DVS-160X/190X SERIES
DAKT-0203-04

DISPLAY MANUAL

P1769

DD2842951
Rev 02
12 March 2021

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DAKTRONICS

FCC Statement

Supplier Declaration of Conformity (SDoC)

This product complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

Warning: The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

Industry Canada Regulatory Information

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Inquiries

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1 Introduction

How to Use This Manual

This manual explains the installation, maintenance, and troubleshooting of this video display system. For additional information regarding the safety, installation, operation, or service of this system, refer to the telephone numbers listed in **Daktronics Exchange and Repair & Return Programs (p.41)**. This manual contains only generic installation topics and is not specific to a particular installation. Contract-specific information takes precedence over any general information found in this manual.

Daktronics identifies documents by the DD number located on the cover page of each manual. For example, this manual would be referred to as **DD2842951**.

Numbering Conventions

Drawing Number

Figure 1 illustrates a Daktronics drawing label. This manual refers to drawings by listing the last set of digits. In the example, the drawing would be referred to as **DWG-1137565**.

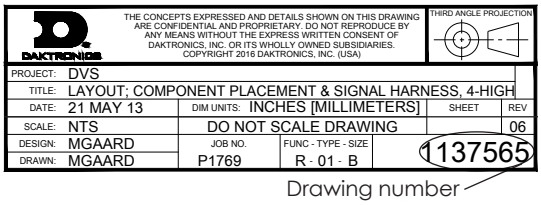

Figure 1: *Drawing Label*

All references to drawing numbers, appendices, figures, or other manuals are presented in bold typeface, as shown in the example below:

> Refer to **DWG-1137565** in **Appendix A: Reference Drawings (p.47)** for the locations of internal display components.

Part Number

Most display components within a display carry a white label that lists the part number. The component part number uses the following format: 0A-XXXX-XXXX (multi-component assembly) or 0P-XXXX-XXXX (display interface board). **Daktronics Exchange and Repair & Return Programs (p.41)** contains the Daktronics Exchange Policy as well as the Repair & Return Program. Refer to these instructions if any display components need replacing or repairing. If an interface board or assembly is not found in the replacement parts list in **Replacement Parts List (p.41)**, use the label to order a replacement. **Figure 2** illustrates a typical label. The part number is in bold.

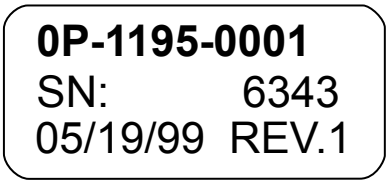

Figure 2: *Typical Label*

Part Type	Part Example	Part Number
Assembly	Display interface board and its mounting plate or bracket	0A-XXXX-XXXX
Individual display interface board	ProLink router (PLR)	0P-XXXX-XXXX
Wire or cable	SATA cable	W-XXXX

Module Number

Figure 3 explains the module labeling method in more detail, and **Figure 4** illustrates how Daktronics numbers modules on a video display.

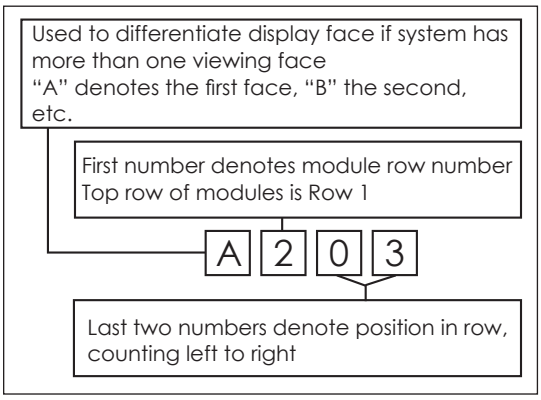

Figure 3: *Module Numbering Breakdown*

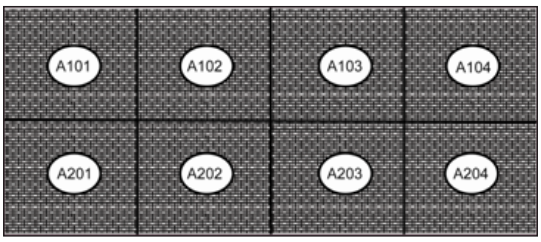

Figure 4: *Module Numbering*

Model Number

Each video display system has a model number that explains the display specifications.

DVS-160X-4/6/10MN-HHHxWWW DVS-190X-6MN-HHHxWWW		
DVS	=	Product series
160X/190X	=	Product generation
4/6/10MN	=	Pixel pitch/layout
HHH	=	Matrix height
WWW	=	Matrix width

Important Safeguards

- Read and understand the installation instructions before beginning the installation process.
- Do not drop the control equipment or allow it to get wet.
- Do not disassemble the control equipment or electronic controls of the display; failure to follow this safeguard will make the warranty null and void.
- Disconnect the display power when not in use or when servicing.
- Disconnect the display power before servicing the power supplies to avoid electrical shock. The power supplies run on high voltage and may cause physical injury if touched while powered.

2 Mechanical Installation

Daktronics engineering staff must approve any changes that may affect the protective integrity of the display enclosure. This includes, but is not limited to, the border shrouding, back sheets, ventilation, and filler panels. If *any* modifications are made to the protective integrity of the display enclosure, detailed drawings of the changes *must* be submitted to the Daktronics engineering staff for evaluation and approval, or the warranty will be null and void.

All decisions regarding display mounting must conform to the specifications and guidelines in this section. Read both the mechanical and electrical installation sections before beginning any installation procedures.

Support Structure Selection & Design

It is the installer's responsibility to ensure the mounting structure and hardware are built per the stamped engineering drawings and are capable of supporting the display.

The deflection/curvature of the members directly behind the display must be limited to prevent structural damage to the cabinets and to ensure the image on the display is not affected. Only the members that will force the display to deform need to be taken into account. The deflection limits are as follows:

- The deflection limit for long-term loading is the span length (in inches) of the structure divided by 400 for both in-plane and out-plane deflection. Examples of long-term loading include dead loads, live loads expected while operating the display, etc.

  Note: Long-term deflection in place before the display face is installed does not need to be considered.

- The deflection limit for short-term loading is the span length (in inches) of the structure divided by 400 for in-plane deflection and the length (in inches) divided by 240 for out-plane deflection. Examples of short-term loading include wind, seismic activity, live loads expected while servicing the display etc.

Refer to **Figure 5** and **Figure 6** for details. Daktronics is not responsible for display mounting decisions made by others.

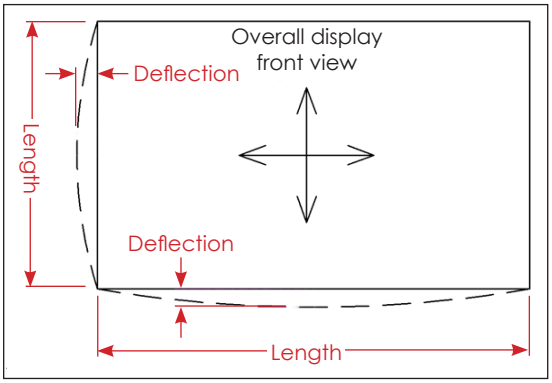

Figure 5: *In-Plane Deflection*

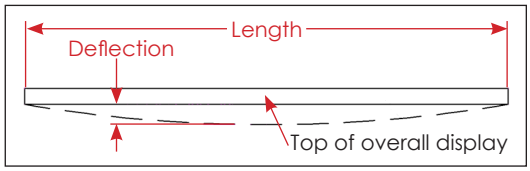

Figure 6: *Out-Plane Deflection*

Border Type Confirmation

For most displays, Daktronics provides a border around the display face. These borders are typically painted metal pieces that attach to their appropriate display sections to enclose the active area of the finished display. Prior to picking any sections, it is important to determine the border style for the finished display.

While each site is unique, Daktronics typically provides two standardized border designs that attach to the display sections: flange borders and clean-look borders. Flange borders provide a main front flange to enclose the active area. This flange may be the only finish the customer requires, or it can provide a location for subcontractors to mechanically fasten extra flashing on-site. Clean-look borders are typically installed when an architect specifies that the sides of the display need to be clean in appearance and aesthetically pleasing with no extra work on-site. These borders hide any mechanical fasteners from the front, sides, and bottom of the display. **Figure 7** shows the difference in appearance between the standard flange and clean-look borders.

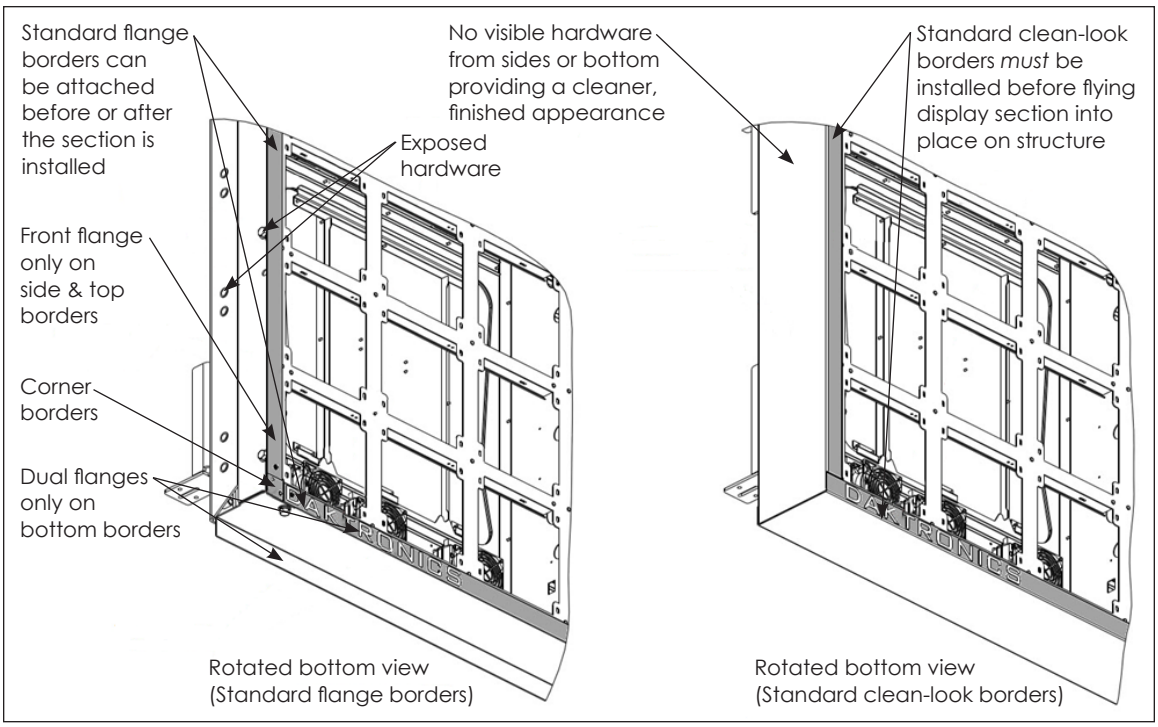

Figure 7: *Standard Flange & Clean-Look Border Differences*

For domestic contracts, standard flange borders may arrive factory-installed on crated display sections as noted on the contract-specific Config Drawings. For international contracts, borders ship in a separate crate. Daktronics recommends attaching flange borders prior to installing display sections; however, if the installation subcontractor feels it would be easier to install loose flange borders after the entire display is hung, that option is available. If the borders are loose, refer to the contract-specific Config Drawings to determine which borders belong to each section.

Clean-look borders will not arrive on-site attached to their appropriate display sections. *It is critical that the clean-look borders be installed to each section prior to flying that display section into place.* Due to interference issues, they cannot be fully installed after the display is installed on the structure. Refer to the contract-specific Config Drawings to determine which borders belong to each section.

Refer to the **DVS-160X/190X Series Border Installation Quick Guide (DD2871800)** for instructions.

Display or Display Section Lifting

Lift points are incorporated into the top of each section. Take care not to exceed the rated load of the lift points.

Figure 8 illustrates both the standard and the alternate method for lifting a display or a display section. It is recommended that displays be lifted with a spreader beam using every lift point provided; alternate arrangements can be made using **Figure 8** as a guide. Do not attempt to lift the display when the lift angle is less than 45°, as this may damage the display.

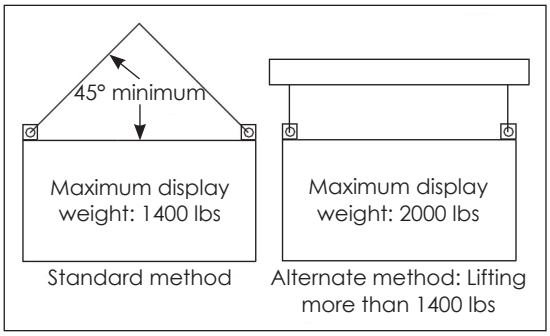

Figure 8: *Display Lifting*

Display Lifting without a Spreader Beam (Standard Method)

Displays may be lifted without a spreader beam if they do not exceed the line angle and maximum capacity limits. Lines must be attached to the lifting lugs provided in the attached full-height support tubes by a clevis. Refer to the first image in **Figure 8**. *Lifting from eyebolts is not acceptable, as it will damage the cabinets.* Eyebolts may be installed in $^{1}/_{2}$" nutsert locations in display section sides for attaching tag lines.

Display Lifting with a Spreader Beam (Alternate Method: Lifting More Than 1400 lbs)

The highest capacity lifting configuration uses a spreader beam attached to the lifting lugs provided in the full-height aluminum tubes. *Larger display sections may be lifted in this configuration if they do not exceed the maximum capacity limit. The maximum load across a section seam if support tubes do not cross the seam is 980 lbs.* The shipping crate weight must be included. Adjacent sections may be lifted simultaneously if the spreader beam provides attachment points for all available lifting lugs. Refer to the second image in **Figure 8**. Eyebolts may be installed in $^{1}/_{2}$" nutsert locations in display section sides for attaching tag lines.

Weight Approximations

The table below lists the weight approximations for the standard section sizes.

Section Size	Section Weight (lbs)
3x3	106
3x4	142
3x5	177
3x6	212
4x3	142
4x4	189

Section Size	Section Weight (lbs)
4x5	236
4x6	283
5x3	177
5x4	236
5x5	295
5x6	354
6x3	212
6x4	283
6x5	354
6x6	425
7x3	248
7x4	330
7x5	413
7x6	496
8x3	283
8x4	378
8x5	472
8x6	566

Display Mounting

This manual covers only general mounting topics. Refer to the contract-specific Shop Drawing for specific mounting instructions.

It is the installer's responsibility to ensure the installation meets local codes and standards. All hardware installation processes must meet the approved, stamped drawings from a professional engineer. Carefully read all bullet points on pages 8 through 11 before proceeding with the installation steps on page 11.

Display Section Basics

Figure 9 (single cabinet section) and **Figure 10** (vertical pair section) show the basic features of a typical DVS display section.

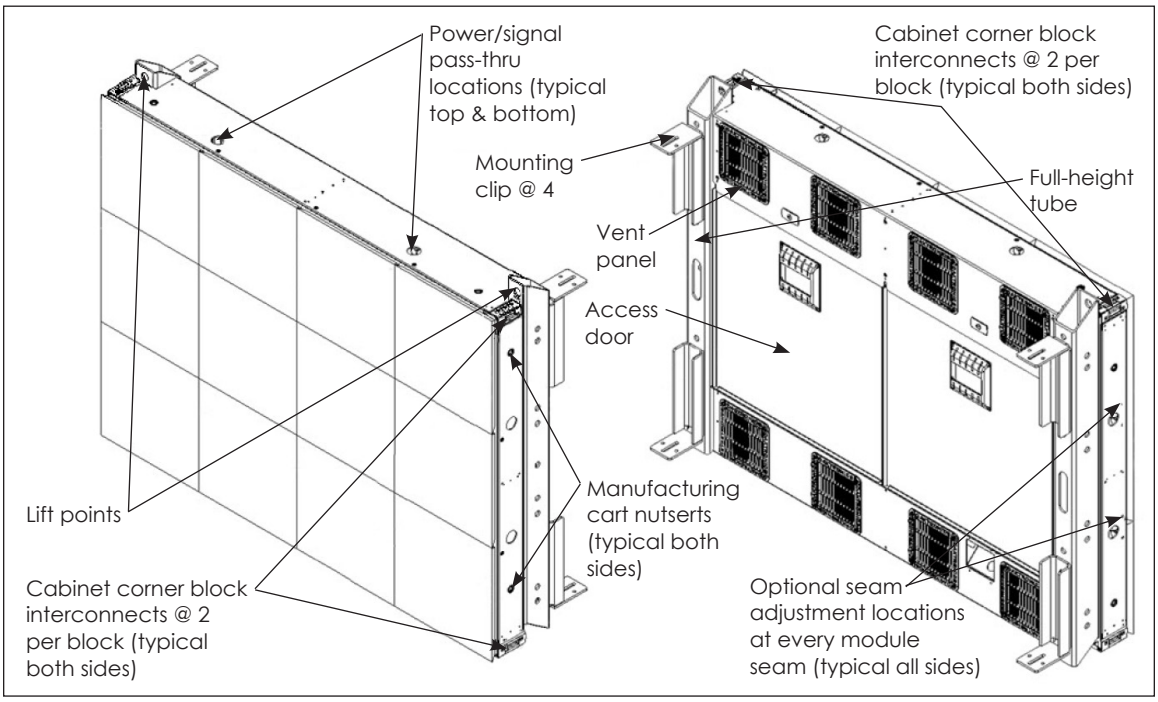

Figure 9: *Typical Single Cabinet Section*

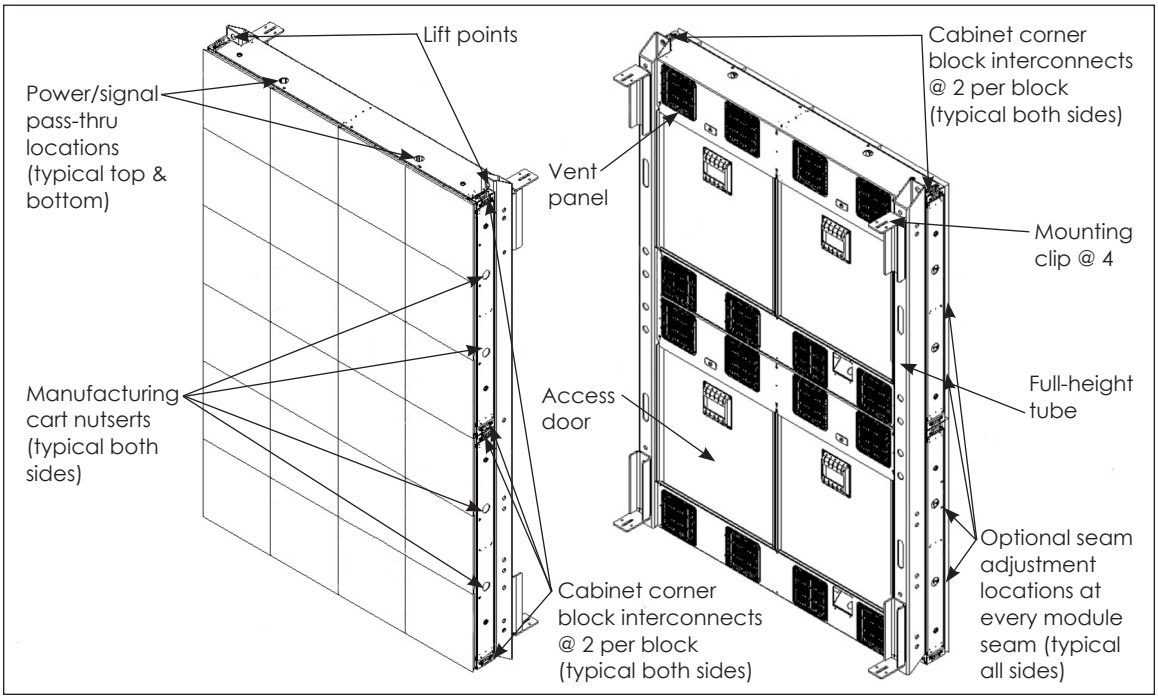

Figure 10: *Typical Vertical Pair Section*

Figure 11 shows the basics of cabinet ventilation. Take note of the ventilation requirements later in this section and the minimum distance required from the ventilation panels to the stringer faces. Blocked ventilation panels may result in the display overheating, causing display failure.

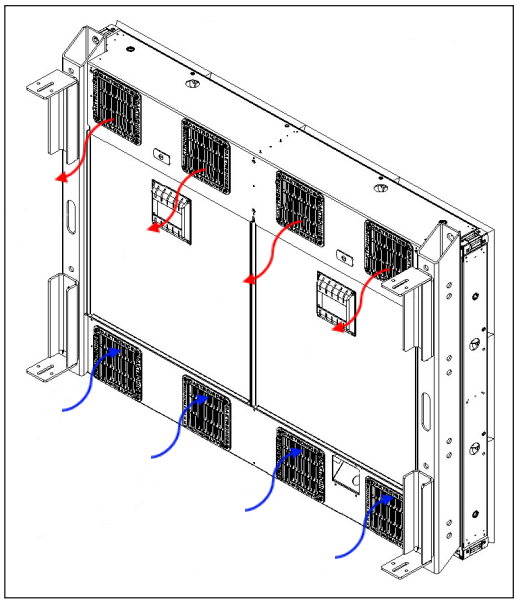

Figure 11: *Ventilation Basics*

Cabinets are ventilated with positive air pressure ventilation. Intake fans force cool air into the bottom ventilation panels in each cabinet, and warm air exhausts out the top ventilation panels in each cabinet.

Verify the following before beginning the installation process:

- Verify the mounting structure is square. Refer to **Figure 12** and measure from the top corner of the top stringer to the opposite bottom corner of the bottom stringer. Repeat this process on the two remaining corners. Compare both measurements. If they differ by more than $^{1}/_{4}$", contact the project manager or mechanical systems engineer.
- Verify the stringer height is accurate based on the contract-specific Shop Drawing. Refer to **Figure 13** and measure from the top of steel (TOS) of each stringer to the TOS for each level. Always measure from the lowest stringer at each column location. Stringer spacing should not vary by more than $\pm^{1}/_{2}$" across the width of the stringers. If either of these variations is encountered, contact the project manager or mechanical systems engineer.

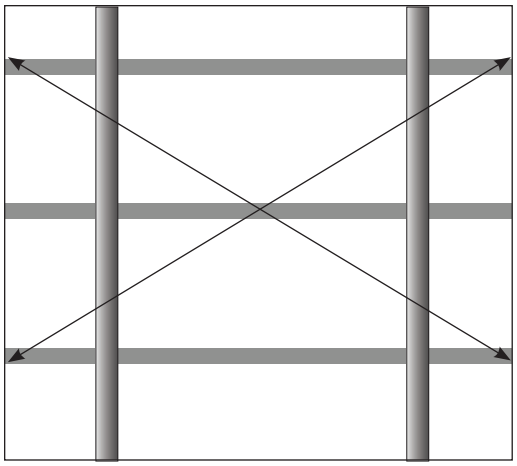

Figure 12: *Verify Mounting Structure*

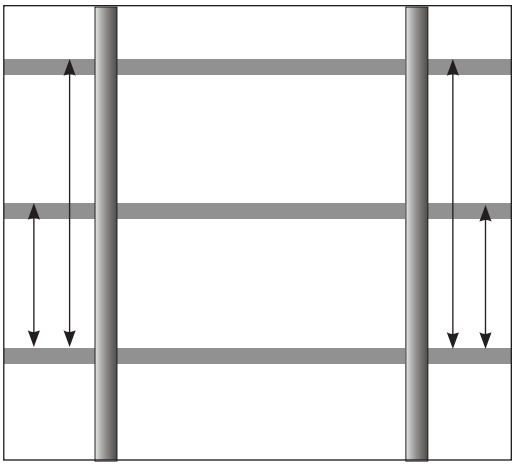

Figure 13: *Verify Stringer Height*

- Verify the plumbness of the stringer faces. Place a plumb bob against the front of the top stringer and drop the plumb bob down to the bottom stringer, measuring left to right down the length of each stringer and the middle. When installing sections, leave enough room between the full-height tubes and the mounting structure to account for any variation in plumbness. Refer to **Figure 14** and **Figure 15** when it is time to hang the sections.

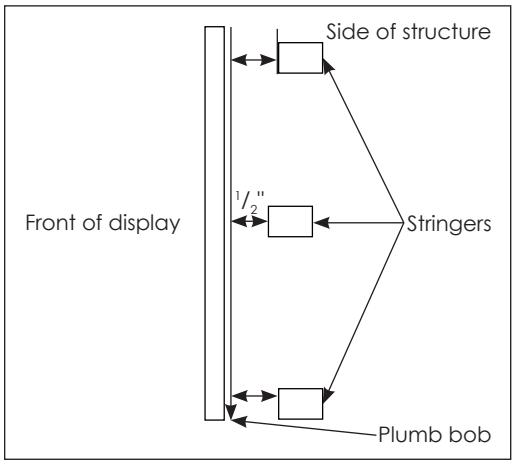

Figure 14: *Verify Plumbness of Stringer Faces*

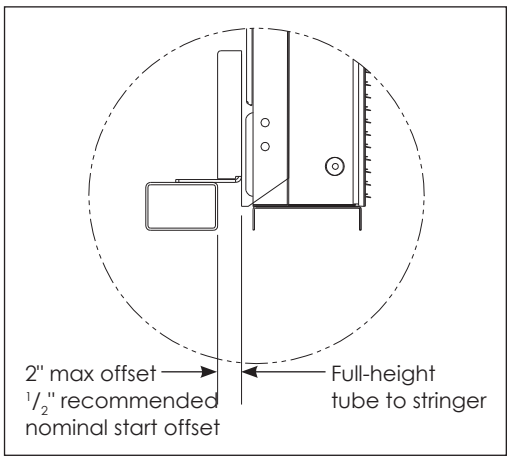

Figure 15: *Verify Cabinet-to-String Offset*

A $^1/_2$" minimum gap from the rear of the display's full-height tubes to the stringer farthest out of tolerance to the display side is recommended. Contact the project manager or mechanical systems engineer if a variation of more than $^1/_2$" in stringer plumbness is encountered.

A 2" maximum gap from the display rear to the stringer farthest away from the display side is permitted. A 1" minimum clearance behind the ventilation panels is required if both the intake and exhaust panels are covered by the stringer face.

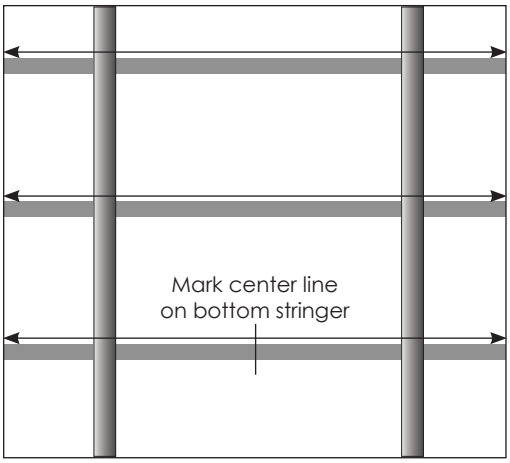

Figure 16: *Verify Stringer Width*

- Verify the width of the structure. Refer to **Figure 16** and measure the length of each stringer. This also helps locate the center point of the structure, serving as a reference for where to install the first cabinet.

- Verify the stringer is straight. Refer to **Figure 17** and use a string line.

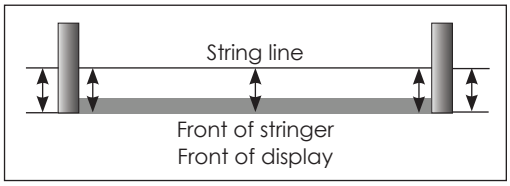

Figure 17: *Verify Stringer Straightness*

Use a tape measure to measure back the same distance from the front of the stringer on both ends of the bottom stringer and mark those spots. Stretch a string line between these two marks and in 10' intervals along the span of the stringer and measure from the front of the stringer to this string line.

This also helps set the bottom row of the display by measuring from the front of the stringer back to the string line and figuring out the variances needed in the clips across the stringers. If the variance is greater than $\pm^1/_2$", contact the project manager or mechanical systems engineer.

Keep these critical points in mind during the installation process:

- Ensure the sign installer and the structural engineer designing the sign structure determine the clips supporting the weight per the design of the structure as well as the installation method. Daktronics mounting clips are designed to support each individual sign section weight by either the top or bottom mounting clips (two clips total).
- Do not set the display sections directly on the ground if the display ships in sections that must be removed from the trailer or crates before installation. Place them on spacers at least 2" high and not directly under the module to prevent module damage. Place supports every 4' to 6'. Refer to the **DVS-160X/190X Series Shipping Frame Field Instructions Quick Guide (DD2872572)**.
- Ensure the sections' bottom mounting angles and stabilizing blocks have been disconnected from the bottom of the crate prior to lifting when removing display sections from wooden crates. Once lifted, remove the countersunk bolt to remove the stabilizing blocks (where attached).
- Wipe any dust or debris off the top of the cabinet sections before lifting the display. This helps with water sealing and module registration.
- Use a clean rag to carefully brush any debris from the module faces before lifting the display and quickly inspect the display faces to ensure all modules are securely latched.
- Ensure the drain holes in the bottom of each section are not obstructed in any way. Inspect the mounting structure to ensure it does not obstruct the drain holes. If the drain holes are obstructed, drill $^{3}/_{8}$" drain holes through the holes in the display cabinet and the mounting structure. Refer to **Figure 18**.

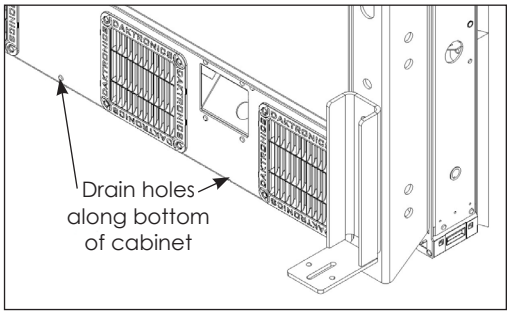

Figure 18: *Drain Hole Locations*

Note: A 1" minimum clearance is required behind the ventilation ports if both the intake and exhaust fans are covered by a stringer face.

- Attach the clips permanently to the structure. Refer to the contract-specific Shop Drawing for more details on welding or bolting requirements. If both are illustrated on the Shop Drawing, contact the project manager. Refer to **Figure 19** for a typical welded attachment or to **Figure 20** for a typical weldless attachment.

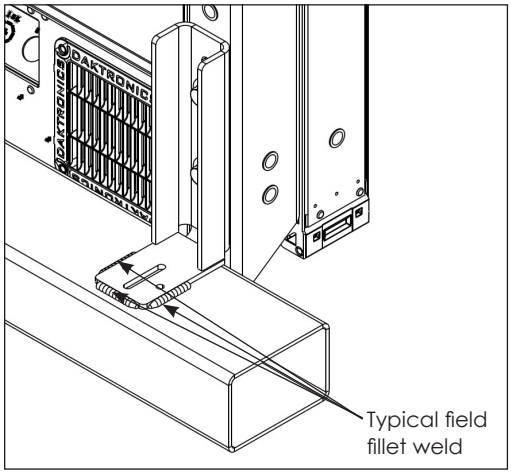

Figure 19: *Typical Welded Attachment*

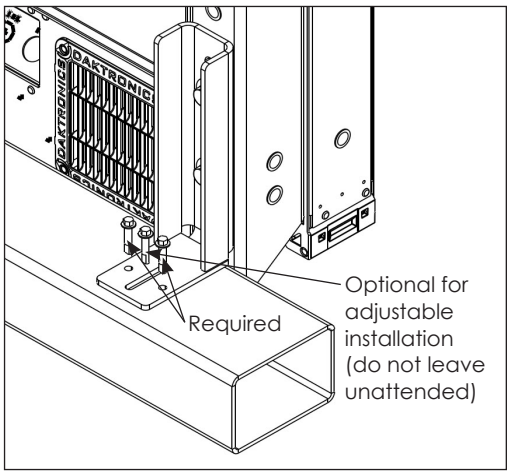

Figure 20: *Typical Weldless Attachment*

Welded attachment: Weld the clip angles on all three sides. It may be necessary to weld on the inside of the clip if two clips are adjacent.

Weldless attachment: Use a screw in the middle slot of the clip to allow for adjustment when hanging the section. Once the section is properly set in place, the screws *must* be securely fastened into the two outer holes of the clip to permanently secure the section to the structure. Refer to the **Structural Self-Drilling Screws Installation Quick Guide (DD1723952)** in **Appendix B: Reference Documents (p.49)**.

- Ensure all light gaskets are in place (continuous between precision corner blocks on the top and the right of each cabinet when viewed from the front).

Recommended Section Installation Sequence for Matrix Displays

1. Review the contract-specific Shop Drawing. On the front view, find the overall width of the display and determine the location of the center line of the overall display. This line will be the starting point of the installation.
2. Determine which section in the bottom of the display lies in that center line. If the center line falls somewhere within the width of a section, this section will be the first section installed. In **Figure 21**, Section 203 will be installed first. If the center line falls at the intersection of two sections on the bottom row, the section to the left of the center line will be the first section installed.

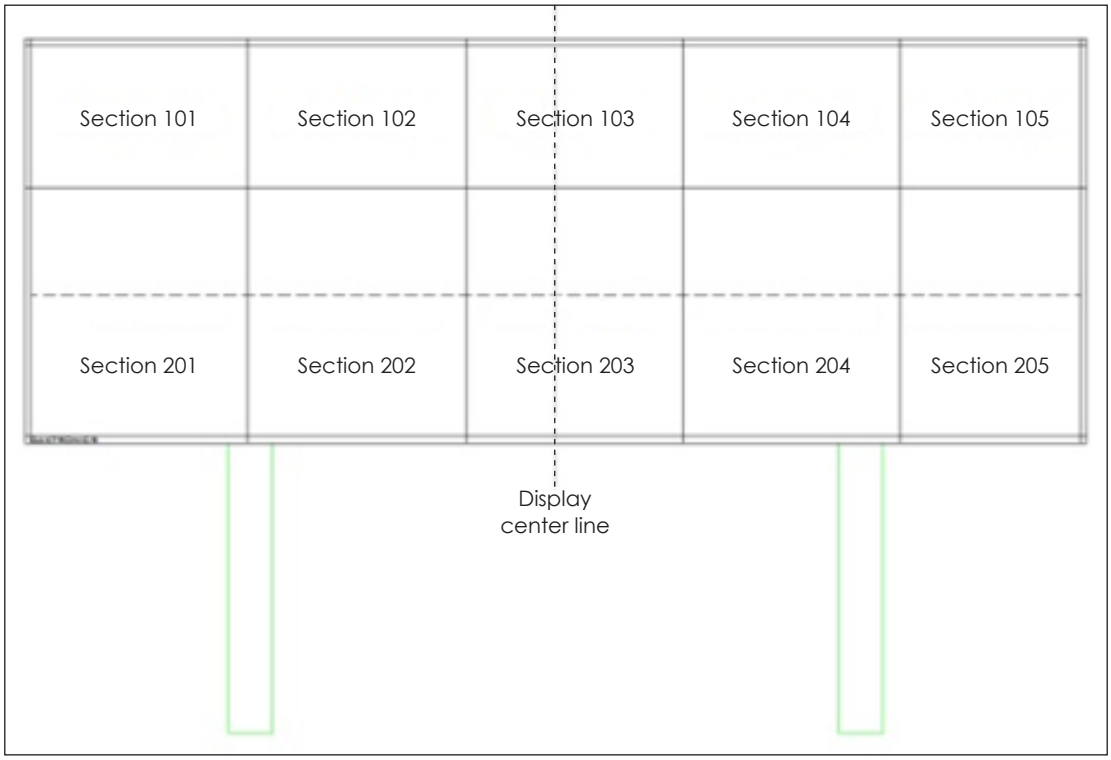

Figure 21: *Determine First Section Installed*

3. Refer to **Installation (p.15)** and install the first section on the bottom row. Refer to **Figure 22**.

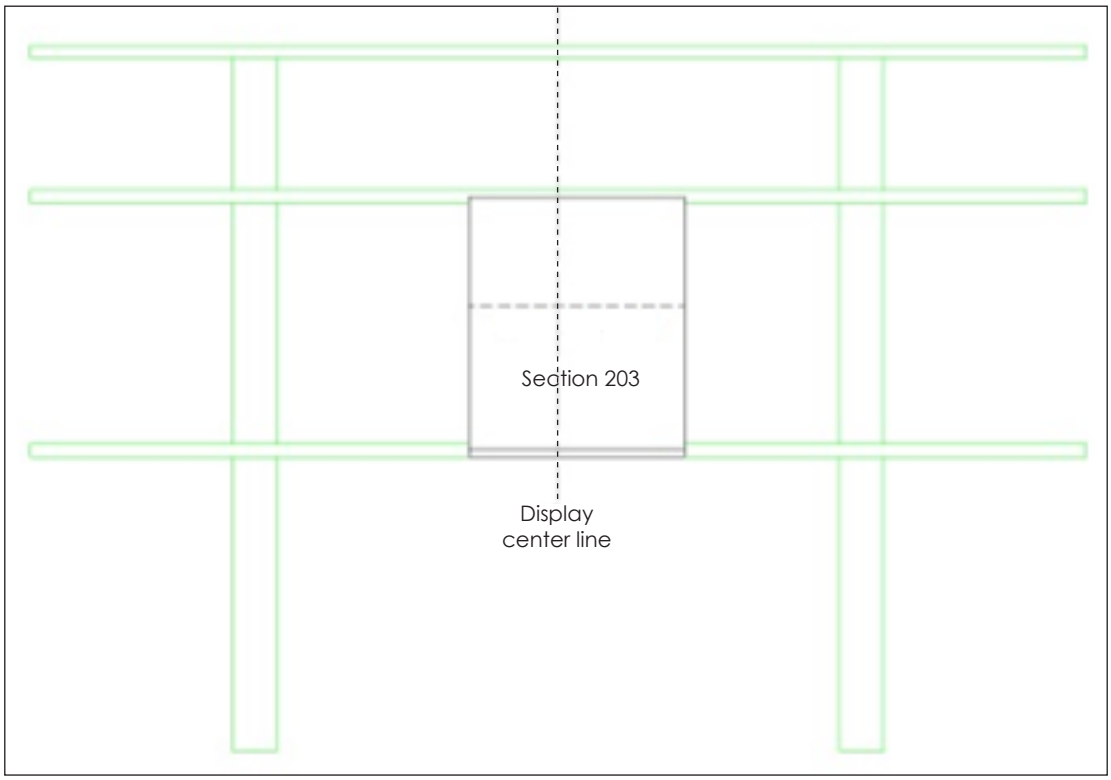

Figure 22: *Install Center Section on Bottom Row*

4. Work to the left on the bottom row after the center section is installed until the left edge of the display is reached. As shown in **Figure 23**, install Section 202 and then Section 201 after Section 203 (the center section) is installed square and plumb.

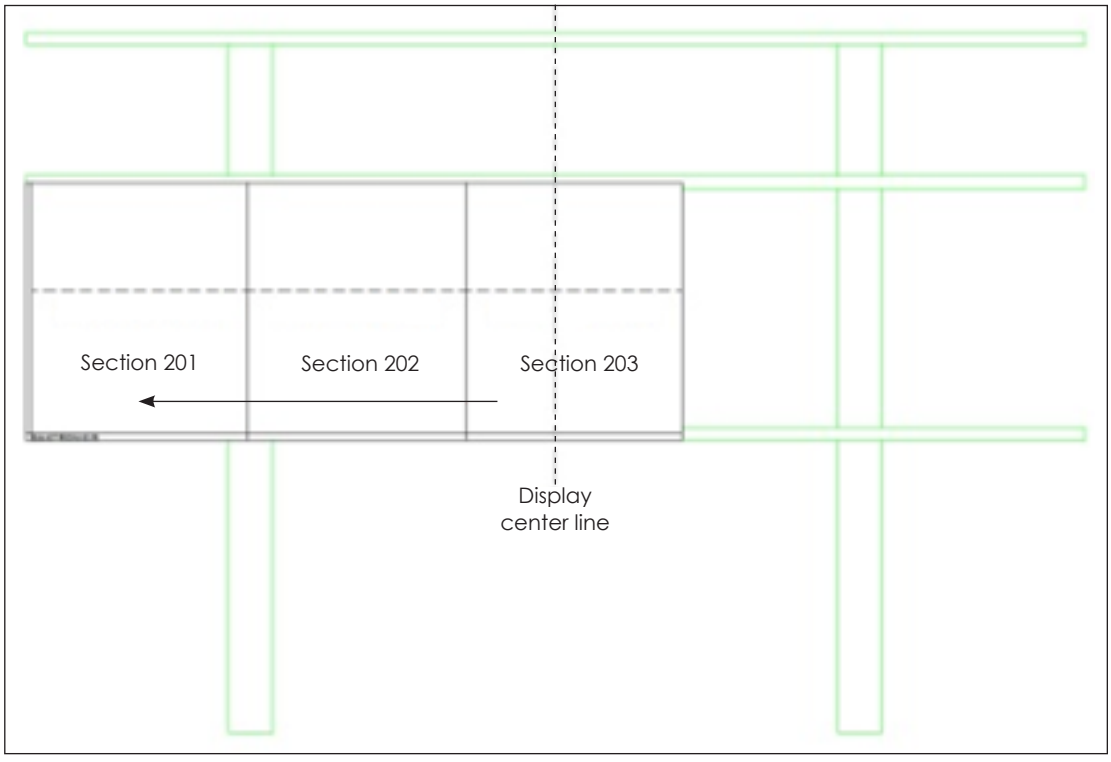

Figure 23: *Install from Center Section to Left on Bottom Row*

5. Go back to the center and finish the bottom row to the right of the center section after the row has been installed from the center to the left. As shown in **Figure 24**, install Section 204 and then Section 205 to reach the far right end of the display and complete the bottom row of sections.

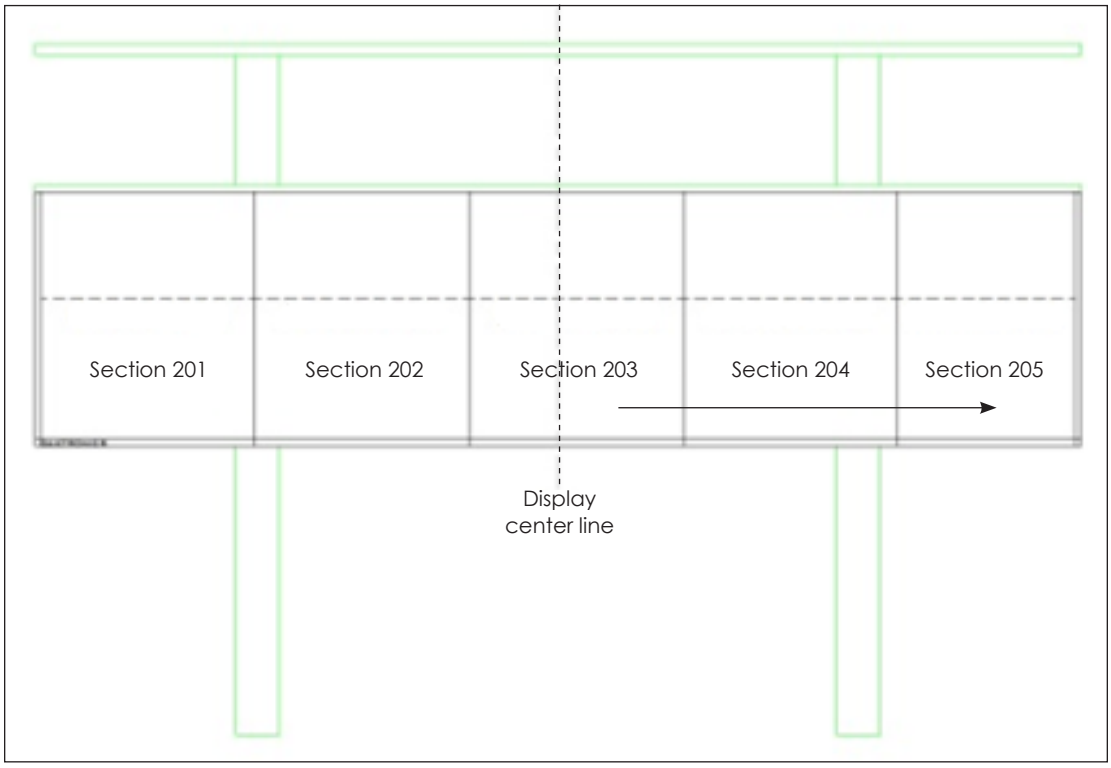

Figure 24: *Install from Center Section to Right on Bottom Row*

6. Begin installing the next row of sections above the center cabinet after the bottom row is completely installed. In **Figure 25**, Section 103 is the center cabinet.

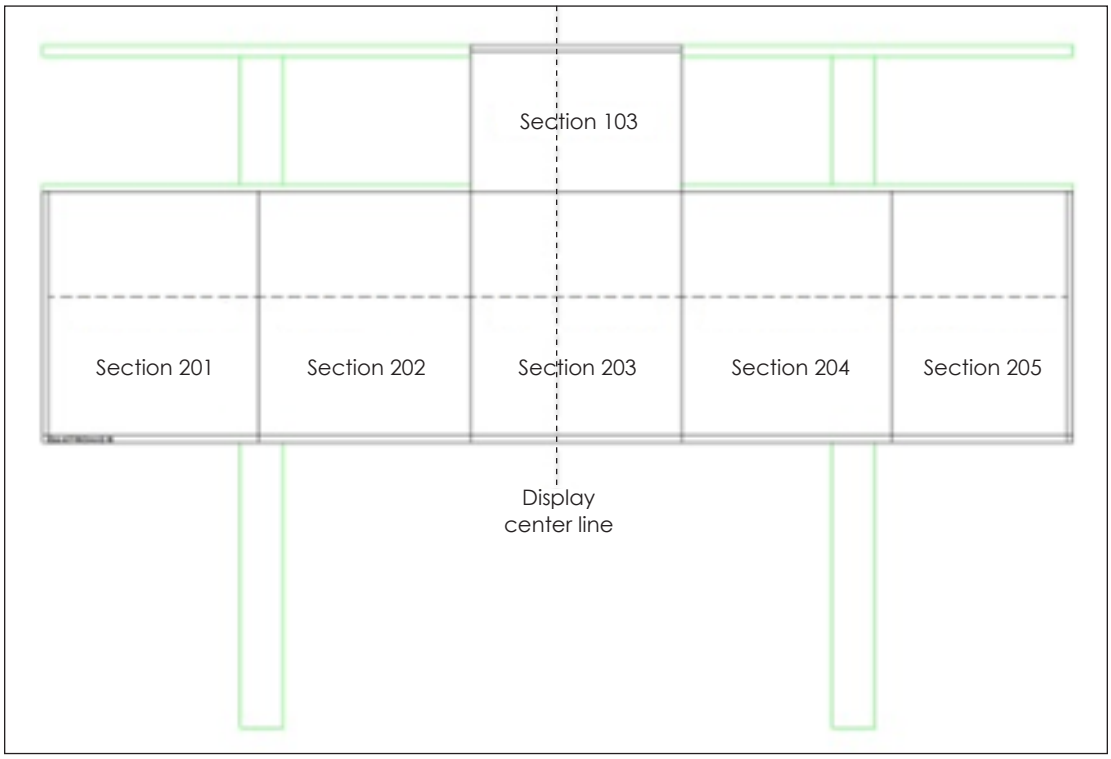

Figure 25: *Install Center Section on Second Row*

7. Work to the left on the second row after the center section is installed until the left edge of the display is reached. As shown in **Figure 26**, install Section 102 and then Section 101 after Section 103 (the center section) is installed and plumb.

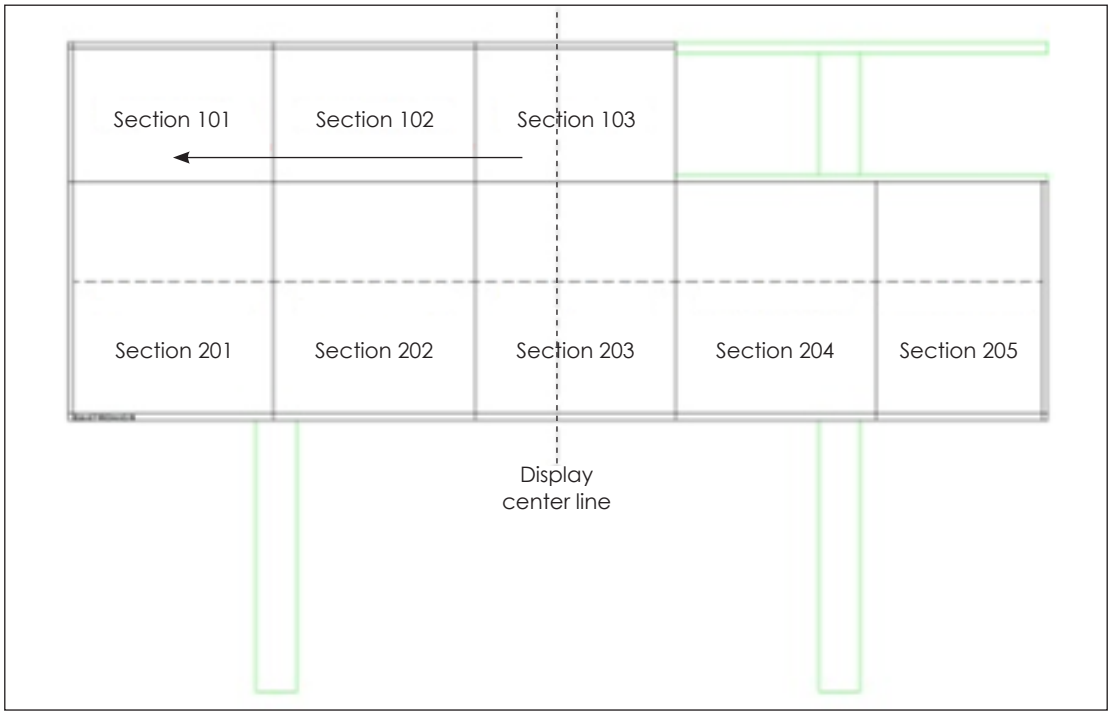

Figure 26: *Install from Center Section to Left on Second Row*

8. Go back to the center and finish the second row to the right of the center section after the row has been installed from the center to the left. As shown in **Figure 27**, install Section 104 and then Section 105 to reach the far right end of the display and complete the second row of sections.

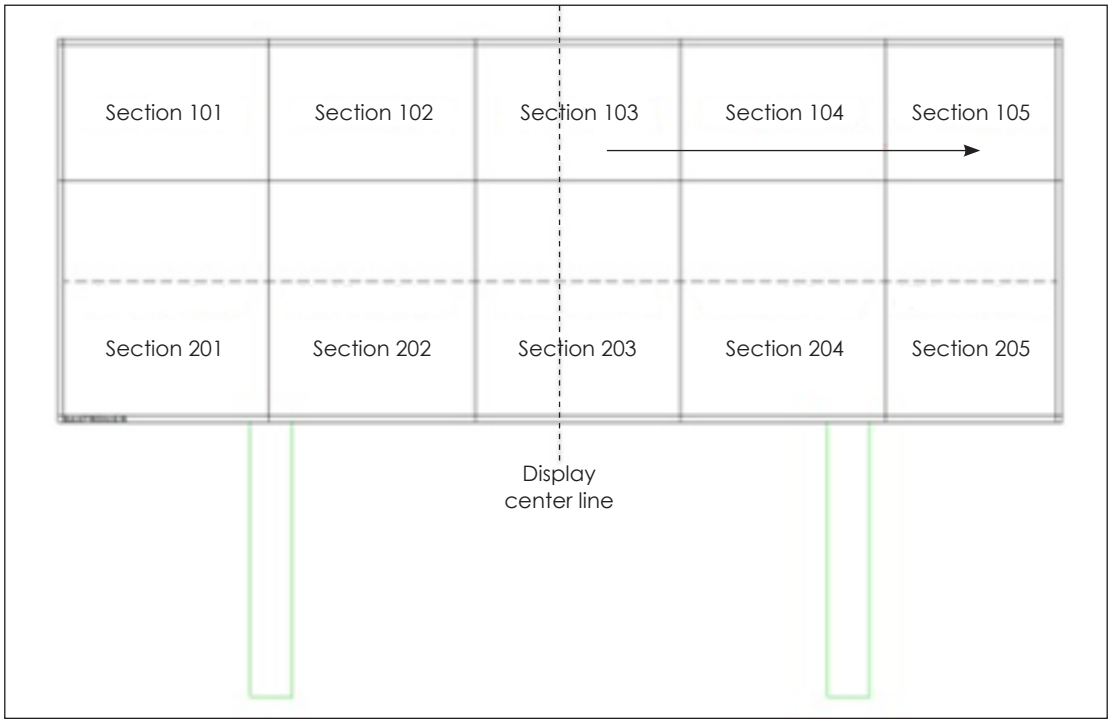

Figure 27: *Install from Center Section to Right on Second Row*

9. Repeat **Steps 6-8** until the remainder of the display is fully installed.

Installation

This section provides general guidance on mounting individual sections to a support structure.

> **Note:** The display must mount directly to a non-combustible surface.

Seam tolerance is critical and must be maintained throughout the installation process. Seam measurement can also verify spacing. Refer to the **DVS-160X/190X Series Seam Measurement Field Instructions Quick Guide (DD2872587)** for information on the seam measurement process and to the **DVS-160X/190X Series Cabinet Alignment Quick Guide (DD2872114)** in **Appendix B: Reference Documents (p.49)** for information on proper seam alignment.

Refer to **Figure 22**, **Figure 28**, and **Figure 29** while completing **Steps 1-4** for placing the first section.

1. Use the dimensions from the contract-specific Shop Drawing and set the bottom clip angles to the approximate correct height from the bottom of the cabinet and tighten to the display.
2. Loosen the top clip angles before flying the cabinet into place to easily adjust the clip angle placement on the structure. Using tag lines when lifting sections into place is recommended. A $^{1}/_{2}$" eyebolt can be installed into the nutserts in the rear of the full-height tubes. Refer to **Figure 28**. Tag lines should be attached to these bolts and *not* to the clip angles, door handles, vent panels, or other areas of the cabinet, as this can damage the cabinet.

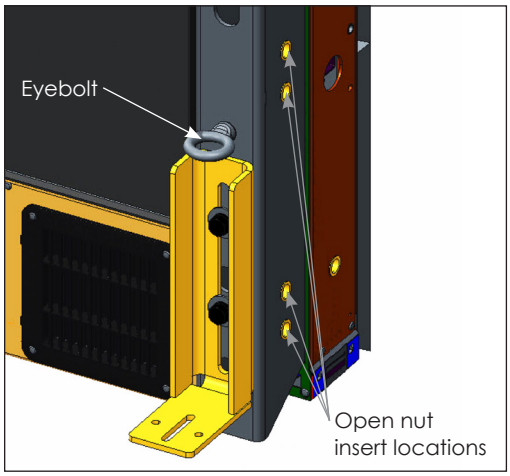

Figure 28: *Recommended Tag Line Attachment*

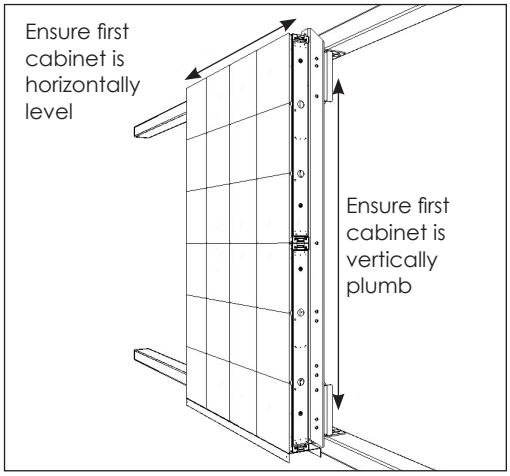

Figure 29: *Horizontally Level & Vertically Plumb Cabinet*

3. Fly the first section into position; adjust and tighten the clips accordingly. Ensure it is both vertically plumb and horizontally level, as other sections rely on this section's position. Refer to **Figure 29**.
4. Set the clip angles and tighten them to the display after the section is in place; then permanently attach the section to the structure per the contract-specific Shop Drawing.

Refer to **Figure 23**, **Figure 24**, and **Figure 30** while completing **Steps 5-8** for placing the second section.

5. Loosen the top clip angles and ensure the bottom clip angles are set all the way up on the bolts before flying the next cabinet into place to easily adjust the clip angle placement on the structure. Lift the section and position it beside the first section, ensuring the corner block alignment pyramids on the cabinets nest together.

6. Install all interconnect bolts across the vertical seam immediately after positioning the section to ensure the display sections fit snugly together and the new section is plumb and level. Refer to **Figure 30**. Do not tighten the bolts until there is a bolt in every corner block location and the display modules are properly aligned. If installing from the rear, look down the module seams from the top or side of the cabinet when attaching sections together to ensure the modules align properly at the splice. After everything is in place, tighten down all corner block splice bolts. If vertical misalignment occurs, loosen the bolts, attempt to adjust and move the section, and retighten the corner block splice bolts. If issues persist, contact the project manager.

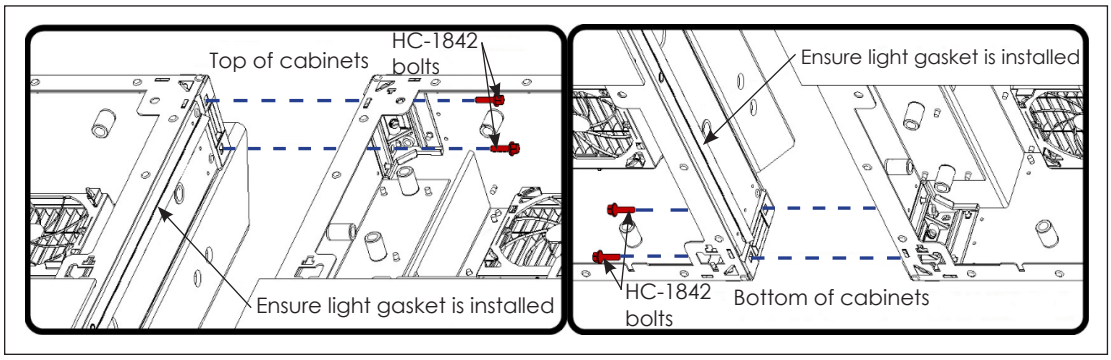

Figure 30: *Vertical Splice Section Bolting*

7. Set the clip angles and tighten them to the display after the splice bolts are tightened. Permanently attach the clip angles to the structure as in **Step 4**. If seam spacing in the cabinet span between the corner blocks is incorrect, refer to **Center Adjustment (p.17)**.

8. Repeat **Steps 5-7** for all remaining sections in the bottom row. Install the bottom and side borders as necessary if they are not already attached prior to flying the sections into place. Refer to **Figure 23** and **Figure 24**.

Refer to **Figure 25** and **Figure 31** while completing **Steps 9-11** for placing the first section on the second row.

9. Loosen the top clip angles and ensure the bottom clip angles are set all the way up on the bolts before flying the cabinet into place to easily adjust the clip angle placement on the structure. Lift the section and position it on top of the appropriate section, ensuring the corner block alignment pyramids on the cabinets nest together.

10. Install all corner block interconnect bolts across the horizontal seam immediately after positioning the section to ensure the display sections fit snugly together, and the new section is plumb and level. Refer to **Figure 25** and **Figure 31**. Do not tighten the bolts until there is a bolt in every corner block location, and the display modules are properly aligned. If installing the display from the rear, look down the module seams from the top or side of the cabinet when attaching the sections together to ensure the modules align properly at the splice. After everything is in place, tighten down all corner block splice bolts. If horizontal misalignment occurs, loosen the bolts, attempt to adjust and move the section, and retighten the corner block splice bolts. If issues persist, contact the project manager.

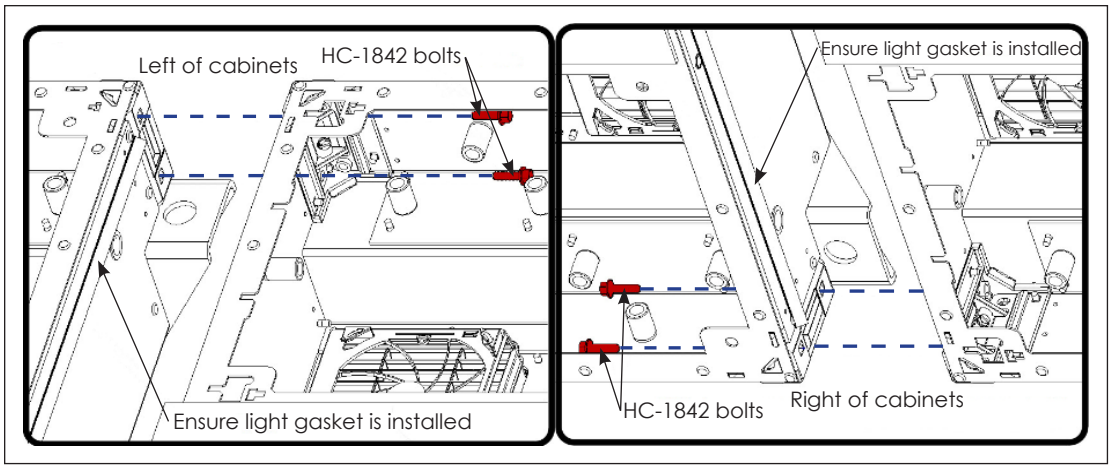

Figure 31: *Horizontal Splice Section Bolting*

11. Set the clip angles and tighten them to the display after the corner block splice bolts are tightened. Permanently attach the section to the structure as shown in **Step 4**.

Refer to **Figure 26**, **Figure 27**, **Figure 30**, and **Figure 31** while completing **Steps 12-15** for placing the remaining sections.

12. Loosen the top clip angles and ensure the bottom clip angles are set all the way up on the bolts before flying the cabinet into place to easily adjust the clip angle placement on the structure. Lift the section and position it on top of the appropriate section, ensuring the corner block alignment pyramids on the cabinets nest together.

13. Install all interconnect bolts through the vertical and horizontal seams immediately after positioning the section to ensure the display sections fit snugly together, and the new section is plumb and level. Refer to **Figure 26**, **Figure 30**, and **Figure 31**. Do not tighten the bolts until there is a bolt in every vertical and horizontal location, and the display modules are properly aligned. If installing the display from the rear, look down the module seams from the top and side of the cabinet when attaching the sections together to ensure the modules align properly at the splice. After everything is in place, tighten down all corner block splice bolts. If misalignment occurs, loosen the bolts, attempt to adjust and move the section, and retighten the corner block splice bolts. If issues persist, contact the project manager.

14. Set the clip angles and tighten them to the display after the splice bolts are tightened. Permanently attach the section to the structure as in **Step 4**.

15. Repeat **Steps 12-14** for all remaining sections. Install the top and side borders as necessary if they are not already attached prior to flying sections into place. Refer to **Figure 27**.

Center Adjustment

Precision blocks provide proper spacing at the ends of section seams, but spacing may vary in the middle where the sections come together. Additional holes are provided along both horizontal and vertical edges of the cabinet for further adjustment if required.

For wide center seams, install $^{1}/_{4}$" bolts through the holes behind the face sheets at the problem locations in the bottom of the top cabinet or the left side of the right cabinet and into the next cabinet's nutsert. Tighten these bolts until the seam is within tolerance. Refer to the **DVS-160X/190X Series Seam Measurement Field Instructions Quick Guide (DD2872587)** in **Appendix B: Reference Documents (p.49)** for details on seam tolerance and to **Figure 32** for details on seam adjustment.

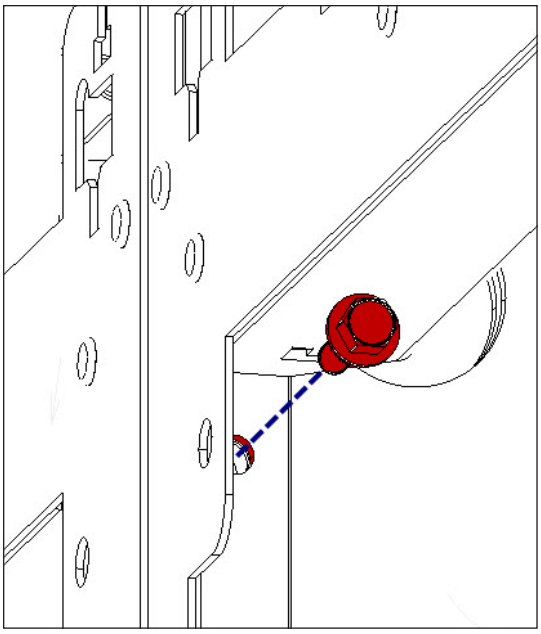

Figure 32: *Adjust Wide Center Seams*

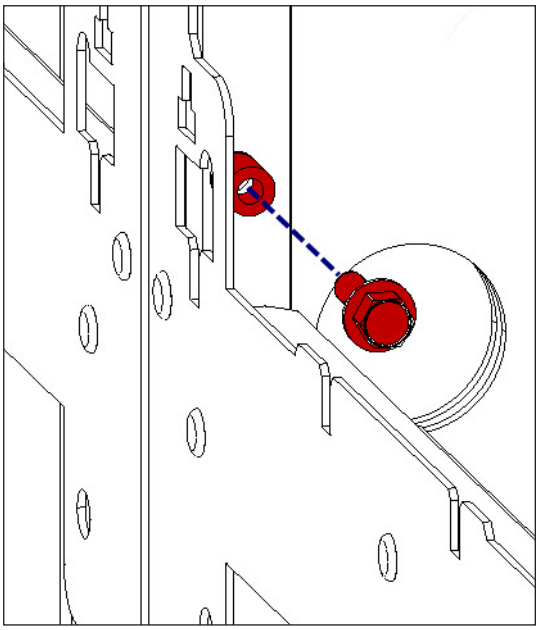

Figure 33: *Adjust Tight Center Seams*

For tight center seams, install $^{1}/_{4}$" bolts into the pre-installed nutserts behind the face sheet at the problem locations in the bottom of the top cabinet or the left side of the right cabinet. Tighten the bolts until the seam is within tolerance. Refer to the **DVS-160X/190X Series Seam Measurement Field Instructions Quick Guide (DD2872587)** in **Appendix B: Reference Documents (p.49)** for details on seam tolerance and to **Figure 33** for details on seam adjustment.

3 Electrical Installation

This display is intended to be installed in accordance with the requirements of Article 600 of the National Electrical Code and/or other applicable local codes. This includes proper grounding and bonding of the sign.

This display is suitable for wet locations. Daktronics engineering staff must approve any changes that may affect the weather tightness of the display. If *any* modifications are made to the weather tightness of the display, detailed drawings of the changes *must* be submitted to Daktronics engineering staff for evaluation and approval, or the warranty will be null and void.

Only qualified individuals should access the electrical components of this display and its associated equipment.

Power Summary

Power from the termination panel breaker routes to the Power In jack on the power supplies. From there, power routes to the individual modules. ProLink routers (PLRs) are powered off the closest available module. Refer to the contract-specific Riser Diagram for detailed power information and individual circuit loads.

DVS-1XY0/DVS-1XY1 120 V ~ 60 Hz	
Maximum Watts	**Maximum Amps**
1872	15.6

Signal Summary

Depending on display application and control room design, display data may route from the control room to the display by a number of different pieces of equipment. The most common are the ProLink6 control system, the A/B transmitter interface, and the video image processor (VIP) video interface itself.

The Block Diagrams and Layout Drawings in **Appendix A: Reference Drawings (p.47)** illustrate the signal layout of each display section. The contract-specific Config Drawing illustrates the signal connections from the control room to the ProLink routers (PLRs) in the display or from cabinet section to section. This is done to some extent in all DVS displays.

Data from the control system routes via fiber-optic cable from Fiber Port A on the VIP to the PLR in the display. Refer to the **VIP-5000 Series Video Image Processor Operation Manual (DD2773152)** for details. The VIP may be located in the control room or in a remote location. The data then routes to the appropriate PLRs via fiber-optic cables. Refer to the appropriate contract-specific Riser Diagram and Config Drawing for more routing information. Refer to the Power Entrance Drawings in **Appendix A: Reference Drawings (p.47)** for fiber termination information.

The Cabinet Fiber Routing Drawing in **Appendix A: Reference Drawings (p.47)** and the contract-specific Config Drawing illustrate the fiber layout from section to section of the display.

The Block Diagrams and Layout Drawings in **Appendix A: Reference Drawings (p.47)** illustrate how data passes from one PLR to the modules and depict power harnessing and component placement.

Each PLR sends data to the modules within the display; refer to the Block Diagrams and Layout Drawings in **Appendix A: Reference Drawings (p.47)** for routing information. Signal exits via fiber-optic cable from Fiber Port B on the PLR and routes to Fiber Port A on the next PLR. Refer to **Figure 34**, as it illustrates a typical signal routing layout. Refer to the contract-specific Config Drawing for further information.

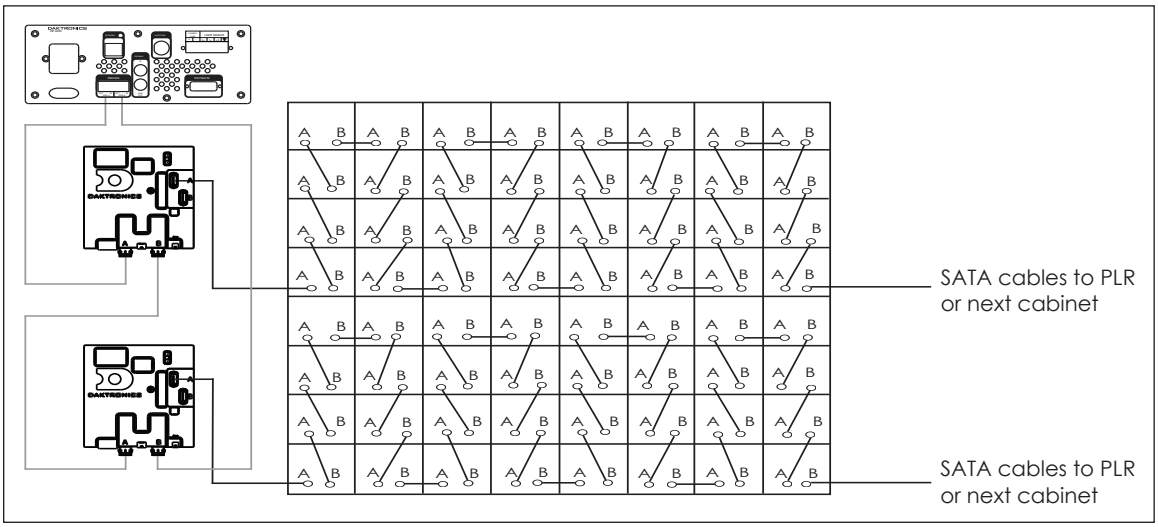

Figure 34: *Signal Routing*

Common Connectors

When pulling a connector from a plug, do not pull the wire or cable; detach the jack itself. Pulling the wires may damage the connector. Not all of these connectors are found in every display.

- **Water-Tight SATA Cable Connector**
  Daktronics uses a variety of SATA cables and SATA cable connectors. **Figure 35** illustrates one of the most commonly used SATA cable connectors. To disconnect the SATA cable connector, squeeze the locking clips inward and pull the plug out of the jack.

Figure 35: *SATA Cable Connector*

- **Fiber-Optic Connector**
  LC connectors are square. To remove an LC connector, depress the small clip on the jack and gently remove. Refer to **Figure 36**.

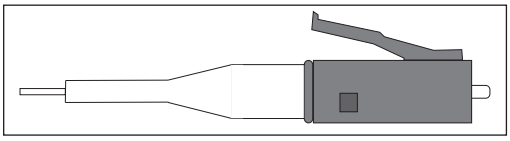

Figure 36: *LC Fiber-Optic Connector*

Control Cable

Refer to the contract-specific Riser Diagram for specifications on signal and power cable runs. Refer to the **VIP-5000 Series Video Image Processor Operation Manual (DD2773152)** for more information on the video image processor (VIP).

The minimum bend radius for this fiber-optic cable is 15 times the outside diameter of the cable or 7". Refer to the contract-specific Riser Diagram for the outside diameter of the cable in this system. All fiber-optic runs must be continuous except where noted on the Riser Diagram.

Display Power

All display grounding, power routing, and termination must meet or exceed local codes and standards.

Correct power installation is imperative for display operation. These subsections give details on display power installation. Only qualified individuals should attempt the electrical installation; untrained personnel should not attempt to install the displays or any of the electrical components. Improper installation could result in serious equipment damage and could be hazardous to personnel.

Refer to contract-specific documentation to determine who is responsible for providing conduit and pulling cable through the conduit.

Grounding

The display must be properly grounded according to the National Electrical Code and any other local or national codes, or the warranty will be null and void.

The display system must have proper earth-ground connection. Proper grounding is necessary for reliable equipment operation, as it protects the equipment from destructive electrical disturbances and lightning.

The material of an earth-ground electrode differs from region to region and varies with conditions present at the site. Consult local grounding codes. Daktronics does not recommend using the support structure as an earth-ground electrode; concrete, primer, corrosion, and other factors make the support structure a poor ground.

Power Installation

1. Connect the grounding electrode at the local disconnect, never at the display termination panel.
2. Use a disconnect that opens all ungrounded phase conductors.

This display uses one of two power termination options. Refer to the Power Entrance; Field Termination Drawing in **Appendix A: Reference Drawings (p.47)** for installation details.

Main Disconnect

Refer to the contract-specific Riser Diagram to determine who must supply a fused main distribution/disconnect and the necessary wiring for power distribution to multiple display termination panels.

The disconnect mechanism must be located in direct line of sight from the display it controls. This allows workers to keep the disconnect mechanism in view while performing display maintenance.

Power disconnects capable of locking in the open position may be located in an out-of-sight location.

The customer or contractor is responsible for conduit and wire unless otherwise stated on contract-specific documentation.

Power Termination at the Termination Panel(s)

All power routing and termination must comply with local and national codes and standards. Display grounding must agree with local and national codes and standards.

The display allows water to enter, so incoming conduits should be pointed downward or have a fitting attached to prevent water from entering the conduit.

When terminating power at the termination panel, the individual power phases must balance as evenly as possible. Current draw per line, as noted on the contract-specific Riser Diagram, is stated as the high leg current draw.

Refer to the Power Entrance Drawings in **Appendix A: Reference Drawings (p.47)** for power termination information.

Display Wiring

Power

After mounting the display and bolting all sections securely together, run power from one section to another. Route the interconnect power wire through the interconnect holes based on the contract-specific Config Drawing, Power Interconnect Drawing, and Riser Diagram. When making the bus harness interconnects, it is imperative that the labels and colors of each connector match to ensure proper phase balancing of the overall power system.

Signal

After mounting the display and bolting all sections securely together, run signal from section to another. Route the fiber and SATA cables based on the contract-specific Config Drawing, Signal Interconnect Drawing, and Riser Diagram. Refer to the Cabinet Fiber Routing Drawing in **Appendix A: Reference Drawings (p.47)** for fiber and SATA routing information.

Display Continuity Check

Before turning on power to the display, perform a continuity check to ensure no short circuits occurred due to shipping vibration.

> **Note:** Ensure all breakers are off before performing these steps.

1. Remove the cover from the termination panel.
2. Use an ohmmeter and place one probe on the neutral terminal and another probe to each of the taps on the breaker wire terminal. Repeat the same test for each breaker.
3. Place one probe to earth ground and one to each of the breaker wire terminals and repeat for each breaker.

All tests should result in a reading of infinity or indicate an open circuit.

Display Power Up

1. Turn on the main disconnect to power up the display.
2. Power up the control system to ensure it is fully operational before proceeding.
3. Run an initialization/power-up script or animation/logo on the display.

Optional Power Redundancy

When redundant power is included in the system, the display uses an N+1 power supply redundancy configuration for protection against module power failure. If a power supply fails, the redundant power supply provides backup power to the affected module. In regular conditions, the redundant power supply remains auxiliary. Refer to **Figure 37**.

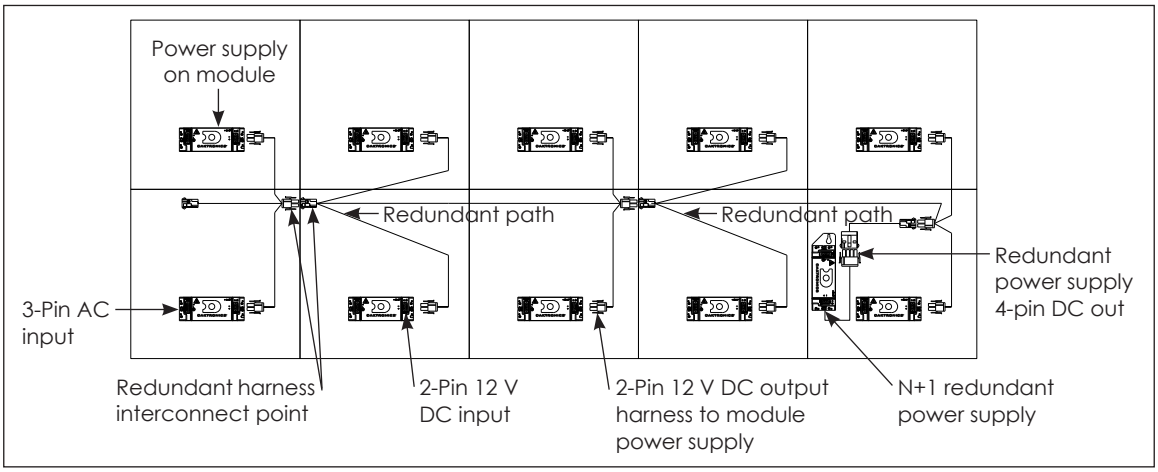

Figure 37: *Power Redundancy*

> **Note: Figure 37** serves as an *example* layout only. Refer to the contract-specific Power Interconnect Drawing for specific layout details.

Testing

To test the redundant power wiring scheme/ setup, locate the last module(s) on the redundant harnessing bus system. Refer to the Block Diagrams and Layout; Component Drawings in **Appendix A: Reference Drawings (p.47)** for wiring information and component placement. Disconnect the three-pin AC power to the power supply on the module. Verify the LEDs or indicator lights on the module remain lit to ensure the module continues to work after the AC power is disconnected. Refer to **Figure 38**.

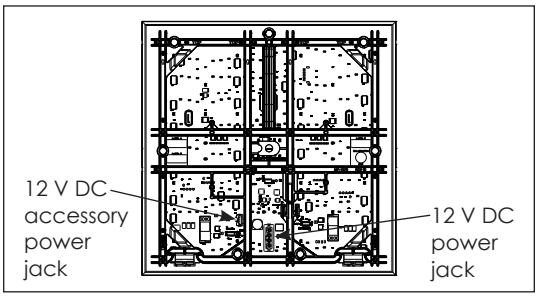

Figure 38: *Module Rear with Jacks*

Signal Redundancy

There are two different levels of signal redundancy: module redundancy, which is part of the standard design, and full-data redundancy.

Standard Module Redundancy

Module redundancy provides a primary and redundant SATA connection throughout the entire display to protect the system from signal failure. If a module in the middle of a signal chain fails, the redundant signal path takes over and limits the signal failure to that single module.

Module Redundancy Testing

To test the module redundancy wiring, use the contract-specific Signal Interconnect Drawing to verify where the ProLink routers (PLRs) are located. The display needs to be powered on and running content. Disconnect the SATA cable from SATA Port A on each PLR individually and verify all modules still display content correctly; reconnect the SATA cable. Disconnect the SATA cable form SATA Port B on each PLR individually and verify all modules still display content correctly; reconnect the SATA cable. Refer to **Figure 39** for details on the PLR ports.

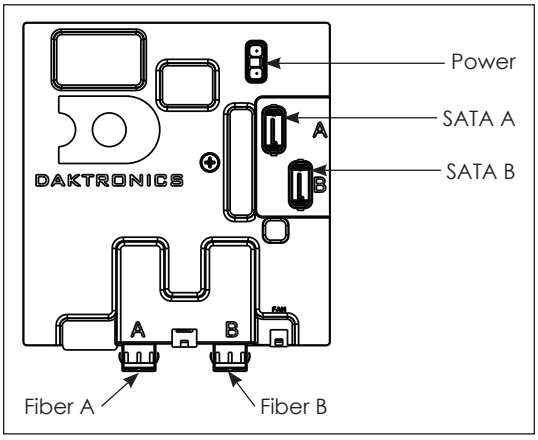

Figure 39: *PLR Connectors*

Optional Full-Data Redundancy

Full-data redundancy provides primary and redundant video image processors (VIPs), PLRs, and SATA connections throughout the entire display to protect the system from signal failure. If any signal component, cabling, or connection fails, its counterpart takes over and limits the signal failure to as little of the display as possible. Refer to **Figure 40** for layout details.

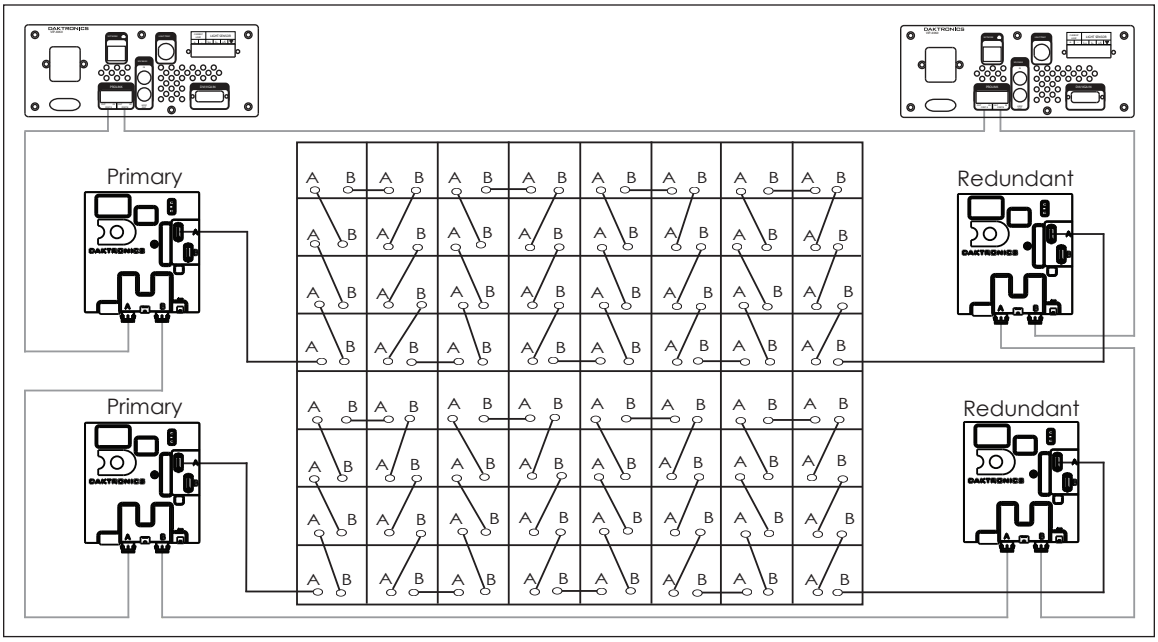

Figure 40: *Signal Routing*

Full-Data Redundancy Testing

To test the full-data redundancy wiring, use the contract-specific Signal Interconnect Drawing to verify where the PLRs are located. Disconnect the SATA cable from SATA Port A on each PLR individually and verify all modules still display content correctly; reconnect the SATA cable. Disconnect the SATA cable from the redundant PLR and verify all modules still display content correctly; reconnect the SATA cable. Refer to **Figure 41** for details on the PLR ports.

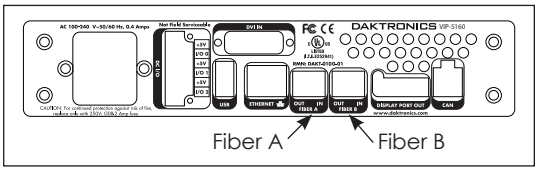

Figure 41: *VIP Connectors*

PLR Redundancy Testing

To test the PLR redundancy, use the contract-specific Signal Interconnect Drawing to verify where the PLRs are located. Disconnect the fiber cable from Fiber Port A on the first PLR and verify all modules still display content correctly; reconnect the fiber cable. Disconnect the fiber cable from Fiber Port B on the last PLR in the chain and verify all modules still display content correctly; reconnect the fiber cable. Refer to **Figure 60** for details on the PLR ports. Another method is to unplug the fiber cable from Fiber Port A on the primary VIP or the fiber cable from Fiber Port B on the backup VIP and verify all modules still display content correctly. Refer to **Figure 61** for details on the VIP ports.

VIP Redundancy Testing

To test the VIP redundancy testing, log into the primary and redundant VIPs and make the primary inactive and the redundant active and verify all modules still display content correctly. For normal operation, the redundant VIP is set to inactive and only passes redundant signal from the primary VIP to the last PLR. Refer to the **VIP-5000 Series Video Image Processor Operation Manual (DD2773152)**.

If available, Intelligent Device Management (IDM) can also verify the system is working as intended. Refer to the **IDM User Manual (DD2097912)**.

Display Series with Embedded Controller

Displays with the embedded controller consist of the standard product with the added controller.

System Startup

The displays show a boot sequence shortly after the power is turned on. The information in this sequence is very useful when using Venus® 1500 software to configure the display. Ensure all display communications and network connections are made before turning the display on.

Boot Sequence

The information in the boot sequence includes the following:

- Firmware name & version
- Display size (pixels high by pixels wide)
- Dynamic Host Configuration Protocol (DHCP)-assigned name
- IP address & state
- Media Access Control (MAC) address
- Configuration port
- Status port

- Management port (used to access configuration)
- Description

Startup Checklist

- ☐ Confirm all communication equipment is installed according to the provided documentation.
- ☐ Confirm any necessary network connections have bene made.
- ☐ Confirm the Venus® 1500 software is installed on the control computer.
- ☐ Inspect the peripheral equipment (temperature sensor, light sensor, etc.) for proper installation.

Network & Communication Installation

This section explains the network settings of displays with an embedded controller and gives guidance for integrating a display with a customer's network. It also provides basic information about available standard communication options.

Daktronics is not responsible for setting up displays on a Wide Area Network (WAN) but does assist with setting up communication on a Local Area Network (LAN) or directly to a laptop.

Keep the following points in mind when installing network and communication:

- Do not turn on the display until all network and communication installation is complete.
- Have a laptop with Internet access on-site (preferred).
- Work with a customer's IT professional for network integration (preferred).

Network Connection

Displays with the embedded controller use Dynamic Host Configuration Protocol (DHCP) by default, allowing the customer's network to configure the display and eliminating manual configuration of the player.

When the display is connected to a network that supports DHCP, a default DHCP name similar to "DAKTXXXXXX," "XXXXXX" representing the last six digits of the player's MAC address is used. This information displays during the boot sequence.

Ports 4500-4525 must be open for communication on the switcher or router.

Computer Connection

When connecting the display directly to a computer, and Dynamic Host Configuration Protocol (DHCP) is not available, the display's AutoIP feature assigns an IP address. AutoIP addresses fall into the range of 169.254.0.0 to 169.254.255.255. The IP address displays during the boot sequence when the display first turns on.

Static IP Address Settings

Setting a static IP address on a display requires the following:

- Laptop with Java®, Silverlight®, DisplayFind (installed from the Venus® 1500 V4 software disk in the Utilities folder), and Internet Explorer® applications installed
- Display IP address (provided by customer)
- Ethernet patch cable to connect computer to display

Work with Daktronics Technical Support when programming a static IP address on the player.

Standard Communication Options

Displays with the embedded controller can receive various forms of Ethernet communication. The standard communication options are listed below, along with the communication specific documentation numbers. For additional information, refer to the documents provided in the communication kits.

Communication Type	Manual DD Number	Quick Guide DD Number
Ethernet – wire	DD1417609	DD1417573
Ethernet – fiber	DD1417611	DD1417581
Ethernet bridge radio	DD1685027	DD1417586

These are the standard communication types, but each site is unique and may include additional equipment. Contact Daktronics Technical Support with any questions.

Software Installation

Venus® 1500 software is the standard control software for displays with the embedded controller. Install Venus® 1500 software either from a disk or from **www.daktronics.com/venus1500**. Click the **Downloads** tab and **Venus1500setup.exe**. Registration is required for Venus® 1500 software and must be completed within 90 days of installation. Refer to the Venus® 1500 Help File for registration instructions.

Minimum System Requirements	Recommended System Requirements
Windows Vista®, 7, or 8 operating system with current updates applied (32- or 64-bit versions)	Windows XP®, Vista®, or 7 operating system with current updates applied (32- or 64-bit versions)
800 MHz processor or higher	1.6 GHz processor or higher
512 MB RAM or higher	1.5 GB RAM or higher
1 GB free hard disk space (additional space required for content storage)	
Monitor and video adapter capable of 1024x768 resolution or higher with DirectX® 9 support	Monitor and video adapter capable of 1280x1024 resolution or higher with DirectX® 9 support
Microsoft® Internet Explorer® browser version 7 or higher	
Microsoft® .NET 3.5 Framework Service Pack 1	

Minimum System Requirements	Recommended System Requirements
CD-ROM or DVD drive	
Keyboard and mouse or other compatible pointing device	

Software Configuration

Ensure all display communications and network connections are made before using Venus® 1500 software to configure a display. After everything is installed, turn the display on, allow it to complete a boot sequence, then follow the steps below:

1. Click the Windows® **Start** button. Hover over **All Programs>Daktronics>Venus 1500 V4** and click **Venus 1500**.
2. Click the **Application** button, highlight **Configure**, and click **Displays**. Refer to **Figure 42**.

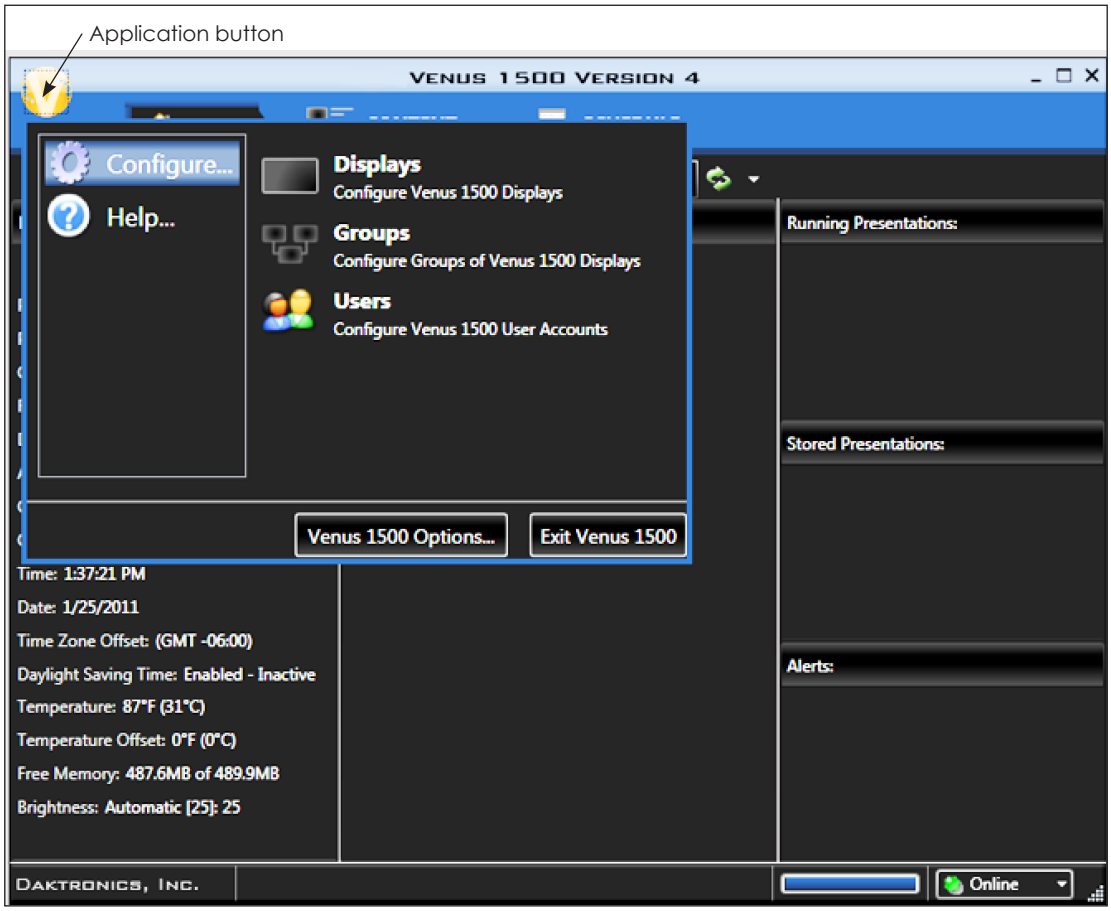

Figure 42: *Begin Display Configuration*

3. Click **Add Display...** from the **Display Management** window or right-click in the **Display Management** window and select **Add Display...**. Refer to **Figure 43**. The software searches for displays on the local network and returns a list of displays.

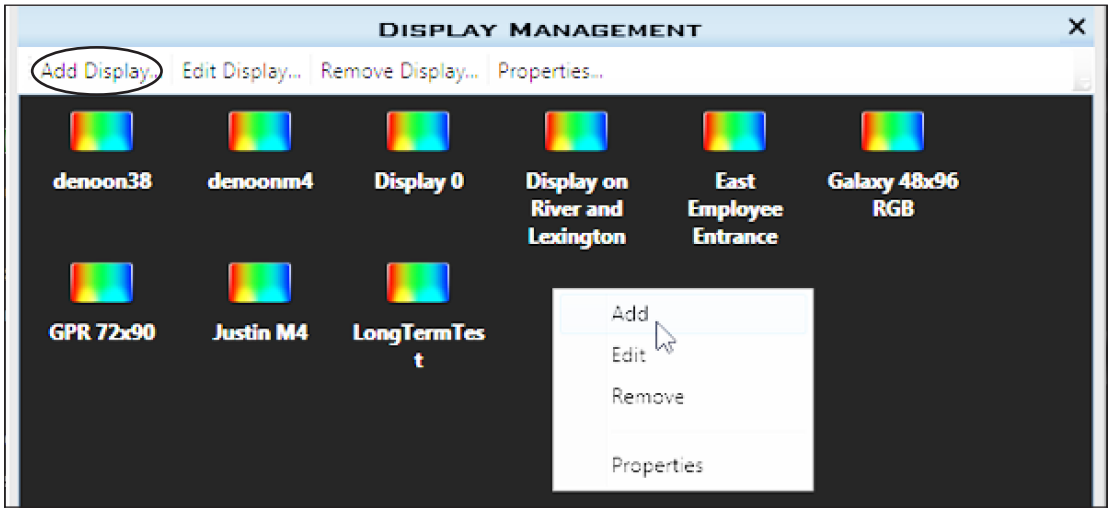

Figure 43: *Configure a New Display*

4. Select the desired display to configure and click **Continue**. Refer to **Figure 44**.

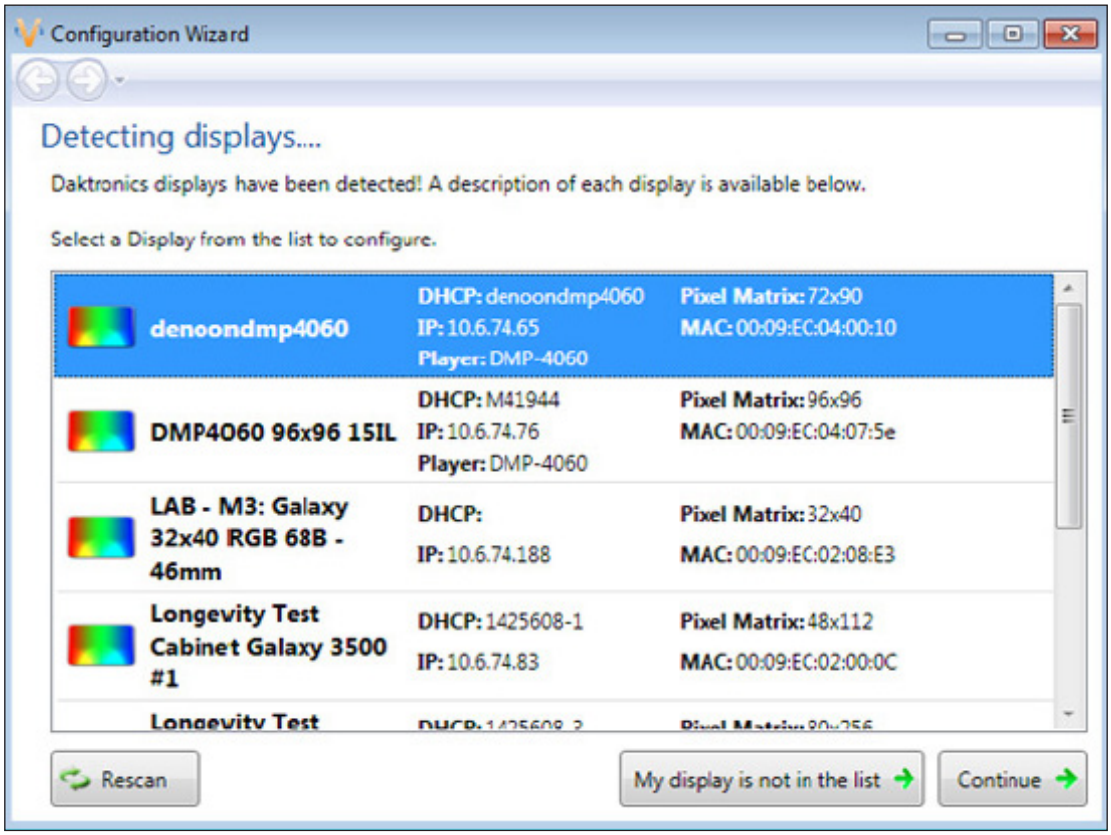

Figure 44: *List of Displays*

> **Note:** If the display is password-protected, enter the password on the **Authentication** page. Save the password in a secure location. Physical access to the display is required to reset the password.

5. Give the display a name to easily identify it when the **Display Found** prompt opens. This prompt also provides a brief description of the display. Click **Continue**.

6. Select the correct time zone for the display's location. Greenwich Mean Time (GMT) with country and city/region are the guides used to select the correct time zone.

7. Click **Back to Start** in the **Summary** box to return to the beginning of the process and configure another display. Click **Finish** to complete display configuration. Refer to **Figure 45**.

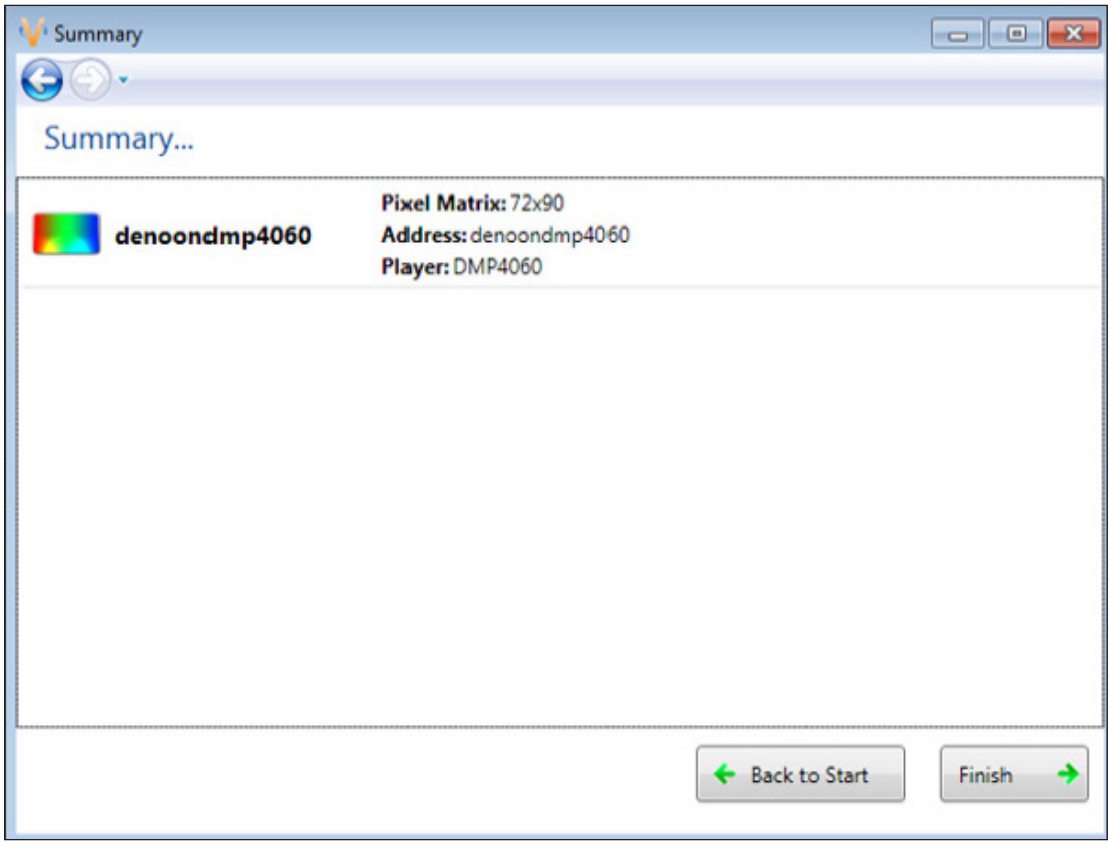

Figure 45: *Display Configuration Summary Window*

Light Sensor Mounting

Light detectors, illustrated in **Figure 46**, monitor the light levels around the display and adjust the LED intensity accordingly.

Figure 46: *Light Detector*

To mount the light sensor on the display border (if not previously factory-installed), refer to the instructions on the Light Sensor Mounting Drawing in **Appendix A: Reference Drawings (p.47)**. Connect the light sensor harness to the quick connect plate.

Optional Temperature Sensor Mounting

A temperature sensor mounts separately and requires a location away from chimneys, air conditioners, vents, tar roofs, concrete, and parking lots that can cause abnormal temperature fluctuations. Usually a separation of at least 20 to 30' horizontally and 8' vertically is required. Locations where air movement is restricted are also unsatisfactory.

The first choice for temperature sensor location is a north eave or northern exposure, away from direct sunlight and above grass. This location gives extra stability and accuracy to the sensor because of the added shading obtained on a northern exposure. Ensure at least 1' of space exists between the bottom of the eave and the top of the temperature sensor housing for accurate readings. Refer to **Figure 47**.

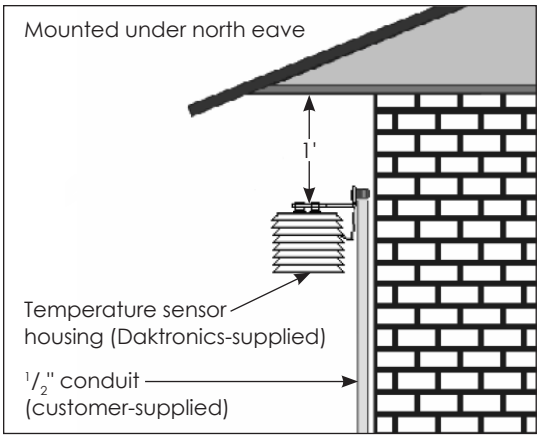

Figure 47: *Temperature Sensor Mounting*

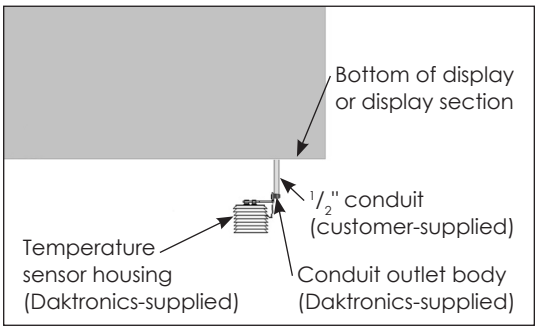

Figure 48: *Temperature Sensor Mounting*

The second choice for temperature sensor location is on the display itself or on the display structure. The location of the sensor should be above, below, or on a northern edge to keep the sensor shaded. If mounting above the display, a minimum height of 6' is required. Mounting a sensor below the display requires a minimum of 8' above the ground and a minimum of 1' between the sensor and the display. Refer to **Figure 48**. Greater accuracy is obtained with grass below the sign rather than concrete or another material.

Optional Conduit Whip

Refer to the contract-specific Riser Diagram to verify where conduit whips should route.

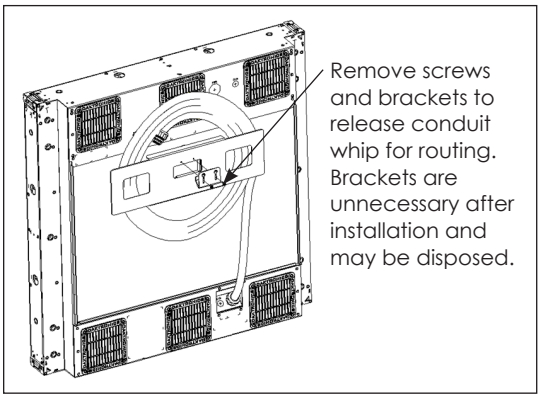

Figure 49: *Conduit Whip*

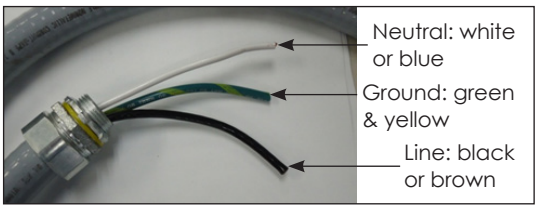

Figure 50: *Conduit End with 8 AWG Wire to Terminate to Junction Box*

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4 Maintenance & Troubleshooting

Turn off display power before performing any repair or maintenance work.

Only qualified service personnel may access internal electronics.

Do not operate the display with the back sheets removed. The back sheets direct adequate airflow around the components. Display operation without the back sheets in place and fans running could cause damage to the display and will make the warranty null and void. Ensure the back sheets are securely fastened into place.

Daktronics product management staff must approve any changes that may affect the display's structural integrity. This includes, but is not limited to, border shrouding, back sheets, and filler panels. If any changes are made to the display, submit detailed drawings to Daktronics product management staff for evaluation and approval, or the warranty will be null and void.

Recommended Tools

When performing maintenance work on the display, Daktronics recommends using the following tools and placing them in a convenient, easy-to-access location.

Tool	Part Number	Use
Module safety lanyard	0A-1175-9000	Prevents modules from falling and breaking
$^{5}/_{16}$" Nutdriver	TH-1156	Removes door and attaches components
$^{1}/_{4}$" Flathead screwdriver	TH-1171	Turns door latches
Ball detent T-handle	TH-1190	Removes modules

These tools are found in the toolkit (Daktronics part number 0A-1769-0001) shipped with each display. Toolkits include other items not on this list, and additional replacement tools may be ordered directly from Daktronics. Refer to **Daktronics Exchange and Repair & Return Programs (p.41)**.

Display Access

DVS displays are designed for either front- or rear-access, depending on site requirements and customer preference. While components in front-access applications are simply removed from the front, rear-access applications require removing the access doors from the rear of the display to reach the internal display components.

To remove the access doors, follow these steps while referring to **Figure 51**:

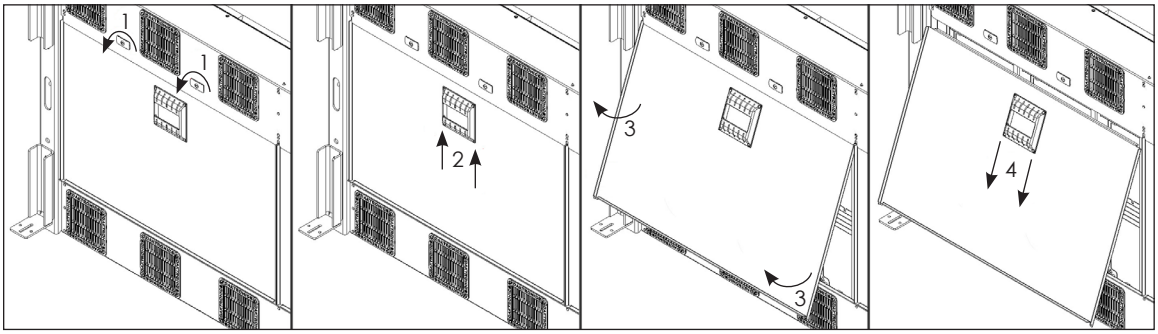

Figure 51: *Remove Door*

1. Use a flathead screwdriver to turn both latches counterclockwise.
2. Slide the door upward to disengage the bottom locks on the door.
3. Rotate the bottom of the door out about 2" from the rear of the display.
4. Slide the door downward to disengage the top clamp on the door and pull the door away from the cabinet.

Internal Component Removal

Internal components for DVS displays, including ProLink routers (PLRs), mount to a bracket with keyholes.

Front-Access Component Removal

1. Locate the component to remove on the Layout; Component Placement Drawings in **Appendix A: Reference Drawings (p.47)** and **Figure 52**.

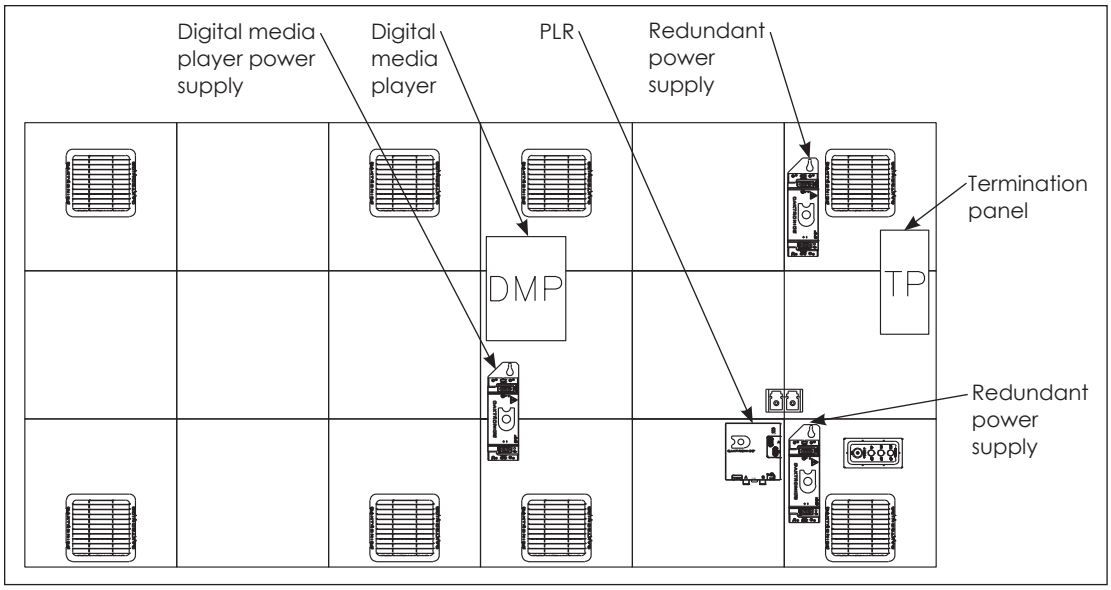

Figure 52: *Typical Component Layout (Rear View)*

2. Disconnect power to the display.
3. Locate the module corresponding to the component to be removed and use a ball detent T-handle to pull the module magnets away from the module mounting sheet.

   To use a ball detent T-handle, follow these steps while referring to **Figure 53**:

   a. Depress the plunger.

   b. Insert the T-handle into the hole on the front of the module.

   c. Release the plunger.

   d. Pull the module away from the mounting sheet. Do not allow the module to hang by the attached signal or power cables.

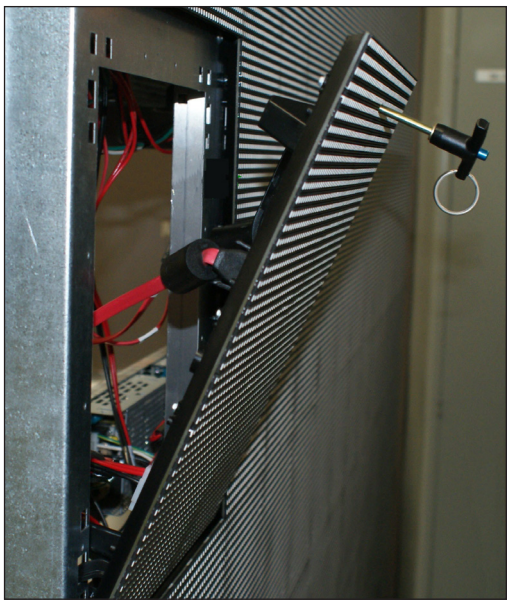

Figure 53: *Use Ball Detent T-Handle*

4. Secure the factory-installed safety lanyard on the module to another area of the display to prevent the module from falling if dropped. Refer to **Figure 54**.
5. Disconnect the power and signal cables from the rear of the module.
6. Remove the component.

   Redundant power supply: Use a $^{5}/_{16}$" nutdriver to loosen the screw holding the power supply to the vertical stiffener. Remove the power supply from the vertical stiffener.

   ProLink router (PLR): Use a $^{5}/_{16}$" nutdriver to loosen the screws holding the PLR to the vertical stiffener.

   Other components: Use a $^{5}/_{16}$" nutrdiver to loosen the screws holding the component to the mounting bracket and lift the keyhole cutouts over the nuts.
7. Detach the cables and carefully remove the component from the display.

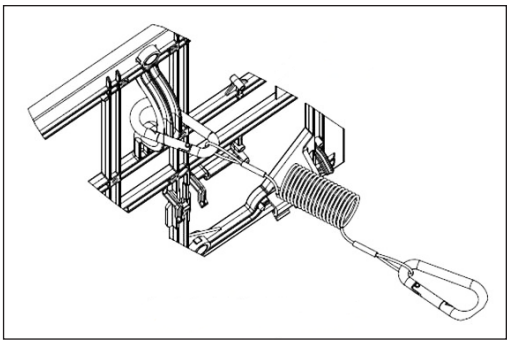

Figure 54: *Module Safety Lanyard*

Reverse these steps to install a component in a display, always disconnecting power to the display first.

The factory-installed safety lanyard on the module must be secured to another area of the display prior to installation.

Rear-Access Component Removal

1. Locate the component to remove on the Layout; Component Placement Drawings in **Appendix A: Reference Drawings (p.47)** and **Figure 52**.
2. Disconnect power to the display.
3. Use a flathead screwdriver to turn the door latches and remove the access door. Refer to **Display Access (p.33)**.
4. Lift the door, pulling it entirely away from the display.
5. Remove the component.

   Redundant power supply: Use a $^{5}/_{16}$" nutdriver to loosen the screw holding the power supply to the vertical stiffener. Remove the power supply from the vertical stiffener.

   ProLink router (PLR): Use a $^{5}/_{16}$" nutdriver to loosen the screws holding the PLR to the vertical stiffener.

   Other components: Use a $^{5}/_{16}$" nutdriver to loosen the screws holding the component to the mounting bracket and lift the keyhole cutouts over the nuts.
6. Detach the cables and carefully remove the component from the display.

Reverse these steps to install a component in a display, always disconnecting power to the display first.

Module Removal

Figure 55 and **Figure 56** show a front and rear view of the module.

Figure 55: *Module Front*

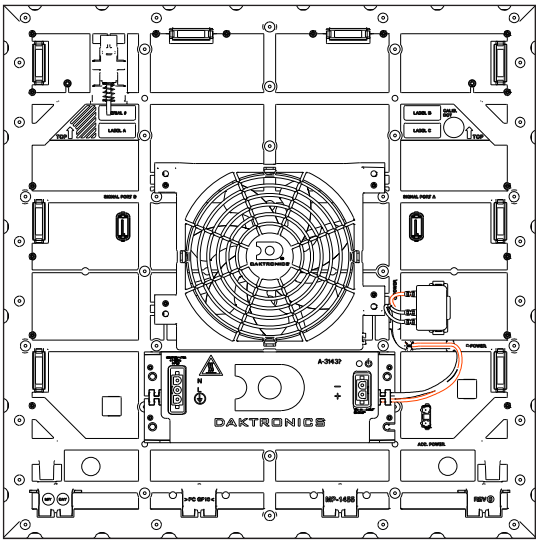

Figure 56: *Module Rear*

Front-Access Module Removal

1. Disconnect power to the display.
2. Locate the module corresponding to the component to be removed and use a ball detent T-handle to pull the magnets away from the mounting sheet.

   To use a ball detent T-handle, follow these steps while referring to **Figure 53**:

   a. Depress the plunger.

   b. Insert the T-handle into the hole on the front of the module.

   c. Release the plunger.

   d. Pull the module away from the mounting sheet.
3. Secure the factory-installed safety lanyard on the module to another area of the display to prevent the module from falling if dropped. Refer to **Figure 54**.
4. Disconnect the power and signal cables from the rear of the module.

Reverse these steps to install a module in a display. The factory-installed safety lanyard on the module must be secured to another area of the display prior to installation.

Rear-Access Module Removal

Depending on display configuration, a power supply and/or ProLink router (PLR) board may need to be removed in order to access a module from the rear.

1. Remove the access panels to open the display from the rear. Refer to **Display Access (p.33)**.
2. Disconnect the power and signal cables from the rear of the module.
3. Secure the factory-installed safety lanyard on the module to another area of the display to prevent the module from falling if dropped. Refer to **Figure 54**.

4. Grip the handle molded into the rear of the module firmly and push until the magnets release from the cabinet face sheet. Rotate the top of the module forward, then lift to disengage the hooks at the bottom of the module and free it from the face sheet.

5. Maintain a firm grip on the module, push it through the front of the display, and rotate it in a manner that allows it to be pulled back through its frame opening. Refer to **Figure 57**.

Reverse these steps to install a module in a display. The factory-installed safety lanyard on the module must be secured to another area of the display prior to installation.

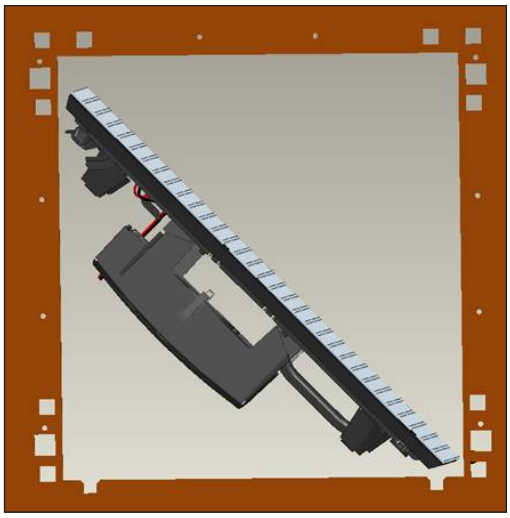

Figure 57: *Remove Module*

Components

Line Filter

Figure 58 illustrates a line filter. Line filters remove electromagnetic noise that might otherwise interfere with local communications channels from the power system. The line filter is mounted to the sectional termination panel.

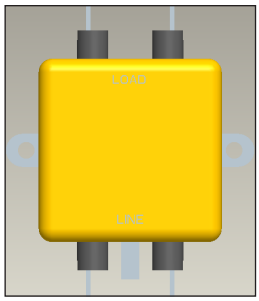

Figure 58: *Line Filter*

Power Supply

Figure 59 illustrates a typical power supply, also referred to as a power module. The power harnesses connected to the unit vary depending on type and overall display application. The power LED (DS1) illuminates when the unit is receiving incoming power.

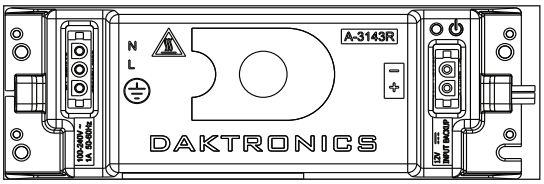

Figure 59: *Power Supply*

> **Note:** Disconnect display power before servicing the power supplies to avoid electrical shock. The power supplies run on high voltage and may cause physical injury if touched.

The power supply mounts to the display on a mounting plate.

ProLink Router

Figure 60 illustrates a ProLink router (PLR). The PLR is a display interface board that passes display data from the ProLink6 control system modules and other PLRs. Refer to the **ProLink 6X5X Installation & Maintenance Manual (DD1735784)** for further information. For information on removing a PLR, refer to **Internal Component Removal (p.34)**.

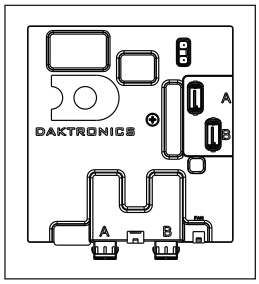

Figure 60: *PLR*

Video Image Processor

Figure 61 illustrates a video image processor (VIP). The VIP is an interface that drives video to the display while also dimming, providing gamma and color controls, and displaying test patterns. Refer to the **VIP-5000 Series Video Image Processor Operation Manual (DD2773152)** for further information.

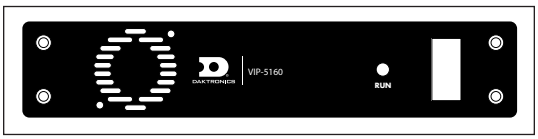

Figure 61: *VIP*

Ventilation System

This display is filterless. Inspect the display for excess dust or debris during scheduled maintenance. If there is excess dust or debris, filters can be added to the site. If needed, contact Customer Support at 1-800-325-8766.

Ventilation Maintenance

Each section of the display has upper and lower openings for air circulation and vents. The fans are located behind the lower openings. They pull air into the cabinet and then force the air up and across the electronic components, then out through the upper opening.

Fans should be checked during the pre-season inspection and during scheduled maintenance. To check the fan operation, hold the piece of lightweight paper up to the vent opening that incorporates the fan to detect air movement. If the fan does not rotate or does not operate smoothly, replace it.

After replacing 10% of the fans, Daktronics recommends replacing all cooling fans to reduce the associated maintenance costs that may incur with increased heat buildup from fan failure.

Filter Maintenance (If Applicable)

Shut off power to the display when not in use. If the power is left on when the display is not operating, the filters will require cleaning and replacing more often.

Check the display ventilation fans and filters (if installed) after 1,500 hours of operation and every 1,500 hours after to ensure the display cools properly. Check the fans and filters (if installed) more often if the display is located in a dusty or harsh weather environment (e.g. along a gravel road with dust-laden air).

- 1,500 hours is equivalent to 83 days if the display operates for 18 hours a day, and the power to the display is turned off when not in use.
- 1,500 hours is equivalent to 62 days if the display runs non-stop for 24 hours a day.

Use the procedure above to check the fan operation.

Filters are either disposable or cleanable. After on year or 1,500 hours of operation, remove the filter and replace it with a new filter or clean the existing filter. If the display has cleanable filters, clean the filters with water and a mild detergent, such as dish soap. Compressed air can also be used to clean the filters if these criteria are met:

- The nozzle is held at least 6" away from the filter.
- The pressure is no greater than 60 lbs per square inch.
- The air is blown through the filter in the opposite direction from which air normally flows. The arrow on the filter indicates the downstream side of the filter.

The filter in the upper opening may not need to be changed or cleaned because the air moving through it has already been filtered. Please check this filter each year or every 1,500 hours of operation to ensure it does not need to be replaced or cleaned. For information on ordering replacement filters, refer to the replacement parts list in **Replacement Parts List (p.41)**. Failure to change or clean the filters may cause the display to overheat, decreasing the display life.

If the display provides rear access only, remove the back panels to service the fans and filters.

Structural Inspection

Perform annual visual inspections of the display to facilitate problem repairs and to lengthen display life.

- Check for paint and possible corrosion, especially at structural tie points and on ground rods.
- Check, tighten,and replace the fasteners as required.
- Check the electronic components closely for signs of corrosion.

Troubleshooting

This table lists problems that may be encountered while operating the display. Next to each problem are troubleshooting steps that may help to resolve it.

Display Problem	Troubleshooting Steps
Module is blank or garbled.	• Check the power status LEDs on all power supplies and modules connected to the module. • Check the SATA cable input into the module and the output from the previous module or PLR. • Perform a module self-test. Refer to the module manual for instructions.
Section of display is blank.	• Ensure the section is receiving power and all breakers are turned on. • Ensure the power status LEDs on the modules, power supplies, and PLRs in the blank section are on. • Ensure the connections to the PLR are secure. Change the connections with one another to test. • Ensure the fiber-optic signal is connected to the PLR or patch panel. • Perform a PLR loopback test to test the PLRs in the section. Refer to the **PLR 6X5X Installation & Maintenance Manual (DD1735784)** for instructions.

Display Problem	Troubleshooting Steps
Entire display is blank.	• Ensure the display is receiving power and all breakers are turned on. When power is applied to the display, power supply LEDs should turn on. • Ensure the VIP is not blank. • Ensure the fiber-optic signal is connected to the VIP. The input signal should be locked. If it is not, check the fiber connections.
Entire display is garbled or uncontrollable.	• Use the test patterns to check the VIP status LEDs and ensure the board is receiving power. Refer to the **VIP-5000 Series Video Image Processor Operation Manual (DD2773152)** for instructions. • Verify the controller/content player configuration and restart the display service. • Ensure the fiber-optic signal cable is connected to the VIP. The input signal should be locked. If it is not, check the fiber connections.

5 Replacement Parts

Replacement Parts List

Part Description	Part Number
Temperature sensor	0A-1151-0010
Photo sensor	0A-1327-3018
Vent panel	0A-1446-1998
34-Piece interconnect kit	0A-1730-0010
Toolkit	0A-1769-0001
ProLink router (PLR)	0P-1525-0004
Fan	B-1072
Filter (if applicable)	EN-2345
Module	Contract-specific

Daktronics Exchange and Repair & Return Programs

To serve customers' repair and maintenance needs, Daktronics offers both an Exchange Program and a Repair & Return Program.

Exchange Program

Daktronics unique Exchange Program is a quick service for replacing key parts in need of repair. If a part requires repair or replacement, Daktronics sends the customer a replacement, and the customer sends the defective part to Daktronics. This decreases display downtime.

Identify these important part numbers before contacting Daktronics:

Display Serial Number: _____

Display Model Number: _____

Contract Number: _____

Installation Date: _____

Sign Location (Mile Marker Number): _____

Daktronics Customer ID Number: _____

To participate in the Exchange Program, follow these steps:

1. **Call Daktronics Customer Service.**

   United States & Canada: 1-800-325-8766

   Outside the United States & Canada: +1-605-275-1040

2. **Mail the old part to Daktronics when the new exchange part is received.**

   If the replacement part fixes the problem, send in the problem part which is being replaced.

   a. Package the old part in the same shipping materials in which the replacement part arrived.

   b. Fill out and attach the enclosed UPS shipping document.

   c. Ship the part to Daktronics.

   Daktronics will charge for the replacement part immediately unless a qualifying service agreement is in place. In most cases, the replacement part will be invoiced at the time it is shipped.

3. **Return the part within 30 working days if the replacement part does not solve the problem, or Daktronics will charge the full purchase price.**

   If, after the exchange is made, the equipment is still defective, please contact Customer Service immediately. Daktronics expects immediate return of the exchange part if it does not solve the problem. Daktronics also reserves the right to refuse parts that have been damaged due to acts of nature or causes other than normal wear and tear.

Repair & Return Program

For items not subject to exchange, Daktronics offers a Repair & Return Program. To send a part for repair, follow these steps:

1. **Call or fax Daktronics Customer Service.**

   Refer to the telephone number on the previous page.

2. **Receive a Return Materials Authorization (RMA) number before shipping.**

   Refer to the telephone number on the previous page.

3. **Package and pad the item carefully to prevent damage during shipping.**

   Electronic components, such as display interface boards, should be placed in an antistatic bag before boxing. Daktronics does not recommend packing peanuts when shipping.

4. **Enclose the following information:**

   - Contact name
   - Address
   - Phone number
   - RMA number
   - Clear description of symptoms
   - Case number

Shipping Address

Daktronics Customer Service
600 E 54th St N
Sioux Falls, SD 57104
Case #

Warranty & Limitation of Liability

The Daktronics Warranty & Limitation of Liability is located in **Appendix C: Daktronics Warranty & Limitation of Liability (p.51)**. The warranty is independent of extended service agreements and is the authority in matters of service, repair, and display operation.

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6 Glossary

Lanyard attachment ring: a ring found on the rear of each module. The lanyard attaches to the ring to keep the module from falling to the ground.

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

Light emitting diode (LED): a low energy, high intensity lighting unit.

Line filter: a device that removes electromagnetic noise from the power system to avoid interference with local communications channels. Line filters sometimes mount on brackets with power supplies. Other times they may mount alone on a bracket.

Louver: a plastic shade positioned horizontally above each pixel row. Louvers increase the contrast level on the display face and direct LED light for easier viewing.

Module: a display board with LEDs, a driver board or logic card, a black plastic housing, and a module latch assembly. Each module is individually removable from either the front or rear of the display.

Module latch: an assembly using a rotating retainer board to hold the module firmly to the display frame. There are two per module, one near the top and one near the bottom.

Pixel: the smallest single point of light on a display that can be turned on and off. For LED displays, a pixel is the smallest block of light emitting devices that can generate all available colors.

Power supply: a device that converts AC line voltage from the termination panel to low DC voltage for one ore more module driver boards. One power supply may power multiple modules.

ProLink router (PLR): a display interface board that passes display data from the ProLink6 control system modules and other PLRs. The ratio of PLRs to module varies with display application.

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

Video image processor (VIP): an interface that drives video to the display while also dimming providing gamma and color controls, and displaying test patterns.

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A Reference Drawings

Refer to **Numbering Conventions (p.1)** for information regarding how to read the drawing number.

These drawings offer general information pertaining to most DVS displays and are listed in alphanumeric order. Any contract-specific drawings take precedence over the general drawings.

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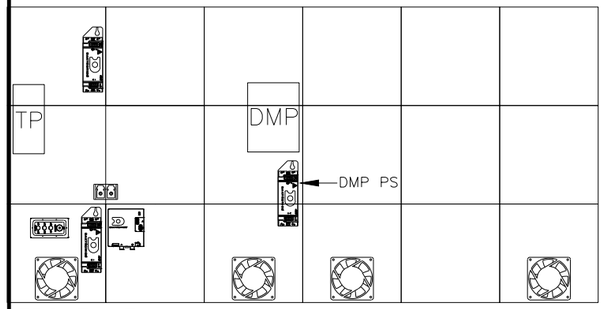
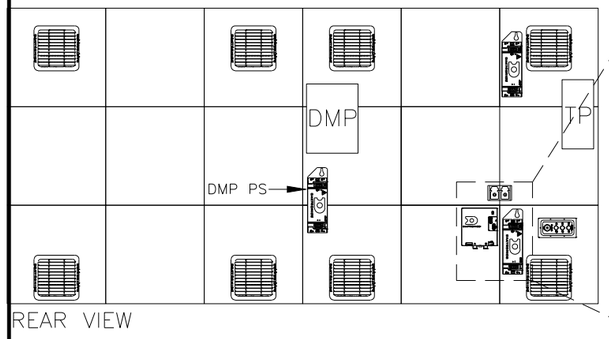
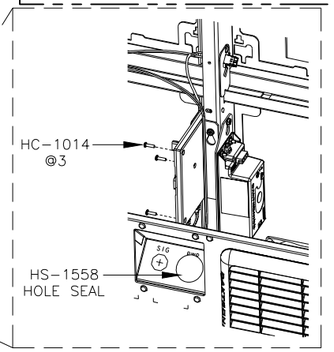
EXAMPLE LAYOUT

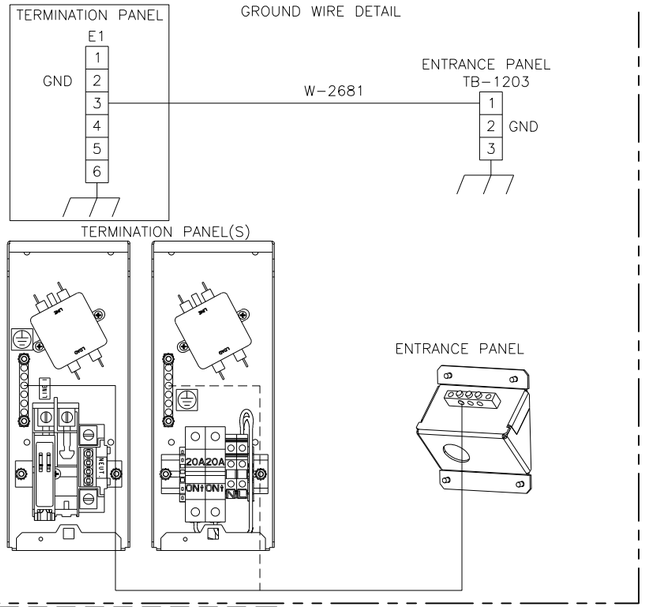


FRONT VIEW



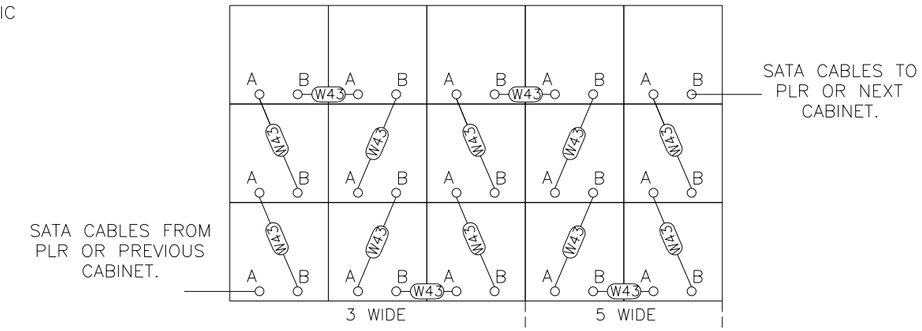
REAR VIEW



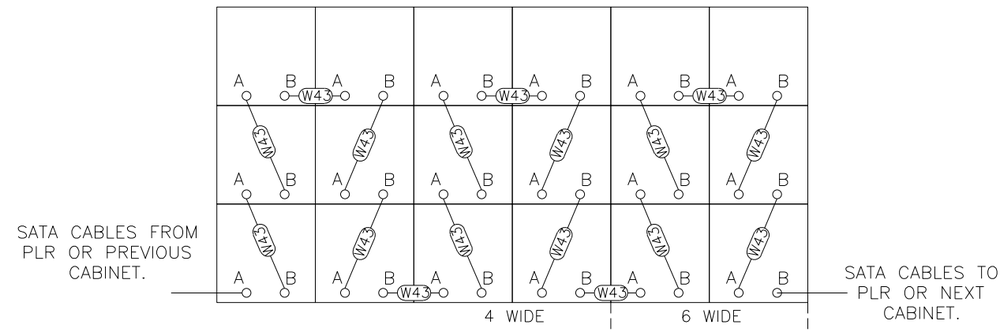


NOTE: REFERENCE SIGNAL INTERCONNECT DWG DISPLAY SPECIFIC

ODD LENGTH CABINETS (3,5) MODULES (FRONT VIEW)



EVEN LENGTH CABINETS (4,6) MODULES (FRONT VIEW)

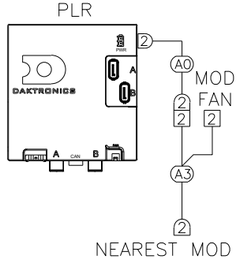


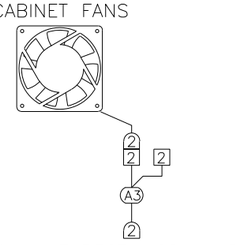
CONFIGURABLE COMPONENTS

		MOUNTING HARDWARE
	CABINET FAN B-1072	NONE
QC	QUICK CONNECT 0M-1098905	HC-1354 @6 TORQUE 27.5 IN-LBS
DMP	DMP-8065	HC-1763 @1 TORQUE 27.5 IN-LBS
	REDUNDANT POWER SUPPLY / DMP POWER SUPPLY	HC-1763 @1 TORQUE 27.5 IN-LBS

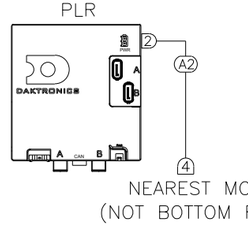
		MOUNTING HARDWARE
TP	TERM PANEL	HC-1763 @ 1, TORQUE 27.5 IN-LBS
	PROLINK ROUTER SEE BOM FOR PART #	HC-1014 @3, TORQUE 5 IN-LBS
	PLR MTG PLATE 0M-1137045	HC-1763 @1, TORQUE 27.5 IN-LBS
	FIBER COUPLER DUAL LC J-1435	NONE
	GROUND BAR TB-1203	HC-1375 @2, TORQUE 39 IN-LBS
	GROUND WIRE W-2681	TB-1203, GROUND BAR TORQUE 25 IN-LBS TB-1159, GND TERM PANEL, TORQUE 25 IN-LBS

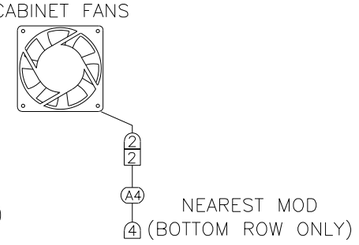
W/ MOD FANS





W/O MOD FANS





W4.3 W-2885
CABLE,DAK SATA,M TO M,28IN,BLK,XOVER,DRAINS CNCTD

A0 W-2152
CABLE; SLC PLUG TO SLC PLUG, 36", 18AWG, PLATFORM

A2 W-2193
HARNESS, PLR SLC TO 4-PIN JST, 18 AWG, 24"

A3 W-2154
CABLE; SLC PLUG Y SLC JACKS, 6", 18AWGPLTFRM

A4 W-2335
HARN; JST PLUG TO SLC JACK, 3", 18AWG,DWG 01045367

NOTE: NO MORE THAN ONE Y CABLE PER MODULE ACCESSORY JACK

REV	DATE:		BY:	
06	11 JAN 19	PER CN-67532; CHANGED PLR PART NUMBER TO "SEE BOM FOR PART #"	MJR	
05	29 APR 16	PER EC-21119 : UPDATED SATA CABLES	RDF	
04	29 OCT 14	REVISED TORQUE SPEC ON HC-1376 FROM 37 IN-LBS TO 39 IN-LBS PER EC-17441	MJR	

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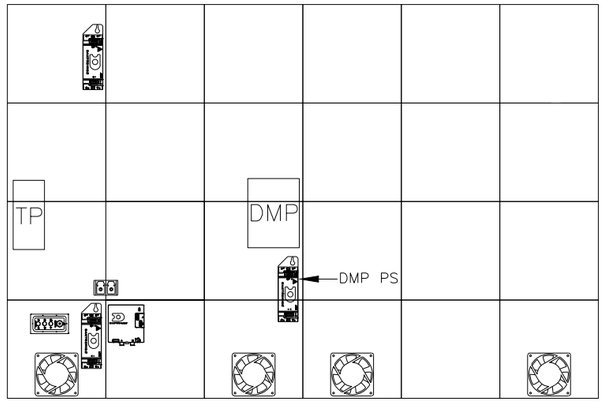
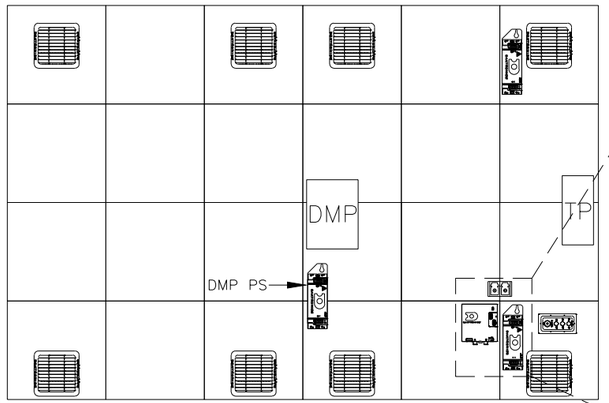
THIRD ANGLE PROJECTION

PROJECT:	DVS			
TITLE:	LAYOUT; COMPONENT PLACEMENT & SIGNAL HARNESS, 3-HIGH			
DATE:	21 MAY 13	DIM UNITS: INCHES [MILLIMETERS]	SHEET	REV
SCALE:	NTS	DO NOT SCALE DRAWING		06
DESIGN:	MGAARD	JOB NO.	FUNC - TYPE - SIZE	1132804
DRAWN:	MGAARD	P1769	R - 01 - B	

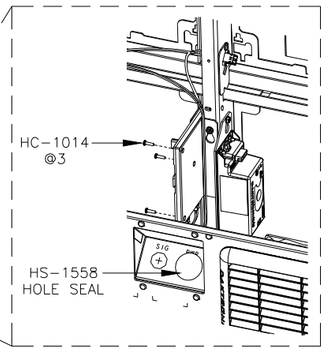
EXAMPLE LAYOUT

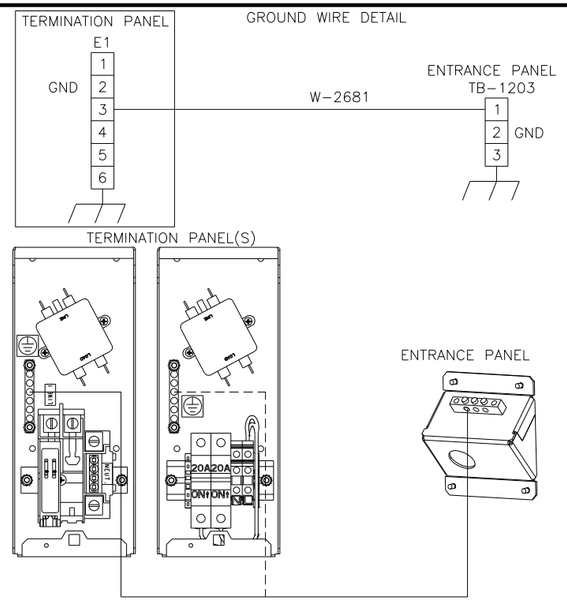


FRONT VIEW



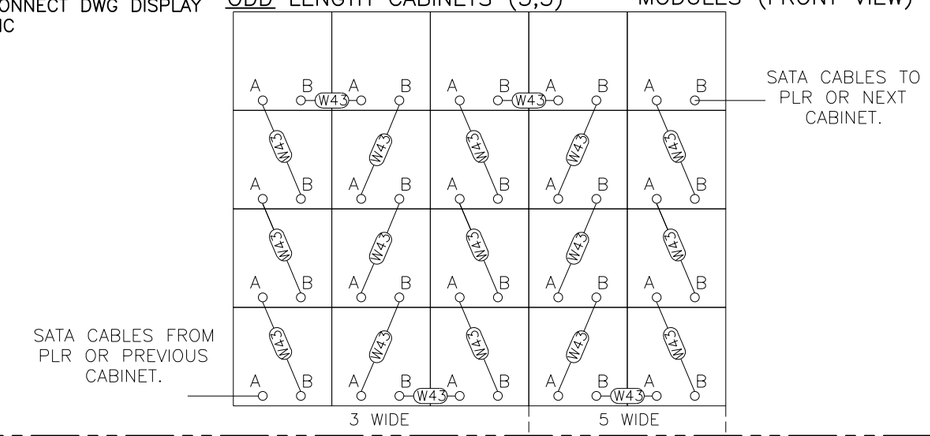
REAR VIEW



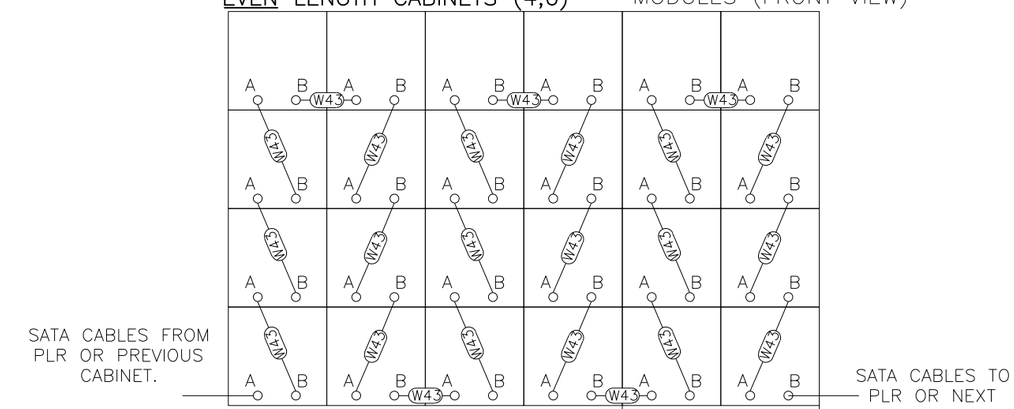


NOTE: REFERENCE SIGNAL INTERCONNECT DWG DISPLAY SPECIFIC

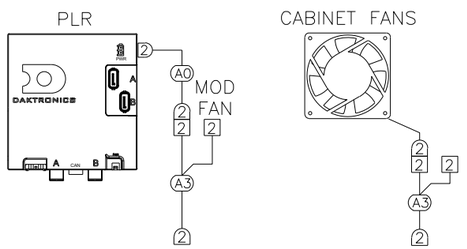
ODD LENGTH CABINETS (3,5) MODULES (FRONT VIEW)



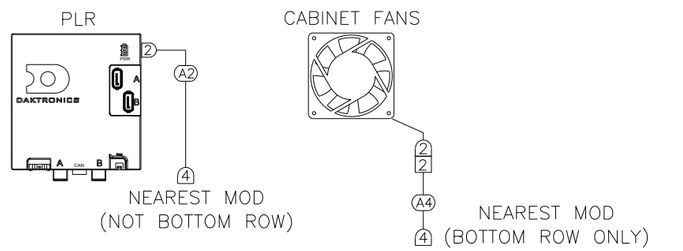
EVEN LENGTH CABINETS (4,6) MODULES (FRONT VIEW)



W/ MOD FANS



W/O MOD FANS



CONFIGURABLE COMPONENTS

		MOUNTING HARDWARE
	CABINET FAN B-1072	NONE
	QUICK CONNECT 0M-1098905	HC-1354 @6 TORQUE 27.5 IN-LBS
DMP	DMP-8065	HC-1763 @1 TORQUE 27.5 IN-LBS
	REDUNDANT POWER SUPPLY / DMP POWER SUPPLY	HC-1763 @1 TORQUE 27.5 IN-LBS

		MOUNTING HARDWARE
TP	TERMINATION PANEL	HC-1763 @ 1, TORQUE 27.5 IN-LBS
	PROLINK ROUTER SEE BOM FOR PART #	HC-1014 @3, TORQUE 5 IN-LBS
	PLR MTG PLATE 0M-1137045	HC-1763 @1, TORQUE 27.5 IN-LBS
	FIBER COUPLER DUAL LC J-1435	NONE
	GROUND BAR TB-1203	HC-1375 @2, TORQUE 39 IN-LBS
	GROUND WIRE W-2681	TB-1203, GROUND BAR TORQUE 25 IN-LBS TB-1159, GND TERM PANEL, TORQUE 25 IN-LBS

(W43) W-2885
CABLE,DAK SATA,M TO M,28IN,BLK,XOVER,DRAINS CNCTD

(A0) W-2152
CABLE; SLC PLUG TO SLC PLUG, 36", 18AWG, PLATFORM

(A2) W-2193
HARNESS, PLR SLC TO 4-PIN JST, 18 AWG, 24"

(A3) W-2154
CABLE; SLC PLUG Y SLC JACKS, 6", 18AWGPLTFRM

(A4) W-2335
HARN; JST PLUG TO SLC JACK, 3", 18AWG,DWG 01045367

NOTE: NO MORE THAN ONE Y CABLE PER MODULE ACCESSORY JACK

REV	DATE:		BY:	
06	11 JAN 19	PER CN-65732; CHANGED PLR PART NUMBER TO "SEE BOM FOR PART #"	MJR	
05	29 APR 16	PER EC-21119 : UPDATED SATA CABLES	RDF	
04	29 OCT 14	REVISED TORQUE SPEC ON HC-1376 FROM 37 IN-LBS TO 39 IN-LBS PER EC-17441	MJR	

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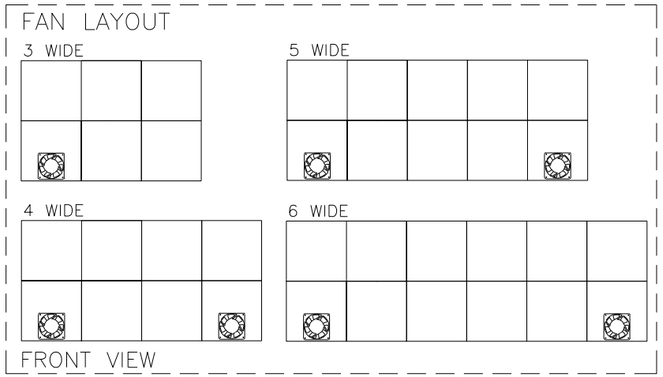
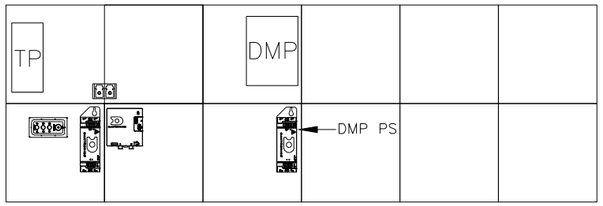
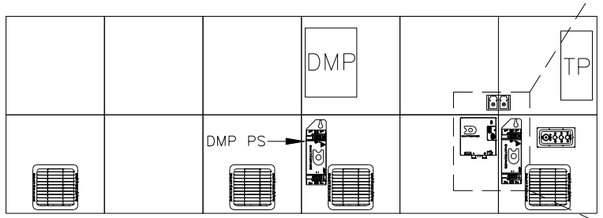
THIRD ANGLE PROJECTION

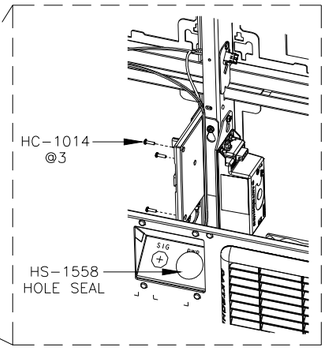
PROJECT:	DVS			
TITLE:	LAYOUT; COMPONENT PLACEMENT & SIGNAL HARNESS, 4-HIGH			
DATE:	21 MAY 13	DIM UNITS: INCHES [MILLIMETERS]	SHEET	REV
SCALE:	NTS	DO NOT SCALE DRAWING		06
DESIGN:	MGAARD	JOB NO. P1769	FUNC - TYPE - SIZE R - 01 - B	1137565
DRAWN:	MGAARD			

EXAMPLE LAYOUT





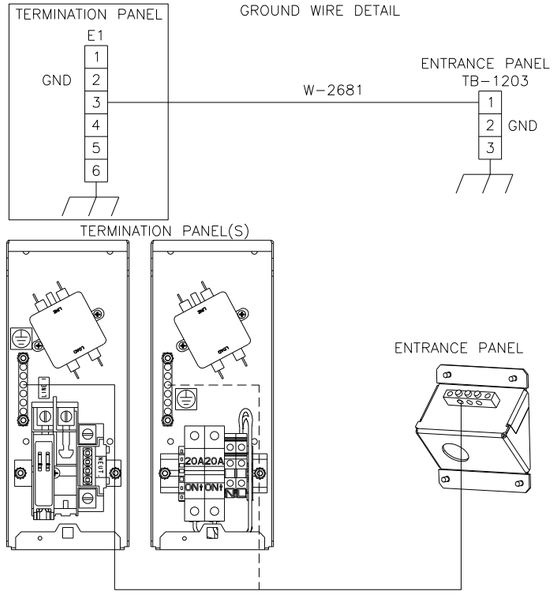




CONFIGURABLE COMPONENTS

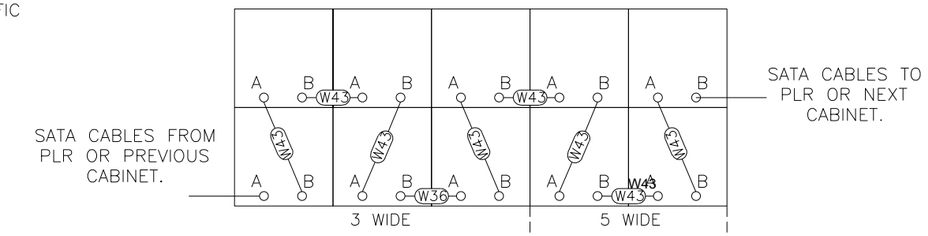
		MOUNTING HARDWARE
	CABINET FAN B-1072	NONE
	QUICK CONNECT 0M-1098905	HC-1354 @6 TORQUE 27.5 IN-LBS
DMP	DMP-8065	HC-1763 @1 TORQUE 27.5 IN-LBS
	REDUNDANT POWER SUPPLY / DMP POWER SUPPLY	HC-1763 @1 TORQUE 27.5 IN-LBS

		MOUNTING HARDWARE
TP	TERM PANEL	HC-1763 @ 1, TORQUE 27.5 IN-LBS
	PROLINK ROUTER SEE BOM FOR PART #	HC-1014 @3, TORQUE 5 IN-LBS
	PLR MTG PLATE 0M-1137045	HC-1763 @1, TORQUE 27.5 IN-LBS
	FIBER COUPLER DUAL LC J-1435	NONE
	GROUND BAR TB-1203	HC-1375 @2, TORQUE 39 IN-LBS
	GROUND WIRE W-2681	TB-1203, GROUND BAR TORQUE 25 IN-LBS TB-1159, GND TERM PANEL, TORQUE 25 IN-LBS

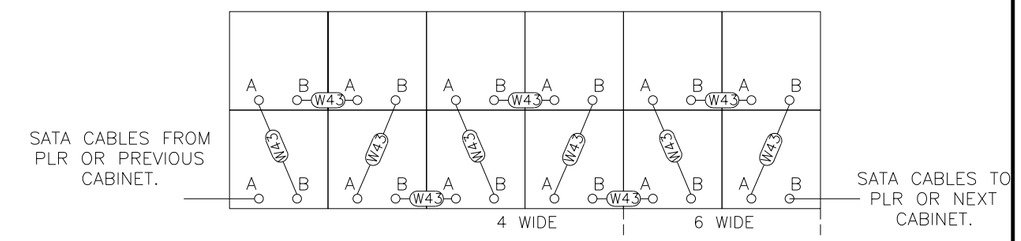


NOTE: REFERENCE SIGNAL INTERCONNECT DWG DISPLAY SPECIFIC

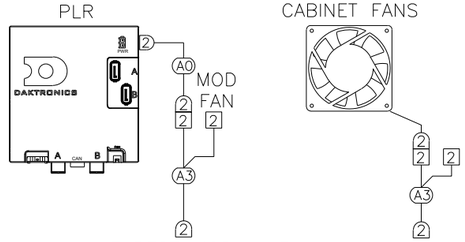
ODD LENGTH CABINETS (3,5) MODULES (FRONT VIEW)



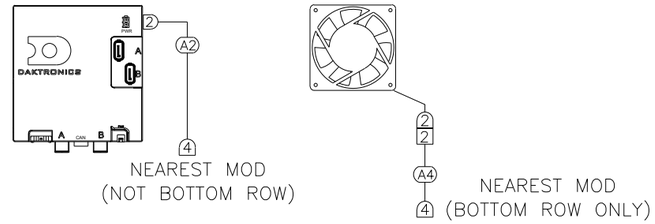
EVEN LENGTH CABINETS (4,6) MODULES (FRONT VIEW)



W/ MOD FANS



W/O MOD FANS



(W43) W-2885
CABLE, DAK SATA,M TO M,28IN,BLK,XOVER,DRAINS CNCTD

(A0) W-2152
CABLE; SLC PLUG TO SLC PLUG, 36", 18AWG, PLATFORM

(A2) W-2193
HARNESS, PLR SLC TO 4-PIN JST, 18 AWG, 24"

(A3) W-2154
CABLE; SLC PLUG Y SLC JACKS, 6", 18AWGPLTFRM

(A4) W-2335
HARN; JST PLUG TO SLC JACK, 3", 18AWG,DWG 01045367

NOTE: NO MORE THAN ONE Y CABLE PER MODULE ACCESSORY JACK

REV	DATE:		BY:	
07	11 JAN 19	PER CN-67532; CHANGED PLR PART NUMBER TO "SEE BOM FOR PART #"	MJR	
06	29 APR 16	PER EC-21119 : UPDATED SATA CABLES	RDF	
05	29 OCT 14	REVISED TORQUE SPEC ON HC-1376 FROM 37 IN-LBS TO 39 IN-LBS PER EC-17441	MJR	

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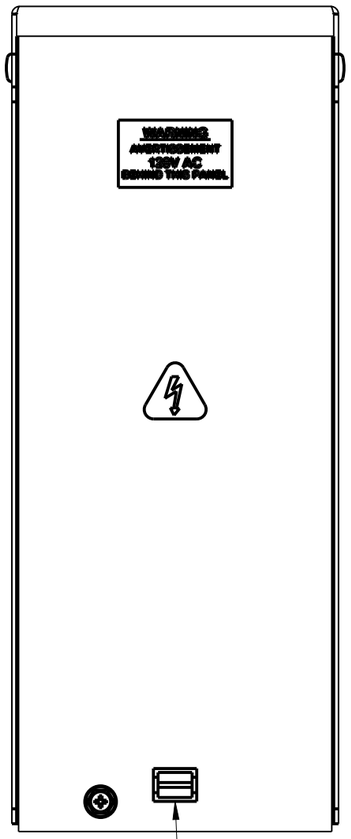
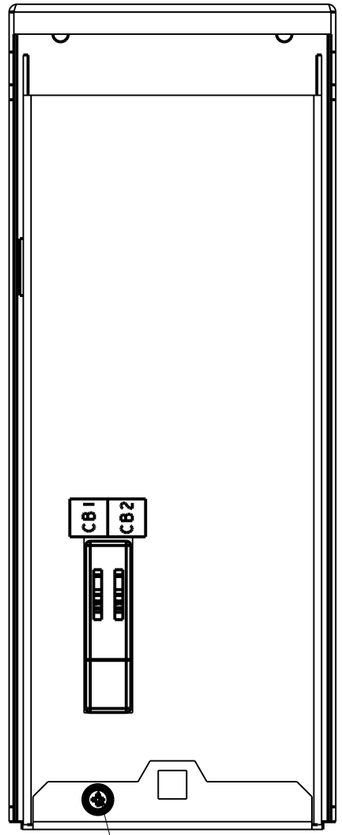
THIRD ANGLE PROJECTION

PROJECT:	DVS			
TITLE:	LAYOUT; COMPONENT PLACEMENT & SIGNAL HARNESS, 2-HIGH			
DATE:	21 MAY 13	DIM UNITS: INCHES [MILLIMETERS]	SHEET	REV
SCALE:	NTS	DO NOT SCALE DRAWING		07
DESIGN:	MGAARD	JOB NO.	FUNC - TYPE - SIZE	1137597
DRAWN:	BFOLKER	P1769	R - 01 - B	

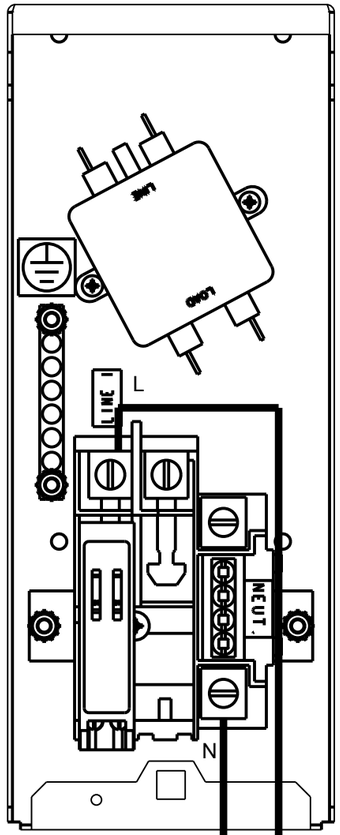
120V BRANCH



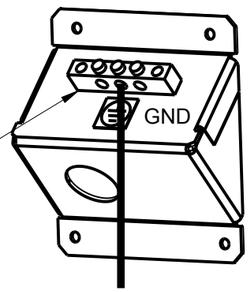
RELEASE LATCH
LIFT COVER



REMOVE SCREW
REMOVE INTERNAL COVER



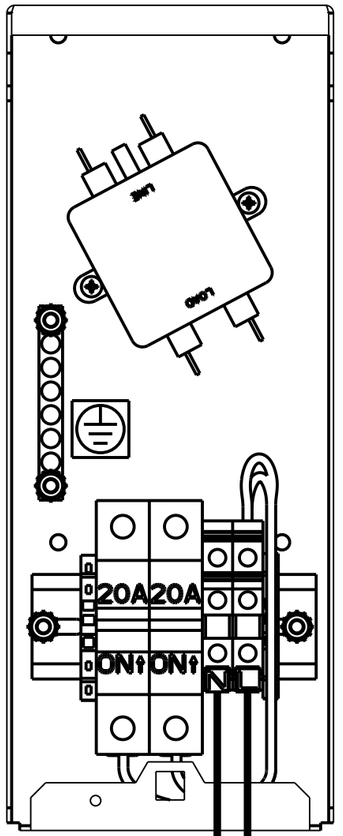
FIELD TERMINATE AT THESE LOCATIONS
LINE AND NEUTRAL
MAX WIRE SIZE - 4AWG
MIN WIRE SIZE - 14 AWG



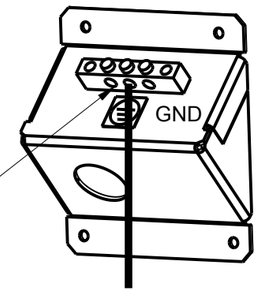
FIELD TERMIANTION LOCATION
GROUND
MAX WIRE SIZE - 6AWG
MIN WIRE SIZE - 14AWG

240V BRANCH

RELEASE LATCH
LIFT COVER



FIELD TERMINATE AT THESE LOCATIONS
LINE AND NEUTRAL
MAX WIRE SIZE - 6AWG
MIN WIRE SIZE - 14 AWG



FIELD TERMIANTION LOCATION
GROUND
MAX WIRE SIZE - 6AWG
MIN WIRE SIZE - 14AWG

IT IS THE RESPONSIBILITY OF THE ELECTRICAL INSTALLATION CONTRACTOR TO ENSURE THAT ALL ELECTRICAL WORK PERFORMED ON SITE MEETS OR EXCEEDS ALL LOCAL & NATIONAL ELECTRIC CODES FOR WIRING AND SPECIFICATIONS. THESE ARE ALSO REFERENCED ON CONTRACT SPECIFIC RISER DIAGRAMS.

REV	DATE:		BY:

DAKTRONICS, INC.
BROOKINGS, SD 57006
DO NOT SCALE DRAWING

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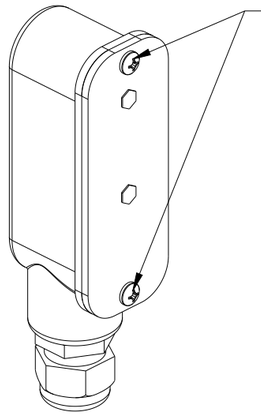
PROJ: DVS
TITLE: POWER ENTRANCE; FIELD TERMINATION DETAIL
DESIGN: MGAARD | DRAWN: MGAARD | DATE: 22-JUL-14
SCALE: 1:2

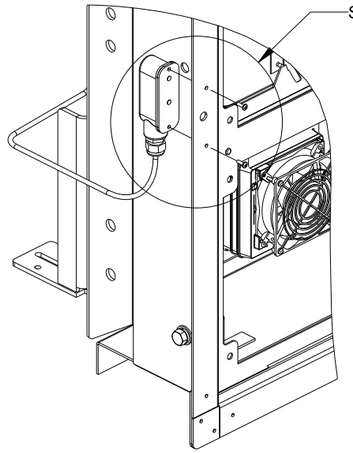
SHEET:	REV	JOB NO:	FUNC-TYPE-SIZE
1 OF 1	00	P 1769	E – 07 – B

1183290



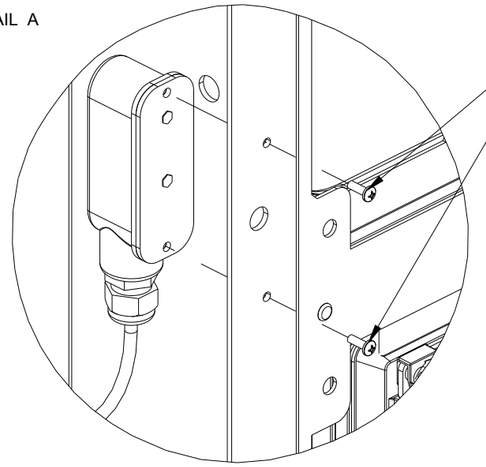
0A-1327-3016
LIGHT SENSOR ASSEMBLY WILL ARRIVE WITH HC-1144 (#8-32 X 0.500) MACHINE SCREWS ASSEMBLED INTO FRONT OF ASSY.

ROTATED FRONT VIEW
LIGHT SENSOR ASSEMBLY
SCALE 1/2



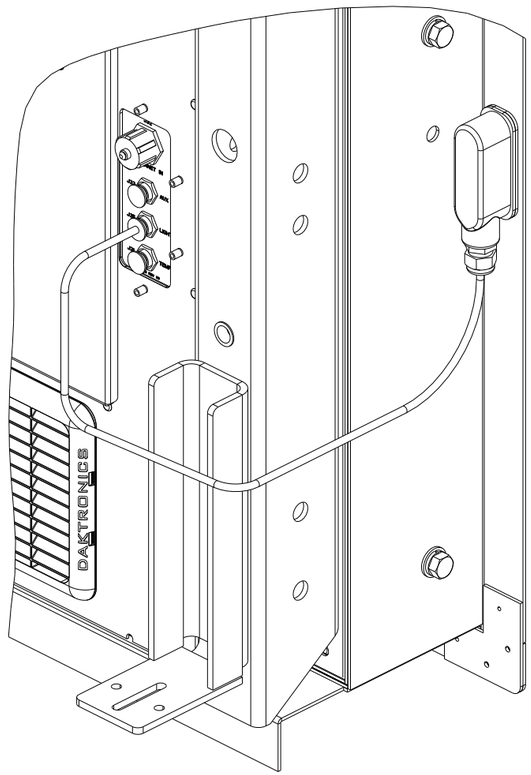
SEE DETAIL A

FRONT ROTATED VIEW
LIGHT SENSOR TO BORDER
EXPLODED



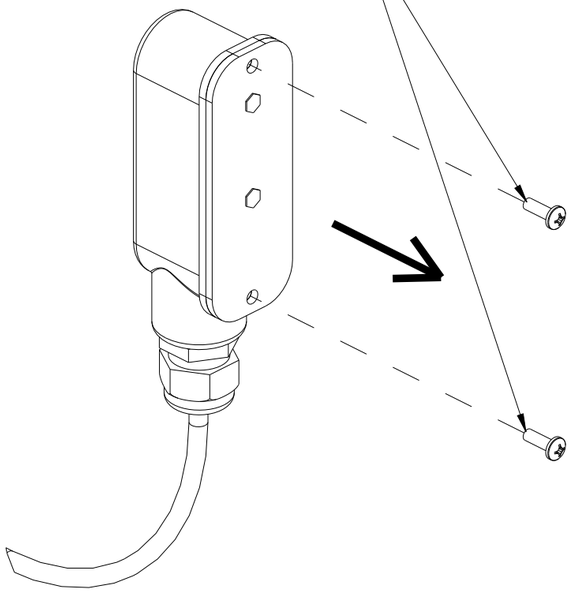
HC-1144 SCREWS @2
FROM 0A-1327-3016
REUSED TO ATTACH
SENSOR TO BORDER

DETAIL A
SCALE 1/3

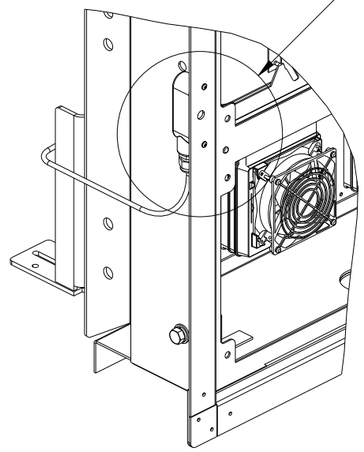


ROTATED REAR VIEW
LIGHT SENSOR ASSEMBLED
SCALE 1/5

THESE SCREWS WILL NEED TO BE REMOVED TEMPORARILY IN ORDER TO BE ATTACHED TO BORDER.

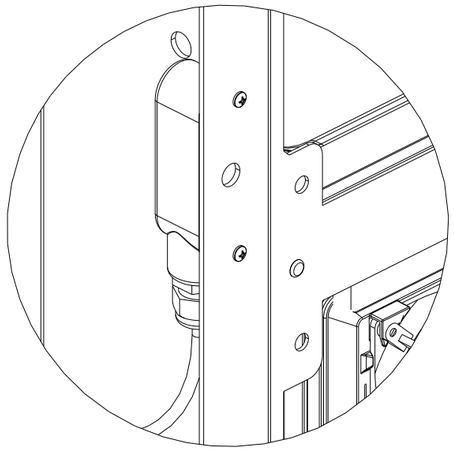


ROTATED FRONT VIEW
LIGHT SENSOR SCREWS REMOVED
SCALE 1/2



SEE DETAIL B

FRONT ROTATED VIEW
LIGHT SENSOR TO BORDER
ASSEMBLED



DETAIL B
SCALE 1/3

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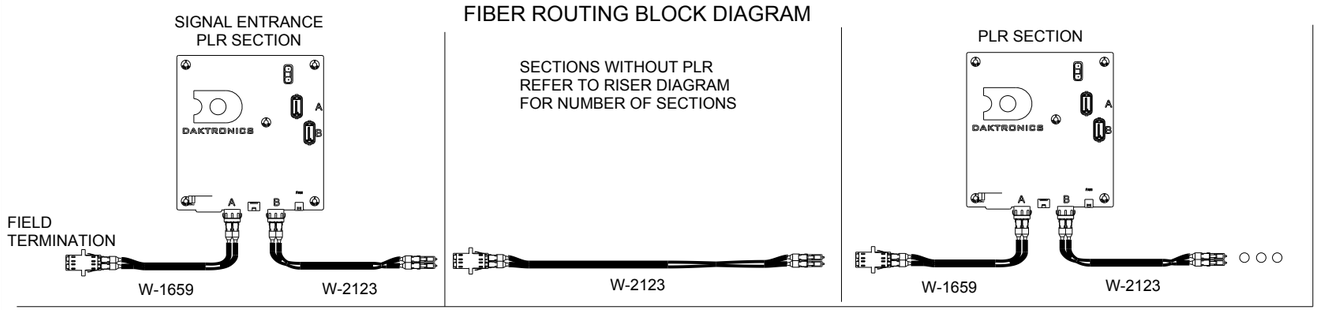
PROJ:	DVS PRODUCT DEVELOPMENT, GEN1
TITLE:	LIGHT SENSOR MOUNT TO BORDER, DVS
DESIGN: RBJERKE	DRAWN: RBJERKE DATE: 03-SEP-14
SCALE: 1=8	

SHEET:	REV	JOB NO:	FUNC-TYPE-SIZE	
1 OF 1	00	P 1769	E – 10 – B	1189594

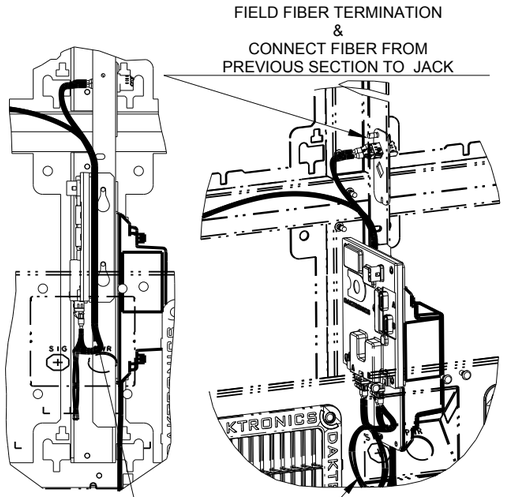
REV	DATE:		BY:

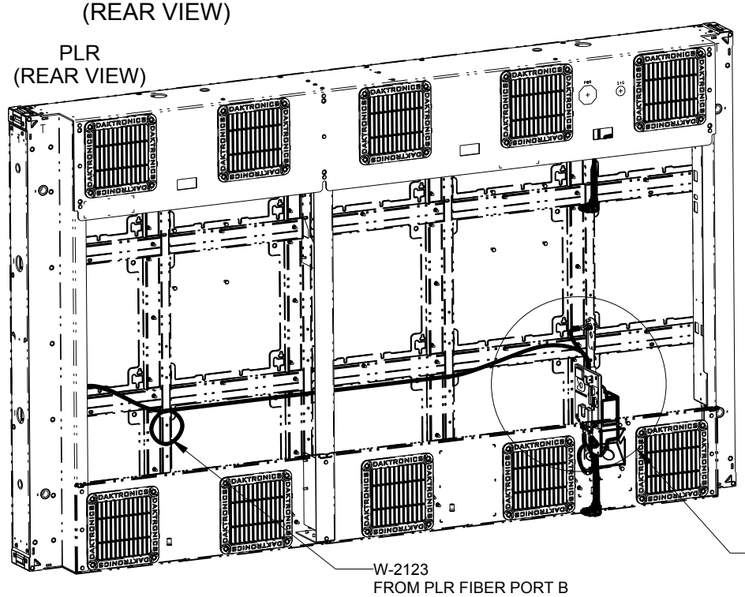
FIBER ROUTING BLOCK DIAGRAM

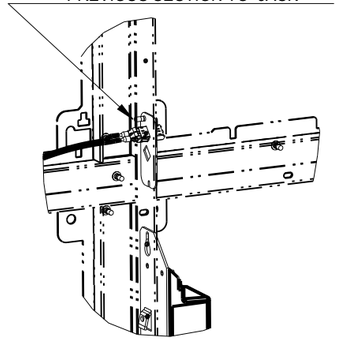


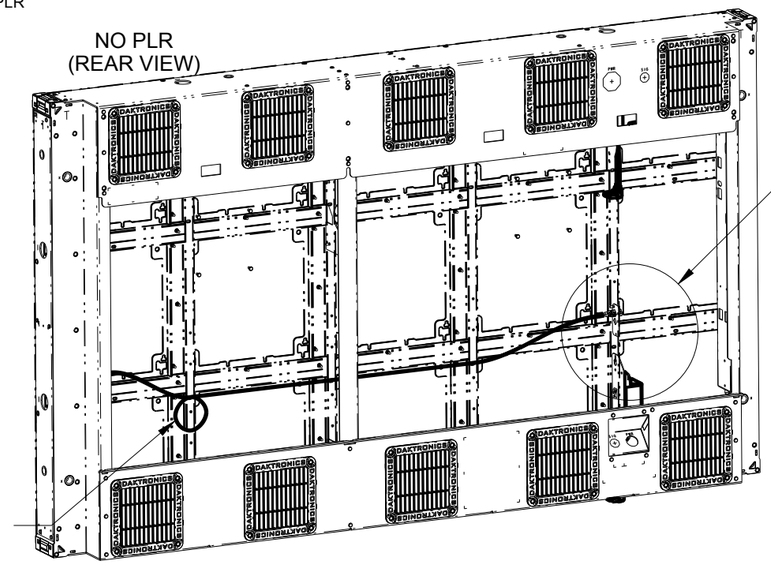
HORIZONTAL FIBER ROUTING

(REAR VIEW)



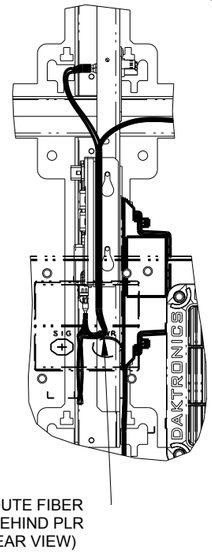


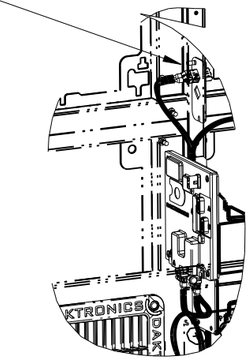


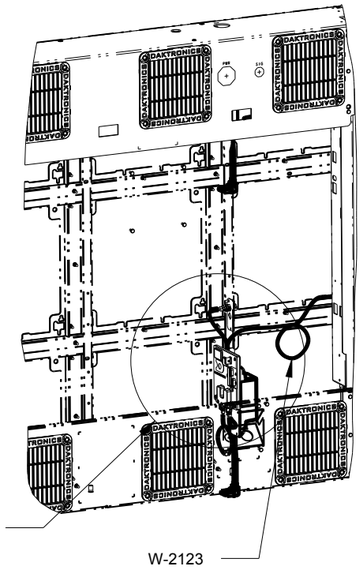


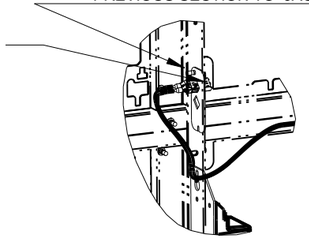
VERTICAL FIBER ROUTING

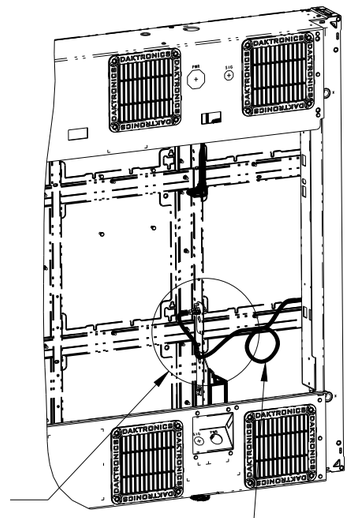
(REAR VIEW)











REV	DATE:		BY:
01	29 MAR 13	CHANGED FRONT VIEWS TO REAR VIEWS	ADH

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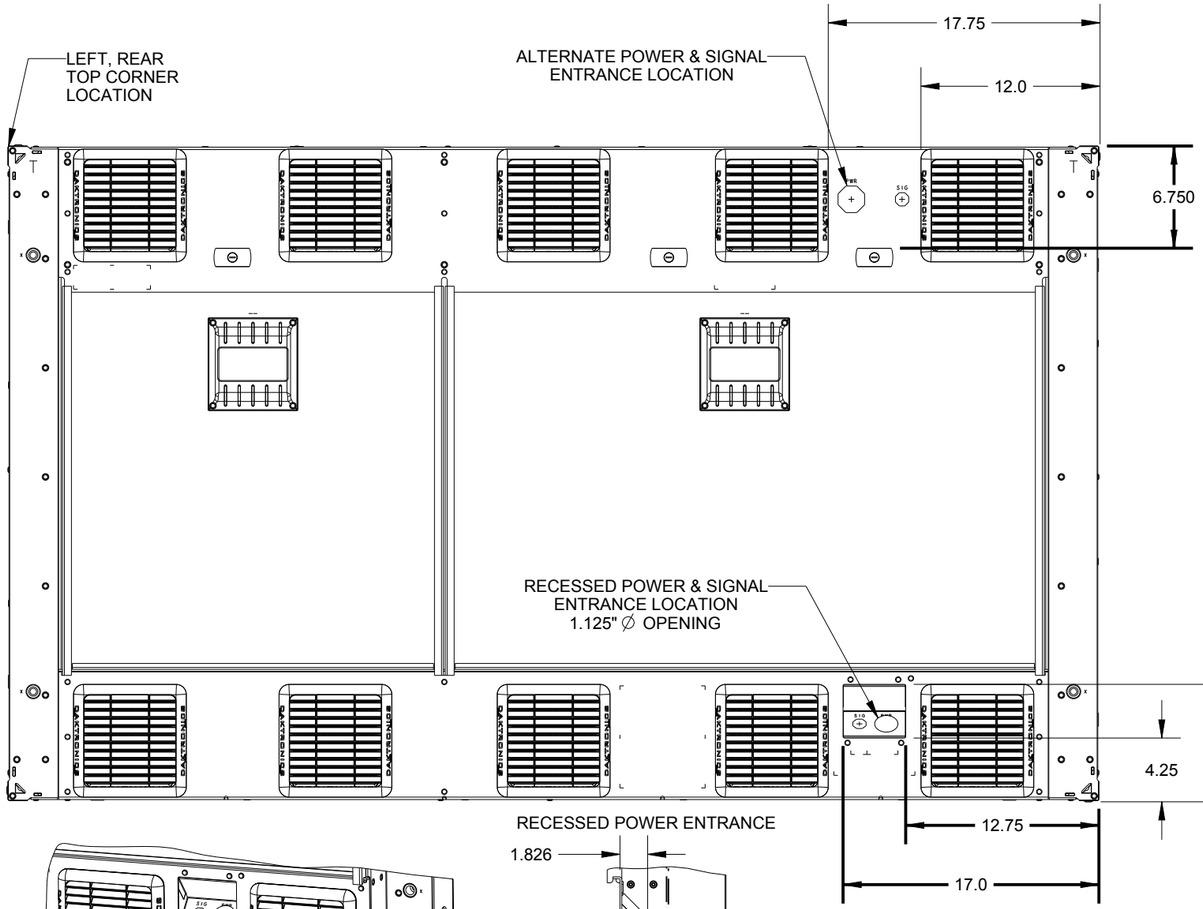
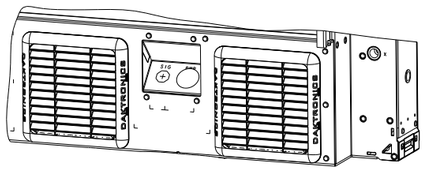
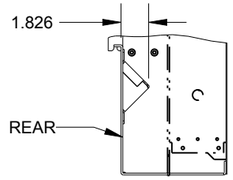
PROJ:	DVS				
TITLE:	CABINET FIBER LAYOUT; DVS				
DESIGN:	MGAARD	DRAWN:	MGAARD	DATE:	20 DEC 12
SCALE:	NTS				
SHEET:	REV	JOB NO:	FUNC-TYPE-SIZE		1191554
1 OF 1	00	P1769	F - 01 - B		

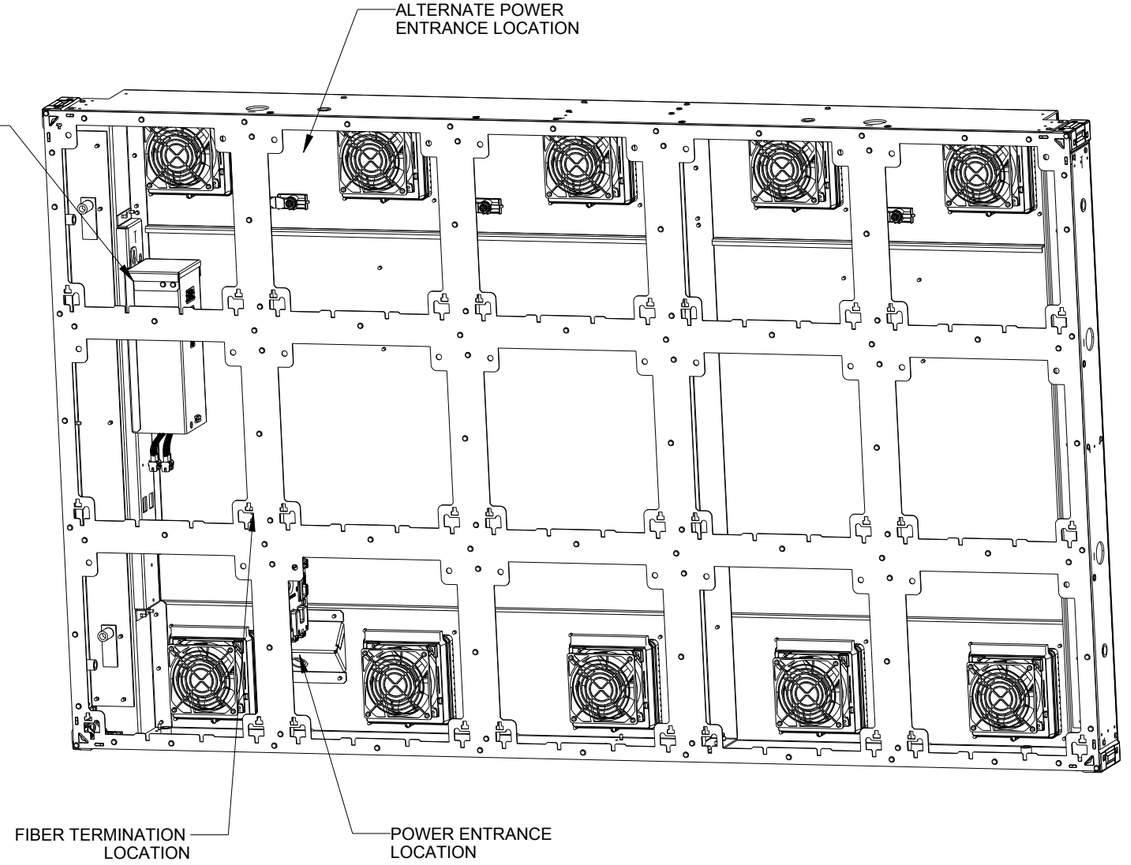
IT IS THE RESPONSIBLITY OF THE ELECTRICAL INSTALLATION CONTRACTOR TO ENSURE CONDUIT USED AND ELECTRICAL WORK PERFORMED ON-SITE MEETS OR EXCEEDS AL LOCAL AND NATIONAL ELECTRIC CODES FOR WIRING AND SPECIFICATIONS.

DISPLAY CABINET IS NOT A WEATHERTIGHT ENCLOSURE









REV	DATE:		BY:

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BROOKINGS, SD 57006
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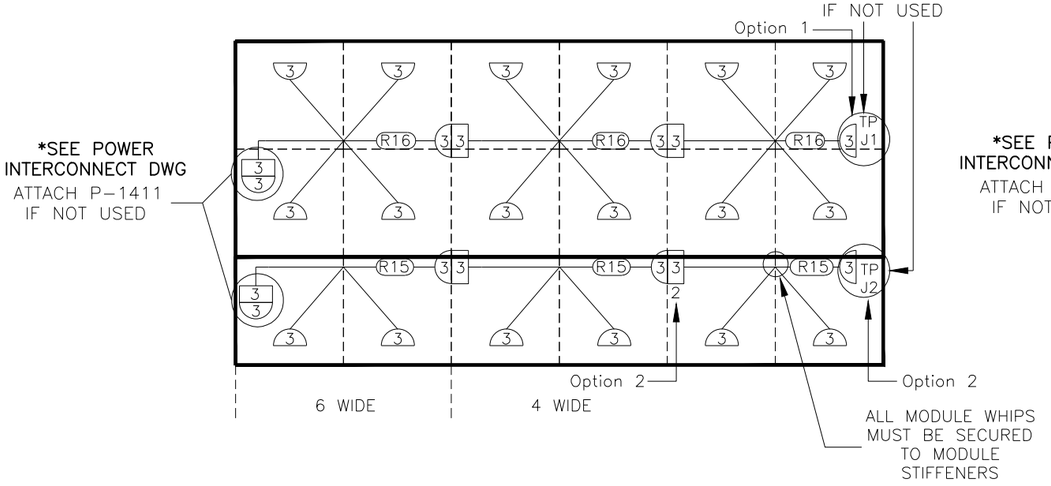
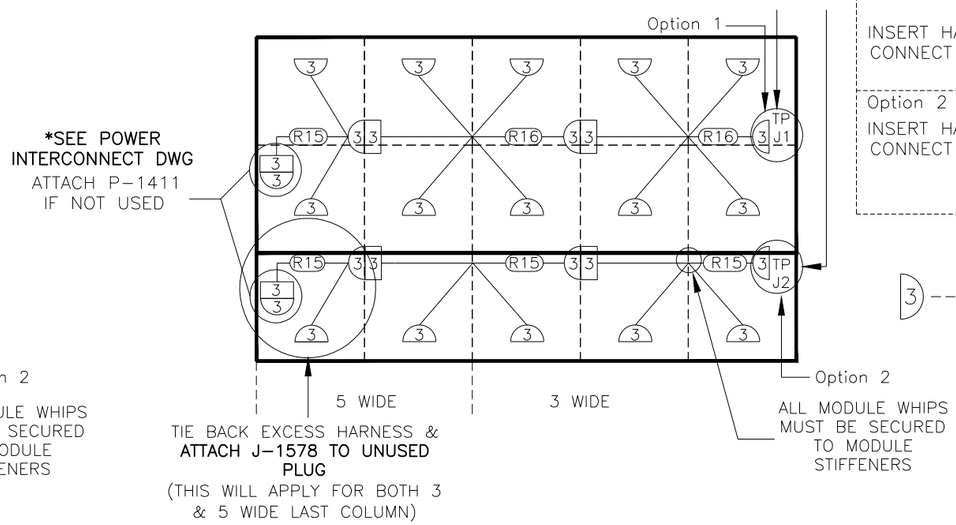
PROJ: DVS				
TITLE: POWER ENTRANCE; FIELD CONDUIT LOCATION				
DESIGN: MGAARD		DRAWN: MGAARD		DATE: 19-SEP-14
SCALE: 1:2				
SHEET:	REV	JOB NO:	FUNC-TYPE-SIZE	1191559
1 OF 1	00	P 1769	E - 07 - B	

3 HIGH VAC (Primary) REAR VIEW

EXAMPLE EVEN LAYOUT

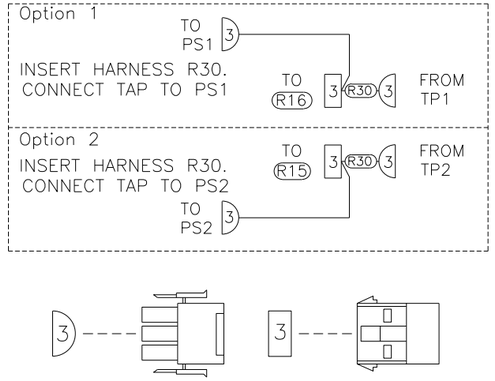


EXAMPLE ODD LAYOUT



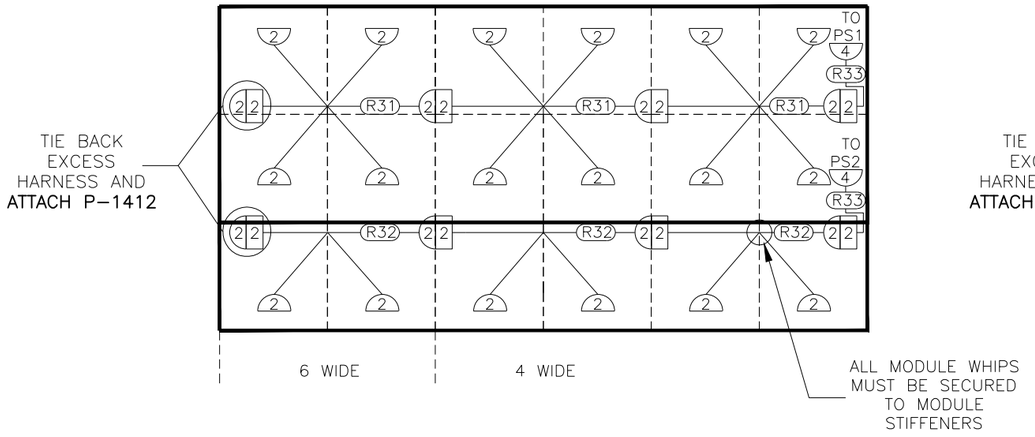
"Optional"

ONLY USED WITH VDC REDUNDANT AND DMP POWER SUPPLIES

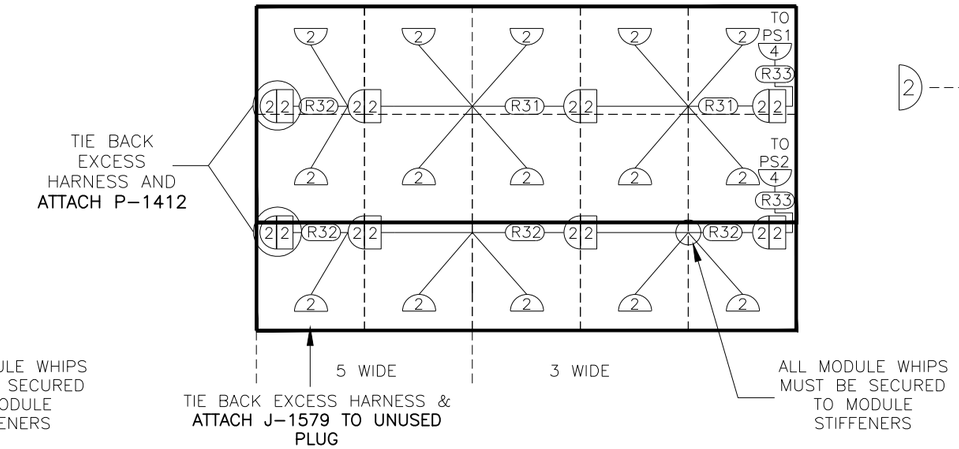


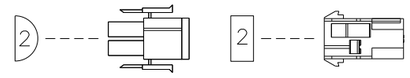
3 HIGH VDC (Redundant)"Optional" REAR VIEW

EXAMPLE EVEN LAYOUT



EXAMPLE ODD LAYOUT





PART NUMBERS

- (R15) W-2346 HARNESS;AC PWR,65W,2MOD,29",CNTR TAP, RVS
- (R16) W-2347 HARNESS;AC PWR,65W,4MOD,29",CNTR TAP, RVS
- (R30) W-2556 HARNESS; 3F TO 3M MNL,12AWG,6",W/3P M MNL WHIP
- (R32) W-2558 HARN; PWR, 65W RD, 2MOD, 2 PIN, 29", CNTR TAP, RVS
- (R31) W-2557 HARN; PWR, 65W RD, 4MOD, 2 PIN, 29", CNTR TAP, RVS
- (R33) W-2559 HARNESS; 2 PIN F MNL TO 4 PIN F MNL

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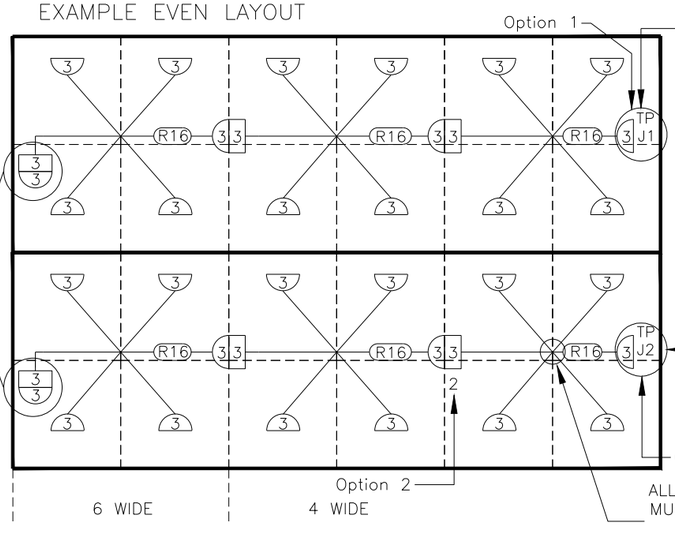
PROJ: DVS				
TITLE: BLOCK DAIGRAM; VAC/VDC HARN, QUAD & DUAL, 3-HIGH				
DESIGN: MGAARD		DRAWN: BFOLKER		DATE: 19 SEPT 14
SCALE: NTS				
SHEET	REV	JOB NO:	FUNC-TYPE-SIZE	1191561
	00	P1769	R - 01 - B	

4 HIGH VAC (Primary) REAR VIEW

EXAMPLE EVEN LAYOUT

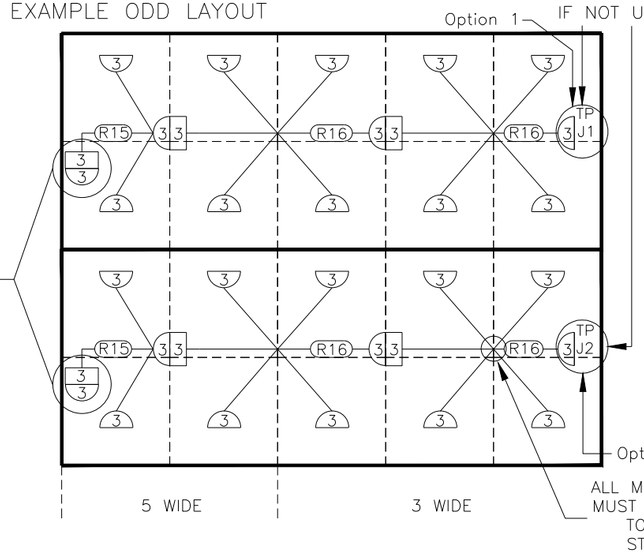


*SEE POWER INTERCONNECT DWG
ATTACH P–1411
IF NOT USED

*SEE POWER INTERCONNECT DWG
ATTACH J–1578
IF NOT USED

ALL MODULE WHIPS MUST BE SECURED TO MODULE STIFFENERS

EXAMPLE ODD LAYOUT



*SEE POWER INTERCONNECT DWG
ATTACH P–1411
IF NOT USED

*SEE POWER INTERCONNECT DWG
ATTACH J–1578
IF NOT USED

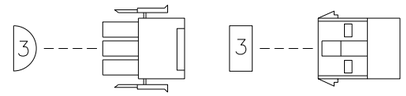
ALL MODULE WHIPS MUST BE SECURED TO MODULE STIFFENERS

"Optional"

ONLY USED WITH VDC REDUNDANT AND DMP POWER SUPPLIES

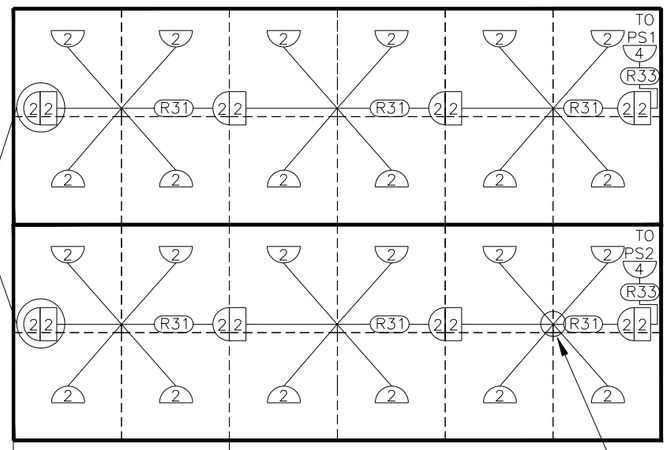
Option 1
INSERT HARNESS R30. CONNECT TAP TO PS1
TO PS1
TO R16
R30
FROM TP1

Option 2
INSERT HARNESS R30. CONNECT TAP TO PS2
TO R16
TO PS2
R30
FROM TP2



4 HIGH VDC (Redundant)"Optional" REAR VIEW

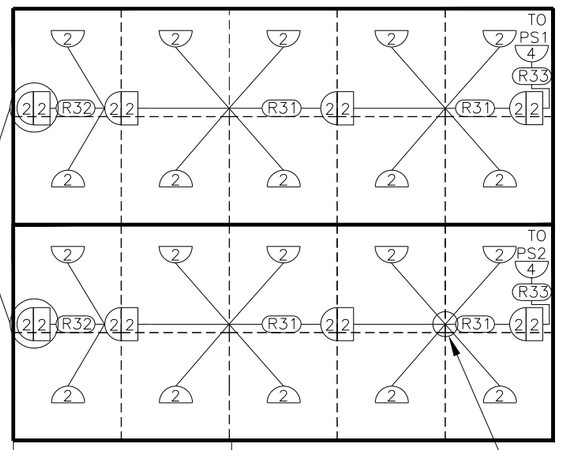
EXAMPLE EVEN LAYOUT



TIE BACK EXCESS HARNESS AND ATTACH P–1412

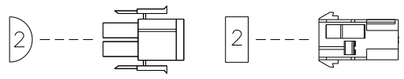
ALL MODULE WHIPS MUST BE SECURED TO MODULE STIFFENERS

EXAMPLE ODD LAYOUT



TIE BACK EXCESS HARNESS AND ATTACH P–1412

ALL MODULE WHIPS MUST BE SECURED TO MODULE STIFFENERS



PART NUMBERS

- (R15) W–2346 HARNESS;AC PWR,65W,2MOD,29",CNTR TAP, RVS
- (R16) W–2347 HARNESS;AC PWR,65W,4MOD,29",CNTR TAP, RVS
- (R30) W–2556 HARNESS; 3F TO 3M MNL,12AWG,6",W/3P M MNL WHIP
- (R32) W–2558 HARN; PWR, 65W RD, 2MOD, 2 PIN, 29", CNTR TAP, RVS
- (R31) W–2557 HARN; PWR, 65W RD, 4MOD, 2 PIN, 29", CNTR TAP, RVS
- (R33) W–2559 HARNESS; 2 PIN F MNL TO 4 PIN F MNL

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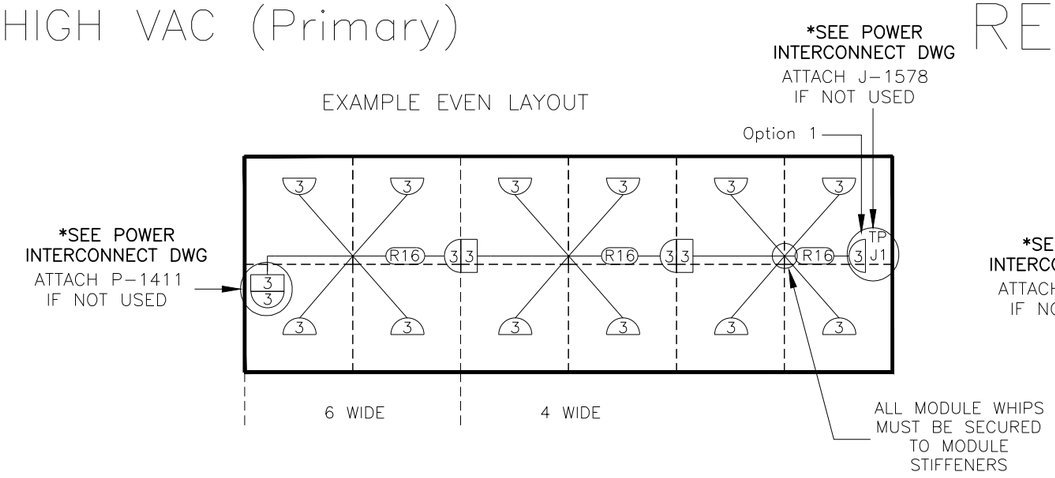
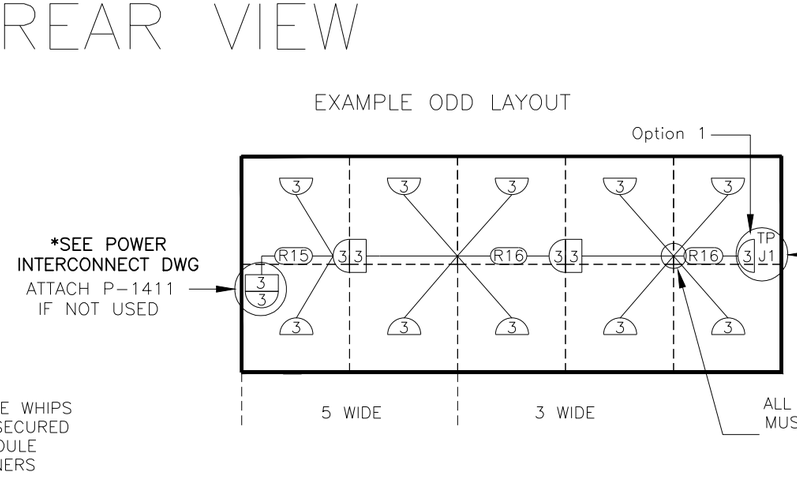
PROJ: DVS				
TITLE: BLOCK DIAGRAM; VAC/VDC HARN, QUAD & DUAL, 4-HIGH				
DESIGN: MGAARD		DRAWN: BFOLKER		DATE: 19 SEPT 14
SCALE: NTS				
SHEET	REV	JOB NO:	FUNC-TYPE-SIZE	1191562
	00	P1769	R - 01 - B	

2 HIGH VAC (Primary) REAR VIEW

EXAMPLE EVEN LAYOUT

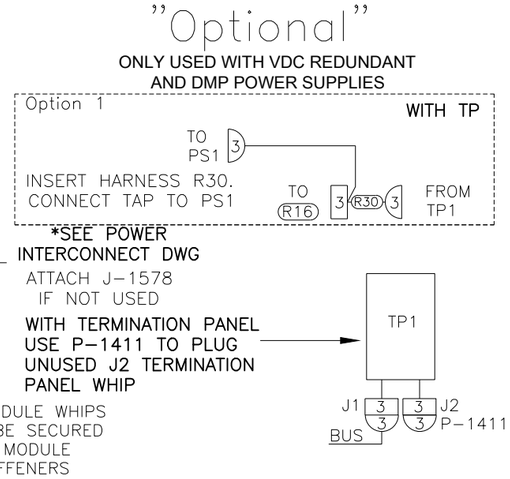


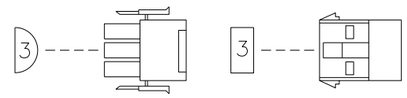
EXAMPLE ODD LAYOUT



"Optional"

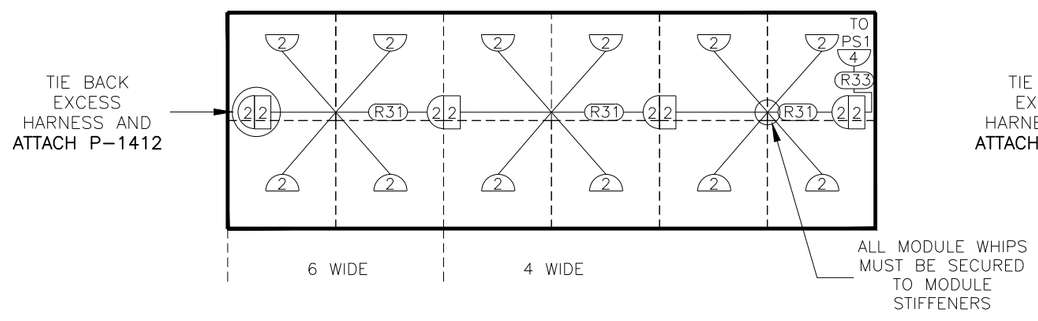
ONLY USED WITH VDC REDUNDANT AND DMP POWER SUPPLIES



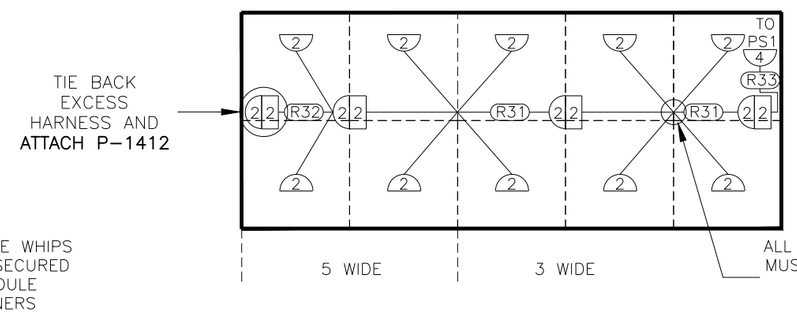


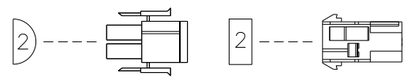
2 HIGH VDC (Redundant)"Optional" REAR VIEW

EXAMPLE EVEN LAYOUT



EXAMPLE ODD LAYOUT





PART NUMBERS

- (R15) W-2346 HARNESS;AC PWR,65W,2MOD,29",CNTR TAP, RVS
- (R16) W-2347 HARNESS;AC PWR,65W,4MOD,29",CNTR TAP, RVS
- (R30) W-2556 HARNESS; 3F TO 3M MNL,12AWG,6",W/3P M MNL WHIP
- (R32) W-2558 HARN; PWR, 65W RD, 2MOD, 2 PIN, 29", CNTR TAP, RVS
- (R31) W-2557 HARN; PWR, 65W RD, 4MOD, 2 PIN, 29", CNTR TAP, RVS
- (R33) W-2559 HARNESS; 2 PIN F MNL TO 4 PIN F MNL

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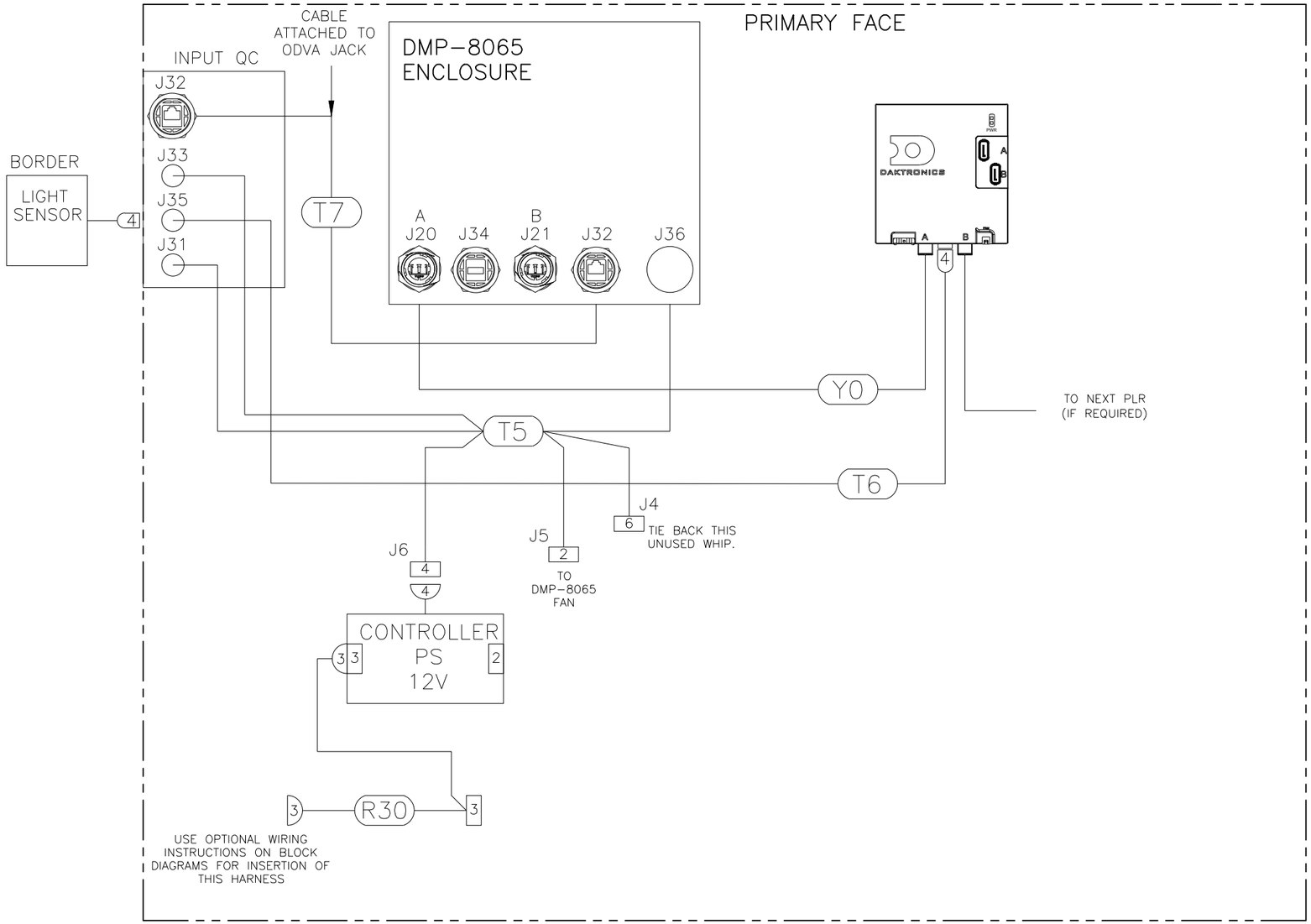
PROJ: DVS			
TITLE: BLOCK DIAGRAM; VAC/VDC HARN, QUAD & DUAL, 2-HIGH			
DESIGN: MGAARD	DRAWN: BFOLKER	DATE: 19 SEPT 14	
SCALE: NTS			

SHEET	REV	JOB NO:	FUNC-TYPE-SIZE	
	00	P1769	R - 01 - B	1191563



HARNESS – REFER TO BOM FOR QTY

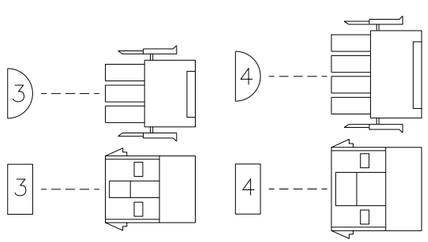
(R30) W–2556
HARN, 3F MNL 3M MNL, 12AWG, 6", W/3M MNL WHIPS @2

(T5) W–2499
HARN, 20 PIN DMP–8065 BREAKOUT, M12 CAN, DVX/GP3

(T6) W–2497
M12 CONNECTOR TO MMNL 4PIN, 3FT, DWG–1095280

(T7) W–2560
CABLE; 3FT ETHERNET CABLE W/ CABLE ODVA

(Y0) W–1659
FIBER; DUPLEX PATCH, 50UM 10GIG LC–LC, 3'



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PROJ: DVS				
TITLE: BLOCK DIAGRAM; DVS W/EMBEDDED CONTROLLER				
DESIGN: MGAARD		DRAWN: BFOLKER		DATE: 19 SEPT 14
SCALE: NTS				
SHEET	REV	JOB NO:	FUNC-TYPE-SIZE	1191564
	00	P1769	R - 01 - B	

B Reference Documents

This section includes the following:

- **Structural Self-Drilling Screws Installation Quick Guide (DD1723952)**
- **DVS-160X/190X Series Seam Measurement Field Instructions Quick Guide (DD2872587)**
- **DVS-160X/190X Series Cabinet Alignment Quick Guide (DD2872114)**
- **DVS-160X/190X Series Sectional Installation Quick Guide (DD2873928)**
- **LED Matrix Display Face Cleaning Quick Guide (ED-14158)**

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Tools

- $^{5}/_{16}$" x 1-$^{1}/_{2}$" Structural self-drilling screws with Expand-a-Seal® sealant (Daktronics part number HC-1764)

  Each self-drilling screw has a $^{3}/_{4}$" band of Expand-a-Seal® sealant applied to the top side of the screw thread. Refer to **Figure 1**.

Figure 1: *Self-Drilling Screw with Sealant*

- Variable-speed drill with no-load speed of 1200-1300 rpm (not provided)

  Drill types vary from job site to job site. Check the specifications on the side of the drill to verify the drill speed. Refer to **Figure 2.** The drill can have one, two, or three transmission speeds. Impact driver drills are not permitted for screw installation. If the drill is cordless, battery life becomes an issue when installing self-drilling screws. The 18 V lithium ion battery is the most effective with base material thicknesses at $^{5}/_{16}$" or less. Batteries higher than 18 V may also be used. Other batteries drain easily, requiring multiple batteries for installations. Testing shows that the Hilti® SF(H)-18A drill/driver can install approximately 25 screws with its 18 V lithium ion battery.

Figure 2: *Drill*

Installation

Install the display sections per the display manual and the contract-specific Shop Drawing.

Select Correct Drill Settings

Note: For the fastest installation, use roughly 40 to 50 lbs of end load (pressing force) when at approximately 1200 rpm. If the drill is not within the specified rpm range, these are the potential problems: higher speeds tend to burn the tips of the screws, and lower speeds work fine for installation but take significantly longer to drill through base material. *Do not* use any end load when threading and seating the screws and slow the drill to approximately 300 rpm. Allow the drill's own power to thread and seat the screw.

Use one of the following methods to set the drill for proper screw installation.

- **Method 1:** Perform a trial run in a non-production tube area. Run two to three screws in a non-critical location to ensure the torque is set properly.
- **Method 2:** Begin installing screws on the lowest clutch setting, increasing the torque until it is set properly.

Drill Screws

Drill the self-drilling screw through the center of the slotted hole in the mounting bracket, allowing for any adjustments with the display. Refer to **Figure 3**. Pre-drilling a pilot hole is advised and may be helpful for overhead drilling. The maximum size for pre-drilled holes is $^{9}/_{32}$".

Screws will only drill through material $^{3}/_{16}$" to $^{5}/_{16}$" thick.

After the displays are leveled and adjusted, install the remaining screws in the circular holes. Refer to **Figure 4**. Displays must be attended at all times if the screws are only installed in the slotted hole. If wind speeds are expected to be above 20 mph, the screws in the circular holes must be installed for strength.

If the screws need to be removed during any part of the installation, do not reuse them, as the sealant may be compromised. If the screw spins freely in its seated position, it is stripped and must be replaced. Refer to **Replace Stripped Screws (p.1)** for further instructions. Testing shows that stitch welds in HSS steel tubes may cause faulty (burnt) tips while drilling. Because the hardness of the weld affects the screw's ability to penetrate the base metal, installations may need to use pre-drilled pilot holes at any stitch weld locations.

For stringer mounting applications, a $^{1}/_{2}$" drain hole is recommended on the bottom side of the HSS stringers at all anticipated low points (end of cantilevers and mid-span points). Refer to **Figure 5**.

For vertical mounting applications, a $^{1}/_{2}$" drain hole in the bottom cap plate is recommended.

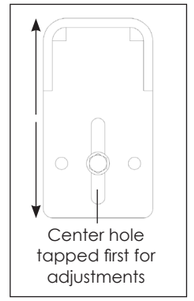

Figure 3: *Adjust Clip*

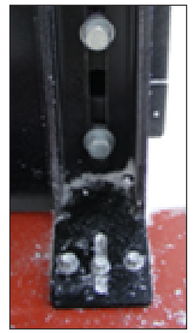

Figure 4: *Seated Screws*

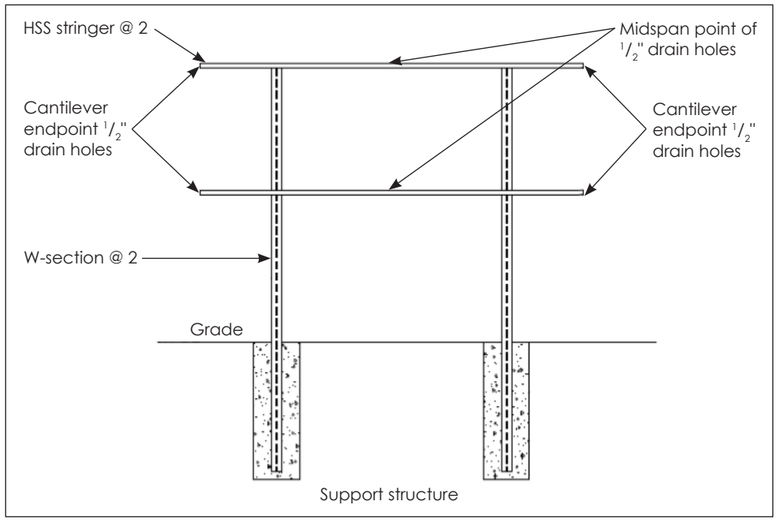

Figure 5: *Drain Hole Locations for Horizontal Mounting Applications*

Replace Stripped Screws

These steps explain how to remove and replacing a stripped screw when it is involuntarily stripped in the base metal. If stripping occurs on multiple screws, adjust the drill torque. It is very rare for multiple screws to strip.

1. Remove the screw in question and replace it with a new screw to verify the original screw was not defective. If the new screw is still stripped, continue with **Step 2**.
2. Determine the new hole locations based on the design requirements shown in **Figure 6**, **Figure 7**, **Figure 8**, and **Figure 9**.

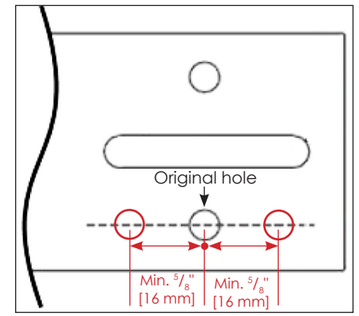

Figure 6: *Offset from Hole*

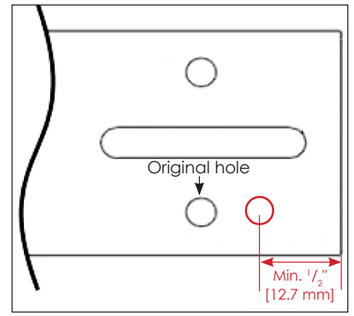

Figure 7: *Offset from Edge*

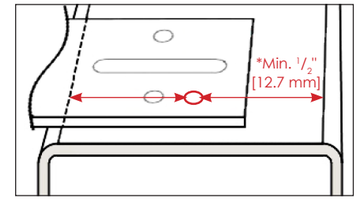

Figure 8: *Offset from Round Edge*

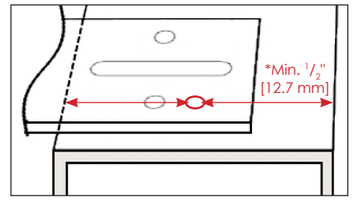

Figure 9: *Offset from Square Edge*

Note: *Measurement applies to any holes used for final mounting (screw installed in hole).

3. Remove the bracket from the sign cabinet. Drill a $^{21}/_{64}$" diameter clearance hole at the previously determined location and re-install the bracket.
4. Install the screws per the previous sections and seal all open holes on the top or sides of the steel HSS with architectural, exterior-grade silicone caulk.

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General Notes

- Take all measurements from the areas shown in **Figure 1** and **Figure 2** when measuring between module cutouts.

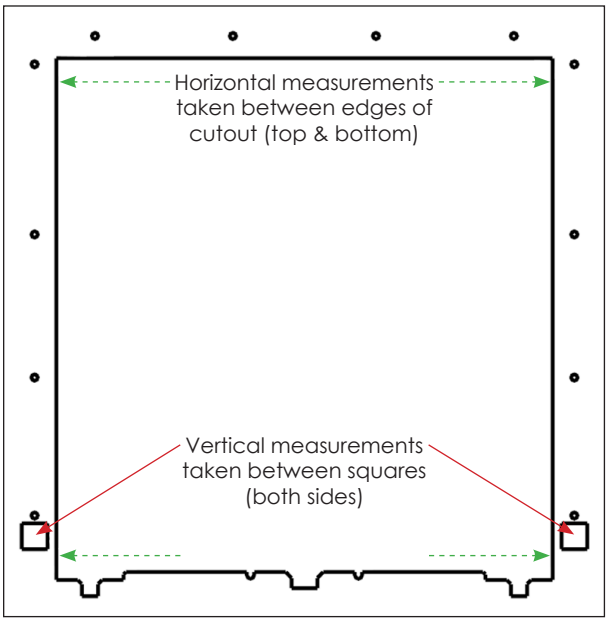

Figure 1: *Measurement Locations in a Module Cutout*

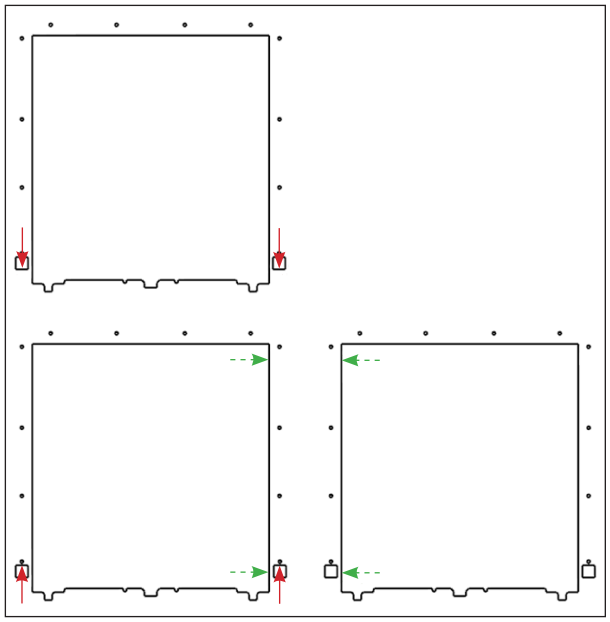

Figure 2: *Measurement Locations in a Module Cutout*

- Ensure the caliper jaws are squarely on the sheet metal.
- Ensure both caliper jaws are located identically on the sheet metal (e.g. not closer to the tip on one jaw, etc.).
- Apply slight pressure to the caliper jaws while measuring.

To measure seams, follow these steps:

1. Use the following table as a reference when measuring cabinet-to-cabinet seam dimensions. Tolerances apply to both horizontal and vertical seams.

Pixel Pitch	Tolerance Range (Inches)		Tolerance Range (Millimeters)	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit
4 mm	-0.0037	+0.0037	-0.09	+0.09
6 mm	-0.0052	+0.0052	-0.13	+0.13
10 mm	-0.0078	+0.0078	-0.20	+0.20

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2. Use the locations noted in **Figure 2** to measure between module cutouts within a module sheet and calibrate the caliper. With the jaws tightly between the two cutouts, press "origin" or "zero" to zero the caliper to that distance as shown in **Figure 3**. Measure between at least three cutouts to ensure the caliper is accurately zeroed.
3. Measure a horizontal seam vertically between module cutouts. Measure vertical seams in the same manner but horizontally between module cutouts.

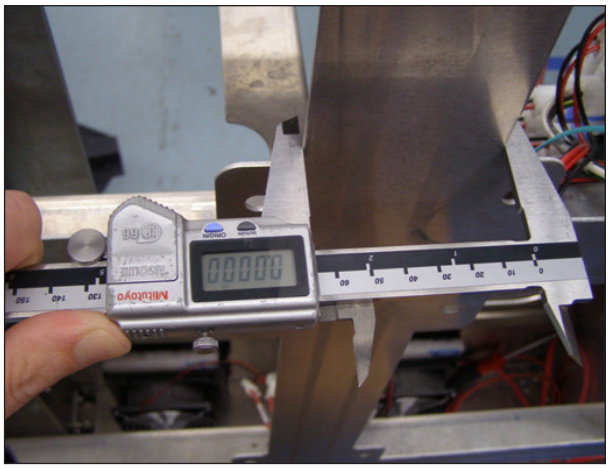

Figure 3: *Caliper Calibration – Vertical Seam*

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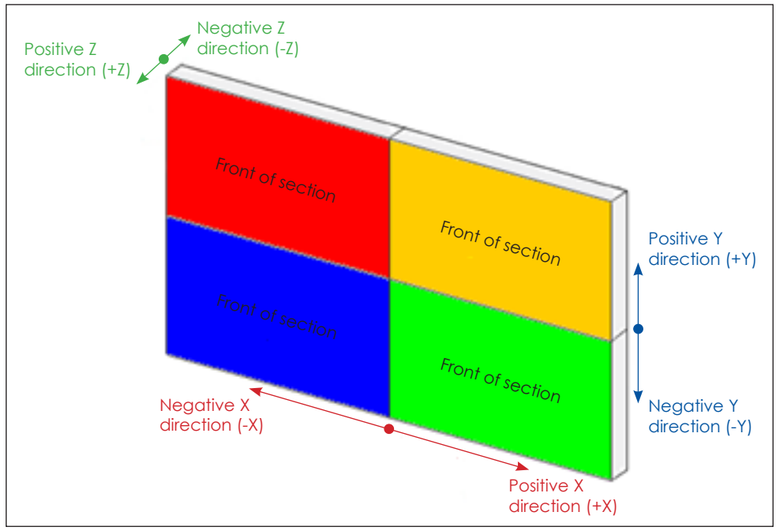
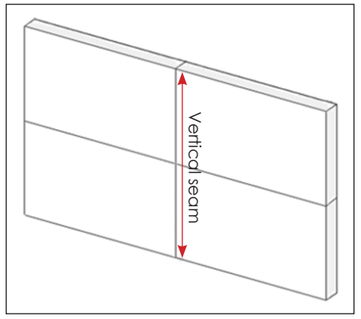
DVS-160X/190X Series Cabinet Alignment Quick Guide

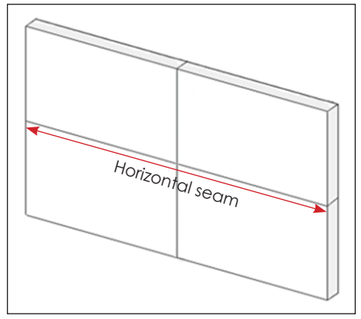
Cabinet alignment is critical to the final appearance of an LED video display and is most easily corrected during the installation process. As pixel spacing of a display becomes tighter, alignment becomes even more critical.

Axis Definition



Seam Definition





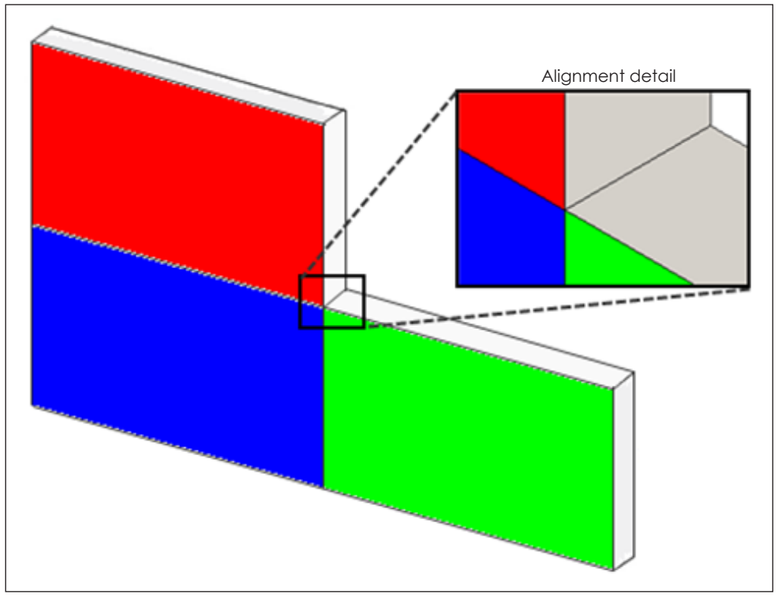
Vertical seam: a location where two vertically oriented edges come together

Horizontal seam: a location where two horizontally oriented edges come together

Wide seam (dim seam or cold seam): a location where the spacing between adjacent pixels is larger than that of the pixels surrounding the seam

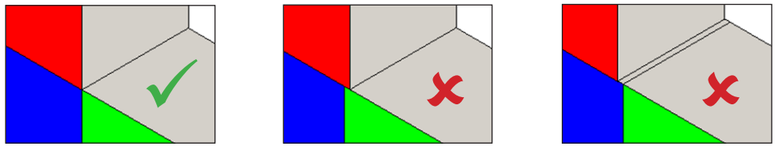
Tight seam (bright seam or hot seam): a location where the spacing between adjacent pixels is smaller than that of the pixels surrounding the seam

Alignment



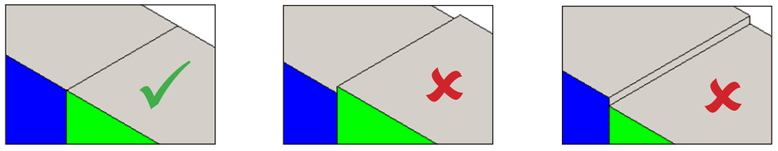
X-Direction Alignment

X-direction alignment issues can cause vertical seams to appear either bright or dim, but a vertical seam caused by X-direction misalignment will not change with the direction from which it is viewed.



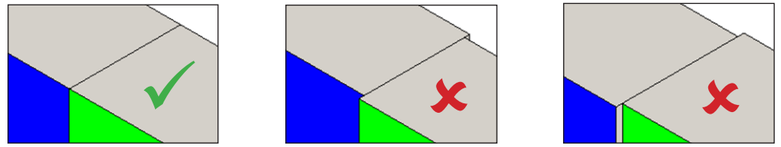
Y-Direction Alignment

Y-direction alignment issues can cause horizontal seams to appear either bright or dim, but a horizontal seam caused by Y-direction misalignment will not change with the direction from which it is viewed.



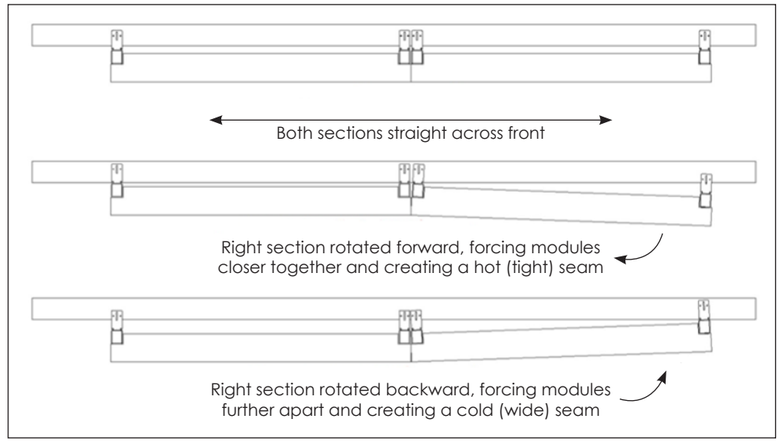
Z-Direction Alignment

Z-direction alignment can be either vertical or horizontal but will appear as a dim seam when viewed from one angle and a bright seam when viewed from the opposite angle across the seam.



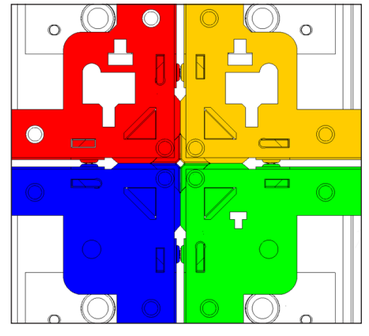
Rotational Alignment

Rotational alignment can be either vertical or horizontal and will not change with the direction from which it is viewed.



Precision Block Alignment

Precision block alignment features bring cabinet corners into alignment, but tolerance within alignment features could allow slight alignment variation and should always be checked during installation.



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05 January 2021

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Mechanical

1. Uncrate the display sections and check the integrity of the cabinet. Check for any obvious deformation or flaws from transport.

2. Use the lifting lugs on the full-height tubes to lift sections into place. Refer to **Figure 1**. Install the bottom-center section (Section 202 in **Figure 2**) first unless otherwise specified.

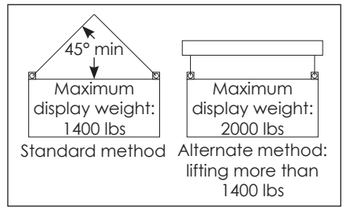

Figure 1: *Display Lifting*

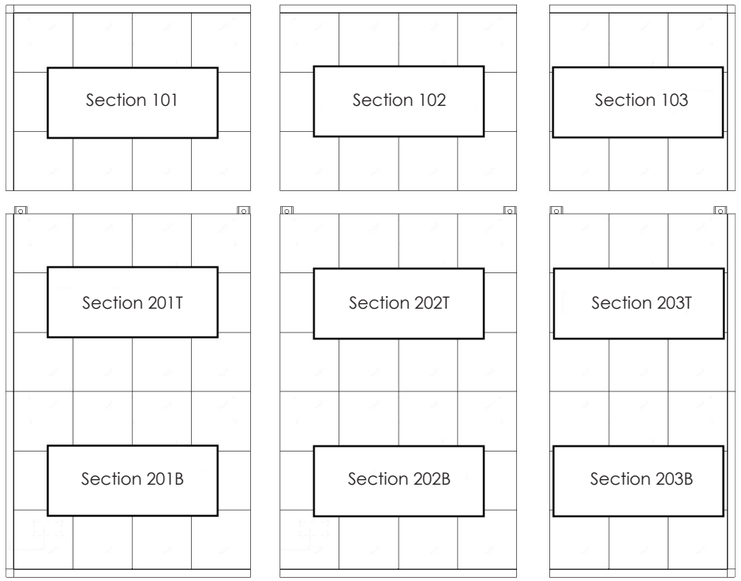

Figure 2: *Front View*

3. Ensure the first section installed is vertically plumb and horizontally level before permanently attaching it to the structure.

   For all subsequent sections, install all interconnect hardware in any adjacent sections while still attached to the crane and before permanently attaching to the structure. Refer to **Side-to-Side Connection (p.1)** and **Top-to-Bottom Connection (p.2)** for connection details.

4. Secure the section until it is permanently attached to the structure using only the two methods described below:

   - The crane remains connected to the section lifting lugs until **Step 8** is complete, and the section is permanently attached to the structure.
   - If a sufficient structure exists, $^1/_2$" eyebolts can be installed in the rear of the full-height tubes, and come-along winches can be tied back to the structure. Refer to **Figure 3**. After the section is secured back with the come-along winches, the crane can be released to pick up the next section. The come-along winches should remain attached to the section until **Step 8** is complete, and the section is permanently attached to the structure.

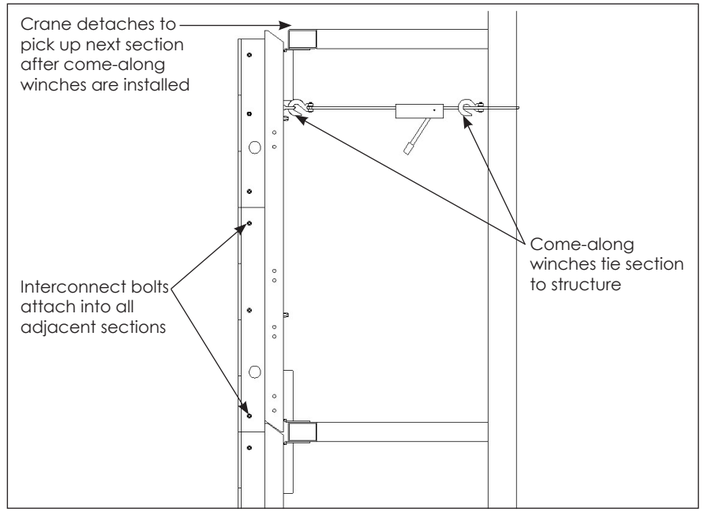

Figure 3: *Keep Section in Place*

5. Adjust the top and bottom clip angles flush to the structure surface.

   Note: A 1" minimum clearance is required behind vents if both intake and exhaust vents are covered.

6. Inspect the faces of the corner blocks highlighted in **Figure 4** and **Figure 5** visually on the installed sections to ensure they are flush and aligned.

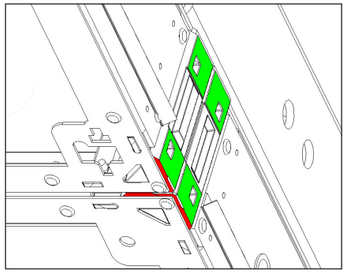

Figure 4: *Inspect Corner Blocks (Side View)*

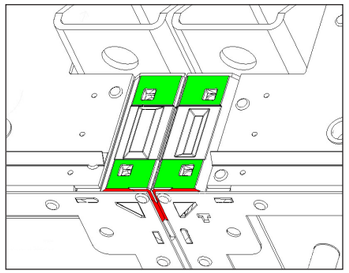

Figure 5: *Inspect Corner Blocks (Top View)*

7. Place a 4' level at both ends and the middle of the display seam (when possible) to ensure the display faces are flush, plumb, and flat to all adjacent sections. Refer to **Figure 6**. If they are no longer aligned, loosen the hardware and repeat **Steps 4-6**.

8. Attach the clips to the structure by either welding (**Figure 7**) or installing the self-drilling screws (**Figure 8**). Refer to the contract-specific Shop Drawing for details on welding and bolting requirements.

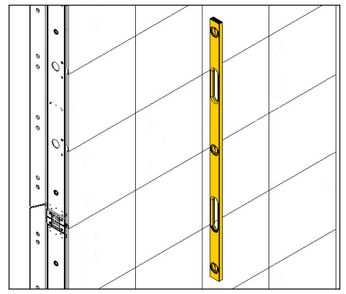

Figure 6: *Ensure Display Faces Are Flush*

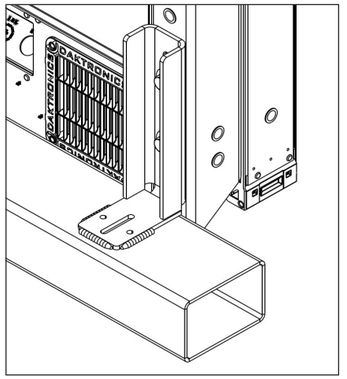

Figure 7: *Welded Attachment*

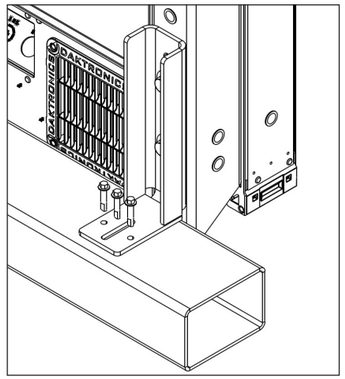

Figure 8: *Weldless Attachment*

Side-to-Side Connection

Connect the sections side-to-side before making any top-to-bottom connections.

1. Place the adjacent sections side-by-side so the alignment pyramids in each nest inside the corresponding recesses.

2. Install $^1/_4$" bolts horizontally through all of the precision blocks in one cabinet and into the adjacent cabinet's corresponding precision block's nutsert (four per side). Refer to **Figure 9**. Finger-tighten the bolts.

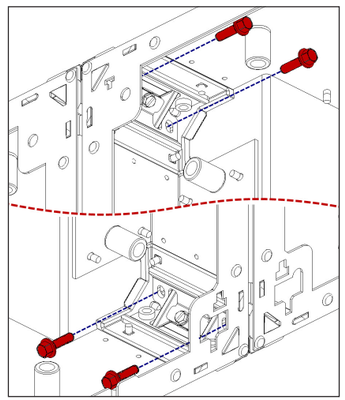

Figure 9: *Install Bolt through Precision Block*

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3. Use a $^{3}/_{8}$" nutdriver to tighten the bolts. The minimum torque required is 6 ft-lbs. Avoid over-tightening. After the precision blocks are tight together, additional torque will not tighten the seams and can damage the blocks. Refer to **Figure 10**.

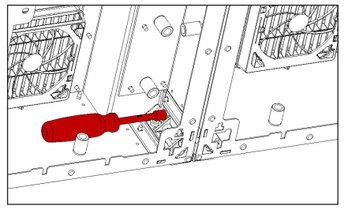


Figure 10: *Tighten Bolt*

4. Inspect the corner blocks on the installed section visually to ensure the faces shown in **Figure 4** and **Figure 5** are flush and aligned.

5. Use a 4' level to ensure the display faces are flush and flat to all adjacent sections. Refer to **Figure 6**.

Top-to-Bottom Connection

Connect the sections side-to-side before making any top-to-bottom connections.

1. Place the adjacent sections on top of each other so the alignment pyramids of each nest inside the corresponding recesses.

2. Install $^{1}/_{4}$" bolts vertically through all of the precision blocks in one cabinet and into the adjacent cabinet's corresponding precision block's nutsert (four per side). Refer to **Figure 11**. Finger-tighten the bolts.

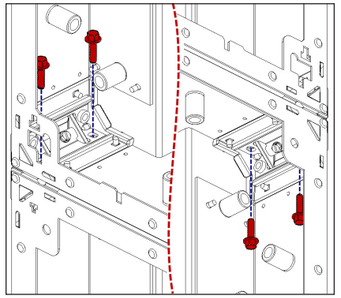


Figure 11: *Install Bolt through Precision Block*

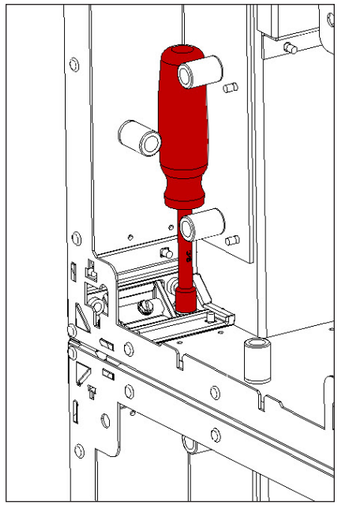


Figure 12: *Tighten Bolt*

3. Use a $^{3}/_{8}$" nutdriver to tighten the bolts. The minimum torque required is 6 ft-lbs. Avoid over-tightening. After the precision blocks are tight together, additional torque will not tighten the seams and can damage the blocks. Refer to **Figure 12**.

4. Inspect the corner blocks on the installed section visually to ensure the faces shown in **Figure 4** and **Figure 5** are flush and aligned.

5. Use a 4' level (when possible) to ensure the display faces are flush and flat to all adjacent sections. Refer to **Figure 6**.

Center Adjustment

Precision blocks provide proper spacing at the ends of section seams, but spacing may vary in the middle where the sections come together. Additional holes are provided along both the horizontal and vertical edges of the cabinet for additional adjustment if required.

For wide center seams, install $^{1}/_{4}$" bolts through the holes behind the face sheets at the problem locations in the bottom of the top cabinet or the left side of the right cabinet and into the next cabinet's nutsert. Refer to the **DVS-160X/190X Series Seam Measurement Field Instructions Quick Guide (DD2872587)** for details on seam tolerance and to **Figure 13** for details on seam adjustment.

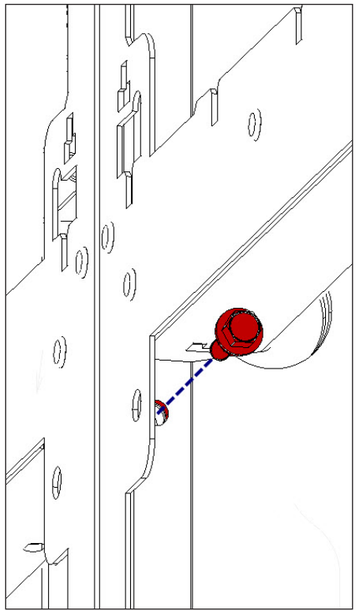


Figure 13: *Adjust Wide Center Seams*

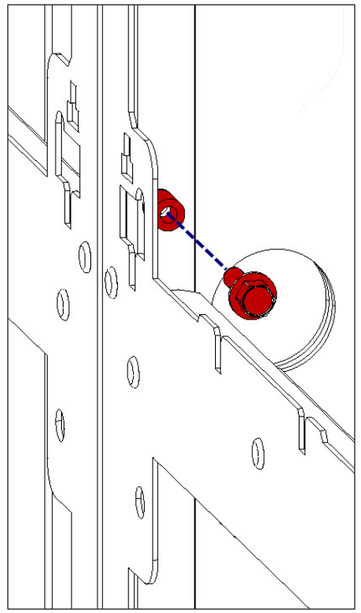


Figure 14: *Adjust Tight Center Seams*

For tight center seams, install $^{1}/_{4}$" bolts into the pre-installed nutserts behind the face sheet at the problem locations in the bottom of the top cabinet or the left side of the right cabinet. Tighten the bolts until the seam is within tolerance. Refer to the **DVS-160X/190X Series Seam Measurement Field Instructions Quick Guide (DD2872587)** for details on seam tolerance and to **Figure 14** for details on seam adjustment.

Electrical

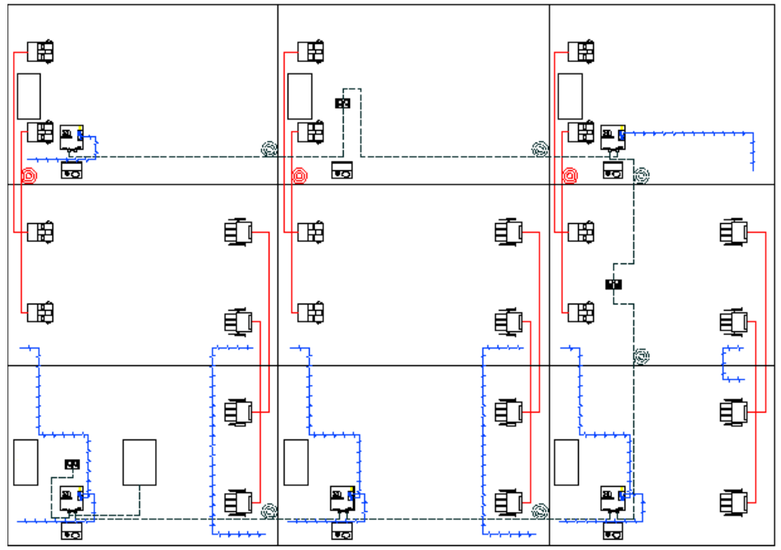
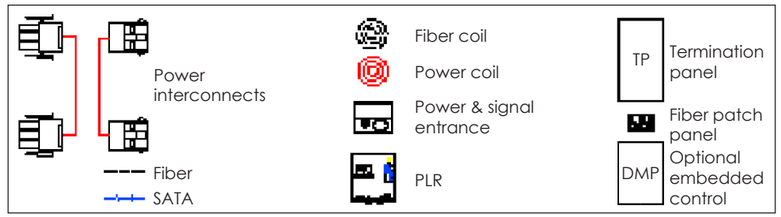


Figure 15: *Signal Routing (Front View)*



1. Route the fiber cable through the signal entrance, then terminate. Refer to **DWG-1191554** in the **DVS-160X/190X Series Display Manual (DD2842951)** for fiber termination information.

2. Connect the fiber cable to the first fiber patch panel. Refer to **Figure 16** and the contract-specific Signal Interconnect Drawing and Riser Diagram.

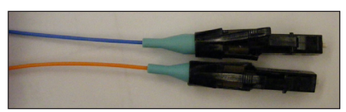


Figure 16: *Fiber Cable*

3. Route the coiled power cables from section-to-section, connecting to the power harness in the next section. Refer to the contract-specific Riser Diagram.

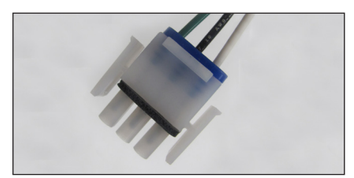


Figure 17: *Power Interconnect between Cabinets*

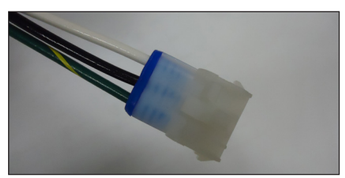


Figure 18: *Power Interconnect between Cabinets*

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4. Route the coiled fiber cables to the next section, connecting at the first fiber patch panel. Refer to **DWG-1191554** in the **DVS-160X/190X Series Display Manual (DD2842951)** for fiber entrance and fiber interconnect details.

> **Note:** The fiber, power, and SATA connections shown in this guide serve as an *example* only. Refer to the contract-specific Signal Interconnect Drawing and Riser Diagram for specific routing information.

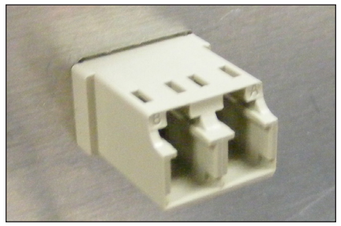

Figure 19: *Fiber Patch Panel Jack*

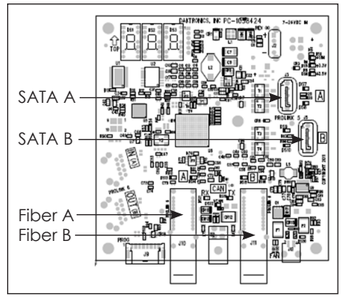

Figure 20: *PLR*

5. Route the SATA cables from section-to-section and connect to the module input. Refer to **Figure 21** and **Figure 22**.

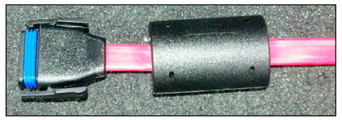

Figure 21: *SATA Cable*

Figure 22: *SATA Connection*

6. Route the power cables through conduit to the termination panels inside the display at the sections specified on the contract-specific Riser Diagram. Refer to **DWG-1183290** in the **DVS-160X/190X Series Display Manual (DD2842951)** for power termination information.

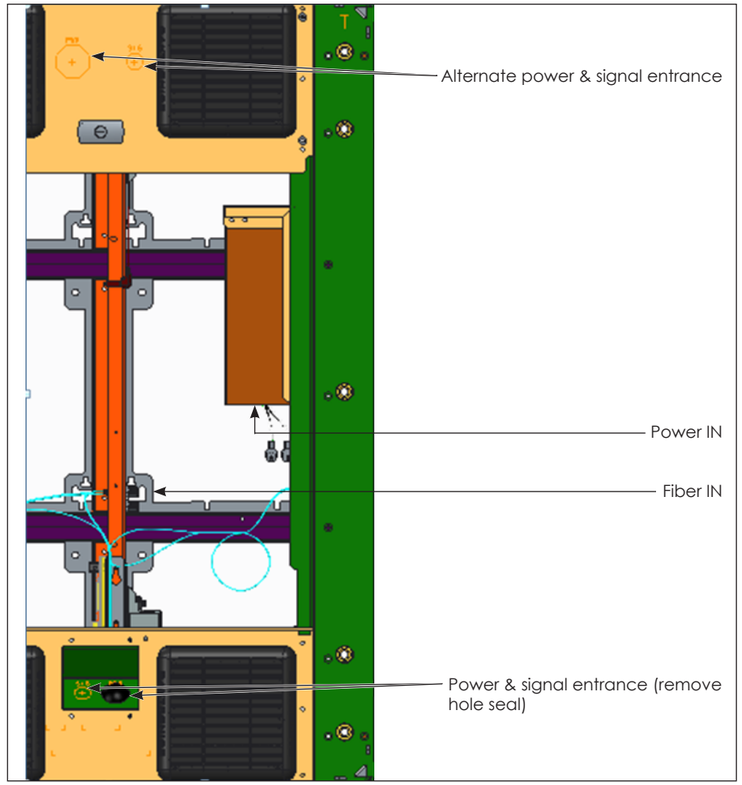

Figure 23: *Power Entrance*

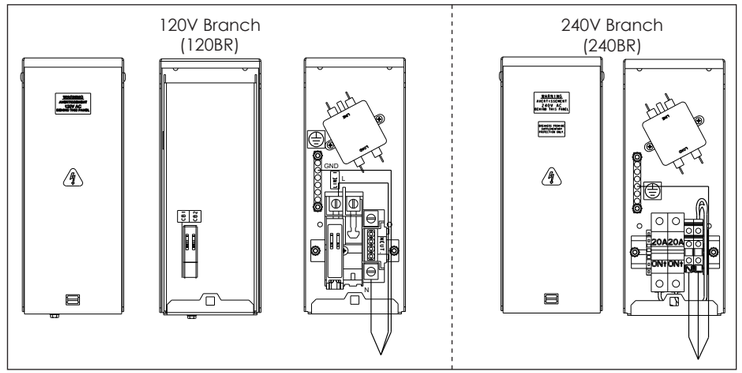

Figure 24: *Power Installation*

> **Note:** This display allows water to enter, so incoming conduits should point downward or have a fitting attached to prevent water from entering the conduit.

7. Remove the screw on the bottom of the termination panel enclosure to remove the internal cover.

Optional Embedded Controller

Refer to the contract-specific Riser Diagram to verify if an embedded controller is included in this system.

Connect the signal cables to the proper quick-connect jacks on the rear of the display.

Figure 25: *Quick Connect Jacks*

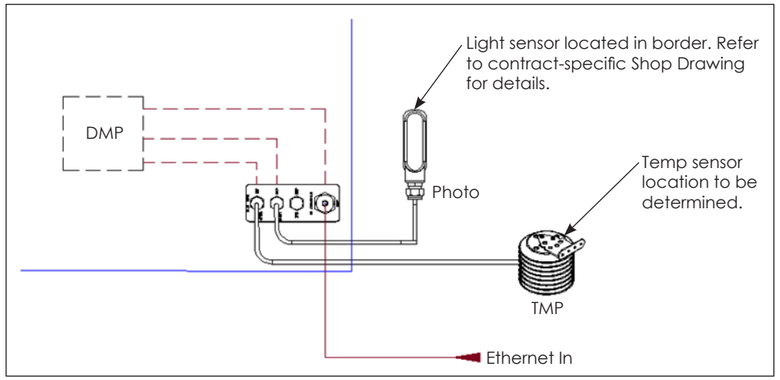

Figure 26: *Embedded Controller Signal Routing (Rear View)*

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LED Matrix Display Face Cleaning Quick Guide

This document outlines materials and methods used to clean all Daktronics LED matrix displays. Due to occasional document updates, please check www.daktronics.com before proceeding.

Outdoor Cleaning Method

Note: Do not use this method on indoor displays.

Using only deionized (DI) water without a cleaner is not recommended, as it does not remove oils and provides inadequate results.

Cleaning Supplies

- Five-gallon [20-liter] bucket
- Car wash concentrate (not a wash and wax):
  - Armor All® car wash concentrate (1:128 soap-to-water ratio)
  - Crystal Simple Green® car wash concentrate (1:30 soap-to-water ratio)
  - Rain-X® high-foaming car wash concentrate (1:128 soap-to-water ratio)
- Cold, relatively soft water (potable, municipal tap water)
- Soft, automotive-washing bristle brush: 4-8' [1-2 m] telescoping handle and a 10"-wide [25 cm] soft-to-medium-head brush with 4" [10 cm] light-to-medium rigidity bristles
  - Detailer's Choice® tri-level flow-through brush with 6' [2 m] handle (Walmart® item #4B360)
  - Ettore® Extend-a-Flo flow-thru wash brush with 6' [2 m] handle (Do-It Best Center item #59072)
  - TOUGH GUY® aluminum flow-through brush with 70" [2 m] handle (Grainger item #491R25)
  - Soft-bristle scrub brush with 42-72" [1-2 m] handle (McMaster-Carr item #6140T41)

  If more detailed cleaning is required, a TOUGH GUY® scrub brush with 8" handle (Grainger item #1DU76) can be used.

Do not use car wash and wax concentrates (wax leaves residue on LEDs), deck brushes (bristles damage LEDs and louvers, spotting-agent rinses (chemicals leave residue on LEDs), or power washers (high pressure damages LEDs and louvers).

Cleaning Process

1. Turn off power to the display.
2. Mix the car wash concentrate and cold water in the five-gallon [20-liter] bucket at the manufacturer's recommended concentration for general cleaning.
3. Dip the brush in the soapy water.

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4. Use horizontal brush strokes to loosen and remove dirt and grime on the display, washing from top-to-bottom in vertical columns. Refer to **Figure 1**. Use light pressure to avoid damaging the LEDs. Clean an area that is safely within reach from a lift or stage, and then move on to the next section of modules. Wash in small sections that can be rinsed before the soapy water dries.

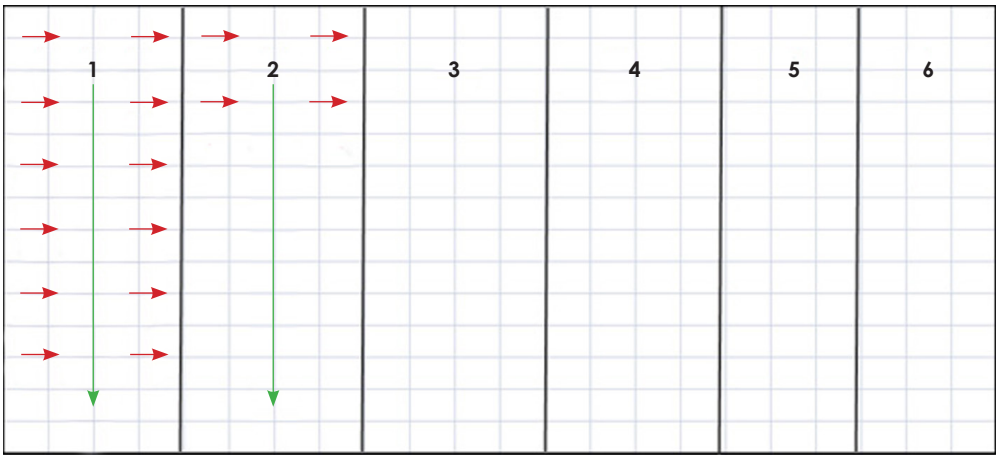

Figure 1: *Wash Display Top-to-Bottom*

> **Note:** Take care not to catch the cloth on the LEDs or plastic louvers, as this may damage them.

5. Rinse the display face with a generous amount of low pressure cold water *before the soapy water dries*. Soap may dry on the display faster or slower depending on weather conditions.

> **Note:** It is important to flush all excess soap residue off the display face with low water pressure.

6. Allow the display to air dry completely before reviewing the cleanliness.
7. Dispose any leftover soapy water in an environmentally safe manner.

Indoor Cleaning Method

Dry Indoor Method

Cleaning Supplies

> **Note:** Do not use chemicals or solvents.

- Automotive dusting brush or other dusting-type cloth/mop without border (cut off if present) or loops: lint-free with a very short or non-existent pile similar to velour, microsuede, or velvet
  - California Car Duster® dust mop (not recommended for 4 mm pitch displays or smaller)
  - MoozikPro polishing cloth (Amazon® item #10766752 - preferred cloth)
  - Microfiber polishing wipe (McMaster-Carr item #7716T3)
  - Microfiber suede polishing cloth (Zoro® item #G7118419)

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Cleaning Process

1. Wipe the display face horizontally with the duster, using light pressure to prevent LED damage. Horizontal strokes follow the path of the LEDs and are best for removing dirt. It may take several passes to remove all dust and grime.
2. Shake out or replace the duster as needed to maintain effectiveness.

Wet Indoor Method

Module masks can accumulate grime and grease during installation, which can greatly reduce image quality. To ensure premium performance, follow the steps in this section.

Cleaning Supplies

- 99% isopropyl rubbing alcohol
- Soft, smooth cloth without a border (cut off if present) or loops: lint-free with a very short or non-existent pile similar to velour, microsuede, or velvet
  - MoozikPro polishing cloth (Amazon® item #10766752 - preferred cloth)
  - Microfiber suede cloth (Microfiber Wholesale item #MSC1414)
  - Microfiber suede polishing cloth (Zoro® item #G7118419)

Cleaning Process

1. Turn off power to the display.
2. Pour isopropyl rubbing alcohol into a squirt bottle and squirt the microfiber cloth twice to moisten it. Refer to **Figure 2**.

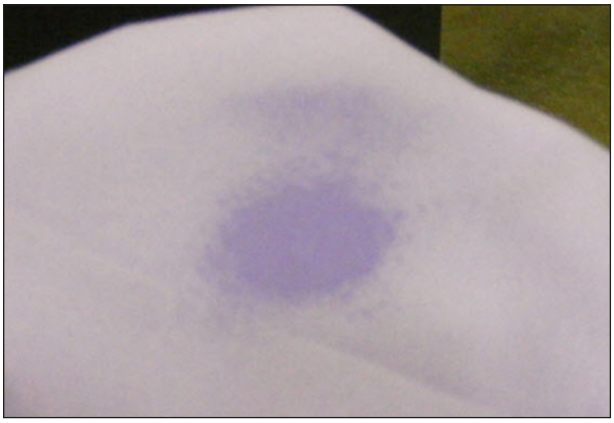

Figure 2: *Moisten Cloth*

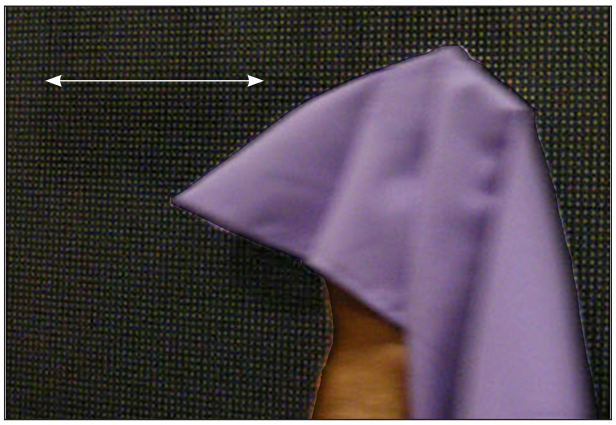

Figure 3: *Wipe Module Up-and-Down*

3. Apply light, even pressure with two or three fingers and steadily wipe the module in an up-and-down motion, covering about 1" of width with each wipe. Refer to **Figure 3**.

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4. Repeat **Step 2** and **Step 3** in a left-to-right motion. Refer to **Figure 4**.

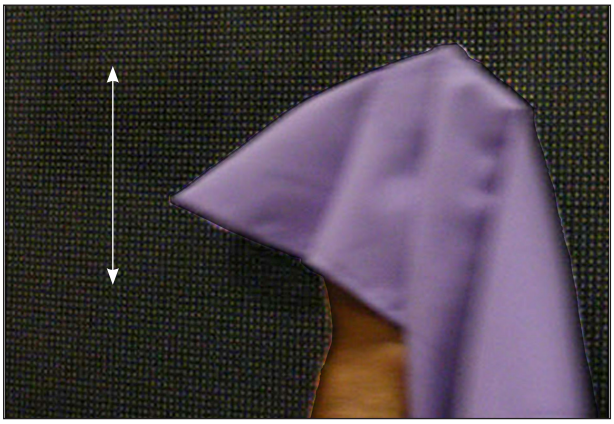

Figure 4: *Wipe Module Up-and-Down*

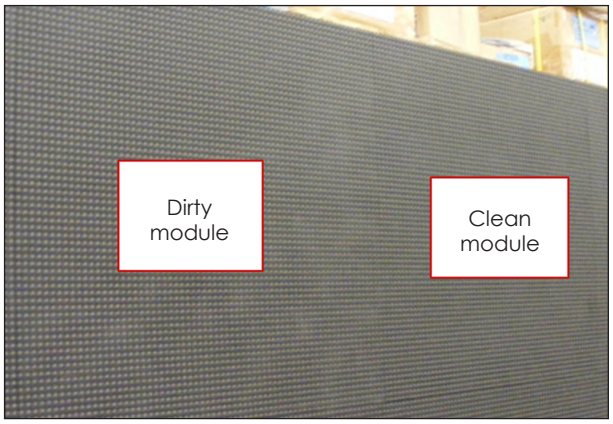

Figure 5: *Examine Display*

> **Note:** Never wipe diagonally and be careful not to snag or catch the cloth on the corners of the LEDs.

5. Examine the display and touch up areas as needed. Refer to **Figure 5**.

Spray Paint Removal

If a display has been spray painted, inadvertently or as an act of vandalism, there are two options for removing spray paint: a soft cloth with isopropyl alcohol (IPA) or a soft cloth with ethanol.

> **Note:** Use the IPA method first. Do not wipe the surface hard or use strong chemical materials that can cause damage to the LEDs.

1. Use IPA and a soft cloth to gently wipe the painted surface and then gently wipe the surface again.
2. Use a clean cloth dipped in pure water to gently wipe the surface.

Metal Dust Removal

If ferrous particles are stuck to magnet locations on the face of the module, follow the steps in this section.

1. Wrap a handheld magnet in a towel.
2. Hold the magnet in a towel and slowly and gently pass the magnet over the affected surfaces, picking up metal shavings and dust from the module.

> **Note:** Keep the magnet from touching the module face to prevent damage to the LEDs or module mask.

3. Hold the towel over a waste receptacle and remove the magnet from the towel. Shake out the towel to discard particles. Refer to **Figure 6**.

Figure 6: *Magnetic Dust*

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C Daktronics Warranty & Limitation of Liability

This section includes the Daktronics Warranty & Limitation of Liability statement.

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DAKTRONICS WARRANTY & LIMITATION OF LIABILITY

This Warranty and Limitation of Liability (the "Warranty") sets forth the warranty provided by Daktronics with respect to the Equipment. By accepting delivery of the Equipment, Purchaser and End User agree to be bound by and accept these terms and conditions. Unless otherwise defined herein, all terms within the Warranty shall have the same meaning and definition as provided elsewhere in the Agreement.

DAKTRONICS WILL ONLY BE OBLIGATED TO HONOR THE WARRANTY SET FORTH IN THESE TERMS AND CONDITIONS UPON RECEIPT OF FULL PAYMENT FOR THE EQUIPMENT

1. Warranty Coverage.

A. Daktronics warrants to the original end user (the "End User", which may also be the Purchaser) that the Equipment will be free from Defects (as defined below) in materials and workmanship for a period of one (1) year (the "Warranty Period"). The Warranty Period shall commence on the earlier of: (i) four weeks from the date that the Equipment leaves Daktronics' facility; or (ii) Substantial Completion as defined herein. The Warranty Period shall expire on the first anniversary of the commencement date.

"Substantial Completion" means the operational availability of the Equipment to the End User in accordance with the Equipment's specifications, without regard to punch-list items, or other non-substantial items which do not affect the operation of the Equipment

B. Daktronics' obligation under this Warranty is limited to, at Daktronics' option, replacing or repairing, any Equipment or part thereof that is found by Daktronics not to conform to the Equipment's specifications. Unless otherwise directed by Daktronics, any defective part or component shall be returned to Daktronics for repair or replacement. This Warranty does not include on-site labor charges to remove or install these components. Daktronics may, at its option, provide on-site warranty service. Daktronics shall have a reasonable period of time to make such replacements or repairs and all labor associated therewith shall be performed during regular working hours. Regular working hours are Monday through Friday between 8:00 a.m. and 5:00 p.m. at the location where labor is performed, excluding any holidays observed by Daktronics.

C. Daktronics shall pay ground transportation charges for the return of any defective component of the Equipment. All such items shall be shipped by End User DDP Daktronics designated facility per Incoterms® 2020. If returned Equipment is repaired or replaced under the terms of this Warranty, Daktronics will prepay ground transportation charges back to End User and shall ship such items DDP End User's designated facility per Incoterms® 2020; otherwise, End User shall pay transportation charges to return the Equipment back to the End User and such Equipment shall be shipped Ex Works Daktronics designated facility per Incoterms® 2020. All returns must be pre-approved by Daktronics before shipment. Daktronics shall not be obligated to pay freight for any unapproved return. End User shall pay any upgraded or expedited transportation charges

D. Any replacement parts or Equipment will be new or serviceably used, comparable in function and performance to the original part or Equipment and warranted for the remainder of the Warranty Period. Purchasing additional parts or Equipment from the Seller does not extend the Warranty Period.

E. Defects shall be defined as follows. With regard to the Equipment (excepting LEDs), a "Defect" shall refer to a material variance from the design specifications that prohibit the Equipment from operating for its intended use. With respect to LEDs, "Defects" are defined as LED pixels that cease to emit light. Unless otherwise expressly provided, this Warranty does not impose any duty or liability upon Daktronics for partial LED pixel degradation. Notwithstanding the foregoing, in no event does this Warranty include LED pixel degradation caused by UV light. This Warranty does not provide for the replacement or installation of communication methods including but not limited to, wire, fiber optic cable, conduit, trenching, or for the purpose of overcoming local site interference radio equipment substitutions.

EXCEPT AS OTHERWISE EXPRESSLY SET FORTH IN THIS WARRANTY, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, DAKTRONICS DISCLAIMS ANY AND ALL OTHER PROMISES, REPRESENTATIONS AND WARRANTIES APPLICABLE TO THE EQUIPMENT AND REPLACES ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ACCURACY OR QUALITY OF DATA. OTHER ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY DAKTRONICS, ITS AGENTS OR EMPLOYEES, SHALL NOT CREATE A WARRANTY OR IN ANY WAY INCREASE THE SCOPE OF THIS LIMITED WARRANTY.

THIS LIMITED WARRANTY IS NOT TRANSFERABLE.

2. Exclusion from Warranty Coverage

This Warranty does not impose any duty or liability upon Daktronics for any:

A. damage occurring at any time, during shipment of Equipment unless otherwise provided for in the Agreement. When returning Equipment to Daktronics for repair or replacement, End User assumes all risk of loss or damage, agrees to use any shipping containers that might be provided by Daktronics, and to ship the Equipment in the manner prescribed by Daktronics;

B. damage caused by: (i)the improper handling, installation, adjustment, use, repair, or service of the Equipment, or (ii) any physical damage which includes, but is not limited to, missing, broken, or cracked components resulting from non-electrical causes;

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altered, scratched, or fractured electronic traces; missing or gauged solder pads; cuts or clipped wires; crushed, cracked, punctured, or bent circuit boards; or tampering with any electronic connections, provided that such damage is not caused by personnel of Daktronics or its authorized repair agents;

C. damage caused by the failure to provide a continuously suitable environment, including, but not limited to: (i) neglect or misuse; (ii) improper power including, without limitation, a failure or sudden surge of electrical power; (iii) improper air conditioning, humidity control, or other environmental conditions outside of the Equipment's technical specifications such as extreme temperatures, corrosives and metallic pollutants; or (iv) any other cause other than ordinary use;

D. damage caused by fire, flood, earthquake, water, wind, lightning or other natural disaster, strike, inability to obtain materials or utilities, war, terrorism, civil disturbance, or any other cause beyond Daktronics' reasonable control;

E. failure to adjust, repair or replace any item of Equipment if it would be impractical for Daktronics personnel to do so because of connection of the Equipment by mechanical or electrical means to another device not supplied by Daktronics, or the existence of general environmental conditions at the site that pose a danger to Daktronics personnel;

F. statements made about the product by any salesperson, dealer, distributor or agent, unless such statements are in a written document signed by an officer of Daktronics. Such statements as are not included in a signed writing do not constitute warranties, shall not be relied upon by End User and are not part of the contract of sale;

G. damage arising from the use of Daktronics products in any application other than the commercial and industrial applications for which they are intended, unless, upon request, such use is specifically approved in writing by Daktronics;

H. replenishment of spare parts. In the event the Equipment was purchased with a spare parts package, the parties acknowledge and agree that the spare parts package is designed to exhaust over the life of the Equipment, and as such, the replenishment of the spare parts package is not included in the scope of this Warranty;

I. security or functionality of the End User's network or systems, or anti-virus software updates;

J. performance of preventive maintenance;

K. third-party systems and other ancillary equipment, including without limitation front-end video control systems, audio systems, video processors and players, HVAC equipment, batteries and LCD screens;

L. incorporation of accessories, attachments, software or other devices not furnished by Daktronics; or

M. paint or refinishing the Equipment or furnishing material for this purpose.

3. **Limitation of Liability**

A. Daktronics shall be under no obligation to furnish continued service under this Warranty if alterations are made to the Equipment without the prior written approval of Daktronics.

B. It is specifically agreed that the price of the Equipment is based upon the following limitation of liability. In no event shall Daktronics (including its subsidiaries, affiliates, officers, directors, employees, or agents) be liable for any claims asserting or based on (a) loss of use of the facility or equipment; lost business, revenues, or profits; loss of goodwill; failure or increased cost of operations; loss, damage or corruption of data; loss resulting from system or service failure, malfunction, incompatibility, or breaches in system security; or (b) any special, consequential, incidental or exemplary damages arising out of or in any way connected with the Equipment or otherwise, including but not limited to damages for lost profits, cost of substitute or replacement equipment, down time, injury to property or any damages or sums paid to third parties, even if Daktronics has been advised of the possibility of such damages. The foregoing limitation of liability shall apply whether any claim is based upon principles of contract, tort or statutory duty, principles of indemnity or contribution, or otherwise

C. In no event shall Daktronics be liable for loss, damage, or injury of any kind or nature arising out of or in connection with this Warranty in excess of the Purchase Price of the Equipment. The End User's remedy in any dispute under this Warranty shall be ultimately limited to the Purchase Price of the Equipment to the extent the Purchase Price has been paid.

4. Assignment of Rights

A. The Warranty contained herein extends only to the End User (which may be the Purchaser) of the Equipment and no attempt to extend the Warranty to any subsequent user-transferee of the Equipment shall be valid or enforceable without the express written consent of Daktronics.

5. Governing Law; Election of Remedies

A. The rights and obligations of the parties under this Warranty shall not be governed by the provisions of the United Nations Convention on Contracts for the International Sales of Goods of 1980. The parties consent to the application of the laws of the State of South Dakota to govern, interpret, and enforce each of the parties' rights, duties, and obligations arising from, or relating in any manner to, the subject matter of this Warranty, without regard to conflict of law principles.

B. Any dispute, controversy or claim arising from or related to this Warranty, the parties shall first attempt to settle through negotiations. In the event that no resolution is reached, then such dispute, controversy, or claim shall be resolved by final and binding arbitration under the Rules of Arbitration of the International Chamber of Commerce. The language of the arbitration

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shall be English. The place of the arbitration shall be Sioux Falls, SD. A single arbitrator selected by the parties shall preside over the proceeding. If a single arbitrator cannot be agreed upon by the parties, each party shall select an arbitrator, and those arbitrators shall confer and agree on the appointed arbitrator to adjudicate the arbitration. The arbitrator shall have the power to grant any provisional or final remedy or relief that it deems appropriate, including conservatory measures and an award of attorneys' fees. The arbitrator shall make its decisions in accordance with applicable law. By agreeing to arbitration, the Parties do not intend to deprive any court of its jurisdiction to issue a pre-arbitral injunction, pre-arbitral attachment, or other order in aid of arbitration proceedings and the enforcement of any award. Without prejudice to such provisional remedies as may be available under the jurisdiction of a court, the arbitrator shall have full authority to grant provisional remedies and to direct the Parties to request that any court modify or vacate any temporary or preliminary relief issued by such court, and to award damages for the failure of any Party to respect the arbitrator's orders to that effect.

6. Availability of Extended Service Agreement

A. For End User's protection, in addition to that afforded by the warranties set forth herein, End User may purchase extended warranty services to cover the Equipment. The Extended Service Agreement, available from Daktronics, provides for electronic parts repair and/or on-site labor for an extended period from the date of expiration of this warranty. Alternatively, an Extended Service Agreement may be purchased in conjunction with this Warranty for extended additional services. For further information, contact Daktronics Customer Service at 1-800-DAKTRONics (1-800-325-8766).

Additional Terms applicable to sales outside of the United States

The following additional terms apply **only** where the installation site of the Equipment is located outside of the United States of America.

1. In the event that the installation site of the Equipment is in a country other than the U.S.A., then, notwithstanding Section 5 of the Warranty, where the selling entity is the entity listed in Column 1, then the governing law of this Warranty is the law of the jurisdiction listed in the corresponding row in Column 2 without regard to its conflict of law principles. Furthermore, if the selling entity is an entity listed in Column 1, then the place of arbitration is listed in the corresponding row in Column 3.

Column 1 (Selling Entity)	Column 2 (Governing Law)	Column 3 (Location of Arbitration)
Daktronics, Inc.	The state of Illinois	Chicago, IL, U.S.A.
Daktronics Canada, Inc.	The Province of Ontario, Canada	Toronto, Ontario, Canada
Daktronics UK Ltd.	England and Wales	Bristol, UK
Daktronics GmbH	The Federal Republic of Germany	Wiesbaden, Germany
Daktronics Hong Kong Limited	Hong Kong, Special Administrative Region of the P.R.C.	Hong Kong SAR
Daktronics Shanghai Co., Ltd.	The Peoples Republic of China	Shanghai, P.R.C.
Daktronics France, SARL	France	Paris, France
Daktronics Japan, Inc.	Japan	Tokyo, Japan
Daktronics International Limited	Macau, Special Administrative Region of the P.R.C.	Macau SAR
Daktronics Australia Pad Ltd	Australia	Sydney, Australia
Daktronics Singapore Pte. Ltd	Singapore	Singapore
Daktronics Brazil LTDA	Brazil	São Paulo, Brazil
Daktronics Spain S.L.U.	Spain	Madrid, Spain
Daktronics Belgium N. V	Belgium	Kruibeke, Belgium
Daktronics Ireland Co. Ltd.	Ireland	Dublin, Ireland

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