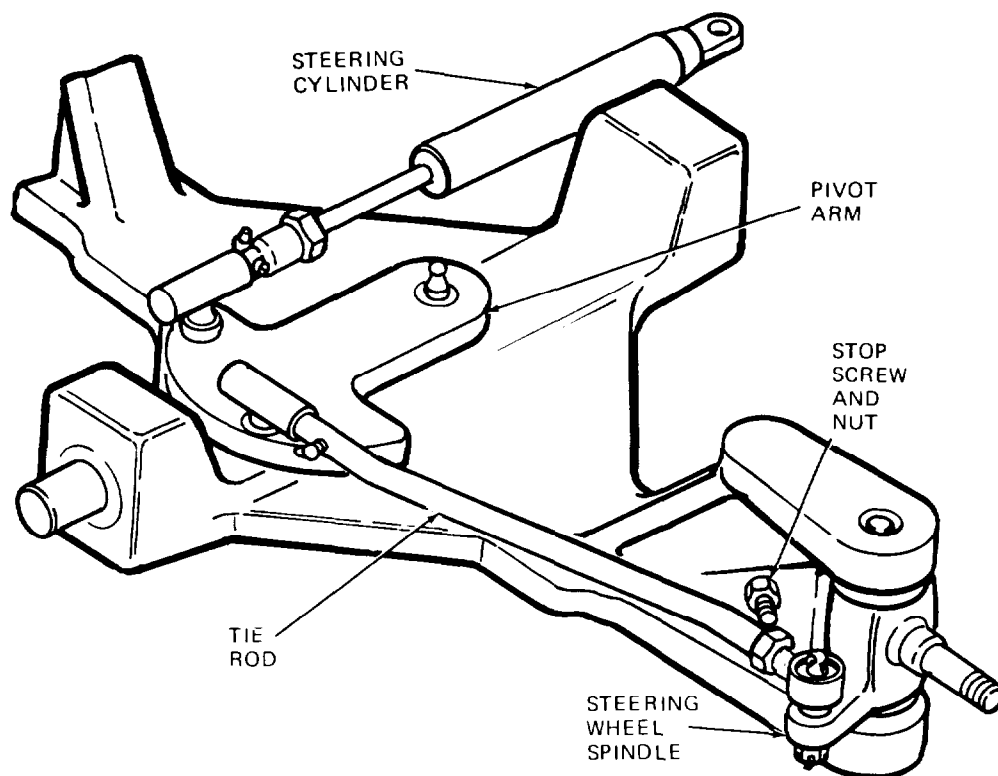
3-71. Steering Hydraulic Valve

a. General. The steering hydraulic valve is mounted at the base of the steering column. Rotation of the steering column opens and closes hydraulic ports and sends hydraulic oil pressure to the steering cylinder.

b. Service.

(1) Inspect hoses attached to the steering hydraulic valve for damage, deterioration, and signs of leakage.

(2) Inspect hydraulic valve for evidence of leaking. Check valve mounting for security.



ME 3930 621 12/3 62

Figure 3-62. Steering wheel spindle stop screw adjustment.

Section XIX. HYDRAULIC LIFT COMPONENTS

3-72. General

a. Power to raise, lower, and tilt the mast and carriage is supplied by the hydraulic system (fig. 3-59). Hydraulic oil is stored in a reservoir and pumped by the hydraulic pump to a control valve. Manipulation of the control valve levers opens and closes ports to the various cylinders, providing motion.

b. The system also supplies the hydraulic oil pressure for the power steering system.

c. The main components as illustrated on figure 3-60 are the hydraulic oil reservoir, hydraulic pump, control valve, filter, lift and tilt cylinders, and hoses and tubes.

3-73. Hydraulic Reservoir Breather

a. Removal. Refer to figure 3-63 and remove the breather from the hydraulic reservoir as follows:

- (1) Remove floor plate.
- (2) Remove breather from hydraulic oil reservoir.
- (3) Remove screw from top of breather and remove filter element.

b. Cleaning and Inspection. Clean the filter element with hydraulic oil or with a reverse flow of compressed air. If element cannot be cleaned or is damaged, replace breather.

c. Installation. Refer to figure 3-63 and install hydraulic reservoir breather as follows:

- (1) Install filter element in cap and secure with screw.
- (2) Check oil level on level gage. Add oil (OE) to bring level to FULL mark on gage.
- (3) Install breather on reservoir.
- (4) Install floor plate.

3-74. Hydraulic Oil Filter

a. General. The micron-type hydraulic oil filter is mounted under the right hand cowl next to the hydraulic control valve. Hose assemblies lead from the control valve to the filter and from the filter to the reservoir.

b. Service. Service of the filter consists of replacing the filter element. Refer to figure 3-64 to service the hydraulic oil filter.

- (1) Remove the right hand cowl.
- (2) Place a suitable container or rags beneath filter to catch oil as element is removed.
- (3) Support filter base and unscrew head bolt to lower filter base.
- (4) Lower filter base and remove filter element and gasket from base.

(5) Clean head assembly and interior of base and inspect for nicks and defects.

(6) Install new element in base and new gasket at top of base.

(7) Position base in head assembly and secure with head bolt.

(8) Operate truck hydraulic system and check filter for leaks. Check level of hydraulic oil in reservoir and add oil to bring to FULL mark on gage.

(9) Install right hand cowl.

c. Removal. Refer to figure 3-64 and remove hydraulic oil filter as follows:

(1) Remove right hand cowl.

(2) Place a suitable container beneath filter to catch oil. Loosen clamps and disconnect hose assemblies from both sides of head. Plug hoses to prevent entrance of foreign material.

(3) Remove two screws, nuts, and lock washers and remove complete filter assembly from truck.

(4) Remove two elbows from filter head.

d. Installation. Refer to b above to service hydraulic filter, if necessary. Refer to figure 3-64 and install hydraulic filter as follows:

(1) Install two elbows in filter head.

(2) Install filter assembly on frame and secure with two screw, nuts, and lock washers.

(3) Remove plugs from hoses. Install hoses on elbows and tighten hose clamps securely.

(4) Operate truck hydraulic system and check filter and hoses for leaks.

(5) Add oil to reservoir to bring level to FULL mark on level gage.

(6) Install right hand cowl.

3-75. Tilt Cylinder

a. General. Two tilt cylinders are mounted on either side of the front of the frame and are connected to the mast. The cylinders operate to tilt the mast to the rear to provide safer carrying and lifting of loads.

b. Removal. Refer to figure 3-65 and remove the tilt cylinder as follows:

(1) Operate the tilt control lever (fig. 2-2) to tilt the mast forward. Connect a chain hoist to the mast to hold it in the forward position.

(2) Shut off truck engine. Remove floor and toe plates.

(3) Disconnect hydraulic hose assemblies from tilt cylinder. Plug hoses and cylinder parts.

(4) Support cylinder with a block of wood. Remove cotter pin and remove pin and washers from yoke at front of cylinder.

(5) Remove screw and lock washer and remove pin retainer from bracket and pin at rear of cylinder.

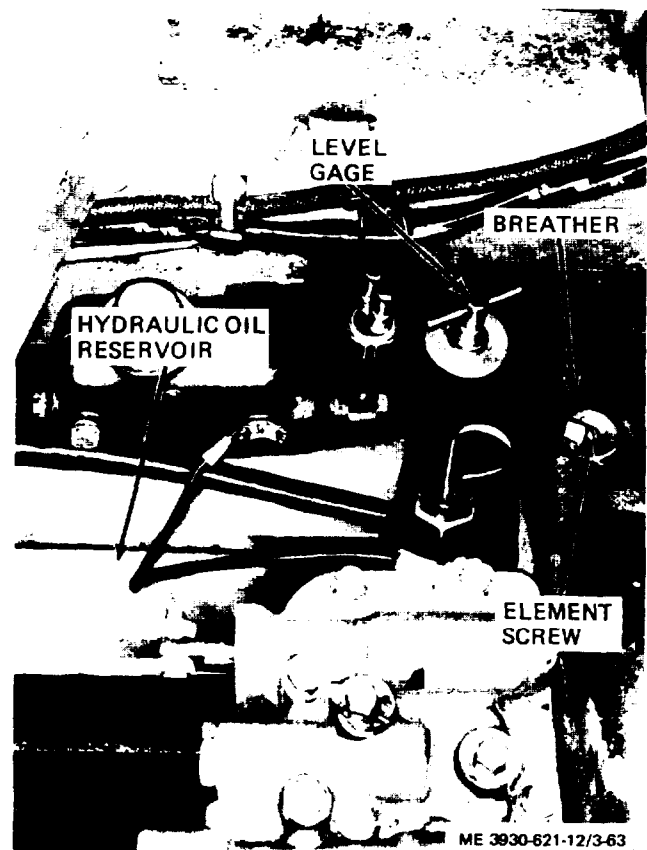


Figure 3-63. Hydraulic oil reservoir and breather, installed view.

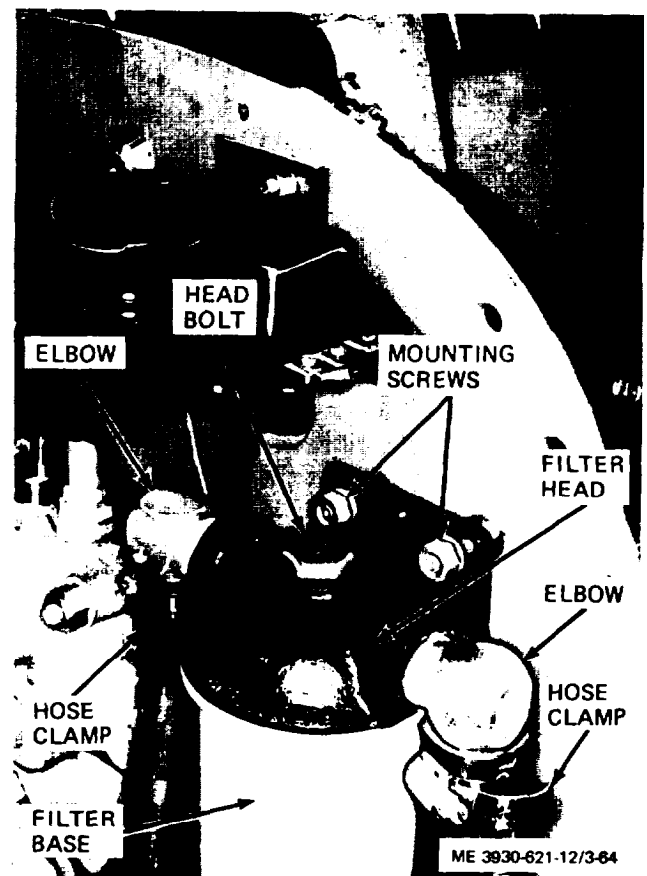


Figure 3-64. Hydraulic oil filter, service and replacement.

(6) Insert a brass drift through hole in pin and remove pin from cylinder and bracket. Remove cylinder from truck.

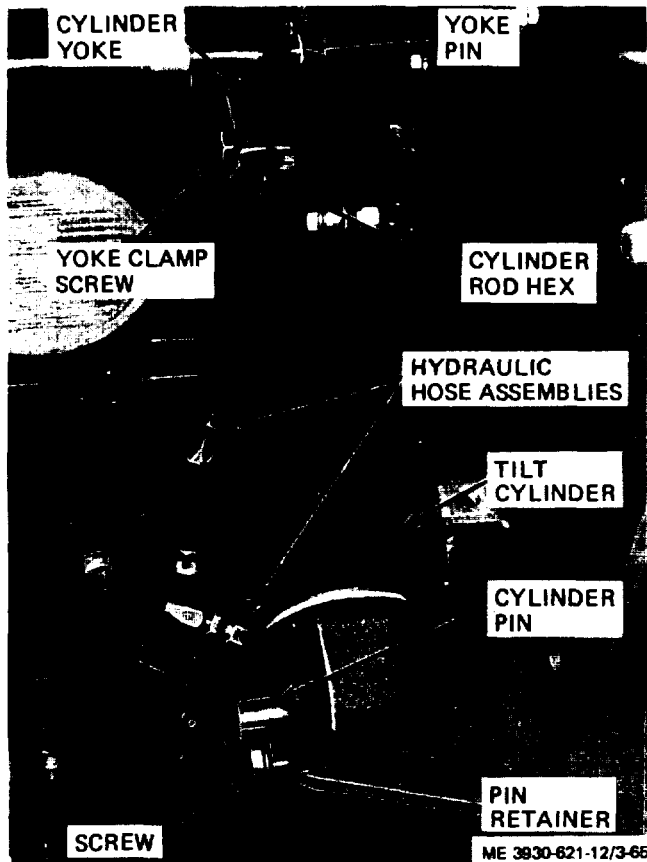


Figure 3-65. Tilt cylinder, installed view.

c. *Installation.* Refer to figure 3-65 and install the tilt cylinder as follows:

(1) Install tilt cylinder in position on truck. Install pin through bracket and cylinder with hole in pin in line with pin retainer position.

(2) Install pin retainer through hole in pin and secure with screw and lock washer.

(3) Install pin through yoke and bracket at front of cylinder. Install washers with pin. Secure pin with cotter pins.

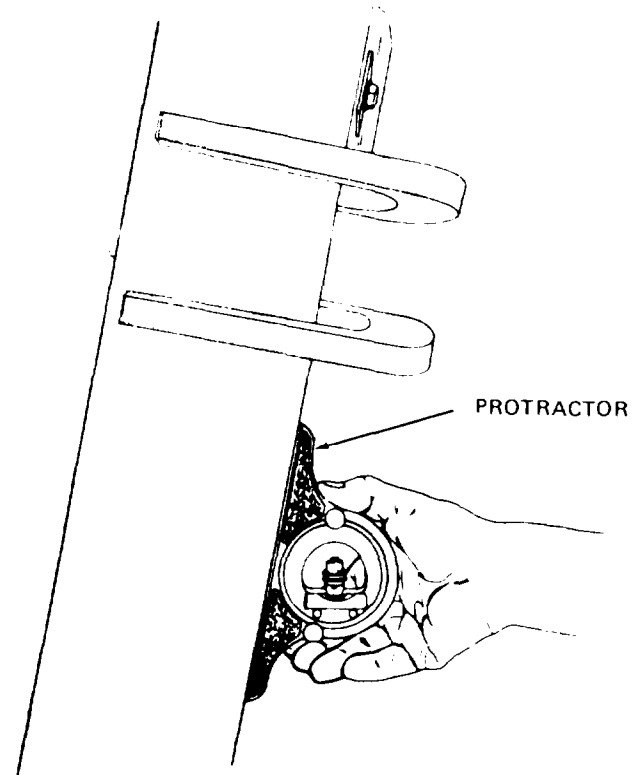
(4) Remove plugs from hoses and cylinder and connect hose assemblies to tilt cylinder.

(5) Disconnect chain hoist from mast and operate truck hydraulic system and check for leaks. Check oil level in hydraulic oil reservoir and add oil if necessary.

d. *Tilt Adjustment.* Normal tilt of mast is 2° forward and 6° backward. Operate tilt cylinders and check tilt angle with a protractor as shown in figure 3-66. Make sure both cylinders have reached the end of their stroke. Check both left and right sides of the mast assembly.

Note. Truck must be on a flat level surface to check and adjust mast tilt.

(1) Set protractor to measure 6° of tilt. Place protractor against mast as shown. Tilt mast to end of backward stroke as shown. Bubble in protractor should be centered if tilt is correct.



ME 3930671 12/366

Figure 3-66. Checking degrees of mast tilt.

(2) If tilt is not correct, tilt mast to the forward position and loosen clamp screw (fig. 3-65) on yoke at front end of tilt cylinders. Turn hex on cylinder piston rod to extend or retract rod as necessary to adjust tilt.

(3) After adjusting, check degree of tilt. Continue to adjust piston rod until 6° of backward tilt is obtained. Tighten clamp screw on yoke.

(4) Forward tilt is automatically adjusted to proper angle when backward tilt is correct.

3-76. Lift Chains

a. *General.* Extension of the two outer cylinders of the cylinder cluster raise the chain bearing and cross head. As the bearing raises the chains, which are anchored on the rear to the cylinder cluster, chains raise the carriage. Chains raise the carriage to the furthest extent of the cylinders.

b. *Removal.*

(1) Lower the mast and carriage to the lowest limit.

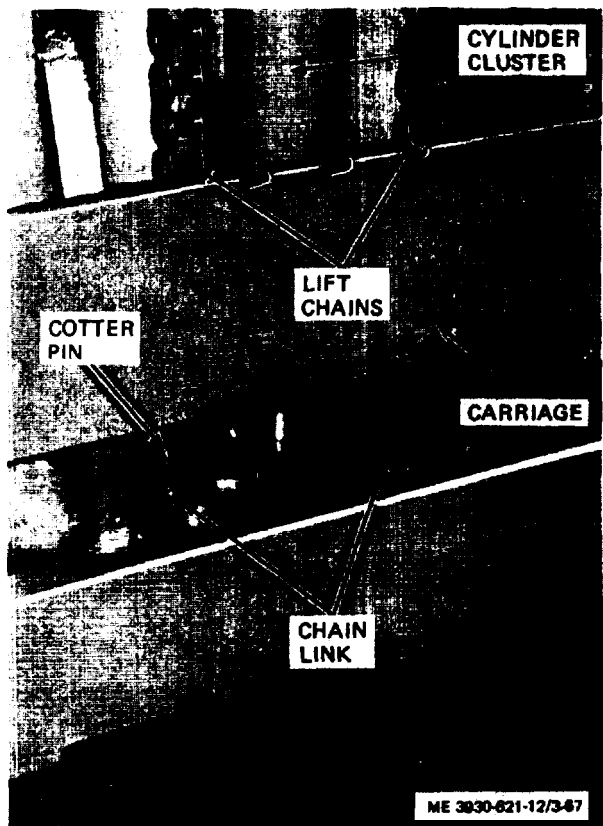


Figure 3-67. Lift chains and carriage, installed view.

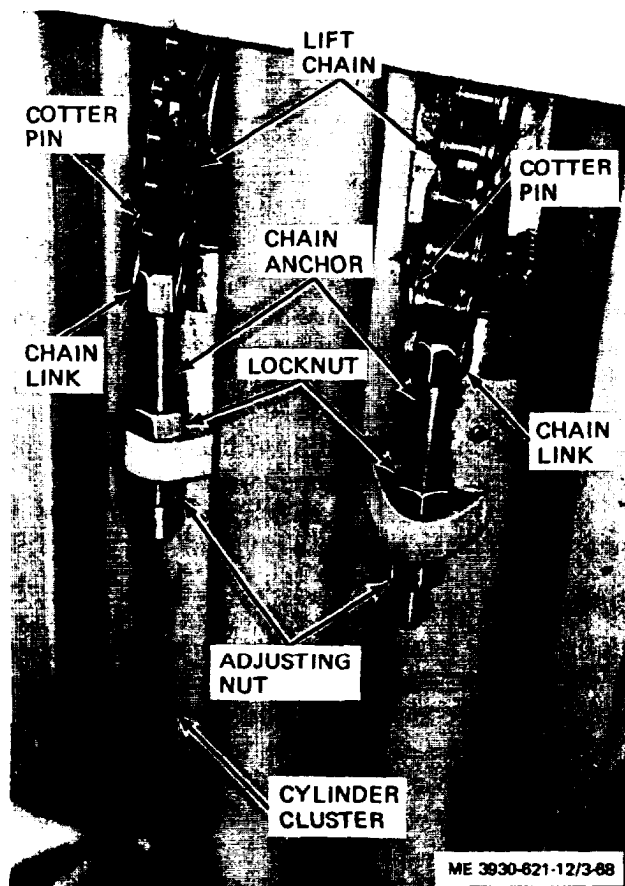


Figure 3-68. Lift chains and chain anchors, installed view

(2) Attach a chain hoist to the carriage and raise slightly to relieve tension on the chains.

(3) Refer to figure 3-67 and remove cotter pins and chain links securing chains to carriage.

(4) Refer to figure 3-68 and remove cotter pins and chain links from chain anchors attached to the cluster cylinder. Lift chains over chain bearings and off of cross head and remove chains from mast.

c. Cleaning and Inspection.

(1) Clean chains with cleaning compound, solvent (Spec. P-S-661) and dry thoroughly.

(2) Inspect chains for bent, cracked, or damaged links. Replace defective links.

(3) Lubricate chains with oil (OE).

d. Installation.

(1) Refer to figure 3-68 and place chains through cross heads and around chain bearings.

(2) Connect chains to chain anchors with chain links and cotter pins.

(3) Lower other ends of chains to anchors on carriage (fig. 3-67) and attach chains to anchors with chain links and cotter pins.

(4) Operate lift mechanism and check chains for binding on uneven operation. If cylinder cluster is fully retracted, carriage should be level and forks should not touch floor. Refer to e below to adjust chains.

e. Chain Adjustment.

(1) Check to see that mast is in a vertical position and that cylinder cluster is fully retracted.

(2) Loosen locknuts and adjusting nuts (fig. 3-68) on the chain anchors.

(3) Turn the adjusting nuts to vary chain length. Tighten or loosen the chains until the chains are a snug fit and forks barely clear the floor.

(4) Tension must be equal on both chains and carriage must be level.

(5) Tighten locknuts. Check adjustment to see it has not been disturbed.

(6) Operate lift mechanism and check chain operation.

(7) Lower carriage and fully retract cylinder cluster. Check for carriage level and forks clearing floor.

Section XX. FRAME, GUARD, AND SEAT

3-77. Overhead Guard

a. Removal. Refer to figure 3-69 and remove the overhead guard as follows:

(1) Remove two screws and nuts securing overhead guard to supports on counterweight.

(2) Remove two screws and nuts securing overhead guard to front corners of truck.

(3) Carefully remove guard from truck.

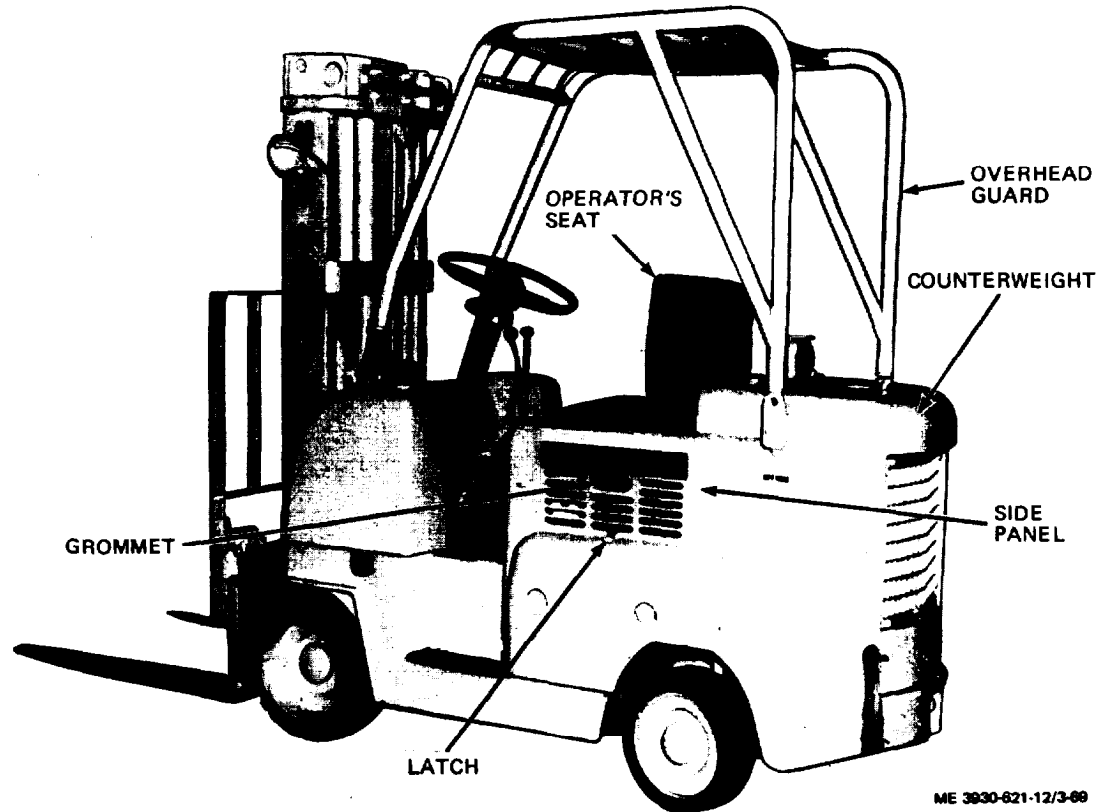


Figure 3-69. Frame, guard, and seat, installed view.

b. *Installation.* Refer to figure 3-69 and install overhead guard on truck as follows:

(1) Carefully lift overhead guard into place on truck.

(2) Secure overhead guard to four supports on corners of truck with four screws and nuts.

3-78. Side Panels

a. *General.* Ventilated side panels are mounted on either side of the seat plate. They help to supply air to the compartment and are easily removable to gain access to components in the compartment. Rubber grommets in hand holes protect sharp edges.

b. *Removal.* Refer to figure 3-69 and remove the side panels as follows:

(2) Disengage latch and remove side panel from truck.

(2) Remove side panel from other side of truck in

the same manner. Replace rubber grommets if grommets are damaged or missing.

c. *Installation.* Refer to figure 3-69 and install side panels as follows:

(1) Install side panels in side of truck.

(2) Secure side panels with latches.

3-79. Operator's Seat

a. *Removal.* Lift rear of seat to clear pins. Slide seat forward to disengage seat plate from flange. Lift seat to rear and up to remove seat and plate from truck.

b. *Disassembly.* Disassemble seat as follows:

(1) Remove seat cushion from lower part of seat.

(2) Remove two screws and lock washers securing backrest cushion to seat frame.

c. *Assembly.* Assemble seat as follows:

(1) Install backrest cushion on frame and secure

with two screws and lock washers.

(2) Install seat cushion on seat.

d. Installation. Install seat and plate in place on

truck. Slide front flange of plate into place. Lower rear of seat and slide seat to rear to engage rear flange and pins.

CHAPTER 4

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

4-1. General

a. Instructions in this chapter apply to the truck to make it available for immediate use upon receipt after shipment. The storage instructions apply to trucks being taken out of service for a period not to exceed six months.

b. Instructions pertaining to overseas shipment are contained in MIL-STD-162A.

4-2. Preparation for Shipment or Storage

a. *Inspection.* Perform preventive maintenance services listed in paragraph 3-7 and table 3-1.

b. *Repair.* Correct all deficiencies noted during the inspection if facilities are available. If repairs required are beyond the scope of organizational maintenance, refer them to direct and general maintenance personnel.

4-3. Truck Preparation

a. *Electrical System.*

(1) Disconnect battery ground cable and tape end of cable to prevent accidental discharge. Use tape, adhesive (FSN 7510-269-8090).

(2) Do not remove battery from truck. Attach tag to steering wheel to alert personnel that battery ground cable has been disconnected.

b. *Cooling System.*

(1) Follow instructions in paragraph 3-37 and flush the cooling system with clear water and drain system.

(2) If rust appears in the system use cleaning compound.

(3) After flushing and draining, fill system with proper amounts of coolant and corrosion inhibitor compound.

c. *Fuel Tank.*

(1) If truck is to be stored for less than 90 days, do not drain fuel tank.

(2) Trucks that are to be stored for longer periods should have fuel tanks prepared according to instructions in MIL-STD-162A and Specification MIL-E-10062A.

d. *Cleaning and Painting.*

(1) Wash truck and remove debris from floor and engine compartment.

(2) Remove rust and corrosion, scrape any flaked

and peeling paint. Dry all surfaces to be painted or coated with preservatives.

(3) Repaint surfaces as required to protect against deterioration. Use the following to paint surfaces.

(a) Primer coat, Specification JAN-P-735 (FSN-8010-161-7419).

(b) Final enamel coat, yellow gloss, color No. 13588, Federal Specification TT-E-489, Federal Standard 595 (FSN's 8010-286-7758, 8010-527-2045, and 8010-616-7488).

(4) Coat all exposed metal surfaces with Oil, Preservative (PL Medium).

(5) Clean all tires thoroughly to remove all grease and lubricants.

e. *Accessories.*

(1) Remove seat, cushion, backrest cushion, headlight, stop and taillight, and fire extinguisher from truck. Store all these accessories in a box, mark box with the truck serial number, and fasten box securely to the truck.

(2) Secure side panels and seat support and seal joints with tape.

4-4. Storage Instructions

a. *General.*

(1) Provide access to the truck during storage. Do not block the wheels but be sure tires are not resting on surfaces containing grease or oil.

(2) If the truck is to be stored outside, cover it with a tarpaulin or other means to provide protection against the weather.

(3) During storage, inspect and operate the truck at the intervals and in the manner described below.

b. 15 to 30 Days.

(1) While in storage, inspect the truck and operate it (for 15 to 20 minutes) one or more times each 15 to 30 days.

(2) Check truck for leaks and proper functioning of components.

c. 30 Days. In addition to the services of b above, perform the following every 30 days.

(1) Test each truck under full load and check carburetor and fuel pump for leaks.

(2) Maneuver the truck in all directions, both forward and reverse for 10 to 15 minutes.

(3) After testing as described above, correct deficiencies as described in paragraph 4-2b.

d. 180 Days. Perform 15 and 30 day services and the following every 180 days. Correct any deficiencies found during the procedures as described in paragraph 4-2 b.

(1) Adjust the drive belt (para 3-12) and clean the fuel pump filter (para 3-22) if necessary.

(2) Check alinement, steering operation, and transmission shift mechanism.

(3) Check parking brake linkage. Check and tighten service brake hydraulic lines if necessary.

(4) Lubricate the truck thoroughly in accordance with LO 10-3930-621-12.

(5) Inspect all electrical connections and tighten or adjust if necessary. Spray ignition insulating compound (U.S. Army Specification No. 3-182) on coil, distributor, alternator, spark plugs, starter, regulator and wiring.

4-5. Loading and Blocking on Railroad Cars

a. Loading.

(1) Remove forks and attach securely to truck.

(2) Load and unload truck under its own power whenever possible. Use ramps and spanning platforms in loading operations.

(3) If truck cannot be operated under its own power, carefully push, tow, or lift it into position.

(4) When using lifting equipment attach hooks, chains, or cables to lifting points marked LIFT HERE.

b. Clearances.

(1) Trucks must be positioned on flat cars to provide clearance for the brake handwheel on all sides.

(2) Overall car clearance must conform to requirements of Association of American Railroads rules.

c. Setting Truck.

(1) With truck in position on flatcar set parking brake.

(2) Depress service brake pedal and wire or block pedal to hold it in the applied position.

d. Securing Truck.

(1) Place wood blocks in front and rear of each wheel. Blocks should not protrude beyond outside of tires. Spike blocks to flatcar floor.

(2) Place wood cleats, approximately the length of the wheel, outside each wheel and against the wheel. Spike cleats to flatcar floor. Place another cleat of the same size on top of each cleat against the wheel and spike top cleat to bottom cleat.

(3) Anchor rear axle and bottom of mast assembly with at least four strands of strong wire. Fasten wire through stake pocket on flatcar and tighten wire by inserting rod in strands of wire and twisting until tight.

e. Cover. If truck is to be shipped on an open car, cover truck with a tarpaulin or similar material. Fasten cover securely to truck and flatcar.

Section II. DEMOLITION OF MATERIAL TO PREVENT ENEMY USE

4-6. General

a. Do not destroy the truck except on order of proper authority and demolish it only to prevent capture and use of the truck by the enemy.

b. Destroy the same parts and components on all similar equipment to prevent enemy use through cannibalization.

4-7. Demolition Methods

a. General. The following paragraphs locate and describe components to be demolished and methods to be used.

b. Smash with Sledge Hammer or Similar Heavy Object.

(1) Controls, including steering wheel.

(2) Steering hydraulic valve.

(3) Carburetor and manifolds.

(4) Cylinder block.

(5) Crankshaft and camshaft.

(6) Transmission and differential case.

(7) Alternator, distributor, ignition coil, and spark plugs.

(8) Battery.

(9) Hydraulic cylinders and cylinder rods.

c. Cut or Destroy.

(1) All wires and electrical cables.

(2) All fuel and hydraulic lines.

d. Puncture or Pierce with Holes.

(1) Fuel tank.

(2) Hydraulic reservoir.

(3) Engine Radiator.

e. Destruction by Explosives. Refer to FM5-25 for instructions by use of explosives.

APPENDIX A

REFERENCES

A-1. Fire Protection

TB 5-4200-200-10 Hand Portable Fire Extinguishers Approved For Army Users

A-2. Lubrication

C9100-IL Fuels, Lubricants, Oils and Waxes
LO 10-3930-621-12 Lubrication Order

A-3. Painting

TM 9-213 Painting Instructions for Field Use

A-4. Radio Suppression

TM 11-483 Radio Interference Suppression

A-5. Maintenance

TB ORD 651 Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems
TM 38-750 Army Equipment Procedures
TM 9-6140-200-15 Operation and Organizational Field and Depot Maintenance Storage Batteries,
Lead Acid Type

A-6. Shipment and Storage

TB 740-93-2 Preservation of USAMEC Mechanical Equipment for Shipment and Storage
TM 740-90-1 Administrative Storage of Equipment

A-7. Destruction of Army Material to Prevent Enemy Use

TM 750-244-3 Procedures for Destruction of Equipment to Prevent Enemy Use

APPENDIX B

BASIC ISSUE ITEMS LIST AND MAINTENANCE AND OPERATING SUPPLIES

Section I. INTRODUCTION

B-1. Scope

This appendix lists items which accompany the Truck, Lift, Fork or are required for installation, operation, or operator's maintenance.

B-2. General

This Basic Issue Items List is divided into the following sections:

a. *Basic Issue Items* - Section II. A list of items which accompany the Truck, Lift, Fork and are required by the operator/crew for installation, operation, or maintenance.

b. *Maintenance and Operating Supplies* - Section III. A listing of maintenance and operating supplies required for initial operation.

B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, Section II.

a. *Source, Maintenance, and Recoverability Codes (SMR)*:

(1) Source code indicates the selection status and source for the listed item. Source codes are:

Code	Explanation
P	Repair parts which are stocked in or supplied from the GSA/DSA or Army supply system and authorized for use at indicated maintenance categories.
P2	Repair parts which are procured and stocked for insurance purposes because the combat or military essentially of the end item dictates that a minimum quantity be available in the supply system.
M-	Repair parts which are not procured or stocked, but are to be manufactured in indicated maintenance levels.
A-	Assemblies which are not procured or stocked as such, but are made up of two or more units. Such component units carry individual stock numbers and descriptions, are procured and stocked separately and can be assembled to form the required assembly at indicated maintenance categories.
X-	Parts and assemblies which are not procured or stocked and the mortality of which normally is below that of the applicable end item or component. The failure of such part or assembly should result in retirement of the end item from the supply system.
X1	Repair parts which are not procured or stocked. The requirement for such items will be filled by use of the next higher assembly or component.
X2	Repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain them through cannibalization. Where

Code	Explanation
	such repair parts are not obtainable through cannibalization, requirements will be requisitioned, with accompanying justification, through normal supply channels.
C	Repair parts authorized for local procurement. Where such repair parts are not obtainable from local procurement, requirements will be requisitioned through normal supply channels accompanied by a supporting statement of non-availability from local procurement.
G-	Major assemblies that are procured with PEMA funds for initial issue only as exchange assemblies at DSU and GSU level. These assemblies will not be stocked above GS and DS level or returned to depot supply level.
N	Items that are nonexpendable.

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

code	Explanation
C	Operator/crew

(3) Recoverability code indicates whether un-serviceable items should be returned for recovery or salvage. Items not coded are expendable. Recoverability codes are:

Code	Explanation
R	Repair parts and assemblies which are economically repairable at DSU and GSU activities and are normally furnished by supply on an exchange basis.
S	Repair parts and assemblies which are economically repairable at DSU and GSU activities and which normally are furnished by supply on an exchange basis. When items are determined by a GSU to be uneconomically repairable they will be evacuated to a depot for evaluation and analysis before final disposition.
T	High dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts are normally repaired or overhauled at depot maintenance activities.
U	Repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, or high dollar value reusable casings or castings.

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. The abbreviation "w/e", when used as a part of the nomenclature, indicates the Federal stock

number includes all armament, equipment, accessories, and repair parts issued with the item. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers in parenthesis. Repair parts quantities included in kits, sets, and assemblies are shown in front of the repair part name.

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 Incorporated in Unit. This column indicates the quantity of the item used in the assembly group. A "V" appearing in this column in lieu of a quantity indicates that a definite quantity cannot be indicated (e.g., shims, spacers, etc.).

f. Quantity Furnished With Equipment. This column indicates the quantity of an item furnished with the equipment.

g. Illustration. This column is divided as follows:

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

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

B-4. Explanation of Columns in the Tabular List of Maintenance and Operating Supplies - Section III

a. Component Application. This column identifies the component application of each maintenance or operating supply item.

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

c. Description. This column indicates the item name and brief description.

d. Quantity Required for Initial Operation. This column indicates the quantity of each maintenance or operating supply item required for initial operation of the equipment.

e. Quantity Required for 8 Hours Operation. This column indicates the estimated quantities required for an average 8 hours of operation.

f. Notes. This column indicates informative notes keyed to data appearing in a preceding column.

Section II. BASIC ISSUE ITEMS

(1) SMR code	(2) Federal stock number	(3) Description Refer no. & fr code	(4) Unit of meas	(5) Qty inc in unit	(6) Qty furn with equip	(7) Illustration	
						(A) Fig No.	(B) Item No.
		Basic Issue Items					
		Manufacturer or Depot Installed					
PC	7510-889-3494	Binder, Loose Leaf	Ea	1	1		
PC	7520-559-9618	Case, Operation and Maintenance Manuals	Ea	1	1		
PC	4210-889-2221	Extinguisher, Fire	Ea	1	1		
		Operator and Organizational Maintenance Manual					
		TM 10-3930-621-12	Ea	1	1		
		Lubrication Order					
		LO 10-3930-621-12	Ea	1	1		

Section III. MAINTENANCE AND OPERATING SUPPLIES

(1) Component application	(2) Federal stock number	(3) Description	(4) Quantity required f/initial operation	(5) Quantity required f/8 hrs operation	(6) Notes
AIR CLEANER (1)	OIL, LUBRICATING	1/2 qt	(4)	(1) Use oil as prescribed in (2) below.
CRANKCASE (2)	OIL, LUBRICATING: 55 gal. drums as follows:			(2) Includes quantity to fill out system as follows:
	9150-265-9364(3)	OE-30	5 1/2 qt	(4)	1qt oil filter
	9150-265-2429(3)	OE-10.	5 1/2 qt	(4)	1/2 qt air cleaner
	9150-242-7604(3)	OES	5 1/2 qt	(4)	4qt crankcase
FUEL TANK	9130-264-6218	GASOLINE: bulk as follows:	4 1/2 gal.	8 gal.	(3) See C9100L for additional data and requisitioning procedure.
		Regular grade	(5)	(6)	
RADIATOR	6850-243-1992	WATER ANTIFREEZE: ethylene glycol 1 gal. can	10 qt		(4) See current LO for grade application and replenishment intervals.
	6850-243-1990	ANTIFREEZE: ethylene glycol 55 gal. drum			(5) Tank capacity.
TRANSMISSION		OIL, LUBRICATING:			(6) Average fuel consumption is 1.0 gal. per hour of continuous operation.
		(7)			(7) Use oil as prescribed in item (2).
		OE-10.	11 qt (8)	(4)	(8) Includes quantity to fill transmission system as follows:
		OES	11 qt (8)	(4)	10 qt transmission
HYDRAULIC BRAKE SYSTEM	9150-231-9071	OIL HYDRAULIC: 1 gal. can as follows:			1 qt filter
	9150-262-9375	HB - non-petroleum base, automotive.	1/2 pt	(4)	(9) Includes quantity to fill hydraulic system as follows:
		HBA - non-petroleum base, automotive, arctic-type.	1/2 pt	(4)	1 qt filter
DIFFERENTIAL		OIL, LUBRICATING, GEAR: 55 gal. drum as follows:			2 1/2 qt lines
	9150-577-5845(3)	GO-90	6 pt	(4)	3 3/4 gal. reservoir
	9150-240-2244(3)	GO-75	6 pt	(4)	
	9150-257-5442(3)	GOS	16 pt	(4)	
HYDRAULIC SYSTEM		OIL, LUBRICATING: 55 gal. drum as follows:			
	9150-265-9429(3)	OE-10.	14 1/4 qt (9)	(4)	
	9150-242-7604(3)	OES	14 1/4 qt (9)	(4)	
LUBRICATION FITTINGS		GREASE, AUTOMOTIVE AND ARTILLERY: 35 lb can as follows:			
	9150-190-0907(3)	G A A	As required	(4)	

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-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.

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

C-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. *Functional 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 - 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 material 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.

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

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

C-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.

C-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

Group No.	Functions group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		A	B	c	D	E	F	G	H	I	J	K		
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
01	ENGINE													
	Engine Assembly	0	0	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	0							O					
	PCV Valve			O					O					
02	FUEL SYSTEM													
	Carburetor				O				O	F				
	Fuel Pump		0	0					O					
	Air Cleaner			C					O					
	Tank, Fuel			C					O	H				
	Governor				O				F	F				
	Filter Fuel			O					O					
	Pedal and Linkage. Accelerator				O				O					
03	EXHAUST SYSTEM													
	Muffler & Pipes.	0							O					
04	COOLING SYSTEM													
	Radiator		O	C					O	H				
	Thermostat		O						O					
	Water Pump	0							O					
	Belt, Fan				O				O					
05	ELECTRICAL SYSTEM													
	Alternator		O						O	F				
	Regulator Voltage		O		O				O					
	Starting Motor		O						O	F				
	Distributor				O				O	O				
	Spark Plugs		O	O	O				O					
	Ignition Coil		O						O					
	Battery		O	C					O					
	Cables Battery			O					O					

(1) Group No.	(2) Functions group	(3) Maintenance functions											(4) Tools and equipment	(5) Remarks
		A	B	C	D	E	F	G	H	I	J	K		
		Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild		
06	TRANSMISSION Filter, Oil Torque Converter Transmission Assy Control Valve Inching Control		F F	O O C	F				O F F F F	F F	H			
07	PROPELLER & PROPELLER SHAFTS Propeller Shaft			O					O	O				
08	FRONT AXLE Front Axle Assembly (Drive) Differential			O O	F				F F	F H				
09	REAR AXLE Rear Axle Assembly (Steering)				F				F	F				
10	BRAKES Brake Shoes, Hand Brake Lever, Hand Brake Cable, Hand Brake Brake Shoes, Service Brake Master Cylinder Wheel Cylinder Pedal			O	O O O O				O O O O O O F	F F F F				
11	WHEELS Wheel Assembly. Tires	O			O				O H	H				
12	STEERING Drag Link Tie Rod Gear Assembly, Steering Hydraulic Cylinder			O	O O F O				O O F O	O O H				
13	HYDRAULIC LIFT COMPONENT Hydraulic Pump Control Valve Control Levers and Linkage Tilt Cylinder. Lift Cylinder Mast Assembly Carriage Assembly Chain Lines & Fittings. Tank, Oil. Filter, Oil		F F	F O O	O				F F F O F F F O O F O	F F F F F F F O				

INDEX

	Paragraph	Page
A		
Accelerator and linkage	3-32	3-20
Adjustments:		
Accelerator	3-32	3-20
Brake pedal	3-67	3-49
Carhuretotor	3-29	3-17
Dibtrihutor pointy	3-44	3-31
Engine	3-27	3-16
Drive belt	3-12	3-6
Governor	3-30	3-18
Horn	3-50	3-39
Lift chain	3-76	3-57
Mast tilt	3-75	3-56
Operator's seat	2-7	2-3
Parking brake lever	3-61	3-45
Spark plugs	3-460	3-35
Steering cylinder	3-70	3-52
Steering wheel stop	3-70	3-52
Tie rods	3-69	3-51
Valves	3-25	3-14
wheer bearings	3-67	3-49
Air cleaner	3-10	3-4
Alternator	3-41	3-26
Axles:		
Front	3-58	3-44
Rear	3-59	3-44
B		
Basic issue item 5	B-1	
Basic issue supplies and equipment	3-2	3-1
Battery:		
Replacement	3-47	3-35
Service	3-11	3-5
Bleeding brakes	3-53	3-40
Blocking, railroad cars	4-5	4-2
Brake pedal (See, Pedal, brake)		
Brake shoes	3-64	3-47
Breathers:		
Engine crankcase	3-26	3-15
Hydraulic reservoir	3-73	3-55
Breather, crankcahe	3-26	3-15
Breather, hydraulic reservoir	3-73	3-55
C		
Carburetor	3-29	3-17
Chain, lift	3-76	3-57
Coil, ignition (See Ignition coil)		
Controls	2-7	2-3
Coolant temperature transmitter	3-48	3-36
Cylinder head	3-24	3-12
Cylinders, hydraulic:		
Lift	3-75	3-56
Steering	3-70	3-52

	Paragraph	Page
D		
Demolition methods	4-7	4-2
Description	1-4	1-1
Depositing a load	2-14	2-9
Difference between models	1-6	1-5
Dismantling for movement	2-3	2-3
Distributor	3-44	3-31
E		
Engine fan	3-39	3-26
Exhaust system	3-35	3-21
Extinguisher operation	2-16	2-10
F		
Fan belt:		
Adjustment	3-12	3-6
Replacement	3-39	3-26
Filters:		
Engine oil	3-5	3-1
Hydraulic oil	3-74	3-55
Transmission oil	3-53	3-40
Front axle	3-58	3-44
Front wheel	3-67	3-49
Fuel pump	3-31	3-19
Fuel tank	3-33	3-21
G		
Governor	3-30	3-18
H		
Headlight	3-49	3-37
Horn	3-50	3-39
Hoses, transmission oil	3-54	3-41
Hourmeter transmitter	3-48	3-36
Hydraulic oil filter	3-74	3-55
Hydraulic reservoir breather	3-73	3-55
I		
Ignition coil	3-45	3-33
Installation after movement	2-4	2-3
Installation of separately packed components	2-2	2-2
Inspectingequipment	2-1	2-1
Instruments	2-7	2-3
L		
Lifting and transporting a load	2-13	2-8
Lift chains (See Chain, lift)		
Lubrication:		
Detailed	3-5	3-1
General	3-4	3-1
M		
Maintenance allocation chart	C-1	
Maintenance and operating supplies	B-1	
Manifolds	3-26	3-15

	Paragraph	Page
Master cylinder, brake	3-63	3-46
Moving the truck	2-12	2-7
Muffler	3-35	3-21
N		
Normal movement	2-5	2-3
Neutral switch. starter	3-51	3-39
O		
Oil pressure transmitter	3-48	3-36
Operation:		
In damp tropical areas	2-21	2-11
In extreme cold	2-19	2-10
In extreme heat	2-18	2-10
In sandy or dusty areas	2-20	2-10
Of equipment	2-11	2-7
Operator's seat:		
Adjustment	2-7	2-3
Replacement	3-79	3-59
Organizational maintenance repair parts	3-3	3-1
Orientation	1-3	1-1
Overhead guard	3-77	3-59
P		
Parking brake lever	3-61	3-45
Pedal, brake	3-62	3-46
Preparing for shipment	4-2	4-1
Preventive maintenance:		
General	3-6	3-3
Services	3-7	3-3
Propeller shaft	3-56	3-42
R		
Radiator	3-37	3-23
Radio suppression:		
General methods	3-19	3-11
Radio interference	3-20	3-11
Replacement of component-	3-21	3-11
Testing components	3-22	3-12
Record and report forms	1-2	1-1
References	A-1	
Relay. horn	3-50	3-39
Rear axle	3-59	3-44
Rear light, combination	3-49	3-37
Rear wheel	3-67	3-49
S		
scope	1-1	1-1
Seat (See Operator's seat)		
Servicing equipment	2-1	2-1
Side panels	3-78	3-59
Spark plugs	3-46	3-35
Special tools	3-1	3-1
Starter	3-43	3-30

	Paragraph	Page
Starter neutral switch (See Neutral switch)		
Starting	2-9	2-5
Steering cylinder	3-70	3-52
Stop light (See Rear light,		
Stopping	2-10	2-6
Storage instructions	4-4	4-1
T		
Tabulated data	1-5	1-3
Tail light (See Rear light)		
Tests:		
Alternator	3-41	3-26
Battery	3-43	3-30
Fuel pump	3-25	3-14
Ignition coil	3-45	3-33
Spark plugs	3-46	3-35
Thermostat	3-38	3-24
Vacuum. engine	3-27	3-16
Tests and adjustments. engine	3-27	3-16
Thermostat	3-28	3-24
Tie rods	3-69	3-51
Tilt cylinder	3-75	3-56
Transmission neutral switch (see Neutral switch)		
Transmitters:		
Coolant temperature	3-48	3-36
Hourmeter	3-48	3-36
Oil pressure	3-48	3-36
Troubleshooting	3-13	3-7
Truck preparation for shipment	4-3	4-1
V		
Valve, steering	3-71	3-54
Valves, timing and adjustment	3-25	3-14
Voltage regulator	3-42	3-28
W		
Water pump	3-38	3-24
Wheel cylinder, brake	3-65	3-49
Wheels	3-67	3-49

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