

MiTek®

SERVICE BULLETIN

Affected machinery:

BLADE™ Wood Processing System

Document:

SB239

Title:

Upgrading to *MPERIA*® Print Controller

Applies to:

All *BLADE* systems using *Matthews*® V84i Print Controllers

Distribution:

Customers upon order (Install by MiTek Technician)

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Purpose and Scope

This service bulletin describes how to convert from a *Matthews V84i* print controller to the new *Matthews MPERIA*® print controller for the *MiTek*® *BLADE*.

Overview

Printer Configurations

The *BLADE* wood processing system can be customized to use a number of different print configurations. When appropriate, the instructions in this document will account for different print configuration options using the A-F labels listed in Table 1. Note that this document only covers straight conversions from matching options (A to A, B to B, etc.)

Table 1: *BLADE* Print Head Configurations

Option	Print Head Description	Valve Configuration
A	Standard with every saw. 1 print head prints standard print fields (text) on front face.	16 Front
B	Uses 2 print heads to print standard print fields, joint and plate information, and joint alignment marks all on the face-up side of boards.	16 Front / 7 Rear
C	Same as A, plus a 2 nd print head to print on the top edge of boards.	16 Front / 7 Edge
D	Same as B, plus a 3 rd print head to print on the top edge of boards.	16 Front / 7 Rear / 7 Edge
E	AGS+: Uses 2 print heads to print everything in B, plus plate outlines in correct location, and basic graphics all on the face-up side of boards.	32 Front / 32 Rear
F	AGS+: Same as E, plus a 3 rd print head to print on the edge of boards.	32 Front / 32 Rear / 7 Edge

Parts and Supplies

Parts in this bulletin will be referred to using the terminology or part numbers listed in Table 2 and Table 3. Please make sure all parts are present before starting this procedure. If you have any questions, call MiTek Machinery Division Customer Service at 1-800-523-3380.

Before beginning the procedure, gather the supplies listed here:

- Philips and flat-blade screwdrivers
- Hex key set
- Marker
- Electrical tape
- Hammer drill and bits for anchoring to floor
- Lockout/tagout mechanism
- USB Drive

Table 2: Parts in Kits for Options A-D (SB239KIT-A and SB239KIT-D)

Quantity	Description	Part #
4	Bolt, anchor, wedge, 1/2x4-1/4	305022
1	<i>BLADE MPERIA</i> printer enclosure assembly	90651-501
1	Network switch, 8 port	504806
1	Cat6 ethernet cable,50 ft	504817
1	Cat5e ethernet cable, 1 ft	508943
1	18 AWG blue wire	508003
1	16 AWG white/blue wire	508006
1	16 AWG blue wire	508006
1	16 AWG green ground wire	508006
1	Gen 1 signal cable converter, V84i to <i>MPERIA</i>	97118-501
1	Gen 2 signal cable converter, V84i to <i>MPERIA</i>	97117-501
1 (option D)	Fan out cable, 1 ft	168176
1	Service Bulletin SB239 document	SB239
5	3-1/2" cable ties	508700
10	13-1/4" cable ties	508702
1 sheet	Labels, blank write-in	694060

Table 3: Parts in Kits for Options E-F (SB239KIT-E and SB239KIT-F)

Quantity	Description	Part #
1	Bolt, anchor, wedge, 1/2x4-1/4	305022
1	<i>BLADE MPERIA</i> printer enclosure assembly	90651-501
1 (option E) 2 (option F)	Cabtite grommet, 0.39-0.43	511764
1	Network switch, 8 port	504806
1	Cat6 ethernet cable,50 ft	504817
1	Cat5e ethernet cable, 1 ft	508943
1	18 AWG blue wire	508003
1	16 AWG white/blue wire	508006
1	16 AWG blue wire	508006
1	16 AWG green ground wire	508006
1	Gen 1 signal cable converter, V84i to <i>MPERIA</i>	97118-501
1	Gen 2 signal cable converter, V84i to <i>MPERIA</i>	97117-501
1	Service Bulletin SB239 document	SB239
5	3-1/2" cable ties	508700
10	13-1/4" cable ties	508702
1 sheet	Labels, blank write-in	694060

Procedure

Electrical Lockout/Tagout Procedure

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

Procedure for Working Either 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, 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 1.
4. Attach a lock and tag that meet OSHA requirements for lockout/tagout to the electrical service entry panel.
5. Open the door to the enclosure to which you need access. Using a multimeter, verify that the power is off.

Figure 1: Lockout/Tagout on the Power Source Panel



Pneumatic System Lockout/Tagout Procedure

	 WARNING
	<p>MOVING PARTS CAN CRUSH AND CUT.</p> <p>Always verify that power to the machine has been turned off and follow approved lockout/tagout procedures.</p>
	 WARNING
	<p>HIGH PRESSURE HAZARD.</p> <p>Bleed pneumatic lines before performing any maintenance on the system.</p> <p>Working on pressurized lines may cause injury.</p>

Software Compatibility Requirement

The version number of the *MATCHPOINT BLADE* software must be 8.0.3 or higher in order for the *MPERIA* printer to function properly. If you are using software version 8.0.2 or earlier, please contact customer service at 1-800-523-3380 before proceeding with this hardware upgrade. The version number is displayed on the launch screen.



Disconnecting the V84i Controller



1. Verify your *MATCHPOINT BLADE* software is compatible with the *MPERIA* hardware. See Software Compatibility Requirement on pg. 5.
2. With the saw locked out, locate the V84i printer enclosure(s). Options A-D include one primary enclosure. Options E and F utilize an additional secondary enclosure.

Figure 2: V84i Printer Enclosures



3. In the V84i primary enclosure, disconnect the **Gripper** (top rearmost) and **LASM** (bottom rearmost) encoder cables. Before proceeding to next step, mark the connectors as Gripper and LASM (see Figure 3).

Figure 3: Encoder Switch



4. Use a flat-blade screwdriver to release and disconnect all print head cables connected to the primary and secondary V84i enclosures. The ports are labeled on the V84i controllers and the existing print head cables should be marked as Front A, Rear B, etc (see Figure 4).
 - The number and type of print head cables will vary according to the *BLADE* configuration. As you disconnect the cables, we recommend marking any print head cables that are not already labeled using the blank wire labels included in the install kit. Refer to Table 4 for wire names.

Figure 4: Print Head Cable Examples



V84i Controller

Table 4: Print Head Cables Inside V84i Enclosures

Option	Cables in Primary Enclosure	Cables in Secondary Enclosure
A	Front print head A	N/A
B	Front print head A Rear print head B	N/A
C	Front print head A Edge print head B	N/A
D	Front print head A Rear and Edge B (with y-splitter)	N/A
E	Front print head A Front print head B	Rear print head A Rear print head B
F	Front print head A Front print head B	Rear print head A Rear print head B Edge print head A

5. Disconnect the Serial/USB print head cable connected to the V84i Controller in the Primary Enclosure.

Figure 5: Serial/USB Print Head Cable



6. Use a compatible hex key to loosen the grommets through which the cables exit each enclosure. Remove the following disconnected cables from the V84i enclosures:
 - Gripper and LAM encoder cables
 - Print head cables (number may vary)
 - USB/Serial print cable

7. Disconnect the power and signal cable from the side of the V84i primary enclosure (see Figure 5).

Figure 6: Power and Signal

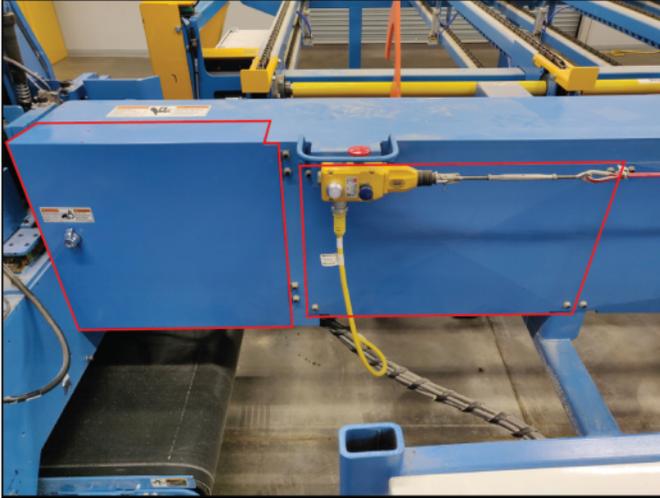


8. Once all cables have been removed, remove any bolts securing the V84i enclosures in place and use a 2-man lift to move the old enclosures clear of the saw.
9. Using a 2 man-lift, position the new *MPERIA* enclosure in the former location of the primary V84i print enclosure to ensure the included cables can reach all necessary connection points.

Preparing the *BLADE* for *MPERIA* Upgrade

1. Before installation of any components can take place, the bundle of cables that runs through the infeed section of the *BLADE* must be released in order to allow the routing and connection of cables in later steps.
2. Use the thumbscrew to unlock and open the infeed access door and a compatible hex key to remove the infeed access panel.

Figure 7: Infeed Access Door (L) and Access Panel (R)

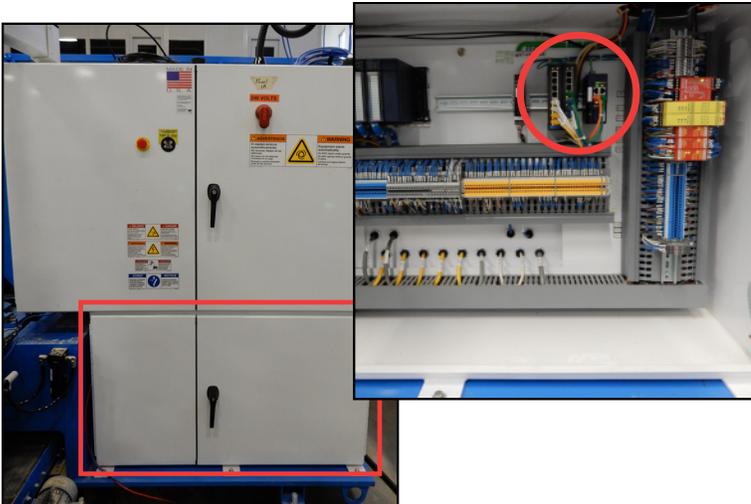


3. Remove all visible cable ties and wrap behind both panels. The cables will be connected and re-bundled at a later point.

Installing the *MPERIA* Enclosure

1. Open the bottom door of the *BLADE* main electrical enclosure and locate the network switches labeled as PT_1, PT_2, and PT_3. See Figure 8.
 - Note that PT_2 and PT_3 switches may not be present in earlier *BLADE* configurations.

Figure 8: Network Switches



2. Follow the below steps to install the new 8-port network switch (referred to as PT_NEW):
 - a) Attach PT_NEW to the DIN rail next to the existing switches.
 - b) To supply power, connect negative (0 VDC) terminal block on the green switch connector to terminal block 52-12 with a minimum 16 awg (white/blue) wire and connect positive (24 VDC) terminal block on the green switch connector to terminal block 50-8 with a minimum 16 awg (blue) wire.
 - c) Connect the green ground wire to the switch using the terminal ring 14-8 end and connect the other end to the nearest ground bar.
3. Review Table 5 to determine how to connect PT_NEW. The layout in the **My setup...** column should roughly match your *BLADE* configuration.

Table 5: BLADE Networking Configurations

My Setup With PT_NEW	Install Instructions
	<p>a) Use the 1-ft Cat5e cable to connect port 1 on PT_NEW to an empty port on PT_2 (use port 8 to match the factory default).</p>
	<p>a) Use the 1-ft Cat5e cable to connect port 1 on PT_NEW to an empty port on PT_2. Use port 8 to match the factory default.</p> <p>b) If ports are not available on PT_2, locate and disconnect a CAT5/6 cable connected to PT_2 that is NOT labeled as VFD. Connect this cable to port 2 on PT_NEW. Repeat step a.</p>
	<p>a) Unplug the cable connected to port 3 on PT_1 (EWON) and connect it to port 2 on PT_NEW.</p> <p>b) Use the 1-ft Cat5e cable to connect port 3 on PT_1 (EWON) to port 1 on PT_NEW.</p>

4. Connect the new **50-ft Cat5/6** cable to port 8 on PT_New.

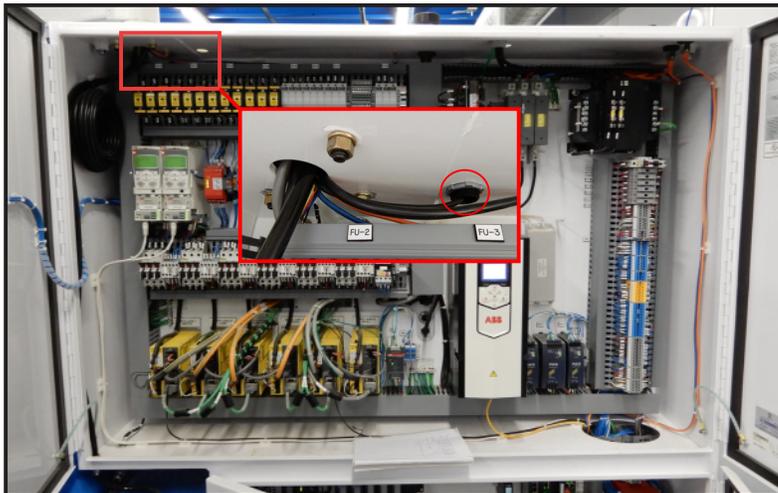
5. Route the **50-ft Cat5/6** cable from the network switch, across the saw, and to the *MPERIA* enclosure by carefully following these routing steps:
 - a) Disconnect the **USB cable for Moxa converter** that connects to the touch screen and feeds into the touch screen enclosure arm. See Figure 9.
 - b) From the main electrical enclosure, pull the **USB cable for Moxa converter** out through the touch screen enclosure arm. See Figure 9.

Figure 9: Pull Wire Through



- c) Locate the **50-ft Cat5/6** cable in the bottom *BLADE* main electrical enclosure and route the free end into the top enclosure through the connecting hole. The cable will be fished through the conduit opening (circled in Figure 10).

Figure 10: Cat5/6 Cable Run



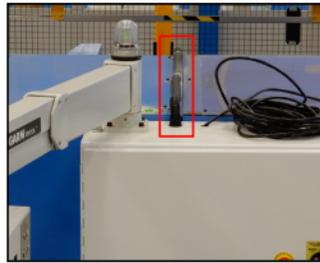
- d) In order to ease the process of fishing the **50-ft Cat5/6** cable (i.e. connecting two cables together to pull one through an existing cable run), remove the connector end of the **USB cable for Moxa converter**. Then connect the bare end of the **USB cable for Moxa converter** to the **50-ft Cat5/6** cable with electrical tape.

- e) Fish (or pull) the **USB cable for Moxa converter** from where it terminates at the V84i primary enclosure to route the **50-ft Cat5/6 cable** through the conduit that runs along the top of the saw frame (see Figure 11). Note that this conduit may not be installed on earlier *BLADE* frames. In these instances, route the cable **50-ft Cat5/6 cable** through the existing path being used by the **USB cable for Moxa converter**.

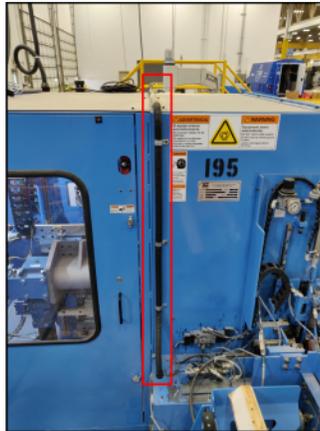
During the routing/fishing process, exercise care not to damage the connector or the cable. If you encounter any resistance, remove the conduit clips and cable ties as necessary to aid movement.

- f) Once the cable has been fished from the *BLADE* main electrical enclosure to the *MPERIA* enclosure, use the 3-1/2" cables ties to secure the **50-ft Cat5/6 cable** inside the cabinet as shown in Figure 12. The cable will be connected inside the *MPERIA* enclosure at a later step.

Figure 11: Conduit Run

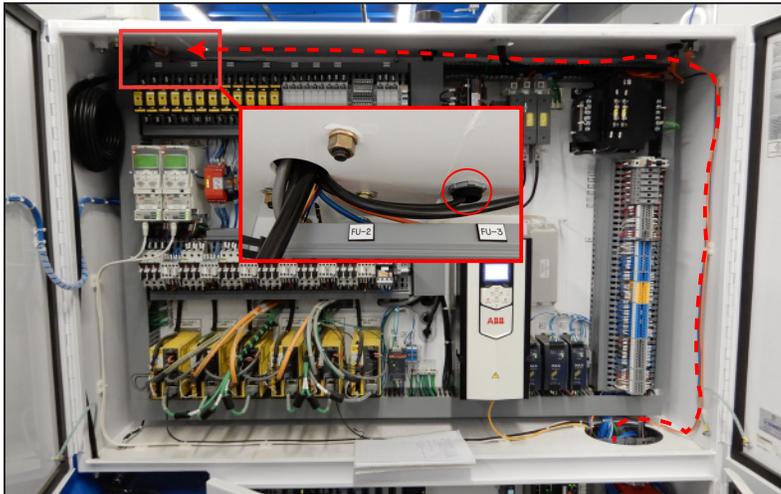


Top View



Side View

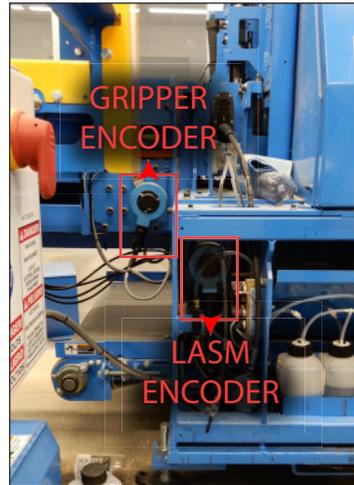
Figure 12: Cat5/6 Cable Management



6. Connect the 2 new encoder cables by following these steps:

- a) Locate the old Gripper encoder cable (labeled as Gripper on page 6).
- b) Disconnect the old Gripper cable at its connection point to the saw. See Figure 13.
- c) Following the routing of the old Gripper cable through the infeed rail, connect the new Gripper cable to the saw.
- d) Remove the old Gripper cable.
- e) Locate the old LASM encoder cable (labeled as LASM on page 6).
- f) Disconnect the old LASM cable at its connect point to the saw. See Figure 13.
- g) At this point, one of two ways to connect the new LASM cable may be utilized. Use whichever methods suits the present *BLADE* configuration:

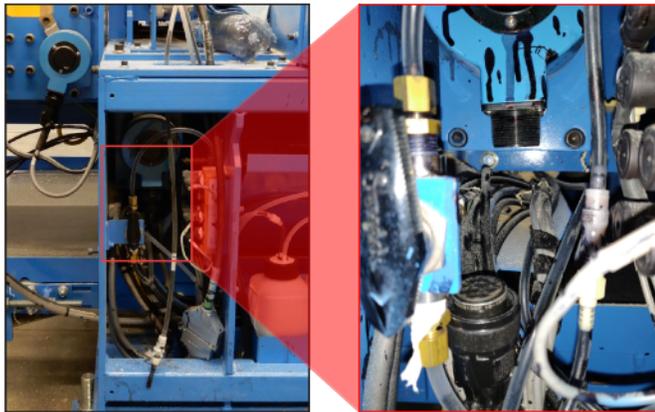
Figure 13: Encoder Ports



Method 1

Remove the old LASM cable. Use your hands to push the new LASM cable through the infeed cable channel and connect the new cable to the LASM port.

Figure 14: LASM Port (L) and Cable Channel (R)



Method 2

Remove the green connector end of the old LASM cable (previously connected to the V84i enclosure) and use electrical tape to connect it to black screw-on connector on the new LASM cable. Pull on the loose end of the old

LASM cable to fish the new cable through the cable channel to the LASM port.



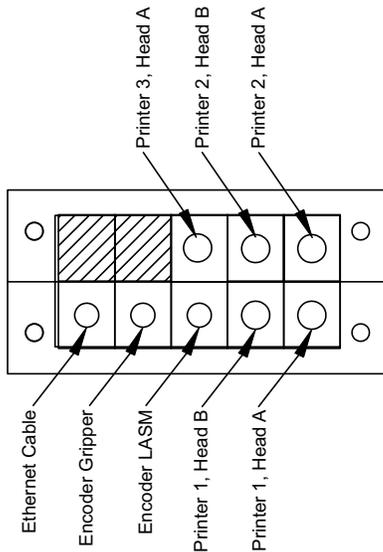
By default, the gripper encoder wiring is set up for a left-to-right board infeed configuration. If your *BLADE* saw is set up for a right to left board infeed configuration, you must rewire the gripper connector in order for the printer to function properly. See Appendix B on pg. 28 for further instructions.

- Run all necessary cables through grommets on the bottom of the *MPERIA* enclosure as seen in Figure 15. Note that the included image may not match your configuration.



Your *BLADE* print configuration may not utilize every cable displayed below. See Appendix A to determine cable requirements for different print options A-F.

Figure 15: Cables Entering *MPERIA* Enclosure Through Grommets



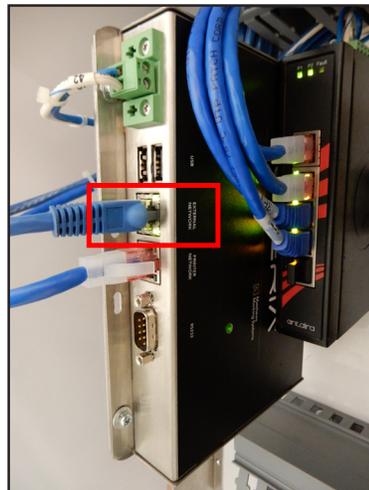
*This is the recommended cable arrangement when entering the *MPERIA* enclosure to ensure your documentation matches your system. If your printer system does not have all of these cables, leave some grommets blank.*



Grommet Ports

- Inside the *MPERIA* enclosure, connect the **50-ft Cat5/6** cable (that was run from the switch in the main enclosure) to the **EXTERNAL NETWORK** port on the print controller.

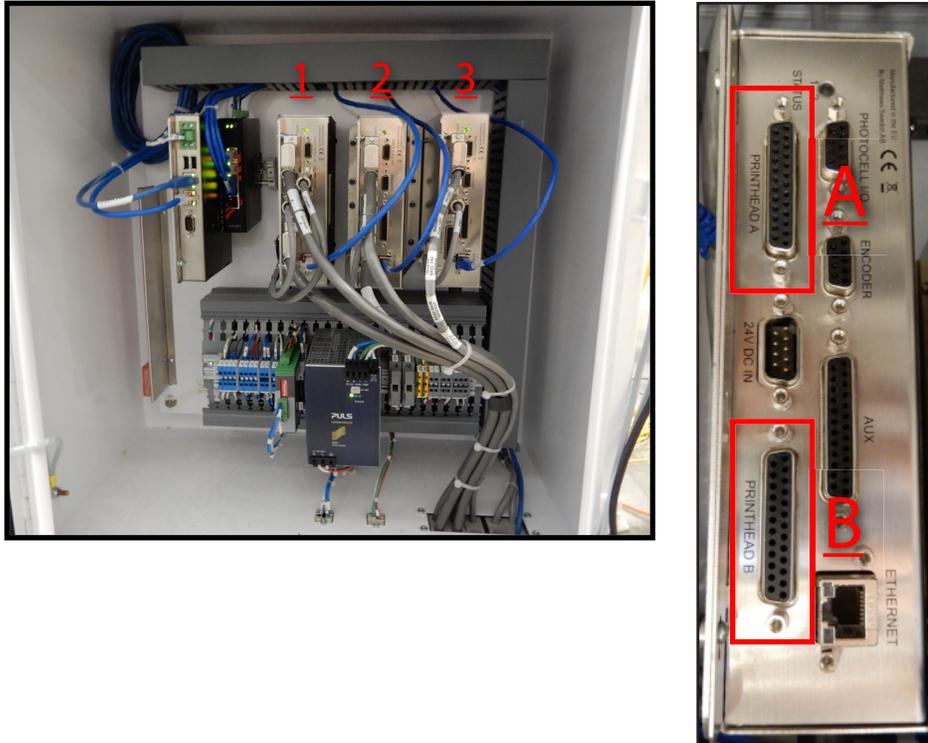
Figure 16: Connect CAT5/6



9. Connect all **print head cables** inside the *MPERIA* enclosure. The cables should be labeled with a letter (A or B) and their associated print head location (Front, Rear, or Edge). The V-Link PRINthead ports are labeled A or B. See Figure 17.

Depending on the *BLADE* print configuration option A-F, one to three V-Links will be pre-installed by MiTek. For the purposes of this bulletin, the V-Links are labeled 1 > 2 > 3. See Appendix A on pg. 25 for drawings that demonstrate how to connect the **print head cables** in each configuration.

Figure 17: V-Link Arrangement and Labels



10. Depending on the frame number of the *BLADE* saw, one of two signal cable adapters will be required (see Figure 18).

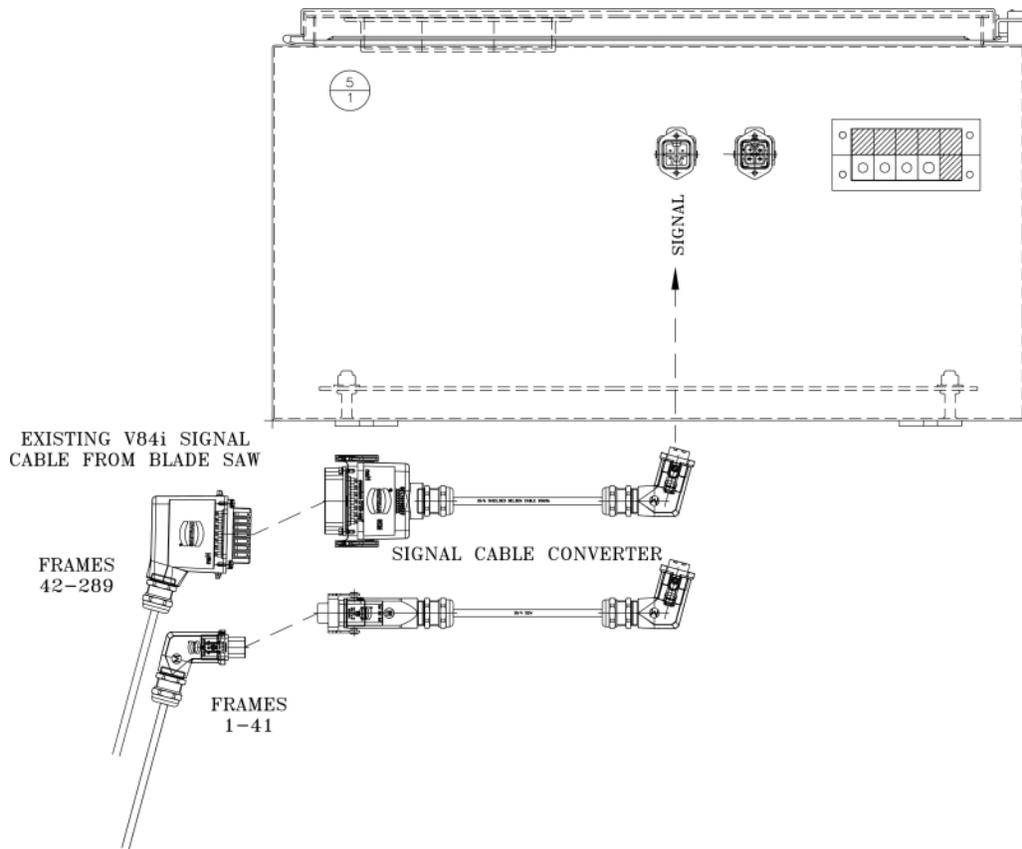
- Frames 1-41: Connect the **Gen 1 signal cable converter** (part #97118-501) to the signal cable (Figure 16).



NOTE: The Gen 1 cable also requires the installation of jumper wires in the bottom door of the *BLADE* main electrical enclosure. See Appendix C on pg. 29 for further instructions.

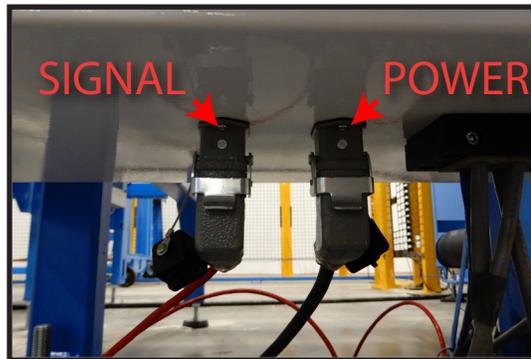
- Frames 42-289: Connect the **Gen 2 signal cable converter** (part #97117-501) to the signal cable (Figure 16).

Figure 18: Signal Cable Converter (V84i to *MPERIA*)



11. Connect the power and signal cables (with *MPERIA* converter attached) to the bottom of the *MPERIA* enclosure.
12. Use wire ties to secure all cables running from the *NEW* enclosure to the saw.
13. Close / reattach all infeed door and panels.
14. Check that all routed cables are fully clear of moving items like the cat track, gripper, and waste conveyor.
15. Once the upgrade has been completed, use the supplied concrete anchors to anchor the *MPERIA* enclosure to the floor according to customer preference.
16. Make note on existing schematics that printer wiring has changed.

Figure 19: Adapter & Cables



Configuring the *BLADE* Software

1. To complete the configuration of the *BLADE* software, you must copy the following files to a personal USB drive. If necessary, contact the customer service manager to determine the location of these files.
 - *MPERIA* Creator Software
 - Netconfig file
 - Emulator file (.LUA file)
2. Remove lockout/tagout devices.
3. Power on the saw and touch screen computer.
4. Check to see if *MPERIA* Creator or TightVNC is installed on the *BLADE* touch screen.
 - If neither are installed, use a USB drive to install ***MPERIA* Creator**.
5. Follow the below instructions to load the **netconfig** file onto the new *MPERIA* Controller:
 - a) Connect the USB drive to either USB port on the print controller located inside the *MPERIA* enclosure.
 - b) Disconnect the power cable from the controller, wait a few seconds, and then reconnect it. Upon loading, it will read the **netconfig** file and update the controller's IP Address to 192.168.1.25.

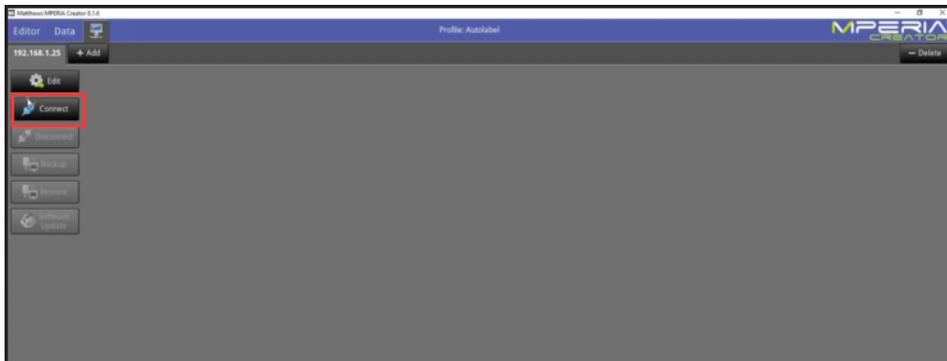
6. Launch the *MPERIA* software. Select anywhere when this screen appears to advance to the next screen.

Figure 20: MPERIA Creator Start Screen



7. Select  at the top of the screen and enter the following info when asked:
 - a) IP address: 192.168.1.25
 - b) VNC port: 5900
 - c) Password: MPERIA
 - d) The host name should default to the IP Address (192.168.1.25).
8. Select **Finish**.
9. Select **Connect**.

Figure 21: Main Menu



10. The **emulator file (.LUA file)** is a plugin required to configure the V-Links with the latest software. Insert the thumb drive which contains the LUA file into the *MPERIA* controller.

11. Select the **Maintenance** tab and then select **Plugins**.

Figure 22: Maintenance Tab.



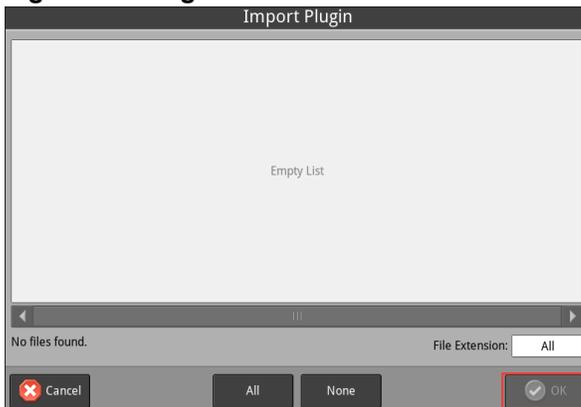
12. Select **Import** and choose the USB drive location connected to the *MPERIA* controller.

Figure 23: Unpopulated Plugins Window



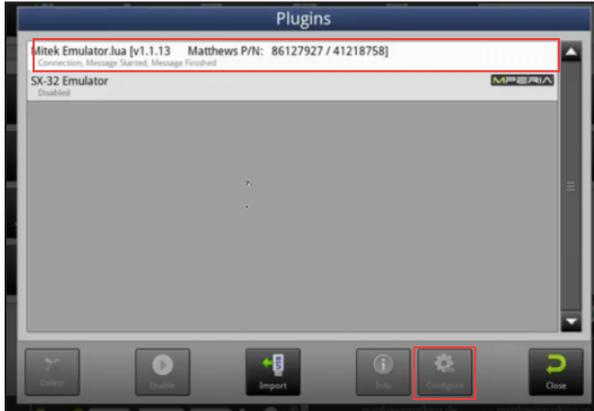
13. Select **MiTek Emulator.lua** and select **OK**. Note that the below window will not be blank for your install.

Figure 24: Plugins Window



14. Select **MiTek Emulator.lua** and select **Configure** to open the configuration window.

Figure 25: List of Emulators

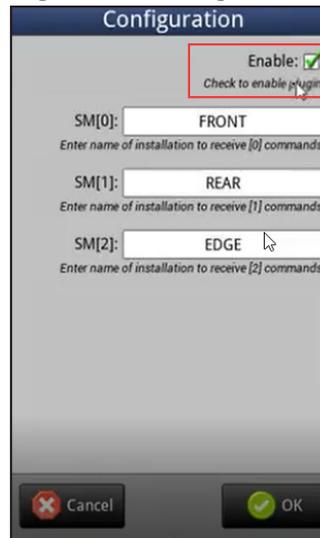


- a) Check the **Enable** check-box.



If more than 1 print head is on a single V-Link, you must also configure the sm[x] values as indicated in Figure 26. Up to 32 nozzles can be associated with each V-Link.

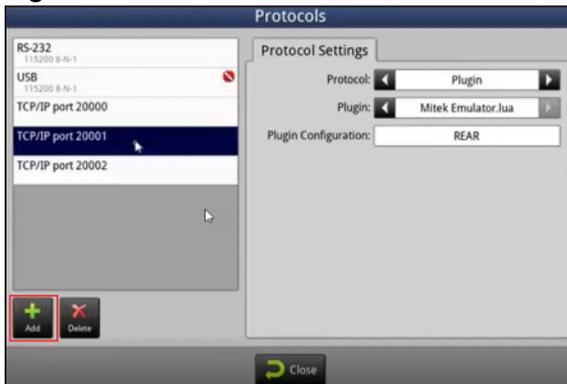
Figure 26: Configuration Window



15. Click **OK**.
16. Click **Close** on the Plugin Window.
17. Configuration tab > Protocols button
 - a) Add V-Links (Ports: Front=20000, Rear=20001, or Edge=20002) and select emulator

18. Select the **Configuration** tab.
19. Select **Print Heads** to assign specific Print Heads to individual ports.
20. Select **Add (+)**.

Figure 27: Protocols Window



21. Enter the port numbers.

Table 6: Port Numbers

	Front	Rear	Edge
Port #	20000	20001	20002

22. Repeat the **Add** steps if there are multiple V-Links.

23. Once all ports are entered, select one port and set the protocol setting:

- a) Protocol: Plugin
- b) Plugin: Mitek Emulator.lua
- c) Plugin Configuration: Name of printer (FRONT, REAR, or, EDGE). If there is only one V-Link, leave this field blank.
- d) Repeat if there are multiple V-Links.

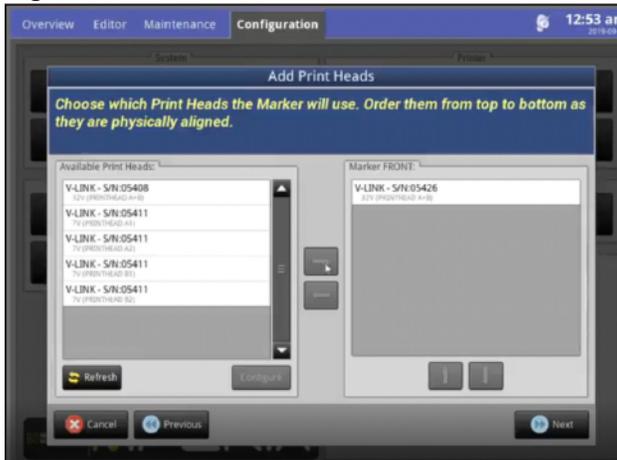
24. Close the Protocols window.

25. From the **Configuration** tab, select **Print Heads**.

26. Do the following steps for each print head to configure them. Select **Next** between each step.

- a) Enter the installation name (FRONT, REAR, or EDGE).
- b) Select V-series model.
- c) Enter the installation name again (FRONT, REAR, or EDGE).
- d) Select correct serial # for the V-Link, and click the arrow to send it to the right half of the screen.

Figure 28: Add Print Heads Window



 Each V-Link can only manage UP TO 32 valves. If, for example, the saw has a 32_32_7 setup, 3 V-Links are required. If the saw has a 16_16 setup, the print heads can both be managed from 1 V-Link. On the next screen you will be required to choose which V-Link is being assigned to the FRONT Printer and configure it properly. If you are setting up a 16V for the FRONT, you will highlight the correct V-Link, select Configure, and change it to a 16_16.

- e) 8000 Maxi print head model
- f) Right-to-left
- g) Enter marker heights.

Table 7: Marker Heights

	32-valve	16-valve	7-valve
Marker Height	128	64	28

- h) Horiz spacing = .84 mm
- i) Set the print head orientation as seen Figure 29.

Figure 29: Print Head Orientation



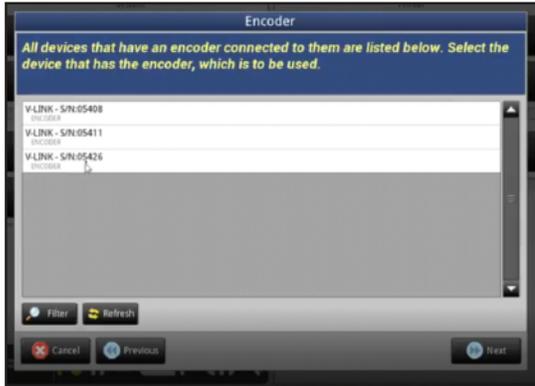
- j) Distance from trigger: Set to 10. After all firmware is updated, it will be changed to .1.
- k) Margin = 0
- l) Do you want to add another marker? If there is only 1 print head per V-Link, select No. If there is more than 1 print head per V-Link, select Yes.
- m) No trigger
- n) Select Encoder button (only front V-Link has one).

Figure 30: Speed Type Window



- o) Select the Front V-Link and then select **Next**.

Figure 31: Encoder Window



- p) On the Basic tab, select:
- Quadrature
 - Inverted
 - 15615
- q) On the Advanced tab, select:
- Reverse filter limit at 2000

Figure 32: Encoder Basic and Advanced Settings



- r) Select Finish to return to the print heads window.
27. Download firmware for *MPERIA* software (.LBI file from Matthews_MPERIA_X.X.X-TOF+LowDistance).
28. Configure the details of the print heads:
- a) Select an Installation name and on the Advanced tab (First FRONT on Figure 33):
- Minimum Speed Threshold = 0
 - Check Enable Operator Trigger Button checkbox

Figure 33: Print Heads Window



29. Select a print head name (2nd FRONT in Figure 33):
 - a) On the Performance tab:
 - Dot size = 270, select Yes to ignore the warning
 - b) On the Advanced tab:
 - Ink Drop Flight Time = 2.1 ms
 - Check the Disable Overspeed Warning checkbox
30. Select the V-Link in Figure 33:
 - a) Distance from Trigger = .1
31. Click the New Installation button from the Print Heads screen in Figure 33.
32. Repeat previous steps for additional installations if present.
33. Cycle the power on the controller (waiting 10 seconds to reconnect) to ensure these settings are accepted.
34. Remove the USB drive from the print controller.

Figure 34: MPERIA Controller Power Cable



Appendix A

These drawings depict the print head cables used to connect the *MPERIA* print controller. The cable number (e.g. Head #1A FRONT or Head #2B REAR) corresponds with the matching V-Links labeled as 1 > 2 > 3 (left to right). Also, make certain to connect the A and B cables to their corresponding V-Link ports. Return to page 14.

Figure 35: Print Head Cables at *MPERIA* Enclosure for Printer Options A & B

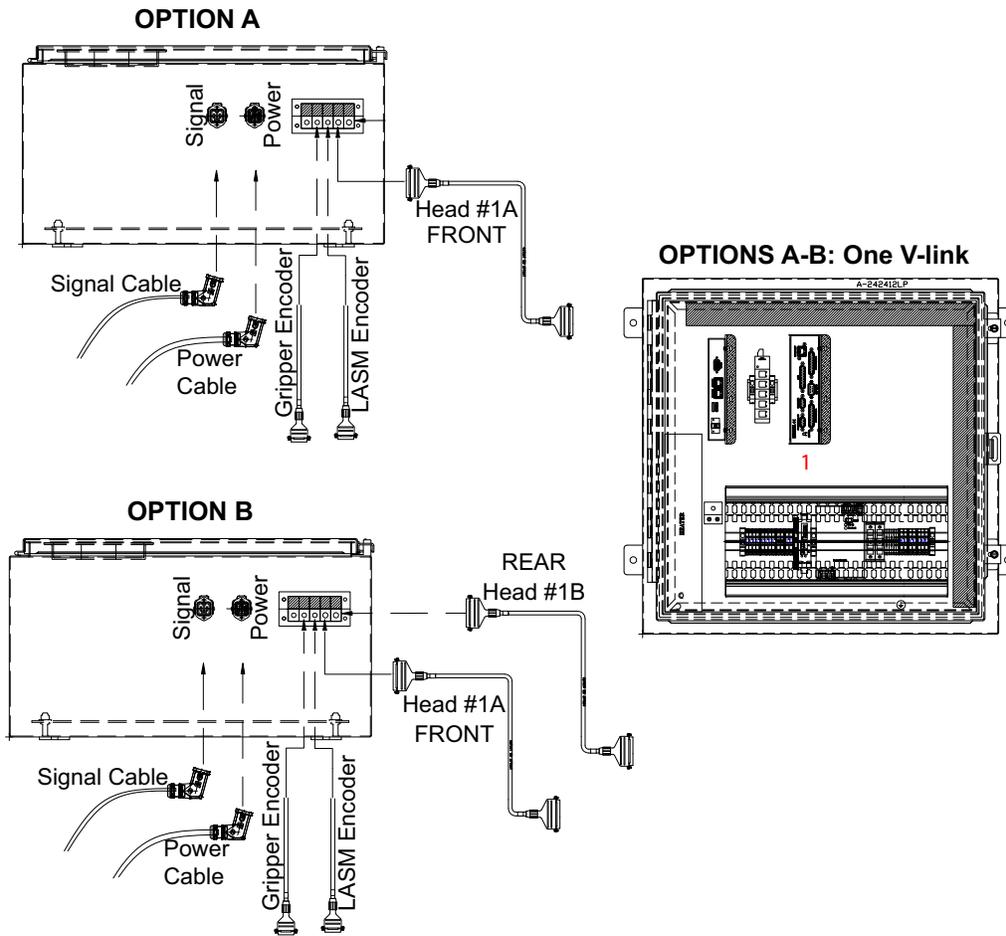


Figure 36: Print Head Cables at *MPERIA* Enclosure for Printer Options C & D

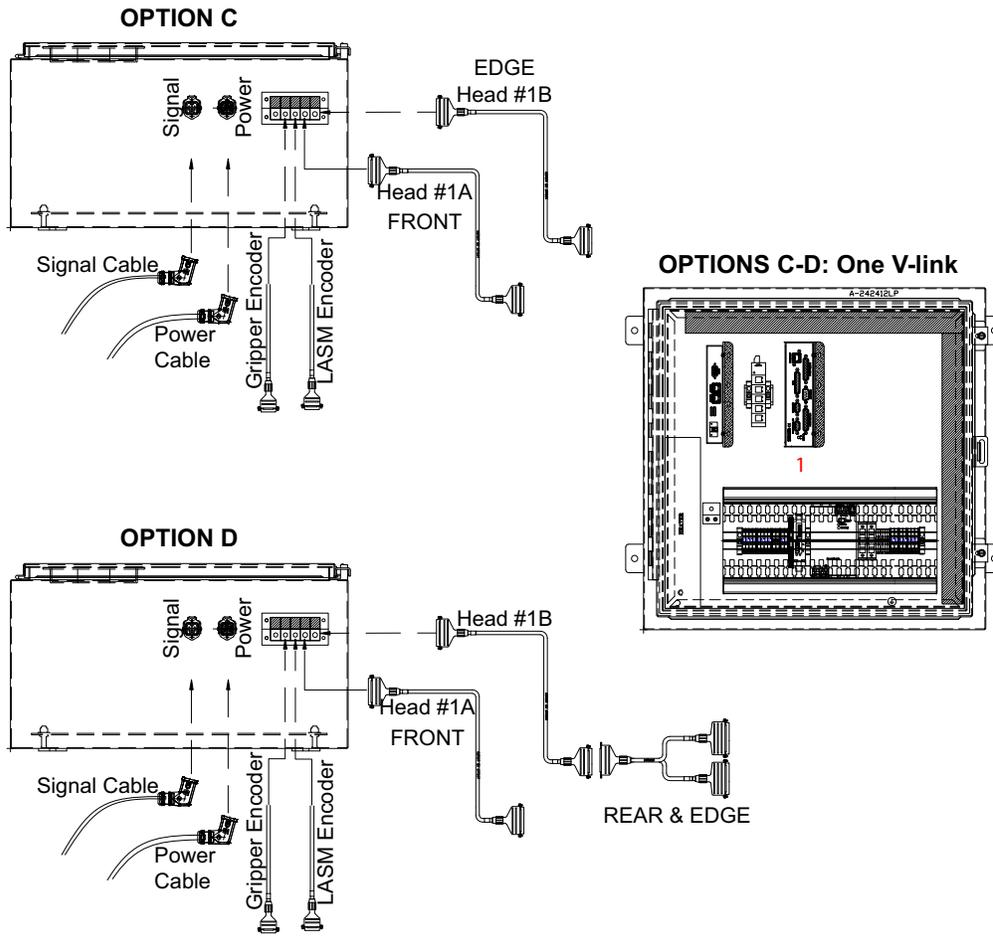
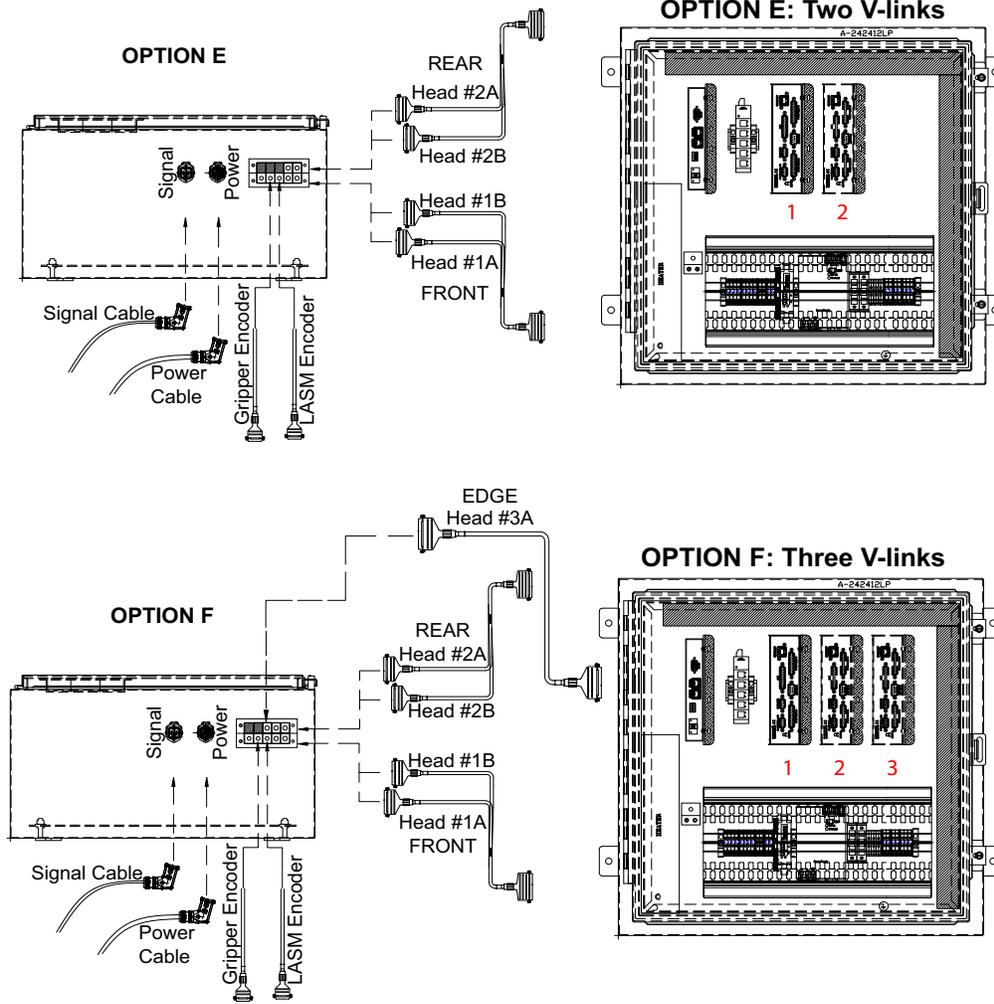


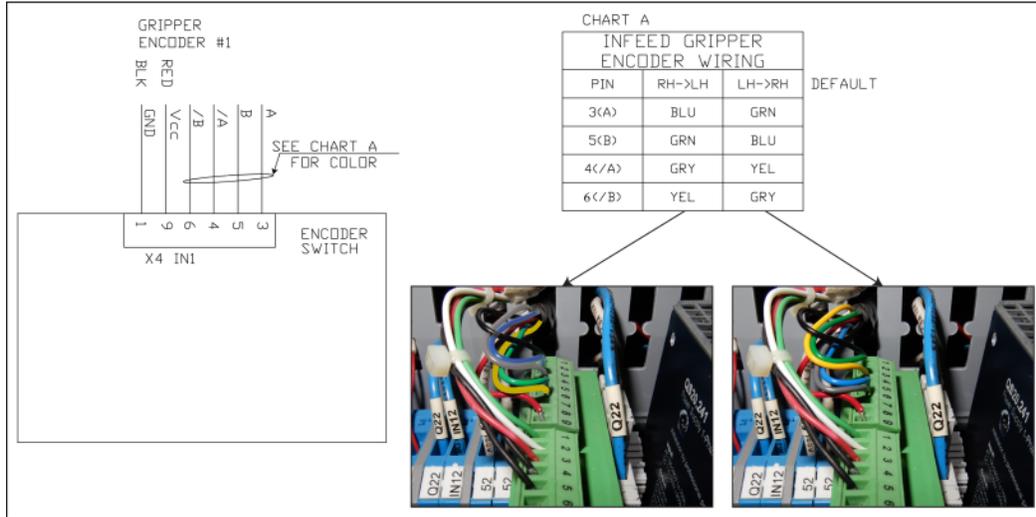
Figure 37: Print Head Cables at *MPERIA* Enclosure for Printer Options E & F



Appendix B

The below drawing depicts the gripper encoder wiring configuration that is required for a right to left or left to right (the default) board infeed configuration. Do not modify the wiring of the LASM encoder. Return to page 13.

Figure 38: Gripper Encoder Wiring Configurations

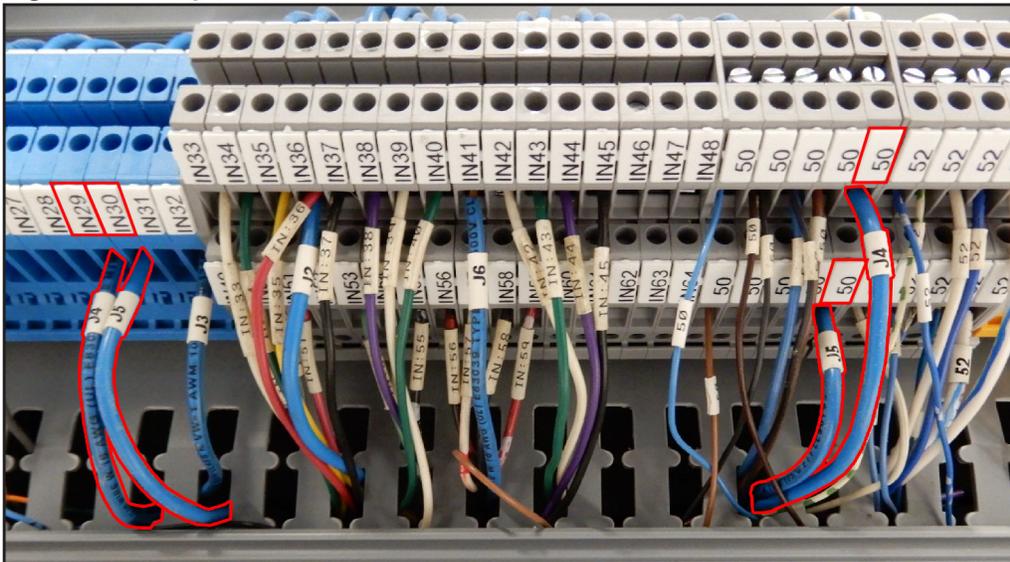


Appendix C

Follow the below steps to connect the jumper wires required for the 1st Gen *MPERIA* signal converter. See Figure 39 for an example installation.

1. Cut the 18 AWG wire into two equal lengths and strip both ends of the wires.
2. Locate terminal blocks IN29 AND IN30 in the bottom door of the *BLADE* main electrical enclosure.
3. Use a flat-blade screwdriver to connect a wire to the each of the bottom ports of terminal blocks IN29 AND IN30. After tightening the screws, gently pull on the wires to ensure they are secure.
4. Route the wires (outlined in red) behind the wiring duct and pull both wires through an opening near the set of 50 terminal blocks.
5. Connect the wires to any two free 50 terminal blocks. If two terminals blocks are not available, two cables may share a single port. After tightening the screws, gently pull on the wires to ensure they are secure.
6. Return to page 16.

Figure 39: Jumper Wires Installation



END OF SERVICE BULLETIN