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Introduction

The instructional studio design presented in this document was created under a scenario that required adaptability for different spaces, flexible content sharing, and a central interface for controlling and recording live online courses. Specifically we were asked to create 35 studios in two months for rooms that ranged from 10x10 to 35x20 with different ceiling height, lighting, and acoustics. These studios would not be permanent installations in the room and might move by the next semester. In addition, ongoing studio support would be provided by the school’s IT group, which meant using equipment that was familiar to their team. Leaning on prior experience delivering live courses from the Applied Physics Laboratory, we partnered with Johns Hopkins Engineering faculty to envision a new approach to live online course delivery.

The instructional studios started with a mobile standing desk, which serves as the command center for instruction. The desk has a room controller, document camera, and an interactive display with adapter for laptop content share. Behind the desk is a whiteboard with whiteboard camera. In front of the desk, we designed an AV cart that includes a shotgun mic pair, LED light panels, two large displays, one off-lens teleprompter, and PTZ camera.

Every aspect of the studio design was focused on reducing external factors introduced with differing spaces, while supporting the delivery of engaging learning experiences. The light panels guarantee consistent lighting regardless of the space. Using two shotgun mics provides professional audio and allows instructors to freely move around, while reducing noise pickup from other directions. Positioning the main camera below the small monitor (off-lens teleprompter) creates the feeling of direct eye contact with the audience, and the two larger displays provide a large view of students and shared content.

The studios put the instructor in control of the meeting using a Zoom Rooms controller—allowing them to easily switch between and share multiple types of content simultaneously: main camera, document camera, laptop content, digital annotations, and whiteboard writing.

Ultimately these studios enable flexible, high quality live direct-to-device content delivery and recording that improves the learning experience for students and in an effort to help support similar initiatives across the JHU system and universities across the nation, our team has assembled this Overview and Assembly Manual. This manual is intended to provide an exhaustive resource so that others may quickly deploy these studios in other settings.

Should you have any questions, please do not hesitate to reach out, as we would be pleased to provide guidance in helping you get your own studios up and running.

Nathan Graham
Director, Center for Digital and Media Initiatives
Studio Overview

1.1 Heckler Design AV Cart + Accessories
1.2 55”/ 50” Monitor (Samsung)
1.3 24” Monitor (HP)
1.4 PTZ Camera (Aver / Logitech)
1.5 Microphone (Shure)
1.6 Speakers (PreSonus)
1.7 LED Lights

1.0 - AV Cart
2.1 Adjustable Standing Desk
2.2 Zoom Rooms Controller (iPad w/ Case)
2.3 Document Camera (IPEVO)
2.4 Touch Display (Huion Kanvas)

3.1 Whiteboard
3.2 Whiteboard Camera (Kaptivo)

2.0 - Desk/ Podium
3.0 - Whiteboard
1.0 - AV Cart

1.1 Heckler Design AV Cart + Accessories
1.2 55”/50” Monitor (Samsung)
1.3 24” Monitor (HP)
1.4 PTZ Camera (Aver / Logitech)
1.5 Microphone (Shure)
1.6 Speaker(s) (PreSonus)
1.7 LED Lights
Component List

<table>
<thead>
<tr>
<th>Component Number</th>
<th>Name</th>
<th>Manufacturer</th>
<th>Model Number</th>
<th>Quantity</th>
<th>Note</th>
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<tbody>
<tr>
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<td>AV Cart (Main Structure)</td>
<td>Heckler Design</td>
<td>H489</td>
<td>1</td>
<td>As specified by JHU - May be substituted with comparable specifications</td>
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<td>Heckler Design</td>
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<td>Heckler Design</td>
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<td>1.1f</td>
<td>Sound Bar Mount</td>
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<td>1.2</td>
<td>55”/50” Monitor</td>
<td>Samsung</td>
<td>UN50RU7100 / UN55RU8000</td>
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<td>24” Monitor</td>
<td>HP</td>
<td>VH240a</td>
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<td>1.4</td>
<td>PTZ Camera</td>
<td>Aver / Logitech</td>
<td>S40 / Rally</td>
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<td>- Logitech Rally to be used in mixed light rooms</td>
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<td>Shure</td>
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<td>Boom Pole</td>
<td>ProAm</td>
<td>BOOM_ADJ</td>
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<td>Custom mounting solution to AV Cart Monitor Arms</td>
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<td>1.6a</td>
<td>Speaker/s</td>
<td>PreSonus</td>
<td>Eris 3.5 (pair)</td>
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<td>*1.6b</td>
<td>2-Input USB Audio Interface</td>
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<td>600XB Bi-Color Led Panel With Dmx, 2-Light Kit w/ Stands</td>
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<td>Zoom Rooms Computer</td>
<td>Dell</td>
<td>Optiplex 7070 Micro</td>
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<td>Logitech</td>
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<td>Human Centric</td>
<td>Dell Optiplex Mount</td>
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* AV Components within 1.1c - Big Compartment (Not pictured at left)
2.0 - Desk/ Podium

2.1 Adjustable Standing Desk
2.2 Zoom Rooms Controller (iPad w/ Case)
2.3 Document Camera (IPEVO)
2.4 Touch Display (Huion Kanvas)
## Component List

<table>
<thead>
<tr>
<th>Component Number</th>
<th>Name</th>
<th>Manufacturer</th>
<th>Model Number</th>
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<td>As specified by JHU - May be substituted with comparable specifications</td>
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<td>Apple</td>
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<td>Redpark</td>
<td>T272 Gigabit Ethernet + Power over Ethernet for Zoom Rooms Console</td>
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<td>n/a</td>
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<td>IPEVO</td>
<td>VZ-X Wireless</td>
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<td>2.4</td>
<td>Touch Display</td>
<td>Huion</td>
<td>Kanvas 20</td>
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<td>mirrors right monitor</td>
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3.0 - Whiteboard

3.1 Whiteboard
3.2 Whiteboard Camera (Kaptivo)
# Component List

<table>
<thead>
<tr>
<th>Component Number</th>
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<th>Model Number</th>
<th>Quantity</th>
<th>Note</th>
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<td>3.1</td>
<td>Whiteboard</td>
<td>Quartet</td>
<td>4x6 Porcelain Whiteboard</td>
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<td>Center at 56” above finished floor (AFF)</td>
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<td>Whiteboard Camers</td>
<td>Kaptivo</td>
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</table>
Wiring Diagram

(1.6b) 2-Input USB Audio Interface

(1.5) Shot Gun - Microphone (long)

(1.7) LED Light Kit

(1.2) 50”/55” UHD Monitor

(1.3) 24” HD Monitor

(1.4) PTZ Camera

(1.6a) Speaker(s)

(1.5) Shot Gun - Microphone (long)

(1.7) LED Light Kit

(1.2) 50”/55” Monitor

(1.8a) Zoom Rooms Computer

(1.8c) - HDMI Capture Card

(1.8d) HDMI Splitter

1.0 - AV Cart
Assembly Guide

The following is a detailed guide for assembling the pop-up studios including the manufacturers’ assembly instructions reordered specific to this installation, as well as, instructions for the custom modifications for these units. The upper level installation steps are as follows:

### 1.0 - AV Cart

1. Assemble (1.1a) AV Cart - Main Structure .............................................. pg 18
2. Add (1.1b) Dual Display Arms to (1.1a) AV Cart .......................... pg 26
3. Attach (1.1e) Big Compartment to (1.1a) AV Cart ................... pg 29
4. Attach (1.1d) Multi-shelf to (1.1a) AV Cart .............................. pg 34
5. Attach (1.1c) Camera Mount to (1.1d) Multi-Shelf ....................... pg 36
6. Attach (1.1f) Sound Bar Mount to (1.1a) AV Cart ................. pg 40
7. Attach (1.7) LED Light Kit - Poles to each end of (1.1b) Dual Display Arms .......................... pg 46
8. Attach (1.5c) Boom Pole to each end of (1.1b) Dual Display Arms ........ pg 47
9. Install (1.5a) and (1.5b) Microphones to (1.5c) Boom Pole ................. pg 48
10. Attach (1.7) LED Light Kit - LED Panels to (1.7) LED Light Kit - Poles ........ pg 49
11. Mount (1.3) 24” Monitor to the top of (1.1e) Big Compartment ................ pg 50
12. Mount (1.2) 50”/ 55” Monitors to (1.1b) Dual Display Arms ........ pg 51
13. Mount (1.4) PTZ Camera to (1.1c) Camera Mount ..................... pg 55
14. Mount (1.6a) Speaker/s to (1.1f) Sound Bar Mount ..................... pg 56
15. Attach (1.8d) Computer Mount to the inside of (1.1e) Big Compartment .......... pg 57
16. Install remaining components inside (1.1e) Big Compartment .......... pg 58
17. Feed all cables through the top corners of (1.1e) Big Compartment .......... pg 58
18. Connect all components with the cables as identified in the Wiring Diagram .......... pg 59

### 2.0 - AV Cart

1. Assemble (2.1) Standing Desk ............................................................... pg 60
2. Assemble (2.2a) Zoom Rooms Console ............................................. pg 63
3. Install (2.2b) iPad into (2.2a) Zoom Rooms Console ..................... pg 66
4. Install (2.2c) Ethernet + PoE for iPad into (2.2a) Zoom Rooms Console .......... pg 68
5. Arrange all remaining components on surface of (2.1) Standing Desk .......... pg 69
6. Connect all components with the cables as identified in the Wiring Diagram .......... pg 70

### 3.0 - Whiteboard

1. Mount (3.1) Whiteboard to the wall ..................................................... pg 71
2. Mount (3.2) Whiteboard Camera to the wall above (3.1 Whiteboard) .......... pg 72
3. Connect all components with the cables as identified in the Wiring Diagram .......... pg 74
Heckler AV

AV CART

for VESA 400 Displays

Assembly & Installation

Watch Assembly Video:

Limited Warranty

Heckler Design warrants your product hardware to be free from defects in material and workmanship throughout the life of the product, and electronic components for a period of one year from the original date of purchase. If you discover a defect in a product covered by this warranty, we will repair at our option using new or refurbished components, or if repair is not possible, replace the item. We reserve the right to request order numbers, receipts, and other supplemental order information as proof of purchase to validate warranty claims.
<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>Vertical Arm &amp; Rear Leg Assembly Screw (2 3/4 inch)</td>
<td>4x</td>
<td>F515</td>
</tr>
<tr>
<td>Multi Shelf Installation Screw</td>
<td>8x</td>
<td>F522</td>
</tr>
<tr>
<td>Zip Tie Anchor Installation Screw</td>
<td>8x</td>
<td>F533</td>
</tr>
<tr>
<td>3/8&quot; Inch Hex Key-AV Cart</td>
<td>1x</td>
<td>F516</td>
</tr>
<tr>
<td>5mm Hex Key-MultiShelf Installation Tool</td>
<td>1x</td>
<td>F523</td>
</tr>
</tbody>
</table>

Keep your special assembly tool in a safe place. To purchase a replacement, please contact service@hecklerdesign.com.
4x M8 Display Mounting Hardware
F521

4x M6 TV Set Screw
F589

4x Zip Tie Mount - Leg
F532

8x Zip Tie Mount - Vertical Arm
F531

8x Zip Tie
F530
VESAs 400 hole pattern display recommended
(VESA Adapter Kit available for VESA 300, 500, 600 displays)

MAX display size: 75 inches
MAX load weight: 250 pounds
Two-Person assembly
Do not overtighten display mounting screws
1  Unpack large parts onto soft surface

2  Assemble legs to base
3 Pop the wheels out of casters

4 Install casters
5 Pop the wheels back

6 Assemble vertical arms to base

Do not fully tighten arm assembly screws until Step 8
8  Tighten the arm assembly screws
Installing Dual Display Kit

Step #2 - Add (1.1b) Dual Display Arms
8x Dual Display Bar Mounting Screw

1x Dual Display Bar Assembly Tool

4x TV Mounting Hardware
1 Install Dual Display bars to vertical arms
**NOTE:** Reverse the big compartment so the AV Equipment is exposed to the back to allow for mounting of (1.3) 24" Monitor to the hole pattern.

Heckler AV
BIG COMPARTMENT
for Heckler AV Cart
H536

4x F522
2x F533
1x F523
6x F530
4x F653
4x F492
2x H536
Install to Heckler AV Cart
**NOTE:** Use the screws to secure the unit with the open side exposed to the back instead of as shown here.

Optional: use screws for increased security

- 4x F522
- 1x F523
Step #4 - Install (1.1d) Multi-Shelf below (1.1e) Big Compartment

Install Multi Shelves

**NOTE:** Mount (1) Multi-Shelf directly to the top of (1.1e) Big Compartment

**NOTE:** Mount (1) Multi-Shelf directly below (1.1e) Big Compartment
Install Multi Shelves

**NOTE:**
Mount (1) Multi-Shelf directly to the top of (1.1e) Big Compartment

**NOTE:**
Mount (1) Multi-Shelf directly below (1.1e) Big Compartment
Heckler CAM MOUNT

Assembly & Installation

Compatible with:
Panacast, Panacast 2, AVer Cam520, AVer Cam530, AVer VC520, AVer All-in-One, Logitech ConferenceCam Connect, Logitech ConferenceCam BCC950, Logitech ConferenceCam CC3000e, Logitech Group ConferenceCam, Logitech PTZ Pro, Logitech Webcam c930a, Logitech HD Pro Webcam C920, Logitech Brio

Limited Warranty
Heckler Design warrants your product to be free from defect in material and workmanship for a period of two years from the original date of purchase. Electronic components are warranted to be free from defect for a period of one year from the original date of purchase. If you discover a defect, please contact service@hecklerdesign.com. Heckler Design will repair, at our discretion, using new or refurbished components. If repair is not possible, Heckler Design will replace the item.
2x Drywall Anchor
F539

2x Drywall Screw
F540

1x Camera Mounting Screw
1/4" - 20, 5/16" Long
F555

1x Camera Mounting Screw
1/4" - 20, 3/8" Long
F556

2x Cart Mounting Screw - M4
F542
1x

Length Adjustment Tool - 5/64" Hex Key
F165

1x

Mounting Tool for Heckler AV Cart
- 3mm Hex Key
F537

1x

Camera Mounting Tool - 3/16" Hex Key
F545

2x

Screw Cap
E123

Phillips Head Screwdriver
Option B - Mount to Heckler AV Cart

1. Select the Camera Mounting Screw that works best with your camera.

2. Loosen, but do not remove.

3. F542
   - 2x

4. F537
   - 2x

F165

E123

F556

F555

F545

F544
Step #6 - Install (1.1f) Sound Bar Mount to (1.1a) AV Cart

H707 - Soundbar Mount

for Heckler AV Cart

Compatible with most soundbar and soundbar-shaped devices with M4, M5, or 1/4-20 mounting points spaced apart from 74 mm to 726 mm.

If you have any questions, please contact Heckler.
service@hecklerdesign.com
844-432-5930
IN THE BOX

A 2 x  Soundbar Mounting Bracket
B 1 x  Hex Key, 5mm
C 4 x  Screw, M6, 10mm
D 4 x  Wingnut, M6

M4 Soundbar-mounting Hardware
E 2 x  Set Screw, M4, 20mm
F 2 x  Wingnut, M4

M5 Soundbar-mounting Hardware
G 2 x  Set Screw, M5, 20mm
H 2 x  Wingnut, M5

1/4"-20 Soundbar-mounting Hardware
I 2 x  Set Screw, 1/4"-20, 3/4"
J 2 x  Wingnut, 1/4-20

For Mounting to H702 Device Panel
K 4 x  Screw, M4, 12mm
L 1 x  Hex Key, 2.5mm
STEP 1
Fasten the appropriate size of set screws to the soundbar and measure the distance between the mounting points.

STEP 2
Determine your ideal soundbar position.

Below the display.
Go to page 4.

Above the display.
Go to page 11.
STEP 3
Mounting below the display

Based on the distance between your soundbar’s mounting points, determine the correct installation of the soundbar-mounting brackets.

<table>
<thead>
<tr>
<th>Option A</th>
<th>74 to 273mm (3 to 10.75 inches)</th>
<th>See Page 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option B</td>
<td>273 to 400mm (10.75 to 15.75 inches)</td>
<td>See Page 6</td>
</tr>
<tr>
<td>Option C</td>
<td>400 to 585mm (15.75 to 23 inches)</td>
<td>See Page 7</td>
</tr>
<tr>
<td>Option D</td>
<td>585 to 726mm (23 to 28.5 inches)</td>
<td>See Page 8</td>
</tr>
</tbody>
</table>

**Option A**
When the distance between your soundbar’s mounting points are spaced 74 to 273mm (3 to 10.75 inches) apart.

![Option A Diagram]
**Option B**
When the distance between your soundbar’s mounting points are spaced 273 to 400mm (10.75 to 15.75 inches) apart.

**Option C**
When the distance between your soundbar’s mounting points are spaced 400 to 585mm (15.75 to 23 inches) apart.
Option D
When the distance between your soundbar’s mounting points are spaced 585 to 726mm (23 to 28.5 inches) apart.
Step #7 - Attach (1.7) LED Light Kit - Poles to (1.1a) AV Cart

1) Drill a hole ~3" from the bottom of the pole and attach to the back of the (1.1b) Dual Monitor Arms with (1) 1-1/2" through bolt and tighten with wing-nut.

2) Attach pole to the back of the (1.1b) Dual Monitor Arms with (1) U-Bolt (#132-1/4” x 1-1/8” x 2-1/4”)
Step #8 - Attach (1.5c) Boom Poles to (1.1a) AV Cart

#1) Drill a hole ~3” from the bottom of the pole and attach to the back of the (1.1b) Dual Monitor Arms with (1) 1-1/2” through bolt and tighten with wing-nut

#2) Attach pole to the back of the (1.1b) Dual Monitor Arms with (1) U-Bolt (#132-1/4” x 1-1/8” x 2-1/4”)
Step #9 - Attach (1.5a+b) Microphones to (1.5c) Boom Poles
Step #10 - Attach (1.7) LED Lights to (1.7) LED Light - Poles
Step #11 - Mount (1.3) 24” Monitor to (1.1e) Big Compartment

Mount the Monitor directly to the back of (1.1d) Multi-Shelf that is mounted to the top of (1.1e) Big Compartment using two (2) #8-32 x 1 3/4” bolts into VESA mounting holes in the back of the monitor.
Step #12 - Mount (1.2) 50”/55” Monitors to (1.1b) Dual Monitor Arms

1. Select correct display-mounting screws

M6 Display Mounting Hardware

1. Transfer rubber spacers from the M8 set screws.

2. Slide rubber spacers on to the M6 set screws.
2 Install display mounting hardware

1.2 - 50”/55” Monitor
3 Mount first display to Dual Display bars

Important Safety Tip: Support first display until both displays are fully installed to avoid tipping and damage to equipment
4 Mount second display to Dual Display bars

Important Safety Tip: Support first display until both displays are fully installed to avoid tipping and damage to equipment.

Adjust TV mounting wingnuts to bring displays even with each other.
Step #13 - Attach (1.4) PTZ Camera to (1.1c) Camera Mount

Select the Camera Mounting Screw that works best with your camera.

Camera should be located just below (1.3) 24” Monitor
Step #14 - Attach (1.6a) Speakers (1.1f) Sound Bar Mount

STEP 1
Fasten the appropriate size of set screws to the soundbar and measure the distance between the mounting points.

STEP 4
Fasten the wingnuts and install the soundbar.
Step #15 - Attach (1.8d) Computer Mount to inside of (1.1e) Big Compartment

Attach Computer Mount to (1.1e) Big Compartment using #8-32 Bolts w/ Nuts

Attach (1.8a) Zoom Rooms Computer to the Computer Mount
Step #16 - Install remaining components into (1.1e) Big Compartment

Step #17 - Feed all cables through top corners of (1.1e) Big Compartment
**Note:** Refer to Wiring Diagram on pg 15

Step #18 - Connect all cables to the components
Step #1 - Assemble (2.1) Standing Desk

RISE UP Assembly Instructions

Parts and Tools list

<table>
<thead>
<tr>
<th>No.</th>
<th>Component Name</th>
<th>Qty</th>
<th>No.</th>
<th>Component Name</th>
<th>Qty</th>
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<td>M4*12</td>
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<td>Cross Bar</td>
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<td>14</td>
<td>ST4.8*19</td>
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</tr>
<tr>
<td>7</td>
<td>M8*10</td>
<td>4</td>
<td>8</td>
<td>Gasket 8</td>
<td>4</td>
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</table>

RISE UP Assembly Instructions

1. M6*16 2PCS

2. M6*16 8PCS
### Parts and Tools List

<table>
<thead>
<tr>
<th>NO.</th>
<th>Qty</th>
<th>Component Name</th>
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<tbody>
<tr>
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<td>Cross Bar</td>
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<tr>
<td>3</td>
<td>30</td>
<td>M4*12 4PCS</td>
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<tr>
<td>8</td>
<td>12</td>
<td>ST4.8*19 12</td>
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</table>

### Assembly Instructions

**RISE UP**

1. **Foot Pad 4PCS**
2. **Upside Down**
3. **M6*16 8PCS**
4. **Gasket 8 4PCS**
5. **M8*10 4PCS**
6. **Gasket 8 4PCS**
Step #2 - Assemble (2.2a) Zoom Rooms Console

Heckler AV®

ZOOM ROOMS CONSOLE

for iPad 10.2-inch 7th Generation

Assembly & Installation

Compatible with
iPad 10.2-inch 7th Generation

2-Year Warranty

Heckler Design warrants your product to be free from defect in material and workmanship for a period of two years from the original date of purchase. Electronic components are warranted to be free from defect for a period of one year from the original date of purchase. If you discover a defect, please contact service@hecklerdesign.com. Heckler Design will repair, at our discretion, using new or refurbished components. If repair is not possible, Heckler Design will replace the item.
<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item</th>
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<tr>
<td>1x</td>
<td>F160</td>
<td>Torx assembly tool</td>
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<tr>
<td>4x</td>
<td>F631</td>
<td>Heckler AV Cart Assembly Screws</td>
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<tr>
<td>1x</td>
<td>F753</td>
<td>Cord anchor</td>
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<tr>
<td>2x</td>
<td>F530</td>
<td>Cable Tie</td>
</tr>
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</table>

Keep your special assembly tool in a safe place. To purchase a replacement, please contact service@hecklerdesign.com.

Phillips Screwdriver
1  Remove back cover and front bezel

2  Route zip ties through holes

Leave space for the cable to pass through
Step #3 - Install (2.2b) iPad

3 Route Apple Lightning cable

4 Install iPad and plug into power
5  Reinstall front bezel

6  Tie down Lightning cable

Make sure to tighten the zip ties on both sides and trim the end
Step #4 - Install Ethernet and PoE for iPad

Install PoE upgrade kit

The pre-installed velcro is for Redpark PoE box, please visit hecklerdesign.com to purchase the component. For PoE upgrade kit instruction guide, please visit: heckler.design/T272

7 Reinstall back cover
Step #5 - Arrange all remaining components on (2.1) Standing Desk

- **2.1** Adjustable Standing Desk
- **2.2** Zoom Rooms Controller (iPad w/ Case)
- **2.3** Document Camera (IPEVO)
- **2.4** Touch Display (Huion Kanvas)
Step #6 - Connect all cables to the components

**Note: Refer to Wiring Diagram on pg 15**
Step #1 - Mount (3.1) Whiteboard to the wall

56" AFF
Step #2 - Mount (3.2) Whiteboard Camera above (3.1) Whiteboard

1. Install the rectangular Kaptivo mounting plate centered above board. Then install the square control pad mounting plate on your preferred side of the board. Use supplied screws. Maximum board size: 6 ft x 4 ft (1.8m x 1.2m).

2. Slide Kaptivo unit onto mounting plate.
**Note:** Refer to Wiring Diagram on pg 15

**Wi-Fi Connection:** Connect Kaptivo data cable and USB power cable to their respective sockets inside the control pad.

**Ethernet Connection:** Connect Kaptivo data cable, USB power cable, and Ethernet cable to their respective sockets inside the control pad. If Ethernet includes power, the USB power cable is not needed.
Step #3 - Connect all cables according to the Wiring Diagram

**Note:** Refer to Wiring Diagram on pg 15

4. Push the control pad onto the mounting plate. Plug in the power adapter to outlet if power is not supplied by Ethernet connection.

5. Complete the setup and activate your account by going to [kaptivo.com/setup](http://kaptivo.com/setup) in any web browser and following the online instructions.