



PROVIDING RESISTOR AND LOAD BANK TECHNOLOGY... TO THE WORLD



PortaBank™ Series

X100-MSH Load Bank

X100-MSH-BF Load Bank

X100-MSH-NWH Load Bank

X100-MSH-NWH-BF Load Banks

Operation and



Service Manual

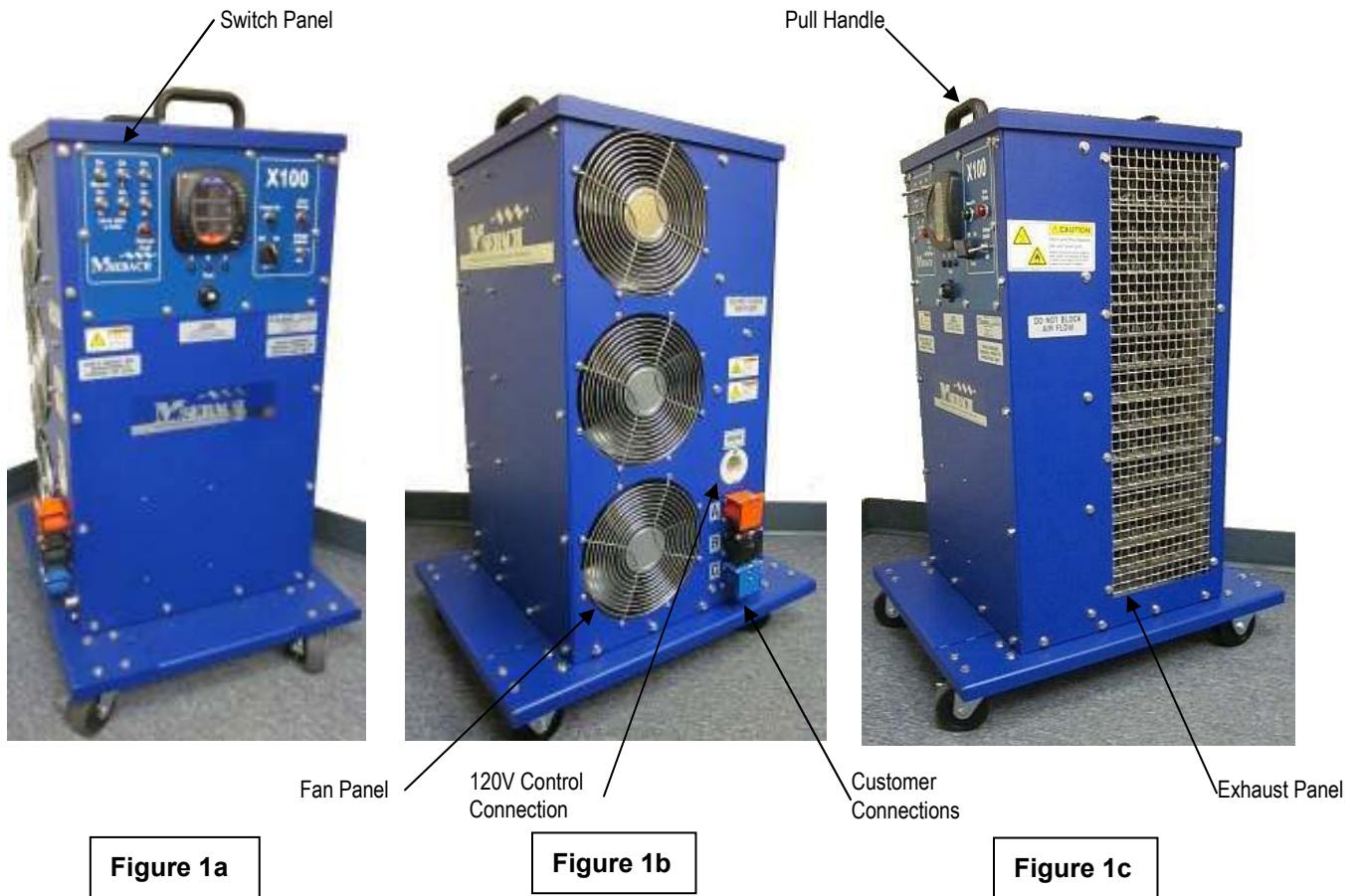
Read all instructions before using the load bank

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IMPORTANT INSTRUCTIONS

1. Components



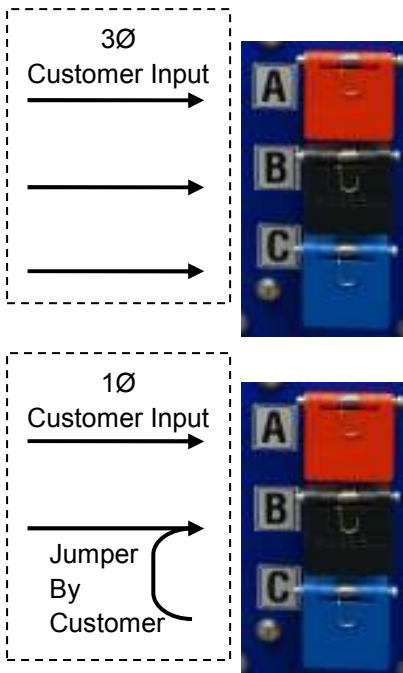
Total Assembly

X100-MSH-BF

2) Specifications

Blower	120VAC, single phase, 60Hz powered from control
Control power	120VAC, single phase, 60 Hz
Rating	Continuous duty
Power factor	1.0
Load elements	Each circuit is connected in delta. The kW at each step is subject to a manufacturing tolerance of ±5%.
Enclosure	Electro-statically powder coat, Blue: PPG PCTZ50108 Touch up paint is Pantone 280-c color. Plastikote custom color universal blend. Air inlet and outlet are covered by metal screens. Heat is discharged horizontally.
Environmental	Quantity three 120V, 1130CFM fans to bring outside air into the load bank.

a) X100 Load Bank



Input Voltage	Volt. Mode	kW Steps	kW Steps	kW Steps	kW Steps	kW Steps	Total Power	Amps
480vAC, 3Ø Resistive	480	5	10	10	25	50	100	120.3
240vAC, 3Ø Resistive	240	5	10	10	25	50	100	240.6
208vAC, 3Ø Resistive	240	3.76	7.51	7.51	18.78	37.56	75.11	208.5
240vAC, 1Ø Resistive	240	3.33	6.67	6.67	16.67	33.33	66.67	277.8
120vAC, 1Ø Resistive	240	0.83	1.67	1.67	4.17	8.33	16.67	138.9

3) Receiving

WARNING! ELECTRIC SHOCK HAZARD. Electric shock can lead to severe injury or death. If the load bank has been damaged in transit, do not operate until a competent technician inspects the unit and determines that it can be operated safely.

1. Check the equipment for obvious damage.
2. Document and report any exterior damage to the carrier immediately.
3. Assembly of wheels to load bank
 - a. Remove four stationary feet
 - b. Position wheel kit on bottom of frame
 - c. Using supplied bolt hardware, attach as shown in the picture. Torque to 5 ft.-pounds

4) Safety

This Load Bank is designed for a variety of loads. Because of this, it is possible that voltages higher than those applied can be present inside the load bank and at external connections of the load bank. Work on load bank internal systems should only be attempted by highly trained technicians and only when power has been disconnected and can not be reconnected to the unit.

IMPORTANT INSTRUCTIONS

When using electrical appliances, basic precautions should always be followed to reduce the risk of fire, electrical shock, and injury to persons, including the following:

- 1) Read all instructions before using this heater/load bank.
- 2) This load bank is hot when in use. To avoid burns, do not let bare skin touch hot surfaces. Use handles when moving this load bank. Keep combustible materials, such as furniture, pillows, bedding, papers, clothes, and curtains at least 6 feet (1.8 meters) from the front of the load bank and keep them away from the sides and rear.
- 3) Extreme caution is necessary when any load bank is used by or near children or invalids and whenever the load bank is left operating and unattended.
- 4) Always unplug load bank when not in use.
- 5) Do not operate any load bank with a damaged cord or plug or after the load bank malfunctions or has been dropped or damaged in any manner. Discard load bank or return to authorized service facility for examination and/or repair.
- 6) Do not use outdoors.

- 7) Do not use in wet or moist locations
- 8) This load bank is not intended for use in wet indoor environments.
- 9) Do not run cord under carpeting. Do not cover cord with throw rugs, runners, or similar coverings. Do not route cord under furniture or appliances. Arrange cord away from traffic areas and where it will not be tripped over.
- 10) To disconnect load bank, turn controls off, then remove plug from outlet.
- 11) Connect to properly grounded outlets only.
- 12) Do not insert or allow foreign objects to enter any ventilation or exhaust opening as this may cause an electric shock or fire, or damage the heater/load bank.
- 13) To prevent a possible fire, do not block air intakes or exhaust in any manner. Do not use on soft surfaces, like a bed, where openings may become blocked.
- 14) A load bank has hot and arcing or sparking parts inside. Do not use it in areas where gasoline, paint, or flammable liquids are used or stored.
- 15) Use this load bank only as described in this manual. Any other use not recommended by the manufacturer may cause fire, electric shock, or injury to persons.
- 16) Always plug load banks directly into a wall outlet/receptacle. Never use with a relocatable power tap (outlet/power strip).
- 17) This load bank includes a visual alarm to warn that parts of the load bank are getting excessively hot. If the alarm light goes on, immediately turn the load bank off and inspect for any objects on or adjacent to the load bank that may cause high temperatures. **DO NOT OPERATE THE LOADBANK WITH THE ALARM LIGHT ON.**
- 18) "SAVE THESE INSTRUCTIONS"

a) Grounding lug

WARNING! ELECTRIC SHOCK HAZARD. The grounding lug must be connected to earth ground. Operating without a grounding connection could lead to injury or death.

When the load bank is in operation the grounding lug must be firmly and electrically connected to earth ground. Failure to do so could allow deadly voltage to be present on the surface of the enclosure. The grounding connection provides a low resistance path to ground. This grounding protects the operator from the possibility of electrical shock. Use a stainless steel 1/4 -20 bolt to connect to ground. Torque to 5ft-lbs. (see figure 4.)

b) Power connections

WARNING! ELECTRIC SHOCK HAZARD. All power connections must be connected or guarded. Failure to do so will expose operators to possible shock and the possibility of grounding-out or shorting-out of the test power source.

c) Control Power

Use 120V type S or type SJ jacketed cord to a wall connection. Cord and service rated to 10 AMP minimum. (see figure 2.)

d) Air intakes and exhaust ports

Caution! All air intakes and exhaust ports must be clear and fully open. This load bank has one air intake designed for proper air flow. Reducing or blocking air flow will lead to overheating and load bank failure.

High volumes of cooling air are needed to prevent load elements from overheating. By their very nature, resistors under load convert electrical energy to heat. This heat must be removed from the unit. The blower, intake, and exhaust ports are sized to provide the proper amount of cooling air. Preventing or limiting air flow will allow the load bank to overheat.

Keep intake at least four feet away from walls and obstructions.

To increase the life of the load elements, allow the fans to run at least three minutes after the load is removed or until exhaust air is cool.

No ductwork is permitted on intake or exhaust of this load bank as this will cause a backpressure and ruin the resistors.

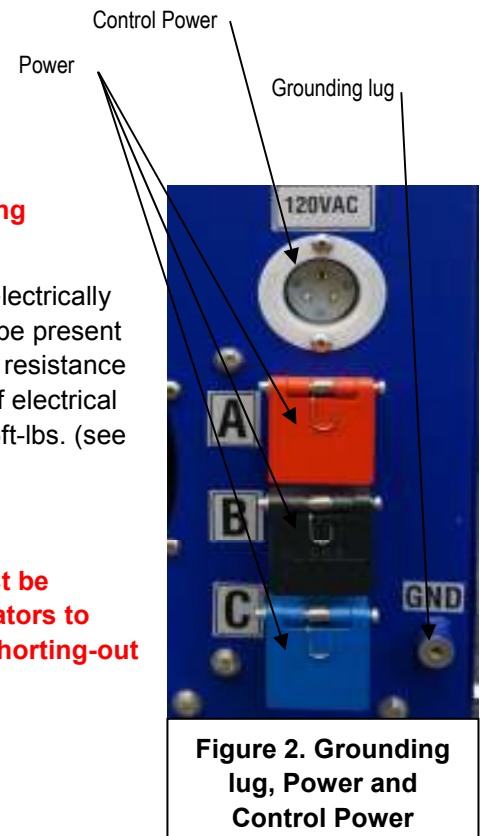


Figure 2. Grounding lug, Power and Control Power

Caution! **Material can be moved by intake air or exhaust air.** Failure to secure material could cause injury to bystanders or damage to the load bank.

Good air flow keeps the load bank cool but can very easily move light debris such as paper, cardboard, and dust with great velocity. Loose materials around the load bank, especially near the intake and exhaust, must be secured to prevent movement. Material on the exhaust side may be blown into and injure a bystander. Material near the intake may be taken into the load bank damaging internal components.

e) Exhaust temperature

WARNING! FIRE AND BURN HAZARD. Keep flammable material at least 40 feet away from the load bank. A great deal of heat is expelled from the load bank. Temperatures inside the load bank are sufficient to ignite flammable fumes or materials. Failure to maintain proper housekeeping and properly securing flammable material could lead to fire, burns, and/or injury.

Even with sufficient air flow, internal component temperature will exceed 600 °C. Exhaust temperatures of 300°C are common. Flammable materials must not be kept around the load bank. Heat from the load bank could ignite this material.

f) Connecting and disconnecting

WARNING! BURN HAZARD. Attempting to connect or disconnect leads while load bank is in operation can lead to severe injury or death. Connecting or disconnecting plugs and receptacles while current is flowing or voltage is present may cause arcing. Arcing can generate a great deal of light, heat and possibility of electrocution.

5) Operation

NOTE: Contact Mosebach Manufacturing if you are planning operations in ambient temperatures above 46 °C.

Ambient plus heat generated by the resistor can cause electrical components to possibly malfunction.

a) Pre-startup

1. Check housekeeping in the operational area and correct all unsafe conditions.
Failure to do this may result in debris being blown around and may cause a fire hazard.
2. Connect the load bank's grounding lug to a known earth ground.

3. Check the switch panel and move all switches to the OFF position. (see figure 3)
4. Select the source voltage required. Your unit is equipped with a voltage sensor, that if 480V is applied and the voltage selector switch is at 240V, the unit will not run. A red overvoltage indicator light will come on and the operator will have to select 480V on the switch.
5. Position load bank so that air will flow freely into the intakes and out of the exhaust port.
6. All air intakes and exhaust ports must be clear.
7. **Caution! Test points provided on the switch panel are for voltage testing only. Attempting to monitor current will cause fuses and meter to fail.**



Figure 3. Switch Panel

b) Startup

1. Connect camlocks to the unit.
Insure cable size is sufficient to carry the expected current. Failure to size conductors properly will lead to conductor overheating, which will damage conductors and may pose a fire hazard.
2. Turn the MAIN on/off power switch to the ON position. Blowers, meter and green power light will turn on.

Caution! Make sure air is flowing from the exhaust port. Failure to have proper air flow will cause unit to overheat and fail.

c) Testing

1. Start with the Main Power located in the ON position and Master in the OFF position.
2. Place the desired test step switches in the ON position.
3. Put the Master ON to engage the resistors.
4. Repeat tests as needed.

d) Shark meter

1. To view line voltage press the down arrow on the meter until the Volts L-L light on the right side is lit. See Figure 4a below.
2. To view phase A and C amps press the down arrow on the meter until the Amps light on the right side is lit. See figure 4b below.
3. To view phase B amps, go to the A and C amp screen as described above and then press the right arrow on the meter. See figure 4c below.



Figure 4a. Line Volts



Figure 4b. Phase A and C Amps



Figure 4c. Phase B Amps

e) Shutdown

1. Place all step switches in the OFF position. Put Master in the OFF position.
2. Allow fans to operate at least three minutes or until exhaust air is cool before shutting them off.

This cooling period will extend the life of your load bank.

3. Turn Main Power Switch to the OFF Position and remove 120v control power.
4. Turn off source power and customer is to confirm prior to disconnection of power cables.
5. Put cables back into the storage box. (Not supplied by Mosebach)
6. Remove ground connections.
7. Move the unit to storage.

6) USB Communication Port for Shark Meter:

This load bank is equipped with a Shark Meter that has a USB communications post. This port enables the user to connect the meter to a PC and read the test parameters from a remote location. Two CD-ROM disks are provided to the user with this manual. The large disk contains communications software and the small disk provides drivers for the USB connection. Both disks must be loaded on the remote PC in order for the meter to properly communicate with the PC.

A USB cable is not provided. It should be purchased separately. See Figure 4 for an example.



Figure 5. Typical USB A to USB B male

After loading the software, shut the PC off. The PC should always be off prior to making any connections with the load bank. Connect the cable between the PC and the load bank. Turn on the load bank and wait for the meter to go through its startup cycle. Once the meter is on, turn on the PC.

Start the Shark Meter program. Follow the directions in the pop-up menu. The PC will display a representation of the meter and will show what the meter is reading. For more detailed information please read the meter manual which is on the larger disk supplied with the load bank.

For additional information go to <http://www.electroind.com/>

7) Troubleshooting

Meter/Load Bank Will Not Turn On	Make sure main switch is in the ON position. Make sure 120v control power is connected.
Blower will not turn on.	Check for debris preventing fan from turning. Check blower fuse. See Figure 5.
Load steps will not turn on.	Check if overtemp red light is on. Make sure that test source is on. Check control fuses. See Figures 5 and 6. Check resistor continuity. See Figure 13 and schematic. Check resistor step fuses. See figure 7
Over temperature light.	This is an indication that the internal cabinet temperature has exceeded 150°F. Make sure the cabinet is ventilated. Check over temperature sensor (OTS) see figure 8.
Over-Voltage Light	Check that applied voltage is in agreement with selected voltage. Check that applied voltage is no more than 5% in the particular voltage mode that the unit is set in. If the limit is exceeded then the unit will not operate. Check the power cord loss if the cable is long.

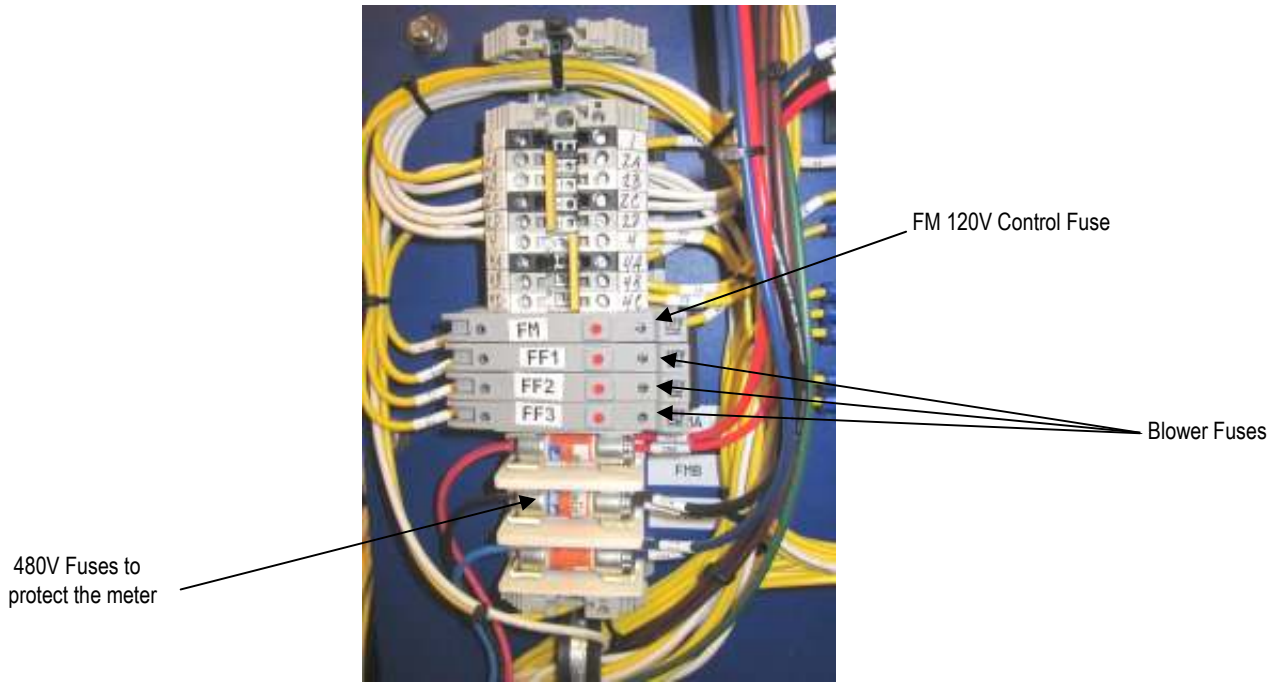


Figure 6 Blower/Control Fuses in the Switch Panel

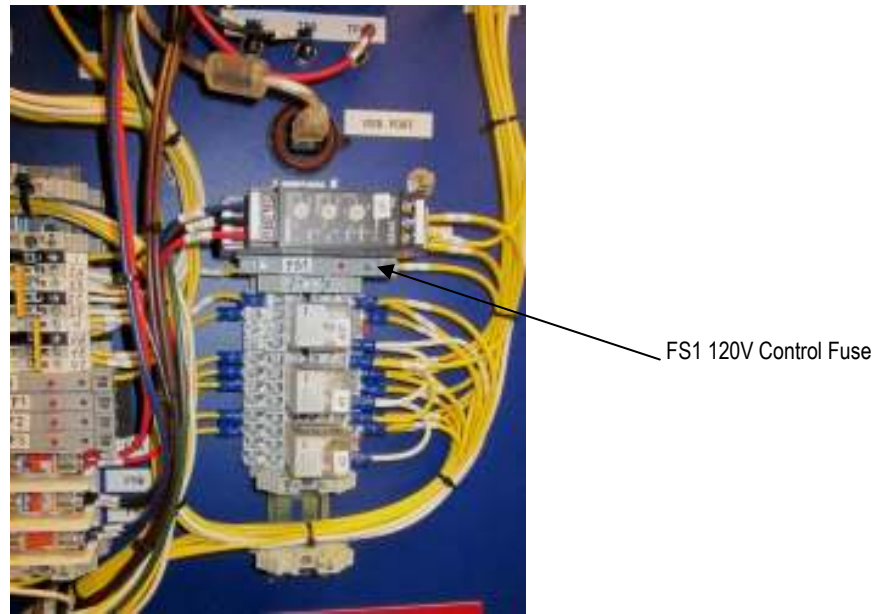


Figure 7 Control Fuse in the Switch Panel

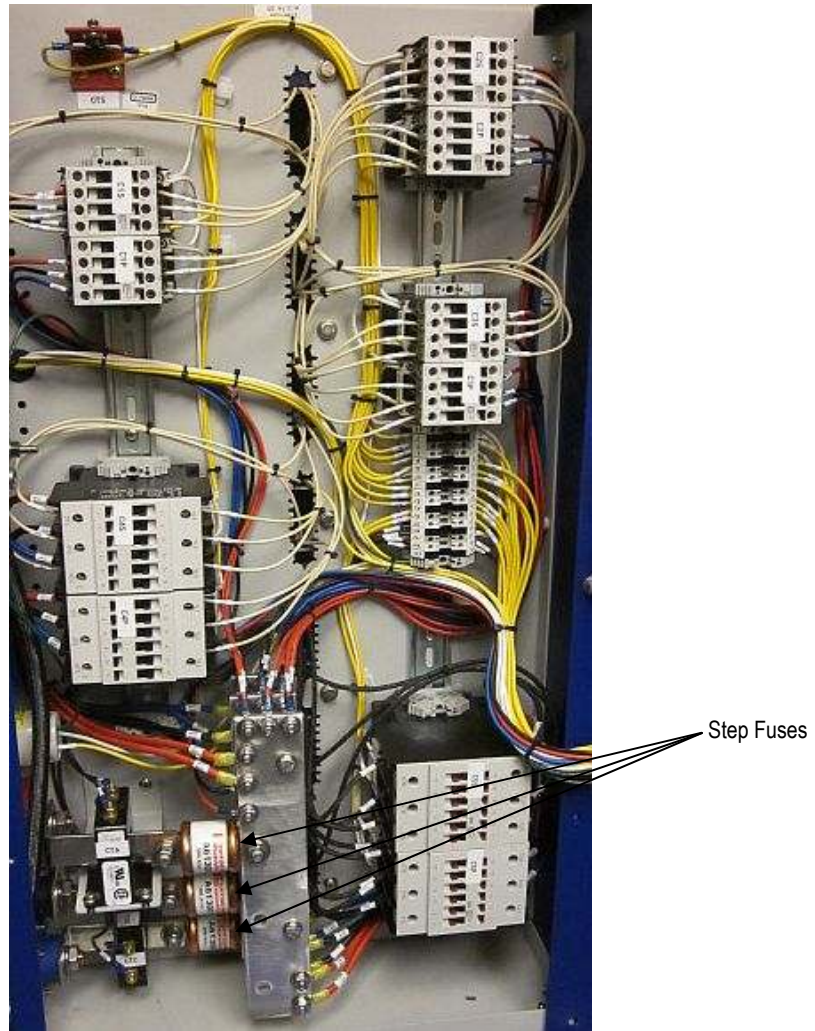


Figure 8. Step Fuses

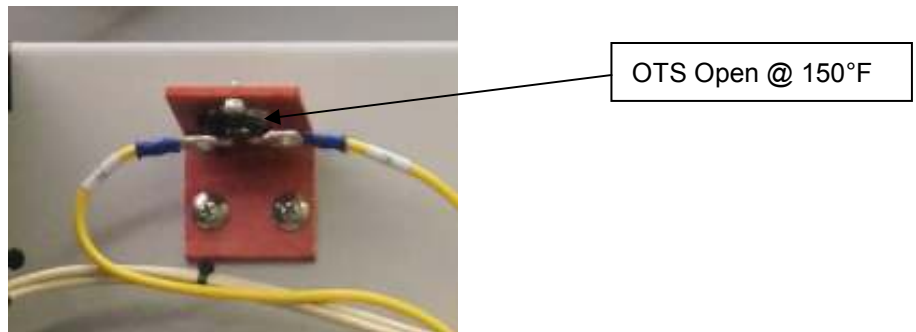


Figure 9. Thermal Switch

8) Replacing Fuses

1. Using a 7/16" socket or wrench, remove the 14 bolts from the lid of the load bank. (See figure 9)



Figure 10

2. Gently remove the lid from the unit by lifting it by the handles.
3. Using a 7/16" socket or wrench, remove the 10 lowest bolts that line the outer perimeter of the switch panel, while leaving the top two in place.



Figure 11

4. Support the switch panel by grabbing the top of the panel with a firm grip.
5. Using a 7/16" socket or wrench, remove the last 2 top corner bolts from the switch panel.
6. Rotate the switch panel open away from the cable service loops as shown in Figure 11.
7. Using a 7/16 socket or wrench, screw one bolt in to the top hole and one bolt into the middle hole.
8. Service on fuses can then be performed.

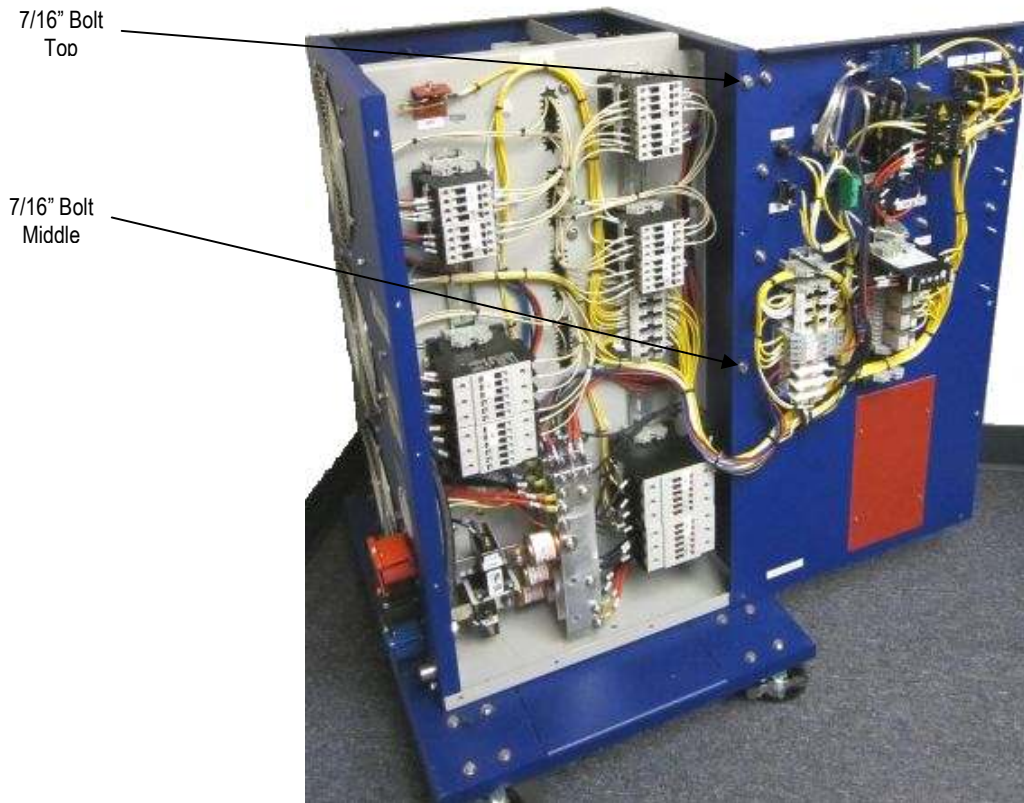


Figure 12

9) Replacing Resistors

1. Open the unit exactly as described under “Replacing Fuses” (see Figures 9, 10 & 11)
2. Using a 7/16” socket or wrench, remove all 22 bolts from the back panel and set it aside.

Back Panel



Figure 13a



Figure 13b

3. Disconnect the bad resistor wires from the contactors. Do not disconnect the wires from the resistor side. Each wire is labeled on both ends for easy location.

Resistor End Label

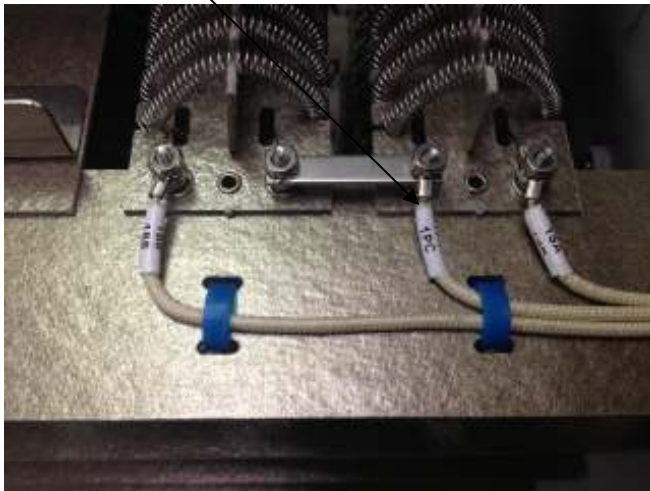


Figure 14a

Contactor End Label

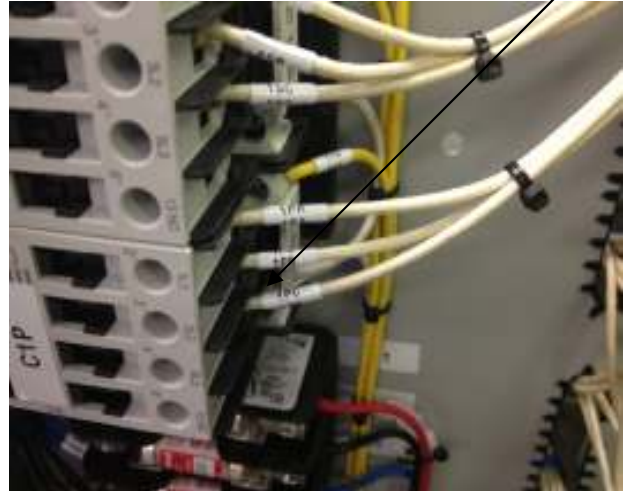


Figure 14b

4. Using a 7/16" socket or wrench, close the switch panel and fasten it back into place with the bolts.
5. Lay the unit on the ground with the exhaust panel facing down.
6. Using a 7/16" socket or wrench, take out the top two and bottom two bolts from the back of the resistor assembly.

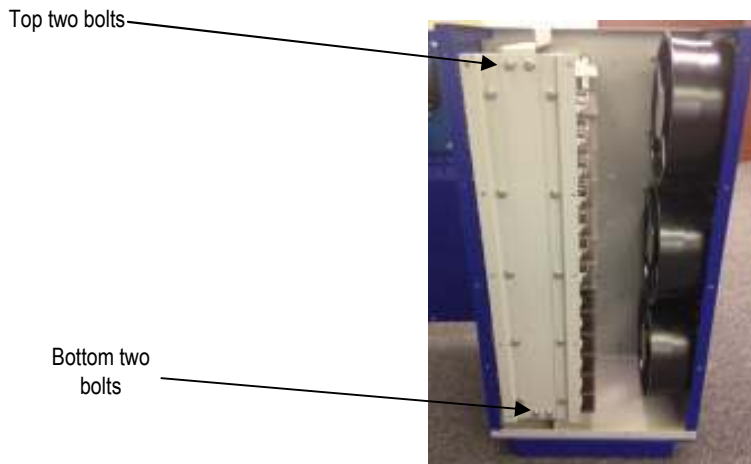


Figure 15

7. Pull out the bad resistor cassette.
8. Replace the old resistor cassette with a new one. Run the three wires through the corresponding hole in the control panel. The part number of each resistor cassette is stamped on the top of them.
9. Bolt the back of the resistor assembly back into place.
10. Stand the load bank back up.
11. Remove the switch panel as stated in step one.
12. Connect the three wires back into the proper contactor location.
13. Using a 7/16" socket or wrench, close the switch panel and fasten it back into place with the bolts.
14. Using a 7/16" socket or wrench, close the back panel and fasten it back into place with the bolts.
15. Using a 7/16" socket or wrench, close the lid and fasten it back into place with the bolts.

10) Preventative Maintenance of the Load Bank

1. Do not use a power washer to clean off the exterior of the unit. It is high voltage electrical equipment.

Action	Frequency
Walk around the unit and inspect for: a) Obvious damage b) Loose hardware	Every use
Megger Test	Every 6 months
Cold Resistance Check	Every 6 months
Air Flow Test	Every 6 months
Power Test	Every 6 months
Open Control Panel and Inspect for: a) Loose wire connections b) Visually damaged components	Every 6 months
Inspect Bearings	Annually
Inspect Fan	Annually
Inspect Resistors for: a) Damage to coils b) Delamination of the mica	Annually
Contactors are opening and closing	Annually
Shark Meter Calibration	Annually

11) Service Parts

	Part Number
Fan	BLWR-0055-0023
Resistor Elements	RA-0055-0117 RA-0055-0118 RA-0055-0119 RA-0055-0120 RA-0055-0121
Fuses	1A = EC-9500-0247 20A = EC-9500-0732 30A = EC-9500-0734 50A = EC-9500-0741 150A = EC-9500-0744 300A = EC-9500-0849
Meter	EC-9500-0314

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“SAVE THESE INSTRUCTIONS”