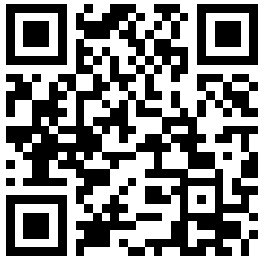

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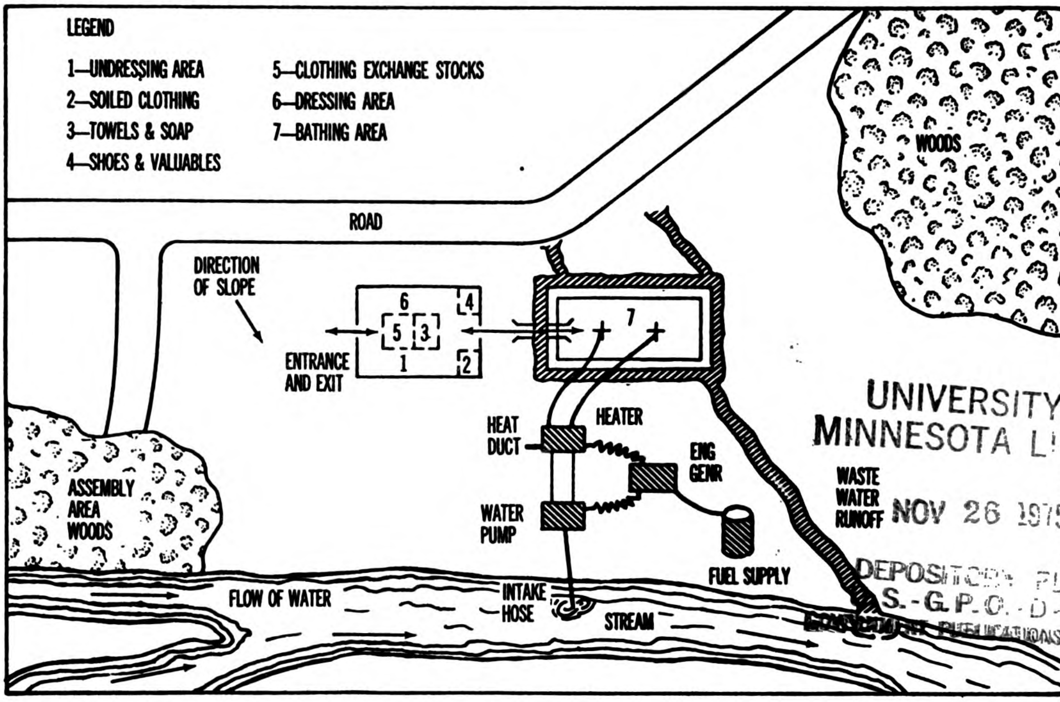
CORRESPONDENCE SUBCOURSE



QM0483

BATH, DELOUSING, AND LAUNDRY OPERATIONS IN THE FIELD

Prepared by
United States Army Quartermaster School
Fort Lee, Virginia 23801
Supply Training Center of the Army School System

FEBRUARY 1973

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Army-Fort Lee, Va.-15034-75-350-C

This copy is a reprint which includes changes and corrections to the originial edition.

MOS RELATIONSHIPS

Off MOS 4200 - Sup & Svc Off - job proficiency. Enl MOS 57E20 - Ldry & Bath Sp - MOS qualification and test preparation.

QM0483
BATH, DELOUSING, AND LAUNDRY OPERATIONS IN THE FIELD

SECTION I

INTRODUCTION

1. SCOPE. This subcourse on bath, delousing, and laundry operations in the field contains an introduction to field bath, delousing, and laundry operations; procedures for pitching, striking, and folding tents; description and maintenance of field bath and delousing equipment; description and maintenance of mobile laundry equipment; and aspects of bath, delousing, and laundry operations.

2. APPLICABILITY. This subcourse is of primary interest to personnel involved in field bath, delousing, laundry, and clothing impregnation operations. This subcourse will equip the student with a working knowledge of these operations, including the techniques for the operation and maintenance of the equipment used. Successfully completed, this subcourse, reinforced with further training or on-the-job experience, will enable the student to function effectively in a field assignment involving bath, delousing, and laundry operations.

3. PROGRAM OF CONTINUING STUDY. When you successfully complete this subcourse, we recommend that you apply to take one or more of the following:

a. QM0015, Personal Clothing and Organizational Clothing and Equipment.

b. QM0351, Logistical Support of Small Units.

SECTION II

ADMINISTRATIVE INSTRUCTIONS

4. MATERIALS CHECK. Check to make sure you have any study materials listed on the cover. If anything is missing, unreadable, or not in order, let us know right away. Use a Student Inquiry Sheet; we've bound one into this booklet at the end of each lesson. Take a look at your examination answer form. Is the subcourse number on the form the same as the number of this subcourse? If not, get the word to us, we'll have another answer form on its way as fast as we can. Don't forget to include your social security account number (student number), mailing address, and ZIP code when you write.

5. SUBCOURSE ORGANIZATION. This subcourse is organized into this single booklet containing materials needed to complete the subcourse. If additional materials are needed, they are indicated on the booklet cover. This subcourse booklet consists of lessons and an examination (see paragraph 7). Each lesson consists of a lesson assignment, contents pages, lesson text, self-grading lesson exercises, and a student inquiry sheet.

6. LESSON EXERCISES. Each lesson in this subcourse is designed for self-evaluation. This is done through the self-grading lesson exercises which you must work after studying portions of the lesson texts. You will find detailed instructions for working the lesson exercises in each lesson. Read these instructions carefully. Because you complete the lesson exercises and verify your own work, you do not submit your answers to the School for grading. This is what is meant by the self-evaluation characteristic of this subcourse's lessons. You will receive credit for the total hours of this subcourse upon successful completion of the examination.

7. EXAMINATION. Take the examination only after you have studied all the lessons and successfully worked all the lesson exercises. Remember, your answers must be based on the study assignments, not on personal experience or information from other sources. Further instructions are on the inside front cover of the examination booklet. Be sure to read them.

a. If you are a Quartermaster School student, use the machine-process answer form for your answers to the examination exercises. We know you want to receive credit for this subcourse, so be sure to send the completed form to the School for grading. Please don't tear, bend, or puncture this form, otherwise the grading machine will toss it back at us, ungraded.

b. If you are a student of another school, use the instructions and answer form provided by that school.

CONTENTS

LESSON 1 Credit Hours: 1

LESSON ASSIGNMENT

SUBJECT	Introduction to Bath, Delousing, and Laundry Operations in the Field.
STUDY ASSIGNMENT	Lesson Text.
SCOPE	Major components of bath, delousing, and laundry field equipment; duties and responsibilities of bath and laundry personnel in the field.
OBJECTIVES	As a result of successful completion of this assignment, the student will be able to--

1. State the mission of a laundry and bath section.
2. Describe the duties and responsibilities of bath and laundry personnel.
3. Identify the major components of bath, delousing, and laundry equipment.
4. State the four factors used in considering an operational site for a laundry site.
5. Estimate the required space and determine the suitability of terrain for operations of a bath unit.
6. Identify the seven stations of a field bath operation and the facilities required.

LESSON TEXT

SECTION I

MISSION, FUNCTIONS, AND DUTIES OF PERSONNEL

1. INTRODUCTION. During World War I, troops in the field experienced dirt, filth, and parasite infestation to the extent that some of them wanted to be wounded so that they would be removed to a field hospital where there was soap, water, and clean sheets. Today, troops in the field have the advantage of bath and laundry facilities so that they may maintain personal cleanliness and freedom from vermin. The availability of these facilities contributes to the soldier's comfort, health, and feeling of well being and, in turn, generates a state of high morale and military effectiveness.

2. MISSION AND FUNCTIONS. The basic mission of a bath and laundry unit is to destroy lice and other parasites which transmit serious diseases, such as typhus and trench fever, and to provide clean laundry to troops. Bath and laundry operations are provided by direct support units to nondivisional troops and units. Support may include allied forces, prisoners of war, and friendly partisan groups. The functions of a bath and laundry unit are to delouse and bathe troops, delouse clothing and equipage, wash clothing and other items, issue clean clothing to troops, and collect and wash damaged clothing and forward clothing to classification.

3. CAPABILITIES. The bath and laundry platoons of a supply and service company can service 15,000 troops a week. Each bath and laundry platoon has six bath teams with a team chief and assistants. One bath team can service approximately 3,000 troops a week. Use of the team concept permits bath points to be set up in one to five locations at the same time and decreases transportation requirements. Fewer vehicles are needed to transport small groups to a bath point nearby than to transport all of the troops to one central bath point some distance away. One bath team is retained in reserve so that the equipment can be serviced on a rotating basis.

4. DUTIES OF BATH AND LAUNDRY PERSONNEL. The platoon leader is the general supervisor of bath and laundry activities. He prepares the bath and laundry schedules, dispatches the units for operations, and supervises the preparation of records and reports.

a. BATH PERSONNEL. Bath personnel and their duties are as follows:

(1) BATH SECTION CHIEF. The bath section chief is in charge of all bath teams and equipment assigned to the bath section. He schedules all team assignments and arranges for the maintenance of equipment on a rotating basis.

(2) BATH TEAM CHIEFS. Bath team chiefs direct the operations of the facilities and supervise the operator maintenance services required on team equipment.

(3) CLOTHING EXCHANGE SPECIALISTS. Clothing exchange specialists are responsible for the stockage, issue, turn-in, and pickup of clothing from the laundry. They maintain records of clothing stocked, issued, shipped, and received from the laundry.

(4) BATH PROCESSORS. Bath processors are responsible for operating the bath equipment and assisting in the processing of personnel through the bath facilities.

b. LAUNDRY PERSONNEL. Laundry personnel and their duties are as follows:

(1) LAUNDRY FOREMEN. Laundry foremen are general supervisors of operations and equipment maintenance. Assistant laundry foremen are usually shift leaders. They serve as team chiefs if the laundry elements function at two points.

(2) LAUNDRY CLERKS. Laundry clerks record the amount of operating supplies used by the unit.

(3) LAUNDRY SPECIALISTS. Laundry specialists operate and perform operator maintenance on laundry equipment. They are familiar with systems of classifying, marking, and exchanging clothing.

(4) LAUNDRY WORKERS. Laundry workers assist in operating laundry equipment.

SECTION II

EQUIPMENT, SITE SELECTION, AND LAYOUT

5. BATH UNIT EQUIPMENT. Major components of bath equipment include an eight-showerhead bath unit; a delousing outfit; and a general-purpose, medium tent. Tentage used for bath and laundry units is described in SLAB 52A.

a. EIGHT-SHOWERHEAD BATH UNIT. The eight-showerhead bath unit (fig. 1) includes a water heater, water pump, shower stands, and hoses. The bath unit is a liquid-fuel-fired water heating plant designed to supply warm water to each of the shower nozzles. The electric power to operate the bath unit is supplied by a self-contained, portable, 3-kw., 60-cycle, 208-volt, 3-phase, skid-mounted generator set. The bath unit is lightweight, completely portable, and simple to operate and maintain.

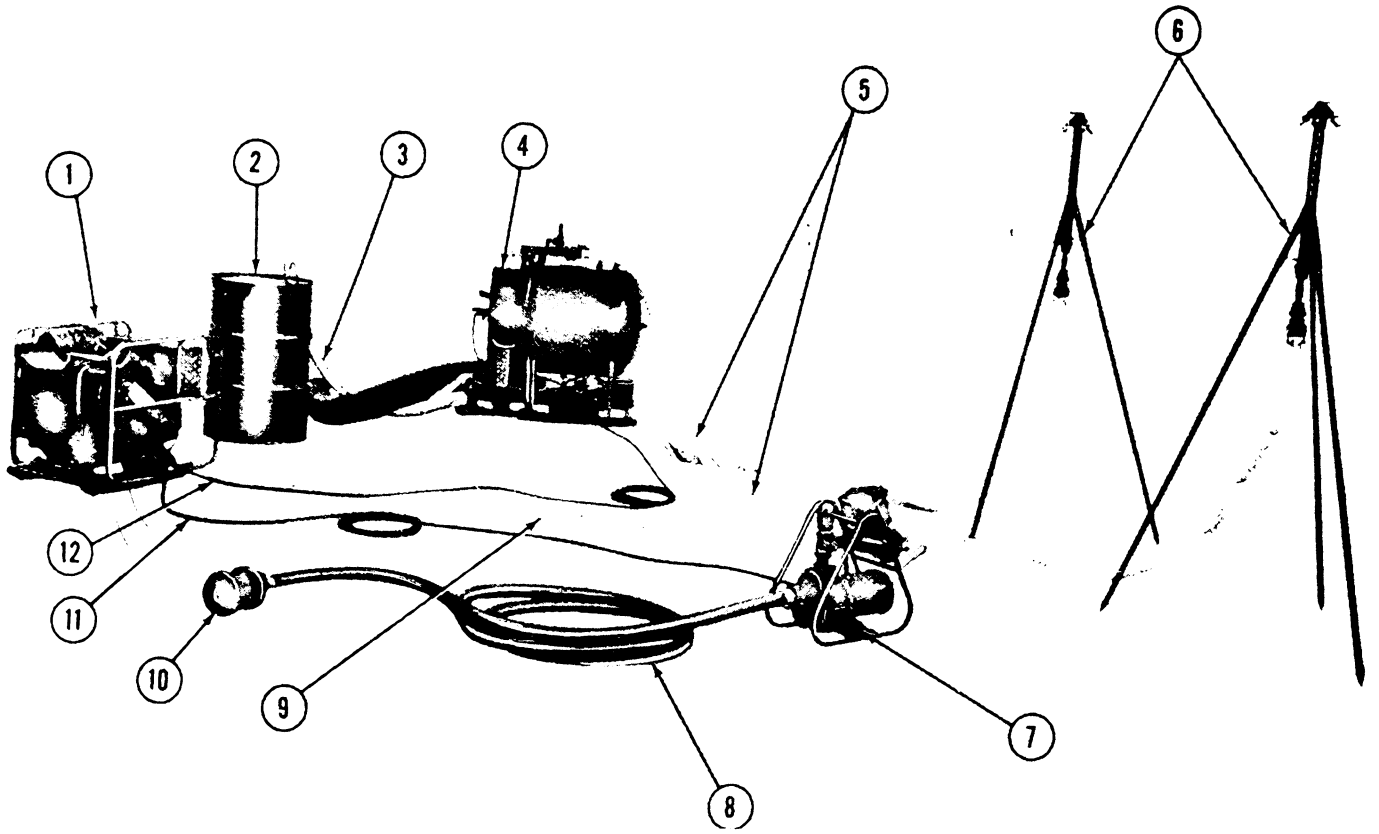
(1) WATER HEATER. The water heater (fig. 2) is designed to heat incoming water to a temperature suitable for showers. The heater is a horizontal unit mounted on a skid. It is constructed with a tank containing an inner and an outer water-heating vessel. Openings in the rear of the inner water vessel allow the combustion gases to flow into the area between the two vessels and then out through the exhaust duct opening on the lower left end of the water heater. Major components of the water heater are the blower, fuel pump, and burner assembly. Other components are illustrated in figure 2.

(a) BLOWER. The blower (5) supplies air to the combustion chamber for burner fuel combustion. The blower is operated by the electric motor mounted on the water heater. The speed of the blower is constant and is set to deliver air for the maximum burning rate.

(b) FUEL PUMP. The fuel pump (6) is mounted to the blower housing and is coupled to and driven by the electric motor operating the blower. The pump draws fuel from the fuel drum and delivers it to the burner at a maximum pressure of 100 pounds per square inch.

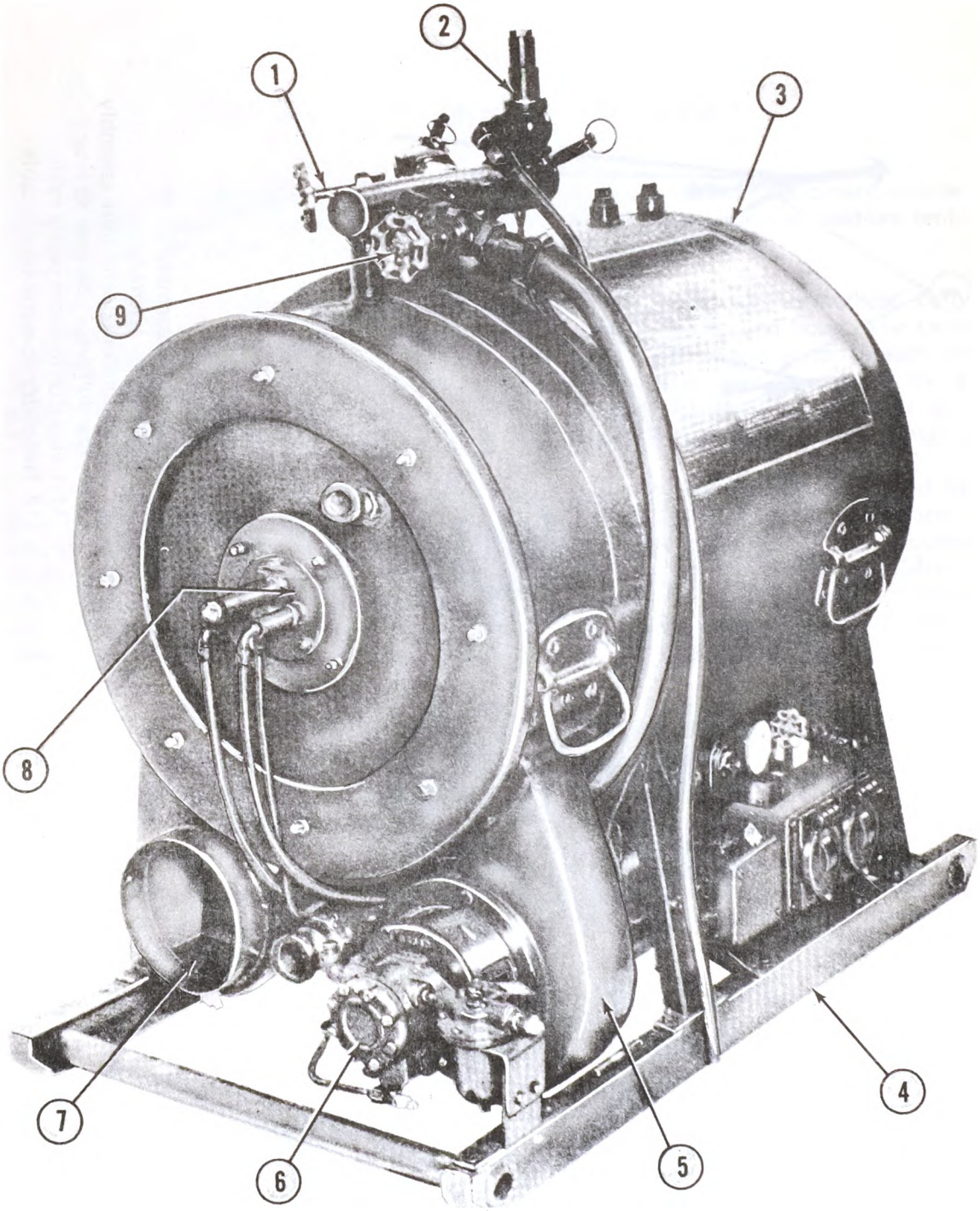
(c) BURNER ASSEMBLY. The burner assembly (8) is equipped with ignition electrodes and a single-variable fuel nozzle with a burning rate from 2 to 6.5 gallons per hour. The nozzle and electrodes are in a holder mounted on the burner assembly at the left end of the water heater. An electrode sight tube pipe nipple with a sight tube bushing is mounted on the nozzle and electrode holder. The combustion chamber contains a sight tube with a sight glass which is used to check the flame in the combustion chamber. Continuous ignition is supplied to the burner through the ignition cable assemblies connected to the transformer.

(2) WATER PUMP. The water pump assembly (fig. 3) is mounted on a tubular frame. The pump is operated by an electric motor mounted to the pump housing. A sediment strainer located in the strainer housing prevents foreign matter larger than the shower nozzle opening from entering the heater. Components of the water heater are as illustrated in figure 3.



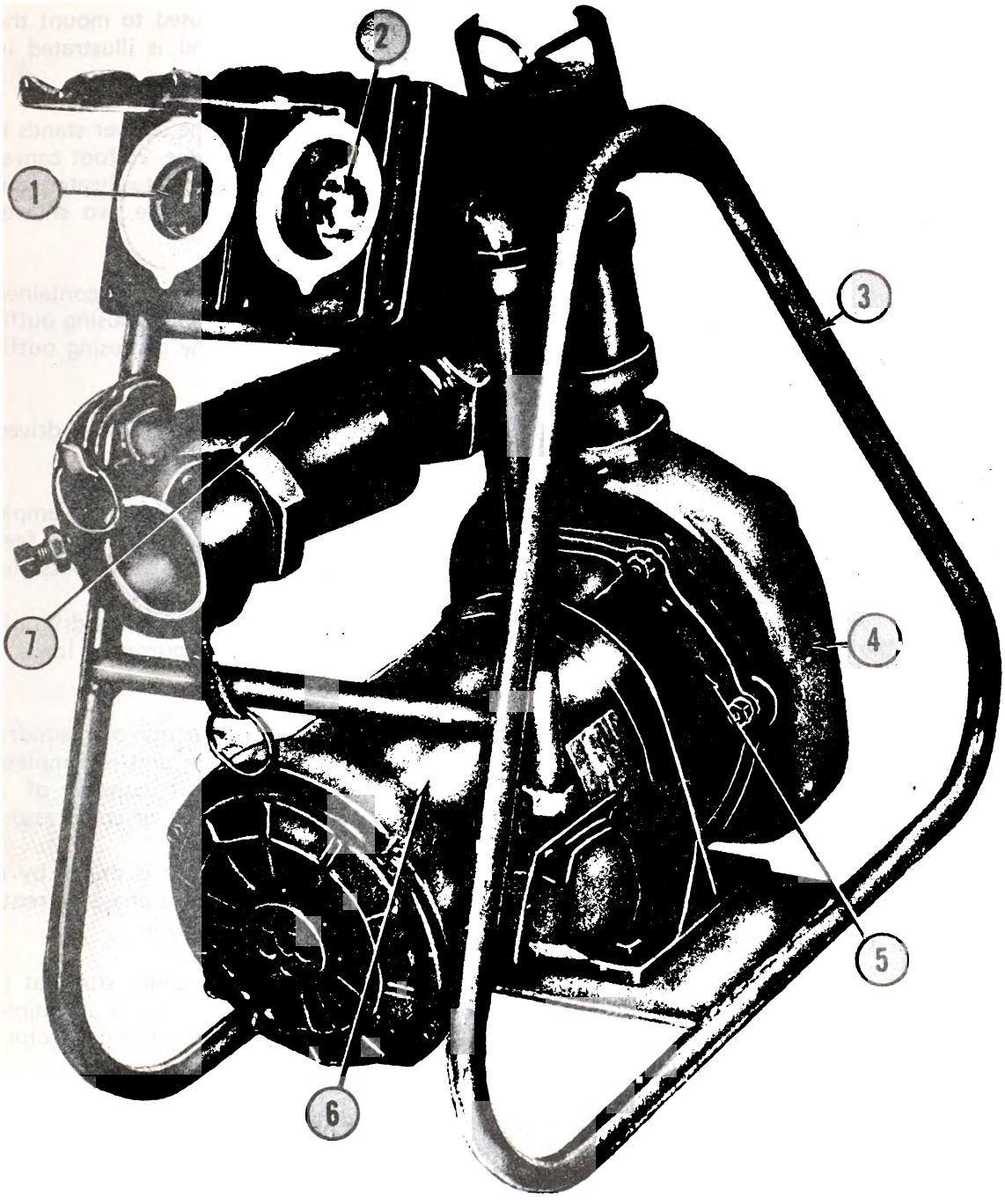
1. Generator set
2. Fuel drum
3. Fuel-feed-and-return hose assemblies
4. Water heater
5. Water-heater-to-shower stand hose assemblies
6. Shower stands
7. Water-pump assembly
8. Suction hose assembly
9. Water-pump-to-heater hose assembly
10. Water-pump-suction-hose strainer
11. Generator-to-water-pump cable
12. Generator-to-water-heater cable

Figure 1. Bath unit set up for operation.



1. Shower stand control valve
2. Upper manifold relief valve
3. Tank
4. Skid
5. Blower
6. Fuel pump
7. Exhaust duct opening
8. Burner assembly
9. Water blender valve

Figure 2. Water heater.



1. Motor switch
2. Receptacle connector
3. Tubular frame
4. Pump housing
5. Water pump
6. Electric motor
7. Strainer housing

Figure 3. Water pump assembly.

(3) SHOWER STANDS. Two shower stands are used to mount the nozzles which discharge the bath unit shower water. A shower stand is illustrated in figure 4.

(4) HOSES. A 25-foot rubber suction hose for the shower stands is furnished to draw water from the water source to the water pump. Three 25-foot canvas hoses are also furnished. One hose carries water from the pump to the water heater, and the other two hoses carry the warm water from the water heater to the two shower stands.

(b) DELOUSING OUTFIT. The delousing outfit is a portable, self-contained unit mounted on a tubular-steel skid frame of welded construction. The delousing outfit can delouse 6,000 troops per day. The two major components of the delousing outfit are the engine and compressor.

(1) ENGINE. The one-cylinder, four-cycle, air-cooled, gasoline-driven engine is rated at 2 3/4 horsepower.

(2) COMPRESSOR. The compressor is designed to provide an ample supply of compressed air to operate 10 dusting guns. The guns can dust 25 cubic feet per minute. Two guns are provided for each hose so that continuous operation is possible.

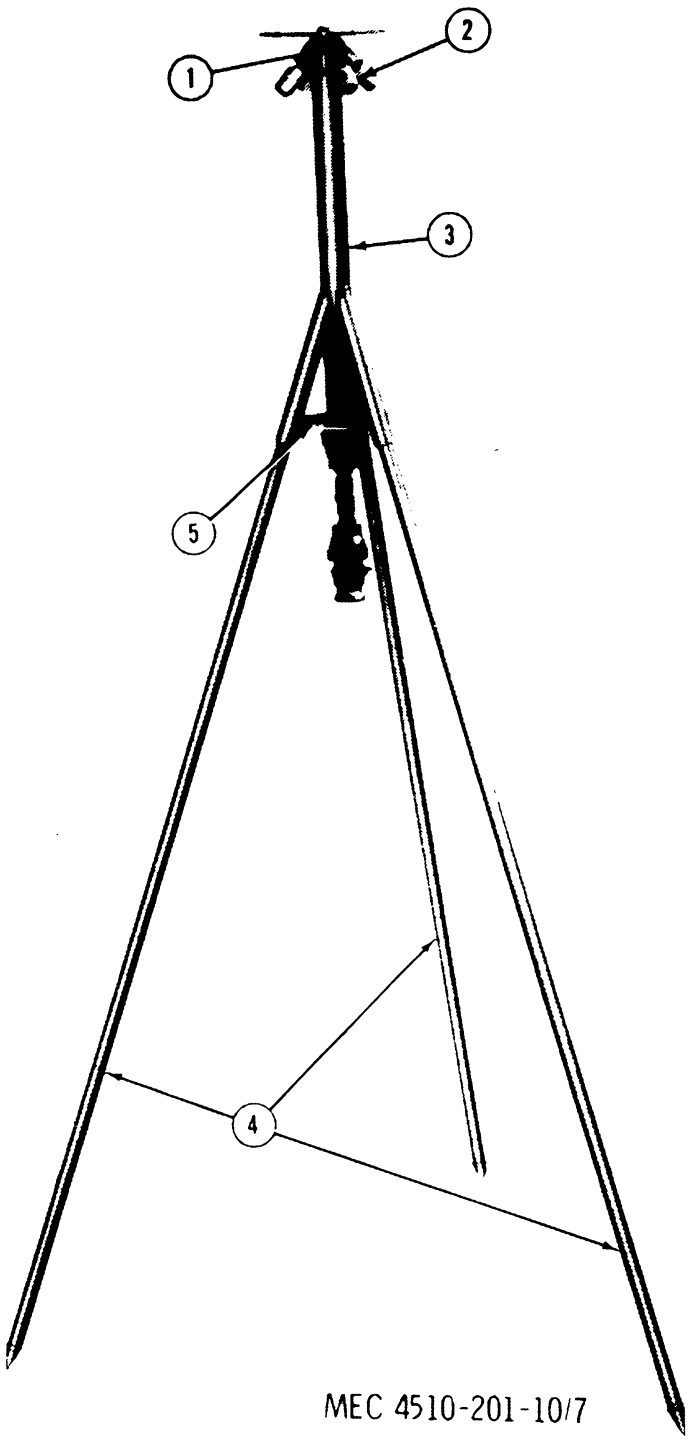
6. LAUNDRY UNIT EQUIPMENT. Major components of the field laundry unit include the single-trailer laundry unit; an engine-generator; and general-purpose, large and medium tents.

a. SINGLE-TRAILER LAUNDRY UNIT. The laundry section of a laundry platoon is assigned single-trailer laundry units for use as required. Each unit is complete and can be operated continuously for 20 hours a day. The unit consists of a washer-extractor, dryer-tumbler, water heater, air heater, water pump, and air compressor.

b. ENGINE-GENERATOR. The 10-kv.-a. engine-generator is driven by a 20-hp., air-cooled gasoline engine that generates 208-volt, 60-cycle, three-phase current. The engine-generator furnishes electric current for the entire laundry unit.

7. SELECTION OF LAUNDRY SITE. The selection of a laundry site that is favorable for operations is important. However, the selection of a site that is accessible to supported units, commands, or installations is more important. The following factors should be considered when a site is selected:

a. WATER. The laundry should be located near a plentiful supply of clean water, since about 500 gallons of water an hour is required for each laundry section. The supply should be soft water that is as free as possible from impurities. Hard water should not be used because it reduces the cleaning power of soaps. Also, in hard water, the soluble salts react with soap to form an insoluble substance that adheres to the fabric. Use of sea or salt water should be avoided since salt water corrodes the metal parts of



1 Head, shower
2 Nozzle, shower
3 Riser
4 Legs
5 Tray, soap

Figure 4. Shower stand.

laundry equipment. When the laundry is operated in a town with a local water system, this water may be used. Care should be taken to insure that dirty water discharged from the laundry will not contaminate water used for drinking, cooking, or bathing.

b. TERRAIN. The laundry site should be located on firm, level, well-drained ground that will support the laundry trailer and vehicles in any type of weather. Adequate space should be available for tentage, vehicle parking, and laundry operations.

c. ROAD NET. The site selected should be accessible to a traveled route or road net and large enough for a turnaround. An internal road net should be established to provide a smooth flow of vehicles into the area, to the proper points within the area, and out again. A one-way traffic pattern is generally most satisfactory, especially under blackout or other restricted light conditions.

d. COVER AND CONCEALMENT. The site selected should provide natural protection from attack and maximum concealment from observation. A protected slope or trees may be used as a windbreak.

8. SELECTION OF BATH POINT SITE. The site selected for the bath point should be as favorable as possible for the operation and should be readily accessible to supported units, command, or installation. The following points should be considered when selecting a bath site:

a. WATER. The bath point should be located near a plentiful supply of clean water, since about 960 gallons per hour is required for each eight-showerhead bath unit. The location of the shower area should have good drainage downhill, downstream, or away from the water supply source. In areas where the command surgeon has determined there is a frequent problem of schistosomiasis (a disease caused by infestation of the blood, evidenced by the presence of elongated worms, pierced with holes) the shower water should be treated to insure removal or destruction of the disease-causing organisms.

b. TERRAIN. The bath site should be located on firm, level, well-drained ground that will support bath equipment and vehicles in any type of weather. Adequate space should be available for tentage, vehicle parking, and bath operations. The space for tentage is estimated by computing the square footage required for the two medium, general-purpose tents--32 feet 8 inches by 16 feet, or approximately 1,046 square feet for the two tents. The space for bath operations is estimated by computing the square footage required for the generator, pump, and water heater--approximately 32 feet 8 inches by 10 feet, or 326 square feet. Therefore, the total area for the bath station is 1,046 square feet plus 326 square feet, or approximately 1,372 square feet. The area for vehicle parking is not computed.

c. ROAD NET. The bath point should be accessible to a traveled route or road net convenient to supported troops.

d. COVER AND CONCEALMENT. A bath site should be selected which provides natural protection from attack and maximum concealment from observation.

9. LAYOUT. When layouts for bath and laundry units are planned, consideration must be given to the frequent moves required to keep pace with supported units.

a. BATH POINT. One or more bath teams may be required to operate in the same location to support a command, an installation, or an organization. Each bath team is a complete unit which can operate independently of other units. A suggested layout for a one-team bath point and clothing exchange is shown in figure 5.

b. LAUNDRY. One or more laundry sections may be required to operate in the same location to support a command, an installation, or an organization. Each laundry section is a complete unit which can operate independently of other units. A suggested layout for a single-trailer laundry section is shown in figure 6. The layout plan for a mobile field laundry should include the following:

(1) RECEIVING AND PICKUP TENTS. Receiving and pickup tents should be readily accessible to unit representatives delivering and picking up clothing and other articles. These tents should also be placed as close to the related laundry trailers as feasible. When possible, receiving and pickup operations should be separated to prevent congestion of personnel and vehicles.

(2) LAUNDRY TRAILERS. Laundry trailers should be located in as small an area as is tactically feasible. If laundry sections must be dispersed for operations, they should be located so as to facilitate control.

10. BATH OPERATIONS. To avoid confusion, bath point personnel should schedule the use of the facility by all supported units. This requires coordination between unit and bath point personnel. Using units provide personnel to guard the valuables for bathers and to assist in setting up the installation. The operations outlined by stations below are flexible. Stations are identified in figure 5. There are only two tents, and only eight men can bathe at one time.

a. STATION NO. 1. As each man enters this station, he is issued a small canvas bag and a metal disk with a cord. Both the bag and the disk bear the same numbers. All valuables are placed in the canvas bag, and the bag is tied and placed in station No. 4. The metal disk is placed around the soldier's neck. All clothing is removed from the body. Footwear is placed in station No. 4.

b. STATION NO. 2. All soiled clothing is gathered at this station. Laundry baskets may be provided for this purpose.

c. STATION NO. 3. Troops pick up soap at this station before moving to the bathing area. After bathing, they return to pick up towels for drying. When directed by medical authority, delousing may follow the bath.

d. STATION NO. 4. Footgear and valuables are stored at this station.

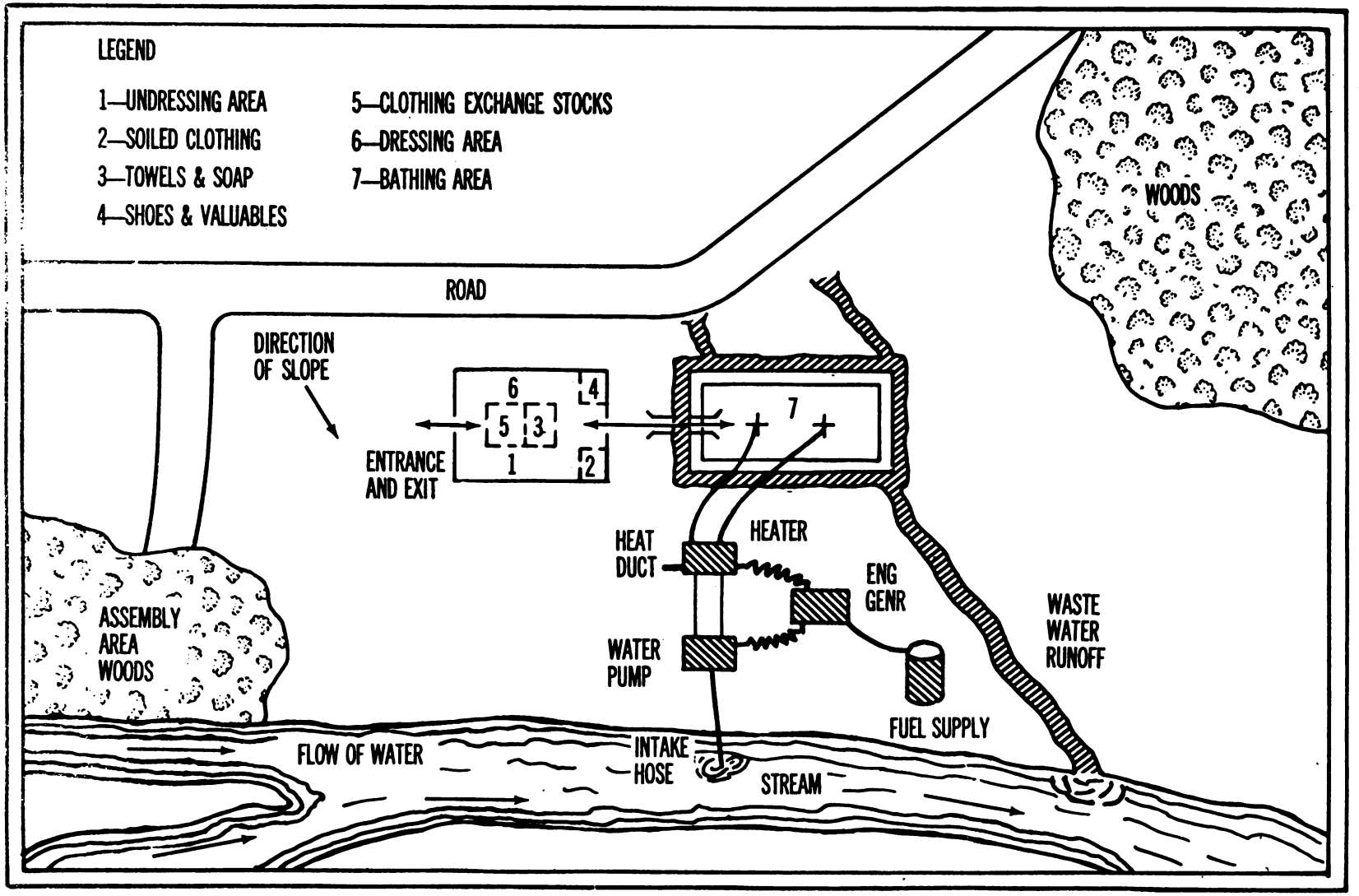


Figure 5. Suggested layout for bath point and clothing exchange facility.

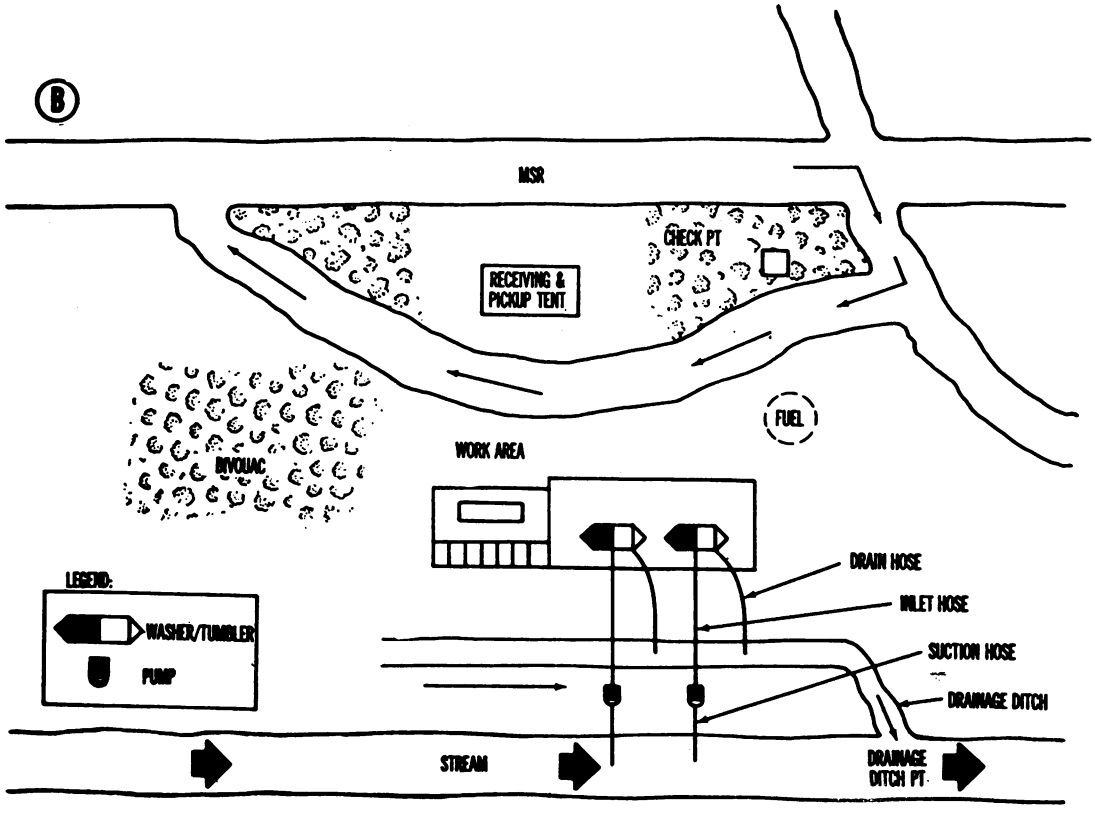


Figure 6. Suggested layout of laundry section using two laundry trailers.

e. STATION NO. 5. Clothing exchange stocks are located at this station. Necessary clothing stocks are obtained through depot supply, and clean clothing is exchanged for soiled clothing. Clothes are sized extra small, small, medium, large, and extra large.

f. STATION NO. 6. This area is reserved for dressing.

g. STATION NO. 7. The two shower stands are located in this tent.

APPENDIX

REFERENCES

FM 20-15	Pole and Frame Supported Tents
FM 29-3	Direct Support Supply and Service in the Field Army
TM 10-280	Field Laundry, Bath, and Clothing Exchange Operations
TM 10-3510-208-12	Operator's and Organizational Maintenance Manual: Laundry Unit, Single Trailer Mounted, with Canvas Cover
TM 10-4510-201-14	Bath Unit, Portable, Eight-Shower Head, M1958

SELF-GRADING
LESSON EXERCISES

REQUIREMENT. Exercises 1 through 10 are multiple choice. Each exercise has only one single-best answer. Indicate your choice by circling its letter.

1. A basic mission of a bath and laundry unit is to

   a. train troops on the proper manner of washing their garments.

   b. train troops on the proper manner of mending their garments.

   c. destroy lice and other parasites found on troops.

   d. perform extensive maintenance on the equipment.

2. Bath processors are responsible for

   a. pickup of clothing from the laundry.

   b. operating bath equipment.

   c. recording operating supplies used by the unit.

   d. maintaining records of clothing stocked by the unit.

3. The assistant laundry foreman is

   a. a bath assistant.

   b. an accounting clerk.

   c. general supervisor of operations.

   d. usually a shift leader.

4. The portable bath unit has how many showerheads?

   a. 8.

   b. 9.

   c. 10.

   d. 12.

5. How many dusting guns does the delousing outfit operate?

   a. 4.

   b. 6.

   c. 8.

   d. 10.

6. Water for the laundry unit in the field should be

   a. hard water.

   b. sea or salt water.

   c. water with alkali.

   d. soft water.

7. The space for bath operations is estimated by computing the square footage required for the

   a. generator, pump, and water heater.

   b. shower units.

   c. delousing outfit.

   d. two tents.

8. For bath equipment and vehicles to be supported in all types of weather, the bath site should be located

   a. with drainage towards the water source.

   b. with drainage upstream.

   c. on firm, level ground.

   d. on firm, sloping ground.

9. Soap and towels are kept at which of the following bath stations?

   a. No. 3.

   b. No. 4.

   c. No. 5.

   d. No. 6.

10. Footgear and valuables are stored at which of the following bath stations?

   a. No. 3.

   b. No. 4.

   c. No. 5.

   d. No. 6.

HAVE YOU COMPLETED ALL EXERCISES? DO YOU UNDERSTAND EVERYTHING COVERED? IF SO, TURN TO THE NEXT PAGE AND CHECK YOUR ANSWERS AGAINST THE SOLUTIONS.

U.S. ARMY QUARTERMASTER SCHOOL
FORT LEE, VIRGINIA 23801

SOLUTION SHEET

INTRODUCTION TO BATH, DELOUSING, AND LAUNDRY OPERATIONS IN THE FIELD

Check your work against the solutions given below. If you have made a wrong response or omitted a required response, correct your work. Then, go back and restudy the appropriate text portion once more (references follow each solution).

Ex	Sol	Ref
1.	c	para 2
2.	b	para 4a(4)
3.	d	para 4b(1)
4.	a	para 5
5.	d	para 5b(2)
6.	d	para 7a
7.	a	para 8b
8.	c	para 8b
9.	a	para 10c
10.	b	para 10d

All references are to the Lesson Text.

HAVE YOU CHECKED YOUR ANSWERS, MADE CORRECTIONS, AND RESTUDIED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON TO THE NEXT LESSON OF THIS SUBCOURSE.

STUDENT INQUIRY SHEET

Number/Title LESSON 1, QM 0483
Introduction to Bath, Delousing, and Laundry Operations in the Field

Date
February 1973

Reprint
Repr (A), Oct 75

Use this form if you have a question or request for information concerning a subcourse lesson or examination. This form may be used to ask questions about lesson or examination exercises, but not to request solutions to those exercises. Use this form also for comments, suggestions, requests for additional subcourses, and other informal communications concerning your correspondence course enrollment.

Last Name	**First Name**	**MI**	Student Number/SSAN	Military Rank

Address (No., street, city and state)	**Zip Code**	Civilian Grade

If your name, grade, or address is new, please place an X in this box ☐	Date Submitted

Request information on or clarification of the following points:

The following errors have been found in the instructional materials:

(Additional space is available on the other side of this form.)

QMFL Form 101
Rev May 75

13S-4720

Note. Fold this inquiry sheet with this School's address on the outside, staple or scotch tape it closed, and mail without an envelope.

CUT ALONG THIS LINE

Use this space for additional comments.

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STUDENT INQUIRY SHEET

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LESSON 2 **Credit Hours: 2**

LESSON ASSIGNMENT

SUBJECT	Tent Pitching, Striking, and Folding
STUDY ASSIGNMENT	Extracts of FM 20-15, Pole and Frame Supported Tents.
SCOPE	Medium general-purpose (GP) tent, including use and care of components; pitching, striking, folding, and storing procedures; tent site selection; knots used in tent pitching; causes, prevention, and correction of tent damage.
OBJECTIVES	As a result of successful completion of this assignment the student will be able to--

1. List and explain the procedures for tent site selection and preparation.

2. List the components of the medium general-purpose tent, and identify the correct procedures for using, handling, and caring for each component.

3. Identify the purpose of the knots commonly used in tent pitching.

4. State and explain the procedures for pitching, striking, folding, and storing the medium general-purpose tent.

5. List the causes of tent damage, and identify the appropriate preventive or corrective measure for each type of tent damage.

LESSON TEXT

This lesson text consists of paragraphs 8, and 26 through 38 extracted from FM 20-15, Pole and Frame Supported Tents. This lesson deals with the medium general-purpose tent. The tent is olive drab (OD) and is fire, mildew, weather, and water resistant (FMWWR).

8. Tent, General Purpose, Medium

a. Use. The tent, general purpose, medium, FMWWR, OD, complete with pins and poles (fig 25), is designed to be used primarily for the quartering of troops. It can also be used as a command post, a fire support control center, or a messhall; and it can be used for artillery operations, storage, housing components of a field hospital, or for housing components of a field bakery. The tent is intended to be used in temperate and tropical climates; however, with the liner, it can be used effectively in cold climates.

b. Description. The tent is a rectangular, hip-roofed, pole-supported tent consisting of eave poles, door poles, center upright poles, ridge pole, tent, and tent liner.

(1) *Tabulated data.*

Height: ridge height, 10 feet; eave height, 5 feet 6 inches.
Length: 32 feet 8 inches.
Width: 16 feet.
Weight: tent, 269 pounds; liner, 100 pounds; pins and poles, 200 pounds.
Cube: 33 cubic feet.
Floorspace: 528 square feet.

(2) *Material.* The roof, sidewalls, and end walls are made of 12.29-ounce duck, FMWWR. The whole tent is made in one piece. The canvas is suspended on a webbing framework which carries the stress and supports the canvas. The walls are split at the four corners and can be fastened together with a slide fastener at each corner.

(3) *Doors.* The tent has two door entrances, one at each end. Each door entrance is 6 feet high and 4 feet wide.

(*a*) *Door curtains.* Two curtains, attached to each end near the door entrances, slide along a double wire cable at the eave to open or shut the door entrances.

(*b*) *Door screens.* A screen is attached on the inside to each side of each door entrance. When in use, the door screens are pulled across the door entrances and secured in place by tying tie tapes at the top of the screens to metal rings at the eave above the door entrances. When not in use, the door screens are rolled to the side inside the tent and secured by tying tie tapes along the sides of the screens.

(4) *Ventilation.*

(*a*) The tent is ventilated by two ventilators, one at the top of each end section near the ridge. The openings are protected by canvas flaps.

(*b*) When stoves are not being used, the stovepipe openings can also be used as ventilators.

(*c*) The door curtains can be opened for more ventilation.

(*d*) Still more ventilation can be obtained by rolling up the sides of the tent to the eaves and tying them with tie tapes.

(5) *Heating.* The tent is heated by two M-1941 tent stoves. There are two stovepipe openings built in near the two large upright poles of the tent. The openings are protected by canvas flaps.

(6) *Cover.* The tent is provided with a cover for use when it is in storage or is being transported.

(7) *Liner.* A liner with cover is available as a separate item of issue. It provides insulation from the cold in winter and reduces radiation from the sun in summer. The liner has both fabric and screening sidewalls below the eaves. The fabric sidewalls are made of 5.2-ounce cotton cloth. The screening sidewalls are made of plastic. The fabric sidewalls can be rolled up to the eaves and secured by tie tapes and thus permit the use of the screening alone. The screening provides protection from insects and permits the liner to be used in hot as well as cold weather. There are two built-in ventilator screens corresponding in location to the two ventilators in the tent. There are two stovepipe openings in the liner corresponding in location to the stovepipe openings in the tent.

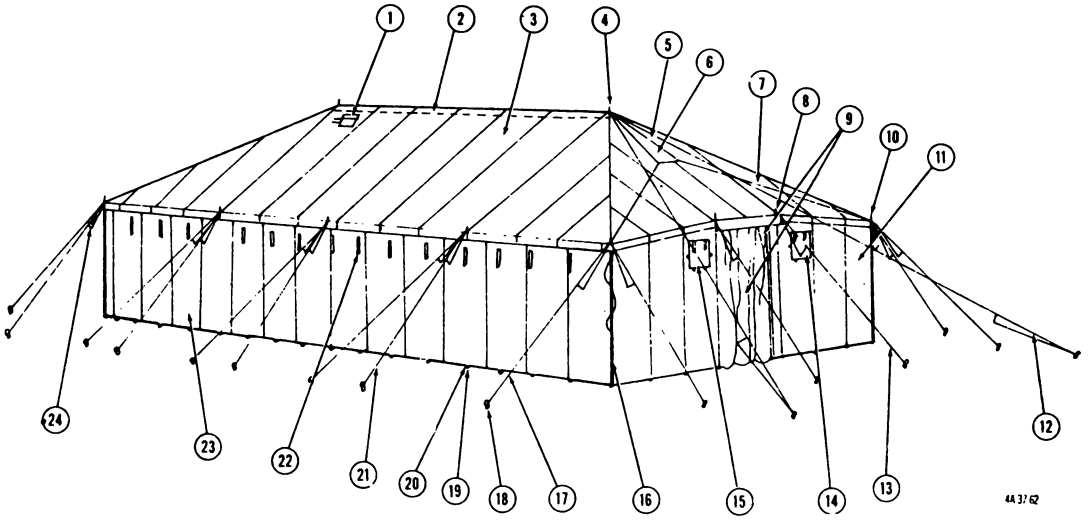
c. Ground Plan. Before pitching the tent, study the ground plan carefully (fig 26).

d. Pitching. Four men can pitch the tent in approximately 40 minutes.

(1) *Securing tent to ground in preparation for tent walls (1, fig 27).*

(*a*) Remove tent from cover, and place it in position on the ground so that corners are square.

(*b*) Close slide fasteners at tent corners.



1 Stovepipe opening
2 Ridge pole
3 Side roof
4 Center pole
5 End roof
6 Ventilator
7 Ventilator flap line
8 Door pole
9 Door curtain
10 Eave pole
11 End wall
12 Ridge guy line
13 Door eave line
14 Care and maintenance instructions flap
15 Erection instructions flap
16 Slide fastener
17 Corner eave line
18 24-inch wood tent pin, or 12-inch steel tent pin
19 Footstop
20 16-inch wood tent pin, or 9-inch aluminum tent pin
21 Side eave line
22 Tie tape
23 Sidewall
24 Tent slip

Figure 25. Tent, general purpose, medium.

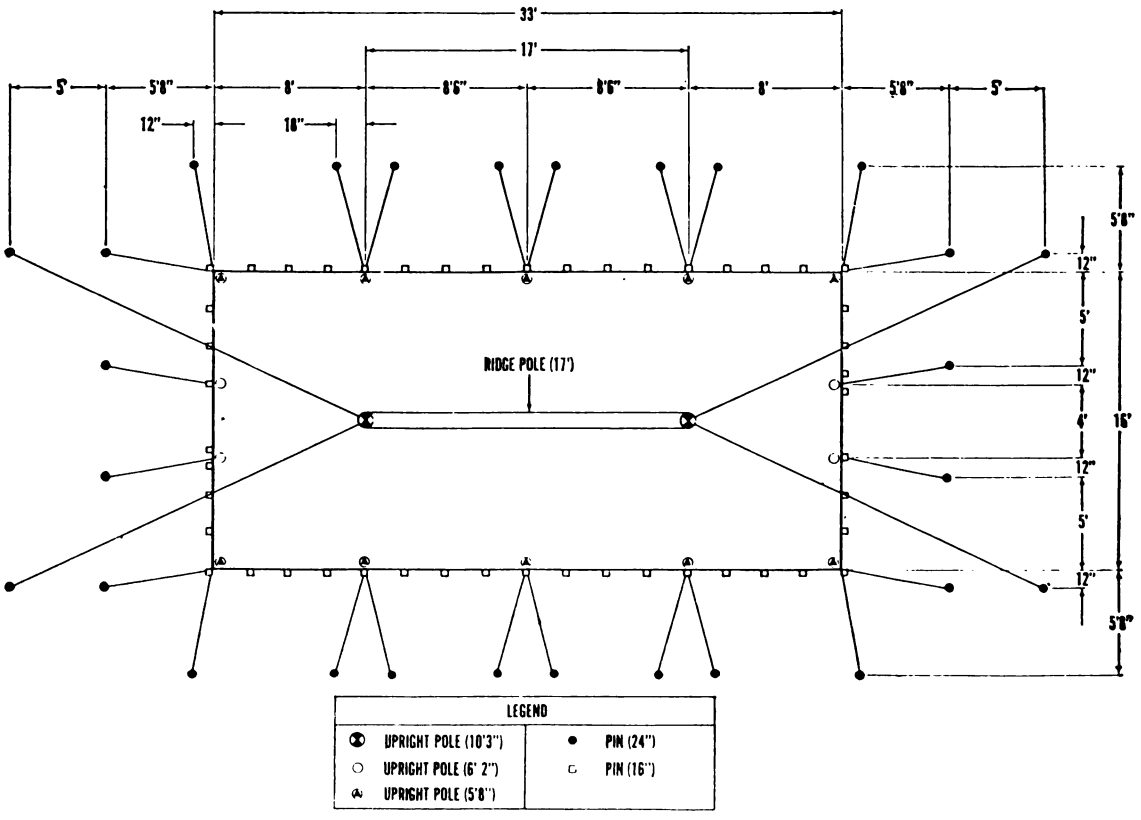


Figure 26. Ground plan of tent, general purpose, medium.

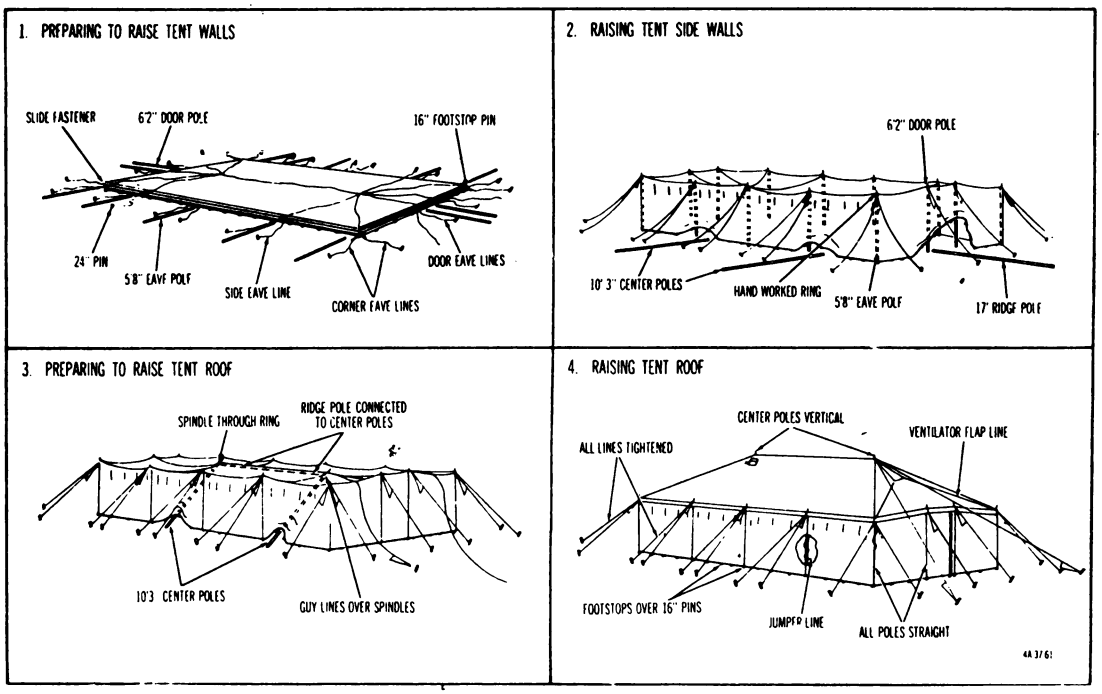


Figure 27. Steps in pitching tent, general purpose, medium.

(*c*) Drive a 16-inch wood pin, or in cold climate a 9-inch aluminum pin, at each corner, and attach end wall and sidewall corner footstops to pins.

(*d*) Drive the 24-inch wood pins, or in cold climate the 12-inch steel pins according to the ground plan, using the 5-foot 8-inch poles to measure distance from the tent.

(*e*) Attach side, corner, and door eave lines to pins.

(2) *Raising tent sidewalls* (2, fig 27).

(*a*) Insert spindles of 5-foot 8-inch poles through grommets at sides and corners of tent.

(*b*) Insert spindles of 6-foot 2-inch poles through grommets at front and rear doors.

(*c*) Raise tent walls by raising side, corner, and door eave poles to an upright position.

(*d*) Tighten eave lines just enough to hold poles up.

(3) *Preparing to raise tent roof* (3, fig 27).

(*a*) Assemble center upright poles and ridge pole.

(*b*) Slide ridge pole through tent door and position it under tent ridge.

(*c*) Insert spindles of center upright poles through holes in ridge pole, through tent ridge plates, and through grommets in tent ridge.

(*d*) Attach guy lines to spindles of center upright poles at each end of the tent.

(4) *Raising tent roof* (4, fig 27).

(*a*) Raise the two center upright poles to a vertical position.

(*b*) Attach all guy lines to pins and tighten.

(*c*) Drive remaining 16-inch wood pins, or in cold climate the 9-inch aluminum pins, and attach footstops to pins.

(*d*) Tie jumper lines to side and corner eave poles, door poles, and center upright poles.

(*e*) Adjust ventilator flap lines and tie them to spindles of corner eave poles.

(*f*) Straighten all poles and tighten all lines until tent is smooth.

(*g*) Tie tie tapes at inside corners of tent around corner eave poles.

(5) *Attaching liner to tent* (fig 28).

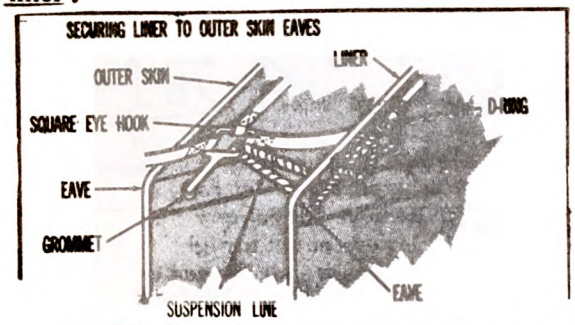
(*a*) Loosen slightly all guy lines by adjusting tent slips (1).

(*b*) Unfold tent liner inside tent on one side of center poles so that stovepipe openings of tent liner are on same side of tent as stovepipe openings in tent (2).

(*c*) Lift each center upright pole, pull liner under pole, and slip liner pole sleeve over pole (3).

(*d*) Tie liner ridge suspension lines to tent ridge plates and to tent ridge pole (4).

(*e*) Secure liner to tent doors, corners, and sidewall eaves by passing eave suspension lines on liner through hardware eye on inside of tent; and then run suspension lines through grommets in liner and secure to D-rings on liner.



(*f*) Tie tie tapes at sides of liner door openings to door eave poles.

(*g*) Wrap liner pole sleeves around center upright poles and tie with tie tapes (5, fig 28).

(*h*) Secure footstops in liner sidewall screen to tent footstop pins (5, fig 28).

(*i*) Tighten all tent guy lines.

e. Striking. Four men can strike the tent in approximately 30 minutes.

(1) *Removing liner.*

(*a*) Untie tie tapes at corners. Untie tie tapes at door entrances from door eave poles. Untie tie tapes of pole sleeves from around center upright poles.

(*b*) Remove footstops of tent and liner screen from footstop pins.

(*c*) Untie and remove eave suspension lines from liner D-rings and grommets, and tent hardware eye.

(*d*) Untie ridge suspension lines from tent ridge plates and ridge pole, and allow tent liner to drop to the ground.

(*e*) Loosen all guy lines. Lift center upright poles slightly and remove liner from the poles.

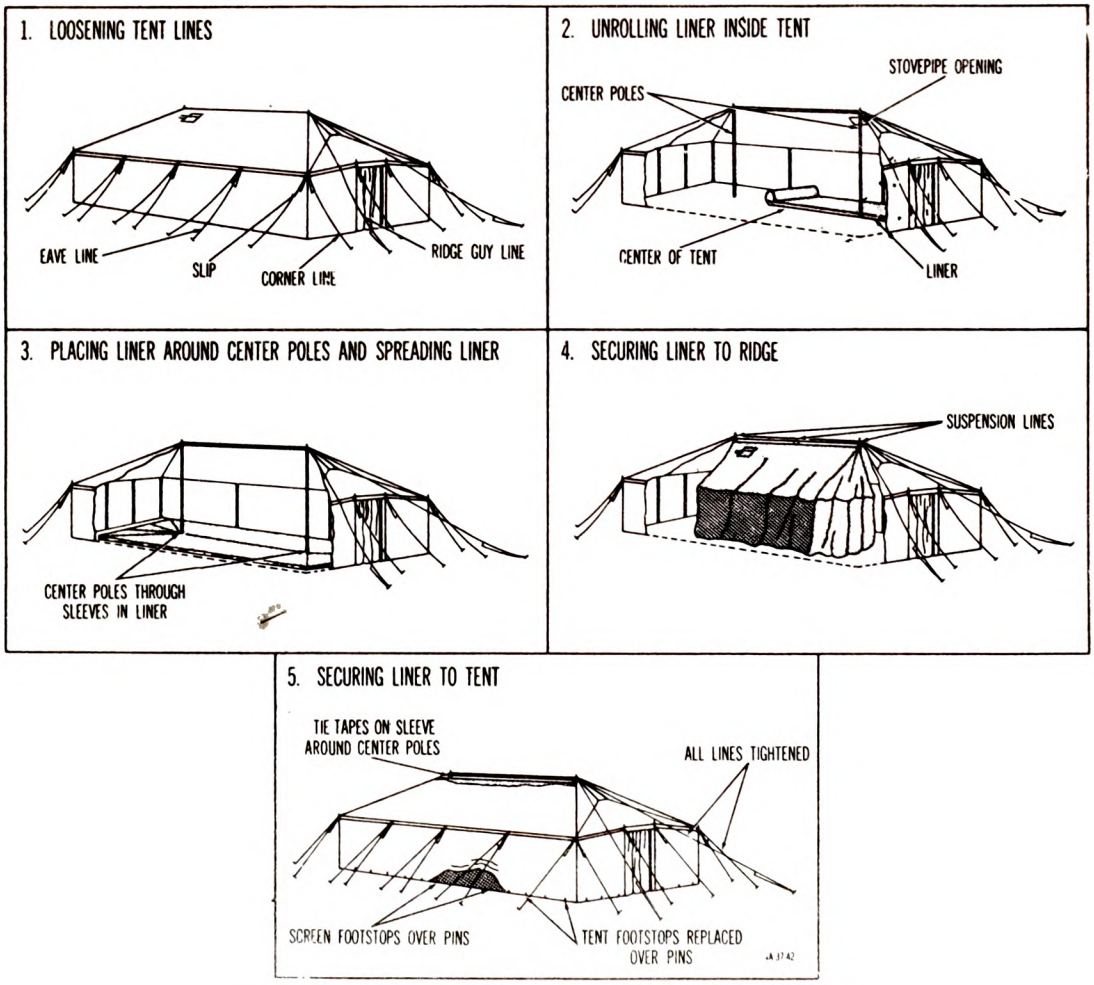


Figure 28. Steps in attaching liner to tent, general purpose, medium.

(2) *Striking tent.*

(*a*) Untie corner lug tie tapes and unwrap lugs from corner eave poles.

(*b*) Close doors and fasten wooden toggles to toggle chapes.

(*c*) Untie jumper lines from center upright poles and from eave and door poles.

(*d*) Remove all footstop pins except those at each corner of the tent.

(*e*) Remove all eave guy lines from guy line pins except those at the corners of the tent. Remove all unused guy line pins.

(*f*) Remove door eave poles and all other eave poles except those at corners.

(*g*) Remove ridge guy lines from tent pins, and lower center upright poles gently to the ground. Remove all unused tent pins.

(*h*) Disconnect center poles from ridge pole and remove poles from tent. Disassemble ridge pole and center poles.

(*i*) Unfasten the eight corner eave guy lines from guy line pins; remove corner eave poles; remove corner footstops from footstop pins; and remove remaining tent pins.

f. Folding.

(1) *Folding liner.*

(*a*) Lay liner out as flat as possible with eave suspension lines rolled and placed on top of liner. Fold side and end walls and sidewall screens under liner; fold triangular ends of end walls over liner roof (1, fig 29).

(*b*) Fold ends of liner toward center, making 6-foot folds. Fold one end of folded liner over the other (2, fig 29).

(*c*) Fold one end of folded liner toward the center and over the other end so that dimensions of folded liner are approximately 6 feet by 6 feet.

(*d*) Fold liner in half twice so that dimensions of folded liner are approximately 3 by 3 feet, place folded liner in center of liner cover, fold all cover ends of flaps neatly within package, and close cover securely

(2) *Folding tent.*

(*a*) Open corner slide fasteners, close tent doors, and close and secure stovepipe openings.

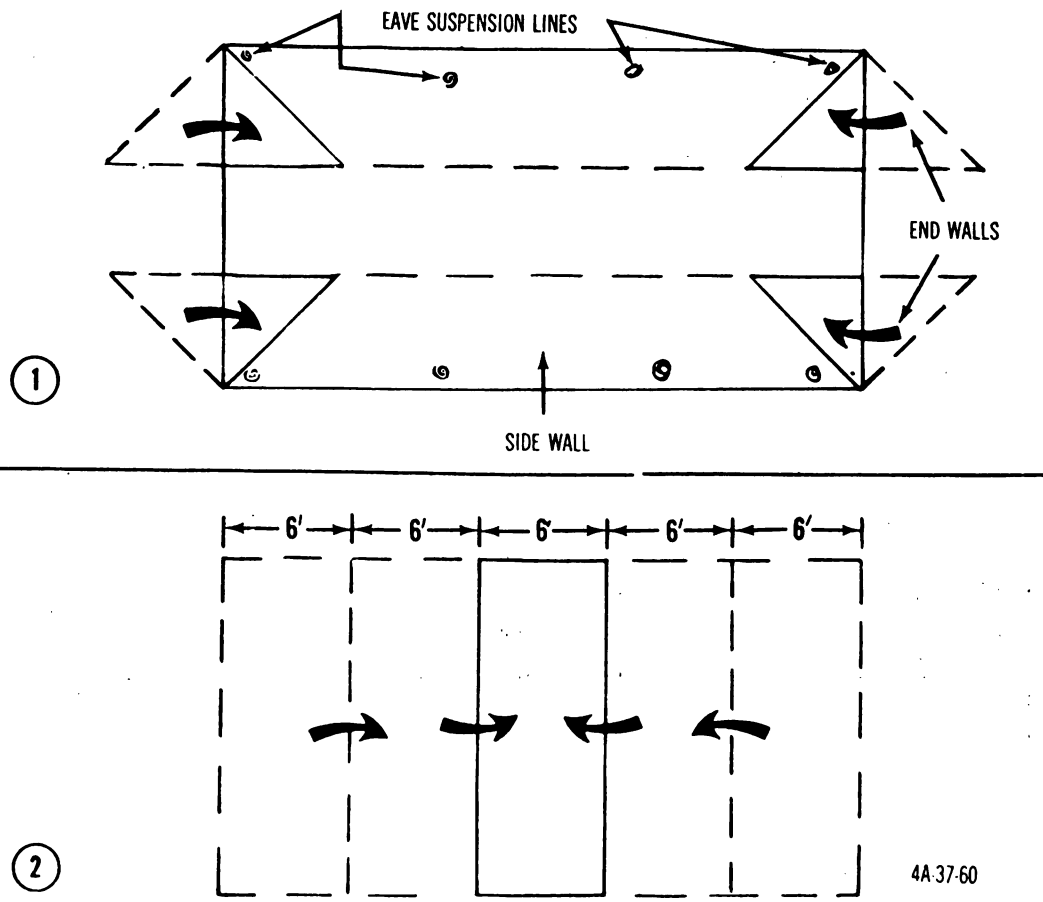


Figure 29. Steps in folding liner of tent, general purpose, [illegible]

(*b*) Spread tent out flat, outside up, and coil guy lines and place them on tent roof.

(*c*) Fold end and sidewalls, along eave line, on tent roof (1, fig 29).

(*d*) Fold ends of tent toward cent making 6-foot folds. Fold one end of fold d tent over the other (2, fig 29).

(*e*) Fold each end of folded tent toward center, making 4-foot folds; and overlap one end over the other (fig 30).

(*f*) Fold tent in half and place in center of cover (fig 30). Close cover securely.

26. Tentpoles

a. Types of Tentpoles. Tentpoles (fig 99) are of two types: upright and ridge. A ridge pole is usually fastened to two upright center poles by placing the spindles of the upright poles through holes at the ends of the ridge pole.

b. Description.

(1) Poles are made of wood except the magnesium adjustable telescopic pole used in the 10-man arctic tent, small general purpose tent, and the 5-man lightweight hexagonal tent.

(2) Poles may be made of one piece or they may be made in sections which can be joined.

(3) Each pole or pole section is marked to show type, length, and section component; for example, "Upright— male section for 12 ft. 3 in. pole." This marking is important and should be taken into consideration in all cases to make sure that each tent pole is in its proper place.

(4) When tents are being pitched, the upright poles are usually sunk from 2 to 4 inches into the ground.

27. Tent Lines

a. Types of Tent Lines. Tent lines may be made of manila, polyester, or metal. They will also vary in length from a 19-inch-long footstop to a 64-foot-long guy line.

(1) *Manila lines.* Exterior lines of most tents are manila lines. Guy lines of this type will shrink when wet and, as a result, should be loosened during rainy weather so that when they shrink they will not become tight enough to tear the tent.

(2) *Nylon lines.* Nylon lines are normally found on the interior of tents or on tent liners.

(3) *Metal lines.* The metal guy line assemblies are used with arrowhead-type ground anchors. These assemblies are approximately 11 feet long and consist of a metal cable, metal adjusting beads, a toggle bar, an S-hook, and a locking toggle. Adjustment of the guy line is made by sliding the adjusting beads through the locking toggle and then locking the toggle in position.

b. Knots. Four knots commonly used in tent pitching are the clove hitch, the round turn and two half hitches, the square knot, and the rolling hitch (fig 100).

(1) *Clove hitch.* The clove hitch is used to fasten a line to an anchorage. It will tighten as tension is applied, no matter which end of the hitch is pulled.

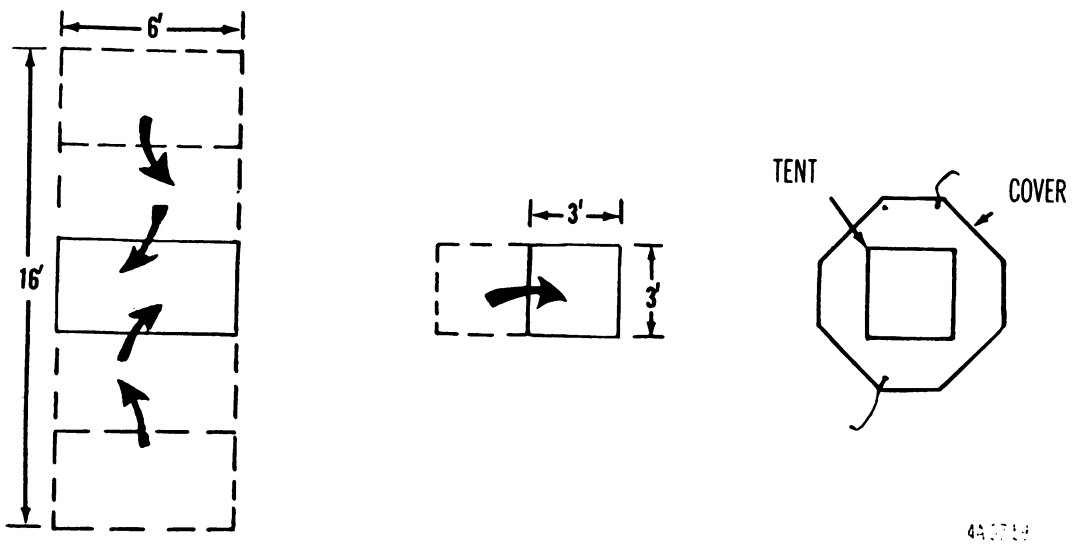


Figure 30. Folding tent, general purpose, medium.

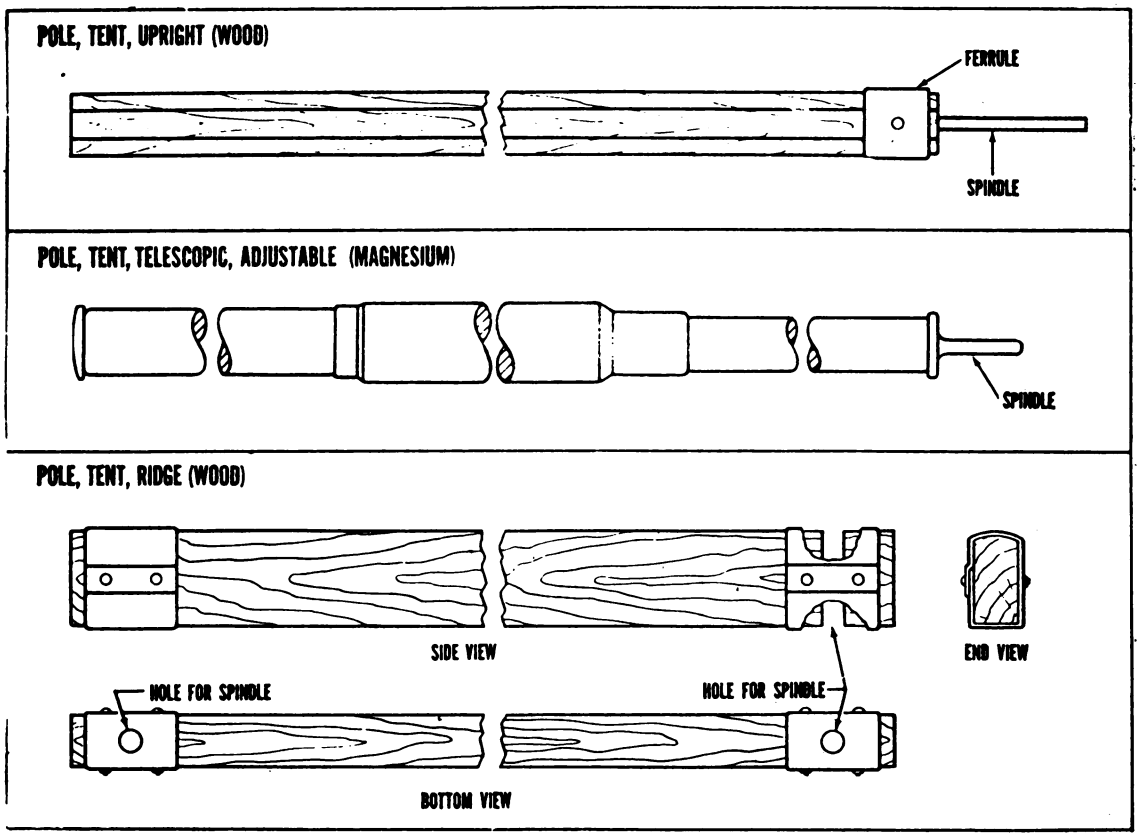


Figure 99. Tentpoles.

(2) *Round turn and two half hitches.* The round turn and two half hitches is used to fasten a line to an anchorage. For permanency, the running end should be seized to the standing part.

(3) *Square knot.* The square knot is used to join two lines of equal size.

(4) *Rolling hitch.* The rolling hitch is used to fasten one line to another, especially a small line to a larger one.

28. Anchoring Systems

a. Tent Pins.

(1) *Types of pins.* The types of pins (fig 101) used with tents described in this manual are the 16-inch, the 24-inch, and the 36-inch wood pins, the 9-inch aluminum pins, and the 12-inch steel pins. Ordinarily, the 16-inch wood pins are used for footstops and the 24-inch wood pins are used for ridge and guy lines. The 9-inch aluminum pins and the 12-inch steel pins are used under cold weather conditions and under hard ground conditions.

(2) *Method of driving pins.*

(*a*) All pins except the 24-inch guy line pins, 24-inch eave line pins, and the 16-inch latrine screen pins are driven vertically into the ground.The 24-inch guy line pins, 24-inch eave line pins, and the 16-inch latrine screen pins are driven into the ground at a 60-degree angle, with the top of the pins leaning toward the tent.

(*b*) Wood pins are driven with the notches away from the tent.

(*c*) Steel pins are driven with the rope retainer portion of the pin away from the tent.

(*d*) Aluminum pins are driven with the convex side of the pin away from the tent.

b. Arrowhead Ground Anchors.

(1) *Description.* Arrowhead ground anchors are issued in a kit which also includes a driving rod and a driving rod holder (fig 102).

(2) *Method of driving anchors.* The arrowhead ground anchors are driven vertically into the ground for at least 2 feet and not more than 2-1/2 feet. After the anchor has been

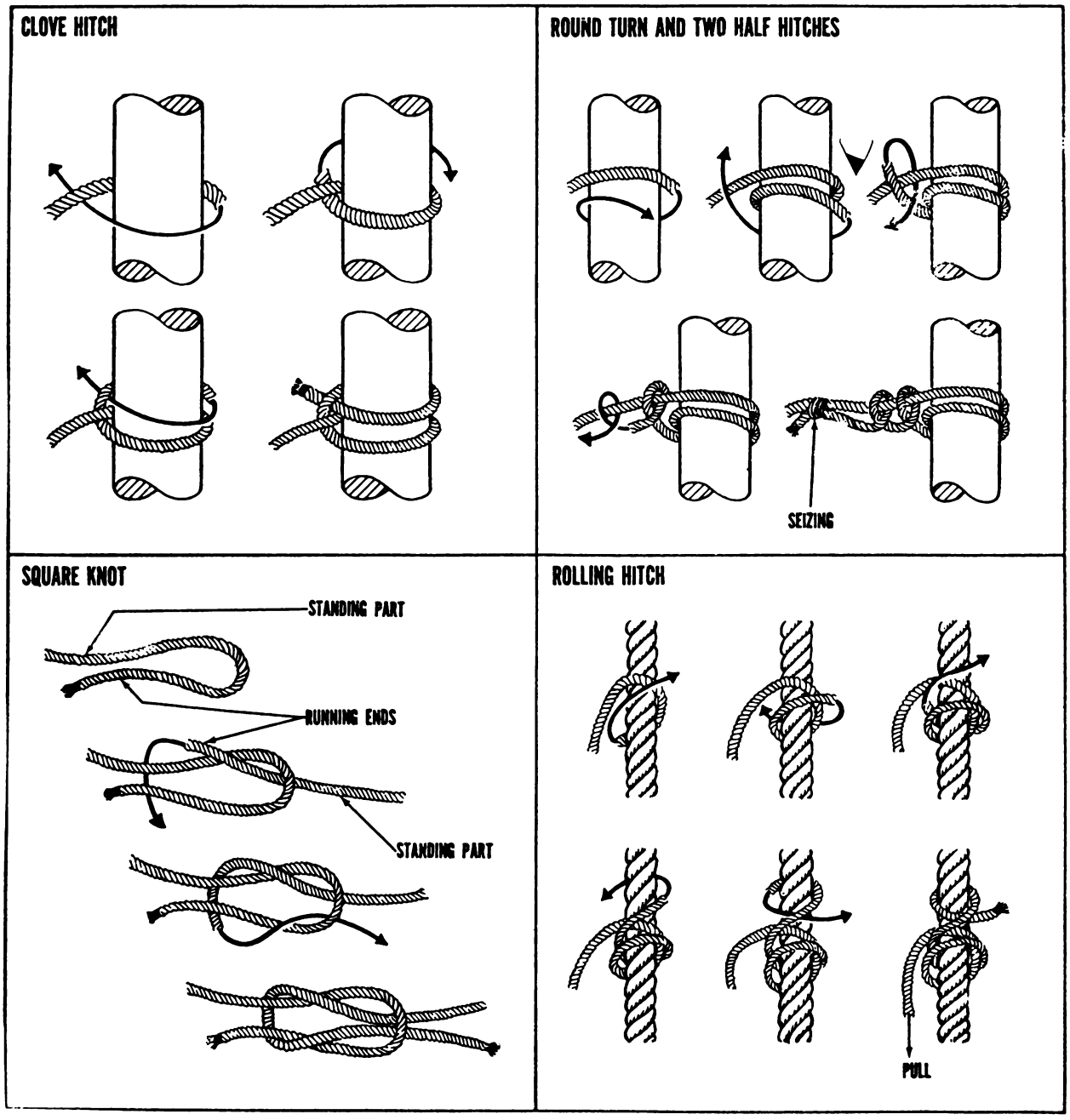


Figure 100. Knots used in tent pitching.

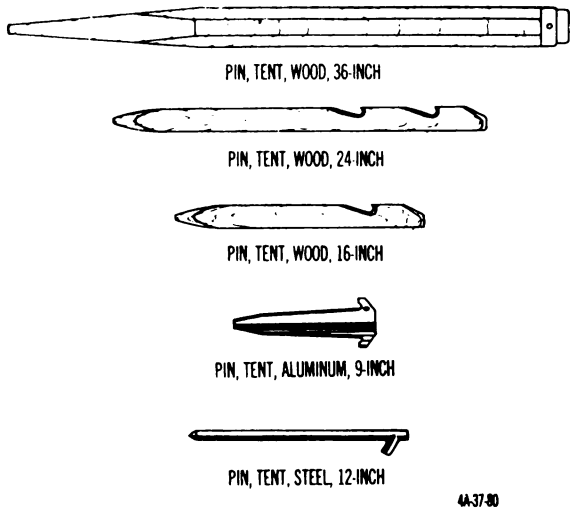
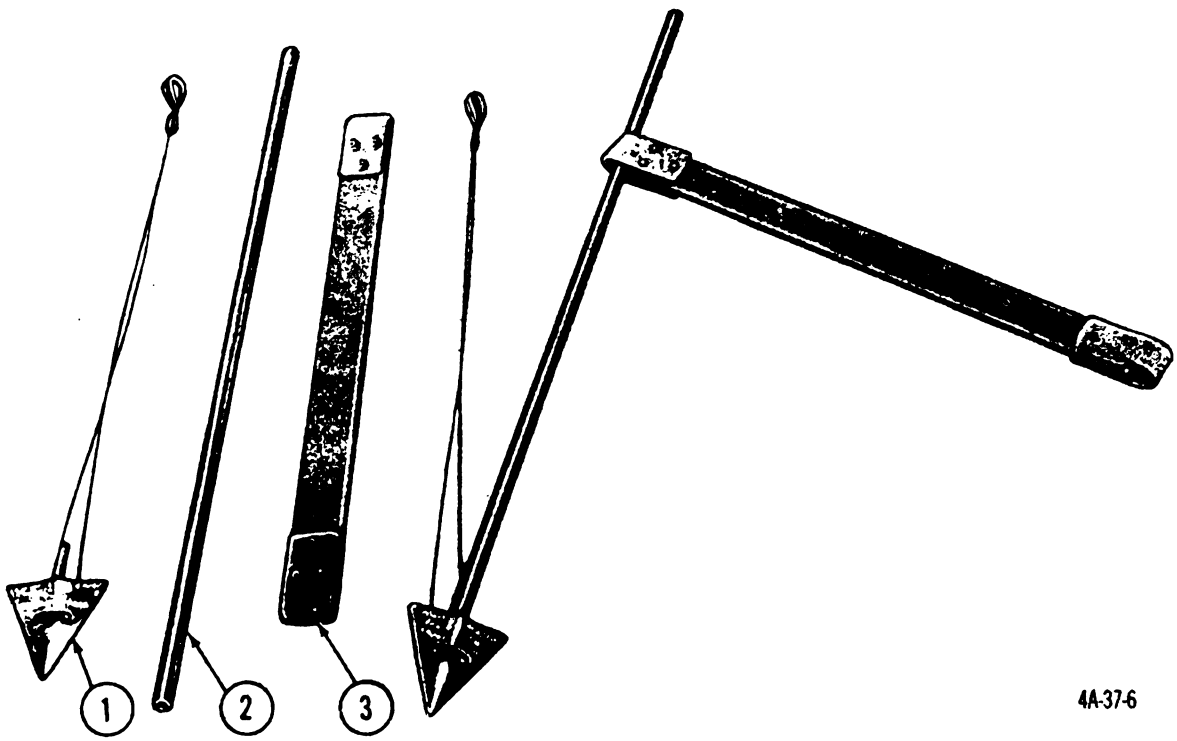


Figure 101. Tent pins.



1 Arrowhead ground anchor
2 Driving rod
3 Driving rod holder

Figure 102. Ground anchor with driving rod and driving rod holder.

driven into the ground, the anchor wire should be given a vigorous tug to upset the anchor in the ground. This action will insure stability of the ground anchor. In arctic regions, steel tent pins are used in lieu of arrowhead ground anchors.

29. Choosing Tent Site

The following points should be considered in choosing a tent site:

a. The ground should be level and free from projecting tree roots and rocks. When such a spot is not available, a place can often be leveled and cleared. In the woods, moss and rocks can be used to level the ground.

b. The ground should be high enough for drainage. Drainage can be improved by trenching around tents and digging an outlet ditch to divert water in the desired direction..

c. The tent should be protected from wind and storm.

d. An area having tough grass turf is desirable.

e. In woods, the location should be away from dead trees or trees with large dead branches.

f. In hot weather, a shady area free from underbrush is desirable.

g. The tent should be placed far enough from a river, lake, or other body of water to be above the high-water mark.

h. In mountainous country, the tent should never be placed in a canyon or next to a dry creek bed. Such places have been known to fill up with rushing torrents in a remarkably short time. The tent should never be placed at the base of a cliff or steep mountainside, where there may be danger from avalanches and falling rocks.

30. Pitching Tent in Snow

a. Before selecting a campsite on snow-covered ground, prod surface with an ice or ski pole to see whether snow conceals any crevices. It may be impossible to find an area entirely without crevices, but it is possible to avoid accidents by knowing where they are.

b. When an adequate site on snow has been found, pack snow hard by stamping on it with skis or snowshoes, or better still, shovel top snow off until firm snow is found below.

c. Pitch tent so that entrance is not directly downwind. If the tent is pitched on snow with the entrance directly downwind, the entrance may become blocked, since snow tends to pile up in the lee of any object.

d. If site is not temporary, dig tent into snow. This will provide better protection from the wind. In open terrain with a strong wind, it may be necessary to build a snow wall on the windward side of the tent to protect it from the wind; thus the tent is easier to heat and is less likely to blow down. Leave some space between sides of tent and snow wall to have room to shovel out snow that may drift into tent.

e. When a tent is pitched on a slope, a horizontal platform should be formed. The snow which is removed may be packed around the outer edge of the platform to widen the space for the tent.

f. High winds, common in cold weather regions, require that tents be anchored securely. Tent pins may not provide sufficient achorage. Arctic tents have snow cloths sewed along the bottom edge of tent walls. When an arctic tent is set up, snow cloths should be flat on the ground outside the tent. Place snow, snow or ice blocks, stones, logs, or other heavy objects on the cloths to help anchor the tent.

g. Do not attempt to drive tent pins into hard, frozen ground if the force required is excessive. Instead, chop small holes into the ground, insert tent pins into holes, and fill holes with slush or water; in a short time the tent pins will be firmly anchored. When removing pins from frozen ground, always chop them out; never hammer them sideways to break them loose.

h. Snow carried into a tent will melt and wet sleeping bags and clothing. The following precautions should be taken to keep snow out of tents:

(1) Each man must take care to brush all snow from his clothing and boots before entering a tent.

(2) One man should enter the tent first and take the sleeping bags, packs, and other articles from the other man after the items have been brushed off completely.

31. Trenching Tent

a. A safe rule to follow is to always trench a tent. When the tent is pitched on heavy soil, clay, or a flat rocky surface, a trench should always be dug. When the tent is set up on a very sandy soil, which absorbs water as fast as it falls, or when it is located on a mound which slopes off in all directions, a trench may not be necessary.

b. Dig trench all around the tent (fig 103 and 104). Cut straight down just outside footstop pins; do not dig in a V-shape. Slope the side away from the tent.

c. Throw dirt from trench away from the tent; never throw it against the tent, for it will quickly rot the canvas.

d. In most cases, do not dig trench more than 4 or 5 inches deep and in the shallowest place not over 3 inches. There should be enough slope in the trench so that the water will flow freely toward the outlet and not back up.

e. To carry the water off, dig an outlet ditch (fig 104) at the lowest point of the area and connect it to the trench which has been dug around the tent.

f. When there is a possibility that water may flow in from higher ground, dig a ditch to divert the water before it can reach the tent.

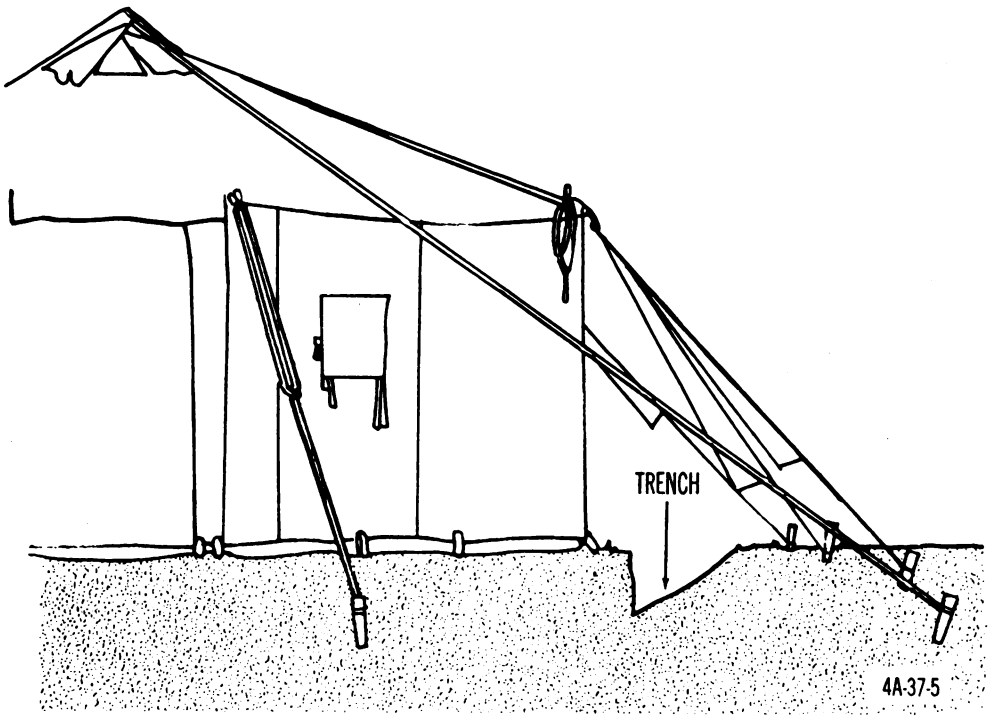


Figure 103. Cross-section view of tent trench.

32. Heating

a. Stoves and Heaters. Information on the types, quantity required, and operation of stoves and/or heaters authorized for use with tents can be found in appropriate technical manuals.

b. Stovepipe Openings. Stovepipe openings are built into most tents. Some openings are reinforced and the tent protected against the head of the stack; others are not protected. Metal shields, which are available, should be placed in the stovepipe openings of tents where there is no reinforcement or heat protection for tent material. Stovepipe openings have canvas flaps attached, which may be closed for protection against the weather and left open for ventilation when stoves are not in operation.

c. Heating Individual Shelters. Normally, there is no provision for heating the 2-man mountain tent. However, when men are forced to stay in it for long periods of time or when the men are wet and need to dry off, one or more of the following expedient measures can be used.

(1) A brush fire can be built over the area on which the tent is to be pitched and kept going for an hour or two. Then, the area should be cleared of all coals and sparks and the tent set up. The ground will remain warm

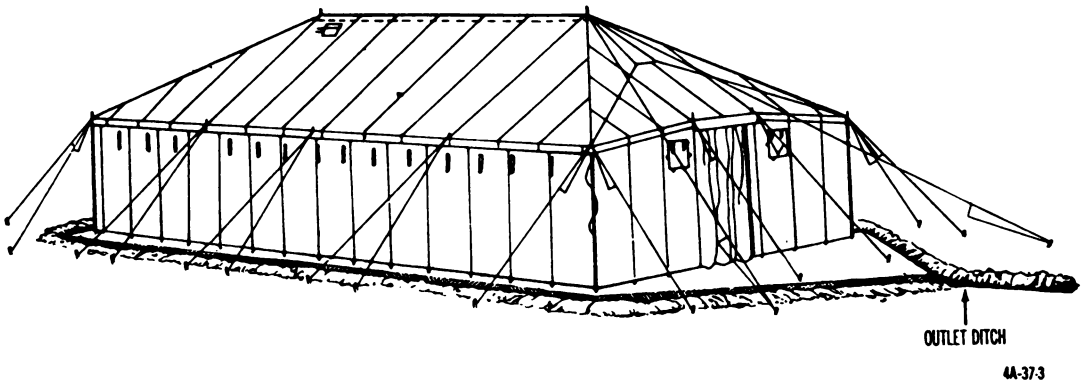


Figure 104. Trenching a tent.

for several hours, and the earth will be dry to sleep on.

(2) Stones 5 or 6 inches in diameter can be put in a hot fire for 2 or 3 hours, and then rolled or lifted with forked sticks into the tent. If a bucket or other metal container is handy, it can be used to hold the rocks or it can be placed upside down over them. The rocks will continue to give off heat for several hours. If there is not sufficient room to pile hot rocks in the tent safely, dig a hole and fill it with hot rocks even with, or slightly below, the surface of the ground.

(3) Although the one-burner cooking stoves issued are intended for cooking purposes, their heat will also take the chill off the inside of of individual shelters. However, be extremely careful of this method of heating the two-man mountain shelter because of the danger of carbon monoxide.

(4) A gasoline lantern is an excellent heater, and even candle lanterns will take off the chill.

33. Ventilation

It is extremely important that a tent used for housing personnel or for sheltering working parties be ventilated properly. Most tents have built-in ventilators of various types. When stoves are not being used, stovepipe openings can be used for additional ventilation In hot weather, the doors can be opened, and on most tents the sidewalls can be rolled up, or the windows opened, to give free circulation of air. The air coming in around the bottom of the tent should never be depended upon for ventilation. If the sod cloth or snow cloth is properly weighted down, very little air will enter. The bottom edge of the tent is the least desirable from which to get ventilation. It is like trying to ventilate a house through the cracks in the floor.

34. Care of Tentage

Probably the greatest amount of damage to tentage is caused by carelessness, such as forgetting to loosen the lines when it starts to rain, not bothering to use spark arresters or draft diverters, adjusting lines carelessly, driving pins in a slipshod manner, or dragging tents over rough ground. To prolong the life and usefulness of tentage, observe the following rules:

a. Pitch, strike, and fold tentage in the manner described in this manual. Do not try to take shortcuts unless you are sure no damage will be done. To protect the top of the tent during handling and in storage, fold the tent so that the sidewalls rather than the top of the tent will be exposed.

b. Observe the utmost care when pitching and striking tents, making sure the material does not tear on protruding pins, overhanging branches, or other objects.

c. Never drag a tent along the ground or floor.

d. Use all the necessary parts and accessories for each tent and use them for their intended purpose.

e. Pack tents carefully for shipment. Some tents are issued complete with bag or cover. In this case, carry tent in bag or cover. When no bag or cover is issued, the tent is usually received wrapped in osnaburg or burlap. Save this material for rewrapping when the tent has to be moved again. Normally, a tent should never be transported without a covering of some kind. make sure that it is in serviceable condition.

f. Pack pins and poles separately from the tent itself except when tent instructions require them to be packed with the tent.

g. Inspect tentage at frequent intervals to be sure that it is in serviceable condition. Particular attention should be given to seams, bindings, lines, and all places where strain is exerted. Be constantly on the lookout for—

(1) Any evidence of mildew.

(2) Any foreign matter which may have collected on the tent.

(3) Small rips and holes, splitting of seams, grommets which have become loose, lines which are beginning to rot, or anything else which does not appear to be in normal condition.

35. Protection Against Rain

a. Most tents are water repellent. However, rain causes tent canvas and lines to shrink, the shrinkage often becoming sufficient to tear the tent. Tents have been torn completely in two under such circumstances.

b. Before tent lines become water soaked, loosen them sufficiently so that when they shrink they will not become tight enough to tear the tent. To compensate for shrinkage, eave and corner lines should have a free swing of approximately 18 inches at the middle of the line.

36. Protection Against Wind

In a strong wind, tighten all lines immediately. Close door entrances, secure walls to footstop pins, and close all corners.

37. Protection Against Fire

Most tents are fire resistant. This does not mean that they will not burn; they usually do not burst into flame, but smolder and char.

b. When using a stove in a tent, every precaution must be taken to avoid fires. Spark arresters or draft diverters must be installed and shields placed around stovepipe openings. All personnel should be well trained in building and maintaining stove fires and should be familiar with all fire regulations.

c. Whenever possible, fire exinguishers containing water should be kept in the tent area.

38. Protection Against Mildew

a. Most tents are mildew resistant. This does not mean that they are not subject to mildew. Under warm and damp conditions, especially in tropical and jungle areas, tents may be ruined by mildew in a few days, if proper care is not taken.

b. To prevent mildew, follow these rules:

(1) Never fold or roll a tent when wet. Even if it is only damp from dew, it will mildew when stored. Make doubly sure that the seams and edges of the tent, especially the bottom edge and the sod cloth, are dry.

(2) When storing or transporting, keep pins and poles separate from tents, except when tent instructions require them to be packed with the tent. In the case of the latter, make sure the pins and poles are cleaned and dried before being placed with the tent.

(3) Keep tents clean at all times. If a tent is pitched under trees, inspect the tent roof frequently to see if it is being harmed by drippings from branches or leaves. The growth of fungi and mold is caused to some extent by tree drippings, oils, greases, and starches, which accumulate on tentage.

(4) Before storing, dry a tent by hanging it up off the ground in bright sunlight. A tent dried on the ground or left hanging outdoors after sundown might absorb enough dampness for mildew to start. When necessary, a tent can be dried indoors. When drying indoors, hang the tent in a well-ventilated place, high enough to permit the tent to be suspended off the floor.

(5) Do not drag tentage along the ground or permit it to come in contact with the ground while in storage.

(6) When storing tents, stack them on dunnage supported by 2- by 4-inch lumber.

(*a*) If the floor is hard surfaced or wooden, the tentage should be at least 4 inches from the floor.

(*b*) If the floor is earthen, the tentage should be at least 8 inches from the ground.

(*c*) Only lumber that has been thoroughly cured should be used for dunnage, since the moisture contained in green lumber will promote the growth of mildew.

(*d*) When dampness in the atmosphere is prevalent, dunnage should be used between each course to permit circulation of air between the blocks. The blocks should be separated and reduced to a minimum number of courses to permit passage of air on all four sides.

(7) When tents are to be stacked near ventilators or openings that may admit moisture, protect tents by packing them in bags or waterproof coverings.

(8) Do not place tentage received from the field in bags until tents are thoroughly dried and all dirt removed by stiff brushes. If any visible signs of mildew are present, hang tents in open air, preferably in the sun.

(9) Give priority of issue to tentage that has been in storage the longest. To prevent issue of newly stored tentage before older stocks are exhausted, blocks should be marked in accordance with length of time tentage has been in storage.

(10) When tentage is stored in open sheds or in tents it should be stacked well away from the sides and ends of shelter (preferably about 2 feet), and items not affected by moisture should be stacked between tentage and outer edges of shelter.

(11) Withdraw from storage tentage found to be infected with mildew. Brush with a stiff brush, allow to dry thoroughly, and issue immediately to installations where driest atmospheric conditions prevail. If there is no opportunity for immediate issue, segregate infected tentage from sound tentage to prevent contamination. Tents which have become unserviceable should be turned in to a salvage installation for classification, repair, and return to stock, or for destruction.

APPENDIX

REFERENCES

FM 20-15	Pole and Frame Supported Tents
ASubjScd 8-7	Tent Pitching

SELF-GRADING
LESSON EXERCISES

REQUIREMENT. Exercises 1 through 22 are multiple choice. Each exercise has only one single-best answer. Indicate your choice by circling its letter.

1. The prescribed means of heating the medium general-purpose tent is by the use of

   a. one 250,000-B.t.u. duct type heater.

   b. two M-1941 tent stoves.

   c. two 5,000-B.t.u. gasoline burner stoves.

   d. four M-1950 Yukon stoves.

2. The medium general-purpose tent is provided with a cover to provide protection

   a. from the cold in the winter.

   b. when the tent is in storage or being transported.

   c. from insects.

   d. while being folded.

3. The time required for four men to pitch the medium general-purpose tent is approximately

   a. 20 minutes.

   b. 30 minutes.

   c. 40 minutes.

   d. 50 minutes.

4. Pins are driven into the ground at each corner of the tent so the tent may be secured before the walls are raised. What type of pins should be used in cold climates?

   a. 16-inch steel pins.

   b. 9-inch aluminum pins.

   c. 24-inch wood pins.

   d. 12-inch steel pins.

5. The time required for four men to strike the medium general-purpose tent is approximately

   a. 30 minutes.

   b. 40 minutes.

   c. 50 minutes.

   d. 60 minutes.

6. The first step a soldier takes when striking a tent is to

   a. close doors and fasten the wooden toggles to toggle chapes.

   b. remove all footstop pins except those at each corner of the tent.

   c. untie corner lug tie tapes and unwrap lugs from corner eave poles.

   d. untie jumper lines from center upright poles and from eave and door poles.

7. When the tent is completely folded, it occupies an area of 3 feet by

   a. 1 foot.

   b. 2 feet.

   c. 3 feet.

   d. 4 feet.

8. Poles for the medium general-purpose tent are made of

   a. wood.

   b. magnesium.

   c. aluminum.

   d. steel.

9. When the medium general-purpose tent is pitched, the upright poles are sunk into the ground approximately

   a. 2 to 4 inches.

   b. 4 to 6 inches.

   c. 6 to 8 inches.

   d. 8 to 10 inches.

10. Which of the following may cause tent damage in rainy weather?

   a. Sagging tent liner.

   b. Shrinking exterior lines.

   c. Torn cover.

   d. Tight square knots.

11. Metal line assemblies include

a. metal adjusting beads and C-clamp.

b. a toggle bar and locking toggle.

c. an S-hook and U-bolt.

d. a locking toggle and toggle bolt.

12. When pitching the medium general-purpose tent, you would use the 16-inch wood pins to anchor the

a. ridge lines.

b. guy lines.

c. footstops.

d. eave lines.

13. The 24-inch guy line pins are driven into the ground at a

a. 30-degree angle.

b. 40-degree angle.

c. 50-degree angle.

d. 60-degree angle.

14. The arrowhead ground anchors are driven vertically into the ground for at least

a. 1 foot.

b. 1 1/2 feet.

c. 2 feet.

d. 2 1/2 feet.

15. A tent site in a canyon would be unacceptable because of the danger of

a. avalanche.

b. wind damage.

c. flash flood.

d. falling trees and rocks.

16. In frozen ground, it is sometimes necessary to chop small holes into the ground, insert pins into holes, and fill the holes with

a. ice or snow.

b. rocks and gravel.

c. mud and gravel.

d. slush and water.

17. Which of the following would cause the canvas of a tent to rot?

a. Storing the tent so that air can pass on all four sides.

b. Pitching the tent on snow-covered ground.

c. Piling dirt from the trench against the sidewalls.

d. Transporting the folded tent in a cover.

18. Carelessness in handling and maintaining tentage includes all of the following EXCEPT

a. forgetting to loosen the lines when it rains

b. failing to use spark arresters or draft diverters.

c. dragging the tent over rough ground.

d. exposing the sidewalls when folding.

19. To compensate for shrinkage, eave and corner lines should have a free swing of approximately

    a. 6 inches.

    b. 12 inches.

    c. 18 inches.

    d. 24 inches.

20. In a strong wind, tentage should be protected by

    a. opening all corners.

    b. opening all door entrances.

    c. closing all door entrances.

    d. loosening all lines.

21. To protect tentage against mildew, stack tengage on dunnage supported by

    a. 1- by 12-inch lumber.

    b. 2- by 4-inch lumber.

    c. 2- by 8-inch lumber.

    d. 4- by 12-inch lumber.

22. Tentage stored in open sheds or in tents should be stacked well away from the sides and ends of the shelter, preferably about

    a. 2 feet.

    b. 4 feet.

    c. 6 feet.

    d. 8 feet.

REQUIREMENT. Exercises 23 through 26 are matching exercises. Column I lists types of knots used in pitching the tent. Column II lists uses of the knots. Select the use in column II that matches the type of knot in column I and indicate your answer by writing the column II letter below the column I number. Choices in column II may be used once, more than once, or not at all.

Column I	Column II
23. Clove hitch.	a. Fastens a line to an anchorage.
24. Round turn and two half hitches.	b. Fastens one line to another.
25. Square knot.	c. Ties wire rope of equal size.
26. Rolling hitch.	d. Ties wire rope of unequal size.
	e. Joins two lines of equal size.

REQUIREMENT. Exercises 27 through 35 are true-false. Indicate the answer on the answer form by writing a T or an F next to the exercise number.

27. The medium general-purpose tent is equipped with a liner so that it can be used effectively in cold weather.

28. The metal guy line assemblies are used with arrowhead-type ground anchors.

29. Wooden pins are driven so that the notches are away from the tent.

30. When pitching the tent on heavy soil, clay, or flat rocky surfaces, a trench should be dug.

31. Tentage inspections should include particular attention to all places where strain is exerted.

32. When the medium general-purpose tent is slightly damp from the dew, it may be stored without drying.

33. The growth of fungi and mold is caused by tree drippings, oils, greases, and starches which accumulate on tentage.

34. Either throughly cured or green lumber is acceptable for use as dunnage.

35. All tentage infected with mildew should be turned in to salvage so as not to contaminate sound tentage.

HAVE YOU COMPLETED ALL EXERCISES? DO YOU UNDERSTAND EVERYTHING COVERED? IF SO, TURN TO THE NEXT PAGE AND CHECK YOUR ANSWERS AGAINST THE SOLUTIONS.

U.S. ARMY QUARTERMASTER SCHOOL
FORT LEE, VIRGINIA 23801

SOLUTION SHEET

TENT PITCHING, STRIKING, AND FOLDING

Check your work against the solutions given below. If you have made a wrong response or omitted a required response, correct your work. Then, go back and restudy the appropriate text portion once more (references follow each solution).

Ex	Sol	Ref
1.	b	para 8b(5)
2.	b	para 8b(6)
3.	c	para 8d
4.	b	para 8d(1)(c)
5.	a	para 8e
6.	c	para 8e(2)(a)
7.	c	para 8f(2)(f) & fig. 30
8.	a	para 26b(1)
9.	a	para 26b(4)
10.	b	para 27a(1)
11.	b	para 27a(3)
12.	c	para 28a(1)
13.	d	para 28a(2)(a)
14.	c	para 28b(2)
15.	c	para 29h
16.	d	para 30g
17.	b	para 31c
18.	d	para 34
19.	c	para 35b
20.	c	para 36
21.	b	para 38b(6)
22.	a	para 38(10)
23.	a	para 27b(1)
24.	a	para 27b(2)
25.	e	para 27b(3)
26.	b	para 27b(4)
27.	T	para 8b(7)
28.	T	para 27a(3)
29.	T	para 28a(2)(b)
30.	T	para 31a
31.	T	para 34g
32.	F	para 38b(1)
33.	T	para 38b(3)
34.	F	para 38b(6)(c)
35.	F	para 38b(11)

All references are to the Lesson Text.

HAVE YOU CHECKED YOUR ANSWERS, MADE CORRECTIONS, AND RESTUDIED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON TO THE NEXT LESSON OF THIS SUBCOURSE.

STUDENT INQUIRY SHEET

Number/Title	Date
LESSON 2, QM0483 Tent Pitching, Striking and Folding	February 1973 Reprint Repr (A), Oct 75

Use this form if you have a question or request for information concerning a subcourse lesson or examination. This form may be used to ask questions about lesson or examination exercises, but not to request solutions to those exercises. Use this form also for comments, suggestions, requests for additional subcourses, and other informal communications concerning your correspondence course enrollment.

Last Name	**First Name**	**MI**	Student Number/SSAN	Military Rank

Address (No., street, city and state)	**Zip Code**	Civilian Grade

If your name, grade, or address is new, please place an X in this box ☐	Date Submitted

Request information on or clarification of the following points:

The following errors have been found in the instructional materials:

(Additional space is available on the other side of this form.)

QMFL Form 101
Rev May 75

13S-4720

Note. Fold this inquiry sheet with this School's address on the outside, staple or scotch tape it closed, and mail without an envelope.

CUT ALONG ---------- THIS LINE

Use this space for additional comments.

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STUDENT INQUIRY SHEET

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LESSON 3 Credit Hours: 2

LESSON ASSIGNMENT

SUBJECT: Field Bath and Delousing Equipment.

STUDY ASSIGNMENT: Lesson Text.

SCOPE: Nomenclature and function of delousing outfit; procedure to set up, start, operate, and close out operations of bath unit; maintenance on the bath and delousing equipment; safety requirement on the equipment.

OBJECTIVES: As a result of successful completion of this assignment, the student will be able to--

1. State the nomenclature and function of the two major components of the delousing outfit.
2. Describe the use of the fumigation bag and insecticides.
3. Describe the procedures used to set up, start, operate, and shut down operations of the bath unit, including maintenance services.
4. State the nomenclature and describe the construction of the 250,000-B.t.u. duct-type heater used in bath and delousing operations, and explain its function.
5. State the safety precautions required for bath unit equipment.

LESSON TEXT

SECTION I

BATH UNIT

1. CHARACTERISTICS. The eight-showerhead bath unit is simply constructed, light in weight, and easily maintained. For maximum portability, the bath unit is made up of separate components.

2. SETTING-UP PROCEDURES. The bath unit should be located on level ground beside a stream. The equipment should be placed in a level position, preferably in a triangular formation (fig. 1). When the unit is moved from the carrier, it should be handled carefully. Four men are required to lift the water heater and four men are required to lift the generator. Procedures for setting up the bath unit are as follows:

a. GENERATOR. Place generator 15 to 20 feet from water pump. Drive the ground rod into the ground as close to generator as possible. Connect the generator grounding terminal stud to the ground rod.

b. WATER PUMP. Place water pump within 10 feet of stream or water tank (fig. 1). Prime the pump.

c. WATER HEATER. Place water heater about 15 to 20 feet from water pump, using lever located on the skid below the blower to adjust heater to a level position. Turn water heater exhaust duct to the right to lock it in position. Do not allow duct to contact hoses or canvas shelter.

d. HOSES. Connect one end of the 15-foot hose to water pump inlet and the other end to suction strainer. Place suction strainer on rocks at the water source. Never place strainer directly on the bottom of the water bed since it picks up gravel which may damage the pump. Connect another hose to the outlet of water pump and to the inlet pipe of water heater located beside the exhaust duct. Connect adapter ends of the two remaining hoses to couplers located on the water manifold on top of the heater.

e. SHOWER ASSEMBLY. Place shower assembly approximately 20 feet from water heater.

f. POWER CABLES. Turn off water pump and heater switches before connecting power cables to the unit.

3. BEFORE-OPERATION INSPECTIONS AND SERVICES. Before-operation inspections are performed to insure that the bath unit is ready for operation and to discover and correct defects before they result in serious damage or failure. DA Form 2400 (Equipment Utilization Record) is used to control equipment listed (fig. 2). DA Form 2404 (Equipment Inspection and Maintenance Worksheet) (fig. 3) is used to record deficiencies and corrective action taken. TM 38-750 should be used as a guide in recording information on equipment. Inspections are performed as follows:

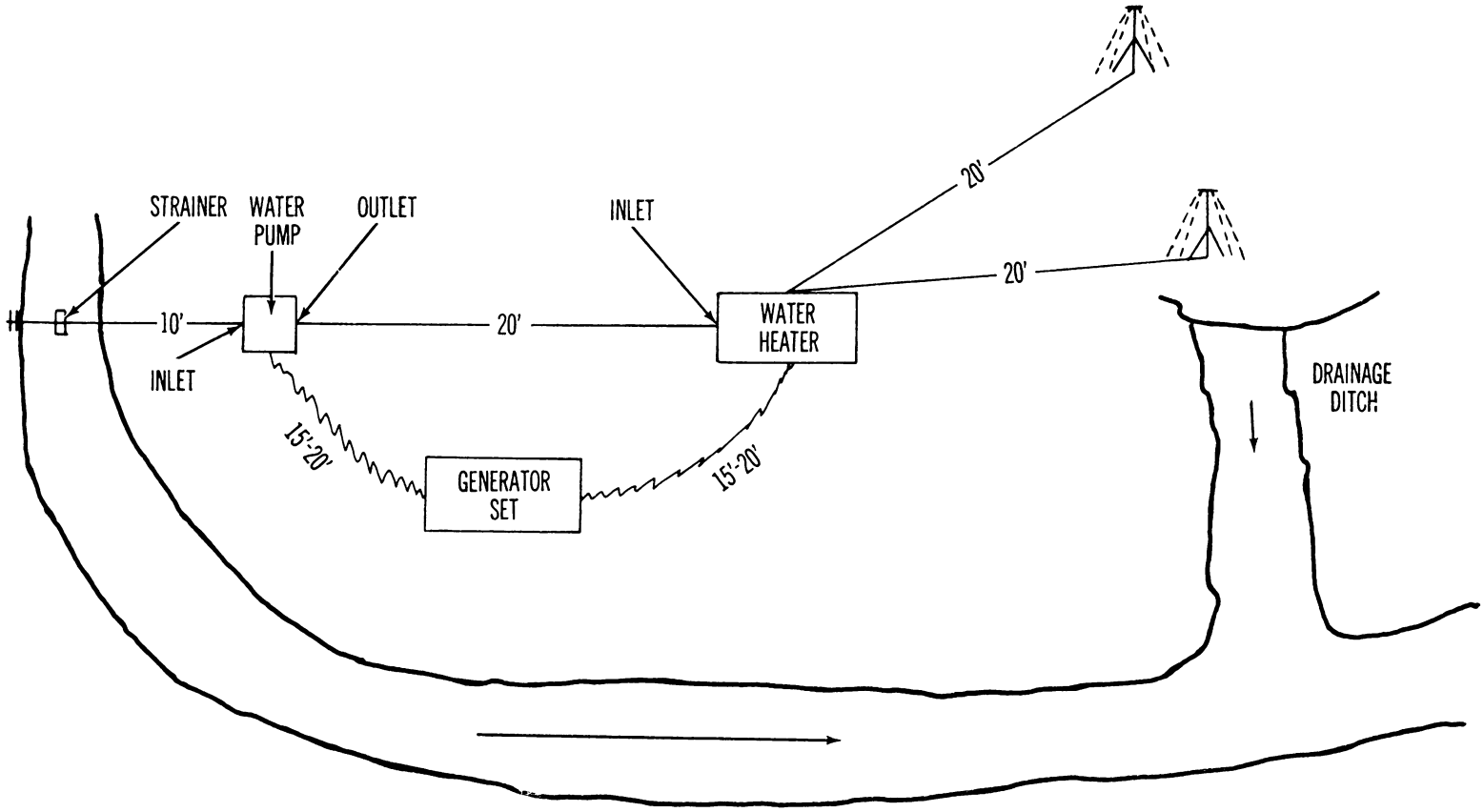


Figure 1. Operational layout.

EQUIPMENT UTILIZATION RECORD
(TM 38-750)

DATE	TYPE	USA NUMBER/SERIAL NUMBER	ADMINISTRATION NUMBER
8 May -	Generator Set Gasoline Engine: 3 KW	1G6396	A-39

ORGANIZATION	ACTION	TIME	MILES	HOURS	
97th Sup and Svc Co, DS					
1ST OPERATOR: A.B. Smith	IN	1700		20	REPORT TO: Lt. J.B. Carson
OPERATOR'S SIGNATURE: A.B. Smith	OUT	0700		17	DISPATCHER'S SIGNATURE: J.H. O'Brien
	TOTAL	10:00		3	
2ND OPERATOR	IN				REPORT TO
OPERATOR'S SIGNATURE	OUT				DISPATCHER'S SIGNATURE
	TOTAL				
3RD OPERATOR	IN				REPORT TO
OPERATOR'S SIGNATURE	OUT				DISPATCHER'S SIGNATURE
	TOTAL				
4TH OPERATOR	IN				REPORT TO
OPERATOR'S SIGNATURE	OUT				DISPATCHER'S SIGNATURE
	TOTAL				

DESTINATION	TIME ARRIVE	TIME DEPART	RELEASED BY (Signature)	REMARKS
FROM 1.			S.M. Muffo	
TO 2.				
TO 3.				
TO 4.				
TO 5.				
TO 6.				
TO 7.				
TO 8.				
TO 9.				
TO 10.				
TO 11.				
TO 12.				
TO 13.				
TO 14.				
TO 15.				

DA FORM 1 JAN 64 2400

Figure 2. DA Form 2400 (Equipment Utilization Record).

EQUIPMENT INSPECTION AND MAINTENANCE WORKSHEET

(TM 38-750)

1. ORGANIZATION	2. NOMENCLATURE AND MODEL
65th Sup and Svc Co, DS	Generator Set MEP-021A

3. REGISTRATION/SERIAL/FSN	4a. MILES	b. HOURS	c. ROUNDS FIRED	d. HOT STARTS	5. DATE	6. TYPE INSPECTION
6115-017-8238		40			9/2.5	daily

7. APPLICABLE REFERENCE

TM NUMBER	TM DATE	TM NUMBER	TM DATE
5-6115-271-14	Jun 12, 90		

INSTRUCTIONS - Perform each check listed in the TM applicable to the inspection performed. Following the sequence listed in pertinent TM, complete form as follows:

COLUMN a - Enter TM item number.

COLUMN b - Enter the applicable condition status symbol.

COLUMN c - Enter deficiencies and shortcomings.

COLUMN d - Show corrective action for deficiency or shortcoming listed in Column c.

COLUMN e - Individual ascertaining completed corrective action initial in this column.

ALL INSPECTIONS AND EQUIPMENT CONDITIONS RECORDED ON THIS FORM HAVE BEEN DETERMINED IN ACCORDANCE WITH DIAGNOSTIC PROCEDURES AND STANDARDS IN THE TM CITED HEREON.

9a. SIGNATURE (Person(s) performing inspection)	9b. TIME	9a. SIGNATURE (Maintenance Supervisor)	9b. TIME	10. MANHOURS REQUIRED
W. F. Vane, CPL		A. B. Brown, SFC		2

TM ITEM NO. a	STATUS b	DEFICIENCIES AND SHORTCOMINGS c	CORRECTIVE ACTION d	INITIAL WHEN CORRECTED e
	X	5118		WFP
	X	5119		WFP
	X	5120		WFP
	X	5121		WFP
	X	5122		WFP
1		defective ground stud	DA Form 2407 (org)	A.B.B.

DA FORM 1 JAN 64 2404

Figure 3. DA Form 2404 (Equipment Inspection and Maintenance Worksheet).

a. GENERATOR. Inspect fuel tank for leaks and replenish the fuel supply if it is inadequate. Check engine oil level and add oil, if necessary. Check fuel strainer for damage and inspect instruments for broken glass or loose mountings. Inspect frame for proper grounding and for dents, cracks, or other damage. Examine shock mounts, loading strap, and canvas cover for good condition.

b. WATER PUMP. Inspect water pump for damage and check suction lift for 15 feet. Be sure that suction strainer is free of leaves and debris and that it is installed in the proper position. Insure that strainer port plugs fit tightly in drain ports, that draincock is closed, and that pump strainer basket is clean. Check power cables for proper condition and connection.

c. HOSES. Check hoses for correct, tight connections and for freedom from kinks and sharp turns. Be sure quick-coupling gaskets are on hand and in good condition.

d. WATER HEATER. Inspect water heater to be sure that it is in a level position, that nozzle and electrode holder of the burner is securely mounted, and that all electrical leads have secure connections. Check blower and motor mounting and insure that blower shutter operates freely. Prime fuel pump, connect fuel lines, and make sure fuel supply is adequate. Examine instruments for broken glass and loose connections and check valves and controls for proper operation. Inspect exhaust duct for tight connections with no leaks and be certain outlets are free of obstructions.

4. STARTING PROCEDURES. Procedures for starting the bath unit are as follows:

a. GENERATOR. Select voltage to meet requirements. For electrical starting, connect a power cable to receptacle on the generator. For manual starting, place a rope around starting pulley and pull rope with a quick, steady motion. The choke opens gradually as the engine attains operating temperature.

b. WATER PUMP. Remove dust cap and fill pump prime with water. Replace the cap. Always operate pump with water in priming chamber to prevent overheating. Move water pump motor switch to ON position. Observe rotation of pump shaft and turn shaft in the direction in which the arrow on the pump points. Do not proceed further until water begins flowing from nozzles of shower stands.

c. WATER HEATER. When water is flowing from nozzles of shower stands, push water heater switch up for ON position. Watch for fuel pressure gage to register 100 p.s.i. Close burner fuel control valve. Look through electrode sight tube bushing to insure there is a continuous spark jumping the gap between the electrodes. Open burner fuel control valve to START position when fuel pressure gage reads approximately 60 p.s.i. Open blower shutter by pushing shutter lever halfway down and open burner fuel shutoff valve by turning shutter lever counterclockwise. Observe combustion flame by looking through combustion light tube.

5. OPERATING PROCEDURES. Operating procedures for the bath unit are as follows:

a. WATER HEATER. Adjust blower shutter so that exhaust from heater is transparent and smokeless. After a few minutes, check water temperature gage reading to be sure it registers between 95° and 105° F. If the reading is higher than 105° F., open water bleeder valve. Open or close shower stand control valve to operate one or both shower stands. Since the number of shower nozzles operated determines the amount and temperature of the water, check the temperature gage every few minutes. Check the combustion in the firebox to be sure it burns steadily without pulsating.

b. INCOMING WATER SUPPLY. When incoming water supply is extremely cold or warm, operating procedures are as follows: Close burner fuel-control valve slowly until gage registers a temperature between 95° and 105° F., if temperature gage does not move after a few minutes. If water temperature exceeds 120° F., the burner automatically shuts off. When water temperature drops to the control setting, it starts again.

c. SHOWER STANDS. Make sure nozzles of the shower stands operate properly, discharging a steady, even flow of water. Be certain water drains downhill from water pump.

6. CLOSING-OUT OPERATIONS. Procedures for closing out bath unit operations are as follows:

a. Close the water heater burner fuel shutoff valve by turning it clockwise.

b. Allow bath unit to operate a few minutes after burner fuel shutoff valve is closed to allow blower to purge any vaporized fuel from burner.

c. Turn off water heater blower and fuel pump motor switch located under the switch cover.

d. Turn off water pump switch.

e. Turn generator circuit breaker switch to OFF position.

f. Disconnect hoses and cables and drain, clean, and coil hoses.

g. Drain water pump by opening the draincock and tipping pump forward. Close the draincock.

h. Drain water from water heater.

7. OPERATION OF GENERATOR UNDER UNUSUAL CONDITIONS. The generator is operated under unusual conditions, as follows:

a. EXTREME COLD (BELOW 0° F.). Keep fuel tank filled to reduce moisture condensation in tank. Keep tank cap and screen free of ice and moisture. Before attempting to start engine, remove ice accumulation on the spark plug and wiring. Allow approximately 5 minutes for engine to warm up before applying load to generator. Refer to current lubrication order for the suitable grade of oil to use. WARNING: Do not touch metal parts with bare hands during extremely cold temperatures.

b. EXTREME HEAT. Refer to current lubrication order for specific lubrication instructions. Keep generator set clean and free of dust and dirt. Provide adequate space around the unit for maximum air circulation. Inspect air shroud and cooling fins for dust or foreign matter that might impede the flow of air.

c. DUSTY OR SANDY AREAS. Inspect air shroud and cooling fins for clogging and clean them, if necessary. Service fuel strainer bowl as often as necessary to keep the bowl free of sand and grit. Exercise care to prevent sand and dust from entering the fuel tank. Make sure air cleaner is serviced frequently by maintenance personnel.

d. SALT WATER AREAS. Because salt water causes metal to corrode, exercise care to prevent unit from contacting salt water. If contact is made with salt water, wash the unit with clean, fresh water after operation is stopped. Paint all exposed, nonpolished surfaces. Coat exposed parts of polished steel or other ferrous material with standard-issue rustproofing material, if available, or cover the parts with a light coat of grease.

e. RAINY OR HUMID CONDITIONS. In humid areas, protect unpainted parts of the generator with a waterproof canvas cover when the generator is not in operation. Keep fuel tank full to prevent the accumulation of condensation. Service fuel strainer bowl often to eliminate the accumulation of water. Because humid conditions cause corrosion and deterioration of electrical components, wipe wiring and components dry.

8. DAILY PREVENTIVE MAINTENANCE CHECKS AND SERVICES. Daily preventive maintenance checks and services are listed in table 1 below:

Table 1. Preventive maintenance checks and services

Items to be Checked	Procedure
Water pump sediment strainer	Check for dirty, broken, or leaking condition and service, if necessary.
Controls	Check for binding or broken condition during operation.
Sight tube glasses	Check for dirty or broken condition.
Burner nozzle and electrode holder	Check for loose mounting. Check lead assemblies for loose connections. Check firebox for improper combustion and electrode for improper spark during operation.

Table 1 (Continued)

Items to be Checked	Procedure
Fuel line and hose assemblies.	Check for broken, bent, and leaking lines. Check hose for loose connections.
Fuel drum	Check for leaks and level of fuel supply. Replenish fuel, if necessary.
Showerhead nozzles	Check for dirty and clogged condition.
Instruments	Check for broken lenses, illegible markings, loose connections, incorrect temperature readings, and too high or too low pressure readings.
Drain plugs and drain cocks	Check for improper installation.
Fuel filter	Check for leaks and dirt. The hand lever must be turned a complete turn daily.
Exhaust duct	Check for broken, dirty, or leaking condition and for loose connections.
Power cord cables	Check for loose or broken connections and for cracked and deteriorated insulation.
Suction hose strainer	Check for dirty or clogged condition. Check during operation for improper positioning.
Fire extinguisher	Check for a broken seal.
Generator:	
Fire extinguisher	Check for proper charge, corrosion, insecure mountings, or evidence of damage. Weigh extinguisher to be sure it contains a full charge.

Table 1 (Continued)

Items to be Checked	Procedure
Fuel tank	Check for fuel level and replenish, if necessary.
Fuel lines and connections	Check for leaks.
Air cleaner	Check for accumulated dirt or foreign matter. Clean, if necessary.
Electrical leads	Check for broken terminals and frayed or worn insulation.
Fuel strainer bow	Check for cracks or nicks and accumulation of water or dirt. Clean, if necessary.
Filter screen	Check for dirty condition. Clean, if necessary.
Gasket	Check for defective condition. Replace, if necessary.
Fuel tank and cap	Check for dirt or insecure mounting. Check cap for proper fit and defective condition. Replace cap, if necessary.
Oil filter plug and drain plug	Check for leaks and worn or damaged threads.
Instruments	Check for cracked or broken glass, defective operation, and loose mountings.
Starter rope	Check for worn, frayed, or damaged condition.
Miscellaneous:	Check for loose or missing bolts, nuts, and screws; loose connections; broken wires; or other needed adjustments. Check for evidence of tampering or damage. During operation, check for engine overheating, too much vibration, or failure to deliver power. Check tools and equipment for a clean condition.

9. SAFETY PRECAUTIONS. Safety precautions for the bath unit are as follows:

a. Ground engine generator before it is operated to prevent serious or possibly fatal shock from contact with components carrying current. Do not operate generator in an enclosed building unless the exhaust gases are piped outside. Do not install or change load cables while the generator is operating. Do not make changeover board adjustments or changes to output terminal connections while the generator is operating.

b. Do not touch water heater exhaust duct during operation, as it becomes extremely hot. Serious burns or body injury may result from contact with the duct before it cools.

c. If the burner fails to ignite immediately after the burner fuel shutoff valve is opened, shut off the valve. This allows the blower to run until the combustion chamber is cleared of all vaporized fuel and prevents a possible explosion.

d. Keep the fire entinguisher filled and in operating condition. When not in use, keep it securely mounted in its bracket on the baseboard.

e. Do not allow oily waste, cleaning rags, oil, grease, fuel, or rubbish to collect around the bath unit, as they create a fire hazard.

f. Keep a constant watch for fuel leaks during operation, as leaking fuel may cause a fire hazard.

g. Do not perform refueling operations while the bath unit is in operation, as spilled fuel may cause a fire hazard.

h. Do not throw water on fire caused by defective electrical equipment, as shock may result. The power source should be shut down and the CO_2 fire extinguisher, sand, or dirt used to put out the fire.

i. When operating bath unit in a shelter or in a confined enclosure, direct exhaust fumes outside to insure proper ventilation.

j. Operate bath unit in conjunction with water treatment procedures approved by the major command surgeon when the bath unit is used in areas where schistosomiasis is prevalent. Schistosomiasis is an infectious disease which may prove harmful to humans.

k. Take the following steps to eliminate the possibility of explosion and injury to personnel by the accumulation of excess fuel vapors in the hot water heater combustion chamber during emergency shutdown or failure of the electrical power supply:

(1) Close burner fuel shutoff valve immediately.

(2) Disconnect ignition electrodes at the combustion chamber.

(3) Restart unit and air purge the combustion chamber for a least 3 minutes before shutdown.

(4) Resume operation by reconnecting the electrodes.

SECTION II

INSECTS, INSECTICIDES, AND DELOUSING OUTFIT

10. INTRODUCTION. One of the greatest responsibilities of the commanding officer of a military organization is to maintain the health and fighting efficiency of the troops. To fulfill this responsibility, he is assisted by the unit surgeon, whose responsibilities include supervising activities and training for the prevention of disease and insect control. Control of diseases borne by insects such as fleas, ticks, and lice is accomplished by the use of insecticides and the delousing outfit for large numbers of troops.

11. DISEASE-CARRYING INSECTS. Types of insects most commonly known to carry diseases are described below.

a. FLEAS. Fleas produce irritating bites and transmit diseases to man. The fleas that attack man live chiefly on cats, dogs, and rodents. When fleas feed on a rodent that has plague, they become infected with plague. There are four stages in the life cycle of the flea: egg, larva, pupa, and adult (fig. 4). The female flea lays her eggs in nests of rodents or places where dogs and cats sleep. The small, white, oval eggs hatch into worm-like larvae. Upon reaching maturity, the larva changes into the pupa, or resting stage, and the adult flea emerges from the cocoon. Adult fleas are wingless and flat on the sides. Their strong, spiny legs enable them to move rapidly in the hair of the host. Their mouth ports are fitted for piercing the skin and sucking blood. Fleas are controlled by applying insecticides to the animal hosts and to the infested areas.

b. TICKS. Ticks are common throughout the world but are less common in the arctic and subarctic zones. Ticks are divided into two groups: hard and soft ticks (fig. 5). Hard ticks have a hard shield on their backs whereas soft ticks do not. Hard ticks are known to carry several diseases including typhus-like fevers. The life cycle of the tick consists of four stages: egg, larva, nymph, and adult (fig. 6). The completion of this life cycle may take 6 weeks to several years. The eggs laid by the female tick hatch into larvae. After feeding on a host found in brush or other vegetation, the larva drops off, molts, and becomes a nymph, which develops into an adult. Since it is impractical to control ticks in the field, ticks should be kept off the body and removed before they become attached.

c. LICE. Lice on humans are found all over the world. When large groups of people are deprived of homes, adequate changes of clothing, and bath facilities, lice usually appear. Although found in tropic climates, they are found more commonly in temperate and subarctic areas where people wear heavy clothing in several layers. Lice transmit such diseases as typhus, relapsing, and trench fever. Disease is usually transmitted by lice bites which itch and cause scratching and the germ to be rubbed into skin abrasions. The life cycle of lice is in three stages: egg, nymph, and adult (fig. 7). Minute, white eggs of the female louse, which are attached to fibers of clothing and occasionally body hairs, hatch into nymphs and shortly afterwards become adult lice. Besides body lice, head lice and crab lice (fig. 8) are annoying pests.

12. INSECTICIDES. Insecticides used for delousing operations in the field are as follows:

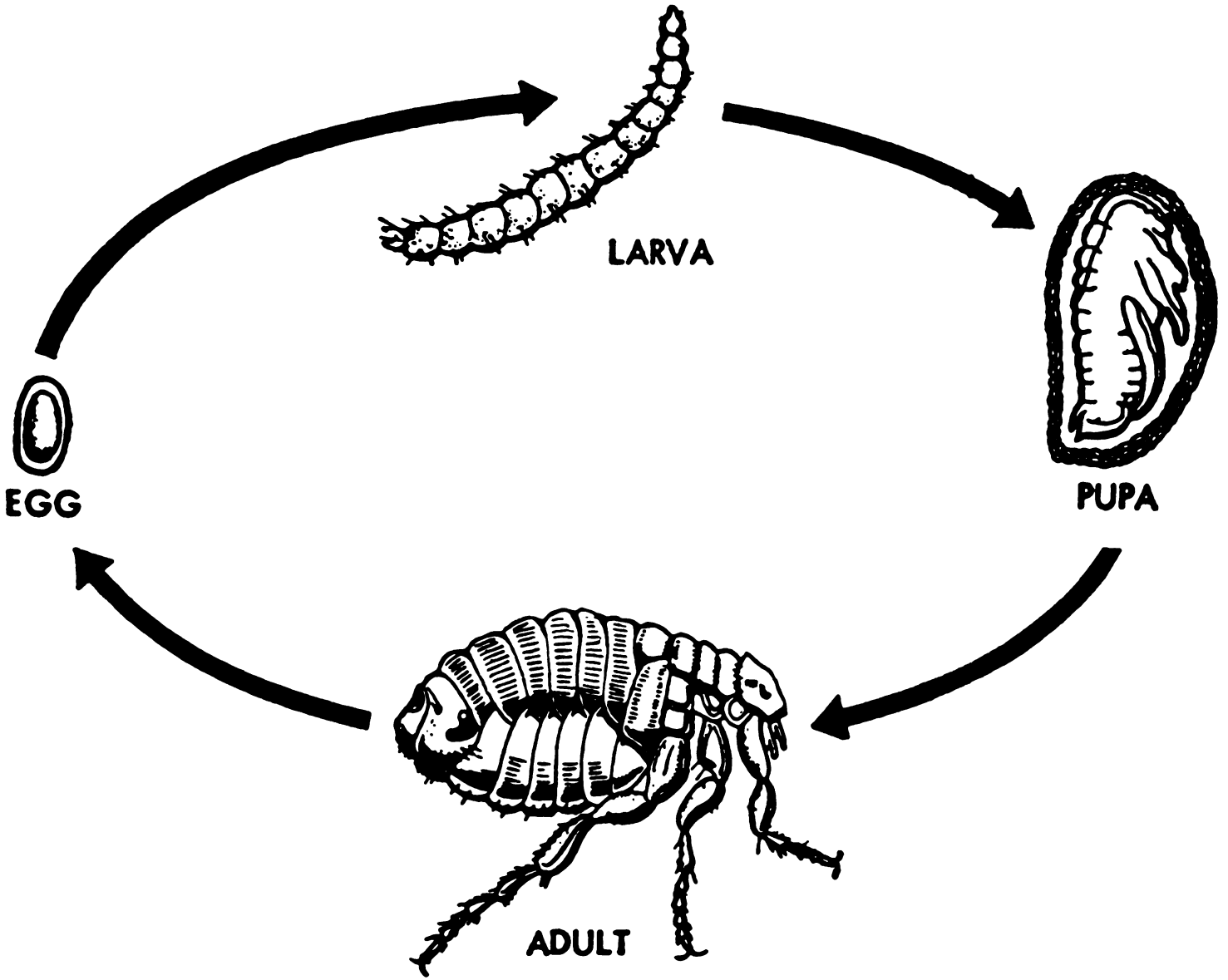
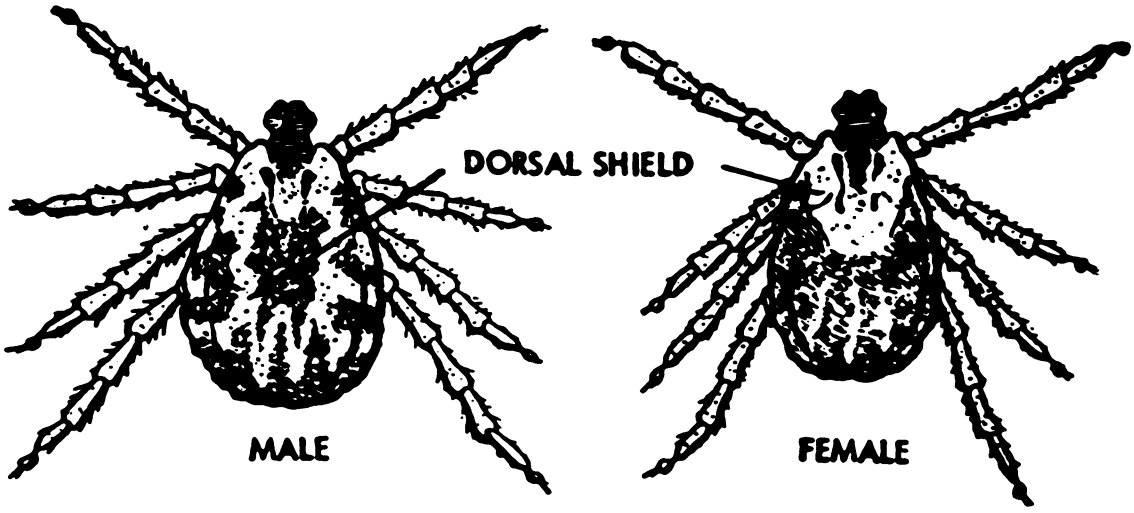
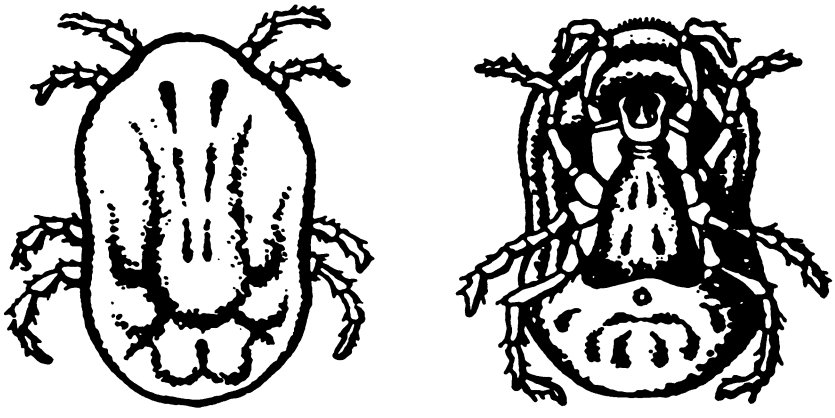


Figure 4. Life cycle, flea.



Adult hard ticks (note dorsal shield and visible mouthparts).



Adult soft ticks (note the absence of visible mouthparts and dorsal shield when viewed dorsally).

Figure 5. Adult hard ticks and soft ticks.

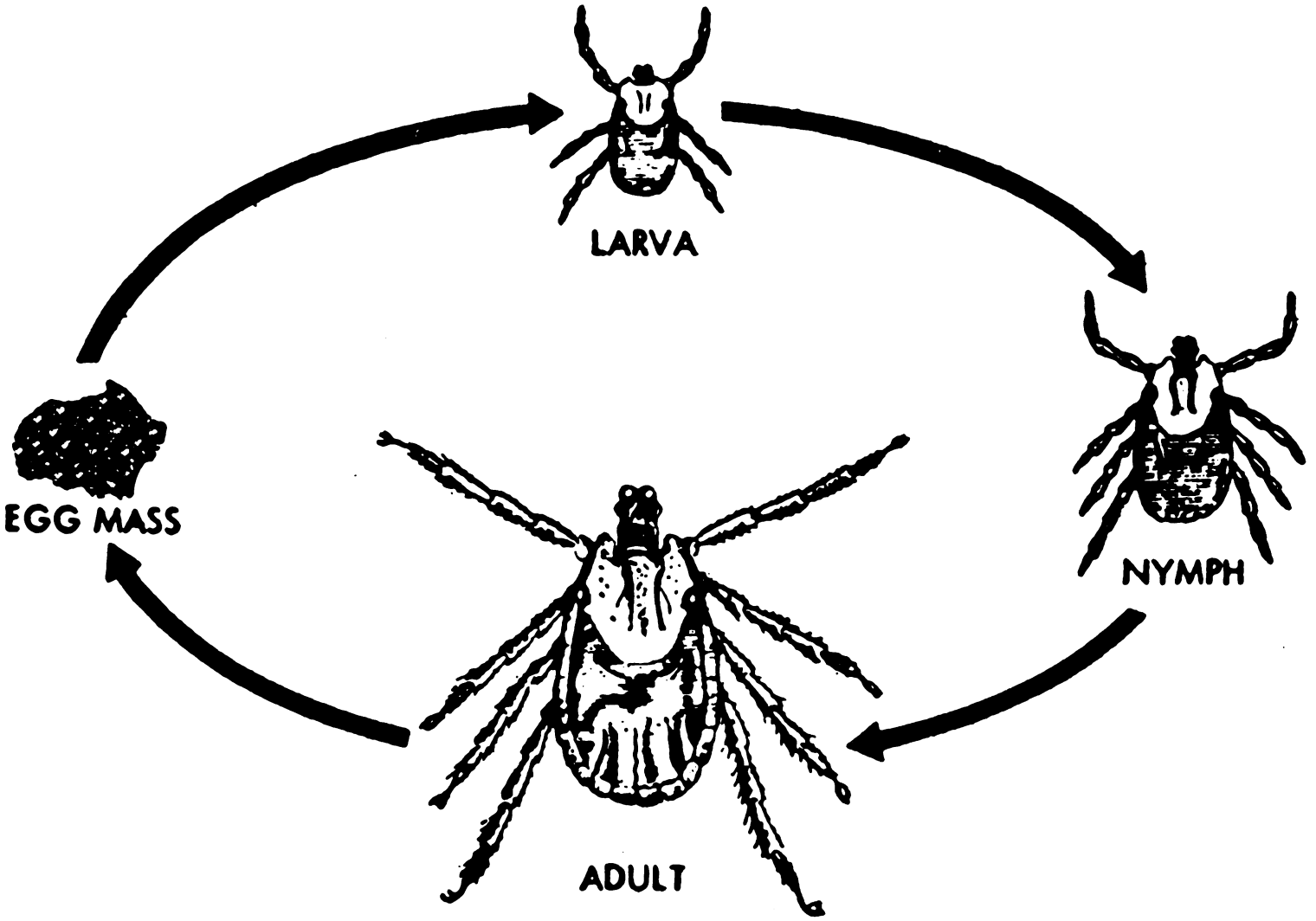


Figure 6. Life cycle, tick.

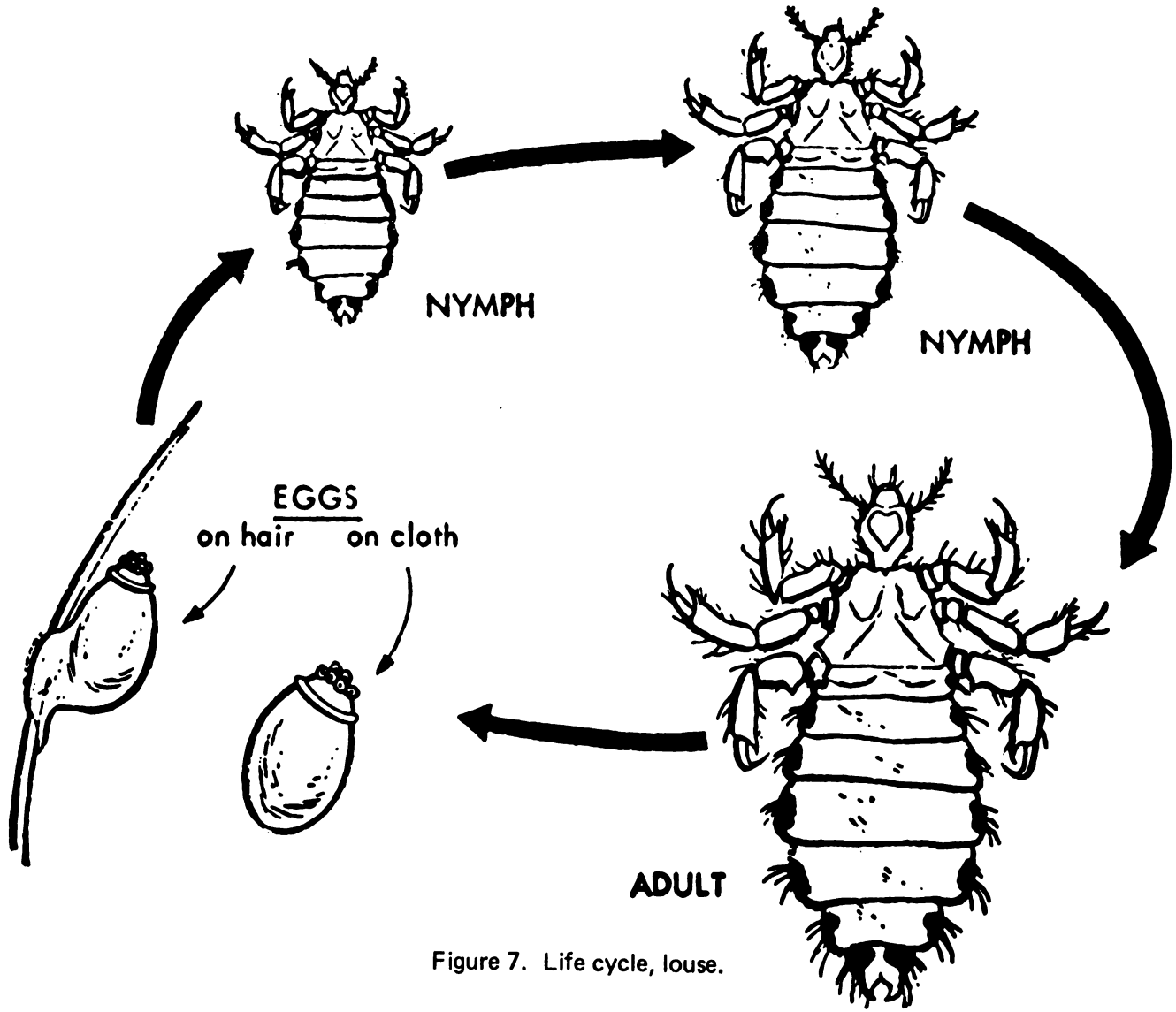


Figure 7. Life cycle, louse.

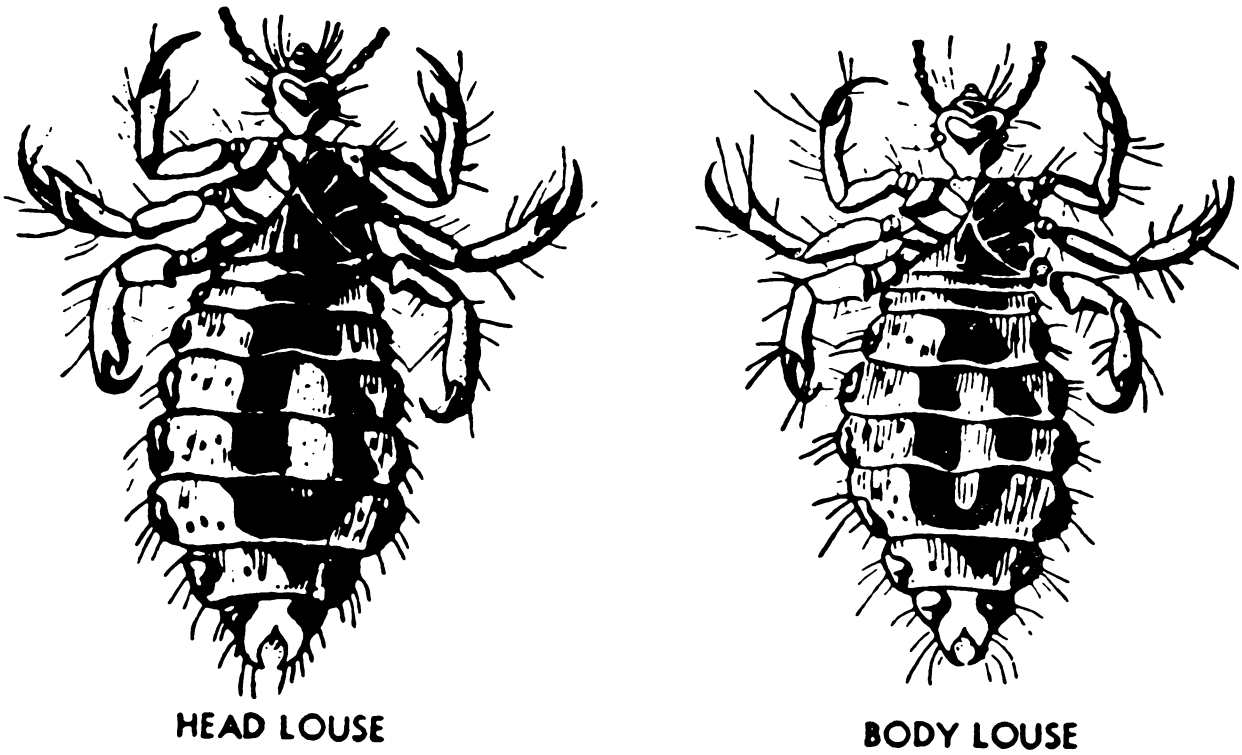


Figure 8. Types of lice.

a. METHYL BROMIDE. Methyl bromide is used to fumigate clothing and bedding. It is used only on recommendation of the surgeon and by or under the supervision of preventive medicine units. At atmospheric pressure, methyl bromide is a gas. Under pressure, it is a colorless, odorless liquid which boils at 40.1° F. It will destroy lice and their eggs and other forms of insect life. Methyl bromide completely penetrates a bag of clothing on contact, but a film of water may prevent the garment from being fumigated. It will not shrink fabrics.

b. LINDANE. Lindane is a harmless powder if used properly. It affects the nervous system of insects and paralyzes them. It is available in cans for individual dusting or in bulk containers for mass delousing. The following safety precautions should be observed:

(1) Keep lindane out of mouth.

(2) After handling insecticide, wash face and hands with soap and water.

(3) Do not store with foods.

(4) Do not dust persons who have open wounds.

(5) Do not shower for 24 hours.

(6) Repeat the dusting in a week, but do not use over 2 ounces a week.

13. FUMIGATION BAG. The fumigation bag is an impenetrable container designed for the use of methyl bromide. Clothing and equipment to be deloused and a bag to hold valuables are placed inside the fumigation bag. The operator inserts one ampoule of methyl bromide into a pocket inside the fumigation bag, closes the pocket, and ties it securely. He then locates the ampoule with his fingers and strikes the narrow end of the ampoule with a solid object which will not cut the bag. The bag is then placed on its side for 45 minutes. When the bag is opened and the contents released, care should be taken to stand up wind to avoid poisonous vapors. The clothing may be worn after it has been aired for 5 minutes. Safety precautions for use of the bag are as follows:

a. Do not remove ampoule of methyl bromide from inside the bag.

b. Handle ampoule carefully, as it is easily broken.

c. Protect ampoule from heat and store in a cool place.

14. DELOUSING OUTFIT. The delousing outfit removes lice from a large number of troops efficiently and rapidly. The two major components of the delousing outfit are the engine and air compressor.

a. ENGINE. The engine (fig. 9) has one cylinder and is 4 cycle, air cooled, 2 3/4 horsepower, and gasoline driven. It provides the power necessary for

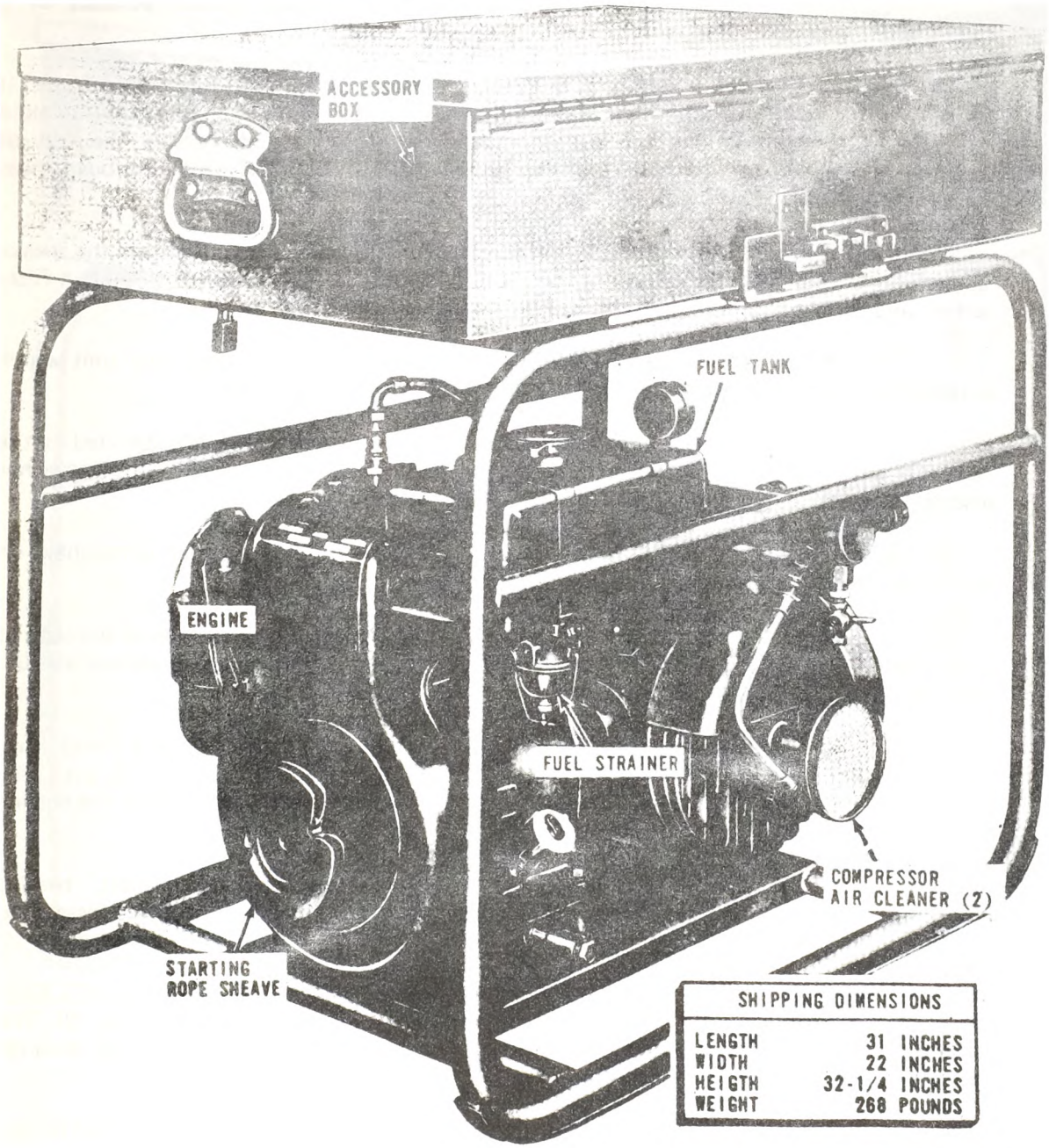


Figure 9. Delousing outfit, left front, three-quarter view.

operating the compressor unit. The compressor unit receives its power through a coupling drive which is directly connected to the engine crankshaft. The engine crankcase holds 2 pints of oil.

(1) IGNITION SYSTEM. The ignition system consists of a high-tension magneto, stop switch, spark plug, and cable.

(2) FUEL SYSTEM. The fuel system is a gravity-flow type. It consists of a 1-gallon-capacity fuel tank and a fuel filter with sediment bowl to hold dirt and water settlings. The fuel filter includes a strainer element to filter the flow of fuel and a fuel shutoff valve to stop the flow of fuel when the sediment bowl must be cleaned.

(3) AIR CLEANER. The air cleaner is mounted on the intake side of the carburetor. This cleaner is an oil-bath-type unit. The air flows through a filter screen and oil bath which pick up foreign particles from the air.

(4) CARBURETOR. The carburetor is a float-type unit which automatically controls the flow of fuel under varying engine loads.

(5) GOVERNOR. The centrifugal-type governor, operated by the camshaft, automatically controls the engine speed under varying loads. The governor assembly should never be readjusted unless absolutely necessary.

(6) EXHAUST MUFFLER. The exhaust muffler is mounted on the cylinder crankcase and consists of a pipe fitting and muffler.

(7) COOLING SYSTEM. The engine cooling system consists of a combination fan and flywheel. The fan forces a flow of air through the flywheel shroud, and the air circulates around the cylinder head and cylinder.

b. AIR COMPRESSOR. The air compressor (fig. 10) is a direct-drive, twin-diaphragm, air-cooled, air-sealed unit. When the pressure gage registers 25 p.s.i., the air compressor provides a filtered flow of air to the manifold for distribution to the dusting guns.

(1) HOUSING. The housing encloses a crankshaft, bearing assemblies, and two diaphragm-type pistons. The housing is attached to a base assembly, and the base assembly is attached to a tubular frame.

(2) CYLINDER HEADS, AIR CLEANERS, AND VALVES. Each of the two cylinder heads has an inlet valve, outlet valve, and air cleaner (fig. 9). The air cleaner and valves allow the air to enter the compressor. The air is forced through an outlet valve into the air manifold for distribution to the dusting guns.

(3) AIR MANIFOLD. The air manifold (fig. 10) mounted on top of the shroud assembly is connected to the compressor heads by two tubes. It has 10 couplers for connecting dusting guns and two pressure relief valves for use if the air pressure exceeds 25 p.s.i.

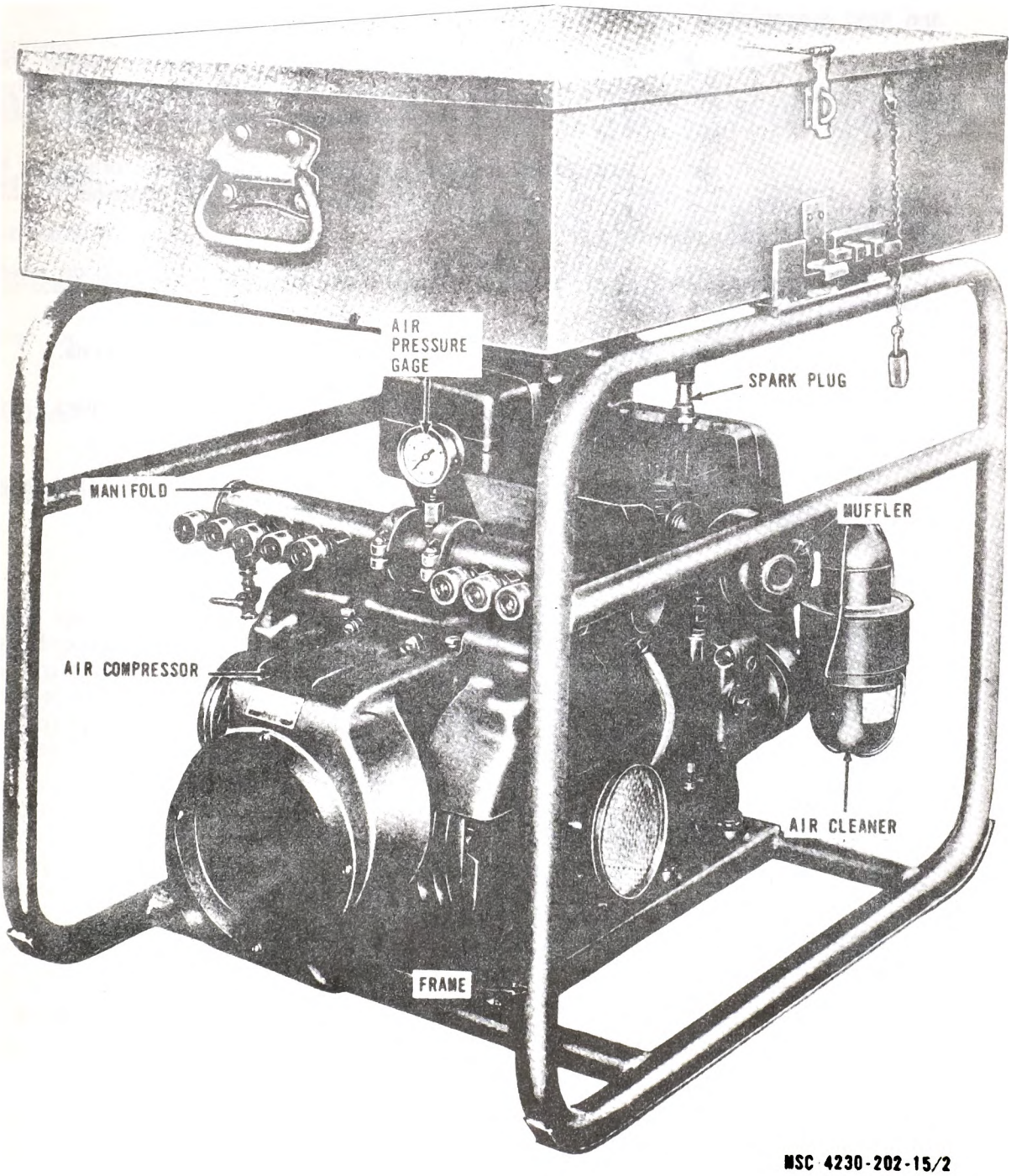


Figure 10. Delousing outfit, right rear, three-quarter view.

(4) BLOWER SCROLL ASSEMBLY AND SHROUD. The blower scroll assembly consists of a flywheel and squirrel-type fan wheel connected to the flywheel enclosed inside the scroll. Air drawn into the fan travels around the compressor housing and head assemblies and is deflected further by the shroud.

(5) FRAME ASSEMBLY. The tubular steel frame on which the delousing outfit is mounted has a base plate for mounting the complete unit. Steel strips on the bottom of the frame serve as skids. The frame is designed to protect the components.

(6) ACCESSORY STORAGE BOX. The accessory storage box is stored on top of the tubular steel frame. This box serves as a storage container for all operating accessories used with the delousing outfit.

15. SETTING-UP OPERATIONS. The delousing equipment is set up on level, well-drained ground, as follows:

a. Remove the accessory storage box from the tubular frame.

b. Remove the 10 dusting guns, 10 air hoses, 20 canisters, and two respirators from the accessory storage box.

c. Connect the air hoses to the compressor manifold, the 10 dusting guns to the air hoses, and the 10 canisters to the dusting guns.

d. Lubricate the equipment before it is set up.

16. BEFORE-OPERATION INSPECTION. Before the delousing equipment is set up, it is inspected for tampering or sabotage. A close inspection is made of subassemblies, such as the carburetor, fuel filter, air cleaner, and muffler. DA Form 2400 is prepared to control the use of the equipment, and DA Form 2404 is used to record deficiencies and corrective actions. TM 38-750 is the reference to be used when preparing the forms. A checklist for inspecting components of the delousing outfit is given in table 2 below.

Table 2. Before-operation checklist

Item	Inspected for:
Air pressure gage	Broken glass or other damage.
Engine	Loose mounting and leaking head gasket.
Cooling fins	Dirt or clogged condition.
Muffler	Insecure mounting or damage.
Shroud and scroll screens	Clogged condition.

Table 2 (Continued)

Item	Inspected for:
Magneto	Loose mounting.
Engine air cleaner	Insecure mounting, dirt, and damage.
Fuel supply	Full tank.
Fuel strainer	Leaks and dirt.
Crankcase breather	Damage to mounting.
Filler cap and gage	Damage and a sufficient amount of oil.
Compressor heads	Insecure mounting, dirt, and damage.
Compressor air cleaner	Looseness and clogged condition.

17. STARTING THE DELOUSING OUTFIT. The delousing outfit engine is started manually with a starter rope and pulley and with the choke closed. After the engine is started, the choke is opened and the engine is warmed up. Filled canisters are attached to the dusting guns and secured with a canister lock. The dusting guns are attached to hoses connected to manifold couplers of the delousing outfit. Dusting begins when pressure in the air compressor reaches 25 p.s.i.

18. OPERATION OF DELOUSING OUTFIT. Eleven men are needed to operate the delousing outfit: Ten to operate the dusting guns and one to refill the 10 additional canisters and service the unit. With the use of the 10 extra canisters, the delousing outfit may operate continuously. Operating procedures may be varied to fit the specific job, since nearly every job presents a different problem.

19. DURING-OPERATION CHECKS. During operation the delousing outfit is checked as given in table 3 below.

Table 3. During-operation checklist

Item	Inspected for:
Engine	Excessive vibration, overheating, and leaks.

Table 3 (Continued)

Item	Inspected for:
Pressure gage	Damage or improper operation.
Muffler	Proper mounting.
Fuel strainer	Leaks and dirt.
Compressor housing and manifold	Air leaks.
Air hoses	Leaks.

20. SHUTTING DOWN UNIT. After the engine is stopped by pushing up the magneto stop switch, the hoses are disconnected from the manifold by pushing in on the coupler until the hose is ejected. The hoses are disconnected from the dusting guns by pushing in on the hose coupler until the male fitting on the gun is ejected.

21. AFTER-OPERATION INSPECTION. A checklist for inspecting components of the delousing outfit after operation is given in table 4 below.

Table 4. After-operation checklist

Item	Inspected for:
Engine	Loose mounting, leaking head gaskets, and clogged cooling fins.
Spark plug	Looseness and damaged insulator.
Engine air cleaner	Insecure mounting, dirt, or damage.
Fuel tank	Full supply. Replenish if necessary.
Magneto	Insecure mounting or crack in case.
Crankcase filler cap	Cleanness.
Shroud and scroll screens	Clogged condition.
Fuel strainer	Leaks and dirt.

Table 4 (Continued)

Item	Inspected for:
Compressor air cleaner	Looseness and clogged condition.
Air pressure gage	Damage.

22. OPERATION IN EXTREME COLD (BELOW 0^{o} F.). The delousing outfit is operated in extreme cold, as follows:

a. FUEL SYSTEM. Procedures for preventing the condensation of moisture from accumulating in the fuel system and forming ice crystals which clog the fuel system are as follows:

(1) Remove snow and ice from fuel tank cap before tank is filled and keep tank full at all times.

(2) Keep fuel tank cap tight to prevent moisture and dirt from entering tank.

(3) Service fuel strainer more frequently than under normal conditions.

b. IGNITION SYSTEM. Keep spark plug clean and free from moisture. Remove ice and snow from spark plug, magneto, and cable. Be sure ignition connections are clean and tight. Avoid excessive handling and sharp bending of the cable insulation since it tends to become brittle at low temperatures.

c. LUBRICATION. Lubricate the delousing outfit according to the current lubrication order. Service the carburetor air cleaner more frequently than under usual conditions.

23. OPERATION IN EXTREME HEAT. In extreme heat, provide ventilation for the flywheel shroud, cylinder crankcase, air compressor fins, and blower scroll screen of the engine and air compressor. Clean fins and screen regularly and lubricate the unit according to current lubrication order.

24. OPERATION IN DUSTY OR SANDY AREAS. In dusty or sandy areas, service the engine air cleaner frequently and replace the oil in the air cleaner bowl when it becomes dirty. Remove the two compressor air cleaners and blow out the dirt, dust, and other debris; or replace the felt disks, as required. Keep the compressor blower scroll screen clean and free of clogging. Provide protection so that sand and dirt cannot enter the fuel system when the tank is filled. Service the fuel strainer as often as necessary to keep it free of sand and dirt. Keep the flywheel shroud, cylinder crankcase, compressor fins, and blower scroll screen free from dust, dirt, and other material that might prevent proper engine and air compressor cooling. Service the carburetor air cleaner more frequently than under normal conditions. Lubricate the unit according to the current lubrication order.

25. OPERATION UNDER RAINY OR HUMID CONDITIONS. When the unit is not in operation, cover it with a canvas or other waterproof covering. Do not operate the unit in the rain unless it is protected by a paulin and do not operate the unit during humid periods until it has been dried. Keep fuel tank full to avoid condensation. In high humidity, the spark plug, magneto, and cable often become unserviceable. If this occurs, remove the unserviceable part and dry it. If this does not remedy the condition, replace the part.

26. OPERATION IN SALT WATER AREAS. Because salt water creates a strong corrosive action on metal, care must be taken to avoid direct contact of the delousing outfit with salt water. Wash down the unit with clean, fresh water at frequent intervals. Also, exercise care to avoid contaminating the fuel system or damaging the ignition system with the water. Coat exposed metal surfaces with an approved rustproofing material to prevent moisture from causing rust. Remove rust immediately and paint exposed areas. Lubricate the unit according to the current lubrication order.

27. OPERATION AT HIGH ALTITUDES. The air output of the air compressor decreases in cubic feet per minute and pounds per square inch, depending on the altitude above sea level that the air compressor is operated. For each 1,000 feet of altitude above sea level, there is an 8-percent reduction in horsepower. If the air compressor output decreases at high altitude, increase the engine speed by advancing the governor control linkage. Be sure the two air cleaners are serviced by the organizational maintenance mechanic, as necessary. Open the engine needle valve slightly more than normal to start the engine and readjust the needle valve to normal running position after the engine is started. Lubricate the unit according to the current lubrication order.

28. PREVENTIVE MAINTENANCE CHECKS AND SERVICES. Preventive maintenance checks and services are listed in table 5 below.

Table 5. Preventive maintenance checks and services

Items to be Checked	Procedure
Fuel tank	Check for fuel level and replenish, as necessary.
Screen	Check for dirty condition. Clean each week.
Engine air cleaner	Clean each week.
Air pressure gage	Check for damage and loose mounting. The normal reading is 25 p.s.i.
Oil fill gage	Add oil as indicated by fill gage.

Table 5 (Continued)

Items to be Checked	Procedure
Fuel strainer	Tighten the thumbnut if gasket is leaking. Clean strainer each week.

29. SAFETY PRECAUTIONS. When the fuel tank is filled, be sure there is a metal-to-metal contact between the container and the tank. Before adjustments are made, remove the ignition cable from the spark plug. Before the unit is operated, be sure that it has adequate ventilation and that the exhaust connection to the outside is adequate. Do not remove the blower screen for maintenance purposes while the unit is in operation. Because compressed air at close range may cause serious eye and ear damage, do not point the air hose at personnel.

SECTION III

TENT HEATER

30. DESCRIPTION. The portable, duct-type, gasoline, 250,000-B.t.u. heater is used to heat the tent for bath and delousing operations or for drying clothes in laundry operations. The heater (fig. 11) weighs 345 pounds and is a compact, self-powered unit designed to produce and deliver a steady flow of heated air through a duct system. The heater consists of a vaporizing-type, gasoline-burner combustion chamber and gasoline engine. The engine powers the combustion-chamber air blower and the propeller-type ventilating fan. The hot air is forced from the heater by the ventilating fan through collapsible ducts. The lowest octane gasoline available may be used in the engine and burner. The fuel is gravity-fed to the engine and burner, and about 4 gallons of fuel per hour are used for maximum operations.

31. MAJOR COMPONENTS. Major components of the heater are as follows:

a. ENGINE. The military standard model engine is 4 cycle, air cooled, and governor controlled. It develops 1 1/2 hp. at 3,600 revolutions per minute (r.p.m.). The operating r.p.m. is 3,450, but if the r.p.m.'s fall blow 3,400, the burner fire will be too high and smoky.

b. VENTILATING FAN. The propeller-type ventilating fan is driven by the power takeoff shaft of the engine. The fan moves the air across the combustion chamber heat transfer surfaces and provides pressure to move the heated air through the ducts.

c. AIR BLOWER. Air is supplied to the combustion chamber by a centrifugal blower driven by the engine crankshaft extension. The blower is located between the crankcase and ventilating air fan.

d. HEAT TRANSFER SYSTEM. The heat transfer system consists of a burner combustion air supply duct which allows air to pass from the blower housing into the heater cabinet. It is located under the engine platform.

e. AIR DAMPER. The combustion air damper limits the flow of combustion air during lighting of the heater. This prevents the flame from blowing out before the fire has a good start.

f. BURNER. The burner is a vaporizing type and consists of a burner bowl vaporizer of cast iron and a perforated sleeve. The perforated sleeve admits air around the side of the burner and provides air for combustion.

g. COMBUSTION CHAMBER. The combustion chamber is made of corrugated stainless steel which is a good heat conductor. All combustion takes place within the enclosed chamber so that carbon monoxide gas never mixes with the hot air entering the canvas ducts.

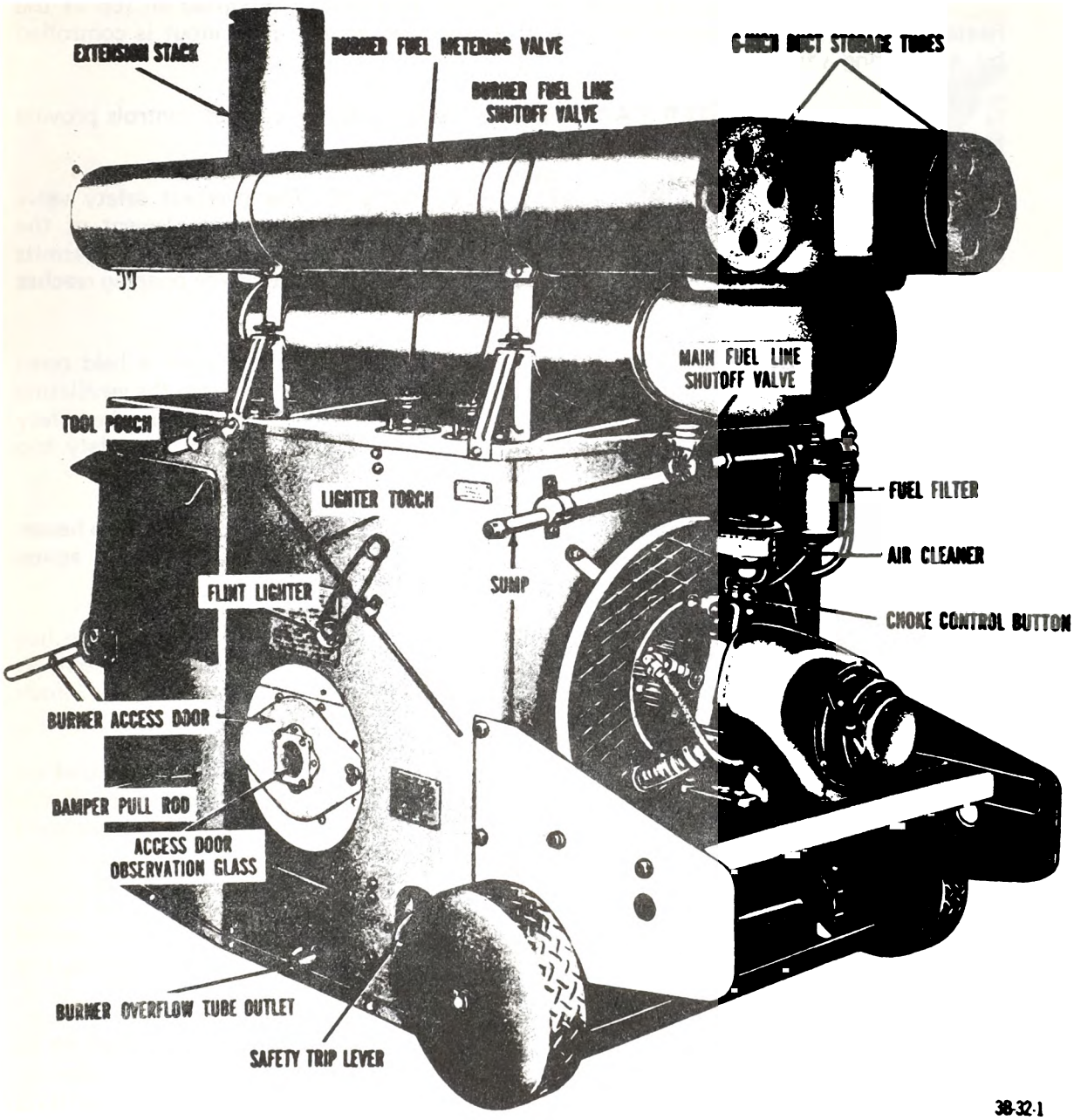


Figure 11. Heater, right rear view.

h. FUEL SYSTEM. A 16-gallon fuel tank is mounted on top of the heater, and the fuel is gravity fed to both burner and engine. Fuel input is controlled by a metering valve.

i. HEATER CABINET CONTROLS. Heater cabinet controls provide protection for the operator and equipment:

(1) OVERHEAT SAFETY VALVE. The overheat safety valve prevents overheating at the warm air discharge opening. The sensing element of the automatic safety control closes the valve enough to restrict the fuel input. The valve permits enough fuel to enter the burner to sustain a pilot light until the discharge opening reaches its normal temperature again.

(2) SAFETY TRIP VALVE. The safety trip valve is held open when the safety valve door is held in an upright position by air pressure from the ventilating air fan. When the engine stops, the fan also stops, relieving the pressure on the safety valve door and causing the door to drop to an open position. This closes the safety trip valve and shuts off fuel to the burner.

j. CABINET. The cabinet serves as a structural enclosure for the heater components. It is an airtight chamber and permits the passage of ventilating air across the combustion chamber and heat transfer elements.

k. DUCTS. The 6-inch exhaust ducts are used to distribute the hot air. They are fastened to the 12-inch ducts by using transition plates, which serve as coupling disks to subdivide the outlet sides of the 12-inch ducts (fig. 12). The 6-inch ducts are fastened to three openings of the transition plate.

l. EXHAUST STACK. The exhaust stack and extension are located on the top rear of the heater. A spark arrester screen is located near the bottom of the stack. The exhaust must always be piped outside when the unit is operated in an enclosed area.

m. WHEELS AND HANDLES. The metal wheels supporting the heater may be retracted by means of a lever when the heater is operated. The handles are lowered by adjusting the wire supports. When the wheels are down and handles extended, the unit can be easily moved from one position to another.

32. SETTING-UP OPERATIONS. Setting-up operations for the heater are as follows: Place heater on level terrain and position discharge openings toward tent or tents. Retract wheels and give a firm pull on the retracting handle to prevent heater from settling with a jolt. Install extension stack and place spark areas for the stack screen downward around the sleeve at the top front of the cabinet. Install the 12-inch canvas ducts with the asbestos-lined end of the duct toward the heater. Fasten the canvas ducts to the heater with two spring clips placed on the exhaust. After transition plates are removed from the side, install plates on the ends of the 12-inch ducts. Install 6-inch ducts on the transition plates (fig. 12).

33. BEFORE-OPERATION CHECKS. The heater is checked before operation as follows: Check oil and gasoline leaks around engine, gas tank fillcap, burner

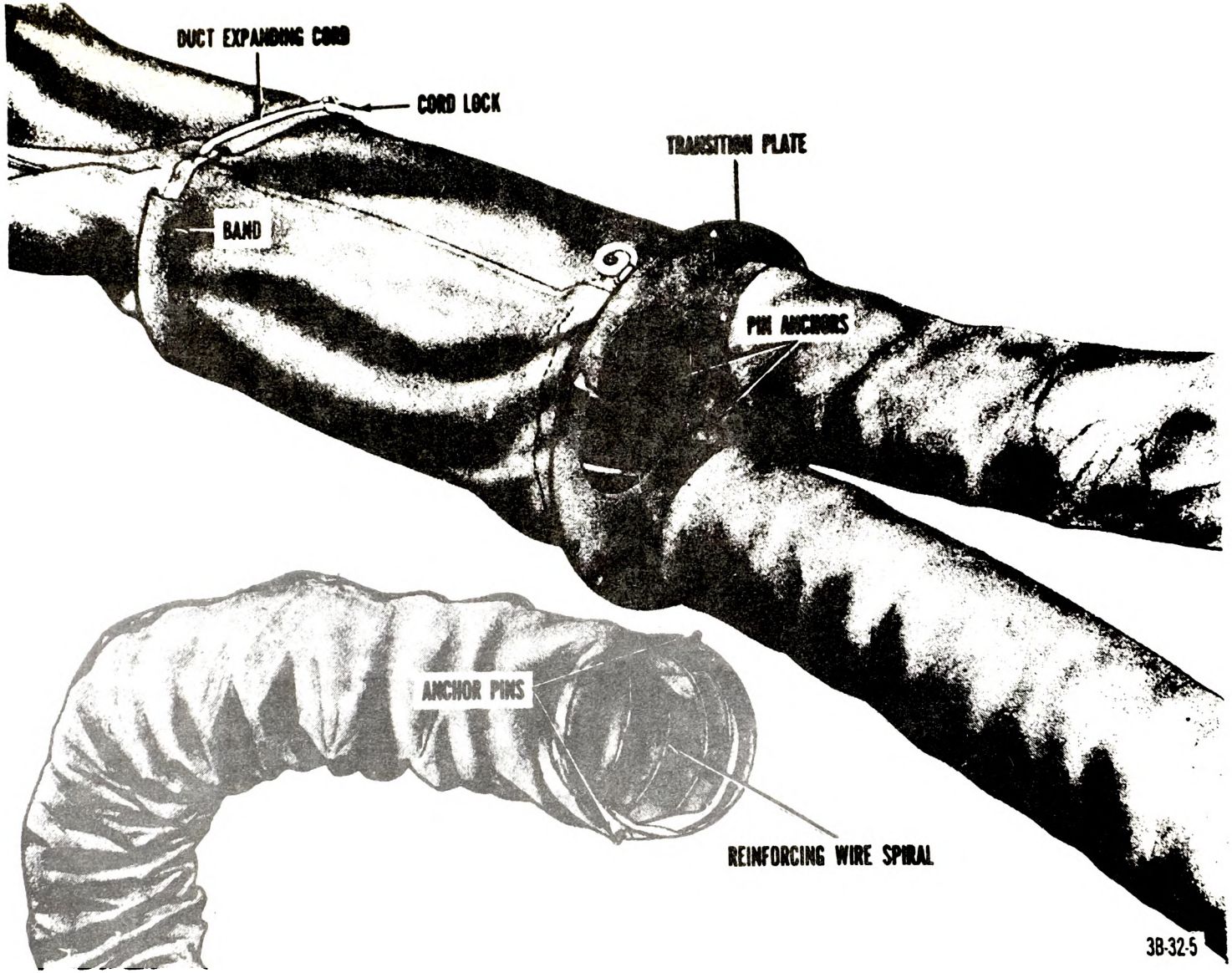


Figure 12. Transition plate attached to canvas ducts.

compartment, and under the heater. Check engine oil level and add oil, if necessary. Check wheels for proper mounting and free operation. Check duct transition plates for distortions and loose or missing pins. Check canvas ducts for torn asbestos packing, for canvas on heater connection ends, and for missing or bent anchor pins. Check controls for proper operation and fuel gage for proper fuel level.

34. STARTING PROCEDURES. Procedures for starting the heater are as follows:

a. Place main fuel line shutoff valve in OPEN position before lighting the burner.

b. Set valve inlet temperature control in correct position.

c. Place throttle in START and then in IDLE position.

d. Place choke lever in CLOSED position.

e. Place ignition switch in RUN position.

f. Wrap starting rope around flywheel flange and pull rope vigorously to start the engine.

g. Open choke valve gradually by moving choke lever toward engine. Move throttle control to GOVERN position.

h. Set safety trip valve by pulling it out. This opens the valve and allows fuel to reach the burner.

i. Open burner access door.

j. Insert torch lighter through burner door and place the lighter in the groove on the bottom of the burner pot.

k. Open burner valve by turning shutoff valve handwheel to OPEN position and allowing fuel to enter the bowl for 15 to 30 seconds. Dip torch lighter wick in fuel to determine the amount of fuel in bowl. Close fuel shutoff valve when there is enough fuel to wet the tip of the wick.

l. Remove torch lighter and light the wick with a friction lighter or other suitable lighter.

m. Close air duct damper by pulling the pull rod out. Hold damper in CLOSED position. Insert and hold torch lighter until fuel ignites. Keep face away from burner door when lighting the fuel.

35. OPERATION OF THE HEATER. In moderately cold weather (32^{o} to 0^{o} F.), the engine may be difficult to start and may require additional choking through the warmup period. If the unit, equipped with a base, is operated in temperatures above 32^{o} F., the flexible tube is disconnected to prevent the oil temperatures from rising

too high and destroying the lubricating properties. In temperatures below 0° F., the carburetor may require external heat to insure starting. For this reason, some engines have an intake manifold heater which consists of a small chamber with a hinged lid. The chamber is packed with an asbestos wick, surrounding the intake manifold. Also, for use in subzero temperatures, some heaters have a special base (oil reservoir) equipped with a passage to direct the exhaust gases through the base. The purpose of this passage is to maintain the temperature of the engine oil at a safe operating level. If the unit, equipped with a base, is operated in temperatures above 32° F., the flexible tube is disconnected to prevent the oil temperatures from rising too high and destroying the lubricating properties. Certain engines are equipped with an air control valve mounted in the lower air duct assembly of the engine. When the valve is open, it regulates the amount of air used to cool the engine. The air control valve should be opened when the outside temperature is -20° F. or lower. Starting and operating procedures in extremely cold weather are as follows:

a. Open intake heater lid. The wick should be in the bottom of the heater under the intake manifold.

b. Saturate wick thoroughly with fuel.

c. Ignite fuel and control the degree of heat by opening or closing the intake heater lid. Usually a minute or so later the heater ignites, the frost melts from the carburetor, and the engine is then ready to start.

d. Close lid to extinguish intake heater flame.

e. Pull choke all the way out and slowly operate starter through six or seven revolutions of the engine.

f. Set choke in half-open position and crank engine vigorously.

g. Reduce amount of choke slowly as engine warms up.

h. Operate heater first with the discharge opening dampers at HALF-CLOSED position. If this is insufficient, close dampers fully.

i. Continue to hold pull rod out and proceed as follows:

(1) Remove torch lighter and extinguish it by holding it over the exhaust stack.

(2) Close and latch burner door.

(3) Open burner fuel line shutoff valve.

j. Place air duct damper in OPERATING position. Release damper handle slowly until flame has been established.

Note. If burner fails to ignite, relight it at once. If 2 minutes or more elapse before relighting, fuel may overflow from the vaporizer tube. If this occurs, close

burner fuel shutoff valve and do not attempt to relight burner for at least 5 minutes. Keep engine running and air duct damper open to evaporate excess fuel in the burner. Relight burner in 5 minutes.

36. DURING-OPERATION SERVICES. During-operation services are as follows:

a. Check hot air delivery. After the heater has been operating 15 minutes, the air should be warm or hot.

b. Regulate heat output by manual adjustment of the burner fuel metering valve. Engine speed should never be slowed.

c. Regulate air flow of heater air by the discharge opening dampers.

37. SHUTTING-DOWN OPERATIONS. Shutting-down operations are performed as follows:

a. Close burner fuel shutoff valve by turning the valve clockwise. Keep engine running to evaporate the fuel.

b. Stop the engine by depressing the ignition switch.

c. Check safety trip valve to be sure it falls back into the nonoperating position as the engine slows down.

d. Remove, clean, and store canvas ducts and remove and store transition plates.

38. AFTER-OPERATION SERVICES. Equipment maintenance forms are prepared, as required. After-operation services are performed, as follows:

a. Check engine oil level and replenish oil as necessary.

b. Maintain a full level of oil in air cleaner.

c. Replenish fuel as necessary.

d. Inspect fuel filter and clean filter if necessary. Inspect fuel lines for leaks or loose connections.

e. Clean equipment and engine exterior of oil and dirt.

f. Lubricate engine according to lubrication order.

g. In cold weather, protect heater when not in use by covering it with canvas.

39. DAILY PREVENTIVE MAINTENANCE CHECKS AND SERVICES. Daily preventive maintenance checks and services are listed in table 6.

Table 6. Preventive maintenance checks and services

Items to be Checked	Procedure
Fuel	Check fuel level and replenish, if necessary.
Fillercap	Check for leaks.
Burner compartment	Check for leaks.
Heater and engine	Check for leaks during and after operation.
Oil	Check for correct level and replenish, if necessary.
Wheels	Check operation and the mounting.
Ducts	Check for distortions and loose or missing mounting pins. Check canvas and asbestos pack for tears, expanding cords and hooks for missing items, and reinforcing wire for breaks or damage.
Controls	Check for proper operation.
Fuel level gage	Check for correct reading of fuel quantity.

40. SAFETY PRECAUTIONS. Safety precautions for the heater are as follows:

a. Be sure exhaust extension stack is set up properly to remove deadly carbon monoxide vapors. Do not use exhaust stack for heating.

b. Do not operate heater indoors.

c. Shut down the heater if gasoline vapors come through ducts.

d. Keep the safety trip valve clean and operating properly.

e. Do not face the access door when the burner is lighted because hot gases may escape through the door.

f. Do not light the heater while pot and heater are warm.

g. Do not refuel, repair, or adjust the heater while the engine is in operation.

h. Keep fire extinguisher in serviceable condition.

APPENDIX

REFERENCES

FM 21-10	Field Hygiene and Sanitation
TM 5-6115-271-14	Operator, Organizational, Direct Support and General Support Maintenance Manual: Generator Set, Gasoline Engine, Military Design; (Less Engine), 3 k.w., a.c., 400 h.z.; DOD Model MEP-021A, FSN 6115-017-8238; Generator Set, Gasoline Engine, Military Design; (Less Engine), 3 k.w., a.c., 60 h.z.; DOD Model MEP-016A, FSN 6115-017-8237; Generator Set, Gasoline Engine, Military Design; (Less Engine), 3 k.w., d.c., 28 Volt; DOD Model MEP-026A, FSN 6115-017-8239
TM 10-4230-202-15	Delousing Outfit: Power Driven, Gasoline Engine; With 10 Dusting Guns
TM 10-4510-201-14	Bath Unit, Portable, 8-Shower Head, M1958
TM 10-4520-201-14	Heater, Duct-Type, Portable, Gasoline, 250,000 B.t.u.
TM 38-750	The Army Maintenance Management System (TAMMS)

SELF-GRADING
LESSON EXERCISES

REQUIREMENT. Exercises 1 through 24 are multiple choice. Each exercise has only one single-best answer. Indicate your choice by circling its letter.

1. When the bath unit is set up, the water pump should be placed

   a. 20 feet from the water supply.

   b. 15 feet from the water supply.

   c. within 10 feet of a water supply.

   d. close to the water heater.

2. One end of the 15-foot hose on the bath unit is connected to the water pump inlet. The other end is connected to the

   a. shower assembly.

   b. generator set.

   c. water heater.

   d. suction strainer.

3. The shower assembly should be located approximately how far from the water heater?

   a. 10 feet.

   b. 20 feet.

   c. 30 feet.

   d. 40 feet.

4. After the engine of the generator set is started and the operating temperature is attained, the choke lever

   a. opens.

   b. closes.

   c. partially opens.

   d. partially closes.

5. The burner fuel control valve of the bath unit is opened to START position when the fuel pressure gage indicates approximately

   a. 35 p.s.i.

   b. 45 p.s.i.

   c. 60 p.s.i.

   d. 80 p.s.i.

6. The first step in shutting down the bath unit is to

   a. shut down the generator set.

   b. place circuit breaker switch in OFF position.

   c. turn off the water heater switch.

   d. turn off the burner fuel shutoff valve.

7. If the bath unit burner fails to ignite immediately, the operator should turn off the

   a. water heater switch.

   b. shower stand control valve.

   c. governor.

   d. fuel shutoff valve.

8. An important safety precaution in making an emergency shutdown of the bath unit is to

   a. disconnect the power cord cables.

   b. disconnect the ignition electrodes.

   c. disconnect the ignition cable assemblies.

   d. close the blower shutter.

9. Methyl bromide insecticide is used to fumigate

   a. buildings.

   b. personnel.

   c. clothing and bedding.

   d. animals.

10. Lindane insecticide is a

   a. powder.

   b. gas.

   c. liquid.

   d. cream.

11. An individual who has been dusted with lindane for delousing purposes can be dusted again after

   a. 18 hours.

   b. a day.

   c. a week.

   d. a month.

12. The time required to fumigate and air clothing is

a. 40 minutes.

b. 45 minutes.

c. 50 minutes.

d. 60 minutes.

13. The two major components of the delousing outfit are the

a. engine and air compressor.

b. engine and fumigation bag.

c. compressor and fumigation bag.

d. fumigation bag and dusting guns.

14. The air compressor of the delousing outfit provides a filtered flow of air to the

a. muffler.

b. manifold.

c. engine.

d. air cleaner.

15. To start the engine of the delousing outfit the choke is

a. half-closed.

b. half-opened.

c. opened.

d. closed.

16. How many men are required to operate the delousing outfit?

a. 10.

b. 11.

c. 12.

d. 15.

17. If the air compressor output of the delousing outfit decreases when operated at high altitude, the engine speed can be increased by

a. retiming the magneto.

b. adjusting the magneto breaker points.

c. retarding the governor control linkage.

d. advancing the governor control linkage.

18. The normal reading of the air pressure gage of the delousing outfit is

a. 25 p.s.i.

b. 30 p.s.i.

c. 35 p.s.i.

d. 40 p.s.i.

19. The function of the 250,000-B.t.u. heater used in bath operations is to provide a steady flow of heated air through a

a. hot water system.

b. fan-type system.

c. gravity system.

d. duct system.

20. Air for combustion in the vaporizing burner of the 250,000-B.t.u. heater is provided by

a. a perforated chamber.

b. an air duct.

c. an air damper.

d. a perforated sleeve.

21. Fuel input of the 250,000-B.t.u. heater is controlled by a

a. metering valve.

b. safety valve.

c. pressure valve.

d. pressure system.

22. The overheat safety valve of the 250,000-B.t.u. heater is partially closed by a

a. spring device.

b. wheel attachment.

c. sensing element.

d. safety trip lever.

23. The 6-inch exhaust ducts of the 250,000-B.t.u. heater are fastened to the 12-inch ducts by

a. couplers.

b. transition plates.

c. bushings.

d. transition couplers.

24. The 250,000-B.t.u. heater must be shut down when gasoline vapors come through the

a. stack.

b. ducts.

c. access door.

d. stack sleeve.

REQUIREMENT. Exercises 25 through 27 are matching exercises. Column I indicates when a maintenance inspection or check is performed on the bath unit delousing equipment. Column II lists items checked or inspected. Select the item in column II that is inspected or checked at the time specified in column I by writing the column II letter below the column I number. Items in column II may be used once, more than once, or not at all.

Column I		Column II	
25.	Before-operation inspection.	a.	Inspect crankcase filler cap.
26.	During-operation check.	b.	Check air hoses for leaks.
27.	After-operation inspection.	c.	Inspect mounting of crankcase breather.
		d.	Check magneto stop switch.

REQUIREMENT. Exercises 28 through 35 are true-false. Record each answer by writing a T or an F next to the exercise number.

28. The ground rod of the generator set used with the bath unit should be driven into the ground as close to the generator as possible.

29. Before-operation inspection is performed to insure that the bath unit is ready for operation.

30. Refueling operations may be performed while the bath unit is in operation.

31. Methyl bromide insecticide used in fumigation operations will not shrink fabrics.

32. Lindane affects the nervous system of insects and paralyzes them.

33. The tent heater is used for drying clothes in laundry operations.

34. The 16-gallon fuel tank of the 250,000-B.t.u. heater is mounted underneath the heater.

35. The combustion air duct damper is opened during lighting of the tent heater.

HAVE YOU COMPLETED ALL EXERCISES? DO YOU UNDERSTAND EVERYTHING COVERED? IF SO, TURN TO THE NEXT PAGE AND CHECK YOUR ANSWERS AGAINST THE SOLUTIONS.

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SOLUTION SHEET

FIELD BATH AND DELOUSING EQUIPMENT

Check your work against the solutions given below. If you have made a wrong response or omitted a required response, correct your work. Then, go back and restudy the appropriate text portion once more (references follow each solution).

Ex	Sol	Ref
1.	c	para 2b
2.	d	para 2d & fig. 1
3.	b	para 2e
4.	a	para 4a
5.	c	para 4c
6.	d	para 6a
7.	d	para 9c
8.	b	para 9k(2)
9.	c	para 12a
10.	a	para 12b
11.	c	para 12b(6)
12.	c	para 13
13.	a	para 14
14.	b	para 14b
15.	d	para 17
16.	b	para 18
17.	d	para 27
18.	a	para 28 & table 5
19.	d	para 30
20.	d	para 31f
21.	a	para 31h
22.	c	para 31i(1)
23.	b	para 31k
24.	b	para 40c
25.	c	para 16 & table 2
26.	b	para 19 & table 3
27.	a	para 21 & table 4
28.	T	para 2a
29.	T	para 3
30.	F	para 9g
31.	T	para 12a
32.	T	para 12b
33.	T	para 30
34.	F	para 31h
35.	F	para 34m

All references are to the Lesson Text.

HAVE YOU CHECKED YOUR ANSWERS, MADE CORRECTIONS, AND RESTUDIED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON TO THE NEXT LESSON OF THIS SUBCOURSE.

STUDENT INQUIRY SHEET

Number/Title LESSON 3, QM0483

Field Bath and Delousing Equipment

Date
February 1973

Reprint
Repr (A), Oct 75

Use this form if you have a question or request for information concerning a subcourse lesson or examination. This form may be used to ask questions about lesson or examination exercises, but not to request solutions to those exercises. Use this form also for comments, suggestions, requests for additional subcourses, and other informal communications concerning your correspondence course enrollment.

Last Name	**First Name**	**MI**	Student Number/SSAN	Military Rank

Address (No., street, city and state)	**Zip Code**	Civilian Grade

If your name, grade, or address is new, please place an X in this box ☐	Date Submitted

Request information on or clarification of the following points:

The following errors have been found in the instructional materials:

(Additional space is available on the other side of this form.)

QMFL Form 101
Rev May 75

13S-4720

Note. Fold this inquiry sheet with this School's address on the outside, staple or scotch tape it closed, and mail without an envelope.

CUT ALONG THIS LINE

Use this space for additional comments.

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LESSON 4 Credit Hours: 2

LESSON ASSIGNMENT

SUBJECT	Mobile Laundry Equipment.
STUDY ASSIGNMENT	Lesson Text.
SCOPE	Function and operation of the seven major components of the single-trailer laundry unit; set-up and take-down of unit; safety precautions required for mobile laundry equipment.
OBJECTIVES	As a result of successful completion of this assignment, the student will be able to--

1. State the nomenclature and explain the function and operation of the seven major components of the single-trailer unit.

2. Give the necessary procedures to set up, operate, and take down the single-trailer laundry unit, including maintenance services.

3. Describe the safety precautions used in operating mobile laundry equipment.

LESSON TEXT

1. COMPONENTS. The single-trailer laundry unit, Army type M532, consists of a trailer chassis model M536 on which are mounted the six components of the laundry unit, including the generator set, water heater, air compressor, washer-extractor, and dryer-tumbler. The water pump is a portable unit mounted on the trailer for transportation only.

a. TRAILER. The 3 1/2-ton M536 trailer chassis is designed for use with the single-trailer laundry unit (figs. 1 and 2). The trailer has a single axle with wheels which are located off center to distribute 400 pounds more weight to the front than to the rear of the trailer. This is to prevent the trailer from tilting. Some of the features of the trailer are explained below.

(1) LIGHTS. The trailer taillights are operated by the light switch in the towing vehicle. Electrical power for the lights is received from the towing vehicle through the intervehicular cable (para 1a(4)) and the trailer chassis wiring harness.

(2) BRAKES. The trailer is equipped with air-over-hydraulic brakes for road operation. The controls for the service brakes are located in the towing vehicle. The trailer is also equipped with handbrake levers for use when parking and operating the laundry unit. The levers are mounted at the front end of the trailer frame, one lever on each side. The lever is moved to the front to apply the brake and to the rear to release it. Brakes are adjusted by turning the knob on the end of the handbrake lever.

(3) RETRACTABLE SUPPORT. The retractable support assembly is secured to the front end of the trailer chassis drawbar. A spring-loaded handle at the top of the retractable support provides for locking the assembly in either the vertical or horizontal position. The position of the support assembly may be changed by pulling out the spring-loaded handle and raising or lowering the assembly with the auxiliary handles on the ground pad and right side of the support frame. In addition to the retractable feature, the entire support assembly can be rotated to permit steering when the support wheels are on the ground. The support frame can be raised by a retractable support crank located on the left side of the support frame. This eliminates the possibility of the wheels contacting the ground while the trailer is being towed with the retractable support in the vertical position. When the retractable support is locked in the vertical position, turning the crank handle clockwise lowers the support wheels and ground pad. Turning the crank counterclockwise raises the wheels and ground pad. A clip welded to the retractable support frame secures the crank handle when the crank is not in use.

(4) INTERVEHICULAR HOSE AND CABLE. Two air hose couplings, tagged Service and Emergency, are mounted in the front crossmember of the chassis frame. The hoses must be connected to the towing vehicle, after which the service brakes may be actuated by the controls in the towing vehicle. The intervehicular cable is used to connect the trailer to the electrical system of the towing vehicle. The plug assembly on the front end of the cable is put into the socket on the rear of the towing vehicle. When the hoses and cables are connected, they affect two instruments in the towing vehicle which are concerned with the trailer operation. They are the air pressure

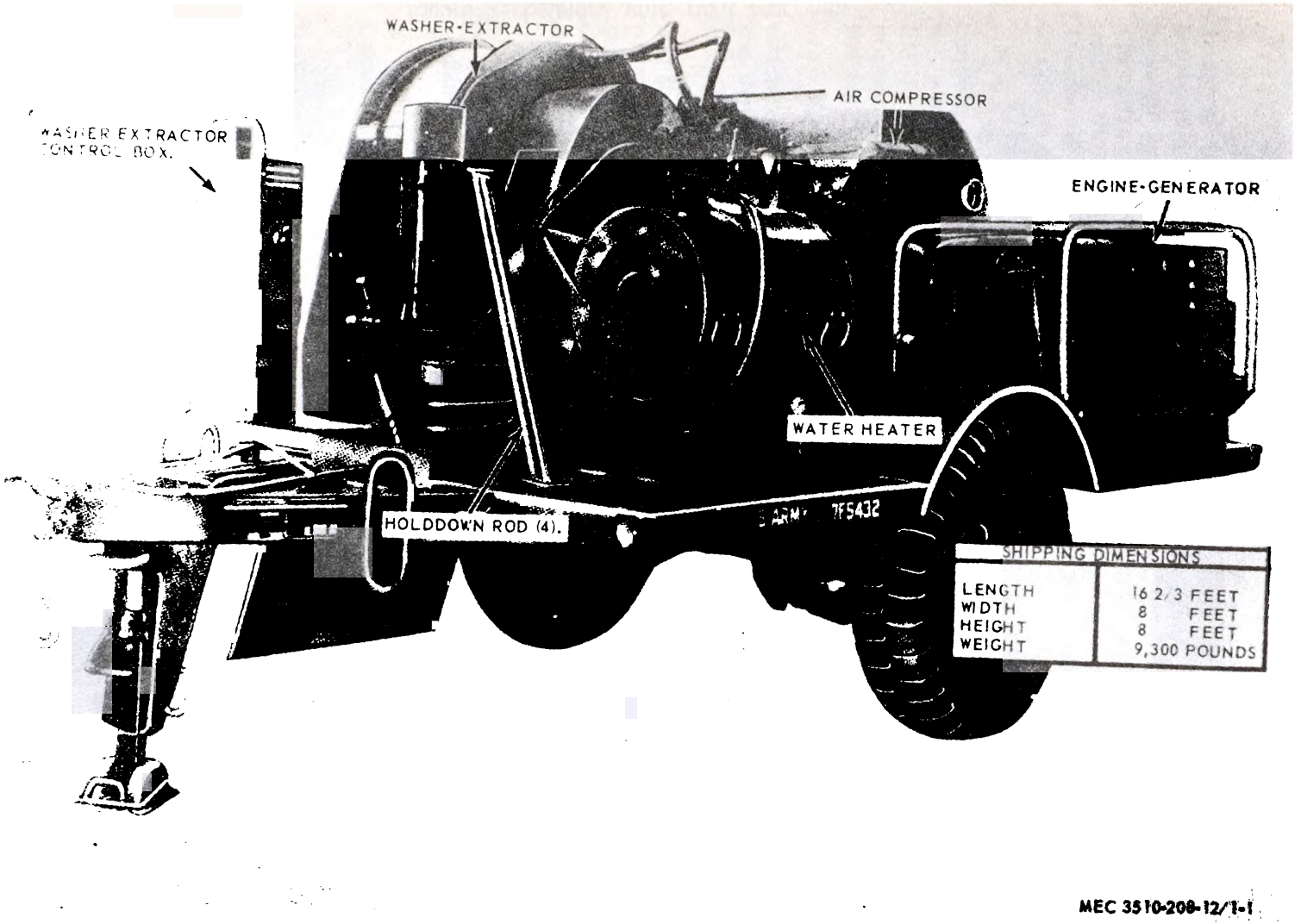


Figure 1. Laundry unit, left frcnt view.

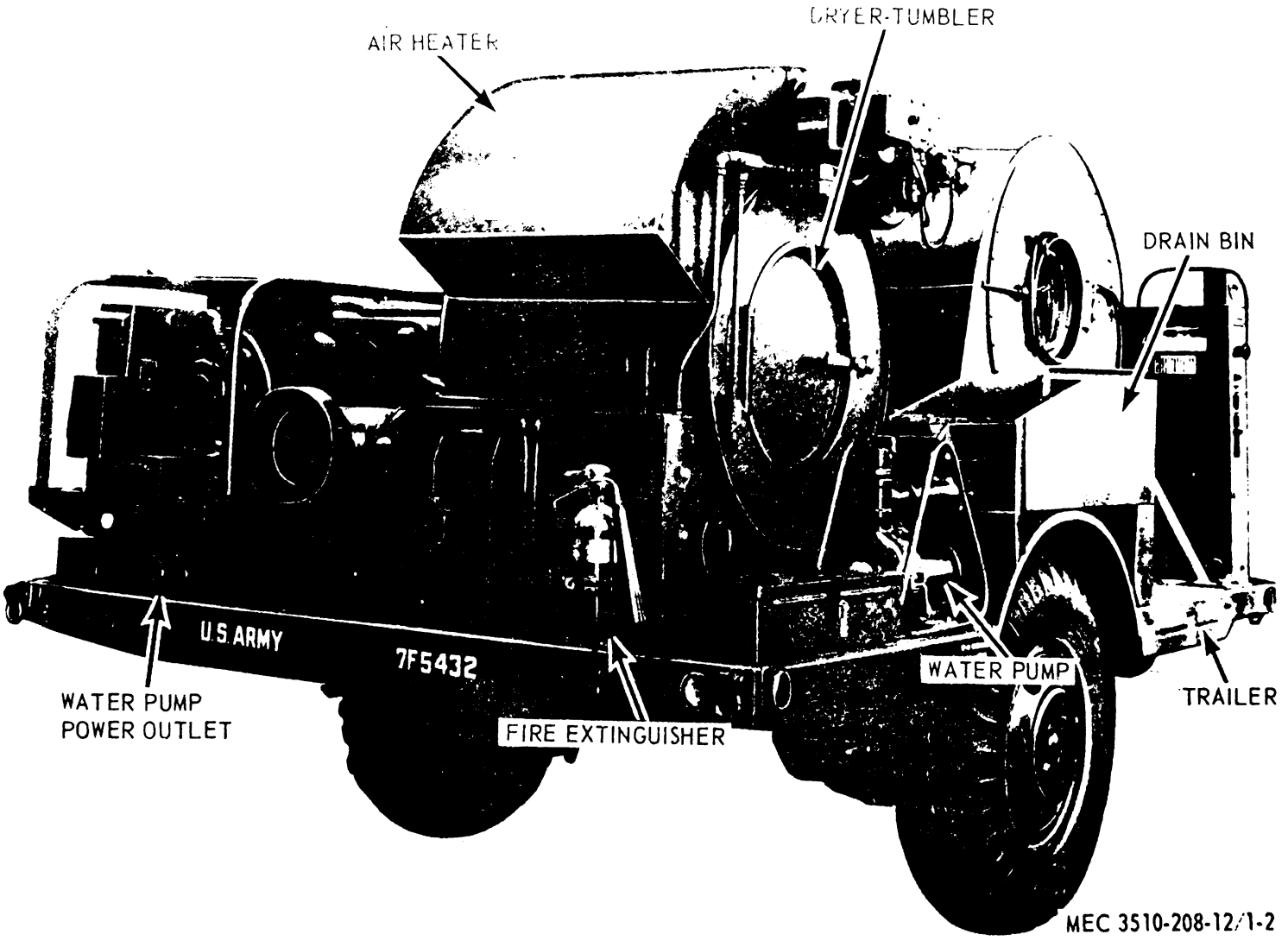


Figure 2. Laundry unit, right rear view.

gage to indicate pressure available for actuating the trailer brakes and the ammeter to indicate that generator current is available for operating the trailer lights.

b. GENERATOR SET. The military design generator set model SF-10-MD supplies electrical power to the laundry unit and is a self-contained, skid-mounted, portable unit. It is mounted on the left rear of the laundry trailer. It is powered by a 4-cylinder, air-cooled engine that is directly coupled to a 10-kilowatt alternating current generator. The generator is designed for various settings, but the setting used in the operation of the single-trailer laundry unit is 60-cycle, 208-volt, 3-phase, 4-wire. The control cabinet (fig. 3) contains the controls, instruments, and components necessary to operate the generator set. Some of the controls and instruments are described below.

(1) SWITCHES. The regular starts and stops of the engine are controlled by the START-STOP switch. When the operator must work on the generator, the engine is stopped by the EMERGENCY STOP-RUN switch. The switch is placed in EMER STOP position to prevent accidental starting, and then it is placed in NORMAL position for starting. The REMOTE-LOCAL switch is set on LOCAL for normal engine starting. The panel light switch operates the two panel lights located on the control cabinet.

(2) VOLTAGE AND CURRENT SELECTORS. The voltage selector is set for the desired phase or line voltage and the current selector is set for the desired current to be delivered by the generator set.

(3) METERS AND GAGES. The voltmeter indicates the voltage and the ammeter registers the current being provided by the generator set. The frequency meter indicates the frequency of the electrical current in cycles being delivered by the generator set. The hourmeter records the total hours of engine operation. The engine oil pressure gage registers oil pressure and the battery charge indicator registers the charge delivered to the battery when the engine is running.

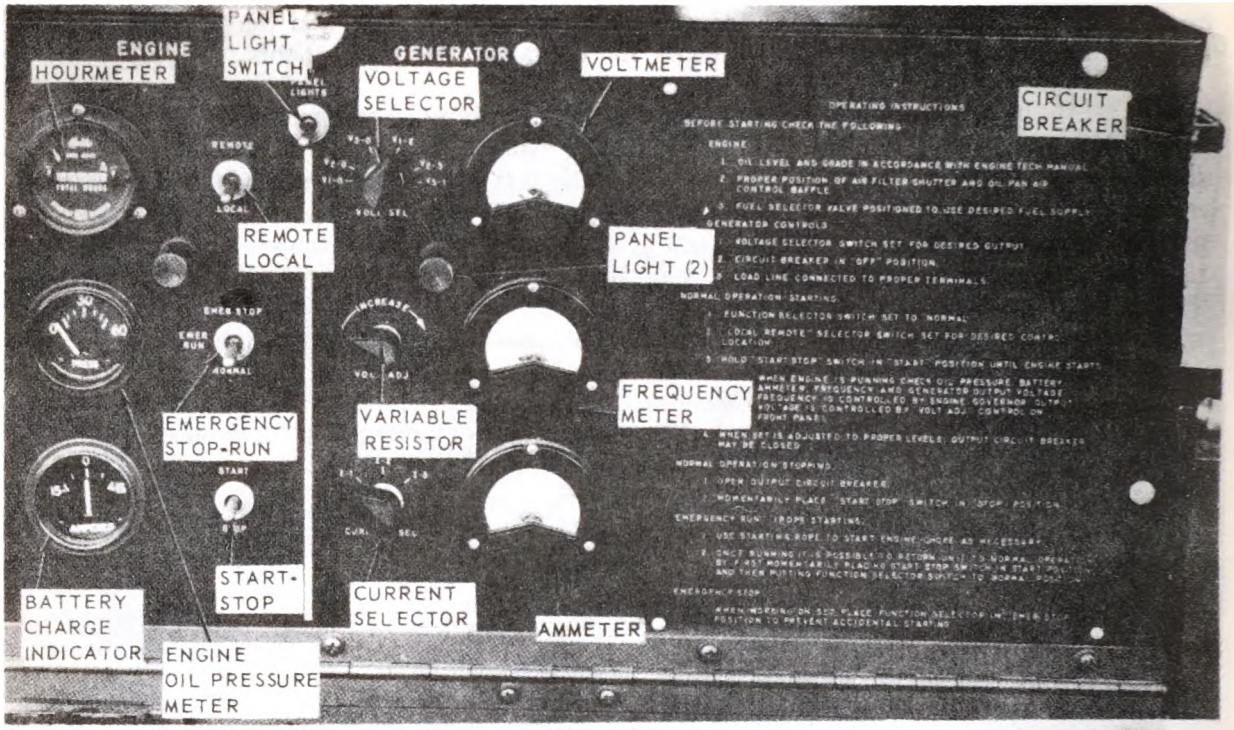
(4) FUEL VALVE. The three-way fuel valve on the right rear of the generator should be placed in SET position for fuel tank supply and in AUX for auxiliary fuel supply.

(5) CHOKE CONTROL. The engine choke control is normally placed in the IN position.

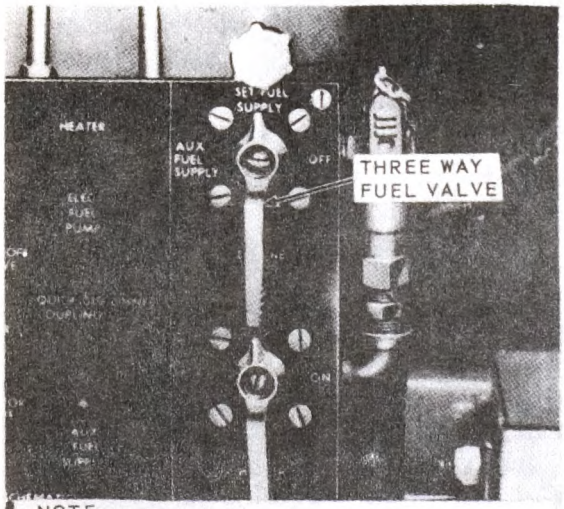
(6) CIRCUIT BREAKER. The circuit breaker is placed in the OFF position when the generator set is stopped or started. When the set is adjusted to proper levels and the engine has reached the operating temperature (3 to 5 minutes), the circuit breaker is placed in the ON position.

c. AIR COMPRESSOR. The air compressor (fig. 4) which provides compressed air for operating the laundry unit, is mounted behind the dryer-tumbler. The laundry operation requires compressed air at a minimum of 75 to 90 p.s.i. (pounds per square inch).

d. WATER HEATER. The water heater (figs. 5 and 6) heats incoming water to a preset temperature. The water temperature is registered on the temperature gage located on the top of the tank. The temperature control thermal switch (fig. 5),



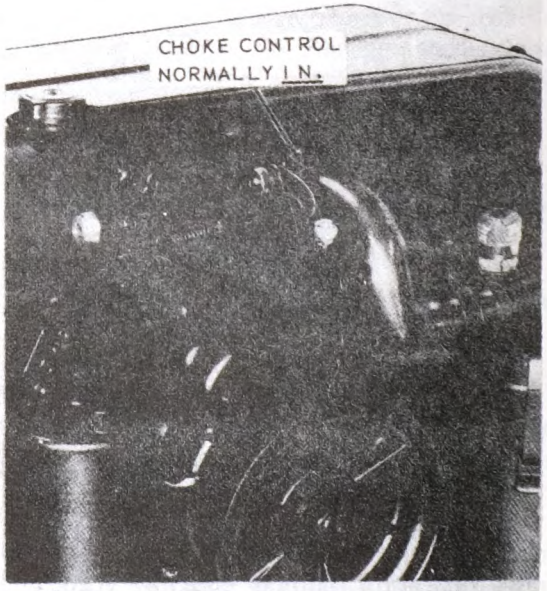
A. ENGINE AND GENERATOR CONTROLS AND INSTRUMENTS.



NOTE:

FOR FUEL TANK SUPPLY, PLACE IN SET POSITION. FOR AUXILIARY FUEL SUPPLY, PLACE IN AUX POSITION.

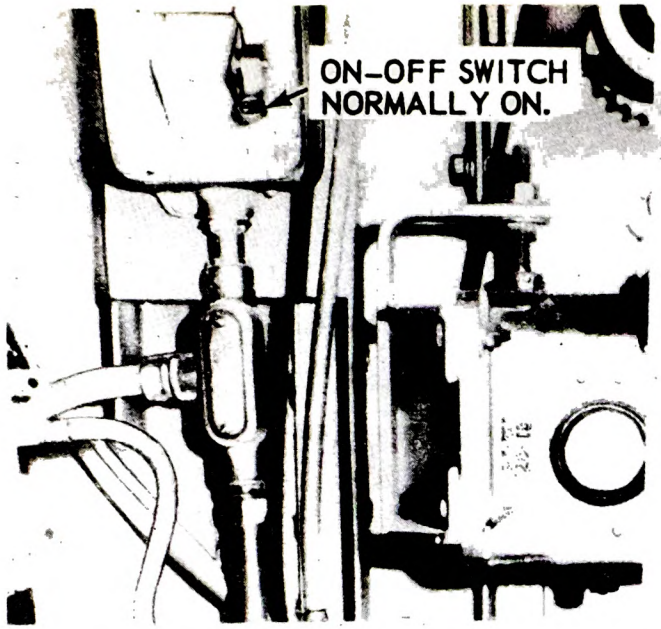
B. THREE WAY FUEL VALVE.



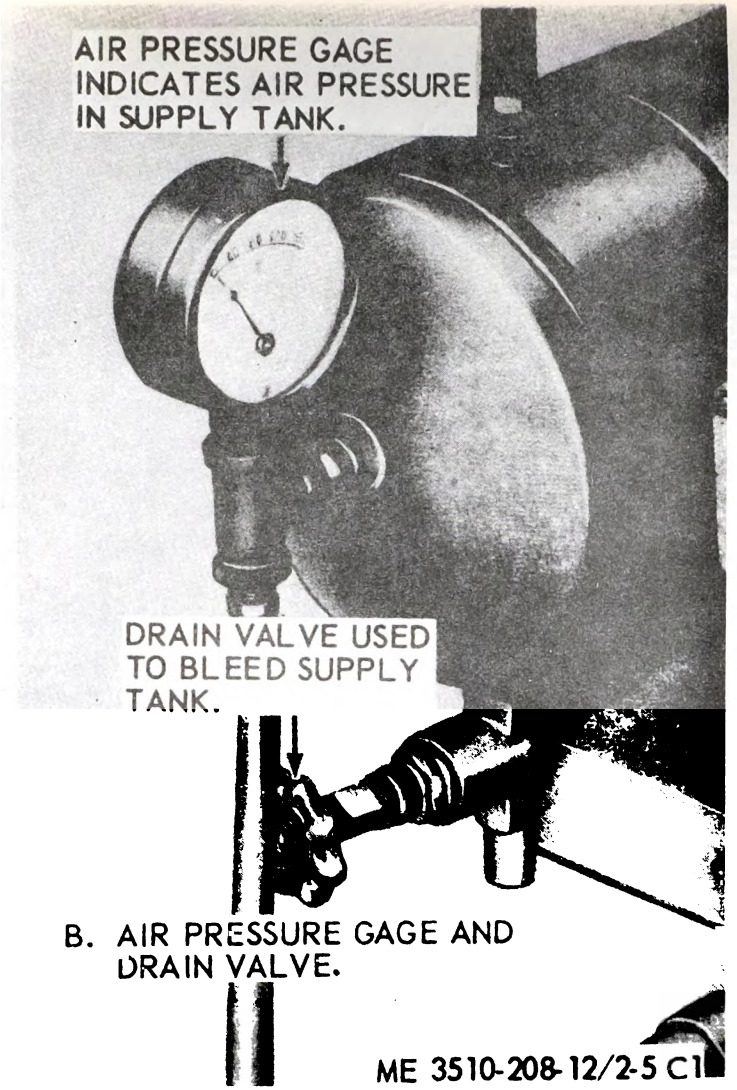
C. CHOKE CONTROL

ME 6115-275-15/2-4

Figure 3. Generator set controls and instruments.



A. AIR COMPRESSOR ON–OFF SWITCH



B. AIR PRESSURE GAGE AND DRAIN VALVE.

Figure 4. Air compressor controls and instruments.

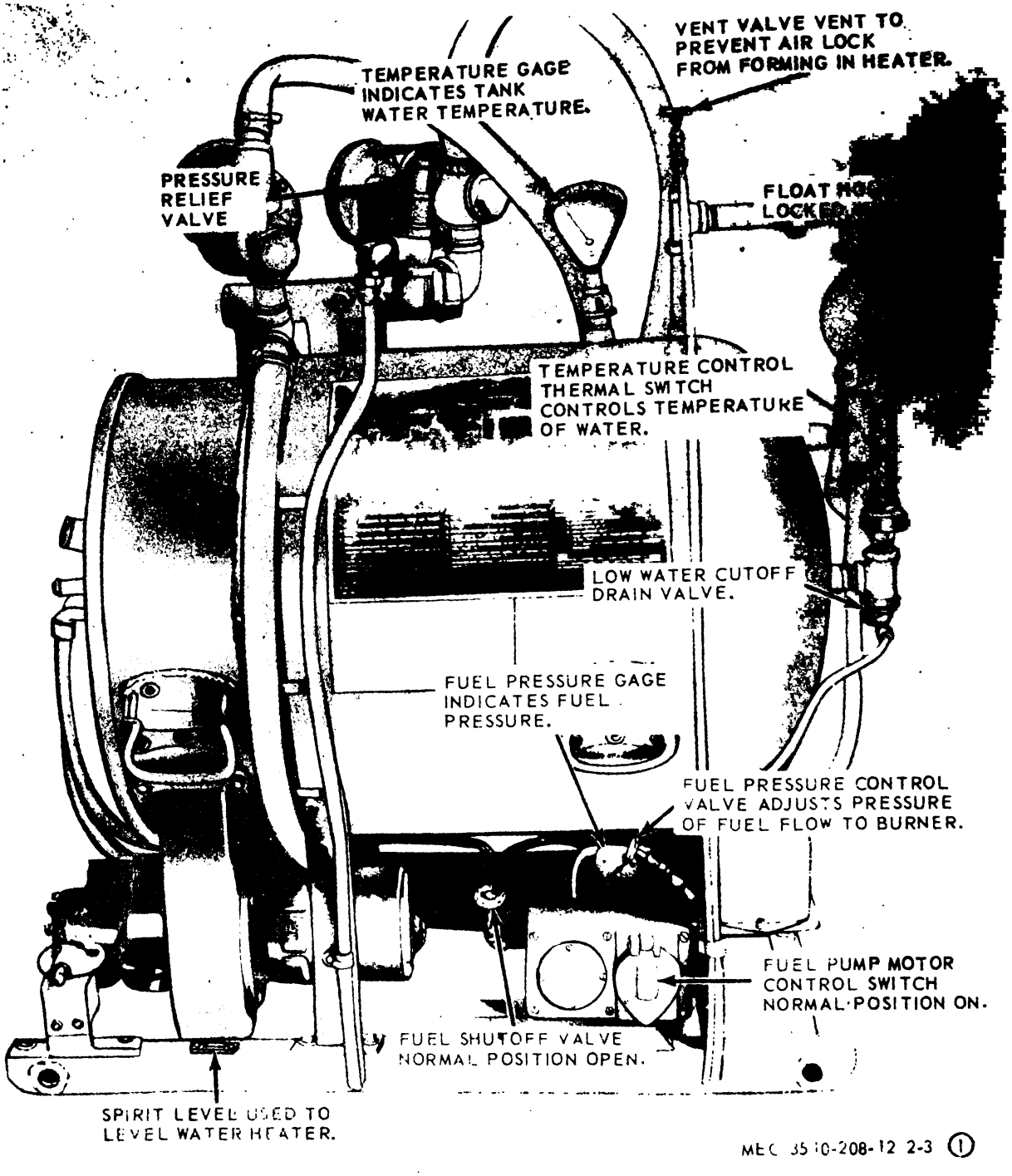


Figure 5. Water heater controls and instruments, side and rear.

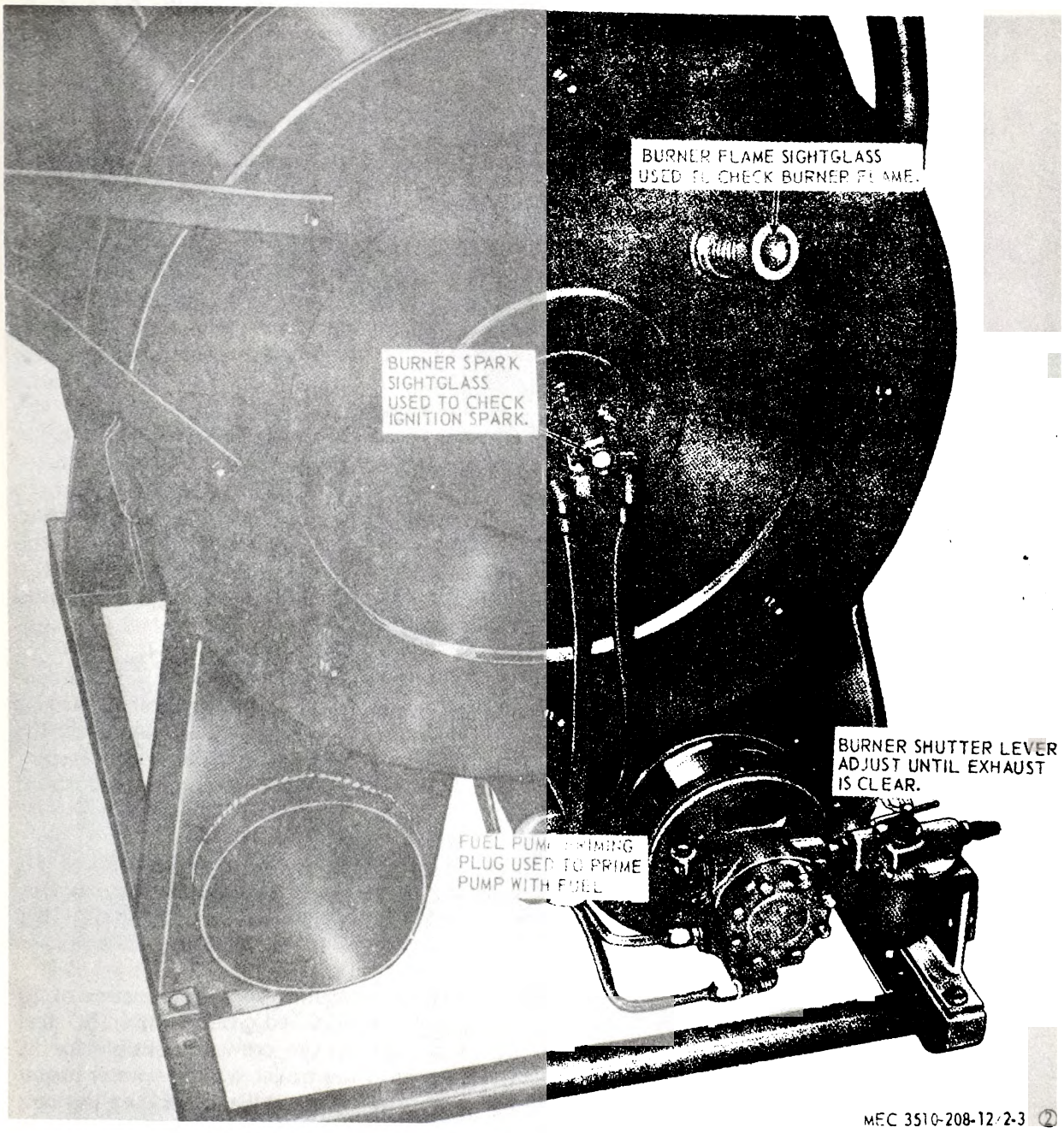


Figure 6. Water heater controls and instruments, front.

located at the top rear of the heater, controls the temperature of the water supplied to the washer-extractor. The water heater burner has a 6 1/2-gallons-per-hour (g.p.h.) fuel nozzle with a burning rate of 2 to 6 1/2 g.p.h. The burner nozzle and ignition electrodes are positioned in the nozzle and electrode holder, which is mounted on the front of the burner tube. A 10,000-volt transformer located at the bottom rear of the heater supplies ignition to the burner, and a blower mounted below the water heater supplies air to the firebox for fuel combustion. The fuel pump, coupled to the blower, draws fuel from the source through a filter, through the fuel shutoff valve, and through the fuel pressure control valve. The control valve controls the pressure indicated on the fuel pressure gage and delivers the fuel to the burner. The blower, fuel pump, and ignition electrodes are controlled by the blower and fuel pump motor control switch located on the left side of the water heater.

e. WASHER-EXTRACTOR. The washer-extractor is an end-loading, reversible-cylinder unit (figs. 7 and 8). It is supported at each corner by a large coil spring and it is equipped with four shock absorbers for stabilizing effects. The washer cylinder inside the shell is constructed of a corrosion-resistant metal and is perforated to allow water to flow through the clothes during the wash and rinse cycles. The ribs inside the cylinder cause the clothes to tumble and create a mechanical action necessary for the laundering process. The washer-extractor is equipped with two electric motors, one for washing and one for extracting. The drive belts from the jackshaft to the extractor motor are kept tight by a coil spring located above the air cylinder. To change from washing to extracting operations, the air cylinder causes the washer motor and the jackshaft to move in a slide mount toward the extractor motor, loosening the belts between the jackshaft and extractor motor. As the washer motor slides forward, it activates a microswitch and starts the extraction operations. The controls and instruments are located on the control panel at the right front corner of the trailer.

f. DRYER-TUMBLER. The dryer-tumbler is an open-end, nonreversible-type unit (figs. 9 and 10). The tumbler cylinder is perforated and has ribs to tumble the clothes. A motor located on the rear of the tumbler shell operates the cylinder. An air heater located on top of the tumbler shell furnishes the hot air necessary for drying the clothes. Fuel for the burner is drawn through the lines connected to an external fuel container.

g. WATER PUMP. A portable, centrifugal-type water pump (fig. 11) mounted in a carrying frame is provided with the laundry unit. After the initial prime, the pump is self-priming and will deliver 18 to 20 gallons of water per minute. It is powered by the generator set.

2. SETTING-UP OPERATIONS. The laundry requires a minimum space of 10 by 20 feet. The site should be located on firm, level, well-drained ground within 50 feet of a water source. The laundry unit usually is set up by the crew responsible for its operation. To prepare the laundry for operation, position the trailer with the water heater next to the water source. Set the handbrakes and lower the stabilizing jack at the rear of the trailer. Remove the canvas cover and stow it in a convenient place. If the equipment is new, remove preservatives from all pulleys, sheaves, gages, valves, and shiny metal surfaces and from around doors and controls. Prepare DA Form 2400 (Equipment Utilization Record) and DA Form 2404 (Equipment Inspection and Maintenance Worksheet). In addition to these general procedures, the personnel set up the equipment as follows:

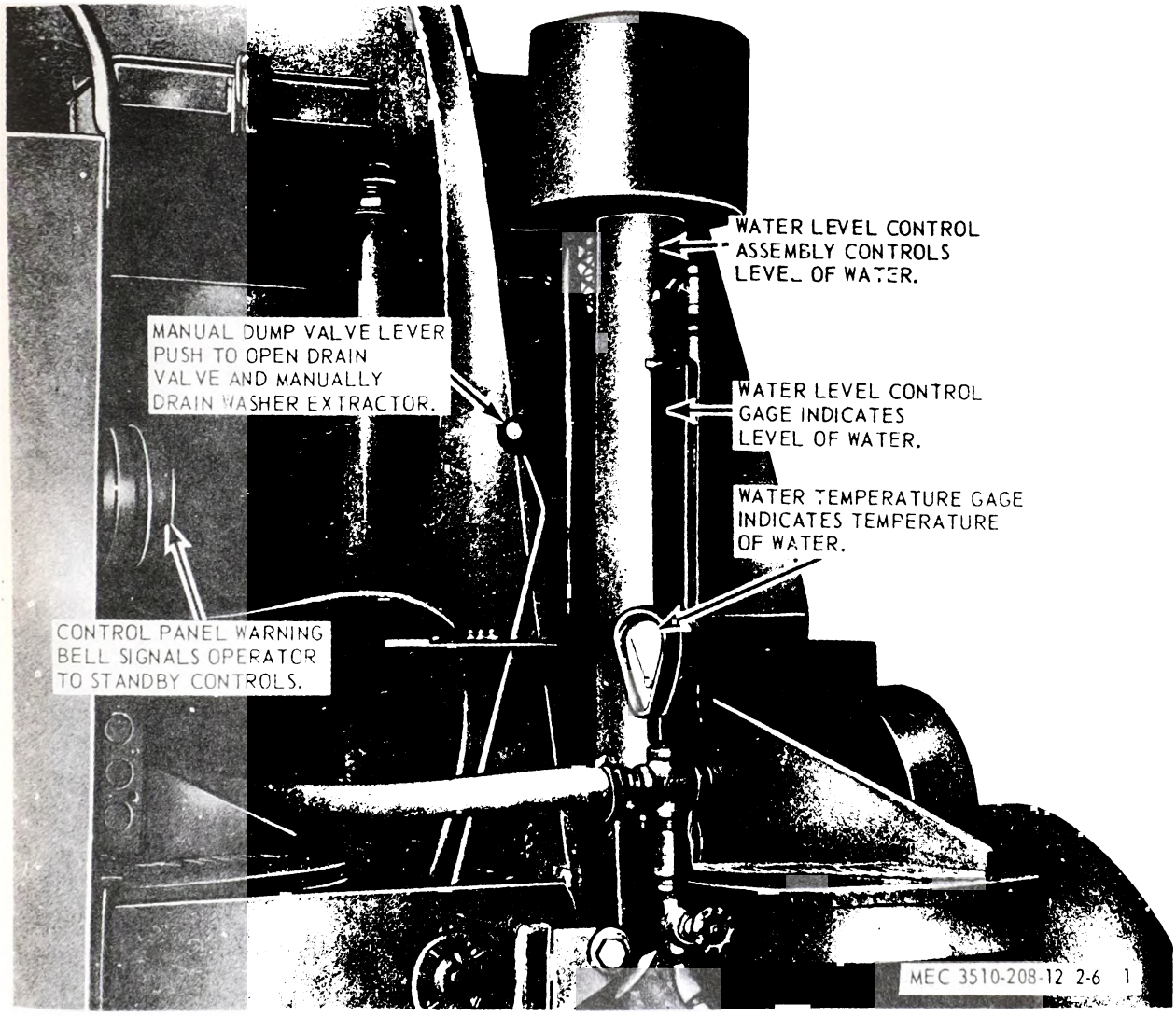


Figure 7. Washer-extractor controls and instruments, right side.

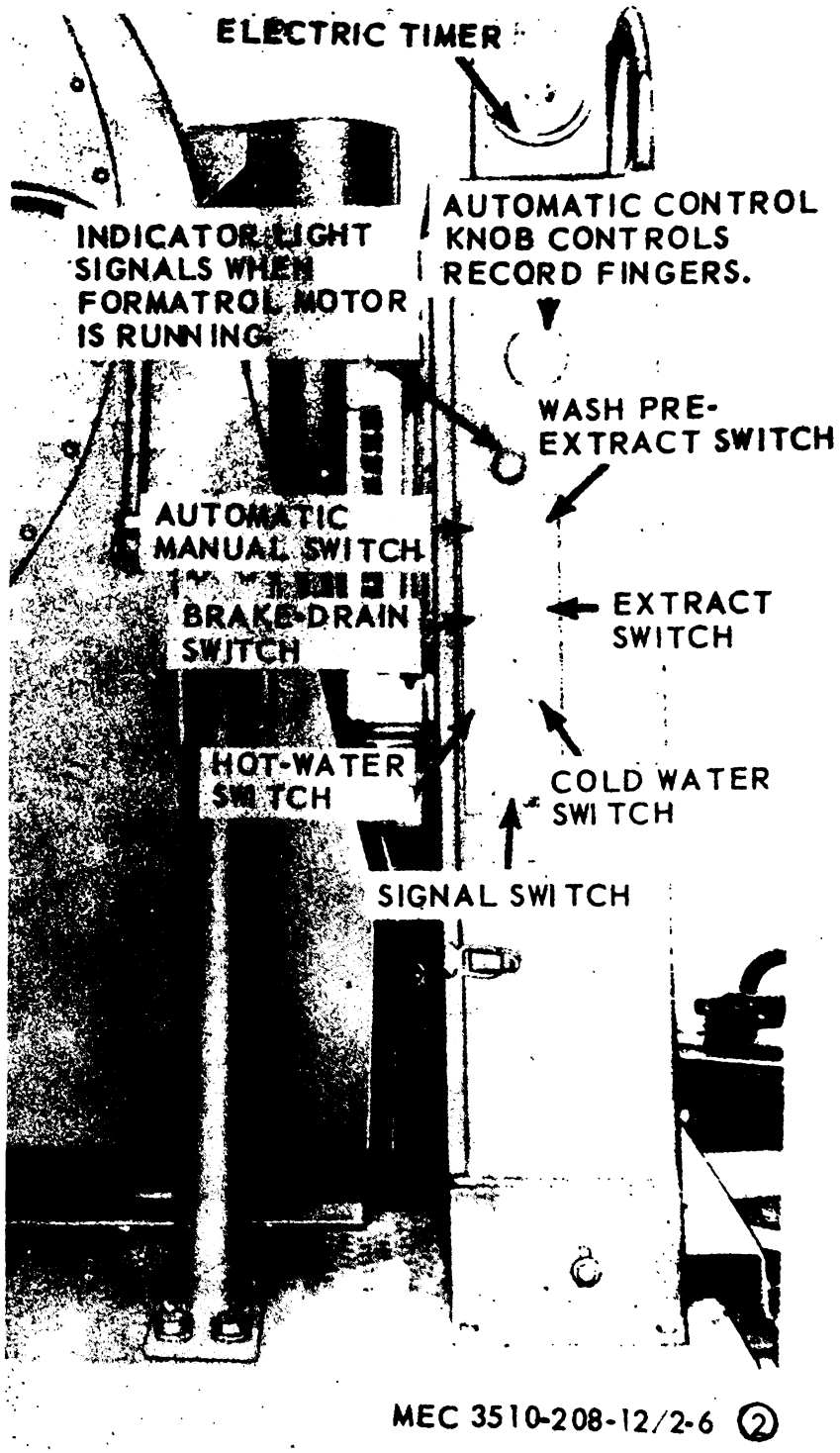


Figure 8. Washer-extractor control panel.

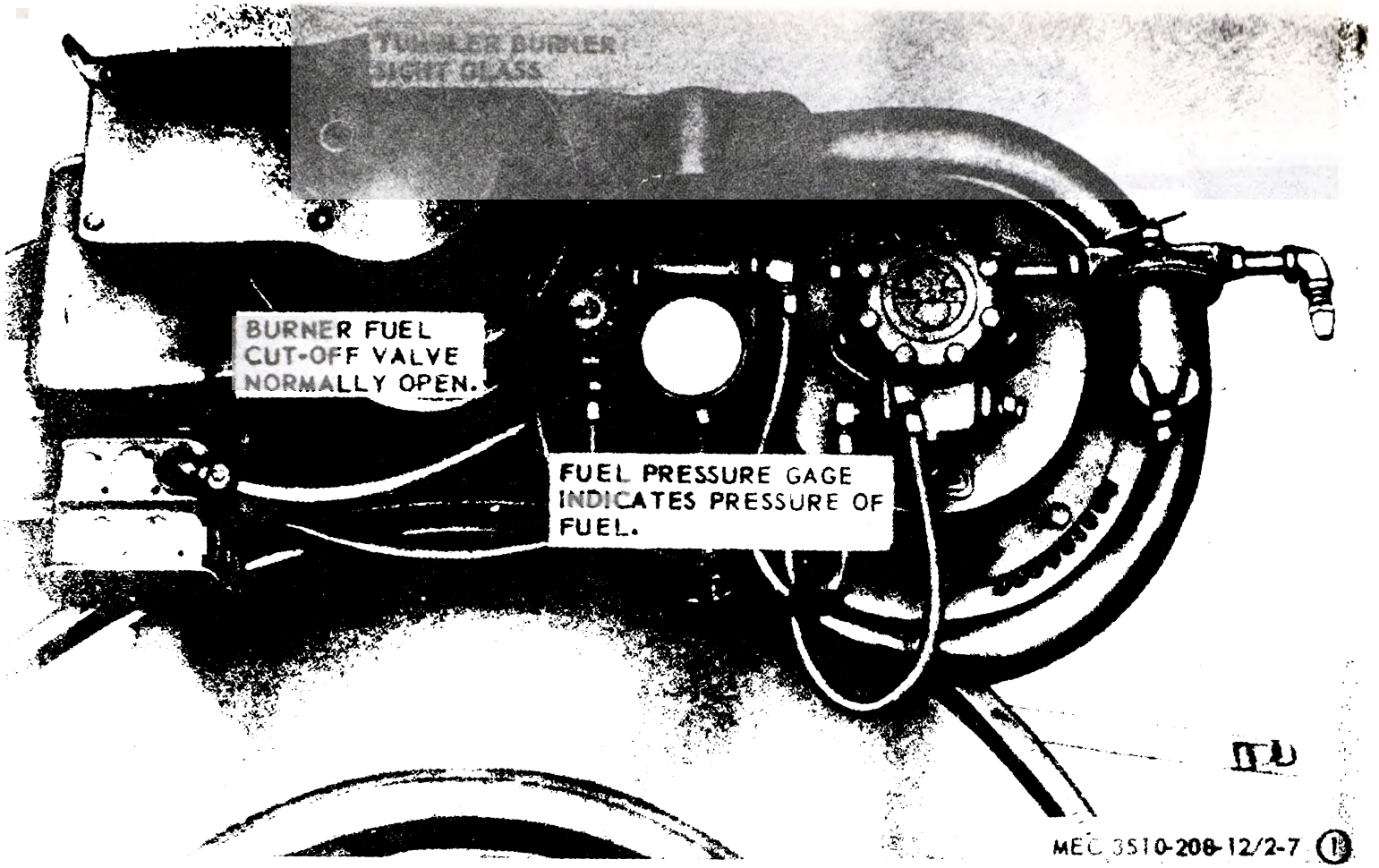


Figure 9. Dryer-tumbler controls and instruments, front.

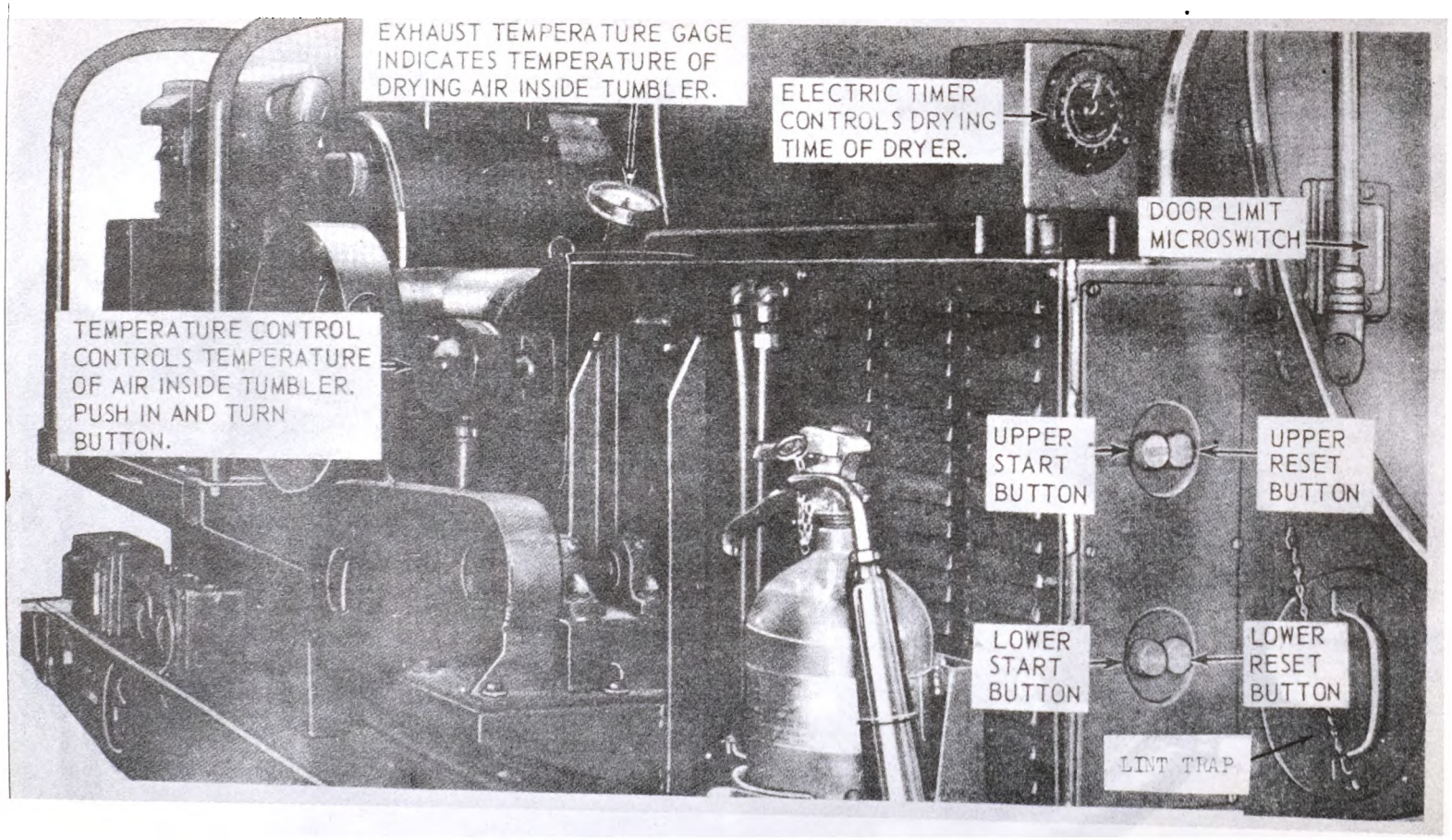


Figure 10. Dryer-tumbler controls and instruments, left side.

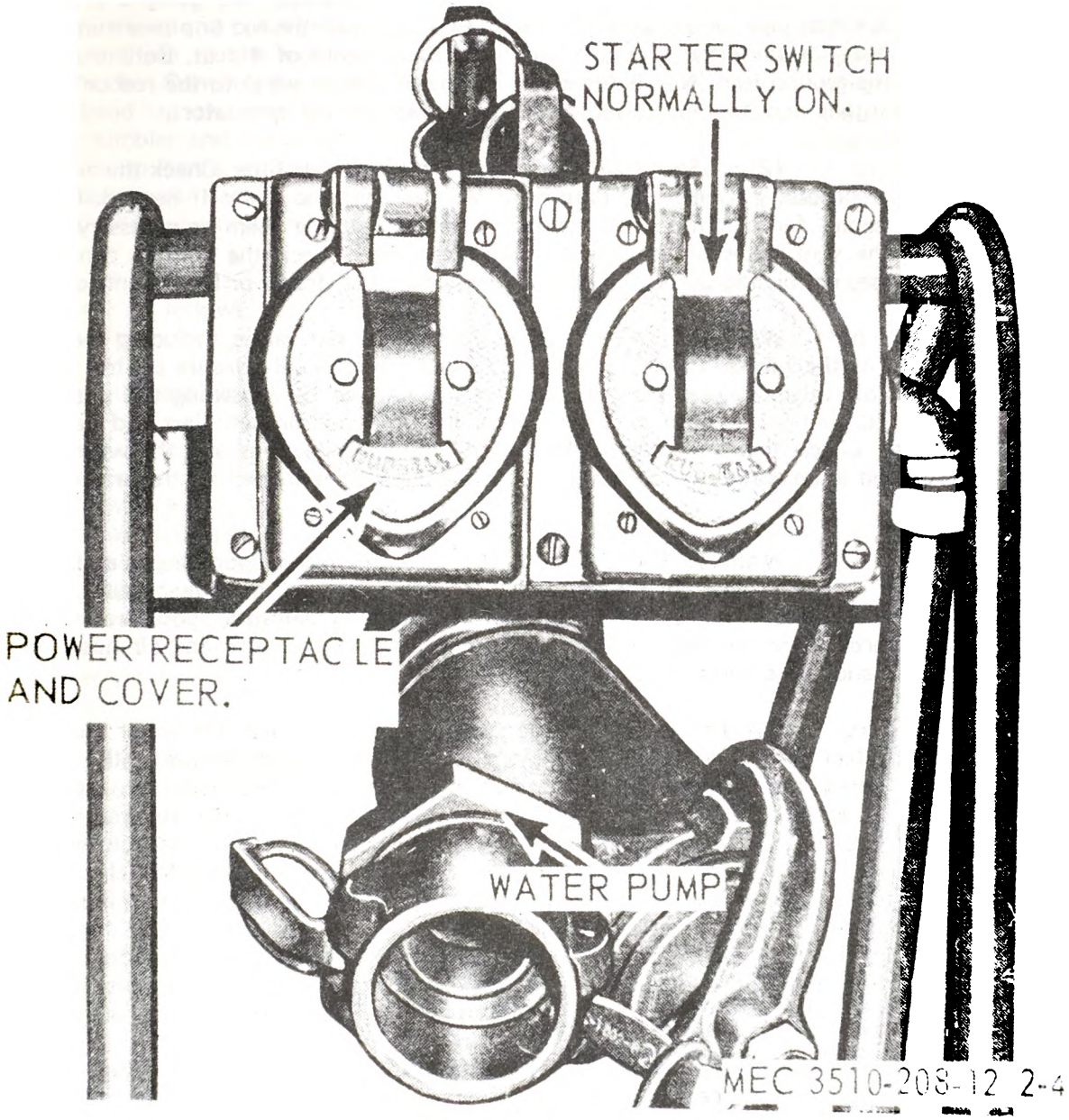


Figure 11. Water pump controls and instruments.

a. GENERATOR SET. The generator must be set to within 15 degrees of level. It must be grounded and serviced before operation.

(1) GROUNDING. Ground the generator set, using a 5/8-inch solid rod, a 3/4-inch pipe, or a 9-square-foot ground plate. Drive the rod or pipe a minimum depth of 8 feet, or bury the ground plate a minimum depth of 4 feet. Bolt or clamp one end of the ground lead (No. 6 American Wire Gage copper wire) to the rod or plate; connect the other end to the ground stud at the rear of the generator.

(2) SERVICING. Clean or repair the air filter. Check the oil level and add oil if necessary. Check the battery water level and add water if needed. Check the battery cables for condition and tighten, clean, or replace them as necessary; also insure that the vent holes of the battery caps are clean. Check the control panel for damaged, loose, or missing parts. Check the wiring for cuts, frays, or loose connections.

b. WATER HEATER. Close the water heater valves, including the vent valve on top of the heater, the low water cutoff drain valve, fuel pressure control valve, and fuel shutoff valve. Release the low water valve float rod by loosening the setscrew, raising the rod, and locking the setscrew. Check the gages for broken glass and bent or broken parts. Check the fuel lines for breaks and loose connections and the wiring for cuts, frays, and loose connections. Connect 7-inch exhaust duct stowed on trailer to water heater.

c. WASHER-EXTRACTOR. Remove the four support braces and stow on the trailer drawbar. Clean all sheaves and pulleys with solvent and adjust belts. Clean the shiny metal surfaces of disks and shoes. Check gages for damages, loose mountings, or missing parts. Check wiring for cuts, frays, and loose connections and air hoses for cuts, breaks, and loose mountings.

d. WATER PUMP. Position the water pump near the water and not more than 10 feet above the water level. Before connecting the suction hose to the water pump inlet, check the condition of the gasket and coupling connections. Connect the strainer to the suction hose and place the strainer in the water. Lodge the strainer in a bed of stones or elevate it so it is not on the bottom of the water source. Before connecting the hose from the water pump outlet to the water heater inlet, check the hose for cuts and frays. For the initial prime of the pump, remove the priming plug, prime the pump with water, and replace the plug. Connect the drain hose to the drain pan at the bottom front of the trailer, and position the discharge end of the drain hose downstream from the suction hose. Before connecting the power cable to the water pump, check the receptacle for broken or missing parts and the cable for cuts or breaks.

e. DRYER-TUMBLER. Close the manually operated burner fuel cutoff valve. Remove the 5-inch canvas duct from its storage location inside the tumbler, and place the duct on the ground behind the laundry unit, temporarily. Check gages and switches for loose connections or broken parts. Check wiring for cuts, frays, and loose connections. Close the air tank drain valve at the bottom rear of the tumbler.

f. FUEL LINES. Connect the fuel line from the auxiliary fuel supply to the auxiliary fuel connection of the generator set. Connect the fuel lines from the

fuel supply to the fuel filter and the fuel pump of the water heater. Connect the fuel lines from the fuel supply to the fuel filter mounted on the right front of the dryer-tumbler.

g. EXHAUST DUCTS. Remove the step assembly from the drain basket compartment and connect the assembly to the trailer frame in front of the washer. Inspect the condition of the exhaust port and the exhaust duct before connecting the duct to the heater. Connect the 5-inch flexible exhaust duct to the dryer-tumbler exhaust port and bend up the end of the duct slightly. Connect the canvas exhaust duct to the dryer-tumbler and insure that the canvas is installed straight out the rear of the tumbler so that no bends in the duct restrict airflow. Position the generator set exhaust duct so that it will not be hazardous to the operators. Be sure all exhaust ducts are vented to open air, never inside a tent.

3. OPERATION OF LAUNDRY UNIT. Procedures for operating the laundry unit are as follows:

a. GENERATOR SET. There are two ways of starting the generator, electrically and manually. The procedures for each are given below.

(1) ELECTRICAL. Check the lead terminals for correct output connection and voltage phase switch position. Place the circuit breaker in the OFF position, the REMOTE-LOCAL switch in LOCAL position, and the EMERGENCY STOP-RUN switch in NORMAL position. Turn the voltage adjusting knob (variable resistor) fully counterclockwise. Set the voltage selector switch to monitor the desired phase or line voltage and the current selector switch to monitor the desired current. Place the engine governor control in the GOVERN position. Pull the choke out. After the engine starts, slowly push the choke in. Press the START-STOP switch to START position and release it after the engine starts. If no oil pressure is indicated, shut down the unit immediately.

(2) MANUAL. Place the circuit breaker in the OFF position. Place the EMERGENCY STOP-RUN switch in the EMER-RUN position and the REMOTE-LOCAL switch in the LOCAL position. Pull the choke out. After the engine starts, slowly push the choke in. When the engine reaches operating pressure, place the EMERGENCY STOP-RUN switch in NORMAL position. At the same time, press the START-STOP switch to START and release. If no oil pressure is indicated, shut down the unit immediately.

b. AIR COMPRESSOR. Place the ON-OFF switch, located on the rear of the tumbler, in the ON position. Check the rotation of the motor. If the rotation does not agree with the arrow on top of the compressor, place the ON-OFF switch in the open position. Change any two power leads and turn on the generator power switch. Place the compressor switch in the ON position and recheck the rotation. Check to see that the air pressure gage reads 75 to 90 p.s.i. Open the bleeder valve to bleed the condensation and then close it. Check for leaks. If the generator set is operating, turn the power switch to OFF, place the circuit breakers at OFF, and place the START-STOP switch at STOP. Listen for leaks, and if there are none, reverse the above procedures to place the air compressor in operation.

c. PUMP AND WATER HEATER. Place the water pump power outlet switch and the water pump switch at the ON positions. Open the water heater vent valve,

located on the top rear of the heater, and close it when the tank is vented. This valve bleeds air from the heater and insures a full tank of water. Place the fuel pump motor control switch in the ON position. Adjust the fuel pressure gage to 80 p.s.i., and if the gage shows less than 80 p.s.i., check for leaks in the fuel line. Check for a blue spark in the burner spark sightglass. Adjust the shutter lever to open the burner shutter halfway. Open the fuel shutoff valve one turn. Check for flame in the burner flame sightglass. If there is a flame, completely open the fuel shutoff valve. If there is no flame, close the fuel shutoff valve and purge the system 15 seconds. If the heater is not purged properly, a flashback may occur which could injure personnel or damage equipment. Adjust the air shutter lever by moving it up or down until the exhaust is clear. Set the temperature control thermal switch to 4 on the dial. Watch the temperature gage and readjust the temperature control switch so that the fire will shut off when the temperature of the water reaches 160° F.

d. WASHER-EXTRACTOR. The washer-extractor may be operated automatically or manually. Either method requires the presence of an operator to add washing supplies, to make corrections in case of rough extraction, and to remove the wash at the end of the cycle. The washer-extractor accommodates a maximum of 60 pounds of wash. Table 1 lists weights of clothing items. The air pressure gage must register a minimum of 75 p.s.i. before the washer is started. The desirable operating pressure is 90 p.s.i. The washing and extracting procedures are as follows:

Table 1. List of clothing weights

COLD WEATHER CLOTHING

Items (one each-medium size)	Dry weight (pounds)
Cap, cold weather	1.25
Coat, cold weather, field	3.40
Hood, extreme cold weather, w/fur ruff	1.25
Liner, coat, cold weather, field	1.87
Liner, parka, extreme cold weather	1.06
Liner, trousers, cold weather, field	.69
Mitten inserts w/trigger finger	.25
Mitten set, extreme cold weather	1.12
Mitten set, white	.31
Muffler, wool	.38

Table 1 (Continued)

Items (one each-medium size)	Dry weight (pounds)
COLD WEATHER CLOTHING	
Parka, camouflage, white	1.93
Parka, extreme cold weather, w/o hood	1.90
Shirt, field, wool	1.62
Shirt, field, wool and nylon	1.62
Socks, cushion sole	.20
Suspenders, trousers	.20
Trousers, cotton and nylon, cold weather, field	2.37
Trousers, extreme cold weather, white	1.00
Trousers, field, wool	1.75
HOT WEATHER CLOTHING	
Coat, and trousers, tropical, mans	.80
Drawers, cotton (boxer)	.22
Shirt, sleeping, mans	.60
Socks, cushion sole	.20
Tropical hat, w/o headnet	.22
Undershirt, cotton, knit, short sleeve	.25
PROTECTIVE CLOTHING	
Chemical protective clothing outfit	4.62
UTILITY CLOTHING	
Belt, black	.13
Handkerchief	.03
Shirt and trousers, utility	1.25

(1) AUTOMATIC. The automatic cycle is operated by a formula control record installed in the control panel. Directions for installing and removing the record are given in figure 12. After installing the record, the operator takes the following actions:

(a) Add the washing supplies through the supply lid. The proper amounts of supplies are given in tables 2 and 3. Put the AUTO-MANUAL switch on AUTO position. If using a multisuds formula, add more supplies when the bell rings and indicator light goes off. Depress the signal switch (fig. 8), hold it down for 10 seconds, and release. If the bell is still ringing, repeat the procedure until it stops.

(b) At the end of the washing cycle, the bell rings and the indicator light goes off again. When this occurs, depress the signal switch and hold it down until the signal finger leaves the No. 14 slot of the control record. Allow the switch to return to its normal position which starts the preextract-extract cycle automatically. If the extraction cycle is extremely rough, push the AUTO-MANUAL control switch to MANUAL and the BRAKE-DRAIN switch to BRAKE. After the door-locking pin returns to the unlocked position, push the AUTO-MANUAL switch to OFF, and turn the control record until the finger contacts the beginning of the preextract-extract slot (No. 4). Repeat the procedure until the extraction is smooth.

(c) When the bell signals the completion of the formula, push the AUTO-MANUAL switch to OFF and wait about 40 seconds for the door-locking pin to release before opening the door. Remove the clothes from the machine and place them in the drain bin.

(2) MANUAL. For manual operation of the washer-extractor, the operator takes the following actions:

(a) Turn the drum (fig. 12) until the finger on the extreme right is on the red line of the record. Select the proper formula from tables 2 and 3 and add the washing supplies through the supply lid. With all control panel switches in the OFF position, push the AUTO-MANUAL switch to MANUAL. Set the electric timer (fig. 8) to the desired position, and push the WASH-PREEXTRACT switch to WASH. Add water to the proper level by holding down the HOT water switch to add hot water and the COLD water switch to add cold water. If after the first attempt the water temperature gage shows that the water is not the correct temperature (tables 2 and 3), add more water until the desired temperature is reached. If water is above the proper level, dump the excess by pushing the BRAKE-DRAIN switch to DRAIN and then returning it to OFF.

(b) Rinse the load after washing. Push the BRAKE-DRAIN switch to DRAIN, and after the water drains, return the switch to OFF. Add water of the proper temperature to the levels prescribed in the formula.

(c) After repeating the washing and rinsing cycles as required by the formula, the load is ready for extraction. Push the BRAKE-DRAIN switch to DRAIN to remove the rinse water from the load. Push the WASH-PREEXTRACT switch to PREEXT. Wait about 10 seconds and push the EXTRACT switch from OFF to EXTRACT. Turn the WASH-PREEXTRACT switch to OFF. Leaving the drain open, extract

Table 2. Cotton wash formula for manual operation

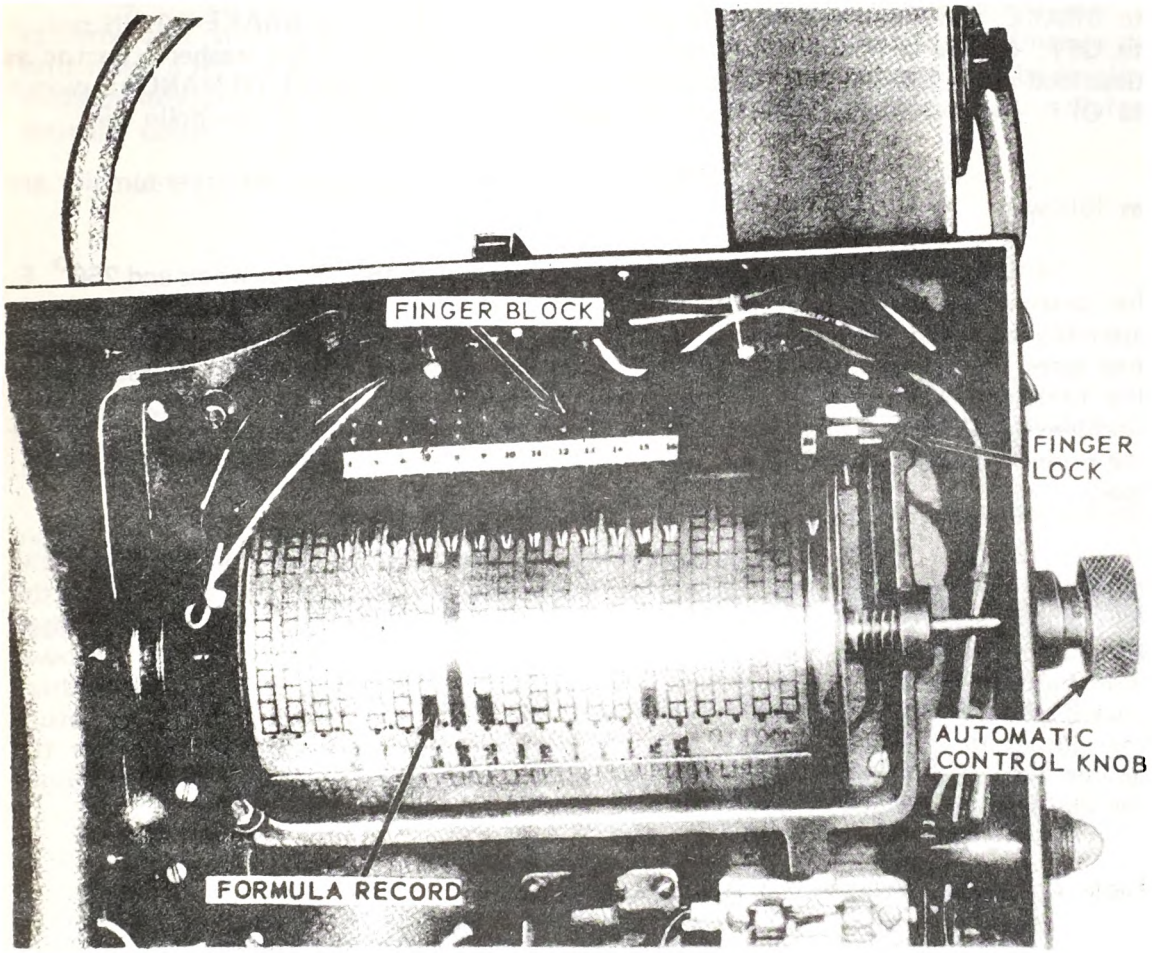
Operation	Water level	Time (includes filling and draining)	Water temperature (approximate)	Detergent
1. Suds	8 in.	5 min.	100° F.	6 oz.
2. Suds	8 in.	5 min.	130° F. or higher	3 oz.
3. Suds	8 in.	5 min.	130° F. or higher	2 oz.
4. Rinse	11 in.	2 min.	130° F. or higher.	
5. Rinse	11 in.	2 min.	130° F. or higher.	
6. Rinse	11 in.	2 min.	130° F. or higher--open drain valve after 1 1/2 min.	
7. Preextract		10 sec.	--drain remains open.	
8. Extract		5 min.	--drain remains open.	
9. Brake to complete stop.				

Note. Water levels are average with fully loaded washer in motion. Allow for absorption before first suds.

Table 3. Wool wash formula for manual operation

Operation	Water level	Time (includes filling and draining	Water temperature (approximate)	Detergent
1. Suds	11 in.	5 min.	100° F.	6 oz.
2. Suds	11 in.	5 min.	100° F.	3 oz.
3. Suds	11 in.	5 min.	100° F.	2 oz.
4. Rinse	11 in.	2 min.	100° F.	
5. Rinse	11 in.	2 min.	100° F.	
6. Rinse	11 in.	2 min.	100° F.--open drain valve after 1 1/2 min.	
7. Preextract		10 sec.	--drain remains open.	
8. Extract		5 sec.	--drain remains open.	
9. Brake to complete stop.				

Note. Water levels are average with fully loaded washer at rest. Filling and draining will be accomplished with washer at rest. Allow for absorption before first suds.



STEP 1. TURN OFF POWER SOURCE AND REMOVE CONTROL BOX COVER.
STEP 2. RAISE FINGER LOCK, OPEN LOCK HANDLE, AND RAISE FINGER BLOCK OUT OF THE WAY.
STEP 3. PULL OUT ON AUTOMATIC CONTROL KNOB AND REMOVE FORMULA DRUM FROM DRUM HEADS.
STEP 4. REMOVE THE RECORD LOCK FROM THE TUBE IN DRUM AND REMOVE FORMULA RECORD.
STEP 5. MOUNT THE DESIRED FORMULA RECORD OVER DRUM SCREEN WITH BENT ENDS OF RECORD IN SLOT OF DRUM. INSTALL RECORD LOCK, BEING SURE IT SEPARATES ENDS OF RECORD.
STEP 6. PULL OUT ON AUTOMATIC CONTROL KNOB AND MOUNT DRUM ON SHOULDER OF DRIVE END (LEFT HAND) DRUM HEAD, ROTATING DRUM SLOWLY BY HAND, UNTIL DRIVE CLIPS SEAT IN DRUM HEAD.
STEP 7. RELEASE KNOB SO THAT FREE END DRUM HEAD ENTERS DRUM. TURN KNOB COUNTERCLOCKWISE UNTIL NOTCH IN DRUM HEAD SEATS OVER CLIP.
STEP 8. LOWER FINGER BLOCK AND LOCK IN PLACE. MAKE SURE FINGERS CONTACT AND ARE AT PROPER COLUMNS ON RECORD. CLOSE CONTROL BOX COVER.

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Figure 12. Formula control record removal and installation.

clothes about 5 minutes. Push EXTRACT switch to OFF. Push the BRAKE-DRAIN switch to BRAKE, and leave it there until the cylinder stops. Push the BRAKE-DRAIN switch to OFF. (If the extraction is extremely rough, stop and restart the washer-extractor as described above.) When the pin withdraws from the door, push the AUTO-MANUAL switch to OFF. Remove the clothes from the washer and place them in the drain bin.

e. DRYER-TUMBLER. Procedures for operating the dryer-tumbler are as follows:

(1) Set the temperature control at 160° F. for wools and 250° F. for cottons. Push the upper start button which engages the fuel pump blower motor assembly and step up transformer. Open the burner fuel cutoff valve one full turn. If fuel does not ignite within 10 seconds, close the fuel cutoff valve for 15 seconds. If the tumbler heater is not vented properly, flashback may injure personnel or damage equipment. When the fire is burning properly, open the fuel valve completely. Adjust the primary air adjustment shutter until the exhaust from the heater has a steady, muffled roar.

(2) Place 30 pounds of laundry in the dryer-tumbler. Leave the remainder in the drain bin. Close the dryer-tumbler door securely. Insure that the temperature control and the electric timer are set at the proper positions (table 4). When the buzzer sounds at the completion of the cycle, turn the timer to OFF, press the lower reset button, and open the dryer-tumbler door. Examine the seams, waistbands, and thick pocket areas of heavy clothing to see if they are dry. If the clothes are still wet, return the clothes to the dryer-tumbler, latch the door securely, set the electric timer for the desired time, and press the lower manual motor start button. Repeat the procedure until the clothes are completely dry.

Table 4. Timing cycles and drying temperatures

Operation	Drying time (minutes)	Air temperature control setting (degrees F.)
Balanced (items of one kind):		
Cottons	13	250
Woolens	13	200
Unbalanced (mixed items):		
Cottons	as required	180
Woolens	as required	160

4. OPERATION IN EXTREME COLD (BELOW 0^{o} F.). During operation in extreme cold, steps must be taken to protect the equipment from freezing. Operate the unit inside a tent or other suitable enclosure. Take measures so that water can be supplied without exposing the water pump or water hoses to below-freezing temperature. Before shutting down the unit, take the following precautions:

a. Vent the valve on top of the water heater.

b. Drain the water pump and store it in an inverted position.

c. Drain the water heater.

d. Drain all water valves and hoses by pushing the AUTO-MANUAL control switch to MANUAL and holding down the HOT and COLD water switches for 2 minutes.

e. Open the drain valve at the bottom of the washer water level control. After the water drains, close the valve.

f. Open the drain valve under the compressor air supply tank to drain condensation.

g. Load the trailer and store it, preferably in a heated shelter.

5. OPERATION IN DUSTY OR SANDY AREAS. Lubricate the equipment according to the current lubrication order. Shut down the unit during severe dust storms and cover it with canvas or some other protective covering. When the area is reasonably clear of dust, clean the unit thoroughly.

6. OPERATION UNDER RAINY OR HUMID CONDITIONS. Operate the unit inside a tent or other suitable enclosure and keep the machinery and motors dry. During transit, make certain that the canvas cover of the trailer is secured in place. Wipe wet or damp electrical equipment with a cloth dampened with an approved cleaning solvent. When cleaned parts are dry, lubricate the unit according to the current lubrication order.

7. SHUTTING-DOWN PROCEDURES. The procedures for shutting down the laundry unit are as follows:

a. DRYER-TUMBLER. Shut down the dryer-tumbler as follows:

(1) Turn the dryer-tumbler fuel cutoff valve (fig. 9) to OFF. Open the dryer-tumbler door and allow the dryer to cool 3 to 5 minutes.

(2) Depress the upper reset and lower reset buttons.

(3) Remove the fuel lines from the dryer-tumbler fuel pump and stow them in the toolbox.

(4) Close the primary air shutter valve on the dryer-tumbler burner.

(5) Remove the canvas exhaust duct and stow it in the dryer-tumbler.

(6) Remove the burner exhaust duct and place it on the ground temporarily.

b. WATER HEATER AND WATER PUMP. Take the following steps to shut down this equipment:

(1) Close the water heater fuel shutoff valve (fig. 5). Turn off the heater control switch and open the water heater vent valve.

(2) Turn off the water pump switches, and disconnect the suction and inlet hoses at the water pump.

(3) Depress the HOT and COLD water switches for 2 minutes to allow complete drainage of all incoming lines to the washer and water heater. Disconnect the inlet hose at the water heater to complete the drainage of the heater.

(4) Open the drain petcock in the water pump housing to allow complete drainage of the pump.

(5) Depress the float holddown rod and lock it in position.

(6) Remove the step assembly and place it in the drain bin.

(7) Remove the exhaust duct from the water heater. Clean the inlet hose and exhaust duct, roll them, and stow them in the drain bin.

(8) Remove fuel lines from the water heater and stow them in the toolbox.

c. WASHER-EXTRACTOR. Take the following steps to shut down the washer-extractor.

(1) Place AUTO-MANUAL switch in MANUAL position.

(2) Open the drain valve under the water level control gage (fig. 7).

(3) Open the manual dump valve (fig. 7) by pushing the lever toward the washer-extractor and locking it in place.

d. OTHER EQUIPMENT. Complete the shutdown as follows:

(1) Push the compressor ON-OFF switch to OFF. Open the bleeder valve on the air compressor tank.

(2) Place the generator circuit breaker in the OFF position. Push the START-STOP switch to STOP. Close the fuel selector valve; remove fuel lines and

stow them in the toolbox. Remove the generator flexible exhaust and stow it inside the 5-inch exhaust duct. Cover the generator set with the canvas provided for that purpose.

Note. If an external power source is used to operate the laundry unit, place the switch in an OFF position.

(3) Remove the drain hose from the drain pan; coil it and place it in the drain bin. All electrical cables should be stowed in the drain bin.

(4) Place one section of the 7-inch exhaust duct and the ground rod assembly on the trailer deck and secure with tiedown straps. Secure the 5-inch exhaust duct to the washer and trailer fender as follows: curve and place underneath the washer and tie down at strap connections; curve between generator set and water heater and fasten with straps; then curve to the front of the trailer deck and secure with holddown straps mounted on a corner of the trailer. Place the other section of the 7-inch duct over the 5-inch duct and secure to the washer and trailer fender.

(5) Stow the water pump in front of the dryer-tumbler. Place the pump frame underneath two clamps and fasten the frame to the trailer deck with a bolt.

(6) Cover the entire unit with its canvas cover. (The front of the canvas is marked.)

(7) Raise the rear stabilizing jack and secure the locking lever. Hook the trailer lunette (metal ring designed to receive a pintle) to the towing vehicle.

8. LAUNDRY UNIT PREVENTIVE MAINTENANCE. To insure that the laundry unit is always ready for operation, the equipment must be inspected systematically. Defects should be discovered and corrected before they result in serious damage or failure. Certain things are checked quarterly by organization maintenance personnel. Other things are checked daily by the operator of the equipment. Defects discovered during operation of the unit are noted for correction to be made as soon as operation has ceased. The operation is stopped immediately if a defect is noted that would damage equipment if operation continued. The operators daily preventive maintenance includes the following actions:

a. WASHER-EXTRACTOR. Lubricate the washer-extractor according to the current lubrication order.

(1) CYLINDER. Inspect the cylinder for dents and damage, and flush with water after operation.

(2) DRAIN VALVES. Check the drain valves for proper operation.

(3) CONTROLS AND INSTRUMENTS. Inspect controls and instruments for damage and loose mounting, and with the unit operating, check for proper operation. The temperature gage should read 130° F. or higher.

b. DRYER-TUMBLER. Lubricate the dryer-tumbler according to the current lubrication order.

(1) EXHAUST DUCTS. Inspect the exhaust ducts for leaks.

(2) CYLINDER. Inspect the cylinder for dents and other damage.

(3) FUEL FILTER. Inspect the fuel filter for sediment in the bowl, and bleed the filter if necessary.

(4) CONTROLS AND INSTRUMENTS. Inspect controls and instruments for damage and loose mounting. With the unit operating, check controls and instruments as follows:

(a) Fuel pressure gage: 75 to 90 p.s.i.

(b) Exhaust temperature gage: 130^{o} to 250^{o} F.

(5) AIR TEMPERATURE CONTROL Inspect the helix control stem for accumulation of lint and clean as required.

(6) LINT TRAP. Check and clean the lint trap daily.

c. WATER HEATER. Lubricate the water heater according to the current lubrication order.

(1) FUEL FILTER. Bleed the fuel filter frequently by turning the hand lever. Drain the sediment weekly.

(2) BURNER ELECTRODE AND BURNER NOZZLE. Check the burner electrode for proper spark.

(3) SIGHT TUBE. Clean the sight tube lens.

(4) SAFETY RELIEF VALVE. Inspect the safety relief valve for damage and free movement.

(5) CONTROLS AND INSTRUMENTS. Inspect controls and instruments for damage and loose mounting. With the unit operating, check the water heater for proper operation. Normal operating readings for instruments are as follows:

(a) Temperature gage: 95^{o} to 160^{o} F.

(b) Fuel pressure gage: 60 to 100 p.s.i.

d. WATER PUMP. Lubricate the water pump according to the current lubrication order.

(1) STRAINER. Clean the strainer daily or after 8 hours of operation.

(2) CONTROL SWITCH. Inspect the control switch for damage and loose mounting.

9. LAUNDRY UNIT OPERATOR MAINTENANCE. Various components of the laundry equipment may require maintenance services by the operator as follows:

a. FUEL PUMPS. Service the air heater and the water heater fuel pumps as shown in figure 13. Adjust the air heater and water heater fuel pumps as shown in figure 14.

b. FUEL FILTERS. Service the air heater and water heater fuel filters as shown in figure 13.

c. SEDIMENT STRAINER. Service the suction line sediment strainer of the water pump as shown in figure 15.

d. WATER PUMP PRIMING. Prime the water pump as shown in figure 15.

e. FLOAT HOLDDOWN ROD. Adjust the float holddown rod of the water heater as shown in figure 16.

f. DRIVE BELTS. Adjust the drive belts as shown in figure 17.

g. FUSES. Remove and install fuses as shown in figure 18.

h. AIR COMPRESSOR AIR FILTERS. Service the air compressor air filters as shown in figure 19.

10. GENERATOR SET PREVENTIVE MAINTENANCE. Preventive maintenance checks and services for the generator set are given below. The set should be lubricated according to the current lubrication order. During operation, any unusual noises or vibrations should be noted and adjustments made.

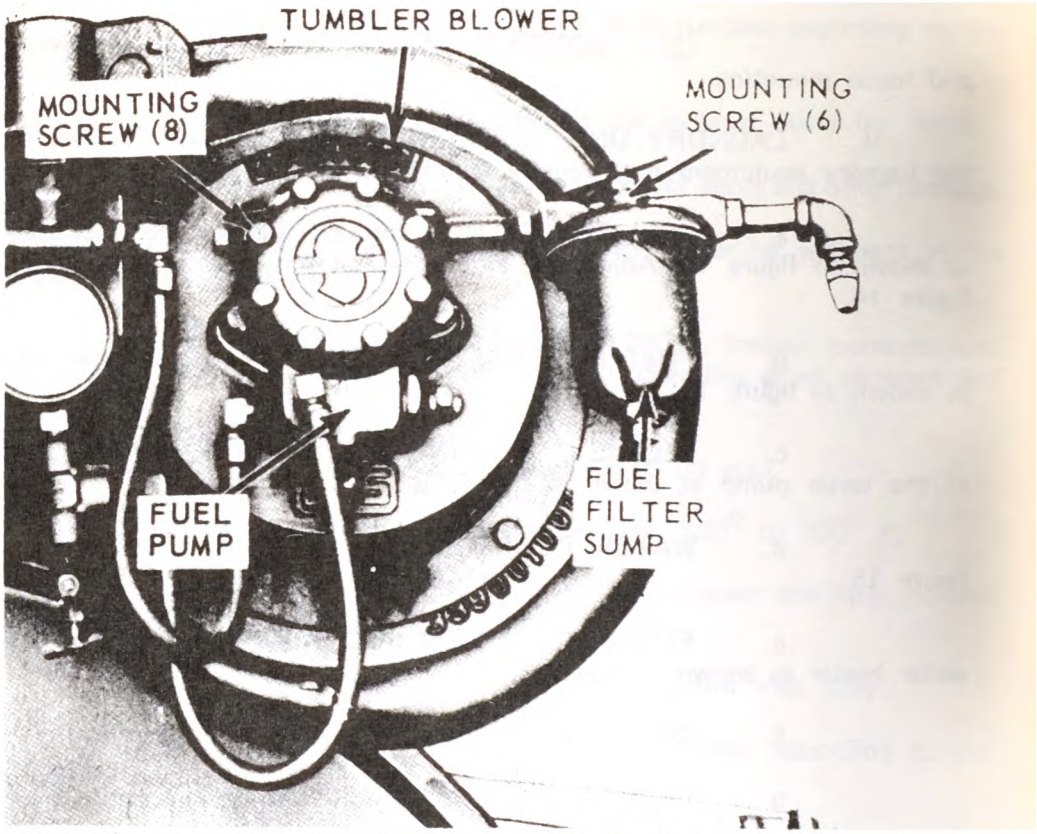
a. OIL LEVEL GAGE. Add oil as indicated by the level gage.

b. FLOW INDICATOR. Check the flow indicator for condition of the air cleaner element. If indicator is above service level, clean and replace the element and reset the indicator.

c. BATTERIES. Tighten loose cables and mountings, and remove corrosion. Inspect batteries for cracks and leaks. Fill the battery to 3/8 inch above plates, and clean vent hole in the filler cap before installing. In freezing weather, run engine a minimum of 1 hour after adding water.

d. FUEL TANK. Add fuel as necessary. Check the fuel can and adapter for leaks and damage. Tighten loose mountings, and inspect hose and connections for leaks. Replace fuel can, adapter, or hose, if defective.

e. FUEL FILTER. Inspect the fuel filter for leaks and tighen thumbscrew if gasket is leaking. Clean the filter element.



STEP 1. REMOVE MOUNTING SCREW (6) ON FUEL FILTER.

STEP 2. REMOVE FUEL FILTER SUMP AND CARTRIDGE DISK.

STEP 3. CLEAN CARTRIDGE DISK WITH AN APPROVED CLEANING SOLVENT.

STEP 4. INSTALL CARTRIDGE DISK AND FUEL FILTER SUMP AND SECURE WITH SCREW (6).

STEP 5. REMOVE MOUNTING SCREW (8) ON FUEL PUMP.

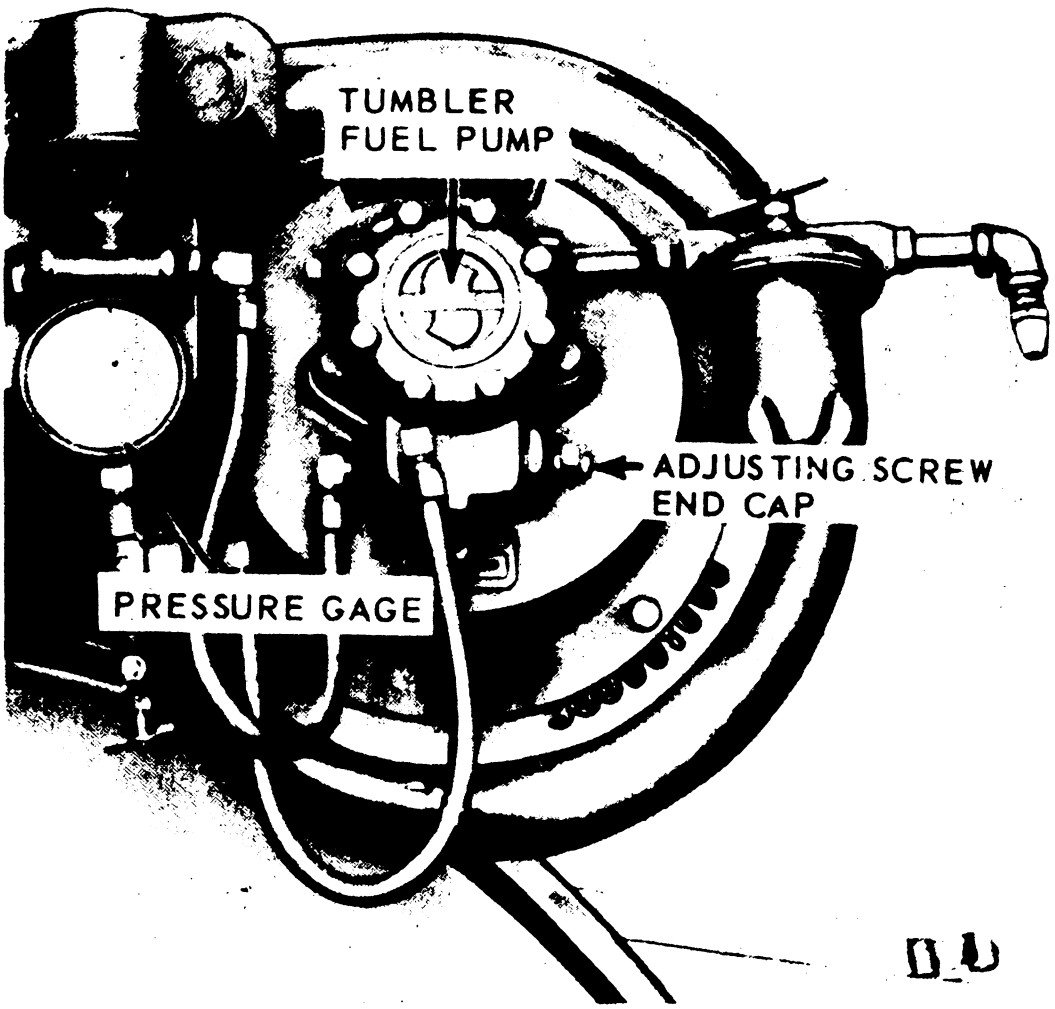
STEP 6. REMOVE AND DISCARD GASKET. REMOVE STRAINER AND CLEAN WITH AN APPROVED CLEANING SOLVENT.

STEP 7. INSTALL STRAINER AND NEW GASKET AND SECURE WITH MOUNTING SCREW (8).

NOTE: SERVICE WATER HEATER FUEL FILTER AND FUEL PUMP IN A SIMILAR MANNER.

MEC 3510-208-12/3-4

Figure 13. Water heater and air heater fuel pump and fuel filter service.



STEP 1. REMOVE END CAP FROM ADJUSTING SCREW.

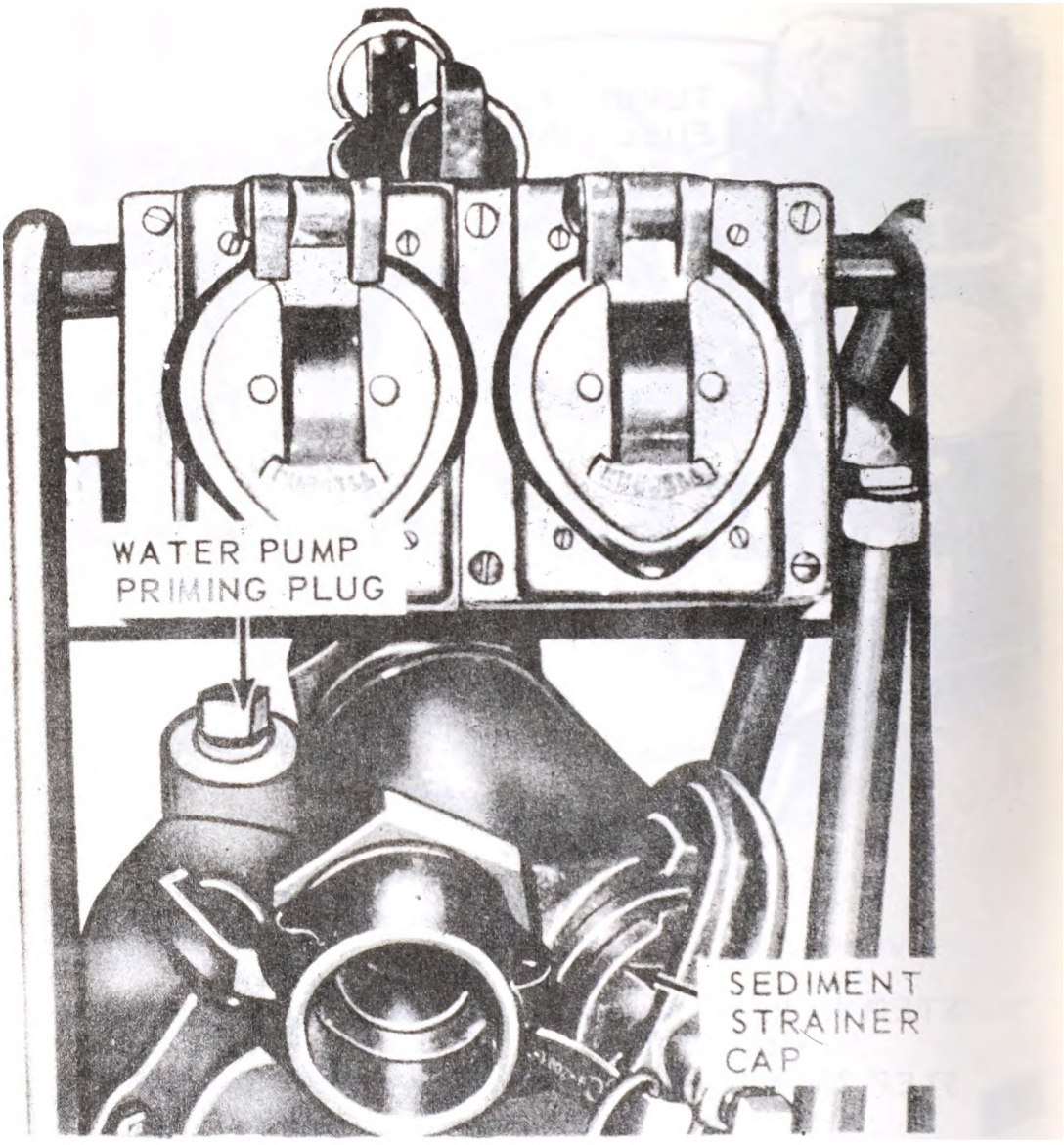
STEP 2. WITH THE FUEL PUMP OPERATING, TURN ADJUSTING SCREW UNTIL THE READING ON THE PRESSURE GAGE INDICATES 100 PSI.

STEP 3. INSTALL END CAP ON ADJUSTING SCREW.

NOTE: ADJUST WATER HEATER FUEL PUMP IN A SIMILAR MANNER.

MEC 3510-208-12 3-5

Figure 14. Water heater and air heater fuel pump adjustment.



STEP 1. REMOVE PRIMING PLUG.
STEP 2. FILL PUMP WITH WATER.
STEP 3. REPLACE PRIMING PLUG.
STEP 4. REMOVE SEDIMENT STRAINER CAP AND STRAINER.
STEP 5. CLEAN STRAINER IN AN APPROVED CLEANING SOLVENT.
STEP 6. INSTALL STRAINER AND CAP.

Figure 15. Sediment strainer service instructions.

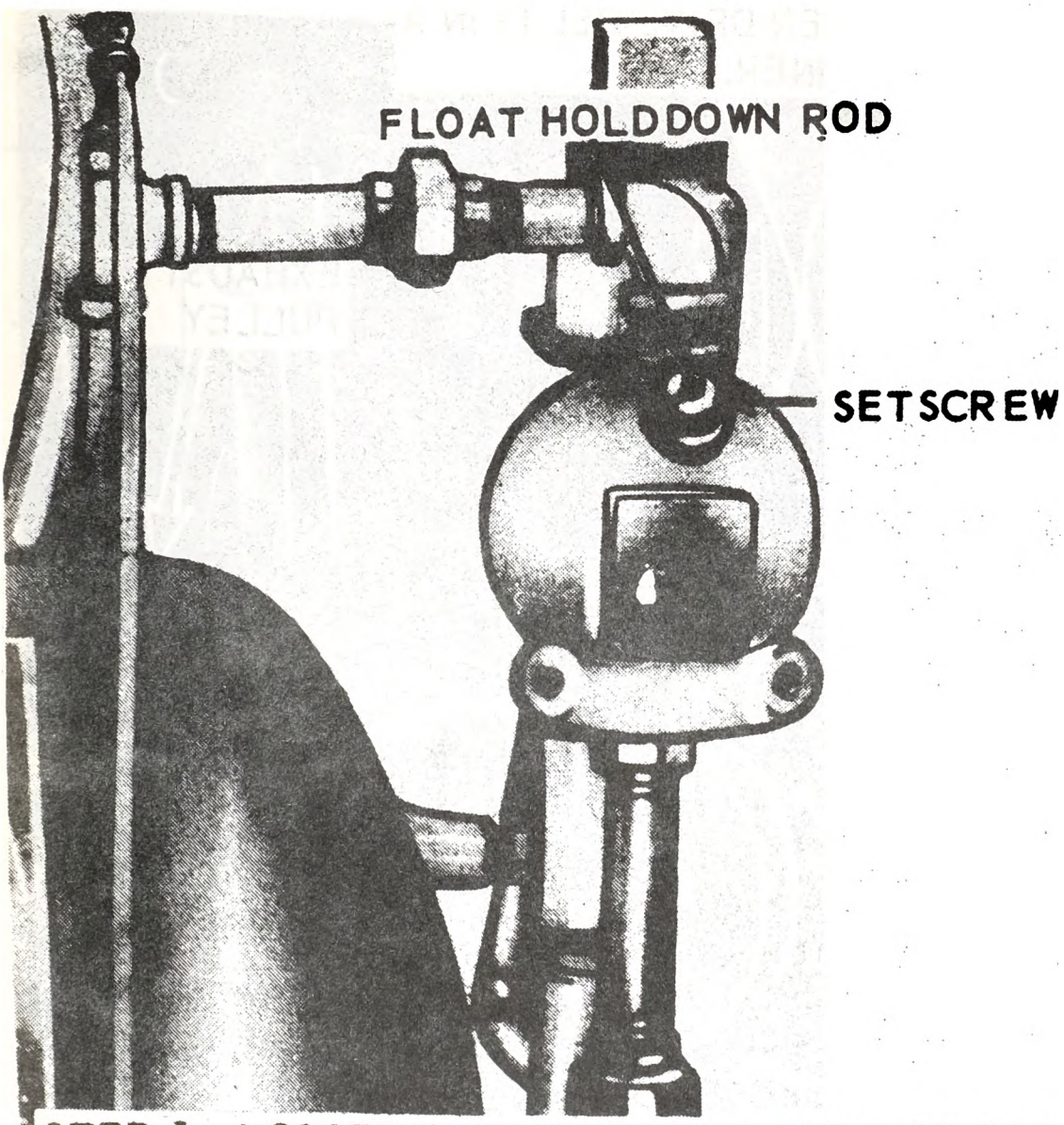


Figure 16. Float holddown rod adjustment.

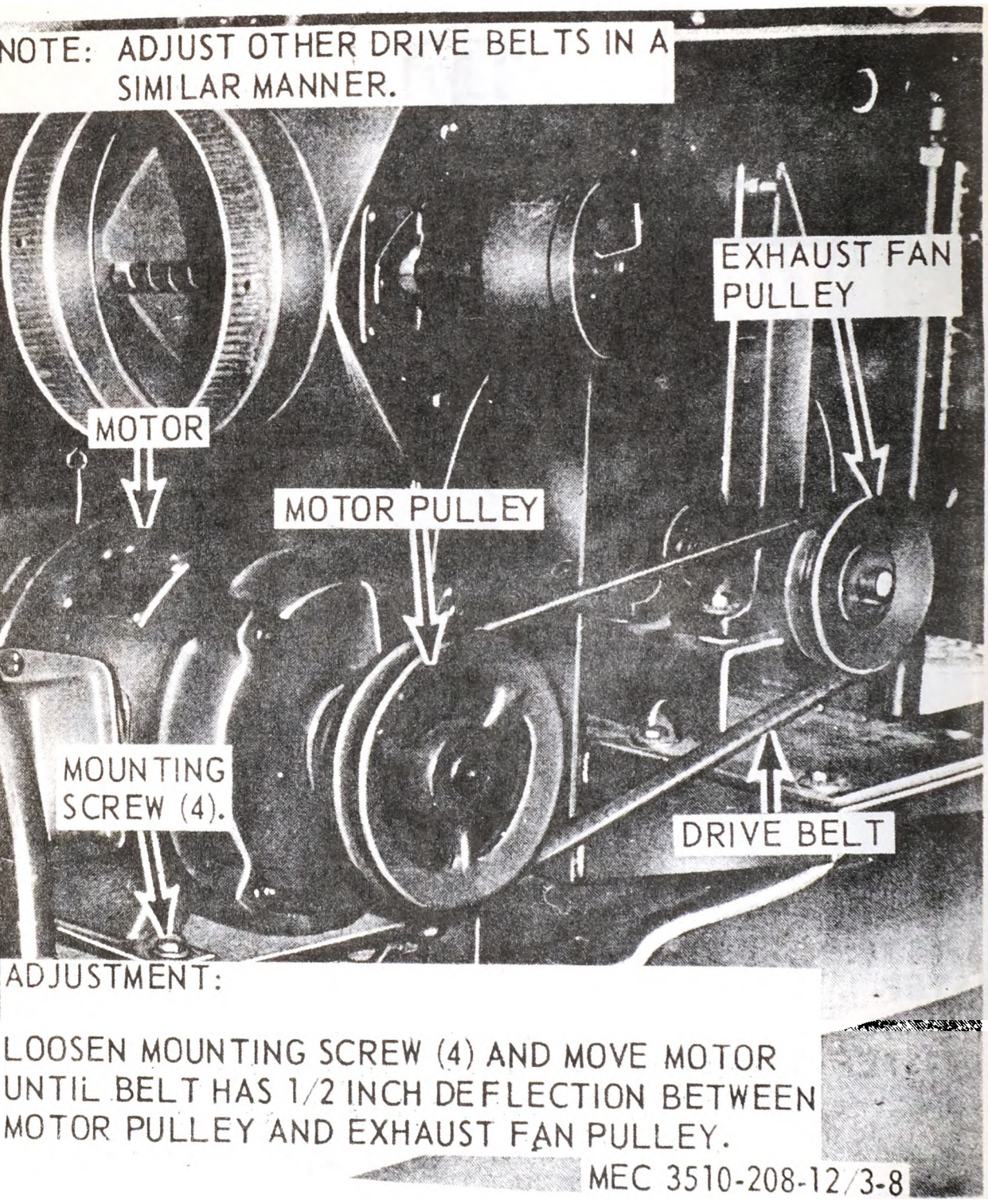
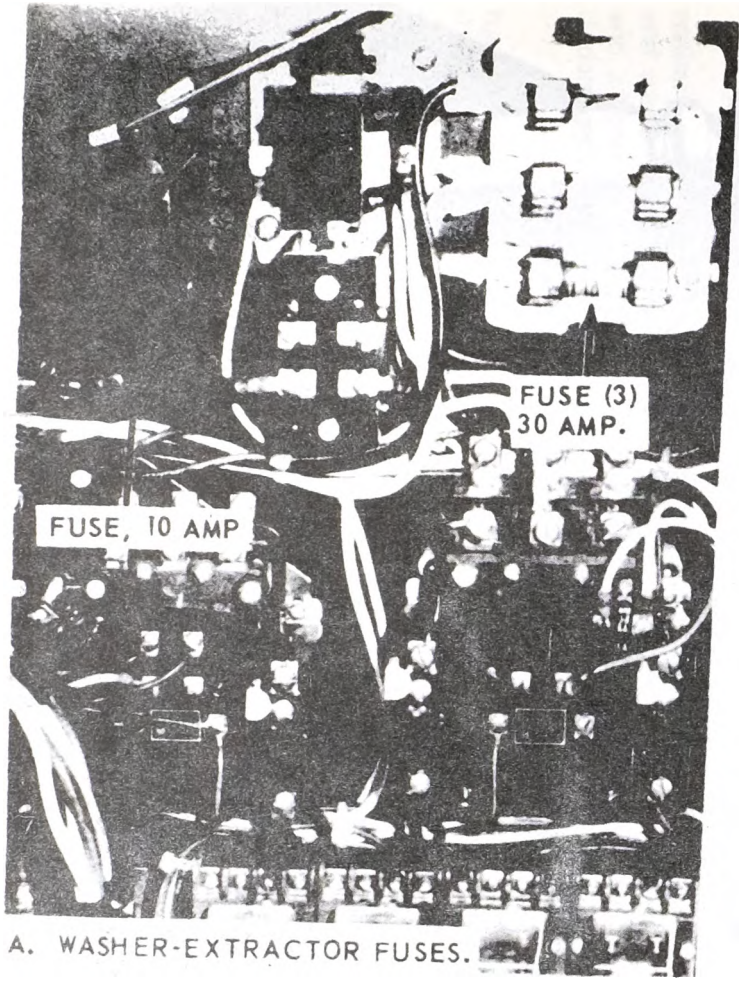
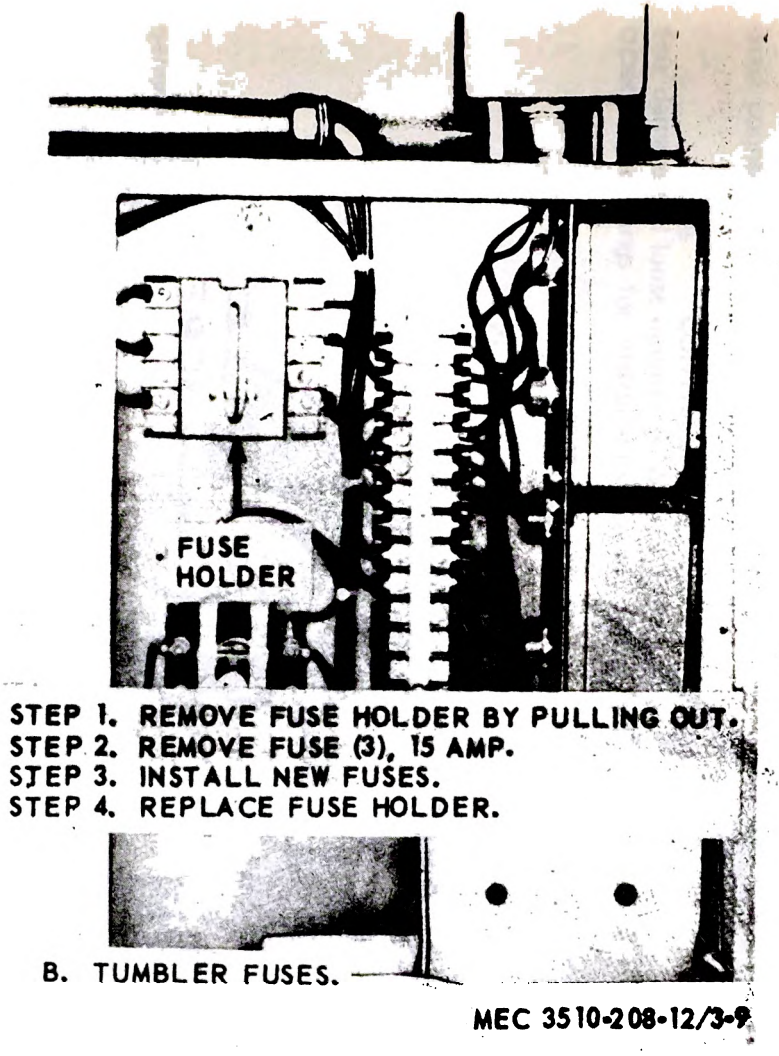


Figure 17. Drive belts adjustment.



A. WASHER-EXTRACTOR FUSES.



A. Washer-extractor fuses

B. Dryer-tumbler fuses

Figure 18. Removal and installation of fuses.

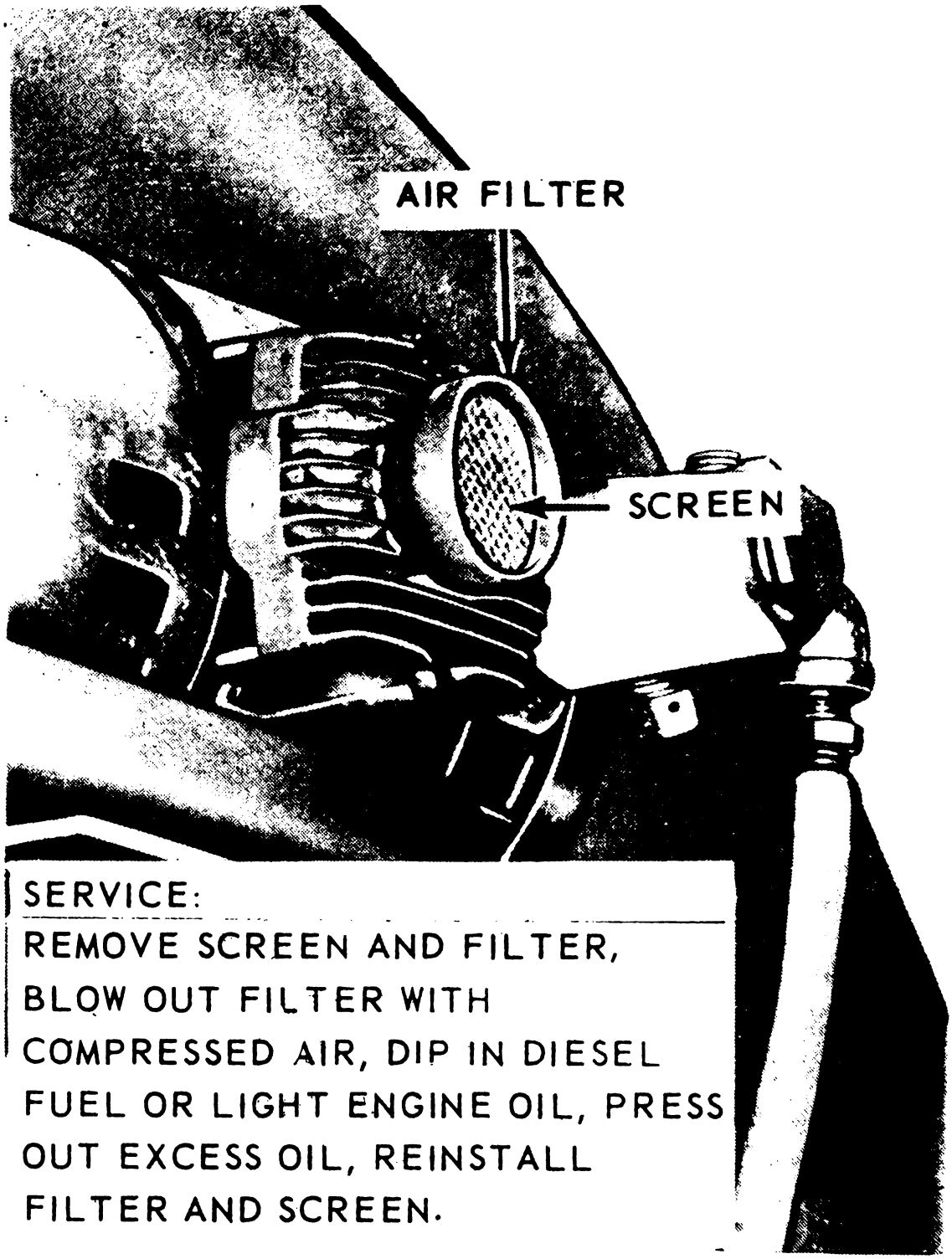


Figure 19. Air compressor air filter service.

f. GROUND TERMINAL. Check the ground terminal for proper ground and connections, and tighten loose connections.

g. CONTROLS AND INSTRUMENTS. Check controls and instruments for damage and loose mountings. With unit operating, check for proper operation. Normal operating readings for instruments are as follows:

(1)	Ammeter D.C.	Plus side of scale
(2)	Oil pressure gage	30 to 40 p.s.i.
(3)	Voltmeter	120-208-240
(4)	Frequency meter	60 cycles
(5)	Current indicator	Indicates percent of load being used. Normal reading not to exceed 100 percent.

h. ENGINE TO GENERATOR COUPLINGS. Inspect the engine to generator couplings for loose or damaged couplings.

11. GENERATOR SET OPERATOR MAINTENANCE. The operator may be required to perform maintenance on various components of the generator set as follows:

a. FUEL FILTER. Service the fuel filter as shown in figure 20.

b. FUEL TANK AND FUEL TANK ADAPTER. A regular issue 5-gallon military gasoline can is used as a fuel tank for this equipment. Remove the fuel tank and adapter as shown in figure 21. Clean all parts with cleaning solvent. Inspect the tank and adapter for damaged threads, cracks, or other defects. Replace the tank or adapter if damaged. Install the fuel tank and adapter by reversing procedures in figure 21.

c. FUSES. Remove and install fuses as shown in figure 22. Clean the fuses and fuseholder with a clean, dry cloth. Inspect fuses for visible damage and replace if necessary.

d. PANEL LIGHT BULBS. Remove and install panel light bulbs as shown in figure 23. Clean the lamps with a clean, dry cloth. Inspect for defects and replace any defective lamps.

12. SAFETY PRECAUTIONS FOR THE LAUNDRY UNIT. Safety precautions for the laundry unit are listed below.

a. BEFORE OPERATION. The operator must observe the following safety precautions before starting the laundry unit:

(1) Do not operate the unit until the ground terminal stud of the engine-generator set has been connected to a suitable ground. Electrical faults in the

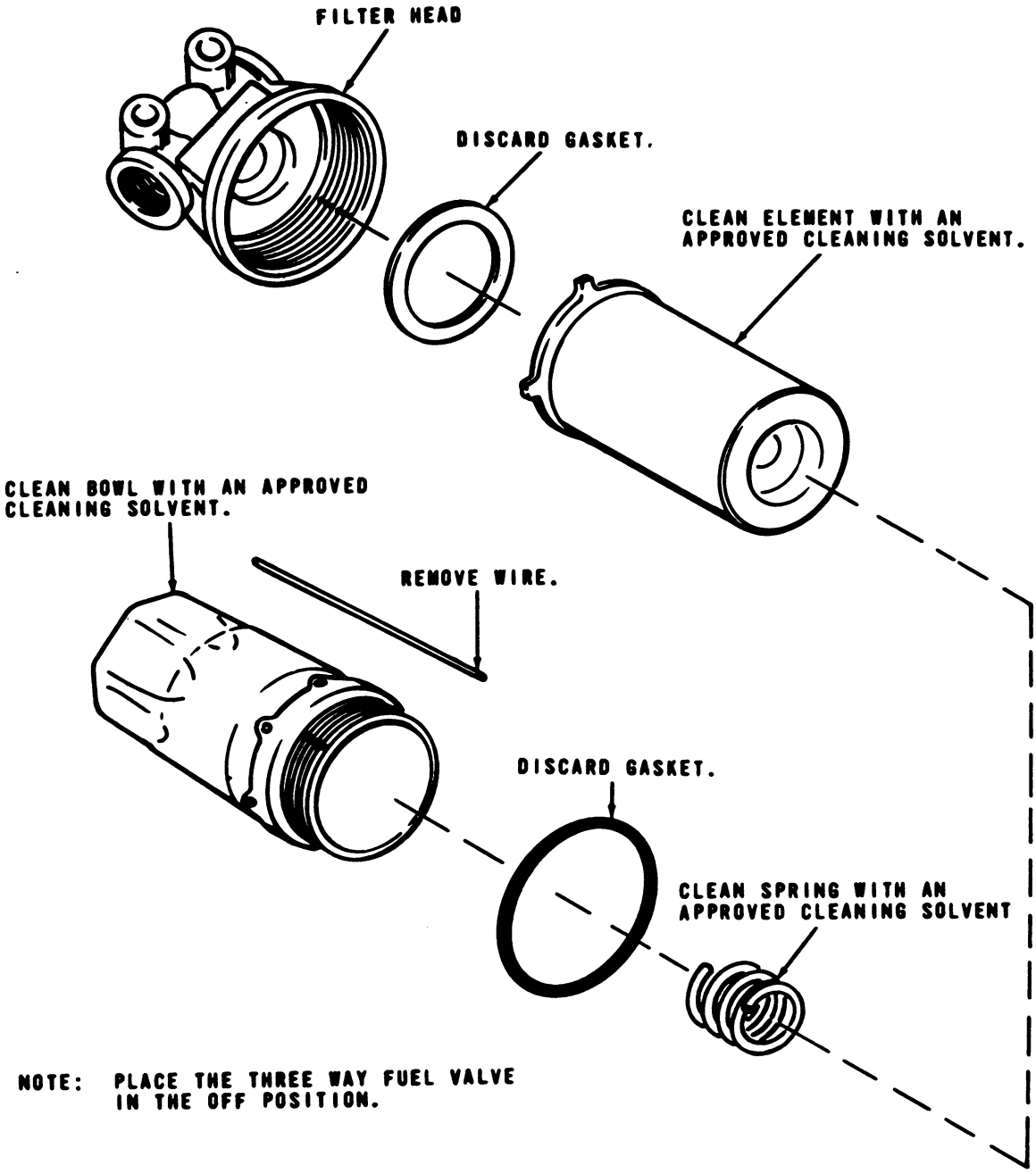


Figure 20. Generator set fuel filter service instructions.

Figure 21. Generator set fuel tank and adapter, removal and installation.

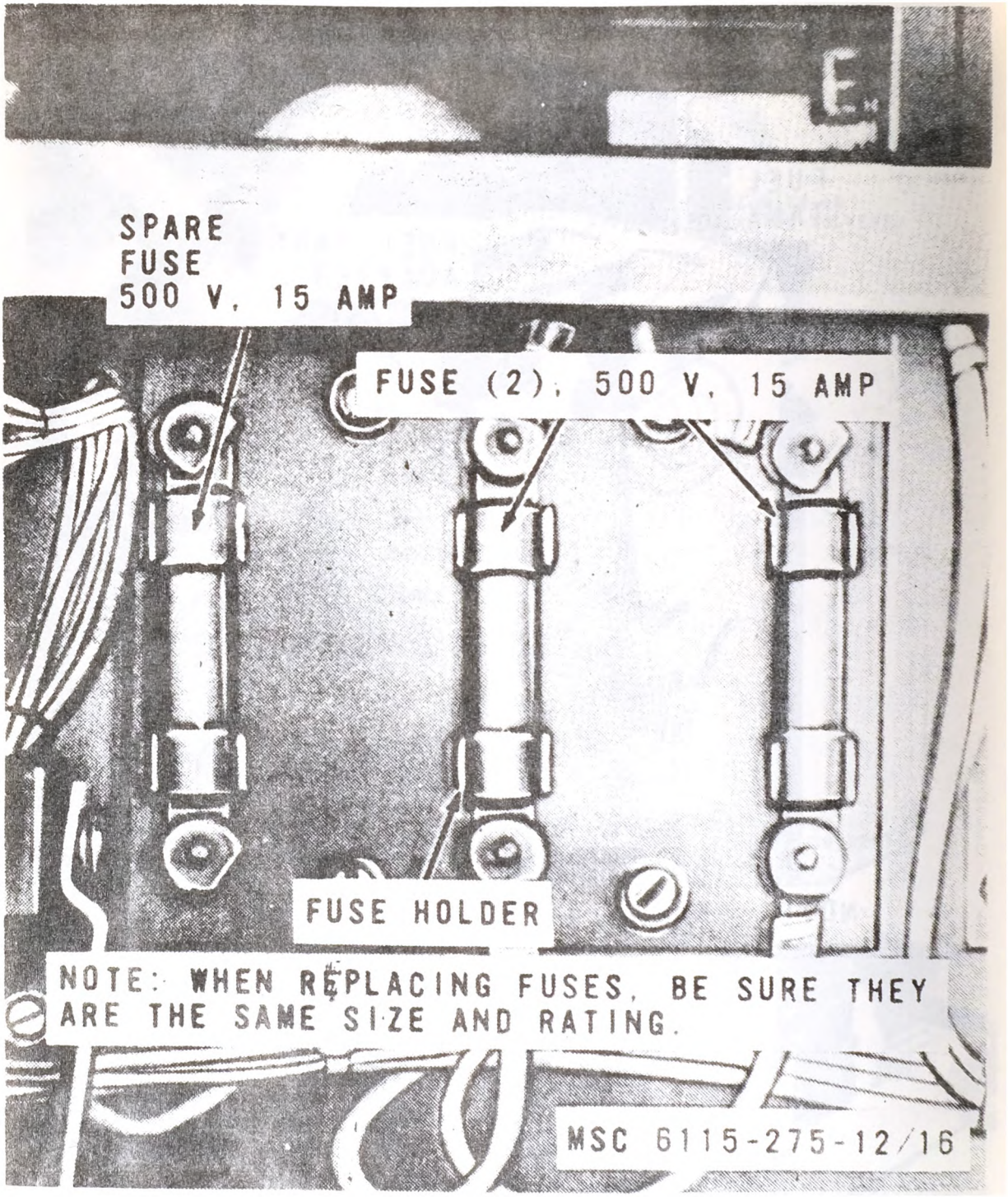


Figure 22. Generator set fuses, removal and installation.

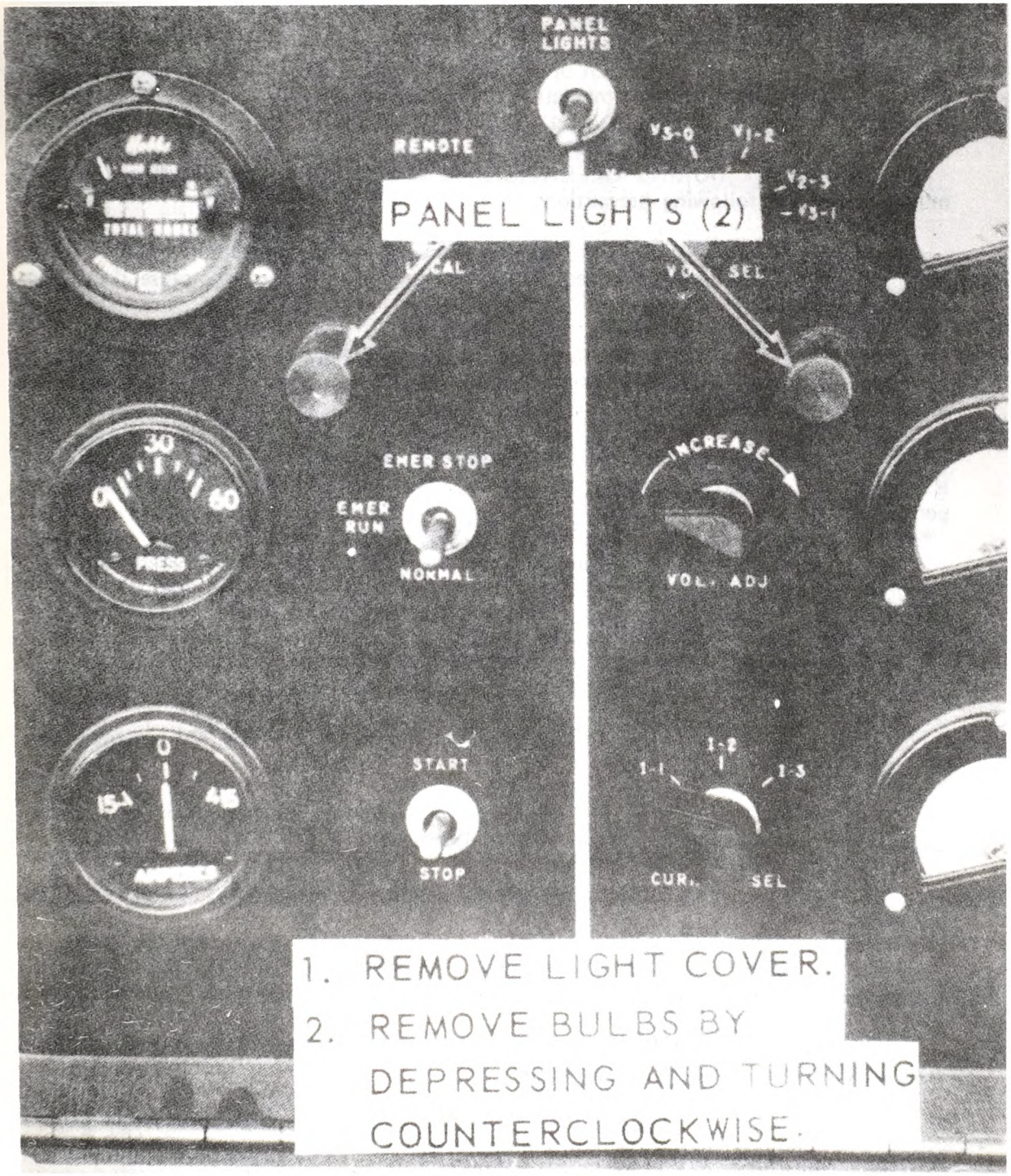


Figure 23. Generator set control panel lights, removal and installation.

engine-generator set, load lines, or load equipment can cause death by electrocution from contact with an ungrounded system.

(2) Do not operate the unit in an enclosed area unless the exhaust gases are piped to the outside. Inhalation of exhaust fumes will result in serious illness or death.

b. DURING OPERATION. While the unit is operating, the operator must observe the following precautions:

(1) Do not make or change electrical connections while the unit is in operation. The voltage generated by the engine-generator can cause death by electrocution.

(2) Keep moisture away from the engine-generator and keep the surrounding area dry when operating the unit. Failure to observe this warning may result in death by electrocution.

(3) Do not service the unit with gasoline or fuel while the unit is in operation. Failure to observe this warning may result in serious injury or death to personnel.

(4) To eliminate the possibility of explosion and injury to personnel by the accumulation of excess fuel vapors in the hot water heater and dryer-tumbler combustion chambers during emergency shutdown or failure of the electrical power supply, take the following steps before resuming normal operations:

(a) Close fuel valves immediately.

(b) Disconnect ignition electrodes at combustion chambers.

(c) Restart unit and allow combustion chambers to be air purged for not less than 3 minutes before shutdown.

(d) Reconnect ignition electrodes, resume normal operation.

13. SAFETY PRECAUTIONS FOR THE GENERATOR SET. The operator of the laundry unit must take the following precautions in operating the generator set:

a. BEFORE OPERATION. The operator observes the following safety precautions before starting the generator:

(1) Do not operate the generator set without a suitable ground connection. Electrical defects in the unit, load lines, or load equipment can cause death by electrocution when contact is made with an ungrounded system.

(2) When servicing batteries, do not smoke or use open flames in the vicinity. Batteries generate hydrogen, a highly explosive gas.

(3) Do not operate the generator set in an enclosed area unless the exhaust gases are piped to the outside. Exhaust gases contain carbon monoxide which is a colorless, odorless, and poisonous gas. Inhalation of exhaust fumes will result in serious illness or death.

(4) When filling the fuel tank, do not smoke or use an open flame in the immediate vicinity. Always provide metal-to-metal contact between the container and the fuel tank. This will prevent a spark from being generated as fuel flows over metallic surfaces. Failure to observe this warning may result in death to personnel.

b. DURING OPERATION. The operator observes the following precautions while the generator is in operation:

(1) Do not fill the fuel tank while the engine is in operation. Gasoline spilled on a hot engine may explode.

(2) Do not perform any electrical maintenance or change load connections while the generator set is operating or connected to an energized line. Failure to observe this safety precaution may result in severe electrical shock or death by electrocution.

c. AFTER OPERATION. If the set is serviced following operation, the operator follows safety precautions listed in a(2) and (4) above.

APPENDIX

REFERENCES

TM 5-2805-204-14	Organizational, DS and GS Maintenance Manual: Engine, Gasoline, Military Standard Models (Model 2A042-11), 10 HP, FSN 2805-952-3927; (Model 4A084-11), 20 HP, FSN 2805-952-3926; (Model 2A042-111), 10 HP, FSN 2805-872-5971; (Model 2A084-111), 20 HP, FSN 2805-872-5792
TM 5-6115-275-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Generator Set, Gasoline Engine: 10 KW, AC, 120/208V, 3 Phase, 60 Hz; Skid Mounted (Less Engine), DOD Model MEP-018A, FSN 6115-889-1447
TM 9-2330-274-14	Operator, Organizational, Direct and General Support Maintenance Instructions With Repair Parts and Special Tools List for Chassis, Trailer: 3 1/2 Ton, 2 Wheel, M536 (2330-777-2957) (Used With Laundry Unit, Trailer Mounted: M532)
TM 10-3510-208-12	Operator's and Organizational Maintenance Manual: Laundry Unit, Single Trailer Mounted, With Canvas Cover (Army Type M532) (Eidal Model ELT9T, FSN 3510-782-5294

LESSON 4

Credit Hours: 2

SELF-GRADING
LESSON EXERCISES

REQUIREMENT. Exercises 1 through 30 are multiple choice. Each exercise has only one single-best answer. Indicate your choice by circling its letter.

1. The generator set supplies electrical power to the

   a. tent heater.

   b. retractable support.

   c. trailer chassis.

   d. laundry unit.

2. The function of the air compressor is to furnish compressed air for the

   a. water pump.

   b. generator set.

   c. water heater.

   d. laundry unit.

3. The function of the water heater is to heat water for the operation of the

   a. water pump.

   b. generator set.

   c. washer-extractor.

   d. dryer-tumbler.

4. Extraction operations are started in the washer-extractor by the activation of

   a. a microswitch.

   b. an air cylinder.

   c. a blower.

   d. an electric motor.

5. The mechanical action necessary to launder clothes in the washer-extractor is provided by

   a. coil springs and shock absorbers.

   b. perforations in the cylinder.

   c. ribs inside the cylinder.

   d. operation of a jackshaft.

6. The dryer-tumbler dries the clothes by means of

   a. a fan operated by the motor.

   b. tumbling, causing cool air to circulate.

   c. an air heater which furnishes hot air.

   d. suction which draws the water out of the clothes.

7. The site selection for operation of the single-trailer laundry unit must measure a minimum of

   a. 50 by 100 feet.

   b. 30 by 60 feet.

   c. 15 by 30 feet.

   d. 10 by 20 feet.

8. How near a water source should the site for a laundry unit be located?

a. 30 feet.

b. 40 feet.

c. 50 feet.

d. 60 feet.

9. The ground rod for the generator set should be driven into the ground to a minimum depth of

a. 4 feet.

b. 6 feet.

c. 8 feet.

d. 10 feet.

10. The water pump should be positioned above water level by not more than

a. 10 feet.

b. 11 feet.

c. 12 feet.

d. 13 feet.

11. To keep the sediment strainer from the bottom of the water source, it should be placed in

a. a bed of stones.

b. sand.

c. a metal container.

d. a cloth wrapping.

12. The first step required in manually starting the generator set is to place the

a. REMOTE-LOCAL switch in LOCAL position.

b. REMOTE-LOCAL switch in REMOTE position.

c. circuit breaker in ON position.

d. circuit breaker in OFF position.

13. If no flame is present in the sightglass of the water heater, what procedures are followed?

a. The fuel shutoff valve is closed and the system purged.

b. The fuel shutoff valve is opened and the system purged.

c. The air shutter is adjusted and the system purged.

d. The temperature control thermal switch is set at 1 and the fuel shutoff valve opened.

14. Leaks in the fuel line of the water heater are indicated if the fuel pressure gage registers less than

a. 80 p.s.i.

b. 90 p.s.i.

c. 100 p.s.i.

d. 110 p.s.i.

15. The washer-extractor will accommodate a load of clothes weighing a maximum of

a. 50 pounds.

b. 60 pounds.

c. 70 pounds.

d. 80 pounds.

16. **When washing woolens by manual operation, the water temperature for all cycles of operation should be approximately**

a. 100^{o} F.

b. 110^{o} F.

c. 125^{o} F.

d. 150^{o} F.

17. The temperature control of the dryer-tumbler should be set at

a. 140^{o} F. for wools and 240^{o} F. for cottons.

b. 150^{o} F. for wools and 245^{o} F. for cottons.

c. 160^{o} F. for wools and 250^{o} F. for cottons.

d. 165^{o} F. for wools and 255^{o} F. for cottons.

18. The drying time for balanced cottons at 250^{o} F. and woolens at 200^{o} F. is

a. 11 minutes.

b. 12 minutes.

c. 13 minutes.

d. 14 minutes.

19. The correct amount of laundry to be put in the dryer-tumbler for an operation is

a. 18 pounds.

b. 20 pounds.

c. 30 pounds.

d. 40 pounds.

20. The first step to take when shutting down the dryer-tumbler is to

a. turn off the fuel cutoff valve.

b. open the dryer-tumbler door and allow the dryer to cool.

c. depress the upper reset button.

d. close the primary air shutter valve of the burner.

21. How does the operator shut down the air compressor?

a. Places the circuit breaker at OFF.

b. Releases the air pressure gage.

c. Closes the bleeder valve of the tank.

d. Pushes the ON-OFF switch to OFF.

22. When the laundry unit is shut down and prepared to move, the water pump is secured to the trailer deck at the

a. left side of the dryer-tumbler.

b. right side of the dryer-tumbler.

c. rear of the dryer-tumbler.

d. front of the dryer-tumbler.

23. After operations, the cylinder of the washer-extractor is flushed with

a. solvent and detergent.

b. water and detergent.

c. water.

d. solvent.

24. During maintenance services, the exhaust temperature gage of the dryer-tumbler should be checked for a maximum reading of

a. 200° F.

b. 250° F.

c. 275° F.

d. 300° F.

25. The lint trap of the dryer-tumbler is checked and cleaned

a. daily.

b. weekly.

c. monthly.

d. semimonthly.

26. The sediment strainer of the water pump should be cleaned

a. daily.

b. weekly.

c. monthly.

d. biweekly.

27. The sediment strainer of the water pump is cleaned with

a. detergent.

b. solvent.

c. water.

d. air.

28. The normal operating reading for the oil pressure gage of the generator set should be

a. 15 to 25 p.s.i.

b. 20 to 30 p.s.i.

c. 25 to 35 p.s.i.

d. 30 to 40 p.s.i.

29. The normal operating reading for the frequency meter of the generator set is

a. 30 cycles.

b. 40 cycles.

c. 50 cycles.

d. 60 cycles.

30. During preventive maintenance of the generator set, the operator should check the current indicator. The normal reading should not exceed

a. 70 percent.

b. 80 percent.

c. 90 percent.

d. 100 percent.

REQUIREMENT. Exercises 31 through 35 are true-false. Record each answer by writing a T or an F next to the exercise number.

31. The first safety step during emergency shutdown of the laundry unit is to disconnect the ignition electrodes at the combustion chambers.

32. Before resuming normal operations after an emergency shutdown, air purge the water heater and dryer-tumbler combustion chambers for 3 minutes.

33. Under certain conditions, the generator set may be operated in an enclosed area.

34. The fuel tank of the generator engine can be filled while the engine is in operation.

35. Load connections can be changed while the generator set is in operation.

HAVE YOU COMPLETED ALL EXERCISES? DO YOU UNDERSTAND EVERYTHING COVERED? IF SO, TURN TO THE NEXT PAGE AND CHECK YOUR ANSWERS AGAINST THE SOLUTIONS.

U.S. ARMY QUARTERMASTER SCHOOL
FORT LEE, VIRGINIA 23801

LESSON 4

SOLUTION SHEET

MOBILE LAUNDRY EQUIPMENT

Check your work against the solutions given below. If you have made a wrong response or omitted a required response, correct your work. Then, go back and restudy the appropriate text portion once more (references follow each solution).

Ex	Sol	Ref
1.	d	para 1b
2.	d	para 1c
3.	c	para 1d
4.	a	para 1e
5.	c	para 1e
6.	c	para 1f
7.	d	para 2
8.	c	para 2
9.	c	para 2a(1)
10.	a	para 2d
11.	a	para 2d
12.	d	para 3a(2)
13.	a	para 3c
14.	a	para 3c
15.	b	para 3d
16.	a	para 3d(2)(a) & table 3
17.	c	para 3e(1)
18.	c	para 3e(2) & table 4
19.	c	para 3e(2)
20.	a	para 7a(1)
21.	d	para 7d(1)
22.	d	para 7d(5)
23.	c	para 8a(1)
24.	b	para 8b(4)(b)
25.	a	para 8b(6)
26.	a	para 8d(1)
27.	b	para 9c & fig 15
28.	d	para 10g(2)
29.	d	para 10g(4)
30.	d	para 10g(5)
31.	F	para 12b(4)(a)
32.	T	para 12b(4)(c)
33.	T	para 13a(3)
34.	F	para 13b(1)
35.	F	para 13b(2)

All references are to the Lesson Text.

HAVE YOU CHECKED YOUR ANSWERS, MADE CORRECTIONS, AND RESTUDIED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON TO THE NEXT LESSON OF THIS SUBCOURSE.

STUDENT INQUIRY SHEET

Number/Title	Date
LESSON 4, QM0483 Mobile Laundry Equipment	February 1973 Reprint Repr (A), Oct 75

Use this form if you have a question or request for information concerning a subcourse lesson or examination. This form may be used to ask questions about lesson or examination exercises, but not to request solutions to those exercises. Use this form also for comments, suggestions, requests for additional subcourses, and other informal communications concerning your correspondence course enrollment.

Last Name	**First Name**	**MI**	Student Number/SSAN	Military Rank

Address (No., street, city and state)	**Zip Code**	Civilian Grade

If your name, grade, or address is new, please place an X in this box ☐	Date Submitted

Request information on or clarification of the following points:

The following errors have been found in the instructional materials:

(Additional space is available on the other side of this form.)

QMFL Form 101
Rev May 75

13S-4720

Note. Fold this inquiry sheet with this School's address on the outside, staple or scotch tape it closed, and mail without an envelope.

CUT ALONG THIS LINE

Use this space for additional comments.

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LESSON 5

Credit Hours: 1

LESSON ASSIGNMENT

SUBJECT	Processing of Laundry, Impregnation of Clothing, and Demolition of Bath, Delousing, and Laundry Field Equipment.
LESSON ASSIGNMENT	Lesson Text.
SCOPE	Processing of clothing in the field; use of records and forms; clothing impregnation; demolition methods for bath, delousing, and laundry field equipment.
OBJECTIVES	As a result of successful completion of this assignment, the student will be able to--

1. Describe the procedures for processing clothing in the field, including receiving, marking, assorting, shipping, and resizing.

2. Outline the use of forms and records used in laundry operations.

3. Identify the materials and describe the procedures for handling, mixing, applying, removing, and storing materials used in clothing impregnation.

4. Outline demolition methods for bath, delousing, and laundry field equipment.

LESSON TEXT

SECTION I

RECEIVING, MARKING, CLASSIFYING, AND SHIPPING LAUNDRY

1. INTRODUCTION. Correct identification of laundry items is an important part of laundry operations. Faulty receiving, marking, or shipping may be the reasons that patrons receive wrong bundles in exchange for their laundry lists. A large factor in the morale of a fighting force is the ability of the mobile laundry unit to provide men with clean clothing when and where it is needed. In order that this may be accomplished, certain operational methods of processing and handling the laundry items should be maintained. Strict observance of these methods contributes to efficient laundry operations and sustains the morale of the fighting force.

2. TYPES OF LAUNDRY. Three types of laundry are processed by field laundries:

a. INDIVIDUAL LAUNDRY. Individual laundry service corresponds to commercial service in that each individual's clothing is returned to him after it is washed and dried. The pin system of identification (para 4a) is used to make certain that each man is returned his own clothes.

b. ORGANIZATIONAL LAUNDRY. Organizational laundry consists of clothing and individual equipment submitted in bulk to the field laundry by a unit or organization. Organizational laundry differs from bulk laundry in that organizational workloads are kept separate to insure the return of the same items to the organization that submitted them for processing. It differs from individual laundry in that the field laundry has no responsibility for keeping an individual's clothing separate when received as part of the organizational workload.

c. BULK LAUNDRY. Bulk laundry consists of clothing and textile items that are laundered for return to stock or for forwarding for repair. This type of laundry is classified by the field laundry according to color and type of fabric before it is washed. It is resized, if necessary, after it is washed.

(1) When the laundry section or platoon is supporting a hospital, the workload usually consists of bed linens, towels, operating gowns, pajamas, and robes.

(2) At a clothing exchange facility, the workload usually consists of socks, underwear, field uniforms, and towels.

(3) When the laundry section or platoon is supporting a clothing and textile maintenance facility, the workload usually consists of clothing and such textile items as blankets, mattress covers, belts, canteen covers, shelter halves, and combat packs.

3. RECEIVING LAUNDRY. The receiving of soiled laundry from supported units is the first step in the production process of the laundry. The laundry clerk works

in the receiving and shipping tent. He keeps records for the laundry and receives and ships laundry. He counts and verifies articles received against laundry lists, checks forms for correctness, and checks for proper signatures on forms. The mobile laundry does not pick up laundry. Supported units turn in and pick up laundry in accordance with schedules established by the laundry officer.

4. MARKING AND CLASSIFYING LAUNDRY. Laundry received by the laundry section is marked and classified.

a. INDIVIDUAL LAUNDRY. Each bundle of individual laundry is marked and classified as follows:

(1) The bundle is emptied onto a table, and the DA Form 2886 (Laundry List for Enlisted Personnel) is removed. In the upper right corner of the laundry list, the marker writes the letter and number of the pin lot he assigns to the bundle. Only one pin tray should be on each table at a time.

(2) The clothes in the bundle are inventoried and checked against the laundry list. If the number of items in the bundle does not correspond with the number of items on the laundry list, the number on the laundry list is circled, and the correct number is written beside it. If the count is correct, a checkmark is made beside each number on the form to acknowledge receipt. The marker initials the form after he checks it. The form is then filed for later use in a final check to insure that the clothing items in correct numbers are returned to each individual's laundry bag after the laundering process is complete.

(3) Each garment is pinned individually with a pin bearing the same number marked in the upper right corner of the laundry list. Pairs of socks may be pinned together, and also handkerchiefs. The laundry bag is also pinned.

(4) After the clothing and laundry bags are marked with pins, they are placed in laundry baskets and delivered to the washer trailer. Each basket, when full, hoids approximately one washer load. The clothing is classified by basket as follows:

(a) White cotton garments and khakis. (If time and resources permit, khaki garments should be separated from white garments.)

(b) Colored cotton garments.

(c) Woolen garments.

b. ORGANIZATIONAL LAUNDRY. DA Form 1974 (Laundry List Medical Treatment Facility and Organization) (fig. 1) is filled out by the organization and turned in with the laundry to the field laundry receiving tent. Unit workloads are usually segregated into item lots by the using unit before they are delivered to the field laundry. Only enough identification to insure return of items to the proper organization is required. For maximum efficiency of operation, some identification procedure may be required when workloads of more than one organization are processed simultaneously.

LAUNDRY LIST
(MEDICAL TREATMENT FACILITY AND ORGANIZATION)
(AR 210-130)

DATE: 15 NOV —

FROM: *(Medical Treatment Facility or Organization)*: 100th Supply & Service Company

STATION: Fort Grant, W. Va.

MARKS:

MEDICAL TREATMENT FACILITY LIST				ORGANIZATION LIST	
QTY	ARTICLE	QTY	ARTICLE	QTY	ARTICLE
	APRON, FOOD HANDLERS		CURTAINS, (Sq. Yd.)		APRON, FOOD HANDLERS
	* BAG, BARRACK OR DUFFEL		CURTAINS, SHOWER-BATH		* BAG, BARRACK OR DUFFEL
	BAG, CONVEYOR		DRAPES, (Sq. Yd.)		BAR, MOSQUITO, TRICOT NETTING
	BAG, FOR SHOT		DRESS, HOSPITAL WHITE		BLANKET, WOOL
	BAG, LAUNDRY		GARMENT, SURGICAL		CAP, FOOD HANDLERS
	BAG, MICROPHONE		GOWN, OPERATING		CAP, FIELD, COTTON, W/VISOR
	BANDAGES, ALL TYPES		HAMMOCK, MUSLIN		COAT, FOOD HANDLERS
	BAR, MOSQUITO, TRICOT NETTING		HEADNET, MOSQUITO		COAT, MAN'S, WRC-OG
	BATHROBE		MASK		COMFORTER
	BEDSACK		MAT, BATH	15	COVER, MATTRESS
	BINDER, ABDOMINAL		MOP		CURTAINS, (Sq. Yd.)
	BLANKET, COTTON		MUSLINS		CURTAINS, SHOWER-BATH
	BLANKET, CRIB		NAPKIN, TABLE		DRAPES, (Sq. Yd.)
	BLANKET, WOOL		PAD, CRIB (Hospital)		DRAWERS, COTTON, SHORT
	CAP, OPERATING		PAD, TABLE OR BED		DRAWERS, WOOL
	CAP, FOOD HANDLERS		PANTS, CONVALES. OR OPER.		HANDKERCHIEF
	CLOTH, TRAY		PANTS, PAJAMA		* HAT, DUCK
	CLOTH, WASH		PILLOWCASE, COTTON		MATERIAL, SHRINKING, (Sq. Yd.)
	COAT, CONVALESCENT		PILLOWSACK		NAPKIN, TABLE
	COAT, PAJAMA		RAGS, PER LB.	100	PILLOWCASE, COTTON
	COAT, OPERATING		RUNNERS, CANVAS, PER YD.		RAGS, PER LB. (Dry weight)
	COAT, FOOD HANDLERS		SCARF, BUREAU	200	SHEET, BED, COTTON
	COVER, BRADFORD FRAME		SHEET, BED, COTTON		SHIRT, COTTON, KHAKI
	COVER, CANVAS		SHEET, 120" x 80"		SHIRT, FLANNEL
	COVER, CHAIR		SHIRT, COTTON, KHAKI		SHIRT, UTILITY, OG
	COVER, COUCH		SHOES, CANVAS		SOCKS, COTTON, PAIR
	COVER, CRIB		SLEEVES, EACH		SOCKS, WOOL, PAIR
	COVER, HOT-WATER BOTTLE		SLING	15	TABLECLOTH, LARGE, PLAIN
	COVER, MACHINE		SPREAD, BED (Counterpane)		TABLECLOTH, SMALL, PLAIN
	COVER, MATTRESS		STRAITJACKET	100	TOWEL, HUCK
	COVER, MAYO		TABLECLOTH, LARGE, PLAIN	100	TOWEL, BATH
	COVER, PAN		TABLECLOTH, SMALL, PLAIN		TROUSERS, FOOD HANDLERS
	COVER, SCREEN		TAPE, SPONGE		TROUSERS, COTTON, KHAKI
	COVER, SHOE		TIEBACKS, CURTAIN, PAIR		TROUSERS, UTILITY, OG
	COVER, SHOT BAG		TOWEL, BATH		UNDERSHIRT, COTTON
	COVER, TABLE		TOWEL, DISH, KITCHEN, COOK		UNDERSHIRT, WOOL
			TOWEL, FACE, HAND		
			TOWEL, ROLLER		
			TROUSERS, FOOD HANDLERS		

TOTAL NO. OF PIECES: 530

* Items to be given water repellent treatment

FOR THE LAUNDRY

SIGNATURE OF RECEIVING CHECKER: James Smith

SIGNATURE OF SHIPPING CHECKER: Lois Mercer

FOR THE ORGANIZATION

SIGNATURE: SSG R.M. Robinson

INSTRUCTIONS: This form will be prepared in duplicate unless articles are shipped by common carrier in which case 3 copies will be prepared, and will be forwarded by medical treatment facilities and organizations when submitting government property for laundry. Claims for shortage must be made within two weeks, accompanied by this list.

DA FORM 1 MAY 66 1974

REPLACES EDITION OF 1 MAR 64 WHICH IS OBSOLETE

Figure 1. DA Form 1974 (Laundry List Medical Treatment Facility and Organization).

c. BULK LAUNDRY. DA Form 1974 is also used for bulk laundry. Bulk material which is to be laundered and placed in stock is not marked. It is sorted into two main classifications, wool and cotton, and is then further segregated into white and colored.

5. ASSORTING AND SHIPPING LAUNDRY. After laundry has been washed and dried, it is delivered to the pickup tent where it is processed for shipping (pickup) by the unit, organization, or facility. During processing, the laundry is resized, (bulk laundry only), assorted or separated, and packaged for the supported unit to pick up.

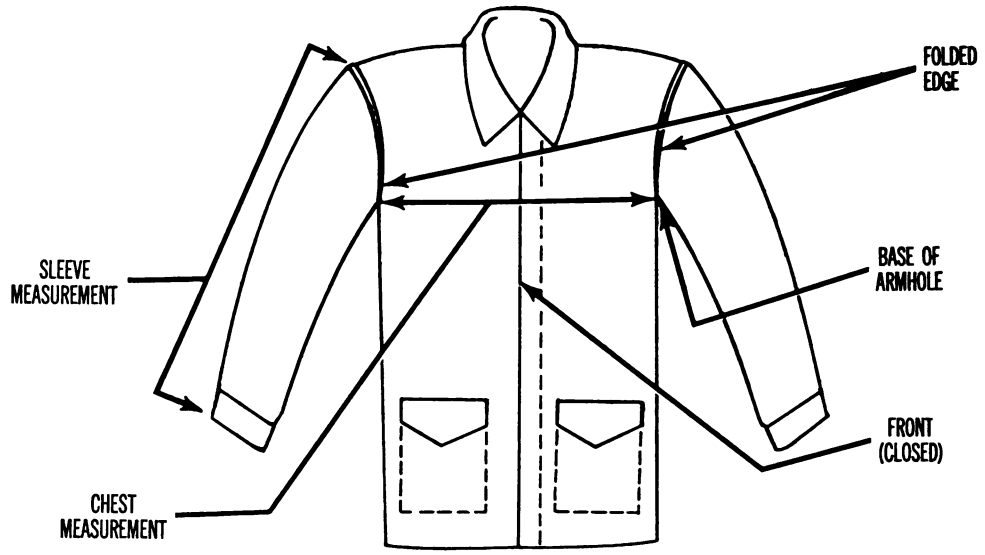
a. INDIVIDUAL LAUNDRY. DA Forms 2886 are removed from the file, and the letter and pin lot numbers previously assigned to the forms upon receipt of the laundry are written in chalk on a sorting table. Clean laundry is assorted, and all garments and the laundry bag bearing the same marking letter and pin lot number are placed at the corresponding letter and pin lot number written in chalk on the sorting table. The number and type of garments are checked against those shown on the form; if all are present, the pins are removed, the laundry is placed in the laundry bag, and the form is tied to the top of the bag. If any garments are missing, the bag of clothing is held until the missing garments are replaced. Loose, unmarked garments are placed to one side and are used to replace garments that are lost or misplaced.

b. ORGANIZATIONAL LAUNDRY. When the laundry section or platoon handles laundry of only one unit, the sorting of finished laundry is not required; the clean laundry is checked for quantity and placed in containers marked with the unit designation. When necessary, however, unit lots of less than a washer load may be combined; in which case, care must be taken to insure that each unit receives the items it turned in.

c. BULK LAUNDRY. The only processing necessary for finished bulk laundry is resizing.

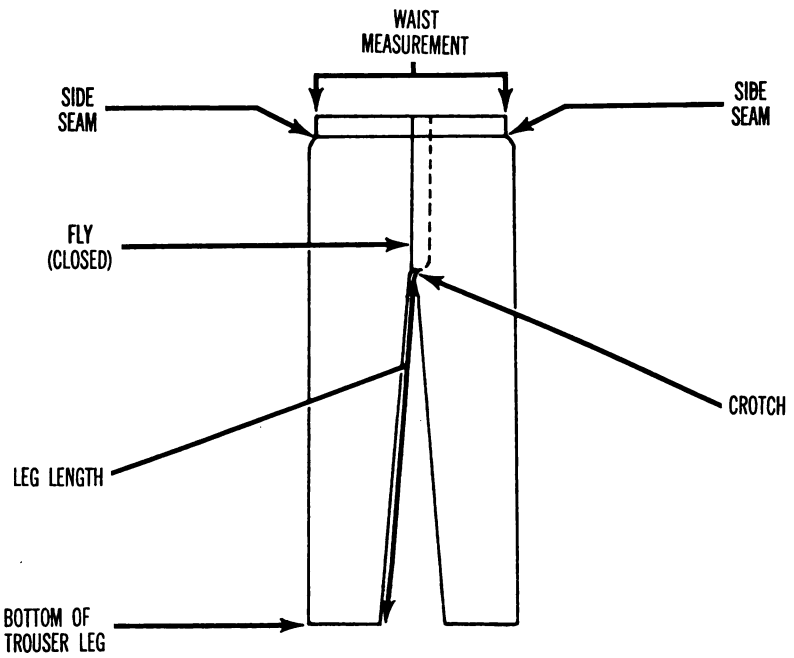
6. RESIZING LAUNDERED CLOTHING. Resizing is necessary only when bulk work is laundered for a clothing exchange or when it is to be placed in stock for reissue. A yardstick is better than a tape measure for measuring because a tape is subject to shrinkage. Each garment is measured, and according to the appropriate measurement table, is assigned a size. Garments are marked as follows: XSM (X-Small), SM (Small), MED (Medium), LG (Large), and XLG (X-Large). Methods for resizing clothing are indicated in figure 2.

a. COATS. Size is determined by chest and sleeve measurements (A). The chest measurement is taken from the base of one armhole to the base of the other, with the front of the coat closed. The measurement is one-half the full chest measurement; for example, a measurement of 19 3/4 inches indicates a full chest measurement of 39 1/2 inches, or size X-small as indicated below. The sleeve length is measured from the top of the armhole seam to the bottom of the sleeve. The chest and sleeve length measurements corresponding to the size are given below.



(A)

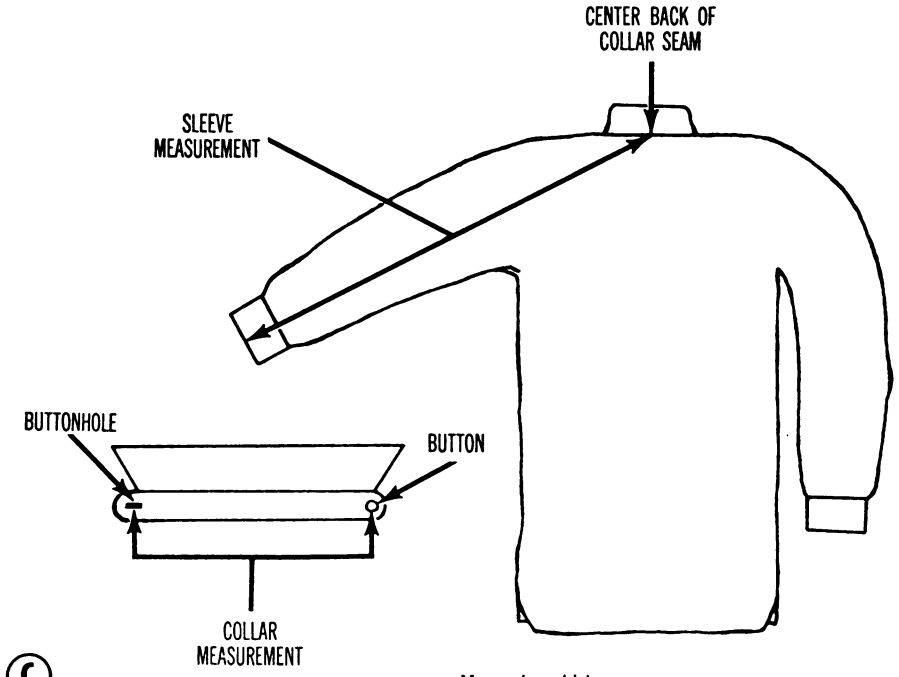
Measuring coats and coat liners.



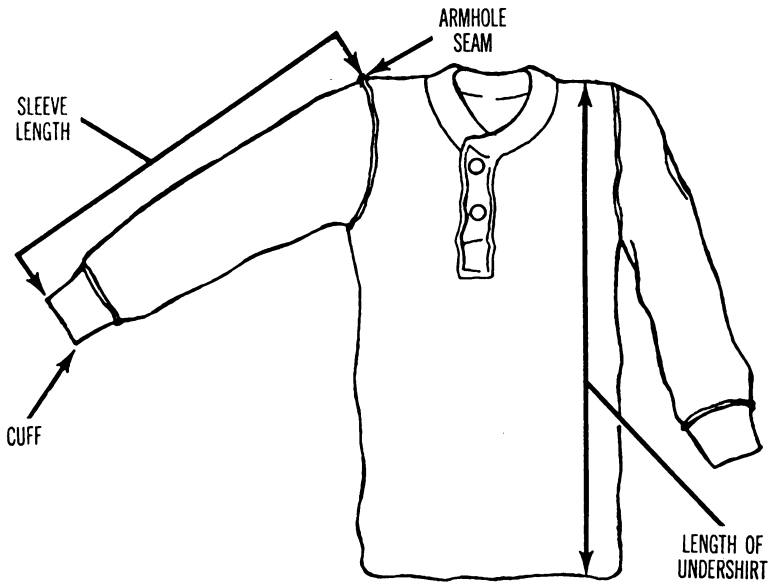
(B)

Measuring trousers.

Figure 2. Measuring methods for resizing clothing.

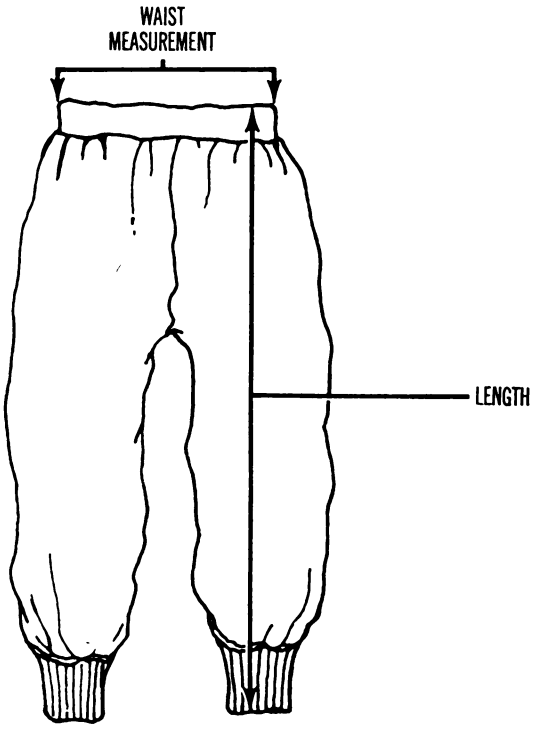


(C) Measuring shirts.

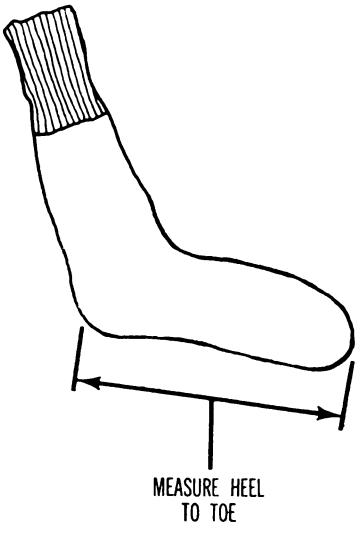


(D) Measuring undershirts.

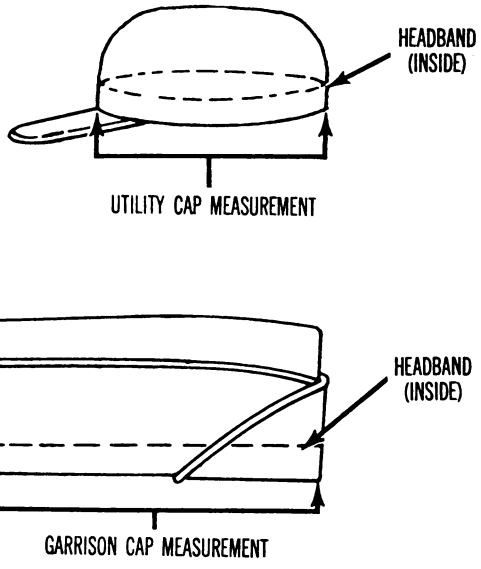
Figure 2 (Continued).



(E) Measuring drawers.



(F) Measuring socks.



(G) Measuring caps.

Figure 2 (Continued).

Size	1/2 full chest (in.) minimum	Sleeve length (in.) minimum			Determinant
		Short	Regular	Long	
X-Small	19 3/4	----------	23 3/4	----------	Size is determined by chest and sleeve measurements.
Small	21 3/4	23 1/4	23 1/4	25 1/4	
Medium	23 3/4	23 5/8	24 5/8	25 5/8	
Large	25 3/4	24 1/8	25 1/8	26 1/8	
X-Large	27 3/4	----------	25 1/2	----------	

b. COAT LINERS. The chest measurement of the coat liner is taken with the coat liner flat and the front edges abutting, from folded edge to folded edge at the base of the armholes (A). The measurement is half the full chest measurement; that is, a measurement of 20 inches indicates a full chest measurement of 40 inches, and the coat liner size is X-small. The sleeve length is measured from the center of the top of the armhole seam to the bottom edge of the sleeve. The sizes corresponding to measurements are given below.

Size	1/2 full chest (in.) minimum	Sleeve length (in.) minimum	Determinant
X-Small	20	19 5/8	Size is determined by chest and sleeve measurements.
Small	22	21 1/8	
Medium	24	21 3/8	
Large	26	21 5/8	
X-Large	28	22	

c. TROUSERS. The waist measurement (B) is taken with the trouser fly closed and the trouser front smoothed flat. The waist is measured along the centerline of the waistband, from side seam to side seam. The measurement taken is half the total waist measurement, which means that the size is double the measurement. The leg length is determined by measuring the inseam of the trousers from the crotch to the bottom of the trouser leg. The sizes corresponding to measurements are given below.

Size	Leg inseam measurement (in.) minimum			Minimum	Determinant
	Short	Regular	Long		
X-Small	26	29	.....	13 3/4	Size is determined by waist and leg inseam measurements.
Small	26	29	32	15 3/4	
Medium	26	29	32	17 3/4	
Large	.....	29	32	19 3/4	
X-Large	.....	29	32	21 3/4	

d. SHIRTS. The collar measurement of a shirt is taken in a straight line from the center of the button to the center of the button hole (C). The sleeve length is measured from the center back of the collar seam diagonally across the back and down the sleeve to the bottom of the cuff. The sizes corresponding to measurements are given below.

Size	Collar (in.) minimum	Sleeve length (in.) minimum	Determinant
X-Small	14	31 1/2	Size is determined by collar size and sleeve length.
Small	15	32	
Medium	16	32 1/2	
Large	17	33	
X-Large	18	33 1/2	

e. UNDERSHIRTS. The sleeve length of undershirts is measured from the top of the armhole seam to the bottom of the cuff (D). The sizes corresponding to measurements are given below.

Size	Full length (in.) minimum	Full length (in.) minimum	Full length (in.) minimum	Determinant
Small	22 1/8	16 1/4	.....	Size is determined by the sleeve and full length measurement.
Medium	23	16 7/8	.....	

Size	Full length (in.) minimum	Full length (in.) minimum	Full length (in.) minimum	Determinant
Large	23 7/8	17 1/4	----------	
X-Large	24 3/4	17 3/4	----------	

f. DRAWERS. The waist measurement is taken along the center line of the waistband, from side seam to side seam (E). The measurement taken is half the total waist measurement, which means that the size is double the measurement. The length of drawers is determined by measuring from the top of the waistband to the bottom of the cuff, while the material is smooth and flat. The sizes corresponding to waist measurements and lengths are given below.

Size	Length (in.) minimum	Length (in.) minimum	Determinant
Small	36 3/8	11 5/8	Size is determined by length and waist measurement.
Medium	37 1/4	12 1/2	
Large	38 1/8	13 3/8	
X-Large	39	14 5/8	
XX-Large	39 7/8	15 1/8	

g. SOCKS. The size is determined by measuring the foot length of a sock from the back of the heel to the toe, while the sock is flat and smooth (F). The sizes corresponding to the measurements are given below.

Size	Foot length (in.) minimum	Determinant
9	8	Size is determined by length of socks.
9 1/2	8 1/2	
10	9	
10 1/2	9 3/8	
11	9 7/8	

Size	Foot length (in.) minimum	Determinant
11 1/2	10 1/4	
12	10 3/4	
13	11 5/8	
14	12 5/8	

h. CAPS. The specific size of a cap is determined by measuring the headband inside the cap (in inches) (G) and dividing by 3.14. For example, if the headband measures 20 1/4 inches, the cap size is 6 1/2. The sizes corresponding to measurements are given below.

Size	Headband measurement (in.) minimum	Determinant
6 1/2	20 1/4	Size is determined by headband measurement divided by 3.14.
6 3/4	21	
7	21 3/4	
7 1/4	22 1/2	
7 1/2	23 1/4	
7 3/4	24	

SECTION II

REIMPREGNATION OF CLOTHING

7. GENERAL. Chemical, biological, and radiological (CBR) agents may potentially be used in modern warfare. Without proper protective measures, these agents may cause many casualties among the troops. Permeable protective clothing (impregnated clothing) is treated with a chemical substance which protects against certain chemical and biological agents. Impregnated clothing may lose the impregnating material when in the hands of troops or in storage, and must be reimpregnated if tests determine reimpregnation is necessary. The job of the laundry operator is to treat the clothing with the proper chemicals to protect military personnel. This clothing may be laundered and reimpregnated by a laundry section. Permeable protective (impregnated) clothing is the clothing in the chemical protective clothing outfit and the vesicant agent protective ensemble. The chemical protective clothing outfit is packaged in a reusable polyethylene bag. The outfit consists of the following items which have been impregnated: one set of chemical protective shirt liners and trouser liners, three pairs of chemical protective cushion sole socks, one pair of chemical protective cotton gloves. Components of the vesicant agent protective ensemble include the vesicant agent protective undershirt, drawers, shirt, trousers, coat, flapset, socks, and cotton knit gloves.

8. IMPREGNATING MATERIALS. The chemical protective clothing is usually reimpregnated in the field by use of materials in the M1 field clothing impregnating outfit or the M3 field clothing impregnating set. The outfit and the set are used for the same purpose and under the same circumstances. Materials used for reimpregnating clothing are as follows:

a. WATER. Water, warm to the touch, should be used for a suspension medium. The water should be free of dirt and foreign matter. Salt water (para 12f) should not be used.

b. XXCC3 IMPREGNITE. XXCC3 impregnite, a fine white powder, is the active ingredient in the impregnation process. XXCC3 deteriorates if left in open containers exposed to sunlight. It is packaged in a moistureproof fiber container. Prolonged contact of XXCC3 with the skin may cause skin rash; operators should bathe after using the solution.

c. CHLORINATED PARAFFIN. Chlorinated paraffin, which has a dark appearance and a density similar to that of molasses, serves to bind the XXCC3 to the fabric. It is packaged in a metal container.

d. WETTING AGENT. The wetting agent consists of detergent-like cream-colored granules used to hold the other chemicals in a water suspension (emulsion). It also assists the impregnite in penetrating the fabric. It is packaged in a metal container.

9. MIXING EQUIPMENT. The mixing equipment listed below should be provided.

a. Two 32-gallon metal containers for mixing the solution.

b. Two 14-quart buckets for measuring the amount of water.

c. Two paddles for stirring the solution. They may be made of scrap lumber.

d. Four 55-gallon drums, with top heads removed, for reclamation of the impregnating solution.

10. PROTECTION OF OPERATORS. At least three operators should be assigned to mix the impregnating solution. For the protection of each operator, the following items are recommended:

a. Rubber gloves.

b. Rubber apron.

c. Dust respirator.

11. PREPARATION OF CLOTHING. The clothing to be impregnated should be clean and dry, should have the pockets turned inside out, and should not be folded or buttoned. One washer load consists of clothing outfits weighing approximately 50 pounds. The M3 impregnating kit contains enough material to process chemical protective clothing outfits for 20 to 25 men; the M1 impregnating outfit contains enough material to process chemical protective clothing outfits for 35 to 40 men.

12. PREPARATION OF IMPREGNATING SOLUTION. The impregnating solution should not be prepared if the temperature is below 32° F. Continuous and thorough stirring is required to prepare the solution, and personnel stirring the solution should be relieved at short intervals. If dye is needed, directions in the instruction booklet furnished with the set or outfit should be followed.

a. Ten gallons of water is put in the 32-gallon mixing container.

b. A container of wetting agent (1.65 pounds) is stirred into the water until the material is completely dissolved.

c. While the solution is being stirred continuously, a container of impregnite XXCC3 (16.5 pounds), a container of chlorinated paraffin (4.33 pounds), and a container of dye mix (1 pound) are added. Stirring continues for 10 minutes to break up all lumps.

d. After the lumps are dissolved, stirring is continued, and 10 gallons of water is added to dilute the solution. Stirring is continued until the impregnation operations begin.

e. Lumps may result from the improper blending of the wetting agent (binder) with the impregnite. Lumps are removed by stirring the solution for short periods

of about 5 minutes over a longer period of from 1/2 to 2 hours. Clothing should never be impregnated with solution containing lumps.

f. Salt water in the solution may cause a large amount of the wetting agent to separate, creating an oily suspension. Because clothing impregnated with an oily suspension gives protection only as long as the garments remain dry, an oily suspension is used only in an emergency.

13. IMPREGNATING PROCEDURES. Impregnating procedures are as follows:

a. Twenty gallons of impregnating solution is added to the washer-extractor.

b. The sets of clothing are added to the washer-extractor and the washer is operated for 10 minutes.

c. Extraction procedures are used for 5 minutes.

d. Extracted clothing is placed in the dryer and dried for 30 minutes at a temperature of 120° F. The time and temperature must be carefully controlled to keep the clothes from burning.

e. Containers are placed to catch reclaimed solution from the washer-extractor drain.

14. DEIMPREGNATING FORMULAS. Impregnated clothing requires deimpregnation if it is to be used without impregnation. The formulas used by the Army to deimpregnate clothing are given in tables 1 and 2.

Table 1. Deimpregnation of cotton clothing

Operation	Water level (inches)	Time (minutes)	Temperature (degrees F.)	Supplies
Break	8	10	160	Soda ash (10 oz.) thiosulphate (6 lb.).
Suds	5	10	180	Soda ash (3 oz.) High titer soap (3 oz.).
Suds	5	5	180	High titer soap (2 oz.).
Rinse	12	3	180	

Table 1 (Continued)

Operation	Water level (inches)	Time (minutes)	Temperature (degrees F.)	Supplies
Rinse	12	3	180	
Rinse	12	3	180	
Sour	5	5	100	Sour (8 oz.).

Table 2. Deimpregnation of wool clothing

Operation	Water level (inches)	Time (minutes)	Temperature* (degrees F.)	Supplies
Break	12	20	140	Soda ash (3 oz.) thiosulphate (6 lb.).
Suds	12	10	120	Low titer soap (7 oz.).
Suds	12	5	120	Low titer soap (3 oz.).
Rinse	12	3	120	
Rinse	12	3	120	
Rinse	12	3	120	
Sour	12	3	120	Sour (2 oz.).

* Water should be kept as near 120° F. as possible, because sudden temperature changes shrink woolens.

15. PACKAGING REIMPREGNATED CLOTHING. The reimpregnated chemical protective clothing is repackaged in its polyethylene bag. Each item is neatly folded to fit compactly into the polyethylene bag, and each bag contains items of a designated size. Used bags should be resealed by means of the plastic zipper. New bags require heat-sealing.

16. CLEANING THE WASHER-EXTRACTOR. The washer-extractor should be cleaned as follows:

a. Five gallons of kerosene is added to the washer-extractor after each three cycles of reimpregnation. The kerosene is agitated for 3 to 5 minutes and drained off.

b. The washer and cylinder are wiped with kerosene and then flushed with hot soapy water. If the impregnating solution dries on the machine, it becomes difficult to remove.

17. SAFETY PRECAUTIONS. Safety precautions are as follows:

a. To protect his respiratory system, each operator should wear a respirator when he is weighing, mixing, and preparing the impregnite solution.

b. All containers should be marked plainly.

c. All containers should be stored in a well-ventilated, dry room.

d. The entire instructions should be read before the mixing of ingredients is begun.

e. All clothes should be unbuttoned, not folded, and pockets should be turned inside out before the clothes are put in the impregnating solution.

f. The machinery should not be loaded with more than its prescribed load.

g. NO SMOKING signs should be posted and smoking prohibited in the operating and storage areas. A smoking area may be designated downwind from these areas.

h. Gasoline, fuel oil, kerosene, lubricating oil, and grease should be stored outside the operating area.

i. Oily rags should be kept in closed metal containers.

j. Clothes must be allowed to cool before being packed to avoid spontaneous combustion.

k. Impregnated clothing should be stored in a cool, well-ventilated place.

l. Firefighting equipment and materials should be kept in convenient places, and fire extinguishers should be placed at key points. Fire extinguishers should be inspected periodically and operators instructed in their use.

SECTION III

DEMOLITION OF BATH, DELOUSING, AND LAUNDRY FIELD EQUIPMENT

18. GENERAL. Military demolition is the destruction of structures, facilities, or material by use of explosives, fire, water, or mechanical or other means. Military demolition is used as a last resort, when it has been determined that the capture of equipment by the enemy is imminent. Demolition of laundry equipment is a command responsibility, and will usually be done on orders from higher headquarters. One person should be technically responsible for all plans for the demolition. The responsibility for the preparation, placing, and firing of explosive charges should not be divided among the operators. If one group finishes its part ahead of another group and sets off its charges, injury or death of other workers may result.

19. DEMOLITION LOCATIONS. Whenever possible, bath, delousing, and laundry field equipment should be demolished at locations where it will impede the advance of the enemy. Possible locations are:

a. Approaches to bridges.

b. Sharp bends in roads.

c. Roads through densely wooded areas.

d. Narrow streets through built-up areas.

e. Airfield landing strips.

20. DEMOLITION METHODS. Various methods are used for demolishing bath, delousing, and laundry field equipment.

a. EXPLOSIVES. Either TNT or dynamite is probably available for area defense and can be used for destruction of the equipment. Of all military explosives, TNT is the least sensitive to accidental ignition. It is reasonably stable in any climate and is not affected by moisture. Because military dynamite, unlike commercial dynamite, contains no nitroglycerin, it is reasonably safe to handle. If it is frozen, it must be thawed before it can be used. Also available is composition C4, a composite explosive, which is recommended for demolition charges. It is pliable, stable, easily attached to the target, and may be cut and molded to fit irregular shaped targets. Land mines may be improvised as an expedient for the destruction of equipment. Hand grenades also may be used instead of TNT charges for the destruction of equipment.

b. WEAPONS FIRE. For destruction by weapons fire, the heaviest available weapon should be used. Weapons usually available are small arms, rifle grenades, rocket launchers, and machineguns.

c. FIRE. Because damage by fire may not be as extensive as expected, fire probably should be used with other demolition methods. Destruction of the equipment by fire is done by packing rags, canvas, or clothing in and around the equipment, soaking the materials with gasoline, kerosene, or fuel oil, and igniting the materials. If available, thermite grenades may be used to destroy the equipment. These grenades generate intense heat capable of melting metal as thick as the engine block of a truck. The destruction can be made more thorough if the equipment is soaked with fuel before the grenades are used.

d. SUBMERSION. The damage which results from submersing the equipment in water is not generally severe but is quickly and easily done. Complete submersion provides concealment of equipment.

e. ABUSE. Much damage can be done to the equipment by misuse and abuse. Engines, fuel and water pumps, and open-type gearboxes can be damaged beyond further use by pouring sand or metal filings into the crankcase of the engine, the priming port of the pump, and the fillercap of a gearbox. The engine should be started, the oil drainplugs opened, and the equipment operated until it stops or breaks down.

f. CONCEALMENT. Vital components of the equipment can usually be removed and scattered through dense foliage to prevent or delay use of the equipment by the enemy.

g. MECHANICAL DESTRUCTION. Mechanical destruction is the easiest method of destroying the equipment because the means of doing so are readily available. When equipment is destroyed by mechanical means, all components of the same type are destroyed to prevent the enemy from reconstructing a usable piece of equipment by cannibalization of parts from several units. Tools that are readily available to break up equipment include sledge hammers, pick mattocks, pickaxes, axes, and crowbars. Some like items used on bath, delousing, or laundry field equipment that may be destroyed include fuel pumps, water pumps, fuel lines, water lines, blowers, and water heaters. Mechanical destruction combined with fire is usually sufficient.

21. PLACING OF EXPLOSIVE CHARGES. Explosive charges should be placed where they will cause the greatest damage to the equipment. Some suggested locations for the charges are as follows:

a. GENERATOR SET (LAUNDRY UNIT).

(1) One charge inside control cabinet.

(2) One charge beneath engine top shroud.

(3) Two charges beneath generator.

(4) One charge under engine assembly.

b. WATER PUMP (LAUNDRY UNIT). One charge under water pump.

c. WATER HEATER (LAUNDRY UNIT).

(1) One charge under burner blower assembly.

(2) One charge under water tank, between heater control assembly and heater tank.

d. WASHER-EXTRACTOR.

(1) Two charges on washer-extractor drive motor assembly.

(2) One charge inside washer cylinder.

(3) One charge under washer control cabinet.

e. DRYER-TUMBLER.

(1) One charge between cylinder drive motor and cylinder shell.

(2) One charge between exhaust fan motor and exhaust fan assembly.

(3) One charge on top of burner blower assembly.

f. GENERATOR SET (BATH UNIT).

(1) One charge inside control box.

(2) One charge between engine and generator.

g. WATER PUMP (BATH UNIT). One charge under pump.

h. WATER HEATER (BATH UNIT).

(1) One charge under burner blower assembly.

(2) One charge under heater tank, between heater controls and heater tank.

i. DELOUSING OUTFIT.

(1) One charge on top of compressor.

(2) One charge on top of engine.

22. SAFETY PRECAUTIONS. All persons except those required to perform the destruction of equipment should be removed from the demolition area. When placement of explosive charges or preparation of equipment for destruction by other means is completed, all the assigned work party should leave the area and should be accounted for before the charges are set off.

APPENDIX

REFERENCES

TM 3-303	Impregnating Set, Clothing, Field, M3; Impregnating Outfit, Clothing, Field, M1; Kit, Testing, Impregnate-in-Clothing, M1
TM 10-280	Field Laundry, Bath, and Clothing Exchange Operations
TM 10-354	Army Fixed Laundry Organization
TM 10-3510-208-12	Laundry Unit, Single Trailer Mounted, with Canvas Cover (Army Model M-532) (Eidal Model ELT9T) FSN 3510-782-5294
TM 10-4230-202-15	Delousing Outfit, Power Driven, Gasoline Engine, with 10 Dusting Guns (Johnson Service Co. Model 252QM) FSN 4230-889-2315

LESSON 5 Credit Hours: 1

SELF-GRADING
LESSON EXERCISES

REQUIREMENT. Exercises 1 through 17 are multiple choice. Each exercise has only one single-best answer. Indicate your choice by circling its letter.

1. What type of laundry service corresponds to commercial service in returning washed and dried laundry to the proper recipients?

   a. Combined.

   b. Individual.

   c. Organizational.

   d. Unit.

2. Bulk laundry is classified before it is washed according to

   a. condition of articles.

   b. size and weight.

   c. types of articles.

   d. color and type of fabric.

3. In marking individual laundry, what is done if the quantity of an item in the bundle does not correspond with the number on the laundry list?

   a. The number written on the laundry list is circled, and the correct number is written beside it.

   b. The number written on the laundry list is scratched out, and the correct number is written beside it.

   c. A checkmark is placed beside the number, and the correct number is written beside it.

   d. The initials of the marker are placed beside the number on the form.

4. For laundry processing, bulk laundry is sorted into how many **main classifications?**

   a. 2.

   b. 4.

   c. 6.

   d. 7.

5. After individual laundry has been washed and dried, it is **delivered to the pickup** tent to be

   a. marked.

   b. assorted.

   c. resized.

   d. pinned.

6. The specific size of a cap is determined by measuring the headband **inside the** cap (in inches) and dividing by

   a. 3.10.

   b. 3.12.

   c. 3.14.

   d. 3.16.

7. The chemical protective clothing outfit is packaged in a reusable

   a. paper bag.

   b. polyethylene bag.

   c. metal container.

   d. wooden container.

8. What items should operators wear when mixing the impregnating solution?

   a. Canvas apron, rubber gloves, and dust respirator.

   b. Rubber gloves, dust respirator, and goggles.

   c. Goggles, rubber apron, and rubber gloves.

   d. Rubber gloves, rubber apron, and dust respirator.

9. The first step in preparing the impregnating solution is to

   a. add the chlorinated paraffin to the mixing container.

   b. add the impregnite XXCC3 to the mixing container.

   c. add 10 gallons of water to the mixing container.

   d. stir in the wetting agent in the mixing container.

10. Lumps in an impregnating solution may be caused by

   a. adding kerosene to the impregnite.

   b. improper blending of the impregnite with the dye mix.

   c. improper blending of the wetting agent with the impregnite.

   d. adding salt to the impregnite.

11. Salt water in the impregnating solution may cause

   a. a discolored suspension.

   b. a dilute suspension.

   c. a lumpy suspension.

   d. an oily suspension.

12. After three cycles of using the washer-extractor to reimpregnate clothing, the machine is cleaned with

    a. cold water.

    b. bleaching agent.

    c. wetting solution.

    d. kerosene.

13. How many persons should be responsible for the plans for demolition of laundry and bath equipment?

    a. One.

    b. Two.

    c. Three.

    d. Four.

14. What demolition method should probably be used with other demolition methods because damage may not be extensive enough?

    a. Fire.

    b. Weapons fire.

    c. Explosives.

    d. Submersion.

15. How many charges are recommended for destroying the generator set of the laundry unit?

    a. Three.

    b. Four.

    c. Five.

    d. Six.

16. How many explosive charges are recommended for destroying the washer-extractor?

a. One.

b. Two.

c. Three.

d. Four.

17. How many charges are recommended for destroying the dryer-tumbler?

a. Two.

b. Three.

c. Four.

d. Five.

REQUIREMENT. Exercises 18 through 20 are matching exercises. Column I lists some of the materials used in impregnating operations, and column II lists characteristics of these materials. Select the characteristics in column II that matches the materials in column I, and indicate your answer by writing the column II letter below the column I number. Choices may be used once, more than once, or not at all.

Column I		Column II	
18.	XXCC3 impregnite.	a.	Detergent-like cream-colored granules.
19.	Chlorinated paraffin.	b.	Fine white powder.
20.	Wetting agent.	c.	Density similar to that of molasses.
		d.	A cleaning solvent.

REQUIREMENT. Exercises 21 through 25 are true-false. Record each answer by writing a T or an F next to the exercise number.

21. In processing organizational laundry, the receiving clerk prepared DA Form 1974 (Laundry List Medical Treatment Facility and Organization).

22. When the laundry section handles laundry of only one unit, the sorting of finished laundry is not required.

23. Clothing to be impregnated should be clean and wet.

24. Impregnated clothing should be stored in a cool, well-ventilated place.

25. When equipment is destroyed by mechanical means, all components of the same type are destroyed.

HAVE YOU COMPLETED ALL EXERCISES? DO YOU UNDERSTAND EVERYTHING COVERED? IF SO, TURN TO THE NEXT PAGE AND CHECK YOUR ANSWERS AGAINST THE SOLUTIONS.

S. ARMY QUARTERMASTER SCHOOL
FORT LEE, VIRGINIA 23801

LESSON 5

SOLUTION SHEET

PROCESSING OF LAUNDRY, IMPREGNATION OF CLOTHING, AND DEMOLITION OF BATH, DELOUSING, AND LAUNDRY FIELD EQUIPMENT

Check your work against the solutions given below. If you have made a wrong response or omitted a required response, correct your work. Then, go back and restudy the appropriate text portion once more (references follow each solution).

Ex	Sol	Ref
1.	b	para 2a
2.	d	para 2c
3.	a	para 4a(2)
4.	a	para 4c
5.	b	para 5a
6.	c	para 6h
7.	b	para 7
8.	d	para 10a,b, & c
9.	c	para 12a
10.	c	para 12e
11.	d	para 12f
12.	d	para 16a
13.	a	para 18
14.	a	para 20c
15.	c	para 21a
16.	d	para 21d
17.	b	para 21e
18.	b	para 8b
19.	c	para 8c
20.	a	para 8d
21.	F	para 4b
22.	T	para 5b
23.	F	para 11
24.	T	para 17k
25.	T	para 20g

All references are to the Lesson Text.

HAVE YOU CHECKED YOUR ANSWERS, MADE CORRECTIONS, AND RESTUDIED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON TO THE EXAMINATION FOR THIS SUBCOURSE.

STUDENT INQUIRY SHEET

Number/Title	Date
LESSON 5, QM0483 Processing of Laundry, Impregnation of Clothing, and Demolition of Bath, Delousing and Laundry Field Equip	February 1973 Reprint Repr (A), Oct 75

Use this form if you have a question or request for information concerning a subcourse lesson or examination. This form may be used to ask questions about lesson or examination exercises, but not to request solutions to those exercises. Use this form also for comments, suggestions, requests for additional subcourses, and other informal communications concerning your correspondence course enrollment.

Last Name	First Name	MI	Student Number/SSAN	Military Rank

Address (No., street, city and state)	Zip Code	Civilian Grade

If your name, grade, or address is new, please place an X in this box ☐	Date Submitted

Request information on or clarification of the following points:

The following errors have been found in the instructional materials:

(Additional space is available on the other side of this form.)

QMFL Form 101
Rev May 75

13S-4720

Note. Fold this inquiry sheet with this School's address on the outside, staple or scotch tape it closed, and mail without an envelope.

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EXAM 483

Correspondence Subcourse Examination

WAIT

DO NOT GO ON TO THE EXAMINATION EXERCISES UNTIL YOU HAVE STUDIED AND COMPLETED ALL LESSONS IN THIS SUBCOURSE. READ THE SPECIAL INSTRUCTIONS (NEXT PAGE) BEFORE STARTING EXAMINATION.

SPECIAL INSTRUCTIONS

1. PREPARING FOR EXAMINATION. Before completing this examination, it is suggested that you review each lesson in the subcourse. Check your answers against the solutions given at the back of each lesson. If you have any questions regarding lesson text, practical exercises, or exercise solutions, use the student inquiry sheet accompanying the lesson.

2. COMPLETING EXAMINATION. Read all directions before completing examination exercises. Check off your answer to each exercise in this examination booklet before indicating your answer on the answer form. Finally, complete the exercises following instructions in NIPUB 203, Correspondence Course Instruction Booklet (sent to you previously). Check your answers before sending in your completed examination answer form. It is suggested that you complete all exercises in this examination. An educated guess is better than an omission.

3. RETURNING ANSWER FORM. When you have completed all examination exercises, return the examination answer form in the addressed envelope provided.

4. EVALUATING SUBCOURSE. You will find a form, student evaluation of subcourse, at the end of the examination exercises. Before filling out this form, read the INSTRUCTIONS at its top. After filling out the form, return it with your examination answer form.

5. USING INQUIRY FORM. A student inquiry sheet is bound in this booklet at the end of the examination. You may use this form for questions regarding administrative matters or legibility of examination materials. The form may also be used for requesting enrollment in an additional correspondence course or in specific subcourses upon completion of current correspondence-course commitments.

EXAM 483 Credit Hours: 1

EXAMINATION ASSIGNMENT

SUBJECT Bath, Delousing, and Laundry Operations in the Field.

STUDY ASSIGNMENT Review of all previous assignments.

SCOPE Bath, delousing, and laundry field equipment; duties and responsibilities of bath and laundry personnel; nomenclature and function of delousing outfit; bath unit operations and maintenance of bath and delousing equipment; function and operation of the laundry unit; safety requirements for bath and laundry equipment; processing of clothing in the field; use of records and forms; demolition of bath, delousing, and laundry field equipment.

OBJECTIVES To test attainment of lesson objectives and to emphasize points that have been previously studied.

EXAMINATION EXERCISES

REQUIREMENT. Exercises 1 through 31 are multiple choice. Each exercise has only one single-best answer. Indicate your answer on the answer form.

1. After washing damaged clothing, the function of a laundry unit is to forward the clothing to

   a. partisan groups.

   b. clothing repair.

   c. property disposal.

   d. classification.

2. The individual in the bath section who is specifically responsible for the stockage, issue, turn-in, and pickup of clothing from the laundry is the

   a. clothing exchange specialist.

   b. bath processor.

   c. bath team chief.

   d. bath section chief.

3. What are the three major components of the water heater for the bath unit?

   a. Compressor, burner assembly, and fuel pump.

   b. Motor, blower, and fuel pump.

   c. Burner assembly, blower, and fuel pump.

   d. Burner assembly, blower, and tank.

4. As the platoon leader of a laundry and bath platoon, you are responsible for selecting a site for laundry operations. It is important that you select a site that is satisfactory for laundry operations; however, it is more important that you select a site that

   a. is accessible to supported units.

   b. has an adequate water supply.

   c. has adequate concealment.

   d. has adequate vehicle parking space.

5. You are the platoon leader of a bath unit, and you are considering a site for a bath point. You are satisfied with the site selected because an adequate supply of clean water is available. How much water do you need?

   a. 860 gallons per hour.

   b. 960 gallons per hour.

   c. 1,060 gallons per hour.

   d. 1,160 gallons per hour.

6. Bath station No. 2 is used as a place to

   a. pick up towels for drying.

   b. store boots and valuables.

   c. gather soiled clothing.

   d. obtain necessary clothing.

7. The wood or steel pins are driven according to the ground plan for the tent, using what pole to measure the distance from the tent?

   a. 10-feet 3-inch.

   b. 6-feet 2-inch.

   c. 5-feet 8-inch.

   d. 4-feet 6-inch.

8. The first step to take when striking a tent is to

   a. untie jumper lines from center upright pole and from eave and door poles.

   b. untie corner lug tie tapes and unwrap legs from corner eave poles.

   c. close doors and fasten the wood toggles to toggle chapes.

   d. remove all footstop pins except those at each corner of the tent.

9. The square knot is used to

   a. adjust a guy line.

   b. fasten a line to an anchorage.

   c. fasten one line to another.

   d. join two lines of equal size.

10. What kind of knot is used on a tent to fasten one line to another?

   a. Rolling hitch.

   b. Square knot.

   c. Round turn and two half hitches.

   d. Clove hitch.

11. Normally, what type of pin is used for footstops of a tent?

   a. 9-inch aluminum.

   b. 12-inch steel.

   c. 16-inch wood.

   d. 24-inch wood.

12. The drainage of a tent site is improved by

a. erecting the tent on sloping ground.

b. trenching around the tent.

c. erecting the tent on sandy soil.

d. erecting a stone wall around the tent.

13. The greatest amount of damage done to tentage is caused by

a. heavy rains.

b. strong winds.

c. fires.

d. carelessness.

14. In a strong wind, the medium, general-purpose tent may be protected by

a. tightening lines, closing door entrances, and closing all corners.

b. loosening lines, closing door entrances, and closing all corners.

c. loosening lines, opening door entrances, and opening all corners.

d. tightening lines, closing door entrances, and opening all corners.

15. In performing before-operation inspections on the bath unit the water pump should be checked to insure that

a. the fuel supply is adequate.

b. the blower shutter operates freely.

c. there is elevation on one end.

d. the drain cock is closed.

16. The first step in operating the water pump is to

a. turn on the water heater.

b. remove the dust cap and prime the pump.

c. push the water pump motor switch to the ON position.

d. close the burner fuel pressure gage.

17. During operation of the bath unit, the water heater temperature gage should read between

a. 85^{o} and 95^{o} F.

b. 90^{o} and 100^{o} F.

c. 95^{o} and 105^{o} F.

d. 100^{o} and 110^{o} F.

18. If the bath unit burner fails to ignite immediately, the operator should

a. turn off the fuel shutoff valve.

b. close the blower shutter.

c. turn off the water heater blower.

d. close the water pump draincock.

19. When an emergency shutdown of the bath unit is necessary, an important safety precaution is to

a. disconnect the suction strainer.

b. disconnect the ignition cable assemblies.

c. disconnect the power cord cables.

d. disconnect the ignition electrodes.

20. At atmospheric pressure, methyl bromide is a

a. gas.

b. liquid.

c. crystal.

d. powder.

21. Lindane, which is used to paralyze insects, is a

a. crystal.

b. gas.

c. powder.

d. liquid.

22. The major components of the delousing outfit are the engine and the

a. air cleaner.

b. magneto.

c. fuel system.

d. air compressor.

23. The engine of the delousing outfit provides the power necessary for operating the

a. tent heater.

b. compressor unit.

c. governor.

d. equipment used for spreading insecticides.

24. When the safety trip valve of the 250,000-B.t.u. heater is closed, fuel is

a. directed to a metering valve.

b. directed to the heat transfer system.

c. restricted to the burner.

d. shut off to the burner.

25. When the 250,000-B.t.u. heater is set up, the heater is first put in a level position and then the

a. extension stack and 12-inch canvas ducts are installed.

b. extension stack and transition plates are installed.

c. transition plates and 12-inch canvas ducts are installed.

d. transition plates and 6-inch ducts are installed.

26. Before the 250,000-B.t.u. heater is operated, checks are made for oil and gasoline leaks around the

a. engine, gas tank fillcap, burner compartment, and air blower.

b. engine, gas tank fillcap, air blower, burner compartment, and under the heater.

c. engine, gas tank fillcap, burner compartment, and under the heater.

d. overheat safety valve, engine, burner compartment, and air blower.

27. How long should the 250,000-B.t.u. heater be operated to have warm or hot air?

a. 5 minutes.

b. 10 minutes.

c. 15 minutes.

d. 20 minutes.

28. The three-way fuel valve of the generator set should be placed in what position for fuel tank supply?

a. RUN.

b. SET.

c. AUX.

d. EMER.

29. The temperature of the water supplied to the washer-extractor is controlled by

a. temperature gage.

b. thermal switch.

c. blower.

d. fuel pump motor control switch.

30. The water heater has a fuel nozzle with a capacity of

a. 4 1/2 g.p.h.

b. 5 1/2 g.p.h.

c. 6 1/2 g.p.h.

d. 7 1/2 g.p.h.

31. When operating the engine-generator of the laundry unit, the surrounding area should be

a. deserted.

b. dry.

c. well-ventilated.

d. guarded.

REQUIREMENT. Exercises 32 through 35 are matching exercises. Column I lists major components of the single-trailer laundry unit, and column II lists controls and instruments used on these components. Select the control or instrument in column II that is required to operate the component in column I, and indicate the answer on the answer form. The choices in column II may be used once, more than once, or not at all.

	Column I		Column II
32.	Generator set.	a.	Float holddown rod.
33.	Water heater.	b.	Door limit microswitch.
		c.	BRAKE-DRAIN switch.
34.	Washer-extractor.	d.	REMOTE-LOCAL switch.
		e.	Pressure regulator gage.
35.	Dryer-tumbler.		

REQUIREMENT. Exercises 36 through 45 are multiple choice. Each exercise has only one single-best answer. Indicate your answer on the answer form.

36. When the generator set is being set up for operations, the unit should be positioned within

    a. 15 degrees of level.

    b. 18 degrees of level.

    c. 20 degrees of level.

    d. 22 degrees of level.

37. If no flame is present in the sightglass of the water heater, what procedures are followed to rectify the condition?

    a. The thermal switch is cut off and the fuel shutoff valve closed.

    b. The water heater vent valve is opened and the fuel system purged.

    c. The fuel shutoff valve is closed and the fuel system purged.

    d. The fuel shutoff valve is opened and the fuel system purged.

38. After the washing supplies are added for automatic operation of the washer-extractor, the AUTO-MANUAL switch should be put in what position?

a. OFF.

b. AUTO.

c. MANUAL.

d. DRAIN.

39. When cotton clothes are being washed, the temperature gage of the washer-extractor should record

a. 120° F. or higher.

b. 130° F. or higher.

c. 140° F. or higher.

d. 150° F. or higher.

40. When the laundry unit is being shut down, the manual valve of the tumbler is turned to the OFF position and the tumbler door is opened for

a. 1 to 2 minutes.

b. 1 to 3 minutes.

c. 2 to 5 minutes.

d. 3 to 5 minutes.

41. How is a correct count of laundry items indicated on DA Form 2886?

a. By initialing.

b. By a number.

c. By a circle.

d. By a checkmark.

42. The two main classifications for bulk materials which are to be laundered are

a. wool and cotton.

b. white and colored.

c. khaki and white.

d. natural fibers and synthetics.

43. What kind of finished laundry is resized?

a. Special.

b. Bulk.

c. Organizational.

d. Individual.

44. The impregnating solution should not be prepared if the temperature of the atmosphere is below

a. 32^{o} F.

b. 35^{o} F.

c. 38^{o} F.

d. 40^{o} F.

45. What would cause separation of the wetting agent of an impregnating solution and create an oily suspension in the solution?

a. Too much dye mix.

b. Hard water.

c. Salt water.

d. Too much chlorinated paraffin.

REQUIREMENT. Exercises 46 through 50 are true-false. Indicate the answer on the answer form by using A for TRUE and B for FALSE.

46. Supported units turn in and pick up laundry in accordance with schedules established by the laundry officer.

47. Kerosene is used to impregnate clothes.

48. The responsibility for firing charges in the various pieces of equipment should be divided among the operators.

49. Total submersion provides concealment of equipment.

50. Mechanical destruction combined with burning will usually provide adequate destruction of equipment.

CUT ALONG THIS LINE

STUDENT EVALUATION OF SUBCOURSE

INSTRUCTIONS

1. **Fill out this form and return it with your completed examination for this subcourse. If you have questions requiring a reply, use Student Inquiry Sheet (QMFL Form 101).**
2. **Print or type information in Section I.**
3. **Complete Sections II, III, and IV with SOFT LEAD PENCIL, if possible. Carefully consider each question and mark your choice of answer clearly in the appropriate column of the form. Your answers will assist the QM School in improving, revising, or rewriting the subcourse and therefore will be carefully evaluated.**

I. GENERAL

Repr (A), Oct75

Subcourse Number:	Title of Subcourse:	Date of Subcourse:
QM0483	Bath, Delousing, and Laundry Operations in the Field	February 1973

Last Name	First Name	MI	Student Number:	Mil/Civ Grade:

Address (No., street, city and state)	Zip Code:

Education: Grade School ☐ High School ☐ College 1 yr ☐ 2 yr ☐ 3 yr ☐ 4 yr ☐ Post-College ☐

Occupation or Job Title:

II. SUBCOURSE TEXT MATERIAL

If your answer is NO to any of the following questions, please explain briefly.

	Yes	No	Not Sure
1. Did the material provided in this subcourse enable you to meet the lesson objectives stated in each lesson assignment?	⁞⁞	⁞⁞	⁞⁞
2. Based on your own practical experience, did the procedures as presented in the text seem workable?	⁞⁞	⁞⁞	⁞⁞
3. Was the text material for each lesson assignment clear and understandable?	⁞⁞	⁞⁞	⁞⁞
4. Was all the detailed information (forms, examples, tabulated data, detailed procedures) included that you felt was needed for you to achieve the LESSON OBJECTIVES?	⁞⁞	⁞⁞	⁞⁞

III. SUBCOURSE LESSON AND EXAMINATION EXERCISES

If your answer is YES to any of the following questions, please explain briefly.

5. Were there any lesson or examination exercises that were not applicable to the stated objectives?	⁞⁞	⁞⁞	⁞⁞
6. Were there any exercises for which you could not find a solution in the materials provided for this subcourse?	⁞⁞	⁞⁞	⁞⁞
7. After you had read the school solution and the references for each lesson exercise, did you find any exercises that still remained unclear or difficult to understand?	⁞⁞	⁞⁞	⁞⁞
8. Was there any information that needed to be added to the subcourse materials to make the exercises more understandable?	⁞⁞	⁞⁞	⁞⁞

IV. NEW COURSES OF INSTRUCTION

If your answer is YES to the following question, please indicate the instructional areas required

9. Are there any new courses of instruction that you feel are required for your professional development or for the development of greater proficiency in your field?	⁞⁞	⁞⁞	⁞⁞

QMFL Form 990-1
15 Mar 67

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STUDENT INQUIRY SHEET

Number/Title	Date
EXAM, QM0843 Bath, Delousing, and Laundry Operations in the Field	February 1973 Reprint Repr (A), Oct 75

Use this form if you have a question or request for information concerning a subcourse lesson or examination. This form may be used to ask questions about lesson or examination exercises, but not to request solutions to those exercises. Use this form also for comments, suggestions, requests for additional subcourses, and other informal communications concerning your correspondence course enrollment.

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The following errors have been found in the instructional materials:

(Additional space is available on the other side of this form.)

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C&TD	27 Dec 74
Petrl & Fld Svcs	22 Aug 75
C&TD	22 Aug 75