



LOV FRYER TECHNICAL  
REFERENCE MANUAL

<b>Introducing the LOV Fryer</b>	<b>1</b>
<b>The LOV Systems</b>	<b>2</b>
<b>M2007</b>	<b>11</b>
<b>RTI-equipped Systems</b>	<b>27</b>
<b>Board Replacement</b>	<b>32</b>
<b>Wiring Diagrams</b>	<b>34</b>

**Frymaster and Dean Technical Service**

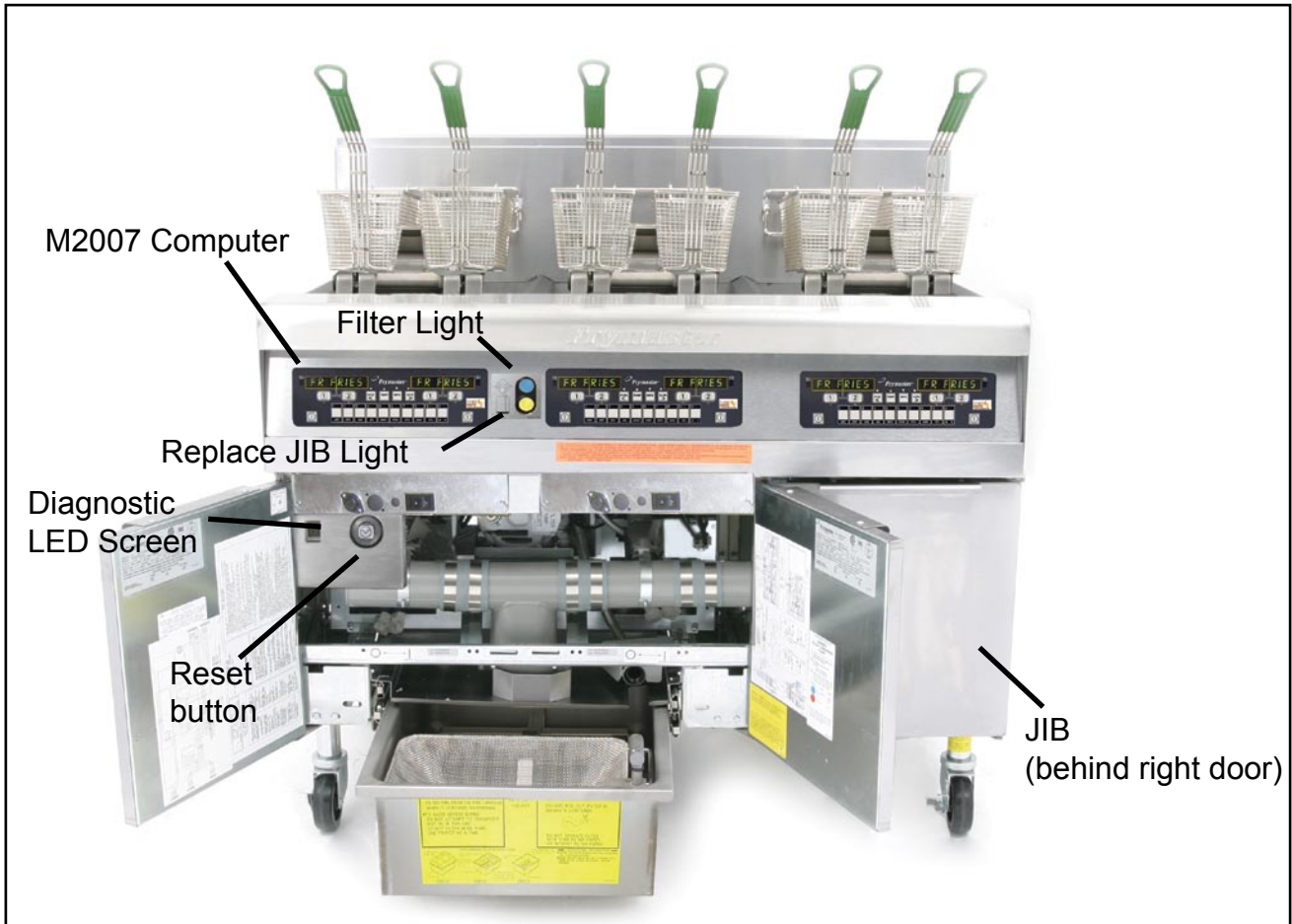
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\* 8196358 \*

**JAN 2008**  
Edition



# LOV Technical Reference



The LOV fryer

## Introducing the Low Oil Volume Fryer

The Low Oil Volume (LOV) fryer is a McDonald's-only, feature-laden version of the RE fryer introduced in 2006. The enhancements found on the LOV fryer include:

- **Low volume frypot** —30 pounds (15 liters) rather than 50 pounds (25 liters) of oil.
- **Automatic top-off** — the fryer automatically maintains an optimal oil level with a reservoir in the cabinet.
- **M2007 computer** — a sophisticated controller with multiple levels of programming.
- **Automatic filtration** — the fryer performs hands-free filtering at prescribed cook cycle counts or at prescribed times.
- **Oil savings** — The combination of a low-volume fry vat and oil automatically kept at a optimal level, reducing oil usage.

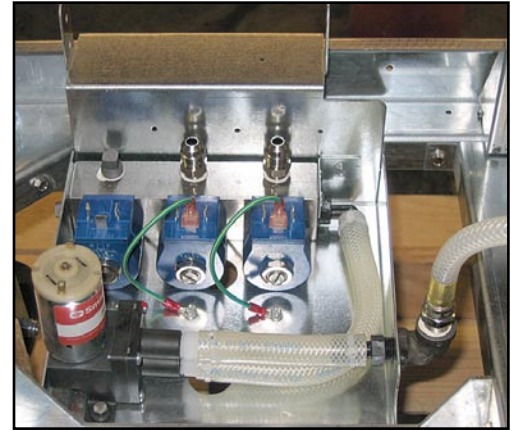
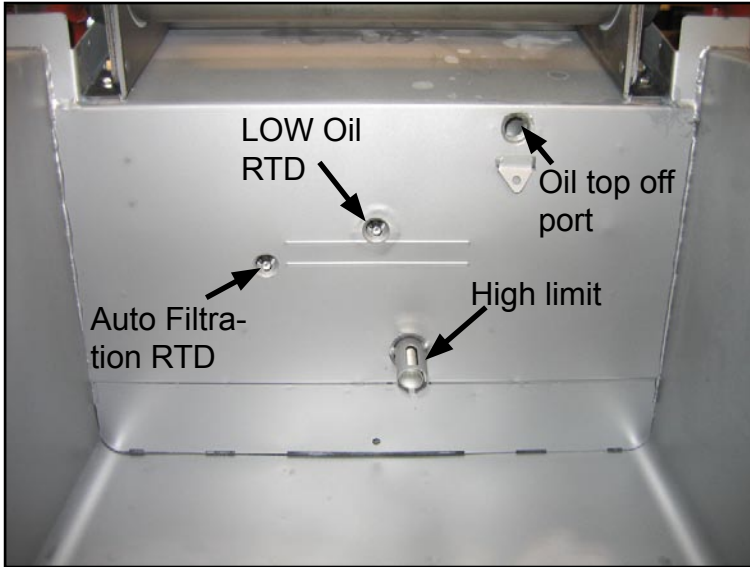
A similar fryer, the Protector, is available for the general market. It has the LOV's auto top-off feature and the on-board oil reservoir, the smaller fry vat and the oil savings associated with smaller vat and the top-off feature.



The Protector Fryer

Filtering using the CM7 computer on a Protector fryer is manual.

# LOV Technical Reference



The solenoid tree and the pump, which move oil from the reservoir to the frypots, are visible above.

## The LOV Systems

### Auto Top Off

The core of the system is an automatic top-off board, which senses when the oil level is low and fills the pot to the top line.

The oil level is monitored by an RTD sensor in the frypot at the upper oil level. The oil is moved to the pot from a reservoir, called a JIB (**Jug In Box**), to the frypot with a small pump.

A circuit board, the ATO (**Automatic Top Off**), is located inside a box behind the JIB. It monitors the oil-level RTD and activates the pump when it senses an oil temperature drop of 60°F (33°C) below setpoint, indicating the oil has moved away from the sensor. The oil is pumped into a solenoid tree and the ATO opens the solenoid for the frypot that needs oil.

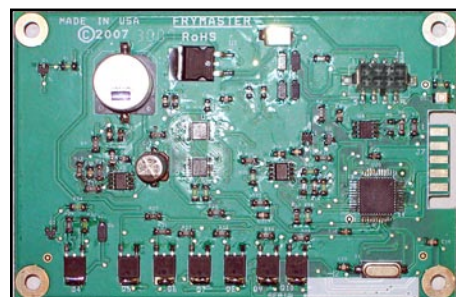
Oil is pumped into the tank until the ATO detects a temperature within 55°F (30°C) of setpoint.

The system is not suited to filling the frypot when it is empty and there are safeguards to prevent it from activating when the fryer is cold and the oil is resting at the lower position.

The system is not active until the oil in the frypot reaches 300°F (149°C). That temperature is monitored by the probe. The activation of the system is handled by the fryer's computer. In the McDonald's system that is the M2007. The automatic top off system is also inactive during filter cycles.

The system works the same in McDonald's gas and electric LOV systems and in the Protector fryer, which is made for the general market.

The level of the reservoir, or JIB, is monitored by the ATO and the M2007 computer. If a low oil condition is not rectified in 6 minutes, the low JIB light is illuminated on the front of the fryer.

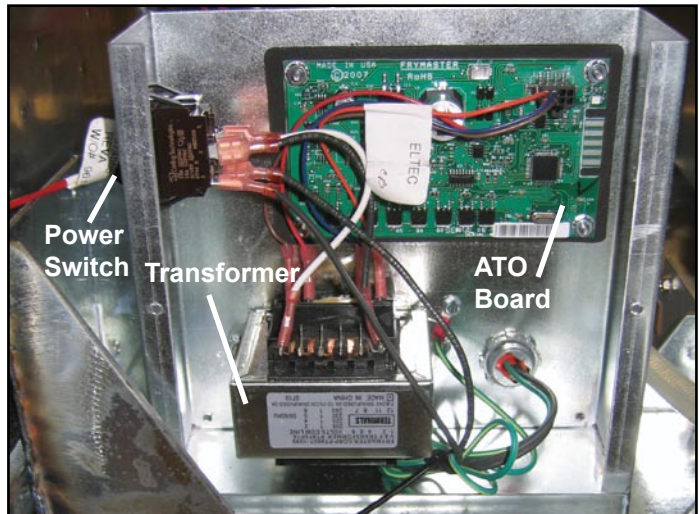


The ATO board controls the top off of the fry pots.

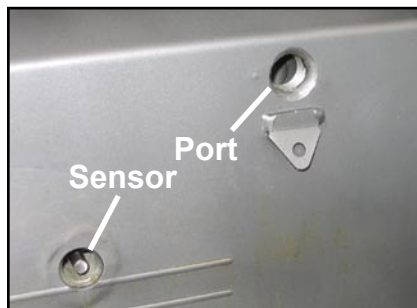
# LOV Technical Reference



The reservoir, or JIB, rests behind the right door of the fryer. A light on the front of the fryer illuminates when the jug is empty.



The ATO board is positioned in a box with the transformer, which provides power for the board. The box also may have a power switch, which allows the system to be shut off (*switch removed in later models*).



Oil trickles into the frypot from a port behind the elements in electric fryers. In gas fryers, it comes from a port on the foam deck. This part of the system is not designed to fill up the vat.

## Troubleshooting the Top Off System

Problem	Probable Cause	Fix
JIB light won't illuminate.	<ol style="list-style-type: none"> <li>1. Auto top off power switch is off. (<i>switch removed in later models</i>)</li> <li>2. No three-phase power in the contactor box/component box supplying the ATO box.</li> <li>3. Failed transformer in ATO box.</li> <li>4. Loose wire.</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify that the auto top off power switch is switched on. The switch is located behind the JIB on the left side of the auto top off control box. (<i>switch removed in later models</i>)</li> <li>2. Ensure power is present</li> <li>3. Check transformer output; replace if necessary.</li> <li>4. Check connection between JIB LED and J6 on ATO board.</li> </ol>
Only one vat tops off.	<ol style="list-style-type: none"> <li>1. Failed solenoid.</li> <li>2. Loose wire connection.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check power to pump. A hot pump suggests a failed solenoid.</li> <li>2. Check wiring harnesses on ATO board and solenoids.</li> </ol>
Wrong vat tops off.	<ol style="list-style-type: none"> <li>1. Wired wrong.</li> <li>2. Flex oil lines incorrectly connected.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check wiring.</li> <li>2. Correct flex line connections.</li> </ol>

# LOV Technical Reference

<b>Problem</b>	<b>Probable Cause</b>	<b>Fix</b>
No vats topping off.	<ol style="list-style-type: none"> <li>1. Auto top off power switch off. <i>(removed in later models)</i></li> <li>2. ATO board power loss.</li> <li>3. Failed or over tightened pump.</li> <li>4. Failed transformer/harness.</li> <li>5. Probe temperature lower than setpoint.</li> <li>6. Oil viscosity too thick.</li> <li>7. Failed solenoid.</li> <li>8. Failed ATO board.</li> </ol>	<ol style="list-style-type: none"> <li>1. Verify that the auto top off power switch is switched on. <i>(removed in later models)</i> The switch is located behind the JIB on the left side of the auto top off control box.</li> <li>2. Check solenoid to see if functioning properly.</li> <li>3. If the solenoid is working, ensure that the screws on the bottom of the pump are not too tight. Loosen the screws. If loosening the screws doesn't fix the problem, replace the pump.</li> <li>4. Ensure transformer in ATO box is functioning properly. Check power from transformer to ATO board. Ensure all harnesses are plugged securely into place.</li> <li>5. Check to see that fryer is heating. Fryer temperature must be at least 300°F (149°C). Check probe resistance. If probe is bad, replace the probe.</li> <li>6. Ensure oil viscosity is thin enough to pump.</li> <li>7. Power to the ATO board has been cut off. Restore power to the board and cycle all computers off and on to readdress system.</li> <li>8. Check for proper voltages using the pin position chart found on pages 40-41 at the back of this manual. If ATO found defective, replace ATO board.</li> </ol>

# LOV Technical Reference

## Auto Filtration (MIB and AIF)

The auto filtration system is controlled by the M2007 computer, the AIF (Automatic Intermittent Filtration) board and the MIB (Manual Interface Board). The filtration is made hands-off by linear actuators operating the drain and return valves.

The computer is programmable, allowing filter cycles to be launched after a set number of cook cycles and a prescribed elapsed time.

The system can be set to lock out automatic filtration during busy times, such as the lunch rush.

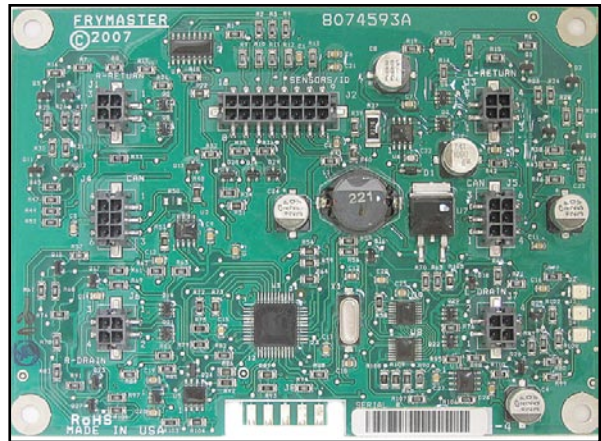
The fryer prompts for filtration by flashing a blue LED on the front and a text prompt on the computer. The operator can say no; cooking can continue.

A Yes response leads to communication between the MIB and the AIF boards. The MIB is the more robust board. It controls and oversees the filtration; the AIF board operates the actuators, which open and close the valves.

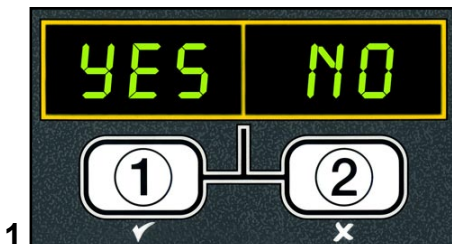
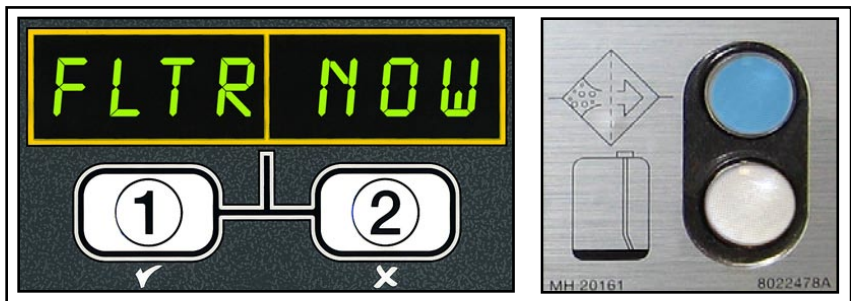
The MIB is in the fryer cabinet and partially covered by a sheet metal cover. The reset button and the LED display are visible. Buttons behind the cover allow limited manual operation of the system and its valves. The cover should be reinstated after service.

The LED displays codes that can be used to diagnose failures (see chart on page 44).

(1) Responding Yes to the Blue LED filter prompt, sets in motion a filter cycle that lasts about as long as a cook cycle. Communication between the M2007 computer, the manual interface, or MIB board, and the automatic intermittent filtration, or AIF board, handle the process. (2) Linear actuators open and close the drain valve and return valve, (3) emptying and refilling the frypot.



An AIF board is mounted under each fry vat.



1



2



3

# LOV Technical Reference

**Mode Display**

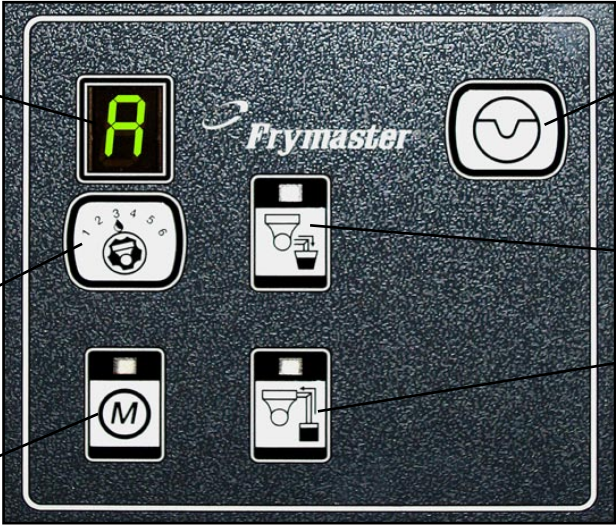
Shows status (auto or manual) vat number (when operating valves manual) and displays error codes.

**Vat Selection**

Selects vat for manual operation of valves.

**Manual/Auto**

Switches fryer from auto to manual operation.



The MIB board

**Reset**

Resets system, ensures all valves are closed.

**Drain**

Opens and closes drain valves in manual mode.

**Return**

Opens and closes return valves and turns on filter pump in manual mode.

**Manual** — Used to toggle between automatic and manual filtration mode. *The unit must be in manual mode for the other MIB buttons to operate.*

**Select** — Used to scroll through the vats, which are shown numerically in the LED.

**Drain** — Used to open and close the drain valve of the vat indicated on the display. When pressed an LED on the button indicates activity: slow blink, awaiting response from AIF; LED illuminated constantly, drain open; no illumination, drain closed; rapid blink, no response from AIF.

**Return** — Used to open and close the return valve on the vat indicated on the display. It also controls the pump. When pressed an LED on the button indicates activity: slow blink, awaiting response from AIF; LED illuminated constantly, drain open; no illumination, drain closed; rapid blink, no response from AIF. The pump turns off before closing the return valve; the return valve opens before the pump is turned on.

The mode display on the face of the MIB board displays a range of letters, which indicate activity or an error.

**These codes are listed on the next page.**



The MIB is mounted behind the left door. See arrow.



# LOV Technical Reference

## Error Codes

**1-8** — Numbers corresponding to the vats.

**A** — Auto mode, auto filtration enabled.

**C** — Closed valve, display alternates between C and vat number. LED blinks.

**d** — Drain issue; display alternates between d and vat number.

**E** — Actuator circuit not sensing actuator; display alternates between **E** and vat number.  
(Ensure actuator is plugged in and in home position.)

**F** — Incomplete filtration; **F** alternates with **n** when the MIB doesn't receive a complete filtration response from an AIF.

**L** — Loading; loading fryer configuration. Shown during initial startup, rare otherwise.

**n** — Network error; **n** alternates with **r**, indicating a time-out on reset; **n** alternates with **F**, indicating an incomplete filtration response (see **F** above); **n** alternating with a vat number and a drain or return LED blinking; time-out error opening or closing a valve.

**O** — Open valve; **O** alternates with vat number and blinking LED.

**P** — Pan switch; filter pan is not in place or not sensed. Auto Filtration disabled.

**U** — Fry battery not configured; the MIB board is looking for a message from an M2007, allowing it to initialize the battery.

**r** - Reset; **r** alternating with a vat number indicates that the MIB board is resetting. If **r** is displayed without alternating with a vat number, a problem may exist with the MIB board itself.

## Manual Draining, Filling, Filtering with MIB



1. Press the M button, which switches the board to manual. The display becomes the number of the vat to be controlled manually.
2. Press the vat selector button until the desired vat number is displayed.
3. Press either the drain or return button to drain or return oil to the vat displayed. Pressing both allows filtration.
4. Pressing the M button again returns the board to automatic mode.

# LOV Technical Reference

## Troubleshooting the Manual Interface Board (MIB)

Problem	Probable Cause	Fix
Auto filtration won't start.	<ol style="list-style-type: none"> <li>1. Ensure MIB is not in manual mode.</li> <li>2. Ensure MIB cover is not pressing against buttons.</li> <li>3. Filter relay failed.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure MIB is in "R" automatic mode and press the reset button.</li> <li>2. Remove and replace cover.</li> <li>3. Replace 24VDC filter relay (807-4482).</li> </ol>
MIB doesn't display A or vat number.	<ol style="list-style-type: none"> <li>1. An error has occurred and displayed character indicates error.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check MIB Diagnostic codes, page 44 of this manual.</li> </ol>
No power at MIB.	<ol style="list-style-type: none"> <li>1. Transformer failed in left component box.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check output on left transformer in left component box; should be 24VDC. If not, replace the transformer.</li> </ol>
MIB error will not clear.	<ol style="list-style-type: none"> <li>1. Power surge or other electrical problem.</li> </ol>	<ol style="list-style-type: none"> <li>1. Press the reset switch, top right corner of the MIB, to reinitialize the CAN system. The reset takes about 20 seconds per vat. The MIB display should return to "R", though it may take more than one minute to do so.</li> </ol>
MIB alternating "n" and "r".	<ol style="list-style-type: none"> <li>1. Network error on the CAN bus communication.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure the CAN bus system is terminated at BOTH ENDS (on the M2007 connector J6 and on the ATO board connector J10) with a resistor equipped 6-pin connector. <ul style="list-style-type: none"> <li>• Ensure all 6-pin CAN connectors are tight between the M2007 (J6 and J7), MIB (J1 and J2), AIF (J4 and J5) and ATO (J10) boards.</li> <li>• 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).</li> <li>• Ensure black computer locator wires are connected from ground to correct pin position (see diagram 805-1656 on page 35 of this manual). Ensure all boards have the corner ground wire attached and tightened.</li> <li>• The locator pin in J2 of the AIF board is either loose or in the incorrect position. See the charts on pages 45-46 of this manual for proper pin position.</li> <li>• In early units, it is possible that the resistor could short. Disconnect power to the unit, unwrap the resistor leads, and ensure they are not touching.</li> </ul> </li> </ol>

# LOV Technical Reference

<p>MIB displays incorrect number of vats.</p>	<ol style="list-style-type: none"> <li>1. Network is not terminated correctly.</li> <li>2. Wiring harnesses are loose or damaged.</li> <li>3. Locator pin issue.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure the CAN bus system is terminated at <b>BOTH ENDS</b> on the M2007 connector J6 and on the ATO board connector J9) with a resistor equipped 6-pin connector. In early units, it is possible that the resistor could short. Disconnect power to the unit, unwrap the resistor leads, and ensure they are not touching.</li> <li>2. Unplug and reseat all wiring harnesses in CAN system. Check resistance between pins 2 and 3 on the CAN network connectors. If checking with resistor at the end, reading should be 120 ohms.</li> <li>3. The locator pin in J2 of the AIF board is either loose or in the incorrect position. See the charts on pages 45-46 of this manual for proper pin position.</li> </ol>
<p>M2007 display shows Filter Error.</p>	<ol style="list-style-type: none"> <li>1. A filter error has occurred. It can be caused by a clogged filter pad, clogged filter pump, filter pump thermal overload or an actuator failure.</li> </ol>	<ol style="list-style-type: none"> <li>1. Follow the on-screen directions according to the flowchart on page 27 of this manual to clear the error. The underlying problem must also be corrected.</li> </ol>

# LOV Technical Reference

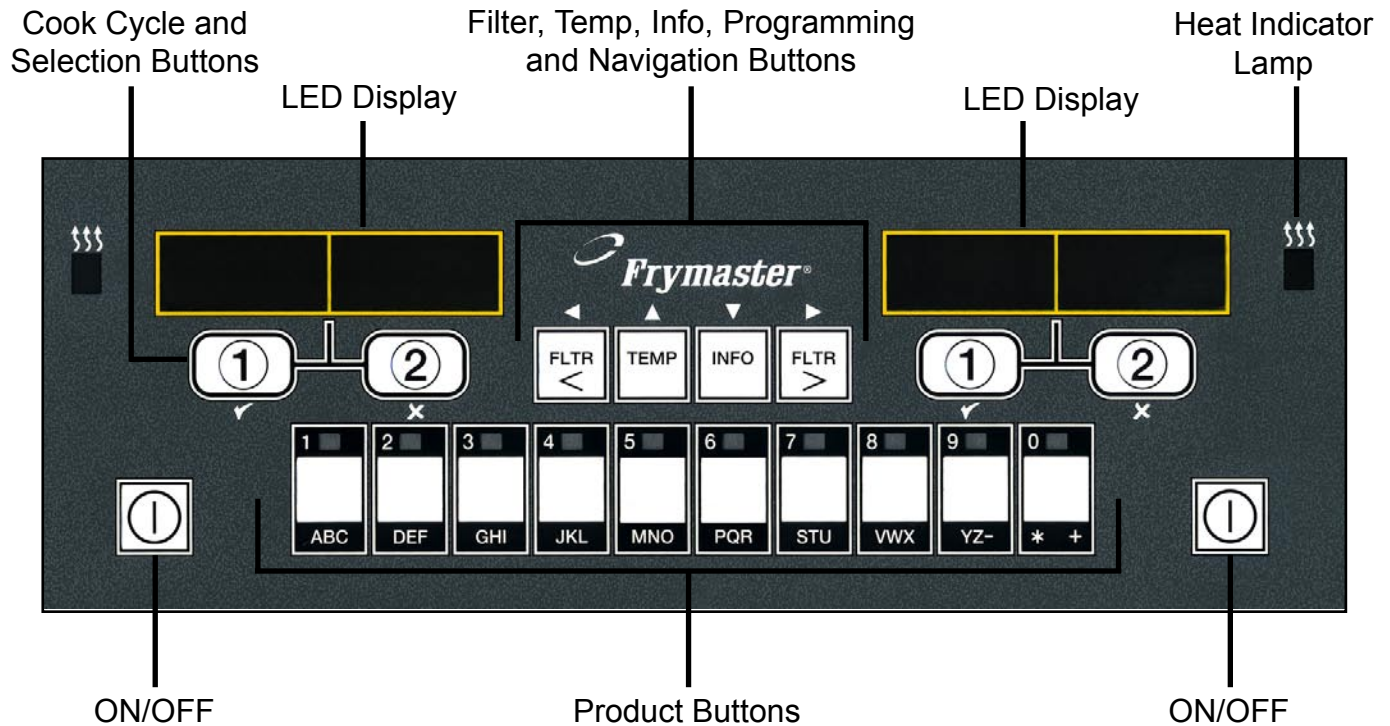
## Troubleshooting the AIF System (AIF)

Problem	Probable Cause	Fix
Actuator doesn't function.	<ol style="list-style-type: none"> <li>1. Actuator unplugged.</li> <li>2. AIF board failure.</li> <li>3. Actuator is bad.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure actuator leads are plugged into AIF board (J1 for FV, J3 for DV).</li> <li>2. Check the power on the connector of the problem actuator while manually opening or closing the actuator. Pins 1 (black) and 4 (white) should produce +24VDC when the actuator is opening; -24VDC should be read from Pins 2 (red) and 4 (white) when the actuator is closing. If either voltage is missing, the AIF board is likely bad. Test the actuator by plugging into another connector to open or close. If the actuator operates, replace the board.</li> <li>3. If proper voltages are seen at the connector and the actuator doesn't operate, replace the actuator.</li> </ol>
Wrong vat drain opens.	<ol style="list-style-type: none"> <li>1. Actuator is plugged into wrong connector.</li> <li>2. Locator pin is in wrong position.</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure the actuator is plugged into the correct connection (J1 for FV, J3 for DV).</li> <li>2. Ensure the locator pin is in the proper position in plug J2. See charts on pages 38-43 of this manual for proper pin position.</li> </ol>

# LOV Technical Reference

## M2007 Computer

### Overview

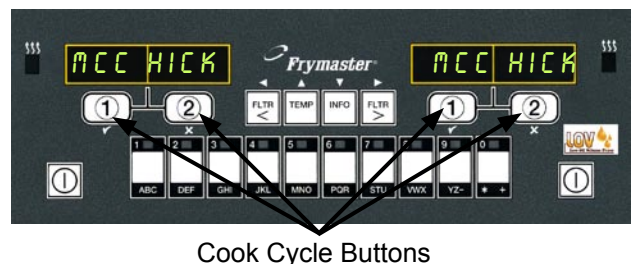
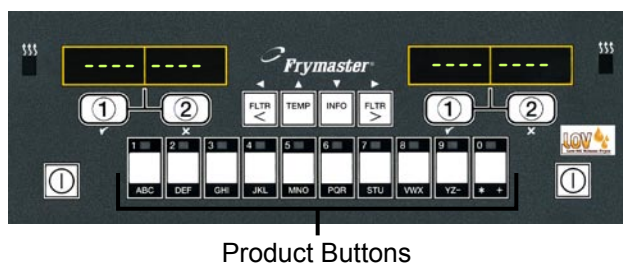


The M2007 computer retains the one-button ease of the M2000 and M100B, combining it with the utility of 40-product menu capability. It will operate with electric and gas fryers, and both full- and split-vat.

On single product vats, press any of the cook cycle buttons to begin cooking. On multi-product vats, press a product button and then a cook cycle button under the display showing the desired product name.

For example, a typical the M2007 computers on a 3-vat fry station will display *FR FRIES*. Pressing one of the cook cycle buttons will begin a cook cycle for French fries.

The chicken/filet station will usually display dashed lines [----]. Pressing the product button assigned to McChicken, for example, will cause *McCHICK* to be displayed. Then, press a cook cycle button beneath the word *McCHICK* to start a cook cycle for McChicken.



# LOV Technical Reference

## Navigation

The menu on the M2007 uses ◀ ▶ and ▲ ▼ buttons to navigate the various menus and submenus.

When programming, the left screen shows a menu or submenu item. The right screen is for data entry. Data is entered with alpha-numeric characters, scrolling through lists or by toggling between choices (see diagrams on previous page).

During programming if a button is not pushed within one minute, the computer returns to operation mode.

## Cook Cycle and Selection Buttons

The ✓ and ✕ buttons are dual-function buttons shared with the number 1 and 2 buttons. They are located directly below the LED displays (see diagrams on previous page). Use these buttons to select or cancel functions. The ✕ button is used to back out of and quit submenus.

## Filter, Temperature, and Info Buttons

The < FLTR and FLTR > buttons (see diagram) are used to filter the left and right vats of a split vat fryer on demand, while the right FLTR > button is used to filter a full vat on demand. The FLTR buttons, if pressed once, will display the amount of cook cycles remaining until a filtration prompt. When the FLTR button is pressed twice, the date and time of the last filter will be displayed.

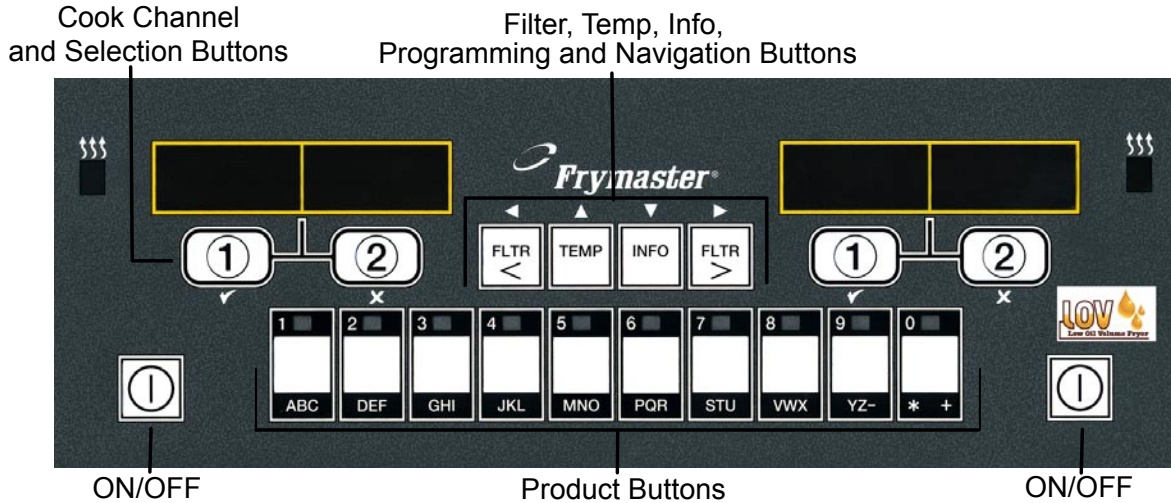
## Temp Button

The TEMP button, if pressed once while the fryer is on, displays current vat temperature on both sides. If the TEMP button is pressed twice while the fryer is on, it shows the setpoint temperatures of the vats. If the fryer is off, the display shows the current versions of software.

## Info Button

The INFO button, if pressed once when the fryer is on, shows the recovery time for each vat from the last test. Recovery displays the time required for the fryer to raise the temperature of the oil 50°F (28°C) between 250°F (121°C) and 300°F (149°C). If the INFO button is pressed and held for three seconds it shows information such as usage, filter statistics and last cook cycles.

# Basic Operation



### Turn Fryer ON

Press right key for full pot; press key on desired side on a split pot.



### Turn Fryer OFF

Press right key for full pot; press key on desired side on a split pot.



### Check Frypot Temperature

Press Temp key once. Displays show frypot temperatures.



### Check Frypot Setpoint

Press Temp key twice. Displays show frypot setpoint temperatures.



### Cancel Duty or Remove Alarm

Press key under active display.



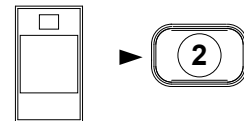
### Start One-Button Cook Cycle (Dedicated Mode)

Press key under display showing desired item.



### Start Two-Button Cook Cycle (Multi-Product Mode)

Press product key bearing icon for desired product. Press cook channel button to begin cook cycle.



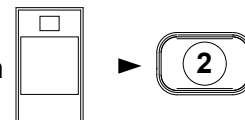
### Change From Dedicated to Multi-Product Mode

Press and hold Cook Channel button under displayed menu item for approximately 3 seconds until beep is heard. Display changes to dashed lines.

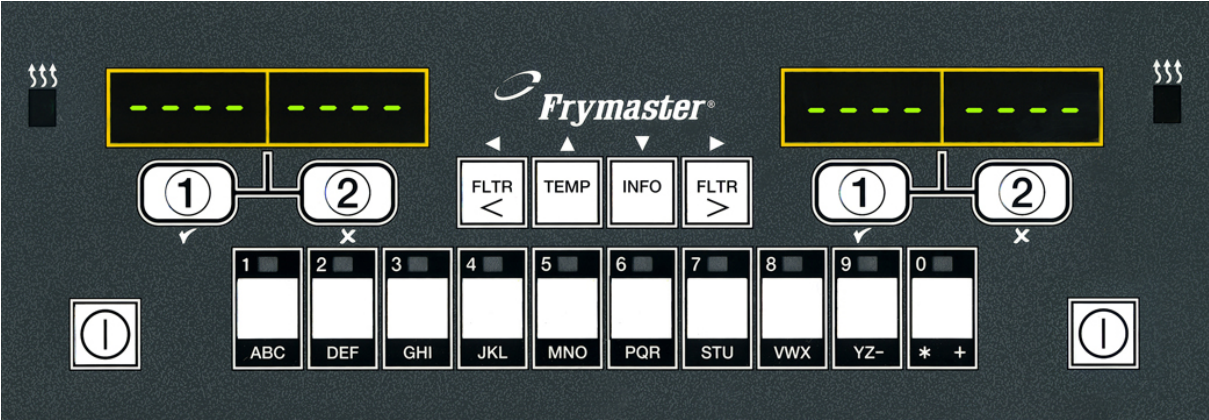


### Change From Multi-Product Mode to Dedicated Mode

Press product key bearing icon for desired product. Press cook channel button under display showing desired item until beep is heard (approx 3 seconds).



# Cooking With Multi-Product Display



**1** Dashed lines appear in both displays.



**2** Press a product button.



**3** Vat with appropriate setpoint displays: skip to step 5.



**4** Vat with inappropriate setpoint displays:



If this occurs, change setpoint by pressing the button assigned to the product.



When the chevrons appear, immediately press and hold cook button until a beep is heard (approximately three seconds).



**5** Press a cook channel button to begin cook cycle.



**NOTE:** If error *REMOVE DISCARD* appears, press and hold cook button under message to remove error message.

**6** Display alternates between MCK and remaining cook time.



**7** If a duty is required for this menu item, duty is displayed when it is time to perform a duty, such as shake.



**8** Press cook channel button under duty display to cancel alarm.



**9** Pull is displayed when the cook time is complete; an alarm sounds.



**10** Press cook channel button under pull display to cancel alarm.

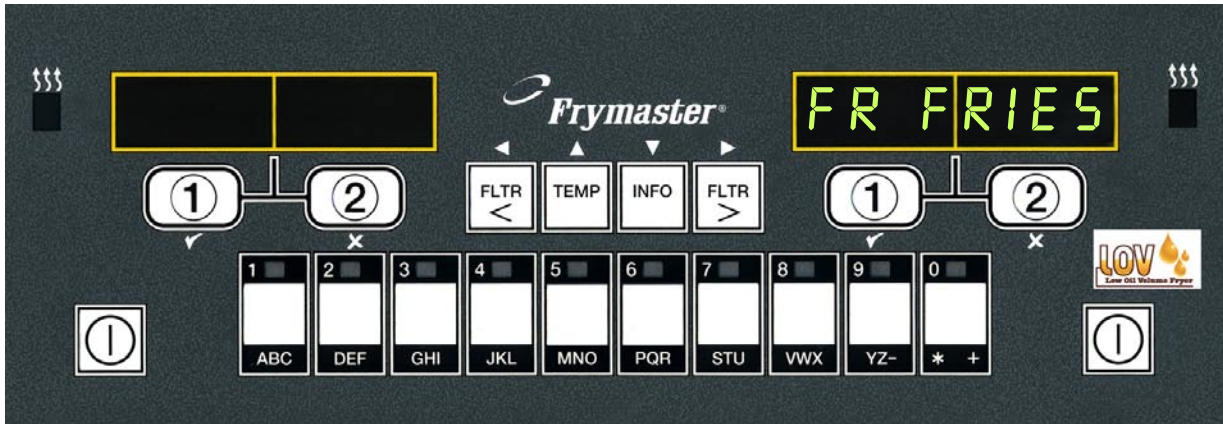


**11** Dashed lines reappear under active display at the end of the cook cycle.





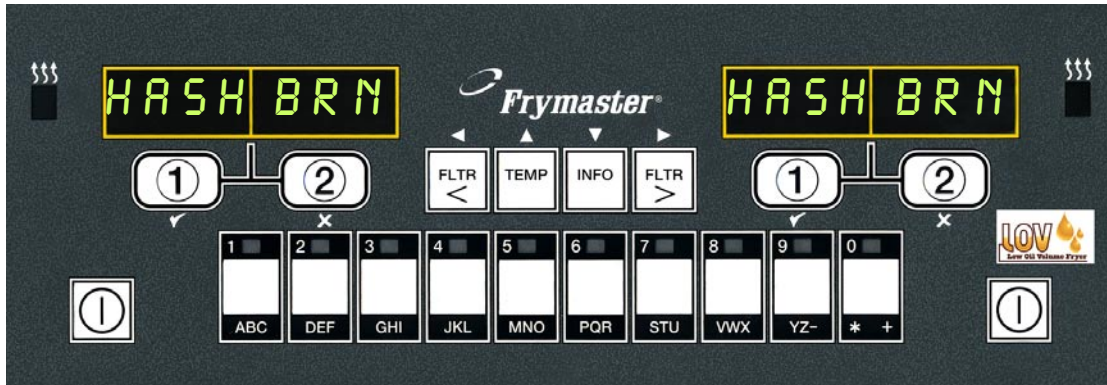
# Cooking With Dedicated Display



- 1 A menu item, such as FR FRIES shows in display  
*FR FRIES*
- 2 Press a cook channel button to begin the cook cycle.
- 3 Display alternates between abbreviated product name and remaining cook time.  
*FRIS < 2:34*
- 4 Duty is displayed when it is time to shake the fry basket.  
*DUTY*
- 5 Press cook channel button to cancel alarm.
- 6 Pull is displayed when the cook cycle is complete.  
*PULL*
- 7 Press cook channel button to cancel alarm.

- 8 Q7 is displayed and alternates with FRIS. As the quality time counts down.  
*Q7 < FRIS*  
*Q1 < FRIS*
- 9 Pressing the cook channel button now will launch a cook cycle and end the quality countdown.
- 10 QA is displayed when the quality time has elapsed.  
*QA*
- 11 Pressing the cook channel button restores the display to FR FRIES and the unit is ready for cooking  
  
*FR FRIES*

# Changing from Breakfast Setup to Lunch



- 1** Press and quickly release product button for french fries.



- 2** Computer will change from Hash Brn to <<<<<<>>>>; an alarm will sound.



- 3** Press and hold the cook channel button under the display until a beep is heard.

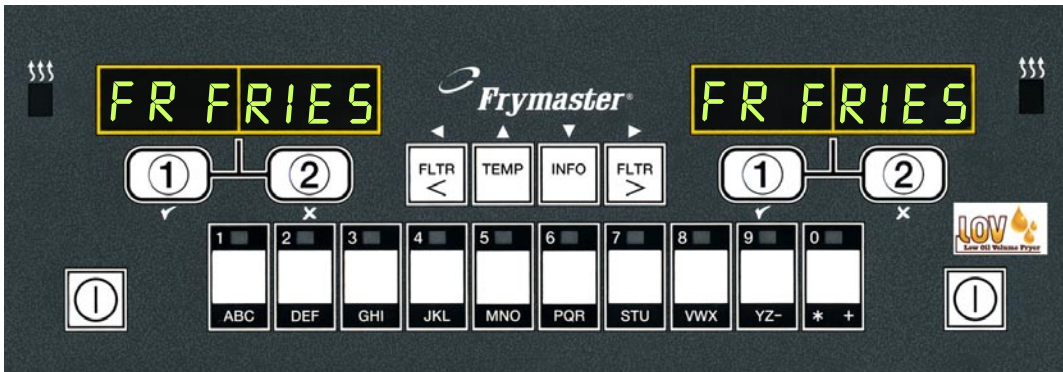


- 4** Display changes to FR FRIES.





Change both displays to FR FRIES


# Changing from Lunch Setup to Breakfast



- 1 Computer displays *FR FRIES*
- 2 Press and quickly release product button for hash browns.
 


- 3 Computer display will change from FR Fries to <<<<<<>>>>>>; an alarm sounds.
 


- 4 Press and hold the cook channel button under the display until a beep is heard.
 


- 5 Display changes to Low Temp until setpoint is reached. *LOW TEMP*
- 6 Display changes to Hash Brn. *HASH BRN*

# LOV Technical Reference

The following chart maps the menu options available in the M2007 computer and indicates the location of more information on each menu item within the *LOV Fryer Installation and Operation Manual*. For more information, consult the indicated section.

M2007 Menu Items	Location in IO manual
------------------	-----------------------

Filter Menu.....	4.11
[Press and hold <b>FLTR ▶</b> ]	
— Auto Filter	
— Maint Filter	
— Dispose	
— Drain to Pan	
— Fill Pot from Drain Pan	
— Fill Pot from Bulk	
Programming	
— Level 1 Program .....	4.12
[Press and hold <b>TEMP</b> and <b>INFO</b> buttons, 2 beeps, displays <b>Level 1</b> ]	
— Product Selection .....	4.12.1
— Name	
— Cook Time	
— Temp	
— Cook ID	
— Qual Tmr	
— Duty Time 1	
— Duty Time 2	
— AIF Disable	
— Assign Btn	
— AIF Clock .....	4.12.2
— Disabled	
— Enabled	
— Deep Clean Mode .....	4.12.3
— High-Limit Test .....	4.12.4
— Hi-Limit Test 1	
— Hi-Limit Test 2	
— Fryer Setup .....	4.9
— Level 2 Program (Manager Level) .....	4.13
[From Level 1, press and hold <b>TEMP</b> and <b>INFO</b> buttons, 3 beeps, displays <b>Level 2</b> ]	
— Prod Comp Sensitivity for product .....	4.13.1
— E-Log Log of last 10 error codes .....	4.13.2
— Passwords Change passwords .....	4.13.3
— Setup	
— Usage	
— Level 1	
— Level 2	
— Get Mgr (to be removed in v. 48)	
— 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 <b>◀</b> and <b>▶</b> for 10 seconds, 3 beeps, displays <b>CODE</b> , enter 1650]	
— Clear Passwords	
— Clear Signature	
— Filter Pad Time	
— Service Required (to be introduced in v. 48)	
Info Mode .....	4.14
— Full/Split Vat Configuration	
— Filter Stats .....	4.14.1
— Review Usage .....	4.14.2
— Last Load .....	4.14.3

# LOV Technical Reference

## Loading and Updating Software

### Loading Software from an SD card to MIB and AIF boards

To update MIB or AIF software in the field follow these steps:

1. Switch all computers to OFF. With the computer displaying **OFF**, press the TEMP button to check current M2007/MIB/AIF software version.
2. Remove the two screws on the right side cover plate of the MIB board.
3. With the MIB displaying **R** insert the SD card with the new software, with the card contacts facing out and the notch on the bottom left, into the slot on the right side of the MIB board.
4. Once inserted, watch for a period in the display to appear on the bottom right of the MIB display, indicating the software is being downloaded. If a period does not appear, the software on the card and on the computer may be the same version, or the boot loader software missing or corrupt. It will not update. If this happens, contact Frymaster.
5. The period blinks several times while loading. Wait for a minimum of two minutes and the period in the display stays off.
6. Remove the SD card from the MIB.
7. If only updating the MIB or AIF boards remove power from the MIB by carefully removing the 16-pin harness behind the MIB board or the five-pin control power cord on the rear of the unit. If updating all the software update the MIB and then the M2007 and then remove all power from the fryer using the five-pin control power cord on the rear of the unit.
8. Restore power to the MIB to reboot the system.
9. A successful upgrade is confirmed by a “cLc” display on the MIB board upon restart followed by “r, 1, r, 1, r, 2, r,” etc., ending with **R**. If this does not happen, try reloading the software.
10. Verify software upgrade by pressing the TEMP button with the computer OFF to check the updated MIB/AIF version.



Insert the SD card with contacts facing the front of the fryer.



Remove the SD card using the fingernail slot on the top of the card.

# LOV Technical Reference

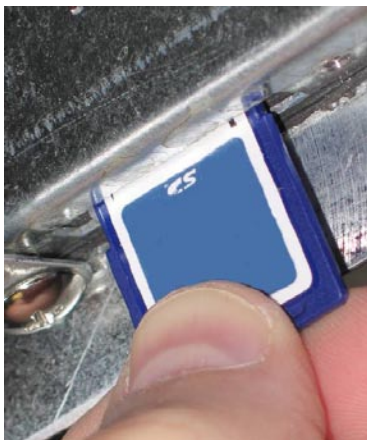
## Loading Software from an SD card to an M2007 Computer

To update M2007 computer software in the field, follow these steps:

1. Switch all computers to OFF. With the computer displaying **OFF**, press the TEMP button to check current M2007/MIB/AIF software version.
2. With the computer displaying **OFF**, remove the two screws on the left side cover plate of the M2007 board.
3. With the computer folded down and the MIB displaying **A**, insert the SD card, with the contacts facing down and the notch on the bottom right (see images below), into the slot on the left side of the M2007.
4. Once inserted, **FWUPD** appears on the left display and **SCCRCOK** appears on the right. Numbers count up on the right display.
5. The display then changes to **FWLOAD** on the left; numbers count up on the right.
6. The computer displays **OBFCRC**. If updating ATO software the computer will display **FUU ATO** on the left and will count down from 2500 on the right.



Insert the SD card with contacts facing up.



Remove the SD card using the fingernail slot on the top of the card.

7. When the update is complete the M2007 displays **DONE** on the left and **RM SDCRD** on the right.
8. Remove the SD card using the fingernail slot on the top of the SD card.
9. If updating the M2007 or ATO board, remove power to the M2007 by removing the 20-pin J2 plug on the rear of the computer, or remove power to the fryer to reboot the computer. If updating all the software update the MIB and then the M2007 and then remove all power from the fryer using the five-pin control power cord on the rear of the unit.
10. Restore power to the M2007 – There is short delay prior to the computer powering up and displaying **OFF**.
11. Repeat steps 1-10 for all computers.
12. With the computer displaying **OFF**, verify software update by pressing the TEMP button to check updated M2007/MIB/AIF version.
13. If the software is adding fields that require passwords, enter Level 2 mode and change passwords.

# LOV Technical Reference

## M2007 Troubleshooting

Problem	Probable Causes	Corrective Action
No display on computer.	A. Computer not turned on.	A. Press the ON/OFF switch to turn the computer on.
	B. No power to the fryer.	B. This fryer has 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. Computer has failed.	C. Swap the computer with a computer known to be good. If computer functions, replace the computer.
	D. Damaged computer wiring harness.	D. Swap with a harness known to be good. If computer functions, replace the harness.
	E. Power supply component or interface board has failed.	E. 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.	Power cycle the computer using the master switch on the component box next to the fuse.
M2007 display shows <b>FILTER BUSY.</b>	Another filtration cycle is still in progress.	A. Wait until the previous filtration cycle ends or an error is cleared to start another filtration cycle. B. Press reset button on the MIB board and wait at least 60 seconds. Computer should clear and return to normal operation once complete.
M2007 display shows <b>REMOVE DISCARD.</b>	In non-dedicated mode a product is dropped that has a different setpoint than the current vat temperature.	Remove and discard product. Press and hold the cook button for three seconds under the display with the error to remove the error. Reset the setpoint of the vat before trying to cook product.
M2007 display shows <b>CHK PAN.</b>	A. Filter pan is not fully set 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 chk pan, switch is possibly defective.

## LOV Technical Reference

Problem	Probable Causes	Corrective Action
M2007 display is in wrong temperature scale (Fahrenheit or Celsius).	Incorrect display option programmed.	M2007 computers may be programmed to display in either Fahrenheit or Celsius. Press and hold ◀ and ▶ simultaneously until code appears. Enter 1658. The computer displays OFF. This toggles the temperature from F° to C° or vice versa. Turn the computer on to check temperature and see the temperature scale. If the desired scale is not displayed, repeat.
M2007 display shows <b>HOT HI 1</b> .	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.
M2007 display shows <b>HI-LIMIT</b> .	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.
M2007 display shows <b>LOW TEMP</b> .	Frypot temperature is between 180°F (82°C) and 315°F (157°C).	<p>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 a #2 product button under the LCD display until a chirp is heard. The alarm will chirp and the computer displays EXIT MELT alternating with YES NO. Press the #1 YES button to exit melt.</p> <p>The fryer may temporarily show low temp when a large batch of product is added to the frypot. However, if low temp is shown constantly, the fryer may not be heating.</p>
M2007 display shows <b>PROBE FAILURE</b> .	Problem with the temperature measuring circuitry including the probe.	This indicates a problem within the temperature measuring circuitry that is beyond the scope of operator troubleshooting.
M2007 display shows <b>PROBE FAILURE</b> with alarm sounding.	Damaged computer wiring harness or connector.	Swap the computer wiring harness with one known to be good. If problem is connected replace harness.
M2007 display shows <b>IGNITION FAILURE</b> .	Open drain valve, failed computer, failed interface board, open high-limit thermostat.	This indicates that the fryer is not heating. It 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. Verify that the drain valves are fully closed.



## LOV Technical Reference

Problem	Probable Causes	Corrective Action
Computer will not go into program mode or some buttons do not actuate.	Failed computer.	Replace computer.
M2007 display shows <b>HI 2 BAD</b> .	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 failed.
Heat indicator off upon initial startup. Display shows <b>HI</b> or <b>HOT</b> with alarm sounding.	Failed computer.	Replace computer.
M2007 display shows <b>IGNITION FAILURE</b> with alarm sounding. Heating indicator is on, but fryer is not heating.	Drain valve not fully closed.	Press the reset switch on the MIB board. All drain valves should close. Using the ON/OFF switch, turn the computer OFF and then ON again.
M2007 display shows <b>IGNITION FAILURE</b> and alarm sounds, but fryer operates normally (false alarm).	Failed computer.	Replace computer.
M2007 display shows <b>LOW TEMP</b> , heating indicator cycles on and off normally but, fryer does not heat.	A. Failed computer. B. Damaged computer wiring harness.	A. Replace computer. B. Replace computer wiring harness.
M2007 display shows <b>FILTER ERROR</b> .	A filter error has occurred due to dirty or clogged filter pad or paper, clogged filter pumps, filter pump thermal overload, or an actuator problem.	Enter the MGR CODE (1234) and follow the steps on the flowchart on page 27 of this manual.
M2007 display shows software for only M2007 or MIB but not all boards.	Loose or damaged harness	Check that all harnesses between M2007s, MIB, AIF and ATO are secure.
M2007 display shows <b>ERROR RM SDCRD</b> (only appears when an error occurs while loading software into the computer).	Defective SD Card	Replace card with another card.

# LOV Technical Reference

## Useful Codes

To enter any of the following codes: Press and hold ◀ and ▶ simultaneously for **TEN** seconds and a third chirp sounds. Release the buttons and **CODE** appears.

- **Reset Factory Menu** - Enter **3322**. The computer display flashes and quickly counts from 1-40 and switches to **OFF**. (**NOTE**: This will delete any hand-entered menu items).
- **Reset CALL TECH Message** - Enter **1000**. Computer display switches to **OFF**.
- **Change from F° to C°** - Enter **1658**. The computer displays **OFF**. Turn the computer on and check temperature to see the temperature scale. If the desired scale is not displayed, repeat.
- **Enter Tech Mode** - Enter **1650**.
- **Readdress LOV configuration after changing an MIB board** – Enter **2007**.

## 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.
- **Fryer Setup, Level One, Level Two and Get Manager Password** - Enter **1234**.
- **Usage Password** - Enter **4321**.

## Tech Mode

Tech mode allows technicians to reset passwords set in levels one and two. It also resets the time and date. It also allows the technician to access the fryer main setup mode.

1. Press and hold ◀ and ▶ simultaneously for **TEN** seconds until a third chirp is heard and **CODE** is displayed.
2. Enter **1650**.
3. The computer displays **TECH MODE** and changes to **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 **CLEAR SIGNATURE**.

# LOV Technical Reference

7. Press the ✓ (1) button to accept the change.
8. The computer displays **CLEAR SIGNATURE** on the left and **COMPLETE** on the right. This resets the date and time. (**NOTE:** This will delete any hand-entered menu items.)
9. 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)
10. Press the ✖ (2) button to accept changes and exit.
11. The computer displays **OFF**. Proceed to the next page to enter the setup mode.

## Fryer Setup Mode

Setup mode allows technicians to set the time, date, temperature format, language, fryer type, vat type and oil system.

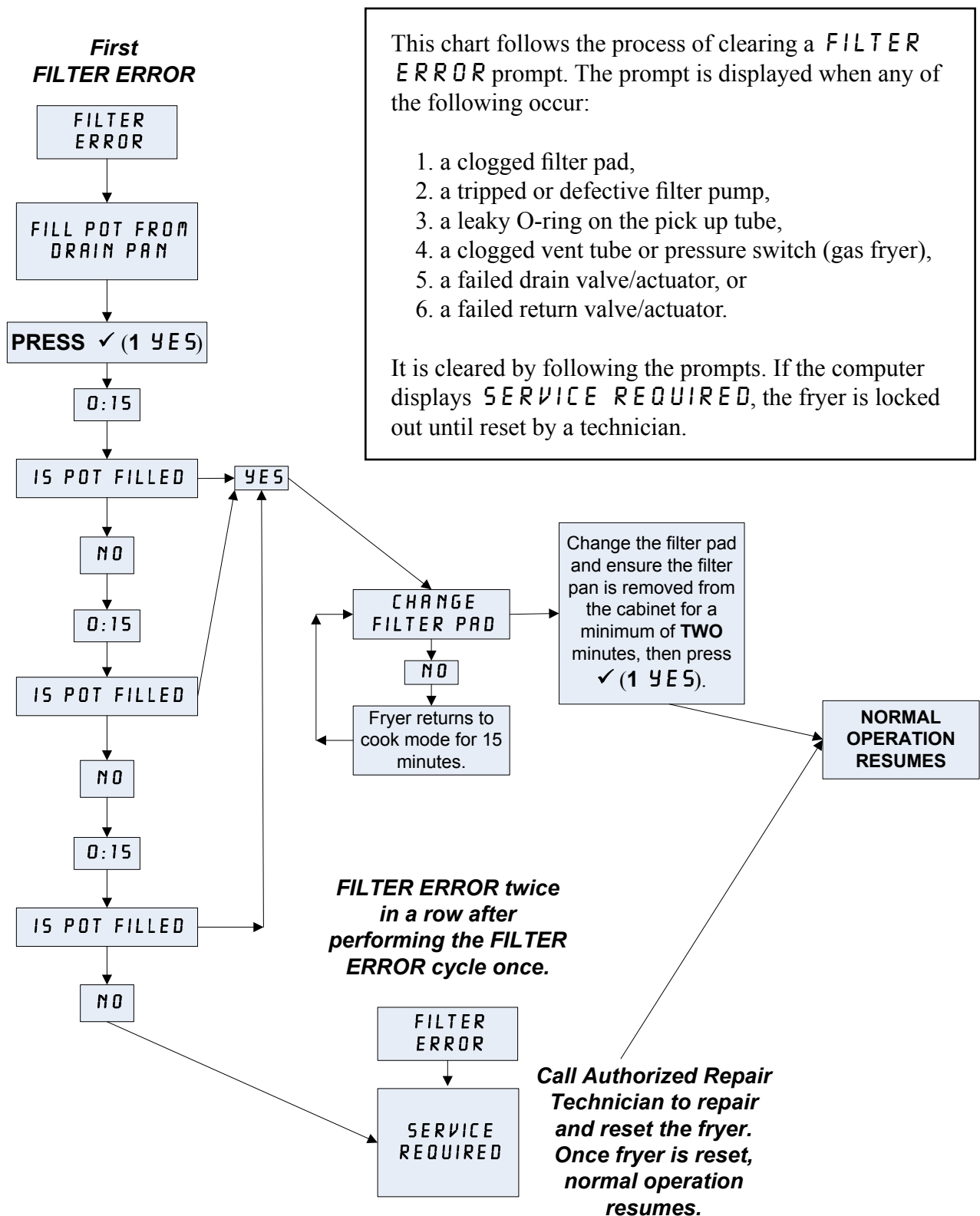
1. With the computer displaying **OFF**, press and hold the **TEMP** and **INFO** buttons until **LEVEL 1** is displayed.
2. Press the **TEMP** key once to **FRYER SETUP**.
3. The computer displays **FRYER SETUP** and then changes to **ENTER CODE**.
4. Enter **1234**.
5. Press the ✓ (1) button to accept selection.
6. The computer displays **TIME FORMAT** on the left and **12 HR** on the right.
7. Press the ▶ button to toggle between **12 HR** and **24 HR** time formats.
8. Press the ✓ (1) button to accept selection.
9. The computer displays **ENTER TIME** on the left and **HH:MM** on the right.
10. Enter the time in hours and minutes using the 0-9 keys.
11. Press the ✓ (1) button to accept selection.
12. The computer displays **ENTER TIME** on the left and **AM** on the right.
13. Press the ▶ button to toggle between **AM** and **PM** if **12 HR** time format was chosen.
14. Press the ✓ (1) button to accept selection.
15. The computer displays **DATE FORMAT** on the left and **US** on the right.

# LOV Technical Reference

16. Press the ▶ button to toggle between **US** and **INTERNTL** time formats.
17. Press the ✓ (1) button to accept selection.
18. The computer displays **ENTER DATE** on the left and **MM-DD-YY** or **DD-MM-YY** on the right.
19. Enter the date using the 0-9 keys.
20. Press the ✓ (1) button to accept selection.
21. The computer displays **LANGUAGE** on the left and **ENGLISH** on the right.
22. Press the ▶ button to toggle between **ENGLISH, FRENCH, FRENCH CANADIAN, SPANISH, PORTUGUESE, GERMAN** and **SWEDISH** languages.
23. Press the ✓ (1) button to accept selection.
24. The computer displays **FRYER TYPE** on the left and **ELEC** on the right.
25. Press the ▶ button to toggle between **ELECTRIC** and **GAS** fryers.
26. Press the ✓ (1) button to accept selection.
27. The computer displays **VAT TYPE** on the left and **SPLIT** on the right.
28. Press the ▶ button to toggle between **SPLIT** and **FULL** vats.
29. Press the ✓ (1) button to accept selection.
30. The computer displays **OIL SYSTEM** on the left and **JIB** on the right.
31. Press the ▶ button to toggle between **JIB** and **BULK** oil systems.
32. Press the ✓ (1) button to accept selection.
33. The computer displays **TEMPERATURE** on the left and **F** on the right.
34. Press the ▶ button to toggle between F° and C° temperature scales.
35. Press the ✓ (1) button to accept selection.
36. The computer displays **FRYER** Setup for three seconds and the computer displays **OFF** on both sides.

# LOV Technical Reference

## Filter Error Flow Chart



## LOV Technical Reference

# RTI-equipped Systems

Some stores may be equipped with RTI oil storage systems. If so, some of the settings, wiring, and troubleshooting may differ from normal LOV fryer systems. (See next page for bulk oil wiring.)

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

- **AC voltage measurements:**

- Pin 1 to Pin 2 - 24 VAC.
- Pin 2 to Pin 3 - 24 VAC when RTI add pump switch is on, 0 VAC when it is off.
- Pin 2 to Pin 4 - 24 VAC when RTI waste valve is on, 0 VAC when it is off.
- Pin 6 to Pin 7 - 24 VAC when RTI JIB valve is on, 0 VAC when it is off.

- **DC voltage measurements:** Pin 1 to Pin 8 - 0 VDC when waste tank is full, 5 VDC when it is not full.

### **Troubleshooting**

The valves and pump should be off while MIB is resetting, roughly 5 seconds after a power on or after pressing the reset button; if any of the valves or pumps are on during reset then the MIB board is bad or wires are shorted.

**If JIB valve is not opening**, measure when JIB valve supposed to be open:

1. 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 at RTI.
2. Voltage at MIB board from Pin 6 to Pin 7, should be 24 VAC; if not, check MIB board is bad or wires to JIB valve are shorted or both.
3. Voltage at JIB valve, should be 24 VAC; if not, check wiring from MIB board.

**If waste valve is not opening**, measure when Waste valve is supposed to be open:

1. 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 at RTI.
2. Voltage at MIB board from Pin 4 to Pin 5, should be 24 VAC; if not, check MIB board is bad or wires to Waste valve are shorted or both.
3. Voltage at Waste valve, should be 24 VAC; if not, check wiring from MIB board.

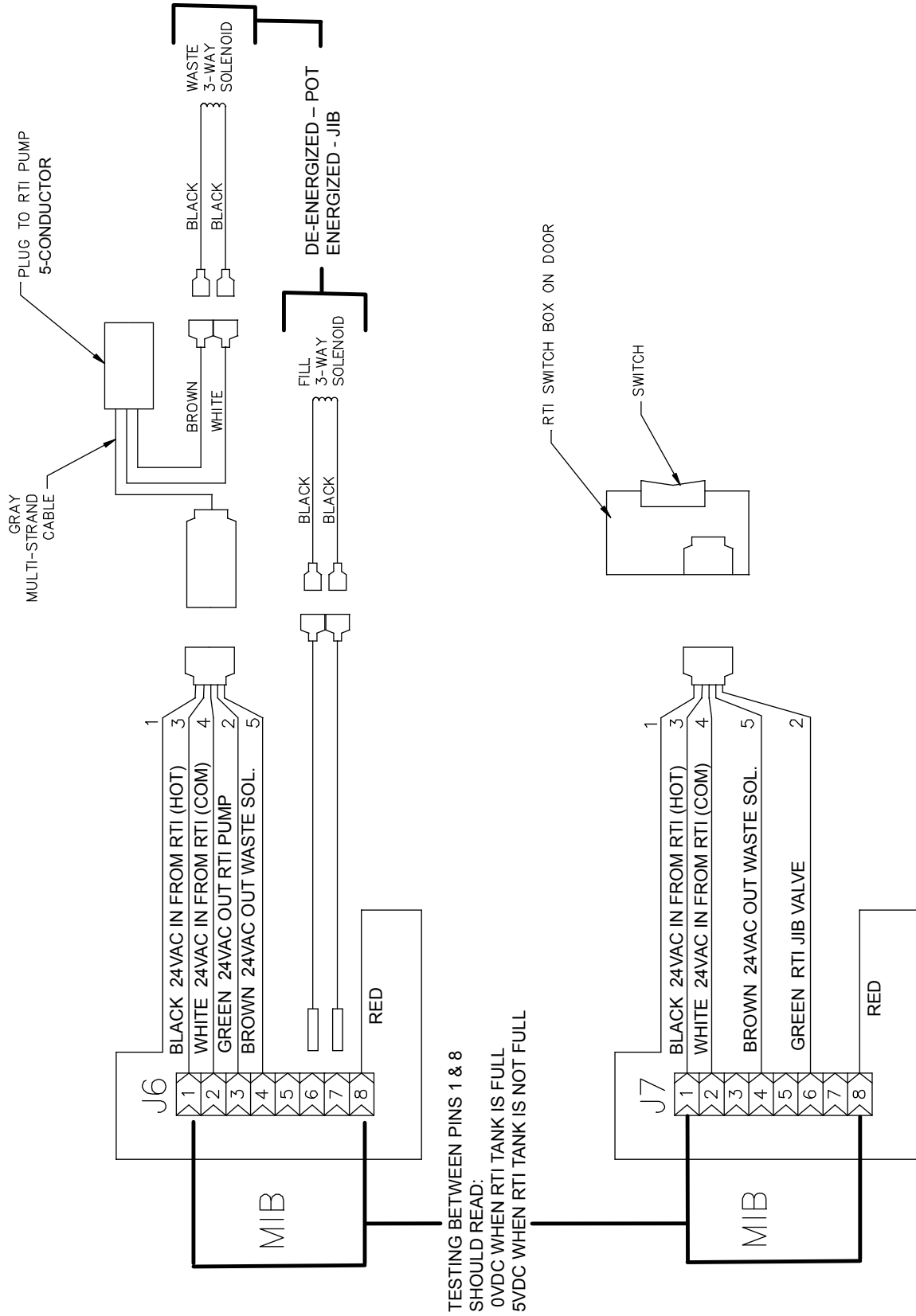
**If Add pump is not operating**, measure when add pump is supposed to be on:

1. 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 at RTI.
2. Voltage at MIB board from Pin 2 to Pin 3, should be 24 VAC; if not, check MIB board is bad or wires to pump relay are shorted or both.

**Waste full signal:** Pin 1 to Pin 8 should be 0 VDC when full, 5 VDC when not full; if no level change, then the connection from RTI switch or MIB board is bad.

# LOV Technical Reference

## Bulk Oil LOV Wiring



# LOV Technical Reference

## Oil Disposal and Fill with RTI-equipped Systems

Bulk oil systems have large oil storage tanks, typically located in the rear of the restaurant, that are connected to the rear manifold on the fryer. Waste oil is pumped from the fryer, through the fitting located on the right, to the disposal tanks and fresh oil is pumped from the tanks, through the fitting located on the left, to the fryer (as shown below).

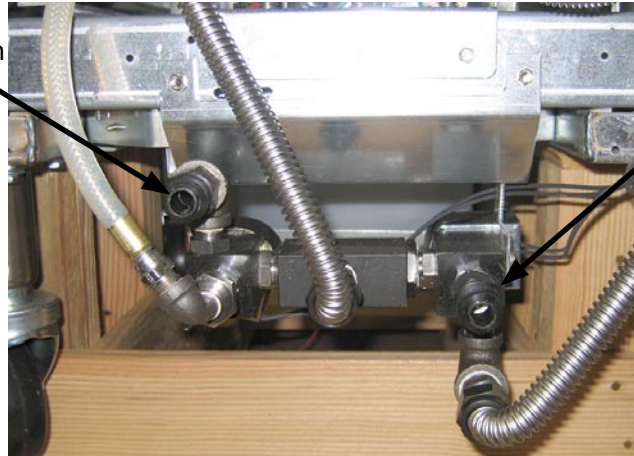
LOV fryers equipped for use with bulk oil systems have an onboard fresh oil jug with two fittings. The rear fitting is used for filling the jug and the front fitting is for topping off the frypot from the jug.

A momentary switch located inside the door adjacent to the JIB allows the operator to fill the JIB from the bulk oil storage tank. To fill the JIB, press and hold the add switch until the JIB is full then release.

**Warning: Do not add HOT or USED oil to the JIB.**

Fresh Oil Connection

Waste Oil Connection



Fittings, LOV Fryer.



The RTI JIB.



RTI momentary switch.



# LOV Technical Reference

## Dispose to Waste, Refill Pot From Bulk

1. Hold down “filter” button until computer beeps twice.
2. Scroll down to “dispose” using “Info” button then press “✓” button to select.
3. Select “Yes” by pressing “✓” to dispose of oil in pot (this is a timed function).
4. “Vat Empty” is displayed.
5. Select “Yes” (by pressing “✓”) if it is empty or “No” (by pressing “✗”) if vat still has oil.
6. “Clean Vat Complete” is displayed.
7. Press “✓” if vat is clean (oil disposes automatically for 60 seconds, if this is selected) and “✗” if it is not clean and needs to be.
8. “Engage Dispose Switch” is displayed. Change the RTI switch to dispose. If the waste tank is full, the computer displays “RTI Tank Full.” Call RTI.
9. Press the “✓” to start disposal. “Pan to Waste” displayed. The pump will run for 60 seconds.
10. “Pan Empty” is displayed.
11. Press “✓” if oil in filter pan is empty. Select “✗” if pan still has oil in it, and the pump will run for another 60 seconds.
12. “Disengage Dispose Switch” is displayed. Switch off the RTI dispose switch.
13. Press “✓” when RTI dispose switch is off.
14. “Fill Pot From Bulk” is displayed.
15. Press and hold “✓” if you wish to fill pot.
16. Release “✓” once pot is at desired level.
17. Press “✗” to Exit program.

## Dispose to Waste

1. Hold down “filter” button until computer beeps twice.
2. Scroll down to “dispose” using “Info” button and press “✓” button to select.
3. Select “Yes” by pressing “✓” to dispose of oil in pot (this is a timed function).
4. “Vat Empty” is displayed.
5. Select “Yes” (by pressing “✓”) if it is empty or “No” (by pressing “✗”) if vat still has oil.
6. “Clean Vat” is displayed.
7. Press “✓” if vat is clean (oil disposes automatically for 60 seconds, if this is selected) and “✗” if it is not clean and needs to be.

# LOV Technical Reference

8. “Engage Dispose Switch” is displayed. Switch the RTI switch to dispose.
9. Press the “✓” to start disposal. “Pan to Waste” displayed.
10. “Pan Empty” is displayed after 60 seconds.
11. Press “✓” if oil in filter pan is empty. Select “✘” if pan still has oil in it, and pump will run for another 60 seconds.
12. “Disengage Dispose Switch” is displayed. Switch off the RTI dispose switch.
13. “Fill Pot From Bulk” is displayed.
14. Press “✘” if you wish to leave pot empty and exit program.

## **Fill Pot From Bulk**

1. Hold down “filter” button until computer beeps twice.
2. Scroll down to “Fill Pot From Bulk.”
3. Press and hold “✓” if you wish to fill pot.
4. Release “✓” once pot is at desired level.
5. Press “✘” to Exit program.

## **Fill Jug From Bulk**

1. When “Yellow” LED indicator light is on, the pot top-off jug is empty.
2. To refill jug press ADD button on the RTI box located on back side of door that accesses jug.
3. Hold down button until oil is to desired level in jug.
4. Press the JIB reset button above the jug to turn the yellow LED off and reengage the ATO system.

## **Jug and Vat Won’t Fill**

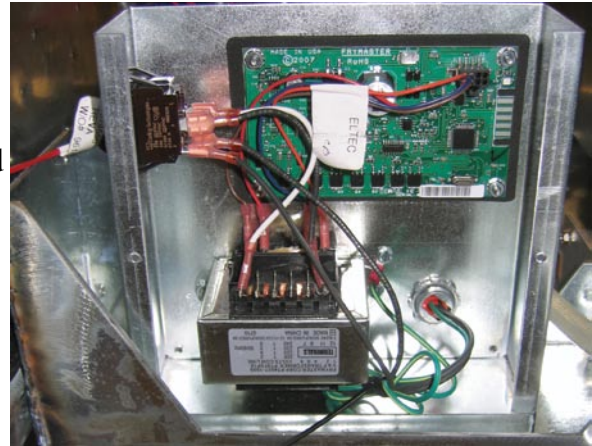
1. Enter FLTR MENU by pressing and holding the FLTR BUTTON.
2. Scroll to FILL POT FROM BULK. Press 1.
3. Computer displays FILL POT FROM BULK/YES NO. Press 1.
4. When the actuator opens, press 1 briefly again. Press 2.
5. Try to fill pot or JIB to see if issue resolved. If not, contact RTI.

## Board Replacement

### ATO Replacement

The ATO board is located inside the box behind the JIB. It is connected to three phase power in electric fryers and should be approached with extra caution.

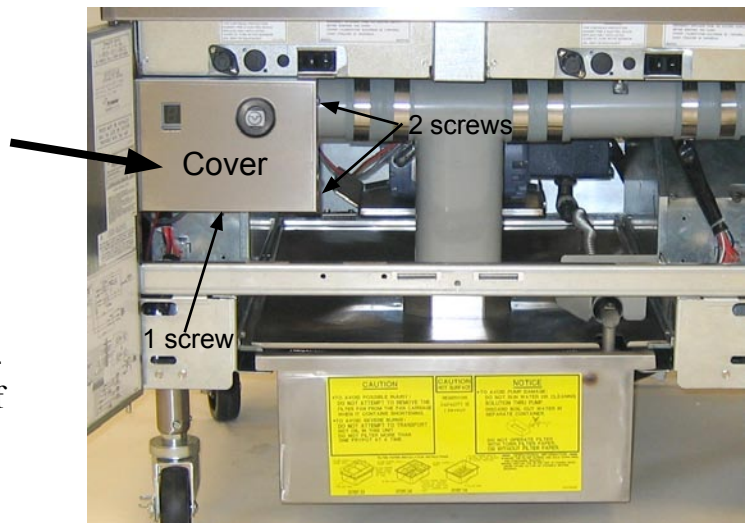
1. Disconnect the fryer from the electrical power supply.
2. Locate the ATO box behind the JIB (Jug In Box).
3. Remove the cover to expose the transformer and ATO board.
4. Mark and unplug any wires or harnesses.
5. Replace the defective component and reattach all wires or harnesses.
6. Replace the cover, then reconnect the power.
7. Turn power off and back on to all computers after power has been restored to the ATO board.



### MIB Replacement

The MIB controller is located inside the left cabinet (see image below). In normal operation, a cover hides the MIB controls. The LED display is visible.

1. Disconnect the fryer from the electrical power supply.
2. Remove the three torx screws from the MIB cover, exposing the MIB board (see image at right).
3. Removing the four nuts in the corners of the board will expose the connections on the back of the board.
4. Disconnect the MIB board and carefully remove the plugs on the rear of the board (see image at right).
5. Replace with a new MIB board and reverse steps to reassemble.
6. Once replaced, reconnect the power.

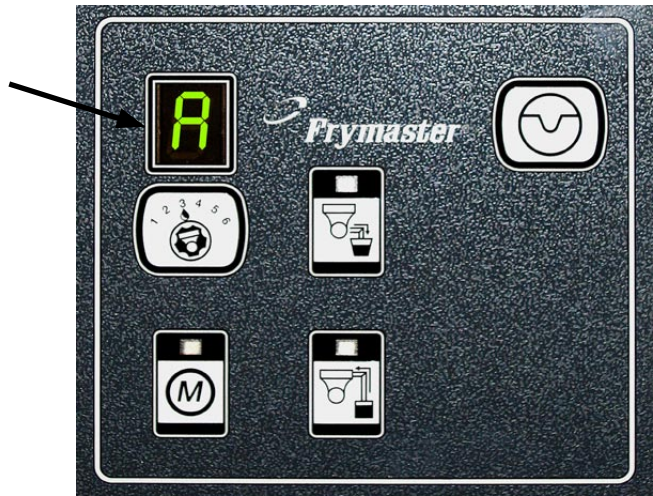


MIB controller cover (three screws hold it in place).

# LOV Technical Reference

The MIB must be readdressed to the system after replacement. This procedure can be done from any one M2007 computers in the bank.

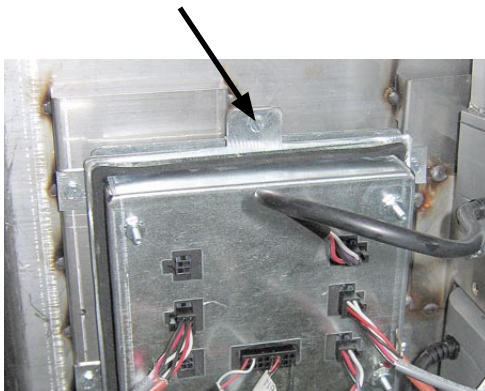
1. Readdress the fryer by pressing and holding ◀ and ▶ simultaneously for TEN seconds until a third chirp is heard and code appears.
2. Enter 2007. The MIB display will display L for several seconds followed by the vat number alternating with “r” until the readdress is complete.
3. When the readdress is finished, the MIB board will display A.



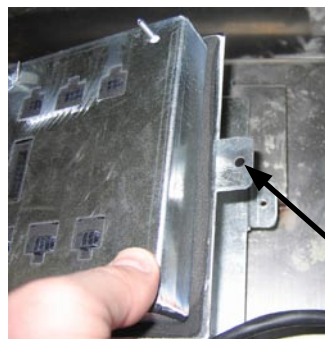
## AIF Replacement

The AIF boards are located inside a protective housing underneath each frypot.

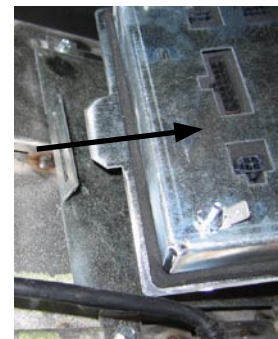
1. Disconnect the fryer from the electrical power supply.
2. Locate the AIF board to be replaced under a frypot.
3. Mark and unplug the harnesses.
4. Locate the screw on the front of the AIF assembly holding it in place.
5. Remove the screw and the front of the assembly drops down and the back tab slides out of the bracket attached to the frypot (see below).
6. Reverse steps to reassemble, ensuring that the new AIF assembly slides into the slot in the rear of the bracket.



Remove this screw that secures the AIF board to the fryer.



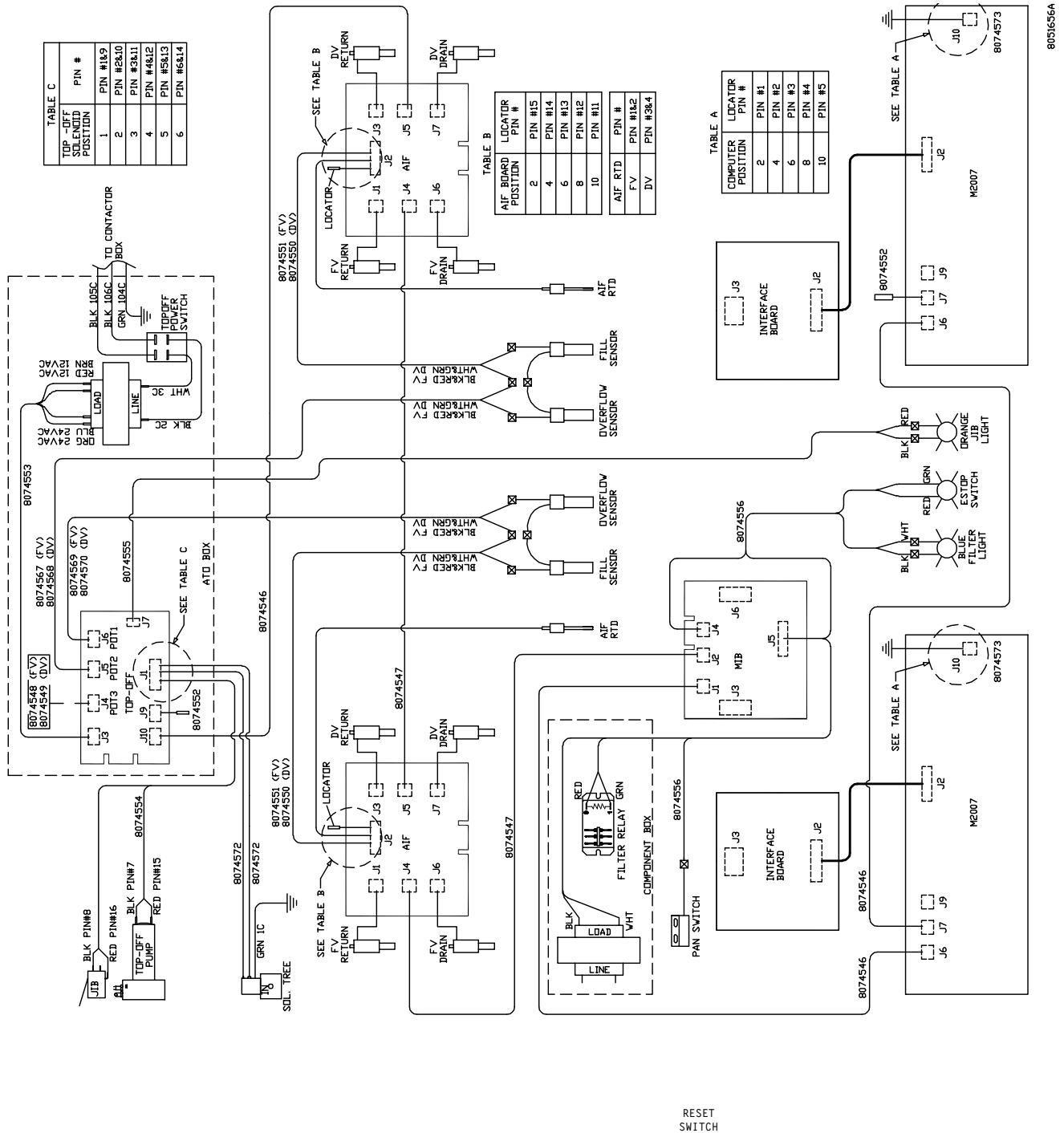
After removing the screw, the AIF assembly drops down.



The bottom tab slides out of the bracket attached to the frypot.

# Wiring Diagrams

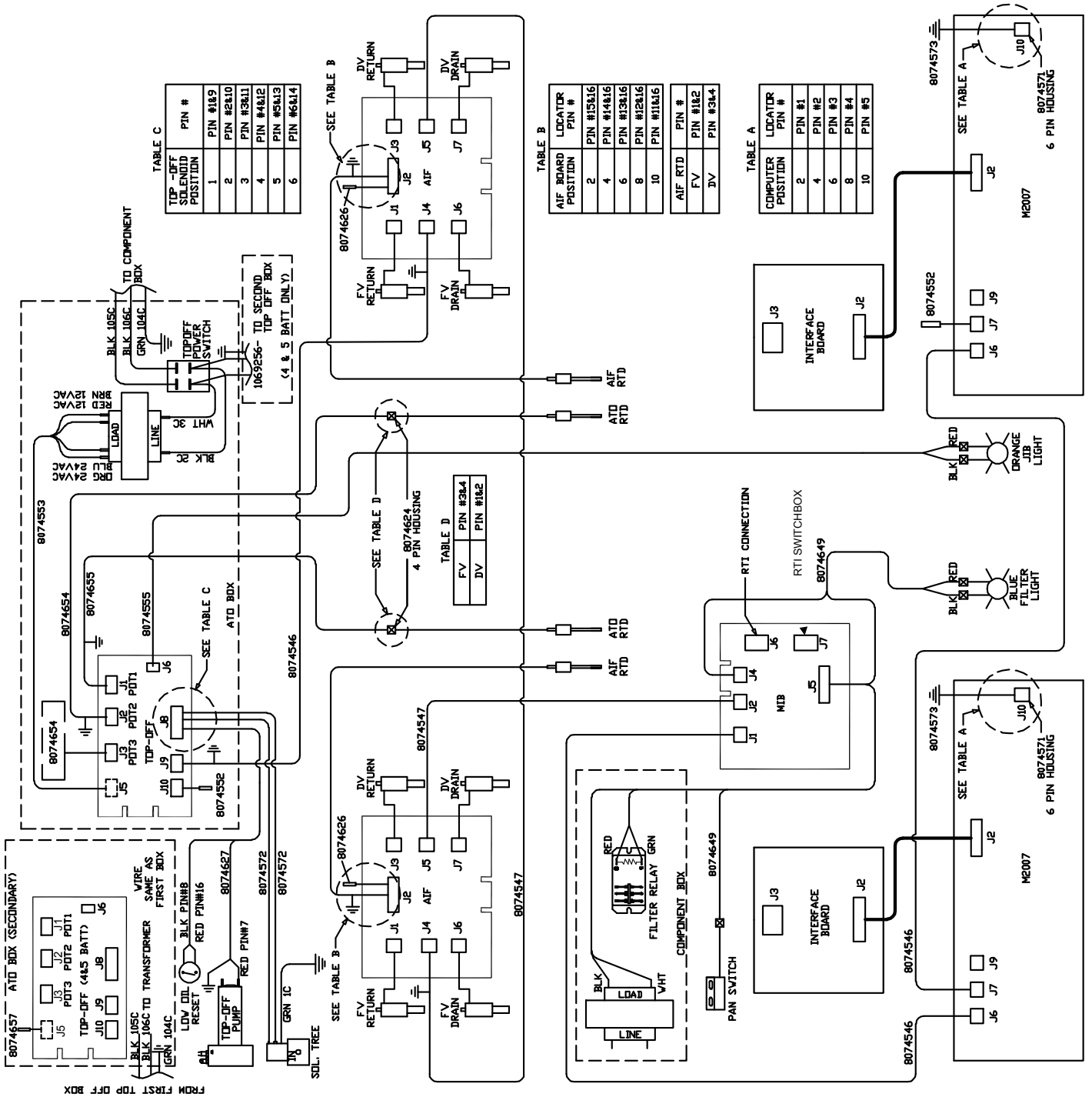
## LOV Electric Fryer with Thermal Sensor



8051656A

# LOV Technical Reference

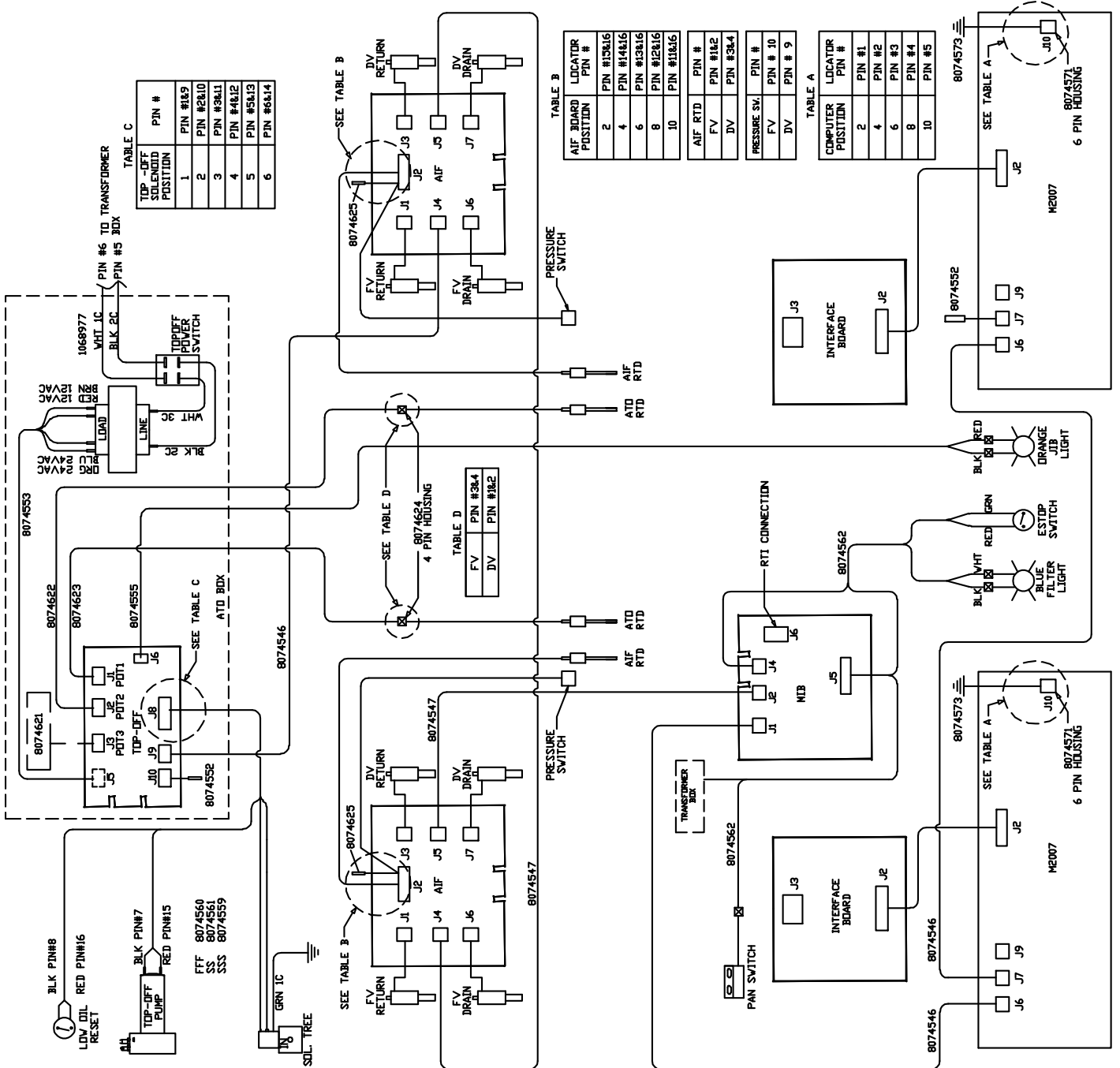
## LOV Electric Fryer with RTD



8051734A

# LOV Technical Reference

## LOV Gas Fryer with RTD



803125A

# LOV Technical Reference

## ATO (Automatic Top Off) Pin Positions and Harnesses (Thermal Sensor)

Connector	From/To	Harness #	Pin #	Function	Voltage	Wire Color
J1	Solenoids	8074572 x1 (FV) 8074572 x2 (DV)	1	Output DV - Vat #1	Ground	Orange
			2	Output FV - Vat #1		
			3	Output DV - Vat #2		
			4	Output FV - Vat #2		
			5	Output DV - Vat #3		
			6	Output FV - Vat #3		
	Top Off Pump & JIB Reset Switch	8074627	7	Top Off Pump	16VDC	Black
			8	JIB Low Reset		Black
	Solenoids	8074572 x1 (FV) 8074572 x2 (DV)	9	24VAC DV - Vat #1	24VAC	Orange
			10	24VAC FV - Vat #1		
			11	24VAC DV - Vat #2		
			12	24VAC FV - Vat #2		
			13	24VAC DV - Vat #3		
			14	24VAC FV - Vat #3		
	Top Off Pump & JIB Reset Switch	8074627	15	Ground	16VDC	Red
			16	Ground		Red
J3	Transformer	8074553	1	24VAC Ret	24VAC	Orange
			2	24VAC		Blue
			3			
			4			
			5	12VAC Ret	12VAC	Red
			6	12VAC		Brown
			7			
			8			
J4 - Vat #3 J5 - Vat #2 J6 - Vat #1	O/Flow Sensor & Fill Sensor	8074569 - Vat #1 8074567 - Vat #2 8074548 - Vat #3	1	FV – SW Out	16VDC	Black
			2	FV – Sw In		White
		8074570 - Vat #1 8074568 - Vat #2 8074549 - Vat #3	3	DV – Sw Out		Red
			4	DV – Sw In		Green
J7	Orange LED	8074555	1	16VDC	16VDC	Black
			2	16VDC Ret		Red
J8			1			
			2			
			3	Ground		
			4	RB7/DATA		
			5	RB6/CLOCK		
J9	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



# LOV Technical Reference

## ATO (Automatic Top Off) Pin Positions and Harnesses (Thermal Sensor, continued)

Connector	From/To	Harness #	Pin #	Function	Voltage	Wire Color
J10	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

# LOV Technical Reference

## ATO (Automatic Top Off) Pin Positions and Harnesses (RTD)

Connector	From/To	Harness #	Pin #	Function	Voltage	Wire Color
J8	Solenoids	8074572 x1 (FV) 8074572 x2 (DV)	1	Output DV - Vat #1	Ground	Orange
			2	Output FV - Vat #1		
			3	Output DV - Vat #2		
			4	Output FV - Vat #2		
			5	Output DV - Vat #3		
			6	Output FV - Vat #3		
	Top Off Pump & JIB Re-set Switch	8074627	7	Top Off Pump	16VDC	Black
			8	JIB Low Reset		Black
	Solenoids	8074572 x1 (FV) 8074572 x2 (DV)	9	24VAC DV - Vat #1	24VAC	Orange
			10	24VAC FV - Vat #1		
			11	24VAC DV - Vat #2		
			12	24VAC FV - Vat #2		
			13	24VAC DV - Vat #3		
			14	24VAC FV - Vat #3		
Top Off Pump & JIB Low Reset Switch	8074627	15	Ground	16VDC	Red	
		16	Ground		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
			7			
			8			
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

# LOV Technical Reference

## ATO (Automatic Top Off) Pin Positions and Harnesses (RTD, continued)

Connector	From/To	Harness #	Pin #	Function	Voltage	Wire Color
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

# LOV Technical Reference

## MIB (Manual Interface Board) Pin Positions and Harnesses

Connector	From/To	Harness #	Pin #	Function	Voltage	Wire Color		
J1	M2007 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		
J3	SD Card							
J4	RTI - JIB Fill Switch	8074649	1	Momentary Switch - Out	5VDC	Red		
	Reset Switch		2	Momentary Switch - In	5VDC	Black		
			3	Ground		Red		
			4	Reset		Green		
J5	Transformer		1	24VAC	24VAC	Black		
	Filter Relay		2	24VAC Ret		White		
			3	Pump Motor	24VDC	Red		
			4	Pump Motor		Green		
			Blue LED	5	Blue LED +	24VDC	Black	
	6			Blue LED -	White			
					7			
					8			
					9			
					10			
			Pan Switch	11	Pan Sw +	24VDC	Black	
				12	Pan Sw -		Red	
					13	Ground		
					14	Ground		
					15			
					16			
J6	RTI - Pump & Solenoids		1	From RTI transformer	24VAC	Black		
			2	Common		White		
			3	To RTI "Add Pump" Relay	24VAC	Green		
			4	To Waste Solenoid - 3 Way	24VAC	Brown		
			5					
			6	To Fill Solenoid - 3 Way	24VAC	Black		
			7	Ground - Fill Solenoid		Black		
			8	From RTI "Waste Tank Full Sensor" Test Pins 1 to 8	0VDC - Full 5VDC - Not Full	Red		

# LOV Technical Reference

## MIB (Manual Interface Board) Pin Positions and Harnesses (continued)

J7	From RTI Box		1	From RTI transformer	24VAC	Black
			2	Common		White
			3			
			4	To Waste Solenoid - 3 Way	24VAC	Brown
			5			
			6	RTI JIB Valve Fill Solenoid	24VAC	Green
			7	Ground - Fill Solenoid		
			8	From RTI "Waste Tank Full Sensor" Test Pins 1 to 8	0VDC – Full 5VDC – Not Full	Red

# LOV Technical Reference

## MIB (Manual Interface Board) Display Diagnostics

DISPLAY	LEDS	EXPLANATION
<b>Drain</b>		
Vat #	Drain LED on	Drain valve on vat # is open
Vat #	Drain LED off	Drain valve on vat # is closed
Vat #	Drain LED slow blink	Drain valve on vat # is opening or closing
Vat # alternating with O	Drain LED fast blink	Problem opening drain valve on vat#
Vat # alternating with C	Drain LED fast blink	Problem closing drain valve on vat#
Vat # alternating with d	Drain LED fast blink	Problem with drain on vat#. (i.e. possible plugged drain)
<b>Return</b>		
Vat #	Return LED on	Return valve on vat # is open
Vat #	Return LED off	Return valve on vat # is closed
Vat #	Return LED slow blink	Return valve on vat # is opening or closing
Vat # alternating with O	Return LED fast blink	Problem opening return valve on vat#
Vat # alternating with C	Return LED fast blink	Problem closing return valve on vat#
<b>Network</b>		
Vat # alternating with n	Drain LED fast blink	Network time-out waiting for response. Could be on drain opening or on drain closing.
Vat # alternating with n	Return LED fast blink	Network time-out waiting for response. Could be on return opening or on return closing.
An "r" alternating with an "n"		Network time-out waiting for a response on a reset command.
An "F" alternating with an "n"		Network time-out waiting for a success or failure message during auto filtering.
<b>Initial State, Configuring the system, and resetting</b>		
U		The state of the battery is unknown. The MIB is waiting for an INIT_CONFIG message from a cooking computer. Once the message is received the manual board will start the process of determining which fryers have split or full vats.
L		An L will be displayed while the MIB is contacting the cooking computers for the initial configuration of the system.
An "r"		An "r" is displayed to indicate that the system is in the process of resetting a vat.
<b>Miscellaneous</b>		
Vat # alternating with an "E"		The actuator circuit has an issue. Check that the actuator is plugged in.
Vat # alternating with an "R"		The vat is trying to close the corresponding drain and return valves.
A	Manual LED off	The system is in auto filtration mode.
Vat #	LED fast blinking	
There will also be a fast blinking LED corresponding to the problem valve.	The system can not go into auto filtration mode because there is a problem closing a valve on one of the vats.	
Vat #	Manual LED on	The system is in manual mode.
P		This will only be displayed in auto filtration mode. It indicates that the pan is not in the system. Any auto filtration messages received at this time are ignored.

# LOV Technical Reference

## AIF (Auto Intermittent Filtration) Actuator Board Pin Positions (Thermal Sensor)

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	8074551 (FV) 8074550 (DV)	1	Ground		White
	DV AIF RTD		2	FV - Temp		Red
			3	Ground		White
	O/Flow Sensor & Fill Sensor		4	DV - Temp		Red
			5	FV - Top In	16VDC	Black
			6	FV- Top Out	16VDC	Red
			7	DV-Top In	16VDC	White
	Pressure Switch (Gas)		8	DV- Top Out		Green
			9	DV – Press Sw (Gas)		
	Locator Pin		10	FV – Press Sw (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	N/A	1	Drain + (Open)	24VDC	Black
			2	Drain – (Closed)	24VDC	Red
			3	Drain Position		Purple
			4	Ground		White
J7	DV Drain	N/A	1	Drain + (Open)	24VDC	Black
			2	Drain – (Closed)	24VDC	Red
			3	Drain Position		Purple
			4	Ground		White

# LOV Technical Reference

## AIF (Auto Intermittent Filtration) Actuator Board Pin Positions (RTD)

Connector	From/To	Harness PN	Pin #	Function	Voltage	Wire Color	
J1	FV Return	N/A	1	Ret + (Open)	24VDC	Black	
			2	Ret – (Closed)	24VDC	Red	
			3	Ret Position		Purple	
			4	Ground		White	
J2	FV AIF RTD	8074551 (FV) 8074550 (DV)	1	Ground		White	
	DV AIF RTD		2	FV - Temp		Red	
			3	Ground		White	
			4	DV - Temp		Red	
			5				
			6				
			7				
			8				
			Pressure Switch (Gas)	9	DV – Press Sw (Gas)		
	10			FV – Press Sw (Gas)			
	Locator Pin		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	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	N/A	1	Drain + (Open)	24VDC	Black	
			2	Drain – (Closed)	24VDC	Red	
			3	Drain Position		Purple	
			4	Ground		White	
J7	DV Drain	N/A	1	Drain + (Open)	24VDC	Black	
			2	Drain – (Closed)	24VDC	Red	
			3	Drain Position		Purple	
			4	Ground		White	







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