

HEAT: Protection from the Cold

Family of Space Heaters (FOSH)

Benefits:

SBCCOM has developed a Family of Space Heaters (FOSH) utilizing the latest advances in combustion, power generation and microprocessor technology to provide comfort and protection for soldiers, supplies and equipment in tents during cold weather operations in the field. The FOSH replaces current M-1941 and Yukon heaters and eliminates the severe safety hazards/ operational deficiencies that have existed over the past 50 years in the field. End products from the FOSH program include a new non-powered burner technology which provides clean, safe, efficient combustion of Diesel and JP-8; a new multi-viscosity fuel control providing accurate, multi-fuel operation in all temperature conditions; a new thermoelectric fan to provide hot air circulation without electrical power; integration of thermoelectric technology to provide single switch, completely automatic, self-powered operation with forced hot air circulation; and accessory equipment including new fuel can stand, gravity feed adapter and quick disconnect shut-off valves.

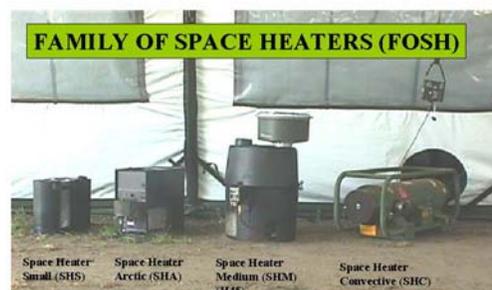
Applications:

Four heaters and a thermoelectric fan make up the FOSH as follows:

- o **Space Heater Convective (SHC)** - heats the Modular Command Post Shelter
- o **Space Heater Medium (SHM) or H-45** - heats all General Purpose tentage
- o **Space Heater Arctic (SHA)** - heats all Arctic tentage
- o **Space Heater Small (SHS)** - heats the 5 man Soldier Crew Tent
- o **Thermoelectric Fan**-used with SHM, SHA, and SHS to provide circulation of heated air in tents

Capabilities:

- o Operates without electrical power
- o Multi-fuel operation (Diesel, JP8,JP5,kerosene, wood & coal)
- o Efficient, clean burning combustion requiring little maintenance
- o Operable in all cold weather conditions down to -60F
- o Self-contained, lightweight, portable, rugged and simple to operate
- o Low cost



Family of Space Heaters (FOSH)

SPACE HEATER ARCTIC (SHA)

The SHA is a 28KBTU heater that is designed to provide heat for the 10 man arctic tent and other tentage with floor area between 100 & 200 square feet. The SHA will replace the current Yukon heater which has severe operational deficiencies and poses a serious safety hazard in the field. The SHA operates without the use electrical power and can burn all types of liquid fuel (DF-2, DF-1, DF-A, JP-5, JP-8) and solid fuel (wood and coal). It utilizes the new vaporizing S-tube burner technology which overcomes the major combustion and safety problems that have existed over the past 50 years in the nonpowered heater industry. These problems include poor smokey combustion of diesel fuel and the hazardous exposure of a pool of raw fuel during operation. The new vaporizing S-tube burner technology eliminates these deficiencies while still maintaining simplicity, ruggedness, and low cost. All accessory components, including the pre-assembled, telescoping stove pipe, can be stored within the heater making it highly mobile and easy to assemble.

REMARKS:

Pre-production prototypes have been fabricated and Production Qualification Testing (PQT) has been successfully completed at Ft. Greely Alaska 2QFY96.

FACTS:

Type Classification: 3QFY97 (NSN 4520-01-444-2375)

Procurement Date: 3QFY98

Fielding Date: 4QFY99

Size: 16"H x 9"W x 16"L

Weight: 35# including all accessories (stack, flue cap, gravity feed adapter, hoses, etc.)

Climate Category: Operational -60F to 60F, Storage -60F to 160F

Application: Arctic 10 & 5 Man Tents

POC: Mr. Joseph Mackoul, DSN 256-5592



Space Heater Arctic (SHA)

SPACE HEATER SMALL (SHS)

DESCRIPTION:

The SHS is a 12KBTU heater that is designed to provide heat for the Soldier Crew Tent (5 man tent) and other tentage with floor area between 80 & 100 square feet. The SHS will satisfy a heating requirement for small military tentage in which there is currently no existing heater that can meet this requirement. The SHS operates without the use electrical power and can burn all types of liquid fuel (DF-2, DF-1, DF-A, JP-5, JP-8). It utilizes the new vaporizing S-tube burner technology which overcomes the major combustion and safety problems that have existed over the past 50 years in the nonpowered heater industry. These problems include poor smokey combustion of diesel fuel and the hazardous exposure of a pool of raw fuel during operation. The new vaporizing S-tube burner technology eliminates these deficiencies while still maintaining simplicity, ruggedness, and low cost. Integral fuel tank design eliminates need for hoses, gravity feed adapter, fuel can and fuel can stand.

REMARKS:

Initial design prototypes have been successfully tested in the climatic chambers at SSCOM 4QTR 98.

FACTS:

Type Classification: 4QFY01 (NSN 4520-01-478-9207)

Procurement Date: 1QFY01

Fielding Date: 2QFY02

Size: 14"H x 8.5"W x 14"L

Weight: 19# including all accessories

Climate Category: Operational -60F to 60F, Storage -60F to 160F

Application: Soldier Crew Tent

POC: Mr. Joseph Mackoul, DSN 256-5592



Space Heater Small (SHS)

H-45 HEATER

The H-45 space heater is a 45KBTU heater that is designed to provide heat for the General Purpose and Temper tents. The H-45 heater replaces the M-41 heater which is antiquated, has severe operational deficiencies and poses a serious safety hazard in the field. The H-45 heater operates without the use electrical power and can burn all types of liquid fuel (DF-2, DF-1, DF-A, JP-5, JP-8, JP-4, and gasoline) and solid fuel (wood and coal). It utilizes the new vaporizing R-tube burner technology which overcomes the major combustion and safety problems that have existed over the past 50 years in the nonpowered heater industry. These problems include poor smokey combustion of diesel fuel and the hazardous exposure of a pool of raw fuel during operation. The new vaporizing R-tube burner technology eliminates these deficiencies while still maintaining simplicity, ruggedness, and low cost.

REMARKS:

The H-45 heater was successfully fielded in 1992.

FACTS:

Procurement Date: FY91

Fielded Date: FY92 (NSN 4520-01-329-3451)

Size: 18" dia X 24"H

Weight: 70# including all accessories (stack, flue cap, gravity feed adapter, hoses, etc.)

Climate Category: Operational -60F to 60F, Storage -60F to 160F

Application: All General Purpose Tentage (Small, Medium and Large), and TEMPER tents

NSN: 4520-01-329-3451 Cost: \$650

POC: Mr. Joseph Mackoul, DSN 256-5592



H45 Heater

SPACE HEATER CONVECTIVE (SHC)

The SHC is a 35KBTU thermoelectric heater that provides forced hot air circulation in military tentage without the need for an external power supply (ie. eliminating the need for a field generator). This effort is the first of its kind to have successfully integrated thermoelectrics and combustion into a fieldable heater prototype that delivers clean, breathable heat to military tentage and shelters. The thermoelectric heater generates its own electrical power (approximately 200 watts) through the use of thermoelectric modules located in the combustion chamber which convert the waste heat into electrical energy. The electrical current generated is used to power the blowers, pumps, ignition system, safety system, and control devices required in the operation of the heater. The heater can be operated either inside or outside the tent and has the capability to burn multiple liquid fuels (DF-2, DF-1, DF-A, JP-5, & JP-8). The heater is simply started with a single switch and operation is completely automatic due to built in diagnostics, safety and temperature controls. The heater will provide a 60% increase in combustion efficiency over currently fielded nonpowered heaters and provide much cleaner combustion of diesel fuel, resulting in a significant reduction in fuel costs and maintenance requirements.

REMARKS:

Pre-production prototypes have been fabricated and Production Qualification Testing (PQT) has been successfully completed at Ft. Greely Alaska 2QFY95.

FACTS:

Type Classification: 3QFY96 (NSN 4520-01-431-8927)

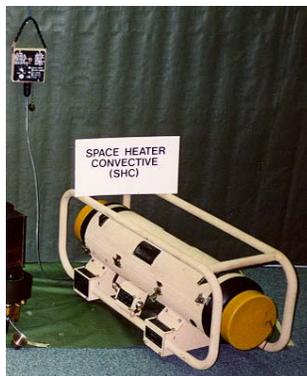
Size: 17"H x 14"W x 39"L

Weight: 67#

Climate Category: Operational -40F to 60F, Storage -60F to 160F

Application: Modular Command Post System Tent, TOCs and other tents housing expensive electronics equipment

POC: Mr. Joseph Mackoul, DSN 256-5592



Space Heater Convective (SHC)

THERMOELECTRIC FAN (TEF)

The TEF is designed for use with standard military heaters to produce more uniform heating of the shelter and resulting in more comfortable living/working conditions, improved health and morale, and obtaining significant fuel savings. The TEF is a compact, lightweight, ruggedly designed unit that is simply set on top of the heaters when in use. It has a built in thermoelectric module which converts heat from the stove into electricity to power a 450 cfm fan. The fan blows air downward over the heater to the bottom of the tent, thus improving air circulation and providing for more even distribution of heat throughout the entire shelter. Improved heating performance as a result of the circulating fan allows operating the burners at lower outputs, thus reducing fuel consumption.

REMARKS:

Final design units have been fabricated under a Phase II SBIR effort. These prototypes were successfully tested with the Space Heater Arctic (SHA) and Space Heater Small (SHS) of the Family of Space Heaters (FOSH) program in a Production Qualification Test (PQT) 1QFY96. The TEF will be Type Classified with the SHA and SHS.

FACTS:

Type Classification: 3QFY97 (NSN 4520-01-457-2790)

Fielded Date: 3QFY00

Size: 12" diameter, 10" high

Weight: 12#

Cost: \$520

Climate Category: Operational -60F to 60F, Storage -60F to 160F

Application: Used with non-powered tent heaters (H45 and SHA)

POC: Mr. Joseph Mackoul, DSN 256-5592



Thermoelectric Fan (TEF)

HEATING STOVE AND DEVICE TRAINING

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HEATING STOVE AND DEVICE TRAINING

HEATING STOVE TRAINING

1. Commanders will ensure that all operators of the below listed equipment will be properly licensed. Certification of the required training will be annotated on the operators OF 346 and DA Form 348 IAW Paragraph 7-2b, AR 600-55, The Driver and Operator Standardization Program:
 - a. M1941, Space Heater, Pot Belly
 - b. M1950, Space Heater, Yukon
 - c. Heater, Space, Radiant, Large (H-45)
 - d. Immersion Heater
 - e. M2, Burner Unit (Cook Stove)

2. The established training and certification program will train operators for the above pieces of equipment that will be used within their command. The training requirements are contained in chapter 7, AR 600-55. Training will be designed to establish and reinforce safe operating habits and positive attitudes toward the operation of this equipment. Equipment training procedures are provided in each of the heater or stove operator and maintenance manuals. Training emphasis will be provided to the operator to include safety, before, during and after operations. Training package outlines are available and are provided within this package.

3. Commanders will establish a Field Pre-Ops inspection requirement of all field heating and cooking stoves before each field exercise to ensure device serviceability. A Pre-Ops inspection check list will be found in the operators -10 manual of each piece of equipment.

4. The Army has six space heating stoves that are issued to provide heating of troop areas. These issued stoves are: M1941 - Pot Belly, M1950 - Yukon and the new H-45 Heating Stove, Space Heater Convective (SHC), Space Heater Small (SHS), Space Heater Artic (SHA).

5. This package contains key instructional areas to prevent accidents for the following heating equipment:
 - a. M1941, Space Heater, Pot Belly - TM 10-4500-200-13
 - b. M1950, Space Heater, Yukon - TM 10-4500-200-13
 - c. Heater, Space Radiant, Large (H-45) - TM 9-4520-257-12
 - d. Immersion Heater - TM 10-4500-200-13
 - e. M2, Burner Unit (Cook Stove) - TM 10-7360-204-13

6. Commanders will ensure that operators are trained on each of the above heating devices which the unit uses. AR 600-55, para 6-1a, specifies equipment training requirements. This training will consist of maintenance of equipment, set up, starting procedures, operational procedures, shutting down, and taking out of operation procedures. Training will be IAW equipment manuals as indicated above. Additionally, training will teach and enforce all warnings and cautions about equipment operations per the manual.

HEATING STOVE AND DEVICE TRAINING

7. Required training will be properly documented IAW AR 600-55 on DA Form 348, Operators Qualification Record of Equipment Licensed and Training. Operators OF 46, Equipment Qualification Card, will reflect equipment authorized to operate.

1. REFERENCES:

- a. AR 385-10, The Army Safety Program, 23 May 88.

HEATING STOVE AND DEVICE TRAINING

- b. AR 600-55, The Army Driver and Operator Standardization Program, 31 Dec 93.
- c. TM 10-4500-200-13, M1941, Space Heater, Pot Belly.
- d. TM 10-4500-200-13, M1950, Space Heater, Yukon.
- e. TM 10-4500-200-13, Immersion Heater.
- f. TM 10-7360-204-13, M2, Burner Unit (Cook Stove).
- g. TM 9-4520-257-12, Operators and Unit Maintenance Manual, Heater, Space, Radiant, Large (H-45).

2. The purpose of this enclosure is to provide guidance and define responsibilities for the prevention of heating stove accidents. Procedures for operator licensing, certification training and safe use of these devices are contained herein.

3. Commanders will ensure that all operators of the below listed equipment will be properly licensed. Certification of required training will be annotated on the operators OF 346 and DA Form 348 IAW Paragraph 7-2b, AR 600-55, The Driver and Operator Standardization Program:

- a. M1941, Space Heater, Pot Belly
- b. M1950, Space Heater, Yukon
- c. Heater, Space, Radiant, Large (H-45)
- d. Immersion Heater
- e. M2, Burner Unit (Cook Stove)

4. Established training and certification programs will train operators for the above pieces of equipment that are used within their command. Training requirements are contained in chapter 7, AR 600-55. Training will be designed to establish and reinforce safe operating habits and positive attitudes toward the operation of this equipment. Equipment training procedures are provided in each of the heater or stove operator and maintenance manuals. Training emphasis will be provided to the operator to include safety, before, during and after operations. Training package outlines are available at Installation Safety.

Enclosure 7

5. Commanders will establish a Field Pre-Ops inspection requirement of all field heating and cooking stoves before each field exercise to ensure device serviceability. A Pre-Ops inspection check list will be found in the operators -10 manual of each piece of equipment.

6. Leadership Training. Commanders will provide awareness training for the supervisors of the soldiers that will be operating this equipment. This training will cover the following major reasons for heating device accidents:

- a. Throwing water into a pot belly stove to clean it.
- b. Leaking fuel control, fuel saturating surrounding material.
- c. Lack of training in, before, during and after operational procedures.

HEATING STOVE AND DEVICE TRAINING

- d. Combustible material placed too close to stove or under stove.
- e. Using mogas and diesel fuel mixture in single fuel stoves. (All stoves are designed to use only one fuel at a time.)
- f. Hot refueling kerosene stoves/generators. (Refilling fuel tanks while stoves/generators are still burning/operating or have not cooled off.)
- g. Improper lighting techniques for immersion heaters (resulting in facial and eye injuries as soldiers look down into the fire chamber during lighting).
- h. Improper refueling and lighting techniques used for the M2, cook stoves.
- i. Improper assembly.
- j. Lack of available fire extinguishers.
- k. Leaving an unattended stove in operation.

7. The following Field Heating Stove Safety Inspection will be used daily by the Commander or his designated representative to identify operational hazards and reduce the risk of fire.

- a. When heaters are operated in sleeping tents, a fireguard must be posted inside the tent. Fireguard must remain awake and alert.
- b. No space heater will be operated unattended.
- c. Stoves will not be operated at the maximum setting. This will cause excessive heating of the smokepipes which will ignite the tent where the pipes extend through the tent.
- d. A sand box will be used to prevent stove igniting combustible surface materials. Other combustible materials will not be within 48 inches of the stove.
- e. No fuel cans will be stored inside tents. Refueling site will be kept clean and free from spilled or leaking fuel.
- f. No stove will be cleaned when it is hot .
- g. No stoves will be refueled while the stove is hot or still burning.

OPERATION OF HEATERS AND STOVES

1. Among the four seasonal changes , there is no period of change that presents such potential for unplanned and unnecessary accidental loss as the fall to winter change. Every year there are accidents involving the misuse, unskilled and nonstandard use of heating stoves. Commanders and chain of command must be knowledgeable of these measures in order to prevent equipment destruction and injuries.
2. Following are a few primary causes of heater or stove fires:
 - a. Throwing water into a pot belly stove to clean it.
 - b. Leaking fuel control, fuel saturating surrounding material.

HEATING STOVE AND DEVICE TRAINING

- c. Lack of licensing and certification, which require training in start-up and operational procedures.
- d. Combustible material placed too close to stove.
- e. Using mogas and diesel fuel mixture in single fuel stoves. (All stoves are designed to use only one fuel at a time.)
- f. Hot refueling of kerosene stoves/generators. (Refilling fuel tanks while stoves/generators are still burning/ operating or have not cooled off.)
- g. Improper lighting techniques for immersion heaters (resulting in facial and eye injuries as soldiers look down into the fire chamber during lighting).
- h. Improper refueling and lighting techniques used for the M2, cook stoves. (last Message for the M2 Stove is, Ground Precautionary Message GPM-SSCOM-97-02: Burner Unit, Model M2A, W/Safety Device, NSN 7310-01-113-9172).
- i. Spilled Coleman fuel when using a stove in a tank turret.
- j. Improper assembly.

3. Following are accident prevention standards to prevent potential hazards of space heaters and other Army stoves:

a. Operators Training. The best way to ensure proper operation of heaters and stoves is through proper selection, training, examining, and supervision of operators. TB 600-1 states that operators of all types of space heaters that operate with liquid fuel will be trained and licensed IAW equipment operating manual and AR 600-55.

b. Inspection Standards - Proper Equipment Set Up.

- (1) Ensure stove is sitting level.
- (2) Ensure proper assembly.
- (3) Ensure stove is not sitting on combustible material, dried grass, leaves, or tentage (use sand box).
- (4) Ensure stove is at least 48 inches from combustible material (i.e., cots, TA-50, administrative, etc.).
- (5) Ensure equipment does not leak. Check fuel hoses and all connections. Enforce the use of drip loops in the fuel hose and drip cans under each loop.
- (6) Ensure serviceable fire extinguishers Type B or Combination Type ABC are located near each stove. (Preferably near exit.)
- (7) Ensure proper fuel is being used. **NO MIXED MOGAS AND DIESEL FUEL** will be used.
 - (a) M1941 Type, Pot Belly - Use only diesel fuel.
 - (b) M1950 Type, Yukon - Use only mogas.

HEATING STOVE AND DEVICE TRAINING

(8) Ensure a minimum of six smoke pipe sections are used, and properly placed and secured extending at least 18 inches through the roof of the tent.

c. Inspection Standards - Proper Equipment Operation.

(1) When heater is operated in a sleeping tent, a fireguard must be posted inside the tent. Fireguard must remain awake and alert.

(2) No space heater will be operated unattended.

(3) Stoves will not be operated at the maximum setting. This will cause excessive heating of smokepipes which will ignite the tent where pipes extend through the tent.

(4) Fuel control settings above seven on the pot belly stove fuel control will cause heavy smoke due to fuel waste and will require the stove to be shut down, cooled and cleaned.

(5) No fuel cans will be stored inside tents. Refueling site will be kept clean and free from spilled or leaking fuel.

(6) No stove will be cleaned when it is hot.

4. More detailed training and operational material for use by the Commander in his/her Accident Prevention Program are attached.

5. Commanders must establish an annual training requirement for initial, as well as refresher training, for both the chain of command and the operators.

Equipment Training for M1941, Space Heater - Pot Belly

Equipment Training for M1950, Space Heater - Yukon

Equipment Training for Immersion Heater

Equipment Training for M2, Burner Unit, Gasoline (Cook Stove)

Equipment Training for Heater, Large (H-45)

HEATING STOVE AND DEVICE TRAINING

EQUIPMENT TRAINING FOR M1941, SPACE HEATER - POT BELLY

1. Establish Training Program IAW Chapter 2, TM 10-4500-200-13.
2. Lesson Plan Outline.
 - a. Description of M1941, para 2-1. (Note: Only diesel fuel used)
 - b. Inspection and Servicing of Equipment, para 2-5.
 - c. Installation or Setting Up Instructions, para 2-7 thru 2-11.
 - d. Operation Under Usual Conditions, para 2-12 thru 2-16.
 - e. Operation Under Unusual Conditions, para 2-17 thru 2-18.
 - f. Preventive Maintenance Checks and Services, Table 2-1, para 2-19 thru 2-28.
3. Besides the warnings and cautions that are contained in the paragraphs above, the following safety precautions will be taught during M1941 training:
 - a. **BEFORE OPERATION:**
 - (1) Do not fill fuel tanks indoors - spillage may cause a hazardous condition.
 - (2) Wipe up all spilled fuel and be sure the fuel valve end of the tank is free of fuel and dry.
 - (3) Ensure space heater installation is complete and meets installation requirements.
 - (4) Do not operate heater in a totally confined area. Sufficient ventilation to eliminate the accumulation of carbon monoxide fumes must be available.
 - (5) Inspect fuel container and lines for leaks. Repair leaks before lighting heater.
 - (6) Keep fuel outside of the tent. Never store spare fuel in the tent.
 - (7) Fire extinguisher should be readily available for use and all personnel instructed in the use of such fire extinguisher.
 - (8) Ensure there is a four-foot clearance around the stove that is free of all combustible materials.
 - (9) Always install the draft diverter on the smokepipe top section.
 - b. **DURING OPERATION:**
 - (1) Do not pour gasoline or oil on fire.
 - (2) Do not operate stove at full blast, even in extremely cold weather. Overheated stove/pipe may ignite tentage.
 - (3) Keep face and hands away from stove lid opening when igniting fuel in burner.

HEATING STOVE AND DEVICE TRAINING

(4) Do not attempt to relight the burner while the stove is hot. Allow the burner to cool before relighting.

(5) If the pot floods, resulting in black smoke coming from the flue cap, do not panic. Follow these simple steps:

(a) Shut the fuel valve off.

(b) Do not open the lid.

(c) Immediately ventilate the area.

(d) Allow to cool.

(e) After burner has cooled, wipe up excess fuel in burner bottom and relight.

(6) Do not allow tripping hazards around stove area that could cause someone to trip and fall into or across the stove.

HEATING STOVE AND DEVICE TRAINING

EQUIPMENT TRAINING FOR M1950, SPACE HEATER - YUKON

1. Establish Training Program IAW Chapter 4, TM 10-4500-200-13.
2. Lesson Plan Outline.
 - a. Description of M1950, para 4-1. (Note: Only mogas fuel used, TM 10-4500-200-13.)
 - b. Installation or Setting Up Instructions, para 4-6 thru 4-9.
 - c. Operation Under Usual Conditions, para 4-10 thru 4-12.
 - d. Operation Under Unusual Conditions, para 4-13 thru 4-15.
 - e. Preventive Maintenance Checks and Services, Table 4-1, para 4-18 thru 4-31.
3. Besides the warnings and cautions that are contained in the paragraphs above, the following safety precautions will be taught during the M1950 training:
 - a. **BEFORE OPERATION:**
 - (1) Do not fill fuel tanks indoors - spillage may cause a hazardous condition.
 - (2) Wipe up all spilled fuel and be sure the fuel valve end of the tank is free of fuel and dry.
 - (3) Ensure space heater installation is complete and meets installation requirements.
 - (4) Do not operate heater in a totally confined area. Sufficient ventilation to eliminate the accumulation of carbon monoxide fumes must be available.
 - (5) Inspect fuel container and lines for leaks. Repair leaks before lighting heater.
 - (6) Keep fuel outside the tent. Never store spare fuel in the tent.
 - (7) Fire extinguisher should be readily available for use and all personnel instructed in the use of such fire extinguisher.
 - (8) Ensure there is a four-foot clearance around the stove that is free of all combustible materials.
 - (9) Always install the draft diverter on the smoke pipe top section.
 - b. **DURING OPERATION:**
 - (1) Do not pour gasoline or oil on fire.
 - (2) Do not operate stove at full blast, even in extremely cold weather. Overheated stove/pipe may ignite tentage.
 - (3) Keep face and hands away from stove lid opening when igniting fuel in burner.
 - (4) Do not attempt to relight the burner while the stove is hot. Allow the burner to cool before relighting.

HEATING STOVE AND DEVICE TRAINING

(5) If the pot floods, resulting in black smoke coming from the flue cap, do not panic. Follow these simple steps:

- (a) Shut the fuel valve off.
 - (b) Do not open the lid.
 - (c) Immediately ventilate the area.
 - (d) Allow to cool.
 - (e) After burner has cooled, wipe up excess fuel in burner bottom and relight.
- (6) Do not allow tripping hazards around stove area that could cause someone to trip and fall into or across the stove.

HEATING STOVE AND DEVICE TRAINING

EQUIPMENT TRAINING FOR IMMERSION HEATER

1. Establish Training Program IAW Chapter 5, TM 10-4500-200-13.
2. Lesson Plan Outline.
 - a. Description of Immersion Heater, para 5-1.
 - b. Installation or Setting Up Instructions, para 5-6 thru 5-7.
 - c. Controls, para 5-9.
 - d. Operation Under Usual Conditions, para 5-10 thru 5-12.
 - e. Operation Under Unusual Conditions, para 5-13 thru 5-15.
 - f. Preventive Maintenance Checks and Services, Table 5-1, para 5-19 thru 5-33.
3. Besides the warnings and cautions that are contained in the paragraphs above, the following safety precautions will be taught during immersion heater training:
 - a. **BEFORE OPERATION:**
 - (1) Do not fill fuel tanks indoors - spillage may cause a hazardous condition.
 - (2) Wipe up all spilled fuel and be sure that the fuel valve end of the tank is free of fuel and dry.
 - (3) Ensure heater installation is complete and meets installation requirements.
 - (4) Do not operate heater in a totally confined area. Sufficient ventilation to eliminate the accumulation of carbon monoxide fumes must be available.
 - (5) Inspect fuel container and lines for leaks. Repair leaks before lighting heater.
 - (6) Keep fuel outside the tent. Never store spare fuel in the tent.
 - (7) Fire extinguisher should be readily available for use and all personnel instructed in the use of such fire extinguisher.
 - b. **DURING OPERATION:**
 - (1) Never look down into the burner unit.
 - (2) Keep face and hands away from stove opening when igniting fuel in burner.
 - (3) If the pot floods, resulting in black smoke coming from the flue cap, do not panic. Follow these simple steps:
 - (a) Shut the fuel valve off.
 - (b) After burner has cooled and excess fuel in burner bottom has evaporated, relight the burning chamber.

HEATING STOVE AND DEVICE TRAINING

(4) Do not allow tripping hazards around stove area that could cause someone to trip and fall into or across the stove.

HEATING STOVE AND DEVICE TRAINING

EQUIPMENT TRAINING FOR M2, BURNER UNIT, GASOLINE (COOK STOVE)

1. Establish Training Program IAW Chapter 2, TM 10-7360-204-13 & P.
2. Lesson Plan Outline.
 - a. Description of M2 Burner Unit, para 2-1.
 - b. Preventive Maintenance Checks and Services, Table 2-1.
 - c. Installation or Setting Up Instructions, para 2-5.
 - d. Operation Under Usual Conditions, para 2-4 thru 2-9.
 - e. Operation Under Unusual Conditions, para 2-10 thru 2-14.
3. Besides the warnings and cautions that are contained in the paragraphs above, the following safety precautions will be taught during M2 burner unit training:
 - a. **BEFORE OPERATION:**
 - (1) Flammable liquids are used in the operation of this equipment. Death or severe burns may result if personnel fail to observe safety precautions.
 - (2) Provide adequate ventilation in cooking area to prevent the accumulation of carbon monoxide.
 - (3) Make sure the burner is turned off and allow the unit to cool before filling the fuel tank.
 - (4) Do not smoke while using the cook stove. Make sure there is no open flame in the vicinity of the refueling area.
 - (5) When filling the fuel tank, always provide a metal-to-metal contact between the container and the fuel tank to eliminate static spark.
 - (6) Remove spilled fuel immediately.
 - (7) Keep fuel tank and fuel container caps tight at all times.
 - (8) Do not store fuel containers near heat or open flame.
 - (9) Never operate range burner without top shield installed.
 - (10) Do not release the fuel air pressure until the burner has been turned off and allowed to cool. Gasoline fumes are explosive and highly flammable.
 - (11) An air compressor will be used to pressurize the fuel tank when testing the safety valve device at organizational level maintenance. At ALL OTHER TIMES, the hand air pump will be used to pressurize the fuel tank.
 - (12) Establish a safe lighting area that is a minimum of 50-feet from the refueling and cooking area.
 - (13) Do not change setting on safety valve device.

HEATING STOVE AND DEVICE TRAINING

(14) Fire extinguishers should be readily available for use at the refueling, pre-heating and cooking location and all personnel instructed in the use of such fire extinguisher.

(15) Movement of the M2 burner unit will only be accomplished by two soldiers.

b. DURING OPERATION:

(1) If a fuel leak is detected, shut the unit down immediately. **DO NOT** operate the unit again until the deficiency has been corrected.

(2) Do not fill the fuel tank while the unit is operating or hot.

(3) Do not operate burner unit when pressure gauge reads in the red.

(4) For overnight or short periods of storage with fuel remaining in the tank:

(a) Release air pressure.

(b) Hand tighten fuel filler cap.

(c) Stow burner unit on back end in vertical position.

(5) If, during operation, the flame goes out for any reason, immediately close generator valve to prevent accumulation of fuel and possible explosion.

(6) Move the burner units a minimum of 50-feet from the cooking and fuel storage areas prior to servicing.

(7) Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Avoid repeated and prolonged skin contact. Do not use near open flame or excessive heat. Flash point of solvent is 100 degrees F to 138 degrees F.

HEATING STOVE AND DEVICE TRAINING

EQUIPMENT TRAINING FOR HEATER SPACE - (H-45) TM 9-4520-257-12 & P

1. Establish training program IAW chapter 1 and 2, TM 9-4520-257-12 & P.
2. Lesson Plan Outline -
 - Description of H-45, section II, Equipment Description and Data. page 1-3.
 - Principles of Operation, Section III, page 1-10.
 - Operating Instructions, Chapter 2, page 2-1.
 - Operation under usual conditions, Section III, chapter 2, page 2-17.
 - Operation under unusual conditions, Section IV, chapter 2, page 2-32.
 - Preventive Maintenance Checks and Services, Section II, page 2-4.
3. Besides the warnings and cautions that are contained in the paragraphs above, the following safety precautions will be taught during H-45 training:
 - a. **BEFORE OPERATION:**
 - (1) Do not fill fuel tanks indoors - spillage may cause a hazardous condition.
 - (2) Wipe up all spilled fuel and be sure the fuel valve end of the tank is free of fuel and dry.
 - (3) Ensure space heater installation is complete and meets installation requirements.
 - (4) Do not operate heater in a totally confined area. Sufficient ventilation to eliminate the accumulation of carbon monoxide fumes must be available.
 - (5) Inspect fuel container and lines for leaks. Repair leaks before lighting heater.
 - (6) Keep fuel outside the tent. Never store spare fuel in the tent.
 - (7) Fire extinguisher should be readily available for use and all personnel instructed in the use of such fire extinguisher.
 - (8) Ensure there is a four-foot clearance around the stove that is free of all combustible materials.
 - (9) Always install the draft diveter on the smokepipe top section.
 - b. **DURING OPERATION:**
 - (1) Do not pour gasoline or oil on fire.
 - (2) Do not operate the stove at full blast, even in extremely cold weather. Overheated stove/pipe may ignite tentage.
 - (3) Keep face and hands away from stove lid opening when igniting fuel in burner.

HEATING STOVE AND DEVICE TRAINING

(4) Do not attempt to relight the burner while the stove is hot. Allow the burner to cool before relighting.

(5) If the pot floods, resulting in black smoke coming from the flue cap, do not panic. Follow these simple steps:

(a) Shut the fuel valve off.

(b) Do not open the lid.

(c) Immediately ventilate the area.

(d) Allow to cool.

(e) After burner has cooled, wipe up excess fuel in burner bottom and relight.

(6) Do not allow tripping hazards around stove area that could cause someone to trip and fall into or across the stove.

HEATING STOVE AND DEVICE TRAINING

MANAGING THE HAZARDS OF HEATING DEVICES.

Attached is a Safety Bulletin concerning Tent Heaters and Stoves. It is paramount that tent heaters and stoves are properly inspected and used correctly while in use. Ensure that this message gets down to every subordinate Commander and leader. Also ensure that this message gets to the unit Safety Officer/NCO for unit safety briefings/posting.

HAZARD:

The hazard associated with tent stoves and other area heating devices that use liquid fuel is:

- FIRE

RISK:

The risk of this operation if not conducted to the established standard, or controlled to reduce or eliminate the hazard is:

- Loss of property from un-attended or mishandled devices.
- Injury to personnel from improper handling resulting in burns and even death.

CONTROL MEASURES:

1. Control measures to use that will eliminate or reduce the risk of hazard:

(a) Ensure stove is not sitting on combustible material, dried grass, leaves, or tentage (use sand box). When operated in a tent with wood or canvas floor, space heaters will be placed on a noncombustible base such as a stove box made of 2X4 lumber. Minimum size of 40x28x4 inches height with a sheet metal bottom. Stove should be placed in center of box with 3 1/2 inches of sand/dirt. Combustible material should be no closer than 48 inches from stove.

(b) Ensure equipment does not leak. Check fuel hoses and all connections. Enforce the use of drip loops in the fuel hose and drip cans under each loop.

(c) Ensure proper fuel is being used. **NO MIXED MOGAS AND JP8** will be used.

(1) M1941 Type, Pot Belly - Use only JP8 fuel.

(2) M1950 Type, Yukon - Use only mogas or solid fuel.

(3) Ensure a minimum of six smokepipe sections are used, and that they are properly placed and secured extending at least 18 inches through the roof of the tent.

(d) When heater is operated in a sleeping tent, a fireguard must be posted inside the tent. Fireguard must remain awake and alert.

(e) No space heater will be operated unattended.

(f) Hot refueling will not be allowed.

(g) No fuel cans will be stored inside tents. Refueling site will be kept clean and free from spilled or leaking fuel.

(h) No stove will be cleaned when it is hot.

HEATING STOVE AND DEVICE TRAINING

(i) Ensure serviceable fire extinguishers Type B or Combination Type ABC are located near each stove. (Preferably near exit.)

2. Commanders are reminded that Kerosene heaters are unauthorized.

GROUND PRECAUTIONARY MESSAGE, (GPM)-SSCOM 97-02, M2A BURNER

HEATING STOVE AND DEVICE TRAINING

ZNR UUUUU

P R 261430Z JUN 97 ZDK PER RUERFDA9001 SVC

FM CGSSCOM NATICK MA//AMSSC-S-ENS//

UNCLAS SECTION 01 OF 02

SUBJ: GROUND PRECAUTIONARY MESSAGE (GPM), GPM-SSCOM-97-02:

BURNER UNIT, MODEL M2A, W/SAFETY DEVICE, NSN 7310-01-113-9172.

* URGENT *
* DEATH OR SERIOUS INJURY (OR DAMAGE TO ARMY EQUIPMENT) WILL *
* OCCUR IF ACTIONS SPECIFIED IN THIS MESSAGE ARE NOT IMPLEMENTED *

A. REF: MEMORANDUM, USASSCOM, SSCNC-WEF, 4 APRIL 1997, SUBJ: FINDINGS AND RECOMMENDATION FOR A CLASS A, M2 BURNER ACCIDENT (CASE NUMBER 960507003).

1. DISTRIBUTION: NOTE THIS IS A GPM AND HAS NOT BEEN TRANSMITTED TO OUR SUBORDINATE UNITS. MACOM COMMANDERS WILL IMMEDIATELY RETRANSMIT THIS MESSAGE TO ALL SUBORDINATE UNITS, ACTIVITIES, OR ELEMENTS AFFECTED OR CONCERNED. RETRANSMITTAL SHALL REFERENCE THIS MESSAGE. MACOM COMMANDERS WILL IMMEDIATELY VERIFY RECEIPT AND RETRANSMISSION OF THIS MESSAGE TO COMMANDER, U.S.ARMY SOLDIER SYSTEMS COMMAND (SSCOM), ATTN: AMSSC-S-ENS, NATICK, MA01760-5049.

2. PROBLEM DISCUSSION:

A. THIS MESSAGE IS FOR UNITS THAT EMPLOY THE USE OF BURNER UNIT, MODEL M2A, W/SAFETY DEVICE, NSN 7310-01-113-9172

B. SUMMARY OF PROBLEM: IT IS IMPERATIVE THAT ALL COMPONENTS OF THE M2A BURNER ARE OPERATING CORRECTLY FOR THE UNIT TO BE SAFE. FAILURE TO PROPERLY INSPECT THE UNIT OR FOLLOW PROPER PROCEDURE CAN RESULT IN AN UNCONTROLLED FIRE OR EXPLOSION OF THE BURNER UNIT. THE PURPOSE OF THIS MESSAGE IS TO EMPHASIZE THE IMPORTANCE OF PROPER MAINTENANCE AND OPERATION OF THE M2A BURNER UNIT. IT HAS ALSO BEEN DISCOVERED THAT DEFECTIVE COMPONENTS HAVE BEEN FIELDDED, THIS MESSAGE PROVIDES INFORMATION TO IDENTIFY DEFECTIVE PARTS.

C. PARTS, ASSEMBLY, OR COMPONENTS TO BE INSPECTED: PREHEATER ASSEMBLY, NSN 7310-00-999-2549, PART NO. 5-11-1230-5, FSCM 81337 GAGE, AIR PRESSURE NSN 6685-00-999-2503, PART NO. 5-11-1242-13, FSCM 81337 GENERATOR ASSEMBLY, NSN 7310-00-999-2495, PART NO. 5-11-1238-9, FSCM 81337 SAFETY VALVE DEVICE ASSEMBLY, NSN 7310-01-343-9014, PART NO. 5-11-2071, FSCM 81337 AIR VALVE ASSEMBLY, NSN 7310-00-999-2508, PART NO. 5-11-1229-25, FSCM 81337 GASKET NSN 5330-01-278-4024, PART NO. 5-11-1229-4-2A, FSCM 81337

3. USER ACTIONS:

A. INSPECTION PROCEDURES: IN ORDER TO ENSURE SAFE OPERATION OF THE M2A BURNER, IT IS IMPERATIVE THAT THE BURNER UNIT BE MAINTAINED PROPERLY

HEATING STOVE AND DEVICE TRAINING

AND THE UNIT IS NOT LEFT UNATTENDED WHILE OPERATING. THE FOLLOWING LIST EMPHASIZES THE PROCEDURES THAT MUST BE ADHERED TO WITH ADDITIONAL INFORMATION WHICH IS NOT PROVIDED IN THE TECHNICAL MANUAL (TM).

(1) FOLLOW PROCEDURE IN TM 10-7360-204-13 & P, TABLE 2-1, PREVENTATIVE MAINTENANCE CHECKS AND SERVICES FOR ITEM NUMBER 6-11. (2) PERFORM ORGANIZATIONAL PREVENTATIVE MAINTENANCE CHECKS AND SERVICES QUARTERLY SCHEDULE, TABLE 4-1, ITEM 13, SAFETY VALVE DEVICE. THE SAFETY VALVE DEVICE MAY BE IMPROPERLY ADJUSTED OR NON-FUNCTIONAL. TEST BY PRESSURIZING SYSTEM. IF VALVE DOES NOT ACTIVATE (RELEASE) AT 65 PSI OR LOWER, REPLACE. THIS DOES NOT PRECLUDE PERFORMING ANY PMCS DESCRIBED IN THE TM, IT ONLY EMPHASIZES THE CRITICAL IMPORTANCE OF THESE PROCEDURES.

(3) DURING PREHEATING, THE M2A MUST NOT BE LEFT UNATTENDED, AN IMPROPERLY FUNCTIONING PREHEATER CAN CAUSE LIQUID GASOLINE TO PUDDLE ON THE GROUND AND IGNITE, ENGULFING THE BURNER UNIT IN FLAMES.

(4) THE GENERATOR MUST BE ADEQUATELY PREHEATED BEFORE THE MAIN BURNER IS IGNITED, USING THE MAIN BURNER TO COMPLETE THE PREHEATING PROCEDURE CAN CAUSE LIQUID FUEL TO COLLECT IN THE MIXING CHAMBER. THIS CAN, IN TURN, IGNITE AND CAUSE THE BURNER UNIT TO BECOME ENGULFED IN FLAMES.

(5) IF A FIRE DOES OCCUR, THE FLAME MUST NOT ONLY BE EXTINGUISHED, BUT THE BURNER SURFACES MUST BE COOLED, OR THE HOT SURFACES MAY REIGNITE THE FUEL THAT HAS COLLECTED CAUSING A FLASH FIRE.

(6) A WORN OUT GENERATOR CAN ALSO CONTRIBUTE TO FIRE OR PRODUCTION OF EXCESSIVE CARBON MONOXIDE. DURING OPERATION OBSERVE FLAME QUALITY, IF THE UNIT IS COMPLETELY PREHEATED AND THE AIR SHUTTER CANNOT BE ADJUSTED TO ACHIEVE A BLUE-GREEN FLAME, THE GENERATOR IS WORN OUT, REPLACE THE GENERATOR ACCORDING TO THE INSTRUCTIONS IN THE TM.

(7) AIR VALVE ASSEMBLIES HAVE BEEN IMPROPERLY MANUFACTURED. THESE AIR VALVE ASSEMBLIES WILL FUNCTION ACCEPTABLY WHEN THE M2 IS OPERATED IAW THE TM. A PROPERLY MANUFACTURED AIR VALVE ASSEMBLY IS A ONE WAY SYSTEM PERMITTING AIR PRESSURE INTO THE GAS TANK AND NOT OUT. THE DEFECT INVOLVES THE CHECK VALVE STEM WITHIN THE AIR VALVE ASSEMBLY WHICH SHOULD PROHIBIT FUEL VAPORS FROM ESCAPING WHEN THE VALVE IS MANUALLY DEPRESSED. SOME CHECK VALVES NOW IN THE FIELD DO NOT FUNCTION PROPERLY AND WILL ALLOW AIR AND FUEL TO BE RELEASED FROM THE TANK THROUGH THE AIR VALVE ASSEMBLY. DO NOT USE THE AIR VALVE ASSEMBLY TO RELEASE AIR FROM THE TANK. THIS CAN ALLOW EXPLOSIVE FUEL VAPOR AND LIQUID TO ESCAPE FROM THE TANK.

(8) A. THERE ARE CURRENTLY TWO TYPES OF FUEL FILLER GASKETS FIELDIED WITH M2 BURNERS. ONE HAS A SQUARE CROSS SECTION AND FILLS THE ENTIRE FILLER CAP GROVE, THE OTHER HAS A ROUND CROSS SECTION (O-RING) AND HAS A LOOSER FIT. THE SQUARE SECTION GASKET MAY LEAK. THE O-RING MAY MOVE OUT OF POSITION INTO THE GROVE (SLIGHTLY ABOVE) AND BLOCK THE PRESSURE RELEASE HOLE. TEST EITHER GASKET OR O-RING BY STANDING A COOL BURNER ON END, FILL THE TANK WITH 10 PSI OF AIR AND FILL AROUND THE FILLER NECK WITH WATER (WITH THE FILLER CAP IN PLACE AND TIGHT) AND LOOK FOR BUBBLES. IF THE CAP CANNOT BE TIGHTENED ENOUGH TO STOP ANY LEAKS REPLACE THE GASKET. THE ROUND SECTION GASKETS MAY CAUSE A QUICK RELEASE OF AIR AND FUEL FROM THE TANK WHEN THE FILLER CAP IS UNSCREWED. IF THE BURNER EXHIBITS THIS PROBLEM, IT CAN BE REPLACED WITH A SQUARE SECTION GASKET. UNDER ALL CIRCUMSTANCES, DO NOT RELEASE PRESSURE BY OPENING THE FUEL FILLER CAP OR MANUALLY DEPRESSING THE AIR VALVE ASSEMBLY NEAR ANY HEAT SOURCE. ALWAYS ALLOW THE BURNER TO COOL BEFORE RELEASING PRESSURE. GAS VAPORS CAN IGNITE WHEN THEY COME INTO CONTACT WITH HOT BURNER SURFACES OR OTHER HEAT SOURCES, INCLUDING LIT BURNERS. USE PROPER REFUEL AND LIGHTING PROCEDURES PER TM.

HEATING STOVE AND DEVICE TRAINING

B. CORRECTION PROCEDURES: FOLLOW PMCS PROCEDURE IN TM, REPLACING DEFECTIVE PARTS AS NEEDED.

C. CATEGORY OF MAINTENANCE: THE OPERATOR IS RESPONSIBLE FOR PERFORMING THE PMCS DESCRIBED IN TABLE 2-1 OF THE TM. ORGANIZATION LEVEL OF MAINTENANCE IS REQUIRED TO REPLACE DEFECTIVE COMPONENTS AND PERFORM THE PMCS IN TABLE 4-1 (INSPECTION OF SAFETY DEVICE)

D. TECHNICAL REFERENCES: TM 10-7360-204-13 & P, OPERATOR, ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR RANGE OUTFIT, FIELD, GASOLINE, MODEL M59 AND BURNER UNIT, MODEL M2A W/SAFETY DEVICE.

4. PROGRAM SPONSORS ACTIONS:

A. A REPLACEMENT TO THE M2A HAS BEEN TRANSITIONED TO DEFENSE INDUSTRIAL SUPPLY CENTER FOR PROCUREMENT. THE MODERN BURNER UNIT (MBU) WILL OPERATE ON JP-8 FUEL AND ELIMINATE THE SAFETY HAZARDS ASSOCIATED WITH THE M2A BURNER. THE BU WILL NOT HAVE A PRESSUREIZED FUEL TANK NOR REQUIRE PREHEATING. IT WILL ALSO HAVE A CLOSED REFUELING SYSTEM; AND PUSH BUTTON, INSTANT ON, ELECTRIC IGNITION. FIELDING OF THE MBU WILL BEGIN NEXT YEAR ACCORDING TO HQDA FIELDING PLAN.

B. REPLACEMENTS FOR THE CAP, FILLER OPENING GASKET, AIR PRESSURE ASSEMBLY, AND SAFETY VALVE DEVICE ARE CURRENTLY BEING EVALUATED. UPON SUCCESSFUL TESTING, THE NEW COMPONENTS WILL BE MADE AVAILABLE AND A GPM WILL BE ISSUED TO ADVISE THE USER.

5. SUPPLY STATUS:

A. PARTS REQUIRED-PARTS ARE TO BE REPLACED ONLY AS NEEDED, PART NUMBERS ARE AVAILABLE IN THE TM.

6. POINTS OF CONTACT (POC):

A. LOGISTICS POC: AL MELONI, DEFENSE INDUSTRIAL SUPPLY CENTER, DISC-VAB23, DSN 442-3283 OR CML (215) 697-3283.

B. TECHNICAL POC: GLEN DOUCET, U.S.ARMY SOLDIER SYSTEMS COMMAND, SSCNC-WEF, DSN 256-4058 OR CML (508) 233-4058.

C. SAFETY POC: PAUL G. ANGELIS, U.S.ARMY SOLDIER SYSTEMS COMMAND, AMSSC-S-ENS, DSN 256-5208 OR CML (508) 233-5208.

HEATING STOVE AND DEVICE TRAINING

LEADERS CHECKLIST

Heaters

TM 10-4500-200-13 cites procedures for using Type 1, 2, and Yukon-model space heaters. It also includes a preventive maintenance checklist. Consult the technical manual when installing and operating space heaters; each operator must be trained for the specific heater. In addition, use the checklist below to manage the risks associated with using heaters.

Portable radiant-type space/tent heater (potbelly and Yukon)

- 1. Are operator instructions written in the unit SOP? Are operators trained to SOP standards and licensed for the specific heater?
- 2. Are fireguard instructions written in the unit SOP? Are fireguards trained to SOP standards and licensed on the specific heater?
- 3. Are a sufficient number of stovepipe sections used so the top section is above the highest point of the tent? Are tent flaps tied back so that flaps do not come in contact with the hot pipe?
- 4. Are stovepipe ends secured with sheet metal screws or rivets?
- 5. When using Type I solid fuel (such as wood or coal) with the heater, is a spark arrestor installed on the top stovepipe section?
- 6. When using Type H liquid fuels and Yukon liquid fuel heaters, is a draft diverter installed on the top section and each section secured with three guy ropes? (Guy ropes are not used with solid fuel.)
- 7. Are heaters operated with only the type of fuel that is required for that type of heater?
- 8. While some tent heaters are designed to use several types of liquid fuel, do operators know that gasoline will never be used as a heating fuel?
- 9. Are space heaters cleaned IAW PMCS to prevent explosion or burning out of control?
- 10. Is the flame arrestor mounted on top of the stovepipe? Is it checked whenever the heater is cleaned?
- 11. Are stovepipe sections straight up and not allowed to come into contact with any part of the tent? (Tents must be inspected to ensure that they are not sagging, and that canvas parts do not contact the stovepipe stacks.)
- 12. Is the area surrounding the heater inside the tent cleared of combustibles, such as cots, for a distance of 4 feet on a horizontal plane from the floor to the ceiling of the tent or building?
- 13. Are fuel cans, lines, and carburetors checked daily for leaks, particularly after changing fuel cans? (No heater will be operated when fuel leaks are present.)
- 14. When heaters are operating, are Class B carbon dioxide (CO₂) or any other chemical fire extinguishers immediately available in the tent?
- 15. Do operators know tent heaters must never be operated at full capacity, even in extreme cold? (Overheating of the stovepipes may ignite tentage.)
- 16. Are space heaters located on a noncombustible base such as a stove box made of 2x4 lumber, minimum size of 40x28x4 inches high with a sheet metal bottom? (Stoves should be placed in the center of the box with at least 3 1/2 inches of sand or dirt, when operated in a tent with wood or canvas floor.)
- 17. Is adequate ventilation provided where space heaters are operating?
- 18. Is the fuel supply can for the heater located outside the tent and as far from the tent as the fuel hose allows and supported on a stable platform or tripod?
- 19. Is an overflow hose used on the heater carburetor and run outside the tent?
- 20. After fuel cans are changed, are cans, all line connections, and carburetors checked for fuel leaks?
- 21. Are fuel systems checked daily for leaks and malfunctions? (Only qualified personnel should do repairs.)
- 22. Are all fuel spills cleaned up immediately?
- 23. Are fuel cans stored away from the tent IAW FM 1-69?
- 24. Is a fire alarm system established and implemented? (Firefighting equipment (extinguishers, shovel, and ax) should be available at selected fire points, and soldiers should be informed on the location of the fire points.)
- 25. Are heaters allowed to cool before refueling or relighting?
- 26. Is the use of heating and cooking devices prohibited in mobilflex tents?

HEATING STOVE AND DEVICE TRAINING

Immersion heaters (TMs 5-4540-202-12 and 10-4500-200-13)

- 1. Are immersion heaters operated only by personnel who have been trained to standard and properly licensed?
- 2. Are operators aware of which type heater they are operating?
- 3. Do operators use care not to expose their faces to combustion chambers while lighting and make sure that there is no fuel in the combustion chamber?
- 4. Do operators ensure the vent cap is closed when filling the fuel tank and all spilled fuel is wiped up?
- 5. Is fuel tank installed on the heater only AFTER the heater is attached to the corrugated trash can?
- 6. If used inside building or tent, are exhaust fumes piped outside (a *must*)?
- 7. Are ventilating pipe seams aligned and facing away from where the user will stand?
- 8. Is a fire extinguisher (dry chemical, CO₂, or Halon) close by?
- 9. Do operators know to never hold lighted torches under the fuel valve to wet the torch with fuel?
- 10. Is fuel never allowed to flow in a steady stream?
- 11. Is only leaded or white gas used for fuel? (Diesel should never be used.)
- 12. Is the combustion chamber checked to ensure a burner assembly is in place before lighting the heater?
- 13. Are no parts of the heater soldered?
- 14. Are defective heaters turned in to support maintenance facilities?

Herman Nelson or similar heaters

- 1. Is the heater placed as far from structures as the length of heating ducts will allow?
- 2. Is a 20-foot-long steel chain or cable attached to the heater to facilitate removal in case of fire?
- 3. Is a 5-foot-high sandbag buffer maintained on the front and two sides of the heater?
- 4. Are fireguards posted when Herman Nelson heaters or other radiant-type tent heaters are operated?

M2 burners (TM 10-7360-204-13)

- 1. Are heaters operated to standard?
- 2. Do only properly trained, qualified, and licensed mess personnel operate the M2?
- 3. Is fuel tank at least 15 meters (16 yards) from open flame or other flammable source and free of fuel spillage before heating?
- 4. Is burner lit only outside the tent? (if wind conditions hamper lighting outside, a wind break should be constructed.)
- 5. Is fuel (gasoline) stored at least 15 meters (16 yards) outside of kitchen enclosures? Are all fuel spills cleaned up immediately?
- 6. Is tank not being filled while the flame is burning or when the burner is hot?
- 7. Are joints not being tightened while burner is in operation?
- 8. Is burner not being operated when the pressure gauge reaches or exceeds 25 pounds per square inch (psi)?
- 9. Is fuel tank not being released until the burner has cooled?

HEATING STOVE AND DEVICE TRAINING

LEADERS CHECKLIST

Gasoline Lantern Operations

TC 10-1 provides operating instructions for field kitchen lanterns. In addition, use the checklist below to manage risks associated with operating gasoline lanterns.

- 1. Was TC 10-1 reviewed before initial operation?
- 2. Are lanterns inspected for loose, damaged, or missing parts (all nuts and caps tightened manually)?
- 3. Are ventilator hood openings inspected to ensure they are free from obstruction?
- 4. Is the pump leather properly lubricated and in good condition?
- 5. Is the filler cap gasket on and in good condition?
- 6. Are lanterns placed away from space heaters? (The pressure seal on the lanterns can rupture, allowing fuel to escape.)