

**SERVICE AND PARTS MANUAL
FRYMASTER BIELA14 SERIES GEN II
LOV™ ELECTRIC FRYER**



This equipment chapter is to be installed in the Fryer Section of the *Equipment Manual*.

FOR YOUR SAFETY
Do Not Store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.



MANUFACTURED
BY

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NOTICE

IF, DURING THE WARRANTY PERIOD, THE CUSTOMER USES A PART FOR THIS MANITOWOC FOOD SERVICE EQUIPMENT OTHER THAN AN UNMODIFIED NEW OR RECYCLED PART PURCHASED DIRECTLY FROM FRYMASTER DEAN, OR ANY OF ITS AUTHORIZED SERVICE CENTERS, AND OR THE PART BEING USED IS MODIFIED FROM ITS ORIGINAL CONFIGURATION, THIS WARRANTY WILL BE VOID. FURTHER, FRYMASTER DEAN AND ITS AFFILIATES WILL NOT BE LIABLE FOR ANY CLAIMS, DAMAGES OR EXPENSES INCURRED BY THE CUSTOMER WHICH ARISE DIRECTLY OR INDIRECTLY, IN WHOLE OR IN PART, DUE TO THE INSTALLATION OF ANY MODIFIED PART AND/OR PART RECEIVED FROM AN UNAUTHORIZED SERVICE CENTER.

NOTICE

This appliance is intended for professional use only and is to be operated by qualified personnel only. A Frymaster Dean Authorized Service Agency (ASA) or other qualified professional should perform installation, maintenance, and repairs. Installation, maintenance, or repairs by unqualified personnel may void the manufacturer's warranty.

NOTICE

This equipment must be installed in accordance with the appropriate national and local codes of the country and/or region in which the appliance is installed.

 DANGER

All wiring connections for this appliance must be made in accordance with the wiring diagrams furnished with the equipment. Wiring diagrams are located on the inside of the fryer door.

NOTICE TO U.S. CUSTOMERS

This equipment is to be installed in compliance with the basic plumbing code of the Building Officials and Code Administrators International, Inc. (BOCA) and the Food Service Sanitation Manual of the U.S. Food and Drug Administration.

NOTICE TO OWNERS OF UNITS EQUIPPED WITH COMPUTERS

U.S.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1) This device may not cause harmful interference, and 2) This device must accept any interference received, including interference that may cause undesired operation. While this device is a verified Class A device, it has been shown to meet the Class B limits.

CANADA

This digital apparatus does not exceed the Class A or B limits for radio noise emissions as set out by the ICES-003 standard of the Canadian Department of Communications.

Cet appareil numérique n'émet pas de bruits radioélectriques dépassant les limites de classe A et B prescrites dans la norme NMB-003 édictée par le Ministre des Communications du Canada.

⚠ DANGER

Improper installation, adjustment, maintenance or service, and unauthorized alterations or modifications can cause property damage, injury, or death. Read the installation, operating, and service instructions thoroughly before installing or servicing this equipment.

⚠ DANGER

The front ledge of this appliance is not a step! Do not stand on the appliance. Serious injury can result from slips or contact with the hot oil.

⚠ DANGER

Do not store or use gasoline or other flammable liquids or vapors in the vicinity of this or any other appliance.

⚠ DANGER

The crumb tray in fryers equipped with a filter system must be emptied into a fireproof container at the end of frying operations each day. Some food particles can spontaneously combust if left soaking in certain shortening material.

⚠ WARNING

Do not bang fry baskets or other utensils on the fryer's joiner strip. The strip is present to seal the joint between the fry vessels. Banging fry baskets on the strip to dislodge shortening will distort the strip, adversely affecting its fit. It is designed for a tight fit and should only be removed for cleaning.

⚠ DANGER

Adequate means must be provided to limit the movement of this appliance without depending on or transmitting stress to the electrical conduit. A restraint kit is provided with the fryer. If the restraint kit is missing contact your local Frymaster Authorized Service Agency (ASA) for part number 826-0900.

⚠ DANGER

This fryer may have two power cords and prior to movement, testing, maintenance and any repair on your Frymaster fryer; disconnect all electrical power cords from the electrical supply.

⚠ WARNING

Do not use water jets to clean this equipment.

LOV™ ELECTRIC WARRANTY STATEMENT

Frymaster, L.L.C. makes the following limited warranties to the original purchaser only for this equipment and replacement parts:

A. WARRANTY PROVISIONS - FRYERS

1. Frymaster L.L.C. warrants all components against defects in material and workmanship for a period of two years.
2. All parts, with the exception of the frypot, O-rings and fuses, are warranted for two years after installation date of fryer.
3. If any parts, except fuses and filter O-rings, become defective during the first two years after installation date, Frymaster will also pay straight-time labor costs up to two hours to replace the part, plus up to 100 miles/160 km of travel (50 miles/80 km each way).

B. WARRANTY PROVISIONS - FRYPOTS

The frypot has a lifetime parts and labor warranty. If a frypot develops a leak after installation, Frymaster will replace the frypot, allowing up to the maximum time per the Frymaster time allowance chart hours of straight-time labor. Components attached to the frypot, such as the high-limit, probe, gaskets, seals, and related fasteners, are also covered by the lifetime warranty if replacement is necessitated by the frypot replacement. Leaks due to abuse or from threaded fittings such as probes, sensors, high-limits, drain valves or return piping are not included.

C. PARTS RETURN

All defective in-warranty parts must be returned to a Frymaster Authorized Factory Service Center within 60 days for credit. After 60 days, no credit will be allowed.

D. WARRANTY EXCLUSIONS

This warranty does not cover equipment that has been damaged due to misuse, abuse, alteration, or accident such as:

- improper or unauthorized repair (including any frypot which is welded in the field);
- failure to follow proper installation instructions and/or scheduled maintenance procedures as prescribed in your MRC cards. Proof of scheduled maintenance is required to maintain the warranty;
- improper maintenance;
- damage in shipment;
- abnormal use;
- removal, alteration, or obliteration of either the rating plate or the date code on the heating elements;
- operating the frypot without shortening or other liquid in the frypot;

- no fryer will be warranted under the ten-year program for which a proper start-up form has not been received.

This warranty also does not cover:

- transportation or travel over 100 miles/160 km (50 miles/80 km each way), or travel over two hours;
- overtime or holiday charges;
- consequential damages (the cost of repairing or replacing other property which is damaged), loss of time, profits, use or any other incidental damages of any kind.

There are no implied warranties of merchantability or fitness for any particular use or purpose.

This warranty is applicable at the time of this printing and is subject to change.

ELECTRICAL POWER SPECIFICATIONS

VOLTAGE	PHASE	WIRE SERVICE	MIN. SIZE	AWG (mm ²)	AMPS PER LEG		
					L1	L2	L3
208	3	3	6	(16)	39	39	39
240	3	3	6	(16)	34	34	34
480	3	3	8	(10)	17	17	17
220/380	3	4	6	(16)	21	21	21
240/415	3	4	6	(16)	20	20	21
230/400	3	4	6	(16)	21	21	21

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CHAPTER 1: SERVICE PROCEDURES

1.1 General

Before performing any maintenance on your Frymaster fryer, disconnect the fryer from the electrical power supply.

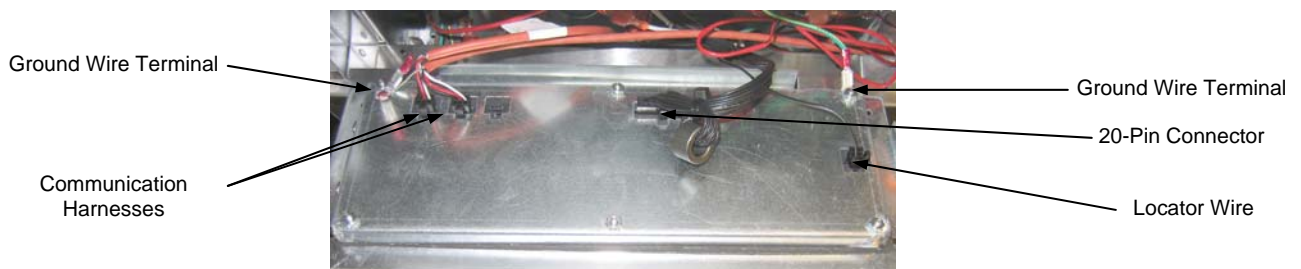
WARNING

To ensure the safe and efficient operation of the fryer and hood, the electrical plug for the 120-volt line, which powers the hood, must be fully engaged and locked in its pin and sleeve socket.

When electrical wires are disconnected, it is recommended that they be marked in such a way as to facilitate re-assembly.

1.2 Replacing a Computer

1. Disconnect the fryer from the electrical power supply.
2. The computer bezel is held in place by tabs at the top and bottom. Slide the metal bezel up to disengage the lower tabs. Then slide the bezel down to disengage the upper tabs.
3. Remove the two screws from the upper corners of the control panel. The control panel is hinged at the bottom and will swing open from the top.
4. Unplug the wiring harnesses from the connectors on the back of the computer, marking their position for reassembly, and disconnect the grounding wires from the terminals. Remove the computer panel assembly by lifting it from the hinged slots in the control panel frame.



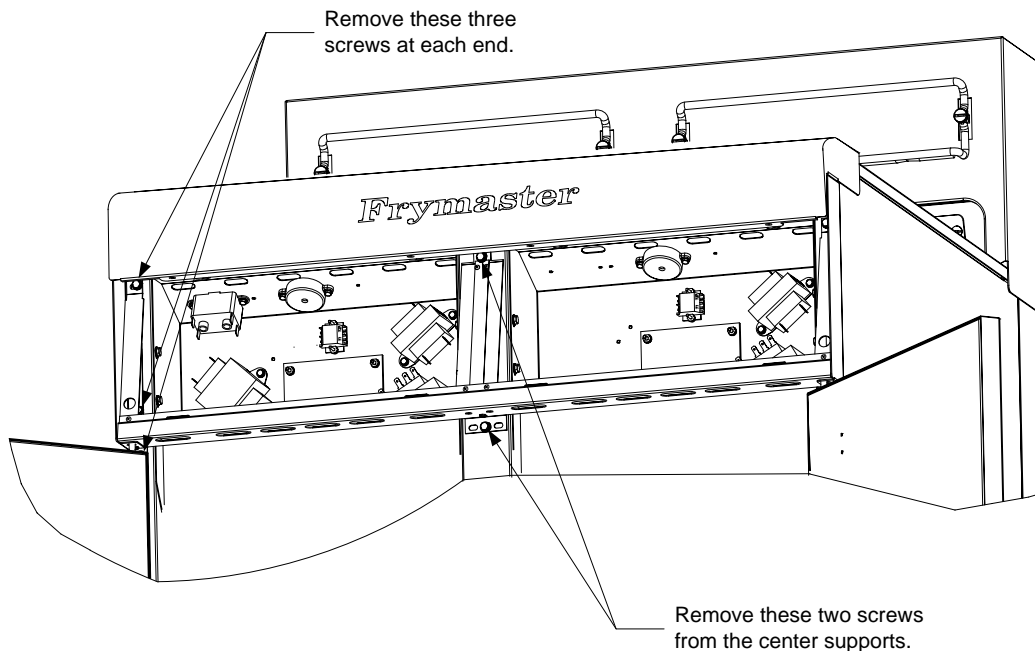
5. Install the replacement computer. Reinstall the control panel assembly by reversing steps 1 thru 4.
6. Setup the computer following the instructions on page 4-9 in the Installation and Operation manual. Setup **MUST** be performed after replacement.
7. Once setup is complete on all replaced computers, reset all control power following the instructions in section 1.11.7 on page 1-22 to readdress the new M3000 computer. Check software version and if necessary update the software. If a software update was necessary, follow the instructions to update the software in section 1.15

1.3 Replacing Component Box Components

1. Disconnect the fryer from the electrical power supply.
2. The computer bezel is held in place by tabs at the top and bottom. Slide the metal bezel up to disengage the lower tabs. Then slide the bezel down to disengage the upper tabs.

3. Remove the two screws from the upper corners of the computer and allow the computer to swing down.
4. Unplug the wiring harnesses and disconnect the grounding wires from the terminals on the back of the computer. Remove the computer assembly by lifting it from the hinge slots in the control panel frame.
5. Disconnect the wiring from the component to be replaced, being sure to make a note of where each wire was connected.
6. Dismount the component to be replaced and install the new component, being sure that any required spacers, insulation, washers, etc. are in place.

NOTE: If more room to work is required, the control panel frame assembly may be removed by removing the hex-head screws which secure it to the fryer cabinet (see illustration below). If this option is chosen, all computer assemblies must be removed per steps 1 thru 4 above. The cover plate, on the lower front of the component box, may also be removed to allow additional access if desired.



Removing the Control Panel Frame and Top Cap Assembly

7. Reconnect the wiring disconnected in step 5, referring to your notes and the wiring diagrams on the fryer door to ensure that the connections are properly made. Also, verify that no other wiring was disconnected accidentally during the replacement process.
8. Reverse steps 1 through 4 to complete the replacement and return the fryer to service.

1.4 Replacing a High-Limit Thermostat

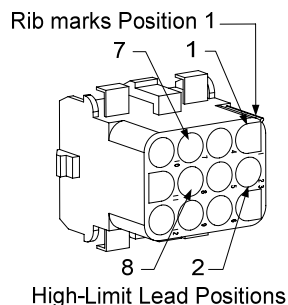
1. Remove the filter pan and lid from the unit. Drain the frypots into an McDonald's Shortening Disposal Unit (MSDU) or other appropriate **METAL** container using the computer "drain to pan option" or using the MIB board in manual mode.



DANGER

DO NOT drain more than one full frypot or two split frypots into the MSDU at one time.

2. Disconnect the fryer from the electrical power supply and reposition it to gain access to the rear of the fryer.
3. Remove the four screws from both the left and right sides of the lower back panel.
4. Locate the high-limit that is being replaced and follow the two-black wires to the 12-pin connector C-6. Note where the leads are connected prior to removing them from the connector. Unplug the 12-pin connector C-6 and using a pin-pusher push the pins of the high-limit out of the connector.
5. Carefully unscrew the high-limit thermostat to be replaced.
6. Apply Loctite™ PST 567 or equivalent sealant to the threads of the replacement and screw it securely into the frypot.
7. Insert the leads into the 12-pin connector C-6 (see illustration below). For full-vat units or the left half of a dual-vat unit (as viewed from the rear of the fryer) the leads go into positions 1 and 2 of the connector. For the right half of a dual-vat unit (as viewed from the rear of the fryer), the leads go into positions 7 and 8. In either case, polarity does not matter.

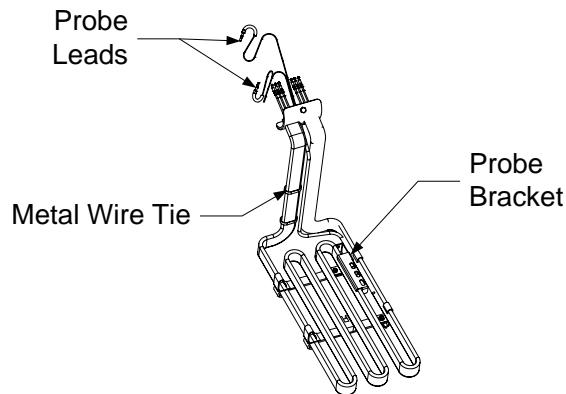


8. Reconnect the 12-pin connecting plug C-6. Use wire ties to secure any loose wires.
9. Reinstall the back panels, contactor plug guards, reposition the fryer under the exhaust hood, and reconnect it to the electrical power supply to return the fryer to service.

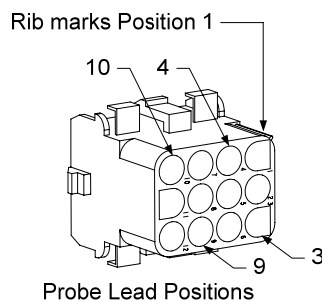
1.5 Replacing a Temperature Probe

1. Lift the element out of the oil.
2. Disconnect the fryer from the electrical power supply and reposition it to gain access to the rear of the fryer.
3. Remove the four screws from both sides of the lower back panel. Then remove the two screws on both the left and right sides of the back of the tilt housing. Lift the tilt housing straight up to remove from the fryer.

4. Locate the red (or yellow) and white wires of the temperature probe to be replaced. Note where the leads are connected prior to removing them from the connector. Unplug the 12-pin connector C-6 and using a pin-pusher push the pins of the temperature probe out of the connector.
5. Remove the securing probe bracket and metal tie wraps that secure the probe to the element (see illustration below). Remove the ground clip on the probe shield.



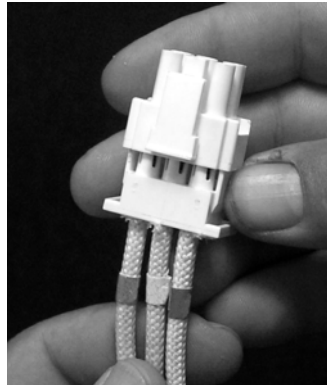
6. Gently pull on the temperature probe and grommet, pulling the wires up the rear of the fryer and through the element tube assembly.
7. Insert the replacement temperature probe (wires first) into the tube assembly ensuring that the grommet is in place. Secure the probe to the elements using the bracket which was removed in Step 5 and the metal tie wraps which were included in the replacement kit.
8. Route the probe wires out of the tube assembly following the element wires down the back of the fryer through the Heyco bushings to the 12-pin connector C-6. Secure the wires to the sheathing with wire ties. Attach the ground clip.
9. Insert the temperature probe leads into the 12-pin connector C-6 (see illustration below). For full-vat units or the right half of a dual-vat unit (as viewed from the rear of the fryer) the red (or yellow) lead goes into position 3 and the white lead into position 4 of the connector. For the left half of a dual-vat unit (as viewed from the rear of the fryer), the red (or yellow) lead goes into position 9 and the white lead into position 10. **NOTE: Right and left** refer to the fryer as viewed from the rear.



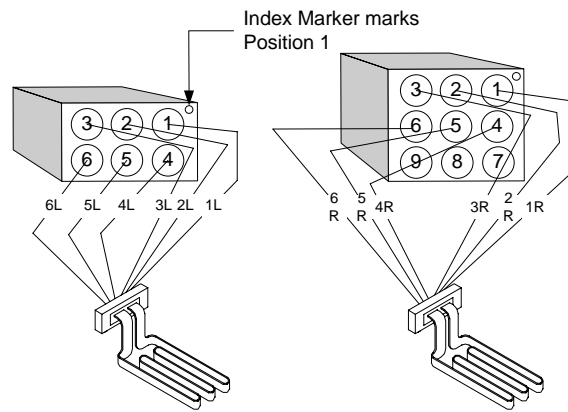
10. Secure any loose wires with wire ties, making sure there is no interference with the movement of the springs. Rotate the elements up and down, making sure that movement is not restricted and that the wires are not pinched.
11. Reinstall the tilt housing, back panels and contactor plug guards. Reposition the fryer under the exhaust hood and reconnect it to the electrical power supply to return the fryer to service.

1.6 Replacing a Heating Element

1. Perform steps 1-5 of section 1.5, *Replacing a Temperature Probe*.
2. Disconnect the wire harness containing the probe wiring, where the temperature probe is attached to the element being replaced. Using a pin pusher, disconnect the probe wires from the 12-pin connector.
3. In the rear of the fryer disconnect the 6-pin connector for the left element (as viewed from the front of the fryer) or the 9-pin connector for the right element from the contactor box. Press in on the tabs on each side of the connector while pulling outward on the free end to extend the connector and release the element leads (see photo below). Pull the leads out of the connector and out of the wire sleeving.

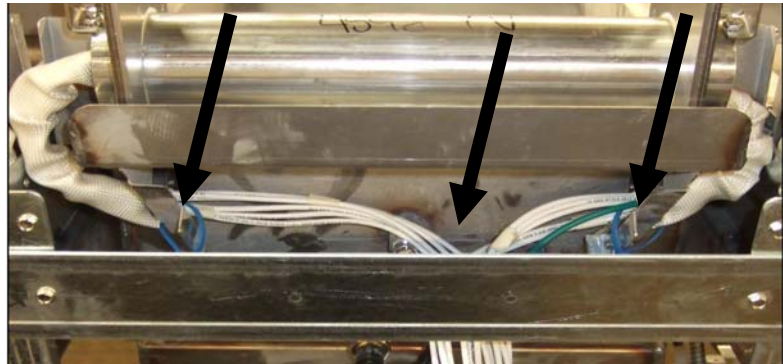


4. Raise the element to the full up position and support the elements.
5. Remove the hex head screws and nuts that secure the element to the tube assembly and pull the element out of the frypot. **NOTE:** The nuts inside the tube can be held and removed using the RE element tube nut spanner, PN# 2304028. Full-vat elements consist of two dual-vat elements clamped together. For full-vat units, remove the element clamps before removing the nuts and screws that secure the element to the tube assembly.
6. If applicable, recover the probe bracket and probe from the element being replaced and install them on the replacement element. Install the replacement element in the frypot, securing it with the nuts and screws removed in Step 5 to the tube assembly. Ensure the gasket is between the tube and element assembly.
7. Route the element leads through the element tube assembly and into the wire sleeving to prevent chafing. Ensure that the wire sleeving is routed back through the Heyco bushing, keeping it clear from the lift springs (see photos next page). Also ensure that the wire sleeving extends into the tube assembly to protect the edge of the tube assembly from chafing the wires. Press the pins into the connector in accordance with the diagram on the following page, and then close the connector to lock the leads in place. **NOTE:** It is critical that the wires be routed through the sleeving to prevent chafing.



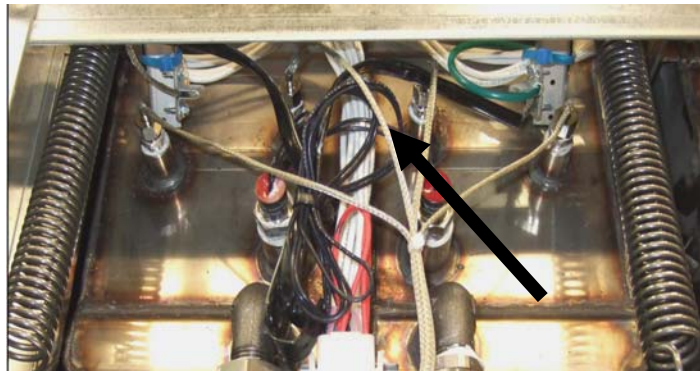
Full vat element wire routing

Pull the element wires through the bushings on either side of the frypot and down the back. Element wires should be routed to the right of the ATO temperature probe on the back wall of the frypot.



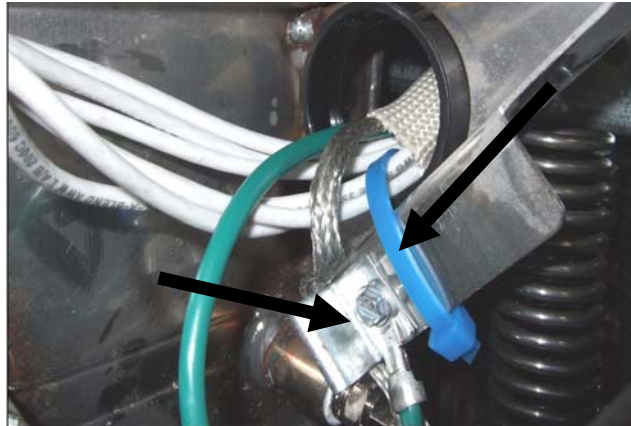
Dual vat element wire routing

Pull the element wires through the bushings on either side of the frypot and down the back. Element wires should be routed to the center of the frypot between the ATO temperature probes.

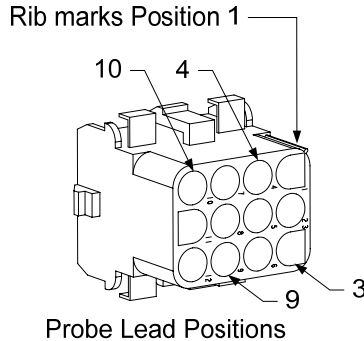


Element grounding and wire routing

To ground the element wires, use the hole in the frypot frame located under the bushing that the element wires pass through. Using a screw through the ground wires ring terminal, connect it to the frypot using the probe ground clip. Use a tie wrap to tie up half of the element wires after the wires are pulled through the bushing. Do not pull tie wrap tight, leave it slack at about one inch



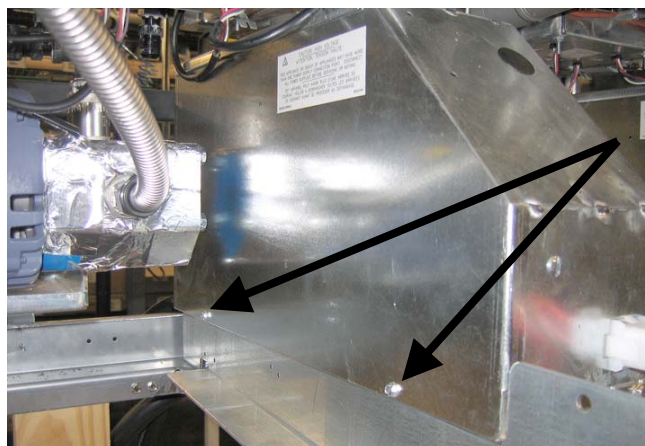
8. Reconnect the element connector ensuring that the latches lock.
9. Insert the temperature probe leads into the 12-pin wiring harness connector (see illustration below). For full-vat units or the right half of a dual-vat unit, the red lead goes into position 3 and the white into position 4. For the left half of a dual-vat unit, the red lead goes into position 9 and the white into position 10. **NOTE: *Right* and *left*** refer to the fryer as viewed from the rear.



10. Reconnect the 12-pin connector of the wiring harness disconnected in Step 2.
11. Lower the element to the full down position.
12. Reinstall the tilt housing, back panels and contactor plug guard. Reposition the fryer under the exhaust hood, and reconnect it to the electrical power supply.

1.7 Replacing Contactor Box Components

1. If replacing a contactor box component in boxes above the filter pan, first remove the filter pan and lid from the unit. If replacing components in fryers tht have ATO boxes, the ATO box may require removal.
2. Disconnect the fryer from the electrical power supply.
3. Remove the two screws securing the cover of the contactor box. The contactor boxes above the filter pan are accessed by sliding under the fryer. They are located to the left and right above the guide rails (see photo below). The contactor boxes for frypots not over the filter pan are accessed by opening the fryer door directly under the affected frypot.



Remove two screws to access contactor box components above the filter pan.

4. The contactors and relays are held on by threaded pin studs so that only removal of the nut is required to replace the component.
5. After performing necessary service, reverse steps 1-4 to return the fryer to operation.



Left and right views of mechanical contactor box components.

Sometimes it is necessary to remove the entire contactor box to repair. Below are the instructions for removing the far left contactor box.

1. Remove fryers from hood and remove all power to fryers.
2. Remove lower back panel.
3. Remove filter pan, lid and downspout splash shield.
4. Remove clevis clip from dispose handle at rear of fryer and let handle drop out of waste valve bracket.
5. Remove two screws holding waste valve handle at front of fryer and remove bracket and handle from fryer.
6. Remove AIF board and tuck wires out of the way of the contactor box for box removal.
7. Remove shipping brace that supports filter pump shelf brace to top of contactor box.
8. Remove contactor box cover.
9. Unplug all wiring from front and rear of contactor box.
10. Remove two screws that hold element wire shield to rear of contactor box and remove wire shield.
11. Remove two screws that support contactor box at rear of box.
12. Remove two screws that support contactor box at front of box.
13. Lift contactor box up to clear left frame rail and slide to the right far enough that the left rear corner of the pump and motor shelf protrude inside of the contactor box slightly.
14. Tip front of contactor box down and to the right slightly and then pull out from opening where filter pan lid would rest.
15. Reverse above steps for reinstallation.

1.8 Replacing a Frypot

1. Drain the frypot into the filter pan or, if replacing a frypot over the filter system, into a McDonald's Shortening Disposal Unit (MSDU) or other appropriate **METAL** container. If replacing a frypot over the filter system, remove the filter pan and lid from the unit.

⚠ DANGER

DO NOT drain more than one full frypot or two split frypots into the MSDU at one time.

2. Disconnect the fryer from the electrical power supply and reposition it to gain access to both the front and rear.

3. Slide the metal bezel up to release the bottom tabs, then slide the bezel down to disengage the upper tabs.
4. Remove the two screws from the upper corners of the computers and allow them to swing down (see illustration and photo on page 1-1).
5. Unplug the wiring harnesses and ground wires from the backs of the computers. Remove the computers by lifting them from the hinge slots in the control panel frame.
6. Remove the tilt housing and back panels from the fryer. The tilt housing must be removed first in order to remove the upper back panel.
7. To remove the tilt housing, remove the hex-head screws from the rear edge of the housing. The housing can be lifted straight up and off the fryer.
8. Remove the control panel by removing the screw in the center and the nuts on both sides.
9. Loosen the component boxes by removing the screws, which secure them in the cabinet.
10. Dismount the top cap by removing the nuts at each end that secure it to the cabinetry.
11. Remove the hex head screw that secures the front of the frypot to the cabinet cross brace.
12. Remove the top-connecting strip that covers the joint with the adjacent frypot.
13. Unscrew the nut located on the front of each section of drain tube, and remove the tube assembly from the fryer.
14. Remove the actuators from the drain and return valves and disconnect the wiring.
15. Disconnect any auto filtration probes and auto top off sensors and wiring.
16. At the rear of the fryer, unplug the 12-pin connector C-6 and, using a pin pusher, disconnect the high-limit thermostat leads. Disconnect any other probe wiring.
17. Disconnect the oil return flexline(s).
18. Raise the elements to the “up” position and disconnect the element springs.
19. Remove the machine screws and nuts that secure the element tube assembly to the frypot. Carefully lift the element assembly from the frypot and secure it to the cross brace on the rear of the fryer with wire ties or tape.
20. Carefully lift the frypot from the fryer and place it upside down on a stable work surface.
21. Recover the drain valve(s), oil return flexline connection fitting(s), actuators, AIF boards and high-limit thermostat(s) from the frypot. Clean the threads and apply Loctite™ PST 567 or equivalent sealant to the threads of the recovered parts and install them in the replacement frypot.
22. Carefully lower the replacement frypot into the fryer. Reinstall the hex head screw removed in step 11 to attach the frypot to the fryer.

23. Position the element tube assembly in the frypot and reinstall the machine screws and nuts removed in step 19.
24. Reconnect the oil return flexlines to the frypot, and replace aluminum tape, if necessary, to secure heater strips to the flexlines.
25. Insert the high-limit thermostat leads disconnected in step 16 (see illustration on page 1-3 for pin positions).
26. Reconnect the actuators, ensuring the correct position of the drain and return valves.
27. Reconnect the auto filtration and auto top off probes.
28. Reinstall the drain tube assembly.
29. Reinstall the top connecting strips, top cap, tilt housing and back panels.
30. Reinstall computers in the control panel frame and reconnect the wiring harnesses and ground wires.
31. Reposition the fryer under the exhaust hood and reconnect it to the electrical power supply.

1.9 Built-in Filtration System Service Procedures

1.9.1 Filtration System Problem Resolution

One of the most common causes of filtration problems is placing the filter pad/paper on the bottom of the filter pan rather than over the filter screen.

CAUTION

Ensure that filter screen is in place prior to filter pad/paper placement and filter pump operation. Improper screen placement is the primary cause of filtration system malfunction.

Whenever the complaint is “the pump is running, but no oil is being filtered,” check the installation of the filter pad/paper, and ensure that the correct size is being used. While you are checking the filter pad/paper, verify that the O-rings on the pick-up tube of the filter pan are in good condition. A missing or worn O-ring allows the pump to take in air and decrease its efficiency.

If the pump motor overheats, the thermal overload will trip and the motor will not start until it is reset. If the pump motor does not start, press the red reset switch (button) located on the rear of the motor.

If the pump starts after resetting the thermal overload switch, then something is causing the motor to overheat. A major cause of overheating is when several frypots are filtered sequentially, overheating the pump and motor. Allow the pump motor to cool at least 30 minutes before resuming operation. Pump overheating can be caused by:

- Solidified shortening in the pan or filter lines, or
- Attempting to filter unheated oil or shortening (cold oil is more viscous, overloading the pump motor and causing it to overheat).

If the motor runs but the pump does not return oil, there is a blockage in the pump. Incorrectly sized or installed paper/pads will allow food particles and sediment to pass through the filter pan and into the pump. When sediment enters the pump, the gears bind, causing the motor to overload, again tripping the thermal overload. Shortening that has solidified in the pump will also cause it to seize, with the same result.

A pump seized by debris or hard shortening can usually be freed by manually moving the gears with a screwdriver or other instrument.

Disconnect power to the filter system, remove the input plumbing from the pump, and use a screwdriver to manually turn the gears.

- Turning the pump gears in reverse will release a hard particle.
- Turning the pump gears forward will push softer objects and solid shortening through the pump and allow free movement of the gears.

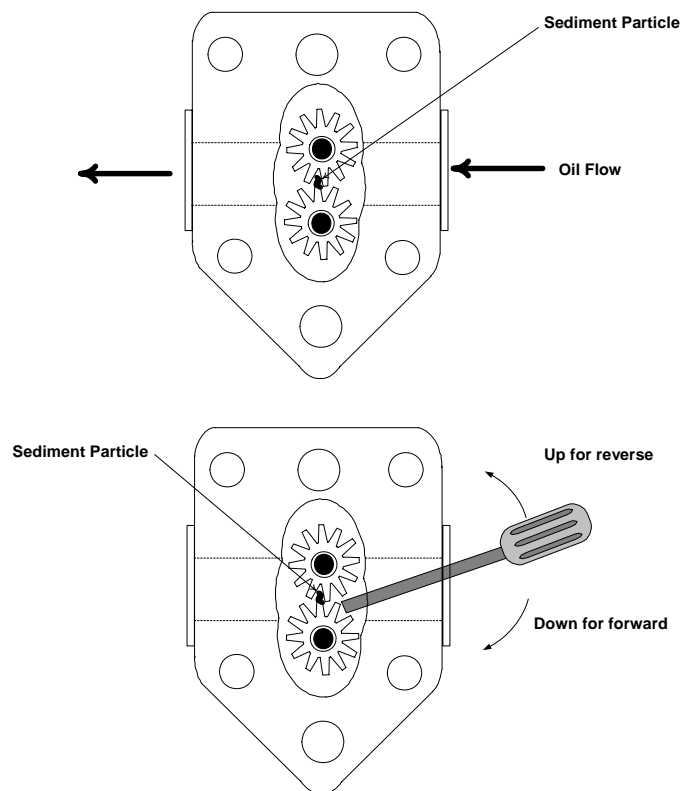
Incorrectly sized or installed paper/pads will also allow food particles and sediment to pass through and clog the suction tube on the bottom of the filter pan. Particles large enough to block the suction tube may indicate that the crumb tray is not being used. Pan blockage can also occur if shortening is left in the pan and allowed to solidify. Blockage removal can be accomplished by forcing the item out with an auger or drain snake. Compressed air or other pressurized gases should not be used to force out the blockage.

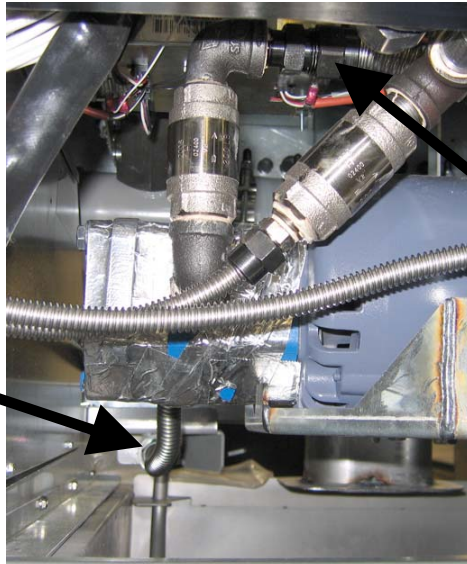
1.9.2 Replacing the Filter Motor, Filter Pump, and Related Components

1. Remove the filter pan and lid from the unit. Drain the frypots into a McDonald's Shortening Disposal Unit (MSDU) or other appropriate metal container.

⚠ DANGER
DO NOT drain more than one full frypot or two split frypots into the MSDU at one time.

2. Disconnect the fryer from the electrical power supply and reposition it to gain access to both the front and rear.
3. Disconnect the flexline running to the oil-return manifold at the rear of the fryer as well as the pump suction flexline at the end of the filter pan connection (see photo on the following page).





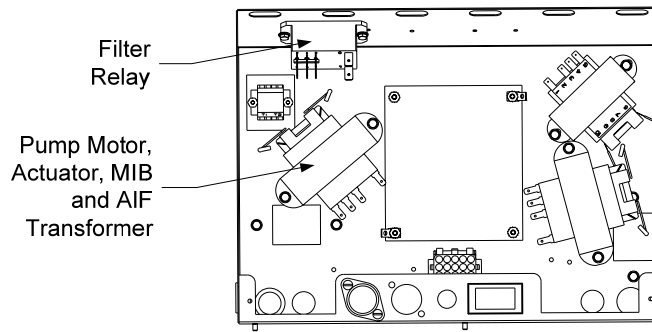
Disconnect flexlines indicated by the arrows.

4. Loosen the nut and bolt which secure the bridge to the oil-return manifold.
5. Remove the cover plate from the front of the motor and disconnect the motor wires.
6. Remove the two nuts and bolts which secure the front of the bridge to the cross brace and carefully slide the bridge rearward off the cross brace until its front end can be lowered to the floor. Undo the single nut holding it in place in back. Be careful not to let the rear of the bridge slip off the manifold at this point.
7. Get a good grip on the bridge, carefully pull it forward off the oil-return manifold, and lower the entire assembly to the floor. Once on the floor, pull the assembly out the front of the fryer.
8. When required service has been completed, reverse steps 4-7 to reinstall the bridge.
9. Reconnect the unit to the electrical power supply, and verify that the pump is functioning correctly using the MIB board in manual mode (i.e., using the fill function when engaged, the motor should start and there should be strong suction at the intake fitting and outflow at the rear flush port.)
10. When proper operation has been verified, reinstall the back panels and the filter pan and lid.
11. Reconnect it to the electrical power supply and reposition the fryer under the exhaust hood to return the fryer to service.

1.9.3 Replacing the Transformer or Filter Relay

Disconnect the fryer from the electrical power supply. Remove the left computer from the fryer to expose the interior of the left component box. The transformer and relay on the left are located as shown in the illustration on the next page. **NOTE:** The right component box is identical to the left except that the transformer and relay on the left side are not present. Once replaced, reconnect the power.

When replacing a filter relay in the left component box, ensure the 24VDC relay (8074482) is used. Similar Frymaster fryers use a 24VAC relay, which can lead to confusion. The 24VDC is used in the LOV™ fryer.



1.10 ATO (Automatic Top-off) Service Procedures

The automatic top-off system is activated when the oil level falls below a sensor in the rear of the frypot. The signal is sent to the ATO board to engage the return actuator to the frypot and turn on the ATO pump. The pump draws oil from the JIB (Jug In Box) through the rear return manifold into the rear of the frypot. Once the oil level has satisfied the sensor, the pump turns off and the actuator closes.

The ATO board is located inside the box, behind the JIB (see Figure 1). The power for the ATO board is supplied from the right hand component box. The power passes through the transformer inside the ATO box to the board.

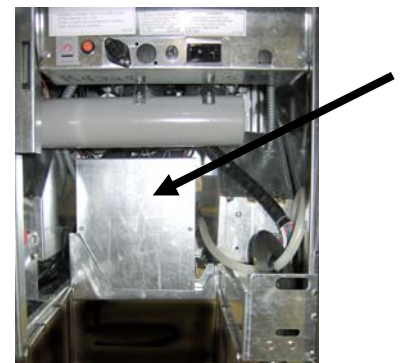


Figure 1

1.10.1 ATO (Automatic Top-off) Troubleshooting

Problem	Probable Causes	Corrective Action
Frypot tops off cold.	Incorrect setpoint	Ensure setpoint is correct.
No power to ATO board	A. J5 connection unplugged B. Fuse blown C. Transformer malfunction	A. Check to ensure J5 on front of ATO board is fully locked into connector. B. Ensure fuse below right control box is not blown and fuse on the right side of ATO box is not blown. C. Check that proper voltage is present at transformer. See table in section 1.10.2.
The yellow JIB low light won't illuminate.	A. Loose wire connection B. Power in the component box is not present. C. Failed transformer.	A. Ensure the yellow LED is securely attached to plug J6 on the ATO board. B. Ensure power is present in the component box. C. If power is present in component box, check the transformer for correct voltage.
One vat tops off but other vats fail to top off.	A. Loose wire connection. B. Actuator issue	A. Ensure all wiring harnesses are securely connected to ATO board and solenoids. B. Check return actuator to ensure actuator is functional.
Incorrect vat tops off.	A. Wired incorrectly. B. Flexlines connected to wrong vat.	A. Check wiring. B. Switch flexlines to correct vat.

Problem	Probable Causes	Corrective Action
Frypots won't top off.	<ul style="list-style-type: none"> A. Empty JIB. B. Probe temperature lower than setpoint. C. Oil is too cold. D. Bad Connection E. ATO board power loss F. Failed transformer/harness G. ATO pump failed H. Failed ATO board. I. ATO lines/pump plugged 	<ul style="list-style-type: none"> A. Ensure JIB has oil. B. Check to see that fryer is heating. Fryer temperature must be at setpoint. Check probe resistance. If probe is bad, replace the probe. C. Ensure that the oil in the JIB is above 70°F (21°C). D. With the computer OFF, press TEMP button and ensure the ATO software version appears. If not, the connection between the AIF and the ATO board may be bad. Ensure the 6-pin CAN connectors are tight between AIF (J4 and J5) and ATO (J10) boards. E. Power to the ATO board has been cut off. Restore power to the board and clear any service required errors. F. Ensure transformer in ATO box is functioning properly. Check power from transformer to ATO board. Ensure all harnesses are plugged securely into place. G. Ensure pump is operational. Check voltage to pump. Replace the pump if defective. H. Check for proper voltages using the pin position chart found on page 1-15. If ATO found defective, replace ATO board and clear any errors. I. Clear the lines/pump.
One vat doesn't top off.	<ul style="list-style-type: none"> A. Filter error exists. B. Actuator, pump, loose connection, RTD or ATO issue. 	<ul style="list-style-type: none"> A. Clear filter error properly. When change filter pad YES/NO is displayed, do NOT press any button until the pan has been removed for at least thirty seconds. After thirty seconds have elapsed, the computer returns to OFF or last display. B. Check actuator, ATO pump, wire connections, RTD and ATO board.
M3000 displays SERVICE REQUIRED – ATO BOARD	<ul style="list-style-type: none"> A. Loose or bad fuse B. Bad Connection C. ATO Board power loss 	<ul style="list-style-type: none"> A. Ensure fuse on right side of ATO box is secure and good. If the computer above the ATO box is missing power check the fuse below the component box. B. With the computer OFF, press TEMP button and ensure the ATO software version appears. If not, the connection between the AIF and the ATO board may be bad. Ensure the 6-pin CAN connectors are tight between AIF (J4 and J5) and ATO (J9 or J10) boards. C. Power to the ATO board has been cut off. Ensure there is correct voltage to the ATO transformer. Restore power to the board and clear any service required errors.

1.10.2 ATO (Automatic Top-Off) Board Pin Positions and Harnesses

Connector	From/To	Harness #	Pin #	Function	Voltage	Wire Color
J8	RTI Add Solenoid	8074671	1	24VAC Ret	24VAC	Black
			2			
			3			
	ATO Pump Relay		4	24VAC Ret	24VAC	Black
			5			
			6			
			7			
	JIB Reset Switch		8	JIB Low Reset	16VDC	Black
	RTI Add Solenoid		9	24VAC	24VAC	Red
			10			
			11			
	ATO Pump Relay		12	24VAC	24VAC	Red
			13			
			14			
			15			
	JIB Reset Switch		16	Ground	16VDC	Red
J4 (Rear) / J5 (Front)	Transformer	8074553	1	24VAC Ret	24VAC	Orange
			2	24VAC		Blue
			3			
			4			
		5	12VAC Ret	12VAC	Red	
		6	12VAC		Brown	
	ATO 4 & 5 Battery Jumper	8074657	7	Jumper	Ohm	Black
			8	Jumper		Black
J3 - Vat #3 J2 - Vat #2 J1 - Vat #1	ATO RTD	8074655 - Vat #1 8074654 - Vat #2 8074621 - Vat #3	1	DV - Probe Ground	Ohm	White
			2	DV - Probe		Red
			3	FV - Probe Ground		White
			4	FV - Probe		Red
J6	Orange LED	8074555	1	16VDC	16VDC	Black
			2	16VDC Ret		Red
J7			1			
			2			
			3	Ground		
			4	RB7/DATA		
			5	RB6/CLOCK		
J10	Network Resistor (pins 2 & 3) or to next ATO Board (4 & 5 vat units)	8074552	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4	5VDC+	5VDC	Black
			5	24VDC	24VDC	Red
			6	Ground		White
J9	AIF J5	8074546	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4	5VDC+	5VDC	Black
			5	24VDC	24VDC	Red
			6	Ground		White

1.10.3 Replacing the ATO board, LON Gateway, ATO pump relay or Transformers

Disconnect the fryer from the electrical power supply. Locate the ATO box (see Figure 1 on page 12), behind the JIB (Jug In Box). Remove the cover to expose the transformers, relay and LON gateway (if installed) (see Figure 2). Mark and unplug any wires or harnesses. Once the LON gateway is removed the ATO board is visible (see Figure 3). Replace the defective component and reattach all wires or harnesses. Replace the cover. Once replaced, **CYCLE POWER TO ENTIRE FRYER SYSTEM**. See section 1.11.7 on page 1-22 to reset control power. Check software version and if necessary update the software. If a software update was necessary, follow the instructions to update the software in section 1.15



Figure 2



Figure 3

Press the TEMP button on one of the M3000 computers, with the computer in the OFF position, to verify software version of the ATO. If the version is not visible, the ATO may not be connected properly.

1.10.4 Replacing the ATO Pump

Disconnect the fryer from the electrical power supply. Locate the ATO pump (see Figure 4), behind the ATO box. Mark and unplug any wires or harnesses. Press up from the bottom on the quick disconnects to release the plumbing (see Figure 5). The plumbing can be pulled from the pump. Loosen the four nuts attaching the pump to the pump tray. Replace the defective component and reverse above steps. Once replaced, reconnect the power.



Figure 4



Figure 5

1.11 MIB (Manual Interface Board) Service Procedures

The MIB (Manual Interface Board) oversees and controls filtration. It receives and sends data over the CAN (Controller Area Network) to and from various sensors and computers. It activates the filtration cycle, controlling when actuators should open and close.

The MIB controller is located inside the left cabinet (see Figure 6). In normal operation a cover hides the MIB controls and only the LED display is visible. The cover is held in place with three torx screws. In normal operation, an “A” is displayed for automatic mode. The MIB control board is useful for diagnostic purposes. It allows manual operation of both the actuators and filter pump without using the M3000 computer.

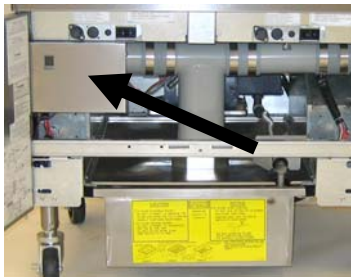


Figure 6: MIB controller cover.



Figure 7

Buttons and LED's

Manual – This button is used to toggle between auto and manual filtration mode. A corresponding LED is lit when in Manual mode. When pressed, a message will be sent to all vats, indicating the mode has changed.

The following buttons are inoperable in auto mode:

Select - This button is used to scroll through available vats, choosing one to be manually filtered.

Drain – This button is used to open and close the drain on the vat indicated on the display. It's embedded LED indicates the following activity:

Blink: Actuator is moving or awaiting a response from the AIF board.

Constant Illumination: Drain open.

No Illumination: Drain closed.

Return – This button is used to open and close the return valve on the vat indicated on the display. When pressed and held, it also turns on and off the pump. It's embedded LED indicates the following activity:

Blink: Actuator is moving or awaiting a response from the AIF board.

Constant Illumination: Return valve open.

No Illumination: Return valve closed.

1.11.1 Manually Draining, Refilling or Filtering using the MIB board

Press the manual/auto switch to set to manual. The LED on the manual key will illuminate and a vat number is displayed (see Figure 8).

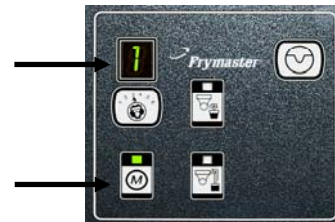


Figure 8

Press the vat selector switch to change vats (see Figure 9).



Figure 9

Pressing the drain or the return switch illuminates and activates the drain or return valve for the vat indicated. Pressing and holding the return switch while the return is open activates the filter motor and pump (see Figure 10).



Figure 10

Pressing the manual/auto switch will return to automatic mode.

1.11.2 MIB (Manual Interface Board) Troubleshooting


Problem	Probable Causes	Corrective Action
Auto filtration won't start.	<ul style="list-style-type: none"> A. Filter pan out of position. B. Oil level too low. C. Ensure MIB board is not in manual mode. D. Ensure MIB cover is not damaged and pressing against buttons. E. Filter relay has failed. F. AIF disable is set to YES, blue light doesn't light. G. Filter motor thermal switch is tripped. H. AIF clock enabled 	<ul style="list-style-type: none"> A. Ensure filter pan is fully inserted into fryer. If the MIB board displays a “P” the pan is not fully engaged into the pan switch. B. Ensure the oil level is above the top oil level sensor. C. Ensure MIB board is in “A” automatic mode. D. Remove and replace cover and see if filtration will start. E. Replace filter relay with part number 807-4482 24VDC relay. F. Set AIF disable in Level 1 to NO. G. Press filter motor thermal switch. H. Ensure AIF clock is set to disabled.
MIB display shows something other than an “A” or vat number.	An error has occurred and displayed character indicates error.	See MIB display diagnostics on page 1-21 for explanation.
No power present at the MIB board	Transformer has failed in left component box.	Check output on the left transformer in left component box; should read 24VAC. If not replace transformer.
MIB will not clear error.	Error remains in non-volatile memory.	Press and hold reset button in top right corner of MIB board for five seconds. The drain, return and manual/auto LEDS will illuminate and the MIB will reset and clear any remaining errors from memory. Allow 60 seconds to reset. If an error still exists, then another issue exists.
MIB indicates incorrect number of vats.	<ul style="list-style-type: none"> A. Network is not terminated correctly. B. Wiring harnesses are loose or damaged. C. An AIF board issue. D. Locator pin issue. 	<ul style="list-style-type: none"> A. Ensure the CAN bus system is terminated at BOTH ENDS (on the M3000 connector J6 and on the ATO board connector J9) with a resistor equipped 6-pin connector. B. Unplug and reseat all wiring harnesses in CAN system. Resistance between pins 2 and 3 on the CAN network connectors should be 120 ohms. C. Check software version numbers on all M3000 computers and ensure all are display an AIF version. If an AIF version is missing, the AIF board may be missing power or bad. Check pins 5 and on J4 and J5 of the affected AIF board for proper voltage. D. The locator pin in J2 of the AIF board is either loose or in the incorrect position. See the charts on page 1-55 of this manual for proper pin position.

Problem	Probable Causes	Corrective Action
<p>MIB board alternating “E” and “vat number and side”.</p>	<p>Network error on the CAN bus communication.</p>	<p>A. Ensure the CAN bus system is terminated at BOTH ENDS (on the M3000 connector J6 and on the ATO board connector J10) with a resistor equipped 6-pin connector.</p> <p>B. With the computer OFF, press TEMP button and ensure the AIF version appears. If not, the 24V to the AIF boards may be missing. Ensure all 6-pin CAN connectors are tight between the M3000 (J6 and J7), MIB (J1 and J2), AIF (J4 and J5) and ATO (J10) boards.</p> <p>C. With the computer OFF, press TEMP button and ensure the ATO version appears. If not, check the CAN wire harness between the AIF board J4 or J5 and the ATO board J9 or J10. The ATO fuse on the right side of the ATO box may be loose or blown; the 110V to the ATO transformer may be missing or the transformer bad. The J4/J5 connector may be loose. Is the right computer functioning? If not the fuse below the contactor box may be loose or blown.</p> <p>D. Check to see if MIB has 24V on pins 5 and 6 of J2. Check to see if 24V is present on pins 5 and 6 of wire harness plugging into J4 or J5 of the first AIF board. If 24V missing, check the pins. Replace the harness if necessary.</p> <p>E. Check continuity between each color wire on the CAN connectors into J7 on the far right computer and J10 on back of the ATO board (black to black, white to white, and red to red), and ensure there is no continuity between different color wires (black to red, red to white, and white to black).</p> <p>F. Ensure black computer locator wires are connected from ground to correct pin position (see drawing 8051734 page 1-55).</p> <p>G. Ensure all boards have the corner ground wire attached and tightened.</p> <p>H. The locator pin in J2 of the AIF board is either loose or in the incorrect position. See the charts on page 1-55 of this manual for proper pin position.</p> <p>I. Bad MIB and/or AIF board.</p> <p>J. Broken resistor lead. Unwrap the resistor leads and check ends.</p>

1.11.3 MIB (Manual Interface Board) Pin Positions and Harnesses

Connector	From/To	Harness #	Pin #	Function	Voltage	Wire Color
J1	M3000 J7	8074546	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4			
			5			
			6			
J2	AIF J4	8074547	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4	5VDC+	5VDC	Black
			5	24VDC	24VDC	Red
			6	Ground		White
J5	Transformer	8074649 RTI 8074844 NON-RTI	1	24VAC	24VAC	Black
			2	24VAC Ret		White
	Filter Relay		3	Pump Motor	24VDC	Red
			4	Pump Motor		Green
	Blue LED		5	Blue LED +	24VDC	Red
			6	Blue LED -		Black
	RTI Open Switch		7	Open Switch +		Black
	RTI Closed Switch		8	Closed Switch +		Red
			9			
			10			
	Pan Switch		11	Pan Sw +	24VDC	Black
			12	Pan Sw -		Red
			13			
			14			
	RTI Open Switch		15	Ground -		White
	RTI Closed Switch		16	Ground -		Green
J6	To RTI connection in rear of fryer	8074760	1	From RTI transformer	24VAC	Black
			2	Common		White
			3	To RTI "Add Pump" Relay	24VAC	Green
			4			
			5			
			6			
			7			
			8	From RTI "Waste Tank Full Sensor" Test Pins 2 to 8	24VAC – Full 0VAC – Not Full	Red

1.11.4 MIB (Manual Interface Board) Display Diagnostics

DISPLAY	LED	EXPLANATION
Drain		
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	On	Drain valve on vat # is open
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Off	Drain valve on vat # is closed
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Blink	Drain valve on vat # is opening or closing or an error condition may exist.
Return		
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	On	Return valve on vat # is open
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Off	Return valve on vat # is closed
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Blink	Return valve on vat # is opening or closing or an error condition may exist
Network		
N		Network error, displays for 10 seconds if no communications are received from the M3000 within 10 seconds after power on or MIB reset.
Resetting		
r		An "r" is displayed for ten seconds or until communication is received from the M3000 after a power on or MIB reset.
Miscellaneous		
E alternating with vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Blink	The circuit has an issue. Ensure the actuator is plugged in. Ensure the CAN connections are all securely plugged into the connectors.
		Indicates the AIF temperature sensor did not detect a full vat during filtration.
A	Manual LED off	The system is in auto filtration mode.
Vat # (The vat number is followed by an "L" to indicate left side of a split vat or an "r" to indicate the right side of a split vat or a full vat.)	Manual LED on	The system is in manual mode.
P		This will only be displayed in auto filtration mode. Filter pan is improperly seated. Any auto filtration messages received at this time are ignored.

1.11.5 MIB (Manual Interface Board) Display Characters

A – Auto Mode – Auto Filtration enabled.

E – Drain or return valve is not in desired state. The display will alternate between **E** and the corresponding vat number. Ensure the actuator is plugged in and an error does not exist.



– Three horizontal lines indicate the AIF temperature sensor did not detect that the vat was full during auto filtration.

n – Network Error - An “n” displays for 10 seconds if no communication is received from the cooking computer within ten seconds after a power on or MIB reset.

P – Pan Switch – Filter pan is improperly seated. Filtration is suspended.

r – Reset Switch - Reset the vat closes all of the valves on the vat. If displayed for some time, there is probably a problem with the board.

1 – 5 – Numbers which correspond to the vats with either an “L” indicating the left side of a split vat or “r” indicating the right side of a split vat or a full vat. These numbers are displayed in manual mode.

1.11.6 Replacing the MIB Board

Disconnect the fryer from the electrical power supply. Remove the torx screws from the MIB cover, exposing the MIB board (see Figure 11). Removing the screw at top center lets the MIB board hinge down. Carefully remove the plugs on the rear of the board (see Figure 12). Replace with a new MIB board and reverse steps to reassemble. Once replaced, **CYCLE POWER TO ENTIRE FRYER SYSTEM**. See next section to reset control power. Check software version # and if necessary update the software. If a software update was necessary, follow the instructions to update the software on in section 1.15 ensuring the MIB reset button is pressed and held for five seconds at the end of the update to update the MIB.



Figure 11



Figure 12

1.11.7 Control Power Reset Switch

The control power reset switch is a momentary rocker switch located behind the control box (see Figures 13 and 14) above the JIB that resets all power to all the computers and boards in the fryer. It is necessary to reset all power after replacing any computer or board. Press and hold the switch for at least ten seconds when resetting the control power to ensure power has sufficiently drained from boards.



Figure 13



Figure 14 (Rear view of Control Box)

1.12 RTI Service Issues

1.12.1 RTI MIB Tests

The LOV™ fryer will **ONLY** operate with RTI systems that have the new RTI updated three-pole float switch. If the float switch is the older two-pole switch, call RTI. These float switches are polarity specific which may short to ground and damage an MIB board.

Normal measurements (MIB J6 8-pin connector with everything connected)

AC voltage measurements:

Pin 1 to Pin 2 - 24 VAC.

Pin 2 to Pin 8 - 24 VAC when waste tank is full, 0 VAC when it is not full.

Pin 2 to Pin 3 - 24 VAC when RTI fill pump is on, 0 VAC when it is off.

Using the RTI test box, PN# 108-0716 allows a quick and easy way to check the 24VAC, the waste full switch and when the RTI pump is operating.

Troubleshooting

All return and drain valves should be closed and pump should be off while the MIB is resetting. If any of the valves or the pump is on during reset, the MIB board is bad or wires are shorted.

RTI pump is not operating or JIB is not filling:

See page 1-26 to ensure that no other function is taking priority over adding oil to jug.

1. Reset the power; wait 60 seconds and see if the valve opens.

With the JIB button pressed:

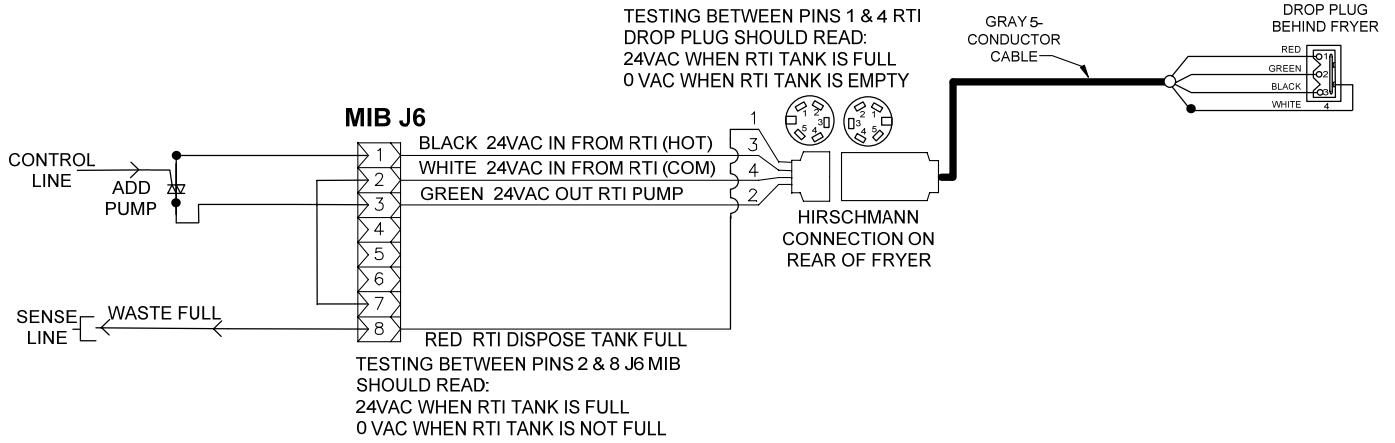
2. Voltage at MIB board from Pin 1 to Pin 2 should be 24 VAC; if not, check connections from RTI 24VAC transformer and check transformer.
3. Voltage at MIB board from Pin 1 to Pin 3 should be 24 VAC when filling JIB or vat; if not, the MIB board is bad or wires to pump relay are shorted or both.
4. Voltage at Add pump relay should be 24 VAC; if not, check wiring from MIB board. The relay is located on top of RTI system.
5. Check voltage at ATO board on J8. Pin 9 to Pin 1 should be 24 VAC with the orange button pressed.

Waste full signal:

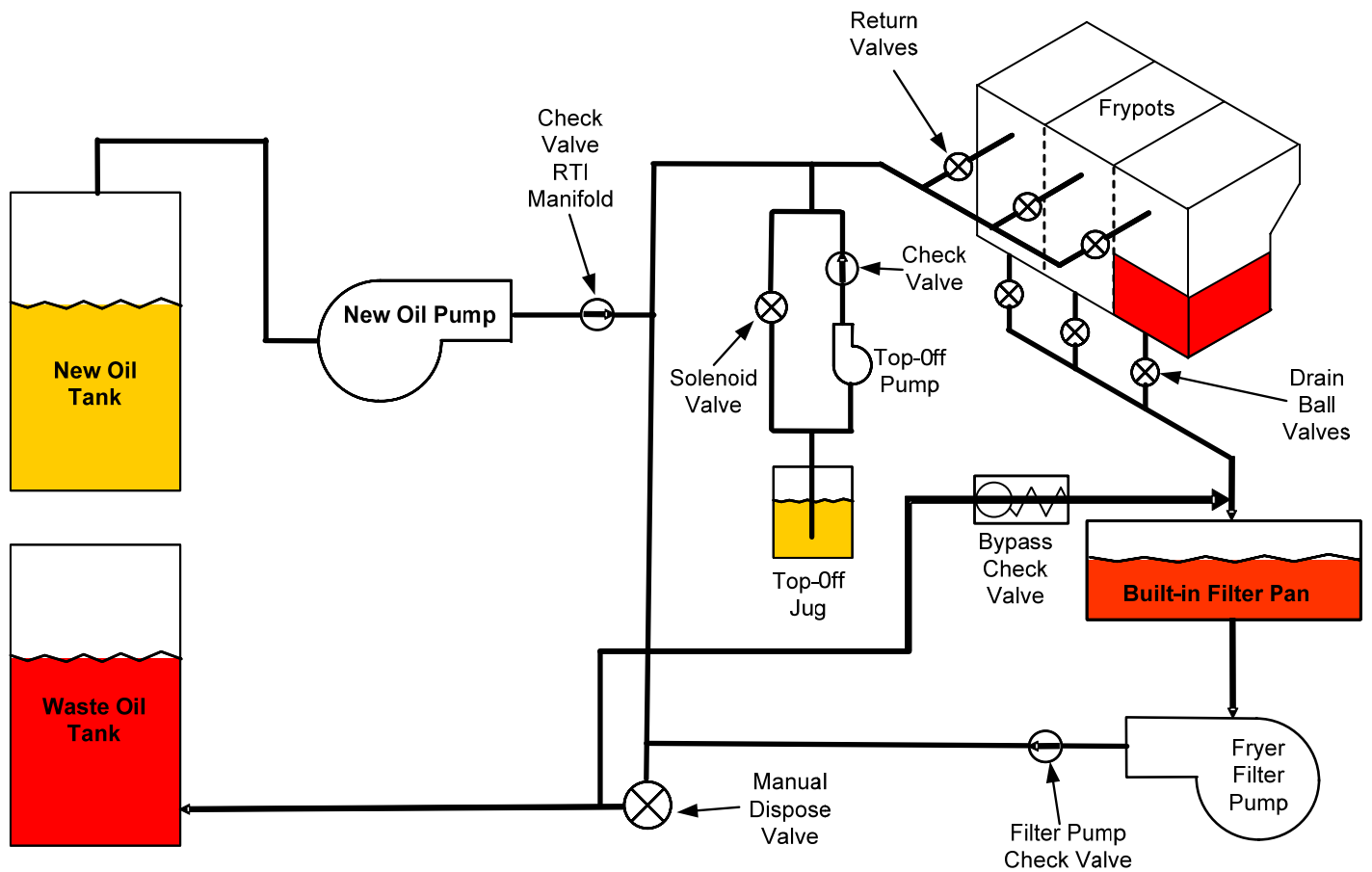
Pin 2 to Pin 8 should be 24 VAC when full, 0 VAC when not full; if no voltage level change, the connection from RTI switch or MIB board is bad.

1.12.2 RTI LOV™ Wiring

BULK OIL LOV WIRING



1.12.3 Frymaster LOV™ Fryer and RTI Bulk Oil System Plumbing Schematic



1.12.4 RTI LOV™ TEST QUICK REFERENCE

DISPOSE TO WASTE, REFILL VAT FROM BULK:

1. Hold down “Filter” button until computer beeps twice.
2. Scroll down to “Dispose” using “Info” button then press “✓” button.
3. “Dispose? Yes/No” is displayed.*
4. Press “✓” to dispose of oil in pot.
5. “Draining” is displayed.
6. “Vat Empty? Yes” is displayed.
7. Press “✓”.
8. “Cln Vat Complete? Yes” is displayed.
9. Press “✓”.
10. “Open Dispose Valve” is displayed. Open dispose valve.
11. “Disposing” is displayed for five minutes.
12. “Remove Pan” is displayed. Remove pan.
13. “Is Pan Empty? Yes No” is displayed.
14. Press “✓” if filter pan is empty. Select “✖” if pan still has oil in it.
15. “Close Dispose Valve” is displayed. Close dispose valve.
16. “Insert Pan” is displayed. Insert pan.
17. “Fill Vat From Bulk? Yes/No” is displayed.
18. Press “✓”.
19. “Press and Hold Yes to Fill” alternating with “Yes” is displayed.
20. Hold down “✓” to fill pot to desired level.
21. “Filling” is displayed while button is depressed.
22. “Continue Filling Yes/No” is displayed
23. Press “✓” to continue filling or “✖” to Exit program.

*NOTE: If the waste tank is full, the computer displays “RTI Tank Full.” Call RTI.

DISPOSE TO WASTE:

1. Hold down “Filter” button until computer beeps twice.
2. Scroll down to “dispose” using “Info” button and press “✓” button.
3. “Dispose? Yes/No is displayed.
4. Press “✓”.
5. “Draining” is displayed.
6. “Vat Empty? Yes is displayed.
7. Press “✓”.
8. “Cln Vat Complete? Yes” is displayed.
9. Press “✓”.
10. “Open Dispose Valve” is displayed.
11. Open dispose valve by pulling completely forward to start disposal.
12. “Disposing” is displayed for four minutes.
13. “Remove Pan” is displayed.
14. Slide the filter pan slightly out of the fryer.
15. “Is Pan Empty? Yes/No” is displayed.
16. Press “✓” if the filter pan is empty. Select “✖” if pan still has oil in it.
17. “Close Dispose Valve” is displayed.
18. Close the dispose valve ensuring the handle is pushed completely towards the fryer.
19. “Insert Pan” is displayed.
20. “Fill Vat From Bulk? Yes/No” is displayed.
21. Press “✖” if you wish to leave pot empty and exit.

FILL VAT FROM BULK:

1. Hold down “filter” button until computer beeps twice.
2. Scroll down to “Fill Vat from Bulk” using the Info button.
3. Press “✓”.
4. “Fill Vat from Bulk? Yes/No” is displayed.
5. Press “✓”.
6. “Press and Hold Yes to Fill / Yes” is displayed.
7. Press and hold down “✓” to fill pot to desired level.

8. "Filling" is displayed during fill.
9. Release button to stop filling.
10. "Continue Filling? Yes/No" is displayed.
11. Press "✖" to exit.

FILL JUG FROM BULK:*

1. When "Orange" indicator light is on, the top-off jug is empty.
2. To refill jug press and hold the orange reset button above the jug until the jug is full.
3. Release the button to stop filling.

***NOTE: The jug may not fill if any of the following are in progress:**

If FILTER NOW? YES/NO, CONFIRM YES/NO, or SKIM VAT is displayed, the fill jug button is disabled until either a filter is complete or until no is chosen.

The system also checks these conditions. The following must be met before jug fill is allowed.

Solenoid closed

- Orange fill button pressed longer than 3 sec.
- Waste valve closed
- Filter Now? Yes/No, Confirm Yes/No, or Skim Vat cannot be displayed
- System power cycle (all boards – computers, MIB, AIF and ATO) after changing setup from JIB to Bulk (use momentary reset). Ensure reset is pressed and held for at least ten seconds.
- No filtration or other filter menu selection can be in process.

Other factors that may not allow fill jug from bulk –

- Defective solenoid
- Defective switch
- RTI pump issue
- RTI relay stuck

If using two fryer systems that are both attached to the RTI system, they may not be able to fill both units at the same time if they have an RTI unit with a single head. Some RTI units have dual heads which can fill simultaneously.

1.13 AIF (Automatic Intermittent) Filtration Service Procedures

The AIF (Automatic Intermittent Filtration) board controls the actuators that open and close the drain and return valve. The AIF boards are located inside a protective housing under each frypot (see Figure 13).

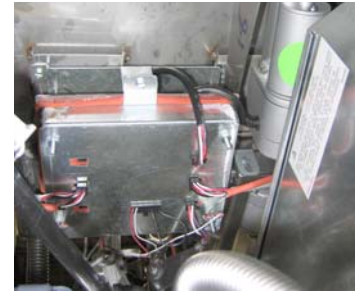


Figure 13

1.13.1 AIF Troubleshooting

Problem	Probable Causes	Corrective Action
<p>Actuator doesn't function.</p>	<ul style="list-style-type: none"> A. No power to the AIF board. B. Actuator is unplugged. C. AIF board failure. D. Actuator readings are out of tolerance. E. Actuator is bad 	<ul style="list-style-type: none"> A. Check pins 5 and 6 of J2 at the MIB board. Should read 24VDC. Check voltage on pins 5 and 6 at the other end of harness and ensure 24VDC is present. Continue to check pins 5 and 6 for 24VDC on plugs J4 and J5 on the AIF boards. B. Ensure the actuator is plugged into the proper connection (J1 for FV return, J3 for DV return and J6 for FV drain and J7 for DV drain). C. Check power on the connector of the problem actuator while trying to manually open or close an actuator. Pins 1 (Black) and 4 (White) should read +24VDC when the actuator is opening. Pins 2 (Red) and 4 (White) should measure -24VDC when the actuator is closing). If either voltage is missing, the AIF board is likely bad. Test the actuator by plugging into another connector. If the actuator operates, replace the board. D. Check resistance of the potentiometer between pin 3 (purple wire) and pin 4 (gray/white wire). Closed should read 0-560Ω. Open should read 3.8K Ω – 6.6K Ω. E. If proper voltages are present at the connector and actuator doesn't operate, reset power to the fryer. If it still doesn't operate replace the actuator.
<p>Actuator functions on wrong vat.</p>	<ul style="list-style-type: none"> A. Actuator plugged into wrong connector. B. Locator pin is in wrong position. 	<ul style="list-style-type: none"> A. Ensure the actuator is plugged into correct connection (J1 for FV return, J3 for DV return and J6 for FV drain and J7 for DV drain). B. Ensure the locator pin is in proper position in plug J2. See table B on page 1-55.

1.13.2 AIF (Auto Intermittent Filtration) Actuator Board Pin Positions and Harnesses

Connector	From/To	Harness PN	Pin #	Function	Voltage	Wire Color
J1	FV Return Actuator	N/A	1	Ret + (Open)	24VDC	Black
			2	Ret – (Closed)	24VDC	Red
			3	Ret Position		Purple
			4	Ground		White
J2	FV AIF RTD		1	Ground		White
	DV AIF RTD		2	FV - Temp		Red
			3	Ground		White
			4	DV - Temp		Red
			5			
			6			
			7			
	Oil Level Sensor (Gas)		8			
			9	DV – OLS (Gas)		
	Locator Pin		10	FV – OLS (Gas)		
			11	Locator Vat #5		Black
			12	Locator Vat #4		
			13	Locator Vat #3		
			14	Locator Vat #2		
			15	Locator Vat #1		
	Locator		16	Locator Signal		Black
J3	DV Return Actuator	N/A	1	Ret + (Open)	24VDC	Black
			2	Ret – (Closed)	24VDC	Red
			3	Ret Position		Purple
			4	Ground		White
J4	MIB J2 or AIF J5	8074547 AIF Board Communication and Power	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4	5VDC+	5VDC	Black
			5	24VDC	24VDC	Red
			6	Ground		White
J5	AIF J4 or ATO J10	8074547 AIF Board Communication and Power	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4	5VDC+	5VDC	Black
			5	24VDC	24VDC	Red
			6	Ground		White
J6	FV Drain Actuator	N/A	1	Drain + (Open)	24VDC	Black
			2	Drain – (Closed)	24VDC	Red
			3	Drain Position		Purple
			4	Ground		White
J7	DV Drain Actuator	N/A	1	Drain + (Open)	24VDC	Black
			2	Drain – (Closed)	24VDC	Red
			3	Drain Position		Purple
			4	Ground		White

1.13.3 Replacing an AIF (Automatic Intermittent Filtration) board

Disconnect the fryer from the electrical power supply. Locate the AIF board to be replaced under a frypot. Mark and unplug the harnesses. The AIF board assembly is held in place with one screw in the front of the assembly (see Figure 14). Remove the screw and the front of the assembly drops down (see Figure 15) and the back tab slides out of the bracket attached to the frypot (see Figure 16). Reverse steps to reassemble, ensuring that the new AIF assembly slides into the slot in the rear of the bracket. Once complete, **CYCLE POWER TO ENTIRE FRYER SYSTEM**. See section 1.11.7 on page 1-22 to reset control power. Check software version # and if necessary update the software. If a software update was necessary, follow the instructions to update the software in section 1.15.

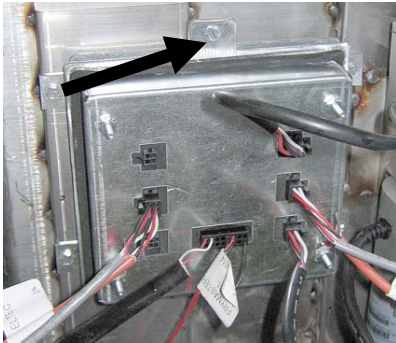


Figure 14

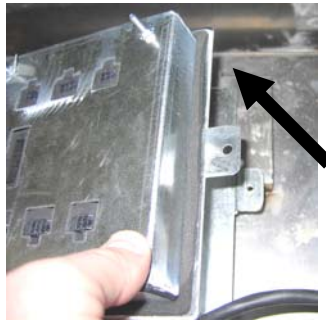


Figure 15



Figure 16

1.13.4 Replacing a Linear Actuator

Disconnect the fryer from the electrical power supply. Locate the actuator to be replaced under a frypot and mark and unplug the actuator. The actuators are held in place by two clevis pins which are held in by "J" clips (see Figure 17). Twist and remove both "J" clips and clevis pins (see Figure 18). It may be necessary to remove the AIF board to access the pins. Remove the actuator and attach the new actuator with only the rear clevis pin and "J" clip. Align the alignment holes and insert the clevis pin into both holes (see Figure 19). Rotate the actuator shaft until the holes of the shaft and valve plate align (see Figure 20). Remove the pin from the alignment hole and insert into the actuator shaft and valve handle (see Figure 21). Insert the "J" pin to secure (see Figure 22).

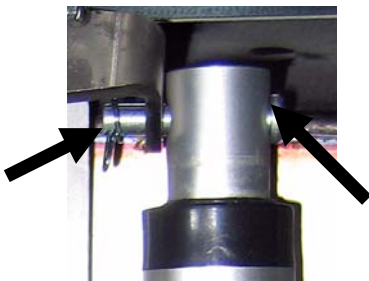


Figure 17



Figure 18



Figure 19

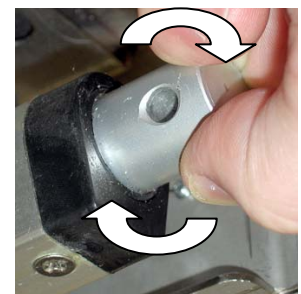


Figure 20



Figure 21



Figure 22

1.13.5 Replacing a Rotary Actuator

Disconnect the fryer from the electrical power supply. Locate the actuator to be replaced and mark and unplug the actuator. The actuators are held in place by two allen screws. Loosen the allen screws. It may be necessary to remove a gas line to the burner when removing a drain actuator. Remove the actuator from the valve stem. Align the actuator with the valve stem and attach the new actuator. Tighten the two allen screws. Reconnect power and test the actuator.

NOTE: Rotary actuators have two different part numbers, which are mirror images of each other that correspond to their mounting position.

1.14 M3000 Computer Service Procedures

1.14.1 M3000 Computer Troubleshooting

Problem	Probable Causes	Corrective Action
No Display on Computer.	<ul style="list-style-type: none"> A. Computer not turned on. B. No power to the fryer. C. Power switch turned off. D. Loose fuse holder. E. Computer has failed. F. Damaged computer wiring harness. G. Power supply component or interface board has failed. 	<ul style="list-style-type: none"> A. Press the ON/OFF switch to turn the computer on. B. This fryer may have two cords: a computer power cord and a main power cord. If the computer cord is not plugged in, the computer will not activate. Verify computer power cord is plugged in and that circuit breaker is not tripped. C. Some fryers have a rocker power switch inside the cabinet below the computer. Ensure the switch is turned on. D. Ensure fuse holder is screwed in properly. E. Swap the computer with a computer known to be good. If computer functions, replace the computer. F. Swap with a harness known to be good. If computer functions, replace the harness. G. If any component in the power supply system (including the transformer and interface board) fail, power will not be supplied to the computer and it will not function.
Computer locks up.	Computer error.	Remove and restore power to the computer.
M3000 display shows FILTER BUSY.	<ul style="list-style-type: none"> A. Another filtration cycle is still in process. B. Computer error. 	<ul style="list-style-type: none"> A. Wait until the previous filtration cycle ends to start another filtration cycle or until the MIB board has reset. This may take up to one minute. B. If filter busy is still displayed with no activity, ensure the filter pan is empty and remove and restore ALL power to the fryer.
M3000 display shows RECOVERY FAULT.	Recovery time exceeded maximum time limit for two or more cycles.	Silence the alarm by pressing the ✓ button. Check that fryer is heating properly. Maximum recovery for electric is 1:40. If this error continues to appear call your ASA.

Problem	Probable Causes	Corrective Action
M3000 display shows ENERGY MISCONFIGURED	Wrong energy type selected in setup.	Press 1234 to enter setup and set energy type for electric.
M3000 display shows EXCEPTION ERROR with the description on the right.	An error has occurred.	Press 1234 to enter setup and reconfigure the computer.
M3000 displays SERVICE REQUIRED followed by the error.	An error has occurred.	Press YES to silence alarm. The error is displayed three times. See list of issues in section 1.14.3. Fix issue. The computer displays SYSTEM ERROR FIXED? YES/NO . Press YES. Computer displays ENTER CODE . Enter 1111 to clear error code. Pressing NO will allow the fryer to cook but the error will be redisplayed every 15 minutes.
M3000 display is in wrong temperature scale (Fahrenheit or Celsius).	Incorrect display option programmed.	See section 1.14.2 on page 1-33 to change temperature scale.
M3000 displays CHANGE FILTER PAD.	Filter error has occurred, filter pad clogged, 24 hour filter pad change prompt has occurred or change filter pad was ignored on a prior prompt.	Change the filter pad and ensure the filter pan has been removed from the fryer for a minimum of 30 seconds. Do NOT ignore CHANGE FILTER PAD prompts.
M3000 display shows INSERT PAN.	A. Filter pan is not fully inserted into fryer. B. Missing filter pan magnet. C. Defective filter pan switch.	A. Pull filter pan out and fully reinsert into fryer. B. Ensure the filter pan magnet is in place and if missing replace. C. If the filter pan magnet is fully against the switch and computer continues to display INSERT PAN , switch is possibly defective.
M3000 display shows HOT-HI-1.	Frypot temperature is more than 410°F (210°C) or, in CE countries, 395°F (202°C).	This is an indication of a malfunction in the temperature control circuitry, including a failure of the high-limit thermostat.
M3000 display shows HI-LIMIT.	Computer in high-limit test mode.	This is displayed only during a test of the high-limit circuit and indicates that the high-limit has opened properly.
M3000 display shows LOW TEMP alternating with Melt-CYCL.	Frypot temperature is between 180°F (82°C).	This display is normal when the fryer is first turned on while in the melt cycle mode. To bypass the melt cycle press and hold either #1 or #2 cook button under the LCD display until a chirp is heard. The computer displays EXIT MELT alternating with YES NO . Press the #1 YES button to exit melt. If the display continues, the fryer is not heating.
M3000 display shows ERROR RM SDCRD	Defective SD Card	Replace card with another card.

Problem	Probable Causes	Corrective Action
M3000 display shows TEMP PROBE FAILURE.	A. Problem with the temperature measuring circuitry including the probe. B. Damaged computer wiring harness or connector.	A. This indicates a problem within the temperature measuring circuitry. Check resistance of probe, if faulty replace probe. B. Swap the computer wiring harness with one known to be good. If problem is corrected, replace the harness.
MAINT FILTER (Manual Filter) won't start.	Temperature too low.	Ensure fryer is at setpoint before starting MAINT FILTER .
M3000 display shows REMOVE DISCARD.	In non-dedicated mode, a product is dropped that has a different setpoint than the current vat temperature.	Remove and discard product. Press a cook button under the display with the error to remove the error. Reset the setpoint of the vat before trying to cook product.
M3000 display shows HEATING FAILURE.	Failed computer, failed interface board, open high-limit thermostat.	Turn off the vat with the issue. The error is displayed if the fryer loses its ability to heat oil. It is also displayed when the oil temperature is above 450°F (232°C) and the high-limit thermostat has opened, halting the heating of the oil.
Computer will not go into program mode or some buttons do not actuate.	Failed computer.	Replace computer
M3000 display shows HI 2 BAD.	Computer in high-limit test mode.	This is displayed during a test of the high-limit circuit to indicate if the high-limit has failed.
M3000 display shows HELP HI-2 or HIGH LIMIT FAILURE.	Failed high-limit.	This is displayed to indicate the high-limit has failed.
M3000 display shows software for only M3000 or MIB but not all boards.	Loose or damaged harness	Check that all harnesses between M3000's, MIB, AIF and ATO are secure. Ensure 24VDC is present on pins 5 & 6 of J2 on MIB board and on J4 or J5 of AIF board. Check for loose or broken pins/wires. If the problem persists, swap out computer from one bank to another and cycle power on the fryer.
M3000 display shows LOW TEMP, heating indicator cycles on and off normally but fryer does not heat.	A. Three phase power cord unplugged or circuit breaker is tripped. B. Blown fuse C. Failed computer. D. Damaged computer wiring harness. E. Open connection in high-limit circuit.	A. Ensure all cords are fully seated in the receptacles, locked into place and that circuit breakers are not tripped. B. Check three amp fuse on front of control box. C. Replace computer. D. Replace computer wiring harness. E. Check high limit circuit starting at the control box connector working to the high-limit.

Problem	Probable Causes	Corrective Action
M3000 display shows IS VAT FULL? YES NO.	A filter error has occurred due to dirty or clogged filter pad or paper, clogged filter pump, filter pump thermal overload, improperly installed filter pan components, worn or missing O-rings, cold oil or an actuator problem.	Follow the steps in the flowchart in section 1.14.5.
Fryer filters after each cook cycle.	Filter after setting incorrect or software update issue.	Overwrite the filter after setting by re-entering the filter after value in level two. Ensure that the down arrow is pressed after entering the value to save the setting (see section 4.13.5 on page 4-33 in the BIELA14 IO Manual).

1.14.2 M3000 Useful Codes

To enter any of the following codes: Press and hold ◀ and ▶ simultaneously for **TEN** seconds; three chirps sound. The computer displays **TECH MODE**. Enter the codes below to perform the function.

- **1658 – Change from F° to C°** The computer displays **OFF**. Turn the computer on and check temperature to see the temperature scale. If the desired scale is not displayed, repeat.
- **3322 – Reset Factory Menu** The computer displays **COMPLETE** and then **OFF**. (**NOTE:** This will delete any hand-entered menu items).
- **1650 – Enter Tech Mode.** See page 1-36 to reset passwords and change filter pad time.
- **1212 – Switch between Domestic Menu and International Menu**. The computer displays **COMPLETE** and then **OFF**. (**NOTE:** This will delete any hand-entered menu items).
- **0469 – Reset FILTER STAT DATA**

The following codes require the removal and reinsertion of the J3 locator plug on the rear of the computer before entering the code.

- **1000 – Reset CALL TECH Message** - Disconnect board locator plug (J3). Reinsert plug. Enter **1000**. Computer display switches to **OFF**. Remove and then restore power to the computer using the 20-pin plug.
- **9988 – Reset BADCRC Message** - Disconnect board locator plug (J3). Reinsert plug. Enter **9988**. Computer display switches to **OFF**. Remove and then restore power to the computer using the 20-pin plug.

The following codes are entered when prompted to do so or from an energy misconfigured exception error.

- **1111 – Reset SERVICE REQUIRED Message** – Enter when the issue is fixed and prompted to enter.
- **1234 – Enter SETUP MODE** from energy misconfigured exception error (This usually can be done without pressing the filter buttons if an error is displayed.)

PASSWORDS

To enter level one, level two passwords: Press and hold the **TEMP** and **INFO** buttons simultaneously until level 1 or level 2 is displayed. Release the buttons and **ENTER CODE** appears.

- **1234 – Fryer Setup, Level One and Level Two**
- **4321 – Usage Password** (resets usage statistics).

1.14.3 Service Required Errors

A SERVICE REQUIRED error alternating with YES displays on the computer. After YES is pressed the alarm is silenced. The computer displays an error message from the list below three times with the location of the error. Then the computer displays SYSTEM ERROR FIXED? YES/NO. If yes is chosen, enter code 1111. If NO is chosen the system returns to cook mode for 15 minutes then redisplay error until issue is fixed.

Pressing the MIB reset button during any filter function will generate a “SERVICE REQUIRED” error.

This is a list of the service required errors and causes.

ERROR MESSAGE	EXPLANATION
PUMP NOT FILLING	Oil not returning to vat quickly. Possible problems: dirty pad, bad or missing O-rings, tripped or defective filter pump, actuators or linkage.
DRAIN VALVE NOT OPEN	Drain valve failed to open; the valve's position is unknown.
DRAIN VALVE NOT CLOSED	Drain valve failed to close; the valve's position is unknown.
RETURN VALVE NOT OPEN	Return valve failed to open; the valve's position is unknown.
RETURN VALVE NOT CLOSED	Return valve failed to close; the valve's position is unknown.
MIB BOARD	Problem with CAN communications; Check for loose CAN connections between computer and MIB board. MIB board failure
AIF BOARD	MIB detects AIF missing; AIF board failure
ATO BOARD	MIB detects ATO board connection lost; ATO board failure
HIGH LIMIT FAILURE	High limit circuit has an issue
AIF PROBE	AIF RTD reading out of range
ATO PROBE	ATO RTD reading out of range
TEMP PROBE FAILURE	TEMP Probe reading out of range
MIB SOFTWARE	Internal MIB software error
INVALID CODE LOCATION	SD card removed during update
MISCONFIGURED ENERGY TYPE	Energy type in fryer setup is incorrect. (ie. Set proper energy type gas or electric) Press 1234 to enter setup to properly configure fryer.
RTC INVALID DATE	The date is invalid. Press 1234 to enter setup to properly configure fryer and set proper date.

1.14.4 Error Log Codes

Refer to page 1-39, level 2 program for access to the E-log. The ten most recent errors are listed from A-J, with A being the most recent error.

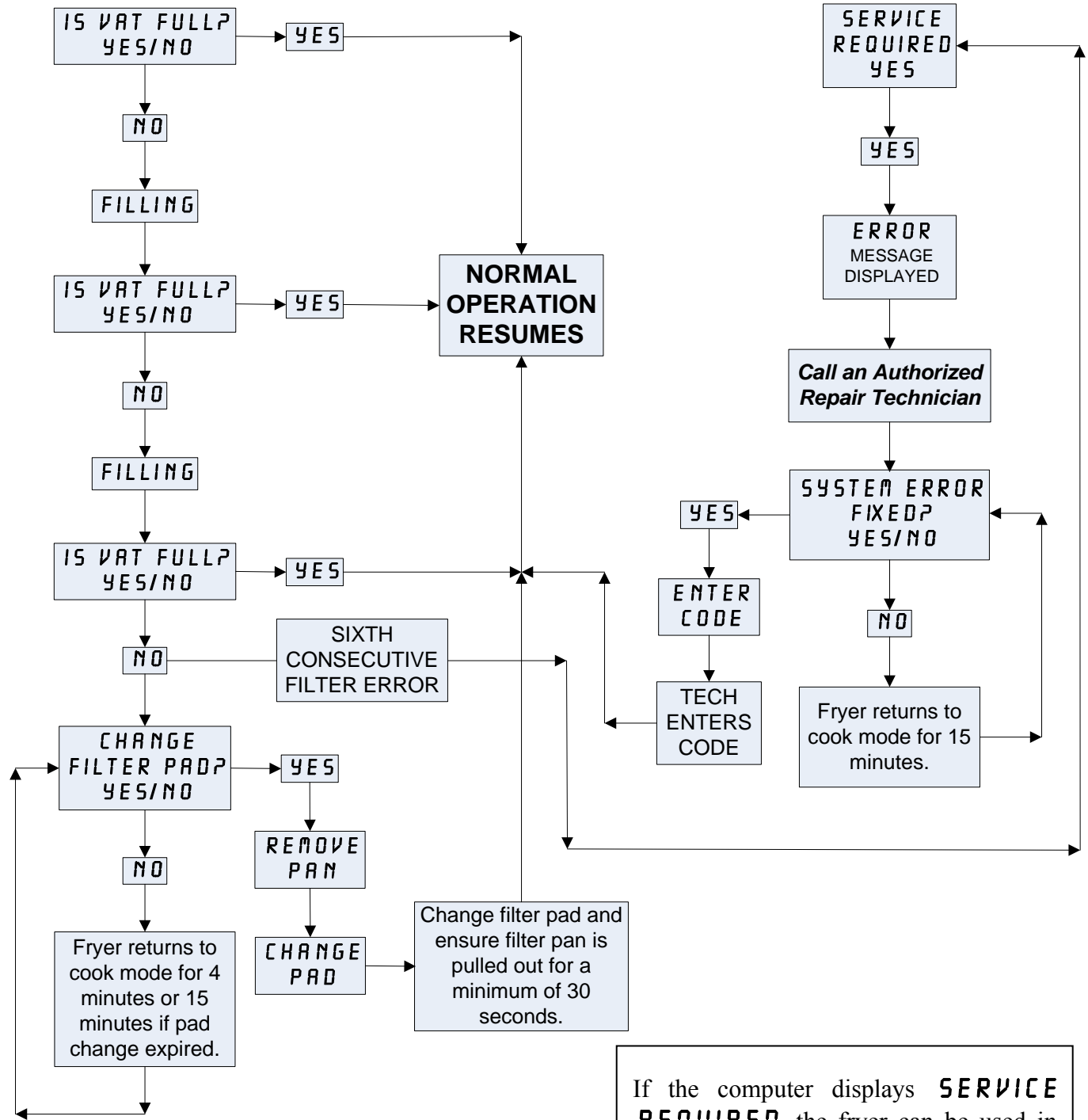
Code	ERROR MESSAGE	EXPLANATION
E01	REMOVE DISCARD (Right)	A product cook is started on the right side of a split vat or in a full vat that has a different setpoint other than the current vat temperature.
E02	REMOVE DISCARD (Left)	A product cook is started on the right side of a split vat or in a full vat that has a different setpoint other than the current vat temperature.
E03	ERROR TEMP PROBE FAILURE	Temp probe reading out of range
E04	HI 2 BAD	High limit reading is out of range.
E05	HOT HI 1	High limit temperature is past more than 410°F (210°C), or in CE countries, 395°F (202°C)
E06	HEATING FAILURE	A component has failed in the high limit circuit such as computer, interface board, contactor or open-high limit.
E07	ERROR MIB SOFTWARE	Internal MIB software error
E08	ERROR ATO BOARD	MIB detects ATO board connection lost; ATO board failure
E09	ERROR PUMP NOT FILLING	Oil not returning to vat quickly. Possible problems: dirty pad, bad or missing O-rings, tripped or defective filter pump, actuators or linkage.
E10	ERROR DRAIN VALVE NOT OPEN	Drain valve failed to open; the valve's position is unknown.
E11	ERROR DRAIN VALVE NOT CLOSED	Drain valve failed to close; the valve's position is unknown.
E12	ERROR RETURN VALVE NOT OPEN	Return valve failed to open; the valve's position is unknown.
E13	ERROR RETURN VALVE NOT CLOSED	Return valve failed to close; the valve's position is unknown.
E14	ERROR AIF BOARD	MIB detects AIF missing; AIF board failure
E15	ERROR MIB BOARD	Cooking computer detects MIB connections lost; Check software version on each computer. If versions are missing, check CAN connections between each computer; MIB board failure
E16	ERROR AIF PROBE	AIF RTD reading out of range
E17	ERROR ATO PROBE	ATO RTD reading out of range
E18	Not currently used	
E19	M3000 CAN TX FULL	Connection between computers lost
E20	INVALID CODE LOCATION	SD card removed during update
E21	FILTER PAD PROCEDURE ERROR (Change Filter Pad)	25 hour timer has expired or dirty filter logic has activated
E22	OIL IN PAN ERROR	The MIB has reset the oil in pan flag.
E23	CLOGGED DRAIN (Gas)	Vat did not empty during filtration
E24	AIF BOARD OIB FAILED (Gas)	Oil is back sensor failed.
E25	RECOVERY FAULT	Recovery time exceeded maximum time limit.
E26	RECOVERY FAULT CALL SERVICE	Recovery time exceeded maximum time limit for two or more cycles.
E27	LOW TEMP ALARM	Oil temperature has dropped lower than 15°F (8°C) in idle mode or 45°F (25°C) in cook mode.

1.14.5 Tech Mode

Tech mode allows technicians to reset all passwords set in levels one and two and change when the fryer calls for a filter pad change. The default is 25 hours.

1. Press and hold ◀ and ▶ simultaneously for **TEN** seconds until three chirps sound and **TECH MODE** is displayed.
2. Enter **1650**.
3. The computer displays **CLEAR PASSWORDS**.
4. Press the ✓ (1) button to accept selection and clear the passwords.
5. The computer displays **CLEAR PASSWORDS** on the left and **COMPLETE** on the right. This clears any passwords set up under levels one and two.
6. Press the ▼ button to toggle to **FILTER PAD TIME** on the left and **25** on the right. (25 hours is the default time to change the pad)
7. Press the ✕ (2) button to accept changes and exit.
8. The computer displays **OFF**.

1.14.6 M3000 Filter Error Flowchart



This chart follows the process of clearing a filtration issue. The prompt is displayed when any of the following occur:

1. a clogged filter pad,
2. a tripped or defective filter pump,
3. a leaky O-ring on the pick-up tube,
4. a failed drain valve/actuator, or
5. a failed return valve/actuator.

If the computer displays **SERVICE REQUIRED**, the fryer can be used in most cases by answering **NO** when the prompt for **SYSTEM ERROR FIXED? YES NO** is displayed. The message repeats every 15 minutes until the issue is repaired and error cleared by a technician. To clear the error, enter 1111 after answering **YES** when **SYSTEM ERROR FIXED? YES NO** is displayed.

1.14.7 M3000 Menu Summary Tree

Reflected below are the major programming sections in the M3000 and the order in which submenu headings will be found under the sections in the Installation and Operation Manual.

Adding New Menu Items

See section 4.10.2

Storing Menu Items in Product Buttons

See section 4.10.3

Draining, Refilling, and Disposing of Oil

See section 4.10.4

Filter Menu 4.11

[Press and hold ◀ FLTR or FLTR ▶]

- Auto Filter
- Maint Filter
- Dispose
- Drain to Pan
- Fill Vat from Drain Pan
- Fill Vat from Bulk (Bulk Only)
- Pan to Waste (Bulk Only)

Programming

Level 1 Program 4.12

[Press and hold TEMP and INFO buttons, 2 beeps, displays Level 1, enter 1234]

- Product Selection 4.10.2
 - Name
 - Cook Time
 - Temp
 - Cook ID
 - Duty Time 1
 - Duty Time 2
 - Qual Tmr
 - AIF Disable
 - Assign Btn
- AIF Clock 4.12.1
 - Disabled
 - Enabled
- Deep Clean Mode 4.12.2
- High-Limit Test 4.12.3
- Fryer Setup 4.9

Level 2 Program (Manager Level) 4.13

[Press and hold TEMP and INFO buttons, 3 beeps, displays Level 2, enter 1234]

- Prod Comp Sensitivity for product 4.13.1
- E-Log Log of last 10 error codes 4.13.2
- Password Setup Change passwords 4.13.3
 - Setup [enter 1234]
 - Usage [enter 4321]
 - Level 1 [enter 1234]
 - Level 2 [enter 1234]
- Alert Tone Volume and Tone 4.13.4
 - Volume 1-9
 - Tone 1-3
- Filter After Sets number of cooks before filter prompt 4.13.5
- Filter Time Sets amount of time between filter cycles 4.13.6

Tech Mode

[Press and hold ◀ and ▶ for 10 seconds, 3 beeps, displays TECH #00E, enter 1650]

- Clear Passwords
- Filter Pad Time

Info Mode 4.14

[Press and hold INFO for 3 seconds, displays Info Mode]

- Full/Split Vat Configuration
 - Filter Stats 4.14.1
 - Review Usage 4.14.2
 - Last Load 4.14.3

1.14.8 M3000 Board Pin Positions and Harnesses

Connector	From/To	Harness PN	Pin #	Function	Voltage	Wire Color
J1	SD Card					
J2	Interface Board to Computer	8074199 SMT Computer to Interface Board Harness	1	12VAC In	12VAC	Black
			2	Ground		
			3	12VAC In	12VAC	
			4	FV Heat Demand		
			5	V Relay	12VDC	
			6	DV Heat Demand		
			7	R/H B/L	12VDC	
			8	Analog Ground		
			9	L/H B/L	12VDC	
			10	ALARM		
			11	Sound Device	5VDC	
			12	ALARM		
			13	FV Probe		
			14	Common Probes		
			15	DV Probe		
			16			
			17			
			18			
			19			
			20			
J3	Interface Board Ground to Computer	Computer Locator Harness	1	Vat #1		Black
			2	Vat #2		
			3	Vat #3		
			4	Vat #4		
			5	Vat #5		
			6	Ground		
J4	Not Used					
J6	Next M3000 J7 or Network Resistor	8074546 Computer Communication Harness	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4			
			5			
			6			
J7	MIB J1 or previous M3000 J6	8074546 Computer Communication Harness	1	Ground		Black
			2	CAN Lo		Red
			3	CAN Hi		White
			4			
			5			
			6			

1.15 Loading and Updating Software Procedures

Updating the software takes approximately 30 minutes. The software only needs to be loaded in **ONE** computer and it will update **all** the computers and boards in the system. To update the software, follow these steps carefully:

1. Switch all computers to **OFF**. Press the TEMP button to check current M3000/MIB/AIF/ATO software version.
2. Remove the bezel and remove the two screws on the left side cover plate of the M3000 board.
3. With the computer folded down, insert the SD card, with the contacts facing down and the notch on the bottom right (see Figure 23 and 24), into the slot on the left side of the M3000.
4. Once inserted, **UPGRADE IN PROGRESS** appears on the left display and **WAIT** on the right.
5. The display then changes to **CC UPDATING** on the left and the percentage completed appears on the right. The display counts up to 100 on the right, changing to a flashing **BOOT**. **DO NOT REMOVE THE CARD UNTIL THE DISPLAY PROMPTS TO DO SO IN STEP 8.**
6. Then **UPGRADE IN PROGRESS** is displayed on the left display and **WAIT** on the right again followed by **COOK HEX, MIB HEX, AIF HEX** ending with **ATO HEX** displayed on the left and the percentage complete on the right.
7. The display then changes to **REMOVE SD CARD** on the left and **100** on the right.
8. Remove the SD card using the fingernail slot on the top of the SD card.
9. Once the SD card is removed the display changes to **CYCLE POWER**.
10. Cycle the control power using the hidden reset switch behind the right control box. **ENSURE THE SWITCH IS HELD FOR 10 SECONDS. WAIT ANOTHER 20 SECONDS UNTIL THE MIB BOARD HAS FULLY RESET BEFORE CONTINUING.**
11. An **EXCEPTION MISCONFIGURED ENERGY TYPE** error may appear on the left computer while a flashing **BOOT** is displayed on the remaining computers while the program is transferred. If this happens, enter 1234 on the left computer. The display changes to **LANGUAGE** on the left and **ENGLISH** on the right. To change the entry use the **< FLTR** and **FLTR >** buttons. To navigate to the next field, use the **▼INFO** button. Once all parameters have been setup, press *** (2)** button to exit. **SETUP COMPLETE** is displayed.
12. When the update is complete the M3000 displays **OFF**. The MIB display will remain blank while software is loading, changing to show the vat numbers. Once the LED's stop blinking, the MIB board will display **A**.
13. Cycle the control power using the hidden reset switch behind the right control box again. **ENSURE THE SWITCH IS HELD FOR 10 SECONDS. WAIT ANOTHER 20 SECONDS UNTIL THE MIB BOARD HAS FULLY RESET BEFORE CONTINUING.**
14. **With the computer displaying OFF, VERIFY software update by pressing the TEMP button to check updated M3000/MIB/AIF/ATO version on each computer. IF ANY BOARDS DID NOT UPDATE, REPEAT THE PROCESS STARTING WITH STEP 3.**
15. Press and hold the two outer filter buttons until **TECH MODE** is displayed.
16. Enter 1650, **CLEAR PASSWORDS** is displayed.
17. Press the INFO button once. **FILTER PAD TIME** is displayed on the left side and **25** is displayed on the right. **IF ANY OTHER NUMBER OTHER THAN 25 IS DISPLAYED, ENTER 25.** This only needs to be performed on one computer.
18. Press the INFO button again.
19. Press the *** (2)** button to exit.
20. Once the software has been updated and the versions are correct, replace the cover and screws covering the SD card slot.
21. Reinstall the screws attaching the computers and bezel by reversing steps 2 through 5.
22. Perform a forced auto filter cycle on each vat except the fish vat by pressing and holding one of the filter buttons. **FILTER MENU** is displayed changing to **AUTO FILTER**.
23. Press the (1 ✓) button.
24. **FILTER NOW YES/NO** is displayed.
25. Press the (1 ✓) button.
26. **SKIM VAT** is displayed changing to **CONFIRM**.
27. Press the (1 ✓) button. The auto filter cycle should start.
28. Once the filter cycle is complete, repeat on each vat in the fryer.
29. Once all vats have been successfully filtered the software update is finished.

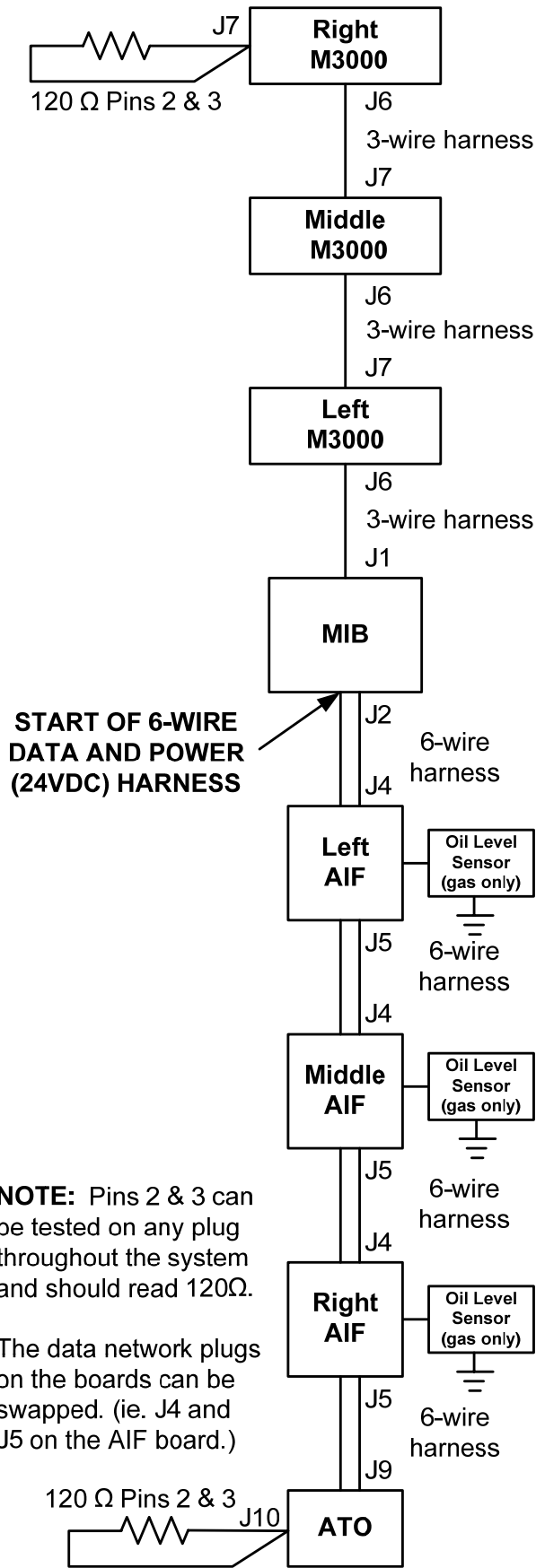


Figure 23



Figure 24

1.16 BIELA14 Series LOV™ Data Network Flowchart



START OF 6-WIRE DATA AND POWER (24VDC) HARNESS

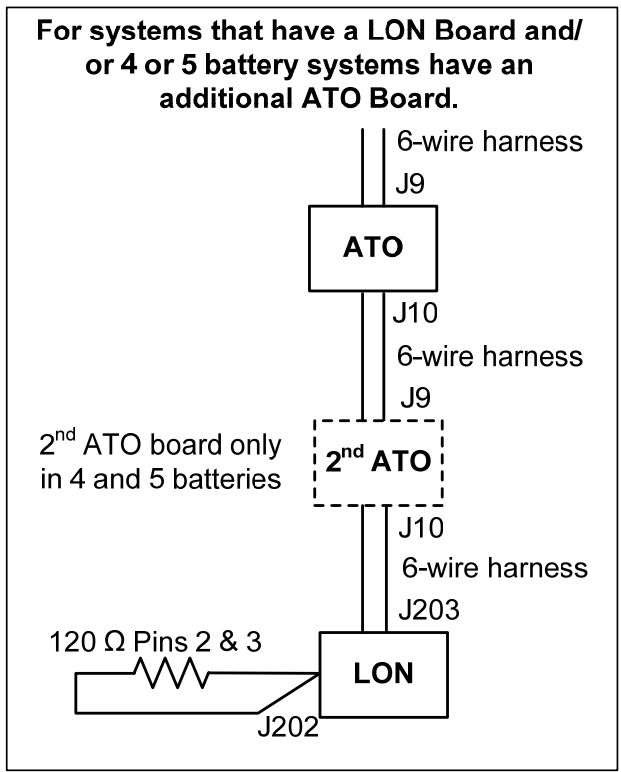
NOTE: Pins 2 & 3 can be tested on any plug throughout the system and should read 120Ω.

The data network plugs on the boards can be swapped. (ie. J4 and J5 on the AIF board.)

Turn each computer to OFF. Press the TEMP button on each computer and verify ALL software versions are present (M3000, MIB, AIF, ATO and LON on US only). A missing version may indicate an open connection. Connections from the MIB to the AIF boards carry 24VDC on the gray cable.

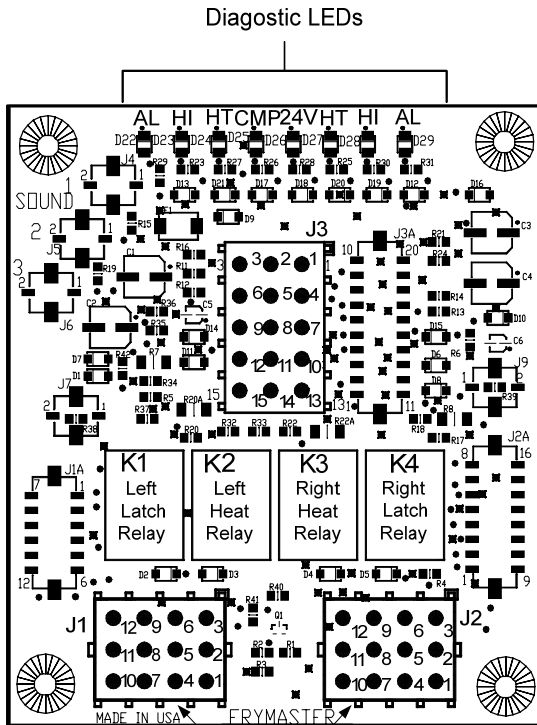
Harness	Pin #	Function	Voltage	Wire Color
3-wire harness	1	Ground		Black
	2	CAN Lo		Red
	3	CAN Hi		White
	4	NOT USED		
	5	NOT USED		
	6	NOT USED		

6-wire harness	1	Ground		Black
	2	CAN Lo		Red
	3	CAN Hi		White
	4	5VDC+	5VDC	Black
	5	24VDC	24VDC	Red
	6	Ground		White



1.17 Interface Board Diagnostic Chart

The following diagram and charts provide ten quick system checks that can be performed using only a multimeter.



Diagnostic LED Legend	
CMP	indicates power from 12V transformer
24	indicates power from 24V transformer
HI (RH)	indicates output (closed) from right latch relay
HI (LH)	indicates output (closed) from left latch relay
HT (RH)	indicates output from right heat relay
HT (LH)	indicates output from left heat relay
AL (RH)	indicates output (open) from right latch relay
AL (LH)	indicates output (open) from left latch relay

PN 826-2260 (106-6664)

Test Points
J1 Left J2 Right

NOTE – Pin 1 is located in the bottom right corner of Both J1 and J2. These test points are **ONLY** for LOV™ Series boards with J1 and J2 plugs on the front of the board.

Meter Setting	Test	Pin	Pin	Results
12 VAC Power	50 VAC Scale	3 of J2	1 of J2	12-16 VAC
24 VAC Power	50 VAC Scale	2 of J2	Chassis	24-30 VAC
*Probe Resistance (RH)	R X 1000 OHMS	11 of J2	10 of J2	See Chart
*Probe Resistance (LH)	R X 1000 OHMS	1 of J1	2 of J1	See Chart
High-Limit Continuity (RH)	R X 1 OHMS	9 of J2	6 of J2	0 - OHMS
High-Limit Continuity (LH)	R X 1 OHMS	6 of J1	9 of J1	0 - OHMS
Latch Contactor Coil (RH)	R X 1 OHMS	8 of J2	Chassis	3-10 OHMS
Latch Contactor Coil (LH)	R X 1 OHMS	5 of J1	Chassis	3-10 OHMS
Heat Contactor Coil (RH)	R X 1 OHMS	7 of J2	Chassis	11-15 OHMS
Heat Contactor Coil (LH)	R X 1 OHMS	4 of J1	Chassis	11-15 OHMS

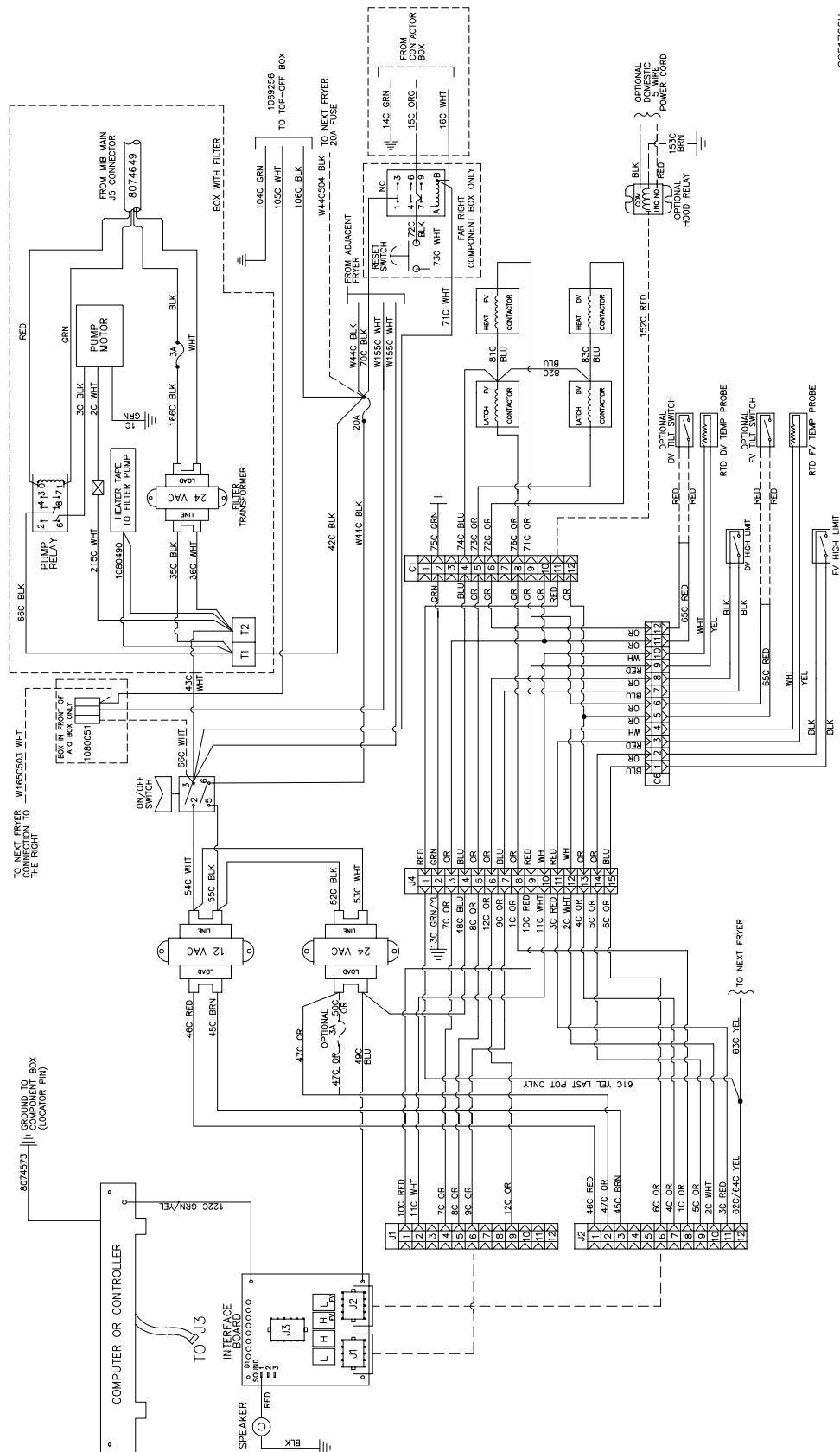
* **Disconnect 15-Pin harness from the computer before testing the probe circuit.**

1.18 Probe Resistance Chart

<h3 style="text-align: center;">Probe Resistance Chart</h3> <p style="text-align: center;"><i>For use with fryers manufactured with Minco Thermistor probes only.</i></p>																	
F	OHMS	C	F	OHMS	C	F	OHMS	C	F	OHMS	C	F	OHMS	C			
60	1059	16	130	1204	54	200	1350	93	270	1493	132	340	1634	171			
65	1070	18	135	1216	57	205	1361	96	275	1503	135	345	1644	174			
70	1080	21	140	1226	60	210	1371	99	280	1514	138	350	1654	177			
75	1091	24	145	1237	63	215	1381	102	285	1524	141	355	1664	179			
80	1101	27	150	1247	66	220	1391	104	290	1534	143	360	1674	182			
85	1112	29	155	1258	68	225	1402	107	295	1544	146	365	1684	185			
90	1122	32	160	1268	71	230	1412	110	300	1554	149	370	1694	188			
95	1133	35	165	1278	74	235	1422	113	305	1564	152	375	1704	191			
100	1143	38	170	1289	77	240	1432	116	310	1574	154	380	1714	193			
105	1154	41	175	1299	79	245	1442	118	315	1584	157	385	1724	196			
110	1164	43	180	1309	82	250	1453	121	320	1594	160	390	1734	199			
115	1174	46	185	1320	85	255	1463	124	325	1604	163	395	1744	202			
120	1185	49	190	1330	88	260	1473	127	330	1614	166	400	1754	204			
125	1195	52	195	1340	91	265	1483	129	335	1624	168	405	1764	207			

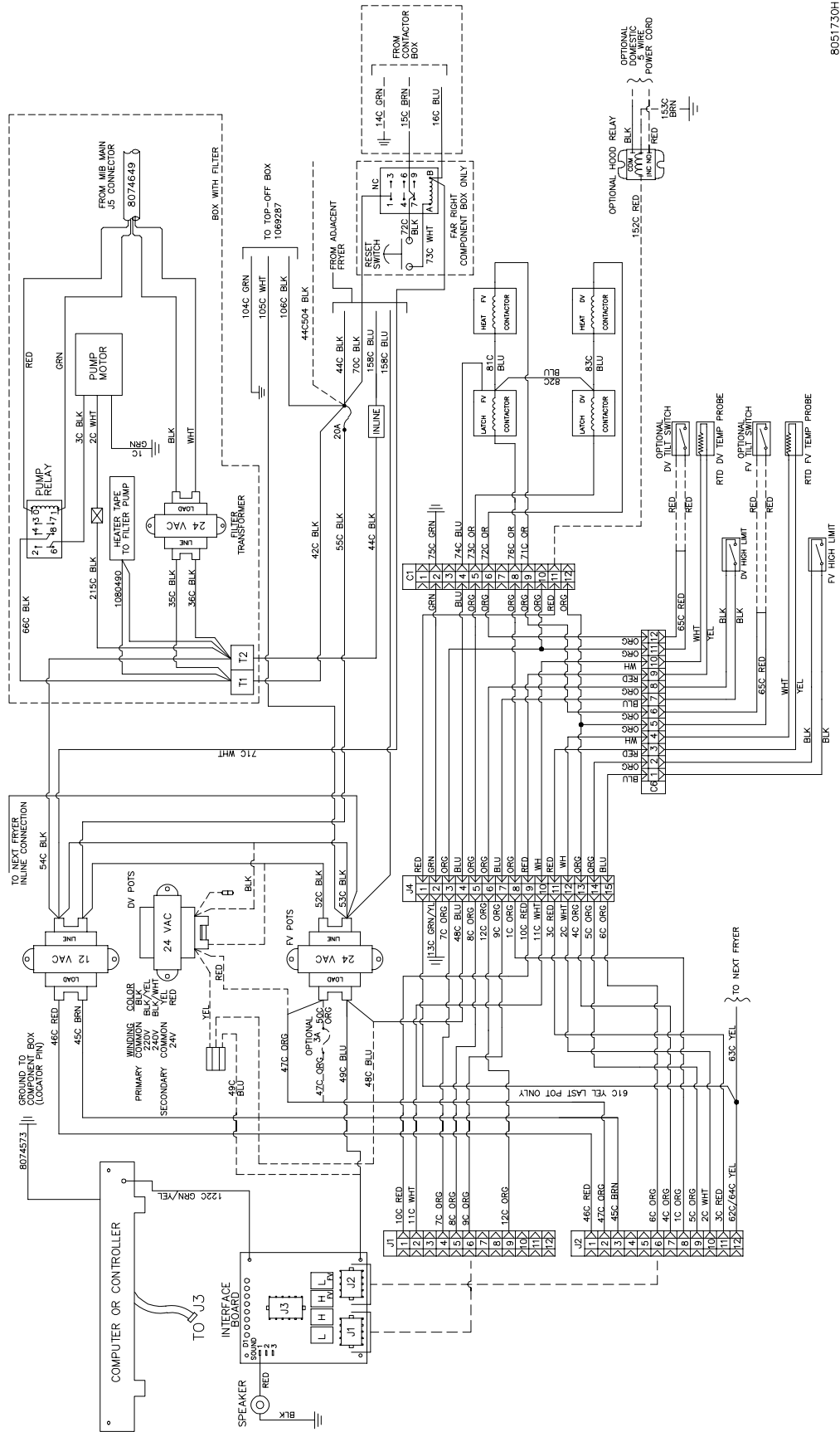
1.19 Wiring Diagrams

1.19.1 Component Wiring (Domestic)



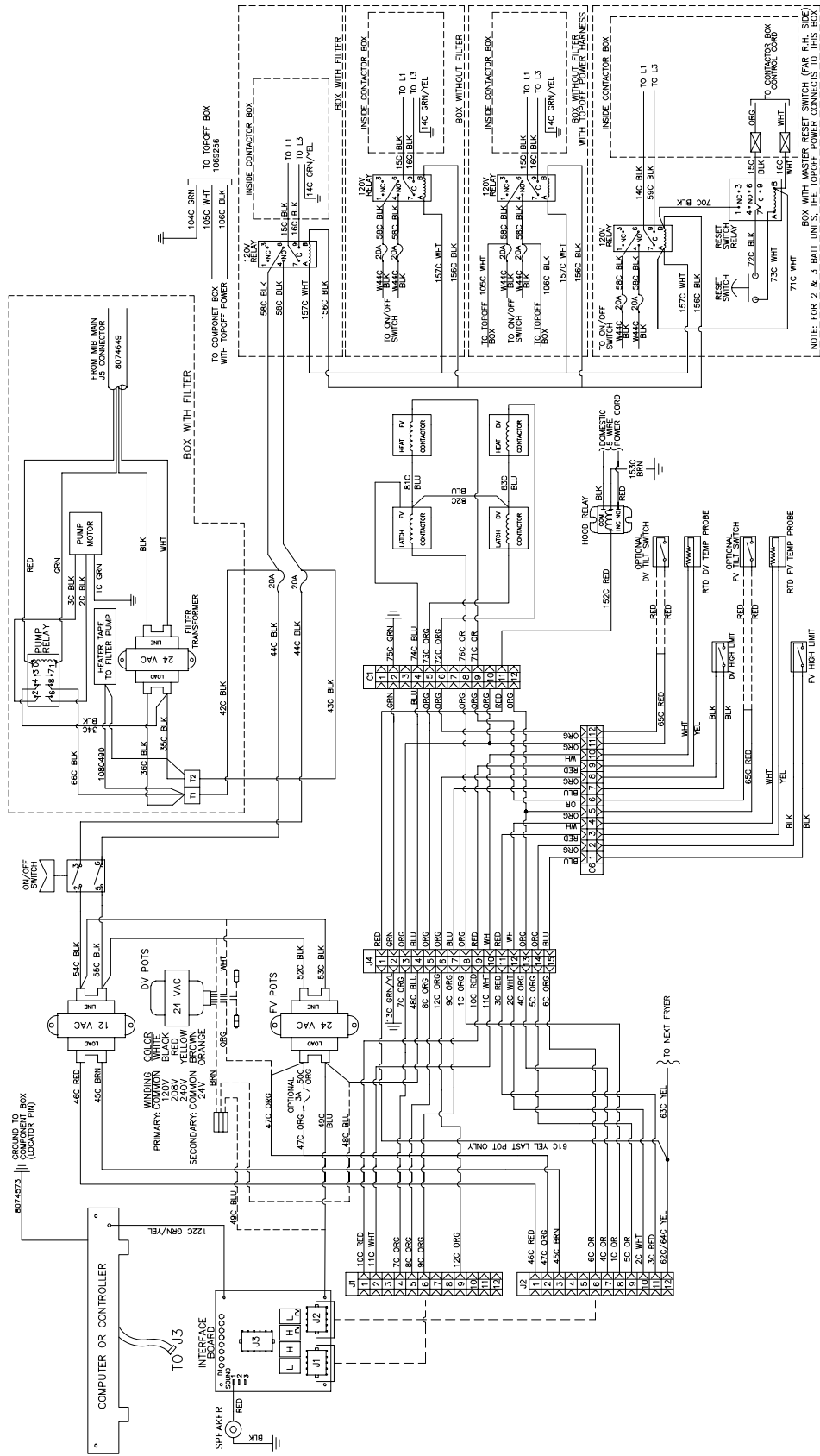
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1.19.2 Component Wiring (CE)



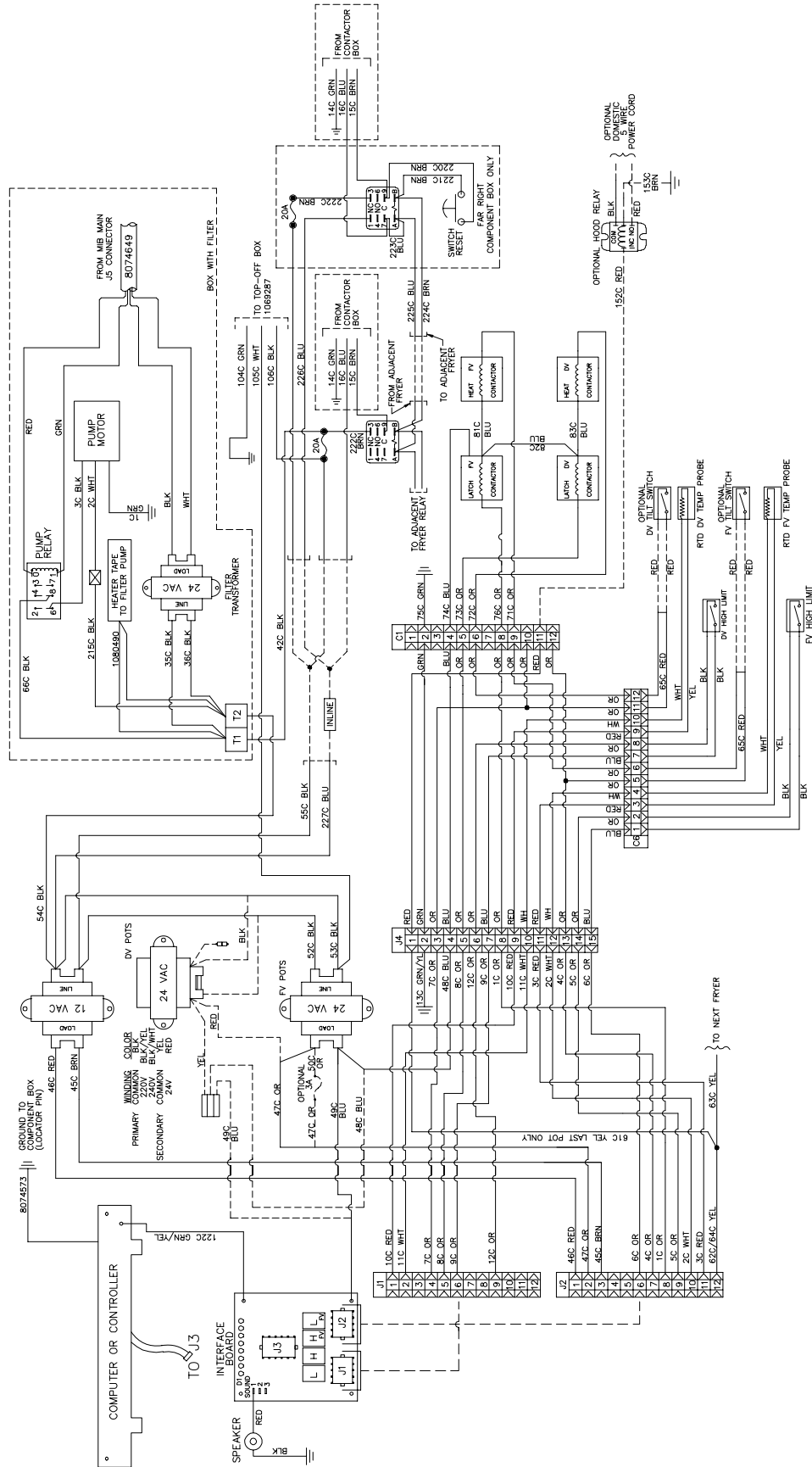
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1.19.3 Component Wiring (CSA)



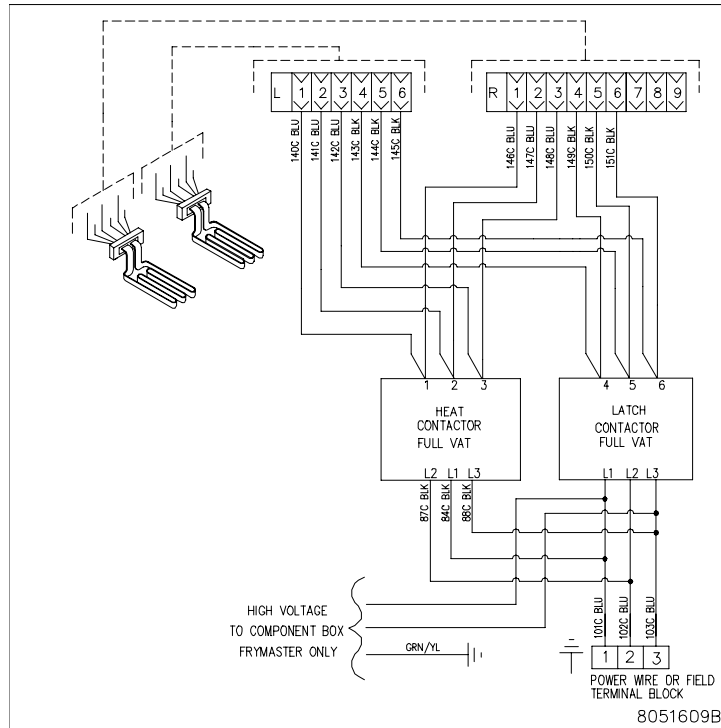
8051729H

1.19.4 Component Wiring (Australia)

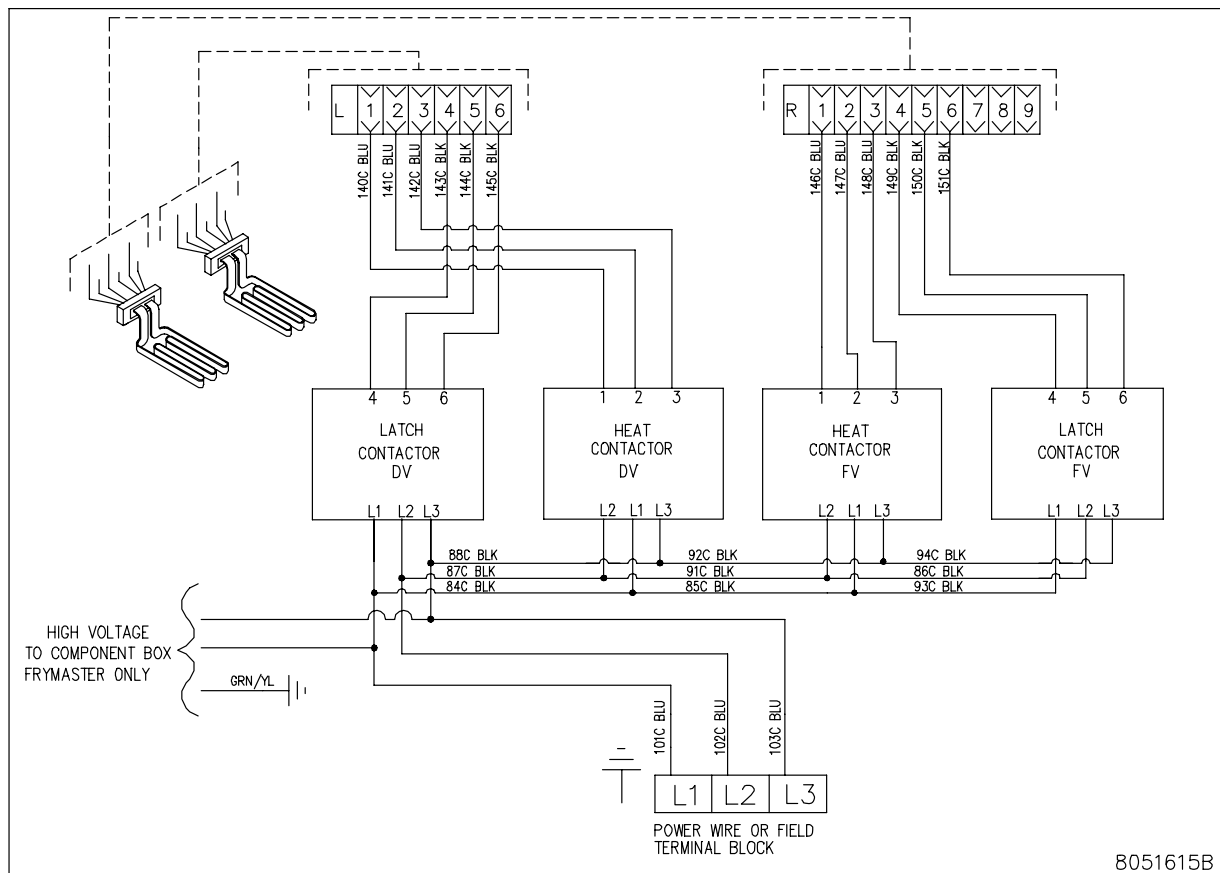


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1.19.5 Contactor Box – Delta Configuration

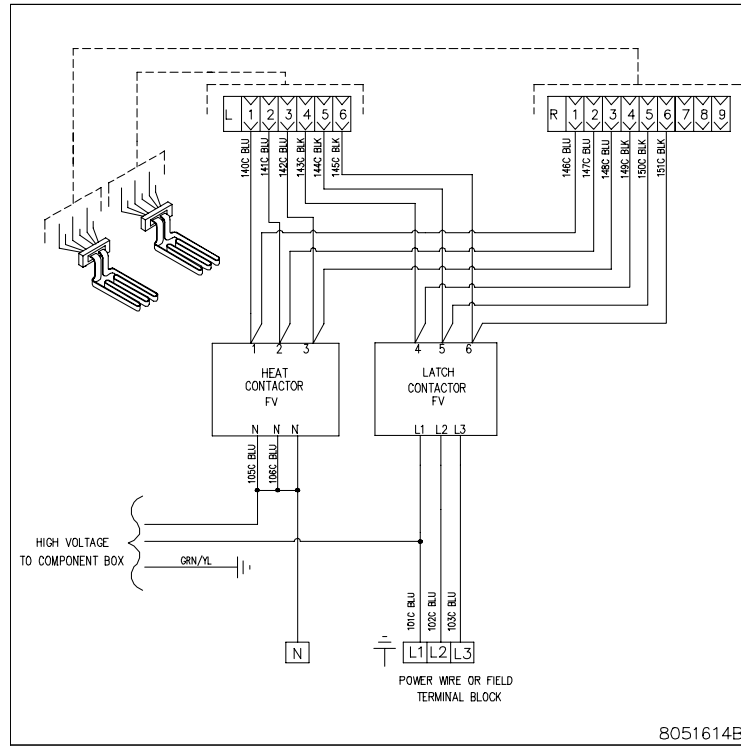


FULL VAT

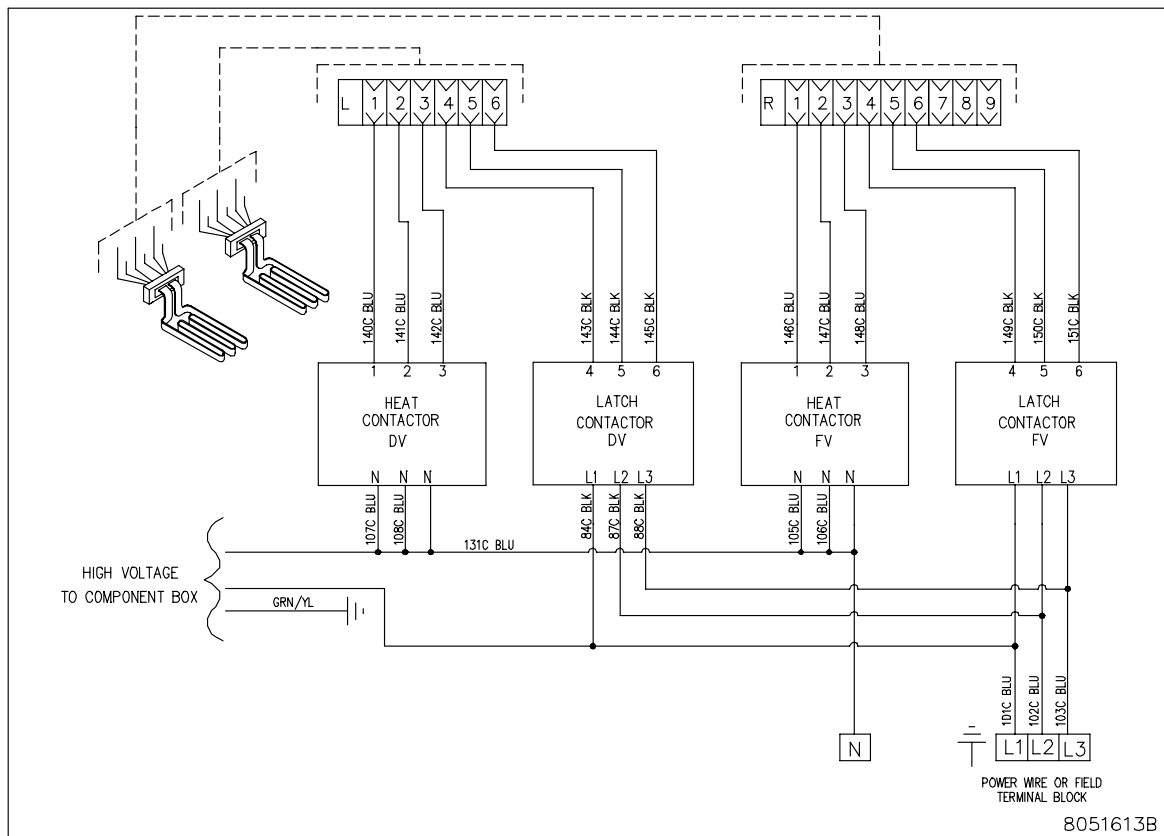


DUAL VAT

1.19.6 Contactor Box – WYE Configuration



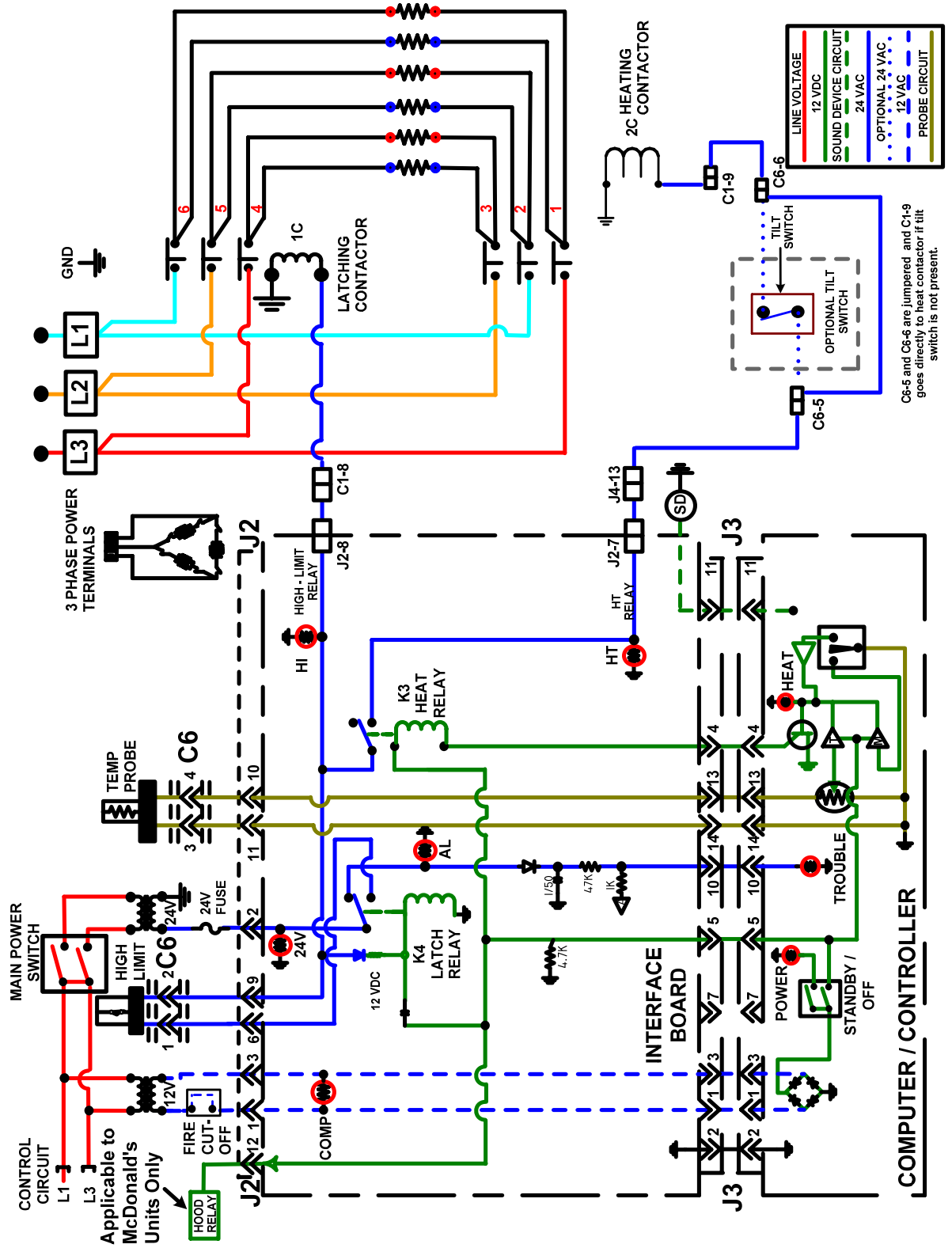
FULL VAT



DUAL VAT

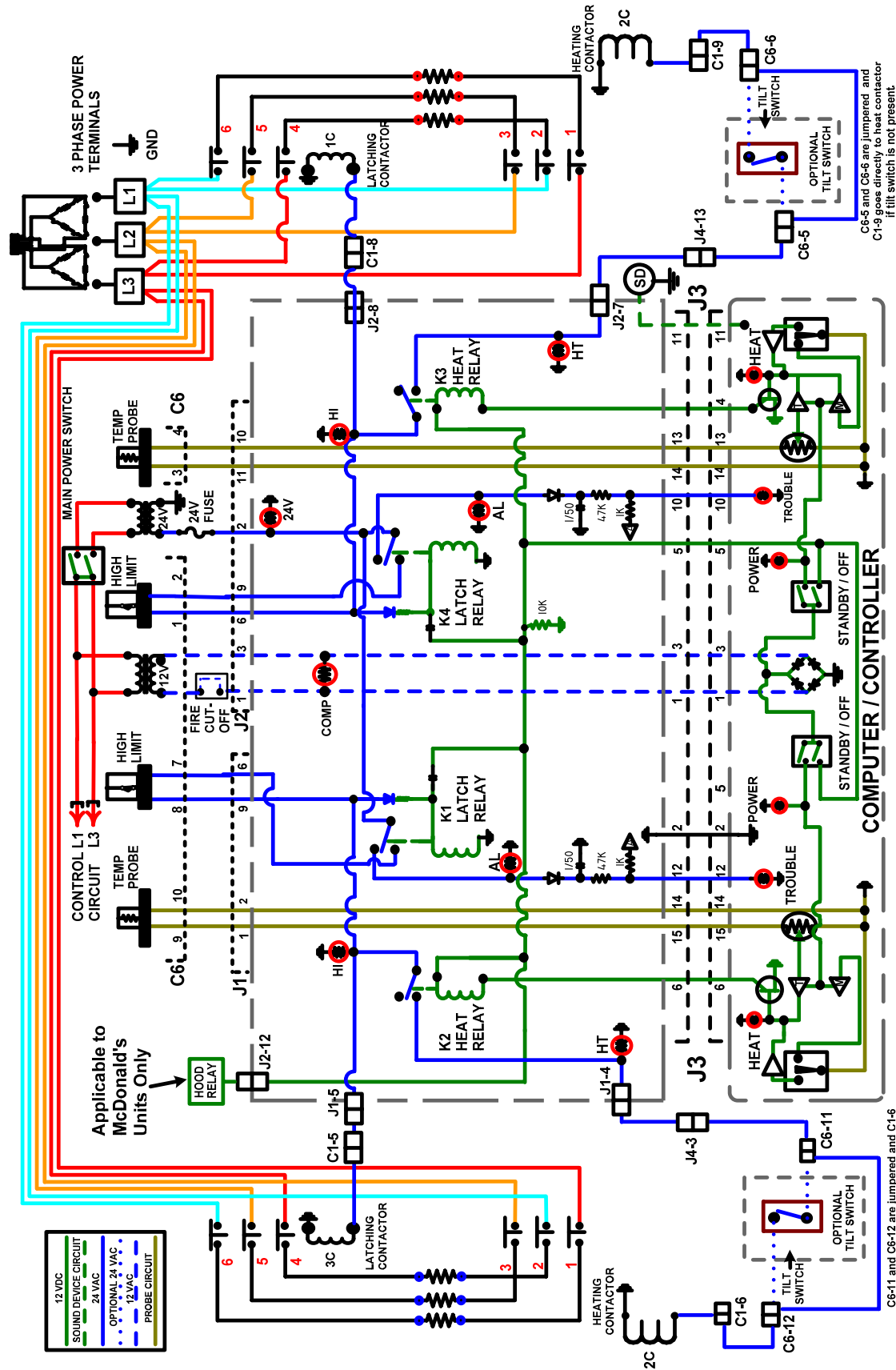
1.19.7 Simplified BIELA14 LOV™ Gen II Series – Full Vat Delta Wiring

ELECTRIC BIELA14 LOV™ GEN II SERIES - FULL-VAT



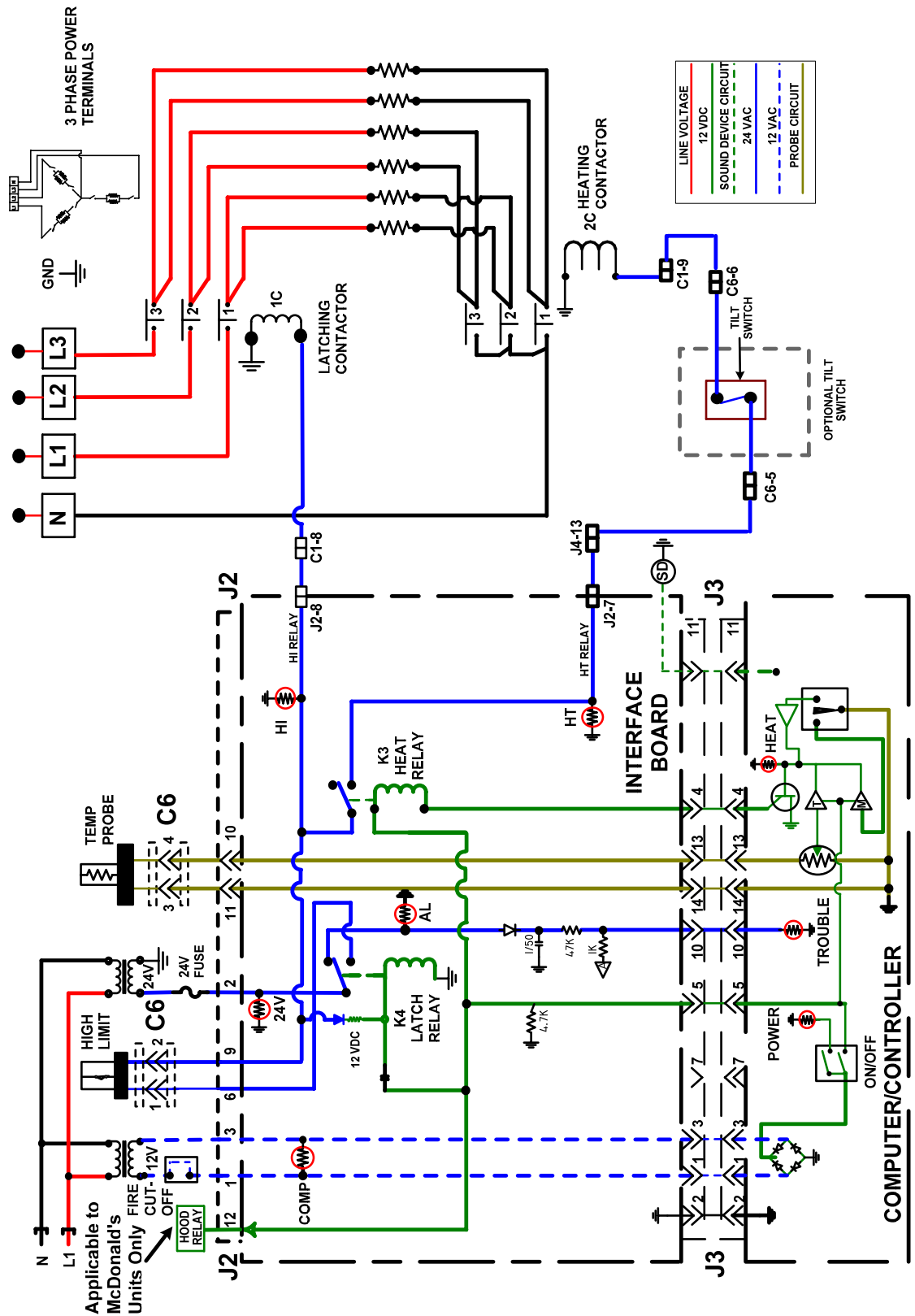
1.19.8 Simplified BIELA14 LOV™ Gen II Series – Dual Vat Delta Wiring

ELECTRIC BIELA14 LOV™ GEN II SERIES - DUAL-VAT



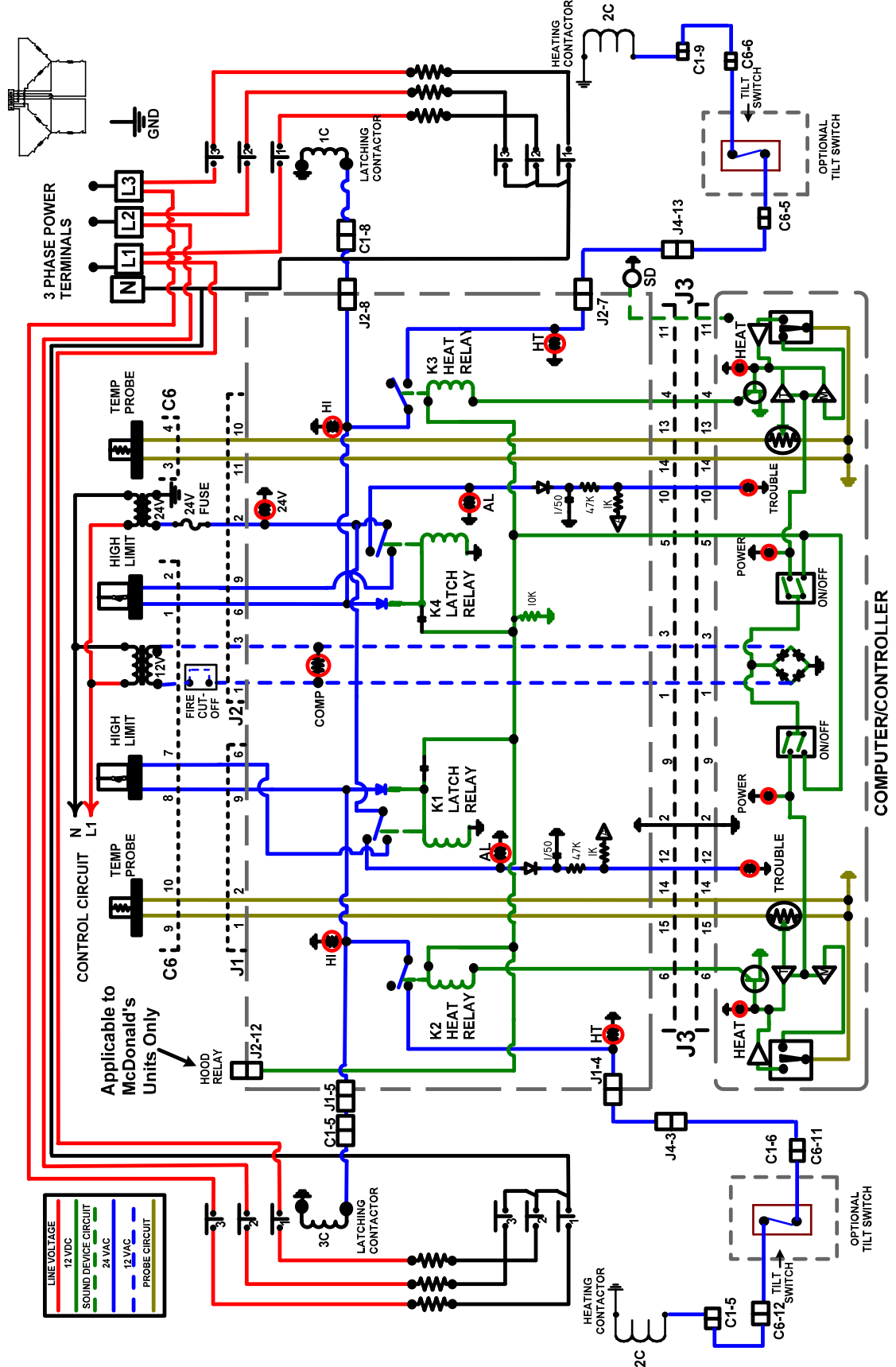
1.19.9 Simplified BIELA14 LOV™ Gen II Series – Full Vat Wiring EXPORT WYE

ELECTRIC BIELA14 LOV™ GEN II SERIES - FULL-VAT EXPORT WYE

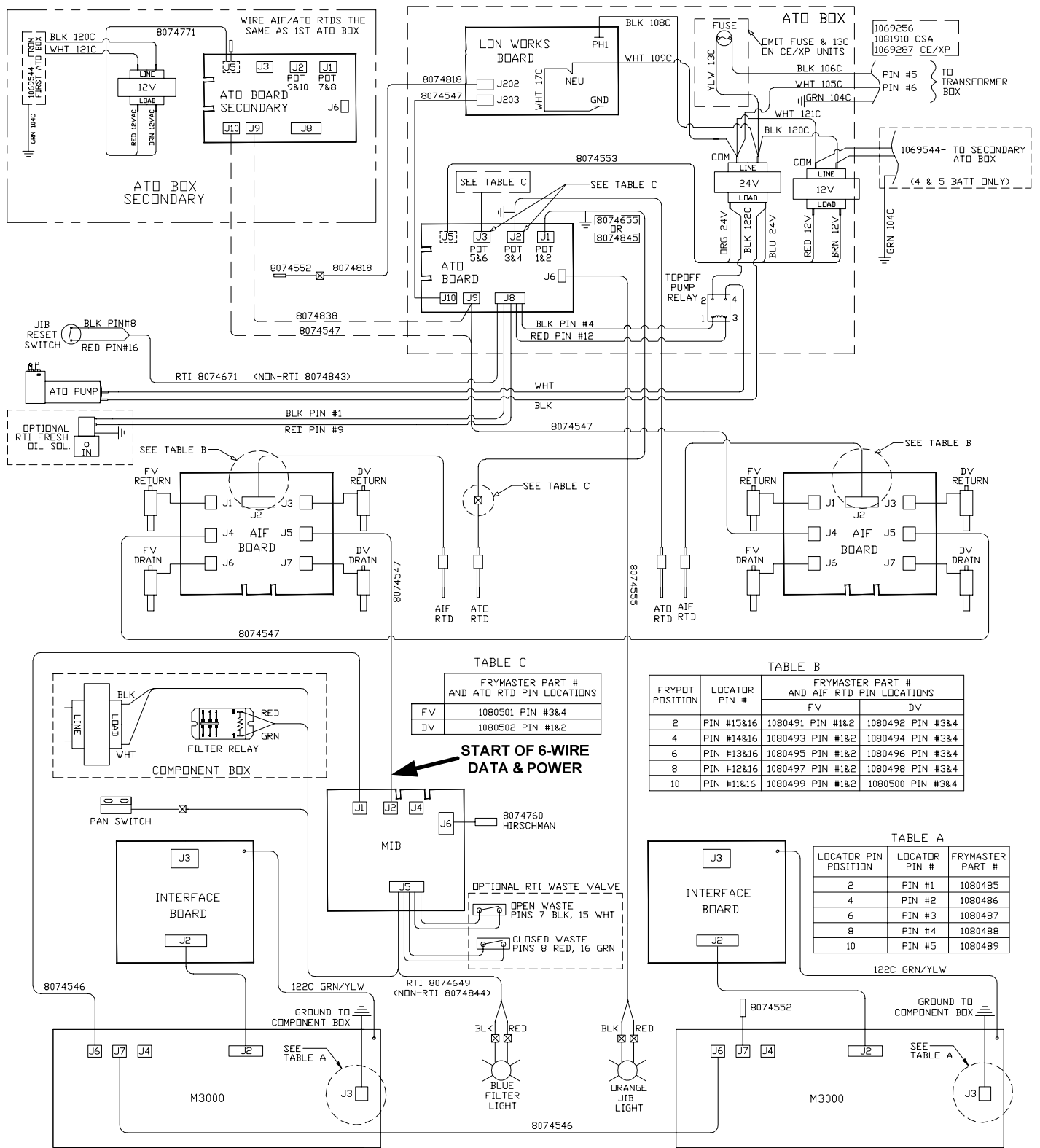


1.19.10 Simplified BIELA14 LOV™ Gen II Series – Dual Vat Wiring EXPORT WYE

ELECTRIC BIELA14 LOV™ GEN II SERIES - DUAL-VAT EXPORT WYE



1.19.11 BIELA14 Gen II Series LOV™ Simplified Wiring

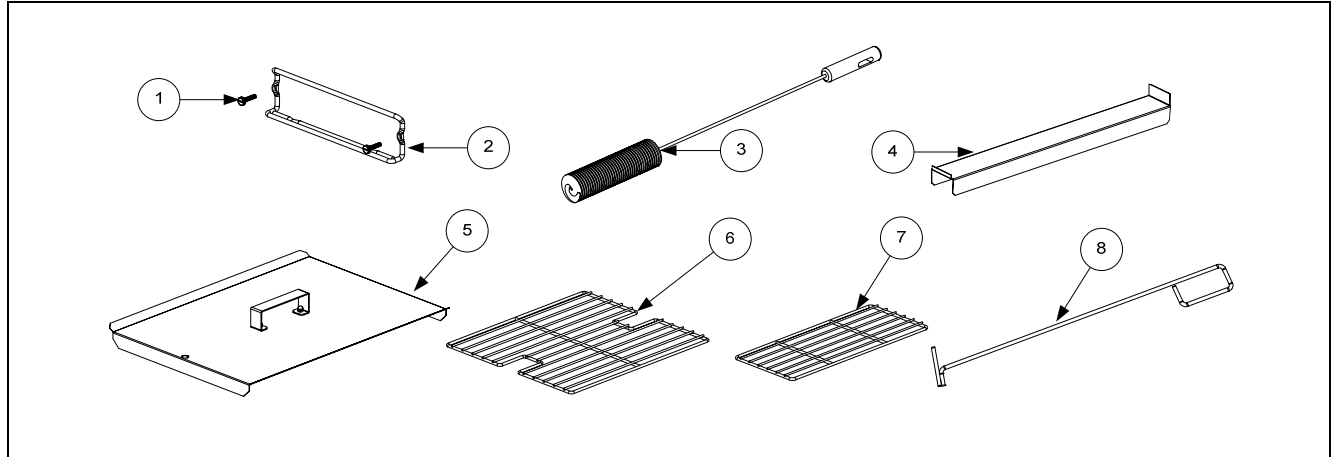


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BIELA14 SERIES GEN II LOV™ ELECTRIC FRYERS

CHAPTER 2: PARTS LIST

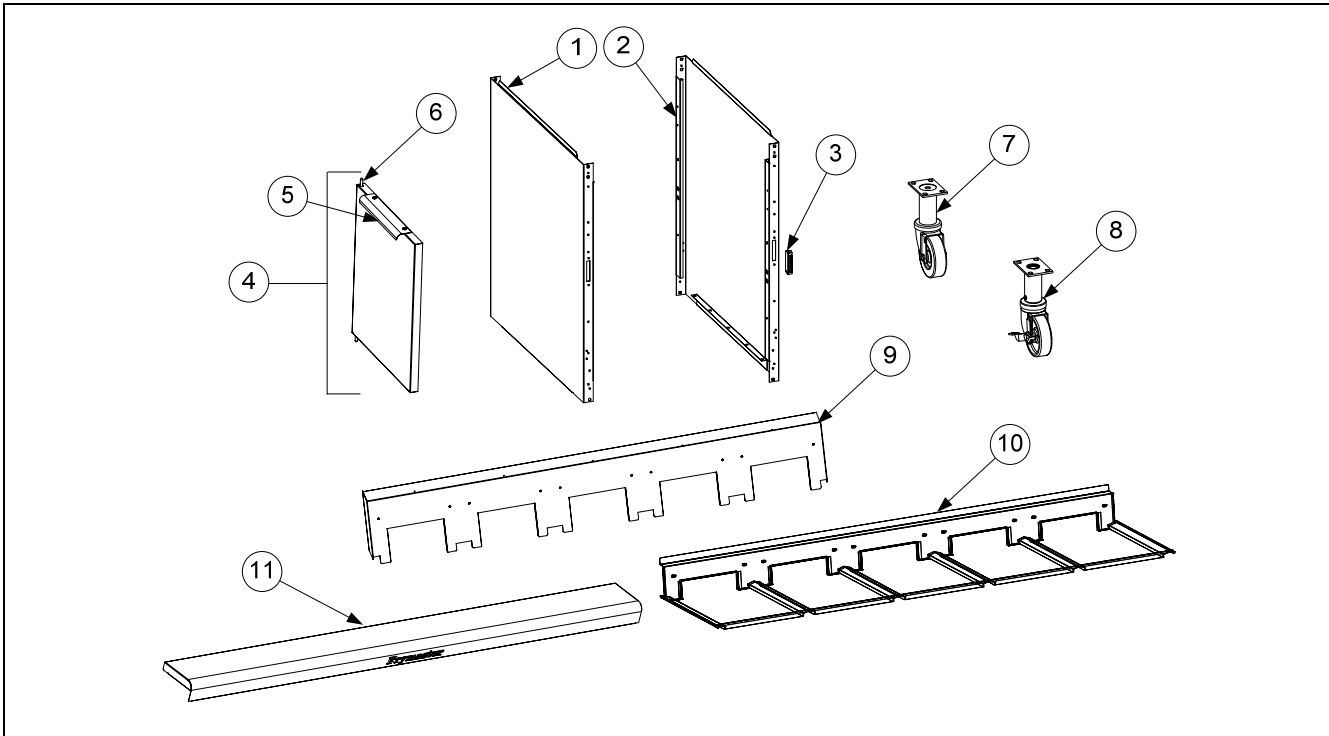
2.1 Accessories



ITEM	PART #	COMPONENT
1	809-0171	Thumbscrew, ¼ -20 X 1⅜-inch Universal Hood
	809-0402	Thumbscrew, ¼ -20 X ½-inch Cap-N-Splash Hood
2	810-2793	Hanger, Wireform Basket
*	809-0921	Spacer, Basket Hanger
3	803-0398	Brush, Frypot
4	823-7263	Connecting Strip, Frypot
5	106-8325	Cover, Full-Vat Frypot
*	106-8329	Cover, Dual-Vat Frypot
6	803-0132	Rack, Full-Vat Basket Support
7	803-0106	Rack, Dual-Vat Basket Support
8	803-0388	Element Lift / Fryers Friend LOV™

*Not illustrated.

2.2 Doors, Sides, Tilt Housings, Cap-N-Splash, Top Caps and Casters

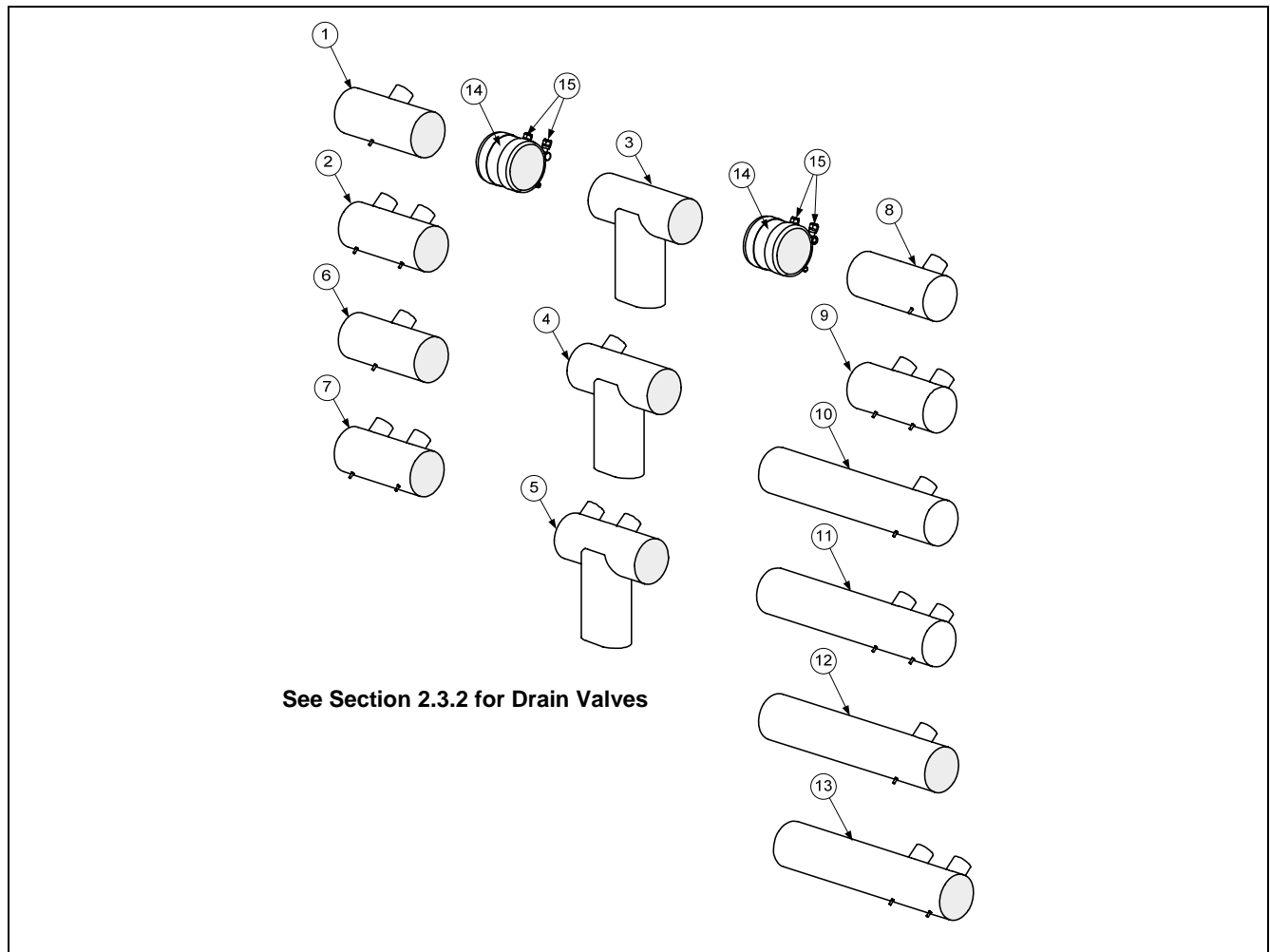


ITEM	PART #	COMPONENT
1	231-0323	Side, Standard Cabinet Left SS (use 221-0323 for Enameled Steel)
2	232-0323	Side, Standard Cabinet Right SS (use 222-0323 for Enameled Steel)
3	810-1105	Magnet, Door (vertical) (use 810-2346 for horizontal over filter pan)
4	108-0915	Door, Left or Right (Left shown – move handle to bottom for right)
5	230-4960	Handle, Eurolook Door
6	106-4067	Pin Assembly, Door
*	810-0275	Spring, Door Pin
*	809-0970	Retaining Ring
*	230-7192	Hinge, Door Lower
*	220-6097	Holder, Manual
7	810-0327	Caster without Brake
8	810-0326	Caster with Brake
9		Tilt Housing (Housing for five station fryer shown)
	823-6085	Two Station, S/S (<i>use 108-0131 for Aluminized Steel</i>) (<i>910-2441 Hoodstrip</i>)
	823-5700	Three Station, S/S (<i>use 108-0132 for Aluminized Steel</i>) (<i>910-2440 Hoodstrip</i>)
	823-6151	Four Station, S/S (<i>use 108-0133 for Aluminized Steel</i>) (<i>910-2439 Hoodstrip</i>)
	823-6243	Five Station, S/S (<i>use 108-0138 for Aluminized Steel</i>) (<i>910-9447 Hoodstrip</i>)
10		Cap-N-Splash
	823-6420	Two Station
	823-6421	Three Station
	823-6422	Four Station
	823-6887	Five Station
11		Top Cap (Top cap for five station fryer shown)
	106-7835	Two Station (<i>Also requires four 809-0078 10-32 Nutserts</i>)
	106-5979	Three Station (<i>Also requires six 809-0078 10-32 Nutserts</i>)
	106-7576	Four Station (<i>Also requires eight 809-0078 10-32 Nutserts</i>)
	106-7841	Five Station (<i>Also requires ten 809-0078 10-32 Nutserts</i>)

* Not illustrated.

2.3 Drain System Components

2.3.1 Drain Tube Sections and Associated Parts

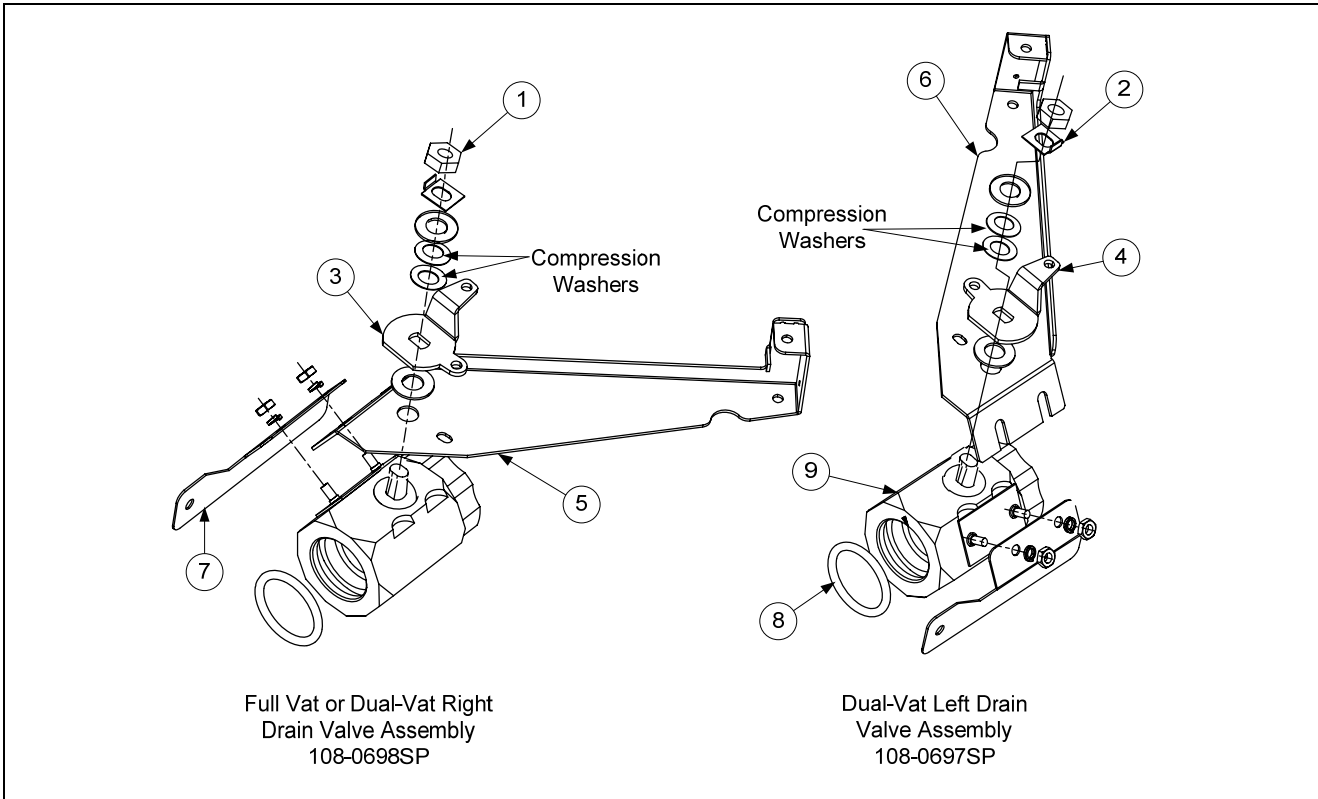


ITEM	PART#	COMPONENT
1	823-6020	Drain Tube, Full-Vat Left Closed/Right End Open
2	823-6112	Drain Tube, Dual-Vat Left Closed/Right End Open
3	108-1874	Drain Tube, Dump (Use 108-1882 for French Unit)
4	108-1876	Drain Tube, Full-Vat 2 Bat. Dump Left Closed/Right End Open
5	108-1878	Drain Tube, Dual-Vat 2 Bat. Dump Left Closed/Right End Open
6	823-6019	Drain Tube, Full-Vat Left and Right Open
7	823-6021	Drain Tube, Dual-Vat Left and Right Open
8	823-6240	Drain Tube, Full-Vat 2 Bat. Left Open/Right End Closed
9	823-6242	Drain Tube, Dual-Vat 2 Bat. Left Open/Right End Closed
10	823-6202	Drain Tube, Full-Vat Left Open/Right End Closed
11	823-6114	Drain Tube, Dual-Vat Left Open/Right End Closed
12	823-6117	Drain Tube, Full-Vat Left and Right Open
13	823-6115	Drain Tube, Dual-Vat Left and Right Open
14	816-0772	Sleeve
15	809-0969	Clamp
*	816-0630	Vinyl Cap
*	810-3531	Valve, Check 20 PSI RTI bypass

* Not illustrated.

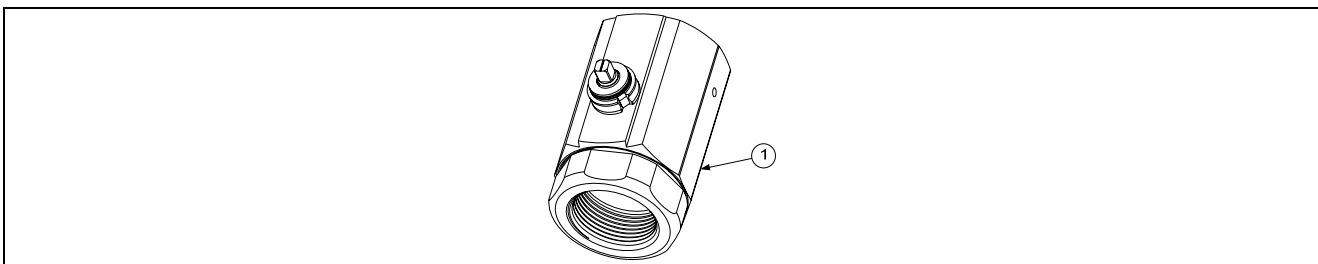
2.3.2 Drain Valves and Associated Parts

2.3.2.1 Linear Actuator Drain Valves



ITEM	PART #	COMPONENT
1	809-0540	Nut, 1/2-13 2-Way Hex Lock
2	900-2936	Retainer, Nut Drain Valve
3	232-5701	Handle, Drain Valve FV or DV Right
4	231-5701	Handle, Drain Valve DV Left
5	824-2048	Mount, Electric Drain Actuator Right
6	824-2047	Mount, Electric Drain Actuator Left
7	222-5962	Bracket, Drain to Valve LOV™ Electric
8	816-0544	O-Ring, Round Drain Seal
9	823-7231	Valve, 1/4-inch Drain LOV™ Electric Right
10	823-7230	Valve, 1/4-inch Drain LOV™ Electric Left

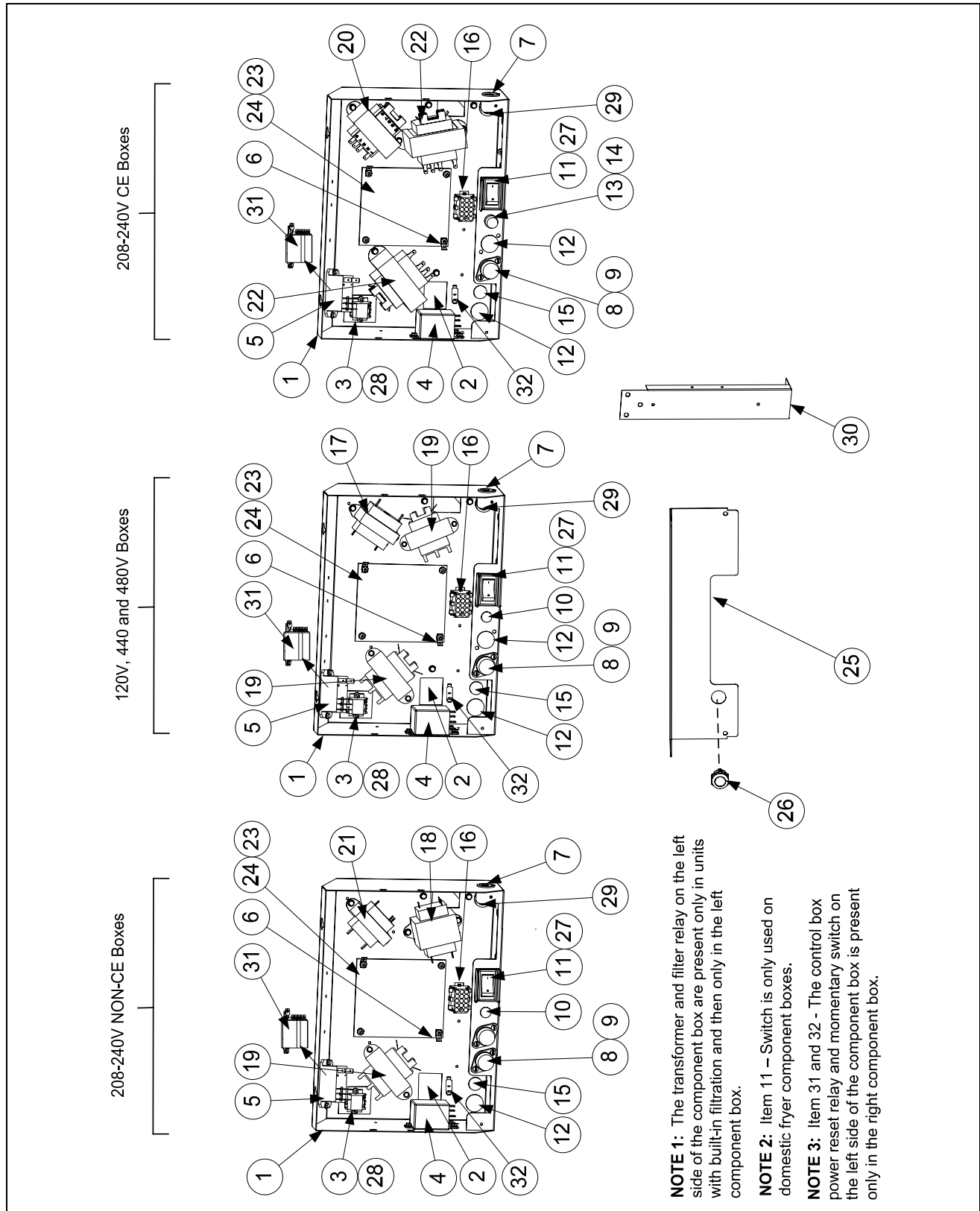
2.3.2.2 Rotary Actuator Drain Valves



ITEM	PART #	COMPONENT
1	810-3755	Valve, 1/4-inch NPT Rotary Actuator

2.4 Electronics and Wiring Components

2.4.1 Component Boxes



2.4.1 Component Boxes cont.

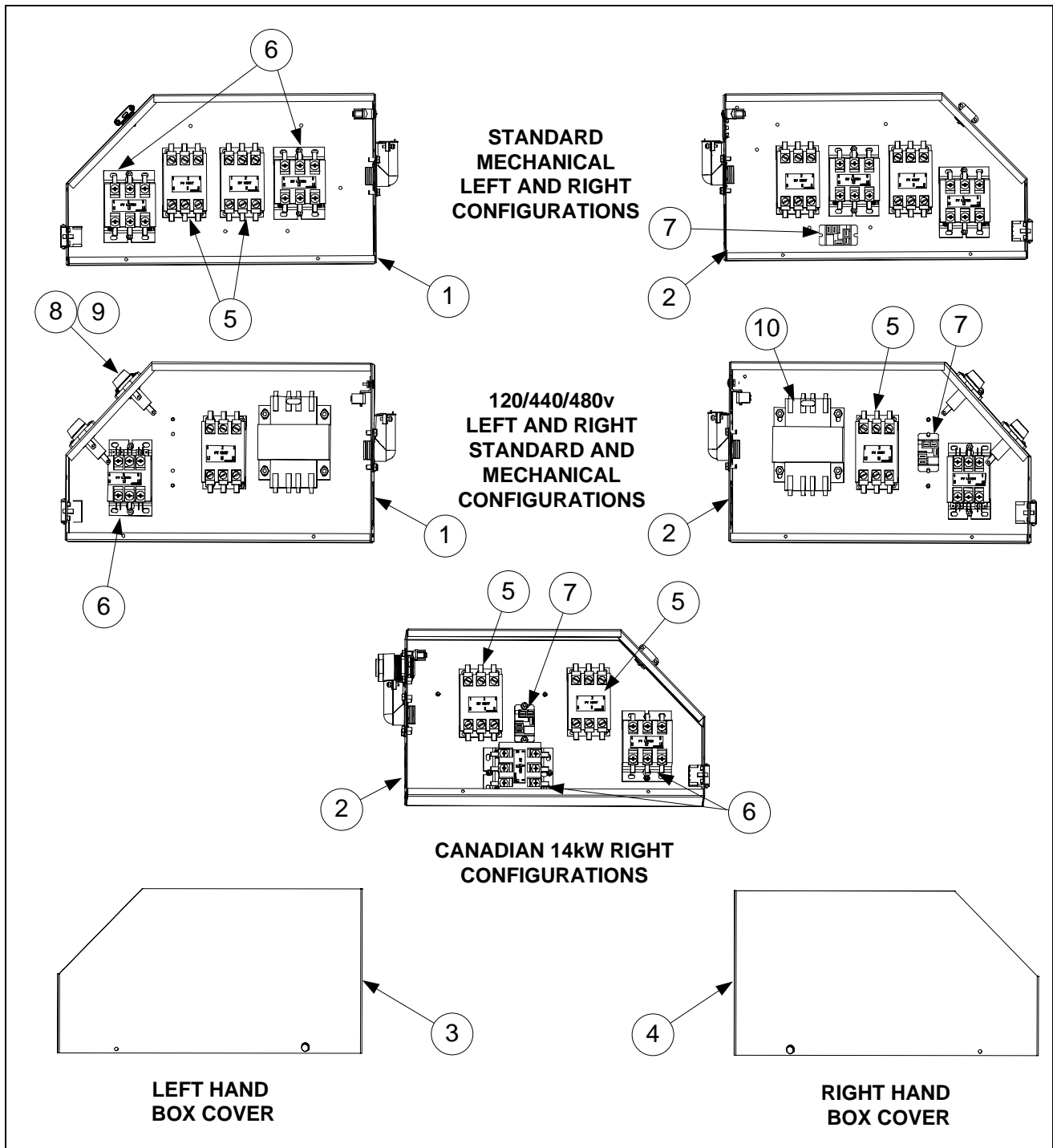
ITEM	PART #	COMPONENT
1	106-5592	Box Assembly, Component
2	200-3300	Bracket, Component Box Strain Relief
3	806-9495SP	Terminal Block
√ 4	807-4346	Relay, 120V DPDT 20A (<i>used in Canadian models only</i>)
√ 5	807-4482	Relay, Filter 2 Pole 30A DPDT 24VDC
6	807-0037	Terminal, ¼-inch Push-on
7	807-0121	Bushing, Heyco Plastic AB-625-500
8	807-0922	Holder, Buss Fuse HPS Screw Type
9	807-2278	Fuse, 20 Amp
10	810-2446	Plug, Button .50 Heyco Double "D"
√ 11	807-4036	Switch, Power
	807-3575	Plug, Carling Switch Hole (<i>used on some models without a switch</i>)
12	807-1947	Plug, Button .875 Dome
13	807-1321	Holder, AGC Panel Mount ¼" Fuse (<i>Some models use item 10 here.</i>)
14	807-1597	Fuse, 3 AMP Slow-Blow
15	810-2445	Plug, Button .625 Heyco Double "D"
16	106-5750	Harness Assembly, RE FV Control
	106-5751	Harness Assembly, RE DV Control
√ 17	807-0855	Transformer, 100-120V/12V 20VA
√ 18	807-0800	Transformer, 100-120V/24V 50VA Filter (<i>Used in FV component boxes</i>)
√	807-4933	Transformer, 120/208/240V/24V 75VA Filter (<i>Used in DV component boxes</i>)
√ 19	807-2181	Transformer, 100-120V /24V 62VA Filter
√ 20	807-2191	Transformer, 208-240V/12V 30VA
√ 21	807-0979	Transformer, 208-240V/12V 43VA
√ 22	807-2180	Transformer, 100-120V 50VA Filter
23	809-0349	Spacer, 4mm X 6mm Aluminum
24		Interface Board
√	826-2260	Standard Full or Dual Vat Interface Board (<i>includes sound harness</i>)
*	807-4403	Speaker, 4-Watt SMT
25	220-4723	Guard, Finger w/ switch opening
26	807-4678	Switch, Momentary Flush JIB Reset
27	230-5038	Guard, RE Box Switch
28	816-0217	Paper, Insulating Terminal Block
29	810-0045	Bushing, .875 Diameter 11/16"
30	200-6654	Brace, Component Box
√ 31	807-4346	Relay, DPDT 20A 120V (<i>used for control power reset in right hand boxes only in domestic and Canadian units</i>)
	807-4770	Relay, DPDT 20A 240V (<i>used for control power reset in right hand boxes only in international units; some international units have one located in each control box</i>)
32	807-2659	Switch, Momentary (<i>used to reset control power; located in box over JIB only.</i>)
*	826-2249	RE Hood/Ansul Interlock Kit (includes terminal block, wires and connectors)

* Not illustrated.

√ Recommended parts.

2.4.2 Contactor Boxes

2.4.2.1 Left and Right Contactor Box Configurations



2.4.2.1 Left and Right Contactor Box Configurations cont.

NOTES: Left and right contactor box assemblies are mirror images of one another. With the exception of the box itself, all components of a left-hand assembly are the same as those in the corresponding right-hand assembly and vice versa except for the hood relay which occurs in the right or large box only. The configurations illustrated show all possible components, but a particular configuration may not have all the components shown.

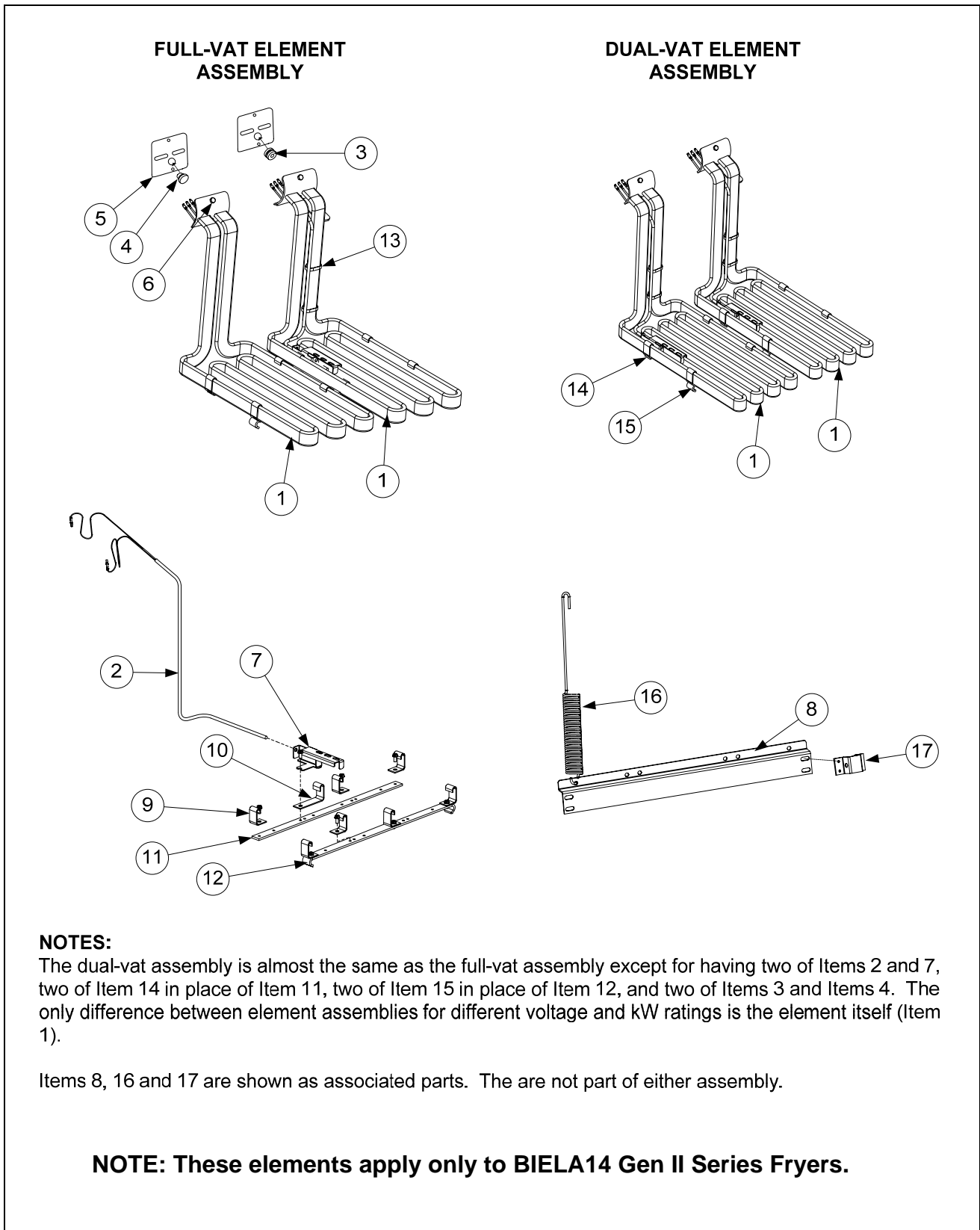
ITEM	PART #	COMPONENT
1	106-8658	Box Assembly, Left Contactor
2	106-8660	Box Assembly, Right Contactor
3	221-0482	Cover, Left Hand Contactor Box
4	222-0482	Cover, Right Hand Contactor Box
9	807-0070	Terminal, Ground Lug
√ 5	807-2284	Contactor, 24V 50 Amp Mechanical (Heat)
√ 6	810-1202	Contactor, 24V 40 Amp Mechanical (Latch)
7	807-1683	Relay, Hood 12VDC
8	807-0922	Holder, Bus Fuse
9	807-2278	Fuse, 20 Amp
10	807-0064	Transformer, 480V/120V 150VA
*	221-0610	Bracket, Left Hand Contactor Box Mounting
*	222-0610	Bracket, Right Hand Contactor Box Mounting
*	807-4316	McDonald's Cordset, 120V 5-Wire
*	807-4317	McDonald's Cordset, Europe 3-Wire Single Phase
*	807-0012	Relay, Tilt Switch 18 Amp 1/3 HP 24 V Coil

* Not illustrated.

√ Recommended parts.

2.4.3 Heating Element Assemblies and Associated Parts

2.4.3.1 Element Assemblies and Hardware



NOTES:

The dual-vat assembly is almost the same as the full-vat assembly except for having two of Items 2 and 7, two of Item 14 in place of Item 11, two of Item 15 in place of Item 12, and two of Items 3 and Items 4. The only difference between element assemblies for different voltage and kW ratings is the element itself (Item 1).

Items 8, 16 and 17 are shown as associated parts. They are not part of either assembly.

NOTE: These elements apply only to BIELA14 Gen II Series Fryers.

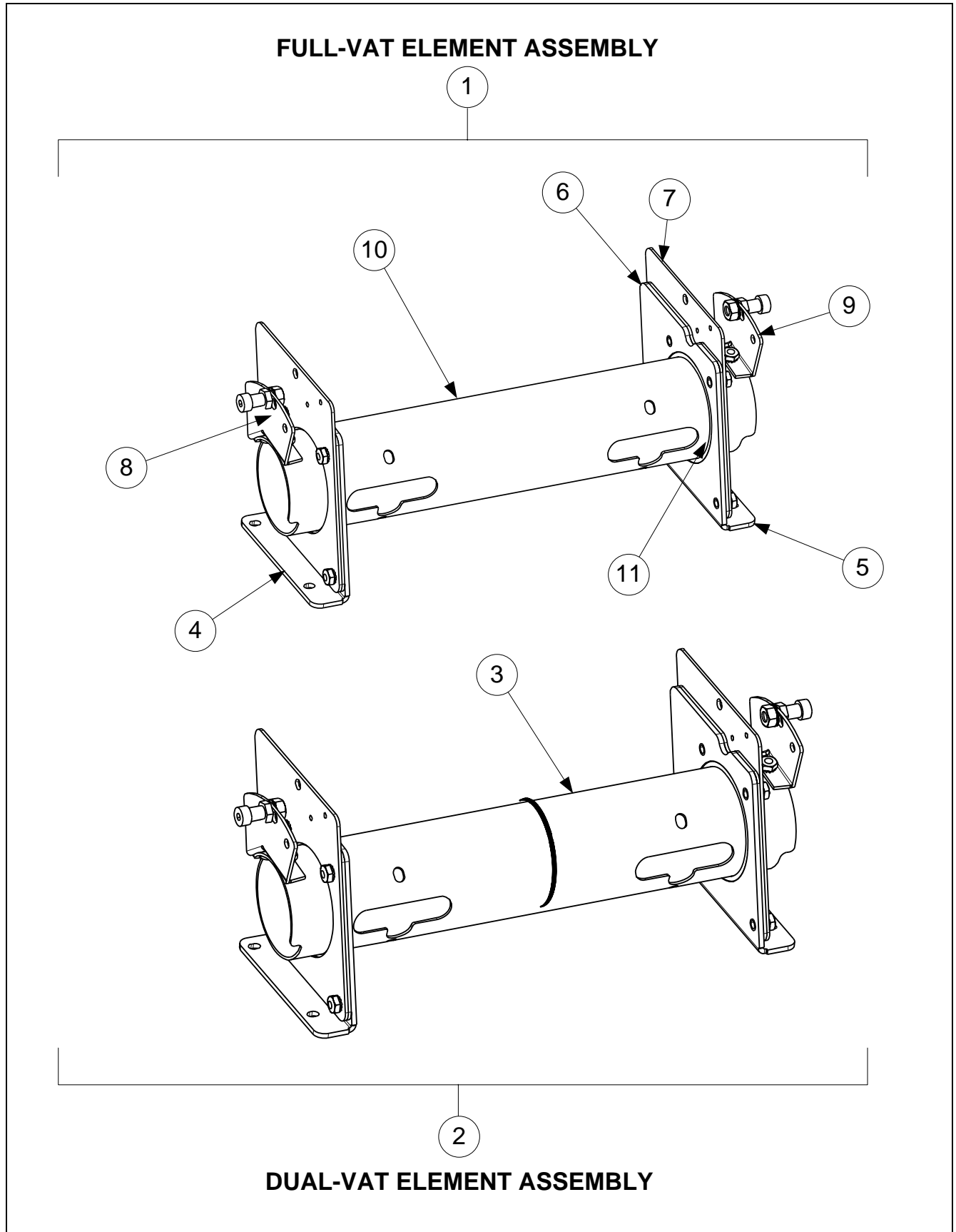
2.4.3.1 Element Assemblies and Hardware cont.

ITEM	PART #	COMPONENT
1		Element
	826-2198	200V 7.0 kW (220V 8.5kW used in some export 3-phase 4-wire WYE units)
√	826-2192	208V 7.0 kW
	826-2200	220V 7.0 kW (240V 8.5kW used in some export 3-phase 4-wire WYE units)
	826-2193	230V 7.0 kW
	826-2199	230V/400V 7.0/8.5 kW (used in some export 3-phase 4-wire WYE units)
	826-2194	240V 7.0 kW
	826-2196	480V 7.0 kW
√ 2	826-2212	Probe, Temperature RE – includes tie wraps and grommet.
3	816-0681	Grommet, Probe
4	816-0480	Plug, .375-inch Dome
5	816-0688	Gasket, Element
6	809-1003	Screw, 10-32 X 3/8-inch Hex Head SS
*	809-0766	Nut, 10-32 Keps Hex Head SS
*	230-4028	Wrench, Element Tube Nut Spanner
7	230-3714	Bracket, Temperature Probe 7.0kW
	230-0784	Bracket, Temperature Probe 8.5kW (used in some export 3-phase 4-wire WYE units)
8	220-0464	Bracket, Lower Spring
9	910-2042	Clamp, Element (Short)
10	230-0781	Clamp, Element (Long)
11	230-4902	Support, Full-Vat Element Rear
12	230-4101	Support, Full-Vat Element Front
13	809-0567	Tie-Wrap, Metal
14	230-4903	Support, Dual-Vat Element Bottom Rear
15	230-4103	Support, Dual-Vat Element Bottom Front
16	810-3030	Spring, Element Lift Left
	810-3131	Spring, Element Lift Right
17	220-0733	Bracket, Lower Spring Mating

* Not illustrated.

√ Recommended parts.

2.4.3.2 Element Tube Assemblies

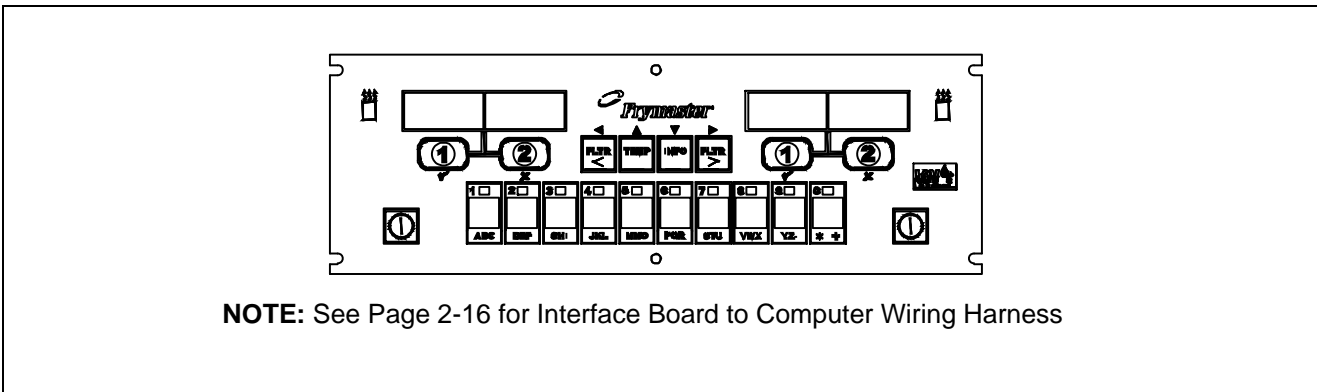


2.4.3.2 Element Tube Assemblies contd.

ITEM	PART #	COMPONENT
1	108-0297SP	Tube Assembly RE Element, Full-Vat
2	108-0298SP	Tube Assembly RE Element, Dual-Vat
3	810-3246	Bushing and Tube Assembly, Dual-Vat
4	108-0315	Bracket Assembly, LH Element Tube Support
5	108-0316	Bracket Assembly, RH Element Tube Support
6	220-0122	Plate, Element Tube Support Inner
7	220-0123	Plate, Element Tube Support Outer
8	106-7651	Bracket Assembly, LH Upper Spring <i>(use 106-6569 for 17kW)</i>
9	106-7652	Bracket Assembly, RH Upper Spring <i>(use 106-6570 for 17kW)</i>
10	810-2992	Tube, Full Vat Element Mounting
11	810-2993	Bushing, Tube End Teflon
*	826-2598	Kit, Tilt Switch
*	807-4742	Switch, Long Lever High Temp

* Not illustrated.

2.4.4 Computers



NOTE: See Page 2-16 for Interface Board to Computer Wiring Harness

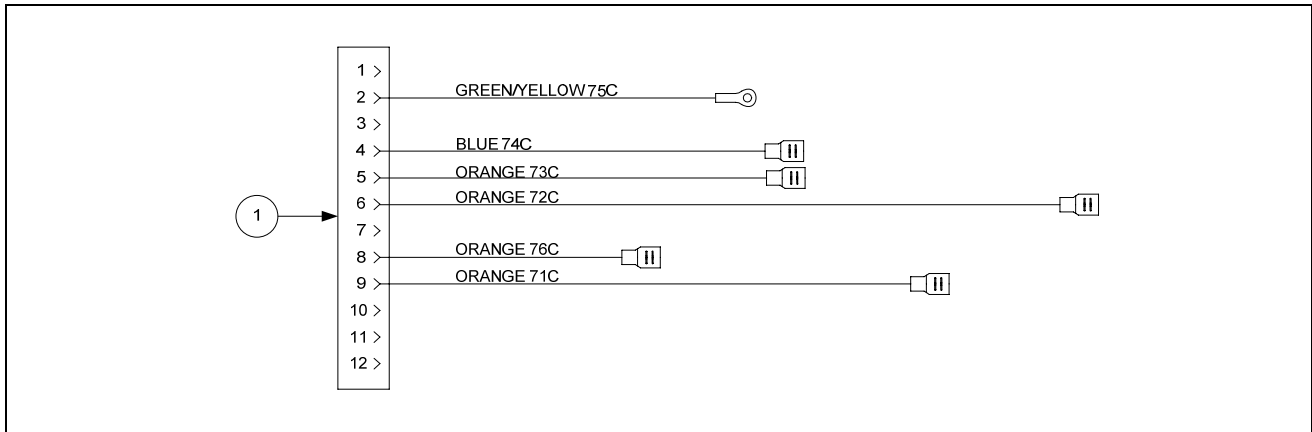
ITEM	PART #	COMPONENT
√	108-1295	Replacement Computer Non-CE Domestic M3000 <i>(For use in US, Canada, Mexico and all other non-CE countries)</i>
√	108-2970	CE M3000 <i>(For use in European CE countries)</i>
*	807-4403	M3000 Speaker SMT

* Not illustrated.

√ Recommended parts.

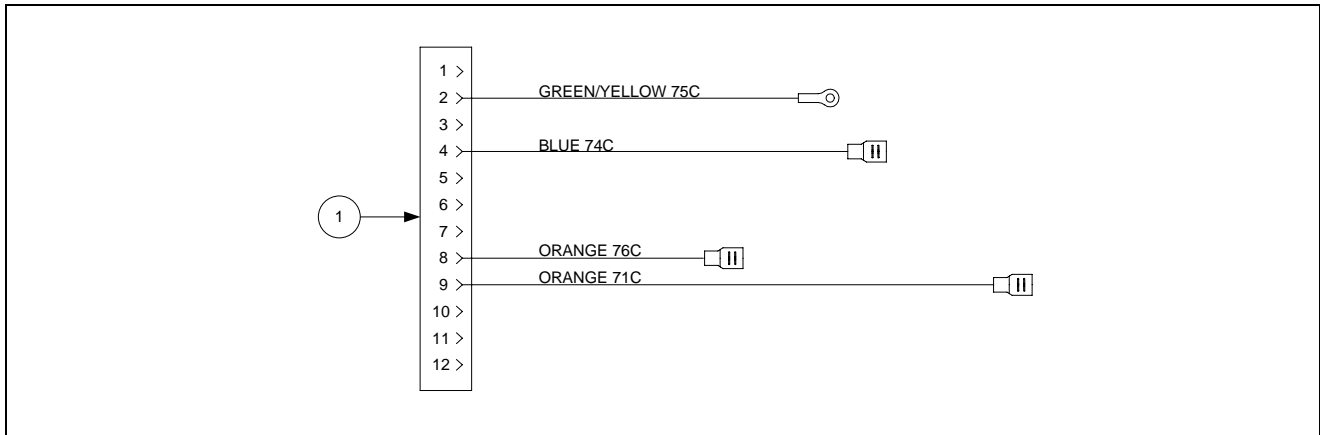
2.4.5 Wiring

2.4.5.1 Contactor Box Wiring Assemblies – 12-Pin Dual-Vat C-1



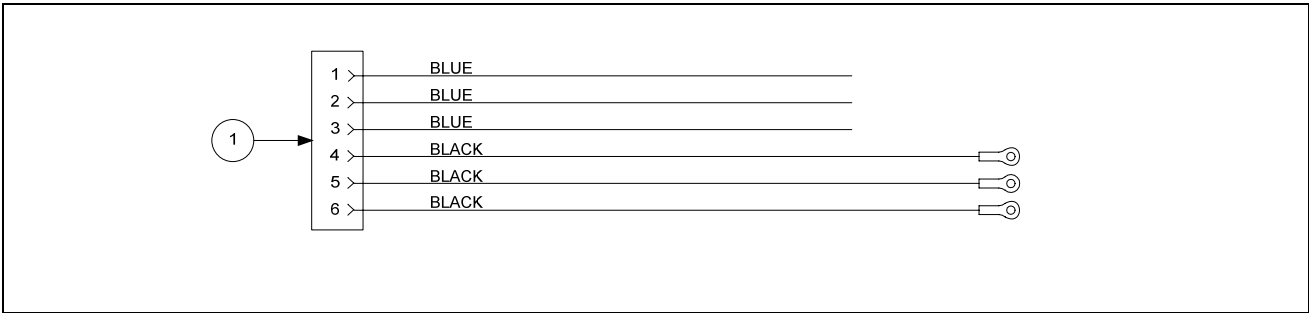
ITEM	PART #	COMPONENT
	106-5980SP	Contactor Box Harness Assembly Dual Vat
1		Standard (See wiring diagrams on pages 1-41 thru 1-43.)

2.4.5.2 Contactor Box Wiring Assemblies – 12-Pin Full-Vat C-1



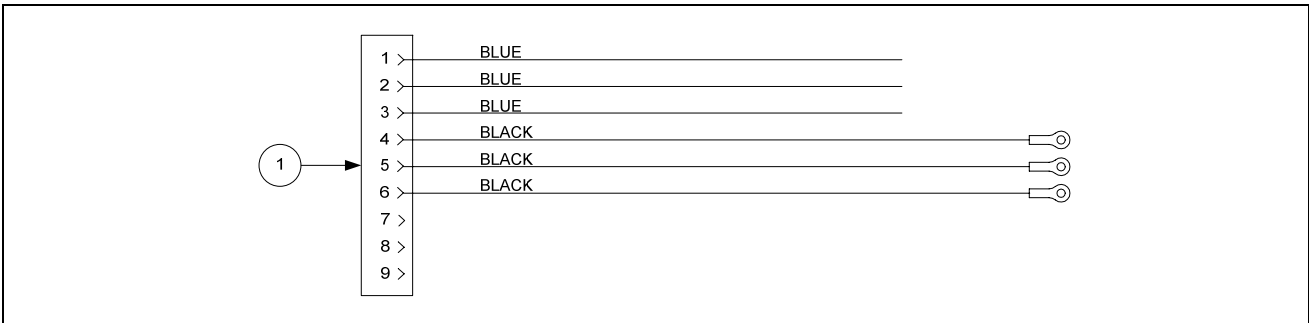
ITEM	PART #	COMPONENT
	106-6031SP	Contactor Box Harness Assembly Full Vat
1		Standard (See wiring diagrams on pages 1-41 thru 1-43.)

2.4.5.3 Contactor Box Wiring Assembly – 6-Pin (Left Element)



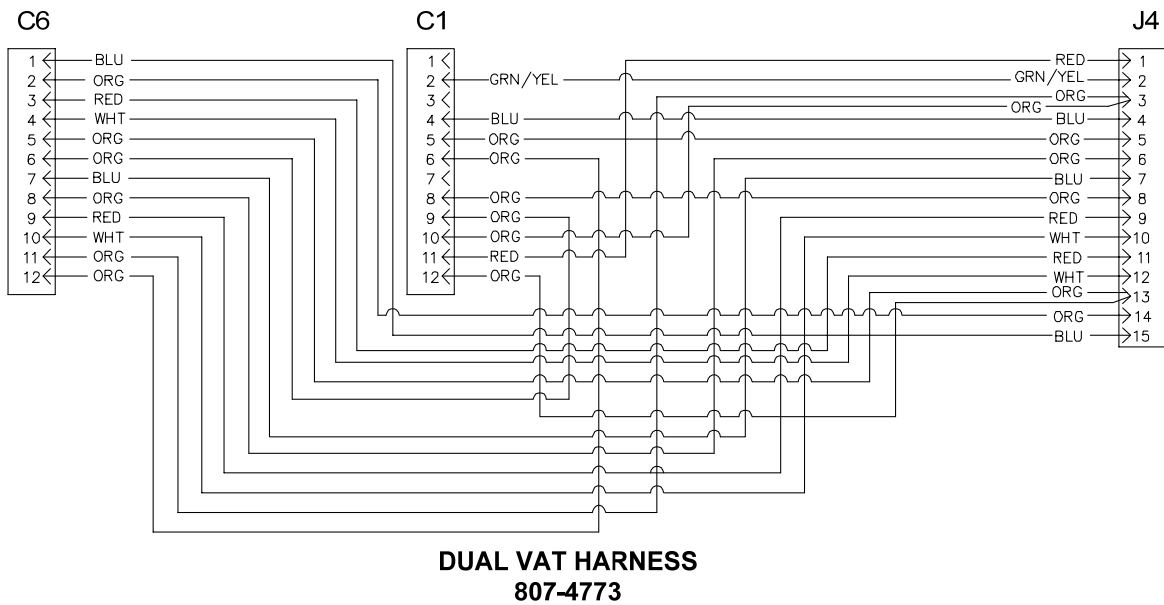
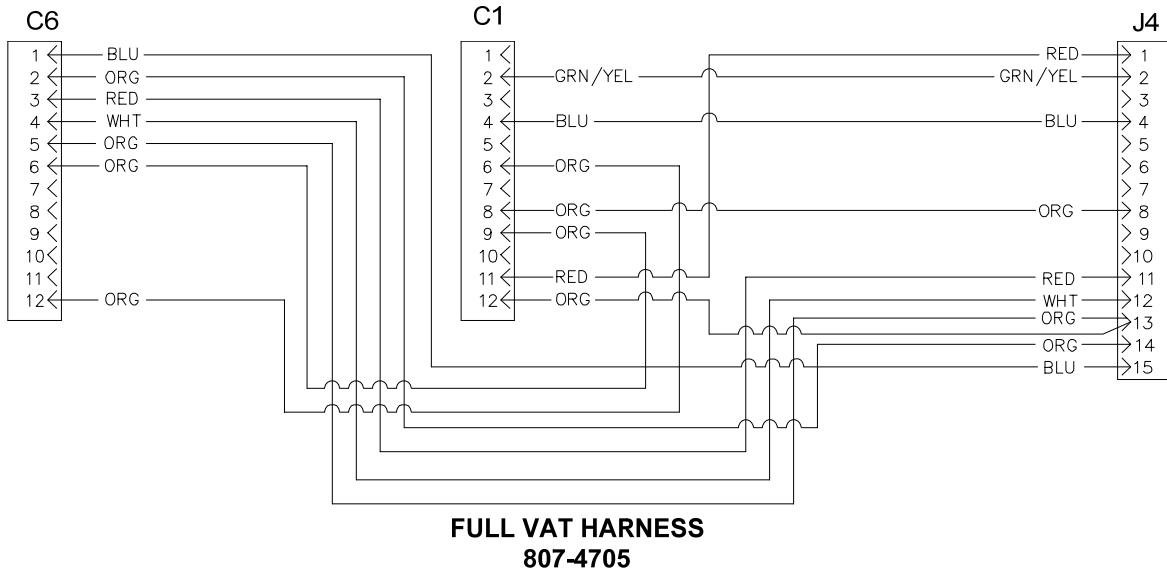
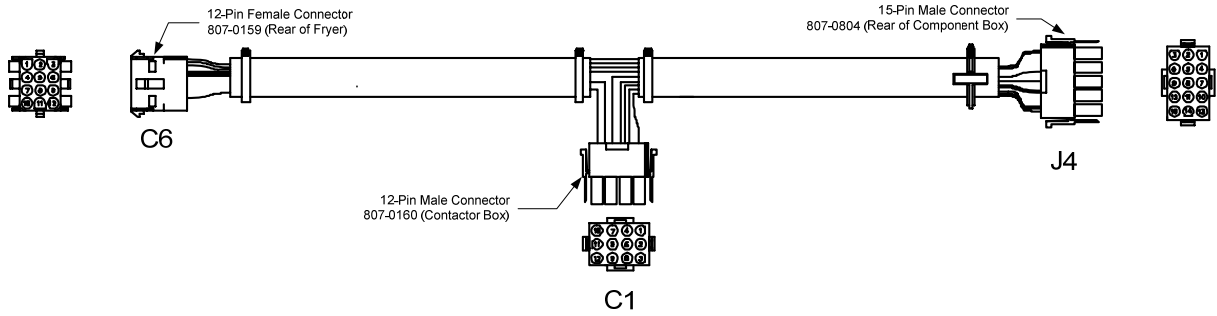
ITEM	PART #	COMPONENT
1	106-8744	14/17 kW Mechanical Contactor

2.4.5.4 Contactor Box Wiring Assembly – 9-Pin (Right Element)

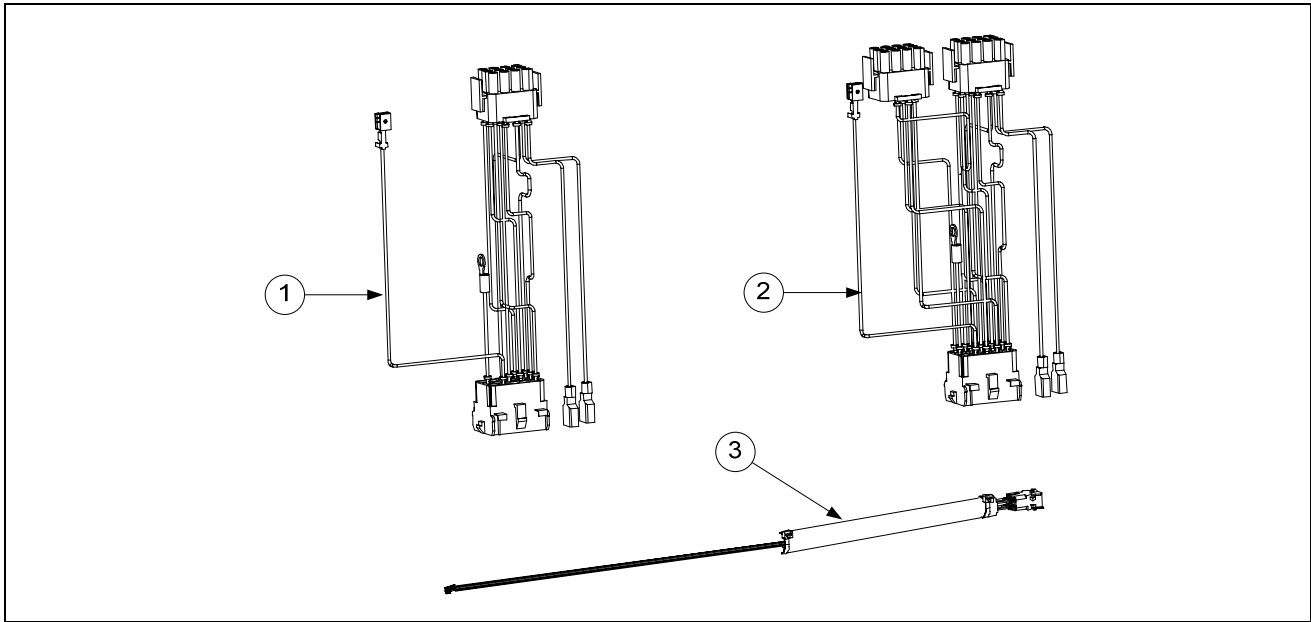


ITEM	PART #	COMPONENT
1	106-8745	14/17 kW Mechanical Contactor

2.4.5.5 Main Wiring Harnesses

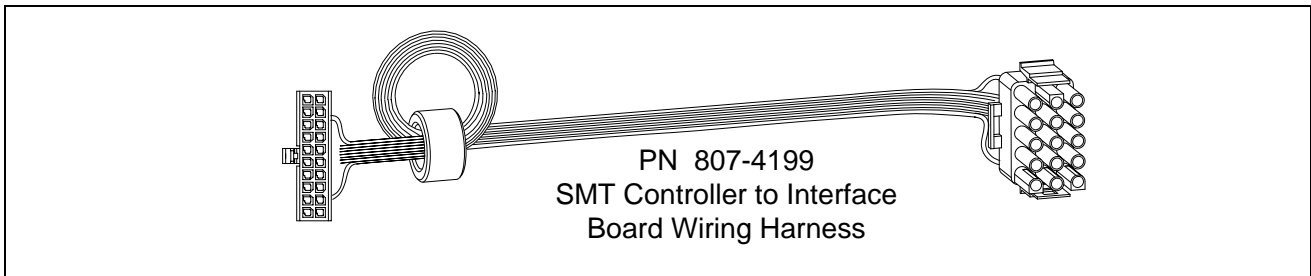


2.4.5.6 Component Box and Filter Pump Wiring Harnesses



ITEM	PART #	COMPONENT
1	106-5750SP	Full Vat Control Harness J4 to J2 (<i>Standard</i>)
2	106-5751SP	Dual Vat Control Harness J4 to J1 and J2 (<i>Standard</i>)
3	108-0490	Filter Pump C2 to Component Box Wiring Harness

2.4.5.7 Interface Board to Controller Wiring Harness – 15-Pin



2.4.5.8 M3000, MIB, AIF and ATO Wiring Harnesses

ITEM	PART #	COMPONENT
*	807-4546	Computer Communication (<i>used from Computer to Computer</i>)
*	807-4547	AIF Communication/Power (<i>used from MIB to AIF and AIF to AIF</i>)
*	807-4649	MIB Power/Blue LED/Pan Sw (<i>used from Transformer and Fltr Rly to MIB to Blue LED and Pan Sw</i>)
*	807-4655	FV/DV Harness RTD Medium (<i>used from RTD to ATO Board</i>)
*	826-2569	FV/DV ATO/RTD Probe Kit
*	807-4553	ATO Power (<i>used from Transformer to ATO Board</i>)
*	807-4671	ATO Pump and JIB (<i>used from ATO Board to Top-off Pump and JIB Reset Switch</i>)
*	807-4772	ATO Pump and JIB (<i>used from ATO Board to Top-off Pump and JIB Reset Switch</i>) 4-5 Battery only
*	807-4555	ATO Yellow LED (<i>used from ATO Board to Yellow LED</i>)
*	807-4722	ATO Yellow LED (<i>used from ATO Board to Yellow LED</i>) 4-5 Battery only
*	807-4573	Computer Locator Wire (<i>used from Computer to Interface Board</i>) See wiring diagram 805-1734 for locator pin positions.
*	807-4552	Communications Terminator (<i>used on Computer pin J6 and ATO board pin J10 to terminate network</i>)
	807-4657	Jumper (<i>used on 4 and 5 battery ATO board plug J5 pin 7 and 8</i>)
*	106-9256SP	Long Top-off Power (<i>used between Component Box to ATO Box</i>)
*	807-4760	Harness, LOV™ RTI-MIB connector
√ *	807-4660PK	SMT Pin Service Repair Kit
√ *	230-2345	SMT Pin Extractor

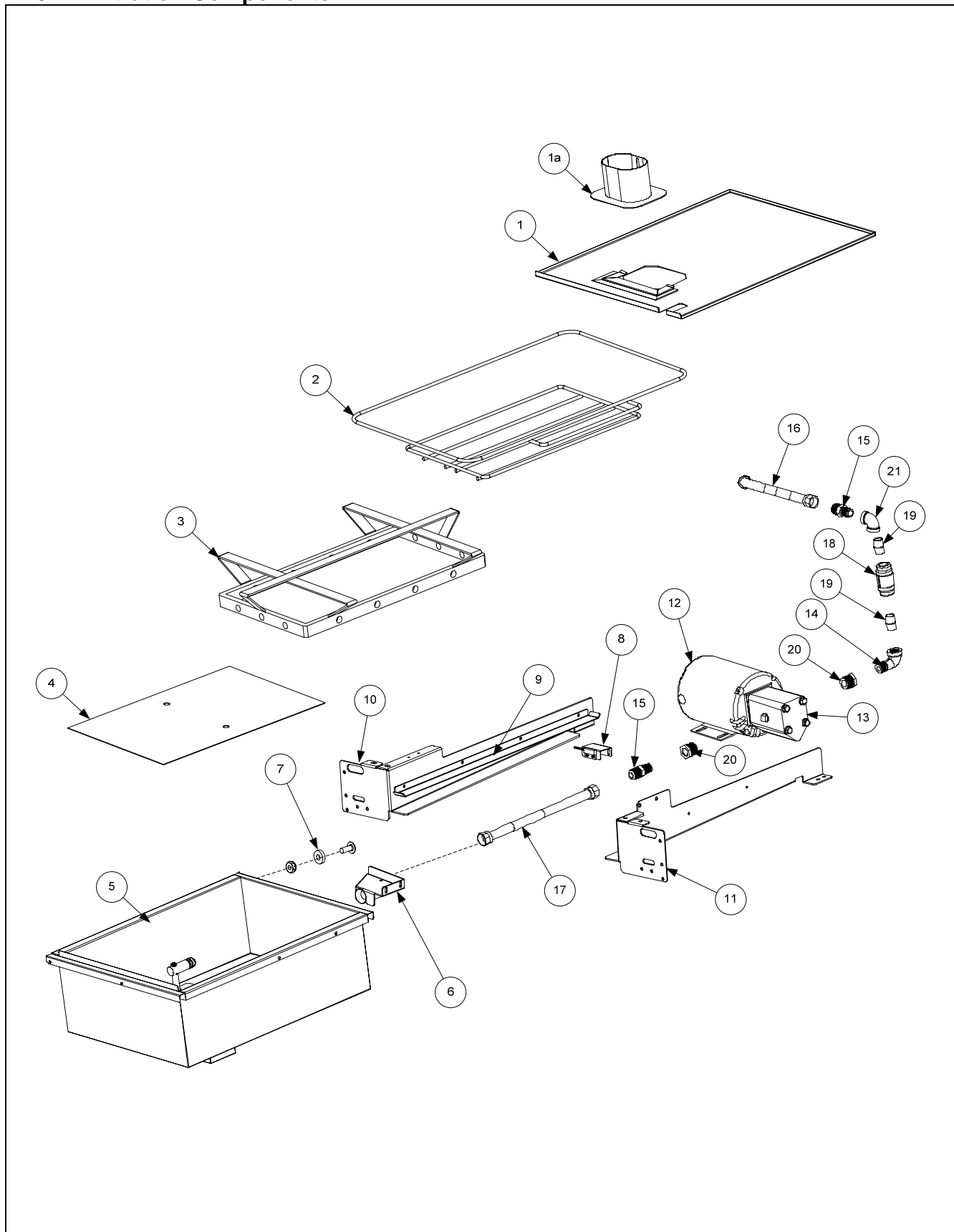
* Not illustrated.

See page 1-14, 1-18, 1-27 and 1-36 for Pin Positions.

√ Recommended parts.

2.5 Filtration System Components

2.5.1 Filtration Components



2.5.1 Filtration Components cont.

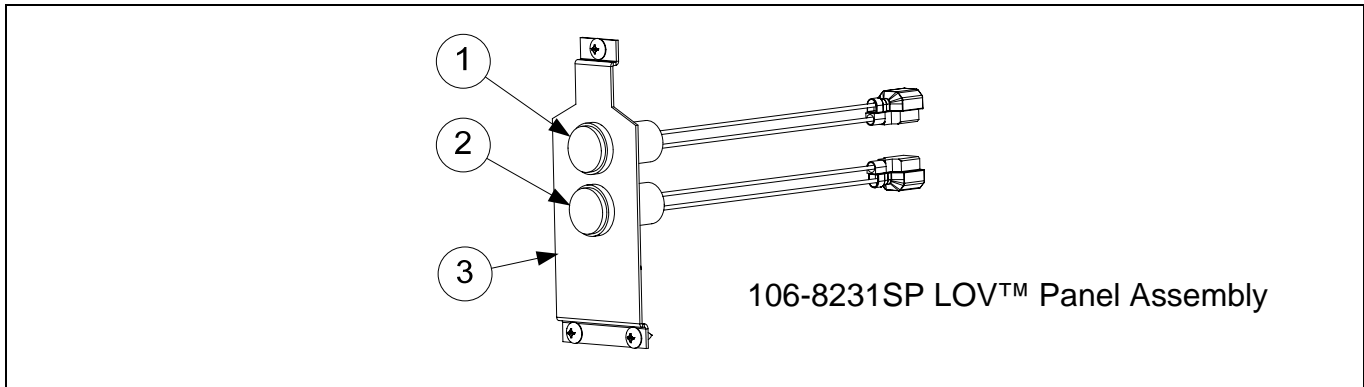
ITEM	PART #	COMPONENT
1	823-7181	Lid, Multi-Vat Fryers, Standard Size Filter Pan
	823-6684	Lid, Multi-Vat Fryers, Standard Size Filter Pan (<i>France Only</i>)
	823-7187	Lid, Two-Vat Fryer, Half Size Filter Pan
	823-6162	Lid, Two-Vat Fryer, Half Size Filter Pan (<i>France Only</i>)
1a	823-7186	Guard, Pan Splash Lid
2	810-3276	Crumb Tray, Standard Size Filter Pan 3, 4 and 5 Vat
	810-3288	Crumb Tray, Two-Vat Fryer, Half Size Filter Pan
3	810-3268	Hold-Down Ring for Pad 16.56 x 22.32, Standard Size Pan 3, 4, and 5 Vat
	810-3289	Hold-Down Ring for Pad 11.20 x 19.10, Two-Vat Fryer, Half Size Filter Pan
4	200-2240	SanaGrid Filter Screen, Standard Size Filter Pan
	220-2901	SanaGrid Filter Screen, Two-Vat Fryer, Half Size Filter Pan
5	106-8677SP	Pan, One-Piece Filter LOV™ Standard Size
	106-9148	Pan, One-Piece Filter LOV™ Standard Size (<i>France Only</i>)
	106-8211SP	Pan, Two-Vat Fryer, LOV™ Half Size
	106-8435	Pan, Two-Vat Fryer, LOV™ Half Size (<i>France Only</i>)
6	823-6715	Suction Tube Standard LOV™
	823-6164	Suction Tube Standard LOV™ (<i>France Only</i>)
	823-6399	Suction Tube Two Vat LOV™
7	810-3007	Magnet, Pull Ring
8	106-9251SP	Assembly, Filter Pan Switch Three Vat or more (106-5876SP Sensor only)
	106-8080SP	Assembly, Filter Pan Switch Two Vat (106-5876SP Sensor only)
*	106-5876SP	Sensor, Magnet
9	230-3936	Rail, Filter Pan Retaining Standard
10	220-3748	Support, Left Filter Pan
	220-3275	Support, Left Filter Pan Two Vat LOV™
11	220-3749	Support, Right Filter Pan
	106-8487	Support, Right Filter Pan Two Vat LOV™
12		Motor and Gasket Kit
	826-1785	100V 50/60 Hz
√	826-1712	115V 50/60 Hz
√	826-1756	208V 50/60 Hz
	826-1270	220-240V 50/60 Hz
	826-1755	250V 50/60 Hz
13	826-2789	Pump, Viking 8 GPM Kit (includes gasket 816-0093)
*	807-11973	Viking Pump Seal Kit
*	809-1020	Cap Screw, 5/16-inch-18 5.50" NC Hex (<i>Connects pump to motor.</i>)
14	813-0165	Elbow, ST ½-inch x ½-inch NPT 90° BM
15	810-1668	Adapter, ⅝-inch to ½-inch NPT Male
16	810-1067	Flexline, 8.5-inch Oil Return
17	810-1057	Flexline, 13-inch Oil Return
18	810-0667	Check Valve ½" NPT
19	810-3738	Adaptor, Check Valve Close Nipple
20	813-0031	Bushing, ¾" NPT x ½" BM
21	813-0062	Elbow, ½-inch x ½-inch 90° BM
√ *	826-1392	O-Ring (Pkg. of 5; used with Item 5)
*	813-0568	Plug, ⅝-inch Socket Head Pipe (used with Item 5; two required)
*	807-1105	Heater Strip Assembly, 100-120V 25W 18"
*	807-1098	Heater Strip Assembly, 208-250V 25W 18"

* Not illustrated.

√ Recommended parts.

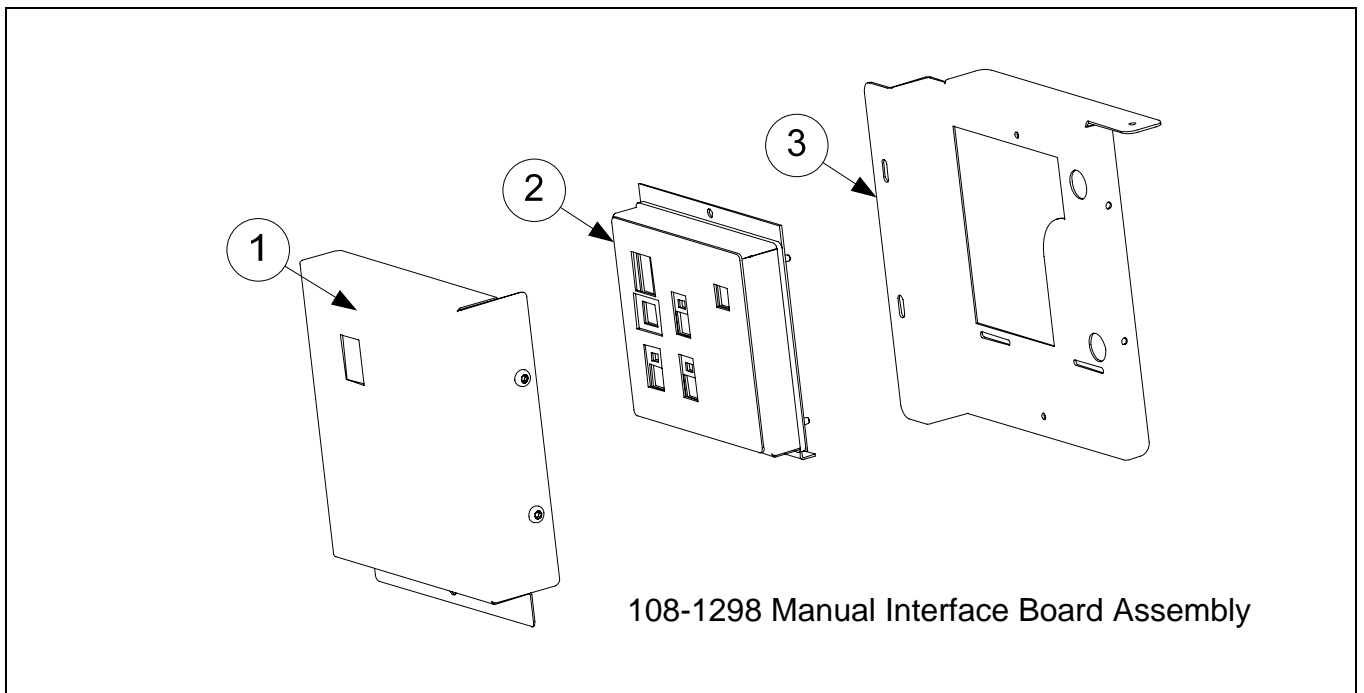
2.5.2 Auto Intermittent Filtration Components

2.5.2.1 LOV™ Indicator Lights Assembly



ITEM	PART #	COMPONENT
1	106-8106SP	Light, Blue 24VDC LED Flush
2	106-8105SP	Light, Yellow/Orange 24VDC LED Flush
3	230-4271	Plate, Control Frame LOV™

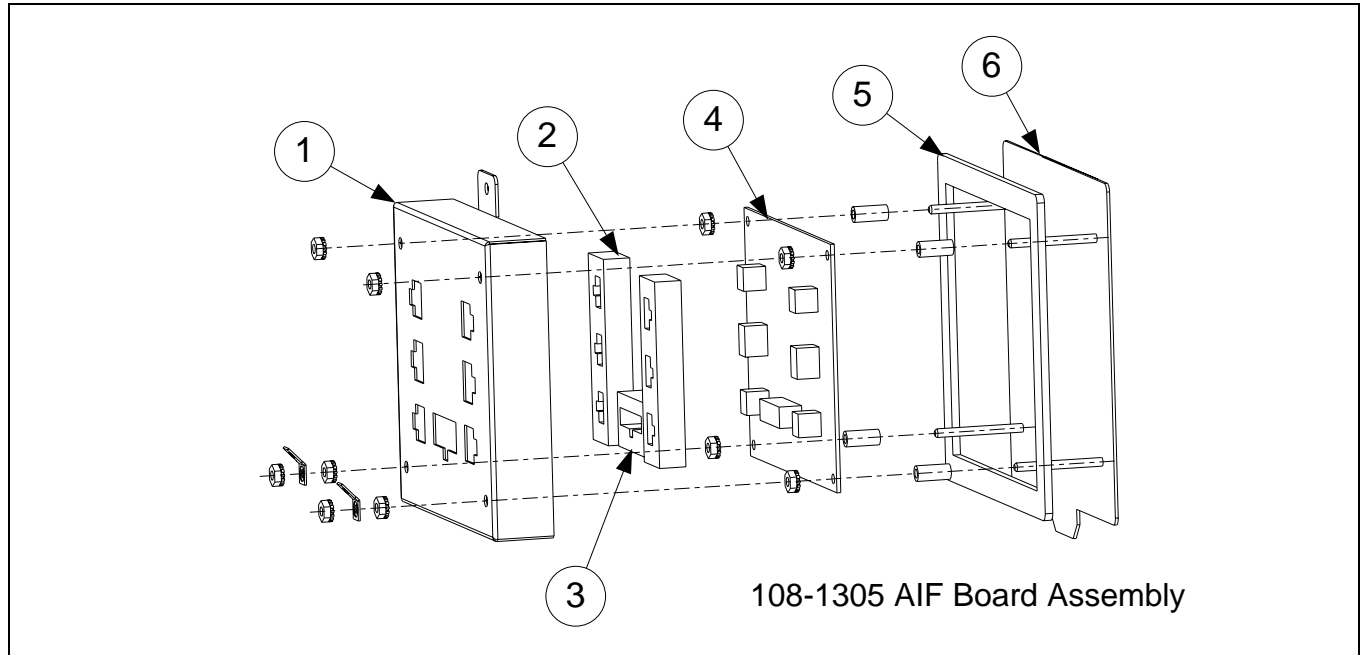
2.5.2.2 Manual Interface Board Assembly



ITEM	PART #	COMPONENT
	108-1298	Assembly, MIB
1	220-6288	Cover, MIB
√ 2	108-2156	Assembly, MIB Computer w/ Frame
	807-4481	Overlay
3	220-5793	Assembly Back, Box MIB

√ Recommended parts.

2.5.2.3 AIF Board Assembly



ITEM	PART #	COMPONENT
	108-1305	Assembly, AIF
1	824-1988	Cover, AIF Board
2	816-0814	Gasket, AIF Board
3	816-0815	Gasket, Computer Board
√ 4	108-1304	Board, AIF
5	816-0820	Seal, AIF Board
6	108-0097	Panel Assembly, AIF Box

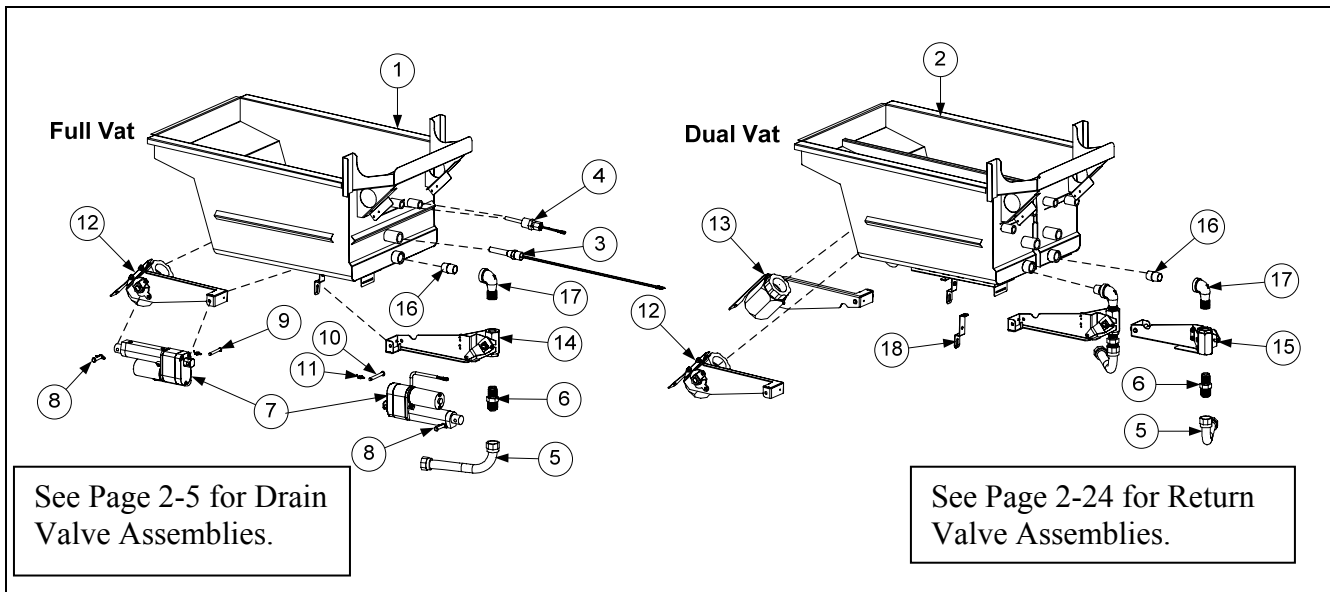
√ Recommended parts.

2.5.2.4 LOV PCB/Computer Board Matrix

PART #	COMPONENT
108-2156	Assembly, MIB PCB w/ metal work
108-1305	Assembly, AIF Board w/ metal frame
108-1304	Board, AIF Board PCB w/ software
108-1279	Board, ATO PCB w/ software
108-1295	M3000 Non-CE Domestic <i>(For use in US, Canada, Mexico and all other non-CE countries)</i>
108-1283	M3000 CE <i>(For use in European CE countries)</i>

2.6 Frypot Assemblies and Associated Parts

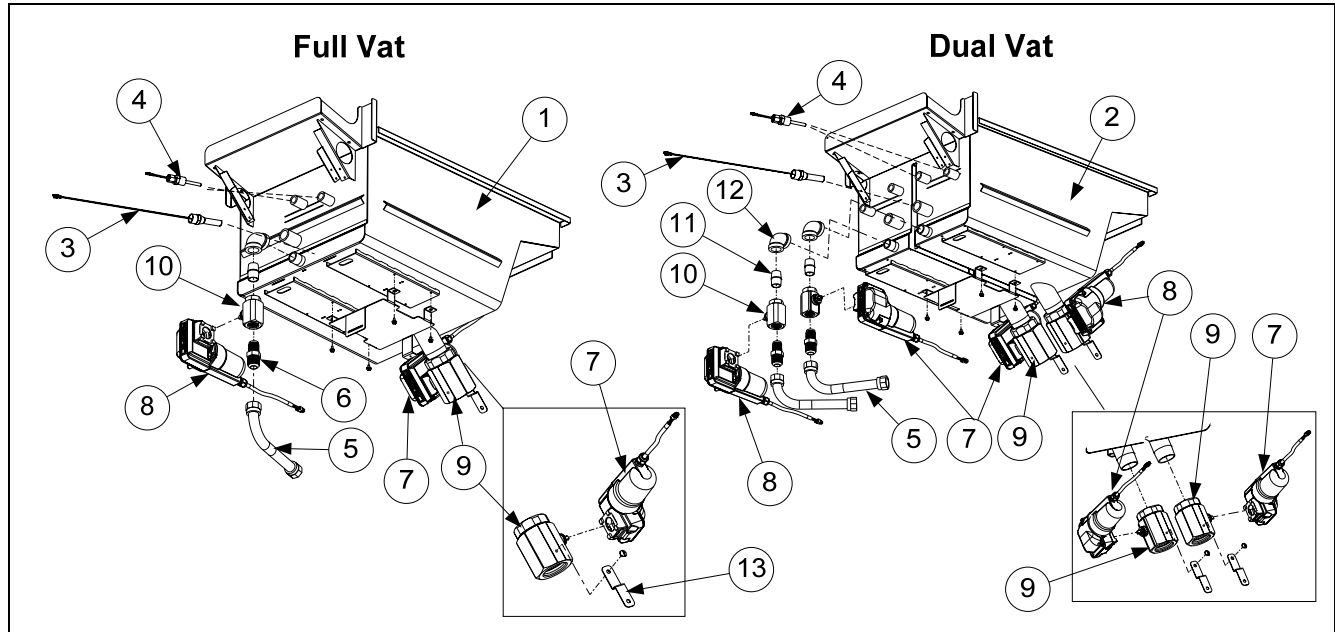
2.6.1 Frypots with Linear Actuators



ITEM	PART #	COMPONENT
1	823-7436	Frypot, Full-Vat LOV™
2	823-7437	Frypot, Dual-Vat LOV™
√ 3		Thermostat Assembly, High-Limit Long Standard
	826-2454	Non-CE Full Vat 425°F (218°C) (17kW FV and 14kW FV) (Color Coded Black 806-7543)
	826-2456	Non-CE Dual Vat 435°F (224°C) (22kW, 17kW DV and 14 kW DV) (Color Coded Red 806-8035)
	826-2455	CE Full and Dual Vat 415°F (213°C) (14kW and 17kW CE) (Color-Coded Yellow 806-8132)
√ 4	826-2706	Probe, Temperature and Fitting Kit AIF/RTD
5	810-1067	Flexline, 5/8" OD x 8.50" Long
6	810-1668	Adaptor, Male 5/8" OD x 1/2"
√ 7	826-2587	Actuator, Linear AIF 24VDC Kit includes 810-1776
8	809-1012	Pin, Clevis, 1/4" x 1 1/4" (Drain and return valves)
9	809-1035	Pin, Clevis, 1/4" x 2 1/4" (center pin drain actuator)
10	809-1036	Pin, Clevis, 1/4" x 2" (center pin return actuator)
11	810-1776	Clip, Toaster Ring
12	108-0698	Valve, Drain Assy. LOV™ FV or DV Right as viewed from front of frypot.
13	108-0697	Valve, Drain Assy LOV™ DV Left as viewed from front of frypot.
14	108-0700	Valve, Return Assy LOV™ FV or DV Right as viewed from front of frypot.
15	108-0699	Valve, Return Assy LOV™ DV Left as viewed from front of frypot.
16	813-0022	Nipple, 1/2" x Close NPT BM
17	813-0165	Elbow, St. 1/2" x 1/2" NPT 90°
18	220-5960	Strap, Elec LOV™ Actuator

√ Recommended parts.

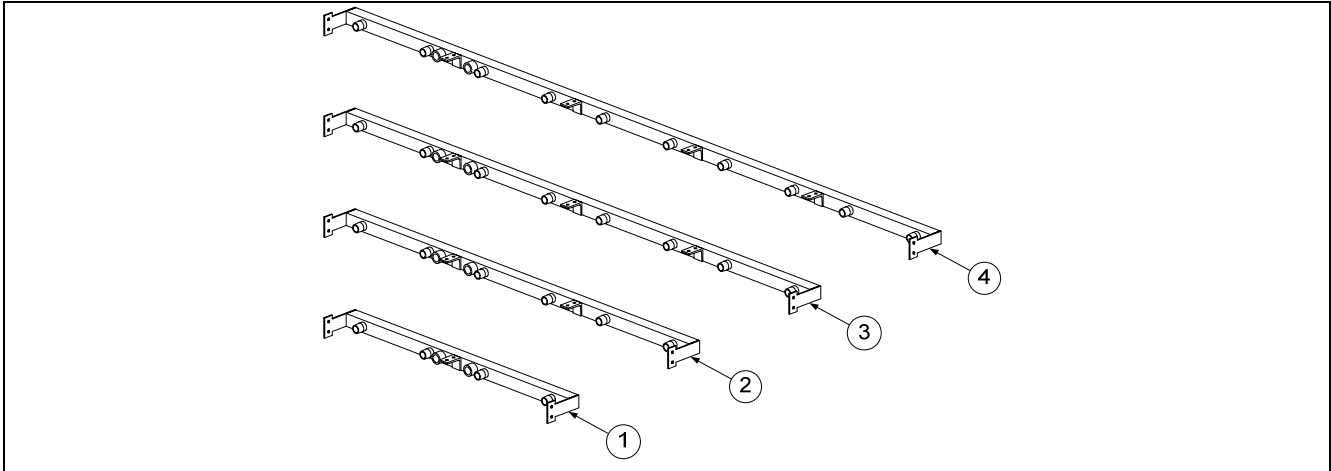
2.6.2 Frypots with Rotary Actuators



ITEM	PART #	COMPONENT
1	823-7672	Frypot, Full-Vat LOV™
2	823-7673	Frypot, Dual-Vat LOV™ (use 823-7745 for Hybrid Fish Vat)
√ 3		Thermostat Assembly, High-Limit Long Standard
	826-2454	Non-CE Full Vat 425°F (218°C) (17kW FV and 14kW FV) (Color Coded Black 806-7543)
	826-2456	Non-CE Dual Vat 435°F (224°C) (22kW, 17kW DV and 14 kW DV) (Color Coded Red 806-8035)
	826-2455	CE Full and Dual Vat 415°F (213°C) (14kW and 17kW CE) (Color-Coded Yellow 806-8132)
√ 4	826-2706	Probe, Temperature and Fitting Kit AIF/RTD
	810-1067	Flexline, 5/8" OD x 8.50" Long
	810-1668	Adaptor, Male 5/8" OD x 1/2"
√ 7	807-4961	Actuator, Rotary 24VDC (#1)
√ 8	807-4962	Actuator, Rotary 24VDC (#2)
√ 9	810-3755	Valve, 1/4 Drain Rotary Actuator LOV™
√ 10	810-3754	Valve, 1/2 NPT Return Rotary Actuator LOV™
	813-0022	Nipple, 1/2" x Close NPT BM
	813-0062	Elbow, 1/2" Blk 90°
	220-7386	Strap, Round Drain Elec LOV

√ Recommended parts.

2.7 Oil Return Manifolds

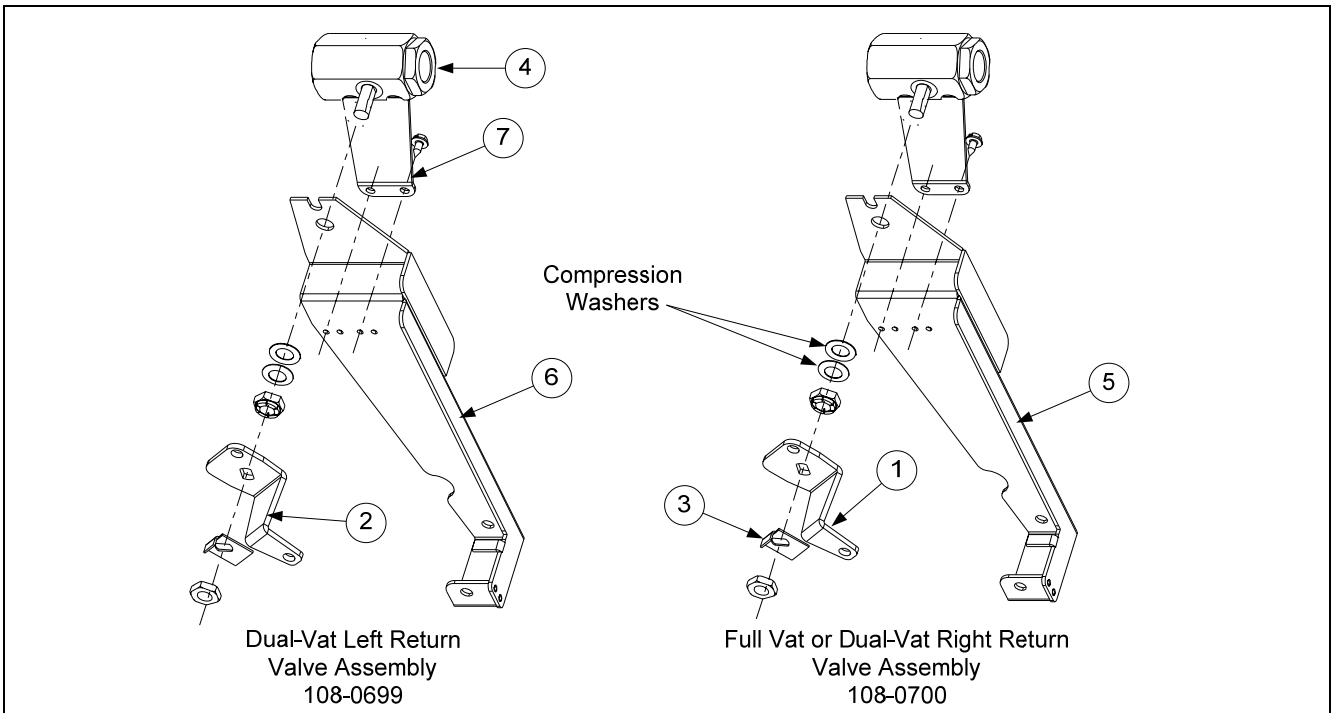


ITEM	PART #	COMPONENT
1	810-3015	Manifold, Two-Station Fryer
2	810-3016	Manifold, Three-Station Fryer
3	810-3017	Manifold, Four-Station Fryer
4	810-3018	Manifold, Five-Station Fryer
*	813-0907	Cap, 15/16-inch Valve

* Not illustrated.

2.8 Return Valves and Associated Parts

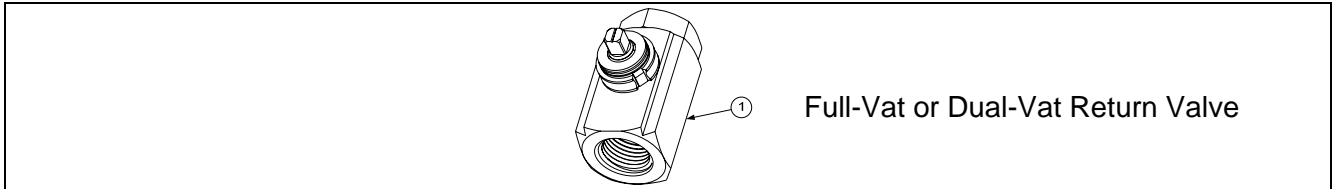
2.8.1 Return Valves and Associated Parts (Linear Actuators)



2.8.1 Return Valves and Associated Parts (Linear Actuators) cont.

ITEM	PART #	COMPONENT
1	232-5702	Handle, Return Valve with Locator FV or DV Right
2	231-5702	Handle, Return Valve with Locator DV Left
3	900-2935	Retainer, Nut Oil Return Valve
4	810-2201	Valve, ½-inch Ball
5	823-7233	Mount, Return Actuator Right
6	823-7232	Mount, Return Actuator Left
7	230-5963	Brace, Return Actuator Bracket

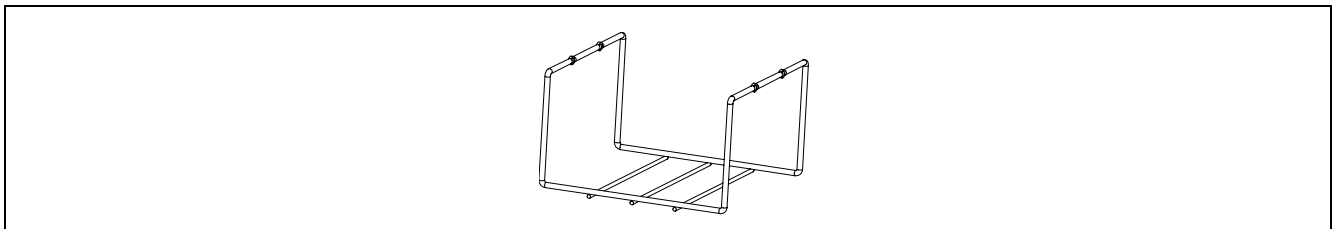
2.8.2 Return Valve (Rotary Actuators)



ITEM	PART #	COMPONENT
1	810-3754	Valve, ½-inch NPT Rotary Actuator

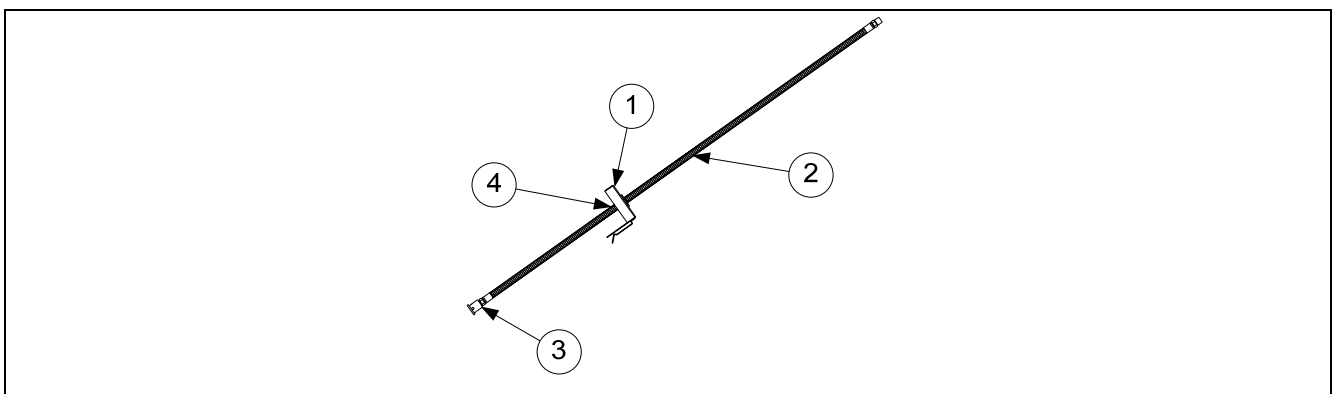
2.9 Auto Top Off Components

2.9.1 JIB Basket



ITEM	PART #	COMPONENT
1	220-7991	Basket, JIB LOV™

2.9.2 JIB Cap and Pick Up Assembly

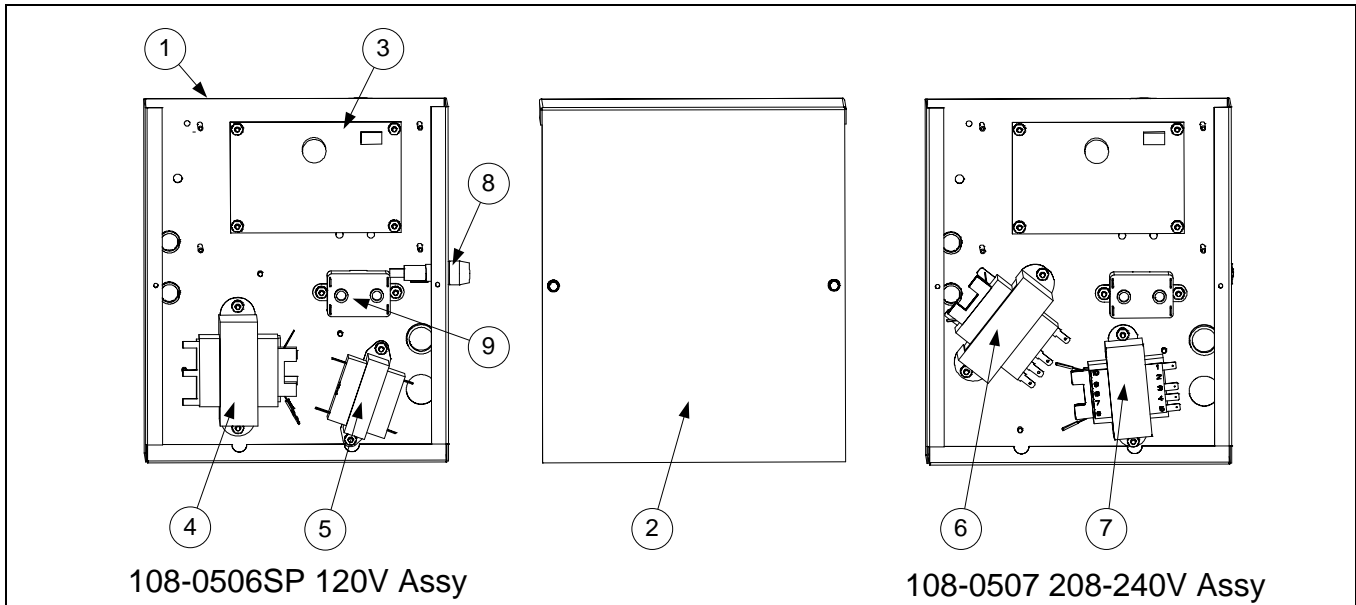


ITEM	PART #	COMPONENT
	108-2005	Cap, JIB Assembly (use 108-2047 for BIB)
1	108-2001	Cap, JIB (use 108-2002 for Intl. BIB)
2	810-3823	Hose, JIB

2.9.2 JIB Cap and Pick Up Assembly cont.

ITEM	PART #	COMPONENT
3	823-7738	Inlet, Oil Reservoir Tube
4	816-0870	Clamp

2.9.3 Automatic Top Off Board Assembly



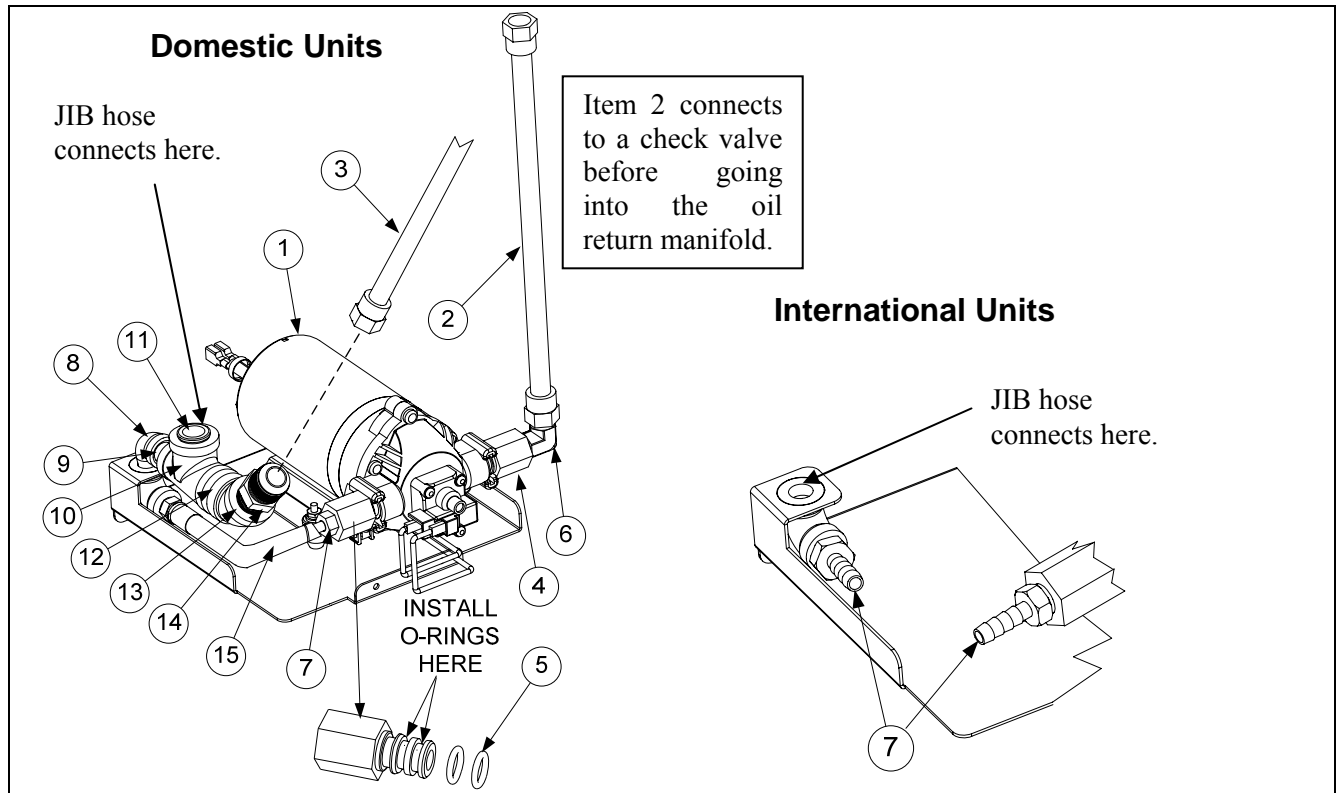
ITEM	PART #	COMPONENT
1	108-0653	Box, Assembly Auto Top Off Board
2	220-5679	Cover, Top Off Board Box
√ 3	108-1279	PCB Board, Automatic Top Off
*	108-1302	PCB Board, LON Works 120V (Must be pre-programmed before shipping)
*	108-1303	PCB Board, LON Works 230-240-250V (Must be pre-programmed before shipping)
√ 4	807-2181	Transformer, 100-120V/24V 62VA
√ 5	807-0855	Transformer, 120V 50/60-12V 20VA
√ 6	807-2180	Transformer, 208-240V/24V 50VA
√ 7	807-2191	Transformer, 208/230/240 -12V 30VA
8	807-1321	Holder, Fuse AGC Panel Mount 1/4"
√ *	807-1597	Fuse, 3A Slow-Blow
√ 9	807-0012	Relay, 18AMP 1/3 HP 24V Coil (Top off pump)

* Not illustrated.

√ Recommended parts.

NOTE: Top off boxes for vats 4 and 5 have either item 4 or item 6, both have item 3.

2.9.4 ATO Pump Assembly

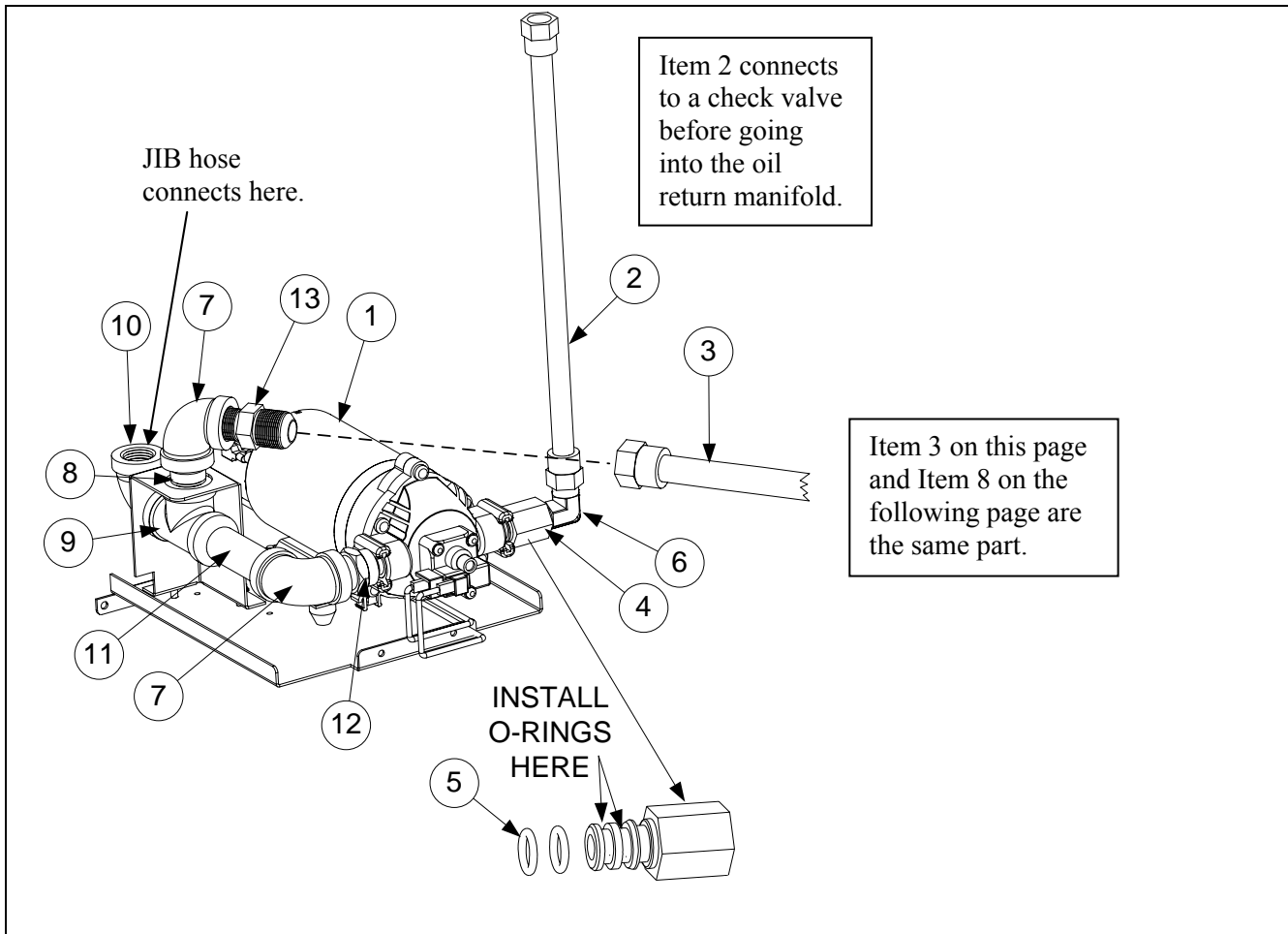


ITEM	PART #	COMPONENT
√ 1	108-0639	Pump, Shurflo 24VAC
2	810-3265	Flexline, ½" OD x 24-inch (Out to oil return manifold)
	810-3591	Flexline, ½" OD x 8-inch (Out to oil return manifold two battery only)
*	810-0667	Check valve, ½ NPT 1 PSI
3	810-1069	Flexline, ⅝" OD x 29.5-inch (In from RTI fresh oil solenoid) Domestic units only
4	810-3666	Fitting, Shurflo Pump
5	816-0782	O-Ring, Viton #111
6	813-0940	Elbow, ¼" NPT x ⅜ Flare
7	810-3770	Fitting, ¼" NPT Male Barb
8	813-0543	Elbow, ¼" NPT BM
9	813-0838	Nipple, ¼" NPT BM Close
10	813-0530	Tee, Reducing ½" x ¼" x ½"
11	813-0304	Bushing, ½" x ¼" BM Flush
12	813-0022	Nipple, ½" x Close NPY BM
13	813-0345	Elbow, ½" BM 45°
14	810-1668	Adaptor, Male ⅝" OD x ½"
15	812-2083	Hose LOV Fryer JIB (Cut and attach to item 7 with a ty wrap)
*	811-1166	Hose, Silicone Braided 18" (sold by the foot)

* Not illustrated.

√ Recommended parts.

2.9.5 ATO Pump Assembly Service Kit (Larger Top Off Lines)

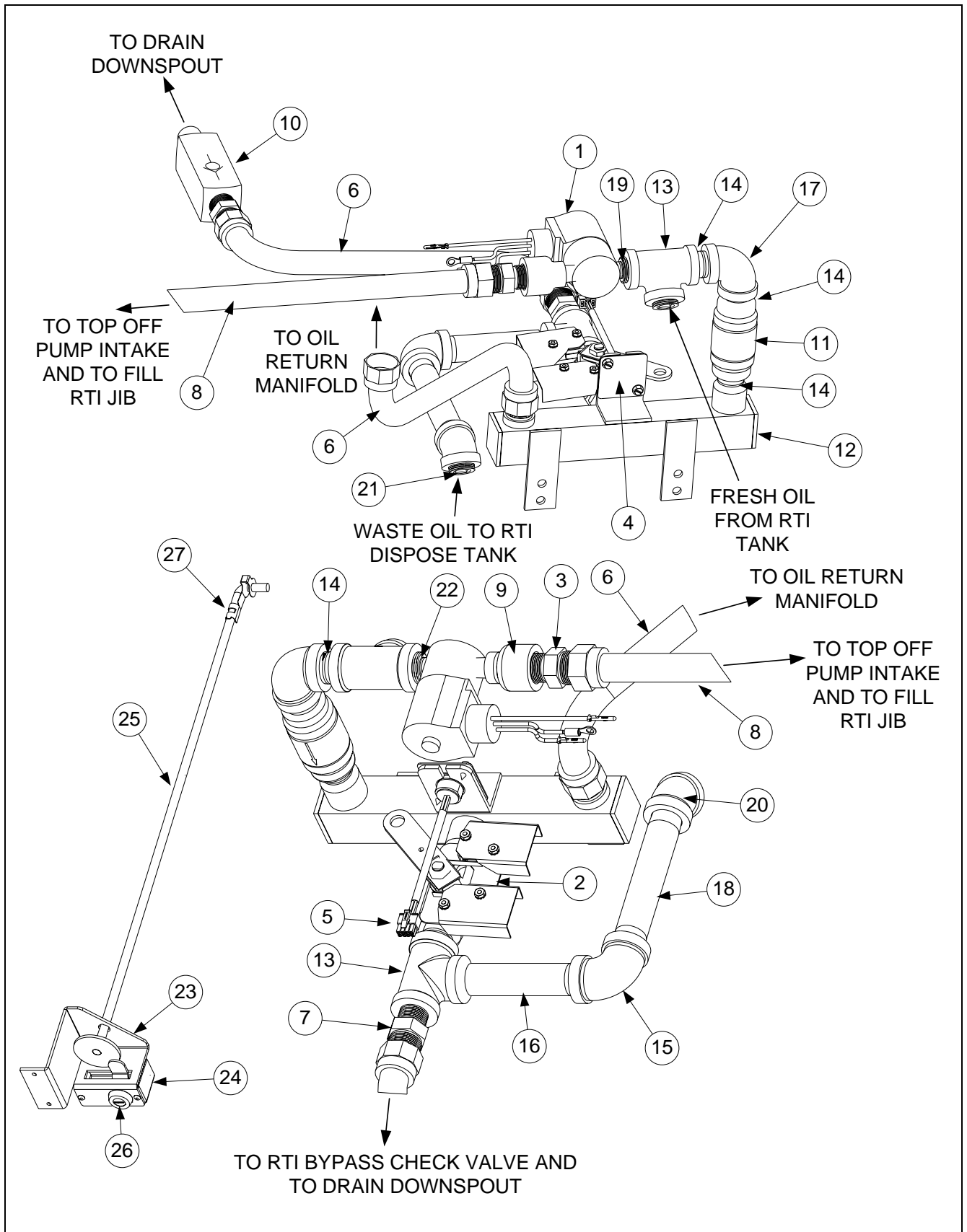


ITEM	PART #	COMPONENT
	108-3041	Kit, Pump BIELA Topoff Service Kit
√ 1	108-0639	Pump, Shurflo 24VAC
2	810-3265	Flexline, 1/2" OD x 24-inch (Out to oil return manifold)
	810-3591	Flexline, 1/2" OD x 8-inch (Out to oil return manifold two battery only)
*	810-0667	Check valve, 1/2 NPT 1 PSI
3	810-1069	Flexline, 5/8" OD x 29.5-inch (In from RTI fresh oil solenoid) Domestic units only
4	810-3666	Fitting, Shurflo Pump
5	816-0782	O-Ring, Viton #111
6	813-0940	Elbow, 1/4" NPT x 3/8 Flare
7	813-0062	Elbow, 1/2" BLK 90° NPT BM
8	813-0087	Nipple, 1/2" x 1.50-inch
9	823-8063	JIB Connection Topoff Welded Assy.
10	813-0165	Elbow, Street 1/2" x 1/2" NPT 90° BM
11	813-0247	Nipple, 1/2" x 3.50-inch NPT BM
12	108-2054	Fitting Assy Shurflo
13	810-1668	Adaptor, Male 5/8" OD x 1/2"
*	813-0907	Cap 15/16"

* Not illustrated.

√ Recommended parts.

2.10 RTI
2.10.1 RTI Manifold and Accessories

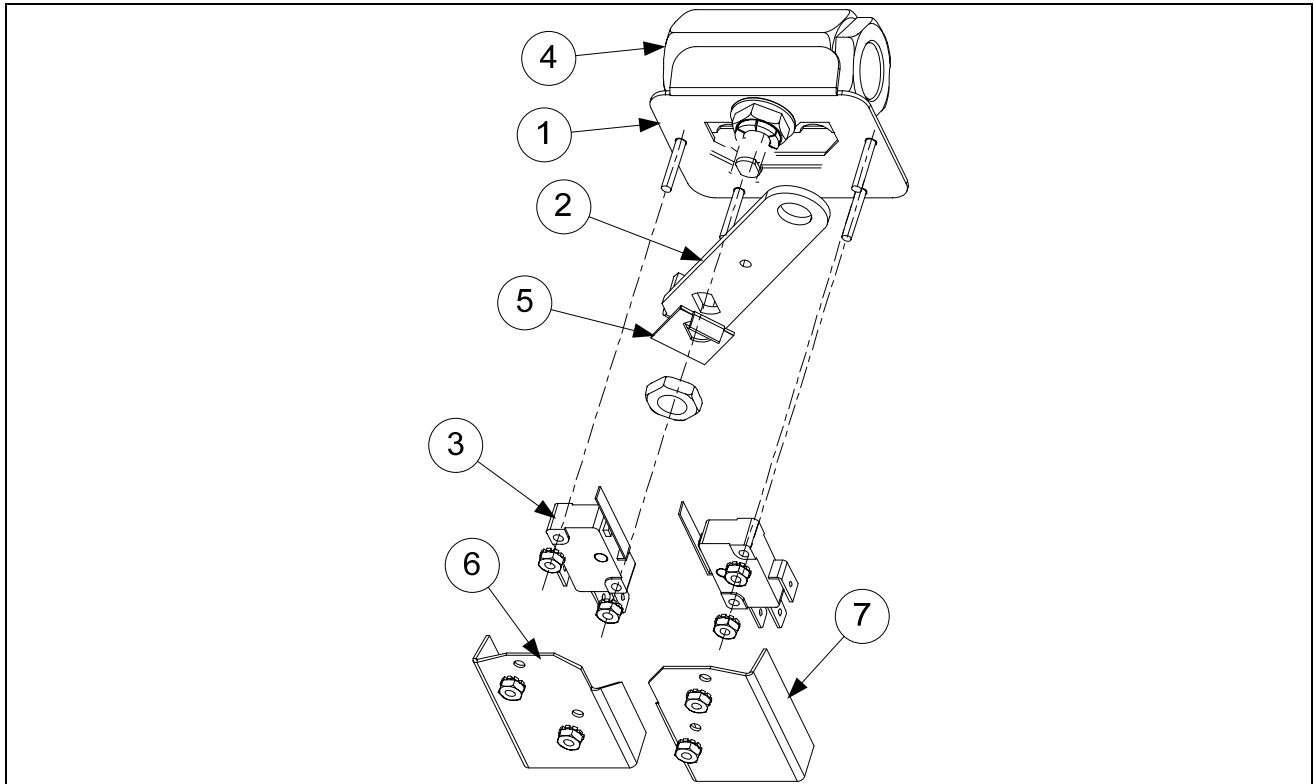


2.10.1 RTI Manifold and Accessories cont.

ITEM	PART #	COMPONENT
√ 1	106-6830	Solenoid Assembly
2	108-0446	Valve, RTI Waste Assembly (see page 2-32 for parts)
3	810-1668	Adaptor, Male 5/8" OD x 1/2"
4	220-5658	Cover, RTI Dust Plug
5	807-4760	Harness, RTI – MIB connection
6	810-1057	Flexline, 5/8" OD x 13-inch long
7	810-1668	Adaptor, Male 5/8" OD x 1/2"
8	810-1069	Flexline, 5/8" OD x 29.50-inch long
9	813-0555	Reducer, Bell Fitting, 1/2" to 1/4" NPT BM
10	810-3531	Valve, Check 20 PSI RTI bypass
11	810-3583	Valve, Check 1/2" NPT 4 PSI RTI Manifold
12	810-3596	Manifold, RTI
13	813-0003	Tee, 1/2" x 1/2" x 1/2" BM
14	810-3738	Adaptor, Check Valve Close Nipple
15	813-0062	Elbow, 1/2" Blk 90°
16	813-0093	Nipple, 1/2" x 4-inch
17	813-0062	Elbow, 1/2" BM 90°
18	813-0261	Nipple, 1/2" x 5-inch NPT
19	813-0304	Bushing, 1/2" x 1/4"
20	813-0345	Elbow, 1/2" Blk 45°
21	813-0336	Plug, 1/2" NPT Square Head
22	813-0838	Nipple, 1/4" NPT
23	220-5656	Brace, RTI Handle
24	220-5657	Cover, RTI Handle
25	823-7142	Handle, RTI Waste Pull
26	810-3587	Lock and Key, RTI Waste Handle
27	809-0601	Clip, Clevis Left Rod End

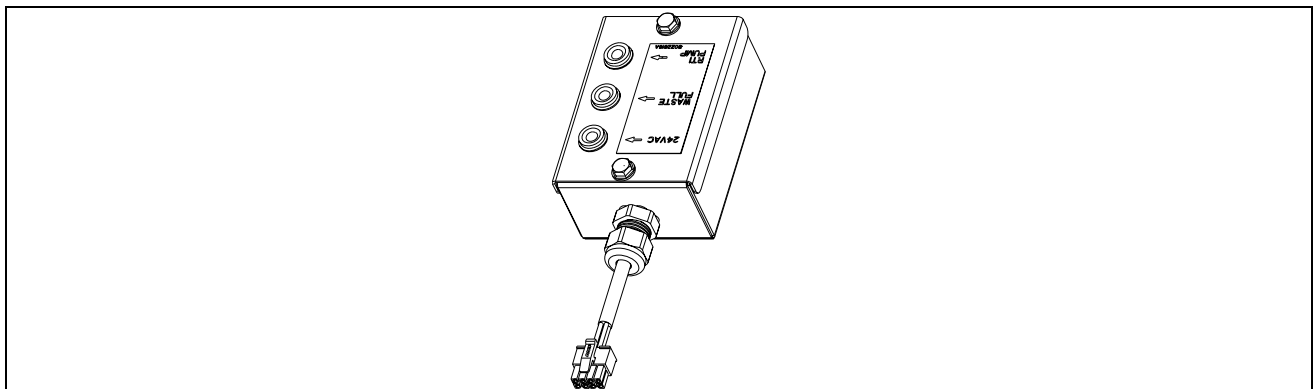
√ Recommended parts.

2.10.2 RTI Dispose Waste Valve



ITEM	PART #	COMPONENT
	108-0446	Valve, RTI Dispose Waste
1	108-0445	Bracket, RTI Waste Valve
2	220-5615	Handle, RTI Waste Valve
3	807-4936	Microswitch, Gold Sealed
4	810-0278	Valve, 1/2" Ball
5	900-2935	Retainer, Nut Return Valve
6	901-2348	Cover, DV Safety Switch
7	902-2348	Cover, DV Safety Switch

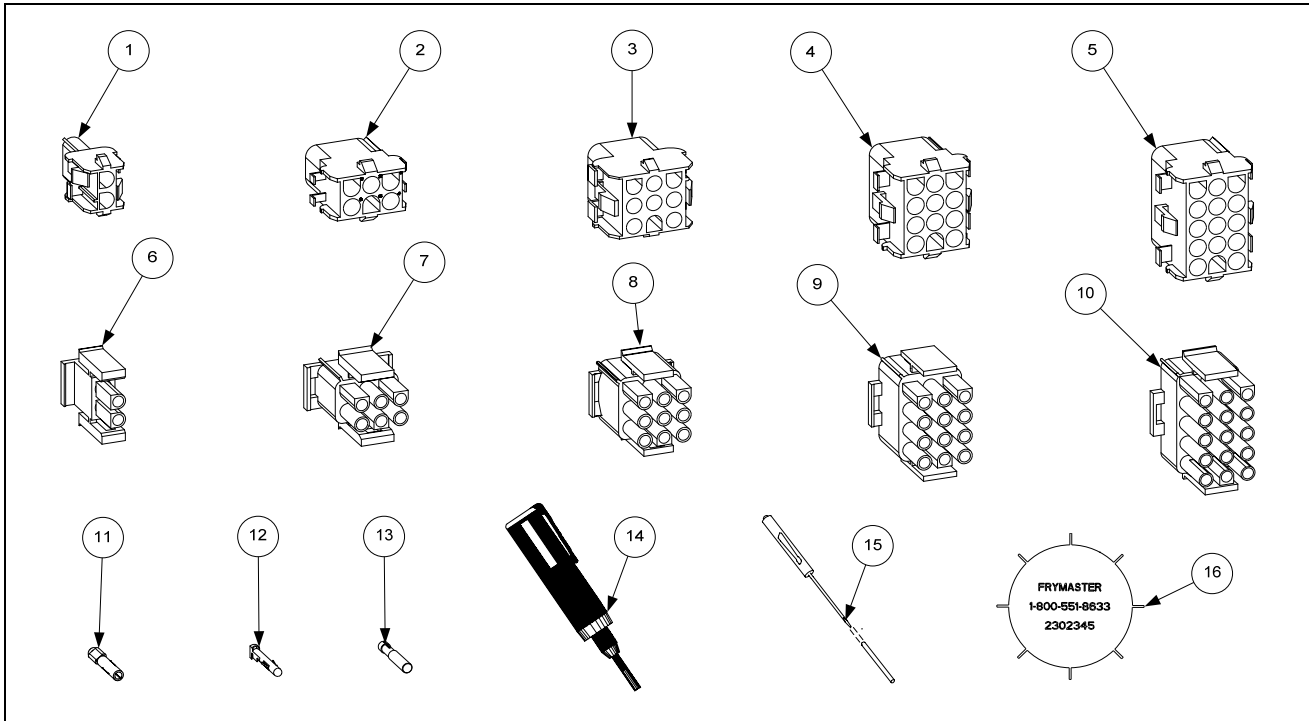
2.10.3 RTI Test Box



ITEM	PART #	COMPONENT
√	108-0716	Box, LOV™ RTI Test

√ Recommended parts.

2.11 Wiring Connectors, Pin Terminals and Power Cords



ITEM	PART #	COMPONENT
Power Cords		
*	807-0154	100/120V-15A 3-wire, w/grounded plug
*	807-4317	100/208/240V-16A 3-Wire with Plug LOV CE
*	807-1685	100/208/240V-18A 3-wire, w/o plug
*	807-4316	120V 5-wire, w/grounded plug LOV
*	807-3817	208/240V 3-Phase 4-wire w/grounded plug
*	807-5105	208/240V 3-Phase 4-wire w/grounded plug 105" CE 4 battery or larger
Connectors and Tools		
1	807-1068	2-Pin Female
2	807-0158	6-Pin Female
3	807-0156	9-Pin Female
5	807-0159	12-Pin Female
5	807-0875	15-Pin Female
6	807-1067	2-Pin Male
7	807-0157	6-Pin Male
8	807-0155	9-Pin Male
9	807-0160	12-Pin Male
10	807-0804	15-Pin Male
11	826-1341	Terminal, Female Split Pin (Pkg of 25)
12	826-1342	Terminal, Male Split Pin (Pkg of 25)
13	807-2518	Plug, Mate-N-Lock (Dummy Pin)
14	807-0928	Extract Tool Pin Pusher
15	806-4855	Pin Pusher Screwdriver Assembly
16	230-2345	SMT Pin Extractor
*	807-4660PK	SMT Pin Service Repair Kit

* Not illustrated.

2.12 Fasteners

ITEM	PART #	COMPONENT
*	809-0429	Bolt, 1/4-inch – 20 x 2.00-inch Hex Head ZP Tap
*	809-0131	Bolt, 1/4-inch -20 x 3/4-inch Hex
*	809-1020	Cap Screw, 5/16-inch-18 5.50" NC Hex (<i>Connects pump to motor.</i>)
*	809-0448	Clip, Tinnerman
*	826-1366	Nut, 4-40 Keps Hex (Pkg. of 25) (809-0237)
*	826-1358	Nut, 6-32 Keps Hex (Pkg. of 25) (809-0049)
*	809-0247	Nut, 8-32 Keps Hex
*	826-1376	Nut, 10-32 Keps Hex (Pkg. of 10) (809-0256)
*	809-0766	Nut, 10-32 Keps Hex SS
*	809-0581	Nut, 1/2 NPT Locking
*	809-0020	Nut Cap 10-24 NP
*	826-1372	Nut Grip 1/4-inch 1/4-20 Hex NP (Pkg. of 10) (809-0059)
*	809-0417	Nut Flange 1/4-inch 1/4-20 Serr
*	809-0535	Nut, "T" 1/4-inch-20 x 7/16 SS
*	809-0495	Nut, 1/4-inch – 20 Press
*	809-0540	Nut, Lock 1/2-inch-13 Hex 2-Way ZP
*	826-1359	Screw, 4-40 x 3/4-inch Slotted Round Head (Pkg. of 25) (809-0354)
*	826-1365	Screw, 6-32 x 3/8-inch Slot Head (Pkg. of 25) (809-0095)
*	809-0357	Screw, 6 x 3/8-inch Phillips Head NP
*	809-0359	Screw, 8 x 1/4-inch Hex Washer Head
*	809-0360	Screw, 8 x 3/8-inch Hex Washer Slot Head
*	826-1371	Screw, 8 x 1/2-inch Hex Head ZP (Pkg. of 25) (809-0361)
*	809-0364	Screw, 8 x 5/8-inch Hex Washer Head ZP
*	809-0518	Screw, 8-32 x 3/8-inch Hex Washer Slotted Head SS
*	809-0104	Screw, 8-32 x 1/2-inch Slotted Head ZP
*	826-1363	Screw, 8-32 x 1/2-inch NP (Pkg. of 25) (809-0103)
*	826-1360	Screw, 10-24 x 5/16-inch Round Slot Head ZP (Pkg. of 25) (809-0024)
*	826-1330	Screw, 10-32 x 3/8-inch Slot Head SS (Pkg. of 25) (809-0117)
*	809-1003	Screw, 10-32 x 3/8-inch Hex Trim Head SS
*	809-0270	Screw, 10-32 x 1/2-inch Phillips Head ZP
*	826-1375	Screw, 10-32 x 3/4-inch Hex Trim Head SS (Pkg. of 5) (809-0401)
*	809-1000	Screw, 10-32 x 1 1/4-inch Hex Sck C/S
*	826-1374	Screw, 10 x 1/2-inch Hex Head (Pkg. of 25) (809-0412)
*	809-0266	Screw, 10 x 1/2-inch Phillips Head ZP
*	809-0434	Screw, 10 x 3/8-inch Hex Washer Head NP
*	809-0123	Screw, 10 x 3/4-inch Slot Head
*	826-1389	Screw, 1/4-20 x 3/4-inch Hex Head ZP (Pkg. of 10) (809-0131)
*	809-0582	Washer 1/2 NPT Locking
*	809-0184	Washer, #10 LK ZP
*	809-0190	Washer, .625 X .275 X 40 Flat SS
*	809-0191	Washer, Lock 1/4 Spring ZP
*	809-0193	Washer, Flat 1/4 Nylon
*	809-0194	Washer, Flat 5/16 ZP

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