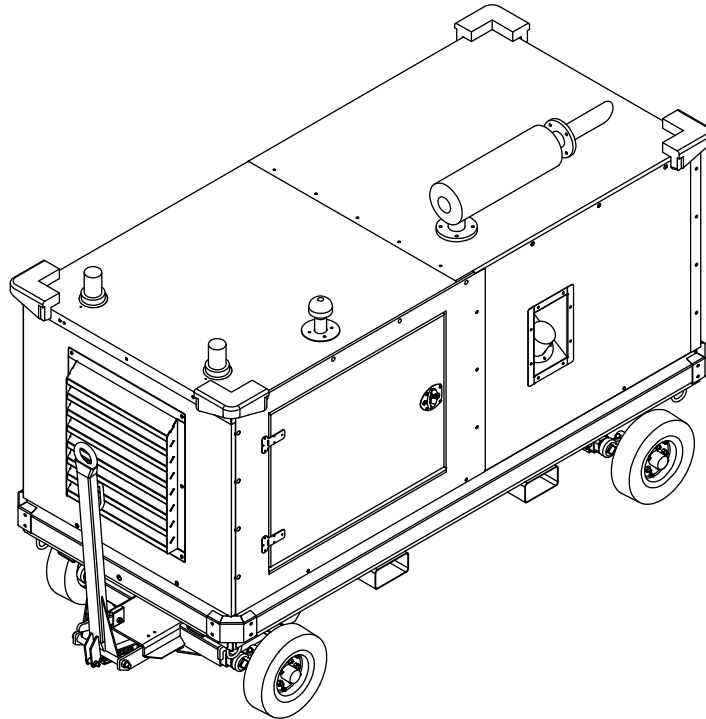


# **MAC400FHC**

## *Flameless Heat Cart*

### *Owner's Manual*



**MODEL NUMBER:** \_\_\_\_\_

**SERIAL NUMBER:** \_\_\_\_\_

**DATE PURCHASED:** \_\_\_\_\_

***SAVE THIS MANUAL FOR FUTURE REFERENCE***

---

 **WARNING**

**CANCER AND REPRODUCTIVE HARM**

[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

(000393a)

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# Section 1: Introduction and Safety

## Introduction

Thank you for purchasing a Generac Mobile Products, LLC product. This unit has been designed to provide high-performance, efficient operation, and years of quality use when maintained properly.

The MAC400FHC flameless heat cart is designed and built for sustained, reliable heat production in industrial operating conditions and environments. The MAC400FHC is built to withstand frequent handling under these conditions.

The unit has forklift access and chain attach points on both sides. The fully enclosed design protects the operating components, allowing all-weather storage and operations.

The information in this manual is accurate based on products produced at the time of publication. The manufacturer reserves the right to make technical updates, corrections, and product revisions at any time without notice.

## Read This Manual Thoroughly



### **WARNING**

Consult Manual. Read and understand manual completely before using product. Failure to completely understand manual and product could result in death or serious injury. (000100a)

If any section of the manual is not understood, contact your nearest Generac Mobile Products (GMP) Authorized Service Dealer (ASD), or contact Generac Mobile Products Customer Service at 800-926-7968, or visit <http://www.generacmobileproducts.com> with any questions or concerns.

The owner is responsible for proper maintenance and safe use of the equipment.

SAVE THESE INSTRUCTIONS for future reference. This manual contains important instructions for the unit that should be followed during installation, operation, and maintenance of the heater and batteries. ALWAYS supply this manual to any individual that will use the unit.

## Safety Rules

The manufacturer cannot anticipate every possible circumstance that might involve a hazard. The alerts in this manual, and on tags and decals affixed to the unit, are not all-inclusive. If using a procedure, work method, or operating technique that the manufacturer does not specifically recommend, verify that it is safe for others and does not render the equipment unsafe.

Throughout this publication, and on tags and decals affixed to the unit, DANGER, WARNING, CAUTION, and NOTE blocks are used to alert personnel to special instructions about a particular operation that may be hazardous if performed incorrectly or carelessly. Observe them carefully. Alert definitions are as follows:

### **DANGER**

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

(000001)

### **WARNING**

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

(000002)

### **CAUTION**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

(000003)

**NOTE:** Notes contain additional information important to a procedure and will be found within the regular text of this manual.

These safety alerts cannot eliminate the hazards that they indicate. Common sense and strict compliance with the special instructions while performing the action or service are essential to preventing accidents.

## How to Obtain Service

When the unit requires servicing or repairs, contact a GMP ASD for assistance. Service technicians are factory-trained and are capable of handling all service needs. Go to <https://www.generacmobileproducts.com/parts-service/find-service> for assistance locating a dealer.

When contacting a GMP ASD about parts and service, always supply the complete model and serial number of the unit as given on its data decal located on the unit. Record the model and serial numbers in the spaces provided on the inside front cover of this manual.

## General Hazards



### ⚠ DANGER

Asphyxiation. Running engines produce carbon monoxide, a colorless, odorless, poisonous gas. Carbon monoxide, if not avoided, will result in death or serious injury. (000103)



### ⚠ DANGER

Hydraulic Fluid Injection. High-pressure, high-temperature hydraulic fluid can pierce skin and cause severe burns. Do not check for leaks with hands. Seek immediate medical attention in case of accident. Failure to protect body accordingly will result in death or serious injury. (000239)



### ⚠ WARNING

Hearing Loss. Hearing protection is recommended when using this machine. Failure to wear hearing protection could result in permanent hearing loss. (000107)



### ⚠ WARNING

Moving Parts. Keep clothing, hair, and appendages away from moving parts. Failure to do so could result in death or serious injury. (000111)



### ⚠ WARNING

Hot Surfaces. When operating machine, do not touch hot surfaces. Keep machine away from combustibles during use. Hot surfaces could result in severe burns or fire. (000108)



### ⚠ WARNING

Vision loss. Eye protection is required when servicing unit. Failure to do so could result in vision loss or serious injury. (000377)

### ⚠ CAUTION

Equipment or property damage. Do not block air intake or restrict proper air flow. Doing so could result in unsafe operation or damage to unit. (000229)

### ⚠ CAUTION

Unit damage. Do not stop engine before heating unit is cooled. Doing so could result in unit damage. (000240a)

### ⚠ CAUTION

Equipment Damage. The emergency stop switch is not to be used to power down the unit under normal operating circumstances. Doing so will result in equipment damage. (000246)

## Explosion and Fire Hazards



### ⚠ DANGER

Explosion and Fire. Fuel and vapors are extremely flammable and explosive. Add fuel in a well ventilated area. Keep fire and spark away. Failure to do so will result in death or serious injury. (000105)



### ⚠ DANGER

Explosion and Fire. Fuel and vapors are extremely flammable and explosive. Store fuel in a well ventilated area. Keep fire and spark away. Failure to do so will result in death or serious injury. (000143)



### ⚠ DANGER

Explosion and Fire. Do not fill fuel tank past full line. Allow for fuel expansion. Overfilling may cause fuel to spill onto engine causing fire or explosion, which will result in death or serious injury. (000214)



### ⚠ WARNING

Risk of Fire. Unit must be positioned in a manner that prevents combustible material accumulation underneath. Failure to do so could result in death or serious injury. (000147)



### ⚠ WARNING

Fire risk. Fuel and vapors are extremely flammable. Do not operate indoors. Doing so could result in death, serious injury, or property or equipment damage. (000281)

**⚠️ WARNING**

Explosion and fire risk. Do not smoke near unit. Keep fire and spark away. Failure to do so could result in death, serious injury, or property or equipment damage. (000282)

**⚠️ WARNING**

Risk of burn. Do not open or mutilate batteries. Batteries contain electrolyte solution which can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention. (000163a)

## Towing Hazards

**⚠️ WARNING**

Crushing hazard. Verify parking brake is properly secured and unit is on level ground. An unsecured unit could suddenly roll or move, and could result in death, serious injury, or equipment damage. (000352)

**⚠️ WARNING**

Property or Equipment Damage. Tighten wheel lug nuts every 30 days to factory specifications. Failure to do so could result in death, serious injury, or property or equipment damage. (000364)

**⚠️ WARNING**

Control loss. Trailer must be securely coupled to the hitch. An incorrectly coupled trailer could result in loss of control, death, or serious injury.

(000360)

**⚠️ WARNING**

Personal injury. Do not operate unit during transport. Doing so could result in death, serious injury, or property damage.

(000231a)

## Battery Hazards

**⚠️ WARNING**

Explosion. Batteries emit explosive gases while charging. Keep fire and spark away. Wear protective gear when working with batteries. Failure to do so could result in death or serious injury.

(000137a)

**⚠️ WARNING**

Explosion. Do not dispose of batteries in a fire. Batteries are explosive. Electrolyte solution can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

(000162)

**⚠️ WARNING**

Accidental Start-up. Disconnect the negative battery cable, then the positive battery cable when working on unit. Failure to do so could result in death or serious injury. (000130)

**⚠️ WARNING**

Environmental Hazard. Always recycle batteries at an official recycling center in accordance with all local laws and regulations. Failure to do so could result in environmental damage, death or serious injury. (000228)

Always recycle batteries in accordance with local laws and regulations. Contact your local solid waste collection site or recycling facility to obtain information on local recycling processes. For more information on battery recycling, visit the Battery Council International website at: <http://batteryCouncil.org>

## Service Safety

- DO NOT perform even routine service (oil/filter changes, cleaning, etc.) unless all electrical components are shut down.
- Replace all missing and hard to read decals. Decals provide important operating instructions and warn of dangers and hazards.
- Wear all task-appropriate Personal Protective Equipment (PPE) when completing maintenance or service tasks.

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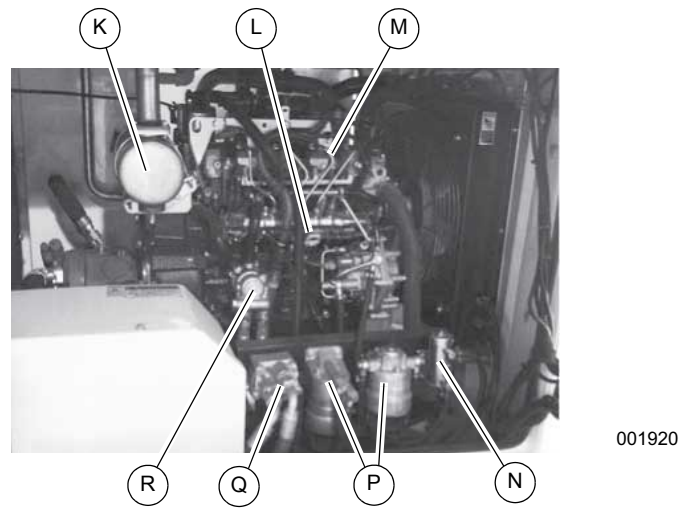
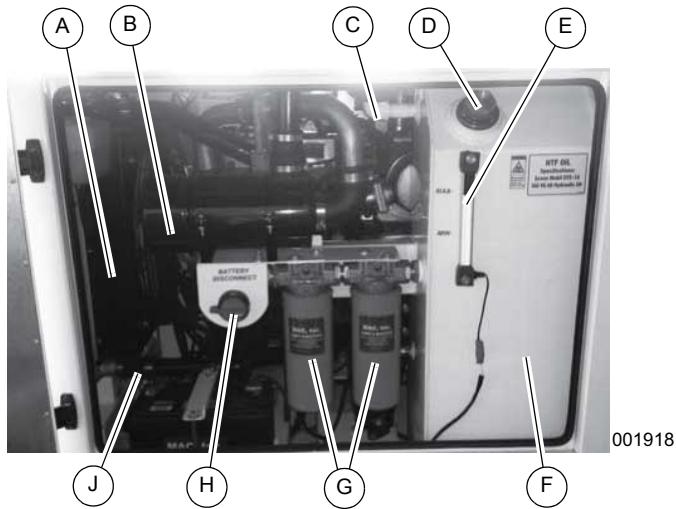


## Section 2: General Information

### Specifications

Heater	400,000 BTU/hour (117.2 kW/hour) maximum
Type	Flameless
Power	Isuzu 4LE2X Tier 4 turbo diesel, 66 HP (49.2 kW)
Operating Speed	2400 rpm
Engine Controls/Display	IFM CR0403 / Murphy PV405
Air Velocity	3600 CFM (6116 m <sup>3</sup> /hour)
Battery	950CCA wet cell battery
Static Pressure	9 in H <sub>2</sub> O (22.8 mm H <sub>2</sub> O)
Air Outlet	12 in (305 mm)
Electrical	12V
Engine Fuel	Diesel (Number 1-D, Number 2-D)
Engine Fuel Capacity	55 gal (208 L)
Engine Oil Capacity	11 qt (10.4 L)
Engine Coolant Capacity	2.5 gal (9.5 L)
HTF Capacity	24 gal (90.8 L)
Engine Fuel Rate (at 100% prime)	3.2 gph (12.1 Lph)
Run Time	18.8 hr
Temperature Rise	180 °F (82 °C)
Pump	Hydraulic piston pump
Fan	18.25 in (46.36 cm) diameter backward inclined
Hitch Type	Pintle ring
Tire Size	4 in x 8 in (10.2 cm x 20.3 cm)
Lug Nut Torque	100 ft-lbs (135.6 Nm)
Duct Length	25 ft (7.6 m)
Estimated Heater Efficiency	85%
Dimensions	120 in x 54 in x 82 in (3.05 m x 1.37 m x 2.08 m)
Weight	4700 lbs (2131.9 kg) operating weight

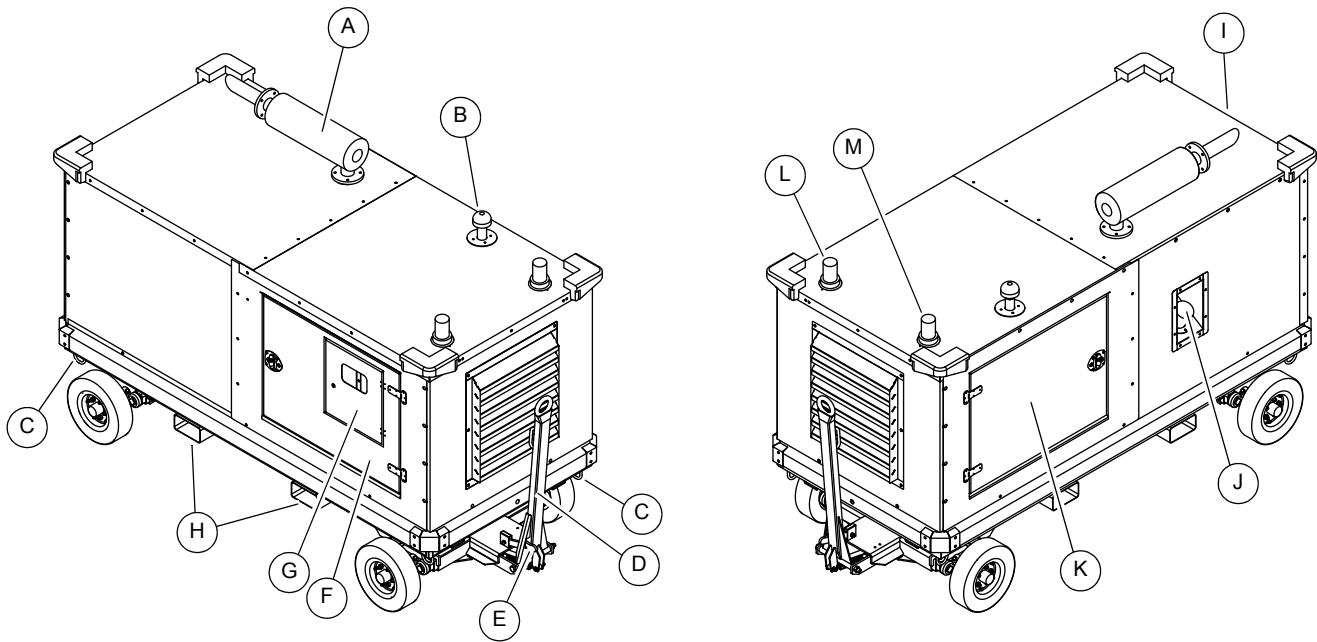
## Internal Component Locations



**Figure 2-1. Heater Components**

- |   |                                    |   |                           |
|---|------------------------------------|---|---------------------------|
| A | Engine radiator                    | K | Diesel oxidation catalyst |
| B | Air filter                         | L | Engine oil dipstick       |
| C | Hydraulic fluid breather/separator | M | Diesel injection system   |
| D | Hydraulic fluid fill               | N | Fuel pump                 |
| E | Reservoir fluid-level indicator    | P | Fuel filters              |
| F | Hydraulic fluid reservoir          | Q | Engine oil filter         |
| G | Hydraulic fluid filters            | R | Engine oil cooler         |
| H | Battery disconnect switch          |   |                           |
| J | Fluid drain (oil, fuel, coolant)   |   |                           |

## External Component Locations



004395

**Figure 2-2. External Components**

- |   |                         |   |                              |
|---|-------------------------|---|------------------------------|
| A | Muffler                 | I | Ducting storage (rear)       |
| B | Air intake cap          | J | Diesel fuel fill             |
| C | Tie-down rings          | K | Street side engine access    |
| D | Tow hitch               | L | Temperature beacon (amber)   |
| E | Parking brake lever     | M | Low fuel level beacon (blue) |
| F | Curb side engine access |   |                              |
| G | Control panel           |   |                              |
| H | Fork lift pockets       |   |                              |

## Emissions Information

See the diesel engine manual for more information.

## Engine Oil Recommendations

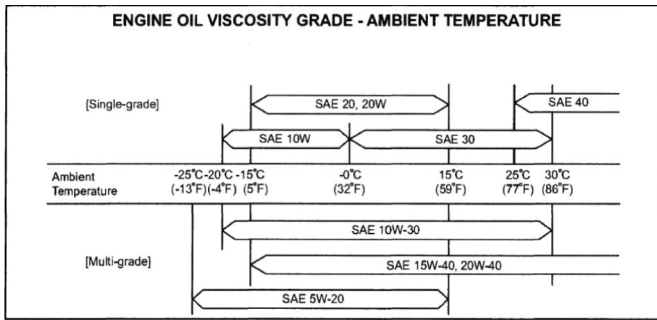
Grade	Type
API	CE, CE, CF, CF-4, CH-4, CI-4, CI-4 plus
ACEA	A3/B3, A3/B4, A5/B5, E2, E3, D4, E5, E7
JASO	DH-1

**NOTE:** Certain brands/types of oil can be used regardless of specified API or ACEA grade.

Change oil and oil filter at least once every 12 months, even if the hours of operation are fewer than the otherwise recommended service interval. See the diesel engine manual for recommended oil types.

### Selection of Viscosity

The chart below shows appropriate oil types according to ambient temperature.



001577

Figure 2-3. Engine Oil Viscosity Chart

## Coolant Recommendations



**⚠ DANGER**

Risk of poisoning. Do not use mouth to siphon coolant. Doing so will result in death or serious injury.

(000149)

Use of improper coolants can damage the engine cooling system. Use demineralized or distilled water for best results. Hard water causes scale deposits, which reduces cooling efficiency and raises internal temperatures, possibly leading to engine damage.

The cooling system should be drained after engine operation in areas where the atmospheric temperature falls below freezing. The use of antifreeze solution is highly

recommended to eliminate the need for repeated draining and refilling. Follow these antifreeze/water guidelines:

- A 50/50 ethylene glycol base antifreeze/water mix, which provides protection to -34 °F (-37 °C), is recommended for use in this engine.
- Never exceed a 60/40 antifreeze/water mix, which provides protection to approximately -58 °F (-50 °C).
- Coolant must be nitrite free and meet the performance standards of ASTM D6210.

**NOTE:** Recommended coolant is ZEREX™ Nitrate Free Extended Life Antifreeze/Coolant.

Test coolant yearly, or every 1000 hours, whichever comes first. See the diesel engine manual for more information.

## Fuel System



**⚠ DANGER**

Explosion and Fire. Fuel and vapors are extremely flammable and explosive. Keep fire and spark away. Failure to do so will result in death or serious injury.

(000168)



**⚠ DANGER**

Explosion and Fire. Do not overfill fuel tank. Overfilling may cause fuel to leak and ignite or explode, resulting in death or serious injury.

(000204)

The engine is designed to use either Number 1-D or Number 2-D diesel fuel.

- Use Number 2-D diesel fuel whenever possible for better fuel economy.
- Use Number 1-D or a winterized blend at temperatures below 20 °F (-7 °C) (check with the service station operator to verify the fuel is properly blended).

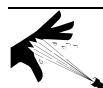
The following are required for diesel fuel:

- Must be free from dust particles.
- Must have adequate viscosity.
- Must have high cetane value.
- Must have high fluidity at low temperature.
- Must have low or ultra-low sulfur (ULSD) content *EPA requirement; varies by geographic location.*
- Must have little residual carbon.

Applicable Standard	Recommendation
JIS (Japanese Industrial Standard)	No. 2
DIN (Deutsche Industrie Normen)	DIN 51601
SAE (Society of Automotive Engineers) Based on SAE-J-313C	No. 2-D
BS (British Standard) Based on BS/2869-1970	Class A-1

Engine performance will be diminished if fuel other than what is specified is used. See the engine manual for more information.

## Hydraulic Oil



### **⚠ DANGER**

Hydraulic Fluid Injection. High-pressure, high-temperature hydraulic fluid can pierce skin and cause severe burns. Do not check for leaks with hands. Seek immediate medical attention in case of accident. Failure to protect body accordingly will result in death or serious injury. (000239)

Type: Exxon Mobil DTE-10 ISO VG 68 hydraulic oil.

## Cart Towing Guidelines

### **⚠ WARNING**

Property or Equipment Damage. Tighten wheel lug nuts every 30 days to factory specifications. Failure to do so could result in death, serious injury, or property or equipment damage. (000364)

### **⚠ WARNING**

Control loss. Trailer must be securely coupled to the hitch. An incorrectly coupled trailer could result in loss of control, death, or serious injury. (000360)

**NOTE:** Do not exceed 15 mph (24 km/h).

The front axle is steered by a tow bar with a pintle ring hitch. It is equipped with a mechanical parking brake activated by raising the tow bar to the locked position.

**NOTE:** See the tow vehicle manual for coupling instructions.

Driving a vehicle with a cart in tow is vastly different than driving the same vehicle without a cart in tow. Consider the following:

- It takes longer to get up to speed.
- More room is needed to turn.
- More distance is needed to stop.
- The driver is responsible for keeping the vehicle and cart in control, and for all damage caused if control is lost.

Before towing, verify the following:

- Coupling, tires, wheels, and lights are in working order.
- Wheel lug nuts are tightened to 100 ft-lbs (135.6 Nm).
- The unit is not running.

While towing, make regular stops to verify the following:

- Coupler is secured to the hitch and locked.
- No damage or unusual wear to tire treads or side-walls.
- Cart and doors are latched and secured.

## Parking Brake Use

### **⚠ WARNING**

Crushing hazard. Verify parking brake is properly secured and unit is on level ground. An unsecured unit could suddenly roll or move, and could result in death, serious injury, or equipment damage. (000352)



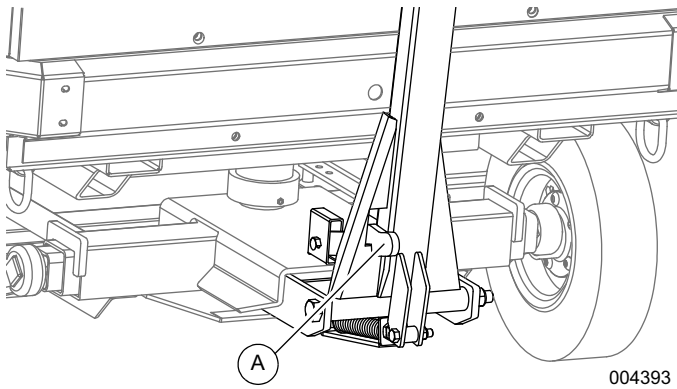
### **⚠ CAUTION**

Pinching and crushing hazard. To avoid possible injury, keep fingers away from pivot point when folding or unfolding trailer tongue. (000313)

See **Figure 2-4**. Engage the parking brake by raising the tow bar to the locked position. The locking lever (A) holds the tow bar in place. Do not operate the unit without the parking brake engaged.

Lift the locking lever up and slowly lower the tow bar to disengage the parking brake.

**NOTE:** Do not attempt to move the unit with the parking brake engaged; equipment damage may occur.



**Figure 2-4. Parking Brake Engaged**

**Monitoring, Diagnostic, and Protective Features**

Mechanical and electrical systems are connected to various sensors that monitor unit status. The controller will automatically stop the unit and display fault information if conditions occur outside of predetermined manufacturing parameters. The controller can also display a variety of critical alerts, diagnostics, and recommendations. The controller provides a variety of real-time current operating condition data. See the engine harness wiring diagrams for more information.

**Controller**

For troubleshooting, see [Digital Controller Status Messages](#).

**NOTE:** Contact a GMP ASD to change controller mode between AUTO or MANUAL, if desired.



**Figure 2-5. Controller in AUTO Mode**

Button Position	MANUAL Mode	AUTO Mode
A	Increase heat	Increase temp setting
B	Increase fan	Decrease temp setting
C	Overview/Analog gauge screen	
D	Main menu	
E	Heater on/off	
F	Next screen	
G	Popup “Softkeys”	

## Section 3: Operation

### Theory of Operation

The flameless heater generates heat by running pressurized fluid through a restrictive orifice, which drops the hydraulic pressure and results in heated fluid. A fan then blows air over the heat exchanger to push heated air out through the heat ducts.

### Before Starting Engine

#### Pre-Start Checklist



#### WARNING

Hot Surfaces. When operating machine, do not touch hot surfaces. Keep machine away from combustibles during use. Hot surfaces could result in severe burns or fire.

(000108)

- Remove all flammable materials and fire hazards within 5 ft (1.5 m) of the unit.
- Keep unit a minimum of 10 ft (3 m) from structures or barricades.
- Verify the unit is not leaking fluids: check inside and outside the unit for leaking fuel, engine oil, HTF/hydraulic oil, and engine coolant.
- Verify the following are clear of debris and obstructions:
  - Engine air intake
  - Engine exhaust stack
  - Outlets and fan intakes
- Verify the air duct hose is securely fastened to outlet duct assembly.
- Check fuel, engine oil, hydraulic fluid, and engine coolant levels.
- Verify unit is properly secure and level with the parking brake engaged.
- Inspect the alternator drive belt for tension and abnormalities.
- Verify battery cable connections are not loose or corroded.
- Inspect ducting for damage or unusual wear.

### Engine Oil Level Check

#### CAUTION

Engine damage. Verify proper type and quantity of engine oil prior to starting engine. Failure to do so could result in engine damage.

(000135)

**NOTE:** Wait at least 10 minutes before proceeding if the engine was running.

1. Remove oil dipstick from crankcase and wipe it clean with a clean, lint free cloth.
2. Insert oil dipstick fully into oil dipstick tube and then remove slowly.
3. Oil level must be between the FULL and ADD marks on the oil dipstick.
4. Add oil (if necessary) to adjust the level. After adding or changing the oil, run the engine for one minute before checking the oil level. Wait 10 minutes to allow the engine to cool and oil to fully drain into the oil pan.

Typical causes of inaccurate oil level readings:

- Reading the high level of oil dipstick.
- Reading oil dipstick before oil fully drains into oil pan.
- Inserting and removing oil dipstick too quickly.
- Removing and reading the oil dipstick before fully seating the oil dipstick into oil dipstick tube.

### Hydraulic Oil Check

On the hydraulic fluid reservoir tank is a gauge showing hydraulic oil level. Verify level is between MIN and MAX.

### Engine Coolant Check



#### WARNING

Risk of burns. Do not open coolant system until engine has completely cooled. Doing so could result in serious injury.

(000154)

1. Remove radiator fill cap.
2. Check coolant level and degree of fouling. Level should be approximately 0.39 in (10 mm) below the radiator core top.
3. Install radiator cap securely.



## Ducting Guidelines

### ⚠️ WARNING

Burn hazard. Do not remove ducting until all air pressure has been emptied from hose duct. Failure to do so could result in severe injury.

(000288)

- Place ducting in desired configuration before operating unit.
- Tightly secure ducting ends to the unit and the air craft.
- Avoid sharp bends or 90° turns in the ducting.
- Use only the necessary length of ducting required; do not exceed maximum length.
- Verify the ducting is not in a high traffic area, and will not impede workers or other machinery. Care should be taken to eliminate the need to step or climb over ducting.
- DO NOT place ducting over combustible materials.
- DO NOT place ducting over surfaces that may damage it or reduce performance, such as water, sharp rocks or glass, electrical wiring, piping, etc.
- DO NOT place or drape anything over ducting, such as covers, insulation, blankets or cloth, electrical wires, etc.

## Engine and Heater Startup



### ⚠️ WARNING

Hot Surfaces. When operating machine, do not touch hot surfaces. Keep machine away from combustibles during use. Hot surfaces could result in severe burns or fire.

(000108)

### ⚠️ WARNING

Crushing hazard. Verify parking brake is properly secured and unit is on level ground. An unsecured unit could suddenly roll or move, and could result in death, serious injury, or equipment damage. (000352)

### ⚠️ WARNING

Equipment damage. Do not attempt to start or operate a unit in need of repair or scheduled maintenance. Doing so could result in serious injury, death, or equipment failure or damage.

(000291)

### ⚠️ CAUTION

Equipment or property damage. Do not block air intake or restrict proper air flow. Doing so could result in unsafe operation or damage to unit.

(000229)

### ⚠️ CAUTION

Equipment damage. Do not use starting aids in the engine air intake system. Such aids can cause immediate engine damage.

(000289)

### ⚠️ CAUTION

Equipment damage. Do not cover unit during operation. All ducting ports must remain open even if not being used. Failure to do so will result in equipment damage.

(000290)

1. Complete the [Pre-Start Checklist](#).
2. Close all access doors.

**NOTE:** All doors on the unit must be closed when operating.

3. Raise tow bar to engage parking brake.
4. See [Figure 3-1](#). Turn ignition key to ON. The screen displays “Engine Preheat”.



001580

**Figure 3-1. Engine Preheat**

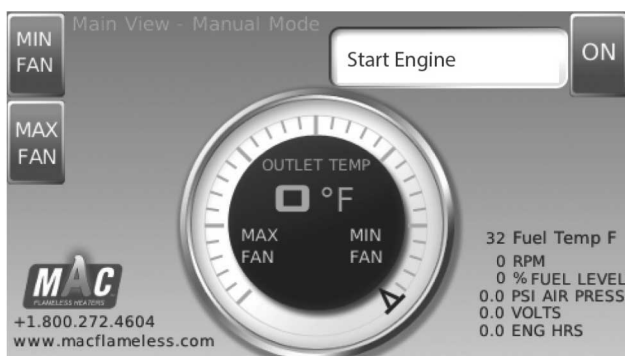
5. See [Figure 3-2](#). Wait approximately five seconds for fuel pump to build pressure. Turn ignition key to START when the screen displays “Start Engine”.

### ⚠️ CAUTION

Equipment Damage. Do not continuously crank engine for more than ten seconds. Doing so will lead to overdischarge of batteries and starter seizure.

(000230)





001584

**Figure 3-2. Start Engine**

- Attach air ducting to aircraft, avoiding sharp bends and twists in duct.

**NOTE:** A twisted or bent air duct will cause loss of air pressure and temperature.

- See [Figure 3-3](#). The screen displays “Engine Warming — Please Wait”.



001585

**Figure 3-3. Engine Warming**

- See [Figure 3-4](#). Press ON to start the heat sequence. Engine warming is complete and the heater automatically begins warming when coolant temperature reaches 140 °F (60 °C). The screen displays “Heater is warming up—Please wait”.



001581

**Figure 3-4. Heater Warming**

- See [Figure 3-5](#). When the heater is warm, heat begins blowing from ducts, the amber strobe light on top of the unit activates, and the screen displays “Heater On — Press OFF to stop the heater”.



001586

**Figure 3-5. Heater On**

## Adjusting Heater Output

Use the up and down arrows to adjust temperature selection to desired outlet temperature. The options are 100 °F (38 °C), 120 °F (49 °C), 140 °F (60 °C), and 160 °F (71 °C). Monitor regularly and adjust as needed.

## AUTO Mode

In AUTO mode, output temperature is manually set, as follows:

- To increase output temperature, press (+) ([Figure 3-6](#), item A).
- To decrease output temperature, press (-) ([Figure 3-6](#), item B).



001578

**Figure 3-6. AUTO Mode**

## MANUAL Mode

In MANUAL mode, heater output can be set to minimum fan or maximum fan, as follows:

- For minimum fan, press MIN FAN ([Figure 3-7](#), item A). Minimum fan produces the highest temperature at the lowest air flow.

- For maximum fan, press MAX FAN (Figure 3-7, item B). Maximum fan produces a lower temperature at a higher air flow.

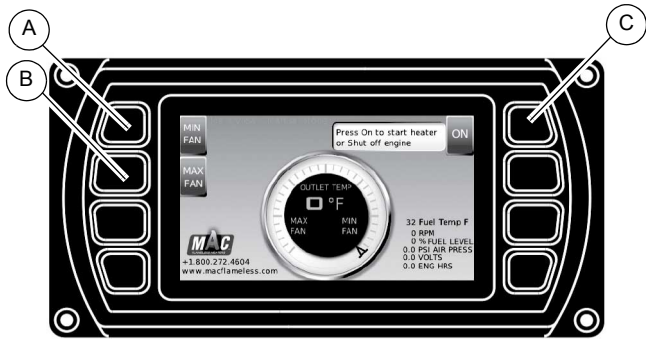


Figure 3-7. MANUAL Mode

001579

## Heater and Engine Shutdown



Equipment Damage. The emergency stop switch is not to be used to power down the unit under normal operating circumstances. Doing so will result in equipment damage. (000246)

1. Press OFF. Heater stops; blower continues running and a countdown displays. The screen displays “Heater is cooling down — Please wait” (Figure 3-8).

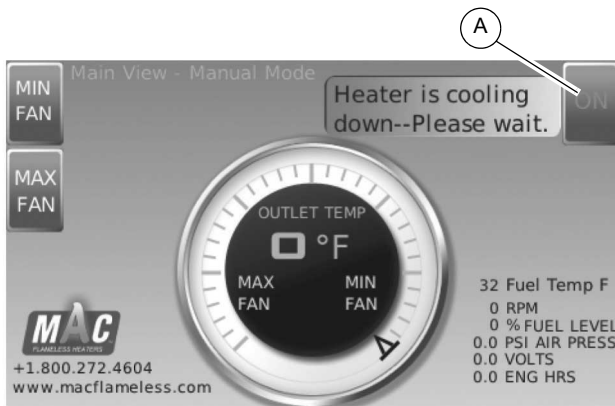


Figure 3-8. Heater Cooling

001582

**NOTE:** During cool down, the ON button (A) is disabled.

The blower stops when the countdown expires. The display indicates when it is okay to shut off the engine (Figure 3-9).



001583

Figure 3-9. Cooling Complete

2. Turn ignition key to OFF.



Unit damage. Do not stop engine before heating unit is cooled. Doing so could result in unit damage.

(000240a)

3. Disconnect air duct from airplane.
- IMPORTANT NOTE: Do not detach air duct until all air pressure is emptied from the duct.**
4. Retract air duct and place in storage area.
  5. Turn main battery disconnect to OFF.

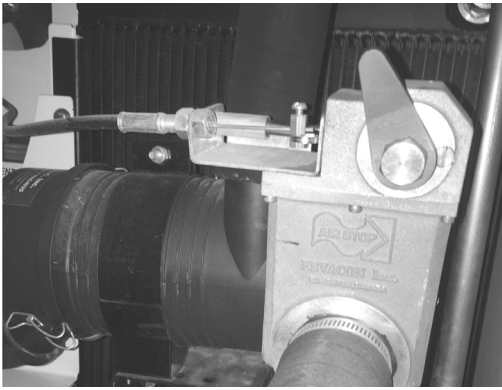
## Positive Air Shutdown (PAS)



Equipment Damage. The emergency stop switch is not to be used to power down the unit under normal operating circumstances. Doing so will result in equipment damage. (000246)

See Figure 3-10. This unit is equipped with a manually activated positive air shutdown (PAS) on the air intake. If the atmosphere contains combustible propane or natural gas, a positive air shutdown can be activated to prevent these gases from being drawn into the engine and igniting.

The PAS system stops the engine by closing an internal valve and obstructing intake air. See Figure 3-11. The PAS is activated by pulling the red T-handle outwards. The reset knob rotates clockwise to block airflow.



004471

**Figure 3-10. Reset Handle in Ready State**



004470

**Figure 3-11. Emergency Stop T-Handle**

### Testing the PAS

Test the PAS at least once a month to ensure optimal valve performance.

Pull the T-handle with the unit completely shut down to manually test the PAS. This action triggers an actuator, closing the butterfly valve inside the valve body. An audible click or series of clicks can be heard when the actuator engages. Confirm that the valve is closed by verifying that the reset knob is rotated completely clockwise. If any resistance is felt, or the valve does not close, contact Generac Mobile Products Technical Support.

### Resetting the PAS

The emergency PAS system must be reset after each emergency event according to the steps below:

1. Turn the control power switch to OFF (O).
2. Locate the PAS valve located inside the cabinet of the unit.
3. See [Figure 3-11](#). Pull T-handle on the PAS valve outwards until there is an audible “click”.
4. See [Figure 3-10](#). Turn rest knob counter-clockwise 90 degrees until there is an audible “click”.

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## Section 4: Maintenance

### Maintenance

Regular maintenance will improve performance and extend engine/equipment life. Generac Mobile Products, LLC. recommends that all maintenance work be performed by a Generac Mobile Products Authorized Service Dealer (GMP ASD). Regular maintenance, replacement, or repair of the emissions control devices and systems may be performed by any repair shop or person of the owner's choosing. To obtain emissions control warranty service free of charge, the work must be performed by a GMP ASD. See the emissions warranty.

### Maintenance Tasks

Daily checks must be performed when unit is operated continuously for extended periods of time. Daily checks and routine monthly checks can be performed by an authorized operator.

**NOTE:** Normal maintenance, service, and replacement of parts are the responsibility of the owner and are not considered defects in materials or workmanship within the terms of the warranty. It is strongly recommended that equipment be periodically checked by a GMP ASD.

### Daily Walk Around Inspection

Check for conditions that could hinder performance or safety, such as (but not limited to) oil, coolant, and fuel leakage, blocked vents, loose or missing hardware, and improper electrical connections. Check for foreign matter blocking the vents and on top of unit.

- Inspect outer cover for significant damage beyond scuffs and small nicks.
- Inspect for wire abrasion.
- Inspect the fan belt for cracking, fraying, and stretching. Verify the belt is properly seated in the pulley grooves.
- Check coolant.
- Check electrical connectors, battery, and ground points. Look for loose or missing hardware.
- Check all flexible rubber hoses for deterioration.
- Check hydraulic hoses for signs of wear.
- Verify hoses are not crushed, bent, or twisted.
- Verify there are no cracks or corrosion.
- Inspect ducting for damage or unusual wear.

### Draining and Refilling the Oil



#### WARNING

Risk of burns. Allow engine to cool before draining oil or coolant. Failure to do so could result in death or serious injury.

(000139)

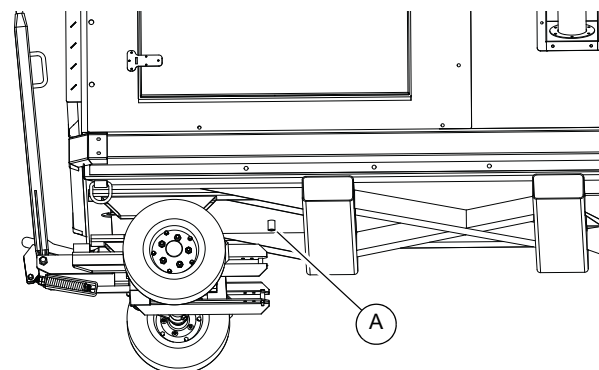
#### WARNING

Potential of cancer. Prolonged or repeated contact with used motor oil has been shown to cause cancer in laboratory animals. Thoroughly wash exposed areas with soap and water.

(000127a)

Proceed as follows to drain the oil:

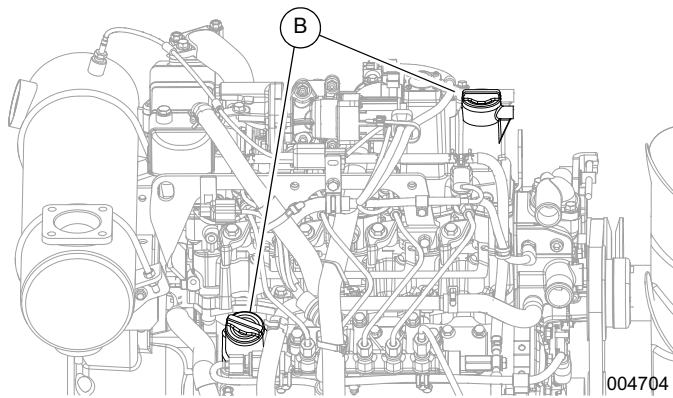
1. See [Figure 4-1](#). Place a suitable container under unit. A drain hose (A) is attached to the drain port and routed through the bottom of the enclosure to drain the oil.



004404

**Figure 4-1. Oil Drain Hose**

2. Remove plug from oil drain/manifold.
3. Open drain valve. Drain oil.
4. See engine manual for oil filter information.
5. Close drain valve.
6. Replace plug in drain port on sub base.
7. Dispose of waste oil in accordance with local, state, or national codes or regulations.
8. See [Figure 4-2](#). Remove filler cap (B) on either the rocker arm cover or on the side of the engine.



**Figure 4-2. Oil Fill Cap Locations**

9. Fill oil pan to specified level.
10. Replace filler cap.

**NOTE:** Do not overtighten filler cap. Overtightening may damage filler cap.

11. Start and run the engine for five minutes. Verify there are no leaks.
12. Stop the engine and let cool for approximately 10 minutes. Verify the oil level is correct. (See [Draining and Refilling the Oil](#).) Repeat steps 8–10 until oil is properly filled.

**NOTE:** Do not overfill oil pan. Overfilling may result in white exhaust smoke, sudden engine overspeed, or engine damage.

### Adding Coolant



**⚠ DANGER**

Risk of poisoning. Do not use mouth to siphon coolant. Doing so will result in death or serious injury.

(000149)



**⚠ WARNING**

Risk of burns. Do not open coolant system until engine has completely cooled. Doing so could result in serious injury.

(000154)

**⚠ CAUTION**

Risk of overheating. Do not use any chromate base rust inhibitor with propylene glycol base antifreeze, boosters, or additives. Doing so will cause overheating and possible equipment damage.

(000165a)

If coolant level is below the filler neck, coolant must be added. (See [Coolant Recommendations](#).) Proceed as follows to add coolant:

1. Verify engine is stopped and cooled.
2. Remove radiator cap.
3. Fill radiator slowly with coolant until it comes up to filler neck.
4. Operate engine for approximately five minutes at a low idle speed to purge the air in the coolant circuit.

**NOTE:** Coolant level will drop.

5. Stop the engine and replenish with coolant once cooled.

### Maintenance Schedule

Periodic inspection, service, and maintenance of this unit is critical to ensuring reliable operation. The following is the manufacturer's recommended maintenance schedule. The maintenance items need to be performed more frequently if the unit is used in severe applications (such as very high or very low ambient conditions or extremely dirty or dusty environments). Use the unit hour meter or calendar time, whichever occurs first, from the previous maintenance interval to determine the next required maintenance interval.

**NOTE:** Some checks are based on hours of operation.

Follow all applicable safety alerts in this manual or the engine service manual before performing any maintenance checks or service.

This maintenance schedule reflects the minimum tasks needed to verify the unit remains operational. Some of the tasks can be performed by an authorized operator, and others must be performed by a GMP ASD.

**NOTE:** An authorized operator is one who has been trained by a GMP ASD in proper operation and inspection of this unit.



## Engine Maintenance Schedule

To protect the warranty status of the engine, engine maintenance and repairs should be performed by a GMP ASD. For more information on the checks and maintenance described below, see the engine manual.

<b>Daily</b>	<ul style="list-style-type: none"> <li>• Check engine oil, coolant, hydraulic oil, and engine fuel levels.</li> <li>• Check radiator filler cap fitting condition.</li> <li>• Inspect alternator drive belt tension and replace if necessary.</li> <li>• Inspect fan belt tension.</li> <li>• Inspect preheating condition.</li> <li>• Check engine starting condition.</li> <li>• Check exhaust smoke condition.</li> <li>• Inspect hoses and connections.</li> <li>• Inspect exhaust system for wear and cracking.</li> </ul>
<b>Every Six Months</b>	<ul style="list-style-type: none"> <li>• Inspect wheel bearings.</li> </ul>
<b>Every 12 Months</b>	<ul style="list-style-type: none"> <li>• Replace coolant.</li> </ul>
<b>At 50 Operation Hours (Break In)</b>	<ul style="list-style-type: none"> <li>• Change engine oil and oil filter.</li> <li>• Change engine fuel filters.</li> </ul>
<b>At 250 Operation Hours</b>	<ul style="list-style-type: none"> <li>• Replace fuel filter element.</li> <li>• Clean water sediment element.</li> <li>• Clean electromagnetic pump filter.</li> </ul>
<b>At 500 Operation Hours</b>	<ul style="list-style-type: none"> <li>• Change engine oil and oil filter element.</li> <li>• Inspect engine accessory drive belts.</li> <li>• Inspect fuel supply system.</li> <li>• Change engine fuel filters.</li> <li>• Inspect alternator drive belt tension, and replace if necessary.</li> <li>• Inspect injection nozzle (*).</li> <li>• Change fuel filter element.</li> <li>• Clean water sediment element.</li> <li>• Clean electromagnetic pump filter.</li> </ul>
<b>At 750 Operation Hours</b>	<ul style="list-style-type: none"> <li>• Replace fuel filter element.</li> <li>• Clean water sediment element.</li> <li>• Clean electromagnetic pump filter.</li> <li>• Inspect fan belt for wear. Inspect for hard turning or unusual sounds.</li> <li>• Inspect fan belt pulleys and bearings.</li> </ul>

<p><b>At 1000 Operation Hours</b></p>	<ul style="list-style-type: none"> <li>• Change engine oil and oil filter element.</li> <li>• Inspect engine accessory drive belts.</li> <li>• Inspect fuel supply system.</li> <li>• Clean cooling system circuit.</li> <li>• Inspect and clean the starter and alternator (*).</li> <li>• Inspect valve clearance (*).</li> <li>• Inspect injection nozzle (*).</li> <li>• Change fuel filter element.</li> <li>• Clean water sedimenter element.</li> <li>• Clean electromagnetic pump filter.</li> </ul>
<p><b>At 1250 Operation Hours</b></p>	<ul style="list-style-type: none"> <li>• Replace fuel filter element.</li> <li>• Clean water sedimenter element.</li> <li>• Clean electromagnetic pump filter.</li> </ul>
<p><b>At 1500 Operation Hours</b></p>	<ul style="list-style-type: none"> <li>• Change engine oil and oil filter element.</li> <li>• Inspect engine accessory drive belts.</li> <li>• Inspect fuel supply system.</li> <li>• Clean positive crankcase ventilation valve.</li> <li>• Inspect injection nozzle (*).</li> <li>• Change fuel filter element.</li> <li>• Clean water sedimenter element.</li> <li>• Clean electromagnetic pump filter.</li> </ul>
<p><b>After 1500 Operation Hours</b></p>	<p>All hours-based checks and maintenance should now be performed every 250 hours.</p>
<p>(* ) = When servicing these items, consult the equipment supplier.</p> <p><b>NOTE:</b> All service and maintenance or repairs are recommended to be completed by a GMP ASD to maintain the warranty status of a unit. You cannot be denied emissions warranty coverage solely based on failure to complete recommended service maintenance.</p>	

**Other Maintenance Checks**

<p>Every 500 Hours</p>	<ul style="list-style-type: none"> <li>• Change air filter.</li> </ul>
<p>Every 1000 Hours</p>	<ul style="list-style-type: none"> <li>• Change hydraulic oil.</li> <li>• Change hydraulic pump filter.</li> </ul>
<p>Annually</p>	<ul style="list-style-type: none"> <li>• Change hydraulic breather/separator.</li> <li>• Carbon monoxide (CO) test at outlet air duct by trained service technician.</li> <li>• Inspect blower/fan hardware for condition and tightness.</li> </ul>



## Battery Inspection



### ⚠️ WARNING

Explosion. Batteries emit explosive gases while charging. Keep fire and spark away. Wear protective gear when working with batteries. Failure to do so could result in death or serious injury.

(000137a)



### ⚠️ WARNING

Explosion. Do not dispose of batteries in a fire. Batteries are explosive. Electrolyte solution can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

(000162)



### ⚠️ WARNING

Risk of burn. Do not open or mutilate batteries. Batteries contain electrolyte solution which can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

(000163a)

### ⚠️ WARNING

Accidental Start-up. Disconnect the negative battery cable, then the positive battery cable when working on unit. Failure to do so could result in death or serious injury.

(000130)



### ⚠️ WARNING

Vision Loss. Eye protection is required to avoid spray from spark plug hole when cranking engine. Failure to do so could result in vision loss.

(000181)

### ⚠️ WARNING

Environmental Hazard. Always recycle batteries at an official recycling center in accordance with all local laws and regulations. Failure to do so could result in environmental damage, death or serious injury.

(000228)

Always recycle batteries in accordance with local laws and regulations. Contact your local solid waste collection site or recycling facility to obtain information on local recycling processes. For more information on battery recycling, visit the Battery Council International website at: <http://batteryCouncil.org>

An authorized operator should inspect the engine battery monthly. At this time, the battery fluid level should be checked using a load tester, and distilled water added if needed. Battery cables and connections should also be inspected for cleanliness and corrosion.

Once every six months, a GMP ASD should inspect the battery system. At this time, the battery condition and state of charge should be checked using a load test battery. The battery should be recharged or replaced as required.

Battery service must be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away.

Observe the following precautions when working on batteries:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of battery.
- Disconnect charging source prior to connecting or disconnecting battery terminals.

**NOTE:** Wash spilled electrolyte down with an acid neutralizing agent. A common practice is to use a solution of 1 lb (454 g) bicarbonate of soda (baking soda) to 1 gal (3.8 L) of water. Add bicarbonate of soda solution until the evidence of reaction (foaming) has ceased. Flush the resulting liquid with water.

**NOTE:** Discharge static electricity before touching battery by first touching a grounded metal surface.

## Battery Installation and Replacement

When required, the battery must be replaced with one of equivalent size, voltage, and CCA (cold crank amp capacity). Minimum CCA for this unit is 950. Contact a GMP ASD for correct battery size. A new battery must be filled with the proper electrolyte and be fully charge before installing.

Battery cables are connect to the unit at the factory. Connect cables to battery posts as follows:

**NOTE:** Turn the battery disconnect to OFF before changing the battery.



### ⚠️ CAUTION

Equipment damage. Do not make battery connections in reverse. Doing so will result in equipment damage.

(000167a)

1. Connect red battery cable from starter contactor to positive (POS or +) battery post.
2. Connect black battery cable to negative (NEG or -) battery post.
3. See [Engine and Heater Startup](#).

## Other Maintenance Checks

The following inspections should be performed by an authorized service technician, or a properly trained authorized operator. These maintenance items require a high level of experience and skill to evaluate and correct.

- Inspect exhaust pipe sleeve.

## Short Term Storage

When the unit will not be in use for three or more months, follow the guidelines below to properly store the unit:

- Perform all necessary maintenance or repairs based on the **Maintenance Schedule**. If necessary maintenance is upcoming, perform the maintenance action before storing.
- Fill the fuel tank to FULL.
- Fill coolant to FULL. Do not drain.
- Remove all dirt and debris from inside and outside the enclosure.
- Lock the unit to prevent any unauthorized operation.
- Store in a safe location — do not position near or on top of any combustible materials; observe any local, state, or national codes or regulations. Store in a low moisture, low dust area.
- Disconnect the negative cable from the battery.

## Return to Service



Equipment damage. Do not attempt to start or operate a unit in need of repair or scheduled maintenance. Doing so could result in serious injury, death, or equipment failure or damage. (000291)

---

Follow the guidelines below for engines and units that have not been operated for three to six months:

- Conduct a thorough inspection of the unit before starting the engine.
- Verify the maintenance schedule is up to date.
- Check all fluids for signs of fouling or degradation.
- After starting the engine, let it warm up for more than 10 minutes at idle.

**NOTE:** Do not start or operate a unit in need of repair or maintenance. Perform all maintenance tasks and repairs before starting. Contact a GMP ASD if there is any doubt as to the unit's usability.

# Section 5: Troubleshooting

## General Troubleshooting Guide

Problem	Cause	Solution
Engine cranks but will not start	No fuel.	Verify there is no fuel leakage and replenish.
	Insufficient oil level.	Replenish oil to full.
	PAS is ON.	Turn PAS to OFF. See <a href="#">Resetting the PAS</a> .
	Air in fuel system.	Purge air from fuel system.
	Clogged fuel filter.	Remove water and change element.
	Gelled fuel.	Warm fuel pipes with hot water or wait until ambient temperature rises.
	Injection pump failure.	Contact a GMP ASD.
	Electromagnetic type fuel pump failure.	
	Engine control system failure.	
	LCD panel shows engine failure.	
	Clogged strainer.	
	Pre-heating device failure.	
Restricted air flow.	Check/replace air filter.	
Engine will not crank (electric start)	Discharged battery.	Replace battery. See <a href="#">Battery Installation and Replacement</a> .
	Battery terminal is disconnected, loose, or corroded.	Replace corroded part(s) and tighten securely.
	Starter ground terminal is disconnected, loose, or corroded.	
	Excessive engine oil viscosity.	Change with oil of correct viscosity. See <a href="#">Draining and Refilling the Oil</a> .
	Starter or electrical system failure.	Contact a GMP ASD.
	Engine seized.	
Engine starts but stops shortly thereafter	Low idle.	Adjust by idling control equipment on the unit. If adjustment is not possible, contact a GMP ASD.
	Clogged fuel filter.	Remove water and change element.
	Clogged pre-fuel filter.	Clean or change element.
	Clogged air cleaner.	
	Engine control system failure.	Contact a GMP ASD.
	Injection pump failure.	
	Clogged strainer.	
Electromagnetic type fuel pump failure.		
Engine running is unstable	Fuel system failure.	
	Water or air in fuel system.	Purge air or remove water.
	Engine control system failure.	Contact a GMP ASD.

Problem	Cause	Solution
Exhaust smoke is white	Insufficient warm-up time.	Conduct warm-up operation.
	Excessive engine oil.	Correct oil level. See <a href="#">Draining and Refilling the Oil</a> .
	Engine control system failure.	Contact a GMP ASD.
	Injection pump failure.	
	Fuel system failure.	
	Excessive idling (more than two hours).	
Exhaust smoke is black	Excessive speed.	<ul style="list-style-type: none"> <li>• Verify engine rpm.</li> <li>• Check AVR adjustment.</li> </ul>
		Clogged air cleaner.
	Injection pump failure.	Contact a GMP ASD.
	Clogged intercooler.	
	Fuel system failure.	
	Clogged exhaust system.	
Engine overheats	No coolant.	Add coolant. See <a href="#">Adding Coolant</a> .
	Front of radiator is clogged with dust.	Clean with soft brush.
	Subtank cap is not tightened.	Tighten or replace sub tank cap.
	Fouled coolant.	Clean inside of radiator and change coolant.
	Oil in coolant.	Contact a GMP ASD.
	Thermostat failure.	Change thermostat.
Oil pressure does not rise	Incorrect engine oil viscosity.	Change with oil of correct viscosity. See <a href="#">Draining and Refilling the Oil</a> .
	Insufficient engine oil.	Replenish engine oil. See <a href="#">Draining and Refilling the Oil</a> .
	Engine failure.	Contact a GMP ASD.
	Meter, lamp, or switch failure.	
Engine has no power	Clogged air cleaner.	Clean element.
	Clogged pre-fuel filter.	
	Clogged fuel filter.	Remove water and change element.
	Clogged strainer.	Contact a GMP ASD.
	Engine control system failure.	
	Engine failure.	
	Clogged exhaust system.	
	Fuel system failure.	
	Incorrect fuel type.	
	Electromagnetic type fuel pump failure.	

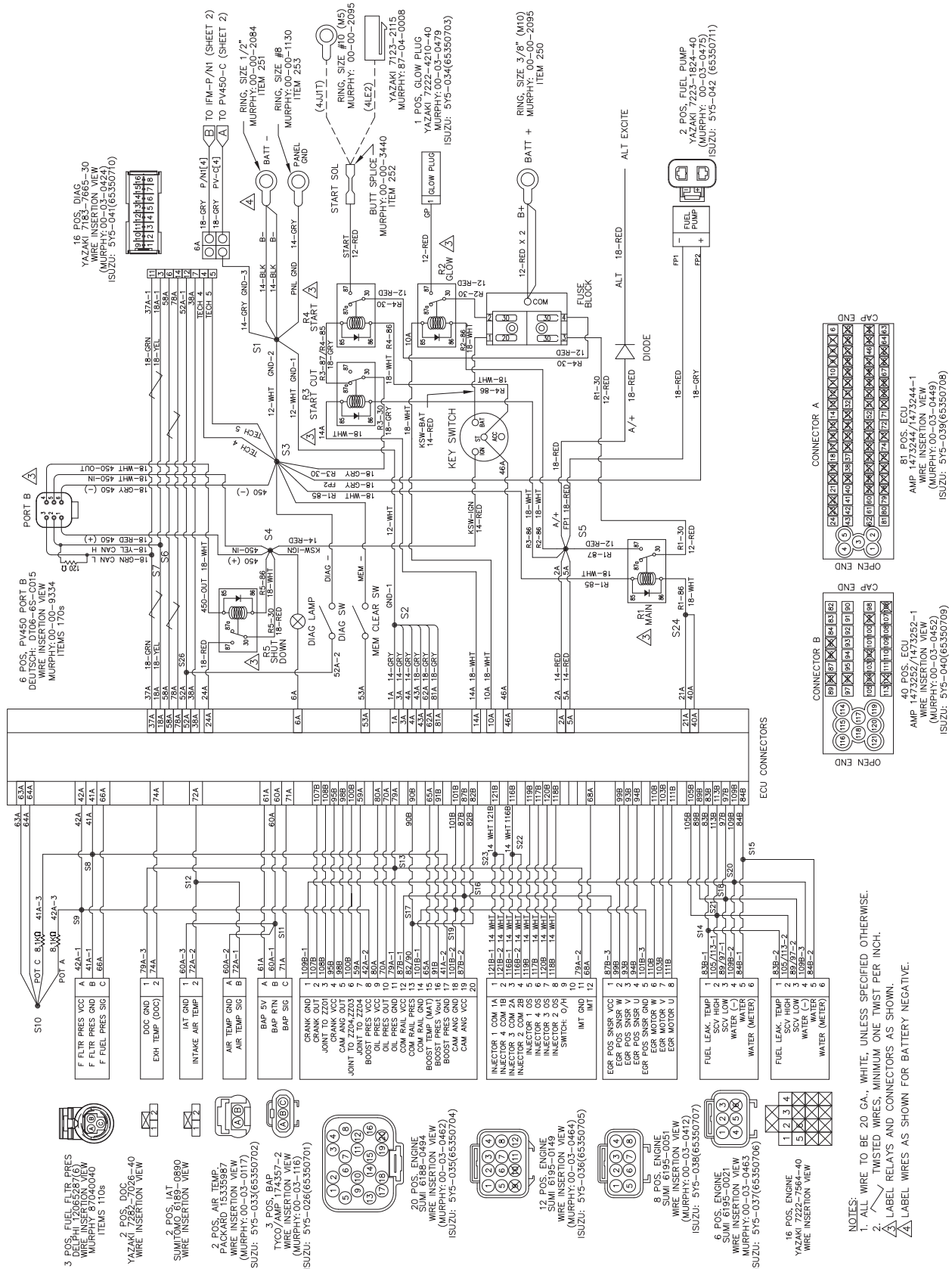
Problem	Cause	Solution
Overheat/shutdown condition (Check controller for engine fault shutdown code)	Access doors are open.	Close all access doors.
	Air outlets are closed.	Open the air outlets and verify there are no obstructions or tight bends in the ducting.
	Front radiator or rear oil cooler are full of debris.	Clean the unit.
	Engine rpm is set too high for ambient temperature.	Lower the engine rpm.
	Faulty temperature sensor.	Check air outlet sensor operation.
	Blower fan operating incorrectly.	Remove ducting; check blower fan operation.
No/low heat condition	Incorrect heater setting (target temperature too low).	Adjust heater output. See <a href="#">Adjusting Heater Output</a> .
	Access doors are open.	Close all access doors.
	Insufficient HTF/hydraulic oil level.	<ul style="list-style-type: none"> <li>• Check level on tank sight glass, adjust as needed.</li> <li>• Inspect HTF hoses for leaks or loose fittings.</li> <li>• Check fluid for foaming.</li> </ul>
	Clogged HTF/hydraulic oil filters.	Check restriction gauges/replace HTF filters.
	Excessive ducting for ambient conditions.	Move unit closer to heat recipient if possible.
	HTF pump drive sheared.	Contact a GMP ASD.
	Controller sensor fault.	Check sensor related to fault.

## Digital Controller Status Messages

Message	Cause
Engine Warming — Please Wait	Engine coolant temperature < 140 °F (38 °C).
Engine Preheat	Wait approximately 10 seconds after heater powers up.
Engine is not ready — Check rpm, Fuel Level or Wait to Start	Engine rpm < 500
	Fuel level < 10%
	Wait to Start signal
Low Fuel Warning	Fuel level < 20% <ul style="list-style-type: none"> <li>• Fuel level notification appears on screen</li> <li>• Low Fuel Level beacon turns on</li> </ul>
	Fuel level ≤ 16% <ul style="list-style-type: none"> <li>• Fuel level notification appears on screen</li> <li>• Heat/fan load reduced to 50%</li> </ul>
	Fuel level ≤ 12% <ul style="list-style-type: none"> <li>• Fuel level notification appears on screen</li> <li>• Open heat circuit and close scroll fan circuit</li> <li>• Drop engine to idle</li> </ul>
	Fuel level ≤ 8% <ul style="list-style-type: none"> <li>• Fuel level notification appears on screen</li> <li>• Engine shuts down</li> </ul>
Check heater settings or connections, then press Reset on the Machine Overview	IFM controller detected a short or break in a sender.
Heater is cooling down — Please wait	IFM controller detects heater is in cool down. ON button disabled.
Engine is going to shutdown	Fuel level ≤ 8%
Engine fault shutdown	Low engine oil pressure
	High engine coolant temperature
	Engine overspeed
Heater shutdown due to temperature; pressure or level out of range	High hydraulic temperature
	Low hydraulic pressure
	Low hydraulic level

# Section 6: Installation Diagrams

## Engine Harness (1 of 3)



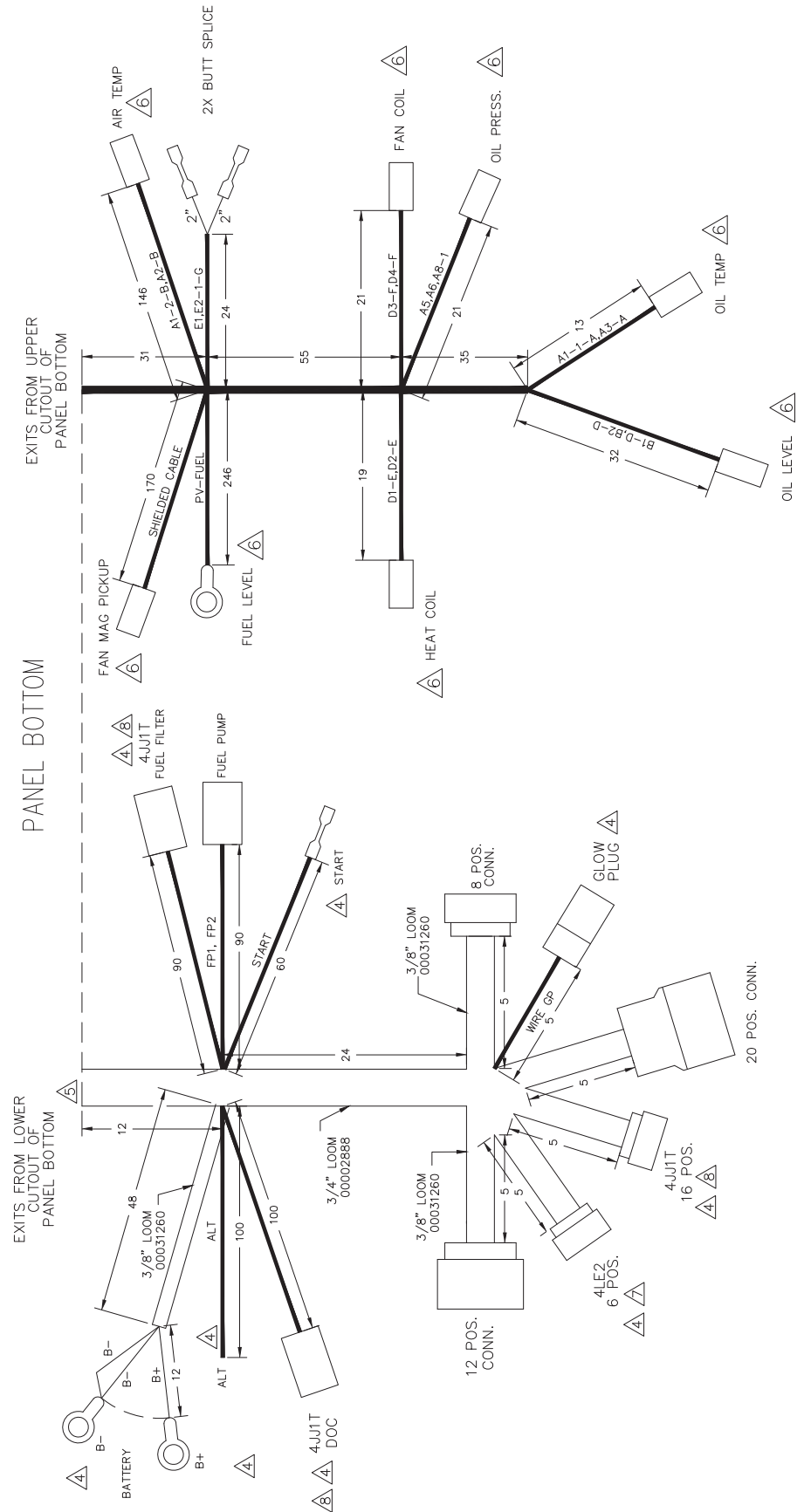




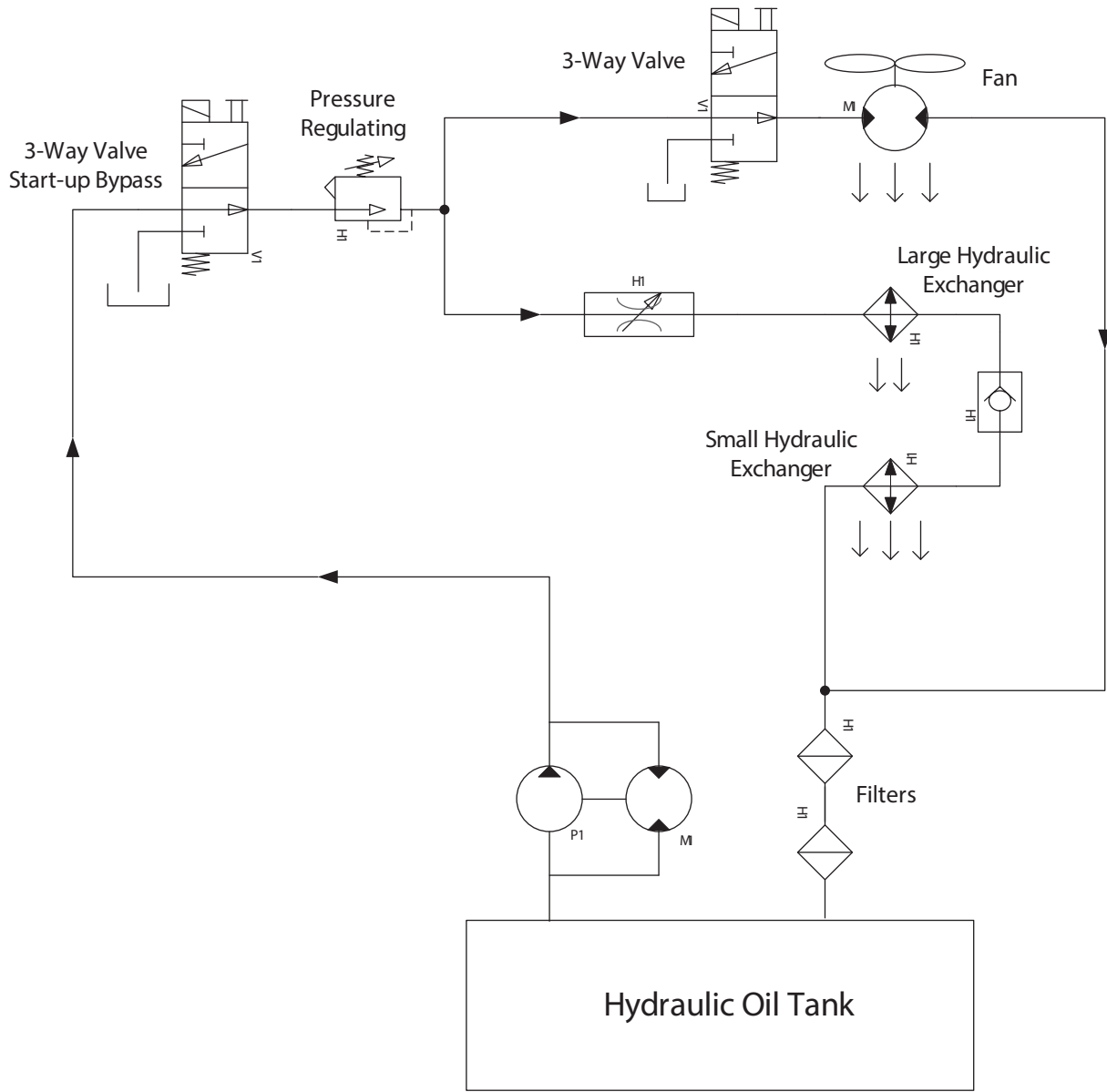
# Engine Harness (3 of 3)

**NOTES:**

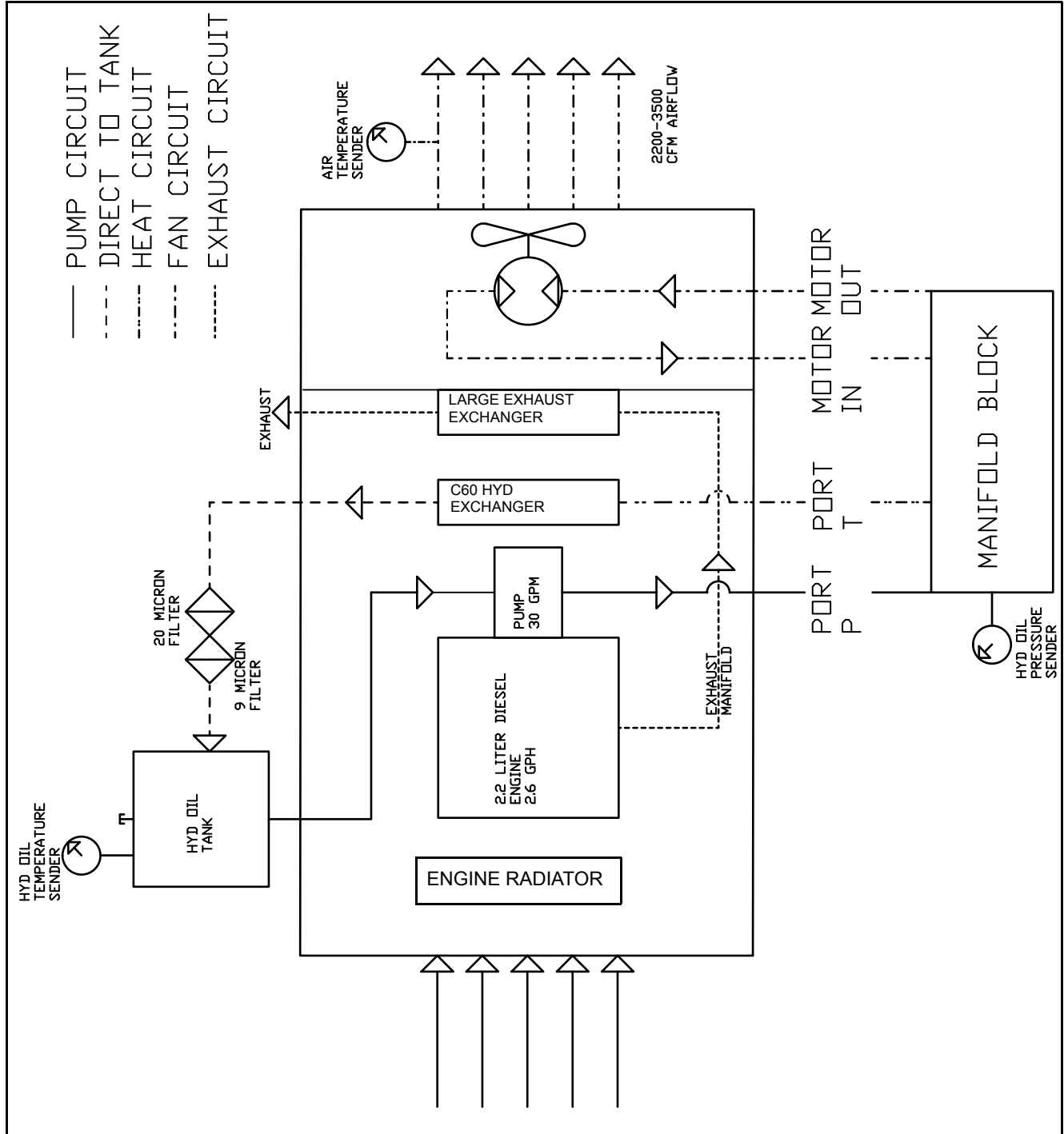
1. = 1/4" LOOM (00002874).
2. DRAWING IS NOT TO SCALE.
3. ALL DIMENSIONS ARE IN INCHES.
4. TAG WIRE ENDS OR CONNECTOR WITH LABELS SHOWN.
5. LOOM SHOULD START ATLEAST 3" FROM INSIDE OF THE PANEL.
6. LABEL CONNECTORS AS SHOWN.
7. USED ONLY FOR 4LE2 ENGINE.
8. USED ONLY FOR FT4 4JJIT ENGINE.
9. UNUSED CONNECTORS SHOULD BE COVERED WITH SHRINK TUBE AND TIDE BACK TO LOOM SECURELY.



# Hydraulic System Schematic



# Hydraulic Heat System



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