CHAPTER 1
GENERAL INFORMATION & OPERATING INSTRUCTIONS.

SECTION 1
DESCRIPTION

1. GENERAL

The Vesuvius model Diesel Aircraft Heater (DAH) is enclosed, self-contained trailer mounted and Diesel Powered Electrically (DPE) driven. This unit is provides safe and reliable aircraft heating. Skid or truck mounting is optionally available. The Vesuvius is also designated as DAH400DPE.

A steel frame base supports the unit. It has an aluminum upper frame and aluminum sheet metal enclosure panels with hinged latching doors for access. Operator control switches are conveniently mounted on the left center of the unit. Heater hose storage is provided in a storage trays located at the sides of the unit. The enclosure is equipped with sufficient inspection, access and service doors to provide ready access to components for inspection, service, and repair activities.

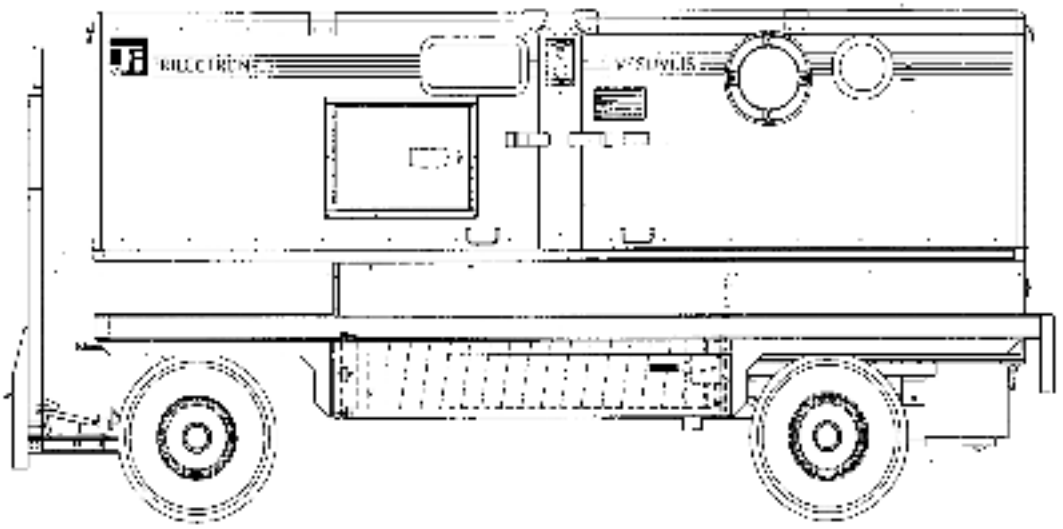

Figure 1. Vesuvius Aircraft Heater

The Vesuvius is manufactured by Trilectron Industries Inc., Palmetto, Florida, U.S.A.

The Vesuvius heats ambient air using a Diesel engine driven AC generator to supply three phase 460 VAC to resistive heating elements as well as component heat that is normally wasted. Engine coolant heat is added to the resistive element's thermal output. The total heating capacity of 347,000 BTU/Hr. can be used for servicing aircraft. Ventilation mode and remote sense (airplane cabin) options are available (See Figure 2.).

This Vesuvius is features a low coolant shutdown engine safety feature. The unit can be optionally equipped with a low fuel warning beacon and a low fuel shutdown system. This allows the heater unit to shut down using normal shutdown procedures before the genset

runs out of fuel. Another option available is Power Transfer. This allows the Vesuvius to use an external power source intead of the genset.

2. MAJOR COMPONENTS (Refer to Figure 5 for assembly location)

A. Chassis:

The Vesuvius is self contained, requiring no external electrical power source. The unit is operable under an ambient temperature range of -30° to 125°F (-34.4°C to 51.6°C), or at relative humidity up to 100%. The unit operates efficiently at altitudes ranging from sea level to 8,000 feet (2,438.4M).

Unit components are protected from the elements by a weather resistant enclosure. This enclosure consists of an arrangement of covers and access doors. The enclosure reduces the operational noise level in the immediate area of the unit, and provides for a cooling air passage. Additional doors are provided for access to controls and indicators.

The standard unit is equipped with an 8 inch diameter x 30 foot long flexible hose/duct for attachment of customer supplied Pre-Conditioned Air (PCA) coupling.

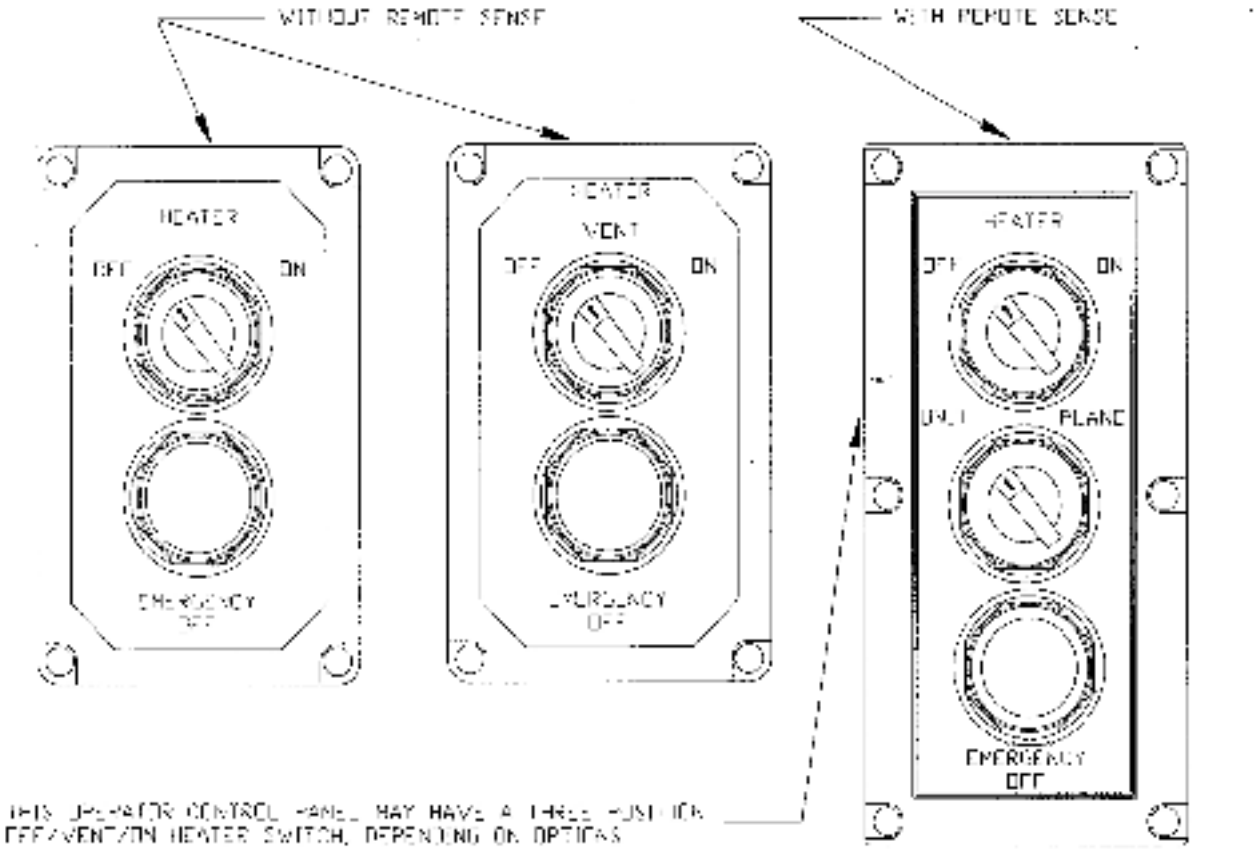

Figure 2. Operator Control Station

B. Operator Control Station:

The operator control station has either two, or three, buttons depending on options. The operator control station is a die cast aluminum switch box mounted on the mid-canopy assembly.

(1) Standard Unit: The operator control station mounts two switches;

- HEATER ON/OFF - This switch controls the electric heater elements.
- EMERGENCY OFF - This RED colored, large button switch allows the operator to shut the unit down should an emergency situation occur.

(2) Boost Heat/Remote Sense Options: The operator control station mounts three switches;

- HEATER ON/OFF - This switch controls the electric heater elements
- UNIT - PLANE - This switch allows the operator to select to have the temperature sensed either at the unit or in the airplane cabin.
- EMERGENCY OFF - This RED colored, large button switch allows the operator to shut the unit down should an emergency situation occur.

(3) Vent Option: The operator control station mounts two switches;

- HEATER ON/VENT/OFF - This switch controls the electric heater elements the same as the standard unit. In addition the VENT position allows the operator to supply blower air to the airplane.
- EMERGENCY OFF - This RED colored, large button switch allows the operator to shut the unit down should an emergency situation occur.

(4) Remote Sense/Vent Options: The operator control station mounts three switches;

- HEATER ON/VENT/OFF - This switch controls the electric heater elements the same as the standard unit. In addition the VENT position allows the operator to supply blower air to the airplane.
- UNIT - PLANE - This switch allows the operator to select to have the temperature sensed either at the unit or in the airplane cabin.
- EMERGENCY OFF - This RED colored, large button switch allows the operator to shut the unit down should an emergency situation occur.

For passenger comfort and safety, the unit is completely operational within 1-1/2-2 minutes after setting the HEATER ON/OFF switch to ON. Setting the switch to OFF immediately inhibits the heating function and shuts down the engine after a two minute cool-down time period.

Operation procedures, both with and without the Boost Heat Option are detailed in Section 1-2, GENERAL INFORMATION & OPERATING INSTRUCTIONS/

C. Genset Assembly:

A Diesel powered 60Hz, 60 kW generator, Control Panel and Output Junction Box comprises the engine/generator set (Genset). An electro-mechanical governor maintains engine speed control for consistent voltage output under varying loads.

(1) **Standard Genset Control Panel (See Figure 3.):** The standard Genset control panel contains electronic circuits monitoring engine performance and generator output functions. This panel does not require operator intervention under normal operating conditions. Genset control functions are pre-set at the factory.

When an engine fault indicator lights, it remains illuminated until the fault is cleared. Genset engine restart is inhibited until the fault is cleared.

Indicator lights:

- LOW OIL PRESSURE (fault) - Indicates when oil pressure drops below normal operating pressure.
- HIGH ENGINE TEMPERATURE (fault) — Temperature has exceeded 200°F (93°C)
- OVERCRANK (fault) — Engine has cranked 3 times within 10 seconds
- OVERSPEED (fault) — Engine has exceeded preset RPM value
- LOW WATER LEVEL (fault) — Coolant fluid level requires operator attention
- LOW FUEL— (Optional) Engine shutdown due to low fuel
- ENGINE STARTED — Engine is running

(a) Gauges:

- VOLTS — Normal operating range: 24 to 30 VDC
- WATER TEMP— Normal operating range: 170-180°F(76-82°C)
- OIL PRESS — Normal operating range: 45-65 psi (45 psi min.)
- HZ - Normal operating range: 60-62 HZ
- A.C. VOLTS — 460
- A.C. AMPERES — Load dependent
- ELAPSED TIME — Engine running time

(2) **Genset Control Panel w/Optional Remote Cabin Sense (See Figure 4.):** The optional Genset control panel contains electronic circuits monitoring engine performance and generator output functions. This panel does not require operator intervention under normal operating conditions. Genset control functions are pre-set at the factory.

When an engine fault indicator lights, it remains illuminated and Genset engine restart is inhibited until the fault is cleared.

Indicator lights:

- LOW OIL PRESSURE (fault) - Indicates when oil pressure drops below normal operating pressure.
- HIGH ENGINE TEMPERATURE (fault) — Temperature has exceeded 200°F (93°C)
- OVERCRANK (fault) — Engine has cranked 3 times within 10 seconds
- OVERSPEED (fault) — Engine has exceeded preset RPM value
- LOW WATER LEVEL (fault) — Coolant fluid level requires operator attention
- TEMPORARY IDLE (Optional) - Momentary toggle switch (See **CAUTION** below)
- ENGINE STARTED — Engine is running

(a) Gauges:

- VOLTS — Normal operating range: 24 to 30 VDC
- WATER TEMP— Normal operating range: 170-180°F(76-82°C)
- OIL PRESS — Normal operating range: 45-65 psi (45 psi min.)
- HZ - Normal operating range: 60-62 HZ
- A.C. VOLTS — 460
- A.C. AMPERES — Load dependent
- ELAPSED TIME — Engine running time

CAUTION

TEMPORARY IDLE SWITCH IS FOR MAINTENANCE PURPOSES ONLY. DO NOT RUN ENGINE IN IDLE MODE LONGER THAN 2-3 MINUTES. EXTENSIVE ENGINE DAMAGE MAY RESULT FROM LOSS OF ENGINE COOLING AIR FLOW.

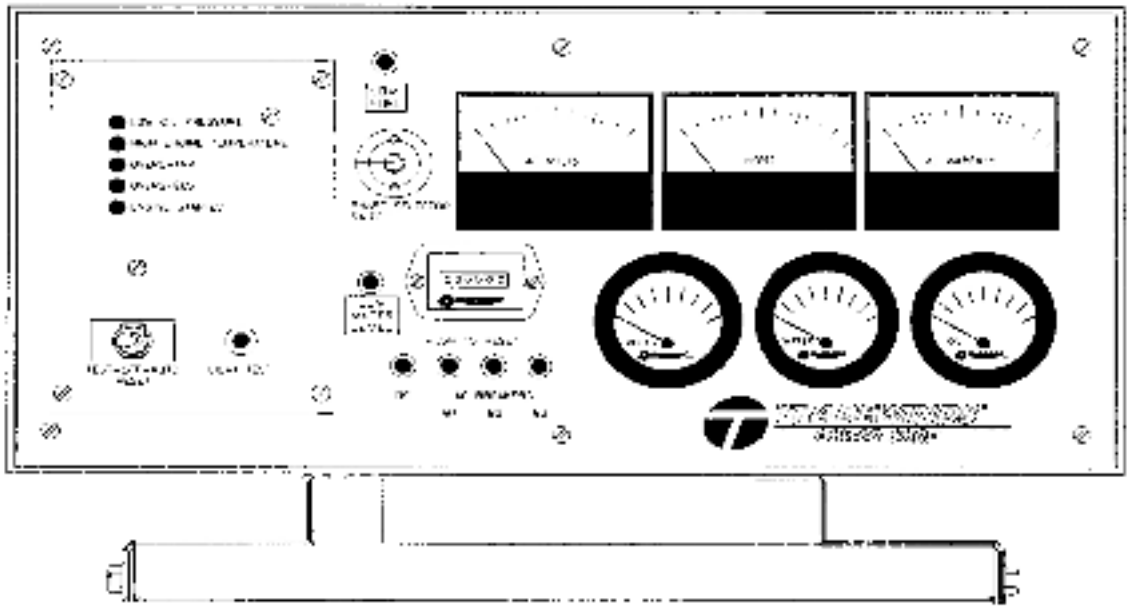

Figure 3. Standard Genset Control Panel

TEMPORARY IDLE SWITCH

FOR MAINTENANCE PURPOSES ONLY

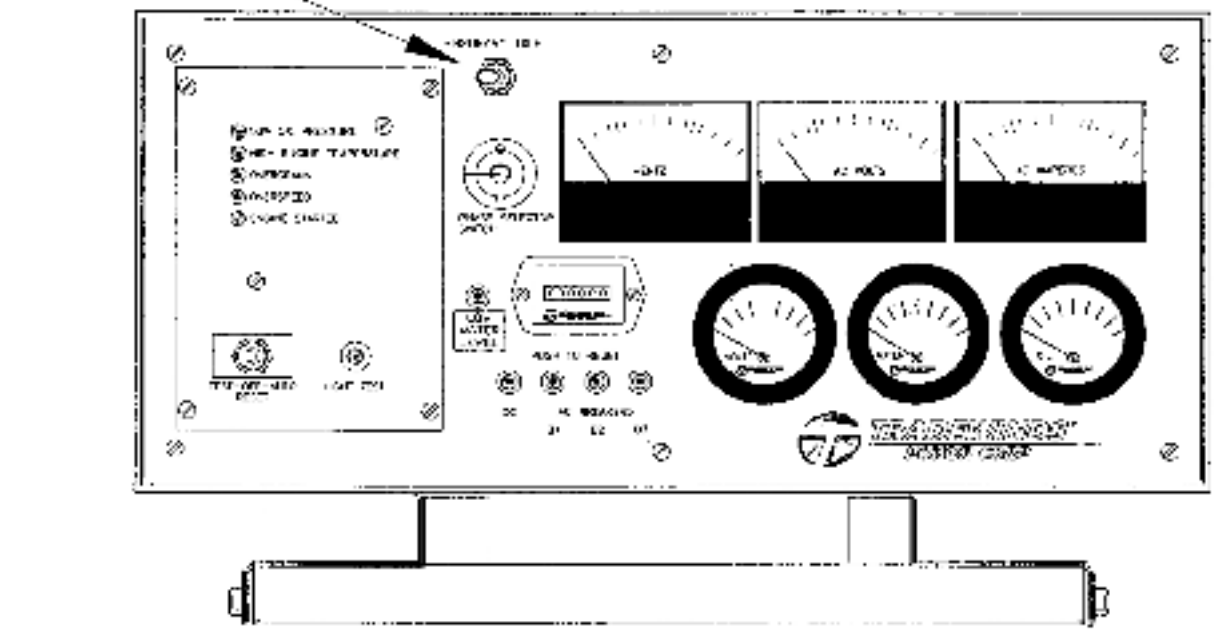

Figure 4. Genset Control Panel-w/Optional Remote Cabin Sense

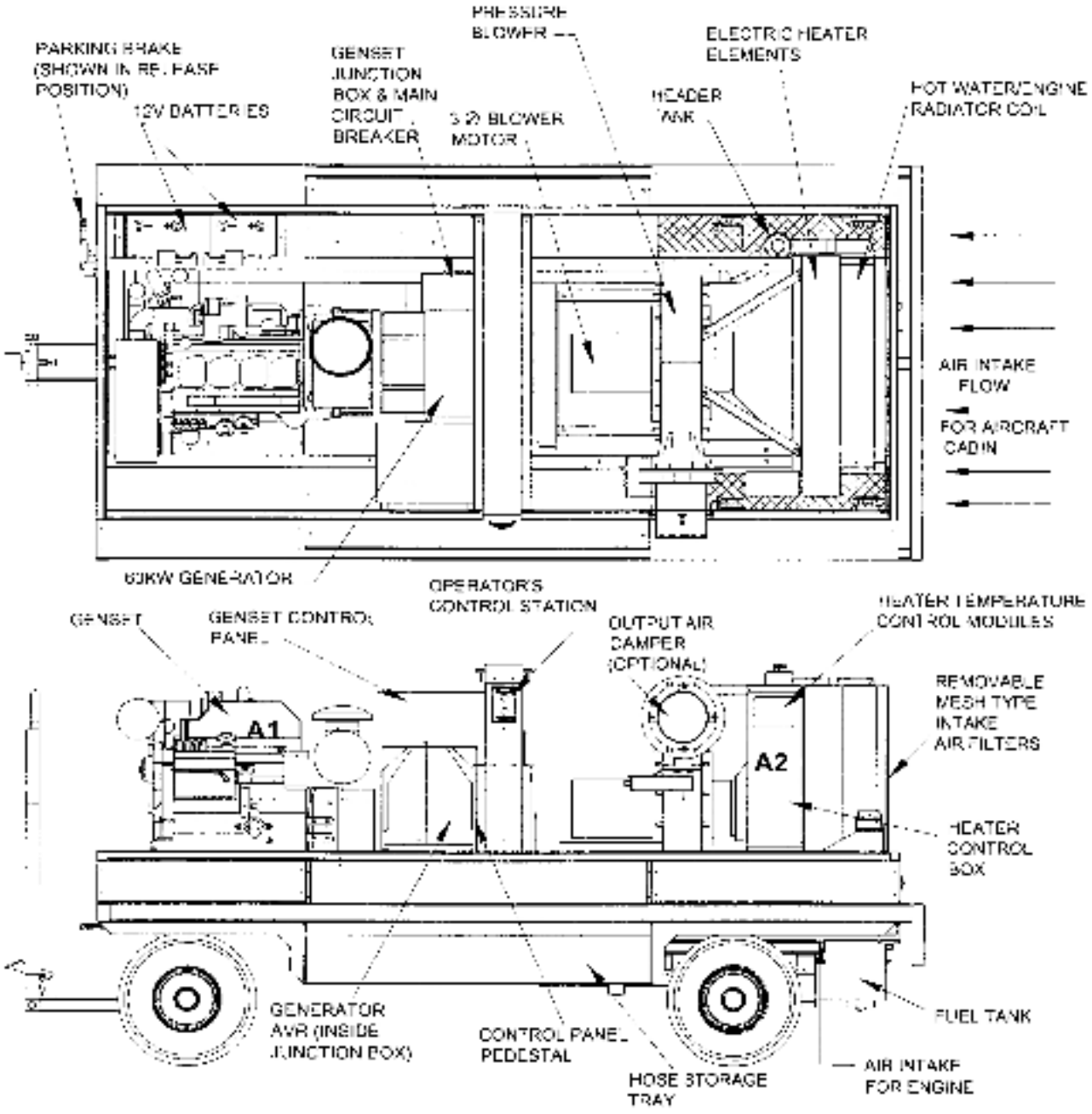

Figure 5. Vesuvius Major Components

(3) **Output Junction Box (See Figure 5.):**

The genset mounts an output terminal junction box containing the main circuit breaker A1CB1(100 Ampere, 3 phase), Automatic Voltage Regulator (AVR) PC board and associated AVR components. Refer to the Installation, Service & Maintenance Manual for AC Generator (Stamford Newage International Ltd.) supplied with this technical manual for more detailed information.

D. Heating Assembly:

Two parts make up the heating system, e.g., the blower and the electric duct heaters.

(1) Blower:

The blower is used to supply the air, but also adds heat to the system. The blower is a 15HP centrifugal air blower. The air damper on the blower discharge automatically restricts air flow to at startup, then gradually, within 1-1/2-2 minutes, permits 100% air flow. The blower adds heat approximating 38,000 BTU/Hr.

(2) Electric Heater Assembly:

The electric heater assembly is a thermostatically protected 40 kW dual bank (HTR 1 and HTR 2) resistive element type process air heater. Automatic cutout thermostat TS1 is mounted at the inside-top of the heater assembly wiring junction panel. Thermostat TS1 provides automatic cutout limit at 210° F(99°C) (opens) and reset at 170°F(76°C) (closes).

(3) Engine coolant radiator coil:

The engine coolant radiator coil is located between the air filter and the electric duct heaters. Engine coolant supplies additional heat to the aircraft. The coolant water is used for heating when the engine coolant is above 160° F(71°C).

(4) Heat Boost (Optional)

The Heat Boost option features an Engine Heat Manifold Extractor that captures heat from the Vesuvius exhaust. This is heat that would normally exit the unit via the exhaust system.

(5) Air Damper Control (Optional)

At unit startup, an electro-mechanical air damper assembly restricts 100% of the initial high pressure hot air output flow. The air damper opens slowly to ensure full air duct pressurization within 1-1/2 to 2 minutes.

(6) Overtemp Switch (Safety Shutoff) Description

The Vesuvius Aircraft Heater incorporates a Johnson Controls® A25 Series Warm Air Control (See Figure 6.) in an output airflow Overtemp sensing circuit. This circuit is designed to shut down the Vesuvius Aircraft Heater if the temperature of the air exiting the blower (See Figure 6 and Figure 7) exceeds the controller's factory setpoint of 165°F (73.9°C).

The Johnson Controls® Series A25 controller is wired as an integral part of the Vesuvius Emergency Shutdown circuit. When the sensed air temperature increases to the controller's setpoint, the overtemp switch will open and shut the Vesuvius down completely.

A manual reset of the unit is required to re-enable start/run functions of the Vesuvius Aircraft Heater.

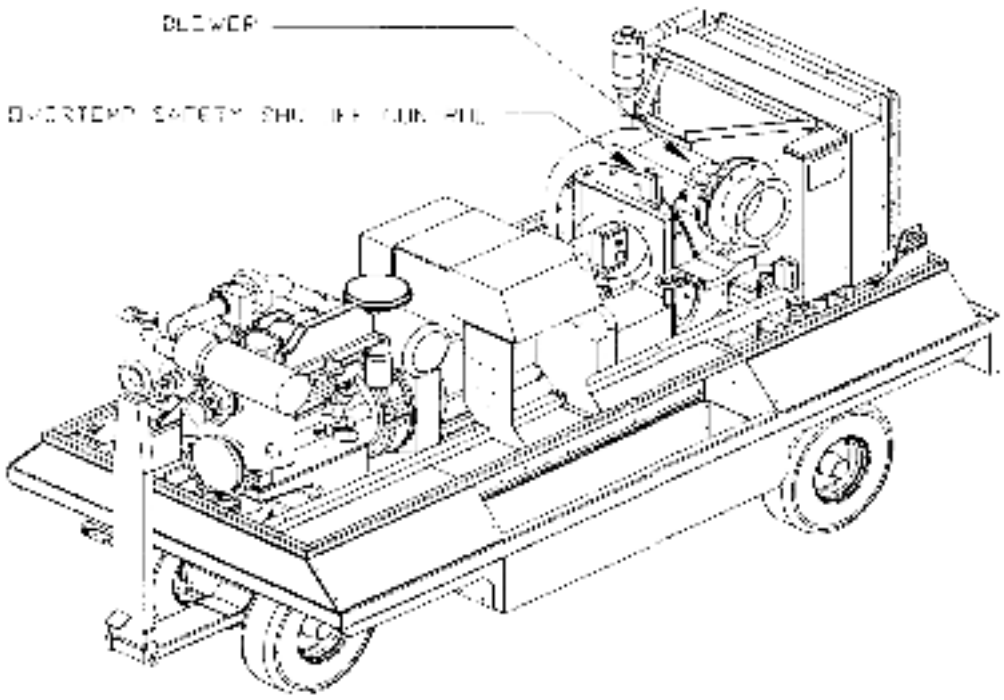

Figure 6. Overtemp Switch Location

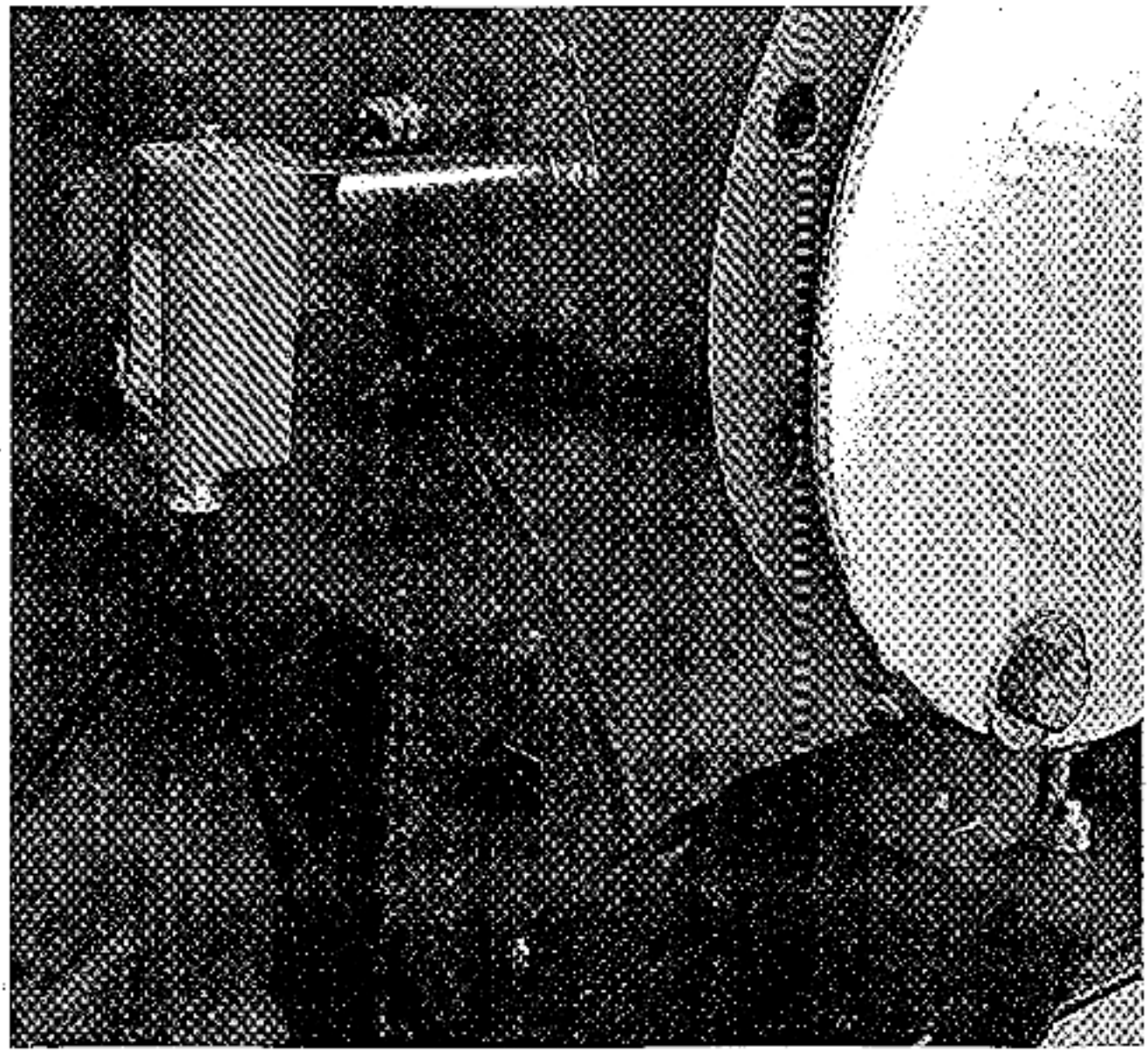

Figure 7. Warm Air cintrol/Blower Assembly

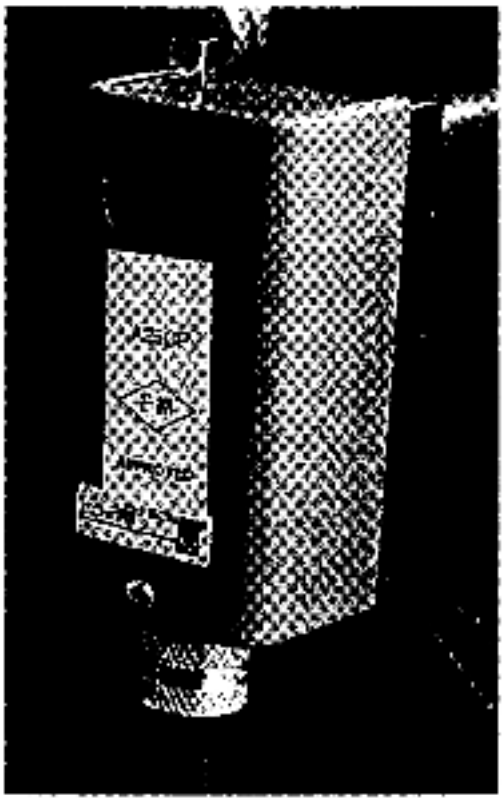

Figure 8. Johnson Controls® Series A25 Warm Air Control Close-up

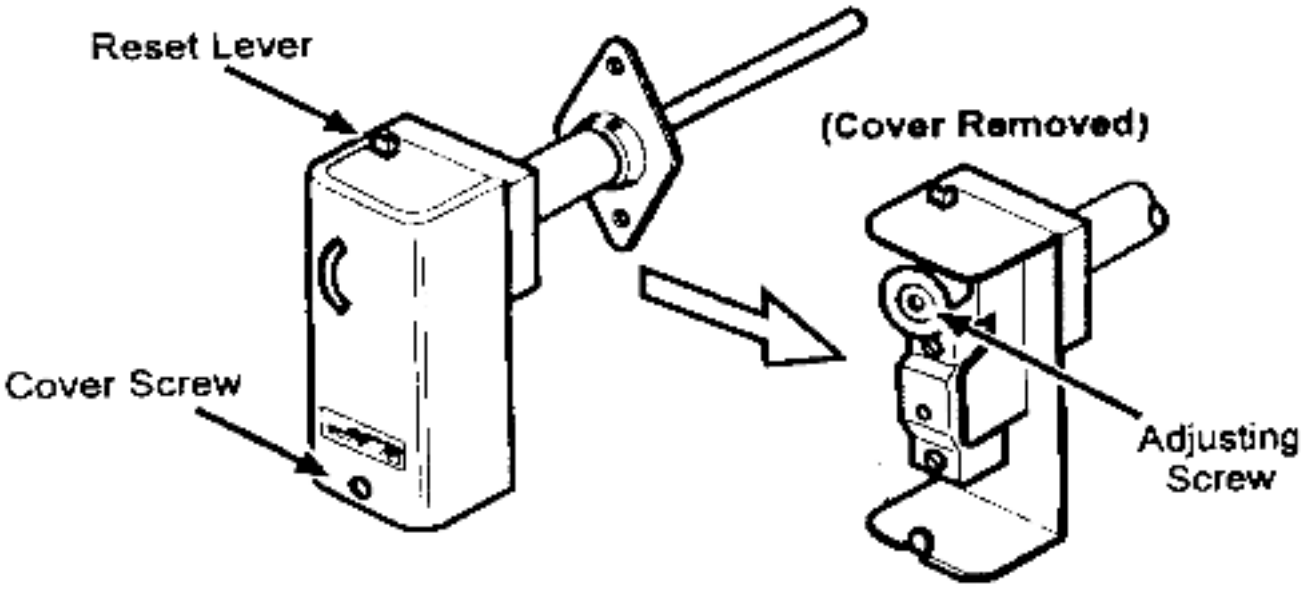

Figure 9. Johnson Controls® Series A25 Details

3. OVERTEMP SAFETY SHUTOFF

The temperature setpoint for the Overtemp Safety Shutoff is factory set at 165°F (73.9°C). It should not be changed in the field except for testing purposes. After tests are complete, the setpoint should be returned to the factory setting.

A. Setpoint Adjustment

- Loosen the cover screw located on the front of the cover at the bottom (See Figure 8 and Figure 9).
- Remove the cover. Adjust the setpoint by rotating the adjusting screw (See Figure 9.).
- Re-install the cover.
- Tighten the cover screw.

B. Test Procedure

Raise the temperature of the air at the sensor to a value greater than the setpoint (165°F-73.9°C) or lower the setpoint to a value less than the air at the sensor.

Once the Overtemp switch trips, it **MUST** be manually reset. When this safety circuit is tripped, it shuts the Vesuvius Aircraft Heater down completely, including the engine and generator. The unit will not start until the Overtemp switch has been manually reset.

C. Reset Procedure

- Lower the temperature of the air at the sensor to a value of 20F (11C) below the set-point.
- Press the Reset Lever. The switch should reset, closing the circuit.

4. ENGINE SYSTEM DESCRIPTION

A. Engine/Genset:

The engine used in this unit is a Diesel, 4-cycle, turbocharged with a mechanical governor. The engine is directly coupled to a generator to produce 460 Volts, 3 phase, with a rating of 60.0 kW. Engine and generator controls are supplied with the genset. All controls and indicators are located within the genset enclosure and are integral to the genset.

(1) As received from the manufacturer, the engine/genset includes the following equipment:

(a) Engine:

- Electro-mechanical speed governor, W/magnetic pickup unit
- Fuel filter assemblies
- Full flow oil filter
- Fuel pump
- Turbocharger
- Low Coolant shutdown gauge-switch

(b) Generator:

- 60Hz Generator
- Output Junction Box:
- Main Circuit Breaker CB1

- Automatic Voltage Regulator (AVR)
- Genset Control Panel Assembly

(2) System Voltage:

The engine system voltage is 24VDC and is provided by two 12V lead/acid storage batteries serially connected.

(3) Fuel Tank/Fuel Gauge:

The fuel tank is mounted underneath the unit at the rear. The fuel filler port is located on the rear of the unit. A removable strainer, located inside the filler neck, should be periodically removed and cleaned. An electrically operated fuel gauge is mounted adjacent to the fuel fill door and continuously indicates fuel level when the unit is running. Fuel level is indicated. with unit not running, when the operator presses the push-to-read switch.

(4) Radiator:

The radiator is a cross-flow design. The coolant for the engine/genset is also used as a heat source to supplement the electric duct heaters.

(5) Air Filter:

The engine air filler is a dry, replaceable element. Refer to section 2-1, table 2 and genset literature.

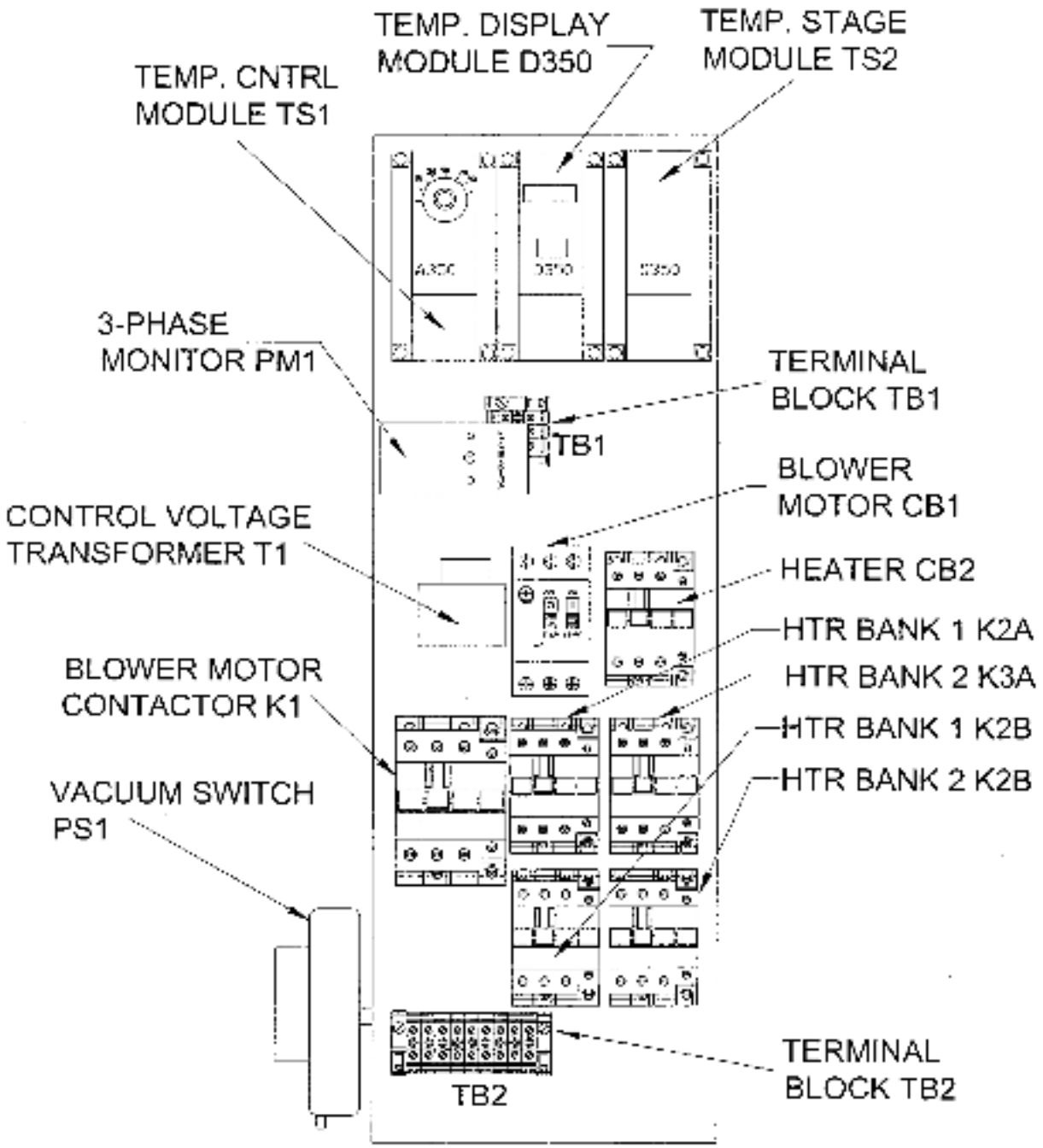

Figure 10. Heater Control Box A2 - Component Location

B. Engine Electrical Circuits (Refer to Section 2-2 for the Engine Electrical Schematic):

(1) All engine instruments are located on the engine/genset control panel. Engine instrument sensor locations are shown in genset operating instructions.

WARNING

NEVER SWITCH THE UNIT ON WITHOUT HAVING THE AIR HOSE FIRMLY AND PROPERLY CONNECTED TO THE AIRCRAFT. FAILURE TO ADHERE COULD RESULT IN SEVERE INJURY TO PERSONNEL OR EVEN DEATH.

(2) Engine Start:

Power for the starter motor, and running circuits, is provided by the battery circuit. The unit is started by setting the ON/OFF switch to ON.

NOTE:

When the ON/OFF switch is set to ON the air damper opens fully in 1-1/2-2 minutes.

5. CONTROL SYSTEM ADJUSTMENTS

This unit is setup and tested at the factory and should not require field adjustment.

A. Heating Adjustment.

The following temperature modules are located on heating control panel A2. When heating is turned on, hot water circuit from the genset to the hot water coils is allowed to operate. As additional heating is required the electric duct heat is activated. For a detailed description, refer to the System 350™ Product Guides (Johnson Controls, Inc.) supplied with this technical manual.

(1) Temperature Control Module (A350AA): S350 temperature control is an on/off electronic temperature control with a single-pole, double-throw relay output and LED indicator. An adjustable temperature differential enables the cyclic rate to be varied from 1- 30°F (0.5-17°C). Air temperature is sensed via RTD1 (Remote Temperature Device). Temperature may manually be set from 90-250° F(32-121° C). The factory settings are:

- Setpoint Temperature = 130°F(54°C)
- Differential = 3° F (-16°C)

(2) Temperature Display Module (D350AA-1C). Indicates, in real-time, actual output air temperature.

(3) Temperature Stage Module (S350AA). The S350AA controls the electric duct heat cutoff maximum temperature. The stage module receives its power, set point and sensor input from the A350AA temperature control module. The factory settings are:

- Differential = 15°F(9.4°C)
- Offset = 3°F(-16°C)

B. Protectives.

Protective devices used in this unit are all contained within the heater control box (A2) enclosure located on the left side of the unit.

(1) Battery Power Fuse: (F-1)

Battery power fuse (F-1) is located on the genset control panel pedestal (See Figure 5.).This fuse protects all the +24 VDC control circuitry external to the control panel. The fuse is rated at 5A-250V (AGC-5).

(2) Input Power Protection (A2PM1) (See Figure 10.):

Phase monitor (A2PM1) is connected to the input power line at A2-TB1. The phase monitor checks for overvoltage and undervoltage with an integral phase sequence monitor. When PM1 trips it inhibits blower motor MT1 and heaters HTR1, 2 by removing 24VAC control voltage from the entire heater control section A2.

(3) Heater Circuit Breaker (A2CB2) (See Figure 10.)

The circuit breaker for the electric duct heaters trips if an electrical fault occurs.

(4) Blower Motor Circuit Breaker (A2CB1) (See Figure 10.)

Circuit Breaker CB2 is a thermal type placed in series with Phase A,B,C of blower motor MT1 input. The the trip point is factory set for 25A using the circuit breaker's current range adjust potentiometer.

(5) Heater Bank Contactors (A2 K2B, A2K3B) (See Figure 10.). When thermostat TS1 reaches cutout limit at 210^0 F and opens, contactors K2B and K3B are tripped (open), removing power from HTR1 & HTR2.

(6) Heater Bank Contactors (A2K2A, A2K3A) (See Figure 10.). When thermostat TS1/ TS2 reaches its temperature setpoint (130^0F) and opens, contactors K2A and K2B are tripped (open), removing power from HTR1 & HTR2.

(7) Air Flow Vacuum Switch (PS1). When high pressure blower reaches operating speed, air flow vacuum switch PS1 closes to enable HTR1 & 2 contactors K2B and K3B. Power can only be applied to the resistive heater element when cross flow is available.

C. Power Control Contactors, Relays, and Motor Starters.

Low voltage control power is supplied to the contactors, relays, and motor controllers to apply high voltage power to the equipment used within this unit.

(1) Blower Motor Contactor (A2K1)(See Figure 10.)

When unit is started 24VAC control voltage is applied to A2K1, via control transformer A2T1, enabling A2K1 contacts L1, 2, 3 allowing three phase (A, B, C) power to supply blower motor MT1.

(2) Low Coolant Level Switch: (FS2)

The low coolant level switch is located in the engine radiator coil assembly next to the header tank. When the coolant level falls below the preset level, the engine shuts down and the LOW WATER LEVEL fault indicator lights.

(3) Low Fuel Shut-down Relay (Optional) (K5).

The low fuel shut-down relay is located on the control panel A2 pedestal. The low fuel shut-down relay K5 is activated when the fuel level float switch reaches the preset low fuel level shutdown point within the fuel tank. K5 is wired in series with ON/OFF switch S1-B. The engine shutdown function of ON/OFF switch S1-B is derived from the wiring to the Cool Down Timer PC board within Control Panel Assembly A1.

(4) Low Fuel Level Relay (K4)(Optional).

The low fuel level relay is located on the control panel A2 pedestal. The low fuel level relay K4 is activated when the fuel level float switch reaches the preset low fuel level point within the fuel tank. Low fuel causes K4-7, 4 contacts to close, supplying power to either a panel mounted warning indicator or roof mounted beacon.

CHAPTER 1
GENERAL INFORMATION & OPERATING INSTRUCTIONS

SECTION 2
OPERATION

1. GENERAL

This section contains information on operating the Vesuvius aircraft heater. The operator must read all instructions before attempting to operate the unit.

WARNING

PROLONGED EXPOSURE TO HAZARDOUS NOISE MAY RESULT IN PERMANENT HEARING LOSS. EAR PROTECTION DEVICES MUST BE USED WHEN WORKING WITHIN A CLOSE PROXIMITY OF THIS EQUIPMENT.

2. PREPARATION FOR USE

The following steps must be carried out before starting the engine.

NOTE:

If the unit is being operated for the first time, refer to Section 1-4 Shipping/Receiving for initial inspection and preparation for use procedure, or if it has been in extended storage, refer to Chapter 1-5 Storage before performing the preoperational inspection.

A. Preoperational Inspection:

Prior to the first operation of the day, the unit must be inspected to ensure safe and reliable operation. The engine should be operated from the engine control panel to observe that engine oil pressure and generator systems are functioning properly. Perform the preoperational inspection as follows:

(1) Unit Physical Inspection:

Visually inspect for defects, i.e., security of common hardware.

(2) Unit Interior Inspection:

Open the unit access doors and inspect the following items located in the unit interior:

(a) Check engine oil level:

Open the engine access doors. Remove engine oil dipstick and check oil level mark on dipstick. Add oil to bring level up to "H" (Full) mark.

(b) Engine coolant level:

Coolant level will be indicated on the Murphy Switchgage® and should be in the FULL range. Reference genset literature for specific information regarding generator and engine specifications, operating, and maintenance requirements.

(c) Engine Assembly:

Visually inspect fuel lines and fittings for evidence of fuel leakage. Inspect valve covers, oil pan, and cylinder block for evidence of oil leakage.

(d) Check for loose hardware and foreign objects that may be drawn into the

conditioned air intake filters during operation.

(3) Blower System:

(a) Inspect the blower wiring for evidence damage

(b) Close the unit access doors.

WARNING

NEVER ENTER THE INTERIOR OF THE UNIT WHILE UNIT IS IN OPERATION. DO NOT STEP ON OR GRAB HOLD OF WIRING OR PIPING.

CAUTION

NEVER OPERATE THE ENGINE WITH THE OIL LEVEL BELOW THE "L" (LOW) MARK OR ABOVE THE "H" (HIGH) MARK. WAIT AT LEAST 5 MINUTES AFTER SHUTTING OFF THE ENGINE TO CHECK THE OIL. THIS ALLOWS TIME FOR THE OIL TO DRAIN TO THE OIL PAN.

(4) Check engine fuel level (when unit is not running) as follows:

(a) Press the fuel level switch, and observe fuel gauge.

WARNING

NEVER SMOKE OR ALLOW AN OPEN FLAME WITHIN THE IMMEDIATE VICINITY OF THE UNIT WHILE SERVICING FUEL. NEVER SERVICE UNIT WITH THE ENGINE OPERATING. FAILURE TO COMPLY MAY RESULT IN FUEL FIRE AND/OR FUEL EXPLOSION CAUSING SEVERE EQUIPMENT DAMAGE AND/OR SEVERE INJURY, EVEN DEATH TO PERSONNEL FROM SKIN BURNS.

WARNING

TO PREVENT SPARKING BETWEEN FILLER NOZZLE AND FUEL TANK, ALWAYS MAINTAIN METAL TO METAL CONTACT BETWEEN FILLER AND FUEL TANK, AND GROUND UNIT TO A CERTIFIED GROUND POINT.

(b) Service with diesel fuel as required. The fuel tank has drains in the bottom of the tank. Drain water and foreign material at least weekly.

B. Connecting Heating Duct To Aircraft:

WARNING

THIS UNIT PRODUCES HIGH VOLUME LOW PRESSURE AIR. ENSURE THAT PCA SERVICE COUPLING IS SECURED TO THE AIRCRAFT. SERVICE AIR DELIVERY HOSE MAY DETACH FROM AIRCRAFT WHILE UNIT IS IN OPERATION, CAUSING INJURY TO PERSONNEL AND OR TO EQUIPMENT OR AIRCRAFT.

(1) Remove heater hose from storage located at the side of the unit. Attach the customer supplied Pre-Conditioned Air (PCA) service coupling to aircraft. This unit produces high volume low pressure air. Make sure the service air delivery duct is securely fastened to the aircraft. If the service air delivery heater hose detaches from the aircraft when the heater is started, injury to personnel or damage to equipment or aircraft may result.

CAUTION

STRAIGHTEN HEATER HOSE TO PREVENT SEVERE BENDS OR KINKS THAT WOULD IMPEDE OR BLOCK THE AIR FLOW. FAILURE TO COMPLY MAY CAUSE THE HOT AIR SERVICE HOSE TO RUPTURE OR PREVENT AN ADEQUATE SUPPLY OF AIR FLOW TO THE AIRCRAFT.

3. HEATER OPERATING INSTRUCTIONS (STANDARD UNIT)

WARNING

HEATER AIR HOSE MUST BE CONNECTED TO AIRCRAFT BEFORE AND DURING OPERATION. DO NOT RUN UNIT WITH HEATER AIR HOSE OBSTRUCTED.

A. HEAT TO AIRCRAFT - ON:

(1) Connect and secure heater air hose to aircraft PCA connector.

(2) Set HEATER ON/OFF switch to ON (See Figure 1.). Engine will start, run and unit will blow hot air (full pressure will occur after 1-1/2 minutes).

NOTE

The factory set temperature setpoint is 130°F. Field adjustment is possible, however changing factory setting is not recommended.

(3) Adjust temperature control module (inside canopy) for desired air temperature (option - not available on some models).

B. HEAT TO AIRCRAFT - OFF:

WARNING

HEATER AIR HOSE CONNECTOR MAY BE HOT TO THE TOUCH.

(1) Set HEATER ON/OFF switch to OFF (See Figure 1.). Unit will continue to run and blow hot air for 1-1/2 minutes.

(2) Remove heater air hose from aircraft PCA connector after the unit engine stops.

(3) Stow hose assembly in side tray.

C. EMERGENCY STOP (See Figure 1.):

- Use ONLY in an emergency situation.
- Do NOT use for routine engine shutdown.
- When used, normal engine cool-down period is bypassed.

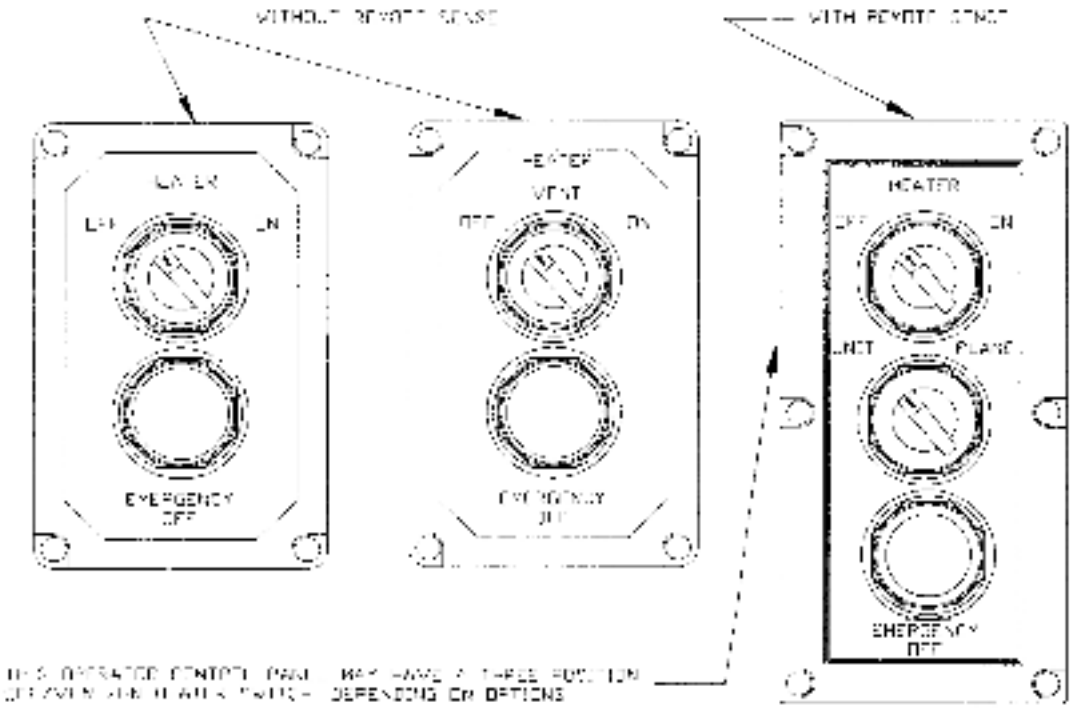

Figure 1. Operator Control Station

4. HEATER OPERATING INSTRUCTIONS (HEAT BOOST/REMOTE SENSE)

WARNING

HEATER AIR HOSE MUST BE CONNECTED TO AIRCRAFT BEFORE AND DURING OPERATION. DO NOT RUN UNIT WITH HEATER AIR HOSE OBSTRUCTED.

A. HEAT TO AIRCRAFT - ON:

(1) Connect and secure heater air hose to aircraft PCA connector.

(2) Set UNIT/PLANE switch to the desired position (See Figure 1.).

NOTE

When set to the UNIT position, the heaters are controlled by the unit's temperature control module. When set to the PLANE position and the Remote Sensing Cable is attached, the unit heaters are controlled by airplane on-board temperature sensing system.

(3) Set HEATER ON/OFF switch to ON (See Figure 1.). Engine will start, run and unit will blow hot air (full pressure will occur after 1-1/2 minutes).

NOTE

The factory set temperature setpoint is 130°F. Field adjustment is possible, however changing factory setting is not recommended.

NOTE

The engine exhaust manifold provides approximately 103,000 BTU/Hr. heating capacity and operates independent of the unit electric heaters.

(4) Adjust temperature control module (inside canopy) for desired air temperature (access not available on some models).

B. HEAT TO AIRCRAFT - OFF:

WARNING

HEATER AIR HOSE CONNECTOR MAY BE HOT TO THE TOUCH.

NOTE

The engine exhaust manifold provides approximately 103,000 BTU/Hr. heating capacity and operates independent of the unit heaters. Heated air will continue to flow through the heater air hose even if the heaters have been turned off and engine and blower are running.

1. Set HEATER ON/OFF switch (See Figure 1.) to OFF. Unit will continue to run and blow hot air for 1-1/2 minutes.
2. Remove heater air hose from aircraft PCA connector after the unit engine stops.
3. Stow hose assembly in side tray.
4. Remove Remote Sensing Control from aircraft.
5. Stow Remote Sensing Control cable in side tray.

C. EMERGENCY STOP (See Figure 1.):

- Use ONLY in an emergency situation.
- Do NOT use for routine engine shutdown.
- When used, normal engine cool-down period is bypassed.

D. ENGINE RUN/IDLE

A TEMPORARY IDLE momentary toggle switch is installed on the optional Genset Control Panel (See Figure 2.). This switch allows the engine to start and run at idle and bypasses normal blower and heater operation.

CAUTION

TEMPORARY IDLE SWITCH IS FOR MAINTENANCE PURPOSES ONLY. DO NOT RUN ENGINE IN IDLE MODE LONGER THAN 2-3 MINUTES. EXTENSIVE ENGINE DAMAGE MAY RESULT FROM LOSS OF ENGINE COOLING AIR FLOW.

1. Set and hold TEMPORARY IDLE momentary toggle switch to the right (idle) position.

2. Set the HEATER ON/OFF switch to ON. Engine will start and run at idle speed until TEMPORARY IDLE switch is released. Blower and heaters will not start while in the TEMPORARY IDLE mode.

NOTE

If unit is running normally with blower and heaters on, setting and holding the TEMPORARY IDLE switch to the right (idle) position will cause the blowers and heaters to shut down due to loss of proper phase power while engine is at idle speed.

3. Release TEMPORARY IDLE switch. Switch returns to left (run) position. Engine returns to normal operating speed. Blowers and heaters will come on line as proper phase power is attained.

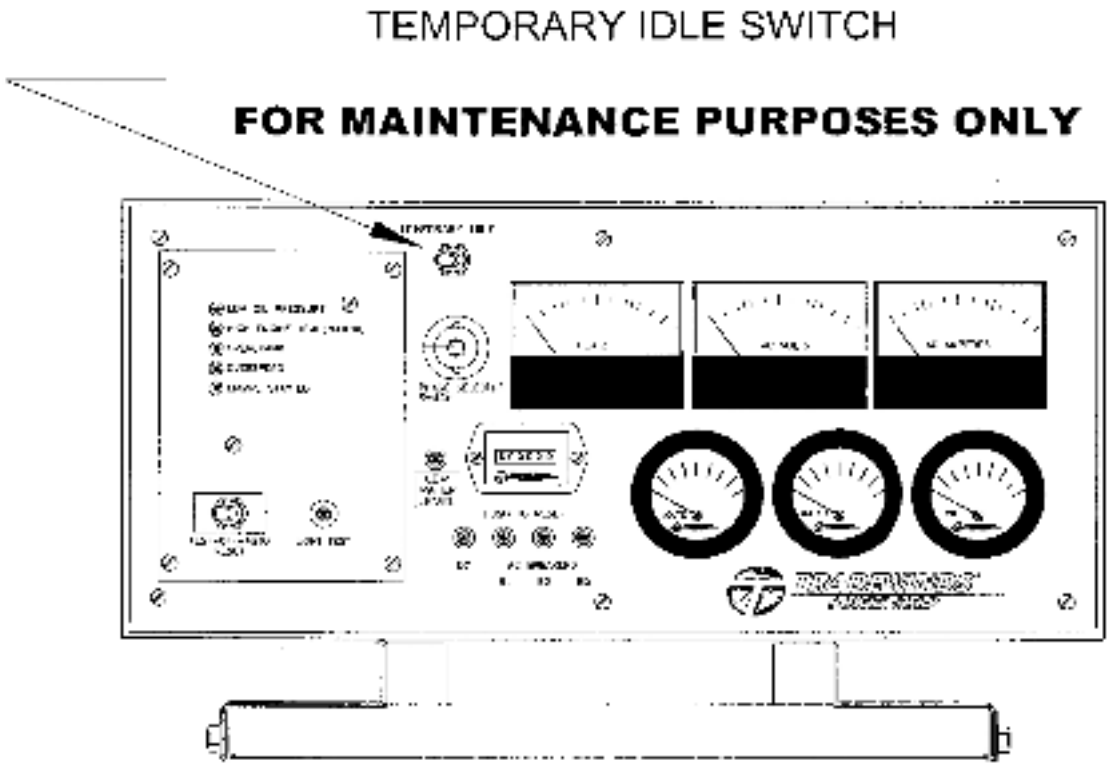

Figure 2. Optional Genset Control Panel

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CHAPTER 1
GENERAL INFORMATION & OPERATING INSTRUCTIONS

SECTION 3
SPECIFICATIONS & CAPABILITIES

1. GENERAL

- Length (overall): 130 inches (3302mm)
- Width (overall): 64 inches (1625mm)
- Height (overall): 63 inches (1663mm)
- Weight (approximate): 3100 lbs (1770 kg)
- Fuel capacity: 60 U.S. gallons (227 ltrs)
- Operating temperature: -30°F to 125°F (134.4°C to 51.6°C)
- Storage temperature: -40°F to 150°F (-40°C to 65.5°C)
- Noise level: Less than 80 dBA at 20 foot radius

2. STRUCTURE

- Steel frame trailer assembly
- Aluminum canopy
- Aluminized steel fuel tank with Protecto-Seal® fuel cap
- Enclosure: Aluminum - panel canopy with doors for service access, welded steel frame
- Removable air intake filters
- 30' Air delivery hose, 8" uninsulated, with Hall Industries® PCA Adapter
- Hose storage trays (2)
- Operational beacon (Optional)
- Low fuel warning (Optional)
- Low fuel shutdown (Optional)
- Exterior hazard lights (Optional)
- Tow bar actuated brakes (Optional)
- Sound attenuating foam (Optional)

3. POWER SYSTEM

- Engine/Generator Set, Tradewinds© 60kW, 460VAC, 400 Hz, 3 Phase with Cummins© 4BTA3.9 engine
  - High temperature shutdown
  - Low oil pressure shutdown
  - Over-Voltage shutdown
  - Under-Voltage shutdown
  - Overcrank starting protection
  - Output Circuit Breaker
- Electro-Mechanical engine speed governor
- Engine control system voltage: 24 VDC
- Engine block heater - 110VAC/220VAC (Optional)
- Engine cool down period after shut off - 2 minutes
- Generator Powerto Facility Power 3-Phase Transfer Switch (Optional)

4. HEATING SYSTEM

- Heating capacity: 347,000 BTU/hr. (Standard Configuration)
- Heating capacity: 450,000 BTU/hr. (With optional exhaust heat exchanger)
- Ambient conditions:
  - Operating temperatures -30°F to 125°F (-34.4°C to 51.6°C)
  - Altitude: To 6000 feet (1828 M)
- Air Output (subject to ambient conditions)
  - Volume/Temperature:
    - 190 lbs per minute @ 100°F (3708°C) rise
    - Maximum static pressure 20" water
  - Delivered air temperature 127°F (52.7°C) over ambient (typical)
- Output air damper (Optional)
- Remote Sense - Airplane Cabin (Optional)
- Vent Air Switch (Optional)

CHAPTER 1
GENERAL INFORMATION & OPERATING INSTRUCTIONS

SECTION 4
SHIPPING AND RECEIVING

1. GENERAL

When shipped domestically, the Vesuvius aircraft heater unit does not normally require crating or a solid external container. It is shipped completely assembled.

2. PREPARATION FOR SHIPMENT

A. To prepare the unit for shipment, perform the following procedures.

(1) Disconnect the air delivery hose from the air duct assembly. Cap the air duct assembly to prevent foreign material from entering.

(2) Place the air delivery hose in its storage tcompartment and secure with rope or other tie-downs.

(3) Ensure all doors are closed and securely fastened.

CAUTION

THE UNIT SHOULD NEVER BE SHIPPED WITH A FULL FUEL TANK. NORMAL EXPANSION OF FUEL DURING THE HEAT OF THE DAY MAY CAUSE THE FUEL TO OVERFLOW. DRAIN TANK COMPLETELY.

(4) Drain fuel tank completely. Inspect fuel tank cap for proper seal and security.

CAUTION

UNDER NO CIRCUMSTANCES SHOULD THE UNIT BE ANCHORED BY PASSING BANDS OR CABLES OVER THE SUPERSTRUCTURE. ANCHOR BY ATTACHMENT TO THE TRAILER CHASSIS ONLY.

(5) To secure unit on transport vehicle, attach cables to the FORE and AFT members of the frame or to both I-beams that run the length of the unit.

B. When deemed advisable by the shipping activity:

The unit should be covered with waterproof canvas or polyethylene material in such a manner as to prevent the entry of natural elements into the electrical and instrument areas.

The application of the covering material should be accomplished in such a manner as to avoid the formation of water pockets or interference with the mobility of the unit. The covering material should be of sufficient strength to preclude rupture or tearing when exposed to conditions encountered during open transportation.

3. RECEIVING

A. Initial Inspection

(1) If the unit has been crated or encased in an envelope of weather resistant material, remove the covering.

(2) Thoroughly inspect the exterior of the housing for any damage which may have occurred during shipment. Open all doors and re-close, checking latches for proper operation.

(3) Inspect all instrument glasses and indicator light lenses for evidence of cracks or

damage.

(4) Open interior access door and inspect interior of unit for security of components. Check fuel system for leaks. Check electrical wiring for brakes or exposed wiring.

(5) Check coolant hoses for evidence of leakage.

(6) Check the entire unit for loose connections, parts, bolts, nuts or other hardware that may have been loosened during transit. Tighten or repair all found discrepancies.

(7) Remove the air delivery duct from its storage tray. Inspect air duct assembly for damage.

B. Initial Servicing:

CAUTION

BEFORE ATTEMPTING TO CONNECT THE BATTERIES, MAKE SURE THE IGNITION SWITCH ON THE ENGINE PANEL IS IN THE OFF POSITION.

(1) Connect the batteries as follows:

(a) From the unit connect the positive terminal lead (Red) to the available positive terminal on the appropriate battery and tighten.

(b) Connect the negative terminal lead (Black) to the available negative terminal on the appropriate battery and tighten. (Two individual 12V batteries, connected in series, supply the system 24VDC power supply).

(2) Remove the engine oil level dip stick. Do not operate unit if oil level is below the "L" (low) mark on the dip stick. Service with oil until oil level is at the "H" (Full) mark. Refer to genset literature for proper oil grade.

(3) Open coolant access door and check coolant level. Coolant should be visible in overflow container when the engine is not running. Service as required to bring the level to mid-point of the oberflow container. Refer to genset literature for proper coolant mixture.

CHAPTER 1
GENERAL INFORMATION & OPERATING INSTRUCTIONS

SECTION 5
STORAGE

1. GENERAL

This section provides instructions for preparing heater unit for both short and long term storage. When the heater is to be stored or removed from operation, use the following procedures to protect the internal and external parts.

2. PREPARATION FOR STORAGE

A. Short Term Storage (less than 3 months):

The following steps are recommended if the heater is to be placed out of service for three months or less. The unit should be prepared for storage as soon as possible after being removed from service.

(1) Close all access doors and covers to minimize build-up of foreign particles in the unit.

(2) Store unit in a building that is dry.

(3) If the storage area has high humidity levels, place moisture absorbing chemicals inside the unit.

B. Long Term Storage:

Special precautions are necessary to protect the heater from rust and corrosion. It is recommended that the unit be stored in a building that is heated during winter months. Moisture absorbing chemicals should be placed inside the unit in climates where there is excessive dampness.

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