DEPARTMENT OF THE ARMY TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL

TRUCK, LIFT, FORK, GASOLINE,

PNEUMATIC-TIRED WHEELS,

15,000-POUND CAPACITY

(HYSTER MODEL H150C,

ARMY MODEL MHE 178)

FEDERAL STOCK NUMBER

3930-897-4632

HEADQUARTERS, DEPARTMENT OF THE ARMY

DECEMBER 1962

TM 10-3930-222-20
C 2

CHANGE

No.2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C., *7 June 1990*

Organizational Maintenance Manual

TRUCK, LIFT, FORK; GASOLINE; PNEUMATIC-TIRED WHEELS;
15,000-POUND CAPACITY; 210 in. LIFT HEIGHT
HYSTER MODEL H150C:
MHE 178 (NSN 3930-00-897-4632)
MHE 178A (NSN 3930-01-054-3894)
MHE 178B (NSN 3930-01-054-3895)
MHE 178C (NSN 3930-01-052-5218)
AND
HYSTER MODEL H150F: MHE 223 (NSN 3930-00-151-4434)

TM 10-3930-222-20, 6 December 1962, is changed as follows:

Page 1.

The manual title is changed to read as shown above.

Table of Contents, Chapter 2, Section I. Change paragraph reference "11-12" to "11".

Page 3.

Paragraph 3 is superseded as follows:

3. Maintenance Forms, Records, and Reports

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by DA Pam 738-750.

Paragraph 4 is superseded as follows:

4. 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 or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, U.S. Army Tank-Automotive Command, ATTN: AMSTA-MB, Warren, MI 48397-5000. A reply will be furnished to you.

Page 5. Paragraph 10 is superseded as follows:

10. Maintenance Inspection and Tests

a. The organizational level mechanic will perform the services and tests that are listed and described in Organizational Preventive Maintenance Checks and Services (par. 14). The services performed at this time will begin the cycle of regularly scheduled preventive maintenance services.

b. The deficiencies and shortcomings noted, and the corrective action taken, will be reported on the appropriate forms as prescribed and explained in DA Pam 738-750.

Page 7.

Paragraph 11. The first sentence is superseded as follows: "Lubrication Order 10-3930-222-12 prescribes lubrication maintenance of the Hyster Model H150C and Hyster Model H150F truck; compliance with the instructions is mandatory at all levels of maintenance."

Paragraph 12 is rescinded.

Page 8. Figure 1 is rescinded.

Pages 9 through *34*. Figures 2(A) through 2(Z) are rescinded.

Page 34. Section II is superseded as follows:

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

13. General

To make sure that your vehicle is ready for operation at all times, inspect it systematically so you can discover any defects and have them corrected

before they result in serious damage or failure. Table I contains your organizational PMCS. The item numbers indicate the sequence of minimum inspection requirements. If you're operating the vehicle and notice something wrong which could damage the equipment if you continue operation, stop operation immediately.

Record all deficiencies and shortcomings, along with corrective action taken, on DA Form 2404. The Item Number Column is the source for the numbers used on the TM Number Column on DA Form 2404.

14. Organizational Preventive Maintenance Checks and Services

a. The item numbers of the table indicate the sequence of the PMCS. Perform at the intervals shown below.

(1) Do your (A) PREVENTIVE MAINTENANCE annually (once every year).

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

b. If something doesn't work, troubleshoot it according to the instructions in this manual or notify your supervisor.

c. Always do your preventive maintenance in the same order so it gets to be a habit. Once you've had some practice, you will spot anything wrong in a hurry.

d. If anything looks wrong and you can't fix it, write it down on your DA Form 2404. If you find something seriously wrong, report it to direct support as soon as possible.

WARNING

Dry cleaning solvent, P-D-680, is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid allowing solvent to contact skin, eyes, and clothes, and do not 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 solvent comes in contact with skin or clothing, wash with water. If solvent gets in your eyes, flush eyes with water and get medical aid immediately. Flash point of solvent is 138°F (59°C).

(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 dry cleaning solvent (P-D-680) to clean metal surfaces. Use soap and water when you clean rubber or plastic material.

(2) *Bolts, nuts, and screws.* Check that they are not loose, missing, bent, or broken. You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around bolt heads. Tighten any bolt, nut, or screw that you find loose.

(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.

(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 condition.

(5) *Hoses and fluid lines.* Look for wear, damage, and leaks. Make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also mean a leak. If leakage comes from a loose fitting or connector, tighten the fitting or connector. If something is broken or worn out, either correct it or report it to direct support.

e. It is necessary for you to know how fluid leaks affect the status of your equipment. The following are definitions of the types/classes of leakage you need to know to be able to determine the status of your equipment. Learn and be familiar with them and REMEMBER-when in doubt, notify your supervisor.

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 operating with Class I or II leaks, continue to check fluid levels as required by your PMCS. Class III leaks should be reported to your supervisor or direct support maintenance. Equipment is not ready/available if any gasoline leak is present, whether Class I, II, or III (refer to AR 385-55).

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

Table I. Organizational Preventive Maintenance Checks and Services

A-Annually H-Hours

Item no.	Interval A	Interval H	ITEM TO BE INSPECTED Procedure: Check for and have repaired, filled, or adjusted as needed
			NOTE **Perform operator/crew PMCS prior to or in conjunction with organizational PMCS if:** ***a*. There is a delay between the daily operation of the equipment and the organizational PMCS.** ***b*. Regular operator is not assisting/participating.**
1			ENGINE.
		250	*a*. Check carburetor for proper idle RPM and throttle adjustment (par. 26).
		250	*b*. Check condition of individual spark plugs and wires. Clean or replace spark plugs. Adjust spark plug gap to 0.030 inch (par. 45).
		250	*c*. Check condition of points. Replace or adjust points to proper gap of 0.022 inch (par. 44i).
2			FAN BELT.
		250	Check fan belt for proper tension (par. 37).
3			BATTERY.
			WARNING **Do not smoke or allow any flame or spark in the vicinity while checking the battery. The battery generates hydrogen, a highly explosive gas.**
			CAUTION **In cold weather operation, charge battery immediately after water has been added with battery electrolyte to prevent freezing. Be careful not to overfill when servicing batteries.**
		250	Test battery to determine cell condition. Recharge or replace. Clean battery, battery terminals, and battery box (par. 47).
4			BRAKES.
		250	*a*. Check handbrake linkage for evidence of wear, breaks, and other damage (par. 62).
		500	*b*. Adjust brake pedal. Brake pedal requires 1/2 inch free travel (par. 63).
		500	*c*. Check thickness of service brake lining. If brake lining is worn to less than 1/8 inch thick, replace the brake shoes (par. 64).
5			RADIATOR.
			WARNING **Cooling system is pressurized. Remove cap slowly and only when engine is cool or burns could result.**
6	•		Check coolant for antifreeze and corrosion protection and inspect cooling system for heavily rusted or partially clogged cooling system (refer to TB 750-651).

Page 42, Troubleshooting, *Malfunction* High or low engine oil pressure. Change "LO 10-3930-222-20" to "LO 10-3930-222-12".

Page 62, paragraph 30. Prior to subparagraph *a*, add the following Note:

Note.

Prior to removal, refer to TB 750-1047, Elimination of Combustibles from Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks.

Page 74. Paragraphs 36*g* and 36*h* are added after paragraph 36*f*:

g. Removal.

(1) Open drain cock (8, fig. 31.1) and drain radiator (7).

(2) Remove headlight wire from clamps on radiator.

(3) Remove hood (par. 77).

(4) Remove fan (par. 38).

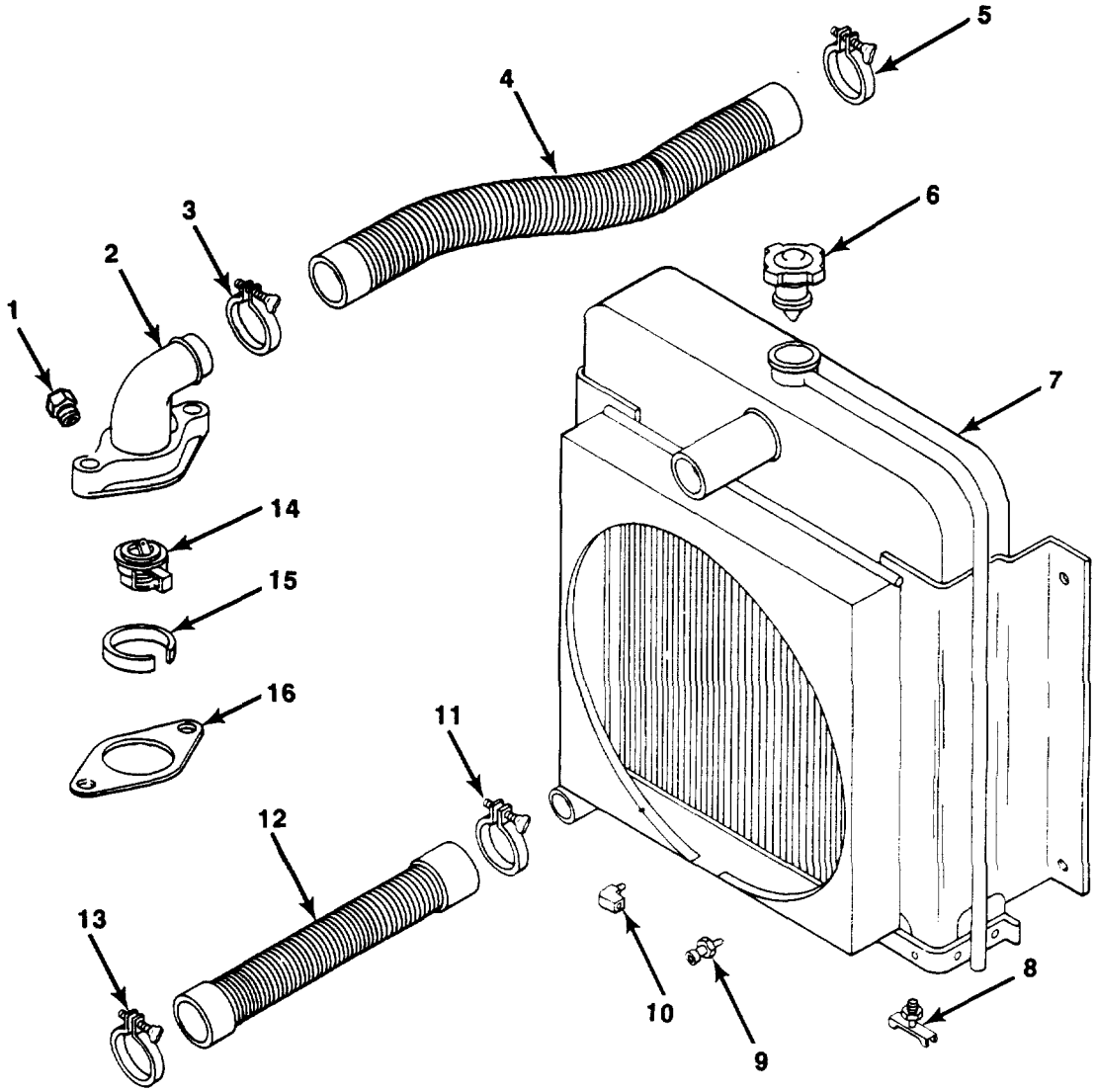
(5) Loosen hose clamps (5 and 11) and disconnect radiator hoses (4 and 12).

(6) Remove screws, washers, and lockwashers that secure the radiator to the truck.

(7) Disconnect two transmission oil hoses at radiator.

(8) Remove radiator (7) from truck, being careful not to damage core.

h. Installation. Reverse procedures in *g* above, being careful not to damage the core.



1 Fitting
2 Elbow, cylinder head water outlet
3 Clamp, hose
4 Hose, radiator upper
5 Clamp, hose
6 Cap
7 Radiator
8 Cock, drain
9 Nipple, hose
10 Elbow, strut
11 Clamp, hose
12 Hose, radiator lower
13 Clamp, hose
14 Thermostat
15 Ring, thermo adapter
16 Gasket

TA502237

Figure 31.1. Radiator and attaching parts.

Page 117.
Paragraph 64.1 is added after paragraph 64 as follows:

64.1. Hydrovac Assembly

a. Removal and Replacement. Remove and replace the brake booster assembly (fig. 72.1).

Figure 72.1 is added as shown on the following page.

Page 138, paragraph 89*c*(4). Change "LO 10-393022-20" to "LO 10-3930-222-12".

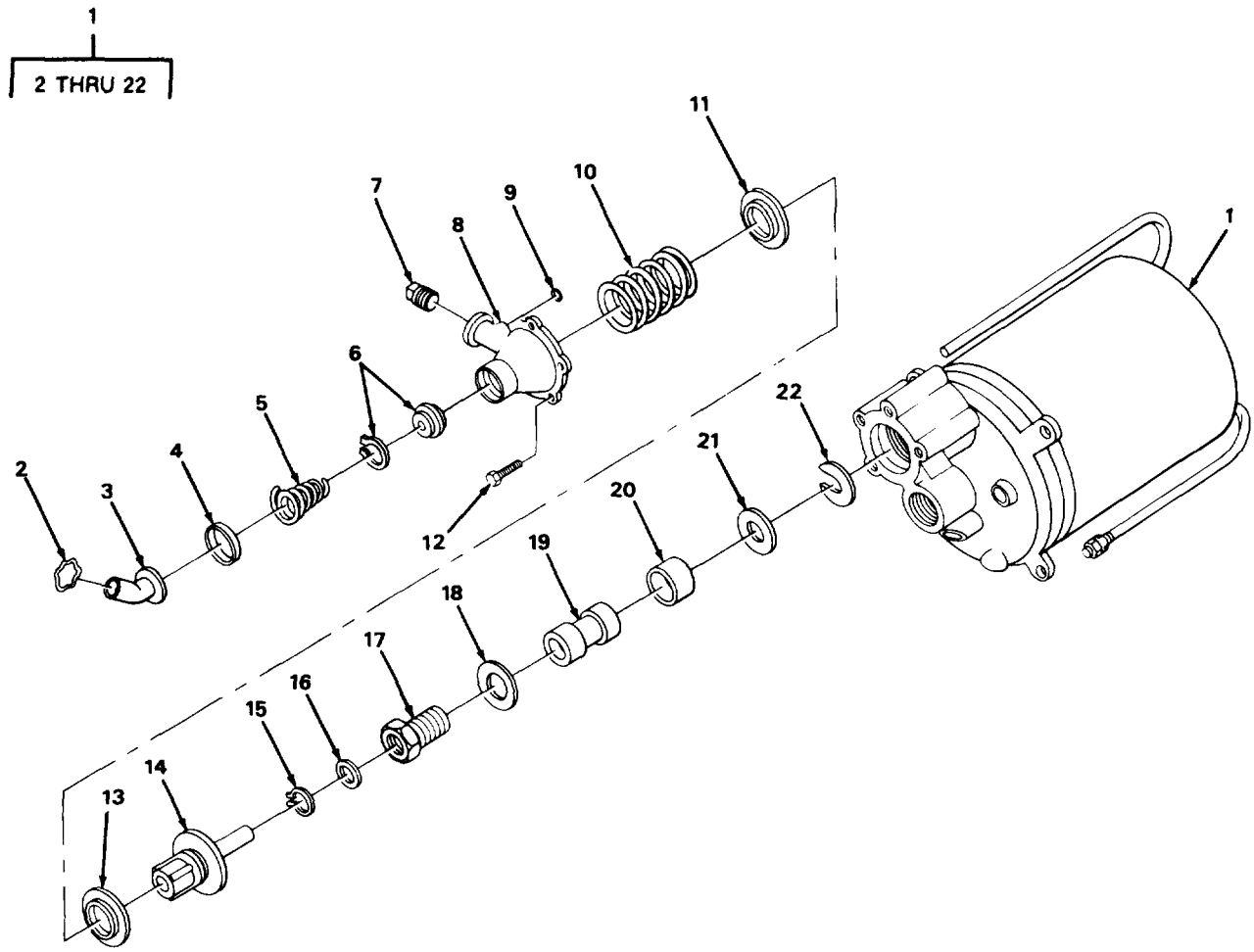


Figure 72.1. Hydrovac assembly.

Page 141. Appendix I is superseded as follows:

APPENDIX I
REFERENCES

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1. Fire Protection

TB 5-4200-200-100	Hand Portable Fire Extinguishers Approved for Army Users

2. Lubrication

C9100-IL	Fuel, Lubricants, Oils and Waxes
LO 10-3930-222-12	Lubrication Order; Truck, Lift, Fork; Gasoline; Pneumatic Tired Wheels; 15,000 lb Capacity, 210-Inch Lift Height (Hyster Model H150C, Army Models MHE-178, MHE-178A, MHE-178B and MHE-178C) (NSN 3930-00-897-4632) and (Model H150F Army Model MHE-223) (NSN 3930-00-151-4434)

3. Painting

AR 746-1	Packaging of Army Materiel for Shipment and Storage
TM 43-0139	Painting Instructions for Field Use

4. Cleaning

TB SIG-327	Harmful Effects of Carbon Tetrachloride on the Human Body

5. Maintenance

AR 310-1	Publications, Blank Forms, and Printing Management
FM 29-2	Organizational Maintenance Operations
TM 750-254	Cooling Systems: Tactical Vehicles
TB 750-1047	Elimination of Combustibles from Interiors of Metal or Plastic Gasoline and Diesel Fuel Tanks
TM 9-2610-200-24	Organizational, Direct Support, and General Support Care, Maintenance and Repair of Pneumatic Tires and Inner Tubes
TM 10-6140-200-14	Installation, Use, Maintenance, and Repair of Industrial Motive Power Storage Batteries for Materials Handling Equipment
FM 11-65	High Frequency Radio Communications
DA Pam 738-750	The Army Maintenance Management System (TAMMS)
TM 10-3930-222-10	Operator's Manual; Truck, Lift, Fork; Gasoline; Pneumatic-Tired Wheels; 15,000-Pound Capacity; 210 in. Lift Height (Hyster Model H150C, Army Models MHE 178, MHE 178A, MHE 178B, and MHE 178C) NSN 3930-00-897-4632 (Hyster Model H150F, Army Model MHE 223) NSN 3930-00-151-4434
TM 10-3930-222-20P	Organizational Maintenance Repair Parts and Special Tools Lists; Truck, Lift, Fork; Gasoline; Pneumatic-Tired Wheels; 15,000 lb Capacity, 210-Inch Lift Height (Hyster Model H150C, Army Models MHE-178, MHE-178A, MHE-178B and MHE-178C) (NSN 3930-00-897-4632) and (Model H150F Army Model MHE-223) (NSN 3930-00-151-4434)

6. Shipment and Storage

TB 740-97-2	Preservation of USAMECOM Mechanical Equipment for Storage
TM 38-230-1	Packaging of Materiel: Preservation (Vol I)
TM 38-230-2	Packaging of Materiel: Preservation (Vol II)
TM 740-90-1	Administrative Storage of Equipment

7. Demolition

TM 750-244-6	Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use

8. Operation

TM 5-331B	Utilization of Engineer Construction Equipment: Volume B; Lifting, Loading, and Hauling Equipment

Page 143. Appendix II is superseded as follows:

APPENDIX II
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

1. General

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

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 functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels.

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.

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 (includes decontaminate, when required), to preserve, to drain, to paint, or to 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 corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments 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 spare, 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 services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions 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.

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 publications (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 materiel 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.

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 functions to be performed on the item listed in Column 2. (For a detailed explanation of these functions, see paragraph 2-2.)

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the level 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 level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The work time 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 the specific tasks identified for the maintenance functions authorized in the Maintenance Allocation Chart. The symbol

designations for the various maintenance levels are as follows:

C	.....	Operator or Crew
0	.....	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 alphabetic order, which shall be keyed to the remarks contained in Section IV.

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

a. Column 1, Tool or Test Equipment 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 Level. The lowest level 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/NATO Stock Number. The National or NATO Stock Number of the tool or test equipment.

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

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

(1)	(2)	(3)	(4) Maintenance Level					(5)	(6)
Group Number	Component/Assembly	Maintenance Function	C	O	F	H	D	Tools and Equipment	Remarks
01	**ENGINE**								
0100	*Engine Assembly*	Test		1.0					A
		Service	0.4						
		Replace			8.0				
		Repair				12.0			
		Overhaul					28.0		B
0101	*Crankcase, Block and Cylinder Head*								
	Block	Replace			8.0				
		Repair				4.0			
	Cylinder Head	Replace		2.7					
0102	*Crankshaft*	Replace				12.5			
0104	*Pistons, Connecting Rods*								
	Pistons	Replace				4.0			
	Connecting Rods	Replace				4.0			
		Repair				2.0			

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
0105	*Valves, Camshaft and Timing System*								
	Valves, Intake and Exhaust	Adjust		1.2					
		Replace			5.5				
0106	*Engine Lubrication System*								
	Oil Filter Assembly Cartridge	Service		0.2					
		Replace		0.3					
	Oil Pressure Relief Valve	Replace			0.5				
0108	*Manifolds*	Replace		1.5					
03	**FUEL SYSTEM**								
0301	*Carburetor, Fuel Injector*								
	Carburetor	Adjust		0.5					
		Replace		1.5					
		Repair			2.5				
0302	*Fuel Pump*	Test		0.3					
		Replace		0.5					
0304	*Air Cleaner*	Service		0.2					
		Replace		0.2					
0306	*Tanks, Lines, Fittings, and Headers*								
	Fuel Tank	Service	0.1						
		Replace		1.0					
		Repair				1.5			
0308	*Engine Speed Governor and Controls*								
	Governor	Adjust		0.3					
		Replace			0.5				
		Repair			1.0				
0312	*Accelerator, Throttle or Choke Controls*								
	Accelerator, Pedal and Linkage	Service		0.2					
		Adjust		0.6					
		Replace		0.8					
04	**EXHAUST SYSTEM**								
0401	*Muffler and Pipes*	Replace		1.0					

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
05	**COOLING SYSTEM**								
0501	*Radiator, Evaporative Cooler, or Heat Exchanger*								
	Radiator	Test				0.1			
		Service	0.3						
		Replace		1.0					
		Repair				2.0			
0503	*Water Manifold, Headers, Thermostats, and Housing Gasket*								
	Thermostat	Test		0.3					
		Replace		0.5					
	Hoses	Inspect		0.2					
		Replace		0.5					
0504	*Water Pump*	Replace		1.2					
0505	*Fan Assembly*	Replace		0.8					
06	**ELECTRICAL SYSTEM**								
0601	*Generator, Alternator*								
	Generator	Test		0.5					
		Service		0.2					
		Replace		0.7					
		Repair			2.5				
0602	*Generator Regulator*								
	Engine Voltage Regulator	Test		0.3					
		Adjust		0.5					
		Replace		0.3					
0603	*Starting Motor*	Replace		0.6					
		Repair			1.5				
0605	*Ignition Components*								
	Distributor	Service		0.2					
		Adjust		0.4					
		Replace		0.5					
		Repair		0.8					
	Spark Plugs	Adjust		0.3					
		Replace		0.5					

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1)	(2)	(3)	(4)					(5)	(6)
			Maintenance Level						
Group Number	Component/Assembly	Maintenance Function	C	O	F	H	D	Tools and Equipment	Remarks
0607	*Instrument or Engine Control Panel*								
	Instruments and Gages	Inspect	0.1						
		Replace		1.0					
0609	*Lights*								
	Headlights, Stoplight-Taillight	Inspect	0.1						
		Replace		0.5					
		Repair		0.7					
0610	*Sending Units and Warning Switches*								
	Temperature Sending Unit	Replace		0.3					
0611	*Horn*								
	Horn Button Assembly	Test	0.1						
		Replace		0.6					
0612	*Batteries, Storage*	Inspect	0.1						
		Test		0.1					
		Service		0.3					
		Replace		0.3					
07	**TRANSMISSIONS**								
0705	*Transmission Shifting Components*								
	Control Linkage	Service		0.2					
		Adjust		0.3					
		Replace		1.0					
0708	*Torque Convertor or Fluid Coupling*								
	Torque Convertor	Replace			0.5				
		Repair				2.0			
0710	*Transmission Assembly*	Service	0.2						
		Replace			1.5				
		Repair				13.0			
0713	*intermediate Clutch High-Low Clutch and Forward and Reverse Clutch*								
		Replace				4.0			
		Repair				6.0			

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1)	(2)	(3)	(4)					(5)	(6)
			Maintenance Level						
Group Number	Component/Assembly	Maintenance Function	C	O	F	H	D	Tools and Equipment	Remarks
0714	*Servo Unit*								
	Control Valve Assembly	Replace			1.0				
		Repair				2.0			
0721	*Coolers, Pumps, Motors*								
	Transmission Oil Filter Assembly	Service		1.0					
		Replace		1.2					
		Repair		0.5					
	Oil Filter Element	Replace		0.2					
	Lines and Fittings	Replace		0.5					
09	**PROPELLER, PROPELLER SHAFTS, UNIVERSAL JOINTS, COUPLER AND CLAMP ASSEMBLY**								
0900	*Propeller Shafts*	Service		0.2					
		Replace			1.0				
		Repair			1.0				
10	**FRONT AXLE**								
1000	*Front Axle Assembly*	Service		0.2					
		Replace			2.0				
		Repair			6.0				
	Drive Axle Shaft	Replace		0.7					
	Breather	Service		0.2					
		Replace		0.4					
1002	*Differential*								
	Differential and Carrier Assembly	Adjust			1.0				
		Replace			4.0				
		Repair			6.0				
11	**REAR AXLE**								
1100	*Rear Axle Assembly*	Service		0.3					
		Replace			1.3				
		Repair			2.0				
1104	*Steering Sideshift and Wheel Leaning Mechanism*								
	Pivoting Arm, Spindles and Bearings	Replace			2.0				

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
12	**BRAKES**								
1201	*Hand Brakes*								
	Hand Brake and Linkage	Adjust	0.2						
		Replace		1.0					
1202	*Service Brakes*	Adjust		0.5					
		Replace		1.3					
1204	*Hydraulic Brake System*								
	Cylinder, Hydraulic Wheel	Replace		1.0					
	Brake Master Cylinder	Service		0.2					
		Replace		1.0					
1205	*Vacuum System Components*								
	Hydrovac Assembly	Replace		2.0					
		Repair			3.0				
1206	*Mechanical Brake System*								
	Pedal and Linkage	Service		0.1					
		Replace		0.5				1	
	Rod, Brake, Master Cylinder	Adjust		0.3					
		Replace		0.3					
13	**WHEELS**								
1311	*Wheel Assembly*								
	Steering Wheel Hubs and Bearings	Service		0.5					
		Adjust		0.2					
		Replace		1.0					
1313	*Tires, Tubes*								
	Tires	Inspect	0.1						
		Service	0.2						
		Replace		0.5					
		Repair				0.7			
	Tubes	Replace		0.5					

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level C	O	F	H	D	(5) Tools and Equipment	(6) Remarks
14	**STEERING**								
1401	*Mechanical Steering Gear Assembly*								
	Tie Rods and Drag Link Assembly	Service		0.3					
		Adjust		0.2					
		Replace		0.5					
		Repair		0.6					
1407	*Power Steering Gear Assembly*	Replace			1.3				
		Repair				2.5			
1410	*Hydraulic Pump or Fluid Motor Assembly*								
	Steering Pump	Replace			0.6				
		Repair			1.5				
1411	*Hoses, Lines and Fittings*	Replace		0.5					
1412	*Hydraulic or Air Cylinders*								
	Steering Booster Cylinder	Service		0.2					
		Adjust		0.3					
		Replace		1.2					
		Repair			2.1				
18	**BODY, CAB, HOOD AND HULL**								
1806	*Upholstery, Seats and Carpets*								
	Seat and Seat Support	Replace		0.5					
	Overhead Guard	Replace		0.5					
24	**HYDRAULIC AND FLUID SYSTEMS**								
2401	*Pump and Motor*								
	Main Pump and Drive Shaft Assembly	Service		0.2					
		Replace			1.0				
		Repair			2.0				
2402	*Manifold and/or Control Valves*								
	Hydraulic Control Valve	Replace			0.7				
		Repair			1.5				

Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE. FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
2402	Manifold and/or Control Valves (Con't)								
	Tilt Control Valve	Replace			0.7				
		Repair			1.5				
2403	Hydraulic Controls and/ or Manual Controls								
	Hydraulic Control Valve Linkage	Replace			0.7				
2404	Tilt Cylinders and Tilt Crank								
	Tilt Cylinders	Service		0.2					
		Replace		0.5					
		Repair			1.5				
2405	Mast Column								
	Lift Cylinder	Replace			1.0				
		Repair			2.0				
	Fork Adjusting Screws	Service		0.5					
	Fork Carriage	Replace			1.0				
		Repair			1.0				
	Cable Chain	Service		0.5					
		Adjust		0.3					
		Replace			0.8				
	Upright Pivots	Service		0.3					
	Upright Assembly	Replace			2.0				
		Repair			3.0				
2406	Strainers, Filters, Lines and Fittings, Etc.								
	Hydraulic Tank Filter and Breather	Service		0.3					
		Replace		0.7					
		Repair		0.7					
	Hydraulic Lines and Fittings	Inspect	0.1						
		Replace			0.5				
		Repair			1.0				
2408	Liquid Tanks or Reser-voirs								
	Hydraulic Tanks	Service	0.1						
		Replace			2.0				
		Repair			1.5				

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) TOOL OR TEST EQUIPMENT REF CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL/NATO STOCK NUMBER	(5) TOOL NUMBER
1	O	Wrench		98104 (30076)

Section IV. REMARKS

(1) Reference Code	(2) Remarks
A	Consists of compression and vacuum testing
B	Reboring may be accomplished at general support maintenance if facilities are available from Government or commercial sources.

Pages 149 and 150, Index.

The following entries are added or superseded alphabetically:

The following entry is deleted alphabetically:

C1

Change No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., *10 October 1973*

Organizational Maintenance Manual
TRUCK, LIFT, FORK; GASOLINE; PNEUMATIC-TIRED WHEELS; 15,000-POUND CAPACITY; 210 in. LIFT HEIGHT (HYSTER MODEL H150C) ARMY MODELS MHE 178, MHE 178A, MHE 178B, AND MHE 178C, FSN 3930-897-4632; (HYSTER MODEL H150F) ARMY MODEL MHE 223, FSN 3930-151-4434

TM 10-3930-222-20. 6 December 1962, is changed as follows:
The title is changed as shown above.
Page 3. Paragraph 1. is superseded as follows:

1. Scope
This manual is for your use in maintaining the forklift truck, Hyster Model H150C, Army Models MHE 178, 178A, 178B and 178C, and Hyster Model H150F, Army Model MHE 223.

Paragraph 4. is superseded as follows:

4. Reporting of Errors
You can improve this manual by calling attention to errors and by recommending improvements using DA Form 2028 (Recommended Changes to Publications) or by a letter, and mail direct to Commander, U. S. Army Troop Support Command, ATTN: AMSTS-MPP, St. Louis, MO.63120. A reply will be furnished directly to you. Page 7. Paragraph 11. the first sentence is superseded as follows: "Lubrication Order 10-3930222-20 prescribes lubrication maintenance of the Hyster Model H150C and Hyster Model H15OF truck; compliance with the instruction is mandatory at Organizational, Direct and General Support and Depot Maintenance levels." Page 8. The nomenclature of the lubrication order is superseded as follows:

TRUCK, LIFT, FORK; GASOLINE; PNEUMATIC-TIRED WHEELS; 15,000 POUNDS CAPACITY (HYSTER MODEL H150C, ARMY MODEL MHE 178,178A, 178B and 178C; HYSTER MODEL H150F, ARMY MODEL 223)

Page 53. Paragraph 22-a. is superseded as follows:

a. Removal.
(1) Remove the carburetor (para 26).
(2) Remove the muffler and exhaust elbow (para 33).
(3) Remove the positive crankcase ventilation tube, valve and fittings from the manifold.
(4) Unscrew the nuts and washers that secure the manifolds to the engine and remove the manifolds and gasket.
(5) Separate the intake and exhaust manifolds.
(6) Remove the heat control (para 34).

Page 54. Paragraph 23,a. is superseded as follows:

a. Removal of cover.
(1) Disconnect the carburetor linkage at carburetor.
(2) Disconnect the air cleaner hose at carburetor.
(3) Disconnect the fuel line at carburetor.
(4) Remove the muffler and exhaust elbow (para 33).
(5) Remove the positive crankcase ventilation tube from the valve cover.
(6) Unscrew the nuts and washers that secure manifolds to engine, and remove the manifolds, gaskets, and carburetor.
(7) Remove the nuts and gaskets that secure valve cover to engine, and remove the cover and gasket.

Figure 16.1 is added:

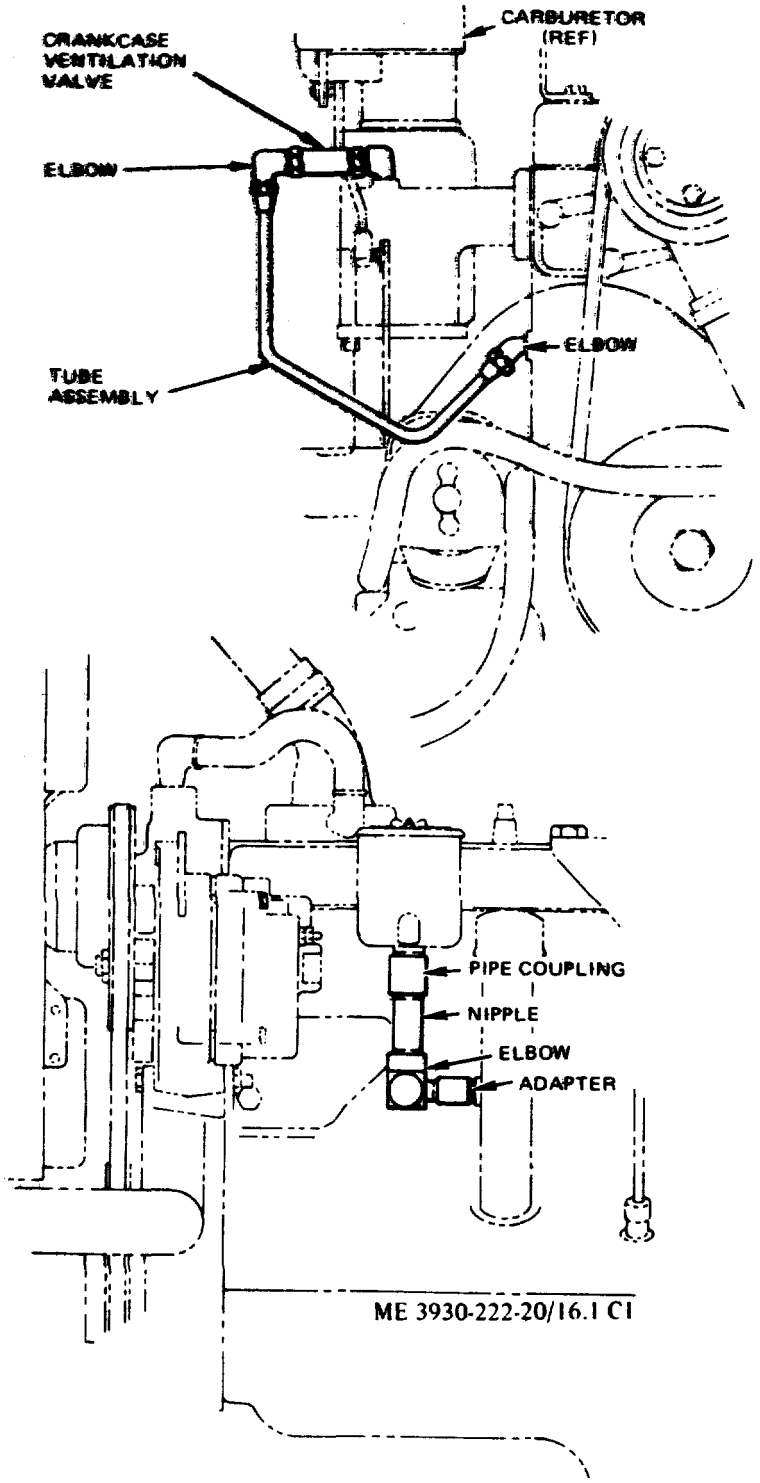


Figure 16.1. Crankcase ventilation valve and related parts (Army Model MHE-223)

Page 55. Paragraph 23.1. is added:

23.1 Crankcase-Ventilation Valve Check

Periodically check the crankcase ventilation valve to insure proper functioning. Perform the following procedures:

(1) Connect a tachometer between the ignition coil primary and ground.

(2) Start the engine and observe the idling speed of the engine.

(3) Remove the crankcase ventilation valve (Fig. 16 1) from the engine valve, cover, and plug the open end of the valve; read the engine RPM change.

(4) A change of less than RPM indicates a plugged ventilation valve metering hole; replace the valve.

(5) Re-install the crankcase ventilation valve in the valve cover.

Page 77. Paragraph 41 title is superseded as follows:

41. Generator (Army Model MNE 178, 178A, 178B and 178C)

Caption for Figure 34 is superseded.

Figure 34. Electrical charging circuit (Army Models MHE 178, 178A, 178Band78C).

Page 78. Paragraph 41.1 is added.

41.1. Alternator (Army Model MNE 223)

The alternator output voltage should be checked using a Volt-amp Test Set Sun Electric Model VAT-20, or equivalent) and a multi-purpose meter. (Refer to para 41.1b). If the Model VAT 20 Test Set is not available at the equipment site, a substitute method can be used as specified in paragraph 41.1c.

a. Initial checks.

(1) Turn the ignition switch off and check connectors at voltage regulator and alternator.

(2) Check belt tension in accordance with procedure given in paragraph 37.

(3) Check battery specific gravity with a hydrometer. Specific gravity should be 1.275.

b. Checking Alternator Output Voltage using Volt-Amp Test Set Model VAT 20.

(1) Connect the model VAT 20 Volt-Amp Test Set to the alternator as shown in figure 41.1.

(2) Disconnect battery ground cable at battery.

(3) Disconnect wire at alternator BAT terminal and connect Volt-Amp Test Set REG had to the terminal.

(4) Connect tester GRD lead to alternator battery pest and tester BAT lead to positive

(5) Connect tester positive lead to alternator BAT terminal and tester negative lead to alternator GRD terminal.

(6) Disconnect the F-R terminal connector at the alternator and connect tester field and Relay control leads to the alternator F and BAT terminals.

(7) Connect battery ground cable.

(8) Set tester GROUND POLARITY switch to negative (-).

(9) Set tester VOLTAGE RANGE switch to 16.

(10) Set Tester LOAD control knob to DIRECT.

(11) Start engine and set to idle at approximately 1500 RPM.

(12) Adjust Load Control on test set to the voltage at 14 volts and observe the ammeter reading. The ammeter should indicate 32 amperes. If reading is low, replace the alternator. Refer to paragraphs 41.1e. and 41.1f.

c. Checking Alternator Output Voltage using Voltmeter Only. (Substitute Method).

The test equipment mentioned in paragraph 41.1 is recommended for checking the alternator output. However, if this equipment is not available, disconnect the F and R connector at the alternator. Connect a jump wire between the alternator BAT terminal and the F terminal being careful not to ground the wire against the alternator case. Connect a voltmeter across the battery post. Start the engine and increase speed to 1500 RPM. The voltmeter should indicate more than 12.5 volts. Do not allow voltage to increase above 16 volts as engine speed is increased. If the voltmeter indicates greater than 12.5 volts, the alternator is functioning properly. The voltage regulator should then be checked and replaced if necessary. If the voltage is less than 12.5 volts, replace the alternator.

d. Checking Field Current Draw (Figure 41.1).

(1) Set tester Field and Relay Control to OPEN.

(2) Set tester GROUND POLARITY switch to negative (-).

(3) Set tester Voltage Range switch to 16.

(4) Connect tester field control leads to alternator F and BAT terminals.

(5) Rotate tester Field and Relay Control to Direct position and observe ammeter. Ammeter should indicate between 2.2 and 2.6 amperes.

If not, the alternator is defective.

(6) Return field and Relay Control to OPEN position.

e. Removal. Refer to Figure 42.1 and remove the alternator as follows:

(1) Remove the capscrew (3, Figure 42.1) and lockwasher (2) that secure the alternator to the adjusting strap (1). Move the alternator toward the engine, and remove the fan and alternator belt from the alternator.

(2) Disconnect and tag the wires at the terminals.

(3) Remove the nut (4) and capscrew (8) that secure the alternator to the mounting bracket (5) and remove the alternator from the bracket.

(4) If necessary, remove the capscrews (7, 9) and lockwashers (6, 10) that secure the bracket to the engine and remove the bracket from the engine.

(5) Unscrew and remove the nut (11) and washer (12) that secure the pulley (13) to the alternator and press the pulley from the alternator.

f. Installation. Reverse procedures in e above.

Page 80. Paragraph 42.c, is superseded as follows:

c. Testing and Adjusting (Army Model MHE 178, 178A, 178B and 178C).

Page 182. Add figure 41.1 as follows:

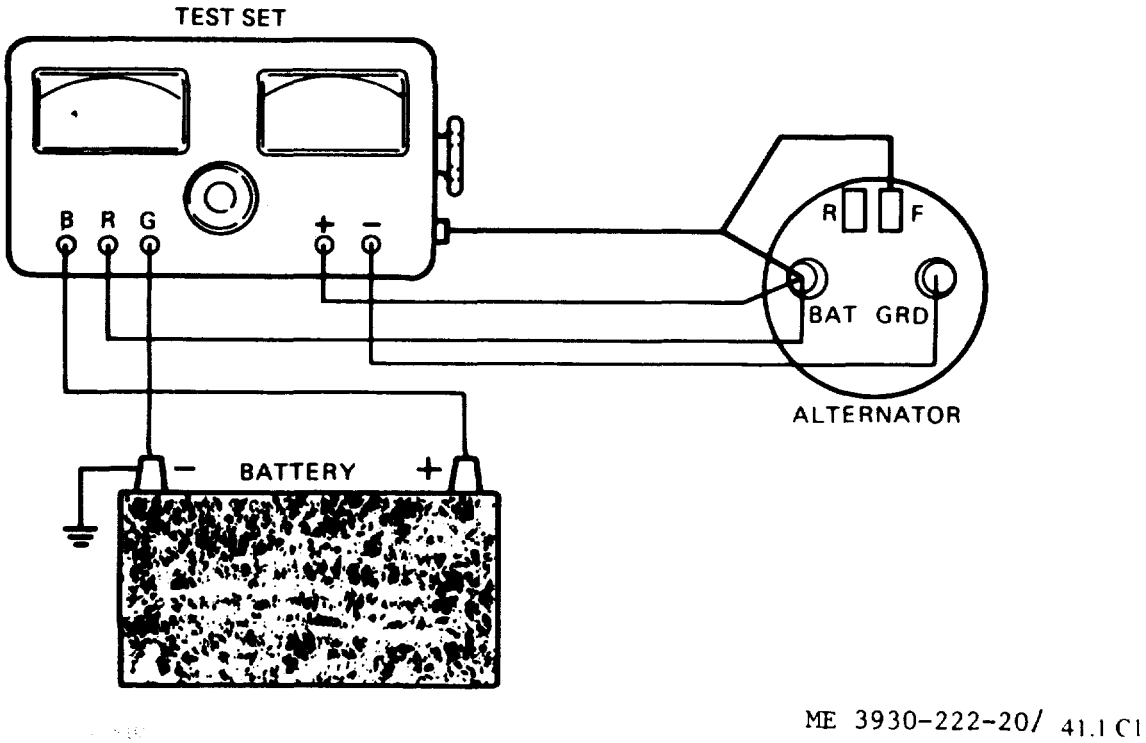


Figure 41.1. Alternator output check (Army Model 223)

Add figure 41.2 as follows:

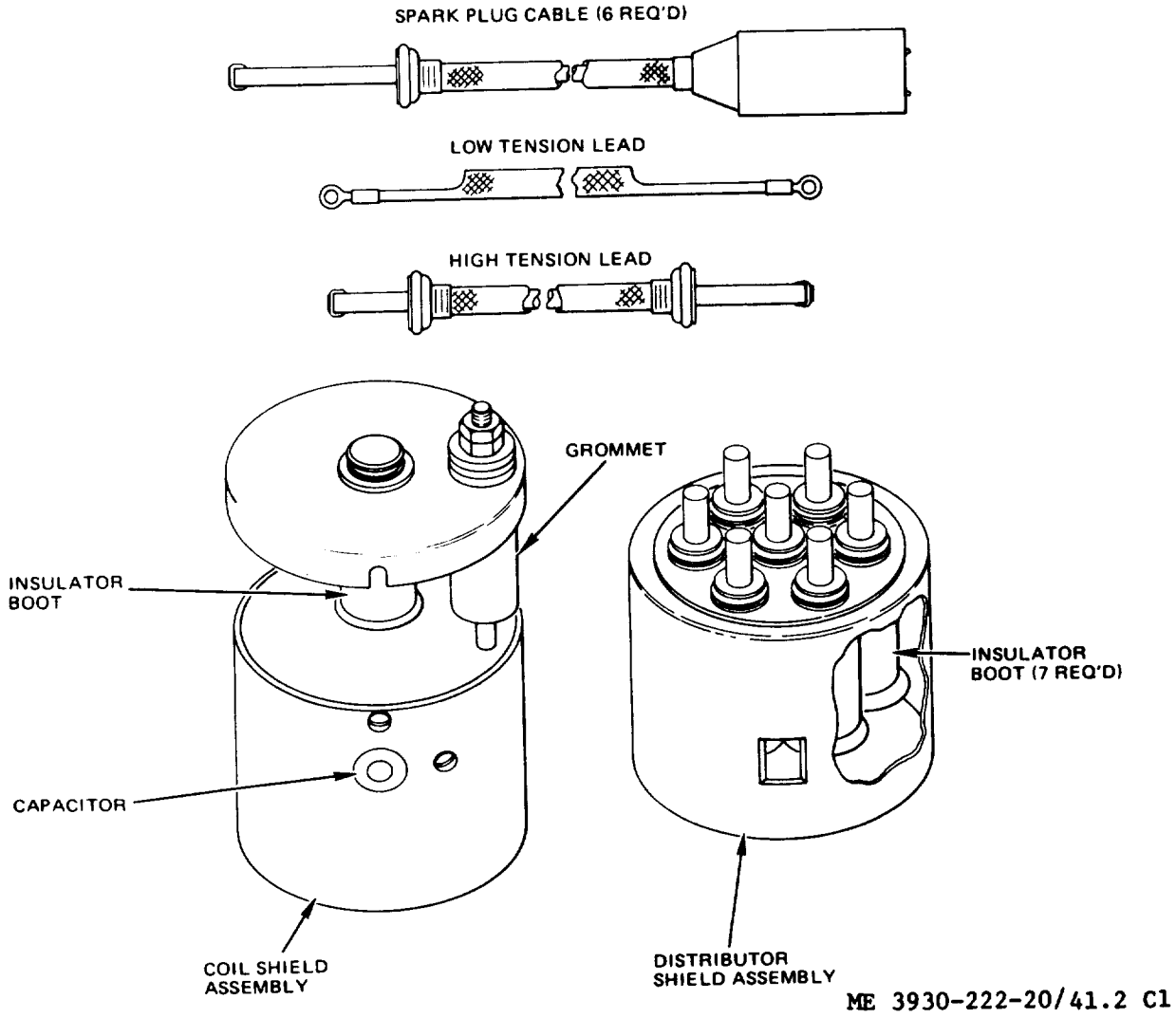


Figure 41.2. Shielding kit (Army Model MHE 223)

Page 84. Figure 42.1 is added.

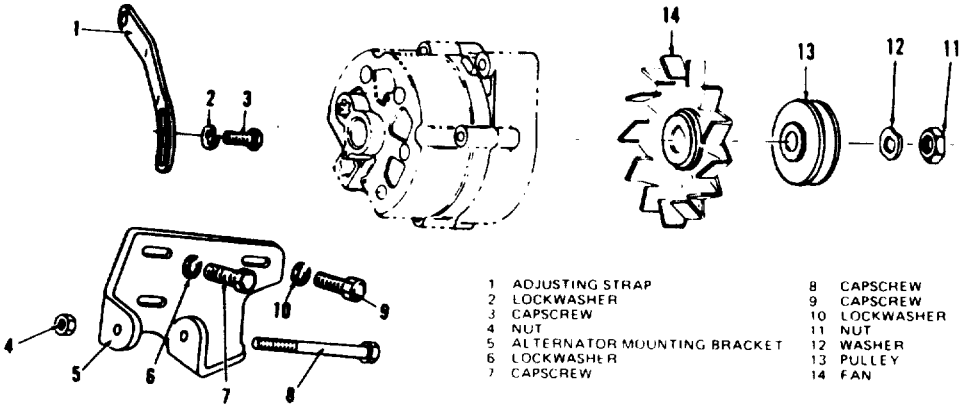


Figure 42.1. Alternator and attaching parts (Army Model MHE 223).

Paragraph 42.1 is added.

42.1. Testing and Adjusting (Army Model 223)

The voltage regulator is sealed in an air-tight enclosure and should not require cleaning with solvents. Remove the cover and check for dust or other foreign matter around the regulator contacts and field relay contacts. If dust is present, blow out with compressed air and install a new gasket. Never clean the contacts with an abrasive material.

a. Inspect regulator case for structural damage which may interfere with normal operation. If the cover is dented or otherwise damaged, replace it.

b. Inspect for worn or frayed electrical leads which may cause short circuits. Replace worn or frayed electrical leads.

c. Inspect for dirty or corroded regulator contact points. If the points are fouled or excessively oxidized, replace regulator.

d. Check voltage regulator setting.

(1) Disconnect battery ground cable at battery.

(2) Connect Volt-Amp tester REG lead to alternator BAT terminal.

(3) Connect tester GRD lead to negative battery post and tester BAT lead to positive post.

(4) Connect tester positive lead to alternator BAT terminal and tester negative lead to alternator GRD terminal.

(5) Connect F-R terminal connector at alternator.

(6) Connect battery ground cable.

(7) Set tester Ground Polarity switch to negative (-).

(8) Set tester VOLTAGE switch to 16.

(9) Set tester lead control knob to DIRECT.

(10) Start engine and set to idle at 1500 RPM. Allow engine to run 15 minutes to permit the system to reach operating temperature and stabilize.

(11) Cycle system by reducing engine speed, stopping and restarting the engine.

(12) Set engine speed at 1500 RPM.

(13) Rotate tester Load Control Knob to LOAD position and adjust until ammeter indicates 14 amperes.

(14) Observe voltmeter reading. Voltmeter should indicate 14.5 volts. If meter indicates less than 14.5 volts, the voltage regulator should be replaced.

Page 85. Caption for Figure 44 is superseded as follows:
FIGURE 44. Adjusting cutout relay armature airgap (Army Models MHE 178, 178A, 178B and 178C).

Page 86. Caption for Figure 45 is superseded as follows:
FIGURE. Adjusting cutout relay point opening (Army Models MHE 178, 178A. 178B and 178C).

Page 87. Caption for Figure 46 is superseded as follows:
FIGURE 46. Test equipment for adjusting cutout relay closing voltage (Army Models MHE 178, 178A, 178B and 178C).

Page 88. Caption for Figure 47 is superseded as follows:
FIGURE 47. Adjusting cutout relay closing voltage (Army Models MHE 178, 178A, 178B and 178C).

Page 89. Caption for Figure 48 is superseded as follows:
FIGURE 48. Adjusting voltage regulator airgap (Army Model MHE 178, 178A, 178B and 178C).

Page 90. Caption for Figure 49 is superseded as follows:
FIGURE 49. Test equipment for checking and adjusting voltage regulator (Army Models MHE 178, 178A, 178B and 178C).

Page 91. Caption for Figure 50 is superseded as follows:
FIGURE 50. Adjusting voltage regulator (Army Models MHE 178, 178A, 178B and 178C).

Page 92. Caption for Figure 51 is superseded as follows:
FIGURE 51. Adjusting current regulator airgap (Army Models MHE 178, 178A. 178B and 178C).

Page 93. Caption for Figure 52 is superseded as follows:
FIGURE 52. Test equipment for checking current regular setting (Army Models MHE 178, 178A, 178Band 178C).

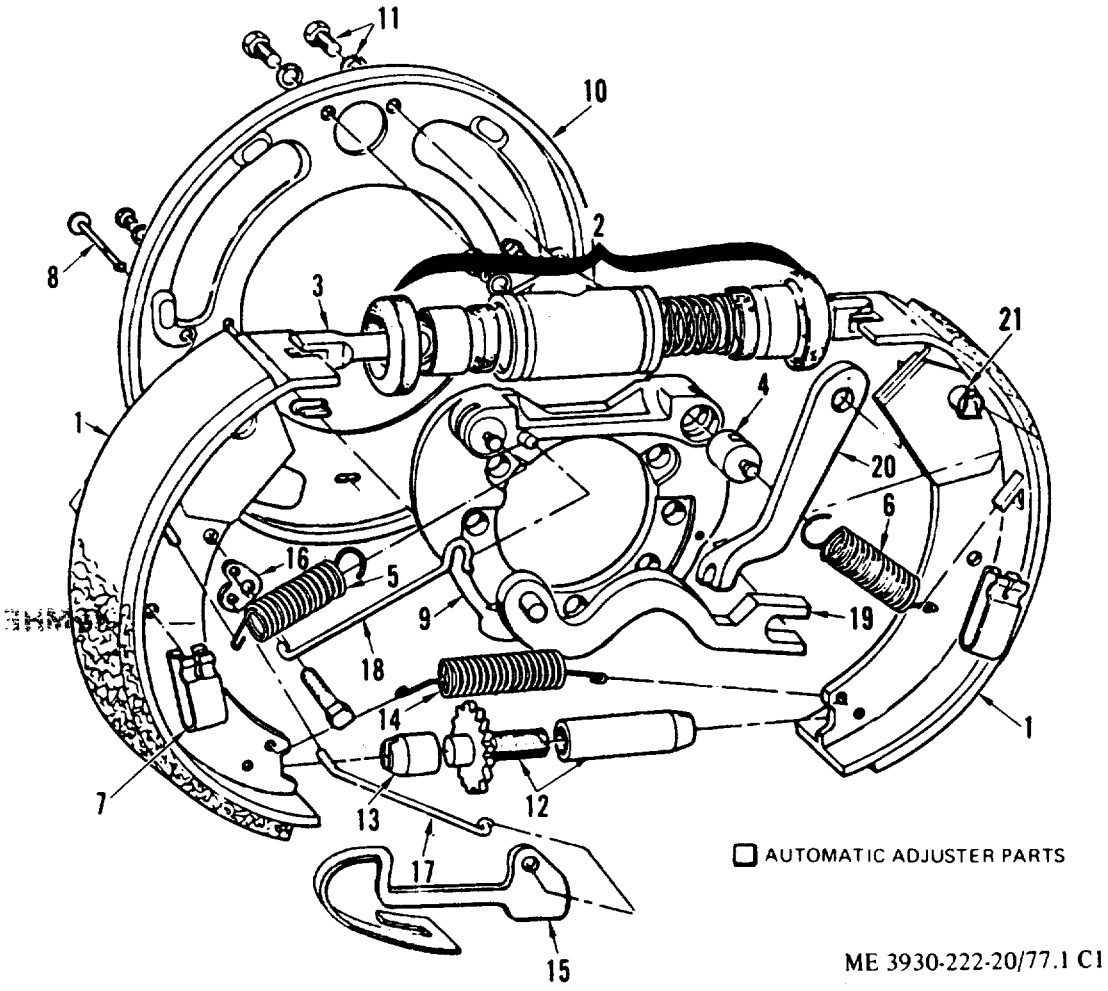
Page 94. Caption for Figure 53 is superseded as follows:
FIGURE 53. Adjusting current regulator setting (Army Models MHE 178, 178A, 178B and 178C).

Page 112. Paragraph 61. Add the following: Army Model MHE 223 trucks are equipped with self-adjusting brakes. A self-adjusting mechanism acts on the star wheel, turning it during reverse travel of the truck, thus adjusting brake shoe contact.

Page 115. Paragraph 64. title is superseded as follows:

64. Service Brakes (Army Models MHE 278, 178A, 178B and 178C)

FIGURE 77.1 is added:



1. BRAKE SHOE SET
2. WHEEL CYLINDER
3. CYLINDER PUSH ROD (2 REQ.)
4. SHOE ANCHOR (2 REQ.)
5. PRIMARY RETURN SPRING
6. SECONDARY RETURN SPRING
7. HOLD-DOWN CLIP (3 REQ.)
8. HOLD-DOWN PIN (3 REQ.)
9. SUPPORT SPIDER
10. BACKING PLATE
11. CAPSCREW WITH LOCKWASHER
12. STAR WHEEL ADJUSTER
13. STAR WHEEL GUIDE
14. ADJUSTER SPRING
15. ADJUSTER LEVER
16. LEVER CRANK (WITH SLEEVE AND SCREW)
17. CRANK-TO-ADJUSTER LEVER LINK
18. CRANK-TO-ANCHOR LINK
19. CONNECTING LINK
20. TOGGLE LEVER
21. SPRING CLIP (2 REQ.)

Figure 77.1. Brake shoe assemble, exploded view (Army Model MHE 223).

Figure 77.2 is added:

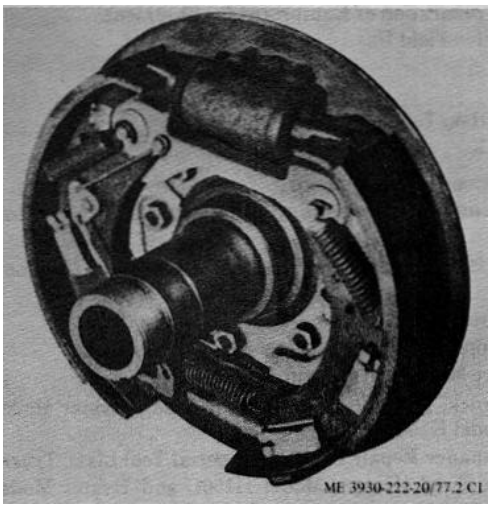


Figure 77.2. Wheel removed to show service brakes (Army model MHE 223).

Page 118. Paragraph 66.1 is added:

66.1. Service Brakes (Army Model MHE 223)

a. Removal.

(1) Release the handbrake.

(2) Remove the wheel hub and drum (para 71).

(3) Clamp the wheel cylinder assembly (2) in position with a wheel cylinder clamp.

(4) Using spring pliers, remove the shoe return springs from the anchor pins (5 and 6, fig. 77.1).

(5) Remove the three hold-down clips (7) by depressing each clip and turning the hold-down pin (8) one-quarter turn.

(6) Remove the adjuster lever (15) and two links (17 and 18).

(7) Spread the shoes away from the cylinder piston rods and shoe anchors (4), then lift the shoes off. Slip the parking brake cable end from the slot in the secondary shoe toggle lever.

(8) Unhook the star wheel adjuster spring (14) to separate the shoes.

(9) Remove the toggle lever (20) from the secondary shoe and the connecting link (19) from the primary shoe by pulling the spring clips (21).

(10) Pull the shoe anchor pins (4) from the support spider (9).

(11) Disconnect and cap the hydraulic line to the wheel cylinder, then remove the two mounting capscrews and lift out the cylinder.

b. Installation. Reverse procedures in a. above.

c. Adjustment.

(1) Release the handbrake.

(2) Remove the dust cover from the backing plate.

(3) Insert a brake tool to engage the star wheel teeth.

(4) Rotate the star wheel until the brake drum is locked.

(5) Back off the star wheel until the brake drum turns freely.

d. Inspection.

(1) Inspect the brake drums for worn or grooved condition. If defective, refer them to higher authority.

(2) If the brake lining is worn to less than 1/8 inch thickness, replace the brake shoes.

Page 141. Appendix I is superseded as follows:

APPENDIX I
REFERENCES

1. Fire Protection

TB 54200-200-10	Hand Portable Fire Extinguishers Approved for Army Users

2. Lubrication

C9100IL	Fuels, Lubricants, Oils and Waxes
LO 10-3930-222-20	Lubrication Order; Truck, Lift, Fork, Pneumatic-Tired, (Hyster Model H150C, and Hyter Model H150F) Army Model 178, 178A, 178B and 178C.

3. Painting

AR 746-1	Color, Marking, and Preparation of Equipment for Shipment
TM9-213	Painting Instructions or Field Use

4. Cleaning

TB SIG-327	Harmful effects of Carbon Techloride on human body

5. Maintenance

FM29-2	Maintenance Management
TB750-51	Use of Anti-Freeze Solutions and Cleaning Compounds in Engine Cooling Systems
TM 9-2610-200-20	Organizational Care, Maintenance and Repair of Pneumatic Tires and Inner Tubes and
TM 9440-200-14	Lead-Acid Type Batteries
TM 11483	Radio Interference Suppression
TM 38-750	The Army Maintenance Management System(TMMS)
TM 10-3930-222-10	Operator's Manual; Truck, Lift, Fork; Pneumatic-Tired; (Hyster Model H150C, and Hyster Model H150F).
TM 10-3930-222-20P	Organizational Maintenance Repair Parts and Special Tool Lists; Truck, Lift, Fork; Pneumatic-Tired (Hyster Model H150C and Hyster Model H150F, Army Models 178, 178A, 178B and 178C).

6. Shipment and Storage

TB 740-97-2	Preservation of USAMECOM Mechanical Equipment for Storage
TM 38-230-1	Preservation and Packing of Military Equipment
TM 740-90-1	Administrative Storage of Equipment

7. Demolition

TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command)

8. Operation

TM5-331B	Utilization of Engineer Construction Equipment B-Lifting, Loading, and Hauling Equipment

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By Order of the Secretary of the Army:

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Chief of Staff

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The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25-E, Unit maintenance requirements for TM 10-3930-222-20.

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TECHNICAL MANUAL
No. 10-3930-222-20

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *6 December 1962*

ORGANIZATIONAL MAINTENANCE MANUAL
TRUCK, LIFT, FORK, GASOLINE, PNEUMATIC-TIRED WHEELS, 15,000-POUNDS CAPACITY
(HYSTER MODEL H150C, ARMY MODEL MHE 178)
FEDERAL STOCK NUMBER 3930-897-4632

———————

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

These instructions are published for the use of personnel responsible for the organizational (second-ehelon) maintenance of the Truck, Lift, Fork, Gasoline, Pneumatic-Tired Wheels, 15,000-Pound Capacity (Hyster Model H150C, Army Model MHE 178) Federal Stock Number 89308974632, procured under contract number N600(MIS)57085.

2. Appendixes

Appendix I is a list of current references. Appendix II is the maintenance allocation chart. The repair parts and special tools list authorized for use at second echelon is published in TM 10-3930-222-20P.

3. Maintenance Forms and Records

The maintenance forms, records, and reports to be used in the second-echelon maintenance of this truck are listed and described in TM 38-750.

4. Recommended Changes

Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments will be submitted on DA Form 2028 and will be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to Commandant, U.S. Army Quartermaster School, Fort Lee, Virginia.

5. Orientation

Throughout this manual, the use of the terms right, left, front, and rear indicates directions from the viewpoint of the operator sitting in the seat of the truck.

Section II. DESCRIPTION AND DATA

6. Description

a. Refer to TM 10-3930-222-10 for a general description of the truck.

b. Additional descriptive material will be found in sections of this manual that pertain to a particular assembly.

7. Tabulated Data

a. Capacities.

Cooling system	14 qt
Drive axle/differential	24 pt
Engine carburetor air cleaner	1/2 pt
Engine crankcase.	5 qt
Engine oil filter	1/2 qt
Fuel tank	14 gal
Hydraulic system:	
Hydraulic master cylinder	1/2 pt
Lines	5 qt
Tank	15 gal
Steering gear housing	1 pt
Transmission	12 qt

b. Engine.

Governed speed	
Under load	2,200 rpm
Without load	2,400 rpm

c. Hydraulic System (Steering).

Proper setting (at engine speed of 600 rpm)	1,225 psi

d. Hydraulic System (Main.

Proper setting (at engine speed of 600 rpm)	1,800 psi

CHAPTER 2

SERVICE UPON RECEIPT OF TRUCK

8. General

When either a new or used truck is received by an organization, it must be serviced as described in paragraphs 13 and 14 to prepare it for operation. These services will be performed by second-echelon maintenance personnel.

9. Removal of Preservatives

a. Remove tape, paper, or other packing. Use extreme care when unpacking and installing separately packaged components.

b. Remove, with SD (Solvent, drycleaning), the preservative compound which has been sprayed on all metal surfaces. Because this compound is not a lubricant, take special care to see that it is completely removed from all wearing surfaces.

c. If any component or system contains preservative oil, drain the oil from it. Fill with proper lubricant as indicated in lubrication order (par. 11).

d. When necessary, fill the battery with electrolyte and prepare the battery for service.

10. Maintenance Inspection and Tests

a. The organization mechanic will perform the services and tests that are listed and described on the maintenance indicator checklist (par. 14). The services performed at this time will begin the cycle of regularly scheduled preventive maintenance services.

b. The deficiencies and shortcomings noted, and the corrective action taken will be reported on the appropriate forms prescribed and explained in TM 38-750.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION

11. General

Lubrication Order 10-3930-222-20 prescribes lubrication maintenance of the Hyster Model H150C truck; compliance with the instructions is mandatory at all levels of maintenance. The order includes lubrication instructions for normal and abnormal conditions and temperatures. If a truck is received without a lubrication order, the using organization must requisition a lubrication order through normal channels in accordance with AR 310-1.

12. Illustrations

The lubrication order is illustrated in figure 1. The letters and numbers that have been inserted on the border of the illustration refer to specific lubrication points that are pictured in A through Z of figure 2.

.

LUBRICATION ORDER

LO 10-3930-222-20

5 DECEMBER 1962

TRUCK, LIFT, FORK, GASOLINE, PNEUMATIC-TIRED WHEELS, 15,000-POUND CAPACITY (HYSTER MODEL H150C, ARMY MODEL MHE 178)

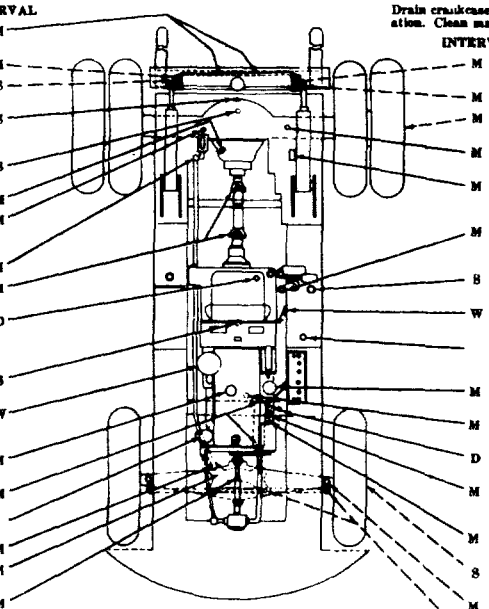
Intervals given are maximums for normal 8-hour operation. For abnormal conditions or activities, shorten intervals. During prolonged periods of inoperation, extend intervals a length of time commensurate with that required to preserve equipment adequately. Clean fittings before lubricating.

Clean parts with SD (Solvent, drycleaning), and dry them before lubricating them.

Broken arrow shafts indicate lubrication points on both sides of the truck.

Drain crankcase and gearcases only when hot as a result of operation. Clean magnetic drain plugs before installing them.

		LUBRICANT	INTERVAL
A	Fork Adjusting Screws. Apply light coat to threads	GAA	M
A	Upright Pivot Pins	GAA	M
A	Lift Chains (See Note 1)	OE	S
B	Drive Axle Filler Plug Capacity: 24 pints (See Note 2)	GO	S
B	Drive Axle Drain Plug (See Note 2)		S
C	Drive Axle Level Plug		M
D	Steering Gear Housing Filler Plug. Replenish to plug opening	GO	M
E	Drag Link, Front	GAA	M
F	Propeller Shaft Universal Joints	GAA	M
G	Transmission Fillercap, Breather, and Bayonet Gage Capacity: 12 Quarts (See Note 3)	OE	D
H	Transmission Drain Plug (See Note 3)		S
I	Air Cleaner (Capacity: 1/2 pint) (See Note 4)	OE	W
J	Distributor (See Note 5)	OE	M
K	Steering Booster	GAA	M
L	Transmission Oil Filter (See Note 6)		
M	Drag Link, Rear	GAA	M
N	Center Arm (Top and bottom points)	GAA	M
O	Hydraulic Pump Shaft	GAA	M
	Oil Can Points (See Note 11)	PL	M



INTERVAL	LUBRICANT		
M	GG-2	Upright Strip Bearings: Apply light coat to surfaces	P
M	GAA	Tilt Cylinder Pivot Pins	Q
M	GAA	Drive Wheel Bearings. Remove, clean, and pack	R,S
M		Drive Axle Breather. Clean in SD.	C
M	HB	Master Cylinder Fillercap. Fill to 1/4 inch from top. Capacity: 1 pint	T
M	OH	Hydraulic Tank Fillercap. Capacity: 15 gallons (See Note 7)	U
S		Hydraulic Tank Air Cleaner (See Note 7)	R
W		Hydraulic Tank Oil Level Gage (See Note 7)	U
		Hydraulic Tank Drain Plug (See Note 7)	V
M		Engine Oil Filter (See Note 8)	W
M		Engine Oil Pan Drain Plug (See Note 9)	H
D		Engine Oil Dipstick (See Note 9)	W
M	OE	Engine Oil Fillercap (See Note 9) Capacity: 6 Quarts	W
M	OE	Generator (See Note 10)	X
S	GAA	Rear Wheel Bearings. Remove, clean, and pack	M,Y
M	GAA	Kingpin Bearings (Top and bottom points)	M
M	GAA	Tie Rod Ends	Z

—KEY AND NOTES—

LUBRICANTS	EXPECTED TEMPERATURES: above + 32° F.	+ 40° to — 10° F.	0° to — 65° F.	INTERVALS
OE—LUBRICATING OIL, Internal Combustion Engine	OE-30	OE-10	OES	D—Daily W—Weekly M—Every 2 months or every 100 operating hours, whichever occurs first. S—Every 6 months or every 500 operating hours, whichever occurs first.
Lift Chains, Distributor Oil Reservoir, and Transmission	OE-10	OE-10	OE-10	
GO—LUBRICATING OIL, Gear	GO-90	GO-75	GOS	
HB—HYDRAULIC FLUID, Nonpetroleum Base, Automotive	HB	HB	HBA	
PL—LUBRICATING OIL, General Purpose	PL-Medium	PL-Special	PL-Special	

GAA—GREASE, Automotive and Artillery	all temperatures	OES—LUBRICATING OIL, Internal Combustion Engine	
OH—HYDRAULIC FLUID, Petroleum Base	all temperatures	GOS—LUBRICATING OIL, gear	
HBA—HYDRAULIC FLUID, nonpetroleum Base, Automotive			

1. LIFT CHAINS—S, remove, soak and wash in SD, drain and dry, soak in OE-10, and drain and wipe outer surfaces of chains.

2. DRIVE AXLE—M, verify level at level plug opening. Replenish with seasonal GO through filler plug opening to bring level to level plug opening. S, drain, clean drain plug, and refill.

3. TRANSMISSION—D, verify level with transmission in neutral and with engine warm and running. Fill to level indicated on bayonet gage. S, drain and refill with OE-10. Clean breather in SD. Torque converter is filled through transmission.

4. AIR CLEANER—W, verify level and add OE as necessary to bring to indicated level. M, drain, clean, and refill.

5. DISTRIBUTOR—M, place two drops of OE in breaker cam wick and wipe trace of GAA on breaker cam. Remove plug at base and place nine drops of OE in opening.

6. TRANSMISSION OIL FILTER—S, when transmission is drained, drain filter, discard used cartridge, clean inside of filter body, and install new cartridge.

7. HYDRAULIC TANK, FILTER, AND BREATHER—W, verify level and replenish as necessary. If oil is contaminated, drain system and tank, change filter element, and refill with clean oil. S, clean breather with SD. Every 2000 hours, install new filter element (TM 10-3930-222-20). Tighten filler cap before running engine.

8. ENGINE OIL FILTER—M, whenever crankcase is drained, discard oil filter. Clean filter base, and install new filter. Check for leaks.

9. CRANKCASE—D, verify level and replenish as necessary to bring level to full mark on dipstick. M, drain and refill with OE. Operate engine a few minutes, and add oil as necessary to bring level to full mark.

10. GENERATOR—Do not overlubricate generator and do not use PL. M, place three drops of OE into each oiler cup

11. OILCAN POINTS—M, apply PL to accelerator linkage, rod ends, hinges, and other friction points not equipped with pressure fittings.

A copy of this lubrication order will remain with the equipment at all times; instructions contained herein are mandatory.

By Order of the Secretary of the Army:

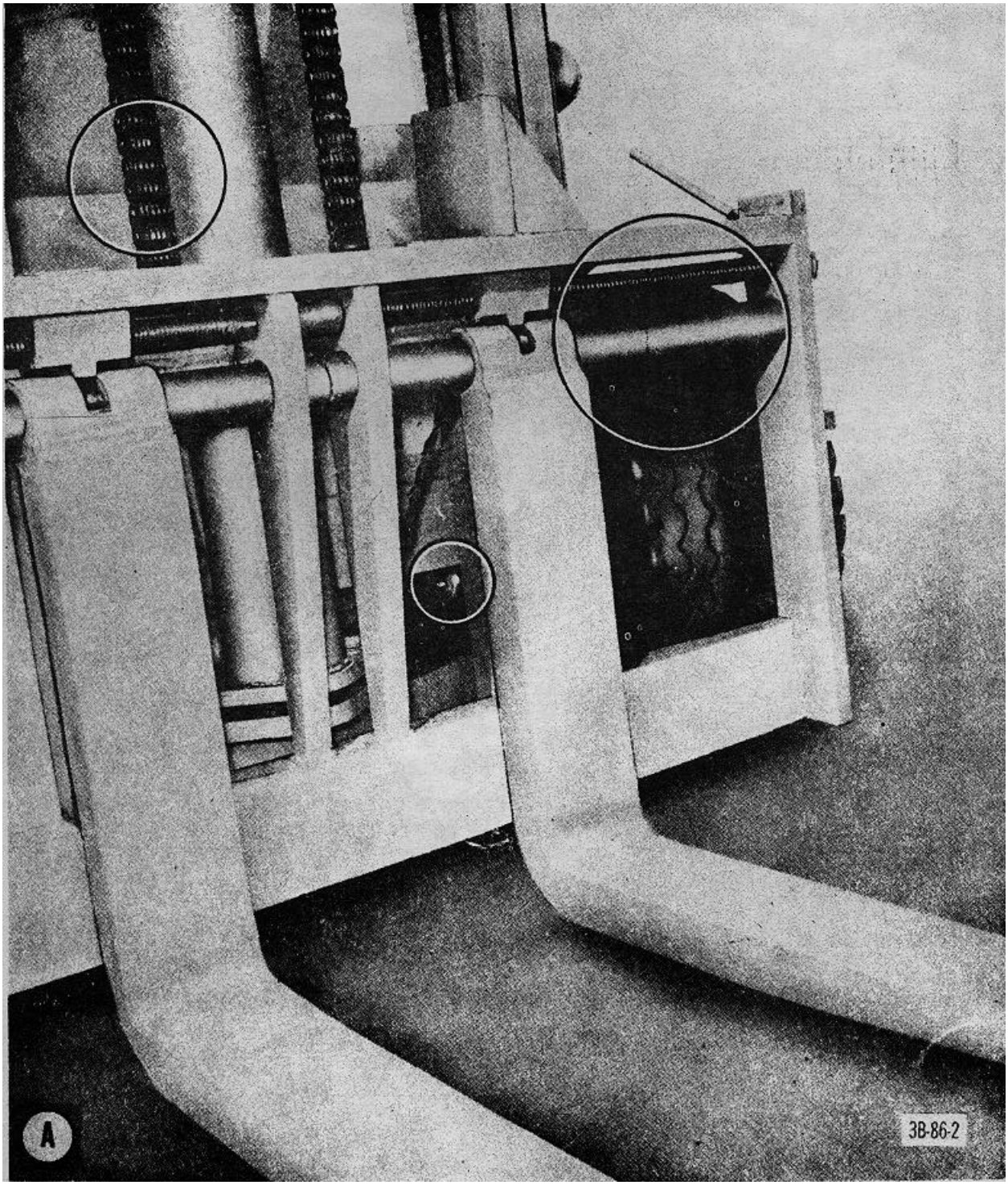
EARLE G. WHEELER
General, United States Army,
Chief of Staff

OFFICIAL:

J. C. LAMBERT
Major General, United States Army,
The Adjutant General

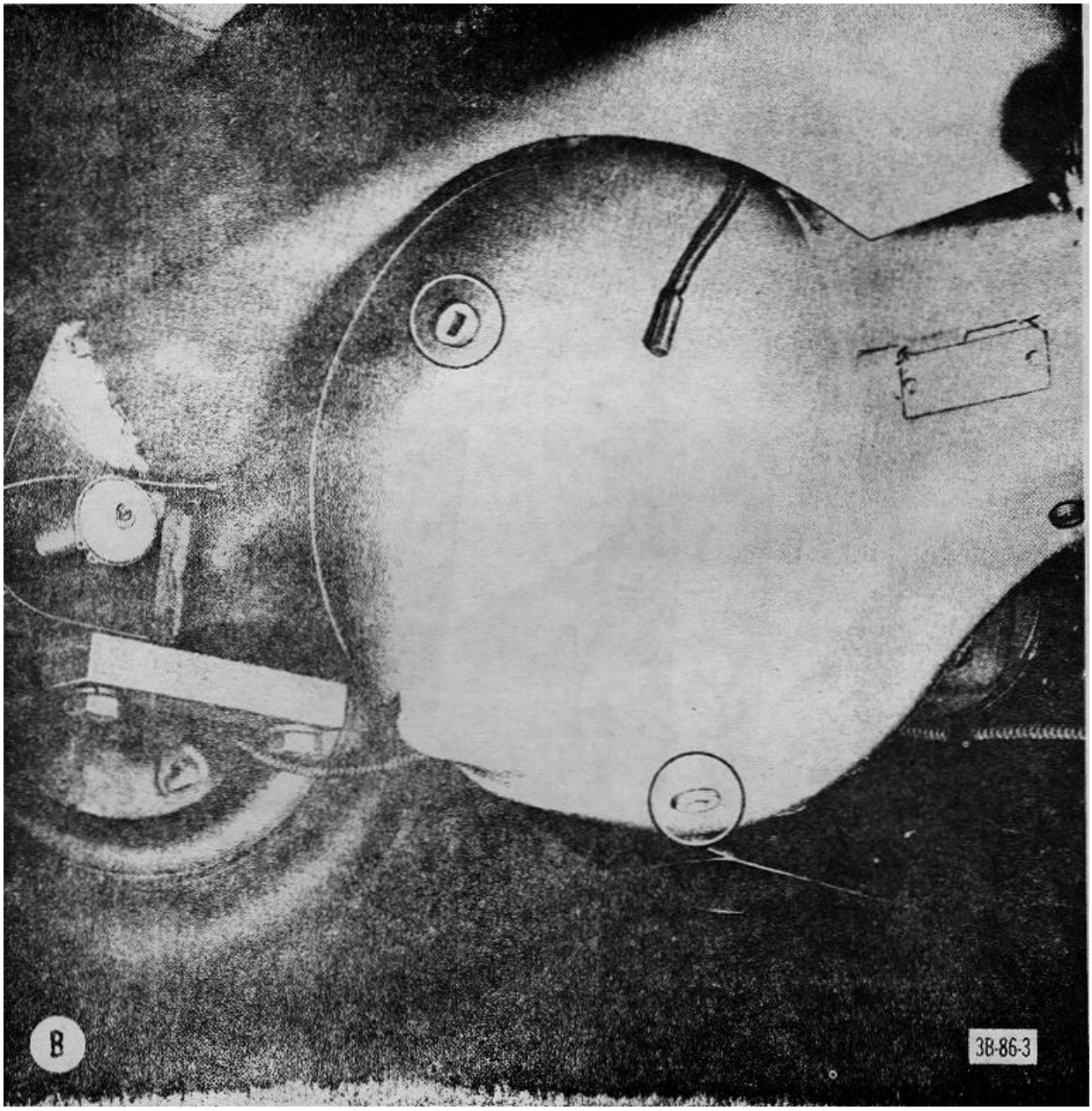
38-86-1

Figure 1. Lubrication Order 10-3930-222-20.



(A)

Figure 2. Lubrication points.



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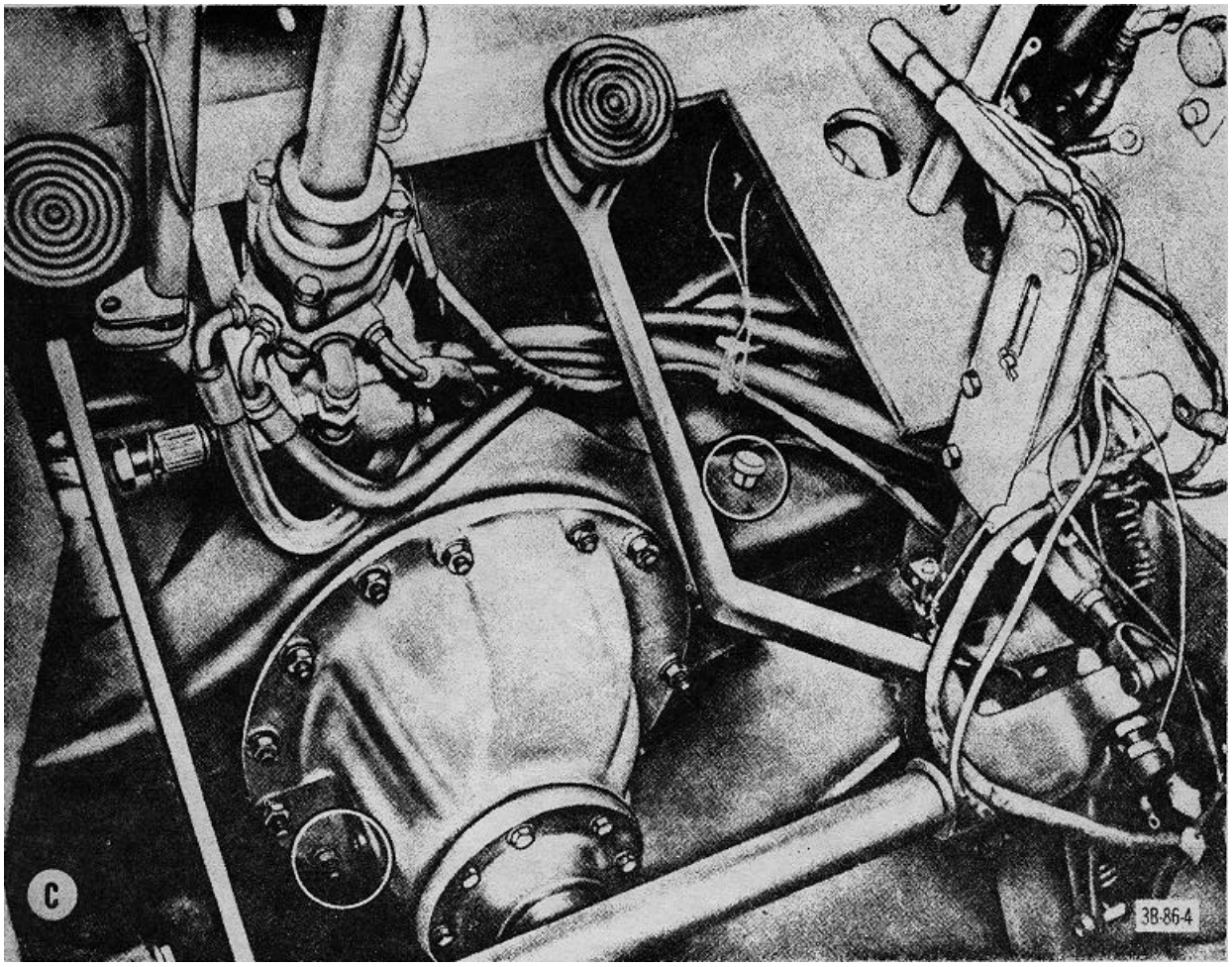

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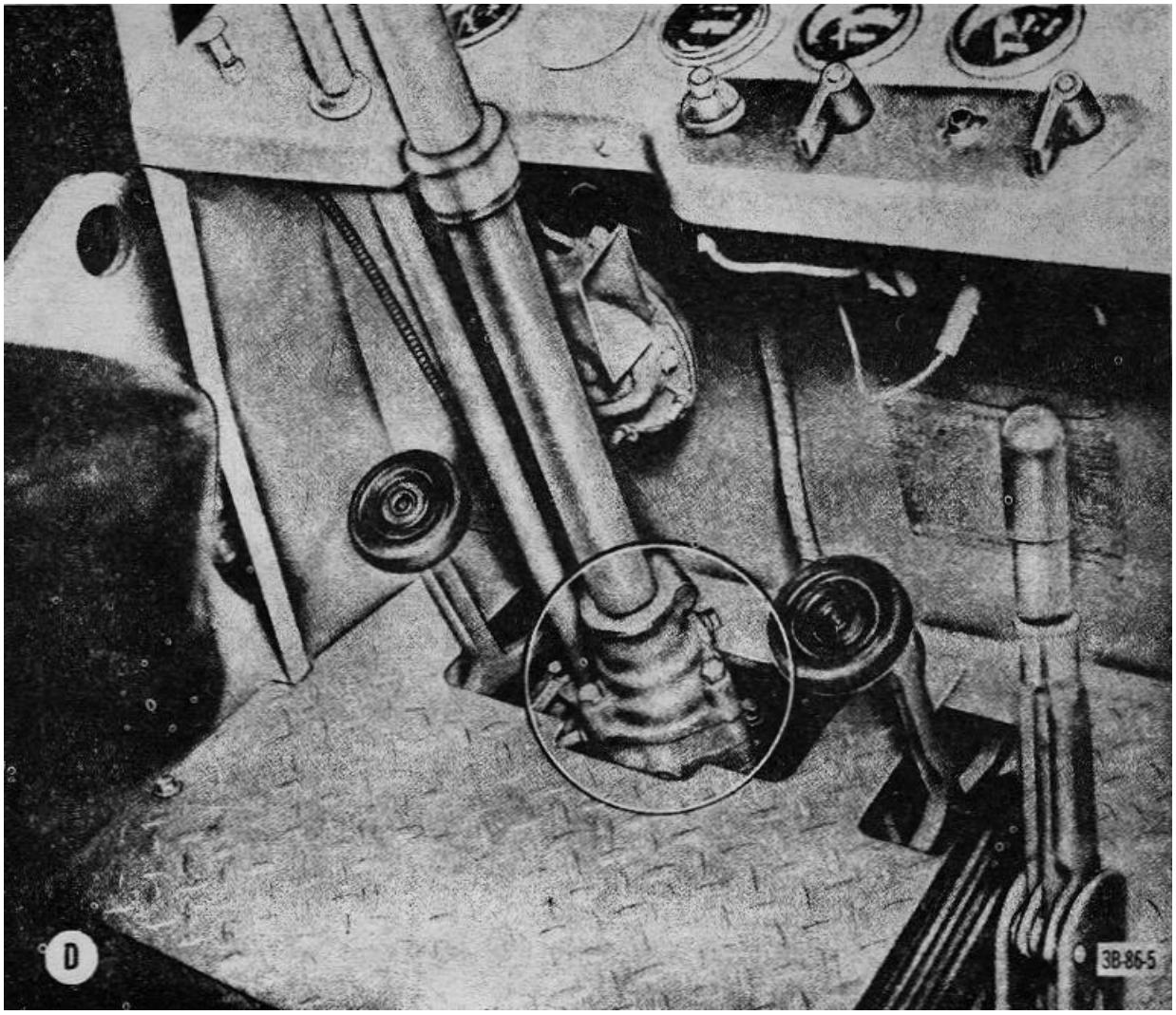

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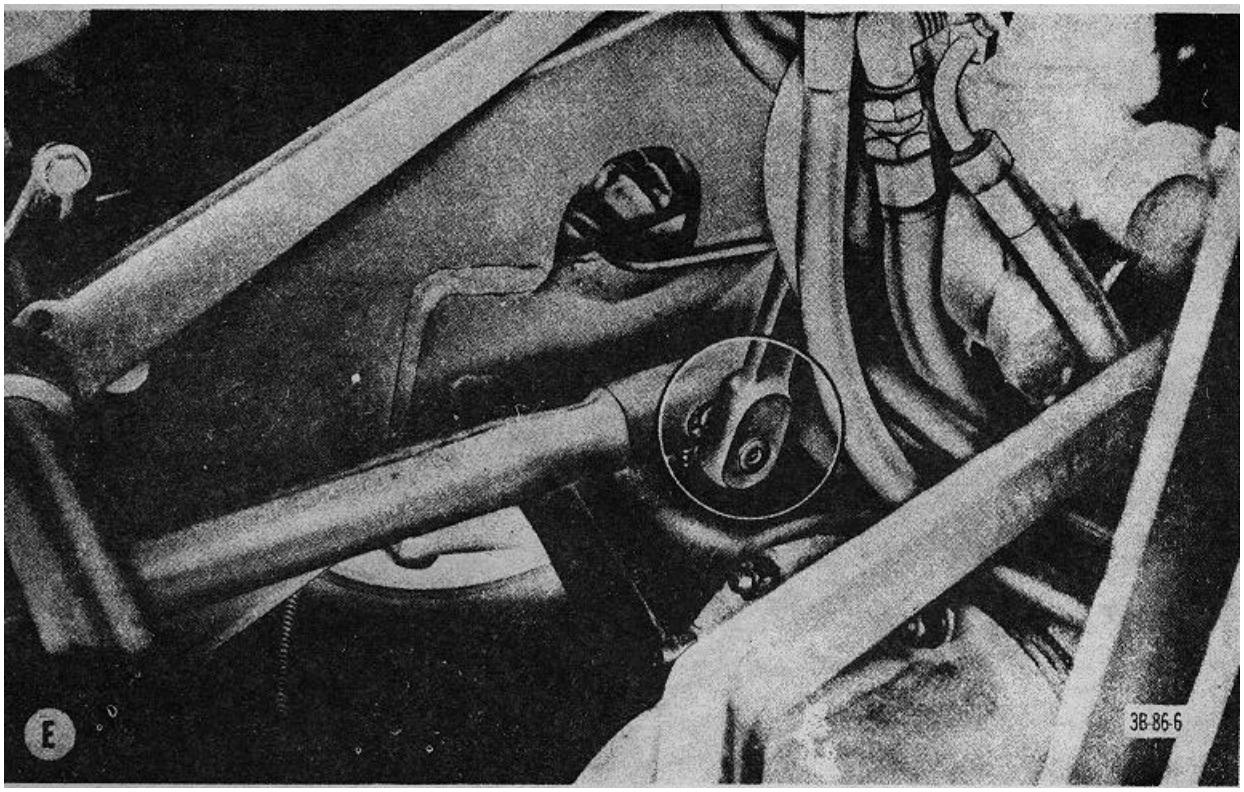

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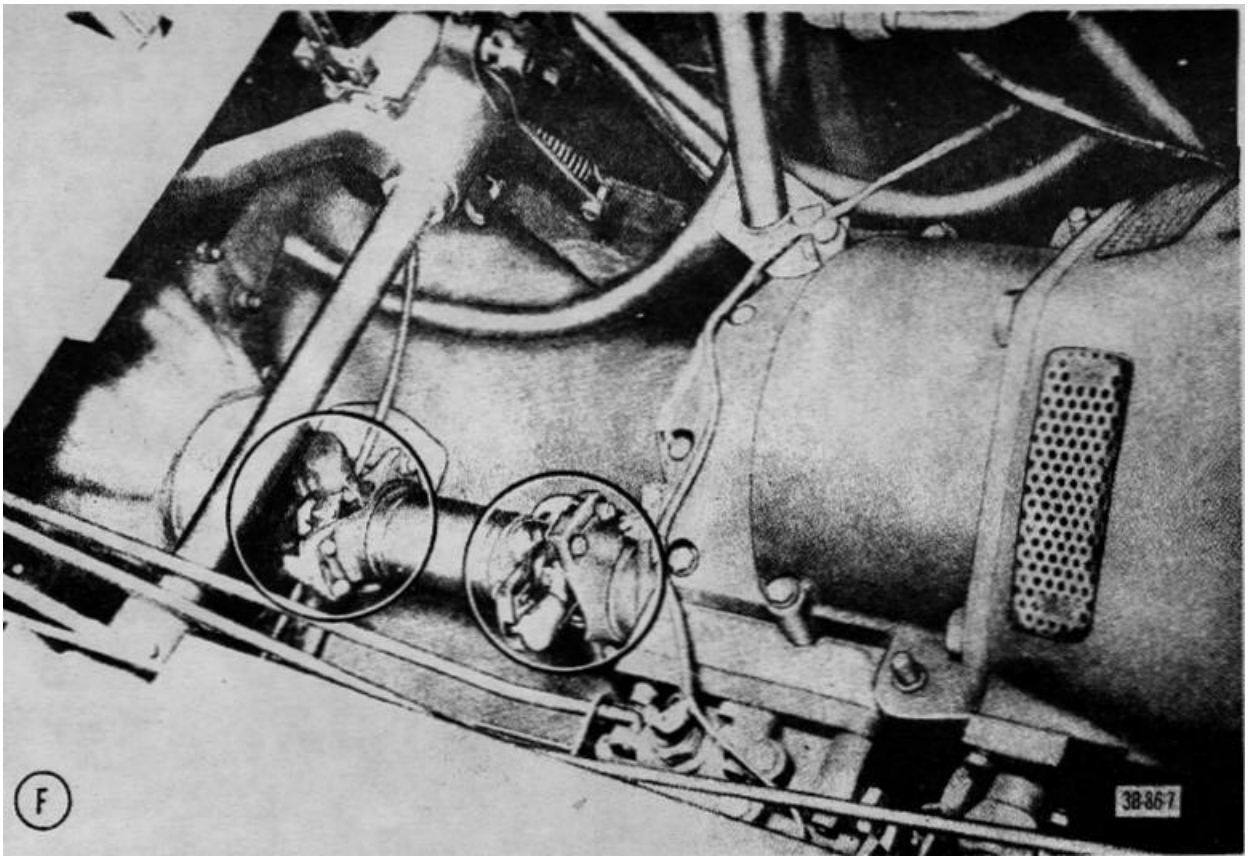

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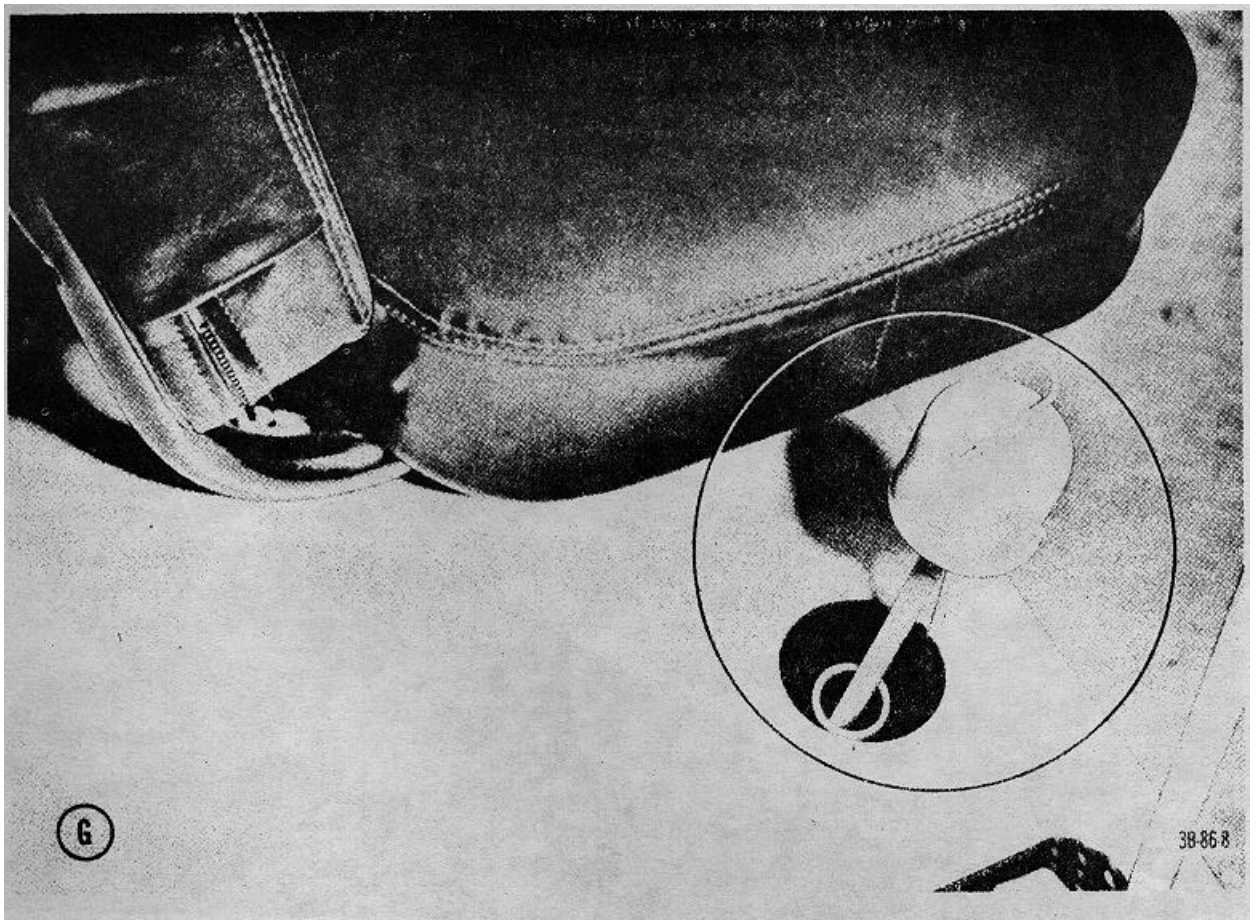

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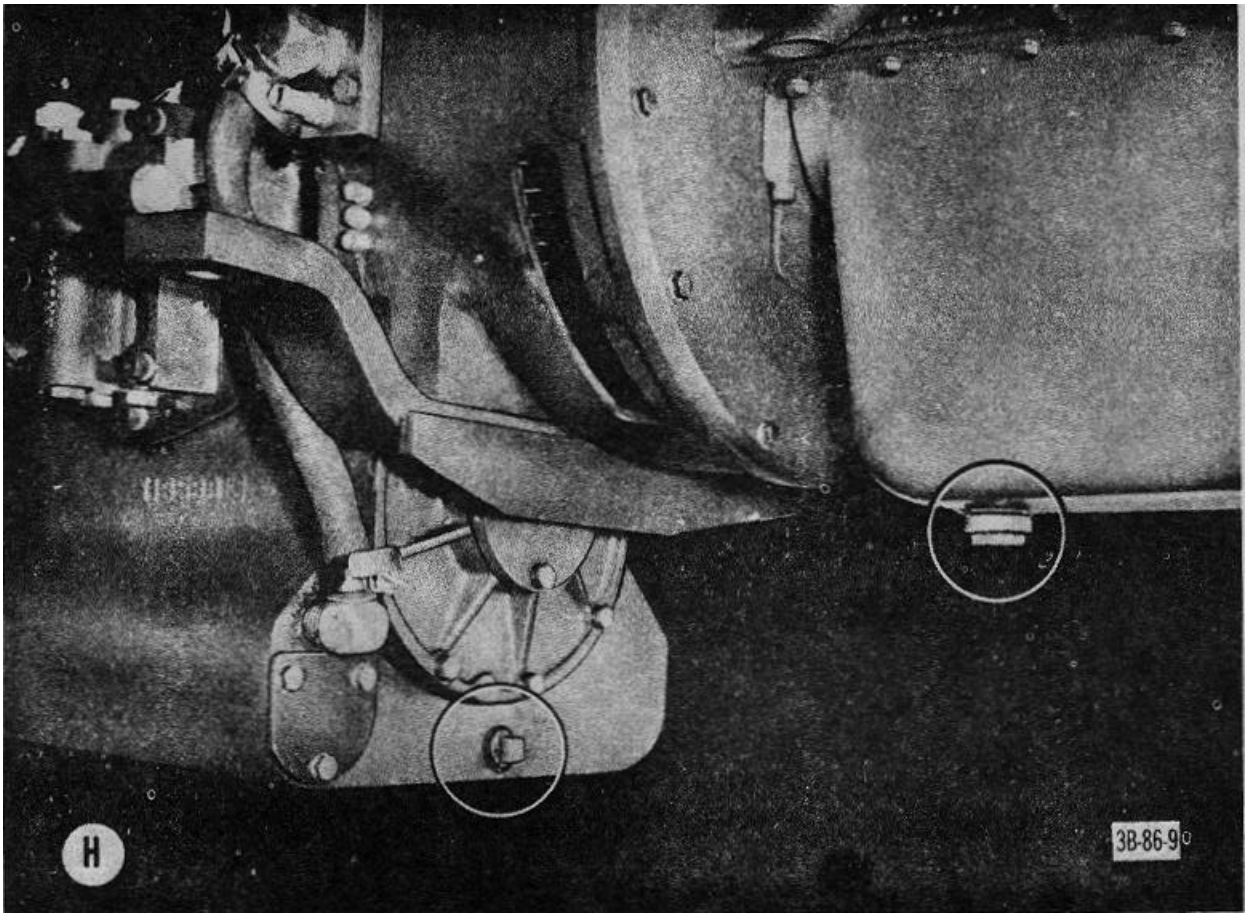

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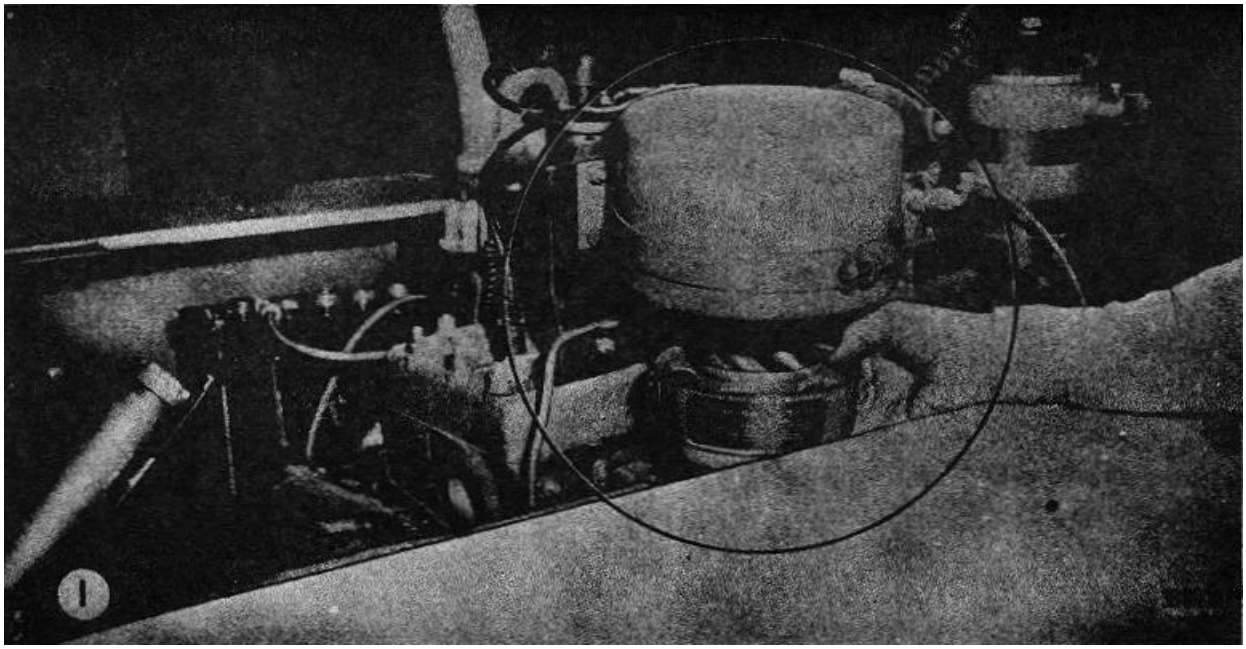

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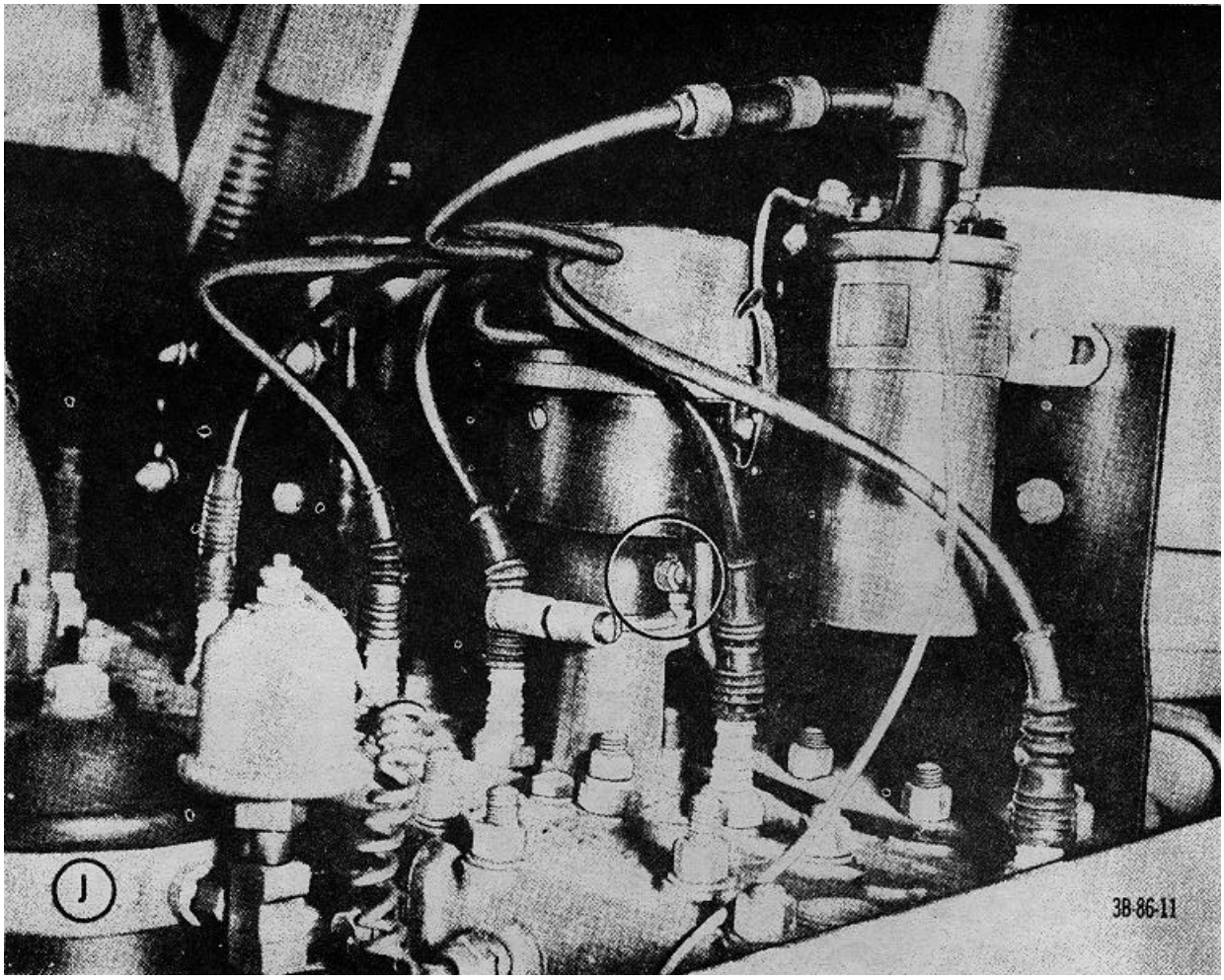

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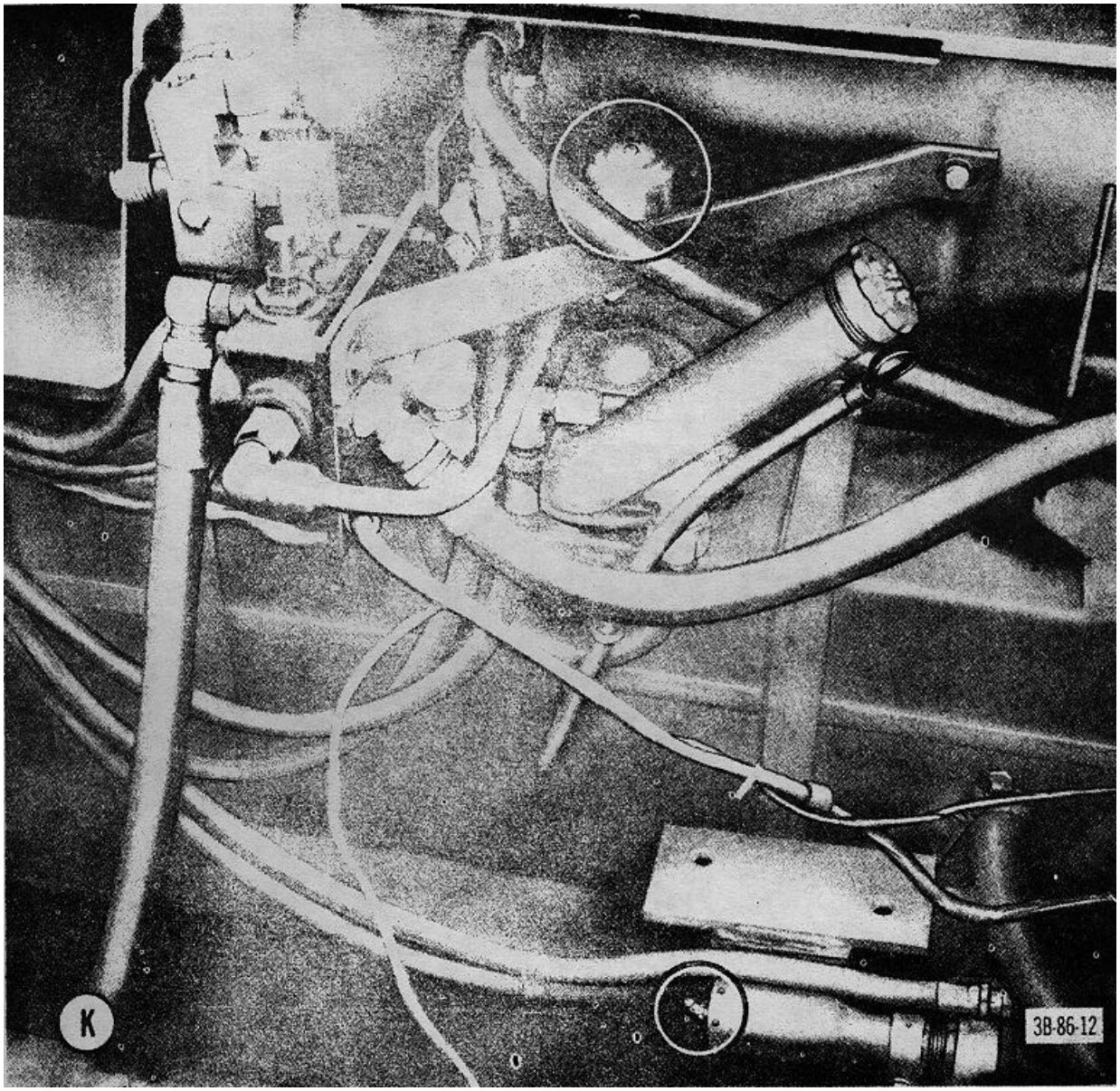

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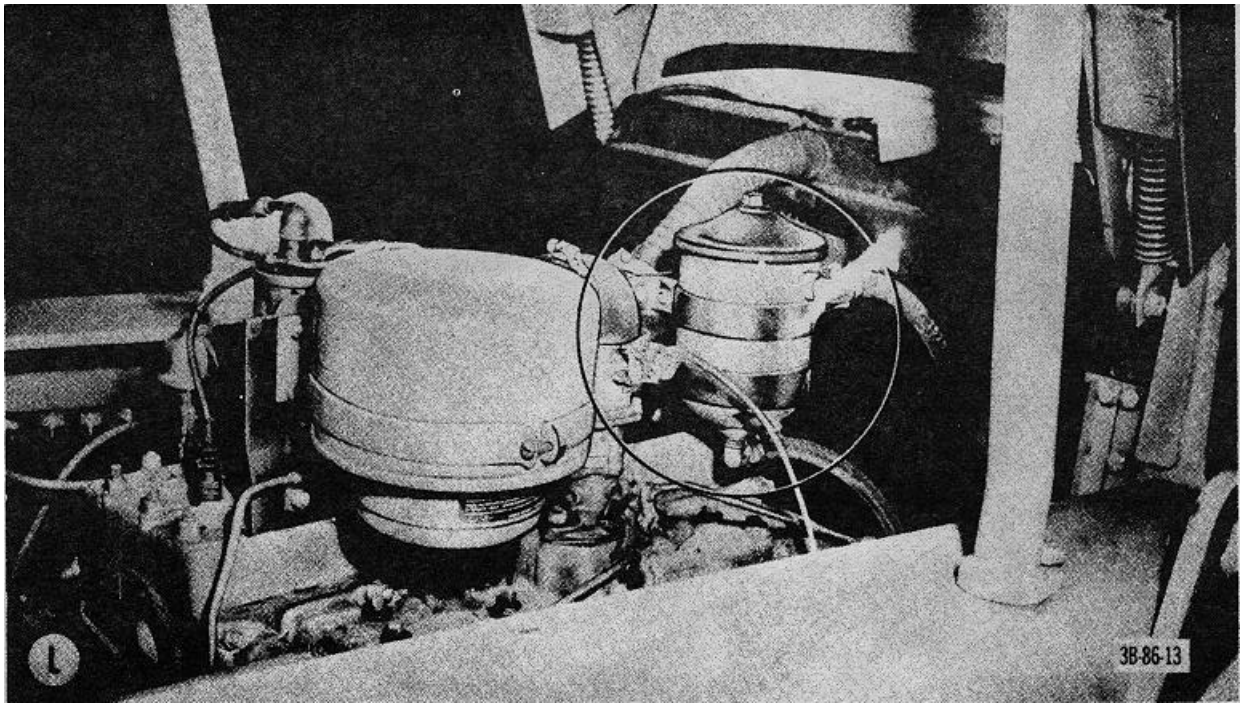

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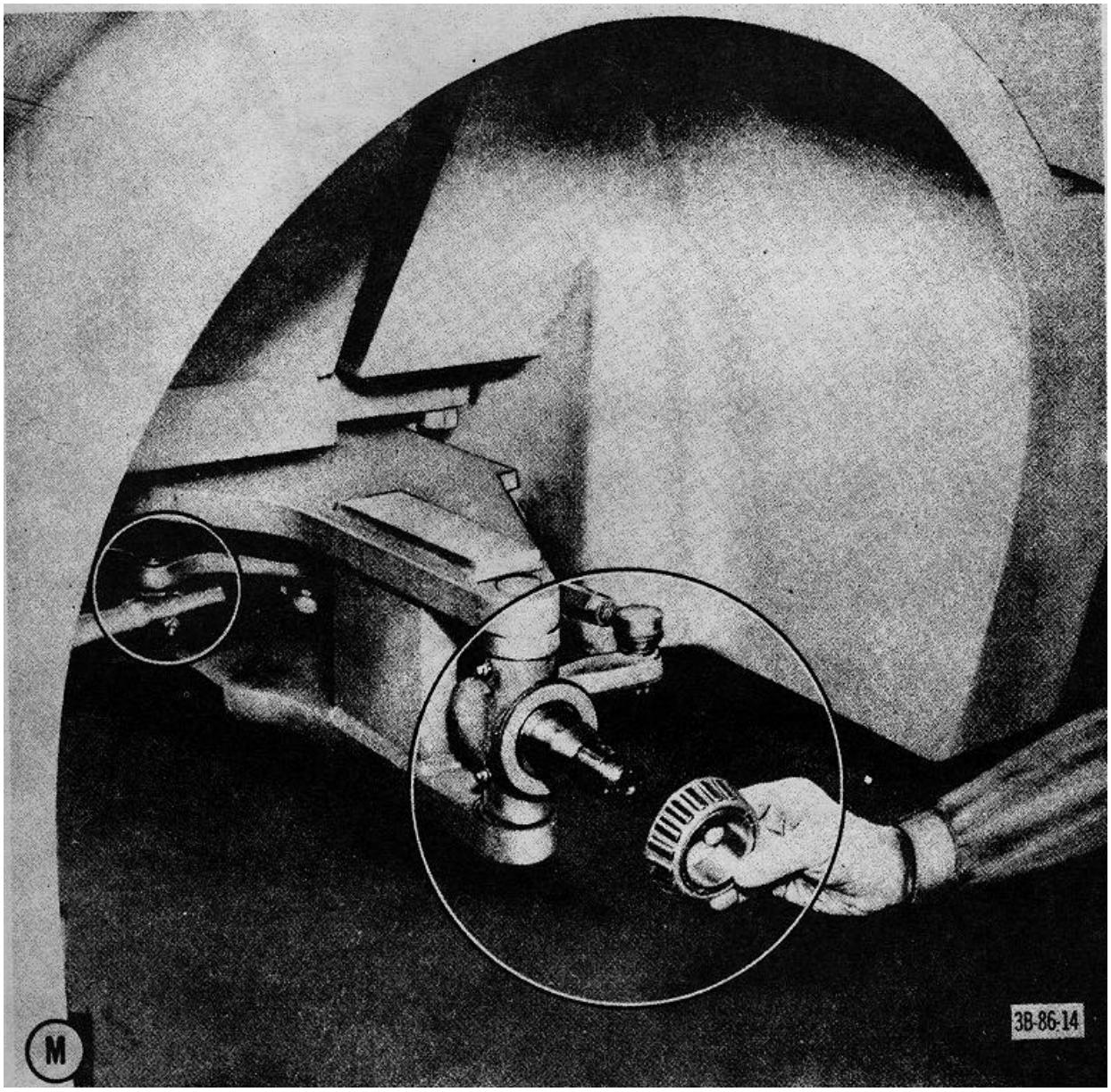

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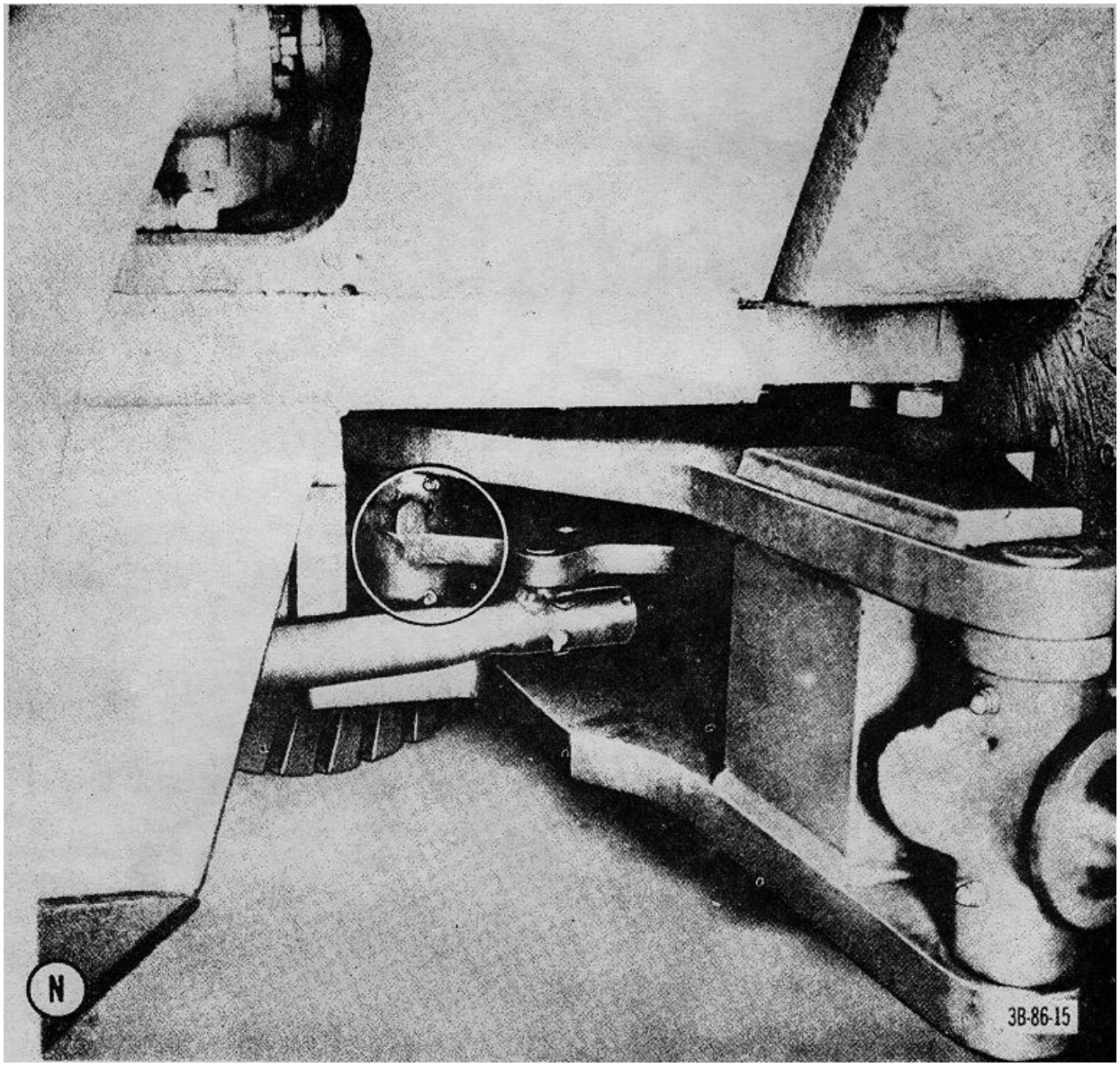

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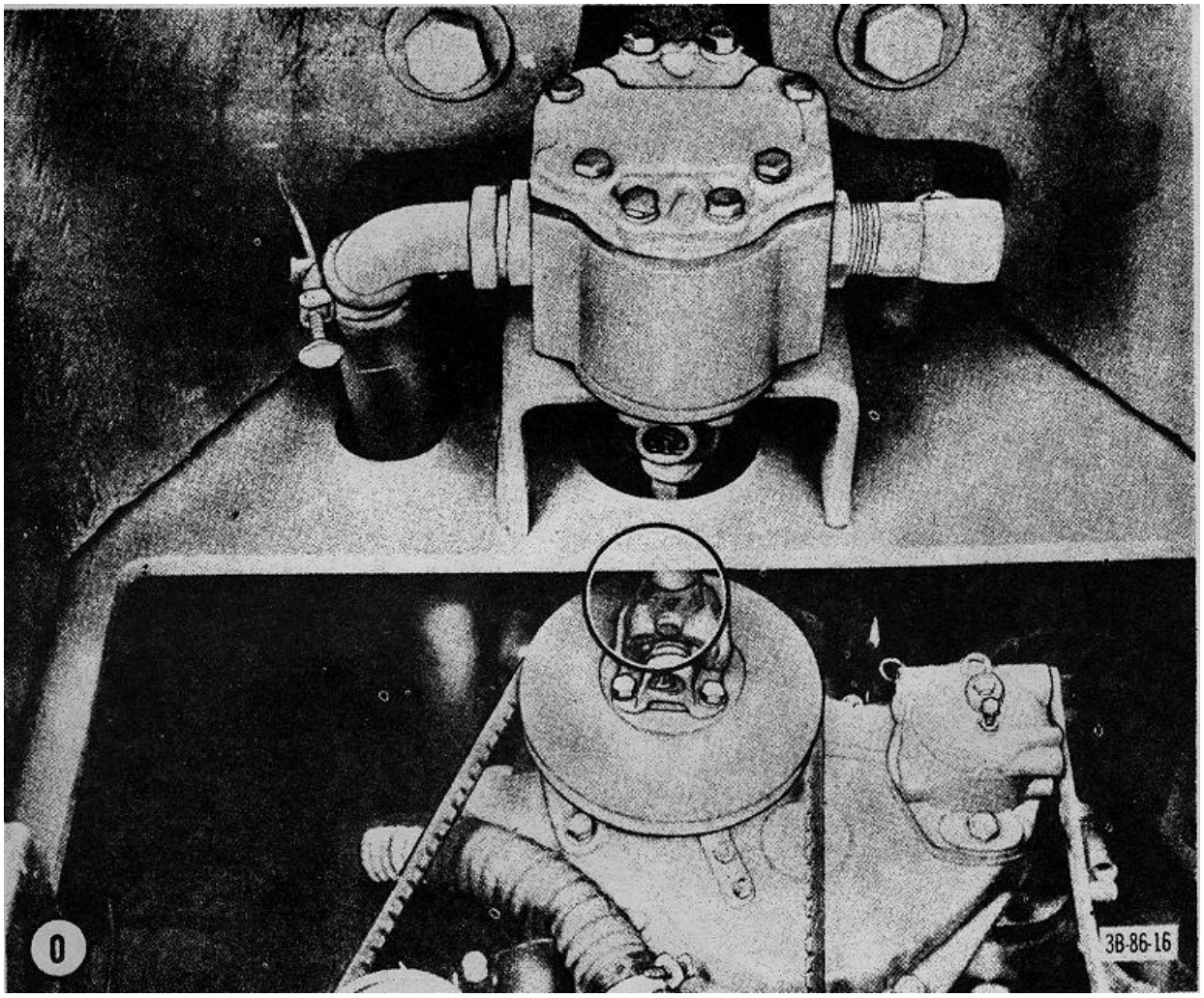

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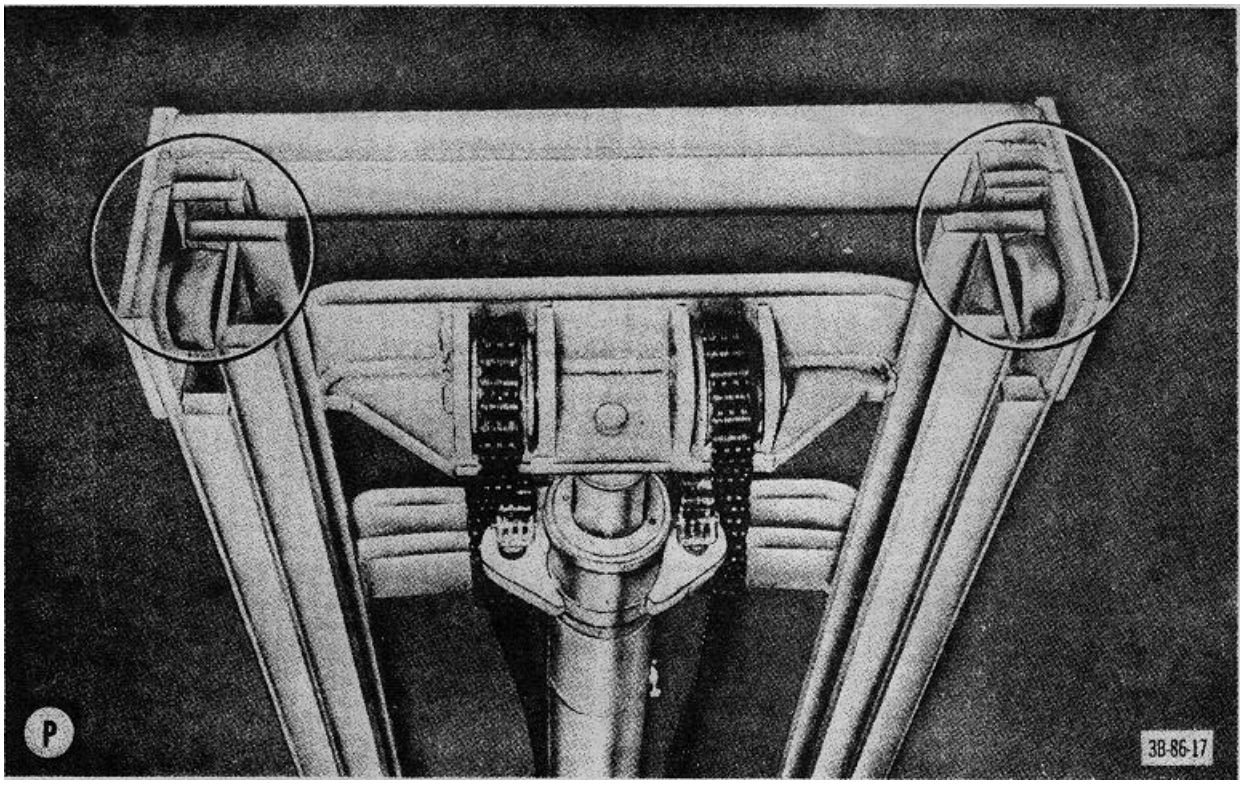

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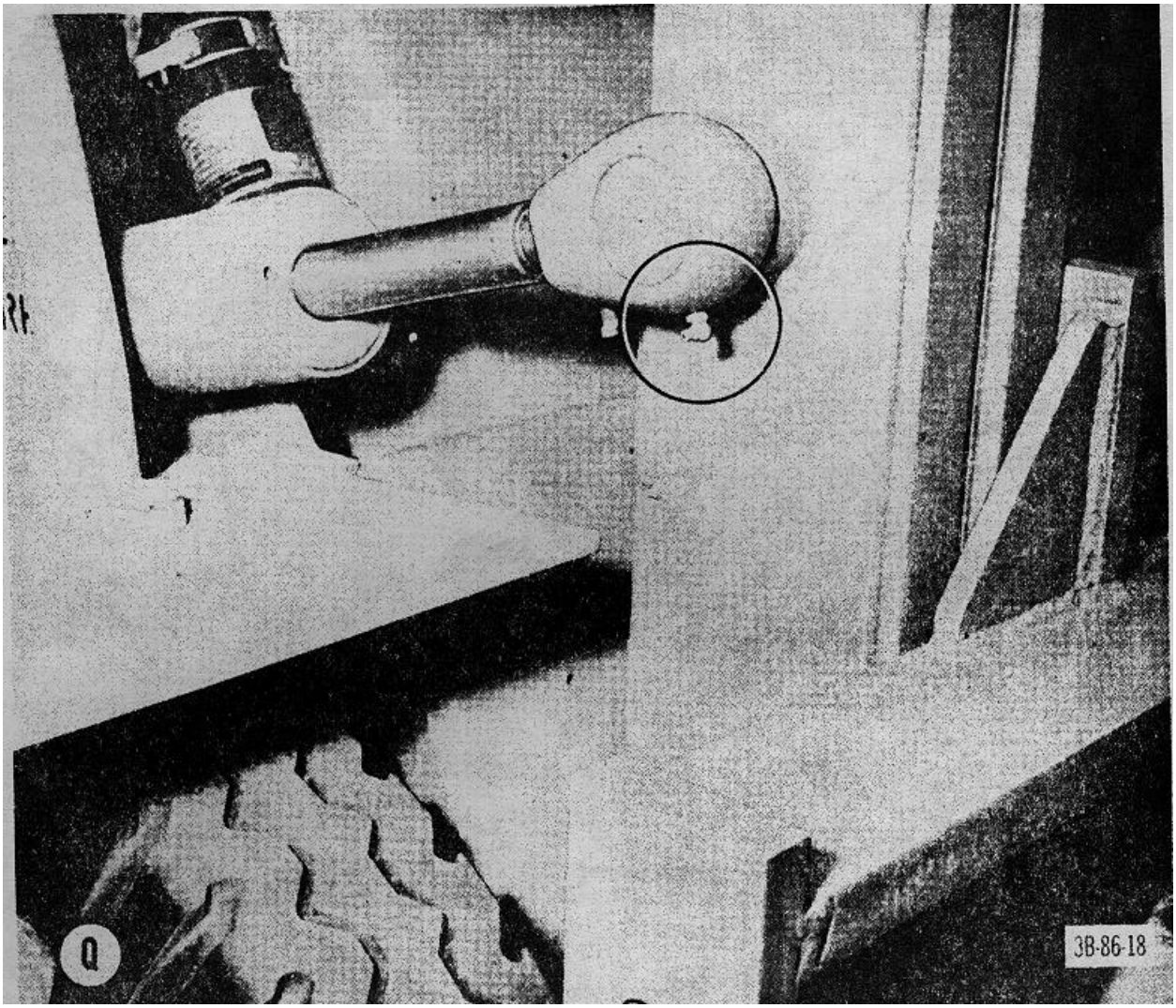

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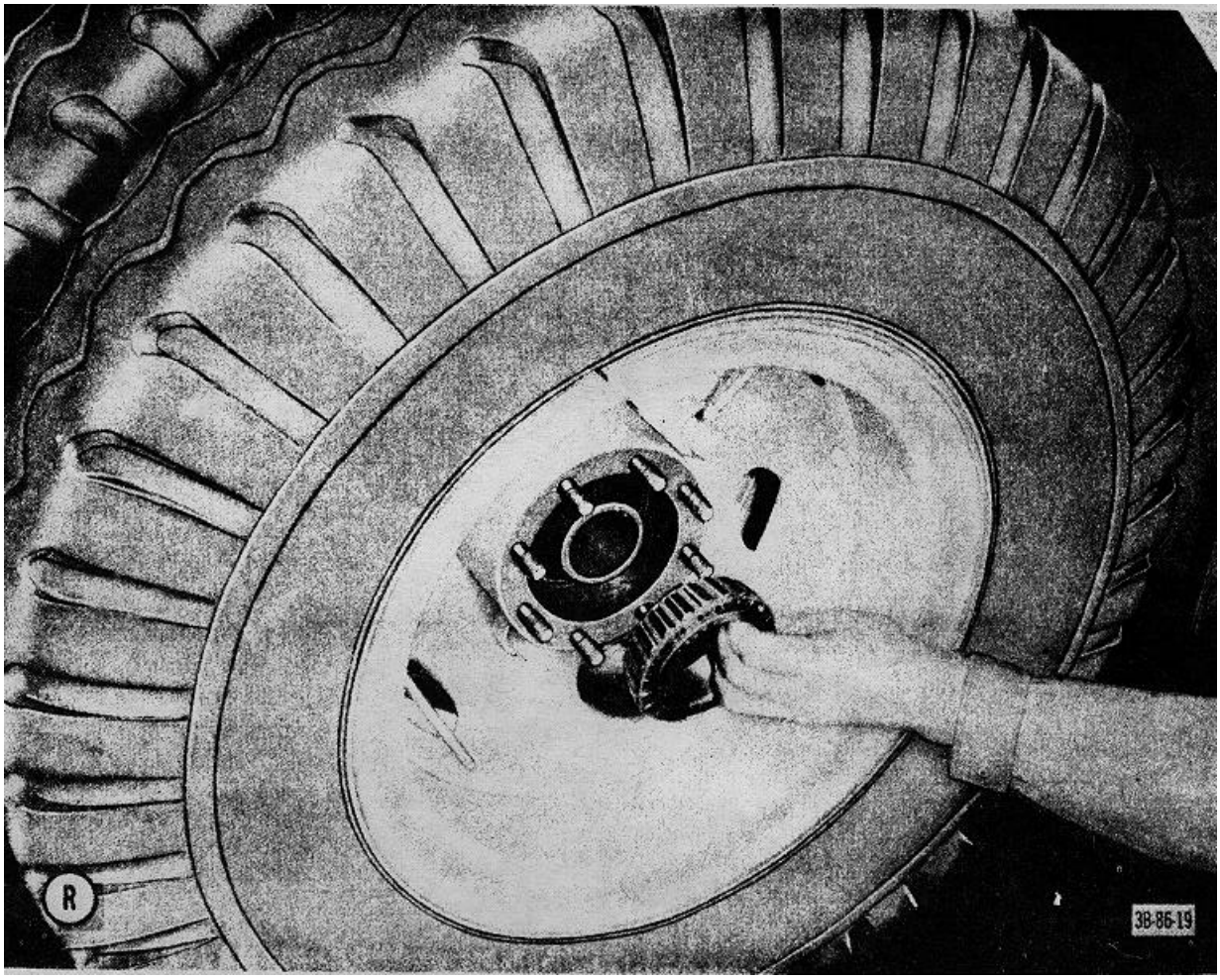

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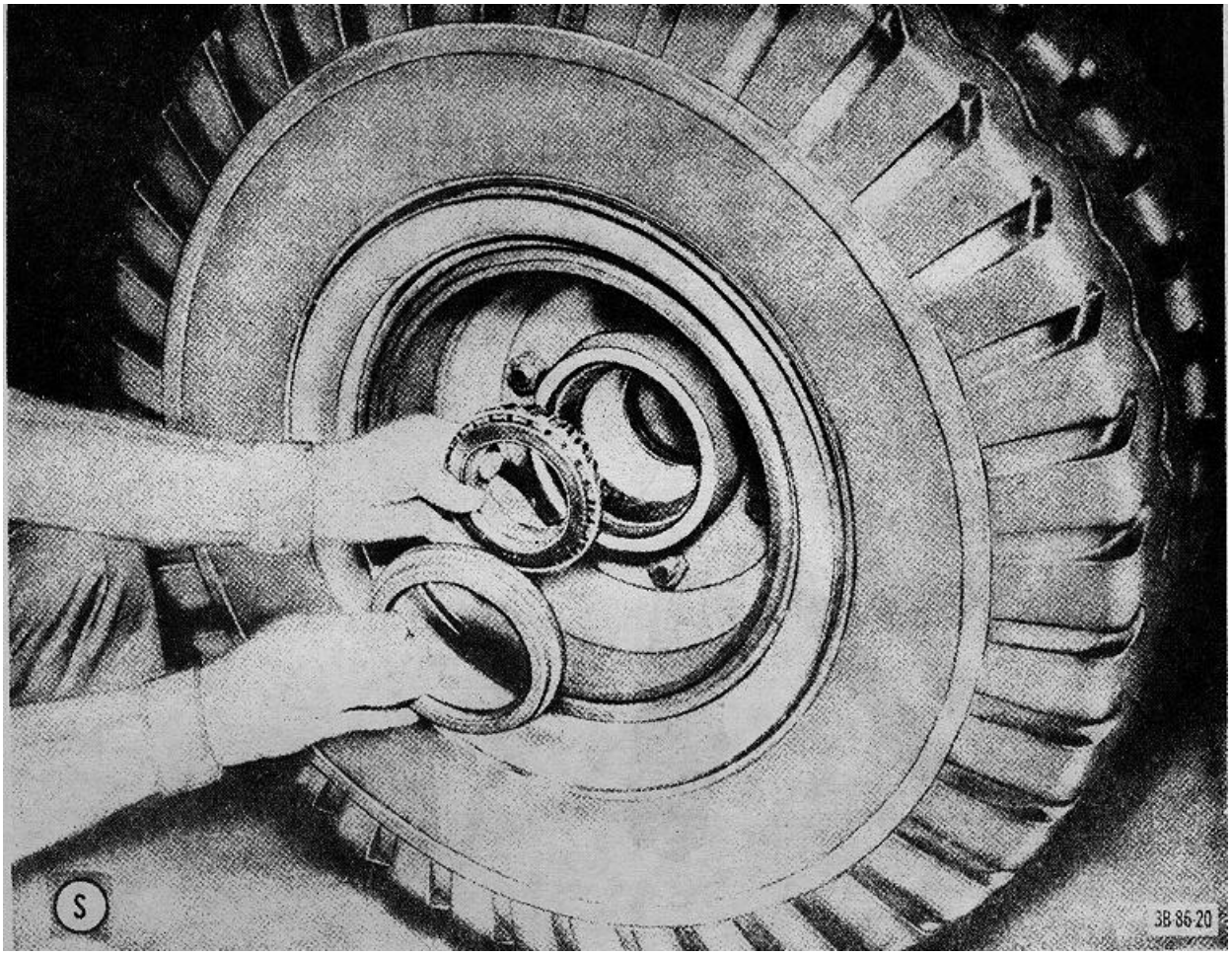

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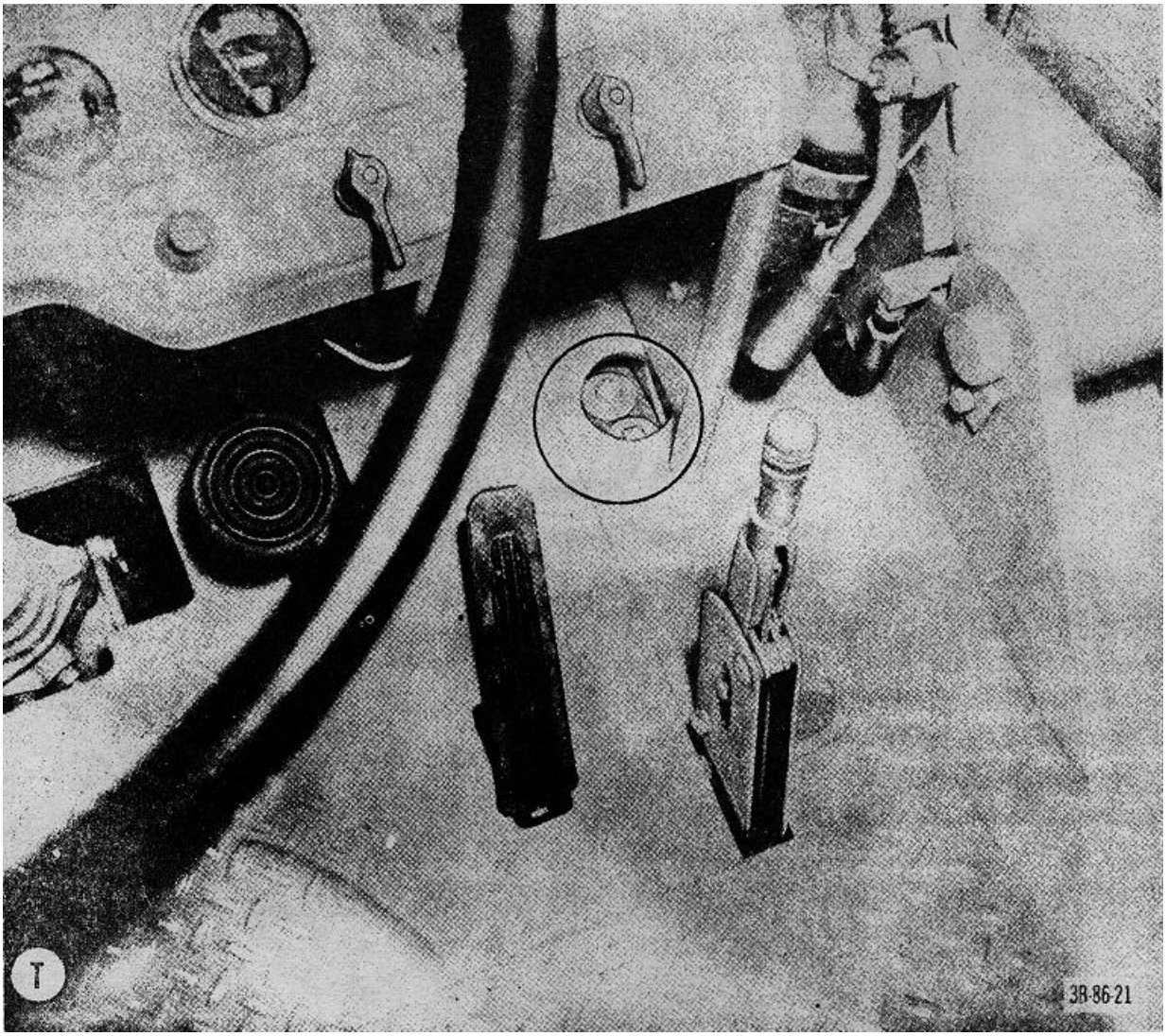

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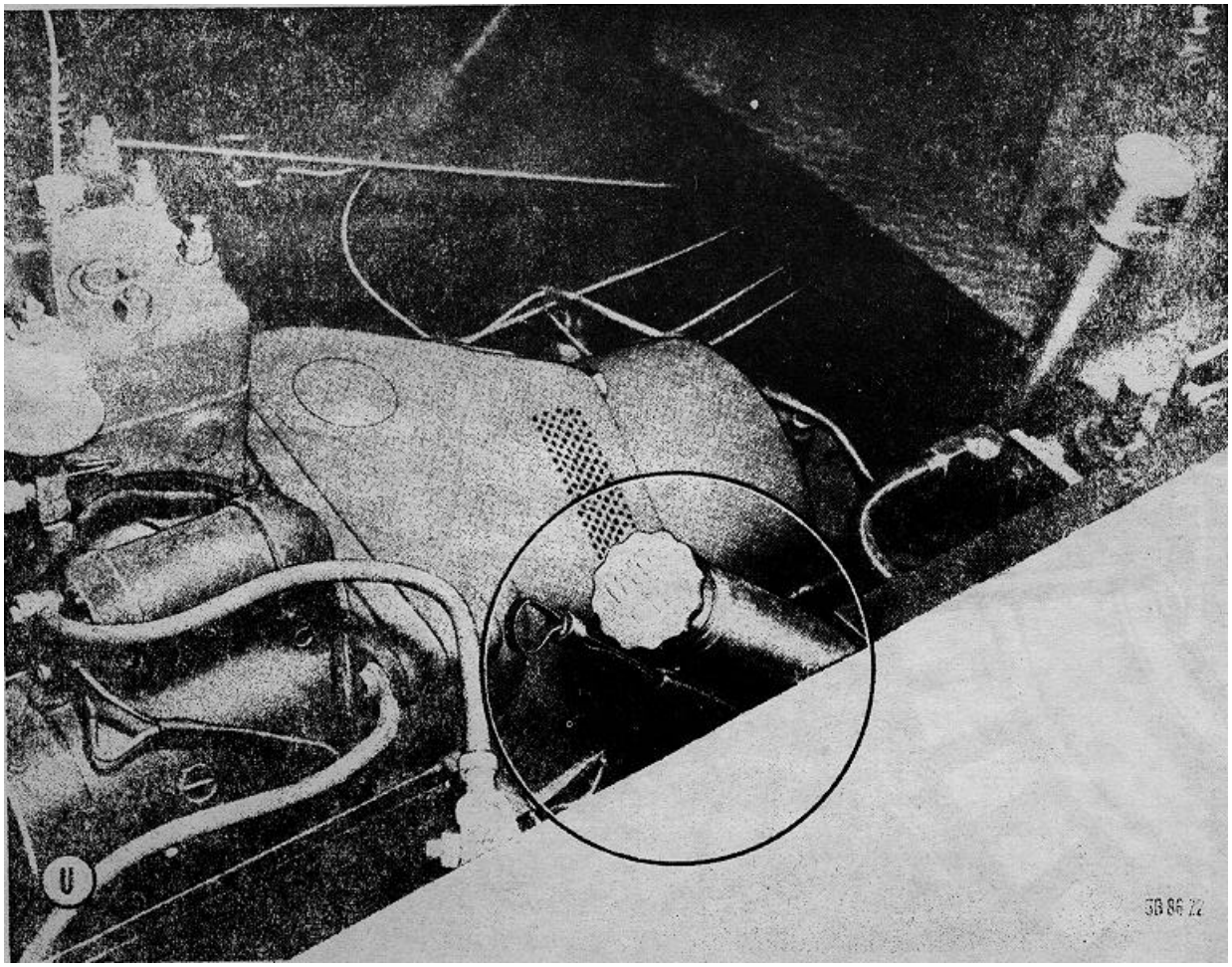

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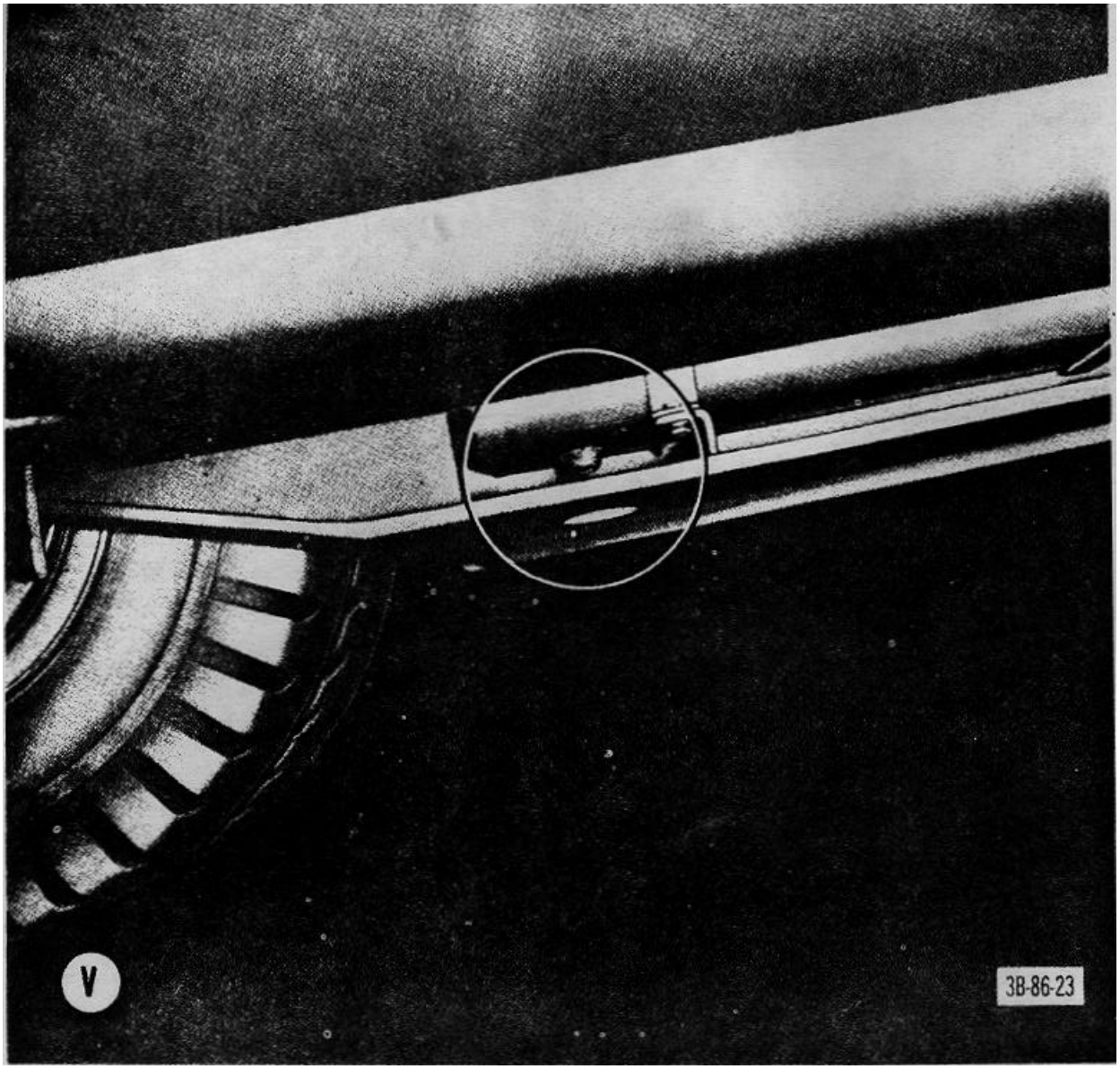

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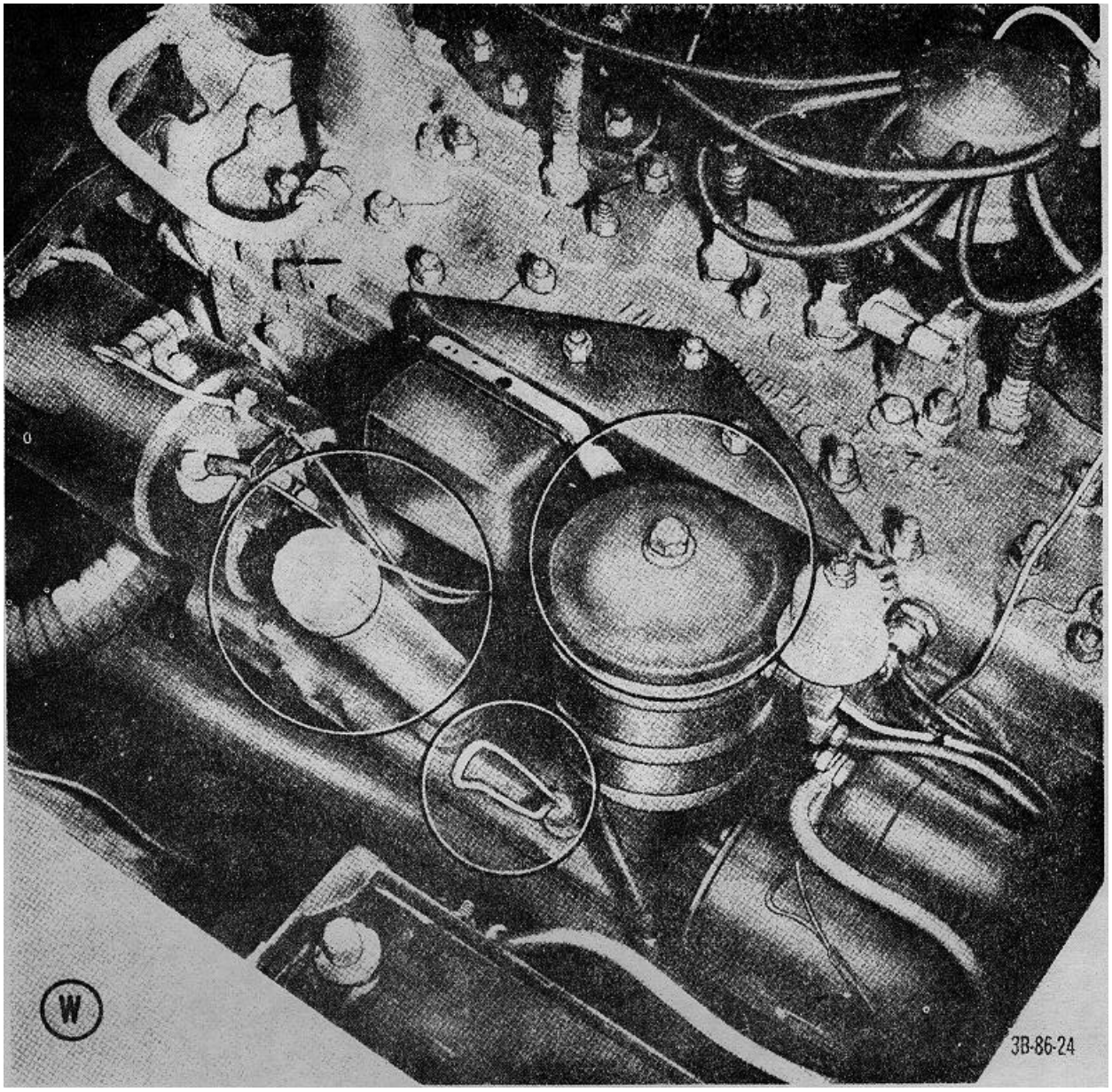

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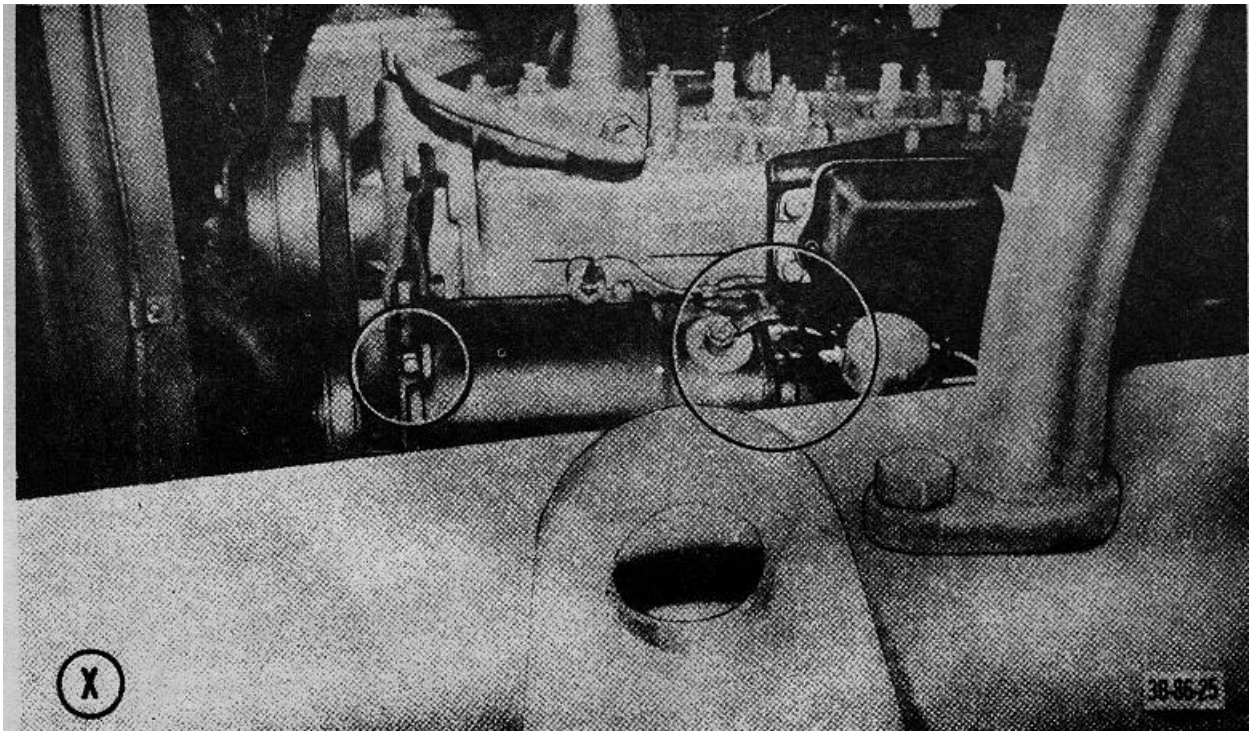

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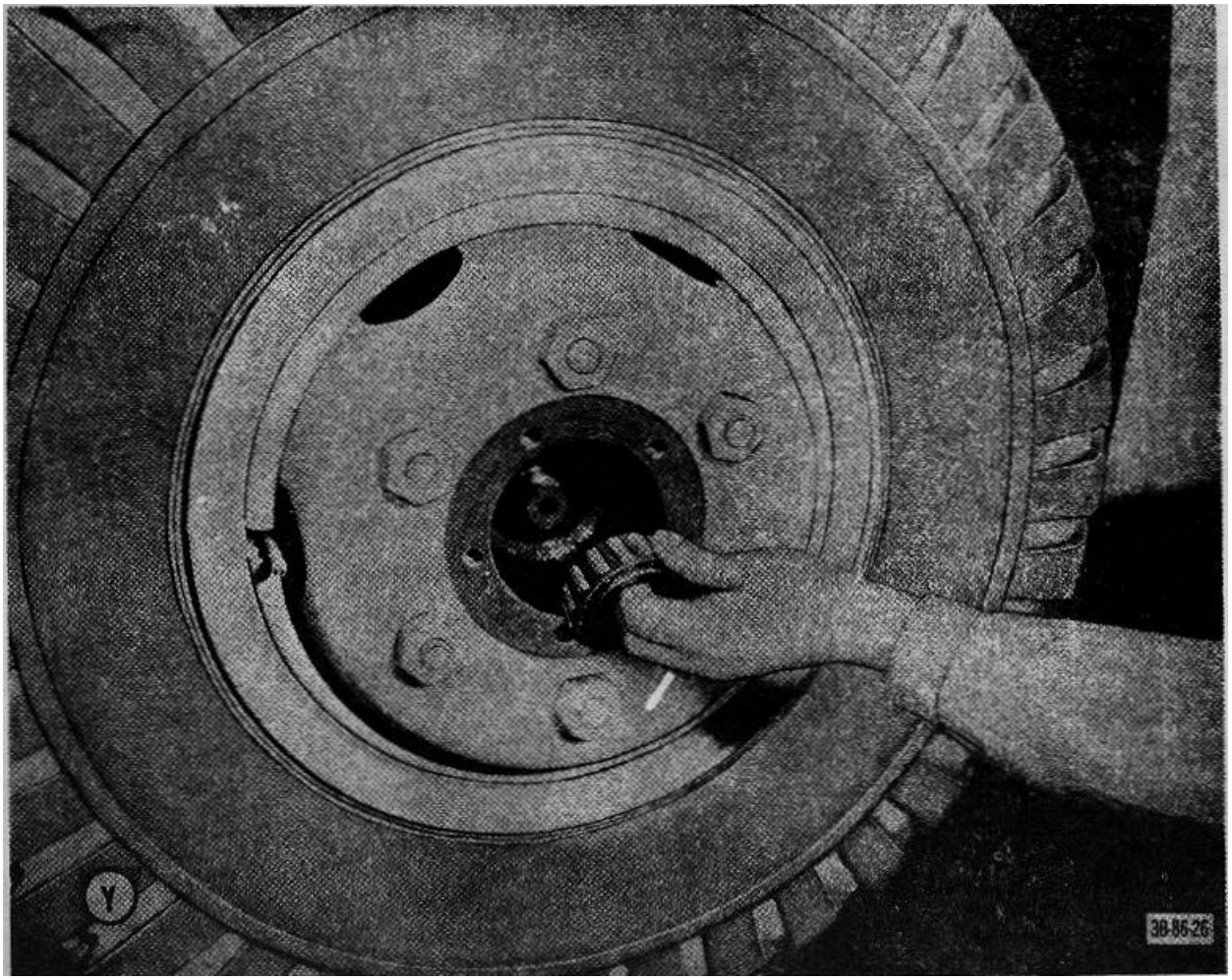

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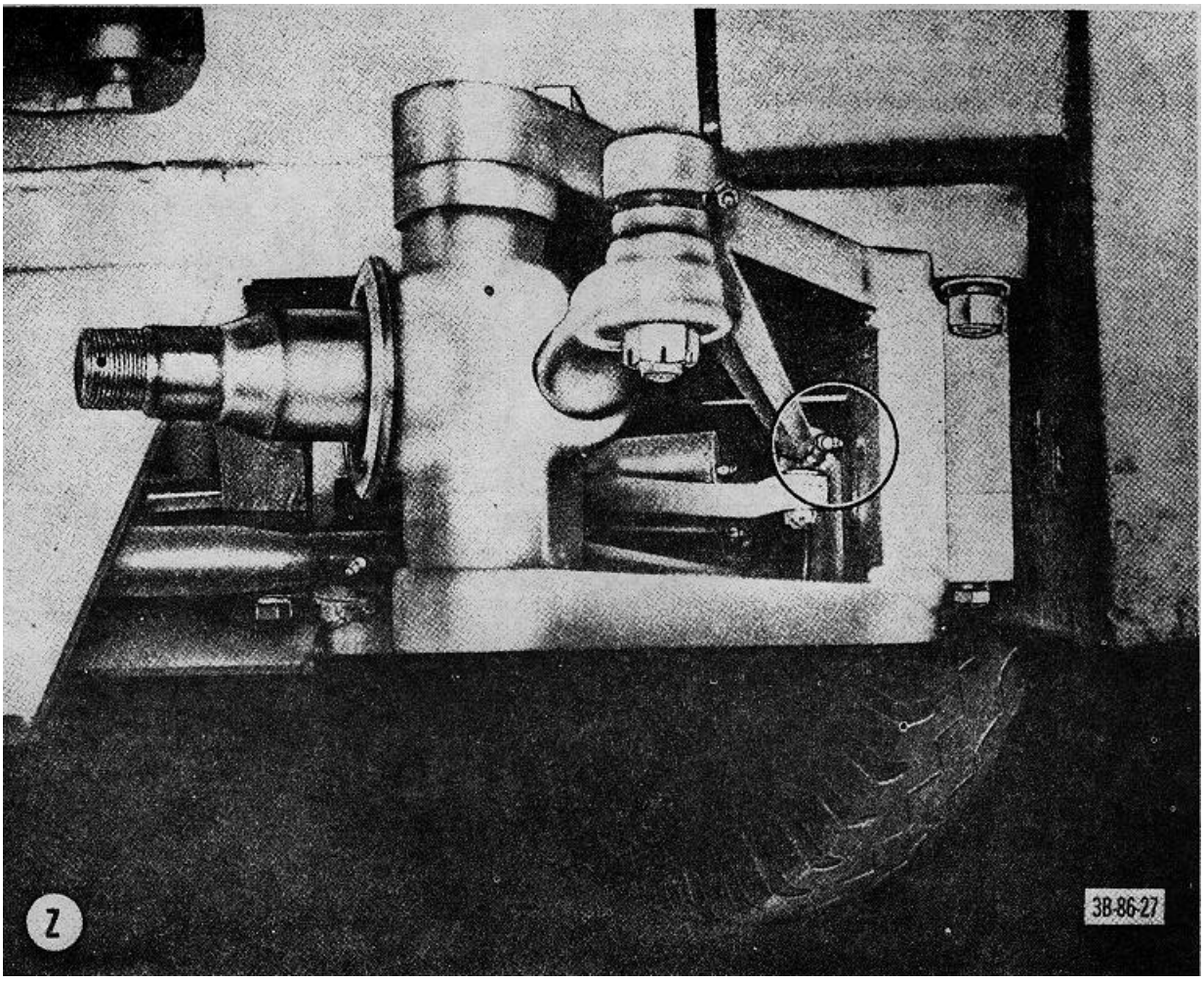

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Section II. PREVENTIVE MAINTENANCE SERVICES

13. General

a. Preventive maintenance is defined as the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, to prevent breakdowns, and to assure maximum operational capability.

b. The services described in this section are those which must be performed by secondechelon maintenance personnel at regularly scheduled intervals. The organization mechanic may be assisted by the operator in performing these services.

14. Maintenance Indicator Checklist

a. The maintenance indicator checklist (table I) prescribes the services that will be performed by the second-echelon mechanic at the indicated intervals. This checklist will also be used by the personnel who conduct formal, informal, technical, and command maintenance inspections.

b. The intervals for performing these preventive maintenance services are as follows:

M-Every 2 months or 100 operating hours, whichever occurs first.

S-Every 6 months or 500 operating hours, whichever occurs first.

c. The deficiencies or shortcomings noted and the corrective action taken will be reported on the appropriate forms prescribed and explained in TM 3K750.

d. Wherever possible, these preventive maintenance services have been fully described in the checklist. For detailed test or adjustment procedures, and for repair or replacement procedures, refer to the paragraph listed in the reference column of the checklist.

Table I. Maintenance Indicator Checklist

KEY:
M-Every 2 months or 100 operating hours, whichever occurs first.
S-Every 6 months or 500 operating hours, whichever occurs first.

Item No.	Interval M	Interval S	Procedure	Par. ref.
			PRELIMINARY SERVICES	
1	x	x	Fuel, Oil, and Coolant.	
			a. Fill fuel tank to proper level.	
			b. Verify coolant level in radiator. Add coolant as necessary.	36
			c. Lubricate truck in accordance with LO 10-3930-222-20 and paragraph 11.	
2	x	x	Modifications and Publications.	
			a. Be sure the logbook and other necessary publications are either on or near the truck.	
			b. Check to be sure all required modifications have been accomplished and that they have been recorded in the logbook as required by TM 38-750.	
3	x	x	Body.	
			a. Inspect the truck body for broken or missing components and for dents or other damages. Be certain counter weight is mounted securely.	
			b. Inspect the paint, markings, and identification plates for visible defects.	
4	x	x	Fork Carriage.	
			a. Inspect fork carriage for damage and secure mounting.	
			b. See that the forks are not bent.	84
			c. Inspect rollers for binding, wear, cracks, and breaks.	
			d. Turn crank assembly and check fork adjusting mechanism for proper operation.	
5	x	x	Lift Chains.	
			a. Inspect lift chains for wear and for clogged, broken, or pitted rollers.	83
			b. Be sure forks are parallel to driving surface.	
6	x	x	Mast Assembly.	
			Inspect mast assembly for correct alinement, secure mounting, and visible defects.	
7	x	x	Hydraulic Cylinders	
			Inspect lift and tilt cylinders for correct alinement, secure mounting, scored or dirty piston rods, and oil leaks.	81
8	x	x	Wheels and Tires.	
			a. Inspect wheels for secure and proper mounting, proper seating of lock-rings, and distortion.'	69, 70
			b. Inspect tires for excessive wear, cuts, breaks, abrasions, blisters, and penetration of foreign objects. Check tires for proper inflation of 100 psi.	69, 70

Table I. Maintenance Indicator Checklist-Continued.

Item No.	Interval M	Interval S	Procedure	Par. ref.
			PRELIMINARY SERVICES	
9	x	x	Transmission Oil Filter and Lines.	
			Inspect filter and lines for cracks, breaks, secure mounting, and leaks.	58
10	x	x	Engine Oil Filter Assembly and Lines.	
			Inspect filter and lines for cracks, breaks, secure mountin and leaks.	19, 20
11	x	x	Carburetor, Choke Control, Throttle, Governor, and linkages.	
			a. Inspect carburetor for secure mounting and leaks.	26
			b. Make sure that choke valve opens fully in the released position and that the throttle valve opens fully when the pedal is depressed.	31
			c. Inspect governor for secure mounting, leaks, and seal.	27
			d. Inspect linkages, springs, and mountings for wear, breaks, and other damage.	
12	x	x	Fuel Pump, Fuel Tank, and Lines.	
			a. Inspect fuel pump assembly for cracks, breaks, secure mounting, and leaks. Clean bowl assembly.	29
			b. Inspect fuel tank and lines for leaks, secure mounting, and clogged vent in fillercap. Drain fuel tank if there is evidence of contamination. Recheck for leaks.	30
13	x	x	Muffler.	
			Inspect muffler for breaks, leakage, rust, and secure mounting.	33
14	x	x	Cylinder Head, Manifolds, and Gaskets.	
			a. Inspect cylinder head and gasket for evidence of oil or water leaks. Torque loose cylinder head nuts to 35 to 40 ft.-lb.	18
			b. Inspect manifolds for warping, cracks, breaks, damaged gaskets, and secure mounting.	22
15	x	x	Radiator and Hoses.	
			a. Inspect radiator for secure mounting, leaks, bent fins, and obstructions in the air passages.	36
			b. Inspect hoses for deterioration and replace a cracked or soft hose. Be sure hose clamps are tight.	
16	x	x	Water Pump and Fan.	
			a. Inspect water pump body for cracks, breaks, or leaks and for secure mounting.	38
			b. If seals leak, replace water pump.	38
			c. Inspect fan for secure mounting and bent or broken blades.	
17	x	x	v-belts and Pulleys.	
			a. Inspect fan and generator v-belt for frayed condition, wear, glazing, and deterioration.	37
			b. Check pulleys for secure mounting and breaks.	
			c. Adjust v-belt to allow 1/2-inch finger-pressure deflection midway between pulleys.	37
18	x	x	Air Cleaner and Hose.	
			a. Inspect air cleaner for secure mounting.	28
			b. Inspect hose for deterioration and clamps for tightness.	
19	x	x	Spark Plugs.	
			Inspect installed spark plugs for cleanness, cracks, and leaks.	45
20	x	x	Ignition Wiring.	
			a. Inspect all accessible wiring for cleanness, damage to insulation, and good connections.	40
			b. Tighten wiring connectors only if they are loose because overtightening will damage connectors.	

Table 1. Maintenance Indicator Checklist--Continued.

Item No.	Interval M	Interval S	Procedure	Par. ref.
21	x	x	Distributor.	
			a. Inspect the distributor assembly for cracks, carbon streaks, corroded terminals, and dirt.	44
			b. Be certain the distributor is mounted securely.	
			c. Inspect the contact points. Be sure they are free of burns, pits, or frosting; are alined correctly; and are adjusted properly to 0.022 inch. Follow adjustment procedure in paragraph 44.	
			d. Inspect the rotor for cracks and the metal contact strip for burned condition.	
22	x	x	Battery, Leads, and Links.	
			a. Inspect battery for cracks and breaks.	47
			b. Inspect battery leads and terminals for dirt, breaks, and burned condition.	
			c. Inspect battery frame for corrosion and breaks.	
			d. Check the level of the electrolyte in the battery. The electrolyte should be one-half inch above the top of the plates.	
			e. Check the specific gravity of the electrolyte solution. The battery is fully charged when the specific gravity reading is 1.260 to 1.270. If specific gravity reading is below 1.225, the battery should be recharged.	
23	x	x	Generator, Starting Motor, and Solenoid Switch.	
			a. Inspect generator and leads for secure mounting.	41
			b. Inspect starting motor and leads for secure mounting.	43
			c. Inspect solenoid switch for secure mounting and proper connections.	
24	x	x	Hydraulic Pump, Control Valve, Hoses, and Fittings.	
			a. Inspect hydraulic pumps (main and auxiliary pumps) and control valve for secure mounting and leaks.	
			b. Inspect hydraulic flow divider valve, hoses, and fittings for secure mounting and oil leaks.	
25	x	x	Brake Lines and Fittings.	
			Inspect brake lines and fittings for leaks and secure mounting.	
26	x	x	Drive Axle Assembly.	
			a. Inspect drive axle for good condition, leaks, and secure mounting.	
			b. See that drive axle breather is open and clean.	
			c. Inspect wheel bearings for wear and proper adjustment.	68
27		x	Drive Axle Assembly.	
			a. Inspect the brakeshoes for secure mounting and for the presence of grease or other foreign matter. Inspect the brakesdrums for scoring and check the retracting springs for breaks and fatigue.	
			b. Inspect service brake linings for wear. If lining is worn to 1/8 inch, it must be replaced.	64
			c. Inspect wheel cylinders for secure mounting and leaks.	66
28	x	x	Steering.	
			a. Inspect steering gear housing for secure mounting and leaks.	
			b. Inspect drag link and tie rod ends for secure mounting and wear.	74, 75
29	x	x	Steering Axle.	
			a. Inspect steering axle for secure mounting.	
			b. Check wheel bearings for wear and proper adjustment.	71
			c. Inspect kingpins and center arm for secure mounting and for wear.	

Table 1. Maintenance Indicator Checklist--Continued.

Item No.	Interval M	Interval S	Procedure	Par. ref.
30		x	Steering Axle. Check the wheels to be sure there is 0^{o} toe-in.	75*e*
31	x	x	Propeller Shaft and Universal Joints. *a.* Inspect joints for matched alinement and secure mounting. *b.* Inspect seals for leaks. *c.* Grasp companion flange and propeller shaft, and twist. Any play indicates excessive wear of propeller shaft and joints.	
32	x	x	Handbrake Lever and Linkage. Inspect handbrake lever and linkage for proper mounting and check cable for wear.	62
33	x	x	Transmission and Torque Converter. Inspect transmission case and torque converter housing for secure mounting, leaks, and discoloration from overheating.	
34	x	x	Brake Master Cylinder. Check master cylinder for secure mounting and leaks. Be sure filler cap vent is open and that boot is properly installed.	65
35	x	x	Fire Extinguisher. Inspect extinguisher for visible defects, proper seal, full charge, and secure mounting.	
36	x	x	Overhead Guard. Inspect overhead guard for breaks, cracks, distortion, and other damages.	78
37	x	x	Seat Frame and Cushions. *a.* Inspect seat frame for cracks, breaks, and secure mounting. *b.* Inspect cushions for excessive wear, rips, and proper mounting.	79
38	x	x	Lights and Wiring. *a.* Inspect lights for secure mounting, broken lenses, and proper operation. *b.* Inspect wiring to be certain it is supported properly, connected properly, and secured tightly.	49,.50
39	x	x	Control Levers. Inspect control levers and linkage for distortion, noticeable defects, and secure mounting. The controls should operate without binding or looseness.	
40	x	x	Inching and Service Brake Pedals and Linkages. *a.* Inspect service brake pedal for proper free travel of 1/2 inch. *b.* See that linkage is securely connected and that pedal return spring returns pedals against stop. *c.* With inching pedal up, adjust inching spool on the transmission control valve within 0.010 inch to 0.030 inch of being all the way in by adjusting the inching linkage.	63 63
			OPERATIONAL TEST	
41	x	x	Starting Motor. Start engine. Observe whether starting motor action is satisfactory, whether it engages and operates properly without unusual noise, whether it has adequate starting speed, and whether the engine starts readily.	
42	x	x	Instruments, Switches, and Horn. Allow engine to operate at idle speed for at least 3 to 5 minutes. *a.* Check the reading on the engine oil pressure gage while the engine is operating at normal speed (TM 10-3930--222-10). At normal operating speed the gage should register 20 to 30 psi. *b.* The water temperature gage should rise gradually to normal operating temperature (indicated by green arc on gage).	

Table 1. Maintenance Indicator Checklist--Continued.

Item No.	Interval M	Interval S	Procedure	Par. ref.
			c. Check the ammeter. A slight charge should be indicated at normal operating speed.	
			d. The fuel gage should register full.	
			e. The hour meter should operate as soon as the engine is operating.	
			f. The transmission temperature gage will indicate red if transmission exceeds safe operating range.	
			g. The horn should be audible for a distance of 300 feet.	
			h. Check all switches for efficient operation, secure mounting, and positive operation.	
43	x	x	Engine. Observe engine operating characteristics, such as noise, engine knocks, and rattles while the engine is accelerated and decelerated.	
44		x	Fuel Pump.	
			a. Inspect the fuel pump for leaks and other defects	29
			b. Perform-a static pressure test on the fuel pump (par. 29).	
45		x	Governor. Adjust governed speed to 2,400 rpm without load and 2,200 rpm with full load.	
46		x	Ignition Timing.	
			Check ignition timing. Adjust the timing as necessary.	44*e*
47		x	Compression Test.	
			a. Perform a compression test.	24
			b. Remove and completely service spark plugs. Adjust gap to 0.030 inch, and torque plugs to 10 to 20 foot-pounds.	45
48		x	Vacuum Test.	
			Perform a vacuum test and adjust carburetor.	26
49		x	Voltage Regulator.	
			Check the voltage regulator for proper voltage output of 13.8 to 14.8 volts, and proper current output of 17.5 to 20.8 amperes.	42
50		x	Steering. With engine turned off, install pressure gage in proper opening on relief valve (located in flow divider). Operate engine at 600 rpm steer wheels to extreme right or left and hold them in this position, and check line pressure. The pressure reading should be 1,200 psi.	
51	x	x	Main Hydraulic Pump. Inspect the main hydraulic pump for leaks. Be certain that it is mounted securely.	
52		x	Main Hydraulic Pump. With engine turned off, install pressure gage at the proper opening in the control valve. Operate engine at top governed speed, tilt mast assembly against rear stops, and check output pressure reading. The proper reading's 1,800 psi.	
53	x	x	Hydraulic Cylinders.	
			a. Lift Cylinder. Place a 15,000-pound load on the forks, and raise load from ground level to a lift height of 210 inches. The load should reach this height it in approximately 22 seconds. Lower the load to 4 or 5 feet above ground level. Hold load in this position for 5 minutes. At the end of 5 minutes, the load should not have drifted more than 1 inch. Check cylinder for leaks.	
			b. Tilt Cylinders. Tilt the load at the lift height of 210 inches. Perform this operation several times and note any malfunctioning. Check cylinders for leaks. Tilt should not exceed 3^{o} forward or 10^{o} backward from center.	

Table 1. Maintenance Indicator Checklist--Continued.

Item No.	Interval M	Interval S	Procedure	Par. ref.
54	x	x	Brakes *a.* Test service brakes for proper functioning. Note any side pull, chatter, or noise *b.* Test parking brake to be sure it will hold vehicle without a load on a reasonable incline. Adjust parking brake if necessary (TM 13930222-10).	
55	x	x	Steering. *a.* Rotate the steering handwheel to the extreme right and left positions and observe for indications of binding or looseness. *b.* Drive vehicle straight ahead and check the steering handwheel for free play. Free play should not exceed 1 inch at center position. *c.* Drive vehicle straight ahead, and note any tendency of the vehicle to wander, shimmy, or pull to one side. Adjust steering alinement.	75
56	x	x	Road Test *a.* Check all shifting control levers to be certain they smoothly shift into all positions. *b.* Operate truck in all directions and at varying speeds, and note any failure of the transmission and torque converter. *c.* Operate the engine at various speeds in all transmission ranges and observe whether the engine has adequate power and acceleration. Perform this operation under both light and heavy loads. Note any failure of the transmission and torque converter.	
			FINAL INSPECTION	
57	x	x	Overheating and Leaks. Immediately after operational test is completed, check brakedrums for evidence of overheating. Check under truck, the engine compartment, and all appropriate components for oil, water, or fuel leaks. Check all hydraulic components for leaks.	

Section III. TROUBLESHOOTING

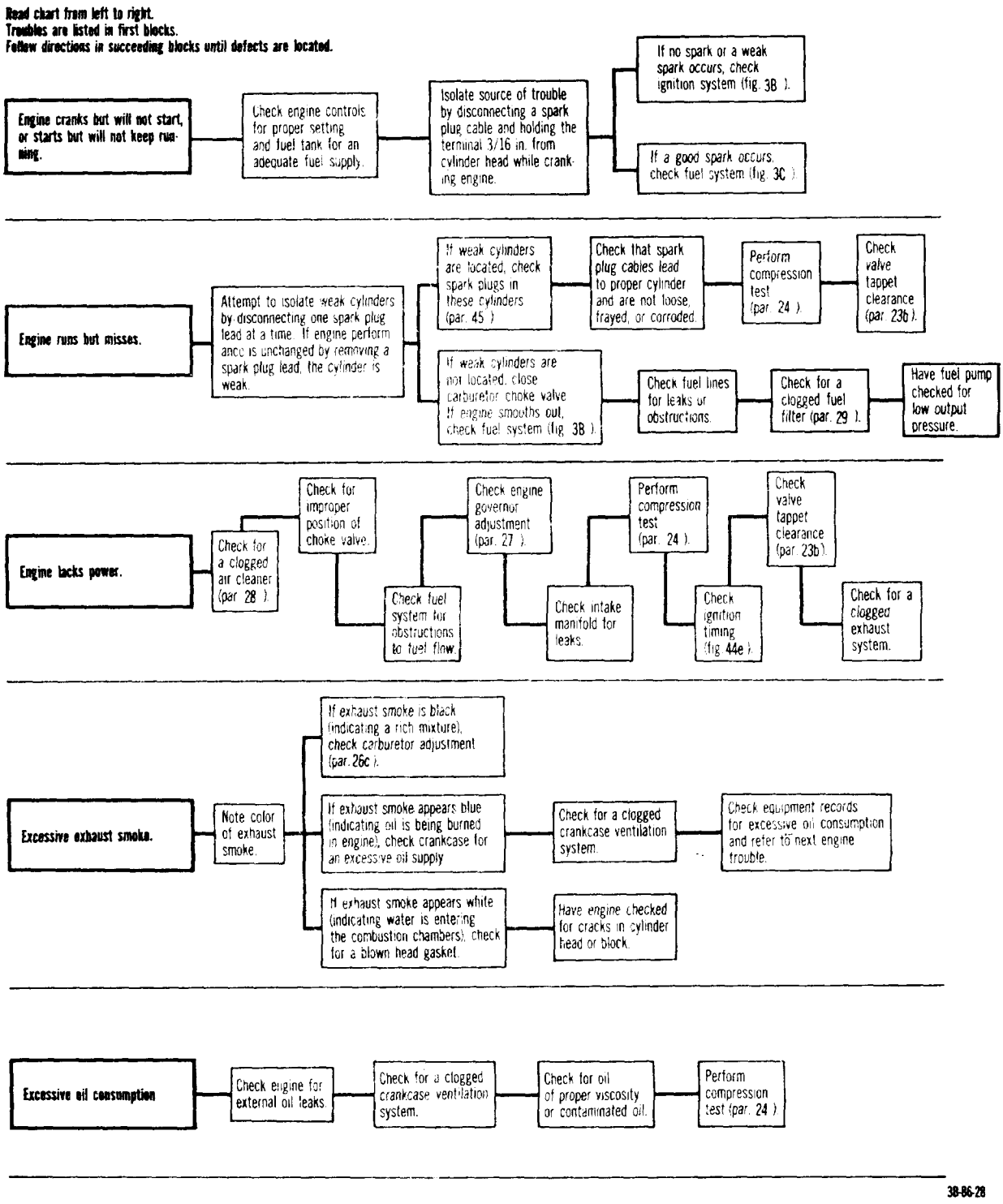
15. General

This section contains troubleshooting information in chart form for aid in locating and correcting some of the common troubles which may develop in the truck. This section cannot cover all of the troubles or malfunctions that may occur. If a specific malfunction or the troubleshooting instruction is not covered herein, isolate the system in which the trouble occurs and then locate the defective component.

Do not overlook the importance of questioning the operator to obtain as many definite symptoms as possible.

16. Procedures

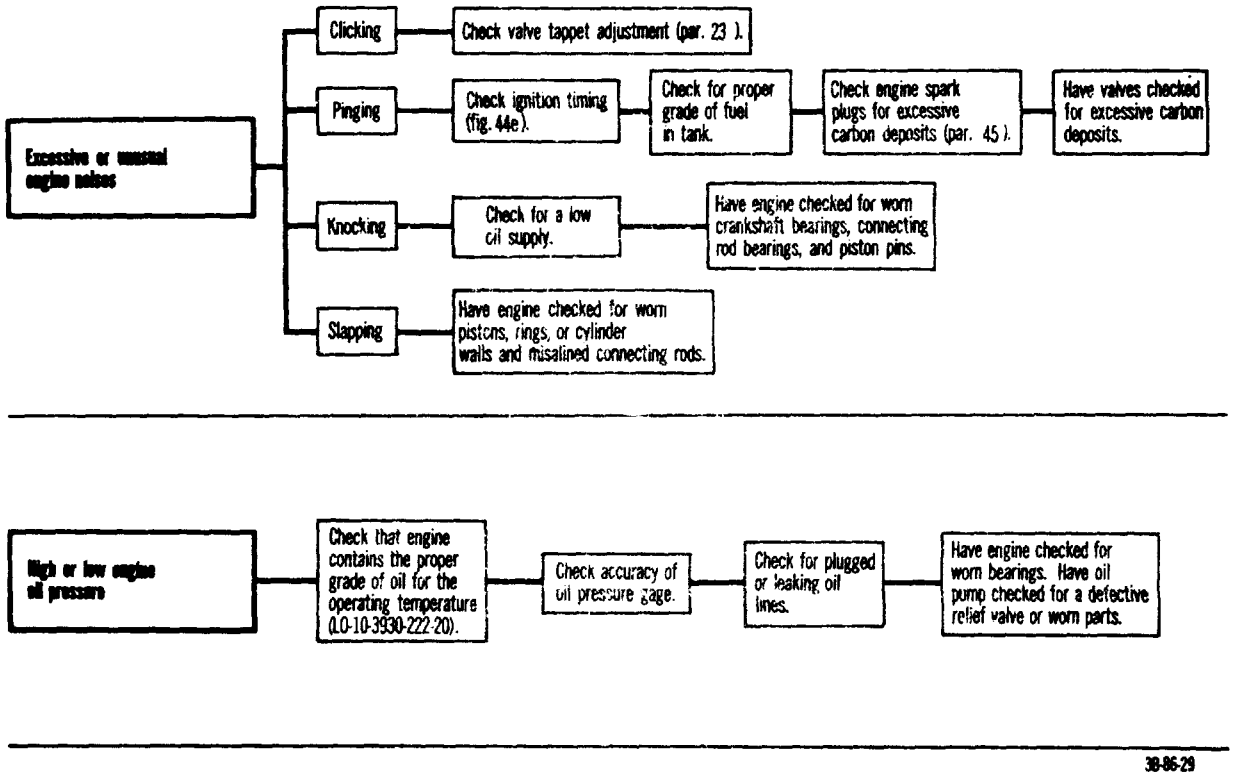
Malfunctions and troubleshooting procedures in chart form are shown in figures 3 through 11. Read the charts from left to right. The malfunctions are listed in the first block. Follow the directions in the suceeding blocks until the defects are located.



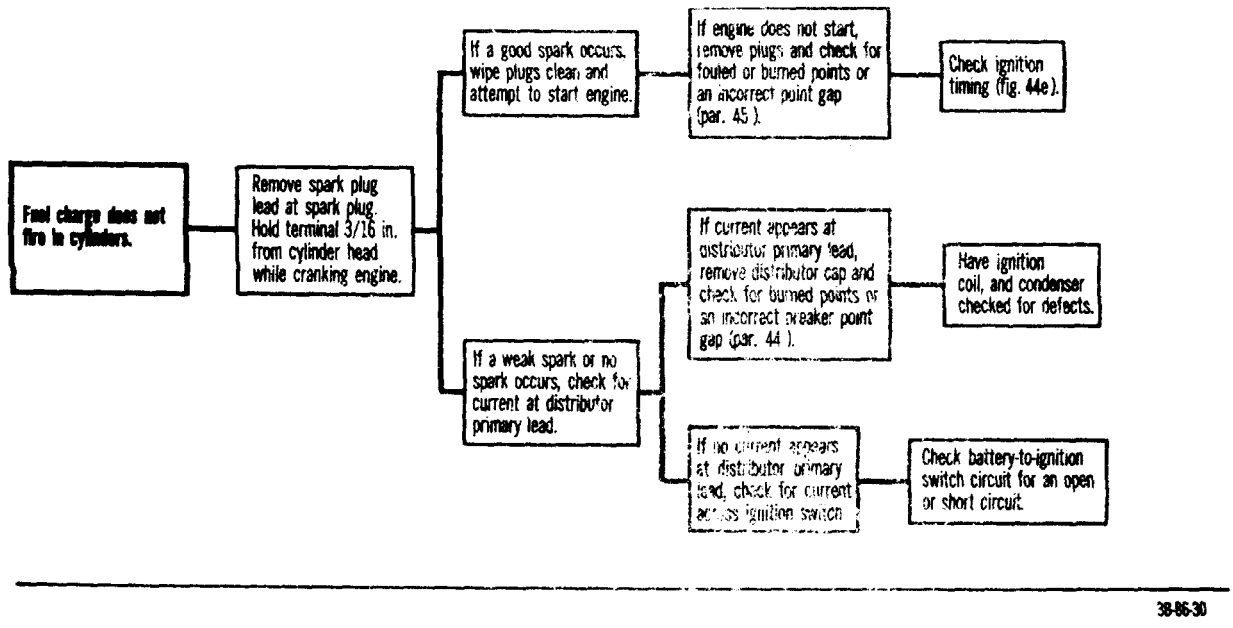
A—Engine troubleshooting chart B—Ignition system troubleshooting chart C—Fuel system troubleshooting chart

(A)

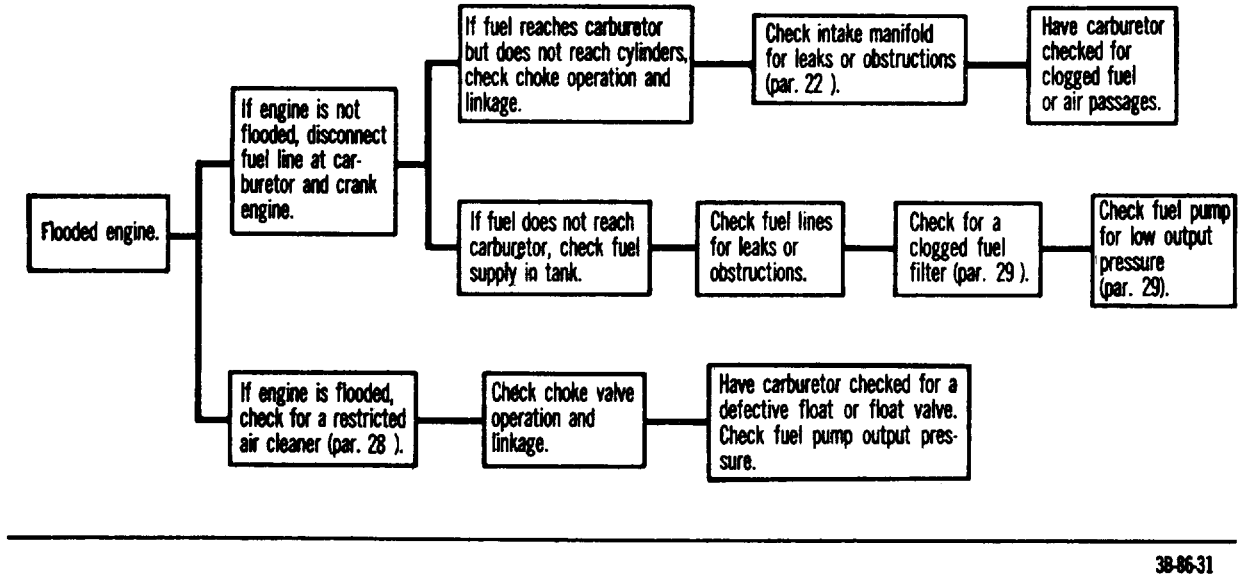
Figure 3. Engine, fuel system, and ignition system troubleshooting charts.



(A)-continued.
Figure 3-Continued.



(B)
Figure 3-Continued.



(C)
Figure 3-Continued.

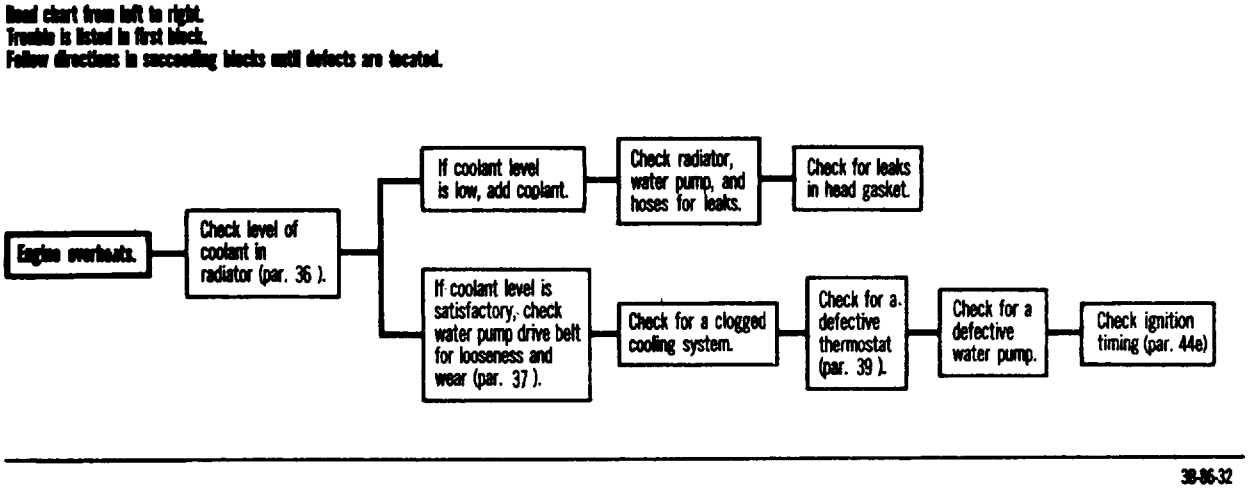


Figure 4. Cooling system troubleshooting chart.

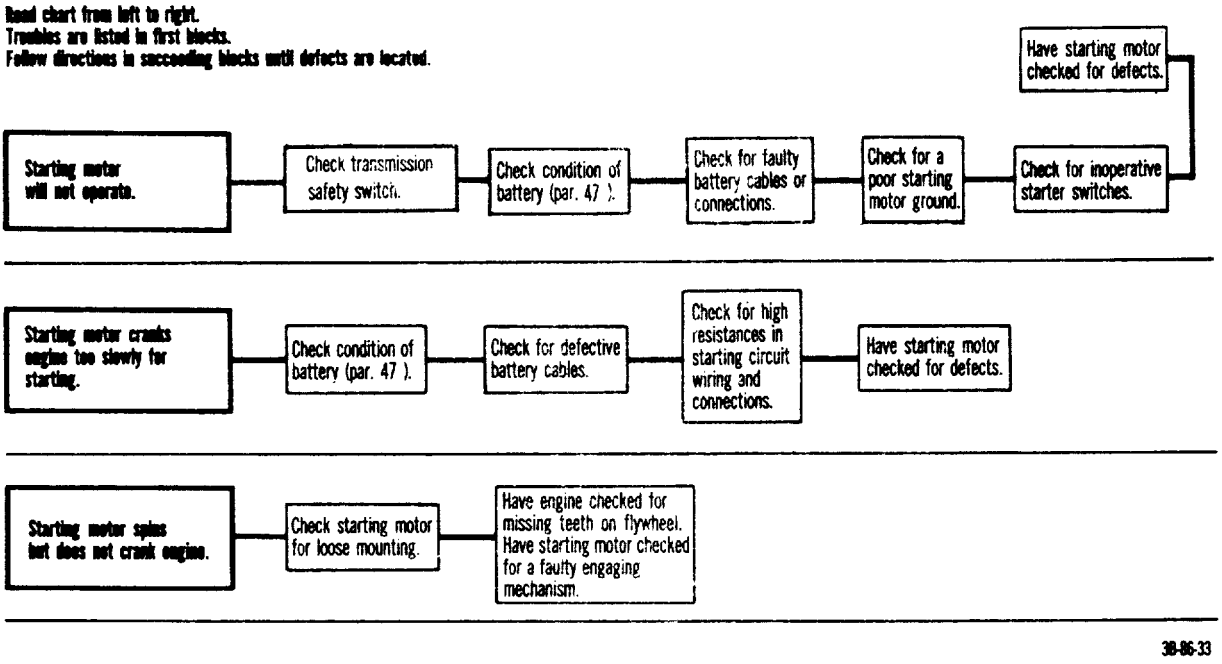


Figure 5. Electrical starting system troubleshooting chart.

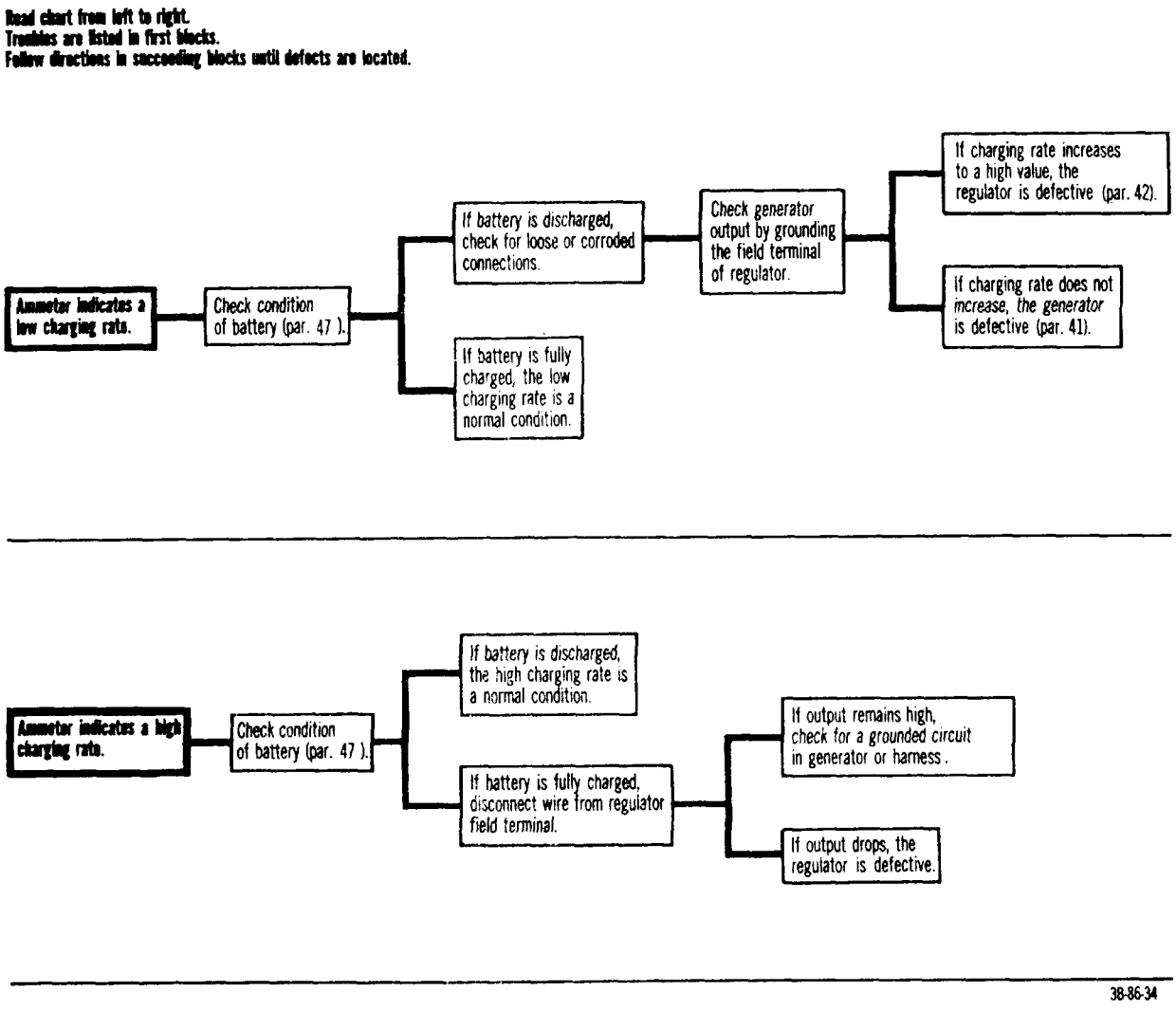


Figure 6. Electrical charging system troubleshooting chart.

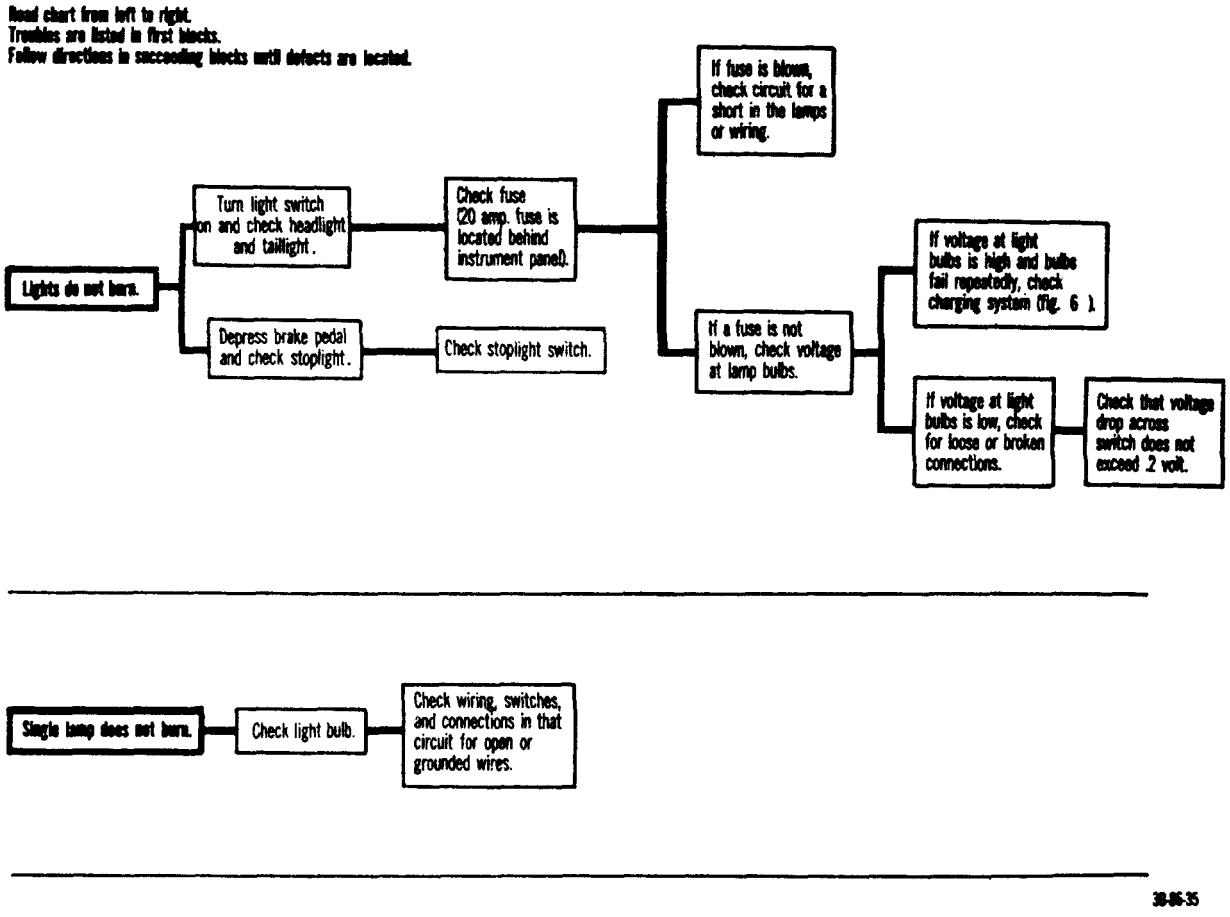


Figure 7. Electrical lighting system troubleshooting chart.

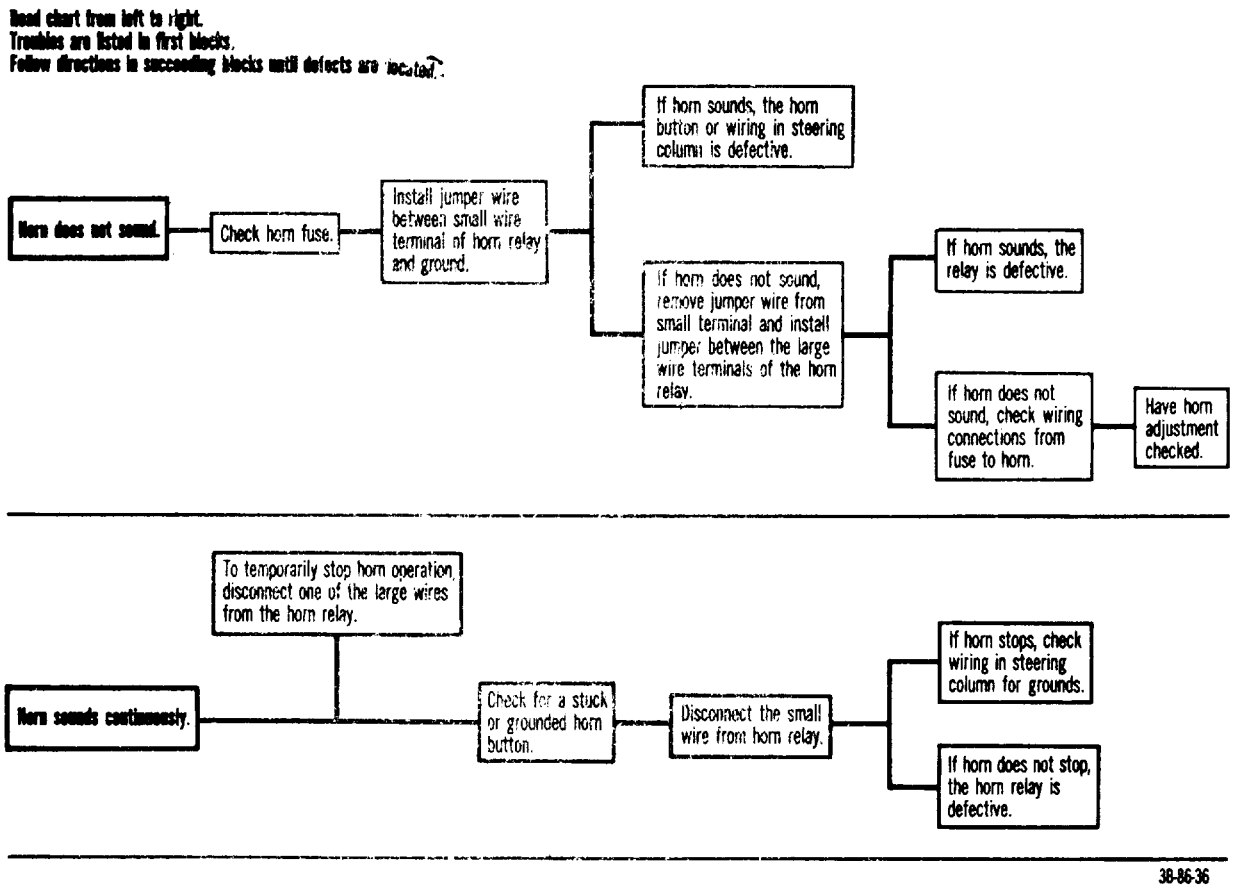


Figure 8. Electrical horn system troubleshooting chart.

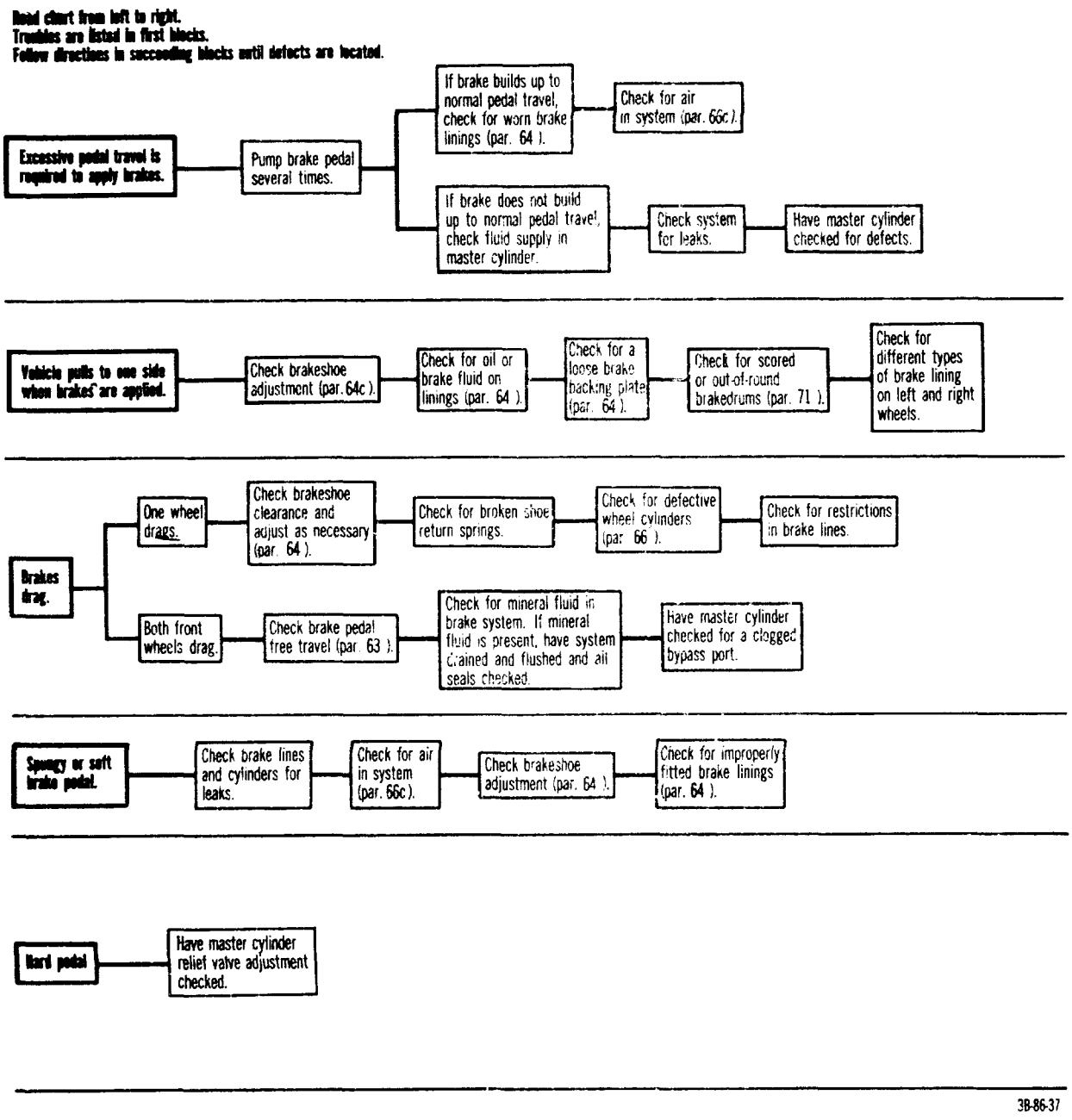


Figure 9. Brake troubleshooting chart.

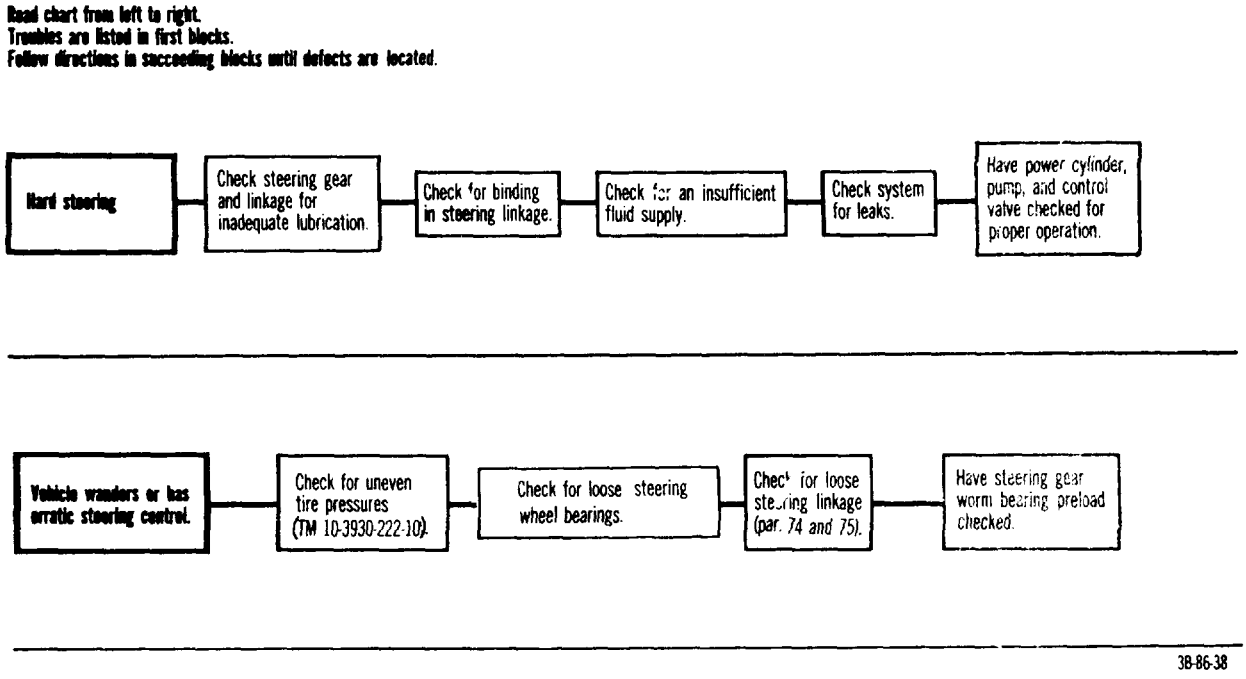


Figure 10. Steering troubleshooting chart.

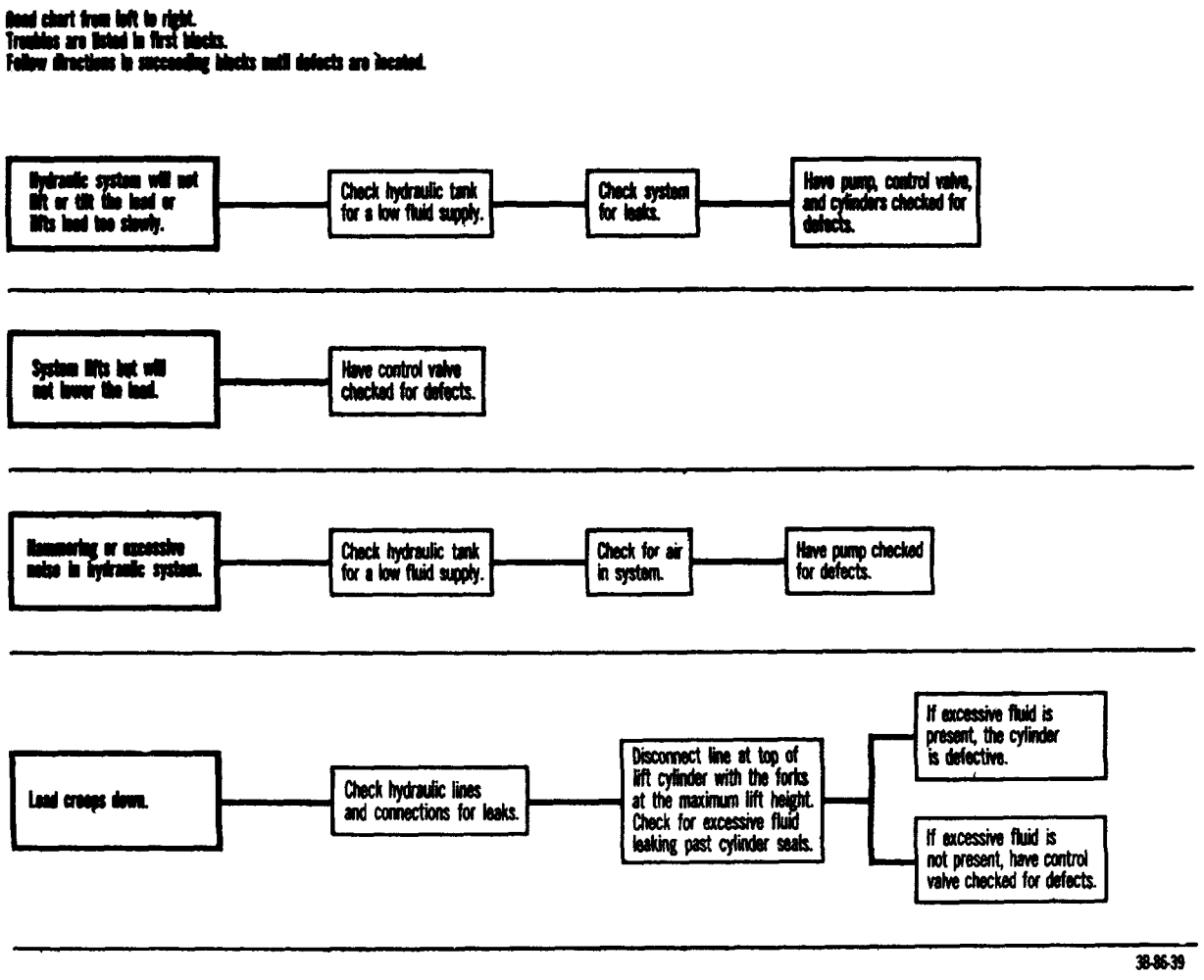


Figure 11. Hydraulic troubleshooting chart.

Section IV. ENGINE (GROUP 01)

17. General

The engine is a six-cylinder, four-stroke cycle, L-head, gasoline type. It is provided with a full-pressure, force-feed lubricating system. Engine temperature is controlled by a bypass thermostat, an impeller-type water pump, and a cored cylinder head. The engine is illustrated in figures 12, 13, and 14.

18. Cylinder Hood

The cylinder head contains the combustion chambers and cored passages for water flow. Refer to figure 15 and remove the cylinder head as follows.

a. Removal.

(1) Drain the cooling system by opening a drain valve at the bottom of the radiator and another just under the generator on the engine block.
(2) Loosen the hose clamps on the upper radiator hose (1) and remove the hose from the water outlet elbow (2).
(3) Disconnect the water recirculating tube (9) between the elbow and the water body.
(4) Disconnect and tag all spark plug wires.

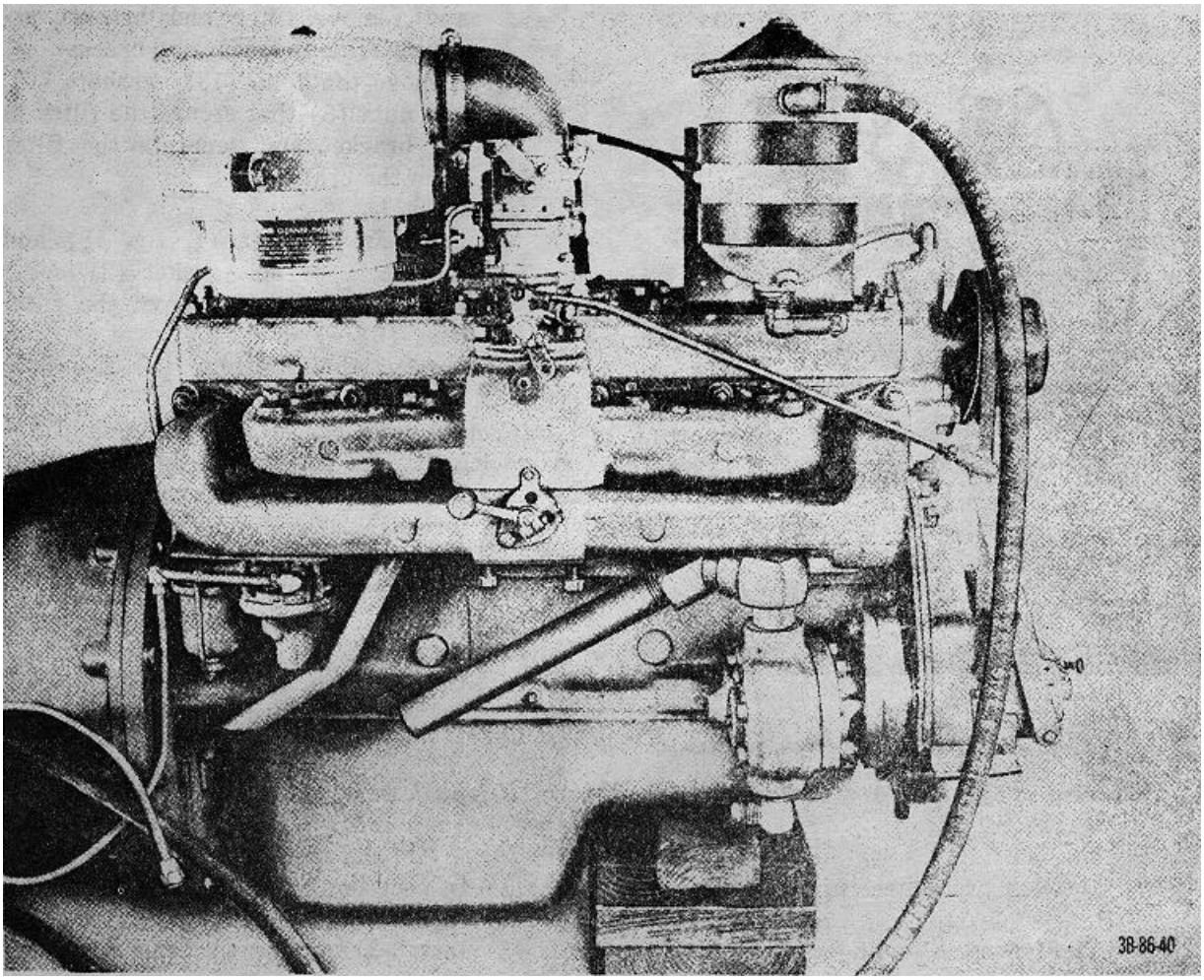


Figure 12. Engine removed from truck, left view.

(5) Remove the nuts that secure the transmission oil filter bracket (3) to the head (6) and lay the bracket assembly to one side.
(6) Remove the nuts that secure the distributor (4) to the head and lay the distributor to one side.
(7) Remove the nuts that secure the coil and air cleaner bracket (5) to the head and lay bracket assembly to one side.
(8) Unscrew and remove the temperature sending unit (7) from the head.
(9) Remove the nuts that secure the engine oil filter bracket (8) to the head and lay the bracket assembly to one side.
(10) Remove the nuts and lockwashers that secure the head to the block and remove from the truck.
(11) Remove the gasket from the block.
(12) Unscrew and remove the stud from the block if necessary.

b. Clearing and Inspection.

(1) Remove all carbon from combustion areas, using a scraper and wire brushes.
(2) Clean the cylinder head thoroughly with SD.
(3) Make sure that gasket contact surfaces on the head and block are clean, smooth, and flat.

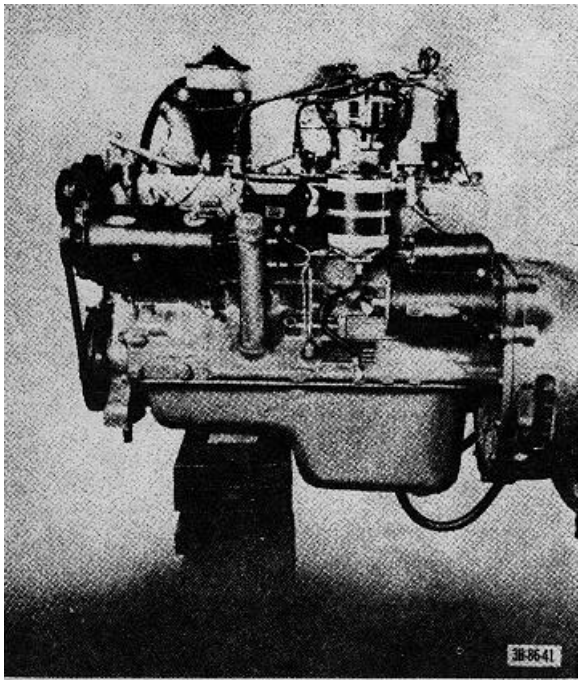


Figure 13. Engine removed from truck, tight view.

(4) Inspect the head for cracks, holes, or warpage.

c. Installation.

(1) Reverse procedures in *a* above, using a new gasket.

(2) Tighten each cylinder head nut to 35 to 40 foot-pounds torque, following the sequence in figure 16.

19. Engine Oil Filter Assembly

Refer to figures 17 and 18 and remove the engine oil filter as follows:

a. Removal.

(1) Remove the oil pressure switch transmitter from the oil filter.

(2) Disconnect the inlet oil tube assembly (14, fig. 18) at the fitting (15) on the filter.

(3) Disconnect tile outlet hose assembly (7) at the engine crankcase.

(4) Remove the outlet hose assembly from the filter if necessary.

(5) Remove the bolts (11) and lockwashers (12) that secure the filter bracket (10) to the mounting bracket 52 and remove filter and bracket assembly from the mounting bracket.

(6) Remove the bolts (13), washers (9), and nuts (8) that secure the filter in the bracket and separate the filter from the bracket.

b. Disassembly.

(1) Unscrew the bolt. (1, fig. 18) and remove cover bolt gasket (2), cover (3), and gasket (4) from the filter body (6).

(2) Remove the cartridge (5) from the body.

c. Cleaning and Inspection. Clean the filter body with SD and inspect the filter assembly for cracks, broken mounting bracket, or stripped threads.

d. Assembly. Reverse procedures in *b* above using a new cartridge and gasket.

e. Installation. Reverse procedures in *a* above.

20. Oil Filter Cartridge

a. Removal. Remove the cartridge from filter assembly (par. 19b).

b. Inspection and Installation.

(1) Inspect the oil filter for oil seepage.

(2) Inspect the hose and fittings for leaks.

(3) Install a new element and gasket by reversing procedures in paragraph 19b.

21. Oil Pan and Gasket

a. Removal.

(1) Remove oil pan drain plug and drain the oil pan.

(2) Remove the bolts and lockwashers that secure the pan to the block and remove the pan and gaskets.

b. Cleaning. Clean the pan by washing in SD and scraping sludge and carbon from the pan.

c. Installation.

(1) Make certain that gasket surfaces are flat and clean.

(2) Install the oil pan by reversing procedures in *a* above using new gaskets.

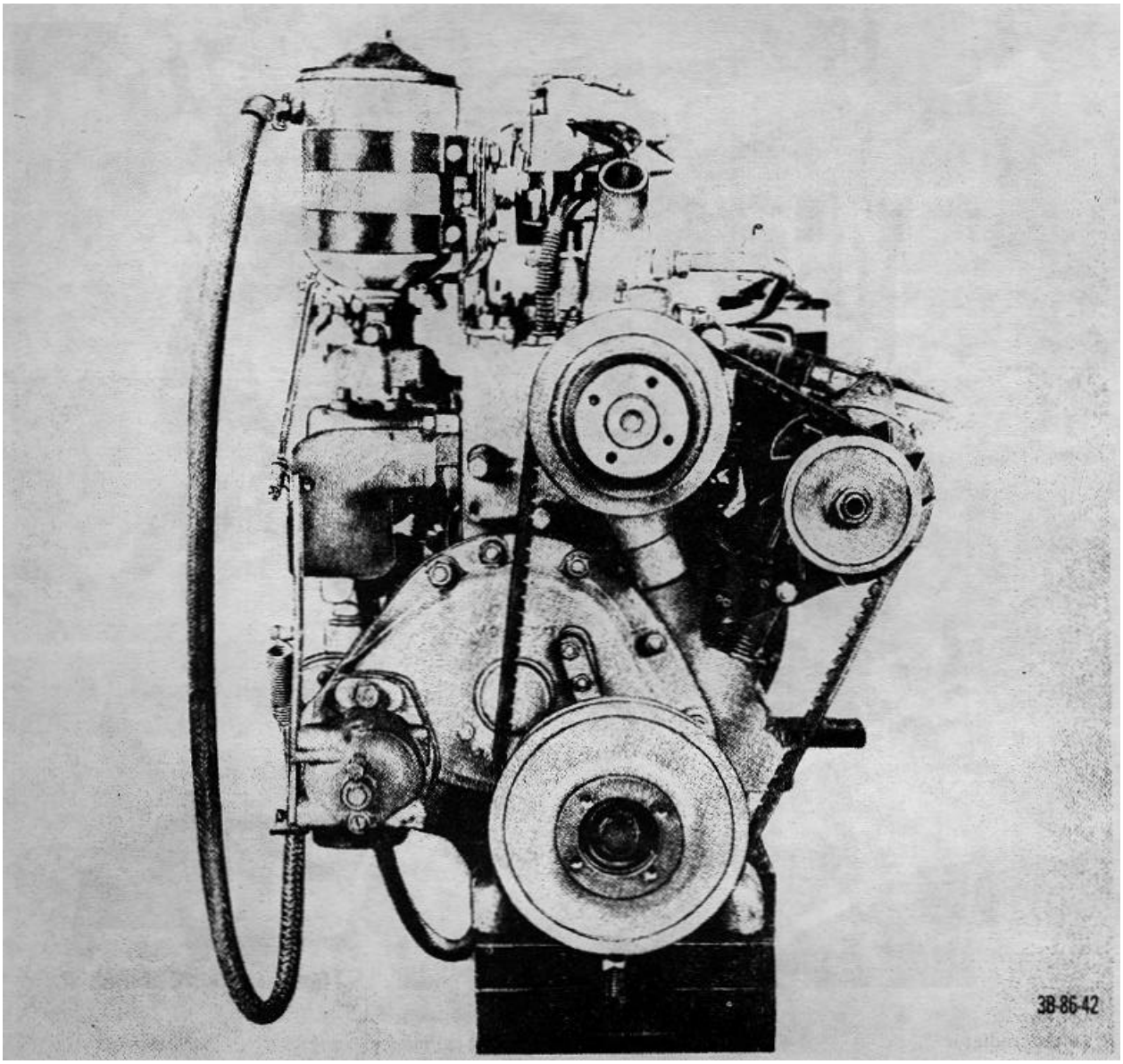


Figure 14. Engine removed from truck, rear view.

22. Manifolds

a. Removal.

(1) Remove the carburetor (par. 26).

(2) Remove the muffler and exhaust elbow (par. 33).

(3) Unscrew the nuts and washers that secure the manifolds to the engine and remove the manifolds and gasket.

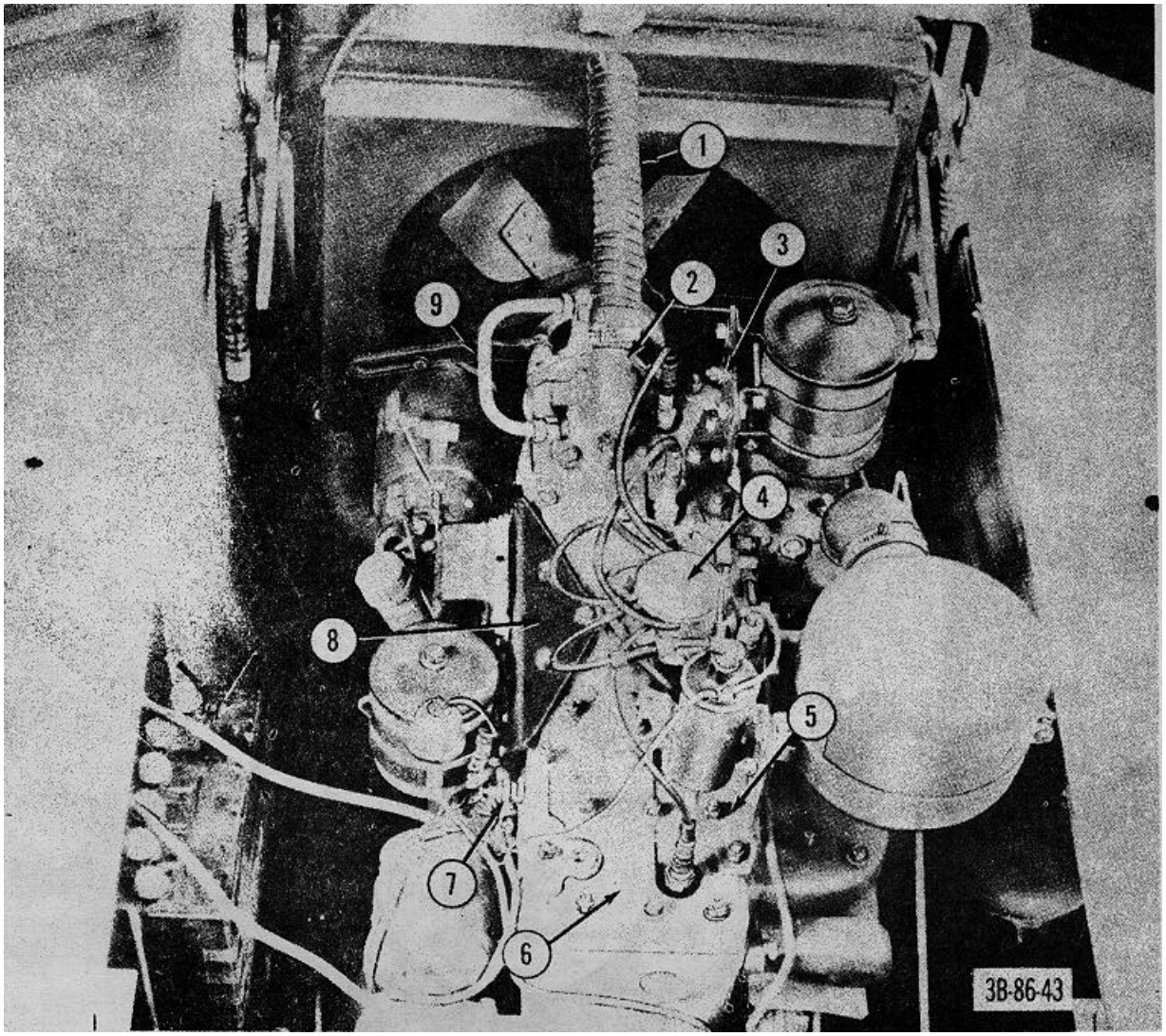
(4) Separate the intake and exhaust manifolds.

(5) Remove the heat control (par. 34).

b. Installation.

(1) Reverse procedures in a above, using new gaskets.

(2) Be sure the intake and exhaust manifolds are securely attached to engine before tightening exhaust elbow to manifold.



1 Hose, radiator
2 Elbow, water outlet
3 Bracket, transmission oil filter
4 Distributor
5 Bracket, saddle, coil and air cleaner
6 Head, cylinder
7 Unit, temperature sending
8 Bracket, engine oil filter
9 Tube, water recirculating

Figure 15. Engine installed on truck, top view.

23. Valves and Valve Cover

a. Removal of Cover.

(1) Disconnect the carburetor linkages at carburetor.
(2) Disconnect the air cleaner hose at carburetor.
(3) Disconnect the fuel line at carburetor.
(4) Remove the muffler and exhaust elbow (par. 33).
(5) Unscrew the nuts and washers that secure manifolds to engine and remove manifolds, gasket, and carburetor.
(6) Remove the nuts and gaskets that secure valve cover to engine and remove the cover and gasket.

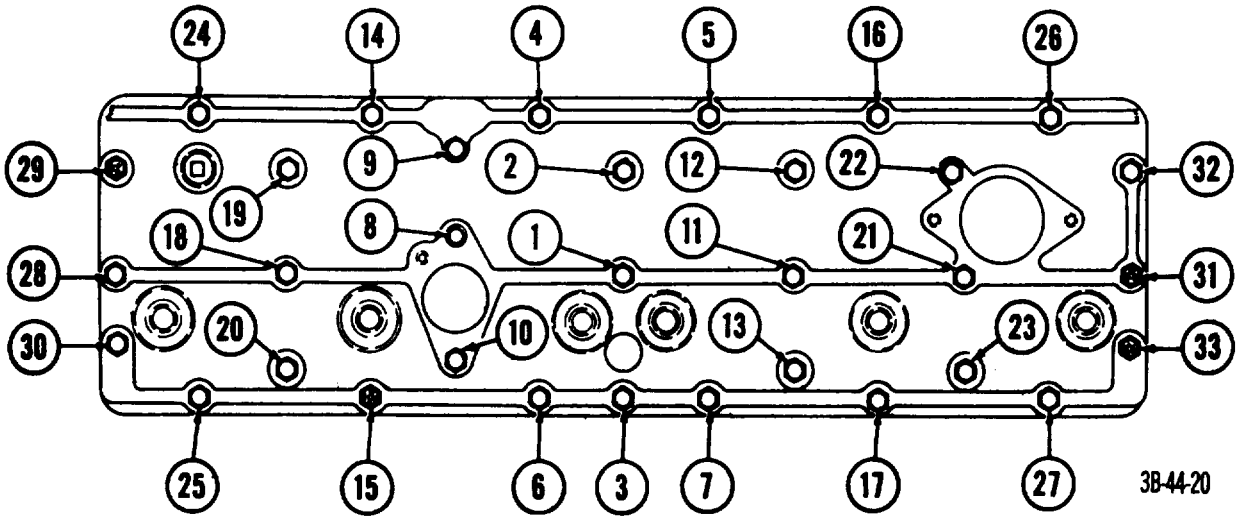


Figure 16. Cylinder head nut tightening sequence.

b. Adjustment of valves.

(1) Using a 1/2-inch valve tappet wrench and a 9/16-inch valve tappet wrench and a 0.014-inch feeler gage, adjust the valves (fig. 19) of the cylinders in the order of 1 6-24.

(2) Turn the engine until the piston moves to top dead center on the compression stroke. The intake and exhaust valves will be in fully closed position.

(3) Slide a feeler gage between the valve tappet adjusting screw and valve stem, A slight drag should be felt with feeler gage when clearance is correct.

(4) To increase clearance, hold valve lifters and turn the adjusting screw to the right.

(5) To decrease clearance, hold the valve lifters and turn the adjusting screw to the left.

c. Installation of Cover.

(1) Clean the cover with SD.

(2) Reverse procedures in a above to install cover and use a new gasket.

24. Compassion Test

The compression test is performed to aid in determining the condition of the rings and valves and to determine whether the cylinder head gasket is leaking., It is performed as follows:

a. Start the engine and allow it to idle until it reaches normal operating temperature.

b. Remove the spark plugs.

c. With the engine at normal operating temperature and the throttle and choke valves fully open, install a compression gage in the spark plug hole.

d. Rotate the engine at normal cranking speed (six revolutions will be sufficient) to obtain maximum compression. Be sure the battery is fully charged and do not rotate the engine more than is necessary to obtain the maximum reading.

e. Check the gage for proper reading (at sea level) of 130 psi. Table II lists the compression readings for sea level and for altitudes of 1,000 to 10,000 feet above sea level.

f. Repeat the testing procedure for each cylinder.

g. Remove the gage, and install the spark plugs.

Table II. Compression Readings

Altitude above e level (in feet)	Proper pressure reading (in PSI)
Sea Level	130
1,000	126.6
2,000	119.8
8,000	116.2
4,000	109.8
5,000	104.4
6,000	100.0
7,000	94.9
8,000	90.3
9,000	85.8
10,000	81.4

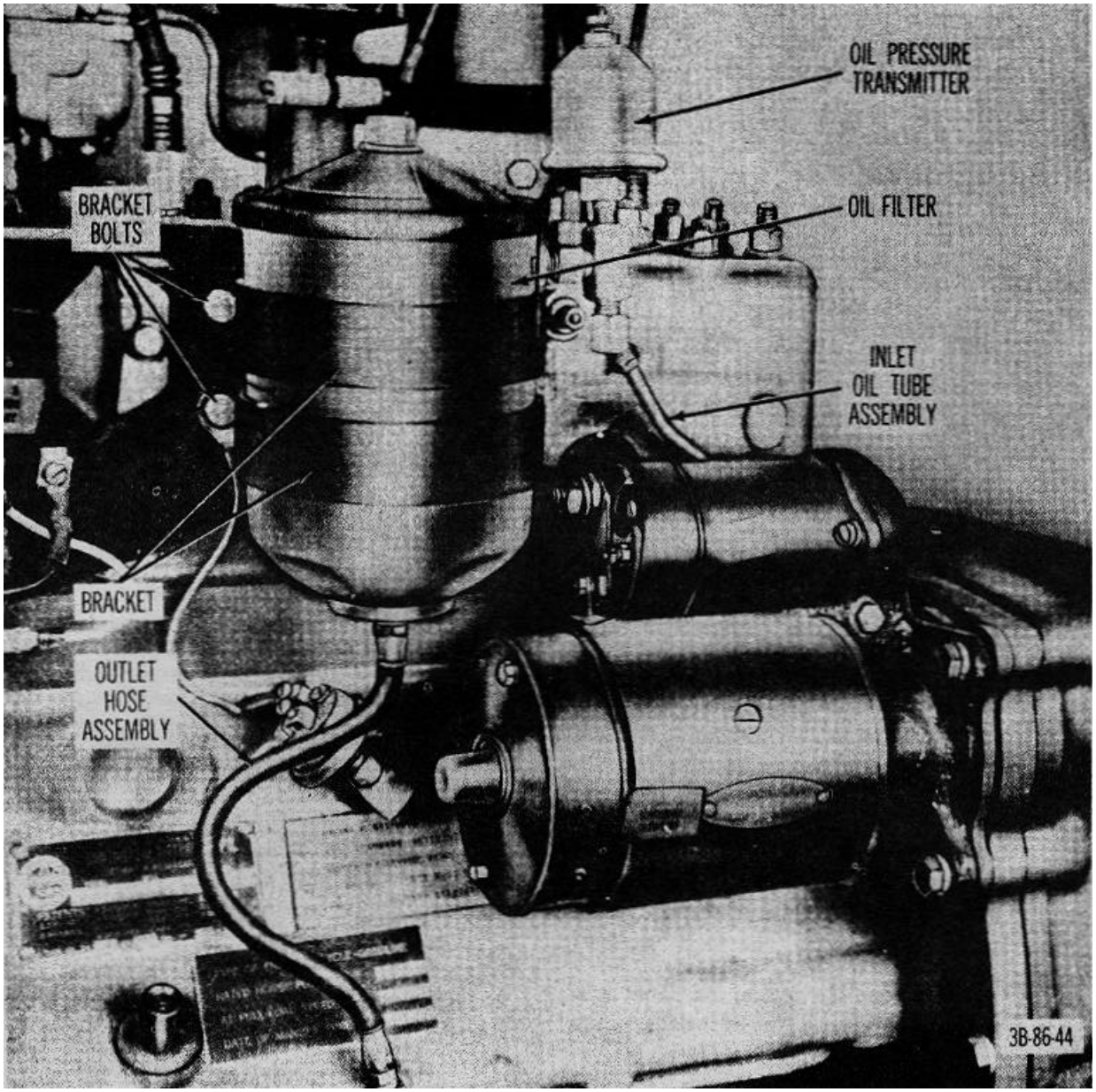


Figure 17. Engine oil filter, mounted on engine.

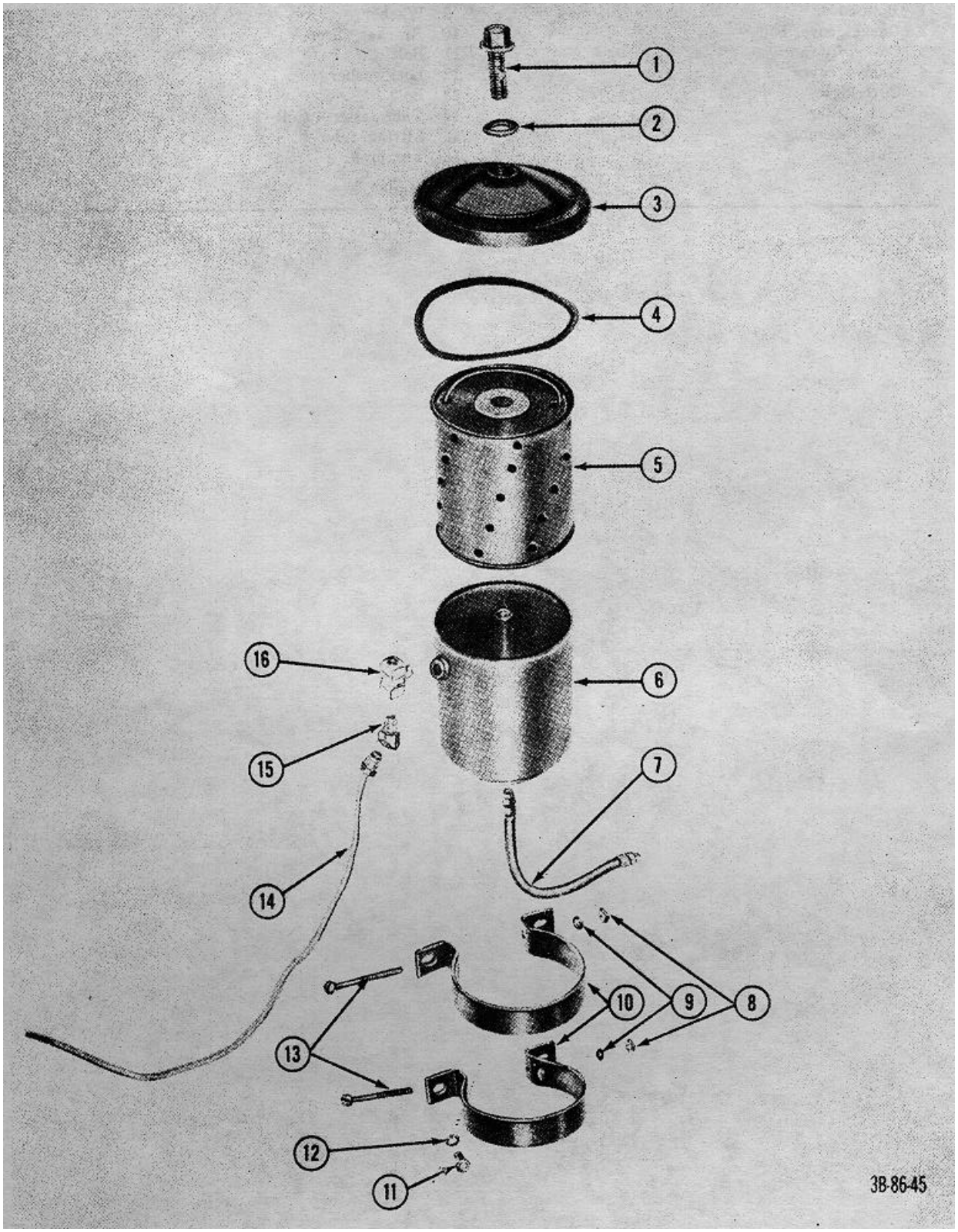


Figure 18. Engine oil filter, exploded view.

1 Bolt, cover
2 Gasket, cover bolt
3 Cover, filter
4 Gasket, cover
5 Cartridge
6 Body, filter
7 Hose assembly
8 Nut
9 Washer
10 Bracket, filter
11 Bolt
12 Lockwasher
13 Bolt
14 Tube assembly, oil
15 Fitting, tube
16 Tee, pipe

Figure 18-Continued.

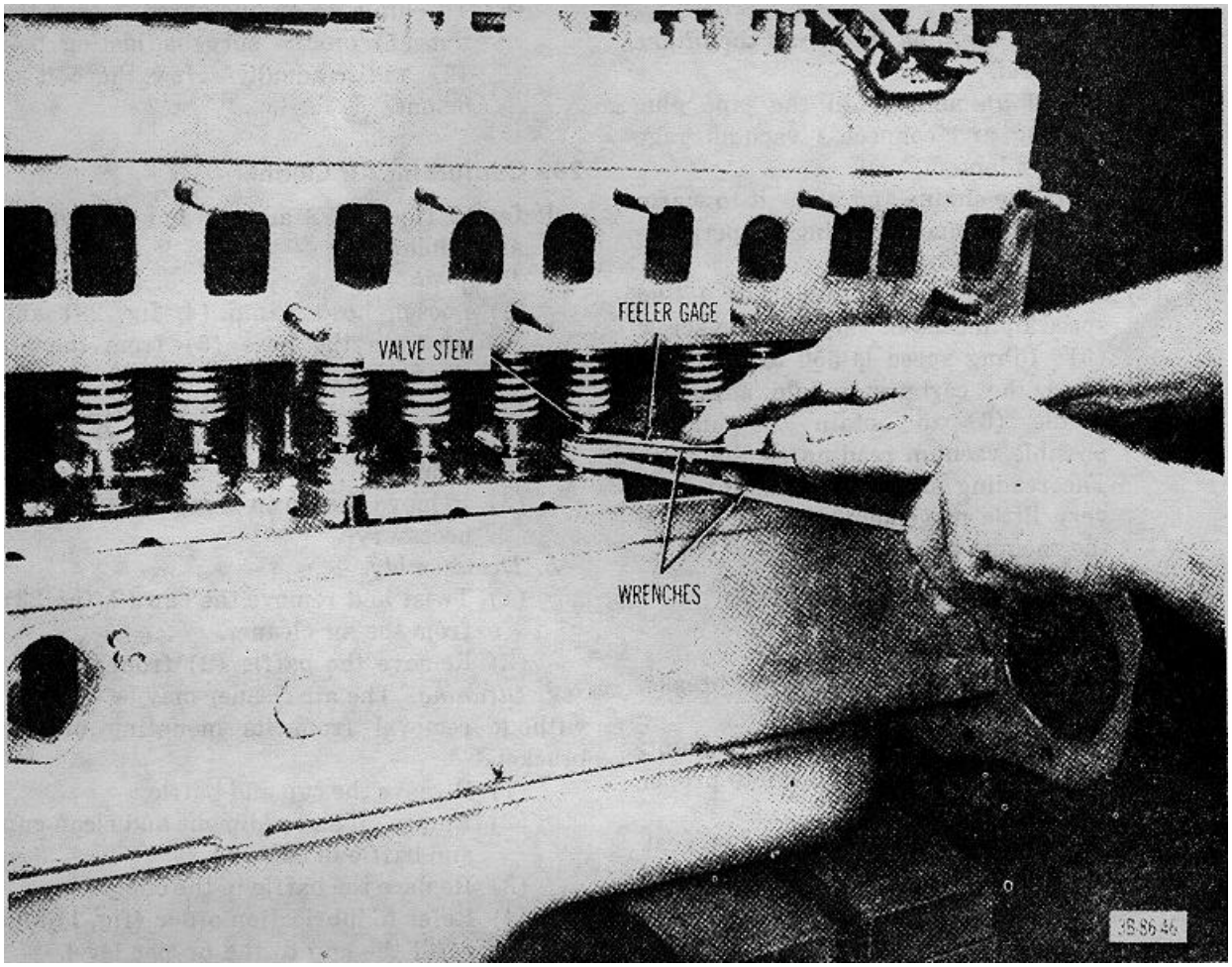


Figure 19. Adjusting the valves.

Section V. FUEL SYSTEM (GROUP 03)

25. General

The fuel system consists of a fuel tank, a mechanical fuel pump, a fuel gage sending unit, a carburetor oil bath air cleaner, a down-draft carburetor, and a centrifugal ball-type governor.

26. Carburetor

a. Removal.

(1) Disconnect the fuel line at the carburetor.

(2) Disconnect and separate the air cleaner hose (1, fig. 20) from the carburetor.

(3) Disconnect the choke control linkage (2) at the carburetor.

(4) Disconnect the governor control linkage (4) at the.

(5) Disconnect the accelerator control linkage (6) at the carburetor.

(6) Remove the nuts and lockwashers that secure the carburetor and remove the carburetor and gasket.

(7) Remove the studs from the manifold if necessary.

b. Installation. Reverse procedures in a above, using a new gasket.

c. Adjustment.

(1) Remove the pipe plug from the intake manifold.

(2) Install an adapter in the pipe plug opening and connect a vacuum gage to the adapter.

(3) Start the engine and allow it to warm up until normal operating temperature has been reached.

(4) Adjust the engine to normal idling speed by means of throttle stop screw (5). Idling speed is 550 to 600 rpm.

(5) Turn the carburetor idle adjusting needle (3) to obtain the highest possible vacuum reading on the gage. The reading should be constant with very little movement of the hand on the vacuum gage.

27. Governor

a. Inspection.

(1) Inspect the linkage for bends, breaks, and secure mounting.

(2) Inspect the governor for secure mounting and leaks. Report leaks to proper authority.

(3) Inspect the governor for broken seal.

(4) Check the engine for proper governed speed of 2,200 rpm under load and 2,400 rpm without load.

b. Adjustment. Refer to figure 21 and adjust governor as follows:

(1) Install a tachometer on the engine.

(2) With engine at normal operating temperature, accelerate engine and check for governed speed of 2,200 rpm under load and 2,400 rpm without load.

(3) If adjustment is needed, remove the seal wire (6), loosen the nut (4) on the eyebolt and change the tension on the governor spring (7) by turning the adjusting nut (5).

(4) Increase the tension on the governor spring to permit an increase in engine speed. Decrease the tension on the governor spring to allow for a decrease in governed engine speed. When desired adjustment is obtained, tighten the nut (4) on the eyebolt.

(5) Replace the seal wire.

(6) To eliminate engine surge, loosen the nut (1) on the surge adjusting bolt (2) and gradually screw the bolt in or out.

28. Carburetor Air Cleaner

Refer to figures 22 and 23 and remove air cleaner as follows:

a. Removal.

(1) Loosen hose clamp (4, fig. 23) and separate the hose (6) from the air cleaner (1).

(2) Unscrew the bolt on the strap (fig. 22) and slide air cleaner from the strap.

(3) Remove the strap from the bracket if necessary.

b. Disassembly.

(1) Twist and remove the cup (3, fig. 23) from the air cleaner.

(2) Remove the baffle (2) from the cup.

c. Cleaning. The air cleaner may be serviced without removal from its mounting on the bracket.

(1) Remove the cup and baffle.

(2) Empty oil and sediment and clean cup and baffle in SD.

(3) Replace the baffle in the cup.

(4) Refer to lubrication order (fig. 1) and refill the cup to the proper level.

(5) Reinstall cup and baffle in air cleaner.

d. Assembly. Reverse procedures in b above.

e. Installation. Reverse procedures in a above.

29. Fuel Pump Assembly

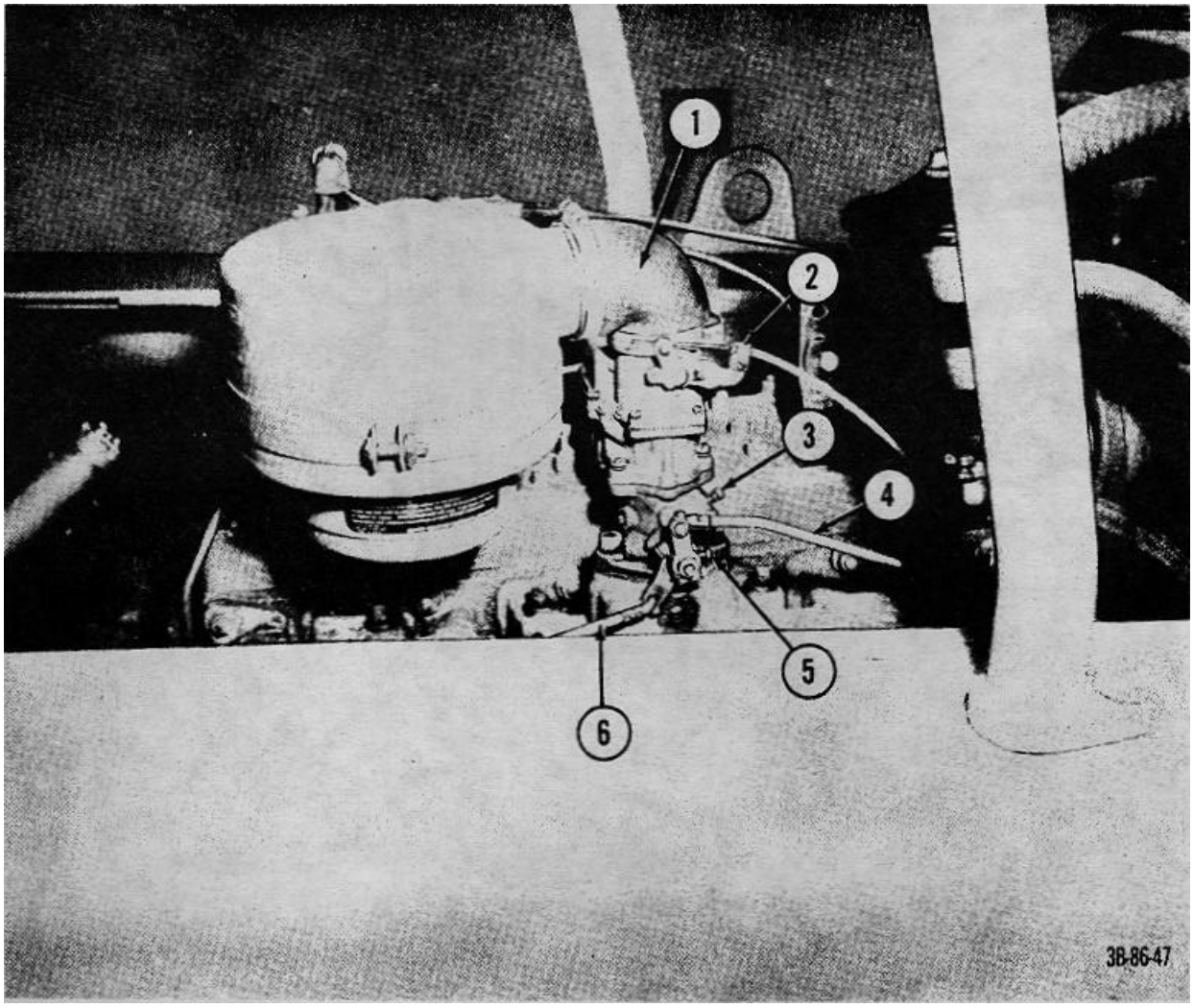
a. Inspection and Cleaning.

(1) Inspect the fuel pump assembly (fig. 24) for cracks, breaks, leaks, and secure mounting.

(2) Loosen the nut that secures bowl to pump, swing the bail to one side, and remove the bowl and the screen.

(3) Clean the bowl thoroughly with SD and be sure no sediment or lint remains in the bowl or on the screen.

(4) Replace the gasket, screen, and bowl. Swing the bail back in place and tighten the nut.



1 Hose, air cleaner
2 Linkage, choke control
3 Needle, idle adjusting
4 Linkage, governor control
5 Screw, throttle stop
6 Linkage, accelerator pedal control

Figure 20. Carburetor installed on truck.

b. Removal.

(1) Turn off the shutoff valve at the fuel tank.

(2) Disconnect the tank-to-pump fuel line at the fuel pump.

(3) Disconnect the carburetor-to-pump fuel line at the fuel pump.

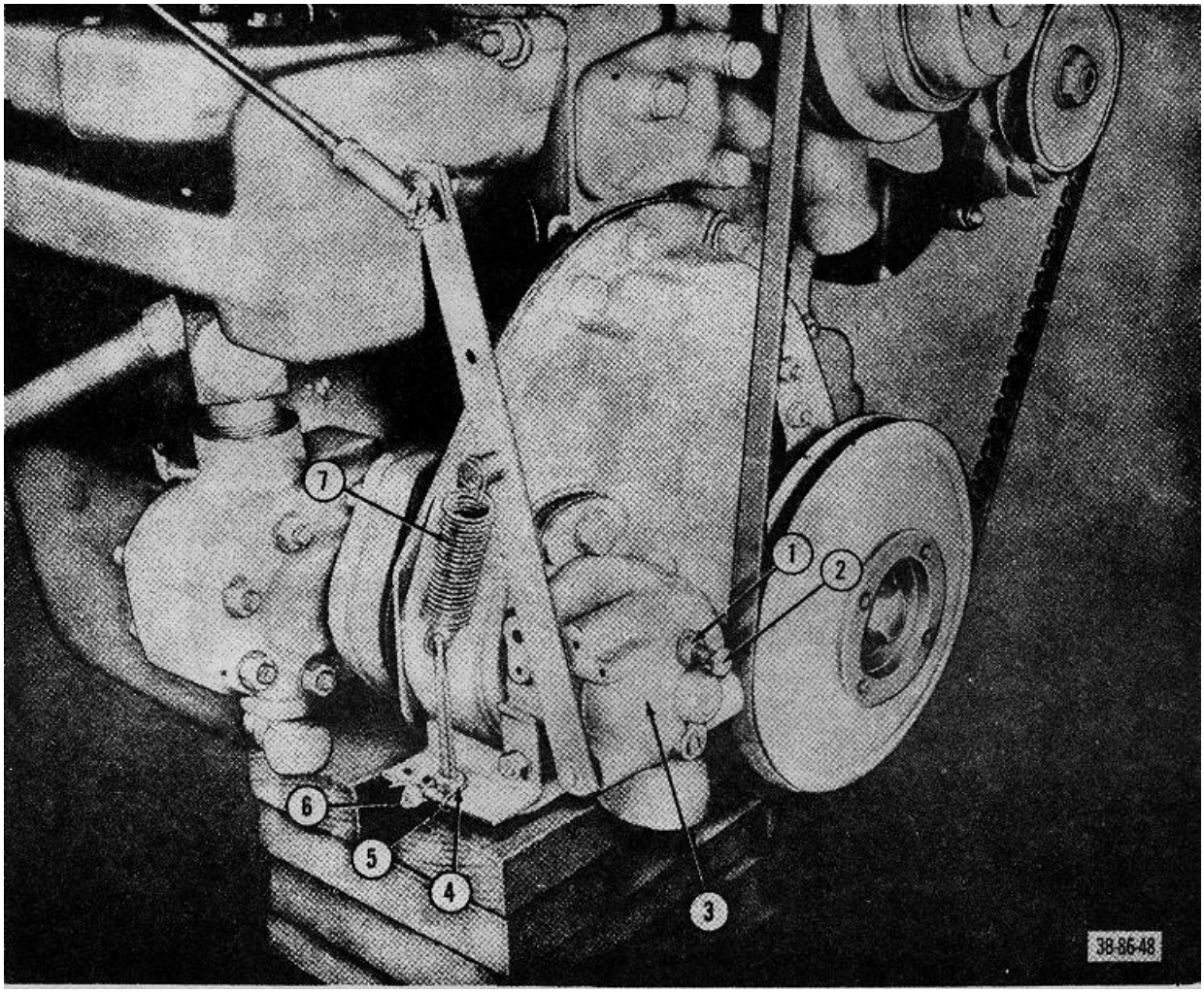
(4) Remove the nuts and lockwashers that secure the pump to the engine and remove the pump and gasket.

c. Installation. Reverse procedures in a above, using a new gasket.

d. Static Pressure Test. To perform the static pressure test on the fuel pump proceed as follows:

(1) Disconnect the fuel line at fuel pump.

(2) Install the necessary adapter and fitting in pump outlet, and attach a pressure gage with rubber tubing.



1 Nut
2 Bolt, surge adjusting
3 Governor
4 Nut
5 Nut, adjusting
6 Wire, seal
7 Spring

Figure 21. Governor installed on truck.

(3) Run the engine at 500 revolutions per minute on the fuel remaining in the carburetor.

(4) The reading on the gage is the static pressure of the fuel pump, and this reading should be 3 pounds per square inch, which is maximum. The length of hose on the pressure gage should not exceed 6 inches, since inaccurate readings may result if longer hose is used between the pump fitting and gage.

30. Fuel Tank

a. Removal.

(1) Remove the floor panels and seat support from the truck.

(2) Drain the fuel from the tank.

(3) Remove the cap assembly (1, fig. 25) from the tank (18).

(4) Disconnect the fuel gage wire (5, fig, 26) at tank.

(5) Unscrew and disconnect the line assembly (1) at the shutoff valve.

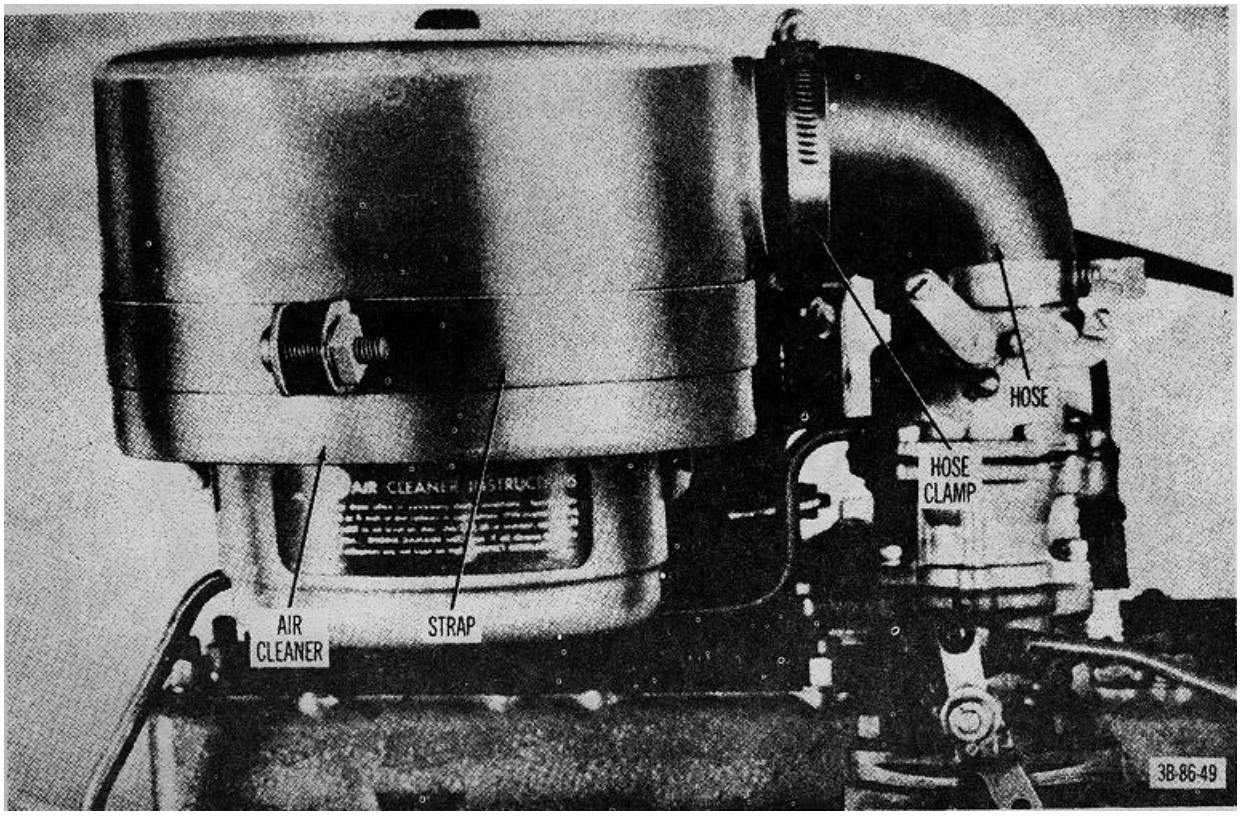


Figure 22. Air cleaner installed on truck.

(6) Unscrew and remove the washer (14, fig. 25), lockwasher (15), and capscrews (16) that secure clamps (12 and 19) to the truck and remove the clamps.

(7) Disconnect and remove the throttle rod (2, fig. 26) from the truck.

(8) Turn the tank on end (fig. 27) and remove the tank from the truck.

(9) Unscrew and remove the shutoff valve (11, fig. 25) and fitting (10) from the tank.

(10) Remove the screws (4, fig. 26) and lockwashers that secure gage (3) to the tank and remove gage, being careful not to damage the float.

(11) Remove the drain plug (17, fig. 25) from the tank.

b. Installation. Reverse procedures in a above.

c. Cleaning.

(1) Clean the outside of the fuel tank with SD.

(2) Clean the inside of the fuel tank with SD and then drain. Allow the fuel tank to dry before refilling it with fuel.

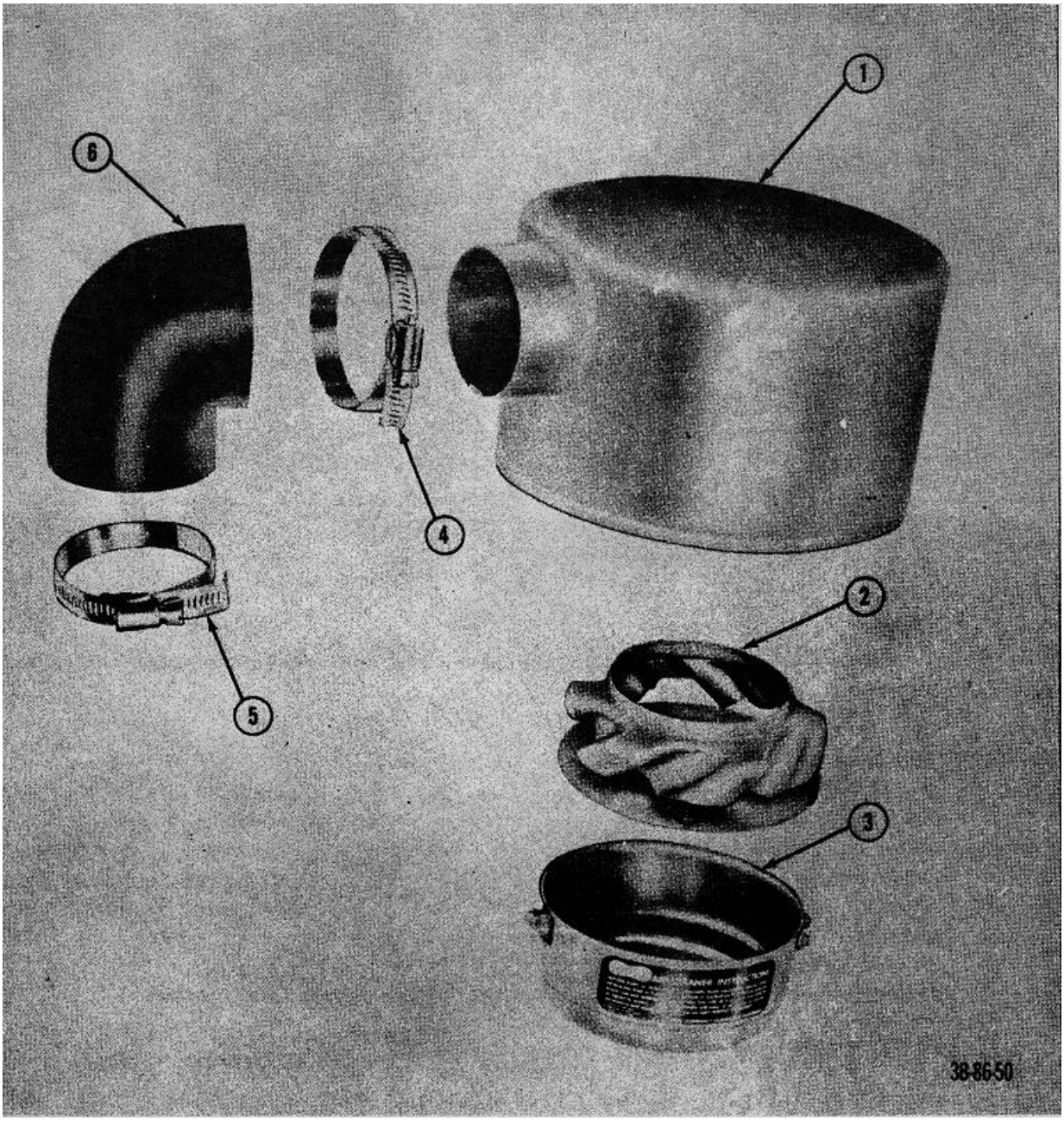
31. Throttle Pedal and Linkage

a. Removal.

(1) Remove the rear floor plate.

(2) Disconnect the throttle rod (7, fig. 28) at the throttle crank (12) by removing the cotter pin (11) from the pin (10) and removing the pin from the rod end (4).

(3) Disconnect the throttle rod at the carburetor and remove rod from the truck.



1 Cleaner, air
2 Baffle
3 Cup assembly
4 Clamp, hose
5 Clamp, hose
6 Hose

Figure 23. Air cleaner assembly, exploded view.

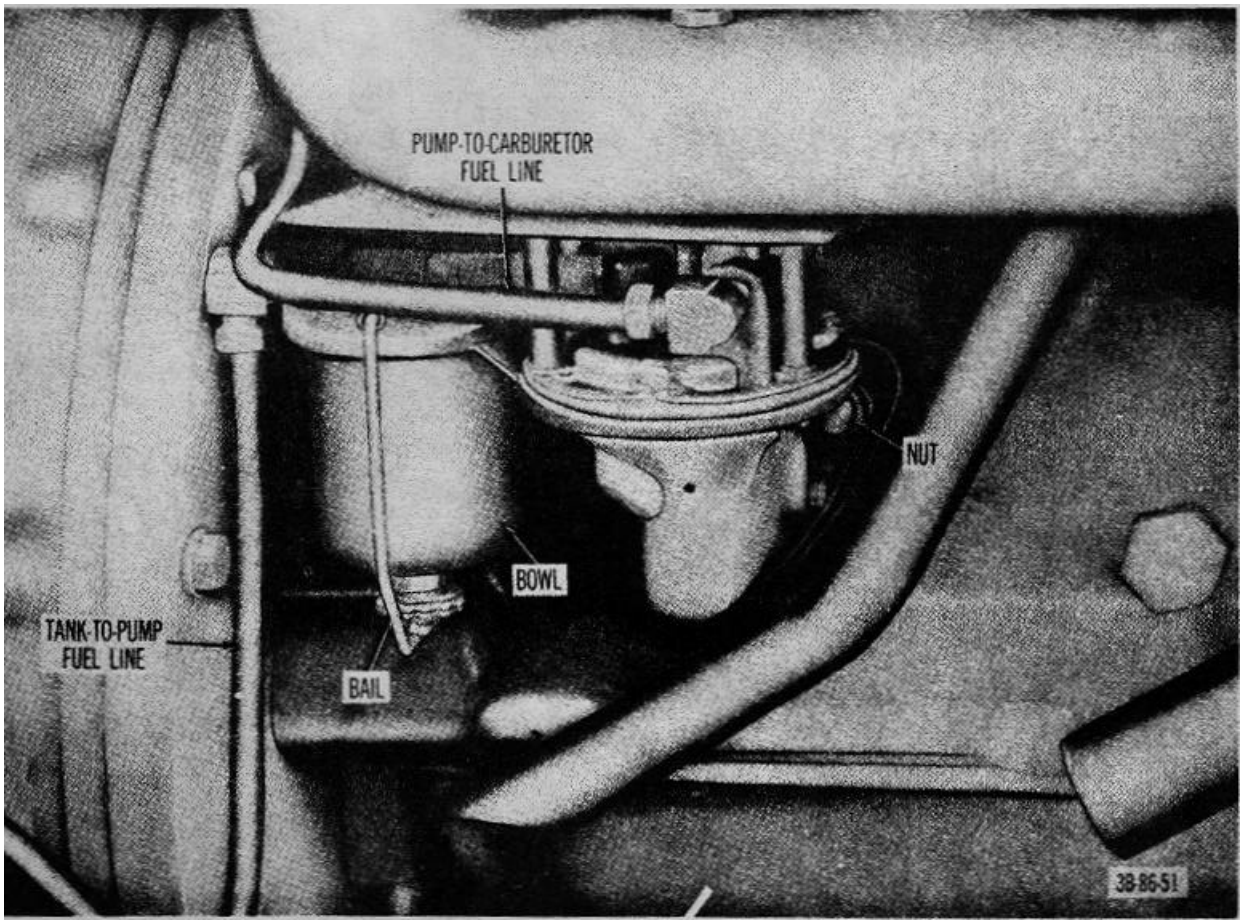


Figure 24. Fuel pump installed on truck.

(4) Remove the front floor board with the pedal assembly.

(5) Unscrew the capscrew (3), lockwasher (2), and nut (16) that secure pedal (1) to the lever (15) and remove the pedal.

(6) Remove the roll pin (17) that secures the lever to the crank and remove the washer (18) and lever from the end of the crank.

(7) Remove the roll pin (13) and washer (14) that secure crank to the floor plate.

(8) Disconnect the spring (9) and remove the crank from the plate.

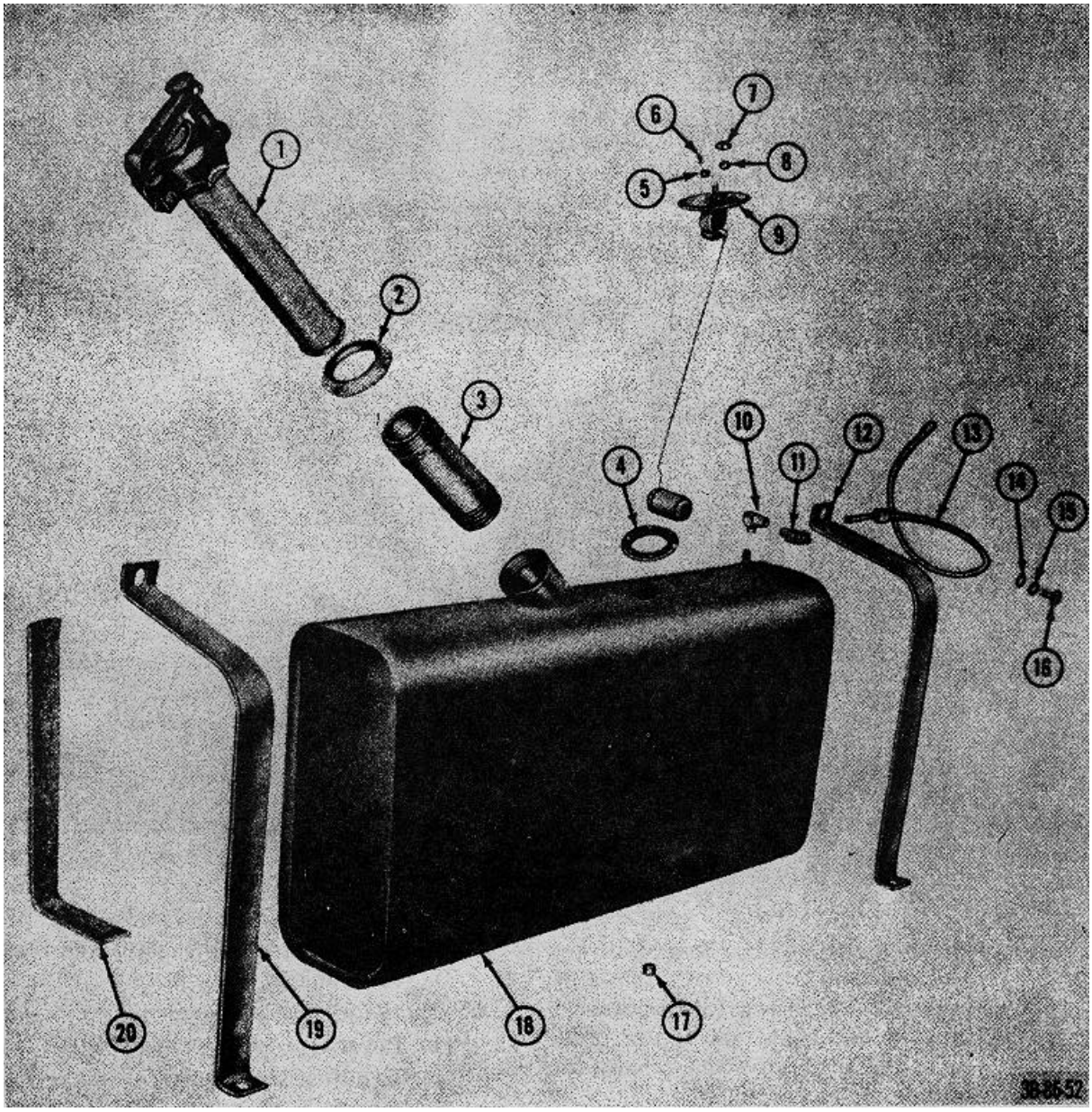
b. Installation and Adjustment.

(1) Reverse procedures in a above.

(2) To adjust the accelerator linkage, have the pedal in return position and the carburetor throttle in closed position and proceed as follows:

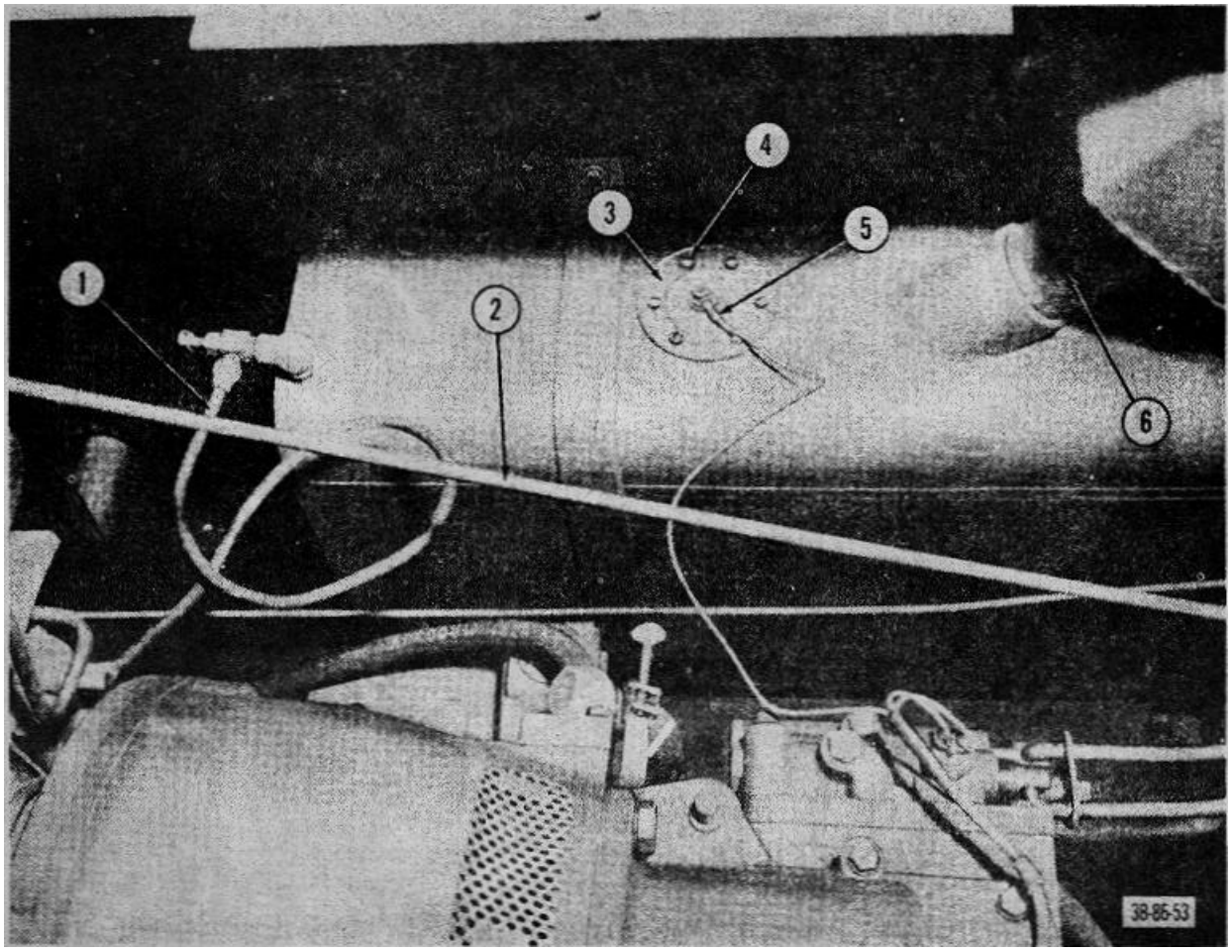
(*a*) Loosen the lock nut (6, fig. 28).

(*b*) Aline the rod end (4) with hole in crank, insert the pin (10) and secure with cotter pin (11).



1 Cap assembly
2 Washer, rubber
3 Fitting
4 Gasket
5 Lockwasher
6 Screw
7 Nut
8 Washer
9 Gage, fuel
10 Elbow
11 Valve, plug shutoff
12 Clamp
13 Line assembly
14 Washer, flat
15 Lockwasher
16 Capscrew
17 Plug
18 Tank, fuel
19 Clamp
20 Pad, felt

Figure 25. Fuel tank and attaching parts, exploded view.



1 Line assembly
2 Rod, throttle
3 Gage, fuel
4 Screw
5 Wire, fuel gage
6 Fitting

Figure 26. Fuel tank installed on truck.

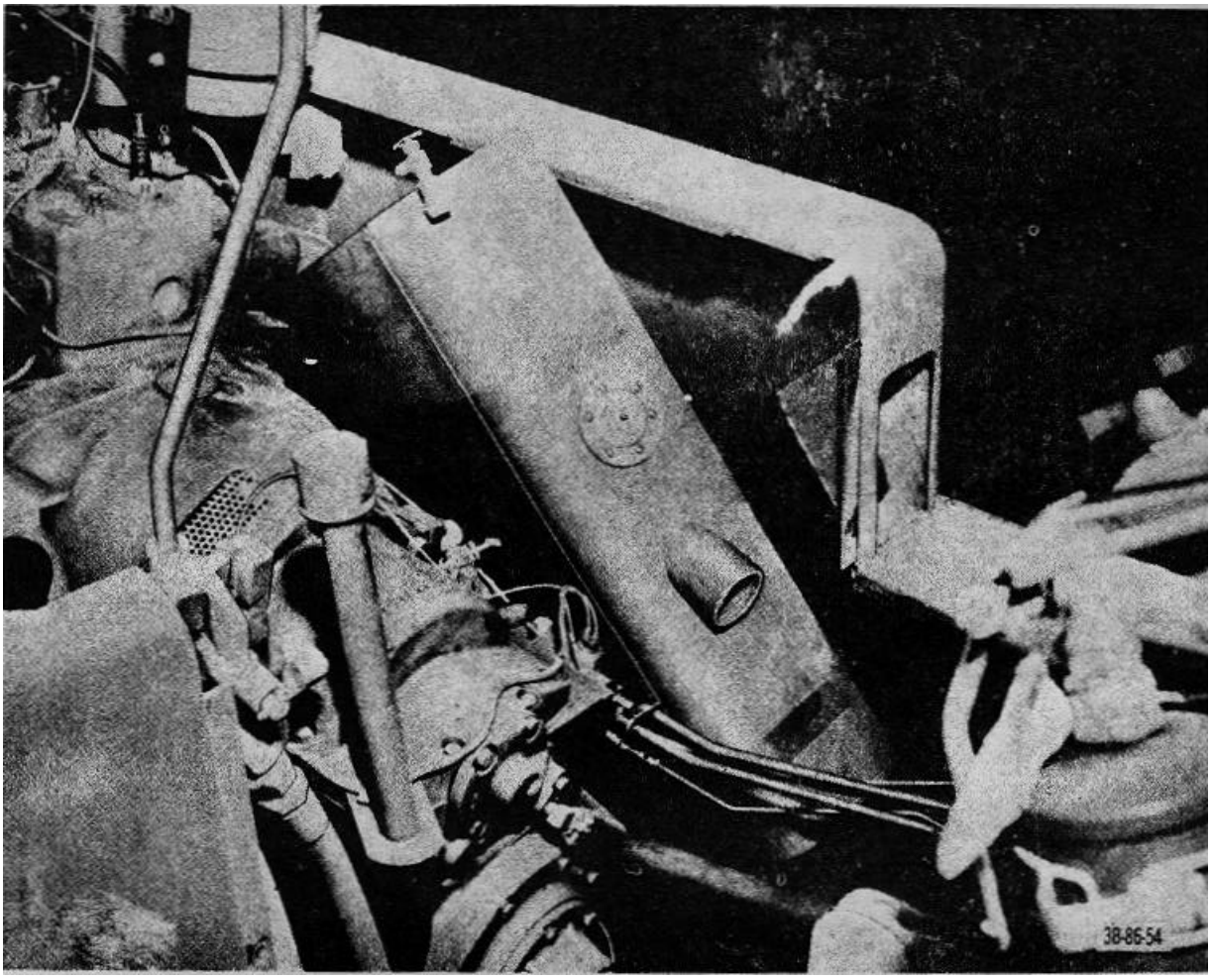
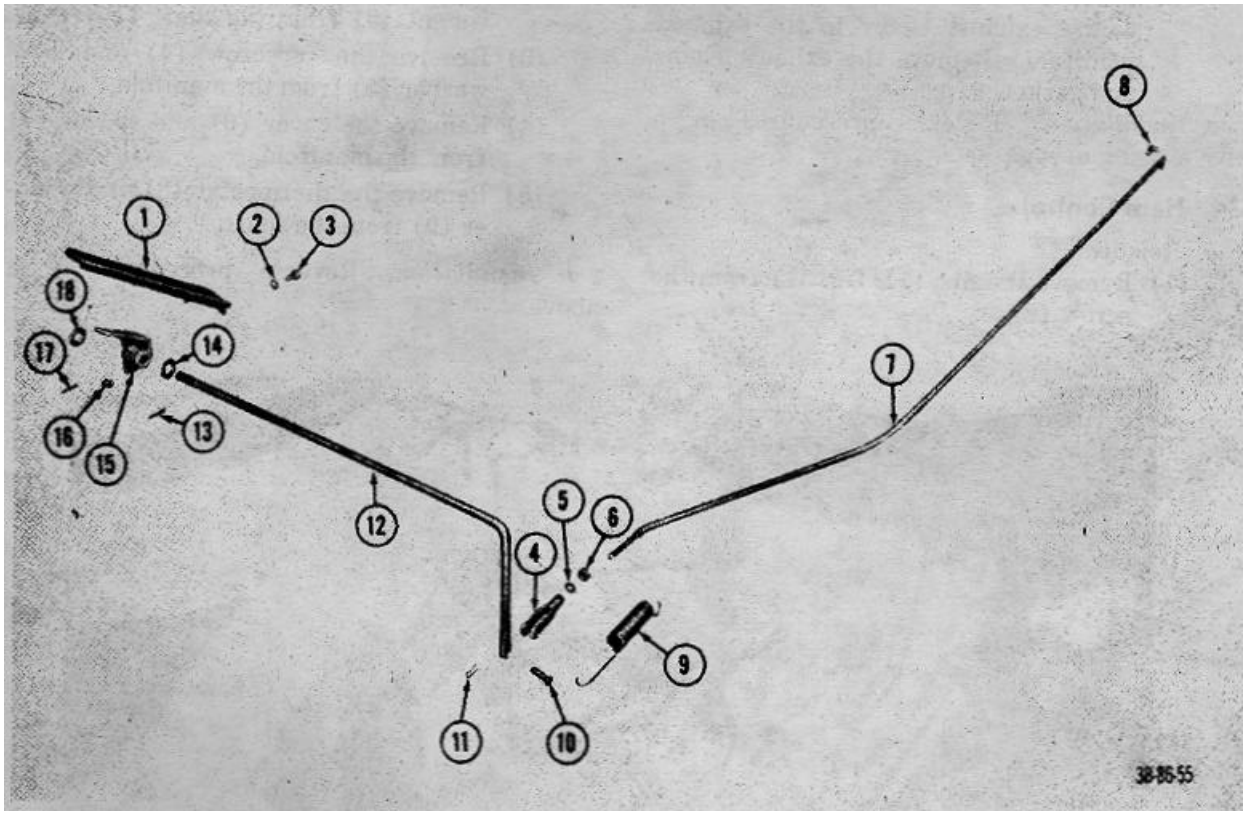


Figure 27. Removing fuel tank.



1 Pedal, throttle
2 Lockwasher
3 Capscrew
4 End, rod
5 Washer, flat
6 Nut
7 Rod, throttle
8 Clip, clevis
9 Spring
10 Pin, straight head
11 Pin, cotter
12 Crank, throttle
13 Pin, roll
14 Washer, flat
15 Lever, throttle pedal
16 Nut
17 Pin, roll
18 Washer, flat

Figure 28. Throttle pedal linkage, exploded view.

Section VI. EXHAUST SYSTEM (GROUP 04)

32. General

The exhaust system consists of a muffler connected to the manifold assembly by an exhaust elbow. A heat control valve, located in the exhaust manifold, deflects the hot gases in the manifold assembly upon starting to permit quicker vaporization of the fuel. As the manifold assembly reaches normal operating temperature, the heat control valve gradually opens.

33. Muffler and Exhaust Elbow

a. Inspection. Inspect the muffler and elbow for holes, cracks, dents, and secure- mounting.

b. Removal.

(1) Remove the capscrews (fig. 29) and lockwashers that secure the muffler to the manifold exhaust elbowv.

(2) Remove the muffler (fig. 30) and gasket from the truck.

(3) Remove the nuts and lockwashers that secure exhaust elbow to the exhaust manifold. Remove the exhaust elbow and gasket.

c. Installation. Reverse procedures in b above, using new gaskets.

34. Heat Control

a. Removal.

(1) Remove the nut (11, fig. 31) from the screw (2).

(2) Remove the key (1) and slide counterweight (3) from the shaft (10).

(3) Remove the capscrew (4) and lockwasher (5) from the manifold.

(4) Remove the cover (6) and spacer (7) from the manifold.

(5) Remove the thermostat (8) and washer (9) from the shaft.

b. Installation. Reverse procedures in a above.

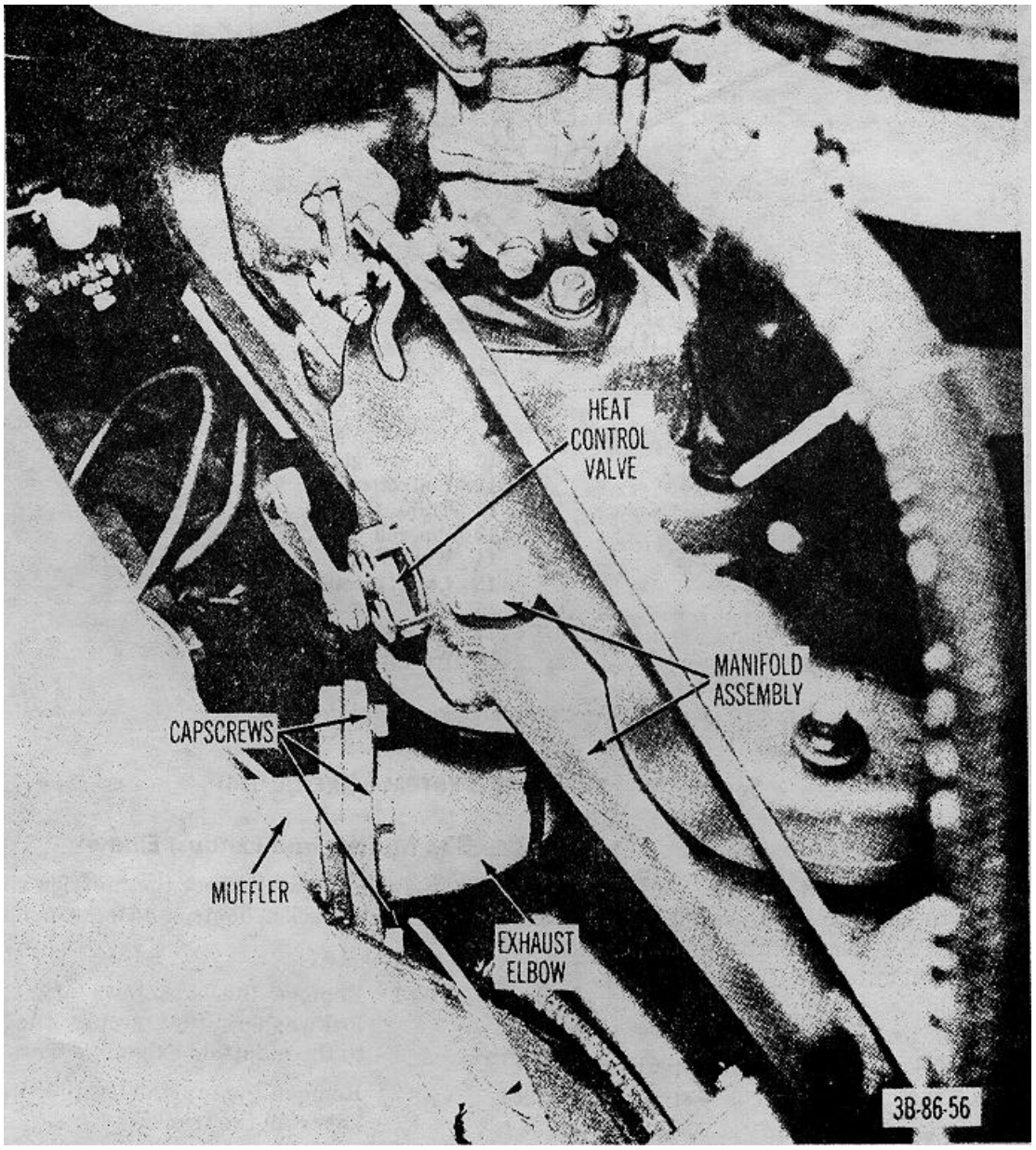


Figure 29. Exhaust elbow installed on truck.

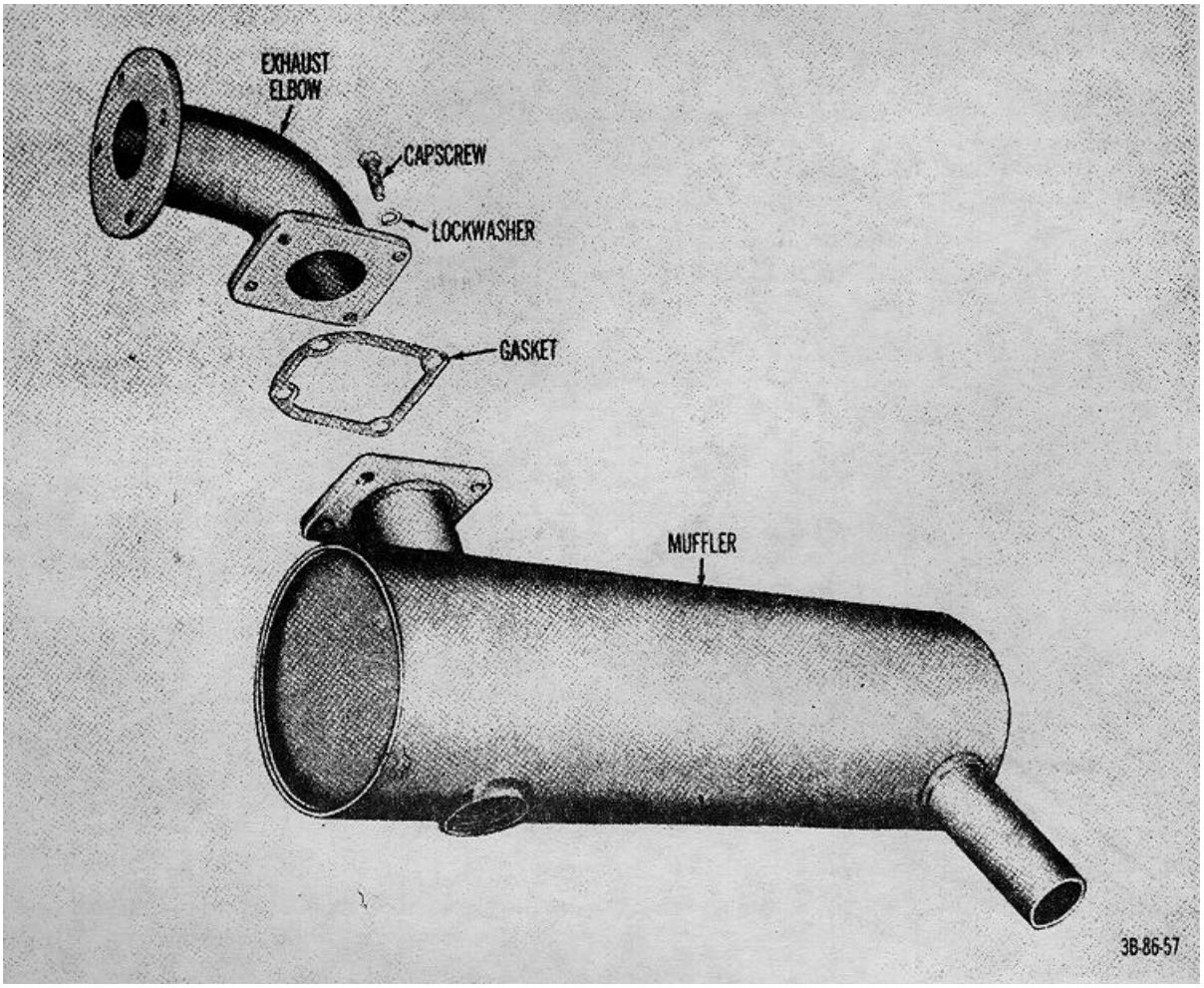
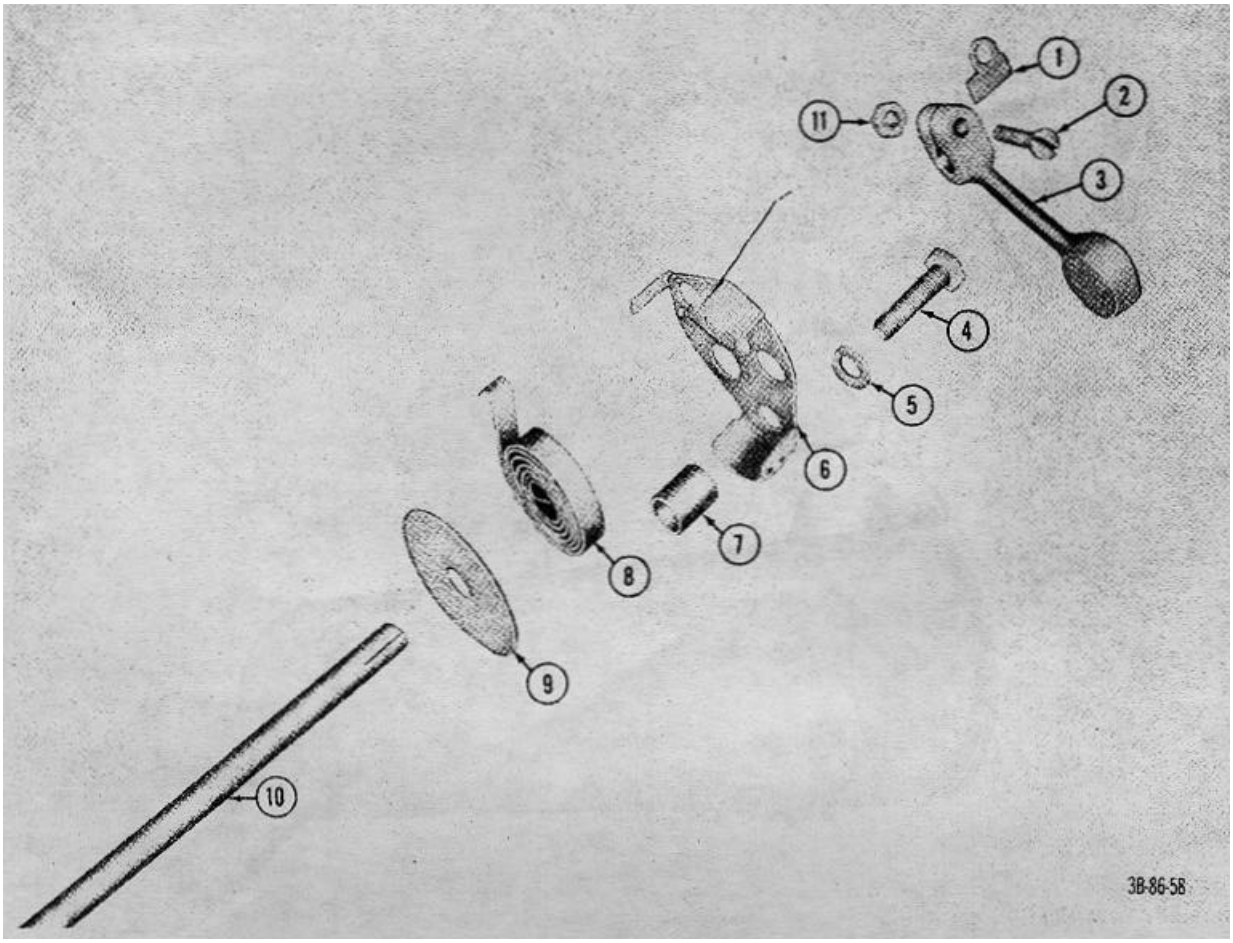


Figure 30. Muffler, exploded view.



1 Key
2 Screw
3 Counterweight
4 Capscrew
5 Lockwasher
6 Cover, thermostat
7 Spacer, cover
8 Thermostat
9 Washer, shield
10 Shaft
11 Nut

Figure 31. Heat control valve, exploded view.

Section VII. COOLING SYSTEM (GROUP 05)

35. General

The cooling system consists of a radiator, a water pump, a fan and a thermostat. The coolant picks up heat from the crankcase and cylinder head as it is circulated by the water pump through the engine. When the coolant temperature rises sufficiently, the thermostat opens and permits the coolant to circulate to the radiator, where, with the help of the fan, the heat is dissipated to the atmosphere. The cooled liquid then circulates back to the engine and through the cycle as long as the thermostat remains open.

36. Radiator

a. Inspection and External Cleaning.

(1) Raise the hood and remove radiator grill.

(2) Clean dirt, insects, and trash from the exterior of the core, using compressed air or a stream of water applied carefully from the rear side of the core. Do not use steam.

(3) If the core fins are bent, use a piece of wood or a blunt instrument to straighten them. Be careful not to puncture the tubes.

(4) Inspect radiator mounts and tighten them as necessary.

(5) Be sure radiator hose clamps are tight.

(6) Inspect radiator and hoses for leaks.

b. Draining and Refilling.

(1) To drain cooling system, remove radiator cap and open drain valve. If the cooling system is not to be refilled immediately, attach a notice to the steering wheel to warn personnel that the cooling system has been drained.

(2) To refill the cooling system, close drain valve and add water, corrosion inhibitor (f below), and antifreeze (e below) as required. Operate the engine, inspect the coolant level, and add coolant as necessary. Install the radiator cap.

c. Cleaning and Flushing. Follow instructions provided with cleaning compound.

d. Pressure Flushing. When overheated condition is not corrected by normal cleaning and flushing, proceed as follows:

(1) Drain the cooling system.

(2) Remove the upper radiator hose from top radiator inlet.

(3) Remove the thermostat (par. 39) and install thermostat housing.

(4) Remove the lower radiator hose from bottom radiator outlet and install a lead-away hose.

(5) Install the pressure gun (one using air pressure to force water) to upper radiator hose.

(6) Force the water through block until water runs clean.

(7) Remove the hose and gun, and install them on radiator outlet at bottom of radiator.

(8) Install a lead-away hose to radiator inlet.

(9) With the radiator cap installed, force water through the radiator until the water runs clean.

(10) Close the drain valve, install the thermostat and hoses, and fill the radiator with proper coolant.

e. Antifreeze Protection.

Note

Antifreeze solutions will be drained from the engine cooling system at the end of each cold season and the solutions will be discarded.

(1) In cold weather, add antifreeze to the radiator to protect the cooling system. Table III shows the quantity of approved antifreeze compound required to protect the 14 quart cooling system.

(2) After filling the radiator with necessary antifreeze compound, allow the engine to run until normal operating temperature is reached. Check strength of antifreeze with a hydrometer.

(3) Before adding water to a radiator containing the antifreeze solution, allow engine to run until the solution is well mixed. Test the solution with a hydrometer and add water and/or antifreeze compound as necessary.

Table III. Antifreeze Requirements
(14-quart cooling system)

Lowest safe temperature (degrees Fahrenheit)	Ethylene glycol (quarts)
27	1
22	2
15	3
6	4
-5	5
-18	6
44	7
-54	8
Lower than -55*	

*Use arctic-grade antifreeze. undiluted (FSN 6865174-1806).

f. Corrosion Inhibitor. To prevent rust and scale, and to extend the life of cooling system components, add corrosion inhibitor compound (FSN 6850-281-1989) to the cooling system in the following amounts:

(1) When water is used as the coolant, add 8 ounces of corrosion inhibitor to the 14 quarts of water.

(2) When a denatured alcohol and water solution is used as emergency antifreeze protection, add 1 ounce of corrosion inhibitor to each 2 quarts of water used in the solution.

37. Fan and Generator V-Belt

a. Adjustment and Inspection. Raise the hood and inspect the V-belt for wear, frays, and proper tension, and adjust for 1/2-inch finger pressure deflection at midpoint between generator and fan pulleys. Refer to figure 32 and remove the V-belt as follows:

b. Removal.

(1) Loosen the bolt and lockwasher that secure the generator to the generator adjusting plate. Move the generator toward the engine and remove the fan and generator V-belt from the generator.
(2) Remove the capscrews that secure the hydraulic pump drive flange yoke to the crankshaft pulley and move the flange yoke from the pulley.
(3) Remove the V-belt from the pulley.

c. installation. Reverse procedures in b and a above.

38. Water Pump and Fan

a. Removal.

(1) Open the drain valve at bottom of radiator and drain the radiator.
(2) Disconnect the water recirculating tube (7, fig. 33) at pump body (4).
(3) Remove the fan belt (par. 37).
(4) Remove the capscrews (15) and lockwashers (14) that secure the fan to the hub and remove the fan.
(5) Disconnect and remove the water hose at the pump.
(6) Unscrew the screws (2) and lockwashers (3) that secure the pump to engine and remove the pump.
(7) Using a suitable puller, remove the hub (12) from the water pump.

b. Installation. Reverse procedures in a above.

39. Thermostat

a. Removal.

(1) Drain the cooling system.
(2) Remove the top radiator hose.
(3) Disconnect the thermostat by-pass line.
(4) Remove the mounting nuts and lockwashers and remove the thermostat housing and gasket.
(5) Remove the thermostat from cylinder head.

b. Installation. Reverse procedures in a above.

c. Testing.

(1) Place the thermostat in a suitable container of water.
(2) Heat the water.
(3) Use a thermometer to determine at what degree thermostat operates.
(4) A properly operating thermostat will begin to open at 160° F. and will be fully opened at 1800 F.
(5) If the thermostat does not operate properly, discard it.

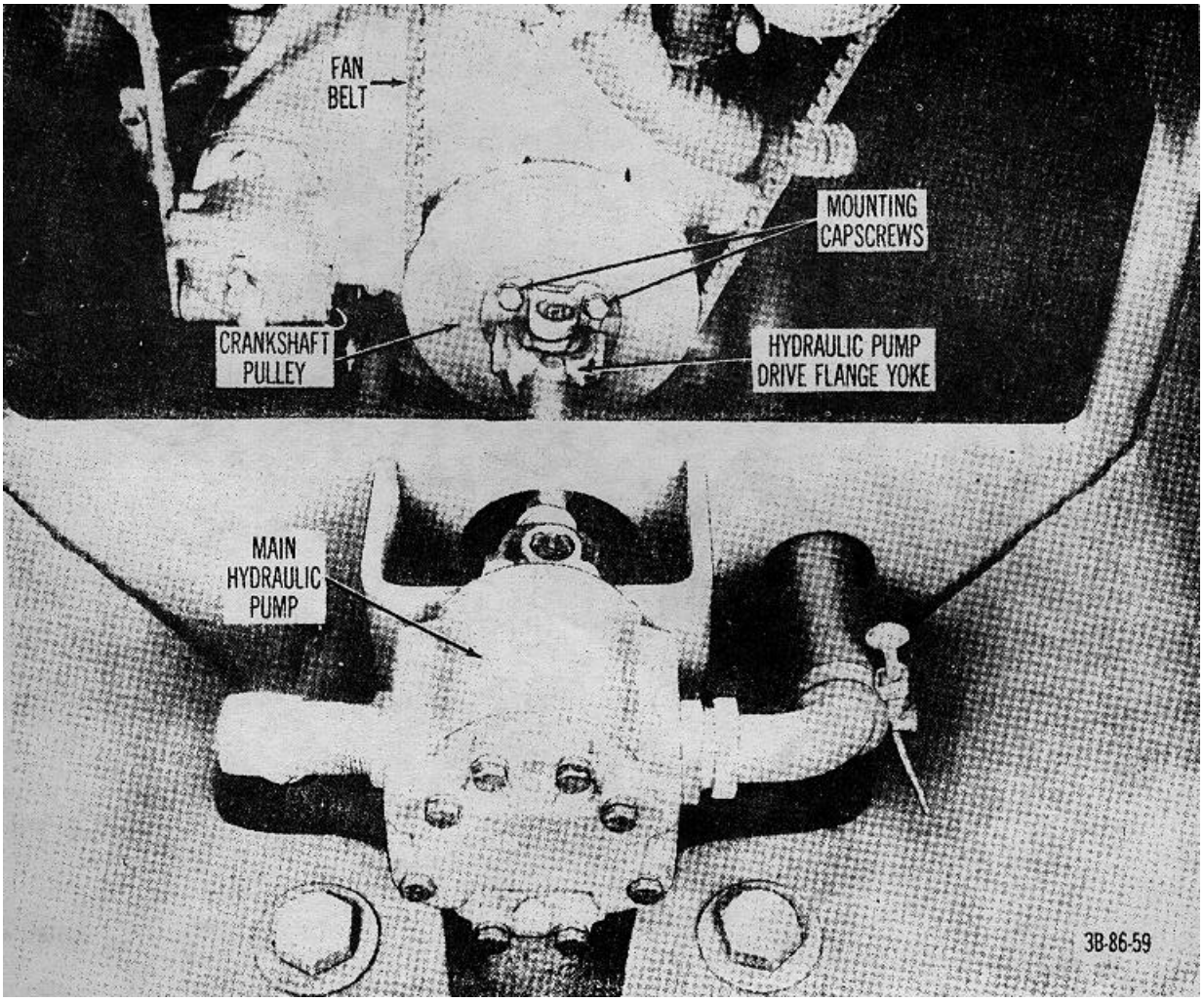
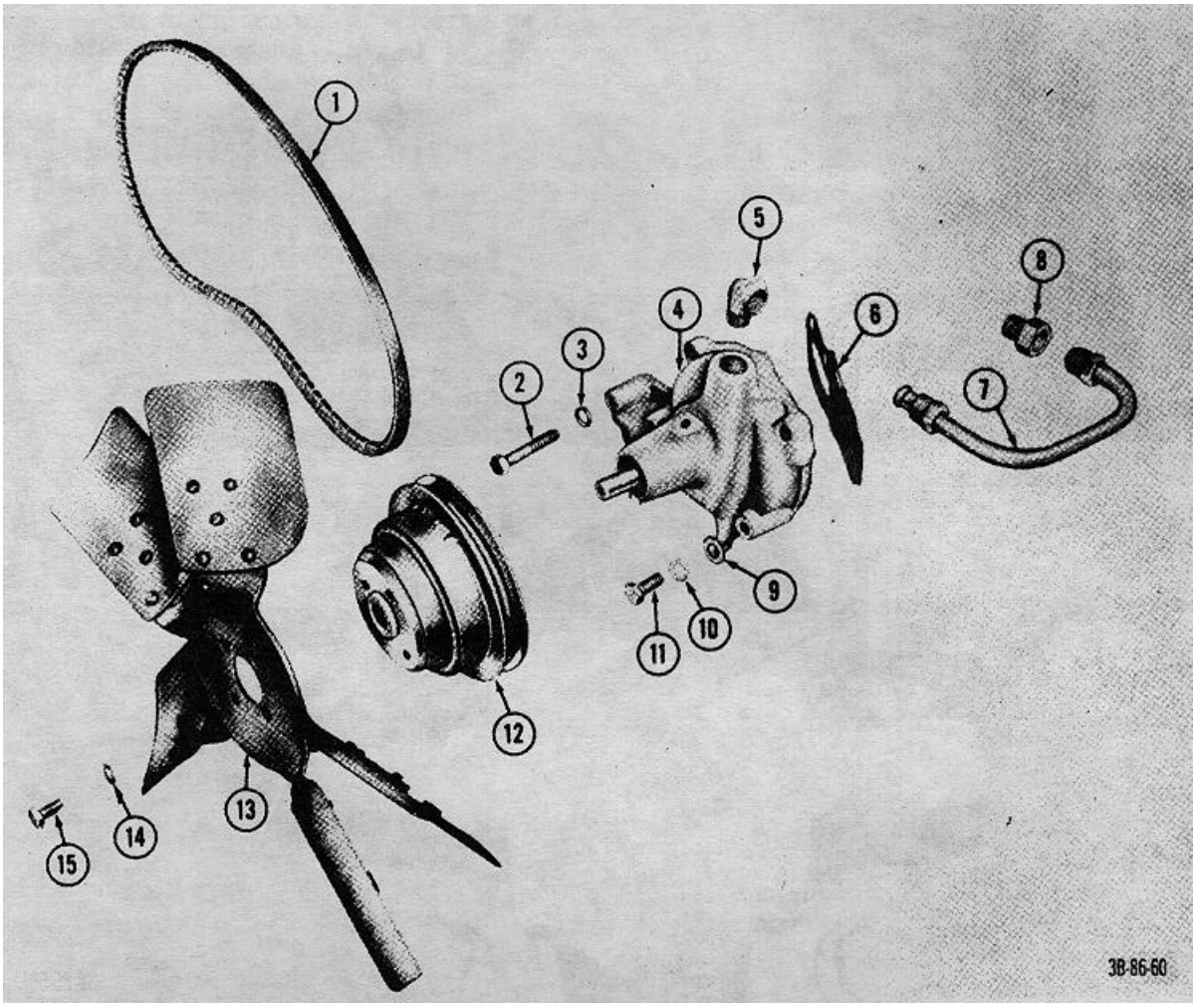


Figure 32. Hydraulic pump drive flange yoke installed on truck.



1 v-belt, fan and generator
2 Screw
3 Lockwasher
4 Body, water pump
5 Elbow, hose
6 Gasket
7 Tube, water recirculating
8 Nipple, pipe
9 Washer, flat
10 Lockwasher
11 Capscrew
12 Hub, fan
13 Blade, fan
14 Lockwasher
15 Capscrew

Figure 33. Water pump, exploded view.

Section VIII. ELECTRICAL SYSTEM (GROUP 06)

40. General

The electrical system consists of six basic circuits: starting, charging, ignition, horn, instrument, and lighting. The units of the various circuits are connected in a 12-volt, negative ground, single-wire system. When repairing or replacing wiring, refer to wiring diagrams (fig. 34-9).

41. Generator

a. Generator Voltage Output Test. Test the generator for voltage output by following the procedure outlined in figure 40.

b. Removal. Refer to figures 41 and 42 and remove the generator as follows:

(1) Remove the bolt (8, fig. 42), lockwasher (7), and washer (6) that secure the generator (9) to the adjusting plate (5). Move the generator toward the engine, and remove the fan and generator belt from the generator.

(2) Disconnect and tag the armature and field wires at the generator terminals.

(3) Remove the jamnuts (10) and nuts (11) from the bolts (12) that secure the generator to the mounting bracket (13) and remove the generator from +.he bracket.

(4) If necessary, remove the nuts and lockwashers that secure the bracket to the engine and remove the bracket from the engine.

(5) Unscrew and remove the nut (1) and lockwasher (2) that secure the pulley (3) to the generator and press the pulley from the generator.

(6) Remove the fan (4) from the generator.

(7) Remove the key (14) from the shaft.

c. Installation. Reverse procedures in a above and polarize the generator if it has lost its residual magnetism. This condition is indicated by an absence of charging. This loss of residual magnetism occurs frequently in generators that have been in storage. To restore magnetism to the generator, take a hot battery wire and momentarily touch the field terminal on the generator. This is known as "flashing" the generator,

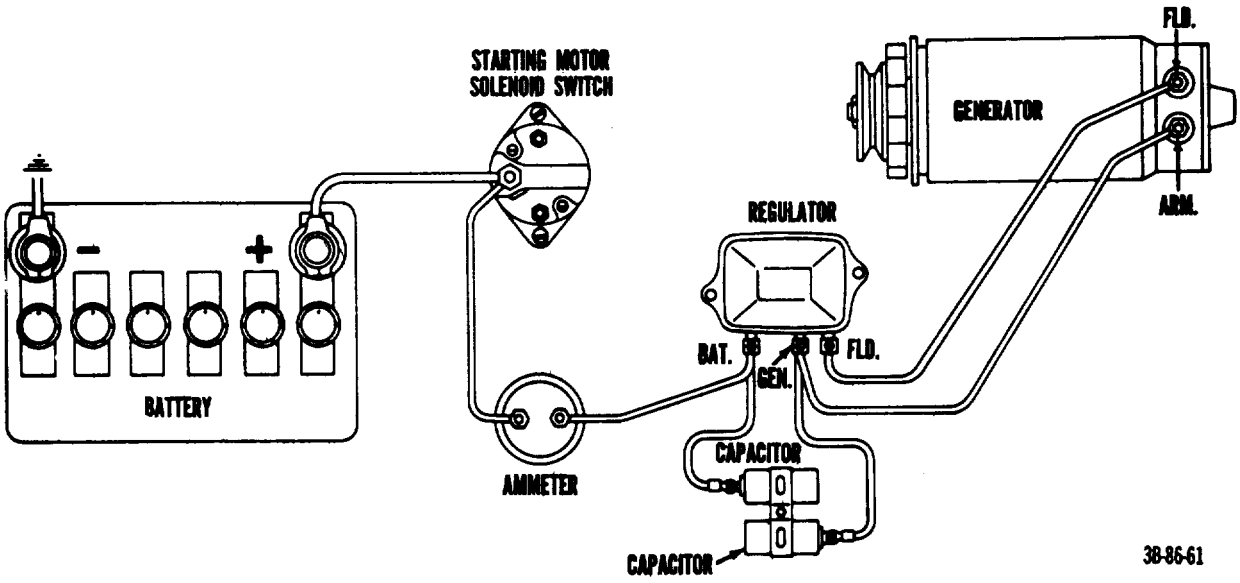


Figure 34. Electrical charging circuit.

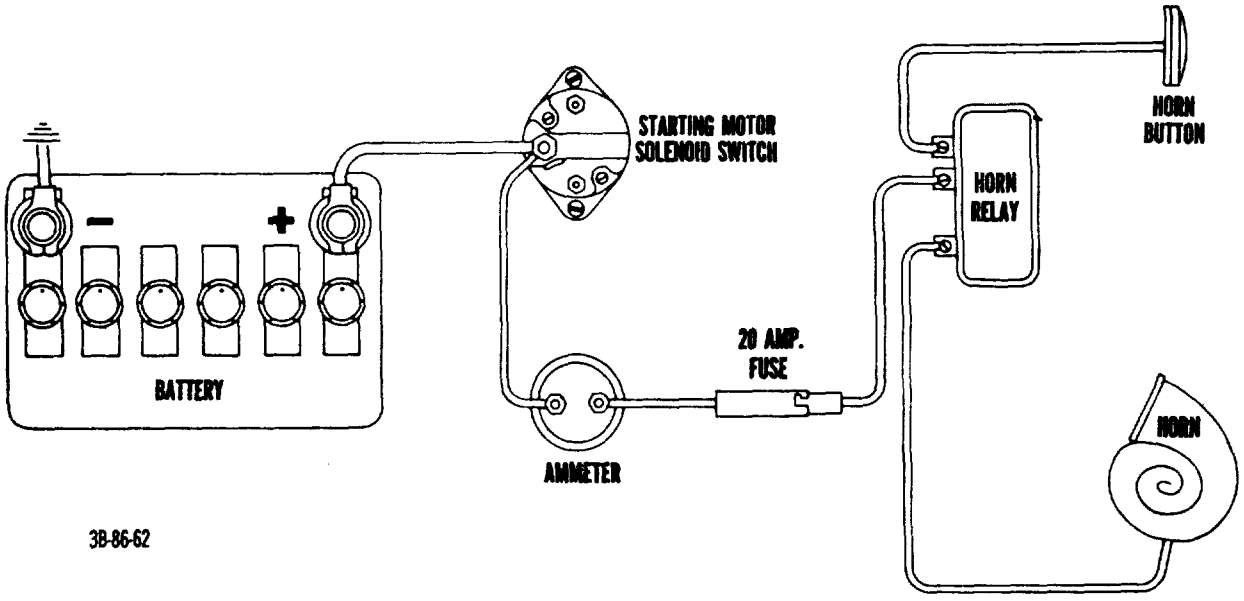


Figure 35. Electrical horn circuit.

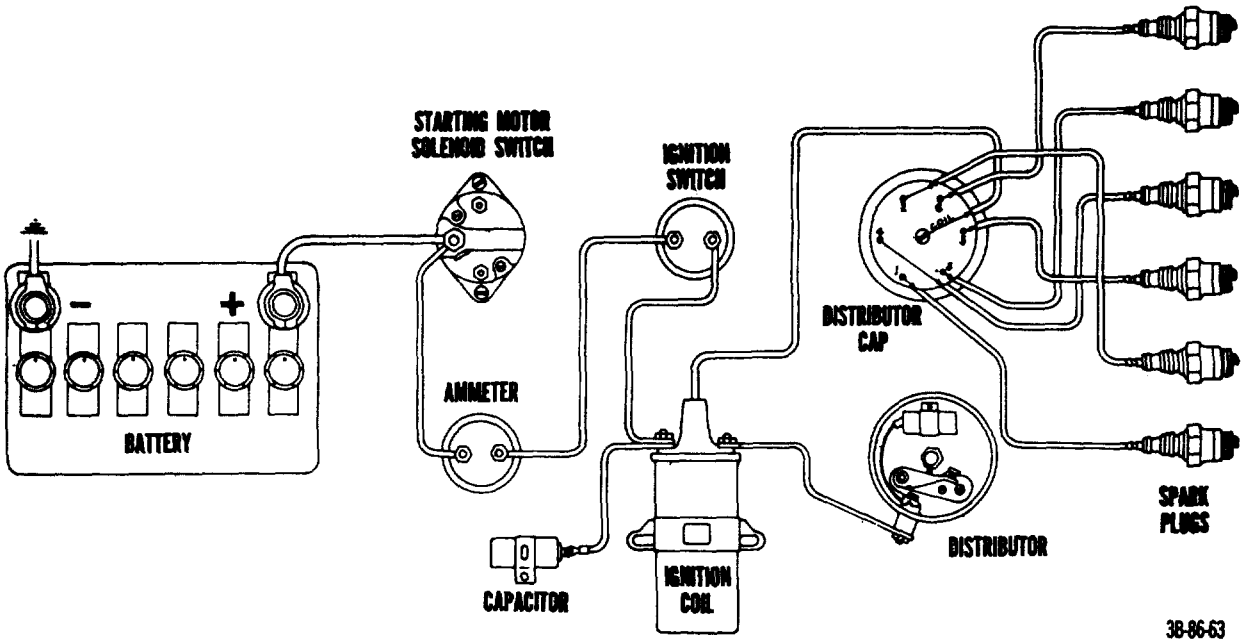


Figure 36. Electrical ignition circuit.

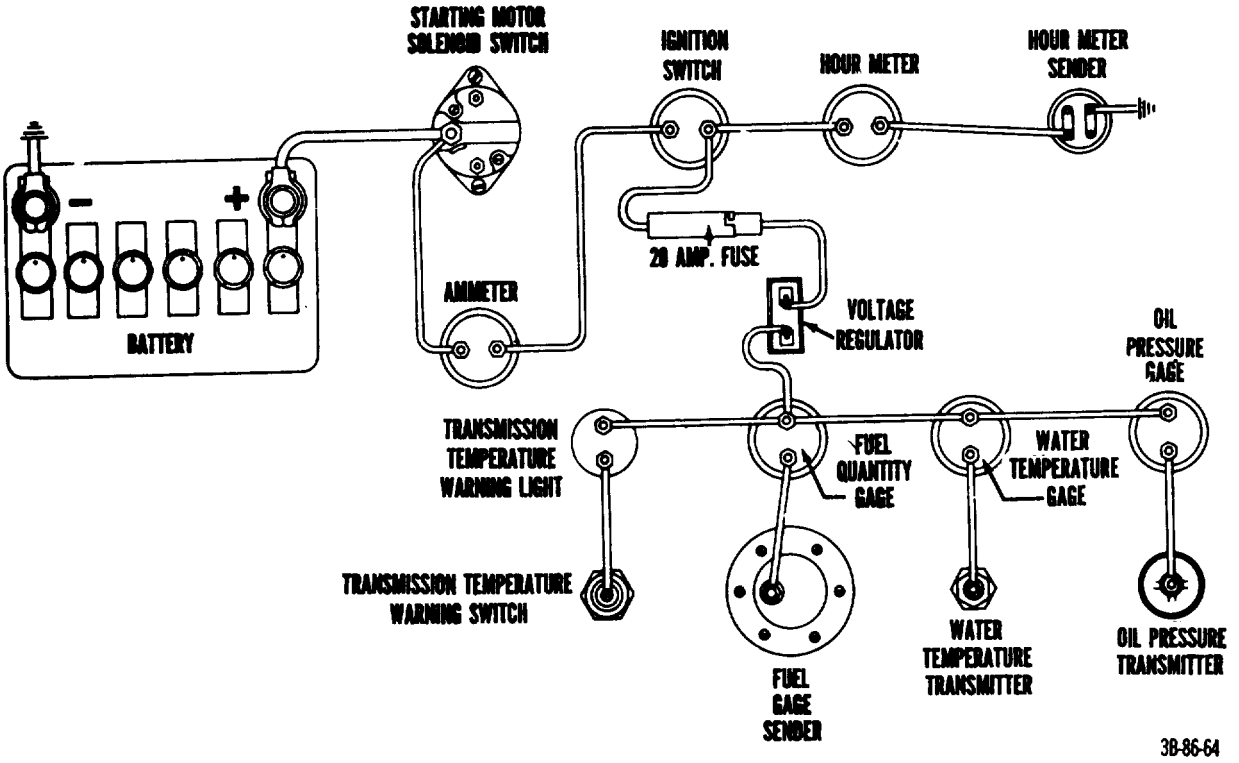


Figure 37. Electrical instruments circuit.

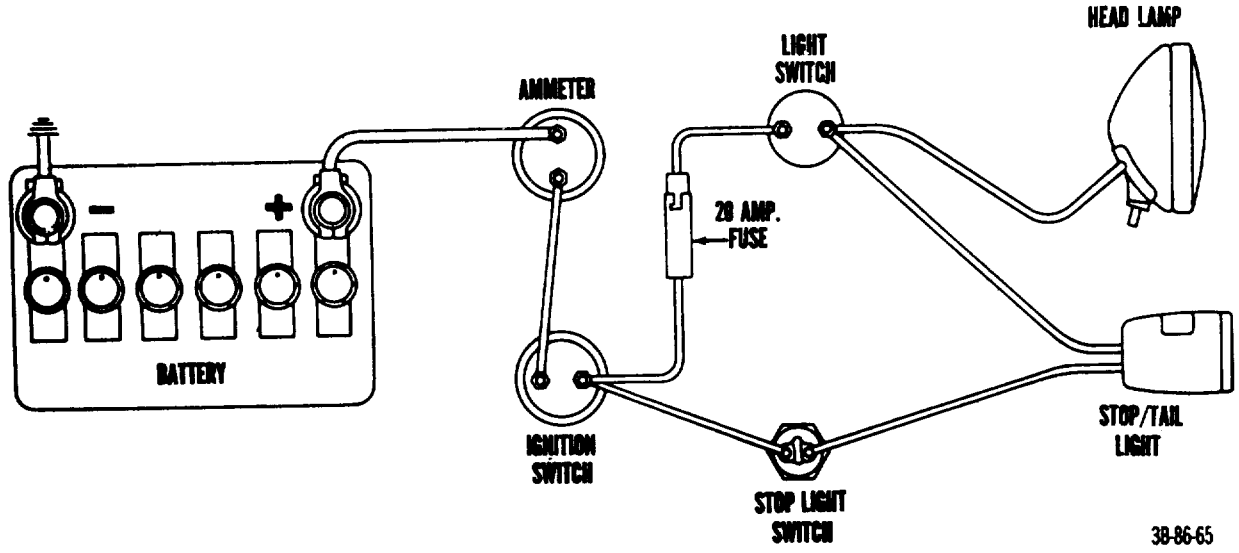


Figure 38. Electrical lighting circuit.

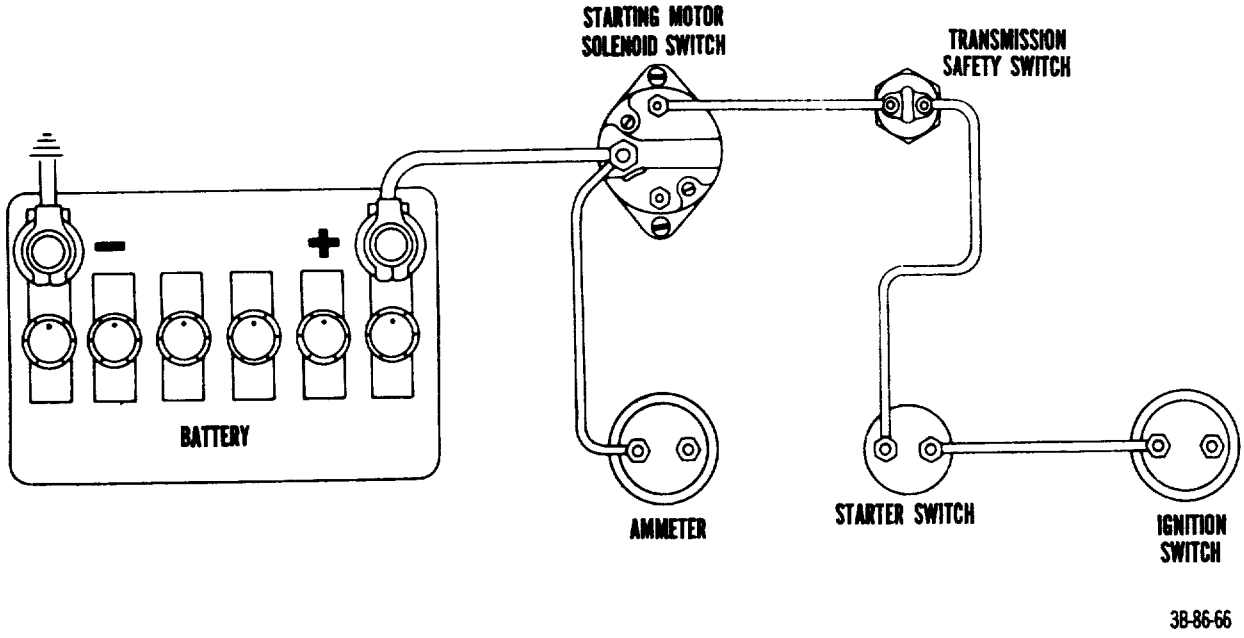


Figure 39. Electrical starting circuit.

42. Engine Voltage Regulator

Refer to figure 43 and remove the regulator as follows:

a. Removal.

(1) Disconnect and tag the generator and field wires and the battery lead at the regulator.

(2) Remove the capscrews and lockwashers that secure the regulator to the bracket and remove the regulator.

b. Installation. Reverse procedures in a above.

c. Testing and Adjusting.

(1) Cutout relay. The cutout relay requires three checks and adjustments, as follows:

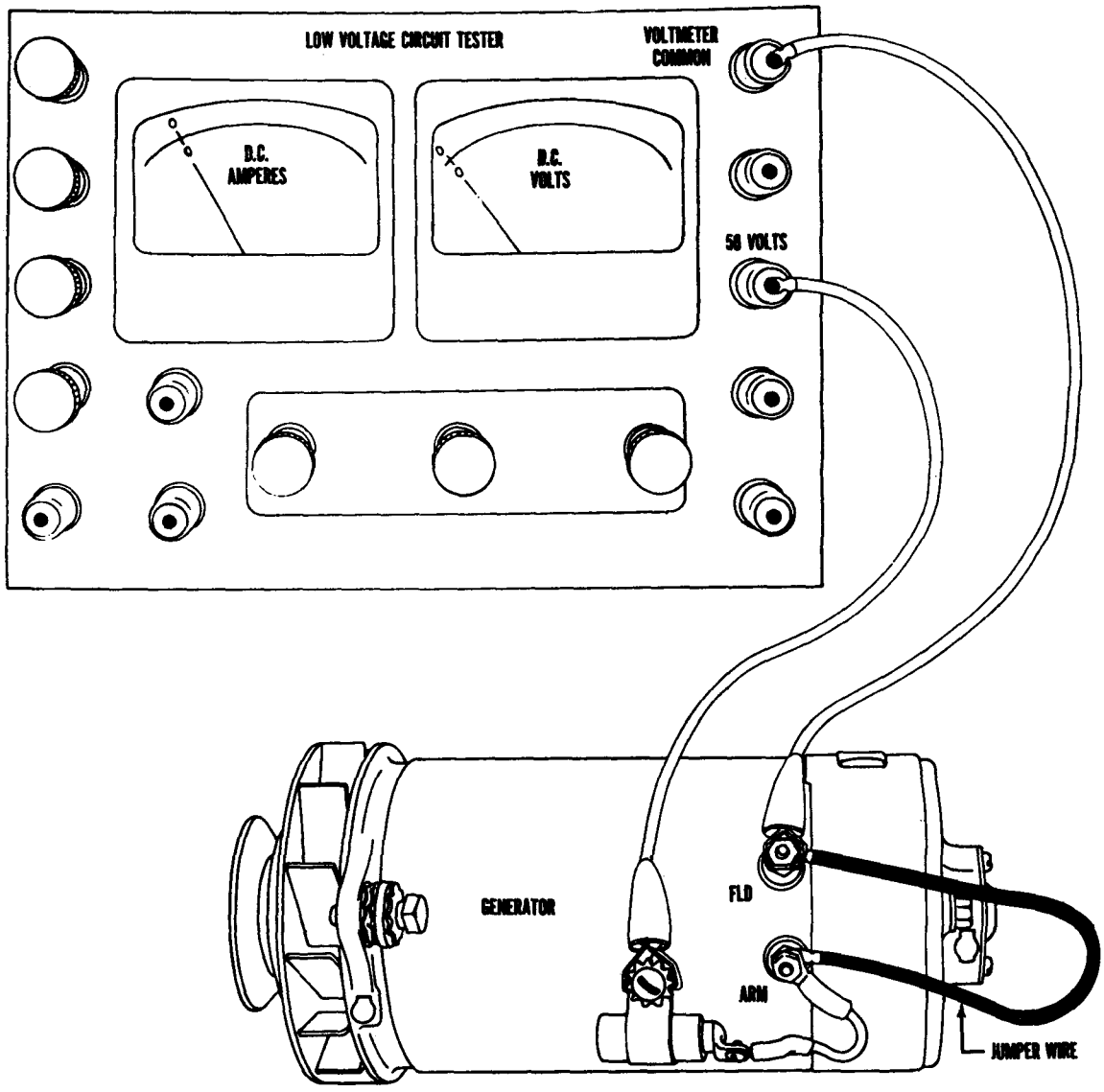
(*a*) *Airgap.* With the battery disconnected, press the armature down as shown in figure 44 until the points just close and measure the airgap between the armature and the center of the core. If adjustment is required, loosen the two armature screws and move the armature up or down until the correct airgap reading of 0.020 inch is obtained. Tighten the armature mounting screws and recheck airgap.

(*b*) *Point opening*. Check the point opening and adjust as shown in figure 45 to a correct reading of 0.020 inch by bending the upper armature stop.

(*c*) *Closing voltage*. The closing voltage should be 11.8 to 13.5 volts. Hook up the test equipment (fig. 46) and adjust the closing voltage as shown in figure 47 by turning the adjusting screw. Turn the screw clockwise to increase spring tension and closing voltage; turn the screw counterclockwise to descrease spring tension and closing voltage.

(2) *Voltage regulator*. The voltage regulator requires two checks and adjustments as follows:

(*a*) *Airgap*. With the battery disconnected, check the airgap for a read ing of 0.075 inch. If adjustment is needed, use a 3/8-inch box-en(



1. DISCONNECT GENERATOR FIELD AND ARMATURE WIRES AT GENERATOR.
2. CONNECT JUMPER WIRE AND TEST EQUIPMENT AS ILLUSTRATED.
3. START ENGINE AND ADJUST R.P.M. TO A FAST IDLING SPEED.
4. OBSERVE VOLTMETER INDICATION.
   IF VOLTAGE IS BELOW 14 VOLTS THE GENERATOR IS DEFECTIVE.
   REFER TO PAR. 41 TO REPLACE GENERATOR.

39-86-67

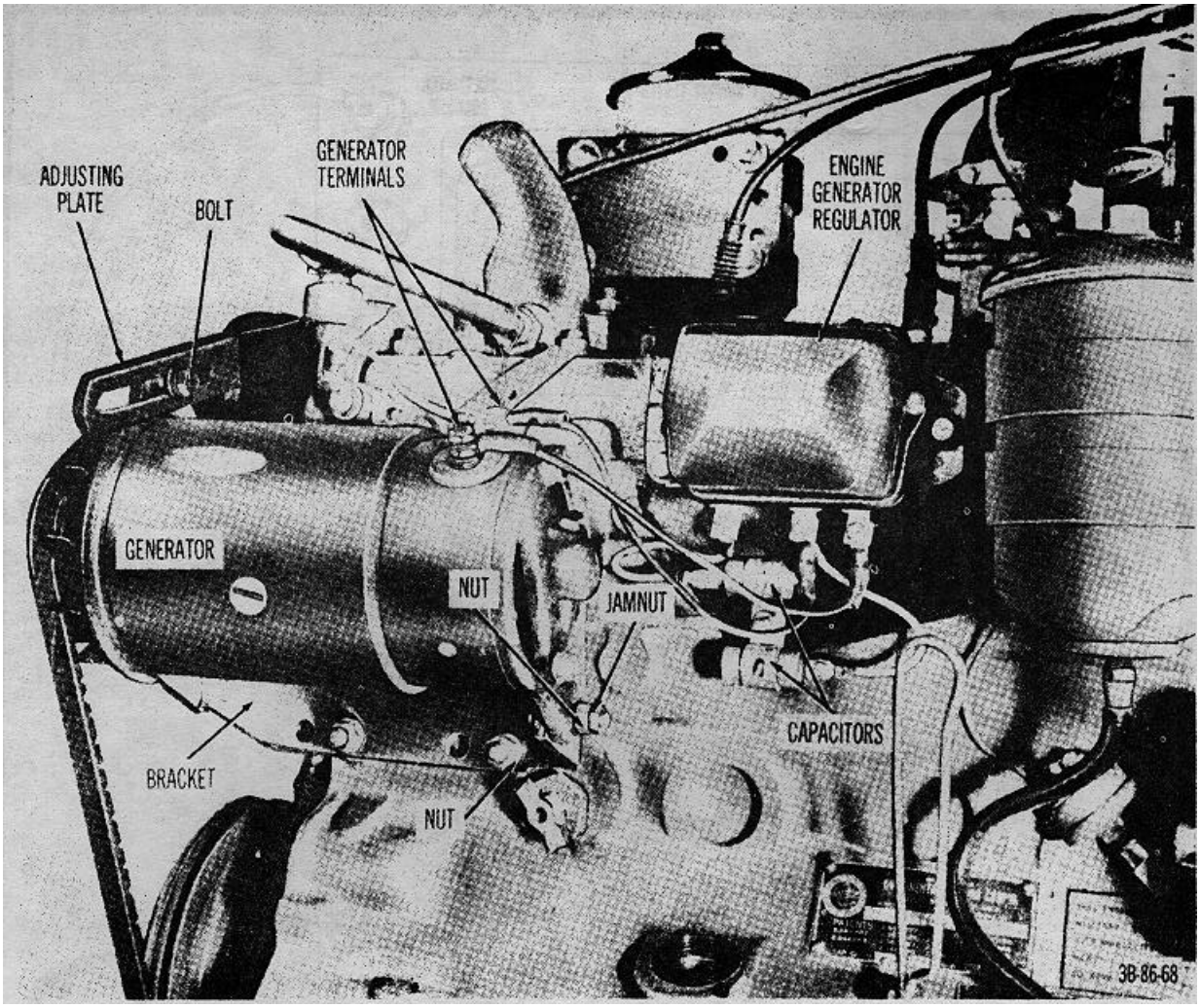


Figure 41. Generator, installed on trock.

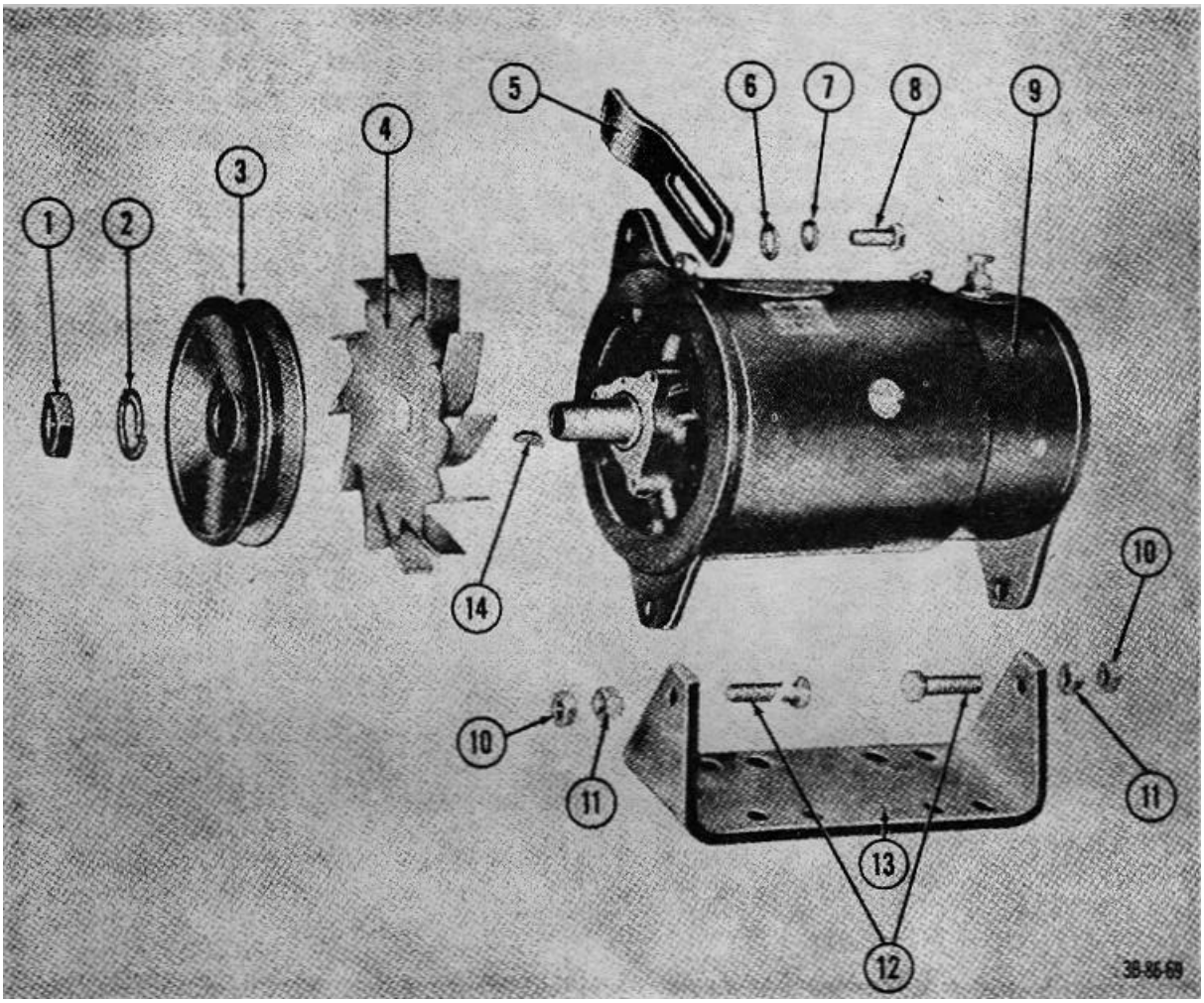
wrench as shown in figure 48 and turn the adjusting nut to obtain the desired setting. Turn the nut clockwise to decrease the airgap and counterclockwise to increase the airgap.

(*b*) *Voltage setting*. Hook up test equipment (fig. 49) and check voltage setting for reading of 13.8 to 14.8 volts. Turn adjusting screw as shown in figure 50 clockwise to increase the voltage setting and counterclockwise to decrease the voltage setting.

(*3*) *Current regulator*. The current regulator requires an airgap check and current setting as follows:

(*a*) *Airgap.* The desired airgap setting is 0.075 inch. With the battery disconnected, check the setting. Turn the adjusting nut as shown in figure 51 to obtain the desired setting. Turn the nut clockwise to decrease the airgap and counterclockwise to increase the airgap.

(*b*) *Current setting*. The desired current setting is 18.5 to 21.5 amperes. Hook up test equipment (fig. 52) and turn the adjusting screw as shown in figure 53 clockwise to increase the ampere setting and counterclockwise to decrease the ampere setting.



1 Nut, plain
2 Lockwasher
3 Pulley, generator
4 Fan
5 Plate, adjusting
6 Washer, flat
7 Lockwasher
8 Bolt
9 Generator
10 Jamnut
11 Nut
12 Bolt
13 Bracket
14 Key, woodruff

Figure 42. Generator and attaching parts.

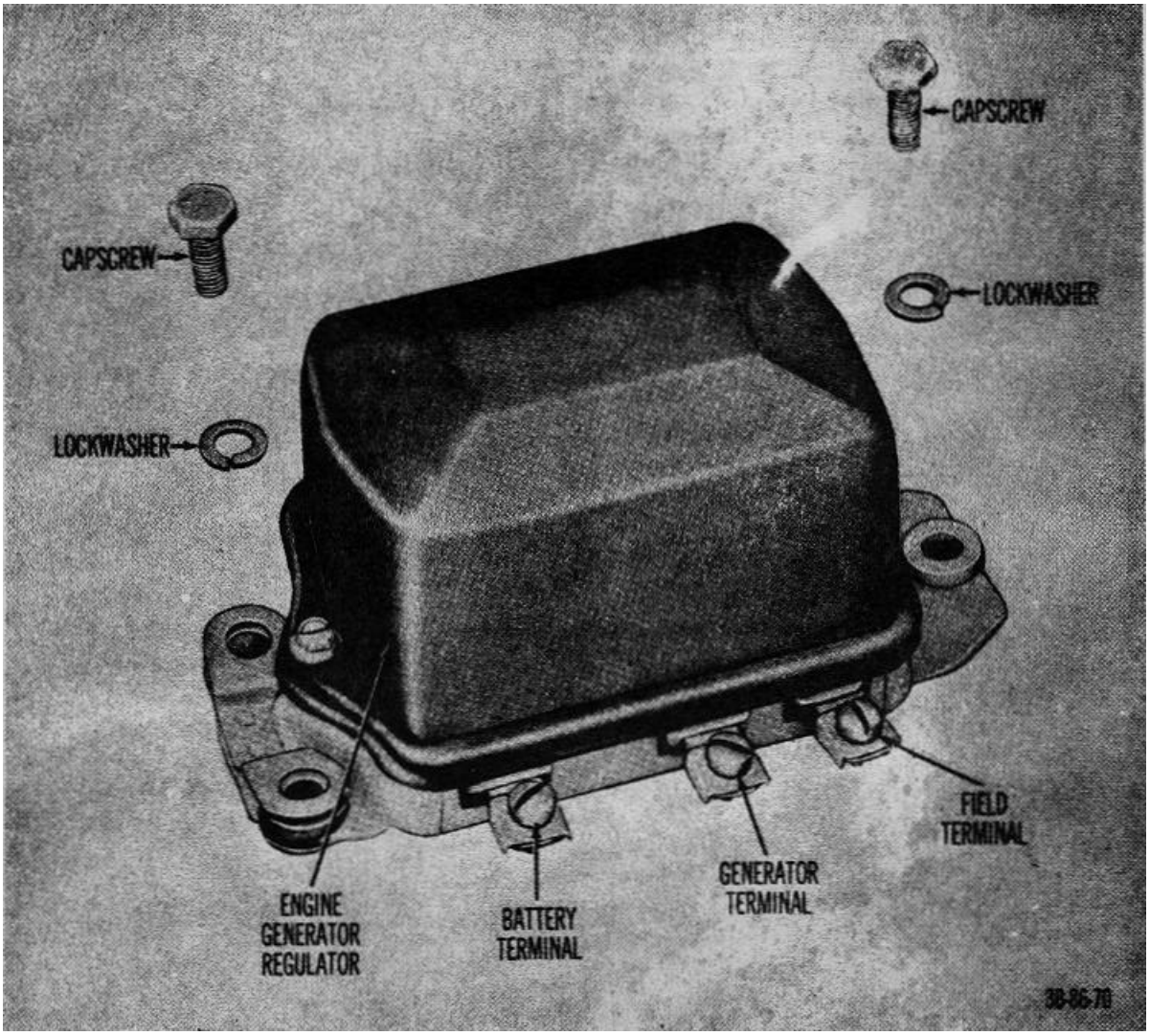


Figure 43. Voltage regulator removed from truck.

43. Starting Motor

Refer to figure 54 and remove starting motor as follows:

a. Removal.

(1) Disconnect the ground strap at battery.

(2) Disconnect the battery cable at the solenoid switch.

(3) Disconnect the starter switch lead at the solenoid switch.

(4) Unscrew and remove the capscrews and lockwashers that secure the starting motor to the engine and remove the starting motor and adapter.

b. Installation. Reverse procedures in *a* above.

44. Distributor

Refer to figures 55 and 56 and remove the distributor from truck as follows:

a. Removal.

(1) Disconnect the lead assemblies (2, fig. 56) at spark plugs.

(2) Disconnect the primary lead wire at distributor.

(3) Loosen the bolt (13) on the clamp assembly (12) and remove the distributor. (The distributor drive shaft is offset.)

(4) Remove the nut and lockwasher that secure the adapter (14) to the cylinder head and remove the adapter.

b. Disassembly.

(1) Remove the capscrew (16, fig. 56) and lockwasher (15) that secure the clamp assembly to the adapter (14) and remove the clamp assembly.

(2) Remove the cap assembly (4) from the distributor.

(3) Loosen the pins (fig. 57) on the inside of the cap assembly and remove the high tension leads from the cap assembly.

(4) Remove the rotor (5, fig. 56) and housing cover (6) from the distributor.

(5) Remove the terminal nut (fig. 58).

(6) Remove the lock screw (fig. 58).

(7) Remove the contact set and terminal (fig. 58).

(8) Remove the screw and lockwasher that secure the capacitor to the distributor and remove the capacitor (fig. 58).

c. Assembly. Reverse procedures in *b* above.

d. Installation. Reverse procedures in *a* above.

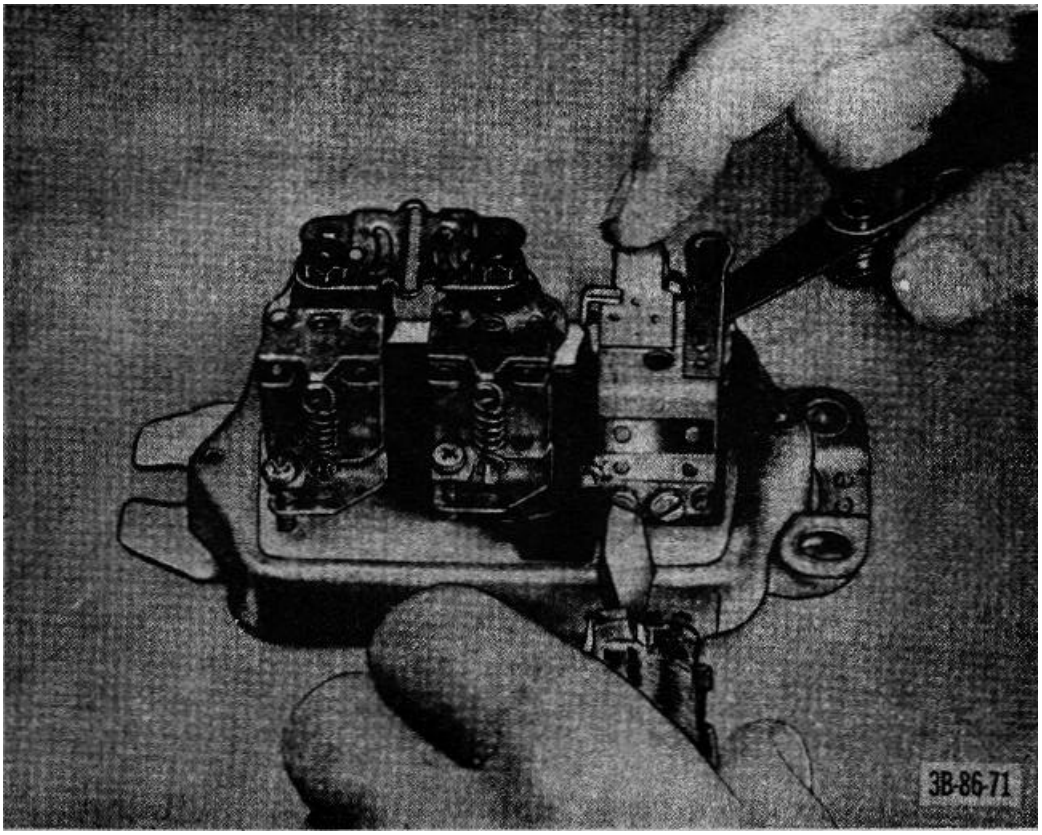


Figure 44. Adjusting cutout relay armature airgap.

e. Ignition Timing.

(1) *Static method.* Chalk the timing marks on the crankshaft pulley (fig. 59) and timing gear cover so that the marks can be seen clearly. Check the contact point gap. Remove the No. 1 spark plug and place the thumb over the spark plug hole. Crank the engine until air escapes around the thumb. Aline the timing marks. Loosen the distributor clamp assembly and turn the distributor on its mounting until the contact points begin to open. Tighten the clamp assembly to secure adjustment.

(2) *Timing light method*. Attach a timing light lead to the No. 1 spark plug. Connect the other timing light lead to the battery (fig. 60). Run the engine at 500 rpm. The No. 1 plug should fire at 5° before top dead center. The light should flash each time the 5° before top-dead-enter mark on the crankshaft pulley passes under the pointer on the timing gear cover. If an adjustment's necessary to obtain correct timing, turn the distributor on its mounting. Rotate the distributor counterclockwise to advance timing; rotate it clockwise to retard timing. Tighten the clamp bolt to secure adjustment.

f. Cap Replacement.

(1) Disconnect the lead assemblies at the spark plugs and coil.

(2) Remove the cap assembly from the distributor.

(3) Install leads in the new cap and tighten the screw pins.

(4) Install the new cap.

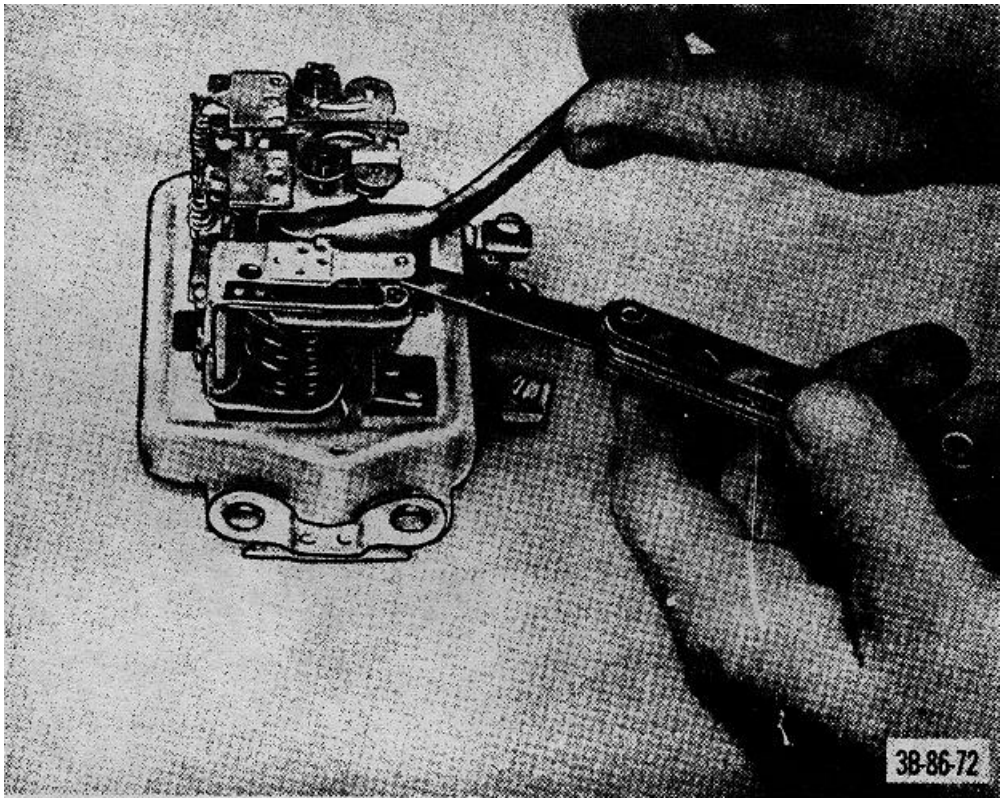


Figure 45. Adjusting cutout relay point opening.

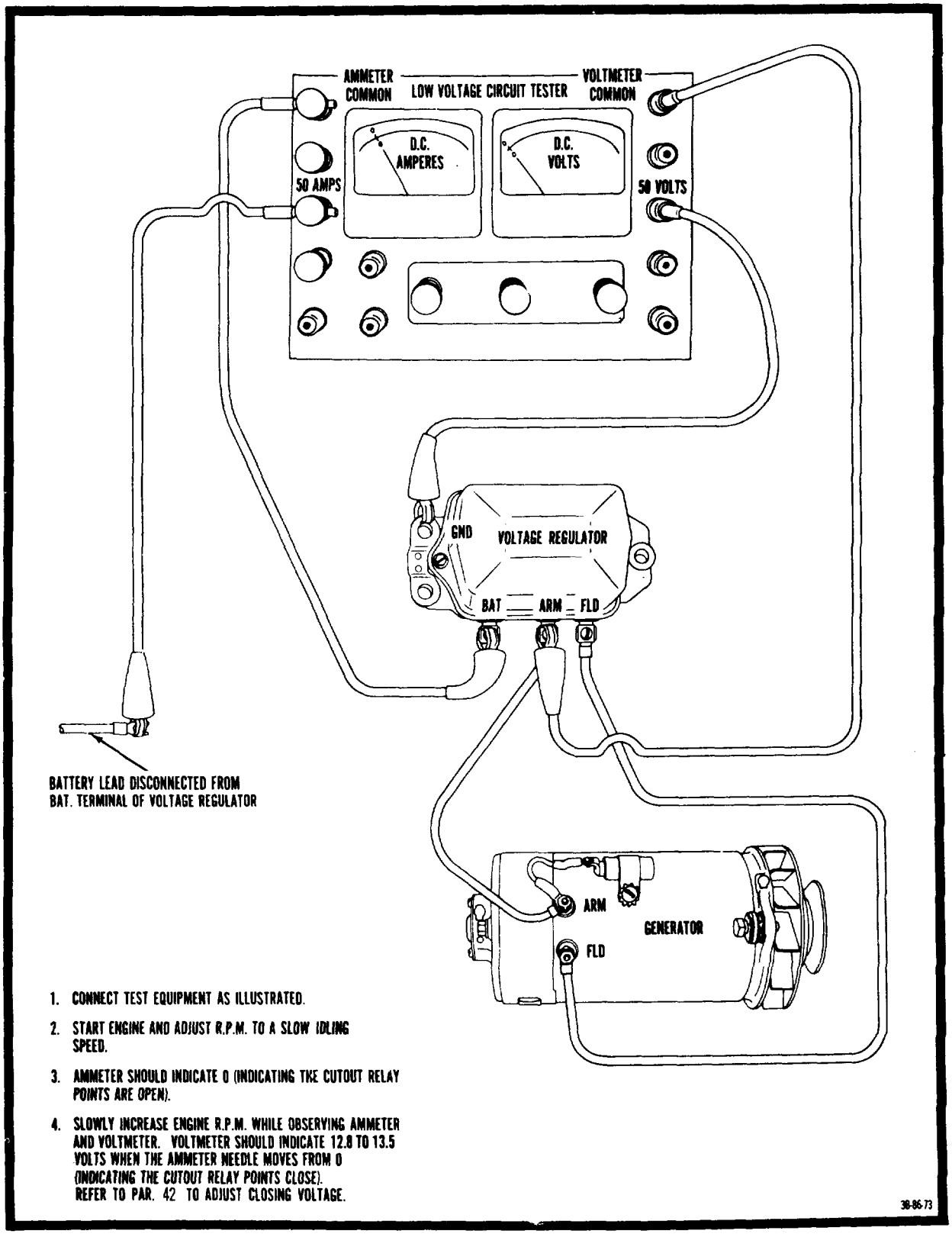


Figure 46. Test equipment for adjusting cutout relay closing voltage.

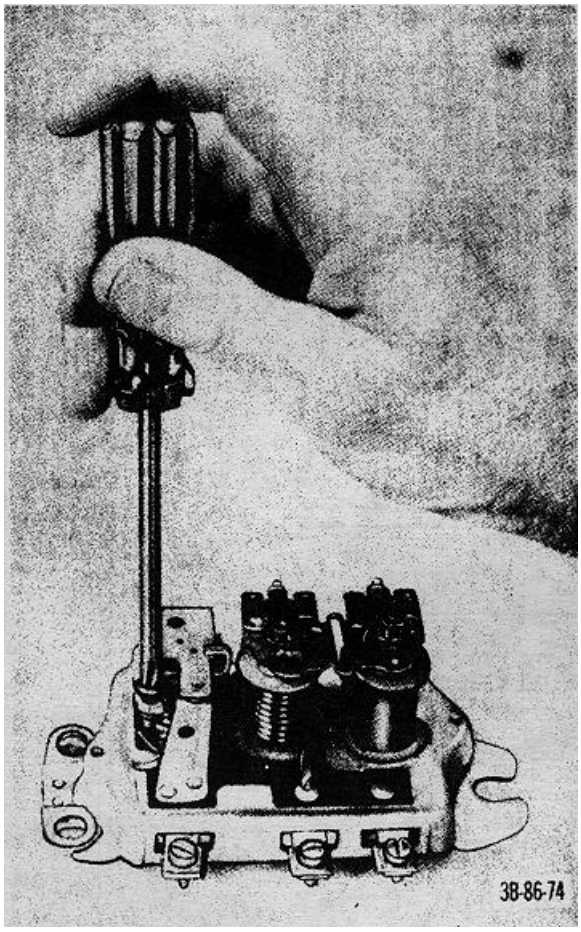


Figure 47. Adjusting cutout relay closing voltage,

(5) Install the lead assemblies on the spark plugs and coil.

g. Capacitor Replacement.

(1) Remove the cap assembly (4, fig. 56).
(2) Remove the rotor (5) and cover (6).
(3) Remove the terminal nut and the capacitor lead from the terminal.
(4) Remove the screw and lockwasher that secure the capacitor to the distributor and remove the capacitor.
(5) Install a new capacitor.
(6) Reverse procedures (1) through (4) above.

h. Contact Set Replacement.

(1) Remove the capacitor (g (1)-(4) above).
(2) Remove the rotor (5, fig. 56) and cover (6).
(3) Loosen the terminal nut (fig. 58).
(4) Remove the lock screw.
(5) Remove the contact set from pivot pin.
(6) Install the new contact set.
(7) Install the lock screw.
(8) Tighten the terminal nut.
(9) Adjust the contact points (i, below).
(10) Install the rotor and cover.
(11) Install the cap assembly.

i. Contact Point Adjustment. With the distributor cap removed, and the rubbing block of movable contact at the high point of the cam, check the contact point gap by inserting a 0.022-inch wire feeler gage between the contact points. If an adjustment is necessary, loosen the lock screw and turn the eccentric screw (fig. 58) to move the stationary point contact support until the proper gap is attained. After adjustment is completed, tighten the lock screw. To check the cam dwell angle refer to figure 61.

45. Spark Plugs

a. Removal.

(1) Remove the lead assemblies from the spark plugs.
(2) Unscrew and remove the spark plugs and gaskets.

b. Cleaning.

(1) Before removal from the engine, the spark plugs may be cleaned by wiping with a dry rag.
(2) After removal (a above), the spark plugs may be cleaned by sandblasting.

c. Adjusting Gap. Adjust the spark plug gap to 0.030 inch, using a round (wire) spark plug gage. To obtain proper adjustment, bend the ground electrode only.

d. Inspection.

(1) Inspect the shell for breaks and stripped threads.
(2) After removal (a above), check the spark plug insulation for breaks, cracks, or chips.
(3) Check for abnormal carbon deposits and burned electrodes.

e. Tests. Spark plugs may be tested on a spark plug tester, using a good spark plug as standard.

f. Installation. Reverse procedures in a above, tightening to 25 to 30 foot-pounds of torque.

46. Dielectric Capacitors

a. Removal.

(1) Disconnect and tag the capacitor leads at the capacitors (fig. 41).

(2) Remove the bolt that secures the capacitors to the regulator support and remove capacitors.

b. Installation. Reverse procedures in a above.

47. Storage battery and Cables

a. Removal.

(1) Disconnect the battery leads (1, fig. 62), ground cable first, at battery.

(2) Unscrew the wing nuts (2) and flat washers (3) that secure the battery frame (4) and remove the battery frame.

(3) Remove the battery (5) from truck.

b. Cleaning. Clean the battery and cable ends with a water solution of baking soda, and wipe dry.

c. Testing. Check the specific gravity of each cell with a hydrometer. If the specific gravity reading is 1.225 or below on the hydrometer, recharge the battery. A fully charged battery reads from 1.260 to 1.270 on the hydrometer.

d. Installation. Reverse procedures in a above. Connect the ground connection last. Replace unserviceable or badly worn cables with new ones.

48. Ignition Coil

Refer to figure 55 and remove coil as follows:

a. Removal.

(1) Disconnect and tag the positive and negative primary leads at coil terminals.

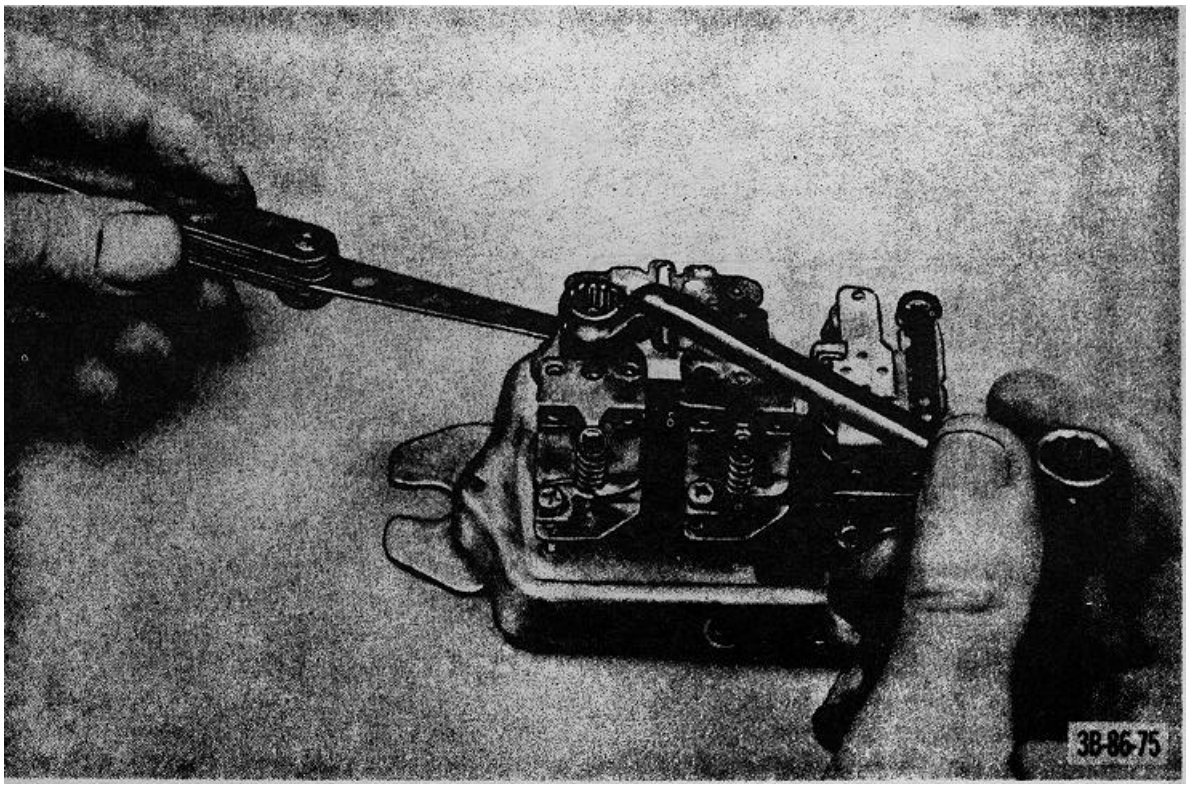


Figure 48. Adjusting voltage regulator airgap.

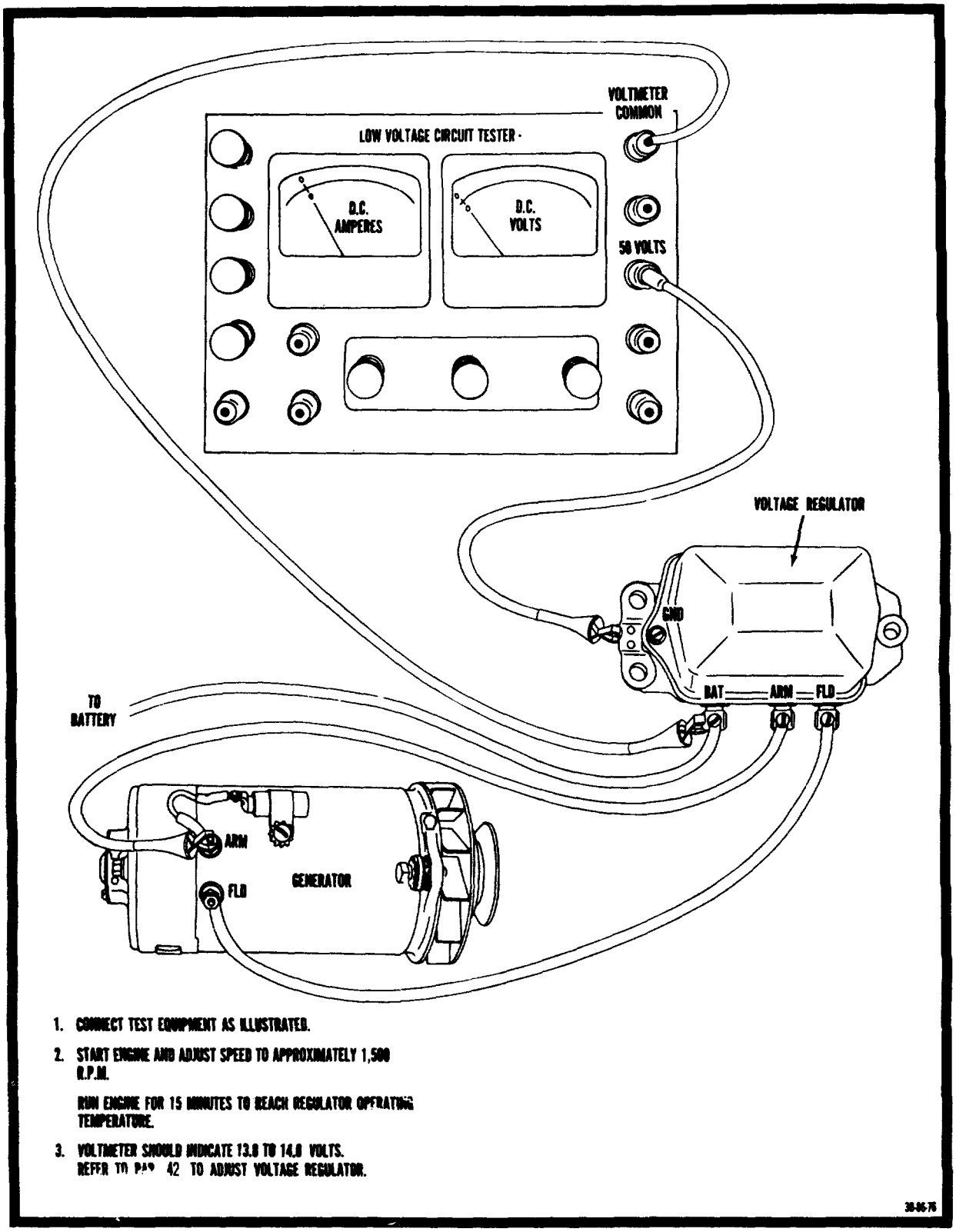


Figure 49. Test equipment for checking and adjusting voltage regulator.

(2) Disconnect the secondary lead assembly at coil.

(3) Unscrew and remove the bolts, nuts, and lockwashers that secure the coil to bracket and remove the coil.

b. Installation. Reverse procedures in a above.

49. Headlight

a. Removal and Disassembly.

(1) Disconnect the headlight electrical lead at the headlight.

(2) Remove the capscrew (9, fig. 63) and lockwasher (8) that secure the headlight to the bracket and remove the headlight.

(3) Remove the screw (6) and nut (5) and remove rim (4) from the headlight assembly.

(4) Remove the retaining ring (2) from the headlight assembly.

(5) Remove the lamp (3) from the body (1).

b. Assembly and Installation. Reverse procedures in a above.

c. Adjustment. Adjust the headlight by loosening the capscrew and turn the headlight to the right or left. Tighten the capscrew to secure adjustment.

50. Stoplight-Taillight

a. Removal.

(1) Disconnect the stoplight-taillight electrical lead at the connector.

(2) Remove the nuts (1, fig. 64) and lockwashers (2) that secure the taillight to the bracket and remove the tail light.

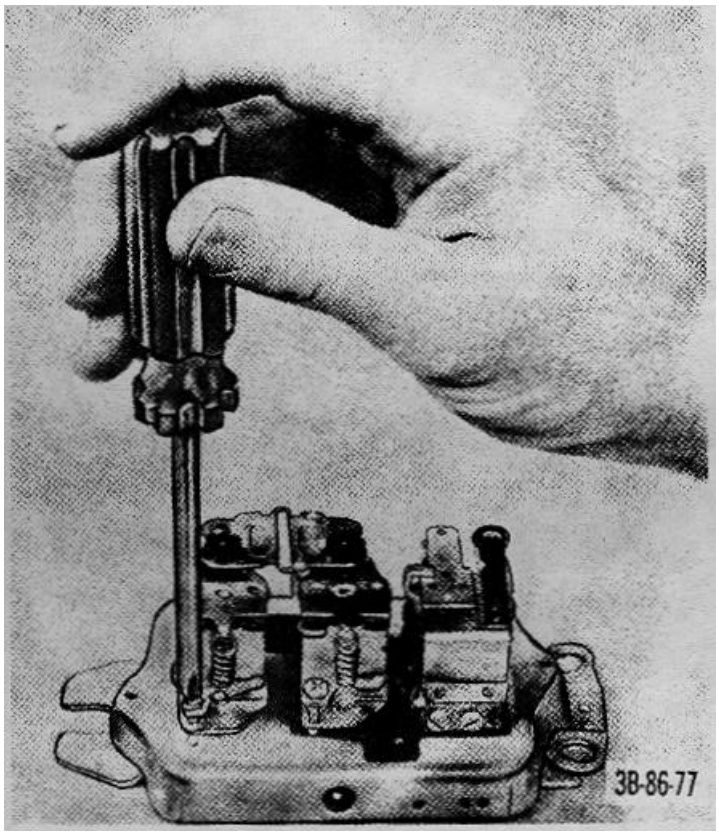


Figure 50. Adjusting voltage regulator.

(3) If the lamp (4) requires replacement, remove the lens and lamp. Reverse procedure to install the lamp.

b. Installation. Reverse procedures in a(1) and (2) above.

51. Horn and Relay

a. Removal.

(1) Disconnect and tag the wires that connect to the horn relay.

(2) Remove the socket head screws, nuts, and lockwashers that secure the relay and horn assembly to the truck and remove the horn assembly and relay.

(3) Remove the nuts and lockwashers that secure horn to bracket and separate horn and bracket.

b. Installation. Reverse procedures in a above.

52. Horn Button Assembly

a. Removal.

(1) Disconnect the horn cable at bottom of steering post.

(2) Remove the horn button cover (8, fig, 65).

(3) Twist the horn button (7) to the right and remove the button.

(4) Remove the contact cup (6), spring (5), and contact cap (4).

(5) Remove the screws (3) that secure the base plate (2) to the steering wheel and remove the base plate.

(6) Attach a wire or strong string to the horn cable assembly (1) at the bottom of the steering post.

(7) Pull the cable assembly through top of steering post.

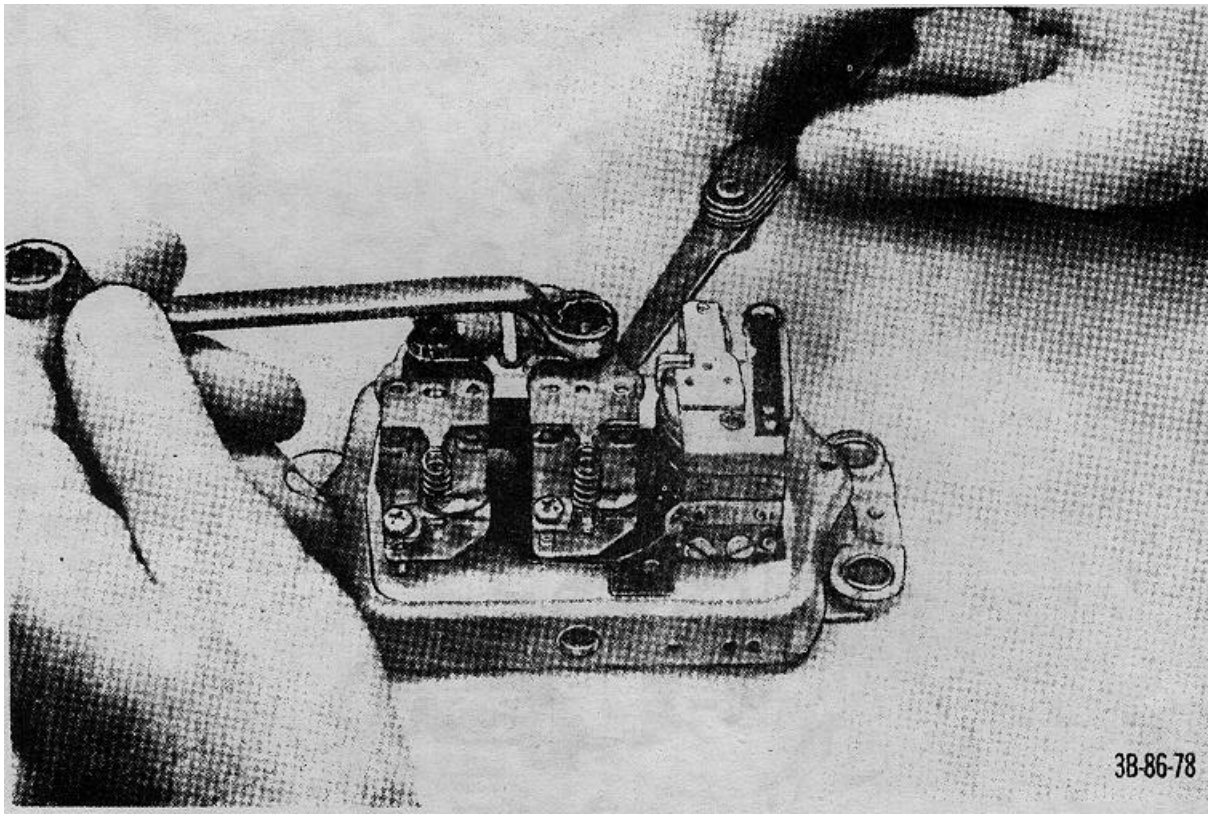


Figure 51. Adjusting current regulator airgap.

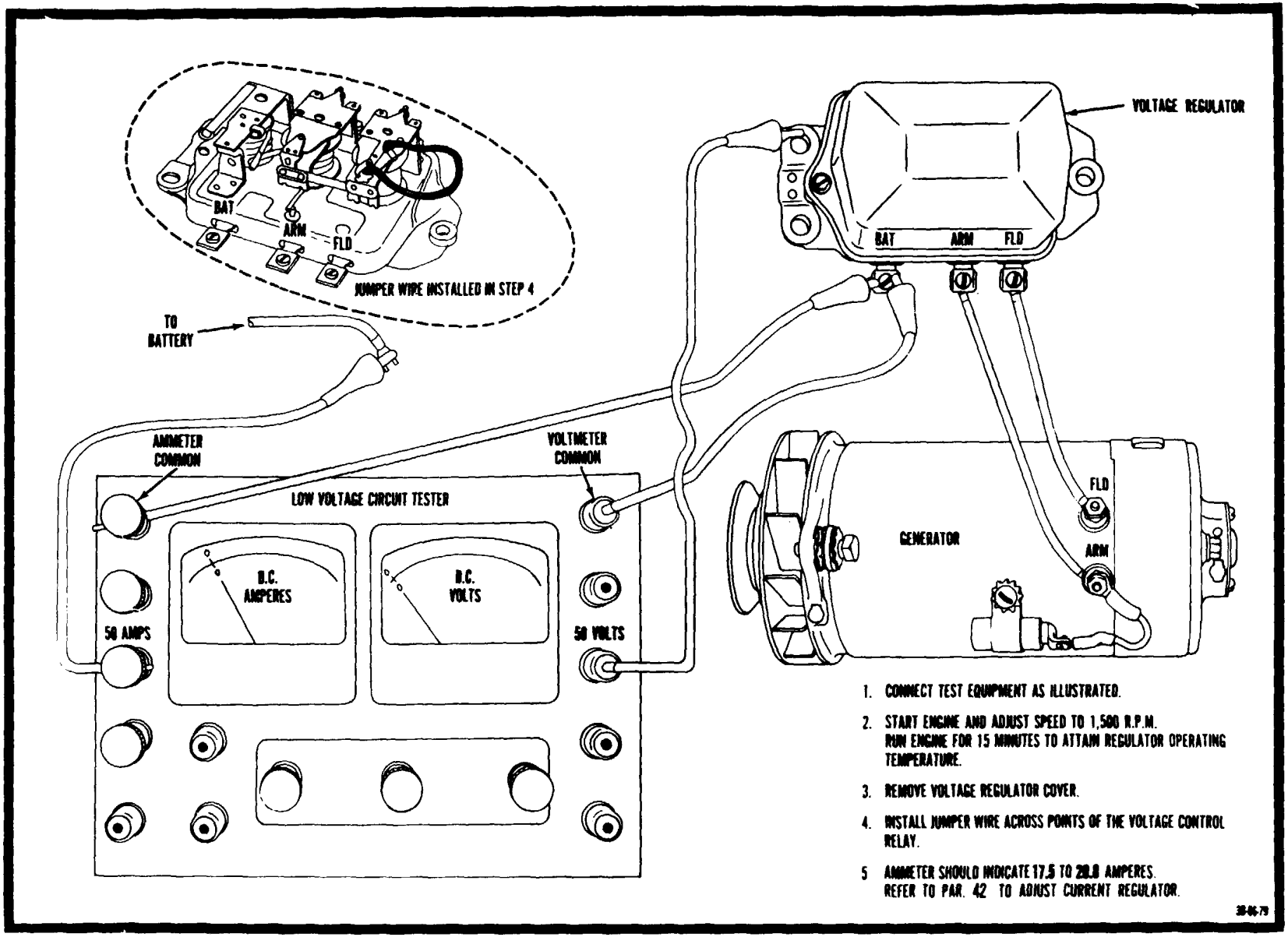


Figure 52. Test equipment for checking current regulator setting.

Note. The wire or string remaining in steering post will be used to install a new horn cable assembly.

b. Installation.

(1) Attach the horn cable assembly to the wire or string.
(2) Pull the horn cable assembly through the steering post.
(3) Reverse procedures (1) through (5) in *a* above.

53. Light Switch

a. Removal.

(1) Disconnect the ground cable at the battery.
(2) Disconnect and tag all electrical leads at the light switch (fig. 66).
(3) Remove the screw that secures the handle to the switch and remove the handle.
(4) Remove the nut and star washer from the switch and remove the switch from the truck.

b. Installation. Reverse procedures in *a* above.

54. Instruments and Gages

The instruments and gages (fig. 66) may be removed by disconnecting wiring from the Individual instrument or gage and removing the instrument or gage from the truck. Tag the wires for proper installation.

55. Temperature Sending Unit

The temperature sending unit, located beside the engine oil filter on the cylinder head is removed as follows:

a. Removal.

(1) Disconnect the lead wire at the unit.
(2) Unscrew and remove the sending unit from the engine block.

b. Installation. Reverse procedures in *a* above.

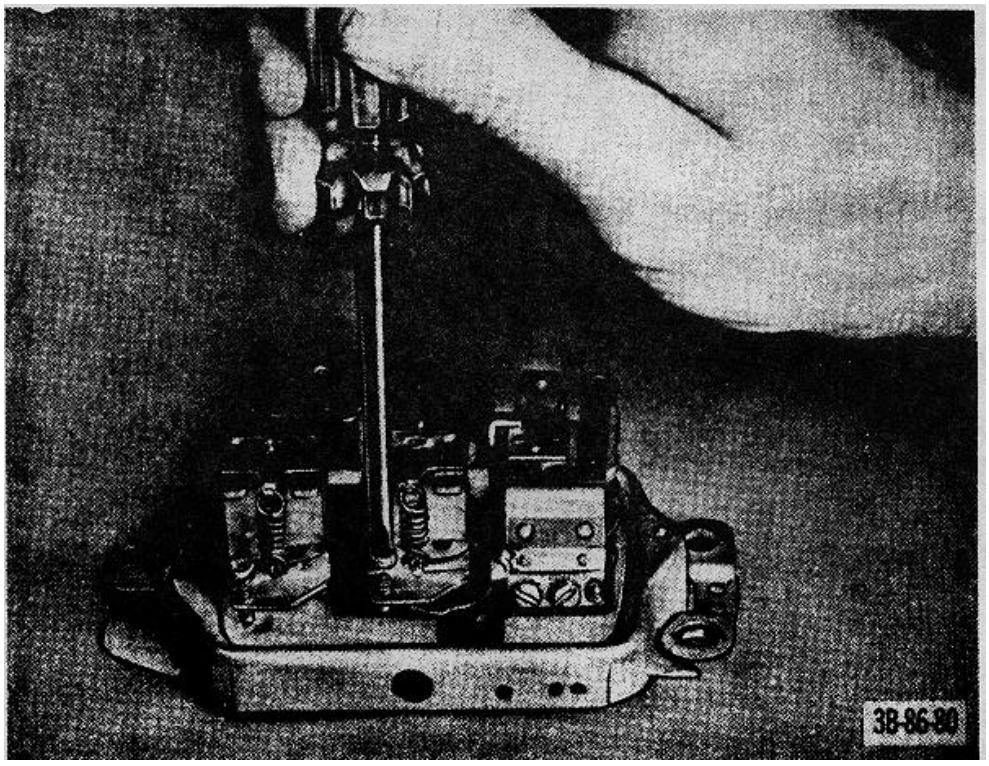


Figure 53. Adjusting current regulator setting.

56. Oil Pressure Transmitter

a. Removal.

(1) Disconnect the lead wire at the transmitter.

(2) Unscrew and remove the transmitter from fitting on the engine oil filter.

b. Installation. Reverse procedures in *a* above.

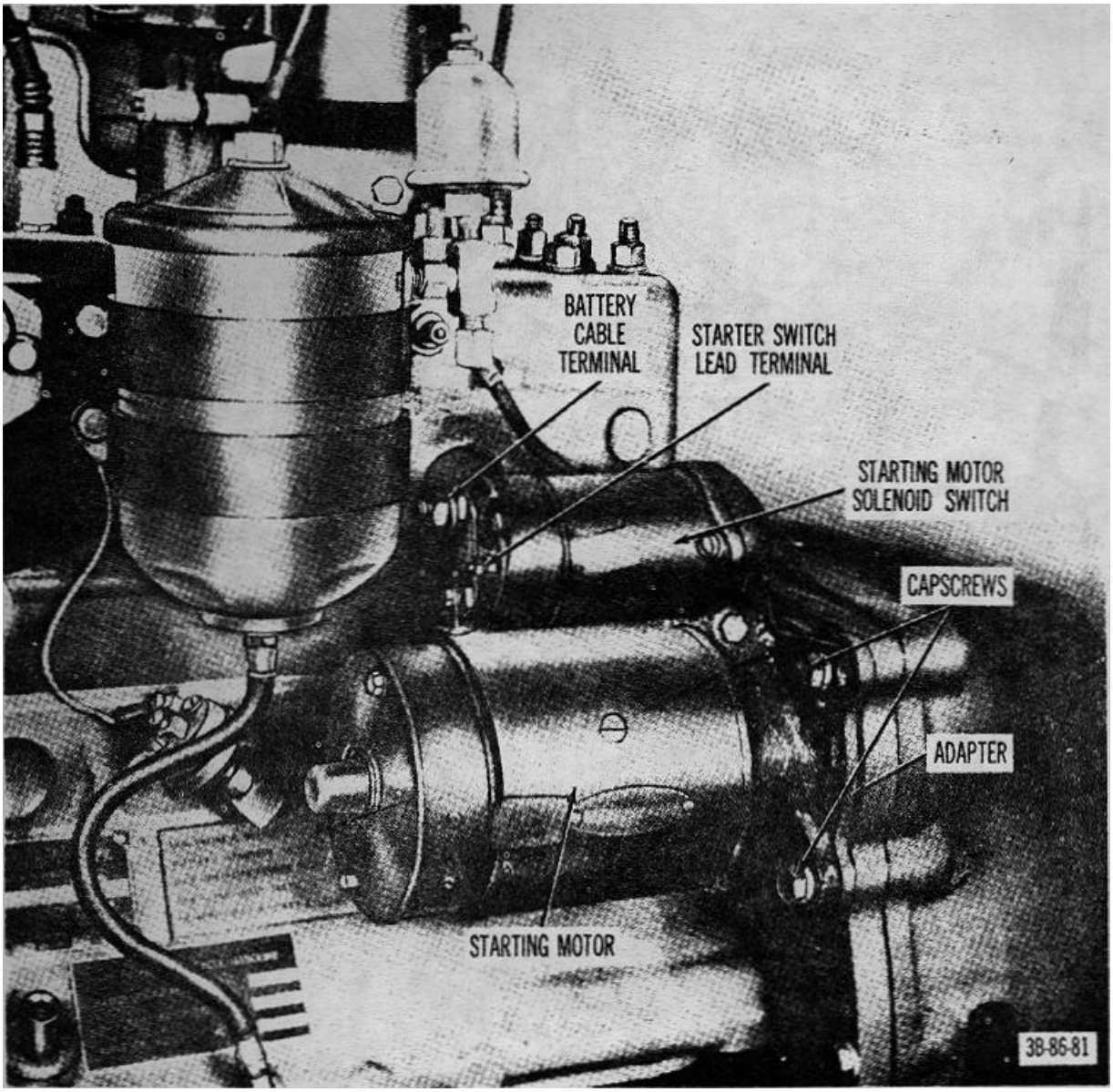


Figure 54. Starting motor installed an truck.

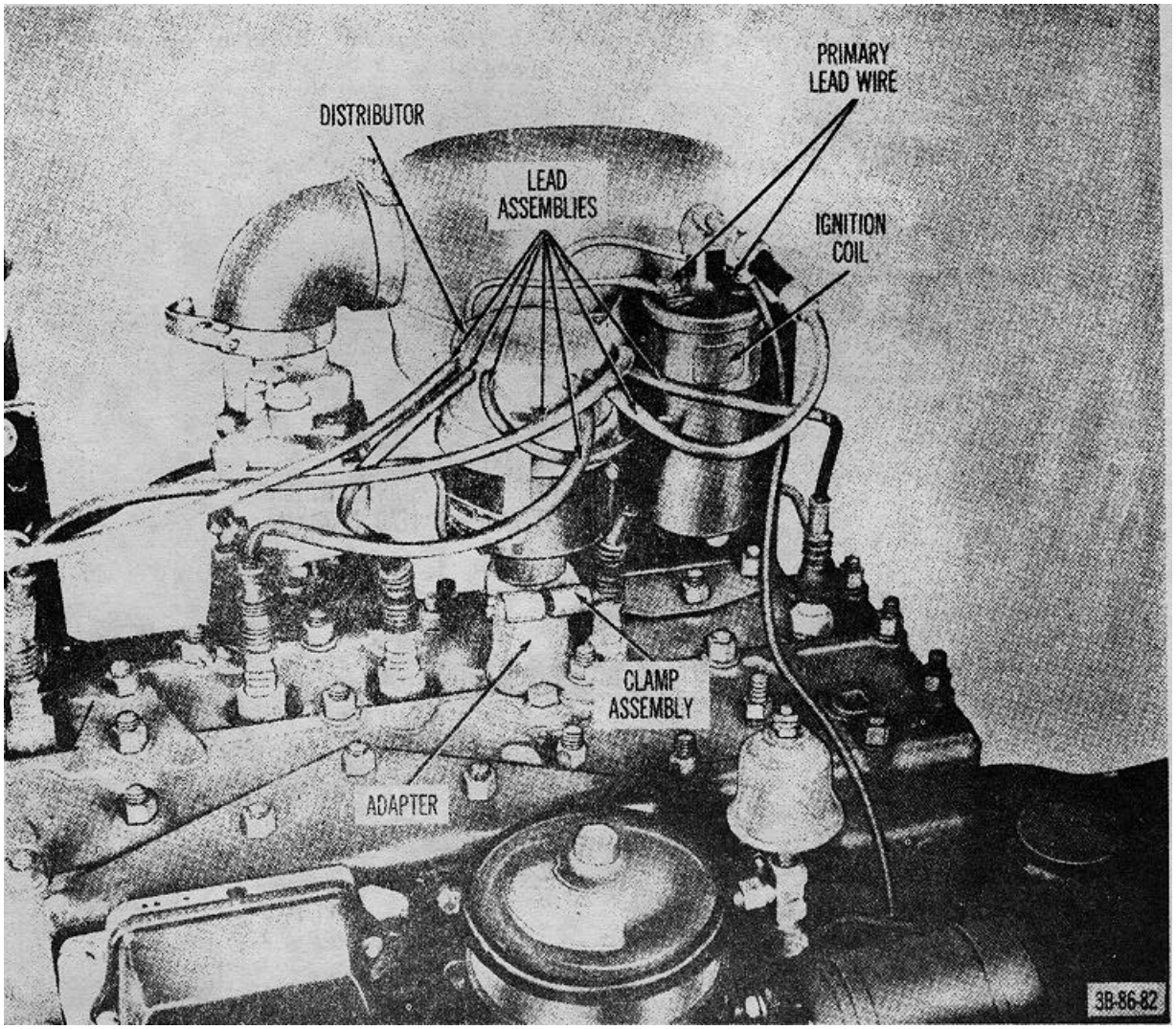


Figure 55. Distributor installed on truck.

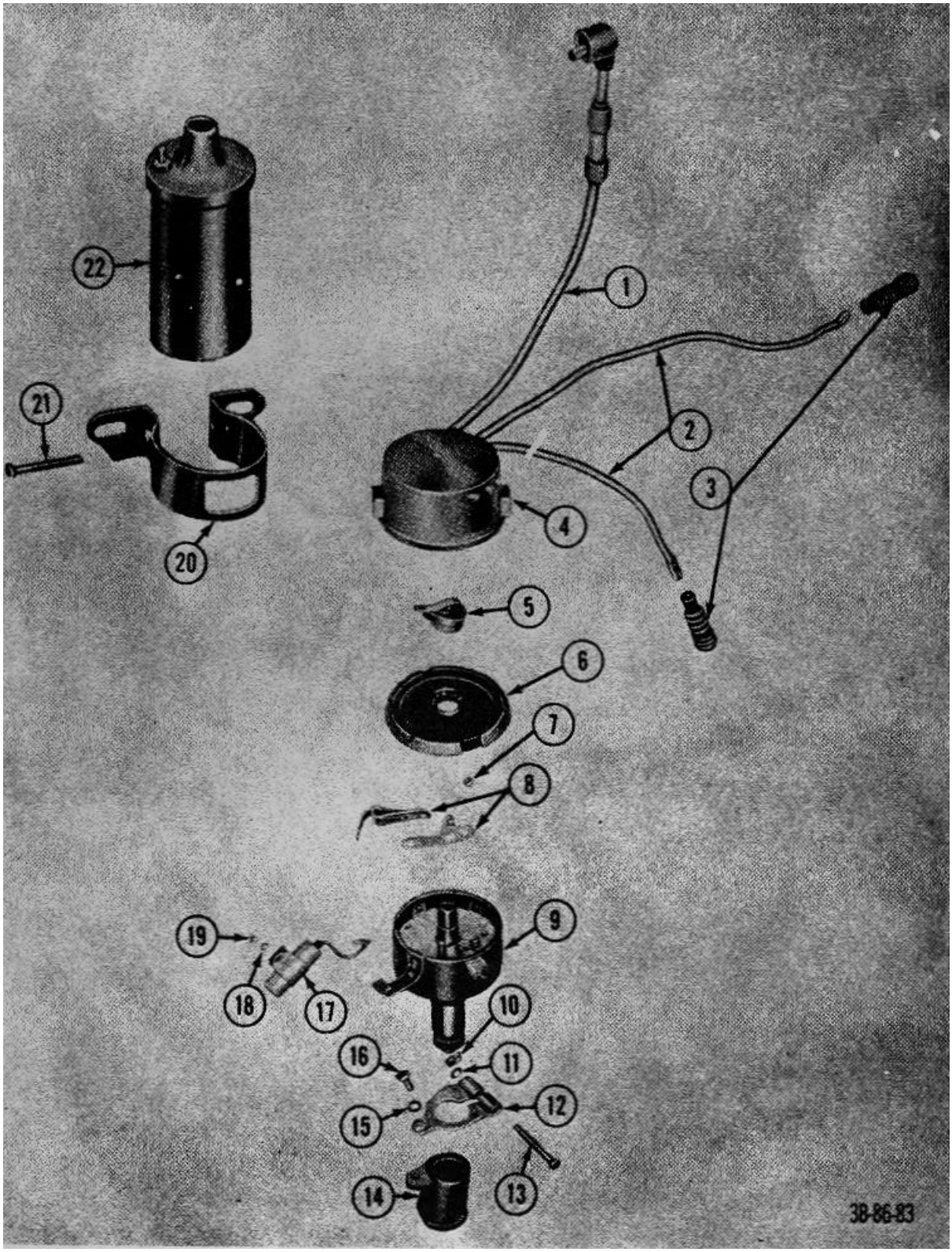


Figure 56. Distributor, exploded view.

1 Wire assembly, distributor-to-coil
2 Lead assemblies
3 Caps, lead assemblies
4 Cap assembly
5 Rotor
6 Cover, housing
7 Screw, lock
8 Contact set
9 Housing
10 Nut
11 Washer
12 Clamp assembly
13 Bolt
14 Adapter
15 Lockwasher
16 Capscrew
17 Capacitor
18 Lockwasher
19 Screw
20 Bracket
21 Bolt
22 Coil, ignition

Figure 56-Continued.

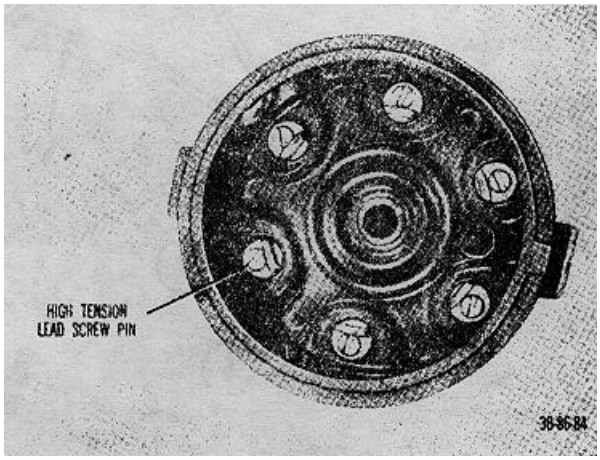


Figure 57. Interior of distributor cap.

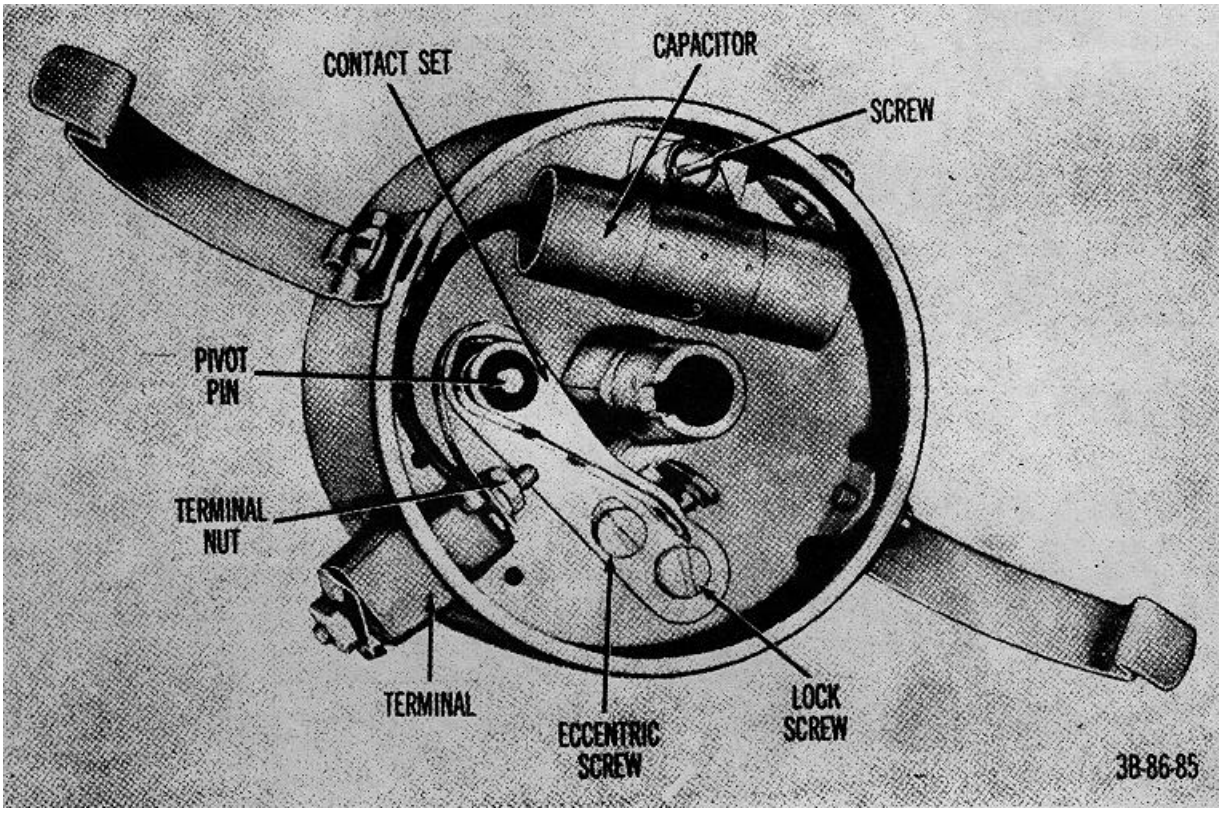


Figure 58. Interior of distributor.

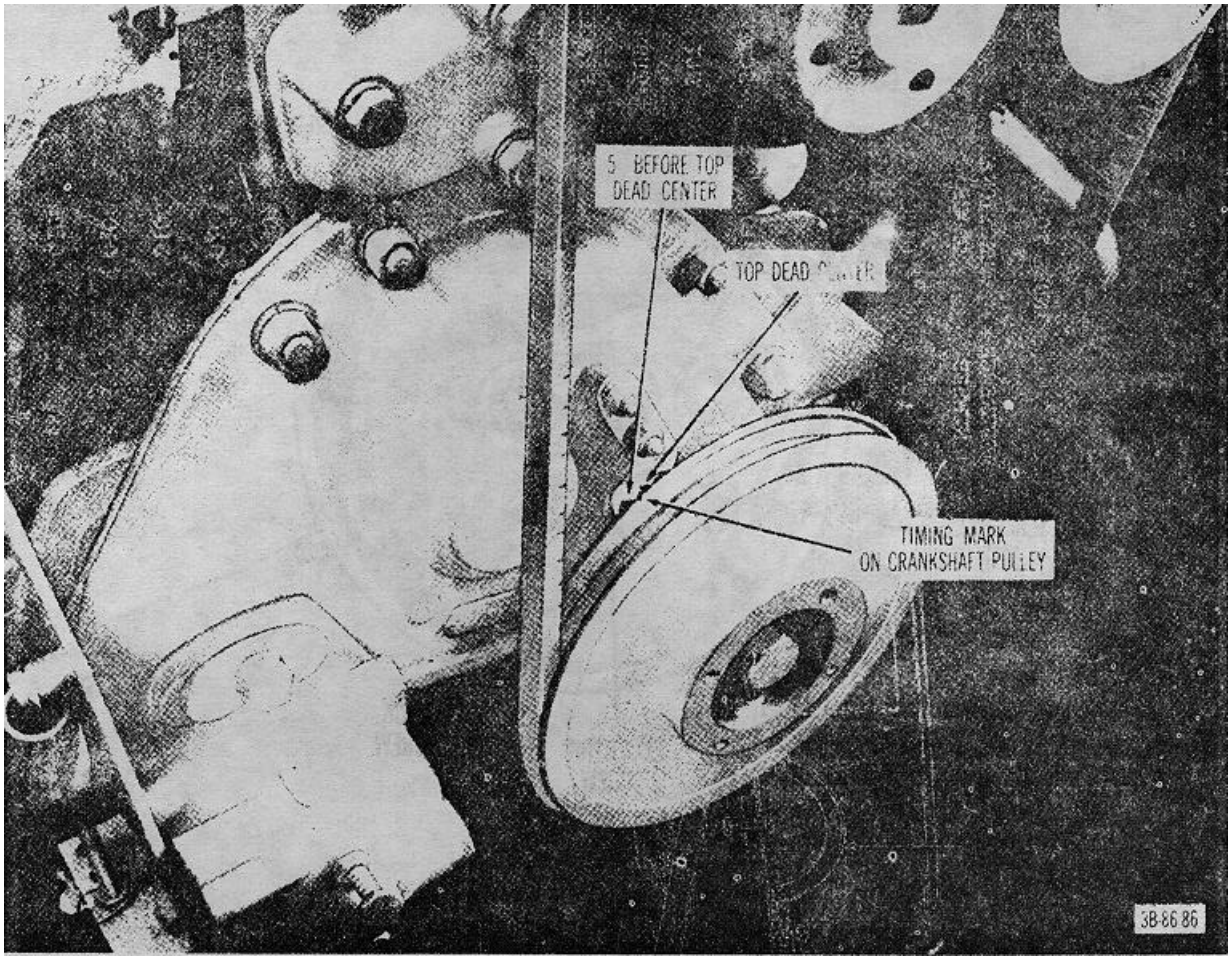


Figure 59. Crankshaft pulley and timing gear cover showing timing marks.

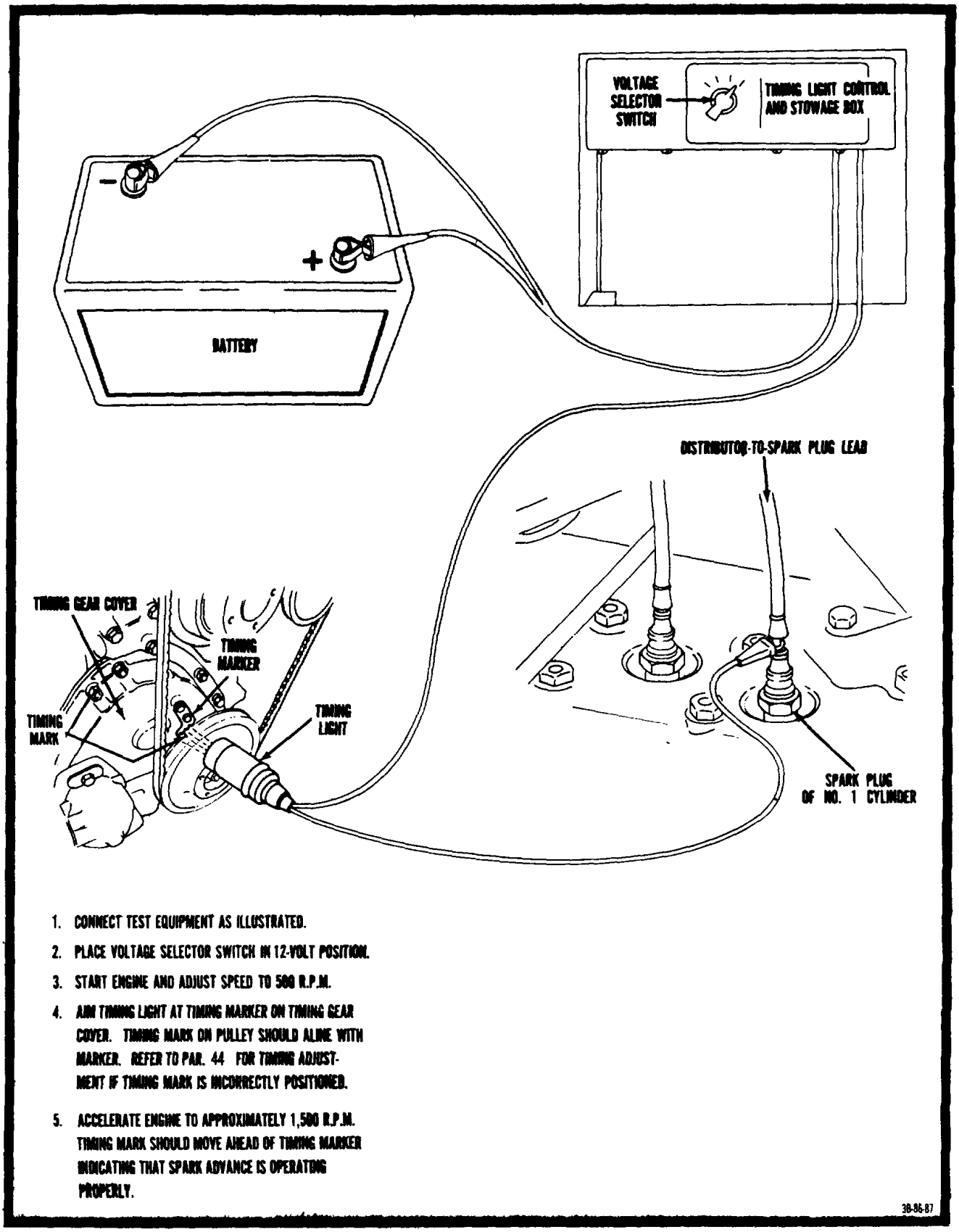


Figure 60. Test equipment for checking timing by the timing tight method.

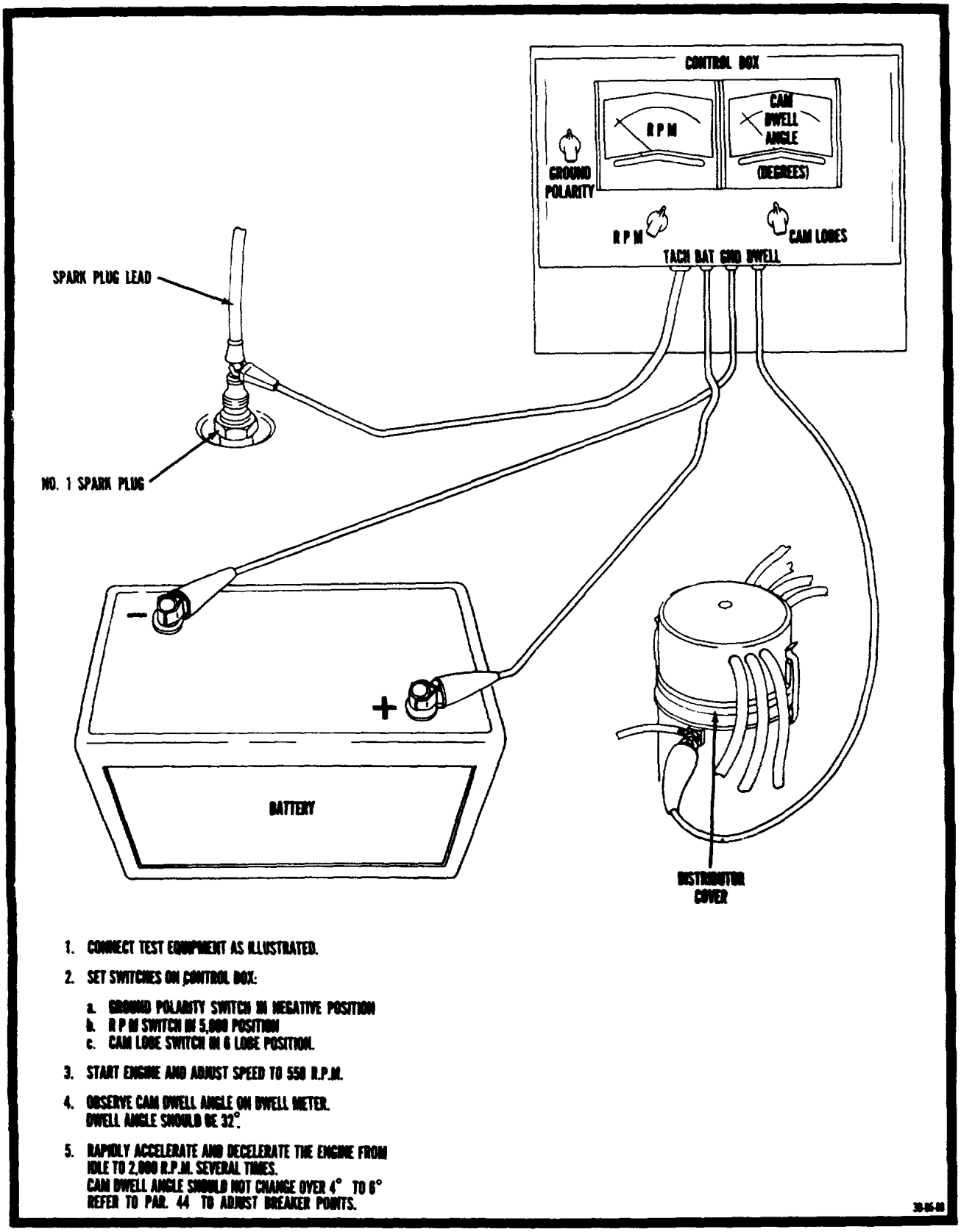
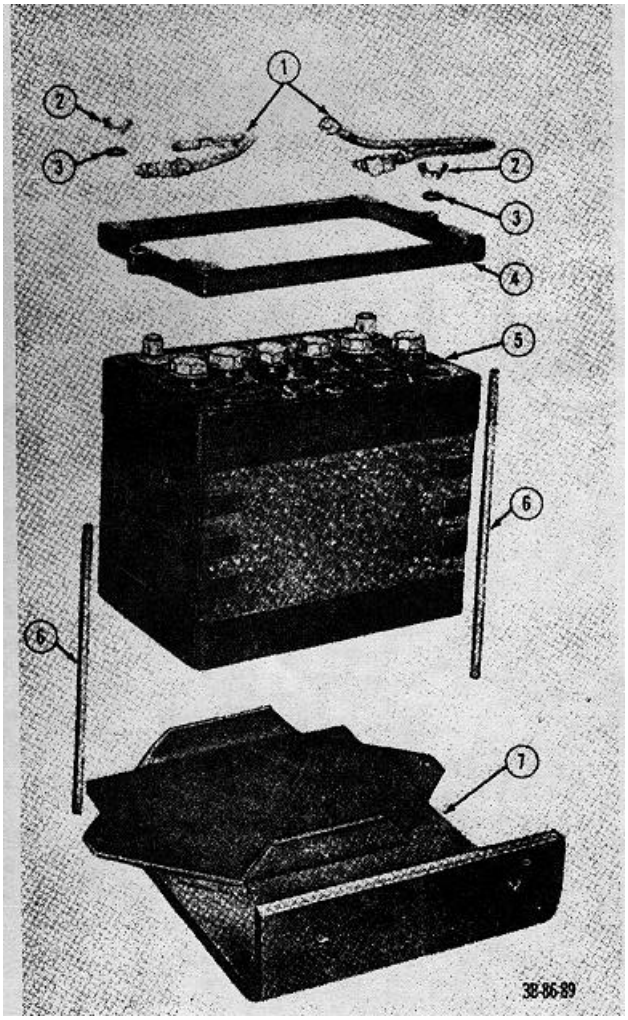
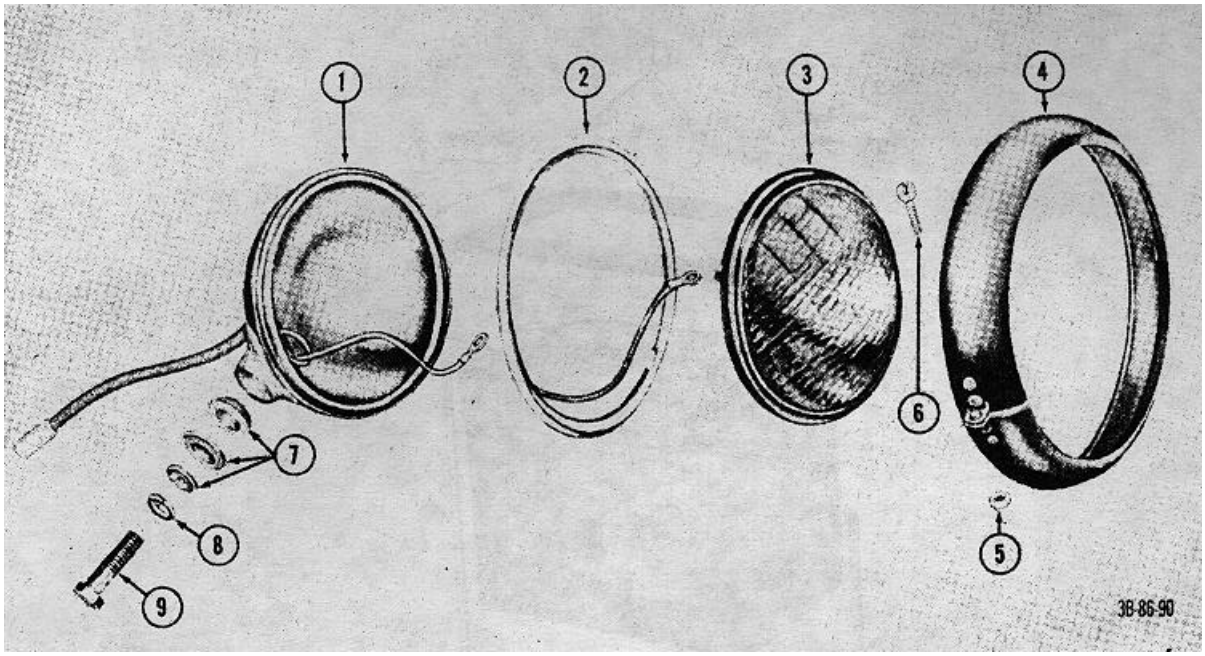


Figure 61. Test equipment for checking cam dwell.



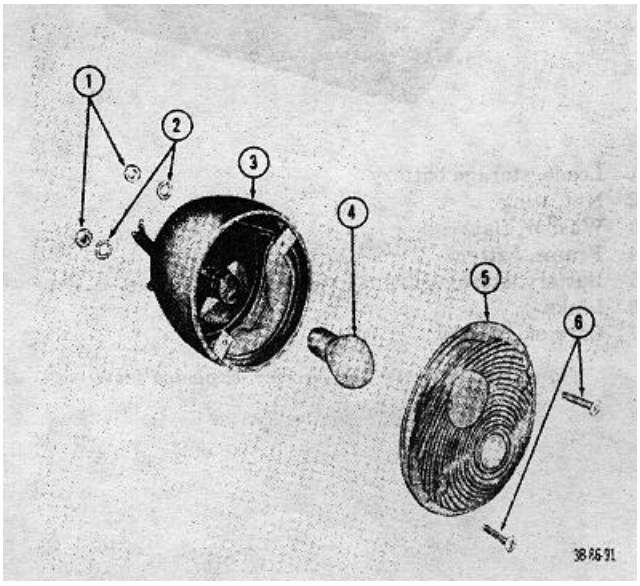
1 Leads, storage battery
2 Nut, wing
3 Washer, flat
4 Frame, battery
5 Battery, storage, dry, 12-volt
6 Links
7 Carrier, battery

Figure 62. Battery and carrier, exploded view.



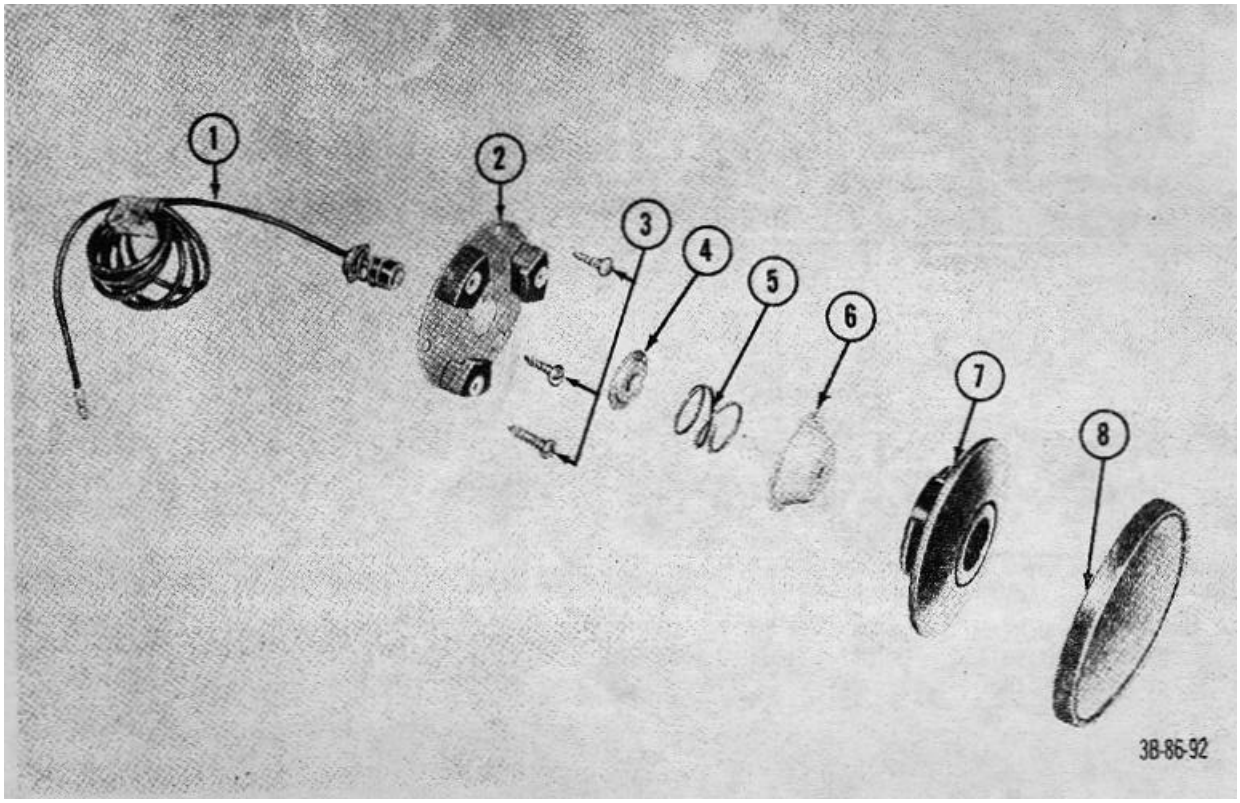
1 Body
2 Ring, retaining
3 Lamp, sealed beam
4 Rim
5 Nut
6 Screw
7 Swivel, mounting
8 Lockwasher
9 Capscrew

Figure 65. Headlight, exploded view.



1 Nuts
2 Lockwashers
3 Body
4 Lamp, incandescent
5 Lens
6 Screws

Figure 64. Stoplight-taillight assembly, exploded view.



1	Cable assembly	5	Spring
2	Plate, base	6	Cup, contact
3	Screws	7	Button, horn
4	Cap, contact	8	Cover, horn button

Figure 65. Horn button assembly, exploded view.

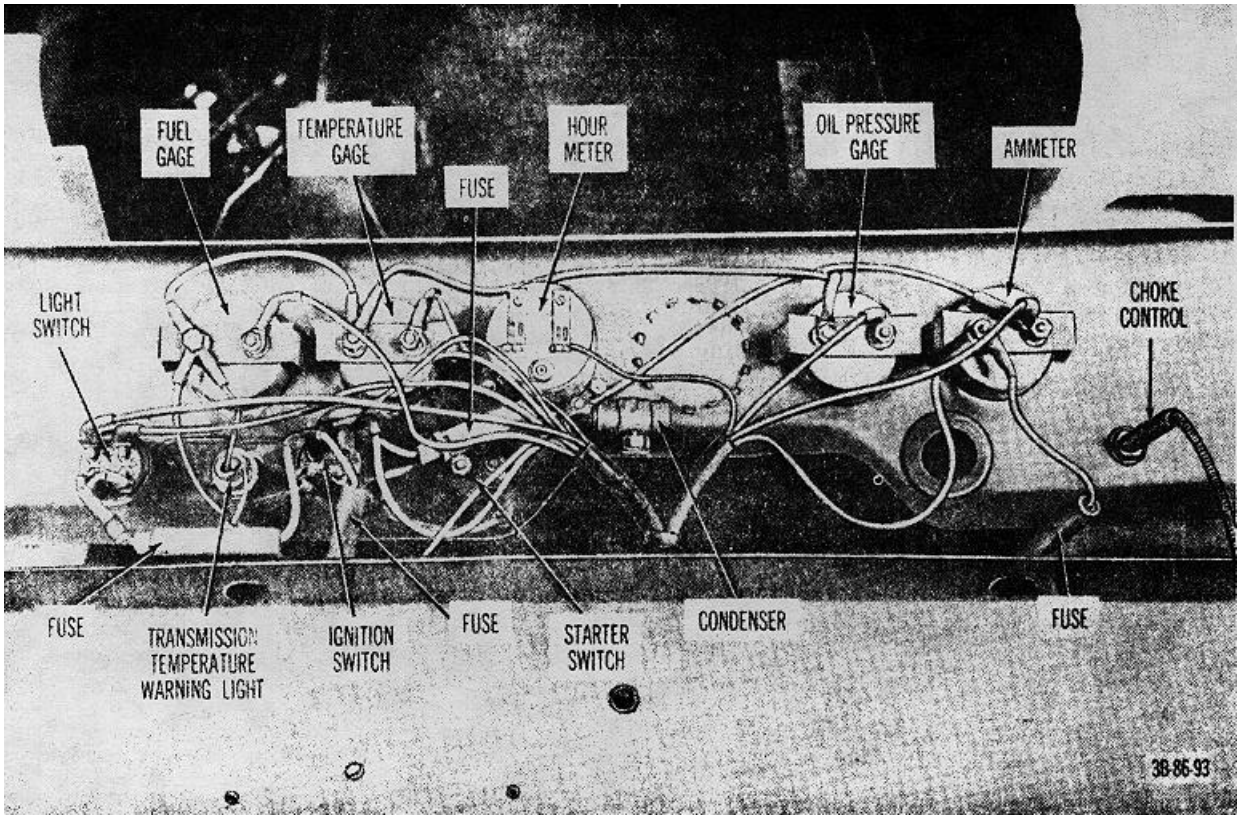


Figure 66. Instruments and gages viewed from rear of instrument panel.

Section IX. TRANSMISSION (GROUP 07)

57. General

The transmission provides a constant mesh with two speeds forward and two speeds reverse. The forward or reverse speeds are manually selected and oil pressure from the pump actuates the selected clutch pack. Part of the oil provided is used to actuate the forward reverse clutch pack, part of it is used in the torque converter, and part of it is used to actuate the high-low clutch pack. Oil flows from the torque converter, through a check valve, through the filter, through the cooling system, into the transmission bearing cap then through the high-low clutch pack.

58. Transmission Oil Filter

a. Removal.
   (1) Disconnect inlet hose (7, fig. 67) at filter assembly.
   (2) Disconnect outlet hose (1) at filter assembly.
   (3) Unscrew and remove bolts (11), flat washers (12), lockwashers (15), and nuts (16) that secure filter bracket (9) to engine bracket (10) and remove filter bracket with filter assembly from engine.
   (4) Unscrew nuts that secure engine bracket to engine and remove engine bracket.

b. Disassembly.
   (1) Unscrew filter bolt (25). and remove gasket (24), filter cover (23), gasket (22), spring (21) and rubber washer (20) from filter body (18).
   (2) Remove element (19) from body.

c. Cleaning and Inspection. *Clean filter assembly with SD and inspect for cracks, broken mounting bracket, stripped threads. Replace with new assembly or element as necessary.*

d. Assembly. *Reverse procedures in b above.*

e. Installation. *Reverse procedures in a above.*

59. Transmission Linkage

a. Removal.
   (1) Remove cotter pins (13 and 15, fig. 68) from straight-headed pins (4) and rod ends (5 and 14) and separate rods (7 and 11) from transmission crank assembly (27) and shifting shaft (3).
   (2) Remove capscrews (fig. 69) and lockwasher that secures bracket to transmission control valve and remove rods from control valve.
   (3) Remove rods from truck.

b. Installation. *Reverse procedures in* a *above.*

c. Adjustment. *Adjust the linkage when installing as follows:*
   (1) Place the transmission levers in neutral.
   (2) With the rods installed in position on the transmission control valve, either shorten or lengthen the rods by turning the rod ends until the rod ends can be connected to the transmission levers.

60. Transmission Control Levers

a. Removal.
   (1) Refer to paragraph 59 and disconnect linkage.
   (2) Remove spring pin (2, fig. 68) that secures forward-and-reverse shift lever (1) to shifting shaft (3) and remove lever from shaft.
   (3) Remove capscrew (3) that secures high-and-low shift lever (31) to crank assembly (27).
   (4) Loosen allen head screw on steering post bracket. Move bracket up so high and low lever can be removed from crank assembly and remove lever.
   (5) Remove capscrews (16 and 18) nuts (21 and 25) and lockwashers (20 and 24) that secure bracket assembly (17) to frame and remove bracket assembly.
   (6) Remove crank assembly and shifting shaft from the bottom of the truck.
   (7) Remove shifting shaft from crank assembly.
   (8) Press bushing (26) from bracket assembly and crank assembly if necessary.

b. Installation.
   (1) Reverse procedures in a above.
   (2) Refer to paragraph 59 and adjust transmission linkage, if necessary.

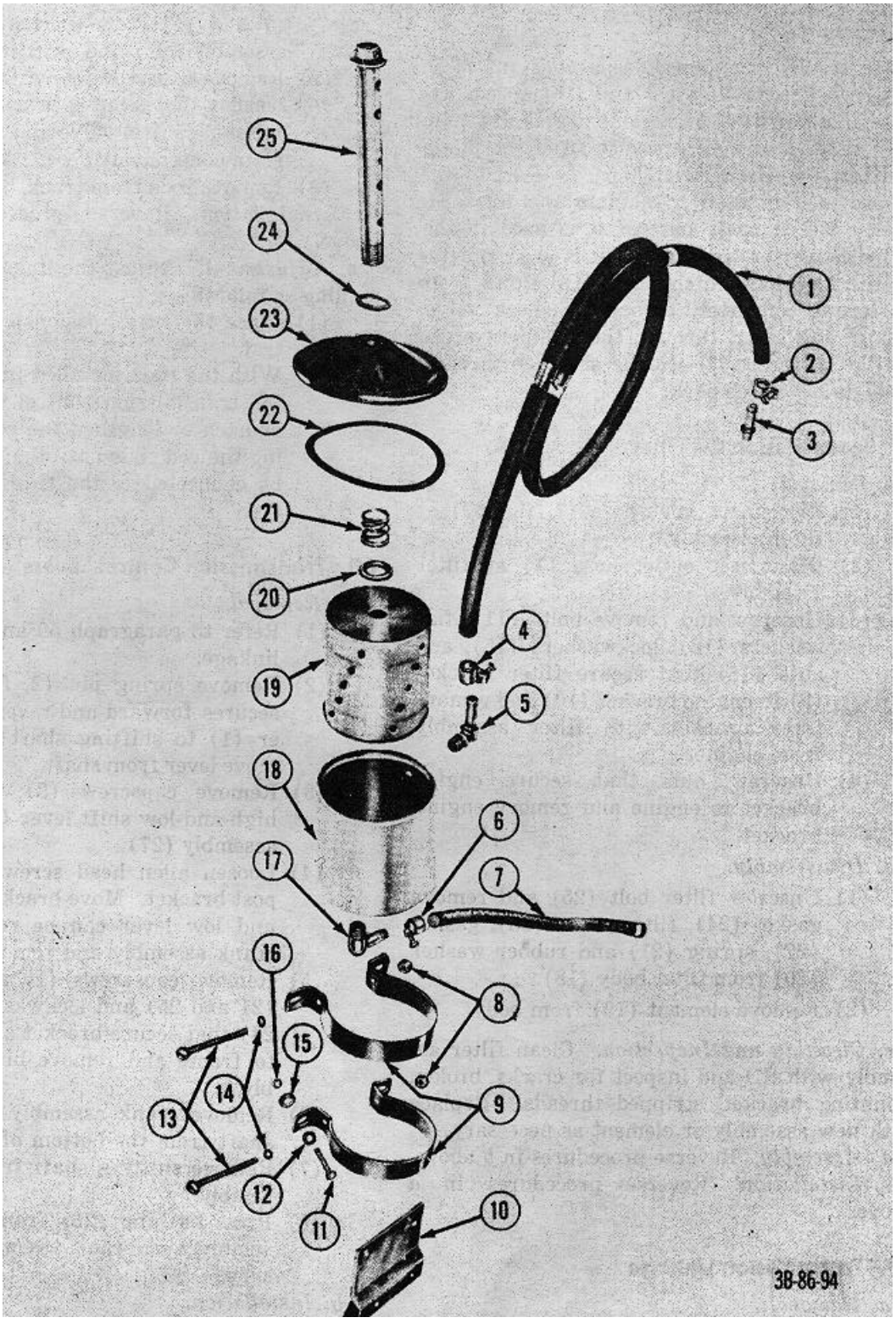


Figure 67. Transmission oil filter, exploded view.

1 Hose, outlet
2 Clamp
3 Fitting
4 Clamp
5 Elbow
6 Clamp
7 Hose, inlet
8 Nuts
9 Bracket, filter
10 Bracket, engine
11 Bolt
12 Washer, flat
13 Screw
14 Lockwasher
15 Lockwasher
16 Nut
17 Elbow
18 Body, filter
19 Element, filter
20 Washer, rubber
21 Spring
22 Gasket
23 Cover, filter
24 Gasket
25 Bolt, filter

Figure 67-Continued.

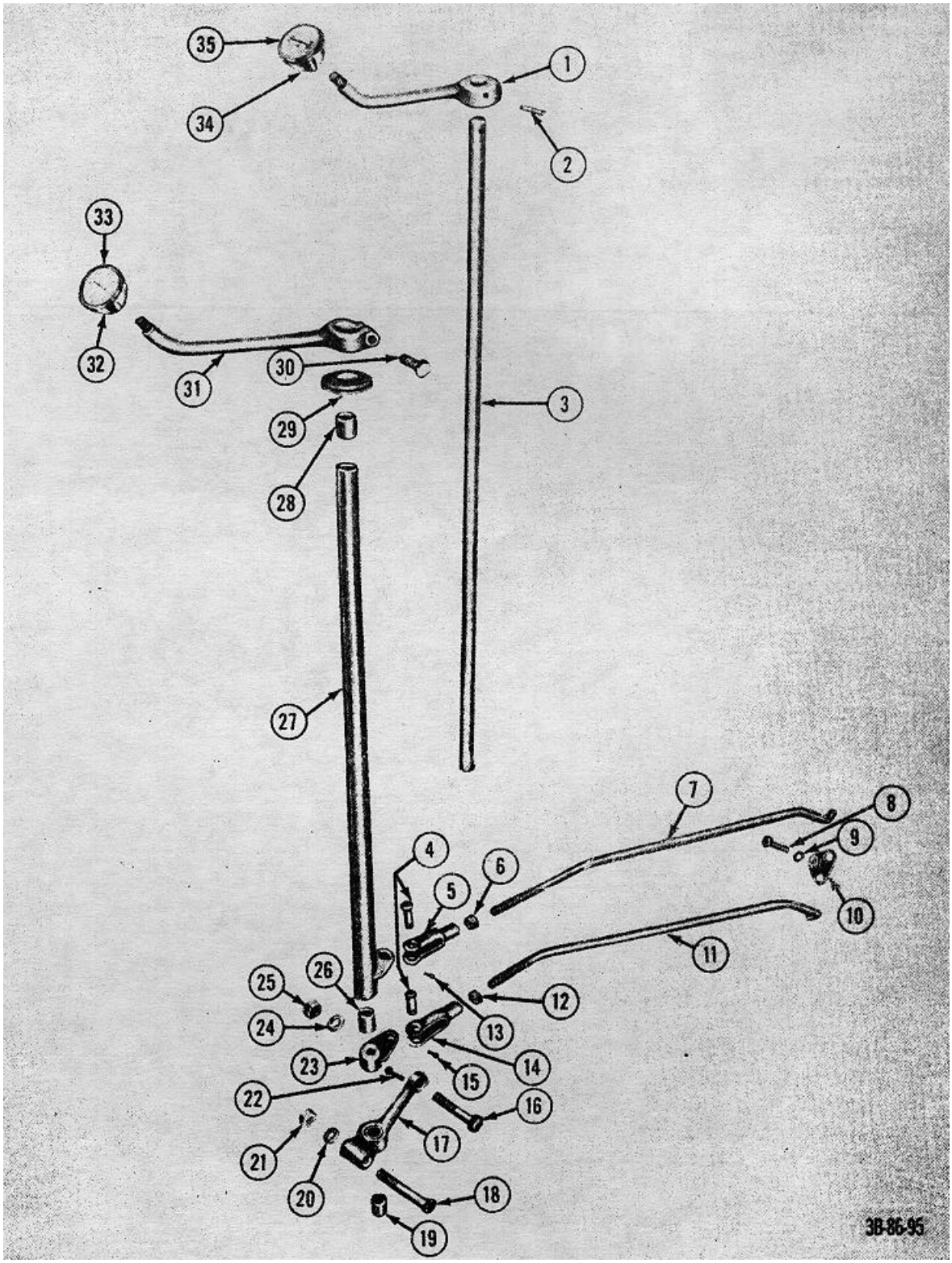


Figure 68. Transmission lever linkage, exploded view.

1 Lever, shift
2 Pin, spring
3 Shaft, shifting
4 Pin, straight-headed
5 End, rod
6 Nut
7 Rod, shifting, high-and-low
8 Capscrew
9 Lockwasher
10 Bracket, spool stop
11 Rod, shifting, forward-and-reverse
12 Nut
13 Pin, cotter
14 End, rod
15 Pin, cotter
16 Capscrew
17 Bracket assembly, shift
18 Capscrew
19 Bushing
20 Lockwasher
21 Nut
22 Pin, roll
23 Crank
24 Lockwasher
25 Nut
26 Bushing
27 Crank assembly, high-low
28 Bushing
29 Grommet, rubber
30 Capscrew
31 Lever, shift
32 Knob
33 Insert, knob
34 Knob
35 Insert, knob

Figure 68-Continued.

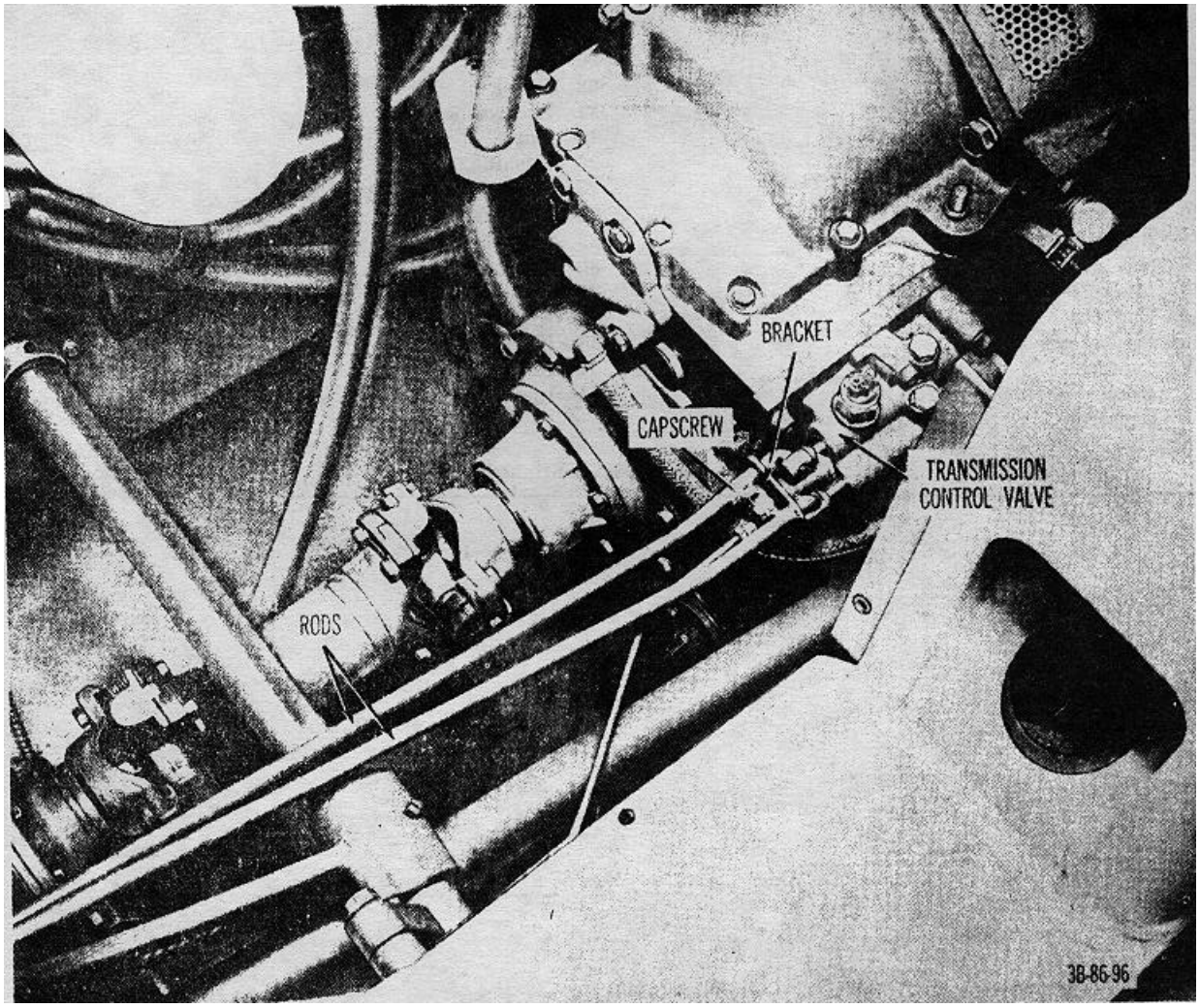


Figure 69. Transmission lever linkage installed on truck.

Section X. BRAKES (GROUP 12)

61. General

The service brakes are hydraulic and complete braking action is obtainable while traveling in forward or reverse. The brakeshoes are full floating and self centering. The brake pedal is mechanically connected to the master cylinder. All brake parts are interchangeable left to right. Each brake has one double piston wheel cylinder located near the top of the backing plate. The upper ends of the two brakeshoes are held against the pistons and the anchor pin 112 by retracting springs attached to the brakeshoe webs. The lower ends of the brakeshoes are connected and held against an adjustable link by a helical spring. The adjustable link is an adjusting screw threaded into a pivot nut. The outer ends of the adjusting screw and pivot nut are slotted to provide engagement with the web of the brakeshoes. An opening is located in the backing plate for brake adjustment. The molded brakeshoe linings are bonded to the brakeshoes.

62. Handbrake and Linkage

Refer to figures 70 and 71 and remove handbrake assembly as follows:

a. Removal.

(1) Release the handbrake.

(2) Remove the cotter pin (7, fig. 71) and withdraw rod end pin (11) from equalizer bar (8).

(3) Remove the capscrews (12) and lockwashers (13) that secure the handbrake lever (2) to the truck and remove the handbrake lever.

(4) Remove the drive wheels and disconnect the handbrake cables (10) at the toggle lever at the brakeshoes.

(5) Remove the capscrews and lockwashers that secure the cable bracket to the wheel backing plate and remove the cable and bracket from the truck.

(6) Loosen the screw, nut, and washer that secure clamp (9) to truck.

(7) Remove the handbrake cables from equalizer bar.

b. Installation. Reverse procedures in a above.

c. Adjustment. See TM 10-3930-222-10.

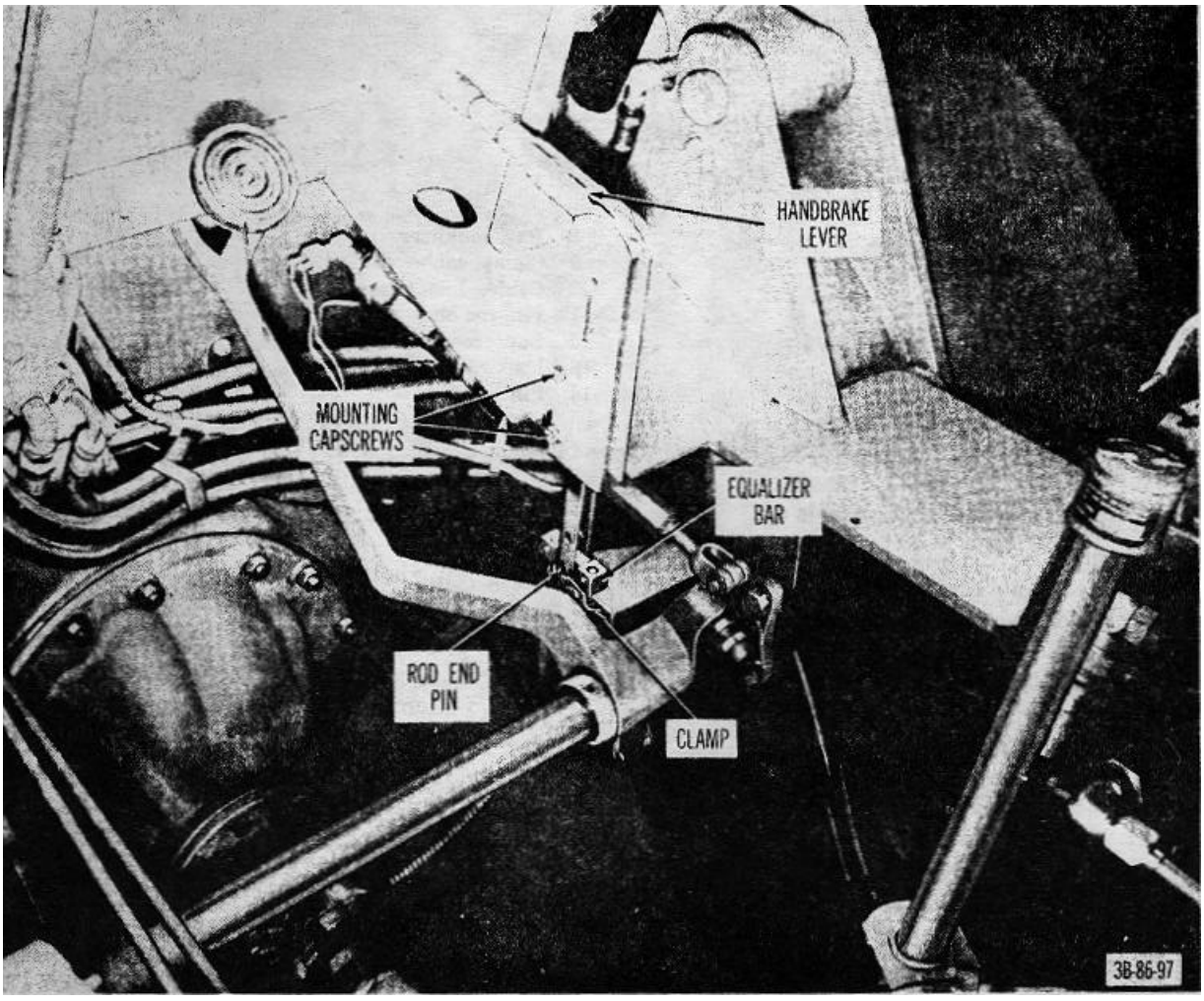
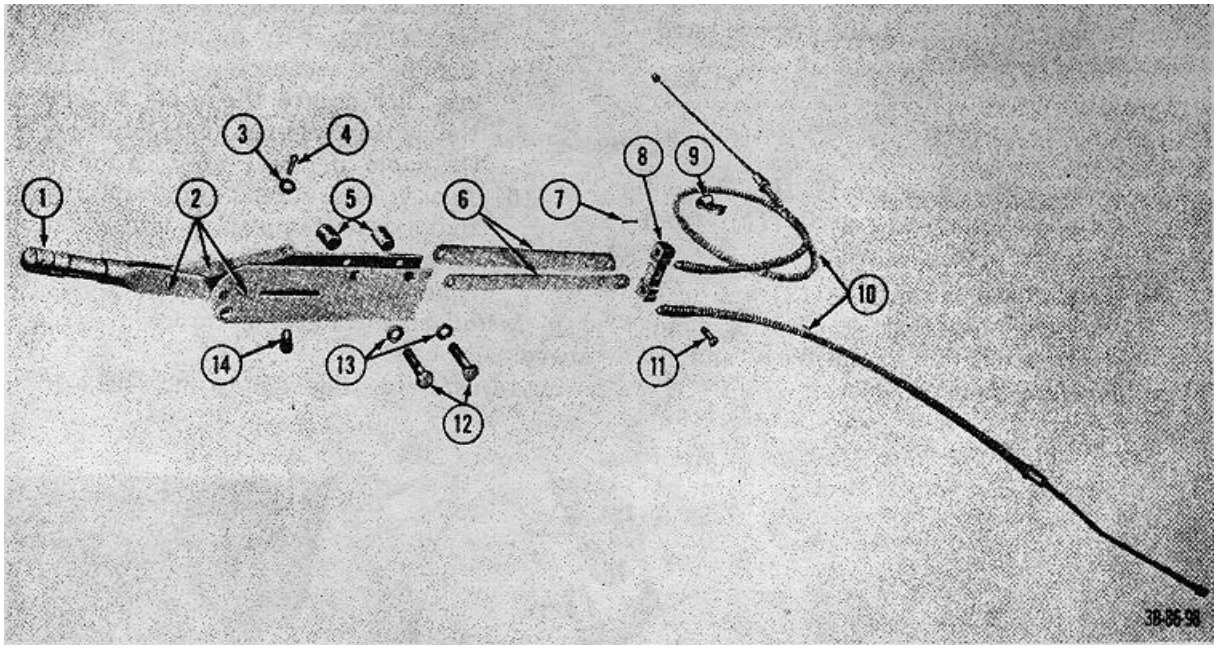


Figure 70. Handbrake installed on truck.



1 Knob
2 Lever, handbrake
3 Washer
4 Pin, cotter
5 Spacers
6 Links
7 Pin, cotter
8 Bar, equalizer
9 Clamp, cable
10 Cables, handbrake
11 Pin, rod end
12 Capscrews.
13 Lockwashers
14 Pin

Figure 71. Handbrake and linkage, exploded view.

63. Brake and Inching Controls

a. Removal.

(1) Remove the floor plates.

(2) Remove the cotter pin (5, fig. 72) and clevis pin (9) and disconnect the clevis (8) and master cylinder push rod (7) from the brake pedal assembly (22).

(3) Remove the nut (38) and lockwasher (40) that secure the inching pedal. linkage to the inching lever (33) and separate the linkage from the inching lever.

(4) Disconnect and remove the brake pedal return spring (21).

(5) Disconnect and remove the inching pedal return spring (18).

(6) Remove the capscrews (15) and lockwashers (14) that secure each end of the brake and inching controls to the truck and remove the brake and inching controls.

(7) Place the special Hyster wrench on the slot of the inching spool of the transmission control valve. Hold the inching spool firmly and unscrew the ball joint (48) from the inching spool.

(8) Remove the lockwasher (49) and special washer (50) from the ball joint.

(9) Remove the inching pedal linkage.

b. Disassembly.

(1) Unscrew and remove the pedal pads (1 and 3) and lockwashers (2 and 4) from the inching pedal assembly (28) and the brake pedal assembly (22).

(2) Remove the right-hand bracket (12) from the cross-shaft (26).

(3) Remove the relay lever assembly (16) from the cross-shaft and then remove the key (25) from the cross-shaft.
(4) Slide the brake pedal assembly (22) from the cross-shaft.
(5) Press the sleeve bearings (19) from the brake pedal assembly.
(6) Unscrew the setscrew (23) and remove the pedal shaft collar (24) from the cross-shaft.
(7) Remove the left-hand bracket (31) from the cross-shaft.
(8) Unscrew the capscrew (37) and lockwasher (35) and remove the inching lever (33) from the bracket.
(9) Remove the nut (39),lockwasher (41), and bolt (44) that secure angle plate (42) to the inching lever (33) and remove plate.
(10) Unscrew the setscrew (30) and remove the pedal shaft collar (29) from the cross-shaft.
(11) Unscrew the setscrew (36) and remove the inching pedal assembly (28) from the cross-shaft.
(12) Remove the key (27) from cross-shaft.
(13) Press the sleeve bearings (32 and 13) from the brackets (31 and 12).
(14) Remove the pins (17 and 20) from the brake pedal assembly (22) and the relay lever assembly (16).
(15) Remove the ball joints (43 and 48) from the inching link (46).
(16) Remove the nuts (45 and 47) from the inching link.

c. Assembly. Reverse procedures in *b* above.

d. Installation. Reverse procedures in *a* above.

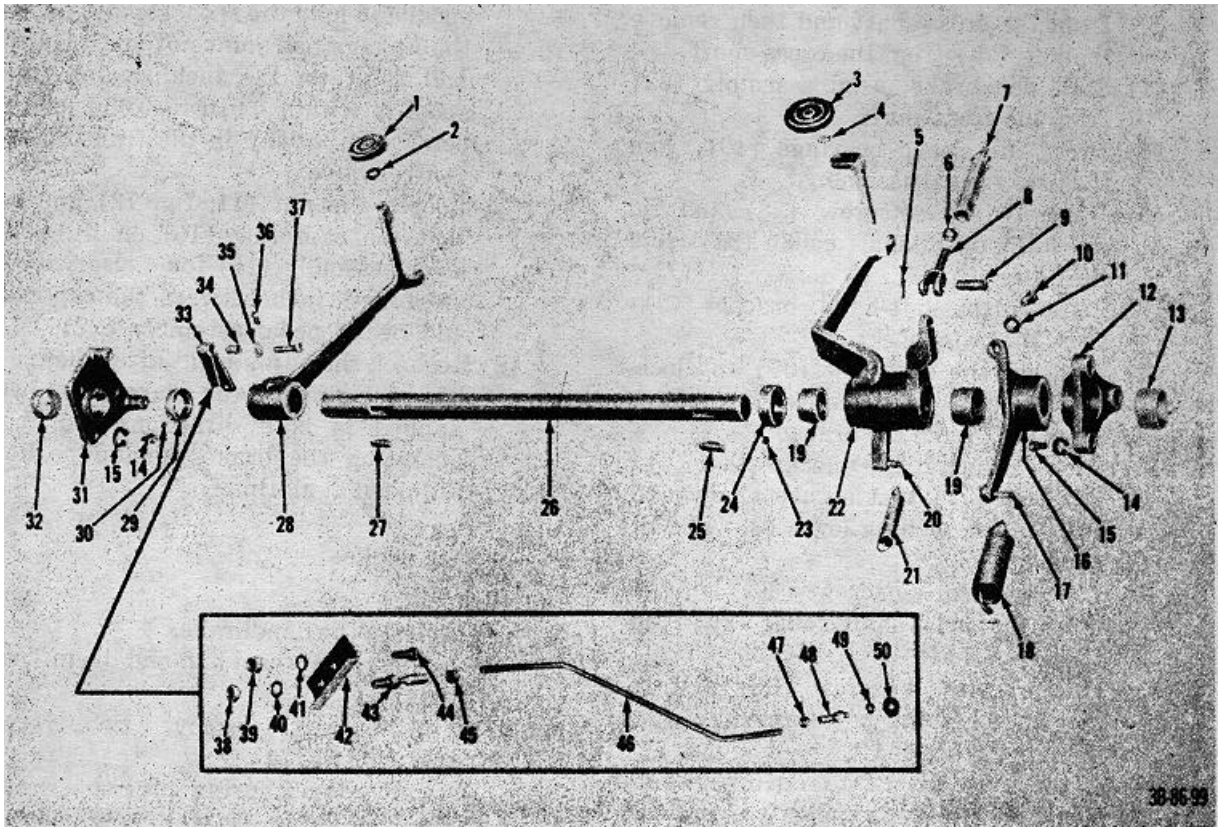
e. Adjustment. Adjust the brake and inching controls as follows:
(1) Adjust the service brakes (par. 64).
(2) Adjust the master cylinder push rod (fig. 73) so that the master cylinder piston fully retracts with the brake pedal up.
(3) Adjust the push rod until brake pedal has 1/2-inch free travel before the push rod contacts the master cylinder piston.
(4) With the inching pedal up, adjust the inching spool. Place the special wrench on the slot of the inching spool and hold the spool steady. Loosen the linkage ball joint nut and turn the ball joint on the inching link until spool is within 0.010 to 0.030 inch of being all the way in the transmission control valve.
(5) Loosen the nut (11, fig. 72) and adjust the capscrew (10) on the relay lever assembly (16) for a clearance of one-fourth inch between the capscrew and brake pedal assembly (22).
(6) Recheck the adjustment after the truck has been run and the brakes have been applied in both directions. For best operation the brakes should be kept adjusted at all times.

64. Service Brakes

a. Removal.
(1) Release the handbrake.
(2) Remove the wheel hub and drum (par. 71).
(3) Unhook and remove two return springs (fig. 75).
(4) Remove three spring clips that secure the brakeshoes to the holddown by rotating holddown pin one-quarter turn.
(5) Remove three holddown pins.
(6) Remove the clips that secure the rear brakeshoe to the handbrake lever cable.
(7) Slip the handbrake cable end from the slot in the secondary shoe toggle lever.
(8) Spread the brakeshoes from the cylinder push rods.
(9) Unhook the adjusting assembly, retracting the spring and separate brakeshoes.
(10) Remove the brakeshoes.
(11) Remove the anchor pins from the spider assembly.
(12) Remove the handbrake link.
(13) Remove the handbrake lever.

b. Installation. Reverse procedures in a above.

c. Adjustment.
(1) Release the handbrake.



1 Pad, pedal, inching
2 Lockwasher
3 Pad, pedal, brake
4 Lockwasher
5 Pin, cotter
6 Jamnut
7 Rod
8 Clevis, master cylinder rod
9 Pin, straight
10 Capscrew, adjusting stop
11 Nut
12 Bracket, right-hand
13 Bearing, sleeve
14 Lockwashers
15 Capscrews
16 Lever assembly, relay
17 Pin, grooved, return spring
18 Spring, inching pedal return
19 Bearings, sleeve, pedal shaft
20 Pin, grooved
21 Spring, brake pedal return
22 Pedal assembly, brake
23 Setscrew
24 Collar, pedal shaft
25 Key, relay lever
26 Cross-shaft
27 Key, Inching pedal
28 Pedal assembly, inching
29 Collar, pedal shaft
30 Setscrew
31 Bracket, left-hand
32 Bearing, sleeve
33 Lever, inching
34 Bushing
35 Lockwasher
36 Setscrew, inching pedal
37 Capscrew
38 Nut
39 Nut, angle plate
40 Lockwasher
41 Lockwasher, angle plate
42 Plate, angle, inching lever
43 Joint, ball, inching link
44 Capscrew, angle plate
45 Nut
46 Link, inching
47 Nut
48 Joint, ball, inching link
49 Lockwasher
50 Washer, special

Figure 72. Brake and inching controls, exploded view.

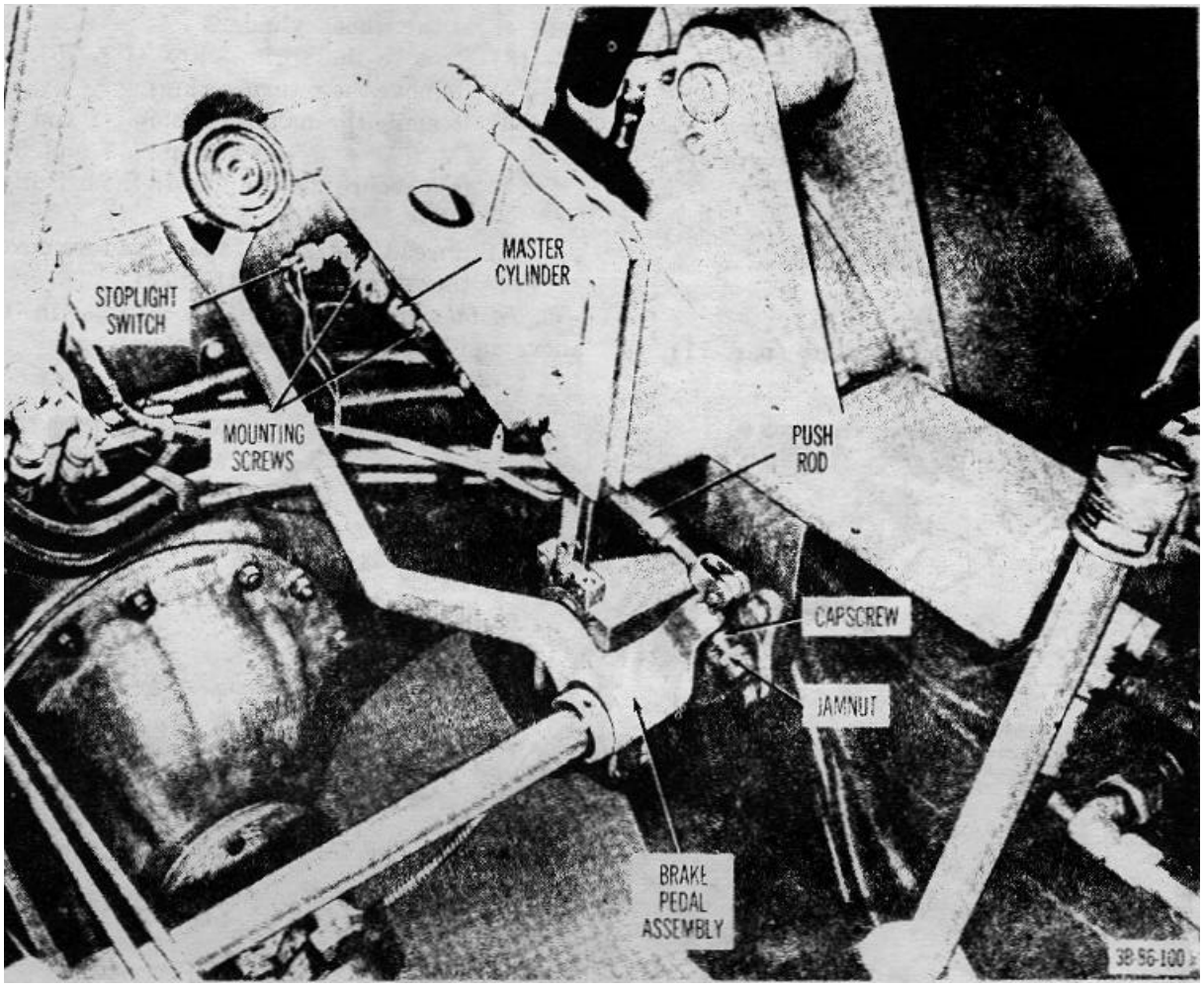


Figure 73. Brake master cylinder, installed on truck.

(2) Remove the dust cover from the backing plate.

(3) Insert a brake tool to engage the star wheel teeth.

(4) Rotate the star wheel until the brakedrum is locked.

(5) Back off the star wheel until the brakedrum turns freely.

d. Inspection.

(1) Inspect the brakedrums for worn or grooved condition. If defective, refer them to higher authority.

(2) If the brake lining is worn to less than 1/8-inch thickness, replace the brakeshoes.

65. Brake Master Cylinder

a. Removal.

(1) Remove the floor plates.

(2) Disconnect and tag the electric wires at the stoplight switch (fig. 73).

(3) Remove the cotter key and clevis pin and disconnect the master cylinder push rod from the brake pedal assembly (fig. 73).

(4) Disconnect two hydraulic-lines at the master cylinder.

(5) Remove the screws (9, fig. 76) nuts (14), and lockwashers (13) that secure the master cylinder body (10) to the truck and remove the cylinder.

(6) Remove the stoplight switch (8), elbow (7), fitting (4), gasket (3), adapter (6), and gasket (5) from the body (10).

b. Installation. Reverse procedures in *a* above. Adjust brake pedal free travel (par. 63).

66. Wheel Cylinder Assembly

a. Removal.

(1) Remove the wheel hubs (par. 71).

(2) Disconnect the hydraulic brake line at the wheel cylinder.

(3) Remove the spring clips (fig. 75).

(4) Remove the return springs.

(5) Remove the mounting bolts (1 and 9, fig. 77) and lockwashers (3 and 8) that secure the cylinder to the backing plate.

(6) Spread the shoes apart and remove the wheel cylinder (fig. 77).

b. Installation. Reverse procedures in a above and bleed the brakes (c below).

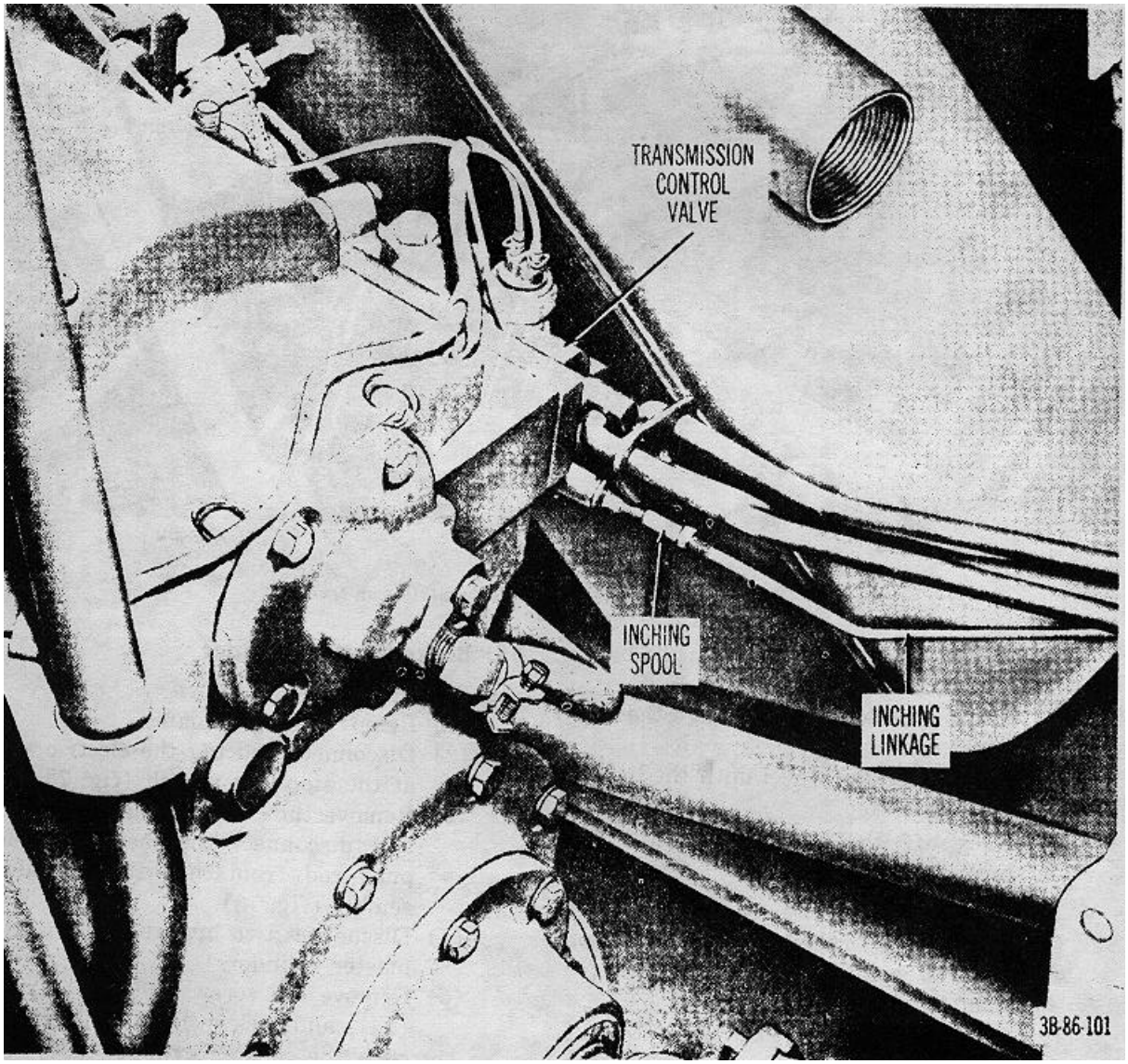


Figure 74. Transmission control valve and inching spool, installed on truck.

c. Bleeding Brakes. Any air in the hydraulic brake system will cause a springy, rubbery action of the brake pedal or will cause the brake pedal to go all the way to the floor plate under normal pressure. Whenever a line has been disconnected at the master cylinder, the entire system must be bled at both wheels until all air is completely expelled. When a line has been disconnected at either wheel cylinder, this cylinder together with the cylinder on the opposite wheel must be bled. Bleed the brakes of air as follows:

(1) Fill the master cylinder with brake fluid.

(2) Connect a bleeder tube on the bleed screw on the wheel backing plate and allow the tube to hang into a container containing hydraulic fluid.

(3) Depress the brake pedal and open the bleeder screw. While the brake pedal is completely depressed, close the bleeder screw. Release the brake pedal.

(4) Repeat (2) above three or four times, or until bubbles cease to appear in

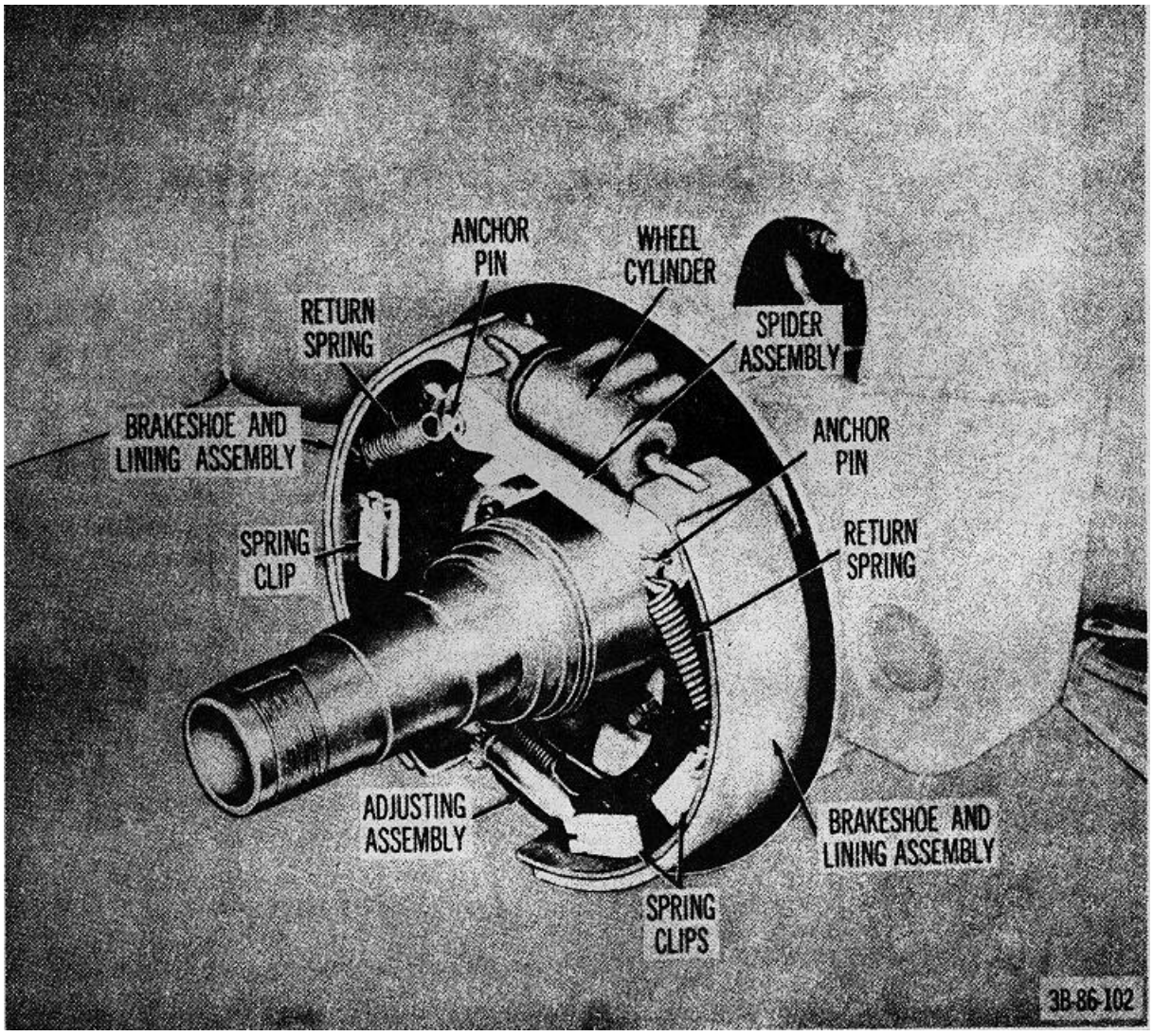
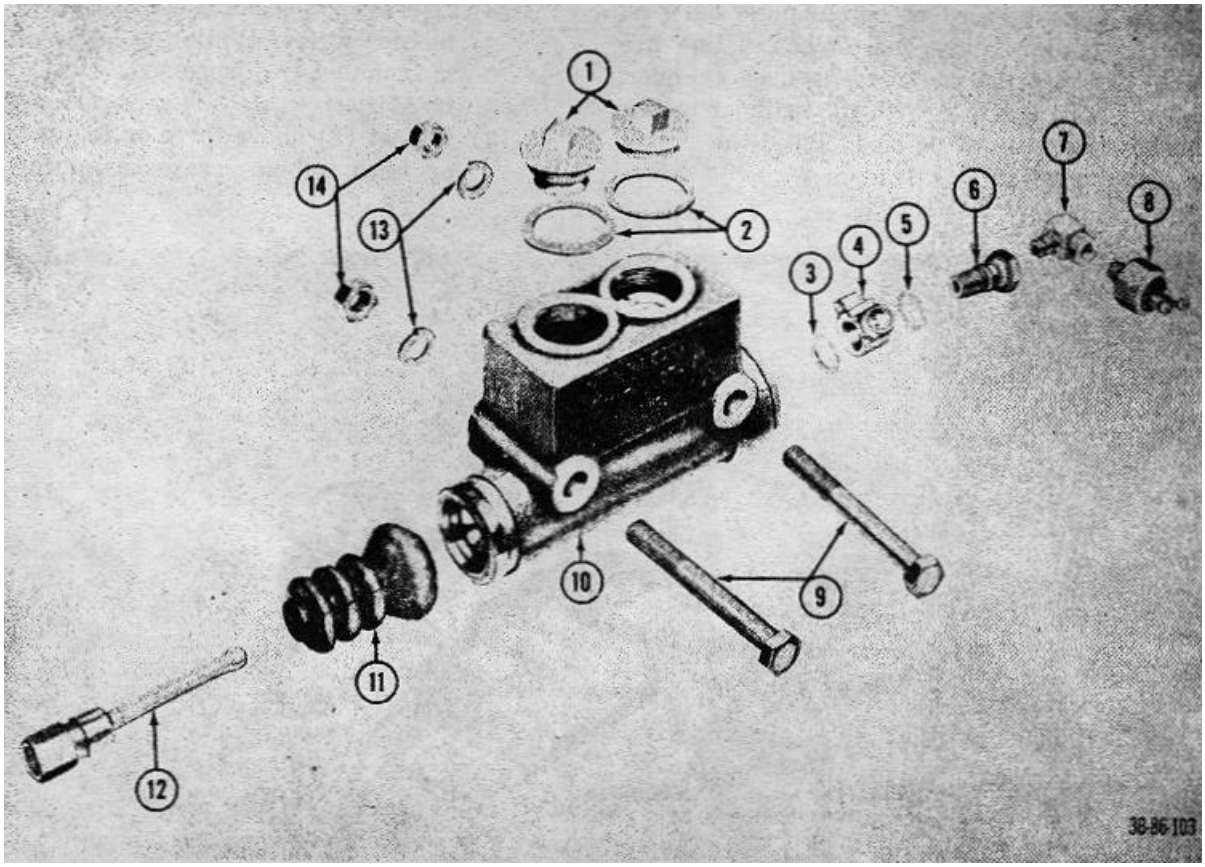


Figure 75. Wheel removed to show service brakes.

container. Close the bleeder screw and disconnect the hose.

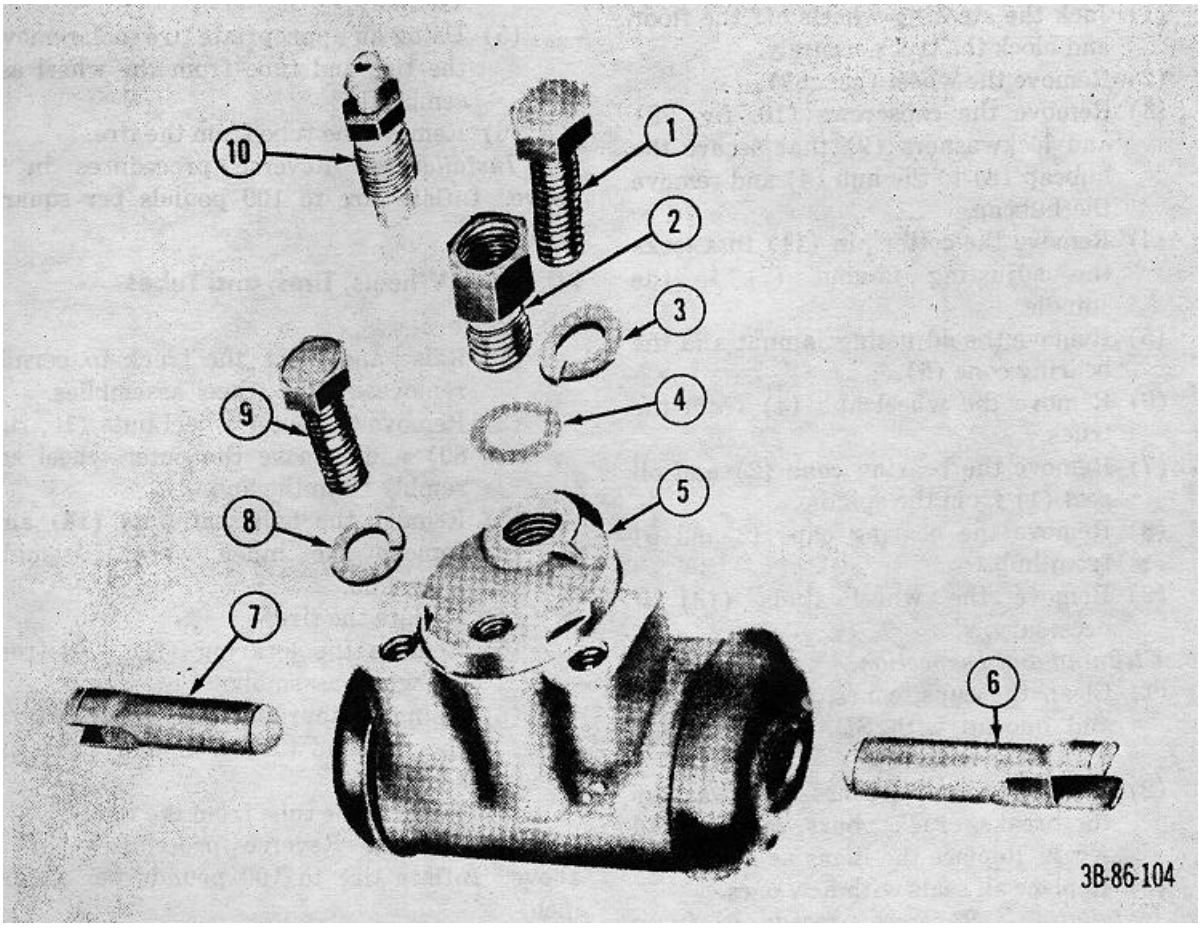
(5) Repeat above procedures for each wheel cylinder.

(6) Check the level of fluid in master cylinder and, as necessary, add fluid to bring to the correct level.



1 Fillercaps
2 Gaskets, fillercap
3 Gasket, copper
4 Fitting
5 Gasket, copper
6 Adapter
7 Elbow
8 Switch, stoplight
9 Screws
10 Body, master cylinder
11 Boot
12 Rod, push
13 Lockwashers
14 Nuts

Figure 76. Brake master cylinder, exploded view.



1 Bolt, mounting
2 Fitting, hydraulic
3 Lockwasher
4 Gasket, copper
5 Body, wheel cylinder
6 Link, connecting
7 Link, connecting
8 Lockwasher
9 Bolt, mounting
10 Valve, bleeder hydraulic

Figure 77. Wheel cylinder and attaching parts.

Section XI. WHEELS (GROUP 13)

67. General

This truck is equipped with six demountable type wheels. There are two steering wheels and two drive wheel assemblies (dual). All of the wheels are interchangeable. Each dual drive wheel consists of an inner wheel and an outer wheel. The inner wheel is secured to the hub by a ball seat nut. -screwed on the hub stud. The outer wheel is then mounted against the inner wheel. A wheel nut, screwed on the ball seat nut, secures the outer wheel. A valve extension is mounted on the inner tire to permit air inflation of the inner tire without removal of the outer wheel. The drive wheel tires are mounted so that the valve stems are 180° apart to permit ease of valve location.

68. Steering Wheel Hubs and Bearings

a. Removal.

(1) Jack the steering wheels off the floor and block the truck securely.
(2) Remove the wheel (par. 69).
(3) Remove the capscrews (10, fig. 78) and lockwashers (9) that secure the hubcap (8) to the hub (4) and remove the hubcap.
(4) Remove the cotter pin (11) that locks the adjusting jamnut (7) to the spindle.
(5) Remove the adjusting jamnut and the bearing cone (6).
(6) Remove the wheel hub (4) from the truck.
(7) Remove the bearing cone (2) and oil seal (1) from the spindle.
(8) Remove the bearing cups (3 and 5) from hub.
(9) Remove the wheel studs (13) if necessary.

b. Cleaning and Inspection.

(1) Clean the cups, cones, nuts, washers, and hubcap with SD, and dry them with clean soft cloth.
(2) Inspect the cups, cones, and washers for breaks, cracks, burs, scoring, and wear. Replace the items as necessary.
(3) Replace all seals with new ones.

c. Installation. Reverse procedures in a above.

d. Adjustment. The cone bearings are adjusted as follows:

(1) Remove the cotter pin from the adjusting jamnut (7, fig. 78).
(2) Tighten the jamnut until a drag is felt when the wheels are turned.
(3) Back off the jamnut either one-sixth of a turn or to the nearest cotter pin hole, then insert the cotter pin.

69. Steering Wheels, Tires, and Tubes

a. Removal.

(1) Using a suitable jack, raise the truck to permit removal of wheel assemblies. Block the truck securely.
(2) Remove the wheel mounting nuts (12, fig. 78) and remove wheel assembly (fig. 79) from the hub.
(3) Deflate the tire.
(4) Remove the lockring from the wheel assembly.
(5) Using an appropriate tire tool, remove the tire and tube from the wheel assembly.
(6) Remove the tube from the tire.

b. Installation. Reverse procedures in a above. Inflate tire to 100 pounds per square inch.

70. Drive Wheels, Tires, and Tubes

a. Removal.

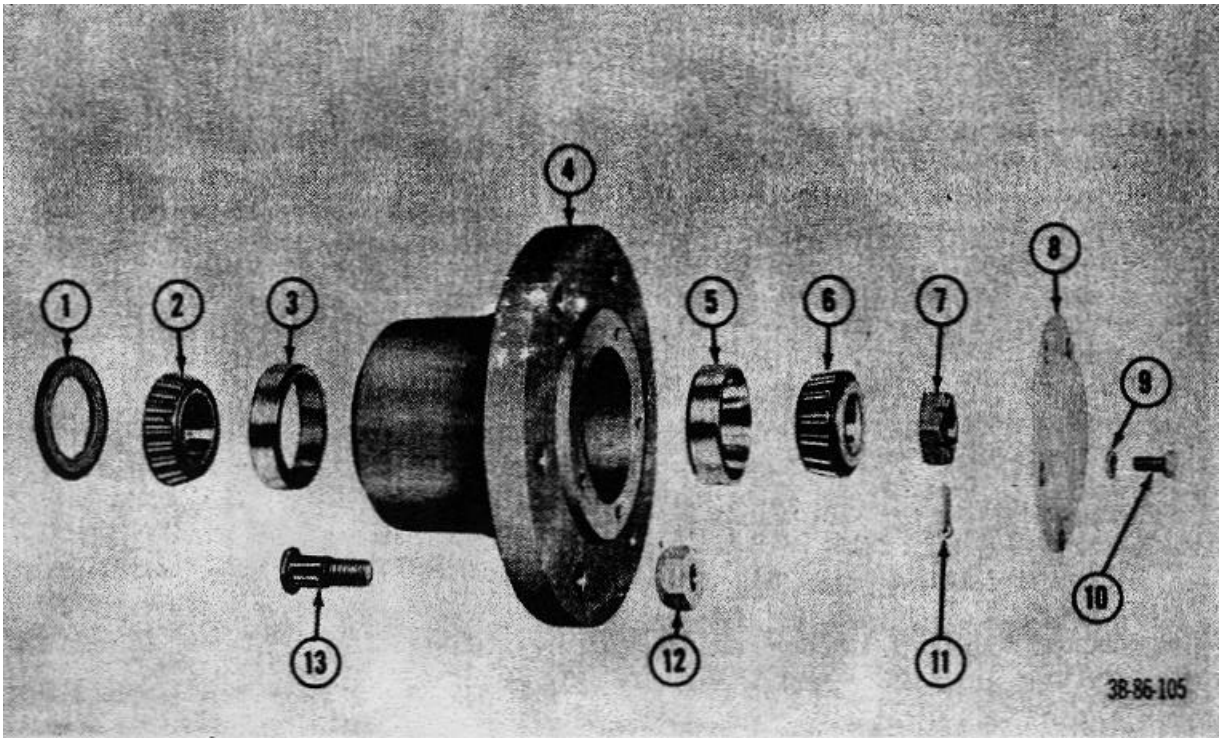
(1) Raise and block the truck to permit removal of the wheel assemblies.
(2) Remove the outer wheel nuts (15, fig. 80) and remove the outer wheel assembly from the hub.
(3) Remove the ball seat nuts (14) and remove the inner wheel assembly from hub.
(4) Deflate the tire.
(5) Remove the lockring (fig. 79) from the wheel assembly.
(6) Using an appropriate tire tool, remove the tire and tube from the wheel assembly.
(7) Remove the tube from the tire.

b. Installation. Reverse procedures in a above. Inflate tire to 100 pounds per square inch.

71. Brakedrums, Hubs, Cones, and Cups

a. Removal.

(1) Remove the drive axle shaft (par. 72).
(2) Remove the oil seal (1, fig. 80).
(3) Remove the outer adjusting nut (2), lockwasher (3) and inner adjusting nut (4) from the axle housing.
(4) Remove the bearing cone (6) from the axle housing.
(5) Remove the brakedrum (11) and hub (7) from the axle housing.
(6) Remove the oil seal (10) and bearing cone (9) and bearing cup (8) from the hub.
(7) Remove the bearing cup (6) from the hub.
(8) Remove the nuts (12) from the studs (13) that secure the drum to the hub and remove the brakedrum.



1 Seal, oil
2 Cone, bearing
3 Cup, bearing
4 Hub, wheel
5 Cup, bearing
6 Cone, bearing
7 Jamnut, adjusting
8 Hubcap
9 Lockwasher
10 Capscrew
11 Pin, cotter
12 Nut, wheel mounting
13 Stud, wheel

Figure 78. Steering wheel hub and bearings, exploded view.

(9) Knock the wheel studs (13) from the hub if necessary.

(10) Using a stud remover, remove the axle studs (16) from the hub if necessary.

b. Cleaning. Wash parts in SD. Do not wash the oil seals in SD.

c. Installation. Reverse procedures in *a* above. Be sure to repack the bearings with grease.

72. Drive Axle Shaft

a. Removal.

(1) Remove the drive axle stud nuts and lockwashers.

(2) Using a suitable hammer, hit the drive axle flange to loosen the dowels. Remove the dowels.

(3) Remove the axle shaft (fig. 81).

b. Installation. Reverse procedures in *a* above.

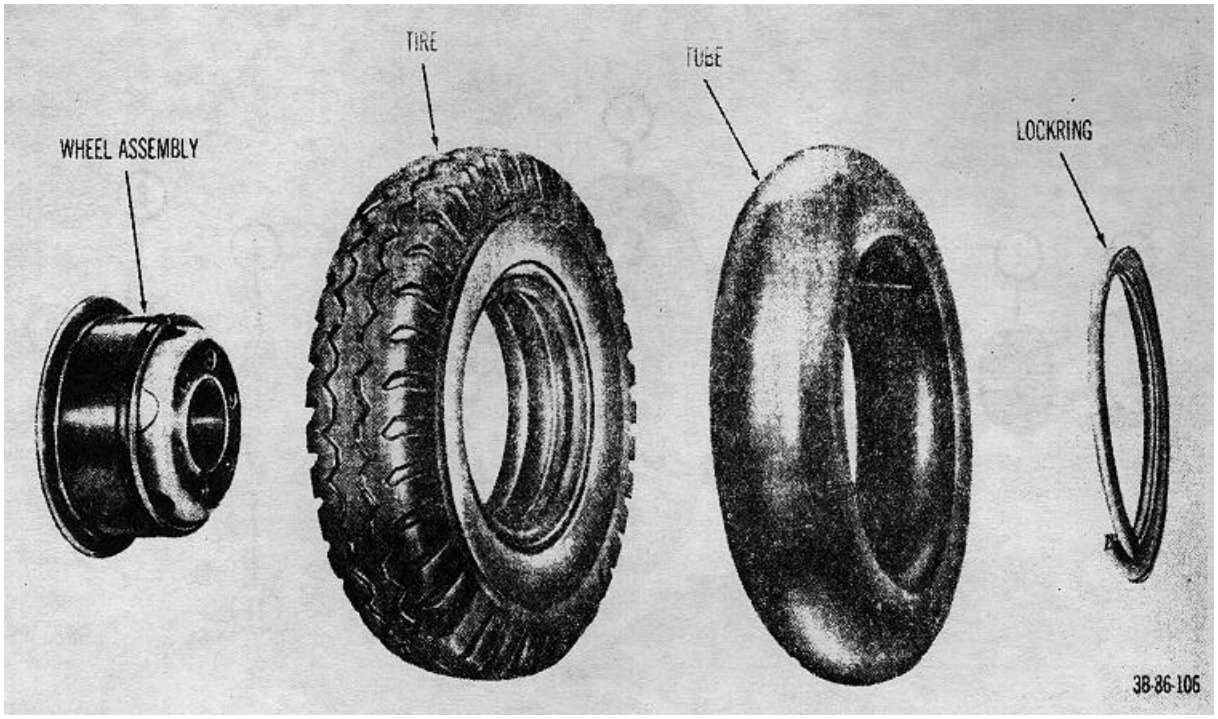
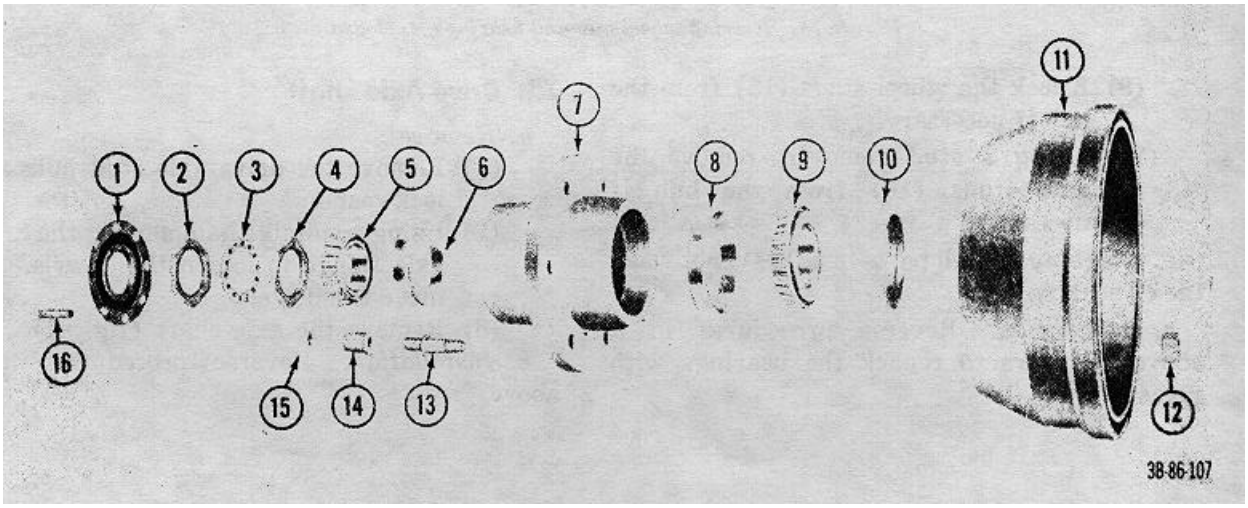


Figure 79. Steering wheel assembly, tire, and tube.



1	Seal, oil	5	Cone, bearing	9	Cone, bearing	13	Stud, wheel
2	Nut, adjusting, outer	6	Cup, bearing	10	Seal, oil	14	Nut, single ball seat
3	Lockwasher	7	Hub, wheel	11	Brakedrum	15	Nut, wheel
4	Nut, adjusting, inner	8	Cup, bearing	12	Nut, lock	16	Stud, axle

Figure 80. Drive wheel hub, cups, and cones, exploded view.

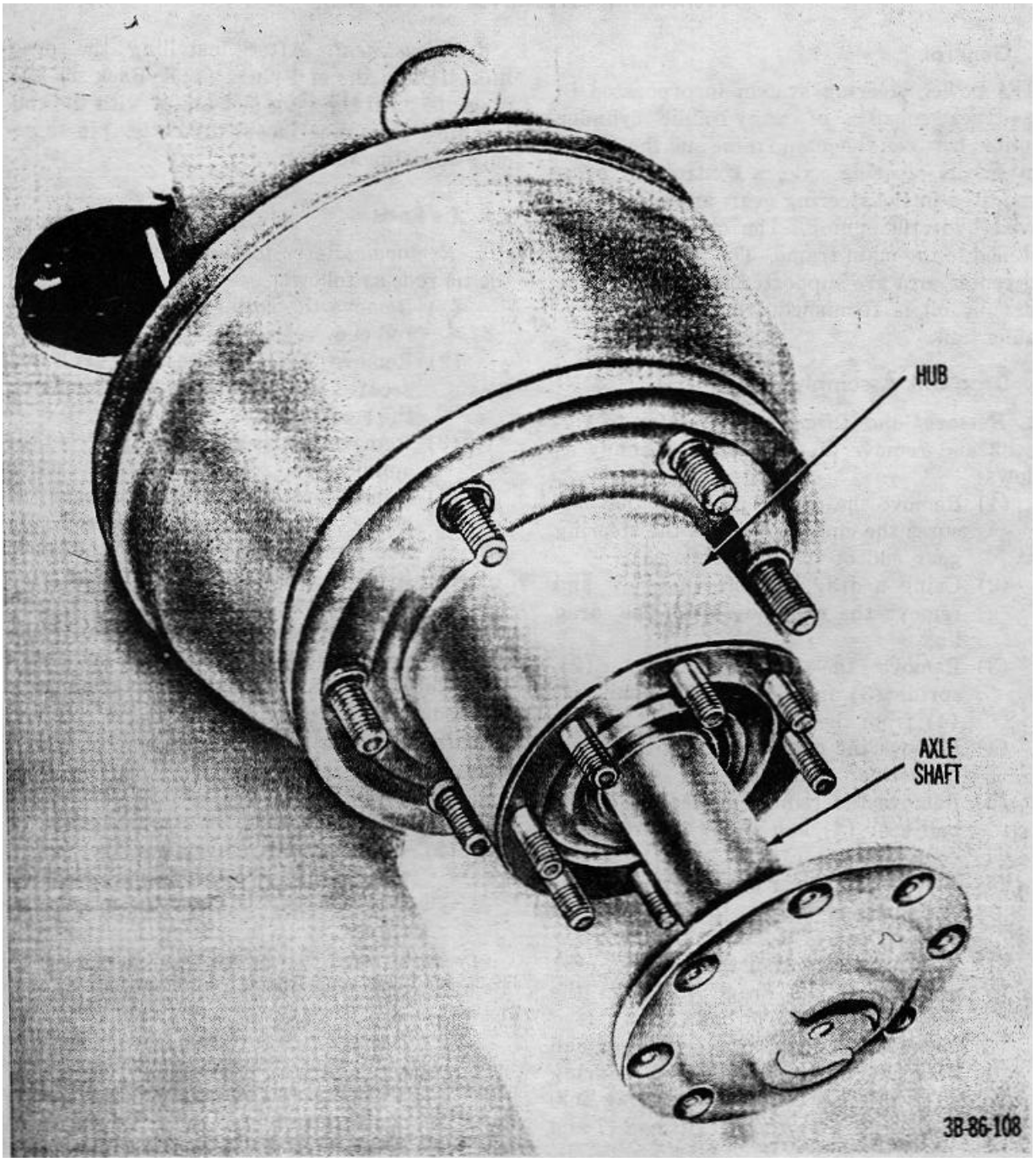


Figure 81. Drive axle shaft and hub.

Section XII. STEERING (GROUP 14)

73. General

The power steering system incorporated in this truck consists of a hydraulic cylinder mounted between the main frame and the center arm in the steering axle, a control valve incorporated in the steering gear, and an engine-driven hydraulic pump. The steering axle is fastened to the main frame. The wheel spindles and center arm are supported in the axle. The hydraulic oil is furnished from the main hydraulic tank.

74. Drag Link Assembly

a. Removal and Disassembly. Refer to figure 82 and remove the drag link assembly as follows:

(1) Remove the cotter pin (6) that secures the end plug (1) at the steering gear end of the drag link (8).
(2) Using a drag link bit, unscrew and remove the end plug from the drag link.
(3) Remove the spring bumper (2), spring (3) and section of the ball seat
(4) from the drag link end. (4) Remove the drag link from the steering pitman arm ball.
(5) Remove the remaining section of the ball seat (4) and seat (5) from the drag link.
(6) Remove the cotter pin (9) that secures the end plug (14) at the steering center arm end of the drag link.
(7) Remove a section of the ball seat (13) and remove the drag link from the steering center arm ball.
(8) Remove the remaining section of ball seat (13) spring bumper (12), spring (11) and seat (10) from the drag link.
(9) Remove the lubrication fittings (7 and 15) if necessary.

b. Inspection.

(1) Inspect for broken springs (3) at each end of the drag link.
(2) Inspect for worn ball seats.

c. Assembly and Installation. Reverse procedures in a above.

d. Adjustment. After installing the drag link, tighten the end plugs (14). Back the end plug off until the plug slot alines with the cotter pin holes; then insert the cotter pin to secure adjustment.

75. Tie Rods

a. Removal. Refer to figure 82 and remove the tie rods as follows:

(1) Remove the cotter pin (16) from tie rod end.
(2) Remove the castellated nut (17) that secures the rod end to the spindle on the steering axle.
(3) Remove the tie rod end (18) from the spindle.
(4) Repeat procedures (1) through (3) above on other end of the tie rod (21) and remove the tie rod from the truck.
(5) Repeat procedures (1) through (4) and remove remaining tie rod.
(6) Loosen jamnut (20) and unscrew tie rod end (18) from tie rod if necessary.

b. Repair. Repair tie rod by replacing parts as needed.

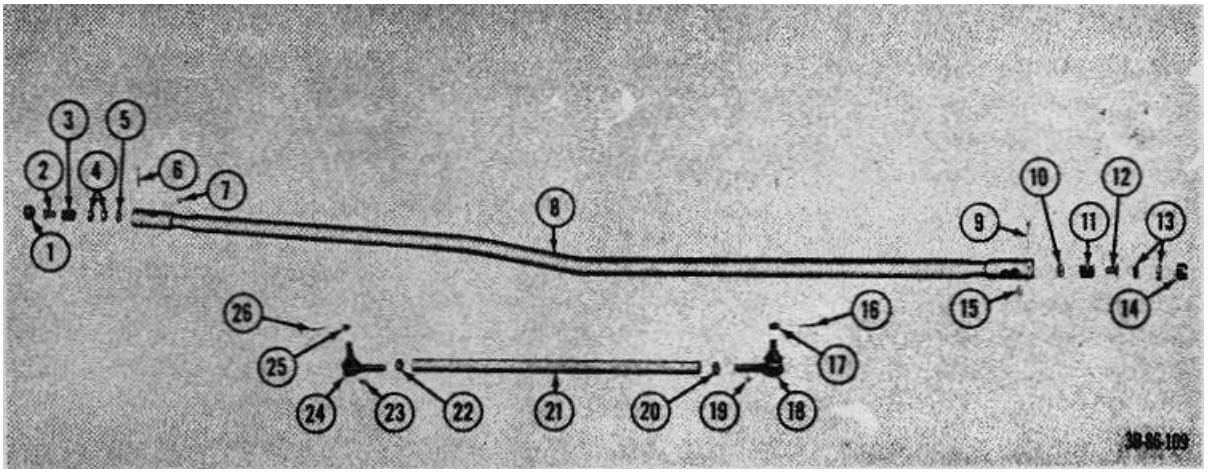
c. Installation. Reverse procedures in a above.

d. Inspection.

(1) Inspect tie rods for straightness.
(2) Inspect tie rod ends for secure and tight installation by jacking one wheel at a time and shaking the wheel sideways.

e. Adjustment. Maintain the steering wheels in alignment by adjusting the tie rods as follows:

(1) Insert a 1-inch round bar through the holes in the upper and lower axle members and through the hole in the center arm to center the steering arm.
(2) The use of the 1-inch round bar will prevent overadjustment. Overadjustment would result in unequal right or left hand turning radii.
(3) Loosen jamnuts on the left and right tie rods and turn the tie rods until the wheels are parallel with the truck.



1 Plug, end
2 Bumper, spring
3 Spring
4 Seat, ball
5 Seat
6 Pin, cotter
7 Fitting, lubrication
8 Link, drag
9 Pin, cotter
10 Seat
11 Spring
12 Bumper, spring
13 Seat, ball
14 Plug, end
15 Fitting, lubrication
16 Pin, cotter
17 Nut, castellated
18 End, tie rod
19 Fitting, lubrication
20 Jamnut
21 Rod, tie
22 Jamnut
23 Fitting, lubrication
24 End tie rod
25 Nut, castellated
26 Pin, cotter

Figure 82. Drag link and tie rod assemblies, exploded view.

(4) Using a suitable toe-in gage, check to be sure there is 0^{o} toe-in.
(5) Tighten the jamnuts when the proper adjustment has been made.

76. Steering Booster Cylinder

a. Removal.

(1) Disconnect and cap the hydraulic hoses (7 and 10, fig. 83) at the cylinder assembly (24).
(2) Remove the cotter pin (21) from the ball socket end (16).
(3) Remove the end plug (20) and half of ball seat (19) from the ball socket end and the lift steering booster cylinder from the center arm on the steering axle.
(4) Remove the remaining half of ball seat (19Y, spring (18), and seat (17) from the ball socket end.
(5) Repeat procedures (2) through (4) above and remove the cylinder from ball stud (31) on the frame of the truck.
(6) Unscrew the nut (32) and remove the ball stud (31) from the frame if necessary.

b. Installation. Reverse procedures in a above and then make adjustment in *c* below.

c. Adjustment. When replacing the cylinder assembly in the truck, adjustment must be made to the ball socket end of the cylinder assembly to give an equal turning radius to the wheels. Adjust as follows:

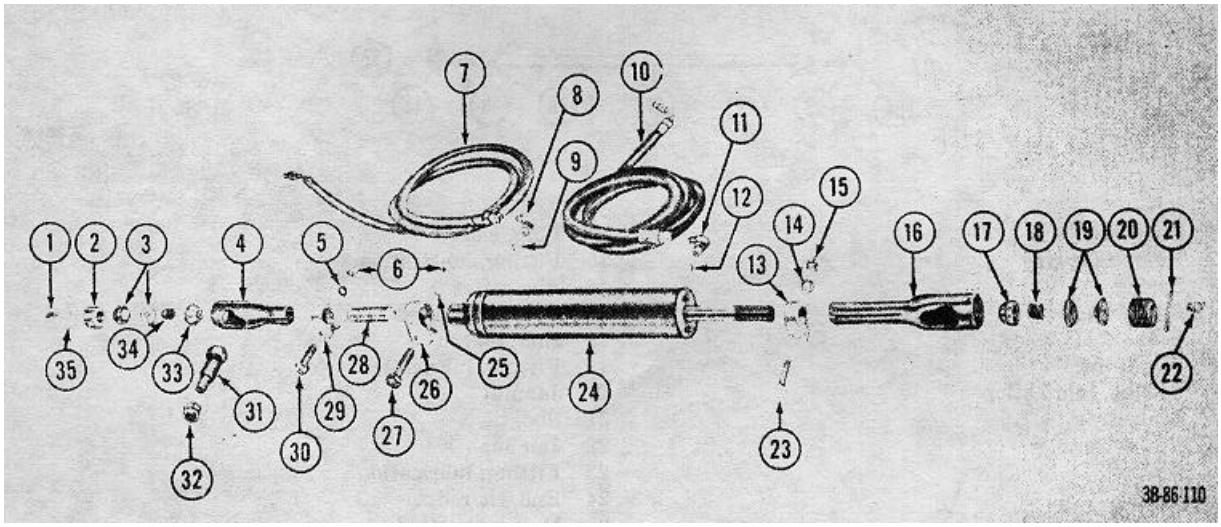
(1) Center the wheels by turning the steering wheel an equal number of turns to the right and to the left and returning the steering wheel to the center position.
(2) Loosen the clamp on the ball socket end of the steering booster cylinder.

Pull the rod from the cylinder assembly and measure half its length.

(3) Push the rod back into the cylinder to the measured mark.

(4) Lengthen or shorten the ball socket end on the rod end until it can be placed on the center arm assembly.

(5) Check for proper cylinder installation by noting that the piston "bottoms" at both ends of the cylinder when the wheels are in the extreme positions.



1 Fitting, lubrication
2 End, plug
3 Seat, ball
4 Ball socket assembly
5 Lockwasher
6 Nuts
7 Hose, hydraulic
8 Fitting
9 Packing, performed
10 Hose, hydraulic
11 Fitting
12 Packing, preformed
13 Clamp
14 Lockwasher
15 Nut
16 Ball socket assembly
17 Seat
18 Spring
19 Seat, ball
20 End, plug
21 Pin, cotter
22 Fitting, lubrication
23 Bolt
24 Cylinder assembly
25 Lockwasher
26 Clamp
27 Bolt
28 Stud
29 Clamp
30 Bolt
31 Stud, ball
32 Nut
33 Seat
34 Spring
35 Pin, cotter

Figure 83. Steering booster cylinder, exploded view.

Section XIII. HOOD (GROUP 17), BODY (GROUP 18) AND OVERHEAD GUARD (GROUP 22)

77. Hood

a. Removal.

(1) Remove the screws, lockwashers, and bushings that secure the hood (fig. 84) to the support brackets on each side of the hood.
(2) Remove the hood from the truck.
(3) Slide the springs off the spring guides.
(4) Remove the nuts and washers and remove the spring guides.
(5) Remove the nuts and washers that secure the hood levers to the truck and remove the hood levers.

b. Installation. Reverse procedures in *a* above.

78. Overhead Guard

a. Removal.

(1) Remove the capscrews and lockwashers that secure the overhead guard to the truck frame.
(2) Using a suitable hoist, remove the overhead guard from the truck.

b. Installation. Reverse procedures in *a* above.

79. Seat Cushion, Backrest Cushion, and Seat Frame

a. Removal.

(1) Remove the seat panel.
(2) Remove the nuts and washers that secure the seat frame to the panel and remove the seat frame.

b. Disassembly.

(1) Unscrew the nuts and bolts that secure the cushion seat to the seat frame and slide the cushion from the frame.
(2) Remove phillip head screws that secure the backrest cushion to the frame and remove the backrest cushion.

c. Inspection. Inspect cushions for excessive wear, rips, and other damages; seat frame for cracks and breaks; and hardware for damaged threads and other forms of mutilation. Replace damaged items as necessary.

d. Assembly. Reverse procedures in *b* above.

e. Installation. Reverse procedures in *a* above.

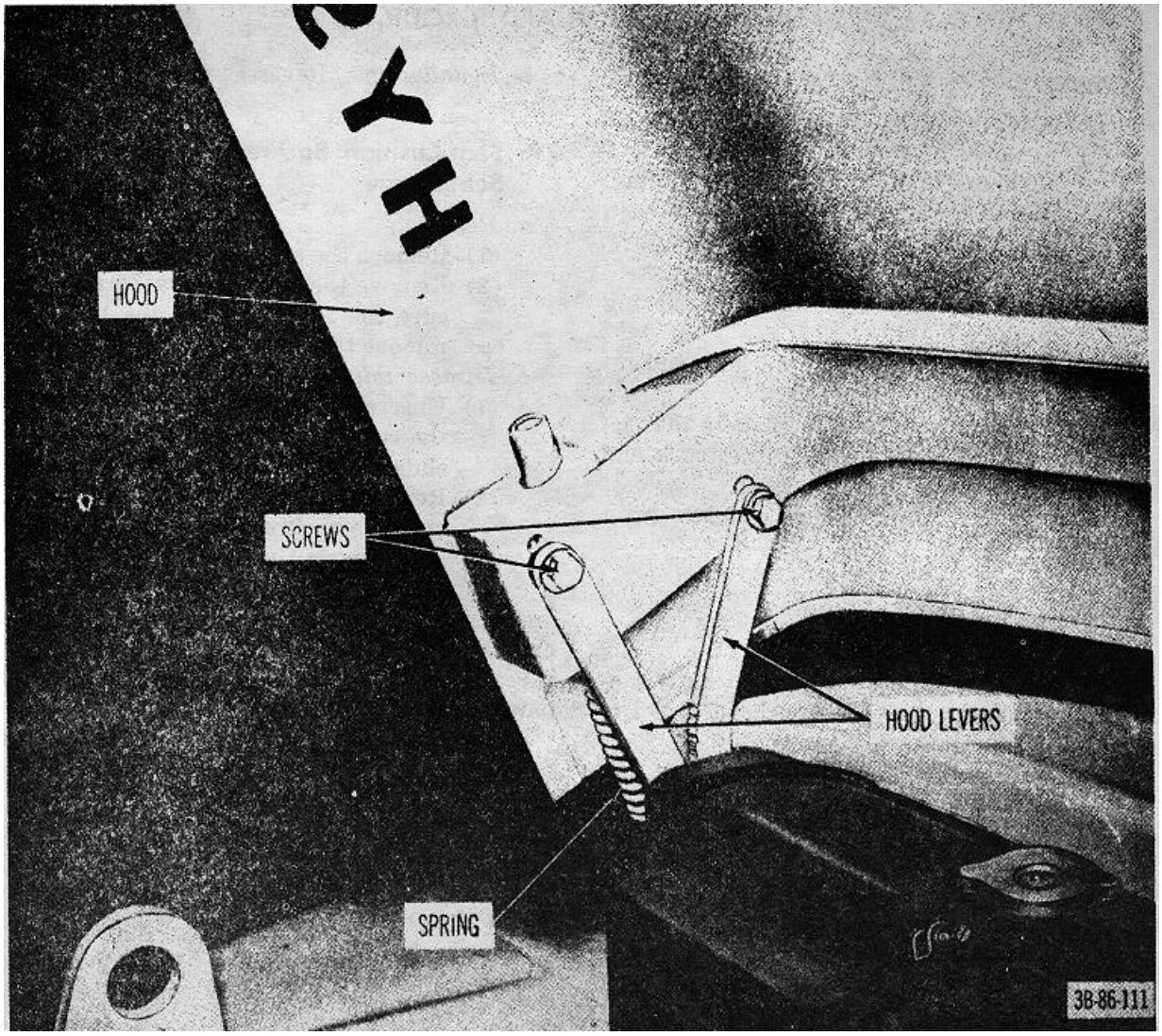


Figure 84. Hood support brackets.

Section XIV. HYDRAULIC LIFT SYSTEM (GROUP 24)

80. General

This section contains instructions for maintenance operations which second-echelon maintenance personnel are authorized to perform on the hydraulic tank strainer, the tilt cylinder, the lift chains, and the hydraulic tank.

81. Tilt Cylinder

Refer to figures 85 and 86 and remove the tilt cylinder assembly as follows:

a. Removal.

(1) Tilt mast forward as far as it will go.
(2) Remove capscrew and lockwasher that secure keeper to truck and remove keeper from truck.
(3) Loosen the setscrew (14, fig. 86) and jamnut (13) that lock the rod end (11) to the rod (10).
(4) Unscrew rod (10) from the rod end.
(5) Remove rod end from mast stud.
(6) Disconnect and cap hydraulic lines.

(7) Remove pin (2) and washers (1 and 3) that secure tilt cylinder assembly to truck and remove cylinder from truck.

b. Installation. Reverse procedures in a above.

c. Adjustment. The end rod must be properly adjusted to prevent binding when the cylinder rod reaches the end of its stroke or "bottoms" Adjust as follows:

(1) Loosen setscrew in rod end so that the rod can be turned.
(2) Actuate the tilt lever control until one of the tilt cylinder rods reaches the end of its stroke of "bottoms".
(3) Adjust the other cylinder by turning the rod until it reaches the end of its stroke or "bottoms".
(4) The rod may be turned a little to line up the flat portion of the rod with the setscrew in the rod end.
(5) Be sure the rod threads are fully engaged in the rod end.

82. Hydraulic Tank Filter

a. Removal. Refer to figs. 87 and 88 and remove filter as follows:

(1) Remove the floor plates.
(2) Remove the seat panel.
(3) Remove the capscrews and lockwashers that secure bracket to the valve bracket and truck frame and remove the bracket.
(4) Disconnect and remove the air cleaner and air cleaner breather pipe from hydraulic tank.
(5) Disconnect hydraulic lines and vent line at hydraulic filter manifold.
(6) Remove capscrews that secure manifold to filter assembly and remove manifold and gasket.
(7) Remove capscrews and lockwashers that secure filter assembly to tank and remove filter assembly.

b. Disassembly.

(1) Remove screws (9, fig. 88) that secure can (8) and head (1) and separate can and head.
(2) Remove gasket (2) from head.
(3) Remove spring (3) from head.
(4) Remove element (7) from can.
(5) Pull valve (6) from relief valve (4) and spring (5) and disconnect valves from spring.
(6) Remove spring (5) from relief valve (4).

c. Inspection.

(1) Check filter assembly for broken parts and replace defective parts with new or serviceable ones.
(2) Replace element as needed.

d. Assembly. Reverse procedures in *b* above.

e. Installation. Reverse procedures in *a* above.

83. Hydraulic Lift Chains

a. Adjustment. The lift chains must be kept in proper adjustment so that the weight of the load is distributed equally on both chains. Adjust the chains as follows:

(1) Tilt the upright to its true vertical position.
(2) Lower the upright to its extreme lower position.
(3) Adjust the stop nuts on the chain ends so that the length of chains are equal and the heels of both forks are just touching the floor.
(4) Check operation of the fork lift.

b. Cleaning. Wash the chains in SD and dry. Lubricate according to Lubrication Order (fig. 1).

c. Inspection. Inspect the chains for pitted or broken rollers, elongation, and defective connecting links. Report defects to higher authority.

84. Load Forks

a. Removal. Refer to figure 89 and remove load forks as follows:

(1) Unscrew capscrews and lockwashers that secure the keeper plate to the carriage and remove plate.
(2) Slide fork pin from carriage.
(3) Remove fork from carriage.
(4) Repeat procedure in (1) through (3) above to remove remaining fork.

b. Installation. Reverse procedures in *a* above.

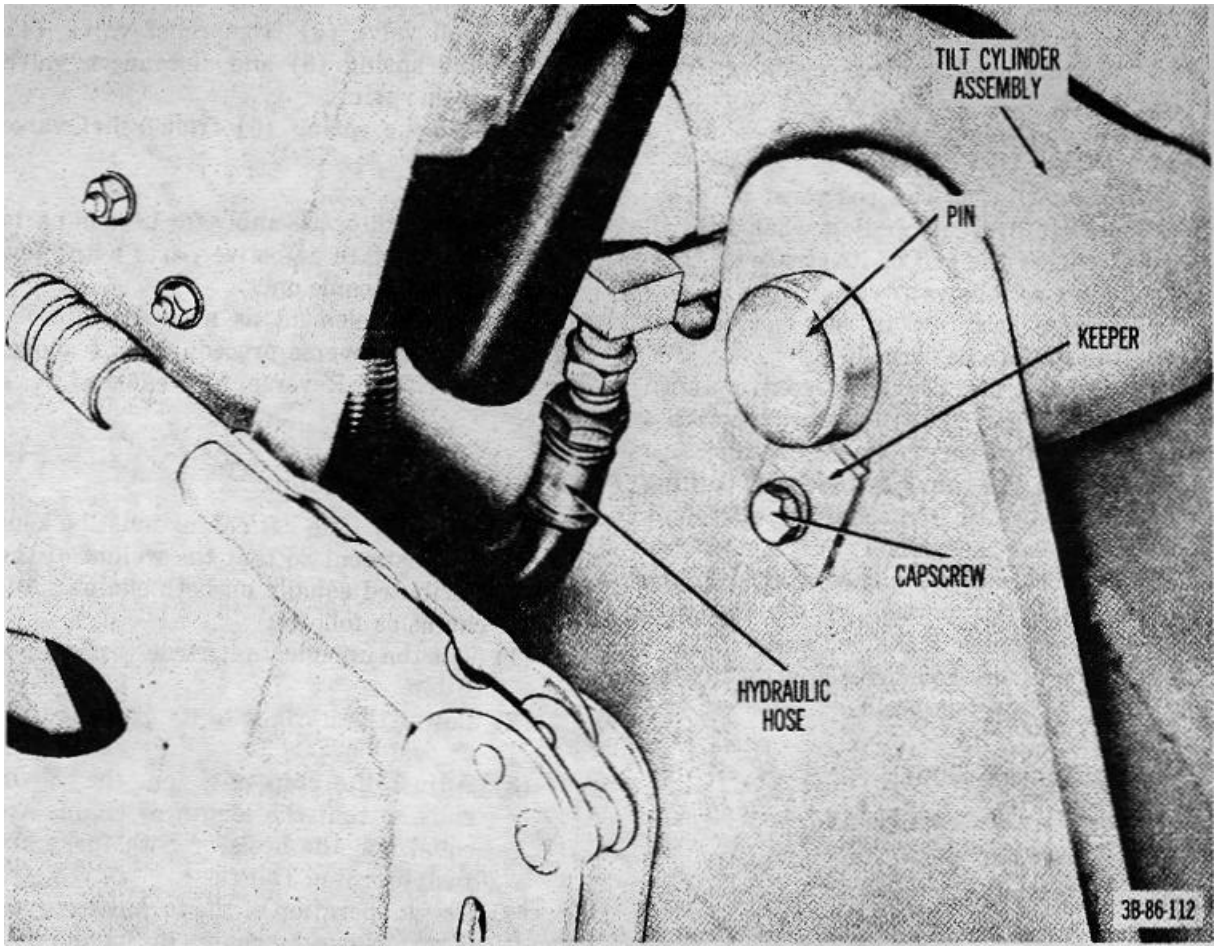


Figure 85. Tilt cylinder, installed on truck.

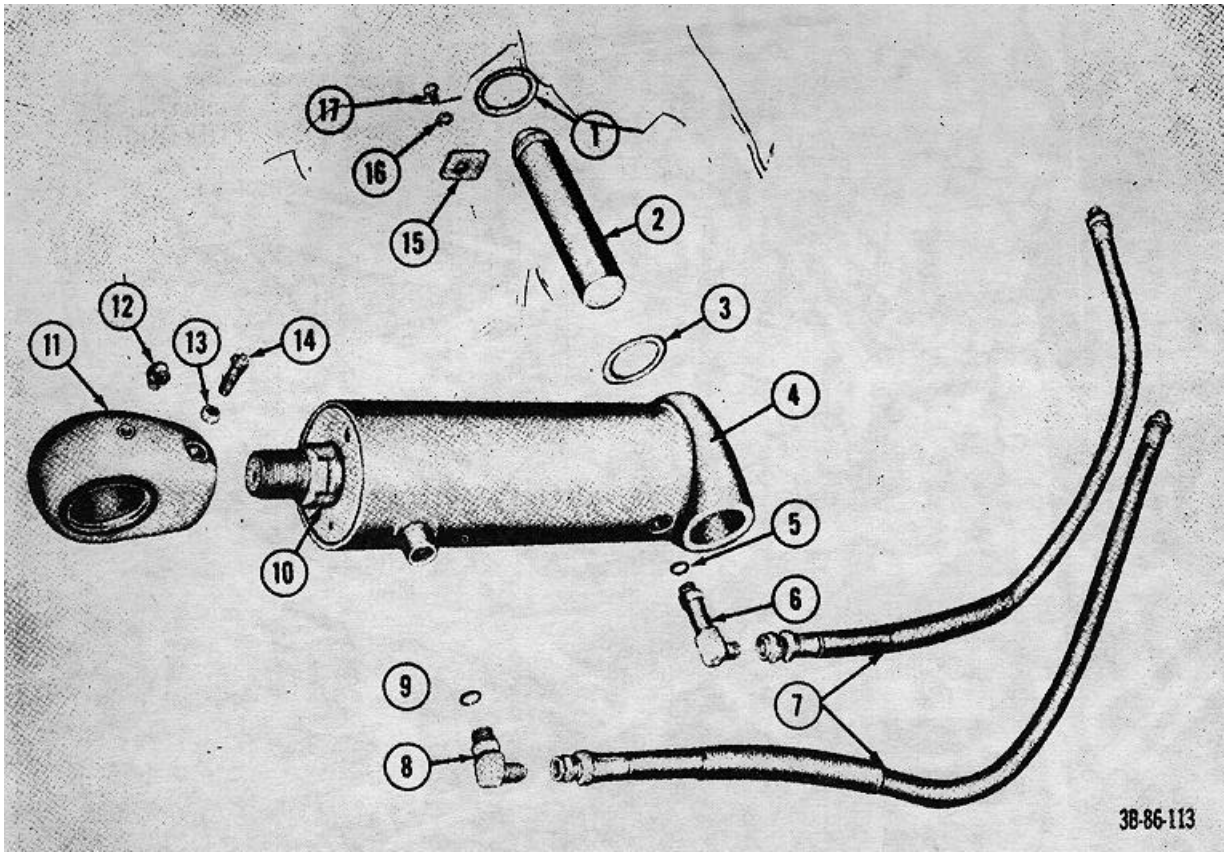
85. Hydraulic Tank

Clean the tank as follows:

a. Remove the hydraulic tank filter (par. 82).

b. Clean the inside of the tank with SD and then drain. Allow the tank to dry before refilling it with oil.

c. Replace the hydraulic tank filter.



1	Washer	10	Rod
2	Pin	11	End, rod
3	Washer	12	Fitting, lubrication
4	Cylinder, tilt assembly	13	Nut
5	Packing, preformed	14	Setscrew
6	Elbow	15	Keeper
7	Hoses, hydraulic	16	Capscrew
8	Elbow	17	Lockwasher
9	Packing, preformed		

Figure 86. Tilt cylinder, exploded view.

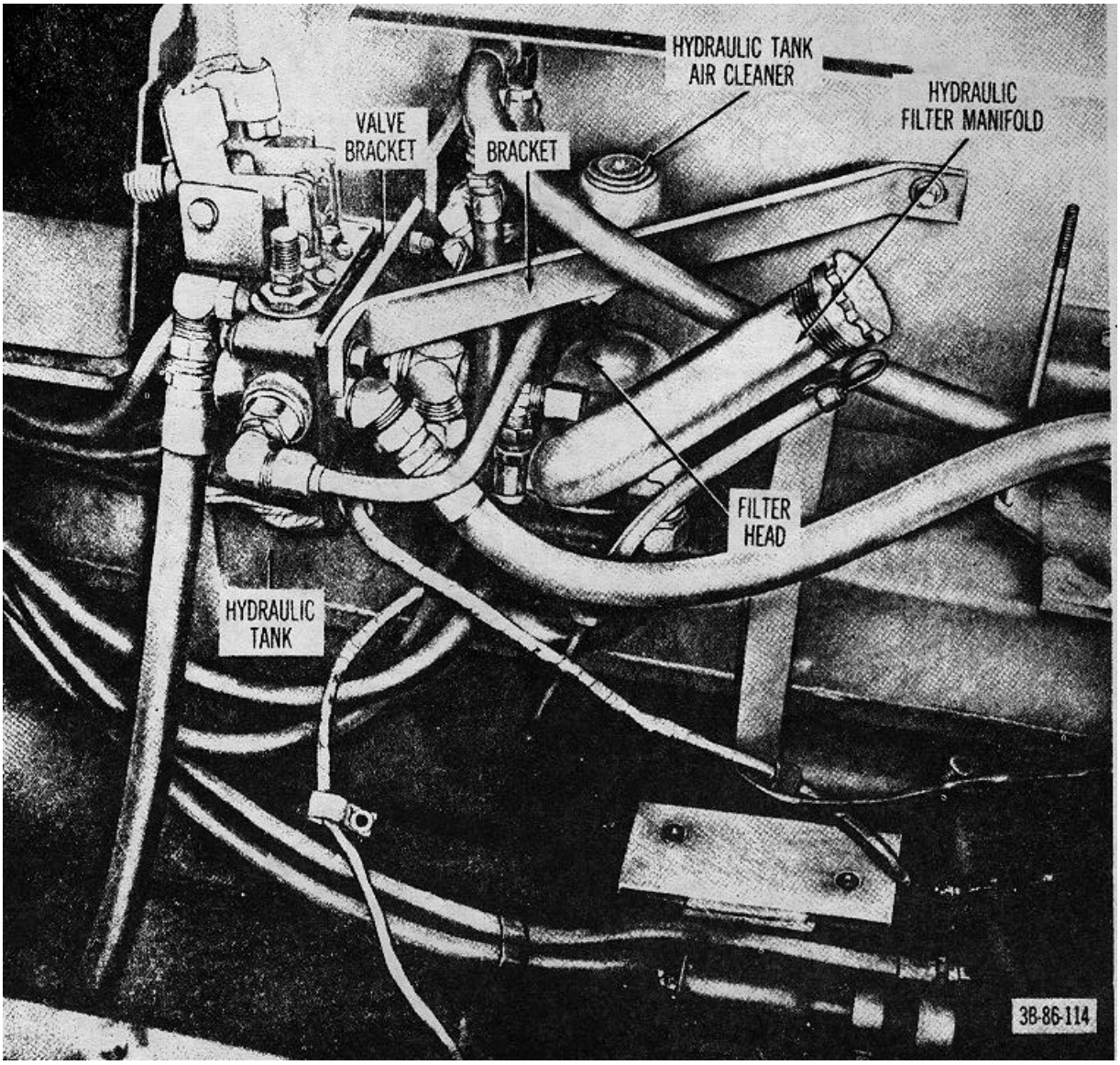
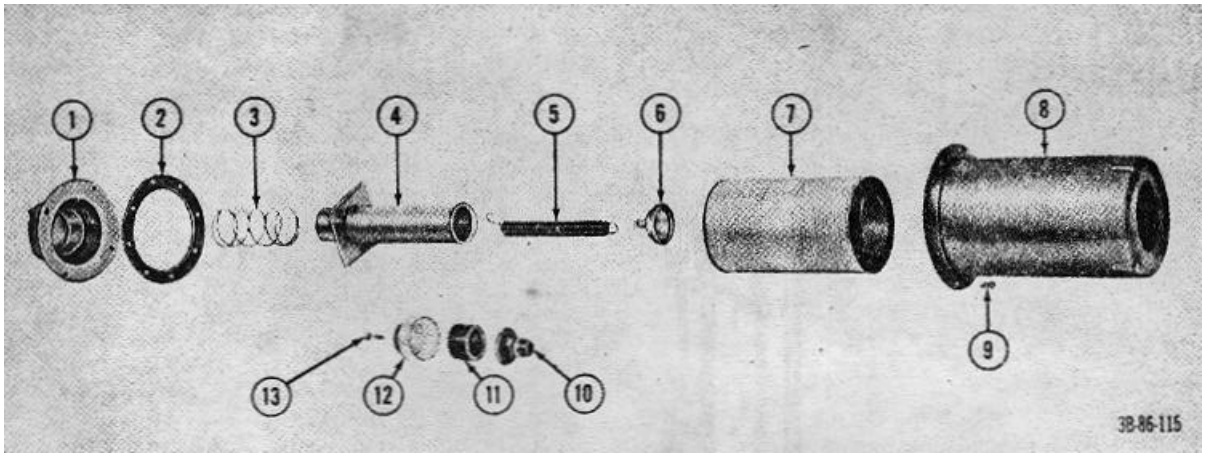


Figure 87. Hydraulic filter, installed on truck.



1	Head, filter	8	Can, filter
2	Gasket, filter	9	Screw
3	Spring	10	Fitting
4	Valve, relief	11	Air cleaner
5	Spring, relief valve	12	Cap, air cleaner
6	Valve, relief	13	Screw
7	Element, filter		

Figure 88. Hydraulic filter assembly and air cleaner, exploded view.

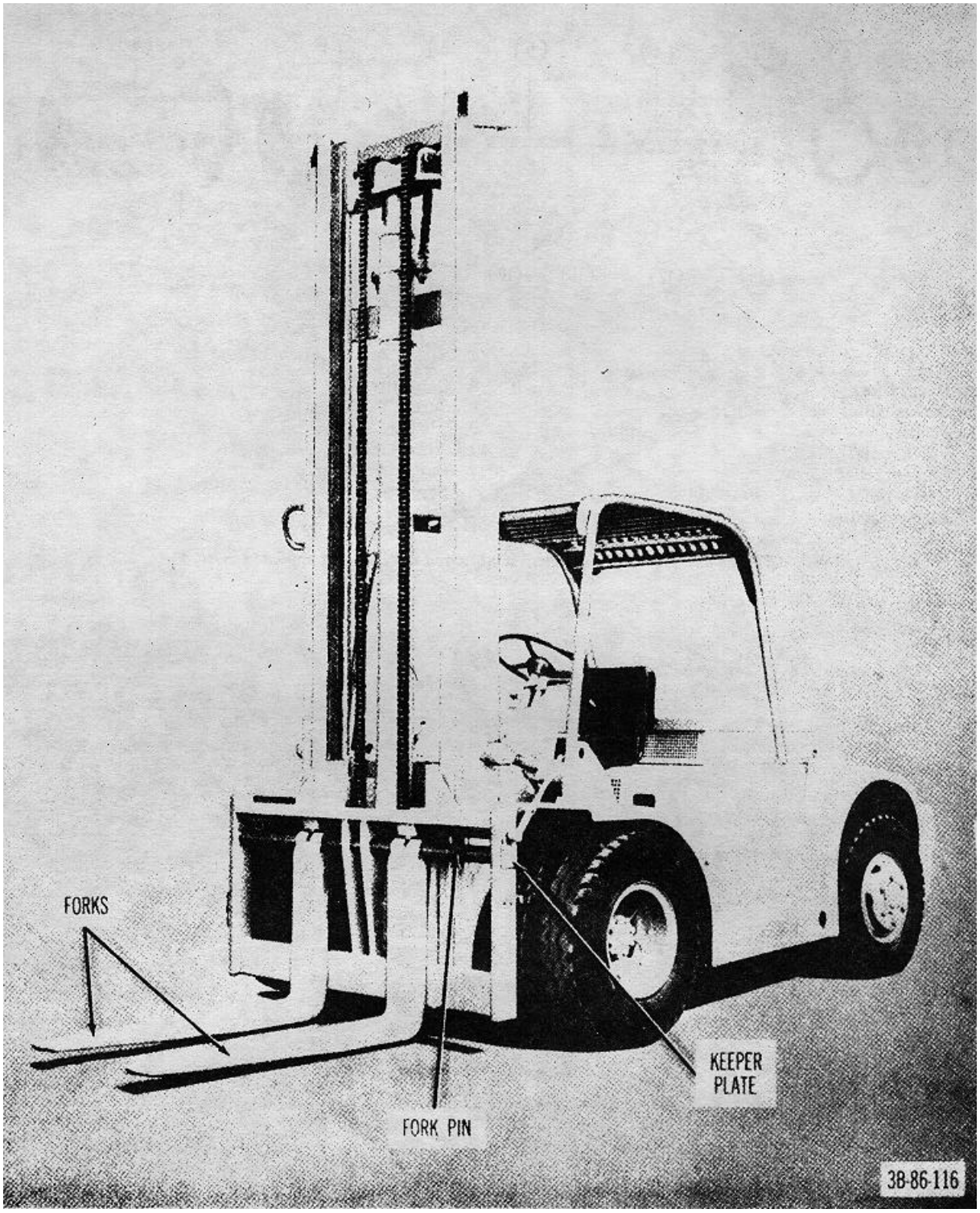


Figure 89. Forks, installed on truck.

CHAPTER 4

SHIPMENT, LIMITED STORAGE, AND DEMOLITION

Section I. SHIPMENT AND LIMITED STORAGE

86. General

These instructions apply to the truck that is to be ready for immediate use upon arrival from shipment, or the truck that will be out of service for a period not to exceed 6 months. Instructions pertaining to oversea shipment are contained in MIL-STD-162A.

87. Preparatory Services

a. Inspection and Operational Test. Perform the services listed in the maintenance indicator checklist (table I).

b. Correcting Deficiencies. Correct all deficiencies if facilities are available for such service. If repairs are beyond the scope of organizational maintenance, refer them to a higher echelon for correction.

88. Preparation of Truck

a. Electrical System. Leave the battery in the truck but be sure the ground lead is disconnected. Tape the terminal end of the ground lead to prevent the battery from discharging accidentally. Use Tape, Adhesive, Pressure Sensitive, Water-Resistant, Type 1, Grade B, 60-Yard Roll, 2-Inch Width, Federal Stock No. 7510-269-8090. Attach a tag to the steering wheel to advise personnel that the ground lead has been disconnected.

b. Cooling System. Following the instructions in paragraph 36, flush the cooling system with clean water and drain. If rust appears, use cleaning compound. After draining, fill system with proper amounts of coolant and corrosion inhibitor compound.

c. Fuel Tank. Do not drain the fuel from the tank if the truck is to be stored for less than 90 days. If the truck will be stored for a longer period, follow the procedures in MIL-STD-162A and Specification MIL-E-10062A.

d. Cleaning and Painting. Wash the truck and remove any debris from the floor and the engine compartment. Remove rust and corrosion, and scrape any flaked and peeling paint; then dry all surfaces to be painted or coated with preservatives. Repaint as required to protect against deterioration. Use Specification JAN-P-735 (FSN 8010-161-7419) for primer coating. Use enamel, yellow, gloss, color No. 13538, Federal Specification TT-E489, Federal Standard 595 (FSN 8010-2867758, FSN 8010-527-2045 and FSN 8010-616-7488) for the finish coating. Apply PL-Medium to exposed surfaces susceptible to rust or corrosion and not otherwise protected. Clean all tires thoroughly.

e. Accessories.

(1) Remove the seat cushion, backrest, headlight, taillight, and fire extinguisher from the truck. Place these components in a box, mark the box to identify it with the truck, and fasten the box securely to the truck.

(2) Secure the hood assembly and seal it with tape.

89. Storage Instructions

Provide access to the truck during storage. Do not block the truck, but be sure that the tires are not resting on surfaces that are contaminated with grease or oil. Cover the truck if it is to be stored outdoors. During storage, inspect and operate the truck at the intervals and in the manner described below.

a. 15 to 30 Days. While the truck is in storage, inspect and operate it (for a period of 15 to 20 minutes) one or more times each 15 to 30 days. Check the truck for leaks and proper functioning of all components.

b. 30 Days. In addition to the services in *a* above, test each truck under full load every 30 days, and check the carburetor and fuel pump for leaks. Maneuver the truck in all directions and in all gear ratios for 10 to 15 minutes. After testing, correct deficiencies as directed in paragraph 87*b*.

c. 180 Days. At the end of 180 days, examine and service the truck as indicated below; correct deficiencies as directed in paragraph 87*b*.

(1) Adjust the V-belt (pal. 37) arid clean the fuel pump assembly (par. 29) if necessary.
(2) Check alinement, steering, and gear shifting mechanism.
(3) Check the brake linkage. Tighten the hydraulic lines if necessary.
(4) Lubricate the truck thoroughly in accordance with instructions on LO 10-3930-22-20.
(5) Inspect all electrical connections and make necessary adjustments. Spray insulating compound (Compound, Insulating, Ignition, U.S. Army Specification No. 3-182) or, coils, distributor, generator, spark plugs, starting motor, regulator, and wiring, but not into commutator openings.

90. Loading and Blocking on Railroad Cars

a. Loading. Load and unload the truck under its own power, whenever possible, using permanent ramps or spanning platforms. If the truck cannot operate under its own power, push, tow, or lift it into position. When lifting equipment, be sure to attach hooks, chains, or cables only to places marked LIFT HERE.

b. Clearances. Position the truck on a flatcar so that the flatcar brake handwheel will have proper clearance on all sides, and so that overall car clearances will conform to requirements of the Association of American Railroad rules.

c. Brakes. After the truck is in position on the flatcar, set the handbrake lever and wire down the service brake pedal, or place a block between the brake pedal and the equipment frame to hold the pedal in the applied position.

d. Cover. Place a tarpaulin or a cover of similar material over the truck when the truck is to be shipped on an open car.

e. Securing Truck. To secure the truck to flatcar, proceed as follows:

(1) Spike the blocks on the flatcar floor, one at the front and one at the rear of each wheel. The sides of the blocks should not project beyond the outsides of the tires.
(2) Put two cleats, each the approximate length of the wheel and tire, against the outside surface of each wheel.
(3) Spike the lower cleat to the flatcar floor and the top cleat to the lower cleat.
(4) Pass at least four strands of strong wire around the axle or another strong component at one end of the truck, and fasten the wire through the stake pocket on the flatcar. Fasten the other end of truck in the same manner. Tighten all wires by inserting a rod in the strands of the wire and twisting.

Section II. DEMOLITION

91. General

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. Destroy the same parts on all similar equipment to prevent enemy use through cannibalization.

92. Methods

a. Controls. Smash all controls, including steering wheel.

b. Gasoline Engine. Pierce or smash cylinder block beside distributor. Damage crankshaft and camshaft.

c. Transmission and Differential. Pierce or smash transmission and differential case.

d. Steering Gear. Pierce or smash steering Sear housing.

e. Wires, Cables, and Lines. Cut, rip out, or otherwise destroy all wires, electrical cables, and fuel, oil, or water lines.

f. Carburetor and manifolds. Smash these assemblies.

g. Generator, Distributor, Ignition Coil, and Spark Plugs. Destroy these components by smashing.

h. Radiator. Drive large holes through core and tube.

i. Fuel Tank. Punch large holes in this tank.

j. Battery. Break case and plates of battery.

APPENDIX I
REFERENCES

AR 310-1	General Policies
AR 320-5	Dictionary of United States Army Terms
AR 320-50	Authorized Abbreviations and Brevity Codes
AR 600-55	Motor Vehicle Driver Selection, Testing. and Licensing
AR 700-38	Unsatisfactory Equipment Report
AR 700-58	Report of Damaged or Improper Shipment
AR 700-3900-5	Registration of Materials Handling Equipment and Special Purpose Vehicles
AR 746-2300-1	Color and Marking of Vehicles and Equipment
AR 750-5	Organization, Policies and Responsibilities for Maintenance Operations
AR 750-3900-1	Materials Handling Equipment
AR 754-9130-1	Utilization of Automotive Gasoline
DA Pam 108-1	Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recordings
DA Pam 310-1	Military Publications: Index of Administrative Publications
DA Pam 310-2	Military Publications: Index of Blank Forms
DA Pam 310-3	Military Publications: Index of Training Publications
DA Pam 3104	Military Publications: Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders
FM 21-5	Military Training
FM 21-6	Techniques of Military Instruction
FM 21-30	Military Symbols
TM 10-3930-222-10	Operator's Manual; Truck, Lift, Fork, Gasoline, Pneumatic-Tired Wheels, 15,000-Pound Capacity, (Hyster Model H1S0C, Army Model MHE 178), Federal Stock Number 3930-897-4632
TM 10-3930-222-20P	Organizational Maintenance Repair Parts and Special Tool Lists; Truck, Lift, Fork, Gasoline, Pneumatic-Tired Wheels, 15,000-Pound Capacity, (Hyster Model H150C, Army Model MHE 178), Federal Stock Number 3930-897-1632
TM 21-300	Driver Selection and Training (Wheeled Vehicles)
TM 38-230	Preservation, Packaging, and Packing of Military Supplies and Equipment
TM 38-750	The Army Equipment Record System and Procedures
MIL-STD-162A	Preparation for Delivery of Warehouse Materials Handling Equipment for Domestic and Oversea Shipment and Storage
LO 10-3930-222-20	Lubrication Order; Truck, Lift, Fork, Gasoline, Pneumatic-Tired Wheels, 15,000-Pound Capacity (Hyster Model H150C, Army Model MHE 178), Federal Stock Number 3930-897-4632

APPENDIX II
MAINTENANCE ALLOCATION CHART

1. This appendix was prepared 6 December 1962 and lists all maintenance operations to be performed by the applicable echelons. These allocations are based on skills, tools, test equipment and the time required or available in the average TOE organization.

2. The sequence of entries coincides with the sequence followed in Appendix III, Repair Parts and Special Tools List.

3. This appendix is a guide in performing maintenance operations; for authorization for specific repair parts, refer to Appendix III, Repair Parts and, Special Tools List.

4. The explanations listed below define the terms used in this maintenance allocation chart:

a. Clean. To perform major cleaning internally or with disassembly.

b. Adjust. To regulate periodically to prevent malfunctioning.

c. Inspect. To verify serviceability and to detect electrical or mechanical failure by scrutiny.

d. Test. To verify serviceability and to detect electrical or mechanical failure by use of special equipment such as gages, meters, etc.

e. Replace. To substitute serviceable assemblies, subassemblies, and parts for unserviceable components.

f. Repair. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes but is not limited to, inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, and straightening.

g. Aline. To adjust two or more parts and/or assemblies of an electrical precision, mechanical, or steering system ,so that their functions are properly synchronized.

h. Overhaul. To restore an item to a completely serviceable condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul operation.

Group Number	Component and Related Operations	Echelon 1	2	3	4	5	Tools Required	Remarks
01	ENGINE							
	ENGINE ASSEMBLY						--------	Compression, Vacuum,
	Test	--	X					Testing
	Replace	--	--	X				
	Overhaul	--	--	--	X			
	BLOCK, engine							
	Inspect	--	--	--	X			
	Overhaul (Rebore)	--	--	--	--	X	--------	Reboring may be accomplished at 4th echelon if facilities are available from Government or commercial sources.

Group Number	Component and Related Operations	Echelon 1	2	3	4	5	Tools Required	Remarks
	HEAD, cylinder							
	Replace	--	X					
	Repair	--	--	--	X			
	VALVES, intake and exhaust							
	Adjust	--	X					
	Replace	--	--	X				
	Repair	--	--	--	X			
03	FUEL							
	CARBURETOR							
	Adjust, Replace	--	X					
	Repair	--	--	X				
	GOVERNOR							
	Adjust	--	X					
	Replace, Repair	--	--	X				
	CLEAN, air							
	Clean. Replace	--	X					
	PUMP, fuel							
	Clean, Test, Replace	--	X					
	TANK, fuel							
	Clean, Replace	--	X					
	Repair	--	--	--	X			
04	EXHAUST							
	MUFFFLER							
	Inspect, Replace	--	X					
05	COOLING							
	RADIATOR							
	Clean	--	X					
	Test, Replace	--	--	X				
	Repair	--	--	--	X			
	v-BELT, fan and generator							
	Adjust, Replace	--	X					
06	ELECTRICAL							
	GENERATOR							
	Replace	--	X					
	Test, Repair	--	--	X				
	ARMATURE, generator							
	Test, Repair	--	--	--	X			
	REGULATOR, voltage							
	Adjust, Inspect, Test, Replace	--	X					
	MOTOR, starting							
	Replace	--	X					
	Test, Repair	--	--	X				
	ARMATURE, starting motor							
	Test, Repair	--	--	--	X			
	DISTRIBUTOR, ignition							
	Adjust, Replace, Repair	--	X					
	PLUGS, spark							
	Clean, Adjust, Test, Replace-	--	X					
	BATTERY							
	Clean, Test, Replace	--	X					
07	TRANSMISSION							
	TRANSMISSION ASSEMBLY							
	Replace	--	--	X				
	Overhaul	--	--	--	X			
	VALVE ASSEMBLY, transmission control							
	Replace	--	--	X				
	Repair	--	--	--	X			

Group Number	Component and Related Operations	Echelon 1	2	3	4	5	Tools Required	Remarks
	LEVER and LINKAGE, control valve							
	Adjust, Replace	--	X					
09	PROPELLER SHAFT							
	SHAFT ASSEMBLY, propeller							
	Replace, Repair	--	--	X				
10	STEERING AXLE							
	AXLE ASSEMBLY, steering							
	Replace, Repair	--	--	X				
11	DRIVE AXLE							
	AXLE ASSEMBLY, drive							
	Inspect, Replace, Repair	--	--	X				
12	BRAKES							
	LEVER and LINKAGE, hand brake							
	Adjust, Replace	--	X					
	PEDALS and LINKAGE, brake and inching Control							
	Adjust, Replace	--	X	--	--	--	--------	Wrench, Hyster Part No. 98104
	BRAKESHOE ASSEMBLIES, service							
	Adjust, Replace	--	X					
	Repair	--	--	X				
	CYLINDER ASSEMBLY, master							
	Replace	--	X					
	Repair	--	--	X				
	CYLINDER ASSEMBLIES, wheel							
	Replace	--	X					
	Repair	--	--	X				
	Adjust	--	--	X				
13	WHEELS							
	WHEEL ASSEMBLIES							
	Replace	--	X					
	Repair	--	--	X				
	BEARINGS, wheel							
	Clean, Adjust, Replace	--	X					
14	STEERING							
	GEAR ASSEMBLY, steering							
	Replace	--	--	X				
	Repair	--	--	--	X			
	LINK, drag							
	Adjust, Replace, Repair	--	X					
	RODS, tie							
	Adjust, Replace, Repair -	--	X					
	CYLINDER ASSEMBLY, booster							
	Replace	--	X					
	Repair	--	--	X				
18	BODY							
	CUSHIONS, seat and backrest							
	Replace	--	X					
	Repair	--	--	--	X			
24	HYDRAULIC							
	PUMP ASSEMBLY, hydraulic lift							
	Replace, Repair	--	--	X				
	PUMP ASSEMBLY, hydraulic steer							
	Replace, Repair	--	--	X				
	VALVE ASSEMBLY, hydraulic control							
	Replace, Repair	--	--	X				

Group Number	Component and Related Operations	Echelon 1	2	3	4	5	Tools Required	Remarks
	VALVE ASSEMBLY, tilt control							
	Replace, Repair	--	--	X				
	CYLINDERS, hydraulic tilt							
	Adjust, Replace	--	X					
	Repair	--	--	X				
	CYLINDER, hydraulic lift							
	Replace, Repair	--	--	X				
	MAST ASSEMBLY							
	Replace, Repair	--	--	X				
	CARRIAGE, hydraulic lift							
	Replace, Repair	--	--	X				
	CHAINS, hydraulic lift							
	Clean, Adjust, Inspect	--	X					
	Replace, Repair	--	--	X				
	TANK, hydraulic							
	Clean	--	X					
	Replace, Repair	--	--	X				

INDEX

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POE (2)
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Army Tml (2)
PG (2)
Arsenals (2)
QM Fld Maint Shops (2)
Sandia Base, DASA (2)
USA Mbl Spt Cen (9)
USA Corps (1)
Units org under fol TOE:
(2 cys each)
10-337
10-407
10-500 (EA, EE, EG)
29-51
33-105
33-106
55-117

NG: None.

USAR: Same as Active Army except allowance is one copy to each unit.

For explanation of abbreviations used, see AR 320-50.

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 decagram = 10 grams = .35 ounce
1 hectogram = 10 decagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 009794