4200 Series
Digital Billboard

Service Manual

DAKTRONICS

DAKTRONICS, INC.

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Section 1: Introduction

1.1 Important Contact Information

Daktronics Help Desk: 1-877-DAK-HELP

Project Manager:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯ Phone Number:⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Email: Billboardtechs@daktronics.com

1.2 Display Identification

This section provides information that is helpful in understanding a Daktronics digital billboard display label. Refer to **Figure 1** while reading the table below.
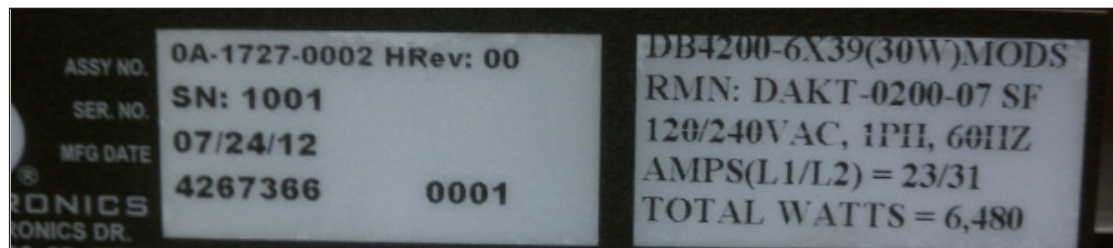
Figure 1: Example 4200 Series Display Label

Display Assembly Number Display Serial Number Manufacture Month/Date/Year	DB-4200 Mods High X Mods Wide (Module power in Watts) MODS Regulatory Model Number: Daktronics - 0200 - 07 Manufactured in Sioux Falls, SD 120/240 VAC, Single Phase, 60 HZ AMPS (L1/L2) = 23/31 Total Watts for Display Section = 6,480

1.3 Terms Used in this Manual

DMP-8065: digital billboard control card that sends content to the display. The DMP limits the display to static content and regulates content hold times.

Lanyard Attachment Ring: a ring found on the back of each module and on the display doors that attaches to a lanyard and prevents the module or door from falling.

Latch Release: a device that holds the module firmly to the display frame. There are two per module, one on the top and one on the bottom.

Light Emitting Diode (LED): low-energy, high-intensity lighting unit.

Line Filter: a device that alternates electromagnetic interference that might disrupt local communication channels and internal equipment operation.

Louver: a black plastic shade positioned horizontally above each pixel row. Louvers increase display contrast.

Module: consists of a display board with LEDs, a driver board or logic card, housing, a module latch assembly, and a louver. Each module is individually removable from either the front or back of the display. Module part numbers vary by pixel pitch.

ProLink Router (PLR): the PLR takes data in from the DMP and then routes that data to other areas in the sign. There is typically one PLR per display section.

Power Supply: a device that converts AC line voltage from the panel board to low DC voltage for driver boards. One power supply powers multiple modules.

Serial Advanced Technology Attachment (SATA) Cable: allows high-speed signal transfer from device to device. In digital billboards, they run signal from module to module.

Termination Block: an electrical connection point, usually used to connect internal power or signal wires of the same type coming into the display from an external source.

1.4   Spare Parts Box

Every Daktronics digital billboard is shipped with a spare parts box that includes commonly replaced components. The table below lists some of the components that may be included in the spare parts box. Refer to the spare parts inventory list on the top of the display spare parts box for a list of the parts in your spare parts box. Contact the Account Service Manager (ASM) to order additional spare parts.

Description	Daktronics Part Number
Module	Varies by pixel pitch
PLR-6050 W/Hook Mount	0A-1487-6009
28" SATA Cable	W-2410
Power Supply	A-2476
LC-LC Duplex Fiber Cable	W-1767
30' 4 Pin Male to 4 Pin Female Cable	W-1820
3' 3 Pin Male to 3 Pin Female Cable	W-2510

1.5   Field Replaceable Units

The table below lists component names and part numbers of components that can be replaced in the display and the control system. Some of these components may be located in the spare parts box. Contact the ASM to order components when needed.

Display FRUs		Control System FRUs	
Description	Daktronics Part Number	Description	Daktronics Part Number
Module	Varies by pixel pitch	Cisco Router	0A-1520-1200
Surge Suppressor	A-2139	DMP-8065 (for market)	0A-1603-3200
Power Supply	A-2476	Light Sensor	0A-1604-4620
3 Pole Contactor	A-3157	Ethernet Switch	A-1815
Axial Fan .4 A	B-1045	500 W Heater	A-1819
Axial Fan .17 A	B-1094	POE Injector	A-3126
12 VDC Relay	K-1040	Mobotix Webcam	A-3127
28" SATA Cable	W-2410	SmartLink™	A-3128
Line Filter	Z-1002	60 V Surge Protector	A-3159
20 Amp Single Pole Breaker	S-1045	Axial Fan .16 A	B-1053
15 Amp Tandem Breaker	S-1199	Axial Fan .13 A	B-1071
120 VAC Relay	K-1044	Filter	EN-2242
ProLink Router	0A-1487-6009	Transformer	T-1043

Section 2: Display and Control Overview

This section describes generic power and signal paths for Daktronics digital billboards. Refer to display specific signal and riser drawings for component locations on your display.

2.1 Display Control System Flow Overview

Figure 2 shows the location of the ISP enclosure, DMP-8065, and the SmartLink™ power control device. The control system bay or components may vary slightly by display. Refer to project specific drawings for your display control location, signal path, and power path.
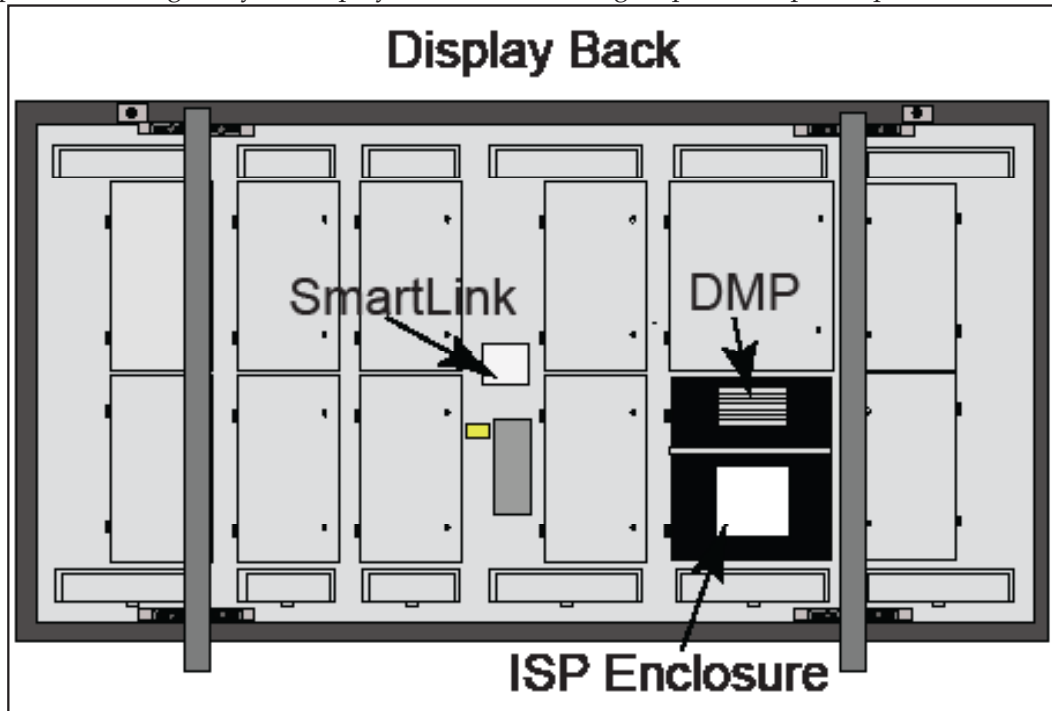
Figure 2: 4200 Series Control Components

2.2 Display Power Overview

The power system for the 4200 series is significantly different than any previous series of Daktronics digital billboards. Each 65 Watt power supply powers two modules. In most cases, the module power path follows the signal path. **Figure 3** shows a basic overview of what the power system looks like in an individual display section. Power to the display section enters into the termination panel and is redistributed to the power supplies. Refer to the layout drawing for display specific power distribution.
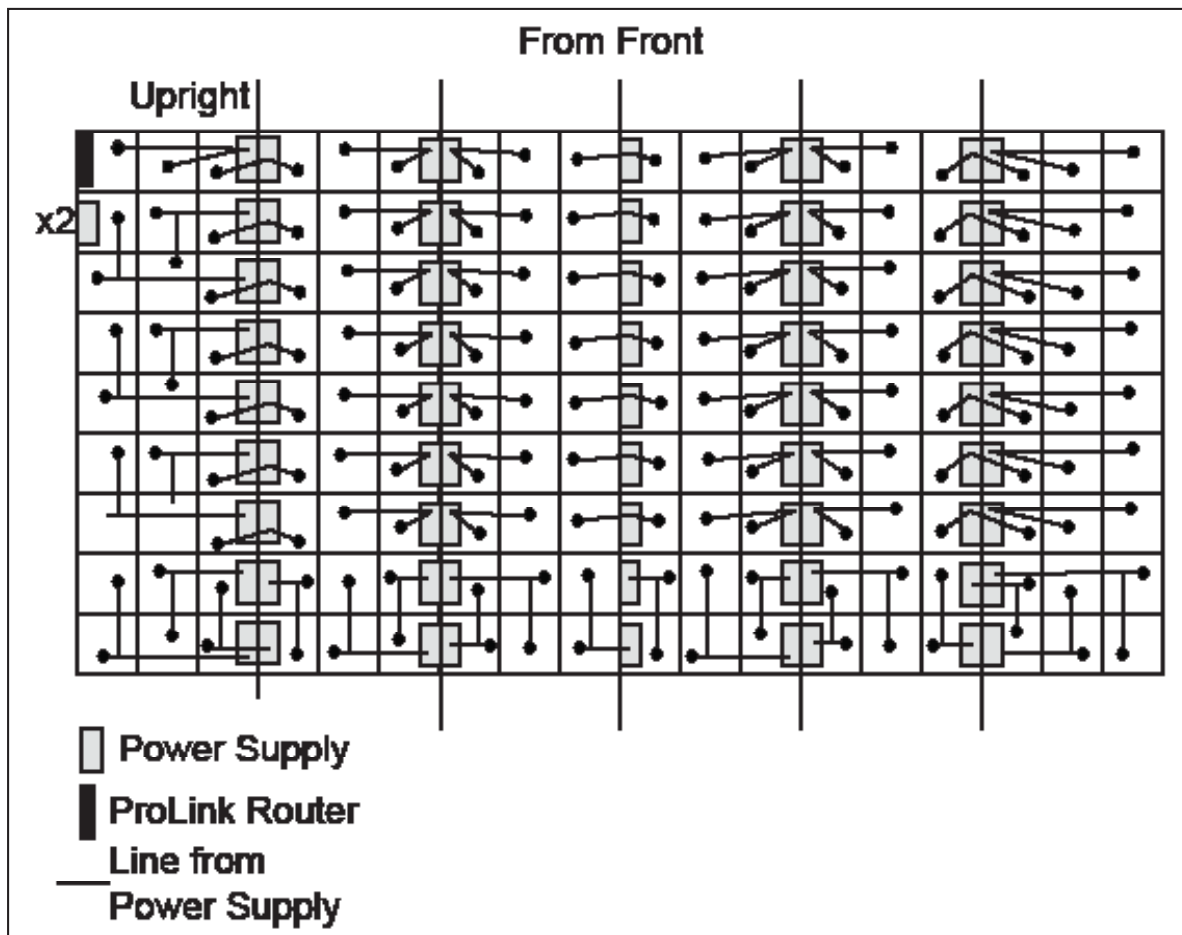
Figure 3: Poster Power Example

2.3 Display Signal Overview

This section provides generic signal path illustrations for even tall sections, **Figure 4**, and odd tall sections, **Figure 5**.

Signal is sent from the DMP-8065 and is sent to the ProLink Router (PLR) in the display section. The PLR then sends the signal to the first module in the section. From that module, the signal is then sent to the other modules in the section. The PLR not only sends signal to the first module in the chain but also receives signal from the last module in the chain and creates a redundant signal path.

Even Module High Section Signal Path
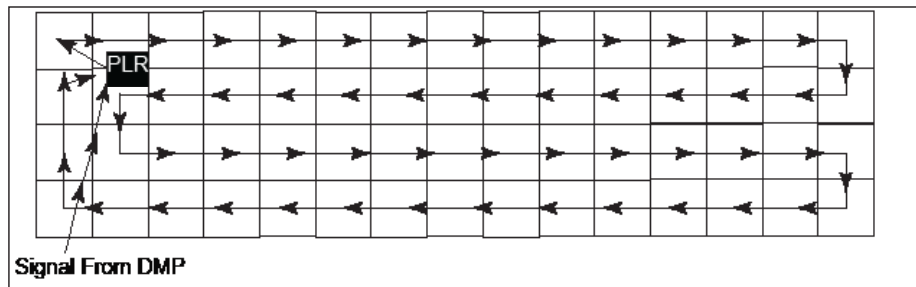
Figure 4: Even Tall Section Signal Path Example

Odd Module High Section Signal Path
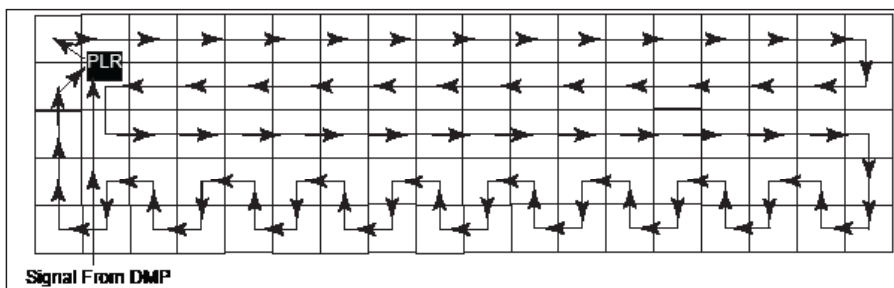
Figure 5: Odd Tall Section Signal Routing Example

Section 3:   Display Troubleshooting

3.1   Remotely Cycling Power

For the 4200 series of displays, Daktronics started shipping a SmartLink™ to every display. The SmartLink™ has four different relays that the Daktronics help desk to remotely cycle power to some control and display components. Refer to **Figure 6** while reading the relay function table below:

Relay	Component
R1	ISP enclosure
R2	DMP-8065
R3	Display
R4	Auxiliary power

If remote troubleshooting is desired, call Daktronics help desk at 1-877-DAK-HELP and they can assist. Do not press the buttons in the SmartLink™ to cycle power to the components because it can take as long as an hour to reset the relays.
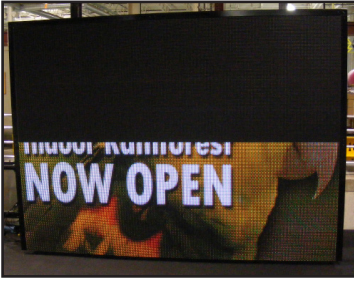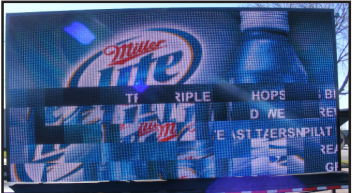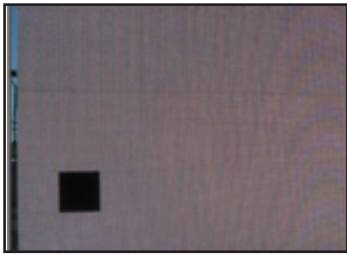
3.2   Display Troubleshooting

The section provides generic guidelines for repairing issues with the 4200 series. Work with Daktronics help desk or experienced technicians to address display issues.

Figure 6: SmartLink™

Issue	Issue Image	Troubleshooting Steps
Entire display blank		1. Verify there is power to site by ensuring the power supply indicators are on. If they are on, there is power to site and it is most likely a signal issue. If there is site power, continue to **Step 3**. 2. Verify the contactors for each display section are closed and allowing power to the display and control system. 3. Verify the ProLink Router (PLR) is receiving power. If the LED indicator lights are on, unplug and reestablish power to the PLR. 4. Verify the fiber cables from the Digital Media Player (DMP) to the PLR are connected. 5. Call Daktronics help desk at 1-877-DAK-HELP (325-4357) and have them verify the content that was supposed to play was successfully uploaded and sent to the display.

Blank display section		1. If applicable, verify the fiber interconnects are installed. 2. On a new installation with multiple power entrances, verify power was run to that section. 3. On displays with multiple power entrances, verify the power interconnect cables between the display sections are connected. 4. Check the modules at the beginning and end of the affected area. This issue can be caused by disconnected or bad SATA cables on both of those modules. If the module power indicator is on, there is most likely a SATA cable issue. If the module power indicator light is off, there is most likely a module issue. 5. Measure site power and verify it meets the requirements listed on the system riser. If this issue appears when there is white or light content, it is possible there is insufficient power to the display. If this is the case, work with an electrician to establish the correct site power. 6. Verify the PLR has power and is functioning. Disconnect and reconnect power to the PLR. 7. Verify there is power to that display section by checking module status indicators on multiple modules. If there is no power, check the breakers on that sections term panel. 8. Check that the contactors in each display section are closed which means that section should be receiving power.
Content switched between display sections		1. Check the signal interconnect cables between the display sections because they may be switched. Port A should be connected to Port A. Port B should be connected to Port B. 2. Check the fiber cables coming from the DMP because they may be switched.
Scattered or out of order content		1. The SATA cable and redundant SATA cable from the PLR to the modules may be switched. 2. Call Daktronics help desk to verify the translation table is correct.

Area of content mixed up - module ID out of order		1. Verify the SATA cable path in that area is correct by comparing it to the display signal drawing. If not, correct the signal path.
1 module out		1. Ensure the SATA and power cables to the module are connected and secure. 2. A SATA cable may be damaged, replace both SATA cables to the module to see if this addresses the issue. 3. It is likely a bad module. Swap the module with a replacement module and verify that the new module functions correctly.
2 modules out		1. Check the status indicators on the back of the modules. If the indicators are off, check the power indicator on the power supply for the affected modules. If the power supply indicator is off and there is power connected to the power supply, replace the power supply. 2. If there is power to the power supply and the modules, check the SATA cables to the modules. It is possible the SATA cables at the beginning and end of the affected modules are disconnected or bad.
3 or more modules out in a line within the same PLR section		1. Check the modules at the beginning and end of the affected area. This issue can be caused by disconnected or bad SATA cables on both of those modules. If the module power indicator is on, there is most likely a SATA cable issue. If the module power indicator light is off, check the power supplies for the modules at each end of the issue are on. If not power or signal, it is most likely a module issue. 2. Measure the site power to verify it meets Daktronics requirements. If this issue is only seen with white or light-colored content, there is most likely a power issue. If there is insufficient power, work with an electrician to establish proper site power.

Display too bright		1. Immediately call Daktronics help desk and have them blank the display. 2. Verify the Multi-Direction Light Sensor (MDLS) is connected. 3. Inspect the area for a light source shining on the Multi-Direction Light Sensor (MDLS). This may cause incorrect readings. If necessary, relocate the MDLS to a different area. 4. Verify the MDLS is mounted correctly. If not, remount the MDLS. 5. Have the help desk verify that the MDLS is set to multi-direction and automatic.
Display too dim		1. Verify the MDLS is connected. 2. Verify the MDLS is mounted correctly. If not, remount the MDLS. 3. Verify there is no debris or excessive dirt buildup on the three MDLS windows. 4. Have the help desk verify that the MDLS is set to multi-direction and automatic. 5. Have the help desk verify the display is not experiencing thermal dimming due to excessive heat.

Section 4:   Accessing Internal Components

4.1   Rear Access

Required Tools: Flathead screwdriver

4200 series digital billboards have hinged doors that are
secured with two quarter-turn latches. If the doors are
obstructed, they can be lifted off the hinges for easy access.
Refer to **Figure 7**.

To access components from the back of the display:
1. With a flathead screwdriver, turn the two quarter-
   turn latches counterclockwise.
2. If the door is obstructed, lift the door off the
   hinges.
   a. Pull the bottom of the display door away from
      the back of the display.
   b. Carefully place the access door out of the way.

4.2   Front Access

Front access is completed by removing modules from the
display front. Refer to the steps in **Section 5.1** to remove
a module from the front of the display to access internal
components.

Figure 7: Labeled Rear Access Door

Section 5:   Module Testing and Removal

5.1   Module Lanyard Attachment

Daktronics recommends attaching a module lanyard (located in the spare parts box) whenever removing a module. To attach a module lanyard:

1. Attach one end of the module lanyard to a lanyard attachment ring on the top of the of the module.
2. Feed the lanyard over a wire rod or through a nearby upright. Do not anchor the module to another module.
3. Attach the other end of the module lanyard to the lanyard attachment ring on the top of the module.

5.2   Removing a Module from the Display Face (Front Access)

Required Tools: $^1/_8$" hex wrench, module lanyard (from the spare parts box)

To remove a module from the front:

1. With one hand on the module face, insert the $^1/_8$" hex wrench into the bottom access hole.
2. Turn the latch release approximately a quarter-turn counterclockwise.
3. Insert the $^1/_8$" hex wrench into the top access hole.
4. Turn the latch release approximately a quarter-turn counterclockwise. You should feel the module release from the display face.
5. Pull the module from the display face just far enough to reach the back of the module.
6. Disconnect the power and SATA cables from the back of the module.
7. Gently place the module on a clean and dry surface.
    Note: If there is no place to set the module, use a safety lanyard to hang the module from the back of the display. Attach the safety lanyard in a way that takes up slack on the lanyard. Carefully let the module hang while ensuring it does not damage LEDs or louvers.
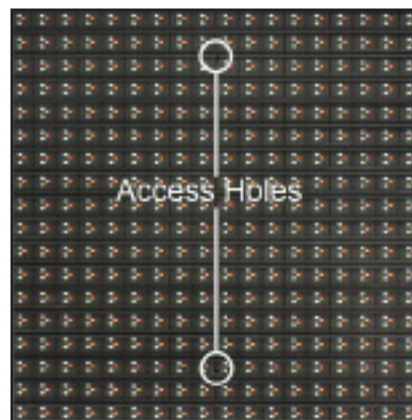
Figure 8: Module Access Holes

5.3   Reinstalling the Module (Front Access)

1. Reinstall the module by aligning it with the opening.
2. Reattach the power and SATA cables.
3. Carefully insert the module into the opening while verifying that SATA and power cables are not being pinched between the module and display face.
4. Firmly press the lower half of the module against the display face.
5. Insert the $^1/_8$" hex wrench into the bottom access hole and turn approximately a quarter-turn clockwise or until you feel it latch in place.
6. Insert the $^1/_8$" hex wrench into the top access hole and turn approximately a quarter-turn clockwise or until you feel it latch in place.
7. Gently pull on the module to verify it is properly seated.
    Note: If the module is not latched properly, the latch springs on the module should force the module away from the display face. If you notice this, attempt to reinstall the module.

5.4 Removing a Module (Rear Access)

Sometimes, when removing a module from the back of the display, certain display components may inhibit module removal. If that occurs, remove the component according to the instructions provided in **Section 6** and then remove the module. Replace all components when done servicing the module.

Required Tools: $^1/_8$" hex wrench, module lanyard (from the spare parts box)

To remove a module from the back of the display:

1. Attach one end of the safety lanyard to a lanyard ring on the top of the module.
2. Feed the lanyard over a wire rod or through a nearby upright in the display. Do not anchor the lanyard to another module.
3. Attach the other end of the lanyard to the lanyard attachment ring on the bottom of the module.
4. Disconnect the SATA power cables from the back of the module.
5. With a $^1/_8$" hex wrench, turn the bottom latch gear approximately a quarter-turn clockwise to disengage the latch.
6. With a $^1/_8$" hex wrench, turn the top latch gear approximately a quarter-turn clockwise to disengage the latch.
   Note: Always maintain a firm grip on the module as you remove it from the face sheet.
7. Rotate the module in a way that allows you to guide it through the frame opening without catching the louvers or LEDs on the cabinet. **Figure 9** shows proper module removal from the back. **Figure 10** shows improper module removal from the back.

Figure 9: Proper Module Removal from Back
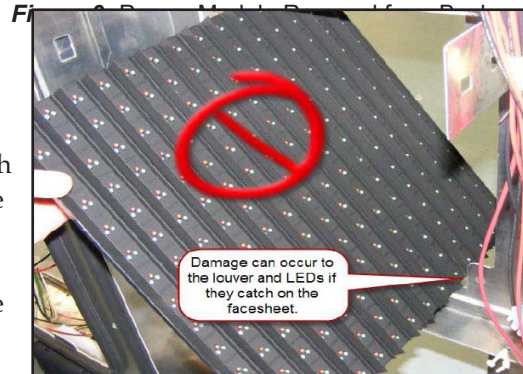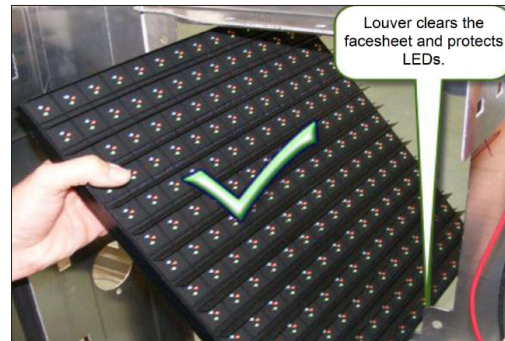
Figure 10: Improper Module Removal from Back

5.5 Removing a Module from the Bottom Row of a Section (Rear Access)

Required Tools: 90 degree Allen wrench, module lanyard

To remove a module along the bottom row:

1. Using the procedure outlined in **Section 5.4**, remove the module above the target module.
2. Disconnect the power and SATA cables from the module.
3. Connect a module lanyard from a lanyard attachment ring on the module to a structural member inside the display.
4. Insert the 90 degree Allen wrench into the top module latch gear.
5. Turn a quarter-turn clockwise to disengage the module from the face sheet.
6. While holding the back of the module, insert the 90° Allen wrench into the bottom module latch gear.
7. Turn a quarter-turn clockwise to disengage the module from the face sheet.

8. Remove the module by pushing it away from the display face, pivoting and rotating it 90 degrees and pulling it through the face sheet.
   Note: Ensure the louver blades run lengthwise when pulling the module through the display face so they do not get damaged by the face sheet.
9. Repair or replace the module as needed.
10. Reverse **Steps 1 - 8** to reinstall the module.

5.6 Removing a Module from Behind a Term Panel (Rear Access)

Required Tools: Phillips head screwdriver, $^1/_8$" Allen wrench, module lanyard

1. Locate the two release screws along the top of the term panel. Refer to **Figure 11**.
2. Use the Phillips head screwdriver to turn each screw counter-clock wise until the term panel disengages from the display.
3. While holding the term panel, allow it to slowly hinge forward.
4. Follow the steps in **Section 5.4** to remove and reinstall a module.
5. Reverse **Steps 1 - 3** to replace the term panel.
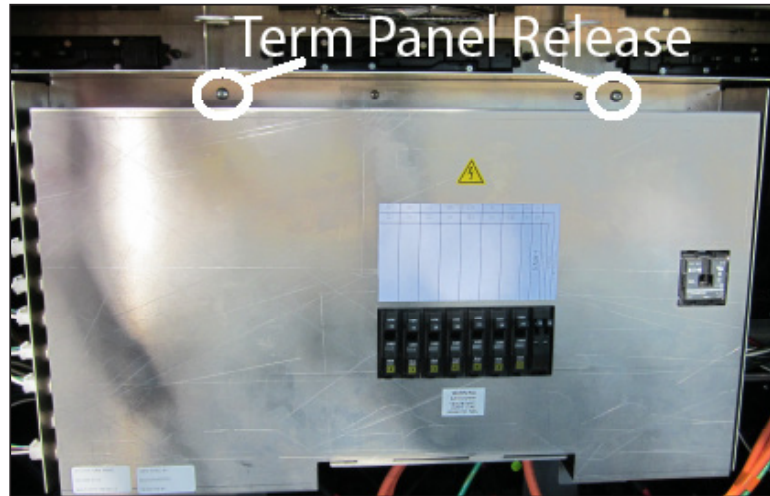
Figure 11: Term Panel With Turnkeys Labeled

5.7 Reinstalling a Module (Rear Access)

1. Rotate and carefully guide the module through the module opening.
   Note: To ensure proper alignment, verify the word TOP printed on the back of the module is to the top left of the module.
2. Once the module is through the display face, align the module with the face sheet so the gravity load pegs fit in the gravity load peg holes. Ensure the lanyard or cables do not pinch between the module and the display.
3. After the module is in place, use the bottom module lanyard rings or the lanyard to pull the module firmly against the face sheet.
4. With a $^1/_8$" hex wrench, turn the bottom latch gear approximately a quarter-turn counter-clock wise to engage the latch.
5. Use the top module lanyard rings or the lanyard to pull the module firmly against the face sheet.
6. With a $^1/_8$" hex wrench, turn the bottom latch gear approximately a quarter-turn counterclockwise to engage the latch.
7. Use the top module lanyard rings or the lanyard to pull the module firmly against the face sheet.
8. With a $^1/_8$" hex wrench, turn the top latch gear approximately a quarter-turn counterclockwise to engage the latch.
9. Connect the SATA and power cables to the back of the module.

5.8 Hinging and Removing the ISP Enclosure for Module Access

The ISP enclosure hinges out of the way for module access. It can also be lifted off the of the hinges. To hinge the ISP enclosure out of the way and lift it off the hinges:

1. Locate the quarter-turn latch at the top of the ISP enclosure.
2. Use a flathead screwdriver, turn the quarter-turn latch counterclockwise until the ISP enclosure disengages.
3. Pull the ISP enclosure from the right to hinge it out of the way.
4. If needed, carefully lift the ISP enclosure off of the hinges on and set aside while ensuring power and signal cables do not get pinched.

5.9 Hinging and Removing the DMP-8065 for Module Access

The DMP-8065 hinges out of the way for module access. It can also be lifted off the of the hinges. To hinge the DMP-8065 out of the way and lift it off the hinges:

1. Locate the quarter-turn latch at the top of the DMP-8065.
2. Use a flathead screwdriver, turn the quarter-turn latch counter-clock wise until the DMP-8065 disengages.
3. Pull the DMP-8065 from the right to hinge it out of the way.
4. If needed, carefully lift the DMP-8065 off of the hinges and set aside while ensuring power and signal cables do not get pinched.

Section 6: Testing and Replacing Display Components

6.1 Testing a Module

Module Status Indicators

Under normal operation, module indicator LEDs (one on each side on the back of the module) should flash once every two seconds. Refer to **Figure 12**.

Note: When troubleshooting, it is important to know that the module may take up to eight seconds to change the pattern.

Performing a Module Self-Test

If a module is blank and has power supplied to it, you can perform a module self-test. For full self-test instructions, refer to **Performing a Daktronics Module Self-Test** in **Appendix A**.

Figure 12: Labeled Module Back

6.2 Replacing Module Power Supplies

The power supply provides power from the term panel to the module. For the 4200 series of digital billboards, the module power supply is located on the uprights. Each power supply typically controls two modules.

Replacing a Module Power Supply

1. Disconnect the power coming from the term panel to the power supply.
2. Disconnect the power cable from the power supply to the modules. Refer to **Figure 13**.
3. Pull the power supply assembly release tab.
4. Gently lift the power supply assembly off the upright.
5. Pull the power supply tab to release the power supply from the mounting bracket and lift the power supply off the pegs.
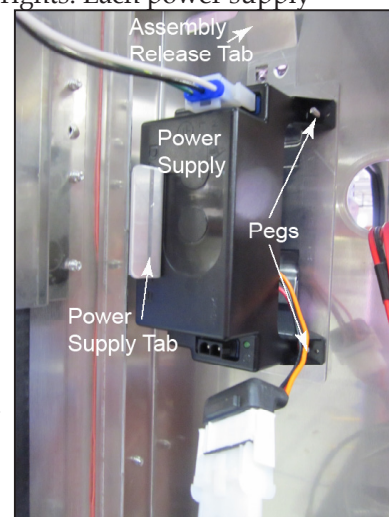
Figure 13: Power Supply Mounted to Upright

6.3   Testing and Replacing a ProLink Router

A ProLink Router (PLR) sends the signal from the DMP-8065 to the modules via SATA cables. For the 4200 series, the PLRs have redundant power.

Testing a PLR

Before replacing a PLR, it may be beneficial to perform a self-test. To perform this test:
1.   Connect a duplex fiber cable from Fiber Port A to Fiber Port B. Refer to **Figure 14**.
2.   Connect a working SATA cable from SATA Port A to SATA Port B.
3.   Connect the power cable to the PLR. This will start the PLR self-test.
4.   Wait for the test to complete. This may take up to 90 seconds. If the PLR has successfully sends and receives data through each of the ports, the letters P.A.S will appear on the Seven Segment Display. If the letters E.r.r appear, the Seven Segment Display will show the port numbers with issues. Refer to the **ProLink Router 6050 Manual** in **Appendix A** for a full list of error codes.
5.   Replace the PLR if the error persists after troubleshooting.
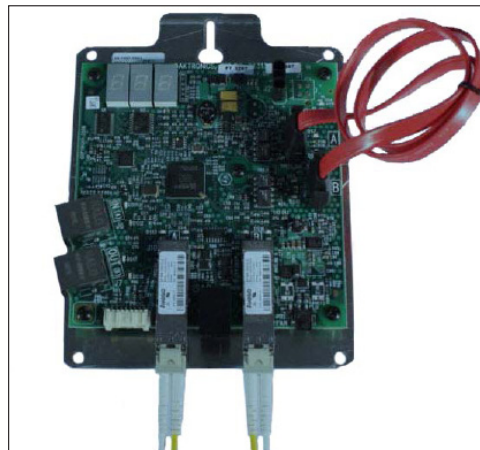
Figure 14: ProLink Router Connected for Self-Test

Replacing a ProLink Router

Required Tools: Phillips screwdriver
1.   Access the interior of the display by using the steps provided in **Section 4**.
2.   Disconnect the PLR SATA and power cables.
3.   Using a Phillips screwdriver, loosen the PLR assembly set screw.
4.   Lift the PLR assembly to disengage it from the display.
5.   Reverse **Steps 2 - 4** to install the new PLR.
6.   Verify the cables are properly seated.

6.4   Replacing PLR Power Supplies

Each PLR has a power supply and a redundant power supply. If one power supply fails, the PLR will still function on the redundant power supply. To replace a failed PLR power supply:
1.   Disconnect any power cables to the power supply and from that power supply to the PLR.
2.   Pull the power supply tab. Refer to **Figure 13**.
3.   Rotate the power supply forward and lift it off of the pegs.
4.   Reverse **Steps 1 - 3** to install a replacement power supply.

6.5 Replacing a Display Fan

Required Tools: Phillips screwdriver, side cutter, cable ties

To replace a fan:.

1. Locate and disconnect the 3-pin Mate-N-Lok connector. It should be cable tied to the wire rod with other cables.
2. Cut the cable ties from the wire rod until the fan power cable is loose.
3. Use the Phillips head screwdriver to loosen the two fan mounting screws. Refer to **Figure 15**.
4. Remove the fan from the display.
5. Reverse **Steps 1 - 4** to install the new fan.
6. Secure any excess cable to the wire rod with cable ties.

Figure 15: Display Fan

Section 7: Control Equipment Overview, Service, and Replacement

## 7.1 Control Equipment Overview

ISP Enclosure

The ISP enclosure contains all of the necessary equipment for the display to communicate over the Internet and schedule content. **Figure 16** shows the equipment and the equipment location within the ISP enclosure.

DMP-8065

The Digital Media Processor (DMP) receives the content from the Internet, sends it to the PLRs within the display and to the modules. All of the connections for the DMP are located on the bottom of the unit. The DMP is a field replaceable unit. Refer to **Figure 19**.

Figure 16: ISP Enclosure

SmartLink™

The SmartLink™ performs power loss detection and remote power cycling for the 4200 series. **Figure 22** shows the SmartLink™ configuration.
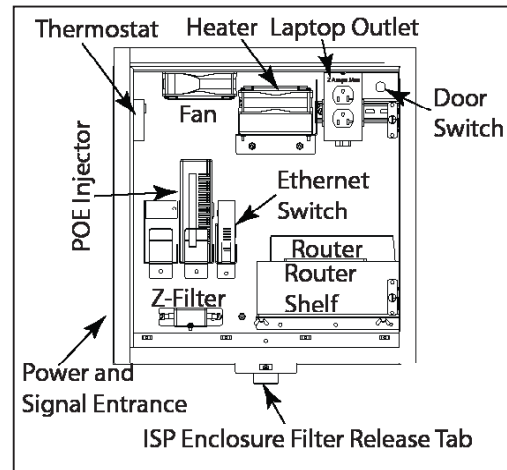
7.2 Opening the ISP Enclosure

To access ISP box components:

1. Access the ISP enclosure by opening the rear access door with the control equipment label.
2. Using a flathead screwdriver, turn the two three-quarter turn latches counterclockwise. Refer to **Figure 17**.
3. For easier access to ISP components, the ISP enclosure door can be lifted off the hinges.
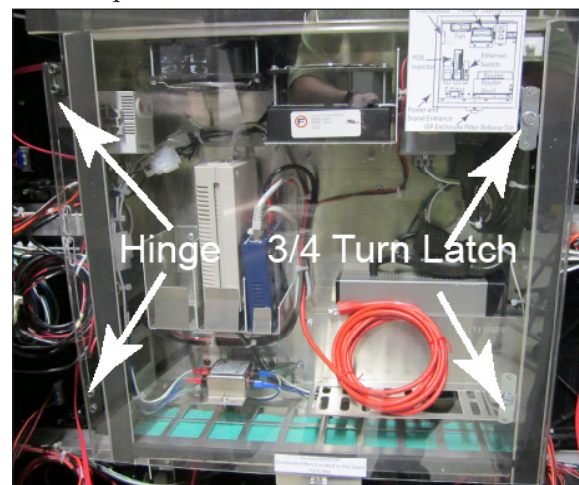
Figure 17: ISP Enclosure Cover Removal

7.3 Connecting a Laptop

Sometime it is necessary to connect a laptop to the display for service. For displays without shared internet, locate the red cross-over cable coming from out of port 5 of the network switch. For displays with shared internet, disconnect the webcam from port 4 of the network switch and connect a Cat-5 cable from port 4 to the laptop.

7.4 Replacing Control Equipment

Replacing the DMP-8065

1. Disconnect the incoming power to the DMP-8065.
2. Disconnect the duplex fiber to PLR port A from the DMP-8065. Refer to **Figure 18**.
3. Disconnect the USB cable from the SmartLink™.
4. Disconnect the duplex fiber to PLR port B from the DMP-8065.
5. Disconnect the network communication cable.
6. Disconnect power to the fan on the DMP-8065.
7. Pull the DMP-8065 release tab and carefully lift the DMP off of the DMP mounting plate. Refer to **Figure 19**.
8. Reverse **Steps 1 - 7** to reinstall the DMP-8065.
   Caution: Risk of explosion if a battery is replaced by an incorrect type. Return the controller to Daktronics for repair or disposal.
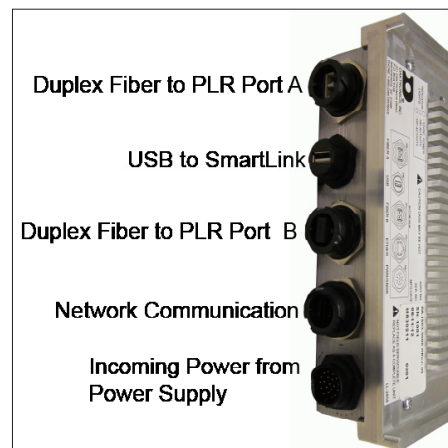

Figure 18: DMP-8065 Jacks

Replacing DMP Power Supplies

Each DMP has a power supply and a redundant power supply. If one power supply fails, the DMP-8065 will still function on the redundant power supply. To replace a failed DMP-8065 power supply:

1. Disconnect any power cables to the power supply and from that power supply to the DMP-8065.
2. Pull the power supply tab. Refer to **Figure 13**.
3. Rotate the power supply forward and lift it off of the pegs.
4. Reverse **Steps 1 - 3** to install a replacement power supply.
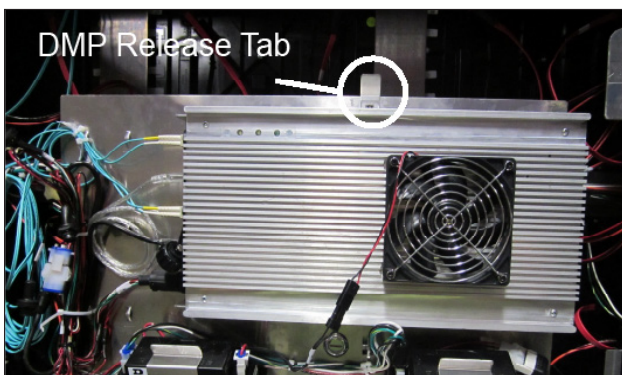

Figure 19: DMP-8065 Release Tab

Replacing the ISP Enclosure Filter

The filter in the bottom of the ISP enclosure should be inspected and replaced if needed. Spare filters are located in the display spare parts enclosure. To replace an ISP enclosure filter:

1. Depress the filter release tab and allow the filter door to hinge down. Refer to **Figure 20**.
2. Remove the existing filter.
3. Replace the filter with a new filter from the spare parts box.
4. Close the filter door until it is securely in place.
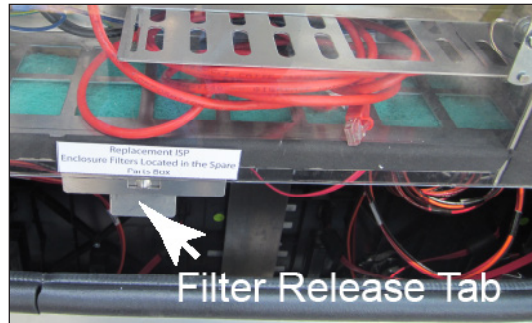
*Figure 20:* ISP Enclosure Filter Release Tab

Replacing the Router

1. Disconnect the power cable from the top of the router.
2. Disconnect the Cat-5 cables from the side of the router.
3. Lift the router out of the bracket.
4. Reverse **Steps 1 - 3** to install the new router.
5. Ensure all cables are installed in the same ports as on the old router.

Replacing the Network Switch

1. Disconnect the power cable from the bottom of the network switch.
2. Disconnect the Cat-5 cables from the top of the network switch.
3. Lift the network switch out of the bracket.
4. Reverse **Steps 2 - 3** to install the new network switch.
5. Ensure all cables are installed in the same ports as on the old network switch.

Replacing the POE Injector

1. Disconnect the power cable from the bottom of the POE injector.
2. Disconnect the Cat-5 cable and the USB cable from the top of the POE injector.
3. Lift the POE Injector out of the bracket.
4. Reverse **Steps 1 - 3** to install the new POE injector.
5. Ensure all cables are installed in the same ports as on the old POE injector.
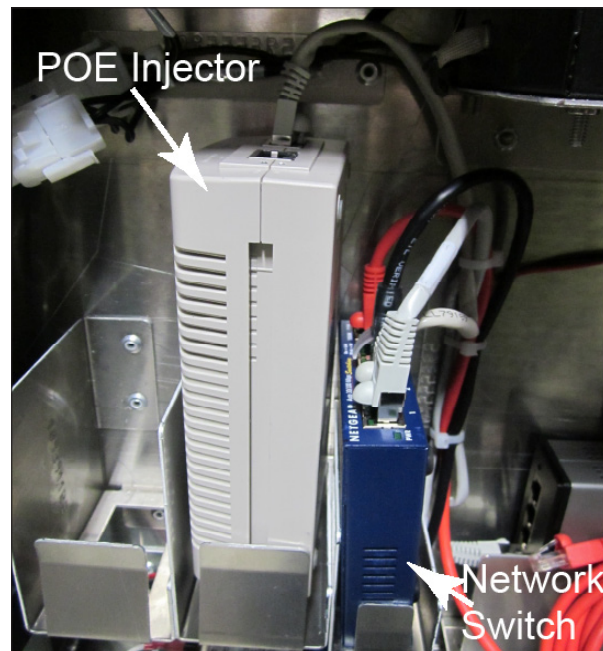
Figure 21: POE Injector and Network Switch in ISP Enclosure

Replacing the SmartLink™

1. Turn off SmartLink™ breaker in the power entrance box.
2. Wait for all LEDs in the SmartLink™ to turn off. This may take up to eight minutes.
3. Disconnect the incoming power wires in the SmartLink™.
4. Disconnect the outgoing power wires from the relays (R1, R2, R3, R4).
5. Disconnect the RS232 cable and remove any cable ties securing it within the SmartLink™.
6. Unscrew the nuts off of the power and signal conduit fittings.
7. Slide the nuts over the ends of the power wires and RS232.
8. Slide the threaded end of conduit fittings out of the SmartLink™.
9. Remove the four screws that secure the SmartLink™ to the display backsheet.
10. Reverse **Steps 1 - 9** to install the new SmartLink™.
11. Call Daktronics help desk and provide them with the new ICCID number from the bottom of the SmartLink™ enclosure.
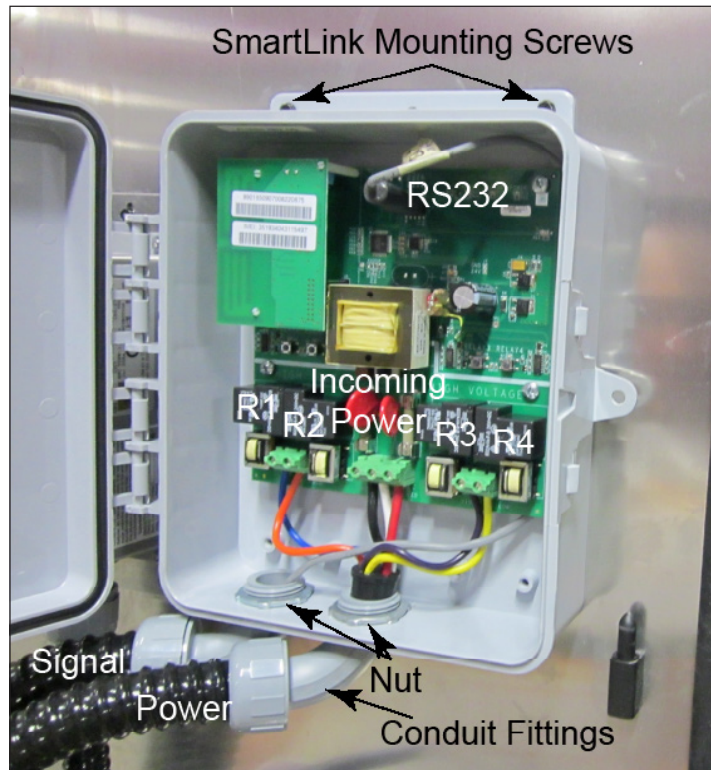

Figure 22: SmartLink™

Replacing the Z-Filter

Required Tools: Phillips screwdriver
1. Unplug the 3-pin Mate-N-Lok power jack from the outside of the enclosure.
2. Disconnect the power cables from both sides of the Z-filter
3. Remove the screws that secure the Z-filter bracket to the back of the ISP enclosure.
4. Remove the two screws that secure the Z-filter to the Z-filter bracket.
5. Reverse **Steps 1 - 4** to install the new Z-filter.

Replacing the Heater

Required Tools: Phillips screwdriver, $^5/_{16}$" nut driver
1. Disconnect the power wire to the heater.
2. Using the nut driver, loosen and remove the mounting plate nuts. Refer to **Figure 23**.
3. Remove the heater assembly from the ISP enclosure.
4. Using a Phillips screwdriver, remove the four heater mounting bolts that secure the heater to the mounting plate.
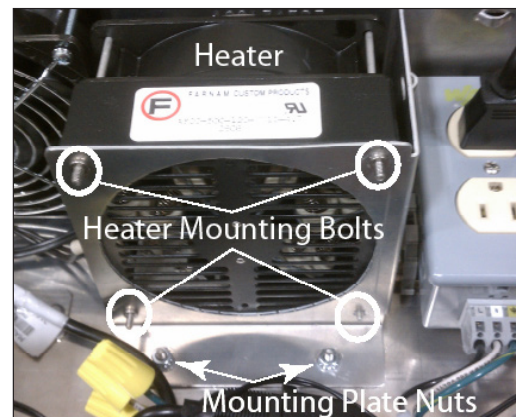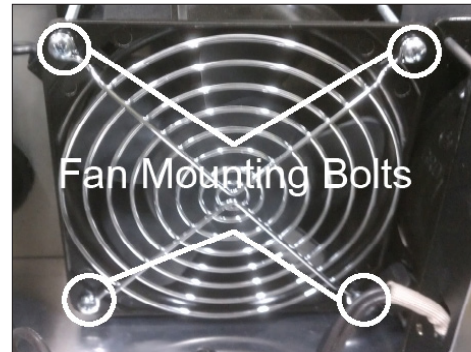5. Reverse **Steps 1 - 4** to install the new heater.

Figure 23: ISP Enclosure Heater Assembly

Replacing the Fan

Required Tools: Phillips screwdriver

1. Disconnect the power wire to the fan.
2. Using a Phillips screwdriver, remove the four fan mounting bolts that secure the fan to the ISP enclosure.
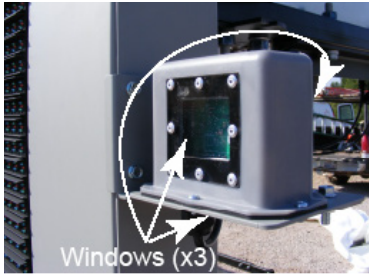3. Reverse **Steps 1 - 2** to install the new fan.

Figure 24: ISP Enclosure Fan Assembly

Section 8: Multi-Direction Light Sensor Testing and Replacement

8.1 Troubleshooting Multi-Direction Light Sensor (MDLS) Issues

There a few crucial things to check if there are issues with the MDLS. The table below lists the crucial items to check if there are issues with the MDLS.

Item	Image
If there is a splice cable attached, inspect the splice cable connection.	
Inspect the MDLS windows for cleanliness.	 Windows (x3)
Check the connections at the back of the display to make sure they are secure.	
Inspect the cable from the back of the display to the MDLS for damage. If needed, order a replacement cable.	
Inspect the cable going into the bottom of the MDLS to see if it was pulled loose.	 MDLS Cable

8.2 MDLS Testing

To test a MDLS, cover it with a piece of heavy cloth. The display should dim within a couple of minutes. Remove the fabric and verify the display returns to the brighter setting. If possible, work with the help desk and have them monitor the display IDM dimming levels.

8.3 Replacing the MDLS

Required Tools: Pliers, side cutters

To replace the MDLS:

1. Disconnect the MDLS from the quick connect on the back of the display (below the power entrance box).
    Note: There may be a splice in the cable between the MDLS and the display back. If so, disconnect the MDLS cable at the splice point, not at the back of the display.
2. Remove the cable that runs from the quick connect to the MDLS.
3. Remove the two attachment bolts that secure the MDLS assembly to the mounting arm.
4. Reverse **Steps 1 - 3** to reinstall a MDLS.
5. Using cable ties, secure the MDLS cable to along the back of the display.
6. Work with the help desk to test the photocell and ensure it is functioning properly.

Section 9: Webcam Access and Troubleshooting

The information is this section describes how to retract the webcam to the display face for service and provides some basic troubleshooting steps. Work with the help desk to verify the camera is aligned and in focus after servicing or cleaning the webcam.

9.1 Retracting the Webcam to the Display Face

1. Remove the three short bolts from the elbow assembly. Refer to **Figure 25**.
   Note: Do not remove the long bolts in the collar.
2. Use the handle to carefully pivot the webcam arm to the front of the catwalk.
   Note: Verify that any webcam cables are not getting pinched or pulled when pivoting the webcam arm.
3. Return the webcam arm to the original position when servicing the webcam.
4. Replace and tighten the three short bolts.
5. Work with Daktronics help desk to verify the webcam is focused and functioning properly.
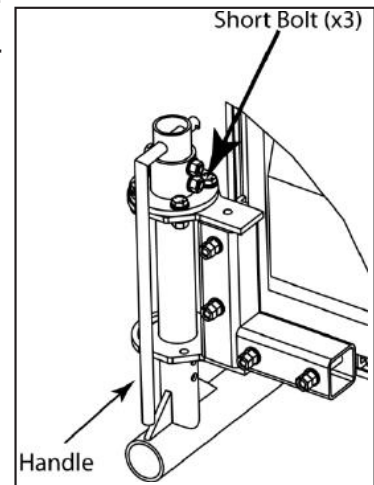

Figure 25: Webcam Arm Bolts

9.2 Webcam Troubleshooting

This section provides some basic power troubleshooting steps to perform if the webcam is not functioning properly. Refer to **Figure 26** while reading the table below.

Issue	Troubleshooting Steps
Red LED indicator on the webcam on.	1. The red LED should only be on during the camera start sequence. Disconnect and reconnect the Ethernet cable to the back of the camera.
Both LED indicators on the webcam are off.	1. Verify the POE injector located in the ISP box is connected and the LED indicators are on. If connected but LED indicators are off, work with the help desk to troubleshoot the issue. 2. If the LED indicators on the POE are on, check the Ethernet connections from the POE injector to the back of the display and from the back of the display to the webcam. It is possible the Ethernet cable is damaged or disconnected. 3. The POE surge may be damaged. Use a RJ45 coupler to bypass.
The help desk can not see a webcam image and the webcam and POE injector are functioning properly.	1. Verify the Ethernet cable from the network switch to the POE injector is connected. 2. Check the status indicator LEDs on the network switch to determine if it is functioning properly and sending data. 3. The POE surge may be damaged. Use a RJ45 coupler to bypass.

Figure 26: Webcam LED Status Indicators

Section 10: Display Maintenance

10.1 Service Calls

After addressing service issues on a service call, inspect the following items:
- Check for loose modules.
- Inspect the display for signs of water intrusion.
- Check for corrosion.
- Check the display for signs of damage.
- Check the control enclosure filters. Replace if needed.
- Inspect the control system for damage.
- Perform an inventory of the spare parts box.
- Have the help desk run a diagnostics check of the display. Work with the help desk to repair any issues found during diagnostics.

10.2 Annual Inspection

It is important to schedule annual maintenance visits on a digital billboard. During the visit:
- Check for water intrusion.
- Replace ISP enclosure filters.
- Inspect for loose modules.
- Inspect the display for excess dust or debris.
    - If there is excess dust or debris, filters can be added to the site. In needed, contact the Account Service Manager for a filter kit.

Appendix A: Reference Drawings

Appendix A contains drawings and quick guides that are generic to Daktronics digital billboards. Project specific drawings and documents take precedence over the document in this section.

Appendix B: Limitation of Liability