

# Service Bulletin

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**Machinery Affected:** Cyber A/T® Saw  
**Document:** SB208-A  
**Title:** Replacing the PLC  
**Applies To:** Replacing an LM90 Model With an RX3i Model  
**Distribution:** Upon Order



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## Purpose and Scope

The model LM90 PLC is being outdated. When a PLC or associated components are needed, the RX3i model is now supplied. This procedure describes how to install the new backplate and electrical components needed.

The RX3i is referred to by the manufacturer as a Programmable Automation Controller, but for the purposes of this equipment, it is still called a PLC.

## Overview

The parts included in this kit are shown in Table 1. Please ensure all parts are present before starting this procedure.

**Table 1: Parts in SB208KIT-A**

Qty.	Part Description	Part #
1	Expansion transmitter	519912
2	Blank modules	519945
1	Profibus master	519913
1	PLC CPU, programmed	92281-501
1	Power supply	519916
1	12-slot rack	519932
3	6-in. Interconnect cables	504808
1	Termination resistor plug	504434
1	Service Bulletin Kit for end-to-end cable	SB221KIT
1 each	Service Bulletin documents	SB208-A

Before beginning the procedure, gather the supplies listed in Table 2.

**Table 2: Customer-Supplied Items**

Qty.	Part Description
1	lockout/tagout mechanism
1	masking tape and pen
1	Phillips and slotted screwdrivers
1	Drill handle, #29 bit, and 8-32 tap

If you have any questions, call MiTek Machinery Division Customer Service at 800-523-3380.

## Procedure

### Preparing the Saw

1. Before shutting down the saw, move all blades and centerlines to a home position. Set the carriage length to a known length such as 6-0-0 (6 ft, 0 inches, 0 16th).
2. From the Manual screen, record all of the current positions in the graphic here.

Figure 1: Record Current Positions Here



The screenshot displays the control interface for a saw, organized into several sections:

- Blade 6:** Controls for blade angle (in/out) and position (+/-), with two input fields.
- Blade 5:** Controls for blade angle (in/out) and position (+/-), with two input fields.
- Blade 4:** Controls for blade angle (+/-) and position (+/-), with two input fields.
- Blade 3:** Controls for blade angle (+/-) and position (+/-), with two input fields.
- Blade 2:** Controls for blade angle (+/-) and position (+/-), with two input fields.
- Blade 1:** Controls for blade angle (+/-) and position (+/-), with two input fields.
- Hold Downs:** Eight directional buttons for blade movement.
- Infeeds:** Four directional buttons for infeed movement, with two input fields below.
- Carriage:** Four directional buttons for carriage movement, with one input field above.
- Lumber Stop:** Two directional buttons for lumber stop movement, with one input field below.
- Start Buttons:** Six green buttons labeled Start 1 through Start 6.
- MANUAL:** A large button at the bottom center.
- Speed Controls:** Three buttons for Angle Speed, CenterLine Speed, and Conveyor Speed.
- Quantity:** A section with a stack of lumber icon, a 'Set' button, and a '1' value, along with 'In' (0) and 'Out' (0) counters.
- Infeed Speed:** A button labeled 'Infeed 100% Speed'.

3. On the HMI (touch screen), go to the PLC screen accessed from the Home screen and write down the PLC software version shown.
4. Power down the operator interface (touch screen computer).
5. Power down the saw, turning the disconnect switch to Off.
6. Lock out and tag out the source that supplies power to the saw, following the instructions in the next section and your internal procedures.

### Electrical Lockout/Tagout Procedures



 <b>WARNING</b>	
	<p><b>ELECTROCUTION HAZARD!</b></p> <p><b>Verify that all power to the machine has been turned off and follow approved lockout/tagout safety procedures before performing any maintenance.</b></p> <p><b>All electrical work must performed by a qualified electrician.</b></p> <p><b>If it is absolutely necessary to troubleshoot an energized machine, follow NFPA 70E for proper procedures and personal protective equipment.</b></p>

#### **When Working on a Machine Inside the Machine’s Main Electrical Enclosure or in the Electrical Transmission Line to the Machine**



Before opening the main electrical enclosure, or attempting to repair or replace an electrical transmission line to the machine, lockout/tagout the machine properly. Follow your company’s approved lockout/tagout procedures which should include, but are not limited to the steps here.



1. Engage an E-stop on the machine.
2. Turn the machine’s disconnect switch to the “off” position. This is usually required to open the main electrical enclosure’s door.
3. Shut the power to the machine off at the machine’s power source which is usually an electrical service entry panel on the facility wall. One example of a locked-out power source panel is shown in Figure 2.
4. Attach a lock and tag that meets OSHA requirements for lockout/tagout to the electrical service entry panel.
5. Open the door to the enclosure in which you need access, and using a multimeter, verify that the power is off.

Figure 2: Lockout/Tagout on the Power Source Panel



### Pneumatic System Lockout/Tagout Procedure

	 <b>WARNING</b>
	<p><b>MOVING PARTS CAN CRUSH AND CUT.</b></p> <p>Always verify that power to the machine has been turned off and follow approved lockout/tagout procedures.</p> <p>Turn off the air switch before performing any maintenance on the equipment.</p>

	 <b>WARNING</b>
	<p><b>HIGH PRESSURE HAZARD.</b></p> <p>Bleed pneumatic lines before performing any maintenance on the pneumatic system.</p>

## Removing Modules Overview



Care must be exercised when installing and removing modules to avoid damage to the modules and backplane.

To remove any module discussed in this procedure, use these guidelines:

1. Locate the release lever(s) at the bottom of the module and firmly press upward (1), toward the module. Wider modules have two release levers that must both be pressed up at the same time.
2. While holding the module firmly and fully depressing the release levers, pivot the module upward until its connector is out of the backplane (2).
3. Lift the module up and away from the backplane to disengage the pivot hook (3).

**Figure 3: Removing a Module**



## How to Avoid Damage When Reinstalling Modules

### NOTICE

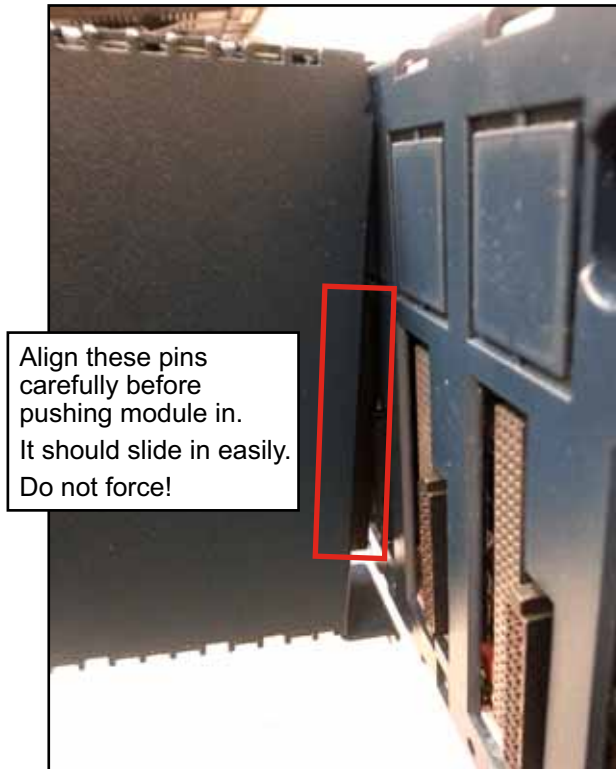
**Be careful not to bend or break the pins on the back of the module!**

These modules are designed with male pins that should easily slide into the female port on the backplane. The pins must be perfectly aligned, though, or they will bend or break when pushed in. Follow the guidelines in Figure 4 and the procedure on page 8 to properly install the modules.



If you receive unexplained errors later in the procedure, check the condition of these pins. If they are bent, try straightening them and re-installing the module. If they are broken off or pushed in, call MiTek Customer Service to return the current module and obtain a new one.

**Figure 4: Avoiding Damage When Re-Installing**



## Installing Modules Overview

To install modules discussed in this Service Bulletin, use the applicable procedure below and follow the guidelines given in Figure 4.

### Pivot-Hook Modules

1. Holding the module firmly, align the module with the correct slot and connector.
2. Engage the module's rear pivot hook(s) in the notch(es) on the top of the backplane (1)
3. Swing the module down (2) until the module's connector engages the backplane's connector, and the release lever(s) on the bottom of the module snaps into place in the bottom module retainer (3).

Figure 5: Installing a Pivot-Hook Module



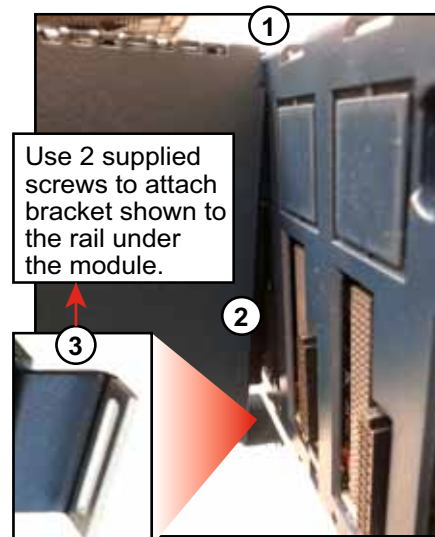
Ensure the pins are aligned as described on page 7!

4. Visually inspect the module to be sure it is properly seated.

### Screw-In CPU/Modules

1. Holding the module firmly, align the module with the correct slot and connector.
2. Engage the module's rear pivot hook(s) in the notch(es) on the top of the backplane (1).
3. Gently press the module pins into the connector holes (2). Ensure the pins are aligned as described on page 7!
4. Attach the bracket at the bottom of the module (3) to the bracket on the backplane with 2 screws.

Figure 6: Installing a Screw-In CPU

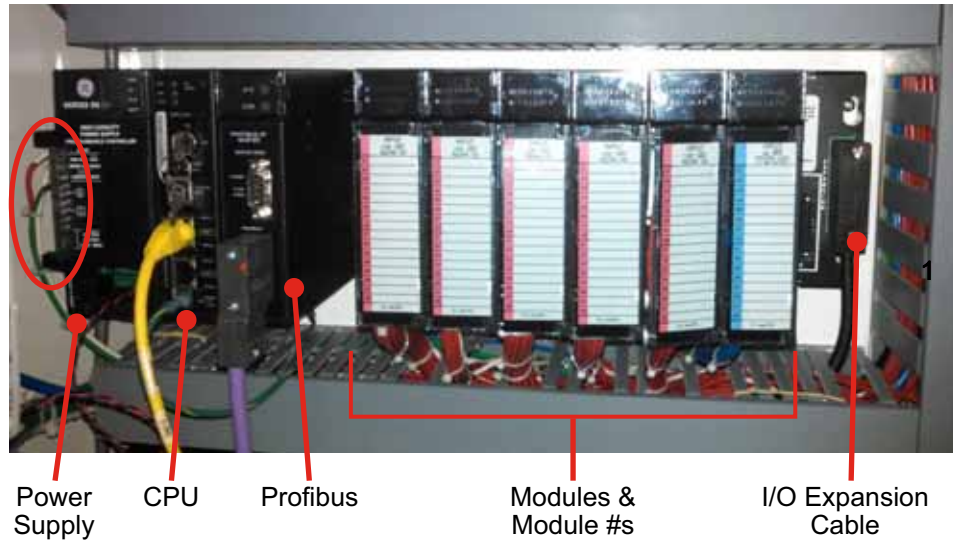




## Removing the Old Backplate (Rack)

1. Open the stationary enclosure's doors and get familiar with the PLC main rack as shown in Figure 7.

**Figure 7: Old PLC Rack Components**



2. Label modules 1-6 as shown in Figure 8.
3. Disconnect the yellow Ethernet cable from the CPU.
4. Disconnect the ground wire from the CPU that is either green or green and yellow. Remove the other end of the ground wire from the enclosure back and discard the wire. Grounding is not required with the new PLC design.
5. Loosen the screws and disconnect the purple cable from the Profibus module.
6. Loosen the screws and disconnect the red, white, and green wires from the PLC power supply.
7. Remove the battery cable from the CPU if there is one.



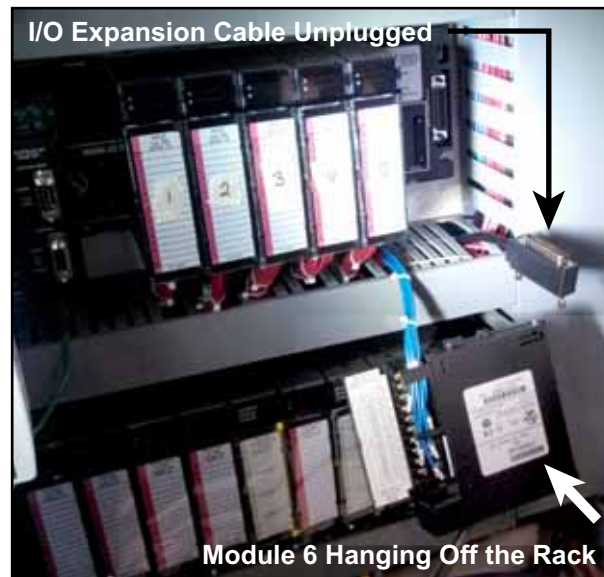
- If an auxiliary battery module is present on the side of the enclosure, loosen the screws on the battery module and remove it.

**Figure 9: Remove the Old Battery Module**



- Remove all modules one by one starting from the right side moving to the left side (Refer to *Removing Modules Overview* on page 6). Carefully let them hang by their wiring.

**Figure 10: Module 6 and I/O Expansion Cable Disassembled from PLC Rack**



- Loosen the screws and disconnect the I/O expansion cable from the backplane.
- Unscrew and remove all screws from the backplane. Keep all them to be re-used later. Discard the old backplane.

## Installing the New Components

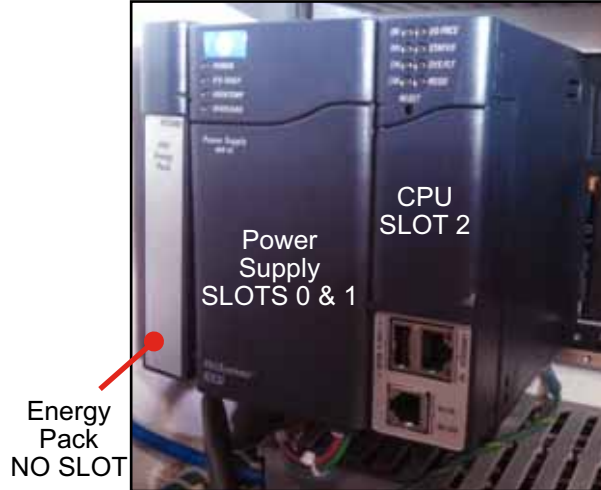
1. Mount the new backplane:
  - a) Using the new backplane as a template, hold it up in the space available in the enclosure and mark the 2 top holes to indicate where new holes should be drilled in the enclosure wall.
  - b) Drill and tap the holes using drill bit #29 and an 8-32 tap.
  - c) Mount the backplane using the two top holes.
  - d) Mark locations of the 2 bottom holes and remove the backplane.
  - e) Drill and tap the bottom holes as described above.
  - f) Mount the new backplane and tighten all screws.

**Figure 11: The New Backplane Installed, With Slots Numbered**



2. Install the new PLC power supply.

**Figure 12: Left End of New PLC Rack**



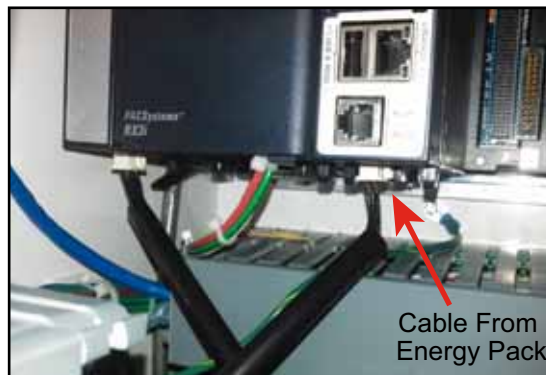
Locate these components in Figure 12.

- a) Place the power supply in slots #0 and #1.
- b) Locate the wires disconnected (in step 6 on page 9). Connect the red wire to terminal +L1, the white wire to N, and the green wire to ground.
- c) If the ON/OFF switch is in the OFF position, press the switch to ON.

3. Mount the energy pack:

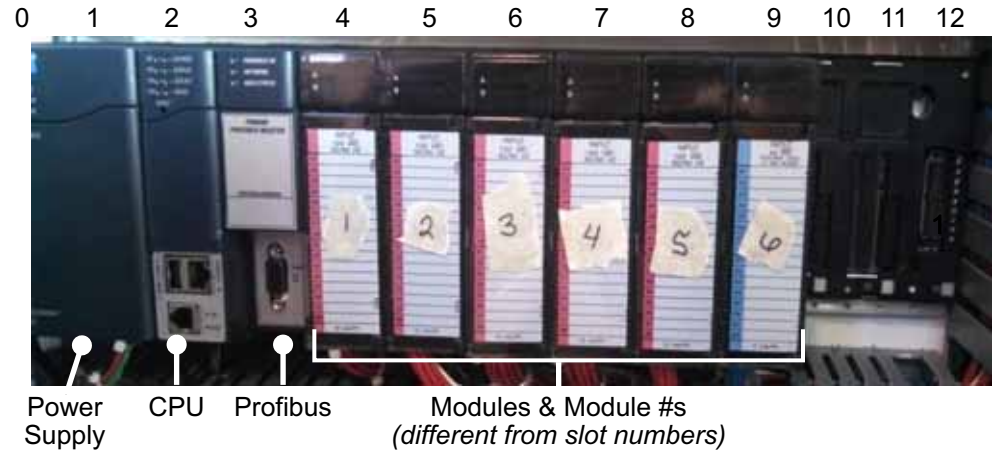
- a) Ensure the energy pack cable is attached, and place the energy pack so it is mounted onto the left side of the power supply. It connects to the side of the power supply similar to how the modules connect to the backplane. It is not in a backplane slot, but connects directly to the power supply.
- b) Connect the cable from the energy pack to the bottom of the CPU as shown in Figure 13.

**Figure 13: Connect the Energy Pack Cable to the PLC**



4. Install the CPU in slot #2.

**Figure 14: Slot Numbers Shown Above New PLC Rack**



Locate these components in Figure 14 and Figure 15.

5. Install Profibus module in slot #3.
6. Install modules 1-6 in order, in slots #4-9.
7. Install the expansion transmitter module as shown in Figure 15:
  - a) Place the expansion transmitter module in slot #12.
  - b) Locate the expansion cable removed earlier, shown in Figure 10 on page 10. Attach the expansion cable to the remote transmitter connector and tighten the screws.

**Figure 15: Installing the Expansion Transmitter Module**



8. Install the 2 blank modules in slot #10 and #11.
9. Reconnect the yellow cable to the CPU Ethernet connector (slot #2). There is no need for a ground wire with the new PLC design.
10. Connect the purple cable to the Profibus module connector (slot #3) as shown in Figure 16.
11. Locate the Interconnect cables supplied in this kit before continuing to the next step. An Interconnect cable is shown in Figure 17.

**Figure 16: Ethernet and Profibus Cables**



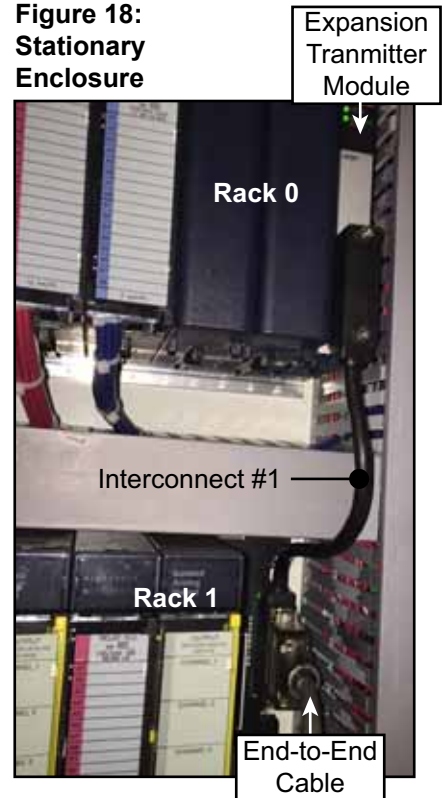
**Figure 17: 6" Interconnect Cable**



## Connecting the Interconnect Cable in Stationary Enclosure

1. Refer to Figure 18. Locate the expansion transmitter module on Rack 0. Plug the 1-sided end of one of the supplied Interconnect cables into the expansion slot. This cable is now called Interconnect #1.
2. Plug the double-sided end into the slot on Rack 1.
3. Plug the End-to-End cable into the double-sided end of the Interconnect cable. See SB221 for more details regarding the End-to-End cable.

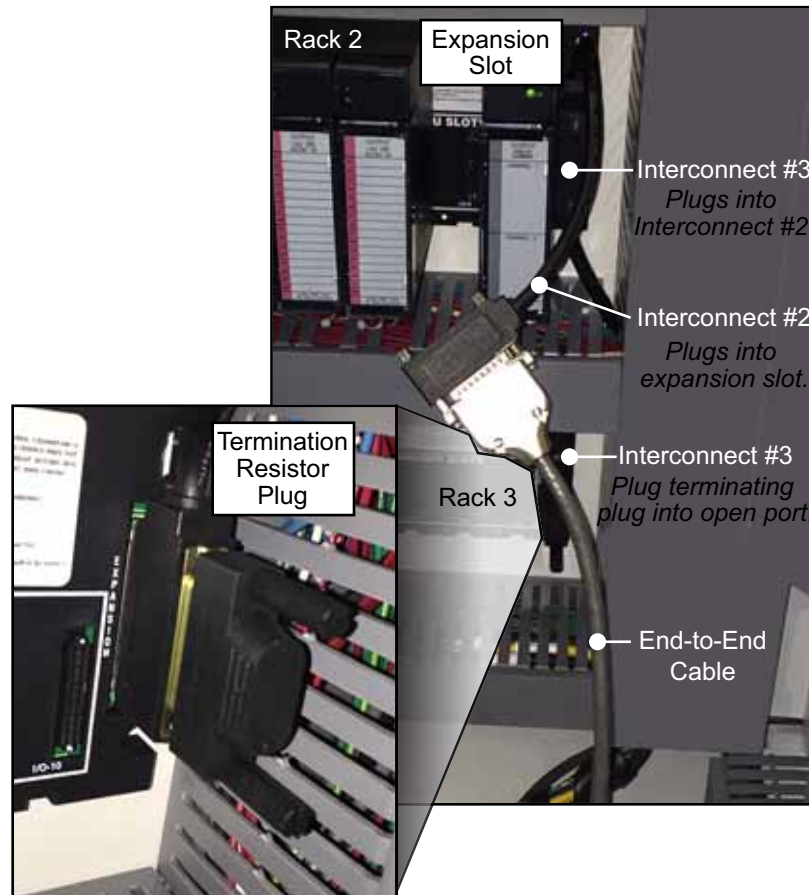
**Figure 18:**  
Stationary  
Enclosure



## Connecting the Interconnect Cables in Carriage End

1. Plug the 2-sided end of an Interconnect cable into the expansion slot in the Rack 2 of the carriage enclosure. It is now called Interconnect #2.
2. Plug the final Interconnect cable (now called Interconnect #3) into the 2-sided end of the Interconnect cable #2.
3. Plug the free end of Interconnect #3 into the expansion slot on Rack 3.
4. Plug the terminating plug into the open port on Interconnect #3.
5. The end-to-end cable plugs into the open side of Interconnect #2. More details can be found in SB221 regarding the End-to-End cable.

**Figure 19: Cyber A/T, Rack 2 & Rack 3, Carriage-End Enclosure**





### Software and Calibration

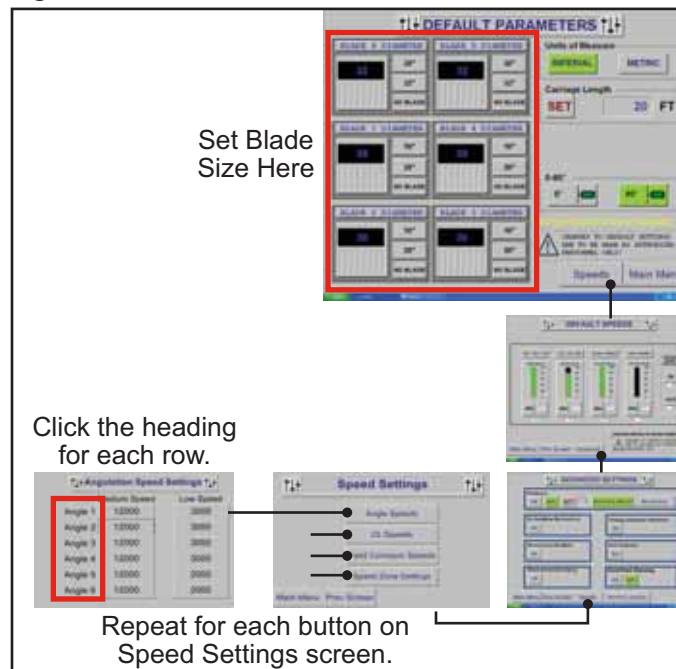
1. Remove the lockout/tag-out mechanisms, turn on the main disconnect, and power up the HMI (touch screen).
2. Verify the following on the Profibus Master Module:
  - PROFIBUS OK LED is green.
  - NETWORK LED is yellow.
  - MOD STATUS LED is static on.
3. Verify the following on the PLC CPU:
  - OK light is green.
  - RN (run) light is green.
  - EN (enable) light is green.
  - SYS FLT (system fault) light is off.
4. Verify on the HMI that the PLC version number has been changed from what it was at the beginning of this procedure. It is shown on the PLC screen, accessed from the Home screen.



If you receive unexplained errors, check the condition of the pins described on page 7. If they are bent, try straightening them and re-installing the module. If they are broken off or pushed in, call MiTek Customer Service to return the current module and obtain a new one.

5. Transfer the necessary defaults from the HMI software to the PLC. Failing to finish these steps will result in blade collisions and inaccurate cuts.
  - a) Set the blade size for each quad by going to the Main Menu>Default Parameters screen on the HMI.
  - b) Press the SPEED button on the Default Parameters screen. Set the speed to the default setting using the Default Speeds screen on the HMI.

**Figure 20: Set the Defaults**



6. Calibrate the saw. Refer to the Equipment Manual for calibration instructions if necessary.

## Overview of PLC Indicators

Review and become familiar with the CPU and RDS D indicators in Table 3.

**Table 3: Explanation of PLC CPU Indicators (for model CPE305)**

LED Name	LED State	CPU Operating State
OK	On, green	CPU has passed its power up diagnostics and is functioning properly (after initialization is complete).
	Off	CPU problem. RUN and OUTPUTS ENABLED LEDs may be blinking in an error code pattern, which can be used by technical support for troubleshooting.
	Blinking, other LEDs off	CPU in Stop-Halt state; possible watchdog timer fault. Refer to the fault tables. If the programmer cannot connect, cycle power and refer to fault tables in PLC manufacturer's manual.
OK and EN (both)	Blinking in unison	CPU is in boot mode and is waiting for a firmware update through a serial port.
RN	On	CPU is in Run mode.
	Off	CPU is in Stop mode.
EN	On	Output scan is enabled.
	Off	Output scan is disabled.
I/O FORCE	On	Override is active on a bit reference.
STATUS	Blinking, green	Energy Pack charging; not yet charged above the minimum operating voltage. (It can operate while below minimum charge because the energy pack is not in use.)
	On, red	Energy Pack circuit fault. There is no need to replace the energy pack because the PLC works without it.
	Blinking, red	Energy Pack near its end of life. There is NO need to replace because the PLC receives its power from the saw.
	On, green	Energy Pack is charged above its minimum operating voltage.
	Off	Energy Pack not connected. Connect the cable to the PLC.
SYS FLT (System Fault)	On, red	CPU is in Stop/Faulted mode because a fatal fault has occurred.
CM	Blinking, green	Signal activity on COM1 port.
	Off	No activity on COM1 port.

**END OF SERVICE BULLETIN**