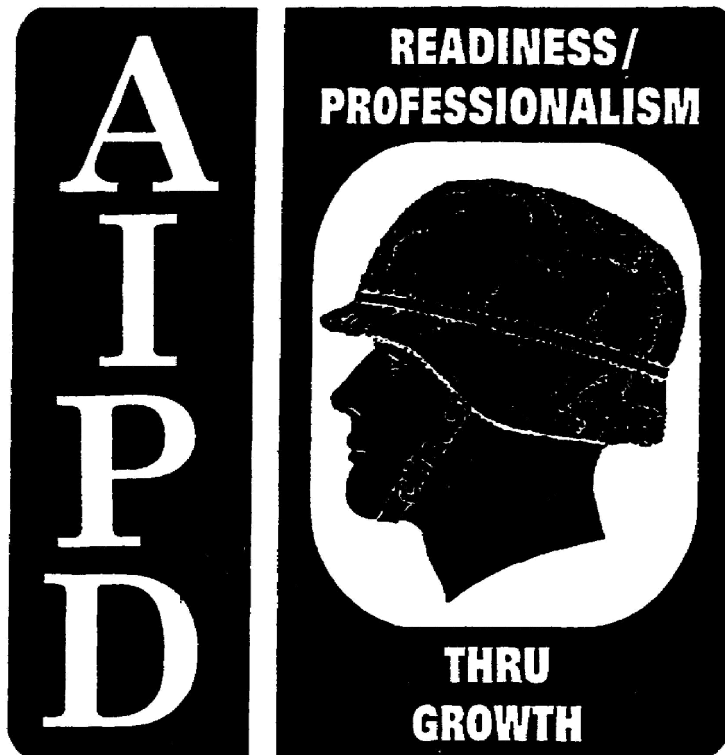


**FOOD SERVICE EQUIPMENT  
AND OPERATIONS**



**THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT**  
**ARMY CORRESPONDENCE COURSE PROGRAM**

**QM 453  
FOOD SERVICE EQUIPMENT AND  
OPERATIONS**

**EDITION A  
5 CREDIT HOURS**

**United States Army Combined Arms Support Command  
Fort Lee, VA 23801-1809**

**SECTION I  
INTRODUCTION**

1. **SCOPE.** This subcourse covers operation, maintenance, and utilization of garrison food service equipment. It also covers utilization and identification of food serving and preparation utensils; identification of food conditions, including frozen foods, fresh fruits and vegetables, meats, fish, poultry, milk and dairy products, dry stores, and canned goods; and reporting unsatisfactory subsistence.

2. **APPLICABILITY.** This subcourse is of interest to all personnel involved with food service. Successfully completed, this subcourse will provide you with a working knowledge of the use, maintenance, sanitation, and safety of food service equipment. This knowledge, along with additional training and experience, will enable you to effectively perform in food service.

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. QM0323, Food Preparation Management.
- b. QM0353, Developments in Food Preservation and Preparation.
- c. QM3394, Food Service Sanitation.







## LESSON 1

### LESSON ASSIGNMENT

#### SUBJECT

Operation, Maintenance, and Safety of Garrison Food Service Equipment.

#### STUDY ASSIGNMENT

Lesson Text.

#### SCOPE

Operation, maintenance, and safe use of garrison food service equipment.

#### OBJECTIVES

As a result of successful completion of this assignment, you will be able to-

1. Identify equipment for food service operations.
2. Identify care and maintenance procedures for operation of food service equipment.
3. Identify safety precautions for operation of food service equipment.

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## LESSON TEXT

### SECTION I

#### INTRODUCTION

1. **GENERAL.** All Army food service activities, including dining facilities, depend on specialized equipment to help store, prepare, cook, and serve foods, and to help clean up afterwards. It is essential that food service personnel know this equipment, know how to use and maintain it, and know and practice safety precautions. Because there are several makes, models, and types of each major item of equipment, operating instructions may vary. For this reason, the manufacturer's manual for each item should be available in the dining facility and should be studied by the cooks. Many items of equipment also have attached instruction plates that give initial operating instructions. In addition, there may be an equipment identification plate with the national stock number, contract number, serial and model numbers and the number of the technical manual that covers the item. Certain items of food service equipment currently in use in the dining facility are no longer being purchased because they are obsolete in type or design. When present warehouse stocks are depleted, they will be replaced with up-to-date equipment.

2. **CARE.** Garrison food service equipment is designed to give efficient, trouble-free service over a long period of time. However, improper operation and lack of care and maintenance can cause premature breakdowns and serious accidents, and require extensive repairs. Each individual is responsible for cleaning and performing operator's maintenance on equipment he has used. He should always make before-operation checks for his protection and for the protection of the equipment. He should always see that the machine is properly assembled and check for damage. He should inspect water, gas, or steam lines, all connections, instruments, and controls to see that there are no leaks and that everything is properly installed, secure, and in good working condition. He should inspect the wiring, connections, and components of electrical equipment to see that everything is dry, clean, secure, and in good working order. He should report any equipment deficiencies or needed repairs to the person in charge.

3. **SAFETY PRECAUTIONS.** There are certain basic safety precautions that apply to all equipment. These should be habitually practiced by food service personnel.

a. **ALL EQUIPMENT.** Food service personnel should never use equipment they have not been trained to use. Regardless of an operator's prior training, he should be instructed in the proper operation of specific food service equipment when he is first assigned to duty. The instructions posted on or near the equipment should be followed exactly. All safety guards on equipment should be in place and in good condition. Particular care must be used to keep aprons, sleeves, or any loose clothing from being

caught in grinders, mixers, or other machinery with moving parts. Food service personnel should never leave a machine while it is operating. Steel wool should not be used in cleaning because the steel filings may get into food or clog equipment.

b. STEAM-HEATED EQUIPMENT. Personnel working with steam-heated equipment must be constantly alert to avoid contact with any steam that escapes. Live steam causes severe burns.

c. ELECTRICAL EQUIPMENT. Personnel working with equipment that is powered or heated by electricity should make sure that all switches are in the OFF position before plugging the cable into an outlet and that wiring and components are free of grease, oil, and water. Operators should not handle electrical wiring or switches with wet hands. Before cleaning or adjusting any piece of electrical equipment, the operator should turn the switch off or disconnect the cable from the outlet.

d. GAS-FIRED EQUIPMENT. With gas-fired equipment there is always the danger of an explosion or toxic fumes. Operators of such equipment should observe all safety precautions and follow closely the directions on the equipment instruction plate. If the equipment has a pilot light, the pilot light should be checked frequently because if it is out or does not work properly, gas may be leaking. Gas ovens should always be ventilated before they are lit and before they are relit after a gas failure. The operator should always make sure the burner with a pilot light ignites promptly when the gas valve is opened; he should make sure the burner that is not equipped with a pilot light ignites promptly when the gas valve is opened and a lighted taper is applied to the gas jet. (A taper should always be used to light equipment without pilot lights; while the taper is being lit, it should be held away from clothing and flammable materials.) A low-wattage night light should be left burning in the kitchen so it will not be necessary for personnel to strike a match in order to find the light switch. If gas or oil equipment is used, fumes may escape and a fire or explosion may result if a match is struck.

## SECTION II

### STORAGE EQUIPMENT

4. REFRIGERATORS. Two types of refrigerators are used in Army dining facilities. The reach-in type (fig. 1) has a 65-cubic foot capacity. It is a one-piece metal cabinet with adjustable shelves and from three to five doors and compartments. If walk-in refrigeration facilities have not been built in as a part of the dining facility, prefabricated walk-in refrigerators are authorized. These insulated structures, assembled from prefabricated panels, are cooled by either plug-in or remote-location refrigeration units. Prefabricated walk-in refrigerators (fig. 2) range from 400 to 1,600 cubic feet in size.

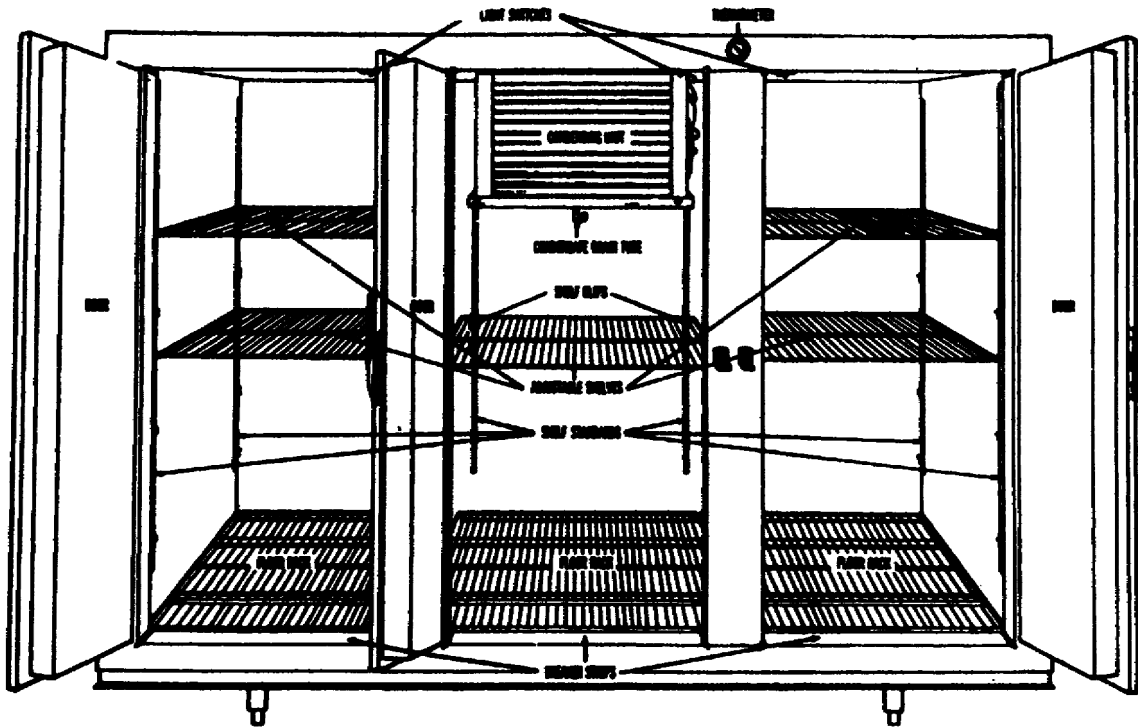


Figure 1. Interior of 65-cubic foot, reach-in refrigerator.

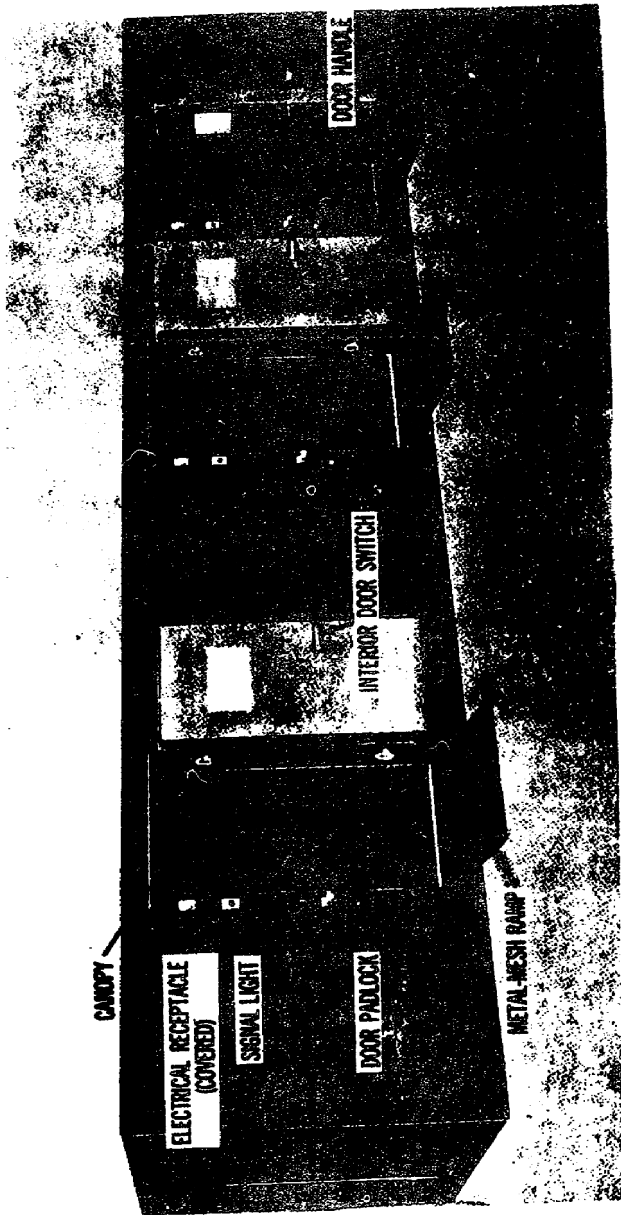


Figure 2. Three walk-in refrigerators linked together.



a. OPERATION. When a refrigerator is in operation, the doors should be kept closed except when storing or removing food. Food stored in a refrigerator should be arranged to allow free circulation of air around each item. In refrigerators with a self contained refrigeration unit, do not place items directly in front of the unit. Cooks should not attempt to make any adjustment to refrigeration units or their controls. If the refrigerator does not maintain temperatures between 32°F and 42°F, notify the first cook or the food service sergeant.

b. OPERATOR MAINTENANCE. Operator maintenance consists of cleaning and lubrication. Refrigerators must be defrosted periodically and cleaned inside and outside at least once a week and more often if necessary. The door gasket should be wiped each day with a clean, dry cloth to remove grease and oil. The best time to clean and defrost refrigerators is on a day when rations are to be delivered.

(1) Cleaning a Reach-In Refrigerator.

(a) Clean one compartment at a time so that food stored in other parts of the refrigerator can stay refrigerated.

(b) Remove the food from the section to be cleaned and store it in another part of the refrigerator.

(c) Remove the shelves and floor racks and scrub with warm water mixed with a small amount of baking soda. (The baking soda is added to help deodorize these parts.) Set the shelves and racks aside to air-dry.

(d) Wash the interior with a clean cloth and warm detergent solution. Wash the ceiling first, then the wells from ceiling to floor, and then the floor.

(e) Rinse the interior with a clean cloth and clear warm water mixed with a small amount of baking soda. Begin at the ceiling and work down to the floor.

(f) Dry the interior with a clean dry cloth and leave the door open a few minutes to ventilate that section of the refrigerator.

(g) Replace the shelves and floor racks. Replace the food and arrange the items so that air can circulate freely.

(h) Clean the other sections of the refrigerator, using the same procedure.

(i) Inspect the drain to make sure that condensation can flow out freely. If the drain hole is blocked, clean the opening.

(j) Wash the exterior with a cloth dampened in warm detergent solution, rinse with a cloth dampened in clear water and dry with a clean, dry cloth.

(2) Cleaning a Walk-In Refrigerator.

(a) Remove the food and store it under refrigeration.

(b) Remove the floor racks and scrub them with a stiff brush and warm water. Set them aside to air-dry.

(c) Wash the interior with warm detergent solution, using the ceiling-to-floor washing procedures used for reach-in refrigerators. Do not wet the electrical connections of self-contained refrigeration units or allow water into vents to remote refrigeration units.

(d) Rinse the interior with warm clear water mixed with a small amount of baking soda.

(e) Dry the interior with a clean cloth.

(f) Inspect the drain frequently. If the drain is dirty or obstructed, remove the strainer and flush the strainer and the drain opening.

(3) Lubricating a Walk-In Refrigerator. The door hinges and latches are the only refrigerator parts lubricated by kitchen personnel. Oil monthly with light lubricating oil.

c. SAFETY PRECAUTIONS. If a refrigeration unit or its wiring smokes or gives any other indication of burning or shorting, the refrigerator should be unplugged immediately, and the person in charge should be notified.

5. FROZEN FOOD CABINETS. If a dining facility does not have built-in frozen food facilities, reach-in frozen food cabinets (fig. 3) are used. The number and type of shelves vary; they may be fixed shelves of the sheet or grid type, that contain evaporator tubing (fig. 3); or they may be adjustable, removable shelves without tubing. These cabinets are intended for storing foods that are already frozen; they lack the chilling capacity required for initial quick-freezing. Although room-temperature or chilled food will eventually freeze in these frozen food cabinets, the length of time required will lower the quality of the food and much of its nutritive value will be lost.

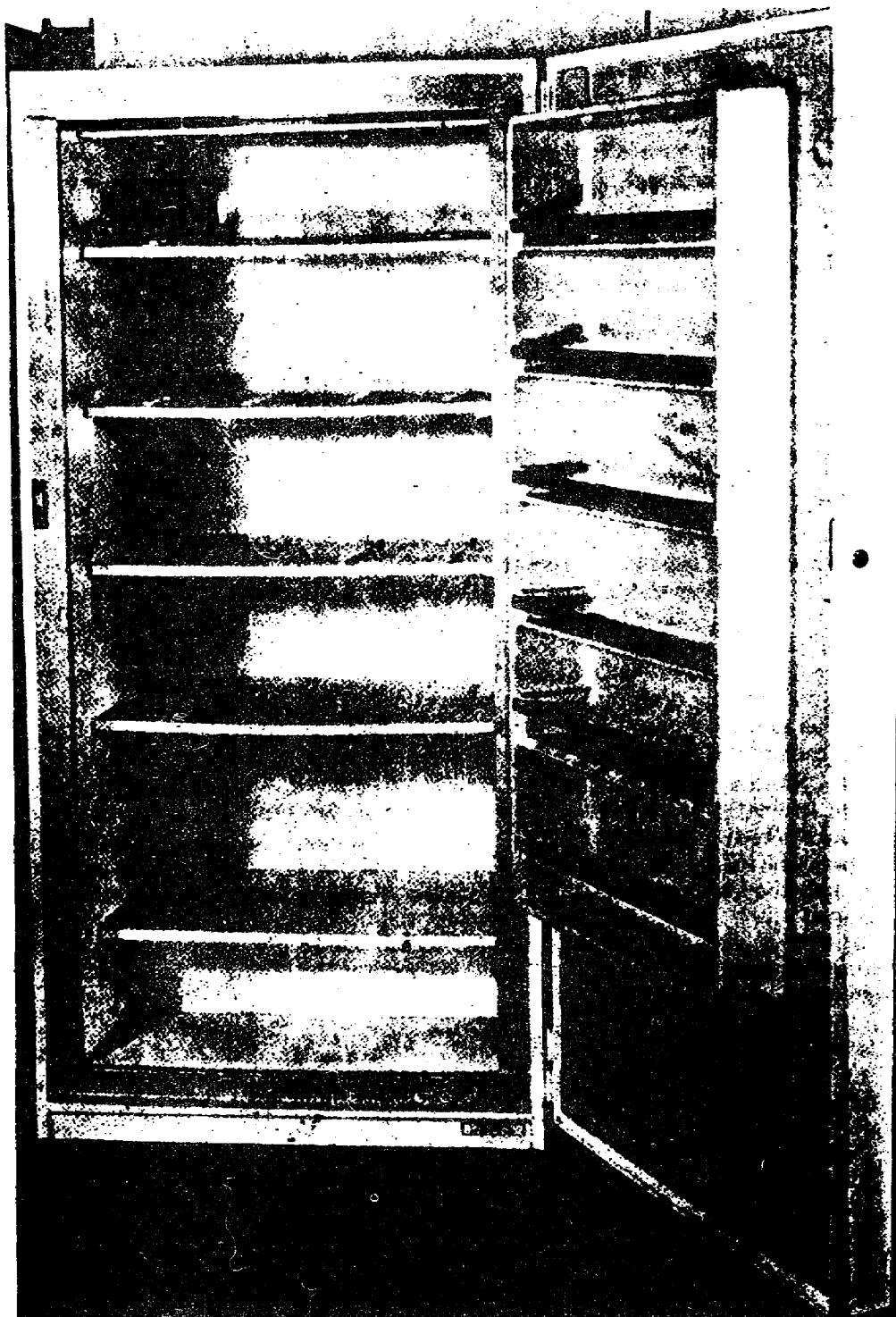


Figure 3. Interior of a frozen food cabinet.

a. OPERATION. The only control on a frozen food cabinet that food service personnel may operate is the manually operated temperature control. This control should be set to maintain a -5° F temperature. The accuracy of the control should be checked periodically between defrostings, and after each defrosting and cleaning. To check the control, a thermometer is placed on the shelf nearest the middle of the cabinet for one hour and then read. If the temperature is not satisfactory, the control should be adjusted and the temperature measured again until the desired temperature is reached.

b. OPERATOR MAINTENANCE.

(1) Defrost and clean the cabinet as necessary, preferably just before the delivery of rations.

(2) Keep the door gasket free of oil, grease and similar substances. Wash it, as necessary, with a warm mild detergent solution.

(3) Do not slam the door. Repeated slamming will flatten the door gasket and cause an imperfect seal.

(4) If the compressor operates constantly, or if the temperature cannot be lowered to -5° F when the control is turned to its coldest setting, notify the person in charge.

c. SAFETY PRECAUTIONS. If there is any indication of burning or shorting in the cabinet wiring, the cord should be disconnected from the outlet immediately, and the person in charge should be informed.

6. ICE CREAM CABINETS. Ice cream cabinets in 15-and 25-gallon capacities are used in cafeteria-type serving lines. These are chest-type cabinets, usually made of bonderized steel finished with baked enamel. The cabinet has a see through top.

a. OPERATION. The temperature control is the only control on an ice cream cabinet that food service personnel may operate. In most cases, the thermostat is set at the factory to maintain a temperature between -7.5° and -5° F. To check the temperature, a thermometer is placed in the well and read after the cabinet has chilled thoroughly.

b. OPERATOR MAINTENANCE.

(1) Defrosting. Ice cream cabinets develop frost and ice formations quickly because of being open during serving period. Frost and ice formations decrease cooling efficiency; therefore, no more than a half inch should be allowed to accumulate. To defrost an ice cream cabinet -

(a) Remove ice cream from the cabinet and store it in a frozen food cabinet.

(b) Turn the temperature control knob to OFF and remove the lids. Do not wash the lids immediately; allow them to warm up while the cabinet is being defrosted.

(c) Allow time for the inside of the cabinet to warm up. When the frost and ice have softened, scrape any remaining accumulation off the walls with a plastic or wood scraper. Never use a sharp or pointed metal scraper because such a scraper can damage the cabinet walls.

(d) When all the ice is removed, wash the interior with a lukewarm detergent solution. Rinse with clear lukewarm water mixed with a small amount of baking soda. Dry the interior of the cabinet thoroughly with a clean dry cloth.

(e) Wash the lids with a lukewarm detergent solution, rinse as in (d) above, dry thoroughly and replace.

(f) Turn the temperature control to a slightly colder-than-usual setting. Place a thermometer in the cabinet and check periodically until a temperature below 0° F has been achieved.

(g) Remove the thermometer and turn the temperature control knob to its normal setting. Remove the ice cream from the frozen food cabinet and replace it in the ice cream cabinet.

## (2) General Maintenance.

(a) Wash the cabinet exterior, as necessary, with a clean cloth dampened in lukewarm, mild detergent solution. Do not use any solvent-type cleaner because such cleaners attack the plastic lids and vinyl sealing gaskets. When serving from the cabinet, wipe up any spills immediately with a clean, damp cloth.

(b) Defrost and clean the interior of the cabinet, as necessary, preferably before ice cream is delivered. The cabinet should be cleaned sufficiently ahead of time to allow it to regain proper temperature before ice cream delivery.

(c) Never clean the cabinet lids with boiling or extremely hot water.

(d) Never use a sharp instrument to scrape the inside of the cabinet.

(e) If the compressor operates constantly, or if the temperature cannot be maintained below 0° F, notify the person in charge.

c. **SAFETY PRECAUTIONS.** If there is any indication of shorting or burning in the cabinet wiring, the cord should be unplugged, and the person in charge should be notified immediately.

## SECTION III

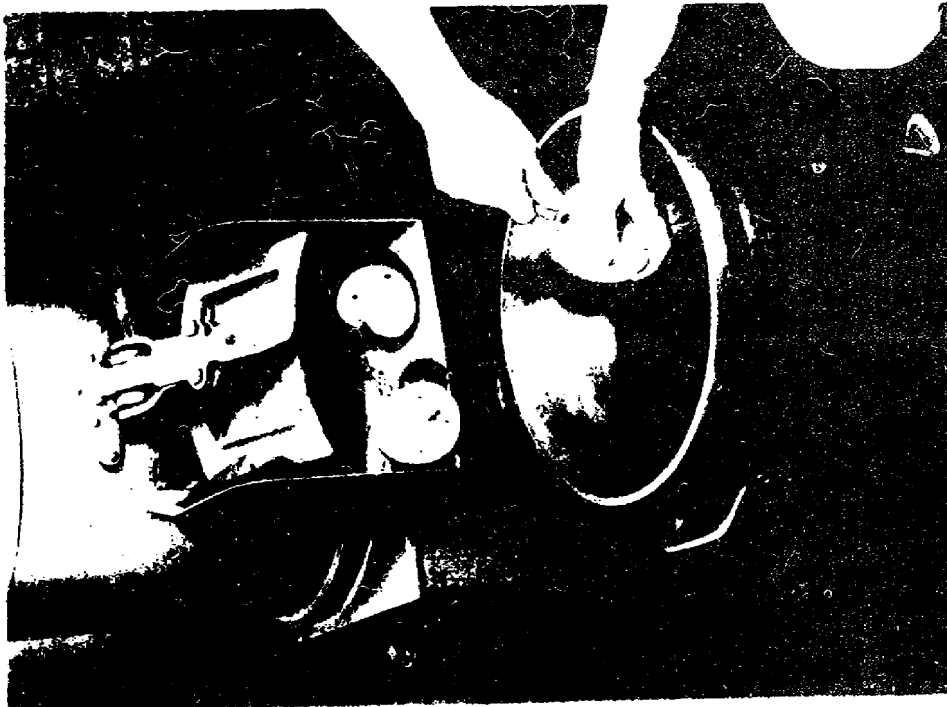
### PREPARATION EQUIPMENT

7. **VEGETABLE-PEELING MACHINE.** The vegetable-peeling machine (figs. 4 and 5) consists of a cylindrical hopper and an electric motor mounted on a tripod, and a peel trap. Peelers range in capacity from 15 to 50 pounds per charge (the quantity that fills the hopper two-thirds full). A cast iron disk rotates at the bottom of the hopper. The inside of the hopper and the top of this disk are coated with a layer of abrasive carborundum. The vegetables in the hopper are agitated by the shape and rotation of the disk, and they are peeled when they come in contact with the abrasive surfaces. A water sprinkler mounted on the hopper sprays water over the vegetables during the peeling operation. A discharge door on the side of the hopper opens to discharge peeled vegetables into a chute. A drainpipe carries the wash water and peelings from the bottom of the hopper to the peel trap. A strainer keeps the peelings in the trap, but the water passes out through the peel trap drainpipe.

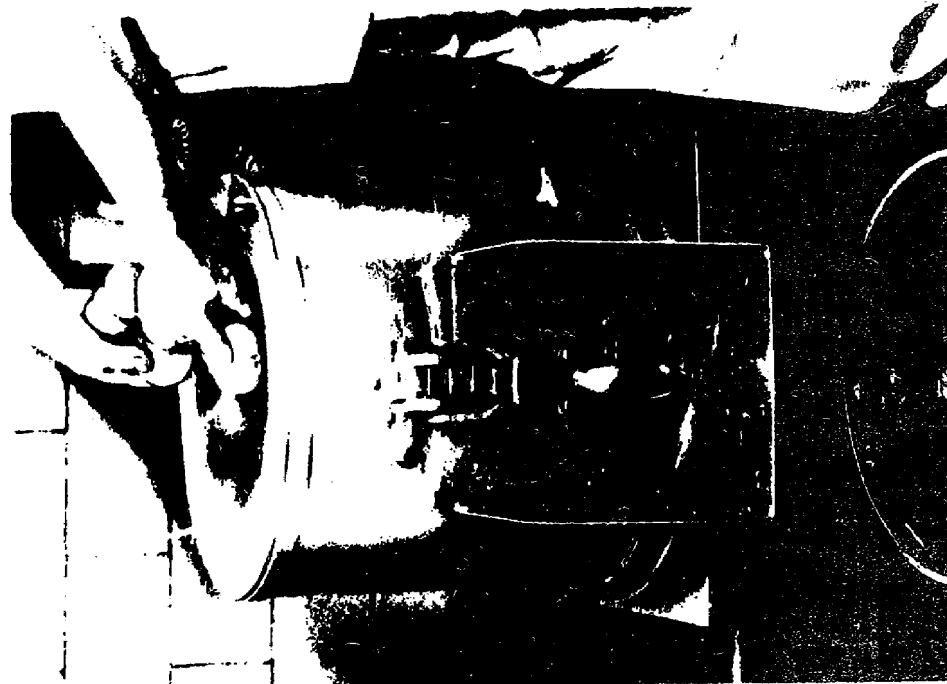
a. **OPERATION.** Vegetables to be peeled should be firm and uniform in size. They should be carefully examined for stones and trash before they are put in the machine. The discharge door should be closed and the motor and water sprinkler turned on before the vegetables are poured into the hopper. The operator should watch the vegetables to see when they are completely peeled, because the time required varies from 45 to 90 seconds, depending on the type and condition of the vegetables. (Potato eyes and similar indentations are removed by hand after the peeling process because leaving the potatoes in the peeler long enough to remove all the eyes would be very wasteful.) As soon as the vegetables are peeled, the water sprinkler is cut off and the discharge door opened. The motor is left on so the rotation of the disk will discharge the vegetables into the chute. A water filled container should be placed under the chute to catch the discharge vegetables and to keep them from turning dark from exposure to air. When the hopper is empty, the discharge door is closed, the sprinkler turned on again, and another charge of vegetables added. The peel trap must be emptied from time to time as necessary. (The vegetable peeler should not be used to peel onions because it will mash them and the machine will retain the onion odor.)

b. **MAINTENANCE AND CLEANING.** The operator must perform the following cleaning and maintenance services before during, and after operation.

(1) **Before operation.** The operator should inspect the machine for damage, see that there is no foreign matter in the hopper, and make sure that the peel trap is clean and its strainer properly installed. He should inspect the water supply and drainage system for leaks.



After potatoes are peeled, open door to allow potatoes to drop into container. Remove eyes and blemishes by hand.



Place potatoes in vegetable peeler. Allow peeler to run until all potatoes are peeled.

Figure 4. Vegetable-peeling machine.



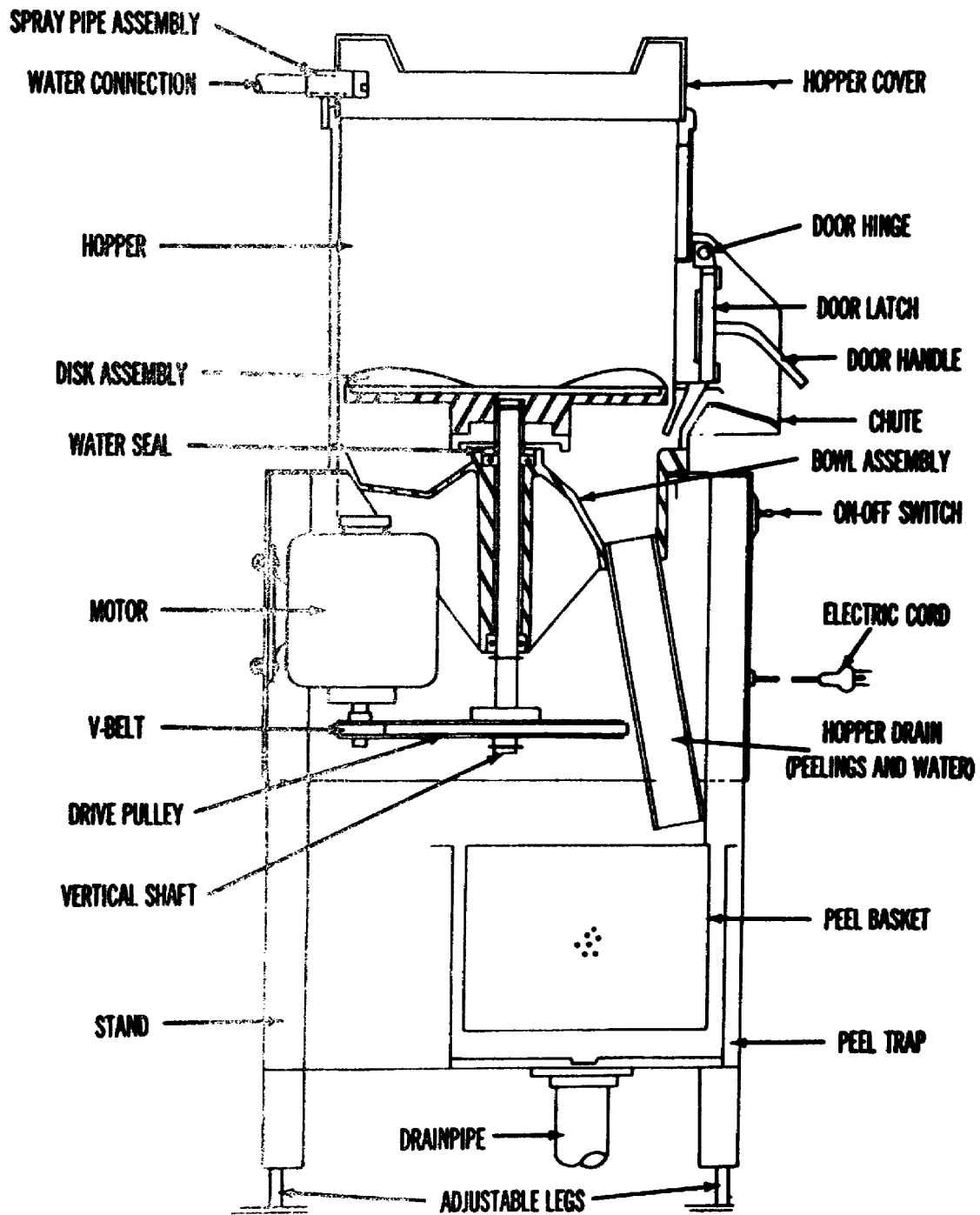


Figure 5. Cutaway diagram of the vegetable-peeling machine.

(2) During operation. The operator must be alert for knocks, rattles, squeaks, hums, odors, and anything unusual that would indicate a defect in the electrical or mechanical operation of the equipment. He should check the discharge door frequently to see that it is tight and should watch the water supply and drainage systems for obstructions or leaks.

(3) After operation. After the water supply and motor have been shut off, the hopper cover should be removed and the disk lifted out. Both the disk and the interior of the hopper should be scrubbed with cold water and a stiff fiber brush. No soap or detergent should be used in this process. The disk should then be set upright in the hopper and the discharge door left open to allow the hopper and disk to air-dry while the machine is not in use. Remove the peel trap and basket. Empty the basket. Flush the trap and basket with cold water and scrub with a stiff brush and warm detergent solution. Rinse, and invert to air-dry. After the peel trap and basket have air dried, reposition them on the shelf. The outside of the machine should be thoroughly cleaned, and the machine should be checked to see that all joints and unions are tight and that wiring and controls are clean and dry.

c. **SAFETY PRECAUTIONS.** The motor of the vegetable peeler and the water sprinkler must be turned on before the vegetables are added. The hopper should be filled with the correct charge (two-thirds full). Excessive amounts of water should not be run through the hopper during operation because the water may splash out or overflow the peel trap onto the floor, creating a safety hazard.

8. **VERTICAL MIXING MACHINE.** The vertical mixing machine has a motor-driven vertical shaft to which various accessories are attached to beat, mix, or whip the contents of the mixing bowl. The machines vary in size from 20-to 80-quart bowl capacity. The smaller capacity mixing machines are usually bench-mounted, and the larger ones are pedestal-mounted (fig. 6). The mixing bowl is raised and lowered by a lever on the small models; on large pedestal-mounted mixing machines, it is raised on a bowl support. The back section of this bowl support rides up and down on the pedestal, and the arms of the bowl support hold the bowl in position. The bowl support is raised or lowered by a hand-operated spiral gear and screw assembly. The vertical shaft is driven by a motor whose power is transmitted by V-belts through a clutch-controlled gear chain. The speed of the mixing machine can be adjusted to three or four different settings by positioning the gearshift lever. The clutch and gear functions on some models are controlled by one lever, and a few models have infinite speed gears. The accessories most widely used with the mixing machine are the beater, wire whip, pastry knife, and dough hook (fig. 7). Some mixing machines are equipped with a power takeoff which operates an attachment with cutting plates to grate, slice, shred, and cut julienne slices (fig. 7).

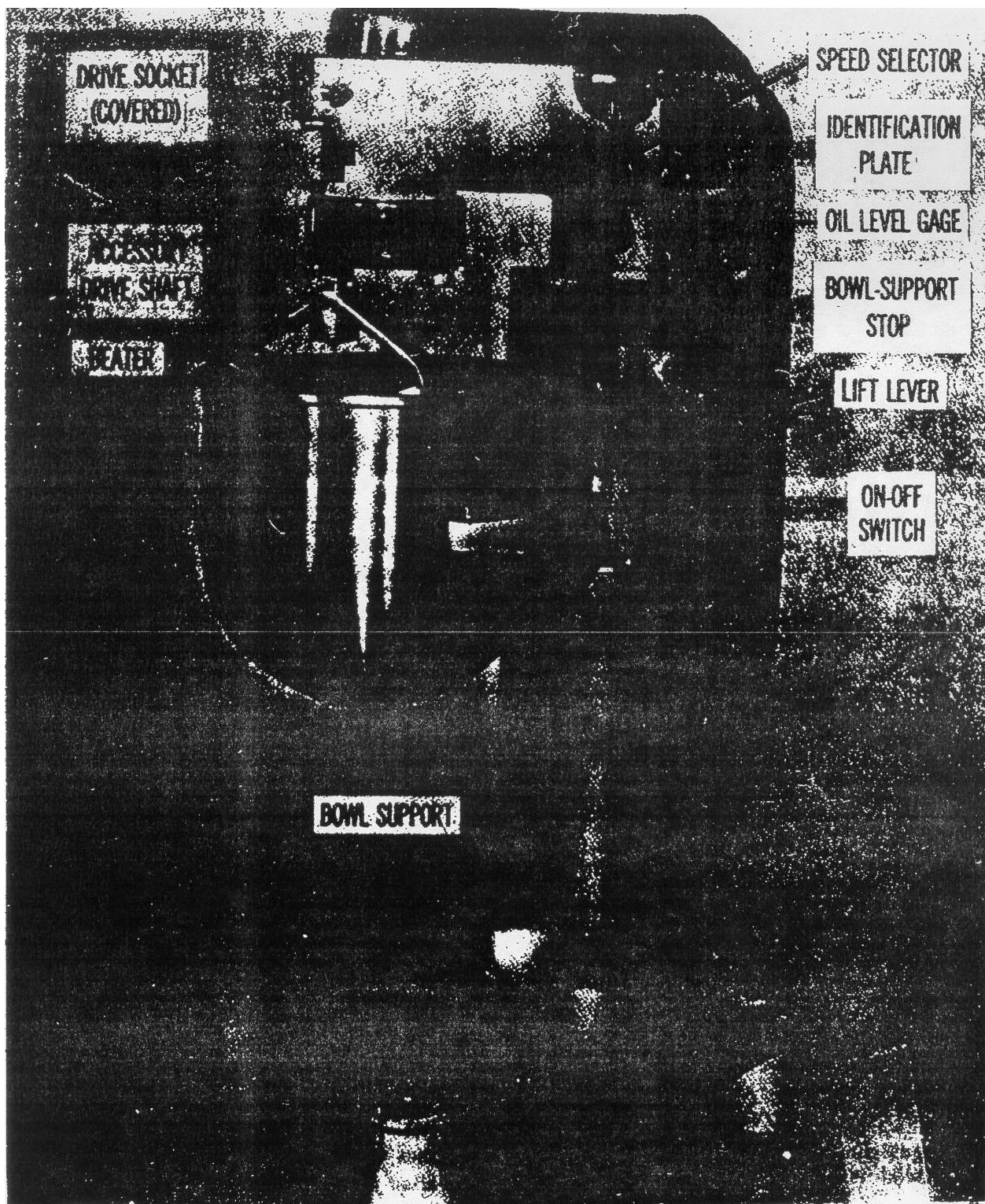
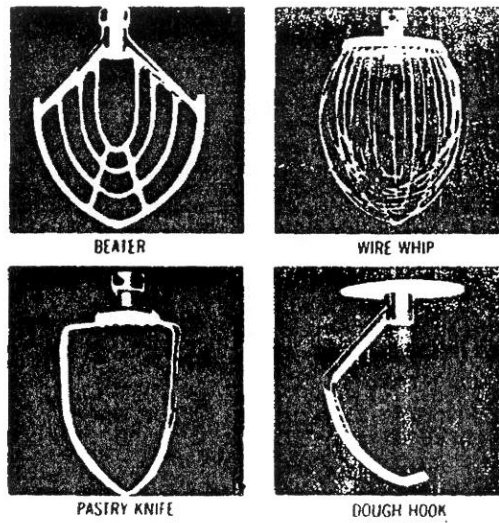
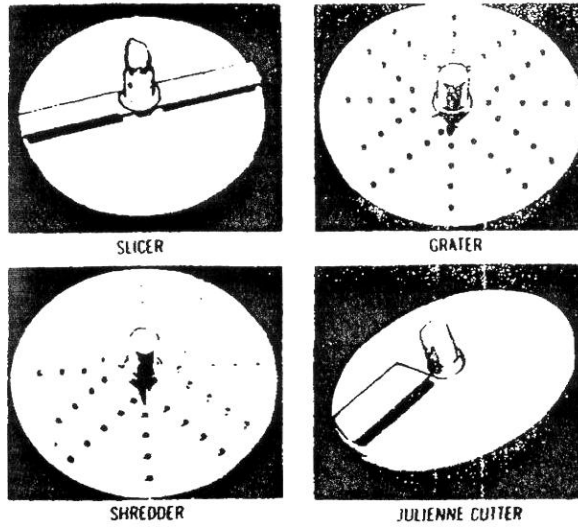


Figure 6. Pedestal-mounted mixing machine, 30-quart capacity.



**A. Accessories used on shaft of vertical mixing machine.**



**B. Attachment with plates used at power takeoff of vertical mixing machine.**

Figure 7. Accessories and attachments for vertical mixing machine.

a. **OPERATION.** The mixing bowl is placed on a bowl truck or dolly, rolled under the mixing shaft, and then seated firmly on the arms of the bowl support. The desired accessory is positioned on the vertical shaft. The bowl is slowly raised until the back of the bowl support rests against the support stop. The support stop should be set to stop the upward movement of the bowl support at a point that will allow the accessory to barely clear the bottom of the bowl. If the support stop is not set properly and the accessory is allowed to touch the bowl, friction will wear away the bottom of the bowl. If the mixing machine has a clutch, the gear is put in neutral before the motor is started; if the mixing machine has no clutch, it is started in lowest gear. On all models, mixing should be started in lowest speed so ingredients will not be thrown out of the bowl. After the ingredients are blended, the speed is raised according to the recipe. After mixing is complete, the gear selector is moved to neutral, the motor is stopped, the bowl is lowered, and the mixing accessory is removed.

b. **CARE AND MAINTENANCE.** The machine should be wiped off with a damp cloth after each use, and the grooves of the vertical shaft scraped or brushed out, if necessary. The bowl and accessory are washed with hot detergent solution, rinsed, and allowed to air-dry. The mixing bowls must be handled carefully to prevent denting because dents will interfere with the action of accessories. The bowls should be carried or moved on the bowl truck and should never be dragged along the floor. The accessories are easily bent and warped. To avoid this, each accessory should be hung in a safe place immediately after it is washed. Five or six drops of mineral oil should be dropped on the shaft of the power takeoff or drive socket after each use. If excess oil appears at a lubrication point or is spilled on the machine, it should be cleaned off immediately before it can get into the mixing bowl. The oil level in the motor should be checked frequently and oil added as needed. The operator should be alert for indications of too little or too much lubrication; if such a condition is discovered, it should be reported immediately to the person in charge.

c. **SAFETY PRECAUTIONS.** Personnel should never put their hand, a spoon, or a spatula into the bowl when the mixing machine is operating because this may severely damage the machine and injure the operator. When attachments are used on the power takeoff, the mixing machine should be set no higher than second speed. Safety precautions that apply to all electrical equipment should be observed (para 3c).

9. **MEAT-SLICING MACHINE.** A table-mounted, motor-driven machine to slice meats, cheese, vegetables, and other foods is authorized for garrison dining facilities. It has three major assemblies. The slicing assembly includes the chute that holds the item to be sliced, the slide-group that supports the chute, and the circular knife that cuts the food. The body assembly includes the machine frame, the inclined table against which the slicing end of the meat rests, the table-adjusting mechanism which sets slice thickness, the slice deflector, and the receiving tray. The drive assembly includes the motor and gear train, or a V-belt and pulleys, which drive the circular knife.

a. OPERATION. Before using the slicer, the operator must see that the knife guard is in place, the chute is properly placed, and the chute support nut is tight. The food to be sliced is placed in the chute and the end weight swung into place to hold the food. The end weight must be used at all times to steady and to add pressure to the item being sliced. The table-adjusting knob is used to set the thickness of the slices. Lower numbers indicate thinner slices, and the higher numbers indicate thicker slices. The operator then turns the toggle switch to ON, grasps the chute handle, and slides the chute back and forth across the table and knife.

b. CARE AND CLEANING. The slicing machine should be cleaned after use by removing, washing, and replacing the chute, wastebbox, knife guard, sharpening stones and sharpener, center plate, and knife. The knife should be cleaned with a damp cloth that has been dipped in hot detergent solution and wrung almost dry and be rinsed with a clean cloth that has been wrung almost dry. Then allow the knife to air-dry. The operator should be careful when he cleans the knife because the exposed blade is very dangerous. The knife should be sharpened as necessary after cleaning. The operator should see that the knife is thoroughly dry before it is put back in place, because moisture should not come in contact with the slicer's electric motor. The wastebbox should be washed in hot detergent solution and scrubbed with a stiff brush. The sharpening stones should be cleaned with water and a stiff brush. The other components and the exterior of the machine should be washed with a clean cloth which has been dipped in hot detergent solution and then wrung very dry. Water should not be allowed to get into crevices in assembled moving parts. Rinse the machine with a cloth dampened in clear hot water. Dry the exterior of the machine and its disassembled components with a clean dry cloth. To keep the chute operating smoothly, the slide rods should be cleaned and oiled with a few drops of mineral oil, daily or when used.

c. SAFETY PRECAUTIONS. The operator of the slicing machine should be the only one allowed to operate the toggle switch that starts the knife rotating. He should check before every use to be sure that the knife guard and end weight are in place. Small end cuts should never be fed to the knife by hand. Before cleaning the machine, he must always turn off the motor and disconnect the plug. When removing the knife guard, he must be especially careful to keep his hands clear of the knife blade. He must use extreme caution and pay strict attention whenever he handles the knife.

## PROGRAMMED REVIEW A

The questions in this Programmed review give you a chance to see how well you have learned the material in sections I, II, and III of lesson 1. The questions are based on the key points covered in these sections.

Read each item and write your answer on the line or lines provided for it. Please use a pencil to write your answer. If you do not know, or are not sure, what the answer is, check the paragraph reference that is shown in parentheses right after the item; then go back and study or read once again all of the referenced material and write your answer.

After you have answered all of the items, check your answers with the Solution Sheet at the end of this lesson. If you did not give the right answer to an item, erase it and write the correct solution in the space instead. Then, as a final check, go back and restudy the lesson reference once more to make sure that your answer is the right one.

**SITUATION.** You are a cook; you are in charge of several cooks' apprentices who are cleaning the refrigeration equipment.

**REQUIREMENT.** Read exercises A1 through A3 and decide whether the apprentice has performed correctly. If he has performed correctly, answer A. If he has made a mistake, answer B.

- A1. An apprentice removes all the food from the compartments in the refrigerator; washes, rinses, and dries the interior and shelves; and immediately replaces the food, turning on the refrigerator to the normal operating temperature. \_\_\_\_\_ (para 4b)
- A2. An apprentice is cleaning the freezer. He removes all the contents and places them in the refrigerator, turns the control to off, and opens the door. He washes, rinses, and dries the interior. He then turns the freezer on, and as soon as the temperature reaches  $-5^{\circ}$  F, replaces the food. \_\_\_\_\_ (para 5b)
- A3. An apprentice removes everything from the ice cream cabinet, turns the control off, and removes the lids. When the frost has softened on the inside of the cabinet, he scrapes it off with a wooden scraper. \_\_\_\_\_ (para 6b)

**SITUATION.** You are a cook and, you are preparing mashed potatoes and sliced roast beef for a meal. You will be using different types of machine-driven equipment which you must be able to identify and use safely.

REQUIREMENT. Exercises A4 through A6 are matching exercises. Column I describes items of equipment. Column II lists equipment. Match the equipment in column II with its description in column I. The items in column II may be used once, more than once, or not at all.

Column I	Column II
A4. A cylindrical hopper with a rotating disk in the bottom operated by an electric motor. _____ (para 7)	a. Meat-slicing machine.
A5. A motor-driven vertical shaft to which various accessories are attached to beat, mix or whip. _____ (para 8)	b. Vegetable-peeling machine.
A6. A motor-driven machine made up of three assemblies, (slicing, body, and drive). _____ (para 9)	c. Vertical mixing machine.

REQUIREMENT. Exercises A7 through A10 pertain to safety precautions that apply to these preparation machines. Complete the exercise by filling in the blank.

- A7. When using the vegetable-peeling machine, you do not add the vegetables until the \_\_\_\_\_ is started. (para 7c)
- A8. When the mixing machine is operating, you should not put your hand or spoon in the \_\_\_\_\_. (para 8c)
- A9. Before operating the meat-slicing machine, you should check to be sure the knife \_\_\_\_\_ and end \_\_\_\_\_ are in place. (para 9c)
- A10. Even when the meat-slicing machine is unplugged, you must use extreme caution when handling the \_\_\_\_\_. (para 9c)

DO YOU UNDERSTAND EVERYTHING IN THIS PROGRAMMED REVIEW?  
HAVE YOU CHECKED YOUR RESPONSES, MADE CORRECTIONS, AND  
RESTUDIED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON  
TO THE NEXT STUDY UNIT OF THIS SUBCOURSE.



## SECTION IV

### COOKING EQUIPMENT

10. **HEAVY-DUTY GAS RANGE.** This range is a gas-fired unit composed of a top cooking surface and an oven (fig. 8). The range may have four open-top burners, a hot top, or a fry top. The open-top range has four direct-flame burners with cast steel grids that support pots and pans directly over the flames. The hot-top range has several burners covered by a heavy cast steel cooking plate. The burners on the fry-top range are covered by a heavy cast-steel griddle with one or more grease troughs; the griddle surface is shaped so that excess grease will drain toward the trough and then into a removable grease tray. The range oven has a bottom-hinged door and an adjustable, removable shelf. The heat control knobs are located on the front panel of the range. Each top and oven burner has a gas-regulating valve, a gas orifice, and an air shutter. The oven burner pilot has a special safety valve that automatically shuts off the oven gas supply whenever the pilot light is out. The heavy-duty gas range operates on natural, manufactured, or liquefied petroleum (LP) gas.

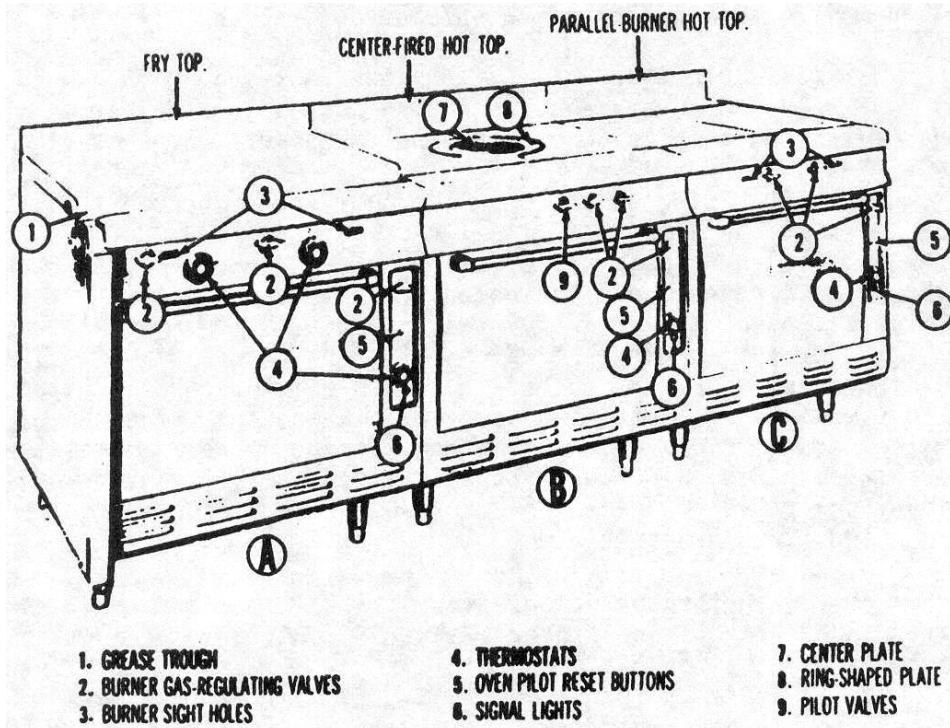


Figure 8. Gas ranges with fry and hot tops.

a. **OPERATION.** Directions for lighting burners on a gas range vary according to the type; make, or model, so the directions in the manufacturer's manual should be followed. To heat either a hot top or fry top, all top burners should be set on HIGH for a few minutes. As soon as cooking temperature is reached, the operator should turn off some outer burners and leave on only enough inner burners to maintain the desired temperature; these should be turned to low or medium. If the oven has separate pilot and burner valves, the pilot is lit with a taper, and the oven burner is then lit from the pilot. The operator should look through the openings in the bottom of the oven to make sure that the oven burners have ignited and are burning properly. The oven should be turned on with the thermostat set at the desired temperature. The oven must be thoroughly preheated before use; after it has reached the desired temperature, it should stand for 15 minutes before it is used. The oven shelf should be loaded evenly, with pans spaced so that they do not touch each other or the oven walls. The operator must be careful not to strike the thermostat bulb when loading or unloading the oven, because if the bulb is damaged, the thermostat will not operate. To shut down a gas range, the top burners are turned off in sequence from the outermost to the innermost. The oven burners should be turned off and the thermostat dial should be turned to OFF or to its lowest setting. The oven door should be opened to ventilate and cool the oven.

b. **MAINTENANCE AND CLEANING.** The operator must perform the following maintenance and cleaning before, during, and after operation.

(1) Before operation. The operator should check all gas valves for leaks and for ease of operation and he should inspect the top cooking plates and the inside of the oven to be sure they are clean.

(2) During operation. The cook should be constantly alert for gas leaks and be sure that all valves are operating properly. He should watch for any excessive variation between the heat indicated by the oven thermostat and the heat indicated by an oven thermometer. He should record variations of more than 10° F and adjust the thermostat to compensate. The operator should also watch pilot and burner flames. The flames should burn quietly and have a distinct purple inner cone and a well-defined outer cone. If the flames are noisy, yellow, or green, the operator should notify the person in charge; he should not try to make any adjustments. On the hot-top range, wipe up any spills immediately. When using the fry top range, scrape top as necessary to keep the surface clean while frying. Push scrapings into grease trough.

(3) After operation. The operator should doublecheck to see that all range controls are properly shut off. After the range has cooled, he should remove the top plate and clean it with a small amount of mineral oil and a grill stone to remove cooked and carbonized materials. Clean the fry top in place using a grill stone and oil. Salad oil should not be used because it will become gummy and will foul the stone. Steel wool should not be used as it will leave steel particles which may get into food.

The other surfaces, including the oven shelf and bottom plate, should be washed with detergent solution, rinsed, and dried. The oven plate and shelf can be immersed; the outside range surfaces should be washed with a disposable cloth and dried with a clean, dry cloth.

(4) Weekly services. Each week, or more frequently if necessary, the top plates of the range should be lifted out and any soot accumulated on the undersides should be removed. The underside should be brushed with a wire brush. The burners should be removed and the ports cleaned out with a wire brush. The burners should not be dipped or submerged; water rusts their interior surfaces and restricts gas flow.

(5) Monthly services. The operator lubricates the oven door hinges with light lubricating oil monthly.

c. SAFETY PRECAUTIONS. All safety precautions that apply to gas-fired equipment should be observed (para 3d). The operator should never stand directly in front of the range when lighting the oven because of the possibility of an explosion. He should never tamper with the safety valve or thermostat and should be careful not to hit the thermostat when loading or unloading the oven. To keep the aisle clear, the oven door should be kept closed when the oven is not in use, and the handles of pans on top of the range should be turned parallel to the range front. The range must be kept free of grease to avoid the danger of fire.

11. HEAVY-DUTY ELECTRIC RANGE. This range (fig. 9) is a single unit consisting of a top section for surface cooking and an oven. It may be a hot-top or fry-top range equipped with three separate, individually controlled heating units. These are electrical-resistor, inclosed tubular heating units embedded in the underside of the grill (rather than exposed on the range top). Grease troughs are provided at both the front and back of the range top. These troughs empty into a removable grease pan located below the top control panel. The oven has a bottom-hinged door, an adjustable, removable shelf, and a vent damper controlled by a lever near the vent cover. The oven controls are located on the lower control panel, and the fuse compartment is immediately below this panel. Two three-heat switches control the upper and lower oven burners, and the oven thermostat controls oven temperature. The oven is also equipped with a signal light that indicates when the oven is heating and when it has reached the desired temperature. Each of the top units is controlled by a three-heat switch or an adjustable thermostat, and each may be turned on independently. A signal light for each burner comes on when current is flowing to that unit and goes out when the preset temperature is reached.

a. OPERATION. For cooking on top of the stove, only the units to be used are turned on. The unit should be turned to HIGH for a few minutes to heat quickly, and then adjusted to the desired temperature. To heat the oven the thermostat is set for the desired temperature, and both switches are set on HIGH. This heats the oven to the desired temperature quickly; the oven should be allowed to stand for 15 minutes after this

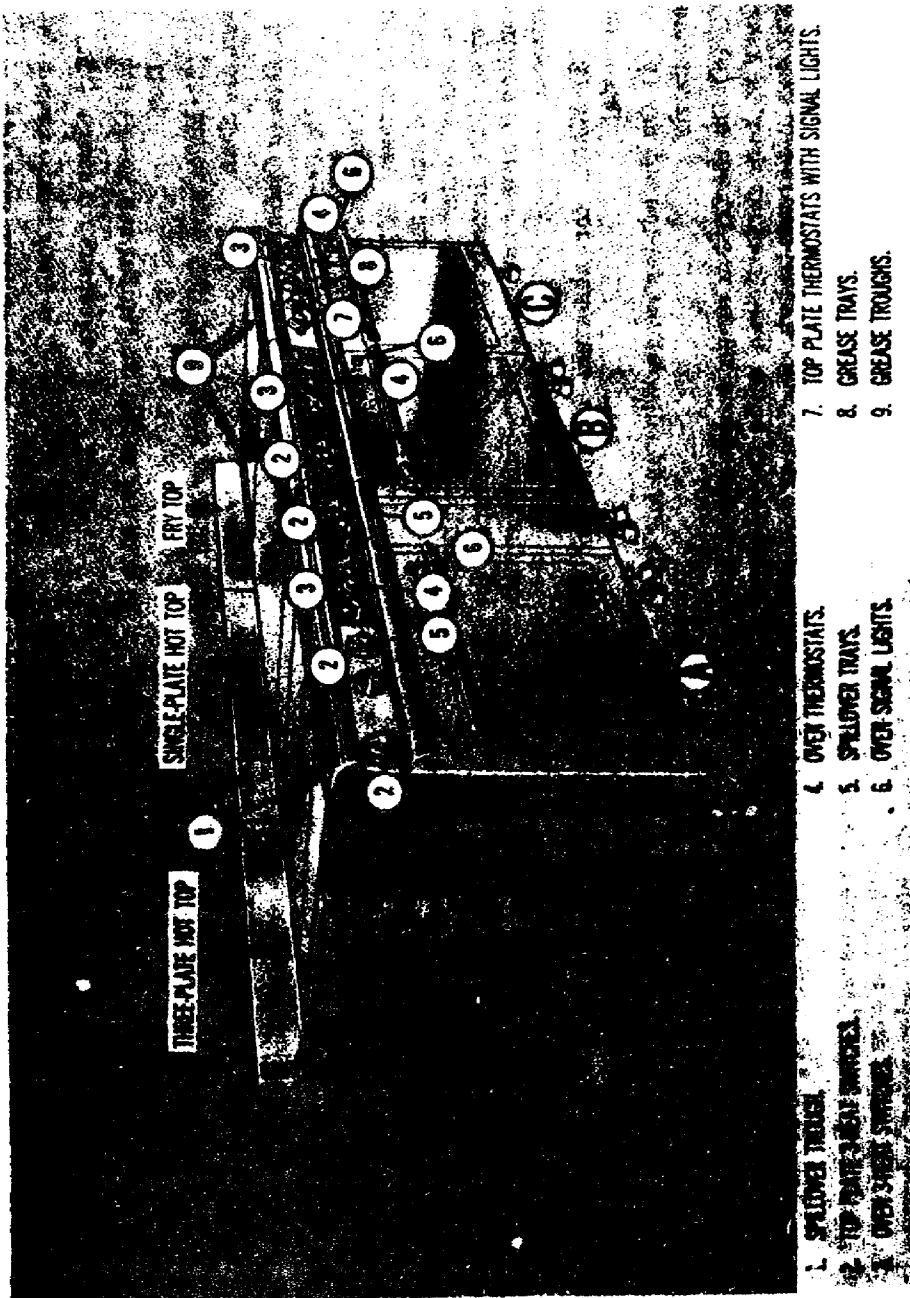


Figure 9. Electric range, hot and fry tops.

temperature is reached. The two unit controls are then adjusted as necessary for roasting or baking, and the oven is loaded with pans spaced evenly on the shelf so that they do not touch each other or the oven walls. When the cooking is finished, the range is shut down by turning all controls to OFF and opening the oven door to ventilate the oven until it has cooled.

b. **MAINTENANCE AND CLEANING.** The operator is responsible for performing the following maintenance and cleaning before, during, and after operation:

(1) Before operation. The operator should see that the range is properly installed and that all switches are working. He should also make sure that the cooking top plates, grease or spill over trays, and oven are clean.

(2) During operation. The operator should be alert for smoke or odor that would indicate shorted electrical wiring. He should watch for anything unusual in the operation of top or oven temperature controls or signal lights. In addition, the operator should clean the top as needed, wiping up any spillovers and grease before they burn on the metal. Scrape the fry top as necessary for maximum cooking efficiency.

(3) After operation. The operator should first make sure that all controls are turned off. When the range has cooled, all surfaces except the top should be washed with detergent solution. Grease and heavy carbon should be carefully scraped from the top. Oil should not be used on the plates unless absolutely necessary; if it is necessary, a grillstone and a small amount of mineral oil can be used to remove any remaining carbon. Salad oil should never be used for this purpose. The top plates of electric ranges must be cleaned in place, and no attempt should be made to remove them. After the top plates are cleaned and all the other range surfaces are washed, all surfaces should be wiped with a clean, dry cloth. The grease tray should be removed, emptied, washed in hot detergent solution, rinsed, dried, and replaced in the range. Lubricate the hinges of the oven door monthly with a light lubricating oil.

c. **SAFETY PRECAUTIONS.** All safety precautions that apply to electrical equipment must be observed (para 3c), and particular care should be taken not to handle electrical wiring or controls with wet hands or when clothes or shoes are wet. The operator should not attempt to clean the fuse compartment of the range because it contains high-voltage wires. In addition, safety precautions such as keeping oven doors closed and pot handles out of aisles, keeping the range grease-free, and protecting the thermostat bulb also apply.

12. **HEAVY-DUTY OIL RANGE.** The heavy-duty oil range (fig. 10) may have a fry top, a hot top, or a combination fry- and hot-top. The range has an oil burner, located on either the right or left of a single oven, or between two ovens -this depends on the model of the oven. The burner fires into a combustion chamber lined with firebrick. Heat radiates to the

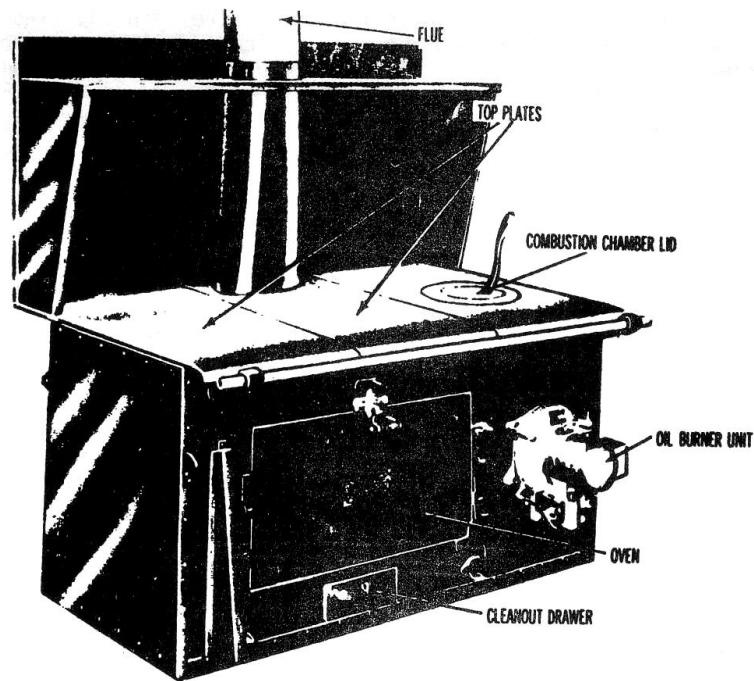


Figure 10. Heavy-duty oil range with hot top.

top of the cooking plates and is carried through heat passages under the plates, around the oven, and up the flue at the back of the range. The oven doors are bottom-hinged and each has several catch positions to permit the door to be propped open in several positions. An oven bypass damper is controlled by a rod projecting through the front of the range. A shelf is located in the high back unit attached to the range. The flue passes through this shelf. The range operates on the following grades of fuel oil (diesel fuel): DF-A (Arctic), DF-1 (Winter), DF-2 (Regular) for which DF-M (Marine) may be substituted, or DF-4 (Heavy).

- a. OPERATION - LIGHTING. Light the oil burner as follows:
  - (1) Open the oven bypass damper, and start the oil pump.
  - (2) Open the main supply valve, and close the burner oil supply valve.

(3) Place a lighted, oil-soaked rag in the combustion chamber immediately in front of and below the burner opening, if the burner is not equipped with an electrical or other type lighter.

(4) Swing the burner unit into firing position and lock it, and then turn on the motor switch.

(5) Set the air-oil-regulating hand lever in the high fire position.

(6) Press and release monetary-contact button to open the solenoid valve.

(7) Open the burner oil supply valve to start the flow of oil.

(8) Set the air-oil-regulating hand lever at the desired firing rate.

(9) After several minutes of firing, close the oven bypass damper.

(10) If the fire is smoky or very clear with many white sparks, notify the person in charge that the regulating linkage is in need of adjustment. The operator must never attempt to adjust the regulating linkage.

b. OPERATION -CONTROLLING HEAT. Never allow the range to overheat. Excess heat will warp top plates and eventually damage the whole range.

(1) Top. The different temperatures for the various types of top cooking are selected by the proper placement of the pots and pans on the range top. The top plate is located directly over the combustion chamber and has the highest temperature. Between the combustion chamber and the top plate farthest from it, the temperature tapers off.

(2) Oven. Good baking temperatures are obtained at a normal firing rate. Use an oven thermometer to determine the oven temperature. The oven temperature can be controlled by adjusting the setting of the flue damper. The damper can be set at three positions: a closed position, which provides the maximum oven heat; a partially open position, which allows some heat to escape up the flue and this reduces the oven temperature; and an open position, which allows all of the heat to bypass the oven. To cool the oven quickly, open the damper and the oven door.

c. OPERATION -SHUTTING DOWN.

(1) Close the burner oil supply valve, stop the oil pump, and close the main supply valve.

(2) Allow the burner motor to run for 2 minutes after shutting off the oil supply so that the remaining oil in the line can be thrown out. (The atomizing cup will not overheat so long as the motor is running-rotating the cup and bringing in primary air.)

(3) Switch off burner motor and immediately loosen the latch and swing the burner out of the firing position.

(4) Clean the atomizing cup and the jet with a clean, soft cloth.

(5) Ventilate the oven by opening the bypass damper and the oven door until the oven has cooled.

d. **MAINTENANCE AND CLEANING.** The operator is responsible for performing the following maintenance and cleaning before, during, and after operation:

(1) Before operation. Before the range is used, the oil burner and all oil lines should be inspected for leaks, and the supply of oil should be checked. The oil supply valve should be inspected to see that it operates properly, the atomizing cup and nozzle should be inspected to see that they are clean and undamaged, and the cooking plates and oven must be checked to see that they are clean.

(2) During operation. The operator should be alert for leaks and for smoke or odor that would indicate overheated components or shorted electrical wiring. He must see that the top plates do not get too hot and that all parts of the range are functioning properly. Anything unusual should be reported to the person in charge.

(3) After operation. The operator should make certain that all shutdown procedures have been followed. Excess grease and carbon should be scraped off the cooking plates or a grill stone and a small amount of mineral oil used to clean them. All external surfaces should be cleaned with a soft, clean cloth. If necessary, the firebrick of the combustion chamber should be cleaned with a brush to remove excess carbon. Once a week, or as needed, the top plates should be lifted off and the soot buildup removed from the undersurfaces. While the plates are off, soot should be scraped from the heat passages and down the sides of the oven to the bottom, where it can be removed through the cleanout door. Care should be used in this cleaning process so soot does not fly all over the kitchen.

(4) Lubricating. Oil the hinges of the oven door monthly with light lubricating oil.

e. **SAFETY PRECAUTIONS.** The electrical wiring to the burner motor should not be handled, and all wiring defects should be immediately reported to the person in charge. If the burner fails to ignite at once,



the oil should be shut off and the combustion chamber ventilated. If the fire does not burn properly, the unit should be shut down and the trouble reported to the person in charge. When lighting or adjusting the burner, the operator should never stand with his head over the open combustion chamber. The oil tank should never be filled while the unit is operating, and the supply of oil in the tank should never be allowed to fall below the LOW mark. The area around an oil range should be kept free of rubbish, and rubbish and paper should not be burned in the combustion chamber. The firebricks which line the combustion chamber must be cleaned with a brush; they should never be scraped or poked with a shovel or poker because hard implements can ruin firebrick. No attempt should be made to light the burner when excessive oil has accumulated in a hot combustion chamber.

13. Ovens. In larger dining facilities, range ovens do not provide adequate baking and roasting space so stacked ovens are used to provide additional space. They may be the cabinet type that consists of a single unit with more than one compartment all heated uniformly by one heat source, or the sectional type that is made up of several basic oven compartments each of which has separate controls and an independent heat source. These compartments are stacked, and the stack is mounted on legs. Gas ovens (fig. 11) are heated by natural, manufactured, mixed, or LP gas. The gas is piped to the ovens through the burner controls, and combustion takes place at the oven burners. The main gas valve controls the gas supply. Gas ovens are equipped with thermostats to control the temperature automatically. Electric ovens (fig. 12) are heated by two sets of electrical resistors or heating rods, one located at the top of the oven chamber and the other located under the oven deck. These units radiate heat into the oven. Each of these units is controlled by a three-heat switch, and each oven has a thermostat. Either or both of these heating units can be used to heat the oven to the desired temperature. Oil-fired ovens (fig. 13) are always of the cabinet type. The various oven compartments are uniformly heated by a single oil burner similar to that on an oil range.

a. OPERATION. The ovens described above are operated as follows:

(1) Gas. The operator should be sure that all gas valves are closed and that the oven has been aired. A taper should always be used to light the pilot or to light the burner if there is no pilot. The heat control should be set at 550° F during lighting, and then turned down to the desired temperature after the burner flame is established. The oven should be allowed to stand for at least 15 minutes after it has reached the desired temperature so that it will be evenly heated. Each shelf should be loaded evenly, and the pans should not touch each other, the oven walls, or the oven door. Each oven compartment should be loaded fully so that there will be no need to add items to a section after baking has begun. The door of the oven should be kept closed during baking. (If the oven is functioning properly, there should be no need to shift pans during the baking process.) Opening the oven door during baking causes temperature changes that cause uneven baking or baking failures. If it is necessary

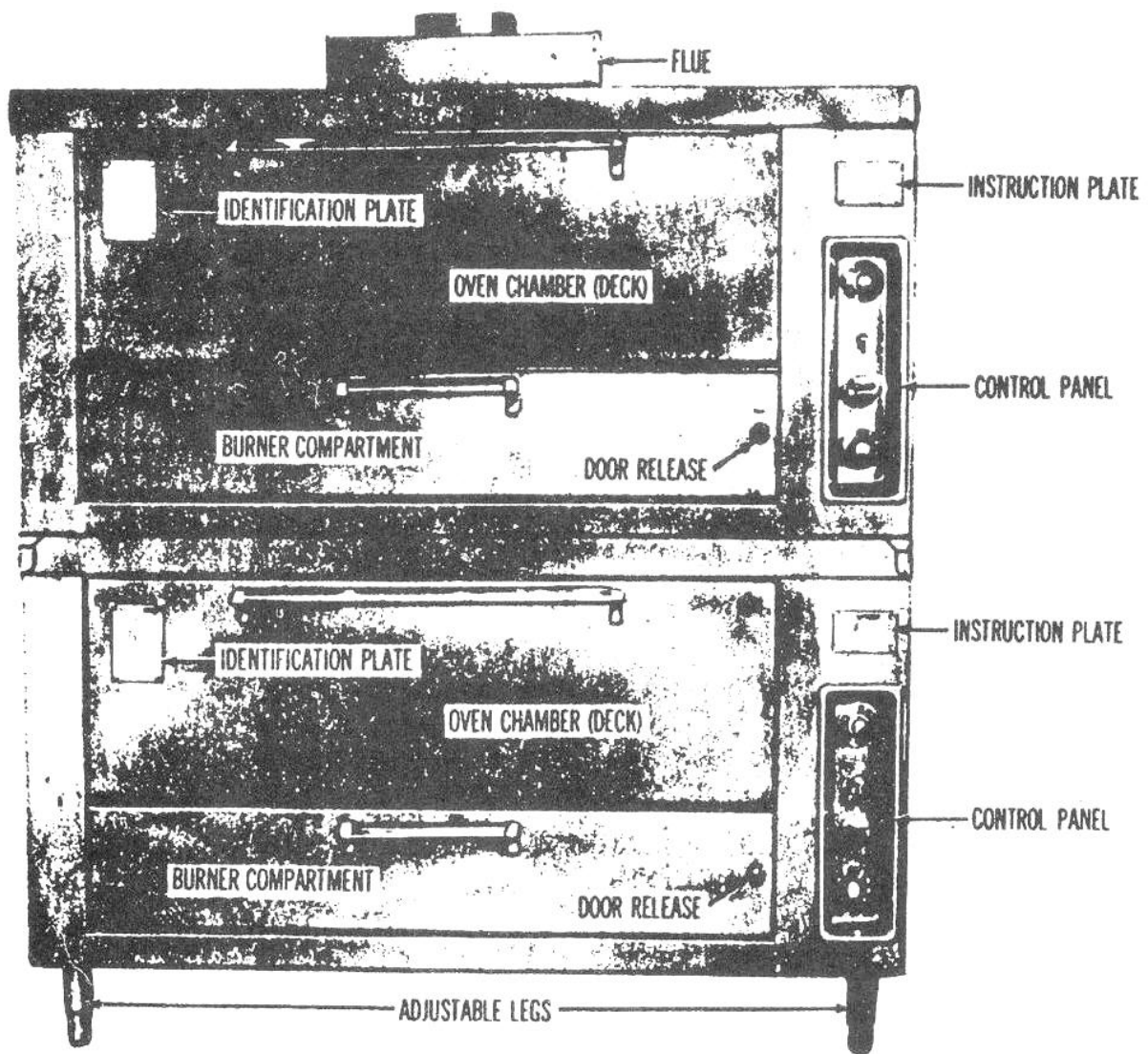


Figure 11. Sectional-type gas-fired oven.

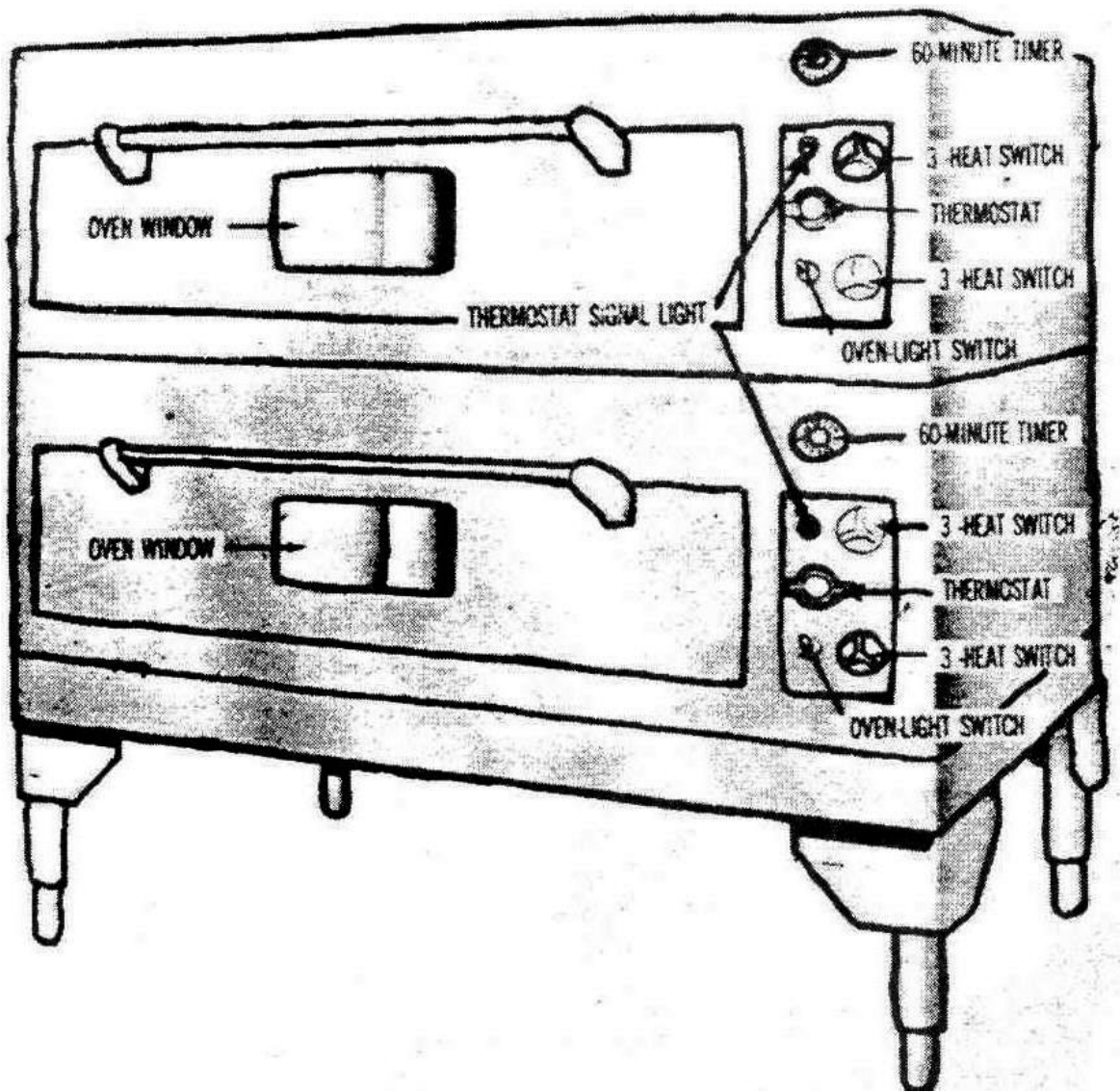


Figure 12. Sectional-type electric oven.

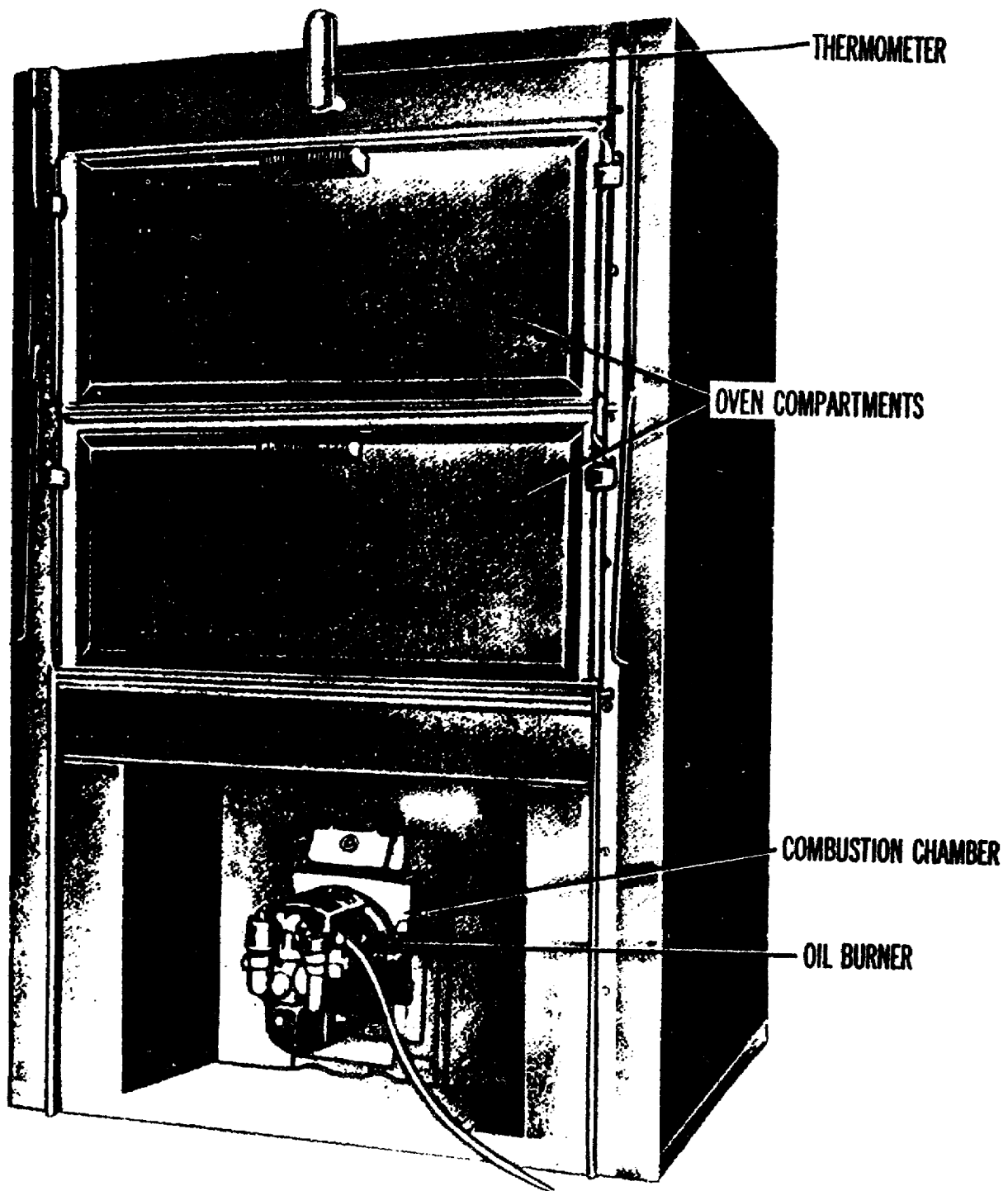


Figure 13. Cabinet-type oil-fired oven.

to lower the oven temperature, the control should be turned to its lowest setting and the door opened until the heat is reduced. When the oven has cooled enough, the door is closed, and the control is reset at the correct temperature.

(2) Electric. To preheat electric ovens, the thermostat is set at the desired temperature and the three-heat switches are turned to HIGH. (Setting the thermostat to its highest reading will not speed up the process.) When the desired temperature is reached, the oven should be allowed to stand for 15 minutes then the three-heat switches should be reset for the desired baking temperature. The rules for loading are the same as those for gas ovens. Electric ovens are shut off by turning the three-heat switches to OFF and are cooled with doors open.

(3) Oil. The oil-fired oven burner is lighted in the same way as the oil range burner. Once the burner is lit, the secondary air damper should be opened wide. A clean, bright fire is necessary to heat the top compartment of the oven adequately without overheating the oven deck immediately above the combustion chamber. A dull, smoky fire will overheat the nearest oven plate and underheat the top compartment. A smoky fire can be corrected by adjusting the secondary air supply to provide more draft. When the ovens have reached the desired temperature, the oil valve should be adjusted to maintain the temperature. (The operator will learn the proper valve settings as he uses the oven.) The oven should be loaded the same as gas and electric ovens. To shut off oil-burning ovens, the burner is shut off and swung out just as the range burner is.

b. **CARE AND CLEANING.** Any food or carbon should be removed as soon as the oven has cooled. If more thorough cleaning is required, the lamps are loosened and the plates are lifted out and cleaned with a grill stone and a small amount of mineral oil. The plates are then replaced in the oven, and all clamps put back in place and tightened. The oven should be turned on to a low temperature to dry the plates thoroughly.

c. **SAFETY PRECAUTIONS.** The safety precautions that should be observed in using the ovens are the same as those for the use of gas, electric, and oil range ovens.

14. **GRIDDLES.** Griddles may be heated by gas or electricity and may be mounted on a table, counter, or range. Gas griddles are heated by natural, manufactured, or LP gas. The gas burners are located under the griddle plate, and the flow of gas to the burners is controlled by valves. The burners are lit from pilot lights. The griddle has a grease trough, and excess grease drains through the trough into tray mounted under the griddle. Electric griddles are heated by a series of heating units under the griddle. The heat of these units is forced up against the griddle by a pad of insulation under the units. The temperature is controlled either by three-heat switches or by a thermostat. The electric griddle (fig. 14) has grease troughs on all sides which drains grease through a drip tube into one or more removable grease trays.

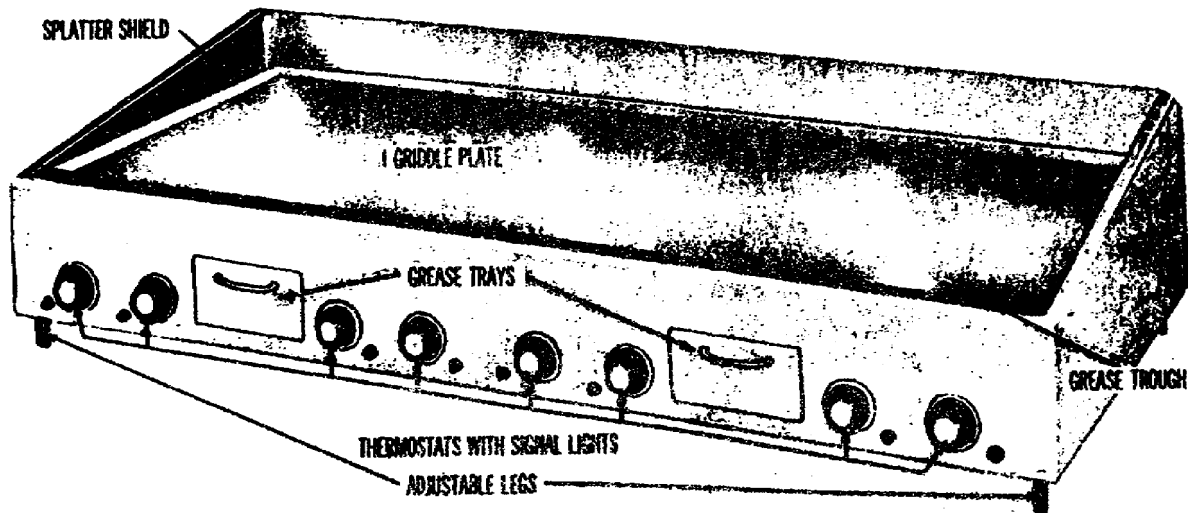


Figure 14. Electric griddle.

a. **OPERATION.** Before lighting the gas griddle, the operator checks to make sure all burner valves are closed and then lifts the griddle plate to expose the pilot lights. Using a lighted taper, he ignites the two pilots which fire the burners. (These pilots are not extinguished after lighting the burners as gas range pilots are; they are allowed to burn until the end of the operating day.) After replacing the griddle plate, he uses the pushbutton to control the pilot and turns the gas valves to HIGH. The burners remain on HIGH until the griddle is preheated and then turned down to the desired cooking temperature. The griddle is turned off by turning off all gas valves. Electric griddles should also be preheated by turning the three-heat switches or the thermostat to HIGH for a few minutes and then adjusting the heat control to the desired temperature. To shut down, the heat control is turned to OFF.

b. **CARE AND CLEANING.** The operator should see that all valves on a gas griddle are operating properly, that there are no gas leaks, and that pilot lights and burners are properly adjusted. On electric griddles, the operator should inspect the griddle to see that no electrical connections are loose and that the three-heat switches or thermostats are operating properly. To clean a gas or electric griddle, the operator scrapes grease and carbon from the griddle into the grease drip or trough; if necessary, he cleans the griddle with a grill stone and a small amount of mineral oil. The griddle plate should then be thoroughly wiped with a clean cloth, and all external surfaces should be cleaned with a clean cloth. The grease receptacle should be removed, emptied, thoroughly scrubbed, and then replaced. Steel wool should never be used to clean the griddle because steel shavings may clog the mechanism or get into the food.

c. **SAFETY PRECAUTIONS.** The general safety precautions that apply to all gas and electric equipment (para 3c and d) should be observed. The

gas supply on a gas griddle should never be turned on until the operator is sure that the taper is lit and burning steadily.

15. **STEAM-JACKETED KETTLE.** This is a 20-, 40-, or 60-gallon kettle with a steam jacket. The heat of the steam cooks the contents of the kettle bowl. The steam-jacketed kettle has a hinged lid, three legs, and connections for attaching steam and water lines. It has a safety valve, set at the factory to blow open at a specific pressure, a drawoff line and valve which allow liquid contents to be drained from the kettle, a strainer which fits into the bottom of the bowl to keep solids from entering the drawoff line and valve, and a swing waterspout through which the kettle can be filled directly. Steam-jacketed kettles are classified as either direct-connected or self-contained. The direct-connected kettle (fig. 15) receives steam from a main steam line through its steam supply valve. A bucket trap captures condensed steam and forces it out through a condensate return valve. The exact pressure that will open the safety valve varies for different makes and models of steam-jacketed kettles. Military specifications allow the maximum pressure to range from 25 to 40 pounds per square inch (psi). The self-contained steam-jacketed kettle (fig. 16) generates its own steam from a boiler heated by gas or electricity. Kettles of this type are used when steam cannot be obtained from main steam lines. The self-contained kettle has the same basic parts and valves as the direct-connected type; in addition, it has the fuel supply lines, valves, switches, and burners necessary to operate its boiler.

a. **OPERATION.** To operate a direct-connected steam kettle, the operator must follow the manufacturer's instructions for the make or model he is using. Operating instructions vary a great deal for different makes and models. Before using a steam-jacketed kettle, he should make sure the safety valve is unobstructed, and working properly, the water and steam lines are not leaking, and their controls are working properly and the condensate return valve is open. For self-contained kettles, he should see that gas or electric lines and controls are in proper condition. Any deficiency or defect should be reported promptly to the person in charge. During operation, the operator should be alert for unusual noises, should see that the safety valve elbow is unobstructed, and should make sure the steam pressure remains within the limits set by the manufacturer. The pressure should never be allowed to build above this point.

b. **CARE AND CLEANING.** The kettle should be cleaned as soon as possible after use. The bowl strainer should be removed, washed in detergent solution, rinsed in hot water, and allowed to air-dry. The kettle should be flushed with warm water and then drained. If food is stuck to the bowl, the warm water should remain in the kettle until it soaks the food loose. After this preflush or presoak, the bowl should be washed as specified in current local directives for cleaning corrosion-resistant steel utensils. Steel wool, metal pads, and scouring powders should never be used to clean the kettle because they will damage its surface and cause scratches in which food particles may lodge. The outside of the kettle should be washed with the solution that was used to clean



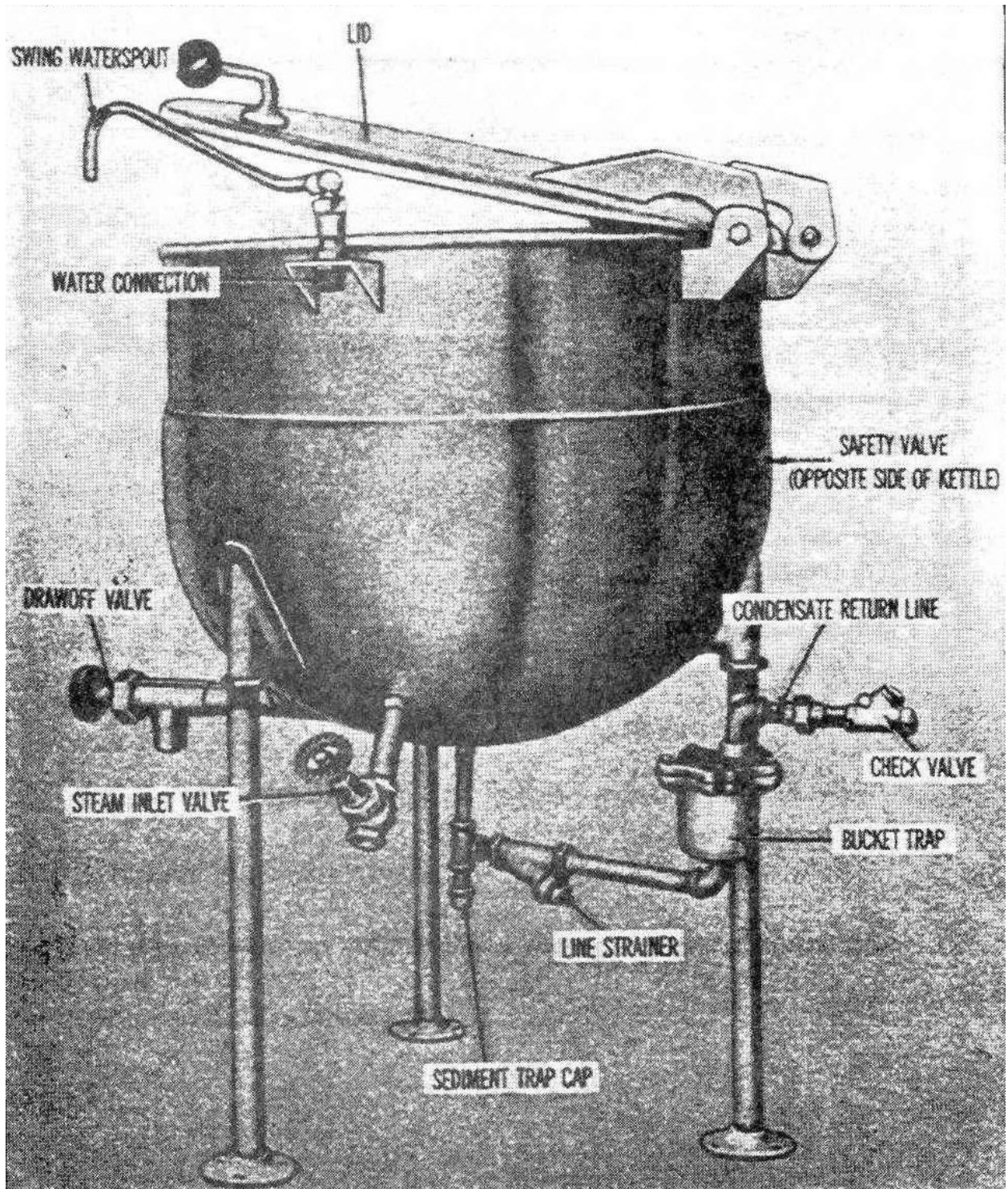


Figure 15. Direct-connected steam-jacketed kettle.



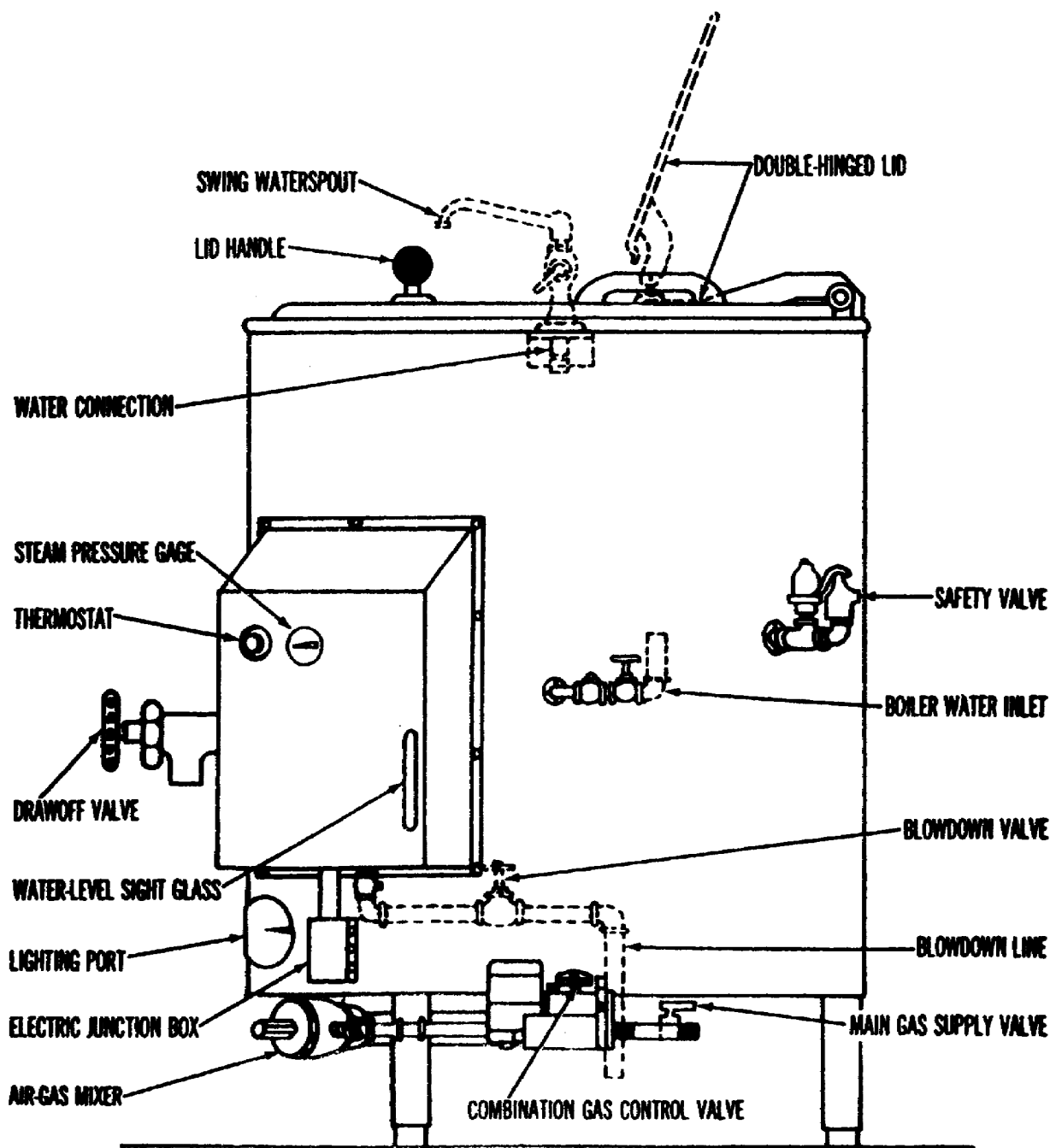


Figure 16. Self-contained gas-fired kettle.

the bowl, rinsed, and dried with a clean, soft cloth. The drawoff valve and pipe should be removed, washed with a brush, rinsed, and replaced. The kettle should then be rinsed again with clear, hot water, and allowed to drain. After this last rinse, the kettle should be heated for 5 to 10 minutes to dry it. When the kettle is dry, the steam should be turned off and the lid opened. The lid is left open while the kettle is not in use.

c. SAFETY PRECAUTIONS. The operator must be very careful to avoid steam burns when he raises the kettle lid. He should see that the safety valve is in good working order and it is not obstructed. A hot, dry kettle should never be filled with water; the steam should be turned on gradually to allow a cold kettle to warm up before full steam pressure is applied. On self-contained steam-jacketed kettles, the operator should see that the proper water level is maintained in the boiler, and he should observe the general safety precautions that apply to gas and electric equipment (para 3c and d). If the pressure in the steam Jacket exceeds the safe level, the unit should be shut down immediately.

16. STEAM COOKER. The steam cooker is used for foods that require moist-heat cooking; it holds steam in actual contact with the food and cooks the food directly. It is unlike the steam-jacketed kettle in which the steam does not come in contact with the food. The advantage of the steam cooker is that food is cooked in less time and retains more of its nutritional value. The steam cooker may have one or more steam compartments, each of which has separate controls and can be operated independently of the others. Each compartment has a door that can be sealed steam-tight by a wheel-operated screw. The cooker is equipped with both solid and perforated stainless steel baskets of various sizes to hold food during cooking. Each compartment steam valve is connected by a rod to the exhaust valve of that compartment; the connecting rod permits both valves to be operated simultaneously. When the control handle is pushed to the ON position, it opens the steam valve and closes the exhaust valve; when pushed to the OFF position, it closes the steam valve and opens the exhaust valve. As a safety feature, the control handles are so designed that when they are in the ON position, the door latch is blocked, and the compartment door cannot be opened.

a. OPERATION. To operate a direct-connected steam cooker, the water supply valve to the main steam line must be opened. This allows main steam, at pressures from 12 to 100 psi, to pass through the reducing valve and to the separate steam compartments at pressures from 3 to 5 psi on older cookers or 4 to 8 psi on newer models. The operator prepares the food, places it in baskets, and places the baskets in the compartment. When the pressure reaches the proper level, he hooks the door latch securely and then turns the door wheel clockwise. Door wheels should be tightened only enough to seal the compartment so that no steam will leak out. The operator then moves the control handle to the operating position, thus opening the steam valve and closing the exhaust valve. After the food has cooked for the proper amount of time, the operator pulls the control handle slowly down into the OFF position, the handle moving only enough to

gradually reduce the steam pressure in the compartment. (If the handle is moved suddenly, the quick release of pressure may cause the food in the compartment to boil over.) When the control handle is in the OFF position, the pressure on the door is released by revolving the door wheel counterclockwise. (The door wheel should be turned slowly, never spun.) The operator then releases the door latch and opens the door slowly, holding the door until it is wide open. To shut down a direct-connected steam cooker, the main steam supply valve is closed.

b. **CARE AND MAINTENANCE.** The operator must perform the following services on the cooker before, during, and after operation:

(1) Before operation. The operator should always check for damage from tampering and report any damage to the person in charge. He should inspect the entire pipe system for steam or water leaks. He should inspect the compartments to make sure they are clean and check the door and latch on each compartment for proper operation.

(2) During operation. The operator should check the steam pressure gage frequently. If the pressure rises above the limit set by the manufacturer, the cooker should be shut down immediately and the trouble reported. When food is first placed in the compartments, the pressure may drop for a short period; if it does not return to normal in 5 to 10 minutes, the cooker should be shut down and this should be reported. The operator should see that all valves are functioning properly and observe particularly the operation of the thermostatic traps. Only cool air and water should escape through these traps; if steam escapes, the cooker should be shut down and the trouble reported. The operator should watch for steam leaking around the compartment doors because it causes the door gaskets to wear and may pit the door frames. If any leak is discovered, the operator should notify the person in charge to have the gasket replaced as soon as possible.

(3) After operation. The operator should check to see that the main steam supply valve is closed and that the boiler heat source is turned off. The compartment shelves should be removed and washed with hot detergent solution, and the interior of the compartments should be washed with clear water. The inside of the doors and the door gaskets should be cleaned with a clean cloth dipped in detergent solution, rinsed with clear, hot water, and then dried with a clean cloth. The shelves should be washed and put back in the compartment, and the doors should be left slightly open to prevent the door gaskets from sticking to the door faces and to allow the compartments to dry. The oilcup on each door-wheel screw should be filled and the bushings of the door hinges lubricated at least once a week.

c. **SAFETY PRECAUTIONS.** The operator should open steam compartment doors slowly; he should never stand directly in front of the cooker when opening the door because hot vapors in the compartment cap cause minor burns and discomfort. If the steam pressure of a cooker rises above the

manufacturer's limit or if the safety valve blows, the cooker should be shut down immediately and the trouble reported.

17. **DEEP-FAT FRYER.** This fryer consists of a fat container, heating unit, temperature control, and draining device. Fryers may be heated either by gas or electricity. The capacity of a deep-fat fryer is rated in the number of pounds of raw potatoes that it can fry in an hour. The capacities of authorized fryers are 30, 35, 60, or 90 pounds, and the temperature range is usually 200° to 400° F. Gas fryers (fig. 17) may be either burner or heat-tube type; both are heated by natural, manufactured, or LP gas. All models should be equipped with an automatic pilot control similar to the safety valve of a pilot burner in the gas range oven. When the thermostat dial on electric fryers (fig. 18) is turned off, the machine is off. When the thermostat dial is set to the desired temperature, a characteristic clicking sound indicates that the-current is on.

a. **OPERATION.** The operator should first make sure that the drain is closed and then fill the container to the proper level with fat. Solid fat should be melted first in a container on a range or in a bain-marie, then poured carefully into the fat container of the fryer. To turn on a gas fryer that has an automatic pilot, the automatic pilot valve is turned on, the temperature control turned off, and the main gas valve turned on. The red button on the automatic control is then depressed and held for about 30 seconds; this lights the pilot. The main burner lights automatically when the thermostat is turned to the desired temperature. If the gas fryer does not have an automatic pilot, the operator lights the pilot with a taper and then the burner will light when the thermostat is set. On any gas fryer, if the main burner fails to light, the operator should turn off all valves and wait 5 minutes before attempting to light the fryer again. The operator makes sure the heating elements are covered with fat, then he sets the thermostat at 250° for preheating. (This preheating is necessary with all types of fryers.) As soon as the fryer is preheated, the operator sets the thermostat to the desired cooking temperature. (During standby periods, the thermostat is set at a low temperature.) To shut down a gas fryer, the thermostat and all valves are turned off. To shut down an electric fryer, the thermostat is turned off and the cord unplugged from the power source.

b. **RULES FOR DEEP-FAT FRYING.** Before the cook puts food into the fryer, he should remove as much moisture and as many loose crumbs as possible. The quantity of each batch in the fry basket should be kept as small as possible, and the basket should always be lowered slowly into the fat so as not to chill the fat. If the temperature is lowered below the effective frying range, the food will absorb too much fat. When frying foods which overlap in the basket (such as pieces of potato) the operator should shake the basket occasionally so that all pieces will brown evenly. Salt should never be sprinkled on food in the fryer because salt speeds fat breakdown. When frying doughnuts, fritters, or other products that must be turned in order to brown both sides, the operator should wait till the downside of each is completely browned before he turns them. The

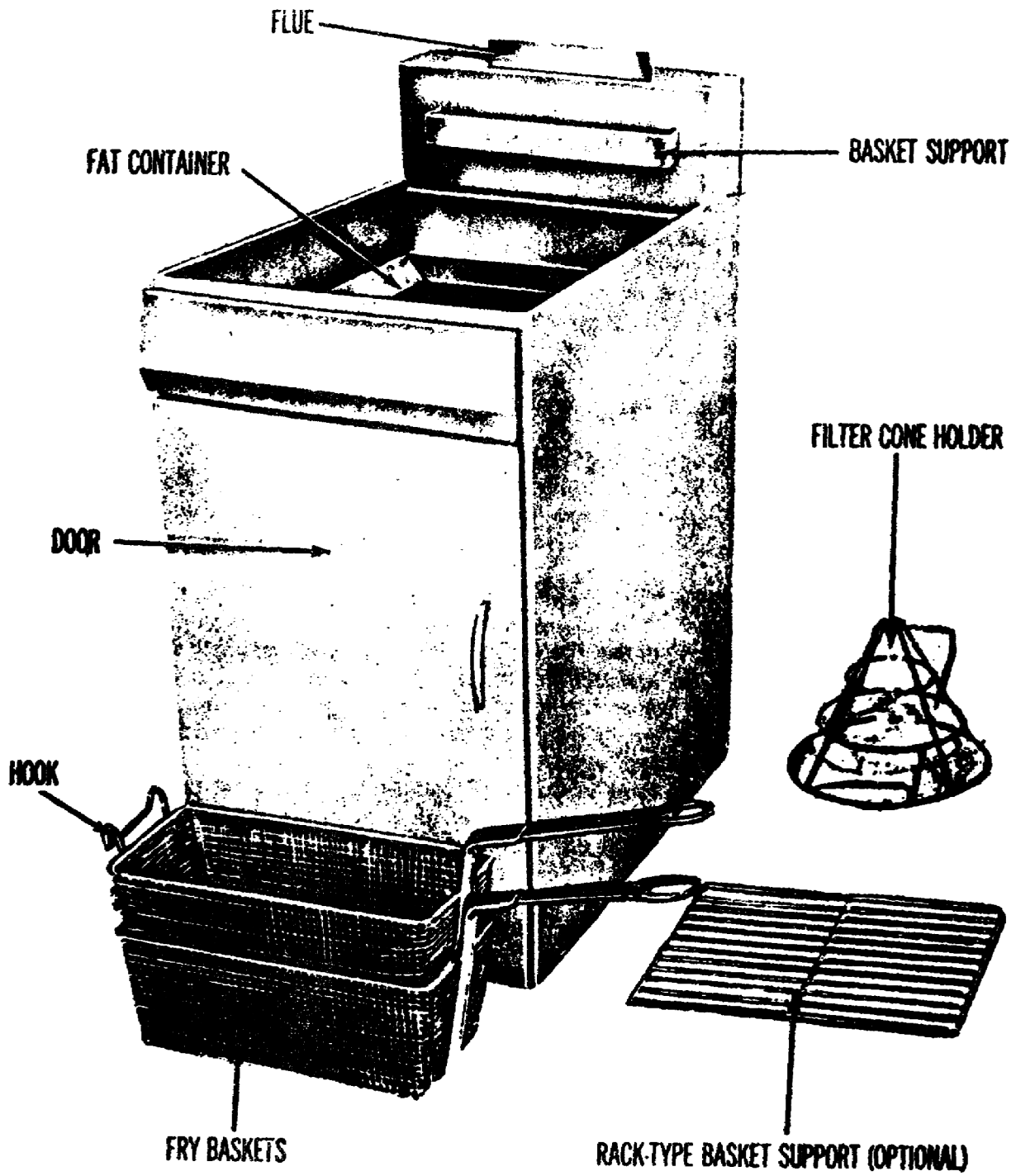


Figure 17. Gas-heated deep-fat fryer.

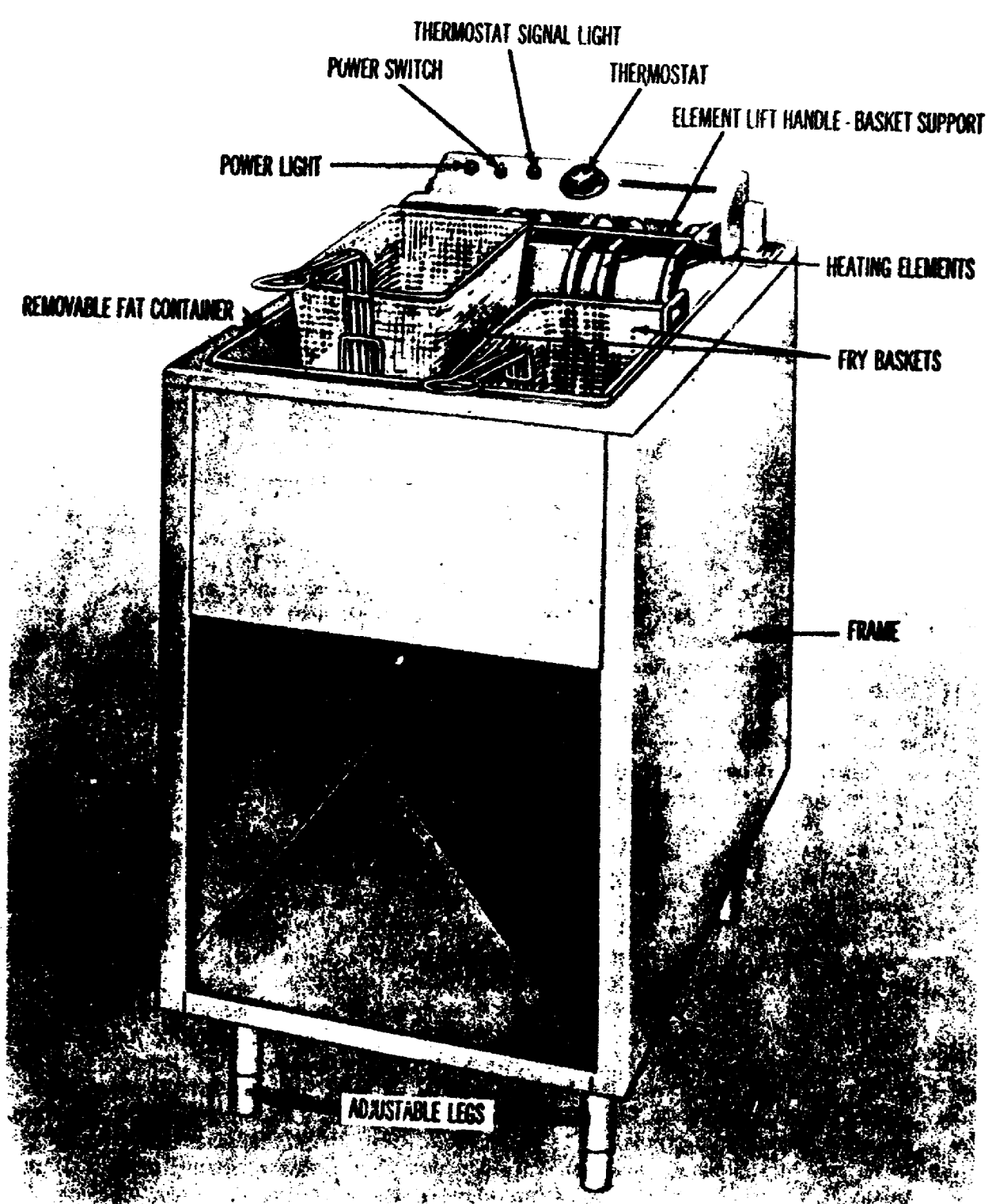


Figure 18. Electric deep-t fryer.

more often an item is turned, the more grease it will absorb. When frying is complete, the basket should be lifted out of the fat and rested on the basket support long enough to let excess fat drain back into the fat container.

c. **CARE AND CLEANING.** When the fat in the fryer has cooled slightly, the operator should put a suitable container under the drain valve, slowly open the valve, and drain off the fat. (The drain valve should always be opened slowly because the fat will still be hot enough cause severe burns.) The grease should be filtered, covered lightly with a clean cloth Cooled to room temperature, and stored in the refrigerator Food particles should be removed from the heating element with a spatula or soft brush and flushed out with a small amount of hot fat. If the fryer has a sediment cup, it should be removed and cleaned. The drain valve should be closed and the fat container filled with hot, detergent solution to within 2 inches of the top. The thermostat should be set to its highest point until the solution boils, then turned down. The solution should be allowed to boil for 10 minutes, then a bucketful of the solution should be drawn off and used for scrubbing the fry baskets, cover, and sediment cup. When these are clean, they are allowed to air-dry. The solution remaining in the fat container is used to scrub the basket supports, ledge, and the interior of the container. The fat container is then drained and filled with clear, hot water. The water is boiled for 10 minutes and then drained. As the water is drained, the interior of the container is rinsed off with a clean brush. All external surfaces of the fryer should be scrubbed with hot, detergent solution, rinsed, and dried immediately.

d. **SAFETY PRECAUTIONS.** The operator should observe all safety precautions that apply to gas or electric equipment (para 3c and d). Extreme care should be used when handling hot fat; it can cause severe burns and will flash into flames if splashed on a hot stove or near an open flame. Water should not be allowed to seep into the electrical plugs, switches, and wiring of the electric fryer. If a gas fryer does not light, the operator should turn off all controls and wait 5 minutes before attempting to light it.

18. **CONVEYOR TOASTER.** This toaster consists of a number of toasting baskets mounted on an endless conveyor chain driven by an electric motor. The toaster has eight baskets, each of which holds three slices of bread. It will toast 570 slices an hour. Bread is placed in the baskets as they pass the opening of the bottom front of the housing. The bread is then carried up into the toasting compartment where it is toasted on both sides by a pair of gas or electric heating elements. As the baskets come down the back of the toaster, they automatically release the toast, which slices into a receiving pan at the foot of the housing. Both gas and electric (fig. 19) conveyor toasters have a starter switch, a knob that turns the conveyor manually, and a thermostat. The starter switch on gas toasters controls only the electrically driven conveyor chain; the starter switch on electric toasters controls the flow of power to the conveyor and heating

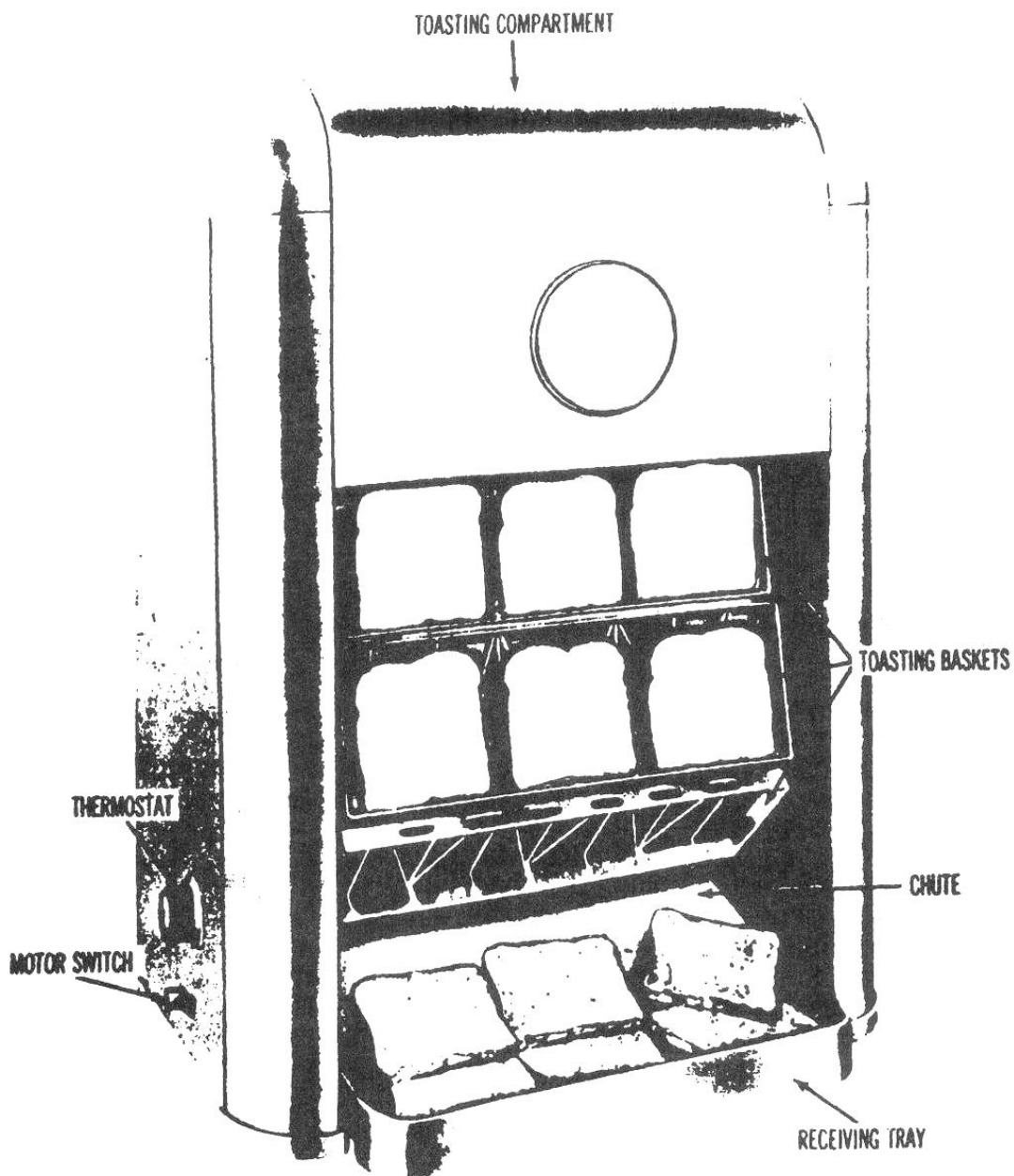


Figure 19. Electric conveyor toaster.

elements. The gas toaster has two lighter holes. A valve must be put on the main gas line to control the flow of gas to the toaster.

a. OPERATION. The starter switch on all toasters should be turned off before the cord is plugged in, then the starter switch should be turned on and off several times to make sure the conveyor operates freely and the baskets fall forward when they reach the bottom of the toaster. On a gas toaster, the operator turns the thermostat about halfway, lights a taper, turns on the gas, and lights the gas through both



lighter holes. The flames should be clear blue. He sets the electric toaster thermostat at 7 on the dial scale. Gas toasters should be preheated for 10 to 15 minutes, and electric toasters for about 20 minutes. After the toaster has heated, the operator should run several pieces of toast through and adjust the thermostat as necessary to produce toast of the desired color. Toasting should not be started too far in advance and should be slowed down during slack periods. To slow production, one or two slices of bread (instead of three) may be loaded in each basket. The receiving tray should be cleared promptly so that toast will not back up and jam the conveyor. The operator should make sure that no bread is left in the toaster when he shuts down operation. With gas toasters, the gas is turned off and the motor allowed to run the conveyor until the toaster has cooled; then the electric switch is turned off. With electric toasters, the thermostat is turned off and the conveyor allowed to run till the toaster has cooled before the switch is turned off. Running the conveyor during the cooling process keeps the baskets from overheating.

b. CARE AND CLEANING. The toaster housing should be wiped each day with a clean, damp cloth. Once a month it should be washed with a nonabrasive cleaning compound and warm water, taking care not to wet the conveyor chain or the electric wires or components. The toaster baskets should be brushed out daily and removed and boiled in detergent solution once a month. Baskets should also be removed and cleaned after raisin bread is toasted. The baskets must be handled carefully because they bend easily. To remove a basket, the operation presses lightly outward on the left chain, slips the chain pin out of the basket keeper, and then pulls the basket to the left to disengage the pin in the right chain. One basket should be left in place to use as a guide until all other baskets have been cleaned and replaced; then it is removed, cleaned, and replaced. The toaster chute should be cleaned after each use. The operator removes the chute by grasping the front rim and pushing back and up. The operator then pulls forward to release the chute from its retaining rod. The chute and space below it should be wiped with a clean, damp cloth and the chute replaced.

c. SAFETY PRECAUTIONS. The operator should observe all general safety precautions and report any trouble to the person in charge. He must keep his hands and arms clear of the hot, moving conveyor assembly. The toaster powerline should always be disconnected before electrical components are handled. If bread jams in the toaster, the motor should be turned off, the bread loosened with a piece of pliable, dry, nonmetallic material, and the conveyor turned with the manual knob until the bread is completely freed.

## PROGRAMMED REVIEW B

The questions in this Programmed review give you a chance to see how well you have learned the material in section IV of lesson 1. The questions are based on the key points covered in the section.

Read each item and write your answer on the line or lines provided for it. Please use a pencil to write your answers. If you do not know, or are not sure, what the answer is, check the paragraph reference that is shown in parentheses right after the item; then go back and study or read once again all of the referenced material and write your answer.

After you have answered all of the items, check your answers with the Solution Sheet at the end of this lesson. If you did not give the right answer to an item, erase it and write the correct solution in the space instead. Then, as a final check, go back and restudy the lesson reference once more to make sure that your answer is the right one.

**SITUATION.** You are a cook. You are preparing to cook a meal on the range top. Your choice of range top will depend on the food you are cooking.

**REQUIREMENT.** Exercises B1 through B3 are matching exercises. Column I describes types of range tops. Column II lists types of range tops. Match the top in column II with its description in column I. Items in column II may be used once, more than once, or not at all.

<u>Column I</u>	<u>Column II</u>
B1. Has a heavy cast-steel cooking plate over several burners. _____ (para 10)	a. Open-top range.
B2. Has a heavy cast-steel griddle with one or more grease troughs. _____ (para 10)	b. Hot-top range.
B3. Four direct flame burners with cast-steel grids. _____ (para 10)	c. Fry-top range.
	d. Combination top range.

SITUATION. You are one of the food service personnel using the range and ovens. To prevent injury to yourself and others, you should know the safety precautions.

REQUIREMENT. Complete exercises B4 through 86 on cooking safety by filling in the blanks with the correct word(s).

- B4. When loading the oven, you should be careful not to hit the \_\_\_\_\_ . (para 10c)
- B5. When the oven is in use, the door should be kept \_\_\_\_\_ as much as possible. (para 10c)
- B6. Handles of pans on top of the range should be parallel to the \_\_\_\_\_ of the range. (para 10c)

SITUATION. You are a cook, and you have just checked the cooks' worksheet for your assignment. You must bake sheetcakes for dinner.

REQUIREMENT. Complete exercises B7 through B10 correctly to indicate the proper use and care of equipment during baking procedures.

- B7. After the electric and gas ovens reach the desired temperature, they should stand for \_\_\_\_\_ minutes before use. (para 13a(1))
- B8. The pans should be arranged so that they do not \_\_\_\_\_ . (para 13a(1))
- B9. The door of the oven should be kept \_\_\_\_\_ (para 13a(1))
- B10. To avoid the danger of a fire, the range should be kept free of \_\_\_\_\_ . (para 10c)

DO YOU UNDERSTAND EVERYTHING IN THIS PROGRAMMED REVIEW?  
HAVE YOU CHECKED YOUR RESPONSES, MADE CORRECTIONS, AND  
RE-STUDIED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON  
TO THE NEXT STUDY UNIT OF THIS SUBCOURSE.

## SECTION V

### SERVING EQUIPMENT

19. **BAIN-MARIE AND STEAMTABLES.** The bain-marie is used to keep food hot until it is served. The steamtable is used to keep food hot while it is being served. Each has a water pan that fills directly from a waterspout. In over-flow pipe fits into the drain hole. When in place, the pipe holds water in the pan; when removed, water drains from the pan. The bain-marie and steamtable are made of corrosion-resistant stainless steel and can be heated by gas, electricity, or remote steam.

a. **BAIN-MARIE.** The bain-marie has perforated plates covering the water in the pan. The top of the bain-marie is open to accommodate containers of various sizes and shapes. The bain-marie is installed in the kitchen, conveniently close to the doors of the serving line. When foods are prepared in advance of serving time, they can be kept hot in the bain-marie.

b. **STEAMTABLE.** The steamtable (fig. 20) provides four to six openings for the insert pans. When pans are inserted in all openings, the water pan is completely covered. Steam, trapped between the water level and the bottoms of the pans, keeps food warm during the serving period. A glass-and-steel guard is installed between the steamtable openings and the tray slide to minimize exposure of food to personnel moving through the serving line.

c. **OPERATION.** Before the operator uses the bain-marie or steamtable, he should check the water level to make sure it is about 1 inch below the top of the overflow pipe. He should check to make sure all controls are turned off, all heat-source lines are free of leaks, all heat controls are functioning properly, and all heating elements are covered with water to the proper depth. Any deficiencies should be reported promptly to the person in charge. On gas models, the operator lights a taper, opens the gas valve to one burner, and lights it immediately. He then opens the valve to the other burner and lights it. The operator should never open both valves at the same time because gas fumes may collect and ignite with explosive force. When the proper water temperature is reached, the burners are turned down enough to maintain a temperature of 150° to 160° F. The electric model is turned to HIGH until the water reaches the correct temperature and is then turned down to maintain it. On steam models, the steam is turned on all the way to heat the water. However, if the main steam pressure is greater than 10 pounds per square inch, the operator must watch very carefully because high pressure will heat the water so quickly that it will boil. As soon as the proper temperature is reached, the steam valve should be partially closed until it releases only enough steam to maintain the temperature. To shut down the units on the gas, electric, and steam models, the gas valves are closed, the three-heat electric switch turned off, or the steam valve closed completely, respectively.

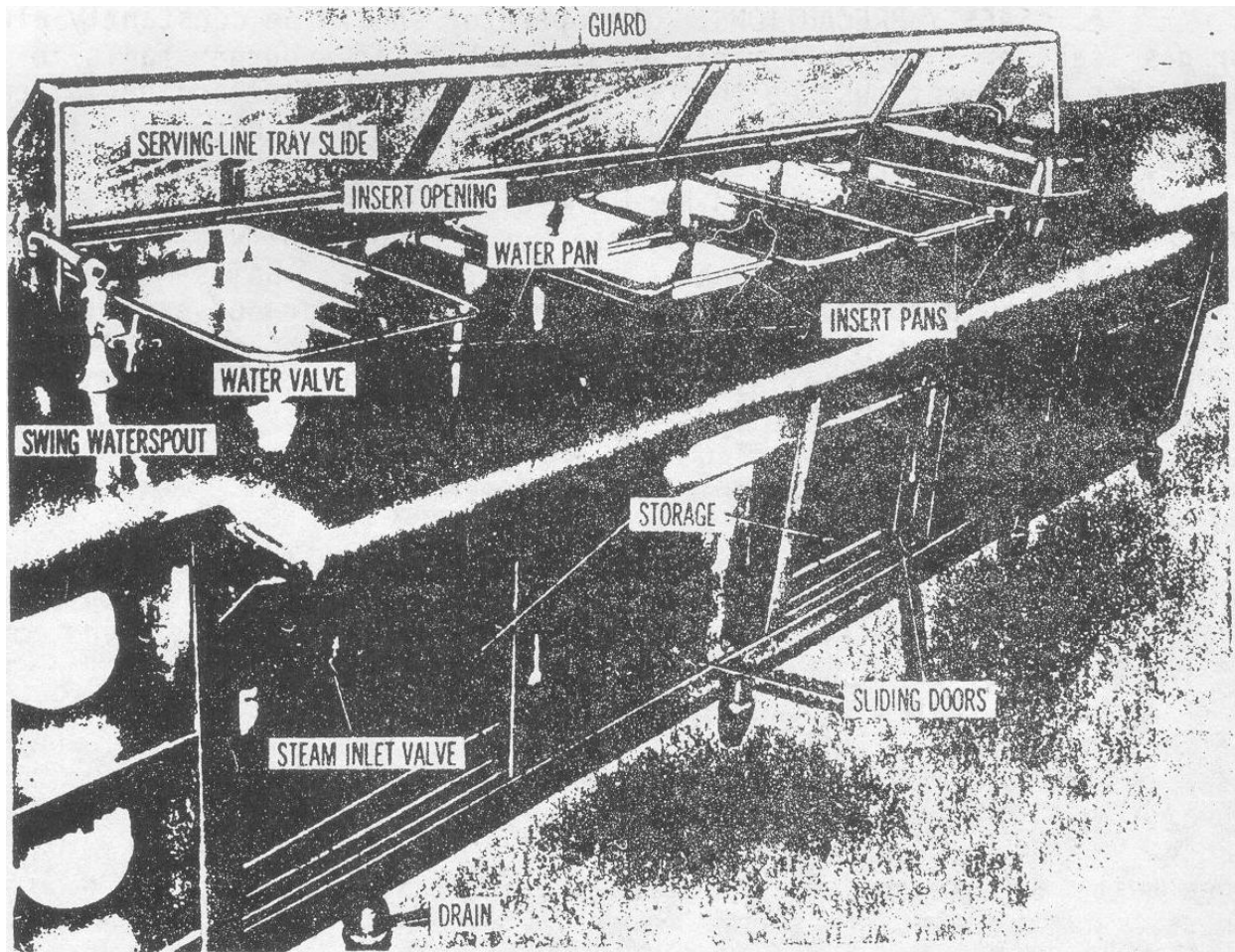


Figure 20. Steamtable installed in serving line.

d. **CARE AND CLEANING.** During operation the water is kept at the proper level in the pan; after use, the unit should be drained by removing the overflow pipe. The interior of the water pan should be washed with hot detergent solution, rinsed, and dried. The perforated plates of the bain-marie and the insert pans of the steamtable are washed with a hot detergent solution, rinsed in hot, clear water, and allowed to air-dry. The perforated plates of the bain-marie are propped at an angle in the water pan; the steamtable inserts are stored in the storage space under the steamtable. The exteriors of the units are washed with a cloth dipped in a hot, detergent solution; rinsed with a cloth dipped in hot, clear water; and dried with a clean, dry cloth. All stainless steel surfaces should be polished with an authorized, nonabrasive metal polish. On gas models, any carbon deposit on the bottom of the water pan must be cleaned off. When the unit has been completely cleaned, it should be allowed to air-dry. Periodically the burners, thermostats, and working parts of gas-heated equipment should be cleaned and adjusted by a mechanic from the post engineer's office.

e. **SAFETY PRECAUTIONS.** The operator should be constantly alert for gas leaks on a gas bain-marie or steamtable; if a burner fails to light, the equipment must be thoroughly ventilated before another attempt is made to light it. Electric unit wiring must be kept clean and free of grease, oil, and water. Operators of electrical equipment should have dry hands, clothing, and shoes-when handling wiring or operating electric switches. Operators of steam equipment must be constantly alert to avoid contact with steam because it can cause severe burns. Bains-marie and steamtables should never be used for storage, Operators of steamtables and personnel responsible for supply and resupply of the serving line must learn to change steamtable inserts properly in order to avoid steam burns. The operator should lift the insert end nearest him only enough to clear the opening; then he should slide the insert toward him, allowing the steam to escape harmlessly at the far end of the opening.

20. **COFFEE URN.** The coffee urn is an upright cylindrical container in which coffee is brewed by the drip method. The boiler capacity is 10 or 15 gallons.. The urn has a leacher set in the top to hold ground coffee, and two liners of equal size separated by an airspace from each other and from the boiler that surrounds them (fig. 21). The airspace allows the coffee to remain hot; it insulates the coffee so it will not boil when the water in the boiler does, and the coffee will not get cold when the boiler is refilled. A condensate outlet is provided so that moisture caused by changes in the temperature can escape from the airspace. Each urn has two gages that indicate coffee levels and two faucets to draw coffee from the liners. The urn also has a gage to indicate water level in the boiler and a water faucet to draw hot water. The water control valve admits or shuts off water to the boiler, and the blowover control valve opens and closes the line through which water from the boiler is forced up through the spray head above the coffee leacher. The pressure in the boiler must reach 1/2 psi before this blowover valve will operate. A vacuum relief valve opens at 1/2 psi and allows a little steam to escape from the condensate tube, thus indicating to the operator that the boiler water has reached the boiling point. A safety pressure valve opens at 1 1/2 psi. A thermostat regulates boiler water temperature and a low-water cutoff switch on gas and electric urns cuts off the heat source if boiler water drops below the safe level. A storage sink is usually located in the urn base to provide cold-water storage for the leacher bag.

a. **OPERATION.** The three elements essential to making a good cup of coffee are clean equipment, fresh, boiling water, and the correct ratio of coffee to water. First, the operator should make certain that the equipment is absolutely clean. He should then drain out the water left in the liners overnight, close the drain valves, fill the boiler, and turn the heat to HIGH. While the boiler water heats, he takes the coffee leacher bag from the storage sink or refrigerator, wrings it out, places it in the leacher on the leacher rack, and puts the correct amount of ground coffee into the bag. He sets the leacher into the top of the urn, making sure that the off-center drain hole is positioned above the liner in which he plans to make coffee. Then he closes the urn cover.

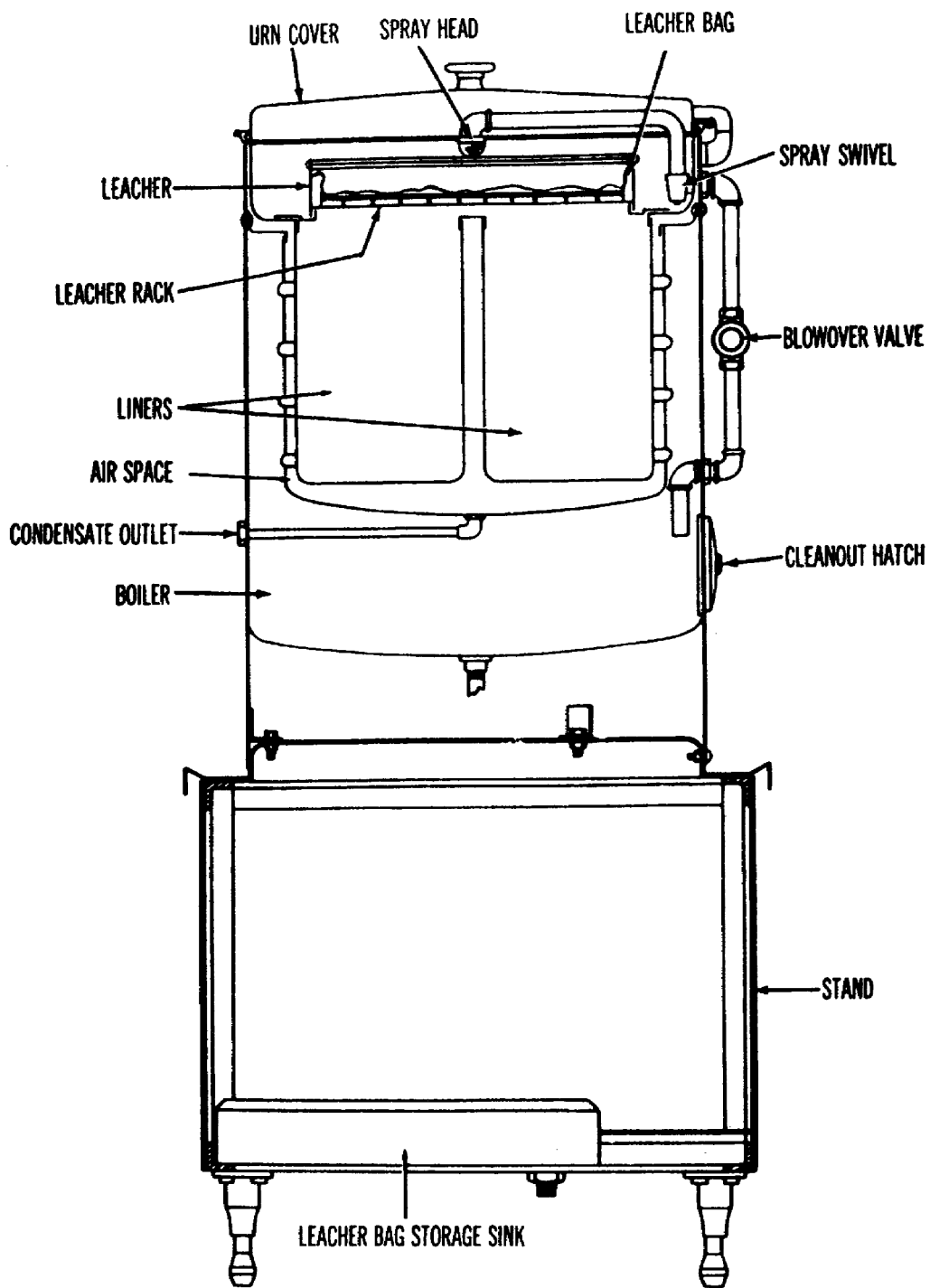


Figure 21. Cutaway diagram of a twin coffee urn.

When the boiler water reaches the boiling point, he opens the blowover valve one and one-half turns and sprays the desired quantity of boiling water over the ground coffee. He closes the blowover valve and slowly opens the water control valve to allow the boiler to refill. The hot boiler must be refilled slowly because if it is filled quickly with cold water, the steam in the boiler may condense and cause extensive damage to the boiler. After the liquid coffee has drained from the leacher into the liner, the operator removes the leacher bag, keeping the drain hole tilted up so it will not drip. On a gas or electric urn, turn the thermostat down to 185° F. On a steam urn equipped with a thermostat, turn the thermostat to "C°," on a steam urn without a thermostat, partially close the steam inlet valve to keep water hot but not boiling. Finally, 1 gallon of coffee for each 5 gallons in the liner should be drawn from the line and poured back into the top of the liner; this mixes the stronger bottom brew with the weaker upper brew and assures a uniform strength throughout the liner. As soon as the coffee grounds are disposed of, the coffee leacher bag should be rinsed out in hot water. It is important that hot water be used for this rinse because cold water will set the oil of the coffee into the cloth of the bag and make the next batch of coffee strong and bitter. After the bag is rinsed, it should be stored in cold water in the sink in the urn base or in a stainless steel dishpan in the refrigerator. The leacher bag should be replaced once a week or after it has been used 21 times.

b. **CARE AND CLEANING.** Care and cleaning procedures for the coffee urn are described in the following paragraphs.

(1) After each use. All brewed coffee in the liners should be drained out after each serving period. The boiler should be filled slowly and the water heated. With the coffee faucet open, the used liners should be thoroughly rinsed with hot water. After the liners are rinsed in hot water, the faucets should be closed, and 2 gallons of fresh cold water should be poured into each liner. The urn cover should be closed.

(2) On shutdown. At the end of the workday, the boiler is filled, the leftover coffee drained off, and with the faucets still open, the liners are rinsed with hot water. The coffee faucets are closed after the rinse, and each liner is filled with 2 gallons of hot water. A mild detergent solution is added to the hot water in the liners and allowed to stand for 5 minutes. Each liner is then scrubbed with a long-handled brush, and the detergent solutions are drained off. While the liners are draining, the coffee faucets should be opened and closed several times. Each liner is rinsed with a gallon of hot water. Finally, each liner is filled with 2 gallons of cold water that will remain until the next use. The cover is left slightly open to let air into the urn, the boiler is filled slowly, and heat is turned off. Remove and wash the drain trough plate. Wash the drain trough with a cloth dampened in a hot detergent solution, rinse with clear hot water and replace the strainer plate. With a cloth dampened in a hot detergent solution, wipe spattered coffee and handprints off the exterior of the urn and stand. Rinse with a cloth



dampened in hot, clear water and dry with a clean, dry cloth. Be careful not to let water seep into the instruments or controls.

(3) Twice-weekly cleaning. Twice a week or as needed, perform the following service in lieu of those prescribed for shutdown. Clean the liners with trisodium phosphate, using the procedures given below.

- (a) Fill the boiler with water and turn on the heat.
- (b) When the water is hot, fill each liner three-fourths full and add one-fourth cup of trisodium phosphate (or one-fourth cup of dishwasher detergent) to each liner. Using a long-handled brush, mix the solution in each liner until the additive is dissolved.
- (c) Allow the solution to remain in the liners for 30 minutes, keeping the heat on.
- (d) Turn the heat off.
- (e) Scrub each liner and the inside of the urn cover with a long-handled, stiff brush and the solution in the liners.
- (f) Draw off the cleaning solution into a container. Disassemble and thoroughly scrub the faucet valves, shanks and gage glasses with the liner cleaning solution and a long thin brush.
- (g) Rinse the disassembled parts thoroughly three or four times in clear, hot water, scrubbing with the thin brush during each rinse. Reassemble and reinstall the components.
- (h) Rinse each liner three or four times, using a pitcherful of hot water for each rinse. As the water is added, scrub each liner and the inside of the urn cover with the long-handled stiff brush. Scrub each liner thoroughly with each rinse. Continue to rinse and scrub until all traces of foreign odor and all the sour taste of the cleaning solution have disappeared.
- (i) Pour 2 gallons of water into each liner. Leave the water in the liners until the next operation.
- (j) Fill the boiler slowly.
- (k) Turn off the heat, as follows:
  1. Gas. Press down and turn the dial of the combination gas control to-OFF.--urn the thermostat to OFF and close the gas supply valve.
  2. Electric. Turn the thermostat to OFF.

3. Steam. Close the steam supply valve and, for a steam urn equipped with a thermostat, turn the thermostat OFF.

(l) Leave the urn cover partially open to aerate the urn.

(m) Remove and wash the drain trough strainer plate. Wash the drain trough with a cloth dampened in a hot water solution, rinse with clear, hot water, and replace the strainer. Polish the outside of the urn with an approved stainless steel cleaner.

c. SAFETY PRECAUTIONS.

(1) The operator should make sure all of the valves and faucets are in the proper position before he fills the boiler.

(2) Make sure the boiler is full of water before turning on the heat.

(3) Never place a rag or other object on or over the safety valve. Be sure the safety valve is working properly and is not obstructed. Steam should escape from the safety valve overflow tube as the water approaches the boiling point. If steam does not escape, shut off the heat and notify the person in charge immediately.

(4) When refilling a hot boiler, open the water valve slowly to avoid damage to the urn from rapid condensation.

(5) When drawing hot coffee or water, turn faucet slowly to avoid splashing.

21. VACUUM COFFEEMAKER. This coffeemaker has a 12-cup capacity; it consists of a steel lower bowl, and a steel upper bowl with a hollow stem, a filter, and a gasket (fig. 22). To make the coffee, water is placed in the bottom bowl, coffee is placed in the top bowl, and the coffeemaker is set on a heat source.

a. OPERATION. The operator fills the lower bowl with cold water, then he installs the filter in the upper bowl neck and puts the correct amount of coffee in the upper bowl. He places the upper bowl on the lower bowl, seating it firmly. The coffeemaker is then set on the burner or element. As the water in the lower bowl is heated, steam pressure forces water from the lower bowl into the upper bowl; the water boiling in the lower bowl causes steam to agitate the water and coffee in the upper bowl. The coffeemaker is left on the heat for 1 minute; it is then removed from the heat, allowing the water to drain down into the bottom bowl. When the coffeemaker is removed from the heat the steam in the lower bowl condenses and creates a vacuum. Outside air pressure forces the brewed coffee from the upper bowl, back into the lower bowl. The filter, installed in the neck of the upper bowl, allows the coffee grounds to remain in the upper



Figure 22. Vacuum coffeemaker.

bowl. The top bowl with the coffee grounds is removed, the bottom bowl is put back on the burner or element, and the burner or element is turned down.

b. **CARE AND CLEANING.** The filter is removed from the upper bowl. If it is paper, it is discarded. If it is cloth, it is rinsed under hot, running water and stored submerged in cold water. Upper and lower bowls are washed thoroughly in a hot, detergent solution using a stiff brush. When necessary, upper and lower bowls are cleaned with an approved stainless steel cleaner.

c. **SAFETY PRECAUTIONS.** The upper bowl should be firmly seated in place on top of the lower bowl. When a full coffeemaker is lifted off the heat, the operator should grasp it firmly, hold it upright, and set it in a safe place.

22. **HOTPLATES.** The gas or electric hotplate is stainless steel with four burners. Both hotplates are used with the vacuum coffeemaker.

a. **OPERATION.** The gas-fired hotplate uses natural, manufactured, or LP gas, and has two everburning pilots. The burner grates are made of cast iron and the burners of cast aluminum. Each burner has two sets of gas openings and a gas control knob. The outer ring of openings provides the full gas flow needed for brewing coffee; the inner set of openings provides the restricted flow of gas needed to keep coffee at serving temperature. The electric hotplate has four heating elements, each controlled by a three-heat switch. The HIGH setting is used to brew the coffee; the MEDIUM or LOW setting is used to keep it at serving temperature.

b. **CARE AND CLEANING.** At the end of the day (or as necessary), the burner grates on the gas hotplate are lifted off, washed in hot, detergent solution; rinsed in hot, clear water; and dried with a clean, dry cloth. They should not be soaked. The burners are lifted out and cleaned the same as the grates except a stiff brush is used. After the burners are reinstalled, they are turned on for 2 or 3 minutes to completely dry interior surfaces. To clean the electric hotplate without a tiltup heating element, the body is washed with a cloth dampened in hot, detergent solution; rinsed with a cloth dampened in clean, hot water; and dried with a clean, dry cloth. On models with tiltup heating elements, the elements are tilted and the stainless steel reflector pans and drip tray removed. They are washed in a hot, detergent solution; rinsed in clear, hot water; dried with a clean, dry cloth; and reinstalled. Once a week, or as required, the body of all hotplates can be cleaned with a stainless steel cleaner.

c. **SAFETY PRECAUTIONS.** The electric hotplate should be unplugged before it is cleaned. Water should not be allowed to seep into electrical connections or controls. The gas hotplate should be checked frequently for gas leaks.

23. MILK DISPENSERS. The bulk-milk dispenser (fig. 23) is a mechanically refrigerated storing and dispensing cabinet for milk. The dispenser, is an upright, rectangular cabinet mounted on four legs. The interior and exterior of the milk dispenser are stainless steel and the corners of the interior are rounded for easy cleaning. The cabinet is cooled by a self-lubricating compressor unit that maintains the temperature between 35° and 38° F. The cabinet holds three 5-or 6-gallon plastic bags of milk, each in a cardboard carton.

a. CONTROLS.

(1) Temperature regulator. A temperature regulator is mounted on the left side of the cabinet which controls the temperature of the interior.

(2) Dispensing levers. The milk dispenser has three dispensing levers. Each of these levers is a one-piece, removable, stainless steel unit. The upper bar of the lever fits into niches on either side of the plastic dispensing well and acts as a pivot point for the lever. The milk container dispensing tube passes through an opening in the lever plate. In the closed position, the weight of the lever handle blocks the milk flow by exerting pressure on the dispensing tube. Milk flows freely when the lever handle is raised.

b. OPERATION. To prepare a can or plastic bag of milk for use in the dispenser, the operator slips the plastic-wrapped tube from the two carrying hooks on the bottom of the can or punches a perforated flap and pulls out the wrapped tube. The plastic wrapping must be removed carefully from the dispensing tube in order not to pull the tube off the nipple of the can or bag. The milk container is set in place, the lift valve removed from the tube well and the tube passed down through the well. A tube clamp should be placed on the tube above the valve contact point and locked into place. The tube should be cut one-fourth of an inch below the valve pressure point and the lift valve replaced. The clamp is removed and the flow of milk can be controlled by opening the lift-valve dispensing lever. When a milk container is almost empty, the operator puts a pan under the valve, tips the container forward, draws off the remaining few ounces of milk, and replaces the container with a fresh one.

c. CLEANING.

(1) After each meal.

(a) Remove the drip pan under the dispenser tubes. Wash it with a hot detergent solution, rinse with clear hot water and air dry.

(b) Wash the exterior surfaces of the milk dispenser with a cloth dampened in a hot detergent solution, rinse with a cloth dampened in clear hot water, and dry with a clean dry cloth. Be sure all traces of milk are removed from the surfaces behind the dispensing levers. Replace the drip pan.

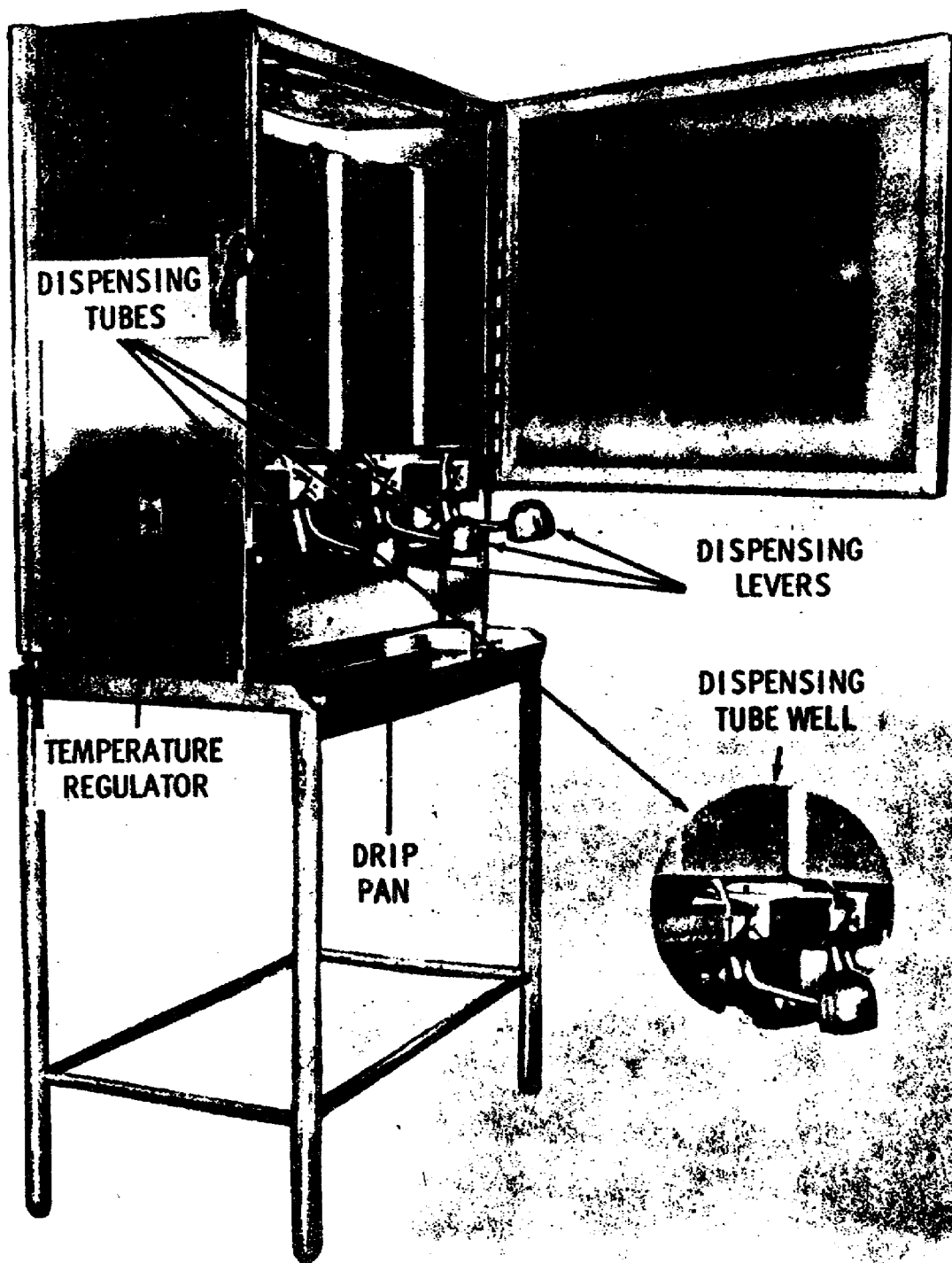


Figure 23. Milk dispenser.

(2) Clean the outside of the cabinet with an approved stainless steel cleaner, twice a week, or as required.

d. DEFROSTING. Defrost the dispenser when the frost is one-fourth inch thick. If frequent defrosting is required, notify the person in charge. Since the cabinet is opened only for resupplying or defrosting purposes, frost should not form rapidly. Frequent resupplying may indicate the need for an additional dispenser. If possible, defrost only when the milk cartons are empty; if this is not possible, remove the partially full cartons to the refrigerator. The procedure for defrosting is as follows:

(1) Unplug the dispenser and open the door.

(2) When the frost has melted, wash the inside of the cabinet, the inside of the door gasket with a warm detergent solution. Rinse with clear warm water mixed with a small amount of baking soda, and dry with a clean dry cloth. Wash the dispensing levers in a hot detergent solution, rinse in clear hot water and dry.

(3) Close the cabinet and plug it in. When it has cooled to 38° F, fill it with fresh cartons or replace the partially full cartons, as appropriate.

e. SAFETY PRECAUTIONS.

(1) When washing the exterior of the cabinet, be careful not to get the electric cord wet or allow water to seep into the temperature regulator.

(2) Keep the door closed except when resupplying or defrosting.

(3) Remove partially full cartons of milk from the dispenser only when necessary.

## PROGRAMMED REVIEW C

The questions in this Programmed review give you a chance to see how well you have learned the material in section V of lesson 1. The questions are based on the key points covered in the section.

Read each item and write your answer on the line or lines provided for it. Please use a pencil to write your answers. If you do not know, or are not sure, what the answer is, check the paragraph reference that is shown in parentheses right after the item; then go back and study or read once again all of the referenced material and write your answer.

After you have answered all of the items, check your answers with the Solution Sheet at the end of this lesson. If you did not give the right answer to an item, erase it and write the correct solution in the space instead. Then, as a final check, go back and restudy the lesson reference once more to make sure that your answer is the right one.

**SITUATION.** You are a cook. You have been assigned to work on the serving line in the dining facility and must be able to identify serving equipment.

**REQUIREMENT.** Exercises C1 through C5 are matching exercises. Column I has incomplete sentences describing equipment used in the serving line. Column II lists pieces of equipment. Match the equipment in column II with its description in column I. The items in column II may be used once, more than once, or not at all.

<u>Column I</u>	<u>Column II</u>
C1. Keeps the food hot by a water pan on the serving line. _____ (para 19)	a. Coffee urn
C2. Brews coffee by the drip method in 10 and 15 gallon quantities. _____ (para 20)	b. Milk dispenser
C3. Brews coffee in 12-cup quantities, using steam pressure. _____ (para 21)	c. Vacuum coffeemaker
C4. Heats one to four pots of coffee at a time. _____ (para 22)	d. Hotplate
	e. Steamtable
	f. Bain-marie.



Column I

Column II

- C5. Has three dispensing wells with a capacity of 5 or 6 gallons each. \_\_\_\_\_ (para 23)
- C6. You are preparing to serve diners from the steamtable. Before turning on the heat or adding the inserts, you should check the \_\_\_\_\_ . (para 19a)
- C7. SITUATION. You are to clean the coffee urn on shutdown at the end of the day.

REQUIREMENT. Choose from the following sentences the sentence that best describes proper cleaning procedures after the leftover coffee is drained off. \_\_\_\_\_ (para 20b(2) & (3))

- a. The liners are washed with hot detergent water, rinsed, and then filled with 2 gallons of fresh cold water.
  - b. The liners are cleaned with a solution of trisodium metaphosphate in a gallon of water, rinsed well, and filled with 2 gallons of fresh cold water.
  - c. The liners are rinsed with hot water and then filled with 2 gallons of cold water.
  - d. The faucets and gages are cleaned with the brush provided; the liners are washed with a detergent solution, rinsed, and then filled with 2 gallons of cold water.
- C8. The \_\_\_\_\_ is a mechanically refrigerated storing and dispensing cabinet for milk. (para 23)
- C9. Defrost the milk dispenser when the frost is \_\_\_\_\_ - \_\_\_\_\_ inch thick. (para 23d)
- C10. When washing the \_\_\_\_\_ of the cabinet, be careful not to get the electric cord wet. (pare 23e)

DO YOU UNDERSTAND EVERYTHING IN THIS PROGRAMMED REVIEW?  
HAVE YOU CHECKED YOUR RESPONSES, MADE CORRECTIONS, AND  
REMOVED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON  
TO THE NEXT STUDY UNIT OF THIS SUBCOURSE.

## SECTION VI

### SANITATION EQUIPMENT

24. **PREFLUSHING MACHINE.** This machine (fig. 24) is used to remove food scraps and grease from plates and trays before they are placed in the dishwashing machine. The two major groups of components of the machine are the tank assembly and the power assembly. The tank assembly consists of a scrapping plate, a scrapbucket and a tank which is the reservoir for the flush water. The power assembly consists of a 1/6-horsepower motor that drives a rotary that forces water up through the gusher tube. The unit can be flush-mounted in the dirty-dish counter and is further supported by adjustable legs. Most of the components of the preflushing machine are stainless steel. The machine is equipped with a pump motor switch that starts and stops the electric motor, a pump intake plate that is set to control the height of the water column, and hot, cold, and blender water valves used to control the temperature and flow of water coming into the tank. The blender valve automatically mixes hot and cold water to a temperature of 115° F and discharges the mixed water at a steady rate of 1h gallons per minute. During operation water valves for hot and cold water are mounted on the incoming water lines, when the preflushing machine is installed. They are not part of the machine.

#### a. OPERATION.

##### (1) Preparing to preflush.

- (a) Position the overflow pipe in the tank drain hole.
- (b) Lower the scrap basket into the tank and place the scrapping basin above it. Position gusher hole in scrapping basin over outlet of gusher tube.
- (c) Open the hot and cold water valves.
- (d) Turn the pump motor switch to ON position.

##### (2) Preflushing.

- (a) Do not use soap or detergent in a preflushing machine except to clean the machine after operations. Both of these products will leave a film that hardens on dishes and is not removed by the dishwashing machine. In addition, because water flows into and out of the machine continuously, it is wasteful to maintain a soap or detergent solution in the machine.
- (b) Remove and discard any paper products such as napkins from the dish or tray. (Nothing else needs to be removed.)

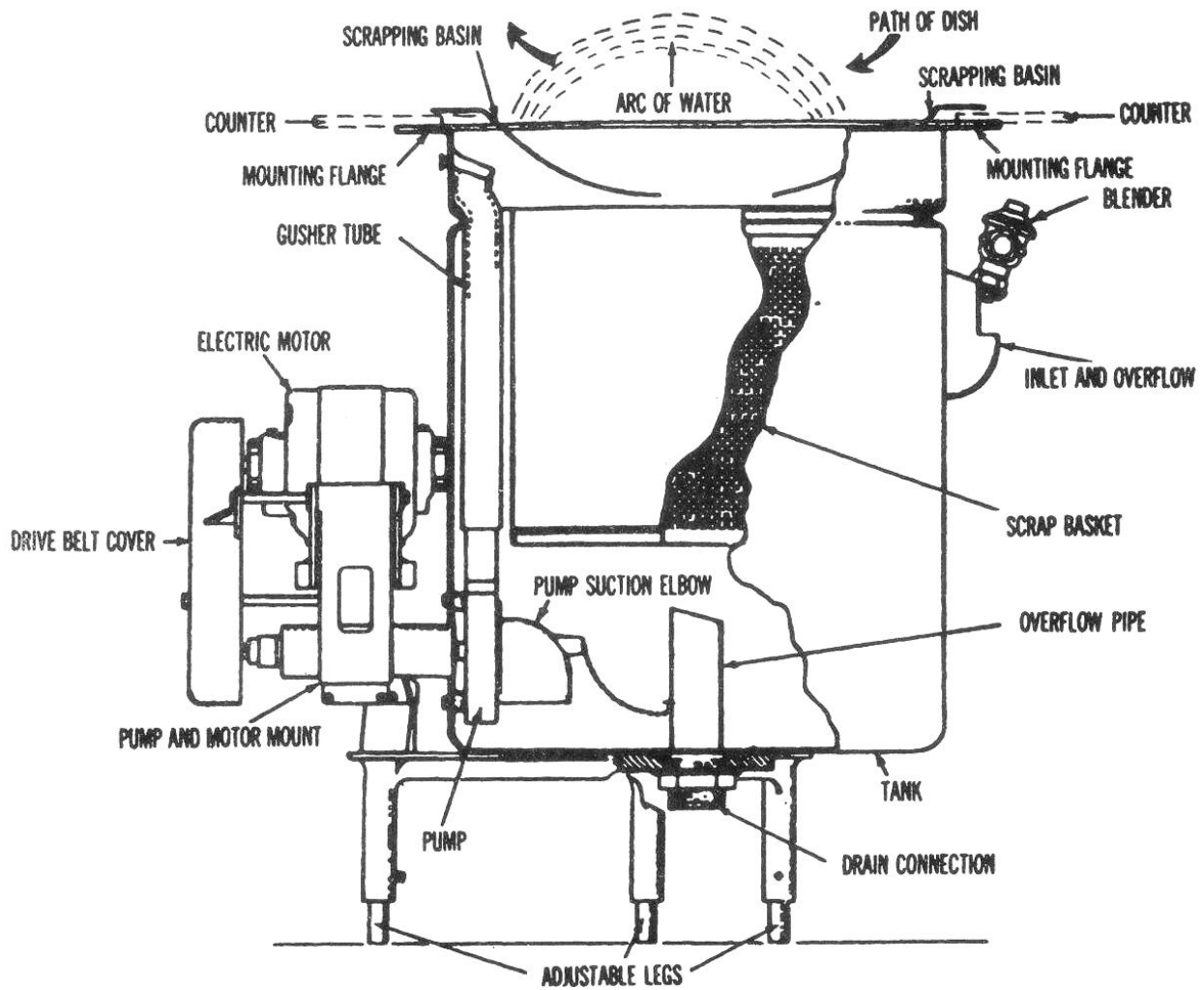


Figure 24. Cutaway diagram of a preflushing machine.

(c) Hold the dish right side up and pass it through the lower end of the arc of the water column (the end farthest from the gusher tube). This operation flushes the top of the dish.

(d) Continue the motion toward the gusher tube to pass the dish through the water column a second time closer to the gusher outlet. This flushes the bottom of the dish.

(e) Stack the flushed dishes or place them in dishwasher racks.

(3) Shutting down.

(a) Turn the pump motor switch to OFF position.

- (b) Close the hot and cold water valves.
- (c) Remove scrapping basin.
- (d) Remove and empty the scrap basket.
- (e) Remove the overflow pipe and allow the tank to drain.

b. OPERATOR MAINTENANCE. Operator maintenance of the preflushing machine consists of cleaning.

(1) After each use.

(a) Scrub the scrapping basin and scrape the basket with a stiff brush and a hot detergent solution. Rinse in clear, hot water and air-dry.

(b) Replace the overflow pipe, open the hot and cold water valves, and fill the tank to an inch below the top of the overflow pipe. Close the water valves.

(c) Add one (1) cup of dishwashing compound or detergent to the water.

(d) Scrub all the interior tank surfaces thoroughly with the cleaning solution and a long-handled brush.

(e) Remove the overflow pipe and drain the tank.

(f) Open the water valves and rinse the tank thoroughly. After rinsing the tank close the water valves.

(2) Daily. At the end of each operating day, complete the cleaning procedure is b(1) above and clean the pump and gusher tube as follows:

(a) Position the overflow pipe.

(b) Open the water valves and fill the tank to one inch below the top of the overflow pipe. Close the water valves.

(c) Add one (1) cup of dishwashing compound or detergent to the water and turn on the pump motor.

(d) Run the pump motor for 10 minutes. Recirculating the cleaning solution flushes grease from the pump, so that it will continue to operate efficiently and also cleans the gusher tube.

(e) Turn the motor off, remove the overflow pipe and drain the cleaning solution.

(f) Replace the overflow pipe, open the water valves, turn the pump motor on and operate the machine for about five (5) minutes to rinse the interior.

(g) Replace the overflow pipe and the scrapping basin, but do not replace the scrapbasket. Store the scrapbasket overnight where it can be exposed to circulating air.

c. SAFETY PRECAUTIONS. In addition to observing the general safety precautions (paragraph 3), the operator should always turn on the cold water first and then add hot until the desired temperature is reached. If the pump motor smokes or makes any unusual noise during operation, the unit should be shut down and the condition reported to the person in charge. The scrapbasket should always be in place because if food scraps are not caught, they may foul the pump and burn out the motor.

25. SINGLE-TANK DISHWASHING MACHINE. The single-tank dishwasher (fig. 25) is a spray-type machine whose body and tank are made of corrosion-resistant steel. There are two sets of spray arms or manifolds in its dishwashing chamber, one for washing and one for rinsing (fig. 26). Wash arms are installed above and below the dish level, and they wash the dishes with water containing detergent. The usual temperature for dishwashing water is 150° to 160° F, but newer dishwashing equipment sometimes specifies lower water temperatures. The operator should follow the instructions in the appropriate technical manual or the manufacturer's instructions. The rinse arms above and below the dish level are connected directly to a booster water heater or a hot water storage tank that provides a clear, hot water for rinsing. The minimum temperature of the rinse water should be 180° F but may range up to 210° F. A removable scrap tray is set immediately below the lower spray arms to keep any food scraps out of the tank.

a. OPERATION.

(1) Preliminary procedures.

(a) Close the drain valve.

(b) Check the wetting-agent-level in the rinse-additive injector. Add more wetting agent, if needed.

(c) Turn the fill switch to the ON position. When the water in the tank reaches the proper level, turn the switch to the OFF position.

(d) Position the scrap trays in the machine.

(e) Open the main steam valve. Adjust the rinse-water temperature control, if necessary, so the rinse-water temperature will exceed 180° F.

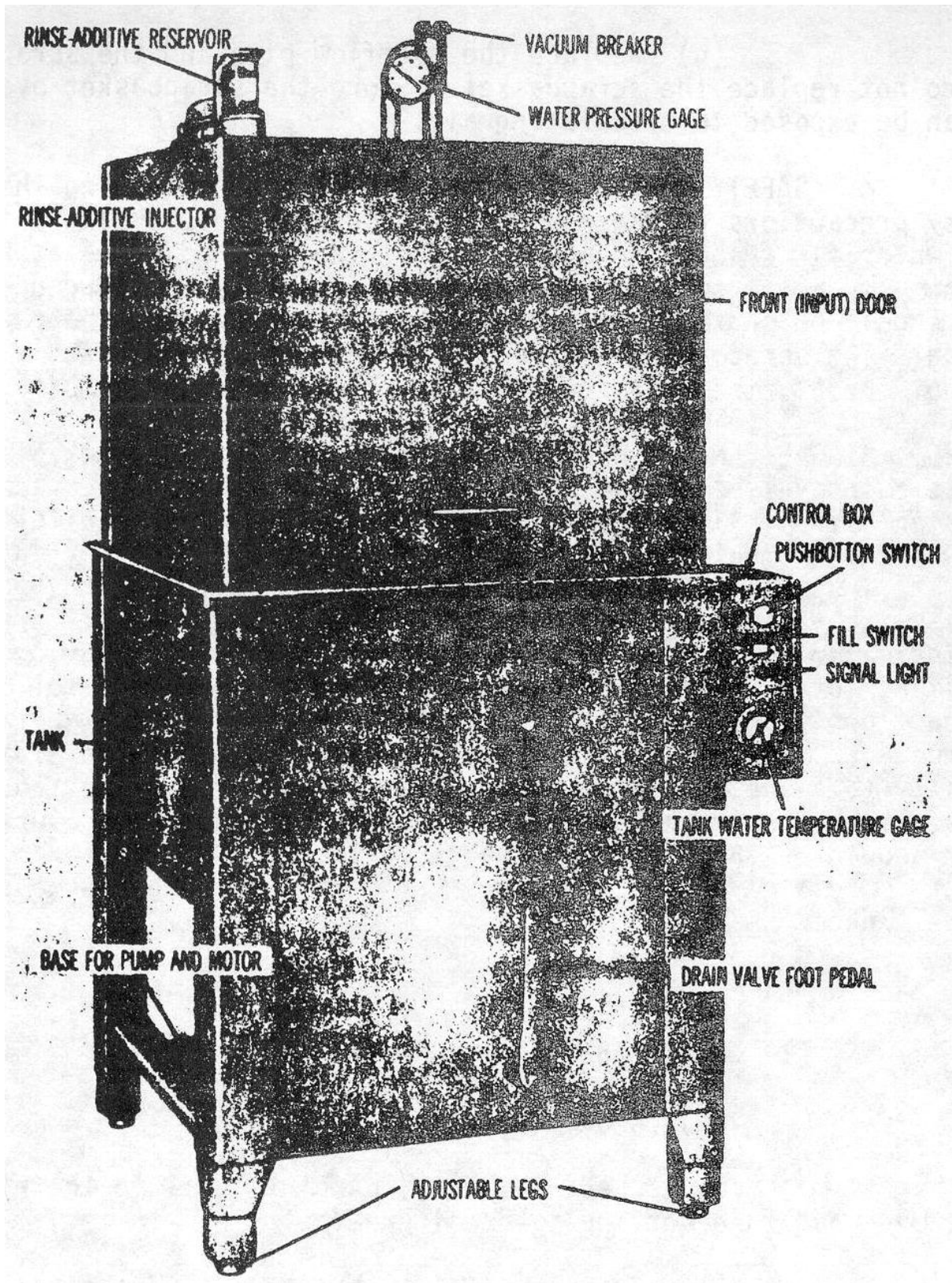


Figure 25. Single-tank dishwashing machine.

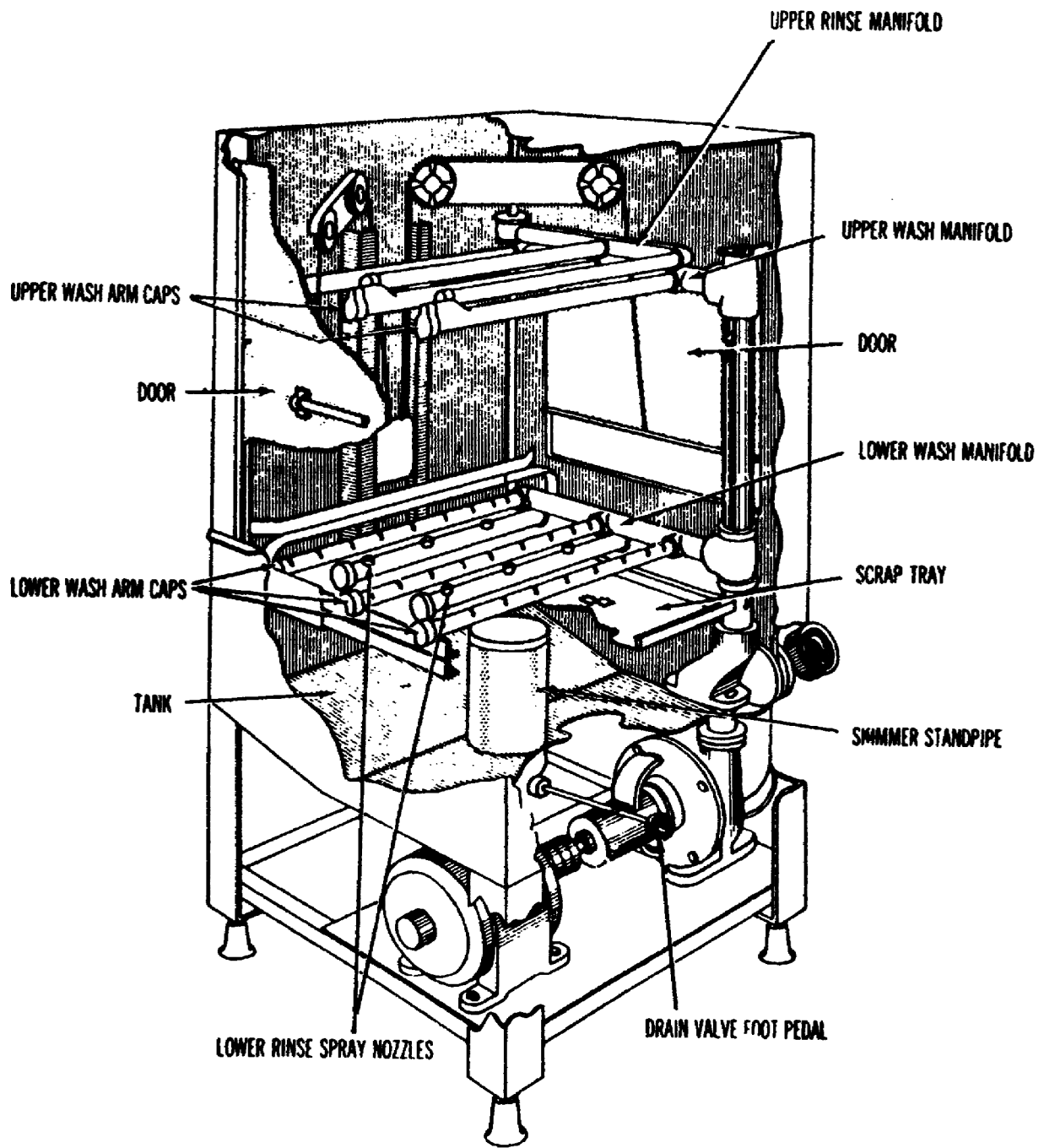


Figure 26. Cutaway diagram of a single-tank dishwashing machine

(f) Add one cup of dishwashing compound, sprinkling it over the scrap trays. Never use soap in a dishwashing machine; it clogs the wash nozzles. Do not use hand dishwashing compound.

(g) Press the start button and allow the machine to complete one full cycle to thoroughly dissolve the dishwashing compound.

(2) Loading racks. After the dishes and utensils have been preflushed, rack them as follows:

(a) Plates and trays. Stand plates, flat dishes, or trays in a tray rack. These items should lean back toward the upper wash manifold at a 60° angle. If compartmented trays are used for serving, no more than five trays should be placed in a standard 20-by-20-inch rack. Plates, saucers and other flat dishes should not be crowded in the racks. Items should be spaced so wash water from both upper and lower manifolds can reach both surfaces of each item.

(b) Cups, bowls and glasses. Place cups and bowls upside down in bowl- and cup-racks. Do not crowd or overlap items. Wash glasses upside down in glass racks or all-purpose racks.

(c) Flatware. Flatware is processed through the dishwashing machine twice, first through the full cycle and then through the rinse cycle only. Flatware is loaded differently for each cycle.

1. Full cycle. Scatter flatware loosely in cutlery racks. Do not crowd flatware. Separate like items, especially spoons, so they cannot nest together. Wash water and rinse water must be able to reach all surfaces of each piece of tableware if the full sanitary effect of machine dishwashing is to be realized.

2. Rinse only. As soon as the washed flatware is cool enough to touch, place the pieces, eating surface down, in clean flatware cylinders. Place knives in one cylinder, forks in another, and spoons in another. Place the cylinders in a stainless steel flatware rack and set the rack into a dishwashing machine cutlery rack. Slide the rack into the machine and operate the machine through the rinse cycle only. This rinse sterilizes the flatware. It should not be touched again until it is removed by the handle from the cylinder.

3. Washing. Raise the intake door and slide a rack of dishes into the dishwashing chamber. Close the door. Push the start button. When the signal light goes out (cycle length is approximately one (1) minute), open both doors. Remove the rack of clean dishes from the outlet side of the machine and slide another rack of dirty dishes in from the intake side. Close both doors and repeat the above procedures until all dishes are washed. If the dishwashing operation takes more than 30 minutes, turn off the steam and drain the tank. Refill the tank with fresh water, turn the steam on, and add one (1) cup of dishwashing compound.



Dissolve the dishwashing compound by cycling the empty machine once. Complete the dishwashing operation.

4. Drying. Allow racks of clean dishes to air-dry. If items are properly spaced in the racks, they should dry quickly. The high temperature of the rinse water and the sheet-draining effect of the rinse-water additive combine to speed spot-free drying.

5. Shutting down. When the last rack of dishes is washed, close the steam valve and open the drain valve. While the tank is draining, clean the wash manifold arms. While the wash arm end caps are off and the scrap trays are in place, fill the tank and add one (1) cup of dishwashing compound. Start the motor and allow the machine to cycle once. Drain the tank and, while it is draining, replace the end caps on the wash arms. Refill the tank and, with scrap trays in place, cycle machine once without dishwashing compound to flush the pump, water lines and tank. When the cycle is completed, drain the tank. Open both doors, or three sides if applicable, and leave them open between uses. Remove the skimmer standpipe. If appropriate, remove the pump-intake strainer and the drain strainer. Wash them with a stiff brush in a hot detergent solution, rinse in clear hot water and reinstall. Wash the exterior surfaces of the machine with a cloth dampened in hot detergent solution, rinse with a cloth dampened in hot clear water and dry thoroughly with a clean dry cloth.

b. OPERATOR MAINTENANCE.

(1) Before operation.

(a) Be sure that scrap trays are properly positioned before starting operations.

(b) Do not turn on the steam until the tank is filled.

(2) During operation.

(a) Check the temperature gages and water pressure gage frequently. If readings are not satisfactory, notify the person in charge.

(b) Check the level of the rinse additive. Refill the reservoir, if necessary.

(3) After operation.

(a) Shut the steam off before draining the tank.

(b) Leave the doors open to allow the interior of the dishwashing machine to air-dry. Failure to do this may result in corrosion and shortening the life of the machine.

(4) Weekly cleaning. Degrease the machine once a week, in lies of the shutdown cleaning procedures. To do this

(a) When the last rack of dishes is washed, close the steam valve and open the drain valve.

(b) While the tank is draining, clean the wash manifold arms.

(c) Remove and scrub the scrap trays and replace them.

(d) Fill the tank.

(e) Add a triple charge of dishwashing compound (3 cups) to the tank. Set the machine on wash only and operate the machine for approximately 20 minutes. Stop the motor and drain the tank.

(f) Open the doors and scrub out the remaining residue with a stiff brush. Flush the interior thoroughly by refilling the tank and running the machine through one cycle without the dishwashing compound.

(g) Drain the tank and leave the machine open to ventilate and air-dry.

c. **SAFETY PRECAUTIONS.** The operator should keep his head, hands, And arms out of the wash chamber during operations. If an accident or any unusual incident occurs he should cut off the machine immediately.

26. **DUAL-TANK DISHWASHING MACHINE.** The dual-tank dishwashing machine (fig. 27) is similar to the single-tank machine, but the dual-tank machine has separate wash and rinse tanks with a splash curtain between them, and the racks of dishes are moved through the machine automatically on a conveyor chain instead of manually. The wash-water temperature is kept between 150° and 160° F, and the rinse water is kept at a minimum of 170° F. The dual-tank machine has an additional curtain rinse as its final phase. In the curtain rinse, water is sprayed evenly across the width of the conveyor from above and below. The temperature of the water must be at least 180° F; if the water temperature falls below 180° F, the machine will cut off automatically.

a. **OPERATION.** The operator puts the scrap trays in place and fills both tanks. He turns on the heat source (gas, electricity, or steam), then turns the motor switch when the dishes are ready for washing. During washing, he should check the wash and rinse temperatures and the detergent-concentration gage frequently. When the dishwashing is completed, he turns off the heat, stops the motors, and drains, washes, and rinses the tanks.

b. **CARE AND CLEANING.** The same procedures are used to clean and care for the dual-tank machine as for the single-tank dishwasher. The

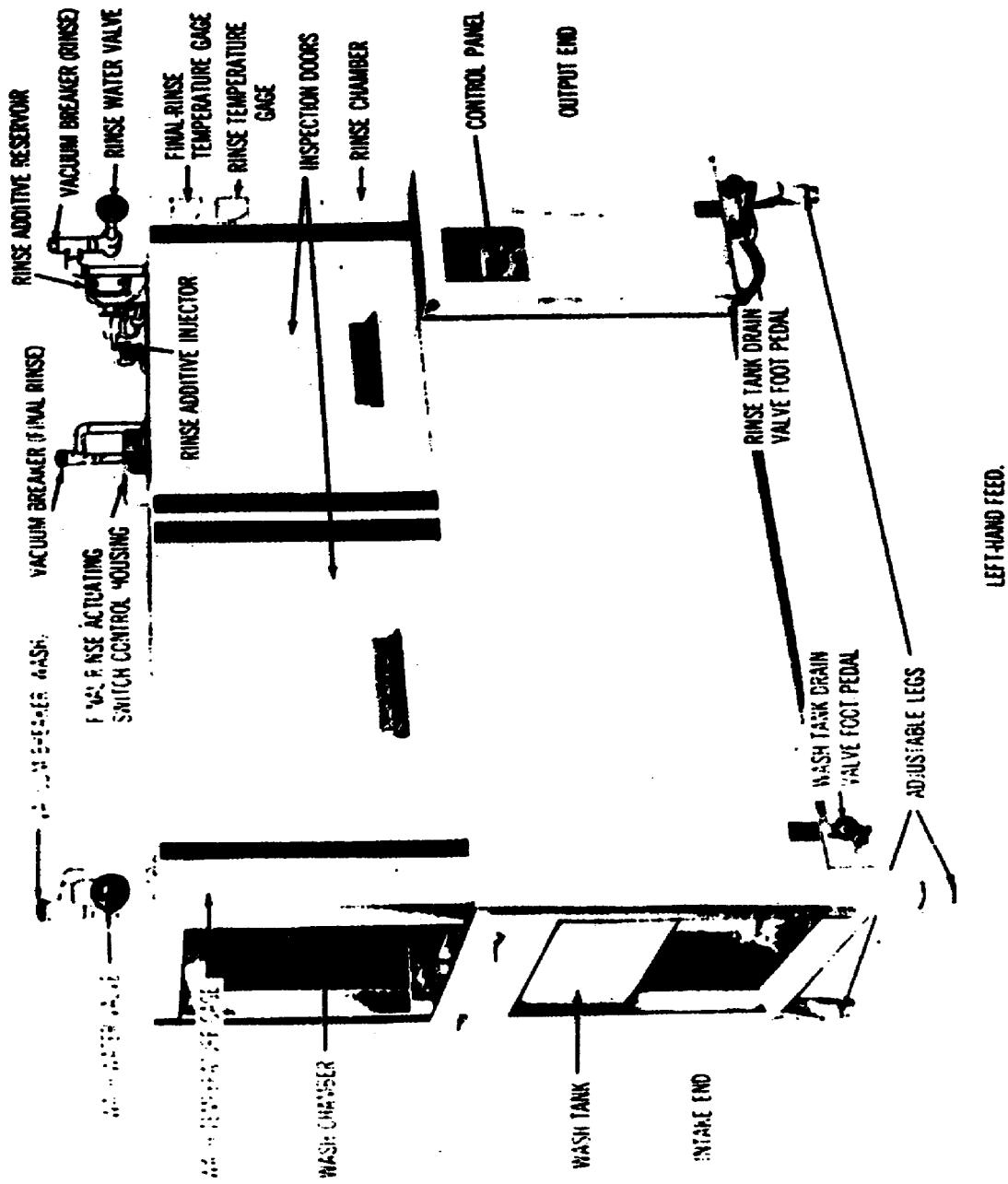


Figure 27. Dual-tank dishwashing machine with left hand feed.

machine should always be left open when it is not in use to allow it to dry and to prevent corrosion.

c. **SAFETY PRECAUTIONS.** In addition to the safety precautions for the single-tank machine, the operator of a dual-tank dishwasher must use special care on a machine that heats the rinse water with steam. He must watch for steam and water leaks and be sure that all valves and switches that control the heat are turned off before the rinse tank is drained. He must keep his hands and arm away from the conveyor drive chains while the machine is operating. Because of the design of the inspection doors, he should never put his head, arms, hands, or fingers through the door openings unless the doors are completely removed from their guides.

## PROGRAMMED REVIEW D

The questions in this Programmed review give you a chance to see how well you have learned the material in section VI of lesson 1. The questions are based on the key points covered in the section.

Read each item and write your answer on the line or lines provided for it. Please use a pencil to write your answers. If you do not know, or are not sure, what the answer is, check the paragraph reference that is shown in parentheses right after the item; then go back and study or read once again all of the referenced material and write your answer.

After you have answered all of the items, check your answers with the Solution Sheet at the end of this lesson. If you did not give the right answer to an item, erase it and write the correct solution in the space instead. Then, as a final check, go back and restudy the lesson reference once more to make sure that your answer is the right one.

**SITUATION.** You are to help wash the dishes. Before loading the dishwasher, you must use the preflush machine to remove scraps from the plates and trays.

**REQUIREMENT.** Complete exercises D1 and D02 by filling in the blanks with the correct wording.

D1. Before using the preflush machine, you must adjust the height of the water column by adjusting the \_\_\_\_\_  
\_\_\_\_\_. (para 24a)

D2. After using the preflush machine, you clean the pump and gusher-tube by pumping detergent solution for \_\_\_\_\_ minutes and then clear water for \_\_\_\_\_ minutes. (para 24b)

**SITUATION.** After preflushing the plates and trays, you are ready to load the ware to be washed in the dishwasher racks.

**REQUIREMENT.** Exercises D3 through D5 are matching exercises. Column I lists ways of loading dishes. Column II lists types of dishes. Match the dish in column II with the method in column I. Items may be used once, more than once, or not at all.

Column I

Column II

- D3. Placed in racks at an angle of about 60°. \_\_\_\_\_  
(para 25a)
- D4. Placed in racks upside down. \_\_\_\_\_  
(para 25a)
- D5. Placed in racks according to type. \_\_\_\_\_  
(para 25a)

- a. Flatware
- b. Glasses.
- c. Pans.
- d. Plates.

SITUATION. You are responsible for training cooks' apprentices to load and operate the dishwasher. You must recognize correct or incorrect procedures.

REQUIREMENT. Read exercises D6 through D10 to decide whether the apprentice has performed correctly or whether he has made a mistake. If the apprentice has performed correctly, write A, if he has made a mistake, write B.

- D6. The apprentice has some unusually dirty dishes to wash so he uses a higher wash water temperature to clean them completely. (para 25)
- D7. The apprentice runs out of automatic dishwashing detergent so he substitutes handwashing detergent, taking care to decrease the amount. (para 25a)
- D8. The apprentice loads the flatware in the cutlery rack, like items together and uncrowded so they will be washed thoroughly. (para 25a)
- D9. The apprentice washes and hoses down the interiors of the dishwasher after operation and leaves the doors open so that the equipment will air-dry. (para 25b)
- D10. The apprentice hears a noise in the machine during operation. He turns off the water and puts his head inside the machine to investigate. (para 25c)

DO YOU UNDERSTAND EVERYTHING IN THIS PROGRAMMED REVIEW?  
HAVE YOU CHECKED YOUR RESPONSES, MADE CORRECTIONS, AND  
RESTUDIED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON  
TO THE NEXT STUDY UNIT OF THIS SUBCOURSE.





## SOLUTIONS

### PROGRAMMED REVIEW A

EXERCISE	SOLUTION
A1.	B
A2.	A
A3.	A
A4.	B
A5.	C
A6	A
A7.	motor
A8.	bowl
A9.	guard; weight
A10.	knife

## SOLUTIONS

### PROGRAMMED REVIEW B

EXERCISE	SOLUTION
B1.	b
B2.	c
B3.	a
B4.	thermostat
B5.	closed
B6.	front
B7.	15
B8.	touch
B9.	closed
B10.	grease

## SOLUTIONS

### PROGRAMMED REVIEW C

EXERCISE	SOLUTION
C1.	e
C2.	a
C3.	c
C4.	d
C5.	b
C6.	water level
C7.	a
C8.	milk dispenser
C9.	one-fourth
C10.	exterior

## SOLUTIONS

### PROGRAMMED REVIEW D

EXERCISE	SOLUTION
D1.	pump intake plate
D2.	10; 5
D3.	d
D4.	b
D5.	a
D6.	B
D7.	B
D8.	A
D9.	A
D10.	B

## LESSON 2

### LESSON ASSIGNMENT

SUBJECT	Identification and Uses of Food Serving and Preparation Utensils.
STUDY ASSIGNMENT	Lesson Text.
SCOPE	Use and identification of food serving and preparation utensils, including pots, pans, cutlery sets, and other small equipment.
OBJECTIVES	As a result of successful completion of this assignment, you will be able to-- <ol style="list-style-type: none"><li>1. Identify utensils for food service operations.</li><li>2. Identify care, maintenance, and safety procedures for use of food service utensils.</li><li>.3 Identify small equipment used for food service preparation and serving operations.</li></ol>

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## LESSON TEXT

### SECTION I

#### PREPARATION AND SERVING UTENSILS

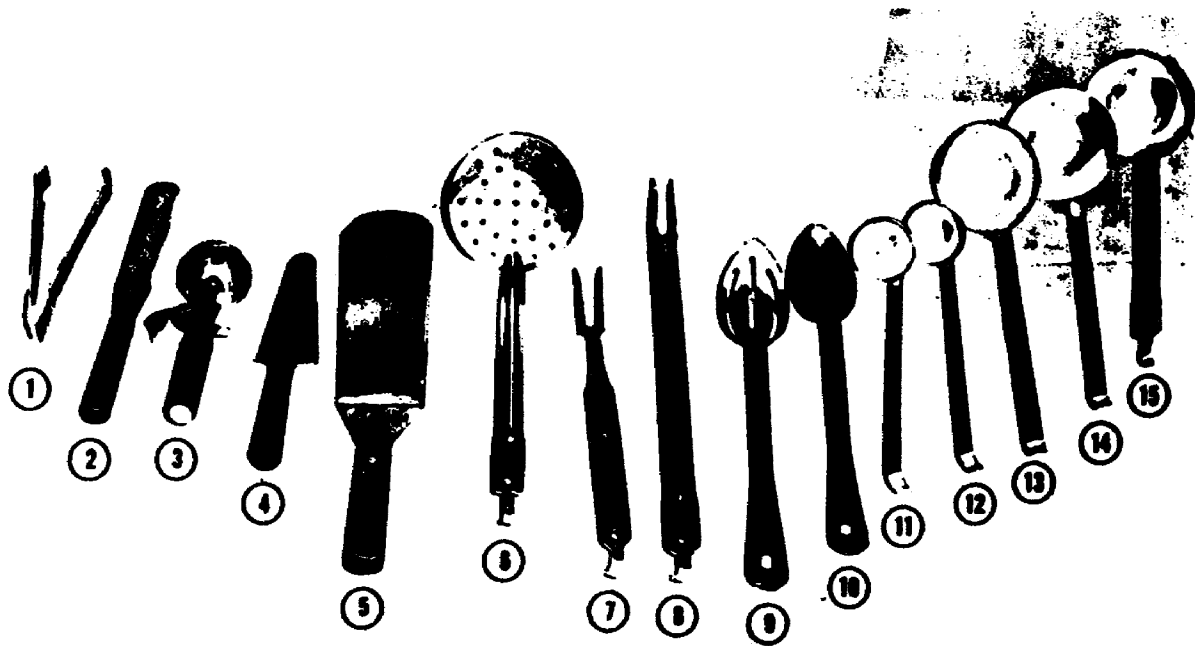
1. **GENERAL.** The cook in the garrison dining facility should know how to use preparation and serving utensils, but he should also know how to clean and maintain the equipment after he uses it. The Clean-as-you-go policy should be observed in all dining facility operations. If cooks clean and maintain equipment after each use, it will always be ready for use and the kitchen will be kept clean, sanitary, and safe.

2. **CARE AND MAINTENANCE.** Many different types of pots, pans, and small utensils are used in the kitchen (figs. 1, 2, and 3). After use, they should be washed thoroughly with hot, detergent solution, rinsed with hot water, and allowed to air-dry. If food is burned on a pan, the pan should be filled with water and boiled until the food is loosened. Soda and washing powders that contain strong alkalis should not be used on aluminum utensils. Sharp instruments, steel wool, or harsh scouring powders should not be used to clean stainless steel, tin-plated, nickel-plated or chrome-plated utensils. The abrasive action may damage the finish of the metal, and steel wool filings may remain and get into food. After pots and pans are cleaned, they may be stored bottoms up; they should not be nested inside each other. Small preparation and serving utensils may be stored in drawers or hung from the rack on the cooks' worktable.

3. **KNIVES.** Knives of many sizes and types (fig. 3), each designed for a certain job, are used in the dining facility. The use of the knife also determines the type of bevel. The bevel is the angled portion of the blade sharpened to make the cutting edge; a narrow bevel will stand more hard wear than a wide bevel. The boning knife has a short, narrow, stiff blade designed to cut through joints and close around bones to separate the meat from the bone; the steak knife has a long, wide blade designed to cut steaks and roasts. The slicing knife or carving knife has a long, thin blade designed to carve cooked meat; the bread knife has a serrated blade to slice baked goods. The paring knife is a small knife used to peel fruits and vegetables, and the cook's knife is a large knife used to slice, chop, or cut vegetables.

a. **SHARPENING.** Knives are sharpened on a medium-fine-grade carborundum oilstone (fig. 4). (A power or hand-driven dry stone should not be used because it will cause the knife to overheat and will remove the temper from the knife edge.) Knives with a wide bevel are held flat against the stone; those with a narrow bevel are held at an angle. To avoid hollowing out the blade, pass the ENTIRE blade edge across the FULL LENGTH of the stone, using first the coarse side and then the fine side of the stone.





- |                        |                   |
|------------------------|-------------------|
| 1. Serving tongs       | 9. Slotted spoon  |
| 2. Spatula             | 10. Basting spoon |
| 3. Ice cream dipper    | 11. 1-ounce ladle |
| 4. Pie and cake server | 12. 2-ounce ladle |
| 5. Food turner         | 13. 4-ounce ladle |
| 6. Skimmer             | 14. 6-ounce ladle |
| 7. 15-inch fork        | 15. 8-ounce ladle |
| 8. 21-inch fork        |                   |

Figure 1. Serving and cooking utensils.

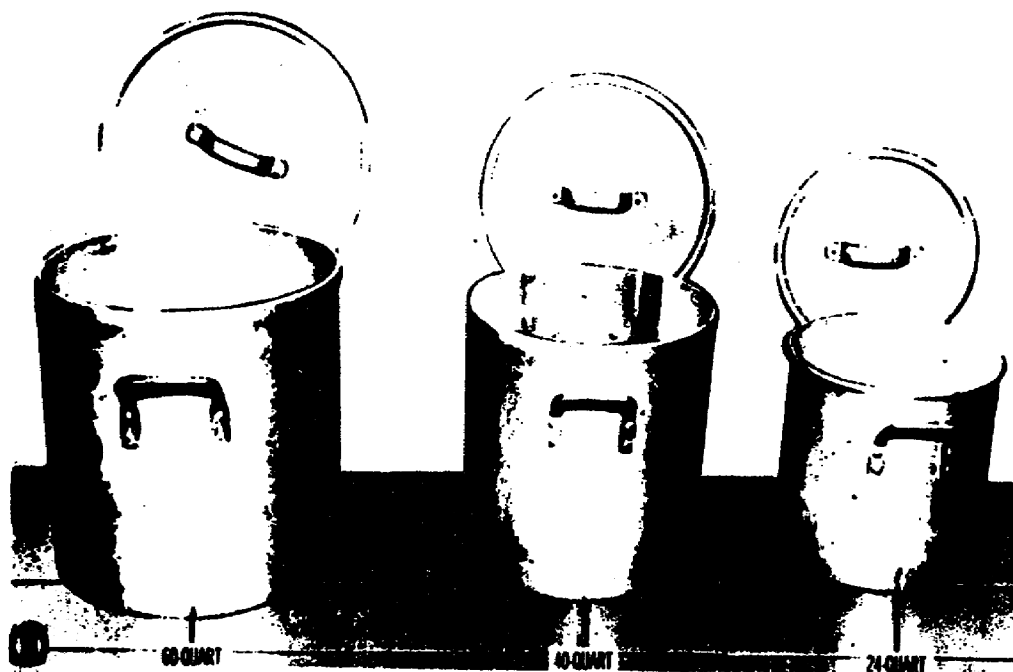
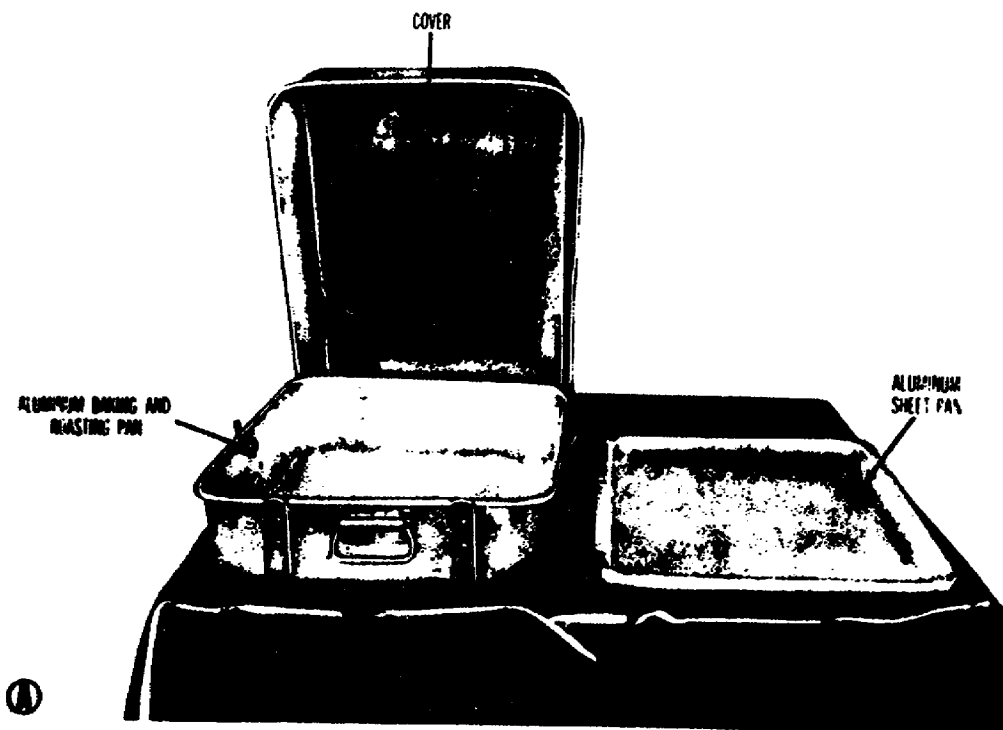


Figure 2. Roasting pan and cover, sheet pan and stockpots.

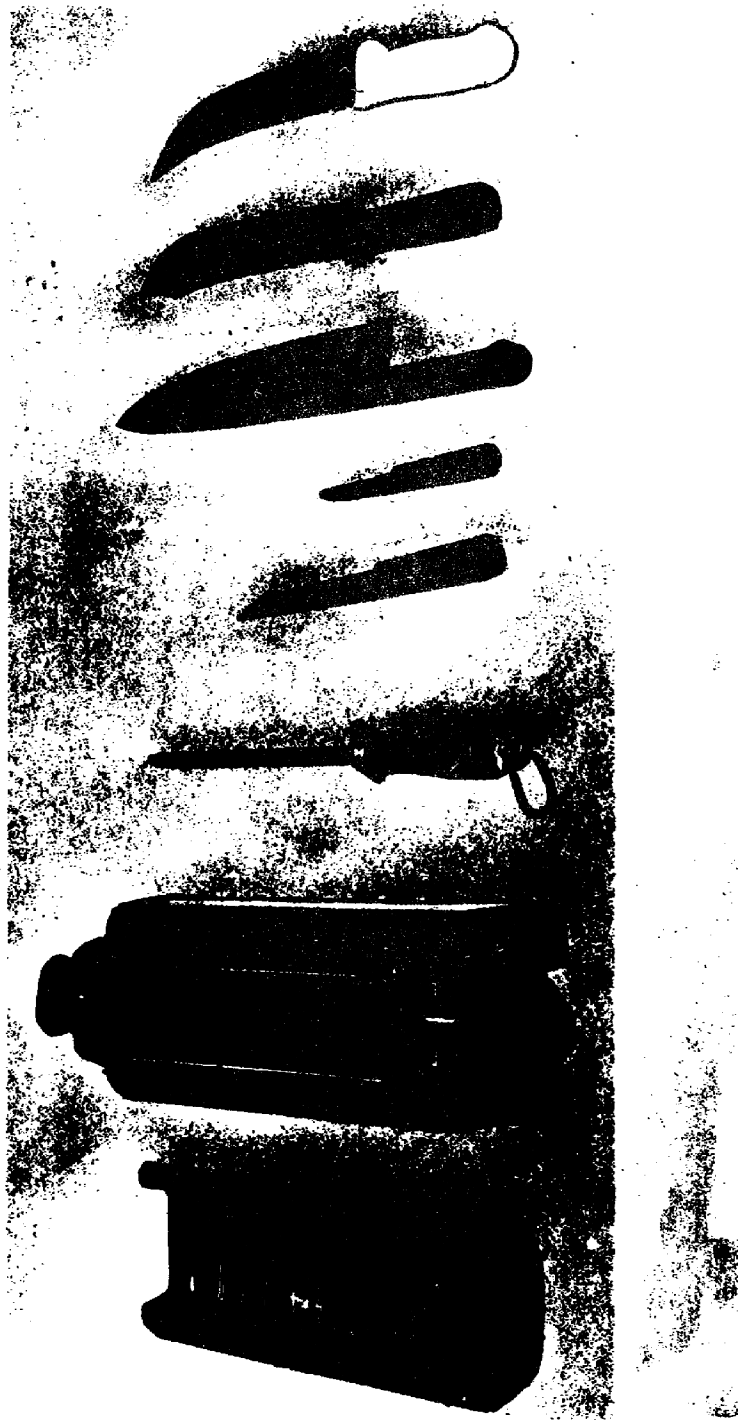
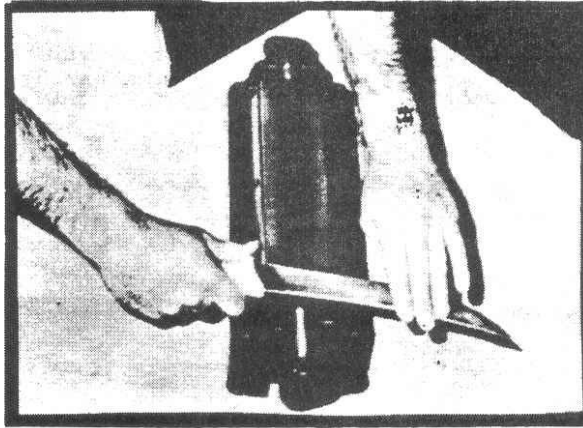
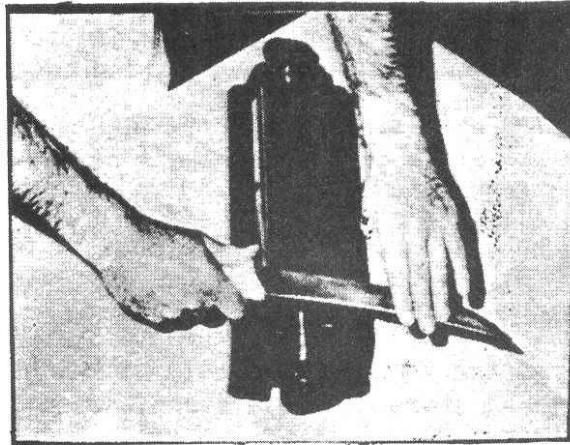


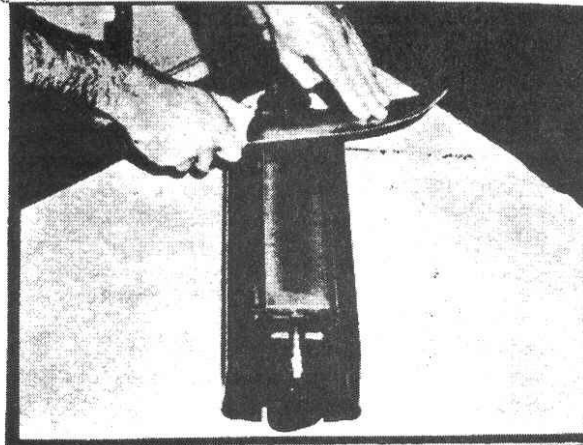
Figure 3. Carborundum oilstone, butcher's steel, and various knives used in the dining facility.



1. PLACE HEEL OF KNIFE AT UPPER END OF STONE.



2. DRAW FULL BLADE (FROM HEEL TO TIP) ACROSS FULL LENGTH OF STONE.



3. TURN KNIFE OVER AND REPEAT PROCEDURES, STARTING WITH HEEL AT OPPOSITE END OF STONE.

Figure 4. Sharpening a knife.

b. **STEELING KNIVES.** After the knife has been sharpened, it must be smoothed or trued (fig. 5) on a butcher's steel. The steel is held with the point up and away from the body. The heel of the knife is placed against the far side of the tip of the steel and the whole length of the blade is drawn down across the steel with a quick, swinging wrist movement. This is repeated with the other side of the blade against the other side of the steel. After the knife is steeled, it is cleaned and stored in the rack or drawer.

c. **CARE AND MAINTENANCE.** The knife should be used only for the job for which it is intended. The user should wash the knife immediately after use with a hot, detergent solution, rinse it with clear water, and dry it carefully. A knife with a wooden handle should not be soaked; the handle will expand when wet and then shrink as it dries, loosening the blade and leaving cracks that can hold food particles and germs. After the knife is cleaned, it should be replaced in the hanging steel rack authorized for use in the dining facility or in a drawer with a slotted wood strip for knife blades.

d. **SAFETY PRECAUTIONS.** Food service personnel should always use the right knife for the job and use it properly. They should always cut away from the body and never palm vegetables or fruits when cutting through them. Knives should never be left in a sink of dishwater; this ruins the handles and is dangerous to personnel. A knife should not be left on a worktable where it may accidentally be covered up and may cut the person who clears off the table. Food service personnel should never carry knives when their hands are full of other things, should never use a knife to open cans, and should never try to catch a falling knife. (They should step back, let the knife fall to the floor, and then pick it up.)



1. Hold steel firmly in left hand, with point upward and slightly away from the body. Be sure that thumb is behind the guard on the steel.



2. With a quick swinging motion of the right wrist and forearm, bring the blade down across the steel toward the left hand.



3. Repeat procedure with other edge of blade against far side of steel. Alternate from side to side, about six strokes on each side.

Figure 5. Steeling a knife.

## SECTION II

### SMALL EQUIPMENT

4. VEGETABLE-CUTTING MACHINE. This is a hand-operated machine that cuts, slices, and cubes firm vegetables (fig. 6). The cutter consists of a frame, handle assembly, runway, chamber, and an assortment of dies and plungers which determine the type of cut.

a. OPERATION. The cutter is fastened securely to a rigid table or bench, and a container is placed under the cutting chamber. The correct setting of die and plunger must be selected for the type of cut. For example, only one back die and plunger are used to slice or cut potatoes for french fries. A back die and plunger and a front die and plunger are used to cube vegetables. After the matching die and plunger are selected, the handle is pulled forward, and the cutter is loaded. The back plunger is slid into the runway and back cubing die is slid into a vertical position ahead of the plunger. Both are firmly engaged in place, and then the handle is pushed back; the procedure is repeated for the front cubing die and plunger. When the proper die and cutter are in place, the handle is pulled all the way forward, and a vegetable is placed in the runway in front of the back plunger. The handle is then pushed all the way back and then returned to the forward position, and the cut vegetable drops into the container. This action is repeated until all the vegetables are cut. To remove the plunger after use, the guide rails are pushed outward to release the plunger. To remove the die, the die handle is held, and the lock pin is pulled out to release the die.

b. MAINTENANCE. Dies and plungers are washed after each use in a warm, detergent solution, rinsed, wiped, and shaken to remove any remaining moisture. After dies and plungers are washed, they are stored immersed in a covered container of vegetable oil to prevent rust and corrosion. Dies and plungers should be handled with care because they are cast metal and will break if mishandled. The runway and chamber are washed with a clean cloth dampened in a warm, detergent solution, rinsed in warm water, and dried. The identification plate is removed periodically, and the chamber is cleaned with a stiff brush and warm, detergent solution and dried. The runway surface, side runners, and the interior of the chamber, including the back of the identification plate, are wiped with a clean, dry cloth and a small amount of mineral oil. The pivot points of the handle are oiled when necessary with a few drops of mineral oil.

c. SAFETY PRECAUTIONS.

(1) Be sure that the vegetable cutter is securely mounted before starting operations.

(2) Always fit die and plunger together to insure a matched pair before inserting them.

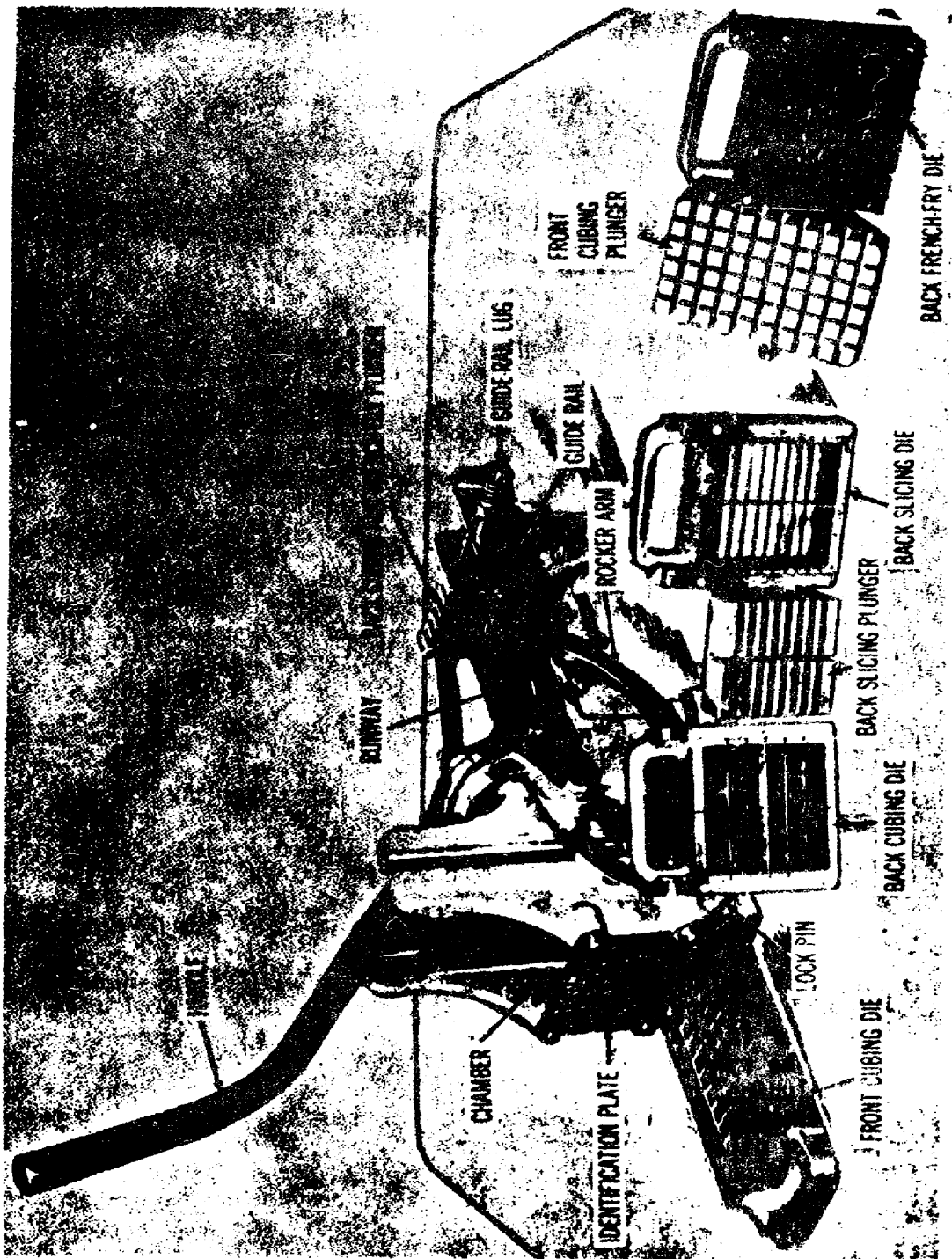


Figure 6. Vegetable-cutting machine.



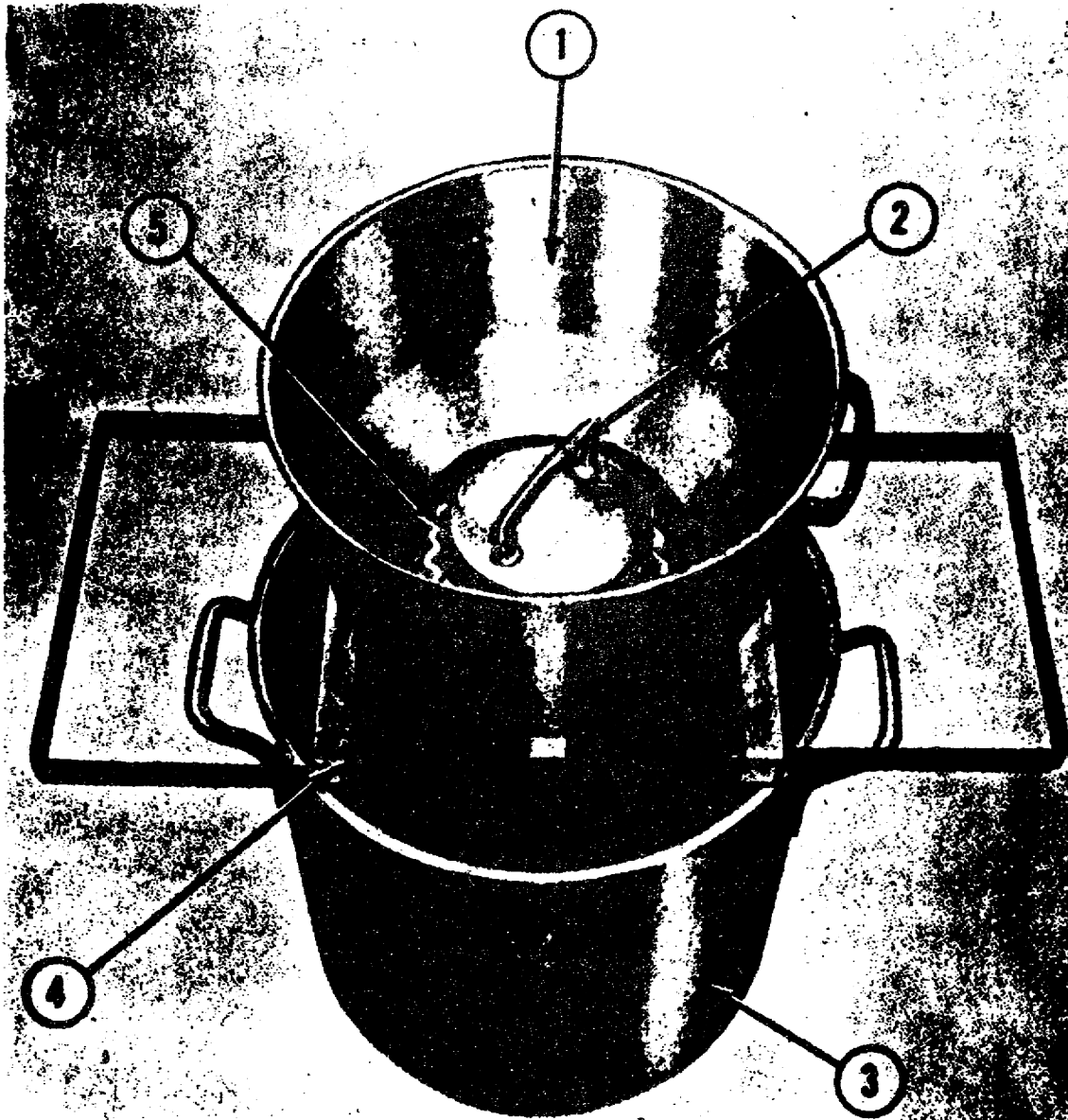
(3) Handle the dies and plungers with care; they are cast metal and will break if mishandled.

5. **COOKING GREASE FILTER.** The cooking grease filter consists of a filter kettle, a filter plunger, a cloth filter disk, and a collapsible adapter rack (fig. 7). It filters hot grease so that it may be reused for cooking purposes. If reused, 20 percent of the fat must be replaced by fresh to revitalize the used fat. The adapter rack has a ring at its center; the filter kettle is placed in this ring and held in position while the grease is being poured. The kettle and plunger are made of tin-coated sheet steel. A stockpot is used with a filter to catch the hot grease.

a. **OPERATION.** The stockpot is placed against a wall or other stationary object so that it will not tip over, and the adapter rack is placed on top of the stockpot. The kettle is placed in the support ring in the center of the rack. The filter disk is placed in the center of the filter kettle, and the plunger is positioned in the center of the filter disk and firmly seated. After all the grease has been poured through the filter, the filter kettle is removed from the rack and the filter is discarded. The grease is stored, lightly covered, in the refrigerator after it has cooled to room temperature.

b. **CLEANING.** The kettle, plunger, and rack are washed in hot, detergent solution, rinsed in clear water, and allowed to air-dry.

c. **SAFETY PRECAUTIONS.** Personnel must be extremely careful when handling hot grease because it can cause severe burns. When pouring hot grease they should be sure that the stockpot is braced to prevent tipping. The grease should be left in a safe place while cooling to room temperature.



- |          |                                                                   |          |                     |
|----------|-------------------------------------------------------------------|----------|---------------------|
| <b>1</b> | <b>Kettle</b>                                                     | <b>4</b> | <b>Adapter rack</b> |
| <b>2</b> | <b>Plunger</b>                                                    | <b>5</b> | <b>Filter disk</b>  |
| <b>3</b> | <b>Stockpot (not included<br/>with cooking grease<br/>filter)</b> |          |                     |

Figure 7. Cooking grease filter.

## PROGRAMMED REVIEW

The questions in this Programmed review give you a chance to see how well you have learned the material in lesson 2. The questions are based on the key points covered in this lesson.

Read each item and write your answer on the line or lines provided for it. Please use a pencil to write your answers. If you do not know, or are not sure, what the answer is, check the paragraph reference that is shown in parentheses right after the item; then go back and study or read once again all of the referenced material and write your answer.

After you have answered all of the items, check your answers with the Solution Sheet at the end of this lesson. If you did not give the right answer to an item, erase it and write the correct solution in the space instead. Then, as a final check, go back and restudy the lesson reference once more to make sure that your answer is the right one.

A1. SITUATION. You are a cook. You must wash and store some utensils that you used in the preparation of a meal.

REQUIREMENT. Choose from the following sentences those that give the proper procedure for washing the utensils. There could be more than one answer. \_\_\_\_\_ (para 2)

- a. You use steel wool to remove food that stuck to a pan and then rinse the pan well.
- b. You wash the utensils with hot detergent solution, rinse with hot water, and air-dry.
- c. You fill the pan with water and boil it until the food burned on it is loosened.
- d. You use soda or strong washing powder to remove food stains from aluminum pans.
- e. You stack dried pans inside each other on a shelf under the cooks' worktable.

A2. You are a cook preparing fresh onions. To use knives safely and correctly for the Job, you should peel the onions with a \_\_\_\_\_ knife and then slice them with a \_\_\_\_\_ knife. (para 3)

A3. SITUATION. You are a first cook; you are supervising the work of other cooks preparing food which involves the use of various knives.

REQUIREMENT. After reading the following sentences, select the cook or cooks who are correctly using and caring for knives. \_\_\_\_\_  
(para 3c and d)

- a. Cook A slices cooked meat with a carving knife that has a wooden handle; then, he puts the knife in the sink to soak.
- b. Cook B uses the paring knife to peel cucumbers and then the cook's knife to slice them. After he finishes, he carries his knives to the sink, washes, air-dries them and hangs them in the rack.
- c. Cook C slices some tomatoes; after slicing them, he leaves the cook's knife lying on the worktable.
- d. Cook D is cooking some vegetables which begin to boil over on the stove. He rushes to the stove, still holding the knife he was using.

SITUATION. You, a cook, have just cubed some vegetables in the vegetable cutting machine. You need to clean the machine to prevent rust and corrosion.

REQUIREMENT. Exercises A4 through A6 are matching exercises. Column I lists three types of maintenance you would perform on parts of the vegetable-cutting machine. Column II lists parts of the machine. Choose the correct parts from column II to fit the maintenance in column I. Items in column II may be used once, more than once, or not at all.

<u>Column I</u>	<u>Column II</u>
A4. Wash and store immersed in a container of oil to prevent corrosion. _____ (para 4b)	a. runway and chamber
A5. Wash with a cloth dampened in a warm detergent solution, rinse in warm water, and dry. _____ (para 4b)	b. dies and plungers
A6. Wipe with a clean dry cloth and a small amount of mineral oil. _____ (para 4b)	c. pivot points of handle
	d. runway surface, side runners, interior of chamber

A7. SITUATION. You, a cook, have finished frying potatoes in the deep fryer. You are going to filter the grease so that it may be reused, so you first assemble the parts to the grease filter.

REQUIREMENT. Starting with the plunger on top and working down to the stockpot on the bottom, fill in the blanks with the missing parts in correct order. (para 5a)

filter plunger

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stockpot

DO YOU UNDERSTAND EVERYTHING IN THIS PROGRAMMED REVIEW?  
HAVE YOU CHECKED YOUR RESPONSES, MADE CORRECTIONS, AND  
REMOVED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON  
TO THE EXAMINATION.

## APPENDIX

### REFERENCES

AR 40-5	Health and Environment
CTA 50-911	Equipment for Army Food Service Facilities, Appropriated Fund
CTA 50-915	Allowances for Miscellaneous Field Garrison Equipment
FM 10-23	Army Troop Feeding Operations
FM 21-10	Field Hygiene and Sanitation
FM 10-25	Preparation and Serving of Foods in the Garrison Dining Facility
TM 10-415	Dining Facility Equipment: Operation and Operator Maintenance
SB 700-20	Army Adopted/Other Items Selected for Authorization/ List of Reportable Items

SOLUTIONS  
PROGRAMMED REVIEW

EXERCISE	SOLUTION
A1.	b and c
A2.	paring; cook's
A3.	b
A4.	b
A5.	a
A6.	d
A7.	disc; kettle adapter; rack