

Operations Manual
Monkey
Hot Water Heater

Model # CDF 1M

220volt 60hz

**Manufactured By: Custom Design &
Fabrication**

Do Not Remove
This Page



Read this Manual and Understand
Completely Before Start Up



Check System Function for Safety
Before Each Start Up



Do Not Use Heater Where System Failure
Could result in a Threat to Divers Life



Do Not Operate If Any Part of the System
Does Not Function Properly



Manufacturer and Distributors are not
Responsible for Misuse of this Equipment



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Monkey Heater Specifications

The Monkey Hot Water Heater System is a complete, lightweight, portable, diver's water heating system. The system uses a stacked stage submersible pump to provide water to the inlet side of the heater during operations. The system comes ready to operate with the exception of an electrical power source and fuel. The electrical power required to operate the system is 220 VAC, 60Hz, 20 amp, single phase.

The heating unit is mounted and enclosed in a steel, welded, tubular frame. The submersible water pump with a 25-foot umbilical is packed with the system. The heating unit is designed to operate on a 220 VAC, 60Hz, 20-amp, single-phase power source, using #1 or #2 diesel oil.

The unit is rated at 500,000 B.T.U. X 2 an hour output and is capable of heating the outlet water to temperatures in excess of 200° F., depending on the size of the fuel nozzle used and the inlet water temperature. The heater will maintain the set operating output temperature to +/- 1° F.

Fuel consumption is dependent on the size of the fuel nozzle in use. For example, a 1.25 size nozzle will use approximately 1.25 gallons of fuel per hour, while a 2.0 nozzle will use approximately 2 gallons of fuel per hour. (at 100 psi.)

Inlet water is provided to the heater by means of the 11-g.p.m. A stacked stage displacement submersible pump provided with the system. The pump has a maximum combined pumping-lift head capability of 600 feet at 40 psi.

The submersible pump is designed to operate from a 220 VAC, 60Hz, 15-amp, single phase power source. A 15-amp switched outlet is mounted on the heater unit for use with the submersible pump only.

CAUTION!

It is required that the diver uses a hot water suit liner. This will help to eliminate hot spots which could cause burns and provide thermal protection in case of hot water heat loss.

Recommended Suit Injection Temperature At 2 G.P.M. Flow Rate

For depths of 0 to 100 feet:

Water Temperature to 50° F. = 96° - 98° F.
Water Temperature to 30° F. = 100° - 102° F.

For Depths of 100 to 240 feet.

Water Temperature to 50° F. = 100° - 103° F.
Water Temperature to 30° F. = 103° - 105° F.

The recommended injection temperature is a base line and will need to be adjusted depending on the following factors.

- a. Flow Rate (g.p.m.) to the diver. (Higher the rate, lower the temperature.)

NOTE!

*The minimum recommended flow rate for 1/2 ID hose is 2 g.p.m.
For 5/8" and 3/4" ID hose, the minimum recommended flow rate is 4
g.p.m.*

- b. Heat Loss from hot water hose.

NOTE!

*The heat loss is dependent on: ID and OD of hose, length of hose,
ambient air and water, and length of hose in the water.*

- c. Ambient water temperature.
- d. Breathing medium.
- e. Breathing gas temperature.
- f. Physical condition of diver.
- g. Work diver is performing.

Hot Water Hose Heat Loss

On an average, the heat loss for a 300 foot, 1/2" ID, 1 1/4" OD hot water hose with an injection water temperature of 110° F. and a flow rate of 2 g.p.m., in an ambient water temperature of 35° F., will be about 18° F. (Base Line). The heat loss for a 1/2 ID, 7/8" OD hose, will be about 36° F. (Base Line). Heat loss for the 5/8" and 3/4" ID hot water hose, under the same conditions, will be about 12° F. (Base Line).

If the flow rate is increased by 2 g.p.m., the heat loss will decrease by about 4° F. from the above base line temperature loss.

As the ambient water temperature increases, the heat loss will decrease. The percent of decreased heat loss to water temperature is 40° = 94%, 50° = 86%, 60° = 65%, and 70° = 40%.

Example

To figure the heat loss for a dive in 50° ambient water using 1/2" x 7/8" hot water hose, with a flow rate of 4 g.p.m.:

$$36^{\circ} - 4^{\circ} = 32^{\circ} \times 86\% = 27.5^{\circ} \text{ F. heat loss.}$$

To figure what the heater output should be set at, add the recommended suit injection temperature and the hot water heat loss.

These figures are based on extreme ambient weather conditions. If the ambient air is warm, then heat loss will be less and heater output should be decreased.

Nozzle Size

Subtract input water temperature from the final recommended heater output temperature, multiply by the gallons per minute output, multiply by 510 (salt water) or 495 (fresh water), and divide by 100,000. Use the next smaller nozzle if answer does not come out to a nozzle size in the spare parts kit.

PUMP SET UP (Before Set-Up Procedures)

1. Remove pump from storage.
2. Inspect the watertight electrical connection at the pump and the power cord for damage. If damage is evident, have a qualified electrician repair it before use.
3. It is recommended that the pump is operated at a depth of 3 to 5 feet below Mean Low Water (MLW) or 2 feet from the bottom.

WARNING!

DO NOT OPERATE PUMP IN THE VICINITY OF WORK LOCATION IF PUMPING CONCRETE OR OTHER HAZARDOUS MATERIALS ARE PRESENT IN THE WATER. SUCH MATERIALS CAN DAMAGE THE PUMP AND HEATER SYSTEM AND CAUSE SEVERE BURNS AND SKIN IRRITATIONS TO THE DIVER.

WARNING!

ALWAYS DISCONNECT THE PUMP FROM THE POWER SUPPLY BEFORE SET UP OR REMOVAL FROM THE WATER.

Set-Up Procedures

1. Set up the unit in the area to be used.
2. Pump must be plugged into the outlet provided on the unit, for the unit to function correctly.
3. Make all of the necessary connections.
 - a. Connect hose(s) from heater outlet valve(s).

WARNING!

DO NOT OPERATE ANY ELECTRICAL COMPONENT IN THIS SYSTEM WITHOUT USING A GROUND FAULT CIRCUIT INTERRUPTER (GFCI)

3. Fuel unit with either #1 or #2 diesel oil.
4. Make sure a flow of water is present through the system.

WARNING!

NEVER OPERATE THE FUEL PRESSURE AT THE REGULATOR LESS THAN 100 PSI. FAILURE TO OBSERVE THIS WARNING WILL RESULT IN INCOMPLETE COMBUSTION, CAUSING EXCESSIVE COIL SOOTING, HARMFUL VAPORS, EXCESSIVE SMOKE AND POSSIBLE FLASHING.

6. Turn unit on, check to make sure burner has fired, and temperature display is functioning.
 - a. Test flow switch.
 - b. To properly test flow switch function, shut down the water flow to the heater. The unit should shut down if the switch is functioning properly.

NOTE

Once burner has fired, observe smoke color. If smoke is white, slightly close vent opening on the burner assembly until smoke disappears. If smoke is black, reverse procedure, slightly opening vent until smoke disappears.

7. Crack open by-pass valve. Set the water flow pressure at 10 psi., using the valve at the units water inlet.
8. Set fuel pressure at the fuel regulator to 120 psi.
9. Allow unit to run 5 minutes or until temperature remains constant on the digital display.

NOTE

Starting operating temperature is recommended to be at 100° F. and is only a guideline for starting procedure. Fine-tuning of the temperature will be when in actual use. It can be set or changed using the water flow controls or the fuel pressure, set at the regulator.

WARNING!

DO NOT OPERATE THE SYSTEM WITHOUT A DIVER BY-PASS VALVE THAT CAN BE OPERATED BY THE DIVER TO ELIMINATE WATER FLOW IF NECESSARY. IN THE EVENT OF A UNIT MALFUNCTION, SEVERE BURNS MAY OCCUR.

10. Once a comfortable working temperature has been achieved, fine adjustments can be made at the fuel pressure regulator.
11. If all set-up procedures have been followed, you should be able to maintain your operating temperature at +/- 1° F.

HIGH-POINT TEMPERATURE CUT-OFF

After temperature has remained constant on the digital display for 3 minutes, depress the set point button on the control panel. This changes the display to read the present high-point temperature cutoff temperature. Adjustments can be made as follows:

For the primary digital readout

- A. Press the set button two times. The display will read Set point.
- B. Press the up or down button and the set points will be displayed.
- C. Press and hold the up or down button until the desired set point is displayed.
3 degrees F over the working temperature is recommended.
- C. Press the set button and then the up key to return to the original display.

For your added safety C.D.F. has installed a Secondary High Limit Circuit. This circuit will trip the unit, the pump receptacle, and stop water flow through the unit in the event of a secondary high-limit trip.

NOTE!

IF THE SECONDARY HIGH LIMIT CIRCUIT TRIPS THE WATER TEMPERATURE IN THE SYSTEM MUST DROP 15 DEGREES F BEFORE THE SYSTEM WILL RESTART

The secondary high limit should be calibrated with the primary at the beginning of each dive day or at each time the unit is restarted. Follow the operations manual start up procedures as always and follow these additional steps:

- A. After a constant diver working temperature has been achieved set the primary high-limit as described in the manual.
- B. Set the secondary high limit in the same manner as the primary, changing the set point temperature to 5 degrees F over the working temperature instead of 3 degrees F.
- C. Complete the remaining daily safety systems checkout as described in this operations manual.

WARNING!

SUPPLY PUMP MUST BE CONNECTED TO THE OUTLET PROVIDED ON THE UNIT FOR THE SECONDARY HIGH LIMIT TO FUNCTION CORRECTLY.

WARNING!

HIGH-POINT CUT-OFF TEMPERATURE SHOULD BE SET NO HIGHER THAN 2°- 3° F. MAXIMUM OVER WORKING TEMPERATURE TO PREVENT INJURY TO THE DIVER.

FAILURE TO OBSERVE THIS WARNING COULD RESULT IN HEAT EXHAUSTION OR SEVERE BURNS TO THE DIVER.

WARNING!

ALWAYS KEEP CONTROL PANEL COVER CLOSED DURING INCLEMENT WEATHER TO PREVENT DAMAGE TO ELECTRICAL COMPONENTS IN THE SYSTEM.

WARNING!

SHOCK HAZARD! DO NOT TOUCH ANY ELECTRICAL COMPONENTS IN THIS SYSTEM WHEN WET. SEVERE SHOCK OR ELECTROCUTION COULD OCCUR.

WARNING!

COMBUSTIBLE MATERIAL PRESENT. KEEP AWAY FROM SPARK OR OPEN FLAME.

FUEL HOOK-UP PROCEDURE

1. Portable fuel containers are provided for your convenience. Each fuel tank has quick connect snap fittings.
2. Connect fuel hose to the tank.
3. *OPEN FUEL VENT ON THE FILLER CAP.*
4. Unit is self-priming.

SHUTTING THE SYSTEM DOWN

1. Shut the heater off at the control panel.
2. Allow the submersible pump to run until outlet water temperature is between 80° - 90° F.
3. Shut off and unplug the submersible pump.
3. Remove the pump from the water and disconnect all pump fittings. Invert the pump to remove all water.
5. Submerge the pump in a BIO safe solution of anti-freeze.
6. Reconnect the pump to the power supply to flood the system with anti-freeze.
(Pump umbilical and unit require approximately three gallons of anti-freeze.)
7. Free divers umbilical of water and/or flood with anti-freeze.
(An evacuation unit can be used to simplify this procedure. Evacuation units are available any size gallon capacities.)

PRE-OPERATIONS CHECK LIST

1. Hook up water and check Airband
2. Plug in machine
3. Hook up fuel lines
4. Open fuel in tank valve
5. Put on discharge hose
6. Open discharge
7. Make sure bypass is closed
8. Open water gate valve
9. Turn on water
 - a. Load regulator about 2 ½ turns
10. Turn on unit
11. Check GFI
12. Check electric valve
 - a. Water should flow
13. Wait for output light to come on
14. Red lights come on
 - a. Check temperature, both should be within 1-2 degrees of each other
 - b. Let unit run approximately 5 mins. Unit must level out temperature to continue
15. Set secondary differential to 15
16. Set secondary set point to 125
 - a. Output light should come on
 - i. Contactor should close
17. Set primary differential to 1
18. Set primary set point to 120
19. Check flow switch by turning off water using gate valve
 - a. Unit should shut down
 - b. IF THE UNIT DOES NOT SHUT DOWN< IMMEDIATELY TURN THE UNIT OFF<
20. Turn water back on
 - a. Unit should fire in 6 seconds
21. Fuel pressure should be 100
 - a. No smoke
 - i. If black, open air 1/8" increments
 - ii. If white close 1/8" increments
22. Rotate fuel regulator clockwise to 200
23. Dial back to 100
 - a. Check for fuel leaks
24. Check secondary
 - a. Dial down until unit shuts off
 - i. ALL functions should stop
 - ii. No flame
 - iii. No water

25. Dial secondary set point back up
 - a. Unit should resume operation to 120-125
 - b. Let unit run and let temperature level out
 - i. Should be within 2 degrees
 - c. If unit cycles raise primary and secondary SP 5 degrees respectively until unit stops cycling Do not exceed 170 on secondary
26. Reset primary Set Point to 120, 125 in winter
27. Recheck differential to make sure it is 1
 - a. Burner should shut off
28. Reset secondary SP to 125, 130 in winter
29. Recheck differential to 15
30. At some point when primary is off and secondary is on degrees bypass burner should fire
 - a. You can dial down primary to achieve this
31. Turn unit off
32. Cool down by pressing electric valve bypass
33. Shut off water
 - a. Unhook water supply
34. Blow out with air
 - a. Not to exceed 100 psi
35. Open all ball valves
 - a. Drain and close Diver 1
 - b. Open discharge
36. Pump 1 gallon of antifreeze into each coil.
 - a. Press electric bypass
37. Blow out unit with air
 - a. Not to exceed 100 PSI
38. Open all valves
 - a. Drain and close all valves except gates
39. Disconnect all lines
 - a. Shut off fuel supply
 - b. Plug fuel fittings in each other
40. TAKE OFF ATTACHMENT FOR WATER, AIR AND ELECTRIC

NOTE

These daily checks will ensure the unit is functioning correctly.

WARNING!

DO NOT OPERATE UNIT IF ANY COMPONENT IN THE SYSTEM IS NOT FUNCTIONING CORRECTLY. TO DO SO COULD CAUSE SEVERE BURNS TO THE DIVER OR CAUSE DAMAGE TO THE SYSTEM.

WEEKLY MAINTENANCE

1. Disconnect Power Supply
2. Replace any non-working parts, valves, gauges etc.
3. Review safety checklist for unit function.
4. Change fuel filter.
5. Run through the testing a heater procedure.

WARNING!

WHEN SERVICING, BE SURE HEATER IS DISCONNECTED FROM POWER SOURCE TO PREVENT ELECTRICAL SHOCK OR FIRE.

MONTHLY MAINTENANCE

1. Disconnect Power Supply.
2. Replace any non-working parts.
3. Review safety checklist for unit function. (TESTING A HEATER)
4. Change fuel filter.
5. Replace fuel nozzle
6. Inspect coils for soot build up.
7. Inspect fuel tank and fittings for dirt and water inside.
8. Inspect electrodes for damage.
9. Inspect circuits for corrosion and damage.

YEARLY MAINTENANCE

1. Change fuel filter.
2. Change fuel nozzle.
3. Inspect blower for corrosion.
4. Wash heater coil free of soot, using a wire brush or vacuum.
5. Remove 3 nuts from burner mounting flange.
6. Carefully remove burner and set aside. Leave electrical connections and fuel hose intact.
7. Cover with waterproof plastic.
8. Replace gasket on burner flange.
9. Check parts inventory.
 - a. New fuel filter.
 - b. Replace lost or used fuel nozzles.
 - c. Replace hose fitting washers.
 - d. Replace any lost or worn fittings.
10. Decalcify the coils using “Ryde lime” or compatible decalcifying solution

WARNING!

***DO NOT OPEN ELECTRICAL CLOSURE FITTINGS OR
PANEL COVERS. THIS PROCEDURE SHOULD ONLY
BE DONE BY A QUALIFIED ELECTRICIAN.***

NOZZLE CHANGING PROCEDURE

1. Disconnect Power Supply.
2. Close air vent on burner adjustment band.
3. Loosen the flare nuts and remove the fuel line between the solenoid valve and nozzle pipe. Set aside. ***Caution! Be careful not to drop the nut into the air vent!***
4. Remove nozzle pipe retaining nut from nozzle pipe and set aside.
5. Loosen the coil clamp located on the other side of the coil and open the burner lid. Carefully slide the nozzle pipe assembly downward and out until the assembly becomes free and lifts out.

Caution! Be careful not to damage the ceramic insulators on the electrodes.

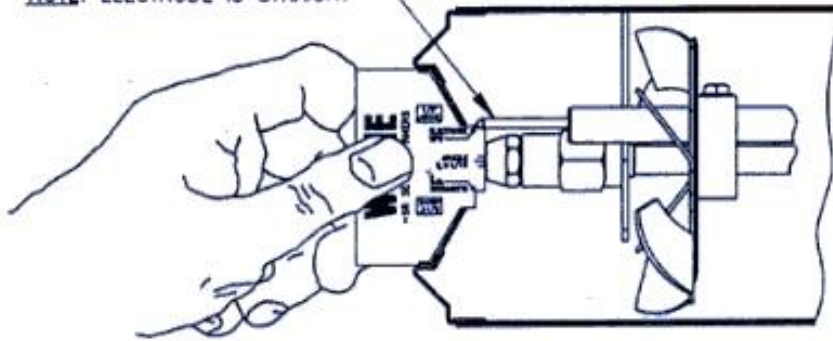
6. Replace the nozzle with the desired size.
7. Reset the electrodes or replace if damaged.
8. Replace the nozzle pipe assembly. Re-assemble all components by reversing the disassembly procedures. Open air band on the burner assembly. Make air adjustments following set-up procedures.

BE CAREFUL NOT TO MOVE ELECTRODE SETTINGS

GUN SETTING GAUGE INSTRUCTIONS
 FOR BOTH 1/2" AND 5/16" ABOVE ϕ
 (FOR "SR" SERIES BURNERS ONLY)

INSERT "SR" SERIES GUN SETTING GAUGE (AS SHOWN BELOW) TO
 CHECK NOZZLE POSITION AND ELECTRODE SETTING

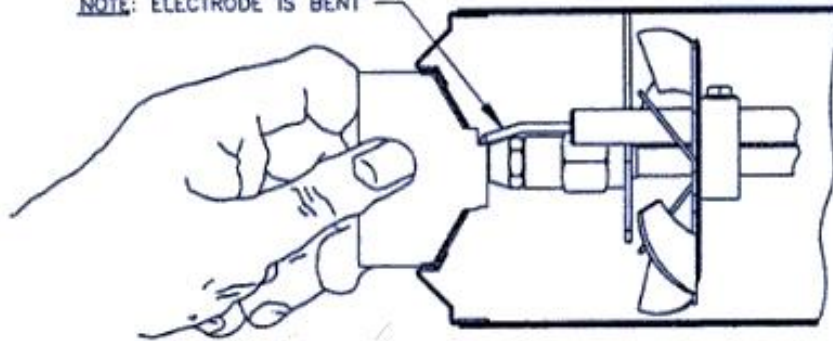
NOTE: ELECTRODE IS STRAIGHT



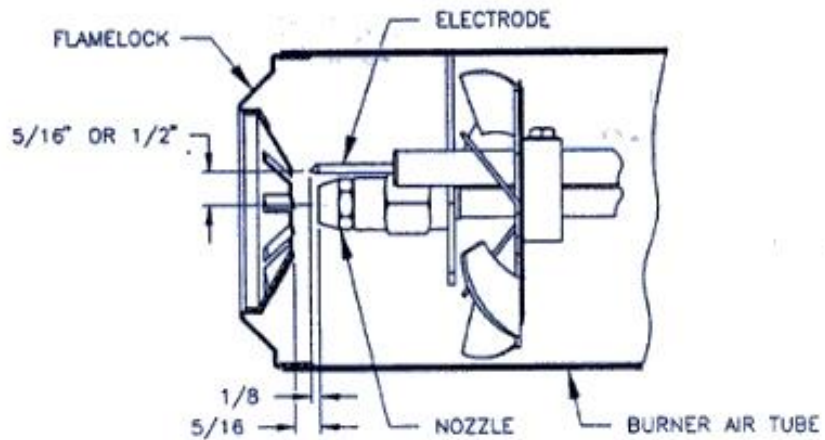
1/2" ELECTRODE SETTING ABOVE ϕ OF NOZZLE

-OR-
 FLIP GUN SETTING GAUGE FOR 5/16" SETTING

NOTE: ELECTRODE IS BENT



5/16" ELECTRODE SETTING ABOVE ϕ OF NOZZLE



TROUBLESHOOTING

1. No water flow.
 - a. Check connection at outlet.
 - b. Pump may be frozen.
 - c. Pump may be burned out.
 - d. Check electrical circuit.
 - e. Check secondary high limit adjustment.(Output light on)

2. LED blinks, clicking sound is heard.
 - a. Pump may be frozen.
 - b. Power surge.
 - c. Short in circuit.
 - d. Insufficient power supply.

3. Black smoke.
 - a. Not enough air.
 - b. Faulty solenoid valve.
 - c. Dirty fuel.
 - d. Electrodes misaligned.
 - e. Weak high voltage coil. (clean contacts.)

4. White smoke.
 - a. Too much air.
 - b. Not enough fuel.

5. Relay indicator blink. (Clicking is heard.)
 - a. Not enough electrical power. (Minimum 220 VAC.)

6. No fuel pressure.
 - a. Faulty regulator.
 - b. Clogged fuel filter.
 - c. Clogged fuel line.
 - d. Snap fitting not coupled properly.
 - e. Leak in fuel line or prime bulb.
 - f. Vent cap closed on fuel tank.

7. Burner won't fire.
 - a. Same as above for fuel pressure.
 - b. Electrodes misaligned.
 - c. Weak voltage coil / dirty contacts.
 - d. Cracked ceramic on electrodes.
 - e. Water in fuel.
 - f. Not enough electrical power. (Minimum 220 VAC.)
 - g. Re-set button tripped. (Located on motor case.)

8. Snap fitting leak.
 - a. Replace O-ring.
 - b. Replace fitting.

9. System freezes.
 - a. Shut system off. Turn pump off.
 - b. Slowly thaw with forced air heat.

WARNING!

DO NOT ATTEMPT TO THAW WITH OPEN FLAME

10. Overheating.
 - a. Faulty sensor.
 - b. Faulty relay(s).
 - c. Insufficient flow of water. (Check flow requirements for size of hose.)

11. Underheating.
 - a. Too much water flow. (Check flow requirements for size of hose.)
 - b. Low fuel pressure. (120 psi at the regulator.)
 - c. Fuel nozzle too small.
 - d. Soot on coil.

12. No PSI on manifold.
 - a. Open gate valve.
 - b. System frozen.
 - c. Cracked coil.

13. No power to heater.
 - a. Check electrical connection.
 - b. Push system by-pass switch.

WARNING!

***IF SYSTEM FIRES, THERE IS A FAULTY CIRCUIT.
DO NOT OPERATE!***

14. LED erratic.
 - a. Faulty sensor.
 - b. Damp circuit. (Dry with forced air heat.)
 - c. Fluctuating supply water pressure.
15. Fuel tank collapse.
 - a. Open tank vent.
 - b. Vent may be plugged.
16. Low water pressure.
 - a. Insufficient water supply.
 - b. Kink or obstruction in water hose.
 - c. Pump by-pass opened too much.
17. Fuel pump won't prime.
 - a. Obstructed fuel line.
 - b. Air leak in fuel line.
 - c. Fuel filter cap loose.
 - d. Faulty fuel pump.
18. Drip from bottom of combustion chamber.

Note! Check smell and/or feel of liquid

If diesel is present:

- a. Faulty solenoid valve.
- b. Loose nozzle.
- c. Misaligned electrodes.

If diesel is not present:

- a. Normal condensation from coil.

19. Motor hiss.
 - a. No lubrication in motor.
20. Thermal re-set on the motor trips.
 - a. Snap fittings on the fuel supply are not correctly engaged.
 - b. Fuel pump is not functioning.

Frozen coil thawing procedure

WARNING: Steam may exit the system!!! Cover valve manifold to safely divert a possible steam discharge away from operator and any bystanders.

WARNING: All valves on the TPU must be in the open position. All hoses must be disconnected from the system.

When you have determined that a frozen coil is the cause of a system malfunction, you can use the system's bypass switch to intermittently fire the burner to internally thaw the system.

Depress the system's bypass switch intermittently at 30-40 second intervals after you here the burner fire

Stop and wait for 5-7 minutes to allow the heat to dissipate into the coils.

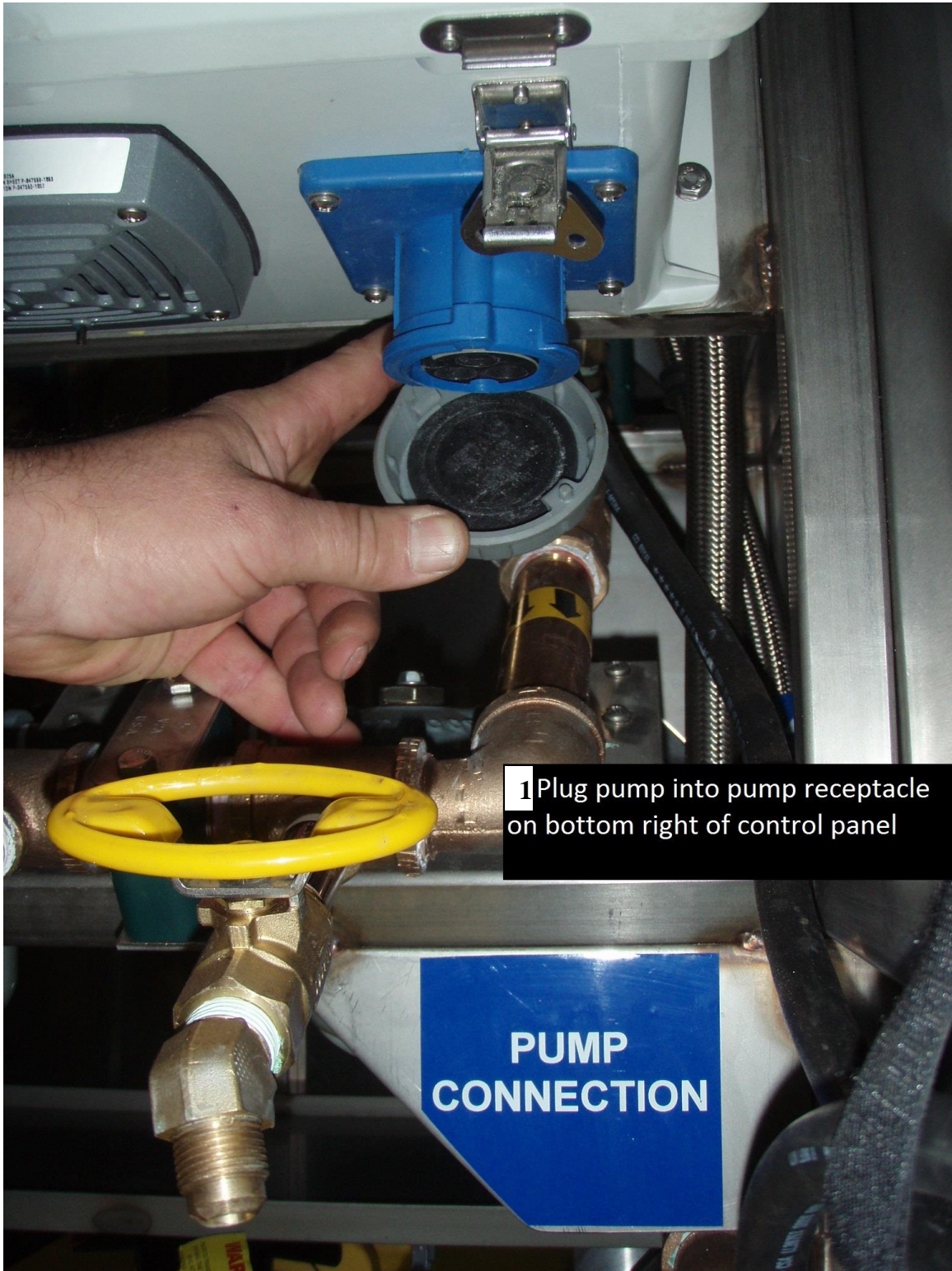
WARNING: Do not exact this procedure more than 5 cycles. STEAM MAY BUILD UP IN THE SYSTEM & CAUSE PERSONAL INJURY, RUPTURED PIPING, OR TEMPERATURE SENSOR BURNOUT.

If this procedure is not successful the unit must be placed in a warm place overnight to slowly thaw the system out.

Proper daily system evacuation is the best SAFE method to ensure the coil does not freeze.

START UP PROCEDURE

1.

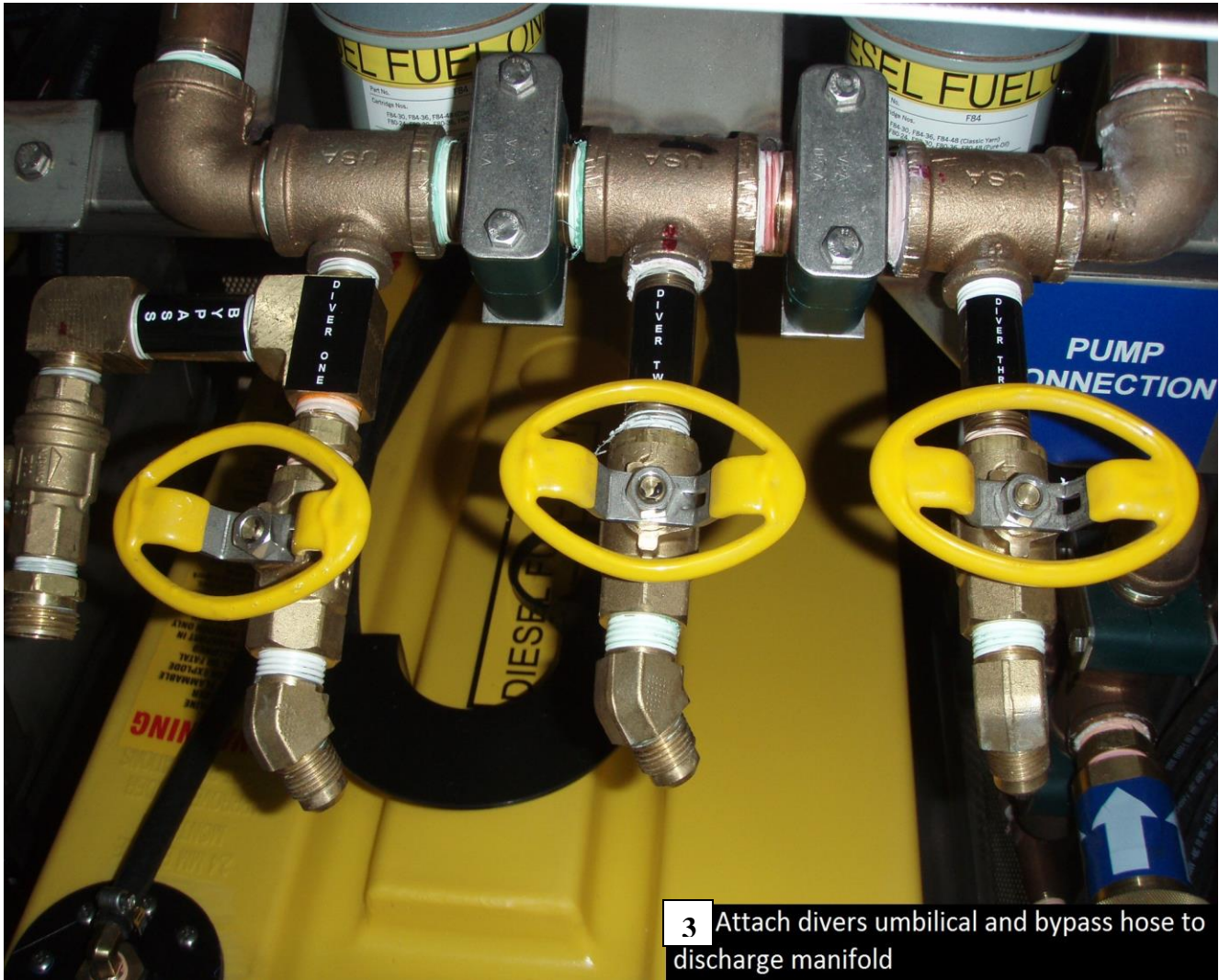


1 Plug pump into pump receptacle on bottom right of control panel

2.

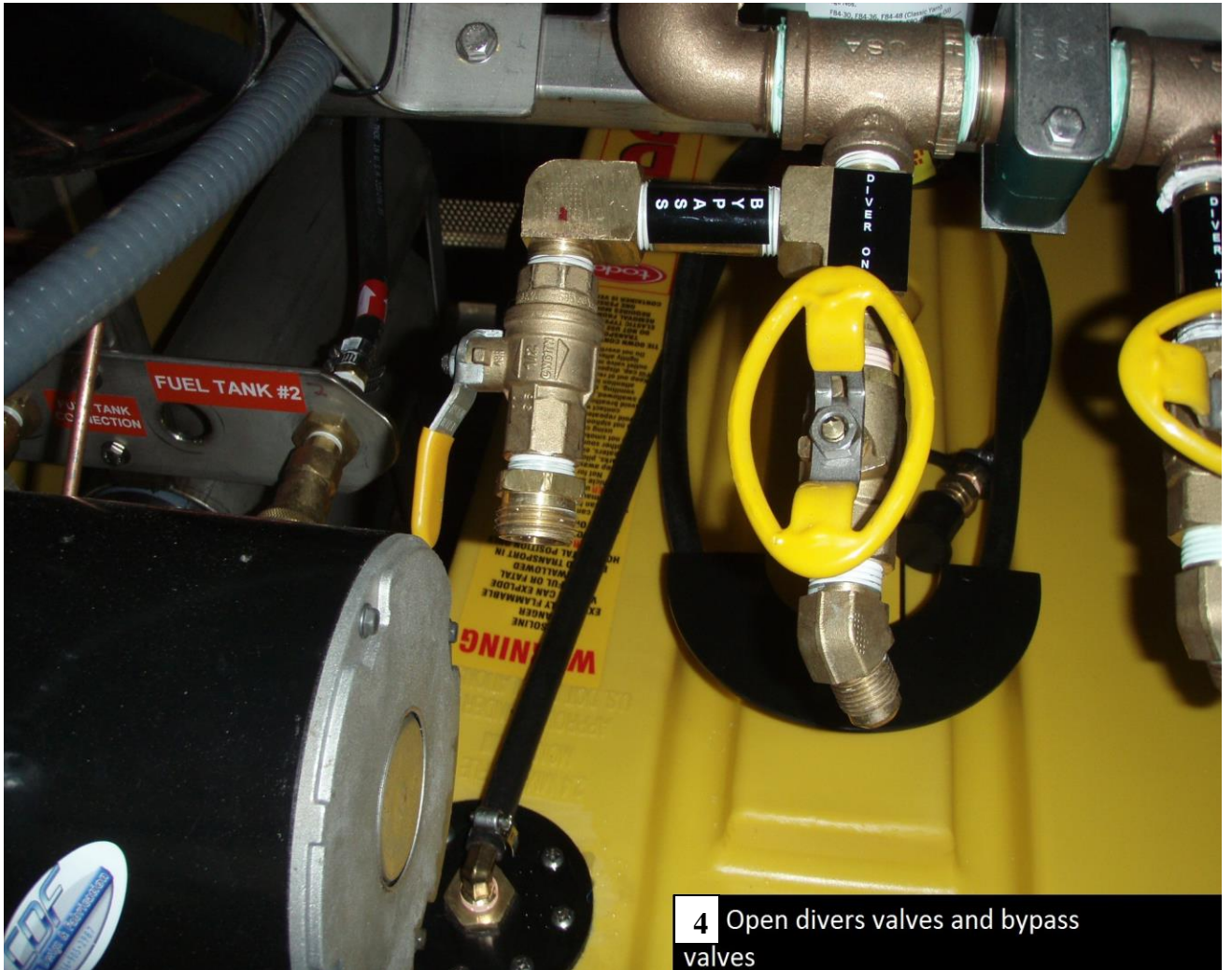


3.



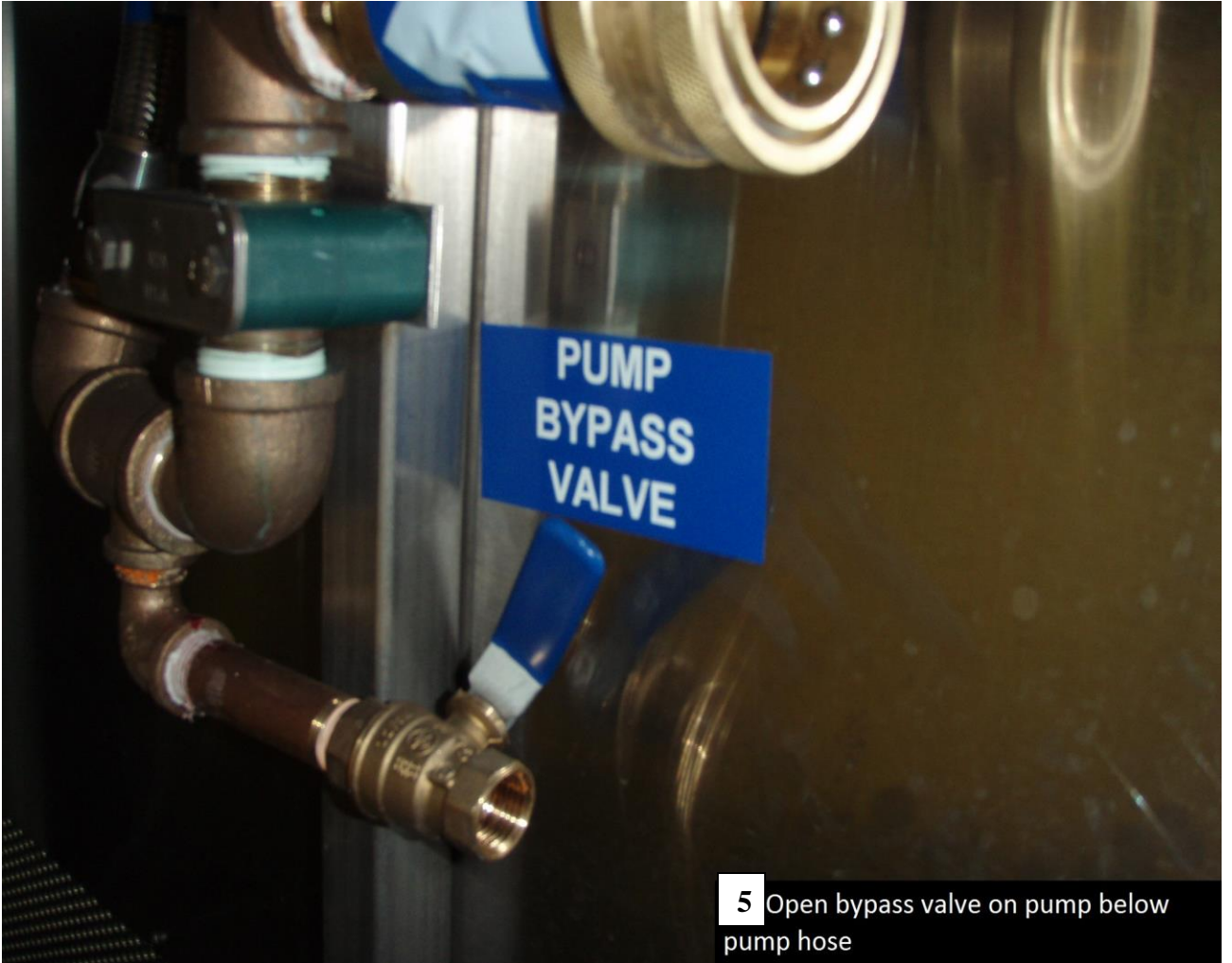
3 Attach divers umbilical and bypass hose to discharge manifold

4.



4 Open divers valves and bypass valves

5.



6.



6 Check blue gate valves - must be fully opened

7.



7 Plug fuel tanks into fuel tank receptor located below coil #2

8.



8 Attach ground wire to unit

9.



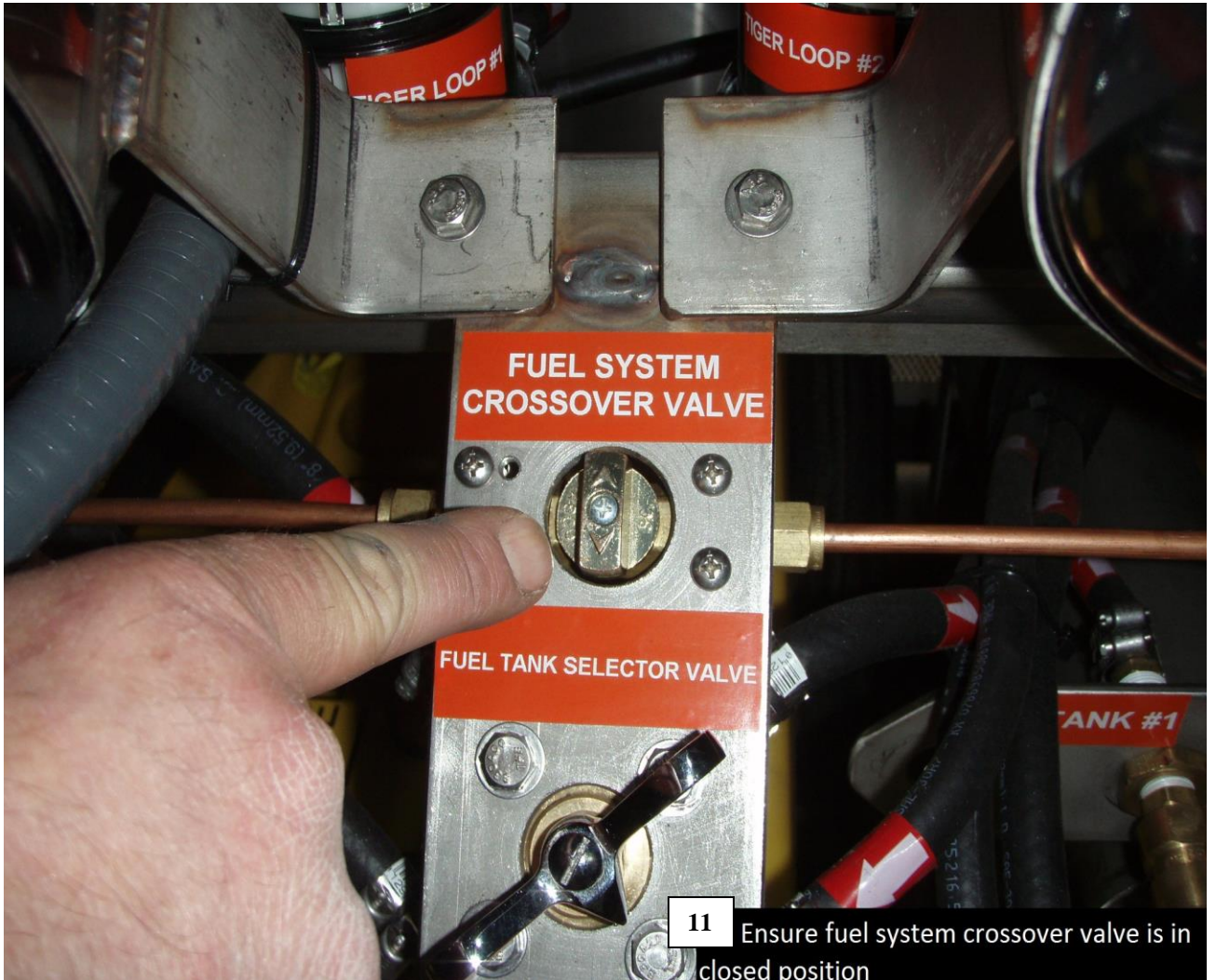
9 Open vents on fuel tank cap

10.

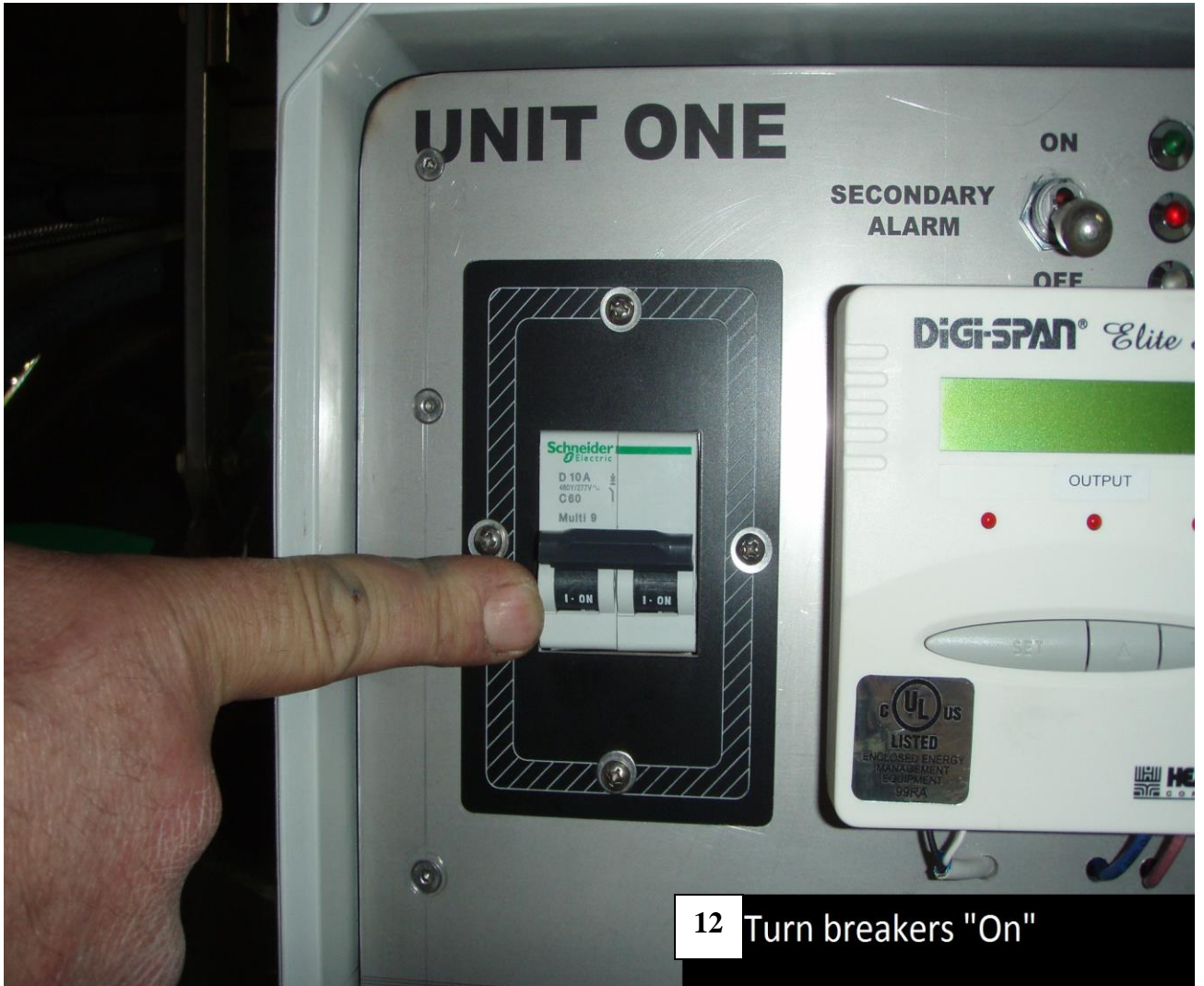


10 Move fuel selector valve to indicate the proper tank

11.



12.



12 Turn breakers "On"

13.



14.



14 Turn burner isolation off

15.



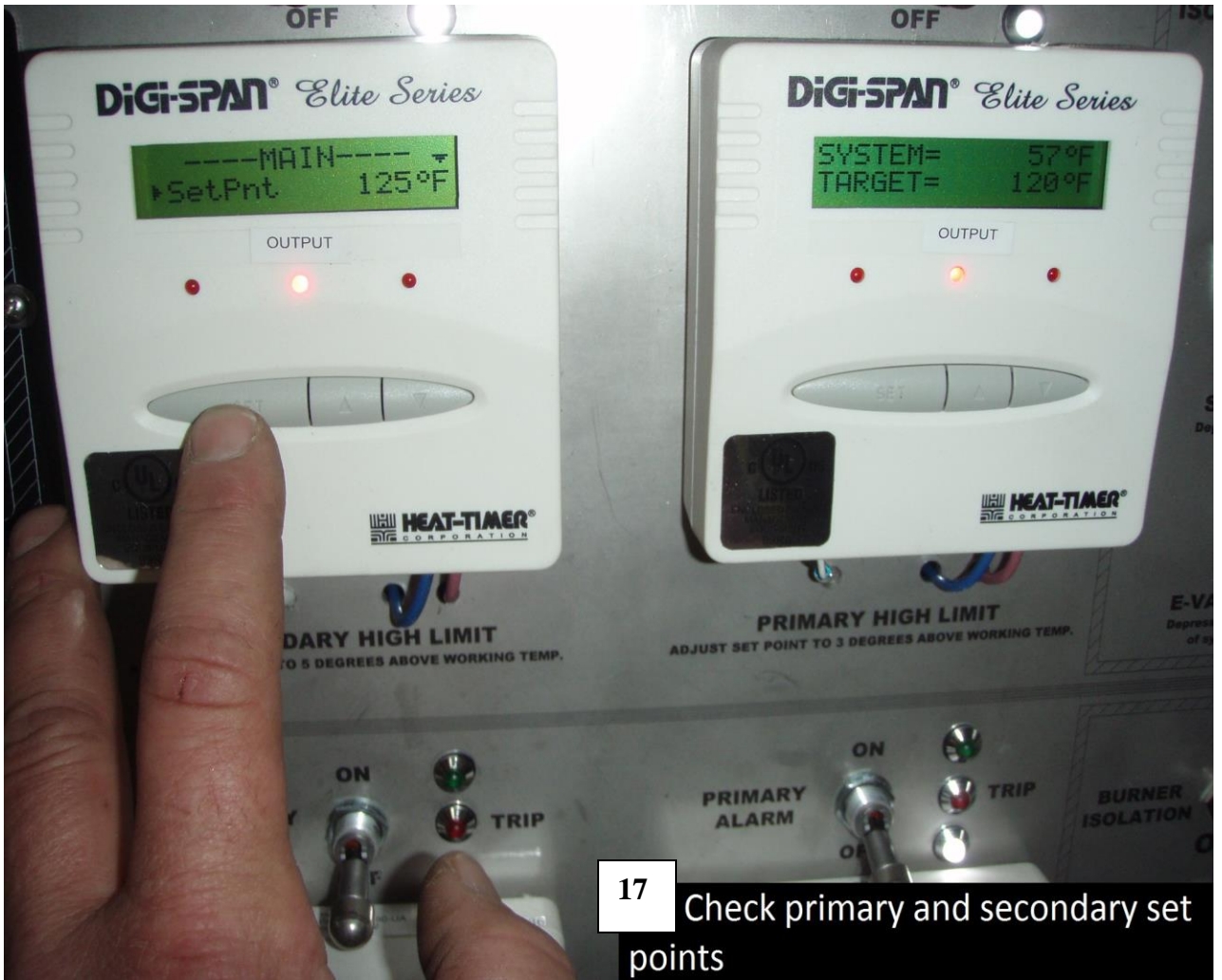
15 Pull out mushroom switches 1 & 2

16.



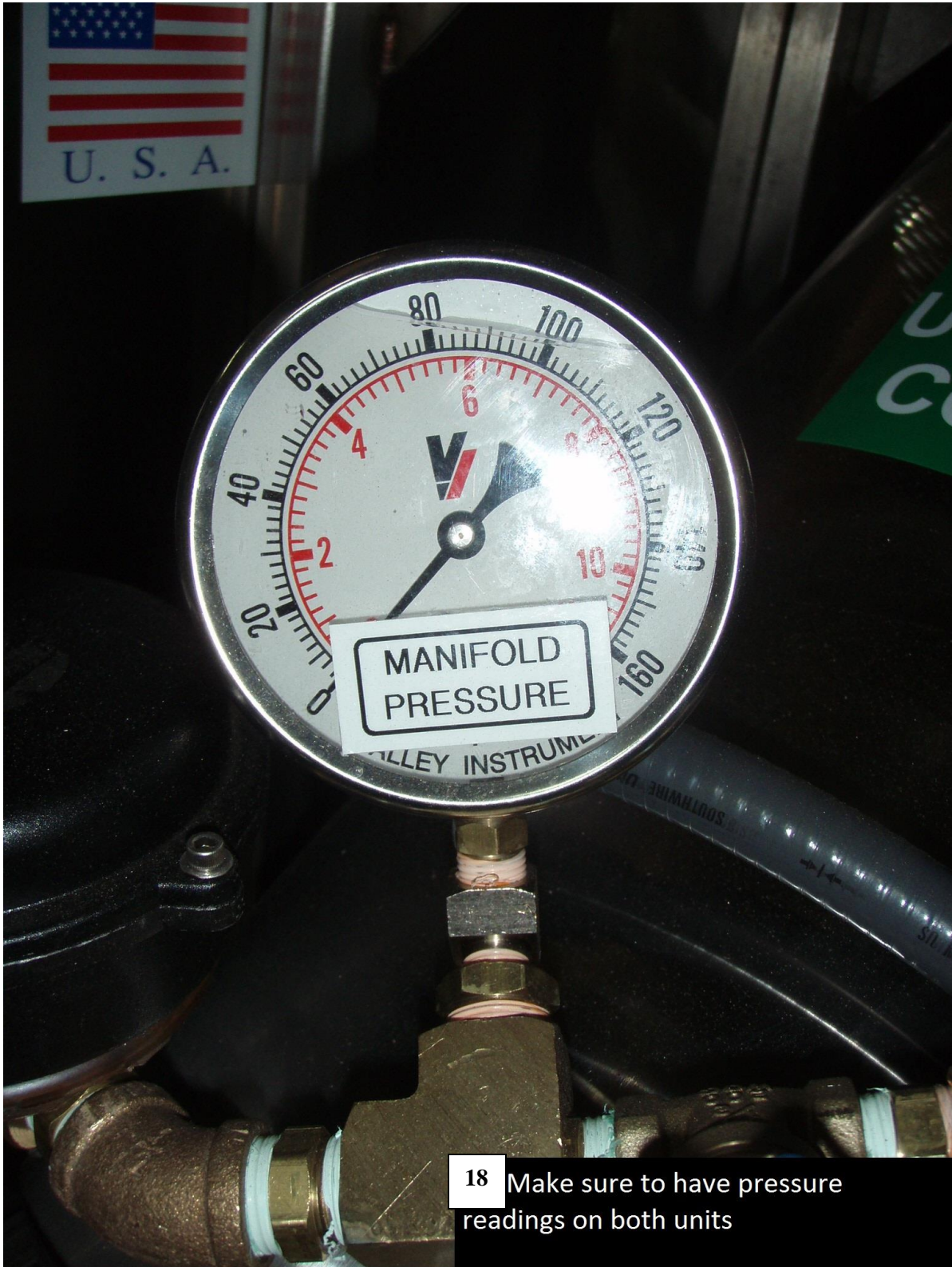
16 Wait for digispan to boot up and for output lights to illuminate

17.



17 Check primary and secondary set points

18.



18 Make sure to have pressure readings on both units

19.



20.



20 Move 4 alarm switches to on after output lights have illuminated

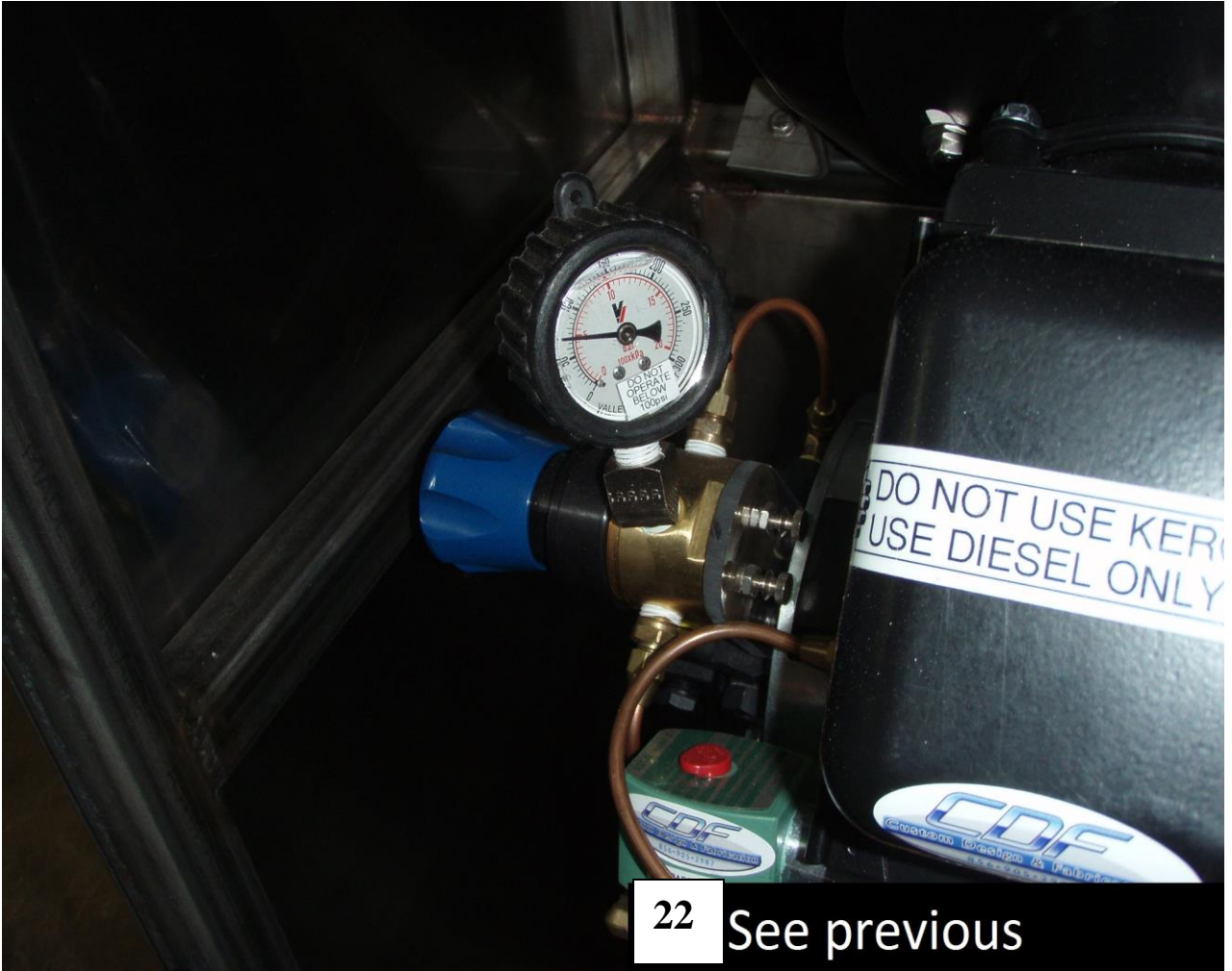
21.



21

Turn burner ISO switch on on both units

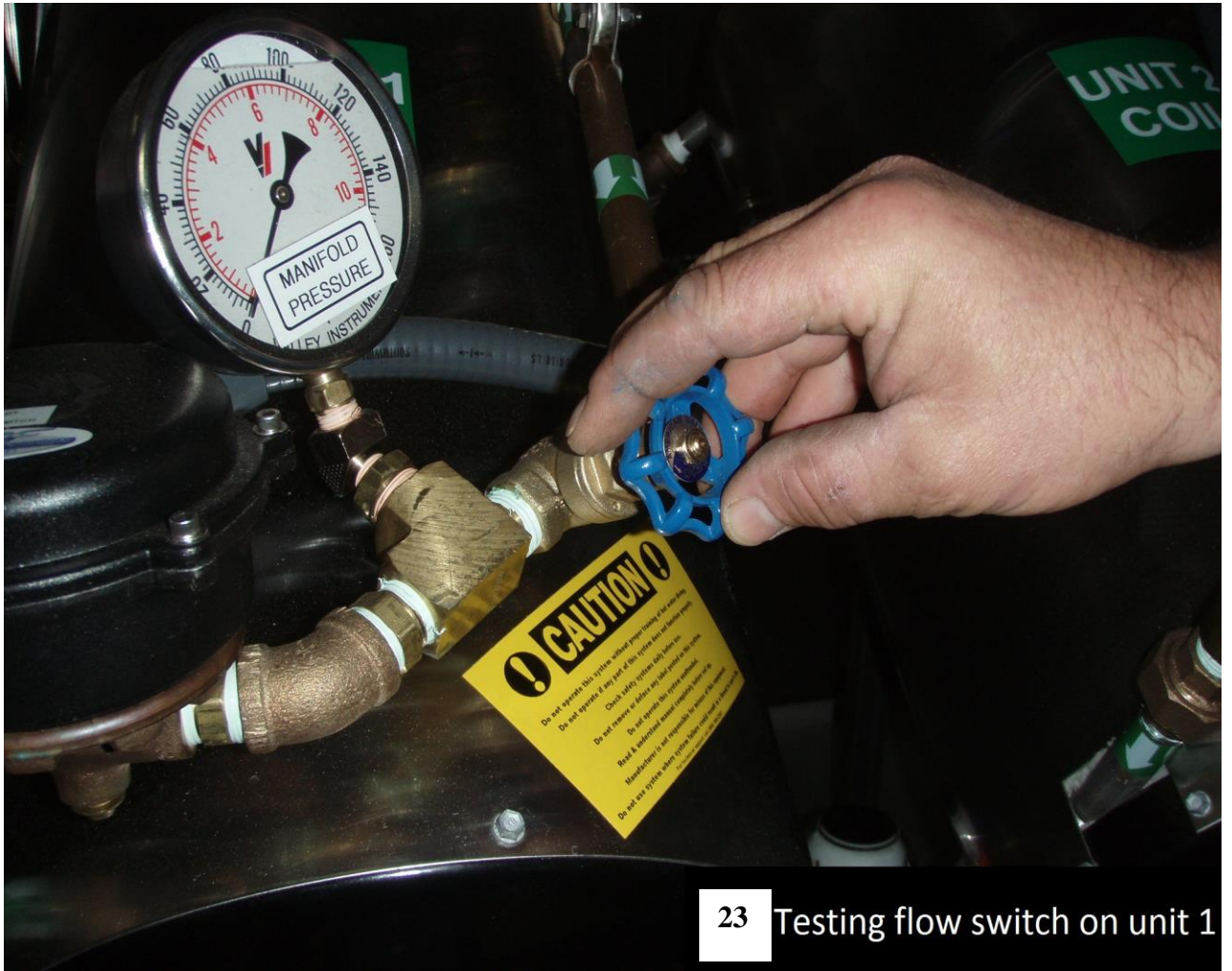
22.



22

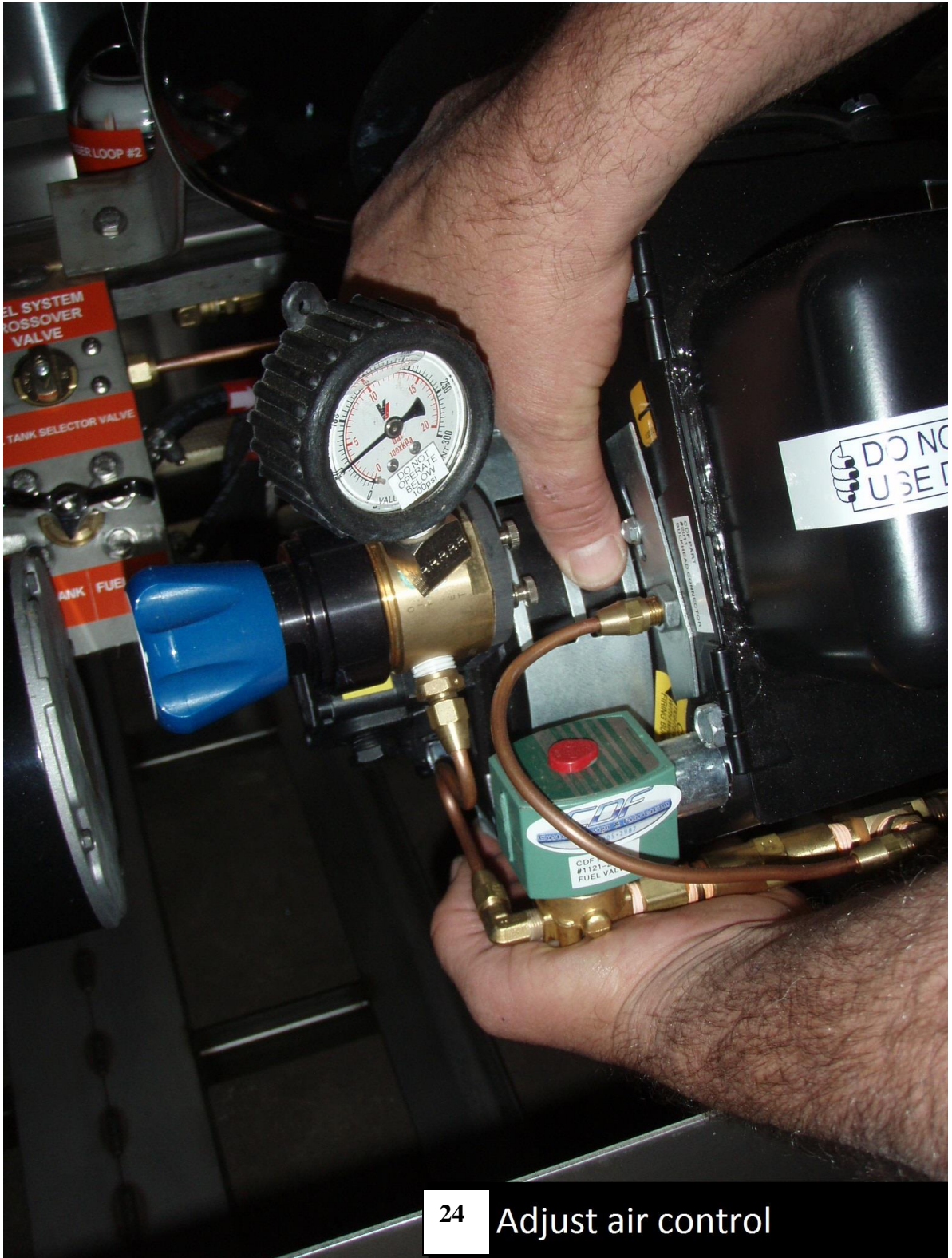
See previous

23.



23 Testing flow switch on unit 1

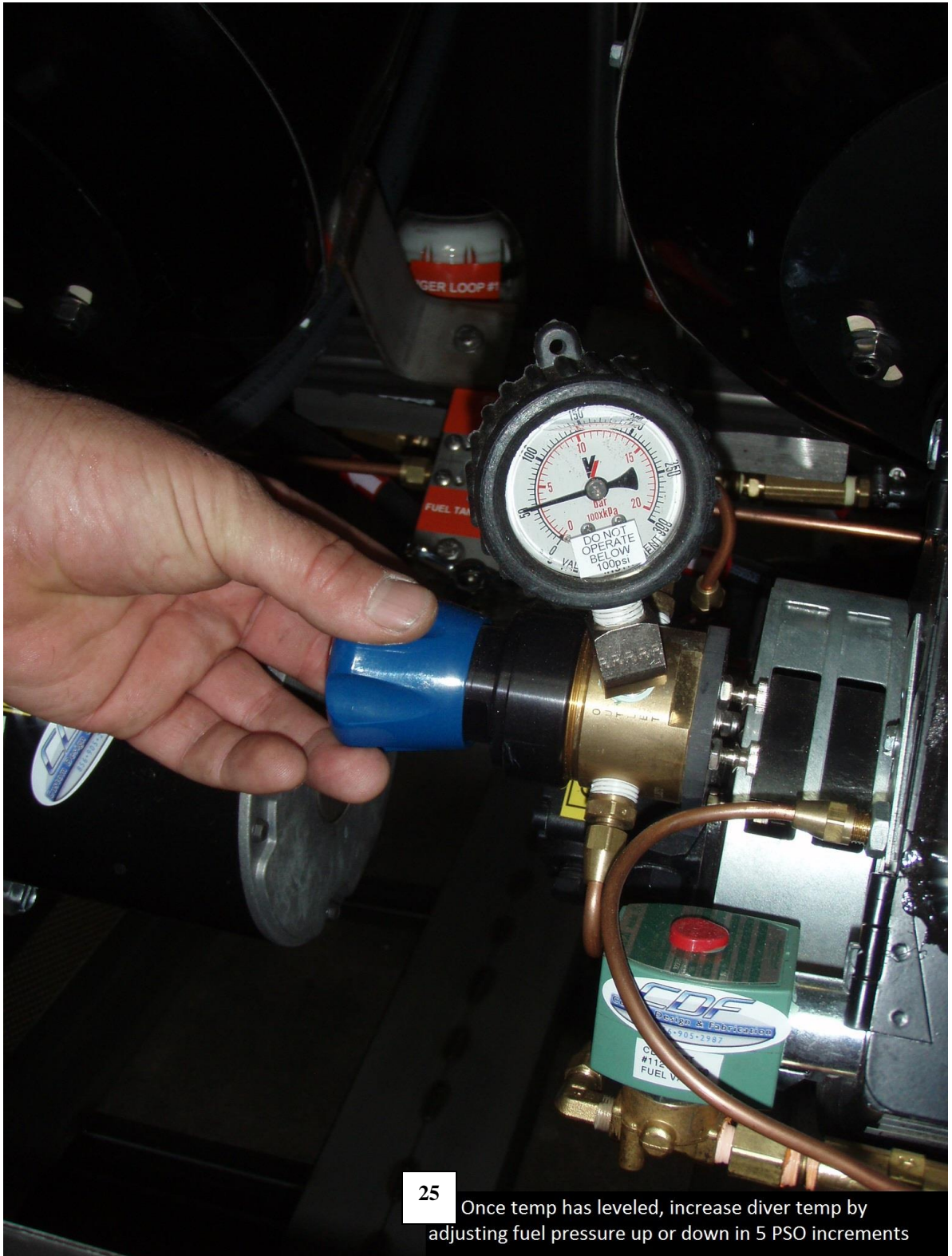
24.



24

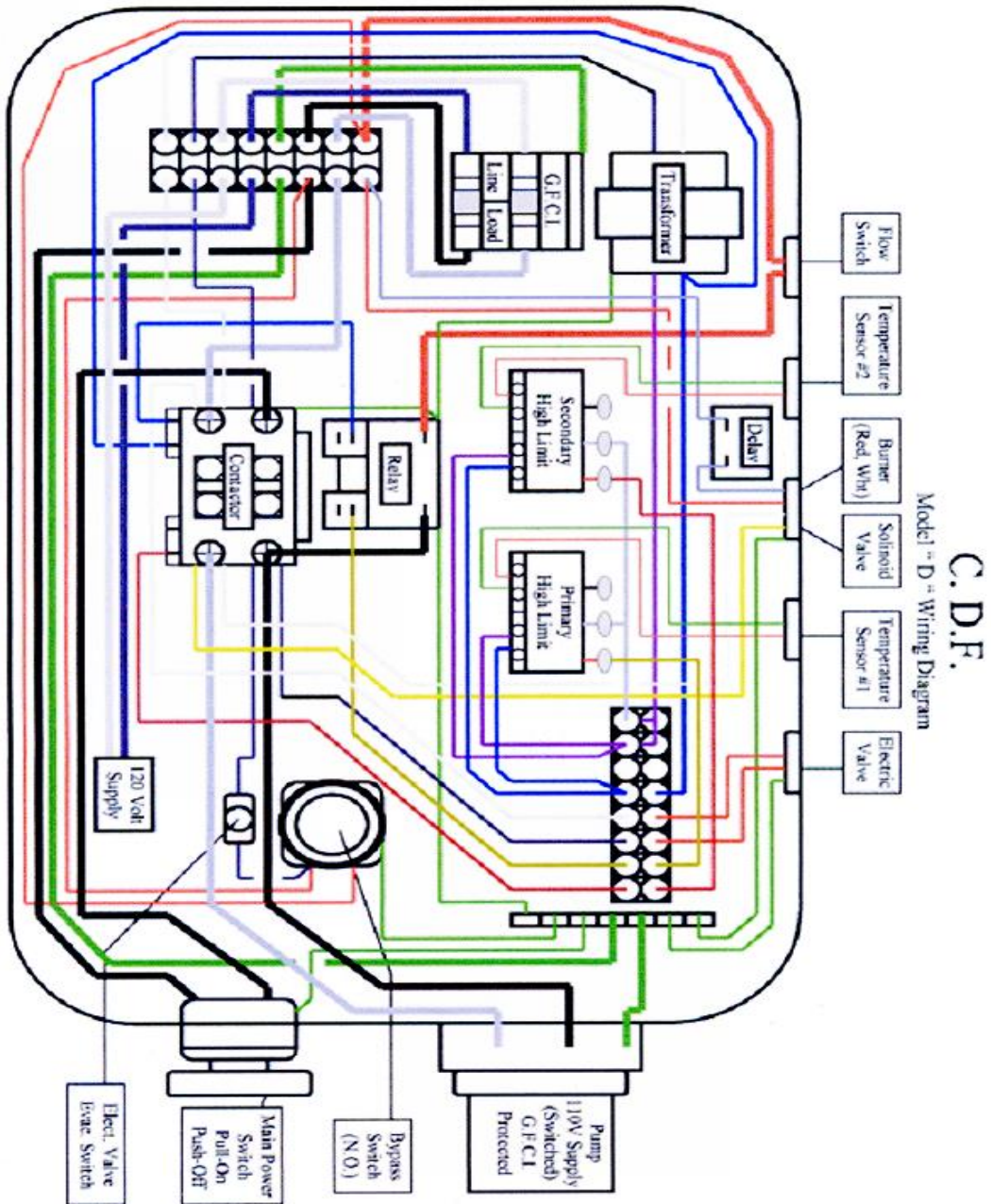
Adjust air control

25.

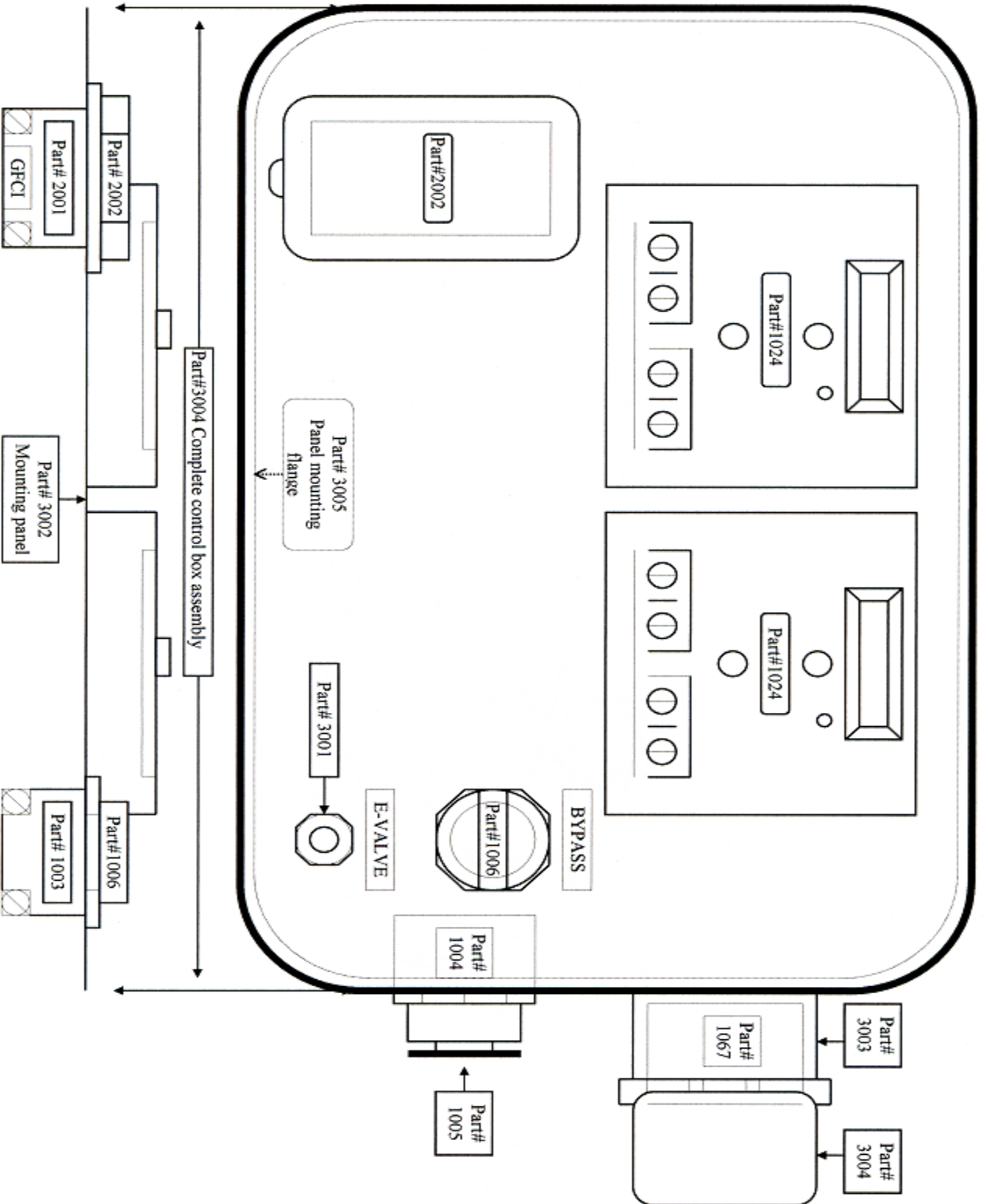


25 Once temp has leveled, increase diver temp by adjusting fuel pressure up or down in 5 PSO increments

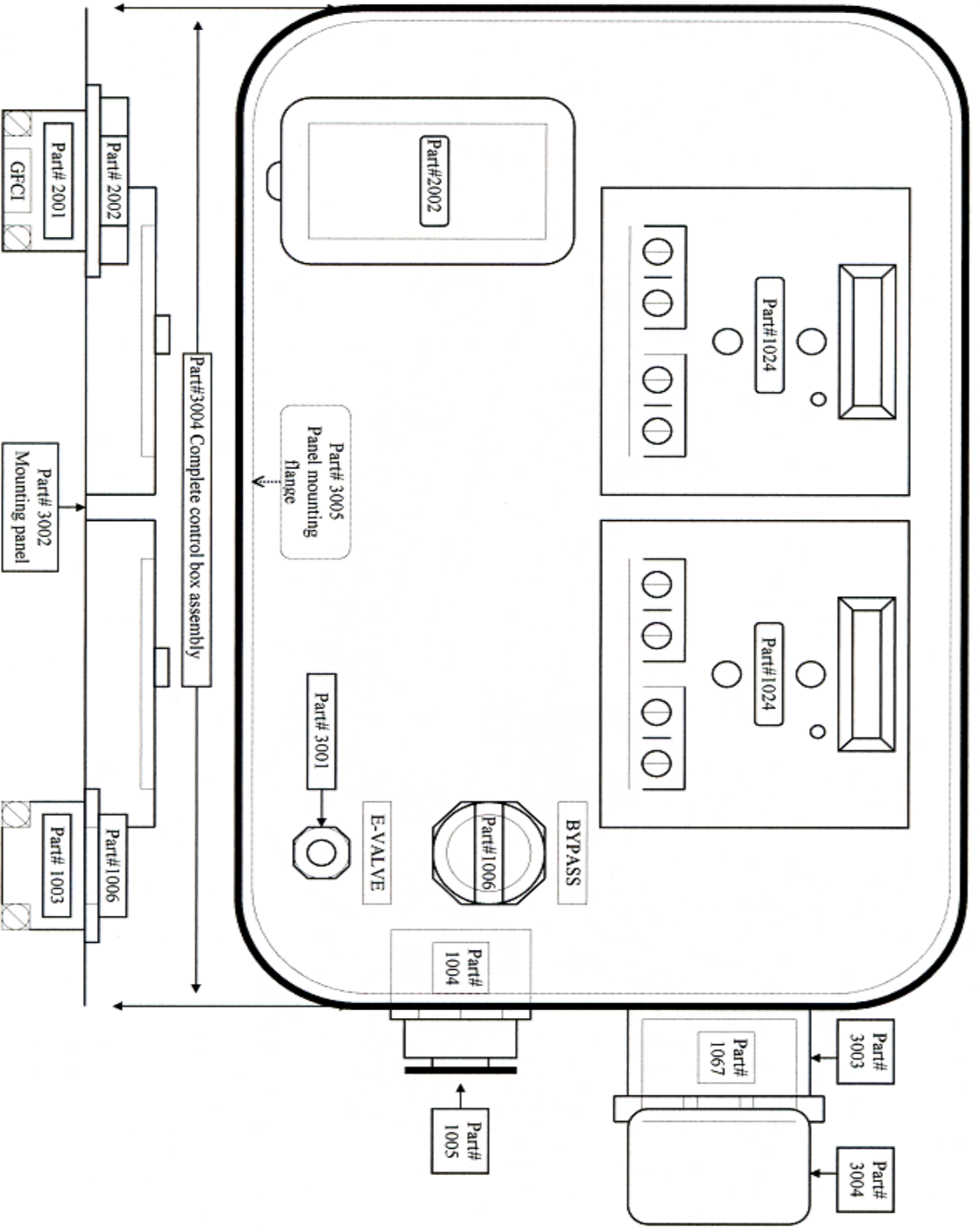
DIAGRAMS AND SCHEMATICS



SWITCH PANEL DIAGRAM & PARTS LIST

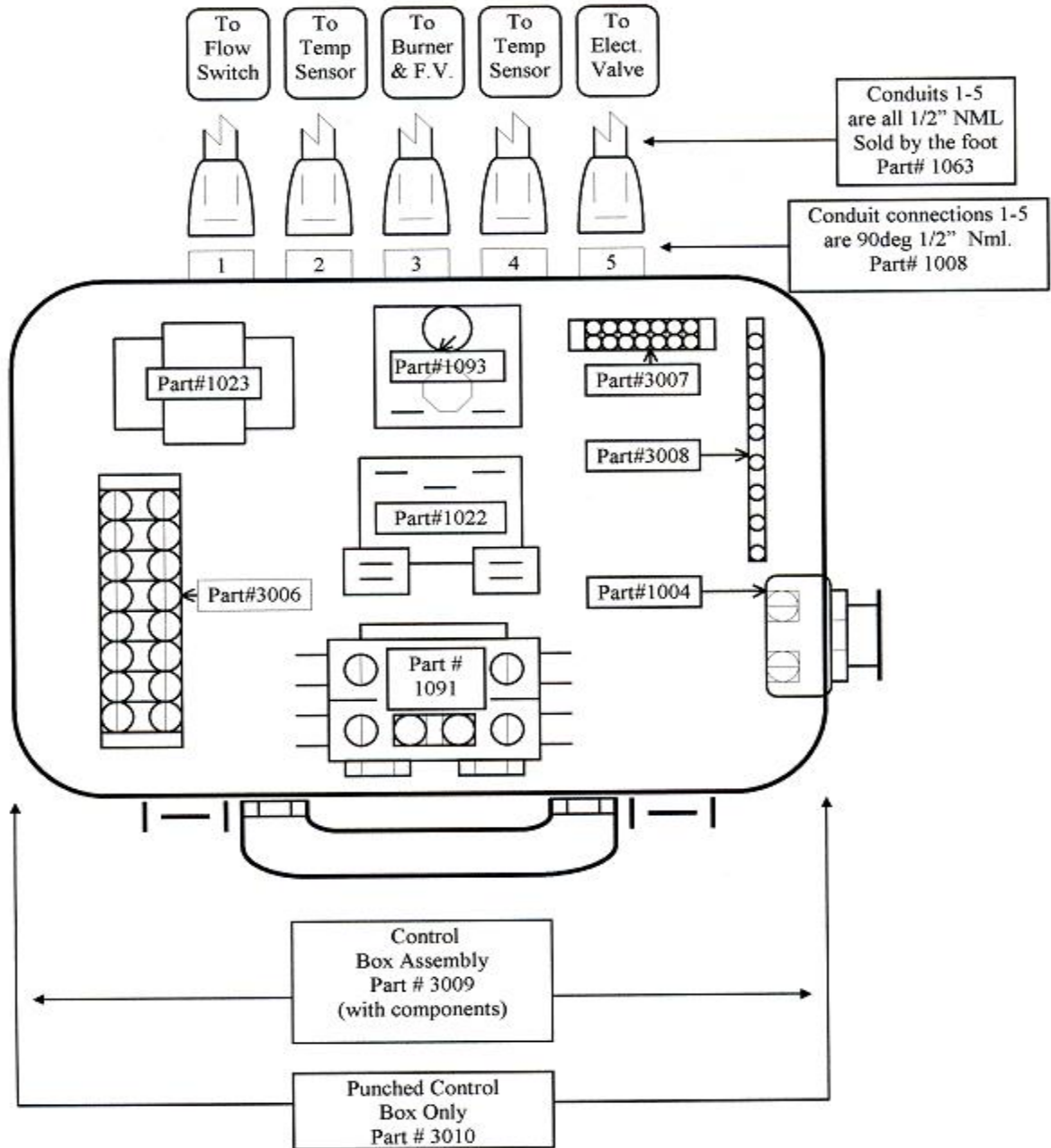


SWITCH PANEL DIAGRAM & PARTS LIST

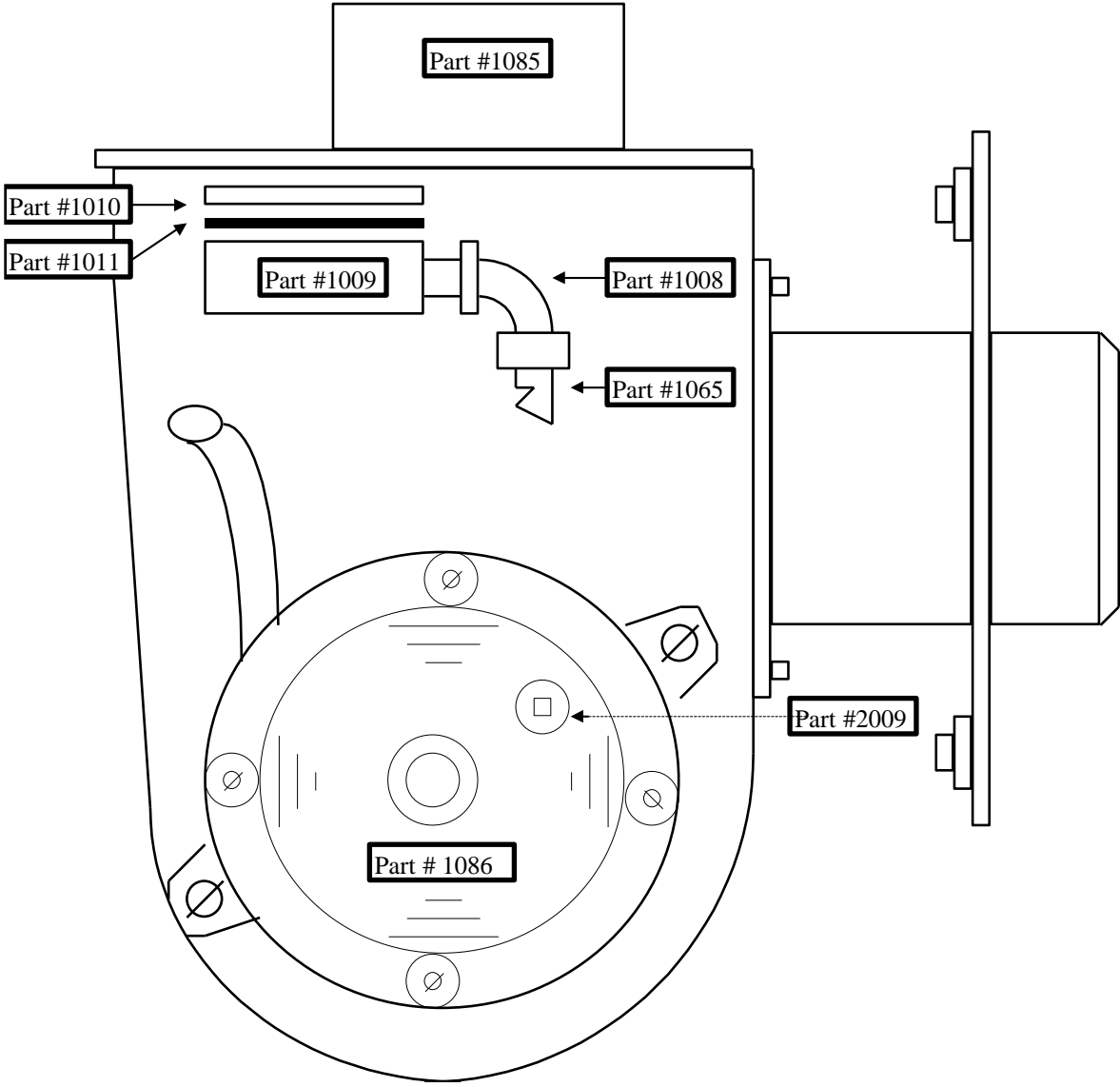


ELECTRIC PANEL DIAGRAM

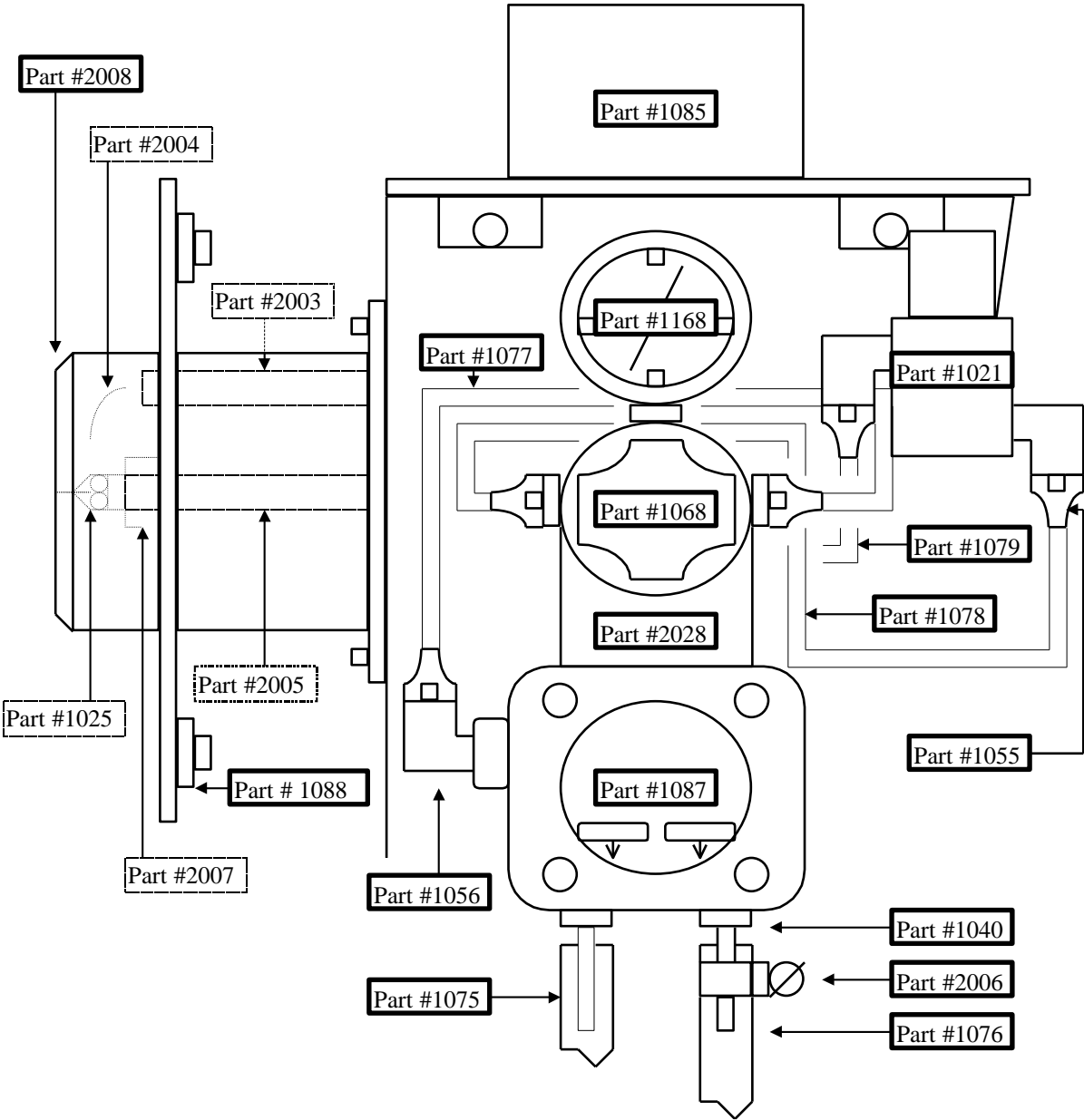
Model D&E



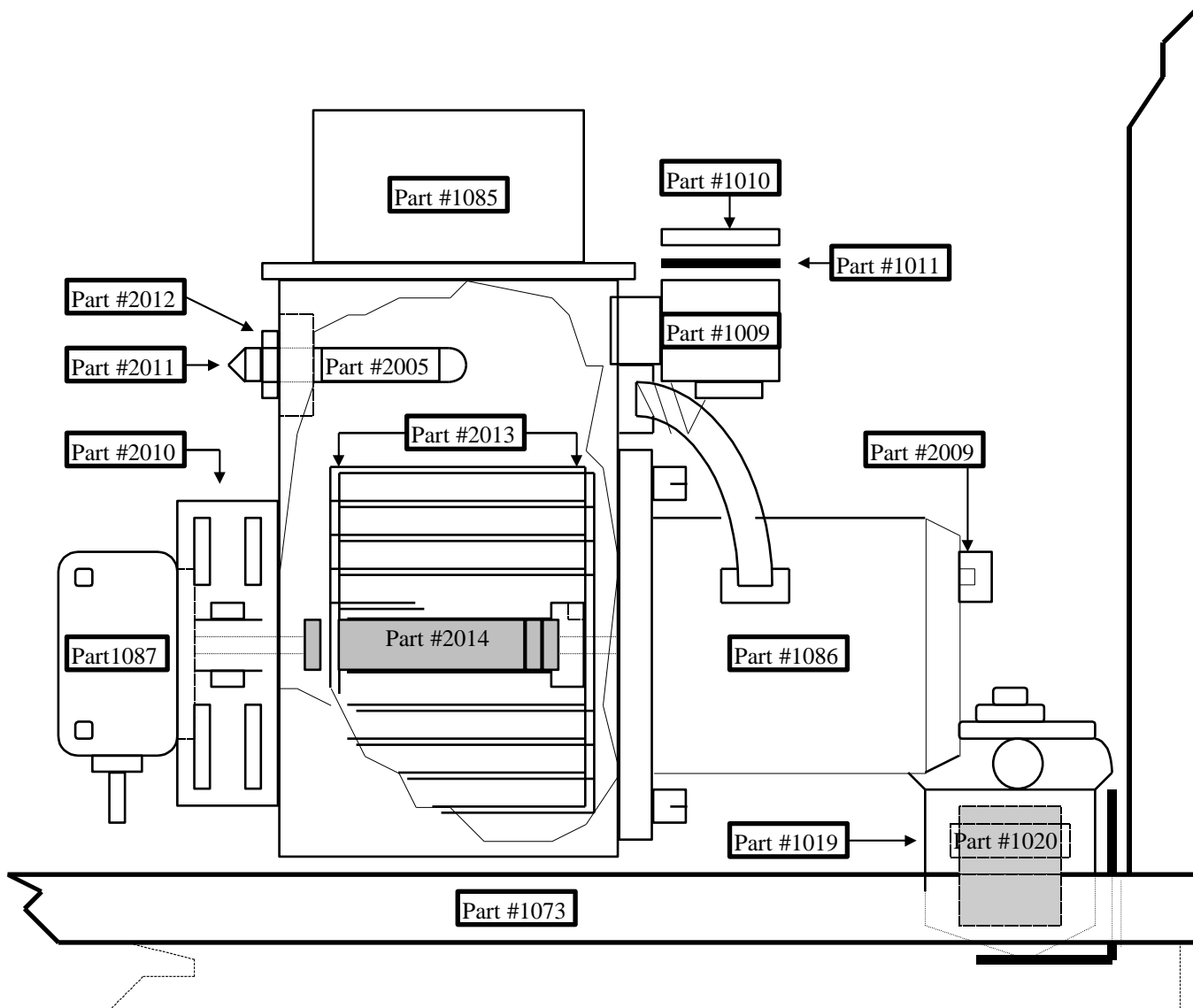
FUEL SYSTEM DIAGRAM AND PARTS LIST



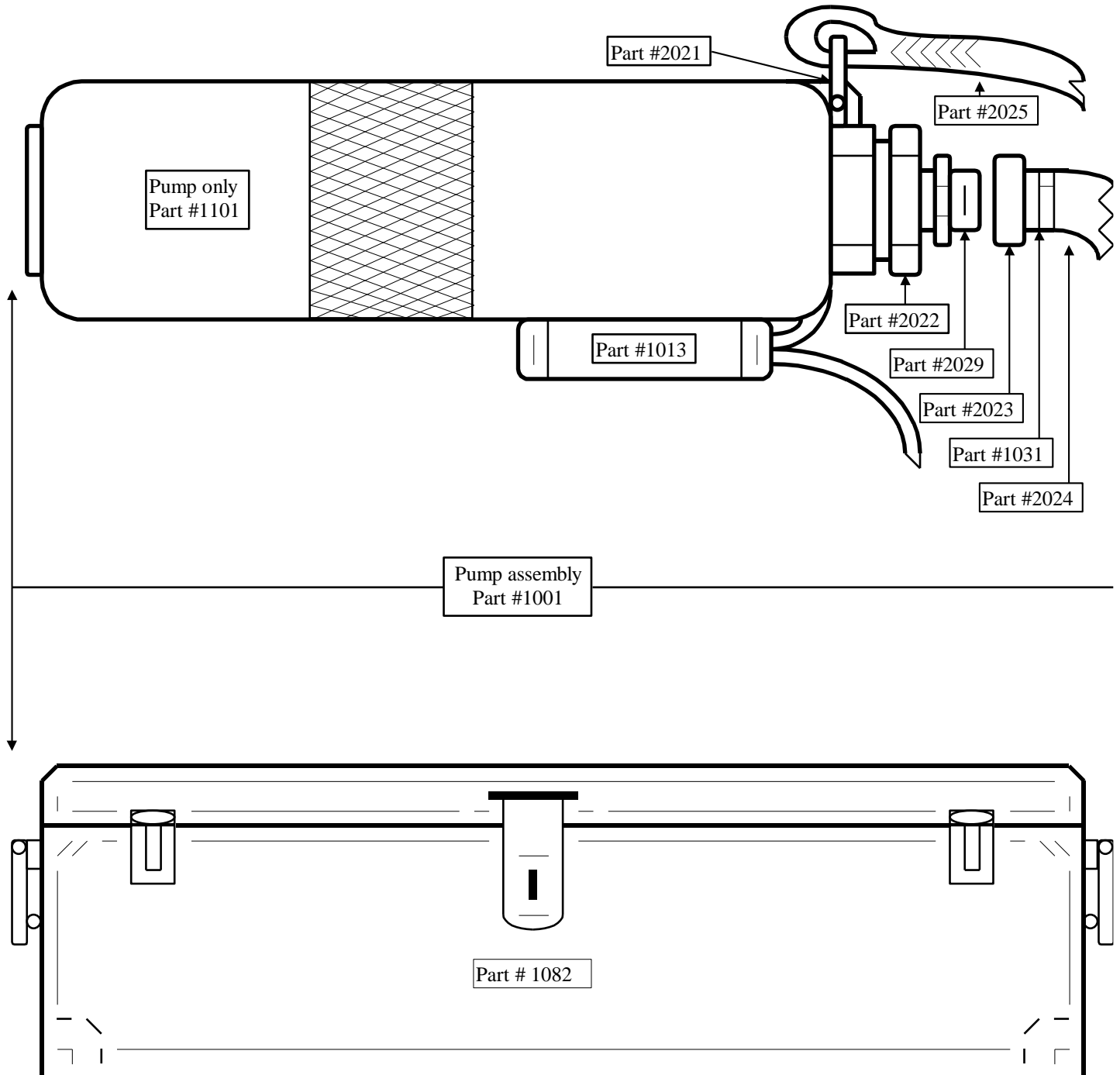
FUEL SYSTEM DIAGRAM AND PARTS LIST



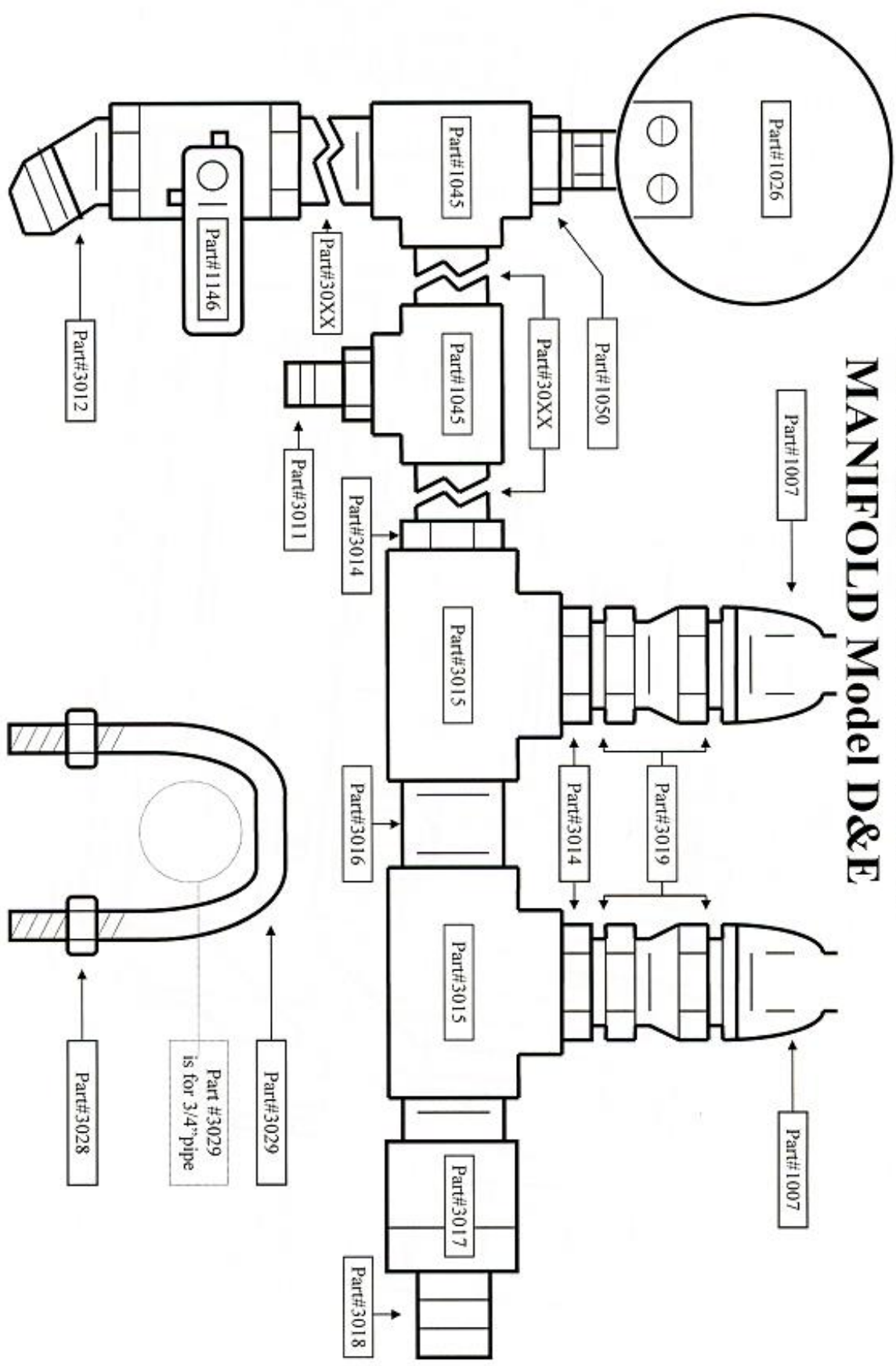
FUEL SYSTEM DIAGRAM AND PARTS LIST



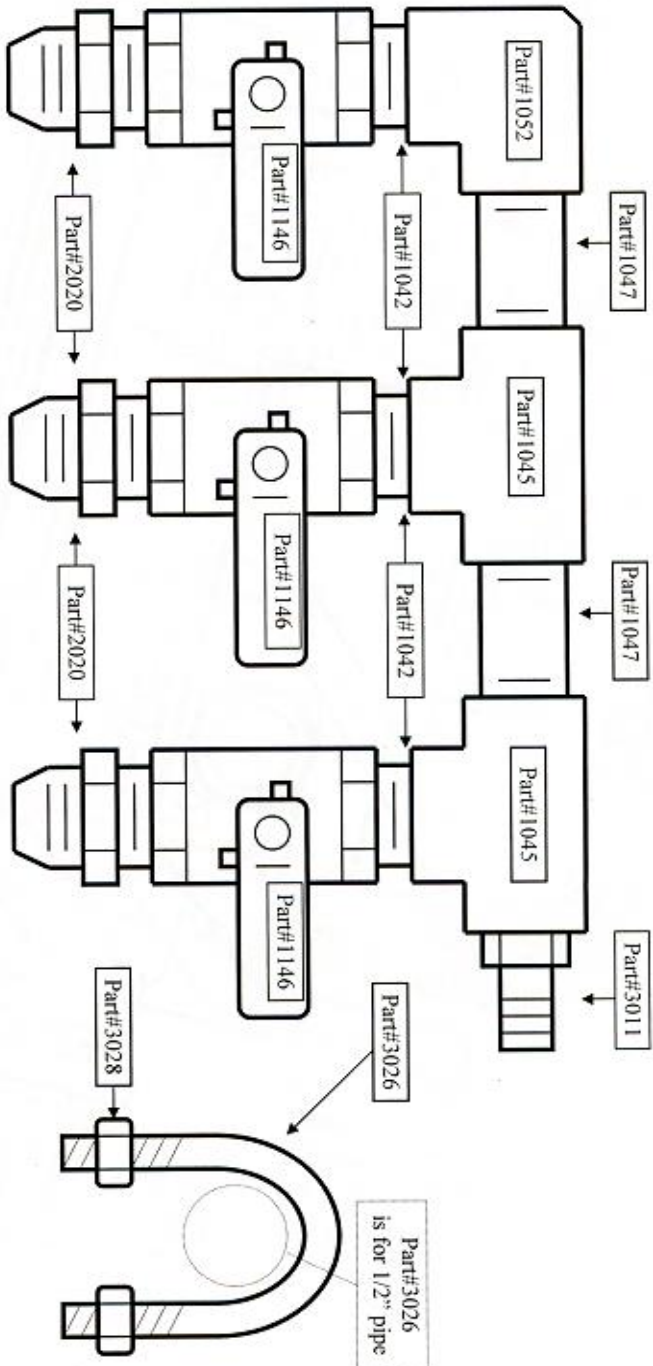
WATER PUMP DIAGRAM AND PARTS LIST



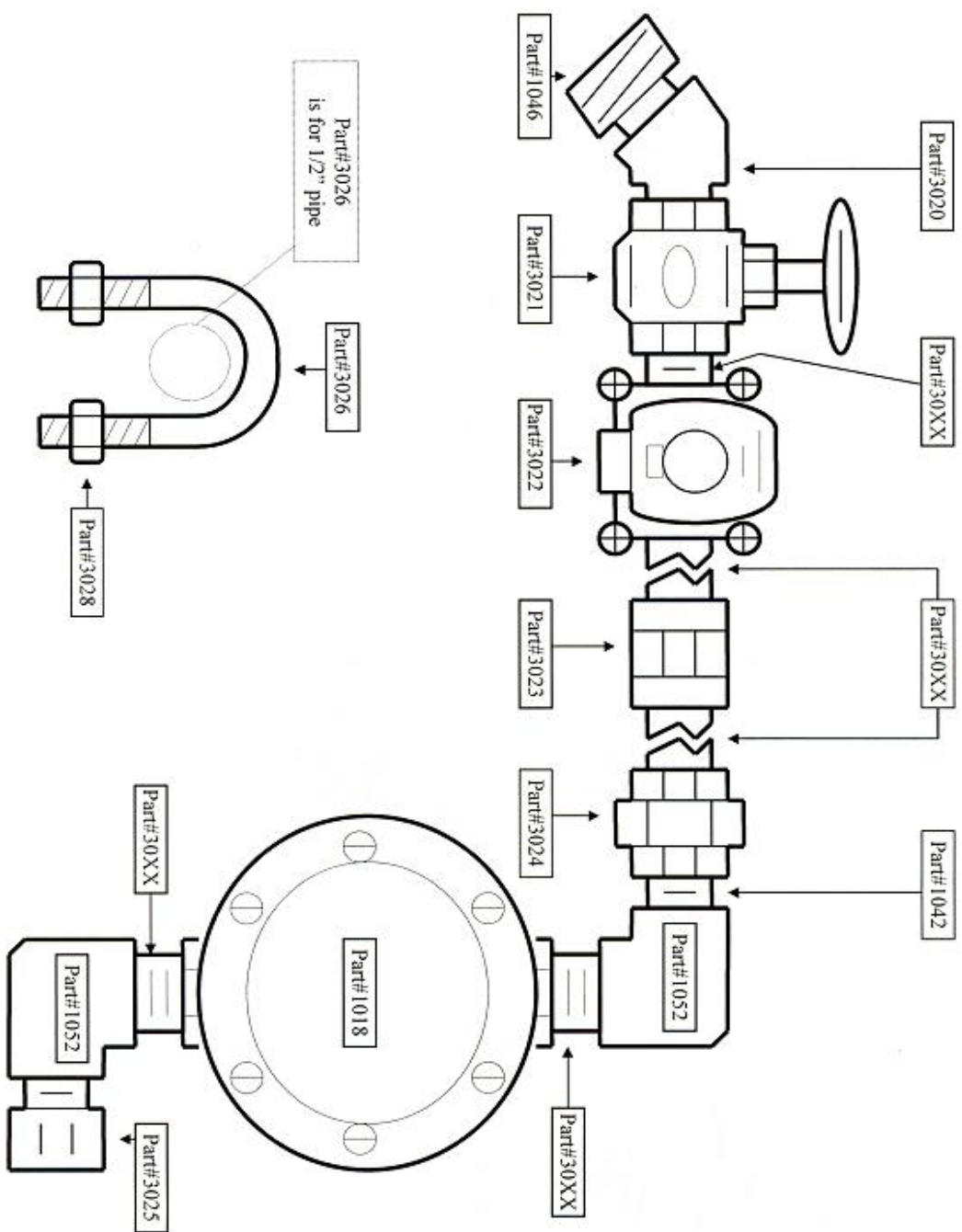
TEMPERATURE SENSOR MANIFOLD Model D&E



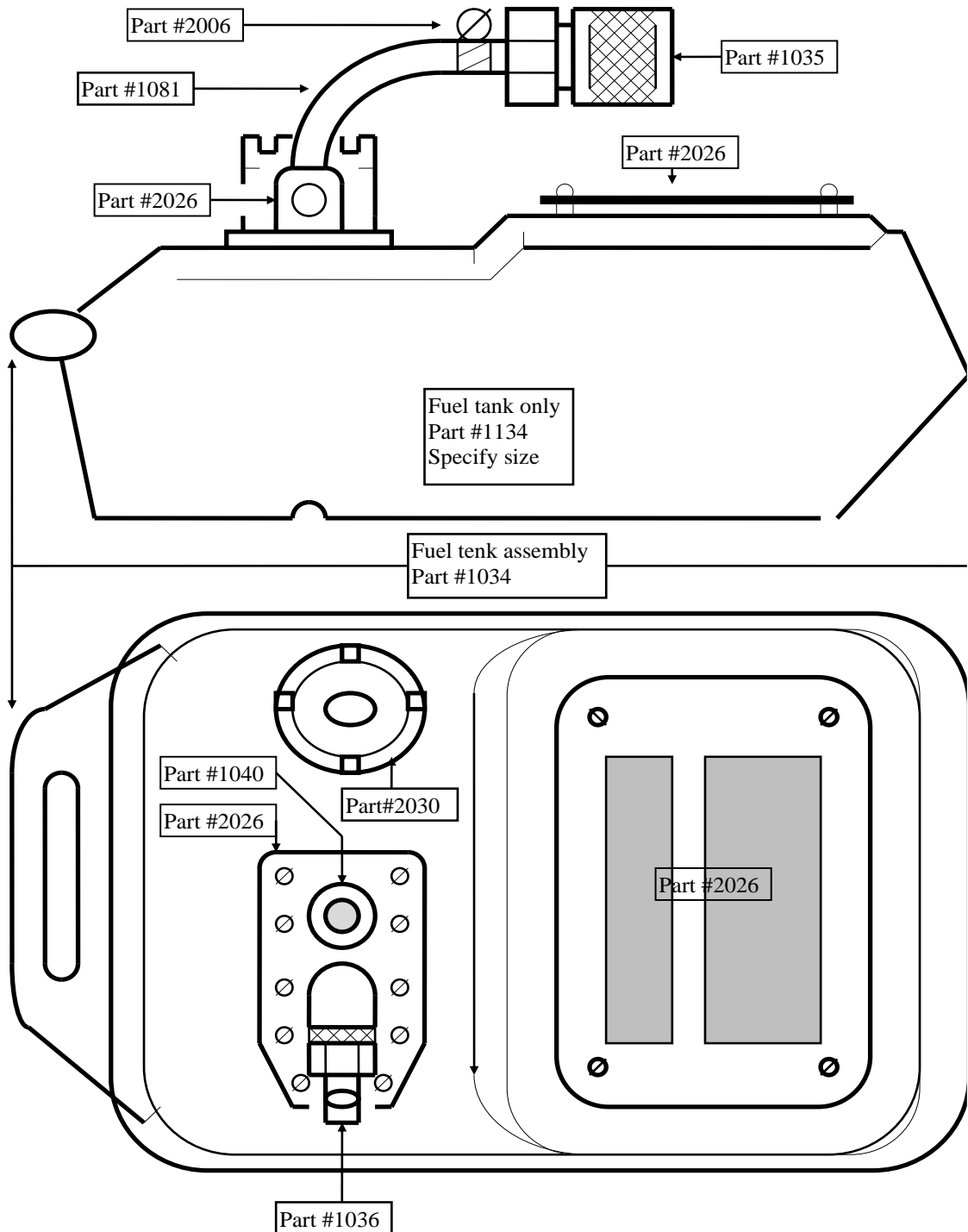
HOT WATER DISTRIBUTION MANIFOLD MODEL D&E



COLD WATER INTAKE MANIFOLD MODEL D&E



FUEL TANK DIAGRAM AND PARTS LIST



PARTS LIST

ITEM #	DESCRIPTION	PART#
1001	SUBMERSIBLE PUMP WITH UMBILICLE	S2J51-J511P/WU
1001B(1101)	SUBMERSIBLE PUMP ONLY	S2J51-J511P
1003	NORMALLY OPEN SWITCH MODULE	ITEZB2BE101
1004	NORMALLY CLOSED SWITCH MODULE	ITEZB2BE102
1005	MUSHROOM PULL SWITCH BODY	ITEZB3B4A
1006	MOMETARY SWITCH ON BODY	ITEZV3B4A
1007	LIQUID TIGHT STRAIGHT CONDUIT CONNECTION 1/2 INCH	FITLTCN050
1008	LIQUID TIGHT 90 DEGREE CONDUIT CONNECTION 1/2 INCH	FITLT9OCN050
1009	90 DEGREE ELECTRICAL BOX LEFT 1/2 INCH	FITLL050
1010	BOX COVER	FITLCC050
1011	COVER GASKET	FITLG050
1013	WATER TIGHT SPLICE KIT	MMM82A
1015	ELECTRICAL BOX TEE 1/2 INCH	FITT0450
1016	15 AMP MALE ELECTRICAL CONNECTOR 110 VOLT	S965VY
1017	LEXAN SWITCH PLATE 1/4 INCLUDE	SS01CDF
1018	FLOW SWITCH 1/2 INCH	FS1W
1019	FUL-FLO FUEL FILTER	FP4
1020	FUL-FLO FILTER REPACEMENT CARTRIDGE	4FO
1021	DELAYED MAG VALVE	V4046A1074
1021B(1121)	MAG VALVE NEMA-4 ENCLOSURE	S401WF02V9BF5
1022	SINGLE POLE SINGLE THROW RELAY	R822B1067
1023	24 x 110 VOLT TRANSFORMER	AT72D1683
1024	DIGITAL READOUT WITH SENSOR	SPC250
1024B(1102)	TEPERATURE SENSOR (PRIMARY)	
1025	NOSE ASSORTMENT 80 DEGREE NS	.75-2.00 80 DEG. NS
1025B		
1026	GAUGE 0-100 PSI	J7D
1027	FLANGE GASKET	3616
1028	COIL ASSEMBLY	31-200
1029	OIL BURNER ASSEMBLY	OBA350
1030	3/8 INC STAINLESS STEEL BAND	
1031	1/2 INCH BARB x 3/4 INCH GARDEN HOSE FEMALE	
1032	1/2 INCH ID-300 WORKING PRESSURE HOSE	1/2 IN.-300WP
1033	LABLE PACKAGE	LP300HW
1034	FUEL TANK (SPECIFY SIZE)	6GAS
1035	FEMALE QUIK DISCONNECT 1/4 INCH	46H CRC
1036	MALE QUICK DISCONNECT 1/4 INCH NPT	461 CRC
1037	PRIME BULB	
1038	1/2 INCH BRONZE GATE VALVE	1211-8
1039	1/2 90 DEGREE STREET ELBOW BRASS	116-8
1040	1/4 INCH BARB x 1/4 INCH MALE NPT BRASS	125-44
1041	1/2 INCH BARB x 3/8 INCH MALE NPT BRASS	110-64
1042	1/2 INCH CLOSE NIPPLE BRASS	112-8
1043	1/4 INCH 90 DEGREE STREET ELBOW BRASS	116-4
1044	1 1/4 INCH x 3/4 INCH BUSHING BRASS	
1045	1/2 INCH FULL FEMALE T BRASS	101-8
1046	3/4 INCH GH x 1/2 INCH INCH NPT BRASS	148-128
1046B(1146)	1/2 INCH IPS BALL VALVE BRASS	BV-8

1047	1/2 INCH x 3 1/2 INCH LONG NIPPLE BRASS	113-856
1050	1/2 INCH x 1/4 INCH BUSHING BRASS	110-84
1051	3/8 INCH NPTx 1/4 INCH HOSE BARB BRASS	125-64
1052	1/2 INCH FULL FEMALE 90 DEGREE ELBOW BRASS	100-8
1053	1/2 INCH x 2 INCH LONG NIPPLE	113-832
1054	1/2 INCH x 11 INCH LONG NIPPLE BRASS	
1055	3/16 INCH FLARE NUT BRASS	41-3
1056	FLARE BY MALE ELBOW BRASS	49-32
1057	FLARE BY MALE STRAIGHT CONNECTOR BRASS	48-32
1058	1/4 INCH x 3/16 INCH BUSHING BRASS	110-42
1059	1/4 INCH HOSE BARB x 1/2 INCH FEMALE NPT BRASS	125F88
1060	1/4 INCH HOSE BARB x 1/4 INCH FEMALE NPT BRASS	125F44
1062	PRIMARY SENSOR WET WELL	WW05
1063	ELECTRICAL CONDUIT 1/2 INCH NON METALIC PER FOOT	EC0514
1064	ELECTRICAL CONDUIT 1/2 INCH NON METALIC PER FOOT	ECO537-75
1065	ELECTRICAL CONDUIT 1/2 INCH NON METALIC PER FOOT	EC0522
1066	ELECTRICAL CONDUIT 1/2 INCH NON METALIC PER FOOT	ECO514
1067	120 VOLT RECEPTICE 15 AMP	5351
1068	FUEL REGULATOR ASSEMBLY	FRAXD
1068B(1168)	0-200 FUEL GAUGE	
1069	MANAFOLD FEED HOSE	MFH05
1072	PUMP UMBILICAL	PU750FM
1073	CHASSIS	PHW300
1074	FUEL LINE FEED 1/4 INCH PER FOOT	FLF25-60
1075	FUEL PUMP FEED PER FOOT	FPF25-18
1076	FUEL BYPASS LINE PER FOOT	FBL27-72
1077	FUEL REGULATOR INLET	FRI46-6
1078	FUEL REGULATOR DISCHARGE	FRD046-5
1079	FUEL BURNER FEED	FBF464-4
1080	FUEL TANK CAP	120CDS
1081	BYPASS CONNECT HOSE PER FOOT	FBC8
1082	PUMP CARRY CASE	30032
1083	JUNCTION BOW ASSEMBLY	JBA300C
1084	UNIT ELECTRICAL FEED	UEF620
1085	BURNER TRANSFORMER	40500
1086	BURNER MOTOR	20554
1087	FUEL PUMP (1ST STAGE)	A2UA
1087B(BUS)	FUEL PUMP (2ND STAGE)	B2VA
1088	BURNER MOUNT NUT	3/8 INCH HEX NUT
1089	SWITCH BOX ASEMBLY	SBA300
1090	SECONDARY HIGH LIMIT CONTROLLER	TS800A
1091	SINGLE PURPOSE CONTACTOR	R8242B106
1093	110 VOLT DELAY (MINIMUM 6 SEC)	TD69
1094	SECONDARY HIGH LIMIT COVER	SSHLC
1095	1/2 INCH 3 HOLE ELECTRICAL COVER	PERC-3
1096	SECONDARY SENSOR CONDUIT CONNECTION	SSCC
1097	SECONDARY SENSOR CONDUIT 1/2 INCH NON METALIC PER	SSC05
1098	1/2 INCH 3 HOLE 2x4 ELECTRICAL BOX OUTDOOR	PERT-11
1099	SRAIN RELIEF CONNECTION 1/2 INCH	2A250
2000	WEATHER TIGHT SINGLE 20 AMP RECEPTACLE COVER	TAY30510
2001	MOTOR CONTROL GFCI	5Z974
2002	GFCI COVER OUTDOOR NON METALIC	
2003	ELECTRODE CERAMIC	

2004	ELECTRODE TUNSGON ONLY	
2005	FUEL DELIVERY TUBE	
2006	HOSE CLAMP	
2007	NOZZLE HOLDER	
2008	AIR DAM	
2009	WATER TIGHT THERMAL RESET COVER	TRC-1
2010	AIR MIX ADJUSTMENT BAND	
2011	BULKHEAD CONNECTOR	
2012	BULKHEAD CONNECTOR RETAINING NUT	
2013	SQUIRREL CAGE FAN	
2014	DRIVE SHAFT	
2015	1/2 INCH FULL FEMALE CROSS	102-8
2016	1/2 INCH NPT x 1/2 INCH SLIP CONNECT WET WELL	SCWW
2017	TEMPERATURE SENSOR (SECONDARY)	
2018	1/2 INCH FEMALE COUPLER	103-8
2019	ELECTRICAL CONDUIT 1/2 INCH NON METALIC PER FOOT	EC05X
2020	1/2 INCH NPT x 45 DEGREE BEVEL	
2021	STAINLESS STEEL SHACKLE	
2022	1 1/4 X3/4 BUSHING BRASS	
2023	1/2 INCH BARB x 3/4 INCH FEMALE GARDEN HOSE BRASS	
2024	3/4 INCH 300 POUND WORKING PRESSURE WATER HOSE PER	
2025	3/8 INCH POLYPRO ROPE PER FOOT	
2026	FIBERGLASS "DANGER- DEISEL FUEL" TANK LABEL	
2027	FUEL SENDING TANK UNIT	
2028	FUEL REGULATOR MOUNTING BRACKET	RBM-LEXAN
2029	3/4 INCH NPT x 3/4 INCH GARDEN HOSE MALE ADAPTOR	
2030	FUEL TANL FILL CAP	
2031	END CAP BURNER	
2032	END ACAP DISCHARGE	
2033	OVERSEAS PARTS BOX	
2034	OVERSEAS PARTS KIT	
2035	STEP DOWN TRANSFORMER	
2036	WHEEL KIT	
2037	25 GALLON TANK MOBILE	
2038	50 CYCLE CONVERSION KIT WITH SPARES	
2039	INTEGRAL EVACUATION (PNEUMATIC)	
2040	SECONDARY SENSOR MODEL C	
2041	BUCKET EVACUATION RESEVOIR (FREE STANDING)	
2042	FUEL SOLENOID VALVEAND BURNER ISOLATION SWITCH (2	
3000	MODEL D/E CHASSIS	PHWDE
3001	EVACUATION SWITCH (MOMENTARY)	
3002	CONTROL PANEL ONLY (LEXAN PLATE)	
3003	2x4 SINGLE OUT PVC ELECTRICAL BOX	
3004	CONTROL SWITCH ASSEMBLY (COMPLETE)	
3005	PANEL FLANGE	
3006	LARGE BARRIER STRIP	
3007	SMALL BARRIER STRIP	
3008	GROUND BAR	
3009	CONTROL BOW ASSEMBLY WITH COMPONENTS	
3010	PUNCH CONTROL BOX ONLY	
3011	1/2 INCH NPTM x 1/2 INCH BARB	
3012	1/2 INCH NPTM x 1/2 INCH JIC 45 DEGREE	
3013	1/2 INCH LONG NIPPLLE ORDER BY MEASUREMENT	

3014	1/2 INCH X 3/4 INCH BUSHING	
3015	3/4 INCH FFM TEE	
3016	3/4 INCH NIPPLE 2 INCH	
3017	3/4 INCH 45 DEGREE STRAIGHT ELBOW	
3018	3/4 INCH NPTM x 1/2 INCH BARB	
3019	TEMPATURE SENSOR WET WELL	
3020	1/4 INCH 45 DEGREE ELBOW	
3021	1/2 INCH GATES VALVE	
3022	1/2 INCH WATER SOLNOID VALVE	
3023	1/2 INCH HEX COUPLER	
3024	1/2 INCH UNION	
3025	1/2 INCH STEP UP	
3026	1/4 INCH / 20 STAINLESS STEEL U-BOLT (1/2 INCH PIPE)	
3027	1/4 INCH FLAT WASHER	
3028	1/4 INCH /20 SAINLESS STEEL NYLOCK NUT	
3029	1 1/4 INCH / 20 STAINLES STEEL U-BOLT (3/4 INCH PIPE)	
FRK100/3	MONKEY HEATER SPARE PARTS KIT	
HWDHM	DUAL HEATER MANIFOLD	

Video Links

CDL Fuel Pump Replacement: https://www.youtube.com/watch?v=nd0CCN5L_y4

CDF Nozzle Change: <https://www.youtube.com/watch?v=j-BIghmOebQ&t=6s>

CDF Transformer Replacement: <https://www.youtube.com/watch?v=gjvkKpEPY0M>

CDF E Valve Re-build: <https://www.youtube.com/watch?v=cH6wvu5ul7U>

CDF Sensor: https://www.youtube.com/watch?v=TocJX_dV8Wo

CDF Fuel Filter Change: <https://www.youtube.com/watch?v=Co7rtlse8rw>

CDF Time Delay: <https://www.youtube.com/watch?v=yGJHNNYdsIc>

CDF Flow Switch: <https://www.youtube.com/watch?v=yumHcwwKyBo>

CDF Digispan: <https://www.youtube.com/watch?v=wp-I-lf7HjQ>