

Chapter 6 Service & Troubleshooting

6.1 INTRODUCTION

This chapter describes all of the major service events, for the AVID Dryer. Manual system control procedures for maintenance and service personnel are described in this chapter. In addition, basic troubleshooting guidelines and methods are provided.



Danger!

The following maintenance procedures and service steps may involve direct system control, which requires a high level of training and thorough knowledge of the AVID process, hardware, and their interactions. The following procedures should **ONLY** be performed by qualified service personnel.

6.2 MANUAL SYSTEM CONTROL

This section describes how to manually operate all functions on the AVID Dryer using commands found in the SERVICE screens.



Warning!

The steps described here involve manual control of the AVID system. In Service Screen Mode, many of the functions available do not contain the usual safety interlocks. Caution and prudence should be exercised at all times when operating the system in Service Mode to avoid damaging the system or creating potentially hazardous conditions for yourself or others.

Procedure:

1. **Check** the Touch Screen User Interface (TUI). If it is illuminated, go on to the next step. If not, press the green start button, located below the EMERGENCY POWER OFF button on the front control panel. The Touch Screen User Interface (TUI) should then illuminate; if not, verify the following:

- System is properly plugged into an electrical outlet.
- The EMERGENCY POWER OFF button is pulled out.
- The Main Disconnect Switch on the back of the system is in the vertical position
- The circuit breaker switch, located inside the electrical box, is in the up position. Only trained maintenance personnel should perform this function.

3. *Touch* **MAIN MENU** (TITLE SCREEN) and the MAIN MENU screen appears.

4. *Touch* **SERVICE** (MAIN MENU) and the SERVICE Screen appears.

5. **Ensure** that no red indicator lights are lit. If any red indicator light are lit, refer to the Troubleshooting guide later in this chapter to determine cause and solution.

The SERVICE SCREEN is set up with the Active control buttons in the left hand column, and status indicator lights only in the center and right hand columns. See Figures 27-29. Service Mode is available any time, as long as the system is NOT running a process. If an Alarm condition exists, the Service Mode may be chosen automatically by the software.

Figure 27 – Service Screen (part 1 – Active Buttons – left hand column only)

SERVICE			Button	Function
<input checked="" type="checkbox"/> DI ON	<input type="checkbox"/> DI HIGH	<input type="checkbox"/> FLOW SWITCH	DI ON	Starts DIW flow into chamber
<input checked="" type="checkbox"/> HEATER	<input type="checkbox"/> DI LOW	<input type="checkbox"/> O.T. SWITCH	HEATER*	Starts Heater, to current recipe setpoint
<input checked="" type="checkbox"/> IPA ON	<input type="checkbox"/> LID LEAK	<input type="checkbox"/> PLENUM LEAK	IPA ON*	Starts IPA flow to Sonic Head
<input checked="" type="checkbox"/> N2 HIGH	<input type="checkbox"/> LID OPEN	<input type="checkbox"/> PLC BATTERY	N2 HIGH	Starts system N2 high flow
<input checked="" type="checkbox"/> LID O.	<input type="checkbox"/> IPA LOW	<input type="checkbox"/> T.C. OPEN	LID O.	Opens/closes lid
<input checked="" type="checkbox"/> N2 MED.	<input type="checkbox"/> FOOT SWITCH		N2 MED.	Starts system N2 med flow
<input checked="" type="checkbox"/> IPA MTR.	<input type="checkbox"/> HEATER DELTA	<input type="checkbox"/> ?HELP?	IPA MTR	Starts IPA circuit pump motor
<input checked="" type="checkbox"/> DRAIN O.	<input type="checkbox"/> LID CLOSE	<input type="checkbox"/> EXIT	DRAIN O.	Opens/closes chamber drain
<input checked="" type="checkbox"/> SONIC PWR			SONIC PWR*	Starts RF to Sonic Head

***This button is interlocked. Prerequisite functions must be completed before pressing button.**

Button	Prerequisite conditions required
HEATER	N2 HIGH button pushed, N ₂ Flow switch input must be made
IPA ON	IPA MTR button pushed
SONIC PWR	IPA MTR button pushed

Figure 28 – Service Screen (part 2 – Sensor Indicators – center column)

SERVICE			Indicator	Sensor tripped
<input checked="" type="checkbox"/> DI ON	<input type="checkbox"/> DI HIGH	<input type="checkbox"/> FLOW SWITCH	DI HIGH	High level chamber sensor
<input checked="" type="checkbox"/> HEATER	<input type="checkbox"/> DI LOW	<input type="checkbox"/> O.T. SWITCH	DI LOW	Low level chamber sensor
<input checked="" type="checkbox"/> IPA ON	<input type="checkbox"/> LID LEAK	<input type="checkbox"/> PLENUM LEAK	LID LEAK	Lid Leak Sensor
<input checked="" type="checkbox"/> N2 HIGH	<input type="checkbox"/> LID OPEN	<input type="checkbox"/> PLC BATTERY	LID OPEN	Lid Open Sensor
<input checked="" type="checkbox"/> LID O.	<input type="checkbox"/> IPA LOW	<input type="checkbox"/> T.C. OPEN	IPA LOW	IPA Low level
<input checked="" type="checkbox"/> N2 MED.	<input type="checkbox"/> FOOT SWITCH		FOOT SWITC	Foot Switch activated
<input checked="" type="checkbox"/> IPA MTR.	<input type="checkbox"/> HEATER DELTA	<input type="checkbox"/> ?HELP?	HEATER DEI	TC/heater1 vs. TC/heater2
<input checked="" type="checkbox"/> DRAIN O.	<input type="checkbox"/> LID CLOSE	<input type="checkbox"/> EXIT	LID CLOSE	Lid Close Sensor
<input checked="" type="checkbox"/> SONIC PWR				

Figure 29 – Service Screen (part 3 – Sensor Indicators – right hand column)

SERVICE			Indicator	Sensor tripped
<input checked="" type="checkbox"/> DI ON	<input type="checkbox"/> DI HIGH	<input type="checkbox"/> FLOW SWITCH	FLOW SWITCH	N2 Flow Sensor
<input checked="" type="checkbox"/> HEATER	<input type="checkbox"/> DI LOW	<input type="checkbox"/> O.T. SWITCH	O.T. SWITCH	Heater OverTemp Switch
<input checked="" type="checkbox"/> IPA ON	<input type="checkbox"/> LID LEAK	<input type="checkbox"/> PLENUM LEAK	PLENUM LEAK	Liquid Sensor, system Plenum
<input checked="" type="checkbox"/> N2 HIGH	<input type="checkbox"/> LID OPEN	<input type="checkbox"/> PLC BATTERY	PLC BATTERY	Voltage, PLC Battery
<input checked="" type="checkbox"/> LID O.	<input type="checkbox"/> IPA LOW	<input type="checkbox"/> T.C. OPEN	TC OPEN	Heater TC, either one
<input checked="" type="checkbox"/> N2 MED.	<input type="checkbox"/> FOOT SWITCH	<input type="checkbox"/> ?HELP?	?HELP?	Accesses HELP Screen if Alarm condition exists
<input checked="" type="checkbox"/> IPA MTR.	<input type="checkbox"/> HEATER DELTA	<input type="checkbox"/> EXIT	EXIT	Returns MAIN MENU Screen
<input checked="" type="checkbox"/> DRAIN O.	<input type="checkbox"/> LID CLOSE			
<input checked="" type="checkbox"/> SONIC PWR				

6.3 TROUBLESHOOTING MAJOR ALARM CONDITIONS

This section describes all the major Alarm conditions one may encounter on the AVID dryer and how to diagnose, and solve the Alarm condition to clear the Alarm.



Warning!

The steps described here involve manual control of the AVID system. In Service Screen Mode, many of the functions available do not contain the usual safety interlocks. Caution and prudence should be exercised at all times when operating the system in Service Mode to avoid damaging the system or creating potentially hazardous conditions for yourself or others.

DRAIN TIMER ALARM	The drain timer times the water being displaced in the tank
<u>DRAIN TIMER ALARM cause #1</u>	
Check drain valve function. Verify CDA regulator is 80 psi. Using SERVICE SCREEN fill process tank with DIW, activate drain, observe DI level. If water doesn't drain, check solenoid voltage at connector #14 (24vdc) solenoid functions, replace valve.	
<u>DRAIN TIMER ALARM cause #2</u>	
Check drain valve adjustment. Using SERVICE SCREEN, fill the tank, open the drain valve, verify that the water is displaced at 2mm/sec. Adjust drain valve through front access panel with a 5/32" Allen wrench.	
<u>DRAIN TIMER ALARM cause #3</u>	
Check level sensors. Using service screen, fill with DIW observe DI HIGH and LOW indicator lights. Green means liquid detected. Adjust sensors by moving up or down in small increments or replace sensors if adjustment doesn't work.	

LID TIMER ALARM	This alarm monitors lid movement. It waits for a complete lid open or close to occur within a given time.
<u>LID TIMER ALARM cause #1</u>	Check basic settings. Verify that the CDA regulator is set for >80 psi. Verify solenoids are functioning properly by activating lid using SERVICE SCREEN. If there is no movement, check solenoid voltage at connector. Solenoids are located behind the right access panel (connector #13 24 VDC).
<u>LID TIMER ALARM cause #2</u>	Check Hall sensors if lid moves. Sensors are on air cylinder behind left access panel. When lid is closed, top sensor should be lit. When lid is open, bottom sensor should be lit. Sensors can be adjusted with a small blade screwdriver and incremental movements up or down.
<u>LID TIMER ALARM cause #3</u>	Adjust flow valves if lid moves and sensors function. They are located on the air cylinder air inputs. Use a small blade screwdriver and adjust for smooth movement. Bottom valve adjusts opening speed, top valve adjusts closing speed.

N₂ LOW FLOW ALARM	The system monitors the N ₂ flow at the beginning of the process for a minimum flow of 20/lpm
<u>N₂ LOW FLOW ALARM cause #1</u>	Verify N ₂ pressure. Verify that the N ₂ regulator located inside the front access panel on the left side is set to a minimum of 80 psi.
<u>N₂ LOW FLOW ALARM cause #2</u>	Verify N ₂ flow. Using service screen, verify no N ₂ flow button is selected. Observe N ₂ flowmeter and verify flow of 5-8 lpm. Select N ₂ medium flow and verify a flow of 35 lpm. Select N ₂ high and deselect N ₂ medium. Verify a flow of at least 80 lpm. Valves are behind flowmeter.
<u>N₂ LOW FLOW ALARM cause #3</u>	Check N ₂ flow switch. Locate N ₂ flow switch behind lid assembly, disconnect connector. Using SERVICE SCREEN, select N ₂ medium flow. Ohm connector on switch side. Resistance should read zero. If not, replace switch.

FILL TIMER ALARM	The system monitors the time to fill the tank during the beginning of a cycle.
<u>FILL TIMER ALARM cause #1</u>	Check DIW facility. Using service screen, turn on DI water. Observe that the water is flowing. If not, verify that facility water is available and system is connected to DIW supply.
<u>FILL TIMER ALARM cause #2</u>	Check DIW valve, located behind the rear access panel. Remove tubing going to valve and activate using SERVICE SCREEN. If no pressure in tube, check solenoid voltage located on the right side of tool (connector #11 24 VDC).
<u>FILL TIMER ALARM cause #3</u>	Verify tank sensors. Using SERVICE SCREEN when tank is full, DI HIGH and LOW indicator lights should be green. If not, readjust or replace sensors. Sensors are located inside front access panels between tank and front control box.

IPA TIMER ALARM	This alarm monitors the level of water after the Cascade step during a cycle (initializing IPA flow). The water should drop to 1/8" below the overflow point within 45 seconds.
<u>IPA TIMER ALARM cause #1</u>	Check drain valve function. Verify CDA regulator is 80 psi. Using SERVICE SCREEN fill process tank with DIW, activate drain, observe DI level. If water doesn't drain, check solenoid voltage at connector #14 (24 VDC). If solenoid functions, replace valve. See drain alarm.
<u>IPA TIMER ALARM cause #2</u>	Adjust sensor. Verify DI high sensor is in the proper position. Using the service screen, fill with DIW and drain until DI HIGH indicator is not lit. Water should be 1/8" below overflow point. If not, adjust sensor position located between front of tank and front control panel.

LID LEAK ALARM	The PLC monitors the lid leak sensor and alarms if liquid is detected around the lid sensor.
<u>LID LEAK ALARM cause #1</u>	Visually inspect for leak. Power system down. Remove lid cover. Inspect the secondary containment area for liquid. If liquid is present, find leak and repair. Restart tool. Caution: sensor is capacitive and will activate when most objects are placed within its vicinity.
<u>LID LEAK ALARM cause #2</u>	Check sensor functionality. Locate lid leak sensor inside lid cover. Find connector 6. Check voltage at J6 pins 1 and 3 for 24 VDC. If voltage is present, reconnect and check pins 1 and 2 for sensor functionality (24 VDC). If not functioning, ohm J6 pin 2 back to PLC with power down.
<u>LID LEAK ALARM cause #3</u>	Check/adjust sensor gain. If sensor doesn't function, remove from bracket and adjust gain on sensor. If still not functioning, replace sensor.

HEATER OVERTEMP ALARM	The PLC monitors the output of the heater for an over temperature condition, monitoring two bi-metal overtemp switches located on the output of the heaters behind the lid.
<u>HEATER OVERTEMP ALARM cause #1</u>	Check temp controller setpoint. Open the front electrical access panel. Bypass the interlock switch. Using SERVICE SCREEN, activate N2 HIGH and HEATER. Verify that the temp controller's setpoint is lower than 300 degrees Celsius. If it is not, use arrows on temp controller to change temperature setpoint.
<u>HEATER OVERTEMP ALARM cause #2</u>	Check overtemp switch. Do not start until heaters are cool. Locate bi-metal switches on heaters. Open connector and ohm out. If resistance is infinite and heater is not hot, replace switch.

TC OPEN ALARM	The PLC monitors the TCs in the heaters and will detect if the wires fail open.
<u>TC OPEN ALARM cause #1</u>	Check thermocouple. Power system down. Open left side panel and remove connector #1. With a multimeter check out pins 11 and 12 and then pins 13 and 14. The meter should show resistance. If not, replace corresponding TC wire.
<u>TC OPEN ALARM cause #2</u>	Check thermocouple module. Power down. Remove front electrical access panel. Locate TC module p/n F2-04THM, located in slot two of the PLC. Ohm out ch1 and then ch2. If both channels show resistance, replace module. Otherwise, replace corresponding TC wire.

PLC BATTERY ALARM	The PLC monitors the backup battery voltage. If it falls below 2.5 VDC, this alarm will occur.
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PLC BATTERY replacement
 The battery should only be removed if a replacement is immediately available. Memory failure will occur 3 minutes after battery is removed. The OEM battery p/n is D2-BAT-1. The PLC is located behind the front electrical access cover.. Power system down before removing panel. Slot 1 of the PLC contains the CPU, which holds the battery in a coin style holder. Note pole orientation during removal.

HEATER DELTA ALARM	The PLC monitors the two heater temperatures individually and will alarm if their temperatures differ by more than 20 degrees Celsius.
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HEATER DELTA ALARM cause #1
 Check SSR. Authorized service personnel only. Open front electrical access panel. Locate SSR 1, 2. Using SERVICE SCREEN, turn on N2 HIGH and HEATER. Check voltage from relay output to ground. Both relays should be 110-120 VAC. If not, replace associated relay.

HEATER DELTA ALARM cause #2
 Check Heater. Power system down. Remove left side access panel. Remove connector #1. Ohm out pins 1 and 5 and then pins 5 and 6. Both readings should be approximately 31 ohms. If not, replace associated heater.

PLENUM LEAK ALARM	The PLC monitors the plenum leak sensor and alarms if liquid is detected around the sensor.
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PLENUM LEAK ALARM cause #1
 Visual check. Power system down. Remove either side panel. Inspect the secondary containment area for liquid. If liquid is present, find leak and repair.. Restart tool. Caution: sensor is capacitive and will activate when most objects are placed within its vicinity.

PLENUM LEAK ALARM cause #2
 Check sensor functionality. Locate plenum leak sensor inside tool in the bottom rear. Find connector #8. Check voltage at J8 pins 1 and 3 for 24 VDC. If voltage is present, reconnect and check pins 1 and 2 for sensor functionality (24 VDC). If functioning, ohm J8 pin 2 back to PLC with power down.

PLENUM LEAK ALARM cause #3
 Check/adjust sensor gain. If sensor doesn't function, remove from bracket and adjust gain on sensor. If still not functioning, replace sensor.

IPA LOW ALARM	The PLC monitors the IPA low sensor and alarms if the IPA becomes low. If the tool is running, the PLC will allow the recipe to complete before indicating the alarm. If the tool is idle, the alarm is immediate.
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IPA LOW ALARM cause #1
 Visually check IPA level. Remove front access panel. Observe IPA bottle. If IPA level is low, replace with new full IPA bottle.

IPA LOW ALARM cause #2
 Check sensor functionality. Locate IPA low sensor inside front access panel. Find connector 7, and check voltage at J7 pins 1 and 3 for 24 VDC. If voltage is present, reconnect and check pins 1 and 2 for sensor functionality (24 VDC). If functioning, ohm J7 pin 2 back to PLC with power down.

IPA LOW ALARM cause #3
 Check/adjust sensor gain. If sensor doesn't function, remove from bracket and adjust gain on sensor. If still not functioning, replace sensor.

6.4 CHANGING THE IPA BOTTLE

This section describes the proper method to change the IPA bottle.

What's Needed

- 1 gallon IPA (isopropyl alcohol)
- Protective gloves (butyl rubber, PVC or equivalent)
- Clean room wipes
- Safety glasses



Important!

Use IPA that meets the following specifications only!

Purity $\geq 99.99\%$

Particles $< 150 > 0.1 \mu\text{m}$ per cc

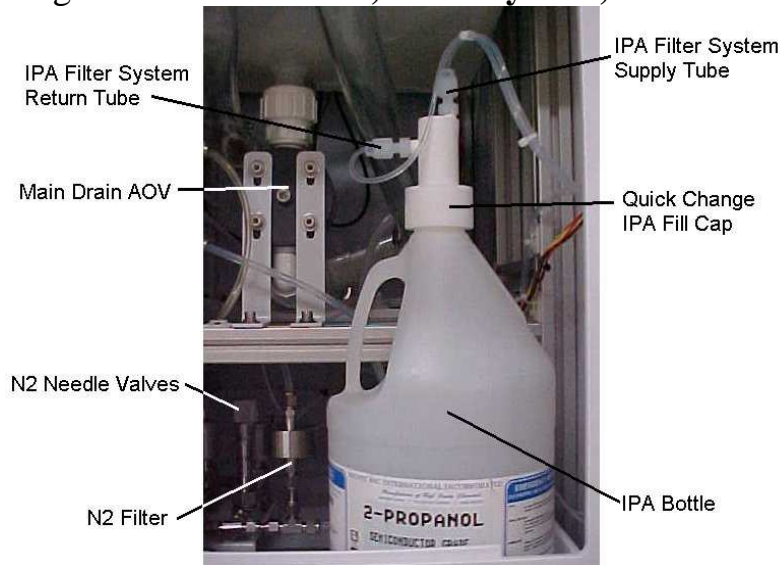
SEMI Standard CI.15-96



Warning!

Wear protective gloves (butyl rubber, PVC or equivalent) and safety glasses with side shields. Work in a well ventilated area.

Figure 30 – IPA Bottle, inside system, front view



Procedure:

1. **Open** front access panel (located under touch screen) while standing in front of system, by lifting latch at top center of panel and pulling panel in an outward and upward motion.

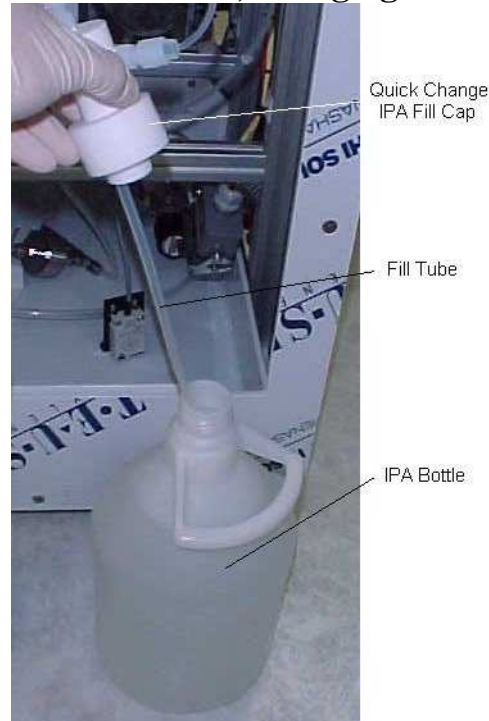


Important!

Perform the remaining steps 2 through 8 as quickly as possible!

2. **Unscrew** the Quick Change IPA Fill Cap from the IPA bottle.
3. **Remove** the IPA bottle from system and lower it, allowing the remainder of the tube from the Fill Cap to slide out of the bottle.

Figure 31 – IPA Bottle, changing IPA Fill Cap



4. **Place** the old bottle on the floor next to the system while holding the Fill Cap. Keep the Fill Cap and the attached tubes from contacting anything to prevent contamination.
5. **Open** the new IPA Bottle (it must be the same shape, size and cap configuration as the existing one) and insert the Fill Cap tubing into the bottle.
6. **Slide** the tube all the way into the bottle while lifting the bottle and placing it back in the system. Make sure the outside of the bottle is dry so you do not trigger the IPA LEAK sensor in the bottom of the system.
7. **Screw** the Quick Change IPA Fill Cap on the bottle hand tight.
8. **Replace** the front access panel. Place the panel on the bottom ledge of the opening and snap the top into place.

6.5 CHANGING THE FUSES

This section describes the proper method to change the fuses in the system electrical junction box.

What's Needed:

- Replacement fuse (various current ratings)
- Large Phillips head screwdriver



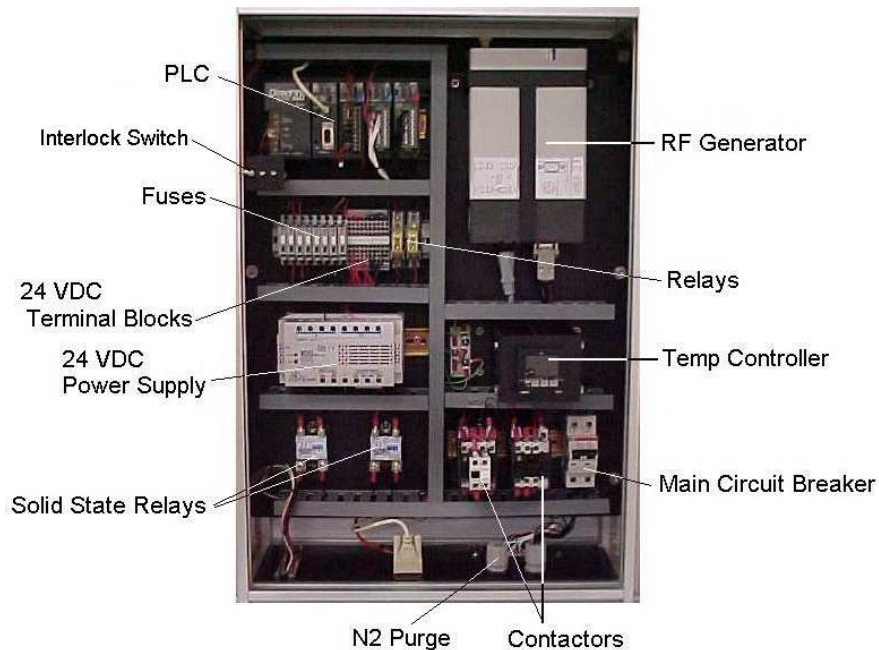
Danger!

This system operates on 200-240 volt, single phase AC power. Only trained, qualified service personnel should access the Electrical Junction Box, or perform the following installation steps.

Procedure:

1. **Ensure** that no wafers are in the Process Chamber and that the system is not running any processes.
2. **Turn** the Breaker switch on the Main Power Junction Box to horizontal, to turn power OFF to the system.

Figure 32 – Electrical Junction Box, front view

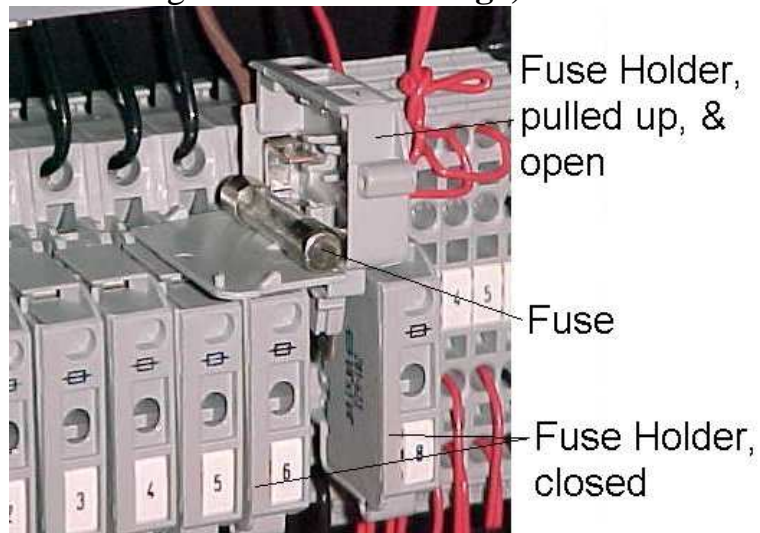


3. **Remove** the system Electrical Panel cover with the large Phillips head screwdriver. Loosen all the “T” nuts in the perimeter of the panel only enough so that they may be turned 90° and the panel taken off. Put the panel in a clean, secure place.

4. **Locate** the Fuse Bank in the center left side of the Electrical Junction Box.

5. **Lift** up on the front lower tab of the fuse housing which contains the fuse you wish to change. The Fuse Holder will hinge up from the bank.

Figure 33 – Fuse change, front view



6. **Open** the Fuse Holder by unsnapping the access door on the left side of the Fuse Holder.
7. **Remove** the blown fuse, cleaning up any pieces of the old fuse, if it is broken.
8. **Place** new fuse into slot. Snap access door closed and push the Fuse Holder back down into place.
9. **Replace** the system Electrical Panel cover with the large Phillips head screwdriver.
10. **Turn** the Breaker switch on the Main Power Junction Box to vertical, to turn power ON to the system.