

Technical Reference

Consider site-specific conditions, panel configuration, and open area guidelines when determining substructure placement. Refer to **Figure 1**.

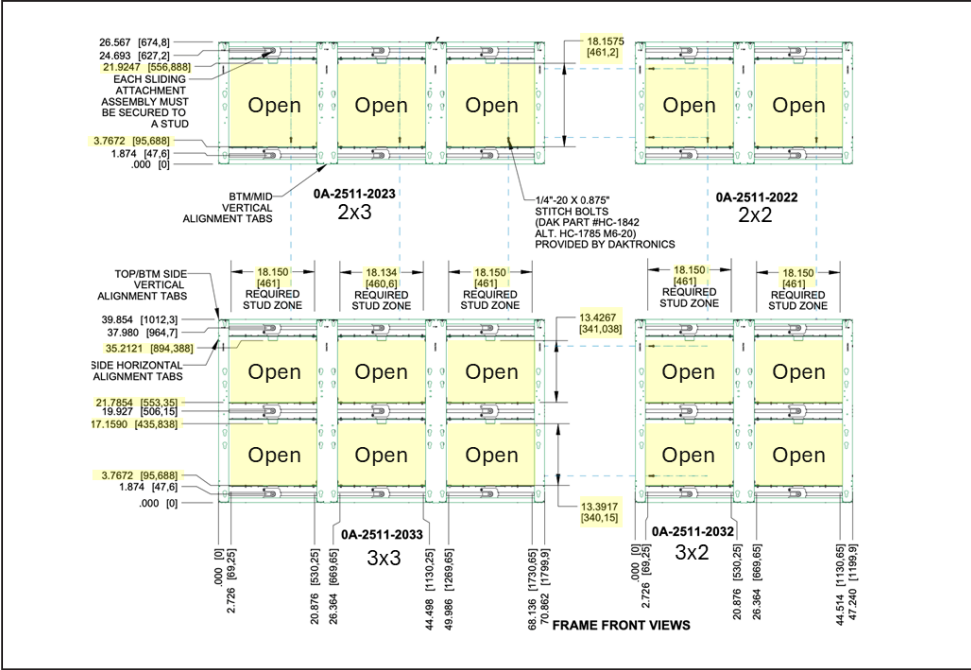


Figure 1: Open Area Guidelines

Custom-Request Plywood Substrate Option

If a custom request was made for plywood wall substrate, then the hollow bolts in the speed frames must be replaced to accommodate the larger 5/16" lag bolts (Daktronics part number HC-5100786) needed for attachment to plywood.

Remove the standard hollow bolts (HC-5098752) and replace with the hollow bolts needed for the plywood fasteners (HC-5098762). Refer to **Figure 2**.

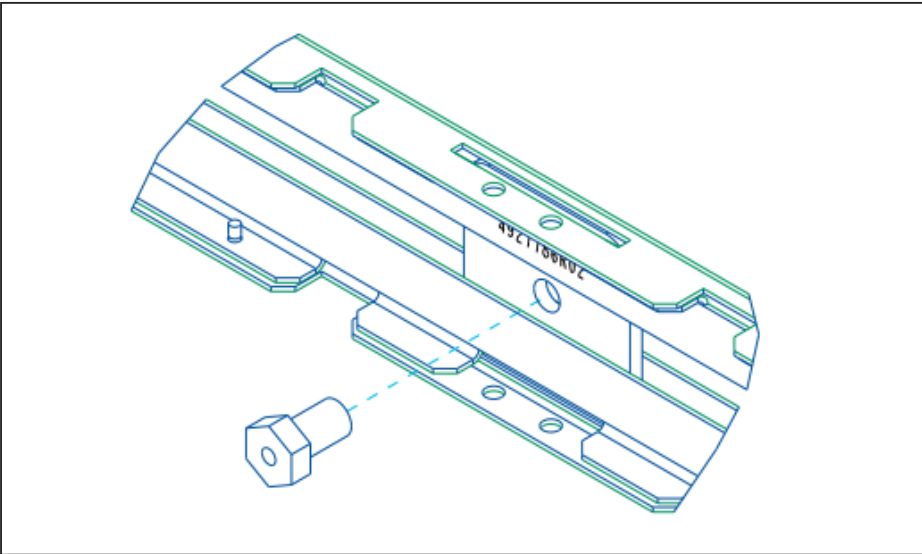


Figure 2: Remove Standard Bolts and Install Custom Bolts

The hollow bolts are differentiated by their through-hole diameters. Refer to **Figure 3**.

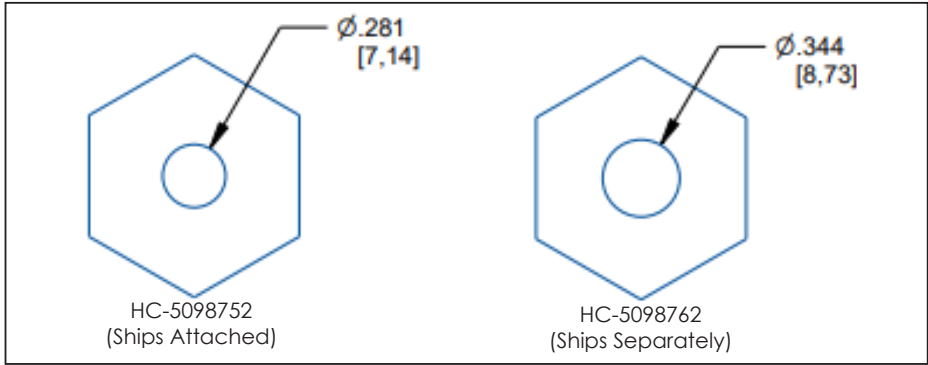


Figure 3: Comparison of Standard and Custom Hollow Bolts

Frame Installation

Install First Frame

Note: These steps are easiest with two or three people.

1. Identify the stud locations on the wall and mark the top, middle, and bottom of the studs. Use a level to draw lines the height of the display and mark the studs.
 2. Identify the position of the bottom-center frame.
 3. Cut the zip ties from the first frame. Test each bolt assembly to verify that it slides freely.
- Note:** If the assembly binds, tap a hammer on the side of the steel plate to break it loose.
4. Mark the location for the perimeter of the frame on the wall. Use this mark to position the first frame. Hold the frame in place on the wall and use a 4' digital level on the top and sides of the frame while positioning it. Refer to **Figure 4**.

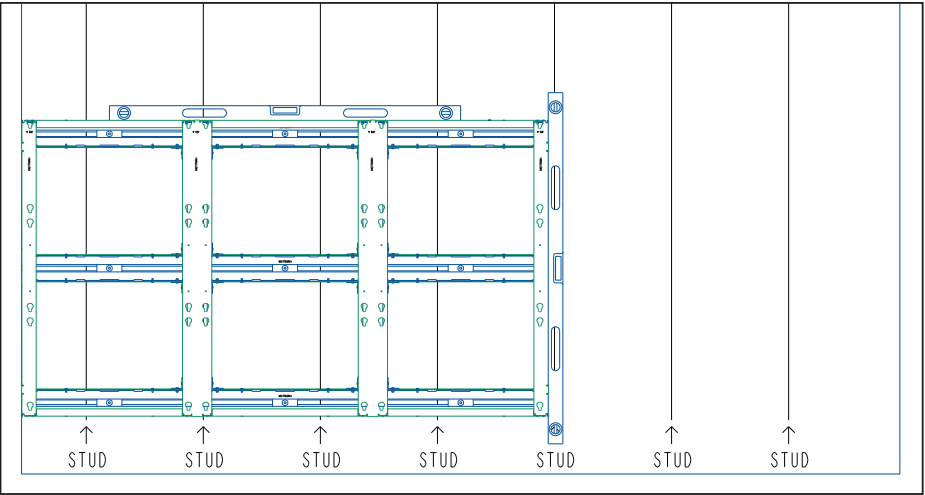


Figure 4: Position Frame on Wall

5. Slide the bolt assemblies to the nearest stud lines.
6. Depending on site-specific conditions, attach the frame to the substrate using TEK screws (HC-3979953), Spax screws, or lag screws. Install the screws through the hollow bolts into the respective studs. Start with the frame corners first, and fill in remaining available screws. Refer to **Figure 5**.

Note: Do not tighten the screws.

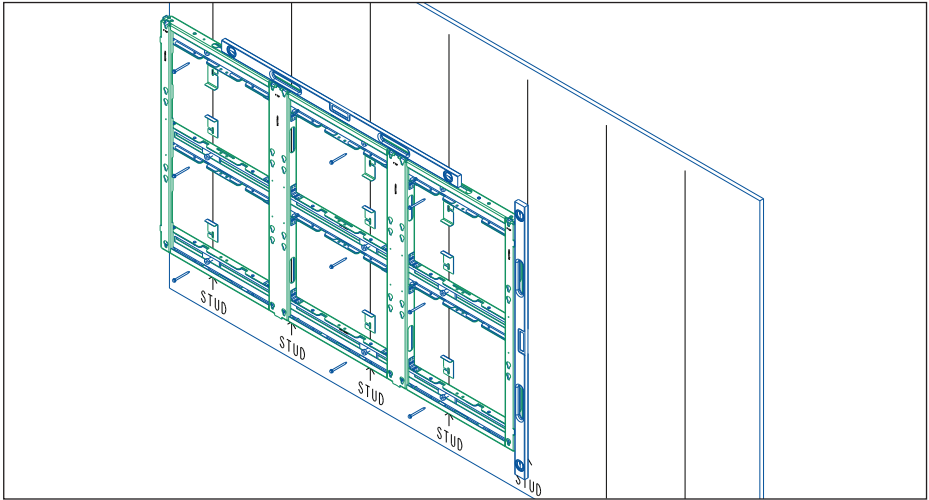


Figure 5: Install TEK Screws in Remaining Bolt Assemblies

7. Install the brace plate (0M-4951150) after starting a screw in the stud.
- Note:** Ensure that the brace plate is positioned on the screw and lands between the wall and the tip of the hollow bolt. The brace plate provides a strong surface to adjust the Z-axis position of the frame. If the brace plate is not placed properly, the tip of the hollow bolt will cut and sink into the wall material.
8. Tighten the screws until the frame is fixed in place.
 9. Use a level on the top and side of the frame and repeat **Steps 6** and **7** for the remaining bolt assemblies.
 10. Place a level on the face of the vertical members in the frame to ensure the frame is plumb and level. Adjust the Z-position of the frame as needed. Refer to **Adjust Frame Z-Position (p.2)**.

Note: Ensure the frame position aligns to the marked location on the wall.

Adjust Frame Z-Position

- 1. Identify the bolt assembly locations to adjust away from the wall. Refer to **Figure 6**.

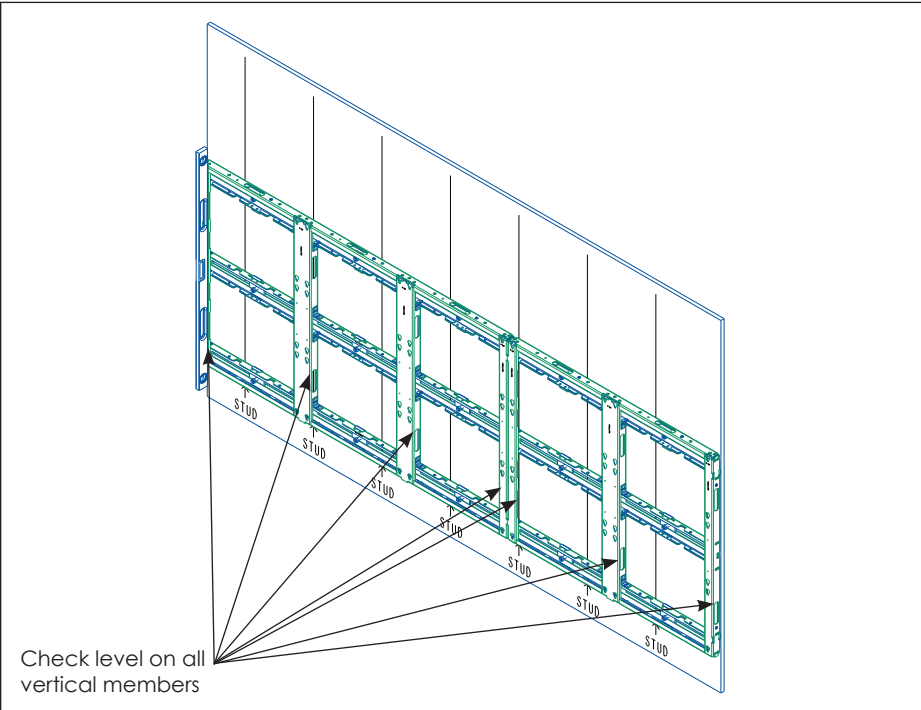


Figure 6: Identify Bolt Assemblies to Z-Adjust

- 2. Adjust one bolt assembly at a time. Refer to **Figure 7**.
 - a. Loosen the TEK screw.
 - b. Tighten the hollow bolt into the threaded plate until the end of the bolt braces against the brace plate. Continue until the face of the frame is level.
 - c. Tighten the TEK screw to lock the Z-position in place.

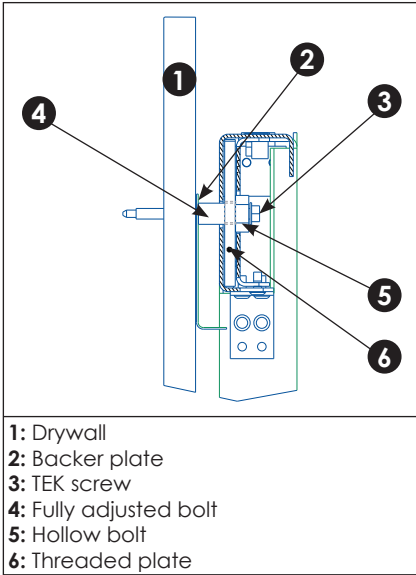


Figure 7: Adjust Z-Position of Bolt Assembly

Note: For the first frame, XY position can be locked by installing seismic clips. Refer to “**Install Seismic Clips**” on page 3. If the first frame is locked in place with a seismic clip, do not install additional seismic clips until the remaining frames are installed and leveled.

Install Next Adjacent Frame in First Row

- 1. Position the adjacent frame in the row next to the installed frame.
- 2. Install the supplied stitch bolts (HC-1842). Refer to **Figure 8**.

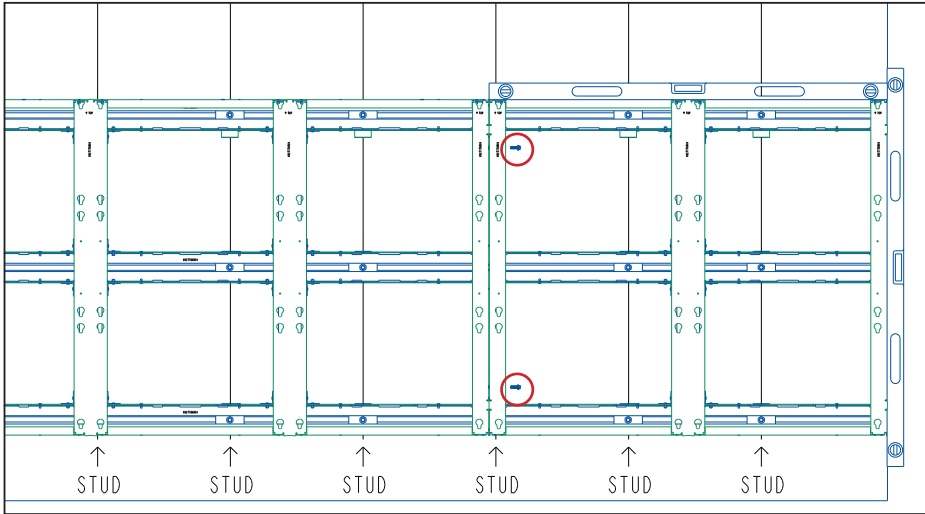


Figure 8: Install Stitch Bolts

- 3. Ensure the alignment tabs are flush and even with each other. Refer to **Figure 9**. Tighten the stitch bolts to lock the tabs into place.

Note: Tighten the bolts to just snug, being sure to not deform the frames.

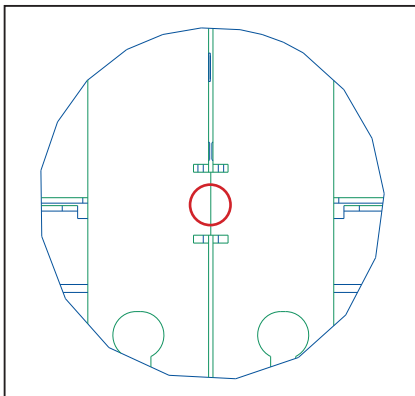


Figure 9: Ensure Alignment Tabs Are Flush & Even

- 4. Cut the zip ties and verify that the bolt assemblies slide freely.
- 5. Slide the bolt assemblies to the nearest stud lines.
- 6. Use a 4' level on top of the frame to level the frame while positioning it.
- 7. Repeat **Steps 5–7 in Install First Frame (p.1)**.
- 8. Repeat **Steps 1–7 in Install Next Adjacent Frame in First Row (p.2)** until the first row is fully installed.
- 9. Use a string line across the installed bottom row and adjust the Z-position of the frames so the frame faces are all aligned to the string. Verify the frame faces are level vertically as they are adjusted for the string line.

Install Remaining Frames

- 1. Position the left frame in the next row on top of the first installed frame. Ensure the alignment tabs are flush and properly aligned. The middle verticals set the X- and Y-axis positions of the frame.
- 2. Install the supplied stitch bolts across the horizontal seam and tighten to lock the frame into place. Refer to **Figure 10**, **Figure 11**, and **Figure 12**.

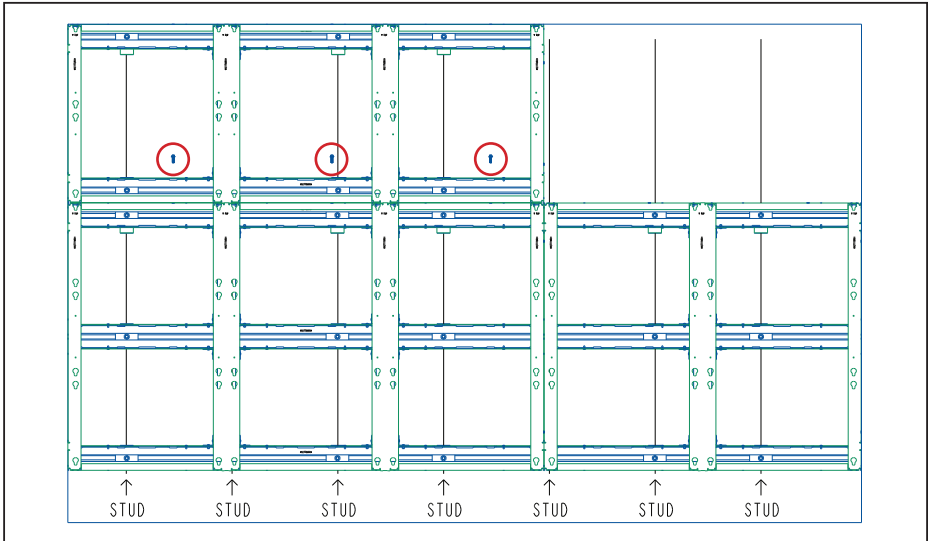


Figure 10: Install Stitch Bolts across Horizontal Seam

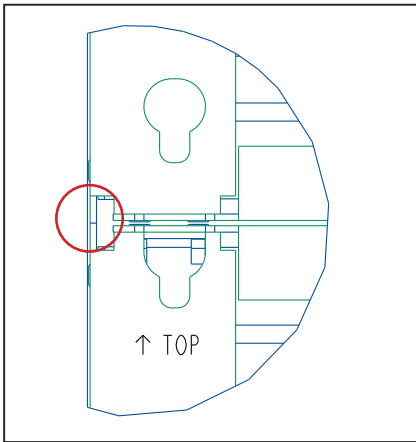


Figure 11: Ensure Alignment Tabs Are Flush & Even

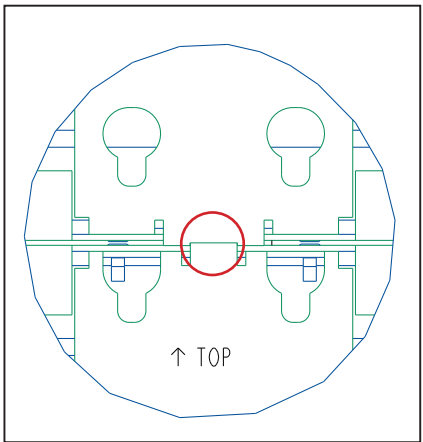


Figure 12: Lock X & Y Position

- 3. Cut the zip ties, allowing the bolt assemblies to slide along the track.
- 4. Slide the bolt assemblies to the nearest stud locations.
- 5. Install TEK screws and brace plates, but do not tighten all the way. Leave the TEK screws approximately 1/4" from tightened down, to allow room for Z-axis adjustment.

6. Install the remaining frames while leaving the frames slightly loose from the wall. Refer to **Figure 13**.

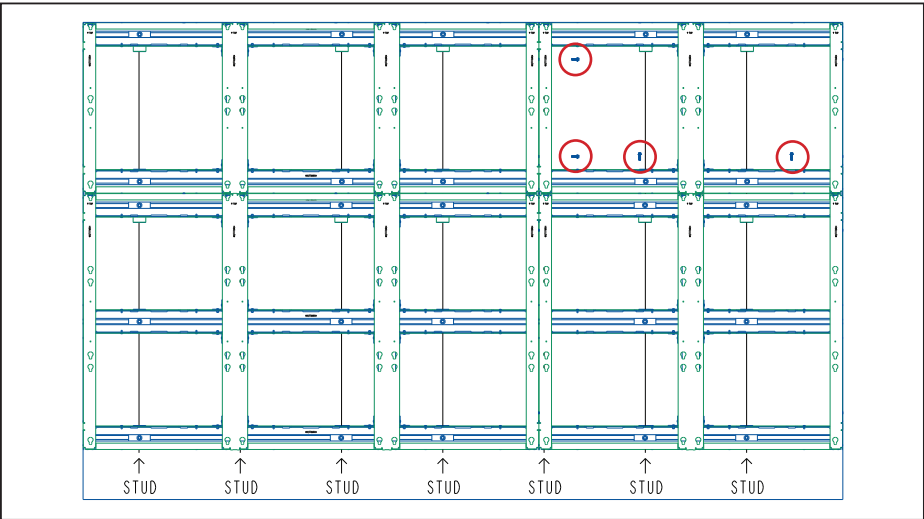


Figure 13: Install Remaining Frames

Plumb/Level Entire Display

1. Identify the wall's high spot. Use a level on the face of the frame column while adjusting the Z-position of the frame column. If a high spot cannot be identified, start with the center-most frame column in the display.
2. Use the frame alignment tabs closest to the display corners and secure a string line in an X pattern. Refer to **Figure 14**.
3. Identify the frame's high points along the string line. Adjust the Z-position toward the wall at the high points if the frames were not previously Z-adjusted. If the high-point frame was previously Z-adjusted, adjust the surrounding frames away from the wall to make the display face level and plumb.
4. Tighten down the TEK screws to lock the frame Z-positions into place.
5. Adjust the frame Z-positions until the faces are aligned to the string and the frame faces are plumb and level to each other.

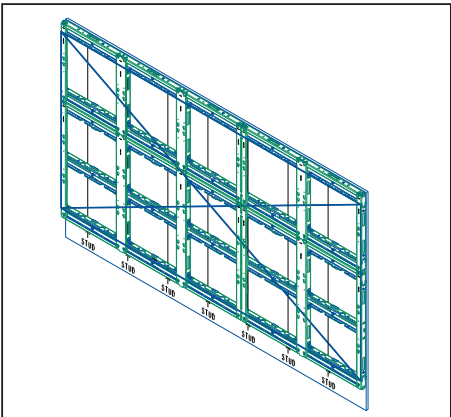


Figure 14: Secure String Line

Install Seismic Clips

1. Place a seismic clip (0M-4983082) up to the secured mounting points in the frame. Refer to **Figure 15**.
- Note:** Ensure that the flange of the clip falls in the track opening and is pressed against the side of the threaded clip.
2. Mark the location of one of the two holes in the clip to match the drill with the screw hole. Remove the clip.
 3. Drill a $\frac{5}{32}$ " diameter hole at the marked location.
 4. Replace the clip and secure with a #10-12 x $\frac{3}{8}$ " sheet metal screw (HC-1186) using the pre-drilled hole. Refer to **Figure 16**.
 5. Repeat clip installation steps for all frame mounting locations in the display.

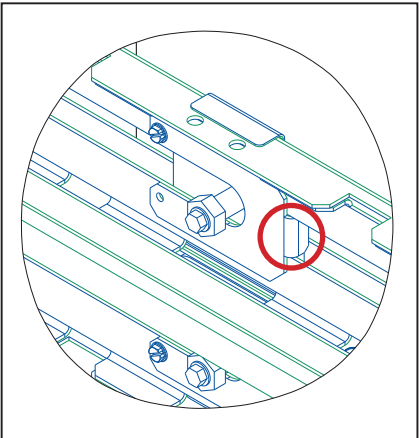


Figure 15: Position Seismic Clip

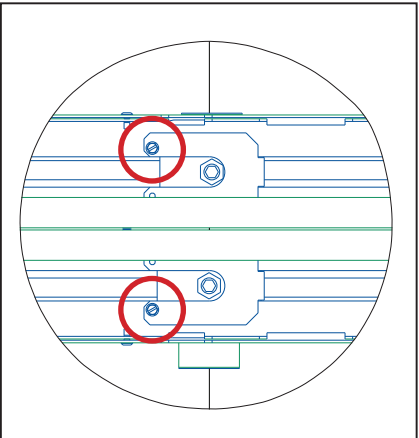


Figure 16: Secure Clip Screws

Panel Installation

Route Power & Signal

1. Identify which panels will require power and/or signal inputs. Refer to the contract-specific Shop and Riser Drawings for details.
2. Use the pass-through holes and notches in the frame to route the power and signal input cables from the input to the required input panel location prior to panel installation.

Note: Incoming power and signal cables external to the display cannot be routed after panels are installed.

Note: When power needs to interconnect across a horizontal seam, remove the rubber cap on the bottom of the affected panels. Do not remove the rubber cap in a panel where power is landing.

Install First Panel

1. Remove the first panel from its packaging and install the hardware.
2. Install four M8 bolts (HC-5402405) through the rear of the panel so the threads are engaged but not tightened all the way. Leave $\sim\frac{1}{4}$ " between the bolt flange and the rear of the panel. Refer to **Figure 17** and **Figure 18**.
3. If installing a panel where power/signal needs to land, route the Cat 6 or Fiber incoming signal cable and/or the male end of the AC power input cable through the rectangular cutout in the panel prior to panel installation.

Note: Depending on the structure and access to the rear of the display, it may be very difficult or impossible to route power cables into the panel after the panel is secured to the speed frame.

- a. Remove the two nuts (circled in yellow in **Figure 19**) securing the appropriate cover on the inside of the cabinet.

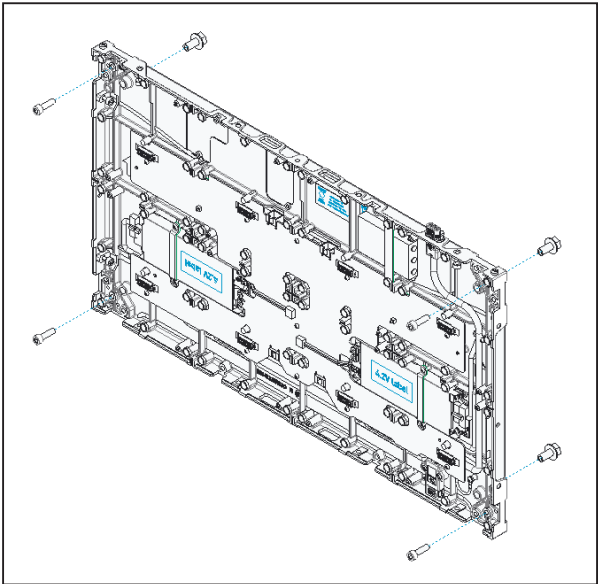


Figure 17: Install Hardware in First Panel

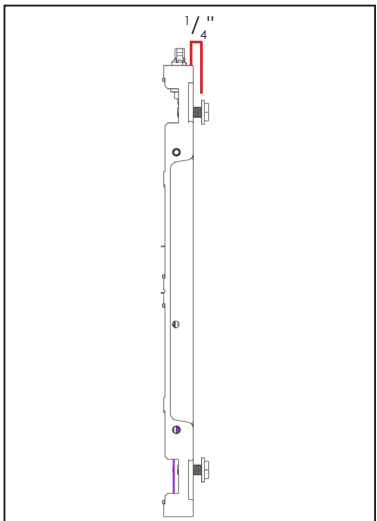


Figure 18: Leave $\frac{1}{4}$ " between Bolt Flange & Panel Rear



Figure 19: Remove Nuts from Cover

- b. Install the power input cable through the rear of the panel and plug in the cable. Refer to **Figure 20**.
- c. Connect power cables between all panels with an interconnect across a horizontal seam, making sure the cable clip fully engages.

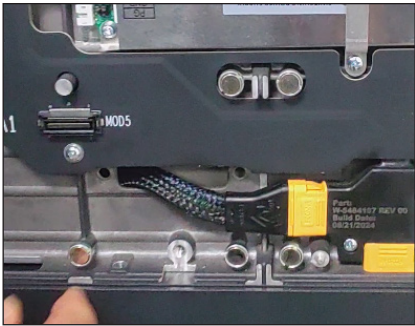


Figure 20: Install Power Input Cable

4. Loosely hang the M8 bolt heads through the keyholes in the frames to place the panel in the bottom center-most display position.
5. Repeat **Steps 1–3** for the remainder of the first row. Refer to **Figure 21**.
6. Push the panels together and verify the far-left and far-right frame alignment tabs are not protruding beyond the display limits. Refer to **Figure 22**. Shift the panels left or right as needed.

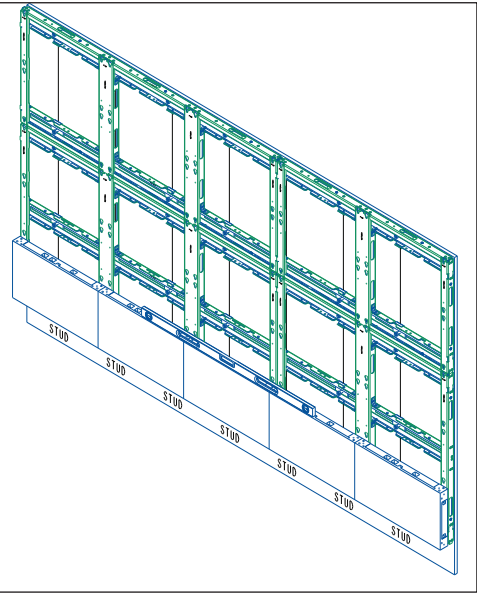


Figure 21: Install Remaining Panels in Bottom Row

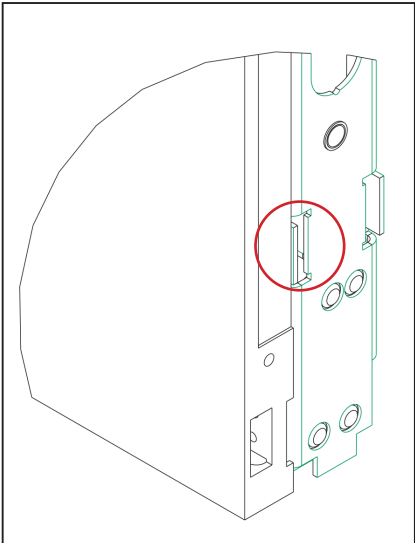


Figure 22: Ensure Alignment Tabs Do Not Protrude Past Display Edge

7. Install the panel side stitch bolts across the bottom row of panels while ensuring the machined tops, bottoms, and faces are all flush to each other. Use a 4 mm key to tighten the stitch bolts. Refer to **Figure 23**.

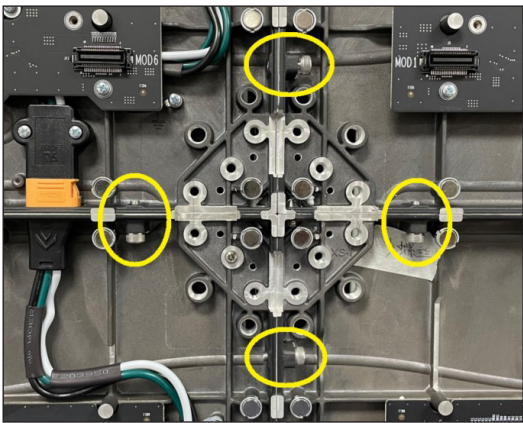


Figure 23: Stitch Bolt Locations

8. Start at the center of the display and use a 4 mm hex key in the end of the M8 bolt to tighten the panel hardware. Level the top of the panel while tightening.
9. Tighten the M8 bolts in the first row of panels until the bolts are snug to the frame.

Note: Turn the M8 bolts counterclockwise to tighten, and clockwise to loosen.

10. Install flattening hardware. Refer to **Figure 24**, **Figure 25**, and **Figure 26**.

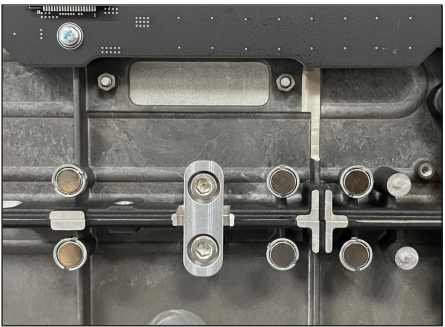


Figure 24: Assembled Panels

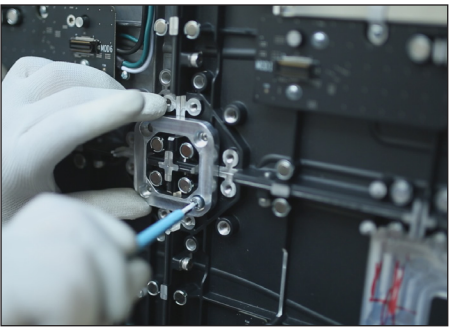
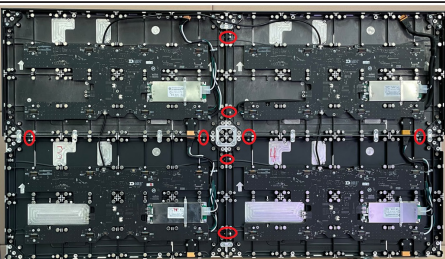
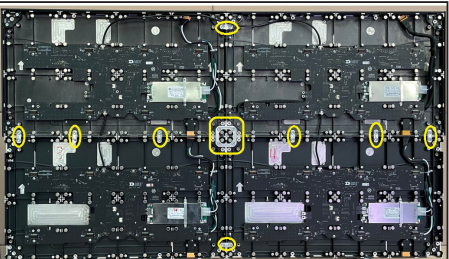


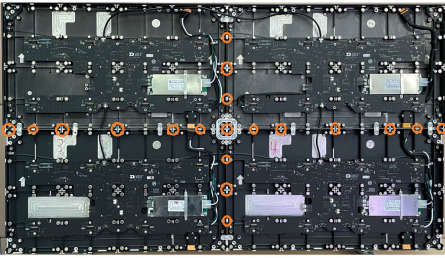
Figure 25: Attach Flattening Plate



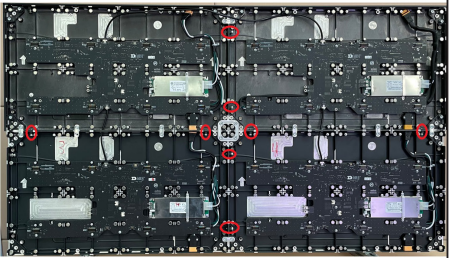
Stitch screws (untightened)



Flattening plate locations



Flatness and Alignment points



Stitch screws (tightened)

Figure 26: Stitch Locations and Flattening Plate Locations

11. Repeat **Steps 1–3** for the remaining panels in the display. Start at the center of the next row up, install the columns, and then fill in from the bottom out from there. Refer to **Figure 27**.

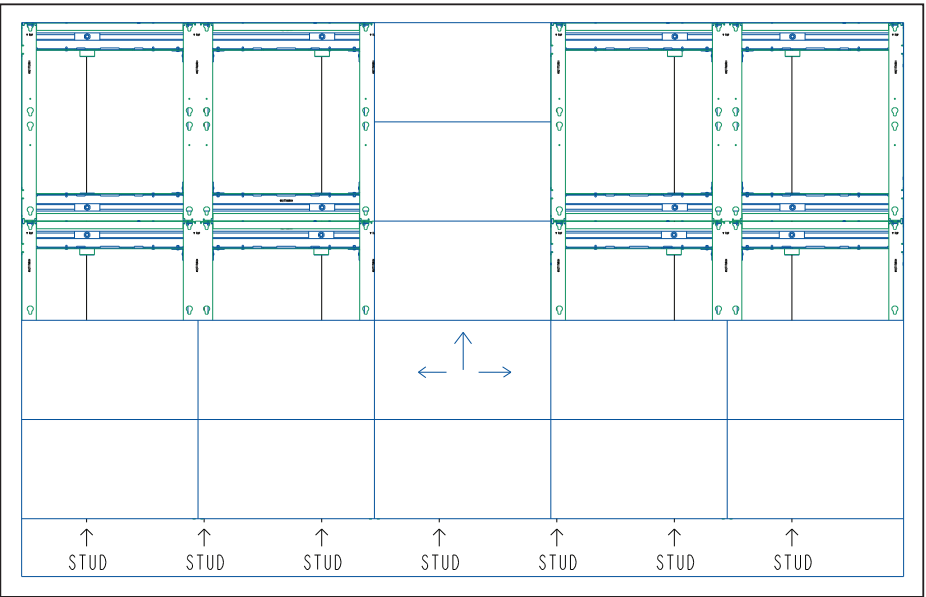


Figure 27: Install Remaining Panels in Display

12. After all of the panels are hanging from the frames, secure panels together and to the frames, starting with the top row of the center column and working outward.
13. Stitch the top row of panels together, ensuring the top and machined surfaces are flush to each other.
14. Tighten the M8 bolts so the panels are snug to the frame.

Note: Turn the M8 bolts counterclockwise to tighten and clockwise to loosen.

15. Continue to stitch panels together with stitch bolts center, down, and out. Tighten the M8 bolts to lock the panels in place. Refer to **Figure 28**.

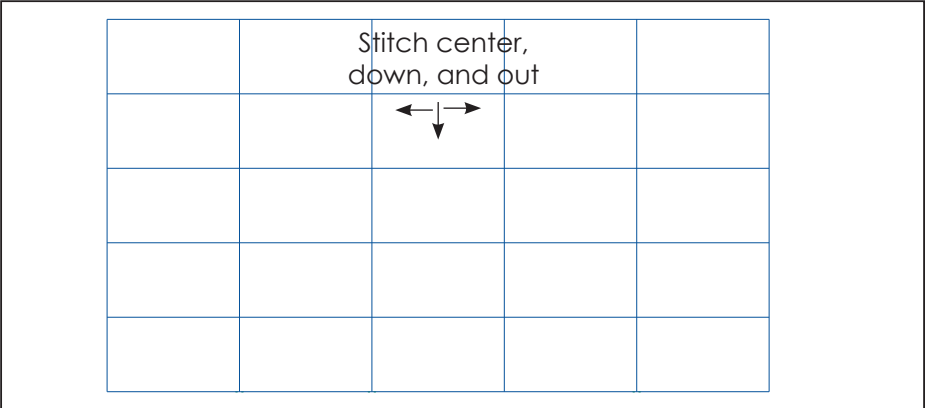


Figure 28: Stitch Panels Together

Adjust Corner Z-Position

Install M5 set screws to adjust the panel corner if a corner needs to be adjusted in the Z-position. Refer to **Figure 29**.

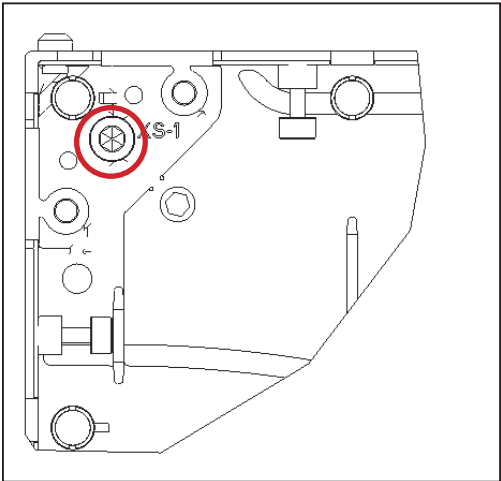


Figure 29: Z-Adjustment Screw Detail

Push Panel Corner from Structure

1. Loosen the M8 bolt in the low panel corner.
2. Tighten the M5 set screw in the low panel corner until the face is flush with the adjacent panel.
3. Tighten the M8 bolt to lock the position into place.

Pull Panel Corner to Structure

1. Loosen the M5 set screw in the high panel corner until the face is flush with the adjacent panel.
2. Tighten the M8 bolt to lock the position into place.

When all panels are installed, go back across the faces of the corners of the panels to ensure the surfaces are flush. Fine-tune the Z-position as needed. Refer to **Figure 30**.

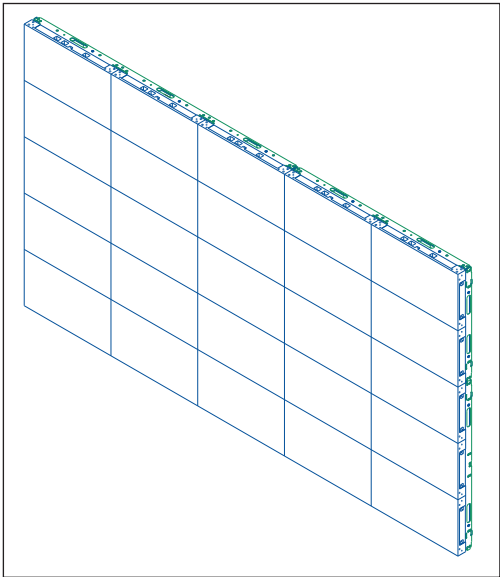


Figure 30: Ensure Panel Corner Faces Are Flush

Electrical Installation

Power & Signal Input

The power input is located on the bottom of each panel. The supplied power cable can be plugged directly into this input as shown in **Figure 31**. Refer to the contract-specific Shop and Riser Drawings for part numbers.

The signal input is located on the bottom of the hub board. Refer to **Figure 32**. Refer to the contract-specific Shop and Riser Drawings for part numbers.

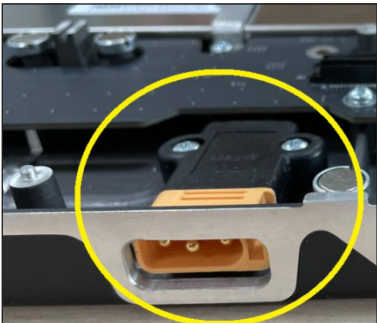


Figure 31: Power Input



Figure 32: Signal Input

Power Connection

The panels are designed for vertical and horizontal power interconnection. Plug the power from the lower panel into the panel above it. Refer to **Figure 33**. Refer to the contract-specific Shop and Riser Drawings for specific routing details. Utilize the table below to determine wire colors:

Service Connections		Wire Colors
AC/L	AC/L1	Brown
AC/N	AC/L2	Blue
GND	GND	Green/Yellow

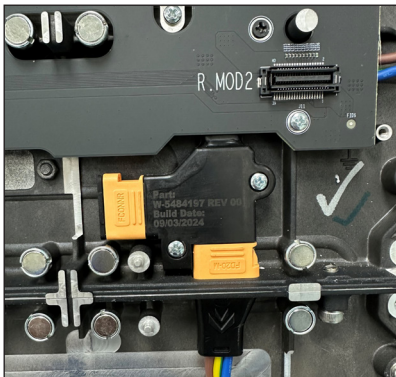


Figure 33: Power Connection

Note: If needed for horizontal power interconnection, the horizontal power jumper cable will ship separately. Install according to the contract-specific Shop and Riser Drawings.

Signal Connection

Signal can be routed horizontally or vertically with the supplied Cat 5e cables. Primary signal is connected to Port L PB and Port R PB. Refer to **Figure 34** and **Figure 35**. Refer to the contract-specific Shop and Riser Drawings for specific routing details.

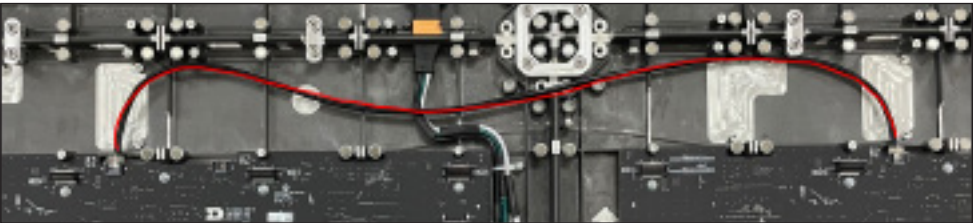


Figure 34: Horizontal Signal Connection

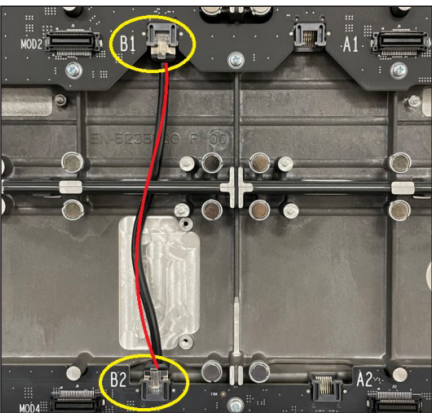


Figure 35: Vertical Signal Connection

Module Installation

1. Always wear gloves while handling modules. Refer to **Figure 36**.

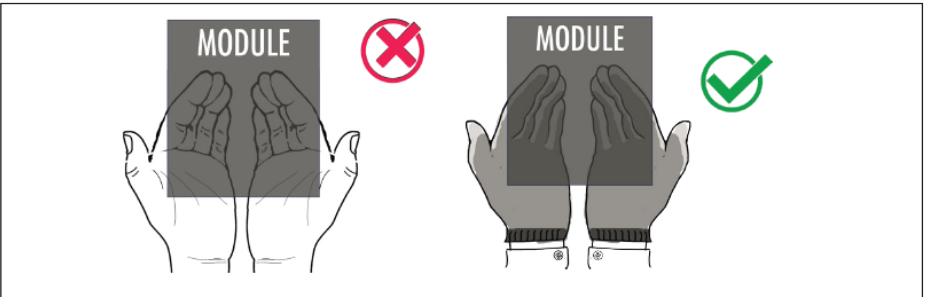


Figure 36: Wear Gloves while Handling Modules

2. Start in the bottom middle of the display and then install left and right. Then move up one row. Refer to **Figure 37**.

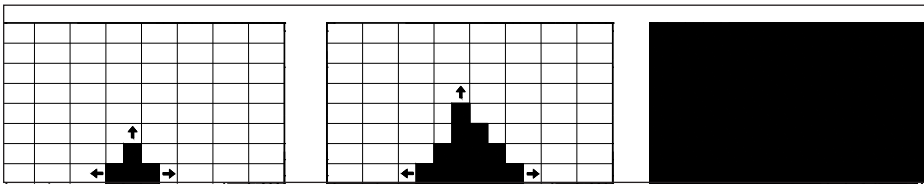


Figure 37: Module Installation Sequence

3. Avoid pushing modules on the tiles edges. Refer to **Figure 38**.

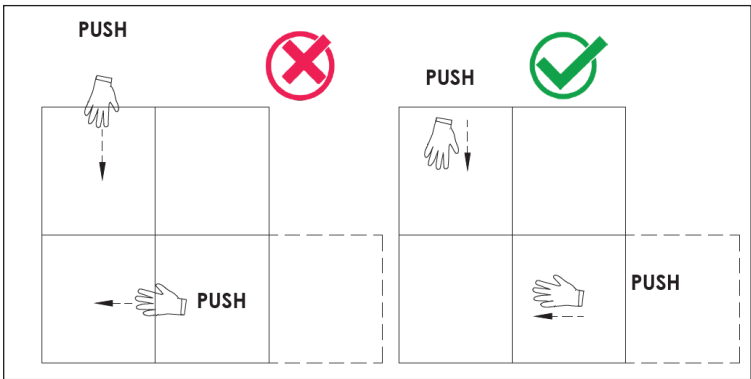


Figure 38: Avoid Pushing on Modules Edges

Note: To install modules with safety lanyard, refer to the **NPN-6600 Series Service Quick Guide (DD5530948)**.

Z-Axis Seam Adjustment

If a module is lower than adjacent modules, remove the module and turn the magnet out for adjustment. Refer to **Figure 39 and Figure 40**. Use a magnetic adjustment tool to loosen the magnet, then turn the magnet by hand.

If a module is higher than adjacent modules, remove the adjacent modules and adjust the appropriate magnets until the modules are flush. This may take several attempts.



Figure 39: Magnetic Adjustment Tool

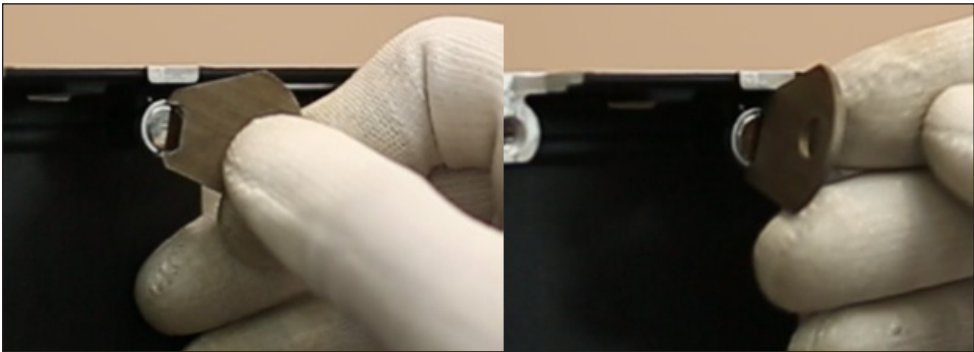


Figure 40: Using Magnetic Adjustment Tool

X/Y-Axis Seam Adjustment

When modules are installed on a display, all modules should be pushed toward the center of the display until all PCBs touch or nearly touch each other. When the display is turned on, there could be many bright seams but no dark seams. If dark seams are present, adjust the seams to be bright. Software will be used later to remove bright seams.

