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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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MIL-STD-1407B

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.

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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.
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(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.
Hz	- (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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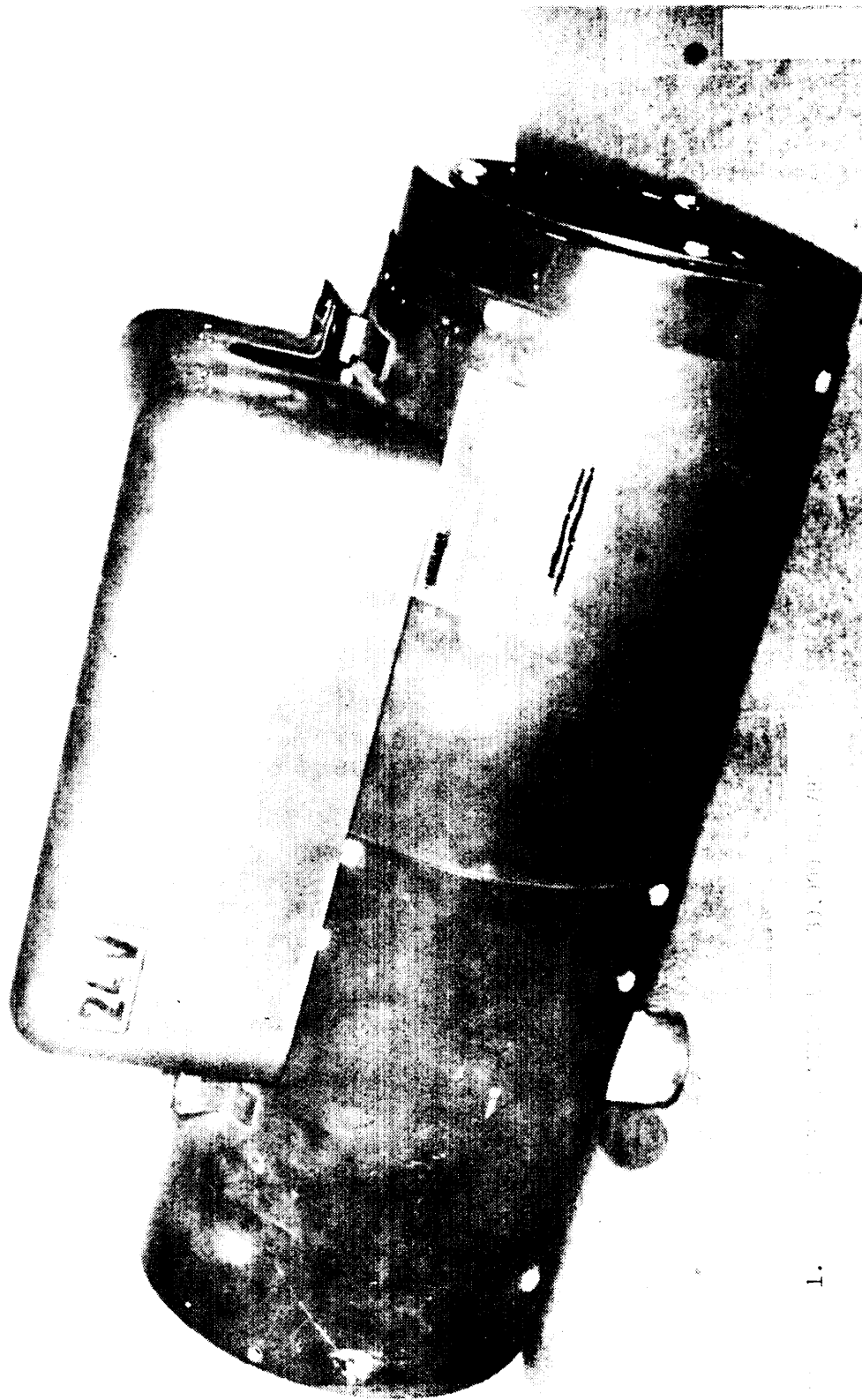
INDIVIDUAL UNIT CHARACTERISTICS

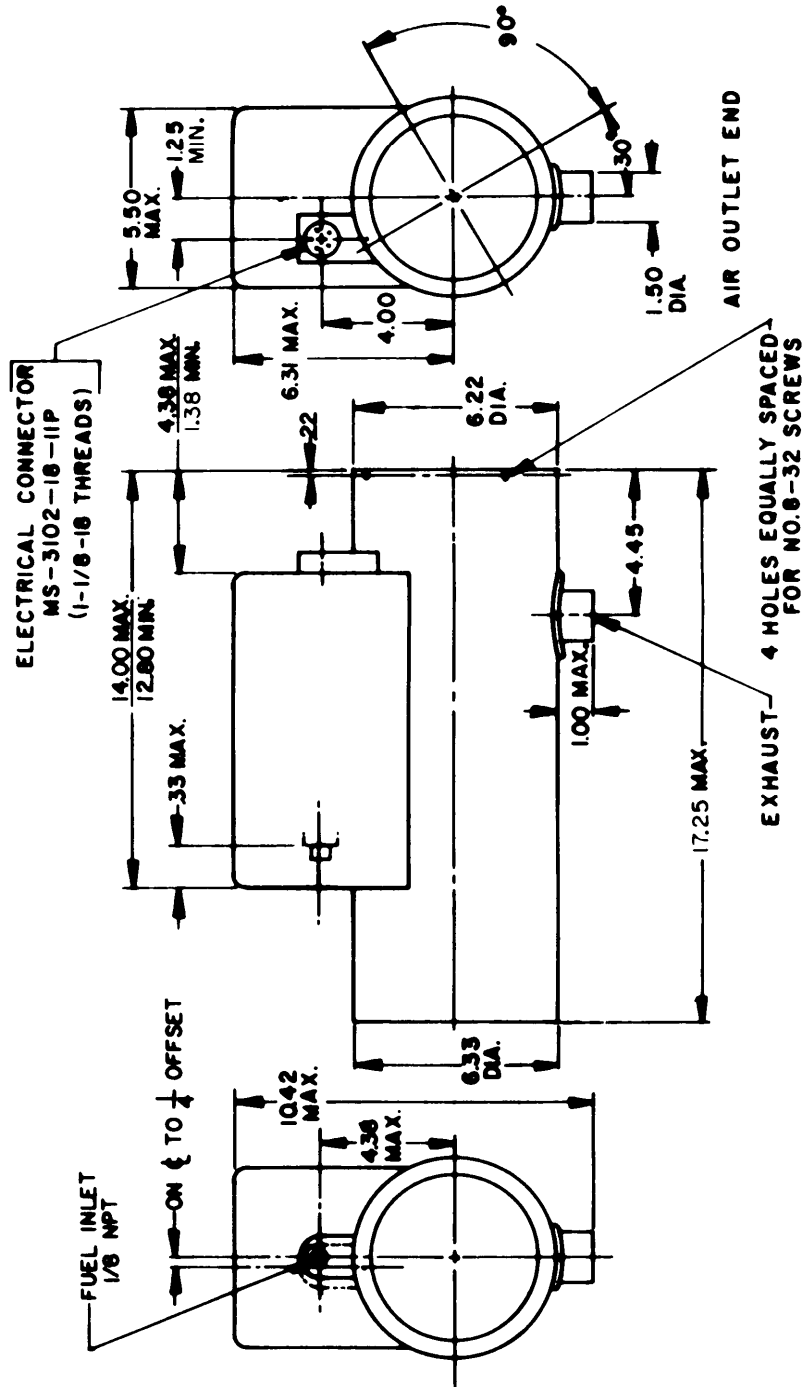
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Single Air	
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NSN 4520-01-081-0773	
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NSN 4520-00-203-0224	

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

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

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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	

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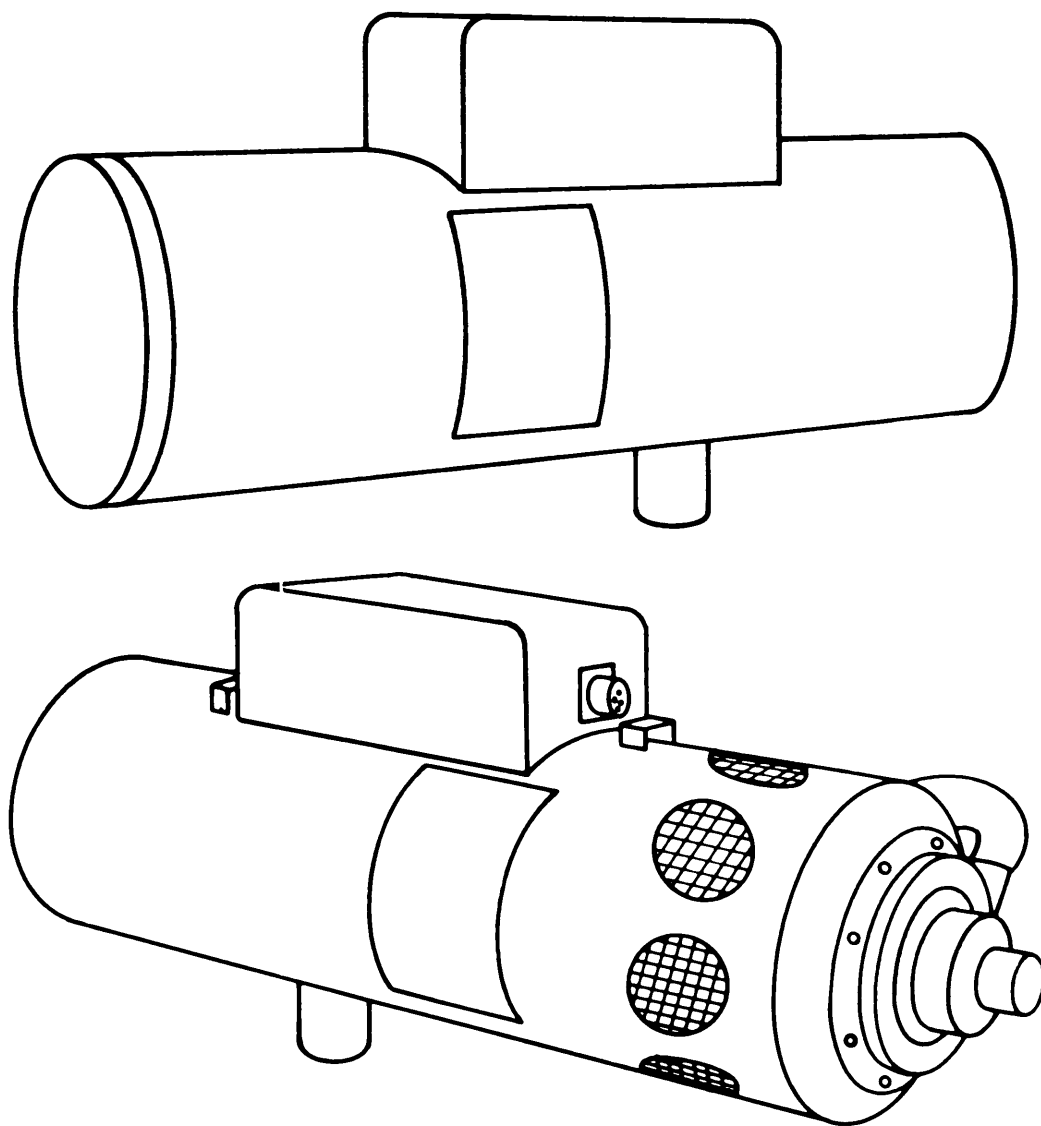


FIGURE 3. Stewart-Warner model 10560C, single air heater, NSN 2540-01-083-0691.

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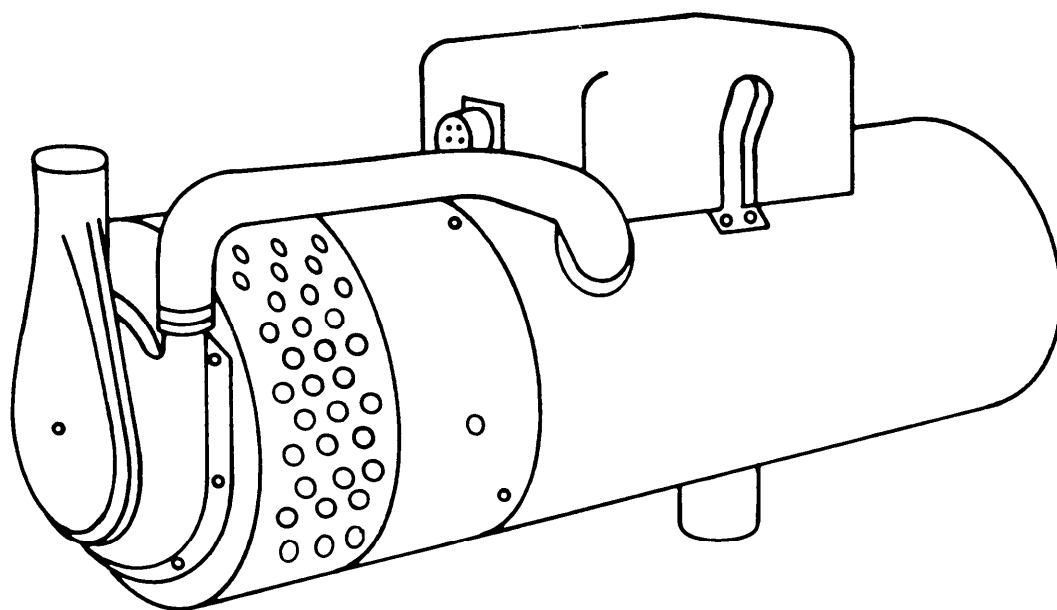


FIGURE 4. Stewart-Warner, dual air heater, model
No. 10560M24BI, NSN 2540-01-169-5159
and model No. 10560M24,
NSN 2540-01-071-0651.

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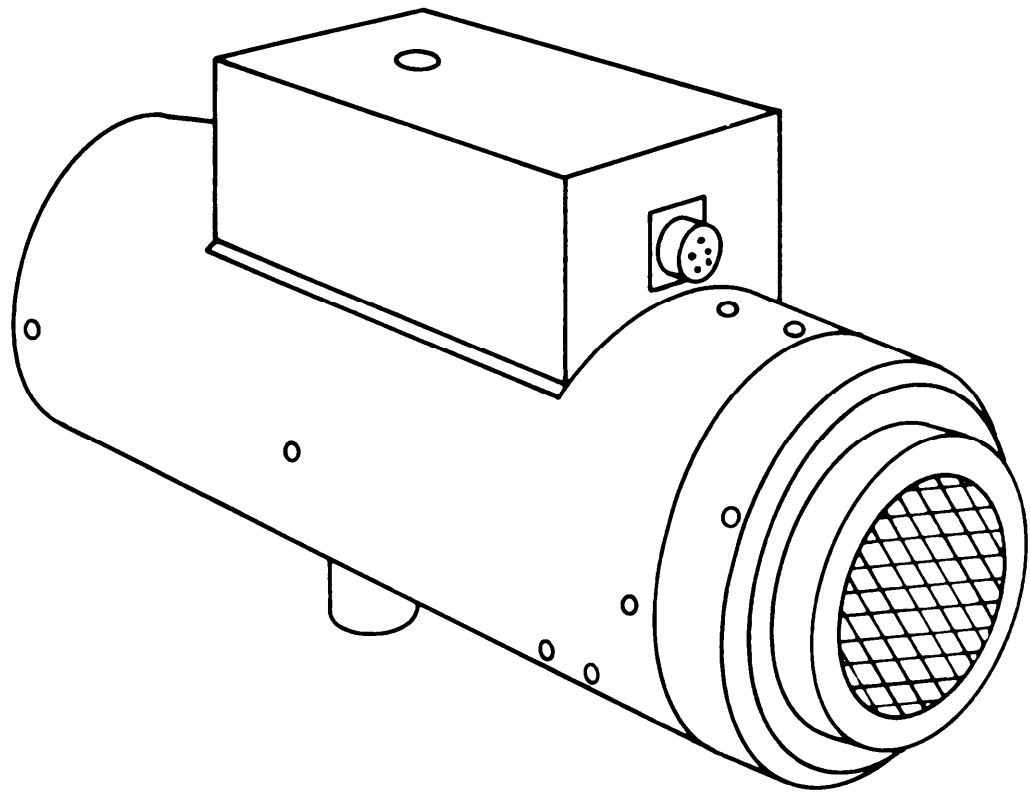


FIGURE 5. Hupp model No. MF-510A, single air heater,
NSN 2540-00-930-8938.

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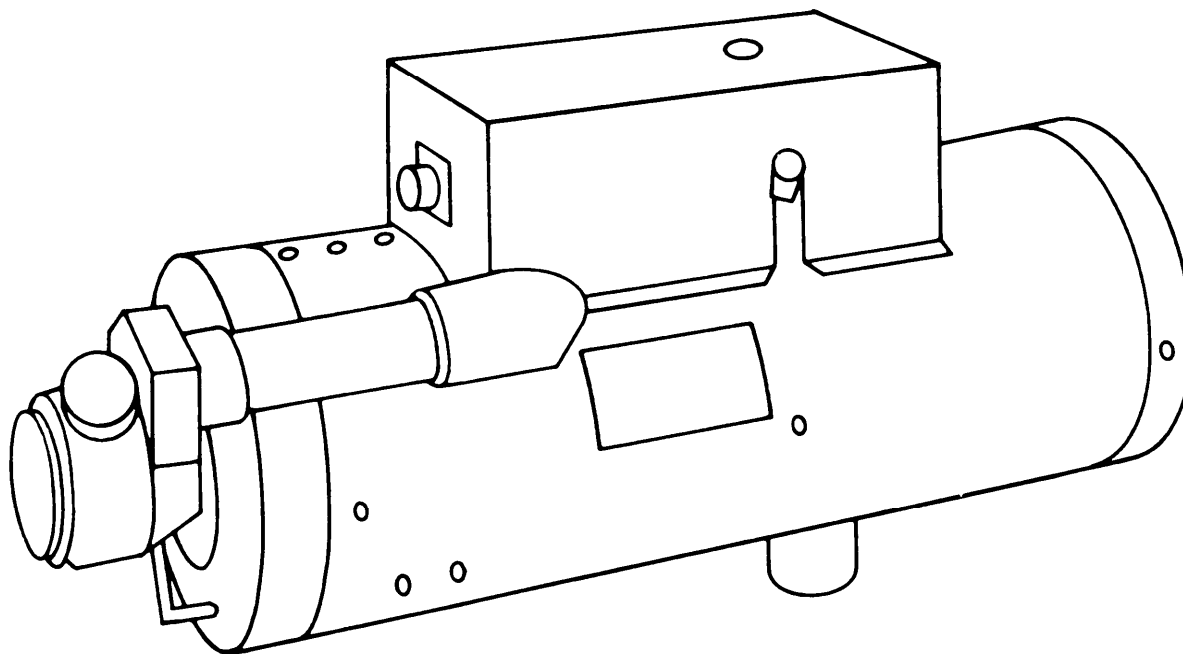


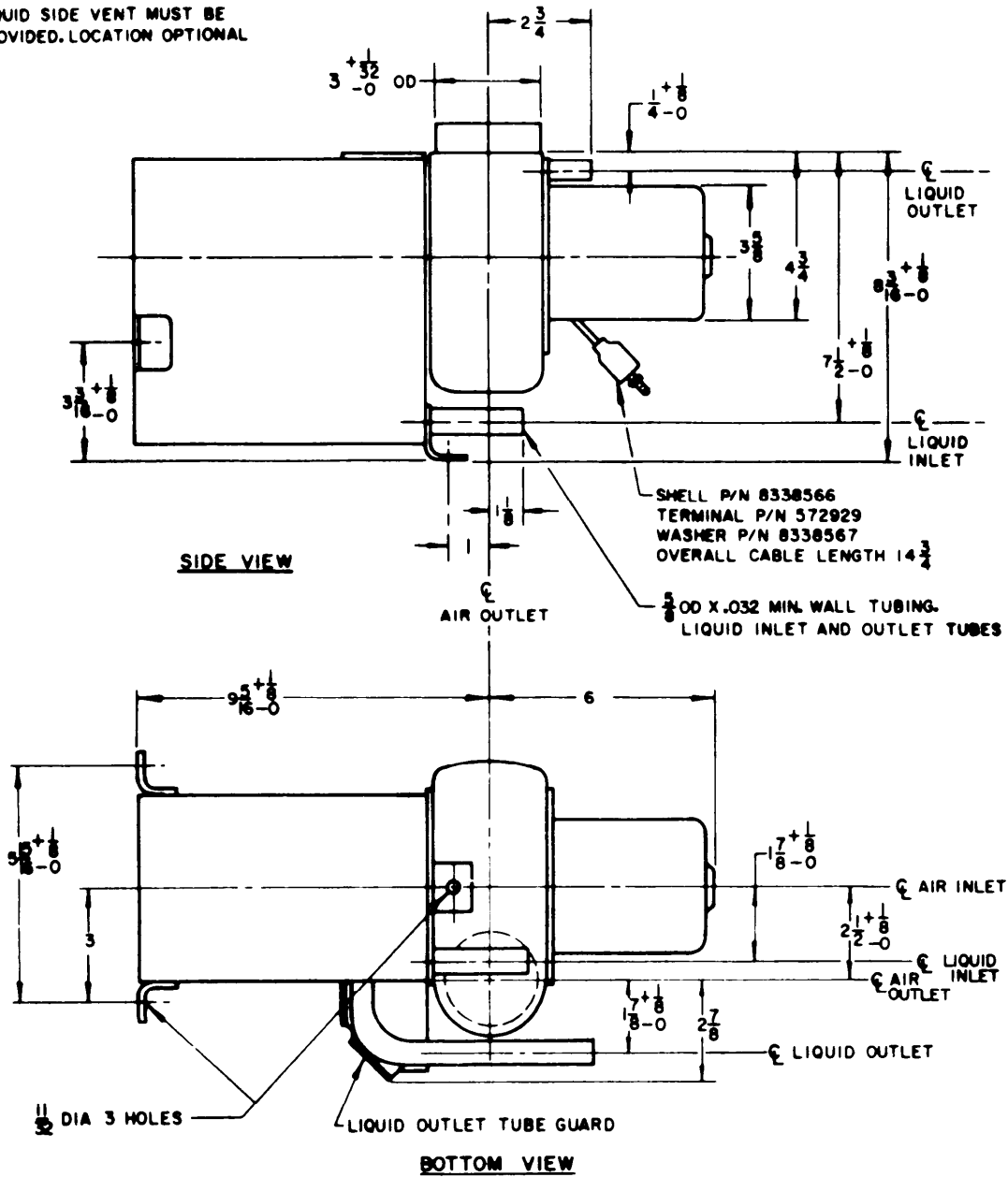
FIGURE 6. Hupp dual air heater, model No. MF510C,
NSN 2540-01-162-3834 and No. MF510B,
NSN 2540-01-071-0652.

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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 ₂ 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

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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

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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 H₂O

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:

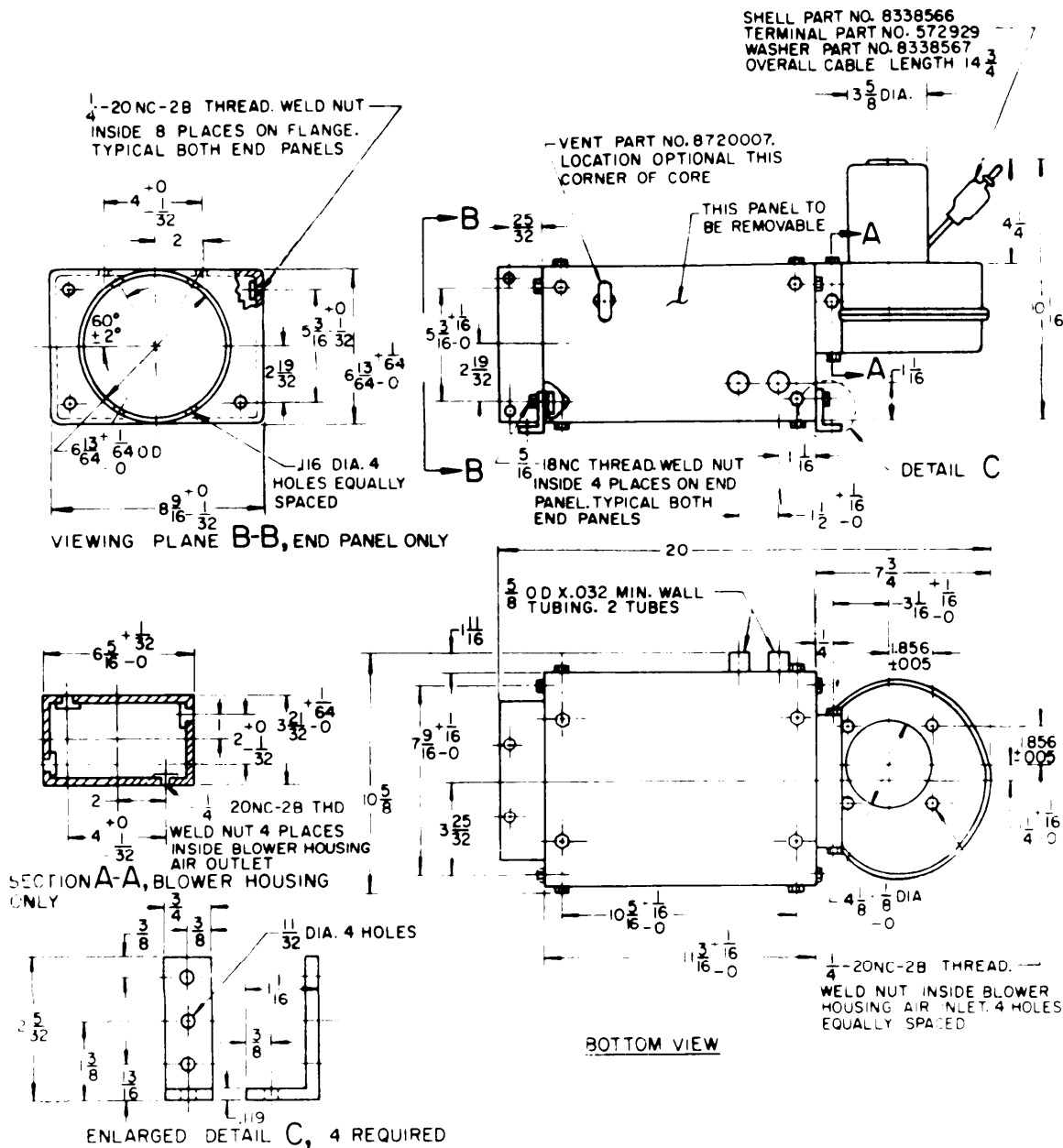
2540-00-202-8591

Line Item Number:

Specification:

MIL-H-3199

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- NOTES:
1. THIS HEATER SHALL CONFORM TO TYPE II, CAPACITY B OF MIL-H-3199
 2. BASIC ASSEMBLY IS SHOWN. HEATER MAY BE ADAPTED TO VARIOUS CONFIGURATIONS BY REARRANGING OR INTERCHANGING END PANELS OR BLOWER HOUSING ATTACHMENT.
 3. INTERNALLY MOUNTED WELD NUTS ARE TO BE USED FOR ALL FASTENERS. SIZE IS OPTIONAL UNLESS OTHERWISE SPECIFIED.
 4. DIMENSIONS ARE IN INCHES, MAXIMUM, UNLESS OTHERWISE SPECIFIED.

FIGURE 8. HEATER, LIQUID COOLANT OPERATED, 30,000 BTU/HR;
 DIMENSIONS X-2777

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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: Conforming to:
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.

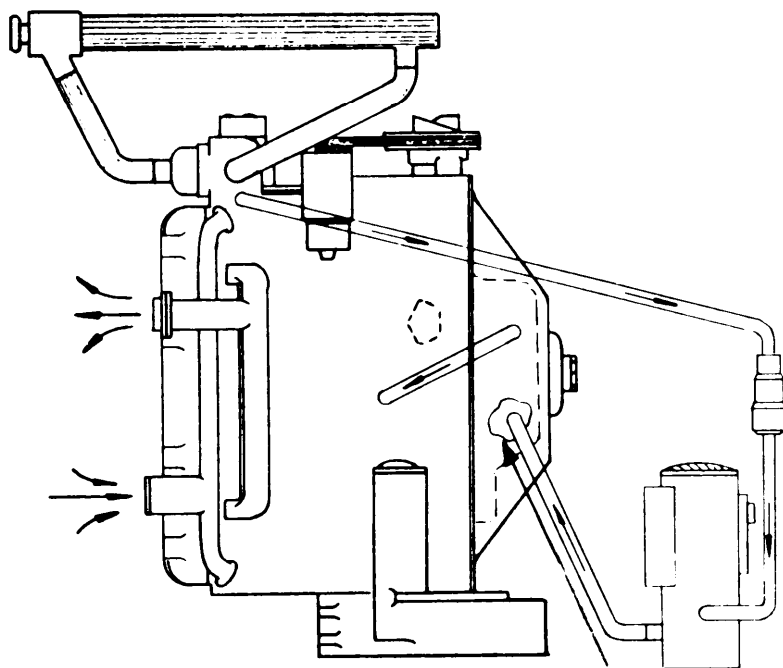
National Stock Number: 2990-00-927-4254

Line Item Number:

Specification: MIL-H-3177

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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:	Conforming to:
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 II	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.

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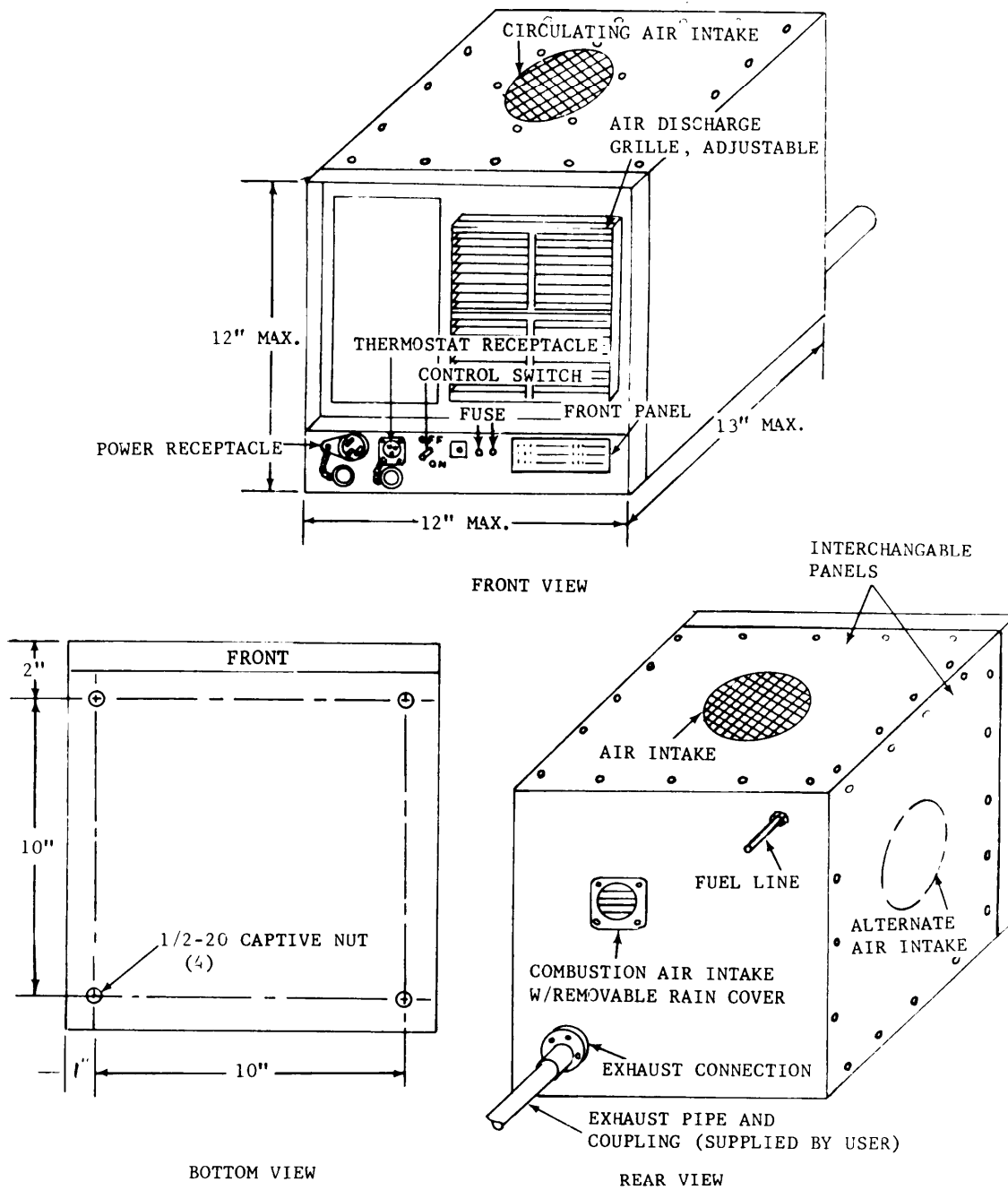


FIGURE 10. . HEATER, SPACE, MULTIFUEL, 15,000 BTU/HR; DIMENSIONS

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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

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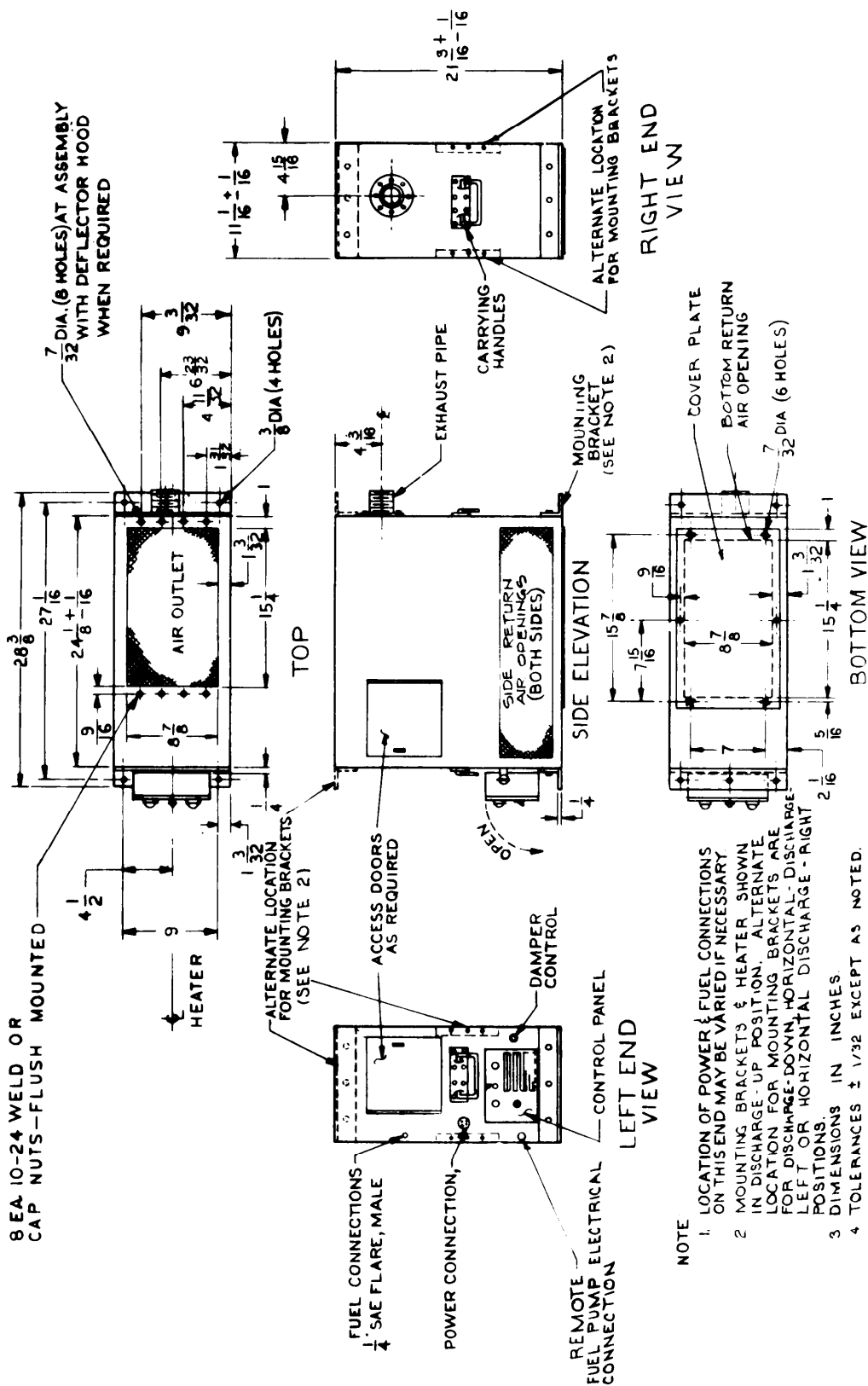
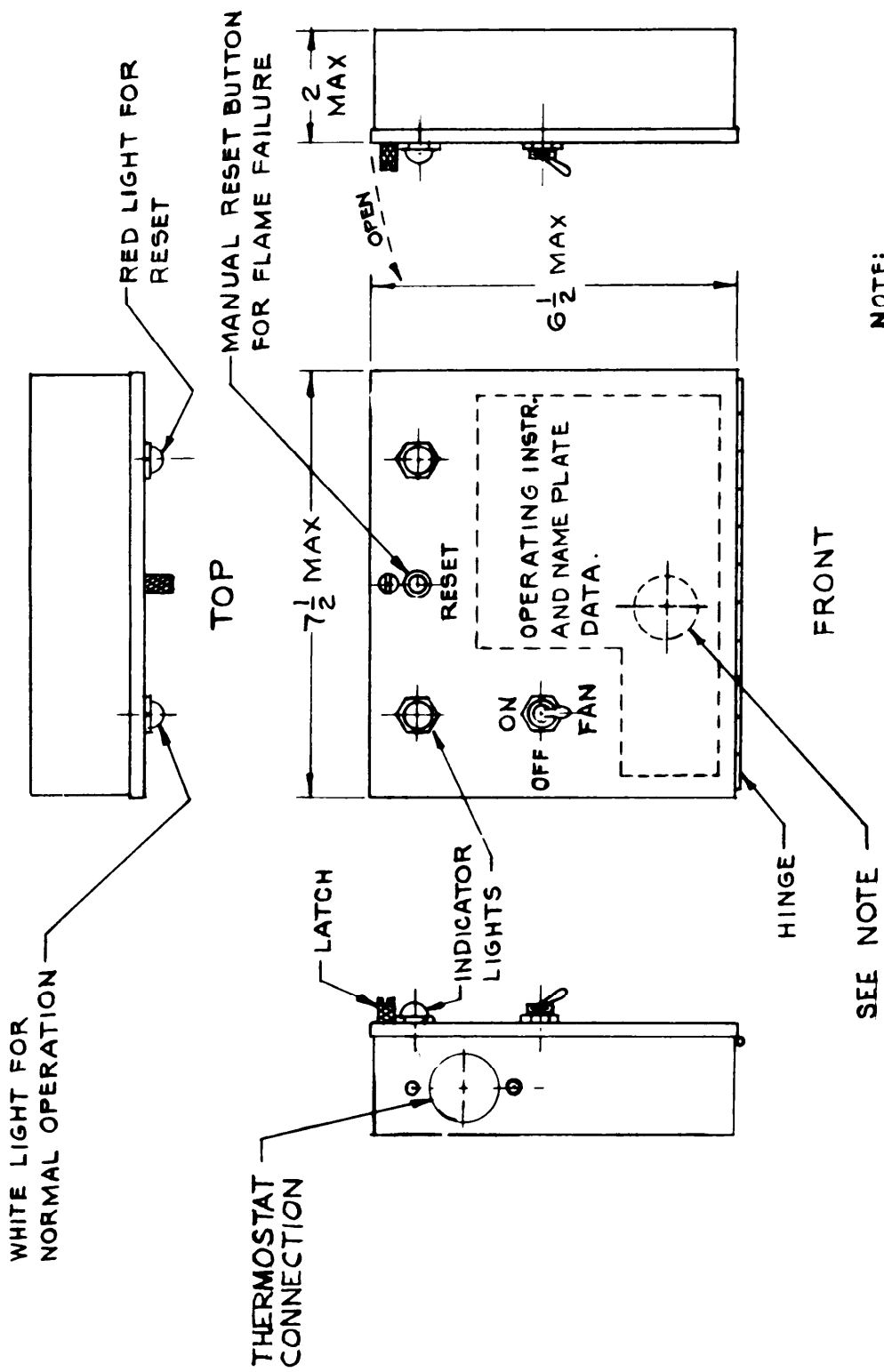


FIGURE 11. Heater, space, with blower, 60,000 btu/hr (discharge up position) (see note 2).

X-1028C

MIL-STD-1407R



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

FIGURE 12.
 HEATER CONTROL BOX

X-2210

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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

MIL-STD-1407B

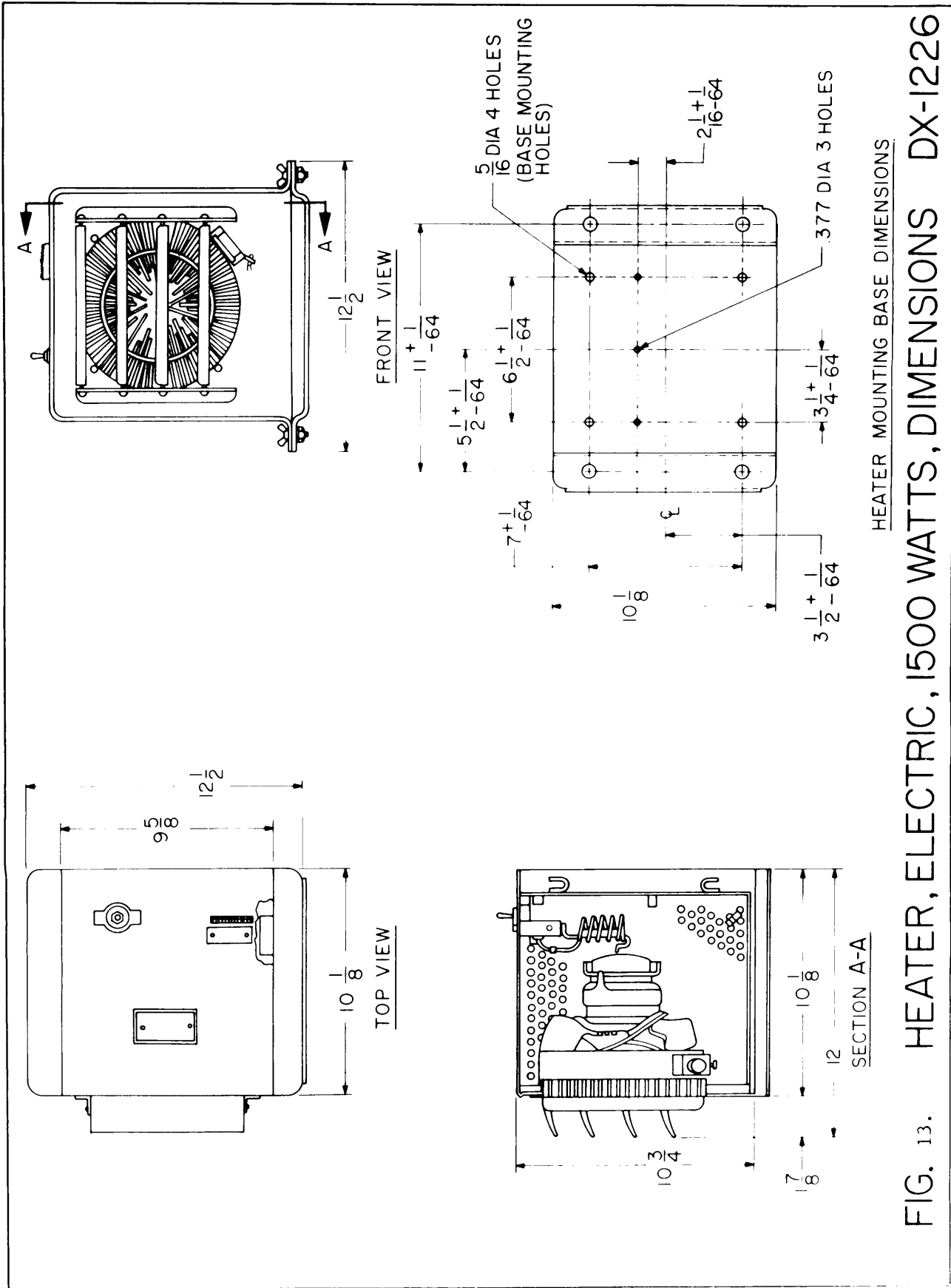


FIG. 13. HEATER, ELECTRIC, 1500 WATTS, DIMENSIONS DX-1226

MIL-STD-1407B

Nomenclature:	Heater, Space, Radiant Type, Portable, Nonblower, 45,000 Btuh (M-1941).
Capacity Heat Output Btuh	45,000
Fuel Type I Type II	Coal or solid fuel burning. Oil burning.
Fuel Consumption Type I Type II	1/4 ton coal per week. 2/3 gallon per hour.
Fuels Type I Type II	Coal and other solid fuels. 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 Type II	Manual, by setting of stack-damper and ash door and by manipulation of unburned fuel and fire. Manual, by float valve.
National Stock Number: Type I Type II	4520-00-257-4877 4520-00-927-4214
Line Item Number: Type I Type II	K25890 K25943
Specification:	MIL-H-13514

MIL-STD-1407B

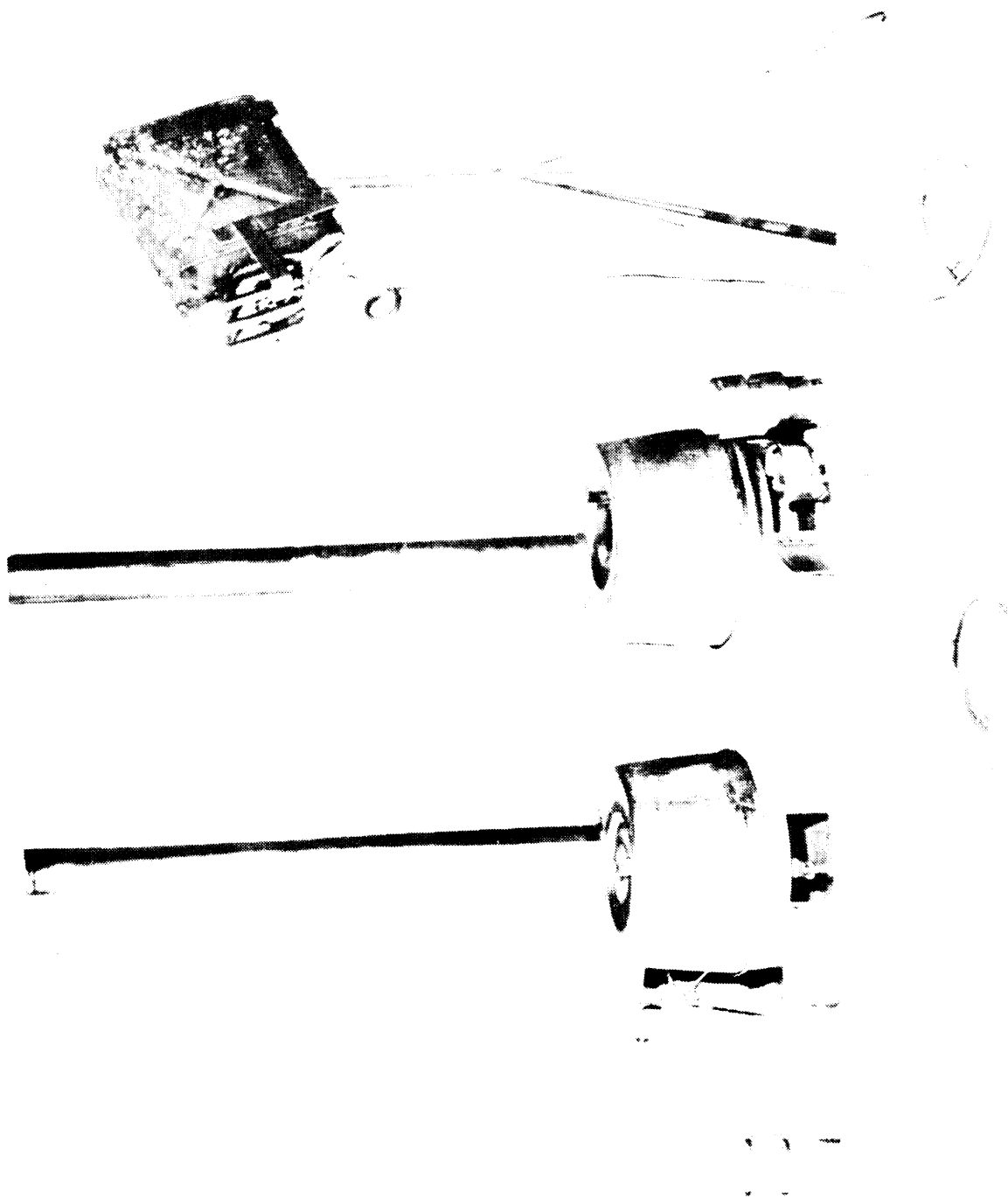


FIGURE 14. Heater, radiant type, portable, 45,000 btu/hr (M-1941).

X-2781A

MIL-STD-1407B

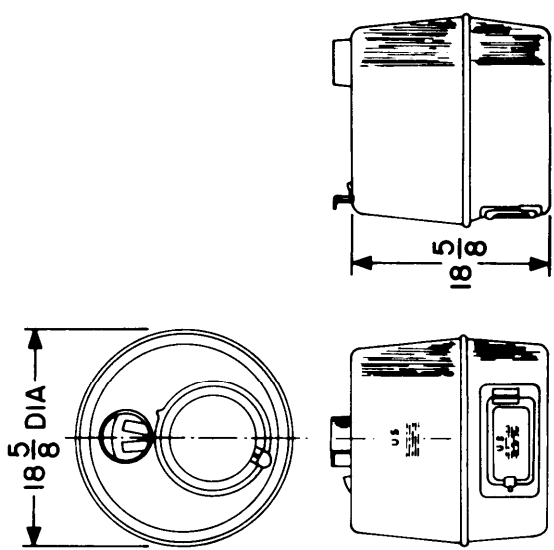


FIGURE 15.2 Overall dimensions (M-41).

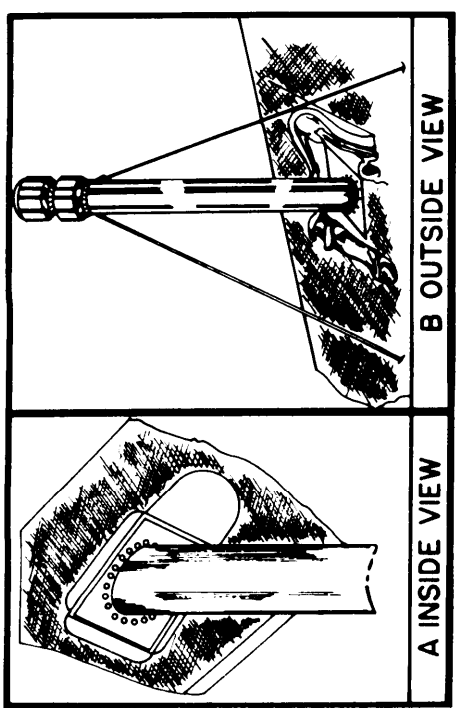


FIGURE 15.1 Accessories. (M-41).

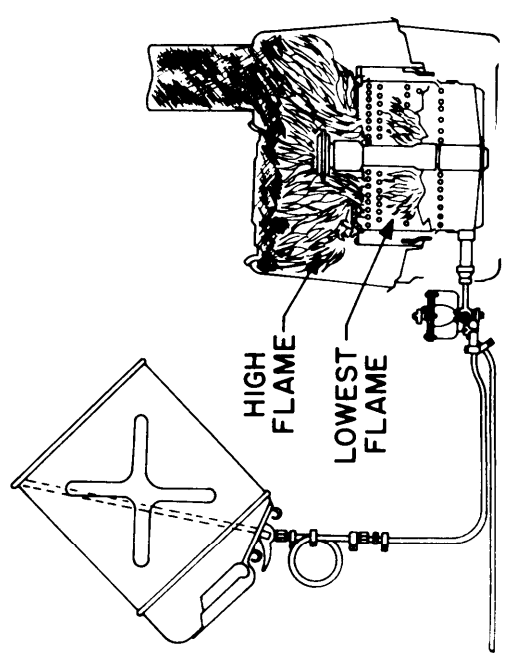


FIGURE 15.3 Internal arrangement, liquid fueled type (M-41).

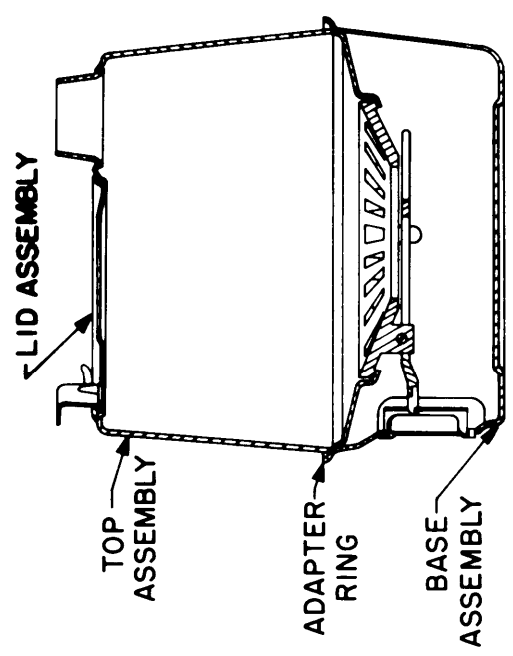


FIGURE 15.4 Internal arrangement burning type (M-41). X-1225A

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

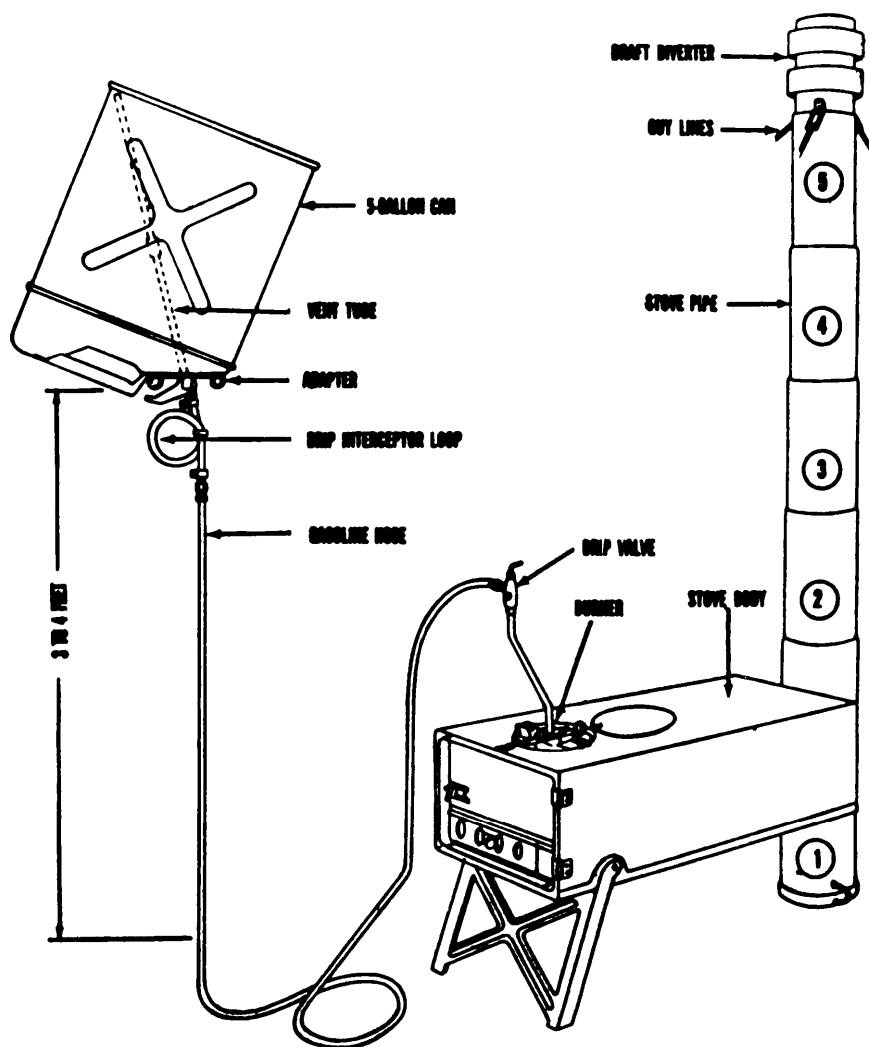


FIGURE 16. INSTALLATION SETUP OF YUKON STOVE

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

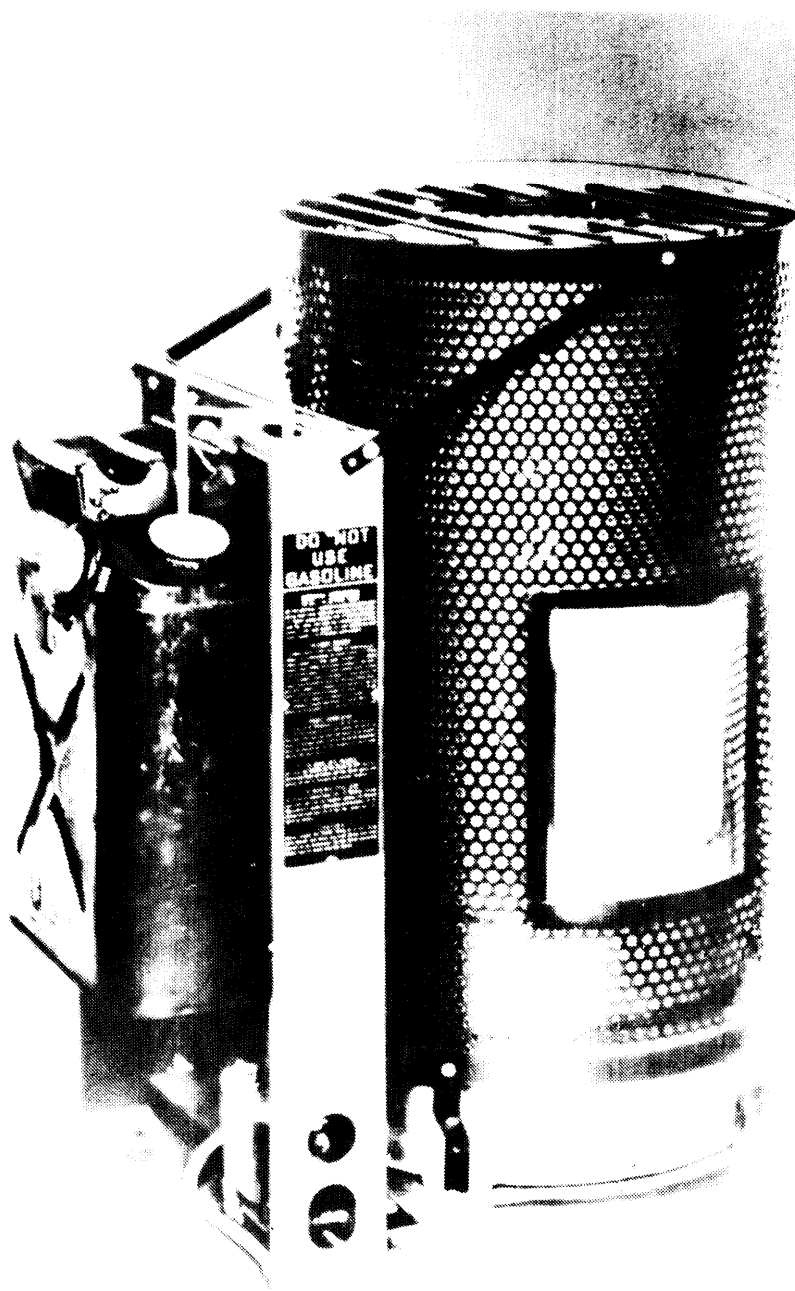


FIGURE 17. Heater, space, oil-fired, 70,000 btu/hr (barracks heater).

X-2783B

MIL-STD-1407B

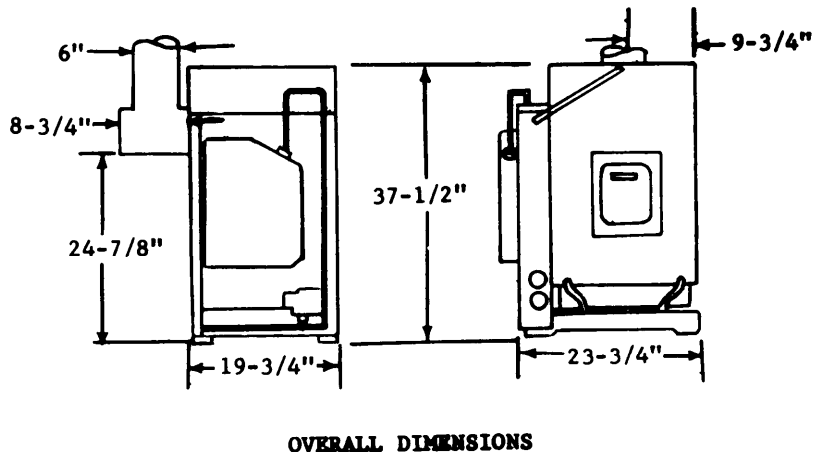
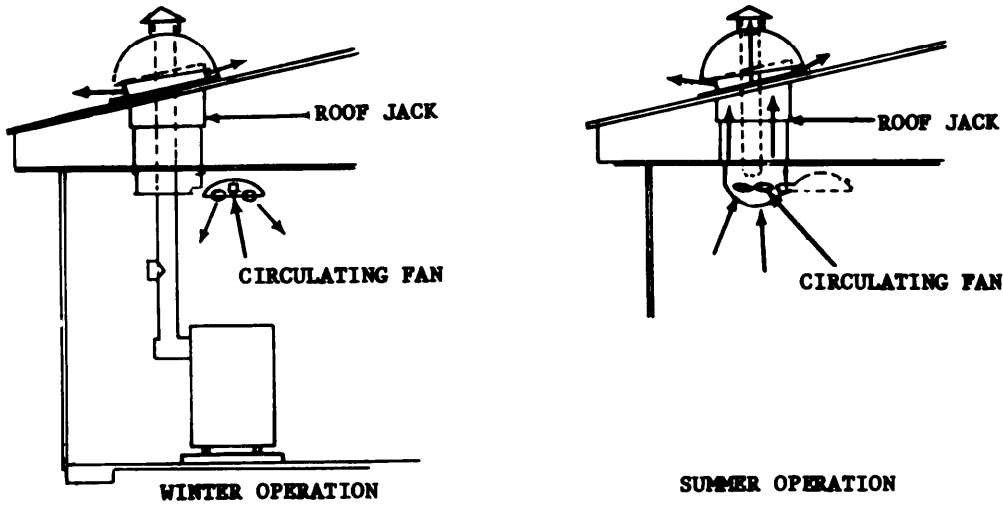


FIGURE 18. Heater, space; oil-fired, 70,000 btu/hr; dimensions and accessories (barracks heater).

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

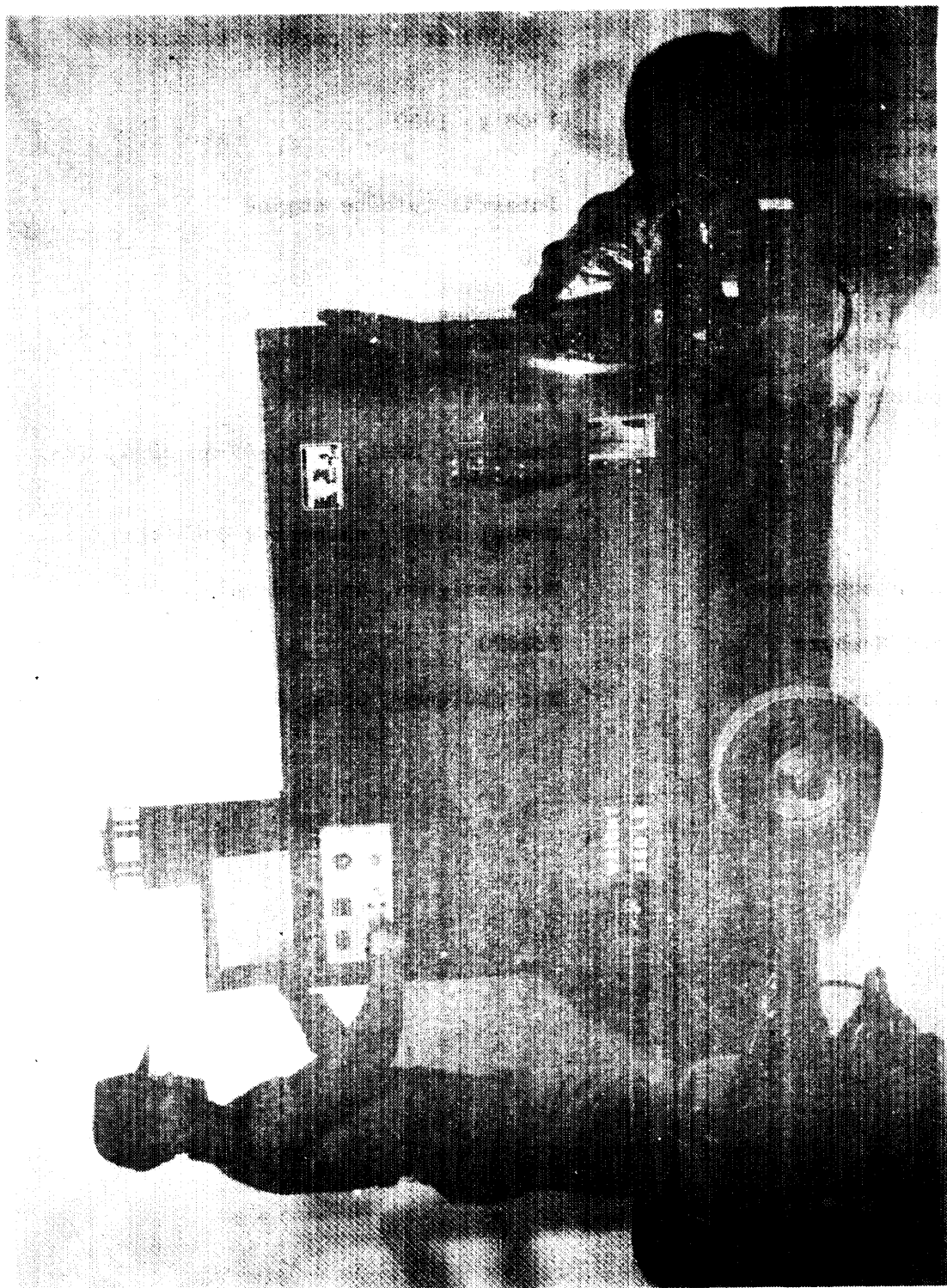


FIGURE 19. Heater, duct type, portable, multifuel, self-powered,
250,000 BTUH, wheel-mounted.

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 volt, 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:	Conforming to:
For classes 1,2, and 3 only	
Gasoline	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

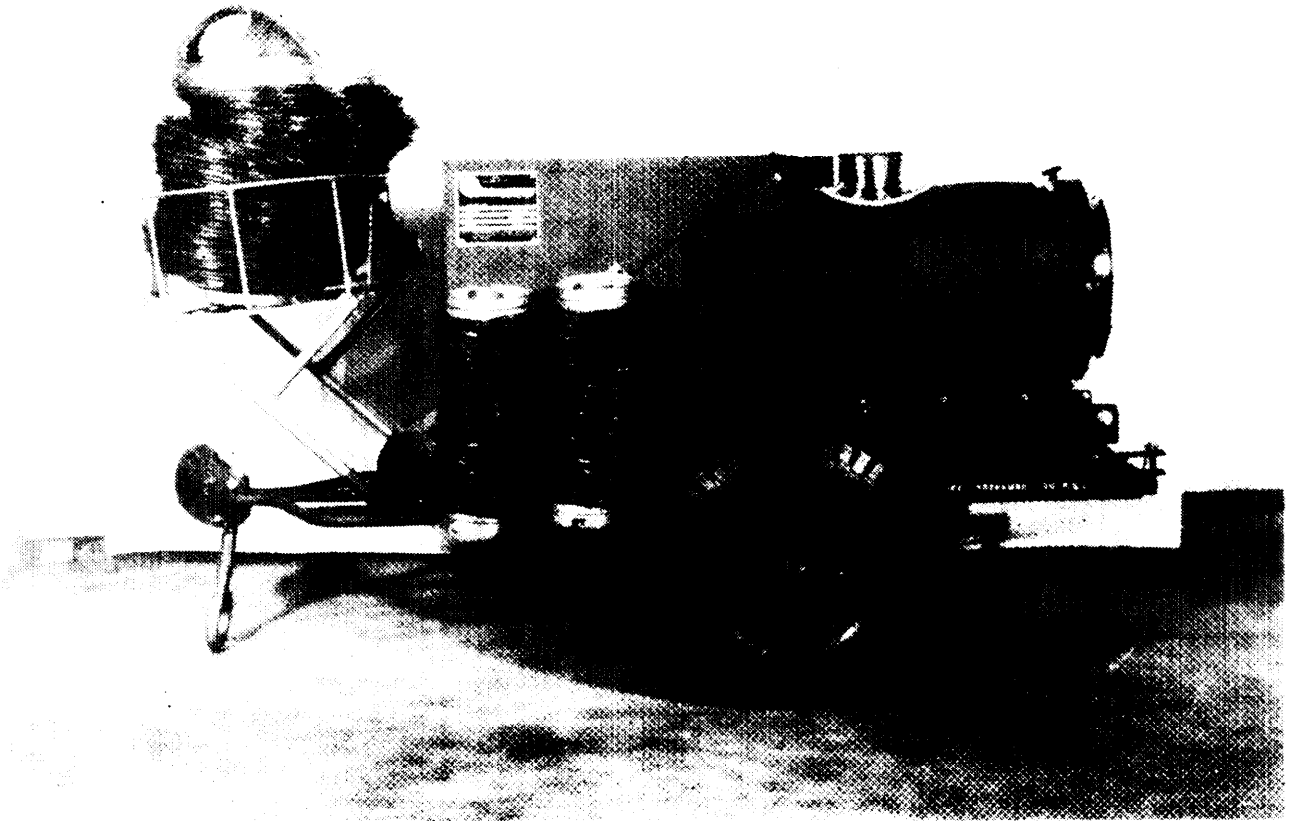


Figure 20. Heater, duct type, portable, 400,000 Btuh.

