DEPARTMENT OF THE ARMY TECHNICAL MANUAL **TM 5-4930-202-12**
DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER **TO 34Y17-4-11-1**

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

LUBRICATING AND SERVICING

UNIT, POWER OPERATED, SKID

MOUNTED, 16 CFM COMPRESSOR

RECIPROCATING, POWER

DRIVEN, WINTERIZED

(GRAY MODEL 250-530 W/ONAN ENGINE MODEL ACK-MF/515D) (FSN 4930-620-0906)

This copy is a reprint which includes current pages from Changes 1 through 4.

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
MAY 1959

SAFETY PRECAUTIONS

Do not fill gasoline tank while the engine is in operation.

Do not operate the engine with any part of the air shroud removed.

Do not operate the engine in a closed area unless the exhaust is piped to an open area. The exhaust contains carbon monoxide, a colorless, odorless, deadly poisonous gas.

Do not insert fingers in the lubricant pump guide tube while the compressor is in operation.

Use only approved solvents for cleaning the parts of the lubricating and servicing unit. Never use gasoline.

When inflating tires of equipment being serviced, remain to one side of the tire rather than directly in front of it. Serious injury may result if the tire blows out, or if the rim is forced off.

Keep a fully charged fire extinguisher in good working order, mounted in bracket and ready for quick use.

Care must be observed when using compressed air as small particles of dust, or dirt may be blown about, causing bodily injury.

Before disassembly of the equipment, relieve all pressure in tank and compressor.

Disconnect the engine ignition cable at the spark plug before servicing the compressor, drive belt or guard.

Stop all operation when cleaning, adjusting, or lubricating the unit being serviced.

Changes in Force: C 1, C 2, C 3, and C 4

TM 5-4930-202-12
C4

CHANGE

No. 4

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

Operator's and Organizational
Maintenance Manual
LUBRICATING AND SERVICING UNIT; POWER OPERATED; SKID-MOUNTED;
10 CFM COMPRESSOR; POWER DRIVEN; WINTERIZED
(GRAY MODEL 250-530 WITH ONAN ENGINE MODEL ACK-MF/515D)
(FSN 4930-620-0906)

TM 5-4930-202-12/TO 34Y17-4-11-1, 8 May 1959, is changed as follows:
Reverse of cover page. Add the following warnings to the list of safety precautions:

WARNING

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

WARNING

Cleaning solvent, PD-680, is POTENTIALLY DANGEROUS CHEMICAL. Do not use near open flame.

Page 2, paragraph 1*c*. Lines 4 through 7 are changed to read: Commander, U.S. Army Troop Support, Command, ATTN: AMSTS-MP, 4300 Goodfellow Boulevard, St. Louis, MO 63120.
Page 16, paragraph 12. Add the following:

Signs conforming to the provisions of AR 385-30 will be erected in the area to provide notification of NOISE HAZARD in accordance with TB MED 251. The signs should read.

WARNING

NOISE HAZARD EQUIPMENT HEARING PROTECTION REQUIRED.

Page 23, paragraph 47. Add:

WARNING

Operation of this equipment presents a NOISE HAZARD to personnel in the area. Wear ear muffs or ear plugs which were fitted by a trained professional.

Page 35, paragraph 72*b*, Add:

WARNING

Dry cleaning solvent, PD-680, used for cleaning is POTENTIALLY DANGEROUS CHEMICAL. Do not use near open flame. Flash point of solvent is 100°F. - 138°F.

By Order of the Secretary of the Army:

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

Official:

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

Distribution:
To be distributed in accordance with DA Form 12-25A (qty rqr block No. 137), Operator requirements for Lubricating and Servicing.

Changes in Force: C1, C2 and C3

TM 5-4930-202-12
C3

Change

No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington. D.C., *28 June 1973*

Operator's and Organizational
Maintenance Manual
LUBRICATING AND SERVICING UNIT, POWER OPERATED,
SKID MOUNTED, 16 CFM COMPRESSOR RECIPROCATING
POWER DRIVEN, WINTERIZED (GRAY MODEL 250-530
WITH ONAN ENGINE MODEL ACK-MF/515D)
(FSN 4930-620-0906)

TM 5-4930-202-12, 8 May 1959, is changed as follows:
Page 1. Delete Appendix III and Title.
Page 2. Paragraph 1b, lines 3 thru 7. Delete "Appendix III .....12P."
Page 102. Appendix III is rescinded.

By Order of the Secretary of the Army:

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

Official:

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

Distribution:
To be distributed in accordance with DA Form 12-25A (qty rqr block No. 138), Organizational maintenance requirements for Lubricating and Servicing.

Changes now in effect: C 1 and C 2

TM 5-4930-202-12
C 2

TECHNICAL MANUAL

Operator's and Organizational

Maintenance Manual

LUBRICATING AND SERVICING UNIT, POWER OPERATED, SKID MOUNTED, 16 CFM COMPRESSOR, RECIPROCATING, POWER DRIVEN, WINTERIZED (GRAY MODEL 250-530 WITH ONAN MODEL ACK-MF/515D) (FSN 4930-620-0906)

TM 5-4930-202-12
CHANGES No. 2

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., *23 July 1963*

TM 5-4930-202-12, 8 May 1959, is changed as follows:

TAGO 5422A-Aug

CHAPTER 7

EQUIPMENT SERVICEABILITY CRITERIA
(Added)

162. Purpose

The following procedure for equipment serviceability evaluation is required as a basis for commanders to report equipment serviceability categories under the provisions of AR 750-10. This procedure establishes a simplified method for evaluating the potential of equipment to perform satisfactorily during a period of 90 days of sustained operations. This procedure also furnishes instructions so that organizational personnel can evaluate and classify their equipment into one of the following three categories:

a. Green. Combat ready equipment free of any condition limiting the reliable performance of its primary mission during the ninety days.

b. Amber. Equipment possessing limiting conditions which may curtail but not preclude a reliable performance of its primary mission.

c. Red. The equipment is unable to perform its primary mission or does not possess an acceptable reliability of performing its primary mission.

163. Scope

The evaluating method described in this procedure should provide 80 percent probability of correct categorization of equipment. It is *not* the intent of this procedure to eliminate or reduce the technical manual requirements for periodic preventive maintenance services on equipment.

164. General

a. The equipment must be immediately available, and not in shop for maintenance, when this evaluation is conducted.

b. Equipment Inspection and Maintenance Worksheet (DA Form 2404) will be used to record results of this evaluation. Complete blocks 1 through 5. Enter ESC (Equipment Serviceability Criteria) in block 6. Enter applicable TM of multiple part manual system and date issued in block 7. The dash 10 through dash 20-series will be indicated to reflect operator and organizational maintenance. Where separate manuals are provided for item of equipment and its engine, both will be indicated. Enter the item number for each of the items as indicated in these instructions in column a. Enter the proper value as determined from the results of each evaluation in column b. Item description goes in column c. DA Form 2404 will be signed by the individual performing the evaluation.

c. The equipment will be placed in applicable category "Green", "Amber", or "Red", in accordance with the total numerical value resulting from this evaluation.

d. Check the equipment records to determine if any uncorrected deficiencies exist. The presence of an uncorrected deficiency, as defined in TM 38-750, automatically places the equipment in the "Red" category. Check for application of urgent modification work orders (MWO). Nonapplication of one or more urgent MWO's automatically places the equipment in the "Red" category. Equipment which receives one or more zero (0) values cannot be placed in the "Green" category. The evaluation will be continued to determine whether the equipment should be placed in the "Amber" or "Red" category.

e. This evaluation is based on an estimated 500 hours use in 90 days of operation under combat conditions.

165. Procedure for Evaluation

a. Lubricating And Servicing Unit Information To Be Determined From Equipment Records.

(1) *Item number 1, lubrications and servicing unit age.* Determine the age of the lubricating and servicing unit in years (3 yrs. 5 mos. counts as 3 yrs., and 3 yrs. 6 mos.

counts as 4 yrs., etc.) from comparison of present date and date of manufacture.

Years	0-3	4-5	6	7	Over 7
Value	10	8	6	2	1

(2) *Item number 2, lubricating and servicing unit hours of operation.* Determine from equipment records the total number of hours the unit has been in operation since new.

Hours	0-700	701-1300	1301-1900	1901-2500	2501-3000	Over 3000
Value	10	8	6	4	2	0

(3) *Item number 3, engine hours of operation.* Determine the number of hours the engine has been in operation, since new or an overhaul, from equipment records.

Hours	0-150	151-250	251-400	401-650	651-750	Over 750
Value	10	8	6	4	2	0

(4) *Item number 4, engine crankcase oil consumption.* Determine how many pints of oil were consumed between the last two oil changes. Do not consider the amount of oil used to fill the crankcase when changing the oil.

Pints	0-2	2-4	4-5	5-7	Over 7
Value	10	8	6	2	0

(5) *Item number 5, compressor hours of operation.* Determine the number of hours the compressor has been in operation, since new or overhaul, from equipment records.

Hours	0-400	401-700	701-900	901-1250	1250-1500	Over 1500
Value	10	8	6	4	2	0

(6) *Item number 6, compressor crankcase oil consumption.* Determine how many pints of oil were consumed between the last two oil changes. Do not consider the amount of oil used in making the oil change.

Pints	0-3	3-5	5-7	7-11	Over 11
Value	10	8	6	2	0

b. Lubricating And Servicing Unit Information To Be Determined From Physical Inspection And Operation. Check on-equipment-materiel (OEM) to insure availability of essential tools required to perform operator preventive maintenance services. Unavailability of essential tools automatically disqualifies an item of equipment for the "Green" category. Start the engine of the lubricating and servicing unit; run until stabilized operating temperature is reached; engage load clutch; release air from air receiver tank so that compressor will start to operate, throwing a load on the engine for several minutes; then run at idle speed momentarily and turn the engine off. Throughout the operational test period, observe the unit closely for evidence of malfunction of any component or accessory. Such evidence includes erratic operation, inability to maintain rated output, unusual noise or vibration, and overheating. Accomplish required adjustments in accordance with the applicable technical instructions before proceeding with the evaluation. If any part, component, or assembly is missing from the end item, it will be considered as not functioning properly. In column d of DA Form 2404, state the fact that the part, component, or assembly is missing from the end item.

(1) *Item number 7, lubricating and servicing unit.* Operate to determine that the unit functions properly at rated output, as stated on data plate. Determine if there are any unusual noises or vibrations. Check the air and grease lines for damage and leaks. Note that if the lubricating and servicing unit will not operate (engine cannot be started; engine runs but total set incapable of output such as compressor will not build up the pressure in the receiver tank), or if the manner of unit's operation constitutes a safety hazard to the lubricating unit and/or to personnel in the area; the lubricating and

servicing unit is automatically categorized "Red" without reference to score. The specific reason for this "Red" categorization will be written on DA Form 2404.

Symptom	Functions properly rated output, no unusual noises or vibrations	Has unusual noises or vibrations, or doesn't operate at rated output	Does not function properly
Value	10	2	0

(2) *Item number 8, instruments and controls.* These items are of a random failure type and require only a check to determine whether they are functioning properly. Check the following items: fuel pump primer lever, choke control, ammeter, heat control thermostat and switch, oil pressure gage, master air pressure control valve, air receiver pressure gage, air control valve, air receiver safety valve, the three (3) air pressure regulators (pump), and the three (3) pump air pressure gages. Check the air pressure gage reading to see if the unloader cuts in at a minimum of 130 pounds and cuts out at a maximum of 175 pounds.

Symptom	All Items Function Properly	One or More Items Not Functioning Properly
Value	10	0

(3) *Item number 9, drive belts.* Inspect the drive belts for wear and proper tension. Belts should be adjusted only tight enough to prevent slippage.

Note. Belts should be replaced only by a matched set.

Symptom	Belts in good condition	Belts in poor condition	Belts not serviceable
Value	10	4	0

(4) *Item number 10, hose reels.* Inspect each of the five hose reels for external damage or a binding condition which impairs proper operation. Inspect the manual friction brake for correct operation.

Symptom	Reels and brake serviceable	Damage or condition which impairs operation
Value	10	1

(5) *Item number 11, lubricant and air hoses and lubricant pumps.* Inspect each hose line for cuts, breaks, and leaks along with swivels, connectors, and control handles.

Note. Check to see that the gear oil and engine oil hoses are of the high pressure type.

Determine if the hoses deliver adequately the various lubricants and if the pumps function properly.

Symptom	All items serviceable and function properly	One or more items not serviceable and/or not functioning properly
Value	10	0

(6) *Item number 12, clutch.* Engage and disengage the load from the engine by using the clutch lever to see if the lever and clutch function properly.

Symptom	Functions properly, adjustments remaining	Functions properly, no adjustments remaining	Does not function properly
Value	10	4	0

(7) *Item number 13, tools and attachments.* This includes: air operated oil spray gun, air gun, air chuck, transfer pump, whip end hose, and hydraulic adapters. Inspect and/or operate all the above tools and attachments to determine if they are serviceable and/or function properly.

Symptom	All tools present, serviceable, and function properly	One or more tools not present, not serviceable and/or not functioning properly
Value	10	0

(8) *Item number 14, heater installation.* Check the fresh air heater which warms the lubricant, engine, and battery box. Also, check the alcohol dispenser for flow.

Symptom	Heater and alcohol dispenser function properly	Heater or alcohol dispenser does not function properly
Value	10	0

c. Trailer Information To Be Determined By Inspection And Operation. In accordance with instructions below, road test the trailer sufficiently to determine presence of unusual noises and vibrations under load and operation, and performance of each listed item. If any part, component, or assembly is missing from the end item, it will be considered as not functioning properly. In column d of DA Form 2404, state the fact that the part, component, or assembly is missing from the end item.

(1) *Item number 15, tires.* Determine the tire tread depth remaining by gaging or measuring the remaining tread. Score each tire separately.

Depth Less in 8ths	4 or more	Not less than 3	Not less than 2	Not less than 1	Less than 1
Score	10	8	6	2	0

Add the score for each tire on the trailer and use the following table to determine the tire value for the trailer:

Total Score	18-20	14-17	10-13	6-9	Below 6
Value	10	8	6	2	0

(2) *Item number 16, frame and axle.* Inspect frame side rails, crossmembers and exterior axle components for cracks, or broken welds.

Symptom	No items cracked, broken or have broken welds	One or more items are cracked, broken, or have broken welds
Value	10	0

(3) *Item number 17, wheels and wheel bearings.* Check to see that wheel bearing retaining nut is properly adjusted. Inspect the wheels for any, damage which would make them not usable. Check wheels for drag or side play which would indicate badly worn wheel bearings.

Symptom	Wheels in good condition, no excessive play	Wheels damaged and/or excessive play
Value	10	0

(4) *Item number 18, other suspension items.* Check support bumpers, and springs to see if they are serviceable and function properly. If trailer is equipped with shock absorbers, check them, also.

Symptom	All items serviceable, and function properly	One or more items not serviceable and/or do not function properly
Value	10	0

(5) *Item number 19, tow hitch, hoses, and landing gear.* These items are of a random failure type and require only a check to see if they are serviceable

and functioning properly. Check the following items: landing gear, hoses and couplings (air-Hyd), and the tow hitch.

Symptom	All items serviceable, and function properly	One or more items do not function properly and/or not serviceable
Value	10	0

(6) *Item number 20, brakes.* Operate brake system to see if it is functioning properly. Inspect master cylinder, wheel cylinders, and lines for hydraulic leaks. Check to see if there is any brake adjustment remaining.

Symptom	Operates properly, adjustments remaining, no hydraulic leaks	Operated properly, leaks evident, no adjustments remaining	Improper operation, no adjustment remaining
Value	10	4	0

166. Rating

a. Add the values of the item numbers specified in *g* or *h* below and record the total on DA Form 2404 in column *b*.

b. Were any uncorrected deficiencies found? Yes ___ No ___

c. Have all urgent MWO's been applied? Yes ___ No ___

d. Was any item given a zero (0) value? Yes ___ No __

e. Were essential tools for operator PM available? Yes ___ No____

f. After obtaining the equipment serviceability color rating from the *g* below, record the color rating in column c on DA Form 2404 beside the total numerical value in column b.

g. To obtain the equipment serviceability color rating for the SKID MOUNTED lubricating and servicing unit, use item numbers 1 through 14 in the Procedure for Evaluation, and apply *a* through *f* above to the table below:

Total Value	No zero values, PM tools available and 118-140	63-117	Uncorrected deficiency found, urgent MWO not applied, or below 63
Color Rating	GREEN	AMBER	RED

h. To obtain the equipment serviceability color rating for the TRAILER MOUNTED lubricating and servicing unit, use item numbers 1 through 20 in the Procedure for Evaluation, and apply *a* through *f* above to the table below:

Total Value	No zero values, PM tools available, and 176-200	109-175	Uncorrected deficiency found, urgent MWO not applied, or below 109
Color Rating	GREEN	AMBER	RED

167. Reporting

Reports will be submitted in accordance with AR 750-10.

168. Errors, Comments, Suggestions

Reports of errors, comments, and suggestions are encouraged. Reports pertaining to chapter 7 should be submitted to the Commanding Officer, U.S. Army Mobility Support Center, ATTN: SMOMS-MK; P.O. Box 119, Columbus 16, Ohio.

Page 92, appendix I, paragraph 5. Make the following changes:

Rescind: TM 5-505, Maintenance of Engineer equipment

Add: AR750-10, Equipment Serviceability Criteria

By Order of the Secretary of the Army:

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

Official:

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

Distribution:

Active Army:

USASA (2)	ESCO (10)	5-605 (2)
DCSLOG (1)	Fld Comd, DASA (8)	5-607 (2)
CNGB (1)	USACOMZEUR (2)	5-635 (2)
TSG (1)	USAREUR Engr Sup	7-100 (2)
CofEngrs (3)	Con Agcy (10)	10-45 (2)
CSigO (1)	USAREUR Engr Proc	10-48 (2)
CofT (1)	Cen (2)	17-100 (2)
USA Maint Bd (1)	MAAG (1)	29-1 (2)
USAARTYBD (2)	JBUSMC (1)	29-5 (2)
USAARMBD (2)	Units org under fol TOE:	29-11 (2)
USAIB (2)	5-5 (2)	29-21 (2)
USAARADBD (2)	5-6 (2)	29-45 (2)
USAAESWBD (2)	5-15 (2)	29-51 (2)
USAAVNBD (2)	5-16 (2)	29-52 (1)
USCONARC (3)	5-25 (2)	29-56 (2)
USAMC (5)	5-26 (2)	29-57 (2)
OS Maj Comd (5) except	5-45 (2)	29-61 (2)
USARJ (10)	5-46 (2)	29-65 (2)
MDW (1)	5-48 (2)	29-75 (2)
Armies (2)	5-54 (2)	29-77 (2)
Corps (2)	5-114 (2)	29-105 (2)
USA Corps (1)	5-115 (2)	29-107 (2)
Div (2)	5-116 (2)	37-100 (2)
Engr Bde (1)	5-117 (2)	39-61 (2)
USMA (2)	5-118 (2)	55-17 (2)
Svc College (2)	5-124 (2)	55-18 (2)
Br Svc Sch (2) except	5-129 (2)	55-19 (2)
USAES (100)	5-145 (2)	55-28 (2)
GENDEP (OS) (10)	5-146 (2)	55-37 (2)
Engr Dep (OS) (10)	5-155 (2)	55-38 (2)
Army Dep (2)	5-156 (2)	55-57 (2)
USA Trans Tml Comd (2)	5-177 (2)	55-87 (2)
Army Tml (1)	5-214 (2)	55-88 (2)
USAMOCOM (2)	5-237 (5)	55-97 (2)
USAOSA (2)	5-262 (5)	55-117 (2)
Div Engr (2)	5-267 (1)	55-127 (2)
Engr Dist (2)	5-278 (5)	55-128 (2)
Engr Fld Maint Shop (2)	5-279 (2)	55-137 (2)
USAERDL (3)	5-420 (2)	55-138 (2)
Engr Cen (5)	5-425 (2)	55-139 (2)
AMS (3)	5-426 (2)	55-158 (2)
Chicago Engr Prod Ofc (10)	5-500 (EH) (2)	55-187 (2)
USA Mbl Spt Cen (36)	5-600 (2)	57-100 (2)

NG: State AG (3).
USAR: Same as active Army except allowance is one copy to each unit.
For explanation of abbreviations used, see AR 320-50.

TECHNICAL MANUAL

Operator and Organizational Maintenance Manual

LUBRICATING AND SERVICING UNIT, POWER OPERATED, SKID MOUNTED, 16 CFM COMPRESSOR, RECIPROCATING, POWER DRIVEN, WINTERIZED (GRAY MODEL 250-530 WITH ONAN ENGINE MODEL ACK-MF/515D) (FSN 4930-620-0906)

TM 5-4930-202-12
CHANGES No. 1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *15 May 1963*

TM 5-4930-202-12, 8 May 1959, is changed as follows:

Page 2, paragraph 1*c*, lines 3 and 4. Delete "by letter" and substitute: "on DA Form 2028".

Lines 4 through 6. Delete "General, U.S. Army Engineer Maintenance Center, Corps of Engineers," and substitute: "Officer, U.S. Army Mobility Support Center, ATTN: SMOMS-MS,".

Lines 6 and 7. Delete "ATTN: EMCJM."

d. (Added) Report all equipment improvement recommendations as prescribed by TM 38-750.

2. Record and Report Forms
(Superseded)

DA Form 2258 Depreservation Guide of Engineer Equipment.

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

***Note*. Applicable forms, excluding standard Form 46 which is carried by the operator, will be kept in a canvas bag mounted on the equipment.**

Page 14, paragraph 10*b*(1), lines 1 and 2. Delete "before-operation inspections" and substitute: "daily preventive maintenance services".

Paragraph 11a, line 2. Change "paragraph 73" to read: paragraphs 74 and 76.

Page 39.

73. General
(Superseded)

To insure that the lubricating and servicing unit is ready for operation at all times, it must be inspected systematically, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services to be performed are listed and described in paragraphs 74 and 76. The item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation of the unit will be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded, together with the corrective action taken, on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest possible opportunity.

74. Daily Preventive Maintenance Services
(Superseded)

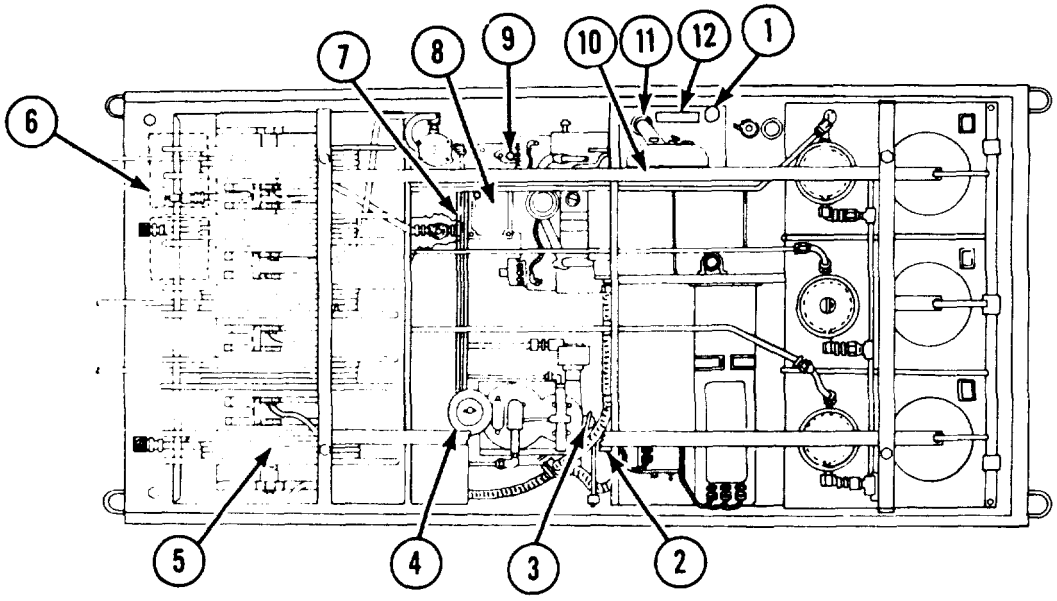
This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by the operator. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to figure 16.1 for the daily preventive maintenance services.

Page 40.

PREVENTIVE MAINTENANCE SERVICES
DAILY

TM 5-4930-202-12 **LUBRICATING AND SERVICING UNIT**

GRAY MODEL 250-530



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR. REF
1	FIRE EXTINGUISHER. Inspect for broken seal.	
2	RECEIVER TANK AND SAFETY VALVE. Check for proper operation. Drain condensation after use.	
3	COMPRESSOR OIL LEVEL GAGE. Add oil as indicated by level gage. Reference current L.O.	
4	COMPRESSOR INTAKE MUFFLER. Clean element (biweekly).	
5	HOSE REELS AND HOSES. Inspect for proper operation.	
6	BATTERIES. Tighten loose cables and mountings. Remove corrosion. Inspect for cracks and leaks. Fill to ½ inch above the plates. Clean vent hole in filler cap before installing. In freezing weather run the engine a minimum of 1 hour after adding water. (Weekly)	

Figure 16.1. (Added) Daily preventive maintenance services.

ITEM		PAR. REF
7	DRIVE BELTS. Proper adjustment is a deflection of ½ to ¾ inch midway between pulleys.	132
8	MASTER CLUTCH. Check for proper operation.	
9	ENGINE OIL LEVEL GAGE. Add oil as indicated by level gage. Reference current L.O.	
10	FUEL FILTER. Tighten thumbnut if leaking. (Clean weekly).	109
11	FUEL TANK. Add fuel as required.	
12	CONTROLS AND INSTRUMENTS. Inspect for damage and loose mounting. With unit operating, check for proper operation. Normal operating readings for instruments are as follows: Ammeter — in charge range Oil pressure gage — 20 to 35 psi Pump air pressure gage — 20 to 200 psi Receiver tank air pressure gage — 150 to 175 psi	17-46
	NOTE 1. OPERATION. During operation observe for any unusual noise or vibration.	

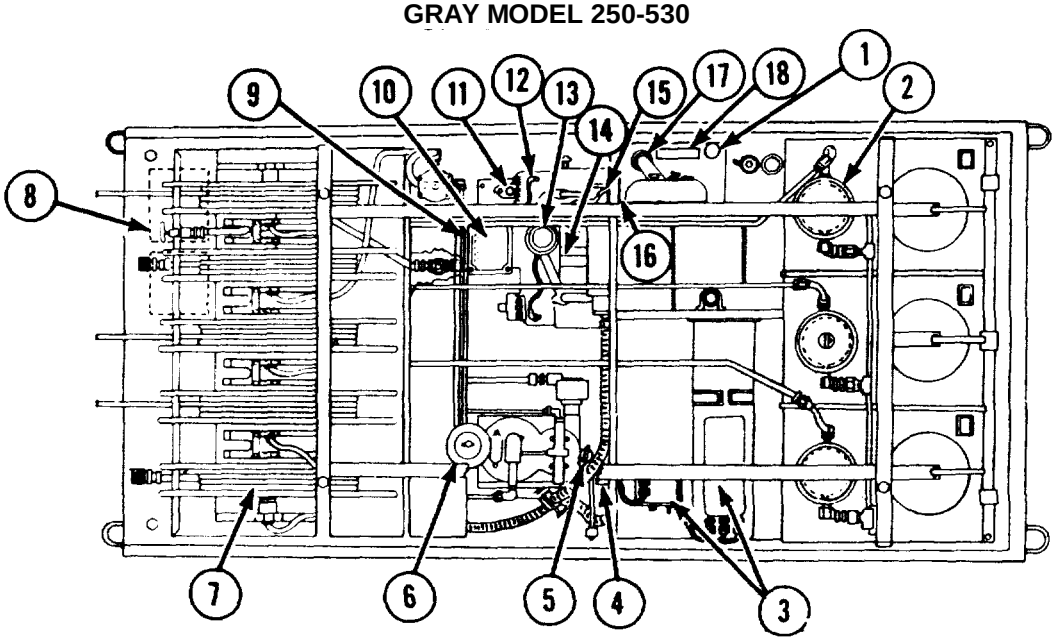
MSC 4930-202-12/16.1

Figure 16.1-Continued.

PREVENTIVE MAINTENANCE SERVICES
QUARTERLY

TM 5-4930-202-12 **LUBRICATING AND SERVICING UNIT**

GRAY MODEL 250-530



LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER

ITEM		PAR. REF
1	FIRE EXTINGUISHER. Inspect for broken seal. Inspect for full charge by shaking for sound or by weight.	
2	PUMP. Inspect for leaks, loose mounting, and proper operation.	
3	WINTERIZATION SYSTEM. Check for breaks, leaks, and proper operation. Clean dirty heater fuel filter element. Check hoses for deterioration. Inspect heater hoses for deterioration and leaks. Check alcohol dispenser for leaks during operation. (Biweekly)	
4	AIR COMPRESSOR. Check for breaks, leaks, and proper operation. Check pressure switch for proper adjustment.	135
5	COMPRESSOR OIL LEVEL GAGE. Add oil as indicated by level gage. Reference current L.O	

Figure 16.2. (Added) Quarterly preventive maintenance services.

ITEM		PAR. REF
6	COMPRESSOR INTAKE MUFFLER. Clean dirty element.	
7	HOSE REELS AND HOSES. Tighten loose mounting hardware and connections. Inspect hose for leaks, cracks, deteriorated or frayed condition, and proper operation.	
8	BATTERIES. Tighten loose cables and mountings. Remove corrosion. Fill to 1/2 inch above the plates. Clean venthole in filler cap before installing. In freezing weather run engine minimum of 1 hour after adding water. Repair or replace a cracked or leaking battery.	
9	COMPRESSOR DRIVE BELTS. Inspect for excessive wear or frayed condition and proper belt tension. Proper tension is 1inch midway between pulleys.	
10	MASTER CLUTCH. Check for proper operation and adjustment (1000 hours).	20
11	ENGINE OIL LEVEL GAGE. Add oil as indicated by level gage. Reference current L.O.	
12	SPARK PLUGS. Replace spark plugs that have cracked insulators and burned electrodes. Clean and set spark plug gaps for 0.025 inch. Torque spark plugs to 25 to 30 foot-pounds. Replace leads which are frayed or broken. Clean and tighten lead connections.	117
13	GOVERNOR AND CARBURETOR. Check external governor and carburetor adjustments.	110,112
14	MAGNETO. Replace pitted or burned magneto points. Proper point gap adjustment is 0.015 inch. (Check adjustment every 500 hours.)	115
15	GENERATOR AND STARTER. Check for proper operation. Check brushes every 1000 hours. Replace brushes worn more than half their original length. (Compare with length of new brush). Replace by set (4).	120
16	FUEL FILTER. Tighten thumbnut if leaking. Clean a dirty element	
17	FUEL TANK. Add fuel as required. Tighten loose mounting. Replace leaking fuel tank. Replace defective cap gasket. Clean cap vent.	

Figure 16.2--Continued.

ITEM		PAR. REF
18	CONTROLS AND INSTRUMENTS. Replace damaged instruments. Tighten loose mounting. With the unit operating check for proper operation. Normal operating readings for instruments are as follows: Ammeter — in charge range Oil pressure gage — 20 to 35 psi Pump air pressure gage — 20 to 200 psi Receiver tank pressure gage — 150 to 175 psi	
	NOTE 1. OPERATIONAL TEST. During operation observe for any unusual noise or vibration.	
	NOTE 2- ADJUSTMENTS. Make all necessary adjustments during operational test.	

MSC 4930-202-12/16.2

Figure 16.2--Continued.

75. Organizational Rescinded

76. Quarterly Preventive Maintenance Services (Superseded)

a. This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equal to 3 calendar months or 250 hours of operation, whichever occurs first.

b. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to figure 16.2 for the quarterly preventive maintenance services.

Page 88, paragraph 156a, line 6. Add: Refer to AR 743-505.

b. Inspection Criteria. Rescinded.

c. (Superseded) Worksheet and Preventive Maintenance. DA Form 2258 (Depreservation Guide of Engineer Equipment) and applicable forms listed in TM 38-750 will be prepared for each major item of equipment when initially placed in limited storage and every 90 days thereafter. Perform required maintenance promptly to make sure equipment is mechanically sound and ready for immediate use.

d. (Superseded) Exercising. Service equipment in limited storage every 90 days in accordance with paragraph 76. Operate equipment long enough to bring it up to operating temperature and insure complete lubrication of all bearings, gears, and the like. Represerve equipment after operation.

Page 92, paragraph 5. After TM 5-505, add the following:

TM 38-750 The Army Equipment Records System and Procedures.

7.1. Shipment and Limited Storage (Added)

AR 743-505 Limited Storage of Engineers Mechanical Equipment.

By order of the Secretary of the Army:

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

Official:

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

Distribution:
Active Army:

USASA (2)	Fld Comd, DASA (8)	5-607
DCSLOG (1)	USACOMZEUR (2)	5-635
CNGB (1)	USAREUR Engr Sup	7-100
TSG (1)	Con Agcy (10)	10-45
CofEngrs (3)	USAREUR Engr Proc	10-48
CSigO (1)	Cen (2)	17-100
CofT (1)	MAAG (1)	29-1
USA Maint Bd (1)	JBUSMC (1)	29-5
USAARTYBD (2)	Units org under fol TOE:	29-11
USAARMBD (2)	Two copies each UNOINDC:	29-21
USAIB (2)	5-5	29-45
USARADBD (2)	5-6	29-51
USAAESWBD (2)	5-15	29-52
USAAVNBD (2)	5-16	29-56
USCONARC (3)	5-25	29-57
USAMC (5)	5-26	29-61
OS Maj Comd (5) except	5-45	29-65
USARJ (10)	546	29-75
MDW (1)	5--48	29-77
Armies (2)	5-54	29-105
Corps (2)	5-114	29-107
USA Corps (1)	5-115	37-100
Div (2)	5-116	39-61
Engr Bde (1)	5-117	55-17
USMA (2)	5-118	55-18
Svc College (2)	5-124	55-19
Br Svc Sch (2) except	5-129	55-28
USAES (100)	5-145	55-37
GENDEP (OS) (10)	5-146	55-38
Engr Dep (OS) (10)	5-155	55-57
Army Dep (2)	5-156	55-87
USA Trans Tml Comd (2)	5-177	55-88
Army Tml (1)	5-214	55-97
USAMOCOM (2)	5-237 (5)	55-117
USAOSA (2)	5-262 (5)	66-127
Div Engr (2)	5-267 (1)	55-128
Engr Dist (2)	5-278 (5)	55-137
Engr Fld Maint Shop (2)	5-279	55-138
USAERL (3)	5420	55-139
Engr Cen (5)	5425	55-158
AMS (3)	5-426	55-187
Chicago Engr Proc Ofc (10)	5500, EH	57-100
USA Mbl Spt Cen (36)	5-600	
ESCO (10)	5-605	

NG: State AG (3).
USAR: Units--same as Active Army except allowance is one copy each unit.
For explanation of abbreviations used, see AR 320-50.

TECHNICAL MANUAL
No. 5-4930-202-12
TECHNICAL ORDER
No. 34Y17- 4-11-1

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE

WASHINGTON 25, D. C., *8 May 1959*

LUBRICATING AND SERVICING UNIT, POWER OPERATED, SKID MOUNTED, 16 CFM COMPRESSOR, RECIPROCATING, POWER DRIVEN, WINTERIZED (GRAY MODEL 250-530 WITH ONAN ENGINE MODEL ACK-MF/515D) (FSN 4930-620-0906)

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

a. These instructions are published for the use of the personnel to whom the Gray model 250-530 lubricating and servicing unit is issued. They contain information on the operation, lubrication, and daily, biweekly, and bimonthly preventive maintenance service of the equipment and its accessories and attachments. It also provides information on shipment and limited storage.

b. Appendix I contains a list of current references. Appendix II contains the maintenance allocation charts. Appendix III lists the basic issue items authorized for use by operator of the equipment and references availability of repair parts for organizational maintenance as listed in TM 5-4930-202-12P.

c. Request any recommendations for changes, additions, deletions and other corrections for the improvement of this manual be forwarded by letter to The Commanding General, U. S. Army Engineer Maintenance Center, Corps of Engineers, P. O. Box 119, Columbus 16, Ohio, ATTN:
EMCJM.

2. Record and Report Forms

The following record and report forms are to be used by the operator and organizational personnel for recording and reporting maintenance operations.

a. Operator.

(1) Standard Form 46 (U. S. Government Motor Vehicle Operator's Identification Card).
(2) DD Form 110 (Vehicle and Equipment Operational Record).
(3) DA AGO Form 518 (Accident Identification Card).
(4) Standard Form 91 (Operator's Report of Motor Vehicle Accident).
(5) DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists of Supply Manual 7, 8, or 9).

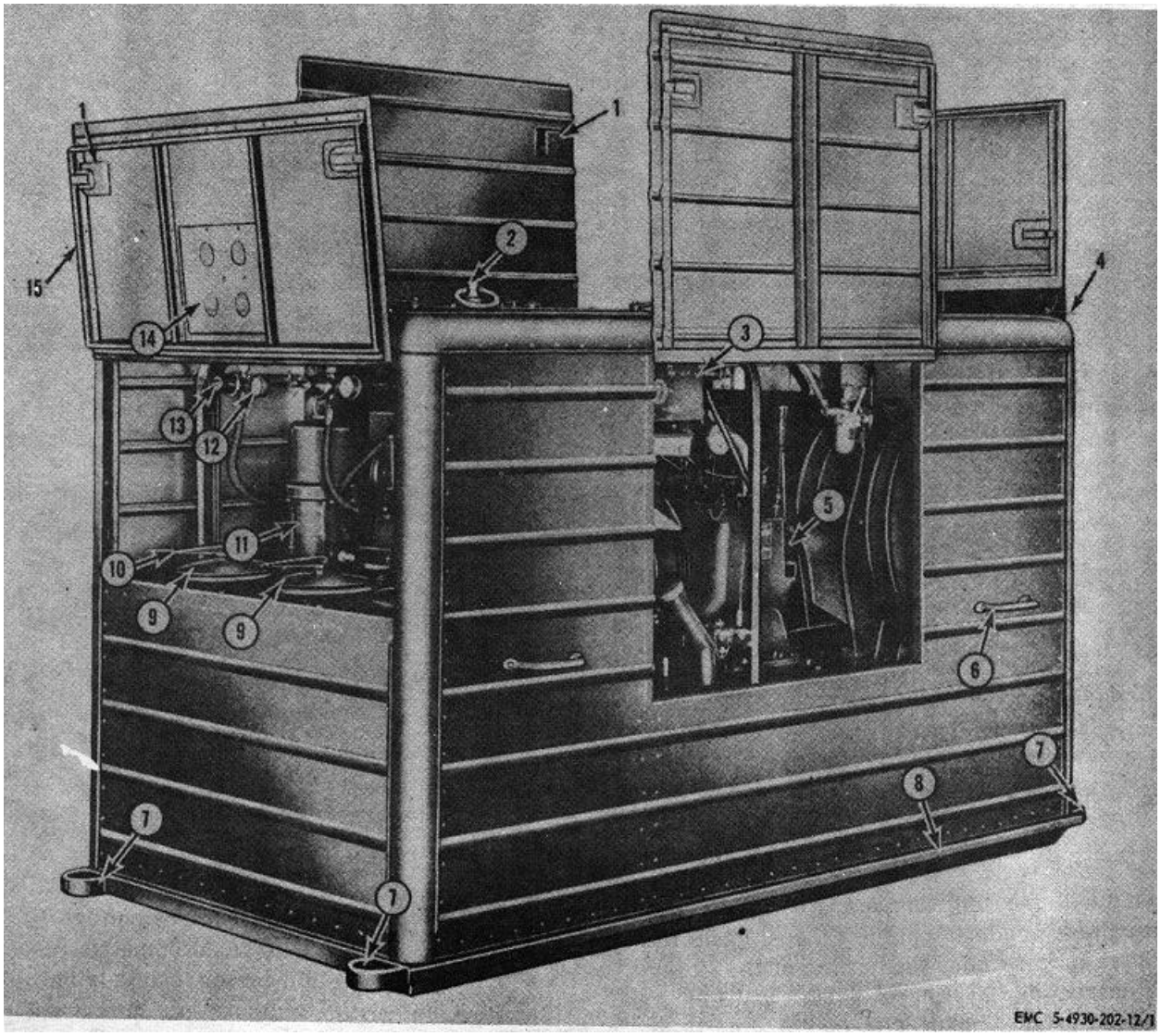
b. Organizational Personnel.

(1) DA Form 5-22 (Unserviceable Part Identification Tag).
(2) DA Form 5-53 (Equipment Record).
(3) DA Form 9-79 (Parts Requisition).
(4) DA Form 285 (Accident) report of individual accident.
(5) DA Form 460 (Preventive Maintenance Roster).
(6) DA Form 464 (Work Sheet for Preventive Maintenance and Technical Inspection of Engineer Equipment).
(7) DA Form 468 (Unsatisfactory Equipment Report).
(8) DA Form 478 (Organizational Equipment File).
(9) DA Form 811 (Work Request, and Job Order).
(10) DA Form 1115 (Property Turn-in Tag for Direct Exchange).
(11) DA Form 1546 (Request for Issue and Turn-in Slip).
(12) DA Form 1543 (Title Insert, for Informal Accountability).
(13) DD Form 6 (Report of Damaged or Improper Shipment).
(14) DD Form 362 (Statement of Charges for Government Property Lost, Damaged, or Destroyed).

Section II. DESCRIPTION AND DATA

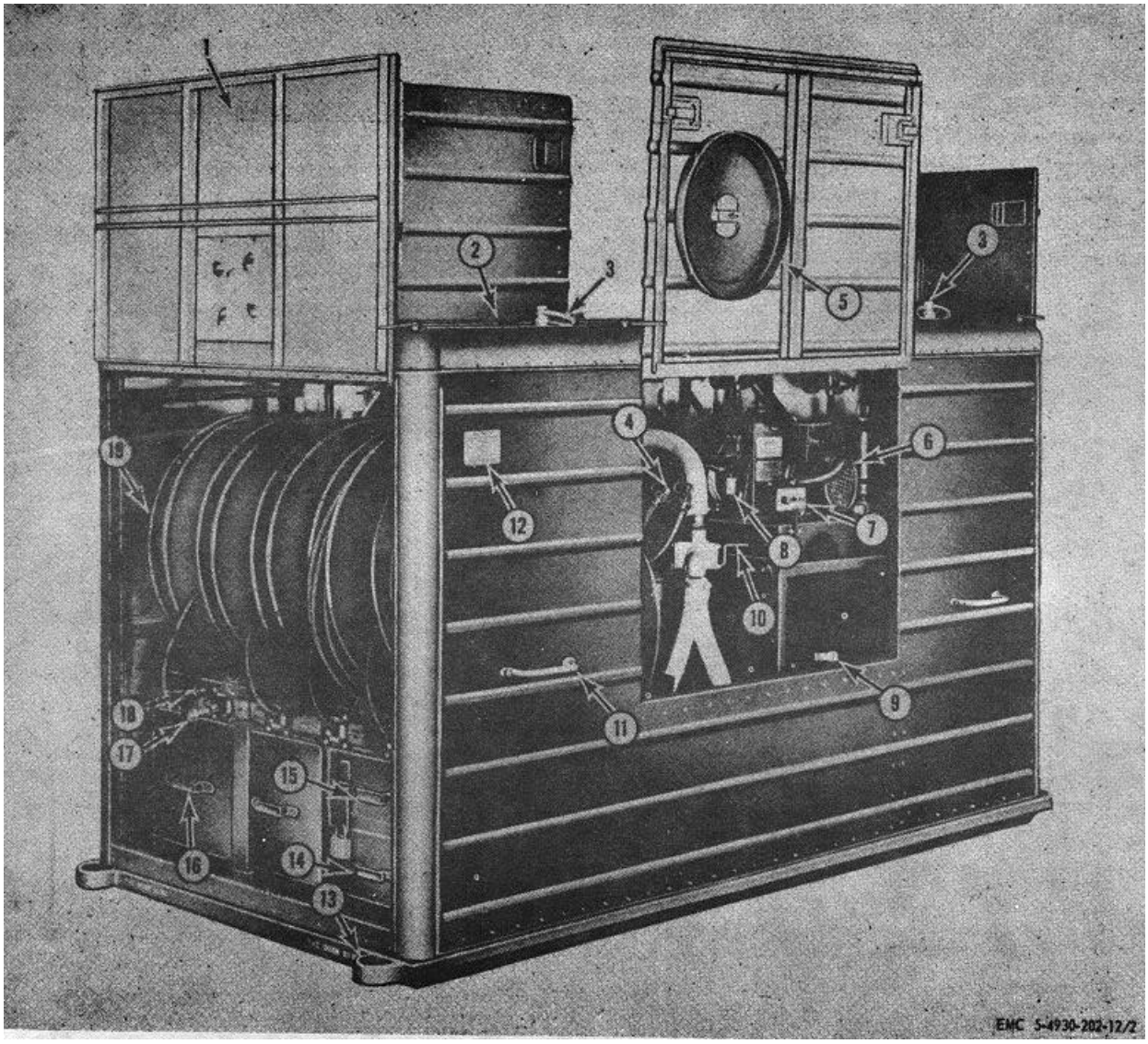
3. Description

The Gray model 250-530 lubricating and servicing unit (figures 1 and 2) is self-contained, gasoline-powered, and equipped for heavy-duty servicing. Air operated pumps provide delivery of lubricant and motor oil from the storage tanks through reel mounted hose assemblies (19, fig. 2) directly to bearings and gearcases. The unit is winterized for below freezing temperatures. A space heater (6) maintains proper' lubricant viscosity at low temperatures. The lubricant container consists of three steel compartments for storing gear lubricant, engine oil, and grease. A heat duct directs the fresh air output of the space heater into the center compartment heat chamber for heating grease and oil in the compartment



1	Inclosed door latch	6	Hand lift handle	11	Low-pressure pump
2	Inclosure lift ring	7	Tie-down rings	12	Air pressure gage
3	Engine control panel	8	Skid (2 rqr)	13	Air regulator valve
4	Door lock	9	Tank fill cover	14	Louver
5	Engine	10	Fill cover handle	15	Inclosure pump access door

Figure 1. Lubricating unit, right three-quarter view.



1	Inclosure door	8	Heater fuel filter	14	Lower accessory drawer
2	Lifting ring sockets	9	Center toolbox	15	Upper accessory drawer
3	Lifting ring	10	Engine exhaust director	16	Battery box
4	Air compressor	11	Hand lift handle	17	Air line coupler
5	Drum adapter	12	Lifting capacity plate	18	Air tank draincock
6	Heater	13	Tie-down rings	19	Reel bank assembly
7	Heater control panel				

Figure 2. Lubricating unit, left three-quarter view.

at freezing temperatures. An engine exhaust hose conducts engine exhaust gases into a heat reservoir under the bottom of the storage compartment for heating of grease and oil. An engine exhaust director (10, fig. 2) diverts exhaust gases through a hose to the atmosphere when heating of lubricant is not necessary. The alcohol dispenser (9, fig. 6) prevents freezing of condensed air in air lines during cold weather operation. Three air-powered pumps are mounted in their respective lubricant storage compartments. Air pressure and speed of each pump is controlled by separate air pressure regulators and pressure is registered with an air pressure gage (12, fig. 1) attached to each regulator. The pumps will operate at air pressures ranging from 20 psi to 200 psi.

The gasoline engine (5) and the gasoline engine powered air compressor (4, fig. 2) are mounted on

top of a horizontal air pressure tank. The air compressor has a delivery capacity of 16 cubic feet of air per minute, and is equipped with an automatic pressure control which unloads the compressor through the auxiliary unloader when the tank pressure has reached 175 psi and allows the compression to resume when the pressure has dropped to 145 psi.

The engine is a 2-cylinder, air-cooled with electric and manual starting provisions, 4-cycle type. Two 12-volt batteries, connected in series, supply cranking power to the gasoline engine, and power for the heater electric fuel pump, igniter, and blower.

A hose reel bank (19) consisting of five hand-operated reels is mounted at the rear of the lubricator together with necessary fittings, control valves, and meters. Four hoses dispense lubricants, and one hose delivers air under pressure. Accessory drawers (14, 15) directly below the reel bank assembly contain all necessary handguns, pneumatic guns, oilers, adapters, and grease fittings.

The unit is inclosed in an aluminum housing, which provides protection under all climatic conditions. Openings with doors (1) on all four sides provide access to the installed components, and the lubricant storage compartment.

4. Identification Plates

a. Graco Lubricating Unit Identification Plate. This plate (A, fig. 3) is mounted directly above the battery box on the reel end of the unit. It gives the manufacturer's name, model number, and serial number.

b. Corps of Engineers Identification Plate. This plate (B, fig. 3) is mounted on the cover of the center toolbox (9, fig. 2). It gives the manufacturer's name, nomenclature, serial number, model number, Federal stock number, date of manufacture, and the government registration number.

c. Engine Data Plate. This plate (C, fig. 3) is mounted on the engine cylinder-head air cover. It shows the manufacturer's name, engine serial number, horsepower rating, and lubrication instructions.

d. Compressor Data Plate. This plate (D, fig. 3) is located on the side of the compressor. It gives the compressor model and serial number.

e. Lifting Attachments Plate. This plate (E, fig. 3) is mounted on the side of the inclosure (12, fig. 2). It gives the load capacity, and lift points for the entire unit and also for the inclosure only.

f. Heater Data Plate. This plate (F, fig. 3) is located on the side of the heater and contains the make, model number, serial number, output capacity and voltage.

g. Clutch Data Plate. This plate (G, fig. 3) is located on top of the clutch housing and contains information on the adjustment and lubrication of the clutch assembly.

h. Lubricant Pumps Data Plates. These plates located on each of the three air-operated pumps contain the manufacturer's name and type.

i. *Alcohol Dispenser Instruction Plate.* This plate (H, fig. 3) is located above the dispenser and gives abbreviated instructions for dispensing alcohol into the system.

5. Differences in Models

This manual applies only to the Gray Lubricating and Servicing Unit, Model 250-530, serial numbers 9510 through 9669, and 9678 through 9717.

6. Tabulated Data

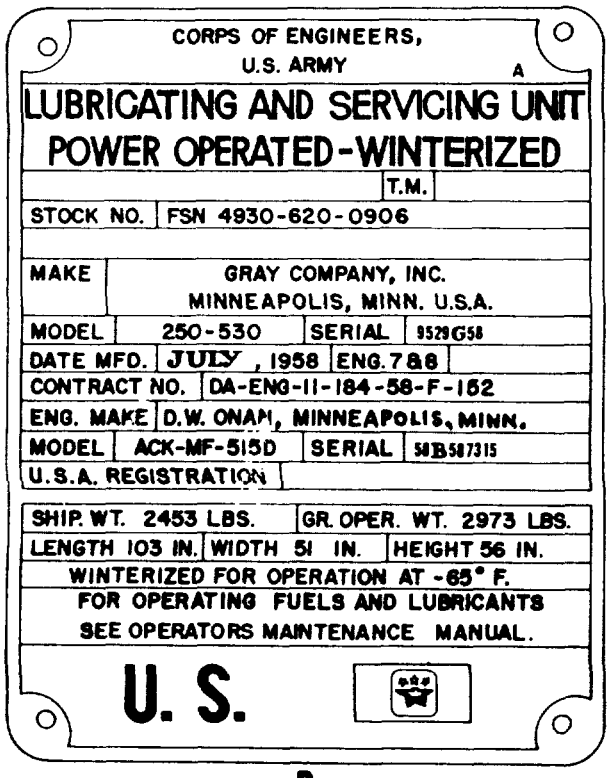
a. General.

Manufacturer	Gray Company, Inc.
Model	250-530
Type	Portable
Overall length	8 ft (feet)
Overall width	3 ft 10 in. (inches)
Overall height	4 ft 8 in.
Weight	2,360 lb (pounds)

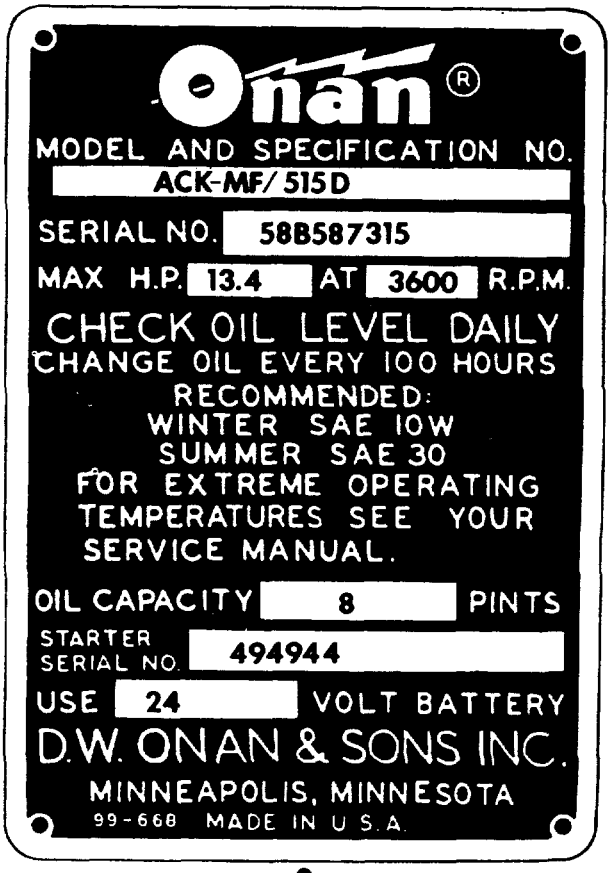
b. Engine.

Manufacturer	D. W. Onan and Sons, Inc.
Model number	ACK-MF/515D

A



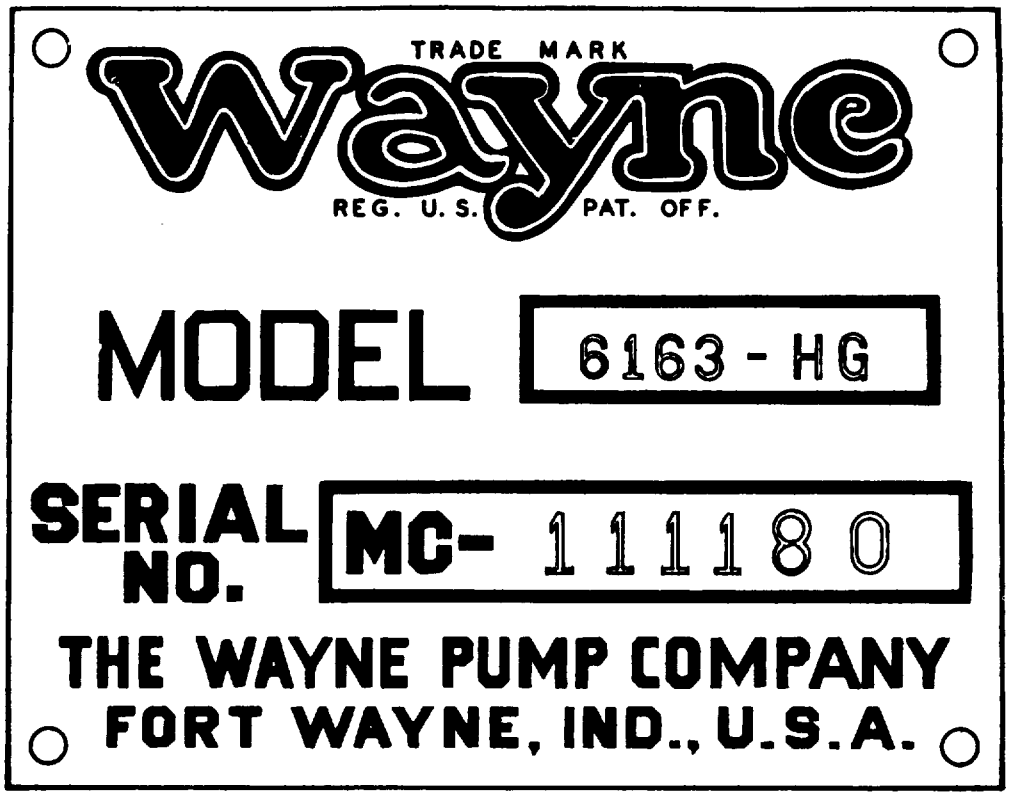
B



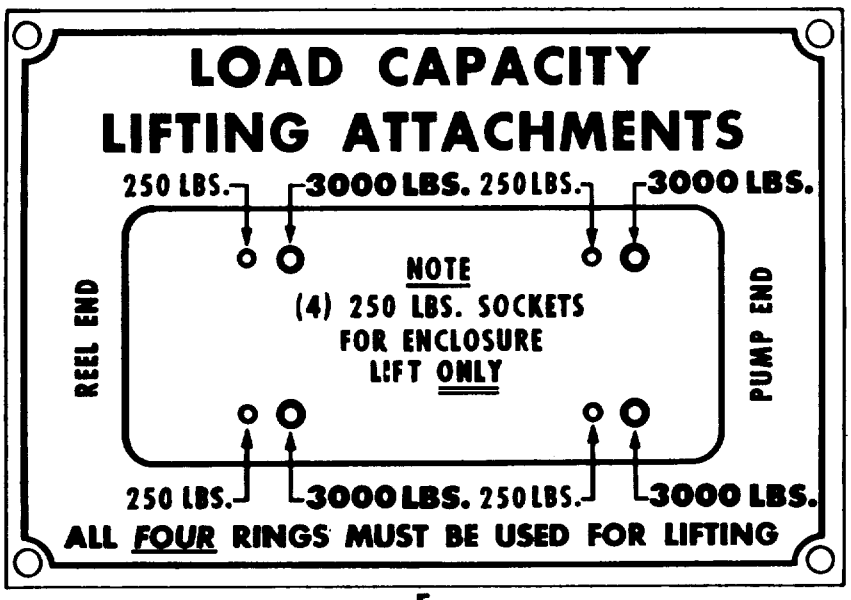
C

EMC 5-4930-202-12/3 ①

Figure 3. Identification and instruction plates.



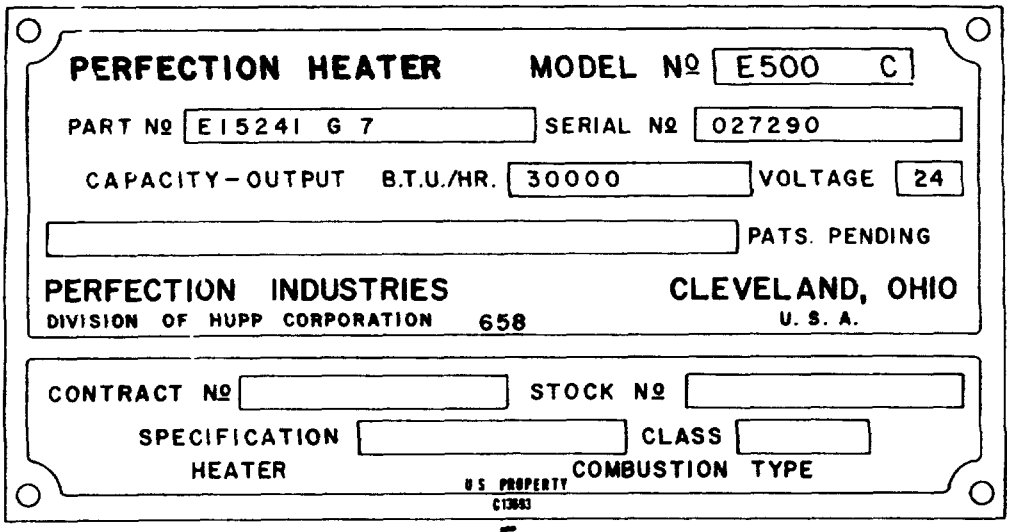
D



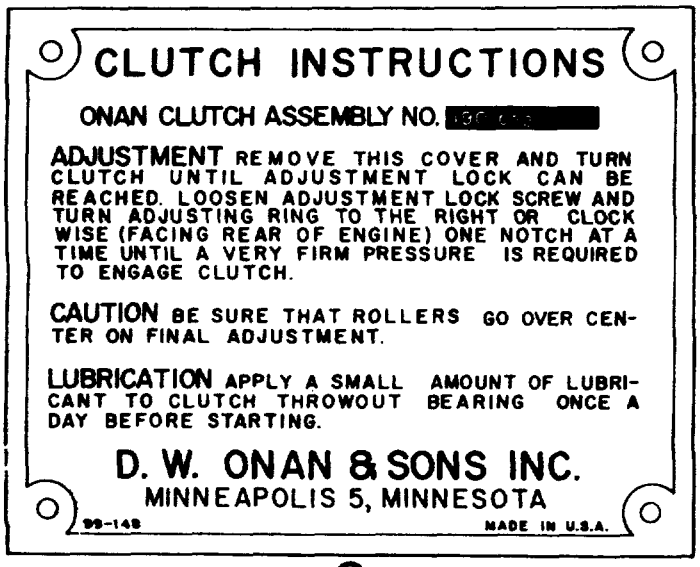
E

EMC 5-4930-202-12/3 (2)

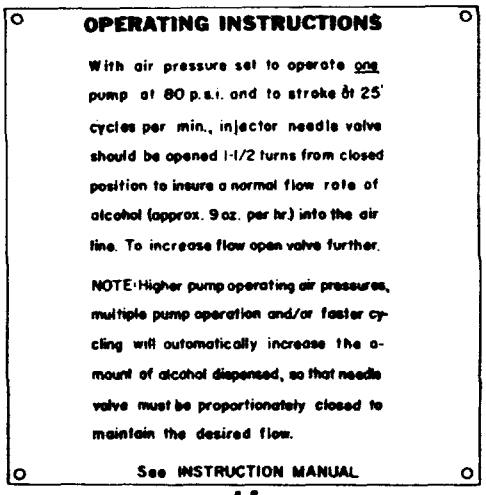
Figure 3--Continued.



F



G



H

Figure 3--Continued.

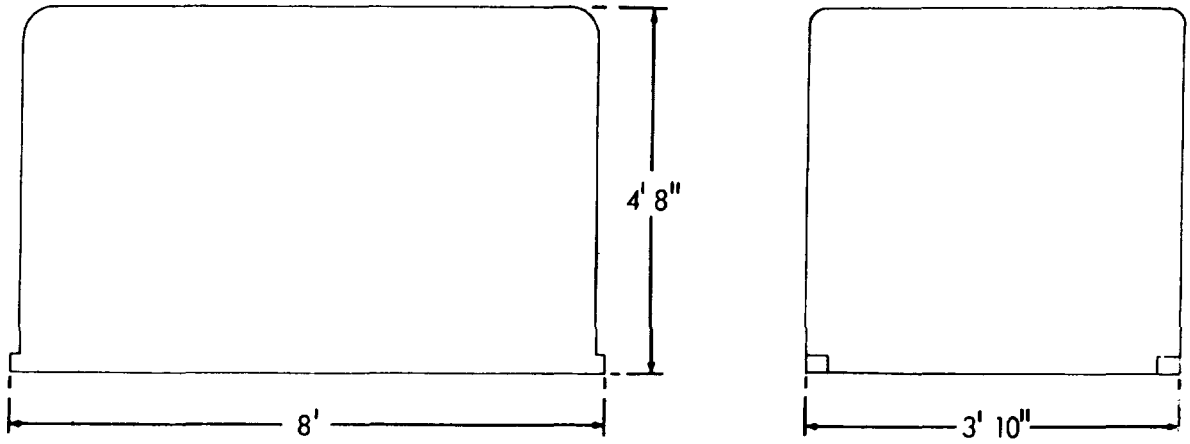


Figure 4. Shipping dimensions.

Serial number	58B587315
Type	2-cylinder, horizontally opposed, air-cooled, L-head, 4-cycle
Horsepower	13.4 at 3,600 rpm (revolutions per minute)
Ignition	Magneto with impulse starter generator
Cranking method	Starter generator
Number of cylinders	2
Compression ratio	6.25 to 1
Rated governor speed	3,600 rpm
Cylinder bore	3 in.
Stroke	2 ¾ in.
Piston displacement	33.8 cu in. (cubic inches)
Spark plug gap	0.025
Valve tappet clearance (Intake and exhaust):	
Minimum	0.006
Maximum	0.008
Magneto breaker point gap	0.015
Ignition timing:	
Engine stopped	11° (degrees) btc (before top center)
Engine running	26 btc

c. Air Compressor.

Manufacturer	Wayne Pump Company
Model	6163-HG
Type	2-cylinder, 2-stage
Displacement	16 cfm (cu ft per minute)
Crankcase capacity	3 pints
Operating pressure	150-175 psi (pounds per square inch)

d. Heater.

Make	Perfection Industries
Type	Fresh air
Model	E 500
Fuel	Gasoline
Fuel consumption:	
High fire	0.4 gph (gal per hour)
Low fire	0.27 gph

Type of burner ..... Vapor pot
Minimum operating temperature ..... 70 F.
Type of control ..... Remote

e. Lubricant Pumps.

Manufacturer ..... Gray Manufacturing Co.
Type:
- General purpose grease pump ..... 46 to 1 high pressure
- Gear oil pump ..... 11 to 1 low pressure
- Engine oil pump ..... 11 to 1 low pressure
- Operating pressure ..... 20 to 200 psi

f. Alcohol Dispenser.

Make ..... Norgren Company
Type ..... Reversible
Model 5743-R

g. Capacities.

Fuel tank ..... 9 gal (gallons)
Engine crankcase..... 4 qt (quarts)
Compressor crankcase..... 2 qt
Lubricant storage bins:
- General purpose grease ..... 23 gal
- Gear oil ..... 27 gal
- Engine oil ..... 27 gal

h. Engine Assembly Torques.

Cylinder head nuts ..... 25-30 ft lb (foot-pounds) cold
Rear bearing plate nuts ..... 18-20 ft lb
Other 5/16 inch nuts ..... 10-12 ft lb
Starter-generator through stud and nut ..... 45-50 ft lb

Table I. Maintenance and Operating Supplies

Item	Component application.	Source of supply	Federal stock number	Description	Quantity required for initial operation	Quantity required for 8 hours of operation	Notes
1	0100—CRANKCASE (ENGINE) (1)			OIL LUBRICATING: 5-gal drum, as follows:			(1) Includes quantity of oil to fill engine oil system as follows: 4 qt—crankcase (engine) 1 ½ qt—crankcase (compressor).
		10	9150-231-6653 (2)	Grade 9250 or OE-30	5 ½ qt	(3)	
		10	9150-265-9435 (2)				
		10	9150-231-9037 (2)	Grade 9110 or OE-10	5 ½ qt	(3)	
		10	9150-265-9428 (2)				
		10	9150-242-7603 (2)	OES	5 ½ qt	(3)	
2	0306—TANK, FUEL			GASOLINE, Automotive bulk	9 gal (5)	8 gal (6)	(2) See SB 38-5-3 for additional data and requisitioning procedures.
		10	9130-160-1816 (2)				
3	5001—CRANKCASE (COMPRESSOR) (4)			OIL, LUBRICATING: (4)		(3)	(3) See LO 5-4930-201-20 for grade application and replenishment intervals.
				SUPPLIES			
4	7205—RESERVOIR			OIL, LUBRICATING: 55 gal drum, as follows:			(4) Use oil as prescribed in Item 1 above.
		10	9150-231-6653 (2)	Grade 9250 or OE-30		(3)	
		10	9150-265-9435 (2)				
		10	9150-231-9037 (2)	Grade 9110 or OE-10		(3)	
		10	9150-265-9428 (2)				
		10	9150-242-7603 (2)	OES		(3)	
5	7205—RESERVOIR			OIL LUBRICATING GEAR, 55 gal drum as follows:			(5) Tank Capacity.
		10	9150-240-2253 (2)	GO—90	27 gal	(3)	
		10	9150-265-9424 (2)	GO—140	27 gal	(3)	
		10	9150-257-5442 (2)	GOS	27 gal	(3)	
6	7205—RESERVOIR			GREASE, 100 lb drum, as follows			(6) Average fuel consumption is 1 gal per hour of continuous operation.
		10	9150-190-0908 (2)	GAA	23 gal	(3)	

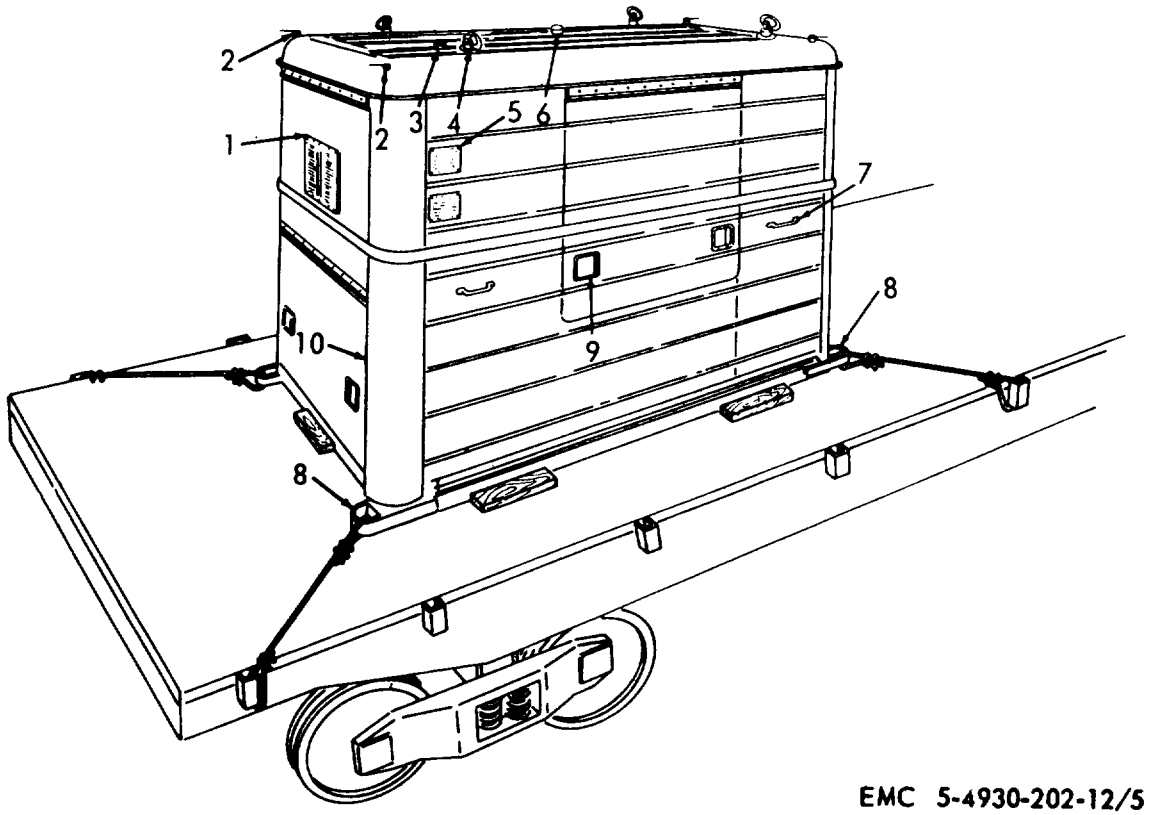
Table 11. Specific Gravity Temperature Corrections

Available cranking power (percent)	-65° F.	-40° F.	-20° F.	-10° F.	-0° F.	20° F.	40° F.	80° F.	100° F.	110° F.	120° F.
50	1.277	1.267	1.259	1.255	1.251	1.243	1.236	1.220	1.213	1.209	1.205
58.3	1.287	1.277	1.269	1.265	1.261	1.253	1.246	1.230	1.223	1.219	1.215
66.6	1.297	1.287	1.279	1.275	1.271	1.263	1.256	1.240	1.233	1.229	1.225
75	1.307	1.297	1.289	1.285	1.281	1.273	1.266	1.250	1.243	1.239	1.235
83.3	1.317	1.307	1.299	1.295	1.291	1.283	1.276	1.260	1.252	1.248	1.245
91.6	1.327	1.317	1.309	1.305	1.301	1.294	1.286	1.270	1.262	1.258	1.255
100	1.338	1.328	1.320	1.316	1.312	1.304	1.296	1.280	1.272	1.268	1.265

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

7. Unloading New Equipment

Four lifting rings (4, fig. 5) are mounted on top of the lubricating unit inclosure (10), to provide lift attachments for unloading the equipment with a power crane or a hoist. Securely tighten the four lifting rings into the lifting sockets in the V-shaped frames through the top of the aluminum inclosure (10). A lift attachment plate (5) located on the housing, illustrates the recommended placement of a crane sling and lift points on the lubricating unit. Four lifting sockets are provided to remove the inclosure from the lubricating unit. The lifting rings (4) are interchangeable between the inclosure lifting sockets, and the lubricating unit lifting sockets. Four tie-down rings (8), one at each corner of the steel skid, are used to secure the unit to the floor or deck of its transportation medium. Tie-down cables attached to these rings, prevent shifting or movement in any direction, during shipment.



1	Louver	5	Lifting capacity plate	8	Tie-down rings
2	Door lock	6	Heater exhaust tube	9	Door latch
3	Lifting ring socket plug	7	Hand lifting handles	10	Inclosure
4	Lifting ring				

Figure 5. Unloading details.

Caution: When unloading the lubricating unit, be sure the removeable lifting rings are inserted into the correct lifting socket as depicted on the lifting attachment plate.

8. Unpacking New Equipment

a. General. New units are processed to meet military specifications and are shipped fully assembled. All openings, gages, valves, and air cleaners are sealed with tape. Preservatives have been placed in the engine crankcase, fuel tank, compressor crankcase, and the air receiver. Do not open the equipment until it is to be put into immediate use.

b. Procedure.

(1) Place the lubricating unit as close as possible to the working site, being sure that the reel service hoses are fully accessible to the operator, and that all access doors can be raised and locked in the full open position (figs. 1 and 2).
(2) Open all doors on the lubricating unit cover, to provide access to controls, gages, and valves.
(3) Remove all sealing tape from the equipment, valves, gage openings, and air cleaners.
(4) Drain the engine crankcase, the compressor crankcase, fuel tank, and the air receiver.

9. Removal of Protective Material and Devices

a. Remove seals and sealing compound from all points.

b. Remove all barrier material and preservatives from threaded surfaces and from all exposed surfaces of the lubricating unit. Wipe clean, using dry cloth. Clean the hinges, fasteners, handles, and other hardware. Clean the reels, hoses, control valves, and lubricant meters.

c. Remove all preservatives and packing from the engine, using clean cloths, and an approved cleaning solvent.

d. Remove all loose packing material and wiping rags from the unit.

e. Open the tool and accessory drawers. Remove and clean the attachments. Replace all items in the drawer so they will be available for use when needed.

10. Inspection of New Equipment

a. General. When a new lubricating unit is received by the using organization, inspect the equipment to be sure that it is in proper operating condition.

b. Visual Inspection.

(1) Perform the before-operation inspections as directed in paragraph 74.
(2) Inspect for any damage which may have occurred in shipment. Report any deficiencies to the proper authority.
(3) Inspect all components for loose mountings or connections.
(4) Check all valves and controls for proper working order.
(5) Inspect the engine for any missing parts or for damage to the air cleaner, manifold, muffler, carburetor, magneto, spark plugs, or fuel lines.
(6) Inspect the fuel tank for dents, cracks, or leaks.
(7) Check oil level and bring to proper level. Refer to LO 5-4930-202-12 for proper grade of lubricant.
(8) Inspect the compressor for any missing parts, or for damage to the air lines, controls, valves, and connections.
(9) Inspect the reel bank and hoses for damage that will affect operation; check all valves and swivels for binding.
(10) Inspect the pumps for outside damage, such as dents or broken parts.
(11) Inspect the batteries for proper electrolyte level and proper cable connections.
(12) Make a visual inspection of the entire unit. Check for loose and missing bolts, nuts, and screws. Inspect all instruments for cracked or broken glass and secure mountings.

11. Servicing New Equipment

a. Maintenance. Perform all preventive maintenance services listed in paragraph 73.

b. Lubrication. Lubricate the unit as specified in LO 5-4930-202-12.

c. Fuel. Fill fuel tank nearly full, using clean, fresh, regular gasoline. Do not use premium gasoline.

Caution: Do not fill the gasoline tank while the engine is in operation. Provide a metallic contact between the container and the tank when filling.

d. Oil. Fill the crankcase of the engine, and the crankcase of the compressor, as specified in LO 5-4930-202-12.

e. *Meters and Gages.* Inspect the meters and gages. See that they are in proper operating condition and securely mounted.

f. Leaks, General. Inspect for leaks, giving particular attention to the fuel, air, lubricating and oil lines, and connections.

Note. Report to proper authority, leaks that cannot be corrected by tightening connections.

g. Fire Extinguisher. Check the condition of the fire extinguisher. Inspect for full charge, proper working order, and secure mounting.

h. Clutch. Inspect the clutch assembly for proper adjustment. Refer to paragraph 128 for clutch assembly adjustment instructions.

i. Electrical System. See that all electrical connections, particularly at the magneto, coil, and spark plugs, are securely connected.

j. Battery. The batteries for the unit are shipped dry-charged. The electrolyte for filling the battery cells is shipped in separate containers. Fill the batteries with electrolyte until the level is one-fourth inch below the filler holes. When the batteries are filled, place them in the battery box and connect the batteries. Use the negative battery terminal for ground connection.

Warning: Clean up any spilled electrolyte with water. Keep the electrolyte off the skin to prevent personal injury.

k. Crankshafts. Remove the ignition cables from the spark plugs and turn the engine and compressor crankshafts several turns to be sure that the pistons and bearings are not binding.

l. Cooling System. Be sure all cooling fins and the air shrouds are free of dirt or material which might hamper proper cooling of the engine and the compressor.

m. Initial Tests.

(1) Disconnect the ignition cables from the spark plugs. Turn the engine over several times by hand to make sure that all parts move freely without binding. If binding is detected, refer this condition to the proper authority. If there is no indication of binding, connect the ignition cables to the spark plugs. Disengage the clutch before starting the engine.

(2) Start the engine. Refer to paragraphs 48 and 49 for starting instructions.

(3) Engine speed is regulated by the governor control, which may be adjusted to regulate the operating speed of the engine (par. 112). The governor on the engine is preset by the manufacturer at a nominal engine speed of 3,600 rpm at no load operation.

(4) Stop the engine (par. 50).

(5) Turn over the compressor several times, by hand, to make sure that all parts move freely without binding. If binding is detected, report this condition to the proper authority.

(6) Start the engine and place the clutch lever in the engaged position. Note if the air pressure rises to 175 psi, and whether the air compressor automatically unloads at that pressure. Release the air pressure from the air receiver and note if the air compressor automatically loads at 150 psi. If the unloading or loading points are more than 5 psi from the stated limits, adjust the compressor pressure switch setting (par. 135).

(7) Test the tightness of all couplings, connections, adapter hose lines, manifold connections, control valves, head gaskets, or any other points of possible leakage. If any leaks are found, tighten joints or replace the defective parts.

(8) Test the lubricant pumps (par. 53).

(9) Connect the heater gas line quick disconnect coupling (17, fig. 9) and the heater power line connector (2, fig. 40).

(10) Adjust belt tension by loosening the bolts holding the engine in position on the mounting blocks, and moving the engine outward to attain proper tension. The tensions are correct when the belts can be depressed without effort, approximately 1/2 to /4 inch midway between the pulleys.

12. Installation or Setting-Up Instructions

The lubricating unit is a self-contained unit and requires no special mounting base. A removable aluminum housing furnishes a protective cover for the unit. Locate the unit where it will receive a supply of clean, dry air. Air filled with dust will clog the compressor air cleaner, and the air intake valves. Situate the equipment so it is plumb and level at all times. Locate the equipment at least two feet from any wall to permit adequate circulation of air. If it is placed in a confined area, circulation is restricted, the unit will heat up, and result in improper operation. Locate the equipment so that the hose reels and lubricant pumps are easily accessible.

Warning: Exhaust gases contain carbon monoxide and are poisonous. Do not run the engine in an inclosed area without proper ventilation, or without an exhaust connection to the outside.

13. Used Equipment

a. General. Used lubricating units which have been stored and shipped in conformance with Army specifications are ready for use on arrival, and serviced in the same manner as new equipment before being put into service.

b. Inspection. Inspect used lubricating units the same as new units (par. 10). Special attention must be given to indications of more than normal wear. Give particular attention to fuel and air lines for damage and leaks. Make sure all gages and controls are connected properly. Report all deficiencies to the proper authority.

c. Service.

(1) Service the lubricating unit (par. 11). Special attention should be given to lubrication services.
(2) Check engine crankcase and compressor crankcase for proper oil level. Add oil if necessary, using oil of the recommended viscosity.
(3) Make sure that all fittings, lines, controls, and gages are not bent, broken, or missing. Clean or replace as necessary.
(4) Start the unit and make a systematic check of all gages and instruments for proper operation. Report all deficiencies to the proper authority.

Section II. MOVEMENT TO NEW LOCATION

14. Dismantling for Movement to New Location

a. Preparation for Shipment.

(1) This equipment requires safe and proper storage of grease guns, adapters, and starting rope, when securing for movement to a new location.
(2) Disconnect the battery cables from the batteries.
(3) Release all air from the air storage tanks.
(4) Lock the hose reels by applying the reel brakes to each of the five reels.
(5) Make sure that the lifting rings which secure the housing to the U-frame are installed properly.
(6) Make sure that all the doors on the housing are securely latched in place.
(7) Wrap the entire housing with a steel banding strap.

b. Loading and Transporting Equipment.

(1) Load the lubricating unit by means of a crane, and a crane sling attached to the four lifting rings, located at each top corner of the housing.
(2) After placing the lubricating unit on the designated mode of transportation, whether it be a flatcar, truck-bed, or a trailer, securely tie down the unit to the carrier, using turn buckles and tiedown cables attached to the tiedown points on the unit assembly (fig. 5).

15. Reinstallation After Movement to New Location

Procedure required for reinstallation of the equipment after movement to a new location are identical to those procedures required for installation or setting up new equipment (par. 12).

Section III. CONTROLS AND INSTRUMENTS

16. General

This section describes, locates, illustrates, and furnishes the operator, or crew, sufficient information pertaining to the various controls and instruments, provided for the proper operation of the lubricating unit.

17. Stop Button Switch

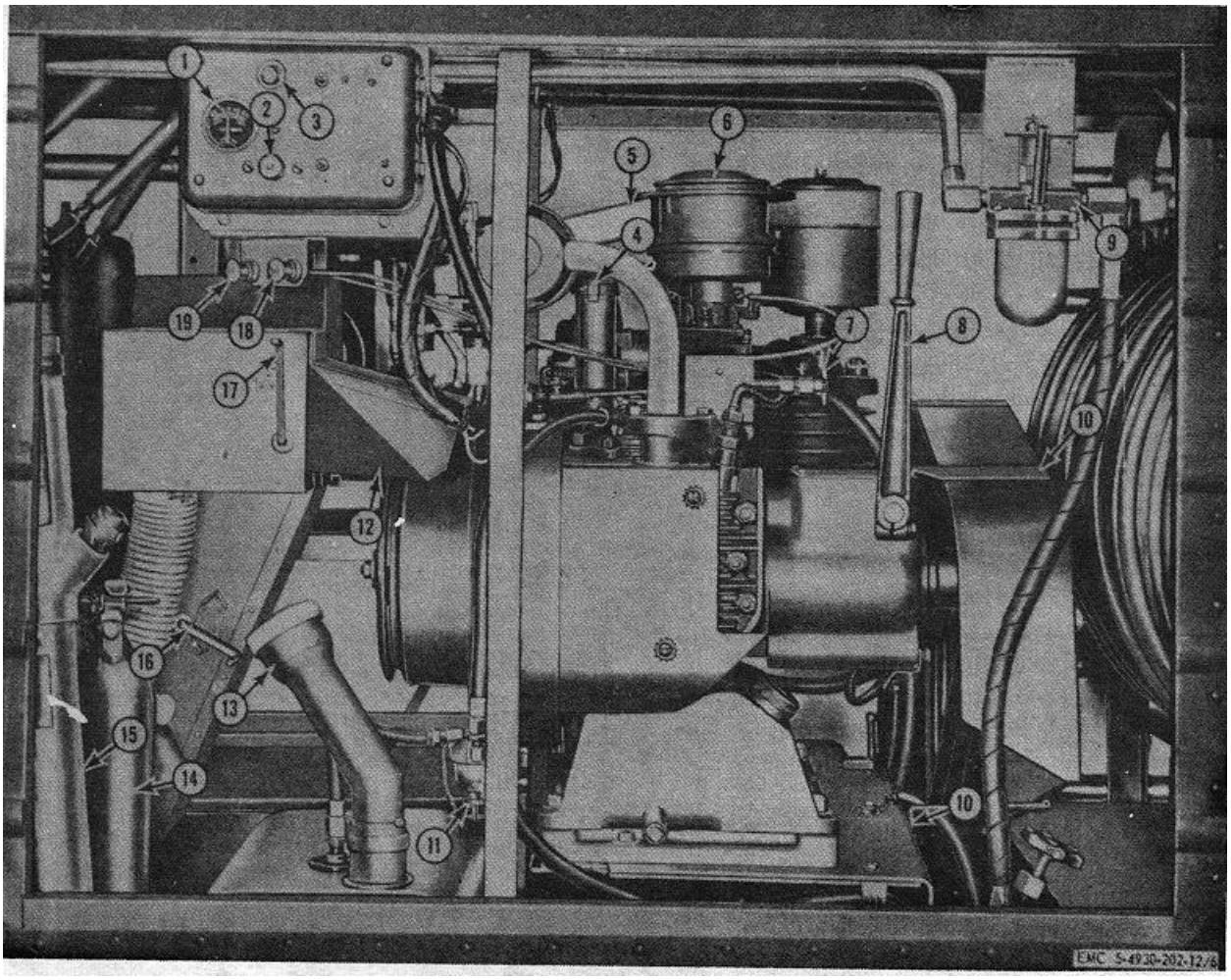
The stop button switch (3, fig. 6) is a pushbutton control switch located on the engine control box. The button is pushed in to stop the engine.

18. Ammeter

The ammeter (1, fig. 6) is located on the engine control box. It is a dial-type instrument %which shows if the generator is properly charging or the battery discharging. The indicator will be just past the 0 mark on the charge side when operating properly.

19. Starter Button Switch

The starter button switch (2, fig. 6) is a push button control switch located on the engine control



1 Ammeter
2 Start button switch
3 Stop button switch
4 Crankcase breather
5 Air heater duct
6 Engine air cleaner
7 Speed reduction shutoff cock
8 Engine clutch lever
9 Alcohol dispenser
10 Belt guard bracket
11 Engine fuel filter
12 Heater duct
13 Fuel tank filler pipe
14 Fire extinguisher
15 Transfer pump
16 Lubricant container hot air damper
17 Engine hot air damper
18 Choke control
19 Idle control

Figure 6. Lubricating unit controls and instruments, engine side.

box. It is used to electrically start the engine.

20. Clutch Lever

The clutch lever (8, fig. 6) on the power takeoff assembly engages or disengages the load from the engine. The clutch is engaged when the lever is in forward position (toward the reels) and disengaged when moved back. A firm pressure of approximately 35 to 40 pounds is required to engage the clutch lever.

21. Alcohol Dispenser

The alcohol dispenser (9, fig. 6) is bracket-mounted, and is located on the engine side of the lubricating unit. A needle valve controls the rate of flow of alcohol from the dispenser. The alcohol dispenser if used to prevent freezing of condensed air in air lines and pumps. This unit is used only when the temperature is below 320 Fahrenheit.

22. Speed Reduction Shutoff Cock

The speed reduction shutoff cock (7, fig. 6) is bracket-mounted on the engine manifold, and is connected to the throttle control inlet. The shutoff cock provides manual elimination of the automatic throttle control for cold weather operation. Engine will then continue to run at the governor set speed.

23. Lubricant Container Hot Air Damper Lever

The lubricant container hot air damper (16, fig. 6) directs heater output to heat the lubricant in the lubricant containers. By swinging the hot air damper lever up into the open position, heater output will be directed to the lubricant containers.

24. Engine Hot Air Damper Lever

The engine hot air damper (17, fig. 6) directs heater output toward the engine. By swinging the engine hot air damper to the left into open position, and the lubricant container hot air damper (16) down into the closed position, heater output will be directed toward the engine and the battery compartment.

25. Choke Control

The choke control (18, fig. 6) is located on the engine control box, and enables the operator to enrich the fuel mixture for starting purposes. Pull the choke control out to enrich the fuel air mixture in the carburetor.

26. Idle Control

The idle control (19, fig. 6) is located on the engine control box, and is used to idle the engine at no-load operation. Pull the idle control out to idle the engine.

27. Oil Pressure Gage

The oil pressure gage (16, fig. 7) is mounted on the engine, behind the blower housing. It is a dial-type instrument which shows oil pressure in pounds per square inch. The indicator reading should be between 20 and 35 psi after the engine is thoroughly warmed.

28. Drain Valve

The drain valve (6, fig. 8) is located at the air receiver on the engine side of the lubricating unit. It is used to drain moisture and air pressure from the air receiver. Turn the handle counterclockwise to release air and moisture.

29. Master Air Valve

The master air valve (2, fig. 8) is located at the air receiver on the engine side of the lubricating unit. The valve releases air from the air receiver, and controls the air pressure supply in all lines issuing from the air receiver. Turn the handle counterclockwise to release air from the air receiver.

30. Air Line Pressure Relief Cock

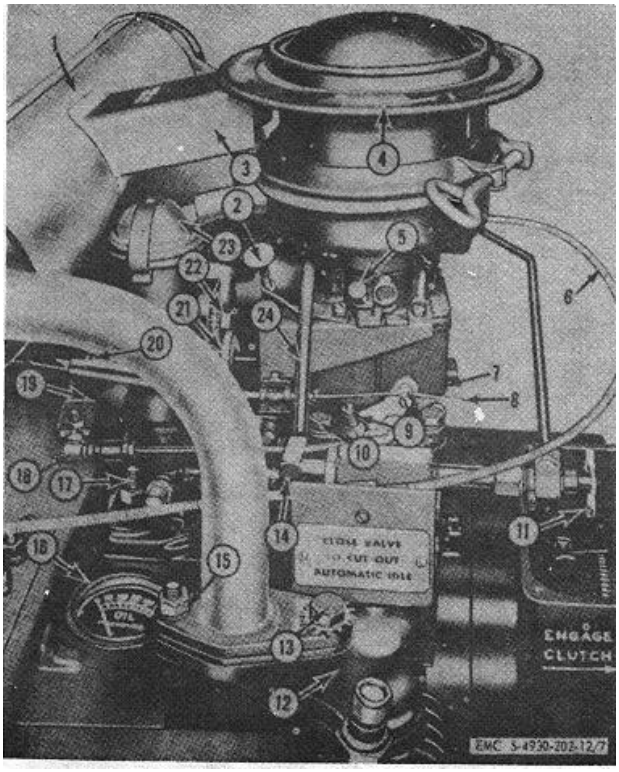
The air line pressure relief cock (11, fig. 8) is located at the air receiver on the engine side of the lubricating unit. The relief cock releases the air pressure in the lines to the pumps and air reel.

31. Thermostat

The heater thermostat (4, fig. 9) is located on the heater control panel. The thermostat regulates the output of the heater.

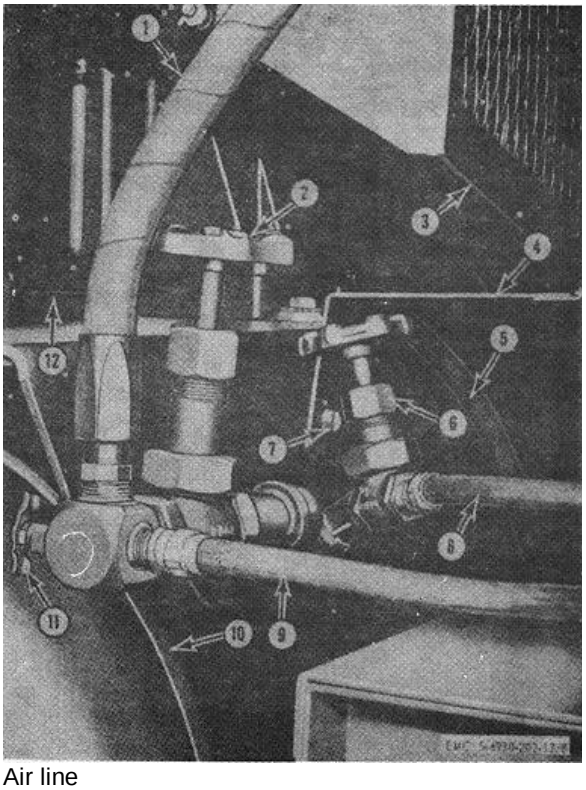
32. Press-To-Test Lamp

The press-to-test lamp (10, fig. 9) located on the heater control panel enables the operator to determine if the heater is operating properly.



1 Muffler
2 Fuel pump primer lever
3 Air cleaner heater duct
4 Air cleaner
5 Idle adjustment
6 Choke linkage
7 Carburetor
8 Throttle linkage
9 Throttle stop screw
10 Cap screw, 5/16-18 x 7/8 in. lg (2 rqr)
11 Speed reduction shutoff cock
12 Manifold
13 Cap screw, 3/8-16 x 2 1/2 in. lg (2 rqr)
14 Throttle bracket
15 Hex nut, 5/16-20 (2 rqr)
16 Oil pressure gage
17 Oil pressure relief adjusting screw
18 Governor linkage
19 Governor arm
20 Sensitivity adjusting screw
21 Governor speed adjusting nut
22 Cap screw, 3/8-16 x 21/2 in. lg (2 rqr)
23 Crankcase breather
24 Fuel line

Figure 7. Engine controls and instruments.



1 Air line
2 Master air valve
3 Belt guard
4 Bracket
5 Negative battery cable
6 Air tank drain valve
7 Hex screw, 1/4-20 x 1/2 in. lg
8 Air drain valve line
9 Air line to reel
10 Air receiver tank
11 Air line pressure relief cock
12 Engine mounting base

Figure 8. Air receiver controls.

33. Heater Control Switch

The heater control switch (9, fig. 9) is located on the lower left-hand corner of the heater control panel. It is a toggle-type switch which turns the heater on to HI, LOW, and OFF.

34. Fuel Pump Primer Lever

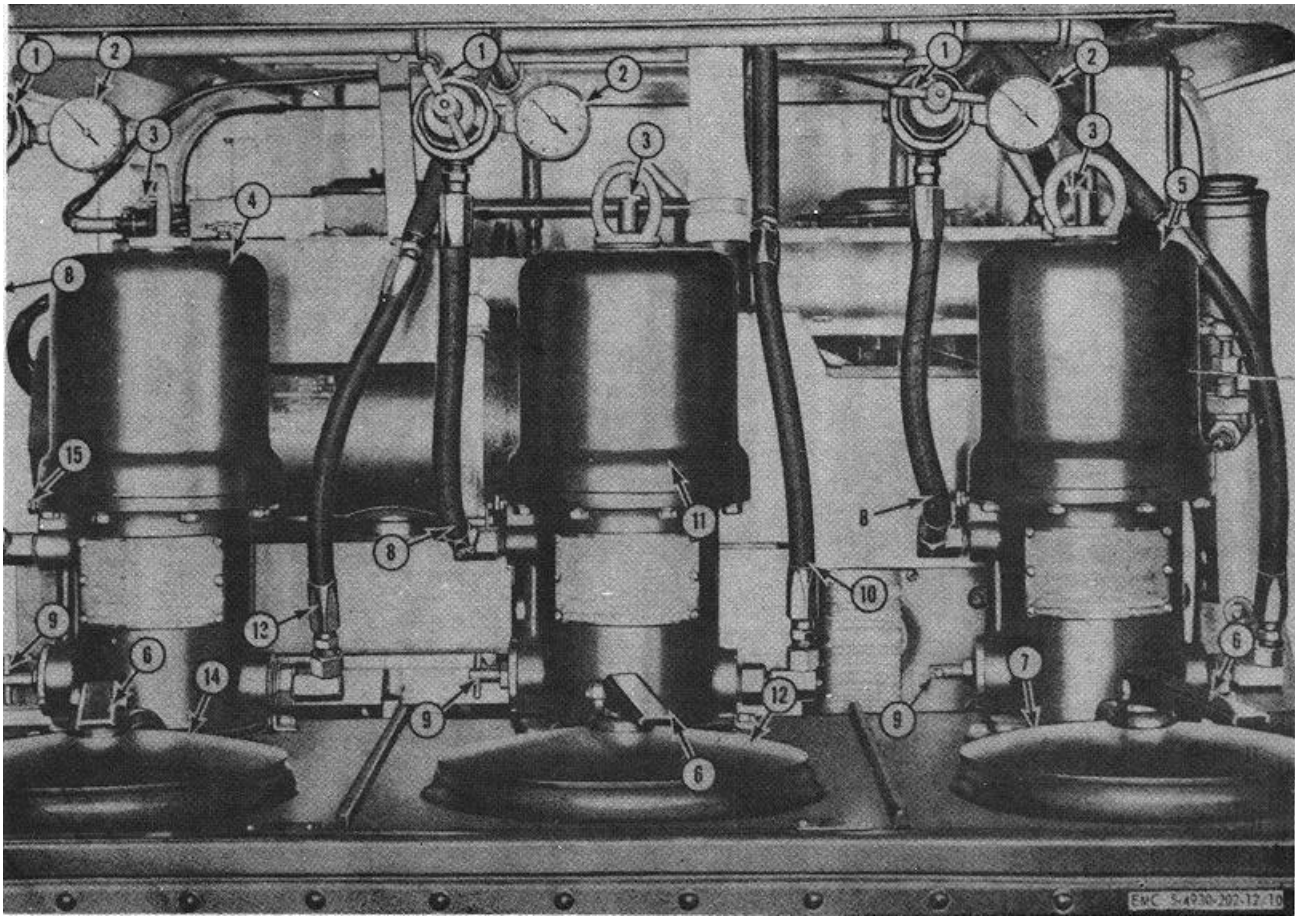
The fuel pump primer lever (3, fig. 9) is located on the engine at the side of the air cleaner and above the carburetor. It is a pump-type lever used to prepare the engine for initial starting by filling the carburetor with gasoline.

35. Air Receiver Pressure Gage

The air receiver pressure gage (12, fig. 9) is located on the compressor side of the unit on the manifold. The air receiver pressure gage is graduated from 0 to 300 psi. The gage should show a pressure of 150 to 175 psi for proper operation of the lubricating unit.

36. Air Receiver Safety Valve

The air receiver safety valve (13, fig. 9) is located on the engine side of the air tank at the top. It is a spring-loaded valve which releases



1 Compressor intake muffler
2 Safety valve
3 Fuel pump primer lever
4 Thermostat
5 Heater bleeder valve
6 Heater
7 Heater slide tray
8 Heater control switch
9 Reset button
10 Press-to-test lamp
11 Center toolbox
12 Air receiver pressure gage
13 Air receiver safety valve
14 Engine exhaust director handle
15 Cap screw, 5/16-18 x 1 in. lg (2 rqr)
16 Bracket
17 Quick coupling

Figure 9. Lubricating unit controls and instruments, compressor side.

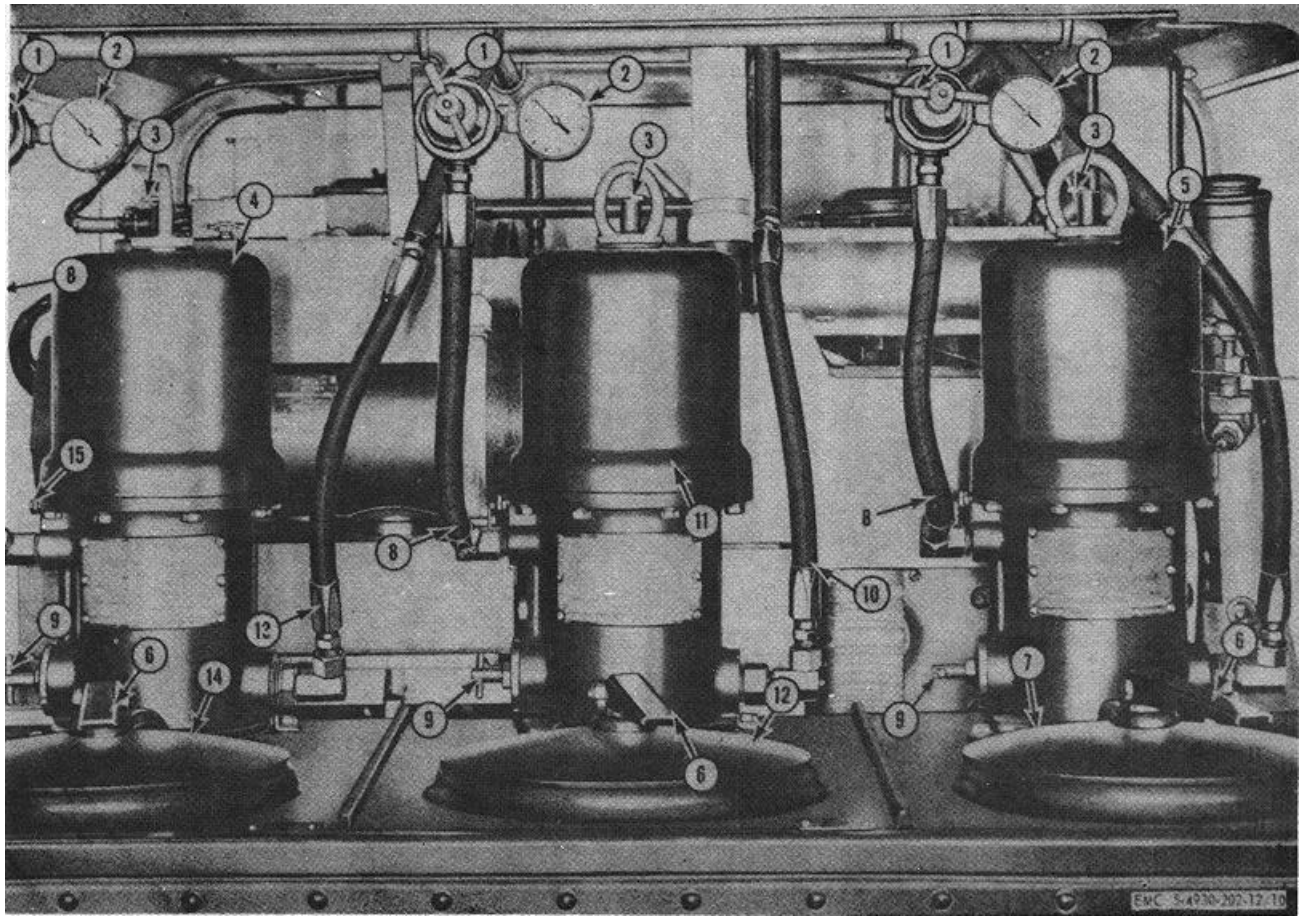
excess air pressure from the receiver at a predetermined setting of 200 pounds. If for any reason the pressure need be released before the excess pressure point has been reached, grasp the ring located on the safety stem, and pull upward to open the safety valve and allow the air to escape.

37. Engine Exhaust Director Handle

The engine exhaust director handle (14, fig. 9) is used either to direct heat from the engine exhaust into the lubricant compartment heat chamber, or direct exhaust gases through a hose to atmosphere outside the unit, when heating of grease and oil is not desired.

38. Air Regulators

Air pressure and speed, to the three lubricating pumps, are controlled by the air regulators (1, fig. 10) mounted on the air line between the air receiver and the lubricant pumps. The exact air pressure to operate the pumps must be determined by the operator, based upon volume or delivery rate required. To increase air pressure to pumps turn regulator handle clockwise.



1 Pressure regulator valve
2 Air pressure gage
3 Condensate valve
4 Gear oil pump
5 Engine oil pump
6 Fill cover handle
7 Fill cover, engine oil
8 Air line, regulator-to-pump
9 Circulating valve
10 Grease, GAA, line
11 High-pressure pump
12 Grease, GAA, fill cover
13 Gear lubricant line
14 Gear lubricant fill cover
15 Oiler

Figure 10. Lubricating unit controls, pump end.

39. Air Pressure Gage

The air pressure gages (2, fig. 10) are mounted on the regulators. There is a gage for each of the three pumps, and each is graduated to read from 0 to 200 psi. Each gage registers the amount of air pressure to its respective pump.

40. Condensate Valve

The manual condensate valve (3, fig. 10) is mounted on the top of each pump, and is used to discharge accumulated moisture from the pump air motor after operation, by turning the handle counterclockwise.

41. Circulating Valve

The circulating valve (9, fig. 10) is mounted on the lower pump housing and permits the bypassing and circulating of lubricants with the pump returning directly into the lubricant compartment. To open circulating valve turn the handle counterclockwise two full turns.

42. Reel Brake

A hand-operated reel brake (16, fig. 11) is mounted on the hub of each hose reel to permit locking of the hose reels at any position during operation or after operation. The reel brake is a lever-type control.

43. High-Pressure Control Valve

A high-pressure control valve (10, fig. 11) is mounted on the engine oil reel, and on the gear oil reel. Depress the trigger on the high-pressure

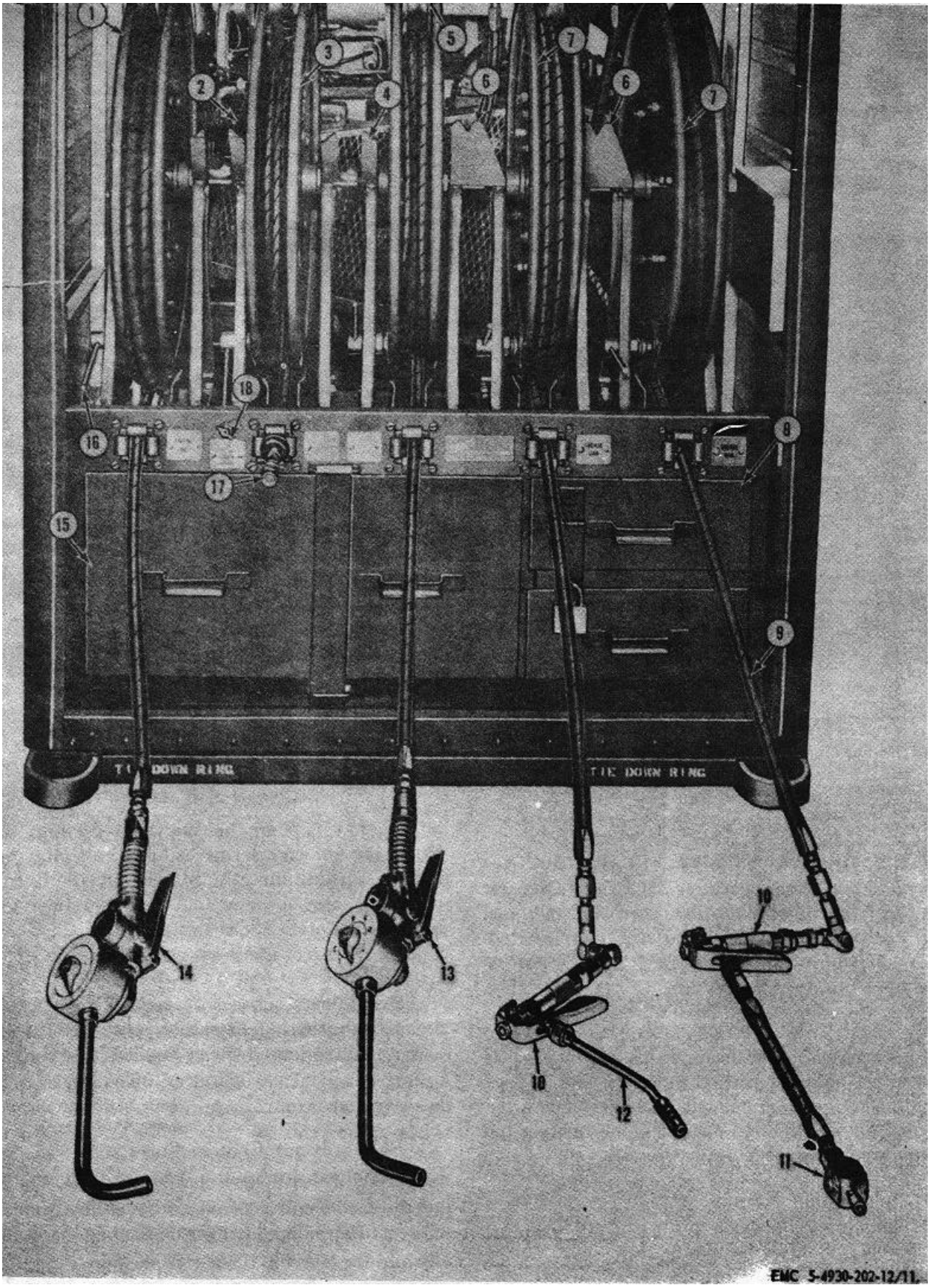


Figure 11. Lubricating unit controls, hose reel end.

1 Reel, engine oil
2 Quart meter valve bracket
3 Reel, air coupler
4 Pint meter valve bracket
5 Reel, gear lubricant
6 High-pressure control valve bracket
7 Reel, grease GAA
8 Upper accessory drawer
9 Lower accessory drawer
10 High-pressure control valve
11 Giant buttonhead whip end
12 Hydraulic adapter
13 Pint meter valve
14 Quart meter valve
15 Battery drainer
16 Hose reel brake control
17 Air line coupler
18 Air tank drain valve

Figure 11-Continued.

control valve, to dispense lubricants. Release the trigger to halt lubricant flow.

44. Metered Control Valve

A metered control valve (13, 14, fig. 11) is mounted on each of the two grease reels. Depress the trigger on the control valve to dispense the lubricants and release the trigger to halt lubricant flow.

45. Air Line Coupling Socket

The air line coupling socket (17, fig. 11) on the air hose reel is used to supply compressed air to the various air-operated accessories.

46. Air Tank Drain Cock

A manually operated air tank drain cock (18, fig. 11) is mounted on the reel bank hose roller panel, and is directly connected by a length of hose to the drain valve to facilitate the draining of moisture and air pressure from the air receiver.

Section IV. OPERATION UNDER USUAL CONDITIONS

47. General

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

b. It is essential that the operator know how to perform every operation of which the lubricating unit is capable. This section gives instructions on starting and stopping the unit, on the basic motions of the machine, and on how to coordinate the basic motions to perform the specific tasks for which the machine is designed.

48. Electric Starting of Engine

a. Move the engine exhaust director handle (14, fig. 9) into the horizontal position, to direct the engine exhaust gases to the atmosphere outside the unit.

b. Rotate the air cleaner (6, fig. 6) so that the screened opening is away from the air heater duct (5).

c. Disengage the clutch lever (8) from the connecting load, by pulling lever toward engine.

d. Pull the choke control (18) 1/2 to 8a out.

e. Press the starter, (2) button in firmly, to crank the engine. If the engine does not start the first or second attempt, push the choke control in before pressing the starter button again.

f. After the engine starts, push the choke control in until the engine runs smoothly.

49. Manual Starting of Engine

a. Perform steps a through b of paragraph 48.

b. Insert the starting rope (3, fig. 12) in the notch of the rope sheave (1).

c. Wind the rope in a clockwise direction around the sheave, leaving about 6 inches free at the handle end.

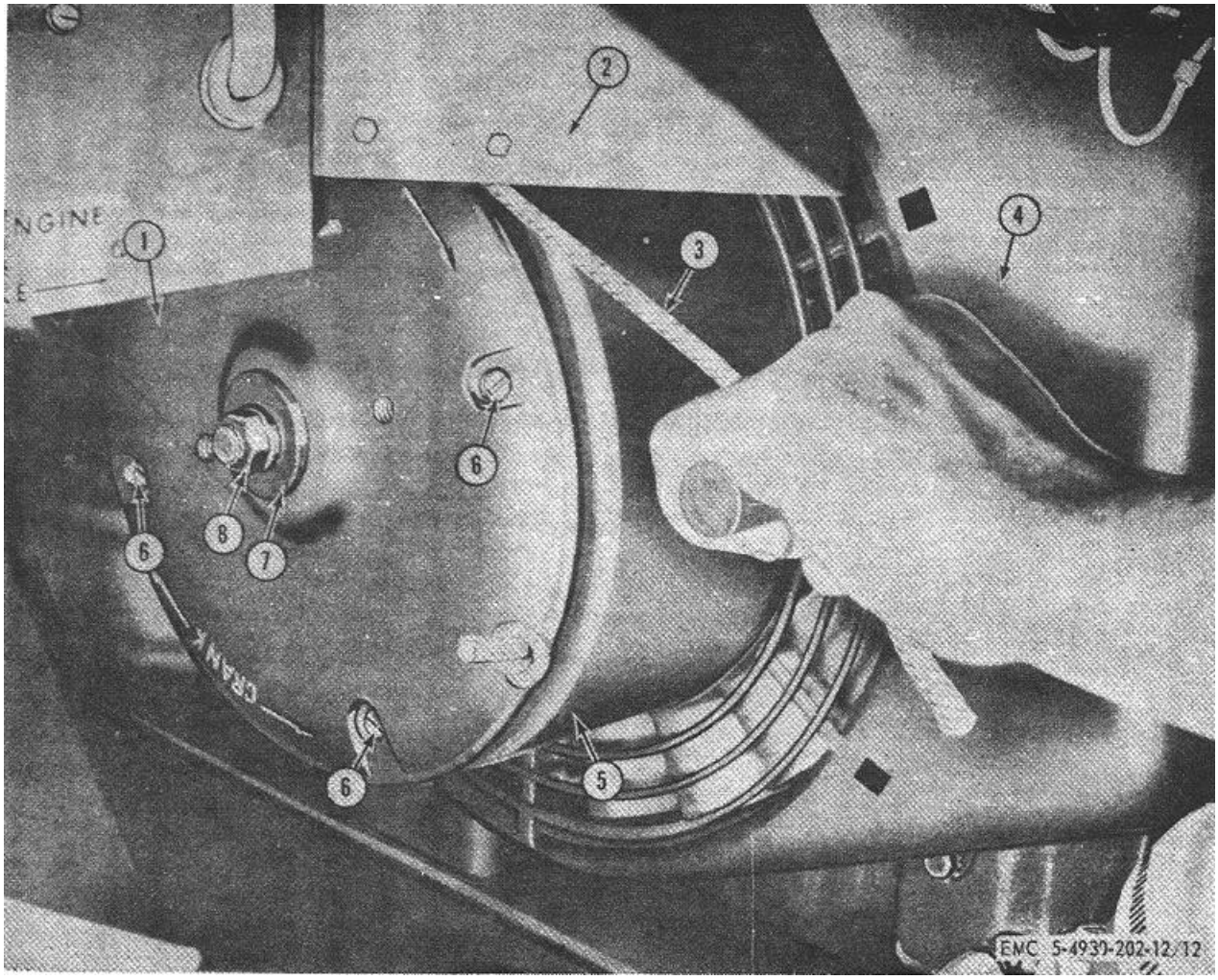
d. Give a fast, strong steady pull the full length of the rope. If the engine does not start at the first attempt, increase choking, and crank again.

e. After the engine starts, push the choke control in, until the engine runs smoothly.

50. Stopping Engine

a. Disconnect all load before stopping the engine by disengaging the clutch from the compressor.

b. Stop the engine by pushing in firmly on the stop button (3, fig. 6) and holding all the way in until the engine stops running.



1	Rope sheave	3	Starting rope	5	Blower and hub	7	Flat washer, 7/16, in.
2	Heat deflector	4	Air shroud	6	Screw, 1/4-28 x 7/8, in. lg (4 rqr)	8	Nut, 7/16-20

Figure 12. Hand starting the engine.

c. Close the master air control valve (2, fig. 8) and open air line pressure relief cock (11) and the drain valve (6) to release the air pressure in the hoses. to all three pumps and the air reel.

51. Emergency Stopping of Engine

In an emergency such as failure of the stop button, stop the engine by pulling the choke control knob out to the limit of its travel.

52. Filling Lubricant Tanks

a. Start the engine. Refer to paragraphs 48 and 49.

b. Allow the engine to reach proper temperature and check the oil pressure gage (16, fig. 7) and the ammeter (1, fig. 6). Proper oil pressure is between 20 and 35 pounds.

c. Engage the clutch lever (8) by moving it toward the hose reels.

Note

Engage the clutch slowly, allowing sufficient time for the compressor to gain speed before fully engaging clutch.

d. Close the master air valve (2, fig. 8) and the air pressure relief cock (11) at the air receiver.

e. Air pressure in the tank will automatically build up to 175 pounds. The pressure switch is pre-set to cut out at 175 pounds pressure, and cut in at 150 pounds pressure.

f. Allow pressure to build up, until the air

pressure gage (12, fig. 9) shows a reading of between 150 and 175 pounds air pressure.

g. Remove the transfer pump (15, fig. 6) from the mounting on the lubricating unit housing.

h. Install the transfer pump (6, fig. 13) in the drum of the lubricant to be dispensed.

i. Remove the transfer pump hose (1, fig. 13) from the center toolbox (9, fig. 2) and install it to the transfer pump (6, fig. 13).

j. Pull out the air reel hose (3, fig. 11) to the required length, and attach the air coupler (17) of the reel hose, to the air coupling (3, fig. 13) of the transfer pump.

k. Open the fill cover (7, 12, or 14, fig. 10) of the lubricant tank to be filled by swinging the fill cover handle (6) to the right and pulling upward.

l. Remove the cap (7, fig. 13) from the end of the nozzle (8), and insert the nozzle into the tank opening.

m. Open the master air control valve (2, fig. 8) to release air from the air receiver.

n. Open the air valve (4, fig. 13) of the transfer pump to the required volume. This controls the operating speed of the transfer pump.

o. After the tanks have been filled, stop the engine.

Note

Always keep lubricant compartments filled at least 3/4 full.

p. Clean and stow the transfer pump and hose in the respective positions on the lubricating unit.

q. Close the master air control valve (2, fig. 8) and open the air line pressure relief cock (11) to release the air pressure in the hose to the air reel.

r. Open the drain valve (6) mounted on the air receiver, and the air tank drain cock (11) to drain moisture and air pressure from the tank.

53. Preparing Lubricant Pumps for Operation

a. Perform steps *a* through *f* paragraph 52.

b. Open the enclosure pump access door (15, fig. 1) and turn the handles of the air pressure regulators (1, fig. 10) counterclockwise. This controls air pressure and speed of each pump.

c. Open the master air control valve (2, fig. 8) at the air receiver, and close the air line pressure relief cock (11).

d. Turn the air regulator handles clockwise until set at the desired air pressure, as registered on the air pressure gage (2, fig. 10).

e. Air pressure to each pump must be adjusted at air regulator serving respective pump. Turn the air regulator handle clockwise to increase air pressure, and counterclockwise to decrease air pressure. The exact air pressure, to operate pumps, must be determined by operator, based upon delivery rate required, viscosity, and temperature of lubricant.

f. Open the circulating valve (9) of each pump, by turning the circulating valve handle counterclockwise two full turns.

g. After charging pump with lubricant, close the circulating valve of each pump, by turning valve handles clockwise to closed position.

h. Open the hose reel access door (1, fig. 2), release the reel lock (16, fig. 11), from one of the lubricant reels (1, 5, 7), unhook the control valve (10, 13, 14) from the bracket (2, 4, 6) and pull the hose from the reel.

i. Sequeeze open the control valve, by depressing the trigger, and the pump will automatically start filling the line, and forcing lubricant through the control valve nozzle or adapter.

j. Allow lubricant to flow until the line has been purged of air, and no aerated lubricant is dispensed.

k. Repeat this operation on the other three lubricant hoses. Lubricating unit is now ready to dispense lubricant.

54. Dispensing Lubricants

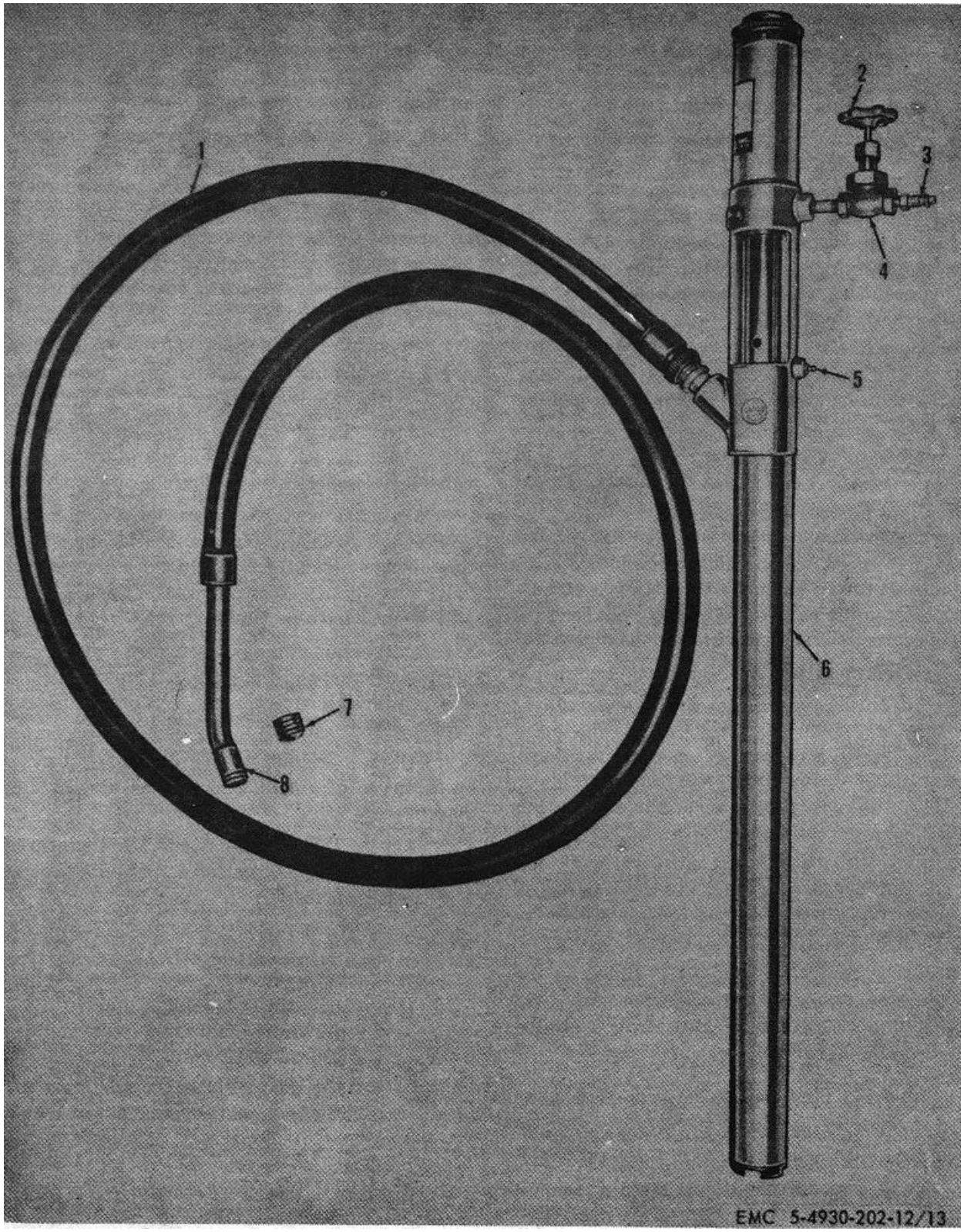
a. Dispensing General Purpose Grease.

(1) Prepare the lubricant pump (11, fig. 10) for operation. Refer to paragraph 53.

(2) Release the reel brake handle from one of the general purpose grease reels (7, fig. 11) and pull out the required length of hose.

(3) Attach the proper adapter (11, 12), selected from those in the accessory drawers (8, 9).

(4) Clean each grease fitting. Attach the



1	Transfer pump hose	3	Air coupling	5	Grease fitting	7	Nozzle cap
2	Air valve handle	4	Air valve	6	Transfer pump	8	Nozzle

Figure 13. Transfer pump.

hydraulic adapter to it, and squeeze the control trigger.

(5) When all the old grease has been forced out of the bearing, shackle, or other points being lubricated, release the control handle trigger. Disconnect the hydraulic adapter from the fitting, and proceed to the next lubrication point.

(6) When all points taking general purpose grease have been lubricated, disconnect the adapter from the control valve. Wipe it clean and return it to the accessory drawer. Rewind the hose on the reel, replace the control handle on the bracket. Latch the reel by moving the handle downward toward the bottom of the reel.

b. Dispensing Gear Oil.

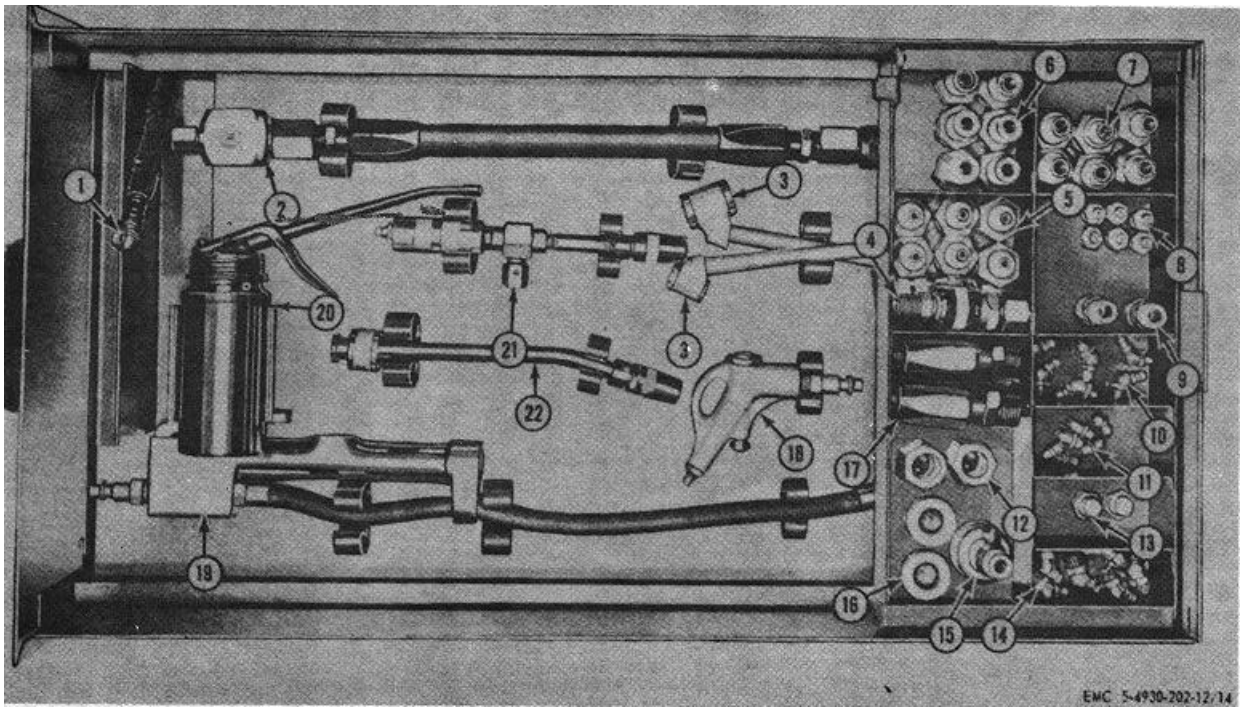
(1) Prepare the gear oil pump (4, fig. 10) for operation. Refer to paragraph 53.

(2) Release the reel brake handle from the gear oil hose reel (5, fig. 11) and pull out the proper length of hose. Advance the meter on the pint meter control valve (13) to "0".

Caution

Do not try to advance the meter reset beyond the O-position.

(3) Clean the area around the opening or the filler plug. Remove the cap or plug which closes the filler opening. Insert the pint meter control valve nozzle (13) into the filler opening. Add oil by squeezing the control handle trigger until the desired amount shows on the



1 Tire pressure gage
2 Giant buttonhead whip end hose
3 Air chuck
4 Air line coupler (2 ea)
5 Lubrication fittings, 1/8 inch NPT (6 ea)
6 Lubrication fittings, 3/8 inch NPT (6 ea)
7 Lubrication fittings, 1/4 inch (6 ea)
8 Straight fittings, 1/4 inch (6 ea)
9 Lubrication fittings, 1/4 inch (2 ea)
10 Lubrication fittings,1/4 inch 45° 28 NPT (6 ea)
11 Lubrication fittings, 1/8 inch Hyd Str (6 ea)
12 Coupling, hose adapter, 3/8 inch NPT (2 ea)
13 Pipe caps, 3/8 inch and washers (2 ea)
14 Lubrication fittings, 1/4 inch-28 NPT-45° (6 ea)
15 Water adapter
16 Coupling plugs (2 ea)
17 Fittings, 3/8 inch NPT (4 ea)
18 Air blower valve
19 Air pressure gage
20 Hand oil gun
21 Hydraulic pressure relief adapter
22 Hydraulic coupler adapter

Figure 14. Accessory items lower drawer.

meter, or until checks by dipstick or other means indicates that a sufficient quantity has been added.

(4) Clean the cap or filler plug, and replace it in the filler opening. Rewind the hose. Replace the control handle on the bracket, and lock the gear oil reel (5) by pulling downward on the reel lock handle.

c. Dispensing Engine Oil.

(1) Prepare the engine oil pump (5, fig. 10) for operation. Refer to paragraphs 52 and 53.

(2) Release the reel brake handle (16, fig. 11) from the engine oil hose reel (1) and pull out the proper length of hose. Advance the meter in the quart meter control valve (14) to "0".

Caution

Do not try to advance the meter reset beyond the "0" stop position.

(3) Remove the cap that closes the filler opening. Insert the nozzle of the quart meter control valve (14) into the filler opening. Add oil by squeezing the control handle trigger until the desired amount shows on the meter, or until checks by dipstick or other means indicate that a sufficient quantity has been added.

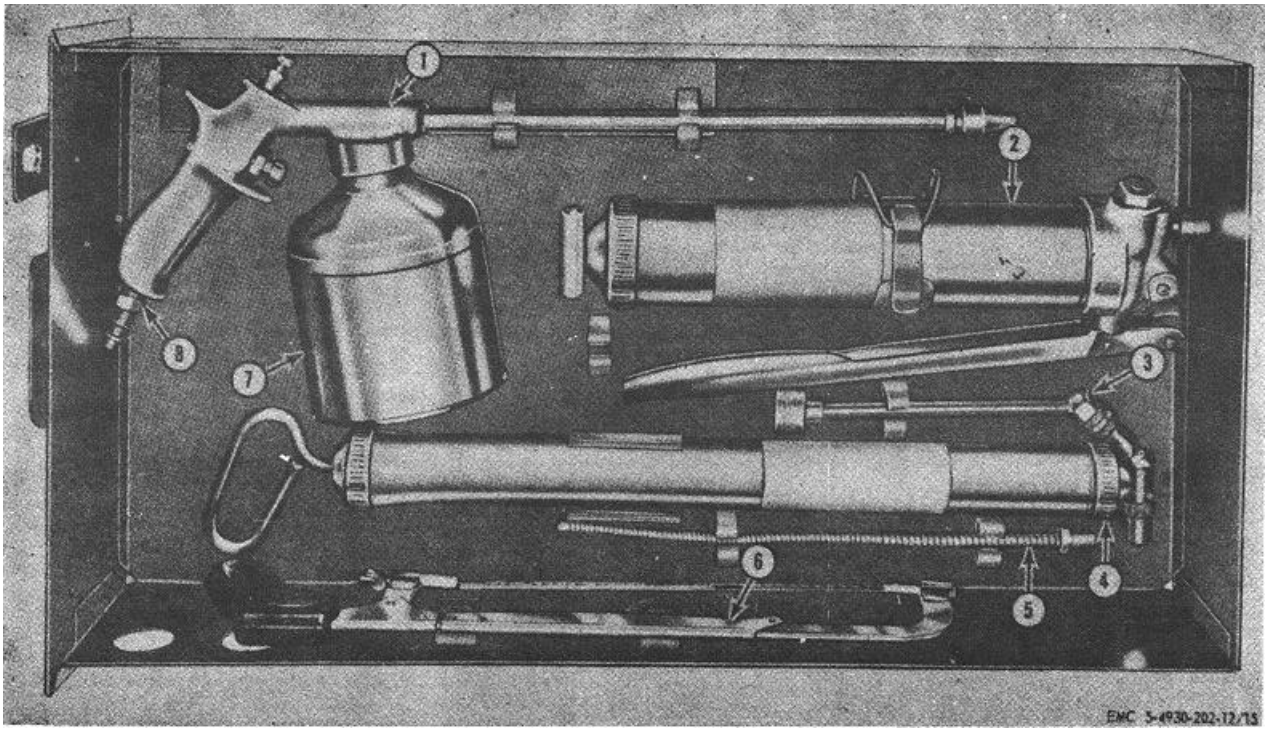
(4) Clean the cap or plug and replace it in the filler opening. Rewind the hose. Replace the control handle on the bracket (2) and lock the reel (1), by pulling downward on the reel lock handle.

d. Use of Air Chuck.

(1) Remove the air chuck (3, fig. 14) and air pressure gage (19) from the lower accessory drawer (9, fig. 11).

(2) Attach the air pressure gage and air chuck to the air line coupler (17, fig. 11) of the air service reel hose (3).

(3) Press the air chuck down firmly on the tire valve, it automatically sends air into the tube. When the proper pressure has been



1 Oil spray gun
2 High-pressure lever gun
3 Swiveling hydraulic adapter
4 Utility gun
5 Flexible nozzle
6 Hacksaw
7 Oil spray container
8 Air line coupling

Figure 15. Accessory items upper drawer.

reached, lift the air chuck off. The air shuts off automatically.

(4) After air service operations have been performed, rewind the air reel hose, disconnect the air pressure gage and air chuck from the air line coupler.

(5) Lock the air reel by pulling downward on the reel lock handle and replace the air chuck (3, fig. 14) and the air pressure gage (19) in the lower accessory drawer (9, fig. 11).

Warning

When inflating tires, remain to one side of the tire rather than directly in front of it. Serious injury may result if the tire blows out, or if the rim is forced off.

55. Shutdown Procedure

a. With the pumps operating, open the condensate bleeder valve (3, fig. 10) on each pump, by turning the valve lever in a counterclockwise direction. Exhausting air will carry accumulated moisture with it.

b. Declutch the engine from the compressor, by pulling the clutch lever (8, fig. 6) back (toward the engine).

c. Stop the engine.

d. Close the master air control valve (2, fig. 8) and open the air line pressure relief cock (11) to release the air pressure in the hoses to the pumps and the air reel.

e. Open the air tank drain valve (6) and the air tank draincock (18, fig. 11) to drain moisture and air pressure from the compressor air receiver (10, fig. 8).

56. Movement to New Work Site

Refer to paragraph 14 for long distance transportation or movement to a new work site.

Section V. OPERATION OF MATERIEL USED IN CONJUNCTION WITH LUBRICATING AND SERVICING UNIT

57. Handguns

a. General. A set of handguns, adapters, and couplers (figs. 14 and 15) are located in the accessory drawers (8 and 9, fig. 11) below the hose reels. These handguns are used to dispense small quantities of grease, lubricants other than general purpose grease, and emptying and filling transmissions.

b. Hand Lever Gun. The high-pressure hand lever gun (2, fig. 15) is used for lubricants required in small quantities, or for dispensing special lubricants. When operating the hand lever gun, best results are obtained by taking full strokes with the lever handle. If a heavy lubricant is used, it may be necessary to prime the lever gun occasionally. Special couplers and adapters provide contact for all types of fittings. To fill the lever gun, proceed as follows.

(1) Remove the container from the head assembly by turning the containers counterclockwise.

(2) Withdraw the follower rod from the container until the cross pin in the rod contacts the latch of the follower plate. Engage the rod to the follower, and push the rod and follower back into the container.

(3) Insert the open end of the container in the lubricant to insure against any air being sucked into the lubricant. Pull back on the follower rod, and fill the container slowly.

(4) Replace the container to the head assembly, and release the follower rod from the latch.

c. Utility Gun. Use the utility gun (4, fig. 15) for emptying or filling transmissions, differentials, or any part of a motor vehicle that requires emptying, other than by drawing through a bottom outlet. Fill the utility gun by inserting the flexible nozzle (5) into the oil or fluid. Pull out the handle as far as it will go. When used for filling purposes, the utility gun is operated by inserting the flexible hose into the oilhole. Push the handle forward until a sufficient quantity of oil has been delivered. When used for draining purposes, the utility gun is operated by inserting the nozzle into the drain hole of the housing. Pull out the utility gun handle as far as it will go, and a gun full of fluid will be removed. To empty, remove the nozzle from the drain hole and push in the handle as far as it will go.

d. Hand Oil Gun. Operate the hand oil gun (20, fig. 14) by squeezing the trigger. Use it for applying small quantities of oil to friction points.

58. Oil Spray Gun, Air-Operated

a. General. Use the air-operated oil spray gun (1, fig. 15) to obtain oil spray at high pressures. The gun consists of an oil spray container (7) and a head with an air valve. Separate controls adjust the quantity of air and the quantity of air ejected. An adjustable nozzle permits either a steady stream or spray type oil injection.

b. Operation. Fill the container with the desired grade of oil. Screw the container into the hood. Attach the air line coupler (8) of the spray gun to the air line coupler (17, fig. 11) of the hose on the lubricating unit. Turn the adjustable nozzle to the closed position. Press the air valve button and open the nozzle until desired amount of oil ejection is obtained.

59. Air Gun

An air-blower valve (18, fig. 14) may be attached to the air line coupler (17, fig. 11) of the airhose on the lubricating unit to permit cleaning with air pressure.

60. Accessory Equipment

a. Air Chuck and Gage. Two air chucks (3, fig. 14) one for standard bore tire valves, and one for large bore tire valves and air pressure gage (19) with quick-operating air line coupling nipple, used for inflating tires, are located in the lower accessory drawer (9, fig. 11).

b. Tire Pressure Gage. The gage (1, fig. 14) for checking pressure in tires is graduated to read from 4 to 50 pounds and is located in the lower accessory drawer.

c. Water Adapter. The water adapter (15, fig. 14) for filling tires with liquid is located in the lower accessory drawer.

d. Hack Saw Frame and Blade. The hack saw frame and blade (6, fig. 15) for use in cutting hose, when replacing reusable hose and fittings, is located in the upper accessory drawer (8, fig. 11).

e. Padlock. Two padlocks with two interchangeable keys per lock are used for locking the toolbox and both repair parts drawers.

f. Air Line Coupling Socket and Nipple. Two air line coupling sockets (4, fig. 14) and nipples, to replace socket or nipple when necessary, are located in the lower accessory drawer (9, fig. 11).

g. Hose End Fittings. Four hose end fittings (6, fig. 14) on high-pressure lubricant hoses are located in the lower accessory drawer.

h. Hose End Fittings. Two male reusable hose end fittings (9, fig. 14), to replace hose end fittings of 1/4-inch inside diameter air hoses, are located in the lower accessory drawer.

i. Hose Adapter Coupling. Two hose adapter couplings (12) to join high-pressure lubricant hoses.

j. Pipe Caps. Two pipe caps (13), to cap high-pressure grease hoses, are located in the lower accessory drawer.

k. Giant Buttonhead Hose Assembly. One giant buttonhead whip end hose (2) with 500 psi pressure relief valve for greasing equipment is equipped with giant buttonhead fittings. One hose assembly to be attached to the control valve on one of the grease, GAA reels (7, fig. 11) and one stored in the lower parts drawer, to replace the other hose assembly when necessary.

l. Buttonhead Coupler Plug and Gaskets. Two buttonhead coupler plugs (16, fig. 14) and gaskets, to replace buttonhead pressure relieve valve when necessary, are located in the lower accessory drawer.

m. Hydraulic Adapter. One hydraulic adapter (22) with quickchange connector for greasing equipment equipped with hydraulic lubrication fittings. One adapter to be attached to the control valve on one of the grease, GAA reels, and one stored ill the lower parts drawer, to replace the other adapter when necessary, are located in the lower accessory drawer.

n. Extension Hydraulic Pressure Relief Adapter. One extension hydraulic pressure relief adapter (21) with 500 psi pressure relief valve for greaseseal-type lubrication points, to prevent ruptured seals when using power lubricating equipment. Sliding sleeve locks firmly on coupler of hydraulic adapter.

o. Giant Buttonhead Lubrication Fittings. Six each lubrication fittings (5, 7 and 6) to replace defective fittings when necessary, are located in the lower accessory drawer.

p. Straight Hydraulic Lubrication Fittings. Six each hydraulic fittings (11 and 8) to replace defective fittings when necessary, are located in the lower accessory drawer (9, fig. 11).

q. 45° Hydraulic Lubrication Fittings. Six each hydraulic fittings (10 and 14, fig. 14) to replace defective fittings when necessary, are located in the lower accessory drawer.

61. Fire Extinguisher

a. Description. The fire extinguisher (14, fig. 6) is a hand-operated, carbon dioxide type. It is mounted on a bracket directly behind the engine oil container.

b. Operation. Remove the fire extinguisher from the mounting bracket and twist out the safety pin. Aim the horn swivel directly at the base of the fire and push the thumb trigger.

c. Refilling and Maintenance. Frequently inspect the fire extinguisher for full charge, proper working order, and secure mounting. The amount of charge in the carbon dioxide type of extinguisher can be checked only by weighing. Empty and full weights are stamped on the valve head. Refer to TM 5-687 and TM 9-1799 for maintenance and refilling instructions.

62. Heater

a. Description. The lubricating unit is equipped with a gasoline heater (6, fig. 9) designed to maintain satisfactory engine operating conditions, and to keep the lubricants in a free-flowing state during cold weather operation. The heater control panel (7, fig. 2) is mounted on the heater slide tray directly to the left of the heater, and to the right of the air compressor. Operation of the heater is controlled by an automatic thermostat (4, fig. 9) and a heat control switch (8).

b. Operation.

(1) Remove the cap from the heater exhaust tube (6, fig. 5).

(2) Swing the engine hot air damper control (17, fig. 6) to the left into open position, and the lubricant container hot air damper (16) down into the closed position. Heater output will be directed toward the engine, and the battery compartment.

(3) Press the press-to-test lamp (10, fig. 9). The lamp will light if power is available at the heater circuit breaker.

(4) Set the thermostat (4) to the desired setting. The difference between numbers on the dial is 10 degrees.

(5) Set control switch (8) to ON-HI.

(6) Shortly after ignition (30 to 45 seconds) the press-to-test lamp (10) will light indicating the burner is in full operation.

(7) The burner will operate on high-flame until the thermostat setting is reached. At this point the heater will cycle to low-flame, until the thermostat again calls for a higher heat.

Note

The heater will cycle from HI to LO heat constantly when the control switch is placed on HI. If the control switch is placed on LO, the heater will burn on low-flame continuously until the heater is turned off.

c. Stopping.

(1) Place the heater control switch (8) in the OFF position.

(2) The heater will continue to burn and the press-to-test lamp will remain on until all gas has been purged from the system.

(3) Replace the cap on the exhaust tube opening (6, fig. 5) on top of the inclosure.

63. Heat and Exhaust Duct Controls

a. Heat Duct Controls.

(1) Engine heat air damper control (17, fig. 6), located on the heater duct, engine side of the unit, directs heated fresh air to the engine.

(2) Lubricant container hot air damper (16) located on the lower part of the heater duct, engine side of unit, directs heater fresh air to the battery drawer (15, fig. 11).

(3) The heater duct (12, fig. 6) located directly above the engine generator directs heated fresh air to the engine (5, fig. 1).

b. Exhaust Duct Controls.

(1) The exhaust air heater duct (5, fig. 6), located between the muffler and the engine air cleaner (6) directs heated air directly into the air cleaner, by rotating the top of the air cleaner so the screened opening faces the muffler duct. By turning the air cleaner counterclock

wise the heater air does not pass into the air cleaner.

(2) The contaminated air from the heater is exhausted by a heater exhaust tube (6, fig. 5) to the atmosphere through the roof of the inclosure.

(3) The engine exhaust director handle (14, fig. 9) directs exhaust gases through a hose to the atmosphere outside the unit, when heating of grease or oil is not desired. When the handle is in the vertical position it conducts exhaust gases into the reservoir under the lubricant containers for heating of grease and oil.

c. Operation of Special Equipment.

(1) Prior to cold weather operation (minus 25° F. to minus 65° F.) shift the engine hot air damper (17, fig. 6) to open position by swinging the control handle up, to direct heated air to the lubricant containers. A portion of the heat is also directed to the battery compartment.

(2) Start the heater (par. 62) and direct heat to the engine air intake for 45 minutes, by moving the engine hot air damper (17, fig. 6) into open position as described in paragraph 63*d*.

(3) Close all lubricating unit doors (15, fig. 1) and louvers (14).

(4) After the end of the 45-minute warmup period start the engine (par. 48 or 49) and allow the engine to operate for approximately 10 minutes.

(5) After the engine has operated for 10 minutes, start the compressor and wait until the compressor unloads before engaging the pumps.

d. Setting of Dampers. Shift the hot air duct dampers to direct heat output to heat the lubricant in lubricant containers. By swinging the tube container hot air damper up to the open position, and engine hot air damper to the right into the closed position, heater output will be directed to the lubricant containers. A portion of the heat is also directed to the battery compartment. There is no need to delay operation until lubricants become warm since low-temperature lubricants can be pumped.

Note

The heat for the battery box is automatically controlled by a control switch and butterfly valve, located in the temperature control heating tube. A sending unit, located in the rear of the battery drawer, is connected to the switch by a capillary tube. The switch automatically opens the butterfly valve and admits heat to the batteries when the air temperature in the box drops to 30°. The switch closes the valve when air temperature in the box reaches 100°.

64. Alcohol Dispenser

Use the alcohol dispenser (9, fig. 6) during cold weather operation. The dispenser is used to inject alcohol into the air lines leading to the pumps to prevent condensate freezeup. It is equipped with an 8-ounce capacity metal bowl and a handle needle valve which controls the flow of alcohol.

Table III. Alcohol Dispenser Valve Setting

40 PSI to pumps	Valve must be opened	80 PSI to pumps	Valve must be opened	120 PSI to pumps	Valve must be opened
1 Pump	2 Turns	1 Pump	11/2 Turns	1 Pump	1 Turn
2 Pumps	11/2 Turns	2 Pumps	11/8 Turns	2 Pumps	3/4 Turn
3 Pumps	1 Turn	3 Pumps	3/4 Turn	3 Pumps	1/2 Turn

Note

For dispensing approximately 9-ounces per hour, operating one, two or three pumps. (With pumps operating at 24 cycles per minute).

Note

Higher pump operating air pressure and faster cycling will automatically increase the amount of alcohol dispensed, so that needle valve must be proportionately closed to maintain the desired flow.

Section VI. OPERATION UNDER UNUSUAL CONDITIONS

65. Operation in Extreme Cold

a. General. Operating the lubricating unit in extremely cold temperatures presents special problems. Lubrication, fuel, oil, electrical and compressed air systems, and care of lubricants are all affected by cold weather operation.

b. Care of Lubricants. Keep lubricants in tightly closed containers and, if possible, in a protected place to insure ease of handling. Remove all snow and ice from the containers before opening them, to transfer lubricants to lubricant tanks or to guns.

c. Special Equipment. This unit is equipped with a heater (par. 62) and an alcohol dispenser (par. 64) for cold weather operation. Proper use of this equipment will keep the lubricants at a temperature at which they will flow freely, and prevent freezing of condensed air in lines and pumps. Use the heat control levers to direct the heat into the designated heat ducts (par. 63).

d. Lubrication. During cold weather, lubricants that are too heavy will make the vehicle hard to start and difficult to operate. This will also cause rapid wear of the moving parts. For lubrication at low temperature, refer to LO 5-4930-202-20.

e. Electrical System. The large surges of electrical current required to start a cold engine require good electrical contacts. Inspect, clean, and tighten all connections, especially battery terminals.

f. Fuel System. In cold weather, condensation of moisture in the air will cause water to accumulate in tools, drums, and containers. This water will freeze and form ice crystals, which clog fuel lines and carburetor jets unless the following precautions are taken:

(1) Use filter paper or other approved strainer when filling the fuel tank, or when transferring fuel from one container to another.

(2) Remove snow or ice from the fuel tank filler cap and dispensing equipment, before filling the fuel tank.

(3) Keep the filler cap tightened properly to keep moisture and dirt from the tank.

(4) After filling or moving a fuel container, allow the fuel to settle before filling the tank.

(5) If possible, keep the fuel tank full when operating in extreme cold weather. This will prevent condensation of moisture inside the tank.

g. Air Cleaner. At subzero temperatures, do not use oil in the air cleaner assembly (6, fig. 6) as it will congeal and prevent the easy flow of air. Wash the filter elements in approved cleaning solvent, and dry thoroughly.

h. Compressed Air System. Drain accumulated moisture from the compressed air reservoirs as often as necessary. The air reservoir is equipped with a draincock located at the end of the drain tank. When the draincock is rotated counterclockwise, the water which has collected in the bottom of the tank will run out.

i. Batteries. The batteries installed in the lubricating unit will give satisfactory service in extreme low temperatures if care is taken to keep the batteries fully charged. If the lubricating unit is to remain idle for any long length of time during cold weather, disconnect the batteries and store them in a warm place.

j. Cold Engine Starting. Before attempting to start in subzero weather, make certain the consistency of the crankcase oil is such that the engine can be started. Check the controls to make sure they are free and in operating condition. When the engine starts, avoid letting it stall by leaving the choke partly open; but be careful not to flood the carburetor.

k. Valves. Be extremely careful in operating valves as they can be easily damaged in low temperature.

66. Operation in Extreme Heat

When operating in extremely high temperatures, efficient cooling and adequate lubrication of the engine and air compressor is vitally important. The cooling system must be checked frequently to make sure the air circulation is not impaired. Give special attention to the engine shrouds and fins for cleanness. Inspect the carburetor air cleaner frequently. Make sure the oil in the air cleaner is at proper level, and clean. Lubricate more frequently than specified in LO 5-4930-202-12.

67. Operation Under Dusty or Sandy Conditions

Operation in sandy or dusty areas will require more frequent inspection and lubrication. Fine sand will penetrate into bushings and bearings. Remove accumulations of sand and dirt at frequent intervals. Inspect the engine and compressor shroud and fins, for clogging and impairment of the air circulation. Check the fuel system and take all necessary precautions to prevent sand from entering the fuel tank. During shutdown periods, fasten all doors securely on the housing.

68. Operation in Salt Water Areas

In salt water areas, give special attention to general maintenance of the lubricating unit, to prevent corrosion of the metal parts. Keep a thin coat of oil on all exposed machined parts, and keep parts as clean and free of moisture as possible. Make sure all unpainted spots are painted or coated with approved preventive compounds.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. SPECIAL ORGANIZATIONAL TOOLS AND EQUIPMENT

69. Special Tools and Equipment

Two special tools, a high-pressure valve wrench, and a low-pressure valve wrench, are illustrated in the basic issue items, appendix III.

70. Basic Issue Tools and Repair Parts

Supply information relative to the basic issue items which are required for stockage by first echelon maintenance are contained in appendix III. Repair parts for second echelon maintenance are listed and illustrated in TM 5-4930-202-12P.

Section II. LUBRICATION

71. General Lubrication Information

a. This section contains a reproduction of the lubrication order and lubrication instructions which are supplemental to and not specifically covered in the lubrication order.

b. The lubrication order shown in figure 16 is an exact reproduction of an approved lubrication order for the lubricating and servicing unit. For the current lubrication order, refer to DA Pam 310-4.

72. Detailed Lubrication Information

a. Care of Lubricants. When storing and handling lubricants, make certain the containers are clean and securely covered to prevent dirt, dust, or other foreign matter from entertaining. Be sure that the lubricant is clean before using.

b. Cleaning. Clean all surfaces surrounding the point to be lubricated before applying the lubricant. Use a clean cloth dampened in an approved cleaning solvent to clean the surfaces before lubrication. Remove all excess lubricant after lubricating.

c. Points of Application. The points of application can be located by referring to LO 54930-202-12 and to the detailed illustrations of the lubrication points. Follow the instructions and apply the proper lubricant as prescribed. Apply the lubricant indicated on the lubrication chart. Overlubrication may cause equipment failure, damage to working parts, and erratic operation.

d. Special Lubrication Instructions.

(1) *Unusual conditions*. Reduce service intervals specified for abnormal operation and extreme conditions, such as high or lower temperatures, prolonged periods of high speed operation, continued operation in dust or sand, immersion in water, or exposure to moisture. Any of these conditions may quickly destroy the protective quality and quantity of the lubricant.

(2) *Changing grades of lubricants*. For information on grades of lubricants refer to LO 5-4930-202-12.

LUBRICATION ORDER
LC 34Y17-4-11-1

LO 5-4930-202-12

9 FEBRUARY 1959

LUBRICATING AND SERVICING UNIT, POWER OPERATED, *SKID MOUNTED, 16 CFM COMPRESSOR,* RECIPROCATING, POWER DRIVEN, WINTERIZED, (GRAY MODEL 250-530)

Reference: TM 5-4930-202-12 SB 38-5-3

Intervals are based on normal operations. Reduce to compensate for abnormal operation and severe conditions. During inactive periods intervals may be extended commensurate with adequate preservation.

Clean fittings before lubricating.

Relubricate after washing.

Clean parts with SOLVENT, dry-cleaning, or with OIL, fuel, Diesel. Dry before lubricating.

Drain crankcases only when hot after operation; replenish and check level when cool.

FOLD FOLD

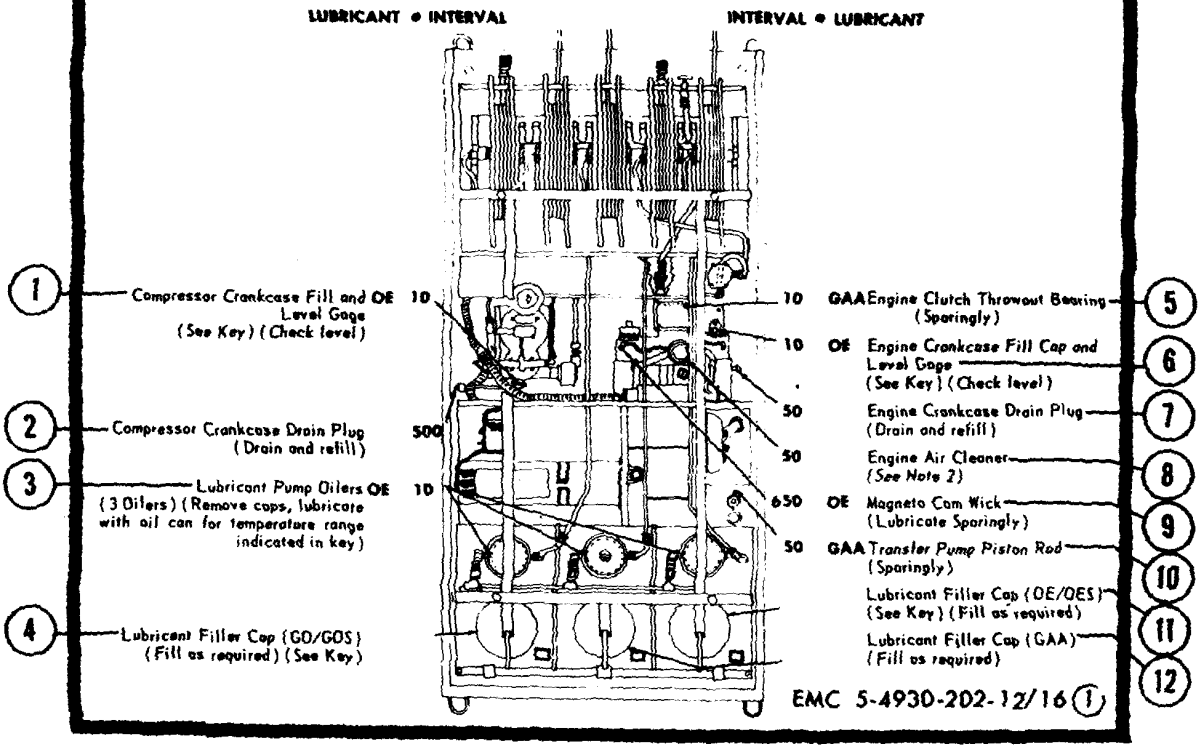


Figure 16. Lubrication order.

- KEY -

LUBRICANTS	CAPACITY	EXPECTED TEMPERATURES			INTERVALS
		Above + 32°F	+40°F to -10°F	0°F to -65°F	
OE - OIL, Engine, Heavy Duty		OE 30 or 9250	OE 10 or 9110	OES	"Intervals given are in hours of normal operation."
Compressor Crankcase	2 qts.				
Engine Crankcase	4 qts.				
Engine Air Cleaner					
Lubricant Filler	108 qts.				
OES - OIL, Engine, Subzero					
GO - GREASE, Gear Universal		GO 90	GO 75	GOS	
Lubricant Filler	108 qts				
GOS - GREASE, Gear Universal Subzero					
GAA - GREASE, Automotive and Artillery		All Temperatures			
Lubricant Filler	82 qts.				

NOTES:

1. FOR OPERATION OF EQUIPMENT IN PROTRACTED COLD TEMPERATURES BELOW -10°F. Remove lubricants prescribed in the key for temperatures above -10°F. Clean parts with SOLVENT, dry-cleaning. Relubricate with lubricants specified in the key for temperatures below -10°F.

2. AIR CLEANER. Every 50 hours disassemble unit, clean with approved cleaning SOLVENT. Dry thoroughly. Dip the screen in oil OE (See Key) and allow to drain. Reassemble.

3. OIL CAN POINT. Every 50 hours lubricate with OE, the throttle, choke, idle and carburetor

Copy of this Lubrication Order will remain with the equipment at all times; instructions contained herein are mandatory.

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE

OFFICIAL:

E. C. SHINKLE
Major General, United States Army
The Adjutant General

MAXWELL D. TAYLOR
General, United States Army
Chief of Staff

OFFICIAL

J. L. TARR
Colonel, United States Air Force
Director of Administrative Services

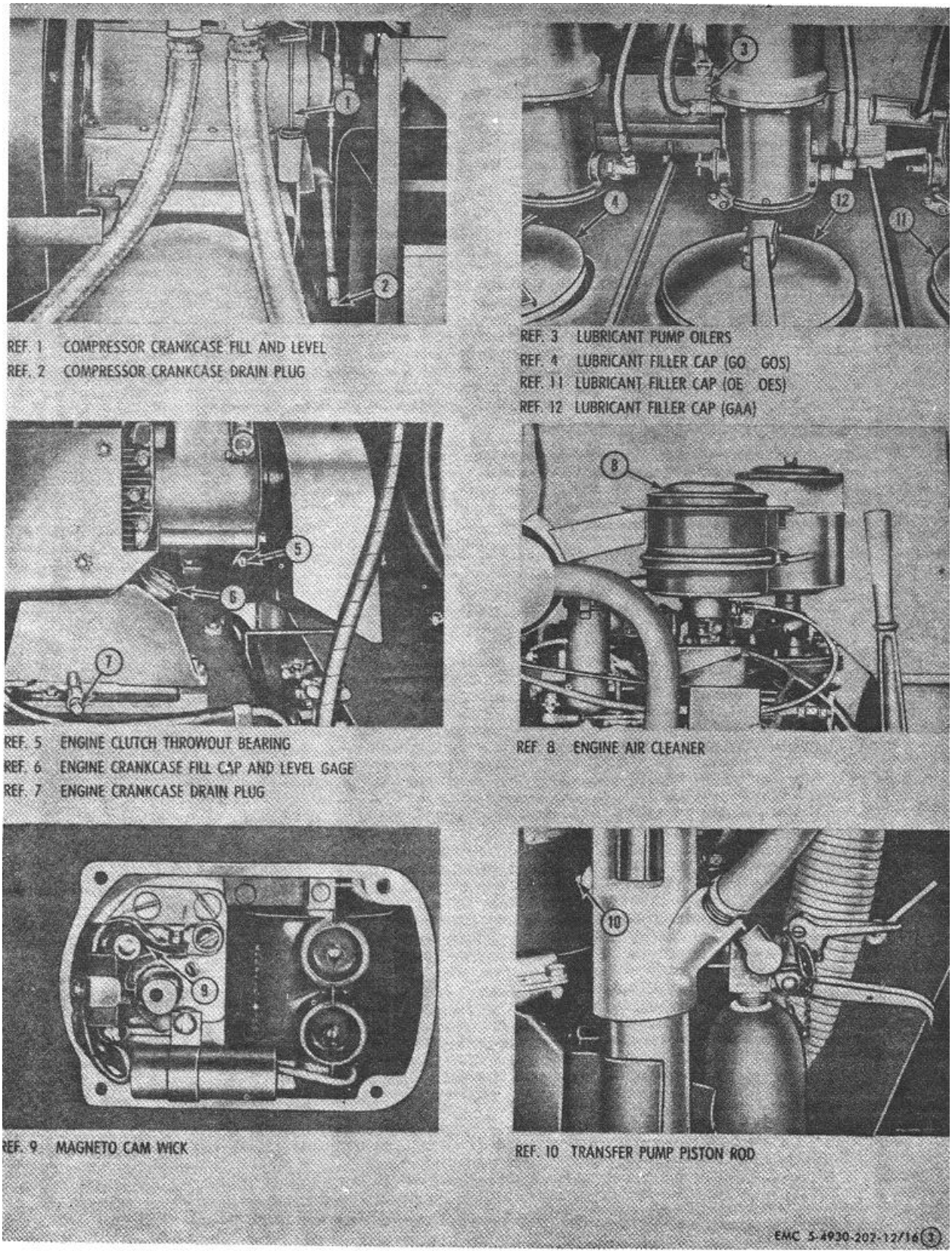
THOMAS D. WHITE
Chief of Staff
United States Air Force

FOLD

FOLD

EMC 5-4930-202-12/16 (2)

Figure 16-Continued.



REF. 1 COMPRESSOR CRANKCASE FILL AND LEVEL
REF. 2 COMPRESSOR CRANKCASE DRAIN PLUG

REF. 3 LUBRICANT PUMP OILERS
REF. 4 LUBRICANT FILLER CAP (GO GOS)
REF. 11 LUBRICANT FILLER CAP (OE OES)
REF. 12 LUBRICANT FILLER CAP (GAA)

REF. 5 ENGINE CLUTCH THROWOUT BEARING
REF. 6 ENGINE CRANKCASE FILL CAP AND LEVEL GAGE
REF. 7 ENGINE CRANKCASE DRAIN PLUG

REF. 8 ENGINE AIR CLEANER

REF. 9 MAGNETO CAM WICK

REF. 10 TRANSFER PUMP PISTON ROD

EMC 5-4930-202-12/16(3)

Figure 16-Continued.

Section III. PREVENTIVE MAINTENANCE SERVICES

73. Operator

To insure that the equipment is ready for operation at all times, inspect it systematically before operation, during operation, at halt, and after operation, so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services will be performed before operation. Defects discovered during operation of the unit will be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noticed during operation which would damage the equipment if operation continued. After operation services will be performed by the operator for periods longer than 10 hours, the unit will be stopped and after operation service will be performed at 10-hour intervals. Defects or unsatisfactory operating characteristics beyond the scope of the operator to correct must be reported to the proper authority. Responsibility for performance of preventive maintenance services rests not only with the operator, but with the entire chain of command from section chief to commanding officer (AR 7505).

74. Operator's Daily Services

Intervals				PROCEDURE
Before operation	During operation	At halt	After operation	
X	X	X	X	*Visual inspection*. Visually inspect the entire unit for cracks, breaks, and loose or missing assembly screws and lockwashers. Inspect for any tampering or damage that may have occurred since the lubricating unit was last operated. Correct deficiencies before using the lubricating unit.
X		X	X	*Fuel*. Check the fuel supply. See that the fuel tank is full.
X	X			*Leaks*. Check for lubrication leaks and air leaks. Check swivel joints at hose reel inlets.
			X	*Cleaning*. Use a brush to remove loose dirt from the exterior of the lubricating unit. Use an approved cleaning solvent to remove dirt and grease accumulations.
	X			*Instruments*. Check all gages for broken glass and secure mounting.
		X	X	*Draincock*. Open the draincock for a short time to release moisture in the air receiver.
X		X	X	*Air cleaner*. Frequently inspect and clean the air cleaner (par. 65*g*). Inspect for secure mounting and loose connections. Check the condition and level of oil in the bowl.
	X			*Unusual noises or operation*. While operating the lubricating unit check for any unusual noises which may indicate trouble. Determine the cause of any excessive vibration or unusual noise which may indicate loose or damaged parts, or lack of proper lubrication. Stop the lubricating unit and correct the trouble or report the condition to the proper authority.
			X	*Tools and equipment*. See that all tools and equipment assigned to the unit are in serviceable condition, clean, and properly stowed.
X				*Fire extinguisher*. Check the condition of the fire extinguisher and inspect it for full charge (par. 61). Do not discharge contents. See that it is securely mounted.
			X	*Protection*. If freezing temperature is anticipated, drain all moisture from the air receiver. Leave the drain valve open.
X		X	X	*Lubrication*. Inspect the entire unit for missing or damaged lubrication fittings, and for indications of insufficient lubrication. Lubricate per (LO 5-4930-202-12).
X			X	*Appearance*. Inspect the general appearance of the unit, giving particular attention to identification markings, and condition of the paint.

Intervals				PROCEDURE
Before operation	During operation	At halt	After operation	
X		X	X	*Fuel filter*. Inspect the filter sediment bowl for any accumulation of dirt or water. Clean the sediment bowl and screen if dirt or water are present. Replace bowl and gasket if necessary (par. 109).
X			X	*Batteries*. Check condition of batteries. Maintain proper electrolyte level and make sure all cables are tight (par. 116).
X	X		X	*Cylinder heads, manifolds, and gaskets*. Inspect cylinder head, manifold, and exhaust pipe for leaks, loose bolts, nuts, and defective gaskets. Check condition of exhaust muffler (par. 123).
X			X	*Cooling fins and shroud (engine).* Inspect the cylinder head and cooling fins, air shroud, and screen for any accumulation of dirt or rust. Never operate engine with shroud removed (par. 122).
X	X		X	*Fuel tank, cap, and gasket*. Check fuel tank, fuel lines, and connections for leaks (par. 113).
X			X	*Compressor*. Inspect compressor head, cylinder cooling fins, intercooler and flywheel fan for accumulation of dust or dirt. Check ail connections for air leaks. See that crankcase breather cap is clean (pars. 132 and 133).
X			X	*Servicing equipment*. Check all servicing equipment units for proper operation. See that they are in serviceable condition, clean, and properly stowed. Replace defective equipment (pars. 140 and 143).
X			X	*Magneto*. Inspect the magneto for loose mounting bolts and for oil leaks around the mounting flange gasket (par. 115).

75. Organizational

Preventive maintenance is performed by organizational maintenance personnel at biweekly and bimonthly intervals. The biweekly interval will be equivalent to a maximum of 50 hours of use. The bimonthly interval will be equivalent of 8 weeks or a maximum of 250 hours of use, whichever occurs first. The preventive maintenance services to be performed at these regular intervals are listed and described in paragraph 74. The numbers appearing at the columns opposite each service refer to a corresponding number appearing on DA Form 464 and indicate that a report of the services should be made at that particular number of the form. These numbers appear either in the second and/or third columns as an indication of the interval at which the service is to be performed. The first column headed "Inspection" is provided for the information of the personnel performing the inspection. A number in this column indicates that an inspection should be made of the listed items in accordance with the instructions given in the text opposite. The indicated items and instructions constitute the minimum inspection requirements.

76. Biweekly and Bimonthly Preventive Maintenance Services

	Service		GENERAL
Inspection	Bimonthly	Biweekly	
1	1	1	*Before-operation services*. Check and perform services listed in daily before-operation services.
2	2	2	*Lubrication*. Inspect the entire unit for missing or damaged lubrication fittings, lines, or grease cups, and for indications of insufficient lubrication. Check for lubrication leaks from oil lines and gearcases, and for defective oil and grease seals.
	2	2	Replace missing or damaged fittings. Correct or report all leaks.
3	3	3	*Tools and equipment*. Inspect the condition of all tools and equipment assigned to the unit. Check condition and mounting to tool compartments.

Inspection	Service		
	Bimonthly	Biweekly	
	3	3	See that all tools and equipment assigned to the lubrication unit are clean, serviceable, and properly stowed or mounted. See that all compartments are in good condition, close and fasten properly.
4	4	4	*Fire extinguisher*. Inspect for full charge, proper working order, and secure mounting. The amount of charge in the carbon dioxide type of extinguisher can be checked only by weighing. Empty and full weights are stamped on the valve head. Inspect for kinked or damaged hose.
	4	4	See that all fire extinguisher deficiencies are corrected or reported to the proper authority.
5	5	5	*Publications*. See that a copy of this technical manual and LO 5-4930-202-12 is on the unit and in serviceable condition.
6	6	6	*Appearance*. Inspect the general appearance of the lubricating unit, giving special attention to cleanness, legibility of identification markings, and condition of the paint.
	6	6	See that deficiencies noticed are corrected or reported to proper authority.
7	7	7	*Modification*. See that all available modification work orders applying to the lubricating unit have been completed.
			ENGINE
11	11	11	*Cylinder head, manifolds and gaskets*. Inspect the cylinder heads, manifolds, and exhaust pipe for leaks, loose bolts and nuts, and defective gaskets.
	11	11	Tighten any loose manifold and exhaust pipe mounting bolts and nuts. Replace defective gaskets. Replace leaking cylinder-head gaskets, and tighten loose head nuts (par. 122).
12	12	12	*Valve mechanism*. Inspect the valve adjustment if excessive tappet noise or loss of power is noticed. See if the valve tappets, springs, and valve cover gaskets are in good condition and secure. Check to see if oil is being delivered to the valve mechanism.
	12	12	Adjust the valve clearance if necessary (par. 124). Secure the valve covers using new gaskets.
14	14	14	*Crankcase*. Check for leaks at crankcase gaskets, drain and fill plugs.
	14	14	Correct or report any leaks noted (par. 127).
18	18	18	*Belts and pulleys*. Inspect condition and tension of drive belts and pulleys. Belts should be adjusted only tight enough to prevent slippage.
	18	18	Adjust tension of belts if necessary. Replace worn or frayed belts (par. 132).
19	19	19	*Oil pressure*. The oil pressure under normal operating conditions, should be 20 to 35 psi, as indicated on the gage. A spring loaded bypass valve regulates the oil pressure.
	19	19	Adjust the oil pressure if necessary (par. 126).
20	20	20	*Governor*. Check the governor adjustment. If the engine surges when running at top speed without load, the governor is out of adjustment.
	20	20	Adjust or replace the governor, if necessary (par. 112).
38	38	38	*Fuel pump and housing*. Inspect the fuel pump and fuel lines for gasoline leaks. Check for oil leaks where the pump is fastened to the engine block and check for loose mounting and assembly screws. Diluted oil indicates a faulty fuel pump.
	38	38	See that all mounting and assembly screws are tight, that the fuel lines are in good condition, and that the connections are tight. If there is any indication of lack of fuel supply to the carburetor, check the fuel pump (par. 111) before dismantling. Repair or replace a defective fuel pump.
39	39	39	*Carburetor and linkage*. Check the carburetor and linkage to see that they are in good condition, correctly installed and assembled. See that the carburetor does not leak, that the control linkage including the choke and throttle shaft, is not badly worn. See that the choke valve opens fully when the control is in the released position. Check for loose or missing screws or nuts to the manifold, or screws holding the throttle body to the bowl assembly. Repair or replace a defective carburetor (par. 110).

	Service		
Inspection	Bimonthly	Biweekly	
	39	39	See that all mounting and assembly nuts and screws are tight and that all linkage and connections are in good condition and secure. If the carburetor is defective replace (par. 110).
40	40	40	*Fuel filter*. Inspect the filter sediment bowl for any accumulation of water or dirt, leaks, or loose mounting. Check filter unit for damage or defects hindering proper operation.
	40	40	Clean the sediment bowl if it contains dirt or water. If the fuel filter unit is defective and cannot be repaired, replace (par. 109).
41	41	41	*Air cleaner*. Inspect the air cleaner for loose mounting and connections. Remove the air cleaner. Inspect for defective seal, clamp, filter element, and body. Check the oil in the reservoir, and the amount of dirt present in the oil.
	41	41	Clean and service the air cleaner in accordance with LO 5-4930-202-12. Replace the air cleaner, if it is defective (par. 108). Be sure that it is pressed firmly into place and that the mounting is secure.
43	43	43	*Tank, cap, and gasket*. Check the fuel tank frame mounting for loose nuts and bolts, and for leaks. Check for defective filler cap and gasket.
	43	43	See that the tank is securely mounted, free of leaks and that the filler cap is clean and has tight fitting. Replace defective parts or report to the proper authority (par. 113).
44	44	44	*Fuel lines*. Check the fuel lines for leaks, loose connections, and damage.
	44	44	Replace damaged fuel line. Tighten loose connections (par. 113).
			ELECTRICAL SYSTEM
46	46	46	*Spark plugs*. Inspect the spark plugs for looseness, bad connections, and dirty or broken insulators. If the engine loses power, check the condition of the spark plug electrodes and the spark plug gap.
	46	46	Replace spark plugs having pitted or burned electrodes. Tighten loose spark plugs and connections (par. 117).
47	47	47	*Battery and battery box*. Inspect batteries for cracks or leaks. Check the level and specific gravity of the electrolyte in the batteries. Record the specific gravity on DA Form 464. Check the batteries terminal connections for corrosion and secure mounting.
	47	47	Add distilled or clean water to cover 'A inch below the filler holes. Replace the batteries if necessary (par. 116). See that batteries are securely mounted.
49	49	49	*Magneto*. Inspect the magneto for loose mounting bolts and for oil leaks around the mounting-flange gasket. Check condition and adjustment of the breaker points.
			Correct point gap is 0.020 inch.
	49		Adjust breaker points if necessary (par. 115). Renew points if they are badly burned or pitted.
50	50	50	*Wiring and switch*. Inspect wiring for oil soaked, cracked or frayed insulation; broken wires, and loose or corroded connections. Check switch for condition and proper operation.
	50	50	See that all connections are clean and tight. Replace switch or wiring if defective.
57	57	57	*Gage*. Inspect air pressure gage for condition and proper operation.
	57	57	Replace damaged or defective gage.
80	80	80	*Frame (base).* Check frame for bent members, breaks, and cracks, and for loose or missing mounting and assembly bolts, and nuts.
	80	80	Tighten or replace loose or missing bolts and nuts. See that any damaged parts are repaired or replaced.
142	142	142	*Relief valve*. Check air receiver relief valve for proper operation.
	142	142	Clean or replace valve, if necessary.
	144		*Compressor valves*. Remove valves, clean thoroughly, and check for broken or damaged parts and pitted seat. Correct any deficiencies (par. 136). Be sure all parts are installed in their original position.
146	146	146	*Air intake muffler*. Inspect air filter for loose connections and for excessive accumulation of dust and dirt.
	146	146	Remove and clean air filter if necessary (par. 131). Assemble and see that all connections are tight.

	Service	
Inspection	Bimonthly	Biweekly
147	147	147
	147	147

Compressor. Inspect compressor head, cylinder cooling fins, intercooler and flywheel fan for any accumulation of dust or dirt. Check all connections for air leaks. See that crankcase breather cap is clean.

See that all parts of compressor are clean. Correct any air leaks. On new or reconditioned compressor, check head bolts for tightness at the first weekly service.

Section IV. TROUBLESHOOTING

77. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the lubricating and servicing unit and its components. Each trouble symptom stated is followed by a list of probable causes of the trouble. The possible remedy recommended is described opposite the probable cause.

78. Backfire at Carburetor

Probable cause	*Possible remedy*
Air leakage intake manifold	Replace faulty intake manifold gaskets (par. 123,.
Fuel mixture too lean	Adjust the carburetor (par. 110).
Spark impulse advanced too far -	Time ignition (par. 119).

79. Engine Lacks Power

Probable cause	*Possible remedy*
Carburetor or fuel pump not operating properly	Replace fuel pump (par. 111). If fuel pump is operating correctly, remove and inspect carburetor. Replace a defective carburetor (par. 110).
Restricted air cleaner	Remove and clean the air cleaner (par. 108).
Restricted exhaust muffler or tail pipe	Remove obstructions. If muffler or tail pipe is badly clogged, install a new muffler (par 123).

80. Starter-Generator Will Not Crank Engine

Probable cause	*Possible remedy*
Discharged or defective batteries .	Recharge or replace (par. 116).
Loose connections	Tighten connections. Replace battery cables if necessary (par. 116).
Defective switch	Replace switch.

81. Starting Batteries Fail To Stay Charged

Probable cause	*Possible remedy*
Defective batteries	Recharge or replace batteries (par. 116).
Loose battery connections	Tighten connections (par. 115).
Defective regulator	Replace regulator (par. 118).

82. Power Drops Under Heavy Load

Probable cause	*Possible remedy*
Poor compression	Tighten cylinder heads and spark plugs (par. 122).
Faulty carburetor	Adjust, replace carburetor (par. 110).
Restricted exhaust line	Remove obstructions. If muffler or tail pipe is badly clogged, install a new muffler assembly (par. 123).

83. Engine Misfires at Light Load

Probable cause	*Possible remedy*
Defective carburetor	Adjust, replace carburetor (par. 110).
Defective spark plugs	Adjust or replace spark plugs (par. 117).
Intake air leak	Replace gaskets (par. 123).

84. Engine Misfires at Heavy Load

Probable cause	*Possible remedy*
Defective spark plugs	Adjust or replace plugs (par. 117).
Carburetor misadjusted	Adjust carburetor (par. 110).
Clogged carburetor	Replace carburetor (par. 110).
Defective spark plug cables	Replace spark plug cables (par. 117).

85. Oil Pressure Low

Probable cause	*Possible remedy*
Leaking fuel pump	Repair or replace fuel pump (par. 111).
Defective oil pressure gage	Replace oil pressure gage (par. 129).

86. Oil Pressure High

Probable cause	*Possible remedy*
Clogged oil passage	Clean all lines and passages.
Oil relief valve stuck	Remove and clean (par. 129).
Defective oil pressure gage	Replace oil pressure gage (par. 129).

87. Engine Fails

Probable cause	*Possible remedy*
Defective fuel pump	Replace a defective fuel pump (par. 111).
Defective carburetor	Replace carburetor if defective (par. 110).

88. Compressor Overheating

Probable cause	*Possible remedy*
Insufficient air circulating around the unit	Move the unit to a minimum of 2 feet from any wall or obstruction (par. 12).
Restricted air intake	Clean or replace the air cleaner or the air intake manifold (par. 131).

89. Noisy Compressor Operation

Probable cause	*Possible remedy*
Loose external parts	Tighten loose bolts, and screws.
Loose flywheel	Tighten flywheel (par. 132).

90. Air Compressor Fails To Operate

Probable cause	*Possible remedy*
Air leaks	Tighten leaking connections and replace defective hoses.
Faulty control valve	Adjust or replace control valve (par. 138).
Worn out belt	Replace belt (par. 132).

91. Air Compressor Loses Pressure

Probable cause	*Possible remedy*
Air leaks	Tighten leaking connections and replace defective hoses
Faulty control valve	Adjust or replace control valve (par. 138).

92. Lubricant Delivery Faulty

Probable cause	*Possible remedy*
Dirty or gummed control valve	Clean thoroughly with an approved solvent.
Leak in lines	Tighten all connections and couplings. Replace defective hoses (par. 141).

93. Cutout Switch Operating at Wrong Pressure

Probable cause	*Possible remedy*
Incorrect adjustment	Adjust switch (par. 135).
Differential setting incorrect	Adjust setting (par. 135).
Dirt holding release valve open	Disassemble and clean valve (par. 135).

94. Hose Reels Do Not Turn Properly

Probable cause	*Possible remedy*
Loose mounting	Tighten the hose reel at the reel hub (par. 141).
Defective reel brake	Replace the reel brake (par. 141).

95. Lubricant Pump Fails To Operate Properly

Probable cause	*Possible remedy*
Faulty connections in grease line	Inspect line for leaks in hose, swivels, connectors, control handle, and pipe line (par. 143).
Inadequate supply of air	Inspect air connections to pump (par. 143).

96. Metallic Thud in Engine

Probable cause	*Possible remedy*
Low oil supply	Add oil (LO 5-4930-202-12).
Diluted oil	Drain, add proper oil (LO 5-4930-202-12).

97. Oil Consumption Excessive

Probable cause	*Possible remedy*
Oil too light or diluted	Drain, fill with correct oil (LO 5-4930-202-12).
Leak at air filler cap	Replace oil filler cap.

98. Air Compressor Pump-Up Time Too Long

Probable cause	*Possible remedy*
Air leaks	Tighten leaking connections.
Clogged air strainer	Remove filter element from air intake muffler and clean (par. 131).

99. Heater Does Not Ignite

Probable cause	*Possible remedy*
Lack of fuel	Fill fuel tank (par. 11).
Clogged fuel filter	Clean or replace fuel filter (par. 149).

100. Heater Does Not Keep Burning

Probable cause	*Possible remedy*
Air in fuel system	Bleed air drain cock (par. 150).
Lack of fuel	Fill fuel tank (par. 11).

101. Insufficient Pressure or Volume of Flow-With Pump Operating

Probable cause	*Possible remedy*
Exhausted lubricant supply	Refill lubricant containers.
Circulation of grease	Push grease down around pump intake priming tube and use heater to warm grease.
Insufficient air pressure supplied to pump	Set air regulator at higher pressure, if necessary. Check for closed or inoperative valves, or obstructions in air lines (par. 142).

Section V. RADIO INTERFERENCE SUPPRESSION

102. Definitions

a. Interference. The term "interference" as used herein applies to electrical disturbances in the radio frequency range which are generated by the lubricating unit, and which may interfere with the proper operation of radio receivers or other electronic equipment.

b. Interference Suppression. The term "interference suppression" as used herein applies to the methods used to eliminate or effectively reduce radio interference generated by the lubricating unit.

103. Purpose of Interference Suppression

The tactical importance of effective interference suppression cannot be stressed too greatly. Since the electrical disturbances generated by the lubricator are composed partly of electrical waves in the radio frequency wave, they must be suppressed for two important reasons. First, they will interfere with the operation of the friendly radio net, and second, they will enable the enemy to locate the equipment and its associated units.

104. General Sources of Interference

Generally, radio interference is generated anywhere a spark occurs or where high frequency current is present. A spark is a small amount of current jumping an air gap in response to the force of a relatively high voltage. The gasoline engine ignition system is a common source. Magneto breaker points, generator commutator, relay contacts, and static charges collecting on the frame are other common causes which in some way must be suppressed.

105. General Methods Used to Attain Proper Suppression

Essentially, suppression is attained by providing a low-resistance path to ground the stray current. The methods used to attain suppression include shielding the ignition, and high frequency wires, grounding the frame with bonding straps, and using capacitor, filter, and resistance circuits where necessary. The gasoline engine is equipped with special shielded and suppressed spark plugs (1, fig. 17), and braided metal sheaths over the ignition cables (3) to suppress radio interference. The magneto (4) is bonded with tooth-type lockwashers and a capacitor inside the magneto to suppress radio interference.

106. Replacement of Suppression Components

a. When replacing suppression parts make sure replacement parts are correct.

b. Replace spark plugs and ignition cables with exact duplicates of the originals,

c. Replace a defective capacitor. Tighten-any loose electrical connections. See that all tooth, type lockwashers are property placed arid secured.

---

1 Spark plugs
2 Tooth-type lockwashers, 3/8 in. (4 rqr)
3 Ignition cables
4 Magneto
5 Cylinder air shroud
6 Cylinder head
7 Tooth-type lockwasher, /2 in. (4 rqr)
8 Nut, ½ x 13 (4 rqr)

Figure 17. Radio interference suppression.

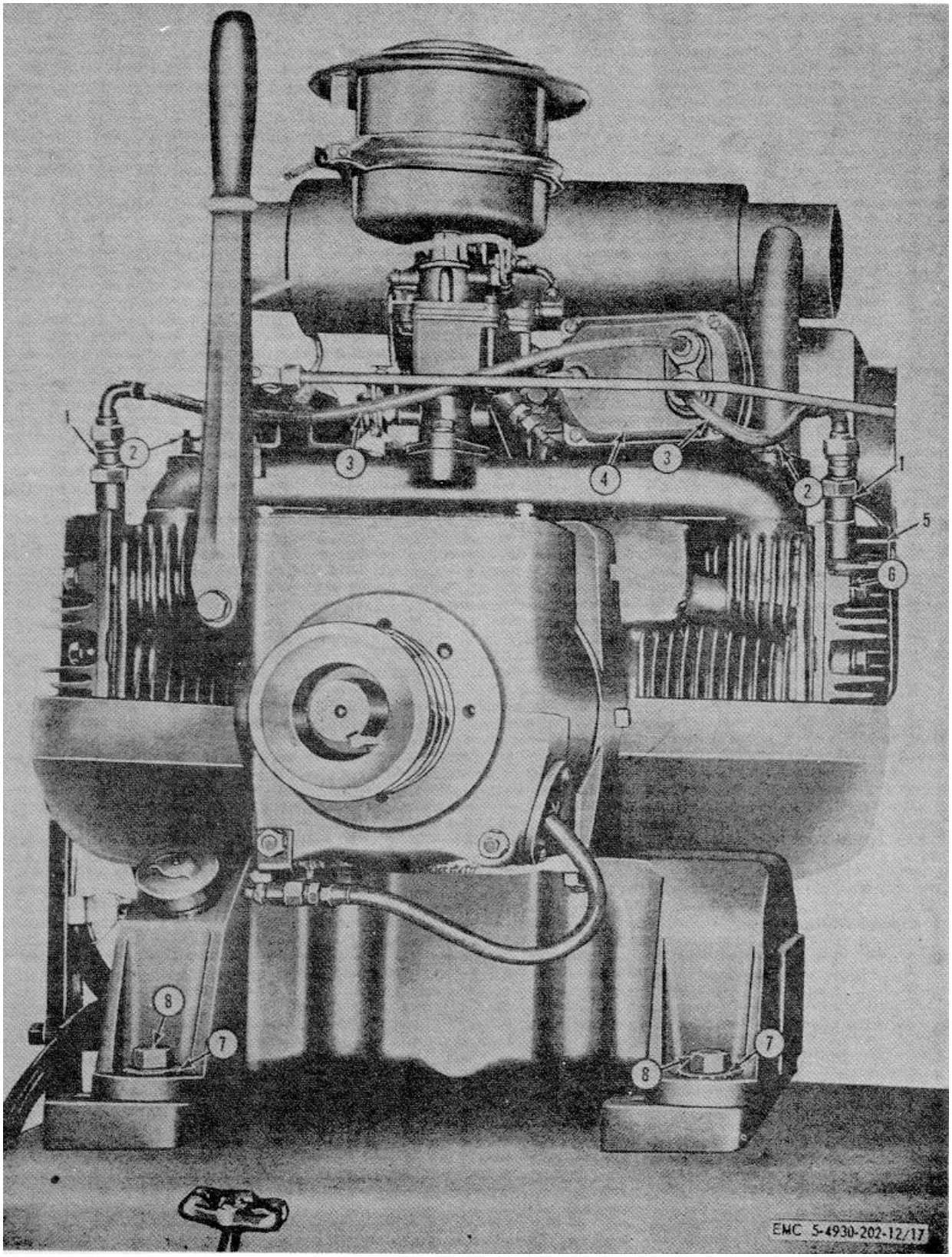


Figure 17-Continued.

Section VI. FUEL SYSTEM

107. Description

The fuel system on the lubrication unit engine consists of a nine gallon capacity fuel tank, a connecting fuel line to the diaphragm-type fuel pump, a dry-type air cleaner, a down-draft carburetor, a fuel filter, and a fuel pump priming control, used to prime the engine. An externally adjustable governor, attached to the carburetor throttle by a governor linkage, regulates the engine speed by increasing or decreasing the fuel mixture. The carburetor has main and idle adjusting needle valves. The main adjusting needle setting determines the air-fuel mixture ratio at all load conditions. The idle adjusting needle affects operation at light load or idle conditions, but does not alter the airfuel mixture. The dry-type air cleaner is used in conjunction with a carburetor air heater duct attached to the muffler. The top of the air cleaner may be rotated, so the opening is in alinement with the heater duct, so air, heated by the muffler, will pass directly into the air cleaner for cold weather operation of the engine.

108. Air Cleaners

a. Removal.

(1) Loosen the screw (4, fig. 18) and clamp (12) which secure the air cleaner (6, fig. 6) to the carburetor.

(2) Remove the air cleaner from the carburetor by lifting the unit up and away from the carburetor.

b. Disassembly.

(1) Loosen the thumbscrew (13, fig. 18) which secures the cover (1) to the body (3).

(2) Remove the filter element (2) from the body.

c. Cleaning, Inspection, and Repair.

(1) Clean the filter element, using an approved cleaning solvent.

(2) Allow the filter element to dry, and dip in oil of the recommended viscosity. Allow excess oil to drain from the filter element.

(3) Inspect the filter element for tears or worn condition. Replace if necessary.

(4) Thoroughly clean the air cleaner body and cover, using an approved cleaning solvent.

(5) Inspect the unit for dents, cracks, or wear. Replace the air cleaner if necessary.

d. Reassembly and Installation.

(1) Install the air cleaner body (3) on the carburetor, and secure by tightening the clamp screw (4).

(2) Position the filter element (2) in the body (3) and install the cover (1).

(3) Secure the cover to the body by tightening the thumb screw (13).

109. Fuel Filter

a. Removal.

(1) Disconnect the fuel line (3, fig. 19) to the fuel filter body (2).

(2) Disconnect the fuel line fitting (8) from the connector fitting (11) at the fuel filter body (2).

(3) Remove the two screws (4) which secure the fuel filter bracket to the frame, and remove the fuel filter from the unit.

b. Disassembly.

(1) Unscrew the mounting bracket and fuel fitting unit from the fuel filter body (2).

(2) Unscrew the connector fitting (11) from the fuel filter body.

(3) Loosen the thumbnut (1) and clamp (10) from the fuel filter bowl (6).

(4) Remove the bowl, gasket (7) and

---

1 Air cleaner cover
2 Filter element
3 Engine air cleaner body
4 Clamp screw
5 Choke linkage
6 Speed reduction shutoff cock
7 Fuel line
8 Adjusting screw locknut
9 Oil pressure relief adjusting screw
10 Governor speed adjusting nut
11 Crankcase breather
12 Mounting clamp
13 Thumbscrew

Figure 18. Servicing and removal of air cleaner.

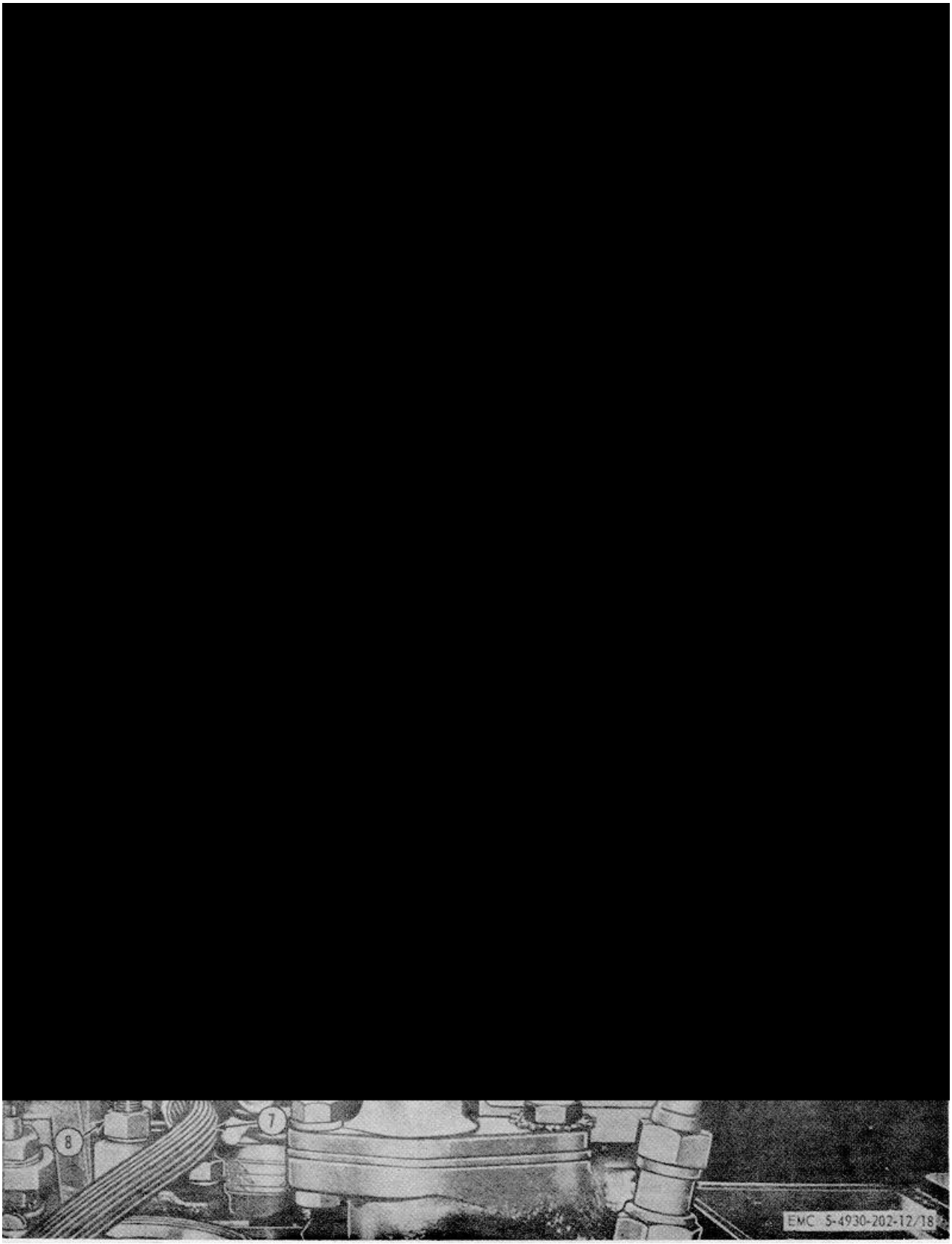


Figure 18-Continued.

screen (5) from the fuel filter body (2).

c. Cleaning, Inspection, and Repair.

(1) Thoroughly clean all parts, using an approved cleaning solvent.

(2) Replace the fuel filter gasket.

(3) Inspect the screen for tears, or deterioration, replace if necessary.

(4) Inspect the filter bowl for cracks or chipped glass. Replace if necessary.

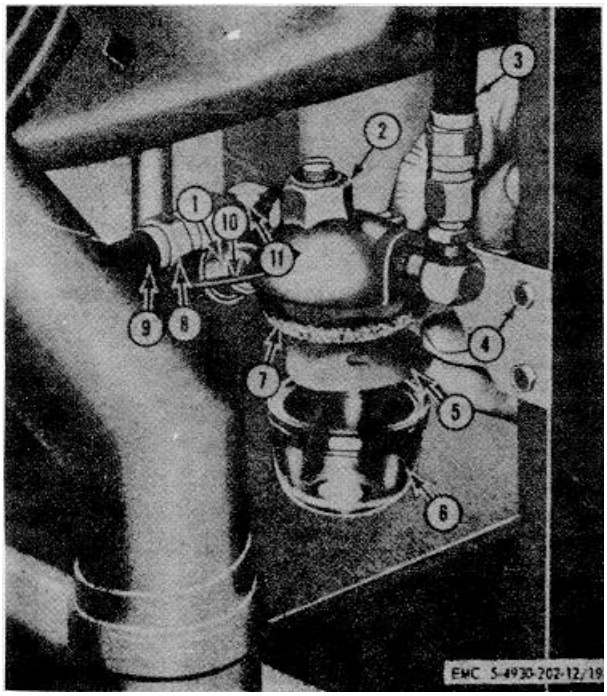
(5) Inspect the body for cracks, chips, or defective threads. Replace if necessary.

(6) Inspect the fuel lines for leaks or defective fittings. Replace if necessary.

d. Reassembly and Installation.

(1) Assemble the screen (5), gasket (7), and bowl (6) to the fuel filter body (2).

(2) Position the thumbnut (1) and clamp (10) beneath the bowl (6), and tighten to secure the bowl to the body.



1	Thumbnut	7	Gasket
2	Body	8	Fuel line fitting
3	Fuel line to fuel pump	9	Fuel line
4	Screw	10	Clamp
5	Screen	11	Connector fitting
6	Bowl		

Figure 19. Servicing and removal of fuel filter.

(3) Install the mounting bracket on the body (2).

(4) Position the fuel filter and bracket assembly, on the frame, and secure with the two mounting screws (4).

(5) Install the fuel tank fuel line (9) and the fuel pump fuel line (3) to the fuel filter.

(6) Test the fuel filter for leaks.

110. Carburetor

a. Removal.

(1) Remove air cleaner (par. 108).

(2) Disconnect the fuel line (5, fig. 20) at the carburetor (19).

(3) Disconnect the choke control screw (22), by unscrewing the cap screw, which secures the linkage to the choke lever (7).

(4) Disconnect the fuel pump primer lever (6) from the top of the carburetor (19).

(5) Discharge the governor linkage (18, fig. 7) ball-joint from the slot at the end of the governor arm (19), by removing the nut from the top of the governor arm.

(6) Disconnect the idle linkage (20) from the carburetor.

(7) Remove the two cap screws (15, fig. 20) securing the carburetor (19) to the manifold (12, fig. 7), and remove the carburetor and gaskets.

b. Cleaning, Inspection, and Repair.

(1) Inspect the carburetor venturi (center air passage). If a heavy deposit of carbon is visible in the venturi, clean the carburetor.

(2) Replace a defective carburetor.

(3) Replace the carburetor mounting gasket.

c. Installation.

(1) Install the carburetor gasket on the manifold (12, fig. 7).

(2) Position the carburetor (7) on the manifold and gasket, and secure with two cap screws (10). Be sure the connection is tight and does not leak.

(3) Connect the governor linkage (18) to the governor arm (19), by installing the nut on top of the governor arm.

(4) Connect the fuel pump primer lever (2) to the top of the carburetor (7).

(5) Connect the choke control linkage (6) to the choke lever (7, fig. 20), by tightening the cap screw on the choke lever.

(6) Connect the fuel line (5) at the carburetor (19) inlet connection.

(7) Connect the idle linkage (20) to the carburetor.

(8) Install the air cleaner (par. 108d).

d. Adjustment.

(1) Allow the engine to thoroughly warm up and adjust the main adjusting needle (12, fig. 20) with a full load connected.

(2) Turn the main adjusting needle (12) in slowly until the speed and power begin to drop.

(3) Turn the adjusting needle (12) out slowly, to the point where the highest speed is reached.

(4) Turn the adjusting needle (12) 1/4 turn farther out for the final setting.

(5) Adjust the idle needle (5, fig. 7) with all load disconnected.

(6) Pull the throttle linkage (8) out to idle engine.

(7) Turn the idle adjusting needle (5) out slowly until the engine starts to run unevenly.

(8) Turn the idle adjusting needle in, to the point where engine speed is at the highest point and operation is steady.

Caution:

Never turn the adjusting needles tightly into their seats. Doing so may form a ridge or ring on the tapered end, which will make proper adjustment impossible.

111. Fuel Pump

a. Testing.

(1) Disconnect the fuel line (5, fig. 20) at the carburetor (19).

(2) Crank the engine slowly by hand and see if fuel comes out of the line at the carburetor.

(3) If the line between the fuel tank and the fuel pump is open, and sufficient fuel in the fuel tank, but the fuel pump fails, it is defective and must be replaced.

b. Removal.

(1) Disconnect the fuel tank line (20, fig. 21), and the carburetor fuel line (19).

(2) Disconnect the fuel primer lever (1) from the fuel pump (17).

(3) Remove two screws (16) and lockwashers, and remove fuel pump (17) from the engine block.

(4) Lift the fuel pump upward and off the engine block.

(5) Remove the two fuel pump mounting gaskets (14) and the spacer (15) from the crankcase.

c. Cleaning, Inspection, and Repair.

(1) Clean the fuel pump using an approved cleaning solvent.

(2) Replace the fuel pump mounting gaskets.

(3) Inspect the fuel pump body for casting defects, and damaged threads which would cause fuel leakage.

(4) Replace the fuel pump if any defects are found.

(5) Inspect and replace the fuel pump mounting cap screws and lockwashers if necessary.

d. Installation.

(1) Install the fuel pump mounting gaskets (14), and spacer (15) on the crankcase.

(2) Install the fuel pump (17) on the gaskets and spacers, being sure that the fuel pump rocker arm is on the right side of the fuel pump cam lobe.

(3) Install the two fuel pump screws (16) and lockwashers which secure the fuel pump to the engine block.

(4) Connect the fuel pump primer lever (1) to the fuel pump.

(5) Connect the fuel tank line (20) and

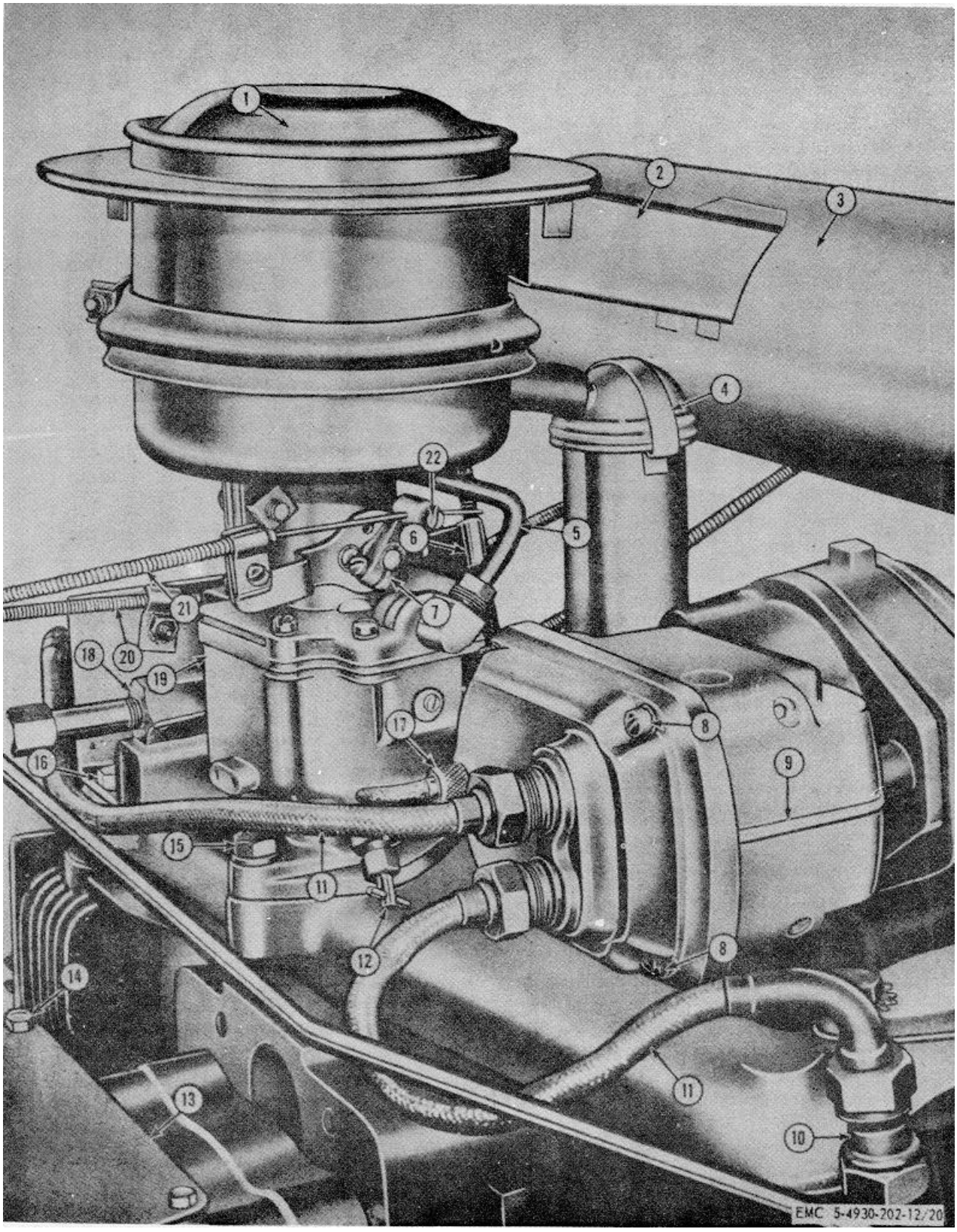
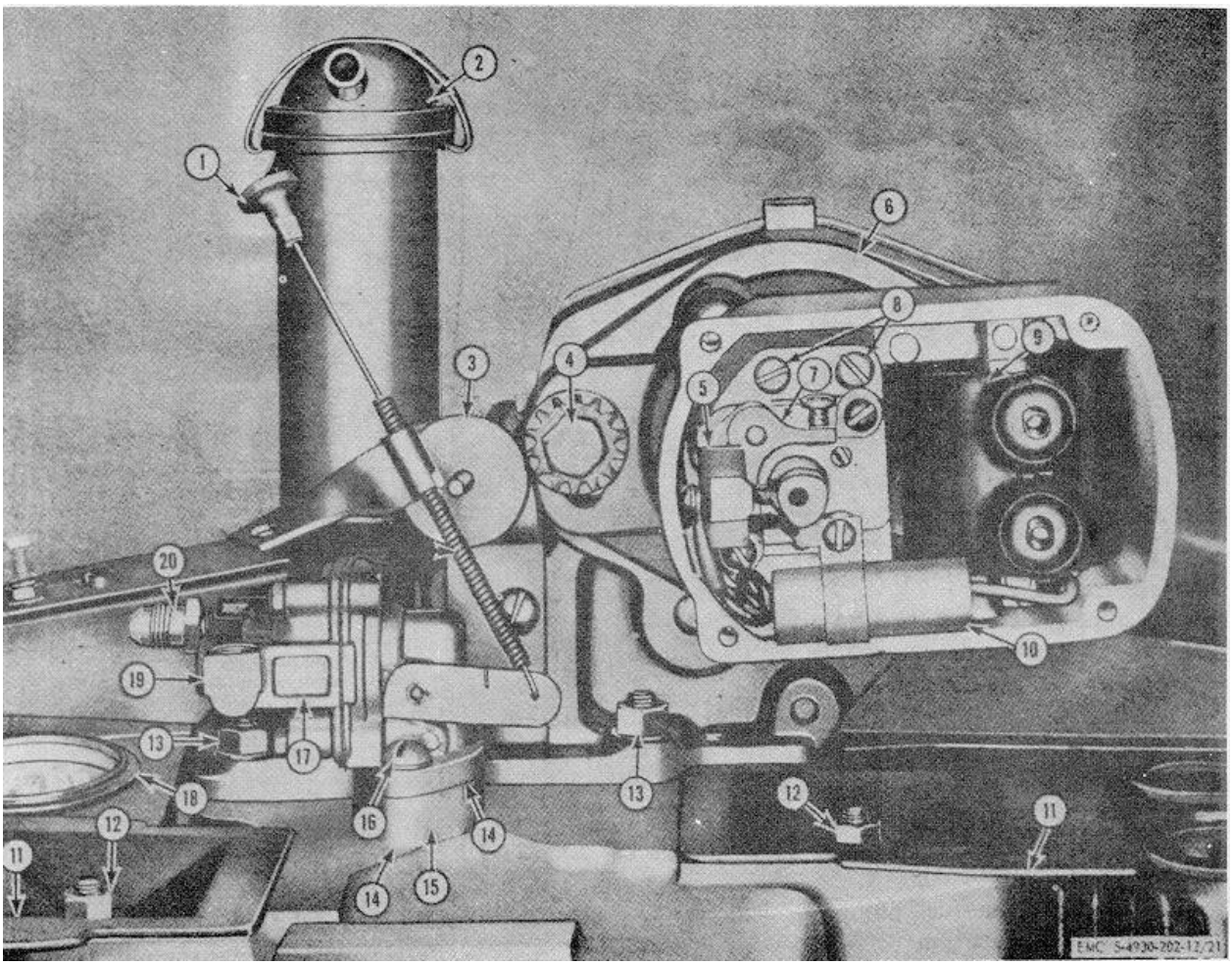


Figure 20. Carburetor removal and adjustment.

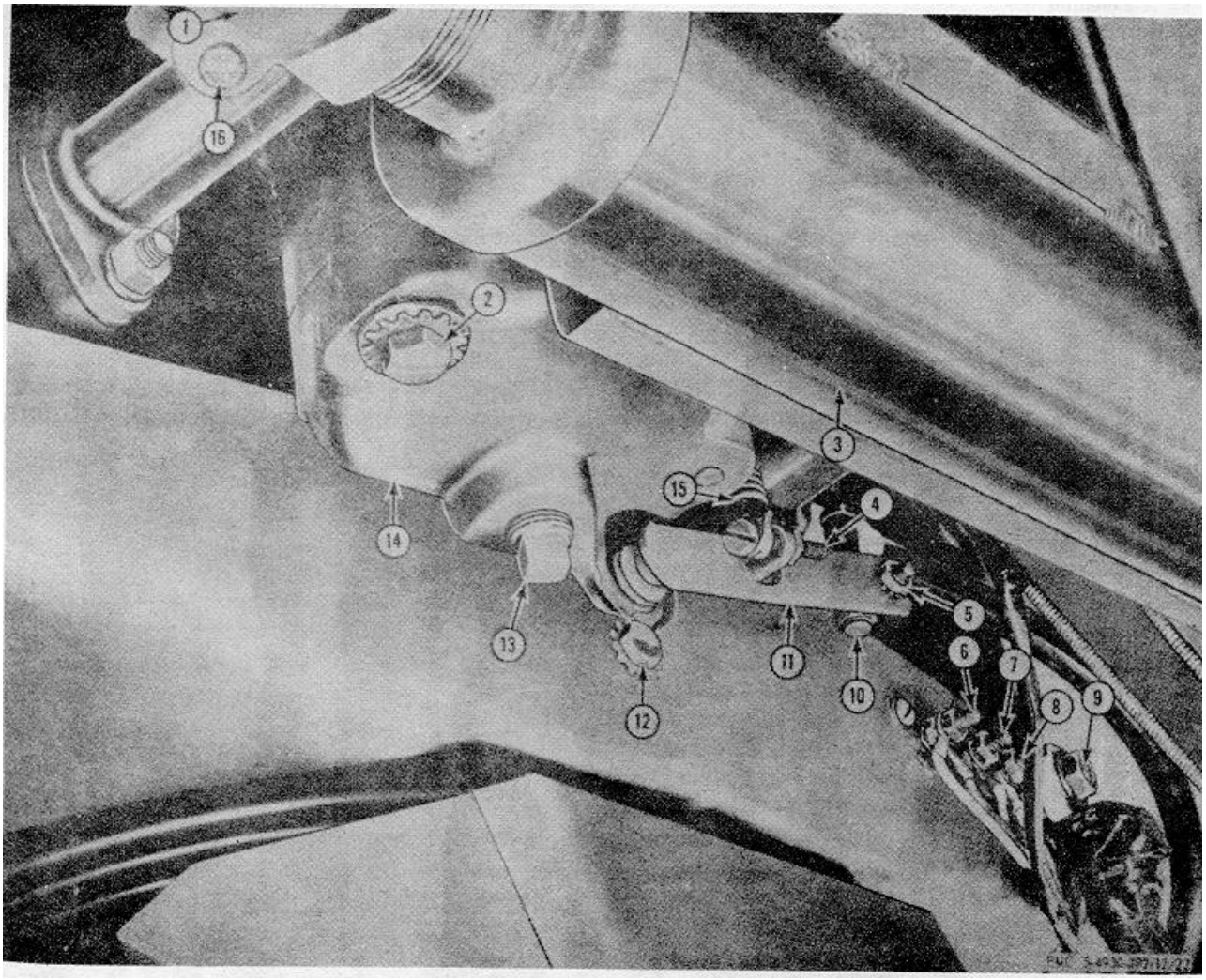
1 Air cleaner
2 Air cleaner heat duct
3 Muffler
4 Crankcase breather
5 Fuel line
6 Fuel pump primer lever bracket
7 Choke lever
8 Screw, No. 10-24 x 5/8 in. lg (4 rqr)
9 Magneto
10 Spark plug
11 Spark plug lead
12 Carburetor main jet adjustment
13 Clutch instruction plate
14 Cap screw, 3/16-32 x ½ in. lg (4 rqr)
15 Cap screw, 5/16-18 x 7/8 in. lg (2 rqr)
16 Screw, ¼-20 x ½ in. lg (2 rqr)
17 Magneto ground cable
18 Throttle control
19 Carburetor
20 Idle linkage
21 Choke linkage
22 Choke control screw

Figure 20-Continued.



1 Fuel pump primer lever
2 Crankcase breather
3 Governor speed adjusting nut
4 Cap screw, 3/8-16 x 2½ in. lg (2 rqr)
5 Adjusting slot
6 Magneto
7 Points
8 Support locking screws, No. 8-32 x 3/8 in. lg (2 rqr)
9 Coil
10 Condenser
11 Valve cover plate (2 rqr)
12 Nut, ¼-28 (2 rqr)
13 Nut, 5/16-24 (2 rqr)
14 Fuel pump mounting gaskets
15 Fuel pump spacer
16 Screw, ¼-20 x 1½ in. lg (2 rqr)
17 Fuel pump
18 Oil pressure gage
19 Carburetor fuel line
20 Fuel tank line

Figure 21. Fuel pump and magneto adjustment and removal.



1	Exhaust pipe	7	Generator terminal F2	12	Screw, ¼,-20 x ½ in. lg (3 rqr)
2	Cap screw, 3/8-16 x 2½ in. lg (2 rqr)	8	Generator terminal F1	13	Pipe plug, 3/8 in.
3	Muffler	9	Generator terminal S2	14	Governor
4	Sensitivity adjusting screw	10	Governor linkage	15	Governor spring
5	Nut, No. 10-32	11	Governor arm and shaft	16	Exhaust, pipe bracket
6	Generator terminal A1				

Figure 22. Governor controls and magneto removal.

the carburetor fuel line (19) to the fuel pump.

(6) Inspect the fuel pump for leaks and proper operation.

112. Governor Controls

a. Removal.

(1) Disconnect the governor spring (15, fig. 22) from the governor arm and shaft (11) by removing the governor sensitivity screw (4) and remove the speed adjusting nut (3, fig. 21) from the speed stud bracket.

(2) Disconnect the governor linkage (10, fig. 22) from the governor arm and shaft (11) and from the carburetor (7, fig. 7) by removing the nut (5, fig. 22) from the top of the arm.

(3) Remove the throttle bracket (14, fig. 7) from the governor linkage (10, fig. 22).

c. Cleaning, Inspection, and Repair.

(1) Inspect the governor arm and shaft, the governor spring, the throttle bracket, and the governor linkage for

binding and for excessive wear at connecting points.

(2) Adjust or replace governor parts as required. Any looseness or wear may cause sluggish or erratic governor operation.

(3) Clean all governor parts using an approved cleaning solvent.

c. Installation.

(1) Install the throttle bracket (14, fig. 7) on the governor linkage (10, fig. 22).

(2) Connect the governor linkage (10) to the governor arm (11) and to the carburetor (7, fig. 7).

(3) Connect the governor spring (15, fig. 22) to the governor arm by installing the sensitivity screw (4).

(4) Install the speed adjusting nut (3, fig. 21) to the speed stud bracket.

d. Adjustment.

(1) Before making governor adjustment, run the engine about 15 minutes.

(2) Adjust the carburetor main jet (par. 110).

(3) Adjust the length of the governor linkage (10, fig. 22) with the engine stopped and tension on the governor spring (15), the stop screw (9, fig. 7) on the carburetor throttle shaft is 1/8 inch from the stop pad of the carburetor body.

(4) Check the engine speed with a tachometer. The no-load engine speed should be 2,800 rpm, maximum rated speed is 3,600 rpm at full load.

(5) Turn the speed adjusting nut (3, fig. 21) in to increase the speed or out to decrease the speed. Be sure the knife edges of the nut fit into the groove in the governor spring bracket.

(6) To increase sensitivity (reduce rpm drop between no-load and full-load) move the speed spring nearer to the governor shaft by turning the sensitivity screw (4, fig. 22) outward.

(7) To decrease sensitivity move the speeds spring away from the governor shaft by turning the sensitivity screw inward.

(8) Recheck the speed adjustment after a sensitivity adjustment. Increasing sensitivity will cause a slight decrease in speed, and will require a slight increase in the governor spring tension.

(9) Adjust the throttle lever stop screw (9, fig. 7) to 1/32 inch from the carburetor bowl when the engine is operating at no-load.

113. Fuel Tank, Lines and Fittings

a. Removal.

(1) Disconnect the flexible fuel line (1, fig. 23) at the fuel pump filter (17). The fuel line has a swivel fitting.

(2) Disconnect the flexible line at the heater fuel pump.

(3) Disconnect and remove the fuel lines (2 and 18) from the top of the fuel tank.

(4) Remove four screws (13) from the fuel tank mounting bracket (15).

(5) Remove fuel tank (16) from mounting bracket (15).

(6) Remove the fuel tank cap (20) and chain from the filler pipe (19).

(7) Remove the filler pipe (19) and the fuel drain plug (14) from fuel tank.

b. Cleaning, Inspection, and Repair.

(1) Replace the fuel tank, if badly dented, punctured, or otherwise damaged.

(2) Clean all parts with an approved cleaning solvent.

(3) Replace the flexible fuel lines and fittings, if leaking or damaged.

(4) Replace filler cap and chain if damaged in any way to hamper proper operation.

(5) Replace fuel tank drain plug if damaged.

c. Installation.

(1) Install the filler pipe (19), and fuel drain plug (14) on the fuel tank (16).

(2) Install the fuel tank cap (20) and chain on the filler pipe (19).

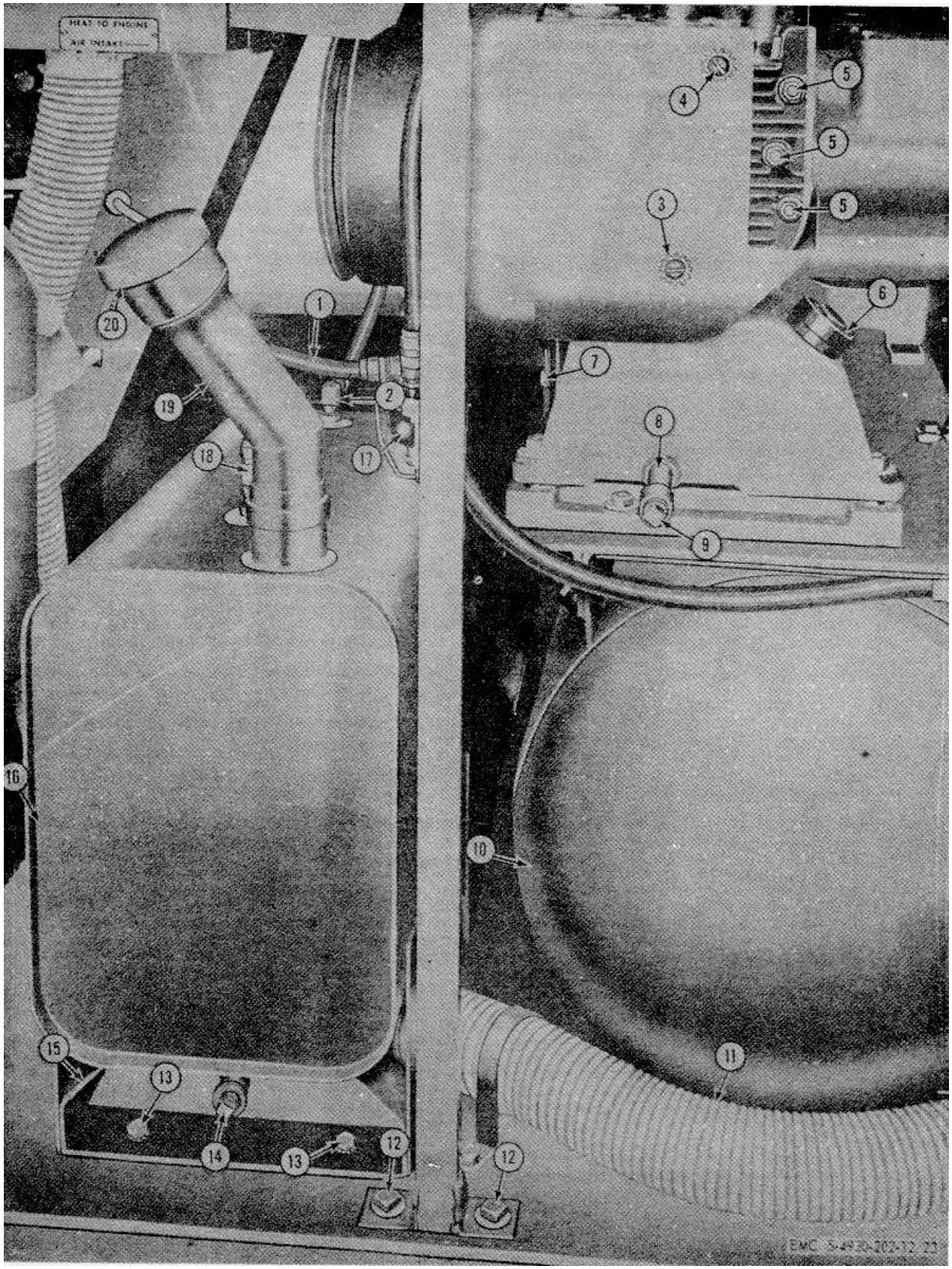


Figure 23. Fuel tank and cylinder head removal.

1	Fuel line	8	Crankcase drain line	15	Fuel tank mounting bracket
2	Heater fuel line assembly	9	Crankcase drain plug, 3/8 in.	16	Fuel tank
3	Screws, 5/16-24 x 3/8 in. lg (2 rqr)	10	Air receiver	17	Fuel filter
4	Screw, 5/16-24 x 3/8 in. lg (2 rqr)	11	Battery drawer heat duct	18	Engine fuel line assembly
5	Nuts, 9/16 in. (14 rqr)	12	Screws, 3/8 x 2 in. lg (13 rqr)	19	Fuel filler pipe
6	Crankcase filler cap	13	Screw, 5/16-18 x 1 in. lg (4 rqr)	20	Fuel tank cap
7	Screw, ¼-20 x ½ in. lg (3 rqr)	14	Fuel tank drain plug, ¼ in.		

Figure 23-Continued.

(3) Install the fuel tank (16) on the bracket (15), by installing the four screws (13) in mounting positions, mounting bracket (15), by installing the four screws (13) in mounting positions.

(5) Connect the flexible fuel line to the heater fuel pump.

(6) Connect the flexible fuel line to the fuel pump filter.

(7) Tighten all connections and check for leaks.

Section VII. ELECTRICAL SYSTEM

114. Description

The principal parts of the magneto-type ignition system are the ignition breaker point assembly with ignition condenser, a fixed resistor, two spark plugs, and an ignition coil. The source of current is a starter-generator assembly mounted on the pump end of the crankshaft. One side of the wiring is connected to the start switch, and the other side of the sending switch is connected to the negative terminal on the battery. The ignition stop button is connected in line with the magneto points and coil. The ignition breaker assembly is contained in the control box, mounted on the engine side of the unit. The assembly consists of breaker points and an ignition condenser. Power for the starter-generator is supplied by two 12 volt batteries connected in series. The storage batteries are recharged by current supplied by the starter-generator. The voltage regulator holds the generated voltage at a predetermined rate, and limits the starter-generator to its maximum safe output.

115. Magneto

a. Removal.

(1) Disconnect the two spark plug leads (11, fig. 20) from the magneto (9).

(2) Disconnect the magneto ground cable (17) from the magneto.

(3) Remove one cap screw (4, fig. 21) on the reel end of the magneto (6).

(4) Remove one cap screw (2, fig. 22) on the pump side of the magneto.

(5) Remove the magneto by pulling straight out toward the reels, and off the unit.

(6) Remove the magneto end cap by removing four screws (8, fig. 20,, and tooth-type lockwashers which secure the cap to the magneto housing.

b. Cleaning, Inspection, and Repair.

(1) Clean parts with a clean lint-free cloth or small stiff brush, using an approved cleaning solvent. Dry thoroughly.

(2) Wipe rotor with a clean lint-free cloth dampened slightly with an approved cleaning solvent.

(3) Wipe the coil capacitor, and wiring with a clean cloth, take care that wiring and terminals are not loosened or damaged while cleaning.

(4) Wipe off ignition cable and ground cable with a clean, dry cloth.

(5) Inspect the rotor for defects. Replace rotor if any defects are noticed.

(6) Inspect wiring for loose soldering or burned spots due to excessive heat. Replace wiring that is frayed, worn, or damaged.

(7) Inspect coil for exposed windings. Replace coil, if faulty.

(8) Inspect points and replace if burned or otherwise damaged.

c. Installation.

(1) Position the magneto (6) on the unit.

(2) Install one cap screw (2, fig. 22) on the pump side of the magneto (9, fig. 20).

(3) Install one cap screw (4, fig. 21) on the reel side of the magneto.

d. Adjustment.

(1) Rotate cam until points (7) are at maximum opening. Check gap with feeler gage.

(2) The points should have an opening of 0.015 inch.

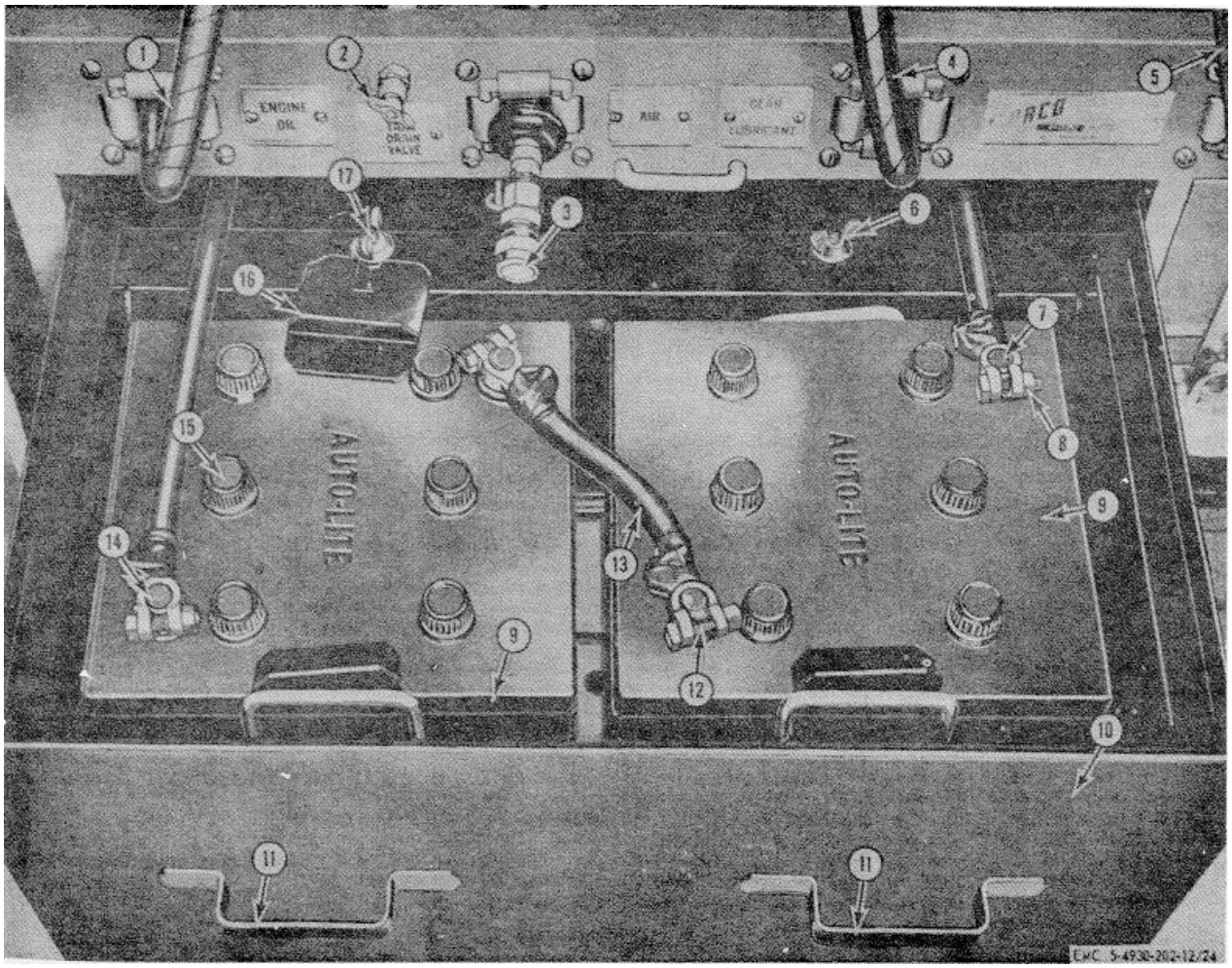
(3) If gap is incorrect, slightly loosen two screws (8), insert screw driver in adjusting slot (5) and open or close points until proper gap is attained.

(4) Tighten the two screws (8), and recheck the point gap.

(5) Install the rotor cap on the cam.

(6) Install the magneto end cap on the magneto housing and secure by installing four screws (8, fig. 20), and tooth-type lockwashers.

(7) Connect the magneto ground cable (17) to the magneto cover.



1 Engine oil dispensing line
2 Air tank drain valve
3 Air line coupler
4 Gear lubricant dispensing line
5 Grease GAA dispensing line
6 Wing nut 3/8-16 (2 rqr)
7 Negative terminal
8 Nut, 5/16-18 (4 rqr)
9 Battery
10 Battery box
11 Battery box handle
12 Bolt, 5/16-18 x 1½ in. lg (4 rqr)
13 Jumper cable
14 Positive terminal
15 Battery filler cap (12 rqr)
16 Tie-down clamp (4 rqr)
17 Tie-down bolt (2 rqr)

Figure 24. Servicing batteries.

(8) Connect the two ignition leads (11) to the magneto cover (9). Check connections and mounting screws for tightness.

116. Batteries, Battery Box, and Cables a. Removal.

(1) Pull the battery box (10, fig. 24) from the stowed positioned beneath the hose reels on the unit.

(2) Disconnect the lead from the positive terminal (14) and the ground cable from the negative terminal (7).

(3) Remove the four battery tiedown clamps (16) by removing the four tiedown wingnuts (6) from the tiedown bolts (17).

(4) Remove the jumper cable (13) from the batteries (9).

(5) Remove the batteries from the battery box (10).

b. Cleaning, Inspection, and Repair.

(1) Test each battery with a battery hydrometer. All cells normally should test 1.280 at full charge.

(2) If a low reading is obtained on the hydrometer, replace the battery.

(3) Fill batteries with electrolyte until the level is 1/4 inch below the filler holes.

(4) Clean and tighten all battery connections. Apply a thin coating of grease to terminal and connections to retard corrosion. Install new connections if necessary.

(5) Inspect and replace defective cables.

c. Installation.

(1) Install the two batteries (9) in the battery box (10).

(2) Install the jumper cable (13) to the two batteries.

(3) Install the four battery tiedown clamps (16), by installing the four wingnuts (6) to the battery tiedown bolts (17).

(4) Connect the lead to the positive terminal (14) and secure the ground cable to the negative terminal (7).

(5) Check all connections for tightness and push the battery box (10) back into stowed position under the hose reels of the unit.

117. Spark Plugs

a. Removal.

(1) Disconnect the ignition cables (3, fig. 17) from the spark plugs (1).

(2) Remove the spark plugs from the cylinder heads (6).

b. Cleaning, Inspection, and Repair.

(1) Clean the spark plugs.

(2) Adjust the gap between the spark plug electrodes to 0.025 inch. Bend only the outer electrodes to adjust the gap, do not bend the center electrodes.

(3) Test; replace if defective.

(4) Replace any spark plug which is mechancially damaged, has damaged threads, or burned electrodes.

c. Installation.

(1) Install the spark plugs (1) in the cylinder heads (6).

(2) Connect the ignition cables (3) to the spark plugs.

(3) Check connections for tightness.

118. Control Box

a. Removal.

(1) Disconnect the two terminal leads (13 and 15, fig. 25) at the control box (23) by removing the two cable nuts (12).

(2) Disconnect the choke control (16) at the carburetor (19, fig. 20) and from the control bracket (21, fig. 25).

(3) Disconnect the idle control (18) from the carburetor (7, fig. 7) and from the control bracket (21, fig. 25).

(4) Remove the four cap nuts (2) which secure the central box to the mounting plate (24), and remove the control box and gasket from the lubricating unit.

b. Disassembly.

(1) Disconnect the lead (1, fig. 26) at the starter switch (24) and at the terminal screws (2).

(2) Remove the two nuts (23) which secure the starter switch (24) to the back of the control box, and remove the starter switch from the control box.

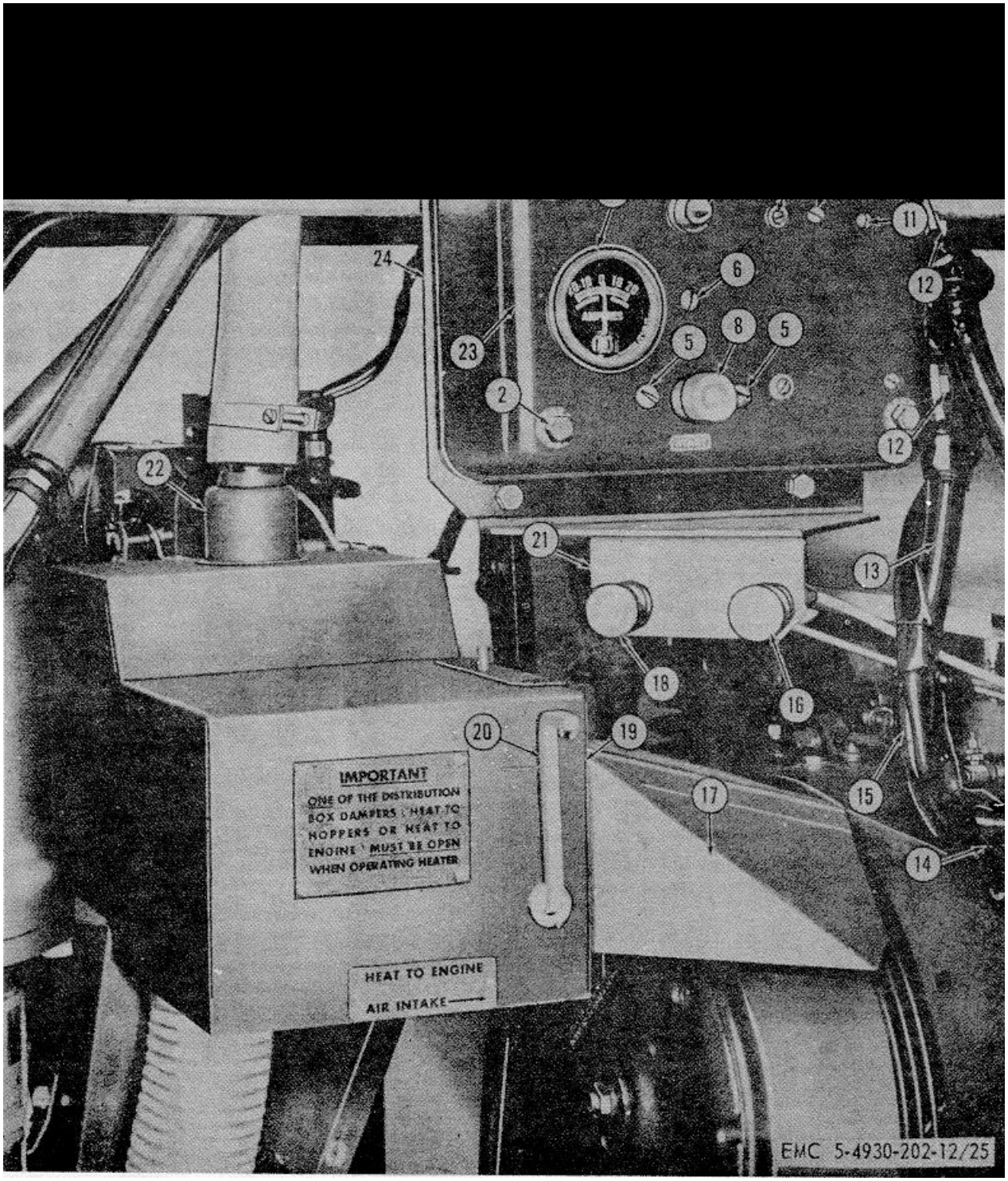


Figure 25. Control box removal.

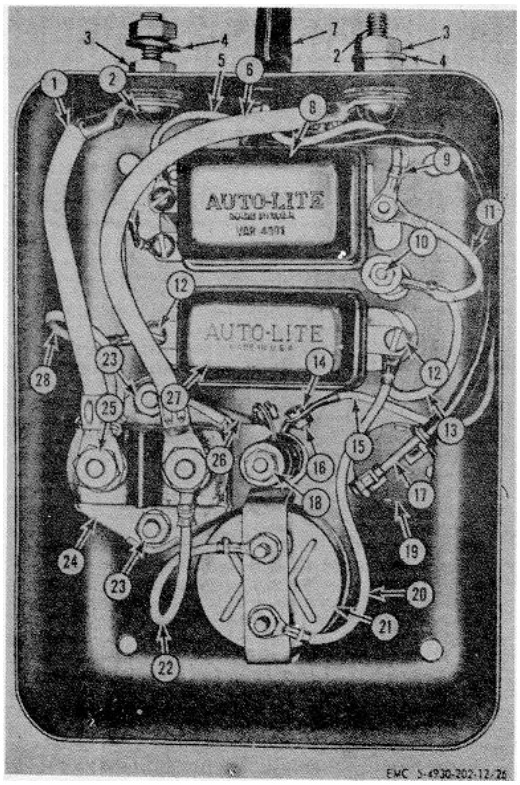
1 Exhaust pipe
2 Cap nut, 1/4--20 (4 rqr)
3 Cap screw, 1/4--20 x 1/2 in. lg (4 rqr)
4 Ammeter
5 Screw, 1/4-28 x 1 1/2 in. lg (2 rqr)
6 Screw, 1/4-28 x 2 1/2 in. lg
7 Stop button
8 Start button
9 Bolt, ,3/16-32 x 1/2 in. lg (2 rqr)
10 Bolt, 1/8-36 x 2 1/4 in. lg
11 Screw, 1/8-36 x 3/4 in. lg (2 rqr)
12 Terminal nut, 5/16-18 (4 rqr)
13 Terminal cable, control box-to-battery
14 Terminal connection strip
15 Terminal cable, control box-to-starter-generator
16 Choke control
17 Heat duct
18 Idle control
19 Heat damper box
20 Engine hot air damper control
21 Engine hot air damper control
22 Exhaust outlet
23 Control box
24 Mounting plate

Figure 25-Continued.

(3) Disconnect the ammeter-to-voltage regulator lead (20) at the ammeter (21), and at the voltage regulator (27).

(4) Disconnect the ammeter-to-starter button lead (22) at the ammeter (21), and at the starter switch (24).

(5) Remove the two screws which secure the ammeter (21) to the control box, and remove the ammeter.



(6) Disconnect the starter switch-to-voltage regulator lead (28) at the starter switch (24) and at the voltage regulator (27).

(7) Disconnect the fixed resistor-to-voltage regulator lead (13) at the voltage regulator (27) and at the fixed resistor (10).

(8) Remove the two bolts (9, fig. 25) which secure the voltage regulator to the control box, and remove the voltage regulator.

(9) Disconnect the relay-to-fixed resistor lead (11, fig. 26) at the fixed resistor

1 Lead, start button-to-terminal screw
2 Screw, 5/16-18 x 1/4 in. lg (2 rqr)
3 Nut, terminal, 5/16-18 (4 rqr)
4 Flat washer, 5/16 in. (2 rqr)
5 Reverse-current relay lead
6 Lead, starter switch-to-terminal screw
7 Harness assembly cover
8 Relay, reverse-current
9 Lead, relay-to-starter-generator
10 Resistor, 2 in. x 9/16 in., 50 ohm, 25 watt
11 Lead, relay-to-fixed resistor
12 Screw, 3/16-32 x 1/4 in. lg (3 rqr)
13 Lead, fixed resistor-to-voltage regulator
14 Screw,1/8-32 x 1/4 in. lg (3 rqr)
15 Lead, relay-to-field resistor
16 Nut, 1/8-32 (2 rqr)
17 Ground wire, stop switch-to-magneto
18 Resistor, 1 1/2 in. x 1/2 in., 60 ohm, 10 watt
19 Stop switch
20 Lead, voltage regulator-to-an meter
21 Ammeter
22 Lead, ammeter-to-start button
23 Nut, 1/4-20 (2 rqr)
24 Starter switch
25 Nut, 5/16-18 (2 rqr)
26 Lead, fixed resistor-to-relay
27 Voltage regulator
28 Lead, starter switch-to-voltage regulator

Figure 26. Control box disassembly.

(10) and at the reverse-current relay (8).

(10) Disconnect the relay-to-starter generator lead (9) at the reverse-current relay (8).

(11) Disconnect the fixed resistor-to-relay lead (26) at the resistor and at the reverse-current relay.

(12) Disconnect the reverse-current relay lead (5) from the reverse-current relay terminals.

(13) Remove the two screws (11, fig. 25) which secure the reverse-current relay to the control box, and remove the reverse-current relay.

(14) Disconnect the ground wire (17, fig. 26) from the stop switch (19), and unscrew the stop button (7, fig. 25) from the control box (23).

(15) Remove the screw (6) which secures the resistor (18, fig. 26) to the control box, and remove the resistor.

(16) Remove the bolt (10, fig. 25) which secures the resistor (10, fig. 26) to the control box, and remove the resistor.

c. Cleaning, Inspection, and Repair.

(1) Clean all parts, using an approved cleaning solvent.

(2) Inspect the voltage regulator for proper mounting and loose connections. Tighten all loose connections.

(3) If the voltage regulator shows a high-charging rate or no-charging rate on the ammeter, replace the voltage regulator.

(4) Inspect the control box wiring for proper connections. Tighten any loose connections at the inside of the control box. Replace any defective wiring.

(5) Inspect the ammeter for cracked or broken glass or defective operation. Replace a defective ammeter.

(6) Inspect the starter switch, and the stop switch for loose connections, proper mounting, and improper operation. Tighten loose stop switch or starter switch mounting connections. Replace a defective stop switch or starter switch.

d. Reassembly.

(1) Position the resistor (10, fig. 26) in the control box, and secure with the bolt (10, fig. 25).

(2) Position the resistor (18, fig. 26) in the control box, and secure with the screws.

(3) Install the stop button (7) to the stop switch.

(4) Position the reverse-current relay (8) in the control box, and secure with the two screws (11, fig. 25).

(5) Position the voltage regulator (27, fig. 26) in the control box, and secure with the two bolts (9, fig. 25).

(6) Position the starter switch (24, fig. 26) in the control box, and secure with the two nuts (23).

(7) Position the ammeter (21) in the control box, and secure with the two nuts.

(8) Connect the reverse-current relay lead (5) to the reverse-current relay terminals.

(9) Connect the resistor-to-relay lead (26) at the resistor (18) and at the reverse current relay terminal.

(10) Connect the relay-to-starter generator lead (9) at the reverse-current relay terminal.

(11) Connect the relay-to-resistor lead (11) at the resistor (10), and at the reverse-current relay terminal.

(12) Connect the resistor-to-voltage regulator lead (13) at the voltage regulator terminal and at the resistor (10).

(13) Connect the starter switch-to-voltage regulator lead (28), at the starter switch terminal nut (25), and at the voltage regulator terminal.

(14) Connect the ammeter-to-starter switch lead (22) at the ammeter terminal nut and at the starter switch terminal nut (25).

(15) Connect the ammeter-to-voltage regulator lead (20) at the ammeter terminal nut, and at the voltage regulator terminal nut (12, fig. 25).

(16) Connect the starter button leads (1) at the starter switch terminal nuts (25) and at the terminal screws (2).

e. Installation.

(1) Install the gasket on the mounting plate (24, fig. 25), and place the control box (23) on the gasket and mounting plate.

(2) Install the four nuts (2), which secure the control box.

(3) Connect the idle control (18) to the control bracket (21) and the carburetor (7, fig. 7).

(4) Connect the choke control (16, fig. 25) to the control bracket (21) and the carburetor (19, fig. 20).

(5) Connect the two terminal leads (13 and 15, fig. 25) at the control box (23), by installing the two cable nuts (12) which secure the terminal cables to the control box.

119. Ignition

a. Testing for Spark.

(1) To determine if the ignition system is producing a sufficient spark, disconnect one of the spark plug cables at the spark plug.

(2) Support the end of the spark plug cable 3/16 inch from a bare metal part of the engine.

(3) Crank the engine rapidly.

(4) The spark should jump the '16 inch gap, showing a sharp blue color.

(5) If the spark fails to jump the gap, or shows a weak spark, make repairs as necessary (par. 117).

b. Ignition Timing Adjustment.

(1) Reference marks for timing the ignition (1, 2 and 12, fig. 27) are indicated on the upper-front portion of the gearcase (14), and a witness mark (9, fig. 31) on the blower wheel (1).

(2) Remove the air shroud (4, fig. 12) by removing the three screws (7, fig. 23) which secure the blower cover to the engine.

(3) Rotate the blower wheel until the witness mark TC is 1/4 revolution or 900 to the left of the TC mark on the gear cover or in line with No. 1 cylinder.

(4) Remove the magneto (par. 115) and hold the magneto (9, fig. 20) in the same position it will occupy in the bracket.

(5) Turn the magneto gear clockwise until it stops turning freely.

(6) Start the magneto into the bracket; before the magneto gear meshes with the idler gear remove the pipe plug (13, fig. 22) and look through the adjusting slot, and see that the magneto mounting hole is located so the mounting screw can travel about the same distance in either direction on the slot.

(7) Secure the magneto in position (par. 115).

(8) Rotate the blower wheel (1, fig. 31) slowly in a clockwise direction until the impulse coupling makes a distinct loud click.

(9) The witness mark (9) should now line up with the 11° mark on the gear cover.

120. Starter-Generator Brushes

a. Removal.

(1) Remove the blower wheel hub (5, fig. 12) by removing the four screws (6), and the nut (8), lockwasher, and flat washer (7), which secures the blower wheel hub to the blower wheel (1, fig.31).

(2) Remove the hub by pulling straight out and off the crankshaft.

(3) Remove the four brushes (7, fig. 27) by removing four screws (5), which secure the brushes in place.

(4) Remove the brush block assembly (10) and springs (3) by removing eight screws (4) which secure the brush blocks to the starter-generator frame.

(5) Remove the condenser (9) by removing the screw (8) which secures the condenser to the bearing support (11).

(6) Remove the bearing support by removing eight screws (6) which secure the bearing support to the starter-generator frame.

b. Cleaning, Inspection, and Repair.

(1) Visually inspect for broken wires and be sure all connections are clean and tight.

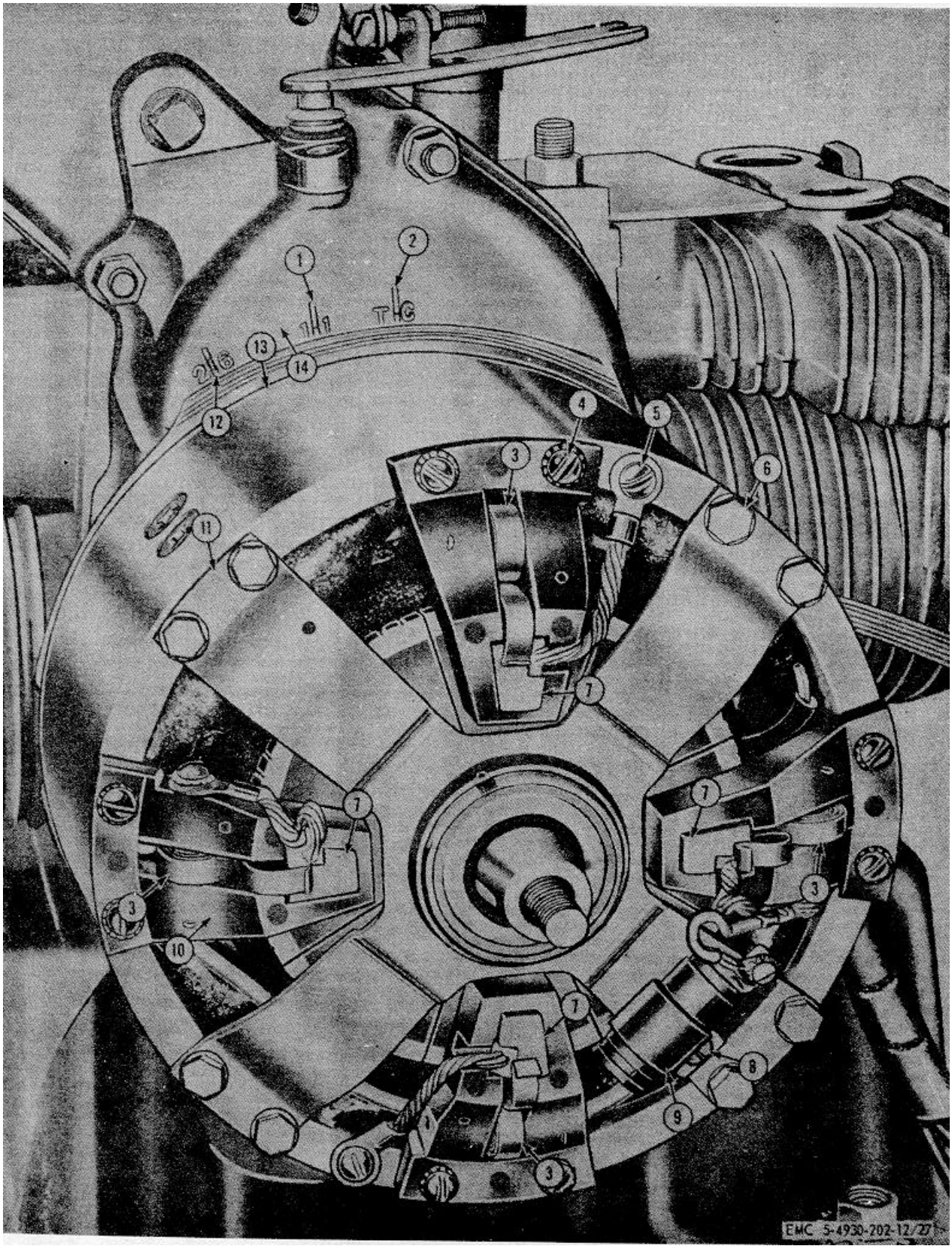


Figure 27. Brush removal and timing mark.

1 11° timing mark
2 TC timing mark
3 Brush spring
4 Screw, rd hd No. 10-32 x 5/8 in. lg (8 rqr)
5 Screw, No. 10-32 x 3/4 in. lg (4 rqr)
6 Screw, 1/4-20 x 1/2 in. lg (8 rqr)
7 Brush
8 Screw, No. 8-32 x 1/4 in. lg
9 Condenser
10 Brush block (4 rqr)
11 Bearing support
12 26° timing mark
13 Starter-generator frame
14 Gearcase

Figure 27-Continued.

(2) Inspect the commutator. Clean the commutator with fine sandpaper if dirty or discolored.

(3) Report a damaged commutator to the proper authority.

(4) Inspect the brushes. If the brushes are oil-soaked or worn to less than one-half of their original length, replace.

c. Adjusting Spring Tension.

(1) Inspect brush springs. Spring tension must be uniform; proper spring tension for the starter-generator is 22 to 25 pounds.

(2) Spring tension can be adjusted by slightly bending the mounting support or by bending the spring at the base of the last coil, whichever method applies.

d. Installation.

(1) Install the bearing support (11, fig. 27) on the starter-generator frame (13) by installing the eight screws (6) which secure the bearing support on the frame.

(2) Install the condenser (9) on the bearing support by installing the screw (8), which secures the condenser.

(3) Install the brush block (10) and spring (3), securing with the eight screws (4).

(4) Install the brushes (7) by inserting them in the brush block. Secure the brush leads in position with the four screws (5).

(5) Install the blower wheel hub (5, fig. 12) on the blower wheel (1, fig. 31) and camshaft, by installing the flat washer (7, fig. 12), lockwasher, and nut (8) on the crankshaft.

(6) Install the four screws (6) which also secure the hub to the blower wheel.

Section VIII. ENGINE

121. Description

The engine is an internal combustion, 4-cycle, gasoline type engine. An oil pressure relief valve, mounted on top of the cylinder block behind the crankcase breather is used to adjust oil pressure in the engine. A breather valve mounted in the crankcase breather cap helps to maintain a slight vacuum in the engine crankcase during operation. It is designed to reduce oil leaks caused by internal crankcase pressure.

122. Cylinder Heads and Cylinder Shrouds

a. Removal.

(1) Remove the two cylinder air shrouds (5, fig. 17), one from each side of the engine, by removing screws (3 and 4, fig. 23) and lockwashers which attach each of the two cylinder air shrouds to the cylinder heads (6, fig. 17).

(2) Disconnect the ignition cable (3) at the spark plug (1).

(3) Remove the spark plugs from the cylinder heads (6).

(4) Remove the 14 nuts (5, fig. 23) and lockwashers which secure each of the cylinder heads to the engine cylinder block.

(5) Remove each of the cylinder heads and gaskets from the block.

b. Cleaning, Inspection, and Repair.

(1) Replace a cylinder head which has broken cooling fins, or other damage.

(2) Replace a cylinder air shroud which is badly bent or damaged.

(3) Inspect all threaded surfaces for burs or damage. Replace any damaged hardware.

(4) Brush all dirt and dust from between the cooling fins. Scrape off all carbon and corrosion deposits on the head and block.

(5) Replace the cylinder head gaskets.

c. Installation.

(1) Install the head gaskets and heads (6, fig. 17) on the engine block.

(2) Install the 14 nuts (5, fig. 23) and lockwashers which secure the cylinder heads to the engine block.

(3) Install the spark plugs (1, fig. 17) and ignition cables (3) in the cylinder heads.

(4) Install the cylinder air shrouds (5) on the cylinder heads, secure with the four screws (3, 4, fig. 23) and lockwashers.

123. Manifold and Muffler

a. Removal.

(1) Remove the carburetor (par. 110).

(2) Disconnect governor linkage (par. 112).

(3) Disconnect fuel lines from fuel pump (par. 111).

(4) Remove muffler (1, fig. 7) by removing two cap screws (13) and two nuts (15) which secure the muffler to the manifold (12), and the manifold to the engine block.

(5) Disconnect the exhaust tube from the muffler.

(6) Remove the muffler from the manifold.

(7) Remove the manifold and gaskets from the engine block.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts with an approved cleaning solvent.

(2) Inspect the muffler for dents, cracks, or other deficiencies. Replace a faulty muffler.

(3) Inspect the manifold for cracks or deficiencies which may cause improper operation. Replace damaged manifold, and replace all gaskets.

c. Installation.

(1) Install the manifold (12, fig. 7) and gaskets on the engine block.

(2) Install the muffler (1) and gaskets on the manifold, and secure with the two cap screws (13) and two nuts (15).

(3) Connect the exhaust tube to the muffler.

(4) Connect the fuel lines to the fuel pump (par. 111).

(5) Connect the governor linkage (par. 112).

(6) Install the carburetor (par. 110).

(7) Check manifold, muffler, and connections for leaks.

124. Valve Adjustment

a. Removal.

(1) Remove the carburetor (par. 10).

(2) Disconnect the governor linkage (par. 112).

(3) Disconnect fuel lines from fuel pump (par. 111).

(4) Remove the muffler and manifold (par. 123).

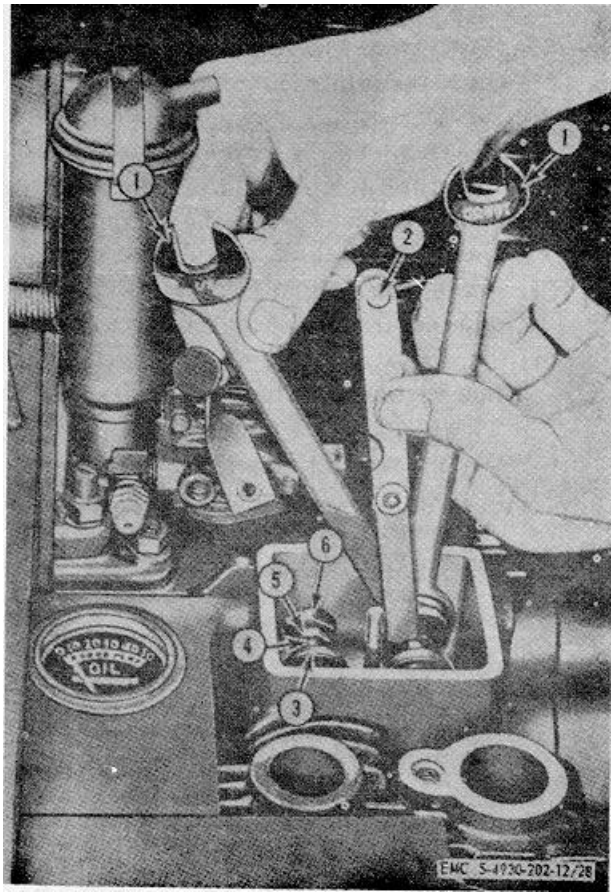
(5) Remove the valve cover (11, fig. 21), by removing the two cap nuts (12) which secure the covers to the block.

(6) Remove the valve cover gaskets.

b. Adjustment.

(1) Hand crank the engine slowly to the point 1/4 revolution past the point at which the intake valve of the left-hand cylinder has opened and closed. This will be the point at which the TC mark on the blower wheel (1, fig. 31) and the TC mark on the gearcase (14. fig. 27) are in line.

(2) Adjust the intake valve for a clearance of 0.006 to 0.008 inch between the end of the valve stem (4, fig. 28) and the tappet (6), and adjust the exhaust valve for a clearance of 0.006 to 0.008) inch between the valve stem and tappet. Use a feeler gage for valve adjustment. Make the adjustment in each case by



1 Wrench, 1/2 in.- 9/16 in. (2 rqr)
2 Feeler gage
3 Valve spring and roto cap
4 Valve stem
5 Adjusting screw
6 Tappet

Figure 28. Valve adjustment.

means of the adjusting screw (5) in the end of the tappet (6). The screw is self-locking and will maintain the setting.

(3) Adjust the valves of the right-hand cylinder, by rotating the blower wheel (1, fig. 31) one full revolution and repeating the adjustment procedure.

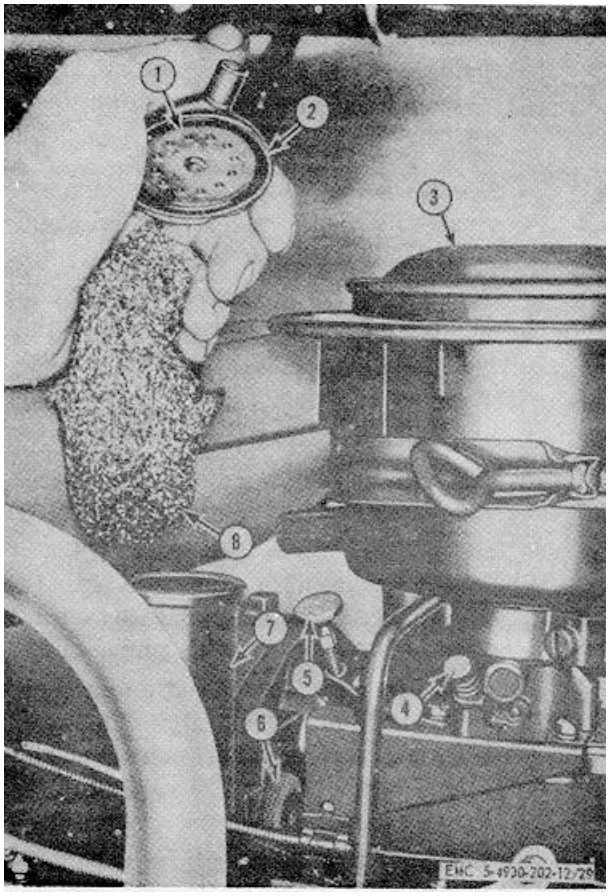
c. Installation.

(1) Install new valve cover gaskets.

(2) Install valve covers (11, fig. 21) and secure with nuts (12) and lockwashers.

(3) Install the manifold and muffler (par. 123).

(4) Connect the fuel lines to the fuel pump (par. 111).



1 Crankcase breather valve
2 Crankcase breather cap
3 Carburetor air cleaner
4 Carburetor adjusting screw
5 Fuel pump primer lever
6 Governor adjusting nut
7 Crankcase breather tube
8 Crankcase breather tube baffle

Figure 29. Servicing crankcase breathes.

(5) Connect the governor linkage (par. 112).

(6) Install the carburetor (par. 110).

125. Crankcase Breather Assembly

a. Removal.

(1) Remove the short piece of tube, connecting the crankcase breather cap (2, fig. 29) to the air cleaner (3).

(2) Pull the crankcase breather assembly up and out of the cylinder block.

(3) Remove the spring clip which secures the crankcase breather cap (2) and valve (1) to the crankcase breather tube (7), and remove the cap.

(4) Remove the crankcase breather tube baffle (8).

(5) Lift out the breather valve (1) from the breather cap (2).

b. Cleaning, Inspection, and Repair.

(1) Soak the cap, valve, and crankcase breather baffle in an approved cleaning solvent.

(2) Wipe out the crankcase breather tube with an approved cleaning solvent.

(3) Replace the tube, cap, valve, or baffle, if defective.

c. Installation.

(1) Install the crankcase breather baffle (8) in the crankcase breather tube (7).

(2) Install the crankcase breather cap (2) and valve (1) in the crankcase breather tube (7) and secure with spring clip.

(3) Install the crankcase breather assembly in the cylinder block, and connect the short piece of tube between the crankcase breather cap (2) and the air cleaner (3).

126. Oil Pressure Regulator

a. Removal.

(1) Loosen the oil pressure adjusting screw locknut (8, fig. 18) mounted on the crankcase.

(2) Turn the adjusting screw (9) out of the crankcase.

(3) Remove the bypass spring and valve from the crankcase.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts in an approved cleaning solvent.

(2) Replace the bypass spring if weak or broken.

(3) Replace the valve if damaged.

(4) Replace the adjusting screw if the threads are damaged.

c. Installation.

(1) Install the bypass spring and valve into the crankcase.

(2) Install the adjusting screw (9).

(3) Tighten the oil pressure adjusting screw locknut (8).

d. Oil Pressure Adjustment.

(1) Start the lubricating unit until operating temperature is reached.

(2) Check the oil pressure on the oil pressure gage (18, fig. 21). Under normal operating conditions the oil pressure should be 20 to 35 pounds pressure.

(3) Loosen the locknut (8, fig. 18) on the oil pressure adjusting screw (9).

(4) Turn the adjusting screw clockwise to increase oil pressure or counterclockwise to decrease oil pressure.

(5) Watch the oil pressure gage while making the adjustment. After the adjustment is completed, securely tighten the locknut.

127. Oil Drain Line

a. Removal.

(1) Remove the crankcase drain plug (9, fig. 23) and drain all oil from the engine crankcase.

(2) Remove the oil line (8) from the crankcase.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts with an approved cleaning solvent.

(2) Inspect all parts for damaged threads, external defects and internal obstructions.

(3) Replace parts as necessary.

c. Installation.

(1) Install the oil line (8) on the crankcase.

(2) Install the drain plug (9) in the oil line (8).

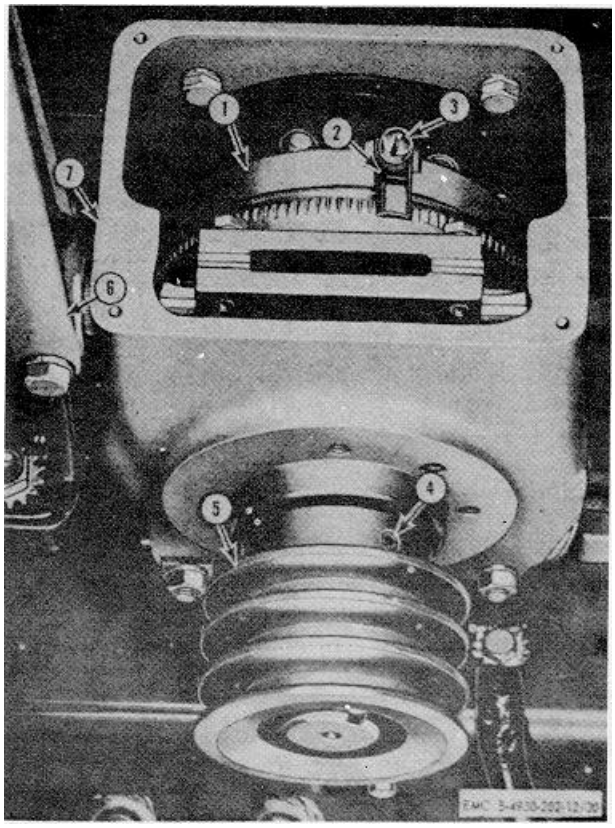
(3) Inspect the oil drain line for leaks.

128. Clutch Adjustment

a. Stop the engine and disengage the clutch lever (6, fig. 30).

b. Remove the top plate (13, fig. 20) from the clutch housing (7, fig. 30), by removing the four screws (14, fig. 20) which secure the plate to the housing.

c. Turn the plate by hand until the adjusting



1 Adjusting ring
2 Lockspring
3 Setscrew
4 Socket HD screw, 5/16 x 7/16 in. lg (2 rqr)
5 Pulley
6 Clutch lever
7 Clutch housing

Figure 30. Clutch adjustment.

ring setscrew (3, fig. 30) and lockspring (2) are at the top of the ring (1).

d. Loosen the adjusting ring setscrew (3) until the adjusting ring (1) is free to turn.

e. Turn the adjusting ring (1) to the right (clockwise) until the toggles can not be locked over center. Use a screw driver (or similar tool with a long heavy shank).

f. Loosen the adjusting ring (1) a notch or two at a time until the toggles can be locked over center with a very firm pull on the engaging lever (6).

g. Securely tighten the adjusting ring setscrew (3).

h. Start the engine and work the clutch lever (6) back and forth several times, allowing the clutch to pick up load but not to lock over center.

i. Stop the engine, loosen the setscrew (3) and tighten the adjusting ring (1) two or three notches for final adjustment. Be sure the toggles lock over center at final adjustment.

j. Tighten the setscrew (3) securely, and install the cover plate (13, fig. 20).

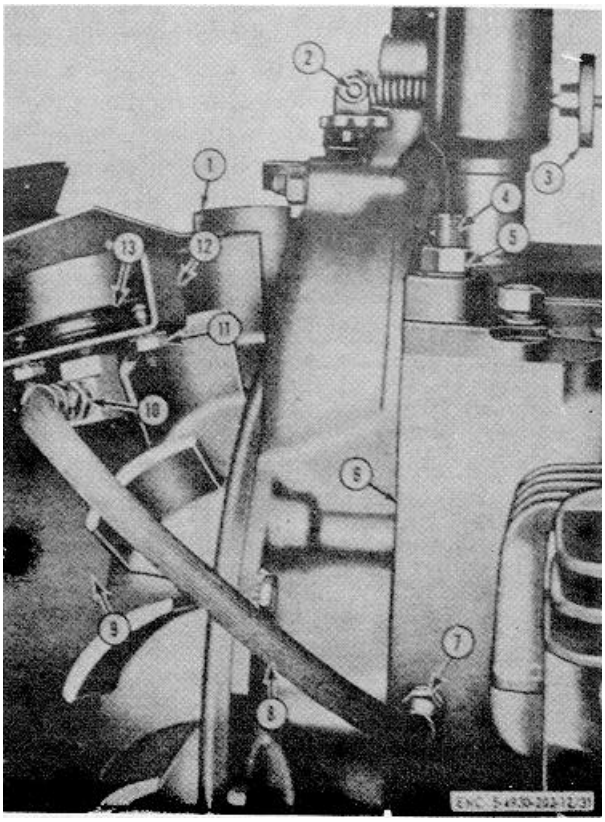
129. Oil Pressure Gage

a. Removal.

(1) Remove the air shroud (4, fig. 12).

(2) Remove the right-side engine air shroud (par. 122).

(3) Carefully pull the blower housing straight forward to the limit permitted by the oil gage flexible line (8, fig. 31).



1 Blower wheel
2 Sensitivity screw
3 Governor speed adjusting nut
4 Oil pressure relief adjusting screw
5 Oil pressure relief adjusting screw locknut
6 Crankcase
7 Oil line connection at crankcase
8 Oil line
9 Witness mark
10 Oil line elbow
11 Nut, No. 12-24 (2 rqr)
12 Bracket
13 Oil pressure gage

Figure 31. Oil pressure gage removal.

(4) Disconnect the oil line at the oil line elbow (10).

(5) Remove the oil pressure gage (13) and bracket (12) from the air shroud (4, fig. 12).

b. Cleaning, Inspection, and Repair.

(1) Clean all parts using an approved cleaning solvent.

(2) Replace the oil pressure gage if the glass is cracked or broken, and the gage does not register properly.

(3) Replace connection fittings if threads are damaged.

c. Installation.

(1) Install the oil pressure gage (13, fig. 31) on the air shroud (4, fig. 12).

(2) Connect the oil line (8, fig. 31) to the oil line elbow (10).

(3) Connect the air shroud to its proper position (par. 122).

(4) Install the right-side engine air shroud (par. 122).

Section IX. COMPRESSING UNIT

130. Description

The compressor on the lubricating unit is a two-stage, 16 cfm unit, with a disk-type valve system. The twin-cylinder construction gives a higher discharge pressure with less consumption of power. A splash-type lubrication system provides adequate lubrication, even if the oil level in the reservoir is low. The compressor is equipped with an automatic pressure control which unloads the compressor through the auxiliary unloader, when the tank pressure has reached 175 psi, and allows compression to resume when the pressure has dropped to 145 psi. A centrifugal unloader, operating from the crankshaft automatically opens a valve releasing the head pressure, when the compressor stops, and closes when compression is resumed. A trouble control, connected to the automatic pressure switch unloader provides automatic reduction of engine speed during the compressor unload periods. A manually operated shutoff cock connected to the inlet of the throttle control provides manual elimination of this automatic speed reduction during cold weather operation.

131. Intake Muffler

a. Removal and Disassembly.

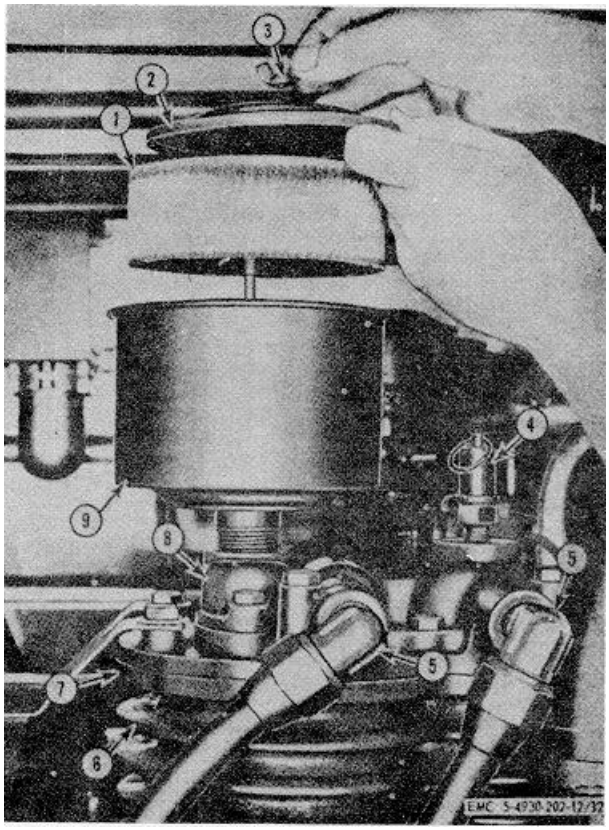
(1) Unscrew the wingnut (3, fig. 32) from top of the intake muffler.

(2) Remove the cover (2) and the filter element (1) from the reservoir bowl (9).

(3) Unscrew the reservoir bowl (9) at the muffler adapter (8).

b. Cleaning, Inspection, and Repair.

(1) Clean all parts, using an approved cleaning solvent. Make sure all dirt, grime, and sediment are removed from the bowl.



1	Filter element	6	Cylinder
2	Cover	7	Cylinder head
3	Wingnut	8	Muffler adapter
4	Safety valve	9	Reservoir bowl
5	Elbow, 3/4 in.		

Figure 32. Servicing compressor intake muffler.

(2) Blow out the filter element, using compressed air, dip in oil of the recommended viscosity, and drain excess oil from the filter element.

(3) Inspect the reservoir bowl, center locking coil, and the cover for dents, defective threads, or wear. Replace the unit if necessary.

c. Reassembly and Installation.

(1) Screw the reservoir bowl (9) into the muffler adapter (8).

(2) Position the filter element (1) and cover (2) on the bowl; secure the unit by tightening the wingnut (3).

132. Belt Guard, Belts, and Pulleys

a. Removal.

(1) Remove the three cap screws (4, fig. 33) and lockwashers (3), two at the cylinder head (6), and one at the crankcase (17), which secure the belt guard (1) to the compressor.

(2) Remove the screw (2) which secures the belt guard to the engine.

(3) Remove the screw (7, fig. 8) which secures the belt guard bracket (4) on the engine side to the engine mounting base (12).

(4) Remove the belt guard by lifting it up and away from the unit on the compressor side.

(5) Loosen the four engine mounting nuts (8, fig. 17), and slide the engine toward the compressor, until the drive belts (1, fig. 34) are loose.

(6) Remove the three drive belts from the drive pulley (15) and the flywheel pulley (7).

(7) Remove the cotter pin from the castellated nut (8), and remove the nut from the flywheel pulley (7).

(8) Slide the flywheel from the keyed shaft, using a pry bar or puller as necessary.

(9) Remove the key from the shaft.

(10) Remove two screws (4, fig. 30) from the drive pulley (15, fig. 34), and slide the drive pulley from the keyed engine shaft.

(11) Remove the key (16) from the shaft.

b. Cleaning, Inspection, and Repair.

(1) Clean all metal parts with an approved cleaning solvent.

(2) Clean off all dirt and grit on the belts.

(3) Dry all parts thoroughly, and be sure that all oil and grease is completely removed.

(4) Inspect the belt guard for dents or tears. Straighten out any dents, twists, or bends; replace if severely damaged. Be sure the belt guard does not rub against the pulleys or drive belts.

(5) Inspect the drive belts for cuts, frays, or excessive wear. Replace the belts if necessary.

(6) Inspect the drive pulley and the flywheel pulley for cracks or burs. Replace a defective pulley.

(7) Replace the cotter pin.

c. Installation.

(1) Position the key (16) in the clutch drive shaft end.

(2) Install the drive pulley (15) on the drive shaft, and tighten the two screws (4, fig. 30).

(3) Position the key in the compressor crankshaft end.

(4) Slide the flywheel (7, fig. 34) into place on the compressor crankshaft.

(5) Tighten down the castellated nut (8) on the flywheel, alining one of the slots in the nut with the hole in the crankshaft.

(6) Install the cotter pin into the slot and hole, and bend the ends in opposite directions.

(7) Install the three drive belts (1) on the drive pulley (15) and on the flywheel pulley (7).

(8) Slide the engine away from the compressor to obtain proper belt tension. Proper tension is indicated when belt can be depressed approximately 1/2 to 3/4 inch.

(9) When belt tension adjustment has been made, check alinement of drive pulley and flywheel pulley.

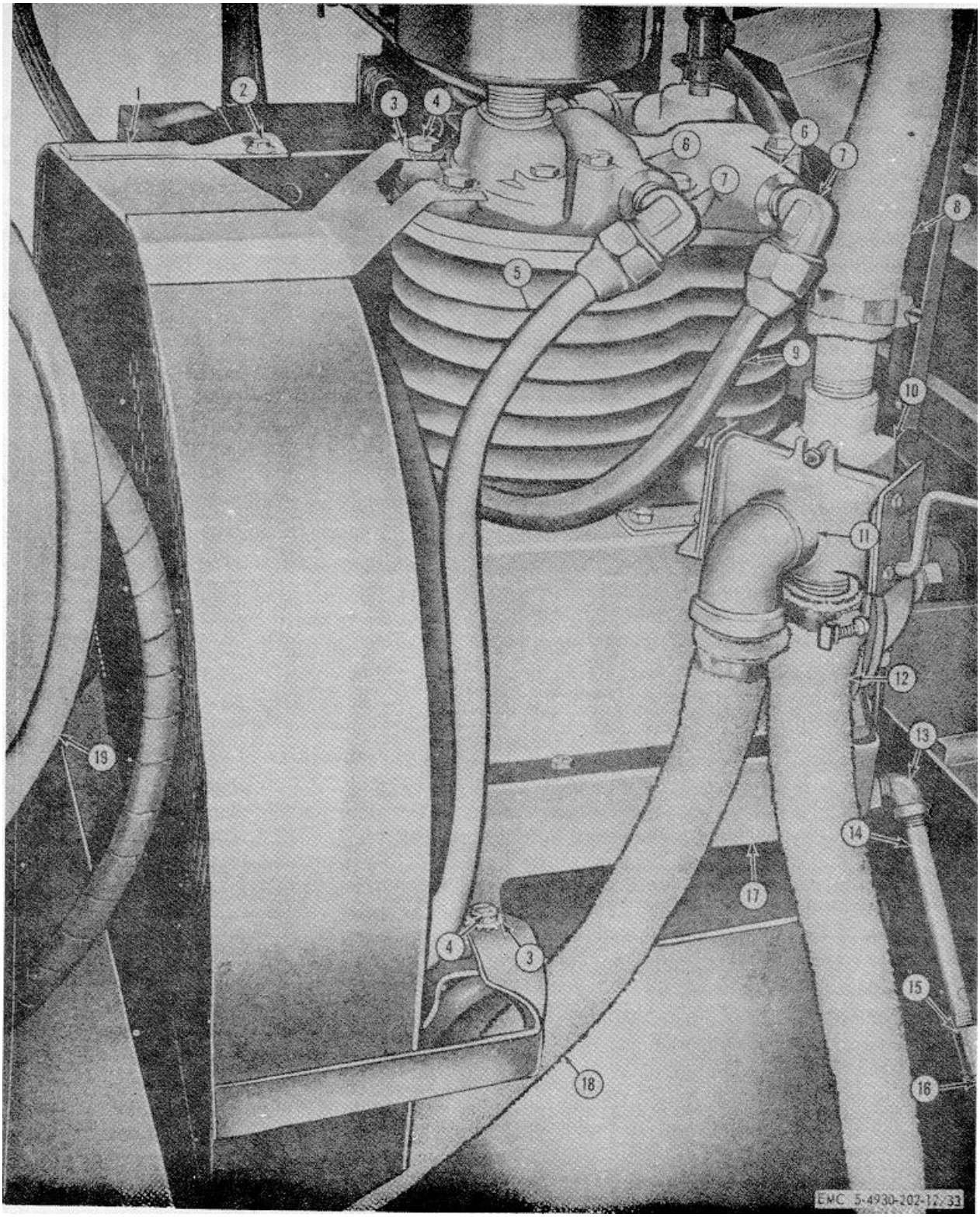
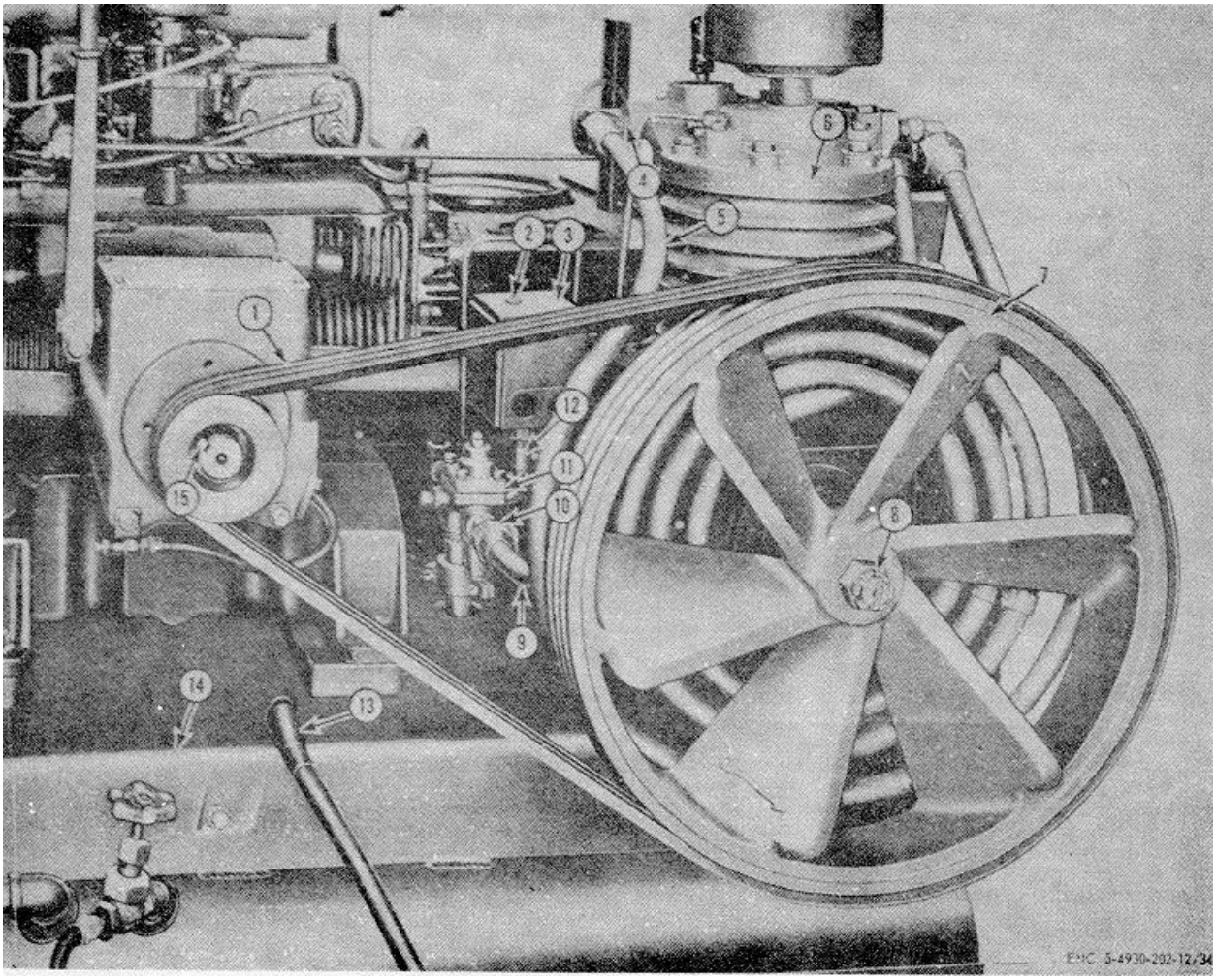


Figure 33. Belt guard removal.

1 Belt guard
2 Screw, 3/16--32 x 1/2 in.
3 Lockwasher, 3/8 in. (3 rqr)
4 Cap screw, 3/8-16 x 1 in. lg (3 rqr)
5 Intercooler assembly
6 Cylinder head
7 Elbow, 3/4 in.
8 Exhaust tube, engine-to-director
9 Aftercooler assembly
10 Exhaust director
11 Elbow, 90° std, 1 in. NPT
12 Exhaust tube, director-to-compartments
13 Elbow, 1/4 in. NPT
14 Nipple, 1/4 in. NPT x 6 in.
15 Coupling, 1/4 in. NPT
16 Pipe plug, 1/4 in.
17 Crankcase
18 Exhaust tube, director-to-atmosphere
19 Hose reel

Figure 33. Continued.



1 Drive belt (3 rqr)
2 Cover screw
3 Pressure switch cover
4 Elbow, 3/4 in. (3 rqr)
5 Intercooler assembly
6 Cylinder head
7 Flywheel pulley
8 Castellated nut
9 Aftercooler assembly
10 Straight fitting, 34 in.
11 Control valve assembly
12 Nipple, Y4 x 51/2 in.
13 Battery ground cable
14 Mounting base
15 Drive pulley
16 Key

Figure 34. Belts, flywheel, and pulley removal.

(10) Tighten the four engine mounting nuts (8, fig. 17), to secure the engine in place.

(11) Install the belt guard (1, fig. 33) on the unit, and replace the three cap screws (4), and lockwashers (3) which secure the belt guard to the compressor.

(12) Install the screw (2), which secures the belt guard to the engine at the clutch plate, and the screw (7, fig. 8) which secures the bracket (4) to the mounting base (12).

133. Air Coolers

a. Removal.

(1) Remove the belt guard, belts, and compressor flywheel from the unit (par. 132).

(2) Disconnect the intercooler (5, fig. 34) from the two elbows (4), and remove the elbows from the cylinder head (6).

(3) Remove the screw which secures the intercooler (5) to the mounting base (14), and remove the intercooler.

(4) Disconnect the aftercooler (9, fig. 33) at the elbow (7), and remove the elbow from the compressor cylinder head (6).

(5) Disconnect the aftercooler (9, fig. 34) from the straight fitting (10), and remove the fitting from the control valve (11).

(6) Remove the two screws (15, fig. 9), one at each side of the compressor, from the brackets, and remove the aftercooler from the compressor.

(7) Remove the safety valve (4, fig. 32) from the cylinder head (7).

b. Cleaning, Inspection, and Repair.

(1) Remove all grease and dirt accumulations from the intercooler, and the aftercooler tubes. Be certain there is no foreign material coating the tubes which could hamper or obstruct the cooling function.

(2) Inspect the intercooler tube and the aftercooler tube for any cracks, dents, or leaks, which would impair their function. Replace a defective intercooler or aftercooler tube.

(3) Inspect the three elbows, and the straight fitting for damaged threads.

Replace a defective elbow or fitting.

(4) Inspect the safety valve for leaks and for loose connections. The blow-off pressure of the safety valve is 70 psi, and prevents excessive pressure from entering the high-pressure intake from the low-pressure discharge. Replace a defective safety valve.

c. Installation.

(1) Connect the three elbows (4, fig. 34) to the cylinder head (6).

(2) Connect the straight fitting (10) to the control valve (11).

(3) Connect the aftercooler (9) to the fitting (10) and to the elbow (7, fig. 33) at the cylinder head (6).

(4) Connect the intercooler (5, fig. 34) to the two elbows (4) at the cylinder head (6).

(5) Install the two screws (15, fig. 9) into the brackets (16), which secure the aftercooler to the compressor.

(6) Install the screw which secures the intercooler (5, fig. 34) to the mounting base (14).

134. Oil Drain Line

a. Removal.

(1) Drain all oil from the compressor crankcase. Refer to LO 5-4930-202-20.

(2) Remove the coupling (15, fig. 33), nipple (14), and elbow (13) from the compressor crankcase.

b. Cleaning, Inspection, and Repair.

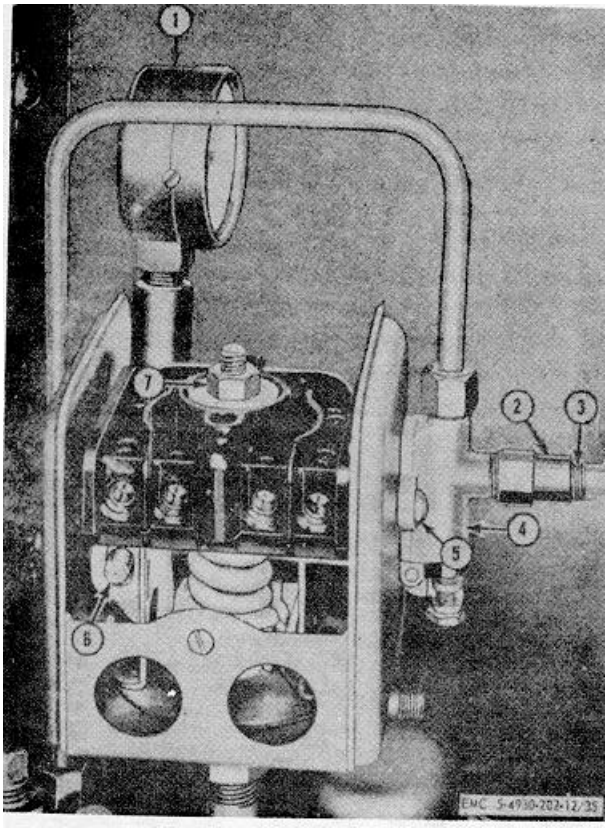
(1) Clean all parts in an approved cleaning solvent.

(2) Inspect all parts for damaged threads, external damage, or internal obstructions.

(3) Replace parts as necessary.

c. Installation.

(1) Install the elbow (13), nipple (14),



1 Air pressure gage
2 Air tube-to-tank control valve
3 Throttle control line
4 Two-way release valve
5 Screw, 1/4--28 x 3/8 in. lg (2 rqr)
6 Adjusting screw
7 Adjusting nut

Figure 35. Pressure switch adjustment.

coupling (15), and plug (16) in the compressor crankcase.

(2) Refill the crankcase with oil in accordance with LO 5-4930-202-20.

135. Pressure Switch

a. Pressure Adjustment.

(1) Remove the two screws (2, fig. 34), which secure the pressure switch cover (3), and remove the cover from the pressure switch.

(2) The unloading pressure is 175 psi. To raise the pressure cutout point, increase tension on the range spring by turning the adjusting nut (7, fig. 35) clockwise.

(3) To lower the pressure cutout point, decrease spring tension by turning the adjusting nut (7) counterclockwise.

(4) The loading pressure is 150 psi. Any change in the pressure cutout setting will raise or lower the cutin point a corresponding amount.

b. Differential Adjustment.

(1) The differential adjusting screw (6), is used to increase or decrease the difference in pounds of pressure between the cutin and cutout points on the compressor pressure switch.

(2) To increase the differential setting turn the adjusting screw clockwise.

(3) To decrease the differential setting turn the adjusting screw counterclockwise.

(4) When the differential setting is increased or decreased, all changes take place in the cutin point. The cutout point remains constant.

136. Two-Way Release Valve

a. Removal.

(1) Disconnect the tank control valve air tube (5, fig. 36) from the two-way release valve (6).

(2) Disconnect the throttle control air tube (2) and the auxiliary release valve air tube (22) from the compression tee (4).

(3) Remove the compression tee from the two-way release valve (6).

(4) Remove the two screws (7) which secure the two-way release valve to the pressure switch (8), and remove the two-way release valve.

b. Cleaning, Inspection, and Repair.

(1) Clean the release valve, using an approved cleaning solvent.

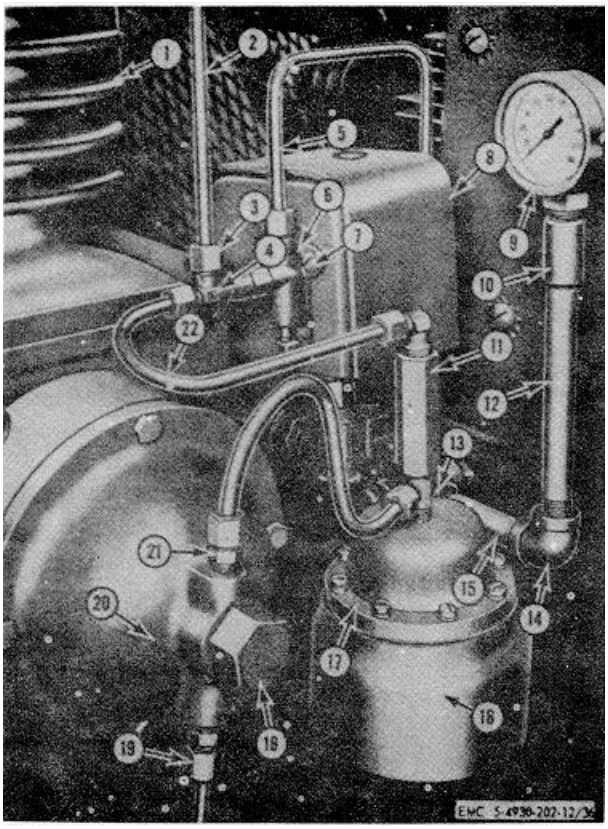
(2) Inspect the two-way release valve. If any parts are worn or damaged, replace.

c. Installation.

(1) Position the two-way release valve (6, fig. 36) on the pressure switch (8), and install the two screws 47) which secure the valve to the pressure switch.

(2) Install the compression tee to the two-way release valve (6).

(3) Connect the throttle control air tube



1 Cylinder
2 Throttle control air tube
3 Connector
4 Compression tee
5 Tank control valve air tube
6 Two-way release valve
7 Screw, 1/4--28 x 3/8 in. (2 rqr)
8 Pressure switch
9 Air pressure gage
10 Pipe coupling, 1/4 in. NPT
11 Auxiliary air release valve
12 Nipple, 1/4 in. NPT x 5 in.
13 Tee
14 Elbow, 1/4 in. 90°
15 Nipple, 3/8 x 3 1/2, in.
16 Auxiliary unloader assembly
17 Tubing, 1/4 x 12 in.
18 Unloading valve cap
19 Bleeder tube
20 Unloading cap
21 Straight connector
22 Air tube
23 Elbow

Figure 36. Compressor air controls.

(2) and the auxiliary release valve air tube (22) to the compression tee.

(4) Connect the tank control valve air tube (5) to the two-way release valve.

137. Air Pressure Gage

a. Removal.

(1) Remove the air pressure gage (9, fig. 36) from the pipe coupling (10).

(2) Remove the pipe coupling from the nipple (12), and the nipple from the elbow (14).

(3) Remove the elbow from the straight fitting, and the straight fitting from the manifold.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts, using an approved cleaning solvent.

(2) Inspect the air pressure gage. See that the air gage needle is not bent, that the glass is not cracked or broken, and that the case is undamaged. Replace a defective air pressure gage.

(3) Inspect all parts for bends, dents, cracks, internal obstructions, or external wear. Replace any defective parts.

c. Installation.

(1) Install the straight fitting in the manifold.

(2) Install the elbow (14) in the straight fitting and the nipple (12) to the elbow.

(3) Install the pipe coupling (10) into the nipple, and the air pressure gage (9) into the pipe coupling.

(4) Test the air pressure gage line for leaks.

138. Auxiliary Unloader Release Valve

a. Removal.

(1) Disconnect the air tube (22, fig. 36) at the compression tee (4) and at the auxiliary unloader release valve (11).

(2) Disconnect the tubing (17) at the unloader cap (20) and at the tee (13).

(3) Remove the elbow (23) from the auxiliary unloader release valve (11).

(4) Remove the auxiliary unloader release valve from the auxiliary unloader assembly (16).

b. Cleaning, Inspection, and Repair.

(1) Clean all parts, using an approved cleaning solvent.

(2) Inspect the auxiliary unloader release valve. If any parts are worn or defective, replace the auxiliary unloader release valve.

(3) Inspect the tubing and connecting fittings for internal obstructions or external wear. Replace any defective parts.

c. Installation.

(1) Install the auxiliary unloader release valve (11, fig. 36) to the auxiliary unloader assembly (16).

(2) Connect the tubing (17) between the auxiliary unloader assembly and the auxiliary unloader release valve.

(3) Install the elbow (23) to the auxiliary unloader release valve.

(4) Connect the air tube (22) between the compression tee (4) and the elbow (23).

(5) Test the auxiliary unloader release valve, and connecting tubing for proper operation.

139. Throttle Control

a. Removal.

(1) Remove the two screws (16, fig. 20) which secure the throttle control (18) to the engine manifold.

(2) Disconnect the air tube (2, fig. 36) at the compression tee and at the throttle control (18, fig. 20).

(3) Remove the throttle control, and the air tube from the unit.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts, using an approved cleaning solvent.

(2) Inspect the throttle control for defective or worn parts. Replace all worn and defective parts.

(3) Inspect the throttle control tubing for internal obstructions, or external wear. Replace the tubing if necessary.

c. Installation.

(1) Position the throttle control (18, fig. 20) on the engine, and install the two screws (16); secure the throttle control to the manifold.

(2) Connect the air tube (2, fig. 36) at the compression tee and at the throttle control (8, fig. 20).

Section X. SERVICING EQUIPMENT

140. Description

The servicing equipment and the lubricating unit consist of a reel bank assembly, three lubricant pumps, and connecting lines and fittings. The air-powered lubricant pumps furnish pressure through lines, to feed the lubricants to the reel bank assembly. The reel bank assembly is a hand-operated battery of five reels and hoses mounted on a common base and bolted to the lubricating unit. It has four hoses for the dispensing of general purpose lubricants, gear oil, and engine oil plus one hose for dispensing air under pressure. Each of the two chassis lubricator reels includes 40 feet of high-pressure hose, a swivel, and a control valve. The gear oil and engine oil reels each consists of 30 feet of high-pressure hose, and a squeeze handle, high volume, balanced hydraulic pressure type, metered control valve. The air reel consists of 50 feet of air hose, quick operating air-line coupling socket, tire chuck, and a blower valve. The high-pressure pump is mounted on the center lubricant container. The pump operates in conjunction with the pressure regulator.

141. Reel Bank Assembly

a. Removal.

(1) Unscrew the five hose couplings one on each reel (1, fig. 37) at the reel hub adapters (4).

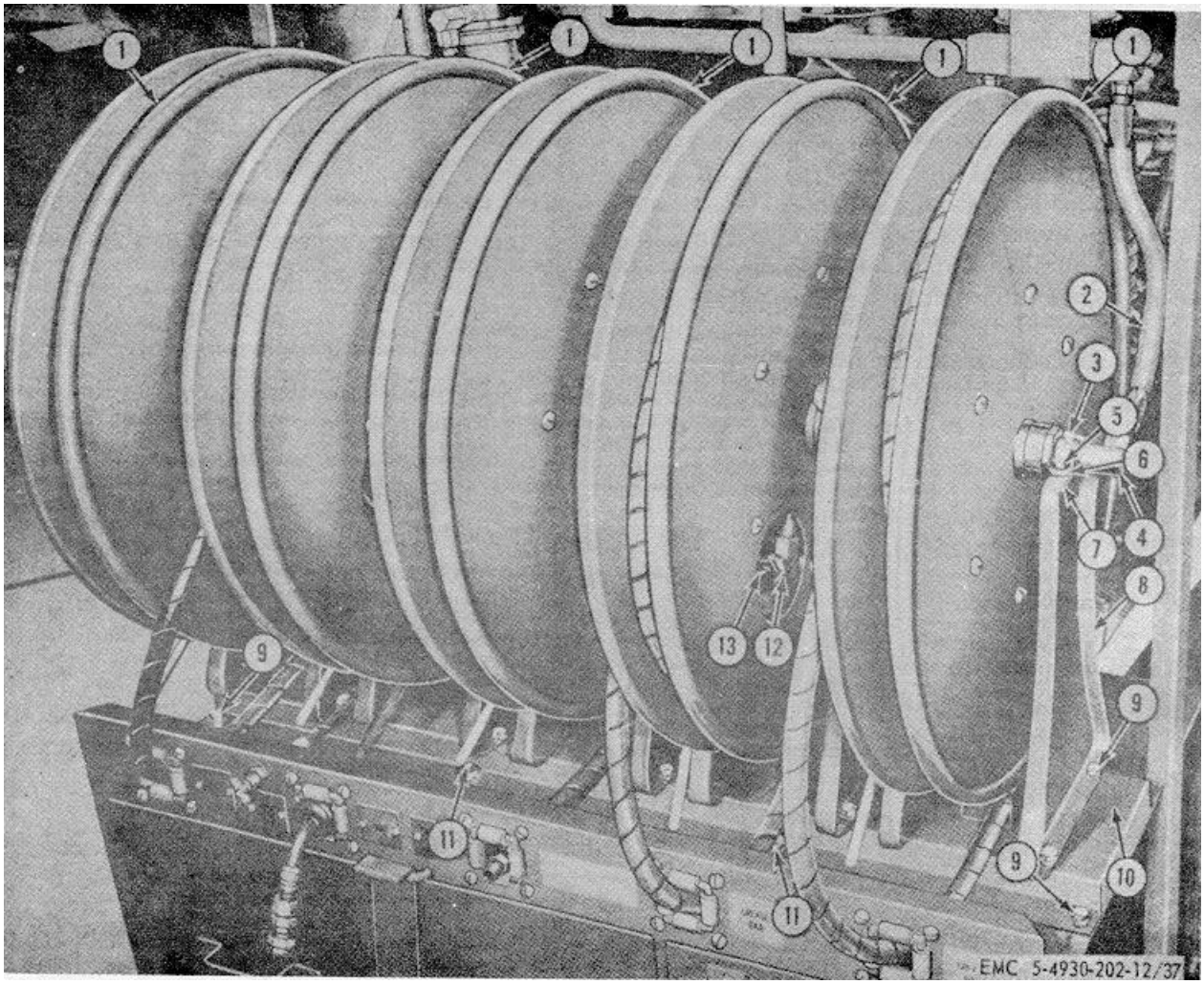
(2) Remove the five hoses from the five hose reels (1) by pulling the hoses all the way out, and disconnecting the hose (13) from the adapter (12).

(3) Remove four screws (9) and four nuts (11) and lockwashers which secure the reel bank assembly to the lubricating unit.

(4) Remove the reel bank assembly from the mounting on the unit, using a suitable lifting device.

b. Hose Reel Removal.

(1) Remove four screws (9), two on each



1 Hose reels
2 Lubricant hose, 11/32 ID x 15 in.
3 Setscrew, 1/4—20 x 3/8 in. lg (10 rqr)
4 Adapter, 90° union, 3/8 x 3/8 in.
5 Hex screw, 5/16--18 x 1 in. lg (20 rqr)
6 Yoke
7 Nut, 5/16--18 (20 rqr)
8 Reel pedestal
9 Screw, 3/8—16 x 3/4 in. lg (24 rqr)
10 Reel bank channel
11 Hex nut, 3/8--16 (4 rqr)
12 Adapter
13 Hose

Figure 37. Reel bank and hose reel removal.

pedestal (8), which secure each hose reel (1) to the reel bank channel (10).

(2) Remove the adapter (4), one on each hose reel (1), from the reel bank assembly.

(3) Remove the adapter (12) from the hose reel (1).

(4) Remove the two screws (5), and nuts (7) which secure the yoke (6) to the reel pedestal (8).

(5) Remove the hose reel (1), yoke (6), and the reel pedestal (8) from the reel bank assembly.

c. Cleaning, Inspection, and Repair.

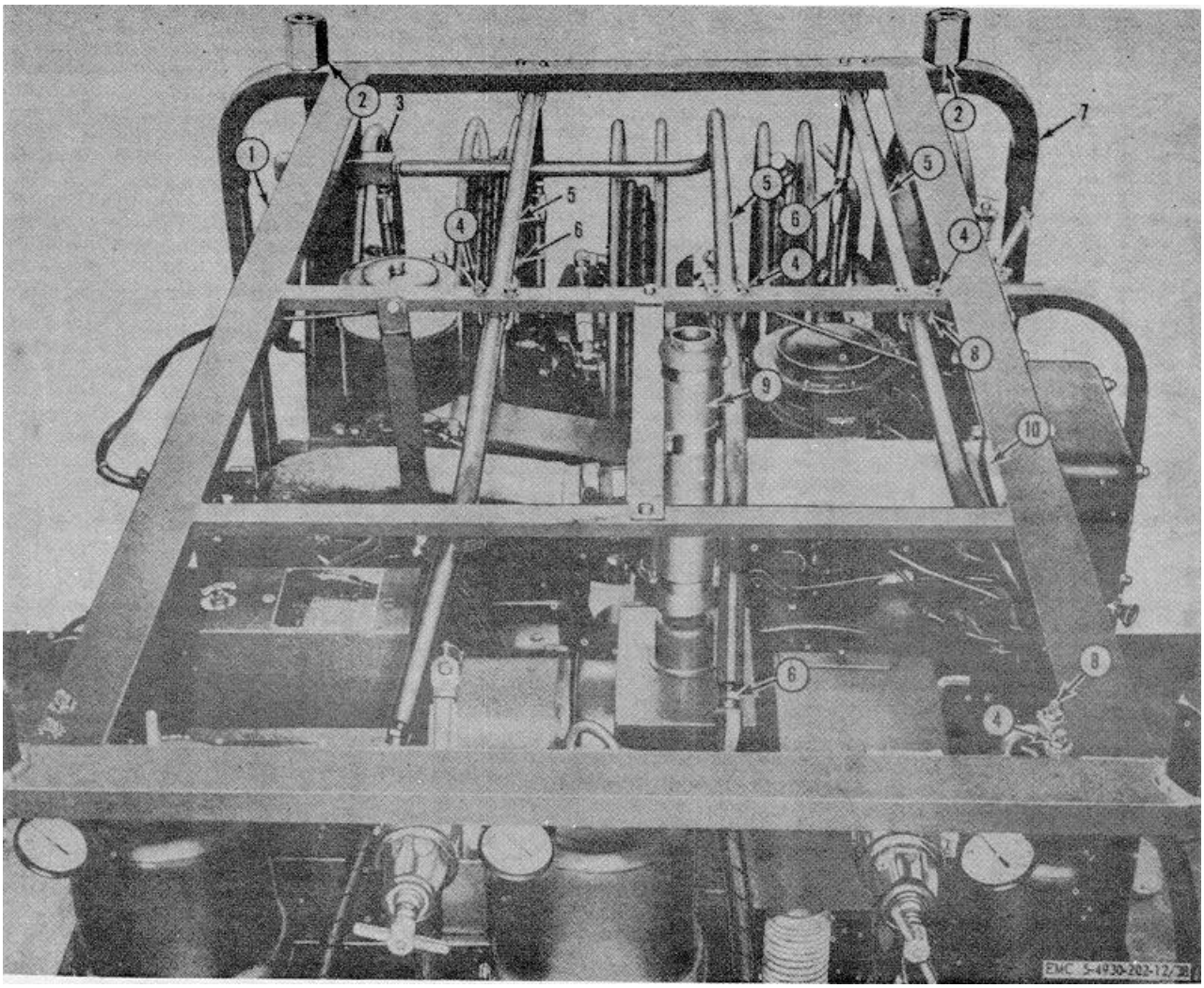
(1) Clean parts with an approved cleaning solvent.

(2) Inspect each hose for breaks, cuts, or other defects. Replace a defective hose.

(3) Inspect each hose fitting for damaged threads, cracks, or other defects. Replace damaged fittings.

(4) Inspect each hose reel and swivel for external damage or binding. Replace a defective hose reel or swivel.

(5) Paint all exposed metal surfaces on the reel bank assembly.



1 Straight frame
2 Lift ring sockets (4 rqr)
3 Grease manifold assembly
4 Nut, 1/4-20 (14 rqr)
5 Grease supply tube
6 Lubricant hose
7 U-frame
8 U-bolt, /4-20 (7 rqr)
9 Exhaust pipe
10 Air line

Figure 38. Lubricant supply tube removal.

d. Hose Reel Installation.

(1) Position the reel pedestals (8) on the reel bank channel (10) and install the screws (9) which secure the reel pedestals to the reel bank channel.

(2) Position the hose reel (1) on the reel pedestals, and position the yoke (6) on the reel hub.

(3) Install the hex screws (5) and nuts (7) which secure the yoke over the reel shaft and to the reel pedestals (8).

(4) Tighten the setscrew (3) on the reel shaft.

(5) Install the adapter (4) to the reel hub, and the adapter (12) to the hose reels (1).

e. Reel Bank Installation.

(1) Install the reel bank assembly on the lubricating unit.

(2) Install four nuts (11) and four cap screws (9) and lockwashers which secures the reel bank assembly to the lubricating unit.

(3) Install the five hoses (13) on the hose reels (1).

(4) Install the five lubricant hoses (2) one

on each reel (1) at the reel hub adapter (4).

142. Lubricant Supply Tubes

a. Removal.

(1) Disconnect the four lubricant hoses (6, fig. 38) at the reel end of the supply tubes (5).

(2) Disconnect the three lubricant hoses (6) from the supply tubes (5) at the pumps.

(3) Remove the grease manifold and bracket from the U-frame (7).

(4) Remove the supply tubes (5) by removing the eight nuts (4) and four U-bolts (8) which secure the lubricant supply tubes (5) to the straight frame (1).

b. Cleaning, Inspection, and Repair.

(1) Clean all parts with an approved cleaning solvent.

(2) Inspect supply tubes for internal obstructions, dents, cracks, or holes which would cause faulty operation.

(3) Replace defective supply tubing.

c. Installation.

(1) Install the supply tubes (5) on the straight frame (1) and secure in place with the four U-bolts (8) and eight nuts (4).

(2) Install the grease manifold and bracket to the U-frame (7).

(3) Connect the three lubricant hoses (6) to the lubricant supply tubes (5) at the pumps.

(4) Connect the four lubricant hoses (6) to the supply tubes (5) at the reel end of the lubricating unit.

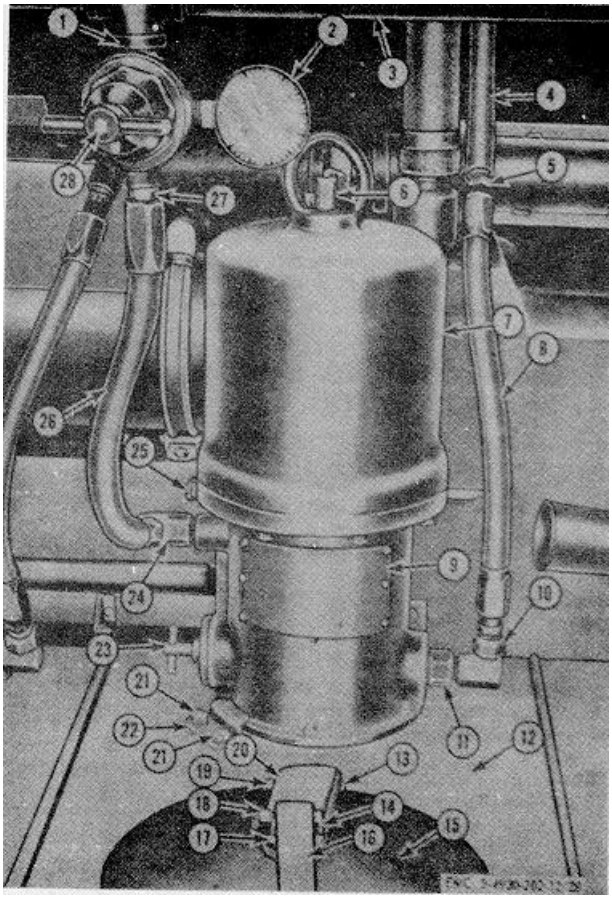
143. Lubricant Pumps

a. Removal.

(1) Disconnect the lubricant hoses (8, fig. 39) from each of the three pumps (7).

(2) Disconnect the air hoses (26) from each of the three lubricant pumps at the air regulator (28).

(3) Remove the 12 screws (21) four on each pump at the holddown clamp



1 Regulator connection to air line
2 Air pressure gage
3 Air line
4 Lubricant supply tube
5 Lubricant hose connection to lubricant supply tube
6 Condensate valve
7 Pump
8 Lubricant hose
9 Exhaust port
10 Lubricant hose connection to union at pump
11 90° union connection to pump
12 Lubricant container
13 Bolt, 5/16-18 x 1½ in. lg (3 rqr)
14 Screw, 5/16-18 x 12 in. lg (3 rqr)
15 Fill cover (3 rqr)
16 Fill cover handle (3 rqr)
17 Spacer
18 Nut, 5/16-18 (3 rqr)
19 Nut, hex, 5/16-18 (3 rqr)
20 Hinge strap (3 rqr)
21 Screw, hex, 5/16-18 x 1 in. lg (12 rqr)
22 Holddown clamp and pin
23 Circulating valve
24 Air hose connection to pump
25 Oiler
26 Air hose
27 Air hose connection to regulator
28 Air pressure regulator

Figure 39. Lubricant pump removal.

(22), which secure the pumps to the lubricant container (12).

(4) Lift the pumps up and out of the lubricant tanks.

(5) Place a clean cover over each pump well, to prevent dirt from entering the containers.

(6) Unscrew the condensate valve (6) from each pump chamber.

(7) Unscrew the oiler (25) from each pump chamber.

(8) Unscrew the circulating valve (23) from each pump.

(9) Disconnect the lubricant hose (8) at the union (11) and disconnect the air hose (26) from the pump at the connection (24).

(10) Unscrew the air pressure gage (2) from the air regulator (28), and remove the air regulator from the air line connection (1).

b. Cleaning, Inspection, and Repair.

(1) Clean the pumps with an approved cleaning solvent.

(2) Inspect the air and lubricant hose lines for leaks in the hoses, swivels, and connectors. The lubricant pumps will operate continuously to replace leaking grease. Replace a defective air hose or lubricant hose.

(3) Inspect the supply of oil in the oiler to insure that the packing and seals in the air chamber are getting an adequate supply of oil.

(4) Remove the oiler filler cap and fill the oiler if necessary. Replace a defective oiler cap.

(5) Inspect the condensate valve for proper operation. Replace a defective condensate valve.

(6) Replace a defective lubricant pump.

(7) Inspect the air regulator and the air pressure gage for proper operation, air leaks, cracked or broken glass and defective threads. Replace a defective air regulator or air pressure gage.

c. Installation.

(1) Install the oiler (25) on each of the three pumps (7).

(2) Install the condensate valves (6) on top of each pump air chamber.

(3) Remove the cover from pump wells.

(4) Install the pumps (7) in the lubricant containers (12).

(5) Install the holddown clamps (22) and the 12 screws (21) which secure the pump to the lubricant containers.

(6) Install the air hoses (26) to the three lubricant pumps and at the air regulators (28).

(7) Connect the lubricant hoses (8) to each of the three pumps and to the supply tube (4).

(8) Install the circulating valve (23) into each pump.

(9) Connect the air regulator to the air line connection (1).

(10) Connect the air pressure gage (2) to the air regulator.

Section XI. LUBRICATING UNIT BODY

144. Description

The lubricating unit body consists of a removable steel frame. The entire unit body is mounted on two wood skids. The housing doors provide access to all controls and instruments. Two louvers regulate the temperature inside the housing, and provide fresh air for engine and heater combustion.

145. Inclosure

a. Removal.

(1) Remove the four lifting rings (4, fig. 5) at the lifting sockets.

(2) Remove the four inclosure lifting sockets plugs (3) from the rod.

(3) Screw the four lifting rings (4) securely into the inclosure lifting sockets.

(4) Using a power hoist, crane with slings, or the hand lifting handles (7), lift the inclosure from the lubricating unit.

b. Cleaning, Inspection, and Repair.

(1) Clean all exposed surfaces, using an approved cleaning solvent.

(2) Inspect the inclosure for dents, cracks, or other damage. Replace a defective housing.

(3) Inspect the doors, door latches, and door hinges for breaks, dents, or cracks. Straighten any minor damages. Replace if necessary.

(4) Paint all exposed metal surfaces, to prevent rusting.

(5) Inspect the lifting handles for dents, cracks, or a badly bent condition. Replace a defective lift handle.

(6) Inspect the lifting rings, and the lifting socket plugs for cracks, defective threads, or bends. Replace any defective parts.

c. Installation.

(1) Using a power hoist, lower the inclosure onto the lubricating unit.

(2) Shift the four lifting rings (4, fig. 5) to the lubricating unit lifting sockets, and secure the inclosure to the frame.

(3) Install the four inclosure lifting socket plugs (3) in the inclosure lifting sockets.

146. Lubricant Container Fill Cover

a. Removal.

(1) Remove the nut (19, fig. 39) at the hinge strap (20) of the fill cover (15), and remove the lockwasher and the bolt (13). Lift off the fill cover.

(2) Remove the screw (14), lockwasher, and nut (18), which secures the fill cover handle (16) to the hinge stop (20).

(3) Remove the fill cover handle, spacer (17), and the hinge strap from the fill cover.

(4) Remove the gasket from the fill cover.

b. Cleaning, Inspection, and Repair.

(1) Clean all parts, using an approved cleaning solvent.

(2) Inspect the fill cover for alinement or damage that would prevent cover from closing securely. Replace a defective fill cover.

(3) Inspect all threaded surfaces for defective or worn parts. Replace as necessary.

(4) Inspect the hinge strap, and fill cover handle for any wear which would hamper proper operation of the fill cover. Replace as necessary.

(5) Replace the fill cover gasket.

(6) Inspect the interior and exterior of all lubricant containers for corrosion or cracks. Repair cracks by welding, and remove all corrosion. Paint exposed metal surfaces. Refer to TM 9-2851 for instructions.

c. Installation.

(1) Assemble the spacer (17), fill cover gasket, hinge strap (20), and fill cover handle (16).

(2) Install the screw (14), lockwasher, and nut (18) which secures the fill cover assembly.

(3) Position the fill cover assembly over the lubricant fill hole, and install the bolt (13), lockwashers and nut (19), which secure the hinge strap (20) to the lubricant container.

147. Skids

a. Removal.

(1) Lift the unit off the floor, so that sufficient clearance is available to remove the two wood skids (8, fig. 1) on the bottom of the frame.

(2) Remove the 13 screws (12, fig. 23), and washers, 7 on the left skid, and 6 on the right skid which secure the skids to the frame.

(3) Remove the skids.

b. Cleaning, Inspection, and Repair.

(1) Scrape all dirt accumulation off the skids.

(2) Inspect the skids for cracks or excessive wear. Replace if necessary.

(3) Paint all exposed surfaces of the skids to guard against weather damage.

c. Installation.

(1) Position the skids (8, fig. 1) on the frame.

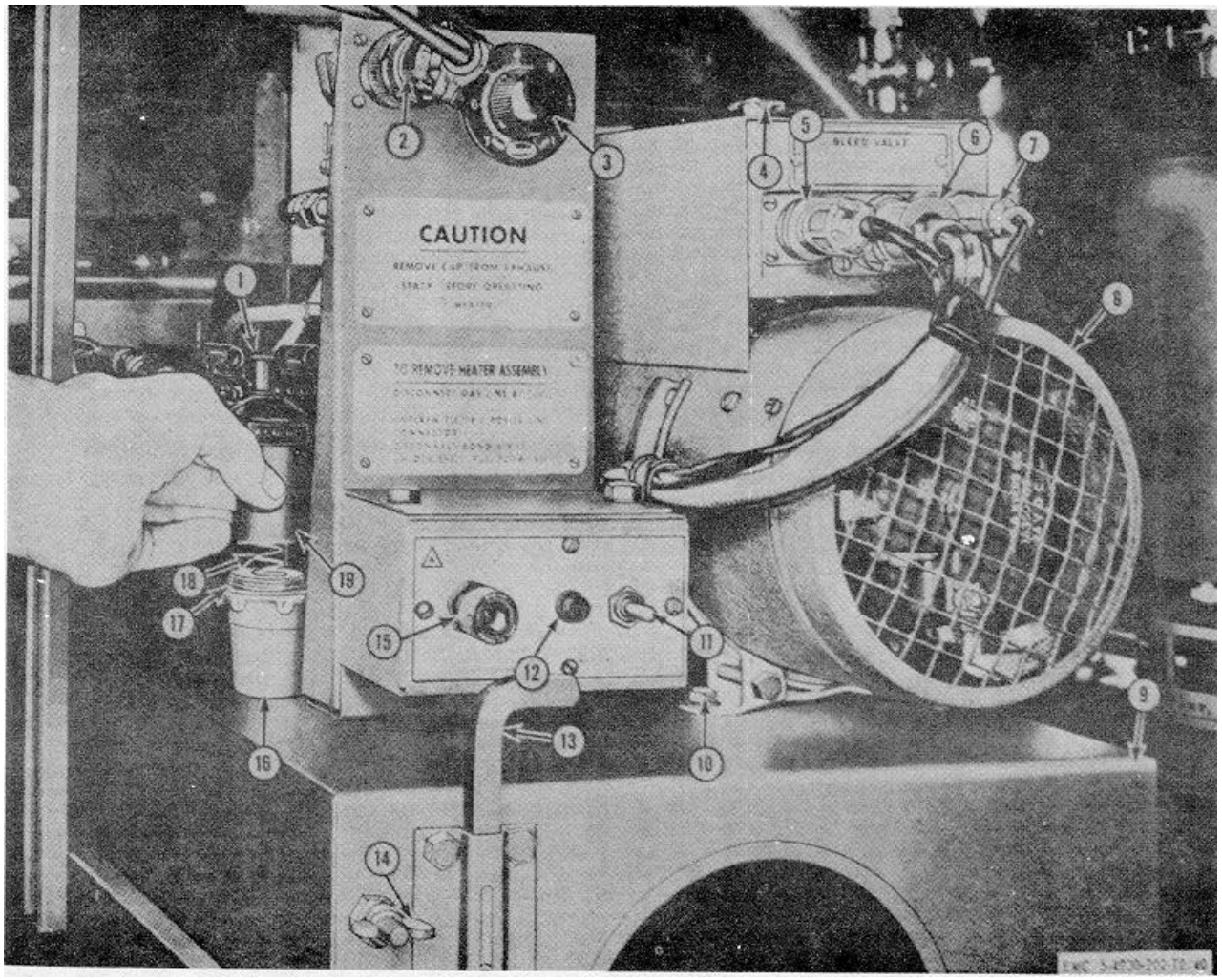
(2) Install the 13 screws (12, fig. 23) and washers, 7 on the left skid and 7 on the right skid, which secure the skids to the frame.

CHAPTER 4
SERVICING OF MATERIEL USED IN CONJUNCTION WITH THE LUBRICATING UNIT

Section I. HEATER

148. Description

The heater on the lubricating unit is controlled by a thermostat to provide heated fresh air at sufficient pressure to preheat and maintain warmth in the lubricant tanks, and to maintain satisfactory engine, battery box, and hose reel temperatures, through lever controlled heat ducts at temperatures down to -70° F.



1	Heater fuel pump filter head	8	Heater	14	Ground strap thumb screw
2	Power line connector	9	Heater slide tray	15	Press-to-test lamp
3	Thermostat	10	Cap screw, ¼-20 x ½ in. lg (4 rqr)	16	Heater fuel pump filter bowl
4	Heater bleed valve	11	Heater control switch	17	Gasket
5	Thermostat receptacle	12	Circuit breaker	18	Heater fuel pump filter spring
6	Cable receptacle	13	Heater shelf locking bolt	19	Heater fuel pump filter strainer
7	Fuel pump receptacle				

Figure 40. Servicing heater fuel pump filter.

The electro-mechanical fuel system operates in conjunction with the heater electrical system to provide a constant flow of liquid fuel to the burner for combustion. The fuel pump supplies fuel at low-pressure to the regulator valve. A bleeder valve is installed at the top of the control box to permit bleeding the air from the fuel system at initial startup of the heater, or following long periods of shutdown. The fuel filter consists of a filter bowl and element, through which the fuel is pumped by the action of the fuel pump.

149. Servicing Heater Fuel Pump Filter

a. Removal.

(1) Pull the heater shelf locking bolt (13, fig. 40) upward and pull the heater slide tray (9) out.

(2) Disconnect the quick disconnect coupling fuel line.

(3) Unscrew the filter bowl (16) and remove.

(4) Remove the filter spring (18) and the filter strainer (19).

(5) Remove the gasket (17) from the bowl;

b. Cleaning, Inspection, and Repair.

(1) Clean the bowl, strainer, and spring in an approved cleaning solvent.

(2) Inspect the filter bowl, element, and spring, for cracks, tears, or other defects that would cause leaks. Replace gaskets.

c. Installation.

(1) Position the gasket (17) on the filter bowl (16).

(2) Install the filter spring (18) and filter strainer (19) in the filter bowl.

(3) Install the filter bowl (16) on the fuel pump filter head (1).

(4) Push the heater slide tray (9) into recessed position and secure with the locking bolt (13).

(5) Connect the quick-disconnect coupling fuel line.

(6) Check the fuel filter for leaks.

150. Bleeding Heater Fuel System

a. Open the bleed valve (4, fig. 40) at the top of the control box.

b. Move the heater control switch (11) to the ON-LOW position.

c. Allow the heater to operate until air bubbles no longer appear at the bleed valve.

d. Dry all heater surfaces and close the bleed valve.

Section II. ALCOHOL DISPENSER

151. Description

The alcohol dispenser is bracket mounted, to the lubricating unit frame, and is used to prevent the freezing of condensed air in the air lines at freezing temperatures. The alcohol dispenser consists of a head assembly and a replaceable metal bowl. In operation, alcohol flow, controlled by the needle valve (4, fig. 41), is injected into the pneumatic system. Failure of alcohol flow is usually due to the presence of dirt or other impurities in the fluid passage.

152. Servicing Alcohol Dispenser

a. Removal.

(1) Close the master control valve (2, fig. 8) on the air receiver tank (10).

(2) Disconnect the air line (1, fig. 41) at the alcohol dispenser by disconnecting the adapter (8). Disconnect the air hose (10) at the alcohol dispenser by disconnecting the adapter (8) from the hose connection (9).

(3) Remove the two cap screws (2) which secures the alcohol dispenser and mounting bracket (3) to the lubricating unit frame.

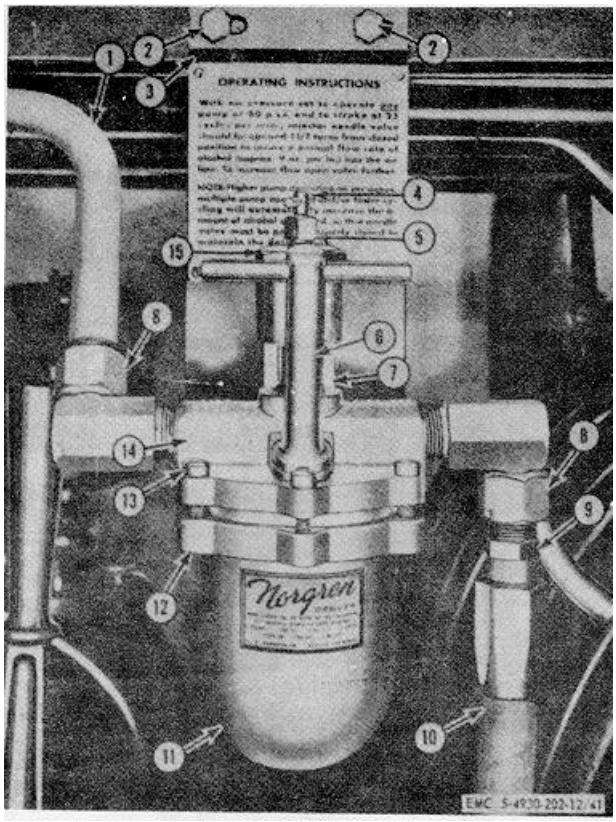
(4) Remove the alcohol dispenser.

b. Disassembly.

(1) Remove the six screws (13) which secure the bowl (11) and ring clamp (12) to the top assembly (14).

(2) Remove the two adapters (8).

(3) Remove the bowl, ring clamp, and bowl gasket.



1 Air line, alcohol dispenser-to-regulator
2 Cap screws, 1/4-20 x 1/2 in. lg (2 rqr)
3 Mounting bracket
4 Needle valve
5 Packing nut
6 Filler plug assembly
7 Sight feed glass
8 Adapter, 90' union
9 Air hose connection to alcohol dispenser
10 Air hose
11 Bowl
12 Ring clamp
13 Screws, 3/16-20 x 3/4 in. lg (6 rqr)
14 Top assembly
15 Plug, top

Figure 41. Alcohol dispenser.

(4) Remove the filler plug assembly (6) from the top assembly.

(5) Remove the needle valve (4) and gland from the top assembly by removing the packing nut (5) and top plug (15).

c. Cleaning, Inspection, and Repair.

(1) Clean all parts with an approved cleaning solvent.

(2) Inspect the sight glass for cracks.

(3) Inspect all fittings and threaded connections for damage. Replace defective parts.

(4) Inspect the bowl for dents or holes. Replace a defective bowl. Replace bowl gasket.

(5) Inspect the needle valve. Replace if damaged.

d. Reassembly.

(1) Install the needle valve (4) and gland in the top assembly (14) and secure with top plug (15) and packing nut (5).

(2) Install the filter plug assembly (6) on the top assembly (14).

(3) Install the bowl gasket on the bowl (11). Place the bowl in position on the top assembly, and secure by installing the ring clamp (12) and six screws (13).

(4) Install the two adapters (8), one to each side of the top assembly.

e. Installation.

(1) Install the alcohol dispenser and mounting bracket (3) on the lubricator frame and secure with the two cap screws (2).

(2) Connect the air line (1) and air hose (10) to the alcohol dispenser adapters (8).

(3) Open the master control valve (2, fig. 8) on the air receiver tank (10).

(4) Inspect the alcohol dispenser for leaks during operation.

CHAPTER 5
SHIPMENT AND LIMITED STORAGE

Section I. SHIPMENT WITHIN ZONE OF INTERIOR

153. Preparation of Equipment for Shipment

a. Disconnect the battery cables from the batteries.

b. Drain all fuel from the engine fuel system.

c. Release all air from the air storage tank.

d. Lock the reels, by applying the reel brakes to each of the five reels.

e. Make sure that the locking pins are installed in the devises securing the housing on the lubricating unit.

f. Make sure all the doors on the housing are securely latched in place.

g. This equipment requires safe storage of grease guns, adapters, and starting rope.

h. Seal all openings, valves, gages,fuel tank cap, the air strainer, and the air cleaner with pressure sensitive sealing tape.

i. Wrap the entire housing with a steel bonding strap.

154. Loading Equipment for Shipment

Load the lubricating unit by means of a crane, and a crane sling attached to the four lifting rings located at each top corner of the unit housing. Be sure that the housing is firmly secured to the base assembly of the unit prior to lifting the equipment off the ground. The locking pins must be fully inserted in the clevises securing the cover to the base assembly. After placing the unit on the designated mode of transportation, whether it be a flatcar, truck-bed, or trailer, firmly tie down the cables attached to the tiedown rings on the unit base assembly.

Section II. LIMITED STORAGE

155. Preparation of Equipment for Storage

a. General. Engineer mechanical equipment which is temporarily not in use, including seasonal equipment, will be placed in limited storage not to exceed six months when authorized by proper authority. The responsibility for Corps of Engineers mechanical equipment, stored under such authorization will remain with the organization or activity to which issued.

b. Inspection, Preservation, and Lubrication for Limited Storage.

(1) *Inspection.* Make a complete inspection of the lubrication unit to determine its condition. Repair or replace any worn or defective parts that may cause damage to the equipment during storage, or impair its efficiency.

(2) *Preservation*. When the unit is placed in limited storage it will be preserved as specified herein. Equipment will be blocked up, and will be so placed where practicable to provide easy access.

(3) *Cleaning.* Prior to the application of any paint or preservative, thoroughly clean all surfaces using any one of the following methods: Petroleum solvent cleaning consists of scrubbing or wiping with a clean brush or cloth, soaked in solvent, accompanied by immersion and soaking when possible. Steam cleaning consists of subjecting the item to a stream of steam, with or without added cleaning compound, followed by dry air. Abrasive cleaning consists of wire brushing, buffing, sanding, or scraping. Immediately

after cleaning, dry the unit with dry compressed air or by the use of a clean, dry cloth.

Caution

Solvents are highly destructive to natural rubber base and electrical insulation, and must not be used on rubber products. When steam cleaning is used, protect all electrical components, such as the generator regulator, generator, starter and any such components that are subject to damage from direct impact of the cleaning jets. Protect sensitive components from steam cleaning by sealing openings with pressure sensitive tape, or by disassembling and removing components when protection cannot otherwise be accomplished.

(4) *Painting*. Paint all surfaces where paint has deteriorated or was removed during the cleaning process. Sand the finish down until it "feather edges" into the bare surface. Paint using materials of the same quality and color as those removed. Refer to TM 92851.

(5) *Exterior surfaces.* Coat precision machined surfaces with preservative, or wrap the cover with a greaseproof barrier material. Coat exposed and unpainted nonprecision metal surfaces with preservative.

(6) *Lubricating system.* Drain the crankcase of the engine and compressor and fill with an engine preservative oil. Attach a tag to the filler caps indicating that the crankcase is filled with preservative oil.

(7) *Draining.* Drain any accumulated water from the air receiver tank.

(8) *Weatherproofing.* Equipment stored outside or otherwise subjected to rain or dust will be protected by temporary seals or covers. Air line openings will be cleared of moisture and sealed.

(9) *Lubrication.* Completely lubricate the unit in accordance with LO 5-4930-202-12 when the equipment is placed in limited storage. Points of lubrication which incorporate seals will be given particular attention to prevent seals from being forced open.

156. Inspection and Maintenance of Equipment in Storage

a. Inspection. When equipment has been placed in limited storage, all scheduled preventive maintenance services, including inspection, will be suspended and preventive maintenance inspection will be performed as specified herein.

b. Inspection Criteria. All equipment in limited storage will be inspected for any unusual conditions, such as damage, rusting, accumulation of water, pilferage, and leakage of lubricants and fuel when exercised.

c. Work Sheet and Preventive Maintenance. DA Form 464 will. be executed on each major item of the equipment when the equipment is initially placed into limited storage and every 30 days thereafter. Required maintenance will be performed promptly to insure that the equipment is mechanically sound and ready for immediate use.

d. Exercising. Equipment in limited storage will be operated long enough to bring it to operating temperature, for complete lubrication of all bearings, gears, etc., at least every thirty days. Equipment must be serviced and in satisfactory operating condition before it is exercised.

CHAPTER 6
DEMOLITION TO PREVENT ENEMY USE

157. General

When capture or abandonment of the lubricating unit to an enemy is imminent, the responsible unit commander must make the decision either to destroy the equipment or to render it inoperative. Based on this decision, orders are issued which cover the desired extent of destruction. Whatever method of demolition is employed, it is essential to destroy the same vital parts of all lubricating units and all corresponding repair parts.

158. Demolition to Render Equipment Inoperative

a. Demolition by Mechanical Means. Use sledge hammers, crow bars, picks, axes, or other heavy tools which may be available, together with the tools normally included with the unit, to destroy the following:

(1) The engine blower housing, carburetor, and flywheel.

(2) The compressor intake and exhaust valves, flywheel, air manifold, gage, unloader pilot, and valves.

(3) The engine and compressorcylinder heads.

(4) The air receiver and lubricant tanks.

b. Demolition by Misuse. Perform the steps listed below to make the unit inoperative.

(1) Drain the compressor crankcase.

(2) Throw sand or other abrasive into the crankcase.

(3) Pack the compressor cylinder head cooling vanes with grass, leaves, straw, dirt, or similar material.

(4) Start the engine, and fully open the throttle.

(5) Operate until the compressor unit fails.

(6) Cut and burn the drive belts. Apply the same procedures as outlined for compressor demolition ((1)-(5) above) to the engine.

159. Demolition by Explosives or Weapons Fire

a. Demolition by Weapons Fire. Fire on the lubricating unit with the heaviest practical weapons available. Direct fire at engine, fuel tank, compressor, air receiver, and lubricant pumps.

b. Demolition by Explosives. Place as many of the following charges (fig. 42) as the situation permits and detonate them simultaneously.

(1) A 1-pound charge between the engine carburetor and cylinder.

(2) A 1-pound charge on the aftercooler side of the compressor near the cylinder head and between the low- and high-pressure cylinders.

(3) A 1-pound charge against the air receiver tank, between the tank and the hose reels.

(4) A one-half pound charge between each hose reel.

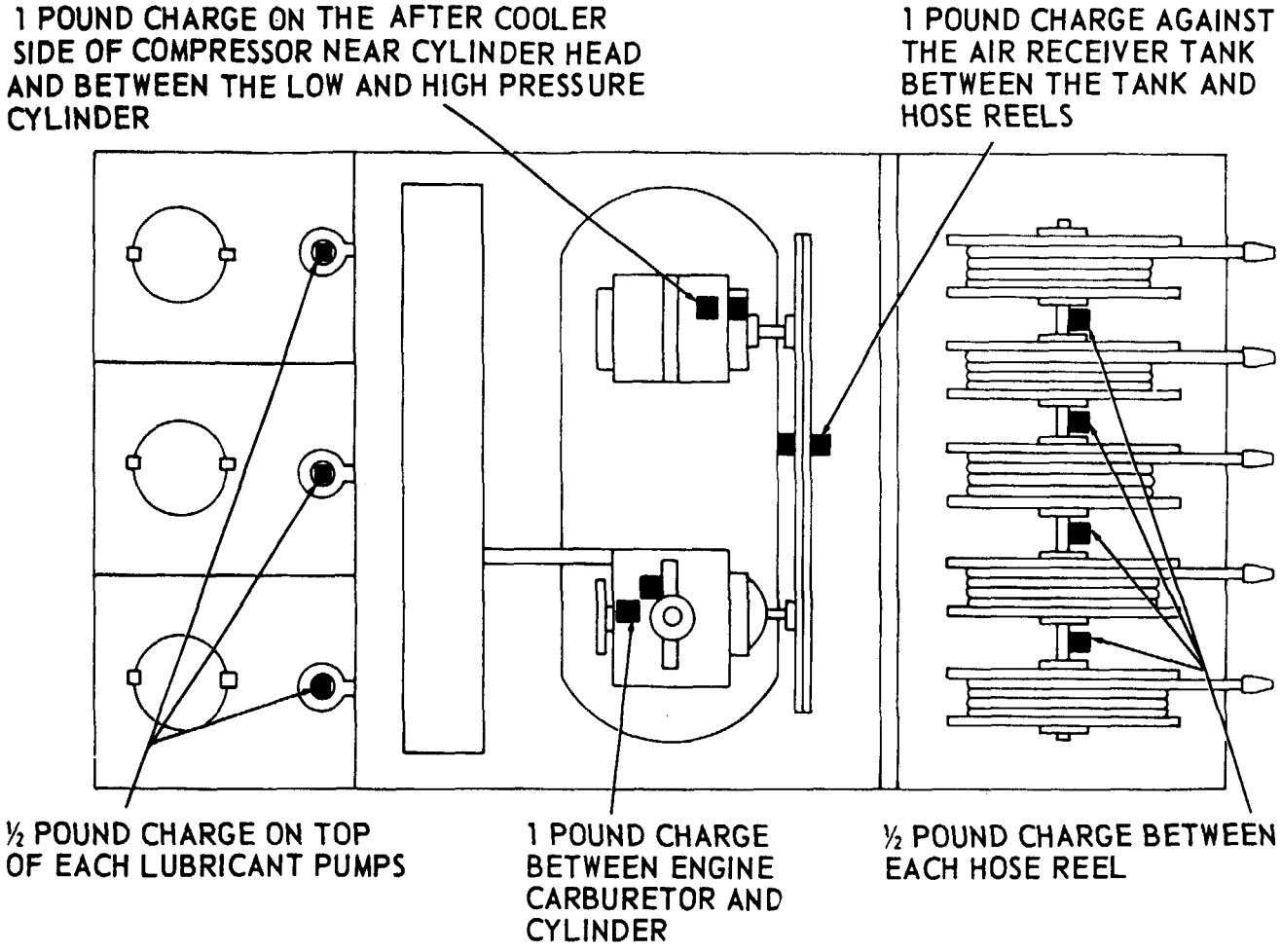
(5) A one-half pound charge on top of each lubricant pump.

160. Other Demolition Methods

If the situation prevents employing either of the preferred demolition methods, use the following methods, either singly or in combination.

a. Scattering and Concealing. Remove easily removable vital parts such as the carburetor, magneto, control mechanisms, and pumps. Scatter these parts through dense foliage, bury them in dirt or sand, or throw them in a lake, stream, or other body of water.

b. Burning. Pack rags, clothing, or canvas around the engine, compressor, and hose reels. Saturate this packing with gasoline or other



LEGEND: ■ ½ POUND CHARGE

EMC 5-4930-201-10/22

Figure 42. Placement of demolition charges.

flammable liquid and ignite it. Remove the lids on the lubricant tanks and burn the lubricants in the tanks.

c. Submersion. Totally submerge the unit in a body of water to afford some water damage and concealment. Salt water will do the greatest damage to metal parts.

161. Training

All operators should receive thorough training in the destruction of the lubricating unit. Refer to FM 5-25. Simulated destruction, using all of the methods listed above, should be included in the operator training program. It must be emphasized in training, that demolition operations are usually necessitated by critical situations when time available for destruction is limited. For this reason, it is necessary that operators be thoroughly familiar with all methods of destruction and be able to carry out demolition instructions without reference to this or any other manual.

APPENDIX I
REFERENCES

1. Dictionaries of Terms and Abbreviations

AR 320-5	Dictionary of United States Army Terms.
AR 320-50	Authorized Abbreviations and Brevity Code.

2. Fire Protection

TM 5-687	Inspection and Preventive Maintenance Services for Fire Protection Equipment and Appliances.
TM 9-1799	Ordnance Maintenance: Fire Extinguishers.

3. Lubrication

LO 5-4930-202-12	Lubrication Order.

4. Painting

TM 9-2851	Painting Instruction for Field Use.

5. Preventive Maintenance

TM 5-505	Maintenance of Engineer Equipment.

6. Publication Indexes

DA Pam 108-1	Index of Army Motion Pictures, Film Strips, Slides, and Phono-Recordings.
DA Pam 310-1	Index of Training Publications.
DA Pam 310-2	Index of Blank Forms.
DA Pam 310-3	Index of Training Publications.
DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
DA Pam 310-5	Index of Graphic Training Aids and Devices.
DA Pam 310-25	Index of Supply Manuals-Corps of Engineers.

7. Radio Interference Suppression

TM 11-483	Radio Interference Suppression.

8. Supply Publications

TM 5-4930-202-12P	Organizational Maintenance Repair Parts List and Basic Issue Items List for Lubricating and Service Unit, Power Operated, Skid Mounted, 16 CFM Compressor, Reciprocating, Power Driven, Winterized (Gray Model 250-530 with Onan Engine Model ACK-MF/515D).

9. Training Aids

FM 21-5	Military Training.
FM 21-6	Techniques of Military Instruction.
FM 21-30	Military Symbols.

APPENDIX II
MAINTENANCE ALLOCATION CHART

1. General

This maintenance allocation chart lists all maintenance and repair operations assigned to each of the five echelons of maintenance for the lubricating and servicing unit, Gray Model 250-530.

2. Definitions

a. Explanation. The following terms used in the maintenance allocation chart, are defined to clarify the exact operation which personnel of the five echelons are required to perform.

b. Service. To clean, to preserve, and to replenish fuel and lubricants.

c. Adjust. To regulate periodically to prevent malfunction.

d. Inspect. To verify serviceability and to detect incipient mechanical failure by scrutiny.

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

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

g. Repair. To restore to a serviceable condition by replacing unserviceable parts or by any other action required utilizing tools, equipment and skills available to include welding, grinding, riveting, straightening, adjusting, etc.

h. Rebuild. To restore to a condition comparable to new by disassembling the items to determine the condition of each of its component parts and reassembling it using serviceable, rebuilt, or new assemblies, subassemblies and parts.

i. Symbol X. The symbol X placed the appropriate column indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

Maintenance Allocation Chart

Functional Group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
	LUBRICATING AND SERVICING UNIT: POWER OPERATED, SKID MOUNTED, 16 Cfm Compressor, Reciprocating, Power Driven, Winterized; (Gray Model 250-530).						
01	ENGINES						
0100	ENGINE ASSEMBLY						
	Service	X					
	Inspect		X				
	Test			X			
	Replace			X			
	Repair		X				
	Rebuild					X	
0101	CRANKCASE, BLOCK, CYLINDER HEAD						
	CRANKCASE						
	Replace				X		
	Repair				X		

Functional Group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
	BLOCK						
	Replace	-----	-----	-----	X		
	Repair	-----	-----	-----	X		
	CYLINDER HEAD						
	Replace	-----	X				
0102	CRANKSHAFT						
	Replace	-----	-----	-----	X		
	BEARINGS						
	Replace	-----	-----	-----	X		
0103	FLYWHEEL ASSEMBLY						
	Replace	-----	X				
0104	PISTONS, CONNECTING RODS						
	Replace	-----	-----	-----	X		
	Repair	-----	-----	-----	X		
0105.1	VALVES						
	Replace	-----	-----	X			
	Repair	-----	-----	X			
0105.2	ROCKER ARMS, TAPPETS						
	Adjust	-----	X				
	Replace	-----	-----	X			
	Repair	-----	-----	X			
0105.3	CAMSHAFTS						
	Replace	-----	-----	-----	X		
	BEARINGS						
	Replace	-----	-----	-----	X		
0105.5	TIMING GEARS						
	Replace	-----	-----	X			
0106.1	OIL PUMP						
	Replace	-----	-----	X			
0106.4	OIL SYSTEM						
	PRESSURE REGULATOR						
	Adjust	-----	X				
	Replace (Plunger & Spring)	-----	X				
0106.5	CRANKCASE VENTILATION						
	Service	X					
	Replace (Cap)	X					
	Replace (Tube)	-----	X				
0106.6	OIL PAN, LINES, LEVEL GAGE						
	OIL PAN						
	Replace	-----	-----	X			
	LINES						
	Replace	-----	X				
	LEVEL GAGE						
	Replace	X					
0108	MANIFOLDS						
	INLET						
	Replace	-----	X				Combination Intake and Exhaust Manifold.
	Replace (Gaskets)	-----	X				
	EXHAUST						
	Replace	-----	X				
	Replace (Gaskets)	-----	X				
0111	ENGINE STARTING SYSTEM						
	ENGINE STARTING-ROPE						
	Replace	X					

Functional Group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
02	CLUTCH						
0200	CLUTCH ASSEMBLY						
	Service	X					
	Adjust	-----	X				
	Inspect	-----	X				
	Replace	-----	-----	X			
	Repair	-----	-----	X			
	Rebuild	-----	-----	X			
0201	CLUTCH DISKS AND PLATES						
	Replace	-----	-----	X			
0202	CLUTCH RELEASE MECHANISM						
	Adjust	-----	X				
	Replace	-----	-----	X			
	Repair	-----	-----	X			
03	FUEL SYSTEM						
0301	CARBURETOR, FUEL INJECTOR						
	CARBURETOR						
	Adjust	X					
	Replace	-----	X				
	Repair	-----	-----	X			
0302	FUEL PUMP						
	Replace	-----	X				
	Repair	-----	-----	X			
0304	AIR CLEANER						
	Service	X					
	Replace	-----	X				
0306	TANKS, LINES, FITTINGS						
	TANK						
	Replace	-----	X				
	Repair	-----	-----	X			
	LINES AND FITTINGS						
	Inspect	X					
	Replace	-----	X				
	Repair	-----	X				
0308	ENGINE SPEED GOVERNOR						
	Adjust	-----	-----	-----	X		Timing Gear
	Inspect	-----	-----	-----	X		Cover removal
	Replace	-----	-----	-----	X		necessary.
	Repair	-----	-----	-----	X		
0308.4	GOVERNOR CONTROLS						
	Adjust	-----	X				
	Replace	-----	X				
	Repair	-----	X				
0309	FUEL FILTERS						
	Service	X					
	Replace (Bowl & Gasket)	X					
	Replace (Assembly)	-----	X				
0312	INJECTOR, ACCELERATOR, THROTTLE, CHOKE CONTROLS						
	Adjust	-----	X				
	Replace	-----	X				
04	EXHAUST SYSTEM						
0401	MUFFLER AND PIPES						
	Replace	-----	X				

Functional Group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
05	COOLING SYSTEM						
0502	COWLING, DEFLECTORS, AIR						
	DUCT, SHROUD						
	SHROUD						
	Inspect	X					
	Repair	-----	X				
	Replace	-----	X				
06	ELECTRICAL SYSTEM						
0601	GENERATOR						
	See 0603						
0602	GENERATOR REGULATOR						
	Replace	-----	X				Unit sealed
	RELAY						
	Replace	-----	X				
	RESISTOR						
	Replace	-----	X				
0603	STARTER						
	COMBINATION STARTER & GENERATOR						
	Service (Clean Commutator)	-----	X				
	Replace (Brushes)	-----	X				
	Inspect	-----	X				
	Replace	-----	-----	X			
	Repair	-----	-----	X			
	Rebuild	-----	-----		X		
0604.2	MAGNETO						
	Service	X					
	Adjust	-----	X				
	Inspect	-----	X				
	Replace	-----	X				
	Replace (Points)	-----	X				
	Replace (Cap)	-----	X				
	Repair	-----	-----	X			
	Rebuild	-----	-----	-----	X		
0605	IGNITION COIL: WIRING; SPARK PLUGS						
	WIRING						
	Replace	-----	X				
	SPARK PLUGS						
	Service	-----	X				
	Test	-----	X				
	Replace	-----	X				
0607	INSTRUMENT & CONTROL PANEL						
	Replace (Panel)	-----	X				
	Replace (Ammeter)	-----	X				
	Repair (Wiring)	-----	X				
	Replace (Switches)	-----	X				
	Replace (Wiring)	-----	X				
0609.2	ADDITIONAL LIGHTS						
	TROUBLE LIGHT						
	Inspect	X					Removal necessary for panel removal.
	Replace	X					
	Repair (Replace Bulb)	X					
0612	BATTERIES						
	Service	X					
	Inspect	X					
	Replace	-----	X				

Functional Group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
	BATTERY BOX						
	Replace	-----	X				
	Repair	-----	X				
	CABLES						
	Replace	-----	X				
	Repair	-----	X				
0615	RADIO SUPPRESSION						
	Replace (Capacitors)	-----	X				
15	FRAME						
1501	FRAME ASSEMBLY						
	Replace (Skids)	-----	X				
	Repair	-----	-----	X			
	Replace	-----	-----	-----	-----	X	
17	BODY, CAB, HOOD, HULL-----						
1708	STOWAGE RACKS, BOXES, STRAPS						
	Replace	X					
	Repair	-----	X				
1712	SPECIAL PURPOSE BODIES						
	Replace	-----	X				
	Repair	-----	-----	X			
	Replace (Panels)	-----	-----	X			
	LIFTING EYE & HANDLES						
	Replace	-----	X				
	Repair	-----	-----	X			
	DOORS, HINGES						
	Replace	-----	-----	X			
	Repair	-----	-----	X			
	LATCHES						
	Replace	-----	-----	X			
	DOOR STOPS						
	Replace	-----	X				
22	MISCELLANEOUS BODY, CHASSIS OR HULL & ACCESSORY ITEMS						
2207	WINTERIZATION EQUIPMENT						
	HEATER ASSEMBLY						
	Service (Fuel Filter)	X					
	Replace (Fuel Pump)	-----	X				
	Replace (Igniter)		X				
	Replace or Repair (Heater Assy).	-----	-----	X			
	THERMOSTATS						
	Replace	-----	-----	X			
	DUCTS & DUCT CONTROLS						
	Replace or Repair (Ducts)	-----	X				
	Replace (Duct Controls)	-----	X				
	LINES, FITTINGS						
	Replace	-----	X				
	WIRING HARNESS						
	Replace	-----	X				
	Repair or Fabricate	-----	-----	X			
2210	DATA PLATES, INSTRUCTION HOLDERS						
	DATA PLATES						
	Replace	-----	-----	X			

Functional Group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
26	ACCESSORIES, PUBLICATIONS, TEST EQUIPMENT & TOOLS						
2602.1	ACCESSORIES (HOSE)						
	Replace	X					
	Repair		X				
2602.2	COMMON TOOLS						
	Replace	X					
2602.4	PUBLICATIONS						
	Replace	X					
47	GAGES (NONELECTRICAL): WEIGHING AND MEASURING						
4703.1	DEVICES						
	OIL PRESSURE GAGE						
	Replace (Gage)	-----	X				
	Replace (Lines, Fittings)	-----	X				
4709	PRESSURE GAGES						
	AIR GAGES						
	Replace	X					
50	PNEUMATIC EQUIPMENT						
5000	AIR COMPRESSOR ASSEMBLY						
	Service	X					
	Adjust	-----	X				
	Inspect	-----	X				
	Replace	-----	-----	X			
	Repair	-----	-----	X			
	Rebuild	-----	-----	-----	X		
6001	CRANKCASE, BLOCK, CYLINDER HEAD						
	CRANKCASE						
	Replace	-----	-----	-----	X		
	Repair	-----	-----	-----	X		
	BLOCK						
	Replace	-----	-----	-----	X		
	Repair	-----	-----	-----	X		
	CYLINDER HEAD						
	Replace	-----	-----	X			
	Repair	-----	-----	X			
5002	CRANKSHAFT						
	Replace	-----	-----	-----	X		
	BEARINGS						
	Replace	-----	-----	-----	X		
5002.3	COMPRESSOR DRIVE						
	BELTS						
	Adjust	-----	X				
	Replace	-----	X				
	BELT GUARD						
	Replace or Repair	-----	X				
	PULLEYS						
	Replace	-----	X				
5004	PISTONS, CONNECTING RODS						
	Replace	-----	-----	-----	X		
	Repair (Replace Bearings)	-----	-----	-----	X		
	Repair (Replace Rings)	-----	-----	-----	X		
5005.1	VALVES, SPRINGS, SEATS, GUIDES						
	Adjust	-----	-----	-----	X		

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
	Replace	.....	.....	X			
	Repair	.....	.....	X			
5006.2	CRANKCASE VENTILATION						
	Replace	.....	X				
	Repair	.....	X				
5006.3	OIL PAN						
	Replace	.....	.....	X			
	Repair (Replace Drain Pipe).	.....	X				
	FILL CAP, DIPSTICK & DRAIN PLUG						
	Replace	X					
5008	AIR INTAKE						
	Service	X					
	Replace	X					
5009.1	UNLOADER PILOT (PRESSURE REGULATOR)						
	Service	.....	X				
	Adjust	.....	X				
	Replace	.....	.....	X			
	Repair	.....	.....	X			
5009.3	UNLOADER VALVES, COMPRESSOR INTAKE						
	Adjust	.....	X				
	Replace	.....	X				
	RELIEF VALVES						
	Replace	.....	X				
5009.6	LINES & FITTINGS						
	Replace	.....	X				
	Fabricate	.....	X				
5010	COMPRESSOR COOLING COOLING COIL						
	Replace	.....	X				
5012	THROTTLING DEVICES						
	Adjust	.....	X				
	Replace	.....	X				
	Repair	.....	X				
5013	HOSE REEL						
	Replace	.....	X				
	Repair	.....	X				
	HOSE						
	Replace	.....	X				
	Repair	.....	X				
5014	AIR RECEIVER						
	Inspect	.....	X				
	Replace (Drain Plug)	.....	X				
	Replace	.....	.....	X			
5015.1	DISCHARGE LINES, FITTINGS, MANIFOLDS						
	Replace	.....	X				
	Repair	.....	X				
72	SERVICING EQUIPMENT						
7201.1	POWER GUN						
	Service	X					
	Inspect	X					
	Test	X					
	Replace	X					

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
	Repair	.....	.....	X			
	Rebuild	.....	.....	.....	X		
7201.2	OIL GUN						
	Replace	X					
7201.4	LEVER GUN						
	Replace	X					
	Repair	.....	.....	X			
7201.5	SUCTION GUN						
	Replace	X					
	Repair	.....	X				
7201.6	OIL SPRAY GUN						
	Replace	X					
	Repair	.....	X				
7201.7	METERS						
	Adjust	.....	X				
	Replace	.....	X				
	Repair	.....	.....	X			
7202.1	HOSE REELS AND HOSE						
	HOSE REELS						
	Replace	.....	X				
	Repair	.....	X				
	HOSE						
	Replace	.....	X				
	Repair	.....	X				
7202.3	CONTROL VALVES						
	Adjust	X					
	Inspect	X	X				
	Replace	.....	.....	X			
	Repair	.....					
7202.4	LUBRICATOR FITTINGS						
	Replace	X					
7203	AIR REGULATOR						
	Adjust	X	X				
	Replace	.....	.....	X			
	Repair	.....					
7205	RESERVOIR OILER						
	RESERVOIRS, OIL AND GREASE						
	Service (Fill)	X	.....	X			
	Replace	.....	.....	X			
	Repair	.....					
	RESERVOIRS FILL COVERS		X				
	Replace	.....	X				
	Repair	.....					
7206	MISCELLANEOUS PARTS AND ACCESSORIES (IN DRAWER)						
	Service	X	X				
	Adjust	.....	X				
	Inspect	.....					
	Replace	X					
	Repair	.....	.....	X			
7207	PUMPS						
	OIL AND GREASE						
	Service	X					
	Adjust	X					
	Inspect	X					
	Test	.....	X				
	Replace	.....	X				

Functional group	Components and related operation	Echelons of maintenance					Remarks
		1	2	3	4	5	
	Repair	.....	.....	X	X		
	Rebuild	.....	.....	.....			
76	FIRE FIGHTING EQUIPMENT						
7603	FIRE EXTINGUISHER						
	Service	X					
	Replace	X					

APPENDIX III

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

This listing itemizes accessories, tools and publications issued with the Lubricating and Servicing Unit, Gray Model 250-530, that are required for 1st echelon operation and maintenance of the equipment.

2. Explanation of Columns

a. Source Codes. Source coding provides data as to the source or method of supply, availability, lowest maintenance echelon authorized to install or capable of manufacturing, and, where applicable, recoverability, of a repair part. The codes consist of number and letter symbols as follows:

(1) *Technical Service.* Numbers appearing in this column indicate the supplying technical service basic number. The number 5 in this column indicates Corps of Engineers repair parts as well as General Engineer supply items. However, those items to be obtained through General Engineer supply channels are indicated by GE in the description column. These code numbers are indicated as follows:

5--Corps of Engineers
9--Ordnance Corps
12--Adjutant General

(2) *Source.* The selection states and method of supply are indicated by the following code symbols:

"P" --is applied to repair which are high mortality parts; procured by technical services, stocked in and supplied from the technical service depot system, and authorized for use at indicated maintenance echelons.

"P1" --is applied to repair parts which are low mortality parts; procured by technical services, stocked only in and supplied from technical service depots, and authorized for installation at indicated maintenance echelons.

(3) *Maintenance.* The lowest maintenance echelon authorized to use, stock, install or manufacture the part is indicated by the following code symbol:

"O" --Organizational Maintenance (1st and 2d echelons).

(4) Recoverability. Repair parts that are recoverable are indicated by the following code symbol:

"R" --Repair parts and assemblies which are economically reparable, and, when available, are supplied on an exchange basis.

b. Federal Stock Number. This column lists the 11-digit Federal stock number used for requisitioning and stockage purposes. When Federal stock numbers are not available, the manufacturer's part number preceded by the 5-digit Federal supply code for manufacturers will be listed in the description column to be used for requisitioning purposes.

c. Description. The nomenclature for each part is given in this column. The noun name to be used for requisitioning purposes has been capitalized. When Federal stock numbers are not available, the 5-digit Federal supply code for manufacturers will be listed in parentheses preceding the manufacturer's part number.

Examples (25980) 162024.

d. Unit of Issue. Where no abbreviation is shown in this column, the unit of issue is "each." Abbreviations used are explained in paragraph 3.

e. Expendability. Those items classified as nonexpendable are indicated by the letters NX.

The column is left blank if the item is expendable.

f. Quantity Authorized. This column contains the quantities of accessories, tools, and publications that are authorized for the item of equipment.

g. Quantity Issued With Equipment. Entries in this column list the actual quantity of accessories, tools, and publications shipped with the item of equipment to the using units. The column is left blank when the quantities authorized must be requisitioned through normal supply channels.

3. Numerical Grouping

Group 06--ELECTRICAL SYSTEM
0612 Batteries
26--ACCESSORIES, PUBLICATIONS, TEST EQUIPMENT AND TOOLS
2602.1 Accessories
2602.2 Common tools
2602.3 Special tools
2602.4 Publications
76--FIRE FIGHTING EQUIPMENT
7603 Fire extinguishers

4. Index to Federal Supply Code for Manufacturers

25980..... Gray Co. Inc.

Section II. BASIC ISSUE ITEMS LIST

Source code				Federal Stock No.	Description	Unit of Issue	Expend ability	Qty author-ized	Qty issued with equip ment	Illustration	
Tech-nical service	Source	Main-tenance	Recover ability							Fig.	Item
					Group 06-ELECTRICAL SYSTEM						
					0612 BATTERIES						
9	P	O	R	6140-057-2554	BATTERY, Storage, 12 v	ea	NX	2	2		
9	P	O	.....	6810-249-9354	SULPHURIC ACID, Electrolyte	Gal	.....	4	4		
					Group 26-ACCESSORIES, PUBLICATIONS, TEST EQUIPMENT AND TOOLS						
					2602.1 ACCESSORIES						
5	P	O	.....		CASE, Operations and maintenance publications, cotton duck, water repellant and mildew resistant MIL-B-11743B	ea	.....	1	1		
					Note **For a complete listing of other accessories see TM 5-4930-202-20P.**						
					2602.2-COMMON TOOLS						
9	P	O	.....	5120-242-3913	HAMMER, Ball peen, machinists, 8 oz.	ea	.....	1			
9	P	O	.....	5120-223-7396	PLIERS, comb, slip joint 6 in.	ea	.....	1			
9	P	O	.....	5120-234-8910	SCREWDRIVER, Common, heavy duty, plastic handle 6 in. blade, 5/16 in. tip.	ea	.....	1			
9	P	O	.....	5120-240-5328	WRENCH, Adjustable, crescent type, single head, open end, heavy duty 15/16 in. opening x 8 in. lg.	ea	.....	1			
					2602.3-SPECIAL TOOLS						
5	P	O	.....		HANDLE, VALVE REMOVING WRENCH (64123) (AC-11233).	ea	.....	1	1		

Source code				Federal Stock No.	Description	Unit of Issue	Expend ability	Qty author-ized	Qty issued with equip ment	Illustration	
Tech-nical service	Source	Main-tenance	Recover ability							Fig.	Item
5	P	O			WRENCH, LOW PRESSURE VALVE REMOVING (64123) (AC-11229).	ea		1	1		
5	P	O			WRENCH, HIGH PRESSURE VALVE REMOVING (64123) (AC-11228).	ea					
					2602.4-PUBLICATIONS						
12					TM 5-4930-202-12 DA TECHNICAL MANUAL.			2	2		
12					LO 5-4930-202-20 DA LUBRICATION ORDER.			1	1		
					Group 76-FIRE FIGHTING EQUIPMENT.						
					7603 FIRE EXTINGUISHER						
5	PI	O		4210-223-9909	EXTINGUISHER, FIRE, CARBON DIOXIDE: charged; hand type; shatter-able cylinder, permanent shutoff type valve, trigger control; 21/2 lb cap. (GE).		NX	1	1		

[AG 412.3 (12 Nov 58)]

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

OFFICIAL:
R. V. LEE,
Major General, United States Army,
The Adjutant General.

THOMAS D. WHITE,
Chief of Staff, United States Air Force.

OFFICIAL:
J. L. TARR,
Colonel, United States Air Force,
Director of Administrative Services.

Distribution:

Active Army:

DCSLOG (1)
ASA (2)
CNGB (1)
Tech Stf, DA (1) except CofEngr (15)
Engr Rsch & Dev Lab (3)
USCONARC (3)
USA Arty Bd (2)
USA Armor Bd (2)
USA Inf Bd (2)
USA Air Def Bd (2)
USA Abn & Elct Bd (2)
USA Avn Bd (2)
Army Maint Bd (1)
US ARADCOM (2)
US ARADCOM Rgn (2)
OS Maj Comd (5) except USASETAF (2)
Milt Dist (1)
USA Corps (Res) (1)
Sector, USA Corps (Res) (1)
Armies (2)
Corps (2)
Div (2)
Engr Brig (1)
Svc Colleges (2)
Br Svc Sch (2) except USAES (100)
USMA (2)
GENDEP (2)
Engr Sec, GENDEP (10)
Engr Dep (10)
Trans Terminal Comd (2)
Army Terminals (1)
OS Sup Agcy (2)
Div Engr (2)
Engr Fld Maint Shops (2)
Buffalo, Chicago,
Detroit, Alaska,
Los Angeles, New Orleans,
New York, Louisville,
Pittsburgh, San Francisco,
Omaha, Seattle,
Kansas City, Baltimore,
Ft Worth, Eastern Ocean,
Philadelphia, Rock Island,
St Paul, St Louis Dist Engr (1)
Engr Cen (5)
AMS (3)
Chicago Proc Ofc (10)
Engr Maint Cen (36)
Engr Sup Con Ofc (10)
Fld Comd, AFSWP (8)
JBUSMC (1)
Japan Engr Sup Cen (20)
USAREUR ComZ (2)
USAREUR Engr Proc Cen (2)
MAAG (5)
Units org under fol TOE:
5-15 (2)
5-16 (2)
5-48 (2)
5-157 (5)
5-215 (2)
5-216 (2)
5-262 (5)
5-267 (1)
5-278 (5)
5-279 (2)
5-315 (2)
5-316 (2)
5-317 (2)
5-324 (2)
5-328 (2)
5-329 (2)
5-355 (2)
5-357 (2)
5-358 (2)
5-359 (2)
5-367 (2)
5-415 (2)
5-417 (2)
5-525 (2)
5-526 (2)
5-906 (2)

10-45 (2)
10-48 (2)
20-300 (2)
20-511 (2)
29-61 (2)
39-61 (2)
55-17 (2)
55-18 (2)
55-19 (2)
55-28 (2)
55-87 (2)
55-117 (2)
55-128 (2)
55-137 (2)
55-908 (2)
55-909 (2)

NG: State AG (3); units--same as Active Army except allowance is one copy to each unit.
USAR: Same as Active Army except allowance is one copy to each unit.
For explanation of abbreviations used, see AR 320-50.

U.S. GOVERNMENT PRINTING OFFICE: 1991 O - 281-486 (41189)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.

SOMETHING WRONG WITH PUBLICATION

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

The Metric System and Equivalents

Linear Measure

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

Weights

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

Liquid Measure

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

Square Measure

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

Cubic Measure

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

Approximate Conversion Factors

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

Temperature (Exact)

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