

TM 9-4940-421-14

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND
GENERAL SUPPORT MAINTENANCE MANUAL

SHOP EQUIPMENT

CONTACT MAINTENANCE

TRUCK MOUNTED

(SOUTHWEST MODEL SECM)

SERIAL NO. RANGE SECM 1001 THRU SECM 2532

NSN 4940-01-016-2262

15 OCTOBER 1977

WARNING

To prevent eye burn, it is necessary that the eyes of the arc welder operator, as well as the eyes of personnel nearby, be shielded from the intense light of the electric arc. Ordinary sunglasses or gas welding goggles do NOT provide sufficient protection.

Do not operate generator-welder within 100 feet of electronic communication equipment.

Do not permit an energized electrode to touch the skin or damp clothing of operator or nearby personnel.

When operating in an enclosed area, the exhaust gases must be piped to the outside. The exhaust gases contain carbon monoxide, which is a colorless, odorless, and poisonous gas.

When handling gasoline, always provide a metal-to-metal contact between container and tank. This will prevent a spark from being generated as gasoline flows over the metallic surface.

Injury or death can result if shop set is not properly grounded.

CHANGE

HEADQUARTERS
DEPARTMENT OF THE ARMY

NO. 1

WASHINGTON , DC 18 SEPTEMBER 1992

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Support Maintenance Manual
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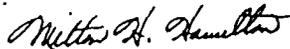
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Reporting Errors and Recommending Improvements. You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publication and Blank Form), or DA Form 2028-2 located in the back of this manual direct to Commander, US Army Armament Materiel Readiness Command. ATTN DRSAR-MAS, Rock Island, Illinois 61201. A reply will be furnished to you.

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CHAPTER 1 INTRODUCTION

Section I. GENERAL

1-1. SCOPE. This manual is published for the use of the personnel to whom the Shop Set Model SECM, Serial No. Range SECM 1001 thru SECM 2532 is issued.

1-2. MAINTENANCE FORMS AND RECORDS. Equipment maintenance forms and procedures for their use are contained in TM 38-750, The Army Maintenance Management System (TAMMS).

1-3. ADMINISTRATIVE STORAGE. Refer to TM 740-90-1 for administrative storage of this equipment.

1-4. EQUIPMENT SERVICEABILITY CRITERIA (ESC). This equipment is not covered by an ESC.

1-5. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE. Refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use for destruction of the equipment.

1-6. REPORTING OF EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR) EIR's will be prepared on DA Form 2407, Maintenance Request Instructions for preparing EIR's are provided in TM 38-750, The Army Maintenance Management System (TAMMS). EIR's should be mailed directly to Commander, U. S. Army Armament Materiel Readiness Command, ATTN DRSAR-MAO, Rock Island, Il. 61201. A reply will be furnished directly to you.

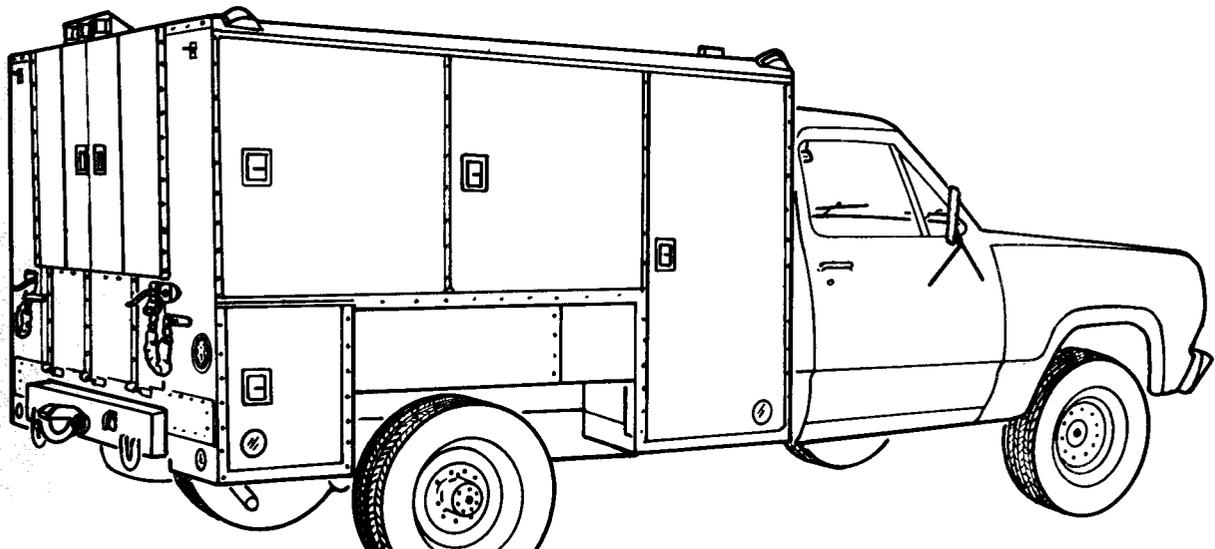
Section II. DESCRIPTION AND DATA

1-7. DESCRIPTION. The Shop set, Model SECM Serial No. SECM 1001 thru SECM 2532 (fig 1-1 and 1-2), consists of 8 compartments. The compartments provide storage space for all tools and equipment. The shop set is mounted on a 4x4 Cab/Truck chassis Model XM887. The shop is equipped with a generator-welder which provides 115 volt single phase alternating current for operation of the air compressor and other equipment, and 200 amperes, 28 volt direct current for welding (see fig FO-1 for wiring diagram). The genera-

tor-welder is driven by a 154 cu., in., 4 cycle, gas engine.

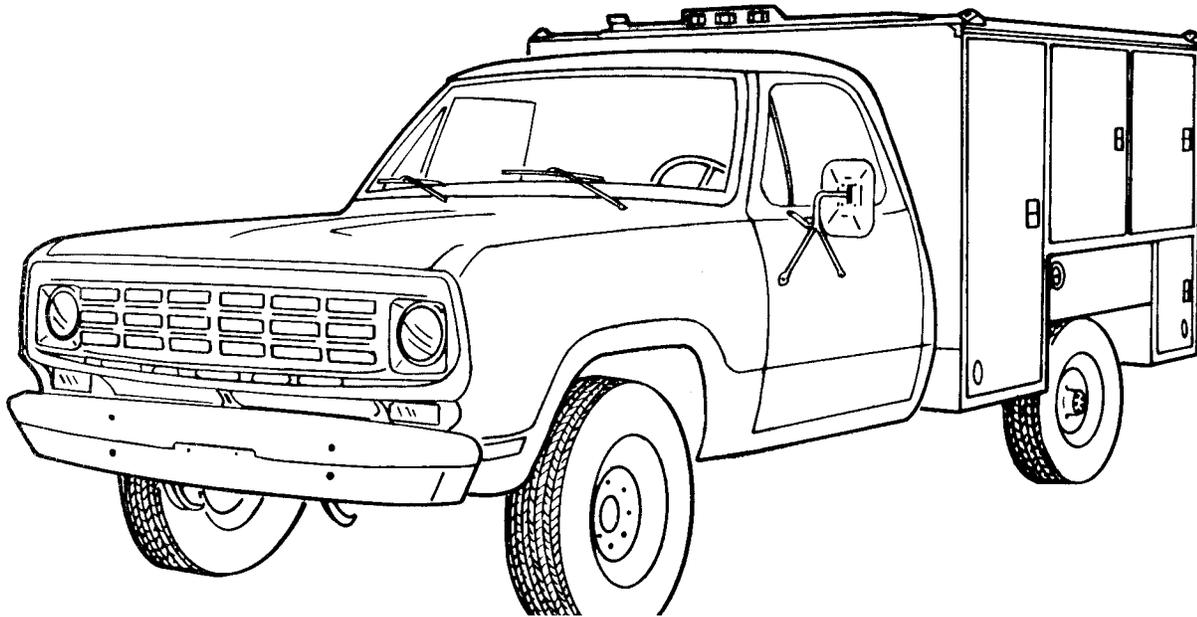
NOTE

This shop set has been designed to operate at temperatures of -25° F to +105° F. It can be safely stored at -50° F to +150° F. A suitable arctic kit(s) is under construction for shop sets to be used in temperatures colder than those cited above. If these kits are required, contact Commander, U. S. Army Armament Materiel Readiness Command, ATTN: DRSAR-MA, Rock Island, Il. 61201.



AR 701532

Figure 1-1. Shop set right rear 3/4 view.



AR 701533

Figure 1-2. Shop set, left front 3/4 view.

1-8. TABULATED DATA.

a. *The U. S. Army Identification Plate.* Located upper left front of the shop set body.

Nomenclature	Shop Equipment, Contact Maintenance, Truck Mounted
Model	SECM
NSN	4940-01-016-2262
Manufacturer	Southwest Truck Body Co.
Length	213 in.
Width	84 in.
Height	82 in.
Shipping weight	7300 lbs.
Cube	849 ft.

b. *Transportation Data.* Located upper left front of the shop set body.

Shop Equipment, Contact Maintenance, Truck Mounted	
Overall Length	213 in.
Overall Height	82 in.
Overall Width	84 in.
G v w	8000 lbs.
Shipping Tonnage	21.2 ton
Shipping Cubage	849 ft.

c. *Welder and Engine.* Located lower left corner of control panel.

(1) *Welder*

Amps	200
Max. ovc	90
Volts	28
Duty Cycle	60%

Aux Power

Volts	120
Phase	1
Hertz	60
KW	4
Power factor	1.0

(2) *Engine*

Manufacture	Wisconsin
Spec	5854-1
Rpm	1800
Model	G-204

d. *Air Compressor and Drive Motor.*

(1) *Air Compressor.*

Model	B-201-SC
Manufacture	Kellogg-American
Stage	Single
Cylinder	Two
Bore	2-1/4 in.
Stroke	2-1/4 in.

(2) *Drive Motor.*

Manufacture	Baldor Electric Co.
Spec	35001-3069
H.P.	1-1/2
Volts	115/230
Frame	145T 528L
Hertz	60
Phase	1
Amps	20/10

e. *Bridge Weight Classification.*

Empty

Class
4

	Class	Air compressor	3/4 pint
Cross-country	4	Fuel tank (truck chassis)	20 gal.
Highway loaded	4	<i>g. Tire Pressure.</i>	<i>Dry Mud and Snow</i>
<i>f. Component Capacities (approx).</i>		Front	35 psi
Engine lubricating system (shop set)	5-1/2 qts.	Rear	50 psi
			30 psi
			45 psi

CHAPTER 2

OPERATING INSTRUCTIONS

Section I. OPERATING PROCEDURES

2-1. GENERAL. This section describes the various controls and instruments and provides the operator or crew sufficient information to operate the shop set.

2-2. CONTROLS AND INSTRUMENTS.

a. Frequency Meter. The frequency meter (fig 2-1) indicates the output power of the welder when driven by the gas engine. Normal reading is 60 hertz when the engine is driving the welder at 1800 rpm.

b. Running Time Meter. The running time meter (fig 2-1) denotes hours of operation.

c. Oil Pressure Gage. The oil pressure gage (fig 2-1) indicates the engine oil pressure. Abnormal oil pressure, the needle should point to the green. If the needle points to the red, stop the engine and determine the cause for low oil pressure.

d. Battery Ammeter. The battery ammeter (fig 2-1) measures the dc current flow to and from the battery. It is calibrated in 10 ampere increments from -30 to +30. Normal indication of the meter is dependent upon the charge of the battery. A low charge, such as exists immediately after engine starting, will result in a high reading. When the charge has been restored to the battery the indicator should read near 0.

e. Choke Control The choke control (fig 2-1) is used to increase fuel intake for initial starting and warm up of a cold engine. Pull out to start engine and push slowly as the engine warms up. Push choke in during normal operation,

f. Throttle Control The throttle control (fig 2-1) is used to adjust engine speed to the desired rpm. Turn the handle counterclockwise and pull out to decrease rpm and push in to increase rpm. Pull out to idle and push in to run.

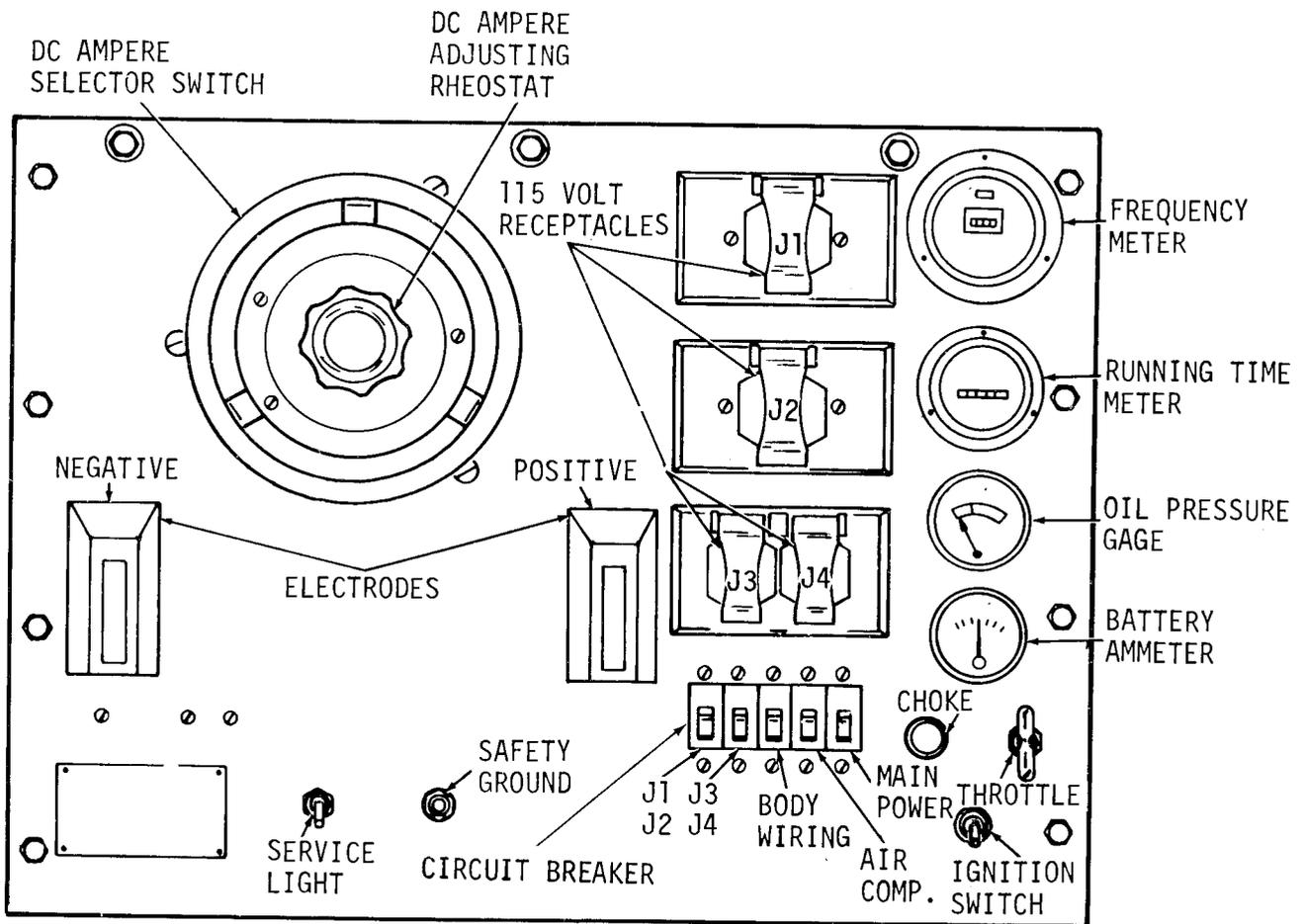
g. Ignition Switch. The ignition switch (fig 2-1) is a 3 position switch, used to start and stop the shop set engine.

h. Circuit Breakers. There are five circuit breakers (fig 2-1). Three 15A circuit breakers protect the receptacles and body wiring circuits. The 30A circuit breaker protects the air compressor circuit. The 40A circuit breaker protects the main power circuit.

i. Receptacles. The receptacles (fig 2-1) are 115 volt single-phase. Receptacles J1 and J2 are the twist-lock type and J3 and J4 are the three-prong type.

j. D. C. Ampere Selector Switch. The switch (fig 2-1) is used to select the welding ampere range required for all welding to be accomplished. Each welding ampere range shown on the switch shows a minimum and maximum for the range selected, and should be further adjusted with the dc ampere adjusting rheostat.

k. D. C. Ampere Adjusting Rheostat. This rheostat (fig 2-1) regulates the dc welding amperage within the ampere range selected at the dc ampere selector switch. Turn the adjusting rheostat clockwise to increase the welding amperage and counterclockwise to decrease the amperage.



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Figure 2-1. Controls and instruments.

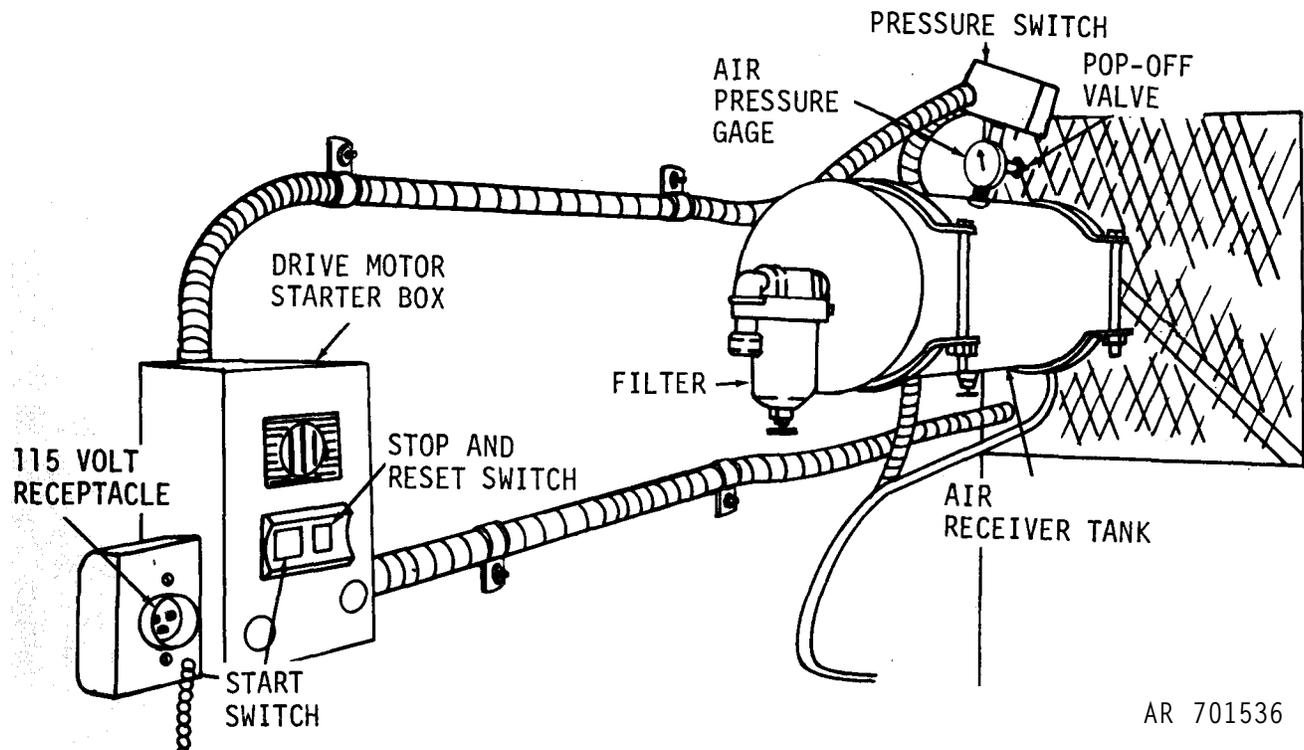


Figure 2-2. Air compressor drive motor controls, air receiver tank pressure gage and pressure switch

l. Service Light Switch. The service light switch (fig 2-1) controls the light on the upper rear of the control panel.

m. Air Pressure Gage. The gage (fig 2-2) shows the amount of air pressure in the air receiver tank. During normal operation it should read between 80 psi and 100 psi.

n. Pressure Switch The switch (fig 2-2) is a pressure operated electric switch that automatically starts and stops the air compressor to maintain a minimum of 80 psi and a maximum of 100 psi.

o. Pop-off Valve. The pop-off valve (fig 2-2) is a safety device to protect the air system and personnel if a malfunction occurs that would cause the pressure in the system to exceed a safe working pressure. The pop-off valve will open to let the air pressure escape from the system when the air pressure of 135 psi is reached.

p. Start, Stop and Reset Switch. The switch (fig 2-2) is used to start and stop the air compressor system. The

reset switch will automatically disengage when a mechanical or electrical malfunction occurs in the air system that causes the electrical circuit to be overloaded.

q. External Power Receptacle. The external power receptacle (fig 2-3) provides 115 volts ac single-phase power to operate equipment.

r. Overspeed Safety Switch. The overspeed safety switch (fig 2-4) will break the ignition circuit at 2140 rpm or 68 hertz. To reset the overspeed safety switch, shut ignition switch off and restart engine.

s. High Temperature Safety Switch. As a safety precaution against overheating, a high temperature safety switch has been mounted to the cylinder head at no. 2 spark plug. The safety switch will automatically stop the engine by shorting out the ignition system. A waiting period of about 15 minutes will be required before the switch has cooled off sufficiently to restart the engine.

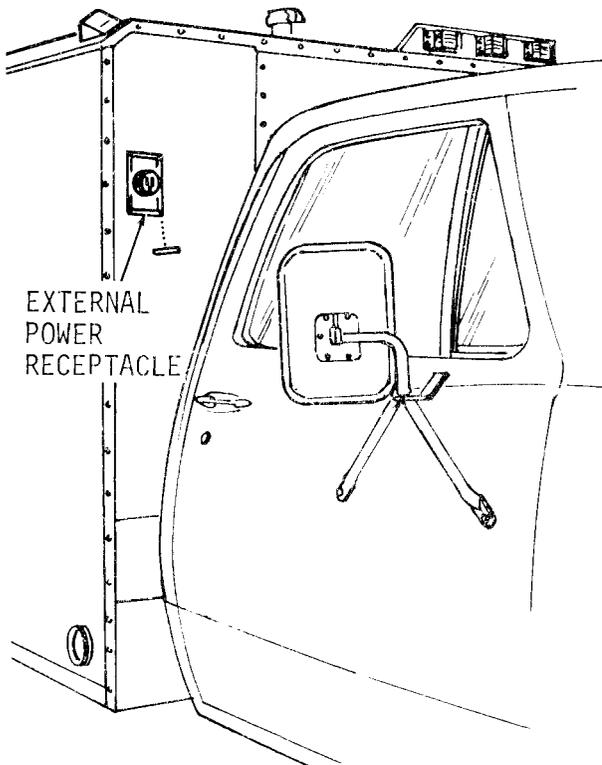


Figure 2-3. External power receptacle.

2-3. STARTING THE ENGINE.

WARNING

Do not operate generator-welder within 100 ft. of electronic communication equipment.

CAUTION

Open overhead door before operating engine.

a. Preparation for Starting.

(1) Perform the necessary daily preventive maintenance checks and services (para 3-3).

(2) Open vent above engine.

b. Starting the Engine.

(1) Unlock throttle and pull out to the idle position.

(2) Pull choke control out.

(3) Move ignition switch to the start position and hold. When engine starts release the switch and it will return to the run position.

NOTE

If engine fails to start within 30 seconds release starter and allow to cool before trying to re-start,

(4) After the engine starts gradually push choke control in and adjust throttle control to the desired rpm.

2-4. STOPPING THE ENGINE.

NOTE

If the engine has been running hard and is hot, do not stop it abruptly from full load, but remove and allow engine to run at idle for three to five minutes.

a. Unlock throttle control and pull out to idle.

b. Place all circuit breakers in the OFF position.

c. Place ignition switch in the OFF position.

2-5. OPERATION OF THE AIR COMPRESSOR.

a. Energize the electrical system (para 2-3).

b. Switch the main power and air compressor circuit breakers ON.

c. Open air receiver tank draincock and drain condensation from tank.

d. Press start switch (fig 2-2) to start.

e. To stop compressor push the stop reset button and place the main power and air compressor circuit breaker OFF.

f. The air compressor pressure switch (fig 2-2) will automatically shutdown the compressor when pressure reaches 100 psi and will restart the compressor as soon as pressure fails below 80 psi.

2-6. OPERATION OF THE GENERATOR-WELDER.

a. Refer to TM 9-237 for welding techniques.

WARNING

Injury or death can result if shop set is not grounded properly.

b. Drive a metal ground rod into the ground adjacent to the shop set. Attach a no. 6 bare copper wire to the

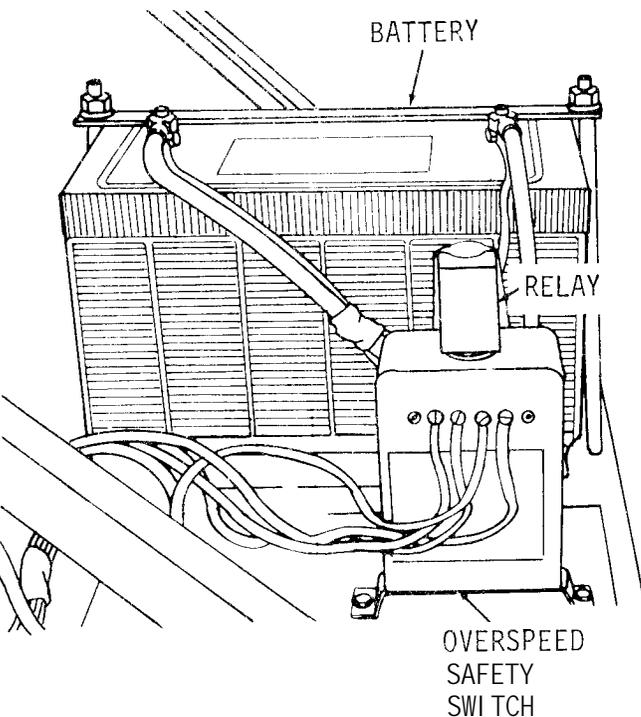


Figure 2-4. Overspeed safety switch.

safety ground terminal on the control panel and the ground rod.

c. Connect electrode and ground cable to the output terminals.

d. Refer to paragraph 2-3 for starting the engine. Move the throttle to the run position. When frequency meter reads 60 hz the welder is ready for operation.

e. Turn the dc ampere selector switch (fig 2-1) so that the desired amperes (welding) range is directly under the arrow at the top of the selector switch. The

dc ampere fine adjustment rheostat located in the center of the selector switch can now be adjusted to the desired amperes within the range shown at the top of the range selector switch.

CAUTION

Do not change the setting of the dc ampere range selector switch, or the fine adjustment while welding is being performed.

NOTE

For best results unwind cables before welding.

Section II. OPERATING UNDER UNUSUAL CONDITIONS

2-7. OPERATION IN EXTREME COLD.

a. *Engine and Air Compressor.* Use the proper lubrication for cold weather operation.

b. *Welder.* Allow a warm-up period to allow the engine to reach normal operating temperature before operating the welder.

c. *Wiring* Do not attempt to service or move the wiring during extremely cold temperatures. Bending a wire under these conditions may cause cracks and breaks in the insulation and the wiring.

d. *Fuel System.* Fuel tank should be kept as full as possible at all times to reduce the possibility of moisture forming in the tank.

2-8. OPERATION IN EXTREME HEAT.

a. *Engine and Air Compressor.* Use the proper lubrication for extreme heat.

b. *Generator-Welder.* Maintain maximum ventilation through the generator-welder at all times.

2-9. OPERATION IN DUSTY OR SANDY AREAS.

a. *Protection.* Locate the shop set in a well-protected area whenever possible. Make sure that all weather seals are in good condition and properly seated. Clean

all equipment carefully and frequently. Cover all exposed or partially exposed components when not in use.

b. *Lubrication.* Observe all lubrication instructions.

c. *Fuel System.* Take all precaution to keep the fuel and fuel system free from dust and foreign particles. Inspect the fuel strainer bowl more frequently than under normal circumstances.

2-10. OPERATION IN RAIN OR HUMID CONDITIONS.

a. *General.* Provide adequate ventilation and shelter to protect the shop set from rain and humidity. Remove any covering during dry periods to aid in drying out of the shop set and components.

b. *Fuel System.* Keep fuel tank full to avoid condensation in the tank.

c. *Welder.* Do not attempt to weld in the direct presence of rain or when condensate is forming on metal parts in an extremely humid atmosphere.

d. *Generator.* All connections must be dry and maintained dry and all interconnecting cables must be waterproof, properly connected and maintained to avoid any shock hazard.

Section III. ENGINE PROTECTION BETWEEN SHORT PERIOD OPERATING INTERVALS

2-11. GENERAL INSTRUCTIONS. When the work interval is completed, the following instructions should be carried out very carefully to protect the engine. To protect the cylinders, pistons, rings and valves and keep them from rusting and sticking, rust preventive oil, as specified under Military Specification MIL-0-6082, (type 1, ready mixed, or equivalent), should be injected into the pipe tap opening on the intake

manifold while the engine is warm and running at moderate speed. About a quarter of a pint is necessary, or enough so that a heavy bluish smoke will appear at the exhaust. The ignition switch should then be shut off and the engine stopped. This fogging operation will give a coating of oil on the above-mentioned parts protecting them from the atmosphere.

CHAPTER 3
OPERATOR/CREW MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3-1. GENERAL. This section contains lubrication instructions for the shop set. No lubrication order has been published. Refer to table 3-1 for lubrication information.

3-2. LUBRICATION INFORMATION.

a. Intervals are based on normal operation. Reduce intervals to compensate for abnormal operations and severe conditions. During inactive periods sufficient lubrications must be performed for adequate preservation.

b. Clean fittings before lubrication.

c. After washing or fording relubricate affected parts

d. Care of lubricants and lubrication equipment. Keep all lubricants in closed containers and store in a clean, dry area away from heat. Do not allow dirt, dust, water, or other foreign material to come in contact with the lubricants. Keep all lubrication equipment clean and ready for use.

TABLE 3-1. LUBRICATION

Lubricants	Capacity	Temperature			Intervals
		above +40°F	+40° to +10°F	+10° to -10°F	
OE-OIL, Engine, Heavy Duty		OE 30	OE 10	OES	
Filter	5 qts				50 hrs.
Air compressor	1/2 qt.				3 months
Oil can points	3/4 pt.	see note 1			
OES-OIL, Engine Subzero					50 hrs.
GAA-GREASE, Automobile and artillery		all temperatures			
Air compressor motor (as required)					
Generator-welder bearings	1 oz.	see note 2			6-8 months

NOTES

1. Oil Can Points. Every 50 hrs. lubricate the hinges, latches linkage and exposed adjusting threads with OE.
2. To be lubricated by Direct Support. Welder generator bearings.

Section II. OPERATOR/CREW PREVENTATIVE MAINTENANCE CHECKS AND SERVICES

3-3. GENERAL.

a. Before You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your "BEFORE" PMCS prior to the equipment leaving its containment area or performing its intended mission.

b. While You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your "DURING" PMCS when the equipment is being used in its intended mission.

c. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA PAM 738-705.

3-4. PMCS PROCEDURES.

a. Your Operator/Crew Preventive Maintenance Checks and Services table (table 3-2) lists the inspections and care of your equipment required to keep it in good operating condition.

3-4. PMCS PROCEDURES (cont).

b. The interval column of your PMCS table tells you when to do a certain check or service.

c. Leakage definitions for operator/crew PMCS shall be classified as follows:

Class I See page of fluid (as indicated by wetness or discoloration) not great enough to form drops.

Class II Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.

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

NOTE

Equipment operation is allowable with minor leakages (Class I or II). Of course, you must consider the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor,

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

Class III leaks should be reported to your supervisor or organizational maintenance.

d. The procedure column of your PMCS table tells you how to do the required checks and services. Carefully follow these instructions. If you do not have the tools, or if the procedure tells you to, have organizational maintenance do the work.

e. If your equipment does not perform as required, refer to Section III, Troubleshooting, for possible problems. Report any malfunctions or failures on DA Form 2404, or refer to DA Pam 738-750.

f. Notify organizational maintenance for any removal of assemblies or equipment required in order to perform PMCS.

g. Not Fully Mission Capable If: column tells you when and why your equipment cannot be used.

NOTE

The term mission capable means that equipment is on hand and is able to perform its combat missions (see AR 700--138).

h. The item number column shall be used as a source of item numbers for the TM Number column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.

Table 3-2. Operator/Crew Preventive Maintenance Checks and Services

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
1	Before Operation	M887 Truck Chassis	TRUCK-MOUNTED CONTACT MAINTENANCE SHOP EQUIPMENT See TM 9-2320-286-10 for PMCS procedures	Stated PMCS requirements are not met.
2	Monthly	Fire Extinguisher	Check for broken seal and for full charge on pressure gage. If seal is broken or gage reads below normal zone, notify organizational maintenance.	Seal is broken or if gage does not show full charge.
3	Before Operation	ABC-M11 Decon Apparatus	See TM 3-4230-204-12&P for PMCS procedures	Stated PMCS requirements are not met.

Table 3-2. Operator/Crew Preventive Maintenance Checks and Services (cont)

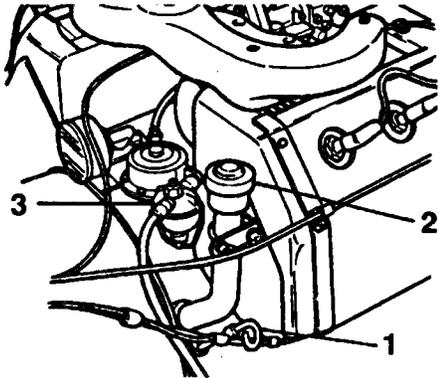
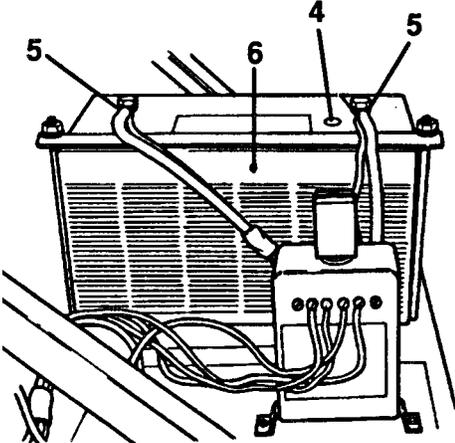
ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
4	Quarterly, except more frequently when operating under dirty/dusty conditions	Air Cleaner Filter	<p>ARC WELDING MACHINE ENGINE</p> <p>Inspect for dirt and dust. Clean as necessary (p. 3-3). If air cleaner filter is clogged with dirt/dust, notify organizational maintenance to replace it.</p> 	Filter is clogged with dirt/dust.
5	weekly	Engine Oil and Leaks	<p>With shop parked on level ground, check dipstick (1) for level of engine oil. Add oil thru filter (2) if oil is 1 quart or more low. Report any class III oil leaks to organizational maintenance.</p>	Oil is 1 quart or more low or if class III oil leaks are present.
6	Monthly	Fuel Strainer	<p>Check fuel strainer (3) for debris and clean as necessary (p. 3-5).</p>	Fuel strainer is dirty.
7	weekly	Air Cooling System Shrouds	<p>Inspect shrouds for looseness, missing components, and cracks. Tighten any loose fasteners. Notify organization~maintenance of missing or cracked shrouds or missing fasteners.</p> 	Air cooling system shrouds are loose, cracked, or missing, or if fasteners are missing.

Table 3-2. Operator/Crew preventive Maintenance Checks and Services (cont)

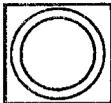
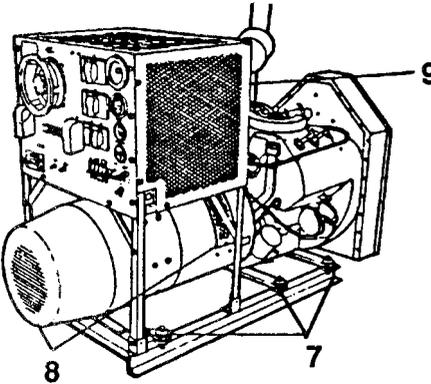
ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
8	Monthly	Battery	<p>ARC WELDING MACHINE ENGINE (CONT)</p> <p>Check battery charge indicator (4) as follows:</p> <div style="display: flex; flex-direction: column; align-items: flex-start;"> <div style="display: flex; align-items: center; margin-bottom: 10px;">  <p>Green Dot – OK</p> </div> <div style="display: flex; align-items: center; margin-bottom: 10px;">  <p>All Dark – Test and Recharge</p> </div> <div style="display: flex; align-items: center;">  <p>All Light (Yellow) – Do Not Try to Test or Recharge</p> </div> </div> <p>Inspect battery terminals and cable connectors (5) for looseness and corrosion. Tighten loose cable connectors. Inspect case (6) for cracks and leaks. Notify organizational maintenance for battery servicing or replacement.</p> <p>ARC WELDING MACHINE POWER UNIT</p> 	<p>Battery cannot be charged or will not hold a charge, or if connectors are loose, or if connectors and/or posts are corroded, or if case is cracked or leaking.</p>
9	Weekly	Arc Welding Machine Power Unit	<p>Inspect both sides of unit for damaged or loose mountings (7). Tighten loose mountings. Check for dirt or debris obstructing vents (8). Clean off any debris with a soft-bristle brush. Check that protective cage (9) is securely in place. Tighten screws if necessary. Report any missing components or damage to organizational maintenance.</p>	<p>Mountings are loose or damaged, or if protective cage is not securely in place (3 or more screws stripped or missing).</p>

Table 3-2. Operator/Crew Preventive Maintenance Checks and Services (cont)

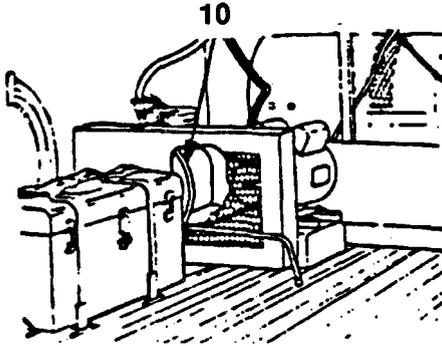
ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			<p style="text-align: center;">AIR COMPRESSOR ASSEMBLY</p>  <p style="text-align: center;">WARNING</p> <p style="text-align: center;">Remove electrical power from air compressor assembly (p. 2-2) before checking or servicing. Failure to do so could result in death or injury to personnel.</p>	
10	weekly	Air Compressor Assembly	Check oil level in compressor base (10); add oil as required (p. 3-1).	Oil is not up to proper level, or if any class III oil leaks are present.
11	Semiannually or every 200 hours of operation, whichever comes first	Air Compressor Oil	Change oil (p. 3-1).	Oil change schedule is not followed.

Table 3-2. Operator/Crew Preventive Maintenance Checks and Services (cont)

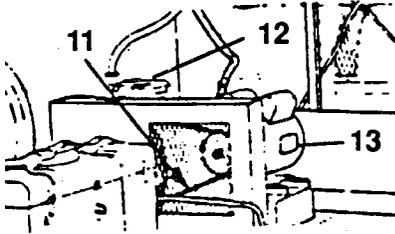
ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			 <p style="text-align: center;">WARNING</p> <p>Remove electrical power from air compressor (p. 2-2) before checking or servicing. Failure to do so could result in death or injury to personnel.</p>	
12	Monthly	v-belt	Inspect V-belt (11) for cracks, frays, and tears. Check tension for 1/2-inch (1.27 centimeter) deflection. If belt is loose, broken, or defective, notify organizational maintenance.	V-belt is loose, broken, or defective.
13	Monthly, or more frequently if operating in sandy/dusty environment	Air Compressor Inlet Filter	Inspect air compressor inlet filter (12) for dust/dirt. Clean if dirty (p. 3-3). Report any tears, perforation, or clogging of the filter to organizational maintenance.	Filter is torn, perforated, or clogged.
14	Monthly	Motor	Check motor (13) for loose or missing mounting hardware. Tighten any loose hardware. Notify organizational maintenance if any items of mounting hardware are missing.	Motor is not securely mounted or any mounting hardware is missing.
15	Before Operation	Safety Ground	<p style="text-align: center;">OVERALL SYSTEM CHECKOUT</p> <p style="text-align: center;">WARNING</p> <p>Injury or death can result if shop set is not properly grounded before operation.</p> <p>Before starting engine check corrections between metal ground rod and wire lead to control panel assembly (p. 2-2 and 2-4).</p>	Shop set is not properly grounded when the welder-generator is placed in operation.

Table 3-2. Operator/Crew Preventive Maintenance Checks and Services (cent)

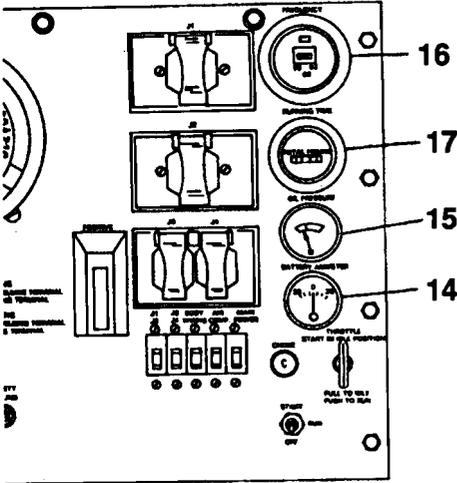
ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
16	Before operation, but not less frequently than weekly.	Air Receiver Tank	Momentarily open drain cock at air receiver tank (p. 2-3) to drain any accumulated moisture. Notify organizational maintenance if drain cock is inoperative.	Drain cock is inoperative.
17	Before operation, but not less frequently than weekly	Pop-off valve	<p>Actuate pop-off valve to check that it is operating properly. Notify organizational maintenance of improper pop-off valve operation.</p>  <p style="text-align: center;">NOTE While START is engaged observe BATTERY AMMETER (14).</p>	Pop-off valve is inoperative.
18	During operation but not less frequently than weekly	Arc Welding Machine Engine	<p>STARTING ENGINE. Strut and warm up engine (p. 2-4). Observe exhaust. Listen for unusual noises. Notify organizational maintenance of hard starting, exhaust smoke after startup, unusual noises, or engine cut-out due to overheating.</p>	Engine will not start or requires long and/or repeated starting, or if there is visible exhaust smoke after warm-up, or if BATTERY AMMETER does not indicate discharging when START is engaged, or if there are unusual noises coming from the engine, or if engine is overheating.

Table 3-2. Operator/Crew Preventive Maintenance Checks and Services (cont)

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
19	During operation but not less frequently than weekly	Control Panel	<p>OVERALL SYSTEM CHECKOUT (CONT)</p> <p>BATTERY AMMETER (14). Check for normal indication in 0 to +30 zone. Negative readings are abnormal. If normal indication cannot be obtained stop engine and notify organizational maintenance.</p> <p>OIL PRESSURE GAGE (15). Check for normal indication in green zone; red zone indicates abnormal. If oil pressure is low, stop engine and add oil as required (p. 3-1). If normal indication cannot be obtained, notify organizational maintenance.</p> <p>FREQUENCY METER (16). Check for normal indication of 58-62 Hz. Adjust throttle as necessary to bring frequency within proper range. Turn on air compressor or otherwise connect 10 amp or greater load to generator. Readjust throttle as necessary to restore frequency within proper range. If generator cannot be maintained at correct frequency range, notify organizational maintenance. Turn off air compressor or remove electrical load.</p> <p>RUNNING TIME METER (17). Check to see if running time meter is turning over while engine is running. Notify organizational maintenance if running time meter is not working.</p>	<p>Ammeter reads in negative zone during engine operation.</p> <p>Oil pressure is in red zone.</p> <p>Meter fails to read 58-62 Hz both with and without load, and/or this frequency range cannot be set and held using the throttle.</p> <p>Running time meter is not working.</p>

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
20	During operation, but not less frequently than monthly		<p>CIRCUIT BREAKERS AND RECEPTACLES. Check that electrical current is delivered to the four receptacles on the control panel (p. 2-2), the receptacle next to the air compressor starter box (p. 2-3), and the external power receptacle (p. 2-4). Check that circuit breakers operate easily and do not cutoff for no reason. Notify organizational maintenance if circuit breakers and/or receptacles are not working properly.</p> <p>SERVICE LIGHT. Turn on, then turn off service light. Notify organizational maintenance if service light is not working.</p>	Any of the outlets are dead, or if circuit breakers cut off for no reason, or if circuit breakers are difficult to turn on and off.
21	During operation, but not less frequently than monthly	Welder	Perform straight stick welding (p. 2-4) or otherwise apply a load at all settings of DC ampere selector switch and DC ampere adjusting rheostat. Notify organizational maintenance if welder is not functioning at all settings.	Welder will not perform its function at all switch settings.
22	During operation, but not less frequently than weekly	Pressure Gage Reading	<p>Turn on air compressor (p. 2-4) and observe reading on pressure gage (p. 2-3) while checking that the compressed air system delivers a steady flow of air. If correct pressure range cannot be reached, adjust the pressure switch (p. 2-3) as follows:</p> <ul style="list-style-type: none"> a. Low cut-in pressure: 75 – 85 psi (517.13 – 586.08 kpa). b. High cut-out pressure: 95 – 105 psi (655.03 – 689.50 kpa). <p>If switch cannot be set to correct pressure, notify organizational maintenance.</p>	Air compressor will not come on and buildup normal pressure of 80-100 psi (551.60 – 689.50 kpa), or if compressed air delivery cannot be maintained at this pressure, or if pressure switch cannot be properly adjusted, or if pressure gage is inoperative.

Table 3-2. Operator/Crew Preventive Maintenance Checks and Services (cont)

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
23	During operation, but not less frequently than weekly	Air System Leakage	<p>OVERALL SYSTEM CHECKOUT (CONT)</p> <p>Observe if air compressor is frequently cycling on and off when air is not being used. Turn off air compressor (p. 2-4) and observe pressure gage reading. Wait several minutes and check gage again. If there is any evidence of a fall off in pressure which would indicate the presence of leaks, notify organizational maintenance.</p> <p>OPERATIONAL TEST COMPLETED</p>	There is evidence of leakage in air system.

Section III. TROUBLESHOOTING

3-5. GENERAL.

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the shop set. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you determine corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions.

If a malfunction is not listed or is not corrected by listed corrective actions notify your supervisor.

c. The table lists the common malfunctions which you may find during the operation or maintenance of the shop set or its components. You should perform the tests/inspections and corrective actions in the order listed.

3-6. TROUBLESHOOTING. Refer to table 3-3 for Operation/Crew Troubleshooting information.

Section IV. OPERATOR/CREW MAINTENANCE PROCEDURES

3-7. AIR COMPRESSOR INLET FILTER.

a. General. The inlet filter should be serviced weekly when in use.

b. Inlet Filter Element Removal. Refer to figure 3-1 to remove filter element.

c. Cleaning and Inspection.

(1) Clean filter element and filter screen in solvent and dry (app D).

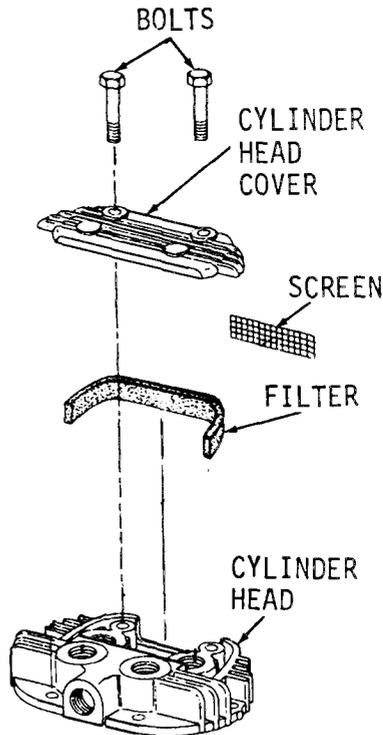
(2) Inspect screen for rust corrosion and that air flows freely through the filter.

(3) Dip the filter element in OE 10 oil and drain.

d. Installation. Refer to figure 3-1 and install in reverse order of removal.

3-8. ENGINE AIR CLEANER.

a. General. The air cleaner filter is a paper element.



AR 701539

Figure 3-1. Air compressor inlet filter, removal and installation.

Table 3-3. TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
ENGINE		
1. ENGINE FAILS TO START OR HARD TO START.		
Step 1. Battery weak.		Charge or replace battery, inspect for loose or corroded terminals.
Step 2. Air cleaner element clogged.		Service or replace air cleaner element (para 3-8).
Step 3. Fuel strainer clogged.		Service fuel strainer (para 3-9).
Step 4. Starter inoperative.		Notify organizational maintenance.
Step 5. Carburetor not choked sufficiently (cold engine).		Pull choke control out.
Step 6. Poor grade or stale gasoline in fuel tank.		Drain and refill with proper grade gasoline.
Step 7. Water or dirt in fuel tank.		Drain and refill with proper grade gasoline.
Step 8. Excessive carburetor flooding.		Notify organizational maintenance.
2. ENGINE MISSES OR RUNS ERRATICALLY		
Step 1. Fuel contaminated.		Drain fuel tank and refill with proper grade gasoline.
Step 2. Air cleaner element clogged.		Service or replace air cleaner element.
Step 3. Worn or cracked spark plug wires.		Notify organizational maintenance.
Step 4. Loose connections at ignition wires.		Tighten loose connections. If trouble continues notify organizational maintenance.

Table 3-3. TROUBLESHOOTING-Continued

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	Step 5. Weak spark.	Notify organizational maintenance.
3. ENGINE STOPS SUDDENLY	Step 1. Fuel tank empty.	Service fuel tank.
	Step 2. Fuel pump defective.	Notify organizational maintenance.
	Step 3. Vapor lock.	Wait until engine has cooled off sufficiently to overcome the vapor lock.
	Step 4. Ignition trouble.	Notify organizational maintenance.
	Step 5. Overspeed safety relay trips.	Reset switch. (para 2-2r)
4. ENGINE OVERHEATS	Step 1. Crankcase oil supply low.	Add oil to proper level.
	Step 2. Restricted exhaust.	Remove restriction from exhaust.
	Step 3. Restricted cooling air circulation.	Remove cooling air restriction.
	Step 4. Dirt between cooling fins on cylinder or head.	Clean dirt from cooling fins.
5. ENGINE BACKFIRES THRU CARBURETOR	Step 1. Water or dirt in gasoline.	Drain fuel tank and service with proper grade of gasoline
	Step 2. Engine cold.	Let engine warm up before applying load.
6. ENGINE KNOCKS OR DEVELOPS OTHER NOISE	Step 1. Crankcase oil supply low.	Add oil to proper level.
	Step 2. Engine overheated.	See malfunction 4 above.
	Step 3. Accessories mounting loose.	Tighten all loose mounting hardware and connections.
GENERATOR-WELDER		
1. GENERATOR-WELDER NOISY	Loose mounting hardware.	Tighten or replace loose hardware.
2. GENERATOR-WELDER OVERHEATS	Step 1. Fan cover openings obstructed.	Remove obstruction from fan cover.
	Step 2. Other causes.	Notify general support maintenance.
AIR COMPRESSOR		
1. AIR COMPRESSOR FAILS TO BUILD UP PRESSURE IN RECEIVER TANK	Step 1. Air hoses, lines or fittings leaking.	Tighten or replace hoses, couplings or fittings.
	Step 2. Receiver draincock open.	Close draincock.
	Step 3. Receiver tank pop-off valve dirty or defective.	Notify organizational maintenance.
2. AIR COMPRESSOR FAILS TO OPERATE	Step 1. Circuit breaker tripped.	Reset circuit breaker (fig 2-1).
	Step 2. Overload circuit in starter control box tripped.	Push reset button (fig 2-2).
	Step 3. Air compressor drive motor defective.	Notify organizational maintenance.
3. AIR PRESSURE LOW	Step 1. Inlet air filter clogged.	Clean inlet air filter.
	Step 2. Electrical pressure switch out of adjustment.	Notify organizational maintenance.

Table 3-3. TROUBLESHOOTING-Continued

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
4. AIR PRESSURE TOO HIGH		Electrical pressure switch out of adjustment. Notify organizational maintenance.
5. AIR COMPRESSOR OVERHEATS		Oil level in compressor crankcase low. Add oil as required (table 3-1).

b. Removal.

(1) Remove four twistlock fasteners securing cover to the false panel located in compartment 1.

(2) Remove wing nut and plate (fig 3-2) securing air cleaner element and remove air cleaner element.

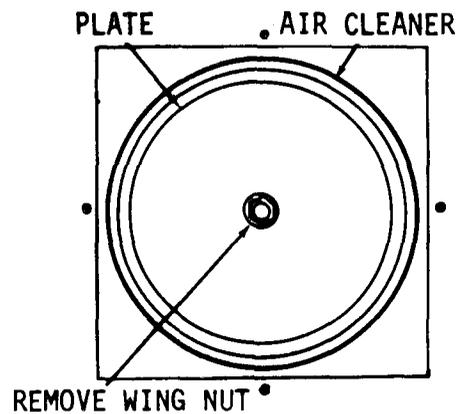
c. Cleaning and Inspection

(1) Inspect element for dirt or damage. If

damaged replace element.

(2) Emergency cleaning. Loosen and remove dirt by blowing with low pressure air. Tapping end of filter on a solid surface is an acceptable method if air is not available. Do not strike sides of filter.

d. Installation. Install in reverse order of removal.



AR 701540

Figure 3-2. Engine air cleaner, removal and installation

3-9. ENGINE FUEL STRAINER (fig 3-3).

a. Removal Remove fuel line quick disconnect from inlet side of strainer. Loosen knurled nut below bowl and swing wire bail to one side. Remove bowl, gasket and screen.

b. Cleaning and Inspection.

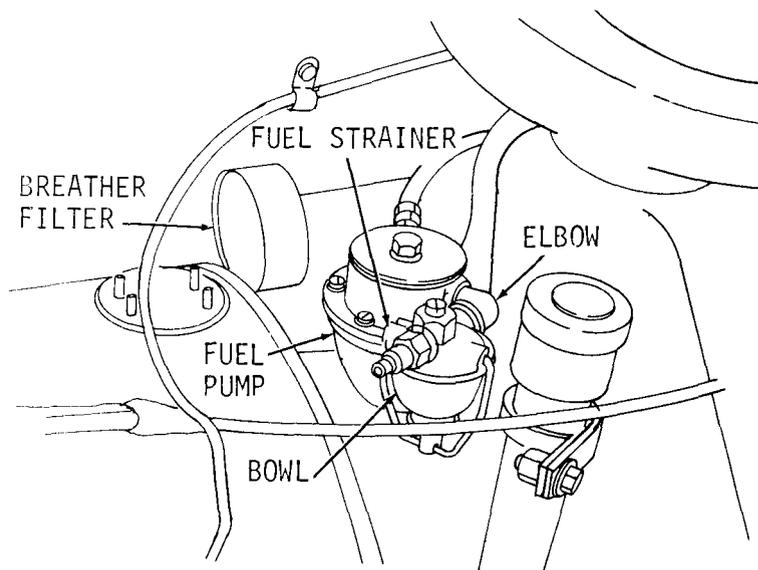
(1) Wash bowl and screen in solvent and dry (app

D).

(2) Inspect bowl for cracks. Replace a defective bowl.

(3) Inspect screen for damage. Replace a defective screen.

c. Installation. Install in reverse order of removal, being sure gasket is in good condition.



AR 701541

Figure 3-3. Engine fuel strainer, removal and installation.

3-10. CRANKCASE BREATHER FILTER (fig 3-3).

a. Removal Remove cover and filter.

b. Cleaning and Inspection.

(1) Clean cover and filter in solvent and dry (app D).

(2) Inspect cover and body for cracks or damage.

(3) Inspect filter for dirt or damage. Replace an unserviceable filter.

c. Installation. Install in reverse order of removal.

3-11. BATTERY. The battery does not require servicing. Check for loose or corroded terminals.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIAL

4-1. INSPECTING AND SERVICING THE EQUIPMENT.

- a.* Perform daily preventive maintenance services (table 3-2).
- b.* Refer to truck manual for servicing chassis.
- c.* Make a complete inspection of the shop set and the equipment, visually inspecting for loss or damage which may have occurred during shipment.
- d.* Inspect the doom, tailgate and other body members for dents, breaks, cracks, and loose or missing parts.
- e.* Inspect the generator-welder for breaks, dents, cracks and loose or missing parts.
- f.* Inspect the air compressor for defects and for loose or missing parts.
- g.* Inspect the engine for dents, defects and for loose or missing parts.
- h.* Correct any deficiencies or refer them to Direct Support Maintenance.

CAUTION

Do not change loading plan of set contents (app E). Relocation may result in damage to Test, Measurement, and Diagnostic Equipment (TMDE) Items due to vibration.

- i.* Visually inspect that all shop set contents in their respective locations and secured with hold down straps and clamps. Refer to Appendix E for proper location of equipment.

4-2. INSTALLATION.

WARNING

Injury or death can result if shop set is not properly grounded.

For installation instructions, see paragraph 2-6b and c.

Section II. MOVEMENT TO A NEW WORKSITE

4-3. DISMANTLING FOR MOVEMENT.

- a.* Disconnect all welding cables and stow securely in the proper compartment.
- b.* Secure all portable accessories in the proper location with hold down straps.

- c.* Make certain that the generator-welder, engine and air compressor are secure.

- d.* Make certain all compartments are securely latched and locked.

4-4. REINSTALLATION AFTER MOVEMENT. Refer to paragraph 4-2.

Section III. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

4-5. SPECIAL TOOLS AND EQUIPMENT.

No special tools or equipment are required by organizational maintenance personnel for the maintenance of this shop set.

4-6. REPAIR PARTS.

Repair parts are listed and illustrated in the repair parts and special tools list covering organizational maintenance for this equipment TM 9-4940-421-24P.

Section IV. LUBRICATION INSTRUCTIONS

4-7. GENERAL. Refer to paragraph 3-2 and table 3-1 for lubrication information.

Section V. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-8. GENERAL. To ensure that the shop set is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure.

4-9. PMCS PROCEDURES.

a. Your Organizational Preventive Maintenance Checks and Services Table (table 4-1) lists the inspections and care of your equipment required to keep it in good operating condition.

b. The interval column of your PMCS table tells you when to do a certain check or service.

c. The procedure column of your PMCS table tells you how to do the required checks and services. Carefully follow these instructions. If you do not have the tools, or if the procedure tells you to, have direct support maintenance do the work.

d. If your equipment does not perform as required, refer to Section VI, Troubleshooting, for possible problems. Report any malfunctions or failures on DA Form 2404, or refer to DA Pam 738-750.

e. Notify direct support maintenance for any removal of assemblies or equipment required in order to perform PMCS.

f. Not Fully Mission Capable If column tells you when and why you or equipment cannot be used. The term mission capable means that equipment is on hand and is able to perform its combat missions (see AR 700-138).

g. The item number column shall be used as a source of item numbers for the TM Number column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.

Table 4-1. Organizational Preventive Maintenance Checks and Services

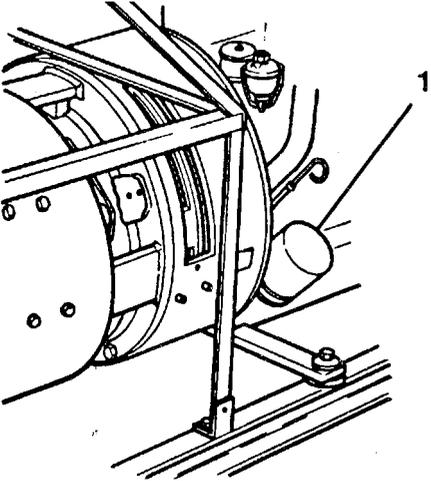
ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
1	Semiannually	Fire Extinguisher	TRUCK-MOUNTED CONTACT MAINTENANCE SHOP EQUIPMENT Recharge, reset, and reseal as required.	
2	Semiannually	M11 Decon Apparatus	See TM 3-4230-204-12&P for PMCS procedures ARC WELDING MACHINE ENGINE 	

Table 4-1. Organizational Preventive Maintenance Checks and Services (cont)

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF
3	Every 100 hours of operation or every 3 months, whichever comes first	Oil and Filter	Change oil and filter (1) every 100 hours of operation or every 3 months, whichever comes first. Change more frequently if operating in dusty conditions.	Oil and filter change schedule is not followed.
4	Semiannually	Crankcase Breather and PCV Vent valve	<p>a. Clean breather hose (p. 4-10) with wiping rag (item 4, app D). Replace breather hose if cut, cracked, or hardened.</p> <p>b. Clean PCV vent valve in solvent (item 3, appx D) and inspect for normal operation (p. 4-10). Replace if unserviceable.</p>	Breather hose is cut, cracked, or hardened. PCV vent valve is clogged and/or inoperative.
5	Semiannually; more frequently under dusty conditions	Carburetor	Inspect for gum, varnish, or other deposits in carburetor, especially throat area. Check that linkage moves freely. If necessary, remove and clean carburetor's metal parts in cleaning solvent (item 3, appx D) and air dry each part. Check and adjust idle speed (p. 4-4). If engine will not maintain smooth idle or if there are symptoms of too rich or too lean fuel mixture, repair carburetor as required (p. 4-4).	Engine cannot be adjusted to have a smooth idle and/or if there are symptoms of too rich or too lean fuel mixture at any operating speed.
6	Semiannually or any time there is an odor of gasoline	Fuel System	<p>Inspect fuel pump, strainer, lines, and fittings for cracks, leaks, or any other damage. Repair fuel strainer as necessary (p. 4-3). Forward defective fuel pump to direct support maintenance for repair.</p> <p style="text-align: center;">WARNING</p> <p>A short between battery positive terminal and chassis metal components could cause injury to personnel. To avoid this, disconnect battery negative cable first.</p>	Fuel is leaking from fuel system or if the engine shows symptoms of fuel starvation.

Table 4-1. Organizational Preventive Maintenance Checks and Services (cont)

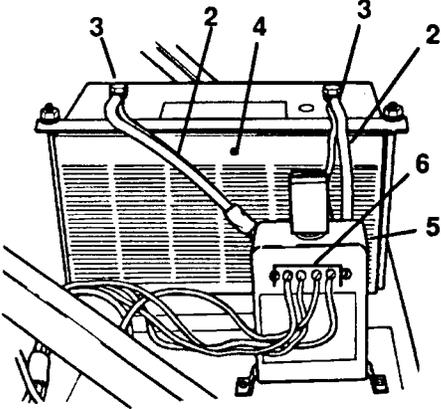
ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
7	Semiannually	Battery	<p>ARC WELDING MACHINE ENGINE (CONT)</p>  <p>a. Disconnect battery cables (2) from battery posts (3). Clean posts and cable terminals with stiff-bristle brush. Reattach cable (2) terminals to posts (3) and coat exposed areas of terminals and posts with a thin coat of grease (item 2, appx D) to stop future corrosion. Wipe off battery case (4) with a wiping rag (item 4, appx D).</p> <p>b. Recharge battery as needed. If battery case is leaking or battery will not hold a charge, replace.</p>	<p>Battery cable connections are loose or corroded.</p> <p>Battery case is leaking or if battery will not stay charged.</p>
		Overspeed Safety Switch	<p>Clean off overspeed safety switch (5) with wiping rag (item 4, appx D) and inspect for loose or corroded terminals (6). Remove any corrosion using extra-fine sandpaper. Tighten loose connections.</p>	<p>Overspeed safety switch terminals are loose or corroded.</p>
		Spark Plugs	<p>Remove and inspect spark plugs (p. 4-4) and service as necessary. Replace spark plug if insulators are cracked or broken, if plug is misfiring, or if electrodes are burned back so that plug cannot be properly gapped.</p>	<p>One or more spark plugs are unserviceable or if one or more cylinders are misfiring due to the spark plugs.</p>

Table 4-1. Organizational Preventive Maintenance Checks and Services (cont)

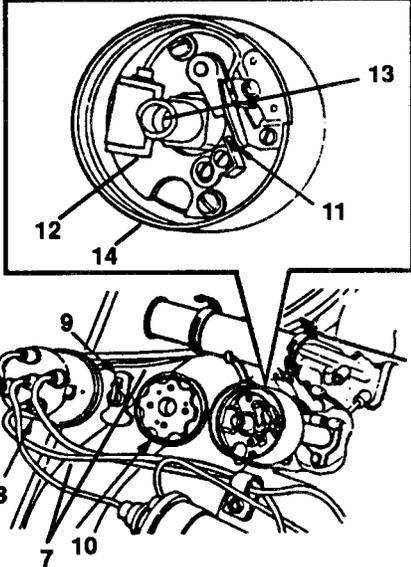
ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
10	Semiannually or every 500 hours of operation, whichever comes first	Spark Plug and Coil Wires	 <p>Note engine firing order and disconnect spark plug and coil wires (7). Clean wires with wiping rag (item 4, appx D). Inspect wires and boots for deep cracks or cuts in insulation or for lack of continuity in wire and replace as necessary.</p>	Spark plug wires are faulty or engine is misfiring due to the spark plug or coil wires.
11	Semiannually or every 500 hours of operation, whichever comes first	Distributor Cap and Rotor	Remove and inspect distributor cap (8) and rotor (9) for carbon tracks. Clean with wiping rag (item 4, appx D). Check for cracks and breaks in plastic and for burned or corroded terminals and contacts. Remove burned spots or corrosion with extra-fine sandpaper. Replace distributor cap and/or rotor if cracked or broken or if terminals or contacts are burned back too far.	Cap or rotor are cracked, if terminals or contacts are burned back too far, or if engine is misfiring due to faulty cap or rotor.
12	Quarterly or every 250 hours of operation, whichever comes first	Breaker Points and Condenser	Remove distributor cap (8), rotor (9) and advance arm clamp screw (10) and check breaker points (11) for burned or pitted contacts and worn cam follower. File faces of points to remove burned spots and pitting. If point faces are excessively burned/pitted or cam follower is worn down too far, replace points (condenser (12) should be-replaced at the same time as the breaker points).	Breaker points are burned back so that correct point gap cannot be set, if cam follower is worn down too far, or if engine is misfiring due to faulty breaker points or condenser.

Table 3-2. Operator/Crew Preventive Maintenance Checks and Services (cont)

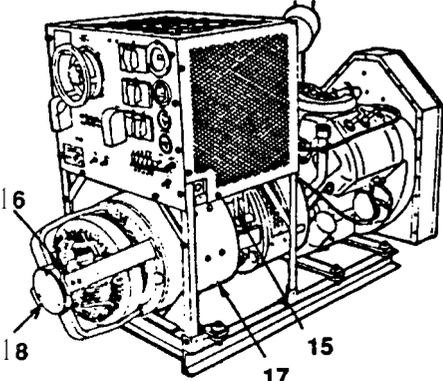
ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
13	Quarterly or every 250 hours, whichever comes first	Cam Sleeve	<p>ARC WELDING MACHINE ENGINE (cont)</p> <p>Apply 2 drops of oil (item 1, appx D) to the felt (13) in the top of the cam sleeve.</p>	Lubrication schedule is not followed.
14	Quarterly or every 250 hours, whichever comes first	Distributor Base	Apply 2 drops of oil (item 1, appx D) to the oiler (14) at the side of the distributor base.	Lubrication schedule is not followed.
15	Semiannually, more frequently under dusty conditions	Air Cooling System Shrouds	Remove air cooling system shrouds (p. 4-12). Inspect air shrouds for dents, cracks, or missing hardware. Clean out any dirt and debris from shrouds and cylinder head fins. Replace any missing hardware. Notify direct support maintenance to pound out any large dents.	Air cooling system shrouds are cracked, have large enough dents or contain debris that would impede air circulation, or if any attaching hardware is stripped or missing.
16	Semiannually	High Temperature Safety Switch	Check high temperature safety switch (p. 2-3) and wiring for shorts, frayed insulation, and loose or corroded connections. Remove corrosion with extra fine sandpaper and tighten any loose connections. Notify direct support maintenance if high temperature safety switch is inoperative.	High temperature safety switch is inoperative.
			<p>ARC WELDING MACHINE POWER UNIT</p> 	

Table 4-1. Organizational Preventive Maintenance Checks and Services (cont)

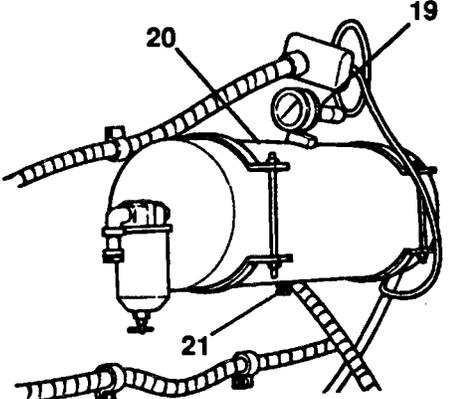
ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE III.
17	Annually	Electrical Brushes	Remove and inspect generator-welder brushes (15) (p. 4-20) and auxiliary generator brushes (16) (p. 4-22) for wear and damage. If they are damaged or are worn unevenly, or if generator-welder brushes are shorter than 7/8 in. (2.22 cm), or if auxiliary generator brushes are shorter than 7/16 in. (1.11 cm), they should be repaired or replaced as required (pp. 4-20 and 4-22).	Brushes and damaged or worn beyond limits
18	Annually	Interior Components and End Bearing	Remove end cover housing (p. 4-21) and inspect for internal accumulation of moisture in generator housing (17). Blow out generator windings with not over 125 psi (172.38 kPa) of dry compressed air. Inspect generator housing for worn end bearing (18) and loose mountings (p. 4-21). Tighten any loose mountings and notify direct support maintenance to repair as required. CONTROL PANEL ASSEMBLY	Mountings are loose or end bearing is worn.
19	Semiannually	Gages	Check that all gages (p. 4-12) are securely mounted. Tighten any loose mounting hardware and replace any missing mounting hardware. Check for loose or corroded connections. Clean any corroded connections with extra-free sandpaper and tighten any loose connections. AIR COMPRESSOR ASSEMBLY 	Gages are loose or mounting hardware is missing, or if connections are loose or corroded.

Table 4-1. Organizational 'Preventive Maintenance Checks and Services (cont)

ITEM NO.	INTERVAL	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
			WARNING	
20	Semiannually	Pop-off Valve	Bleed air system of pressure before servicing. Clean pop-off valve (19) with a clean wiping rag (item 4, appx D) dampened with solvent (item 3, appx D). Replace pop-off valve if defective.	Pop-off valve is inoperative
21	Semiannually	Air Receiver Tank	Clear air receiver tank (20) with wiping rag (item 4, appx D) dampened with solvent (item 3, appx D). Replace drain cock (21) if defective.	Drain cock is defective,

Section VI. TROUBLESHOOTING

4-10. GENERAL.

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the shop set. Each malfunction for an individual component, unit or system is followed by a list of tests or inspections which will help you to determine corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions.

If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. This table lists common malfunctions which you may find during the operation or maintenance of the shop set or its components. You should perform the tests/inspections and corrective actions in the order listed.

4-11. TROUBLESHOOTING. Refer to table 4-2 for organizational maintenance troubleshooting.

Section VII. RADIO INTERFERENCE SUPPRESSION

4-12. GENERAL. This section is not applicable to this equipment.

Section VIII. MAINTENANCE OF ENGINE FUEL SYSTEM

4-13. FUEL STRAINER (fig 4-1).

a. General. The fuel strainer is located on the right side of the engine above the oil filler tube. Fuel from the tank is delivered to the fuel strainer, then passes through the sediment bowl and up through the screen, which removes dirt from the fuel.

b. Removal.

- (1) Remove fuel line quick disconnect from fitting on the fuel strainer.
- (2) Remove the fuel strainer sediment bowl.
- (3) Unscrew the strainer body from the connection to the fuel pump.

c. Cleaning and Inspection.

- (1) Wash the removed parts with cleaning solvent and dry thoroughly (app D).
- (2) Inspect sediment bowl for cracks. Replace a defective sediment bowl.
- (3) Check the strainer body for cracks, breaks and bad threads. Replace the strainer body if it is defective or damaged.
- (4) Inspect the filter screen for tears or clogged mesh. Clean the screen or replace if necessary.

d. Installation. Install in reverse order of removal.

Table 4-2. TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	ENGINE
1. ENGINE FAILS TO START	
Step 1. Spark plug insulator wet or dirty. Wipe clean and dry.	
Step 2. Spark plug cracked. Replace spark plug (para 4-16).	
Step 3. Improper ignition timing. Retime the engine (para 4-17).	
Step 4. Starter will not crank the engine. Check electrical connections and wires. If alright, replace starter (para 4-20).	
2. ENGINE MISSES	
Step 1. Ignition wire loose. Tighten all electrical connections.	
Step 2. Fouled spark plug. Clean spark plugs and adjust gap (para 4-16).	
Step 3. Distributor breaker points pitted or worn. Replace distributor breaker points (para 4-17).	
3. ENGINE LACKS POWER	
Step 1. Improper ignition timing. Retime the engine.	
Step 2. Carburetor out of adjustment. Adjust carburetor (para 4-15).	
Step 3. Carburetor choke not opening. Check and adjust choke control (para 4-15e).	
Step 4. Carburetor clogged. Clean carburetor (4-15b and c).	
4. ENGINE BACKFIRES	
Step 1. Water or dirt in gasoline. Clean fuel tank, lines, and fuel strainer.	
Step 2. Engine cold. Choke engine for cold weather starting.	
Step 3. Spark plugs too hot. Replace spark plugs (para 4-16).	
	AIR COMPRESSOR
1. AIR COMPRESSOR AIR PRESSURE LOW	
Electric pressure switch defective or out of adjustment. Adjust or replace switch (para 4-39).	
2. AIR COMPRESSOR AIR PRESSURE TOO HIGH	
Electric pressure switch defective or out of adjustment. Adjust or replace switch (para 4-39).	

4-14. FUEL PUMP (fig 4-1).

a. General The fuel pump is a diaphragm type and is actuated by an eccentric on the camshaft.

b. Removal

- (1) Remove the fuel strainer (para 4-13 b).
- (2) Disconnect the fuel line to the carburetor.
- (3) Remove the two bolts and two lockwashers that secure the fuel pump to the adapter and remove

the fuel pump and gasket.

(4) Remove the two bolts and two lockwashers that secure the adapter to the crankcase.

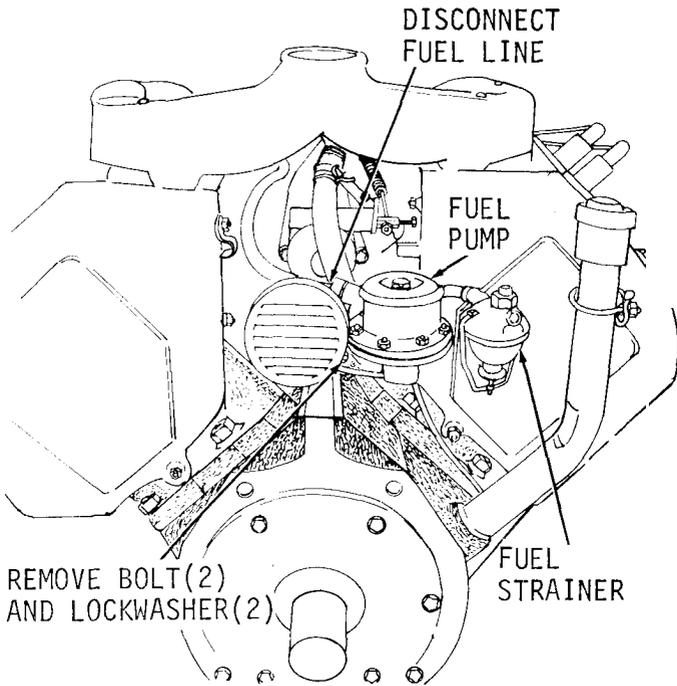
c. Cleaning and Installation.

(1) Clean all parts in cleaning solvent and dry thoroughly (app D).

(2) Inspect each part for evidence of cracks, breaks, or other visible damage.

(3) Inspect the fittings and be sure that the fuel lines are not damaged.

d. Installation. Install in reverse order of removal.



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Figure 4-1. Fuel pump, removal and installation.

4-15. CARBURETOR (fig. 4-2).

a. General. The carburetor is a float type with idle fuel adjustment. The carburetor is designed with 2 major units — a die cast aluminum throttle body and a stamped steel fuel bowl.

b. Removal.

- (1) Disconnect choke control wire.
- (2) Disconnect governor spring.
- (3) Remove air cleaner hose.
- (4) Disconnect fuel line at fuel pump.

- (5) Remove PCV valve.
- (6) Remove two bolts and two lockwashers that secure carburetor and gasket to the engine intake manifold. Remove carburetor and gasket.

c. Cleaning and Inspection.

(1) Clean all metal parts in cleaning solvent and dry each part thoroughly (app D).

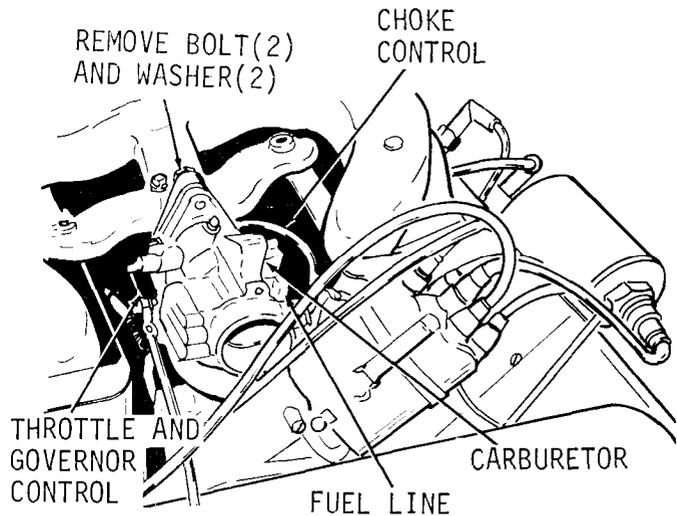
(2) Blow out all passages in the throttle body and fuel bowl with clean dry compressed air. Reverse the flow of air in the passages to insure that all dirt has been removed. Make sure that all carbon deposits and foreign matter have been removed from the throttle bore and idle port.

d. Installation. Install in reverse order of removal.

e. Carburetor Adjustments. Start the engine and let it run until it reaches operating temperature. Turn idle adjusting screw out until engine falters; slowly turn in the screw until the engine runs smoothly. Stop the engine. The idle adjusting screw should be in proper adjustment at about 3/4 to a full turn open.

NOTE

Hook governor spring in hole no. 7 of governor lever.



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Figure 4-2. Carburetor, removal and installation.

f. Choke Adjustment.

- (1) Loosen adjusting screw on butterfly arm.
- (2) Be sure choke control is pushed all the way in.
- (3) Hold butterfly in the full open position and tighten adjusting screw on butterfly arm.

Section IX. MAINTENANCE OF IGNITION COMPONENTS

4-16. SPARK PLUGS.

a. Removal. Disconnect the cable assembly from the spark plugs. Clean out the spark plug wells in the cylinder heads and remove the spark plugs with the spark plug wrench.

b. Cleaning and Inspection.

- (1) Wipe the exterior of the spark plugs clean with a cloth dampened with cleaning solvent.
- (2) Examine the firing ends of the plugs noting the type of deposit. Wet, sludgy deposits indicate ex-

cessive clearance between the valve guides and stems, or that excessive amounts of oil are entering the combustion; check the distributor and spark plug cables for defects that could result in too inadequate a spark. Burned or overheated plugs are indicated by a burnt or badly eroded electrode. Check the air shrouds and cooling fins for causes of engine overheating. A rusty brown or grayish white powdery deposit when unleaded or regular gasolines have been used is normal. Clean deposits from the electrodes. Use a wire brush to clean the threads.

(3) Examine the spark plug electrode for pitting. Replace a badly pitted spark plug.

(4) Set the gap of spark plugs to 0.030 inch.

c. Installation. Install spark plug and gasket in the spark plug hole and tighten. Torque the spark plugs 25-30 lbs. ft. Connect the spark plug cables.

4-17. DISTRIBUTOR ASSEMBLY (fig 4-3).

a. Removal.

(1) Remove eight bolts and eight nuts and remove false panel (compartment 1).

(2) Loosen hose clamp on carburetor air intake.

(3) Remove eight bolts and eight lockwashers securing screen and air intake duct. Remove flywheel shroud screen, air intake duct and carburetor air inlet hose.

(4) Disconnect spark plug and ignition coil wires.

(5) Disconnect coil and high temperatures safety switch wires from the primary terminal.

(6) Loosen screw on advance arm lock and remove distributor assembly.

b. Cleaning and Inspection.

(1) Clean the exterior of the distributor assembly with a cloth dampened in cleaning solvent (app D).

(2) Inspect distributor for cracks or other defects and replace defective parts.

(3) Remove distributor cap and inspect rotor for cracks or other defects. Inspect for burned or pitted points.

c. Installation. Install in reverse order of removal.

d. Distributor Timing.

(1) Remove screen over the flywheel air intake opening. This will expose the timing marks on flywheel shroud and the vane on the flywheel, marked by an "X" and the letters "DC" (fig 4-4).

WARNING

Operation of the engine without the screen in place, exposes the operator to moving flywheel vanes which can, if contacted, cause serious injury or death.

(2) Remove the spark plug from no. 1 cylinder and turn engine over slowly, at the same time hold finger over the spark plug hole to determine the compression stroke (para 6-12 a).

(3) Upon reaching the compression stroke, con-

tinue turning until the leading edge of the marked vane on the flywheel is in line with the centerline mark on the flywheel shroud of the no. 1 cylinder (fig 4-4). The no. 1 piston is on top dead center in this position. Replace distributor.

(4) Remove the distributor cap. The centerline of the distributor rotor should be in line with the center of the notch in the distributor housing. The no. 1 cylinder is ready to fire in the retarded timing position, when the distributor rotor is in this position.

(5) With the advance arm clamp screw loose, turn the distributor body slightly in a counterclockwise rotation so that the breaker points are firmly closed. Then turn the distributor body in a clockwise rotation until the breaker points are just beginning to open. At this point a slight resistance can be felt. Tighten advance arm clamp screw.

(6) The breaker point gap should be 0.018 to 0.022 inch. This should be checked before the distributor body is set, otherwise any adjustment made to the breaker point opening will change the ignition advance. Replace the distributor cap. If care is exercised in the above operations, the spark timing should be accurate enough for satisfactory operation, checking spark advance with a neon lamp is recommended.

e. Neon Lamp Timing.

CAUTION

Do not exceed 2200 rpm when generator-welder is hooked to the engine.

NOTE

The engine should be timed to the 23° advanced position at not less than 2000 rpm.

(1) Connect neon timing light in series with the no. 1 spark plug.

(2) Chalk or point the end of the "X" marked vane on the flywheel.

(3) With the engine operating at 2000 rpm or over, allow the flash from the neon lamp to illuminate the marked vane. At the time of the flash, the leading edge of the vane should line up with the running spark advance timing hole on the flywheel shroud (fig 4-4). If it does not line up, loosen the advance arm clamp screw, turn the distributor body slightly clockwise or counterclockwise, as required, until the marked flywheel vane matches up with the advance timing hole.

(4) Tighten the advance arm clamp.

(5) Stop engine.

(6) Install flywheel screen.

NOTE

A 3/8 inch diameter hole is located in the screen rim to check timing without removing screen.

f Distributor Point Gap Adjustment.

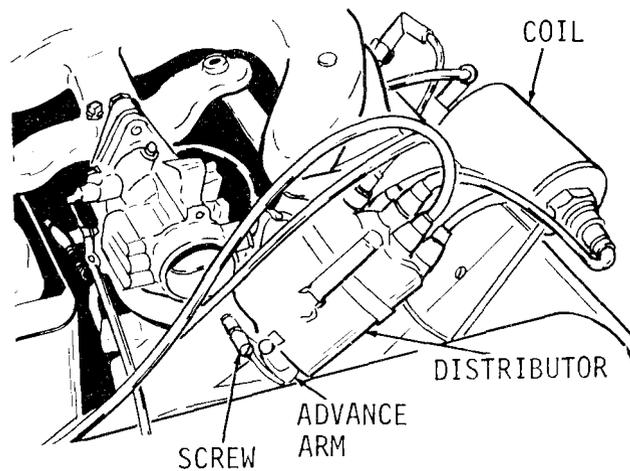
(1) Turn engine over until the distributor breaker arm rubbing block is on a high point of the cam.

(2) Loosen the stationary contact screw.

(3) Turn fixed contact screw in or out, until the

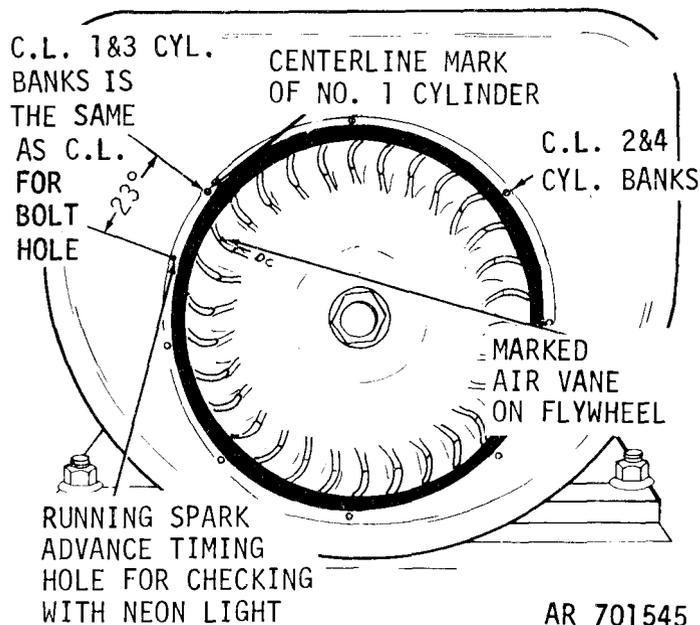
correct gap is obtained. The distributor breaker point gap should be 0.018 to 0.022 inch.

(4) Tighten the stationary contact screw.



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Figure 4-3. Distributor, removal and installation.



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Figure 4-4. Flywheel timing marks.

4-18. IGNITION COIL (fig 4-5).

a. Removal.

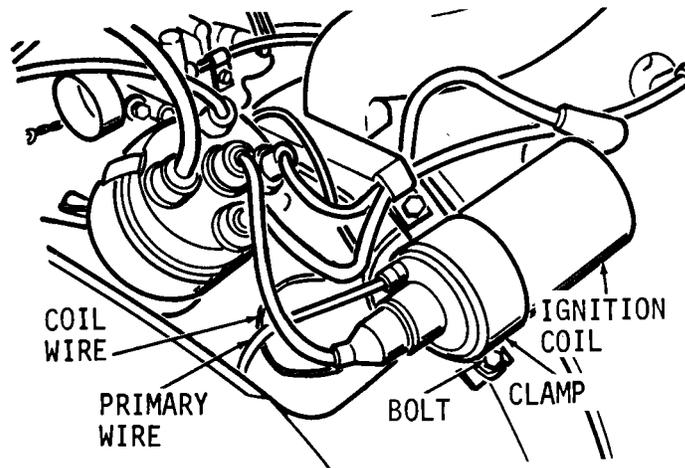
- (1) Disconnect coil wire from distributor.
- (2) Disconnect and tag wires from the two terminals.
- (3) Remove capscrew and washers securing clamp assembly to the cylinder head cover shroud.

(4) Remove ignition coil.

b. Cleaning and Inspection.

- (1) Clean the exterior of the ignition coil with a cloth dampened in cleaning solvent (app D) .
- (2) Inspect the coil for cracks and hose connections . Replace if defective.

c. Installation. Install in reverse order of removal.



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Figure 4-5. Ignition coil removal and installation.

Section X. MAINTENANCE OF ENGINE ELECTRICAL SYSTEM

4-19. BATTERY (fig 4-6).

a. Removal.

(1) Remove protective guard from rear of control panel (para 4-26).

CAUTION

To avoid short, disconnect negative cable first.

(2) Disconnect the battery cables.

(3) Remove two nuts and two lockwashers from hold down bracket bolts. Remove hold down bracket.

CAUTION

Remove the relay from the top of over-

speed safety switch before removing the battery (fig 4-12).

(4) Remove the battery.

b. Cleaning and Inspection.

(1) Clean all corrosion from the battery terminals and case, with a wire brush.

(2) Inspect the battery case for cracks and the terminals for loose mounting.

(3) When battery cables are installed, coat exposed areas of the terminals with a thin coat of grease to prevent corrosion (app D).

c. *Installation.* Install in reverse order of removal.

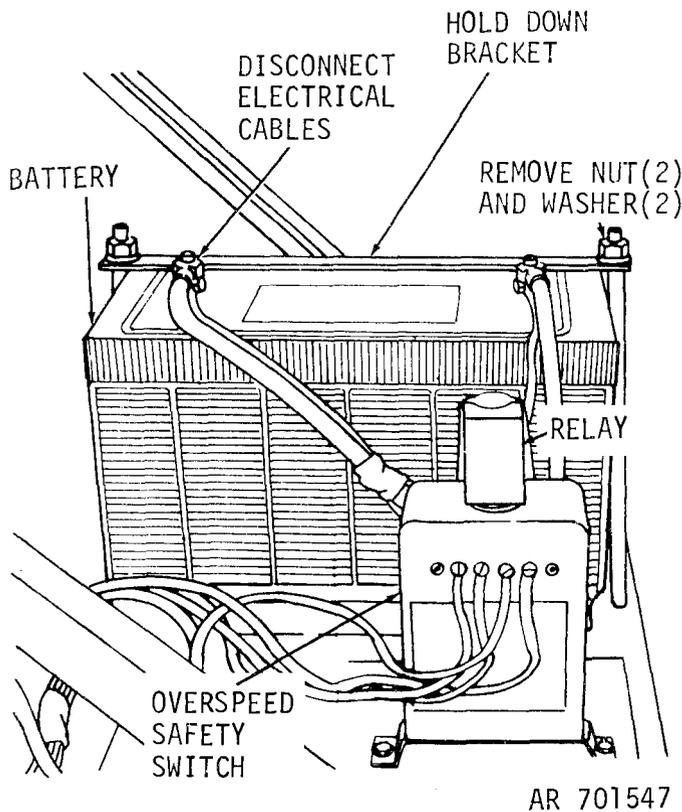


Figure 4-6. Battery removal and installation.

4-20. STARTER (fig 4-7).

CAUTION

Disconnect battery cables before removing starter.

a. *General.* Before removing restarter, the engine must be removed. Slide the engine out compartment door one (Ref., fig E-1) by using the following procedure.

- (1) Loosen nine bolts and remove guard from rear of control panel.
- (2) Disconnect tag and electrical leads.
- (3). Remove conduit brackets from control panel base'.
- (4) Remove three capscrews and three lockwashers securing the hose rack and remove (curbside door).
- (5). Remove acetylene tank and bracket.
- (6) Remove eight bolts and eight nuts and remove false panel.
- (7). Remove three bolts and three nuts from upper and lower flange. Remove exhaust pipe.
- (8) Disconnect fuel line quick disconnect at fuel strainer.
- (9) Remove two bolts and two tapered washers from rail below control panel.

(10) Remove two bolts and two tapered washers from rail below front of engine.

(11) Remove safety block from rear rail below control panel.

(12) Remove two safety blocks from rail below front of engine.

(13) Slide generator-welder engine out of compartment until assembly reaches stop.

b. Removal.

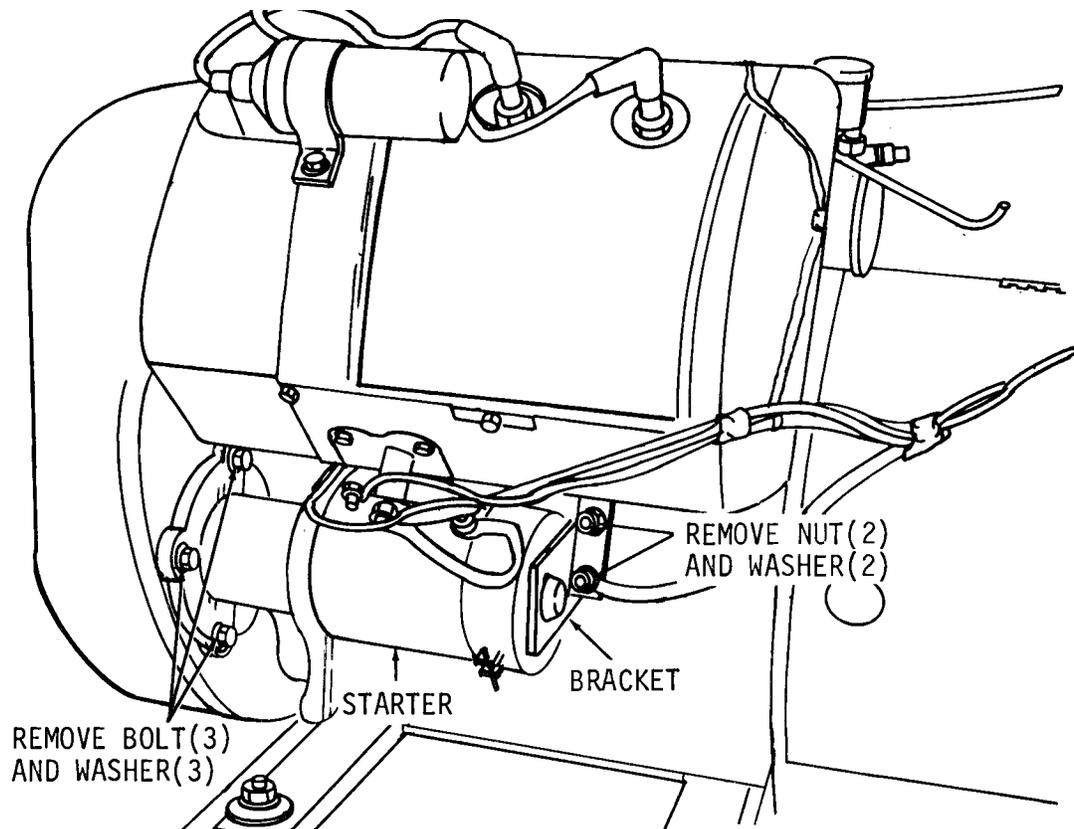
- (1) Disconnect and tag starter electrical leads.
- (2) Remove two nuts and two lockwashers from the starter support bracket and remove bracket.
- (3) Remove three bolts and three lockwashers securing starter to the flywheel shroud.
- (4) Remove the starter.

c. Cleaning and Inspection.

- (1) Clean the outside of the starter housing with a cloth dampened with cleaning solvent (app D).
- (2) Inspect housing for cracks and other damage.

d. Installation.

- (1) Install starter in reverse order of removal.
- (2) Install generator-welder engine assembly in reverse order of removal.
- (3) Reconnect battery terminals.



NOTE : TAG AND DISCONNECT ELECTRICAL WIRING

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Figure 4-7. Starter, removal and installation.

Section XI. MAINTENANCE OF ENGINE LUBRICATION SYSTEM

4-21. OIL FILTER ASSEMBLY (fig 4-8).

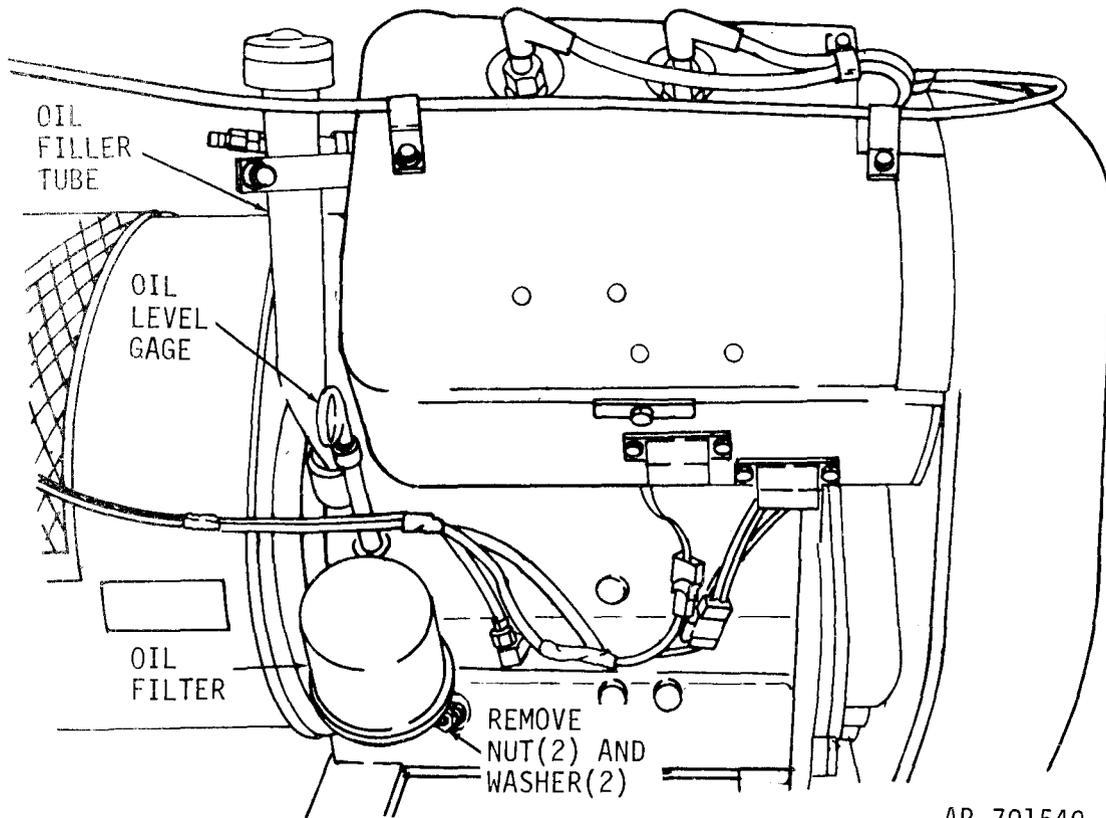
a. Removal.

- (1) Remove oil filter cartridge.
- (2) Remove two nuts and two lockwashers securing oil filter base to the crankcase.
- (3) Remove oil filter base and gasket.

b. Cleaning and Inspection.

- (1) Clean base with solvent and dry thoroughly (app D).
- (2) Inspect base for cracks and other damage.

- #### c. Installation.
- Install in reverse order of removal. Use a new gasket.



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Figure 4-8. Oil filter assembly, removal and installation.

4-22. PCV SYSTEM.

a. *General.* The system is a semi-closed system consisting of a valve and filter. Under full load conditions the system admits engine by-pass gases to the atmosphere through the air inlet filter housing.

b. *Removal* (fig 4-9).

(1) Remove two hose clamps from the breather hose and remove the breather hose from the valve and cover assembly.

(2) Remove the PCV valve from the intake manifold.

(3) Remove cover and filter element from the breather assembly.

(4) Remove two screws and lockwasher securing the breather housing to the cover assembly and remove the breather housing.

(5) Remove capscrew and washer securing the cover assembly to no. 3 cylinder. Remove the cover and gasket.

(6) Remove capscrew and washer securing the cover assembly to no. 4 cylinder. Remove the cover and gasket.

c. *Cleaning and Inspection.*

(1) Clean the breather hose and inspect for cracks or deterioration.

(2) Clean cover assemblies with cleaning solvent and dry thoroughly. Inspect for cracks and other damage (app D).

(3) Clean the breather housing with cleaning solvent and dry thoroughly. Inspect the breather housing for cracks and other damage (app D).

(4) Clean the filter element in solvent and dry thoroughly. Inspect element for holes, damage and other defects (app D).

(5) Clean PCV valve in cleaning solvent and dry thoroughly. Inspect for clogging, varnish buildup and other damage (app D).

d. *Installation.* Install in reverse order of removal.

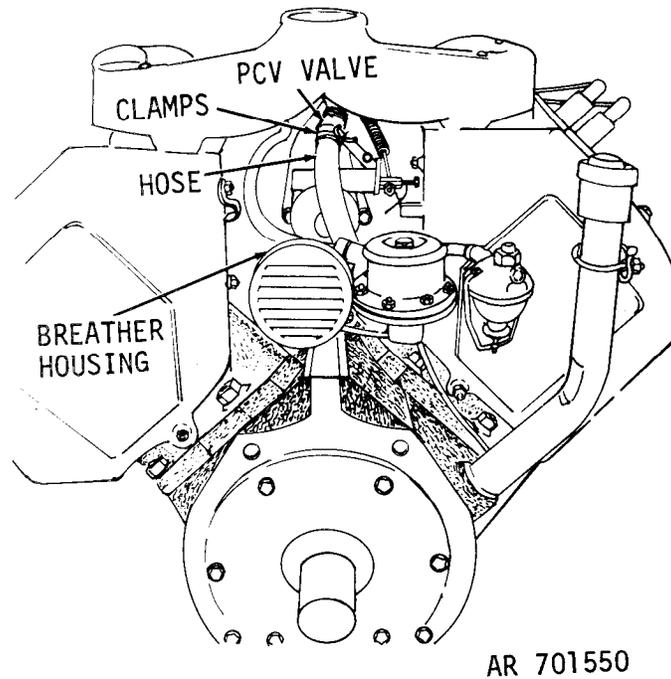


Figure 4-9. PCV valve and filter, removal and installation.

Section XII. MAINTENANCE OF ENGINE GOVERNOR

4-23. GOVERNOR ASSEMBLY (fig 4-10).

a. Removal.

- (1) Remove distributor assembly (para 4-17).
- (2) Disconnect governor oil line.
- (3) Disconnect governor linkage.
- (4) Remove carburetor (para 4-15).
- (5) Remove four bolts and four lockwashers securing governor to the gear housing.
- (6) Remove the governor and gasket from the gear housing.

b. Cleaning and Inspection.

- (1) Clean exterior of the governor with solvent and dry thoroughly (app D).
- (2) Inspect the governor gear for cracked or chipped teeth. Replace a defective gear.

- (3) Inspect the governor housing for cracks, damage or other defects.

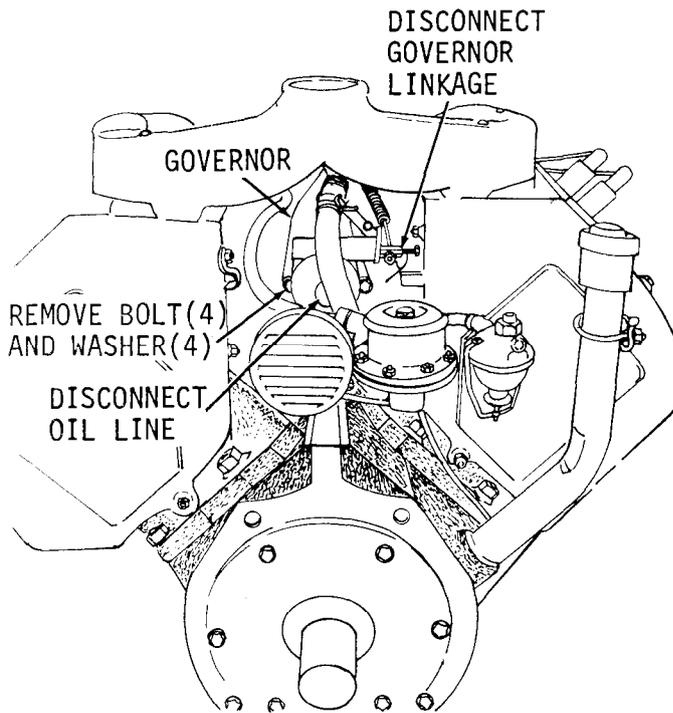
c. Installation. Install in reverse order of removal.

NOTE

Hook governor spring in hole no. 7 of governor lever.

d. Adjustment.

- (1) Start engine, let engine run until it reaches normal operating temperature.
- (2) Push throttle to full IN position.
- (3) Using mechanical tachometer set rpm by turning adjusting nut on the governor control rod until a reading of 1800 to 1860 rpm is obtained.
- (4) Frequency meter reading should read 60 to 62 hertz.



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Figure 4-10. Governor, removal and installation.

Section XIII. MAINTENANCE OF ENGINE AIR COOLING SYSTEM

4-24. DESCRIPTION. A combination fan and Flywheel forces air through the flywheel shroud to circulate around the cylinders and cylinder heads. Air shrouds are provided to direct the flow of air.

CAUTION

Do not operate the engine with any part of the shrouding removed. To do so may cause engine to overheat and be damaged.

4-25. ENGINE AIR SHROUDS.

a. Removal

(1) Cylinder head shrouds.

(a) Disconnect the spark plug cables from the spark plugs.

(1) Remove the screws and lockwashers that secure the spark plug cable clips, the throttle control cable chips, and the screw and lockwashers securing the ignition coil clamp. Remove the remaining screws and

lockwashers, securing the cylinder head shrouds to the flywheel shroud, lower cylinder shrouds, rear shroud covers, cylinder heat deflectors and remove the cylinder head shrouds.

(2) Rear shroud covers.

(a) Remove the screws and lockwashers that secure the rear shroud covers to the cylinder heat deflectors.

(b) Remove the screws and lockwashers that secure the lower cylinder shrouds to the rear shroud covers. Remove the rear shroud covers.

(3) Lower cylinder shrouds.

(a) Remove the starter solenoid.

(b) Remove the rectifier and regulator modules.

(c) Remove the screws and lockwashers that secure each of the lower cylinder shrouds to the flywheel shroud. Remove the lower cylinder shroud.

b. Installation. Install in reverse order of removal.

Section XIV. MAINTENANCE OF CONTROL PANEL AND CUBICLE

4-26. CONTROL PANEL GUARD.

a. Removal Loosen nine bolts and remove the control panel guard.

b. Cleaning and Inspection.

(1) Clean control panel guard with solvent and dry thoroughly (app D).

(2) Inspect control panel guard for holes, dents and cracks. Replace a damaged control panel guard.

c. Installation. Install in reverse order of removal.

4-27. FREQUENCY METER (fig 2-1 and 4-11).

a. Removal.

(1) Disconnect and tag electrical leads.

(2) Remove three screws and remove frequency meter.

b. Cleaning and Inspection.

(1) Clean the frequency meter with a clean, lint-free cloth.

(2) Inspect for damage and for loose terminals. Replace a defective frequency meter.

c. Installation. Install frequency meter in reverse order of removal.

4-28. RUNNING TIME METER (fig 2-1 and 4-11).

a. Removal.

(1) Disconnect and tag electrical leads.

(2) Remove three screws and remove running time meter.

b. Cleaning and Inspection.

(1) Clean the running time meter with a clean, lint-free cloth.

(2) Inspect for damage and loose terminals. Replace a defective running time meter.

c. Installation. Install running time meter in reverse order of removal.

4-29. OIL PRESSURE GAGE (fig 2-1 and 4-11).

a. Removal.

(1) Disconnect oil pressure line from the oil pressure gage.

(2) Remove two nuts and two lockwashers from rear of oil pressure gage.

b. Cleaning and Inspection.

(1) Clean the oil pressure gage with a clean, lint-free cloth.

(2) Inspect for loose fitting and other damage and replace a defective oil pressure gage.

c. Installation. Install oil pressure gage in reverse order of removal.

4-30. BATTERY CHARGING INDICATOR (Ammeter fig 2-1 and 4-11).

a. Removal.

(1) Disconnect and tag electrical leads.

(2) Remove two nuts and two lockwashers and remove battery charging indicator.

b. Cleaning and Inspection.

(1) Clean the battery charging indicator with a clean, lint-free cloth.

(2) Inspect for damage and for loose terminals. Replace a defective battery charging indicator.

c. Installation. Install battery charging indicator in reverse order of removal.

4-31. RECEPTACLES, 115V (fig 2-1 and 4-11).

a. Removal.

(1) Disconnect and tag electrical leads.

(2) Remove receptacle covers.

(3) Remove receptacles.

b. Cleaning and Inspection.

(1) Clean receptacles with a clean, lint-free cloth.

(2) Inspect for loose terminals or damage.

(3) Replace a defective receptacle

c. Installation. Install receptacles in reverse order of removal.

4-32. CIRCUIT BREAKERS, 115V (fig 2-1 and 4-11).

a. Removal.

(1) Disconnect and tag electrical leads.

(2) Remove screws and remove circuit breakers.

b. Cleaning and Inspection.

(1) Clean circuit breaker with a clean, lint-free cloth.

(2) Inspect circuit breakers for cracks, loose terminals and test for continuity across the terminals. Continuity should be indicated with the breaker ON and not indicated with the breaker OFF.

c. Installation. Install circuit breakers in reverse order of removal.

4-33. D.C. AMPERE SELECTOR SWITCH (fig 2-1 and 4-11).

a. Removal.

(1) Disconnect and tag electrical leads.

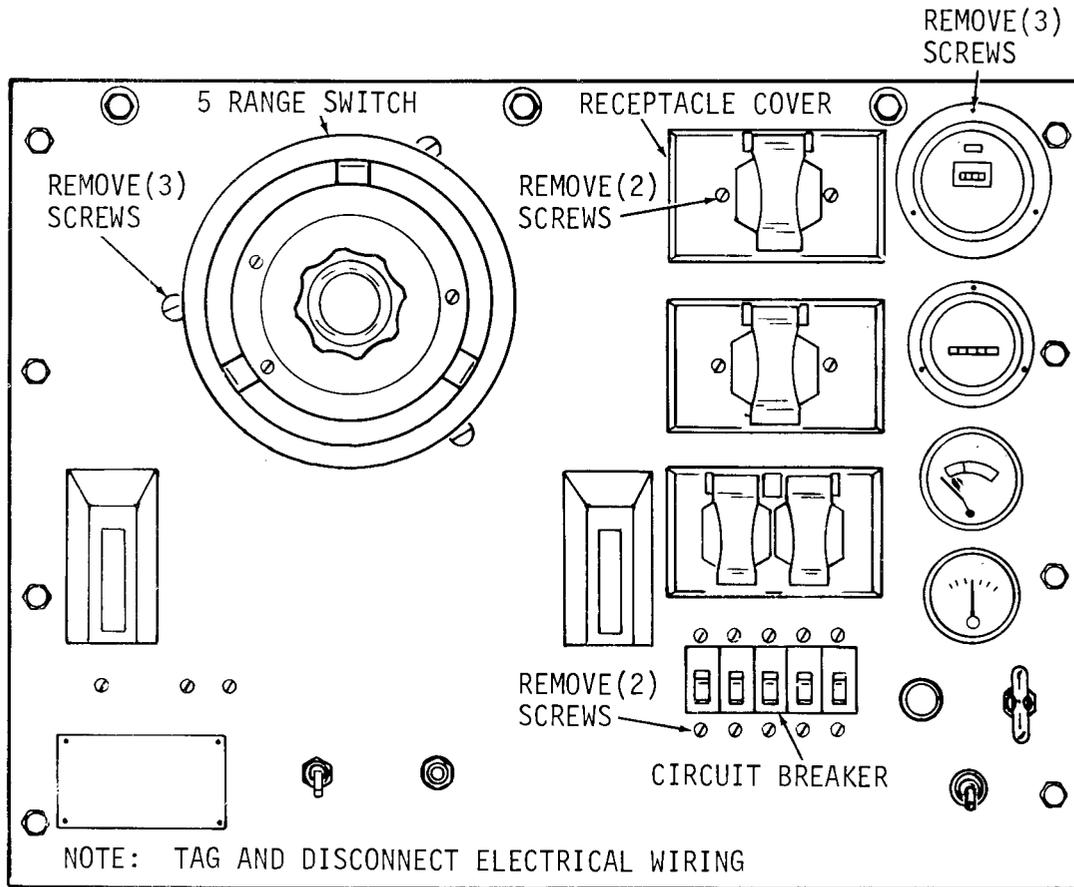
(2) Remove three screws and remove dc ampere selector switch.

b. Cleaning and Inspection.

(1) Clean with a clean, lint-free cloth.

(2) Inspect for broken insulation, burnt insulation, loose terminals and other defects. Replace a defective switch.

c. Installation. Install dc ampere selector switch in reverse order of removal.



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Figure 4-11. Controls and instruments, removal and installation.

4-34. OVERSPEED SAFETY SWITCH (fig 4-6 and 4-12).

a. Removal.

- (1) Disconnect and tag electrical leads.
- (2) Remove two bolts securing overspeed relay switch and remove switch.

b. Cleaning and Inspection.

- (1) Clean with a clean, lint-free cloth.
- (2) Inspect for loose terminals and other defects.

c. Installation. Install overspeed relay in reverse order of removal.

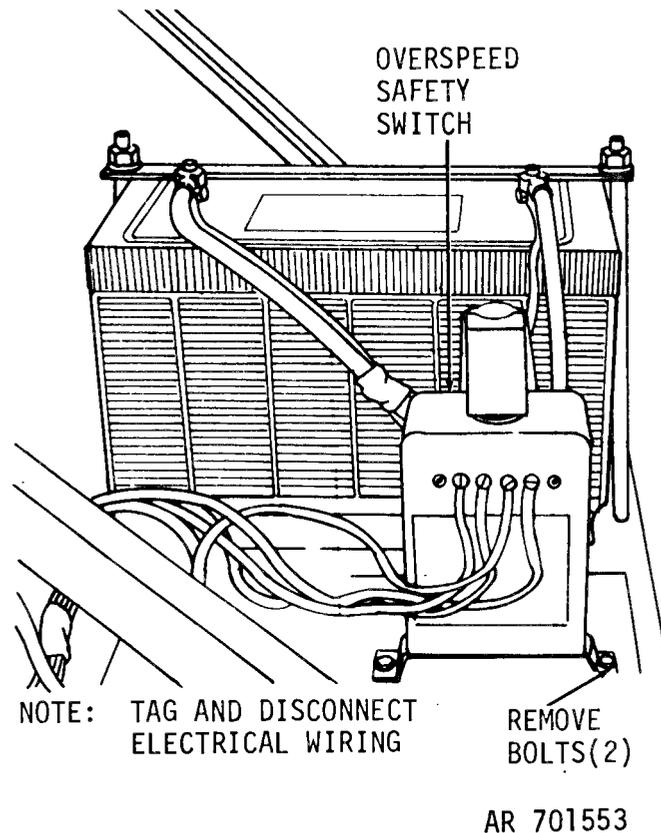


Figure 4-12. Overspeed safety switch, removal and installation.

Section XV. MAINTENANCE OF PNEUMATIC EQUIPMENT

4-35. GENERAL. The single stage air compressor is driven by a 1.5 horsepower motor. The unit delivers an adequate volume of air to the air receiver tank to maintain an air pressure differential of 80 to 100 psi. The air receiver tank pressure gage indicates, at all times, the output of the system and the pressure in the tank. A pop-off valve set at 135 psi prevents the system from being overloaded. A draincock beneath the tank pro-

vides a means of draining the condensation out of the system after the air compressor has been used.

4-36. AIR COMPRESSOR (fig 4-13).

a. Removal. Open draincock and relieve any pressure in system. Remove four bolts and four washers, disconnect air line, tag and disconnect electrical leads.

b. Installation. Install in reverse order of removal. Close the draincock.

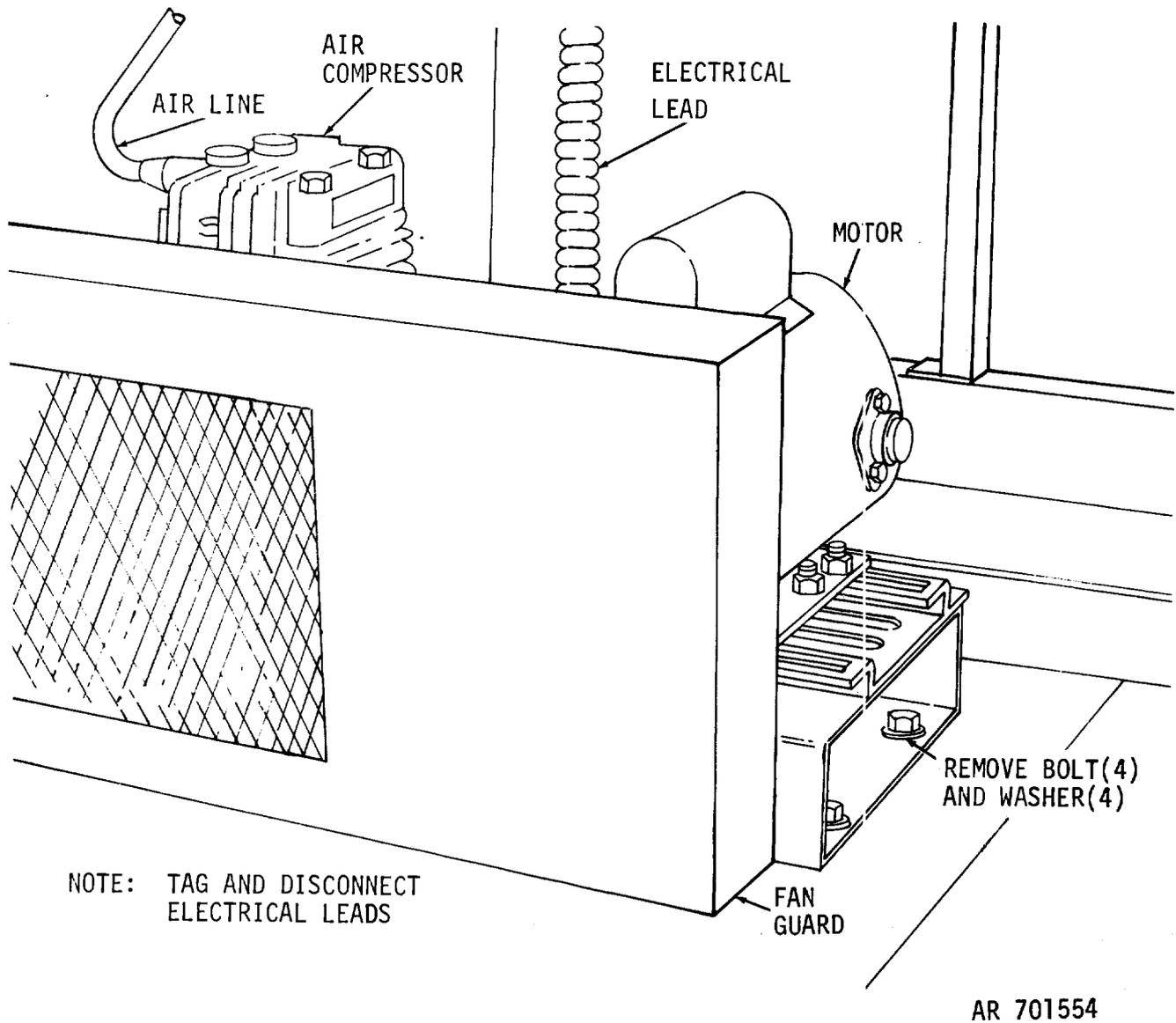


Figure 4-13. Air compressor and drive motor assembly, remove and installation

4-37. V-BELT.

Adjustment.

- a. Remove ten screws and remove fan guard.
- b. Loosen four hold down bolts and nuts and slide the motor on the base to allow the belt a 1/2 inch deflection between pulleys. Tighten the four hold down bolts and nuts.

4-38. AIR COMPRESSOR DRIVE MOTOR.

a. Removal

- (1) Disconnect and tag electrical lead.
- (2) Remove fan guard and V-belt.
- (3) Remove four bolts and nuts and remove drive motor.

b. Installation. Install drive motor in reverse order of removal.

4-39. AIR COMPRESSOR PRESSURE SWITCH.

- a. To increase both CUT-IN and CUT-OUT turn pressure adjusting screw clockwise (fig 4-14).
- b. To increase DIFFERENTIAL and maintain same CUT-IN pressure, turn differential screw at edge clockwise (fig 4-14).

WARNING

Do not block POP- OFF valve,

NOTE

CUT-IN pressure should be set at 80 psi and differential should be set to CUT-OUT at 100 psi.

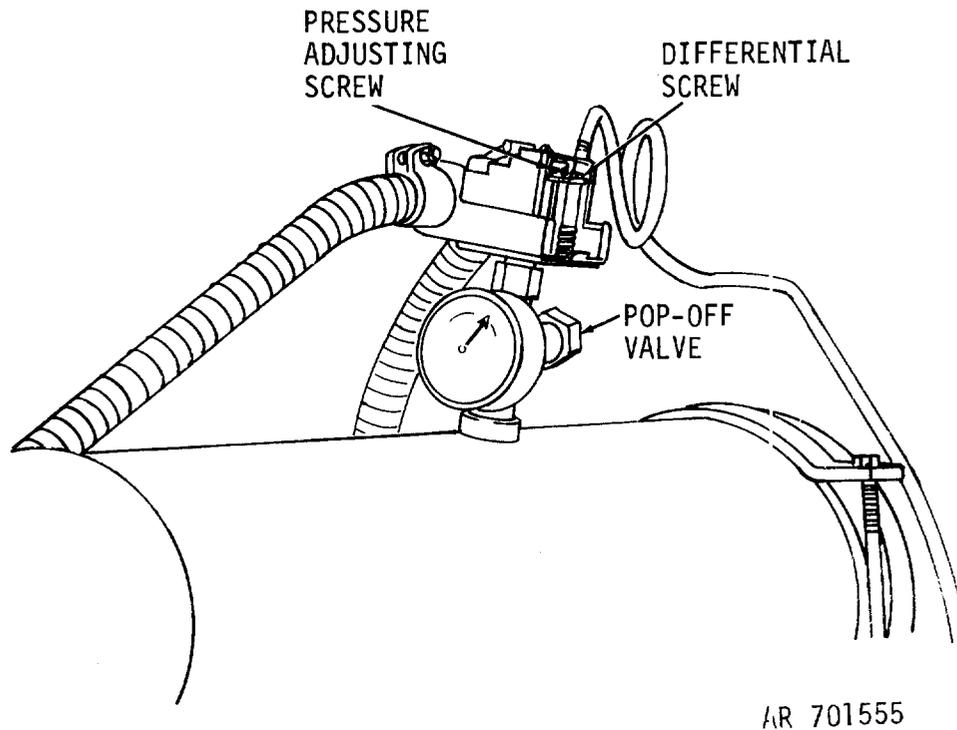


Figure 4-14. Air compressor pressure switch adjustment.

4-40. AIR RECEIVER TANK (fig 4-15).

a. Removal

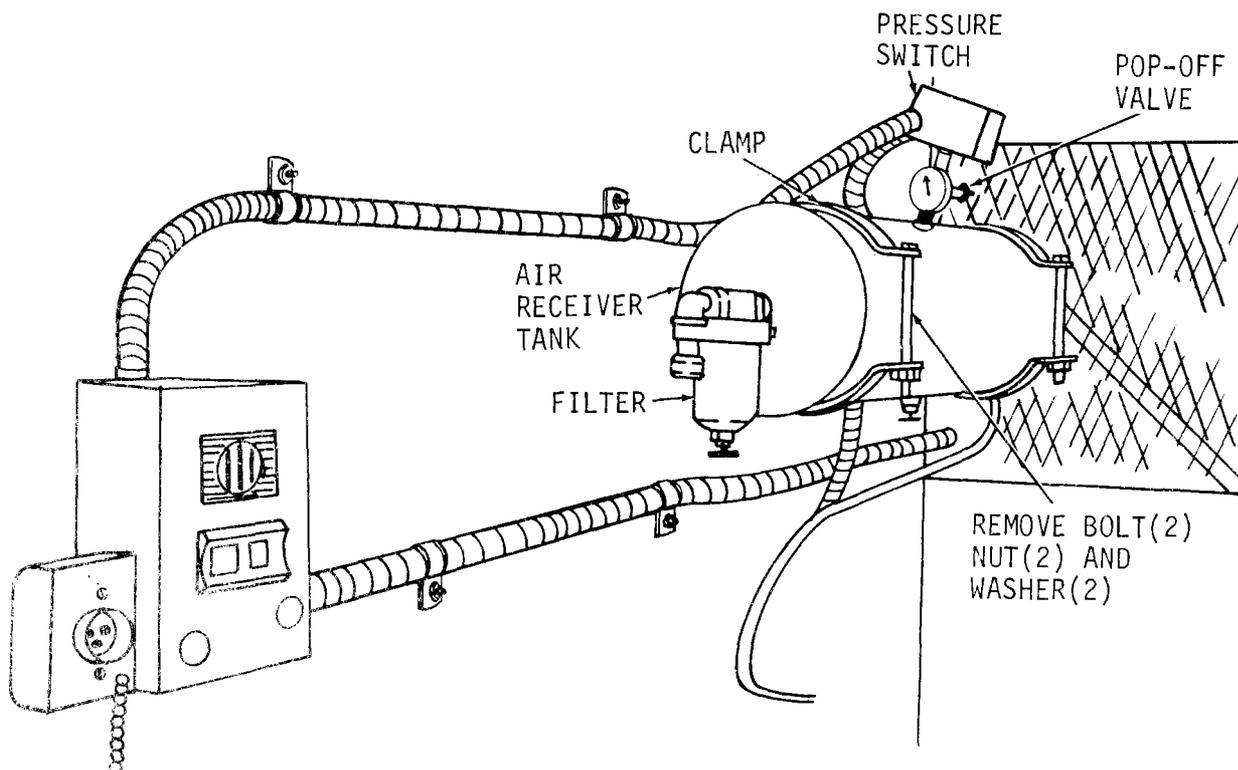
- (1) Bleed air from tank.
- (2) Disconnect and tag electrical leads from pressure switch.
- (3) Disconnect air line from air compressor.
- (4) Remove two bolts, nuts and washers from clamps securing air receiver tank.
- (5) Turn air receiver to clear pressure gage and air

line to clear clamp and slide air receiver tank out.

b. Cleaning and Inspection.

- (1) Clean air receiver with a cloth dampened with leaning solvent (app D).
- (2) Inspect air tank for cracks, dents, damaged fittings and other defects. Replace a defective tank.

c. *Installation.* Install air receiver tank in reverse order of removal.



NOTE: TAG AND DISCONNECT ELECTRICAL WIRING

AR 701556

Figure 4-15. Air receiver tank, pressure gage, and pressure switch, removal and installation.

Section XVI. MAINTENANCE OF ENGINE EXHAUST SYSTEM

4-41. EXHAUST PIPE (fig 4-16).

a. Removal.

- (1) Remove three bolts and three nuts from upper and lower flange connections.
- (2) Remove insulated wrapping from exhaust pipe.

b. cleaning and Inspection.

- (1) Clean exhaust pipe in solvent and dry thoroughly (app D).
- (2) Inspect exhaust pipe for rust, holes and soft spots. Replace if defective.

c. Installation. Install exhaust pipe in reverse order of removal.

4-42. MUFFLER (fig 4-16).

a. Removal.

- (1) Remove insulated wrapping from muffler.
- (2) Remove three bolts and nuts from flange securing muffler to exhaust pipe.
- (3) Loosen clamp securing muffler to pipe nipple. Remove muffler.

b. Cleaning and Inspection.

- (1) Inspect for soft spots by pressing the shell, and for internal deposits of loose rust by shaking the muffler.
- (2) Replace if defective.

c. Installation. Install muffler in reverse order of removal.

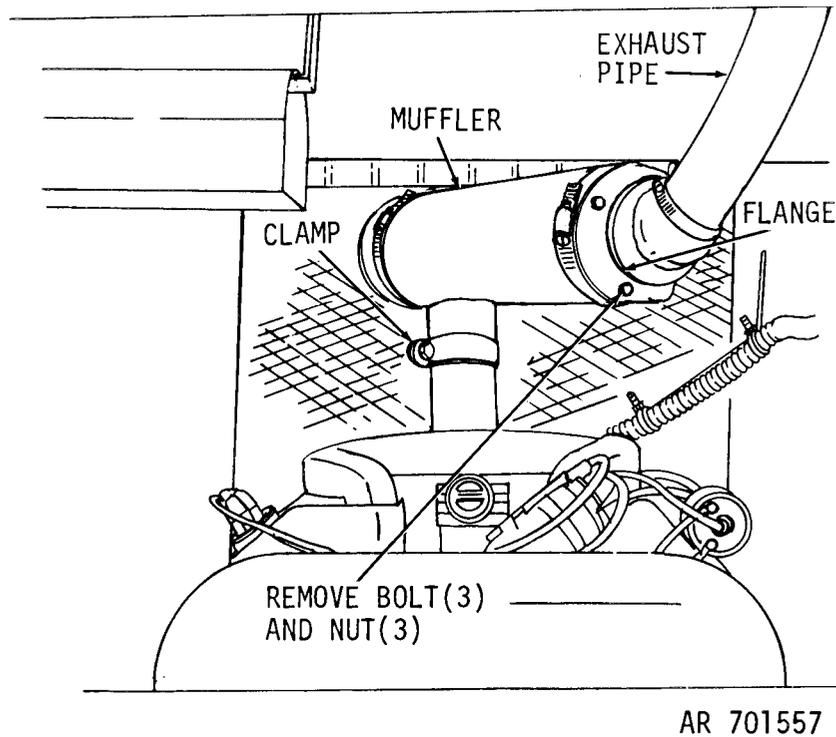


Figure 4-16. Muffler, removal and installation.

Section XVII. MAINTENANCE OF GENERATOR-WELDER

4-43. VENTILATING FAN COVER.

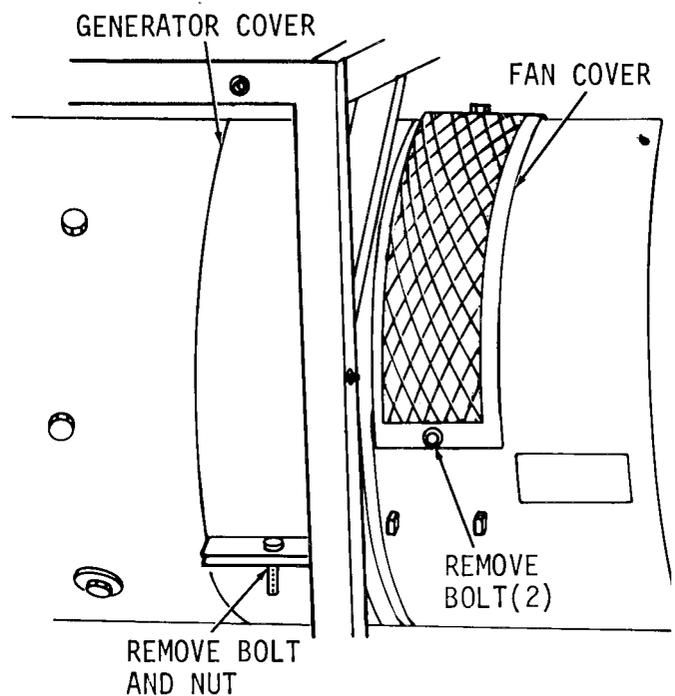
a. *Removal.* Refer to fig 4-17 and remove the fan cover.

b. *Cleaning and Inspection.*

(1) Clean ventilating fan cover with cleaning solvent and dry thoroughly (app D).

(2) Inspect fan cover for cracks, breaks, bends and broken welds. Repair or replace damaged fan cover.

c. *Installation.* Refer to fig 4-17 and install in reverse order of removal.



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Figure 4-17. Fan cover and generator housing cover, removal and installation

4-44. **GENERATOR HOUSING COVER.**

a. Removal. Refer to figure 4-17.

b. Cleaning and Inspection.

(1) Clean cover with solvent and dry thoroughly (app D).

(2) Inspect cover for cracks, bends and dents. Replace a defective cover.

c. Installation. Install in reverse order of removal.

4-45. **GENERATOR-WELDER BRUSHES** (fig 4-18).

a. General. Before removing the generator-welder brushes the engine must be moved. Slide the engine out compartment door five (app E) by using the following procedure.

(1) Loosen nine bolts and remove guard from rear of control panel.

(2) Disconnect and tag electrical leads.

(3) Remove conduit brackets from control panel base.

(4) Remove acetylene tank and bracket.

(5) Remove eight bolts and eight nuts and remove false panel.

(6) Remove three bolts and three nuts from lower flange in exhaust pipe.

(7) Disconnect fuel line quick disconnect at fuel strainer.

(8) Remove two bolts and two tapered washers from rail below control panel.

(9) Remove two bolts and two tapered washers from rail below front of engine.

(10) Remove safety block from rear rail below

engine.

(11) Remove two stop blocks from frame below control panel.

(12) Using pry bar break assembly frame free and slide out compartment door five (app E) until assembly reaches stop.

b. Removal.

(1) Refer to paragraph 4-44 to remove generator housing cover.

(2) Disconnect brush pigtail. Raise brush spring and remove brush. Remove remaining brushes in a similar manner.

c. Cleaning and Inspection.

(1) Remove dirt and dust from brushes and brush holders with low pressure compressed air.

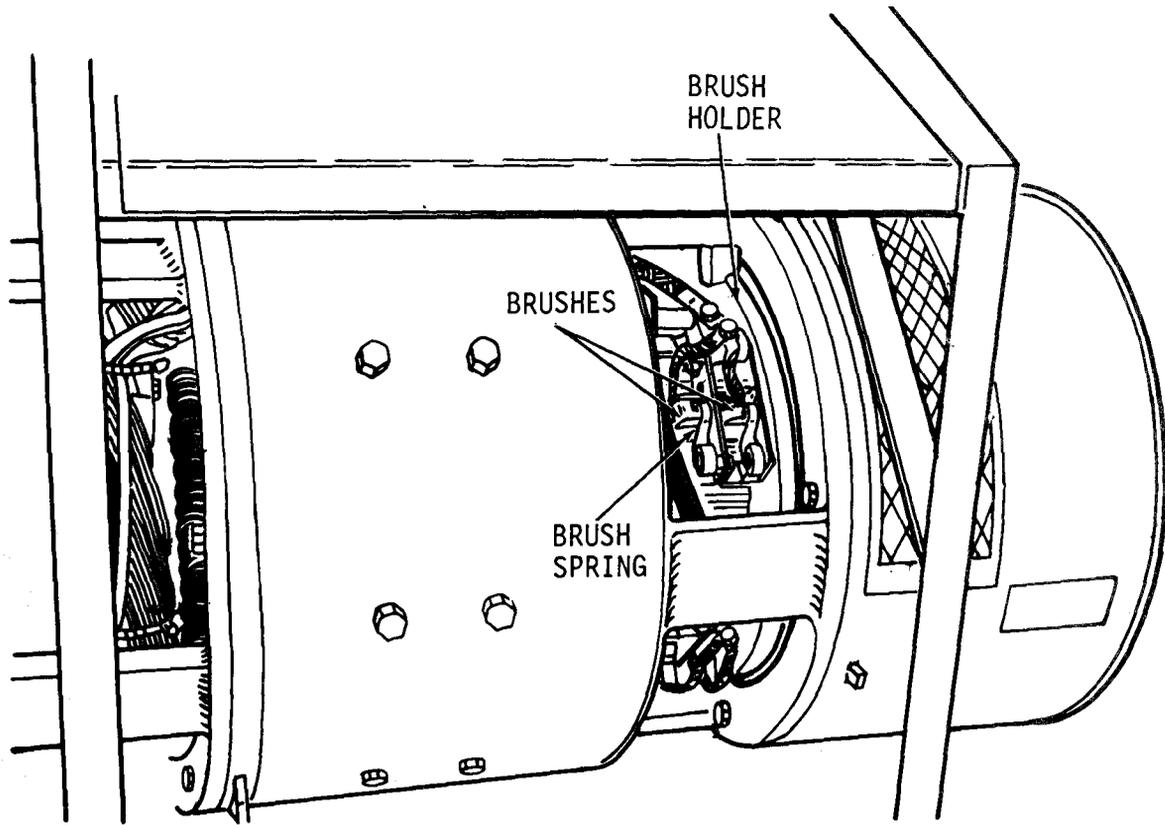
(2) Inspect the brushes for breaks, nicks or damage to the commutator wearing surfaces. Replace worn or damaged brushes.

d. Installation. Install in reverse order of removal. Install housing cover (para 4-44).

CAUTION

Do not use emery cloth for seating brushes. Emery particles will cause short circuits in commutator.

e. Seating Brushes. Seat brushes to contour of the commutator by placing a strip of no. 00 sandpaper between the brushes and commutator with grit side of sandpaper against brushes. Draw sandpaper back and forth until brushes conform to contour of commutator. Remove all loose carbon particles from the commutator with clean, dry, compressed air.



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Figure 4-18. Generator-welder brushes, removal and installation.

4-46. END COVER HOUSING.

a. *Removal* Refer to figure 4-19 and remove end cover housing.

b. *Cleaning and Inspection.*

(1) Clean housing with solvent and dry thoroughly

(app D).

(2) Inspect housing for blockage, dents, cracks and damaged louvers.

c. *Installation.* Install in reverse order of removal.

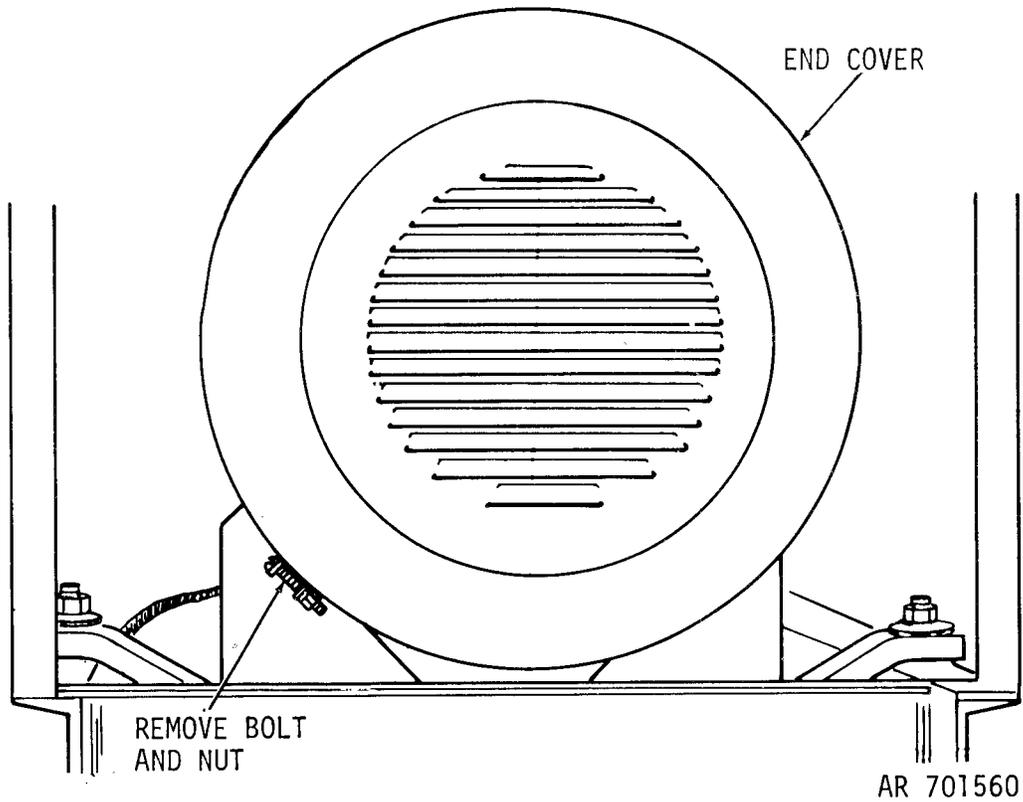


Figure 4-19. End cover housing, removal and installation.

4-47. AUXILIARY GENERATOR BRUSHES (fig 4-20).

a. Removal.

- (1) Disconnect and tag electrical wires.
- (2) Remove end caps and springs and remove brushes.

b. Cleaning and Inspection.

- (1) Remove dirt and dust from brushes and brush holders with low pressure compressed air.
- (2) Inspect the brushes for breaks, nicks or damage to the commutator wearing surface. Replace worn or damaged brushes.

c. Installation. Install in reverse order of removal.

d. Seating Brushes. Refer to paragraph 4-45e.

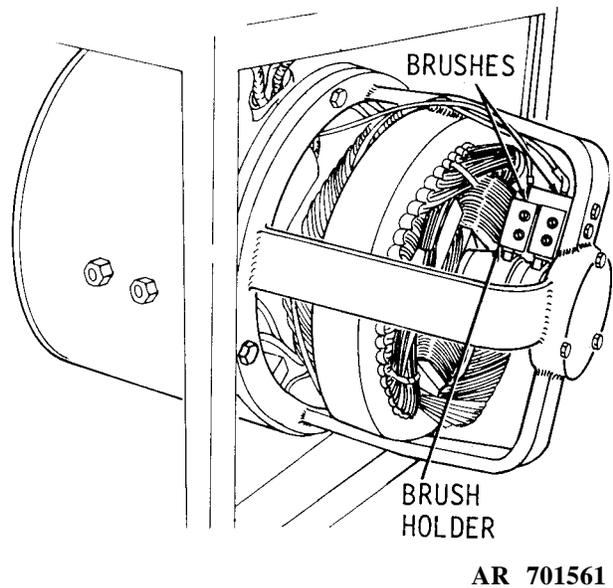


Figure 4-20. Auxiliary generator brushes, removal and installation.

Section XVIII. MAINTENANCE OF SHOP BODY COMPONENTS

4-48. GENERAL. The shop set body is a welded and riveted unit having eight side compartments for tool and equipment storage and a centrally located cargo area to the rear of the generator-welder engine. Hinged doors, fitted with locks, are provided for compartment closure. A hinged door, located in the roof, is provided for air ventilation when operating the engine. A tail-gate, hinged double doors, and roof enclose the generator-welder engine and air compressor. Various doors and compartment fixtures are riveted in place. Any maintenance to be performed to these components will necessitate rivet removal. Be sure to use the correct size and type of rivet when replacing riveted components of the shop set body.

4-49. COMPARTMENT DOORS, ROOF VENT

DOOR, AND REAR DOORS.

NOTE

Left and right side compartment doors are interchangeable.

a Removal. Refer to figure 4-21 for removal of the compartment doors, roof vent door, and rear doors from the shop set body.

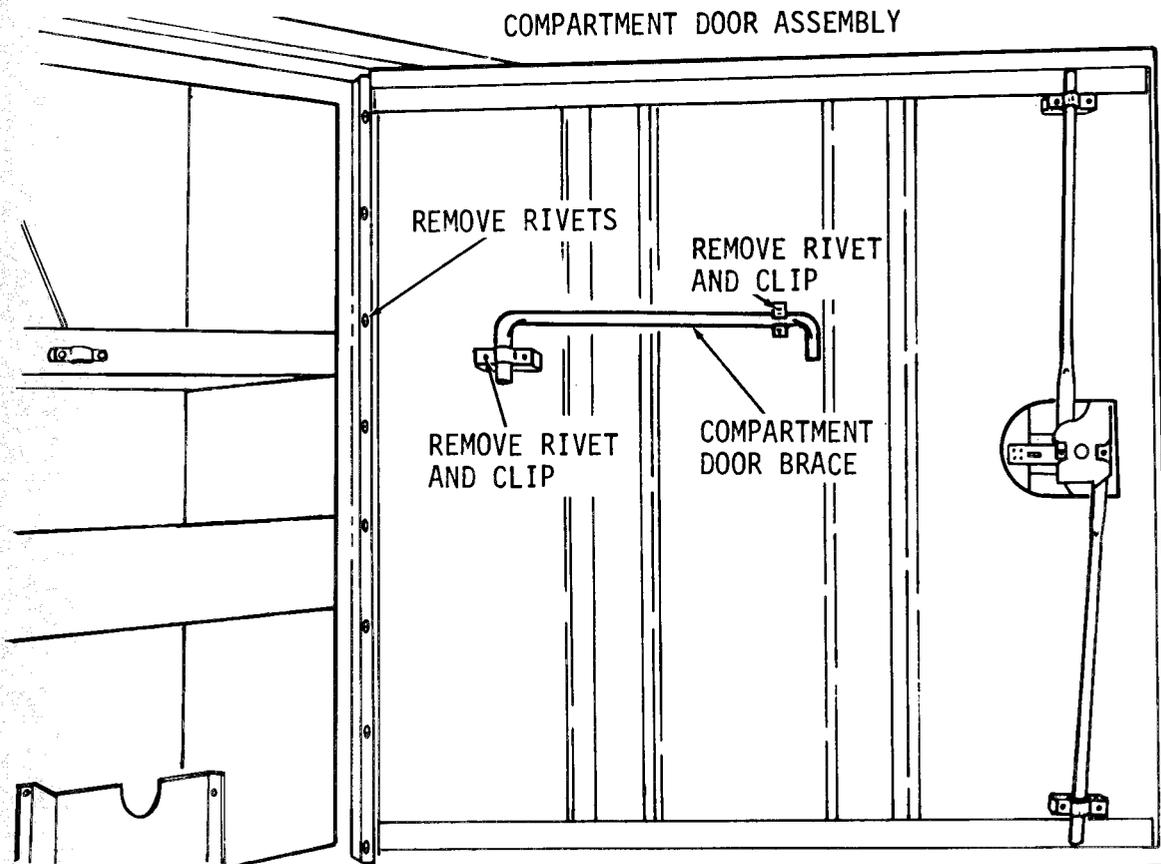
b. Cleaning and Inspection.

(1) Clean all parts with cleaning solvent and dry thoroughly (app D).

(2) Inspect the compartment door brace for cracks, breaks or other damage. Replace a damaged brace.

(3) Inspect all hardware for damage. Replace as required.

c. Installation. Install in reverse order of removal.



NOTE : REMOVE THE REMAINING COMPARTMENT DOORS, COMPARTMENT DOOR BRACES AND REAR DOORS IN SIMILAR MANNER.

AR 701562

Figure 4-21. Compartment doors and compartment door braces, removal and installation.

4-50. TAILGATE AND TAILGATE LATCH.

a. *Removal.* Refer to figure 4-22 and remove the tailgate and the tailgate latch from the shop set body.

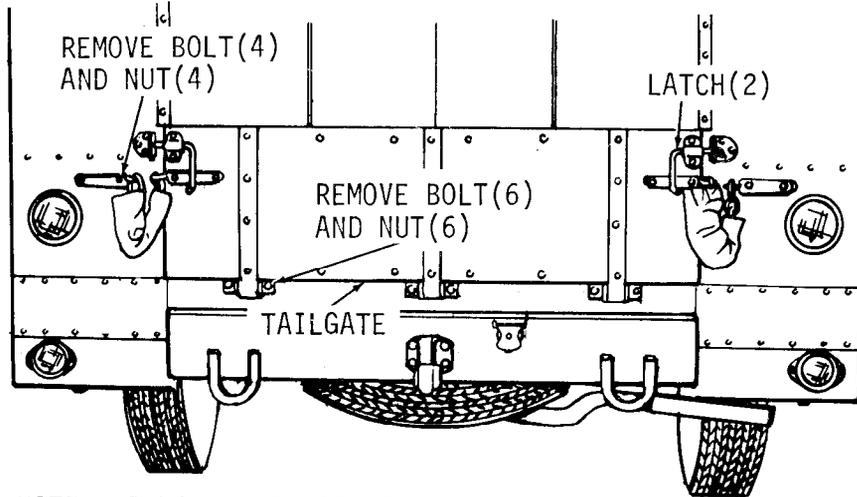
b. *Cleaning and Inspection.*

(1) Clean all parts with cleaning solvent and dry

thoroughly (app D).

(2) Inspect all parts for dents, cracks, breaks, distortion and deterioration, straighten or replace if defective.

c. *Installation.* Install in reverse order of removal.



NOTE: REMOVE THE VISE FROM THE TAILGATE.

AR 701563

Figure 4-22. Tailgate and tailgate latch removal and installation.

4-51. FUEL TANK FILLER TUBE.

a. *Removal.* Refer to figure 4-23 to remove fuel tank filler tube.

b. *Cleaning and Inspection.*

(1) Clean parts in cleaning solvent and dry thoroughly (app D).

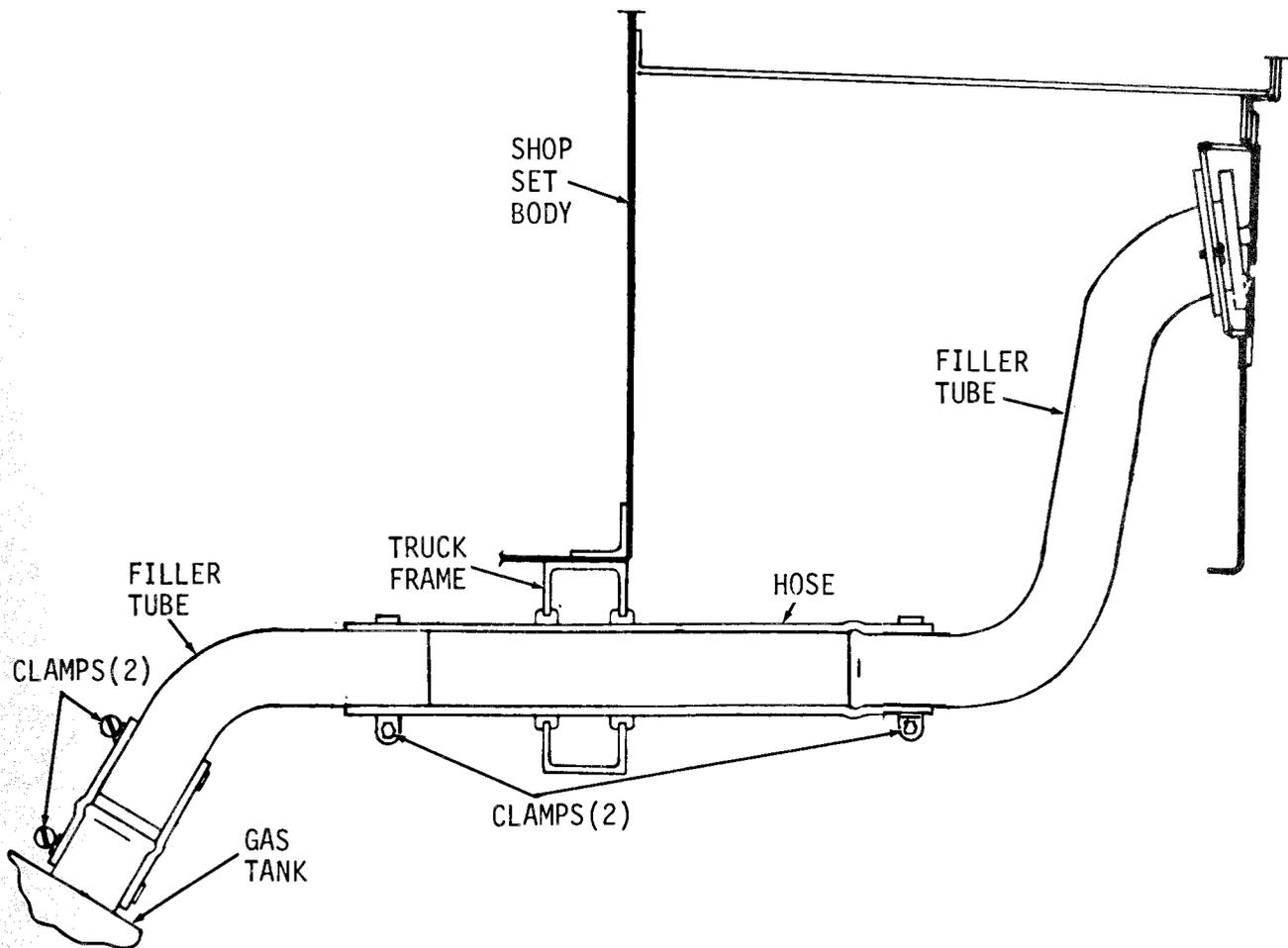
(2) Clean hose with soap and water and dry

thoroughly.

(3) Inspect the fuel tank filler tube for cracks, holes and dents. Replace a defective filler tube.

(4) Inspect hoses for cracks, holes and deterioration. Replace a defective hose.

c. *Installation.* Install in reverse order of removal.



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Figure 4-23. Fuel tank filler tube, removal and installation.

4-52. TAILLIGHT AND STOPLIGHT.

a. Removal (fig 4-24).

- (1) Open compartment door (4 or 8) (app E).
- (2) Push upper part of light out of rubber seal.
- (3) Disconnect electrical plug.
- (4) Remove light.
- (5) Remove rubber seal.

b. Cleaning and Inspection.

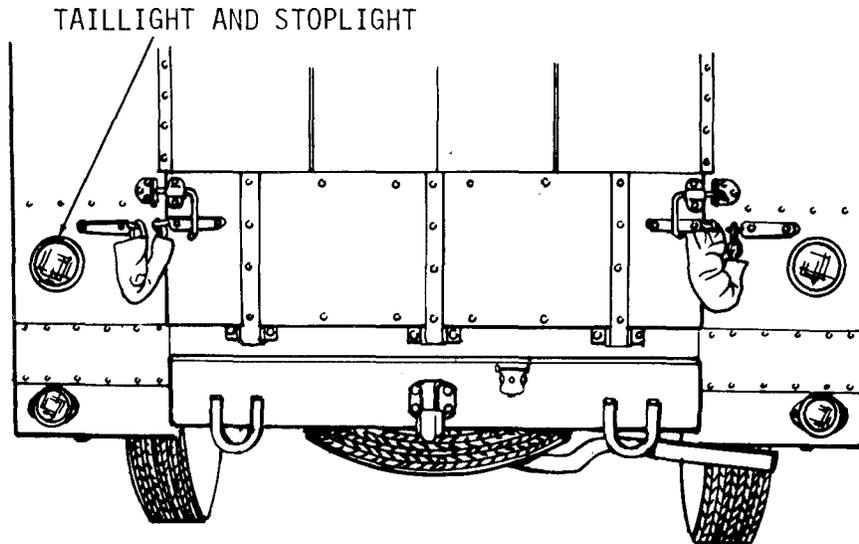
- (1) Clean rubber seal with soap and water and dry thoroughly.
- (2) Clean light with a clean, lint-free cloth.

(3) Inspect rubber seal for tears and deterioration. Replace a damaged rubber seal.

(4) Inspect light for damage. Replace a defective light.

c. Installation

- (1) Install rubber seal.
- (2) Connect electrical plug.
- (3) Place lower part of light in the rubber seal, work lip of seal around light and push top of light into rubber seal.
- (4) Close compartment door.



AR 701565

Figure 4-24. Taillight and stoplight, removal and installation,

4-53. CLEARANCE LIGHTS.

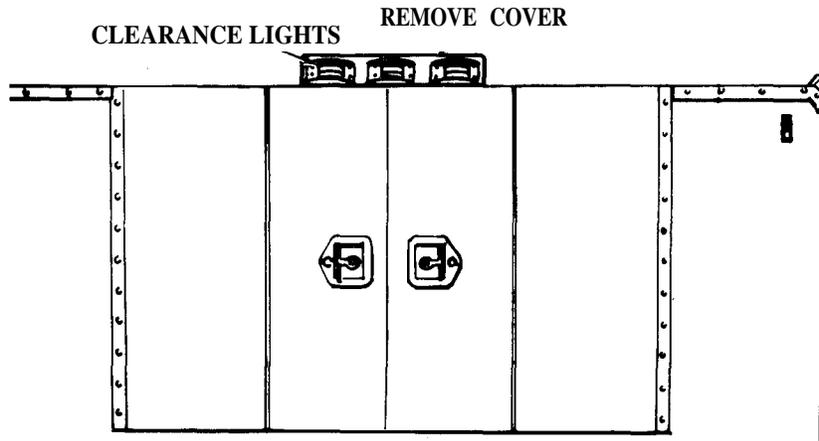
a. *Removal.* Refer to figure 4-25 to remove clearance light.

b. *Cleaning and Inspection.*

(1) Clean lens with a clean, lint-free cloth.

(2) Inspect all parts for damaged threads, bends, cracks, breaks, and other damage. Inspect for a defective lamp and any corrosion. Replace any defective parts.

c. *Installation.* Install in reverse order of removal.



NOTE: TAG AND DISCONNECT ELECTRICAL LEADS

AR 701566

Figure 4-25. Clearance lights, removal and installation.

4-54. EXTERNAL POWER RECEPTACLE.

a. *Removal.* Refer to figure 4-26 to remove the external power receptacle.

b. *Cleaning and Inspection.*

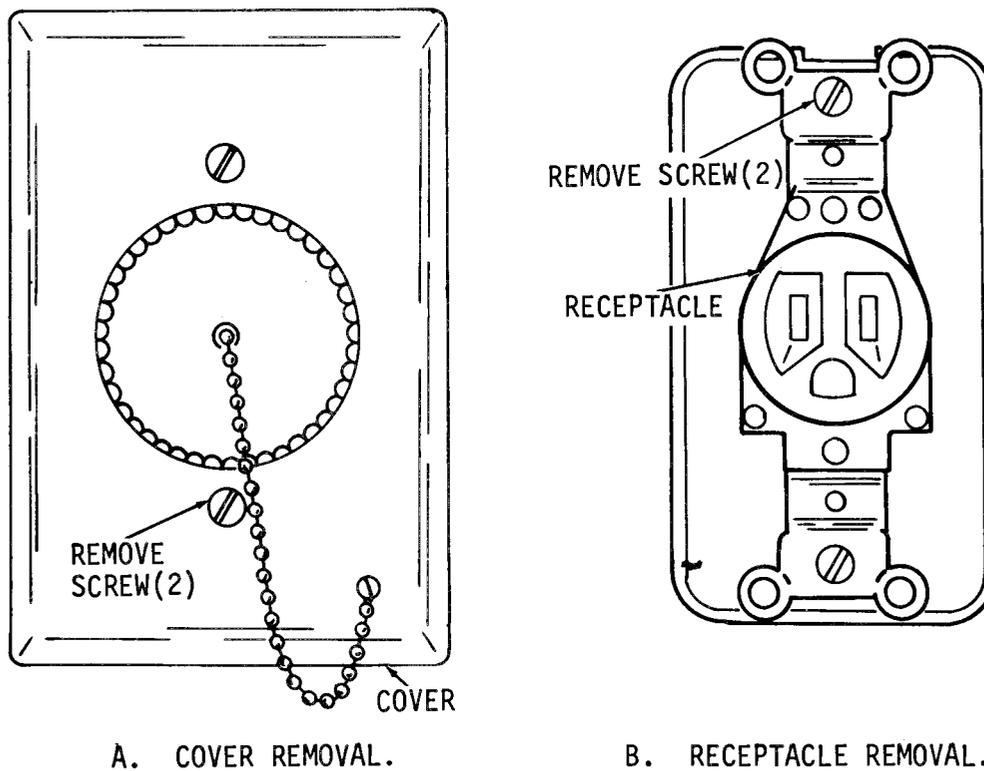
(1) Clean parts with a cloth dampened in cleaning solvent (app D).

(2) Inspect for defective or missing hardware and loose electrical connections. Replace loose or missing parts and be sure electrical connections are secure.

(3) Inspect wiring for breaks or damaged insulation. If wiring is defective, notify direct support.

c. *Installation.* Install in reverse order of removal.

NOTE: TAG AND DISCONNECT ELECTRICAL LEADS.



AR 701567

Figure 4-26. External power receptacle, removal and installation.

4-55. INTERVEHICLE RECEPTACLE.

a. *Removal* Refer to figure 4-27 to remove inter-vehicle receptacle.

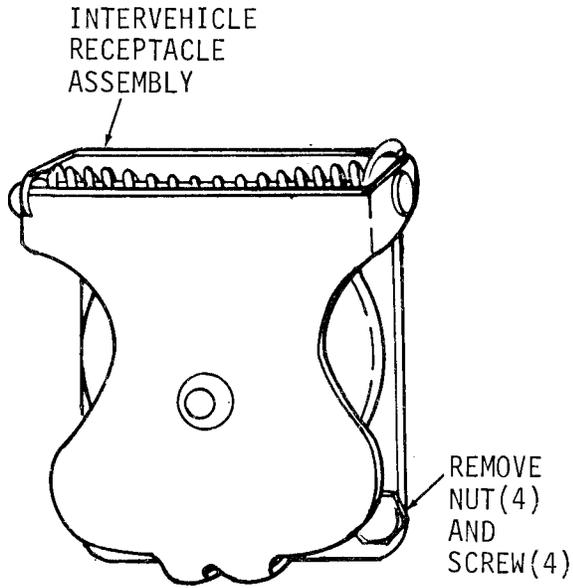
b. *Cleaning and Inspection.*

(1) Clean metal parts with cleaning solvent and

dry thoroughly (app D).

(2) Inspect the receptacle for bends, cracks or other damage and replace damaged receptacle.

c. *Installation.* Install in reverse order of removal.



NOTE: TAG AND DISCONNECT ELECTRICAL LEADS

AR 701568

Figure 4-27. Intervehicle receptacle, removal and installation

4-56. REAR BUMPER.

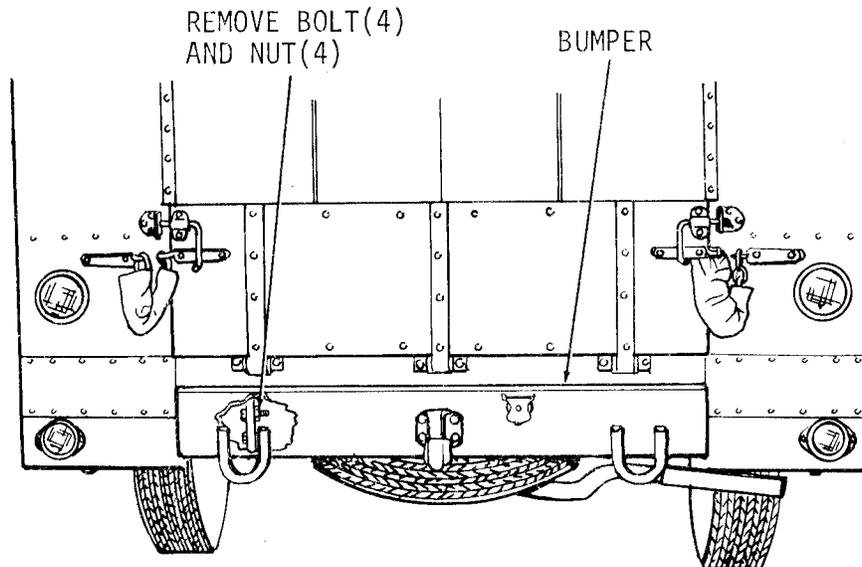
a. *Removal* Refer to figure 4-28 to remove rear bumper.

b. *Cleaning and Inspection.*

(1) Clean metal parts with cleaning solvent and dry thoroughly (app D).

(2) Inspect bumper and brackets for cracks, bends or other defects.

c. *Installation.* Install in reverse order of removal.



NOTE: TAG AND DISCONNECT ELECTRICAL WIRING

AR701569

Figure 4-28. Rear bumper, removal and installation.

CHAPTER 5

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS AND EQUIPMENT

5-1. SPECIAL TOOLS AND EQUIPMENT. No special tools or equipment are required by direct support and general support maintenance personnel for the maintenance of the shop set.

5-2. REPAIR PARTS. Direct support and general support maintenance repair parts are listed in TM 9-4940-421-24P.

Section II. TROUBLESHOOTING

5-3. GENERAL.

a. This section contains troubleshooting information for locating and correcting most of the operating trouble which may develop in the shop set. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that

may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. The table lists the common malfunctions which you may find during the operation or maintenance of the shop set or its components. You should perform the tests/inspections and corrective actions in the order listed.

5-4. TROUBLESHOOTING. Refer to table 5-1 for direct support and general support troubleshooting.

Table 5-1. TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
ENGINE		
1. ENGINE BACKFIRES		Overheated or sticky valves. Repair or replace valves (para 6-12).
2. ENGINE KNOCKS		Step 1. Worn or loose piston pin. Replace piston pin (para 6-17). Step 2. Connecting rod bearing loose or burned out. Replace any worn or damaged parts (para 6-17). Step 3. Loose connecting rod bearings. Install new bearings (para 6-17). Step 4. Weak or broken valve springs. Check valve springs and replace if necessary (para 6-12). Step 5. Excessive carbon. Remove cylinder heads and scrape carbon from head and from top of piston (para 6-11).
3. OIL CONSUMPTION HIGH		Step 1. Worn valve guides, oil rings, cylinder walls and pistons. Replace worn guides, oil rings, and pistons (para 6-12, 6-17). Step 2. Worn main or connecting rod bearings. Replace worn main or connecting rod bearings (para 6-17).
FLYWHEEL ALTERNATOR		
1. BATTERY OVERCHARGE		With engine running full governed rpm, check battery voltage with dc voltmeter. If voltage is over 15.0. Replace regulator module. If voltage is under 15.0. Check battery condition.
2. LOW/NO CHARGE		Step 1. With engine running at full governed rpm, check battery voltage with dc voltmeter. If voltage is greater than 14 volts, place load on battery to reduce voltage below 14 volts. If the change rate increases. Replace regulator module. If charge rate does not increase with new regulator module. Replace rectifier module. Step 2. With engine stopped unplug all connectors between modules and stator. Start engine and run at full governed rpm. With ac voltmeter check voltage between each of the black stator leads and ground. If one of the two voltages is zero or they are over 10% apart. Replace the stator.

Table 5-1. TROUBLESHOOTING-Continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	
	AIR COMPRESSOR
1. COMPRESSOR OVERHEATS Low oil level. Add oil as required.	
2. COMPRESSOR KNOCKS Low oil level. Add oil as required.	
	GENERATOR-WELDER
1. GENERATOR-WELDER NOISY Bearing defective. Replace bearing.	
2. GENERATOR-WELDER FAILS TO GENERATE REQUIRED VOLTAGE Step 1. Brushes burned or badly worn. Replace brushes (para 4-45). Step 2. Commutator dirty. Clean commutator.	

Section III. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS AND ASSEMBLIES

5-5. ENGINE, GENERATOR-WELDER AND CONTROL CUBICLE.

a. Removal.

- (1) Remove guard from rear of control panel (para 4-26).
- (2) Disconnect and tag electrical leads.
- (3) Remove conduit brackets from control panel base.
- (4) Remove three capscrews and lockwashers securing the hose rack and remove (curbside door).
- (5) Remove acetylene tank and bracket.
- (6) Remove eight bolts and nuts and remove false panel.
- (7) Remove exhaust pipe (para 4-41).
- (8) Disconnect fuel line quick disconnect at fuel strainer.
- (9) Remove two bolts and two tapered washers

from rail below control panel.

(10) Remove two bolts and two tapered washers from rail below front of engine.

(11) Remove two bolts and two safety blocks from inside of rear rail.

(12) Use the oxygen or acetylene bottle tie-down strap. Place the strap around the welder between the lugs.

(13) Position forklift so that the forks will be above the centerline of the engine and generator-welder. Secure the strap to the forks. Raise the forks to relieve the pressure from the rails and back the forklift slowly as not to damage the shop set.

(14) Place the engine and welder assembly on a suitable stand.

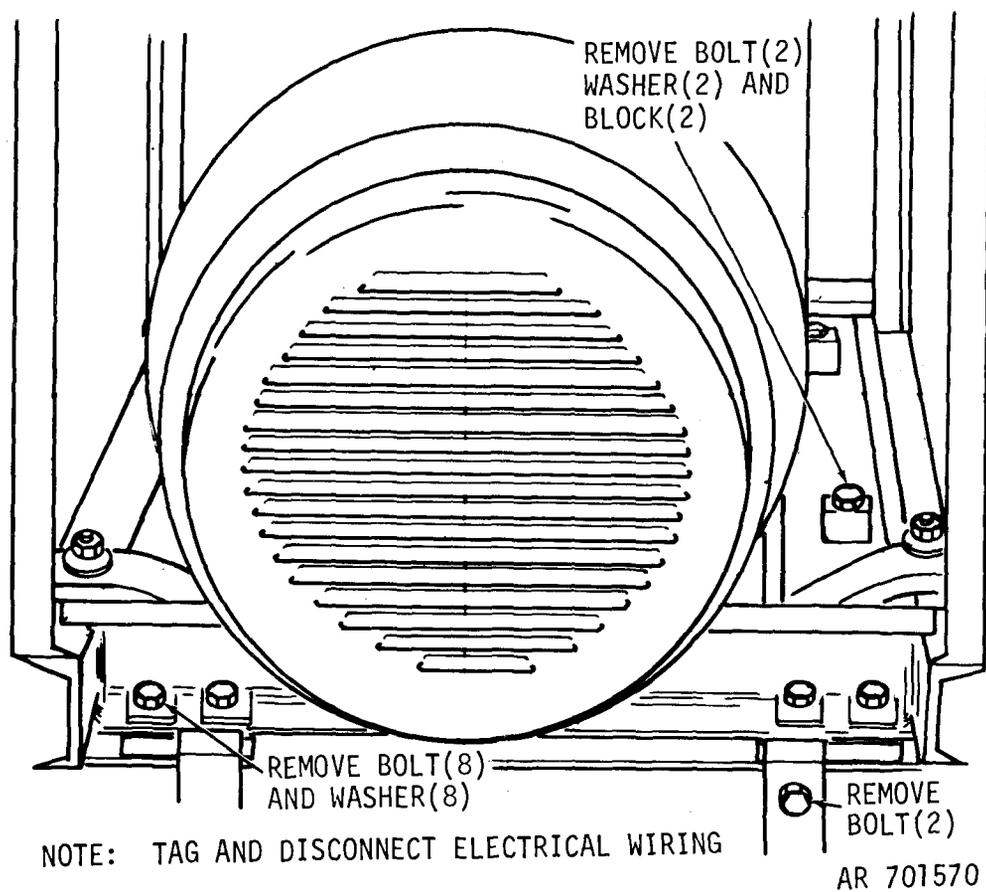


Figure 5-1. Engine, control panel, and generator-welder, removal and installation.

b. Installation. Install engine and generator-welder assembly in reverse order of removal.

5-6. SHOP BODY.

a. Removal (fig 5-2).

(1) Tag and disconnect electrical leads at rear of truck frame.

(2) Disconnect fuel filler tube.

(3) Disconnect fuel line for generator-welder

engine.

(4) Remove eight bolts, eight nuts, sixteen washers and eight body shims.

(5) Remove the shop set body from the truck frame.

b. Installation. Install shop set body in reverse order of removal. Torque nuts 40-45 ft. lbs.

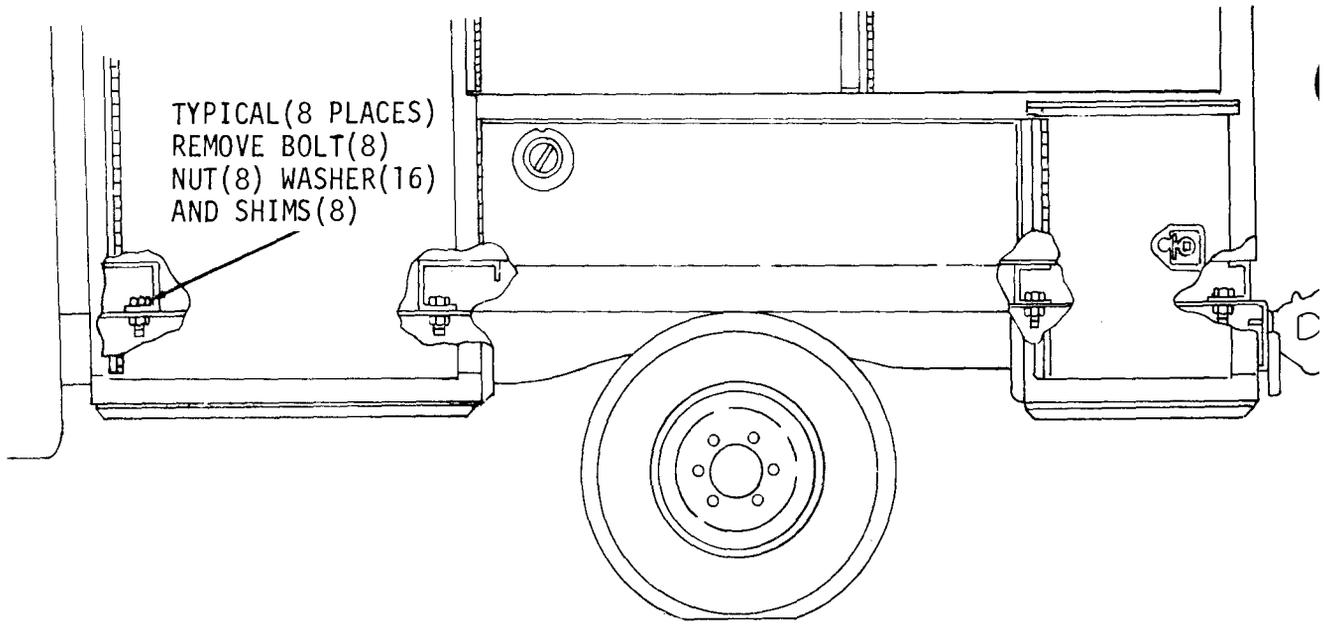


Figure 5-2. Shop set body, removal and installation.

CHAPTER 6

REPAIR OF ENGINE

Section I. INTRODUCTION

6-1. GENERAL. Instructions in this section and in succeeding sections of this chapter are published for

the use of direct support and general support personnel responsible for maintenance of the engine.

Section II. ENGINE

6-2. GENERAL. The four-cycle engine is so termed because of the four distinct and separate strokes of the piston during one complete power cycle. The engine develops power by rapidly burning a highly compressed mixture of fuel and air in a closed combustion chamber. The ignited force of the burned fuel-air mixture is directed against the piston that compressed the gas, driving the piston away from the ignition. The piston is attached to a crankshaft, which changes the reciprocating motion of the piston to a rotary, driving motion. The four operations intake, compression, power, and exhaust, each require a complete stroke. This gives one power stroke per cylinder for each two revolutions of the crankshaft.

6-3. ENGINE AND GENERATOR-WELDER DIS-ASSEMBLY.

a. General. Whenever it becomes necessary to remove the engine and generator-welder assembly from its mounting in the shop set for repair purposes, the engine and generator-welder assembly is removed as a unit. Refer to paragraph 5-5.

b. Removal.

- (1) Remove generator housing cover (fig 4-17).
- (2) Remove fan housing cover (fig 4-17).

(3) Turn engine until two setscrews securing armature to fan assembly are visible. Loosen the two setscrews. Remove four capscrews attaching the generator housing to the fan housing (fig 6-1). Separate the fan housing and generator housing.

(4) Turn engine until two setscrews are visible through the hole in the left side of the fan housing. Loosen the two setscrews and remove the fan assembly from the engine crankshaft.

(5) Remove four capscrews and washers attaching fan housing to the engine and remove fan housing.

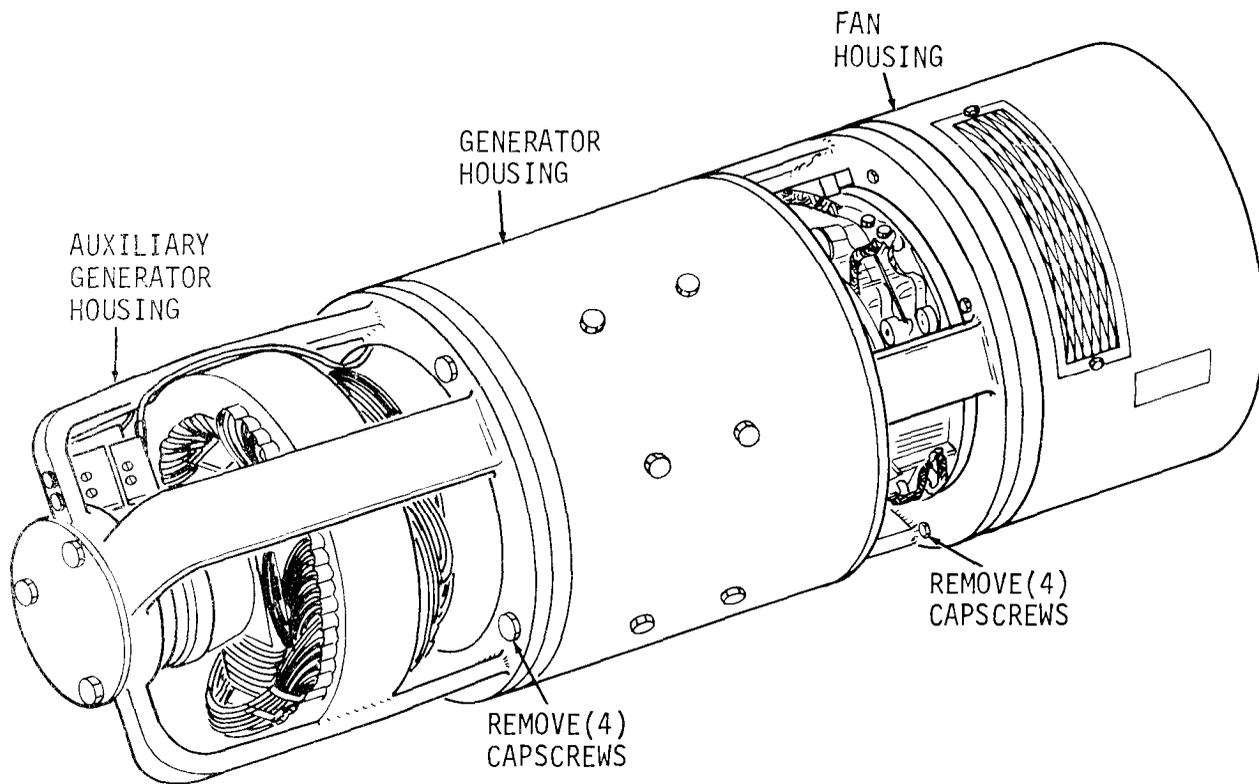
(6) Remove four bolts, nuts, washers, rubber shock mounts and cup washers attaching engine support bars to the rail. Remove engine.

c. Cleaning and Inspection.

(1) Clean the engine with an approved cleaning solvent and dry thoroughly. Be sure all dirt, grease, grit and other foreign matter are removed (app D).

(2) Clean all mounting hardware with an approved cleaning solvent. Inspect each threaded surface for corrosion or damage. Replace all mounting hardware that is corroded or damaged.

d. Installation. Install the assembly in reverse order of removal.



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Figure 6-1. Engine and generator-welder, removal and installation.

6-4. FUEL PUMP.

a. *Removal.* Refer to paragraph 4-14 for fuel pump removal,

b. *Cleaning and Inspection.*

(1) Clean all metal parts in an approved cleaning solvent and dry thoroughly (app D).

(2) Inspect the bracket and fuel head for cracks or breaks. Replace if necessary.

(3) Inspect all parts for wear or other damage. Replace if necessary.

c. *Installation.* Install in reverse order of removal.

6-5. CARBURETOR.

a. *Removal.* Refer to paragraph 4-15 and remove the carburetor.

b. *Cleaning and Inspection.*

(1) Clean all metal parts in cleaning solvent and dry each part thoroughly (app D).

(2) Blow out all passages in the throttle body and fuel bowl with clean dry compressed air. Reverse the flow of air in the passages to insure that all dirt has been removed. Make sure that all carbon deposits and other foreign matter have been removed from the throttle bore and idle port.

c. *Installation.* Install in reverse order of removal.

d. *Adjustment.* Refer to paragraph 4-15e.

6-6. GOVERNOR.

a. *Removal.* Refer to paragraph 4-23 for removal of the governor.

b. *Cleaning and Inspection.*

(1) Wash the parts in solvent and dry thoroughly (app D).

(2) Replace a defective governor.

c. *Installation.* Install in reverse order of removal.

d. *Adjustment.* Refer to paragraph 4-23d.

6-7. DISTRIBUTOR.

a. *Removal.* Refer to paragraph 4-17 and remove the distributor.

b. *Disassembly.* Refer to figure 6-2 and disassemble the distributor.

c. *Cleaning and Inspection.*

(1) Before cleaning distributor cap, check for carbon tracks.

(2) Clean parts thoroughly with a clean, lint-free cloth.

(3) Inspect distributor cap for cracks, broken towers, burned or corroded terminals and worn center contacts. Replace unserviceable cap.

(4) Inspect rotor for cracks, carbon tracks, breaks and a burned, corroded or broken metal terminal. Replace a damaged rotor.

(5) Inspect breaker points for roughness, burning and pitting. Replace damaged points.

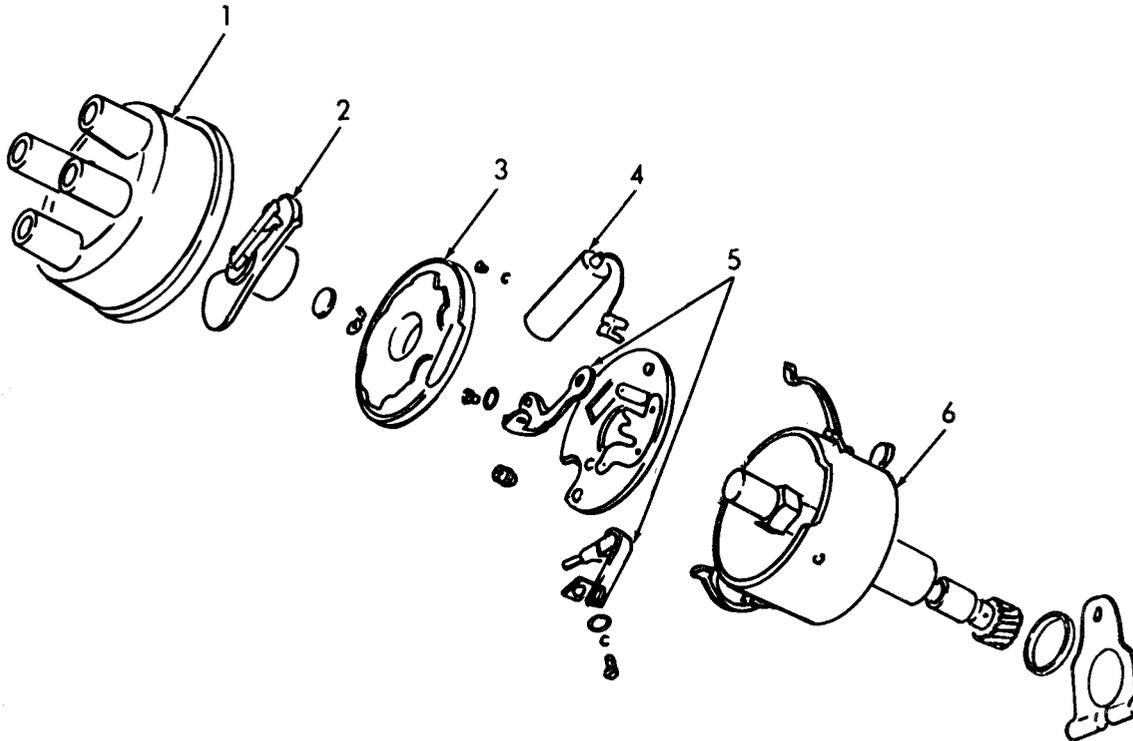
(6) Inspect the coil to distributor primary wire for broken, bare, or frayed wire. Replace a damaged wire.

d. Reassembly. Refer to figure 6-2 and reassemble

the distributor in reverse order of disassembly.

e. Installation. Refer to paragraph 4-17 and install the distributor. Be sure to lubricate the cam and wick.

f. Adjustment. Refer to paragraph 4-17f.



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- Legend for fig 6-2:
- 1. Distributor cap
 - 2. Rotor
 - 3. Dust cover
 - 4. Condenser
 - 5. Points Set
 - 6. Base Assembly

Figure 6-2. Distributor assembly, exploded view.

Section III. ENGINE DISASSEMBLY

6-8. FLYWHEEL.

a. Removal (fig 6-3).

(1) Drive the crank pin out of the crankshaft. Remove the nut and lockwasher.

(2) Hit the end of the crankshaft with a soft hammer to loosen the flywheel. If the flywheel is not loosened after two or three blows, use a puller to remove it.

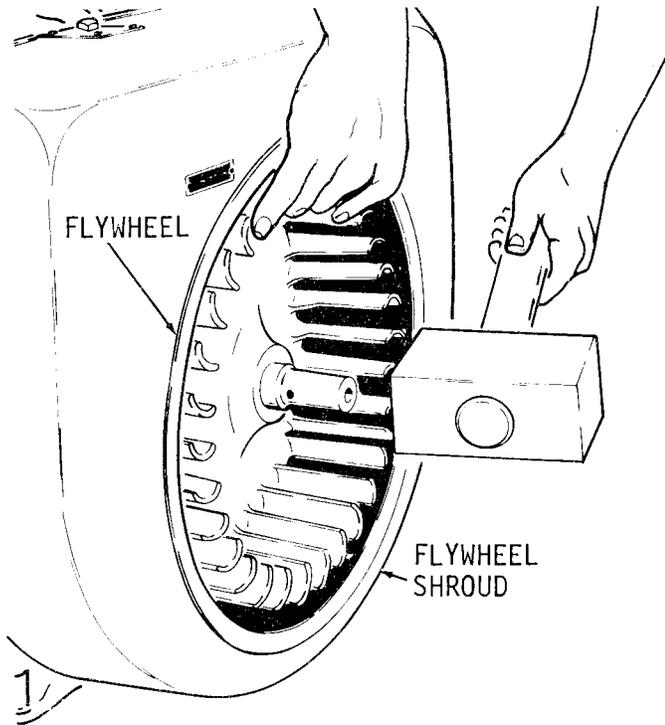
(3) Remove the key from the crankshaft.

b. Cleaning and Inspection.

(1) Wash all parts in cleaning solvent and dry thoroughly (app D). Use a wire brush to clean rust and scale from the flywheel. Be careful and not damage the flywheel alternator rotor.

(2) Inspect the flywheel for cracks or broken vanes. Inspect the flywheel ring gear for broken or cracked teeth. Replace a damaged flywheel.

c. Installation. Install flywheel in reverse order of removal.



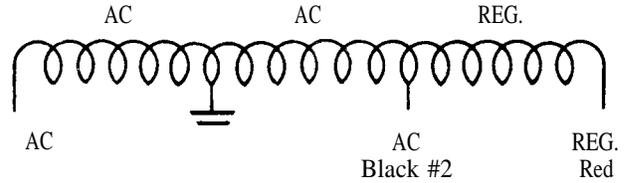
AR 701574

Figure 6-3. Flywheel, removal and installation,

6-9. FLYWHEEL ALTERNATOR STATOR.

a. *Testing.* Refer to table 6-1 and check stator using

Table 6-1. ALTERNATOR STA TOR CHECKS



NOTE

Wire numbers indicated for probe connections are for convenience only and are not indicated on the connectors.

METER PROBE CONNECTIONS	METER VALUE
Black # 1 to Black #- 2	0.40 ohm
Black # 1 to Engine grid.	0.20 ohm
Black # 2 to Engine gnd	0.20 ohm
Black # 1 to Red	3.20 ohms
Black # 2 to Red	2.80 ohms

REPLACE STATOR

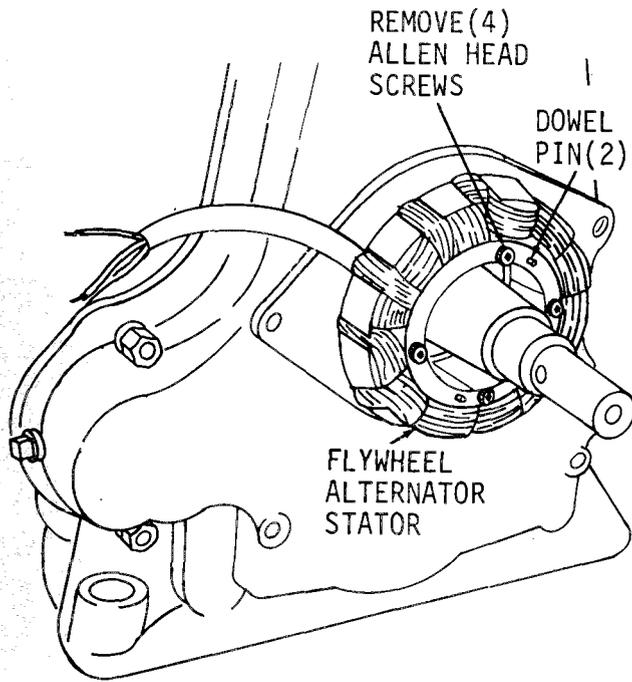
∞ Indicates open Circuit

b. *Removal (fig 6-4).* Remove four allen head screws and washers attaching stator to gear housing cover. Remove stator from gear housing.

c. *Cleaning and Inspection.*

- (1) Wipe stator clean with a clean, lint-free cloth.
- (2) Inspect stator for cracks, broken or loose wire connections.

d. *Installation.* Install in reverse order of removal.



AR 7101575

Figure 6-4. Flywheel alternator stator, removal and installation.

6-10. MANIFOLD ASSEMBLY.

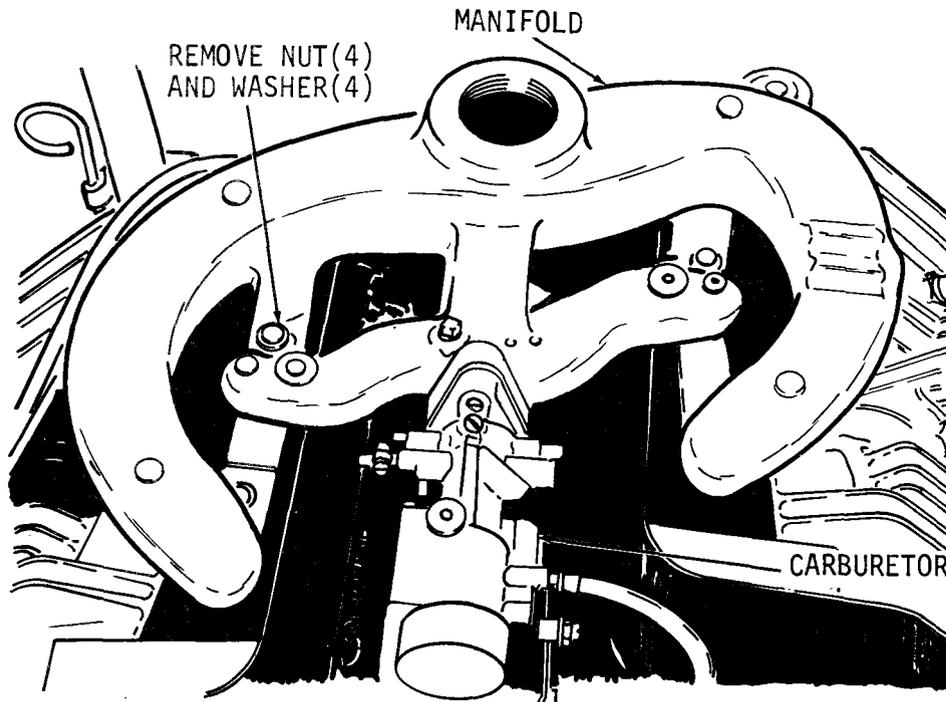
a. Removal (fig 6-5).

- (1) Remove carburetor (para 4-15).
- (2) Remove four nuts and lockwashers securing the manifold to the cylinder block.
- (3) Lift off the manifold assembly from the cylinder block. Remove gaskets and inserts.

b. Cleaning and Inspection.

- (1) Clean the manifold with a wire brush to remove any rust or foreign material.
- (2) Examine the manifold for cracks or breaks. Replace a defective manifold.
- (3) Check the manifold cylinder block gaskets and inserts. Replace if damaged.

c. Installation. Install manifold assembly in reverse order of removal. Torque nuts 35 lbs. ft.



AR 701576

Figure 6-5. Manifold assembly, removal and installation.

6-11. CYLINDER HEAD.

a. Removal (fig 6-6).

- (1) Remove the cylinder head shrouds and rear shroud covers.
- (2) Remove the manifold assembly (para 6-10).
- (3) Remove the spark plugs.
- (4) Remove the seventeen capscrews (19) and washers (18) that secure the cylinder head (17) to the cylinder block (12). Remove the cylinder head and gasket (16).

b. Cleansing and Inspection.

- (1) Carefully scrape and wire brush all carbon deposits from the cylinder blocks. Clean the carbon from the tops of the pistons and blow away the carbon with compressed air.
- (2) Wire brush and scrape the carbon out of the

cylinder heads.

(3) Wipe the cylinder heads and blocks with a cloth dampened with cleaning solvent. Dry thoroughly (app D).

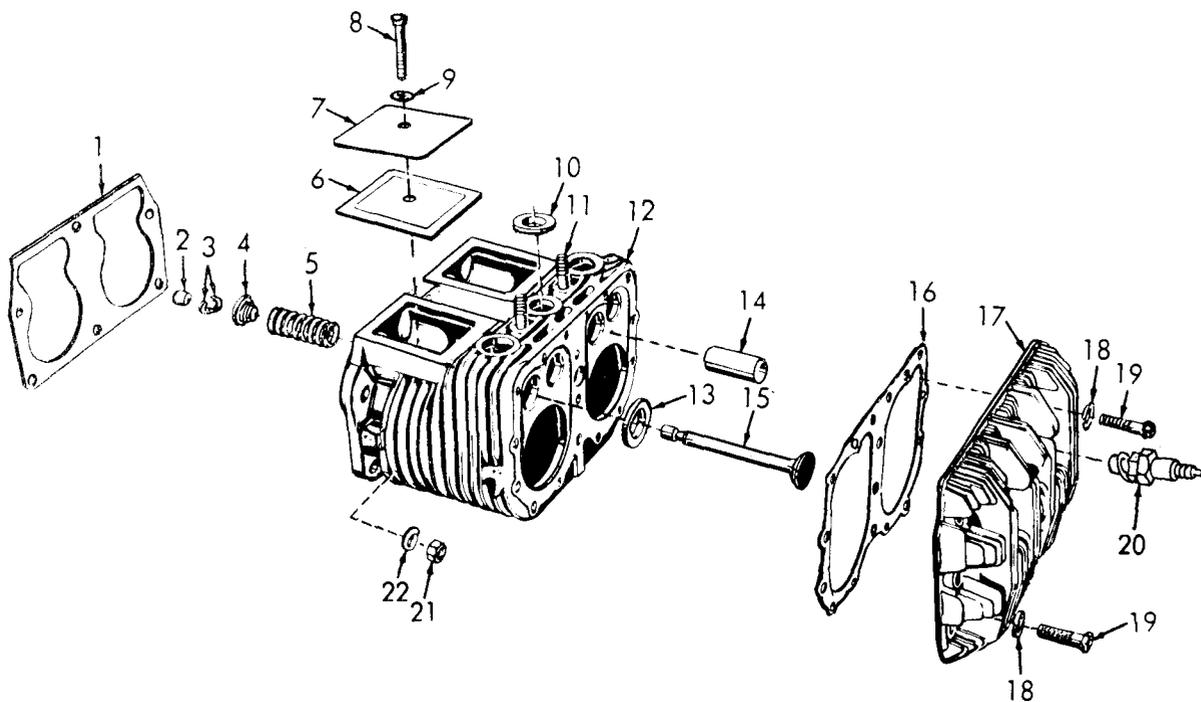
(4) Inspect the cylinder heads for cracks, breaks or warping. Replace a defective cylinder head.

(5) Inspect the top of the cylinder block for cracks or breaks. Inspect the cylinder walls for scoring and pitting.

(6) Inspect the top of the valves and valve seats. Repair or replace any defective valves or valve seats.

c. Installation.

- (1) Install cylinder head in reverse order of removal.
- (2) Apply a mixture of graphite and oil on the capscrews and tighten to 25-32 lb. ft. torque.



AR 701577

Legend for fig 6-6:

- | | |
|--------------|--------------------|
| 1. Gasket | 12. Cylinder block |
| 2. Cap | 13. Insert |
| 3. Lock | 14. Guide |
| 4. Seat | 15. Valves |
| 5. Spring | 16. Gasket |
| 6. Gasket | 17. Cylinder head |
| 7. Plate | 18. Washer |
| 8. Bolt | 19. Screw |
| 9. Washer | 20. Spark plug |
| 10. Retainer | 21. Nut |
| 11. Stud | 22. Washer |

Figure 6-6. Cylinder block, exploded view.

6-12. VALVES.

a. General. The valves are lifted by tappets located in the crankcase. The tappets are raised by the lobes on the camshaft. The firing order of the cylinders is 1-3-4-2. Number 1 cylinder is the nearest one to the flywheel in the left bank of cylinders; number 3 cylinder is the other one in this bank. Number 2 cylinder is the nearest one to the flywheel in the right bank of cylinders and number 4 is the other (fig 4-4).

b. Removal

- (1) Remove the governor (para 4-23).
- (2) Remove the cylinder heads (para 6-11).
- (3) Remove the valve covers (fig 6-6).

NOTE

Tag or otherwise identify each valve and its parts so they will be reinstalled in the same guide and valve chamber from which they were removed.

(4) Use a valve spring compressor and compress the valve spring. Remove the pair of valve spring seat locks, the valve stem rotator, and valve spring seat. Remove the spring compressor, lift out the valve, and remove the valve spring.

c. Cleaning and Inspection.

(1) Clean the valves on a wire wheel brush to remove carbon from the valve face and gum deposits from the stems. Wash the springs with cleaning solvent and dry thoroughly (app D).

(2) Clean out the valve guides in the cylinder block and blow out with compressed air.

(3) Clean the valve seat inserts and top of the cylinder block.

(4) Inspect the valves for burned, pitted or cracked faces. Replace a burned, cracked or deeply pitted valve.

(5) Inspect the valve springs for breaks and wear. Replace if weak or damaged.

(6) Inspect the valve seat insert for looseness and excessive wear.

(7) Inspect and replace all unserviceable parts.

d. Valve and Valve Seat Refacing.

(1) Reface valves and valve seats only when there is evidence of warping or deep pits. A good method of detecting warping is to check each valve stem in a valve face grinder, and slowly rotate the valve while the grinding wheel is brought near the rotating valve face.

(2) Using a valve face grinder, reface the valves to an angle of 45 degrees. Replace any valve that measures less than 0.0625 inch from the top of head to the edge of the refaced outer circle.

(3) Install a pilot in the valve stem bore of the cylinder block. Set the stone on the valve reseating outfit to the angle of 45 degrees and dress the stone with the dresser. Place the grinder and stone assembly over the pilot in the valve stem bore, and grind just enough to make a smooth seat.

e. Valve Grinding Procedure.

- (1) Remove all traces of carbon from the face of

the cylinder block.

(2) Lightly coat the entire valve seat with a good quality water-soluble, valve-grinding compound. Slip a light lifting spring over the valve stem, and lubricate the stem. Drop the valve into its original place in the cylinder block. The lifting spring should barely hold the valve face off its seat. Set the grinding tool on the valve head, and press down until the valve is seated. Turn the valve one-quarter turn, first in one direction, then the other. Do this three or four times. Release pressure on the valve so that the lifting spring will lift it from its seat, and turn the valve 10 degrees thru 15 degrees to another position. Repeat the grinding. Do this until all of the compound is rubbed off the valve seat. Take out the valve, apply fresh compound, and repeat the grinding operation as necessary.

(3) Do not overgrind the valves. Occasionally clean the valve and its seat to see how the grinding is progressing. When all of the pits and grooves have disappeared wipe the valve and its seat clean and place 3 to 10 soft pencil marks on the valve seat. Drop the valve in place. Turn it one-quarter turn, and remove. A perfect seat will be identified if every pencil mark shows where the valve has rubbed it. If any pencil marks remain untouched, continue the grinding.

(4) When the grinding is completed, clean off all traces of the cleaning compound. Check the valve seat for concentricity with a dial indicator.

f. Valve Assembly Installation.

(1) Place the valve springs (5, fig 6-6) in their respective valve chambers.

(2) Insert the valves (15) into the same bores from which they were removed. Assemble the valve spring seats (4) on the valve stems. Compress the valve springs and install the valve spring seat locks (3).

(3) Install the cylinder heads.

g. Tappet Clearance Adjustment.

(1) Make sure the engine is cold.

(2) Crank the engine slowly until the no. 1 piston is rising in the compression stroke. Continue cranking until the marked vane on the flywheel aligns with the no. 1 centerline mark on the flywheel shroud which is 45 degrees counterclockwise from the vertical (fig 4-4).

(3) Adjust the valve tappet clearance as shown in figure 6-7. Adjust exhaust valve tappet clearance to 0.016 inch. Adjust the inlet valve tappet clearance to 0.008 inch.

NOTE

Chalk mark the vane directly opposite the marked vanes on the flywheel. To determine the 180 degree turn mentioned, turn the crankshaft until the chalk-marked vane is aligned with the no. 1 cylinder centerline.

(4) Turn the engine crankshaft 180 degrees clockwise and adjust tappet clearance on the no. 3 cylinder.

(5) Turn the crankshaft clockwise until the marked vane is aligned with the no. 2 cylinder centerline which is 45 degrees clockwise from the vertical. This

position is 270 degrees past the position of (4) above. Adjust the tappet clearance of no. 4 cylinder.

(6) Turn the crankshaft clockwise until the chalk-marked vane is aligned with the no. 2 cylinder centerline. This position is 180 degrees past the position (5) above. Adjust the tappet clearance of no. 2 cylinder.

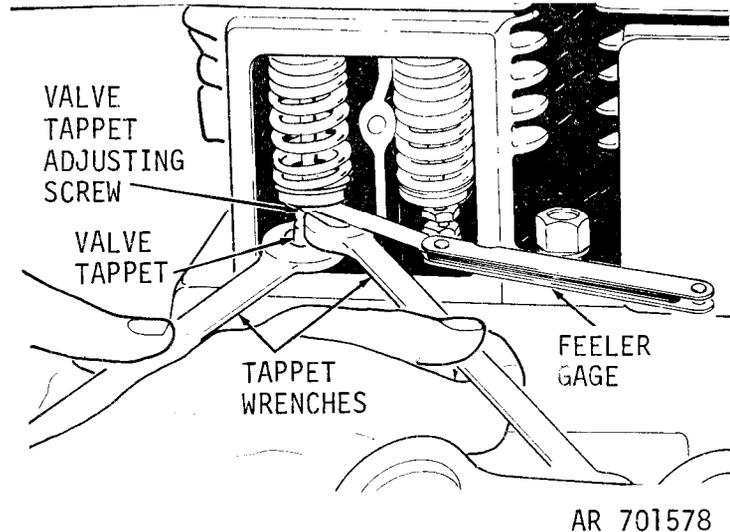
(7) Install the gaskets and valve covers. Tighten the capscrews securely.

(8) Install cylinder heads (para 6-11c).

(9) Install governor (para 4-23).

(10) Install the flywheel screen.

(11) install the spark plugs (para 4-16c).



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Figure 6-7. Adjusting valve tappets

6-13. VALVE-SEAT INSERT.

a. General. The valve seats are replaceable, hardened inserts which are pressed into the cylinder blocks. The inserts should be replaced if they are pitted or burnt to the point where ordinary grinding procedures will not make them serviceable.

b. Valve-Seat Insert Replacement.

(1) Remove as instructed in paragraph 6-12b.

(2) Clean and inspect as instructed in paragraph 6-12c.

(3) Using a suitable puller, remove the exhaust valve-seat inserts. Take care not to damage the insert counterbore.

(4) Clean all the carbon from the insert counterbore, and from the valve port.

CAUTION

Do not attempt to drive in an oversized insert before machining the counterbore.

(5) Finish the counterbores in the cylinder blocks so that bore-to-insert interference is between 0.002 and 0.004 inch. Chill the inserts with dry ice; then, using a pilot driver, tap the insert in place with light blows. Peen the insert to anchor it in place.

(6) Reface each insert if necessary to make their valve seats concentric with the valve stem bore. Use a dial indicator and make sure that the valve seats are concentric. Regrind the valve seats if necessary.

(7) Install the valves, and adjust the tappet clearance as instructed in paragraph 6-12.

6-14. OIL PAN (fig 6-8).

a. General. The bottom cover plate is also the oil pan of the engine which serves as an oil reservoir. The oil pan is provided with a pipe plug to drain the oil.

b. Removal.

(1) Drain all the crankcase oil from the engine.

(2) Lay the engine on its side supporting it in such a manner which will prevent damage to the cylinder air shrouds.

(3) Remove the four capscrews and lockwashers that secure the front and rear engine supports to the bottom of the crankcase. Remove the engine supports.

(4) Remove the fourteen capscrews and lockwashers that secure the crankcase bottom cover plate to the crankcase. Remove the cover plate and gasket.

c. Cleaning and Inspection.

(1) Scrape out all sludge and foreign particles accumulated on the bottom of the oil pan, and wash all parts removed in cleaning solvent (app D).

(2) Brush the screen with a stiff brush and remove all sludge and foreign matter from between the wires of the screen. Dry with clean, dry compressed air.

(3) Inspect the oil pan for dents. If minor, smooth out with hammer and wood block. Replace the oil pan if it is damaged beyond serviceable limits.

d. Installation. Install new oil pan gasket and the oil pan with the deep end of oil pan toward oil pump. Secure with fourteen capscrews and washers. Tighten capscrews 6 to 9 lbs. ft.

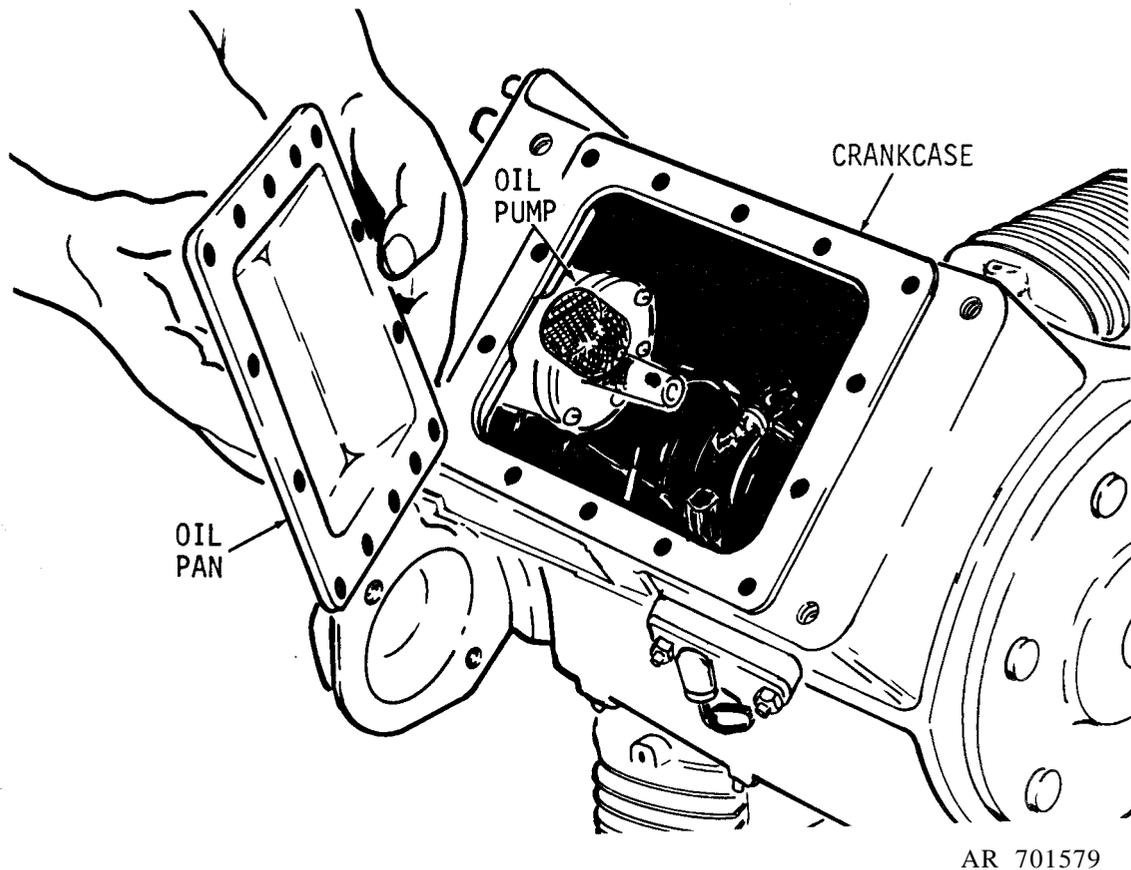


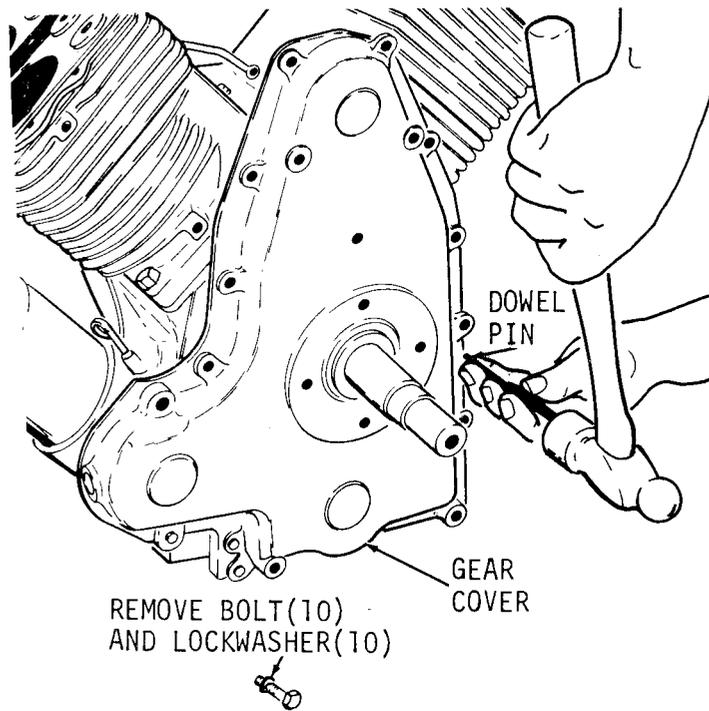
Figure 6-8. Oil pan, removal and installation.

6-15. OIL PUMP.

a. Removal.

- (1) Remove the oil pan (para 6-14).
- (2) Remove the front gear cover (fig 6-9). Remove

ten capscrews and lockwashers that secure the gear cover to the crankcase. Using a suitable drift pin, carefully drive the two dowel pins out from the gear cover. Remove the gear cover and gasket.

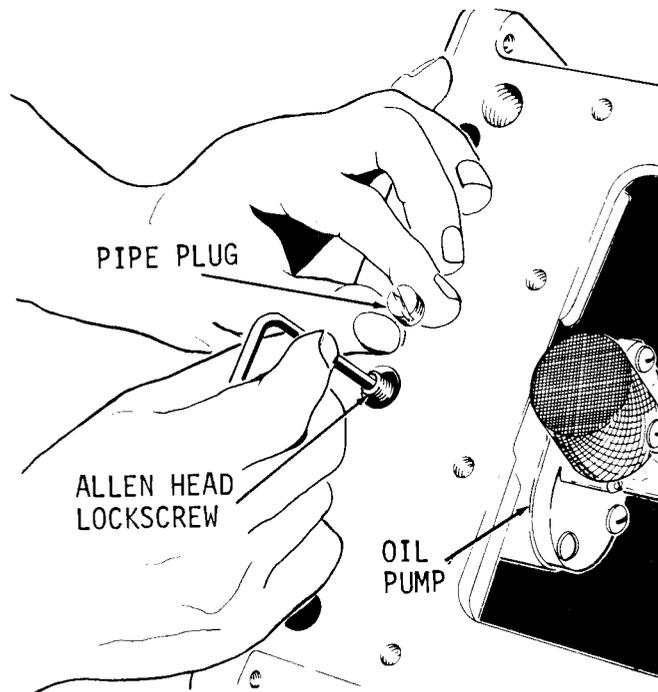


AR 701580

Figure 6-9. Gear cover, removal and installation.

- (3) Remove the pipe plug and allen head lockscrew (fig 6-10).
- (4) Remove the nut (1, fig 6-11) that secures the gear (2) to the oil pump drive shaft. Place a suitable

brass rod or similar punch against the drive shaft, and carefully drive the shaft through the gear. The oil pump assembly can then be removed by withdrawing it toward the center of the crankcase.



AR 701581

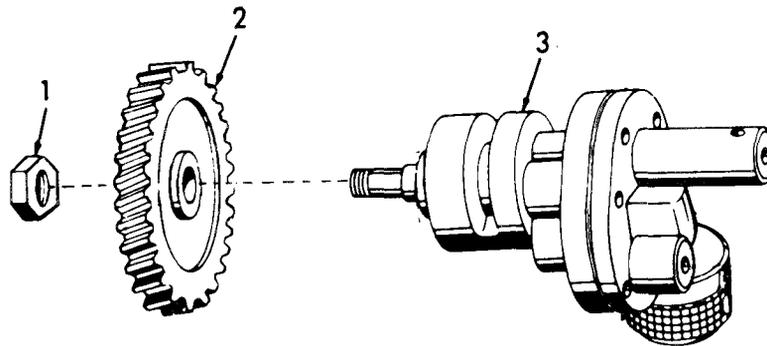
Figure 6-10. Oil pump, removal and installation.

b. Cleaning and Inspection.

(1) Wash all of the parts in cleaning solvent and dry thoroughly. Use a fiber brush to clean the screen

(app D).

(2) Examine the pump body and gear for cracks or breaks and replace a defective oil pump.



AR 701582

Legend for fig 6-11:

1. Nut
2. Gear
3. Body

Figure 6-11. Oil pump, exploded view.

c. Installation.

(1) Install the oil pump in the crankcase with the screen facing toward the bottom of the engine. Secure with the setscrew and pipe plug.

(2) Install the woodruff key in the oil pump shaft.

(3) Install the gear (2) and secure with the nut (1).

(4) Apply a thin coat of grease to a new cover plate gasket and position the gear cover on the crankcase and secure with capscrews and lockwashers. Tighten to 6-9 lbs. ft.

6-16. TIMING-GEAR TRAIN (fig 6-12).

a. General. The timing-gear train is located at the same end of the engine as the flywheel, and is enclosed in a gear cover. It comprises the governor gear, camshaft gear, crankshaft gear, idler gear and oil pump gear. The governor gear can be removed from the gear train without removing the gear cover. The remaining gears, with the exception of the crankshaft gear, can be removed after the gear cover is removed.

b. Removal.

(1) Remove the gear cover (fig 6-9).

(2) Remove the setscrew from the left-hand side of the crankcase which locks the idler shaft in position.

(3) Using a gear puller remove the idler shaft and idler gear assembly.

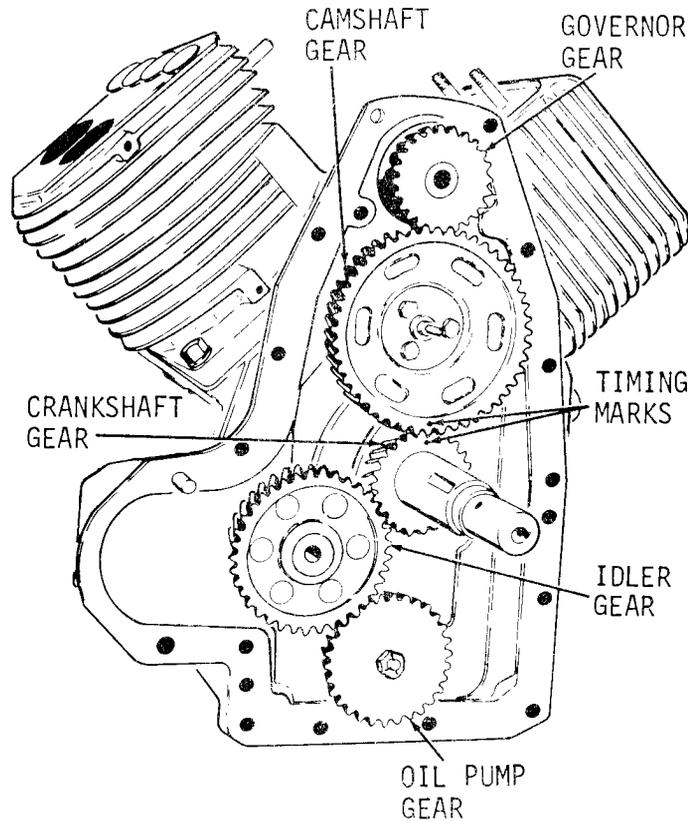
(4) Remove the three capscrews (1, fig 6-13) and lockwashers (2) that secure the camshaft gear (3) to the camshaft. Pull the camshaft thrust plunger (7) from the end of the camshaft. Remove the plunger spring (6).

c. Cleaning and Inspection.

(1) Wash the removed gears with cleaning solvent and dry thoroughly (app D).

(2) Examine the gears for broken, cracked or chipped teeth. Replace any damaged or excessively worn gears.

(3) Inspect the idler gear shaft for scoring or pitting. Remove any roughness with a fine grade of emery cloth.



AR 701583

Figure 6-12. Timing-gear train.

(4) Examine the camshaft thrust-plunger spring for pits or breaks. Replace a defective spring.

(5) Check the hardware for rust or bad threads. Replace any defective hardware.

d. Installation.

(1) Position the camshaft gear (3, fig 6-13) on the end of the camshaft. The three holes in the camshaft and the gear are staggered in such a manner that they are lined up in only one position, which will automatically time the gear to the shaft. Secure the camshaft gear in place with three lockwashers (2) and three capscrews (1). Tighten to 14-18 lbs. ft.

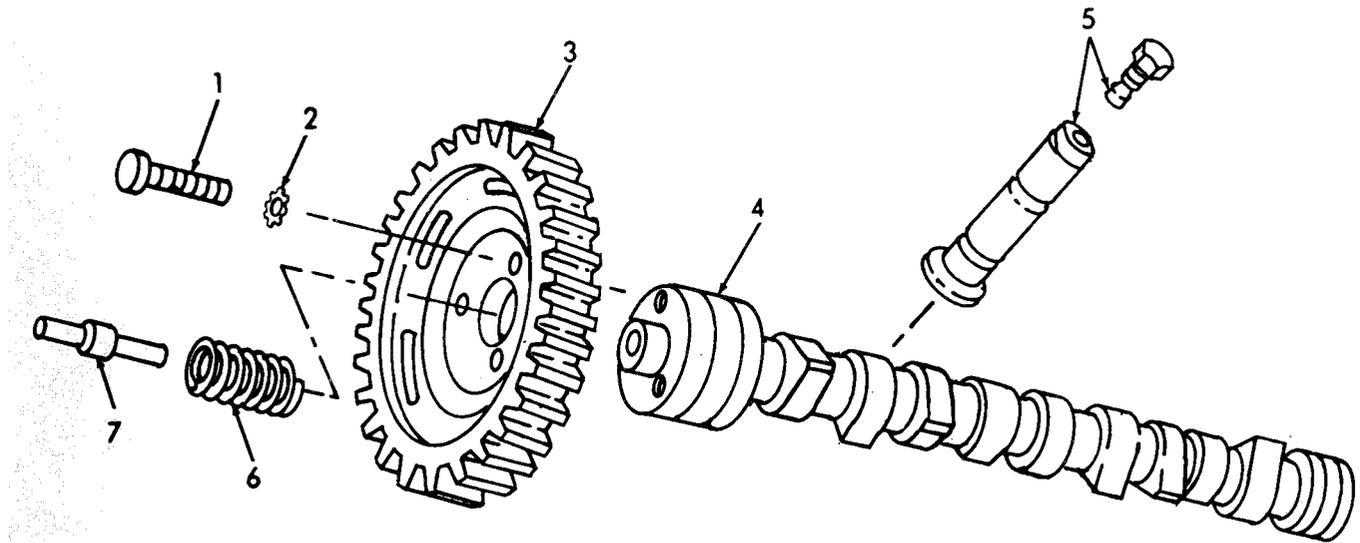
NOTE

Be sure the timing marks on the camshaft gear and crankshaft gear are lined up.

(2) Install the thrust-plunger spring (6) and the thrust-plunger (7) in the hollow end of the camshaft.

(3) Slide the idler gear over the idler gear stud with the timing marks toward the shoulder of the idler gear shaft. Using a suitable fiber hammer, carefully drive the idler gear shaft into the case. Be sure that the oil groove is facing upward. Take care to allow 0.003 to 0.004 inch clearance between the idler gear and stud collar. Install the setscrew in the crankcase to secure the idler gear shaft.

(4) Check the position of all the gears and install the gear cover (para 6- 15c.(A)).



AR 701584

Legend for fig 6-13:

1. Capscrew
2. Lockwasher
3. Gear
4. Camshaft
5. Valve tappet assembly
6. Spring
7. Plunger

Figure 6-13. Camshaft exploded view.

6-17. CONNECTING RODS AND PISTONS.

a. General The pistons are made of heavy duty alloy casting, and are equipped with two compression rings, one scraper ring and one oil ring. The upper end of the connecting rod is fitted with bronze bushing. The connecting rod has a shell bearing.

b. Removal.

- (1) Remove cylinder head (para 6-11).
- (2) Remove the oil pump (para 6-15).
- (3) Remove the carbon and ridge at the top of the cylinder bore with a ridge reamer,
- (4) Turn the crankshaft until the lower end of the desired connecting rod is accessible.
- (5) Remove the nuts (18, fig 6-14) from the connecting rod bolts (8). Loosen the cap from the bolts by tapping it with a soft-faced hammer. Remove the cap

of the connecting rod (7).

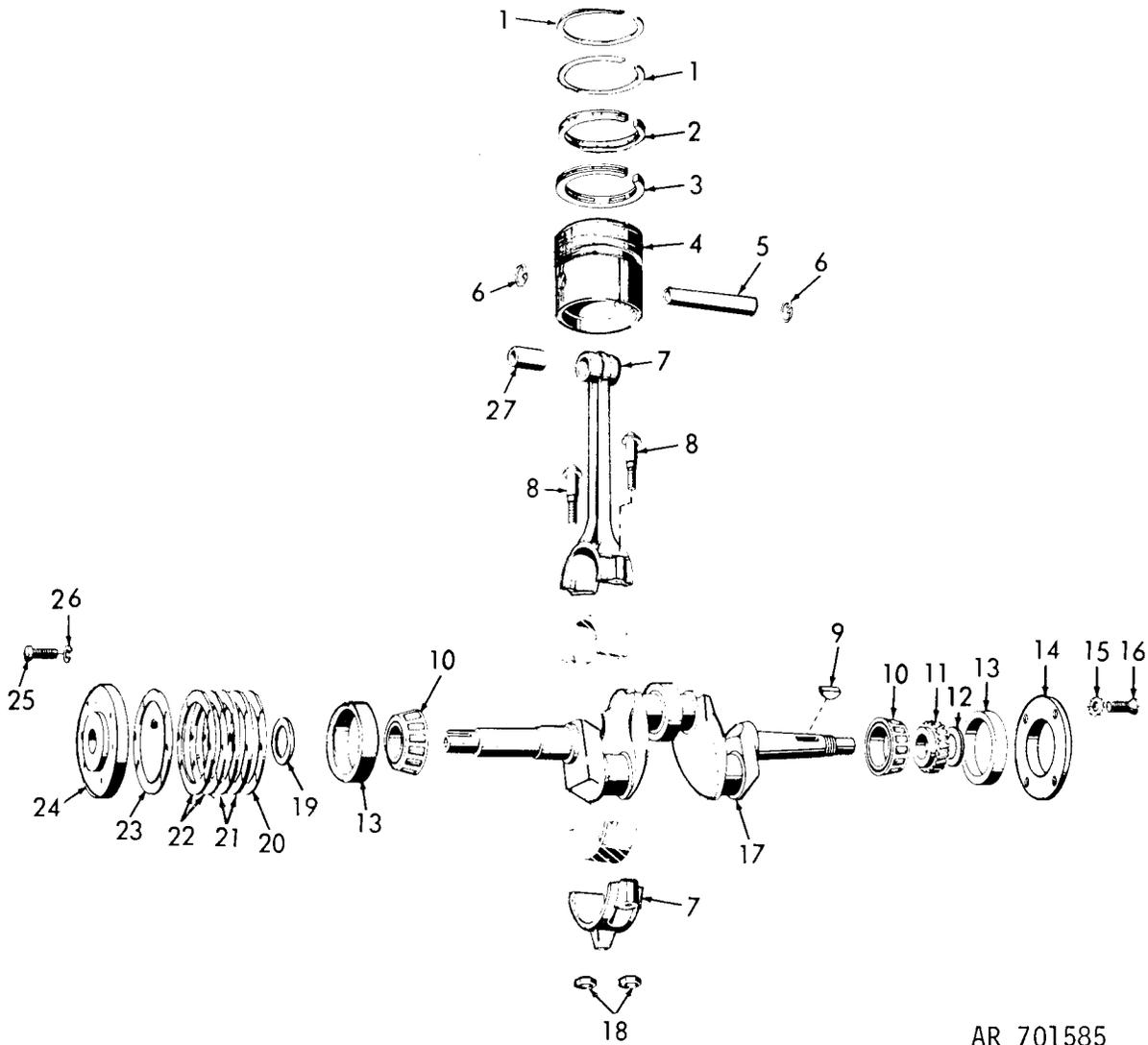
(6) Push the piston and connecting rod out through the top of the cylinder bore, Be careful not to scratch or mar the bore. Reassemble the connecting rod cap.

NOTE

The connecting rods and caps are matched and must be paired together to insure correct installation. The caps and rods are marked with their respective cylinder numbers.

c. Disassembly.

- (1) Remove the piston rings from the pistons.
- (2) Remove the retaining rings (6) and push the piston pin (5) out from the piston (4) and connecting rod (7).
- (3) Remove the piston pin bushing (27). Place the connecting rod in a press, and press out the bushing.



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- | | |
|----------------------|------------------------|
| Legend for fig 6-14: | 14. Main bearing plate |
| 1. Ring, compression | 15. Lockwasher (6) |
| 2. Ring, scraper | 16. Screw (6) |
| 3. Ring, oil | 17. Crankshaft |
| 4. Piston | 18. Nut |
| 5. Piston pin | 19. Seal |
| 6. Ring, retaining | 20. Gasket 0.006 inch |
| 7. Connecting rod | 21. Shim 0.006 inch |
| 8. Bolt | 22. Shim 0.014 inch |
| 9. Woodruff key | 23. Gasket 0.003 inch |
| 10. Bearing | 24. Bearing plate |
| 11. Gear, crankshaft | 25. Screw |
| 12. Oil slinger | 26. Lockwasher |
| 13. Cup | 27. Bushing piston pin |

Figure 6-14. Crankshaft, piston and connecting rod, exploded view.

d. Cleaning and Inspection.

(1) Using a wire brush, remove all carbon from the ring grooves in the pistons and from the top of the pistons, making sure that the oil holes in the lower ring grooves are open.

(2) Wash all parts in cleaning solvent and dry

thoroughly (app D).

(3) Measure the cylinder bores with an inside micrometer. Measure the bore lengthwise and crosswise above the ring travel; repeat the measurement at the top of the ring travel. The difference in these measurements will determine the amount of

wear in the cylinder bore, the taper and out-of-round condition.

(4) Clean the carbon from the top of the piston. Clean the ring grooves with a ring groove tool or a piece of an old ring.

(5) Wash all of the parts in cleaning solvent and blow dry with compressed air (app D).

(6) To measure the piston ring gap, place the ring into the cylinder bore in the approximate operating position, and measure the gap with a feeler gage. The gap clearance should be between 0.010 to 0.020 inch.

(7) Invert the piston and slide it into the cylinder bore. Check the piston-to-cylinder clearance at the piston skirt. The clearance should be 0.0037 to 0.0042 inch. The clearance must be measured at the center of the thrust face, at the bottom of the piston skirt.

(8) Measure the piston ring side clearance. Replace the piston if the side clearance is not within the following tolerances.

Topping0.0015 to 0.0035 inch

2nd and 3rd ring 0.0015 to 0.0035 inch

Oilring0.002 to 0.004 inch

(9) Measure the fit of the piston pin in the piston. The clearance should measure 0.0000 to 0.0008 inch.

(10) Check the piston pin bushing in the connecting rod for wear, scoring, or out-of-round condition. The clearance between the piston pin and bushing should be 0.0005 to 0.0011 inch. Replace bushing as necessary.

NOTE

When pressing in new bushings, be careful to align the oil hole in the bushing with the oil hole in the connecting rod.

(11) Inspect the connecting rod bearing halves for wear or scoring. Check the bearing to crank pin clearance; it should be between 0.0013 and 0.0035 inch. Replace if worn beyond the limits.

e. Reassembly of Connecting Rod and Piston.

(1) Using a fiber hammer, tap the piston pin (5, fig 6-14) into the piston (4) about one inch.

NOTE

Each piston and connecting rod is marked for its cylinder; make sure that the parts are assembled in the proper position.

(2) Place the proper connecting rod (7) in the matched piston so that the oil hole in the connecting rod cap is correct. Tap the piston pin into the other bore of the piston, and install the two retaining rings (6).

(3) Expand the oil ring (3) and install it in the bottom groove of the piston skirt. Next, install the scraper ring (2). Mount the scraper ring with scraper edge down. Install the compression rings (1). Stagger the piston ring gaps 90 degrees apart around the piston.

(4) Fit the connecting rod bolts (8) in the rod, and fit the upper bearing half so that the oil hole in the bearing aligns with the oil hole in the rod. Lightly oil the piston, piston rings and cylinder walls. Turn the crankshaft journal, to which the rod is to be attached,

to top dead-center. Use a ring compressor to compress the piston rings.

f. Installation of Connecting Rod and piston.

(1) Lower the piston into the cylinder. Using the butt end of a hammer handle, carefully push the piston and connecting rod into the cylinder until connecting rod rests on the crankshaft. This action will release the piston ring compressor.

(2) Assemble the lower rod cap. A number is stamped on each rod and cap to insure matching of the parts. Make sure the numbers agree for each rod and cap. Push the piston down while rotating the crankshaft to bottom dead-center. Position the cap on the rod so that its oil hole faces the oil spray nozzle. Secure the assembly with nuts (7) and tighten each nut to 26-32 ft. lbs. torque.

(3) Using a suitable feeler gage, measure the side clearance between the bearing and crankshaft. The clearance should measure at least 0.009 inch and not more than 0.016 inch.

(4) Install the oil pump. Refer to paragraph 6-15.

(5) Install the cylinder heads. Refer to paragraph 6-11.

6-18. CRANKSHAFT AND CAMSHAFT.

a. General. The crankshaft is supported at both ends by roller bearings. The outer race or cup of the bearing at the drive end of the engine is carried in the main bearing plate, which is secured to the crankcase with capscrews and lockwashers. Shims are installed between the bearing plate and crankcase to provide the proper crankshaft end play. The camshaft operates the valve tappets and fuel pump adapter. The cams and fuel pump eccentric are integral with the shaft. The two camshaft journals ride in honed bores in the crankcase.

b. Removal of the Crankshaft.

(1) Remove the cylinder heads and valves (para 6-11 and 6-12).

(2) Remove the fuel pump adapter (para 6-4).

(3) Remove the gear cover (para 6-15a(2)).

NOTE

When removing camshaft and idler gear, tag each gear to facilitate installation.

(4) Remove the idler and camshaft gears (para 6-17).

(5) Remove the connecting rods and pistons (para 6-17).

NOTE

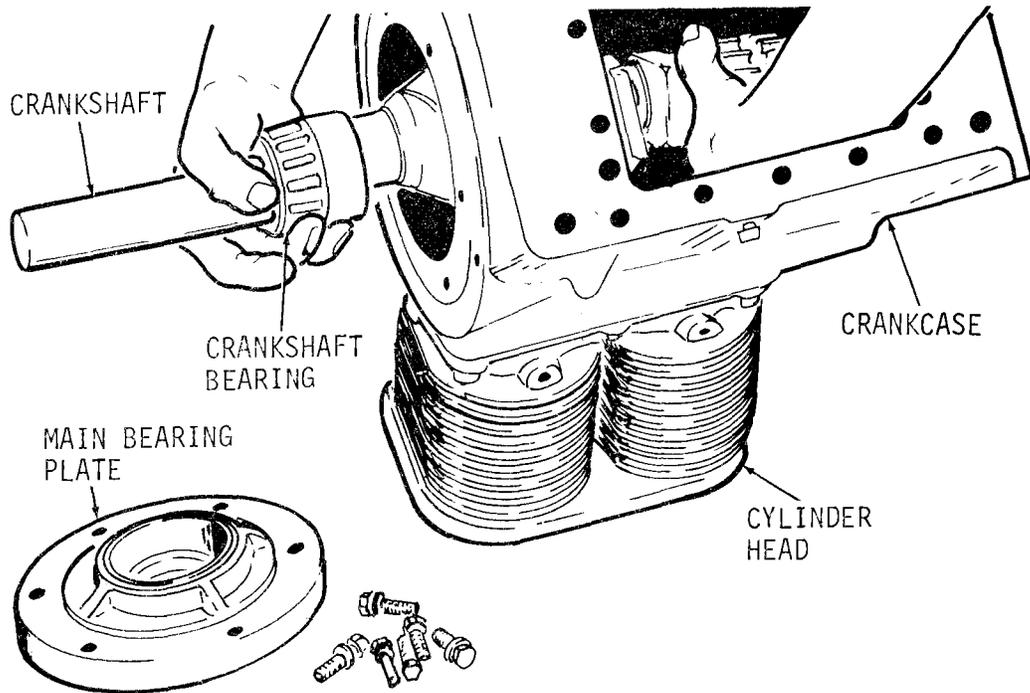
Keep the shims together so that the same shims will be reinstalled. If any are damaged, replace them with shims of the same thickness.

(6) Remove the six capscrews and lockwashers that secure the main bearing plate to the crankcase. Pry off the bearing plate, gaskets and any installed shims.

(7) Slide the oil slinger (12, fig 6-14) from the

flywheel end of the crankshaft (25) and carefully remove the assembled crankshaft through the rear

opening of the crankcase (fig 6-15).



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Figure 6-15. Crankshaft, removal and installation.

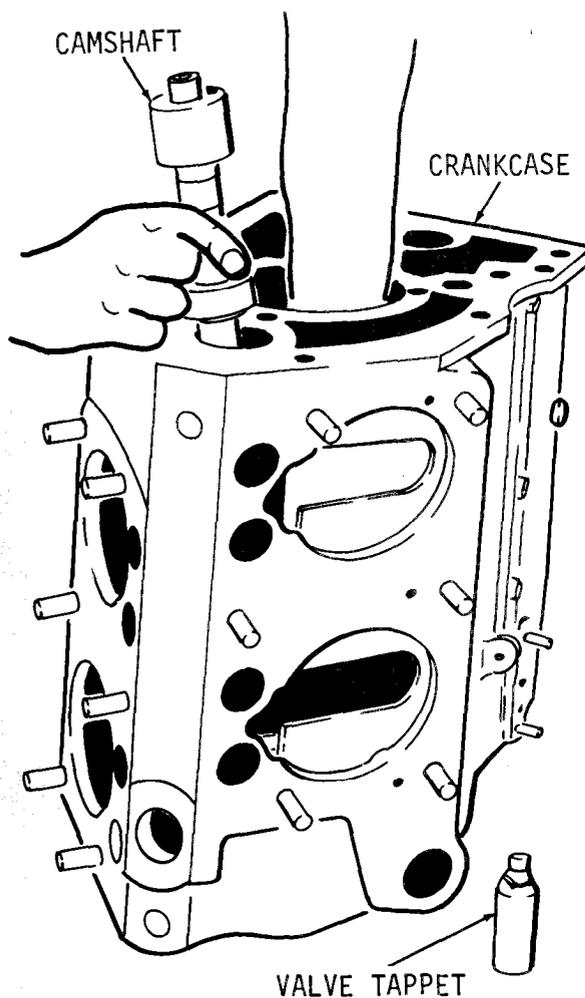
(8) Remove the crankshaft gear (20) with a press plate by pressing the crankshaft through the gear with an arbor press. Remove the woodruff key (17) from the crankshaft.

(9) Remove both bearings (6) from the crankshaft.

c. Removal of the Camshaft.

(1) Remove the tappets (5, fig 6-13) from the cylinder block.

(2) Carefully remove the camshaft from the flywheel end of the engine (fig 6-16).



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Figure 6-16. Camshaft removal and installation.

(3) With a sharp chisel, punch a hole in the expansion plug installed in the rear camshaft bore in the crankcase. Pry the expansion plug out with a screwdriver.

d. Cleaning, Inspection and Repair.

(1) Crankshaft.

(a) Wash the removed crankshaft parts in cleaning solvent and dry thoroughly (app D).

(b) Inspect the connecting rod journals on the crankshaft for scoring. Hone the journals to remove any slight scoring, or replace a defective crankshaft.

(c) Measure the journals. Replace a crankshaft that is worn more than 0.002 inch. The diameter of the crankshaft should be between 2.125 and 2.126 inches.

(d) Check the main bearing plate and bearing retainer plate for cracks, breaks, or burrs on the mating surface. File away any burrs. Replace a cracked or broken plate.

(e) Check the rear oil seal for damage or indication of wear. Replace a defective oil seal.

(f) Inspect the bearing cones and cups. Ordinarily they should be in good condition. Replace defective oil seals.

(g) Inspect the hardware for bad threads, rust, or damage incurred during removal. If the screws have bad threads, replace the screws. Repair the mounting holes by running a tap into them. Replace any other defective hardware.

(h) Replace the main bearing plate gaskets.

(2) Camshaft

(a) Wash the camshaft and tappets with cleaning solvent and dry thoroughly (app D).

(b) Inspect the camshaft for alignment, scoring, and roughness on the cams and journals. Repair any slight roughness, or replace a badly scored camshaft.

(c) Measure the camshaft journals and cams. Replace the camshaft if either the journals or cams are worn beyond the limits of allowable wear. The no. 1 camshaft journal should be between 1.8725 and 1.8730 inches. The smaller no. 2 journal should be between 1.2475 and 1.2480 inches.

(d) Measure the camshaft journals and the camshaft bores in the crankcase. If the difference in diameters exceeds 0.0035 inch, and the camshaft is within the wear tolerances, replace the crankcase. If the difference in diameter is less than 0.002 inch, ream and hone the crankshaft bores.

e. Reassembly and Installation.

(1) Camshaft.

(a) Apply a thin coat of oil to the tappets (5, fig 6-13), and install them in the proper bores in the crankcase. Place a prop under the tappets so as to clear the camshaft when it is installed.

(b) Apply a thin coat of oil to the camshaft (4), and install it in the crankcase. Install a new expansion plug. Remove the props from under the tappets.

(2) Crankshaft.

(a) Press the bearings (6, fig 6-14) on the crankshaft.

(b) Install the key (17) in the crankshaft keyway. Align the keyway in the crankshaft gear (20) with the installed key, and press the gear on the shaft.

(c) Assemble the oil seal in its retainer and press the assembly into the main bearing plate with the retainer facing toward the exterior face of the plate.

(d) Press the bearing into the main bearing plate.

(e) Apply a coat of bearing grease to the roller bearings.

(f) Carefully install the crankshaft into the crankcase through the rear opening of the crankcase. Engage the crankshaft gear in the gear train so that the timing mark on the camshaft gear aligns with the timing mark of the crankshaft gear.

(g) Apply a thin coat of grease to the two gaskets (28). Position the thicker gaskets (27) around the rear opening of the crankcase and the gasket on the main bearing plate.

(h) Install the bearing plate and shims on the crankcase. Secure them with the six capscrews and lockwashers. Tighten capscrews to 25-30 lbs. ft. torque.

(i) Use a dial indicator and set its contact point against the end of the crankshaft. With a screwdriver pry the crankshaft back and forth, being careful not to damage the connecting rod journals. If the end play of the crankshaft exceeds 0.005 inch, remove shims to adjust. Add shims if there is not at least 0.002 inch end play.

(j) Install the connecting rods and pistons (para 6-17).

(k) Install the idler and camshaft gears (para 6-16).

(1) Install the gear cover (para 6-15a (2)).

(m) Install the fuel pump (para 6-4).

(n) Install the cylinder heads and valves (para 6-11 and 6-12).

6-19. CYLINDER BLOCKS AND CRANKCASE.

a. General.

(1) *Crankcase.* The crankcase is a one-piece casting machined at the top and fitted with studs to mount the two cylinder blocks. The camshaft bores are honed, and serve as bearing surfaces for the camshaft.

(2) *Cylinder Blocks.* The cylinder blocks are cast in pairs and are provided with cooling fins. The valve stem bores are machined in each of the blocks.

b. Removal of Cylinder Block.

(1) Remove the valves (para 6-12).

(2) Remove the connecting rod and pistons (para 6-17).

(3) Remove the six nuts (21, fig 6-6) and lockwashers (22) that secure each cylinder block (12) to the crankcase. Remove the cylinder blocks and gaskets (1). Tag them so that they will be reinstalled on the same side of the crankcase from which they are removed.

c. Cleaning and Inspection of Cylinder Block.

(1) Clean, inspect and repair the cylinder bores as necessary.

(2) Clean, inspect and repair the valve seats and

bores as necessary.

(3) Use a wire brush, compressed air, and cleaning solvent to clean the cooling fins of the cylinder blocks. Inspect the cylinder blocks for cracks, breaks, or damaged cooling fins. Replace defective cylinder block.

(4) Inspect the manifold mounting studs, cylinder block mounting studs, mounting hardware. Tighten any loose mounting studs. Replace any defective hardware.

(5) Examine the threaded cylinder head mounting holes. Repair any holes that have bad threads.

(6) Replace the cylinder block gaskets.

d. Installation of the Cylinder Block.

(1) Position a new gasket (1, fig 6-6) over the studs of the crankcase. Install the appropriate cylinder block (12) and secure it with the six lockwashers (22) and nuts (21). Tighten the nuts to 62-78 lbs. ft. torque.

(2) Install the pistons and connecting rods (para 6-17).

(3) Install the valves (para 6-12).

e. Disassembly of the Crankcase.

(1) Remove the timing gears (para 6-16).

(2) Remove the crankshaft (para 6-18).

(3) Remove the camshaft (para 6-18).

(4) Remove the cylinder blocks (para 6-19).

(5) Remove the oil filler tube.

f. Cleaning and Inspection of the Crankcase.

(1) Clean the crankcase with a wire brush and cleaning solvent and dry thoroughly (app D).

(2) Examine the oil filler tube for corrosion, bends, or dents. Repair or replace the oil filler tube as necessary.

(3) Examine the crankshaft bores. Replace a defective crankcase.

(4) Examine the crankcase for cracks or breaks. Replace a defective crankcase.

g. Reassembly of the Crankcase.

(1) Chill the oil filler tube with dry ice and install in the crankcase.

(2) Install the camshaft (para 6-18).

(3) Install the crankshaft (para 6-18).

(4) Install the timing gears (para 6-16).

(5) Install the cylinder blocks (para 6-19).

CHAPTER 7

REPAIR OF ENGINE STARTER

Section I. INTRODUCTION

7-1. GENERAL. This provides procedures for removal, disassembly, cleaning, inspection, repair, assembly, and installation of the engine starter.

Section II. MAINTENANCE INSTRUCTIONS

7-2. ENGINE STARTER.

a. Removal. Refer to paragraph 4-20 and remove the engine starter.

b. Disassembly. Refer to figure 7-1 and disassemble the starter.

c. Cleaning Inspection and Repair.

(1) Clean all metal parts in cleaning solvent and dry thoroughly (app D).

(2) Clean frame with a clean cloth dampened with cleaning solvent and dry thoroughly with compressed air (app D).

(3) Clean brush holder and springs with a brush and cleaning solvent. Dry thoroughly with compressed air (app D).

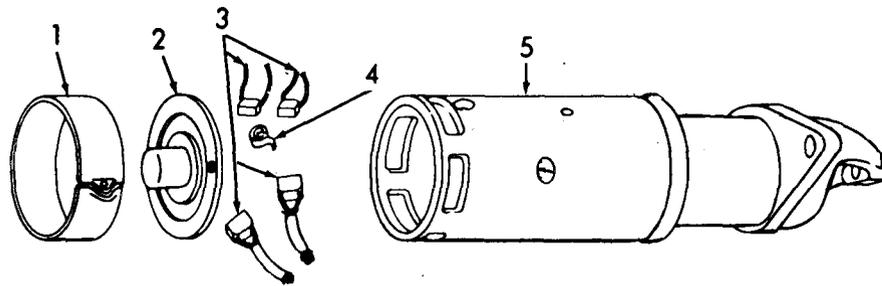
(4) Clean brushes with a clean, dry cloth only. Do not permit cleaning solvent to come in contact with brushes.

(5) Replace brushes if less than 1/2 inch long.

d. Reassembly and Installation.

(1) Reassemble starter in reverse order of disassembly.

(2) Install the starter in reverse order of removal.



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Legend for fig 7-1:

1. Cover hand
2. Commutator end housing
3. Brushes
4. Brush spring
5. Housing

Figure 7-1. Starter, exploded view.

CHAPTER 8 REPAIR OF GENERATOR-WELDER

Section I. INTRODUCTION

8-1. GENERAL. The generator-welder is a multi-purpose machine capable of generating direct current for welding and 120 volts, single phase, 60 hertz, to oper-

ate electrical equipment. The 4 cycle gasoline engine is the only source of power to operate the generator-welder.

Section II. GENERATOR-WELDER MAINTENANCE

8-2. ON-EQUIPMENT TESTING.

a. Generator-Welder Armature. Refer to TM 5-764 for armature testing procedures.

b. Shunt Field. Refer TM 5-764 for shunt field testing procedures.

c. Welding Generator Series Field Group. Refer to TM 5-764 for series field group testing procedures.

d. Welding Generator Interpole Group. Refer to TM 5-764 for interpole group testing procedures.

8-3. GENERATOR-WELDER.

a. Removal and Disassembly.

(1) Refer to paragraph 6-3 to remove generator-welder from the engine.

(2) Refer to paragraph 4-45 to remove welder brushes.

(3) Refer to paragraph 4-46 to remove end cover housing.

(4) Refer to paragraph 4-47 to remove auxiliary-generator brushes.

(5) Refer to figure 6-1 and remove four capscrews securing auxiliary-generator housing to generator housing.

(6) Remove the armature from the generator housing and place in a suitable stand.

(7) Remove two bolts and nuts securing brush holder to generator housing and remove brush holder.

b. Testing During or After Disassembly. Refer to TM 5-764 and test each component of the generator-welder at the appropriate time during disassembly.

c. Cleaning and Inspection.

(1) Clean all metal parts with cleaning solvent and dry thoroughly (app D).

(2) Inspect holder assembly for breaks, cracks, or other damage. Replace all parts found to be defective.

CAUTION

Do not use emery paper or emery cloth on any commutator.

(3) Clean a slightly dirty or discolored commutator with no. 00 sandpaper. Blow sand, dust and dirt from the armature with clean, dry, compressed air.

(4) Inspect the armature shaft bearing surface for wear, galling roughness or other damage. Replace a damaged bearing.

(5) Inspect the welder commutator and auxiliary

generator commutator for roughness, wear, or eccentricity. Measure the commutator runout with a dial indicator. Place the armature assembly in a lathe and turn a commutator that is 0.003 inch or more out-of-round. Make light cuts until the commutator is clean,

(6) Undercut the mica separators in the commutator to a depth of one-thirty-second inch below the commutator bars, either by hand or by machine.

(7) Inspect all stator assemblies and field coils for defective insulation broken leads, or other defects. Replace defective windings, leads or insulation.

(8) Inspect generator housing and auxiliary generator for cracks or breaks. Weld minor cracks and replace a damaged housing.

(9) Inspect the generator-welder base for cracks, breaks, and damaged mounting hardware. Weld cracks and minor breaks. Replace damaged mounting hardware.

d. Reassembly. Reassemble in reverse order of disassembly.

e. Installation. Install generator-welder in reverse order of removal.

8-4. GENERATOR BEARING SERVICE.

a. General. The generator end bearing is the only thing requiring lubrication. Greasing twice yearly is sufficient for the bearing under normal use. Pressure fittings are not recommended, because grease, under pressure, may go through the bearing grease seal and into the commutator.

b. Removal. Use a puller and remove bearing from armature shaft.

c. Cleaning and Inspection.

(1) Clean the bearings in solvent and place on clean absorbent paper and allow to drain dry. Do not spin the bearing dry with compressed air.

(2) Inspect the bearing for cracked balls or race, burned or galled spots, or excessive play due to normal wear. Replace a damaged or worn bearing.

d. Installation

(1) Repack the bearing with approximately one ounce of grease, automotive and artillery, before installation. Pack the space to be covered by the cover plate.

(2) Install bearing on the armature shaft.

CHAPTER 9
REPAIR OF PNEUMATIC EQUIPMENT

Section I. INTRODUCTION

9-1. GENERAL. This section covers repair instructions for the air compressor and drive motor. The motor is rated at 1-1/2 horsepower, 115 volt, 60 hertz single

phase alternating current. The air compressor is a two cylinder, single stage and rated at 5 cfm.

Section II. AIR COMPRESSOR AND RELATED PARTS

9-2. AIR COMPRESSOR.

a. *Removal* Refer to paragraph 4-36 for removal of the air compressor.

b. *Disassembly.* Disassemble air compressor as illustrated in figure 9-1.

c. *Cleaning Inspection and Repair.*

(1) Clean all parts with cleaning solvent and dry thoroughly (app D).

(2) Inspect the cylinder head for cracks, breaks, warpage, and other damage.

(3) Inspect the baseplate for cracks, burrs and other defects.

(4) Inspect the crankcase for cracks, breaks, damaged threads, scoring, wearing, warpage and other defects.

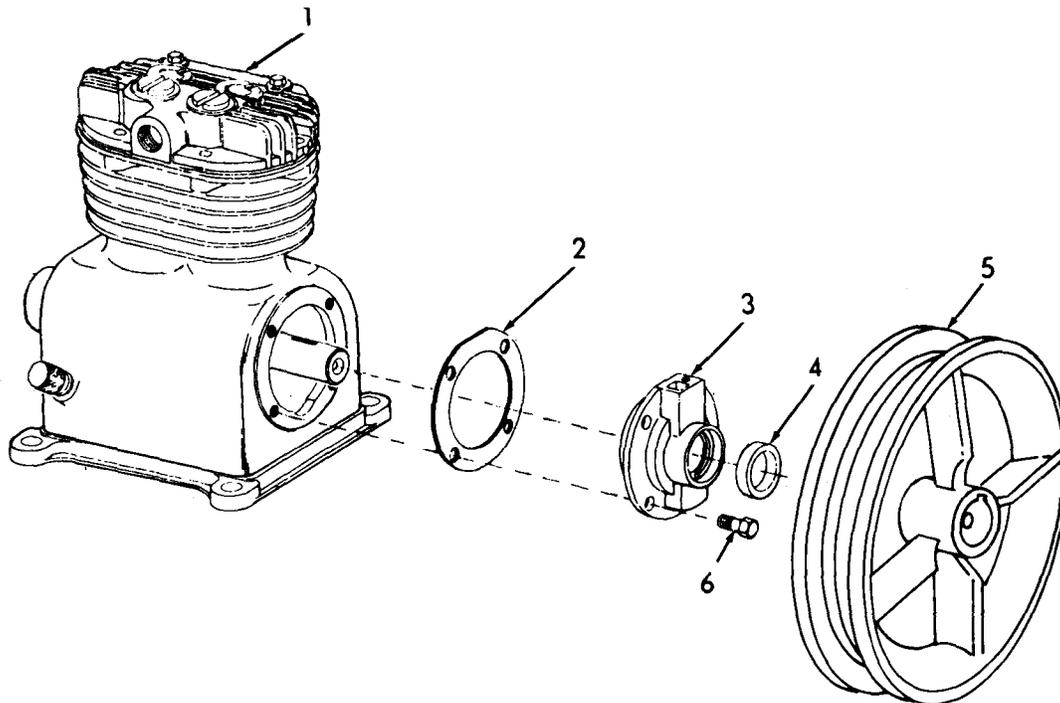
d. *Reassembly.*

(1) Reassemble the air compressor in reverse order of removal.

(2) Use the following torque values in reassembling the air compressor:

End cover bolts	5 lbs. ft.
Pulley screw	10 lbs. ft.

e. *Installation.* Install the air compressor in reverse order of removal,



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Legend for fig 9-1:
1. Air compressor
2. End cover gasket
3. End cover

4. Oil seal
5. Pulley assembly
6. Bolt

Figure 9-1. Air compressor, exploded view.

9-3. AIR COMPRESSOR DRIVE MOTOR.

a. *Removal.* Refer to paragraph 4-38 and remove drive motor.

b. *Disassembly.* Refer to figure 9-2 and disassemble the drive motor.

c. *Cleaning and Inspection.*

(1) Clean parts in cleaning solvent and dry thoroughly (app D).

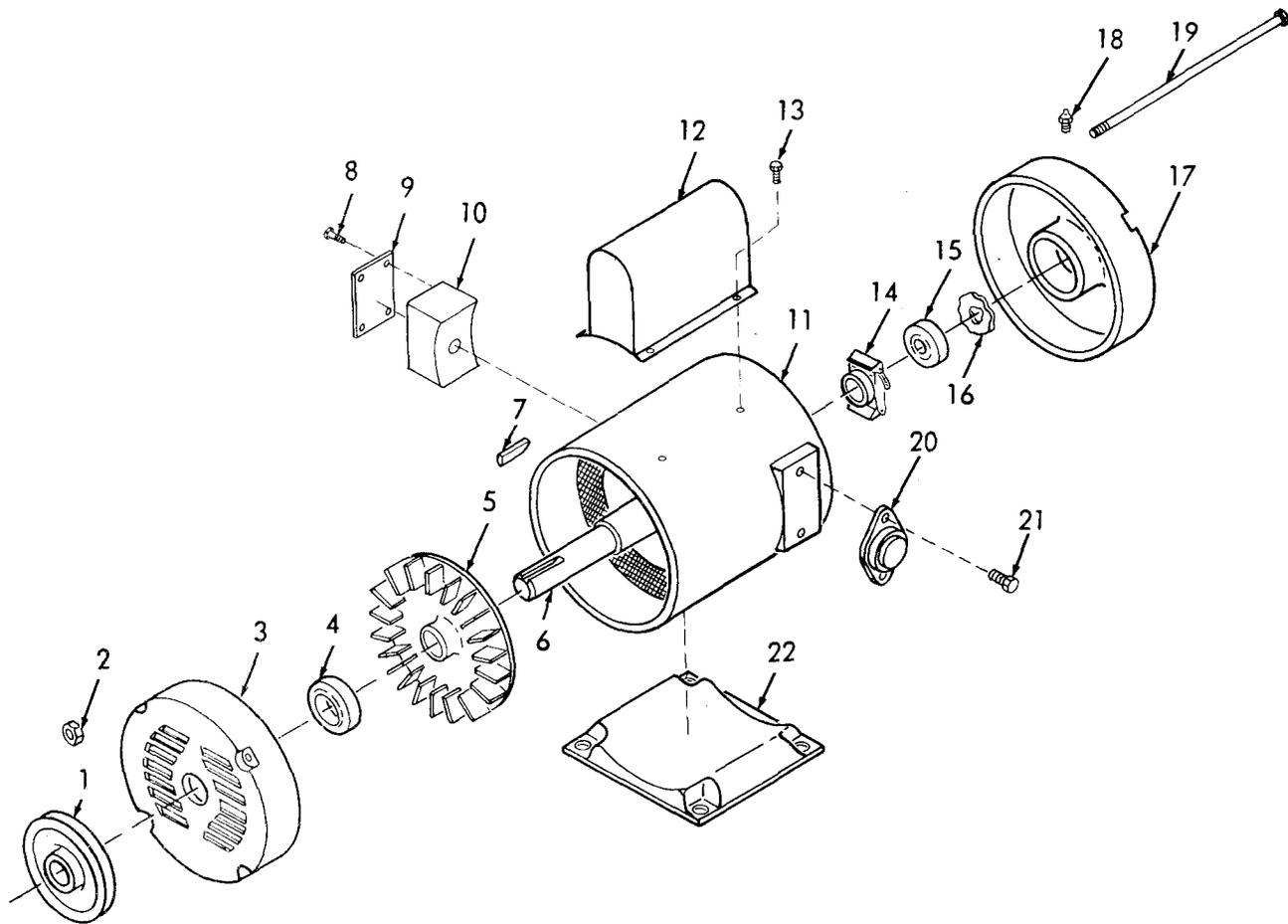
(2) Inspect for cracks, pitting, burning, excessive wear and other damage.

(3) Replace defective parts or a defective motor that is damaged beyond repair.

d. *Testing After Disassembly.* Test the motor for open or shorted circuits and for insulation resistance (TM 5-764).

e. *Reassembly.* Refer to figure 9-2 and reassemble the drive motor in reverse order of disassembly.

f. *Installation.* Refer to paragraph 4-38 and install the drive motor in reverse order of removal.



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Legend for fig 9-2:

- 1. Pulley
- 2. Nut (4)
- 3. End plate
- 4. Bearing
- 5. Fan
- 6. Shaft assembly
- 7. Woodruff key
- 8. Screw (4)
- 9. Cover
- 10. Conduit box
- 11. Body assembly

- 12. Capacitor box
- 13. Screw (2)
- 14. Switch
- 15. Bearing
- 16. Wavy washer
- 17. End plate
- 18. Grease fitting (2)
- 19. Bolt
- 20. Thermal switch
- 21. Bolt
- 22. Base

Figure 9-2. Air compressor drive motor, exploded view.

APPENDIX A
REFERENCES

A-1 Maintenance

TM 38-750 The Army Maintenance Management System
TM 5-764 Electrical Motor and Generator Repair
TM 9-4940-421-24P organizational, Direct Support And General Support Maintenance Repair Parts And
Special Tools List (Including Depot Maintenance Repair Parts And Special Tools) For
Shop Equipment Contact Maintenance Truck Mounted.

A-2. Shipment and Storage

TM 740-90-1 Administrative Storage of Equipment

A-3. Destruction of Equipment

TM 750-244-3 Procedures For Destruction of Equipment To Prevent Enemy Use,

**APPENDIX B
BASIC ISSUE ITEMS**

Section I. INTRODUCTION

B-1. SCOPE. This appendix lists basic issue items; items troop installed or authorized for operation or operator's maintenance of the shop set.

B-2. GENERAL. This basic issue items; items troop installed or authorized is divided into the following sections:

a. Section II. Basic Issue Items List. A list of items which are furnished with and which must be turned in with the end item.

b. Section III. Items Troop Installed or Authorized List. A list of items which at the discretion of the unit commander, may accompany the end item, but should not be turned in with the end item.

b-3. EXPLANATION OF COLUMNS.

a. Illustration. This column is divided as follows:

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

(2) *Item Number.* The number used to identify each item called out in the illustration.

b. National Stock Number Indicates the National Stock Number assigned to the item and will be used for requisitioning purposes.

c. Part Number Indicates the primary number used by the manufacturer (individual, company, firm, corporation or government activity), which controls the design and characteristics of the item by means of its engineering drawings, specification standards, and inspection requirements, to identify end item or range of items.

NOTE

When a stock numbered item is requisitioned, the repair part received may have a different part number than the part being replaced.

d. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or government agency, etc.

e. Description. Indicates the federal item name and, if required, a minimum description to identify the item. The last line for each item in the BIIL and ITIAL indicates the part number with the FSCM in parentheses.

f. Unit of Measure (U/M). Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (eg., ea, in., pr, etc). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

g. Quantity Furnished with Equipment (Basic Issue Items Only). Indicates the quantity of the item authorized to be used with the equipment.

h. Quantity Authorized (Items Troop Installed or Authorized Only). Indicates the quantity of the item authorized to be used with the equipment.

Section II. BASIC ISSUE ITEMS LIST

(1) Illustration		(2) National Stock Num	(3) Part No. & FSCM	(4) Description	(5) Location	(6) Unble On Code	(7) Qty Reqd	(8) Quantity			
(a) Figure No.	(b) Item No.							Rcv'd	Date	Date	Date
		7510-00-889-3494		Binder, Log Book							
		2540-00-670-2459		Bag Assembly, Pamphlet							
				DA Technical Manual TM 9-4940-421-14							

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C-1 GENERAL.

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

b. The Maintenance Allocation Chart (MAC) in Section II, designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component, will be consistent with the assigned maintenance functions.

c. Section HI lists the special tools and test equipment required for each maintenance function as referenced from Section II.

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

C-2. MAINTENANCE FUNCTIONS.

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and detect incipient failure by measuring the mechanical 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 (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

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

e. Align. 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 measurements. 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. Install The act of emplacing, seating or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. The-act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services or other maintenance actions to 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.

i. Overhaul. That maintenance effort (services/actions) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. 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.

C-3. COLUMN ENTRIES USED IN THE MAC.

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

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 Functions. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see para C-2).

d. Column 4, Maintenance Level. Column 4 specifies by listing of a "work time" figure in the appropriate subcolumn(s) the lowest level of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform the 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 number of manhours specified by 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, troubleshooting 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
- O Organization 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, test, and support equipment required to perform the designated function.

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

C-4. COLUMN ENTRIES USED IN TOOLS AND TEST EQUIPMENT REQUIREMENTS.

a. Column 1, Tool or Test Equipment Reference

Cose. The tool and test equipment reference code correlates with a maintenance function on the identified end item or component.

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.

C-5. EXPLANATION OF COLUMNS IN SECTION IV.

a. Reference Code. The code scheme recorded in Column 1, Section III.

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

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
01 0100	ENGINE ENGINE ASSEMBLY	Inspect Test Service Replace Repair Overhaul	0.1 0.3	0.1	2.2	1.3	12.0		
0101	CRANKCASE, CYLINDER BLOCK Cylinder Head Cylinder Block Manifold	Inspect Replace Inspect Replace Inspect Replace			0.2 0.5	0.2 0.7			
0102	CRANKSHAFT CRANKSHAFT ASSEMBLY Pistons and Rods Flywheel Assembly Camshaft	Replace Repair Inspect Replace Inspect Replace Repair Inspect Replace Repair			1.9	0.4 0.8	0.5		
0103	ENGINE LUBRICATION SYSTEM Filter, Oil Pan, Oil Pump, Oil	Service Replace Inspect Replace Inspect Replace	0.1 0.2		0.1 1.5	0.2 0.8			

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
	Valve, PCV and Crankcase Breather	Inspect Service Replace	0.1 0.2 0.3						
0104	FUEL SYSTEM Carburetor	Inspect Adjust Replace		0.7 0.4 0.5					
	Pump, Fuel	Inspect		0.1 0.5					
0105	AIR CLEANER Air Cleaner Assembly	Inspect Service Replace	0.2 0.1 0.4						
0106	ENGINE SPEED GOVERNOR AND CONTROLS Governor Assembly	Inspect Replace Adjust		0.1 0.9 0.1					
0107	FUEL FILTER Strainer Assembly	Inspect Service Replace	0.1 0.3 0.4						
0108	COOLING SYSTEM Cowling, Air Ducts Shrouds, Air Baffle	Inspect Replace	0.1	0.6					
0109	ELECTRICAL SYSTEM Stator Assy, Alternator	Inspect Test Replace			0.2 0.4 0.3				
	Battery	Inspect Replace	0.1	0.2					
0110	STARTING MOTOR Starter, Engine	Inspect Replace Inspect		0.1 0.5 0.2 0.3					
0111	IGNITION COMPONENTS Distributor Assembly	Inspect Adjust Replace Repair		0.1 0.3 0.5	0.5				
	Spark Plugs	Inspect Adjust Replace		0.1 0.1 0.2					
	Ignition Coil	Inspect Replace		0.1 0.2					
0112	EXHAUST SYSTEM Muffler	Inspect Replace		0.1 0.5					
	Exhaust Pipe	Inspect Replace		0.1 0.4					
02 0201	FUEL SYSTEM LINES AND FITTINGS Filler Tube	Inspect Replace	0.1	0.6					
03 0301	ELECTRICAL SYSTEM LIGHTS Taillight	Inspect Replace	0.1	0.2					
	Clearance	Inspect Replace	0.1	0.2					
0302	POWER RECEPTACLE	Inspect Replace	0.1	0.3					
0303	WIRING HARNESS	Inspect Replace		0.1	0.4				

(1) Group Number	(2) Component/Assembly	(3) Maintenance function	(4) Maintenance level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
04	FRAME								
0401	BASE, GENERATOR-WELDER AND ENGINE MOUNTING	Inspect Replace		0.1 0.5					
05	BODY								
0501	STOWAGE STRAPS	Inspect Replace	0.1 0.4						
0502	SPECIAL PURPOSE BODIES								
	Body Assy.	Inspect Replace	0.2 2.0						
	Compartment	Inspect	0.1						
	Doors and Roof	Inspect	0.5						
	Vent Door	Replace							
	Rear Door Assy. and Tailgate	Inspect Replace	0.1 0.5						
06	BODY CHASSIS ACCESSORY ITEMS								
0601	ACCESSORY ITEMS								
	Reflectors	Inspect Replace	0.1 0.3						
	Bumper	Inspect Replace	0.1 0.5						
0602	DATA PLATES								
	Plate, Instruction	Inspect Replace	0.1 0.2						
07	WELDING EQUIPMENT								
0701	ARC WELDER								
	Generator Assembly	Inspect Test Service Replace Repair Overhaul	0.1 0.2 0.2 0.5	0.2 0.5	0.7	1.2			
0702	ROTOR ASSEMBLY								
	Armature Assy.	Test Replace Repair Overhaul		0.2 0.3 0.4	0.5				
0703	STATOR ASSEMBLY								
		Test Replace Repair Overhaul		0.2 0.3 0.4	0.7				
0704	BRUSH HOLDER ASSEMBLY.								
	Brushes	Inspect Replace	0.1 0.3						
0705	GENERATOR HOUSING COVER								
		Inspect Replace	0.1 0.2						
0706	FRAME SUPPORT								
		Inspect Replace	0.1 0.1						
0707	HOUSING CARRIER								
		Inspect Replace	0.1 0.1	0.4					
0707	VENTILATING SYSTEM								
	Fan Cover	Inspect Replace	0.1 0.2						
	End Cover Housing	Inspect Replace	0.1 0.2						
0708	CONTROL PANEL HOUSING CUBICLE								
	Guard Assembly	Inspect Replace	0.1 0.2						
	Panel Assembly	Inspect Replace	0.1 0.3						
	Meters	Inspect	0.1						
	Frequency	Replace	0.2						
	Running Time								
	Ammeter								
	Wiring Assy.	Inspect	0.3						

(1) Group Number	(2) Component/Assmly	(3) Maintenance function	(4) Maintenance level					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
	Circuit Breaker	Replace			1.2				
		Inspect		0.1					
	Receptacles	Replace		0.2					
		Inspect		0.1					
	Choke Assembly	Adjust		0.1					
		Replace		0.5					
	Throttle Assembly	Adjust		0.1					
		Replace		0.5					
0709	CONNECTING DEVICES								
	Terminal Board	Inspect			0.1				
		Replace			0.6				
0710	SWITCHES AND CONTROLS								
	D.C. Selector Switch	Inspect		0.1					
		Replace		0.5					
	Replay, Overspeed	Inspect		0.1					
		Replace		0.3					
0711	VOLTAGE REGULATOR			0.1					
	Fuse	Replace		0.2					
08	GAGES (NONELECTRICAL)	Replace		0.1					
0801	OIL PRESSURE	Inspect		0.1					
		Replace		0.2					
0802	LINES AND FITTINGS	Inspect		0.1					
		Replace		0.2					
09	PNEUMATIC EQUIPMENT								
0901	AIR COMPRESSOR ASSEMBLY	Inspect	0.2						
		Service	0.4						
		Adjust		0.3					
		Replace		2.1					
	Head Cylinder	Inspect	0.1						
	Inlet Filter	Service	0.3						
		Replace		0.2					
0902	UNLOADER SYSTEM COMPONENTS								
	Pressure Switch	Inspect	0.1						
		Adjust		0.2					
		Replace		0.3					
	Pop-off Valve	Inspect	0.1						
		Adjust		0.2					
		Replace		0.3					
0903	AIR RECEIVER								
	Tank Assembly	Inspect	0.1						
		Service	0.1						
		Replace		0.4					
0904	AIR DISCHARGE SYSTEM								
	Lines	Inspect	0.1						
		Replace		0.3					
0905	V-BELT	Inspect	0.1						
		Adjust		0.1					
		Replace		0.2					
0906	DRIVE MOTOR	Inspect	0.1						
		Service	0.1						
		Replace		0.3					
10	FIRE FIGHTING EQUIPMENT COMPONENTS								
	FIRE EXTINGUISHER	Inspect	0.1						
		Test	0.1						
		Service	0.2						
		Replace	0.1						

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

Not applicable

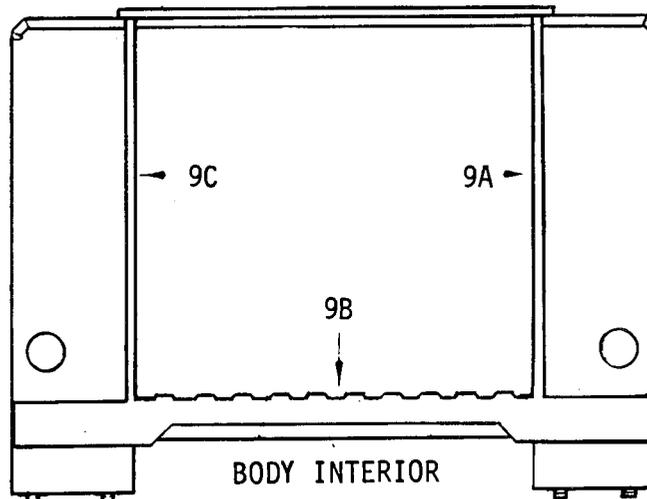
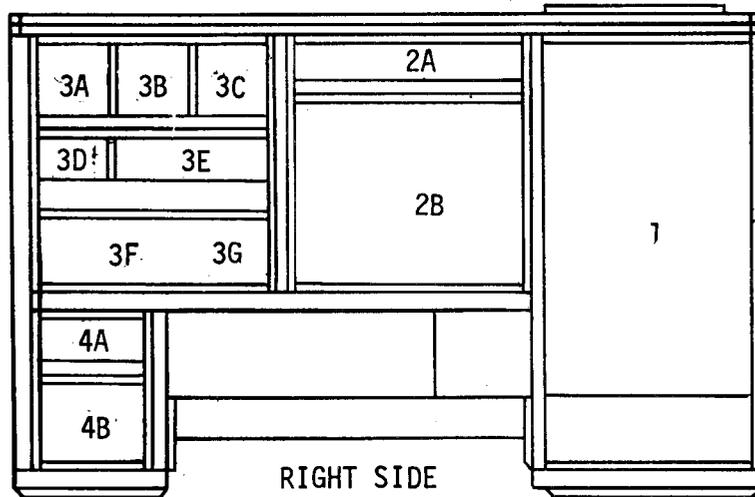
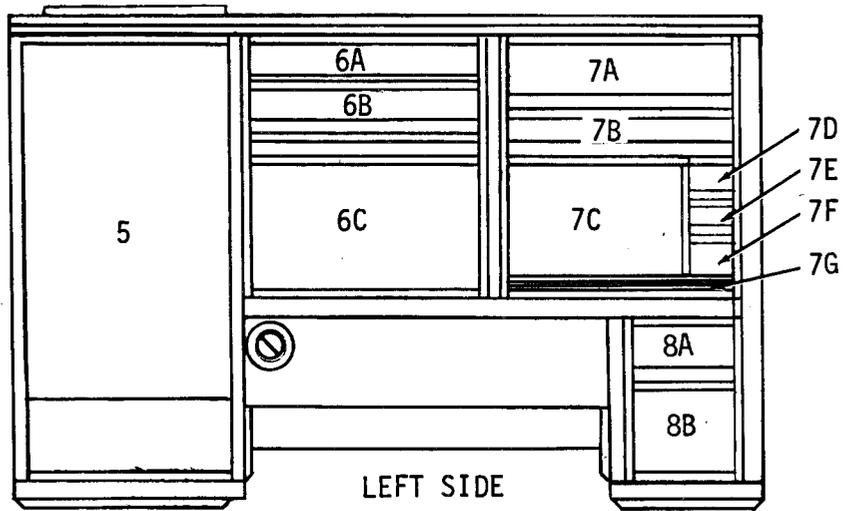
Section IV. REMARKS

Not applicable

**APPENDIX D
EXPENDABLE CONSUMABLE MAINTENANCE
SUPPLIES AND MATERIALS**

Item	Description	Ref No. FSCM	NSN
1	LUBRICATING OIL OE/HDO 30 OE/HDO 10 OES	MIL-L-2104 MIL-L-2104 MIL-L-0295	9150-00-265-9435 9150-00-269-9428 9150-00-402-2372
2	GREASE AUTOMOTIVE: GAA	MIL-L-10924	9150-00-190-0904
3	CLEANING SOLVENT	MIL-PD-680	6810-00-664-0387
4	RAG, WIPING	DDD-R-30	7920-00-205-1711

APPENDIX E CONTENTS OF SHOP SET



AR 701591

Figure E-1. Shop set tool location.

This appendix contains a list of tools and equipment of the shop set. The first column lists the National Stock Number, the second column lists the description, the

third column lists the location reference, and the fourth column lists the quantity.

CONTENTS OF SHOP SET

NSN	Description	Location	Qty
8120-00-264-5531	ADAPTER, COMP GAS CYL	9B	1
8120-00-264-5530	ADAPTER, COMP GAS CYL	9B	1
8120-00-695-5867	ADAPTER, COMP GAS CYL	9B	1
8120-00-695-6001	ADAPTER, COMP GAS CYL	9B	1
8120-00-695-6044	ADAPTER, COMP GAS CYL	9B	1
8120-00-695-5983	ADAPTER, COMP GAS CYL	9B	1
5935-00-081-8025	ADAPTER, CONNECTOR	9B	2
5130-00-293-2330	ADAPTER, SPINDLE	3A	1
4730-00-273-0905	ADAPTER, TUBE TO HOSE LH	9B	2
4730-00-273-0668	ADAPTER, TUBE TO HOSE RH	9B	2
4910-00-348-7600	ADAPTER SET---ELECTRIC TEST	6A	1
8415-00-250-2531	APRON, WELDERS	5	1
5330-00-233-5840	ASBESTOS SHT, COMP RUBBER	3A	1
5330-00-641-1192	ASBESTOS SHT, COMP GRAPHITE	1	1
5110-00-243-0901	BLADE, HAND HACKSAW, 10 PER BUNDLE	9B	2
6150-00-809-9029	CABLE ASSY, POWER, ELEC	2A	2
6150-00-866-2358	CABLE ASSY, POWER, ELEC	2A	2
5120-00-180-0909	CLAMP, C LIGHT	3D	2
5120-00-222-1613	CLAMP, C MEDIUM, CAST	3D	2
5975-00-913-0883	CLAMP, ELECTRICAL BRONZE	9B	1
5940-00-679-9547	CLAMP, GROUND	5	1
4730-00-116-5121	CLAMP, HOSE	9B	5
4730-00-554-8698	CLAMP, HOSE	9B	5
4730-00-908-3193	CLAMP, HOSE	9B	4
4730-00-927-3838	CLAMP, HOSE	9B	3
4730-00-908-6292	CLAMP, HOSE	9B	3
5120-00-494-1895	CLAMP, PLIER	9B	2
3439-00-262-7556	CLEANER SET, WELDING	9B	1
3439-00-383-3634	CLEANER SET, WELDING	9B	1
5350-00-192-5047	CLOTH, ABRASIVE GRADE 1/0 50 sheets	3C	1
5350-00-192-5050	CLOTH, ABRASIVE GRADE 4/0 50 sheets	3C	1
5330-00-291-1685	CORK SHEET	3A	2
4730-00-595-1813	COUPLE HALF	9C	1
4730-00-595-1813	COUPLE HALF	9B	1
4730-00-142-1958	COUPLE HALF	9B	2
	COUPLE HALF	9B	3
4730-00-176-4292	COUPLE HALF	9B	3
7510-00-223-6708	CRAYON, MARKING	3D	1
5120-00-240-6040	CROWBAR	9B	1
5120-00-184-8400	CROWFOOT ATTACH, SOCKET WRENCH	9B	1
5110-00-224-7057	CUTTER, BOLT	9A	1
5180-00-596-1038	CUTTER AND FLARING TOOL KIT	7B	1
5130-00-203-6542	DRILL, ELECTRIC, PORTABLE, 3/4 in.	9C	1
5130-00-293-0955	DRILL, ELECTRIC, PORTABLE, 3/8 in.	7A	1
5133-00-189-9318	DRILL, TWIST 7/16 in. dia.	9B	1
5133-00-189-9326	DRILL, TWIST 9/16 in. dia.	9B	1
5133-00-228-1335	DRILL, TWIST 1 1/16 in. dia.	9B	1
5133-00-228-1331	DRILL, TWIST 3/4 in. dia.	9B	1
5133-00-293-0983	DRILL, SET, TWIST 1/16 thru 1/2 in.	7D	1
4720-00-223-7381	DUPLEX HOSE	1	1
3439-00-262-2671	ELECTRODE, WELDING	5	20
4210-00-889-2221	EXTINGUISHER, FIRE	9C	1
5120-00-595-8279	EXTRACTOR SET, SCREW	9B	1
5120-00-293-2997	FACE, HAMMER, INSERTED	9B	4
5110-00-373-1691	FILE, THREAD RESTORER	9B	1
6545-00-922-1200	FIRST AID KIT	3B	1
4730-00-470-6625	FITTING KIT, TUBE-PIPE 430	7C	1
5120-00-965-0603	FLINT TIP, IGNITER 6 to box	9B	1
6230-00-815-5022	FLOODLIGHT, ELECTRIC	9C	2
3439-00-255-4566	FLUX, SOLDERING 1/4 lb can	9B	1

CONTENTS OF SHOP SET- Continued

NSN	Description	Location	Qty
3439-00-255-4577	FLUX, WELDING 1 lb.	9B	1
4910-00-204-3170	GAGE, TIRE PRESSURE, SELF-CONTAINED	9B	1
4240-00-203-3810	GOGGLES, INDUSTRIAL	3B	2
4240-00-203-3804	GOGGLES, INDUSTRIAL WELDERS	3B	2
4940-00-255-8677	GUN, AIR BLOW	9B	1
4930-00-265-7082	GUN, FLUID, DIRECTLY DLVY	4A	1
5120-00-900-6098	HAMMER, HAND BLACKSMITHS 12 lbs.	7G	1
5120-00-900-6111	HAMMER, HAND MACHINISTS BALL-PEEN	9B	1
5120-00-240-3096	HAMMER-BRUSH, WELDERS	1	1
5110-00-228-3161	HATCHET, HALF	9B	1
4240-00-540-0623	HELMET, WELDERS	5	1
3950-00-292-9879	HOIST, CHAIN	9A	1
3439-00-238-1638	HOLDER, ELECTRODE	5	1
4720-00-278-4887	HOSE, RUBBER	9C	25
5120-00-965-0326	IGNITER, FRICTION	9B	1
4910-00-204-2644	INFLATOR GAGE	8A	1
5120-00-224-7330	JACK, HYDRAULIC, 12 ton	8B	1
6240-00-155-8634	LAMP, INCANDESCENT 115 v	7A	4
6240-00-553-1881	LAMP, INCANDESCENT 120 v	7A	4
6150-00-665-9799	LEAD, ELECTRICAL	5	2
4240-00-262-7092	LENS, GOGGLES, INDUSTRIAL COVER	3B	4
4240-00-262-7099	LENS, GOGGLES, INDUSTRIAL FILTER	3B	1
4240-00-262-7106	LENS, GOGGLES, INDUSTRIAL PLASTIC	3B	2
4240-00-203-7764	LENS, HELMET, WELDERS COVER	3B	2
4240-00-276-8940	LENS, HELMET, WELDERS FILTER LENS	3B	6
6230-00-240-3759	LIGHT, EXTENSION	8B	2
4910-00-937-5724	LIGHT, IGNITION TIMING	6A	1
4930-00-253-2478	LUBRICATING GUN, HAND	4A	1
	MOISTURE STABILIZER	6B	1
6625-00-553-0142	MU LTIMETER RANGES 0 to 5000	6C	1
4730-00-224-7324	NIPPLE	9E	1
4730-00-224-7323	NIPPLE	9B	1
4930-00-554-6778	OILER, HAND FORCE FED	4A	1
5330-00-247-0510	PACKING MATERIAL 1 lb. roll	3D	1
7240-00-160-0455	PAIL, METAL	8B	1
5350-00-598-5537	PAPER, ABRASIVE FINE GRADE 100 sheet	3C	1
5350-00-598-6105	PAPER, ABRASIVE MEDIUM GRADE	3C	1
5330-00-467-3615	PAPER, GASKET $\frac{1}{32}$ in. thk	9A	6
5330-00-270-8470	PAPER, GASKET $\frac{1}{16}$ in. thk	9A	2
2640-00-204-3196	PATCH, INNERTUBE OBLONG, 20 per box	4B	1
2640-00-052-0828	PATCH, INNERTUBE RD	4B	25
5120-00-239-8251	PLIERS, LINEMANS	9B	1
5120-00-537-3375	PLIERS, HOSE CLAMP	9B	1
5120-00-516-3120	PULLER, MECHANICAL 0 to 8 in.	3D	1
5120-00-595-9485	PUNCH, ALIGNING $\frac{5}{32}$ in.	9B	1
4910-00-922-6921	REPAIR KIT, TUBELESS TIRE	4B	1
5975-00-642-8937	ROD, GROUND	9A	1
3439-00-244-4540	ROD, WELDING BRASS $\frac{1}{8}$ in.	9A	15
3439-00-244-4541	ROD, WELDING BRASS $\frac{3}{16}$ in.	9A	15
3439-00-247-2981	ROD, WELDING IRON $\frac{1}{8}$ in.	9A	5
3439-00-246-0565	ROD, WELDING STEEL $\frac{3}{32}$ in.	9A	10
3439-00-246-0566	ROD, WELDING STEEL $\frac{1}{8}$ in.	9A	10
3439-00-246-0568	ROD, WELDING STEEL $\frac{3}{16}$ in.	9A	10
5130-00-857-8526	SANDER, DISK, ELECTRIC	3E	1
5120-00-256-9014	SCREWDRIVER, OFFSET	9B	1
8030-00-291-1787	SEALING COMPOUND	9B	1
8415-00-164-0513	SLEEVE, WELDERS	5	1
3439-00-184-8960	SOLDER, LEAD ALLOY, WIRE, ACID	9B	1
3439-00-243-1882	SOLDER, LEAD ALLOY, WIRE, ROSIN	9B	1
3439-00-222-1632	SOLDERING IRON, ELECTRIC	9B	1
5110-00-624-3214	STRIPPER, HOSE COVER	7G	1
6680-00-171-4584	TACHOMETER, MECHANICAL	7F	1
6630-00-247-2968	TESTER, ANTIFREEZE	8A	1
6630-00-171-5126	TESTER, BATTERY	8A	1

CONTENTS OF SHOP SET — Continued

NSN	Description	Location	Qty
4910-00-250-2423	TESTER, CYLINDER, COMPRESSION	6B	1
4910-00-255-8673	TESTER, INTERNAL COMBUSTION ENGINE	7E	1
4910-00-092-9136	TEST SET, LOW VOLTAGE CIRCUIT	6C	1
5180-00-194-2600	THREAD REPAIR KIT	3E	1
5180-00-448-2362	THREADING SET, SCREW UNC	9A	1
5180-00-122-4975	THREADING SET, SCREW UNF	9A	1
5180-00-699-5273	TOOL KIT --- MASTER MECH	2B	1
3433-00-294-6743	TORCH SET, CUTTING AND WELDING	7A	1
6685-00-281-8190	VALVE, REG, FLUID PRES, ACETYLENE	1	1
6685-00-641-3519	VALVE, REG, FLUID PRES, OXYGEN	1	1
5120-00-223-1951	VICE, BENCH AND PIPE	9B	1
4910-00-243-3130	VULCANIZER, HOT PATCH	4B	1
5130-00-049-7912	WHEEL, ABRASIVE	3G	6
6145-00-643-0956	WIRE, ELECTRICAL	8B	2
5120-00-240-5328	WRENCH, OPEN END, adjust 8 in.	9B	2
5120-00264-3796	WRENCH, OPEN END, adjust 12 in.	9B	1
5120-00-277-1477	WRENCH, PIPE ¼ to 1 in.	9B	1
5120-00-277-4479	WRENCH, PIPE 1 to 2 in.	9B	1
5120-00-277-text	WRENCH, PIPE	9A	1
5120-00-277-text	WRENCH, TORQUE	2B	1
5120-00-611-text	WRENCH SET, SOCKET	3F	1

I N D E X

	paragraph	page		paragraph	page
A			F		
Administrative storage	1-3	1-1	Flywheel	6-8	6-3
Air cleaner, engine	3-8	3-3	Flywheel alternator stator	6-9	6-4
Air compressor	4-36	4-15	Frequency meter	4-27	4-13
Drive motor	4-38	4-16	Fuel pump	4-14	4-3
Pressure switch	4-39	4-16	Fuel strainer	4-13	4-3
Receiver tank	4-40	4-17	Fuel tank filler tube	4-51	4-24
Repair	9-2	9-1	G		
V-belt adjustment	4-37	4-16	Generator bearing	8-4	8-1
Air compressor inlet filter	3-7	3-2	Generator housing cover	4-44	4-20
Air pressure gage	2-2 <i>m</i>	2-3	Generator-weldcv	8-3	8-1
Air shrouds, engine	4-25	4-12	Generator-weldvvr brushes	4-45	4-20
Alternator flywheel stator	6-9	6-4	Governor	4-23	4-11
Auxiliary generator brushes	4-47	4-22	Guard, control panel	4-26	4-12
B			H		
Battery ammeter	4-30	4-13	Head, cylinder	6-11	6-6
Battery	4-19	4-7	High temperature safety switch	2-2s	2-3
Battery servicing	3-11	3-6	Housing, end cover	4-46	4-21
Belt adjustment, air compressor	4-37	4-16	I		
Brushes			Ignition coil	4-18	4-6
Generator-welder	4-45	4-20	Ignition switch	2-2 <i>g</i>	2-1
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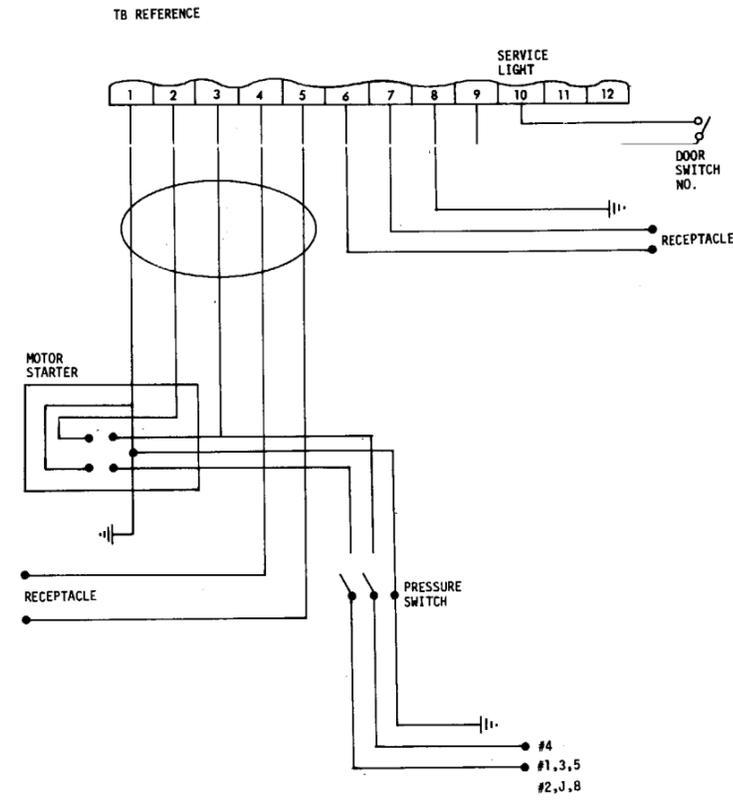
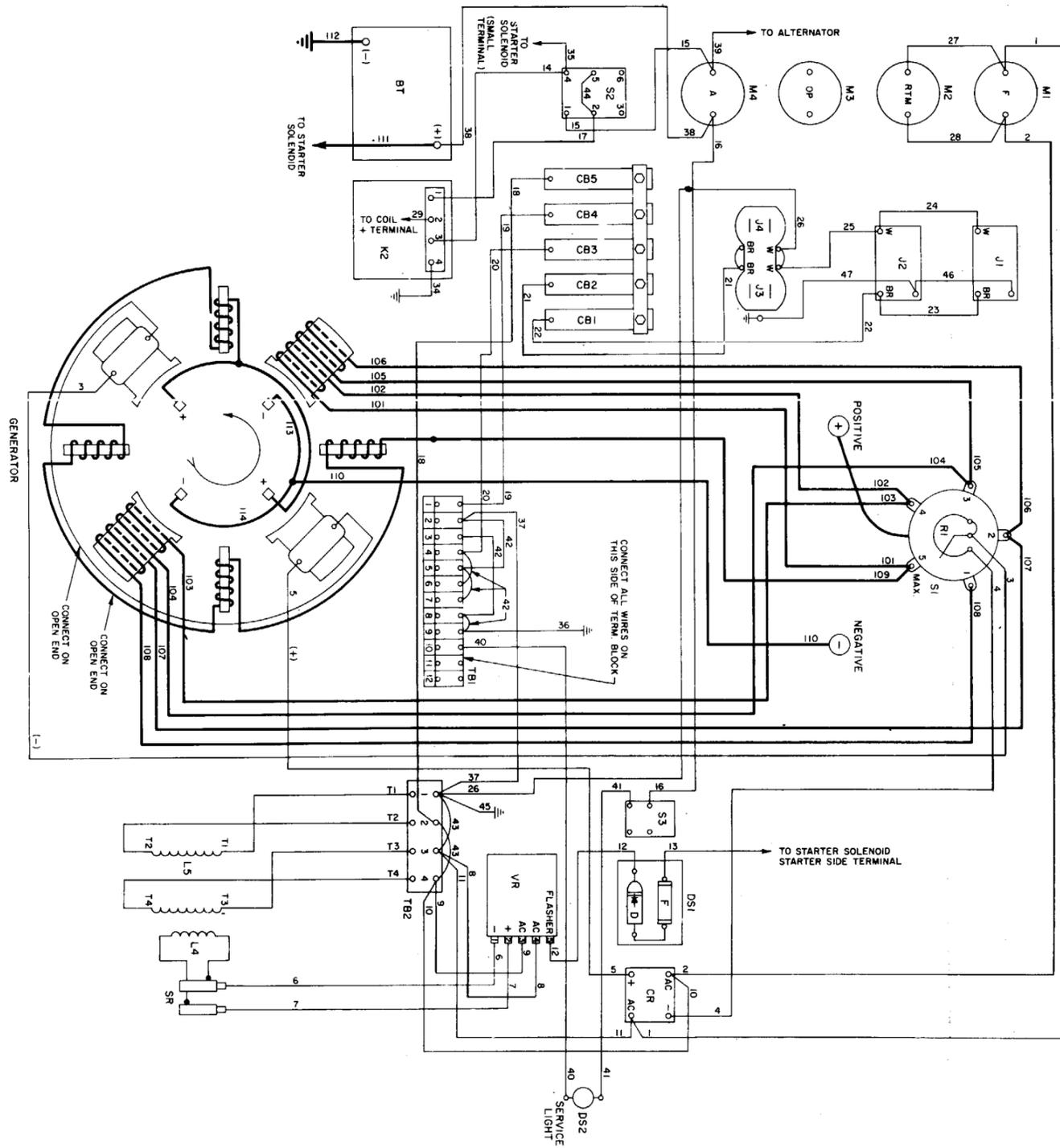
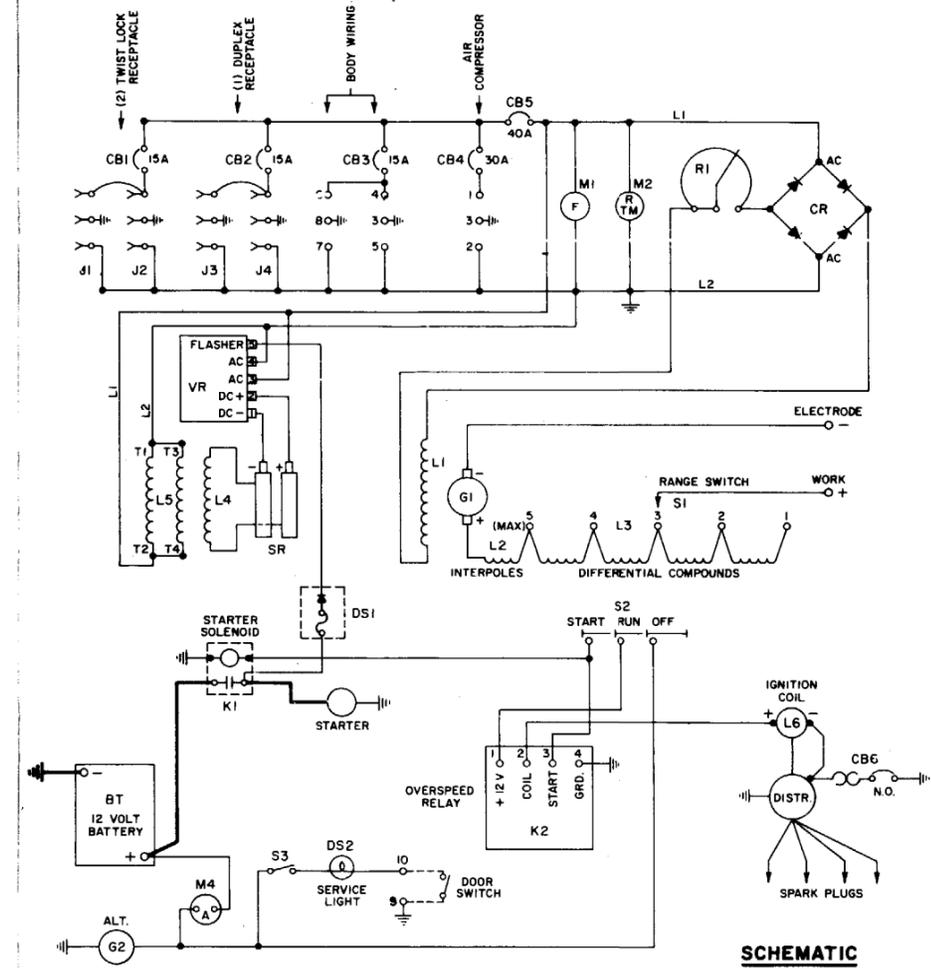


Figure FO-1. Generator-welder wiring diagram.



SCHMATIC

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Brigadier General United States Army
The Adjutant General

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3		2	
109		51	
2-8			2-1
12	1-6a		

Item 10. Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.

Item 3. The NSN and P/N are not listed on the AMDF nor the MCRL. Request correct NSN and P/N be furnished.

Preventive Maintenance Checks and Services. Item 7 under "Items to be inspected" should be changed to read as follows: Firing linkage and firing mechanism pawl.

Since there are both 20- and 30- round magazines for this rifle, data on both should be listed.

SAMPLE

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TEAR ALONG PERFORATED LINE



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 decigrams = .035 ounce
 1 dekagram = 10 grams = .35 ounce
 1 hectogram = 10 dekagrams = 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 milliliters = .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

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