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**NOT  
MEASUREMENT  
SENSITIVE**

MIL-HDBK-1407  
30 June 1998

# **DEPARTMENT OF DEFENSE HANDBOOK**

## **MILITARY HANDBOOK**

**HEATERS, VEHICULAR COMPARTMENT;  
HEATERS, COOLANT, ENGINE;  
HEATERS, SPACE; HEATERES, DUCT-TYPE**



AMSC N/A

AREA 4520

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DEPARTMENT OF DEFENSE  
Washington, DC 20301

Heaters, Vehicular Compartment; Heaters, Coolant, Engine; Heaters, Space;  
Heaters, Duct-Type.

10 This Military Standard is approved for use by all Departments and Agencies  
of the Department of Defense.

2. Beneficial comments (recommendations additions, deletions) and any pertinent  
data which may be of use in improving this document should be addressed to:  
Commander, US Army Belvoir Research and Development Center, ATTN: STRBE-TSE,  
Fort Belvoir, VA 22060-5606, by using the self-addressed Standardization  
Document Improvement Proposal (DD Form 1426) appearing at the end of this  
document or by letter.

MIL-STD-1407B

FOREWORD

This Military Standard is issued to implement Department of the Army policy specified in AR 700-115 regarding the use of only Standard Family Heaters as described herein for Field Army type application and systems, and to provide a guide to all Department of Defense users for the selection of such Standard Family Heaters. The use of this standard plays a prime role in the Military Standardization Program being carried out by the Department of Defense. The use of heaters listed herein will eliminate item duplication.

This publication includes existing heaters that constitute the Standard Family of Military Heaters and units currently under development which will be added to the Standard Family as they become available. The data sheets give BTUH output and general application characteristics available at this time.

For assistance in the use, installation, and technical data contact:

- (a) Heaters, Vehicular Compartment  
Commander  
U. S. Army Tank - Automotive Command  
ATTN: AMSTA-GBM  
Warren, MI 48397-5000
- (b) Heaters, Coolant, Engine  
Commander  
U. S. Army Tank - Automotive Command  
ATTN: AMSTA-GBM  
Warren, MI 48397-5000
- (c) Heaters, Space (Nonblower Type)  
Commander  
U. S. Army Natick Research and Development Center  
ATTN: STRNC-ES  
Natick, MA 01760-5014
- (d) Heaters, Space (Blower Type)  
Commander  
U. S. Army Belvoir Research and Development Center  
ATTN: STRBE-FES  
Fort Belvoir, VA 22060-5606
- (e) Heaters, Space, Electric  
Commander  
U. S. Army Belvoir Research and Development Center  
ATTN: STRBE-FES  
Fort Belvoir, VA 22060-5606
- (f) Heaters, Duct-Type, Portable  
Commander  
U. S. Army Belvoir Research and Development Center  
ATTN: STRBE-FES  
Fort Belvoir, VA 22060-5606

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1. SCOPE

1.1 Coverage. This standard covers the heating capacity (expressed in British Thermal Units per hour, Btuh) and general application characteristics for heaters with various capacities and operating characteristics. It covers vehicular compartment heaters, engine coolant heaters, space heaters (blower and nonblower types), (fuel and all-electric types), and portable duct-type heaters. These models comprise essentially the complete Standard Family of Military Heaters to satisfy the various requirements. Data sheets of operating and physical characteristics as presently established are presented for each heater. Information is also included on units currently under development which will be added to the Standard Family as they become available.

1.2 Method of reference. When available, a National Stock Number is given for each heater listed herein, and it should be used for referencing a particular model. Reference to models without National Stock Numbers should be made by the nomenclature listed. When it has been determined that a special nonfamily item is required, the requirement for the special item with supporting documentation should be processed in accordance with procedures contained in AR 700-115.

2. REFERENCED DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this standard to the extent specified herein.

SPECIFICATIONS

FEDERAL

- |           |   |
|-----------|---|
| O-A-548   | - Antifreeze/Coolant, Engine: Ethylene Glycol, Inhibited, Concentrated. |
| O-I-490   | - Inhibitor, Corrosion, Liquid Cooling System.                          |
| VV-F-800  | - Fuel Oil, Diesel.   |
| VV-G-1690 | - Gasoline, Automotive, Leaded or Unleaded.                             |

MILITARY

- |            |   |
|------------|---|
| MIL-G-3056 | - Gasoline, Automotive, Combat.                             |
| MIL-H-3177 | - Heaters, Coolant, Engine: Multi-Fuel-Burning, 24-Volt DC. |
| MIL-H-3199 | - Heaters, Vehicular Compartment 28-Volt, DC.               |
| MIL-H-4607 | - Heater, Engine and Shelter, Ground, Type H-1.             |
| MIL-G-5572 | - Gasoline, Aviation: Grades 80/87, 100/130, 115/145.       |
| MIL-T-5624 | - Turbine Fuel, Aviation, Grades JP-4 and JP-5.             |

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- MIL-H-11511 - Heater, Space: Multifuel, with Blower, 60,000 Btu/Hr.
- MIL-A-11755 - Antifreeze, Arctic-Type.
- MIL-H-12340 - Heater, Space, (Yukon, M-1950, with Accessories) .
- MIL-H-13514 - Heaters, Space, Radiant Type, Portable, 45,000 Btu/Hr.
- MIL-H-14516 - Heaters, Space: Oil-Fired 70,000 BTU Per Hour, Theater of Operations Type.
- MIL-F-46162 - Fuel, Diesel, Referee Grade.
- MIL-H-46792 - Heater, Vehicular Compartment: Multi.fuel Burning 24 Volt, Dc.
- MIL-H-52204 - Heaters, Space: Multifuel, with Blower, 15,000 Btu/Hr.
- MIL-H-52641 - Heater, Electric, 1,500 Watts, 115 Volts, AC, with Fan.
- MIL-H-62315 - Heater Assembly, Combustion, Vehicular Compartment , 60,000 BTU/HR.
- MIL-T-83133 - Turbine Fuel, Aviation, Kerosene Type, Grade JP-8 .

STANDARDS

MILITARY

- MS 3102 - Connector, Receptacle, Electric, Box mounting.

(Copies of specifications and drawing required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer. )

2.2 Order of precedence. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard shall take precedence.

3. DEFINITIONS

For purposes of this document the following definitions apply.

3.1 Heaters, vehicular compartment. A device designed to heat the interior of a vehicle by utilizing the heat from the engine coolant system, or a liquid fuel type burner.

3.2 Heaters, coolant, engine. A heater designed to burn fuel or to utilize electric power to apply heat through direct connection to the engine coolant system to facilitate starting in low temperatures; may also supply heated coolant to heat exchanger.

3.3 Heaters, space. A device designed to burn various types of fuel within an enclosure which protects and confines the fire. It is used for the purpose of raising the temperature of the air in its immediate vicinity.

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3.4 Heater, space, electric. A device having a heating element which, when connected to an electrical source, directly imparts heat.

3.5 Heater, duct type, portable. A heater equipped with integral connections for attaching flexible ducts to direct heat to equipment or spaces such as engine surfaces, railroad cars, warehouses, and tents. It is equipped with a blower, and must be mounted on skids or wheels, or be capable of being hand carried.

3.6 Abbreviations.

<u>Btuh</u>	- British Thermal Units per Hour - Heat required to produce a temperature rise of 1° F in 1 pound of water in 1 hour.
<u>Hz</u>	- (Hertz) Frequency of electrical power in cycles per second.
<u>cfm</u>	- Cubic feet of airflow per minute.
<u>gal/hr</u>	- Gallons per hour.
<u>lbs</u>	- Pounds.
<u>psig</u>	- Pounds per square inch gage.
<u>gpm</u>	- Gallons per minute.

4. GENERAL REQUIREMENTS

(Not applicable.)

5. DETAIL REQUIREMENTS

5.1 Data sheets. Data sheets containing detailed output and general application characteristics, and an outline sketch and photograph, when available, are included herein for each model heater (see Index).

Custodians:

Army - ME  
Navy - MC  
Air Force - 84

Preparing activity:  
Army - ME

Project 4520-0274

Review activities:

Army - AT, ER  
DLA - CS

User activity:

Army - MI



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Nomenclature: Heater, Vehicular Compartment: Multifuel-Burning, 24 Volt DC, 30,000 Btuh.

Capacity

Heat Output Btuh	
Nominal	30,000
Minimum at high setting	27,000
Low setting	15,000

Air Discharge Rate cfm

Minimum 0-inch water static pressure	115
Minimum with 0.75-inch water static pressure	80

Power Requirements

Voltage nominal	24 dc
Voltage range	19-30
Current Maximum Start (amps)	20
Current Maximum Run (amps)	8
Frequency	Direct Current

Operating Weight Max, lbs 21

Fuel Consumption lbs/min

High setting	0.049
Low setting	0.031

Fuels:

Diesel fuel per specification	VV-F-800
Gasoline per specification	VV-G-1690, MIL-G-3056
Jet fuel per specification	MIL-T-5624

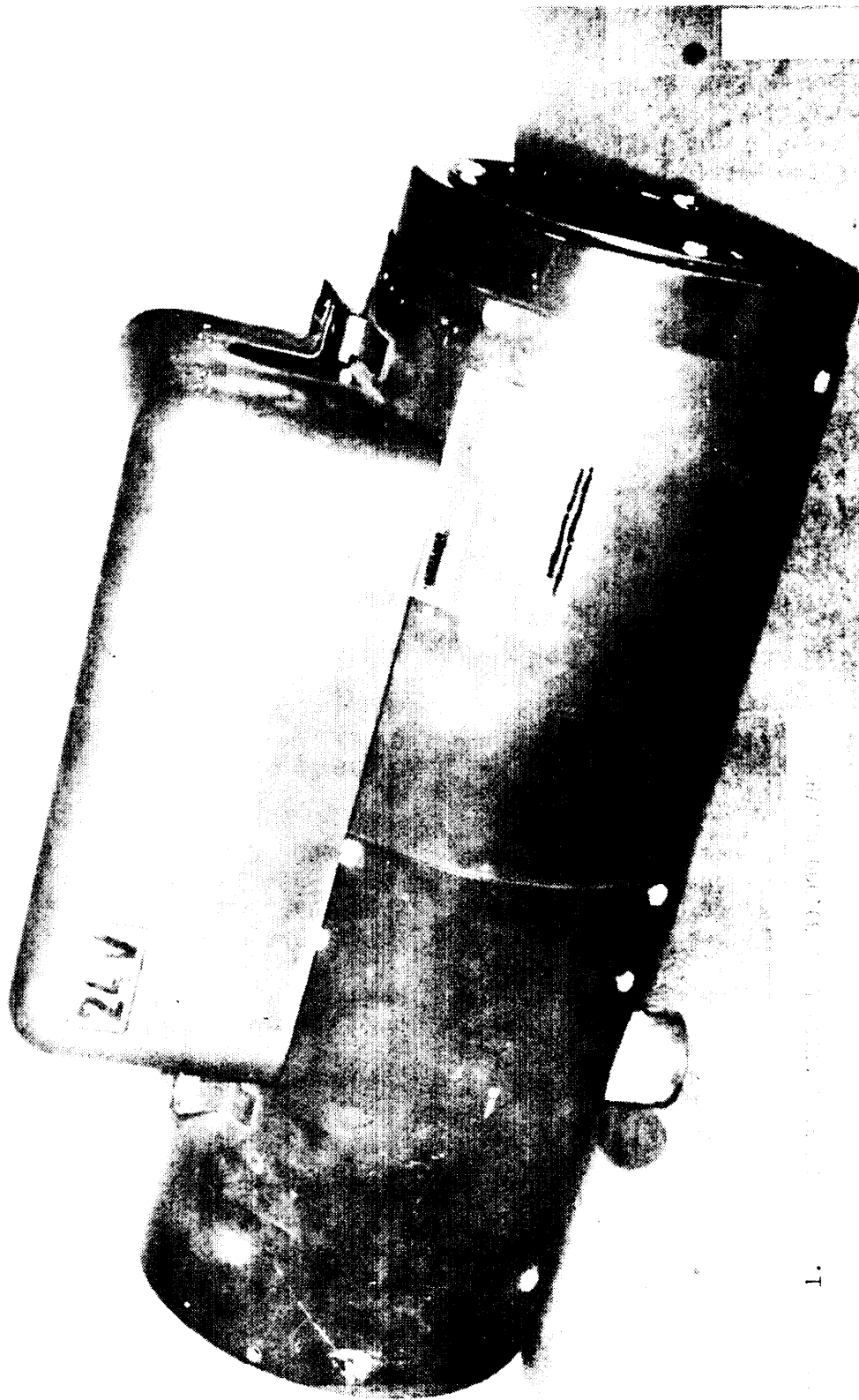
Control, when specified: Manual start and stop, manual cycling from high to low setting.

National Stock Number: 2540-00-113-4180

Line Item Number:

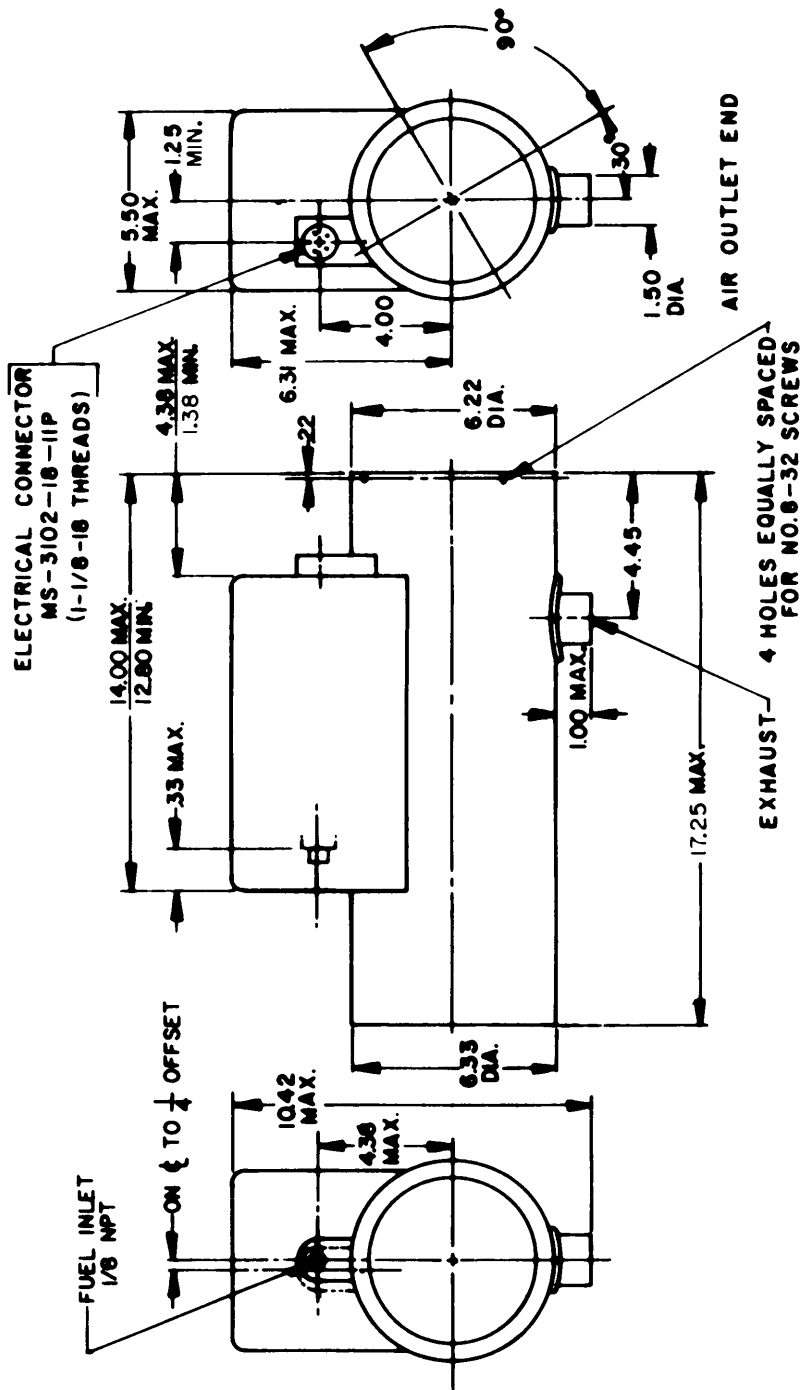
Specification: MIL-H-46792

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2771

1.



**NOTE:** All dimensions in inches; unless otherwise specified tolerances are  $\pm 0.030$  inches,  $\pm 1/2^\circ$  on angles.

**FIGURE 2. HEATER, MULTIFUEL, 30,000 BTU/HR; DIMENSIONS X-2772**

MIL-STD-1407B

Nomenclature: Heater, Vehicular Compartment, Multifuel,  
60,000 Btuh, Single Air and Dual Air

Heat Output (Btuh)

Nominal	60,000
Minimum at high setting	57,000
Low setting	30,000

Air Discharge Rate (cfm),  
minimum, with water static  
pressure of

0 inches	200
1.3 inch	150

Power Requirements

Voltage (volts)	
Nominal	24
Range	19-30

Current Max. (Amperes)

Start	16
Run	15

Operating wt., approx., (lbs) 35

Fuel Consumption, Max. lbs/min

High setting	0.092
Low setting	0.052

Fuels per specification

Diesel	VV-F-800
--------	----------

Control

Start and stop	Manual
Setting changes	Manual

National Stock Number

Dual Air	2540-01-169-5159
	2540-01-162-3834
Single Air	2540-01-083-0691
	2540-00-930-8938

Procurement Specification

Dual Air	MIL-H-62315
Single Air	

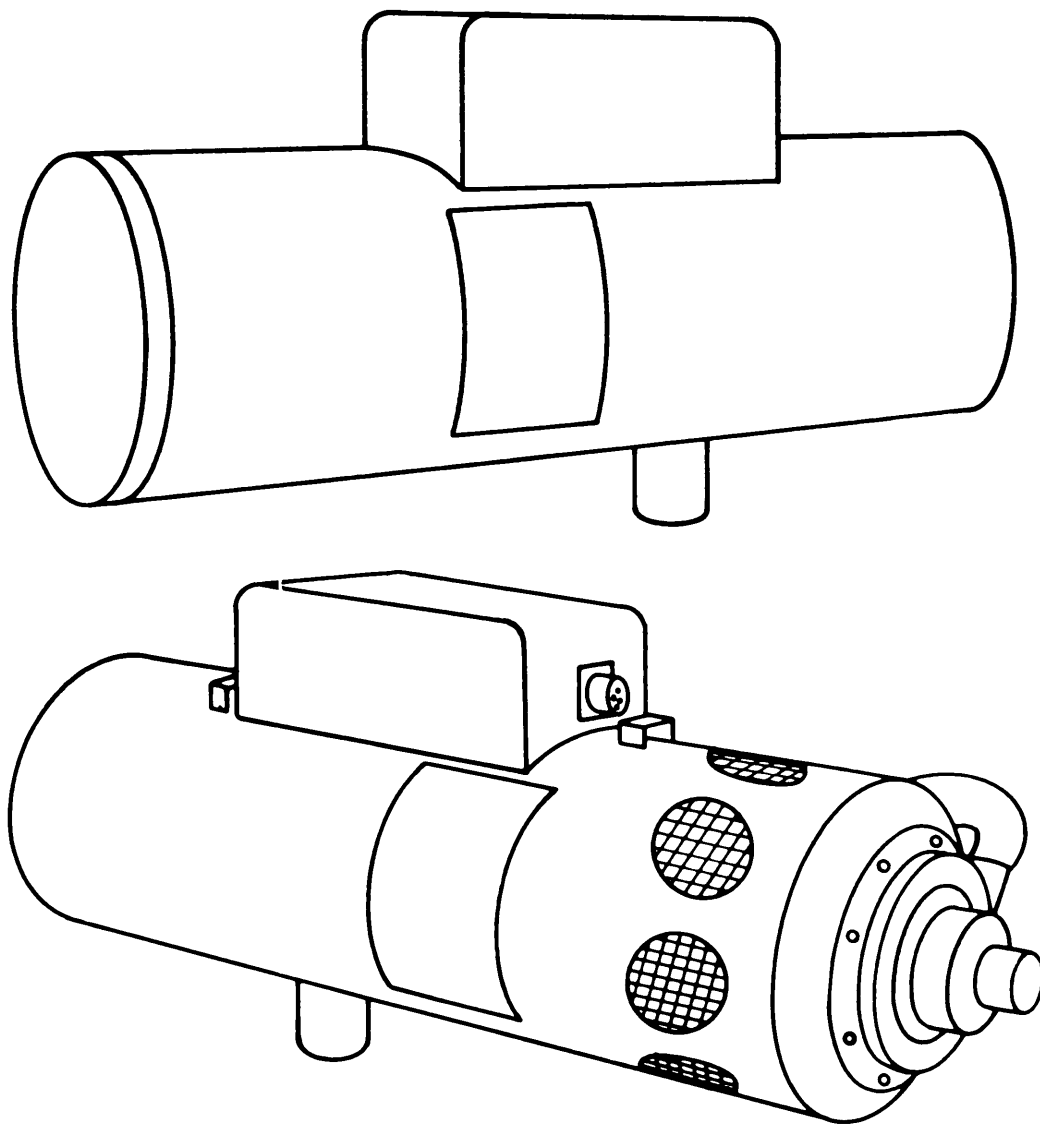


FIGURE 3. Stewart-Warner model 10560C, single air heater, NSN 2540-01-083-0691.

**X-4439**

MIL-STD-1407B

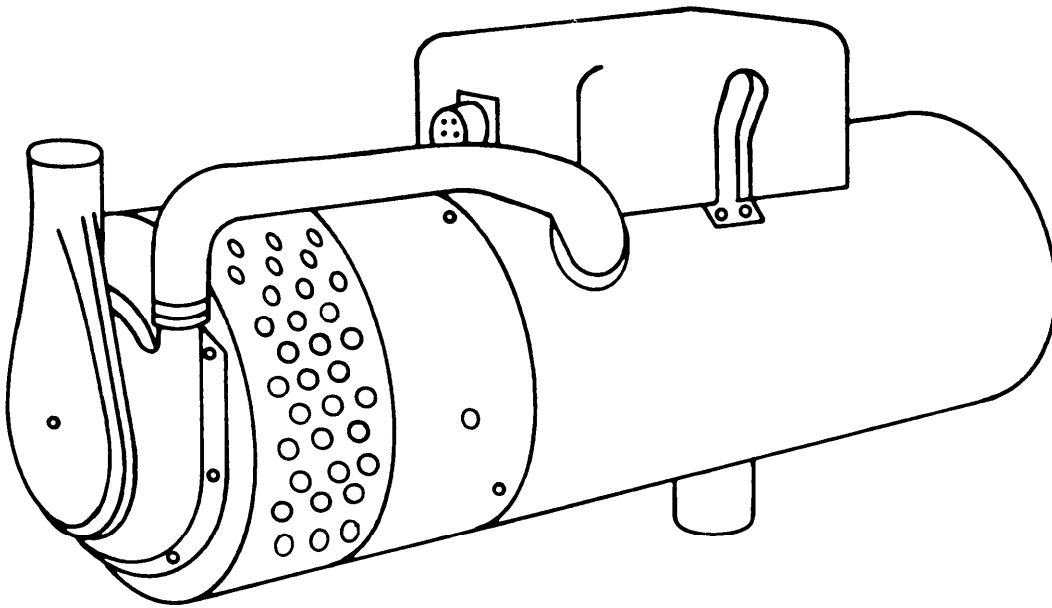


FIGURE 4. Stewart-Warner, dual air heater, model  
No. 10560M24BI, NSN 2540-01-169-5159  
and model No. 10560M24,  
NSN 2540-01-071-0651.

**X-4440**

MIL-STD-1407B

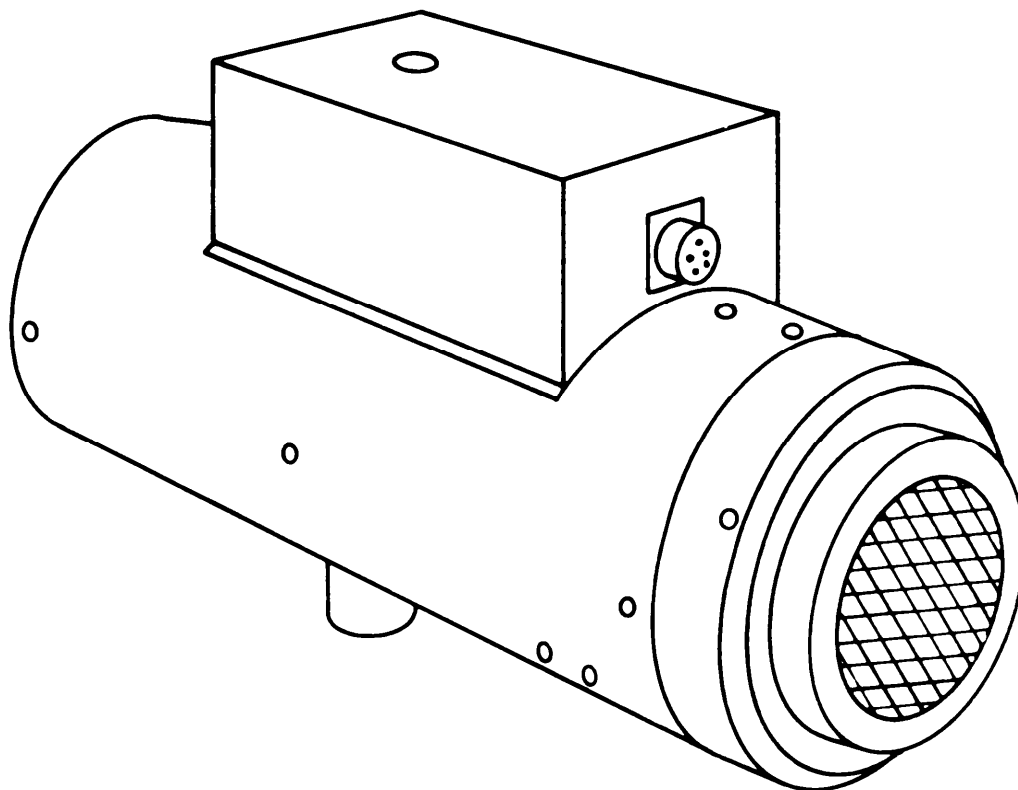


FIGURE 5. Hupp model No. MF-510A, single air heater,  
NSN 2540-00-930-8938.



MIL-STD-1407B

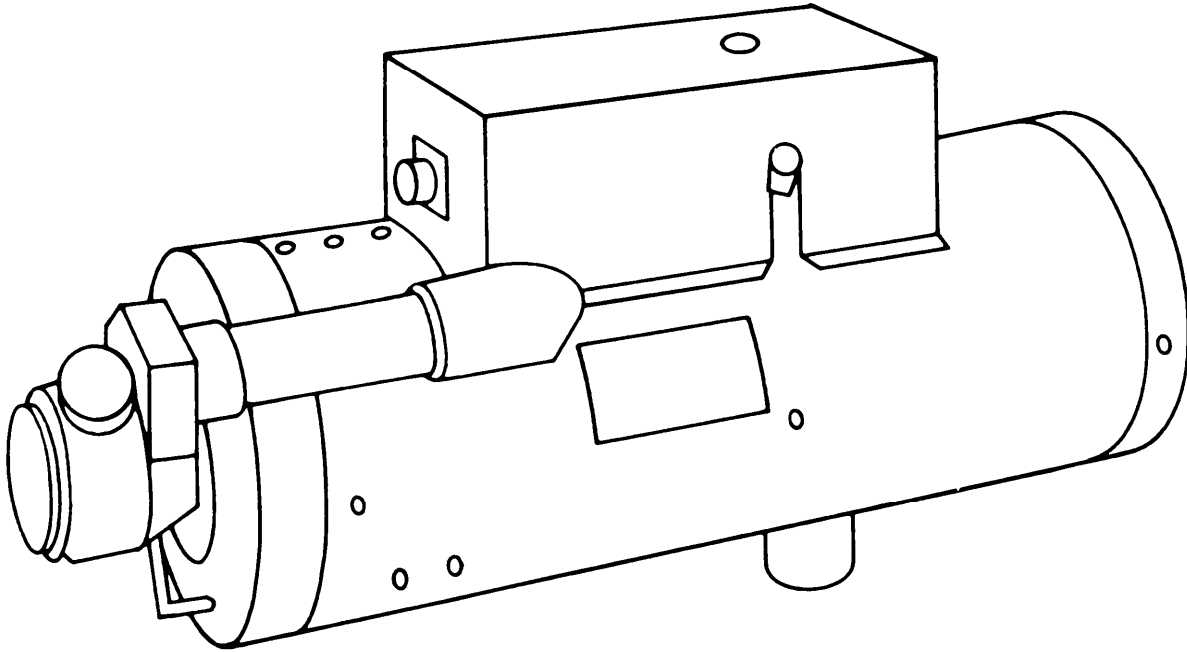


FIGURE 6. Hupp dual air heater, model No. MF510C,  
NSN 2540-01-162-3834 and No. MF510B,  
NSN 2540-01-071-0652.

**X-4442**

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Nomenclature: Heater, Vehicular Compartment: 24 Volt DC  
(Liquid Coolant Operated, Personnel) 20,000  
Btuh.

Capacity  
Heat Output Btuh  
Nominal 20,000  
Minimum w/1.6 H<sub>2</sub>O  
static pressure 12,000

Air Discharge Rate cfm  
Minimum 0-inch water  
static pressure 150  
Minimum 1.6-inch water  
static pressure 75

Power Requirements  
Voltage nominal 24  
Voltage range 20-28.5  
Frequency Direct Current  
Coolants Water and antifreeze compound conforming to  
0-A-548, or water and corrosion inhibitor  
compound conforming to 0-I-490, or arctic-  
antifreeze compound conforming to MIL-A-11755.

Control, when specified: Manual start and stop, with automatic  
operation if suitable thermostat is installed.

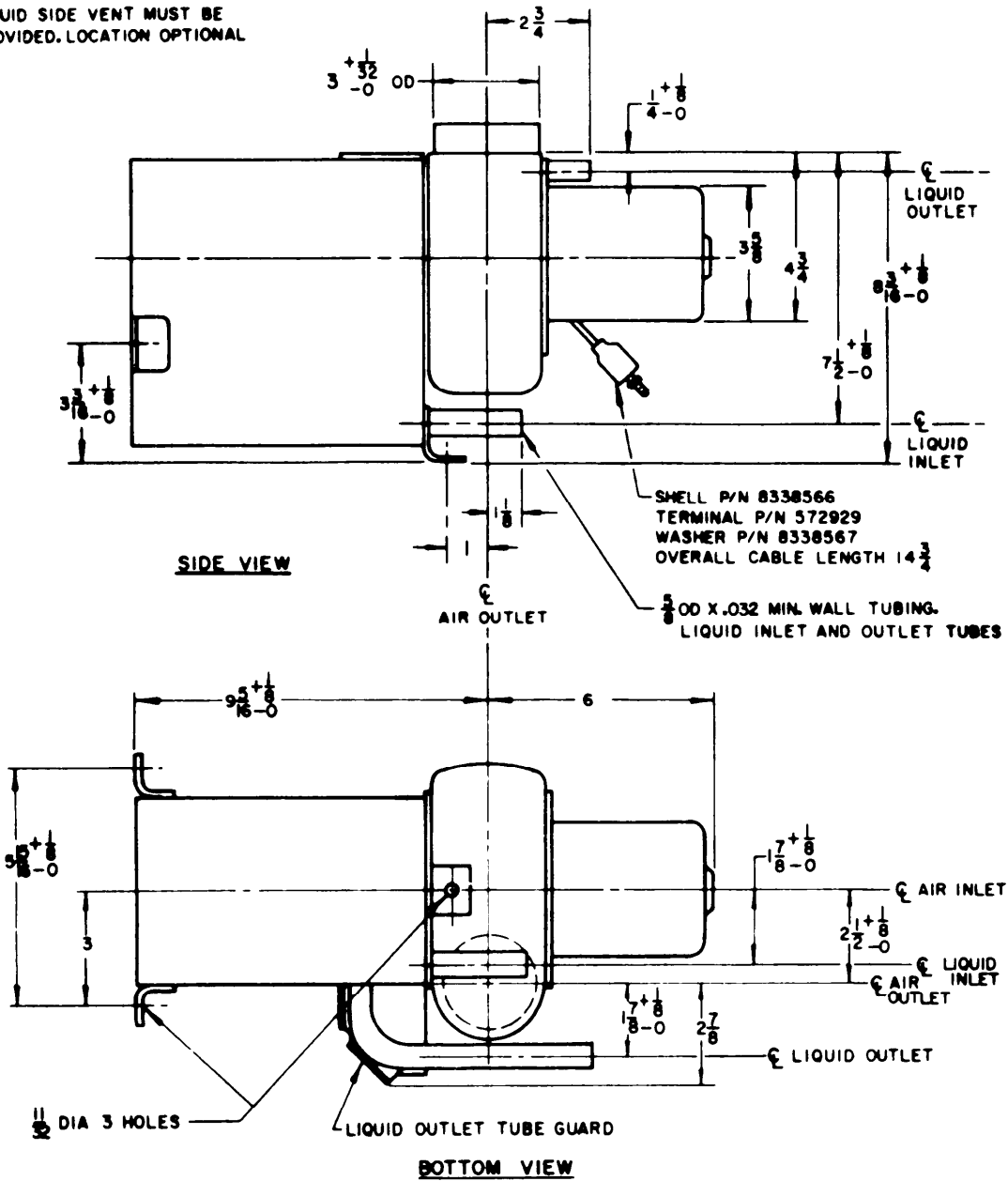
National Stock Number: 2540-00-869-0424

Line Item Number:

Specification: MIL-H-3199

MIL-STD-1407B

LIQUID SIDE VENT MUST BE PROVIDED. LOCATION OPTIONAL



**NOTES:**

1. THIS HEATER SHALL CONFORM TO TYPE II, CAPACITY "A" OF MIL-H-3199.
2. DIMENSIONS ARE IN INCHES, MAXIMUM, UNLESS OTHERWISE SPECIFIED.

FIGURE 7. HEATER, LIQUID COOLANT OPERATED, 20,000 BTU/HR;  
 DIMENSIONS

MIL-STD-1407B

Nomenclature:

Heater, Vehicular Compartment: 24 Volt DC  
(Liquid Coolant Operated, Personnel) 30,000  
Btuh.

Capacity

Heat Output Btuh

Nominal

28,000

Minimum w/1.6 H<sub>2</sub>O

15,000

static pressure

Air Discharge Rate cfm

Minimum 0-inch water

150

static pressure

Minimum 1.6-inch water

75

static pressure

Power Requirements

Voltage nominal

24

Voltage range

20-28.5

Frequency

Direct Current

Coolants

Water and antifreeze compound conforming to  
0-A-548, or water and corrosion inhibitor  
compound conforming to 0-I-490, or arctic-  
antifreeze compound conforming to MIL-A-11755.

National Stock Number:

2540-00-202-8591

Line Item Number:

Specification:

MIL-H-3199



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Nomenclature: Heaters, Coolant, Engine: Multifuel Burning,  
24 Volt DC, 15,000 Btuh (MIL-H-3177).

Capacity

Heat Output Btuh	
Nominal	15,000
Minimum	13,500

Coolant-Pump Characteristics

Discharge pressure, psig	1.75
Flow minimum, gpm	0.25

Power Requirements

Voltage nominal	24
Frequency	Direct Current

Maximum Dimensions, Inches

Height	11
Width	7
Length	15
Weight, lbs	25

Fuel Consumption approx, 0.3  
gal/hr

Fuels:

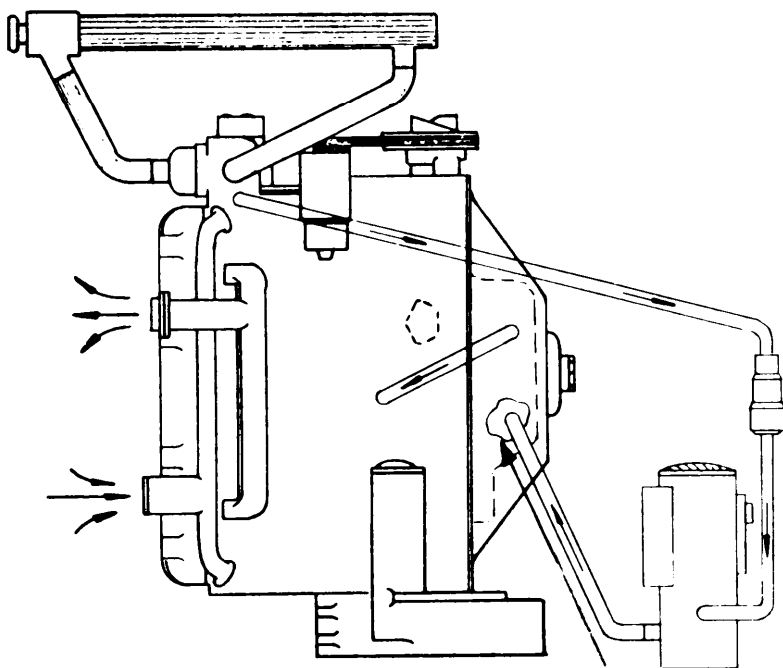
Diesel fuel	Conforming to: VV-F-800, Grades DF-A, DF-1
Gasoline	VV-G-1690, MIL-G-3056
Turbine fuel, aviation	MIL-T-5624, Grades JP-4 and JP-5.

National Stock Number: 2990-00-927-4254

Line Item Number:

Specification: MIL-H-3177

FIGURE 9. ONE TYPE OF ENGINE HEATING SYSTEM, UTILIZING COMBUSTION-HEATER



OIL PAN HEATED BY COIL  
CARRYING HEATED SOLUTION  
DIRECT FROM HEATER

X-2779

MIL-STD-1407B

Nomenclature: Heater, Coolant, Engine: Multifuel Burning,  
24 Volt DC, 30,000 Btuh.

Capacity

Heat Output Btuh	
Nominal	30,000
Minimum	27,000

Coolant Pump Characteristics

Discharge pressure, psig	3050
Flow minimum, gpm	0.50

Power Requirements

Voltage nominal	24
Frequency	Direct Current

Maximum Dimensions, Inches

Height	11
Width	7
Length	20
Weight, lbs	35

Fuel Consumption, gal/hr 0.6

Fuels:

Diesel fuel	VV-F-800, Grades DF-A, DF-1
Gasoline	VV-G-1690, MIL-G-3056
Turbine fuel, aviation	MIL-T-5624, Grades JP-4 and JP-5.

National Stock Number: 2990-00-135-6427

Line Item Number:

Specification: MIL-H-3177



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Nomenclature: Heater, Space, Multifuel, with Blower, 15,000 Btuh.

Capacity  
Minimum Output 15,000

Air Discharge Rate, cfm  
Minimum 0.2 inch water static pressure 115  
Minimum 0.35 inch water static pressure 100

Power Requirements

Type	I	II	Iv
Voltage	120	120	28
Frequency	60	400	dc
Phase	1	1	

Operating Weight, lbs 40

Fuel Consumption, gal/hr .25

Fuels: Conforming to:  
Gasoline VV-G-1690, MIL-G-3056, any other up to 100 octane.  
Diesel Fuel VV-F-800, Grades DF-1, DF-2 and DF-A.

Control Manual start, automatic cycling.

National Stock Number:

Type I	4520-01-010-0316
Type 11	4520-00-709-9223
Type IV	4520-00-357-0518

Line Item Number:

Type I	Not assigned.
Type II	Not assigned.
Type IV	Not assigned.

Specification: MIL-H-52204.

MIL-STD-1407B

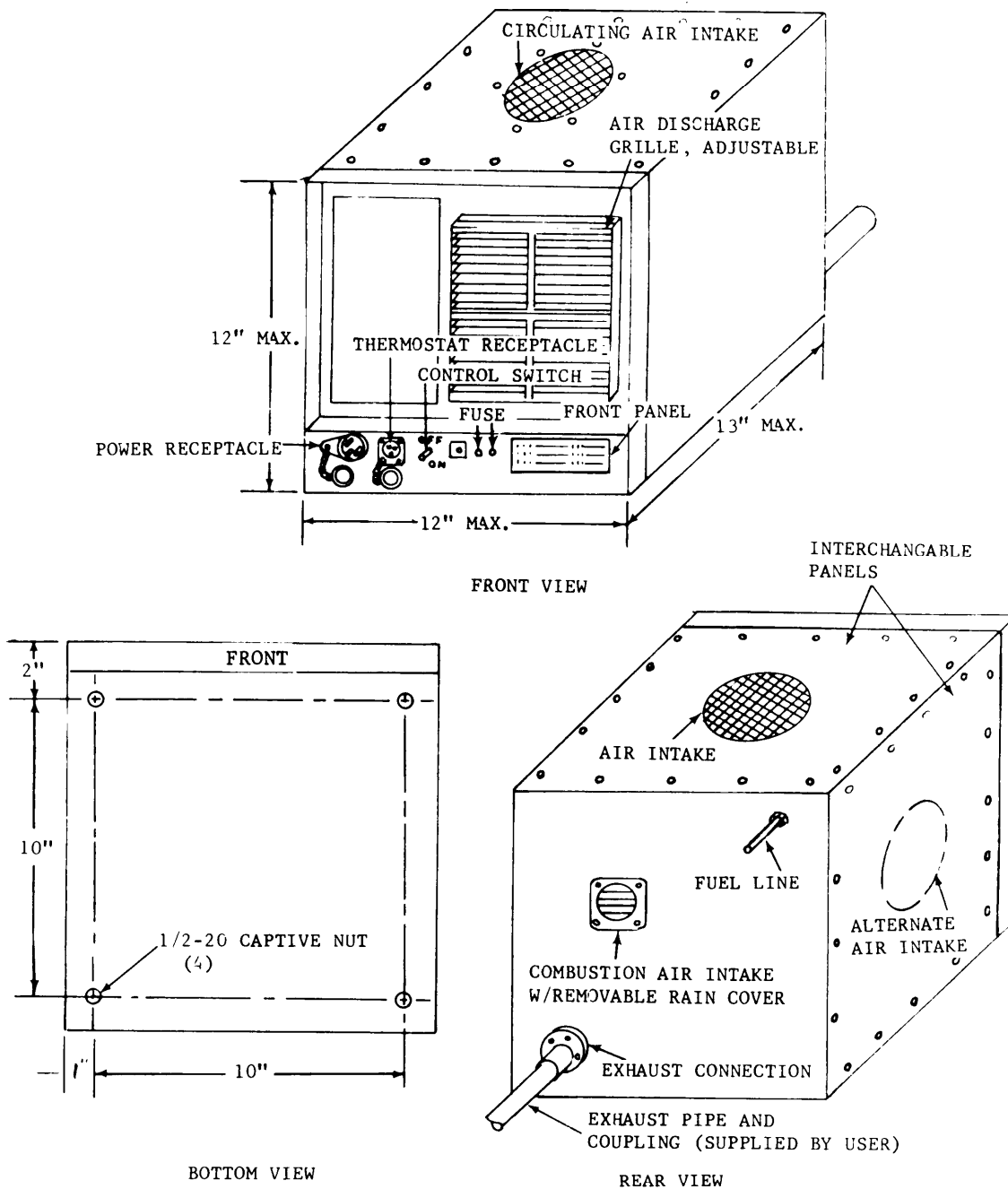


FIGURE 10. . HEATER, SPACE, MULTIFUEL, 15,000 BTU/HR; DIMENSIONS

X-2780

MIL-STD-1407B

Nomenclature: Heater, Space, Multifuel, with Blower, 60,000 Btuh.

Capacity  
Heat Output Btuh  
Minimum 60,000

Air Discharge Rate, cfm  
Minimum at 0.2 inch water static pressure 500  
Minimum at 0.35 inch water static pressure 425

Power Requirements

Type	I	II
Voltage	120	208
Frequency	50/60	400
Phase	1	3

Operating Weight, lbs 130

Fuel Consumption, gal/hr 1.75

Fuels: Conforming to:  
Gasoline VV-G-1690, MIL-G-3056, any other up to 100 octane.  
Diesel Fuel VV-F-800, Grades DF-1, DF-2 and DF-A.

Control Manual start, automatic cycling

National Stock Number:  
Type I 4520-00-683-8595  
Type II Not assigned.

Line Item Number:  
Type I K26301  
Type II Not assigned.

Specification: MIL-H-11511

MIL-STD-1407B

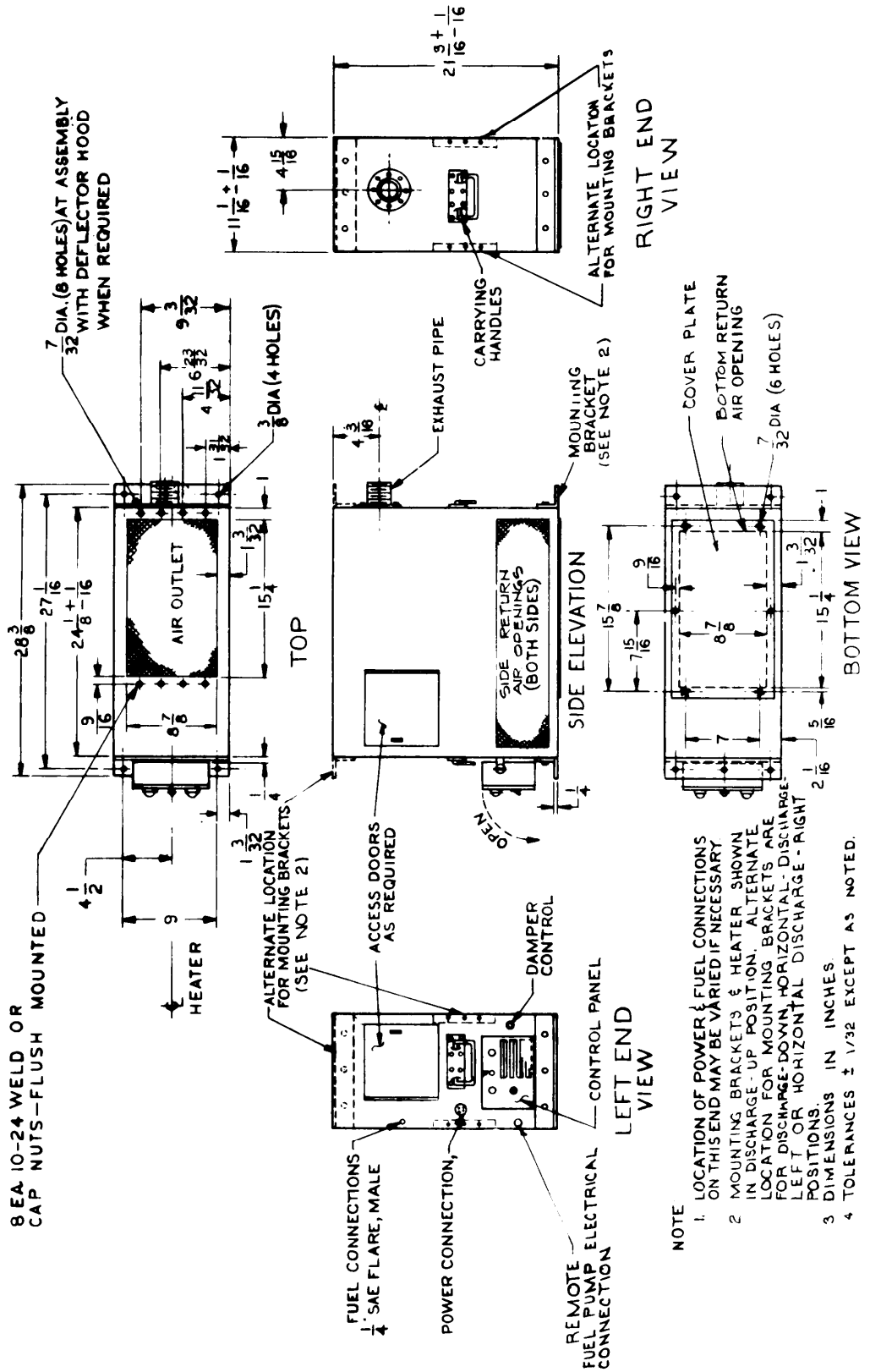
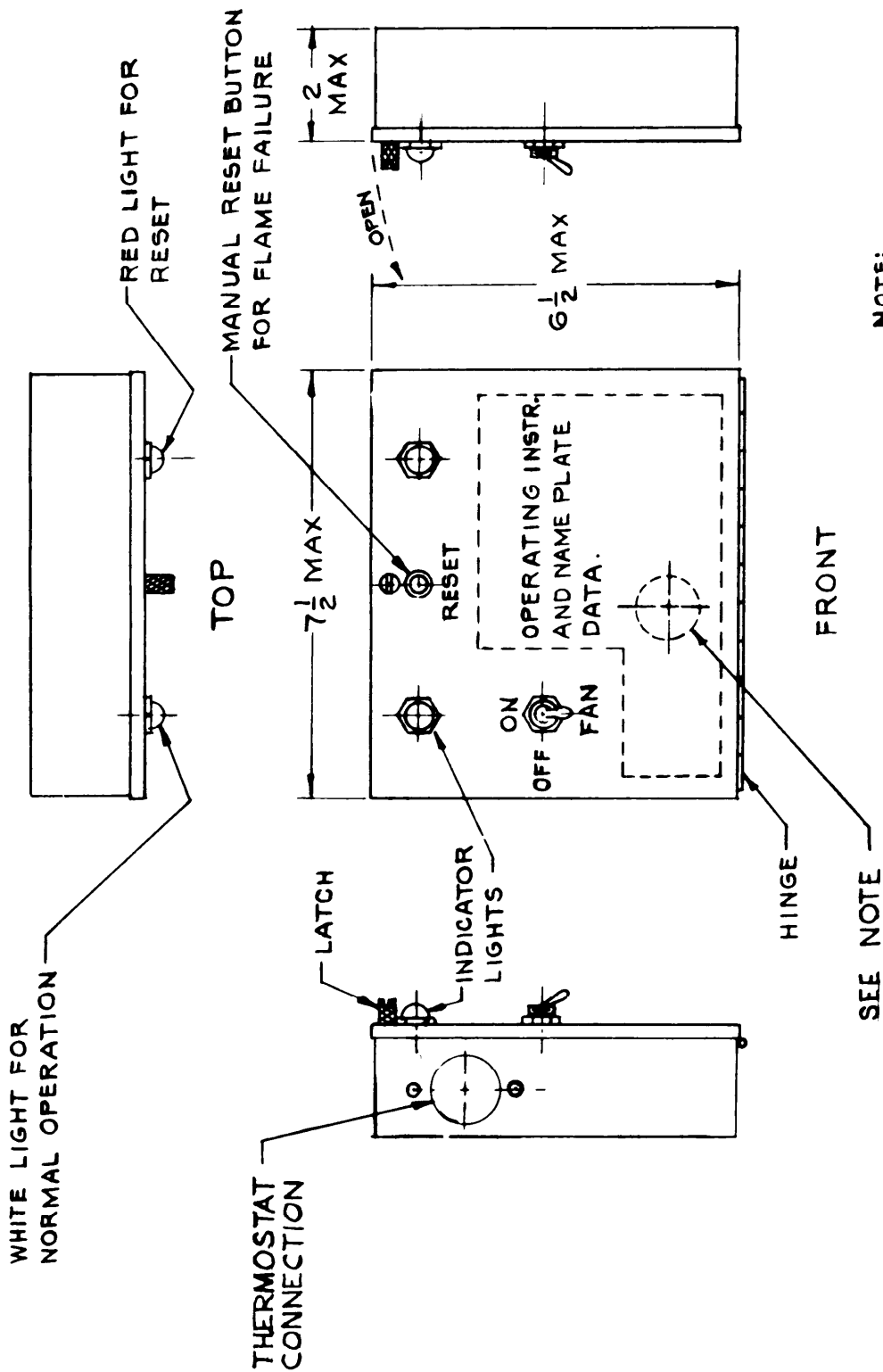


FIGURE 11. Heater, space, with blower, 60,000 btu/hr (discharge up position) (see note 2).

X-1028C

MIL-STD-1407R



NOTE:  
 PROVIDE SUITABLE PLUG &  
 RECEPTACLE FOR CONNECTING  
 TO HEATER CIRCUIT.

FIGURE 12.  
 HEATER CONTROL BOX

X-2210

MIL-STD-1407B

Nomenclature:	Heater, Space, Electric with Blower, 5,000 Btuh.
Capacity	
Heat Output Btuh	
Minimum	5,000
Air Discharge Rate, cfm	
Minimum at 0-inch water static pressure	92
Power Requirements	
Voltage	115
Frequency	60
Phase	1
Watts	1500
Operating Weight, lbs	25
Control	Manual start-stop, switch adjustable thermostat regulation. Permits fan operation without heating.
National Stock Number:	4520-00-177-6198
Line Item Number:	
Specification:	MIL-H-52641

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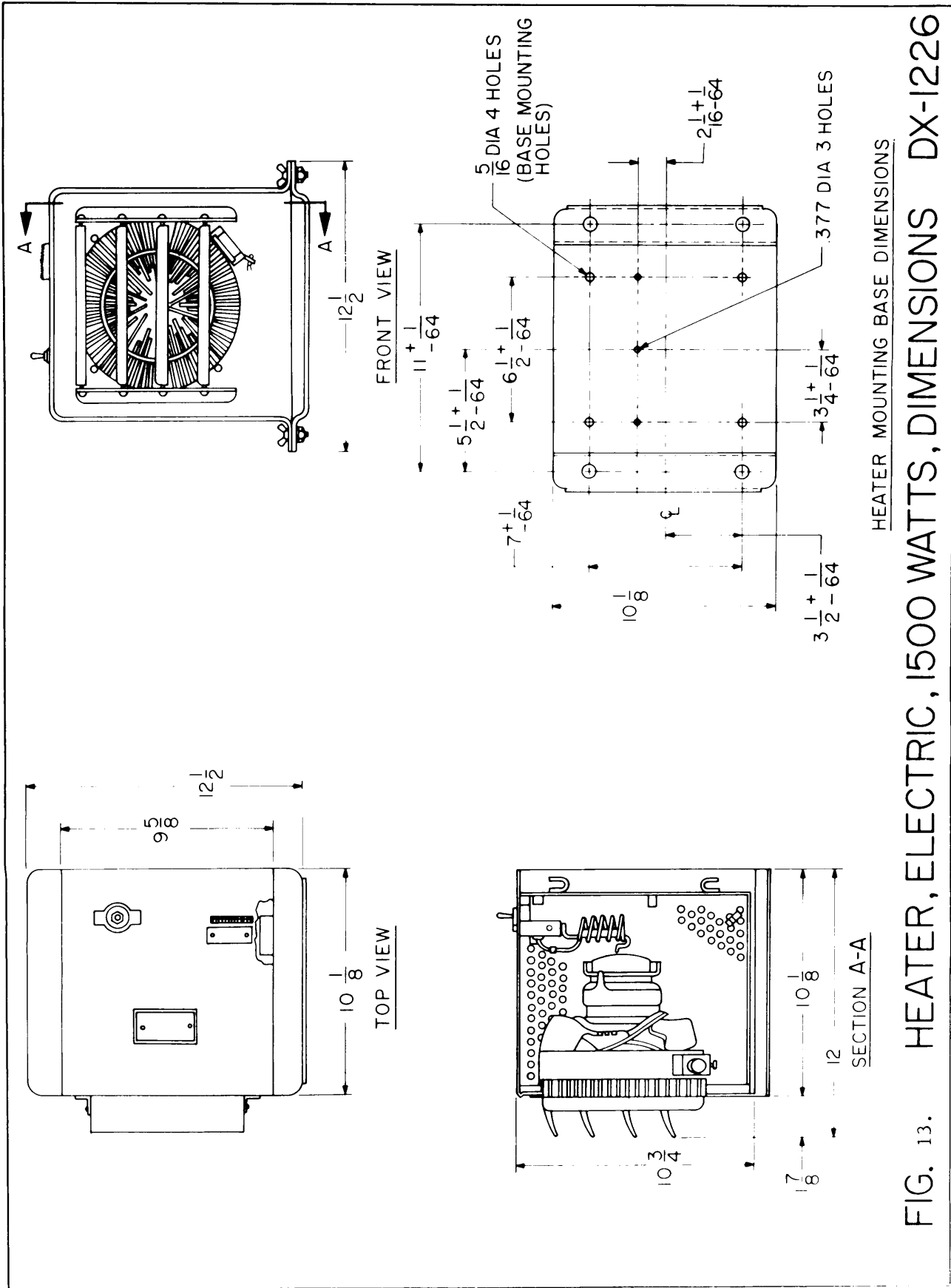


FIG. 13. HEATER, ELECTRIC, 1500 WATTS, DIMENSIONS DX-1226

MIL-STD-1407B

Nomenclature: Heater, Space, Radiant Type, Portable,  
Nonblower, 45,000 Btuh (M-1941).

Capacity  
Heat Output Btuh 45,000

Fuel  
Type I Coal or solid fuel burning.  
Type II Oil burning.

Fuel Consumption  
Type I 1/4 ton coal per week.  
Type II 2/3 gallon per hour.

Fuels  
Type I Coal and other solid fuels.  
Type II Diesel, conforming to VV-F-800, Grade DF-2 or  
lighter; jet fuel or gasoline, any grade.

Operating Weight, lbs 44

Heat Output Control  
Type I Manual, by setting of stack-damper and ash  
door and by manipulation of unburned fuel and  
fire.  
Type II Manual, by float valve.

National Stock Number:  
Type I 4520-00-257-4877  
Type II 4520-00-927-4214

Line Item Number:  
Type I K25890  
Type II K25943

Specification: MIL-H-13514



MIL-STD-1407B

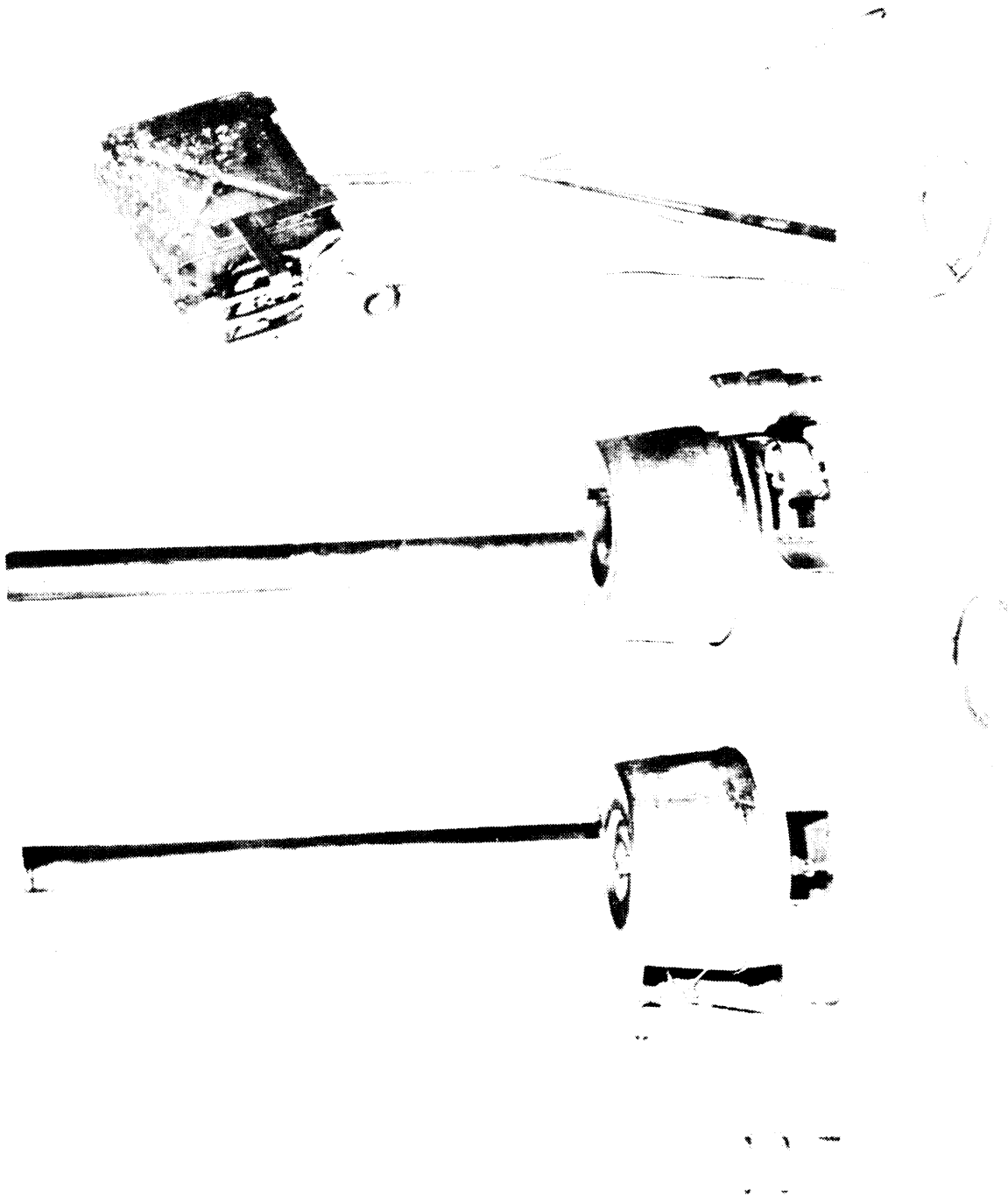
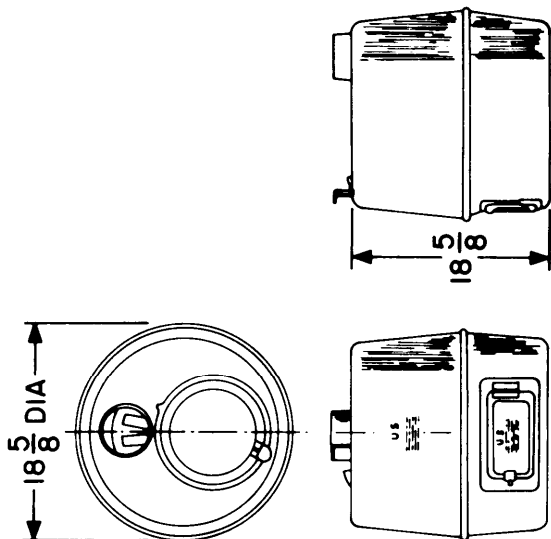


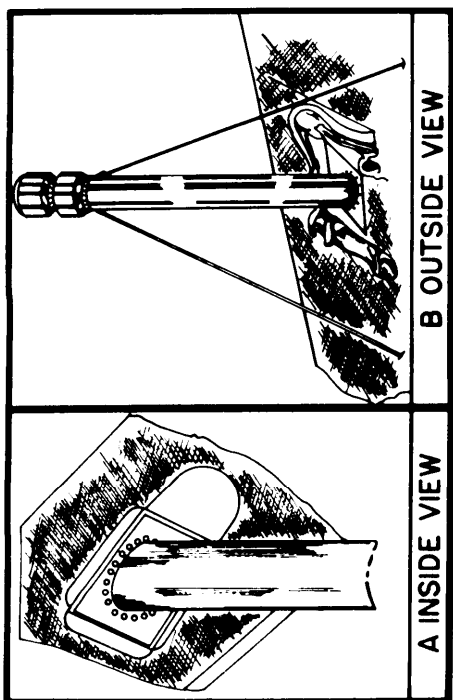
FIGURE 14. Heater, radiant type, portable, 45,000 btu/hr (M-1941).

X-2781A

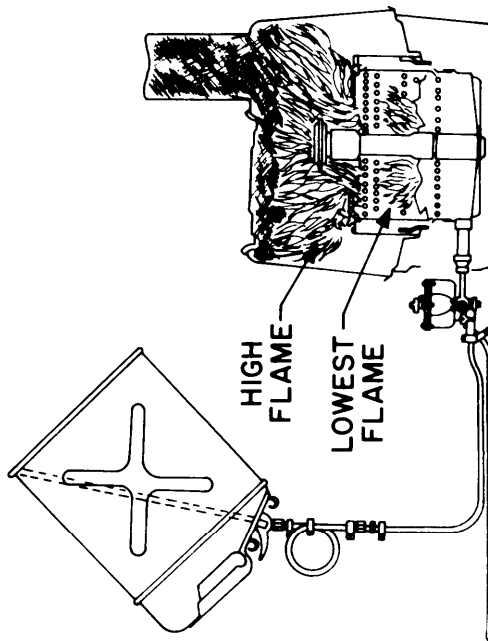
MIL-STD-1407B



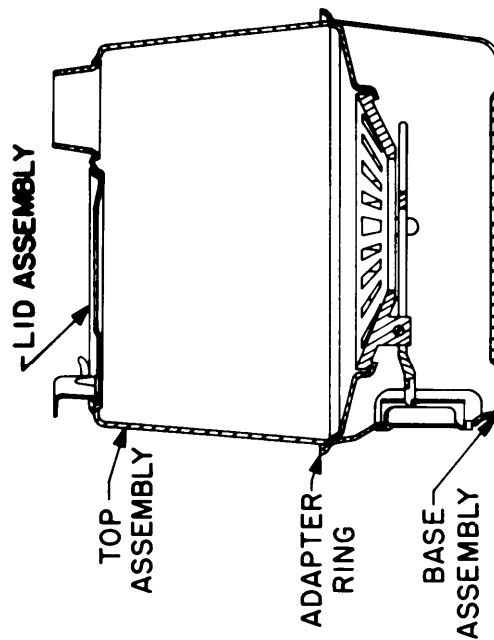
**FIGURE 15.2 Overall dimensions (M-41).**



**FIGURE 15.1 Accessories. (M-41).**



**FIGURE 15.3 Internal arrangement, liquid fueled type (M-41).**



**FIGURE 15.4 Internal arrangement burning type (M-41).**

MIL-STD-1407B

Nomenclature:	Heater, Space, Radiant Type, portable, Nonblower, 60,000 Btuh (Yukon).
Capacity Heat Output Btuh	60,000
Fuel Consumption, gal/hr	0.625
Fuels	Normally gasoline, but provision made for solid fuel to be used when necessary.
Weight (Packed), lbs	33
Size: Height with diverter	106 inches
Height stovetop, assembled.	16 inches
Length, assembled with stack.	30 inches
Width, assembled.	10 inches
Control	Drip valve with sight glass.
National Stock Number:	4520-00-287-3353
Line Item Number:	K26275
Specification:	MIL-H-12340

MIL-STD-1407B

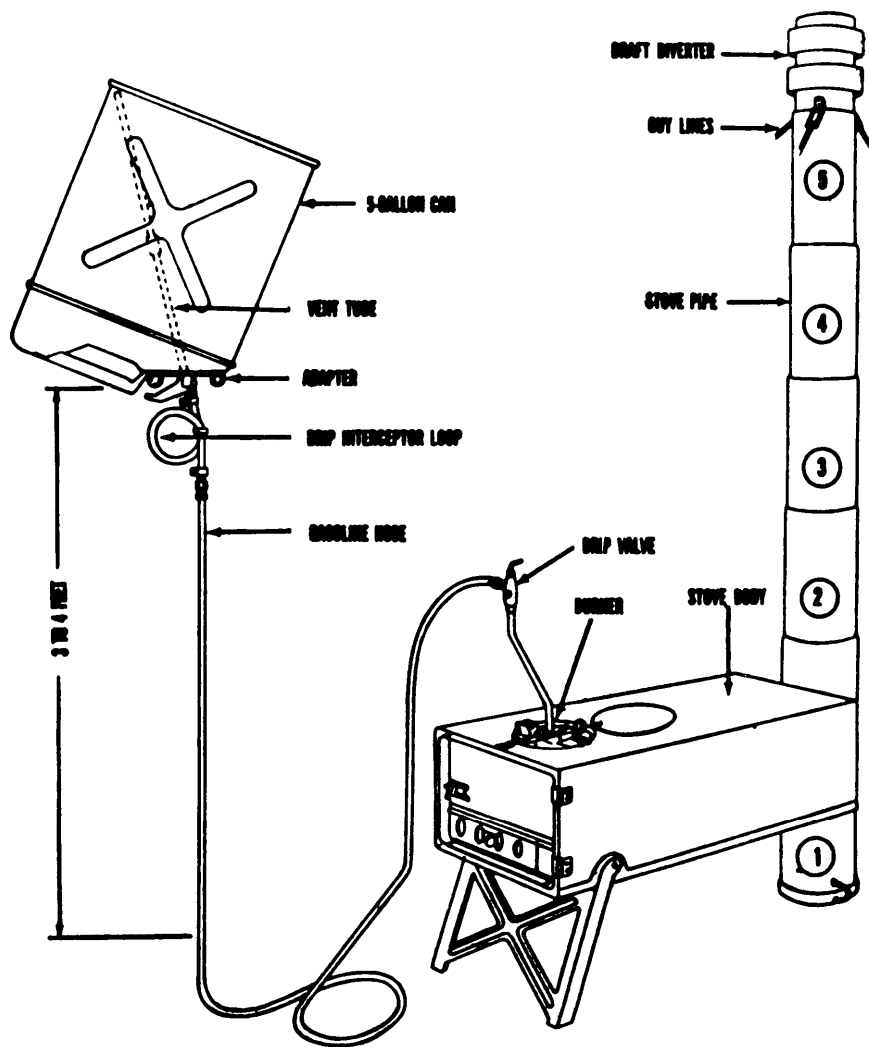


FIGURE 16. INSTALLATION SETUP OF YUKON STOVE

X-2782

MIL-STD-1407B

Nomenclature	Heater, Space, Fuel Oil, Floor Installation, Nonblower, 70,000 Btuh (Barracks Heater).
Capacity	
Heat Output Btuh	70,000
Fuel Consumption, gal/hr	3/4
Fuels	Diesel, Grades DF-A, DF-1, and DF-2, conforming to VV-F-800.
Weight, lbs	87
Control	Manual, float type fuel valve.
National Stock Number:	4520-00-540-0557 4520-00-540-0557, with fan and smoke stack.
Line Item Number:	K26164
Specification:	MIL-H-14516

MIL-STD-1407B

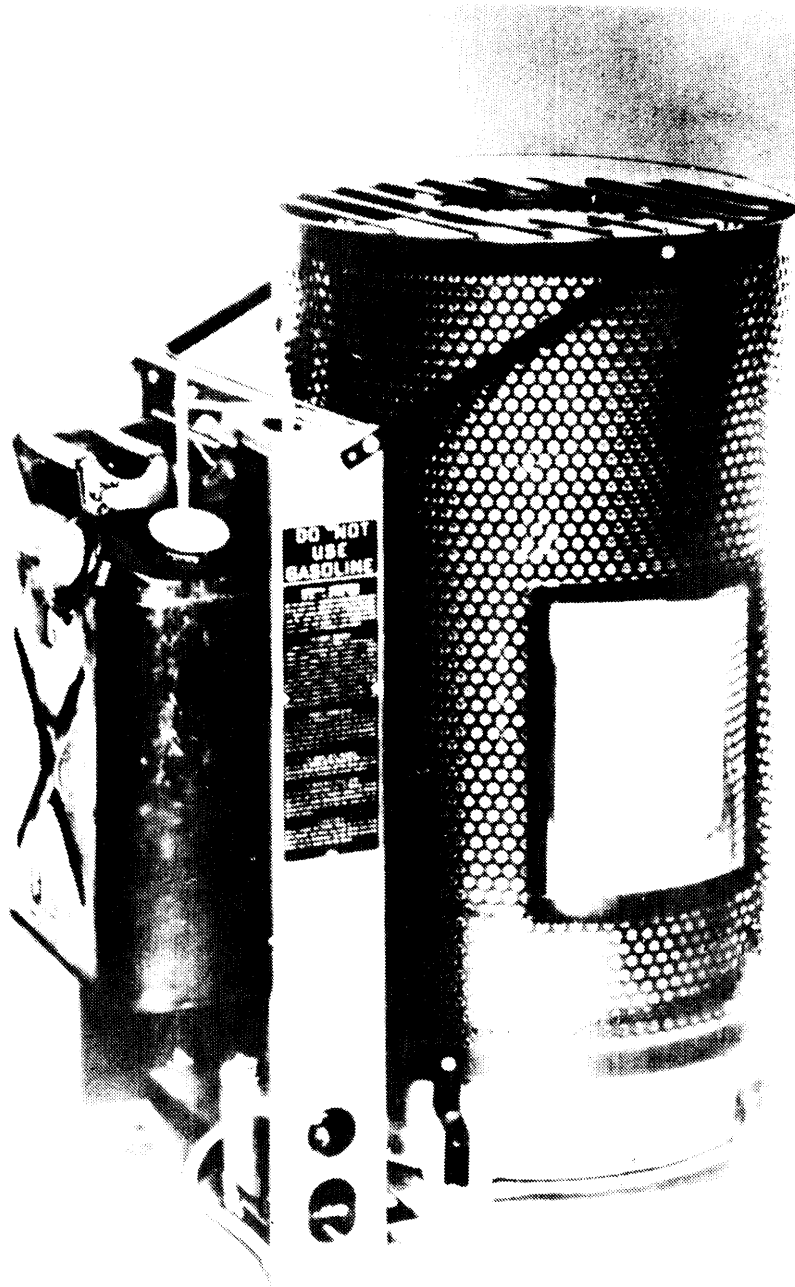


FIGURE 17. Heater, space, oil-fired, 70,000 btu/hr (barracks heater).

X-2783B

MIL-STD-1407B

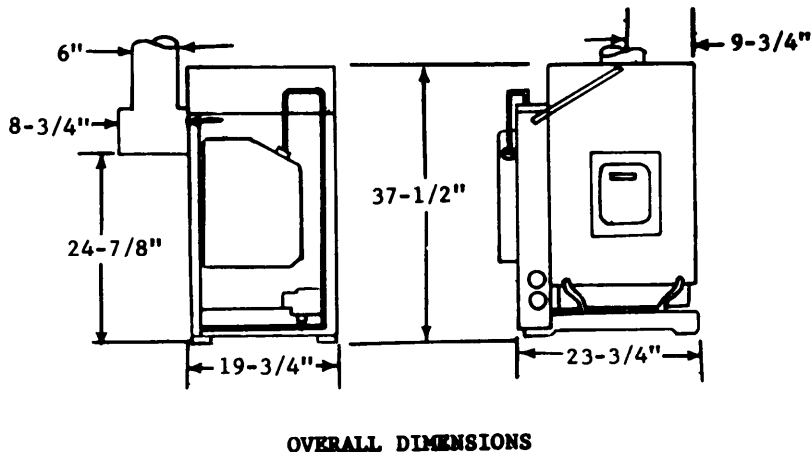
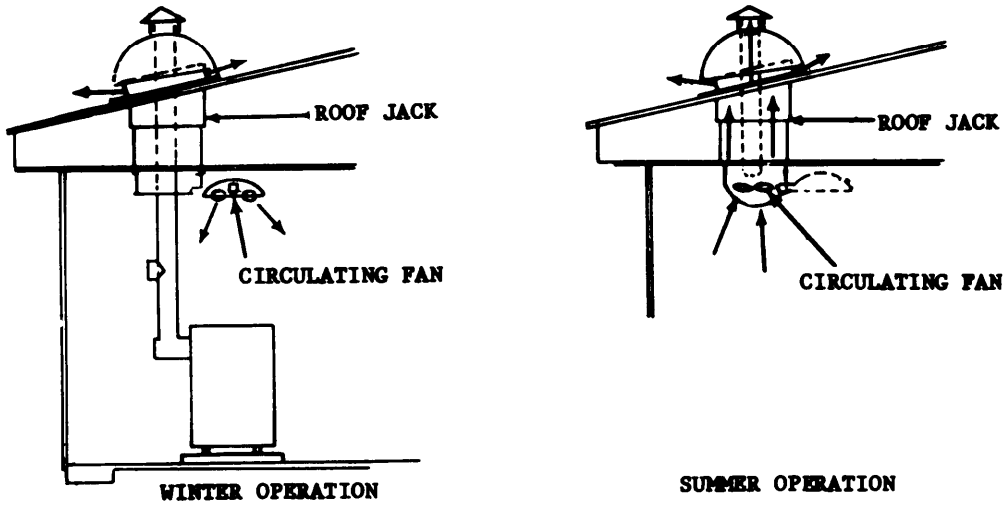


FIGURE 18. Heater, space; oil-fired, 70,000 btu/hr; dimensions and accessories (barracks heater).

X-2784B

MIL-STD-1407B

Nomenclature:	Heater, Duct-Type, Portable, Multifuel, Self-powered, 250,000 Btuh, Wheel-Mounted.
Capacity	
Heat Output Btuh	
Minimum	250,000 at 0° F outdoor temperature
Air Discharge, cfm	
Minimum 1-inch water static pressure	1300 to 1900
Power Source	Integral turbine engine
Operating Weight, lbs	650
Size: Width	40 inches
Height	58 inches
Length	65 inches
Fuel Consumption, gal/hr	3.25
Fuels	Gasoline, DF-1, DF-2, DF-A, JP-4, JP-5, Kerosene.
Control	Manual start, automatic cycling.
National Stock Number	Not assigned, under development.
Line Item Number:	Z32890
Specification:	Not assigned, under development.



MIL-STD-1407B

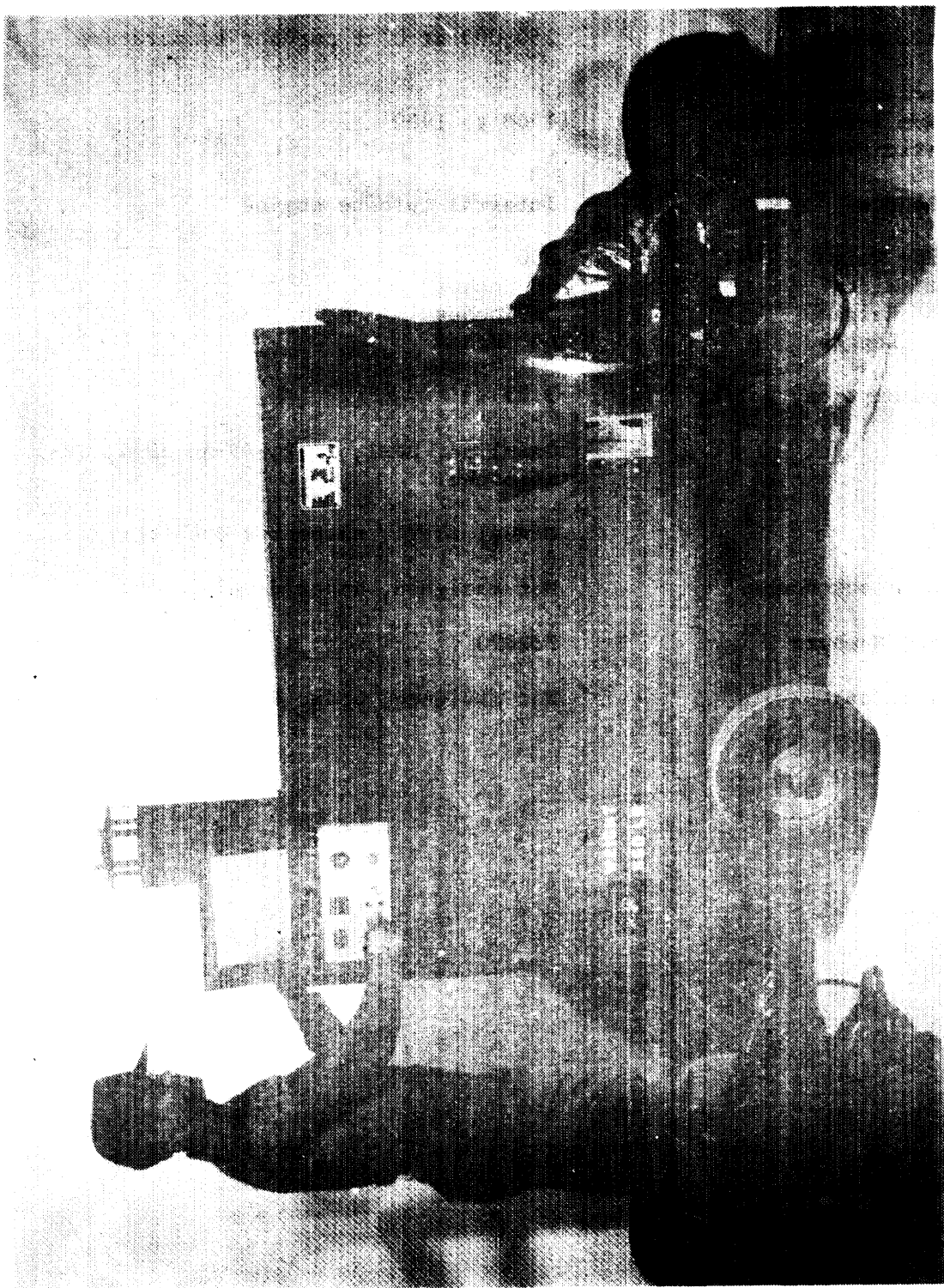


FIGURE 19. Heater, duct type, portable, multifuel, self-powered,  
250,000 BTUH, wheel-mounted.

X-4107A

MIL-STD-1407B

Nomenclature: Heater, Duct-Type, Portable, 400,000 Btuh.

Capacity  
Heat Output Btuh  
Minimum 400,000 at (-) 65° F.

Air Discharge, cfm 1100 to 1500

Prime Mover:  
Class 1 Equipped with a commercial gasoline engine.  
Class 2 Equipped with an electric motor, 208/220  
voltage, 3 phase, 60 Hertz.  
Class 3 Equipped with a military standard gasoline  
engine 1-1/2 hp., Model No. 1A08-III.  
Class 4 Equipped with a commercial diesel engine.

Dry Weight, lbs 675 for class 1, 2, or 3 heaters.  
800 for class 4 heaters.

Fuels:  
For classes 1,2, and 3 only  
Gasoline Conforming to:  
VV-G-1690, MIL-G-3056, MIL-G-5572  
For class 4 only  
Diesel fuel VV-F-800, Grades DF-1, DF-2 and DF-A.  
Turbine Fuel MIL-T-5624, Grades JP-4 and JP-5, MIL-T-83133,  
Grade JP-8.

Fuel Consumption, gal/hr 5

Control Manual start, automatic control of air  
discharge temperature.

National Stock Number: 4520-00-203-0224

Army Line Item Number: K24931

Specification: MIL-H-4607

MIL-STD-1407B

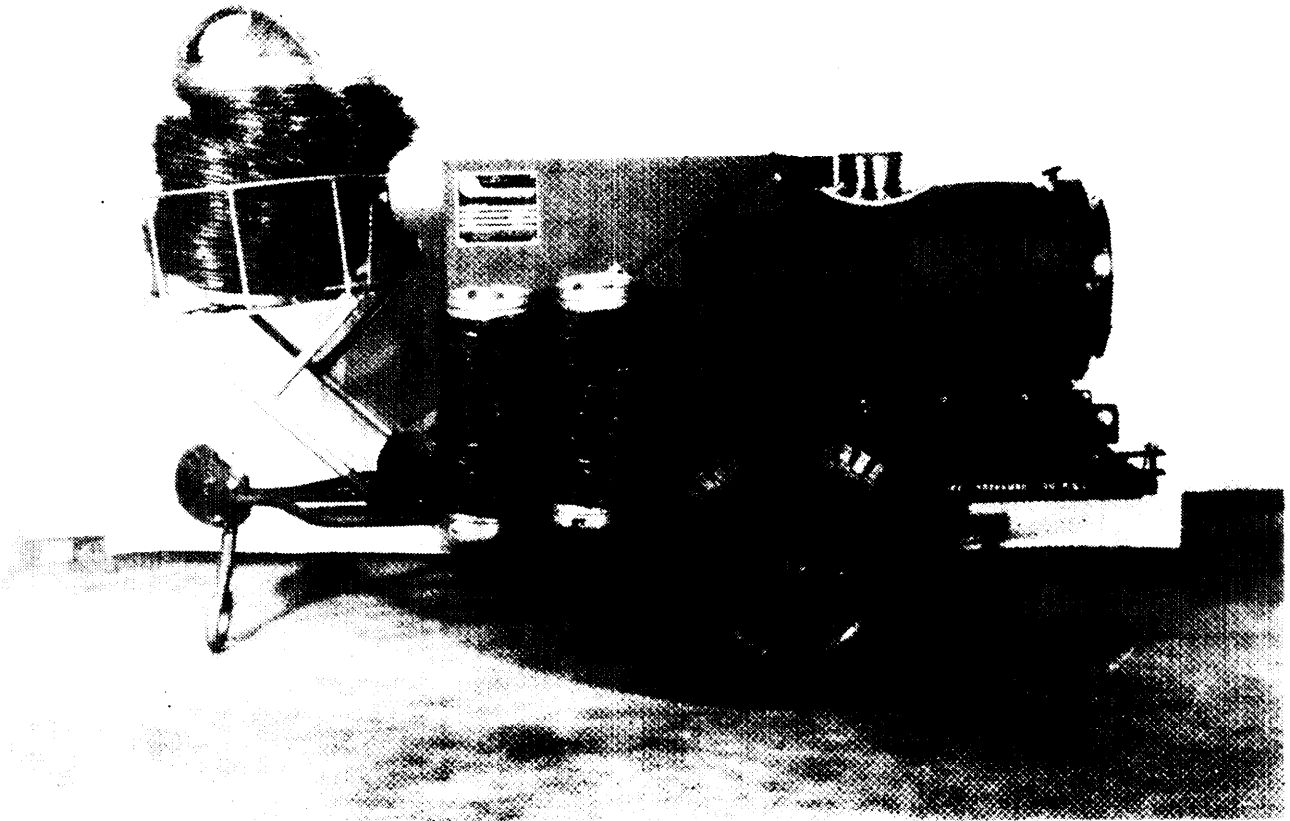


Figure 20. Heater, duct type, portable, 400,000 Btuh.

