

Important Safety Messages

FE Petro equipment is designed to be used to pump volatile hydrocarbon liquids such as gasoline and diesel fuel. Installing or working on this equipment means working in an environment in which these highly flammable liquids are present. **This presents a risk of severe injury or death if these instructions and standard industry practices are not followed. Read and follow this entire instruction booklet before installing or working on this equipment.**

As you read these instructions, watch for the following safety symbols:

Warning  This symbol identifies a potentially hazardous situation which, if the instructions that follow it are not adhered to, could result in death or serious bodily injury.

Caution  This symbol identifies a potentially hazardous situation which, if the instructions that follow it are not adhered to, could result in serious property damage, including possible environmental contamination as a result of the leakage of fuel from the equipment.

Warning  **Follow all federal, state, and local laws governing the installation of this product and the entire system. When no other regulations apply, follow NFPA 30, 30A, and 70 from the National Fire Protection Association. Failure to do so could result in severe injury, death, serious property damage and/or environmental contamination.**

Warning  **If the electrical circuit breakers are accidentally turned on while the STP-SCI is being installed, electrical power could be applied to the STP-SCI, creating the risk of potentially lethal electrical shock hazard. ALWAYS tag and lock breakers so they are not turned on accidentally.**

Warning  **Always disconnect both power supplies (110-250V Hook and the 208-240V input) before installing or servicing. Failure to do so could result in severe injury or death.**

Installer: This instruction booklet **MUST** be left with the owner of the service station at which the equipment is being installed.

Station Owner: Retain these instructions for future use and provide them to persons servicing or removing this equipment.

INSTALLATION INSTRUCTIONS

Read and become familiar with these instructions before doing installation.

1. Install STP per STP/IST Fixed and Variable Length Installation and Owner's Manual.
2. Remove cover of STP-SCI and mount base to wall or other surface.

Note: The STP-SCI must be mounted indoors and can operate at ambient temperatures between 40° and 105° F (4°-41° C).

3. Connect input power of 208-240 VAC to L1 and L2 and Ground wire to terminals per Figure 2.
4. Connect dispenser hook signal to terminals, 110-250V supply and return per Figure 2.
5. Using an ohmmeter, verify the motor leads (M1 and M2) are not shorted to ground.

Warning  **Damage to the STP-SCI may occur if motor leads are shorted together or to ground and power is applied.**

6. Connect motor leads to M1 and M2 and Ground wires to terminals per Figure 2.
7. For Stand Alone controller configuration set SW1 and SW2 poles 1-8 per Figure 1 (Stand Alone configuration is Factory setting). For Master-Slave and/or Alternating Circuit configurations, go to "**Master-Slave/Alternating Circuit**" section, step 9.
8. All STP-SCI controllers must be calibrated. Continue to step 14 "**Calibration**" section to complete installation.

MASTER-SLAVE/ALTERNATING CIRCUIT

The Master-Slave feature allows the master to turn on additional STP's when the first STP operating needs help due to loading (flow rate) or an abnormal condition exists. The Alternating Circuit (AC) feature continuously alternates the lead pump, thus turning on a different STP each time all dispensers are shut off and at least one dispenser is turned back on. The Master-Slave/AC configuration combines the features of the Master-Slave and AC functions.

Note:

- STP-SCI is not compatible with the STP-SC or the STP-SCB in Master-Slave, Alternating Circuit configurations.
- Master-Slave will not work with PMA33, PMA75B (50 Hz PMA), or PMAH150B (50 Hz PMA).

9. Wire STP-SCI controllers according to Figure 3 for Master-Slave, Figure 4 for AC or Figure 5 for Master-Slave & AC Configurations. Connect Communication cable, RS 485, to terminals (+, G, and -) wire "+" together, "G" together and "-" together then wire the shielded cable drain wire to Ground (G) at one end only. Use at least 22 AWG three conductor shielded cable with drain wire.
10. Connect dispenser hook signal to the STP-SCI designated as Master per Figures 3,4, and 5.

Note: Be sure L1, L2, M1, M2 and Grounds are installed at each STP-SCI.

11. Configure Master-Slave and Alternating Circuit features by setting SW2 poles 3 and 4 per Figure 1.
12. Create an address for each controller by setting SW1 poles 1-5 per Table 1. Each Controller must have its own unique address.
13. Attach cover of controller to base and complete the "**Calibration**" section of the installation manual, step 14.

Note: There can only be one Master in a system and up to 31 slaves.

CALIBRATION

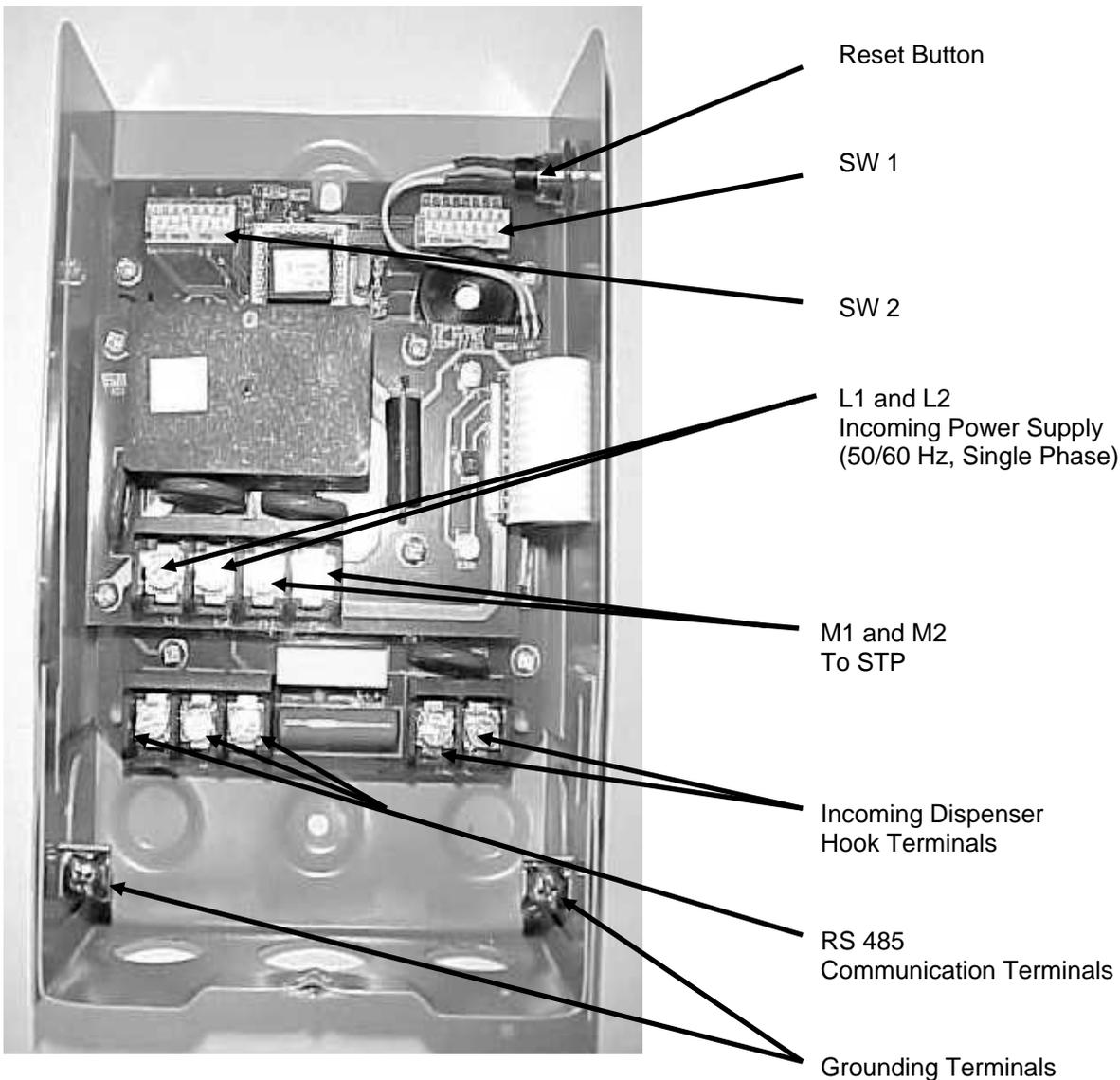
Note: Before calibration process can begin, fuel level in tank must be above the motor intake

1. It is recommended to close either the STP clamp valve or a ball valve at the STP discharge. Turn on power supply to the STP-SCI. The green light indicator will come on steady, the red light indicator will flash eight times and the audible alarm will beep eight times. This indicates the STP-SCI is Uncalibrated.
2. Put the controller in calibration mode by pressing and holding the **reset button**, the push-button on the right side of the control box, until all three light indicators blink alternately. This will take approximately 10 seconds. Release the reset button. **For Master Slave and Alternating Circuit configurations put the master and all the slaves into calibration mode before going to step 3.**
3. Lift a handle on a dispenser to turn the pump on. After approximately 16 seconds the controller will take a "snapshot" of the voltage, current and power. The three lights will quit alternating and only the green light will remain flashing. This indicates the calibration is complete and the dispenser handle can be turned off. Remember to open the STP clamp valve or ball valve when calibration is complete. If the controller does not calibrate the red light will flash and

the audible alarm will beep an abnormal condition code, see the “**Troubleshooting Guide**” section to identify and correct the abnormal condition.

Important Information for Calibrating Controllers:

- All STP-SCI’s must all be calibrated prior to operation.
- All three indicator lights will flash alternately in calibration mode.
- The STP-SCI will calibrate only when the STP is free of abnormalities (faulty wiring, etc.), and a dispenser handle is turned on within 10 minutes after calibration is initiated. Calibration must be done at zero flow. False abnormal conditions will result if calibration is done with flow.
- If electronic line leak detection is used make sure the STP-SCI is in calibration mode (all three lights flashing alternately) before the dispenser handle is turned on. If it is not, the STP-SCI will not turn on and the line leak detector will sense a fault. When the line leak detector senses a fault, it will not provide a dispenser hook signal to the STP-SCI and the STP-SCI will not calibrate until the line leak detector is reset.
- With blending dispenser systems calibrate all blended product STP-SCI’s simultaneously by selecting the mid-grade handle at the dispenser.
- If power is lost to the controller the calibration data is retained.



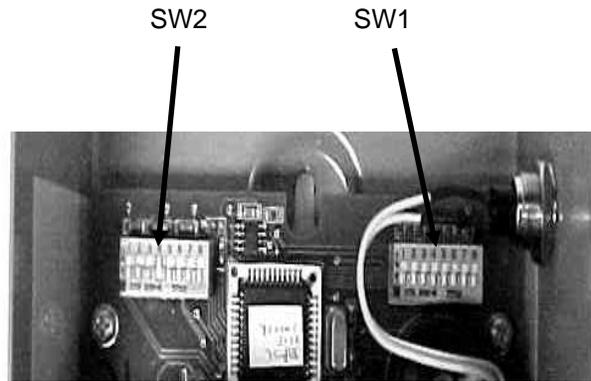
Picture 1

Configuration Options								
SW1 Poles			SW2 Poles					
	1-5	6-8	1	2	3	4	5	6-8
Stand Alone (Factory Setting)	NA	See Table 2	See Table 2	NA	Off	Off	See Table 2	NA
Master Controllers								
Master-Slave	See Table 1	See Table 2	See Table 2	NA	On	Off	See Table 2	NA
Alternating Circuit				NA	Off	On		
Master-Slave & Alternating Circuit				NA	On	On		
Slave Controllers								
All Slaves	See Table 1	See Table 2	See Table 2	NA	Off	Off	See Table 2	NA

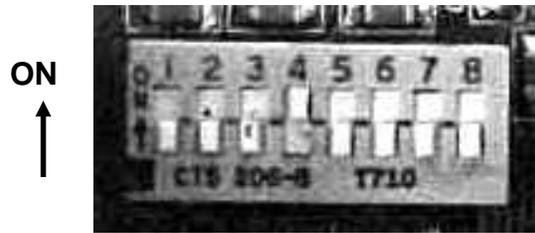
Figure 1

SW1					
Address	Pole 1	Pole 2	Pole 3	Pole 4	Pole 5
Master	Off	Off	Off	Off	Off
Slave - 1	On	Off	Off	Off	Off
Slave - 2	Off	On	Off	Off	Off
Slave - 3	On	On	Off	Off	Off
Slave - 4	Off	Off	On	Off	Off
Slave - 5	On	Off	On	Off	Off
Slave - 6	Off	On	On	Off	Off
Slave - 7	On	On	On	Off	Off
Slave - 8	Off	Off	Off	On	Off
Slave - 9	On	Off	Off	On	Off
Slave - 10	Off	On	Off	On	Off
Slave - 11	On	On	Off	On	Off
Slave - 12	Off	Off	On	On	Off
Slave - 13	On	Off	On	On	Off
Slave - 14	Off	On	On	On	Off
Slave - 15	On	On	On	On	Off
Slave - 16	Off	Off	Off	Off	On
Slave - 17	On	Off	Off	Off	On
Slave - 18	Off	On	Off	Off	On
Slave - 19	On	On	Off	Off	On
Slave - 20	Off	Off	On	Off	On
Slave - 21	On	Off	On	Off	On
Slave - 22	Off	On	On	Off	On
Slave - 23	On	On	On	Off	On
Slave - 24	Off	Off	Off	On	On
Slave - 25	On	Off	Off	On	On
Slave - 26	Off	On	Off	On	On
Slave - 27	On	On	Off	On	On
Slave - 28	Off	Off	On	On	On
Slave - 29	On	Off	On	On	On
Slave - 30	Off	On	On	On	On
Slave - 31	On	On	On	On	On

Table 1

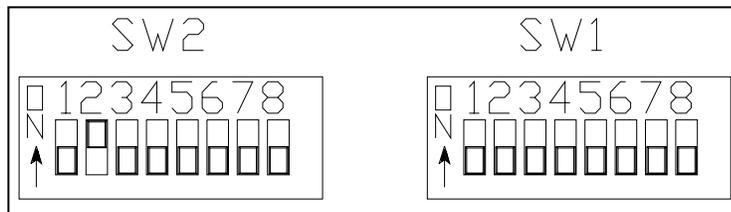


Picture 2



Picture 3

Factory Default Switch Settings



Factory setting is Stand Alone configuration with all selectable features off, Fault Read out, Bypass, Auto Restart, Fault Shutdown, and Extended Run Disable

Switch Definitions

SW1		
Pole	Description	Function
1	Address 0	Controller Addressing switches for use with Master/Slave and Alternating Circuit configurations See Table 1
2	Address 1	
3	Address 2	
4	Address 3	
5	Address 4	
6	Fault Read out*	ON Displays the last 5 abnormal conditions the controller encountered
7	Bypass*	ON Bypasses diagnostics for 10 minutes. Use as Troubleshooting aid
8	Auto Restart*	When ON , controller will attempt to restart STP with Empty Tank error when hook signal is applied.

SW2		
Pole	Description	Function
1	Fault Shut down	For M/S and AC only. When ON an Abnormal condition on any controller it will shut down all STPs
2	Unused	Unused Switch
3	Master/Slave**	ON for Master controller OFF for Slave(s) and Stand Alone
4	Alternating Circuit**	ON for Master Controller OFF for Slave(s) and Stand Alone
5	Extended Run Disable*	ON disables Extended Run Fault OFF Extended Run detection active
6	Unused	Unused switches
7	Unused	
8	Unused	

* See trouble shooting guide for detailed description

** See Figure 1 for configuration switch settings

Table 2

Selectable features to aid Troubleshooting

See Figure 1 for location and See Switch Definitions table for brief description of the following features:

Fault Read Out Mode (SW1, Pole 6)

With this mode selected, switch in the ON position, the controller will display the last 5 abnormal conditions it encountered. The controller will beep once and then the red LED will flash the most recent abnormal condition. It will then beep twice and the red LED will flash the second to last abnormal condition. The controller will follow this sequence through 5 beeps and then repeat the sequence. It will continue to repeat the sequence while in this mode. If there is less than 5 abnormal conditions the controller will continue the beep sequence but the red LED will not flash after the beep. With the appropriate equipment the last 5 abnormal conditions can be read through the RS485 port.

Bypass Mode (SW1, Pole 7)

With this mode selected, switch in the ON position, the controller will operate as a standard control box. It will not indicate or shut down any abnormal condition with the exception of an over current condition (short or locked rotor). The controller will stay in this mode for 10 minutes. After the 10 minutes the controller will revert to its normal operation. Pushing the reset button will allow it to run another 10 minutes in the Bypass mode.

Auto Restart Mode (SW1, Pole 8)

With this mode selected, switch in the ON position, If the controller detects an empty tank/under load condition, it will shut down the pump and it will attempt to start the pump when a hook signal is removed and reintroduced to the controller. If the empty tank condition is still present the controller will shut down the pump. If the empty tank condition is corrected (tank is refilled) the controller will run the STP and clear the abnormal condition. In M/S configuration, if the Master is in the under load condition, it will wait until the Slave controller calls for help before attempting to restart.

Fault Shutdown Mode (SW2, Pole 1)

For Master-Slave and Alternating Circuit configurations only, this mode only needs to be selected on the Master controller. When this mode is selected, switch in the on position, the entire system will shutdown if any of the controllers, Master or Slaves, detect an abnormal condition. The system will not run until the abnormal condition is corrected and the reset button is pushed or the Fault Shutdown mode switch is turned off and the reset button is pushed.

Extended Run Disable (SW2, Pole 5)

This switch, when in the ON position, will disable the Extended Run Fault detection of the STP-SCI. The Extended Run Fault will shut off the STP if it has been running for 60 minutes without a change in product flow. A possible application of this switch is in an emergency generator where the STP is running at all times.



Do not disable the Extended Run if the system requires the pump to be off for line leak detection i.e. Mechanical Leak Detectors, Electronic Line Leak detection. Disabling the Extended Run Fault and running the STP continuously could mask a leak in the system.

TROUBLESHOOTING GUIDE

To aid field service personnel the STP-SCI is equipped with a microprocessor control that makes it possible for the unit to diagnose abnormal operating conditions, and communicate them via LEDs on the front panel and by an audible alarm. The following is a definition of all operation and abnormal operating codes.

Green light on steady Power (208-240V) is applied to the STP-SCI.

Green light flashing Pump Motor Assembly (PMA) is running.

Note: If the green light stays steady, even when a dispenser is energized, check the dispenser hook signal terminals on the STP-SCI. Verify that 110 – 250VAC is across the hook terminal (see Figure 2). If the green light remains steady, 110 – 250 VAC is present at the hook terminal and switch settings are correct, call FE Petro Technical Service for assistance.

Warning  **If the green light flashes, even when all the dispensers are turned off, there may still be power present at the STP-SCI Hook Terminal. If this condition exists call FE Petro Technical Service for assistance.**

**Red Light Flashing/
Alarm Beeping** Abnormal condition. Determine the number of flashes/beeps and refer to the appropriate row on the guide below.

Disabling the audible alarm

To silence the audible alarm, depress the push button briefly. This only silences the alarm; it does not reset the controller.

Reset

Before correcting an abnormal condition (red light flashing/alarm beeping), note the number of flashes/beeps, reset the controller by depressing the push button on the side of the control box for between three and ten seconds (all indicator lights will go out) and check for proper operation. If controller operates correctly, do not continue to service unless the abnormal condition is still present. If the controller indicates the abnormal condition is still present correct the condition, according to the troubleshooting guide, then reset the controller and check for proper operation. **Contact FE Petro Technical Service for further assistance, if applicable.**

Flashes /Beeps	Condition	Potential Causes	Proposed Action
1	Under Load	Low fuel level in the storage tank Or Obstructions in Motor Intake Or Calibrated with product flow	<p>Note: If Auto Restart Switch is set in the ON position once fuel is again above the PMA end bell and the hook signal is reapplied the STP-SCI will restart with out pushing the reset button.</p> <ol style="list-style-type: none"> 1. Check fuel level in storage tank; schedule fuel delivery, when delivery is complete and fuel level is above PMA end bell push reset button on STP-SCI. Check for correct system operation. If fuel levels are within acceptable range, the STP-SCI may need to be recalibrated if it was previously calibrated with air in the lines or with product flow.
2	Low Incoming Voltage	Voltage fluctuations or low input voltage	<p>Note: STP-SCI will automatically restart when the voltage returns to acceptable operating range.</p> <ol style="list-style-type: none"> 1. Use AC voltmeter to verify incoming voltage is within the 208-240VAC acceptable range. If voltage is not within this range, contact an electrician to correct problem. If voltage is within acceptable range and condition is still present after resetting, recalibrate controller per "Calibration" section.
3	Overload	Short in wiring from STP-SCI to PMA Or Incorrectly wired through capacitor Or Foreign material in PMA or rotor within motor is locked up	<ol style="list-style-type: none"> 1. Check and verify wiring is correct from STP-SCI to motor (shorts or incorrectly wired capacitor). If condition is corrected, check for proper operation. If operating correctly, do not continue with next step. If condition is still present, continue to next step. <p>PMA Replacement/Inspection</p> <ol style="list-style-type: none"> 2. Disconnect input voltage at load center, lock and tag out circuit breakers. 3. (See PMA Replacement Instructions P/N 400289002, included with New PMA) Disengage the 3/4" securing bolt of the electrical connector and swing out of the way. Remove two 9/16" bolts from extractable portion of the manifold. 4. Pull extractable part of the pump. <p>Note: Pump Motor Assembly shell can be damaged by blows from hard surfaces, use care in removing.</p> <ol style="list-style-type: none"> 5. Remove black end cap from PMA and attempt to spin rotor with a 3/16" Allen wrench to determine if there's any binding. If rotor does not spin freely and/or there is physical damage (note this on a warranty claim form for FE Petro use), proceed with step 7. If no binding or physical damage to PMA, reinstall extractable by following the previous steps in reverse order and then continue to the next step. <p>Note: PMA can have a locked rotor during startups if it has been exposed to a corrosive environment, such as a tank ballasted in water.</p> <ol style="list-style-type: none"> 6. Turn on power to the STP-SCI unit and verify correct system operation. If condition is corrected, do not continue to next step. If condition is still present, remove the extractable by repeating steps 2 through 4 and then continue to next step. 7. Remove four 5/16" cap screws that connect the PMA with a ¼" Allen wrench and remove the PMA from the motor discharge head. <p>Note: Prior to mounting a new PMA, check lead assembly (wires inside the extractable portion to PMA) for shorted wires and proper alignment, which may have caused the condition.</p> <ol style="list-style-type: none"> 8. Replace with new PMA. <p>Note: Pump motor shell can be damaged by blows from hard surfaces, use care in replacing.</p> <ol style="list-style-type: none"> 9. Re-install extractable and secure by following reverse order of disassembly. 10. Turn on power to the STP-SCI unit and verify correct system operation.

Flashes /Beeps	Condition	Potential Causes	Proposed Action
4	Open Circuit	Connection broken from STP-SCI to PMA Or Locked Rotor w/ Thermal Overload Open Or Incorrectly wired through capacitor Or Relay Failure	<ol style="list-style-type: none"> 1. Wait 5 minutes before pushing the reset button on the STP-SCI. This will allow the motor thermal overload to reset if locked rotor has occurred. Check for proper operation of system; if operating correctly do not continue to next step. If condition is still present continue to next step. 2. Disconnect power at load center, lock and tag out circuit breakers. 3. Remove the two motor control outputs (M1 and M2) from the STP-SCI unit. 4. Using an ohmmeter (low range setting), place leads between two wires going to the STP, this is the first step in determining where the open circuit has occurred. Correct readings between M1 and M2 wires (orange and black) should match that of the motor being used +/-1 ohms. These readings can be found in TB004 or the STP/IST Fixed & Variable Length Installation and Owner's Manual. Readings between any of the motor wires and ground should be an open circuit. If readings in this step are incorrect, continue with the next step. If readings are correct go to step 7. 5. Check and verify capacitor wiring is correct in STP junction box. Refer to the STP/IST Fixed & Variable Length Installation and Owner's Manual for wiring diagram or SB003. If condition has been corrected, do not continue with next step. If wired correctly and condition is still present, continue with next step. 6. Go to the submerged turbine and remove the cover at the top of the extractable manifold. Remove the three wire nuts and continue conductivity tests on the three wires going to the motor. Readings between any of the motor wires and ground should be an open circuit. If readings are incorrect and there are no problems with the lead assembly wiring, go to "PMA Replacement/Inspection" in 3 flash section. If readings are correct, there is problem with the wiring between the STP-SCI and this point, continue with next step. 7. Remove the junction box cover and do conductivity test on wires in the junction box after the capacitor through the extractable discharge head (orange to orange, red to red, and black to black). If wires are not conducting, replace the male and female connectors of the STP. See STP/IST Fixed & Variable Length Installation and Owner's Manual for replacement parts. Check for proper operation. If operating correctly, do not continue. If conductivity readings are correct and the condition is still present, continue to next step. 8. Upper Board relay may be stuck open or damaged. Replace Upper Board (Relay Assembly); see "Replacement Parts" section for part number. Turn on power to the STP-SCI unit and verify correct system operation.
8	Uncalibrated	New Installation	<p>Note: All STP-SCI's must be calibrated prior to operation.</p> <ol style="list-style-type: none"> 1. Calibrate STP-SCI per "Calibration" section. If controller calibrates, do not continue to next step. If abnormal condition is indicated, Count Flashes/beeps before pushing reset button. Follow troubleshooting guide for the indicated condition. Correct condition and recalibrate. 2. Check the following: <ul style="list-style-type: none"> • Calibration is done at no flow (close STP clamp valve or ball valve in line). • Dispenser hook signal is applied within 10 min. of putting controller in calibration mode. • No open circuits between controller and motor. • Lines have been purged of air. • Locked Rotor
9	Extended Run	Continuous Hook Signal applied for more than 60 min. without pumping product	<ol style="list-style-type: none"> 1. Disconnect power at load centers, lock and tag out circuit breakers. 2. Check voltage across hook terminal with all dispenser handles off. There should be no voltage applied. If voltage is present, contact an electrician to correct the problem. After the problem has been corrected, turn on power to the STP-SCI and verify system is operating correctly.
10	Relay Fault	Relay contact failure	<p>Caution  The STP will continue to run after this fault indication is displayed.</p> <ol style="list-style-type: none"> 1. Disconnect power at load centers, lock and tag out circuit breakers. 2. Replace Upper Board (Relay Assembly), see "Replacement Parts" section. 3. Turn on power to the STP-SCI unit and verify correct system operation.

Contact FE Petro for additional troubleshooting information at 1-800-225-9787.

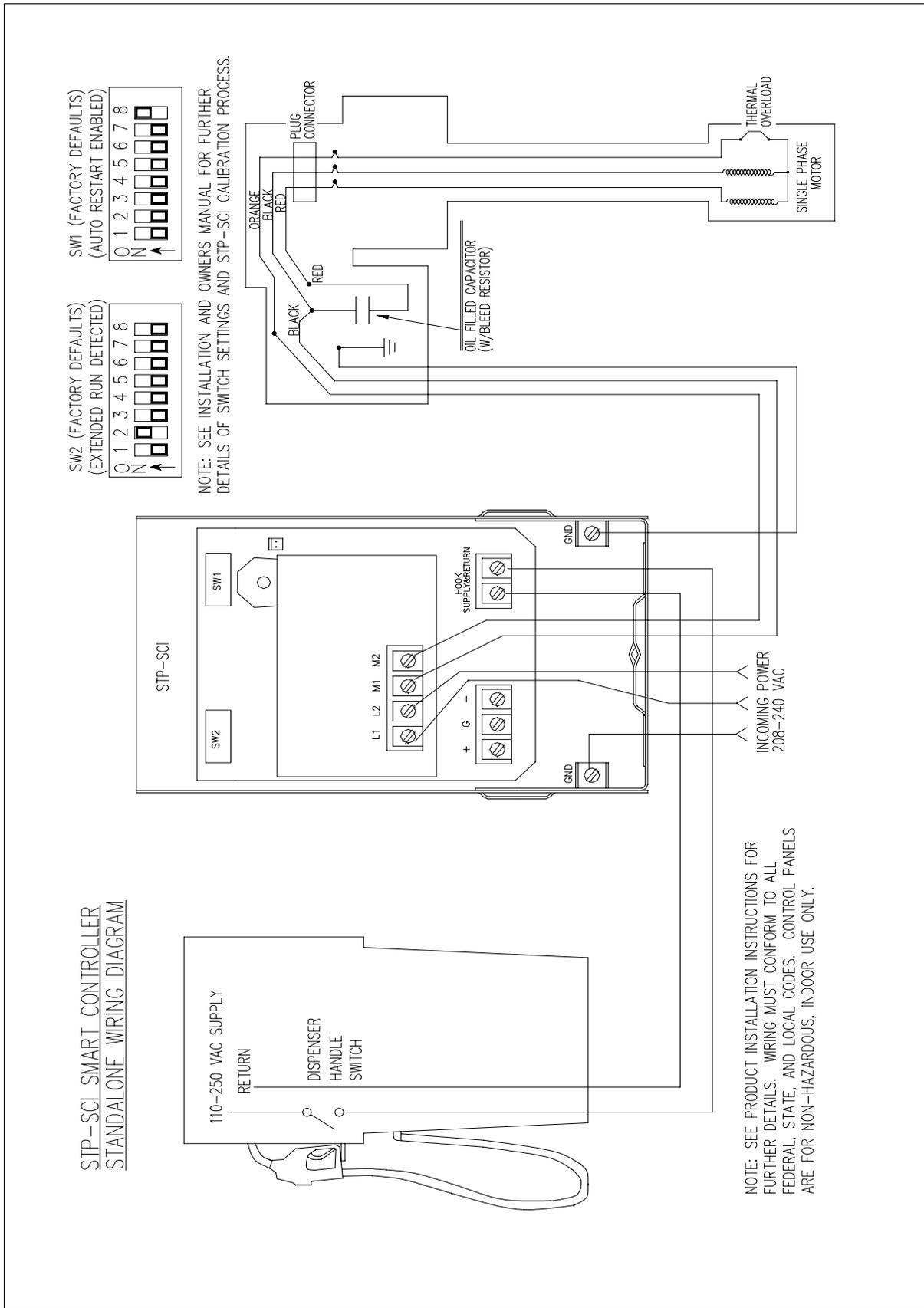


Figure 2
STP-SCI Stand Alone Wiring Diagram

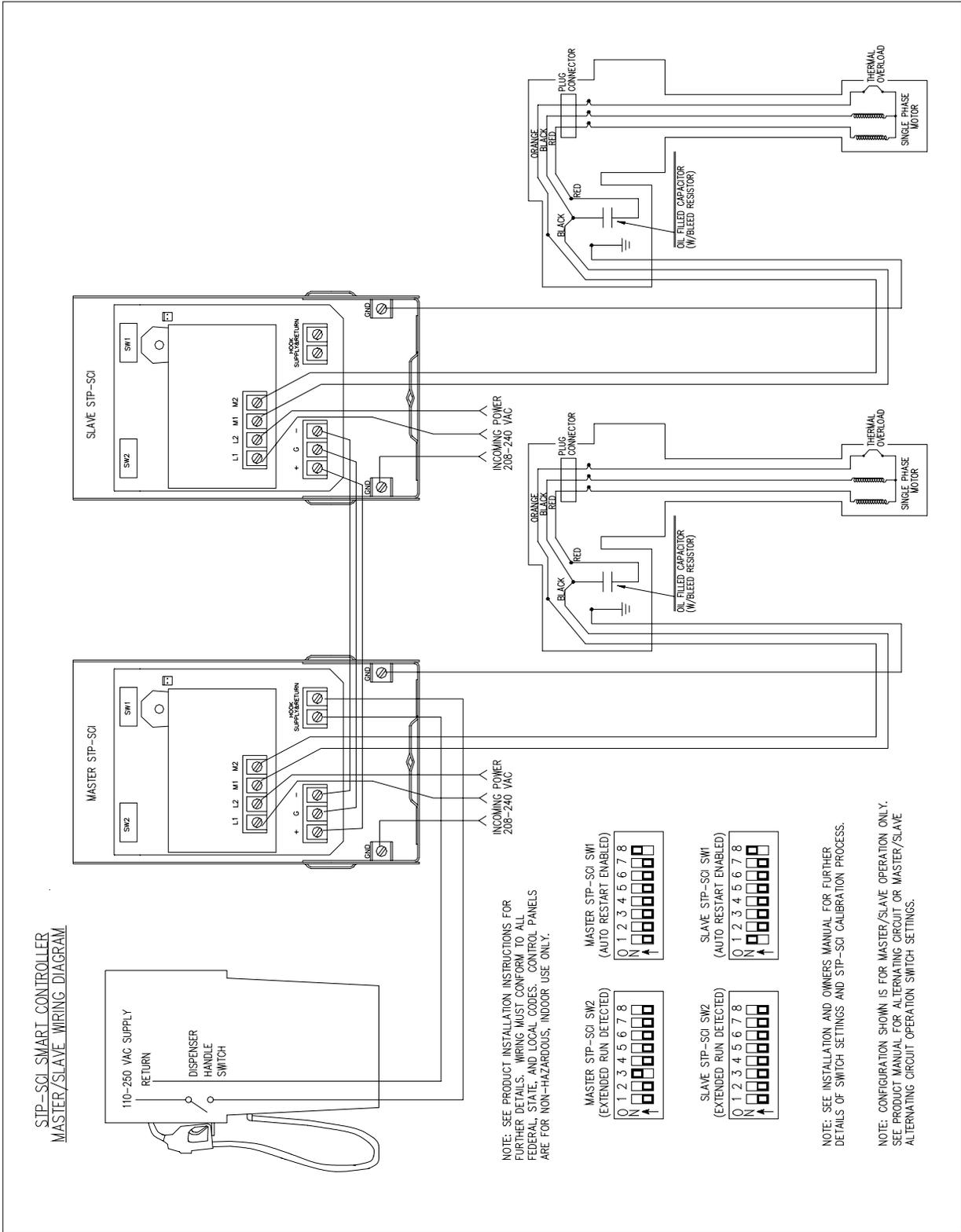


Figure 3
STP-SCI Master/Slave Wiring Diagram

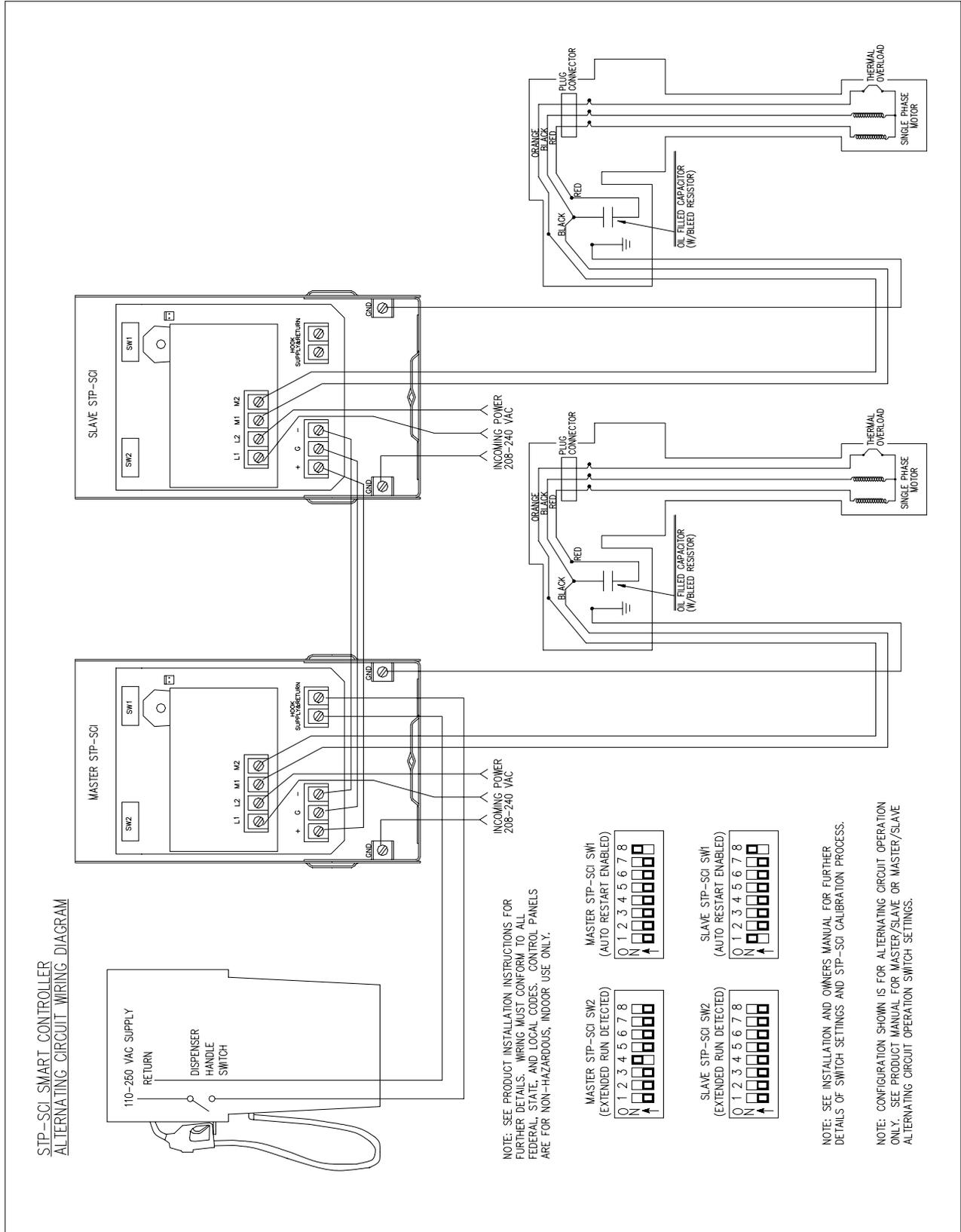


Figure 4
STP-SCI Alternating Circuit Wiring Diagram

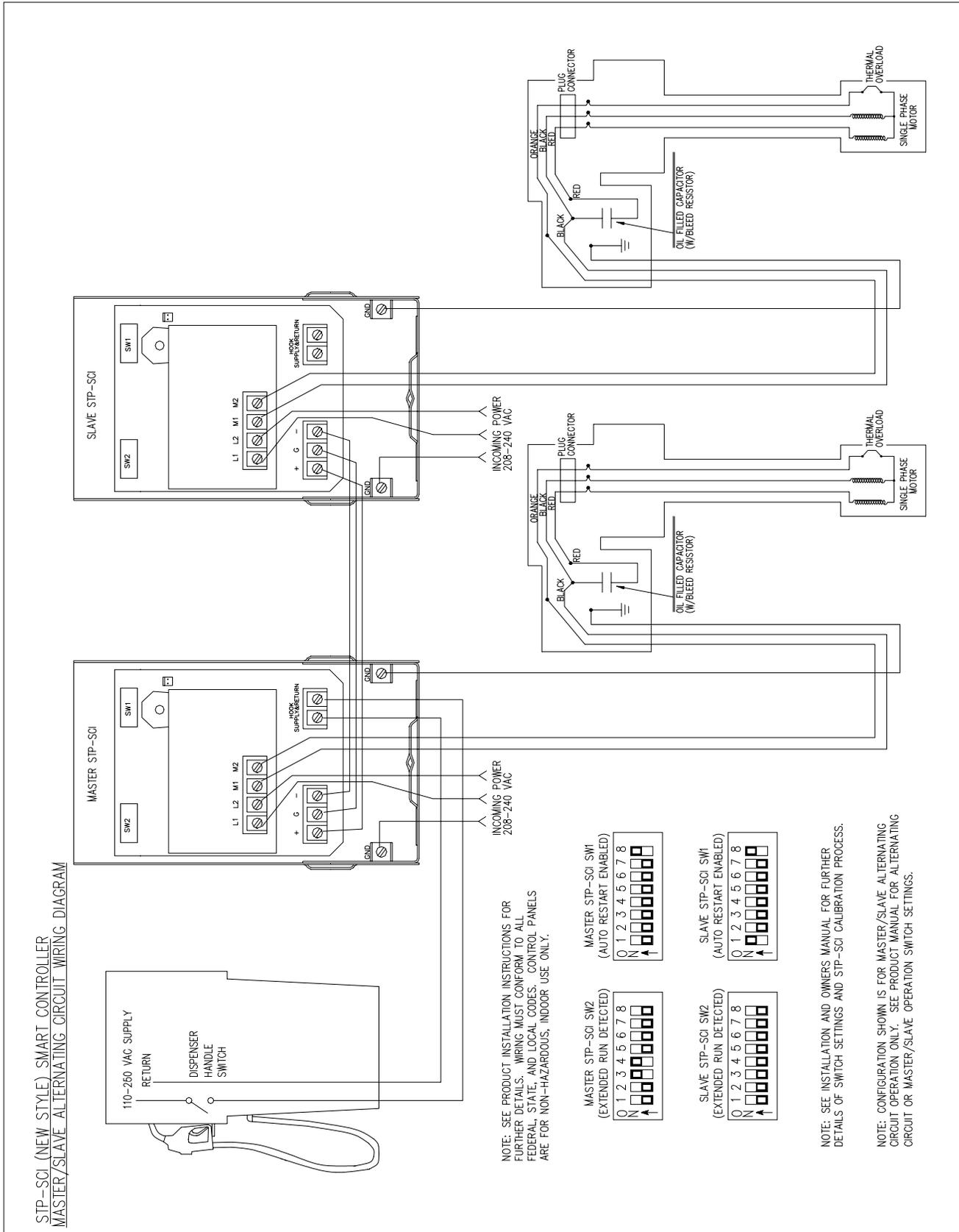
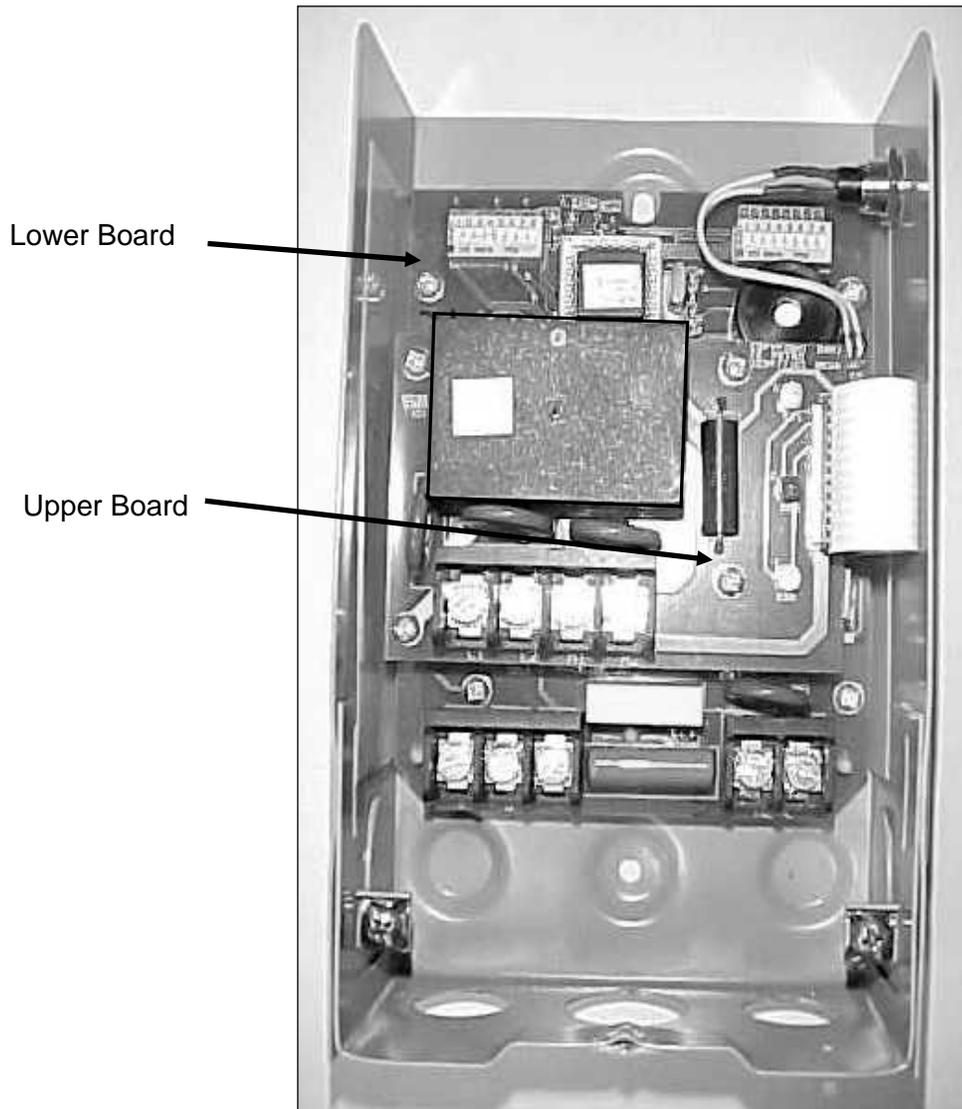


Figure 5
STP-SCI Master/Slave Alternating Circuit Wiring Diagram

REPLACEMENT PARTS

Upper Board (Relay Assembly): P/N 225005930
Lower Board (Control Assembly): P/N 225000930



Picture 4

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