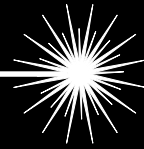


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Commercial Mobile Power



Operation and Installation

RBAA Hydraulic Generator Sets (6-15 kW)

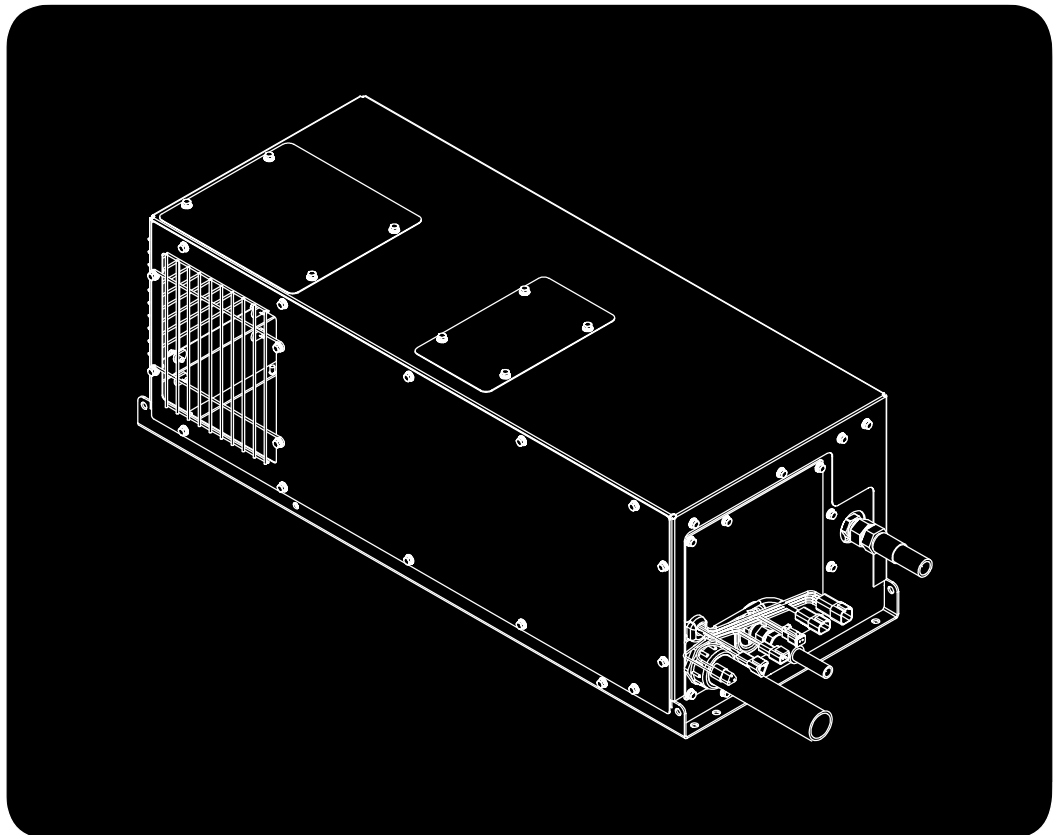


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Safety Precautions

Thoroughly read *Operation and Installation* before operating the genset. Safe operation and top performance can be only be attained when equipment is operated and maintained properly.

The following symbols in this manual alert you to potential hazards to the operator, service person and equipment.

⚠ DANGER *alerts you to an immediate hazard which will result in severe personal injury or death.*

⚠ WARNING *alerts you to a hazard or unsafe practice which can result in severe personal injury or death.*

⚠ CAUTION *alerts you to a hazard or unsafe practice which can result in personal injury or equipment damage.*

Electricity, moving parts, batteries and high-pressure hydraulic fluid present hazards which can result in severe personal injury or death.

GENERAL PRECAUTIONS

- Make sure all fasteners are secure and torqued properly.
- Do not work on the genset when mentally or physically fatigued or after consuming alcohol or drugs.
- You must be trained and experienced to make adjustments while the genset is running—hot, moving or electrically live parts can cause severe personal injury or death.
- Keep multi-class ABC fire extinguishers handy. Class A fires involve ordinary combustible materials such as wood and cloth; Class B fires, combustible and flammable liquid fuels and gaseous fuels; Class C fires, live electrical equipment. (ref. NFPA No. 10)

- Genset installation and operation must comply with all applicable local, state and federal codes and regulations.

GENERATOR VOLTAGE IS DEADLY!

- Generator electrical output connections must be made by a trained and experienced electrician in accordance with applicable codes.
- Use caution when working on live electrical equipment. Remove jewelry, make sure clothing and shoes are dry, stand on a dry wooden platform or rubber insulating mat and use tools with insulated handles.

BATTERY GAS IS EXPLOSIVE

- Wear safety glasses.
- Do not smoke.
- To reduce arcing when disconnecting or reconnecting battery cables, always disconnect the negative (–) battery cable first and reconnect it last.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not wear loose clothing or jewelry near moving parts such as PTO shafts, fans, belts and pulleys.
- Keep hands away from moving parts.
- Keep guards in place over fans, belts, pulleys, and other moving parts.

HYDRAULIC FLUID UNDER PRESSURE CAN CAUSE SEVERE PERSONAL INJURY

- Always shut down the engine that drives the hydraulic pump before loosening or tightening fittings.
- The high pressure spray from a leak or fitting in a hydraulic line can penetrate the skin, leading to possible blood poisoning. Wear safety glasses. Do not delay getting proper medical attention if exposed to high pressure oil spray.

Specifications

	6 kW Models ¹	
	Specs 4781 & 4782	Specs 2282, 2653, 4355 & 4356
GENERATOR: 2-Pole Revolving Field, 1-Bearing, Self-Excited, 1-Phase, Electronic Voltage Regulation		
Frequency	60 Hertz	60 Hertz
Voltage (3-Wire)	120 / 240 volts	120 / 240 volts
Current	50 / 25 amps	50 / 25 amps
Speed	3600 rpm	3600 rpm
DC SYSTEM:		
Battery Voltage	12 volts	12 volts
Control Fuse (F1)	20 amp blade-type	20 amp blade-type
INSTALLATION: Hydraulic Pump		
Min – Max Pump Speed	550 – 3000 rpm	950 – 3200 rpm
SAE Flange	BB	B
SAE Spline Shaft	15 Tooth, 16/32 Pitch	13 Tooth, 16/32 Pitch
SAE Straight Key Shaft	1–1/4 inch	7/8 inch
Flow	8 gpm	8 gpm
Maximum Pressure	4000 psi	4000 psi
Hydraulic Fluid	Dextron III	Dextron III
Weight	73 lb (33 Kg)	58 lb (27 Kg)
Max Engine Draw	22.4 hp	22.4 hp
INSTALLATION: Hydraulic Hose & Fittings		
Pump to Motor	#8, 4000 psi Hose; 37° Fittings	#8, 4000 psi Hose; 37° Fittings
Genset to Oil Reservoir	#10, 200 psi Hose; 37° Fittings	#8, 200 psi Hose; 37° Fittings
Pump Case to Oil Reservoir	#10, 200 psi Hose; 37° Fittings ²	#8, 200 psi Hose; 37° Fittings
Oil Reservoir to Pump Hose Fitting at Reservoir Fitting at Pump	#20 (Min), 200 psi 37° Fitting 37° Fitting	#20 (Min), 200 psi 37° Fitting 37° Fitting
INSTALLATION: Generator Module		
Noise	72 dB(A) ³	72 dB(A) ³
Weight	195 lb (89 Kg)	179 lb (81 Kg)
Dimensions (L x W x H)	31.08 x 15.96 x 13.79 in (789.4 x 405.38 x 350.33 mm)	31.08 x 15.96 x 13.79 in (789.4 x 405.38 x 350.33 mm)
Cooling Air Flow	1450 cfm	1450 cfm
Max Ambient Temp Continuous Full Load Intermittent Load	120° F (49° C) 140° F (60° C)	120° F (49° C) 140° F (60° C)
1 – Rated @ 1.0 PF		
2 – Requires #10 Hose and #8 Reducer at Reservoir.		
3 – Rated @ 10 ft (3 m), before installation, under full load.		

	8 kW Models ¹		
	Specs 4783 & 4784	Specs 2283, 2654, 4357 & 4358	Spec4863
GENERATOR: 2-Pole Revolving Field, 1-Bearing, Self-Excited, 1-Phase, Electronic Voltage Regulation			
Frequency	60 Hertz	60 Hertz	50 Hertz
Voltage (3-Wire)	120 / 240 volts	120 / 240 volts	120 / 240 volts
Current	66/33 amps	66/33 amps	66/33 amps
Speed	3600 rpm	3600 rpm	3000 rpm
DC SYSTEM:			
Battery Voltage	12 volts	12 volts	12 volts
Control Fuse (F1)	20 amp blade-type	20 amp blade-type	20 amp blade-type
INSTALLATION: Hydraulic Pump			
Min – Max Pump Speed	550 – 3000 rpm	950 – 3200 rpm	500 – 3200 rpm
SAE Flange	BB	B	B
SAE Spline Shaft	15 Tooth, 16/32 Pitch	13 Tooth, 16/32 Pitch	15 Tooth, 16/32 Pitch
SAE Straight Key Shaft	1–1/4 inch	7/8 inch	1–1/4 inch
Flow	8 gpm	8 gpm	7 gpm
Maximum Pressure	4000 psi	4000 psi	4000 psi
Hydraulic Fluid	Dextron III	Dextron III	Dextron III
Weight	73 lb (33 Kg)	58 lb (27 Kg)	73 lb (33 Kg)
Max Engine Draw	22.4 hp	22.4 hp	22.4 hp
INSTALLATION: Hydraulic Hose & Fittings			
Pump to Motor	#8, 4000 psi Hose; 37° Fittings	#8, 4000 psi Hose; 37° Fittings	#8, 4000 psi Hose; 37° Fittings
Genset to Oil Reservoir	#10, 200 psi Hose; 37° Fittings	#8, 200 psi Hose; 37° Fittings	#8, 200 psi Hose; 37° Fittings
Pump Case to Oil Reservoir	#10, 200 psi Hose; 37° Fittings ²	#8, 200 psi Hose; 37° Fittings	#10, 200 psi Hose; 37° Fittings ²
Oil Reservoir to Pump Hose Fitting at Reservoir Fitting at Pump	#20 (Min), 200 psi 37° Fitting 37° Fitting	#20 (Min), 200 psi 37° Fitting 37° Fitting	#20 (Min), 200 psi 37° Fitting 37° Fitting
INSTALLATION: Generator Module			
Noise	72 dB(A) ³	72 dB(A) ³	72 dB(A) ³
Weight	179 lb (81 Kg)	179 lb (81 Kg)	179 lb (81 Kg)
Dimensions (L x W x H)	31.08 x 15.96 x 13.79 in (789.4 x 405.38 x 350.33 mm)	31.08 x 15.96 x 13.79 in (789.4 x 405.38 x 350.33 mm)	31.08 x 15.96 x 13.79 in (789.4 x 405.38 x 350.33 mm)
Cooling Air Flow	1450 cfm	1450 cfm	1450 cfm
Max Ambient Temp Continuous Full Load Intermittent Load	120° F (49° C) 140° F (60° C)	120° F (49° C) 140° F (60° C)	120° F (49° C) 140° F (60° C)
1 – Rated @ 1.0 PF			
2 – Requires #10 Hose and #8 Reducer at Reservoir.			
3 – Rated @ 10 ft (3 m), before installation, under full load.			

	10 kW Models ¹	
	Specs 2619 & 2655	Specs 4546 & 4547
GENERATOR: 2-Pole Revolving Field, 1-Bearing, Self-Excited, 1-Phase, Electronic Voltage Regulation		
Frequency	60 Hertz	60 Hertz
Voltage (3-Wire)	120 / 240 volts	120 / 240 volts
Current	83 / 42 amps	83 / 42 amps
Speed	3600 rpm	3600 rpm
DC SYSTEM:		
Battery Voltage	12 volts	12 volts
Control Fuse (F1)	20 amp blade-type	20 amp blade-type
INSTALLATION: Hydraulic Pump		
Min – Max Pump Speed	850 – 3000 rpm	600 – 3000 rpm
SAE Flange	B	B
SAE Spline Shaft	13 Tooth, 16/32 Pitch	15 Tooth, 16/32 Pitch
SAE Straight Key Shaft	1–1/4 inch	1–1/4 inch
Flow	10.5 gpm	10.5 gpm
Maximum Pressure	4000 psi	4000 psi
Hydraulic Fluid	Dextron III	Dextron III
Weight	70 lb (32 Kg)	73 lb (33 Kg)
Max Engine Draw	28 hp	28 hp
INSTALLATION: Hydraulic Hose & Fittings		
Pump to Motor	#8, 4000 psi Hose; 37° Fittings	#8, 4000 psi Hose; 37° Fittings
Genset to Oil Reservoir	#10, 200 psi Hose; 37° Fittings	#10, 200 psi Hose; 37° Fittings
Pump Case to Oil Reservoir	#8, 200 psi Hose; 37° Fittings	#10, 200 psi Hose; 37° Fittings ²
Oil Reservoir to Pump Hose Fitting at Reservoir Fitting at Pump	#20 (Min), 200 psi 37° Fitting SAE Size 32, Code 61 Flange Head at Pump	#20 (Min), 200 psi 37° Fitting 37° Fitting
INSTALLATION: Generator Module		
Noise	72 dB(A) ³	72 dB(A) ³
Weight	205 lb (93 Kg)	205 lb (93 Kg)
Dimensions (L x W x H)	31.08 x 15.96 x 13.79 in (789.4 x 405.38 x 350.33 mm)	31.08 x 15.96 x 13.79 in (789.4 x 405.38 x 350.33 mm)
Cooling Air Flow	1450 cfm	1450 cfm
Max Ambient Temp Continuous Full Load Intermittent Load	120° F (49° C) 140° F (60° C)	120° F (49° C) 140° F (60° C)
1 – Rated @ 1.0 PF		
2 – Requires #10 Hose and #8 Reducer at Reservoir.		
3 – Rated @ 10 ft (3 m), before installation, under full load.		

	15 kW Models ¹	
	Specs 3164 & 3165	Specs 4548 & 4549
GENERATOR: 2-Pole Revolving Field, 1-Bearing, Self-Excited, 1-Phase, Electronic Voltage Regulation		
Frequency	60 Hertz	60 Hertz
Voltage (3-Wire)	120 / 240 volts	120 / 240 volts
Current	125 / 62.5 amps	125 / 62.5 amps
Speed	3600 rpm	3600 rpm
DC SYSTEM:		
Battery Voltage	12 volts	12 volts
Control Fuse (F1)	20 amp blade-type	20 amp blade-type
INSTALLATION: Hydraulic Pump		
Min – Max Pump Speed	900 – 3200 rpm	850 – 3000 rpm
SAE Flange	C	B
SAE Spline Shaft	14 Tooth, 12/24 Pitch	15 Tooth, 16/32 Pitch
SAE Straight Key Shaft	1–1/4 inch	1–1/4 inch
Flow	17 gpm	17 gpm
Maximum Pressure	4000 psi	4000 psi
Hydraulic Fluid	Dextron III	Dextron III
Weight	80 lb (36 Kg)	73 lb (33 Kg)
Max Engine Draw	35 hp	35 hp
INSTALLATION: Hydraulic Hose & Fittings		
Pump to Motor	#10, 4000 psi Hose; 37° Fittings	#10, 4000 psi Hose; 37° Fittings
Genset to Oil Reservoir	#12, 200 psi Hose; 37° Fittings	#12, 200 psi Hose; 37° Fittings
Pump Case to Oil Reservoir	#10, 200 psi Hose; 37° Fittings	#10, 200 psi Hose; 37° Fittings
Oil Reservoir to Pump Hose Fitting at Reservoir Fitting at Pump	#20 (Min), 200 psi 37° Fitting SAE Size 32, Code 61 Flange Head at Pump	#20 (Min), 200 psi 37° Fitting 37° Fitting
INSTALLATION: Generator Module		
Noise	72 dB(A) ²	72 dB(A) ²
Weight	225 lb (102 Kg)	225 lb (102 Kg)
Dimensions (L x W x H)	39.2 x 15.8 x 13.7 in (995 x 402 x 348 mm)	31.08 x 15.96 x 13.79 in (789.4 x 405.38 x 350.33 mm)
Cooling Air Flow	1600 cfm	1600 cfm
Max Ambient Temp Continuous Full Load Intermittent Load	120° F (49° C) 140° F (60° C)	120° F (49° C) 140° F (60° C)
1 – Rated @ 1.0 PF		
2 – Rated @ 10 ft (3 m), before installation, under full load.		

Introduction

ABOUT THIS MANUAL

This manual covers Operation and Installation of the hydraulic generator sets (gensets) listed on the front cover. It includes Specifications, Maintenance and Troubleshooting. For more information on the genset, refer to Parts Catalog 943-0201 and Service Manual 943-0501.

HOW TO OBTAIN PARTS AND SERVICE

To obtain parts or service contact the nearest Cummins®/Onan® dealer or distributor.

- In the United States or Canada, call 1-800-888-6626 and select Option 1 (touch-tone phones only) or fax 1-763-528-7229 (Cummins Power Generation).
- Outside North America, call 1-763-574-5000 (Cummins Power Generation) between 7:30 AM and 4:00 PM Central Standard Time, Monday through Friday or fax 1-763-574-8087.
- When ordering parts or calling for service, be ready to provide the complete model number and serial number, both of which are printed on the genset nameplate.

PRODUCT DESCRIPTION

The genset consists of several components or modules that are installed at various locations on the vehicle. The components are interconnected electrically

and hydraulically as shown on Page 23 or 26, respectively.

- **Genset** – The genset is an AC generator driven by an hydraulic motor. An automatic voltage regulator maintains nominal output voltage (120 / 240 VAC) under varying generator loads. An integral oil-to-air heat exchanger cools the oil (hydraulic fluid) before it is returned to the reservoir.
- **Hydraulic Pump** – The hydraulic pump powers the generator motor and is driven by a power takeoff on the vehicle transmission. The pump maintains constant flow, and thus nominal generator frequency (60 Hz), by automatically adjusting piston stroke as engine speed varies in response to other concurrent tasks, such as vehicle propulsion or pumping.
- **Oil Reservoir** – The oil reservoir has a three gallon oil capacity. It is equipped with a full-flow 6 micron oil filter, oil level sight glass, filter pressure gauge, breather filter and oil fill cap.
- **Generator Display Module** – The generator display module displays generator output voltage, frequency and current. It also displays the temperature of the oil returning to the oil reservoir and the number of hours run.
- **Generator ON / OFF Switch** – The vehicle builder provides the generator ON / OFF switch.
- **Hydraulic Fluid** – The genset is designed for use only with Dextron III hydraulic fluid (oil).

Operation

STARTING AND STOPPING

Genset operation involves switching the genset ON or OFF and monitoring the genset display module (Figure 1) and oil level sight glass (Figure 2).

Starting

If not running or engaged, start the vehicle engine and engage the PTO clutch (if so equipped). Switch ON the genset and then switch ON the loads individually or at the vehicle AC distribution panel.

⚠ CAUTION *Although the genset is capable of starting up with all loads connected, to save wear and tear, start the genset first and then connect the loads.*

Stopping

First switch OFF the loads individually or at the vehicle AC distribution panel and then switch OFF the genset.

The PTO need not be disengaged when shutting down the genset. Switching OFF the genset shuts off oil to the generator drive motor, thus stopping the generator. (Some oil continues to circulate between pump and reservoir via the case drain as long as the engine is running.)

⚠ CAUTION *Leaving the generator switch ON while the vehicle is standing by with the engine off can run down the engine starting battery and cause damage to genset components. Always switch OFF the generator before parking the vehicle in standby.*

GENSET DISPLAY MODULE

AC Output

The genset display module normally displays AC output voltage, frequency and current in each leg (Figure 1). The Display will blink the amp value as a warning if current in either line is excessive. The Display will blink the voltage value as a warning if voltage is too low or too high.

Hour Meter

Press “Mode” once to display the number of hours run. The display will revert to AC output after about 10 seconds.

Oil Temperature

Press “Mode” twice to display the temperature of the oil returning to the oil reservoir. The display will revert to AC output. The Display will blink the oil temperature value as a warning if oil temperature exceeds 185° F.

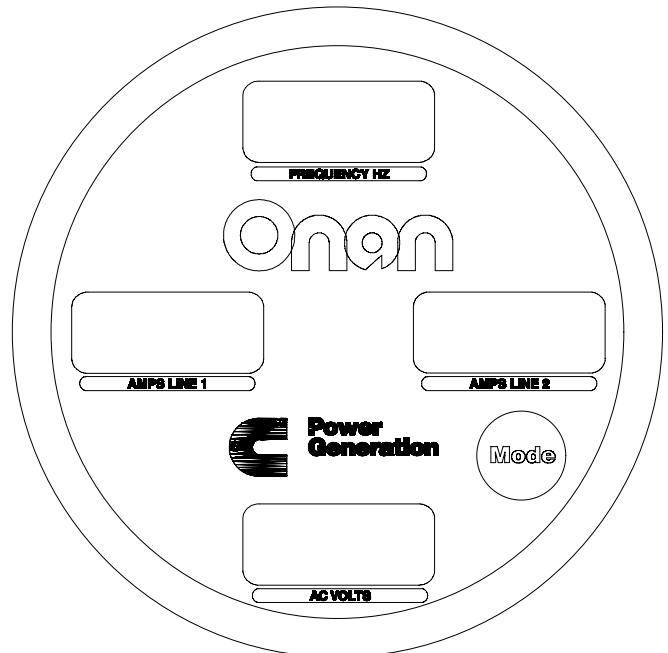


FIGURE 1. GENSET DISPLAY MODULE

Maintenance

⚠ CAUTION *The slightest amount of dirt in an hydraulic system can damage precisely machined internal components or cause the regulator spool valve to stick, resulting in erratic operation. Keep dirt out:*

- *Thoroughly clean the outside of a fitting or cap before disconnecting or removing it.*
- *Keep all openings in components and hoses capped with proper JIC caps until just before making connections.*
- *Thoroughly flush hoses before connecting.*
- *Regularly replace the oil filter.*
- *Never reuse hydraulic fluid that has been drained. Only use Dextron III hydraulic oil.*

OIL LEVEL

Check oil level often and keep it within 1/4 inch of the top of the sight glass (Figure 2). Only use Dextron III

hydraulic fluid. Pump the oil through a 10 micron filter (SAE Class 4) when filling the reservoir.

OIL FILTER

Replace the oil filter every 1000 hours of operation or sooner if the needle on the filter pressure gauge approaches the red area (25 psi).

BREATHER FILTER

Replace the breather filter on the oil reservoir every 1000 hours of operation.

GENERATOR

Have the generator bearing and brushes checked every 2000 hours of operation, or 5 years, whichever comes first. This must be performed by a trained and experienced mechanic (authorized Onan dealer).

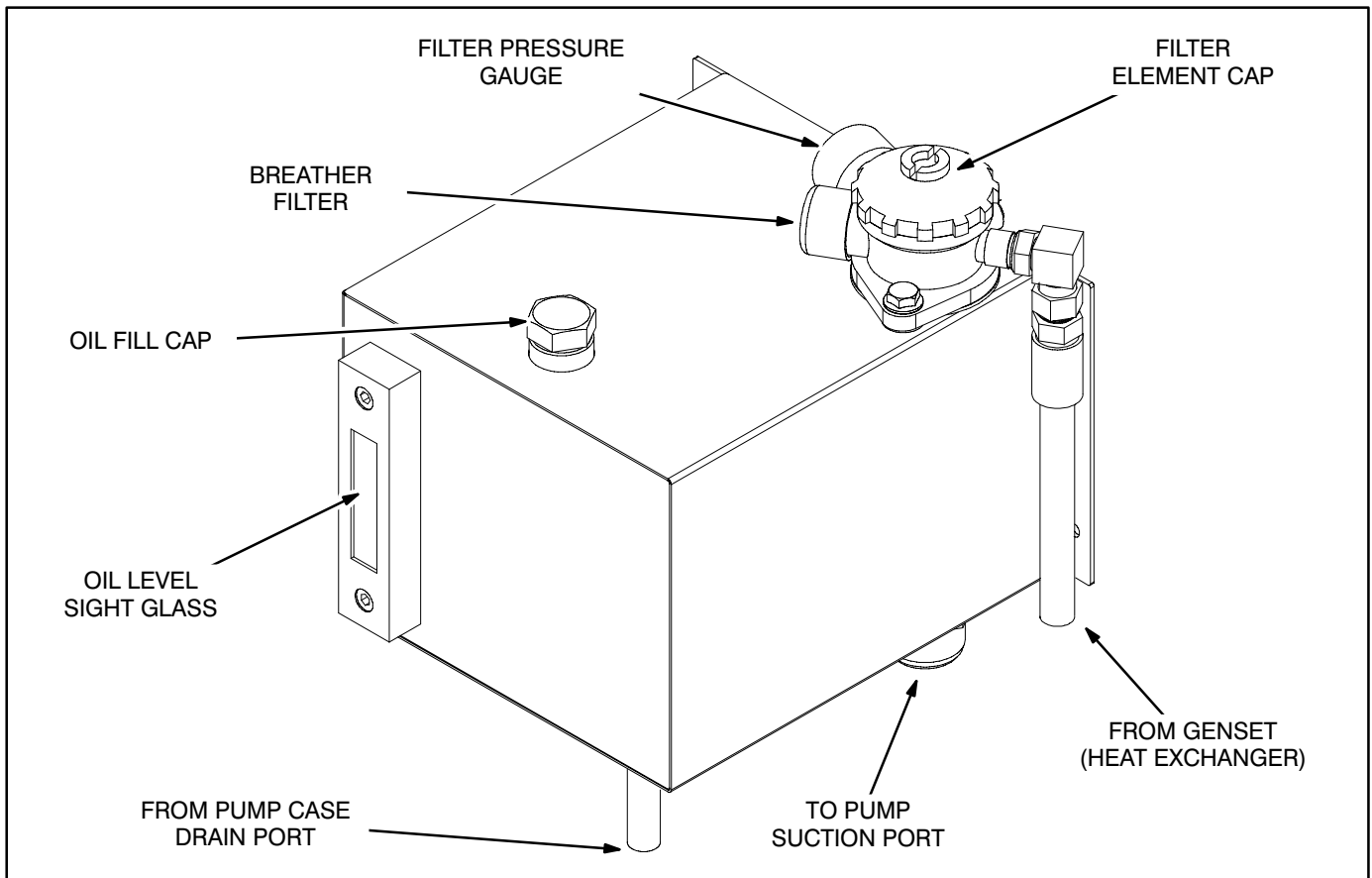


FIGURE 2. OIL RESERVOIR

Installation

Note: Manuals are updated from time-to-time to reflect changes in the equipment and its specifications. For this reason, only the copy of the installation manual supplied with the genset should be used as a guide for the installation.

⚠ WARNING *Improper installation can result in severe personnel injury or death. The installer must be trained and experienced in the installation of electrical, mechanical and hydraulic equipment.*

The builder of the vehicle bears sole responsibility for the selection of the appropriate genset, for its proper installation and for obtaining approvals from the authorities (if any) having jurisdiction over the installation. The genset is suitable for installation in accordance with the National Electrical Code, NFPA No. 70 (USA) or the Canadian Electrical Code, C22.1.

Before mounting the genset, pump or oil reservoir, carefully consider the routing of all hydraulic hoses and wiring and whether a drive shaft will be required to drive the pump.

GENSET

Refer to *Specifications* and to the Outline Drawings beginning on Page 23 regarding outside dimensions, weight, mounting bolt holes, cooling air inlet and outlet openings and hydraulic and wiring connections.

Cooling Air Flow

For sufficient air flow to cool the genset, provide at least 3 inches (76 mm) of clearance in front of and across the entire face of the finned heat exchanger (air outlet) and in front of both air inlets. Two (2) of the four (4) air inlets must be open. Rearrange the plates and screens, as necessary, between the four air inlet openings. *The location with respect to bulkheads and other equipment must be such that the warm air does not recirculate back into the genset air inlets.*

Cooling Air Test

To determine whether the installation allows for sufficient genset cooling, monitor oil temperature with the display module (Figure 1) while running the genset under full load for at least two hours. Oil temperature must not exceed 185° F (85° C).

If oil temperature does exceed 185° F (85° C), check inlet air temperature while continuing to run the genset under full load.

- If inlet air temperature exceeds 120° F (49° C), cooling air is recirculating between outlet and inlets or is being heated some other way, such as by passing through the hot engine compartment. The genset must be relocated or the air inlets and outlets baffled to prevent recirculation or the entrance of hot air from some other source.
- If inlet air temperature does not exceed 120° F (49° C), but oil temperature exceeds 185° F (85° C), inlet or outlet air is being blocked or restricted. The genset must be relocated or the obstructions removed.

Note: Instruments having traceable calibration must be used for this test. The Display Module is not such an instrument.

NFPA Certification Test

As oil temperature rises, hydraulic efficiency falls off slightly. Therefore, load the genset to 104 percent of rated load at the start of the 2-hour NFPA Certification Test. If the inlet air temperature does not exceed 120° F (49° C), the genset will finish the test carrying at least 100 percent of rated load, meeting the certification requirements. See Cooling Air Test if air temperature exceeds specifications.

Hydraulic and Electric Interconnections

See HYDRAULIC CONNECTIONS (Page 15) and WIRING CONNECTIONS (Page 16) for important considerations with respect to interconnections between components in the system.

OIL RESERVOIR

When locating and mounting the oil reservoir, consider the following:

1. The reservoir should be the highest point in the system and the bottom of the oil reservoir must be at least 2 feet (610 mm) higher than the top of the pump.
2. The fill cap and filter must be readily accessible for filling oil and changing filters (Page 9). *There must be at least 8 inches (204 mm) of clearance above the reservoir for withdrawing the filter element.*
3. The oil level sight glass and filter pressure gauge must be readily visible and should be in view from the genset ON-OFF switch.
4. See HYDRAULIC CONNECTIONS (Page 15) regarding hose connections.

GENSET ON/OFF SWITCH

Provide an ON/OFF switch rated at least 20 amps at 12 VDC to turn the genset on and off (see schematic, Page 29). Locate the switch at a convenient location. The genset display module and oil reservoir

gauges should be in view. Interconnect the ON/OFF switch and genset with lead harness No. 338-4084.

PTO ON/OFF SWITCH

If the PTO has a clutch, it is recommended that the ON/OFF switch also be connected to turn off the genset. That would prevent the operator from inadvertently turning off the PTO but not the genset. Otherwise, if the genset is left ON, the hour meter would record running hours when the genset is not running. Further, the vehicle battery could be run down and internal genset components could be damaged.

BATTERY

Genset control and monitoring requires connection to a 12 volt battery. Use lead harness No. 338-4085 to connect the genset to a terminal block in a vehicle equipment cabinet that provides battery positive (+) and negative (–) terminals.

Lead harness No. 338-4085 has a 20 amp blade-type fuse holder and fuse (yellow) to protect the genset control circuits from shorts to ground. *The fuse should be readily accessible for replacement.*

GENSET DISPLAY MODULE

Locating Display

Locate the genset display module (Figure 3) at a convenient location. It should be in view from the genset ON-OFF switch. Mount the display module with four (4) 1/8 inch screws. Interconnect it with the other system components with lead harness Nos. 338-4087, 338-4088 and 338-4089.

Recalibrating Display

Check the label on the back of the display. It should correspond to the generator rating. If it does not, recalibrate the display as follows:

1. Press the hidden Menu button twice and then the Mode button twice.
2. The display will show the current kW setting.
3. If not correct, press the Menu button as many times as necessary to select the correct setting. The next higher rating is displayed each time you press the Menu button. The display restarts at 6 kw after the highest rating is attained (45 kW) by pressing the Menu button.
4. Once the desired setting has been selected, press and hold the Mode button and the Menu button to save the setting. Hold both buttons until the display returns to its normal display.

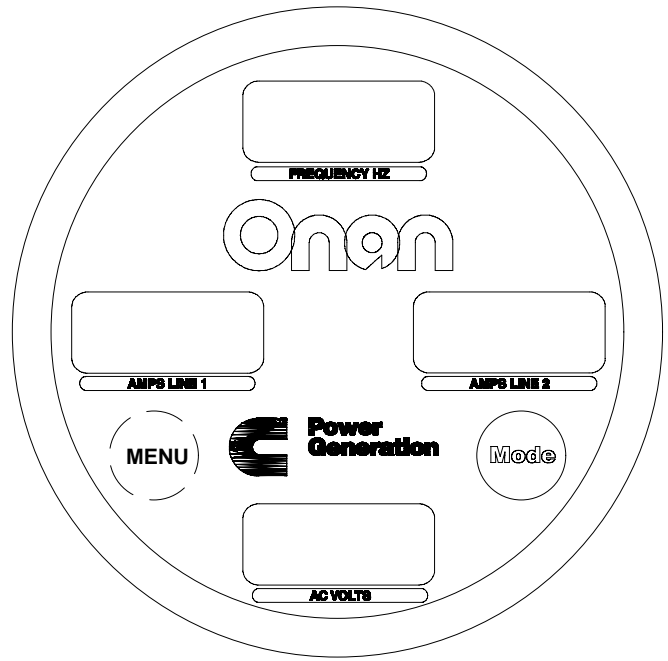


FIGURE 3. GENSET DISPLAY MODULE

HYDRAULIC PUMP

⚠ CAUTION Do not use the pump solenoid as a handle to lift or maneuver the pump. Doing so can damage the solenoid so that it hangs up when closing or opening.

Refer to *Specifications* regarding minimum and maximum pump speeds, SAE mounting flanges and SAE hose connections.

When locating and mounting the pump consider possible interference with frame rails, cab floor, exhaust pipes and other vehicle components.

The pump must be mounted such that the case drain fitting is on top to vent air from the pump (Figures 4 and 5). See Figure 6 for the alternate case drain location if it is necessary to mount the pump up side down from that shown in Figures 4 and 5.

Note: The pump must be rotated clockwise, as viewed from the end of the input shaft. Some PTOs, however, turn counterclockwise. When selecting a PTO, make sure to check for clockwise rotation.

Interconnect the pump ON/OFF solenoid and gen-set with lead harness No. 338-4086.

Direct Mounting

Whenever possible, bolt the pump directly to the PTO flange. Note, however, that the pump exceeds the usual 40 pound limit on how much weight can hang from a PTO flange. See *Specifications* for pump weights. To avoid damage to the PTO, secure the back of the pump by means of a rigid bracket to the case of the vehicle transmission.

Use the tapped holes in the manifold block to secure the bracket to the pump (Figure 5). Or, on some pumps, use one of the two case screws on the back of the pump. The thickness of the bracket material under the head of the pump case screw must not exceed 1/8 inch (3 mm). The thickness of the rest of the bracket material must be sufficient to provide the necessary rigidity. Use standard practice in designing, fabricating and assembling the bracket.

Torque the pump case screw, if used, to 72 lb-ft (98 N-m) and the transmission case screws as specified in the transmission service manual.

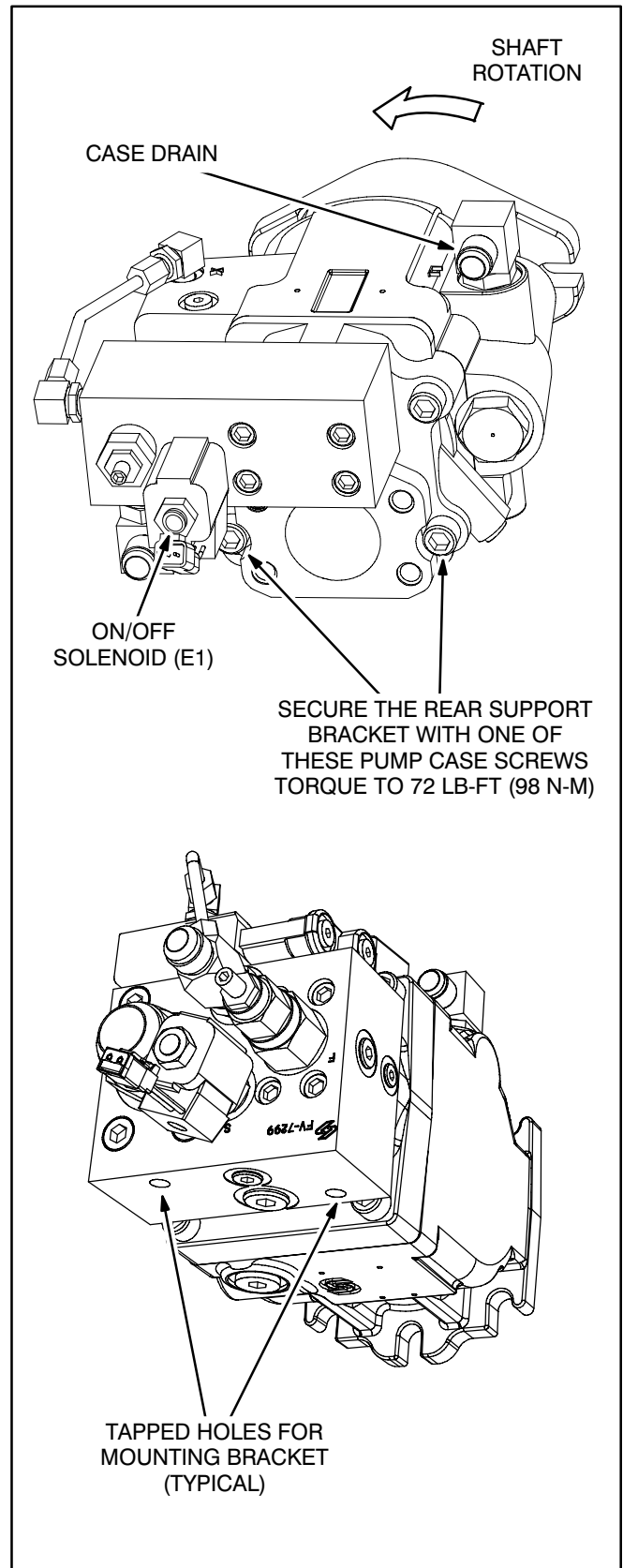


FIGURE 4. TYPICAL PUMP ASSEMBLIES

Remote Mounting

When necessary, mount the pump on a frame cross member and connect it to the PTO by means of a drive shaft (Figure 5). Consider the following:

1. The drive shaft can turn as high as 3000 rpm. To minimize vibration and wear, locate the pump such that the drive shaft U-joint angles will be as small as possible. The PTO and pump must be parallel within 1 degree and offset not more than would cause a 5 degree shaft angle.

Use standard practice in designing, fabricating and assembling the pump bracket and drive shaft.

2. Use lock wires to secure hub set screws.
3. Provide guards around drive shafts at locations where they could accidentally be touched.

⚠ WARNING *Rotating drive shafts can cause severe personal injury or death. Guards must be provided to prevent accidental contact.*

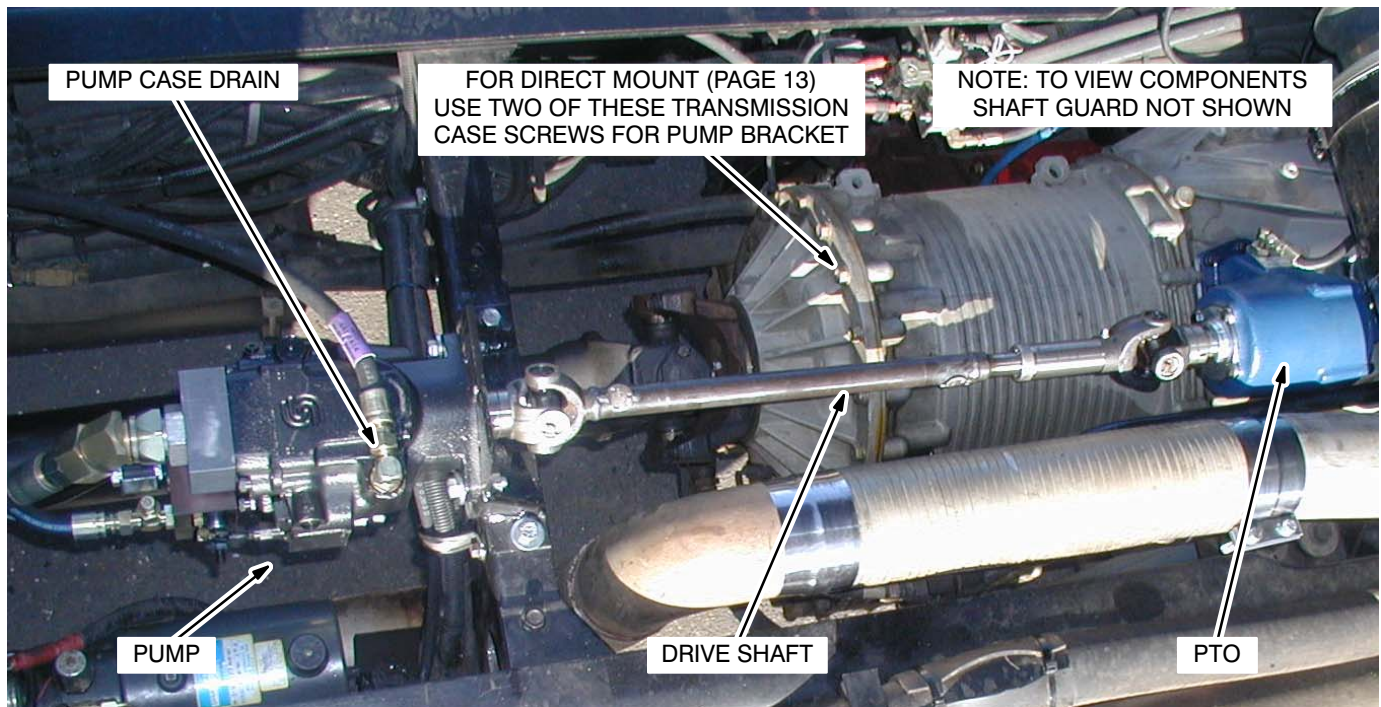


FIGURE 5. TYPICAL ARRANGEMENT OF PTO, HYDRAULIC PUMP, DRIVE SHAFT AND CASE DRAIN

HYDRAULIC CONNECTIONS

Page 23 or 26 illustrates the hydraulic interconnections between the components of the system. See *Specifications* regarding hose and fitting specifications.

⚠ CAUTION *The slightest amount of dirt in an hydraulic system can damage precisely machined internal components or cause the regulator spool valve to stick, resulting in erratic operation. Keep dirt out:*

- *Thoroughly clean the outside of a fitting or cap before disconnecting or removing it.*
- *Keep all openings in components and hoses capped with proper JIC caps until just before making connections.*
- *Thoroughly flush hoses before connecting.*
- *Regularly replace the oil filter.*
- *Never reuse hydraulic fluid that has been drained. Only use Dextron III hydraulic oil.*

Hose Length and Routing

1. Consider that hoses shrink slightly in length and expand slightly in diameter under pressure.
2. If the pump is bolted to a transmission mounted on vibration isolators, there must be enough slack in the connected hoses to prevent strain due to pump movement.
3. To avoid trapping air, the hoses connected to the pump should slope up from the pump and the hose between the genset and oil reservoir should slope up to the reservoir.

4. Do not bend hose tighter than the hose manufacturer recommends.
5. Flush hoses and cap them with JIC caps after cutting and terminating their ends.
6. Use wide-sweep 90-degree fittings.
7. Support, restrain and protect hydraulic hose as necessary to prevent chaffing.
8. Always use two wrenches when tightening fittings. Torque fittings in accordance with Table 1.

TABLE 1. HYDRAULIC FITTING TORQUES

SAE 37° (JIC) FITTING SIZE	RECOMMENDED TORQUE (LB-FT)
#8	21
#10	60
#12	85
#16	120
#20	170
#24	200

Filling the Pump and Connecting Hoses

Connect all of the hoses of the system (Page 23 or 26), *except the pump case drain hose*. Then remove the plug in the case drain hose fitting (Figure 5, Page 14) and fill the pump to the brim through the fitting. Finally, connect the case drain hose between pump and reservoir.

Wait until STARTUP (Page 17) to fill the system.

Note: Filling the pump this way is the only way to make sure that the pump will not start up dry and be seriously damaged.

WIRING CONNECTIONS

Page 23 or 26 illustrates the wiring interconnections between the components of the system. Also see the wiring schematic on Page 29.

AC Output Connections

Gensets rated 6 to 8 kW have four 12 AWG leads in 1/2 inch trade size non-metallic spiral conduit for AC connections at the vehicle AC distribution panel.

Gensets rated 10 kW have four 10 AWG leads in 3/4 inch trade size non-metallic spiral conduit for AC connections at the vehicle AC distribution panel.

Gensets rated 15 kW have four 06 AWG leads in 1-1/4 inch trade size non-metallic spiral conduit for AC connections at the vehicle AC distribution panel.

Control and Monitoring Connections

All wiring interconnections between components of the system are done with sealed connectors on the ends of short external leads which mate with matching connectors on 15 foot (4.3 m) long extension harnesses (Table 2).

TABLE 2. WIRING HARNESSSES

HARNESS	CONNECTIONS
338-4084	Genset to Remote ON/OFF Switch
338-4085	Genset to Battery
338-4086	Genset to Pump ON/OFF Solenoid
338-4087	For Display Power (from Genset)
338-4088	For Oil Temperature Display (from Sensor)
338-4089	For AC Display (from Genset)

Wiring Methods

Follow the National Electrical Code (USA) or Canadian Electrical Code, as required. Especially note the following:

1. Have a trained and experienced electrician supervise and inspect the installation of all AC wiring.
2. Provide overcurrent protection as required at the vehicle AC distribution panel. See Article 445, NFPA No. 70 (USA) or Part 1, Section 14 of C22.1 (Canada).
3. Install vibration-proof switches and controls that won't open and close circuits when the vehicle is in motion.
4. Provide ground fault circuit interrupters (GFCIs) for all convenience power receptacles.
5. Route AC power wiring and remote control wiring separately.
6. Seal all conduit openings into the vehicle interior to keep out vehicle engine exhaust. Apply silicone rubber or equivalent sealant inside and outside each conduit connector. (Flexible conduit is not vapor-tight and will allow exhaust gas to enter along the wires if not sealed.)
7. Bond the genset and all connected AC and DC equipment and controls to a common grounding point in accordance with applicable codes.

⚠ WARNING EXHAUST GAS IS DEADLY!
Seal all wiring openings into the vehicle interior to keep out exhaust gas.

⚠ WARNING Faulty grounding can lead to fire or electrocution, resulting in severe personal injury or death. Grounding must be in accordance with applicable codes.

STARTUP

Filling Hydraulic System and Purging Air

Before filling the hydraulic system, make sure all hydraulic and electric connections have been made and that the pump has been filled through its case drain (Page 15). Fill the system as follows:

1. Switch OFF the line circuit breaker on the vehicle AC distribution panel to disconnect all loads.
2. Fill the oil reservoir to within 1/4 inch of the top of the sight glass (Page 9). The level will drop as the suction and case drain hoses fill.

⚠WARNING *The high pressure spray from a leak or fitting in a hydraulic line can penetrate the skin, leading to possible blood poisoning — Wear safety glasses — Shut down the engine that drives the hydraulic pump*

before loosening or tightening fittings — Do not delay getting proper medical attention if exposed to high pressure oil spray.

3. Turn the genset **ON**, engage the PTO clutch (if so equipped) and crank the engine for a few seconds (disabling start if possible).
4. Refill the oil reservoir. The level will drop as hoses, motor and heat exchanger fill.
5. Repeat Steps 3 and 4 as necessary until the oil level in the reservoir stabilizes 1/4 inch from the top of the sight glass.
6. Listen for pump noise (rattling sound) with the engine running and genset **ON**. Shut down the engine or disengage the PTO clutch immediately if the pump is noisy and repeat Steps 3 and 4.

⚠CAUTION *Continuing to run or load a noisy pump or motor can destroy it. Purge all air before continuing.*

TIP: *Air trapped in the hydraulic system is the most likely cause of poor generator set performance, such as the inability to attain full power output or stable frequency. If you suspect that the system has trapped air, run the generator set for a few minutes and then let it sit for a few hours or overnight.*

Adjusting Frequency

It will be necessary to adjust frequency before connecting loads. The factory sets frequency slightly low to reduce the likelihood of overspeeding and damaging the generator and fan during startup.

1. Switch OFF the line circuit breaker on the vehicle AC distribution panel to disconnect all loads.
2. Start the engine and engage the PTO clutch (if so equipped). Stop the engine or disengage the PTO clutch immediately if the pump is noisy (metallic sound) and purge the system of air.
3. Turn the genset switch **ON** and observe the gauges on the genset display module. Frequency will be low.

Note: Frequency is adjusted while the pump is in operation.

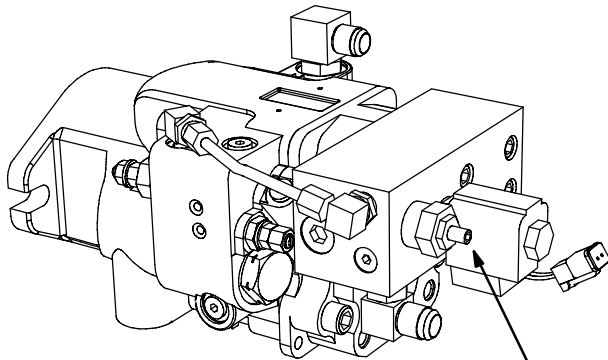
4. Loosen the locknut on the frequency adjusting screw on the pump manifold (Figure 6) and slowly turn the screw **counterclockwise** to increase frequency. Set the locknut when frequency stabilizes at 62.5 Hz for a 60 Hz genset or 52 Hz for a 50 Hz genset.

⚠WARNING *Rotating drive shafts can cause severe personal injury or death. Guards must be provided to prevent accidental contact.*

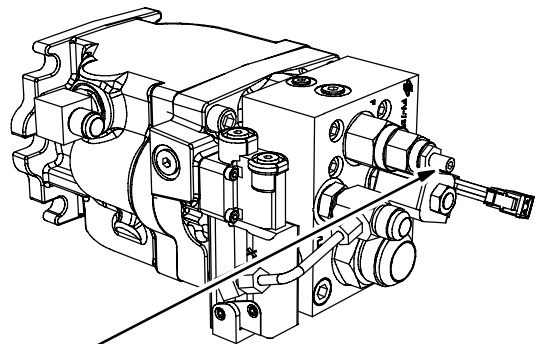
5. Set the locknut and recheck frequency.
6. Connect full-load and check frequency. Frequency should not drop below 59 Hz for a 60 Hz genset or 49 Hz for a 50 Hz genset.
7. If frequency remains erratic or droop cannot be adjusted to within 62.5 to 59 Hz (52 to 49 Hz), air may be trapped in the system. See TIP.
8. Recheck frequency and droop.

TIP: Air trapped in the hydraulic system is the most likely cause of poor generator set performance, such as the inability to attain full power output or stable frequency. If you suspect that the system has trapped air, run the generator set for a few minutes and then let it sit for a few hours or overnight.

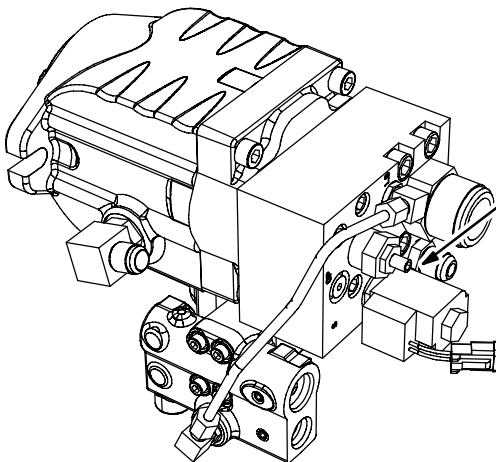
Pump 121-0155 for Specs 2282, 2283,
2619, 2653, 2655, 4355, 4356, 4358



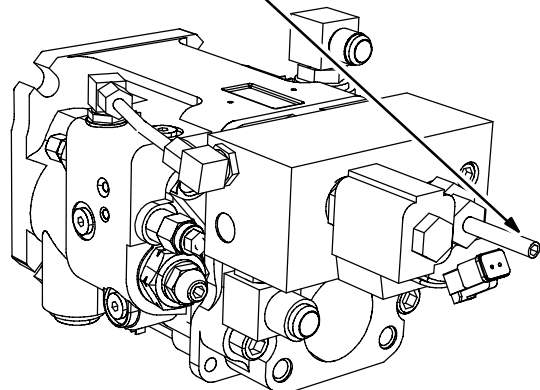
Pumps 121-0233 & 121-0239 for Specs:
4546, 4547, 4548, 4549, 4782, 4784



FREQUENCY
ADJUSTING SCREW
AND JAM NUT



Pump 121-0220 for Specs:
2282, 2283, 2653, 2654



Pump 121-0196 for Specs: 3164, 1365

FIGURE 6. FREQUENCY ADJUSTING SCREW

Troubleshooting

This section covers problems that may be encountered and suggests possible causes and corrective actions. If you are unable to resolve the problem af-

ter taking the corrective actions suggested, call an authorized Onan dealer. See HOW TO OBTAIN PARTS AND SERVICE (Page 7).

NOISY PUMP OR MOTOR (RATTLING SOUND)

⚠ WARNING *There are hazards present in troubleshooting that can cause equipment damage, severe personal injury or death. Troubleshooting must be performed by trained and experienced persons who know about the hazards of electricity, hydraulic systems and machinery. Read Safety Precautions inside the front cover and observe all instructions and precautions in this manual.*

Possible Cause	Corrective Action
1. Air trapped in hydraulic fluid	Purge the air and refill the oil reservoir as necessary (Page 17). ⚠ CAUTION <i>Continuing to run or load a noisy pump or motor can destroy it. Purge the air before continuing.</i>

NO OUTPUT OR AIR DISCHARGE — ENGINE RUNNING

⚠ WARNING *There are hazards present in troubleshooting that can cause equipment damage, severe personal injury or death. Troubleshooting must be performed by trained and experienced persons who know about the hazards of electricity, hydraulic systems and machinery. Read Safety Precautions inside the front cover and observe all instructions and precautions in this manual.*

Possible Cause	Corrective Action
1. ON/OFF Switch OFF	Turn the switch ON .
2. Disengaged PTO	Engage the PTO.
3. Blown Fuse (F1)	Replace with a 20 amp (yellow) blade-type fuse (Page 29). If the new fuse blows, check for ground faults in harnesses 338-4084, 338-4085 and 338-4087 and replace as necessary (Page 23 or 26).
4. Hydraulic fluid leak	Check for and repair any leaks in the system and refill as necessary (Page 9).
5. 12 VDC not available	Check for 12 VDC at terminal 2 of the ON/OFF Switch (S1 on the Wiring Schematic, Page 29). Service as necessary.

NO OUTPUT OR AIR DISCHARGE — ENGINE RUNNING (CONTINUED)

⚠ WARNING *There are hazards present in troubleshooting that can cause equipment damage, severe personal injury or death. Troubleshooting must be performed by trained and experienced persons who know about the hazards of electricity, hydraulic systems and machinery. Read Safety Precautions inside the front cover and observe all instructions and precautions in this manual.*

Possible Cause	Corrective Action
6. Faulty ON/OFF Switch	Turn ON the ON/OFF switch (S1) and check for 12 VDC at switch terminal 1 (Wiring Schematic, Page 29). Service as necessary.
7. Faulty Lead Harness	Check for bent, corroded or missing connector pins and damaged leads in harnesses 338-4084, 338-4085 and 338-4086 and replace as necessary (Page 23 or 26).

NO OUTPUT — GENSET RUNNING AND AIR DISCHARGING

⚠ WARNING *There are hazards present in troubleshooting that can cause equipment damage, severe personal injury or death. Troubleshooting must be performed by trained and experienced persons who know about the hazards of electricity, hydraulic systems and machinery. Read Safety Precautions inside the front cover and observe all instructions and precautions in this manual.*

Possible Cause	Corrective Action
1. Line circuit breaker (vehicle AC distribution panel) OFF, TRIPPED or faulty	<ol style="list-style-type: none"> a. If the circuit breaker is OFF, find out why, make sure it is safe to re-connect power, and then switch it ON. b. If the circuit breaker TRIPPED, shut down the genset and repair the shorted or grounded equipment that caused tripping. c. Replace a faulty circuit breaker.
2. Misconnected Genset Power Supply Cord	Reconnect the genset power supply cord correctly at the vehicle AC distribution panel (Wiring Schematic, Page 29).

FREQUENCY TOO HIGH OR TOO LOW OR ERRATIC

⚠ WARNING *There are hazards present in troubleshooting that can cause equipment damage, severe personal injury or death. Troubleshooting must be performed by trained and experienced persons who know about the hazards of electricity, hydraulic systems and machinery. Read Safety Precautions inside the front cover and observe all instructions and precautions in this manual.*

Possible Cause	Corrective Action
1. Misadjusted frequency	Adjust frequency as necessary (Page 19).
2. Pump speed too high or too low	Verify that the combination of PTO speed ratio and engine speed range results in pump speeds that fall within the specified range. See <i>Specifications</i> . If pump speed falls outside the range, reinstall the PTO with a gear ratio that will keep pump speed within the specified range at all engine speeds.

OUTPUT VOLTAGE TOO LOW

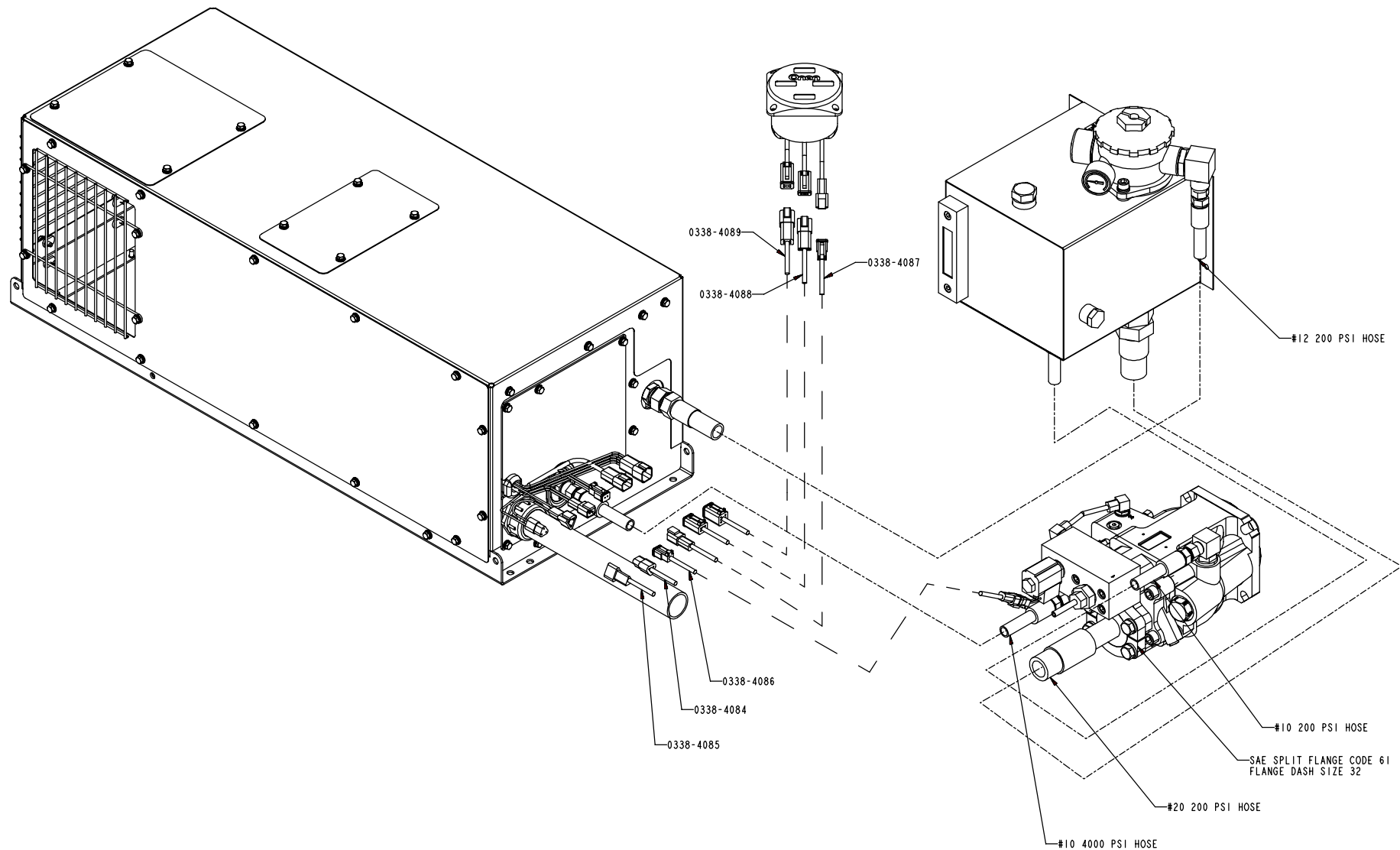
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Possible Cause	Corrective Action
1. Misadjusted frequency	Adjust frequency as necessary (Page 19).
2. Faulty generator or AVR	See an authorized Onan dealer.

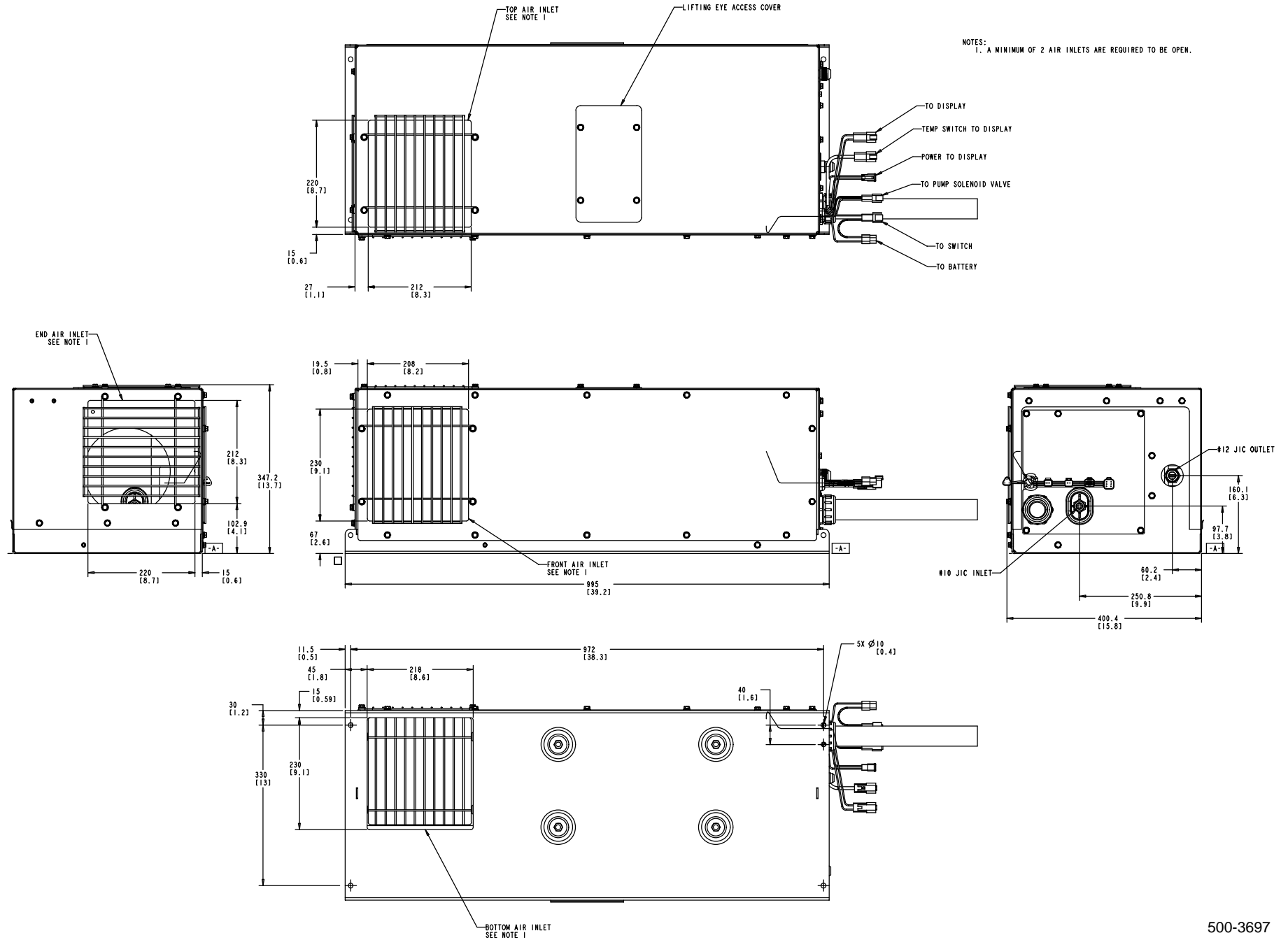
NOISY GENERATOR

⚠ WARNING *There are hazards present in troubleshooting that can cause equipment damage, severe personal injury or death. Troubleshooting must be performed by trained and experienced persons who know about the hazards of electricity, hydraulic systems and machinery. Read Safety Precautions inside the front cover and observe all instructions and precautions in this manual.*

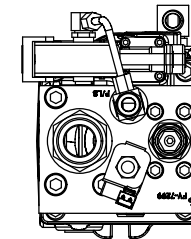
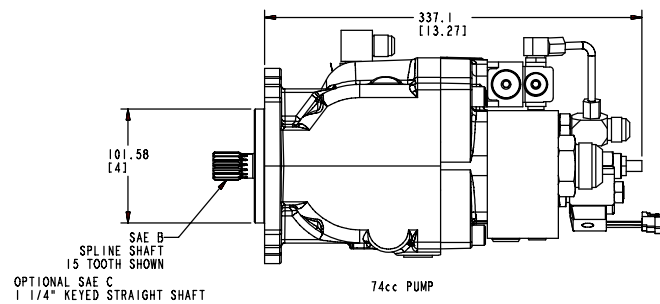
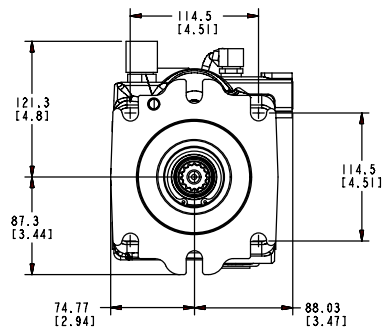
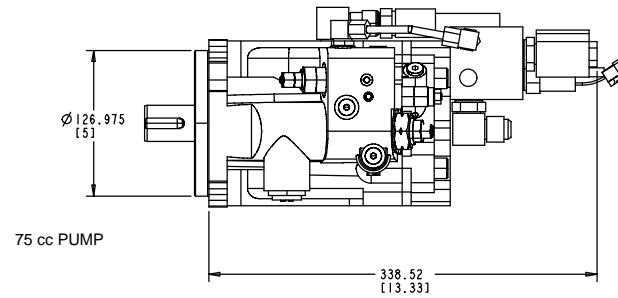
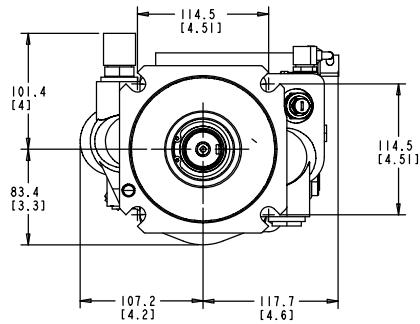
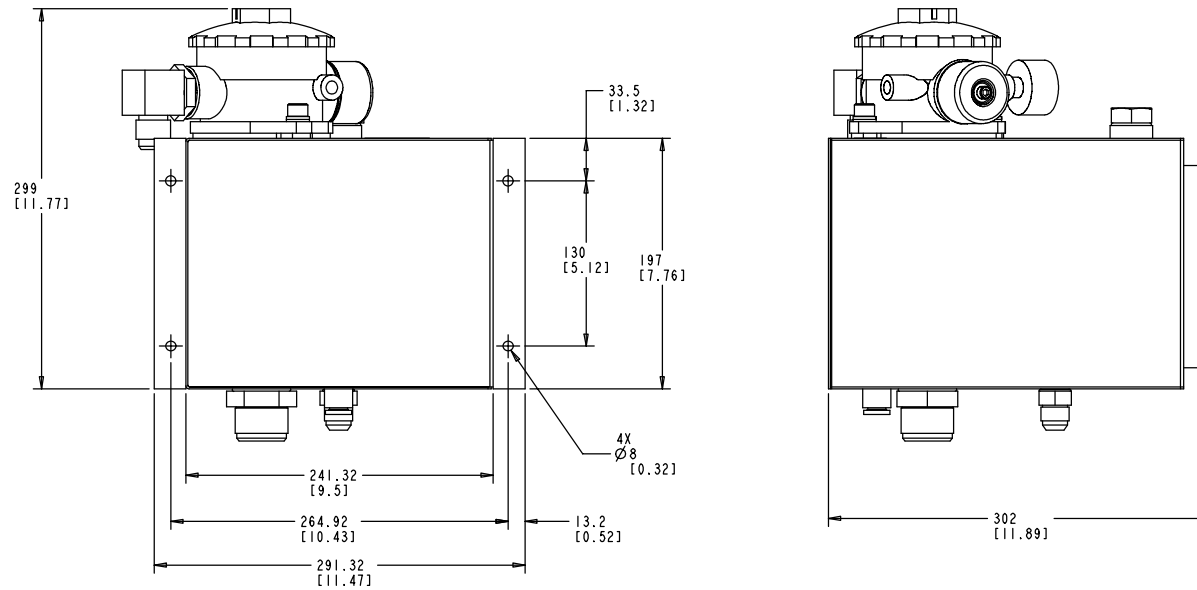
Possible Cause	Corrective Action
1. Loose brush block or fan, worn bearing or misaligned rotor and motor	See an authorized Onan dealer.



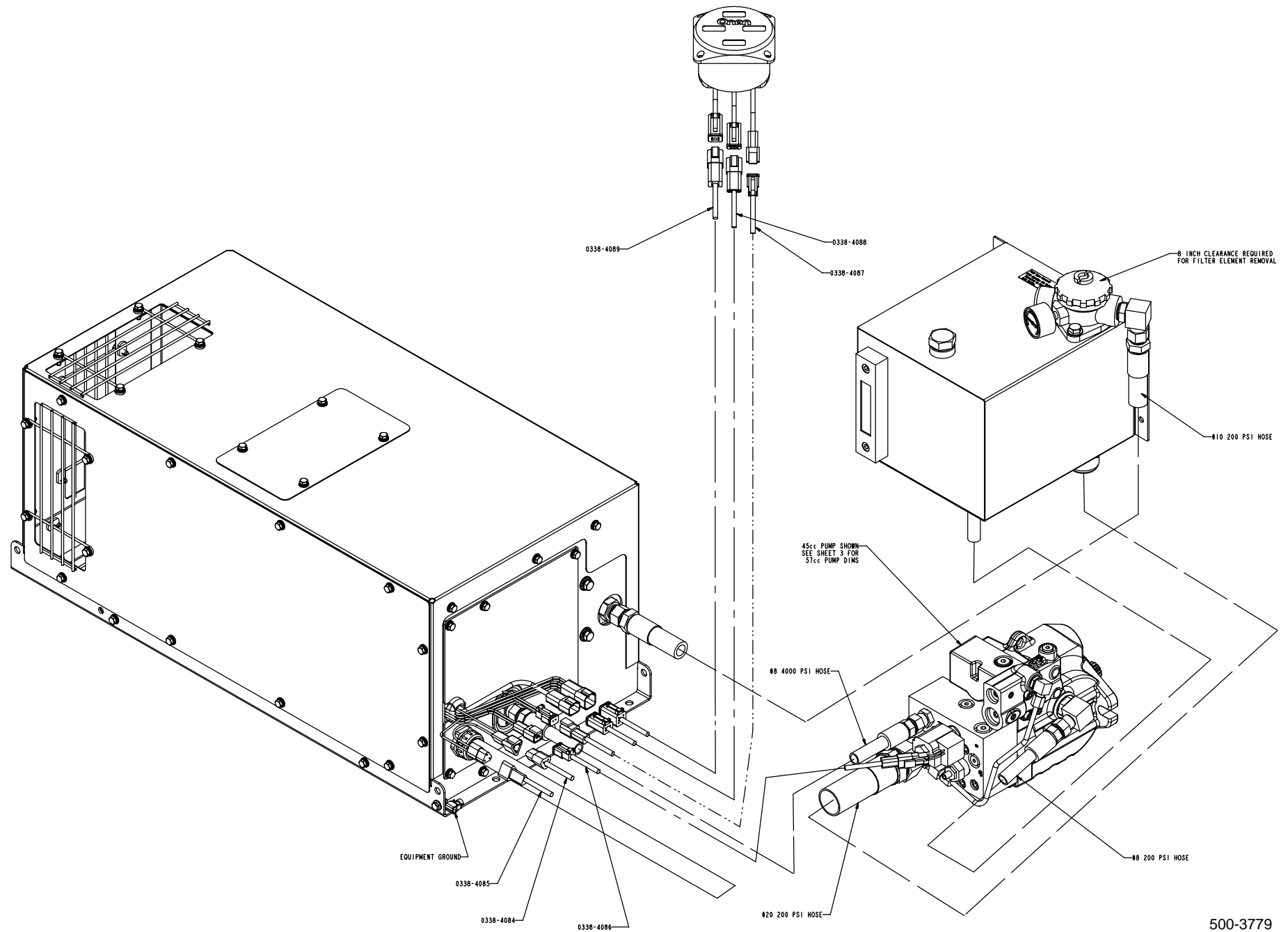
15 kW OUTLINE DRAWING (SHEET 1)



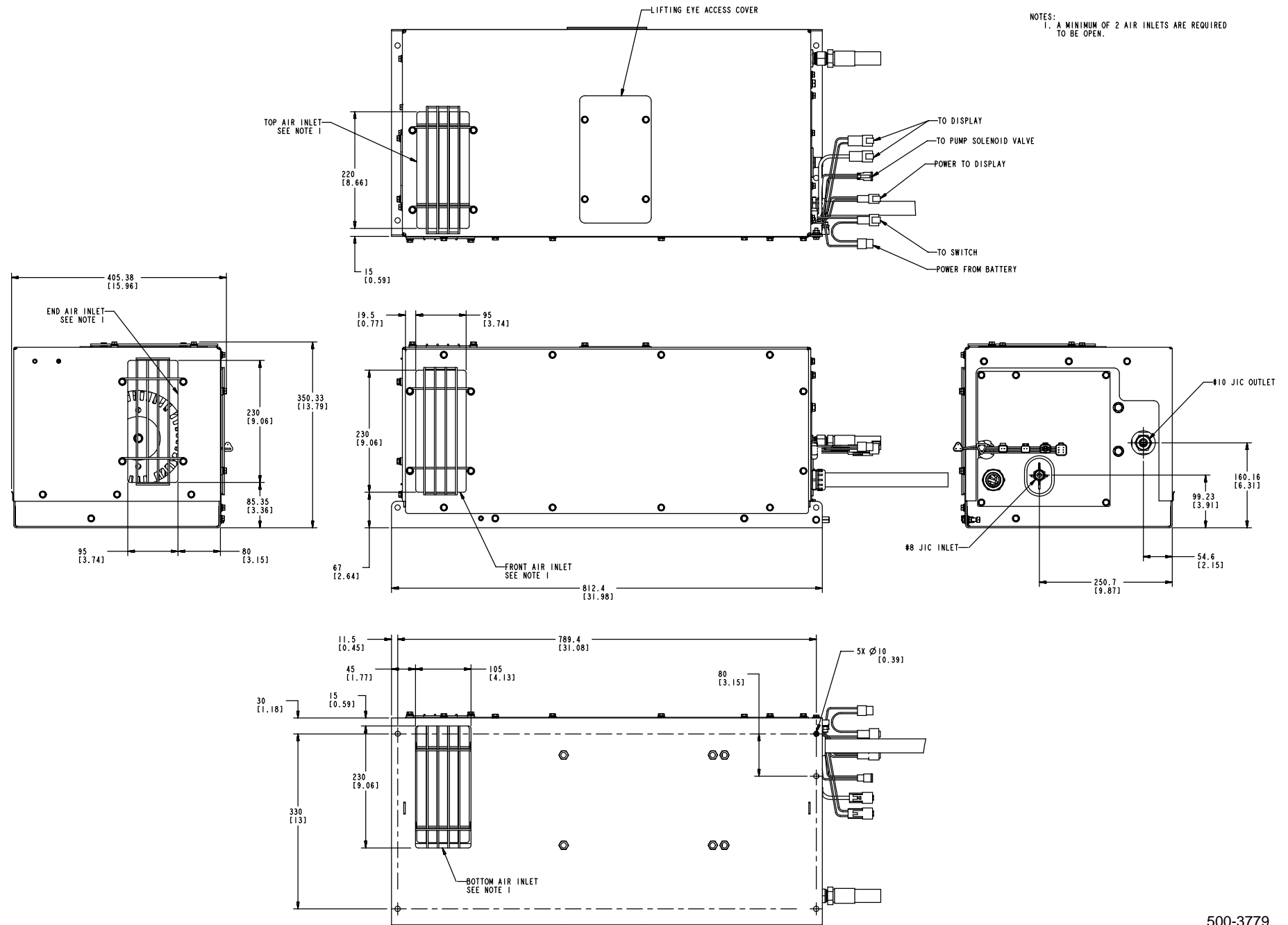
15 kW OUTLINE DRAWING (SHEET 2)



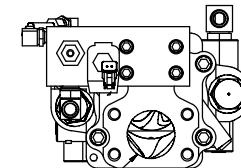
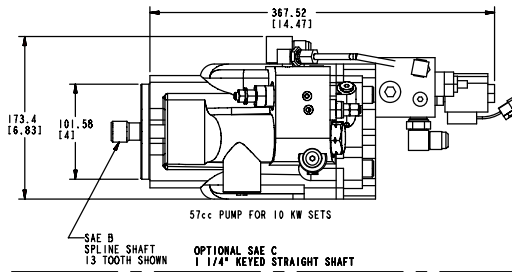
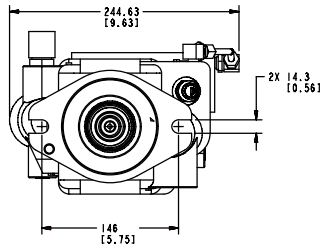
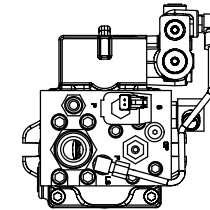
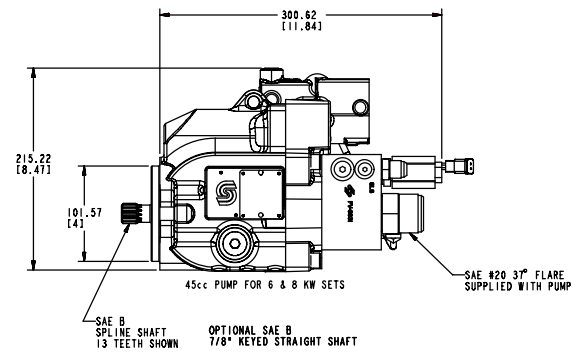
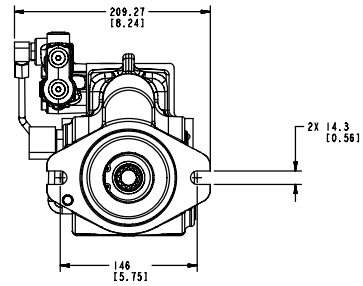
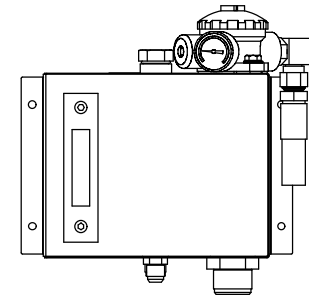
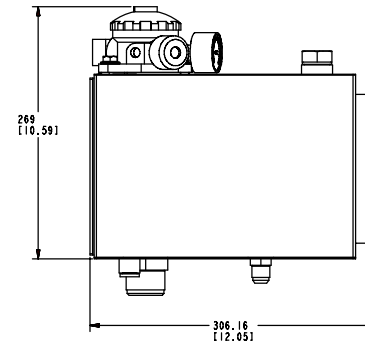
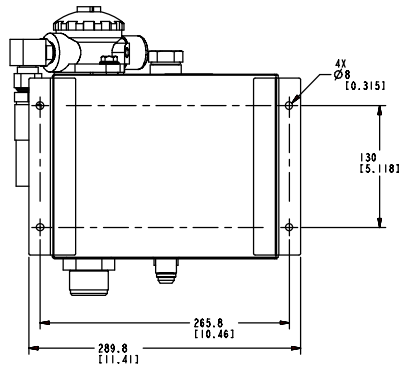
15 kW OUTLINE DRAWING (SHEET 3)



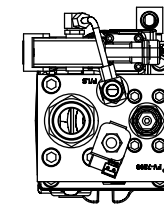
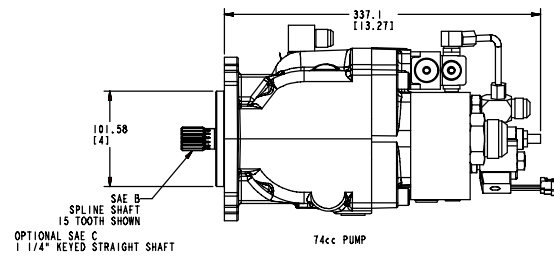
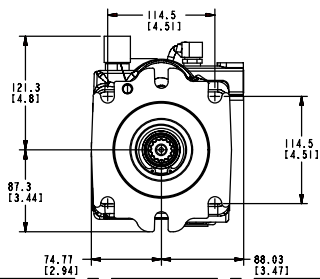
6, 8 & 10 kW OUTLINE DRAWING (SHEET 1)



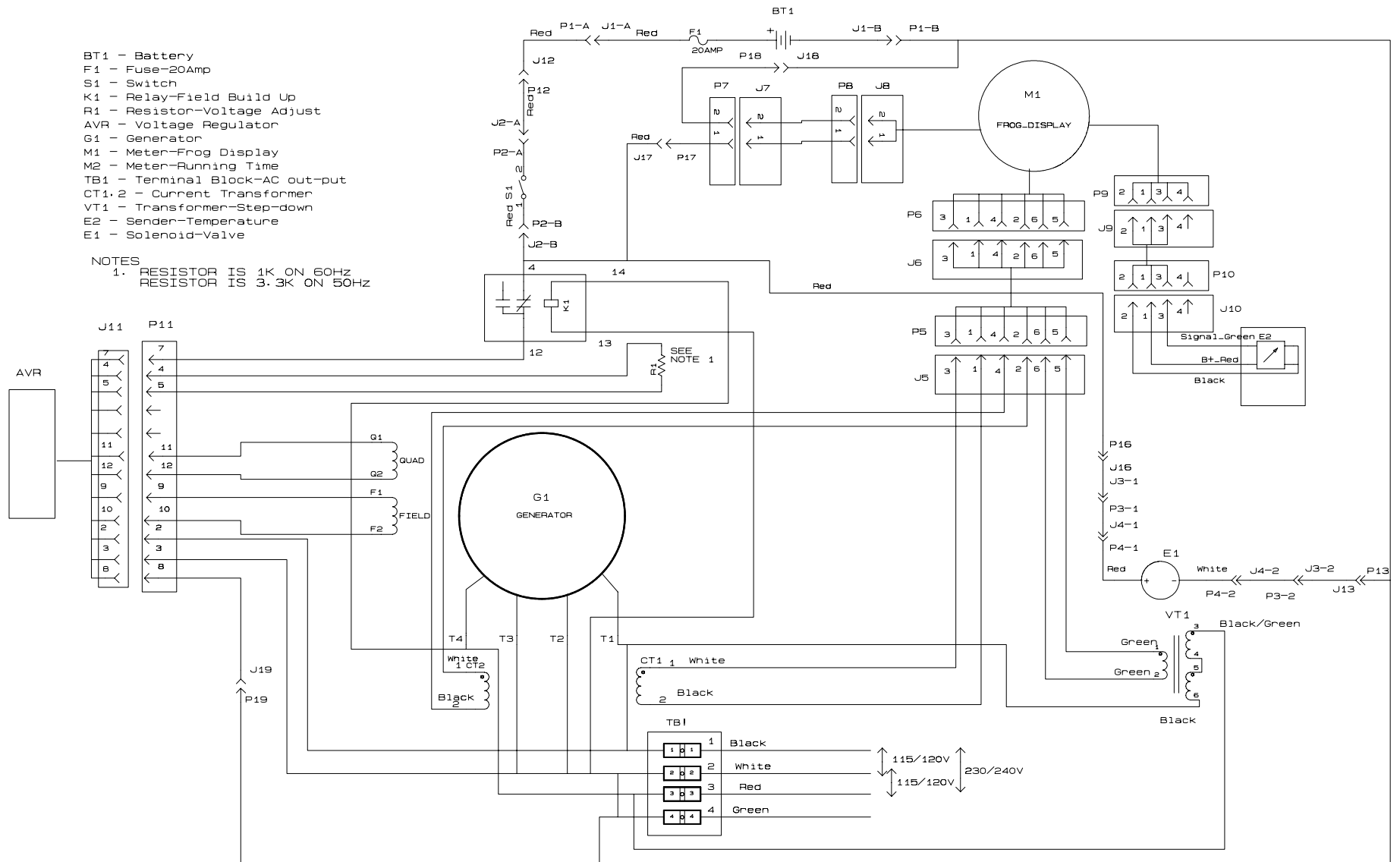
6, 8 & 10 kW OUTLINE DRAWING (SHEET 2)



SAE SPLIT FLANGE
CODE 61, DASH SIZE 32



6, 8 & 10 kW OUTLINE DRAWING (SHEET 3)



WIRING SCHEMATIC



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